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JOHNSON'S
NEW
UNIVERSAL CYCLOPÆDIA:
A
SCIENTIFIC AND POPULAR
TREASURY
OF
USEFUL KNOWLEDGE.

ILLUSTRATED WITH MAPS, PLANS, AND ENGRAVINGS.

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To the
memory of the late
HORACE GREELEY,

the great philanthropist and public educator—whom only to know was to love—this UNIVERSAL CYCLOPÆDIA, which he planned and assisted in editing in part, is reverently dedicated by his devoted friend and household companion,

THE PUBLISHER.

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PUBLISHER'S ANNOUNCEMENT.

WITH profound gratitude to the American people for the unprecedented favor heretofore extended to him—a favor which has manifested itself in the purchase of more than half a million copies of his previous publications—the Publisher now takes pleasure in laying before the same generous public the entirely new and very elaborate work herewith presented, entitled JOHNSON'S NEW UNIVERSAL CYCLOPÆDIA. In doing this he respectfully solicits the continuance of the liberal patronage which has been thus far bestowed on him, and which he has endeavored to deserve by faithfully laboring to meet the intellectual wants of an enlightened and cultivated people. He does not claim perfection for this work, though it has been prepared without regard to labor or expense. Still, whatever imperfections the critical eye may discover in it, no one who gives it a candid examination can fail to concede that it possesses, in many important particulars, such a superiority over any other encyclopædia yet published as must make it invaluable, if not indispensable, to the scholar, the man of business, and the general reader.

To explain the principles which have governed the preparation of this work belongs properly to the province of the Editors. The Publisher may, nevertheless, be permitted to observe, that in bringing together the vast amount of material here accumulated, recourse has been had to every accessible source of authentic information. The most recent publications, not only in English, but in all the leading languages of the continent of Europe (particularly the German, French, and Italian), have been constantly consulted. And in order to guard against the possibility of being betrayed into error by relying too implicitly on printed authorities, all articles compiled from such sources have been subjected to the scrutiny of accomplished critics in the departments of knowledge to which they severally belong. A very important feature in the plan, moreover, which has been systematically pursued throughout, has been to place all the most important subjects in the hands of living authorities of distinguished eminence, to be originally treated expressly for this work. Each of the articles thus specially prepared is attested by the signature of its author; and, immediately following this Announcement, a list of the many eminent writers who have been already thus engaged is given in full.

The original suggestion of this work is due to the late Hon. HORACE GREELEY, LL.D., for more than ten years the intimate friend of the undersigned, and for the last two years or more of his life a member of his family. It has been dedicated to his memory, therefore, not only in testimony to the warm personal regard which, during this long period, he won to himself by his many kindly traits of character; but also in just recognition of his early participation in the preparation of the work itself, and of the fact that it may, without impropriety, be said to owe to him its existence. As an indefatigable laborer and prolific writer for the daily press (to say nothing of the more permanent monuments of literary industry which he created in the course of a long and "busy life"), dealing constantly with topics of immediate and stirring interest in the political, industrial, and social world, where the whole force of an argument or trustworthiness of a conclusion must depend constantly on the correctness of the assumed premises, Mr. Greeley had long felt the need of a comprehensive book of general reference better adapted to his needs, and to the needs of all active workers like himself, than any then in existence. His experience taught him that the existing encyclopædias, all of which have their merits, fail to meet the wants of the class of busy and practical men to which he belonged, for several reasons. In the first place, they are generally too voluminous: occupying a whole shelf in a library, instead of a corner of a writing-table, they cannot be consulted without disarrangement, loss of time, and serious inconvenience. Secondly, since many of their articles have much the form of treatises, the important facts in them of which the busy man is in need are spread over a large surface, and can only be found by a search involving vexatious delay. And thirdly, in respect to accuracy of statement and freshness of

information, these works are very unequal. Even in the new editions of the most approved encyclopædias—editions professedly rewritten throughout—errors of long standing continue in many instances to be perpetuated, and statistical and scientific statements which belong to a period long passed by are often presented.

The busy man's cyclopædia, according to Mr. Greeley, should be something different in every one of the particulars here specified. It should be, first of all, a *table-book:* that with him was a *sine qua non.* It should, furthermore, be pre-eminently a book of facts, and to a very limited extent, if at all, a volume of discussions or of critical opinions. Finally, it should be severely and uniformly accurate; and should be brought up, in every article, to the actual state of knowledge at the date of publication. With Mr. Greeley, to perceive a mode in which the world might be benefited was to feel an irrepressible desire to secure the benefit. In many earnest conversations, two years or more before the end of his useful life, he urged upon the undersigned himself to undertake the publication of a work of such a character as is here briefly outlined; promising to contribute personally a large share of the literary labor which the preparation of the work would require. The magnitude of the pecuniary responsibility involved in so vast an enterprise prevented an immediate acquiescence in this proposal; and it was only after it had been repeatedly presented that the undersigned finally yielded to these pressing solicitations, and consented to assume the heavy burden. Some of the words used by the zealous originator and early advocate of the scheme, in the conversations above referred to, are still remembered; and now that he has passed away for ever, they may perhaps be read with interest, as illustrating his peculiarities of expression in earnest social intercourse with his daily associates. The decision of the undersigned to comply in this matter with the wishes of his distinguished friend was reached during a drive with Mr. Greeley in the Central Park of New York City in December, 1870; and in the course of that memorable drive, Mr. Greeley said, emphatically, "I want just three books constantly at my elbow when I am writing: *Johnson's Family Atlas of the World, Webster's Dictionary,* and an *Encyclopædia* of not more than four volumes—three would be better; and this book should have every general article abridged as much as possible, or, as they say in Vermont, 'boiled down.'" In another explanation of his views as to the kind of condensation to be given to the work, he said, "I don't care upon whose shoulders Humboldt's cloak may have fallen, or if he had one, even; but I simply want to know when and where he was born, what he did, and when he died. The rest would be good for nothing except to lumber up the book. The lives and labors of men are the best kind of history, and the history that is needed; but lengthy dissertations upon them in a book of reference would be misplaced."

The preparation of the work having been resolved on, and Mr. Greeley having promised it from the beginning the aid of his counsel and his pen, it might naturally have been anticipated that he would cheerfully assume, or perhaps claim as due to him of right, the position of its Editor-in-chief. This, however, would have been impracticable with him, considering the numerous and absorbing duties already pressing upon him; which did not prevent him, however, from allowing his name to be placed as that of an associate on the editorial staff. He gave to the matter probably as much thought as if he had been in the chief direction, but he had not time to attend in person to the practical execution of the working plans. As soon as the proper literary assistance could be secured, repeated consultations took place between the Editors and the Publisher in the private room of Mr. Greeley at the residence of the undersigned in this city; and in these conferences he unfolded his views in so lucid and masterly a manner as strongly to impress all who heard him with admiration of his comprehensive grasp of the subject, and to convince them of his own wonderful fitness to contribute personally to the successful execution of the scheme.

Before the business arrangements for prosecuting the work had been actually completed, it occurred to the undersigned that there might be some advantage in transferring the responsibility of the publication to some other well-known publishing house in this city or elsewhere; reserving only to himself the task of managing the sale. Messrs. Charles Scribner & Co. of New York, and afterwards Messrs. James R. Osgood & Co. of Boston, were applied to, but without success; for while, on other accounts, they were not indisposed to regard the proposition favorably, they hesitated to stake upon a single enterprise so large an amount of capital as seemed likely to be required to carry out this work with the thoroughness contemplated. This caused, however, only a temporary delay. After having put his hand to the plough, the undersigned had at no time the idea of looking back; and when it became evident that, if the work was to be carried through, the entire responsibility must rest upon himself alone, he came to the deliberate conclusion that his shoulders were broad enough to bear it. In point of fact, however, the cost of the publication has proved even more serious than was at first anticipated. The design from the beginning having been to make a good book, no other consideration has been at any time allowed to interfere for a moment with it. The circle of eminent contributors has been constantly extending; and it is believed that no similar work has ever been produced in this country, or elsewhere, in which the literary labor of preparation has been more liberally compensated. At

this very time arrangements are nearly completed by the Editors, by means of which the future volumes of the work will be enriched by a largely increased number of articles from distinguished foreign contributors; and some of these articles have already been received. Judging from the experience of the past, it is a reasonable estimate to say that the complete work will involve an outlay which cannot fall much below $200,000, and may materially exceed that large sum.

The active labor of preparing the work was vigorously set on foot as early as the spring of 1871, under the direction, at first, of two editors only, but with an able and thoroughly competent staff of regular writers, and the promised aid of many eminent special contributors. Mr. Greeley entered upon that part of the task which he had chosen for himself with even more than his wonted enthusiasm; and notwithstanding the multiplicity of his cares and the endless demands upon his time, his proper department never dragged so long as he was able to hold a pen. Even in the midst of the excitements which followed his nomination to the presidency in 1872, and under the oppressive heats of one of the most exhausting seasons ever known, he prepared the elaborate article on the "Confederate States," which will be found in this volume—an article which was probably the last important literary production of his life. In putting this, which proved to be his final contribution to the present work, into the hands of the undersigned, he remarked, with that simplicity which was his most striking characteristic, "I hope it will be acceptable, for I have done my best to tell the truth, and not to offend the people of either the North or the South."

As the work advanced, and its magnitude began to be more fully appreciated by its conductors, the principle of the division of labor which had guided its execution from the beginning was brought more distinctly out, and made more efficacious, by enlarging the editorial corps, and incorporating into it men not only thoroughly competent to direct the several departments of which they assumed the charge, but known to be so by the public. Time also was given to such of these gentlemen as had not been engaged until after some progress had been made in preparing the electrotype plates, to revise thoroughly all of the work which had thus been put into shape, and to propose additions or emendations with the most perfect freedom; and all the suggestions of improvement made by them were unhesitatingly adopted without regard to expense. This has to some degree retarded the appearance of the volume, which it had been originally designed to lay before the public some time in 1873; but the Publisher has the satisfaction of believing that the delay thus occasioned has been vastly more than compensated, in having secured for the work the careful scrutiny and approval of the body of able and distinguished men whose names appear on the title-page as Editors and Associate Editors. It is not without a feeling of natural pride that the Publisher calls public attention to the galaxy of talent there exhibited; each departmental editor having been engaged in consequence of the honorable eminence already achieved by him in some one of the many paths of letters or science. No name has been included in the list merely to give an adventitious lustre to the book. All are the names of active workers, and they are placed there to give the public a secure guaranty of the trustworthiness of the varied information which these volumes embrace.

There remains, in conclusion, one pleasant duty to discharge, that of making public and honorable mention of the efficient services rendered by those whose superior practical skill has clothed the work of the literary laborers in its visible garb; among whom should be named Mr. L. F. Thomas of Philadelphia, Pa., who read the proofs; Messrs. Westcott & Thomson of the same city, who set up the type and made the plates; Messrs. Redman & Kenny of New York, who prepared nearly all the graphic illustrations; Mr. C. X. Craig, who engraved the maps; and Messrs. T. W. Baker and F. S. Jones, who in a variety of ways have lent most valuable aid in furthering this colossal undertaking.

The first volume of the work is now before the public, who will be able to judge for themselves how nearly it approaches to that ideal of excellence which should be the object of all human effort, but which no human effort can be expected ever completely to attain. One merit it may nevertheless claim, which is not likely to be disputed—that, having been prepared under the supervision of an editorial corps in which every section of the country and every leading religious denomination is represented, no shadow of political prejudice, or taint of sectional jealousy, or trace of sectarian bitterness, will be found to disfigure its pages.

With these preliminary observations, which the occasion seemed to require, the undersigned has now only to make his best obeisance to the public and retire behind the scene; confident that the verdict which will presently be pronounced upon the fruit of so much care and labor and outlay as have been lavished on this work, will be as favorable as it is certain to be just, and as it must be final.

Faithfully,

A. J. JOHNSON,

PUBLISHER OF ATLASES, MAPS, AND BOOKS.

11 GREAT JONES STREET, NEW YORK
(near Broadway),
June, 1874.

PREFACE.

When a new book of general reference is presented for the first time to the public, it becomes its originators to state the reasons which have induced them to undertake the labor of its preparation, and to explain the principles which have guided them in the performance of their task. There are many encyclopædias already in existence, from the merits of which the present Editors are by no means disposed to detract. They, like most men whose lives are given to study, have made much use of works of this description, and have learned by experience to appreciate their value. But the same experience has taught them that there are certain particulars in which all the works of this class with which they are acquainted are more or less unsatisfactory.

In explanation of what is here meant, it must be premised that no cyclopædia, however it may be named, can be, in the strictest sense, universal, and that therefore every such work must sometimes fail to respond to the demands of the inquirer. The misfortune is, that the particulars as to which these works are thus occasionally disappointing are too often precisely those on which information is most frequently needed in the ordinary affairs of life. In statistics, for example, they deal much in aggregates and little in details. In geography they are full upon countries, and provinces, and capitals, and populous cities; but whatever lies beyond this they leave to the gazetteers. And while, as to the men whose names have come down to us from other times, the information they furnish leaves little to desire, in regard to those who have made themselves conspicuous among the living generation, they are either silent, or their notices are imperfect and few.

But, in the second place, the information which these works contain is often scattered through too large a space: facts of detail, of which the need is immediate and pressing, are so submerged beneath the multitude of words that the hurried inquirer finds his time and his patience alike too limited to permit him to study them out. The works of this class which have cost their editors the largest labor and their publishers the largest outlay —such, for instance, as the "Encyclopædia Metropolitana" and the "Encyclopædia Britannica"—have, as a necessary consequence of their ambitious design, and in virtue of the very pains expended in carrying this faithfully out, sacrificed to a great degree their every-day usefulness. For quiet perusal, with abundance of leisure, they are invaluable; but they are libraries rather than books of reference. They are in no proper sense dictionaries, but groups of systematic treatises loosely linked together; and though their general titles are arranged in alphabetic order, they can only be conveniently consulted for the purposes of occasional reference by the aid of an independent index.

But, thirdly, these elaborate and costly works have not only the character of a library, they have almost the bulk of a library. They fill many volumes, and occupy so large an amount of space as to unfit them altogether for table use. A condition indispensable to the usefulness of a book of reference is, nevertheless, that it shall be always near the inquirer's hand—on the table of the student, on the desk of the merchant, on the bench of the artisan;—a condition which deprives every voluminous cyclopædia, however great in other respects may be its merits, of its principal practical value for the every-day uses of practical men.

Another fault of most works of this class is, that the information they give cannot always be trusted. In this respect they are very unequal. An article, for example, in

the "Encyclopædia Britannica," which bears the signature of Thomas Young, or Henry Brougham, or Sir John Herschel, will of course command universal confidence; but besides such as these, there are in the same work many articles of unknown authorship, derived probably, in most instances, from previous similar publications, and originally affected by unsuspected errors which they continue to perpetuate.

Finally, it is too often the case that books of general reference are behind the actual state of knowledge at the date of their publication. In the progress of the sciences, in the growth and decline of industries, in the incessant social and political mutations which time brings with it, any occasional résumé of the aspects of human affairs must largely lose in value in proportion as the point of time for which it is true recedes into the past. Every inquirer, therefore, who has sought from books of reference information as to matters of living interest, must have been often disappointed to find that, while they tell him so very much, they fail to tell him precisely what he wants to know.

Entering thus upon their task with a lively recollection of the particulars in which they have found the books of general reference at their command to fail them at their need, the Editors of this one have faithfully labored, not wholly they trust without success, to avoid the faults here signalized. To this end, considering in the outset that no work, however comprehensive its scope, can be absolutely exhaustive of all human knowledge, they have aimed to give the largest space to matters concerning which the need of exact information is most generally and most frequently felt; keeping in view, at the same time, the wants of the student in his closet, and those of the practical man in the daily affairs of life.

They have, secondly, treated all large subjects *analytically*, exhibiting each elementary topic under its own head in alphabetic order. Titles are thus multiplied and separate articles abridged. The work becomes its own index, and is made to combine the character of a dictionary with that of a cyclopædia. Upon topics of principal importance or of immediate and living interest, nevertheless, it has not been considered incompatible with this plan to introduce systematic essays; but these when admitted are practically indexed, by including their subordinate titles in the alphabetic arrangement, with cross-references to the principal articles. The accuracy of the information conveyed in these more elaborate essays is in all cases attested by the signatures of their writers, who will be recognized in general as the highest authorities on the subjects thus treated. In the list of these valued contributors, elsewhere given, will be noticed the names of very many gentlemen of distinguished eminence in letters and science in the United States and in Europe; and negotiations recently completed, or now in progress, with foreign writers no less eminent, will largely extend this list for the future volumes.

In the articles of the class by far most numerous, however, the principle has been adhered to of compressing the largest number of facts or truths into the smallest possible compass. These articles are therefore very brief, but pithy in proportion to their brevity. Comments, discussions, speculations—even, as a rule, criticisms upon the *chefs d'œuvre* of art or letters—have been avoided. These have no fit place in a book of reference, of which the proper object is to give facts of positive knowledge, and not the opinions of men about such facts. This was the principle laid down by the eminent man with whom, as the Publisher has elsewhere stated in a narrative of deep interest, the project of this work originated. "Give me the facts—I will find you the words," seems always to have been the unuttered motto of Horace Greeley. And the only book of reference which Mr. Greeley required was a book of facts. The character of the present work will be found to have been largely controlled by this fundamental principle of its projector. Had he lived to rejoice with us in its publication, it might have been more largely so; but the present editors have remembered that to most men facts are sometimes made more useful, and principles more intelligible, by concise illustrations of their significancy.

Still, the condensation given to the articles in general has made it possible to introduce an amount of information in detail, principally geographical, biographical, and statistical, quite beyond what will be found in any other cyclopædia.

1. As to Geography. So far as the United States are concerned, this work is a complete gazetteer. Every township in every State or Territory will be found recorded in its proper place, with its population according to the census of 1870; and every town of more than

one thousand inhabitants has been written up expressly for this work by a competent authority resident on the spot, wherever such could be found. The larger towns, and the States themselves, have been made the subjects of elaborate articles by accomplished experts, whose names, attached to the articles, will be a sufficient guaranty of the fidelity with which they have been prepared.

Nor has foreign geography been a subject of less careful or less conscientious attention, although it has not been followed into so minute detail as that of our own country. Compact notices are given of all towns numbering more than five thousand inhabitants; in which are exhibited all the important statistical facts relating to them, whether industrial, educational, social, religious, or in any manner otherwise interesting. Every important country has been treated, by specially competent writers, in a variety of aspects, including its physical geography; its political divisions; its growth or decline in population; its geology, natural history, and mineral resources; its agriculture and manufactures, and their characteristic products; its commerce and commercial marine; its inland navigation and railway communications; its political institutions; its systems of civil and criminal jurisprudence; its postal and telegraphic service; its provision for the maintenance of religion, the support of education, the cultivation of art, and the encouragement of science; its methods of organized benevolence; its literature, ephemeral and permanent; its military and naval strength; and finally, in brief outline sketch, the history of its past, as a key to its actual condition. Provinces and large towns have been treated in accordance with the same plan, in so far as it is applicable to them; and, for the volumes which are to follow, arrangements recently concluded will secure a more effectual execution of the plan than is shown even in the thorough and carefully studied articles contained in the present. Hereafter, foreign countries and their principal towns will be described by eminent foreign writers, members of the geographical and statistical societies of European capitals, or gentlemen of distinguished reputation whose studies have been specially devoted to these subjects. Some of the articles prepared under these arrangements for the ensuing volume have already been received.

2. As to Biography. In this department, the present work may fairly claim a certain merit, not only for what it has added of matter wholly new, but also for what it has omitted. Many names handed down from the distant past, which have long encumbered the dictionaries of biography without sensibly enhancing their value, will be looked for in the present publication in vain. They are names of men who were no doubt useful in their day, but who have been long since nearly swallowed up in that practical oblivion which awaits the great majority of mankind, however prominent among the men of their own generation. The space thus gained has been more usefully filled, by introducing in large number the biographies of living men, whose names are constantly encountered in journals or heard on people's lips, but of whom little is generally known beyond those facts of their history which have secured for them honorable distinction, or simple notoriety. The materials for these biographical notices have been gathered by writers perfectly well acquainted with their subjects; and the statements they embrace may be accepted as entirely authentic. It may probably be remarked that some of the names here given are not those of men entitled to permanent pedestals in a national Walhalla. To this entirely just observation the reply may be, that the object of these volumes is not to dispense laurels, nor to distinguish, among the candidates for immortality, those who are most deserving. Their single object is to furnish to the people such information as the people need—information, moreover, of a kind which the people have heretofore had no ready means of obtaining. But though among the names which appear in these volumes for the first time there are doubtless some which may have for the world, and even for the American portion of it, only a temporary interest, and which will therefore, sooner or later, drop from the places here assigned them, there are none, it is believed, concerning which the men of the present generation are not likely more or less frequently to desire information. They are names of men who have been, or who are now, conspicuous in public affairs, or prominent as religious teachers and leaders, or influential as writers or journalists, or distinguished as members of the Bar or Bench, or widely known as philanthropists, scholars, educators, engineers, naturalists, physicists, chemists, or devotees of abstract or applied science. It is of course not to be expected that a first

journals devoted to these sciences, the reports and public documents published under the authority of governments, relating to population, commerce, agriculture, manufactures, coinage, currency, etc., and in general all publications entitled to be regarded as authentic sources of information as to important matters of fact. All the articles prepared by the writers in the office have passed under the critical scrutiny of three or four, at least, of the editorial staff, before being finally given to the press. With these ample provisions to secure accuracy and to guard against errors of ignorance or inadvertency, it is to be hoped that the faults of this work will consist rather in its unavoidable omissions than in any seriously mistaken statements.

As additional evidence of the thoroughness with which the work of this Cyclopædia has been, at least in intention, conducted, it may be further remarked, that the number of specially qualified writers engaged in it is unprecedentedly great. No argument is necessary to secure assent to the proposition, that an article upon any important subject prepared by one who, through the study and investigation of a lifetime, has made the subject his own, must be at once more clear in its method and more instructive in its details, than any that can be compiled by an ordinary writer, even with the best printed authorities before him. The rule has been, therefore, to place such subjects in such hands; and this has been followed out so persistently that, in not a few instances, after articles in themselves quite unexceptionable had been already prepared by the office-writers, and had even been set up in type, they have been subsequently cancelled and set aside in favor of new articles by living authorities upon the same subjects, whose co-operation had been later secured. In regard to changes of this nature, in many instances involving delay and no slight expense, the Editors feel bound to acknowledge—and they do here publicly acknowledge—the unfailing cheerfulness with which the Publisher has received all their suggestions, and the prompt liberality with which he has carried them into effect.

After saying so much of the pains taken with the literary labor of the Cyclopædia, it may seem like descending to matters comparatively trivial to speak of the work as a pronouncing dictionary. This, however, is a feature in it which will strongly recommend it to most readers; for nothing is more embarrassing, either in public speaking or in ordinary conversation, than the uncertainty which is often felt as to the proper mode of accenting an unfamiliar word. In this book the place of the accent is marked in the title of every article, and thus the essential guide is given to its just pronunciation.

One important observation remains to be made in conclusion. No cyclopædia, however correctly it may represent the state of the world's knowledge or of its material condition at the date of its publication, can continue to do so for a long period of years. Works of this kind, nevertheless, have often been reprinted from the same plates unaltered, for a quarter of a century or more; long before the end of which period, in regard to all matters to which time brings change, they cease to be authorities altogether. With the present work it is proposed to pursue a different plan. Editions will be printed from month to month, as the demand may require; but no edition will be published without such corrections in the plates as the progress of time may render necessary. The book will therefore always, so far as vigilance can accomplish that result, be kept up in its record of facts to the date of its delivery to purchasers; and its latest issues will stand on a level, in point of authority, with its earliest. It follows that whatever errors may be found to have escaped notice in the present issue, will be corrected as soon as discovered; and the Editors will feel themselves under obligations to any who will call their attention to such as they may chance to observe.

By means of this system of continual emendation, by supplying omissions, by adding immediately on their announcement new facts which the progress of discovery may bring to light, and by entirely rewriting, from time to time, such articles as are capable of being improved by reconstruction, the Editors trust that the work may not only preserve its original value, but that it may even, with lapse of time, grow more and more useful to the public for whose benefit it has been designed, and to whose judgment it is now submitted.

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NEW YORK, June, 1874.

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⁂ The following statement shows the subjects to which the different members of the editorial staff have severally given their more particular attention, not only in themselves preparing articles relating to those subjects, but also in securing contributions from others, and in carefully scrutinizing all such contributions with a view both to ensure accuracy and to exclude anything which might seem objectionable.

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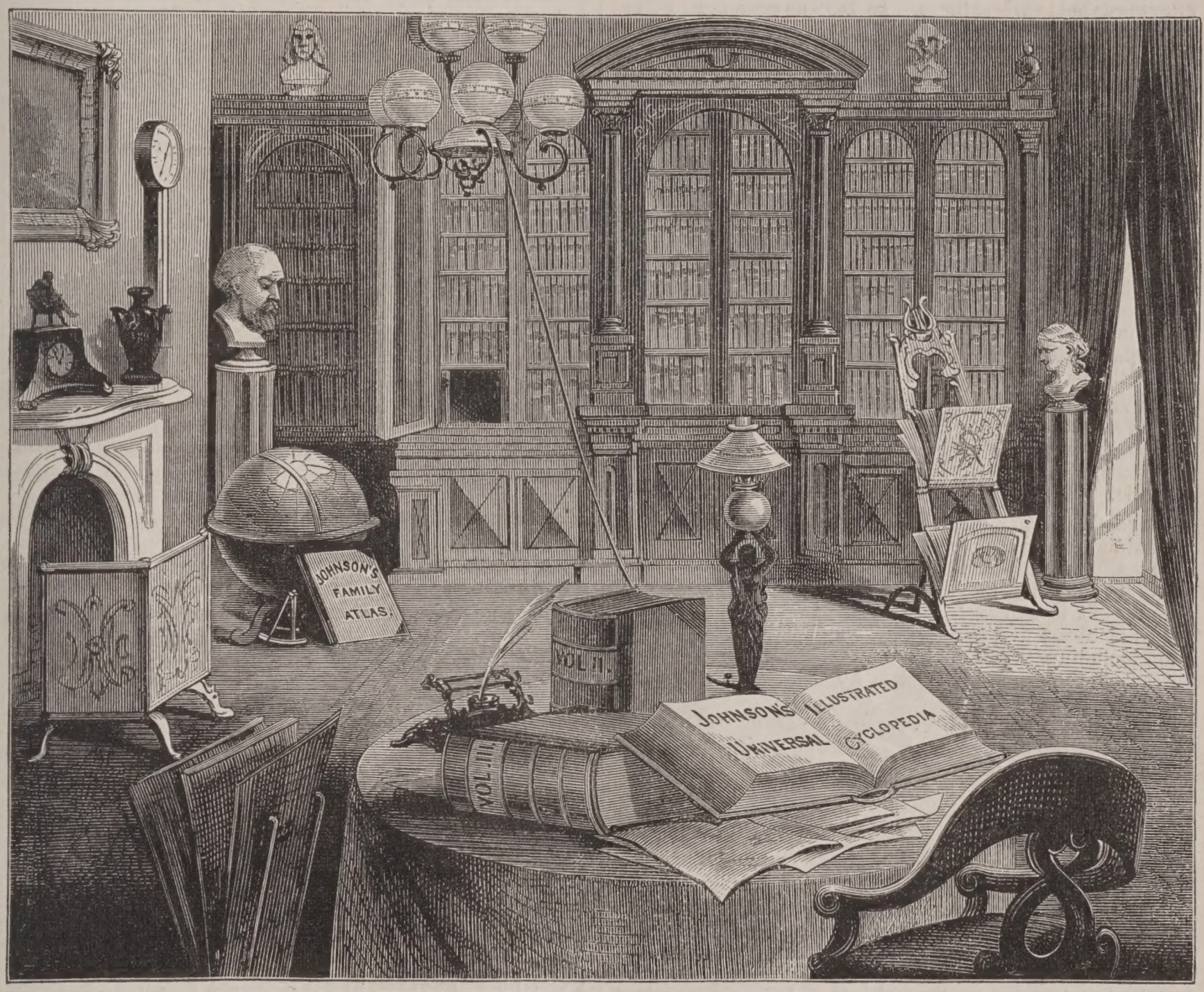


A.

A, the first letter of all known phonetic alphabets, except the Abyssinian (or Ethiopian), in which it forms the thirteenth, and the Runic, in which it is the tenth. The cause of its being placed at the head of all the principal European and Asiatic alphabets is not certainly known, but is probably to be found in the fact that the original sound of the letter (similar to that of our *a* in *far*) is the most easily formed of all the vowels, requiring for its utterance scarcely any effort, and the slightest possible change in the position of the vocal organs, except simply opening the mouth; it is accordingly the first sound that children usually utter.

A with a stroke above it (*á*), in the ancient Greek, denoted the first numeral, but ϗ with the stroke beneath stood for 1000.

A in Latin stands for 500, and with a stroke over ($\overline{A}$) for ten times that number (or 5000).

A is also used to mark a note in MUSIC (which see).

A is frequently used as an abbreviation. (See ABBREVIATIONS.)

In logic, *A* is the sign employed to denote a universal affirmative proposition.

A^1 (or "A No. 1") is often applied in mercantile affairs to denote any article of the very highest class. In registering vessels, *A* designates the character of the hull of the vessel, while the figure 1 marks the efficient state of her anchors, cables, stores, etc.

Among the ancient Romans *A* stood for several proper names, especially for the prænomen Aulus.

A, Ab, or **Abs,** a Latin particle signifying "from," "off," "away," and forming the prefix of a multitude of English words, as *abduct,* to "lead or take away;" *abstract,* to "draw away or from;" *avert,* to "turn away."

Aa, the name of several rivers or streams in Germany, Switzerland, Holland, Russia, and France. It is supposed to signify "water," and to be etymologically related to the Latin *aqua.* **Aach,** or **Ach,** another form of the same word, constitutes a part of several geographical

names, as *Aachen* (the German of Aix-la-Chapelle), *Biberach*, etc.

Aachen. See AIX-LA-CHAPELLE.

Aagard (CARL FREDRIK), a Danish painter, born in 1833, at first gave his attention to decorative painting, but afterwards turned to landscape painting. One of his most celebrated pictures is a scene from a zoological garden, which was exhibited at Stockholm in 1866.

Aal'borg (*i. e.* "Eel Castle" or "city"), a seaport of Denmark, in Jutland, on the south shore of the Lymfiord, through which vessels pass into the Cattegat, and 63 miles N. W. of Aarhuus. The number of vessels arriving here annually amounts to about 400. Pop. in 1870, 11,721.

Aa'len, a town of Würtemberg, on the Kocher, 48 miles by rail E. N. E. of Stuttgart. Pop. in 1871, 5552.

Aa'li Pash'a (MEHEMED EMIN), a Turkish statesman, was born in 1815 at Constantinople, was appointed minister of foreign affairs Aug. 15, 1845, which position he filled three times within the period from 1846 to 1853. In Dec., 1845, he became chancellor of the divan, in 1846 pasha, and in 1852 for the first time grand vizier, which position he afterwards held several times. In 1855 he represented Turkey at the conferences of Vienna and Paris, and signed the treaty of Paris of Mar. 30, 1856. In May, 1864, he presided at the conference of European powers for settling the Rumanian question. In 1867, while the sultan undertook a tour over the Continent, Aali Pasha was appointed regent of the empire. In the same year he went to Candia to settle the difficulties on that island amicably. He was also well known as a poet. Died Sept. 6, 1871.

Aalten, a town of the Netherlands, province of Guelderland, on the Aar, 29 miles E. of Arnhem. Pop. in 1867, 6160.

Aar, a river of Switzerland, rising in the Grimsel and Schreckhorn Mountains in the canton of Berne, forms the remarkable fall of Handeck, traverses the lakes of Brienz and Thun, and enters the Rhine opposite Waldshut. Length, 175 miles. It is navigable from Thun to its mouth. AAR is also the name of several rivers of Germany.

Aa'rau, a town of Switzerland, capital of Aargau, on the river Aar, 63 miles by railway W. of Zürich. It has manufactures of silk and cotton stuffs, mathematical instruments, etc. In 1798 it was the capital of the Helvetic republic. (See SWITZERLAND.) Pop. in 1870, 5449.

Aard-Vark, *i. e.* "earth-pig" (*Orycter'opus Capen'sis*), an animal of the class Mammalia, order Edentata, abounds in Cape Colony. It is a plantigrade, is about five feet long, including the tail, burrows in the ground if pursued, and quickly enters so far that it is beyond the reach of the pursuer. It feeds on ants, seeking its prey by night; it readily breaks down the walls of the ant-hills, catching the insects with its long prehensile and slimy tongue. Its flesh is often used as food.

Aard-Vark.

Aard-Wolf, *i. e.* "earth-wolf" (*Prot'eles crista'tus*), a carnivorous digitigrade quadruped of the class Mammalia, is a native of Caffraria. It is about equal in size to a fox, and resembles a hyæna in structure and other respects, having the fore legs longer than the hind legs. It is called earth-wolf because it digs burrows or holes in the ground, in which it passes the day. It is considered by some as a connecting link between the hyæna and the dog.

Aar'gau [Fr. *Aargovie*], a canton in the N. part of Switzerland, is bounded on the N. by Germany, on the E. by Zurich, on the S. by Lucerne, and on the W. by Basel and Solothurn. Area, 543 square miles. The chief rivers are the Aar and the Limmat. It consists chiefly of fertile and well-cultivated hills. Fruit of all kinds is produced in large quantities, and many cattle are raised here. It has important cotton factories. There are mineral springs at Baden and Schinznach. In 1871 the population was 198,873, of whom 107,703 were Protestants, 89,180 Roman Catholics, 449 belonged to other Christian churches, and 1541 were Jews. The canton was organized in 1803. The constitution is dated from 1841, and was revised in 1852 and in 1862. The income in 1867 amounted to 2,046,685 francs, the expenses to 2,581,685 francs, and the debt was estimated at 1,000,000 francs. It contributes 14,762 men to the federal army. Capital, Aarau. (See MÜLLER, "Der Aargau," 1870.)

Aar'huus, a seaport of Denmark, in North Jutland, on the Cattegat, 37 miles S. E. of Viborg. It has a cathedral, a museum, a library, and various manufactories. Pop. in 1870, 15,025.

Aar'on [Heb. אַהֲרֹן], the first high priest of the Israelites, was a descendant of Levi, probably in the eighth or ninth generation. He was three years older than his brother Moses (Ex. vii. 7), and apparently (Ex. ii. 4) some years younger than their sister Miriam. An impulsive and eloquent man, he was appointed spokesman to Moses, whom he assisted in the deliverance of the Israelites from the bondage in Egypt. He died on Mount Hor, which is still called the "Mountain of Aaron," and was succeeded in the priesthood by his son Eleazar.

Aaron (SAMUEL), a Baptist minister and educator, born in 1800 at New Britain, Pa., was ordained in 1829, and held pastorates at New Britain and Norristown, Pa., and at Burlington and Mount Holly, N. J. He also gained great reputation as a teacher in various schools, especially at Treemount Seminary, near Norristown, and the Mount Holly Institute. He was the author of various text-books. Died April 11, 1865.

Aar'sens, or **Aarssens, van** (FRANCISCUS), born at The Hague in 1572, was the son of the Dutch statesman Cornelis van Aarsens (1543–1624). The younger Van Aarsens was sent to the court of France as resident in 1598, and as ambassador in 1609 and in 1627; to Venice from 1609 to 1615, and again in 1619; to England in 1626 and in 1640, when he negotiated the marriage between the prince of Orange (William II. of Nassau) and the princess Mary, daughter of Charles I. of England. Died in 1641.

Aa'sen (IVAR ANDREAS), a Norwegian writer, born Aug. 5, 1813, at Orsteen, was at first a school-teacher, but subsequently devoted himself wholly to the study of the Norwegian dialects. He was supported in this study by the Drontheim Association of Sciences, which furnished him the means of visiting all parts of the country. He wrote "Det Norske folkesprogs grammatik" (1848), "Ordbog over det Norske folkesprog" (1852), and "Norsko ordsprog" (1856). Also poems and dramas.

Aas'vär is the name of a group of small islands under the Arctic polar circle, about 10 miles from the Norwegian coast, which until recently were entirely unnoticed. The owner leased them for a small price to two poor fishermen. At present they are one of the most important fishing-places in Europe. About Dec. 10, when the herrings arrive, over 10,000 fishermen come here, and in two or three weeks catch about 200,000 kegs of herrings. From Jan. 1 to Dec. 1 the islands are almost deserted, being inhabited by only a few families.

Ab, the eleventh month of the Jewish civil year, and the fifth of the ecclesiastical year.

Abab'de, a village of Middle Egypt, on the east bank of the Nile, 8 miles S. of Beni Hassan. Near it are the ruins of the ancient Antinoë (or Antinoöpolis), a city built by the emperor Hadrian (or Adrian) in honor of his favorite Antinoüs.

Ababdeh, a negro tribe of nomads in Upper Egypt and Nubia, are chiefly employed as guides through the deserts.

Ab'aca, or **Manila Hemp,** is the fibre of the leaf-stalk of a species of plantain (*Mu'sa troglodyta'rum,* otherwise called *Mu'sa tex'tilis*), growing abundantly in the Philippine Islands, from which many thousand tons are annually exported. Of the fibres of this tree a cordage is made which has the property of floating on water; sea-water does not rot it, and it therefore requires no tarring. A portion of the fibre which is fine and white is manufactured into a kind of linen. It is an excellent material for paper.

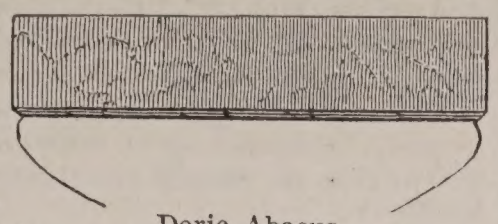
Aback', in sea-language, denotes the position of the sails when laid flat against the mast, either by the force of the wind or for the purpose of avoiding some imminent danger.

Ab'aco, or **Great Abaco,** the largest of the Bahama Islands, is 80 miles long, its N. E. point being in lat 26° 18′ N., lon. 76° 57′ W. Area, about 96 square miles. Carleton is the chief town, and its southern point is in lat. 25° 51′ N., lon. 77° 09′ W. LITTLE ABACO lies W. of the northern part of Abaco.

Ab'acot, an antique cap of state, worn formerly by the kings of England. It was made in the shape of a double crown.

Ab'acus [Gr. ἄβαξ, gen. ἄβακος], a calculating instrument which was used in mercantile transactions by the ancient Greeks and Romans, and is sometimes used in schools by the moderns. One form common in the U. S. for teaching children addition and multiplication consists of a frame somewhat like that of a slate, with twelve wires running through it, and twelve beads or small balls

on each wire. *Ab'acus Pythagor'icus* was anciently a name for the multiplication table. In architecture, *abacus* signifies the level tablet placed between the entablature and the capital of a column. The old Ionic as well as the Tuscan abacus is similar to the Doric (as here represented), but the new Ionic resembles the Corinthian.



Doric Abacus.

Corinthian Abacus.

Abâd, an affix of Persian origin, signifying "abode," and occurring in the names of many cities in the East; as *Hyderâbâd,* the "abode or city of Hyder."

Abâd' is also the name of several kings who reigned in Moorish Spain. Abâd I. was the first Moslem king of Seville. He began to reign in 1023, and died in 1042. Abâd III., the last of this dynasty, died in 1095.

Abad'don, a Hebrew name applied to the angel of the bottomless pit; the same as the Asmodeus of Tobit iii. 8, and the Apollyon of Rev. ix. 11.

Abaft', a sea-term signifying at or towards the stern of a vessel.

Abaissé, or **Abaissed** (*i. e.* "lowered"), a term in heraldry applied to any armorial figure when it is depressed or placed below the centre of the shield.

Ab'ana, the name of one of the rivers of Damascus mentioned in the Bible (2 Kings v. 12). Its identification with the modern Barada is now generally accepted. (See PORTER'S "Five Years in Damascus," 1855.)

Abancay', a town of Peru, in the department of Cuzco, is situated on the river Abancay, 74 miles W. S. W. of Cuzco. It has large sugar-refineries. Pop. estimated at about 5000.

Abancourt, d' (CHARLES FREROT), a distinguished French engineer, born in Paris, resided many years in Turkey in the employ of the French government. Several of the maps of Eastern Europe prepared by him have a high reputation. Died at Munich in 1801.

Abancourt, d' (CHARLES XAVIER JOSEPH FRANQUEVILLE), a minister of Louis XVI. of France, was born at Douai in 1758. He was a nephew of the celebrated Calonne. He was massacred at Versailles Sept. 9, 1792.

Aban'donment [from the Fr. *abandonner*], in law, is used in several senses, depending upon the subject to which it is applied:

1. *In Insurance.*—In this branch of the law it is applied to recovery by the insured in case of loss. Loss is either total or partial. In certain cases of partial loss the insured may, at his election, transfer the entire property to the insurers, and claim a total loss. The insurers would thus become the owners of the property in its impaired condition. This act is abandonment, and the "total loss" thus occasioned is termed constructive. It is applicable particularly to marine insurance. The subject is governed by rules differing somewhat in England and in America. The general principle is, that a serious injury must have happened by a marine peril to the ship or cargo (the value must have usually been diminished more than one-half), or the purposes of the voyage as to the ship must have been substantially defeated, as in the case of an embargo for an indefinite time. The act of abandonment must be exercised not upon mere conjecture, but upon credible information, and without delay. No particular form is necessary.

2. *As to Personal Property.*—An owner may cast away or otherwise relinquish personal property, so as to cause his ownership to cease. This may readily occur in the case of property at sea. The intent is a principal subject of inquiry. Property in this condition is otherwise called "derelict."

3. *Real Estate.*—Abandonment in this branch of the law applies to incorporeal rights, such as easements. There can be no abandonment of the ownership of the land itself. This must be parted with by some recognized mode of conveyance, such as a deed, or the principle of estoppel must be invoked or the rules of the statute of limitations.

4. In the legal relation of husband and wife the word abandonment is frequently employed as an equivalent to desertion. It is in some instances defined by statute.

Abar'ca (JOAQUIN), a Spanish bishop and leader of the absolutist party, born in 1780, was, on account of his zealous advocacy of the principles of absolutism, made a bishop by Ferdinand VII. Subsequently he became prime minister of Don Carlos, but after a time fell into disfavor for being too moderate. He was banished, and died in 1844 in a convent near Turin, Italy.

Aba'rim (meaning "regions beyond"), a mountain-range of Moab, on the E. side of Jordan, opposite Jericho, mentioned in Num. xxvii. 12 and elsewhere. Pisgah is either the same as Abarim or a part of it. This line of mountains rises to the height of nearly 3000 feet above the Mediterranean, and more that 4000 feet above the Dead Sea. As seen from Jericho or the Mount of Olives, the summit of the range is apparently almost level. But recent explorers report considerable inequalities of surface. The highest of the peaks, still called Mount Neba or Nebbeh, is thought to be the Nebo from which Moses viewed the Land of Promise (Deut. xxxiv. 1–4).

Abascal' (JOSÉ FERNANDO), a Spanish commander, born at Oviedo in 1743. He entered the army in 1762, served against the French and the English, became intendant of New Galicia, and in 1804 was appointed viceroy of Peru. He was an able and popular ruler, and accomplished much for the people of Peru. In 1812 he was made a marquis. He was recalled in 1816. Died at Madrid June 30, 1821.

Abatement [from the Fr. *abattre,* to "strike away"] is a legal term applied in various branches of the law.

1. *Title to Real Estate.*—Here it refers to the wrongful entry of a stranger upon land after an ancestor's death, and before the entry of an heir or devisee, and thus keeping him out of possession. The wrong-doer is termed an abator.

2. *Nuisances.*—In this case it means the act of destroying or removing a nuisance, which may take place without legal process. No unnecessary damage must occur, and the act must be done without a breach of the peace.

3. In respect to legacies and creditors' claims the word means a proportionate reduction of them where there are not sufficient assets to make full payment.

4. In actions the word has two significations: (1.) In respect to pleadings. A defendant may assert by a "plea in abatement" that the plaintiff's action ought to cease by reason of some informality or irregularity. It is called a *dilatory* plea, because it does not meet the case upon the merits. Such pleas are not favored in modern law, and there is a tendency to confine them by statute within narrow limits. If the cause is abated on such grounds, a new action may be brought. (2.) In respect to the termination of a litigation by the occurrence of some event during its progress, such as the death or disability of a party. In a court of law the regular effect of the death of a party was to cause the action to abate altogether. In a suit in equity proceedings were suspended, and might be revived by established methods. Similar rules were applied to disabilities, such as the marriage of a female party to an action. The effect of this doctrine is largely modified in codes of procedure in this country, and in England by the "Common-Law Procedure" act. Under these statutory regulations an action may, after the death of a party, be continued by or against his representatives, on motion to the court in which the action is pending. The application is subject to regulations to prevent unnecessary delay. There are certain actions in which there can be no revival. An instance is that of a cause of action for a personal wrong (tort). This is said to "die with the person." In other words, it cannot be prosecuted by or against the executors or administrators of a party sustaining or inflicting the wrong.

T. W. DWIGHT.

Abatement, in heraldry, denotes symbols of disgrace introduced into a coat-of-arms; these are scarcely mentioned by any heraldic writers except the English. A *delf tenné* is the sign of a revoked challenge; a *point-à-point* denotes a coward; a *gusset sinister* denotes drunkenness.

Abattis, or **Abatis** [Fr.], in fortification, a bulwark or obstruction formed by trees felled and placed side by side, so that their tops are directed towards the enemy. Sometimes the ends of the branches are cut off and sharpened.

Abattoir, a public establishment in which cattle, sheep, etc. are killed with such sanitary arrangements as will guard the population of a city against the nuisances of private slaughter-houses. This improvement originated in Paris in 1807. The principal abattoirs for the city of New York are at Communipaw in Jersey City, N. J.

A Battuta [It.], a term in music signifying in strict or measured time.

Aba-Ujvar, a county of Hungary, is bounded by the counties of Zips, Saros, Zemplin, Torna, and Borsod. Area, 1109 square miles. The country consists entirely of picturesque mountains. The soil, which is very fertile, yields wine in abundance. Gold, silver, iron, and copper are found here. Pop. in 1869, 166,666. Chief town, Kaschau.

Abauzit (FIRMIN), a celebrated French Protestant phil-

osopher and mathematician, was born at Uzès, Languedoc, Nov. 11, 1679, was educated at Geneva, travelled in England and Holland, and wrote several works on theology, antiquities, etc. He was a friend and correspondent of Sir Isaac Newton, who esteemed him highly, and he was profoundly versed in many branches of learning and science. Died in Geneva Mar. 20, 1767.

Abbadie (JACQUES), D. D., a French Protestant divine, born in Béarn in 1658. He removed to England in 1688, preached in London, and became dean of Killaloe in Ireland. His chief work is a "Treatise on the Truth of the Christian Religion" (in French, 2 vols., 1684), which was received with favor by both Protestants and Roman Catholics. Died in London Nov. 7, 1727.

Abbadie, d' (ANTOINE and ARNOULD MICHEL), two brothers and French travellers, born in Dublin in 1810 and 1815, who explored Abyssinia and Upper Egypt between 1838 and 1848, travelled up the White Nile, and even visited Darfoor. Their more important works are "Nouvelles du haut fleuve Blanc," "Note sur la route du Darfour," "Sur les nègres Yambo," "Géodésie d'Éthiopie," etc. (1860–63), and "Douze ans dans la Haute-Éthiopie" (2 vols., 1868). Their collection of Ethiopic and Amharic manuscripts, numbering 234, was until recently the largest collection in Europe.

Abbandonamen'te [It.], in music, signifies "with self-abandonment," despondingly.

Abbas', or, more fully, **Abbâs-Ibn-Abd-il-Moot'-talib,** a paternal uncle of Mohammed, and the ancestor of the dynasty of Abbassides, was born at Mecca about 566 A. D. He fought against Mohammed at the battle of Bedr, but was afterwards converted, and rendered important services to that prophet.

Abbâs I., or **Shâh Abbâs,** surnamed THE GREAT, a king of Persia, born in 1557, was a son of Mohammed Mirza. He began to reign about 1584, and distinguished himself by his ability and energy. In 1605 he defeated the Turks in a great battle, and recovered the Persian provinces which they had occupied. Died in 1628.

Abbâs-Mîr'za, a son of Fatah Ali Shah, king of Persia, was born in 1783. He commanded the Persian army which was defeated by the Russians in 1811. He was a prince of superior talents, and promoted the introduction of European culture and military tactics into Persia. He died before his father, in 1833.

Abbâs Pacha, viceroy of Egypt (the third of the present dynasty), a grandson of Mehemet Ali, was born at Yedda, in Arabia, in 1813. He succeeded his uncle Ibrahim Pacha Nov. 9–10, 1848, and died in July, 1854. He was succeeded by his uncle, Saïd Pacha.

Abbassides (pronounced ab-bas'sidz; sing. **Abasside,** ab-bas'sid), or **Abbasides** [Lat. *Abbas'idæ;* called by the Arabs BENI ABBÂS, *i. e.* "sons or descendants of Abbâs"], the name of a celebrated dynasty of caliphs who reigned at Damascus, and afterwards at Bagdad, from 762 to 1258 A. D. They traced their genealogy to Abbâs, the uncle of Mohammed. To this dynasty belonged the caliphs Harun-al-Raschid and Al-Mamun.

Abbatu'cci (CARLO, or CHARLES), a Corsican general, born in 1771. He served in the French army under the republic, and was killed at Huningue in 1796.

Abbatucci (CHARLES), a son of Jean Charles, born in 1816, became under Napoleon III. counsellor of state, and was in June, 1872, elected to the National Assembly as the candidate of the Bonapartist party.

Abbatucci (GIACOMO PIETRO, or JACQUES PIERRE), a Corsican, born in 1726, became a general of division in the French service. Died in 1812.

Abbatucci (JEAN CHARLES), a French lawyer, a nephew of Carlo, noticed above, was born in Corsica in 1791. He became in 1848 a partisan of Louis Napoleon, who appointed him minister of justice in 1852. Died in 1857.

Abbatucci (SÉVERIN), son of Jean Charles, was in 1871 elected member of the National Assembly, and in August resigned his seat in order to give to Rouher, the leader of the Bonapartist party, an opportunity to be elected.

Abbé, ăb'bā', a French term formerly applied to ecclesiastics and students of theology who were supported by the revenue of monasteries. They often devoted themselves to literary pursuits or were employed as tutors in wealthy families. Before the Revolution the king had the power to nominate 225 *abbés commendataires,* whose offices were sinecures. (See ABBOT.)

Abbeoku'ta, or **Abbekuta** (*i. e.* "under the rock"), a large town of Western Africa, and capital of the kingdom of Yorruba or Yarriba, is built on granite hills around a rock 250 feet high, and is situated on the left bank of the Ogoon River, 120 miles N. W. of Benin. The negro bishop Crowther has established a newspaper here in the Egba language; the number of Christians is estimated at 2000. It was founded in 1825 by some fugitives, and has rapidly increased. Pop. estimated at 100,000.

Ab'bess [Lat. *abbatis'sa*], the superior of a convent of women, corresponding in rank and authority to an abbot, except that she cannot exercise the functions of the priesthood.

Abbeville, ăb'vèl', a fortified city of France, situated on the river Somme, in the department of Somme, on the Northern Railway, 36 miles by rail N. W. of Amiens. It contains a fine cathedral and manufactories of woollen cloths, etc. Abbeville has in late years been made famous by the discovery of many interesting relics of pre-historic man in the valley of the Somme at that place. Pop. in 1866, 19,385.

Ab'beville, a county in the W. N. W. of South Carolina, bordering on Georgia. Area, 960 square miles. It is bounded on the S. W. by the Savannah River, and on the N. E. by the Saluda, and is intersected by the Greenville and Columbia R. R. Generally fertile and well watered. Gold is found in the county. Cattle, grain, cotton, and wool are raised. Pop. 31,129. Capital, Abbeville.

Abbeville, the capital of Henry co., Ala., finely situated 3 miles from Yattanabbee Creek and 100 miles S. E. of Montgomery. It has two churches, one academy, and one weekly paper. Pop. of township, 1267.

M. A. SHEEHAN, ED. "HENRY COUNTY REGISTER."

Abbeville, a post-village, capital of Wilcox co., Ga.

Abbeville, a post-village, capital of Vermilion parish, La. It has one weekly newspaper. Pop. 545.

Abbeville, a post-village of Lafayette co., Miss., on the Central Mississippi R. R., 56 miles N. by E. of Grenada.

Abbeville, the capital of Abbeville co., S. C., is 97 miles W. by N. of Columbia, on a branch of the Greenville and Columbia R. R. It has some manufactures, a male and female academy, three schools, five churches, a library, two newspapers, a Bible society, and various public buildings. Pop. of Abbeville township, 3034.

J. C. HEMPHILL, ED. "MEDIUM."

Abbey (RICHARD), a Methodist clergyman and author, born in Genesee co., N. Y., Nov. 16, 1805, removed to Illinois in 1816, and to Natchez, Miss., in 1825. In 1844 he entered the ministry in the Methodist Church, and is now (1873) a member of the Mississippi Conference of the Methodist Episcopal Church South. He has been an extensive newspaper and review writer. His first book, "Letters to Bishop Green on Apostolic Succession," was published in 1853, and was soon followed by the "End of the Apostolic Succession," a written debate with Yerger and Smedes on High-Church doctrines. His "Ecclesiastical Constitution" was published in 1856, "Creed of All Men," against deism, appeared in 1855, "Church and Ministry" in 1859, and "Diuturnity" in 1866. In 1868 he published anonymously "Ecce Ecclesia," and in 1872 "The City of God and the Church-Makers." He has also published "Baptismal Demonstrations," "Divine Assessment," "Strictures on Church Government," "The Divine Call to the Ministry," etc. In 1858 he was elected financial secretary of the Southern Methodist Publishing House.

Abbia'ti (PHILIPPO), a skilful Italian painter, born at Milan in 1640; died in 1715.

Abbitib'bie, or **Abbitib'be,** a lake, river, and trading-station in British North America, near James's Bay, into which the river flows.

Abbon the Crooked (in Latin, *Ab'bo Cer'nuus*), a French monk of St.-Germain-des-Prés, described the siege of Paris by the Northmen (885–887) in an epic poem which has been translated into French by Guizot. Died in 923.

Abbon of Fleury [in Latin, *Ab'bo Floriacen'sis*], an eminent French monk, born near Orleans in 958, was one of the most learned men of his age. He became abbot of Fleury. Died in 1004.

Ab'bot [Lat. *ab'bas;* Fr. *abbé;* from the Hebrew *abba,* "father"], the superior of a convent or monastery, and an ecclesiastic of high rank in the Roman Catholic Church. Abbots were ranked as prelates of the Church next to the bishops, and had the right to vote or speak in the general councils. In England there were formerly a number of *mitred abbots,* who sat and voted in the House of Lords.

Abbot, a post-township of Piscataquis co., Me. It has manufactures of lumber, carriages, etc. Pop. 712.

Abbot, a township of Potter co., Pa. Pop. 534.

Abbot of Misrule, or **Abbot of Fools,** called in Scotland the "Abbot of Unreason," a title given in the Middle Ages to the master of revels, and especially to the person appointed to preside over Christmas festivities.

Abbot (Abiel), D.D., born at Andover, Mass., Aug. 17, 1770, graduated at Harvard in 1792, was a Congregational minister in Haverhill, Mass. (1795–1803), and in Beverly, Mass., until 1827, when he sailed for Cuba. Died of yellow fever at Staten Island, N. Y., June 7, 1828. His "Letters from Cuba" (1829), and a volume of his sermons (1831), with a memoir, have been published.

Abbot (Abiel), D.D., born at Wilton, N. H., Dec. 14, 1765, graduated at Harvard in 1787. He studied theology, was tutor at Harvard (1794–95), minister of the Congregational church at Coventry, Conn. (1795–1811), and of the Unitarian church, Peterborough, N. H. (1827–48). He published a "History of Andover," Mass. (1829), etc. Died Jan. 31, 1859.

Abbot (Benjamin), LL.D., an eminent teacher, was born at Andover, Mass., Sept. 17, 1762, and graduated at Harvard College in 1788. He was principal of Phillips Academy at Exeter, N. H., for fifty years (till 1838). Among his pupils were Daniel Webster, Alexander H. Everett, Edward Everett, Lewis Cass, Jared Sparks, and George Bancroft. Of fine character and courtly manners, he had great power over his pupils. He died Oct. 25, 1849.

Abbot (Charles), Lord Colchester, born Oct. 14, 1757, Speaker of the British House of Commons (1802–17), was made peer in 1817, and died May 8, 1829.

Abbot (Ezra), born in Jackson, Me., April 29, 1819, graduated at Bowdoin College in 1840, became in 1856 assistant librarian in Harvard College, in 1872 professor of New Testament criticism and interpretation in the Cambridge Divinity School; published "Literature of the Doctrine of a Future Life" (1864–71). He has also served as assistant and editor of such works as Norton's "Gospels," Hackett's revision of Smith's "Bible Dictionary," Noyes' "New Testament," and Hudson's "Concordance." He has also published many review articles, etc.

Abbot (Francis Ellingwood), born at Boston, Mass., Nov. 6, 1836, graduated at Harvard, and was (1870–73) editor of the "Index," a journal devoted to the interests of Free Religion. He also published articles on the "Philosophy of Space and Time," "The Conditioned and the Unconditioned;" "Philosophical Biology," etc., in the "North American Review" and other periodicals.

Abbot (George), D. D., born in Surrey Oct. 29, 1562, was educated at Oxford. He became bishop of London in 1610, and archbishop of Canterbury in Jan., 1611. He was noted for his liberal principles, and was a rival or opponent of Laud. Died Aug. 4, 1633.

Abbot (Gorham Dummer), LL.D., a younger brother of Jacob Abbott, was born Sept. 3, 1808, graduated at Bowdoin College in 1826, and took a part of the theological course at Andover in the class which graduated in 1831. He was pastor for three years at New Rochelle, N. Y., and for thirteen years principal of the Spingler Institute in New York City. He has published "The Family at Home," "Nathan Dickerman," "Mexico and the U. S." (1869), and other works.

Abbot (Henry L.), an American officer, born Aug. 13, 1831, at Beverly, Mass., graduated at West Point 1854, major of engineers Nov. 11, 1865, served as assistant on Pacific R. R. surveys, 1854–57, and was associated with General Humphreys on the hydrographic survey of the delta of the Mississippi, 1857–61, the results being set forth in an elaborate report, "Physics and Hydraulics of the Mississippi River." In the civil war served in the Manassas campaign, 1861; engaged at Blackburn's Ford and Bull Run (wounded and brevet captain); in the construction of the defences of Washington, 1861–62; in the Virginia Peninsula, 1862; engaged at Yorktown (brevet major) and the Seven Days' operations before Richmond; as chief topographical engineer of Banks's expedition to the Gulf of Mexico, 1862–63; as colonel of the First Connecticut Artillery Volunteers, in command of siege artillery before Petersburg, 1864–65 (brevet lieutenant-colonel U. S. A., and brevet brigadier-general U. S. V.); engaged in various actions; as chief of artillery of expedition to Fort Fisher, 1865; and in command of a brigade in the defences of Washington, 1863–65. Brevet colonel and brigadier-general U. S. A. Mar. 13, 1865, and brevet major-general U. S. V. for gallant and meritorious services. Since the war he has been superintending defences and in command of engineer battalion and torpedo school of practice at Willet's Point, N. Y., member of engineer boards, and observer on solar eclipse expedition to Sicily, 1870–71. He is the author of several professional papers, and a member of American Academy of Sciences and other associations.

George W. Cullum, U. S. A.

Abbot (Robert), D. D., a learned English bishop, a brother of Archbishop George Abbot, was born in 1560. He became a popular preacher, and in 1615 bishop of Salisbury. Died Mar. 2, 1617. He left several theological, controversial, and political works, once highly valued for their learning.

Abbot (Samuel), a wealthy merchant of Boston, born at Andover, Mass., was one of the founders of the theological seminary at Andover, towards the building of which he gave $20,000 during his lifetime and $100,000 at his death. He also contributed large sums for various other charitable purposes. Died April 30, 1812, aged eighty.

Abbot (Walter), U. S. N., born in 1843 in the State of Massachusetts, graduated at the Naval Academy in 1861, became an ensign in 1862, a lieutenant in 1864, a lieutenant-commander in 1866, served on board the steam frigate Mississippi at the passage of Forts St. Philip and Jackson and the capture of New Orleans in 1862, and on board the iron-clad New Ironsides from 1863 to 1865 in her numerous engagements with the forts off Charleston, and in the fight with Fort Fisher at Wilmington, N. C. Died at Funchal, Madeira, in the winter of 1873.

Foxhall A. Parker, U. S. N.

Ab'botsford, the seat of Sir Walter Scott, is situated on the right bank of the Tweed, about three miles from Melrose Abbey. It is surrounded by beautiful scenery. This estate was purchased in 1811 by Sir Walter, who expended a large sum of money in the erection of a picturesque and irregular pile of buildings, which has been characterized as "a romance in stone and lime." The expense of this building was the chief cause of Scott's failure in 1826. (See Scott, Sir Walter.)

Ab'bots-Lang'ley, a parish of England, in Hertfordshire, was the birthplace of Nicholas Breakspear (Adrian IV.), the only Englishman who ever became pope.

Ab'bott (Benjamin), a noted Methodist preacher, was born in Pennsylvania in 1732. He travelled and preached extensively in his native State, in New Jersey, Delaware, and Maryland, and was one of the chief founders of his denomination in those States. His native eloquence was extraordinary. His autobiographical records, embodied in Firth's "Life of Abbott," are among the most remarkable of the early writings of Methodism. He was a man of little education, but of saintly character. Died in 1796.

Abbott (Charles), Lord Tenterden, an eminent English judge, born at Canterbury in 1762. He published in 1802 a "Treatise on the Law of Merchant Ships and Seamen," which is a standard work; became a judge in the court of common pleas in 1816, and lord chief-justice of the king's bench in 1818. In 1827 he was raised to the peerage as Lord Tenterden. Died in 1832.

Abbott (Jacob), a prolific and popular writer, was born at Hallowell, Me., Nov. 14, 1803, graduated at Bowdoin College in 1820, studied theology at Andover, Mass., from 1822 to 1824, was tutor in Amherst College from 1824–25, and professor of mathematics in the same institution from 1825 to 1829, was principal of the Mount Vernon School (for young ladies) in Boston from 1829 to 1834, when he was ordained and took charge of the Eliot church in Roxbury (till 1836). For several years he made his home in New York City, though frequently absent in foreign countries. He now (1873) resides at the old family homestead in Farmington, Me. His reputation as an author was established by the "Young Christian Series," consisting of "The Young Christian" (1832), "The Corner-Stone" (1834), "The Way to Do Good," "Hoaryhead," and "McDonner." But he is best known as the author of "The Rollo Books" (28 vols.), "The Franconia Stories" (10 vols.), "Harper's Story-Books" (36 vols.), and other juvenile works, some of which have been translated into various languages.

Abbott (Rev. John Stevens Cabot), brother of Jacob, was born at Brunswick, Me., Sept. 18, 1805, graduated at Bowdoin College in 1825, at Andover Theological Seminary in 1829, and was settled as minister in Worcester, Roxbury, Nantucket, and New Haven. Since 1866 he has resided in Fair Haven, Conn. Among his works may be named "The Mother at Home" (1833), and "History of Napoleon Bonaparte," 2 vols. 8vo. Among the most important of his recent works is his "History of Napoleon III." (1868).

Abbott (Lyman), third son of Rev. Jacob Abbott, was born in Roxbury, Mass., Dec. 18, 1835, graduated at the New York University in 1853, practised law for a time in New York City, studied theology with his uncle, Rev. John S. C. Abbott, was settled in the ministry at Terre Haute, Ind., from 1860 to 1865, was connected with the Freedmen's Commission from 1865 to 1868, then accepted the pastorate of the New England Congregational church in New York City, which he resigned in 1869, and now (1873) resides at Cornwall, on the Hudson, engaged in literary pursuits. Since 1871 he has edited for the American Tract Society its "Illustrated Christian Weekly," the only *illustrated* ro-

ligious weekly paper in the country. Besides other literary work, he has published "Jesus of Nazareth, His Life and Teachings" (1869), "Old Testament Shadows of New Testament Truths" (1870), "Morning and Evening Exercises, selected from the Writings of Henry Ward Beecher" (1871), "Laicus, or the Experiences of a Layman in a Country Parish" (1872), and is now engaged in carrying through the press of Harper & Brothers a "Popular Religious Dictionary" of about 1200 pages.

Abbott (Robert O.), M. D., brevet colonel and surgeon U. S. A., born in 1824, entered the army as assistant surgeon in 1849. In 1862 he became medical director of the Fifth Corps, and in the summer of that year medical director of the department of Washington—a difficult position, the duties of which he performed with great honor and administrative ability and rare professional skill. Died, in consequence of overwork, June 10, 1867.

Ab'bott's, a township of Bladen co., N. C. Pop. 716.

Ab'bott's Creek, a post-township of Forsyth co., N. C. Pop. 753.

Abbrevia'tio Placito'rum ("abbreviation of pleadings"), in legal history, an abstract of ancient pleadings made prior to the Year Books. (See Year Books.)

Abbreviations [Lat. *abbreviationes*, from *abbre'vio, abbrevia'tum*, to "shorten" (from *bre'vis*, "short")], customary contractions of words and phrases used in writing, in order to save time and space. They are formed by the omission of some letters or words, or by the substitution of arbitrary signs. In mediæval manuscripts abbreviations are so numerous that special study and training are required to decipher them.

The following are the more important abbreviations in common use:

āā, ana, "of each."
A. A. A. G., Acting Assistant Adjutant-General.
A. A. G., Assistant Adjutant-General.
A. B., *Artium Baccalaureus*, Bachelor of Arts.
A. B. C. F. M., American Board of Commissioners for Foreign Missions.
Abp., Archbishop.
A. C., *Ante Christum*, before Christ; also Arch-Chancellor.
Acct., account.
A. D., *Anno Domini*, "in the year of our Lord."
Ad. or Adv., adverb.
Adj., adjective.
Admr., administrator.
Admx., administratrix.
Æt. or ætat., *ætatis*, of age.
A. G., Adjutant-General.
A. H., *Anno Hegiræ*, "in the year of the Hegira" (flight of Mohammed).
Ala., Alabama.
A. M., *Anno Mundi*, "in the year of the world."
A. M., *Ante Meridiem*, "before noon."
A. M., *Artium Magister*, Master of Arts.
Anon., anonymous.
Ans., answer.
Apr., April.
A. Q. M., Assistant Quartermaster.
A. R. A., Associate of the Royal Academy (London).
Ari., Arizona.
Ark., Arkansas.
A. U. C., *Ab Urbe Condita*, "from the Founding of the City" (*i. e.* Rome).
Aug., August.
A. V., Authorized Version.
A. Y. M., Ancient York Mason.
B.A.or A. B.,Bachelor of Arts.
Bart. or Bt., Baronet.
Bbl., barrel.
B. C., before Christ.
B.C.L.,Bachelor of Civil Law.
B. D., Bachelor of Divinity.
B. L., Bachelor of Laws, *legum baccalaureus*.
Bp., Bishop.
Brig.-Gen., Brigadier-General.
Bro., brother.
Bush., bushel. [*Beata Virgo*.
B. V., Blessed Virgin, Lat.
C., *centum*, a "hundred;" also "centigrade."
C., Consul; also chapter.
Ca., *circa*, about.
Cal., California.
Cal. or Kal., Kalends.
Cantab., *Cantabrigiensis*, "of Cambridge."
Cantuar., of Canterbury.
Cap., *capitulum*, "chapter."
Capt., Captain.
C. B., Companion of the Bath; also Cape Breton.
C. C., Caius College.
c. c., cubic centimetre.
C. C. P., Court of Common Pleas.
C. E., Civil Engineer.
Cent., *centum*, "hundred."
Cf., *confer*, compare.
C. G. H., Cape of Good Hope.
Chap. or ch., chapter.
Chron., Chronicles.
C. J., Chief-Justice.
C. M., common metre.
Co., company; also county.
C. O. D., cash on delivery.
Col., Colonel; also Colorado.
Coll., college.
Com., Commodore, Commissioner.
con., *contra*, "against."
Cor., Corinthians.
Cor. Sec., Corresponding Secretary.
Cos., cosine.
Coss., *Consules* or *Consulibus*, "consuls" (of Rome).
Cr., creditor.
Crim. Con., criminal connection or conversation.
C. S. A., Confederate States of America.
Ct. or Conn., Connecticut.
Cwt., a hundredweight.
Cyc., cyclopædia.
d., penny, pence, *denarius*.
D., five hundred; also Denarius.
D. A. G., Deputy Adjutant-General.
Dak., Dakota.
Dan., Daniel, Danish.
D. C., District of Columbia; also *da capo*, "from the beginning."
D. C. L., Doctor of Civil Law.
D. D., Doctor of Divinity.
D. D. S., Doctor of Dental Surgery.
Dea., deacon.
Dec., December.
Deg., degree.
Del., Delaware; also *delineavit*, "he designed" (on engravings).
Dept., department.
Deut., Deuteronomy.
D. F., *Fidei defensor*, "Defender of the faith."
Dft., defendant.
D. G., *Dei gratiâ*, "by the grace (or favor) of God."
Dist., district.
Do., ditto, "the same."
Doz., dozen.
Dr., Doctor; also debtor.
D. T., Dakota Territory.
D. V., *Deo volente*, "God willing."
Dwt., pennyweight.
E., east.
Ebor., *Eboracum*, York.
Eccl., Ecclesiastes.
Ecclus., Ecclesiasticus.
E. D., Eastern District (of Brooklyn, N. Y.).
Ed., editor, edition.
Edin., Edinburgh.
E. E., Errors excepted.
e. g., exempli gratiâ, "for example."
E. I., East Indies.
E. I. C., East India Company.
E. M., Mining Engineer.
Encyc., encyclopædia.
E. N. E., east north-east.
Eng., English, Engineers.
Eph., Ephes., Ephesians.
E. S. E., east south-east.
Esth., Esther.
Esq., Esquire.
et al., et alii, "and others."
etc., *et cætera*, "and the rest;" *i. e.* other such things; and so forth.
Et seq., *et sequens*, "and the following."
Exr., executor.
Exod., Ex., Exodus.
Exon., *Exonia*, Exeter.
Exx., executrix.
Ez., Ezra.
Ezek., Ezekiel.
F. or *f.*, franc, florin, farthing, foot.
F. and A. M., Free and Accepted Masons.
F. or Fahr., Fahrenheit.
F. A. S., Fellow of the Antiquarian Society; Fellow of the Society of Arts.
F. A. S. E., Fellow of the Antiquarian Society of Edinburgh.
F. B. S., Fellow of the Botanical Society.
F. D., *Fidei defensor*, "Defender of the faith."
Feb., February.
F. F. V., first families of Virginia.
F. G. S., Fellow of the Geological Society.
Fla., Florida.
F. L. S., Fellow of the Linnæan Society.
F. R. A. S., Fellow of the Royal Astronomical (or Asiatic) Society.
F. R. C. P., Fellow of the Royal College of Physicians.
F. R. C. S., Fellow of the Royal College of Surgeons.
Fri., Friday.
F. R. G. S., Fellow of the Royal Geographical Society.
F. R. S., Fellow of the Royal Society.
F. R. S. E., Fellow of the Royal Society of Edinburgh.
F. S. A., Fellow of the Society of Antiquarians.
F. S. S., Fellow of the Statistical Society.
F. Z. S., Fellow of the Zoological Society.
Ga., Georgia.
Gal., Galatians.
gal., gallons.
G. B., Great Britain.
G. C. B., Grand Cross of the Bath.
G. M., Grand Master.
Gen., General, Genesis.
Ger., German.
Gov., Governor.
Gr., Greek.
G. T., Good Templars; Grand Tyler.
Gtt., *guttæ*, "drops."
Hab., Habakkuk.
Hag., Haggai.
H. B. C., Hudson's Bay Company.
H. B. M., His or Her Britannic Majesty.
Hdkf., Handkerchief.
h. e., hoc est, "this is."
Heb., Hebrews.
hhd., hogshead.
Hist., history.
H. I. H., His or Her Imperial Highness.
H. M. S., His or Her Majesty's Ship.
Hon., Honorable.
Hos., Hosea.
H. R., House of Representatives.
H. R. H., His or Her Royal Highness.
H. S. S., *Historiæ Societatis Socius*, Fellow of the Historical Society.
I., Is., Isl., island.
Ia., Iowa.
Ibid. or Ib., *ibidem*, "in the same place."
Id., *idem*, "the same."
Id., Idaho.
i. e., id est, "that is."
I. H. S., *Iesus Hominum Salvator*, "Jesus Saviour of men."
Ill., Illinois.
incog., *incognito*, "unknown."
Ind., Indiana.
Ind. Ter., Indian Territory.
In lim., *in limine*, "at the outset."
In loc., *in loco*, "in the place."
I. N. R. I., *Jesus Nazarenus Rex Judæorum*, "Jesus of Nazareth, King of the Jews."
Inst., institute.
inst., *instante mense*, "in the present month."
Int., interest.
I. O. O. F., Independent Order of Odd Fellows.
I. O. S. M., Independent Order of the Sons of Malta.
Isa., Isaiah.
It., Italian.
J. A., Judge Advocate.
Jam., Jamaica.
Jan., January.

Jas., James.
J. C., Juris Consult.
J. C. D., *Juris Civilis Doctor*, Doctor of Civil Law.
J. D., *Juris Doctor*, Doctor of Law.
Jer., Jeremiah.
Jno., John.
Jona., Jonathan.
J. P., Justice of the Peace.
Jr. or Jun., Junior.
Jud., Judith.
J. U. D., *Juris utriusque Doctor*, Doctor of both Canon and Civil Law.
Judg., Judges.
J. V. D., *Juris utriusque Doctor*, Doctor of Civil and Canon Law.
K., King.
Kal. or Cal., Calends.
Kan., Kansas.
K. B., Knight of the Bath.
K. C., King's Counsel.
K. C. B., Knight Commander of the Bath.
K. G. C. B., Knight Grand Cross of the Bath.
K. G., Knight of the Garter.
K. P., Knight of St. Patrick.
K. T., Knight of the Thistle.
Kt., Knight.
Ky., Kentucky.
La., Louisiana.
Lam., Lamentations.
Lat., latitude.
Lat., Latin.
L. D., Lady Day.
Lev., Leviticus.
L. H. D., *Literarum Humaniorum Doctor*, Doctor of Literature—conferred only by the Regents of the University of the State of N. Y.
L. I., Long Island.
Lib., *liber*, book.
Lib., lb., l., *libra*, a "pound."
Lieut., Lieutenant.
LL.B., Bachelor of Laws.
LL.D., *Legum Doctor*, "Doctor of Laws."
L. S., *Locus Sigilli*, "Place of the seal."
Lon., longitude.
L. R. C. P., Licentiate of the Royal College of Physicians.
L. R. C. S., Licentiate of the Royal College of Surgeons.
L. S. D., *Libri, Solidi, Denarii*, "pounds, shillings, [and] pence."
M., Monsieur, *mille* (a "thousand"), a mile; noon.
M., 10,000.
M. A., Master of Arts.
Macc., Maccabees.
Mad. or Mme., Madame.
Mag., magazine.
Maj.-Gen., Major-General.
Mal., Malachi.
Mar., March.
Masc., masculine.
Mass., Massachusetts.
Matt., Matthew.
M. B., Bachelor of Medicine.
M. C., Member of Congress.
Md., Maryland.
M. D., *Medicinæ Doctor*, "Doctor of Medicine."
Me., Maine.
M. E., Methodist Episcopal.
M. E. S., Methodist Episcopal South.
M. H. S., Massachusetts Historical Society.
Messrs. or MM., Messieurs, "gentlemen."
Mic., Micah.
Mich., Michigan.
Minn., Minnesota.
Miss., Mississippi.
Mlle., Mademoiselle.
Mme., Madame.
Mo., Missouri.
Mon., Montana.
Mons., Monsieur.
M. P., Member of Parliament.
M. R. C. S., Member of the Royal College of Surgeons.
M. R. I. A., Member of the Royal Irish Academy.
MS., manuscript.
MSS., manuscripts.
Mt., mount.
Mus. D., Doctor of Music.
N., north, or noon.
N. A., North America.
N. A. S., National Acad. of Sci.
N. B., *Nota Bene*, "mark well;" also North Britain (Scotland) and New Brunswick.
N. C., North Carolina.
N. E., north-east, New England.
Neb., Nebraska.
Neh., Nehemiah.
Nem. Con., *Nemine contradicente*, or Nem. Diss., *Nemine dissidente*, "no one contradicting or opposing."
Nev., Nevada.
N. F., Newfoundland.
N. G., New Granada.
N. H., New Hampshire.
N. J., New Jersey.
N. M., New Mexico.
N. N. E., north north-east.
N. N. W., north north-west.
No., *Numero*, "Number."
N. O., New Orleans.
Nov., November.
N. P., Notary Public; also New Providence Island.
N. S., Nova Scotia, New Style.
N. T., New Testament.
Num., Numbers.
N. W., north-west.
N. W. T., North-west Territory.
N. Y., New York.
N. Z., New Zealand.
O., Ohio.
Ob., *obiit*, "died."
Obad., Obadiah.
Obdt., obedient.
Obs., obsolete.
Oct., October.
Ol., *oleum*, oil.
Ol. or Olym., Olympiad.
Or., Oregon.
O. S., Old Style.
O. T., Old Testament.
Oxon., *Oxoniensis*, "Oxonian" or "of Oxford."
Oz., ounce.
P., *Père*, "father."
Pa., Pennsylvania.
Parl., Parliament.
P. C., Privy Councillor.
P. E. I., Prince Edward's Island.
P. E., Protestant Episcopal.
Per Ann., Pr. An., *Per Annum*, "by the year."
Per Cent., *Per Centum*, "by the hundred."
Pet., Peter.
Ph. D., *Philosophiæ Doctor*, "Doctor of Philosophy."
Phil., Philippians, Philip.
Phila., Philadelphia.
Philem., Philemon.
Philom., *Philomathes*, "a lover of learning."
Philomath., "a lover of learning."
Pinxt. or pxt., *pinxit*, "he painted."
Pk., peck.
pl., plu., or plur., plural.
plff., plaintiff.
plupf., pluperfect.
P. M., *Post Meridiem*, "after noon."
P. M., Postmaster.
P. O., Post-office.
Pop., population.
Port., Portuguese.
P. P., Parish Priest.
PP., *Patres*, "fathers."
pp., pages.
P. P. C., *pour prendre congé*, "to take leave."
P. R., Porto Rico.
Pres., President.
Priv., privative.
Prof., Professor.
Pro tem., *Pro tempore*, "for the time."
Prob., problem.
Prov., Proverbs.
Prox., *Proximo* or *Proximo mense*, "in the next month."
Ps., Psalm.
P. S., postscript, privy seal.
Pub. Doc., public document.
Pxt., *pinxit*, painted it.
q., farthing (*quadrans*).
Q., Queen, question, Quintus.
Q. C., Queen's Counsel.
Q. d., *Quasi dicat*, "As if he should say."
Q. E. D., *Quod Erat Demonstrandum*, "which was to be demonstrated."
Q. E. F., *Quod Erat Faciendum*, "which was to be done."
Q. M., Quartermaster.
Q. P., "as much as you please."
Qr., quarter, farthing.
Q. S., *Quantum Sufficit*, "a sufficient quantity."
Qu., query.
Q. V. or *q. v.*, *quod vide*, "which see," or *quantum vis*, "as much as you please."
R. (*Rex*), "King," or *Regina*, "Queen."
R. A., Royal Academician, or Royal Artillery.
R. C., Roman Catholic.
R. E., Royal Engineers.
Rec. Sec., Recording Secretary.
Ref. Ch., Reformed Church.
Reg. Prof., Regius Professor.
Rev., reverend, Revelation.
R. I., Rhode Island.
R. M., Royal Marines.
R. M. S., Royal Mail Steamer.
R. N., Royal Navy.
Ro. or Robt., Robert.
Rom., Romans.
R. R., Railroad.
R. Rs., Railroads.
R. S. D., Royal Society of Dublin.
R. S. E., Royal Society of Edinburgh.
R. S. V. P., *répondez, s'il vous plait*, "Reply, if you please."
Rt. Hon., Right Honorable.
Rt. Rev., Right Reverend.
S., south, saint, or shilling.
S. A., South America.
Sam., Samuel.
Sans., Sanscrit.
S. C., South Carolina.
Sc. or Ss., *scilicet*, "to wit;" also *sculpsit*, "he engraved it" (on engravings).
S. E., south-east.
Sec., Secretary.
Sept., September.
sin., sine.
S. J., Society of Jesus.
S. J. C., Supreme Judical Court.
S. M., *Sa Majesté*, His or Her Majesty.
Sp. or Span., Spanish.
S. P. Q. R., *Senatus Populusque Romanus*, "the Roman senate and people."
Sq. or Seq., *sequens*, the following; Sqq., *sequentes*, the same in plural.
Sq. ft., square foot.
Sq. in., square inch.
Sq. m., square mile.
SS., saints; also "esses," a collar worn by knights and others in heraldry.
Ss. or Sc., *scilicet*, "to wit," "namely."
Ss., *semis*, "half."
S. S., Sunday School.
S. S. E., south south-east.
S. S. W., south south-west.
St., saint and street.
S. T. D., *Sacrosanctæ Theologiæ Doctor*, Doctor of Theology.
S. of T., Sons of Temperance.
S. T. P., *Sacrosanctæ Theologiæ Professor*, Professor of Theology.
S. W., south-west.
Syr., Syriac.
T. E., Topographical Engineers.
Tenn., Tennessee.
Tex., Texas.
Text. Rec., *Textus receptus*.
Thess., Thessalonians.
Tit., Titus.
U. G. R. R., Underground Railroad.
Ult., *Ultimo, ultimo mense*, "in the last month."
U. P., United Presbyterian.
U. S., United States.
U. S. A., United States Army.
U. S. A., United States of America.
U. S. N., United States Navy.
U. S. P., United States Pharmacopœia.
U. S. S., United States ship or steamer.
U. T., Utah Territory.
V. or vs., *versus*, against.
Va., Virginia.
V. D. M., *Verbi Dei Minister*, "preacher of the word of God."
Ven., Venerable.
V.-G., Vicar-General.
Viz., *Videlicet*, "namely."
V.-P., Vice-President.
vs., *versus*, "against."
Vt., Vermont.
W., west.
Wash., Washington.
W. I., West Indies.
Wis., Wisconsin.
W. N. W., west north-west.
W. S. W., west south-west.
W. T., Washington Territory.
W. Va., West Virginia.
Wy., Wyoming Territory.
X, Χριστός, Christ.
Xmas., Christmas; Xtian, Christian, etc.
Yr., year, your.
Zech., Zechariah.
Zeph., Zephaniah.
&, and.
&c., *et cætera*, or and so forth.

Y^e^, Y^t^, The, That. (This use of Y originated in the Anglo-Saxon character þ, which was equivalent to the modern *th*. In manuscripts this character degenerates into a form like a black letter *y* (ȳ), which was retained after its origin and real sound had been lost sight of.)

Abbrevia'tor, a notary of the papal court and of the church councils, whose business is to prepare briefs and perform various important services as secretary. The number of these notaries was formerly about seventy-two.

Abbt (THOMAS), an eminent German author, born at Ulm in 1738. He became professor of mathematics at Rinteln in 1761, and contributed to the improvement of the German language. His chief works are "Vom Verdienste" ("On Merit," 1765) and "Vom Tod fürs Vaterland" ("On Dying for [one's] Fatherland," 1761). Died in 1766.

Abd, an Arabic word which signifies "servant" or slave, and forms the prefix of many Oriental names, as ABD-ALLAH, "servant of Allah," ABD-ER-RAHMAN, "servant of the Merciful" (*i. e.* of God).

Abd-el-Hamid (DU COURET), a French traveller, born in 1812, set out in 1834 for the East, visited Egypt, travelled up the Nile, through Abyssinia, to the shores of the Red Sea, and returned along the Red Sea to Cairo. In consequence of the Eastern habits contracted on his travels, he embraced Mohammedanism, and assumed the name of Abd-el-Hamid. After having been imprisoned in Persia for political reasons, he was released through the intervention of France, and returned to his native country in 1847. In 1848 he was despatched by the government to Timbuctoo. He published the result of this exploration in "Mémoire à Napoléon III." (1855); he also published "Médine et la Mekke" (3 vols., 1855).

Abd-el-Kâ'der (*i. e.* the "servant of the Powerful," in other words, the "servant of God"), a distinguished Arab chieftain, born near Mascara, in Algeria, in 1807. His father, Mehi-ed-Deen, was a maraboot, or religious noble, of no little influence. Algeria having been invaded by the French in 1830, Abd-el-Kâder was chosen emir (prince) by the Arabs of that country. He defeated the French at Macta in 1835. A treaty of peace was concluded in 1837. In 1839 hostilities were again renewed, and in the war which followed, against a power so much superior to his own, Abd-el-Kâder displayed extraordinary energy, combined with a marvellous fertility of resources, but he was at length, in 1847, obliged to yield to overwhelming odds: he laid down his arms on condition that he should be sent to Alexandria or St. John d'Acre. But, in direct violation of the terms of capitulation, he was taken to France, where he was detained as a prisoner until 1852. In 1860, when the Christians of Syria were threatened with massacre by the fanatical Mohammedans of that country, Abd-el-Kâder, with extraordinary diligence and at the risk of his own life, protected many thousands of those defenceless people so long as the danger lasted. In 1864 he paid a visit to Egypt, where he was well received by the viceroy, and received from M. de Lesseps a piece of land. He also joined the order of Freemasons. In 1865 he visited Constantinople, where he was received with great honors. In 1867 he attended the Universal Exhibition of Paris. Abd-el-Kâder has written in the Arabic language a work which he sent to the French Academy, and which was translated into French by Dugat, under the title "Rappel à l'Intelligent, avis à l'Indifferent" (1858). Died Nov., 1873. (See "Life," by CHURCHILL, London, 1867.)

Abd-el-Latif', or **Abdallatif,** an Arabian historian and physician, born at Bagdad in 1162. He wrote a valuable work on the history, antiquities, and geography of Egypt, of which De Sacy published a French version. Died about 1230.

Abd-el-Wahâb', the founder of the sect of Wahabites or Wahâbees, was born in Nejed, Arabia, in 1691. He recognized the Koran, and endeavored to reform the Mohammedan religion, which he affirmed had become corrupted from its primitive purity. Died in 1787. (See WAHABEES.)

Abde'ra [Gr. Ἀβδήρα], an ancient city of Thrace, noted as the birthplace of the philosopher Democritus. The stupidity and ignorance of the people of Abdera was proverbial.

Abd-er-Rahman III., surnamed AN-NÂSIR-LIDIN-ILLAH, or AL-NASSER-LIDÎNILLAH, a celebrated caliph, was born about 888 A. D. He began to reign at Córdova in 912. He was an able and successful warrior, and was distinguished as a patron of learning and the arts. During his long reign the power and glory of the Moslem empire in Spain were raised to the highest pitch. Died in 961.

Abdica'tion [Lat. *abdica'tio*], a term applied to the act of resigning a throne, which has frequently occurred. The Roman emperor Diocletian voluntarily abdicated in 305 A. D., and the German emperor Charles V. in 1556. Many sovereigns have been compelled to abdicate by the hostility and violence of their subjects, as James II. of England (1688), Charles X. (1830) and Louis Philippe (1848) of France, Ferdinand of Austria (1848), and Isabella of Spain (1870).

Abdo'men [Lat. *abdo'men* (gen. *abdom'inis*), from *abdo, abdere,* to "hide"], that portion of the trunk of the human body which lies below the diaphragm. It contains the liver, pancreas, spleen, and kidneys, as well as the stomach, the small intestines, and the colon. The abdomen is lined by a serous membrane, the peritoneum, which is folded over the viscera, allowing them a certain freedom of motion, but retaining them in their proper relations to each other by means of the mesenteric fold. The external wall of the abdomen is conveniently divided by writers into thirteen "regions," by means of four imaginary transverse lines and five vertical ones. The first transverse line crosses the point of the ensiform cartilage; the second is on the lowest ribs; the third goes from the anterior superior spinous process of the ilium on one side to the same point on the other; the fourth is on the upper margin of the pubic bone. The first and fifth vertical lines run on either side towards the shoulder-joint from the insertion of Poupart's ligament into the pubes; the second and fourth lines ascend from a point on the crest of either ilium vertically towards the posterior border of the axilla; the third line passes along the spinous processes of the vertebræ. Of the thirteen regions, five are anterior, four are lateral, and four are posterior. From above downward, the anterior are the epigastric, umbilical, hypogastric, and right and left inguinal regions. The lateral regions are the right and left hypochondriac and the right and left iliac. The posterior regions are the inferior dorsal and lumbar regions of either side.

ABDOMEN, in entomology, the hindmost of the three regions into which the body of an insect is divided. It is composed, typically, of eleven rings or segments, more or less distinct from each other, but the number is often only ten. It contains a portion of the intestines and the sexual organs. In the perfect insect its segments have attached to them no legs or wings. In many insects its last segments bear appendages of various uses and forms, as pincers, stings, ovipositors, etc. In some insects the abdomen is not well differentiated from the thorax.

Abdomina'les [the plu. of the Latin adjective *abdomina'lis,* "belonging to the abdomen"], or **Abdominal Fishes,** in the Linnæan classification, an order including all osseous fishes of which the ventral fins are beneath the abdomen and behind the pectoral fins. In the system of Cuvier the name is given to an order of more limited extent, a subdivision of the Malacopterygii or soft-rayed fishes, having the ventral fins, if present, beneath the abdomen and not attached to the bones of the shoulder. It includes the Cyprinidæ (carp, etc.), Esocidæ (pike, etc.), Siluridæ, Salmonidæ (trout, salmon, etc.), Clupeidæ (herring, etc.), Cyprinodontidæ, etc. The order is not recognized by all naturalists.

Abduc'tion [from the Lat. *ab,* "away," and *duco, ductum,* to "lead"], in law, the forcible or fraudulent carrying away of a person. It is usually confined to females removed with a view to their marriage or seduction. It is allied to the word *kidnapping,* which would include the case of males. Abduction is an offence severely punished by statute law, both in England and in this country.

Abd-ul-Aziz' [written in French *Abdoul-Aziz,* and in German *Abd-ul-Asis*], a son of Mahmood II., was born in 1830, and succeeded his brother, Abd-ul-Medjid, as sultan of Turkey, June 25, 1861. He reduced the imperial civil list from seventy-five million piasters to twelve million, abolished, among other barbarous practices, that of assassinating the sons of the princesses, favored the introduction of Western manners and customs, and he has done much to destroy the old and cherished traditions of the Turks. (See TURKEY.)

Abd-ul-Medjid' [written in French *Abdoul-Medjid,* and in German *Abd-ul-Medschid*], sultan of Turkey, the eldest son of Mahmood II., was born in 1823. He succeeded his father July 1, 1839, when his capital was menaced by the victorious army of Mehemet Ali, viceroy of Egypt. This danger was averted by the intervention of England and other great powers in July, 1840. He favored religious liberty and the reforms which his father had initiated, but his good-will was partially frustrated by the resistance of his fanatical subjects. He died June 25, 1861, and was succeeded by his brother, Abd-ul-Aziz. (See TURKEY.)

Abeceda'rians, a sect founded in the sixteenth century by a person named Storck, who professed that learning was not necessary, not even the knowledge of the alphabet (A B C, hence their name), for the proper understanding of the Scriptures; and some went so far as to maintain that it was not even desirable to know how to read.

A'Beck'et (GILBERT ABBOT), a humorous English writer

and lawyer, born in London about 1810. He contributed to the London "Times" and "Punch." Among his works is "The Comic Blackstone" (1844–46). Died in 1856.

A'Becket (THOMAS). See BECKET.

Abed'nego ["slave of Nego," the second god of the Babylonians], the name given in Babylon to Azariah (Dan. i. 7), one of Daniel's three friends.

Abeel' (DAVID), D. D., an American missionary, born at New Brunswick, N. J., June 12, 1804. He published "A Journal of a Residence in China, 1829–33," "A Missionary Convention in Jerusalem, 1838," and "The Claims of the World to the Gospel." Died at Albany Sept. 4, 1846.

A'beken (BERNHARD RUDOLPH), a German writer, born at Osnabrück Dec. 1, 1780, became in 1808 tutor to the sons of the poet Schiller, and afterward director of the gymnasium in Osnabrück. He published "Cicero in seinen Briefen" ("Cicero in his Letters," 1835), which is highly commended, and has been translated into English. Died at Osnabrück Feb. 24, 1866.

A'bel, the second son of Adam and Eve, was killed by his brother Cain. He is regarded as a type of faith and as the first martyr. (See Genesis iv. and Hebrews xi. 4.)

Abel (CLARKE), an English surgeon and naturalist, born in 1780. He served as naturalist to Lord Amherst's embassy to China in 1816, and published a "Narrative of a Journey in the Interior of China" (1818). Died at Cawnpore, India, Nov. 24, 1826.

Abel (JOSEPH), an historical painter, born near Linz on the Danube in 1768, worked in Rome and Vienna. Among his works is "Prometheus Bound." Died in 1818.

Abel (NIELS HENRIK), an eminent mathematician, born at Findö, in Norway, in 1802. He gained distinction by his discoveries in the theory of elliptic functions, and was highly eulogized by Legendre. Died in 1829.

Abelard [Lat. *Abælardus*], or **Abailard** (PIERRE), a celebrated French philosopher and dialectician, born near Nantes, in Bretagne, in 1079. He studied dialectics under the Nominalist Roscellinus and the Realist William de Champeaux, and afterwards theology under Anselm of Laon. He taught in various places, largely in Paris, drawing around him great numbers of pupils from different parts of Europe. He sought to avoid the extremes of Nominalism and Realism, though his doctrine is not far removed from strict Nominalism. He had marvellous subtlety; he was able to foil the first masters of his age in logic; and was as audacious in propounding his notions as he was ingenious in defending them. But he lacked moral courage; he loved truth less than he thirsted for fame; his vanity and selfishness had no bounds; and his treatment of one of his pupils, the beautiful and accomplished Eloise, whom he first seduced, afterwards married, and then deserted, leaves upon his memory an indelible stain. He was one of the most prominent founders of Scholasticism, and exerted a larger influence upon the intellectual activity of his time than any other man. He died in 1142. The most complete work on Abelard is Charles de Rémusat's "Abélard," Paris, 1845. (See also COUSIN'S "Introduction to the Works of Abelard;" BERINGTON'S "History of Abelard and Heloise," and WRIGHT'S "Abelard and Eloise," N. Y., 1853.)

Abel, von (KARL), a German statesman, born at Wetzlar in 1788, was a leader of the absolutist and ultramontane party. He became Bavarian minister of the interior in 1838, and was removed from office by the influence of Lola Montez in 1847. Died at Munich in Sept., 1859.

A'belites, or **Abe'lians,** a sect of Christians who lived in Northern Africa in the fourth century. They enjoined marriage without carnal intercourse, in order not to propagate original sin, claiming in support of their practice the example of the patriarch Abel. They adopted children, who were brought up to the same kind of marriage. They were extinct before the time of Augustine.

Aben, Ebn, or **Ibn,** a prefix to many Arabic proper names, denoting "son of."

Abenaquis. See ABNAKIS.

Aben'cerrage, the name of a noble Moorish family of Granada, in Spain. The implacable feud between this family and the Zegris formed the subject of several Spanish and French dramas.

A'bendberg, a mountain of the Bernese Alps, in the Swiss canton of Berne, rises abruptly from the S. shore of Lake Thun, and has an altitude of about 5000 feet above the sea. On its southern slope is an asylum for cretins, founded about 1842.

A'ben Ez'ra, a Spanish Jew and eminent commentator on the Bible, born at Toledo about 1090–1100. He excelled as a mathematician, linguist, physician, and poet. Died about 1167–76. The dates are uncertain.

A'bensberg, a small town of Bavaria, 18 miles S. W. of Ratisbon, has a castle and a mineral spring. Here Napoleon defeated the Austrians April 20, 1809.

A'ber, a Cymric term signifying "meeting-place of waters," occurs as a prefix to names of places in Great Britain—*e. g.* Aberdeen. It is probably etymologically related to the Persian *ab*, "water." The corresponding Gaelic term is *Inver*—*e. g.* Inverness.

Aberbrothwick. See ARBROATH.

Ab'ercorn, DUKES OF, marquesses of Abercorn (in the Irish peerage, 1790), Viscounts Hamilton (in the peerage of Great Britain, 1786), earls of Abercorn (1606), barons of Paisley (1587), of Abercorn (1603), of Hamilton, Mountcastle, and Kilpatrick (in the peerage of Scotland, 1606), Viscounts Strabane (1701), Barons Strabane (1616), Mountcastle (in the Irish peerage, 1701), marquesses of Hamilton (in the Irish peerage, 1868), and dukes of Chatelhérault (in France, 1548), one of the most prominent noble families of Great Britain.

Abercorn (JAMES **Hamilton**), FIRST DUKE OF, born Jan. 21, 1811, succeeded his grandfather as marquis of Hamilton in 1818, and became lord lieutenant of Ireland in 1866, which position he held until 1868, when he was created duke of Abercorn. He is at present lord lieutenant of Donegal co., Ireland, and major-general of the Royal Archers.

Ab'ercrombie (JAMES), a British general, born in 1706, who in 1758 took command of near 50,000 men in New York, in order to recover the forts which the French had taken. On the 8th of July he attacked Ticonderoga, but was repulsed by the French with great loss, and was soon removed from the command. Died April 28, 1781.

Abercrombie (JAMES), D. D., an eloquent Episcopalian clergyman and scholar, born Jan. 26, 1758, preached in Philadelphia, where he died June 26, 1841.

Abercrombie (JOHN), M. D., an eminent Scottish physician, born at Aberdeen in 1780. He graduated as M. D. in 1803, practised in Edinburgh, and attained the reputation of being the first consulting physician in Scotland. He published "Inquiries concerning the Intellectual Powers of Man" (1830), and "The Philosophy of the Moral Feelings" (1833), which were highly esteemed. Died in 1844.

Abercrombie (JOHN J.), an American officer, born in 1798 in Tennessee, graduated at West Point in 1822, colonel Seventh Infantry Feb. 25, 1861, and Aug. 31, 1861, brigadier-general U. S. volunteers. He served chiefly on the Western frontier (1822–61); as adjutant First Infantry (1825–33); in the Black Hawk war in 1832; in the Florida war, 1837–40; engaged at Okee-cho-bee (brevet major); in the war with Mexico, 1846–48; engaged at Monterey (wounded and brevet lieutenant-colonel), Vera Cruz, Cerro Gordo, and aide-de-camp to Major-General Patterson, 1846–47; as superintendent of recruiting service, 1853–55. In the civil war served in the Shenandoah campaign, 1861–62; engaged at Falling Waters; in the Virginia Peninsula, 1862; engaged at Fair Oaks (wounded) and Malvern Hill, and till 1864 in command of troops before Washington, D. C. Brevetted brigadier-general U. S. A. for long and faithful services, and retired from active service June 12, 1865. GEORGE W. CULLUM, U. S. A.

Ab'ercromby (JAMES), BARON DUNFERMLINE, born in 1776, was a son of General Sir Ralph Abercromby. He was chosen Speaker of the House of Commons by the Whigs in 1835, and resigned in 1839, when he passed into the House of Lords. Died in 1858.

Abercromby (Sir RALPH), a distinguished British general, born in Clackmannanshire Oct., 1734, entered the army in 1758. After the peace of 1783 he passed ten years at home in retirement. He distinguished himself in the disastrous campaigns in Holland in 1794 and 1795. In 1795 he took command of an expedition sent to the West Indies, where he captured several islands from the French. He was the second in command of the army which the duke of York led to Holland in 1799, and was appointed in 1800 commander-in-chief of the expedition to Egypt, which was then occupied by the French under Bonaparte. The British army, which landed early in Mar., 1801, was attacked by Menou, near Alexandria, on the 21st of that month. In this action the French were defeated, but Sir Ralph was mortally wounded, and died on the 28th of Mar., 1801. He was distinguished for superior talents, bravery, and humanity.

Ab'erdeen', or **Aberdeen'shire,** a county of Scotland, is bounded on the N. and E. by the North Sea, on the S. by Kincardine, Forfar, and Perth, and on the W. by Inverness and Banff. It has an area of 1970 square miles. The Grampian range of mountains extends along the southern boundary of this county, which contains several high peaks. Among these are Ben-Macdhui, 4390 feet,

and Cairngorm, 4060 feet high. It is drained by the Dee and the Don. The principal rocks are granite and mica-slate. More cattle are raised in Aberdeen than in any other county in Scotland. Pop. in 1851, 212,032; in 1871, 244,607.

Aberdeen, a city and seaport of Scotland, and the capital of the county of Aberdeen, is on the North Sea, at the mouth of the river Dee, 93 miles N. N. E. of Edinburgh. It is a handsome city, with spacious streets and granite houses, and is celebrated as a seat of learning. Among the principal public buildings are the town-house, several churches, and Marischal (pronounced mar'shal) College, founded in 1593. Aberdeen has a good harbor and an extensive trade, the chief articles of export being fine cotton and woollen fabrics, granite, grain, cattle, and fish. Here are flourishing manufactories of cotton and woollen goods, combs, machinery, etc. Old Aberdeen, which is near the mouth of the Don, about 1 mile N. of the new city, is the seat of King's College and University, founded in 1494. Pop. of the parliamentary burgh in 1871, 88,125.

Aberdeen, capital of Monroe co., Miss., is on the W. side of the Tombigbee River, and connected by a branch railroad with the Mississippi and Ohio R. R. It buys and ships 16,000 bales of cotton yearly. It has a fine court-house, one of the best river bridges in the South, a female college, and a great trade. It contains five steam-mills and a steam cotton-compress, and is but 18 miles from the famous Greenwood Springs. It has a tri-weekly newspaper. Pop. 2022. S. A. JONAS, ED. AND PUB. "EXAMINER."

Aberdeen, a thriving post-village of Huntington township, Brown co., O., on the Ohio River opposite Maysville, Ky., and 60 miles above Cincinnati. Pop. 871.

Aberdeen (GEORGE HAMILTON **Gordon**), FOURTH EARL OF, a British statesman, born in Edinburgh Jan. 24, 1784, graduated at Cambridge in 1804. He began his public life as a Tory, was sent as ambassador to Vienna in 1813, and was raised to the British peerage as Viscount Gordon in 1814. In 1828 he became secretary of state for foreign affairs in the cabinet of the duke of Wellington, with whom he resigned in Nov., 1830. He was reappointed to that office by Sir Robert Peel in 1841, gradually abandoned the high Tory principles, and favored a pacific foreign policy. In 1846 he resigned office with Sir Robert Peel, after whose death (1850) he was regarded as the chief of the Peelite party. He became, in Jan., 1853, prime minister in a cabinet formed by a coalition of parties. In 1854 England was involved in a war against Russia, to which measure Lord Aberdeen gave a reluctant support. Either from this cause, or because the war was conducted with ill success, the ministers became very unpopular. Lord Aberdeen resigned in Feb., 1855, and was succeeded by Lord Palmerston. Died Dec. 14, 1860.

Aberdeen (GEORGE JOHN JAMES), FIFTH EARL OF, oldest son of the preceding, born Sept. 28, 1816, was for a number of years, as Lord Haddo, a member of the House of Commons, where he voted with the Liberals. He succeeded his father in the peerage in 1860. Died Mar. 22, 1864.

Aberdeen, EARLS, Viscounts Formantine, Barons Haddo, Methlie, Tarves, and Kellie (in the Scottish peerage since 1682), Viscounts Gordon (in the peerage of the United Kingdom since 1814), and baronets (in the Scottish peerage since 1642), one of the most prominent noble families of Great Britain, an offshoot of the ancient Scotch family of the Gordons.—Sir John Gordon of Haddo was in 1642 created baronet by Charles I. for services rendered to that monarch in the battle of Turriff.—Sir George Gordon of Haddo was lord high chancellor of Scotland when in 1682 he was created an earl. He was an uncompromising opponent of William of Orange. Died in 1720.

Abergavenny, commonly pronounced ab-er-gā'ne, a market-town of England, in Monmouthshire, on the Usk, which is here joined by the Gavenny, and crossed by a fine bridge, 13 miles W. of Monmouth.

Abergavenny, EARLS OF, and Viscounts Nevill (in the peerage of Great Britain, 1784), barons of Avergavenny since the time of Henry III., a prominent noble family in the peerage of Great Britain.—WILLIAM NEVILL, FIFTH EARL OF, was born Sept. 16, 1826, and succeeded his father in 1868. His oldest son and heir is REGINALD WILLIAM BRANSBY, Viscount Nevill, born Mar. 4, 1853.

Ab'ernethy (JOHN), a dissenting minister, born at Coleraine, in Ireland, in 1680. He was for many years pastor of a Presbyterian church at Antrim, and incurred the censure of the synod by his independent spirit. About 1730 he removed to Dublin, where he preached to an independent congregation. Died in 1740.

Abernethy (JOHN), an eminent English surgeon, born in London in 1765, was a grandson of the preceding, and a pupil of John Hunter. He was chosen assistant surgeon of St. Bartholomew's Hospital, London, in 1786, and eventually chief surgeon of the same. As a lecturer on anatomy and surgery he gained immense popularity. He published in 1809 an important work, "On the Constitutional Origin and Treatment of Local Diseases," the doctrines of which have greatly contributed to improve the science of surgery. Many anecdotes are related of his eccentric manners and of his witty or petulant speeches to his patients. Died in 1831.

Aberra'tion [Lat. *aberra'tio*, from *ab*, "from," and *er'ro, erra'tum*, to "wander"], a term variously employed: in optics it denotes the unequal deviation of rays of light when refracted by a lens or reflected from a concave mirror. There are two kinds of optical aberration—viz., Chromatic (from the Greek χρῶμα, "color") Aberration, or Aberration of Refrangibility, and Spherical Aberration, or Aberration of Sphericity. In astronomy also there is the Aberration of the Celestial Bodies, sometimes (but less correctly) termed the Aberration of Light.

1. *Chromatic Aberration, or Aberration of Refrangibility.*—A convex lens may be regarded as a number of prisms having their bases in contact. Hence, when a sheaf of rays of white light passes through it, the rays undergo not only refraction, but also decomposition; and since the variously colored rays into which white light is divided by a prism possess different refrangibilities, it follows that when light is converged by a convex lens it is refracted to different foci. The violet rays, being the most refrangible, form a focus nearest to the lens; while the red rays, being the least refrangible, form a focus farthest from the lens. Thus, in place of one focus, there are, in reality, an almost infinite number—viz., one for each of the differently refracted rays (the rays even of the same general color being not all refracted equally), and in the order of violet, indigo, blue, green, yellow, orange, red. Hence the rays do not meet at the same focus of the lens; and this deviation of the foci is called the *chromatic aberration* of a lens.

2. *Spherical Aberration, or Aberration of Sphericity.*—Lenses and mirrors are usually ground with spherical surfaces, and so long as the aperture does not exceed eight or ten degrees, the rays of homogeneous light refracted or reflected by different parts of them meet very nearly at the same focus of the lens or mirror. But as the aperture of a spherical mirror increases, the rays reflected from the edges cross each other at a point on the axis nearer to the mirror than those which are reflected from portions of the mirror near its centre. Thus, the rays are deviated from the true focus of the mirror. Again, with regard to spherical lenses of large aperture, the rays which pass through the lens near its circumference are refracted to a point nearer to the lens than those which pass through its central portion. In the case of mirrors this deviation of light from the focus is called *spherical aberration by reflection*, while in the case of lenses it is called *spherical aberration by refraction*. It may be remedied by giving lenses and mirrors parabolic surfaces—a plan which is almost invariably followed in the construction of specula for astronomical purposes.

3. *Aberration of the Celestial Bodies*, often (but less correctly) termed the *Aberration of Light*, in astronomy, an apparent displacement of a celestial object, due to the progressive motion of light. This aberration is caused—1, by the motion of the earth in its orbit; and 2, by the motion of the observed celestial objects. It was discovered by Bradley in 1727. This astronomer reasoned that if the earth's motion bears only an appreciable relation to the velocity of light, we ought to expect that the rays from a star would seem to come from a point nearer than is actually the case to that point in the heavens towards which the earth's course is directed. The phenomenon he had observed corresponded exactly with this explanation. The change of place due to the velocity of light, estimated from the eclipses of Jupiter's satellites, corresponded (within the limits of observational error) with the observed changes in the apparent positions of the fixed stars. It follows, from a consideration of the earth's path, that each star appears to describe a small ellipse about its true place. This fact is of great importance in its direct bearing on observational astronomy, but it is perhaps no less important on account of the evidence it supplies as to the motion of the earth.

The correction of the observed position of a celestial object for aberration gives the true position for the moment when the light which makes it visible left it; but this is not the true position for the moment of observation, except on supposition that the observed object is at rest. If the body itself is in motion, then, in addition to the correction of position for aberration, there must be a correction for the amount of proper motion which has taken place in the interval since the light which makes it visible left it. In order to make this correction we must know the rate of

proper motion and the distance of the body. If the absolute proper motion of the body is given in miles, or length-measure, and not the apparent in angular measure, and is parallel to the motion of the earth, then the whole correction may be treated as aberration, by taking the sum or the difference of the velocities per second of the two bodies, according as they are in the opposite or in the same direction, and comparing this with the velocity of light. If the velocities of the two bodies are in the same direction and equal, their difference is zero, and the correction is *nil*. Hence, a body moving in the same direction as the earth, and with the same velocity, is unaffected in apparent position by aberration. The same will be true of a body not moving in the same direction as the earth, provided that when its velocity is decomposed into rectangular components, one of which is parallel to the earth's motion, this latter component velocity is equal to the earth's velocity and in the same direction.

It follows from the foregoing that the bodies of a group or system, as observed the one from the other, are unaffected by aberration in consequence of any common motion in which all participate alike, but that they suffer displacement from this cause only in consequence of their relative motions. The moon partakes of the annual motion of the earth round the sun, but suffers no aberration on that account; and so the sun, though it may have a proper motion in space, is unaffected by this cause in its apparent position, as viewed from the earth or from any other member of the solar system, since this motion is one in which all the bodies of the system equally participate.

REVISED BY F. A. P. BARNARD.

A'bert (JOHN J.), an American officer, born 1785 in Maryland, graduated at West Point 1811, chief of Topographical Engineers July 7, 1838, rank of colonel. Upon resigning from the army, April 1, 1811, he became a lawyer, and as a private of the District of Columbia militia was engaged in the battle of Bladensburg, Md., in 1814. After his reappointment as brevet major of Topographical Engineers, Nov. 22, 1814, he was on various surveys of harbors, rivers, and coasts, and Mar. 19, 1829, placed in charge of topographical bureau, Washington, D. C., being also Indian commissioner, 1832–34, and member of several scientific, historical, and geographical societies. He was retired from active service Sept. 9, 1861, and died Jan. 27, 1863, at Washington, D. C., aged 78. G. W. CULLUM, U. S. A.

Abert (WILLIAM STRETCH), a son of Colonel J. J. Abert, was born in the District of Columbia, graduated at West Point in 1855, entered the artillery, became in 1861 captain in the Sixth Cavalry and colonel of volunteers, serving throughout the civil war with great honor, and receiving a brevet of lieutenant-colonel U. S. A. In 1867 he was made major of the Seventh Cavalry. Died at Galveston, Tex., of yellow fever, Aug. 25, 1867.

Ab'eryst'with, a market-town, seaport, and fashionable watering-place of Wales, at the mouth of the Ystwith, 34 miles N. E. of Cardigan. It has good hotels. Pop. in 1871, 6898.

Abey'ance [Norman Fr. *abbaiaunce*, "expectation;" literally, "gaping" or waiting with open mouth], a legal term signifying "in expectation or suspense." It is used to indicate the condition of property where there is no person in whom its ownership is vested. In the law of real estate it is generally applied to a fee, which is said to be in *abeyance* when there is no particular owner of the inheritance. It has been laid down that a fee can be in abeyance only while there is a freehold estate (or life interest) in the land vested in some person. It is denied by writers of high authority that a fee can be in abeyance. The tendency of modern law certainly is to discountenance this theory, and to reduce the cases of abeyance to the narrowest possible limits. The term has been applied in some instances to personal property, as in case of captures at sea in time of war, as to the title after capture and before condemnation in the prize court.

Ab'gar, or **Ab'garus** [Gr. Ἄβγαρος], written also **Abagarus, Agbarus,** and **Augarus,** a name common to several kings of Edessa, in Mesopotamia. The fourteenth of these kings, Abgar Uchomo, is said to have been in correspondence with Christ. The genuineness of this correspondence has found defenders even in the nineteenth century.

Abgil'lus (JOHN), son of the king of the Frisii, became a Christian, and accompanied Charlemagne in several of his expeditions. He received the title of Prester, or Priest, on account of the excessive severity of his life. He is not to be confounded with the Mongolian Prester John of the eleventh century.

A'bib (after the Babylonian captivity called **Nisan**), the first month of the Hebrew sacred year, and the seventh of the civil year.

Abida-Jebel, a volcanic mountain of Abyssinia, in Mudaito; lat. 10° 9′ N., lon. 41° E.

A'bies [supposed to be derived from the Lat. *ab*, "from," and *eo*, to "go," on account of the great height to which it goes or extends from the earth], the Latin name of a genus of coniferous trees which have leaves growing singly on the stem, as the fir and the spruce. The *Abies excelsa* produces the valuable timber called "white deal," also Burgundy pitch and frankincense; the *Abies balsamea* yields the balm of Gilead, or Canadian balsam. The famous cedar of Lebanon, which affords excellent timber, is called *Abies cedrus* by some botanists. Several species of *Abies* are highly prized as evergreen ornamental trees—viz., *Abies excelsa* (the Norway fir), *Abies alba* (white spruce), *Abies nobilis* (noble silver fir), *Abies pectinata* (European silver fir), and *Abies balsamea* (balsam fir). The *Abies balsamea, Abies Canadensis* (hemlock spruce), *Abies alba, Abies Fraseri*, and *Abies nigra* are natives of the Eastern U. S., while the most magnificent species of the genus, *Abies Douglasii, Abies Menziesii, Abies nobilis, Abies grandis*, and *Abies amabilis*, grow on the western coast of North America.

Ab'ila, capital of the tetrarchy of Abilene, identified, some fifty years ago, with Sûk, on the right bank of the Barada, near the point where it breaks through the Antilibanus range of mountains towards the plain of Damascus. It was on the great road between Heliopolis and Damascus, 32 miles from the former city and 18 miles from the latter. There was another Abila E. of the Jordan, a few miles S. of the Yarmuk (or Hieromax), the northern boundary of Gilead.

Abile'ne, an ancient tetrarchy, whose capital was ABILA (which see). It is impossible to fix its limits. St. Luke (iii. 1) speaks of it as the tetrarchy of Lysanias, who was apparently a son of the Lysanias mentioned by Josephus. (See KRAFFT'S "Topographie Jerusalems," 1847.)

Abilene, a post-village, capital of Dickinson co., Kan., on the Kansas River and Kansas Pacific R. R., 95 miles by railroad W. of Topeka. It has one weekly newspaper. It is a great point for shipping cattle eastward by rail.

Abim'elech ("the royal father"). I. A king of Gerar, a city of the Philistines in the time of Abraham (Gen. xx. 1, *sq.*). II. Another king of Gerar in Isaac's time (Gen. xxvi.), perhaps a son of the foregoing. III. A son of Shechem (Judges ix.), was for three years (B. C. 1322–1319) a self-constituted king over a great part of Israel.

Ab'ingdon, a market-town of England, in Berkshire, on the Ock where it joins the Isis, 51 miles W. N. W. of London. It sends a member to Parliament. Pop. of the parliamentary borough in 1871, 6583; of the municipal borough, 5805.

Abingdon, a city of Knox co., Ill., on the Chicago Burlington and Quincy R. R., 85 miles N. E. of Quincy. It is surrounded by a rich agricultural district, and is the seat of Hedding College, controlled by the Methodist Episcopal Church, and of Abingdon College, sustained by the Christian denomination. It has four hotels, three churches, one plough-factory, two steam-mills, and one wagon-factory. The city has three public parks, and one weekly newspaper. Pop. in 1870, 948.

W. H. HEATON, ED. AND PROP. "KNOX CO. DEMOCRAT."

Abingdon, a post-twp. of Harford co., Md. Pop. 2598.

Abingdon, the capital of Washington co., Va., in a township of its own name, on the Virginia and Tennessee R. R., 315 miles W. S. W. of Richmond. It has three female colleges of high grade, an extensive iron-foundry, and is the birthplace of several distinguished men. It has a weekly paper. The county was organized in 1776, and is the first spot of earth named in honor of the Father of his Country. Emory and Henry College is in this county, and a large male academy, both flourishing institutions. The Maury Literary Society of Abingdon has a valuable library. Immense deposits of salt and gypsum are found here, and a very large part of the salt used in the Southern States during the war was obtained from salt-wells bored in this vicinity. Pop. of township, 3163; of village, 715.

GEO. R. DUNN, PUB. "ABINGDON VIRGINIAN."

Abingdon, a township of Gloucester co., Va. Pop. 4506.

Abingdon, EARLS OF, Baron Norreys (1572, in the English peerage), a noble family of Great Britain. The first earl was created in 1682.—MONTAGU BERTIE, the sixth earl, was born June 19, 1808, and succeeded his father in 1854. He is lord lieutenant of Berkshire.

Ab'inger (Sir JAMES **Scarlett**), LORD, born in Jamaica, 1769, was educated at Cambridge and the Middle Temple, and was called to the bar in 1791. He became one of the most accomplished barristers of his time. In 1818 he entered Parliament as a Whig, but afterwards became a

decided Tory. In 1827, and again in 1829, he was attorney-general. He was raised to the peerage in 1834, and was appointed chief baron of the exchequer. He died April 7, 1844.

Ab'ington, a township of Mercer co., Ill. Pop. 931.

Abington, a post-township of Wayne co., Ind. P. 833.

Abington, a post-township of Plymouth co., Mass., on the Old Colony R. R., 18 miles S. by E. of Boston, has four post-villages (North, East, Centre, and South Abington), manufactures of boots, shoes, and tacks, one national and two savings banks, three weekly newspapers, eleven churches, and forty-two schools. The Hanover branch and the Abington and Bridgewater R. R. traverses this town, which is the largest in the county. Pop. 9308.

ARTHUR P. FORD, ED. "JOURNAL."

Abington, a township of Luzerne co., Pa. Pop. 2362.

Abington, a post-twp. of Montgomery co., Pa. P. 2440.

Abipones, a tribe of Indians living in the Gran Chaco, in the Argentine Confederation. They lived formerly W. of the Paraná, between lat. 28° and 30° S., between Santa Fé and Santiago del Estero, but at present have removed towards Corrientes. The Abipones are of high stature, good swimmers, and tattoo themselves. Long lances and arrows with iron points are their weapons. In 1783 their number was estimated at 5000, but they have been reduced to 100 at the present day. They are related to the Tobas.

Abka'sia, or **Aba'sia,** a narrow territory in Western Asia, belonging to Russia, lies between the Caucasus Mountains and the Black Sea, which bounds it on the S. W. Area, estimated at 3486 square miles. Pop. about 80,000. The inhabitants, under the emperor Justinian, became Christians, but subsequently embraced Mohammedanism.

Ab'lution [Lat. *ablutio*, from *ab*, "from," and *lu'o*, *lu'tum*, to "wash"], a religious ceremony of the Roman Catholic Church, signifies the washing of the sacramental cup and of the hands of the priest.

Abna'ki, or **Abenaqui,** frequently called **Tarrantenes** or **Taranseens,** a name given to the former tribes of Algonquin Indians of Maine and vicinity. They were once formidable enemies of the Indians of Southern New England and of the colonists, siding with the French against the English, but the latter overcame them and expatriated the greater part. Their remnants are Catholics, their ancestors having been converted by the labor of Sébastien Rale (1658–1724) and others. Rale compiled a dictionary of their language (published in 1833). Their history has been written by Maurault (1866) and by Vetromile (1866).

Ab'ner (the "enlightener"), the uncle of Saul, the first king of Israel. Abner became commander-in-chief of Saul's army, and for some time after the death of the king he was the chief support of Ishbosheth, his successor; but subsequently went over to the side of David, then king of Judah. With David he found such favor that the jealousy of Joab was aroused, and Abner was slain by him B. C. 1046.

Åbo [Sw. pronunciation, ō'boo], a Russian city and seaport, on the Aurajoki near its entrance into the Gulf of Bothnia; lat. 60° 26′ 58″ N., lon. 22° 17′ E. It was built by Eric IX. of Sweden in 1157, was subsequently taken by the Russians, and in 1809 was, with the whole of Finland, ceded to Russia. It was the capital of Finland until 1819, and is now the see of a Lutheran archbishop. The University of Åbo, having been destroyed by fire in 1827, was rebuilt at Helsingfors. Pop. in 1867, 18,109.

Åbo-Björneborg, a government of Finland, is bounded by the governments of Wasa and Tawastehus, and by the Gulfs of Finland and of Bothnia. Area, 9895 square miles. The chief occupation of the inhabitants is commerce and shipbuilding. The government has also some factories. Pop. in 1867, 319,784. Chief town, Åbo.

Åbo, Peace of, concluded August 17, 1743, between Sweden and Russia, put an end to the war begun by Sweden at the instigation of France in 1741. During this contest, and through the misconduct of the Swedish generals, the Russians gained entire possession of Finland. The greater part of this territory they offered to restore on condition that Sweden should elect the prince of Holstein-Gottorp successor to the throne. This condition the Swedes complied with, and the treaty of peace was accordingly signed at Åbo.

Aboite, a post-township of Allen co., Ind. Pop. 906.

Abolition of Slavery. Ancient servitude of the constrained, involuntary kind appears to have risen, flourished, decayed, and passed away without provoking any organized moral or religious opposition. That, so far at least as Europe was affected, was irrespective of race or color; for, though the Egyptians and Arabs bought and held negro slaves, they were not known in Europe till introduced into Spain by the Moorish invasion and conquest. After the slavery of negroes had been firmly planted in, and quite generally diffused over, the New World, slaves began to be taken to Europe by their American masters, and legal opinions for a time affirmed the validity of their bondage in countries where no law forbade it; but this was arrested, so far at least as Great Britain was concerned, by the famous decision of Lord Mansfield, who, in the case of the negro Somerset, brought to England from the West Indies by his master, held that slavery can only exist by virtue of positive law, and that, there being no such law in England, the master, though a Briton, forfeited all right in and power over him by taking him to that country.

The first systematic agitation for the overthrow of slavery began with certain American Quakers—John Woolman and Anthony Benezet of Philadelphia being conspicuous among them—about the middle of the last century. Benezet published in 1762 a book in exposure and denunciation of the slave-trade. His friend William Dillwyn removed to England some time afterwards, and there enlisted Granville Sharpe and others in the cause. The agitation soon after arising in this country against the Stamp Act and other arbitrary measures of the British government, incited many Americans to consider questions of natural right, and thus to condemn and oppose slavery. Hence, Thomas Jefferson, himself a slaveholder, yet opposed to slavery, had no difficulty in inducing a majority (sixteen to seven) of the Congress which met next after the acknowledgment of our independence to vote to exclude slavery (in March, 1784) absolutely and for ever from all the Union not included in any State. The proposition did not then prevail, since the votes of a majority (seven) of all the States were required to enact it, and the absence of a delegate from New Jersey reduced the States voting yea to *six*, against three voting nay — North Carolina being divided. The proposition, restricted to an inhibition of slavery in the territories already ceded by the States to the Confederation, was renewed in 1787, when it was unanimously passed, and it was reiterated with like unanimity by the first Congress which assembled under the Federal Constitution, when it received the approval of President Washington.

Meantime, the convention which formed that Constitution had authorized Congress to prohibit the importation of slaves after twenty years; and this was done—Congress having forbidden, in 1794, our people to engage in carrying slaves to other lands, absolutely outlawing all participation in the slave-trade by our people, and all importation of slaves into this country, by an act passed March 2, 1807—twenty-three days *before* the British Parliament, after a struggle which had lasted nearly a quarter of a century, did likewise.

A British society for the suppression of the slave-trade was organized by Dillwyn, Granville Sharpe, and Thomas Clarkson in 1787, to whom William Wilberforce, already in Parliament, soon lent his powerful aid. William Pitt, then prime minister, admitted the justice of their cause, and gave them a cold and hesitating support; Charles James Fox, his great rival, was its hearty supporter; so was Edmund Burke. Yet bill after bill for the suppression was defeated either directly or by postponement until after Pitt's death and Fox's accession to the premiership, when (in June, 1806) a resolve pledging the House to the measure passed the Commons by 100 yeas to 41 nays, and a bill founded thereon was next winter carried through both Houses, and received the royal assent Mar. 25, 1807.

Great Britain was slowly followed in this step by Sweden, Denmark, Holland, France, and several of the South American republics. Spain and Portugal reluctantly promised to do likewise, but were tardy in fulfilling their compact, even though they had accepted money or favor from Great Britain as a consideration therefor. The slave-trade was first declared a felony by act of Parliament in 1811, while acts passed in 1824 and 1837 made it piracy, punishable by transportation for life.

So soon as the slave-trade had been placed under the ban of the law, its British adversaries reorganized for a war upon slavery itself, against which they had hitherto put forth no combined or systematic efforts. Mr. Wilberforce presented their petition to the House of Commons in 1823, when it was defeated; Mr. Brougham took the lead in their behalf in 1830; and the struggle for parliamentary reform which followed the death of George IV. and the accession of William IV. brought a large adhesion of strength to their cause; so that in May, 1833, Mr. Stanley (the late earl of Derby) introduced, as secretary for the colonies, resolves which proposed the total (though gradual) emancipation of the slaves held in the British colonies, and a payment to their owners of £20,000,000. These resolves passed both Houses, and were followed by a bill of like tenor, which likewise passed and received the royal assent Aug. 2, 1833. It took effect Aug. 1, 1834, but an

apprenticeship system was engrafted upon the measure, whereby the slavery of some was virtually prolonged for four, and that of others for six years. Experience proved this apprenticeship tainted with all the vices of slavery, relieved by scarcely any of its advantages; so the last traces of slavery were, by common consent, effaced from British soil Aug. 1, 1838.

The more northern of our States are justly entitled to the credit of having first in modern times discerned and proclaimed the wrong and mischief of slaveholding. Abolition received in Great Britain powerful and, for a time, commanding influence in Church and State; but the slaveholders were distant colonists, not directly represented in Parliament, and their defeat would not disturb the existing social order in the mother-country. Not so in the original New England States, New York, New Jersey, and Pennsylvania. Rhode Island, then eminently commercial, was long the focus of an extensive slave-trade, wherein some of her first families were involved; and slaves were held as firmly, though not so numerously, in New York and Pennsylvania as in Virginia and the Carolinas before the Revolution. Soon after the Declaration of Independence, Massachusetts adopted a bill of rights, which her highest court soon decided was incompatible with slavery, which was thereby outlawed. In Pennsylvania an abolition society, whereof Dr. Franklin was a member, was organized in 1780, and did not cease its earnest efforts until it had seen that State made a home for freemen only. In New York a similar organization was effected somewhat later, and the State was brought to decree the emancipation of her slaves by the constitution of 1821, though, with regard to some who were then minors, the liberation did not take effect till about 1830. In New Jersey the work was still more gradual, but hardly a handful were held in a nominal bondage after that date. Slavery had ceased to be a power north of Delaware and Maryland as early as 1820, save through the political, commercial, and social ligaments which bound the North and the South closely together, and made the wishes and supposed interests of the latter potent throughout the former.

As in England the early efforts of the abolitionists were directed against the African slave-trade exclusively, and a general crusade against slavery disclaimed, so in this country the anti-slavery spirit was long contented with resisting the extension of slavery into regions previously unscourged by it. There were, indeed, unconditional abolitionists, of whom Benjamin Lundy, William Lloyd Garrison, Alvan Stewart, Nathaniel P. Rogers, Lewis Tappan, and Elijah P. Lovejoy may be deemed representative pioneers; but their school was limited in numbers, and had little immediate influence on legislation or government, since an overwhelming majority of those earnestly opposed to slavery held that the spirit, if not the letter, of the Federal Constitution forbade all interference by Congress with the internal polity of a State, and restricted to moral influence the efforts of the citizens of one State to subvert or modify the institutions of another State. But when, in 1818, the Territory of Missouri framed a constitution and applied for admission into the Union as a State—said constitution recognizing and upholding slavery—the representatives of the free States very generally resisted such admission until she should provide at least for gradual emancipation. The Senate opposed any such restrictions, but a compromise was ultimately effected whereby Missouri was admitted as a slave State on condition that slavery should never exist in any territory of the U. S. north of the parallel of 36° 30′ N. latitude. The House consented to this by barely three majority (90 to 87), nearly all the nays being cast by Northern opponents of slavery. (See MISSOURI COMPROMISE.) On the admission of the republic of Texas into the Union in 1845 the Missouri Compromise line of division was agreed upon and extended through all the public domain then acquired. In 1846, pending the war with Mexico, Mr. David Wilmot of Pennsylvania introduced into the House a proposition to prohibit for ever slavery from all new territory that might be acquired from Mexico, at the termination of that war. This proposition became celebrated as the Wilmot Proviso, and gave rise to continued and heated discussions in the House and the Senate until 1850, when another compromise, as it was called, was effected. (See SLAVERY COMPROMISE OF 1850.) The agitation was renewed again in 1854, when a bill was introduced into the Senate by the Hon. Stephen A. Douglas for the organization of State governments in the Territories of Kansas and Nebraska, and providing for the repeal of the so-called Missouri Compromise act of 1820. The bill was adopted by the Senate by a large majority, but in the House it encountered very strong opposition, passing finally by a vote of 113 to 100. The question whether slavery should exist within the States to be formed under this act was thus referred to the people of the Territories themselves, and was left to be decided by what, in the popular parlance of that day, was called "squatter sovereignty." As the Territories were thinly peopled, there consequently arose a rapid migration towards them, especially towards Kansas, from both North and South, each section aiming to secure a predominance in the popular vote and in the constitutional convention. Occasional collisions between these rival colonists naturally occurred, attended in some instances with serious violence; and the struggle for power was protracted through several years. Both parties prepared and presented constitutions to Congress embodying their respective views. The election of Mr. Lincoln as President in 1860 finally decided the controversy, and Kansas was admitted as a free State in 1861. The same event occasioned the withdrawal from their seats in Congress of the Senators and members of the House from seven of the Southern States, and gave the advocates of slavery restriction by Federal legislation a majority in the Senate for the first time since the government was organized. The House was still more decidedly anti-slavery. As the war went on, defeats, even more than victories, diffused and intensified among Unionists the hatred of slavery; so that when Mr. Lincoln (Sept. 22, 1862) proclaimed that if the revolted States should still continue in rebellion he would, on the 1st of January ensuing, declare free all who were held as slaves within those States, public sentiment was ripe for sustaining that policy. Secession being still rampant, the President issued his second proclamation on the day appointed; after which no Federal commander was at liberty to remand slaves who had fled from their masters to find protection within the Union lines. From that date the war for the Union became, what in essence it had necessarily been from the outset, a struggle for freedom to all, and European rulers, who had smiled upon the Confederacy in the earlier stages of the contest, were repelled from taking its part openly when it was seen that its fate involved that of American slavery.

The Thirty-seventh Congress initiated the work of direct, outright emancipation by an act proposed by Senator Wilson of Massachusetts, abolishing slavery in the Federal District, and paying the owners an average compensation of $300 for each slave liberated. This bill passed the Senate, April 3, 1862, by 29 yeas to 14 nays, and the House, April 10, by 92 yeas to 39 nays. This was followed by an attempt to proffer a like compensation to the so-called Border States if they would consent to emancipation; but it was strenuously opposed by their representatives and by the entire Democratic party, and ultimately failed in the House for lack of a two-third vote to take it up out of its order on the last day of the session. A bill prohibiting absolutely all slaveholding in any Federal territory became a law, by the President's approval, June 19, 1862. A bill decreeing the freedom of all slaves of persistent rebels found in any place occupied or commanded by the forces of the Union, forbidding their rendition to their masters, and providing that negroes might be enlisted to fight for the Union, after undergoing sundry transmutations ultimately passed the House by 82 yeas to 42 nays, and the Senate by 27 yeas to 12 nays, and became a law, by the President's approval, July 17, 1862.

A constitutional amendment (the thirteenth), abolishing and prohibiting evermore the enslavement of human beings, was proposed in the Senate by Mr. Henderson of Missouri at the former session, when it passed that branch, April 8, 1864, by 38 yeas to 6 nays—six Senators not voting. Being sent to the House, it failed to command the requisite two-thirds—yeas, 85; nays, 66; when Mr. Ashley of Ohio kept it alive by changing his vote to nay and then moving a reconsideration. When that Congress reassembled, Dec. 6, 1864, for its final session, Mr. Lincoln had been triumphantly re-elected and the civil war was plainly near its end. The President, in his annual message, recommended a reconsideration and passage of the amendment aforesaid; and this was accomplished, Jan. 31, 1865, by 119 yeas to 57 nays—12 chosen as Democrats or Conservatives voting with all the Republicans in the affirmative—every Republican present and voting; eight Democrats absent. By the ratification of three-fourths of the States, and by the utter collapse of the civil war, this amendment became a part of the supreme law of the land, and its authority has never been contested. By its force slavery was banished from the U. S., as it had already been from every portion of this continent except Brazil and the Spanish islands of Cuba and Porto Rico. In Brazil an act was passed in Sept., 1871, freeing all the slaves belonging to the government, and securing freedom to all those born after the date of the enactment. (There has not yet been published any complete history of the abolition of slavery; the best work on the abolition of the slave-trade is CLARKSON'S "History of the Abolition of the Slave-Trade," 2 vols., 1808.)

HORACE GREELEY.

Aboli″tionists, a name applied to those persons—more particularly in the U. S.—who were distinguished for their zeal against the institution of slavery. (See ANTI-SLAVERY SOCIETY, by HON. HORACE GREELEY, LL.D.)

Abo′mey, an African town, capital of the kingdom of Dahomey; lat. 7° 30′ N., lon. 1° 40′ E. It contains several royal palaces. Pop. estimated at from 50,000 to 60,000.

Abo′ny, a town of Hungary, in the county of Csongrad, 47 miles S. E. of Prague. Pop. in 1869, 10,232.

Aborig′i-nes [a Latin word derived from *ab*, "from," and *ori′go* (gen. *ori′ginis*), "source," "origin"], the earliest original inhabitants of a country—that is, those who occupied it at the period when it began to be known, and who either were (according to a once prevalent opinion) indigenous to the soil, or had immigrated thither before the dawn of history. Some of the ancients supposed they had always inhabited the same soil, and sprang from it, as the Athenians, who thence called themselves *autoch′thones* (from αὐτός, "itself," and χθών, "earth," "soil," "land"); *i. e.* sprung from the land or soil itself. But the Romans and modern nations use the word aborigines to designate those inhabitants of a country of whose origin nothing certain is known. Thus the Indians of America are properly called aborigines, because they were found there at its discovery, and as to their origin we have only their own tradition (which is not uniform) that their ancestors came from a distant region in the North-west.

Abor′tion [Lat. *abortio*], the premature birth or exclusion of the human fœtus. It is doubtful whether the act of causing an abortion is an offence at common law unless the mother is quick with child, on the untenable ground that life does not begin until that period. The early statutes took the same distinction. Later legislation in England wholly discards it, and makes it a felony to procure the miscarriage of a female by unlawful means at any period of her pregnancy. The laws of the various States in this country still maintain to some extent the older rule.

About (EDMOND), a popular French novelist and political writer, born at Dieuze (Meurthe) Feb. 14, 1828. In 1868 he wrote, as one of the contributors to the "Gaulois," a series of witty and satirical letters, in consequence of which that paper was suppressed by the authorities; but he was nevertheless assisted by the imperial government, which in 1870 appointed him councillor of state. At the beginning of the war he was for a short time war-correspondent for the "Soir." Sept. 14, 1872, he was arrested by the Germans, but was released Sept. 21. He published in 1855 a work on modern Greece, "La Grèce contemporaine," which was much admired. He had been sent to the French school of art in Athens by his government. Among his works are novels entitled "Tolla" (1855), "Germaine" (1857), a political treatise on "The Roman Question" (1860), "Madelon" (1863), "Le Progrès" (1864), "La vieille roche" (3 vols., 1865–66), "L'infame" (1867), "Les mariages de province" (1868), "L'A B C du travailleur" (1868).

Aboville (FRANÇOIS MARIE), COUNT, a French general, born at Brest Jan. 23, 1730. He directed the artillery at Yorktown, Va., in 1781, and was inspector-general of artillery under Napoleon I. Died Nov. 1, 1819.

Abrabanel′, or **Abarbanel′,** sometimes written **Barbanella** (ISAAC), a celebrated Spanish rabbi, born in Lisbon in 1437, was liberally educated. He was greatly distinguished for his intellectual powers and various erudition. Having been banished from Portugal in 1481, he found refuge in Spain until 1492, when the Jews were expatriated from that kingdom. He died at Venice in 1508. His commentaries on the Holy Scriptures were once highly esteemed.

Abracadab′ra, a term probably of Persian origin, was in former times highly prized as a magical formula, and supposed to be efficacious in the cure of fevers.

A′braham, originally **Abram,** an eminent Hebrew patriarch, called the "Father of the faithful," was born at Ur, in Chaldea, according to Hales, 2153 B. C.; according to Ussher, 1996 B. C. (Bunsen says he lived about 2850 B. C.). "Abraham" signifies "the father of a numerous people." He migrated to Canaan, where he led a nomadic life in tents, was greatly renowned for piety and wisdom, and was called a friend of God. He died at the age of 175 years. (See Genesis xi.–xxv.; Acts vii.; Hebrews xi. 8–17.)

A′braham-a-Sanc′ta-Cla′ra, a popular German preacher and Augustine friar, whose name was ULRICH MEGERLE, was born in Suabia June 4, 1644. He was appointed preacher to the imperial court at Vienna in 1669, and published many religious works. His sermons were seasoned with witty, humorous, or whimsical expressions. Died Dec. 1, 1709.

A′brahamites, the name of a sect of Bohemian deists, who are said to have rejected all parts of the Bible except the Ten Commandments and the Lord's Prayer. They were suppressed in 1783.

A′braham Osh′ki, a Jew of Portuguese descent, who translated the Bible, word for word, into Spanish. It was published in 1553 at Ferrara, and although the first edition is now seldom met with, it is still esteemed in Spain both by Christians and Jews.

Abran′tes, a fortified town of Portugal, in Estremadura, on the Tagus, 73 miles N. E. of Lisbon. Grain, oil, and fruit are sent from it to the market of Lisbon. Pop. in 1863, 5590.

Abrantes, DUKE OF. See JUNOT.

Abrantes, DUCHESS OF (Madame JUNOT), born in Montpellier Nov. 6, 1784, was married to General Junot about 1800. Her family was related to that of Bonaparte, to whom her mother had shown great kindness before he became a general. In 1806 she accompanied her husband to Lisbon, and in 1807 General Junot was made duke of Abrantes. On the restoration of the Bourbons she was kindly received by Louis XVIII. She distinguished herself as an authoress, and wrote, besides other works, "Memoirs, or Historical Souvenirs of Napoleon, the Revolution, the Directory," etc. (18 vols., 1831–34). Died June 7, 1838.

Abrax′as Stones, the name of certain gems (found in Syria and Egypt) on which are engraved the word Abraxas and several symbols or fantastic figures. They were once prized as amulets and talismans.

Abridg′ment [Fr. *abréger*, to "shorten"], a condensation or compendium of a book or literary work. In the law of copyright an abridgment, when fairly made, is regarded as a new work, and accordingly its publication is not an infringement of the copyright. A distinction is taken in the legal decisions between an abridgment and a compilation. The latter is more readily regarded as an infringement, as the words of an author are reproduced, while in a true abridgment the thoughts are expressed in other words and in a condensed form.

Abro′lhos (*i. e.* "open your eyes"), a group of small rocky islands which belong to the province of Espirito Santo, Brazil. The largest of these, Santa Barbara, 40 miles from the coast, has a lighthouse in lat. 17° 58′ S., lon. 38° 42′ W.

Abru′zzo, the northern part of the former kingdom of Naples, but now included in the kingdom of Italy. It is bounded on the N. E. by the Adriatic. It is divided into three provinces—viz. Chieti, formerly called Abruzzo Citeriore (or Citra); Teramo, formerly Abruzzo Ulteriore (or Ultra) I.; and Aquila, formerly Abruzzo Ulteriore II.

Ab′salom, the third son of King David, by Maacah, a Syrian princess, was remarkable for his personal beauty. Having, by his popular arts and fair speeches, gained the favor of the people, he rebelled against his father and raised a large army, which was defeated by the army of the king. Retreating from this battle, Absalom was killed by Joab, although David had given orders that his life should be spared. (See 2 Samuel xiii.–xix.)

Ab′salon, called also **Axel,** an eminent prelate and general, born in Iceland in 1128, was a liberal patron of learning, and was distinguished for his wisdom in council. He was one of the ministers of the Danish king Waldemar I., and became archbishop of Lund in 1178. Died in 1201.

Ab′scess [Lat. *absces′sus*, from *abs*, "away from," and *ce′do*, to "go," because the pus separates itself from the rest of the body], in surgery, is a circumscribed collection of pus in any part of the animal organism, as distinguished from "purulent infiltration," which designates such a collection not circumscribed. The term "diffuse abscess" is, however, applied, though improperly, to purulent infiltration. An "acute abscess" is one which is the result of active inflammation. "Cold abscess" is the result of chronic inflammation. The tendency of an acute abscess is to "point" or "come to a head;" that is, from the outward pressure of the accumulating pus, the walls yield mechanically in the direction of least resistance. In favorable cases the evacuation of the pus, natural or artificial, is the initiation of recovery; but if the abscess be of the "cold" variety, or be deep-seated and extensive, or be associated with metastatic symptoms or septicæmia, the question of recovery becomes a much more complicated one. Deep-seated abscesses, when they traverse considerable tracts of the body and "point" at a distant part, are called "congestive abscesses"—a term which is very properly passing out of use. Such abscesses are often for a long time difficult of detection, and their treatment taxes, too often in vain, the best skill of the surgeon. In general, abscess is detected by observation of the general and local symptoms. The general symptoms are fever and subsequent rigors; the

local are "pain, heat, redness, and swelling," followed by softness and fluctuation of the fluid contents. (See Pus.)

Abscis'sa [from the Lat. *abscindo, abscissum*, to "cut off"], a term used in geometry to denote a segment cut off from a straight line by an ordinate to a curve.

Abse'cum, or **Absecom,** a post-village of Atlantic co., N. J., on the Camden and Atlantic R. R., and near Absecum Bay, 7 miles N. W. of Atlantic City. Absecum lighthouse is a brick structure, standing on the S. side of Absecum Inlet; lat. 39° 21′ 55″ N., lon. 74° 24′ 32″ W. It shows a fixed white dioptric light of the first order, 165 feet above the sea.

Absentee, a term applied to capitalists and proprietors of land who do not reside on their estates, but spend their incomes in other countries. This practice is very prevalent among the Irish nobility and gentry, and some political economists ascribe the poverty of Ireland partly to this absenteeism.

Absinthe [Fr. for "wormwood"], a liqueur much used in France, prepared from alcohol mixed with volatile oil of wormwood, oil of anise, and other ingredients. It has peculiarly intoxicating effects, which are due to the oil of wormwood, the state resulting from its use being very different from the result of alcohol poisoning. Trembling, vertigo, fearful dreams, and epileptiform convulsions are among its severer consequences. Absinthe-drinking is one of the most dangerous forms of stimulation yet invented—the more so because its immediate consequences are usually more agreeable than those of alcohol.

Ab'sis, or **Ap'sis** [Gr. ἁψις, an "arch"], a name given formerly to that part of a church in which the clergy were seated or the altar was placed. It was either circular or polygonal on the plan, and covered with a dome.

Ab'solute [from the Lat. *ab*, "from," and *solu'tus*, "loosed," a "part" (from *sol'vo, solu'tum*, to "loose")], originally, loosed or freed from all conditions, absolutely independent; hence, positive, unconditional, unlimited. As a scientific term it is the reverse of relative, as *absolute velocity*. In metaphysics it represents the unconditioned infinite and self-existent. Absolute monarchy is that which is not limited or restricted by constitutional checks.

Absolute Alcohol. See Alcohol, by C. F. Chandler.

Absolu'tion [Lat. *absolutio*], in canon law, is the pardon and remission of sins which a Roman Catholic priest pronounces to a penitent offender.

Absor'bents [for etymology, see Absorption], a term applied to a set of vessels of a peculiar character in the animal body. (See Lymphatics.)

Abso'rokas, a tribe of American savages. (See Crows.)

Absorp'tion [Lat. *absorp'tio*, from *ab*, "from," and *sor'beo, sorp'tum*, to "sip or suck"] is the function by which nutritive matter is absorbed into an animal or plant. Plants absorb carbonic acid gas by their leaves and other green parts, and it is supposed that this absorption takes place principally through the *stomata* of the leaves, and both by the upper and under surface of the leaf; in some plants much more powerfully by the one surface than by the other. But plants also derive their nourishment partially, although not principally, from their roots, and it is at the extremities of their fibrils that absorption takes place most rapidly, by capillary attraction and a process called Endosmose (which see). Absorption in animals is known to be largely by endosmose, and that process, mechanical rather than vital, is affected, it is believed, only indirectly by the nervous energy.

Abs'tinence [from *abs*, "from," and *te'neo*, to "hold," to "keep"], the act or state of abstaining from food, drink, etc.

Abstinence, Total, that is, from all indulgence in the use of intoxicating beverages, was practised in early ages by the Nazarites and Rechabites, mentioned in Scripture. Some of the Hebrew prophets rigorously inveigh against the prevalence of drunkenness, yet hardly indicate total abstinence as the proper remedy. The Essenes (which see)—a Jewish sect contemporary with the Messiah—were distinguished for temperance in eating and drinking, eschewing generally the use of flesh and wine. Mohammed peremptorily forbade the use of wine as a beverage by his followers. In the feudal ages, societies designed to shield their members and others from the evils of drunkenness were often formed, but not on the basis of absolute disuse of stimulants. The discovery of alcohol by an Arabian chemist about 1000 A. D. had, through the art of distillation, greatly expanded and intensified the evils of intemperance, especially in Northern Europe, where beer had generally been the most potent stimulant attainable by the masses. The discovery and settlement of America, largely increasing the average rewards of manual labor, especially on this continent, rendered intemperance more common, by increasing the ability of the common people to purchase alcoholic stimulants; and this country, especially throughout the half century succeeding its Declaration of Independence, was hardly equalled in the prevalence of intoxication even by the British and Scandinavian kingdoms, and was unapproached by any other nation.

The earliest known organization of a total abstinence society in the U. S. was "The Temperate Society of Milton and Northumberland" (Saratoga co., N. Y.), founded by Dr. Billy J. Clarke in 1808, which at its commencement had forty-three members. Distilled liquors and wines were absolutely prohibited by its rules, but not the moderate use of beer. In 1813 was formed the "Massachusetts Society" for the suppression of intemperance. In 1826 the American Temperance Society was organized. The evils resulting from the free use of ardent spirits were so general and glaring that kindred societies were soon formed in many cities, villages, and rural townships, the movement being strongly aided, especially among zealous Christians, by Dr. Lyman Beecher's "Six Sermons on Intemperance." Dr: Eliphalet Nott, president of Union College, was also early and honorably distinguished as a pioneer in the temperance cause. It was not till 1833 that, at a national meeting of the friends of temperance, held in Philadelphia, the principle of "total abstinence from all that may intoxicate" was propounded, only to be voted down; but it was again proposed, and adopted, at a national convention held at Saratoga Springs in August, 1836, and became henceforth the basis of the temperance movement, to which a great impulse was given by the "Washingtonians" (in good part reformed drunkards), who began their work in 1841, and for a time seemed destined to sweep all before them. The first State to prohibit the sale of intoxicating beverages was Maine, in 1851. The other New England States soon followed her example. New York had already (in 1846) authorized the voters of her several cities and townships to forbid such sale by a popular vote; but her court of appeals pronounced this unconstitutional, as it likewise did (in 1859) a law of absolute prohibition enacted in 1855. Chief-Justice Shaw of Massachusetts held that every citizen injured or annoyed by the proximity of a grogshop might lawfully abate it as a nuisance, but his two associates, on appeal, overruled him.

Partial, if not general, prohibition was enacted in several Western States, but here, as elsewhere, most imperfectly enforced. The Washingtonian effort gradually spent its strength and faded out, being succeeded by new organizations, whereof the "Sons of Temperance," "Good Templars," "Rechabites," "Good Samaritans," and "Cadets of Temperance" are still active and flourishing.

The total abstinence movement in Great Britain first attracted public attention in 1831. The "pledge" to drink no intoxicating liquors was first adopted by a national gathering at Manchester in 1834. It has never yet become so influential in that as in this country, and its upholders have only ventured to ask of Parliament a "permissive" act—that is, one allowing any locality to forbid and outlaw the liquor traffic by a majority vote—and this has never been conceded. The votaries of total abstinence in Great Britain are generally found in the humbler walks of life.

In Ireland total abstinence was first effectively commended by Father Mathew, who, by his simple expositions and exhortations, persuaded millions of his countrymen and fellow-Catholics to take the pledge, which many of them have since broken. Since his death, in 1856, the reform has decidedly lost ground in Ireland, while it has as yet made little headway in any part of Continental Europe or South America. Horace Greeley.

Abstinents, a Christian sect of Gaul and Spain in the latter part of the third century A. D., who condemned marriage and the use of flesh-meats and wine, declaring that they were made by the devil, and not by God.

Ab'stract [from the Lat. *abs*, "from," and *tra'ho, trac'tum*, to "draw"], literally, that which is drawn away or separated (or viewed separately) from all external circumstances or conditions, and hence opposed to Concrete (which see).

Abstrac'tion (see preceding article), the intellectual process by which the mind separates one of the attributes of an object from the others, and thinks of it exclusively. An idea or notion of an abstract or theoretical nature is sometimes called an abstraction.

Abstract Science (metaphysics, logic, mathematics) starts from a proposition, not derived from experience, but found as an axiom in the human understanding; from which proposition a whole system is evolved by inference and deduction. All discoveries, as far as they are not incidental, are made by application of abstract science (experiment), as all inventions are made by application of knowledge of the real object (experience).

Absurd'um, Reduc'tio ad, a term used in geometry to denote a mode of demonstration, in which the truth of a proposition is demonstrated by proving that the contrary is absurd or impossible.

Abt (FRANZ), a German composer, born at Eilenburg Dec. 22, 1819. He became in 1855 first chapelmaster to the duke of Brunswick. His works are chiefly songs, which enjoy great popularity in Germany and the U. S.

Abu (also written in English *Aboo*), an Arabic word, signifying "father," occurs as a prefix to many Oriental names.

Abu, a mountain of India, in Rajpootana, connected with the Aravulli range, is about 5000 feet above the level of the sea. It is a celebrated place of pilgrimage for the Jainas, who have four temples at Dilwara, near the middle of the mountain. One of these is said to be the most superb of all the temples of India.

Abubekr', or **Aboo-Bekr,** a caliph, the first of Mohammed's successors, was born in Arabia about 570 A. D. His original name was ABD-EL-KAABA, which was exchanged for ABOO-BEKR (*i. e.* "father of the virgin"), because his virgin daughter Ayesha was married to the prophet. He began to reign in 632 A. D., and died in 634, leaving a high reputation as a man and a ruler.

Abugirgeh, a large Fellah town of Middle Egypt, about 2 miles W. of the Nile and 122 miles above Cairo.

Abukir', a village of Egypt, on the site of the ancient Canopus, and on the sea-coast at the west side of Abukir Bay, 15 miles N. E. of Alexandria. Here is a castle.

Abukir Bay is on the coast of Lower Egypt, between the village and castle of Abukir and the Rosetta mouth of the Nile. In this bay Admiral Nelson gained a decisive victory over the French fleet, Aug. 1, 1798, and the Turks were defeated by the French under Napoleon I., July 25, 1799.

Abulca'sis, or **Abulka'sis,** written also **Abul-Kasem, Khalaf Ebn Abbas,** a celebrated Arab physician and surgical writer, born near Córdova, in Spain. His principal work was published in 1778, under the title of "Abulcasis de Chirurgia." The portion of it devoted to surgery is regarded as the most valuable treatise of the kind that has come down to us from early times. Died about 1110.

Abulfa'raj [Lat. *Abulfara'gius*] (GREGORIUS), a learned historical writer, born in Armenia in 1226, became maphrian or primate of the eastern division of the Jacobite Christians in 1266. He wrote in Syriac and Arabic several valuable works, among which is a "History of the Dynasties." Died in 1286.—There was also a famous Oriental poet, Ali Abulfaraj (897–997).

Abul-Fazl, an eminent Oriental historian, who in 1574 became vizier or prime minister of the great Mogul emperor Akbar. He was a wise and liberal statesman. He was assassinated about 1600. Among his important works are a history of Akbar, called "Akbar Nameh," and "Institutes of Akbar" ("Ayeen Akbari").

Abulfe'da, a Moslem prince and celebrated Arabian author, was born at Damascus about 1273. He fought with distinction for the sultan of Syria against the Tartars or Mongols, and was rewarded with the title of prince of Hamah. He wrote an important work entitled "An Abridgment of the History of Mankind," and another, "The Description of the Countries," which is regarded as the best Arabic work on geography that is extant. Died in 1331.

Abu Sambul, Abusimbal, or **Ipsambul,** a ruined place in Nubia, on the W. bank of the Nile, 1014 miles above Cairo and 8 miles above the Second Cataract. It contains two of the best-preserved specimens of the great rock-hewn temples of ancient Egypt. It has also four sitting colossal statues, which are not only the largest, but are considered the finest, specimens of Egyptian plastic art. One of these figures is fifty feet high as it sits.

Abutment, the part of a pier or wall from which an arch springs, and which resists the lateral or outward pressure. (See BRIDGE, by GEN. J. G. BARNARD, U. S. A.)

Aby'dos, an ancient city of Upper Egypt, on the left bank of the Nile, 5 or 6 miles from the river, and about 100 miles below Thebes. Here are the ruins of a temple of Osiris and a temple of Memnon, in which Mr. Bankes discovered in 1818 the celebrated tablet of Abydos, now in the British Museum.

Aby'dus, or **Aby'dos** [Gr. Ἄβυδος], an ancient city of Asia Minor, on the Hellespont opposite Sestos, was celebrated as the place where Xerxes and his vast army crossed over to Europe on a bridge of boats, 480 B. C. It was also celebrated for its connection with the story of Hero and Leander.

Ab'yla and **Cal'pe,** the names of the pillars of Hercules, standing on both sides of the Straits of Gibraltar. The former was in Africa.

Abyssin'ia [Arab. *Habesh*], in a wider sense, is the name commonly given by European geographers to the entire Ethiopic plateau which rises on the W. of the Red Sea, extending to the S. W., and descending on the N. to the lowlands of Nubia, and on the W. to the plains of Sennaar and Kordofan. On the E. it is bounded by Adal, and the southern part, which is as yet almost entirely unexplored, extends for an unknown distance into the interior of Africa. The population is estimated by the Catholic bishop of Massaja at 12,000,000, of which over 9,000,000 are Sidamas and Gallas.

Abyssinia, in a more limited application, comprises the three former kingdoms of Tigre, Amhara, and Shoa. It is bounded on the N. E. by the Red Sea, on the S. by the country of the Gallas, and on the N. W. by Nubia. Its area is estimated at about 158,000 square miles, and the population at 4,000,000. The country ascends from the W. in broad terraces, which in the E. descend abruptly, and reach a height, in some places, of 8000 feet. The plateaus are encircled by mountain-ranges of 12,000 to 14,000 feet in height. The low and waterless district of the savage Danakil tribes separates the fissured plateau, with its mighty streams and ravines (which occasionally widen into deep valleys), from the sea, which is only accessible from three points—Massowa, in the N., Amphilla Bay, about 100 miles farther to the S. E., and Tajurrah, in the S. The hydrographic centre of the country is Lake Tsana or Dembea, which is crossed by the Abai, the chief river of Abyssinia. The next river of importance is the Atbara, which flows in a north-westerly direction towards the Nile, and receives the Tacazze from the S. E. The beds of the upper Abai, of the Atbara, and of the Tacazze are surrounded by three mountain-ranges, of which that in the E. of the upper Tacazze forms the orographic crown of the country. The mountains consist mostly of porphyry, basalt, and limestone. Its wild, romantic character the country owes to a grand volcanic action of the later tertiary period. The hot springs in the interior, occasional eruptions on the coast of the Red Sea, as well as earthquakes (1854), prove that volcanic action is not entirely extinct as yet. The surface of the country is, however, subject to much greater changes to-day in consequence of the action of the mountain-streams, which for thousands of years have carried to the valley of the Nile the fertile soil of the plateaus. Deeper and deeper they dig into the rocks, and transform the narrow ravines into broad valleys. The vegetation of the valleys is of an exceedingly luxuriant, tropical character. But in consequence of fevers, serpents, and beasts of prey it is not well adapted to habitation. The plateau, however, with very few animals, and swept by strong winds, has a healthy, temperate climate and a fertile soil. It has but few forests, and in some parts is entirely without trees, but a rich grass covers the ground, which is traversed by many springs and brooks throughout the year. All the different kinds of grain of the East and of Europe, such as corn, barley, rye, oats, etc., grow here exceedingly well; while the lowlands produce cotton, sugar-cane, and tobacco, and the best coffee grows wild everywhere. The eastern plains of the sub-alpine region are occupied by lawless hordes of Mohammedan Asebo Gallas, who make almost uninterrupted incursions into the plateaus, which are inhabited by Christians.

The most important city of the country is Gondar, which is also the residence of the abuna. Other cities are Adowa (the capital of Tigre), Antalo, Ankobar (the capital of Shoa), Angolola, and Aliya Amba.

The Abyssinian peasant is an industrious workman. The soil, indeed, needs only to be scratched to produce three harvests a year, and cattle of all kinds thrive finely. But as the rural districts are subject not only to large tributes, but also to constant robberies from all sides, the peasants generally suffer greatly from poverty.

Most of the inhabitants belong to the ABYSSINIAN CHURCH (which see). Some of the border districts have been occupied by Mohammedans, who appear to be advancing. The Falasha are a peculiar Jewish tribe, living in the Sainen Mountains and in several other districts. The Roman Catholic Church, which in the course of the sixteenth century was several times on the point of gaining a great influence, began its missionary operations again in 1833, and was vigorously supported by the influence of France. The great hopes which the conversion of a prominent Abyssinian prince raised in the missionaries were, however, not fulfilled; the membership in 1872 did not exceed a few hundred, and in that year the missionaries were again expelled from Tigre by Kassa. The first Protestant missionary who labored among the Abyssinians was Gobat (subsequently Anglican bishop of Jerusalem), who was followed by many others; none of whom, however, have succeeded in firmly establishing Protestantism in Abyssinia.

History.—The Abyssinians, who, according to Arabian traditions, emigrated from Yemen, are a mixed race. Even at the present day the inhabitants of the different provinces differ widely both in their language and in their physiognomy. In history the Abyssinians first appear in the empire of Axum. Under a family of kings who claimed to be descended from Solomon and the queen of Sheba, and who ruled to the end of the fourth century, the country advanced greatly. In the middle of the fourth century Christianity was introduced. The advance of the Mohammedans, however, broke off every connection with the remainder of the Christian world, and left the country entirely to Coptic influences. As the patriarch, according to law, must necessarily be a Copt, and generally was an ignorant monk, the clergy, who had formerly not been wanting in theological and scholastic learning, could not reach a high state of education. In 1603 the combined efforts of the Portuguese (who had saved the empire from total destruction by the Mohammedans and Gallas) and of the Jesuits succeeded in converting the royal family to Catholicism. Civil wars were the result, as the people remained true to their old faith; and only when the connection with the Church of Rome was fully severed (about 1630) did the country again become quiet.

The power of the imperial family, the Hazie, was gradually reduced to a mere shadow, until in the present century its authority was totally set aside by Ras Ali, the governor of Amhara. Nominally, the Hazie continued, however, to rule until Lij Kassa was crowned as *negus negussië* (king of kings) in 1855. Kassa, descended from noble but poor parents, was made by the favor of the regent Menene, the mother of the nominal king, Ras Ali, governor of the province of Kuara. Impelled by ambition, he soon rebelled and seized the province of Dembea. After several years of quiet, varied by a few successful raids into the neighboring lowlands, he undertook a great expedition against Egypt, which was a complete failure. This induced Menene to take up arms against him again, but the royal troops were completely beaten. After several more victories over Gocho, the most powerful chief of Gondar, and over Ras Ali himself, Kassa was in possession of the whole of Amhara. Then, after he had also defeated Ubië, the independent prince of Tigre, at Deraskye (1855), he was master of the whole of Abyssinia, and was crowned king under the name of Theodore II. Increasing vanity and pride now took the place of the pleasing manners which had gained him the affection of those around him, especially of the Europeans. He still continued, however, to be a good ruler as long as his friend and adviser, the Englishman John Bell, who had come to Abyssinia in 1842, remained with him. The attempts at reform to which Bell tried to encourage him remained almost entirely fruitless, although Theodore destroyed the power of the feudal nobles and of the priesthood. When in 1860 he had lost his friend Bell in a war against the rebels, he became a bloodthirsty tyrant and the scourge of his people. For three years terrorism kept the country in subjection; then, unable to bear his extortions for the maintenance of the army, numbering 150,000 men, the people rose in a general rebellion. Wherever Theodore came with his army the people fled into the mountains, and only returned after he had left. He found nowhere an open enemy, but famine reduced his army so quickly that it only numbered 7000 men when the difficulties with England began.

The English-Abyssinian War.—Walter Plowden, who at one time had just as much influence with Theodore as Bell, had been sent to Gondar as English consul, and had in 1849 concluded a commercial treaty with Ras Ali. Theodore intended to send an embassy to England. Lord Clarendon answered through Powell that Queen Victoria would receive the embassy if Theodore would desist from his plan of conquering Egypt. This caused the first bitterness, for the king's favorite plan was the restoration of the ancient Ethiopian empire. After Plowden's death in 1860, Cameron was sent as English consul to Abyssinia. Theodore sent him with a letter to Queen Victoria to open negotiations for a war with the Turks. (The story that he wanted to marry Victoria was invented by the French newspapers.) One Bardel was sent for the same purpose to Paris. Cameron himself remained in Africa, and sent the letter by mail. Before an answer could be expected he returned to Abyssinia. Theodore, who meanwhile had been strongly prejudiced against the Europeans by the imprudent conduct of the French consul Lejean, and the unfavorable reception which Bardel had received in Paris, regarded the conduct of Cameron as an insult. At this time the missionary Stern, who was in the service of an English missionary society, by an error of etiquette angered the king, who punished him severely. Imprudently Stern told the Frenchman Bardel that he had written a book, "Wanderings among the Fellashas of Abyssinia," which might bring him into trouble. Bardel translated the most insulting portions of it to the king, who in the greatest rage imprisoned Stern and Rosenthal, another missionary who was guilty of a similar offence. As no answer came from Queen Victoria, Cameron, according to orders from his government, asked for permission to return to his post at Massowa. In answer to this, Theodore put him and his companions in chains (Jan. 4, 1864), and brought him in November to the mountain-fortress of Magdala. This caused the British government to answer Theodore's letter, and to charge the Syrian Hormuzd Rassam with its delivery. He had to wait, however, until July, 1865, before he received permission from the king to enter Abyssinia. In Jan., 1866, he met Theodore, and so far won his favor that the prisoners were released, and were permitted to depart. Suddenly, however, Rassam and those just released were again imprisoned, because Theodore had understood Queen Victoria's letter as proposing that Rassam should remain with him in exchange for the prisoners, and therefore considered Rassam's intention to leave immediately as a breach of treaty. The efforts of several German scholars residing in Abyssinia, as Dr. Schimper and Zander, succeeded in bringing about a reconciliation. But still the whole party were kept in captivity, which, though not severe, could still only be broken by force of arms. As Theodore did not answer a letter demanding the release of the prisoners, Lord Stanley sent the king on Sept. 9, 1867, his ultimatum, which Rassam, however, did not deliver, fearing that the consequences might be fatal to the prisoners. The English government resolved therefore to send an armed expedition from Bombay, and gave Sir Robert Napier the command. Colonel Merewether, the British resident in Aden, and the Swiss WERNER MUNZINGER (which see) had for some time been engaged in trying to discover the best means to secure the success of the difficult undertaking. At the head of a large reconnoitering party they found the best road to the plateau, and established friendly relations with the natives, in which they were most efficiently aided by the German missionary Dr. Krapf. Therefore, when Napier landed, Jan. 3, 1868, at Mulkutto, in the shallow bay of Annesley—which Colonel Merewether had transformed into a convenient harbor by building a long pier—he found almost all obstacles removed. In Senafeh the army, consisting of 4000 Englishmen and 8000 East Indians, with 10,000 mules and twenty elephants for the transportation of the artillery and the provisions, first gained a footing in the highlands. Thence they moved in a southerly course to the fortress of Magdala, which was considered almost impregnable, and into which Theodore had retired, being pressed on all sides by rebellious princes. The difficulties of the ground, as well as the extreme carefulness of Napier, caused the army to advance but slowly. On the 10th of April the first action took place, at Arogy, in which Theodore's troops were driven back into the fortress. Theodore now released the prisoners, but Napier demanded an unconditional surrender, and, as that was refused, proceeded on April 14 to storm the fortress, which was taken with but little trouble. Theodore was found dead on a hill, having killed himself. Napier conducted the difficult retreat with great success, and took the prince Alamayu, the only legitimate son of Theodore, to England. After the British had left, the country returned to the old state of anarchy, from which Theodore had for a time raised it. In 1869, Gobazie, prince of Amhara, proclaimed himself king, but only ruled as far as his arms prevailed. He was in 1871 defeated in a great and decisive battle near Adowah by Prince Kassa of Tigre, who early in 1872 was crowned with great solemnity as Emperor John of Ethiopia, but was likewise unable to break the opposition of a number of the independent princes. In Sept., 1872, Kassa was involved in serious difficulties with the khedive of Egypt, which led to the occupation of some mountain-districts (which were claimed by Kassa as belonging to Abyssinia) by Werner Munzinger, who had been appointed by the khedive governor of Massowah. After his victory over Gobazie, the new emperor had appointed Prince Voronya as ras of Amhara; who, however, when the emperor returned to Adowa, endeavored to make himself independent. The emperor subdued Amhara again, took Gondar without resistance, and compelled Voronya to sue for pardon. Ten days after this had been granted to him, Voronya escaped from the residence of the emperor, and again placed himself at the head of his troops. Early in 1873 he was, however, again defeated; the emperor once more entered Gondar, and his rule over Amhara and Tigre was regarded as more firmly established than at any previous period. (See HOLTON, "Abyssinia," 1871; it contains a complete list of all printed works on Abyssinia; ANDRÉE, "Abyssinien," 1869; MARKHAM, "A History of the Abyssinian Expedition," 1869.)

A. J. SCHEM.

Abyssin'ian Church. Abyssinia was converted to Christianity in the early part of the fourth century. The

church is national and independent, and with regard to doctrine Monophysitic. The visible head or *abuna* ("our father") is ordained by the Coptic patriarch of Alexandria. Circumcision is practised in the Abyssinian Church, preceding baptism. Communion is administered daily to the laity, and confession is rigidly enforced, even among priests. The efforts made, both by the English and Roman Catholic churches, to elevate the religious tone of the Abyssinians have hitherto, owing in part perhaps to political influences, been attended with but little success.

Aca'cia [from the Gr. ἀκή, a "sharp point," on account of the prickles or thorns on the tree], a genus of plants of the natural order Leguminosæ, found in Asia, Africa, America, and Australia. This genus comprises many beautiful and useful trees, among which is the *Aca'cia Arab'ica*, producing the gum-arabic of commerce. The bipinnated foliage of some species of acacia is sensitive to the changes of the weather. Several of the species are valuable for timber, and the seeds of the *Acacia concinna* are used as soap, and form an article of commerce.

Acacia Arabica.

Acad'emy [Gr. Ἀκαδημία; Lat. *acade'mia;* Fr. *académie*], a word originally applied to an Athenian garden or grove and to the school of philosophy which Plato founded in that place, which was in a suburb of Athens. The name is supposed to have been derived from Academus or Hecademus, a mythical person who, according to Greek tradition, presented the garden to the people of Athens. The modified systems or schools of philosophy which the successors of Plato adopted were designated by the titles of the Middle and the New Academy. The word academy is also applied to a society of authors, savants, or artists founded for the improvement of literature, science, or art. The first institution of which we read, at all corresponding to this idea, was the Museum, a society of scholars established at Alexandria by Ptolemy Soter in the third century B. C., which concentrated in that city all that was most eminent in science, philosophy, poetry, or criticism. The Jews in different cities, the Constantinopolitan emperors, and the Arabian caliphs founded societies of the same description. Charlemagne, among his various efforts for the propagation of literature, collected an association of learned men, who read and compared the works of antiquity, and gave themselves in their academic intercourse the assumed names of different ancient authors. But this institution was dissolved at the death of Alcuin; nor do we find any memorial of a similar society, except a few among artists, chiefly in France, until after the taking of Constantinople by the Turks, when the Greek scholars driven into Italy held literary meetings, which gradually assumed a more regular form. In 1560 a society called the Academia Secretorum Naturæ, was founded at Naples in the house of Baptista Porta, but was abolished by a papal interdict. It was, however, succeeded by the Academia Lyncei at Rome, of which Galileo was a member, the objects of which, like those of the former, were chiefly connected with the pursuit of natural history. From the beginning of the seventeenth century academies multiplied in Italy. Among the most eminent of those which bore a philosophical character was the Academy del Cimento at Rome in that century; and in more recent times the Academy of Sciences at Bologna deserves to be mentioned with honor. But Italy has been most prolific in academies of literature and philology, which form by far the greatest number in the catalogue of 550 such institutions which have been enumerated as existing or having existed in that country. A general and somewhat ridiculous fashion prevailed in the seventeenth and eighteenth centuries among literary men of that country, of forming themselves into societies for the promotion of literary objects, to which they gave fanciful symbolic names, every member assuming in his own person some analogous appellation. Among the most celebrated was the Academy (It. *Academi'a*) degli Arcadi at Rome, of which the meetings were held in a meadow, and the members enacted shepherds and shepherdesses. It was founded about 1690, and still subsists, having various affiliated societies in other places. The Academia degli Umidi, one of the oldest of these associations, became afterwards the Florentine Academy. The Academia degli Intronati ("of the Deaf"), degli Umoristi ("of the Humorists"), and many others with similar quaint appellations, have acquired celebrity in Italy. Of her philological academies the most illustrious is the Academia della Crusca (*i. e.* "of the straw or chaff" *), founded at Florence in 1582, which by its famous dictionary established the Tuscan dialect as the standard of the national language. It is now incorporated with the Academia Fiorentina.

The first institution of this kind in France, the Académie Française, was founded in 1635, by Cardinal Richelieu. It was formed for the purpose of refining the French language and style, and, although in its first period it was chiefly remarkable for the adulation which it bestowed on its vain though able founder, it became in process of time by far the most celebrated and influential of all European literary societies. It consisted of forty members, and a place among them was eagerly sought after for a long period as one of the highest honors which could be attained by an author. Like that of La Crusca, it published a dictionary of the national language in 1694. The Royal Academy of Sciences was founded by Louis XIV. in 1666, and published 130 volumes of memoirs up to the year 1793, when it was abolished by the Convention. The Academy of Painting and Sculpture, and that of Inscriptions and Belles-Lettres, were the other two principal academies of Paris. The latter was founded by Colbert in 1663, and remodelled in 1701. At the Revolution all four were abolished, and in 1795, at the suggestion of Condorcet, the National Institute of France was established in their stead. It consisted of four classes, arising out of the four academies of which it was composed. According to its reorganization by Napoleon in 1806, these classes were remodelled, and each of them consisted of a certain number of sections, each furnished with a specified number of acting and corresponding members. The first class, or that of sciences, had sixty-three members and 100 correspondents; that of languages, forty, and sixty correspondents; that of history and antiquities, forty, and sixty correspondents; that of the arts, twenty-eight, and thirty-six correspondents. The first, third, and fourth each named eight foreign associates. In 1816 the Institute was again remodelled by Louis XVIII. The four classes again took the name of academies, and became more independent of one another, their joint property being managed by a commission of eight members, two from each, under the superintendence of the minister of the interior. The first academy (that of sciences) retained the same number of members; the second and third were reduced to thirty-eight and thirty-seven respectively; the fourth was increased to forty. To the Academy of Inscriptions and Belles-Lettres and that of Sciences was added a class of free academicians, of the number of ten, with no privilege except that of attendance. The Academy of Arts had the right to choose its own number of free members.

Of similar institutions in Germany, the oldest was the Academia Naturæ Curiosæ, a scientific association, founded in 1662 in Franconia, afterwards taken under imperial protection, when it received the name of the Academia Cæsareo-Leopoldina. The Royal Academy of Sciences at Berlin was founded in 1700 by Frederick I. of Prussia; Leibnitz was its first director. Other German academies of sciences are those of Göttingen, established in 1750; the Bavarian Academy at Munich, established in 1759, chiefly for history, and in 1829 divided into three sections; and the Saxon Association of Science, founded in 1846, and divided into two classes. The Imperial Royal Academy of Sciences at Vienna originated in 1846. Turkey established a similar institution in 1851, and Egypt in 1859. The Imperial Academy of Sciences at St. Petersburg was founded by Catherine I., and endowed by Catherine II. with great munificence, but established on the French model. She separated from it the Academy of Arts.

In England the name of academy has been chiefly confined to associations for promoting the arts. The Royal Academy of Arts was founded in 1768, and consists of forty members. It has separate professors of painting, architecture, anatomy, and perspective, and a council of nine is elected annually. The Academy of Ancient Music was founded by private association in 1710; the Royal Academy of Music, under the patronage of George III., but dissolved shortly after. The present Academy of Music was founded in 1822. The principal literary and philosophical societies, answering in character to the branches of the French Institute, are: 1. The Royal Society of London, which is confined to objects of a scientific character. It had its origin as early as 1645, but was established by royal charter in 1662. Its acts have been published under the name of "Philosophical Transactions" from 1665 to the present day. 2. The Antiquarian Society, which was established in 1751, and whose acts are published under the title of "Archæologia." 3. The Society of Arts, which originated in 1718. 4. That of Literature, which was founded in 1823. Besides these, there are numerous societies which bear the name of the peculiar branch of science to which their exertions are confined. The Royal Society of Edinburgh obtained a charter in 1783, and another, with more liberal provisions, in 1811.

* In allusion to its office of winnowing or purifying the national language.

Among the most valuable published transactions of academies and similar societies, besides those already mentioned, are those of Colbert's "Académie des Inscriptions et Belles-Lettres" (50 vols. 4to, from 1701 to 1793); those of the Institute being continuations of the memoirs of the former academies of which it was composed; those of the Royal Academy of the Sciences and Belles-Lettres at Berlin; at first in Latin, then in French (from its remodelling in 1744 by Frederick the Great), now in German; the "Acta" of the Imperial Academy of St. Petersburg; the "Commentarii" of the Academy of Bologna; and the "Antichità d'Ercolano," published by the Herculanean Academy of Naples.

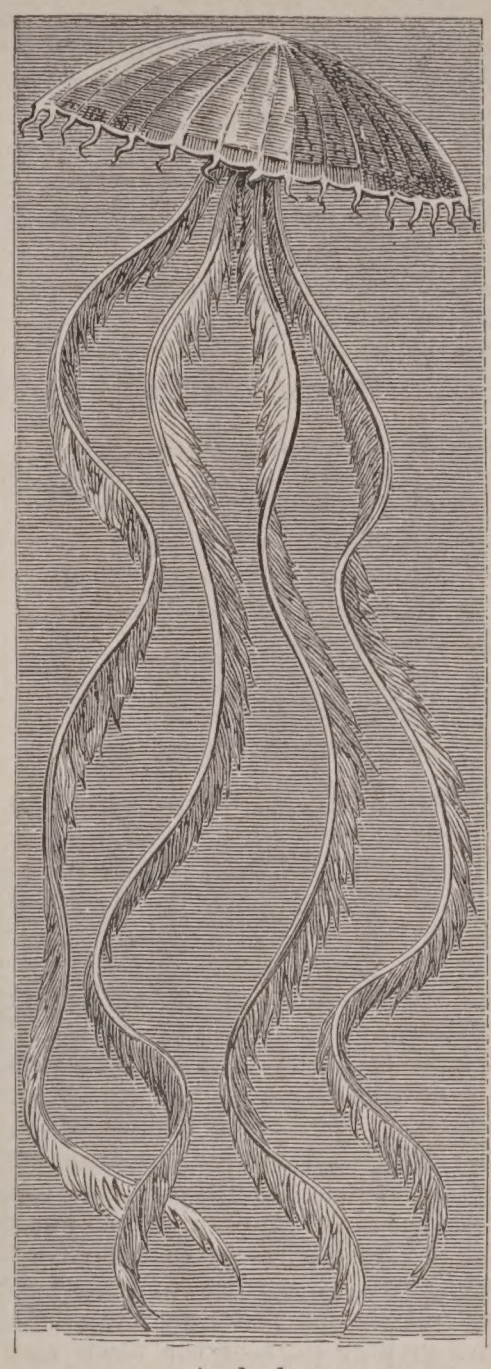
The American Academy of Sciences and Arts was founded in 1780 by the council and house of representatives of Massachusetts. The National Academy of Sciences of the U. S., incorporated by the Thirty-seventh Congress in 1863, was limited by the original charter to fifty members, citizens of the U. S., fifty foreign associates, and a variable number of honorary members. Its stated meetings are held twice a year. Special meetings are held on call. Committees pursue at all times investigations required by the government. The Academy of Natural Sciences of Philadelphia was founded in 1812. Besides a very valuable scientific library, it contains one of the best natural-history collections in the world, especially rich in birds. (See MILITARY ACADEMY, and also NAVAL ACADEMY, by PROF. R. S. SMITH.)

J. THOMAS.

Aca'dia [Fr. *Acadie*], sometimes called **Arca'dia, Acca'dia,** or **Ca'die,** the peninsula now called **Nova Scotia.** It was settled by the French in 1604. Acadia originally included New Brunswick and a part of Maine. It was the subject of frequent quarrels between the French and English on account of the valuable fisheries near its coast, and was finally ceded to England in 1713. The inhabitants having refused to take the oath of allegiance to the British king and to bear arms against the French, the governor and his council resolved to remove them to the other British provinces. The French settlers, 18,000 in number, were forced to give up their property, and were sent off in such haste that many families were separated. This event has furnished the subject of "Evangeline," one of Longfellow's most admired poems.

Acajut'la, a town and seaport in the Central American republic of San Salvador, is situated on the Pacific Ocean, 12 miles S. of Sonsonate. It consists, besides the custom-house and the dwelling of the captain of the port, of a large warehouse, almost entirely in ruins at present, and a few huts and sheds. Under the Spanish rule it was for a long time the only port on the W. coast between Acapulco and Realejo; at present it is second in importance in San Salvador, and has over one-third of the foreign trade of this republic. The chief article of export here is Peruvian balsam, of which 20,000 pounds are annually exported.

Acale'phæ (or, in English, **Ac'alephs,** and sometimes **Acale'phans**), [from the Gr. *ἀκαλήφη*, a "nettle"], (in the singular **Acale'pha** or **Ac'aleph**), a class of radiated animals according to the system of Cuvier. They are commonly called jelly-fishes or sea-nettles, and sometimes sea-blubber. The body of these animals is composed of a transparent, gelatinous substance, and in one section of the class, the true Medusæ, the body is entirely unsupported by any hard framework. The quantity of solid matter contained in them is very small, over ninety-nine per cent. being water; they may therefore be described as almost "living water." If one of them be taken from the sea and laid upon the surface of a dry board or rock, it deliquesces very rapidly. One of these, weighing fifty ounces when taken from the water, has been found not long afterwards to be nothing but a little dry cellular tissue, weighing only five or six grains. All the senses in the Acalephæ save that of touch are thought to be wanting. They possess, however, a muscular and a nervous system, as well as a distinct digestive apparatus. The digestive organs are lodged in a common centre or a longitudinal axis. From this centre proceed ray-like processes, with tentacular appendages presenting a great variety of form. In these are the peculiar *nettling* organs, which are generally composed of an oval capsule containing a spirally-coiled filament, which is suddenly thrown out whenever the animal is in any way disturbed. These filaments are lined to their very extremities by barbules, which are arranged in such a manner as always to point backward when the filament is projected. A system of vessels from the gastric cavity proceeds through the body. The existence of blood has not yet been detected. The acalephs have no teeth; in some of the animals of this class, such as the *Physalia* (or Portuguese man-of-war), food is obtained by suction through the flask-like appendages which hang down beneath, each possessing an orifice and a sucker. The Acalephæ are of various forms and sizes; many of them are shaped somewhat like an umbrella when spread. While most of them are extremely small, the larger sometimes attain a length of three feet or more. The phosphorescence of the sea is in part caused by multitudes of minute Acalephæ. The larger acalephs subsist on small fish and other marine animals; they are propagated by eggs, etc., according to the process of alternate generation. The eggs produce a brood totally different from the parent, and resembling Infusoria, which attach themselves to some stationary object and assume a polyp-like form, and by gemmation produce a progeny which in time attains to the original form, or, in other words, becomes like the grandmother. (See ALTERNATE GENERATION.) They possess the power, also, of multiplying by gemmation alone, little ones being almost ready formed from the substance of the parent, mostly from the walls of the peduncle or from the surface of the ovaries, and being very similar to their parents. These animals are classified according to the different powers of locomotion which are exhibited in them. They are grouped in three orders—the Ctenophoræ, Discophoræ, and Hydroids, ranking in the order named, the Hydroids being the lowest in development. In some instances the Hydroids closely approach the character of the polyps; but others are plainly acalephs, and there are many intermediate gradations.



Acalepha.

Acantha'ceæ [so named from *Acanthus*, one of its genera], a natural order of monopetalous exogenous plants, having irregular didynamous flowers, and particularly known by their calyx being imbricated in two broken whorls, and by their seed growing from hooks on the placenta. Several species of this order have beautiful flowers, like the *Thunbergia*. The U. S. have several genera.

Acanthas'pis [Gr. *ἄκανθα*, a "spine," and *ἀσπίς*, a "shield"], a genus of buckler-headed fishes found by Dr. Newberry in the corniferous limestone of Ohio. It somewhat resembles *Cephalaspis*, the buckler or carapace bearing similar denticulated spines, but the cranial plates are covered with a peculiar vermicular ornamentation, and were not ankylosed together.

Acan'thophis [from the Gr. *ἄκανθα*, a "thorn," and *ὄφις*, a "serpent"], a genus of venomous serpents allied to the viper, and natives of Australia. They have a horny spine at the end of the tail. The genus includes the dreaded death adder, *Acanthophis antarctica*, one of the most venomous of known reptiles.

Acanthopteryg'ians [Gr. *ἄκανθος*, a "thorn," and *πτέρυξ* (gen. *πτέρυγος*), a "wing" or "fin"], one of the two primary divisions of the Osseous fishes in the system of Cuvier. This order, which includes the perch and mackerel, is characterized by the bony spines which are formed from part of the rays of their dorsal, anal, and ventral fins. This order is the most extensive of those generally recognized by naturalists among fishes.

Acanthu'rus* Chirur'gus, or **Sea-Surgeon,** owes its name to the sharply-pointed and keen-edged spine on the side of the tail, which cuts and wounds like a surgeon's lancet. The scales of this fish are very small, and the single spine on each side of the tail is movable and set in a longitudinal groove. Its food is of a vegetable nature. It is found on the Atlantic coasts of tropical America and Africa, and is tolerably plentiful in the Caribbean seas.

* Literally "thorn-tailed," from the Gr. *ἄκανθα*, a "thorn," and *οὐρά*, a "tail."

Acan'thus [from the Gr. *ἄκανθα*, a "thorn"], the systematic name of a genus of herbaceous plants, natives of Southern Europe, belonging to the natural order Acanthaceæ. The most remarkable species of this genus are the *Acanthus mollis* and the *Acanthus spinosus*, which have large white flowers and shining leaves of a beautiful form. This foliage is said to have suggested to the architect Callimachus the first idea of the ornate and beautiful capital which forms the most striking feature in the Corinthian order of architecture.

Natural form of the leaf.

Leaves artistically modified.

A Capel'la, or **A la Capel'la,** in music, means "in the church style;" it is equivalent to *alla breve*, a time-signature which frequently appears in church music. It likewise denotes that the instruments are to play in unison with the voices, or that one part is to be played by a number of instruments.

Acapul'co, a seaport-town of Mexico, on the Pacific Ocean, and in the state of Guerrero, 190 miles S. S. W. of Mexico; lat. 16° 55′ N., lon. 99° 48′ W. The harbor is nearly landlocked, and is one of the best in the world. The climate is hot and unhealthy. It formerly commanded the whole trade between the Spanish dominions in America and those in the East Indies. Since the discovery of the California gold-mines it has again become one of the most important ports of Mexico. The harbor is so deep that large ships can anchor close to the granite rocks. The steamers which ply between Panama and San Francisco touch here regularly. The greater part of the town was destroyed by an earthquake in 1852. Pop. about 3000.

Acari'dæ or **Acar'ida** [for etymology see Acarus], a family of small animals, including the acarus or mite and other minute insects belonging to the order Arachnida. Their food consists of both animal and vegetable substances. Some of them are free and lead a wandering life, while others are parasitic, living on other animals. Those of the former class have their mouths furnished with distinct mandibles, and are often found in great numbers in old cheese, brown sugar, and dried fruit, and in the cabinets of entomologists. One of the most destructive of these is the *Acarus destructor*. Those of the latter class are possessed of a sucker, by which they adhere to the skins of animals, where they are supplied with nourishment.* A few species of the Acaridæ are aquatic, and have their legs furnished with hairs, by means of which they swim with facility. The Acaridæ are propagated by eggs, and are extremely prolific. When mature they usually have eight legs, the young or imperfectly developed animals having only six. It was an *Acarus* whose appearance under the electrical experiments of Mr. Crosse startled the public several years ago with the supposition that it was generated or created by the electrical fluid. From its discoverer it was called *Acarus Crossii*. (See Spontaneous Generation.)

Acar'ina [for etymology see Acarus], a sub-order of spider-like insects, inferior in rank to true spiders, including the ticks, the mites (Acaridæ), and other families, having the various articulations merged into or closely joined to the abdomen.

Acarna'nia, a district of ancient Greece, bounded on the N. by the Ambracian Gulf, on the E. by the river Achelous, and the S. and W. by the Ionian Sea. According to tradition, it was named from Acarnan, the son of Alcmæon. It is mostly occupied by well-wooded hills or mountains. Acarnania and Ætolia constitute a nomarchy or province of modern Greece, with an area of 3025 square miles. Pop. in 1870, 121,693.

Ac'arus [from the Gr. *ἀκαρής*, "that which cannot be cut on account of its smallness" (from *α*, negative, and *κείρω*, to "cut")], a genus of minute animals, including the common mite found in figs and other dry provisions (the *Acarus domesticus*), and many other species. (See Acaridæ.) The itch is caused by an acarus which was formerly known as the *Acarus scabiei*, but which is now usually called *Sarcoptes hominis*.

Ac'ca Lauren'tia was the name of a woman to whose grave the ancient Romans brought sacrifices on the occasion of a festival, on the tenth day before the calends of January. According to a Roman legend, she married the rich Tarrutius, and upon her death left her whole property to the Roman people; while, according to another legend, she was the nurse and foster-mother of Romulus and Remus.

Accelerando, in music, signifies, with gradually increasing velocity of movement.

Accelera'tion [Lat. *accelera'tio*, from *ad*, "to" (implying "addition"), and *cel'ero, celera'tum*, to "hasten"], a continuous increase of the velocity or rate of motion of a moving body. The measure of velocity is, in general, the space through which that velocity, if unvarying, would carry a body in a unit of time (in mechanics, one second). When motion is uniform, the spaces passed over in successive units of time are equal. When it is accelerated or retarded, these spaces increase or diminish, and cannot be taken as measures of the velocity at either the beginning or the end of the period. In order, therefore, to compare the successive velocities of an accelerated or retarded body, the spaces must be taken which are passed over in consecutive equal but indefinitely small intervals of time. If these minute spaces increase, the velocity is accelerated; if they diminish, it is retarded. Their differences show whether retardation is uniform or otherwise. If they increase, it is increasing; if they diminish, it is diminishing. Thus, the differences of these differences, or the second differences, indicate the character of the variation. If the second differences are positive, the acceleration is increasing or the retardation is diminishing, and *vice versâ*. If the second differences are zero, the acceleration or retardation is uniform. The simplest case of a force producing a uniform acceleration is that afforded by the action of the earth on falling bodies. The increase of velocity in this case is proportional to the time, and nearly equal to 32.2 feet per second.

Acceleration of the Fixed Stars denotes the apparent greater diurnal motion of the stars than of the sun, the cause of which is that the sun's apparent yearly motion takes place (though much more slowly) in a direction contrary to that of its apparent daily motion. Compared with the sun, the stars thus seem to gain about three minutes fifty-six seconds each day, coming by that interval earlier each successive twenty-four hours, to the meridian.

Acceleration of the Moon, or Acceleration of the Moon's Mean Motion, is one of the most remarkable peculiarities of the lunar motions. It was noticed by Halley that when the ancient eclipses are compared with modern lunar observations, the moon is found to be moving faster now on her course round the earth than in former days. The explanation of this peculiarity was long sought for unsuccessfully by the leading professors of the Newtonian system of astronomy. Indeed, it may be said even now that the acceleration of the moon is a problem but partially solved. We owe to Laplace the first successful attempt to explain the difficulty. He showed that the moon's motion is accelerated through the slow process of diminution which the eccentricity of the earth's orbit is undergoing. Owing to this change, there results (on the whole) a slight diminution of the sun's influence upon the moon's motions. The influence of the earth being thus increased, the same effect accrues as would follow from a slight increase in the earth's mass; in other words, a slight decrease in the moon's period of revolution. But it has been recently shown that Laplace's explanation accounts for only about one-half of the moon's actual acceleration. The remaining half remains still unexplained.

Acceleration of the Planets. The motion of the planets in their orbits is variable, being quicker or slower according as the planet is at a less or a greater distance from the sun. Hence, in moving from the apogee to the perigee of the orbit, the motion of a planet is accelerated, and on the contrary, in moving from the perigee to the apogee, the motion is retarded. Revised by F. A. P. Barnard.

Ac'cent [Lat. *accen'tus*, from *ad*, "to" or "according to," and *ca'no, can'tum*, to "sing" or "sound"]. In English, accent usually denotes the greater stress which is laid on some one syllable of a word, as, for example, in *na'tion, protect', ev'ident, for'midable*. In our language the accent is never placed farther from the end of a word than the pre-antepenultimate (as in *ex'quisitely, hos'pitable, for'midable*). Even this is comparatively rare, and the pronunciation of such words is attended with some difficulty to many speakers. The accent on the antepenultimate (as in *ed'ucate, ev'ident, mortal'ity*), on the penultimate (as in *devo'tion, na'tion*, etc.), and on the ultima (as in *exhort', proceed'*), is of continual occurrence.

* For an account of the parasitic Acaridæ the reader is referred to Kuechenmeister's "Manual of Parasites," vol. ii.

In French, accent denotes not a *stress of voice*, but for the most part simply a *quality of sound;* thus, *e* with the acute accent (*é*) represents a sound nearly similar to the English *a* in *fate;* with the grave accent (*è*) it indicates a sound nearly like our *e* in *met*, and with the circumflex (*ê*) a sound similar to the last, but still more open. *A* with the circumflex (*â*) is pronounced like our *a* in *far* or *farther* (å), while *a* without any accent approaches very nearly to our *a* in *fat* (å). The grave accent on the preposition *à* ("to") is merely used to distinguish this word from the verb *a* ("has"), which is always written without the accent.

In German, accent is essentially the same as in English; in Italian, Spanish, and most other European languages (including the modern Greek), it is similar, or very nearly similar, to that of our tongue.

With regard to the ancient Greek accent, there is a great diversity of opinion among scholars. The most probable theory seems to be that the acute accent of the Greeks caused the syllable on which it was placed to be sounded in a higher key than the other syllables, but without any greater stress or force of utterance, and that "when a high-tone ultima, followed by other words in close connection, dropped down to a lower key, it was written with a grave accent instead of the acute." (See on this subject an interesting paper read by Prof. Hadley before the American Philological Association, July 27, 1870.) The acute followed by a grave on the same long syllable combined to form the circumflex. They were at first probably written separately, as in the word σῶμα, but afterwards the two were joined, as in σῶμα. The invention of the Greek signs of accent is due to Aristophanes of Byzantium, a celebrated grammarian, who lived and taught in Alexandria, and who flourished about 260 B. C. (or about 200 B. C., according to some writers).

Accent in music is analogous to accent in language. It consists of a stress or emphasis given to certain notes or parts of bars in a composition, and may be divided into two kinds—grammatical and rhetorical or æsthetic. The first kind of accent is perfectly regular in its occurrence, always falling on the first part of a bar. It is true that long or compound measures of time have, besides the chief accent in every bar, some subordinate accent, but these are only slightly marked. As a general rule, we may observe that the grammatical or regular accent must not be exaggerated. It should be marked only so far as to give a clear sense of rhythm. The æsthetical accent is irregular, and depends on taste and feeling, exactly as do the accent and emphasis used in oratory. In vocal music well adapted to words, the words serve as a guide to the right use of æsthetical accents.

Accen'tor [Lat. the "warbler"], a genus of warblers,

Accentor.

including the hedge-accentor or sparrow (*Accentor modularis*), a familiar and abundant European bird, five and a half inches long, brown above, steel-colored beneath. Its song is fine, but short. It has been introduced into the U. S. The *Accentor Alpinus* of the Alps is a larger bird.

Accep'tance, an engagement to pay a bill of exchange. (See Bill of Exchange, by Prof. T. W. Dwight, LL.D.)

Accep'tants, or **Constitu'tionists,** a name given in 1713 to the Jesuits in France who accepted the constitution or bull Unigenitus issued by Pope Clement XI. The Jansenists, who rejected the pope's bull, were called Appellants or Recusants, and appealed to a general council. They were imprisoned and persecuted, but after the death of Louis XIV., the regent, the duke of Orleans, prevailed on the greater part of the recusant bishops to accept the bull with certain modifications. The Appellants continued their resistance after the Unigenitus became national law (1730).

Acces'sary, or **Acces'sory** [from the Lat. *ad*, "to," and *cedo, cessum,* to "go"], in criminal law, a participant in a felony who is not the chief actor, and is not present at its commission, but yet in some way is connected with it, either before or after the fact (or act committed). An accessary before the fact is one who, though not present, procures, counsels, or commands another to commit it. An accessary after the fact is one who, knowing a felony to have been committed, receives, relieves, comforts, or assists the felon.

In offences below the grade of felony there are no accessaries. All implicated are regarded as principals. By the common law of England the same rule is applied to the case of treason. In manslaughter, as defined by common law, there can be no accessary before the fact.

Acces'sion [Lat. *accessio*, from *ad*, "to," and *cedo, cessum,* to "go"], in law, a species of title to property borrowed from the civil (or Roman) law, and defined to be the right to all which one's own property produces, whether that property be movable or immovable, and the right to that which is united to it by accession, either naturally or artificially. By this principle the increase of an animal belongs to its owner, or a building becomes the property of the man on whose soil it is erected. An important instance of the application of this doctrine is found in the manufacture by one person of materials belonging to another. The property in its manufactured state belongs, in general, to the owner of the materials. A leading exception to the principle is, that if the manufacturer, acting in good faith, without the consent of the owner, changes the identity of the materials, as if he converts grapes into wine or grain into whisky, he will become the owner of the manufactured article. This rule would not be applied in favor of a wilful wrong-doer. The word "accession" is also used to indicate the fact of succession in government, such as the "accession" of a new dynasty in monarchies, as in the case of the House of Hanover in England. T. W. Dwight.

Accessory, or **Accessary,** in painting, a term applied to everything introduced into a picture that is not an essential part. In an historical painting the human or animated figures are the principal objects, and all the others are accessories.

Ac'cidens, or **Per Accidens** (*i. e.* "by accident"), a Latin phrase used by the older philosophers to denote an effect not following from the nature or essence of the thing, but from some accidental quality. It is opposed to *per se:* thus, fire burns *per se;* heated iron burns *per accidens.*

Ac'cident [from the Lat. *ad*, "to," and *ca'do*, to "fall," to "happen"], in logic, is one of the predicables; in its strictest logical sense it is that which may be absent from or present in the subject, the essence of the species to which the subject belongs remaining the same. Thus, if it be predicated of a man that he is "walking," or that he is "a native of Paris," the first expresses what is termed a separable accident, the latter an inseparable; *i. e.* the individual may cease to walk, but cannot cease to be a native of Paris, but neither of these alters the species, man, to which the individual belongs. It is to be observed with regard to the accident, as well as the other predicables, that they exist only relatively to each other, so that the same quality may be accidental when predicated of the species which is a property when predicated of the individual. Thus, "malleability" is an accident of the subject "metal," because many metals are not malleable. But it is one of the properties of gold, iron, etc., as distinguishing these from the non-malleable metals.

Accident. This is an important topic in equity jurisprudence. It has been defined to be such an unforeseen event, misfortune, loss, act, or omission as is not the result of any negligence or misconduct in a party. It is, however, difficult to bring all the cases in which the court assumes jurisdiction within the bounds of a definition. Some of the leading cases of interference by the court are—1. Where negotiable or other instruments have been lost, and there is no adequate remedy in a court of law. 2. Where a clause has been inadvertently omitted from or inserted in an instrument. The court in such a case makes the instrument conform to the intent of the parties. 3. Penalties and forfeitures. In this class of cases the court relieves against the penalty or forfeiture where the injury occasioned by the breach of duty is susceptible of complete

compensation, as in the case of an omission to pay rent on an appointed day. There would be no relief in case of a wilful wrong, nor where the forfeiture is in the nature of a statutory remedy for a breach of duty. 4. Cases of omission, through inadvertence or want of knowledge of facts, to defend an action. The court has power to allow the necessary steps still to be taken. It is a general rule that the court will not interfere in favor of a mere volunteer, such as a donee or devisee in a will. Thus, if a seal were accidentally omitted from a conveyance made without consideration, or a clause were omitted from a will, there would be no relief. It is a further rule that relief will not be granted as against a purchaser who has acquired legal rights in good faith and for a valuable consideration.

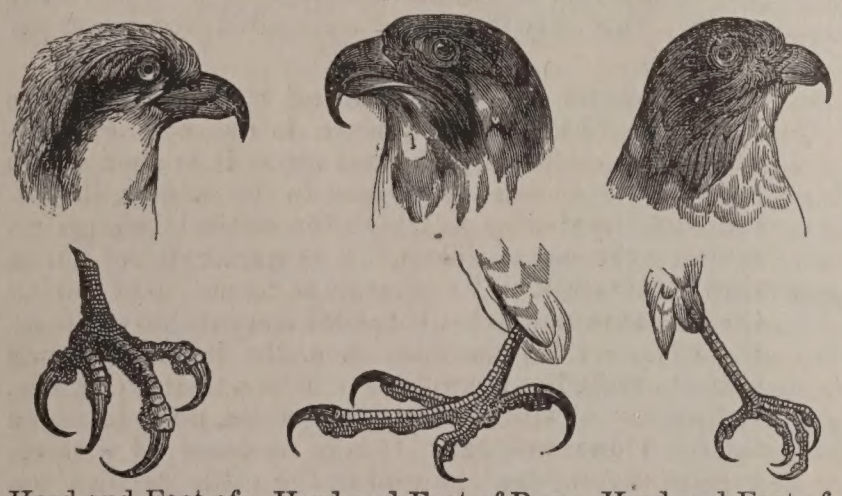
Accident, a post-township of Alleghany co., Md. Pop. 1006.

Acciden'tal Col'ors are colors depending on the hypersensibility of the retina of the eye for complementary colors. If we look for a short time steadily with one eye upon any bright-colored spot, as a wafer on a sheet of white paper, and immediately after turn the same eye to another part of the paper, a similar spot will be seen, but of a different color. If the wafer be red, the imaginary spot will be green; if blue, it will be changed into yellow; the color thus appearing being always what is termed the complementary color of that on which the eye was fixed.

Accidentals, in music, are those flats and sharps which are prefixed to the notes in the course of a movement, and are not indicated by the signature at the commencement.

Accidentals, in painting, are those fortuitous or chance effects, occurring from luminous rays falling on certain objects, by which they are brought into stronger light than they otherwise would be, and their shadows are consequently of greater intensity. This sort of effect is to be seen in almost every picture by Rembrandt, who used them to a very great extent. There are some fine instances of accidentals in Raphael's Transfiguration, and particularly in the celebrated picture, the *Notte* of Correggio, in which the light emanates from the infant Christ. With these effects may be classed such accidental lights as those from a forge or a candle, or some such object, of which the use is extremely important to the painter of still-life.

Accip'itres [from the Lat. *accip'io,* to "take"], the plural of the Latin *accip'iter,* the name given by Linnæus to an order of carnivorous birds, including the eagle, vulture, hawk, and owl. More recent ornithologists have named this order Raptores. This order comprises all the true birds of prey, though the shrikes and a few other birds, from their habits, almost deserve the latter title. As may be seen in the accompanying illustrations, the beaks



Head and Foot of the Osprey. Head and Foot of Peregrine Falcon. Head and Foot of American Sparrow-hawk.

and claws of the Accipitres are marvellously adapted, by their sharpness and curvature, to the predatory habits of these birds.

Acclama'tion [Lat. *acclama'tio*], a term used in public and deliberative assemblies. A motion or proposition is adopted by acclamation when the assent is so nearly unanimous that the counting of votes is omitted. The different modes of electing a pope are called scrutiny, acclamation, and inspiration.

Acclima'tion [from the word *climate*], the adaptation of a human being to a climate different from that to which he is accustomed. Such adaptation is accompanied by a change in the organism, assimilating it to those of natives of the country which the acclimatized person has adopted. Certain tropical climates, it would appear, can never be safely endured by any native of cold or temperate regions. The British troops in Bengal never become truly acclimated, but the ill-health and mortality increase with the length of stay in that climate. The same experience has been met with in West Africa and elsewhere. On the other hand, the French island of Réunion, which is very unhealthy even for planters and merchants and most others, has a healthy and hardy peasantry of French descent, whose immunity from disease is probably to be ascribed to their abstinence from alcoholic stimulants and from all excesses—an abstinence which is enforced by their utter poverty. This important subject has only of late received careful attention.

Acclimatiza'tion, the adapting an animal or plant to a foreign climate. Although many plants and animals have a remarkable capacity of adapting themselves to changes of climate, yet such changes are often attended with maladies called "diseases of acclimatization." Special associations (called "acclimatization societies") for acclimatizing animals, plants, etc. have been formed in many countries. Instead of "acclimatization," the French use the word "acclimatation."

The acclimatization of foreign field and singing birds in the U. S. has been attempted near most of our larger cities with considerable success. The "Acclimatization Society" of Cincinnati in 1873 imported many hundred pairs of German birds at great expense. The object is not only to naturalize foreign songsters, but to increase the number of birds destructive of insects injurious to vegetation. Similar societies exist at Sandusky, St. Louis, and other points, both in the Northern and Southern States. Among the birds imported are the blackbird (a singer), thrush, golden finch (very beautiful and a sweet singer), green-bird, bullfinch (easily tamed and trained), redbreast, starling (a fine singer), lark, greenfinch, goldfinch, knotpecker, the wagtail, the magpie, hedge-sparrow, titmouse, nightingale, redtail, German quail (a singer), and fence-sparrow.

Accolade, a ceremonious act by which, in former times, knighthood was conferred. It was an embrace and a gentle blow or "dub" on the shoulder of the new-made knight, made by the sovereign.

Accol'ti (Benedetto), an Italian writer and lawyer, born at Arezzo in 1415, became chancellor of the republic of Florence in 1459. He wrote a Latin history of the crusade which Godfrey of Bouillon conducted to Palestine. This was the basis of Tasso's great poem. Died in 1466.

Ac'comac, a county in the E. part of Virginia, bordering on Maryland. Area, 480 square miles. It is part of a peninsula, the "Eastern Shore," and is bounded on the E. by the Atlantic Ocean, and on the W. by Chesapeake Bay. The surface is level and the soil moderately fertile. Corn, oats, and wool are raised. Capital, Drummondtown or Accomac Court-house. Pop. 20,409.

Accomac Court-House, a post-village, the capital of Accomac co., Va., 95 miles E. by N. of Richmond.

Accommodation Paper. See Bill of Exchange.

Accom'plice [*ad-con-plicare,* to "fold up together"], one of several persons associated in a crime. In its broadest use it includes all who are connected with the offence, whether as principals or accessaries; but it is generally applied to those who are admitted to give evidence against their fellow-criminals.

Accord' [from the Fr. *accorder,* to "harmonize"], or **Accord and Satisfaction,** in law, an agreement between an injured party and the one who has caused the injury that the latter shall give, and the former receive, something in satisfaction of the wrong inflicted. The "accord" is an agreement as to the thing to be done, and the "satisfaction" is the performance of the agreement. This agreement, if executed, is a bar to any suit brought on the original cause of action. The subject is governed by well-settled rules, such as that the thing to be done must not be uncertain, that it must be advantageous to the injured party, and that the agreement must be fully carried into effect. Under these rules it would not be a valid accord to give the injured party something to which he was already entitled, as, for example, to pay a portion of a debt.

Accord, in music, is synonymous with concord, the relation of two sounds which are agreeable to the ear.

Accor'dion, a musical instrument, in which the tones are produced by the vibration of metallic springs moved by wind, which is applied by a bellows. It was invented by Damian, a Viennese, about 1829.

Account' [remotely from the Lat. *ad,* "together," and *compu'to,* to "reckon"], a computation or calculation; a statement of the receipts and payments of one who acts in a fiduciary relation, as an executor or a trustee, or a statement showing in detail the transactions between merchants or others who have dealt together. An account current is one that is open, running, and unsettled. An account stated is one which has been adjusted between the parties, and a balance struck. An account may also become stated without any express agreement, and by implication, as where one of two merchants who have dealt together draws

up a formal statement of their dealings and sends it to the other, and the latter receives it and retains it without objection for a reasonable time. He is thus presumed to assent to its correctness.

Account, or account render, is the name of a common-law action which lay against one who by virtue of his position or office ought to have rendered an account and refused to do so. This action is now almost obsolete. A court of equity has much more complete power to grant relief in all cases of mutual accounts, and in cases where the taking of an account is incidental to other matters over which that court has jurisdiction. Some of the instances in which an account may be taken on the one ground or the other are agency, general average, apportionment, contribution between sureties, waste, trusts, express or implied, including administration, guardianship, and partnership. In suits for an account both parties are deemed to be substantially plaintiffs for many purposes, and an affirmative decree may be made for the defendant, if a balance be found in his favor, as well as for the plaintiff. T. W. Dwight.

Accra, or **Ac'ra,** a small territory in Africa, on the Guinea coast, belongs for the most part to England. It is about lat. 5° 30′ N., lon. 0° 12′ W. The English portion has about 3000 inhabitants, chiefly negroes.

Accre'tion [from the Lat. *ad,* "to," and *cresco, cretum,* to "grow"], the gradual accumulation of soil along the banks of a river or the sea, formed by the washing of the water. In the case supposed the increase belongs to the owner of the adjacent land. If the increase be sudden, the alluvion formed upon the sea-shore or navigable river belongs to the state.

Ac'crington, a manufacturing town of England, in Lancashire, is situated in a deep valley between several hills, and at the junction of two railways, 13 miles E. of Preston and about 22 miles N. by W. of Manchester. It has increased rapidly in population and importance, and is considered the centre of the cotton-printing business. It has also extensive manufactures of cotton cloth, and coal-mines in which many of the inhabitants are employed. Among the public buildings is a fine Gothic church built in 1838. Pop. in 1851, 7481; in 1861, 19,688.

Accuba'tion [Lat. *accuba'tio,* from *ad,* "to," "upon," and *cu'bo,* to "lie"], the reclining posture in which the ancient Greeks and Romans took their meals. Two or three couches were spread around the dining-table, each of which was capable of containing three persons. The guests lay on their left sides, their heads or elbows being supported by pillows, the feet of the first being behind the back of the second, and those of the second behind the third. The middle place was generally deemed the most honorable.

Ac'cum (Friedrich), a German chemist, born at Bückeburg in 1769. Having removed to London in 1793, he became professor of chemistry in that city about 1802. He promoted the use of gas for illumination by a valuable work entitled a "Practical Treatise on Gas Light" (1815). He wrote other works. Died in Berlin in 1838.

Accu'mulated [from the Lat. *ad,* "to," "up," and *cu'mulo, cumula'tum,* to "heap"] **Force** is the power of a moving body to overcome resistance. When a force acts on a body so as to produce its motion, the force must be in excess of the resistance to the motion, and, as power is imparted to the body at each instant, this is termed accumulated force. Thus, if a strong man should pull on a rope attached to a ship at rest, but floating free in still water, his efforts at first would seem unavailing, because his strength would be so slight compared with the *vis inertiæ* (which is proportioned to the weight) of the ship. If, however, he continue to pull steadily, the force applied will gradually impart a slow motion to the vessel. This is an example of the accumulation of force, which, however, is less manifest in this instance, owing to the fact that not merely the *vis inertiæ* of the vessel, but also the weight and friction of the opposing water, are to be overcome. But let us suppose a mass of iron or lead of many thousand tons to be suspended by a huge chain or cable extending to an immense height.* In this case, as there would be no appreciable resistance from the air, the constant application of a very small force would at length, by accumulation, communicate a rapid motion and prodigious momentum to the huge mass in question—a momentum which a force a thousand times as great could not suddenly overcome, and indeed could only overcome at all by a continual application, and consequent accumulation, of force in an opposite direction.

* It is obvious that if the chain or cable were not very long, the weight soon after it began to move (acting like a pendulum) would necessarily rise considerably higher than the point at which it was first suspended; hence a great part of the force applied would be lost in overcoming the attraction of gravitation.

Accusative. See Declension, by J. Thomas.)

Aceph'ala ["without a head," from the Gr. *α,* priv., and *κεφαλή,* the "head"], a term applied to a class of mollusks called otherwise Conchifera or Lamellibranchiata. (See Conchology, by George W. Tryon, Jr.)

Aceph'ali [etymology the same as the preceding], a term applied in the early Christian Church to bishops exempt from the jurisdiction of their patriarchs.

Aceph'alocysts [from the Gr. *α,* priv., *κεφαλή,* "head," and *κύστις,* a "bladder"] are hydatids without head or visible organs, and were formerly considered to be parasitic animals, but more recent observations establish the fact that they are scolices or larvæ of cestoid worms, especially of the tape-worm. They are found in various parts of the body of man, as the liver, cavity of the abdomen, etc., and consist of simple sacs filled with a transparent liquid. These sacs are oval or approaching to spherical, and vary in size from the head of a pin to that of a child. They appear to increase by gemmation, developing smaller cysts between the laminæ of the parent, which are discharged from its inner or outer surface. They are composed of a homogeneous substance resembling albumen. (See T. S. Cobbold's "Entozoa," 1864, p. 259 *et seq.*)

Acer'ra (anc. *Acer'ræ*), a town of Italy, in the province of Caserta, 8 miles by railway N. E. of Naples. It has a cathedral and a seminary. The sluggish channels of the Lagni render the place unhealthy. Pop. in 1861, 10,971.

Ace'sius, a bishop of Constantinople, lived about 320–340 A. D. He favored the Novatian doctrine. Constantine said to him, "Place a ladder, O Acesius, and ascend alone into heaven." (Socrates i. 10.)

Acetab'ulum [a Latin word signifying a "vinegar cup or cruet"], a term applied to the suckers on the arms of the cuttle-fish and other dibranchiate cephalopods, which have been, hence, recently termed Acetabulifera. These suckers are called by Aristotle *κότυλοι* ("cups"), which has sometimes been erroneously translated "joints." In anatomy, acetabulum signifies the cavity of the hip-joint. In entomology, it is the socket on the trunk of an insect in which the leg is planted.

Aç'etal [from the Lat. *ace'tum,* "vinegar"], a colorless, inflammable liquid obtained by the action of spongy platinum upon the vapor of alcohol. It is convertible by slow combustion into *acetic acid.*

Aç'etate [Lat. *ace'tas, -atis*]. The acetates are a class of salts composed of acetic acid and various oxides. They are all soluble in water, and, for the most part, crystallize readily. Many of these are extensively used either in dyeing or for medical purposes. The following are among the most important: *Acetate of Aluminium.*—This salt exists only in solution, being decomposed by evaporation. It is largely used in dyeing and calico-printing as a mordant, and is prepared by precipitating alum with acetate of lead, sulphate of lead being thrown down, and a mixture of acetate of aluminium and sulphate of potassium remaining in solution. *Acetate of Ammonium.*—The neutral acetate is a white crystalline salt, readily soluble in water and alcohol, and evolving ammonia on evaporation, so that it is difficult to obtain it in its crystalline form. Its solution is known in pharmacy as Spir'itus Mindere'ri. *Acetate of Copper.*—Copper forms several acetates; the normal salt is known as crystallized verdigris. It forms dark, bluish-green prismatic crystals, which are efflorescent and very poisonous. There are three basic acetates of copper, named, respectively, the sesquibasic, the dibasic, and the tribasic. These are all contained in common verdigris, which is largely used both as a pigment and as a mordant in dyeing. It is obtained by submitting metallic copper to the joint action of air and acetic acid. *Aceto-arsenite of Copper.*—A beautiful but very poisonous green pigment, known in commerce as arsenic green, imperial green, Paris green, and Schweinfurt green. It is insoluble in water, and is prepared by boiling verdigris and arsenious acid together. *Acetate of Iron.*—Iron forms two acetates; the only one of importance, however, is the ferric acetate, which is generally prepared by mixing persulphate of iron with acetate of lead. It has not been obtained in the crystalline state, but forms a red-brown solution, which decomposes on ebullition. A very crude mixture of the ferrous and the ferric acetate, known as pyrolignite of iron, is largely used as a mordant in dyeing black. *Acetate of Lead.*—Lead forms a normal and several basic acetates. Normal acetate of lead (known as sugar of lead) is a white crystalline salt, having a sweet astringent taste. When oxide of lead is digested with a solution of normal acetate, the tribasic acetate is formed in long, silky needles. A solution of this salt is frequently used on account of its power of precipitating many vegetable substances, such as gum and coloring matters. It is used in medicine under the name of Goulard water or

Goulard extract (*liquor plumbi subacetatis*). *Acetate of Potassium* is a very deliquescent salt, and is obtained with difficulty in a crystallized state; it melts to a limpid liquid below redness. It exists in the juices of many plants, and is prepared artificially for medicinal purposes by neutralizing acetic acid with carbonate of potassium. *Acetate of Sodium.*—An efflorescent crystalline salt, prepared by saturating acetic acid with carbonate of sodium. On evaporation it separates into large transparent prisms. It is similar in its medical properties to the acetate of potassium.

Acet'ic Aç'id [Lat. *aç'idum acet'icum*] is the most common of the vegetable acids, and is the essential principle of vinegar. It is composed of carbon, oxygen, hydrogen, and water. It occurs in the juices of many plants, and in some animal secretions. It is produced by the decomposition and oxidation of many organic bodies. It is prepared from weak alcoholic liquids, as wine, cider, and beer, by oxidation, "acetous fermentation," and by the destructive distillation of wood, "pyroligneous acid."

The chemical formula of acetic acid is $HC_2H_3O_2$. Alcohol may be converted into acetic acid by bringing it into contact with spongy platinum, from which it absorbs oxygen. (See FERMENTATION.) Crystallizable or glacial acetic acid, the most concentrated form of acetic acid, is obtained by distilling dry acetates with concentrated sulphuric acid.

Acetic Anhydride, Anhydrous Acetic Acid, or **Oxide of Acetyl,** obtained by the action of oxychloride or chloride of phosphorus on acetate of potassium, a colorless, very mobile, strongly refracting liquid, possessing a powerful odor.

Acetic Ethers are acetates of the alcohol radicals, such as acetate of ethyl ($C_2H_5C_2H_3O_2$); acetate of methyl, "æther lignosus" ($CH_3C_2H_3O_2$), found in crude wood vinegar; acetate of amyl ($C_5H_{11}C_2H_3O_2$), made by distilling acetate of potassium, fusil oil, and sulphuric acid. (For other members of the group see WATTS's "Dictionary of Chemistry," i. 21.)

Ac'etone, or **Pyro-acetic Spirit,** a limpid, mobile liquid of agreeable odor and biting taste, like that of peppermint. It mixes with water, alcohol, and ether, and dissolves many camphors, fats, and resins. Acetone is the representative of a class of organic bodies, called ketones, which are derived from the aldehydes by the replacement of one atom of hydrogen by an alcohol radical.

Aldehyde.	Acetone.
C_2H_4O.	$C_2H_3(CH_3)O$.

Ac'etyl, Acetox'yl, or **O'thyl,** a radical not yet isolated, but supposed to exist in acetic acid and acetates.

Acetyl is C_2H_3O.

Acetic acid, $\left.\begin{matrix}C_2H_3O\\H\end{matrix}\right\}O$.

Acetate of potassium, $\left.\begin{matrix}C_2H_3O\\K\end{matrix}\right\}O$.

Acetic anhydride, $\left.\begin{matrix}C_2H_3O\\C_2H_3O\end{matrix}\right\}O$.

C. F. CHANDLER.

Achæ'an [an adjective derived from ACHAIA (which see)] **League,** a confederation of Grecian cities formed about 280 B. C. Previous to the invasion of Macedonia by the Gauls, the Achæans had performed an insignificant part in the history of Greece, but soon after that event four Achæan towns formed a league for mutual protection. Aratus of Sicyon induced his native town to join the league (251 B. C.), and was himself made strategos (general-in-chief) of the confederacy. Corinth joined the league in 243 B. C., and was soon followed by Epidaurus, Megara, and several other cities. Philopœmen, called the "last of the Greeks," became strategos of the league in 208 B. C. In 191 B. C. the confederacy included Sparta, Athens, and nearly all the cities of the Peloponnesus, and for fifty years maintained the cause of Grecian independence against the Ætolians and against the encroachments of Rome. The confederates, under Diæus, were defeated at Corinth by the Roman general Mummius, and Southern Greece was made a Roman province under the name of Achaia (146 B. C.). The Achæan confederacy may be said to furnish the most perfect example of the federative system which ancient Greece affords, and its history forms one of the most glorious chapters in the annals of ancient times.

Achæ'ans [Gr. Ἀχαιοί], one of the four races of inhabitants of ancient Greece. The name is often extended in the Homeric poems to the whole Greek people. The Achæans proper inhabited parts of Thessaly, and in the Peloponnesus they anciently occupied Argos, Laconia, and the neighboring regions, whence they were, for the most part, expelled by the Dorians, the exiles settling along the northern shore of the Peloponnesus, and founding there a new community. They remained an obscure people till the founding of the ACHÆAN LEAGUE (which see).

Acha'ia [Gr. Ἀχαΐα], a state of ancient Greece, in the N. part of the Peloponnesus, was bounded on the E. by Sicyonia, on the N. by the Bay of Corinth, and on the S. by Arcadia and Elis. It was about 65 miles long from E. to W. The surface was hilly or mountainous. (See ACHÆAN LEAGUE.) Achaia and Elis constitute a nomarchy or province of modern Greece. Area, 1908 square miles. Pop. in 1870, 149,561. In the days of the New Testament writers, Achaia signified the whole Peloponnesus.

Achard (LOUIS AMÉDÉE EUGÈNE), a French novelist, born in 1814, was for a time contributor to the "Courrier de Paris" in 1845, and after the revolution of 1848 became a political writer in the camp of the royalists. He wrote, among other works, "Belle Rose" (5 vols., 1847), "L'eau qui dort" (1860), "Miss Tempête" (1861), "Histoire d'un homme" (1863), "Madame de Sarens" (1865).

Acha'tes, a friend and companion of Æneas, was noted for his fidelity. The proverbial phrase *fidus Achates* is often applied to a man who is a devoted follower of his chief.

Acheen', an independent kingdom in the N. W. part of Sumatra, has an area of about 25,500 square miles. It was formerly much larger, but in recent times its power and extent have considerably decreased. The interior is entirely unknown. The E. coast consists of large fertile plains, while on the W. are high mountain-ridges. The chief productions are rice, cotton, tropical fruits, pepper, and vegetables. Horned cattle, horses, and goats are raised in large quantities and of an excellent breed. The inhabitants are Mohammedans, and are divided into Acheenese, Pedeerese, and Malays. The former are found all over the empire, and are again divided into three tribes. The Pedeerese are found in the region of Pedeer on the N. coast, which formerly was a powerful kingdom. They are of a much darker complexion than the Acheenese. The Malays come from the southern coasts of Sumatra, and prevail in some parts of the S. W. They are of small stature, dark complexion, more agile and ingenious than the neighboring tribes, but also sensual, treacherous, and proud. They are good sailors, very fond of cockfights, and addicted to the use of opium and betel. Their language is a Malay dialect. The estimates of the population range between 450,000 and 2,000,000. The sultan is nominally the highest authority, but in reality the government is in the hands of a shahbandar appointed by him. The sultan has generally very little authority, because he has not the means to make himself felt. In many kampongs (*i. e.* villages), especially those situated at a distance from the capital, and which have become wealthy through trade, he possesses no authority whatever. Each of the three subdivisions of the Acheenese proper has two chiefs, whose position is hereditary, and who bears the title panglima or tivwanku. The sultan must consult with these six chiefs on anything that he intends to undertake, and must ask for their consent, which they only give after consultation with the chiefs of the second grade. These six chiefs of the Acheenese elect the new sultan from the reigning family, and have the right to depose him if he acts contrary to the popular custom, or does anything injurious to the public welfare. Every village has its own chief, called panghulu, imam, or datu, and in a larger kampong a rajah. He must consult with the members of his community on every question, and report the result to his panglima.

The income of the sultan consists of 5 per cent. of the value of all goods imported into the capital, Acheen, and the duties levied on the goods imported in the provinces, as well as on the sale of pepper. In return, he must pay each of the panglimas five catti, gold (each at 480 Spanish dollars). The panglimas, however, deliver just as much as they please of the money raised in the sultan's name, and this explains the lowness of his finances. To improve his financial affairs he carries on trade, and his mercantile affairs are conducted by the shahbandar, who of course does not neglect his own interest.

Acheen was visited by the Portuguese in 1506, by the Dutch in 1595, and by the English in 1612. In 1659 the East India Company established a factory at the capital. In 1818 a long internal war was brought to a close by the interference of Sir Stamford Raffles in favor of the sultan Janhar, who in return granted the English valuable trading privileges to the exclusion of the other European nations. In 1824, England exchanged her possessions in Sumatra against Malacca, and the protectorate over Acheen was transferred to Holland, which, however, engaged not to destroy the independence of Acheen. This provision was revoked by a treaty of Feb. 5, 1871. In the beginning of 1873 a war arose between the Dutch and Acheen. In the memorial published by the Dutch government in April the treachery of the sultan is declared to be the cause. He is accused of having solicited the aid of the Dutch against some native tribes, and at the same time the aid of other European powers, especially Turkey, France, and Italy, against the Dutch. In con-

sequence of this, the Dutch governor was instructed to demand a satisfactory explanation and guarantees for the future conduct of the sultan, and only to declare war if these demands were not complied with. As they were refused, the governor declared war on Mar. 26, 1873. The first operations of the Dutch were not successful, but they were to be resumed in the fall on a large scale.

The city of Acheen, the capital of the above state, in lat. 5° 35′ N., lon. 95° 19′ E., is rapidly decaying. According to an old estimate, it had 30,000 inhabitants, which number, however, is at present by far too large. It is situated on a river, about one mile from the sea-shore. The harbor is guarded by a small fort with four or five cannons. Some coasting trade is carried on with Malacca, Singapore, and Penang.

Achelo′us [Gr. Ἀχελῷος], now **As′pro-Pot′amo,** the largest river of Greece, rises in Mount Pindus, flows nearly southward, forms the boundary between Acarnania and Ætolia, and enters the Ionian Sea after a course of about 100 miles.

A′chenbach (Andreas), a German landscape and marine painter of the Düsseldorf school, was born at Cassel in 1815. He obtained a medal of the first class in Paris in 1855.

Achenbach (Heinrich), a German statesman, born Nov. 23, 1829, became in 1858 *privatdocent*, and in 1860 professor at the University of Bonn, in 1866 chief councillor in the Prussian ministry of commerce, in 1872 secretary of state in the ministry of public worship, and on May 14, 1873, minister of commerce. He has also been since 1866 a member of the Prussian Diet. While professor in Bonn he published valuable works on the agrarian relations of the Germans in ancient times, on German and French mining laws, and founded an excellent periodical exclusively devoted to mining law.

Achenbach (Oswald), a landscape painter, a brother of Andreas, was born at Düsseldorf in 1827. In 1863 he became professor of painting in the academy of his native city.

Ache′nium [from the Gr. α, negative, and χαίνω, to "gap," to "open"], a term applied by botanists to a dry, hard, one-seeded, indehiscent fruit or pericarp, as that of the rose and the ranunculus.

A′chenwall (Gottfried), a distinguished German writer on statistics, born at Elbing in 1719, is reputed to have originated statistical tables. He became professor of philosophy at Göttingen about 1750. He first introduced the term "Staatswissenschaft," by which he proposed to include all the knowledge essential to statesmanship. Died in 1772.

Ach′eron [Gr. Ἀχέρων, gen. Ἀχέροντος], the ancient name of a river of Elis, an affluent of the Alpheus. It was also applied in mythology to a river of the infernal regions.

Acheron′tia [from *Ach′eron*, in the Greek mythology a river of the dead], or **Death's-head Moth,** is a genus of lepidopterous insects belonging to the family Sphingidæ. There is found in England and other European countries a species of this genus (the *Acheron′tia at′ropos*), having on the back of the thorax a remarkable representation of a human skull, and it has hence received the name of death's-head moth. This is a very handsome insect, and is from four and a half to five and a half inches in expanse of wing. If disturbed or handled, it makes a peculiar squeaking noise, the only known example, it is said, of a lepidopterous insect having what may be called a voice. It is much dreaded by the ignorant and superstitious, who consider its appearance to be ominous of evil. It does not hesitate to attack beehives, devouring the honey and putting the bees to flight. Though possessing no weapons of defence that have yet been discovered, it appears to suffer no harm from its armed enemies. Its larva is a large caterpillar about five inches in length, with beautiful markings; the color is a kind of greenish-yellow, and the back is traversed by lines partly blue and partly white, speckled with black spots. The caterpillar feeds mostly on the leaves of the potato plant; and it retires deep into the earth, and changes into a chrysalis in the month of September. It emerges the following June or July, transformed into a perfect insect. This moth is seen most frequently in the mornings and evenings of autumn.

Death's-head Moth.

Acheru′sia. I. A lake in Epirus, into which the river Acheron flows. II. A cavern in Bithynia, near the city of Heraclea; through it Hercules is said to have dragged Cerberus up to the light of day.

A-Cheval [Fr., meaning "on horseback" or "astride"], as a military term, indicates the position or situation of a body of troops *astride*, as it were, of a river or road, etc., which separates or divides one portion from another.

Achill, åk′il, or **Eagle Island,** an island off the W. coast of Ireland, forming part of the county of Mayo. It is about 15 miles long by 12 miles broad. Area, 55 square miles. Pop. about 5000. On the coast is a sheer precipice 2200 feet high.

Achil′les [Gr. Ἀχιλλεύς], a famous Grecian warrior, the hero of Homer's "Iliad," was the son of Peleus, king of Thessaly, and the sea-nymph Thetis. From the name of his father, he was often called Peli′des. At the siege of Troy he was pre-eminent for courage, strength, and swiftness, but, having been offended by Agamemnon, he refused to fight. But when his friend Patroclus had been killed, he returned to the war to avenge his death. He slew Hector and many other Trojans. According to a poetic legend, his mother, by dipping him in the river Styx, had rendered him invulnerable except his heel, by which she held him. He was killed with an arrow by Paris, who shot him in the heel.

Achil′les' Ten′don [Lat. *ten′do Achil′lis*] connects the soleus and gastrocnemius muscles of the calf of the leg with the heel-bone. It is capable of resisting a force equal to 1000 pounds weight, and yet is sometimes ruptured by the contraction of these muscles in sudden extensions of the foot. The name was given in allusion to the death of Achilles, the Grecian hero, by a wound in the heel. Ancient surgeons regarded wounds or serious bruises of the Achilles tendon as fatal. In modern surgery, however, tenotomy, or the division of this or other tendons, is a not infrequent operation, especially in the treatment of club-foot. In that form of this affection called *Tal′ipes equi′nus* the tendo Achillis is unnaturally shortened, so that the heel in standing does not touch the ground.

Achil′li (Giovanni Giacinto), Dr., an Italian Protestant, formerly a Dominican friar, was born at Viterbo in 1803. He left the Catholic communion about 1839, and issued an Italian version of the New Testament, which is regarded, by some, as the best in that language. In 1850 he went to England, and became involved in a lawsuit (in 1852) which was brought against Dr. John Henry Newman for slander. The case was tried before Lord Campbell, and a verdict given for the plaintiff, Dr. Achilli. Dr. Achilli has also been professor of the Italian language and literature in the English College at Malta.

Achromat′ic ["without color," from α, priv., and χρῶμα, "color"], a term applied to lenses and telescopes through which objects appear colorless, or without the discoloration which arises from the unequal refrangibility of the rays of light. (See next article.)

Achro′matism [for etymology, see preceding article]. (See Aberration, Chromatic.) A prism of flint glass will cause a certain amount of refraction and of dispersion, and if a similarly-shaped prism of the same glass be placed behind it, in the reverse position, the refraction and dispersion in one direction by the first prism will be exactly neutralized by the refraction and dispersion in the opposite direction by the second prism, and as a result there will be no refraction and no color. But suppose a prism of *crown glass*, having the same dispersion as the one of flint glass, be placed behind the latter in the reverse position, the two dispersions, being opposite and equal, will neutralize each other, and the result will be white light; but the mean refractions being different, they will not neutralize each other, and the beam of light will pass through achromatic, or almost free from color, but refracted more or less. As a lens may be looked upon as a combination of prisms with curved surfaces, achromatic lenses may be produced in the same way as achromatic prisms. Absolute achromatism is perhaps unattainable by art, owing to the spectra from different dispersive media not having an exact proportionality to one another. This is called irrationality of dispersion. It may be remedied in some degree by introducing a third lens of plate glass in addition to the flint and crown glass lenses. An under-corrected lens is one in which the correcting lens of flint does not quite accomplish the purpose, and the violet ray will come to a focus a little within the red. In an over-corrected lens the error is of the opposite kind, and the order of colors will be inverted.

Achromatic Telescope. See Telescope.

Achtkarspe′len (the "eight parishes"), a town of

the Netherlands, in the province of Friesland. Pop. in 1867, 9285.

Achtyr'ka, a town of Russia, in the government of Kharkov, 69 miles N. E. of Kharkov, on the Vorskla River. Pop. in 1867, 17,411.

Aci, or **Aci Reale,** a town and seaport of Sicily, in the province of Catania, at the mouth of the river Aci, near the foot of Mt. Etna, and 7 miles by rail N. E. of Catania. It is built mostly of lava, and has many fine edifices. Here are mineral springs and the Cave of Polyphemus. Pop. in 1872, 35,787.

Aç'id [Lat. *açidus*, "sour"], in chemistry, a term applied to an important class of compounds. The various acids usually have the following properties: (1) solubility in water; (2) a sour taste; (3) the power of turning vegetable blues to red; (4) the power of decomposing carbonates, and displacing the carbonic acid with effervescence; (5) the power of neutralizing more or less the alkalies, at the same time losing most of their own characteristic properties, forming salts. (See SALTS.) A great number of acids are compounds of oxygen with various elements. Others contain chlorine, iodine, or other elements, instead of oxygen. (See CHEMISTRY.) Various theories have been advanced to account for the peculiar properties of acids. That of Dulong, proposed in 1816, is now generally accepted. It is known as the binary or hydrogen theory of acids. All acids are considered *salts of hydrogen* (Gerhardt)—*i. e.* compounds of hydrogen with simple or compound acid radicals; thus:

Hydrochloric acid H(Cl),
Hydriodic acid H(I),
Hydrocyanic acid H(CN) or H(Cy),
Nitric acid $H(NO_3)$,
Sulphuric acid $H_2(SO_4)$,
Phosphoric acid $H_3(PO_4)$.

Salts, according to this theory, are produced by replacing the hydrogen by metals or basic radicals; thus, hydrochloric acid and potassic hydrate form potassic chloride and water: $HCl + KHO = KCl + H_2O$. Nitric acid and ammonic hydrate yield ammonic nitrate and water: $H(NO_3) + (NH_4)HO = (NH_4)(NO_3) + H_2O$. Sulphuric acid and calcic hydrate yield calcic sulphate and water: $H_2(SO_4) + CaH_2O_2 = Ca(SO_4) + 2H_2O$. Phosphoric acid and sodic hydrate yield sodic phosphate and water: $H_3(PO_4) + 2NaHO = Na_2H(PO_4) + 2H_2O$. Acids are monobasic, bibasic, tribasic, etc., according as they contain one, two, or three atoms of replaceable hydrogen. Acids may produce several classes of salts, according as they contain more or less atoms of hydrogen. Hydrochloric acid forms one salt with potassium, KCl. Sulphuric acid forms two—the *neutral*, $K_2(SO_4)$, in which both atoms of H are replaced by K; the *acid*, in which only one is replaced, $KH(SO_4)$. Phosphoric acid forms three classes, thus: $K_3(PO_4)$, $K_2H(PO_4)$, $KH_2(PO_4)$. An atom of a monatomic radical replaces one atom of hydrogen, as shown above in the case of K,(NH_4) and Na. An atom of a diatomic radical, as calcium, replaces two atoms of H, as shown above in the case of sulphuric acid and calcic hydrate. This is further illustrated by the following formulæ:

Acids.	Radicals.	Salts.
HCl	K′	K(Cl).
"	Ca″	$Ca(Cl_2)$.
"	Bi‴	$Bi(Cl_3)$.
$H_2(SO_4)$	K′	$K_2(SO_4)$.
"	K′	$KH(SO_4)$.
"	Ca″	$Ca(SO_4)$.
$H_3(PO_4)$	K′	$K_3(PO_4)$.
"	"	$K_2H(PO_4)$.
"	"	$KH_2(PO_4)$.
"	Ca″	$Ca_3(PO_4)_2$.
"	"	$Ca_2H_2(PO_4)_2$.
"	"	$CaH_4(PO_4)_2$.

Compound ethers are salts in which the hydrogen of the acid is replaced by the alcohol radicals. (See ETHER.)

Ethyl chloride $(C_2H_5)'Cl$; amyl nitrate $(C_5H_{11})'(NO_3)$; ethylene iodide $(C_2H_4)''I_2$.

Acids are of three types:

(1) The water type: water $= \left.\begin{matrix}H\\H\end{matrix}\right\}O$, $\left.\begin{matrix}H_2\\H_2\end{matrix}\right\}O_2$, $\left.\begin{matrix}H_3\\H_3\end{matrix}\right\}O_3$; nitric acid $\left.\begin{matrix}(NO_2)'\\H\end{matrix}\right\}O$; sulphuric acid $\left.\begin{matrix}(SO_2)''\\H_2\end{matrix}\right\}O_2$; phosphoric acid $\left.\begin{matrix}(PO)'''\\H_3\end{matrix}\right\}O_3$.

(2) The hydrochloric acid type: hydrochloric acid HCl; hydriodic acid HI; hydrocyanic acid H(CN).

(3) The ammonia type: ammonia $NH_3 = N\left\{\begin{matrix}H\\H\\H\end{matrix}\right.$; cyanic acid (carbamide) $N\left\{\begin{matrix}(CO)''\\H\end{matrix}\right.$; succinamide $N\left\{\begin{matrix}(C_4H_4O_2)''\\H\end{matrix}\right.$; sulphocyanic acid $N\left\{\begin{matrix}(CS)''\\H\end{matrix}\right.$.

(4) Intermediate acids are formed from two or more atoms of two different types. Sulphamic acid (SO_3H_3N) is derived from $\left.\begin{matrix}H_3N\\H_2O\end{matrix}\right\}$; chlorhydrosulphuric acid (SO_3HCl) from $\left.\begin{matrix}HCl\\H_2O\end{matrix}\right\}$. (See AMIC ACIDS.)

(See a very interesting paper on normal and derived acids by G. F. BARKER, in the "American Journal of Science" [2] xliv., 1867, p. 384.) C. F. CHANDLER.

Acidim'eter [from the Lat. *aç'idum*, an "acid," and the Gr. μέτρον, "measure"], an instrument for determining the strength of an acid by its saturating power. It usually consists of a glass tube graduated into a hundred equal parts, and containing an alkaline liquor of known strength, the proportion of which requisite to saturate a given quantity of any acid is the equivalent of that acid. (See CHEMICAL ANALYSIS and VOLUMETRIC ANALYSIS.)

Ack'land (Lady HARRIET CAROLINE FOX), a daughter of the earl of Ilchester and wife of Major John D. Ackland of the Twentieth regiment of foot in the British army, was born in 1750, and accompanied to America her husband, who was wounded and made prisoner at Saratoga Oct. 7, 1777. She attended upon her husband (who died in the following year) with great constancy and heroism. Died July 21, 1815.

Ack'ley, an incorporated town of Hardin co., Ia., at the junction of the Dubuque and Sioux City and Central R. Rs. of Iowa, 132 miles W. of Dubuque. It has a weekly newspaper. ED. INDEPENDENT.

Acknowl'edgment [from the English word *knowledge*], in law, the act by which one who has executed an instrument declares or acknowledges, before some authorized officer, that it is his act or deed. The term is also applied to the officer's certificate of this fact endorsed on the instrument. The general object of an acknowledgment is twofold: first, to comply with the recording acts, so that the instrument may be lawfully recorded; secondly, to give the instrument such authenticity that it may be put in evidence in courts of justice, without further proof of its execution. As a general rule, it is not necessary to the validity of the instrument, though the laws of some of the States provide that a wife's conveyance of real estate or release of dower is invalid unless on a private examination apart from her husband she acknowledges that she executed it freely and without fear or compulsion of her husband. This rule is borrowed in its substance from an English practice under a so-called statute of fines. The officers generally authorized to take acknowledgments are judges and clerks of courts, mayors, justices of the peace, commissioners of deeds, and notaries public.

Acknowledgments of conveyances of real estate should correspond in form with the requirements of the law of the State where the land is situated, though that law sometimes permits them to be valid if they conform to the law of the place where they are executed. T. W. DWIGHT.

Ac'land (HENRY WENTWORTH), M. D., D. C. L., F. R. S., born in 1815, was educated at Christ Church, Oxford, where he took his degree of M. D. in 1848. He was one of the founders of the University Museum, and became in 1858 regius professor of medicine. He accompanied the prince of Wales to America in 1860, and has published "The Plains of Troy" (1839) and a valuable "Memoir on the Visitation of Cholera in Oxford in 1854," besides numerous scientific and medical papers.

Acœme'tæ (*i. e.* the "sleepless"), [from the Gr. α, priv., and κοιμάομαι, to "fall asleep"], an order of monks, sometimes called Watchers, which was founded at Constantinople early in the fifth century. They performed divine service day and night, and were divided into three classes, each of which had its share of duty. They established many monasteries and were held in high estimation. Studius, a Roman noble and a member of this order, built a monastery called Studium, and the monks were styled Studitæ. Having afterwards favored the doctrines of Nestorius, their credit declined.

Ac'olyte [from the Gr. ἀκόλουθος, a "follower"], a functionary who, in the Roman Catholic Church, assists the priest in the performance of religious services. According to Roman Catholic authorities, acolytes formed the second of the inferior orders of clergy in the primitive Church, subdeacons being the first. It is now the fourth of the minor orders.

Aco'ma, a village of Valentia co., N. M., supposed by some to be *Acuco*, mentioned by the Spanish historians. It is inhabited by Indians, is built on a high sandstone rock,

and is reached by a spiral staircase cut in the rock. It has a church and a missionary station, but has at present no priest.

Acoma, a township of McLeod co., Minn. Pop. 392.

Aconca′gua, the highest peak of the Andes, is in Chili, lat. 32° 38′ 30″ S., lon. 70° 0′ 30″ W. Its height is 22,478 feet above the level of the sea.

Aconca′gua, a province of Chili, is bounded on the N. by Coquimbo, on the E. by the Argentine Republic, on the S. by Santiago and Valparaiso, and on the W. by the Pacific. Area, 4932 square miles. This province is the most mountainous part of Chili, and contains the highest peak of the Chilian Andes, Aconcagua. The climate is very dry, and owing to the high mountain-ranges there is very little vegetation in this province. Pop. in 1863, 130,253. Chief town, San Felipe.

Ac′onite [Lat. *Aconi′tum*], a plant of the genus *Aconi′tum* and the order Ranunculaceæ. The Old World contains many species of this genus, some of them, particularly *Aconitum ferox* of India, very poisonous. The Atlantic U. S. have two native species. The *Aconitum Napellus,* or monkshood, a native of Europe, Asia, and the Rocky Mountains of the U. S., is the plant which yields the aconite used in medicine. This plant abounds in the deadly alkaloid aconitine, but when administered in suitable doses is useful in rheumatism, neuralgia, and in fevers. This remedy, in minute quantity, is a favorite with homœopathists, but was employed by physicians before the rise of homœopathy. The "winter aconite" (*Eranthis*) of Europe is a closely related plant, and has similar properties.

Ac′orus Cal′amus (sweet flag), a medicinal plant of the order Araceæ. Its aromatic stem (rhizoma) is used as a stomachic and tonic. It is a native of both continents, and is known as "sweet flag."

Acos′ta (Gabriel), a Jewish reformer, born in 1587 in Oporto, Portugal, was educated in the Catholic religion, but went to Holland, where he embraced the faith of his fathers, and changed his name to Uriel. He was condemned and persecuted as a heretic by the rabbis, and died by suicide in 1647. His autobiography was published in Latin and German in 1847.

Acotyled′onous Plants [from the Gr. α, priv., and κοτυληδών, a "seed-leaf"], plants without cotyledon or seed-lobes. The term is synonymous with Cryptogamous Plants (which see), for the latter plants are propagated by spores, and not by true seeds. A few seed-bearing plants, like the dodders, have, however, no cotyledons.

Acous′tics. The term acoustics is derived from the Greek ἀκουστικός, from ἀκούω, to "hear"—"belonging to the sense of hearing." Acoustics has for its object the study of the nature, the production, and the perception of sound.

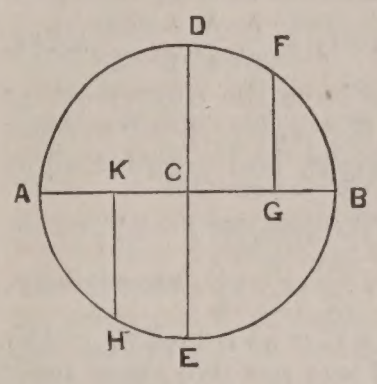
Strictly speaking, sound is a sensation which is produced when vibrations of a certain character are excited in the auditory apparatus of the ear. These vibrations are generated by progressive tremors in the atmosphere, called sound-waves, the nature of which we shall briefly consider. Let it be premised that the particles of the air, and of all elastic media, are ordinarily maintained in a state of equilibrium and rest by mutually repellent forces. If any particle be disturbed from its position of equilibrium, it must be by an impulse received from some body foreign to the medium; and when so disturbed it is solicited to return by a force directly proportioned to the distance, or *amplitude,* of its displacement from that point. Also, the velocity with which it will be animated on reaching in its return the point of original rest will be directly proportioned to the extreme amplitude of its displacement; so that, in virtue of its inertia, it will make an equal and similar excursion in the opposite direction. When in its return from this it reaches once more the point of equilibrium, it will have passed over the entire range of its movement in both directions; and this is said to constitute one complete oscillation or double vibration.

From the law of force above stated the following deductions are made by the help of the calculus. Put a to represent the extreme amplitude of displacement; V, the maximum velocity of the vibrating particle (the velocity with which the particle passes the point of equilibrium, expressed by the distance such velocity, continued uniformly, would carry a body in one second of time); T, the time of a complete double vibration; and π, the ratio of the circumference to the diameter of the circle. Then $V = 2\pi\frac{a}{T}$, and $T = 2\pi\frac{a}{V}$; from which last expression it appears that the time of vibration is constant, whatever be the amplitude of displacement, since a varies directly as V.

But in an elastic medium one particle cannot be displaced from the position of equilibrium without disturbing the equilibrium of its nearest neighbors. The neighboring particle towards which it is driven will begin, almost but not quite in the same instant, to move in the same direction; and this will disturb the next, and through it the third, and so on, the tremor being rapidly propagated throughout the medium. The distance to which this tremor will have reached when the particle first disturbed has completed one entire double vibration is the length of the sound-wave, or of one complete undulation.

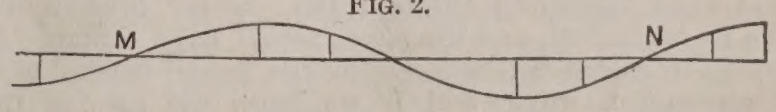
The relation between vibration and undulation may be made more clear by the following illustration. Since VT is the distance accomplished in time, T, with velocity, V, and since $VT = 2\pi a$, it follows that if, with radius, $a = CA$ or CB, we describe a circle, ADBE, a particle p' will describe the circumference, ADBE, with velocity V continued uniform, in the same time, T, in which the vibrating particle p performs a complete double vibration on the diameter AB. If p' leaves D in the same instant in which p passes C, the two will be together at B, and again at A; and it is further provable that, at any intermediate instant, the line joining p and p', as FG or HK, will always be parallel to CD, and perpendicular to AB. Also, that if the arcs of revolution be reckoned from D, and the time from D to F, or from D to H, be called t, the distance $y = CG$ or CK, of p from the point of equilibrium, C, will always be representable by the formula $y = a \sin 2\pi\frac{t}{T}$; and the velocity, v, of the same particle will always be $v = V \cos 2\pi\frac{t}{T}$.

Fig. 1.



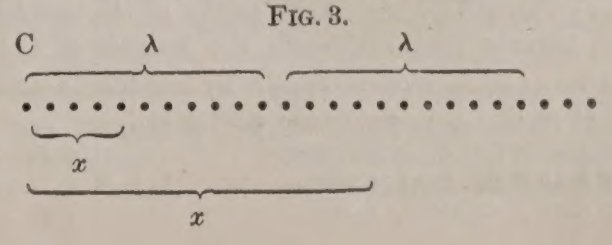
Now the rapidity of the propagation of the tremor through the elastic medium is, for all tremors producing the sensation of sound, vastly greater than the velocity v or V; and this velocity of propagation is uniform, although the several velocities of the particles of the medium which successively take up the tremor, diminish with the increase of distance from the origin, because of the diffusion of the exciting force through a constantly increasing number of particles. This diminution for moderate distances may be disregarded. If the foreign body which disturbs p be, for instance, the limb of a tuning-fork making 500 double vibrations per second, the time of describing CB will be but the 2000th part of a second. During this time the tremor in the air will advance more than six inches, while CA will hardly exceed $\frac{1}{40}$th of an inch. The velocity of propagation in this case, therefore, exceeds the mean velocity of vibration more than 240 times. But if we consider the movement of p through CB to be made up of an indefinite number of exceedingly minute elementary motions, these elementary motions will have all the different velocities corresponding to the possible values of FG between C and B; and each one of these velocities will be successively transmitted along the line of propagation, one behind the other; so that, when p reaches B and comes to rest, all these velocities will still be living in a row of particles extending over a distance of six inches, the largest being foremost, and the least, which is zero, being that of the particle p itself. As p returns towards C, it leaves its next neighbor towards the right partially unsupported, and that neighboring particle follows it. There occurs then a second series of propagated movements, all the molecules moving in the returning direction, though the tremor advances, forming the wave of dilatation, as the former was the wave of compression. Sound-waves may accordingly be represented graphically by a curved line, as in Fig. 2, where the

Fig. 2.



portion of the curve above the horizontal straight line represents the wave of compression, and the part below the wave of dilatation. The ordinates to the different parts of this curve represent the velocities animating the particles in the different parts of the wave; those above being advancing velocities, and those below, receding. The distance between M and N is the length of a complete undulation, commonly represented by λ. Then if x (Fig. 3) be

Fig. 3.



taken to represent any distance from the point of rest, C, of the disturbing or sounding body, the distance, y, of the particle at x from its place of equilibrium will be expressed by the formula

$$y = a \sin 2\pi \left(\frac{t}{T} - \frac{x}{\lambda}\right);$$

and the velocity animating that particle at the instant by the formula

$$v = V \cos 2\pi \left(\frac{t}{T} - \frac{x}{\lambda}\right).$$

For examples under the first formula, let $t = n\,T$; *i. e.* let p have made an exact number of complete oscillations; then by giving different values to x we ascertain the condition of corresponding points along the line. Thus if $x = 0$, we have $y = 0$; or p is at this moment in its position of equilibrium. Making x successively $= \frac{\lambda}{8}, \frac{\lambda}{4}, \frac{\lambda}{2}, \frac{3\lambda}{4}, \lambda, 2\frac{1}{8}\lambda$, and substituting these values, we have the corresponding values of y equal to $-a\,\frac{7}{10}, -a, 0, +a, 0$; positive signs indicating displacement to the right, and negative signs the reverse.

For examples under the second formula, let $t = n\,T$, as before, and put $x = \frac{\lambda}{6}, \frac{\lambda}{3}, \frac{2\lambda}{3}, \frac{7\lambda}{8}, \frac{5\lambda}{3}, \frac{\lambda}{2}, \frac{7\lambda}{4}$, successively. We shall then have $v = +\frac{1}{2}V, -\frac{1}{2}V, -\frac{1}{2}V, +\frac{7}{10}V, -\frac{1}{2}V$, V, 0, for the corresponding velocities; positive signs indicating movement towards the right, and negative signs the reverse. The signs of displacement and movement for the same particle are half the time alike and half the time unlike.

Velocity of the Propagation of the Sound-waves in the Air.—This has been the subject of a considerable number of experiments, of which we give below the most important. In 1822 a determination of this kind was undertaken by some members of the French Academy; the stations selected were at Montlhéry and Villejuif, the distance being 18622.27 mètres. Cannon were alternately discharged at the two stations at night, and the time which elapsed between the flash and the perception of the sound noted. On the first night twelve and seven shots were heard—on the second only one. The result was, that at a temperature of 0° C. sound travels with a velocity of 331.2 mètres per second. It is somewhat strange that to this important experiment only two nights were devoted.* We have besides this, the more careful experiments of Moll and Van Beek † in the following year, who obtained for their result at 0° C., 332.05 mètres per second; and finally we must add the experiments of Bravais and Martins, ‡ who measured the velocity of sound in a slanting upward direction from the Lake of Brienz to a station on the Faulhorn, obtaining as result at 0° C. a velocity of 332.37. This last experiment is interesting as showing that sound travels with the same velocity in an upward direction as on a level, as is required by the formula of Laplace.

Recently several pieces of apparatus have been devised by which the velocity of sound can be measured when the distance travelled over is only a few feet; so that it is now possible to make this experiment in a small apartment. Suppose that we generate a sharp, short sound at the open extremity of a tube, the other end being closed by a membrane; the sound-impulse, reaching the closed end of the tube, would announce its arrival by giving the membrane a little push outward; and if we had fastened on it a pencil, this might be caused to make a mark on a sheet of paper at the same instant. Let us now imagine that we had, near each other, *two* such tubes, the second one being longer than the first, but bent so that both still terminated side by side, each with its membrane and pencil, and that finally our sheet of paper, instead of being stationary, were in motion. Then, under these circumstances, the sound-wave travelling through the shorter tube would make its mark first, and the paper would have a chance to move a few inches before receiving the pencil-mark due to the companion wave; and if we knew the rate of the paper's motion, it is evident that we could easily calculate the velocity with which the sound had travelled through our apparatus. This general explanation will give an idea of the principle involved in a number of new contrivances, with some of which it is even possible to experiment at various temperatures and on other gases than our atmosphere. A simple and cheap apparatus of this kind was, in 1866, devised by Dr. Ernst Neumann,§ a school-teacher in Dresden; the difference in the paths of the sound-waves was about twenty feet, although the length of the apparatus was only three; the sound was generated by the discharge of a child's brass cannon. The paper was attached to a circular disk arranged with a handle, which enabled the experimenter to revolve it with a velocity of only one turn per second, which was roughly accomplished by watching a seconds pendulum, consisting of a ball attached to a string having a length such as to cause it to vibrate seconds. The mean of a number of experiments gave a result far more accurate than would have been expected. Using the same general idea, but causing the sound-waves to act on little gas-burners connected with the two membranes, in the same year Ivan Zoch‖ in Erlangen contrived a far more delicate instrument, with which he obtained results rivalling those of the French Academy in 1822, although in his case the difference of the paths was only three or four feet. With it he measured the velocity in various gases, and by driving a current of air through during the experiment was actually able to ascertain the change due to this cause. A somewhat similar idea was used in this fruitful year by Prof. Quincke¶ of Berlin, in a very beautiful contrivance, where, unlike the two preceding, the signal was given not to the eye, but to the ear, the two sounds being made to destroy each other, producing silence in a manner presently to be explained. With this instrument Dr. Seebeck** has proved that in *small* tubes sound travels slower than in the open air, partly, as it would seem, owing to friction, and partly to loss of heat developed by the sound-wave itself through conduction by the walls of the tube. He has also shown that in *small* tubes the velocity is less in the case of deep notes than with those which are higher.

Laplace's formula for the velocity of sound in gases and vapors is

$$v = \sqrt{\frac{gh}{d}}\,K;$$

v = the number of mètres traversed by the sound-wave in a second of time; g = the accelerating force of gravity = 9.8088 mètres; h = the height of the mercury in the barometer reduced to the height it would have at 0° C.; d = the specific gravity of the gas, mercury at 0° being taken as unity; K = the quotient of the specific heat of the gas at a constant pressure, divided by its specific heat at a constant volume = 1.42. It is seen from this formula that the velocity is directly proportional to the square root of the pressure the gas is under, and inversely proportional to the square root of its specific gravity. It is evident also that the velocity is independent of the height of the barometer, for a change in the barometer affects not only h in the numerator, but also d in the denominator, in such a way that the value of the fraction remains constant. No term relating to the distance of the sounding body enters the formula; hence the velocity is independent of the distance—that is, of the amplitude of the sound-wave. The following is a convenient formula for calculating the velocity of sound in air at various temperatures:

$$v = 333.\ M\sqrt{1 + at};$$

a = coefficient of expansion of air for 1° C. = 0.003665; t = the temperature in degrees of the centigrade scale; M standing for mètres. It was also found experimentally that sound moves quicker with the wind and slower against it; the final velocity being in the one case equal to the sum, in the other equal to the difference, of the velocity of wind and that of the sound-wave itself. In gases, the velocity of sound, of course, as indicated by the formula, increases with the temperature; in air this increase is about two feet per second for each degree centigrade. The velocity of sound in oxygen gas at 0° C. is 1040 feet; in carbonic acid, 858 feet; in hydrogen, 4164 feet.

In 1827, Colladon and Sturm determined experimentally the velocity of sound in fresh water. The experiment was made on the Lake of Geneva, and it was found to be 4714 feet per second at a temperature of 15° C. Laplace has also given a formula for the velocity of sound in liquids:

$$v = \sqrt{\frac{g}{\lambda}};$$

g as before = 9.8088 mètres, and λ is the amount which a column of the liquid one mètre long shortens under a pressure equal to its own weight; it hence is necessary to determine the compressibility of the liquid in order to employ this formula, as the velocity is inversely proportional to

* "Ann. de Chim. et de Phys.," T. xx., p. 210.
† Pogg. "Ann." Bd. v., s. 351, 469.
‡ Pogg. "Ann." Bd. lxvi., s. 351.
§ Pogg. "Ann.," cxxviii., s. 307.
‖ Pogg. "Ann.," cxxviii., s. 497.
¶ Pogg. "Ann.," cxxviii., s. 177.
** Pogg. "Ann.," cxxxix., s. 104. Compare also the experiments of Regnault on this subject ("Comp. Rend." t. lxvi., p. 209); also those of Kundt (Pogg. "Ann.," cxxx., s. 337); and finally those of Schneebeli (Pogg. "Ann.," cxxxvi., s. 296).

the square root of the compressibility. The velocity of sound in alcohol at 20° C. is 4218 feet; in ether, at 0°, 3801; in sea-water, at 20° C., 4768.

The velocity of sound in solids can be calculated by this last formula, and can also be experimentally determined; that in

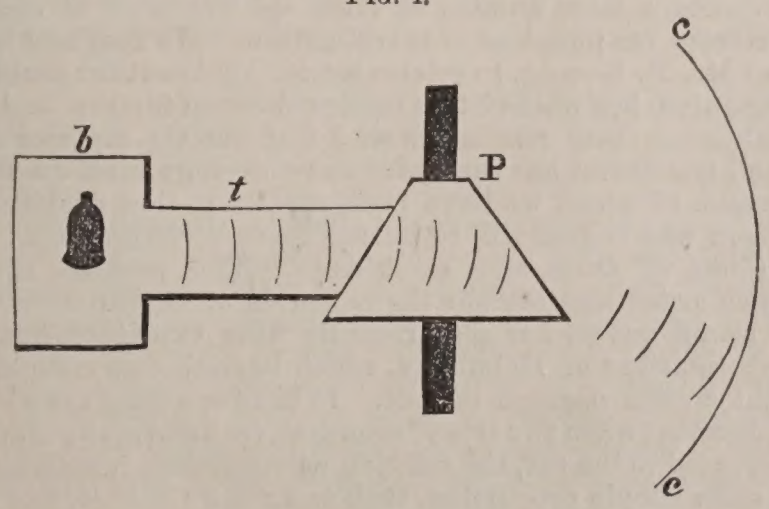
		At 20 C.°	At 100°.
Gold	is	5,717	5,640
Lead	"	4,030	3,951
Copper	"	11,666	10,802
Iron	"	16,822	17,386

The Intensity of Sound varies inversely as the square of the distance of the sounding body from the ear; it is also proportional to the square of the amplitude of the sound-wave. Thus far, we can hardly be said to possess a phonometer, or instrument for the purpose of comparing the relative intensities of two sounds or sets of sound-waves; hence we must regard with interest a step recently taken in this direction by Prof. A. M. Mayer of Hoboken, who, by employing small vibrating flames and the principle of interference, succeeded in solving this problem in certain cases. For details we must refer the reader to the original article, published in the January number of the "American Journal of Science and Arts," 1873.

Reflection of Sound.—The waves of sound can be reflected like the waves of light, and obey the same law, the angle of incidence being equal to the angle of reflection; this can be proved indirectly with the aid of spherical or parabolic mirrors, though, from the circumstance that the sound-waves are large relatively to such reflecting surfaces as can be used, the experiments are far more difficult than with the almost infinitely shorter waves of light. The author has recently contrived a new method by which the reflection of sound can be studied, and the relative reflecting powers of different substances examined. A circular disk with open and closed sectors, or with sectors of different materials, is made to revolve rather slowly near a sounding-reed, in such a way that the sound is from time to time reinforced by reflection. The result is, that a sound resembling "the beats" is produced, these alternations of sound and comparative silence disappearing when the disk is made complete, or when its alternate sectors are composed of substances having the same power of reflection. The same apparatus can be used to determine the relative powers of different bodies for the transmission of sound. Echoes are cases of the reflection of sound, and the wonderful power of very long tubes in conveying sounds to a great distance is due to the same property.

Refraction of Sound.—Sound-waves can be refracted or bent out of their course by denser or rarer bodies in a manner corresponding to light; this can be demonstrated by the use of a large lens of carbonic acid enclosed in a thin membrane, when it will be found that the sound-waves from a watch will be concentrated just as a glass lens concentrates the rays of light. Recently, the refraction of sound has been directly studied with a prism, according to the method which has long been used in light. Prof. C. Hajech generated sound-waves in the interior of a box *b*, by the aid of a bell which was struck by clockwork; travelling along a tube *t*, they reached the prism *P*, and were refracted by it as indicated in Fig. 4. The amount by which they were bent out of their path was ascertained by moving the ear over the graduated circle *cc*, which was in an adjoining room, till the position of maximum intensity had been ascertained. The sides of the prism were made of thin membrane, of paper, or finally of sheets of mica. Experiments were performed on hydrogen, ammonia, illuminating gas, carbonic acid, and on sulphurous acid gas. Besides these gases, two

FIG. 4.



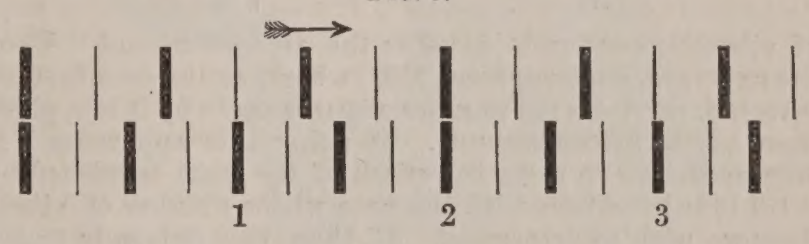
liquids were also employed—ordinary water and water saturated with common salt. Amongst other results it was found that the same prism refracted waves of different lengths (or different tones) alike. The results of these measurements corresponded with those indicated by the known velocities of sound in the substances employed, taken in connection with the explanation of refraction as given in the undulatory theory of sound.

Sound-waves rendered Visible.—Quite recently this feat has been accomplished by the German physicist Töpler, who employed the snap of an electric spark for the generation of the sound-wave, and then illuminated it by the instantaneous light of a second spark. He was thus not only able to see with distinctness a simple sound-wave, but also to observe its reflection, refraction, and the interference of two sound-waves. (*Pogg. Ann.*, cxxxi., s. 180, 1867.)

Inflection of Sound-waves.—From the circumstance that the sound-waves are not minute relatively to the obstacles they encounter, it happens that they manifest this property of travelling around corners in a high degree. The corresponding experiments with light require some care, but the inflection of sound-waves is something that we with difficulty escape from, obstacles placed in their path casting but little acoustic shadow.

Interference of Sound-waves.—Thus far, we have occupied ourselves with single sets of waves, and have supposed the particles of air to be acted on by only one wave at a time. It will, however, more commonly happen that it is necessary to deal with particles which are at the same instant being acted on by more than a single wave. Let us take the simplest case, and suppose our particles acted on by two equal and similar sound-waves; now, it may happen under these circumstances that the two waves agree in their action, any particular layer of air being at the same moment subjected to a condensation or rarefaction from both these sources. When this happens the motion of its particles will be twice as great, and we shall hear a louder sound. But something else is equally likely to occur: it may happen that just at the moment when the layer ought to be condensed by one wave, its companion attempts to rarefy or expand it; these two motions will then neutralize each other, and instead of sound we shall have silence. This can be illustrated with two similar organ-pipes which give exactly the same note; sounding them both together may give a louder tone, or one which is quite faint. If closed organ-pipes are used, the silence, as far as the musical note is concerned, is quite complete, nothing but the hoarse *noise* which is always mingled with it being perceptible. We can combine both these experiments into a single one by employing organ-pipes which give slightly different tones; if now both sets of waves start fairly together, the condensations and rarefactions being in harmony, this state of things cannot long remain, owing to the inequality in their length, as is shown in Fig. 5, where condensation is marked heavily, rarefaction lightly. Already at 1 the condensation coincides with the rarefaction; farther on, at 2, the old state of things has returned; and the condition at 3 is the same with that at 1. Hence, in this experiment we must expect to have alternations of sound and silence, the tone rising and swelling to a maximum, then dying away again to repeat itself, etc. These alternations are called *beats*, and furnish even to the unmusical ear a very

FIG. 5.



accurate means of judging of the identity of musical tones. Having considered briefly these general properties of sound-waves, we pass on to some of their distinguishing characteristics. Among the most important of these is—

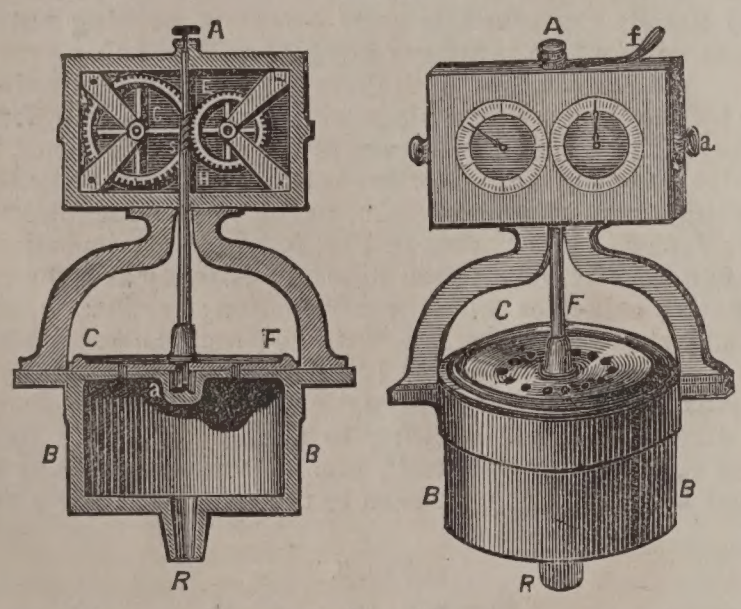
Length of Sound-waves.—The pitch of the note, other things being equal, depends on the length of the wave; long waves give low notes—short waves, those that are high. The longest waves, in the air at a temperature 0° C., which are capable of producing the sensation of sound, have a length of about 66 feet. The tone, from a musical point of view, is imperfect, and in order to remove this defect entirely it is necessary to shorten the wave to about 27¼ feet. On the other hand, when the waves are reduced to a length of three or four tenths of an inch, they again become inaudible; to have a useful musical effect their length must be increased to about 3.2 inches. Instead of speaking of the *length* of the sound-waves, which evidently must vary with temperature, it is more customary to use the *number of vibrations* producing a given sound; thus, as sound travels at the rate of 1090 feet per second in the air at 0° C., it follows that a wave 66 feet long will execute in a second 16½ vibrations, and one which is 27¼ feet long, forty vibrations, etc. We give below a table, arranged in octaves, of the number of vibrations of the notes used in music:

$16\frac{1}{2}$	33	66	132	264	528	1056	2112	4224
$\underline{\underline{C}}$	$\underline{C}$	C	c	$\overline{c}$	$\overline{\overline{c}}$	$\overline{\overline{\overline{c}}}$	$\overline{\overline{\overline{c}}}$	$\overline{\overline{\overline{\overline{c}}}}$
$C_{//}$	C′	C	c	c′	c″	c‴	c⁗	c⁗′
C″	C′	C	c	c′	c″	c‴	c⁗	c⁗′
C_2	C_1	C	c	c_1	c_2	c_3	c_4	c_5
c–3	c–2	c–1	c^0	c^1	c^2	c^3	c_4	c^5
ut_{-2}	ut_{-1}	ut_1	ut_2	ut_3	ut_4	ut_5	ut_6	ut_7

As will be seen, several modes of notation are employed, the last being the French—that preceding, the method proposed by Sondhaus for scientific purposes. In large organs $\underline{\underline{C}}$ with $16\frac{1}{2}$ vibrations is reached, the effect being imperfect; the piano reaches $\overline{\overline{\overline{a}}}$ with 3520 vibrations, and sometimes $\overline{\overline{\overline{\overline{c}}}}$ with 4224. The highest note employed in the orchestra is d_5, with 4752 vibrations (piccolo flute). The practical range in music is from 40 to 4000 vibrations, embracing seven octaves. The human ear is, however, able to reach eleven octaves; that is, the sensation of sound is produced by vibrations varying from $16\frac{1}{2}$ up to 38,000 in a second.

It is not difficult to measure the length of the sound-waves or the number of vibrations producing them; a very simple means is with the sirene of Cagniard de Latour. This instrument consists of a circular revolving disk C F (Fig. 6), which is provided with fifteen small apertures cut in its substance in a slanting direction; below this disk is a second one, which is stationary, and also provided with a similar set of holes. When air is driven through the apparatus by a wind-bellows the upper disk is set in rotation after the manner of a reaction mill, which has the effect of rapidly opening and closing the set of apertures, so that when a sufficient velocity of rotation has been attained, the pulses of air rushing through produce a low musical note, the pitch rising with the velocity or number

FIG. 6.



of vibrations communicated to the air in a second. Upon the axis is an endless screw, E H, which, acting on a toothed wheel, S, registers the number of turns made by it in a given time, say in fifteen seconds. In using this apparatus it is only necessary to raise the pitch of the note furnished by it till it is in unison with the note whose number of vibrations we wish to determine. If, then, this unison is maintained for fifteen seconds, we can, without calculation, read the required number of vibrations directly on the dial-plate of the sirene; then, by dividing the velocity of sound in the air by this number, we have the length of the wave. In the case of a tuning-fork the number of vibrations can be still more directly ascertained by attaching to one of its arms a small piece of fine wire or a minute portion of a feather, and causing this to act as a pen on a revolving cylinder. This latter is covered by a sheet of paper which has been smoked by burning camphor, and when set in revolution registers the vibrations made by the tuning-fork on the lampblack surface. Seconds marks are simultaneously impressed on the smoked paper by an electro-magnetic attachment; so that afterwards it is not difficult to obtain the desired result with a high degree of accuracy. There are also other methods of measuring the length of sound-waves, based on the principle of interference, and quite recently Prof. Mayer of Hoboken has succeeded in measuring wave-lengths directly in the air. (*American Journal of Science and Arts*, for Nov., 1872, p. 387.)

The Form of a Sound-wave.—In all that has preceded, and also in the formulas for the sound-wave, we have assumed that the particles of air swing backward and forward, obeying the law of the pendulum; and this is true for pure, simple tones, such as those furnished by tuning-forks. The ear is so constructed as to be able to take up these pendulum-like vibrations, which then produce appropriate sensations in the brain, but it is not capable of directly taking up vibrations which are executed according to laws different from that of the pendulum. Let us take a simple case, and suppose the air acted on by two pendulum-like sets of impulses, due to the joint action of two tuning-forks, one of which in a second executes twice as many vibrations as the other. The particles of air will then obey a new law, and will assume positions and velocities which are the *resultants* due to the action of the two original forces, and the form of the wave will be entirely altered. When this new kind of wave strikes upon the ear it is instantly analyzed into its two constituents, which independently affect their corresponding nerve-fibrils, and a peculiar sensation is produced, due to the presence of two distinct sensations; indeed, as Helmholtz, to whom we owe these interesting facts, has shown, it is possible after some practice to actually recognize the two original constituents. If we add a third, a fourth, or any number of new sets of impulses, the law changes with each, and also the resulting form of the wave, and consequently the final sensation. Conversely, if by any other means we generate waves having forms *not normal*, and present them to the ear, they will instantly be analyzed into a sufficient number of normal forms to meet the requirement, and a corresponding number of sensations will be produced. For example, reed-pipes, or a reed alone, furnish waves with an abnormal form, and the sound from them is analyzed, as Helmholtz has shown, by the ear into sixteen to twenty sets of normal waves or pure simple tones. We may add here that, as in this example, it is not necessary that these distinct sets of waves or notes should be independently generated, but merely that the original wave should have a form capable of being analyzed into these simple constituents. Even the form of the wave furnished by the sirene is not normal; along with its proper or fundamental note the octave is *virtually present* in an amount which is often somewhat embarrassing. These higher notes, which accompany the proper or fundamental tone, are called over-tones, or harmonicals, and it is their presence which determines the quality of the sound, or its *timbre* or *clang-tint*. In the case of tuning-forks the over-tones are absent, hence the hollow and somewhat poor character of the sounds they emit; with closed organ-pipes they are scarcely present to any extent, though more so with open pipes, where the first and second over-tones can be distinctly recognized—*i. e.* the octave and the twelfth. In reed-pipes they are present in great abundance and strength, so as quite to change the character of the fundamental note; the same is true of stringed instruments. It is the presence of these over-tones which enables us to distinguish between different instruments, even when sounding the same fundamental note, and finally which, as we shall see, enables us to recognize the voices of different persons under similar conditions. Our inability to distinguish at once the presence of particular over-tones is simply the result of want of practice, and is shared alike by the musical and unmusical. This can be corrected by practice, or by the use of the resonators contrived by Helmholtz. These instruments have usually the form of a hollow sphere, open at both ends of its diameter; one of these openings has a shape adapting it for insertion into the ear; the other aperture is larger, its size being determined by experiment. The size of this opening and the capacity of the sphere are so related that when the sphere is placed in connection with the ear the experimenter is rendered comparatively deaf to all notes but one, the strength of this latter being greatly exalted by the instrument. The analysis of which we have just spoken was to a great extent effected by the aid of these contrivances, a large number of these spheres being of course necessary for purposes of investigation. We may add here that Mr. R. Koenig, so celebrated for his beautiful acoustic apparatus, has pushed this matter one step farther, and by connecting these resonators with manometric capsules and small gas-flames has succeeded in rendering *visible* the phenomena of which we have been speaking, thus enabling a person who is deaf still to pursue these investigations.

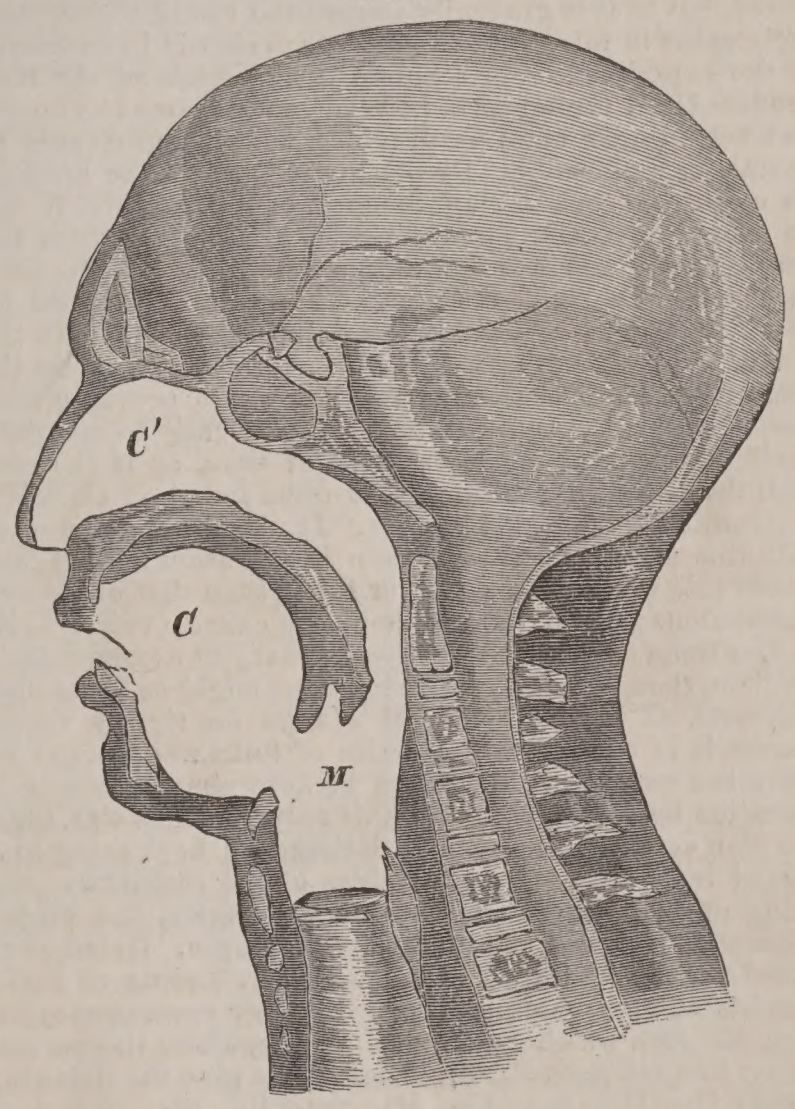
Cause of Dissonance or Discord.—This peculiar effect, which sometimes attends the reception of two or more sets of sound-waves, has also recently been explained by the investigations of Helmholtz, which have thrown a flood of light on this obscure subject. It has for a long time been known that when two sets of sound-waves are simultaneously presented to the ear, the relation between their length being in some simple proportion, such as 1 : 2, 2 : 3, 3 : 4, or 4 : 5, an agreeable effect is produced, the sounds seeming to melt into each other, producing what is known as consonance; while, on the other hand, more complicated relations often generate discord. To account for this, many fanciful theories have been proposed, of which we will merely allude to that of Leibnitz, who imagined that the mind delighted in the

perception of simple mathematical relations, and was displeased by the reverse! It is hardly necessary to say that this is not the true explanation, which we must seek in certain relations of the nerves of sensation to external stimulating causes. The nerves of vision, touch, and hearing are endowed with the following property: when stimulated, the sensation produced is at the first instant at a maximum, and rapidly becomes less intense; if, however, the nerves are allowed to rest for small intervals of time, they quickly regain their former sensitiveness, and this process may be repeated indefinitely. If, now, we expose the eye, for example, to light, we obtain the maximum sensation; then the periodic withdrawal and return of the light may readily be so arranged as to produce in succession a long series of these maxima of sensation, which quickly become disagreeable, and even may be dangerous: it is the case of a flickering light, whose bad effects are so well known. The sensation of tickling is strictly analogous to the above, and is produced by corresponding causes. The nerves have, however, another well-known property: after stimulation the sensation produced is found to remain, or "persist," for a minute interval of time with undiminished strength; so that in the case of light and sound, if the successive stimulations follow each other at sufficiently rapid intervals, these evil effects are naturally abolished, and only continuous sensations are perceived. Discord is, then, as Helmholtz has ascertained, due to the presence of the beats, or to rapid alternations of sound and comparative silence, they corresponding to the flickerings of a flame. When from any cause these beats follow each other at the rate of about 33 in a second, the discord is at its maximum, becoming more tolerable with twice this number, and finally disappearing altogether as their number is increased to about 120 in a second. On the other hand, if the beats follow quite slowly —for example, at the rate of three to five in a second—the effect is not unpleasant, and can even be employed in music, suggesting as it does the idea of trilling. Discord is then due to the production of beats by the interference of the over-tones, which almost always accompany the fundamental notes, and, as has been shown by calculation, this can be entirely or partially avoided only by the use of such simple ratios as those above indicated. For further details we must refer the curious reader to the original work of Helmholtz ("Die Lehre von den Tonempfindungen," 1865).

Effect of Communicating Motion to the Source of Sound or to the Ear.—In all the foregoing it has been tacitly assumed that during experiment the position of the source of sound and of the recipient ear remained invariable; when this ceases to be true, certain curious changes are produced, which recently have grown into importance, owing to their correspondence with certain optical phenomena by which it is possible to study the motion of the fixed stars towards or away from our planet. Let us suppose that the sounding body is stationary, and that the ear of the observer is moved with some rapidity towards it; then it will result that in a given time the observer will receive a larger number of impulses than at first, and that the pitch of the sound will be correspondingly elevated. The same effect will be produced by moving the sounding body towards a stationary ear. And from the same cause it is evident that motion of the ear away from the source of sound will lower the pitch of the note, etc. These ideas were first brought forward by Christian Doppler in 1842, and since then have been repeatedly subjected to the test of experiment. Dr. Ballat in Belgium, with the aid of a locomotive and a party of musicians, proved their correctness in a quantitative manner, and Dr. Mach has contrived an apparatus with a moving reed-pipe by which they can be studied in an ordinary room; and finally by the use of tuning-forks Prof. Mayer of Hoboken has succeeded in illustrating them before large audiences. (*American Journal of Science and Arts*, April, 1872, p. 267.)

The Voice.—As the human vocal organs are built essentially on the plan of a reed-pipe, it is desirable at the start to understand the construction and action of one of these instruments. A reed organ-pipe consists, then, of two parts, a vibrating tongue or reed, and a variously shaped pipe. When connected with a wind-bellows the reed is thrown into vibrations, and after the manner of a sirene permits the air to pass through in a series of puffs, which, linking themselves together, generate a musical tone. The waves furnished by the reed are not, however, normal in form, but, as previously explained, have a form such as would be generated by the joint action of a fundamental normal tone or wave, combined with a set of shorter waves or over-tones: in other words, practically it furnishes a fundamental note with a series of strong over-tones, the particular fundamental note and corresponding set of over-tones depending on the construction of the reed itself and the manner in which it is tuned. The function of the pipe is to strengthen any or all of these notes; thus, conical pipes strengthen all the over-tones up to a certain height, excluding those that are not much longer than the aperture of the pipe itself, while cylindrical pipes strengthen the odd over-tones, or those whose rates of vibration are related to each other as 1, 3, 5, etc. Hence, the pitch of the note is determined by the rate of the reed's vibrations—the quality, or clang-tint, of the sound by the shape and size of the pipe. In the human vocal organs the reed is supplied by two vibrating membranes at M (Fig. 7), called the vocal cords. For the production of sound it is necessary that they should be stretched, and that at the start the opening between them should be closed. Air is then forced through them from the lungs; they are set in vibration, and allow it an interrupted passage, exactly as in the case of a reed, as has been shown by experiments on the living and dissected larynx, or with the aid of artificial vocal cords made of sheet india-rubber. The pitch of the voice depends on the extent to which the membranes are stretched. Müller, by increasing the tensive force half an ounce up to eighteen ounces, raised the tone with one of his dissected preparations more than two octaves. The pitch depends also to some extent on the strength of the current of air employed, rising as the latter is increased. The human voice includes not quite four octaves, though no one single voice would be able to compass a scale of this extent. The pitch also, other things being equal, depends on the length of the vocal cords; that of men is about 18 millimètres, with women it is only 12. The clearness of the voice depends on the accurate closure of the slit between the cords, from time to time, while they are in operation. Theory and experiment alike point to the fact that when the vocal cords are set in action waves having an abnormal form are generated, corresponding to a fundamental note with a set of

FIG. 7.



over-tones. The function of the cavity of the mouth and nose *CC'* (Fig. 7) is to strengthen or weaken the fundamental tone and various sets of the over-tones; and in this action the size of the opening of the mouth also plays an important part; thus, the quality of the sound uttered, or its clang-tint, depends finally on the shape and size of the cavity of the mouth and nose. This cavity, then, corresponds to the pipe of a reed organ-pipe. The vocal cords retaining all the time the same tension, by altering the shape and size of the cavity of the mouth and its opening we can generate sounds having a different clang-tint, as, for example, Ah, O, etc. It is not even necessary to set the vocal cords into action if a complex sound consisting of many tones is supplied from some outward source; thus, we were recently informed by President Barnard of Columbia College that by taking advantage of the complex sounds or noise of a railroad car, and by varying suitably the cavities just referred to, he has succeeded in producing musical notes in rapid succession, such as the notes of any familiar melody, at pleasure.

The Vowel-sounds are the simplest which can be uttered by the human voice, and have frequently been made the

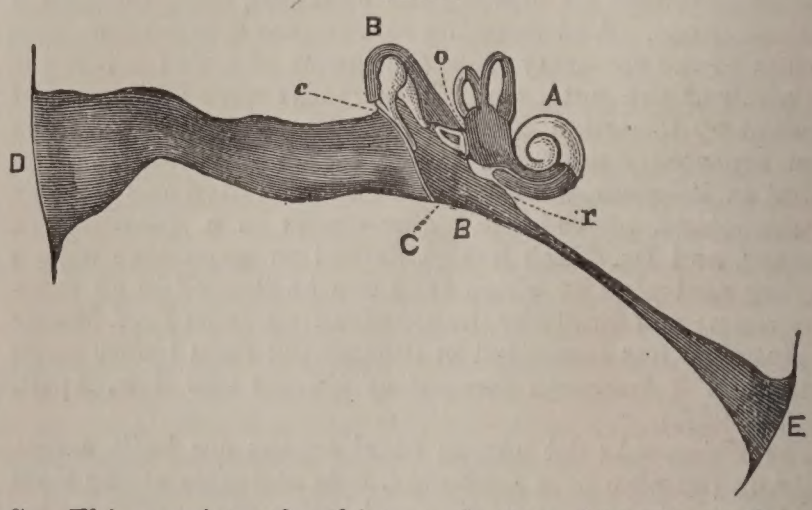
subject of investigation. In 1831, Willis in England found that by mingling certain tones produced by reed-pipes he could to some extent imitate the vowel-sounds. (*Pogg. Ann. Bd.*, xxiv., s. 397.) In this mode of working there is the obvious difficulty that reed-pipes furnish large sets of notes, so that it is not possible to obtain very accurate knowledge by such experiments. More recently, Helmholtz, with the aid of his resonators above described, succeeded in analyzing the vowel-sounds, although they present greater difficulties than most other sounds of equal complexity. This results from the circumstance that, from childhood upward, we all have been accustomed to regard the tones of the vowel-sounds as independent wholes, making no attempt to ascertain their musical components, since in the case of a vowel-sound the clang-tint is all important, and is indeed the only means by which we judge of its identity. Helmholtz ascertained that vowel-sounds are produced by the presence of a fundamental note mingled with its higher over-tones in various proportions; he even was able to prove that the intensity of the highest of these over-tones varies somewhat in different individuals, being greater in voices that are shrill than in those whose sound is softer. Having finished this labor, he undertook the artificial reconstruction of the vowel-sounds from pure constituents. These are best furnished by vibrating tuning-forks. One of these instruments, alone by itself, furnishes a tone which at a little distance is quite inaudible, but by causing it to vibrate directly in front of a hollow *metallic* cylinder of exactly the right capacity, its sound is greatly strengthened, and can be distinctly heard in a room of large dimensions. The cylinder is of course entirely closed with the exception of a circular opening at the end near the fork. When the fork is thus caused to vibrate in connection with a resonator, the sound is instantly extinguished if the aperture in the cylinder be closed, but as it is gradually opened the sound correspondingly gains in intensity; so that it is evidently in the power of the experimenter to regulate the loudness of the tone produced. A tuning-fork, however, soon ceases to vibrate, and accordingly must be provided with a contrivance to obviate this difficulty. By placing it between the arms of an electro-magnet having the form of a horseshoe, it can be caused to vibrate for any period of time, provided the magnetic attraction is intermittent, and always exercised at exactly the right moment. This is accomplished by breaking and re-establishing the electric current with the aid of another tuning-fork, which vibrates at exactly the same rate; and the second fork, being also provided with a similar electro-magnet, is able independently to maintain itself in vibration for any length of time, as is the case with the vibrating attachment so often found on electrical apparatus for medical purposes. It would not be possible with this arrangement to sustain in vibration a third fork whose rate was a *little* slower or faster than that of its two companions; but if its rate should be exactly twice, three, or four times as great, this end could easily be accomplished; for then, though the attractive impulses might be fewer than desirable, at least they would always be rightly timed. Hence, it is evident that a series of forks whose rates of vibration are as 1, 2, 3, etc. can be kept simultaneously in vibration by a contrivance of this nature. This was, then, the plan actually employed by Helmholtz; keys being connected by strings with the valves of the resonators, and being opened by the pressure of the fingers, the proper notes were obtained with the desired strength. Helmholtz's vowel-sound apparatus, as made by Mr. Koenig of Paris, consists of eight tuning-forks with their resonance-cylinders, the fork which establishes and regulates the current being on a separate stand. These forks give the following notes: Ut_2, Ut_3, Sol_3, Ut_4, Mi_4, Sol_4, Ut_5, Si_5. When all these forks are set in vibration, their resonance-cylinders remaining closed, only a low humming sound is heard, but by pressing one or more keys the corresponding notes are called forth with any desirable degree of strength. The German vowel-sound *u* can be approximately imitated by sounding the Ut_2 fork alone, or better by adding the two first over-tones—*i. e.* the octave and twelfth, Ut_3 and Sol_3. *O* is obtained with a weak Ut_2 and strong Ut_4; Ut_3, Sol_3, and Mi_4 mingling to a small extent. The German *a*, with Ut_5 and Mi_4 strong; Ut_3, Ut_4, Sol_4 having a moderate strength. In the same language the *æ* is given by Mi_5 and Sol_5 strong, with the notes Ut_4, Ut_5, Sol_4 weaker; and finally the *e* by the aid of Sol_5, Si_5, and Ut_6 strong; Ut_3 and Ut_4 being weaker.

Of course, since only pure musical notes are employed, they can only reproduce the musical constituents of the vowel-sounds; hence the effect resembles the sound of the vowels as sung rather than pronounced. Corresponding with these remarkable experiments, Helmholtz also found it possible to imitate with the same apparatus certain varieties of organ-pipes; at least to reproduce the musical constituents of their tones, though of course the noise with which they are often accompanied was absent; he in addition imitated the nasal tones of the clarionet by the use of a portion of the forks, while the joint action of the whole set gave the softer tones of the bugle-horn. For exciting the apparatus into action he used only two of Grove's cups, though other experimenters have since then found it somewhat difficult of manipulation, and lately an attempt has been made by Appun to replace it by a series of reeds provided with resonators, with which it has been found possible to reproduce some of the sounds in question (*u* and *a*).* We must here mention the remarkable results attained in the last century by Prof. v. Kempelen in Vienna with his speaking machine, which more recently has been greatly perfected by the two Fabers, uncle and nephew.† Some months ago the latter exhibited in Columbia College this wonderful apparatus, which is capable of uttering not only syllables, but words and sentences, with a certain mechanical precision. In it the human vocal organs are directly imitated by vibrating plates of ivory, and it is remarkable that it is operated on by only fourteen keys or stops, which give the five vowels and the nine consonants, *l, r, w, f, s, b, d, g, sch.* The other consonants are produced partly by combinations of the above, and partly by increasing the strength of the current of air from the bellows. For the purpose of causing the machine to speak French, an extra attachment is provided, whereby more nasal tones can be generated. Mr. Faber has also connected with it a singing attachment, in which, by means of quick changes in the form of the vocal cords, the musical scale can be executed.

Consonants.—These sounds are generally regarded not as constituted of notes having any particular musical relation to each other, as in the case of the vowel-sounds, but rather as consisting of different varieties of noise. Thus, as examples of explosive noise we have *p* and *b*, *t* and *d*, *k*, *g*, *q*; of frictional noise, *s*, *z*, *sch*, *l*, *f*, *v*, *m*, *n*, and *h*; of intermittent noise, *r*.‡ The mechanical mode by which the consonants are produced is to a considerable extent understood, but their actual acoustic elements resist all attempts at complete analysis. That they have an acoustic character cannot, however, be doubted, and some progress has been made towards ascertaining the natural pitch of their predominant notes. Thus, upon repeating (in German) the consonants *b*, *k*, *t*, *f*, *s*, it will be found that *b* is the deepest in tone, *s* the highest; and that, taken together in the above order, they constitute a series of perceptible musical gradations. For further information we must refer the reader to the original investigations of Dr. Oskar Wolf, who seems to have succeeded in actually determining the pitch of the predominating constituent in the case of most of the consonants.‡

The Ear.—The sensation of sound is produced by the stimulation of certain nerve-fibrils in the interior of the ear, and this result is brought about by the *sound-waves* in the following manner: These waves first strike upon the external ear, and possibly are, to some slight extent, concentrated by it; afterwards they travel along the tube D (Fig. 8), and reach the tympanum or drum of the ear at

FIG. 8.



C. This consists of a thin membrane which closes the external passage, and which is capable of being set in vibration or of responding to an immense variety of waves or impulses. It may here be remarked that a catholicity of this kind has not thus far been observed in experiments on membranes artificially stretched, whose range is found to be far more limited. There is also some reason to believe that the tympanum is capable of a certain degree of "accommodation" to the sounds that are presented to it, following the well-known analogy of the eye in this respect. Attached to the inner side of the tympanum is a series of

* "Sprache und Ohr," by Dr. Oskar Wolf, page 11.

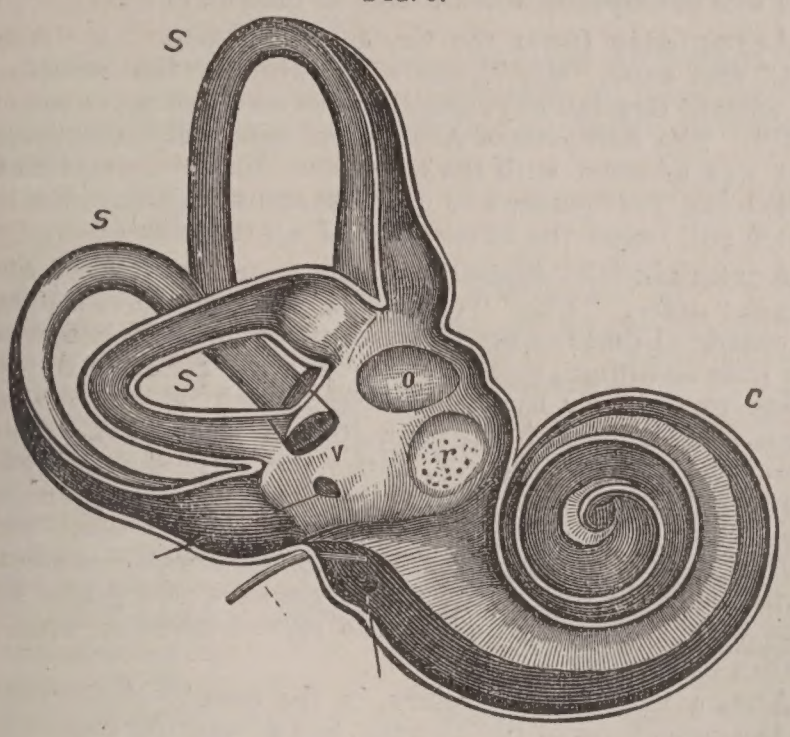
† "Der Mechanismus der menschlichen Sprache nebst Beschreibung einer Sprechenden Machine von Wolfgang v. Kempelen," Vienna, 1791.

‡ See the work of G. Gattfied Weiss, Braunschweig, 1868.

‡ "Sprache und Ohr," Dr. Oskar Wolf, Braunschweig, 1871.

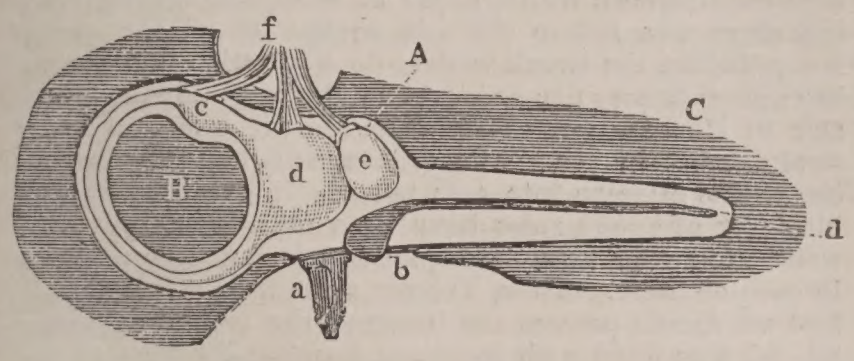
three small bones, called respectively the malleus, *c*, the incus, and the stapes, *o* (the hammer, the anvil, and the stirrup. See Figure 8). These bones are rather closely bound together, and transmit the vibrations of the tympanum finally to the stirrup, which is destined to communicate them to the inner ear. The portion we are now engaged with has a communication with the mouth by means of the Eustachian tube, E, which is closed except in the act of swallowing; its function is to preserve an equilibrium between the pressure of the air in the middle ear and that on the other side of the drum. While the middle ear is filled with air, the inner ear is filled with a liquid, and is completely enclosed for protection in solid bone. In Fig. 9 a sec-

FIG. 9.



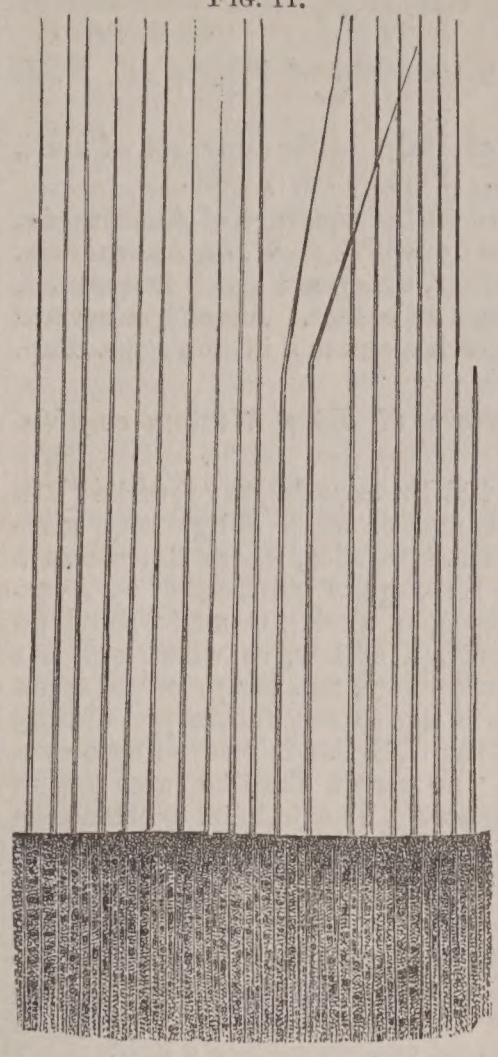
tion of the inner ear is given. SSS are the semicircular canals cut open; V is the vestibule; *o* and *r* are the foramen ovale and the foramen rotundum; C is a section of the cochlea. We give in addition a *plan* of the ear, after Helmholtz (Fig. 10), the cochlea, for the sake of clearness, being supposed to be unrolled. A is the vestibule, C the cochlea, *a*

FIG. 10.



the foramen ovale, *b* the foramen rotundum, *f* the nerves of hearing. The sacs at *d* contain attached to their walls small crystals of carbonate of lime in contact with the nerves, and their function, as it appears, is to render us sensible of simple short sounds or shocks, which probably would not affect the vibratory apparatus presently to be described. They act as *drags* on the nerves when the latter vibrate with the water in which they are bathed, and thus produce sensation. This is the simplest portion of the apparatus for hearing, and is found in many of the lower animals, where the more complicated arrangements are entirely absent. These sacs contain also, in connection with the nerves, certain microscopic hairs, that are quite elastic and brittle, and probably capable of being set into vibration when the particular notes to which they are tuned are presented to them, just exactly as a tuning-fork can be set in vibration by the waves proceeding from a second fork of the same pitch. (See Fig. 11.) In the cochlea we also find a membrane (the organ of Corti) with a great number of fine microscopic cords stretched in it, which probably have the same function. The reader will find, by opening a piano and pressing the foot on the right-hand pedal, that if then the vowel-sounds, for example, are pronounced in a loud, clear voice over the strings, it will result that the strings which are capable of giving the notes of which they are built up will be set in vibration, and will echo back somewhat faintly the original sounds. And so it is probably in this portion of the ear; these microscopic strings, being thus set in vibration, stimulate the nerves connected with them and produce corresponding sensations. If the sound is compound or the form of the wave abnormal, this sound is analyzed into its constituents, since the cords (and rods) can only execute normal vibrations; which circumstance explains much that was said under the head "Form of the Wave;" and we see finally that the clang-tint is the sensation produced by the simultaneous action of two or more of these strings upon their appropriate nerves. The cochlea contains about 3000

FIG. 11.

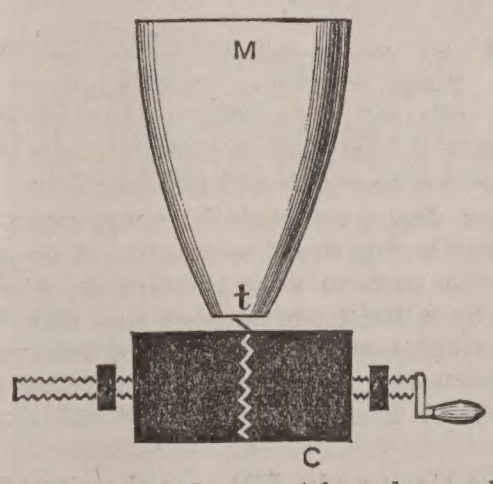


of these strings, and if, with Helmholtz, we suppose that 200 of them are useful for rendering us sensible of tones not used in music, there will remain for the musical tones proper 2800 for the seven octaves, or 400 for each octave, $33\frac{1}{3}$ for each half tone. Now, according to the experiments of E. H. Weber, skilful musicians can distinguish $\frac{1}{6.4}$ of a half tone, which is a smaller quantity than corresponds to the number of these strings. It would appear, then, that in this case *two* of these strings are at the same time excited into action, and the musician by practised attention is able to notice which of them vibrates the more strongly.

As rendering the above views more probable, we may mention the experiments of Von Hensen on the ears of certain minute forms of crabs, which he enclosed in an artificial ear corresponding to the labyrinth. The ears of these crustaceans are partially external, and consist of sets of hairs capable of vibration, connected with the nerves, as in the case we have just been considering. When different notes were sounded, Von Hensen was able with the microscope to notice that certain hairs responded, etc.* The functions of certain portions of the ear are still involved in much obscurity; this is the case, for example, with the three semicircular canals, concerning whose object and use we possess as yet no certain information. Among the fishes the myxine has one of these canals, the lamprey has two, the higher forms, three; and it appears that in birds of prey they become highly developed.

In closing this article it may be proper briefly to mention the results obtained with the *phonautograph* of Scott and Koenig. This may be regarded as a gigantic ear, endowed with the power of permanently registering the vibrations of its own tympanum. It consists of a parabolic mirror, M (see Fig. 12), of zinc, which concentrates the sound-waves, and causes them to set in vibration a thin membrane, *t*, which is provided with a "pen" attached to its centre. The vibrations are in this way finally inscribed on the surface of a revolving cylinder, C, which is covered with paper smoked by burning camphor. The figure gives a view of this apparatus seen from above. With this

FIG. 12.



instrument Koenig succeeded in obtaining the autographic curves due to single notes, or to the joint action of several within the compass of an octave. Donders, however, was able, after much trouble, to obtain the complex curves due to the vowel-sounds. For *u* (German) it was a common sine curve, as it should be; this was also true for *ü* and *i*, the instrument being able to reproduce neither the weak over-tones of the first, nor the high over-tones of the second. The form of the curve altered with the pitch of the voice uttering the vowel, but changes in dialect produced only slight modifications. With diphthongs the duration of the sound and modifications due to change from one diphthong to another were rendered visible. Consonants spoken just before a vowel altered only the beginning of the curve, and pro-

* Von Hensen, "Studien über das Gehoerorgan der Dekapoden;" Von Siebold u. Kölliker, "Zeitschrift für wiss. Zoologie," Bd. xiii.

duced only a corresponding modification when uttered immediately after the vowel.* The duration of *a* in the word *daag* = 42, in *dagen* = 37, in *dag* = 16 vibrations, each single vibration consuming $\frac{1}{216}$ of a second, so that the actual durations were, 0.16, 0.142, 0.061 of a second of time. O. N. Rood.

Acquack'anonck, a township of Passaic co., N. J. Pop. 4368.

Acquavi'va, a town of Italy, in the province of Bari, 16 miles S. S. W. of Bari. Pop. in 1861, 6517.

Ac'qui, a town of Italy, in the province of Alessandria, on the Bormida, 21 miles by rail S. S. W. of Alessandria. Here are sulphurous springs, which are much frequented, and ruins of an old Roman aqueduct. Acqui has several fine buildings and silk-factories, and is a bishop's see. Pop. in 1861, 6824.

Acquin'ton, a township of King William co., Va. Pop. 2960.

Acquit'tal [from the Old Fr. *acquiter*, to "forsake"], in law, a release from a contract or other obligation; more usually employed in criminal practice, where it denotes a judicial deliverance from a charge of guilt, either by a verdict of not guilty by a jury upon a trial, termed "acquittal in fact," or by mere operation of law, as where one has been charged simply as accessary, and the principal is acquitted. An acquittal is a bar to any future prosecution for the same offence. In the U. S. this is secured by a constitutional provision that "no person shall be twice put in jeopardy for the same offence." The judicial construction of this clause prevents a second trial for the same offence after an acquittal.

A'cre [from the Ang.-Sax. *acer* or *æcer*, a "field," etymologically allied to the Lat. *ager* and Ger. *Acker*], a superficial dimension of land, is equal to 4840 square yards. The English acre is the same as that of the U. S. A French acre contains about one *arpent* and a half.

Acre, Ak'ka, or **St. Jean d'Acre** [Phœnician *Accho*, and called by the Greeks *Ptolema'is*], a city and seaport of Syria, is on the Mediterranean, 30 miles S. of Tyre, and 8 miles N. of Mount Carmel; lat. 32° 54′ N., lon. 35° 6′ E. The "key of Palestine," it has been the scene of many famous sieges and battles. It was taken by the Crusaders in 1104, and retaken by the Saracens in 1187. In 1191 it was recovered by the Crusaders (under Guido of Jerusalem, Philip of France, and Richard the Lion-hearted of England), and held by them till they were finally driven out of Palestine in 1291. Bonaparte besieged it for sixty days in 1799, but failed to take it. In 1840 it was bombarded and captured by the English fleet. Pop. variously estimated at from 20,000 to 50,000.

Acre'lius (Israel), a clergyman, born at Ostaker, Sweden, Dec. 25, 1714, was educated at Upsal, and was appointed in 1749 a provost to take charge of the Swedish congregations on the Delaware. After a sojourn in America of seven years, he returned to Sweden in 1756. He wrote a description of the Swedish colonies in America (1759). Died April 25, 1800.

Ac'robat [literally, "one who goes or moves upon his extremities (toes)," from ἄκρος, "extreme," and βάτης, "one who treads or goes"], a term applied to a rope-dancer or to a person who entertains the public by performances on the tight rope or slack rope, and by gymnastic feats of agility, such as vaulting and tumbling.

Acrob'ates (i. e. the "acrobat"), a genus of Australian marsupials, includes the "pigmy acrobat," "dwarf phalanger" or "opossum mouse" (*Acrobates pygmæus*), which in its character and habits resembles the flying squirrel. It is two inches long, and its tail is of about the same length.

Acrocerau'nia [from ἄκρον, a "peak" or "promontory," and κεραυνός, "thunder"], the ancient name of a chain of mountains on the western coast of Greece, and extending into the sea by a bold promontory; so called because violent thunder-storms are said to be frequent in that region. The modern name is Chimara. The Acroceraunian promontory is Cape Linguetta; lat. 40° 27′ N., lon. 19° 18′ E.

Ac'ro-Corin'thus, a steep rocky hill near the city of Corinth, in Greece, is about 2000 feet high. On this hill stood the acropolis or citadel of Corinth. The view from the top is very extensive and beautiful.

Acroġ'enous [from the Gr. ἄκρον, "summit," and γένω, to "be born"], a name applied to certain cryptogamous plants (acrogens), as ferns and mosses, in which the stem increases by the coherence of the bases of the leaves and by elongation at the summit, and not in diameter by the addition of fresh matter to their outside, as in exogens, or to their inside, as in endogens.

Acro'lein, Acryl'ic-Al'dehyde, $C_3H_4O = C(CH_2)''H$ / COH,

an intolerably pungent body produced by the dehydration of glycerine. It is always produced when neutral fats containing glycerine are subjected to destructive distillation, and is the chief cause of the offensiveness of that operation.

Acron'ycal [from the Gr. ἄκρος, "extreme," and νύξ, "night"]. A star or planet is said to be acronycal when it is opposite to the sun, or passes the meridian at midnight. It rises acronycally when it rises as the sun sets, and sets acronycally when it sets as the sun rises.

Acrop'olis [from the Gr. ἄκρον, a "peak" or "summit," and πόλις, "city"], the name given to the citadel of an ancient Grecian city, usually built on the peak or top of a hill. The Acropolis of Athens was especially celebrated, and was adorned with the temple of Minerva or Athena, called the Parthenon, and the Erechtheum, the ruins of which still excite the admiration of all travellers.

Acros'tic [Gr. ἀκρόστιχον, from ἄκρος, "extreme," and στίχος, "order," "line," "verse"], a term applied to a poem so contrived that the first, last, or other series of letters of the lines shall form some name or phrase. Sir John Davies wrote twenty-four hymns to Astræa, each of which is an acrostic on Elizabetha Regina (Queen Elizabeth). On a somewhat similar principle, in the poetry of the Hebrews the initial letters of the verses were made to correspond to the letters of the alphabet in their proper order. The 119th Psalm affords perhaps the most remarkable example of this. Every line in the first division of the psalm begins with א (aleph), and in the second division with ב (beth), and so on.

Acs, a village of Hungary, in the county of Komorn, on the right bank of the Danube, has a beautiful palace of the prince of Liechtenstein, and in the Hungarian revolution was the scene of several battles, of which that of Aug. 3, 1849, was the most important. Pop. in 1869, 3933.

Act [Lat. *ac'tus* (from *a'go, ac'tum*, to "do")], in dramatic literature, is a division of a drama; it is again subdivided into scenes. The Greek dramas of the old model were naturally divided into separate portions by the choric odes (or stasima), which occur at intervals, during which the stage was left to the sole occupation of the chorus. Nevertheless, the Greek writers do not notice this division in express terms; nor do we know the origin of the famous rule of Horace, that every dramatic piece should be restrained within the limits of five acts, neither more nor less. The division into acts must be in great measure arbitrary,† although rules have been laid down by various writers to define the story or plot which should be contained in each of them. Thus, Vossius gives it as a rule that the first act should present the intrigue, the second develop it, the third be filled with incidents forming its knot or complication, the fourth prepare the means of unravelling it, which is finally accomplished in the fifth.

Act, a term applied in legal and political language to a law or statute which is approved and ordained by the legislature, as an act of Parliament, an act of Congress. The proposed law is called a bill until it has passed through the first, second, and third readings, and has been approved by both houses of Parliament (or Congress) and signed by the executive.

Act, in the English universities, is an exercise performed by students before they receive a degree. The student who is said "to keep the act," and is called the respondent, chooses certain propositions, which he defends by syllogisms. Several other students, called "opponents," who are nominated by the proctor, try to refute his arguments.

Act of Settlement, in Great Britain, is the title of the statute 12 and 13 of William III., c. 2, by which the crown was limited to the House of Hanover, and all Roman Catholics were excluded from the throne.

Ac'ta Diur'na ("Daily Acts"), the name of an official gazette or journal published by authority in ancient Rome. It contained brief notices of the transactions of public assemblies, legal tribunals, etc. Julius Cæsar was the first to order that the Acta Diurna should be drawn up in regular form and published.

Ac'ta Erudito'rum ("Acts of the Learned") was a literary journal founded at Leipsic in Germany in 1682 by Otto Mencke and others. It had a high reputation, and was continued until 1782.

* F. C. Donders, "Zur Klangfarbe der Vocale;" Pogg. "Ann." 1864, cxxiii., s. 527, 528.

† "Sakoontalâ" (a drama by Kâlidâsa), perhaps the most exquisite production of the poetic genius of the Hindoos, was divided into *seven* acts.

Ac'ta Mar'tyrum ("Acts of the Martyrs"), a collection of the lives of Christian martyrs. The most noted is that of Ruinart, Paris, 1689, commemorating the martyrs of the first four centuries.

Ac'ta Sancto'rum ("Acts of the Saints"), a collection of the lives of Christian saints of all ages. The most extensive collection is that of the Jesuit Bollandists, which begins with January and follows the calendar. The first volume appeared in 1643; the fifty-fourth, which comes down to Oct. 14, in 1793; the fifty-fifth in 1845; the sixtieth, which comes down to Oct. 29, in 1867.

Actæ'on [Ἀκταίων], in Greek mythology, a grandson of Cadmus, was a famous hunter. It is said that he was changed into a stag and killed by his own hounds because he had seen Diana bathing.

Ac'tian Games, games celebrated at Actium, in Greece, in honor of Apollo. They were restored by Augustus to commemorate his victory over Antony at Actium (31 B. C.).

Actin'ia [from the Gr. ἀκτίς or ἀκτίν, a "ray"], a genus or sub-order of radiated marine animals, of the class Zoophyta, and order Actinoida, often called sea-anemones. They are generally attached to rocks or shells, are of a soft, gelatinous texture, and have numerous tentacula, by which they seize their prey. Some species of *Actinia* are very beautiful, and resemble flowers. Among the most remarkable genera of the order Actinoida is the Bunodes (which see).

Actinia.

Ac'tinism [from the Gr. ἀκτίν or ἀκτίς, a "ray"]. The effects produced by the rays of the sun are of three kinds, illumination, warming, and chemical change. The first two of these are obvious enough, and are always perceived wherever the solar rays penetrate. The chemical changes produced by light occur only under certain conditions, and are not obvious to common observation. Certain salts have very long been known to undergo decomposition in the sunlight, or even in the diffuse light of day; and among these the salts of silver are especially remarkable. To this property, the so-called indelible inks, of which silver nitrate is the basis, owe the permanency of the traces left by them. The chloride, bromide, and iodide of silver are more sensitive still.

When a beam of compound light is dispersed by the prism, the most energetic action upon silver salts is found in the violet rays of the spectrum; but this effect, as shown by Stokes, extends very far into the darkness beyond the violet. Stokes made the additional remarkable discovery that these non-luminous chemical rays become luminous when certain substances are presented to them. Such substances among others are solution of quinine sulphate, infusion of horse-chestnut bark, glass tinted yellow by oxide of uranium, and fluor spar. This phenomenon was named by its discoverer, *fluorescence*. (See Fluorescence.) The heating effects of the spectrum, on the contrary, are found to be more remarkable in the red than anywhere else among the luminous rays; while the maximum heating effect is entirely outside the spectrum and in the dark. This discovery, made long ago by Sir William Herschel, is a counterpart to the more recent one of Stokes just mentioned; and both taken together show that the sunlight, as dispersed by the prism, spreads through a wide space, in which the rays exciting vision occupy only the middle part.

The luminous, heating, and chemical effects of light being so broadly different, it was natural, in the earlier stages of this investigation, to ascribe them to agencies or forces essentially differing from each other in physical character. It was common, therefore, to say that the sunlight is made up of three independent species of rays, the colorific, the calorific, and the chemical. Instead of the word chemical, Dr. Draper, of New York, proposed, in 1842, to substitute the term *tithonic* to distinguish the rays of the class last mentioned; this term being derived, by a fancied analogy, from the beautiful myth of Tithonus and Aurora. Sir John Herschel, a little later, suggested the term *actinic*, which ultimately prevailed. To the three kinds of rays above mentioned, Dr. Draper, in 1844, proposed to add a fourth, under the name phosphorogenic rays; that is to say, rays which cause certain substances, which have been acted upon by them, to continue, for some time afterwards, to *phosphoresce*, or to give light in the dark. Dr. Draper believed it to have been established by his experiments, that these rays, though imparting to material bodies the light-producing power, are themselves totally distinct from light. The more recent labors of this eminent investigator have led him, however, to the conclusion—which is the doctrine now generally received—that, physically considered, the sunlight is homogeneous, the variety of effects produced by it being consequences of the different degrees of rapidity with which the vibrations of the luminiferous ether are performed, and being especially dependent on the nature of the surface and of the substance upon which the rays are received.

Tyndall has recently made some interesting additions to our knowledge of the actinic properties of light, in experiments upon the vapors of a variety of volatile compounds which when highly rarefied are instantly decomposed by it. In the course of these experiments he has incidentally demonstrated the cause of the blueness of the sky, or of distant mountains seen through a large body of intervening air. This tint is owing to the presence in the air of exceedingly minute particles of precipitated vapor.

The actinic properties of light have formed the basis of an art having an almost endless variety of useful applications. (For particulars in regard to this, see Photography, and also Light, Chemical Effects of.)

F. A. P. Barnard.

Actinom'eter [from the Gr. ἀκτίν, a "ray," and μέτρον, a "measure"], an instrument for measuring the actinic or chemical rays of light. (See Actinism.) Several methods of doing this have been proposed; thus, a sensitive surface of chloride of silver is found to darken, when exposed to the light, in proportion to the intensity of the light and the duration of exposure; and since this darkening is produced entirely by the actinic rays, the depth of tint produced by exposure for a few (say five) minutes will give an approximate idea of the intensity of the actinism present. The difficulty in this case is to prepare chloride of silver paper which shall always have the same degree of sensitiveness. Dr. Draper employed for the above purpose the reaction originally observed by Gay-Lussac and Thénard, that chlorine and hydrogen, when mixed in equal volumes, do not combine in the dark, while they unite to form hydrochloric acid when exposed to the actinic rays of light. Draper discovered the important law that this action varies in direct proportion to the actinic intensity of the light and to the time of the exposure. Other actinometers have been proposed, based upon other chemical reactions; thus, a solution of chloride of gold and oxalic acid will remain clear in the dark, but precipitates gold when exposed to actinic rays.

Ac'tion [from the Lat. *ago, actum*, to "perform," to "move"], in law, means a proceeding before a court of justice by one person against another to obtain redress for the infringement of a right, in the manner prescribed by law. This definition would exclude such proceedings as mandamus and prohibition. The word is not properly applied to courts of equity, but the corresponding proceeding is there termed a suit. Actions are distinguished into civil and criminal. A civil action is instituted for the enforcement of a private right or the redress of a similar wrong. In reference to the place in which they are to be brought, they are either local or transitory. Civil actions are either real, personal, or mixed. Criminal actions are prosecuted in the name of the state against some person charged with the commission of a crime. The distinction between real and personal actions refers to the point whether the recovery of land is sought, or damages by way of compensation, or specific personal property. An action is local when by a rule of law it must be brought in a particular locality, such as a county. Actions not so localized are termed transitory.

The number of actions under these rules is quite considerable. The distinctions between them are sometimes subtle and perplexing. There is a marked tendency in this country to modify or to do away with them, and to establish a single form of civil action, embracing proceedings both in law and in equity. The New York code of procedure assumes to give a definition sufficiently comprehensive to include both an action at law and a suit in equity. It abolishes all the old forms of action, and recognizes but one action, termed a "civil action." The rule of this code has been extensively followed in the Western States, and has had much influence upon legal opinion in England.

T. W. Dwight.

Action, a series of events forming the subject of an epic; thus, the adventures of Æneas form the action of the "Æneid." Epic action should have three qualifications: It should be but one, should be entire, and should be great.

Action, in oratory, signifies gesture, or the adaptation of the countenance and gesture of the speaker to his subject and sentiments. This *sermo corporis* ("language of the body"), as Cicero calls it, is a very important part of oratory. Demosthenes said that action was "the beginning, the middle, and the end of the orator's office or art."

Action, in painting and sculpture, is the state of the subject as imagined in the artist's mind at the moment chosen for representation.

Action, in mechanics, denotes the effort which a power or body exerts upon another body. It is an axiom in mechanics that action and reaction are always equal. Thus, if an anvil be struck with a hammer, the resistance of the former to the latter is exactly equal to the force with which the hammer acts upon the anvil.

Actions for Pianos are mechanical devices by which the impulse given the key is transmitted to a hammer which strikes the string. The action also regulates the motion of the hammer after the stroke, preventing any reaction or rebounding. Actions made by different makers differ somewhat in the details of their construction. They have been brought to a high degree of perfection.

Ac'tium [Gr. Ἄκτιον], (now called **A'zio**), a promontory and town of ancient Greece, in Acarnania, near the entrance of the Ambracian Gulf. Here occurred the great naval battle of Actium (31 B. C.), between Octavius Cæsar and Mark Antony; the former gained a decisive victory.

Active Voice. See Grammar.

Ac'ton, a piece of defensive armor, formerly worn in the shape of a shirt with short sleeves. It was made of leather, to which pieces of iron were sewed.

Acton, a post-township of York co., Me. Pop. 1008.

Acton, a post-township of Middlesex co., Mass., on the Fitchburg, the Nashua Acton and Boston, the Hudson branch, and the Lowell and Framingham R. Rs. It has valuable stone-quarries, and South Acton is an important manufacturing village. Total pop. 1593.

Acton, a township of Meeker co., Minn. Pop. 486.

Acton (Lord John Emeric Edward Dalberg), born in 1834, was elected to Parliament for Carlow in Ireland in 1859. He belonged to the liberal Catholic party, in whose interest he founded in 1861 the "Home and Foreign Review." In 1865 he was returned to Parliament, and in 1869 created a baron.

Ac'tor (fem. **Ac'tress**), a stage-player, or performer of dramas. Actors are supposed to have originated in ancient Greece. By the ancient Romans they were regarded as a disreputable class. After the fall of the Roman empire the dramatic art and profession was abandoned or lost for several centuries. The first actors in England were servants of the nobility, and performed for the diversion of their masters. In the Middle Ages the monks exhibited a species of drama called mysteries or miracle plays, the subject of which was usually some miracle or marvellous event in the history of the Church.

Acts of the Apostles, the fifth book of the New Testament. (See Apostles, Acts of.)

Ac'upuncture [Lat. *acupunctu'ra*, from *a'cus*, a "needle," and *pun'go, punc'tum*, to "prick"], or **Acupunctura'tion,** a term applied to the surgical operation of puncturing a diseased part with needles. This method is extensively used in Japan and China for the cure of many diseases, and has been successfully applied in the treatment of rheumatism. Steel needles are made use of, about three inches long, and set in handles. The surgeon, by a rotary movement, passes one or more to the desired depth in the tissues, and leaves them there from a few minutes to an hour. Their insertion is accompanied by no pain except the first prick—a fact of which the quacks of the sixteenth century did not fail to take advantage. According to Cardan, they travelled from place to place practising acupuncture, and before inserting the needle they rubbed it with a peculiar kind of magnet, either believing or pretending that this made the operation painless. The relief to pain afforded by this simple operation is sometimes astonishing, and the wounds are so minute as to be harmless if skilfully made.

Acush'net, a post-township of Bristol co., Mass., has manufactures of lumber, boxes, cigars, and boots and shoes, but is chiefly agricultural. Pop. 1132.

Acute' [Lat. *acu'tus*, from *ac'uo, acu'tum*, to "sharpen," to "point" (literally, "pointed," hence "sharp," "severe")], a term applied to diseases having severe or violent symptoms, attended with danger, and terminating favorably or otherwise within a few days.

Ac'worth, a post-township of Sullivan co., N. H. Gigantic crystals of beryl occur here. There are manufactures of wooden ware, woollens, boots and shoes, etc. Pop. 1050.

Ad, a Latin preposition signifying "to," "at," "by," "on," "towards," "near," "with," etc. In compound words the *d* is usually changed to correspond with the following letter; thus, *ad* becomes *ac* before *c*, *al* before *l*, *ap* before *p*, etc.

Ada, a town of Hungary, in the county of Bacs, on the river Theiss, 30 miles S. of Szegedin. Pop. in 1869, 9344.

A'da, a county in the S. W. part of Idaho, includes Boisée Valley. It is intersected by the Boisée River, and bounded on the S. by the Lewis (or Snake) River. The surface is mountainous. Gold is found in this county. Grain, potatoes, and butter are produced. Pop. 2675. Capital, Boisée City.

Ada, a post-village of Kent co., Mich., in a township of its own name. Pop. of township, 1427.

Ada, a post-village of Hardin co., O., on the Pittsburg Fort Wayne and Chicago R. R., 57 miles W. of Crestline. It has a college, the North-western Ohio Normal School, three churches, numerous manufactories, and one weekly newspaper. Bent L. Thompson, Ed. "Record."

Adagio, å-dâ'je-o [composed of *ad*, "at," and *agio*, "ease," "leisure"], an Italian musical term, signifies a slow movement or measure of time.

Adair', a county in the central part of Iowa. Area, 576 square miles. It is drained by Middle River and by affluents of Nodaway River. The surface is undulating or nearly level. Grain, wool, hay, and butter are produced. Pop. 3982. Capital, Fontanelle.

Adair, a county in the S. part of Kentucky. Area, 450 square miles. It is traversed by Green River. The soil is moderately fertile and extensively covered with forests. It contains abundant water-power. Cattle, grain, tobacco, and wool are produced. Pop. 11,065. Capital, Columbia.

Adair, a county in the N. N. E. part of Missouri. Area, 570 square miles. It is intersected by Chariton River, and by the North Fork of Salt River. The surface is undulating and the soil generally fertile. Cattle, grain, tobacco, and wool are produced. It is intersected by the St. Louis Kansas City and Northern R. R. Pop. 11,448. Capital, Kirksville.

Adair, a township of Camden co., Mo. Pop. 637.

Adair (James), a trader who resided among the North American Indians for forty years, mostly among the Chickasaws. He was the author of a work on the American Indians (1775), in which he attempted to show the resemblance between their customs and those of the Jews.

Adair (John), an American general, born in South Carolina in 1759. He commanded a body of Kentuckians at the battle of New Orleans in 1815, and was governor of Kentucky from 1820 to 1824. He was U. S. Senator (1805–06) and member of Congress (1831–33). Died May 19, 1840.

Adair (Sir Robert), born in London May 24, 1763. He became a Whig member of Parliament in 1802, ambassador to Vienna in 1806, and represented Great Britain at Constantinople from 1809 to 1811. Died Oct. 3, 1855.

Adal', a narrow tract of Eastern Africa, bordering on the Red Sea, and extending from Massowa to the Strait of Bab-el-Mandeb. It is inhabited by nomadic tribes of Donakila (or Danakil), and is considered a part of Abyssinia by some geographers.

A'dalbert (Heinrich Wilhelm), a Prussian prince, a cousin-german of William I., born in Berlin Oct. 29, 1811. He entered the army in his youth, and obtained the rank of lieutenant-general. He became in 1848 admiral and commander-in-chief of the navy. Died June 6, 1873.

Ada'lia, or **Satalieh** (anc. *Attalia*), a seaport of Turkey in Asia, in Anatolia, on the gulf of the same name, 175 miles S. E. of Smyrna, in lat. 36° 52′ 2″ N., lon. 30° 45′ E. It is built on the slope of a hill, has narrow, dirty streets, and a small but good harbor. Tropical fruits are exported hence. Pop. estimated at 13,000, of whom about 3000 are Greeks.

Ad'am [Heb. אדם, *i. e.* "man"], the first man (see Gen. i., ii., and iii.), is supposed to have been created, according to the Hebrew chronology, 4004 B. C., and according to the Greek chronology, 5411 B. C., though some writers contend that his date should be placed much earlier. He was originally placed, with Eve his wife, in the garden of Eden, whence they were expelled for voluntary disobedience to the Divine command.

Adam (Adolphe Charles), a celebrated French composer, born July 24, 1803, published numerous popular operas and ballets, of which the most celebrated are "Le postillon de Longjumeau," which was played for the first time in 1836, and gained great applause; "Le roi d'Yvetot" (1842), "Richard in Palestine" (1849), and "La jolie fille de Gand" (1839). Died May 3, 1856.

Adam (Albrecht), a German painter of battles, born

at Nördlingen April 16, 1786, entered the service of Eugène de Beauharnais, with whom he witnessed the Russian campaign of 1812. Died Aug. 28, 1862.

Adam (LAMBERT SIGISBERT), an eminent French sculptor, born at Nancy in 1700. Some of his works adorn the garden of Versailles. He became professor in the Royal Academy at Paris in 1744. Died in 1759.—NICOLAS SÉBASTIEN, a skilful sculptor, a brother of the preceding, was born at Nancy in 1705. Among his works is "Prometheus Bound." Died in 1778.

Adam (ROBERT), the most celebrated British architect of the eighteenth century, was born in 1728, went to Italy in 1754, and from Italy to Dalmatia, where he visited the ruins of the palace of the emperor Diocletian, on which he published "The Ruins of the Palace of the Emperor Diocletian at Spalatro" (1764). Among his most prominent works are the university building and St. George's church in Edinburgh, the buildings known as the Adelphi in London, besides many private residences. He died in 1792, and was buried in Westminster Abbey.

Ad'amant [Lat. *ad'amas;* Gr. *ἀδάμας*, "that cannot be subdued or broken," from *α*, negative, and *δαμάω*, to "subdue"], the ancient name of the diamond, is also a word used to denote a substance of extraordinary hardness and strength or durability.

Ad'amites, an heretical sect who are said to have sprung up in the second century, who rejected marriage, and appeared in public naked. This name was also assumed by a sect of fanatics who arose in Bohemia in the fifteenth century and advocated a community of wives. They still exist in Bohemia, and are said to be guilty of great excesses, though outwardly discreet.

Ad'ams, a county of the W. part of Illinois. Area, 760 square miles. It is bounded on the W. by the Mississippi River, which separates it from Missouri. The surface is undulating; the soil is exceedingly fertile. The county is intersected by the Chicago Burlington and Quincy R. R. Cattle, grain, tobacco, and wool are produced. Cooperage, flour, metallic wares, etc. are among the manufactures. Pop. 56,362. Capital, Quincy.

Adams, a county of Indiana, bordering on Ohio. Area, 324 square miles. It is watered by the Wabash and St. Mary's rivers, is well timbered and nearly level, and the soil is productive. Grain, wool, hay, and dairy produce are the staples. It is intersected by the Cincinnati Richmond and Fort Wayne R. R. Pop. 11,382. Capital, Decatur.

Adams, a county of the S. W. of Iowa. Area, 432 square miles. It is drained by the Nodaway River and other streams. Coal is mined here. Grain, hay, wool, and butter are produced. Pop. 4614. Capital, Quincy.

Adams, a county in the S. W. of Mississippi, has an area of about 440 square miles. It is bounded on the W. by the Mississippi River, and on the S. by the Homochitto. The surface is nearly level; the staple products are maize, cotton, cattle, and wool. Pop. 19,084. Capital, Natchez.

Adams, a county in the S. central part of Nebraska, intersected by the Little Blue River. It is traversed by the Burlington and Missouri River R. R. Grain and hay are raised. Pop. 19. Capital, Juniata.

Adams, a county in the S. part of Ohio, has an area of 500 square miles. It is bounded on the S. by the Ohio River, and drained by Brush Creek. The surface is hilly. Iron, building-stone, cattle, grain, tobacco, wool, and flour are produced. Pop. 20,750. Capital, West Union.

Adams, a county of Pennsylvania, bordering on Maryland, has an area of about 530 square miles. It is drained by the Conewago Creek and the head-streams of the Monocacy River. The South Mountain range extends along the north-western boundary. Copper and marble are found. The surface is uneven. Cattle, grain, wool, and hay are produced, and carriages, leather, lime, flour, saddlery, etc. are manufactured. Pop. 30,315. Capital, Gettysburg.

Adams, a county of Wisconsin, bounded on the W. by the Wisconsin River, has an area of about 650 square miles. The surface is mostly covered with forests, which furnish valuable lumber. Grain, wool, hay, and butter are produced. Pop. 6601. Capital, Friendship.

Adams, a township of La Salle co., Ill. Pop. 1662.
Adams, a township of Allen co., Ind. Pop. 2388.
Adams, a township of Carroll co., Ind. Pop. 1149.
Adams, a township of Cass co., Ind. Pop. 807.
Adams, a post-township of Decatur co., Ind. Pop. 2162.
Adams, a township of Hamilton co., Ind. Pop. 2178.
Adams, a township of Madison co., Ind. Pop. 1564.
Adams, a township of Morgan co., Ind. Pop. 1207.
Adams, a township of Parke co., Ind. Pop. 3286.
Adams, a township of Ripley co., Ind. Pop. 2703.
Adams, a township of Dallas co., Ia. Pop. 1015.
Adams, a township of Delaware co., Ia. Pop. 730.
Adams, a township of Keokuk co., Ia. Pop. 866.
Adams, a township of Mahaska co., Ia. Pop. 835.
Adams, a township of Wapello co., Ia. Pop. 1363.

Adams, a post-township of Berkshire co., Mass., contains several large manufacturing villages, among which are North and South Adams. The Pittsfield and North Adams and the Troy and Boston R. Rs. terminate at North Adams. Adams has extensive manufactures of cotton and woollen goods, prints, ginghams, warp, twine, cassimeres, paper, nitro-glycerine, boots and shoes, etc. It has two national banks and three savings banks. Here is Mount Greylock, 3600 feet high, the highest point in Massachusetts. North Adams is also the western terminus of the Hoosac Tunnel. It has two weekly newspapers and one quarterly. Adams has an abundant supply of water from water-works. It has fourteen churches and four large hotels. It also contains a natural bridge, and the "Sand Springs," a well-known place of summer resort. A considerable number of Chinese are employed in the boot and shoe factories. Pop. 12,090.

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Adams, a township of Hillsdale co., Mich. Pop. 1797.
Adams, a township of Houghton co., Mich. Pop. 670.
Adams, a post-township of Mower co., Minn. Pop. 576.
Adams, a township of De Kalb co., Mo. Pop. 879.

Adams, a post-village and township of Jefferson co., N. Y., on the Rome Watertown and Ogdensburg R. R., 156 miles W. N. W. of Albany. Adams village is the seat of Hungerford Collegiate Institute; it also contains two banks, one weekly newspaper, a foundry, a malt-house, two tanneries, a cabinet-shop, a sash-and-blind factory, saw and grist mills, and two carriage manufactories. There are eight churches in the town. Pop. 1352; of Adams township, 3348.

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Adams, a township of Champaign co., O. Pop. 1238.
Adams, a township of Clinton co., O. Pop. 883.
Adams, a township of Coshocton co., O. Pop. 1113.
Adams, a township of Darke co., O. Pop. 2291.
Adams, a township of Defiance co., O. Pop. 1220.
Adams, a township of Guernsey co., O. Pop. 762.
Adams, a township of Lucas co., O. Pop. 959.
Adams, a township of Monroe co., O. Pop. 1201.
Adams, a township of Muskingum co., O. Pop. 727.
Adams, a post-township of Seneca co., O. Pop. 1537.
Adams, a township of Washington co., O. Pop. 1786.
Adams, a township of Butler co., Pa. Pop. 973.
Adams, a township of Cambria co., Pa. Pop. 836.
Adams, a township of Adams co., Wis. Pop. 425.
Adams, a township of Green co., Wis. Pop. 1007.

Adams (CHARLES BAKER), an American naturalist, born at Dorchester, Mass., Jan. 11, 1814. He graduated at Amherst College in 1834, served as tutor in the same institution during the years 1836–37, was professor of chemistry and natural history in Middlebury College 1838–47, when he became professor of zoology and astronomy in Amherst College, which post he held till his death, which occurred at St. Thomas, West Indies, Jan. 19, 1853. He was a man of comprehensive grasp, with great capacity also for details. He wrote reports upon the geological survey of Vermont, also "Contributions to Conchology," and, in connection with Prof. Gray of Brooklyn, prepared an elementary treatise upon geology, which has had much favor.

Adams (CHARLES FRANCIS), LL.D., D. C. L., an American diplomatist, the son of John Quincy Adams, was born in Boston Aug. 18, 1807. He graduated at Harvard in 1825, studied law, and was admitted to the bar in 1828. In 1848 he was nominated for the office of Vice-President by the Freesoilers, who supported Mr. Van Buren for the presidency. He published the "Life and Works of John Adams" (10 vols., 1850–56). Having joined the Republican party, he was elected a member of Congress in 1858, and again in 1860. In the spring of 1861 he was appointed minister to England, the duties of which position were, during the American civil war, very arduous and critical. He performed these duties with much ability and prudence, and returned home in 1868. In 1871 he was appointed one of the arbitrators on the Alabama claims.

Adams (DANIEL), M. D., was born at Townsend, Mass., Sept. 29, 1773, and graduated at Dartmouth in 1797. He was prominent in New Hampshire politics, and was widely known as an educator, editor, and physician, and as the author of an excellent arithmetic and other school-books. Died at Keene, N. H., June 8, 1864.

Adams (HANNAH), born at Medfield, Mass., in 1755, was one of the first women of America to engage in literary pursuits. She was a person of great excellence of character, and possessed real merit as a writer. She wrote a "View of all Religions" (1784), "History of New England" (1799), "Evidences of the Christian Religion" (1804), "History of the Jews" (1812), "Letters on the Gospels," an "Autobiography," and other works. Died at Brookline, Mass., Nov. 15, 1831. She was the first person whose remains were buried at Mount Auburn.

Adams (HENRY A.), U. S. N., born in 1833 in Pennsylvania, graduated at the Naval Academy in 1851, became a passed midshipman in 1854, a master in 1855, a lieutenant in 1856, a lieutenant-commander in 1862, a commander in 1866. While attached to the sloop-of-war Levant in 1856 he took part in the engagement with the Barrier Forts at the mouth of the Canton River, China. He served on board the Brooklyn at the passage of Forts St. Philip and Jackson and the capture of New Orleans in 1862, and participated afterwards, while attached to the North Atlantic blockading squadron, in both attacks on Fort Fisher. Of his services at Fort Fisher, Admiral Porter, in his official despatch of Jan. 28, 1865, writes: "I recommend the promotion of Lieutenant-Commander H. A. Adams, without whose aid we should have been brought to a stand-still more than once. He volunteered for anything and everything." FOXHALL A. PARKER, U. S. N.

Adams (ISAAC), born in 1803 at Rochester, N. H., invented in 1828 the well-known Adams printing-press, which he further improved in 1834. This press is now in very general use.

Adams (Rev. JASPER), D. D., was born at Medway, Mass., in 1793, graduated at Brown University in 1815, was professor of mathematics there (1819–24), was president of Charleston College, S. C., in 1824 and again in 1827–36, of Geneva College in 1825–27. He was (1838–40) a professor of geography, ethics, etc. at West Point. Died Oct. 25, 1841.

Adams (JOHN), the second President of the United States, was born in Braintree, Mass., on the 19th of Oct., 1735, O. S. He graduated at Harvard College in 1755, studied law, and was admitted to the bar in 1758. For this profession he was well fitted by a clear, sonorous voice, a ready fluency of speech, and a quick conception. In 1764 he married Abigail Smith, a woman of superior intelligence. His attention was drawn to political affairs by the passage of the Stamp Act in 1765, and he offered on that subject a series of resolutions which were very popular. He removed to Boston in 1768, became one of the most courageous and prominent advocates of the popular cause, and was chosen a member of the General Court (the legislature) in 1770.

He was one of the delegates that represented Massachusetts in the first Continental Congress, which met in Sept., 1774. In a letter written at this crisis he declared: "The die is now cast; I have passed the Rubicon. Sink or swim, live or die, survive or perish with my country, is my unalterable determination." He distinguished himself in Congress by his capacity for business and for debate, and advocated the movement for independence when the majority of the members were inclined to temporize and to petition the king. In May, 1776, he moved and carried a resolution in Congress that the Colonies should assume the duty of self-government. In June a resolution that the United States "are and of right ought to be free and independent" was moved by Richard Henry Lee, seconded by Mr. Adams, and adopted by a small majority. Mr. Adams was a member of the committee of five appointed June 11 to prepare a declaration of independence, in support of which he made an eloquent speech about July 2. He was the chairman of the board of war appointed in June, 1776, and was sent as commissioner to France in 1778, but returned in July, 1779. Having been appointed as minister to negotiate a treaty of peace and commerce with Great Britain, he went to Europe early in 1780. Conjointly with Franklin and Jay he negotiated a treaty, the preliminary articles of which were signed Nov. 30, 1782. He was employed as minister to the court of St. James from 1785 to 1788, and during that service wrote his "Defence of the American Constitutions" (1787). In 1789 he became Vice-President of the United States, and about that time identified himself with the Federal party, by which he was re-elected to the office of Vice-President in 1792.

In 1796, Mr. Adams was chosen President of the United States, receiving seventy-one electoral votes, while his competitor, Thomas Jefferson, received sixty-eight votes. He sympathized with the anti-Gallican party, and pursued the policy of neutrality between France and England. Involved in a quarrel with the French Directory, which interfered with the maritime interests of the Americans, he sent Mr. Murray as minister to France early in 1799, in order to avert a war. This act gave much offence to the Federalists, and broke the unity of that party. Among the unpopular measures for which Mr. Adams was held responsible were the Alien law and the Sedition law. In 1800 he was the Federal candidate for the office of President, but he was not cordially supported by Gen. Hamilton, the favorite leader of his party. Receiving sixty-five electoral votes, he was defeated by Thomas Jefferson, who received seventy-three votes.

Mr. Adams then retired from public life to his large estate at Quincy, Mass., and gave his attention partly to agriculture. The general neglect and odium which he experienced were at last compensated by the election of his son John Quincy to the presidency of the United States. He died on the 4th of July, 1826, on the same day with Thomas Jefferson. It is a curious coincidence that three Presidents of the United States (Monroe being the third) have died on that anniversary. J. THOMAS.

Adams (JOHN), LL.D., eminent as a classical teacher, was born in Canterbury, Conn., Sept. 18, 1772, and graduated at Yale College in 1795. After presiding over Plainfield Academy, and Bacon Academy in Colchester, Conn., he was made principal of Phillips Academy, Andover, Mass., May, 1810, resigned that position after great success in 1833, and died April 24, 1863. Prof. Thomas C. Upham and many other distinguished scholars and philanthropists were among his pupils at Andover.

Adams (JOHN COUCH), an English astronomer, born in Cornwall June 5, 1819, was educated at Cambridge. In 1841 he began to search for the causes of the irregularities in the motion of Uranus. He ascertained that they were caused by the attraction of a planet then unknown, and thus partakes with Leverrier the honor of the discovery of Neptune, for which he received the Copley medal in 1848. He became Lowndean professor of astronomy at Cambridge in 1858.

Adams (JOHN QUINCY), the sixth President of the United States, was born in Braintree, Mass., on the 11th of July, 1767. He was eldest son of President John Adams and his wife, Abigail Smith, who was descended from the family of Quincy. In 1778 he was placed at a school in Paris, and in 1780 passed to the University of Leyden. He returned home in 1785, and finished his education at Harvard College, where he graduated in 1788, after which he studied law with Theophilus Parsons, and was admitted to the bar in 1791. Having gained distinction by some political essays, he was appointed minister to The Hague in 1794. In 1797 he married Louisa Catherine Johnson of Maryland, and in the same year was sent as minister to Berlin, from which he was recalled in 1801, when the Republicans obtained power.

He was elected a Senator of the U. S. by the Federalists in 1803, but voted for Jefferson's embargo in 1807, and thus separated himself from the Federal party, and lost his seat in the Senate in 1808. Before this date he had distinguished himself as a public speaker, and had been appointed professor of rhetoric at Harvard College (1805). In 1809 he was sent as minister to Russia. He was one of the commissioners that negotiated the treaty of peace with Great Britain, signed Dec. 24, 1814, and he was appointed minister to the court of St. James in 1815. In 1817 he became secretary of state in the cabinet of Monroe, in which position he remained eight years. In 1824 four candidates for the presidency were presented—John Q. Adams, Andrew Jackson, Henry Clay, and William H. Crawford—all of whom professed to be Democrats. Mr. Adams received eighty-four electoral votes, Jackson ninety-nine, Crawford forty-one, and Clay thirty-seven. As neither had the requisite majority, the election devolved on the House of Representatives, which chose Mr. Adams. This result was due to the influence of Henry Clay, and when Mr. Adams nominated him as secretary of state, the friends of Jackson accused Adams and Clay of "bargain and corruption," but the charge is not generally credited. His administration was opposed by a powerful party, formed by a coalition of the Jacksonians with the friends of Crawford. This party had a majority of the members of Congress, and, uniting on General Jackson as their candidate, triumphed in the election of 1828, when Mr. Adams received only eighty-three electoral votes out of two hundred and sixty-one, which was the whole number.

In 1830 he was chosen by the voters of his native district to represent them in Congress, in which he distinguished himself by his application to business, his assertion of the right of petition, and his resolute opposition to what he considered to be the encroachments of the slave-power. "With unwavering firmness," says W. H. Seward, "against a bitter and unscrupulous opposition, exasperated to the highest pitch by his pertinacity—amidst a perfect tempest of vituperation and abuse—he persevered in presenting these petitions [against slavery] one by one, to the

amount sometimes of two hundred in a day." He continued to represent the same district in Congress for seventeen years, during which he maintained a position independent of party. He was seized with paralysis in the Capitol on the 21st of Feb., 1848, and died on the 23d of that month. In religion he was a Unitarian. He left many writings in prose and verse, which have been published; also a voluminous diary of his public life. He had an only surviving son, Charles Francis Adams, noticed above. J. THOMAS.

Adams (JOHN QUINCY), a grandson of the preceding, and son of Charles Francis Adams, noticed above, was born at Boston, Mass., Sept. 22, 1833, graduated at Harvard in 1853. He was the Democratic candidate for governor of Massachusetts in 1867 and 1868, but was both times defeated. He was also a candidate for the vice-presidency in 1872, on the ticket with Charles O'Conor.

Adams (JOHN R.), D. D., born in Plainfield, Conn., graduated at Yale College in 1821, was three years a teacher in Phillips Academy, Andover, Mass., was Presbyterian and Congregational minister in various towns of New Hampshire, New York, Massachusetts, and Maine; was chaplain during the civil war in the Fifth Maine and One-Hundred-and-Twenty-first New York regiments. For his services he received public acknowledgments from the governor of Maine. Died April 26, 1866, at Northampton, Mass., aged sixty-four.

Adams (NEHEMIAH), D. D., an American theologian, was born at Salem, Mass., Feb. 19, 1806, graduated at Harvard in 1826, and at Andover Theological Seminary in 1829. He first settled at Cambridge in 1829, and in 1834 became pastor of the Essex street church in Boston. He resigned his pastorate in 1870. He published several theological and other works, and a "South-side View of Slavery" (1854), which was severely condemned by the opponents of slavery. He has had a high reputation for scholarship and pulpit eloquence.

Adams (SAMUEL), a celebrated American patriot and orator, born in Boston Sept. 27, 1722, was a second cousin of President John Adams. He graduated at Harvard College in 1740, and became a merchant, but was not successful in that business, which he soon abandoned. In 1765 he was chosen to represent Boston in the General Court of Massachusetts, in which he distinguished himself by his courage, energy, and oratorical talents, and acquired great influence. Before the Revolution he was an unflinching advocate of the popular cause, and took such an active part in political meetings that he was one of the two leading patriots who were excepted from a general pardon offered in 1775. He was a member of the first Continental Congress, which met in Sept., 1774, and he signed the Declaration of Independence in 1776. He remained in Congress about eight years, was afterwards elected to the senate of Massachusetts, and was a member of the State convention which ratified the Federal Constitution in 1788. His political affinities connected him with the Republican (or Jeffersonian) party. He was elected governor of Massachusetts in 1794, was re-elected twice, and retired to private life in 1797. Having survived his only son, he died in Oct., 1803. In religion he was a decided Calvinist. In the letters and other writings of John Adams occur several passages which express a high opinion of the talents and merits of Samuel Adams, in whose productions he says may be found "specimens of a nervous simplicity of reasoning and eloquence that have never been rivalled in America." (See W. V. WELLS's "Life and Public Services of Samuel Adams," 3 vols. 8vo, 1865.)

Adams (SETH), a brother of Isaac Adams, the inventor, was born at Rochester, N. H., April 13, 1807, has been for many years associated with his brother in the manufacture of the Adams printing-press, and since 1849 has been extensively engaged in sugar-refining in Boston, Mass. He has given considerable sums of money to Bowdoin College.

Adams (WILLIAM), D.D., LL.D., a son of John Adams (principal of Phillips Academy, Andover), a distinguished Presbyterian divine, born in Colchester, Conn., Jan. 25, 1807, graduated at Yale College 1827, and at Andover Theological Seminary 1830. He was ordained at Brighton, Mass., Feb., 1831, settled over the Central Presbyterian church in New York City, Nov., 1834, and over the newly-formed Madison Square Presbyterian church, Feb., 1853. An acknowledged leader in the New School branch of the Presbyterian Church, he took a prominent part in the reunion of the two branches in 1870. He has published many sermons, addresses, and articles in reviews, besides the following volumes: "The Three Gardens—Eden, Gethsemane, and Paradise, or Man's Ruin, Redemption, and Restoration," 1856; "Thanksgiving: Memories of the Day, and Helps to the Habit," 1867; "Conversations of Jesus Christ with Representative Men," 1868. In 1873 he was chosen president and professor of sacred rhetoric in the Union Theological Seminary, N. Y.

Adams (WILLIAM T.), a popular American writer, known under the pseudonym of OLIVER OPTIC, born in Medway, Mass., July 30, 1822, has published numerous works for children. Among these may be named "The Riverdale Series" and "Young America Series." His journal, entitled "Our Boys and Girls," founded in 1867 as a weekly, and subsequently published as a monthly, has obtained a large circulation.

Adams Centre, a post-village of Adams township, Jefferson co., N. Y.

Adam's Creek, a twp. of Craven co., N. C. P. 1352.

Ad'amson (JOHN), an English author, born in 1787. He wrote a "Memoir of Camoens" (1820) and "The History, Antiquities, and Literature of Portugal" (2 vols., 1842–46). Died in 1855.

Adam's Peak, a mountain in Ceylon in lat. 6° 52′ N., lon. 80° 32′ E., which has a height of about 7000 feet. It is considered by the Booddhists as the holy centre of the world. A temple is situated on the highest portion of the peak, under which the footprints of Booddha and Sripadam (*i. e.* "luck") are said to be seen. Booddha is said to have left those traces upon his last visit to the earth. The Brahmans and Mohammedans also consider it a holy mountain—the former, because they consider Booddha as an avatar (incarnation) of Vishnoo; the latter, because they ascribe the footprints to Adam, who is said to have here mourned for 1000 years his expulsion from Paradise, standing on one foot.

Ad'amsthal, a village of Moravia, Austria, 9 miles N. of Brünn. In the neighborhood is the curious calcareous cavern Regciskala, which belongs to the large system of caverns which is found to the N. of Brünn. Adamsthal is growing considerably, and is much visited by tourists.

Ad'amstown, a post-borough of Lancaster co., Pa. Pop. 431.

Adamsville, a twp. of Marlboro' co., S. C. Pop. 1407.

Ada'na, a city of Asia Minor, on the river Sihoon, about 20 miles from the sea and 18 miles E. of Tarsus. It has some trade in grain, wine, cotton, etc. Here are interesting ancient remains. Pop. estimated at 25,000.

Adanson (MICHEL), a celebrated French naturalist, born at Aix April 7, 1727, was educated at the college of Plessis. He went to Senegal in 1748 to explore the natural history of that region, in which he passed five years in his arduous and dangerous enterprise, and collected an immense number of animals and plants. He published, after his return, a "Natural History of Senegal" (1757), and "The Families of Plants" (1763), in which he opposed the artificial system of Linnæus. In 1759 he was elected a member of the Academy of Sciences. He expended the labor of several years on an encyclopædia entitled "The Universal Order of Nature," which he left in manuscript, perhaps unfinished. A part of his mature life was passed in extreme poverty, but he afterwards received a pension from the state. He was a man of noble but eccentric character, and was regarded as a naturalist of the first order by Cuvier, who composed a eulogy on him. Died Aug. 3, 1806.

Adanso'nia, a genus of plants of the natural order Sterculiaceæ, was named in honor of the great naturalist, M. Adanson. The *Adanso'nia digita'ta*, or baobab, is found in tropical Africa, and is one of the largest trees in the world. It does not grow very high, but its trunk is often more than twenty feet in diameter. The fruit of the baobab is called monkey-bread. Adanson saw a tree of this species which he estimated to be 5000 years old.

Adansonia.

A'dar, the name of the sixth month in the civil year of the Jews, which included part of February and March.

Ad'da (anc. *Ad'dua*), a river of Northern Italy, rises in the Valtellina, among the Rhætian Alps, and enters Lake Como, which is an expansion of this river. After issuing from that lake it flows nearly southward through Lombardy, and empties itself into the Po 7 miles above Cremona. Length of river and lake, about 130 miles.

Ad′dax, the *O′ryx* (or *Ad′dax*) *nasomacula′tus* of the naturalists, is a large antelope found in Nubia, Kordofân, and other parts of Northern or North Central Africa. Its broad spreading hoofs enable the animal to obtain a firm foothold upon the dry and yielding sand. Its horns, which are from three to four feet long, are beautifully twisted into a spiral, having two turns and a half. The general color of the addax is a milk-white, but there is a black patch of hair on the forehead, and it has a dark brown mane, with more or less of reddish-brown mixed with gray on the head, shoulders, and part of the back.

Addax.

Ad′der, a common name of the viper, or of any venomous serpent belonging to the family Viperidæ. The name is popularly applied to several non-venomous snakes.

Ad′dington, a county of Canada, in the S. E. part of Ontario, bordering on Lake Ontario, has an area of 576 square miles. It is drained by the Napanee River, and contains several small lakes. Among the staple productions are lumber and wool. Capital, Bath. Pop. in 1871, 21,312.

Ad′dison, a county in the W. part of Vermont. Area, 750 square miles. It is bounded on the W. by Lake Champlain, and drained by Otter Creek. The surface in the E. is mountainous, but the soil near the lake is level and fertile. Quarries of white and variegated marble are worked in this county, which is intersected by the Rutland and Burlington R. R. Cattle, grain, wool, and hay are produced, and lumber, cooperage, saddlery, carriages, etc. are manufactured. Capital, Middlebury. Pop. 23,484.

Addison, a post-township of Du Page co., Ill. Pop. 1613. It is the seat of a teachers' seminary.

Addison, a township of Shelby co., Ind. Pop. 2677.

Addison, a township of Washington co., Me. P. 1201.

Addison, a township of Oakland co., Mich. Pop. 1063.

Addison, a post-village and township of Steuben co., N. Y. The village contains many important manufacturing establishments, and is in a highly flourishing condition. It has one weekly paper. Pop. 2218.

G. H. Hollis, Ed. "Advertiser."

Addison, a post-township of Gallia co., O. Pop. 1340.

Addison, a post-township of Somerset co., Pa. Pop. 1456.

Addison, a post-township of Addison co., Vt. P. 911.

Addison, a post-township of Washington co., Wis. Pop. 1833.

Ad′dison (Joseph), an English humorist, moralist, and author of great merit and celebrity, was born at Milston, near Amesbury, in Wiltshire, on the 1st of May, 1672. He was a son of Lancelot Addison. In 1687 he entered Queen's College, Oxford, from which he passed to Magdalen College in 1689. He became a good classical scholar, and as a writer of Latin verse probably excelled all his contemporaries. At an early age he enjoyed the friendship and patronage of Dryden, Lord Somers, and Montagu (Lord Halifax), the last of whom persuaded him to enlist as a Whig in the civil service of the state. Having in 1699 received a pension of £300, he visited France and Italy, and wrote a charming "Letter from Italy," in verse, addressed to Lord Halifax (1701). He lost his pension on the death of William III. (1702), and returned home in 1703. His next work was "The Campaign," a poem on the battle of Blenheim (1704), which was greatly admired, and was rewarded with the office of commissioner of appeals. He afterwards produced his interesting "Travels in Italy," and "Rosamond," an opera. He was appointed under-secretary of state in 1706, and was elected to Parliament in 1708. His diffidence disqualified him for public speaking, but this defect was compensated by his success as a political writer. He became in 1709 secretary to Lord Wharton, lord lieutenant of Ireland, and contributed to the "Tatler," of which his friend Richard Steele was the editor.

On the 1st of Mar., 1711, Addison and Steele began to issue daily "The Spectator," the most elegant and famous periodical and miscellany that ever appeared in England. Addison wrote the best of the essays, which form an epoch in literary history and have exerted a powerful and salutary moral influence. Among his literary merits are grace and propriety of diction, elegant taste, genial philosophy, and inimitable humor. "As an observer of life, of manners, of all the shades of human character," says Macaulay, "he stands in the first class."

"The Spectator" ceased to appear daily in Dec., 1712, but was revived as a tri-weekly paper in 1714. Among his other works are the tragedy of "Cato" (1713), which was received with great applause, an ingenious "Dialogue on Medals," and a series of able political papers called "The Freeholder" (1715). In 1716 he married the proud and uncongenial countess-dowager of Warwick, and early in 1717 was appointed secretary of state. He resigned this office in 1718, and died June 17, 1719, leaving only one child, a daughter. His marriage appears not to have been happy. Addison was greatly distinguished for his wit and colloquial powers. Lady Mary Montagu, who had conversed with the most eminent wits, pronounced him "the best company in the world." "His humanity," says Macaulay, "is without a parallel in literary history. The highest proof of human virtue is to possess boundless power without abusing it. No kind of power is more formidable than the power of making men ridiculous; and that power Addison possessed in boundless measure. But it would be difficult, if not impossible, to find, in all the volumes which he has left us, a single taunt which can be called ungenerous or unkind." "Whoever wishes," says Dr. Johnson, "to attain an English style, familiar but not coarse, and elegant but not ostentatious, must give his days and nights to the volumes of Addison. . . . He not only made the proper use of wit himself, but taught it to others. He has restored virtue to its dignity, and taught innocence not to be ashamed. This is an elevation of literary character 'above all Greek, above all Roman fame.'" (See Johnson's "Lives of the Poets;" Macaulay, "Critical and Historical Essays;" Atkin, "The Life of Addison," 1843.) J. Thomas.

Addison's Disease [named from its discoverer, the late Dr. Addison of Guy's Hospital, London], or **Supra-renal Melasma,** a rather rare disease, the most obvious symptom of which is a gray-black or bronze color of the skin, gradually coming on. The chief lesion discovered after death is a cheesy degeneration of the supra-renal capsules, the result of a peculiar chronic inflammation. Patients usually suffer from extreme debility, depression of spirits, pain in the epigastrium and back, often accompanied by dyspepsia, vomiting, diarrhœa, and grave nervous symptoms. No remedy is known, and the disease, though careful nursing is extremely useful, is probably never cured.

A′del, a post-village, the capital of Dallas co., Ia., 25 miles W. of Des Moines. One of the best water-privileges in the State is to be found here. It is the centre of two projected railroads. The surrounding country is rolling and highly productive. There are two weekly newspapers. Pop. 711; of Adel township, 1563.

J. E. Williams, Ed. "Gazette."

Ad′elaide, a city, the capital of South Australia, is situated on both sides of the river Torrens, 8 miles from its entrance into the Gulf of St. Vincent. It was founded in 1836. The streets are wide and rectangular. It is the seat of an Anglican and a Roman Catholic bishop, and contains a government-house, an assay-office, a theatre, extensive manufactures, and several banks. Pop. in 1871, 27,208. Port Adelaide, situated about 6 miles N. N. W. of the city, is the centre of the commerce of the colony. The harbor admits vessels drawing eighteen feet of water. It has a heavy trade in copper, grain, and wool. Adelaide is connected by railways with Dry Creek, Victor Harbor, Gawlertown, Kapunda, and Kooringa.

Adel′phia [*i. e.* "brotherhood;" from the Gr. ἀδελφός, a "brother"], a collection of the stamens of a flower into a bundle. Linnæus employed this term for those plants in which the stamens, instead of growing singly, combine into one or more parcels or brotherhoods; thus, Monadelphia signified stamens all connected into one parcel; Diadelphia, into two parcels, and so on.

Adelphia.

A′delsberg, a market-town of Carniola, Austria. A short distance from the town is the Adelsberg Grotto, which is one of the most peculiar caverns of the world. It consists of five different parts, and is full of beautiful formations, which are partly suspended from the ceiling (stalactites), in part hang down upon the wall like draperies (incrustations), and part arise from the ground in the form of obelisks or columns (stalagmites).

A′delung (Friedrich), a German philologist, born at Stettin Feb. 25, 1768, became a resident of St. Petersburg, and preceptor to the grand duke, who was afterwards the emperor Nicholas. He wrote on the Sanscrit language and literature. Died Jan. 30, 1843.

Adelung (JOHANN CHRISTOPH), an eminent philologist, an uncle of the preceding, born in Pomerania Aug. 8, 1732. His reputation is founded chiefly on his "Attempt at a Complete Grammatico-Critical Dictionary of the German Language" ("Versuch eines vollständigen grammatisch-kritischen Wörterbuches der Hochdeutschen Mundart," 1774–86). This is considered to be superior to Dr. Johnson's Dictionary in definitions and etymology. Among his other works is one on language, entitled "Mithridates oder allgemeine Sprachen-Kunde." Died at Dresden Sept. 10, 1806.

A'den, a seaport of Arabia, in Yemen, is on the Gulf of Aden, at Cape Aden, in lat. 12° 46′ 15″ N., lon. 45° 10′ E. It was a magnificent emporium in the Middle Ages, and, being favorably situated near the entrance of the Red Sea, was the chief mart of the products of Asia. From these advantages, and its climate, rendered cool and delightful by the sea-breeze (although the rugged volcanic hills with which it is surrounded, without a particle of vegetation, make it anything but attractive in appearance), it was named, after the Oriental manner, Aden (*i. e.* "Eden"). The British obtained possession of it in 1839, since which time the population and trade of the place have rapidly increased. It has a good harbor, a dry and healthy climate, and one of the most important and advantageous positions on the route from Europe to India, whether by the railway from Alexandria to Suez, or by the Suez Canal and the Red Sea. Aden resembles Gibraltar in its position on a rocky promontory and in its military importance; it has been strongly fortified by the British. Its area is about 19 square miles. The exports in 1871–72 were £885,919, and imports £1,404,169. The population, which in 1838 was not over 1000, is variously estimated at from 20,000 to 50,000.

Aden, Cape, a rocky promontory at the S. extremity of Arabia, adjoining the town of Aden, rises to the height of 1776 feet. It is joined to the mainland by a low sandy isthmus less than a mile wide.

Aden, Gulf of, that part of the sea lying between Arabia and Adel, and extending from the Strait of Bab-el-Mandeb to the Indian Ocean or Arabian Sea. On some maps this is marked as the Arabian Gulf. Length, about 500 miles.

Adept′ [Lat. *adeptus*, from *ad*, "for," and *aptus*, "fitted"], a term applied to a person who is skilful or well versed in any art or science; formerly applied especially to an alchemist who was supposed to have discovered the secret of turning base metal into gold, or to have found the philosopher's stone.

Ader′no, a town of Sicily, at the foot of Mount Etna, 17 miles N. W. of Catania. Pop. in 1861, 12,877.

A′dersbach Rocks, a remarkable group of high and detached sandstone rocks, near the village of Adersbach, in the N. E. part of Bohemia. They present fantastic forms, and occupy an area of several miles in extent. One of the pinnacles is over 200 feet high.

Adet (PIERRE AUGUSTE), a French chemist and politician, born at Nevers in 1763. He was sent by the French Directory as ambassador to the United States in 1795, but he suspended his functions in 1797, for the alleged reason that the American government had violated its neutrality. Died in 1832.

Adhe′sion [Lat. *adhe′sio*, from *ad*, "to," and *hæ′reo*, *hæ′sum*, to "stick"], the attractive force which causes the smooth surfaces of two substances to adhere together, or which causes a fluid and solid to unite. The amount of adhesion between solid surfaces is measured best by the adhesion balance of J. J. von Prechtl. Capillary attraction is an instance and particular manifestation of adhesion.

ADHESION, a term used in botany to denote the union of contiguous parts, as when the petals adhere and form a monopetalous corolla; the calyx often adheres to the ovary, and then seems as if it grew from the apex of it. This tendency causes great diversity of appearance in the organs of plants.

Adiaph′orites [from the Gr. ἀδιάφορος, "indifferent"], a name given to Melanchthon, and those who agreed with him in submitting, in things indifferent, to an imperial edict. When Charles V. in 1548 issued an edict called the Interim, relating to disputed religious doctrines, the Protestants became involved in a controversy in which this name originated.

Ad′ige [Lat. *Ath′esis*], a river in Italy, rises among the Alps in the Tyrol, where it is called the Etsch. Flowing southward, it passes by Trent, and enters Lombardy. After passing by Verona, it flows nearly south-eastward, and falls into the Gulf of Venice about 13 miles N. E. of Adria. It is a rapid stream, about 220 miles long. It is navigable from its mouth to Trent, but the velocity of the current impedes navigation.

Ad′ipocere [Lat. *adipoce′ra*, from *ad′eps* (gen. *ad′ipis*), "fat," and *ce′ra*, "wax"], a substance which results from the decomposition of animal bodies, and resembles spermaceti, or a mixture of wax and fat. Human bodies buried in wet ground are often reduced to this condition.

Ad′ipose [Lat. *adipo′sus*, from *ad′eps* (gen. *ad′ipis*), "fat"], of the nature of fat, fatty. Adipose tissue is an animal membrane which contains the fatty matter. It presents an aggregation of very small spherical pouches or vesicles filled with fat or oil. This tissue is organized and vital, but the fat is not.

Adiron′dac Mountains, a group of mountains, the highest in the State of New York, occupy parts of the counties of Hamilton, Essex, Franklin, and Clinton, and are in the N. E. part of the State. The highest summit, Mount Marcy, which is in Essex county, is 5370 feet above the level of the sea. These mountains, being of primitive formation, are remarkable for grand and picturesque scenery. They are covered with forests of maple, ash, beech, pine, hemlock, cedar, and other trees, and abound in game. A number of lakes occur among the Adirondacs, which are also drained by the Saranac and Ausable rivers. The Adirondacs are a favorite resort for summer recreation. The waters abound in trout, and deer and other game is to be found in the forests. Iron ore and lumber are obtained here.

Adirondac, a former village of Newcomb township, Essex co., N. Y., about 1800 feet above the level of the sea, and 100 miles N. N. W. of Albany. Here are rich beds of magnetic iron-ore, and several iron-works, now abandoned. The village was near Lake Sandford, which is 11 miles long and is navigable.

Ad′it [Lat. *ad′itus*, from *ad*, "to," and *e′o*, *i′tum*, to "go"], a horizontal passage and entrance into a mine, designed partly to drain water from it. Adits occur chiefly in mountainous regions, and are sometimes several miles long.

Adja′cent Angle, an angle contiguous to another, so that one side is common to both angles.

Ad′jective [Lat. *adjectivum*, from *ad*, "to," and *jacio*, *jactum*, to "cast," to "put"], in grammar, the name of a class of words which are joined to nouns, in order to qualify the general ideas expressed by the nouns.

Adjourn′ment, a term applied to the postponement of the proceedings of the U. S. Congress, or of either house of the British Parliament, from one time to another specified time. It differs from prorogation, which is an act of royal authority, whereas the power of adjournment is vested in each house respectively.

Ad′jutant [Lat. *adju′tans*, from *adju′to*, to "assist"], the title of a military officer who assists the superior officer of an army, regiment, etc. He carries orders from the chief to the subordinate officers, and collects the reports which are made by the latter to the former. He inspects escorts and guards, keeps the journal or account-book of the regiment or division, and acts as secretary to his chief. In the U. S. a regimental adjutant ranks as first lieutenant.

Ad′jutant (*Cico′nia ar′gala*), an East Indian bird, allied to the stork, is called argala by the natives. It is about five feet high, has long legs and an enormous bill, and can swallow a cat or a small leg of mutton with the greatest facility. It is very useful as a scavenger, cleansing the streets and public squares of various offal and dead animals. The famous marabou feathers are obtained from the adjutant and a kindred species, the marabou (marabout) of Africa.

Adjutant-General, the principal organ of the commander of an army in publishing orders. The same organ of the commander of a division, brigade, geographical division, or department is styled assistant adjutant-general. The laws of the U. S., however, provide for but one adjutant-general, with the rank of brigadier-general (colonel after vacation of office by present incumbent), made by regulations chief of a bureau of the war department, and charged with the recruiting service, records, returns, etc.; two assistant adjutants-general, with the rank of colonel; four with the rank of lieutenant colonel; and thirteen with the rank of major. The bureau duties of adjutants-general and assistants are—publishing orders in writing; making up written instructions, and transmitting them; reception of reports and returns; disposing of them; forming tables showing the state and position of corps; regulating details of service; corresponding with the administrative departments relative to the wants of troops; corresponding with the corps, detachments, or individual officers serving under the orders of the same commander; and the method-

ical arrangement and care of the records and papers of his office. The active duties of adjutants-general consist in establishing camps; visiting guards and outposts; mustering and inspecting troops; inspecting guards and detachments; forming parades and lines of battle; the conduct and control of deserters and prisoners; making reconnaissances; and in general discharging such other active duties as may be assigned them.

ADJUTANT-GENERAL of a State. See MILITIA.

Ad La'tus (*i. e.* "at the side," implying readiness to assist), a term applied to persons sent, as aids, with an ambassador, especially when the latter is unable to speak the language of the court to which he is ordered. In Austria the term is applied to generals who are given as aids to the commandant of an army corps or province.

Ad'ler (GEORG J.), Ph. D., a German philologist, born at Leipsic in 1821, came to the U. S. in 1833. He was for some time professor of German in the University of New York. He wrote several German and Latin school manuals, and an excellent German and English dictionary. Died in New York Aug. 24, 1868.

Ad'lerberg (VLADIMIR FEODOROVITCH), COUNT, a Russian general and minister of state, born in 1793, served in the campaigns of 1812–14, was major-general in the Turkish campaign of 1828, and was made lieutenant-general in 1833. He also held the positions of general director of the mails, minister of the imperial house, and chancellor of the Russian orders. Of his sons, Alexander and Nicholas are both lieutenants-general and adjutants-general to the emperor. Nicholas was appointed governor-general of Finland in 1866.

Ad'lercreutz (CARL JOHAN), COUNT, a Swedish general, born April 27, 1757, served against Russia in 1788, and in the Finnish war of 1808. On Mar. 13, 1809, in consequence of several unpopular actions of the king, Gustavus IV., he arrested the king in the name of the people, which act gained him great popularity. Died Aug. 21, 1815.

Ad'ler Sal'vius (JOHAN), a celebrated Swedish ambassador and diplomatist, was born in Strengnäs, Sweden, in 1590, and died at Stockholm in 1652. He was sent by Gustavus Adolphus on various missions of importance, and during the Thirty Years' war he enjoyed the fullest confidence of that monarch. After the conclusion of peace he returned to Sweden, and was created a councillor and baron. Throughout his life a firm friendship existed between him and the celebrated chancellor Oxenstiern.

Ad'lersparre (GEORGE), COUNT, a Swedish officer and statesman, born Mar. 28, 1760, took part in the wars of 1788 and 1808 against Russia, and in the deposition of Gustavus IV. He received many indications of favor from the new king, but was dissatisfied with the result of the revolution, because he had not gained as much influence as he desired. He published from 1830–33 a number of secret documents, as well as his correspondence with Charles XIII. and others, in consequence of which he was sentenced to pay a fine. He nevertheless continued to publish these documents. Died Sept. 23, 1835.

Ad Lib'itum (*i. e.* "at (or according to) pleasure"), often employed by physicians in giving directions about taking some harmless medicine; also used in music to indicate that a certain part may be played according to the taste of the performer.

Adme'tus [Gr. Ἄδμητος], son of Pheres, who was the mythical founder and first king of Pheræ in Thessaly. He was one of the Argonauts, and took a part in the Calydonian Hunt. He won the hand of Alcestis by coming to the suit in a chariot drawn by boars and lions, that being a condition imposed by the bride's father, Pelias. The god Apollo procured from the Fates a grant that Admetus might be exempt from death if his father, mother, or wife should die for him. The touching story of Alcestis and her devotion, death, and restoration to life is the subject of one of the most celebrated tragedies of Euripides.

Administra'tion [from the Lat. *ad*, "for," and *ministro, ministratum*, to "be a servant"]. This word literally signifies "management" or the conduct of business. It is often used to indicate the action of the executive department of government, as distinguished from the legislative and judicial. It sometimes is employed with reference to trust funds, but its technical meaning is the management or disposition, according to law, of the personal estate of an intestate or of a testator having no executor. The common-law distinction between heirs on the one hand and executors and administrators on the other, should be noted. When an owner of real estate died, his estate devolved upon his heirs, who were persons related to him by blood; when an owner of personal property died, leaving a testament or will, that branch of his estate devolved upon his executors, if such were named; if there were none, then upon administrators appointed by a court of justice. Administration in this sense was in England under the control of the ecclesiastical courts until 1857, when it devolved upon a newly-created court of probate. In the U. S. it is generally vested in special tribunals termed probate, or orphans', or surrogates' courts. By such a court administration is conferred on the person or persons entitled to it by the local rules of law. It is in general committed first to the widow or husband, then to the children, and then to the other next of kin, in a prescribed order. The court has power of selection among the next of kin in equal degree. These provisions are substantially copied from early English statutes. The person thus entrusted with the administration is called an administrator. The court grants him "letters of administration" as evidence of his authority. He represents the deceased. He must make an inventory of the personal estate, collect the assets, and convert the property into cash, pay the debts, render an account, and distribute the balance in his hands among the persons entitled to it. He is a trustee, and under the control of a court of equity as well as of the probate court.

When the deceased leaves a will, but there is no executor, the person to whom administration is granted is termed an administrator "with the will annexed" (*cum testamento annexo*). In this case the will is to guide the administrator in his duties. Should an administrator die before his duties are fulfilled, another is appointed to perform the residue of his functions, called "administrator *de bonis non*."

While an administrator exercises full control over the personal estate of the deceased, his authority is confined to it unless it is insufficient to pay debts; in which case the probate court generally has by statute the right to direct him to sell enough of the real estate to satisfy them.

Letters of administration confer no power to bring actions in foreign states. Where there are assets in another state or country, a subordinate or ancillary administrator is appointed, who acts under the direction of the foreign court, and remits according to its order any funds which he may receive to the principal administrator. T. W. DWIGHT.

Ad'miral [Fr. *amiral*], the title of a naval officer of the highest rank, supposed to be derived from the Arabic *amir al bâhr*, which signifies "chief" or "commander of the sea." The English form of the word was formerly *amiral*, as in Milton's "Paradise Lost." The admirals of the British navy are divided into three classes (according to the color of their flag), and are styled admirals of the red, of the white, and of the blue. The admiral of the red commands the centre of a fleet disposed in battle-array. Vice-admiral is the title of the officer next in rank to the admiral; and a rear-admiral is the third in the scale of subordination.

The grades of rear-admiral and commodore in the U. S. navy were first established by act of July 16, 1862, which provides that the number of each grade shall not exceed 9 rear-admirals, 18 commodores, 36 captains, 72 commanders, 144 lieutenant-commanders, 144 lieutenants, 144 masters, and 144 ensigns. Squadrons would be commanded by rear-admirals, and the individual vessels thus: First rates by commodores; second rates by captains; third rates by commanders; fourth rates by lieutenant-commanders. By act of Congress of Dec. 21, 1864, the President was authorized to appoint from the rear-admirals one vice-admiral, who shall be the ranking officer in the navy of the U. S., and whose relative rank with officers of the army shall be that of lieutenant-general in the army. This grade was created for and bestowed upon Rear-Admiral Farragut. By act of July 25, 1866, it was provided that the number of officers of each grade on the active list should be 1 admiral, 1 vice-admiral, 10 rear-admirals, 25 commodores, 50 captains, 90 commanders, 180 lieutenant-commanders, 180 lieutenants, 160 masters, 160 ensigns, and in other grades the number now allowed by law. The rank of admiral thus created was bestowed upon Vice-Admiral David Farragut. It is now (1873) held by David D. Porter.

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Ad'miralty [from the word *admiral*], the tribunal which has cognizance of maritime causes. This court was established in England about the time of Edward III., and was at first held before the lord high admiral or his deputy. At present, admiralty jurisdiction is there exercised by the judge of the admiralty, who holds an instance or a prize court by means of separate commissions; the former being the ordinary admiralty court, and the latter being a special tribunal instituted in time of war to take cognizance of matters pertaining to prizes. In the U. S. exclusive admiralty and maritime jurisdiction is by the Constitution delegated to the Federal courts.

It was for a long time an unsettled question whether the word as there used had the limited sense employed in the early English statutes of 13 and 15 Rich. II., restricting

admiralty jurisdiction, or whether it had a wider signification. The latter view has finally prevailed, principally owing to the arguments of Mr. Justice Story; and the word embraces not only cases occurring on tide-waters, but on navigable streams above tide-water, including the great lakes. It rests with Congress to determine upon what court the jurisdiction shall be conferred. It has accordingly vested it in the first instance in the district court. No distinction is taken here between the instance and the prize court.

Admiralty jurisdiction is either civil or criminal. Its civil jurisdiction embraces cases of maritime contracts (such as affreightment, repairs of ships, bottomry bonds, pilotage, seamen's wages, and salvage), general average, collisions, and maritime trespasses in general. The principles and course of practice of the court in civil cases are in the main derived from the Roman or civil law.

Admiralty, the office of lord high admiral of England; also the department of the navy or the commissioners who control the navy. The chief minister of marine in Great Britain is styled first lord of the admiralty.

Admiralty Islands, a cluster of islands in the Pacific, N. E. of Papua. The largest is nearly 60 miles long, and is in lat. 2° S., lon. 147° E.

Admis'sions [from the Lat. *admitto, admissum,* to "send to," to "suffer one to enter"], in the law of evidence, are acknowledgments or concessions by a person of the existence of certain facts. When they relate to the matter in dispute, they are admissible in evidence against the party making them. They may be made either by a party to an action or by some one identified with him, as by a partner. The admissions of an agent will affect his principal. Those made by a predecessor in interest will affect his successor. Thus, the admissions of an ancestor will charge an heir. In form, an admission may be either direct or implied from conduct, or in some instances even from silence. The effect of an admission is usually only to raise a presumption against the party, which he may rebut; but some admissions are regarded as of so high a character that the law will not allow them to be contradicted. (See Estoppel, by Prof. T. W. Dwight, LL.D.)

Ado'be, the name of the sun-dried bricks of which houses are built in Mexico, Arizona, California, and Central America. The adobe brick is made of sandy loam, and the houses are usually only one story high.

Adol'phus (or **A'dolph**) of Nassau was elected emperor of Germany in 1292, as successor to Rudolph of Hapsburg. In 1298 the German princes transferred the imperial crown to Albert, but Adolphus refused to abdicate. A war ensued between these rivals, and Adolphus was killed in battle in July, 1298.

Adol'phus Fred'erick, duke of Holstein-Gottorp and king of Sweden, was born May 14, 1710. He was elected bishop of Lubeck in 1727, crown-prince of Sweden July 3, 1743, and became king on April 5, 1751. The Swedish nobles continued their arrogance under him to the utmost, so that at last he threatened to resign. In consequence of this the parliament revoked the restrictions of the royal prerogatives. Died Feb. 12, 1771.

Adol'phus (John), an English historian and lawyer, born in 1766. He was noted for eloquence, and practised with great success in criminal causes. His defence of Thistlewood, accused of treason, in 1820, was highly commended. His principal work is a "History of England from the Accession of George III." (7 vols., 1805–45). Died July 16, 1845.

Ad'onai [an ancient plural of Heb. אָדוֹן, "Lord," with suffix denoting a pronoun of the first person; cf. Fr. *monsieur*], a term applied in the Hebrew Scriptures to God. Owing to the veneration of the Hebrews for the most sacred name of the Deity, Jehovah (or Yahveh) was not pronounced in reading the Scriptures; but Adonai was read instead of it wherever it occurred. When the Hebrew text came to be vocalized, the proper pointing of Adonai, אֲדֹנָי, was given to יהוה (? Jehovah), so that the true pronunciation of the latter name has been lost.

Adon'ic Verse is composed of a dactyl and a spondee (or of a dactyl and a trochee). It is specially adapted to lively poetry, but is seldom used alone, being generally combined with other metres. The beautiful and well-known Latin hymn, however, commencing with

"Plaudite cœli,
Rideat æther," etc.,

affords an instance in which this metre runs through the whole piece.

Ado'nis [Gr. Ἄδωνις], a youth who was celebrated in ancient poetic legends as a model of youthful beauty and a favorite of Venus. Addicted to the pleasures of the chase, he was killed by a wild boar. An annual festival in honor of Adonis, called Adonia, was celebrated in Asia Minor and other countries bordering on the Mediterranean. He was called Thammuz by the Hebrew writers.—Adonis was also the name of a river which rose in Mount Lebanon, and flowed through Phœnicia into the sea.

Adonis, a genus of herbaceous plants, of the natural order Ranunculaceæ, natives of Europe. Several species of this genus are cultivated for the beauty of their flowers.

Ad'onists, a name given to some biblical critics who maintain that the Hebrew points usually annexed to the consonants of the word Jehovah are not the proper points belonging to that word.

Adop'tian Con'troversy, The, originated in Spain near the end of the eighth century. Felix, bishop of Urgel, and Elipandus, archbishop of Toledo, advanced the doctrine that Christ was by nature and generation the Son of God only as regards his divine nature, but as to his human nature he was merely the Son of God by adoption. Those who espoused these views were called Adoptionists (in Lat. *Adoptiani*). They have been called the Nestorians of the West. No particular notice was taken of them so long as they confined the propagation of their opinions to Mohammedan territory, but when they undertook to spread the new doctrine in the Frankish empire, Charlemagne promptly put a stop to it by convening two synods, one at Ratisbon (792), another at Frankfort (794), both of which condemned Adoptianism as heresy. Elipandus, who still adhered to his views, died in 799. Felix recanted at the Council of Aix-la-Chapelle in 799, and died in 816.

Adop'tion [from the Lat. *ad,* "to," "for," and *optio,* a "choice"], in law, is the taking a child of other parents as one's own. The practice, which was common in ancient Rome, was recognized by the civil law, and is found in countries and states where that law and its modifications still prevail. In some other states the matter is regulated by statute. The parents, guardians, next of kin, or other legal representative of the child, must in general give consent after notification of the intent to adopt. Adopted children do not, in most countries, inherit property coming from collateral relatives of the adoptive parents. Adoption is usually authorized by a probate court or other established authority after due notice. The adoption of an adult person is known in the civil law as adrogation.

Ador'no (Antonio), a doge of Genoa, was driven out and re-established three times in succession. It was by his persuasion that the Genoese agreed to the treaty, signed Oct. 26, 1396, which rendered them subjects of Charles VI. of France. The violence of the Genoese, however, soon undid what Adorno had advised them to do.

Adour, a river of South-western France, rises in the Pyrenees and flows north-westward. After passing by Dax, it pursues a S. W. direction, and enters the Bay of Biscay a few miles below Bayonne, which is on its bank. Length, about 200 miles. It is navigable to Dax.

Adowah, or **Adoa,** the capital of the Abyssinian province of Tigre, is situated in a well-cultivated and populous plain near the ruins of Axoom, the former capital of Abyssinia. It is the most important commercial town of Abyssinia. Pop. about 5000.

A'dra (anc. *Abde'ra*), a seaport of Spain, in Andalusia, 46 miles S. E. of Granada. Here are extensive lead-mines. Pop. about 7400.

Adrain' (Robert), LL.D., born at Carrickfergus, Ireland, Sept. 30, 1775, served as an officer in the rebellion of 1798, was badly wounded, escaped to the U. S., was professor of mathematics in Rutgers College (1810–13), Columbia College (1813–25), and the University of Pennsylvania (1827–34). Died at New Brunswick, N. J., Aug. 10, 1843.

Adramy'ti (the ancient *Adramyt'tium*), a seaport of Asia Minor, on the Gulf of Adramyti, 83 miles N. of Smyrna. It exports olives, wool, and gall-nuts. Pop. about 8000.

Adraste'a [Gr. Ἀδράστεια, perhaps from α, negative, and διδράσκω, to "escape," because her punishments were certain], a Greek surname or epithet for the goddess Nemesis, who administered retribution for iniquity.—Also, a nymph of Crete, to whom, with Ida and the Curetes, Rhea entrusted the infant Zeus in the Dictæan grotto.

Adras'tus [Gr. Ἄδραστος], a king of Argos and a contemporary of Theseus, was the father-in-law of Polynices. He commanded the famous expedition called the war of the "Seven against Thebes," the object of which was to restore Polynices to the throne of Thebes. This enterprise, which was not successful, was a favorite theme of ancient epic and tragic poets.

A'dria, or **Ha'dria,** an ancient town of Italy, situated between the Po and the Adige, in the province of Rovigo, 13 miles E. of Rovigo. It was in ancient times a

seaport on the Adriatic, but it is now 14 miles from that sea. Pop. 12,803.

A'drian, the county-seat of Lenawee co., Mich., is a flourishing city, distinguished for the elegance of its public and private buildings. Its streets are wide and lined by shade trees. It is situated on rolling ground, and is intersected by the S. branch of the river Raisin, which, besides affording perfect drainage, furnishes water-power. The city is divided into four wards, which are represented by two aldermen each in the city council, of which body the mayor is chairman. It possesses a handsome central public school building costing $100,000, built of brick and sandstone. There are also four branch school buildings in the different wards. The total valuation of school property is not less than $250,000. The schools are controlled by a board of six trustees, two of whom are elected annually. The annual expenditures for education, including interest and payment of bonds, amount to about $25,000. Adrian possesses a well-organized paid fire department employing two steam fire-engines, one hook-and-ladder truck, and a mounted Babcock fire-extinguisher; total valuation of apparatus, horses, and real estate, $50,000. Manufactures are railroad lanterns, car trimmings, locks, and all kinds of brass and malleable iron work, employing 100 men and $250,000 working capital. The Adrian Car and Manufacturing Company manufactures railway and street cars, employing from 200 to 300 men and $300,000 actual capital. The leading car-shops of the Lake Shore and Michigan Southern R. R. are also located here. Adrian is situated on the main line of the Lake Shore and Michigan Southern R. R., 30 miles W. of Toledo and 74 miles S. and W. of Detroit, between which cities and Chicago it is the principal passenger point. Another railroad, connecting with the Grand Trunk at Grand Trunk Junction, and having St. Louis as its objective point, is rapidly being constructed. The city has a national bank, two daily and weekly, and two exclusively weekly papers, one in the German language. Among its other industries are 3 large foundries and 1 machine-shop, 1 paper-mill, manufacturing both printing and wrapping paper, and employing 30 hands and $75,000 capital; 1 woollen mill, 2 steam sash and blind and turning establishments, and numerous wagon and blacksmiths' shops. It has 5 large hotels, and several minor ones. Its mineral spring and hotel is much frequented. The Masonic Temple, a prominent building, cost $100,000. The opera-house, which is handsomely frescoed and is capable of seating 1500 persons, cost in its erection and equipment $30,000. Adrian College, a leading Methodist institution, is healthfully located on the western boundary of the city. On Monument Square is a beautiful marble shaft surmounting a freestone base, on the different panels of which are the names of those soldiers from Adrian who lost their lives in the civil war. Surveys have been made for a system of water-works to cost $100,000. A street railway from the dépôt to the college is projected. Pop. 8438; of Adrian township, exclusive of part of the city, 1451.

APPLEGATE & FEE, PUBS. "TIMES AND EXPOSITOR."

Adrian, a township of Monroe co., Wis. Pop. 603.

Adrian, emperor of Rome. See HADRIAN.

A'drian [Lat. *Adrianus*] **I.,** a native of Rome, was elected pope in 722. His dominions were invaded by the king of the Longobards, against whom Adrian was defended by Charlemagne. Under this pontiff Rome enjoyed more than usual prosperity. Died in 795.

Adrian IV. (NICHOLAS BREAKSPEAR), the only Englishman who ever attained the dignity of pope, was born near St. Albans. He became cardinal-bishop of Albano in 1146, and was chosen pope in 1154. He was a strenuous asserter of papal supremacy. Died in 1159.

Adrian VI., a native of Utrecht, and a preceptor of the emperor Charles V., succeeded Leo X. in 1521. He favored reform, and was honest and virtuous. Died in 1523.

Adriano'ple [anciently *Adrianopolis;* Turk. *Edreneh*], a large city of European Turkey, on the river Maritza (the ancient Hebrus), 130 miles W. N. W. of Constantinople. The name is derived from the Roman emperor Hadrian, who founded a city here. It was the capital of the Ottoman empire from 1366 until 1453. Here is the famous mosque of the sultan Selim, which is said to be the finest Moslem temple extant, and has four lofty minarets. Among the other public structures are a palace, the bazaar of Ali Pasha, and an aqueduct by which the city is supplied with water. Here are extensive manufactures of silk, cotton, and woollen stuffs. Among the exports are opium, leather, wool, and attar of roses. Adrianople is the residence of the governor-general of the vilayet Edreneh, and of a Greek bishop. Pop. estimated at from 100,000 to 150,000.

Adriat'ic Sea [Lat. *Mare Adriaticum*], a portion of the Mediterranean, lying between Italy on the one hand and Illyria and Albania on the other. The name was derived from the town of Adria. It is about 500 miles long from N. W. to S. E., and has a mean width of about 100 miles. The N. W. part of it is called the Gulf of Venice, and at the S. E. end it is connected by the Strait of Otranto with the Ionian Sea. The N. E. coast is rocky, and begirt with a great number of islands. The depth and extent of the Adriatic have been greatly diminished by deposits of sand and mud and by the formation of alluvial tracts along the shore. The encroachment of the land is most remarkable on the W. and N. W. coasts of the Gulf of Venice.

Adul'tery [Lat. *adulterium*], criminal sexual intercourse between a married person and one of the opposite sex, whether married or single. This act has been punished by the laws of some nations with great rigor—among the ancients often with death. In the English law the act is not treated as a temporal crime, but left to the cognizance of the spiritual courts. A civil action for damages may by common law be brought by a husband against one who has committed adultery with his wife. This is called an action "for criminal conversation." It is also a ground of divorce—at first partial, but now, by statute, total. In some of the States of this country adultery has been made a crime, while in others the English law in its substance still prevails, and only the civil proceedings are allowed.

Advancement [Old Fr.], in law, is a provision of money or other property, made by a parent for a child in advance or anticipation of the estate or distributive share to which such child would be entitled on the parent's death. An expenditure for the education and maintenance of a child is not regarded as an advancement. It must be made with a view to a portion or settlement in life. The parent's intent is the main subject of inquiry. In the English law of real estate it only applies in case of several female heirs, who take the interest called coparcenary. In the American law of descent the subject is of general application. The effect of an advancement is to reduce the child's share to that extent, estimating the value as of the time of the receipt. An advancement differs from a debt in that the latter can be recovered by action, while the former can only be deducted from a distributive share. It is at the option of the person advanced to bring in to the general distribution the amount received or not. In the English law the act of bringing it in is termed hotchpot. The doctrine strictly applies only to cases of intestacy. There is a cognate doctrine termed "ademption," applicable to the case of property left by will. In this country the subject is often governed by statute, sometimes establishing distinct rules for real and personal estate. The word "advancement" is also used in the law of trusts to indicate that a purchase of land made in the name of a wife or child or other person as to whom the purchaser stands in the place of a parent shall actually belong to such person, and shall not, by the fiction of a resulting trust, revert beneficially to the purchaser. T. W. DWIGHT.

Advancement of Science. The British Association for the Advancement of Science was founded in 1831 by Sir David Brewster, Sir John Herschel, Sir Humphry Davy, and others. The American Association for the Advancement of Science was formed in 1847.

Ad'vent [Lat. *adven'tus,* from *ad,* "to," and *ve'nio, ven'tum,* to "come," referring to the coming of Christ], a term applied by the Church to the period of four weeks preceding Christmas. The Catholics, and some Protestants, observe Advent by abstaining from public amusements and nuptial festivities. The Greek Church lengthens the period to six weeks.

Ad'ventists, a body of Christians found chiefly in the U. S., whose distinctive characteristic is a belief in the speedy advent or second coming of the Lord Jesus Christ. In 1833, William Miller of Massachusetts was led by the study of the prophecies of the Bible to the belief that the second advent and the final judgment would occur in 1843. He had at one time about 50,000 followers; and notwithstanding the failure of this and other predictions fixing a definite date, there are, it is believed, about 20,000 members of the Adventist churches, who at present do not presume to foretell the period of the second advent, but live in expectation of that event. They generally practice adult immersion, believe in the necessity of a change of heart and a godly life, in the ultimate annihilation of the wicked, and in the sleep of the dead until the final judgment.—There is a separate organization of Seventh-Day Adventists, which in 1872 had 40 ministers, 46 licentiates, 204 churches, and 4801 members.

Ad'verb [Lat. *adverbium,* from *ad,* "to," and *verbum,* a "word"], one of the parts of speech in grammar. Adverbs are in all languages indeclinable (though sometimes subject to the change of form known as comparison), and are used

to express modifications of verbs, adjectives, or other adverbs, as to place, time, cause, manner, intensity, certainty, conditionality, quality, quantity, etc. The function of an adverb is often performed by sentences or parts of sentences. Most English adverbs are formed by adding the suffix *ly* to an adjective or its root, though many are not thus formed.

Adverse Possession. See DISSEIZIN.

Ad'vocate [from the Lat. *ad*, "to," and *voco, vocatum*, to "call"], a word which in the ecclesiastical and civil law courts corresponds to counsellor or counsel in common law courts. The term by which the members of the bar in Scotland (following the civil law) is known is the Faculty of Advocates. In a popular sense, the word denotes a defender or protector generally, especially one who pleads for his client in open court.

Advocate, Lord, is in Scotland the title of an important public functionary, the public prosecutor of criminals and the senior counsel for the Crown in civil causes. He is sometimes styled king's (or queen's) advocate, and is the first law-officer of the Crown for Scotland.

Advocate of the Church [Lat. *advocatus ecclesiæ*], in the Middle Ages a canon or a layman, often a prince or baron, who assumed the protection of a bishop's see, a monastery, or a particular church. Sometimes the office was hereditary, when it appears to have implied the duty of defending the Church's rights by force of arms. Oftener, perhaps, it was held by an *advocatus causarum*, a person appointed by a prince to defend the Church temporalities in secular courts of law. They often administered justice in the name of the Church. They collected tithes and other revenues, and were frequently priests who enjoyed lucrative benefices. The people suffered so severely from their oppressions that Pope Urban III., in 1186, undertook to reform the abuse; but so great was the opposition of the Church and nobles that it was not for many years that the evil was modified.

Advocates, Faculty of, is the title of the associated members of the legal profession in Scotland. This society was formed in 1532.

Advocates' Library, the largest library of Scotland, belongs to the Faculty of Advocates, and is located in Edinburgh. It was founded in 1682 by Sir George Mackenzie, and contains about 200,000 volumes. It ranks as the fourth library in the number of volumes in Great Britain.

Advoca'tus Diab'oli (*i. e.* the "devil's advocate"), a phrase applied in the Roman Catholic Church to a person whose business is to magnify the faults or detract from the merit of those who are proposed to be canonized as saints. He is opposed by an *advocatus Dei*, or "God's advocate." An *advocatus diaboli* nearly prevented the canonization of Saint Charles Borromeo in 1610.

Advow'son, in English law, the right of presentation to an ecclesiastical benefice or a vacant living in the Church. The lord of a manor by building a church acquired the right of nominating the minister, and as long as this right continues annexed to a manor it is called an advowson appendant. Most of the benefices of the English Church are presentative advowsons, which are regarded as property, and are bought and sold. Of nearly 12,000 church benefices, about one-half belong to the Crown, the bishops and other higher clergy, the universities, etc.; the remainder are in the gift of private persons. In most cases, however, the bishop has a right to reject the appointee if he chooses.

Ad'ytum [Gr. ἄδυτον, "inaccessible"], the innermost shrine of a temple or sacred building, accessible only to certain priests and others duly initiated. Of a similar character was the "holy of holies" in the Temple of Jerusalem. The adytum, or cella, was the place where the deity worshipped was believed to be especially present. Some writers have called the innermost recesses of the human spirit the "adytum."

Æchmal'otarch [from the Gr. αἰχμάλωτος (from αἰχμή, the "point of a spear," and ἁλόω, to "be taken"), "taken with the spear," and ἄρχω, to "rule"], the title of the governor of the captive Jews residing in Chaldæa, Assyria, and the adjacent countries. He was called by the Jews themselves *roschgaluth*, "chief of the captivity."

Æ'dile [Lat. *ædi'lis*, from *æ'des*, a "temple" or "building"], a Roman magistrate who superintended the temples and other public buildings, the public games and spectacles, and performed various other duties. Two curule ædiles were annually elected. There were also "plebeian ædiles." Colonies and other towns had ædiles. This office was one of dignity and honor, though reckoned as a minor magistracy. (See SCHUBERT, "De Romanorum Ædilibus," 1828.)

Aë'don [Gr. Ἀηδών], in Greek mythology, a daughter of Pandareus of Ephesus. According to the Odyssey, she was the wife of Zethus, king of Thebes. Envious of Niobe, her brother Amphion's wife, she attempted to slay the eldest son of the latter, but by mistake killed her own child, Itylus. Zeus changed her into a nightingale, whose sad notes are the expression of Aëdon's woe. There are other and different traditions as to Aëdon's crime and suffering, but in all she is transformed into the nightingale.

Æge'an Sea [Lat. *Ægæ'um Ma're;* Gr. Αἰγαῖον πέλαγος, perhaps from αἰγίς, a "squall," though other etymologies have been given], or **Grecian Archipelago,** the name given by the ancients to that part of the Mediterranean between Asia Minor and Greece. Its length from N. to S. is about 400 miles, and its breadth about 200. It is very deep, and encloses numerous islands, several of which are of volcanic origin, while others are composed of white marble. Many of them rise to the height of 1600 feet.

Ægid'ius Colon'na, an eminent schoolman, born at Rome in 1247 of an illustrious stock. He was the pupil of Aquinas and Bonaventura, and became an Augustinian hermit. In 1292 he became prior-general of his order. He went to France, where Philip the Bold made him tutor for his son, afterwards Philip the Fair. In 1296 he became archbishop of Bourges. For many years he taught with applause in the University of Paris, and was called *Doctor Fundatissimus* and *princeps theologorum*. Died Dec. 22, 1316. He left a great number of writings, most of which are now in MS.

Ægi'na [Gr. Αἴγινα], **Egina,** or **Engia,** an island of Greece, in the Gulf of Ægina (*Saron'icus Si'nus*), 16 miles S. S. W. of Athens. It is 8 miles long, and nearly the same in width. It is of an irregularly triangular shape. Area, 41 square miles. The western half is a fertile plain; the remainder is diversified by mountains, hills, and valleys, which produce almonds, wine, olive oil, etc. This island is celebrated for its architectural remains. (See ÆGINETAN SCULPTURES.) Pop. 6000. At the N. W. end of the island is the modern town of Egina. Mount St. Elias, the highest point of the island, is in lat. 37° 42′ N., lon. 23° 30′ E. The island is difficult to approach.

Ægina, Gulf of (the ancient *Saron'icus Si'nus*), is a portion of the Ægean Sea lying between Attica and the Morea. It contains the islands of Ægina and Salamis.

Ægine'tan Sculptures. The small island of Ægina contains very interesting remains of ancient sculpture. On an eminence in the eastern part of the island stand the ruins of a temple, usually called the temple of Jupiter Panhellenius, but now believed to have been a temple of Athena. Among these ruins a series of statues, sixteen in number, were excavated by a company of Germans, Danes, and Englishmen in 1811, and are now in the Glyptothek at Munich. The various figures that have been discovered seem true to nature, as in the old Greek style, with the structure of bones, muscles, and even veins, distinctly marked; but the faces have that unpleasant, forced smile which is characteristic of all sculpture before the time of Phidias. (See MÜLLER, "Ægineticorum Liber," 1817.)

Ruins in Ægina.

Ægi'ra [Gr. Αἴγειρα], one of the twelve cities of the ancient Achæan confederation in Greece. It probably stood near the sea and on the river Crius, though its site is not well known at present. It was chiefly famous for its temples of Zeus, Apollo, Artemis, and Aphrodite Urania (the "heavenly Venus," a goddess who was especially worshipped here), as well as of other divinities. This town is called *Hyperesia* by Homer.

Ægis'thus [Gr. Αἴγισθος], in classic mythology, a son of Thyestes, and an adopted son of Atreus. He seduced Clytemnestra while Agamemnon was absent, and was her accomplice in the murder of that king. He was killed by Orestes.

Æ'gium [Gr. Αἴγιον; now *Vostitza*], a city of ancient Greece, belonged to the Achæan League, and after 373 was the chief city in that confederation, of which it was long the capital. It had a good harbor to the W. of the river Selinus. Remains of its ancient buildings are yet to be seen. The modern town is a place of some importance. It is surrounded by gardens. On Aug. 23, 1817, it was visited by an earthquake which destroyed two-thirds of the houses.

Æ′gle* Mar′melos, the scientific name of a remarkable fruit tree growing in the central and southern parts of India, and belonging to the natural order Aurantiaceæ. It sometimes attains the size of a large apple tree, which in shape it may be said to resemble, being broad and spreading, rather than high. The fruit is always of a somewhat irregular form, and when mature varies in size from five to eight or nine inches in diameter. At the season when it is fully ripe there are no leaves on the trees, which, with their naked branches supporting here and there a fruit of such

Ægle Marmelos.

magnitude, present a singular and striking appearance. It is popularly known in India as the bêl or bael (sometimes incorrectly written *bhel*) fruit. It has a hard but rather thin shell or rind, resembling in consistency the shell of a squash, and contains a soft, yellowish pulp of a peculiar flavor, esteemed delicious by many, and abounding in a bland, transparent mucilage (with which the seed-cavities in particular are filled), which, it is said, renders this fruit singularly beneficial in dysentery and other complaints attended with irritation of the bowels. The seeds are situated in a small cavity which they do not nearly fill, the remaining space being occupied by the transparent mucilage already described. The half-ripe fruit, dried, has recently been introduced into the British pharmacopœia under the name of *Bela;* it is mildly astringent, and is said to be very efficacious in cases of diarrhœa and dysentery. The ripe fruit is an excellent aperient, being very gentle and for the most part effectual in its operation. If the culture of this valuable fruit could be successfully introduced into the West India Islands and the southern parts of North America, it might richly repay the expense and labor incurred in making the experiment.

Ægospot′ami [Gr. Αἰγὸς ποταμοί], a small river and a town in the Thracian Chersonese, where the Spartan Lysander defeated the Athenian fleet in 405 B. C. This victory ended the Peloponnesian war. A large aërolite fell near this place about 465 B. C.

Ægyp′tus [Gr. Αἴγυπτος], a son of Belus and a brother of Danaus, became king of Arabia, and conquered the country which derived from him the name of Egypt. According to a legend, he had fifty sons, who were murdered (except one) by the daughters of Danaus. (See DANAIDES.)

Æ′lia Capitoli′na, a name given to the colony which was planted by the emperor Hadrian at Jerusalem; this title it retained until the time of the Christian emperors.

Aelst, or **Aalst, van** (EVERT), a skilful Dutch painter, born at Delft in 1602. His subjects were dead game, golden and silver vessels, etc. Died in 1658.—His nephew WILLIAM, born in 1620, painted flowers, fruits, and still-life with wonderful success. Died in 1679.

Aeltre, or **Aaltere,** a large trading village in the Belgian province of East Flanders, 13 miles W. of Ghent. Pop. in 1866, 6520.

Æne′as [Gr. Αἰνείας], the hero of Virgil's "Æneid," was, according to tradition, the son of Anchises and the goddess Venus. He was one of the most valiant defenders of Troy against the Greeks. According to Virgil, he, after many adventures and disasters, settled in Italy, and married Lavinia, the daughter of King Latinus. The origin of the Roman state is traditionally ascribed to him and his heirs.

Æne′id [Lat. *Æne′is*] is the title of Virgil's great epic, the most celebrated and beautiful poem in the Latin language. It is regarded as an imitation of Homer's "Iliad" and "Odyssey," and, in the opinion of most critics, is inferior to them in originality and sublimity.

Æo′lia [Gr. Αἰολία], or **Æ′olis** [Gr. Αἰολίς], a region of Asia Minor, so called from the Æolians, who settled there and founded several cities on different parts of the coast. It was more especially in Lesbos, and along the neighboring shores of the Gulf of Elea, that they finally concentrated their principal colonies, and formed a federal union, called the Æolian League, consisting of twelve states and several inferior towns. The soil of this country is very fertile.

Æo′lian Harp, a simple musical instrument, the sounds of which are produced by the vibration of strings moved by wind. It is formed by stretching strings of catgut, tuned in unison, across a wooden box, which is placed in an open window. Athanasius Kircher (1602–80) was the inventor.

Æo′lians [so named from *Æ′olus,* a son of Hellen], one of the primitive tribes of the ancient Greeks. They were the dominant race of Thessaly and Bœotia. They founded on the western coast of Asia Minor many states or cities, among which were Smyrna and Mitylene. The Æolic dialect was harsh, and approached the character of the Doric. It preserved the digamma for a long time. The fragments of Alcæus and Sappho present the typical Æolic language. (See ÆOLIA.)

Æol′ipile, or **Æol′ipyle** [from the Lat. *Æ′olus,* the "god of the winds," and *pi′la,* a "ball"], a hollow metallic ball, having a small orifice with which a curved tube is connected. When filled with water and heated, steam passes out violently. It was thought by the ancients to illustrate the origin of the winds; hence the name.

Æ′olus [Gr. Αἴολος], in Greek mythology, the god who controlled the winds and reigned in the Æolian Islands. (For an account of his actions and kingdom, see VIRGIL'S "Æneid," book i., 51–63.)

Æ′on [Gr. *αἰών*], a Greek word signifying an age, a period of time; also eternity. The Gnostics used the word æons in a peculiar sense, as distinct entities or virtues that emanated from God before time began.

Æra′rians [Lat. *ærarii*], a class of inhabitants of ancient Rome who did not belong to any of the tribes or centuries, and who had no civic rights except the protection of the state. Any citizen, no matter how high his rank,

* *Æ′gle* [Gr. Αἴγλη, "splendor" or "glorious beauty"], the name of one of the Hesperides, was probably applied to this tree as meriting a place in the fabled garden which, according to the poets, was assigned to the care of those celebrated nymphs.

for bad conduct might be degraded to the rank of an ærarian by the censors, but the punishment was not in all cases a lifelong one. The Cærites seem to have been ærarians; at any rate, the disfranchisement of a citizen was sometimes called "*in Cæritum tabulas referri*," or "being placed in the list of Cærites." Persons declared infamous became ærarians. This class is also believed to have included a large number of small retail merchants, who came to Rome from the provinces without authority, and were received into no tribe. Ærarians paid a heavy tax, but were exempt from military duty.

Æra'rium, the public treasury in the temple of Saturn at Rome, in which money and the public accounts and archives were kept. Besides the regular treasure, there was an *ærarium sacrum*, or reserve, and later a military treasury. The funds belonging to the *populus*, or patricians, was called *publicum*, and kept in a separate treasury, though in the same building.

A'ërated Bread [from the Lat. *aër*, "air"], an unfermented bread, the ingredients of which are wheat flour, salt, carbonic acid, and water. The carbonic acid is thoroughly mixed with the flour and water in air-tight vessels by means of machinery especially adapted to this purpose, so that it is as light as the best fermented bread.

A'ërated Waters are extensively used to allay thirst in feverish conditions. The most common of these is *carbonic acid water*, incorrectly called soda-water, for it seldom contains soda. It is prepared by placing chalk or marble in a vessel with water and sulphuric acid, when the carbonic acid is evolved in the form of gas. The latter is afterwards forced into water under pressure, so that the water dissolves about five times its own volume of the gas. It forms a brisk, sparkling liquid, with a pungent but pleasant taste. The use of leaden reservoirs for aërated water is not without danger of poisonous effects. When copper lined with silver or tin is used, it requires, for safety, to have the lining renewed at least as often as once in two years. Carbonic acid water is, when iced, a most refreshing drink in sea-sickness and in many cases of disease. The effervescing draughts called *soda powders* and *seidlitz powders* are other forms of aërated beverages. In the former, bicarbonate of soda and tartaric acid are added to water in a tumbler, and a refreshing draught instantaneously prepared. *Seidlitz powders* contain tartrate of soda and potassa and bicarbonate of soda in one paper, and tartaric acid in the other; and when both are added to water, effervescence ensues, and the liquid is then taken. A more agreeable and useful *purgative* aërated water is the effervescing solution of citrate of magnesia in carbonic acid water, the invention of an American pharmacist. Aërated waters are also produced naturally. Water, as it comes from a spring, tastes differently from the same water after being boiled; and this is due to the unboiled water containing the gases oxygen, nitrogen, and carbonic acid—especially the latter—dissolved in it. Rain water has a mawkish taste, chiefly because of the impurities dissolved in it; but when that rain water trickles down through the earth, it is filtered and purified, and absorbs more or less air and gas. When it is dashed from ledge to ledge of rock, it becomes still more thoroughly aërated. Many spring waters are aërated in a peculiar way, which confers upon them important medicinal properties; these will be noticed under the head of MINERAL WATERS, by C. F. CHANDLER.

Aë'rial Perspec'tive, in painting, is the art of giving due gradation to the strength of light and shade and the colors of objects, according to their distances; or the laws which regulate the apparent distances of bodies, as modified by the variations in the transparency of the air or in the brightness of the light.

Æ'rians, an heretical sect founded in the fourth century by Ærius, a native of Pontus. They were Homoiousians (*i. e.* they maintained that the Son was similar to the Father in essence, but not identical with him).

Aërodynam'ics [Lat. *aërodinam'ica*, from the Gr. *ἀήρ*, "air," and *δύναμις*, "power"], the dynamics of the air, and of gaseous bodies generally; the phenomena exhibited by gaseous bodies, whether at rest or in motion under the action of *forces*. These phenomena are seldom treated independently; but are in part common to all fluids, gaseous or liquid. As peculiar to *gases*, they present themselves in innumerable special forms; *e. g.* the transmission of sound; the movements of projectiles; of the pendulum; of railway trains, etc. Also in pneumatics, in aëronautics, in the application of the force of the wind as a mechanical power, and to navigation, etc.

Aeröe, ā'rö'e̤h, or **Arroe,** a Danish island in the Baltic, 10 miles S. of Funen, is 14 miles long and about 5 miles wide. It is fertile and well cultivated. Pop. about 12,400.

Aërolites. See METEORS, by PROF. H. A. NEWTON.

Aërom'eter [from the Gr. *ἀήρ*, "air," and *μέτρον*, "a measure"], an instrument formerly used to make the necessary corrections in pneumatic experiments to ascertain the mean bulk of gases.

ëronau'tics [from the Gr. *ἀήρ*, "air," and *ναυτής*, a "sailor"]. The credit of the invention of the balloon (1783) is conceded to Stephen and Joseph Montgolfier, sons of a paper-maker at Annonay, near Lyons, France; but the principles on which a balloon could be constructed were already pretty generally known to scientific men. The Jesuit Francis Lana of Brescia in 1670 projected a balloon which, though impracticable of construction, was founded upon the fundamental principle established by Archimedes that a body will float upon or be suspended in a fluid denser than itself. Curiously, the Jesuit anticipated recent visionary schemes of application to offensive warlike purposes, in the prediction that "no walls or fortifications could then protect cities, which might be completely subdued or destroyed, without having the power to make any sort of resistance, by a mere handful of daring assailants, who should rain down fire and conflagration from the region of the clouds."

The Montgolfier balloon by which, June 5, 1783, the first public ascent was made, was a spherical bag consisting of pieces of linen, merely buttoned together, suspended from cross poles; two men kindled a fire under it, and kept feeding the flames with small bundles of chopped straw; the loose bag gradually swelled, assuming a graceful form, and in the space of five minutes it was completely distended, and made such an effort to escape, that eight men were required to hold it down. On a signal being given, the stays were slipped, and the balloon instantly rose with an accelerating motion till it reached some height, when its velocity continued uniform, and carried it to an elevation of more than a mile; but its buoyant force being soon spent, it remained suspended only ten minutes, and fell gently in a vineyard, at the distance of about a mile and a half from the place of its ascension.

The substitution of hydrogen (the lightest of all gases, generated by the application of dilute sulphuric acid to iron filings) for smoke (or the heated products of combustion) was soon after tried by M. Charles of Paris with ultimate success. But hydrogen is troublesome to make, and, moreover, expensive. Coal gas (carburetted hydrogen), easily obtained from gas-works, has almost superseded it in modern times, though much heavier (about two-fifths the density of air). The balloon itself is made of varnished silk or calico or rubber cloth, and enveloped in a netting to which the suspending cords of the car are attached.

The balloon offered to scientific men a ready method of exploring, for scientific purposes, the higher regions of the atmosphere. Of the earlier ascents perhaps the most noteworthy are those made by Biot and Gay-Lussac. The latter (Sept. 15, 1804) ascended to the height of 23,040 feet or 4¼ miles above the level of the sea, and 1600 feet higher than the loftiest pinnacle of our globe. But this feat was surpassed by Messrs. Glaisher and Coxwell in an ascent from Wolverhampton in 1862. The precise elevation they reached could only be guessed, but it could scarcely be less than 35,000 feet, and might possibly extend to 37,000 feet, or seven miles.

Mr. Glaisher, who is the greatest authority on the phenomena of balloon ascension, having ascended higher than any other and always for scientific purposes, has given the following table for the diminution of density of the air:

At the height of	1 mile	the barometer reading is	24.7	in.
"	2 miles	" "	20.3	"
"	3 "	" "	16.7	"
"	4 "	" "	13.7	"
"	5 "	" "	11.3	"
"	10 "	" "	4.2	"
"	15 "	" "	1.6	"
"	20 "	" "	1.0	" less.

Concerning temperature the result of all his mid-day experiments is thus expressed:

"The change from the ground to 1000 feet high was 4° 5′ with a cloudy sky, and 6° 2′ with a clear sky. At 10,000 feet high it was 2° 2′ with a cloudy sky, and 2° with a clear sky. At 20,000 feet high the decline of temperature was

1° 1′ with a cloudy sky, and 1° 2′ with a clear sky. At 30,000 feet the whole decline of temperature was found to be 62°. Within the first 1000 feet the average space passed through for 1° was 223 feet with a cloudy sky, and 162 feet with a clear sky. At 10,000 feet the space passed through for a like decline was 455 feet for the former, and 417 feet for the latter; and above 20,000 feet high the space with both states of the sky was 1000 feet nearly for a decline of 1°. As regards the law just indicated, it is far more natural and far more consistent than that of a uniform rate of decrease." (*British Quarterly*, Oct., 1871.)

One of the most important determinations to be made, especially in connection with aërial *navigation*, is that of the atmospheric currents. So long as, without power of self-propulsion, the balloon is committed to the air to be borne as it lists, it is scarcely correct to talk of navigation. That there is some degree of certainty in air-currents may be indicated by a curious fact mentioned by M. Flammarion (a distinguished French aëronaut)—namely, that the traces of his various voyages are all represented by lines which had a tendency to curve in one and the same general direction. "Thus," says he, "on the 23d of June, 1867, the balloon started with a north wind directly towards the south-south-west, and, after a while, due south-west, when we descended. A similar result was observed in every excursion, and the fact led me to believe that above the soil of France the currents of the atmosphere are constantly deviated circularly, and in a south-west-north-east-south direction." (*Id.*)

On the 12th of Jan., 1864, Mr. Glaisher left the earth, where a south-east wind was prevailing. At a height of 1300 feet, he was surprised to enter a warm current, 3000 feet in thickness, which was flowing from the south-west, that is, in the direction of the Gulf Stream itself. At the elevation in question the temperature, according to the usual calculation, should have been 4° or 5° lower than that at the ground, whereas it was 3½° higher. In the region above, cold reigned, for finely-powdered snow was falling into this atmospheric river. Here, therefore, was a stream of heated air previously unsuspected, which, if its course is steady, as it appears to be during winter, constitutes a prodigious accession to our resources, and adds another to the many meteorological blessings the world enjoys. (*Idem.*)

"The meeting with this south-west current" (writes Mr. Glaisher) "is of the highest importance, for it goes far to explain why England possesses a winter temperature so much higher than our northern latitudes. Our high winter temperature has hitherto been mostly referred to the influence of the Gulf Stream. Without doubting the influence of this natural agent, it is necessary to add the effect of a parallel atmospheric current to the oceanic current coming from the same regions—a true aërial Gulf Stream." (*Idem.*)

It is the result of meteorological observations made at the Smithsonian Institute and elsewhere that in the temperate zones of our continent the resultant direction of all the winds is from the west. During the time of sailing vessels the average length of a voyage from America to England was scarcely more than one-half of that in the opposite direction. All thunder-storms come to us from the west. The higher clouds are perpetually seen moving eastward.

From the published letters of Prof. Henry to Mr. Wise, the aëronaut, concerning his proposed aërial voyage across the Atlantic, the following extracts are made:

"All the observations that have been made on the motion of the atmosphere, as well as the deductions from theoretical considerations, lead to the conclusion that the resultant motion of the air around the whole earth, within the temperate zones, especially about the middle of them, is from west to east, and therefore, provided a balloon can be sustained at a sufficient height and for a sufficient length of time, it would, under ordinary circumstances, be wafted across the Atlantic. But the question is, Can the balloon be sustained at a sufficient height and for a sufficient length of time to make the journey? This is a question that can be determined only by actual experiment. . . . I had no doubt of the fact that, if your balloon can be sustained in the air sufficiently long, a voyage might be made across the Atlantic; but this is the point which, it would appear to me, from my partial knowledge of what has been accomplished in the art of ballooning, is yet to be satisfactorily established. No one, however, has had more experience in the art than yourself, and you ought not to venture on the hazardous journey without the fullest assurance that the balloon can be sustained at the requisite elevation for, say, ten days." (*New York Times*, July 11, 1873.)

In the above (as is believed) is found the sole basis for the notion of reaching by balloon the European continent from ours. Some attempts have been made to apply mathematical analysis to the determination of the general direction of the winds, but the imperfect knowledge of the recondite data and the difficulty of defining them analytically are insuperable obstacles.

A determinate current—a "gulf stream"—might afford *some* slight basis of calculation for an aërial voyage, but scarcely enough to form the basis of balloon *navigation*. Self-propulsion has been aimed at by hundreds of inventors, few of whom have possessed knowledge of the real data or difficulties of the problem. Among such, however, should not be included M. Dupuy de Lôme, the celebrated naval constructor, who is said to have received a grant from the French government to enable him to construct a fish-like machine to be worked by a screw, and assisted by a sort of swimming bladder. (*British Quarterly.*)

An exhaustive mathematical investigation of M. Gustave Lambert ("De la Locomotion Mécanique dans l'air et dans l'eau," Paris, 1864) is presumed to be an exponent of the scientific basis upon which M. de Lôme founds his project. A pamphlet of nearly 100 large and closely-printed octavo pages cannot here be summarized. We must content ourselves with a statement of a practical result, premising that the idea of a *flying* machine is pronounced impracticable; that while the aërial ship must be *self-sustaining*, spherical or spheroidal forms (such as now in ordinary use) are inapplicable. Self-sustenation being attained, the problem is asserted to be *identical with the naval problem;* hence the balloons should have forms analogous to those of very sharp-built ships. Their length should be ten to twelve times their greatest transverse dimensions. The feebleness of *tonnage* compared with the volume of air displaced, imposes enormous dimensions. Thus for the driving screw (or helix) 15, 20, or even 25 mètres of radius may be necessary. The figures suggested for the very smallest type are as follows: Cross-section, 200 square mètres (about 46 feet diameter); length, 120 mètres (400 feet); tonnage, about 15 tons; speed, 40 mètres per second (88 miles per hour); engine, 360 horse-power, driving a screw of 4 arms of 15 mètres radius at a rate of 45 revolutions per minute. The carcass of the balloon, or rigid framework, "is arranged upon the tubular principle of Stevenson." The covering to consist of an exterior gummed envelope, made very smooth, and an interior envelope (containing hydrogen) divided into air-tight compartments. As the total weight diminishes by the consumption of the fuel, air is admitted into these compartments in place of the hydrogen. The screw shaft extends from end to end, traversing, through packing boxes, the partitions; by which mutual points of support are obtained. It is believed that such a structure need not weigh more than 5 tons; and hence 10 tons will be allowed for the navigators, the engine, the water, and the fuel. The author admits that if ordinary marine engines are taken as types the allowance is greatly inadequate; but he thinks a high-pressure cylinder engine of 60 horse-power *can be* made to weigh only 6 tons, by which a speed of 20 to 25 mètres per second (44 to 55 miles per hour, equal to that of a "gale of wind") may be had. There will remain 4 tons (of tonnage) to spare, of which one ton is assigned to navigators and water and three tons to fuel, by which a run of 50 hours' duration may be made. The author supposes that, for ordinary voyages, 55 miles per hour will (except in cases of strong head-winds) allow supply stations to be reached in much less than 50 hours; generally in 10 hours. Furthermore, with the apparatus as just described, it would be *possible* to go, *with fair wind*, from Paris to New York. This assertion (in the author's language) "is neither hazardous, utopian, nor rash; it is a solution which the reader may verify with the figures before him." The author anticipates that ultimately engines of very high pressure, of 400 horse-power, and weighing but 5 or 6 tons, may be counted upon, and even that a "steam-turbine" can be realized, by which the weight of cylinders, cranks, and connecting rods will be dispensed with; and finally that if gun (or explosive) powders can be substituted for steam, a speed of 100 mètres per second (220 miles per hour) may be realized, and 24 hours' fuel-supply carried.

The author whose *results* we have thus epitomized concludes by what he entitles "*Proposition pratique*" to form a "*Société pour la locomotion aërienne*" with a capital of five millions of francs, by which to make experimental constructions.

Mr. Glaisher, whose aëronautic experience has been already alluded to, expresses no such hopes. He tells us that he has attempted no improvement in the management of the balloon, that he found it was wholly at the mercy of the winds, and that he saw no probability of any method of steering it ever being discovered. (*British Quarterly Rev.*) But Mr. Glaisher's field of thought and observation has been, as regards aërial navigation, quite diverse from our author's, and the problem is not to be decided by an *ipse dixit* of this kind.

At the commencement of the French Revolutionary war, about ten years after the production of the Montgolfier

balloons, an Aërostatic Institute was formed by command of the French Directory (at the suggestion of Guyton de Morveau) in the École Polytechnique, and under its superintendence reconnoitring war balloons were constructed by a M. Couté, and supplied to each republican army in the field. The army of the Rhine and Moselle was provided with two—viz., the "Hercule" and "Intrépide;" another named the "Céleste" was prepared for the use of the army of the Sambre and Meuse; the "Entreprenant" for the army of the North; and a fifth was destined for the army of Italy. That attached to the army of the Sambre and Meuse, under Gen. Jourdan, was first used May, 1794, by Col. Coutelle, at Maubeuge, before Mayence, in reconnoitring the enemy's works. This balloon, which was 27 feet in diameter, and took at first fifty hours to inflate, was retained to the earth by two ropes, and the aëronauts communicated their observations by throwing out weighted letters to the general beneath. After this method of reconnoitring had been successfully practised four or five days, a seventeen-pounder gun was brought down to a neighboring ravine, and (being thus masked) suddenly opened fire upon the balloon. Several shots were fired without effect, and the machine was then hauled down; but the next day the gun was forced to retire and the reconnoissances were then carried on as before. After two or three weeks, the balloon was removed to Charleroi, distant from Maubeuge about 36 miles. To save the expense and trouble of another inflation, it accompanied the troops at a sufficient height to allow the cavalry and baggage wagons to pass beneath, ten men marching on either side of the road, and each man holding a separate rope attached to the balloon, which was thus retained at its proper elevation. After making one observation on the way, the balloon arrived before Charleroi at sunset, and the captain had time before close of day, to reconnoitre the place with a general officer. Next day they made a second observation in the plain of Tumet, and at the battle of Fleurus, which took place on the following day, June 17, 1794, the balloon was employed for about eight hours, hovering in rear of the army at an altitude of 1300 feet. (*Prof. Paper, R. E.*, vol. xii.)

This notable instance of the successful employment of a reconnoitring balloon is thus commented upon in the French history, "La Guerre de la Révolution de France:" "Ce fut à cette bataille (Fleurus), que l'on fit, pour la première fois, l'essai d'un arëostat, avec le secours duquel le Général Jourdan put être parfaitement instruit des dispositions et des mouvemens d'ennemi; ainsi, cette découverte regardée jusqu' alors comme un objet de pure curiosité, dut être, dès cet instant, rangé parmi les inventions utiles." (*Idem.*)

We hear too of balloons at a battle near Liege and in the sieges of Mayence and Ehrenbreitstein in 1799. That we hear no longer of them during the Napoleonic wars is evidence that no adequate results were obtained from them.

An attempt was, however, made to revive them in the African campaign of 1830, but there was no opportunity for making use of them. The Austrians are said to have employed reconnoitring balloons before Venice in 1849, and the Russians in observing from Sebastopol. The French again made use of them in the late Italian campaign of 1859, but this time the service was in charge of civilian aëronauts, the MM. Godard. Ascents were made from Milan, Gargonzola, Castenedolo, and the Castiglione Hills; and, according to the *Times* Paris correspondent (in the letter dated 11th of Jan., 1862), they proved great failures, as judged from a military point of view. (*Idem.*)

The balloon was tried for our service in the recent civil war. Ascents were made from our lines on the north of the Potomac, during the fall of 1861, with no material results. It formed a part of our equipage and *impedimenta* during the Virginia peninsula campaign, including the siege of Yorktown and the operations before Richmond. The writer is not aware of a single official report recording any material service rendered by the balloon, but numerous newspaper paragraphs concerning it have been quoted, like the following referring to the battle of the "Seven Pines," or "Fair Oaks," of June 1, 1862: "During the whole of the engagement on Sunday morning, Prof. Low's balloon hovered over the Federal lines at an altitude of about 2000 feet, and maintained successful communication with Gen. McClellan at his head-quarters. It is asserted that every movement of the Confederates armies was distinctly visible, and instantaneously reported." (*Times*, June 17, 1862.)

The balloons in use were of two sizes—the smaller of about 30 feet diameter containing 1300 cubic feet, and the larger of double this capacity. The latter size I believe are found preferable. While encamped before Richmond, Capt. F. Beaumont, R. E., spent some time in our camp (part of which as a guest of the writer) and paid particular attention to our balloons. I avail myself of his labors (*vide Prof. Paper, R. E.*, vol. xii.) for a description:

"The balloons were made of the best and finest description of silk, double sewn and prepared with the greatest care; the summit of the balloon containing the gas valve being made of either three or four folds of cloth, to ensure sufficient strength in that part subject to the greatest strain. The varnish, on which the success of the apparatus much depends, was a secret of Mr. Low's, the chief aëronaut, his balloons kept in their gas a fortnight or more, and their doing so he laid to the fact of the varnish being particularly good; there was always a small amount of leakage, still at the end of a fortnight sufficient gas remained in the balloon to enable him to make an ascent without its being replenished. In balloons for military purposes this is an important point, as they must be kept ready to ascend at any moment. I have little doubt, however, that many well prepared varnishes could be found to answer the purpose as well; the network covering the bag was gathered in, in the usual manner, and ended in a series of cords attached to a ring, hanging about level with the tail of the balloon, and from this hung the wickerwork car, the ring being about level with a person's chest when standing upright in the car. The string for working the valve passed through the centre of the balloon, and coming out at the tail was loosely tied to the ring, to which were fastened the guys, three in number; thus the car, though swayed about by the motion of the balloon, hung always nearly vertically beneath it.

"The gas generators, two in number, were nothing more than large tanks of wood, acid proof inside, and of sufficient strength to resist the expansive action of the gas; they were provided with suitable stop-cocks for regulating the admission of the gas, and with man-hole covers for introducing the necessary materials. The gas used was hydrogen, and indeed for practical purposes, all things considered, there is none other that is nearly so suitable; its low specific gravity makes it a *sine qua non* for a military aëronaut, as independently of the ease with which it is produced, when a balloon is attached to the earth it is of the first importance that it should offer as little resistance to the air as possible, as its stability depends upon this point. The hydrogen was generated by using dilute sulphuric acid and iron; any old iron, such as bits of the tires of wheels, old shot broken up, etc., was used; so that it was necessary to provide only the sulphuric acid, which in large quantities is cheap, and with proper precautions very easy to carry.

"The gas generated passed through a leathern tube into a lime purifier, and thence in a similar manner into a second, the action of the lime simply absorbing the carbonic acid and other extraneous gases, and sending the hydrogen quite, or very nearly pure, into the balloon. On leaving the generator its temperature was high, even the leathern pipe being so hot that the hand could hardly bear to touch it, but after passing the second purifier it was delivered, barely warm, into the balloon. The whole of the apparatus was so simple that nothing more remains to be said about it.

"In using it the balloon is unpacked and laid in well-ordered folds on a carpet spread on the ground to receive it; the tail is then placed ready for connection with the last purifier, properly charged with lime and water, and the connection by leather pipes between the purifier and the generator having been established, the latter is charged; care must be taken not to complete the communication between the last purifier and the tail of the balloon until a clear stream of hydrogen is obtained, so as to avoid getting foul air into the machine. Under ordinary circumstances, in three hours from the time of the machine being halted, it can be prepared for an ascent; but this, should circumstances require it, might be shortened by employing two generators and making a suitable alteration in the purifying arrangement. Such alteration, however, would rarely be necessary, as the balloon, when inflated, can, unless in very windy weather, be very readily carried; twenty-five or thirty men lay hold of cords attached to the ring and march along, allowing the machine to rise only sufficiently to clear any obstacle that there may be in the way.

"Each generator required four horses to draw it, and each balloon, with the tools, etc., four horses. The sulphuric acid it is essential to keep in a carriage to itself, but two horses will draw a sufficient quantity of concentrated acid to last for a long time. The undermentioned is a *resumé* of the balloon corps and apparatus with General McClellan's army:

"*Balloon Corps.*

1 chief aëronaut, 1 captain, assistant do., 50 non-commissioned officers and privates,	requiring 2 instructed men.

"*Apparatus.*

2 generators, drawn by 4 horses each.
2 balloons, " " 4 horses each (including tools, spare ropes, etc.).
1 acid cart, " " 2 horses.

"When the machine is inflated it is kept to the ground by a series of sand-bags which are hooked on to the network, so that they can be disengaged at a moment's notice; thus confined, with the sentry to guard it, the machine remains unhurt in any weather short of a very violent wind storm, in which case it should be hauled down altogether.

"When it is required for an ascent, the captain and some thirty of his men get round the balloon and carry it to the appointed place; the weight to be lifted having been put into the car, the ballast is so adapted, that including a couple of bags of sand, which it is not safe to go up without, there should be a buoyancy of, say, 20 or 30 pounds; the three guy ropes having been attached the men leave go of the car together and seize the ropes, one of which is led through a snatch-block attached to a tree, or some securely fixed object; the ropes are then paid out, and the machine rises to the required height; the motion of the guy ropes is regulated by the aëronaut through the captain on the ground. Of course, on the proper manipulation of the ropes the convenience and safety of the aëronaut depend."

The following extract gives such an accurate idea of what *could be seen* that I quote farther:

"Most anxious inquiries were made from the observers in the balloon, as to the difficulties that lay on the road to Richmond. Were there any fortifications round the place? Where were the camps, and for how many men? Were there any troops in movement near the present position? and many other questions of equal importance. Now these questions were difficult to answer; and even from the balloon many of them could only be replied to with more or less uncertainty. From the balloon to the Chickahominy, as the crow flies, was about two miles; thence on to Richmond, eight more. At the altitude of 1000 feet in clear weather an effective range of vision of ten miles could be got; thus the ground on the opposite side of Richmond could be seen; that is to say, houses, and the general occupation of the land became known. Richmond itself was distinctly seen, and the three camps of the Confederates could be distinguished surrounding the place.

"Looking closer the wooded nature of the country prevented the possibility of saying whether it were occupied by troops or not, but it could be confidently asserted that no large body was in motion. In the same way, on seeing the camps round the place one could form a very rough estimate of the number of men they were for, but it was impossible to say whether there were men in them or not. Earthworks, even at a distance of eight miles, could be seen, but their character so far off could not be distinctly stated, though one could with certainty say whether they were of the nature of field or permanent works. The pickets of the enemy could be made out quite distinctly with supports in rear, thrown forward to the banks of the stream. The country from its thickly wooded character was peculiarly unfitted for balloon reconnoissances; had it been a plain like Lombardy, the position of any considerable body of troops would have been known; as it was, it was only possible to say that they were not in motion; this could be confidently asserted, as though they might remain hid in the woods while stationary, in marching they must, at some time or other, come into open ground and be seen.

"During the battle of Hanover Court-house, which was the first engagement of importance before Richmond, I happened to be close to the balloon when the firing began. The wind was rather high, but I was anxious to see, if possible, what was going on, and I went up with the father of the aëronaut. The balloon was, however, short of gas, and as the wind was high, we were obliged to come down. I then went up by myself, the diminished weight giving increased steadiness, but it was not considered safe to go higher than 500 feet on account of the unsettled state of the weather. The balloon was very unsteady, so much so that it was difficult to fix my sight on any particular object; at that altitude I could see nothing of the fight. It turned out afterwards that the distance was, I think, over twelve miles, which, from 1000 feet, and on a clear day, would in a country of that nature have rendered the action invisble."

With some considerable experience at Yorktown and before Richmond, the writer can only say that, while no means of obtaining information in war should be neglected, the slight amount obtained by the balloon did not compensate for the enormous expense and incumbrance which it involved. An ascent of 1000 feet was the *maximum* aimed at—probably the maximum *practicable;* for the weight of the rope becomes a limiting element to higher ascensions by captive balloons. In reality I doubt whether more than 600 or 700 feet were ever attained; a very slight wind sufficing to carry the balloon off at a large angle with the vertical through the point of attachment. With modern firearms three miles' distance from the enemy is about a minimum for so large an object, for though the hitting *of the balloon* may involve no great risk to the observer (since it would descend slowly) its injury should be guarded against. The view at three miles' distance from 600 feet height is anything but a "bird's eye" one; but at least it surmounts all *adjacent* obstacles. But suppose the enemy's position lies in a wooded country and extends for several miles. How much of it will be exposed by such a view? If a fortification or a line of battle, with a *clear front*, is the object, there will be improved vision; but to make out anything really specific and useful, a telescope (not a mere binocular) of high power and (hence) small field is indispensable. Now the motion of the balloon renders the use even of the opera-glass difficult; of the telescope absolutely impracticable. Only *once* in all his ascents (before Yorktown) did the use of a telescope appear practicable, and of so little service had it always proved it had been left behind. Descending to obtain one and reascending, a breeze had disturbed the dead calm in which *only* it can be used. *Some* information was obtained from it before Yorktown—much more from the trenches. Before Richmond it rendered no service worthy of record. (To those who would study more fully the military uses of the balloon, I refer to the able and exhaustive articles by Captain Beaumont and Lieutenant Grover, "Prof. Papers R. E.," vol. xii.)

We hear of no use of the balloon for reconnoitring purposes during the recent Franco-German war; but it at least proved itself to have *a* use. During the German siege upwards of fifty of these aërial packets sailed from the beleaguered metropolis with despatches for the outer world. They conveyed about two and a half millions of letters, representing a total weight of about ten tons. Most of them took out a number of pigeons, which were intended to act as postmen from the provinces. One called *Le Général Faidherbe* was furnished with four shepherd's dogs, which it was hoped would break through the Prussian lines, carrying with them precious communications concealed under their collars. The greater number of these balloons were under the management of seamen, sometimes solitary ones, whose nautical training, it was naturally supposed, would qualify them more especially for the duties of aërial navigation. More than one fell into the hands of the enemy, having dropped down right amongst the Prussians. In some of these cases the crews were generally made prisoners, but in others they effected their escape; and more than once their despatches were preserved in a very remarkable way—in one instance being secreted in a dung-cart, and in another being rescued by a forester, and conveyed to Buffet, the aëronaut of the "Archimède," who had been sent out in search of them, and had traversed the hostile lines on his errand. Many of these postal vessels were carried to a considerable distance, some landing in Belgium, Holland, or Bavaria; whilst one, "La Ville d'Orléans," was swept into Norway, and came to anchor about 600 miles north of Christiania. A few, unhappily, never landed at all. *Le Jacquard*, which left the Orléans railway station on the 28th November, with a bold sailor for its sole occupant, disappeared like many a gallant ship. It was last observed above Rochelle, and probably foundered at sea, as some of its papers were picked up in the Channel. "Le Jules Favre" (the second of that name), which set out two days subsequently, has arrived nowhere as yet; and one of the last of these mail-balloons, the "Richard Wallace," is missing, as much as if it had sailed off the planet into infinite space. So long as these machines continued to be launched by day, they were exposed to a fusillade whilst traversing the girdle of the Prussian guns, the bullets whistling round them even at an elevation of 900 or 1000 mètres. To avoid this peril it became necessary to start them by night, although the disadvantages of nocturnal expeditions, in which no light could be carried, and consequently the barometer could not be duly read, were held by many to outweigh all the dangers attaching to German projectiles. (*British Quarterly*, Oct., 1871.)

Another event so exceptional as the siege of Paris may again justify the use of balloons for similar services, and in open countries they *may* perhaps occasionally serve usefully for military reconnoissances. To science they do not appear (as now constructed) capable of adding much to the little (*something* indeed) they have already given. When the "balloon of the future"—that in short which M. Lambert confidently predicts, shall have appeared, then, indeed, science, commerce, social and business intercourse, and the art of war, may all hail it as an important adjunct; till then we must *wait*. (See "Travels in the Air," by James Glaisher, Camille Flammarion, and W. de Fonville, London, 1871; "Prof. Papers, Royal Engineers," vol. xii.; "De la Locomotion dans l'air et dans l'eau," Gustave Lambert, Paris, 1864.) J. G. Barnard, U. S. A.

A'ërophytes, or **Aë'rial Plants** [from the Gr. ἀήρ, the "atmosphere," and φυτόν, a "plant"], are plants which grow in air only, as distinguished from *terrestrial* plants, or

those which grow in earth, and *hydrophytes*, or those which live under water. The epiphytal orchids and many lichens are aërial plants, deriving sustenance from the air and its vapors. They are to be distinguished from parasites, like mistletoe, which feed on, and not merely grow on, trees, etc.

Aërostat'ic Press, a machine used to extract the coloring-matter from dyewoods and other substances by atmospheric pressure. For this purpose a vessel is divided by a horizontal partition pierced with small holes. Upon this the substance containing the coloring-matter is laid, and a cover, also perforated, is placed upon it. The liquid which is to dissolve the coloring-matter is then poured on the top, and the air being drawn from the under part of the vessel by an air-pump, the liquid is forced through the substance by the pressure of the atmosphere.

Aërostat'ics. See AËRODYNAMICS.

Æs'chines [Αἰσχίνης], a celebrated Greek orator, born at Athens 387 B. C., was the greatest rival of Demosthenes. He served with distinction at the battle of Mantinea (362 B. C.), and was in early life an opponent of Philip of Macedon. Having been sent with other negotiators on an embassy to the Macedonian court in 347 B. C., he afterwards became a friend of Philip and an adversary of Demosthenes, who accused Æschines of receiving a bribe from the king of Macedon. He made a famous oration against Ctesiphon, because the latter proposed to reward Demosthenes with a golden crown, but he was defeated in his contest by the matchless eloquence of his rival, and was exiled in 330 B. C. He then retired to Rhodes, where he taught rhetoric with applause. Three of his orations are still extant; they have been edited by Franke (1860) and others. Died in 314 B. C.

Æs'chylus [Gr. Αἰσχύλος], an excellent Athenian tragic poet, born at Eleusis, in Attica, in 525 B. C. He was the most ancient of the three great tragic poets of Greece. He fought with distinction at the battle of Marathon (490 B. C.), and again at the battle of Salamis. In 484 he gained his first prize in tragedy. He composed, it is said, about seventy tragedies, and gained thirteen prizes, but he was defeated by Sophocles in 468 B. C., soon after which he went to Syracuse, where he was honored by King Hiero. He died at Gela, in Sicily, in 456 B. C. According to a commonly received tradition, he was killed by a falling tortoise which an eagle dropped. Only seven of his tragedies are extant—viz., "Prometheus Bound," "The Seven against Thebes," "The Persians," "Agamemnon," "The Female Suppliants," "Choëphori," and "Eumenides." His "Oresteia," which is certainly one of the most powerful works of art which the human mind ever created, is the only complete trilogy which has been left to us. It consists of the three tragedies, "Agamemnon," "Choëphori," and "Eumenides," and shows in the most striking manner how the Greek tragedies which we possess must be considered only as parts of greater compositions—as acts of dramas rather than as dramas. Its idea is to show the redeeming influence of the state in the life of mankind.

Æscula'pius [Gr. Ἀσκληπιός], in classic mythology, the god of medicine, was a son of Apollo. The poets feigned that he raised the dead to life—that he thus offended Pluto, who complained to Jupiter, who killed Æsculapius with a thunderbolt. He was afterwards worshipped as a god, and a temple was erected to him at Epidaurus. According to Homer, he had two sons, Machaon and Podalirius. His descendants were called Asclepiadæ.

Æs'culin, or **Esculin** ($C_{21}H_{24}O_{13}$), a crystalline fluorescent glucoside obtained from the bark of the horse-chestnut and other trees of the genera *Æsculus* and *Pavia*. It possesses a bitter taste, and is converted by boiling hydrochloric or dilute sulphuric acid into glucose and a bitter crystalline substance called æsculetin, $C_9H_6O_4C_{21}H_{24}O_{13} + 3H_2O = 2C_6H_{12}O_6 + C_9H_6O_4$.

Æsir, ā'sir (the Norse plural of *As* or *Asa*, a word of uncertain derivation, but probably allied to the Sanscrit *as*, to "be," and applied as a name to the gods as "beings," *par excellence*), the general name of the beneficent deities of the Norsemen. The principal Æsir are Balder, Frey, Freyia, Frigga, Heimdall, Odin, Thor, Tyr, Vali, and Vidar, which will be noticed under their respective heads.

Æ'sop [Lat. *Æso'pus;* Gr. Αἴσωπος], a celebrated fabulist, born about 620 B. C., is supposed to have been a native of Phrygia. He was a slave in his youth at Athens, but afterwards obtained his freedom in consideration of his wit. A statue executed by Lysippus was erected to Æsop by the Athenians. Many of the fables which in popular collections are ascribed to Æsop are spurious.

Æso'pus (CLODIUS), a famous Roman tragic actor, was a friend of Cicero, and flourished about 75 B. C. His action was grave, dignified, and impassioned. He retired from the stage in 55 B. C.

Æstiva'tion [from the Lat. *æs'tivo, æstiva'tum,* to "spend the summer," to "retire for the summer season"], a botanical term, used to denote the manner in which the parts of a flower are folded in the bud before it has opened. The various forms of æstivation are called *valvate, imbricated, contorted, induplicate, reduplicate,* etc.

Æsthet'ics [Gr. αἰσθητικός, "fitted for perception"]. The word and its cognates were applied by the Greeks in relation to the philosophy of perception. In modern philosophy the term is used to denote the scientific classification of the faculties through which we apprehend the beautiful and the sublime, and which give us the experience of the resulting emotions. It involves also the statement and discussion of the laws which should preside over and condition all forms of artistic production, the application of these general laws to the special branches of the fine arts in respect to criticism, and the history of the development of these laws in practice. The principles of æsthetics were in ancient times discussed by Plato, Plotinus, and St. Augustine; and in their application to poetry by Aristotle and Horace; and in relation to eloquence by Quintilian, and to style by Longinus. The term was first used in its modern sense in the eighteenth century by Alexander Gottlieb Baumgarten, professor of philosophy at Frankfort-on-the-Oder. He taught that there is in the mind a power or faculty for the appreciation of the beautiful—a power whose existence is not dependent on that of the intellect, though the latter may be necessary in order properly to direct and develop the æsthetic faculty. Psychologists have classed the operations of the mind under three general heads—namely, the Intellect, the Sensibilities, and the Will. The proper object of the first is Truth; of the second, Beauty in its various forms, including harmony; and of the third, Good or Virtue. Æsthetics would consequently come under the second division, relating as it does to objects or qualities which appeal at once to the sensibilities, without any direct reference to the intellectual power.

There may be said to be two distinct schools, which differ radically respecting the true principles of æsthetic development and culture. The one, starting with the standard works of art, or with the most perfect models which nature offers us, and selecting from each what appears most pleasing or graceful, seeks, by means of these, either by direct imitation or indirect suggestion, to create a new work, which shall combine as many as possible of the elements of the original models. It is obvious that the merits of such a work cannot in any case rise above the aggregate of the merits of the productions after which it has been copied. The other school, recognizing the fact that it is possible for transcendent genius to create forms of beauty which shall not only excel in their combined effect, but in their individual elements, everything that has ever been seen in nature or in art, seeks to cultivate the faculty of ideal conception, using the works of nature or the models of the great masters simply to improve the art of expression; or, in other words, the power to translate, as it were, our ideal conceptions into forms which can be understood and appreciated by the common mind. Those of this school would say that such works as the Apollo Belvedere, or Dannecker's celebrated statue of Christ, could never, in the first instance, be formed from actual nature—that, in fact, the very power of selecting the most beautiful forms, or the most beautiful elements of any particular form, implies the existence of an ideal faculty; for if the mind has not some standard in itself, but is wholly dependent on what it sees for its conception of beauty, why should it not copy the faulty as well as the beautiful? It is, in fact, by trying what it sees by the ideal standard in itself, that it knows how to select the one and reject the other.

Æsthetics cannot yet be considered a complete and systematically developed science, though several of the best minds of the last and present century have done much to investigate and explain its principles. Among the most important works on this subject are the following: FRIEDRICH THEODOR VISCHER'S "Aesthetik, oder die Wissenschaft des Schönen" ("Æsthetics, or the Science of the Beautiful"), which is perhaps the best and most complete work on æsthetics that has yet appeared; HEGEL'S "Aesthetik," contained in his complete works, published after his death; COUSIN'S "Le Vrai, le Beau et le Bon" ("The True, the Beautiful, and the Good"); WEISSE'S "System der Aesthetik," 2 vols., Leipsic, 1830; JOUFFROY'S "Cours d'Esthétique," Paris, 1842; RUGE'S "Neue Vorschule der Aesthetik," 1837; ZIMMERMANN, "Geschichte der Aesthetik," Vienna, 1858; and DIPPEL, "Handbuch der Aesthetik," 1873. (See ALISON, "On Taste," 1784; BURKE, "The Sublime and Beautiful," 1756; BASCOM, "Æsthetics," 1862; H. N. DAY, "The Science of Æsthetics;" and especially KANT, "Kritik der Urtheilskraft.")

REVISED BY M. B. ANDERSON.

Æthiops. See ETHIOPS MINERAL.

Aë'tians, the followers of Aëtius, who was in the fourth century a deacon, and afterwards a bishop. He was an Arian, but was considered a heretic by both orthodox and Arians. His doctrine and followers were condemned in 359 A. D.

Aë'tius, sometimes incorrectly written ÆTIUS, an eminent Roman general, born in Mœsia before 400 A. D. As commander of the Roman army in Gaul, he gained important victories over the Visigoths, Huns, and other barbarians about 425–430 A. D. Aëtius and Theodoric commanded the army which in 451 checked the victorious hordes of Attila the Hun, and defeated him in a great battle at Châlons. He was suspected of treachery by the emperor Valentinian III., who killed him with his own hand in 454 A. D.

Æt'na, a township of Logan co., Ill. Pop. 920.

Ætna, a township of Mecosta co., Mich. Pop. 335.

Ætna, Mount. See ETNA.

Æto'lia [Gr. Αἰτωλία], a state or country of ancient Greece, was bounded on the N. by Thessaly, on the E. by Locris and Doris, on the S. by the Gulf of Corinth, and on the W. by the river Achelous. It was intersected by the river Evenus, the modern Phidaris or Fidaris. The surface is partly mountainous, the scenery magnificent, and the climate delightful. The range of Mount Pindus extends along the northern part. The ancient Ætolians were a warlike, barbarous, and rude people in the age of Pericles. Ætolia now forms, conjointly with Acarnania, a nomarchy of the kingdom of Greece. (See ACARNANIA.)

Affec'ted, or **Adfec'ted,** a term used in algebra: applied to an equation, it signifies that two or more several powers of the unknown quantity enter into the equation; as, $x^3 - ax^2 + bx - c = 0$, in which there are three different powers of x.

Affet'to, or **Affetuo'so,** in music, a term prefixed to a movement, showing that it is to be performed in a smooth, tender, and affecting manner.

Affida'vit [Late Lat. from *ad*, "to," *fides*, "faith," *dedit*, "he gave" (*i. e.* "he made oath")], an oath in writing made before some person who has authority to administer an oath; a statement in writing signed by the party making it, and sworn to before some authorized officer, who appends and signs an official statement to that effect, termed a "jurat." By an extension of its original meaning it is made to include also cases where an affirmation, authorized by law, is taken instead of an oath. An affidavit is made *ex parte* and without cross-examination. It is much used in making various motions in court, and in proving conveyances executed before subscribing witnesses, so as to have them recorded. An affidavit is called *extra-judicial* when, though taken before an officer authorized to administer oaths, it is not itself required or authorized by law.

Affin'ity [from the Lat. *ad*, "to," "on," and *fi'nis*, "boundary"], in law, is the relationship contracted by marriage between a man and his wife's kindred, and between a wife and her husband's kindred. Affinity is used in contradistinction from consanguinity, which expresses relations that originate in the blood.

Affinity, a term used in biology to denote that the relation which organisms bear to one another is very close, and depends on some essential correspondence between important organs. The term is used in contradistinction to analogy, in which the points of resemblance are of less importance. Thus the foliage of *Lath'yrus nisso'lia* resembles that of grass, but there is no real affinity between the dicotyledonous *Lathyrus* and the monocotyledonous grass.

Affinity, Chemical, the attractive force which unites two or more chemical substances so as to form a compound which differs from either of them; or the mutual propensity which certain kinds of matter have to combine with each other exclusively or in preference to any other connection. "This term," says Liebig, "is decidedly fallacious if it be intended to convey the meaning that such substances are related to each other." This force or propensity acts only at insensible distances—that is, only when the two bodies are in contact. The action of affinity is often modified and increased by heat and light, as in the case of potash and sand, which will only unite when raised to a red or white heat; and the gases chlorine and hydrogen will not combine unless they are exposed to the light. Many surprising changes in the properties of matter are produced by affinity, as when the poisonous chlorine unites with sodium to form common table-salt. The poisonous prussic acid is composed of carbon, hydrogen, and nitrogen, neither of which is noxious by itself. Elements differ greatly in the strength and range of their affinities. Oxygen has an affinity for nearly all the other elements.

Affirma'tion [Lat. *affirma'tio*, from *ad*, "to," and *fir'mo*, *firma'tum*, to "make firm," to "bind"], in law, a declaration made by a witness as a substitute for an oath in a court of justice. This formula is used by Quakers and others who have conscientious scruples against oaths. In the U. S. the use of affirmations instead of oaths has become very common, experience seeming to have shown that the value of evidence and the force of obligations are not diminished thereby.

Affla'tus [from the Lat. *ad*, "to," "upon," and *flo*, *fla'tum*, to "blow"], a term sometimes used to signify inspiration or the gift of prophecy, especially in reference to those who uttered oracles at Delphi.

Affre (DENIS AUGUSTE), archbishop of Paris, was born at St.-Rome-de-Tarn in 1793. He became vicar-general at Paris in 1834, and archbishop in 1840. During the insurrection of June, 1848, he made a generous effort to end the carnage by a personal appeal to the insurgents, but while he was speaking to them hostilities were renewed between the insurgents and the military, and he was mortally wounded by a ball. He left an "Essay on the Egyptian Hieroglyphics" (1834), and other works.

Afghanistan' is the Persian name of the country of the Afghans, which is called by the natives *Wilajet* (*i. e.* the "mother country"). It is situated between lat. 29° and 36° N. and lon. 62° and 72° E., forming a small quadrilateral, which historically, geographically, and linguistically forms the connecting link between India and Western Asia. It is bounded on the N. by Bokhara, on the E. by British India, on the S. by Beloochistan, and on the W. by Persia. The area is estimated (Behm and Wagner, "Bevölkerung der Erde," Gotha, 1872) at 250,900 square miles. The ground rises towards the N. E. to 6000 feet above the sea-level, and descends gradually towards the S. W. to 1600 feet. In the N. are the wild snow-covered mountains of Hindoo-Koosh, and farther on the ancient Paropamisus, which is divided at present into the Kohi-Baba—from which the Helmund descends—and Ghur Mountains. The boundary between the Indian and Persian systems is formed by the desolate mountain-range of Takht-i-Suleiman. The depression in the S. W., in which Lake Hamoon is situated, is exactly opposite in character to the N. and E., which, in consequence of the mountainous nature of the country, have no large rivers. Besides the Helmund, the Cabul is the only river of any consequence which flows through the eastern mountains towards the Indus.

In consequence of the difference in the height and directions of the mountains, great contrasts are found in the climates of the different parts. In the sheltered valleys all kinds of tropical fruits, tobacco, and cotton are grown, while in the northern plateaus snow-storms are of frequent occurrence. The same contrasts are found in the animal kingdom. Bears, wolves, and foxes are found, together with lions, tigers, and camels. The mountains are rich in valuable minerals and metals (iron, lead, gold, sulphur).

The population is estimated (Behm and Wagner, "Bevölkerung der Erde," Gotha, 1872) at 4,000,000. The large majority of the inhabitants are Afghans, who belong to the Indo-European race, and are divided into an eastern and a western group. Besides the Afghans, there are also remains of the original Iranian inhabitants (Tadshiks) and Indian tribes, who, like the Afghans, belong to the Sunnite Mohammedans; the Turanian Hezareh and the Turkish Kazzilbash, who, like the Persians, are Shiitic Mohammedans. The proud and powerful race of the Afghans rules over all these. The Afghans are divided into many tribes, who recently have become united under one ruler, but seem to be opposed to a real union, although they do not lack a national pride. For trade and industry the Afghan has no taste; his element is war. The chief cities are Cabul, Kandahar, Balkh, Herat, Peshawer, and Ghuzni. (For the language of the Afghans, see AFGHAN LANGUAGE.)

History.—Herodotus was acquainted with Afghanistan. He calls the inhabitants Pactyans. The warlike tribes who rule the country at present first entered the country at the time of the Persian-Mongolian rule, and did not begin to act together until the middle of the eighteenth century, when, under Ahmed-Shah (1747–73), the founder of the Durani or Abdali dynasty, they threw off the rule of the Persians, whom they had always hated on account of their religion. Bloody civil wars devastated the country, until with the death of Kamram the Durani monarchy, which had existed for seventy-six years, totally collapsed in 1829. With the exception of Herat the country passed into the hands of the Baraksai. Three brothers divided the country, of whom Dost Mohammed was the most powerful. The perpetual war, however, did not cease. In the W., Persia tried to capture Herat; in the E., Dost Mohammed was at war with Lahore; and on Oct. 1, 1838, the British governor-general of India, Lord Auckland, under various

pretexts, declared war against Afghanistan. In the spring of 1839 the Anglo-Indian army advanced with great losses through the pass of Bolan to Kandahar, and in August took possession of the deserted city of Cabul for the British protegée, Shud-Shah, the lawful heir to the throne. Dost Mohammed was compelled to surrender to the British, but his son Akbar raised a revolution throughout the country; in consequence of which the British were compelled to leave the country in Jan., 1842. Hunger, cold, and the fanatic Ghildshees completely destroyed the retreating army. Generals Nott and Pollock, however, again invaded the country, dispersed the disorderly troops of Akbar, destroyed Ghuzni and Cabul, and quickly retreated. The British now thought that they had completely humbled the Afghans, and that there was no risk in releasing Dost Mohammed. This energetic prince quickly restored his power in Cabul, and as early as 1846, conjointly with the SIKHS (which see), again commenced operations against the British. The defeat of his allies (1849) forced him to relinquish all hopes in this direction. On the other hand, he extended the empire in the N. as far as Balkh (1850), and brought the southern tribes under his rule by the capture of Kandahar. To gain Herat and to settle his western boundaries, he concluded an offensive and defensive alliance with the British, and was led into a war with Persia (1856–57), which had violated its treaties with England. The hostilities were, however, soon ended by a treaty, according to which Herat, which had been occupied by the Persians in Oct., 1856, was given to Ahmed Khan, a Baraksai chief. Dost Mohammed renewed his alliance with the British, and he and his heirs were recognized as sovereigns. The country enjoyed several years of quiet, until, in 1860, Ahmed Khan had a little difficulty with the son of Dost Mohammed, Afzul Khan of Kunduz, about some border districts. This was soon settled. But when Ahmed Khan, at the instigation of the Persians, advanced in 1862 at the head of a large body of troops towards Farrah and Kandahar, Dost Mohammed marched against him, having formed the plan not only to extend the northern part of the Afghan empire in the E. to Balkh, but in the W. even to Chardjuy. He repelled the enemy beyond the boundary and enclosed Herat, which surrendered after a long siege on May 26, 1863, shortly after Ahmed Khan had died within its walls. But Dost Mohammed also died on May 29, before he had entered the city. His death put an end to the prospect of a speedy consolidation of the Afghan empire.

The Persian government, as soon as it heard of the defeat of its faithful ally, Ahmed Khan, and the death of Dost Mohammed, sent an envoy to Shere Ali, the son and heir of Dost Mohammed, who in opposition to the policy of his father wished to remain at peace with Persia, and effected a reconciliation. In other respects, Shere Ali was not so fortunate. Immediately after the death of Dost Mohammed disturbances arose in every quarter. Afzul Khan, the brother of Shere Ali and the governor of Balkh, refused to make the customary signs of submission, and proceeded immediately to actual hostilities. He soon captured Cabul and Kandahar, and was recognized by the governor-general of India not as sovereign of Afghanistan, as he desired, but as ruler of Cabul and Kandahar. He died, however, soon after this recognition. The civil wars were only ended in Jan., 1869, when Shere Ali defeated his half-brother Azeem and his nephew Abdul Rhaman Khan at Ghuzni so decisively that they were compelled to seek refuge in the British territory. In July, 1869, new difficulties arose on the frontiers of Turkistan. But the chief danger for Afghanistan does not lie so much with the native tribes of Asia as with Russia on the one hand and England on the other, both of whom are desirous of obtaining Herat. Shere Ali chiefly owes his success to subsidies in money and arms furnished by England, which hoped to find in him a trustworthy ally to check the Russian advance in Central Asia. Lord Mayo gave Shere Ali a grand reception in British India, and held a conference at Umballah in Mar., 1869. Shere Ali was formally recognized as sovereign of Afghanistan by England—an act which created a great sensation both in Persia and Russia. In 1871, Afghanistan was again the seat of civil war, Mehemed Yakub, a son of Shere Ali, having revolted. In May the rebels took possession of the important city of Herat, but a reconciliation was very suddenly brought about by English influence, as Yakub is less devoted to English interests than his father. But, while England assists Shere Ali, Russia favors the pretensions of his rival, Abdul Rahman, and pays him a yearly subsidy. In 1872, in consequence of the advance of the Russian forces towards Afghanistan, Earl Granville on Oct. 8 despatched a note to the British ambassador at St. Petersburg to demand assurances from the Russian government that it would not encroach upon the country which Afghanistan claimed as her own. These demands were conceded in 1873, and thus dispelled the fears which were entertained as to an Oriental war between Russia and Great Britain. (See EYRE, "The Military Operations at Cabul," 1843; KAYE, "History of the War in Afghanistan," 1861; MOHAN LAL, "The Life of Dost Mohammed Khan," 1846; BELLEW, "Journal of a Political Mission to Afghanistan," 1862; VAMBÉRY, "Centralasien," 1873; and the accounts of travels by Connolly, Burnes, Masson, Ferrier, Bellew, Vambéry, and others.) A. J. SCHEM.

Afghan Language and Literature (*Pushtu, Pashtô*, or *Puχtu*). The Afghan language is, like all mountain languages, a harsh, guttural tongue—so much so that Mohammed is reported to have said that the "Pushtu is the language of hell." It has until recently been classed by all the leading authorities, as Dorn, Lassen, and F. Müller, under the Iranian group of languages of the Indo-European family. But Dr. Ernst Trumpp ("Grammar of the Pashtô Language, or Language of the Afghans, compared with the Iranian and North-Indian Vernaculars," 1873), who is at present considered the highest authority on the Pashtô language, and Prof. M. Haug of Munich, entirely disagree with those who hold this opinion. While Dr. Trumpp wishes to give it an intermediate position between the Iranian and Indian groups, Dr. Haug makes it a separate branch of the great Indo-European family.

The Afghan language has thirty-nine sounds, ten of which are confined to words which have been introduced from the Arabic; it is written with Arabic characters. It is not until very lately that we meet with any literary attempts, and then only imitations of Persian models, partly of a romantic-epical and partly of a lyrical form. One of the earliest, and at the same time most learned, poets is Abdurrahman, from the district of Peshawer, a learned Suffee. Others are—Mirza Khan Anssari, a poet of the first half of the seventeenth century; Khushhal Khan Khattak, his contemporary, who took up his abode in India; but especially Ahmed Shah Abdali, the founder of the Durani dynasty. Historical and religious documents are also not wanting, but none are older than the fifteenth century. The former works on the Afghan language, as the "Grammar" (1840) and the "Chrestomathy" (1847) by Dorn, a "Grammar of the Pukhtu," "Dictionary of the Pukhtu," and the anthology, "Gulshan-i-rôh" ("Selections from the Poetry of the Afghans," 3 vols., 1860–61), by Raverty, and Müller's "Die Conjugation des Afghanverbums" (1867), have been entirely superseded by the new work of Prof. Trumpp, which has already been referred to. A. J. SCHEM.

Afium', or Afium-Kara-Hissar ("black castle of opium"), a city of Asia Minor, in Anatolia, 53 miles S. E. of Kutaieh. It is on a mountain-side, is the residence of a pasha, and has a large trade in opium, whence its name. Here are numerous mosques, a citadel, and manufactures of carpets, arms, saddlery, etc. Pop. estimated at 50,000.

Afrago'la, an Italian town, in the province of Naples, noted for its manufactures of straw bonnets. Pop. in 1861, 16,129.

Afrancesa'dos, a name given to those Spaniards who supported the French cause, or recognized Joseph Bonaparte as king, in 1808–13. They were proscribed or treated with severity by Ferdinand VII. after he was restored to the throne.

Af'rica [called also *Libya* (Gr. Λιβύη) by the ancients, who appear, however, to have been acquainted with the northern and north-western portions only], the third in point of size of the great divisions of the globe. The ancient Romans at first applied the name *Africa* only to that part of the continent with which they were best acquainted, the part about Carthage. This became the Roman province of Africa; and when, in later times, the name came to be applied to the whole continent (previously called *Libya*, though that name was often very loosely employed to designate the north-eastern part of the continent), the province of Africa was often called Africa Propria, Africa Vera, or Africa Provincia. This province may be roughly stated to have occupied the old Carthaginian home territories, and was sometimes known as Zeugitana. Its present native name, *Frikiah,* is obviously connected with that now given to the whole continent. Some of the ancient geographers reckoned Africa as a part of Europe. In form the continent of Africa somewhat resembles an imperfect triangle, having its base towards the north and its apex towards the south. Its whole length from Cape Bianco on the N. (lat. 37° 20′ N., lon. 9° 48′ E.) to Cape Agulhas (lat. 34° 49′ 8″ S., lon. 20° 0′ 7″ E.) is 5100 miles; and its greatest breadth from E. to W. (*i. e.* from Cape Guardafui at the entrance of the Red Sea at Bab-el-Mandeb (lat. 11° 50′ N., lon. 51° 21′ E.) to Cape Verde on the Atlantic (lat. 14° 44′ N., lon. 17° 32′ W.) is more than 4500 miles. Behm and Wagner ("Bevölkerung der Erde," Gotha, 1872) estimate the area at 11,600,000

square miles. Africa is bounded on the N. by the Mediterranean, on the E. by the Red Sea and Indian Ocean, on the S. by the Southern Ocean, and on the W. by the Atlantic. It presents the appearance of a vast peninsula, united to the adjacent Asiatic continent at its north-east extremity, between the Red Sea and the Mediterranean, by the Isthmus of Suez, a narrow strip of land. Its coast-line is 16,200 miles in length, and is nowhere deeply indented with bays or gulfs, except the Gulf of Guinea on the western coast. The other principal indentations are—the Gulf of Sidra, on the northern, the Bights of Benin and Biafra, on the western, and Sofala and Delagoa Bays, on the eastern coast; Capes Spartel and Bianco, on the N., Cape Verde, on the N. W., Cape Agulhas, on the S., and Cape Guardafui, on the E., are its more prominent projections. Among the few islands which, from their proximity, may be considered to belong to this continent, are the Bissagos, in Senegambia, near the mouth of the Rio Grande; Fernando Po, in the Bight of Biafra; Princess Island and the islands of St. Thomas and Annobon, in the Gulf of Guinea; the Querimba and Bazaruta Islands, and the islands of Zanzibar and Pemba, on the eastern coast. The Canary and Cape Verd Islands, near the north-western coast, are farther off than the others; Madagascar, the Comoro Islands, and Socotra are off the eastern coast, Madagascar being separated from the mainland by the Mozambique Channel, which is 250 miles broad in its narrowest part.

Political Divisions.—In 1872 the area and population of the political divisions of Africa were, according to Behm and Wagner, as follows:

Countries.	Square Miles.	Population.
Morocco	259,600	2,750,000
Algeria	258,300	2,921,246
Tunis	45,700	2,000,000
Tripoli, with Barca and Fezzan	344,400	750,000
Egypt	659,000	8,000,000
Desert of Sahara	2,436,000	4,000,000
Mohammedan countries of Central Soudan	631,000	38,800,000
French Senegambia	96,500	209,162
Liberia	10,000	718,000
Dahomey	4,000	180,000
British possessions in Western Soudan	17,100	577,313
Portuguese possessions in Western Soudan	35,900	8,500
Other territory in Western Soudan	658,000	36,807,000
Abyssinia	158,000	3,000,000
Other territory in Eastern Africa	1,341,000	26,700,000
Portuguese possessions in Southern Africa—*a.* Eastern coast	383,000	300,000
b. Western coast	313,000	9,000,000
Cape Colony	221,300	682,600
Natal	17,800	269,362
Orange Free State	42,400	37,000
Transvaal Republic	114,300	120,000
Other territory in Southern Africa	934,000	5,591,000
Territory on the equator	1,522,000	43,000,000
Cape Verd Islands	1,650	67,347
St. Thomas and Principé	450	19,295
Fernando Po and Annobon	490	5,596
Ascension	38	
St. Helena	47	6,860
Tristan d'Acunha	45	53
Socotra	1,700	3,000
Abd-el-Kuri	60	100
Zanzibar	600	380,000
Madagascar	228,500	5,000,000
Comoro (with Mayotte)	1,070	64,600
Arco, etc	150	
Reunion	970	209,737
Mauritius and dependencies	700	322,900
Other islands	420	19,639
Total, inclusive of the desert of Kalahari	11,600,000	192,520,000

Mountains, Table-lands, etc.—The entire southern half of Africa consists of an immense plateau, which descends in the S. W. and E. in terraces to narrow coast-countries, and which has only lately become known. The interior consists of a plateau running from S. to N., and in some parts is not more than from 2000 to 3000 feet high. It is generally very level, and is partly open desert (Kalahari) and partly wooded, rich in water, fertile, densely populated, and well cultivated. On the eastern border of the central basin, beyond the coasts of Mozambique and Zanzibar, is the territory of the great lakes, while under the equator and nearer to the E. coast are found a series of high mountain-ranges (Mountains of the Moon) with high, snow-clad peaks (Kilimandjaro, 18,000 feet). In Central Africa we meet with the plateau of Soudan, beyond the Niger, as the N. W. extremity of the South African plateau, and the alpine region of Abyssinia as the N. E. extremity. In the N. are found the Atlas Mountains, with the plain of Beled-el-Jerid, which forms the stepping-stone to the desert.

Deserts.—The great deserts of Africa are the Sahara and those of Nubia and Libya, situated N. of the Soudan and Abyssinia, the two together constituting the largest desert in the world. The Sahara is upwards of 3500 miles in length, and nearly 1400 miles in its greatest breadth, running almost across the whole breadth of Northern Africa between the parallels of 15° and 35° N. lat. Its entire area has been estimated at 1,500,000 square miles—a space equal to nearly twice the surface of the Mediterranean. The attempt to furnish water along the routes across this vast desert by means of artesian wells appears to be a success. In South Africa, about the tropic, is the desert Kalahari.

Rivers and Lakes.—The rivers of Africa, although many of them are large, have, until a very recent period, afforded no certain inlet to its central regions, and the trade of Europeans has thus been confined to narrow districts along the coast. The Nile is the only river in Northern Africa flowing into the Mediterranean; it is also the longest river in Africa, having a course of probably not less than 4000 miles. There are no other rivers of any magnitude, so far as known, in Northern or North-western Africa. The most considerable in Eastern Africa are the Zambezi (or Quillimane) and the Juba. The former rises in the interior, and enters the Mozambique Channel by several mouths. It is said to have a course of 900 miles, and to be navigable during the rains for 200 or 300 miles from the sea. The Juba, rising in Abyssinia, falls into the Indian Ocean at the town of Juba, on the coast of Zanguebar, in lat. 0° 15′ S., lon. 43° 39′ E. It is said to be likewise navigable for boats to a great distance from the sea. The other principal rivers of Eastern Africa are the Hawash, in Abyssinia; the Atbara (with its affluent, the Takatze); the Bahr-el-Abiad, or White Nile, and the Bahr-el-Azrek, or Blue Nile; the last three are branches or affluents of the Nile. The principal rivers of Western Africa, beginning at its northern limit and proceeding south, are the Senegal, Gambia, Casamanza, Cacheo, the Jeba (or Geba), the Rio Grande, the Nunez, the Sierra Leone, the Adiri (or Volta), the Quorra or Joliba (Niger), the Zaire (or Congo, one of the largest in Africa), the Coanza, and the Gariep (or Orange) rivers.

Among the largest lakes of Africa that have been fully explored is Lake Tchad (Chad, or more correctly, according to Barth, Tsad). It is situated nearly in the centre of the continent, in the territory of Bornu, in lat. about 13° N. and lon. 15° E. It is about 220 miles long, and, at its widest part, about 140 miles broad; and receives two rivers—the Yeou, from the west, and the Shary, from the south. The other known lakes of Africa are the Debo, in Soudan, in the same latitude as Tchad, and under the fifth parallel of W. lon., traversed by the Niger; the lake of Dembea, in Abyssinia, traversed by the Bahr-el-Azrek; and Lake Nyassa, in South-east Africa, about which little is known. It was seen in 1859 by Livingstone, according to whom it is 50 miles long. Among the other large lakes are the Victoria Nyanza, discovered by Capt. Speke in 1858 (supposed by him to be the principal source of the Nile), lying under the equator; the Albert Nyanza, W. of Victoria Nyanza, first seen by Sir Samuel Baker in 1864; and the Tanganyika, S. of Albert Nyanza. Lakes are also met with in the ranges of Mount Atlas, the largest of which is called Lowdeah. Another large lake was discovered in Southern Africa by Dr. Livingstone, in 1849. It is called by the natives N'gami (the Ng is pronounced like the Spanish Ñ), the "Great Water;" it is said to be about 70 miles in length, and is both the source and recipient of several fine streams. Among the former is the Zouga, which flows from the lake, first in a N. E. and then in a S. S. E. course. It is described by Dr. Livingstone as a beautiful stream; the banks are covered with gigantic trees, including a species of Adansonia, some individuals of which measured from seventy to seventy-six feet in circumference. The water of the river is soft, cold, and remarkably clear. It rises and falls periodically, the cause of which is unknown.

Geology.—The geology of Africa is known as yet only from a few cursory observations made at points distant from each other. The part passed over by Dr. Livingstone presents a variety of schists, shales, sandstone, and tufa, overlying granitic and trap rocks. In one place, towards the eastern side of the continent, coal is found under the sandstone. The lofty barrier of limestone along the western boundary of Egypt reappears in the rugged hills of the Sahara; it sometimes contains marine shells. Limestone is also found along the lower skirts of the Atlas Mountains. The strata occupying the surface over the desert of Sahara are very modern, showing that the sea covered this area at a very recent date. The high table-lands of the interior of Africa apparently include representatives of all the older geological formations, and show that the nucleus of the continent is of very ancient date. In Southern Africa the geological structure has been determined with considerable accuracy, and triassic strata have been found there in great

force. They have furnished some remarkable fossil reptiles, which have been grouped by Owen into a new family (Dicynodontia, *dis kuon odous*, "two canine teeth"), which, with beaks much like those of turtles, have immense canine teeth implanted in the upper jaws.

Of the precious metals, gold has long been found in Africa. Probably the richest gold-mine is at Nataku in Western Africa, the gold occurring in lumps, grains, and spangles. Gold-dust is found on the Barra, on the W. coast. Iron occurs in Morocco, Algeria, and Abyssinia, and in the mountains of Central and South Africa. Copper and lead are also found in Southern Africa. Large diamond-fields have recently been discovered in great abundance near the Vaal River. Of other minerals, salt, manganese, and different nitrates have been found in large quantities.

Climate.—The climate of Africa, as far as its continental character prevails, and particularly in the rainy zone, is entirely uniform, and in consequence of the position of the continent (four-fifths in the tropics), of the large extent of the Sahara within the hot zone, of the extensive table-lands of Southern Africa, and of the deficient water-supply and the limited area of the forests, it is exceedingly dry and hot. The interior of Africa is in all probability the hottest region on the globe, but exhibits great contrasts of temperature. While the days often reach a temperature of 120° to 125° Fahrenheit, the nights sometimes have only 55°. The region of the tropical or summer rains extends from lat. 16° to 21° N. North of the equator the rainy season lasts from April to October, in the S. from October to April. In the extreme northern and southern parts of Africa the four seasons of the temperate zone are found.

Vegetation.—In those regions where dampness and heat are combined, especially in the valleys of the large rivers, the vegetation is exceedingly luxuriant and rich in peculiar forms. Among the more prominent plants are the baobab, the shiah butter tree, the dragon tree, the date and fan palms, the oil-palm, various species of aloes, numerous spices and drugs, dyewoods, and timber trees, and the coffee and india-rubber tree. Among the productions are cotton, indigo, bananas, wheat, corn, rice, European and tropical fruits, including the grape. Several varieties of earth-nuts are extensively cultivated. Dourra and teff are native grains resembling millet.

Zoology.—The animal life is distinguished by large and clumsy forms. The elephant and rhinoceros and the hippopotamus (which is peculiar to this continent) are found here. Among the Carnivora the lion, leopard, hyæna, ichneumon, and civet are met with. Throughout Africa the graceful family of the antelopes, in over sixty species, is found, sometimes in herds of 100,000. The camel, the Barbary horse, and the ass are the beasts of burden mostly used in Africa. Numerous genera of apes and monkeys are found. The zebra in Southern Africa, and the giraffe, the tallest existing mammal, in Central and Southern Africa, are peculiar to the continent. Among the birds the ostrich is the most remarkable. Numberless flocks of parrots and bright-colored, noisy birds enliven the forests. Among reptiles, the crocodile is found in all the large rivers and lakes of Africa. Various species of serpents and lizards are also met with. Among the insects, the ants with their cone-like habitations are the most destructive. They attack and demolish everything, except metals and stones, that comes in their reach. Besides these ants, the locusts cause great destruction of property. They travel about in large swarms, and woe to the fields that they alight upon; not a vestige of green remains after they have left. But they are also used as food by many of the native tribes.

Population.—The population is estimated by Behm and Wagner ("Bevölkerung der Erde," Gotha, 1872) at 192,520,000. The densest population is found in the Soudan, on the Gulf of Guinea, from the Senegal to Lower Guinea, also on several other parts of the coast, on large rivers (as the Nile), and, according to recent reports, in some parts of the interior of Southern Africa. To the N. of the Soudan, inclusive of Abyssinia and the territory of the Nile, the Caucasian race (with both dark and light-colored representatives) predominates, comprising the Berbers, Abyssinians, Egyptian Copts, and the Turks. The rest of the continent S. of these countries is inhabited by the Ethiopian or negro race. In the extreme S. are the Cafirs, the Bushmen, and the Hottentots. European colonists are found almost all along the coast, especially in Cape Colony, Algeria, and the islands.

Approximate Religious Statistics.—Mohammedanism and Fetishism are the prevailing religions of Africa, except in Abyssinia, where a corrupt form of Christianity exists; in Madagascar, where the conversion of the queen (1869) and the prominent men of the country has secured the Christianization of the island; in the republic of Liberia, the government of which is under the controlling influence of the Protestant denominations of the U. S.; and in the colonies of the European nations. Human sacrifices are offered among some of the negro nations, but rarely, except on great occasions. The number of Mohammedans in Africa is from 60,000,000 to 100,000,000. The Jews are numerous in Morocco, Algeria, and Abyssinia; their aggregate number in all Africa is from 700,000 to 800,000. The estimates of the Roman Catholic population greatly vary (from 1,000,000 to 4,000,000), as it is doubtful how large a portion of the Portuguese colonies may be set down as nominally Catholic. The Protestant population before the conversion of Madagascar was estimated at about 700,000; it exceeded in 1873 that of the Roman Catholic. In Abyssynia and Egypt about 3,500,000 are connected with the Abyssinian and Coptic churches.

Languages.—Recent discoveries have shown that a scientific classification of the African tribes can be made neither by distinction of color nor of languages. Many tribes have changed their original language for another, or have mixed it considerably with other languages, while some of the darkest races, as the Wolof on the Senegal, are decidedly related to the Caucasian race. Prof. F. Müller ("Linguistiche Ethnographie," in Behm, "Geogr. Jahrb.," 1868) divides the languages into five large families: I. The languages of the African negroes, in twelve groups: the Teda, Maba, Bornu, Bagrimma, Houssa, Logone, Wandala, Wolof, and Mande languages, the Mena languages, the languages of the Nile, the languages of the Niger, those of Sierra Leone, and those of the Gold Coast. II. The languages of the Central Africans, in two groups: Fulah and Nuba languages. III. The language of the Hottentots, in four groups: Nama, Kora, dialect of the Cape, and the language of the Bushmen. IV. The Cafir languages, in three groups: the eastern group, comprising the true Cafir languages, the languages of Zambezi and of Zanzibar; the central group, comprising the Setchuana and Tekeza; and the western group, comprising the Bunda, Herera, Londa, Congo, Mpongwe, Dikele, Isubu, and Fernando Po. V. The Caucasians of Africa, in two groups: the Hamitic languages, comprising the Egyptians, the Bedja, Somauli, Dankali, and Galla; the Semitic languages, comprising the Ethiopic (Geez), Tigre, Amharic, and Arabic.

Commerce.—The commerce of Africa, owing to the barbarous state of the country and to the large dimensions of the slave-trade, has never been of any great importance. But in recent times, since the civilized nations have adopted measures to suppress this inhuman traffic, a great progress has been made. The principal articles of export are gums, timber, wax, ivory, palm oil, gold, hides, feathers, etc. A considerable inland trade is carried on with iron goods, clothing, salt, beads, and small shells called cowries, which are also used as a circulating medium. The Maria Theresa dollar, which circulates in Abyssinia, along the shores of the Red Sea, and some parts of the Soudan, is the only coin used in Africa, with the exception of the European colonies.

History of Discovery.—The peninsular form of Africa is supposed to have been known to the ancients, and it is even supposed by some that the Phœnicians circumnavigated this continent long before the earliest historical records. In modern times Africa has been the object of many researches and explorations. In 1446, Cape Verde was doubled by the Portuguese. In 1486, Bartholomew Diaz discovered the Cape of Good Hope, and in 1498, Vasco da Gama doubled it. Since the middle of the sixteenth century other nations, especially Englishmen, Frenchmen, and Germans, have also taken part in the exploration of Africa. In 1788 the foundation of the African Association of London gave new life to the exploration of this continent. Among the more prominent travellers in the last ten years of the eighteenth and in the nineteenth century are Hornemann (to Murzuk and on the Niger); Lander (on the Niger); Mungo Park (1795–97 and 1805–06) on the W. coast; Burckhardt in the region of the Nile; Denham, Clapperton, and Oudney to Bornu (1822–24); Clapperton in 1825 through Upper Guinea to Sokota; in 1849, Richardson, Barth, and Overweg from Tripoli to the Niger and Benue, who were followed by Vogel in 1853. Barth alone returned in 1856; Vogel was murdered by order of the sultan of Wadaï, and Richardson and Overweg died on the way. Equal in importance to these travels in the N. of Africa are those of Livingstone in the S. In 1849 he reached Lake N'gami from the S., in 1851 the Liambye, and during the years 1852–56 he travelled from the Liambye to Loanda on the W. coast, and thence through the continent to the mouth of the Zambezi, when he discovered the Victoria Falls, which are said to exceed in beauty the Falls of Niagara. From 1858–64, Dr. Livingstone, together with his brother Charles, explored the lakes Nyassa and Shirwa, and three times traversed for a great distance the upper course of the Shire. In 1865 he set out on a new journey to reach the equator and to find the sources of the Nile. Dec.

6, 1866, the men belonging to his expedition returned and reported him murdered by the natives. But subsequent explorations and two letters—one dated Dec. 14, 1867, and the other in 1869—showed these reports to be untrue. In 1870, Henry Stanley, in the employ of the "New York Herald," set out to discover Livingstone, and was so fortunate as to find him in 1872. Upon his return, Mr. Stanley brought with him the journal and several letters of Dr. Livingstone, which throw an important light upon the regions of Central Africa. Livingstone awaited the supplies which were sent him by Stanley in Ujiji, and then set out again. In 1857–59, Burton and Speke discovered the lakes Tanganyika and Victoria Nyanza or Ukerewe, and in 1860–63, together with Grant, Speke discovered the passage of the Nile from the Victoria Nyanza. In 1864, Baker discovered Lake Albert Nyanza, and ascertained that it is connected with Lake Victoria Nyanza. In 1869, Baker undertook a new expedition up the Nile to suppress the slave-trade and to extend the Egyptian domain, and on his return, June, 1873, reported to have been entirely successful. Other explorers are the Dutch lady Tinne, Carlo Piaggia, and the two brothers Poncet, Petherick (on the Bahr-el-Gazal) and Du Chaillu (in equatorial Africa). Among the German explorers are especially to be named Dr. G. Schweinfurth, Heuglin, Kinzelbach, Munzinger, Steudner, Baron von der Decken, Krapf, Karl Mauch, who discovered large gold-fields in Southern Africa, and Gerhard Rohlfs, who explored Morocco, Algeria, Tripoli, and the countries of the Soudan. At the close of 1872 a new society for the exploration of Africa was formed in Germany, which began its operations by sending out an expedition for the exploration of the Congo, under Dr. Güssfeldt. Gerhard Rohlfs had also set out again for these regions. In South-eastern Africa, Karl Mauch had continued his explorations in 1872, and had discovered, in lat. 20° 15′ S. and lon. 26° 30′ E., the ruins of an ancient city, which he thought to be Ophir, together with the ruins of the queen of Sheba's palace, and a temple built by her in imitation of that of Solomon.

Literature.—Compare, besides the works of the explorers already mentioned, PETERMANN and HASSENSTEIN, "Innerafrika nach dem Stande der geogr. Kenntnisse in den Jahren 1861–63" (1863); VIVIEN DE ST.-MARTIN, "Le Nord de l'Afrique dans l'antiquité" (1863). On the countries of the Nile, see the works of RÜPPEL, RUSSEGGER, WERNER, and KNOBLECHER; also KLÖDEN, "Das Stromsystem des oberen Nil" (1856); BEKE, "The Sources of the Nile" (1860). For the Soudan compare the works of LANDER and CAILLIÉ; also MAGE, "Voyage dans le Soudan occidental" (1868), and HORTON, "Physical and Medical Climate and Meteorology of the West Coast of Africa" (1867). On Eastern Africa compare GUILLAIN, "Documents sur l'histoire, la géographie, et le commerce de l'Afrique orientale" (1856), and KRAPF, "Reisen in Ostafrika" (1858). Central and South Africa is described in BURTON, "The Lake Regions of Central Africa" (1860); ANDERSSON, "Travels in South-west Africa;" L. MAGYAR, "Travels in Southern Africa;" FRITSCH, "Drei Jahre in Südafrika" (1869); and "Die Eingebornen Südafrikas" (1872).

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African Association, a society formed in London in 1788 to assist enterprising men in their attempts to explore Africa. It was united with the Royal Geographical Society in 1831.

African Company. A company by this name was incorporated in Great Britain in 1754 for the purpose of promoting trade with Africa. It was obliged to support all English fortifications between Cape Blanco and the Cape of Good Hope, in return for which it received an annual salary of £13,000. It was deprived of its charter in 1821.

African Methodist Episcopal Church, The, was organized in 1816 by colored Methodists, who had been down to that date under the care of the Methodist Episcopal Church. They elected Rev. Richard Allen their first bishop in 1816. Their doctrines are substantially the same as those of the parent Church. They report (1872) 620 ministers and 200,000 members. They have four high academies, one university, and two weekly journals. (See METHODISM, by REV. ABEL STEVENS, A. M., LL.D.)

African Methodist Episcopal Zion Church, The, was formed in 1820 by a secession of African Methodists from a congregation of the Methodist Episcopal Church in New York City. They held their first annual conference in 1821; it was composed of 22 preachers, and reported 1426 church members. In 1838 the conference elected Rev. Christopher Rush its first bishop, with the title of superintendent. Its superintendents are elected quadrennially by the general conference. They report (in 1872) 700 ministers and 164,000 church members. Their doctrines and ecclesiastical system are mostly copied from those of the Methodist Episcopal Church. (See METHODISM, by REV. ABEL STEVENS, A. M., LL.D.)

Africa'nus (SEXTUS JULIUS), a Christian writer eminent for his learning, died about 232 A. D. He wrote a general chronology of the world from the creation to 221 A. D., in which he fixes the date of the creation at 5499 B. C.

Af'ton, a post-township of Washington co., Minn. It is the seat of an academy. Pop. 825.

Afton, a post-village and township of Chenango co., N. Y., on the Albany and Susquehanna R. R., 28 miles E. N. E. of Binghamton. It has six churches, a spoke factory, a sash-and-blind factory, and other shops, and a fine suspension bridge across the Susquehanna, which intersects the township. The bridge has 362 feet span. Pop. of township, 1931.

Afton, a township of De Kalb co., Ill. Pop. 873.

Afton, a township of Cherokee co., Ia. Pop. 263.

Afton, a township of Howard co., Ia. Pop. 474.

Afton, a post-village, capital of Union co., Ia., on the Burlington and Missouri River R. R., 180 miles W. of Burlington and 50 miles S. W. of Des Moines. It has two weekly papers, a fine court-house, and is the centre of an extensive country trade. Pop. 961.

J. F. BISHOP, ED. OF "AFTON NEWS."

Afze'lius (ARVID AUGUST), a Swedish poet and historical writer, born May 6, 1785. He published, besides other works, a "Legendary History of the Swedes." Died Sept. 25, 1871.

A'ga, a Turkish title, signifying "lord," is given to a superior military commander, and to others as an honorary title.

Ag'ades, Ag'adez, or **Ag'des,** a city of Central Africa, capital of the kingdom of Asben, is in an oasis of the Sahara; lat. 16° 30′ N., lon. 8° 12′ E. It formerly had a population of about 50,000, which is now greatly reduced. It is visited by merchants from Soudan, and others from Northern Africa. Pop. about 7000.

Agalmat'olite [from the Gr. ἄγαλμα, "image," and λίθος, "stone"], a name applied to a number of soft, fine-grained minerals which the Chinese carve into images. They are hydrated, aluminous, or magnesian silicates, as pyrophyllite, biharite, pinite, talc, etc.

Ag'ama, the name of a lizard, employed by Cuvier to designate the first section of the iguanian sauria, or Agamidæ, which section is characterized by the absence of palatal teeth. The agamoid lizards include several genera, which are numerous in species. They are distributed over the warmer parts of America, Africa, Asia, and Australia. Most of them have a lax skin, which they can inflate with air. One of the most remarkable animals of this family is the CHLAMYDOSAURUS (which see).

Agamem'non [Gr. Ἀγαμέμνων], the son of Atreus, king of Mycenæ, was a brother of Menelaus. He had the chief command of the Greeks at the siege of Troy, where he quarrelled with Achilles. He, as well as his brother, was often called ATRI'DES (*i. e.* "son or descendant of Atreus"). After his return from Troy to his own kingdom he was murdered by his wife Clytemnestra and Ægisthus. He was the father of Orestes, Electra, and Iphigenia.

Agamen'ticus, Mount, in York co., Me., is about 4 miles from the ocean, above the level of which it rises 673 feet. It is an important landmark for seamen; lat. 43° 13.4′ N., lon. 70° 41.2′ W. It is in York township.

Ag'ami (the *Pso'phia* of the naturalists), a genus of South American birds, called trumpeters from a peculiar sound which they utter. The *Pso'phia crep'itans* is equal in size to a large pheasant, but has longer legs and neck. It can be perfectly domesticated.

Ag'apæ [from the Gr. ἀγάπη, "brotherly love"], love-feasts, or feasts of charity, in use among the early Christians. After the celebration of the communion, the oblations which had been made in the church, consisting of meat and bread, which the rich had brought from their houses, were consumed at a common feast.

Agapem'one [from the Gr. ἀγάπη, "love," and μονή, "abode"], a community of fanatics and free-lovers formed in 1846 at Charlynch, in Somersetshire, England, by Henry J. Prince, who was previously a clergyman of the Anglican Church. His disciples, known as "Lampeter Brethren," or "Family of Love," hold their property in common, live in splendid style, and pass their time in voluptuous ease. Mr. Prince makes extravagant pretensions as an apostle or reformer in religion, and it is said that he is styled "God incarnate" by his followers, who are sometimes called Princeites.

Agape'tæ [from the Gr. ἀγαπήτος, "beloved"], the title given to the virgins and widows who among the primitive

MAP OF AFRICA

Drawn and Engraved on Copper-Plate EXPRESSLY FOR JOHNSON'S UNIVERSAL CYCLOPÆDIA

Scale of Miles 100 200 300 400 500

20 10 0 10 Longitude East 20 from Greenwich 30 40 50 60

57 67 77 87 Longitude East 97 from Washington 107 117 127 137

CAPE VERDE ISLANDS

25 Long. W. Green.

S. Antonio, S. Nicolao, Sal, Bonavista, Fogo, Mayo, Porto Praya, St. Jago

Scale same as main map.

52 Long. E. Wash. — North Lat. — 15 — 17

ST HELENA

5°45′ Long. W. Green.

Jamestown, Longwood, Tomb of Napoleon, Diana's Pk. 2,700 ft., White Pt., Castle Rock, Rupert's Valley, Flagstaff Hill, Prosperous Bay Pt., Sandy Bay Pt., Turk's Cap Pt., Lemon Valley, Rupert's Pt.

Scale of Miles 1 2 3 4

71°15′ Long. E. Wash. — South Lat. — 16 — 18

Tropic of Capricorn

Note – St. Helena (discovered by the Portuguese) is chiefly noted as the place of exile of the ex Emperor Napoleon Bonaparte, whose residence, Longwood, was on an elevated plateau of the interior. He was confined there from Oct. 16th 1815, to the period of his death May 5th 1821.

SOUTH ATLANTIC OCEAN

INDIAN OCEAN

MOZAMBIQUE CHANNEL

GULF OF GUINEA

GULF OF ADEN

MEDITERRANEAN SEA

RED SEA

EQUATOR

Christians devoted their time to the service of bishops and ministers.

Agape'tus I. was elected pope of Rome in 535. Died in 536 A. D.

Agapetus II. became pope in 946, and died in 955 or 956.

A'gardh (Karl Adolph), a Swedish naturalist, born in Scania Jan. 23, 1785, was ordained a priest in 1816. He wrote, besides other works, "Species of Sea-weeds" ("Species Algarum," 1820–28) and "Systematic Arrangement of Sea-weeds" ("Systema Algarum," 1824). He became bishop of Karlstad in 1834. Died Jan. 28, 1859.

Ag'aric [Lat. *Agar'icus*, from the Gr. ἀγαρικόν], a genus of fungi, the species of which are very numerous. True agarics have radiant gills, while *Boleti* have tubes beneath the cap or pileus. The *Agaricus campestris* or common mushroom and some others are delicate articles of food; the *Agaricus muscarius* and other species are dangerous poisons; many of the deliquescent species are called toadstools; numerous small ephemeral species appear to be harmless. The *Agaricus olearius* is remarkable for being phosphorescent. The common mushroom is frequently cultivated, both in the open garden and in sheds. The term *agaric* is also applied to various *Polypori* and other fungi which grow on the trunks of trees. From some of these "punk," "touchwood," or "amadou" is prepared.

Aga'sias of Eph'esus, a Greek sculptor, who is supposed to have lived about 400 B. C. Among his works is a fine statue called "The Gladiator" or "Borghese Fighter," which is now in the Louvre.

Ag'assiz (Louis John Rudolf), M. D., Ph. D., LL.D., an eminent Swiss naturalist and geologist, born in the parish of Motier, near Lake Neuchâtel, May 28, 1807, was the son of a Protestant minister. He studied the medical sciences at Zurich, Heidelberg, and Munich, where he graduated. His first work was a Latin description of the fishes which Martius and Spix brought from Brazil, published in 1829–31. He devoted much time to the study of fossil fishes, and was appointed professor of natural history at Neuchâtel in 1832. During a visit to Paris he formed friendships with Cuvier and Humboldt. His reputation was increased by a great work in French, entitled "Researches on Fossil Fishes" (5 vols., 1832–42, with more than 300 plates), in which he made important improvements in the classification of fishes. Having passed many summers among the Alps in researches on glaciers, he propounded some new and interesting ideas on geology and the agency of glaciers in his "Études sur les Glaciers" (1840) and his "Système Glaciaire" (1847), which are among his principal works.

In 1846 he crossed the Atlantic on a scientific excursion to the U. S., in which he soon resolved to fix his permanent residence. He accepted, about the beginning of 1848, a chair of zoology and geology at Harvard; he explored the natural history of the U. S. at different times, and gave a new impulse to the study of nature in this country. He rejects the Darwinian theory of organic development. In 1865 he conducted an expedition to Brazil, and explored the lower Amazon and its tributaries, in which it is stated that he discovered more than 1800 new species of fishes. He became in 1868 a non-resident professor of natural history at Cornell University, Ithaca, N. Y. Early in Dec., 1871, he accompanied the Hassler expedition, under Prof. Pierce, to the South Atlantic and Pacific oceans and the western coast of America. Among his important works are "Outlines of Comparative Physiology" (1848); a "Journey to Brazil" (chiefly written by his wife, 1868); and "Contributions to the Natural History of the United States," an expensive work which is to extend to ten vols. 4to, of which the first four volumes appeared 1857–62. Probably no one except Hugh Miller has done more to popularize science in our time than Agassiz, and no other teacher has trained so many young and rising naturalists. Yet it may be observed that some of his favorite opinions (*e. g.* of the absolute immutability of species) are not now held by many living naturalists. More, however, than almost any other leader in modern science, Agassiz has insisted upon a theistic view of creation, as opposed to the idea of the self-evolution of uncreated nature. "He is not merely," says Mr. Whipple, "a scientific thinker; he is a scientific force; and no small portion of the immense influence he exerts is due to the energy, intensity, and geniality which distinguish the nature of the man. In personal intercourse he inspires as well as performs, communicates not only knowledge, but the love of knowledge." He died at Cambridge, Mass., Dec. 14, 1873.

Agassiz, Mount, a remarkable mountain-peak of Arizona, is an extinct volcano, about 70 miles N. E. of Prescott. It is 10,000 feet or more above the level of the sea, and belongs to the range or group of San Francisco Mountains. As a place of summer resort it has every attraction—scenery, water, climate, elevation, and proximity to one of the greatest natural curiosities in North America, the Great Cañon of the Colorado.

Ag'ate [from *Acha'tes*, a river of Sicily, where they were first found], a mineral much used for ornamental purposes, is a variety of quartz marked with veins or layers, which are different in color and often concentric. This structure is due to the mode of formation, in successive layers on the walls of cavities, usually in volcanic rocks. Agates are found in all countries, and are much used for ornaments and utensils, such as seals, ring and pin stones, vases, cups, mortars, etc. Many of the polished agates are very beautiful, and their preparation has created an important industry at Oberstein in Germany. Here great skill is displayed in cutting and polishing agates, and still more in *coloring* them. A large part of the Oberstein agates come originally from South America.

Ag'atha, Saint, a Silician virgin and martyr, who was put to death in 251 A. D.

Agathar'chus ['Αγάθαρχος], a Greek painter who lived about 480 B. C., is regarded as the inventor of scene-painting, or the first who applied the laws of perspective to the art of painting.—Another painter of this name lived about sixty years later, and was patronized by Alcibiades.

Aga'thias, surnamed Asianus, a Greek historian and poet, was born at Myrina, in Asia Minor. He became a resident of Constantinople about 554 A. D., and wrote a history of contemporary events, which is extant. Died about 580.

Agath'ocles [Gr. 'Αγαθοκλῆς], a tyrant of Syracuse, born in Sicily, was originally a potter. He raised himself by his talents to a high military rank, and also distinguished himself as an orator. Having massacred a large number of the prominent and respectable men of Syracuse, he obtained the supreme power in 317 B. C. He afterwards waged war against the Carthaginians, over whom he gained several victories in Africa, but was subsequently defeated by them. In 306 B. C. a peace was made, which secured to both parties their former possessions. Died in 289 B. C. His death is ascribed to a poisoned toothpick, given to him at the instigation of his grandson Archagathus.

Ag'athon, or **Ag'atho** ['Αγάθων], an eminent Greek tragic poet, born at Athens about 450 B. C., was a friend of Plato and Euripides. He gained a prize for one of his tragedies in 416 or 417 B. C. Plato expressed a high opinion of his works, of which only small fragments are extant. Died about 400 B. C.

Aga've [from the Gr. ἀγανός, "illustrious," "noble"], a genus of plants of the order Amaryllidaceæ; they are natives of tropical America. The most remarkable species of this genus is the *Agave Americana*, commonly called American aloe, or century plant. The latter name originated in an incorrect opinion that it bears no flowers until it has attained the age of one hundred years. The spike, which often rises to the height of about thirty-six feet, sometimes bears as many as 4000 flowers. The agave never survives long after efflorescence. The *Agave Americana* is employed for fences in Southern Europe; it has become naturalized in Italy and the north of Africa. By maceration of the leaves of this and other species are obtained fibres, which are used, under the name of Sisal hemp, for the manufacture of ropes, hammocks, etc. Another species, the *Agave Mexicana*, when the innermost leaves have been torn out, affords a juice which yields sugar; and which, when diluted with water and subjected to fermentation, becomes an intoxicating drink called *pulque*, to which the Mexicans not unfrequently sacrifice both fortune and life. It is made likewise from the *Agave Americana*, and from several other species; and a spirituous liquor (aguardiente) is distilled from it. The roots of *Agave saponaria* are used in Mexico for washing, forming a lather with salt water as well as with fresh.

Ag'awam, a post-village of Hampden co., Mass., on the W. side of the Connecticut River, in a fertile township of its own name, 98 miles W. S. W. of Boston. It has manufactures of paper and woollens. Pop. of township, 2001.

Agde (anc. *Ag'atha*), a town of France, department of Hérault, on the river Hérault and Canal du Midi, 2 miles from the Mediterranean, and 18 miles by rail E. of Bézières. It is mostly built of black basalt, and is popularly called the Black Town. Here is a college, also a school of navigation. Pop. in 1866, 9586. It has an active trade in wine, oil, silk, grain, etc. Its harbor is in lat. 43° 17′ N., lon. 3° 28′ E., and is accessible to ships of 200 tons.

Age [Lat. *æ'tas*], a word used in various significations: 1, it denotes the whole duration of the life of a man or other creature; 2, a certain period or division of human life, which, according to Shakspeare, is divided into seven ages; 3, the time when a person is authorized by law to act for himself, and is released from the control of his parents

or guardians. According to the laws of England and the U. S., a person becomes of age when he or she is twenty-one years old. Before this age one cannot vote or make a valid will. A citizen of the U. S. cannot be a Senator before the age of thirty, nor President before the age of thirty-five. In Great Britain men are eligible to Parliament at twenty-one. The natural divisions of human life are infancy, childhood, boyhood (or girlhood), adolescence, manhood (or womanhood), and old age. The age of puberty is fourteen or fifteen. The sixty-third year is called the grand climacteric. Some trees are believed to live to an age of 4000 years or more. The average life of a horse is from twenty-five to thirty years; of an elephant, probably about two hundred; of a dog, from twelve to fifteen. Fishes are remarkable for longevity, and a carp (it is said) has been known to live two hundred years.

AGE, in chronology and history, is sometimes used as synonymous with century, and sometimes also with a generation. Writers differ in respect to the period included under what is called the *Middle Ages*, but they are commonly understood to begin about the time of Charlemagne, and to extend to the fifteenth century.

AGE, in literature, is a period usually bearing the name of some powerful person who flourished during that time. Among the most memorable of these are the age of Pericles, the Augustan age, the age of Leo X., and the age of Elizabeth (or Elizabethan age).

In geology, an AGE is the second great division of time—*e. g.* the *Devonian Age*, the time in which the Devonian system of rocks was deposited—or intervals in the life-history of the globe marked by the prevalence of certain forms of animal or vegetable life; *e. g.* the *Age of Mammals* = the Tertiary; the *Age of Reptiles* = the combined Triassic, Jurassic, and Cretaceous Ages of geological time.

AGE is a term used to designate the successive epochs or stages of civilization in universal history or mythology. The Greek and Roman poets imagined a series of four ages—the Golden, the Silver, the Brazen, and the Iron. An ancient and widespread tradition commemorates the pristine innocence, peace, and happiness of the primeval Golden Age, under the reign of Saturn. The other three were regarded as successive degrees of declension from that primitive state. The *pre-historic* ages in modern anthropology are usually called the older and newer stone ages (palæolithic and neolithic ages) and the age of bronze.

Agen, å′zhâN′ (anc. *Agin′num*), a town of France, capital of the department of Lot-et-Garonne, on the right bank of the Garonne, 85 miles by rail S. E. of Bordeaux. It is pleasantly situated in a fertile country, and has an active trade in brandy, prunes, leather, wine, madder, and other articles. Here is a public library; also manufactures of serge, cotton prints, and linen goods. Joseph Scaliger was born in the vicinity of Agen. Pop. in 1866, 18,222.

A′gency, a post-village of Wapello co., Ia., in a township of its own name. Pop. 630; of township, 1223.

Agency, a township of Osage co., Kan. Pop. 1865.

Agen′da [from *a′go, ac′tum,* to "act" or "do"], a Latin word signifying "to be done," or "what ought to be done," has been applied by theologians to practical duties as distinguished from the *credenda* ("to be believed"), or doctrines that must be accepted as articles of faith.

Agénois, å′zhå′nwå′, a former district of France, in Guienne, had an area of about 1080 square miles. It is now comprised in the department of Lot-et-Garonne.

Age′nor [Gr. Ἀγήνωρ], in classic mythology, a king of Phœnicia and a son of Neptune, was the father of Cadmus, Phœnix, and Europa.

A′gent [from the Lat. *ago,* to "act"], in law, one who acts for another. This is an extensive topic, and must be treated with a brevity scarcely admitting even a sketch of its rules. Many of its principles closely resemble the corresponding topic in the Roman law (*mandat*), so that they are of quite general application in the jurisprudence of civilized countries. Agency may be created by express words or by implication. There are cases in which an express authority in writing is necessary by statutory law. It is a general rule that when an act is to be done under seal the agent's authority must be of the same grade. Should a person act as agent without authority, the subsequent ratification of the act will make it valid and binding on the person for whom it was done, in the same manner as if he had originally directed it. An agency is often implied from the course of business. A wife who sells goods in her husband's shop, or receives payment of a debt due him with his knowledge and without objection, may be deemed to be his agent, and may bind him in subsequent transactions of a similar kind. An agency is in general revocable either by the principal's own act, executed with sufficient notoriety, or by some event which renders the performance of the act impracticable. Thus, the death of the principal, in general, causes an instantaneous revocation. There is a class of powers, termed "powers coupled with an interest," which in their nature are irrevocable. There must be in this case an interest on the part of the agent in the property over which the power is to be exercised. An illustration is the pledge of goods for a debt, with a power to sell in default of payment. The leading points in agency are the relations of principals to third persons, those of the agent to third persons, and the mutual relations between the principal and agent.

I. *The Relations of the Principal to Third Persons.*—It is a rule that when an agent acts within the scope of his employment he may bind his principal. This is on the principle of identity. There is another class of cases where the agent is not acting within the scope of his employment, but the principal has given him the *appearance* of authority, and the third person with whom he deals has no adequate means of distinguishing between his apparent and actual authority. In this case the principal is liable under a rule that where one of two innocent persons must suffer, that one should sustain the loss who has put it in the power of the wrong-doer to commit the wrong. It is in substance the doctrine of ESTOPPEL IN PAIS (which see). Under this doctrine usage has great effect upon the power of agents to bind their principals. There is a large number of agents who have known and recognized functions, such as factors, brokers, and cashiers of banks. It is the well-settled rule that these persons, acting within the usage of their business, may bind their principals, notwithstanding instructions to the contrary, unless these restrictions are brought to the knowledge of the persons with whom they deal. It is a general rule that when a power is conferred upon an agent, he has by implication such incidental authority as is necessary to carry his power into effect. An authority created by writing must be followed, and an act in excess of it is unauthorized and not binding on the principal. The mode of execution deserves notice. The agent should purport to bind his principal. This rule is particularly applicable to sealed instruments. Should an agent have a so-called power of attorney to execute a conveyance of land, the deed should purport to be the act of the principal by the agent, and should be subscribed in that manner; otherwise it would be at most the agent's deed, and not that of the principal. Where there is no technical rule in the way, a principal may be liable even though undiscovered, as he must be deemed to be identified with the agent. On the general principles of the law of contracts, the principal can take advantage of a contract made in his behalf with a third person, and enforce it by action in his own name, even though he were not at the time disclosed, subject to the qualification that the rights of the other party to the contract are not prejudiced. A principal is liable for the fraudulent or wrongful acts of his agent acting within his employment. He cannot take the benefit of the agent's acts and avoid their burdens. So complete is the identification of these parties that notice to an agent on the subject of his employment is legally notice to the principal, although it be not in fact communicated. This rule often operates with great severity upon innocent principals, imputing legal fraud when none has been in fact committed.

II. *The Relations of the Agent to Third Persons.*—If the agent having power to bind his principal does so expressly, he is not liable. But if he exceeds his authority, or, acting within it, fails to disclose his principal, he becomes personally responsible. In the case first supposed he is deemed to have entered into an implied contract that he has the necessary authority, and is liable accordingly. In the other case, the third person, on discovering the principal, has an election either to charge the agent or the principal. This doctrine may perhaps be qualified if the agent contracts in writing, on account of the rule that parol evidence is inadmissible to alter a written instrument. The agent, in turn, may have a right of action upon a contract made in his own name with a third person, though in fact made for the benefit of his principal. It is a general rule that an action does not lie against an agent to test the right of the principal to a fund, but the action should be brought against the principal himself. But in the case of duress of goods (see DURESS), if payment is made to an agent under protest, an action may be brought against him to recover back the money. This doctrine assumes much importance in its application to duties collected upon imports; so that a law of Congress regulates the mode in which the protest should be made.

III. *The Relation of Principal and Agent as between Themselves.*—The rules governing this relation are quite different. The agent is bound to obey the instructions of the principal. If in violating them he binds the principal to third persons, he is personally liable to make compen-

sation for his breach of duty. His relation is a fiduciary one. He is subject to the rule that he cannot deal in his principal's affairs for his own benefit. When directed to sell, he cannot become a purchaser; when ordered to buy, he cannot become a seller. This rule springs from the relation, and is applied with as much rigor to agents who act gratuitously as to those who receive compensation. An agent having discretion to exercise cannot delegate his authority; he cannot substitute another in his place. Where the business requires it, he may employ subordinates in the execution of his duties. It is not uncommon to insert a clause in a written delegation of agency (power of attorney) allowing substitution; this is valid. An agent should keep separate accounts, and distinguish his principal's money from his own; otherwise he might become personally responsible for its loss. The measure of his liability ordinarily is reasonable care, which is determined by that diligence which prudent men usually exercise in the conduct of their own affairs. For his services he is in general entitled to a reasonable compensation. He is sometimes paid by commissions; this is usual in the case of a broker. He has earned his commissions when he has brought the purchaser and seller together. He cannot be deprived of them by a failure on the part of his employer, through wantonness or caprice, to enter into the contract which he has succeeded in negotiating for him.

The law of agency underlies, to a considerable extent, the law of partnership. The rules whereby one partner can bind his associates by contracts within the scope of their business are but applications of the doctrines of agency to this special branch of the law. (For information of a more special nature concerning particular cases of agency, consult ATTORNEY, BROKER, FACTOR, PARTNERSHIP, etc.)

T. W. DWIGHT.

Agesila'us [Ἀγησίλαος] **II.,** a celebrated Spartan general and king, was a son of King Archidamus II. He began to reign at the death of his brother Agis in 399 B. C., two years after which war was renewed between the Spartans and the king of Persia. Agesilaus commanded the army which invaded Asia Minor, and gained several victories, but in the mean time the Athenians, Thebans, and other Greek peoples had formed a coalition against Sparta, to defend which the king was recalled by the ephori in 394 or 395 B. C. He maintained his reputation in this war, which was ended by a treaty of peace in 378. Sparta was again involved in a war with the Thebans, who under Epaminondas gained a decisive victory at the great battle of Leuctra, 371 B. C., at which, however, Agesilaus was not present. He afterwards defended the city of Sparta with success when it was besieged by Epaminondas. He died about 360 B. C., aged 84 years.

Agglu'tinate [from the Lat. *ad*, "to," and *glu'tino*, *glutina'tum*, to "glue" or "cement"] **Languages,** a term applied, in comparative philology, to languages which are in a certain state of development intermediate between those which are strictly monosyllabic like the Chinese, and those which are inflectional like the Greek or Latin. Examples of languages in the agglutinated state are found among the Indian languages of America and the Turanian languages of Asia. In the Aryan languages conjugation and declension are doubtless the result of *glueing on* pronouns to verbs and nouns; but in them these terminations have coalesced, so as to form practically a single word, and the primitive parts have therefore, in a greater or less degree, lost their original and independent force. In the Turanian languages, however, the declension and conjugation can still be taken to pieces, and the affixes are seen to be distinct from the roots to which they are appended, as in Turkish, etc. (See MAX MÜLLER'S "Lectures on the Science of Language," first series, lect. viii.)

Agh'mat, a fortified town of Morocco, on the N. declivity of Mount Atlas, 24 miles S. of Morocco. Pop. about 6000.

Aghrim, or **Aughrim,** awg'rim or awH'rim, a parish of Galway, Ireland, 13 miles N. E. of Loughrea. Here the army of William III. gained a decisive victory over that of James II., July 12, 1691.

Agincourt, å'zhăN'kooR', or **Azincourt,** å'zăN'koor', a village of France, in the department of Pas de Calais, 18 miles E. of Montreuil, and 10 miles N. W. of St.-Pol. Near this place the English king, Henry V., who had about 15,000 men, gained a complete victory over the French army of about 60,000 on the 25th of Oct., 1415.

A'gio [in Italian, *aggio*, a word originally signifying "ease," "convenience," "accommodation"] was used in Italy to denote the difference between the real and nominal values of money, or the percentage difference between the values of the current and standard money of a place. The premium or discount on foreign bills of exchange is sometimes called *agio*.

Agis IV., of Sparta, born about 264 B. C., was a wise and meritorious ruler. He began to reign conjointly with Leonidas in 244 B. C., when Sparta was in a degenerate condition. He attempted to restore the old Spartan institutions and to reform the corrupted morals of the people. He also proposed to improve the condition of the poorer citizens by an agrarian law. Condemned by the ephori on a charge of subverting the laws, he was strangled in 240 B. C.

Agnadello, ån-yå-del'lo, a village of Northern Italy, 10 miles E. of Lodi. Here the French duke of Vendôme defeated Prince Eugène Aug. 16, 1705, and Louis XII. of France the Venetians May 14, 1509. Pop. about 1600.

Agnano, ån-yå'no, a lake of Italy, 3 miles W. of Naples, is about half a mile in diameter. It occupies the crater of an extinct volcano, and is near the Grotto del Cane, from which noxious gases arise.

Ag'nate [from the Lat. *ad*, "to," and *nas'cor*, *natus*, to "be born"]. In Roman law, *agnates* are those who descend through males from a common ancestor, in opposition to *cognates*—*i. e.* all the descendants of a common ancestor, whether through males or females. Thus, in France, by Salic law, the hereditary crown passed by right of *agnation*, females being excluded.

Ag'nes Cit'y, a township of Lyon co., Kan. Pop. 143.

Ag'nes, SAINT, a Roman virgin, who is said to have suffered martyrdom under Diocletian, in 303 A. D.

Agne'si (MARIA GAETANA), an Italian woman of extraordinary learning and intellect, was born at Milan Mar. 16, 1718. About the age of twelve she could converse in Greek, Latin, and other languages on abstruse subjects of philosophy and mathematics. During the illness of her father, who was a professor of mathematics at Bologna, she lectured in his place. She published a work called "Analytical Institutions" (1748), which displays mathematical genius of a high order. Died Jan. 9, 1799.

Agnes Sorel, mistress of King Charles VII. of France, was born 1409, became in 1431 lady of honor to the duchess of Anjou, and so fascinated the king by her beauty that he appointed her lady of honor to the queen. She exercised a most beneficial influence over the king, whom she stimulated to action against the English, who then invaded France. She died Feb. 9, 1450, as it is supposed, by poison administered by the dauphin.

Ag'ni, or **Ag'nis** [etymologically related to the Latin *ig'nis*], in Hindoo mythology, the god of fire. He was a deity of great importance among the early Aryans, but after the rise of the gods of the Hindoo triad he sank into a very subordinate position. He is sometimes represented with two faces, three legs, and seven arms, with his head surrounded by flames, and is generally painted of a deep-red color. By some he has been made to correspond to the Vulcan of classic mythology, but he does not anywhere appear as an artificer, like that deity. His principal characters are those of a purifier and bearer of incense to heaven, thus being made a mediator between man and the gods. His two faces are supposed to be a type of fire in its two characters—beneficent (or creative) and destructive—and his seven arms to indicate the seven prismatic colors.

Agnoë'tæ [from the Gr. ἀγνοέω, to "be ignorant"], in ecclesiastical history, the name of a sect in the sixth century who maintained that Christ in his human nature was ignorant of many things, particularly of the day of judgment. Another and earlier sect of this name denied the omniscience of God.

A'gnolo, d' (BACCIO), a distinguished Italian architect and sculptor in wood, was born at Florence in 1460. He is said to have been the first who ornamented the windows of palaces with frontons or frontispieces. Died in 1543.

Agno'men [from the Lat. *ad*, "to," and *no'men*, a "name"]. Besides the prænomen, nomen, and cognomen, the ancient Romans sometimes had a fourth name (*agnomen*), which was derived from some illustrious action or remarkable event. Thus, two Scipios had the name Africanus given them on account of their victories over the Carthaginians in Africa. The younger of these celebrated generals had a second agnomen—viz. Æmilianus—because he was the son of L. Paulus Æmilius, and adopted into the family of the Scipios. Fabius *Cunctator* (*i. e.* "Fabius the delayer") was so called because by his cautious policy and prudent delays he, and he alone, of all the Roman generals, was able to oppose Hannibal successfully when that general was at the height of his victorious career.

Agnone, ån-yo'nå, a town of Italy, in the province of Campobasso, 20 miles N. W. of Campobasso. Copper-ware is made here. Pop. in 1861, 9255.

Ag'nus De'i, the name applied to the fifth and last section of the Roman Catholic mass, beginning with the

words "Agnus Dei, qui tollis peccata mundi" (*i. e.* "Lamb of God, who takest away the sins of the world"). It is also applied to the figure of a lamb bearing a cross, which is stamped on a compound of balsam, chrism, and wax, or on silver, and often worn by Roman Catholics.

Agon'ic [from the Gr. *a*, "without," *γωνία*, an "angle"] **Line** is the name applied to the line which joins all the places at which the magnetic needle points due north and south. The plane of the *magnetic meridian* of a place, which is the vertical plane passing through the two poles of a magnetic needle freely suspended at that place, does not, generally speaking, coincide with that of the geographical meridian, a vertical plane passing through the place and the north and south terrestrial poles. The angle formed by these planes is termed the *magnetic declination*. At certain places these planes coincide, and such places are called places of *no declination*. The line which joins all these places is termed the *line of no declination*, or the *agonic line*. A line of this kind passes through the eastern part of South America to Hudson's Bay, thence towards the North Pole to the White Sea; passing southward, it cuts Arabia, and, after traversing the Indian Ocean and the eastern portion of Australia, goes through or near the South Pole to join itself again. It is not fixed in position, but is at present moving slowly westward on our continent. There is a second agonic line which has been observed near China and Japan.

Agonis'tici, an ascetic sect of Christians who lived in Northern Africa in the fourth century. They renounced labor and matrimony. Their name, derived from the Greek *ἀγωνίστης* (*agonis'tes*), a "wrestler," appears to have been given in allusion to their wrestling with "the world, the flesh, and the devil."

Agos'ta, or **Augus'ta,** a seaport of Sicily, in the province of Catania, and on the Mediterranean, 14 miles N. of Syracuse. It has a good harbor, defended by two forts, and exports salt, olive oil, wine, and honey. In 1693 it was nearly destroyed by an earthquake. Pop. in 1861, 9223.

Agoua'ra (*Procyon cancrivorus*), the crab-eating raccoon of South America, is larger than the common raccoon, has a shorter tail, and more variable colors. It is commonly of a blackish-gray, with six rings around the tail. In habits it resembles the common raccoon.

Agouti, ä-goo'tee (*Dasyproc'ta*), a genus of rodent mammals related to the porcupines. The common agouti (*Dasyprocta agouti*) is a native of Brazil, Paraguay, Guiana, and the neighboring countries. Formerly, in these districts it existed in great numbers, but from its frequent ravages on the sugar-cane, potatoes, and yams, it has in many parts been hunted out and almost exterminated. It is between the size of a hare and a rabbit, has long hind legs, round ears, bright black eyes, and a short, stumpy tail, which, as well as the rump and thighs, is covered with long, coarse, bristly hair, whence the name *Dasyprocta* (from the Gr. *δασύς*, "rough," and *πρωκτός*, "tail" or "hinder parts"). The agouti is an omnivorous animal, eating almost all kinds of vegetables, fruits, roots, meats, etc. Its habits are all quick and active, and even while eating it continually turns its head from side to side, in order to guard against danger. The animal is easily domesticated, but as it is specially fond of using its teeth on all kinds of furniture, it is but little valued as a pet. It gnaws with great rapidity, taking but a few minutes to cut its way through an ordinary door. Add to this that its playfulness and all its amusing qualities seem to be lost in its domestic state. In some countries its flesh is eaten, but a prejudice generally prevails against it.

Black Agouti.

There are several other species, such as the black agouti (*Dasyprocta cristata*), whose range is nearly the same with that of the common agouti, but is perhaps more limited. The agoutis are said to have been the largest mammals inhabiting the West India Islands at the time of their discovery.

A'gra, or **Akbarâbâd',** a city of Hindostan, in the North-west Provinces, and capital of the division of the same name, is on the right bank of the river Jumna, 134 miles by rail S. S. E. of Delhi, and 754 miles by rail N. N. E. of Bombay; lat. 27° 11′ N., lon. 78° E. It was the capital of the Mogul and Mohammedan emperors of India from 1504 to 1647, and was once a large and splendid city, but a great part of it is now in a ruinous state. The houses are mostly built of red sandstone. Here are several magnificent edifices, the most celebrated of which is the Tâj Mahal, a mausoleum erected by the emperor Shah Jehan (1627–66) in honor of his favorite queen. This edifice, the finest in India, and perhaps in the world, is built of white marble, surmounted with a dome seventy feet in diameter, and adorned internally with exquisite mosaics of cornelian, lapis lazuli, and jasper. It cost above £3,000,000. Among the articles exported from Agra are cotton, sugar, salt, and indigo. Many houses in Agra were destroyed by the Sepoys during the mutiny of 1857. At that time the population was 125,262.

Ag'ram, or **Zag'rab,** a royal free city of Croatia, and the capital of that country, on the left bank of the Save, 172 miles S. of Vienna. It is the seat of a Roman Catholic archbishop, and has two gymnasia, two Realschulen, two normal schools, two theological seminaries, besides many other institutions of learning. Six annual fairs are held here. Pop. in 1869, 19,857.

Agra'rian Law [Lat. *lex agra'ria*, from *a'ger*, a "field"]. This term originated in the ancient republic of Rome, and signified a law enacted to distribute or regulate the public land, *ager publicus*. Such laws were opposed by the patricians, who had appropriated to their own use the lands acquired by conquest, and who had long enjoyed the privilege of occupying them as tenants, on the condition of paying to the state a tithe of the produce. The consul Spurius Cassius first proposed to divide a portion of public land among the poor citizens, but the measure was defeated by the aristocrats. In 367 B. C. an agrarian law was originated by Licinius Stolo, ordaining that no man should possess more than 500 *jugera* (330 acres) of the public domain, and that such public land as any man occupied in excess of 500 *jugera* should be distributed among the poor citizens. Tiberius Gracchus was the author of an important agrarian law. These and later agrarian laws were never executed. In Sparta the attempt of King Agis IV. to enforce an agrarian law led to his murder by the ephori (240 B. C.).

Agreement. See CONTRACT, by PROF. T. W. DWIGHT.

Agric'ola (CNEIUS JULIUS), a Roman general and statesman, born at Forum Julii (Fréjus), in Gaul, June 13, 37 A. D. He was appointed governor of Aquitania by Vespasian in 73, and became consul in 77. About a year later he was sent as governor to Britain, which he conquered, and governed with much ability and moderation. By a wise and humane policy he promoted the civilization and prosperity of the natives. He erected a chain of forts from the Clyde to the Frith of Forth. He was recalled about 85 A. D. by Domitian, who was jealous of him. Died Aug. 23, 93 A. D. He was the father-in-law of the historian Tacitus, who wrote a Life of Agricola.

Agricola (JOHANN), originally SCHNEIDER or SCHNITTER, a German theologian, born at Eisleben April 10, 1492, studied at Wittenberg, and became a friend of Luther, with whom he was afterwards involved in a doctrinal controversy. He obtained a chair at Wittenberg in 1536. Agricola and his followers were called Antinomians (opposers of the law), because they maintained that a Christian is not bound to obey the Mosaic law. He wrote many theological works, and published a valuable collection of German proverbs. Died in Berlin Sept. 22, 1566.

Agricultural Chemistry is the study of the chemical relations of those substances which compose the products of the farm. Since the chemistry of these substances is most intimately connected with their physical, geological, and physiological aspects, the term agricultural chemistry, as commonly understood, embraces a wide range of natural science in its applications to vegetable and animal production. The object of agriculture is to develop from seed and soil the largest possible value of useful plants and useful animals at the smallest cost. Nothing is plainer than that the farmer should accurately understand the nature of those materials and agencies which build up his crops and increase his herds. He should know whence the materials of his crops may be drawn, what ones are placed at his disposal naturally in surplus, and what must be provided by his own care. He should know how to control or work in harmony with the energies whose action is essential to his success. Agricultural chemistry inquires, first of all, what the plant and animal are made of. It finds that both, when living, consist largely of water, to the extent of forty to ninety per cent., which is indispensable to their existence as a vehicle for the process of circulation or transfer of nutriment. The dry plant or animal may be divided into matter volatile by heat, ninety to ninety-nine per cent., and one to ten per cent. of ash. The volatile or combustible matter is either organized—*i. e.* possesses a structure, or is a tissue of organs, inimitable by the art of man, through whose mechanism the principle of vitality operates—or else it consists of substances which are the direct results of chemical changes in the organized matter. Muscle-fibre and wood-fibre are of the former, sugar and urea are of the latter kind. The volatile matters are thence termed organic; they consist of carbon compounds, most of which are highly complex in their atomic constitution.

The most important organic matters of our staple field-crops are few in number—being, 1. The amyloids, compounds of carbon with hydrogen and oxygen, the last two being in the proportions in which they exist in water—viz., cellulose or wood-fibre, starch, the sugars and the gums; 2. The pectoids, also compounds of carbon, hydrogen, and oxygen, comprising pectose—the hard pulp of fruits and roots—and pectine, pectosic and pectic acids—the gummy or gelatinous matters of ripe and cooked fruits; 3. The fats and fixed oils; 4. The organic acids, oxalic, malic, citric, and tartaric; 5. The albuminoids, albumen, casein, fibrin, and their analogues, which, besides carbon, hydrogen, and oxygen, contain fifteen to eighteen per cent. of nitrogen, with one-half to one per cent. of sulphur. The ash of the plant consists of phosphates, sulphates, chlorides, silicates, and carbonates of potassium, sodium, calcium, magnesium, and iron.

The growth of a plant is the development of a germ or seed when acted upon by the solar ray, with access of water, air, and soil. The organic matters above enumerated as constituents of crops are exclusively generated and organized by the plant. Carbonic acid gas supplies carbon, water furnishes hydrogen and oxygen, while nitrogen is derived partially from minute quantities of ammonia mingled with the air. Nitrogen is, however, chiefly obtained from the nitrates of the soil. All the ash-elements come exclusively from the soil. The agriculturist cannot aid the nourishment of his crops except through the soil, and there he can only influence the supplies of water, of nitrogen, and of ash-elements. Carbon, the most abundant ingredient of all crops, making up forty-four to forty-eight per cent. of the dry matter, is furnished so fully by the atmospheric carbonic acid that additional supplies from the soil are not directly advantageous. The atmosphere contains, it is true, but a very small proportion of this gas—one-twenty-five hundredth of its bulk—but this is considerably in excess of the wants of the most luxuriant growth.

The fertility of the soil depends, chemically—1, upon the presence in it of all the ash-elements and of nitrates in proper quantity; and 2, on their occurrence there in such states of combination as give a constant and regulated supply. Numerous experiments have demonstrated that a soil destitute of any one of the following substances—viz., phosphoric acid, sulphuric acid, potash, lime, magnesia, oxide of iron—is absolutely barren by virtue of such deficiency. It is also certain that a soil which contains the usual amount of potash, but only in the form of feldspar, or of phosphoric acid, but only as apatite, or of magnesia, but only as serpentine, is infertile, because these substances do not yield their elements to the solvent agencies of the soil or plant rapidly enough to serve as plant-food. Alumina is an abundant element of soils, but it is always absent from agricultural plants; and recent investigations also appear to show that silica, which is present in many plants, is an accidental ingredient, and in no manner essential to their growth or perfection. Soda likewise appears to be unessential to most of the vegetative processes; for, although it is perhaps never entirely absent from cultivated plants, it often occurs in them in extremely minute quantity, so that the soda which is indispensable to the blood and milk of animals must be obtained, in part at least, directly from mineral sources.

Nitrates and ammonia-salts—which are the natural supplies of nitrogen to crops—rarely are, and never need be, present in the soil in more than the minutest proportion. It is only requisite that they be generated or gathered there as rapidly as crops remove them. The process of nitrification, whereby inert or inassimilable nitrogen existing in the soil or in the air is converted into nitric acid, is one of the utmost agricultural importance, though still largely involved in mystery.

The great bulk of any soil is chemically indifferent in the nourishment of the present crop. The weight of an average loamy soil is about 4,000,000 pounds per acre for each foot of depth. A crop of grain of thirty-three bushels removes but 140 pounds of ash-elements—viz., forty pounds in the seed and 100 pounds in the straw. A hay-crop of two tons carries off but 260 pounds of ash-ingredients. These quantities, if assumed to come from two feet of depth, are respectively but 1-30,000th and 1-57,000th of the entire mass of soil. Hellriegel's experiments give results which warrant us in concluding that 55 pounds of potash, 17 of soda, 17 of magnesia, 23 of lime, 55 of phosphoric acid, 11 of sulphuric acid, 8 of chlorine, and 54 of nitrogen (in the form of nitrates), are all that need be present, in soluble condition, in 1,000,000 pounds of soil, in order to establish there a fertility equal to the production of 33 bushels of barley-grain and 2000 pounds of straw per acre. In other words, the 140 pounds of ash-elements may be taken from 1,000,000 pounds of a soil in which but 186 pounds exist in soluble condition, and in which, therefore, the proportion of real plant-food—nitrogen, but not water, included—is but 1-4000th. Good soil, in the practical sense, however, yields, and may contain, a larger proportion of immediately available plant-food than one part in 4000, but rarely more perhaps than ten times that amount.

As cropping removes these substances from the soil, they are replaced more or less rapidly and completely by weathering, whereby, under the influence of moisture, carbonic acid and oxygen, aided by heat and by the alternations of heat and cold, the rock-dust of the soil is gradually fluxed into soluble pabulum, and charged with nitrates.

The soil is endowed with absorptive qualities which enable it to retain in a state of comparative insolubility certain ash-elements, especially those which are in general the least abundant—viz., phosphoric acid and potash—even when applied to it from external sources in the most soluble form and in large quantity. This absorption of plant-food by the soil is accompanied by a corresponding liberation of other substances, especially of lime and sulphuric acid. The impalpable matter of the soil, consisting largely of aluminous and ferruginous silicates, is mainly the seat of these absorptions; sand, silica, carbonate of lime, humus, and even pure clay (kaolinite), being destitute of the power in question.

Soils may be fully supplied with all the nutritive elements in proper quantity and form, and yet be infertile. This may happen on account of faults in physical condition, whereby they are rendered uncongenial to plants. A certain medium porosity, admitting of access and efflux of water, and a quality of being suitably warmed by the sun and of carrying heat through the cool of the night, are no less indispensable to high productive power than an appropriate chemical condition.

Manures improve the soil by supplying one or several of those ingredients required by plants which are deficient either by reason of yearly removal of crops or from original poverty of composition. Practice has taught that phosphates and nitrogen in assimilable form are most commonly the substances which strikingly benefit land, and chemical analysis shows that of these the former is ordinarily the least abundant ingredient of soils, and the latter is one which is not only not abundant, but one which rapidly wastes by solution in rain-water, being daily carried off in immense quantities, through springs and rivers, into the sea.

The action of fertilizers is not, however, fully explained by their affording a direct supply of lacking nutritive elements; manures operate indirectly to feed crops, by their chemical effects upon the soil. It has been abundantly demonstrated that common salt, gypsum, and other saline matters may react on the soil to convert potash and magnesia, for instance, into soluble forms, and thus to give the same result as would follow an immediate application of the last-named substances.

Certain manures which are used in large doses, such as stable-dung, peat, marl, and lime, also influence the fertility of the soil, by amending its texture or otherwise modifying its physical characters.

It is theoretically possible to produce a maximum crop of any given kind, continuously and perpetually, upon the same plat of land. In practice, however, it is far easier, and therefore far cheaper, to alternate or rotate crops. A hoed crop implies surface-tillage, several times repeated during the growing season, thus effectually exposing the upper soil to the oxidizing influence of the air. A field put into grass or clover is to some extent under opposite conditions. In the one case, organic matters waste rapidly; in the other, they accumulate in the soil. In the first instance, the surface-soil tends to lose that porosity and attractiveness for moisture due to the presence of humus, which is a quality of the utmost significance in climates subject to drouth. In the second instance, the soil gains in these respects. On the other hand, the lower soil, which under hoed crops is yearly broken up by repeated ploughing, may settle down to injurious compactness in a pasture or meadow. Deep-rooted crops affect the soil very differently from those whose radication is confined to near the surface. The reasons for rotation thus become, to some extent, apparent. Agricultural chemistry is competent to show, further, that some plants, while occupying the soil, enrich it, and, though yielding the farmer a large and valuable harvest, yet actually manure the land for a subsequent crop. Clover has long been known as a plant of this kind. A good clover-crop, when made into hay, removes from the soil twice or thrice the ash-elements and nitrogen that are contained in a good wheat-crop, and yet the good clover-crop will develop in a soil where the good wheat-crop can only be raised by help of manure. More than this, the good clover-crop not only grows on the unaided soil, but likewise fertilizes that soil, so that it can

subsequently make the good wheat-crop. The enriching effects of clover are absolute in respect of nitrogen. The clover plant is able, in a given time and on a given surface, to assimilate nitrogen much more rapidly, or to a much greater amount, than the wheat plant can. It therefore flourishes better on a limited supply, or gives a full crop where wheat would make perhaps but half a crop; and, besides, leaves in the soil where it has grown more nitrogen in its roots and stubble than an entire wheat-crop contains. In respect of ash-elements, the clover plant can add nothing to the soil in the way of quantity, but it strongly influences their quality. It transmutes the insoluble matters into soluble, and collects largely, by its deep-penetrating roots, from stores of food which the wheat plant can scarcely reach. When its roots decay, these substances remain where a succeeding wheat-crop can at once utilize them. This enriching process has again its narrow limits. If we keep land in clover, it becomes "clover-sick," probably from exhaustion of the deep-lying plant-food, and this disease is hard to cure, because of the inaccessibility of the subsoil to fertilizing applications.

By judicious rotation of crops a soil of moderate quality may be made to yield fair harvests without loss of productive power. In order thus to economize in the fullest degree the resources of soil and crop, the farmer needs an accurate knowledge of their nature, such as can only be obtained by encouraging the study of agricultural chemistry.

In studying the utilization of vegetable products for obtaining the various animal matters which are employed as food, etc., agricultural chemistry enters into a higher and more difficult field. Here it has been obliged, by numerous experiments, to test much of the empirical knowledge which agricultural practice had too vaguely supplied, and also finds itself under the necessity of investigating the most purely scientific questions of physiology. Although many useful practical results have been obtained, this department of our knowledge is extremely incomplete, and, save in technical details, is too closely allied to the general subject of animal nutrition to require notice in these pages.

Of useful books on agricultural chemistry, those of Liebig and Boussingault take pre-eminence; the former by their brilliant suggestiveness, the latter by their accurate experimental study of many points of the highest practical interest. In Germany, Wolff, Heiden, Knop, and Mayer have recently published excellent systematic treatises. Great Britain has produced no extended work since J. F. W. Johnston's "Lectures," which are still valuable, though far behind the time. In the United States, two books by S. W. Johnson have been received with favor. (See Liebig, "Agricultural Chemistry," 1841; "Modern Agriculture," 1859; "Natural Laws of Husbandry," 1863, etc.; Boussingault, "Economie Rurale," 1851; "Mémoires de Chimie Agricole," 1854; "Agronomie, Chimie Agricole," etc., 1860–68; Wolff, "Naturgesetzliche Grundlagen des Ackerbaues," 1856; "Landwirthschaftliche Fütterungslehre," 1861; Heiden, "Düngerlehre," 1868; Knop, "Lehrbuch der Agricultur Chemie," 1868; Mayer, "Agricultur Chemie," 1871; Johnston, "Lectures on Agricultural Chemistry and Geology," 1847; Johnson, "How Crops Grow," 1868; "How Crops Feed," 1870.)

S. W. Johnson.

Agricultural Geology—geology applied to agriculture—embraces whatever can be learned in regard to the nature of the substructure of any district with reference to drainage and water-supply, the origin, physical structure, and mineral constituents of soils, the distribution and properties of mineral fertilizers, etc. It is chiefly valuable as teaching the probable resources of a district in soil, subsoil, mineral manures, etc. To the farmer it is often desirable that he should know the results likely to be obtained from deep ploughing and deep draining. These depend greatly on the nature of the rock, the dip and compactness of the strata, and the form of the surface in reference to the stratification. In a majority of cases, the subsoil is derived from the underlying rock, and the soil is derived from the subsoil; so that for the most part the soil indicates the rock. Thus in any estimate of the fertility of land the nature of the underlying rock comes into consideration, for both the depth and texture of the soil depend, to a considerable extent, on the rock beneath, and the productiveness is dependent on these. Thus, soils formed from rocks which abound in phosphates are often of extraordinary fertility. Even the fossils and shells that are found in, and are characteristic of, rocks increase the value of the land where they occur.

Agricultural Schools. See Scientific Schools.

Agricultural System, a theory of political economy invented by F. Quesnay (physician to Louis XV.), who taught that those only increase the wealth of a country who develop the resources of the earth, such as the products of the vegetable and mineral kingdoms.

Agriculture [Lat. *agricultu'ra,* from *a'ger,* gen. *a'gri,* a "field" or "land," and *co'lo, cultum,* to "till;" literally, the "tillage (or cultivation) of land"] is the art of increasing and assuring, by human effort and care, the production and growth of such material substances as contribute to the sustenance or enjoyment of our race, whether directly or through the nourishment of such animals as minister to the comfort and well-being of mankind. Its origin and progress are nearly identical with those of civilization. The absolute savage gathers and consumes the seeds, nuts, roots, etc. that gratify his appetite or renew his wasted strength; he may collect and save them in seasons of plenty to minister to his needs in time of want, but he never thinks of planting or tilling with intent to increase his stores. Save under the immediate pressure of hunger or cold, he has no habit of working—no days or hours set apart for industry. Were it otherwise, he would cease to be a savage.

The barbarian is primarily a careless, nomadic cattle-breeder or shepherd. Having captured and domesticated certain animals, he spares a part of them for weeks, or months, or years, that they may be available in time of greater need. Some of them—the horse and the dog, for instance—he values and preserves, though, unless sorely pressed by hunger, he rejects them as food. Some rarely found, like the beaver, otter, mink, etc., he prizes for their fur, whereby he may defend himself against cold, and sometimes increase his personal attractions. The breeding and rearing of the horse, cow, sheep, camel, reindeer, ass, hog, etc. form the earliest and rudest department of barbarian industry. Poorly and scantily fed or sheltered, these animals increase slowly, and thousands of them are often swept off by the unusual severity of winter. Land is lightly valued by the ruder herdsmen: if one locality does not serve, they seek and find another. A great dearth or famine has sometimes set in motion tribe after tribe, until a hunt for food became a migration, then an irruption, overturning dynasties and subjugating races more polished but less warlike than their conquerors.

Though the origin of agriculture is lost in the darkness which shrouds pre-historic times, it can hardly be doubted that men first sowed seeds in the annually-inundated lower valleys of the Nile and other great rivers, which, cradled in distant mountains, are swelled by melting snows more slowly and equably than others. These valleys are often more or less extensively seeded by grains or nuts brought down by the floods; and when such seeding failed or proved inadequate, observation would soon teach those whose subsistence depended on the process to supplement or eke out Nature's niggard, capricious bounty by human providence and industry. Nature had presented a pattern whereon man might profitably improve. After a time the sower strewed his seeds over the face of the stilled and slowly-receding flood, knowing that the softened soil beneath would retain and cover the germs which the sun would speedily quicken: hence the Hebrew proverb, "Cast thy bread upon the waters, and thou shalt find it after many days." Such seeding required no animal or mechanical power, no implement but the human hand and arm, while the annual inundation supplied in abundance the elements of growth. Such was probably the infancy of agriculture.

But the area naturally inundated is small and limited, while, under favoring circumstances, population tends ever to increase. To cultivate more acres was indispensable; and the most facile, rather than the most fertile, were first selected for such use. But here the earth required breaking up and pulverizing; so the aid of strong, docile animals was soon invoked, and rude implements devised to render their muscular strength serviceable. The yoke and the plough were thus called into existence—both rude, as the yoke still measurably is; the original plough being a forked stick or tree-top, with one prong left five or six feet long for a beam, and the other shortened to a foot or two, and sharpened, to serve as a coulter and share. Asia, Africa—nay, even Spain and Portugal—have made but moderate improvements thereon to this day; while Western Europe and the United States have left the primitive plough almost out of sight. Yet it was not till the beginning of the eighteenth century that Jethro Tull persuaded a few British farmers that iron was the true, chief material for ploughs; and only the enlightened cultivators of the present century have substituted steel for iron.

The ruling classes in most nations of antiquity wronged themselves by degrading labor. In the Brahminical hierarchy, which has so long petrified a large portion of the human race, priests rank above soldiers, and soldiers form a caste which looks down on the tillers of the soil. Nearly all the ancient kingdoms of Semitic origin or genius, the Hebrews excepted, concurred substantially in this mistaken estimate. Greece should have been more enlightened, but her ruling caste also, in the days of her glory, was a

caste of warriors, while her soil was tilled mainly by slaves. Rome, in the days of her republican vigor, was a community of cultivators, every citizen being allotted land (usually about six acres), which he was expected to till with his own hands, as was done by some of her greatest warriors and wisest statesmen. But wars of conquest soon filled the republic with slaves captured in battle, and rural labor, as well as household service, was devolved on them, rendering tillage menial and (in the general regard) degrading. Agriculture drooped and withered under this burden, and Italy, naturally the garden of Europe, drew a great part of her bread for ages at first from Sicily, then from Egypt and other distant regions, which ignorance, neglect, and wretched husbandry could not render sterile or unfruitful. Feudalism in the West, Islamism in the East, planted themselves on the ruins of the mighty but corroded fabric of Roman power; and it was not till the Crusades had somewhat shattered the claims of feudalism that any substantial progress in agriculture was made since the ages of Moses and Homer. The average serf of Western Europe, at the date of the Norman conquest, and for generations thereafter, was nowise more fortunate, and was barely more efficient, than the Hebrew cultivator of the age of Samson or of David.

The law given by Moses, the book of Job, and the paintings still fresh and vivid in the Egyptian pyramids, together carry us back nearly or quite five thousand years, and show us that the plough has been in use for more than that number of years. Moses ordained that the soil should lie fallow every seventh year—a rude but tolerably certain mode of restoring, by rest and atmospheric influences, its exhausted fertility. Isaac, the son of Abraham, is said to have reaped a hundred-fold in one instance—a wondrous product if the crop were the most prolific known to Western Asia in that age. Indeed, historians agree that a yield of five bushels per acre of wheat was the full average of antiquity, if not beyond it. Rye, barley, and oats did better, though not much. Even middling husbandry, with modern implements and methods, yields at least twice as much per acre, and thrice as much per bushel of seed, as did that of Europe and Asia from ten to forty centuries ago. In the production of the grape, the olive, the apple, fig, etc., as also in the rearing of cattle, the ancients stood more nearly on a plane with us, save that their stock was inadequately and capriciously fed and sheltered in winter, whence great losses were from time to time encountered. A very few eminent breeders kept choice animals, but the great majority thought no more of blood in cattle than of grafting their apple trees or underdraining their marshes. In Greece, agriculture scarcely attracted the notice of the intellectual, powerful, and cultivated minority, who were intent on war and politics, art and music; and no work of noticeable ability survives to attest Greek devotion to, or interest in, the improvement of the soil. Rome was less sterile in this respect; her writers on agriculture proffered suggestions which, though more than two thousand years old, may still be pondered with profit by practical farmers. The original allotment of land to each Roman citizen ranging from two up to six acres, the advantage of thorough over shiftless cultivation is especially insisted on by them, while the advisability of early planting, tilling, harvesting, etc. is forcibly commended. Slavery having degraded labor, while luxury enervated the richer classes, Roman agriculture sank into decay, and Italy was for centuries largely supplied with bread-grain from abroad. The Northern barbarians who overturned and divided the Roman empire were but rude cultivators, and despised the arts of peace, as only befitting serfs and slaves. Of course they did nothing to improve the wretched methods of cultivation which they found in vogue in Greece, Gaul, Iberia, and Italy. But the Saracens, who soon wrested a great part of Southern Europe from the grasp of their degenerate offspring, introduced irrigation and kindred arts from Northern Africa, and made the Spanish peninsula flourish as it had never done till then. The fact that their revenue in Spain amounted in the tenth century to $30,000,000 (equal to twenty times that amount in our day) indicates an efficiency and a thrift in cultivation, as well as manufactures, unknown to their modern successors.

So long as Europe bent to the yoke of feudalism, agricultural improvement was scarcely possible. The tillers of the soil were mainly tenants at will, bound to rush to arms at the call of their lord, and liable to be dispossessed at his nod. They usually paid their rents in kind, and one who grew unusually large crops would have been promptly required to increase his quota of rent. Leases for fixed terms, or for two or more lives, gradually replaced the older methods, the landlords at length discovering that their own true interest required that the tenant should be incited to improve his processes, enlarge his fields, and increase his crops.

The condition of the masses under the feudal system precluded efficient cultivation. Sunk in the grossest ignorance, grovelling in superstitious fear of a haughty priesthood, taking the law from the mouths of their landlords or feudal masters, they had neither means nor will to improve their holdings and methods. Wheat they seldom ate; their scanty crops of this grain were required by their masters; rye, barley, and oats afforded their meat and their drink—beer or mead being their only luxury. Even the aristocracy of most European countries, but especially of England, knew few edibles but these, esculent vegetables being as yet few and poor. Says "The British Cyclopædia:" "It was not till the end of the reign of Henry VIII. that any salads, any carrots, or other edible roots were produced in England. The little of these vegetables that was used was formerly imported from Holland and Flanders." Butcher's meat had been and was abundant and cheap, only because most of the country was uncultivated, lay in common, and was ranged over by cattle that received little care and less fodder. The invention of printing, the discovery of America, the dayspring of inquiry and mental freedom inaugurated by Martin Luther, rung the knell of feudalism. The New World supplied some excellent edibles to the Old—Indian corn and the potato foremost among them. No other grain but rice yields food for man so bounteously as the maize; no other root is so generally acceptable as the potato, though several others yield a larger bulk or weight per acre. Even if the maize were already known to China and the far East, its value to Europe was not lessened. And even tobacco, though making a heavy draft upon the soil, has largely contributed to enhance the gains of the husbandman, since many communities pay as much annually for this seductive narcotic as for bread.

Modern agriculture dates from the invention of printing, and the consequent multiplication of books and of readers. "The Book of Husbandry," the first English work of decided merit devoted to tillage, was first published in the reign of Henry VIII. (1534), and is attributed to a judge named Fitzherbert. It is eminently practical in its inculcations, and nearly as minute in its descriptions as its lineal successor, Mr. Stephens's "Book of the Farm." It was soon followed by several others of like purpose, which are often judicious, though sometimes fantastic, in their recommendations. The introduction of red clover and the turnip into Great Britain, about 1645, probably did more for her farmers than all the books ever printed had thus far done. It is said that Lord Bacon, having assiduously collected all the works treating of agriculture known in his day, after dipping into them sufficiently to form an opinion of their contents, at length consigned them to the flames, saying that they laid down rules arbitrarily and with no regard to principles. We presume this sweeping criticism contemplated the writings of German and French, as well as British, writers on the art of cultivating the soil.

Jethro Tull, a gentleman farmer of Berkshire, whose "Horse-hoeing Husbandry" appeared in 1731, seems to have been the first author who contemplated the farmer's calling with the eye of genius. He had for thirty years been drilling in his crops with decided advantage, and he tells others how to profit by his example. He insisted on the advisability of repeated ploughings before seeding, and of sowing in drills so wide apart as to admit of cultivation with a horse-hoe. Underdraining being as yet unknown, he laid his land in ridges, with shallow ditches intervening; he sowed but three pecks of seed to the acre; he hoed his wheat in the fall, and again in the spring; and, making the ridges of this year on the ground allotted to the ditches of last year, he grew thirteen crops of wheat in succession on the same field, and maintained that the soil was nowise exhausted thereby. He thus anticipated the Loisweden practice of our day, which consists in marking off a (drained) field into strips three feet in width, cultivating these in alternate years, and tilling the fallow spaces between the strips of grain. It is claimed for this practice that the crop is as large as when all the ground is sown, and that wheat after wheat may thus be grown *ad infinitum!* Tull sowed turnip seed in the same drills or ridges, at depths of one, two, and four inches respectively, calculating that the lowest would germinate in spite of any but the severest drouth, and that, the young plants appearing at different times, a part of them must at all events escape the fly. British agriculture owes very much to the turnip, which grows luxuriantly in its moist, cool climate, yet is there left in the ground, scarcely touched by frost, until gnawed away gradually by sheep, which are thus fattened more cheaply than they otherwise could be.

The breeding of choice sheep and cattle received signal attention in Great Britain during the last century, and the improvements thus effected have been maintained and extended. The Durham and Alderney breeds of cattle, the Leicester, Cotswold, and other excellent breeds of long or

coarse-woolled sheep, are among the trophies of that century. The Merino was brought from its native Spain by George III. in 1788, but experience proved it unsuited to the British isles, where mutton is of more consequence than wool.

The high price of grain, caused by the persistent wars between France and England for twenty-five years prior to 1815, stimulated the progress of British agriculture. Scotland participated fully in this improvement, whereby millions of acres were reclaimed from heath and bog or rugged pasture, and made largely productive of grain and roots. Underdraining was greatly promoted by an act of Parliament providing that money should be advanced from the public treasury to defray its cost, upon the security of a first mortgage on the property thus reclaimed.

The progress of agriculture since 1800 has been so rapid that its recent triumphs outweigh all that preceded them. The use of dissolved bones as a fertilizer is hardly yet seventy years old, yet it has increased the annual grain-harvest of Great Britain by millions of bushels. For a generation the farmers of this and other countries saw cargo after cargo of bones taken from their shores to fertilize British fields, without even asking what this should suggest to them; but now they use all the bones attainable (mainly in the shape of superphosphate), and look around for more. Guano—whereby the fields of Peru and Chili were fertilized long before Columbus dreamed of a shorter passage westward to China and Japan—first found its way to Great Britain in 1841: its annual application already costs that country millions of dollars, and is still increasing. Lastly, the employment of steam in the direct service of agriculture, not only in threshing and winnowing, but in ploughing and tilling as well, is among the great and beneficent improvements of boundless scope and promise for which mankind are indebted to the intelligent and energetic cultivators and mechanicians of Great Britain.

American agriculture, like that of continental Europe, has too generally been content to follow and to copy where it might have pointed and led the way. Wrestling with giant forests, with stumps and roots, and often with a rocky or a sandy soil, with his capital absorbed in the purchase of his generally superabundant acres, the average American cultivator has been content to do as his grandfather did, heedless of all suggestions of improvement. Underdraining, deep-ploughing, the use of commercial fertilizers, etc., he instinctively dislikes, and resists so long as resistance is possible. Thus far the substantial triumphs of American agriculture have mainly been the trophies of mechanical genius. Thus, the cotton-gin of Eli Whitney has done more to diffuse comfort and plenty throughout the civilized world than any single achievement of an American farmer. Our people were among the first to reduce the weight and lessen the draft of the plough, and they have been among the foremost in its gradual transmutation from a rude implement, constructed mainly of wood, to one far more effective, whereof barely the handles are of wood, while the land-side, as well as the share, and nearly or quite all besides, are made of polished and excellent steel. In axes, scythes, hoes, spades, and nearly every other instrument of manual effort on a farm, our country may boast a decided superiority. In the profitable substitution of animal for manual exertion, however, have our most signal triumphs been won. By ploughing instead of hoeing Indian corn we have immensely increased the area cultivated, while reducing the cost of the product. Under our prompting the sickle has been superseded by the cradle in cutting all the smaller grains, and this again by the reaper, which cuts acres more rapidly than roods could be cut with the cradle. The mower (always akin to, and sometimes identical with, the reaper) has so reduced the cost and fatigue involved in our hay-harvest that cattle are kept far more cheaply in our old States, estimating their cost in hours of labor, than they could be prior to the last twenty or thirty years. Horse-rakes, hay-tedders, with fanning-mills and kindred devices for separating grain from chaff, threshers of many diverse patterns, corn-huskers, potato-diggers, etc., have immensely economized our labor and increased the bulk and value of our annual harvests. Underdraining, subsoiling, irrigation, etc. have as yet been naturalized among us entirely by the efforts of an enlightened but nowise numerous minority, but their benefits are so signal and indubitable that the many cannot long hesitate to adopt them.

In the use of steam in ploughing we are deplorably backward, owing in good part to our recent great and exhausting civil war. But for this a thousand portable steam-engines would doubtless have been tearing up our fields ere this, as is the case already in Great Britain, and must soon be here. As it is, we may fairly boast of *one* step in advance of our great rival. On the plantation of Mr. Effingham Lawrence, fifty miles below New Orleans, on the west bank of the Mississippi, the largest steam-engines yet constructed by Messrs. John Fowler & Co., the British makers of steam-ploughs and other cultivating machinery, are steadily and profitably employed, not merely in ploughing that glutinous, leathery clay to a depth of twenty-six to twenty-eight inches, but similar engines, worked entirely by blacks till recently slaves, are lifting and pulverizing to a depth of fully two feet the spaces which separate the rows of growing cane; and doing the work so thoroughly, when the cane is about one foot high, that it needs no further tilling till matured—the plants pushing their roots quickly into the mellow earth, and thence drawing sustenance for a growth so luxuriant as to smother and choke out all future weeds. So far as is known to this writer, no earlier cultivation of growing crops by steam has been seen on this planet.

And this is a hint by which thousands must profit. But few years can elapse before the vast prairies of the West and South-west will be cultivated largely, if not mainly, by steam—the same locomotive being employed to plough, seed, till, harvest, thresh, winnow, and perhaps transport the grain to the nearest steamboat wharf or railroad station. Working on untired through day and night, consuming nothing when idle, and thoroughly pulverizing fifty acres per day to a depth unattainable by horse-power, the steam-engine will prove here, as elsewhere, the mightiest friend and most useful servant ever vouchsafed to human genius at the call of an urgent need.

Early History of Agriculture.—As the Greeks and Romans appear to have arrived at as great a degree of perfection in legislation as the moderns, so they may be said to have attained great excellence in the art of agriculture. Till within the present century very little difference existed between the most approved agriculture of climates analogous to that of Italy and the agriculture of the Romans as described by Cato, Columella, and other ancient writers. The chief superiority of the moderns consists in their machinery, and especially in their knowledge of the sciences connected with this pursuit; the last, though extremely important, being of very recent date, and as yet by no means generally diffused. By science are not only acquired more enlightened and greatly improved methods of treating the soil, but superior breeds both of plants and animals have been originated; by improved machinery a more perfect tillage has been produced, and also a more complete separation of the produce of the soil from the refuse of the plants and other impurities.

In Great Britain the history of agriculture begins with the Roman Conquest. Julius Cæsar found the inhabitants in a state of semi-barbarism, but Agricola left them in possession of all the arts of civilization known to the Romans. Agriculture declined with the invasion of the Saxons, but was preserved through the dark ages after the establishment of Christianity by the intelligence of the members of religious establishments, who gradually became possessed of the greater part of the landed property in the country. The culture of the land will be found to have depended in every country principally on its climate and civilization, though partly, also, on its government and population. In the warmer climates, where nature produces fruits in the greatest abundance for the food both of men and animals, and where very little care is required to procure shelter or clothing, agriculture has made little progress, because it is comparatively unnecessary for the prosperity of the inhabitants. On the other hand, in climates of a directly opposite character agriculture has made equally slight progress, owing to the almost insurmountable obstacles opposed to it. It is therefore only in intermediate climates, where the soil admits of labor by man throughout a great part of the year, that agriculture is calculated to attain the highest degree of perfection.

Literature of Agriculture.—The literature of agriculture begins with the works of the Romans, of which COLUMELLA's work, "De Re Rustica," may be considered the most comprehensive and valuable. VIRGIL's "Georgics," a poem unequalled of its kind in any language, may be said to teach, with all the attractions of the most exquisite poetry, everything that was then known of the art of agriculture. In the dawn of modern agriculture, the principal writers were—Crescentius in Italy, Herrera in Spain, Olivier de Serres in France, Hereshbachius in Germany, and Fitzherbert in England. (For the recent literature of scientific agriculture, the reader is referred to the bibliography at the end of AGRICULTURAL CHEMISTRY.) At the beginning of the present century the most comprehensive author on agriculture in Italy was Fillippo Re; in France, Tessier; in Germany, Mayer; and in England, Marshall. About the best work from which a general idea may be obtained of the agriculture of France and corresponding climates is MAISON, "Rustique du xix^{e} siècle, ou Encyclopédie d'Agriculture pratique," complete in one volume, 8vo.; and the

corresponding British works are LOUDON's "Encyclopedia of Agriculture;" STEPHENS's "Book of the Farm;" MORTON's "Cyclopedia of Agriculture;" and WILSON's "British Farming." HORACE GREELEY.

Agriculture, Department of, was established by Congress in 1862 in Washington, D. C. By means of annual and monthly reports it diffuses information deemed advantageous to the agricultural interests of the country. It purchases and propagates seeds and plants, which are distributed to the people of the U. S. It is under the commissioner of agriculture, who is appointed by the President and confirmed by the Senate. It has a fine building, which stands W. of the grounds of the Smithsonian Institution. Connected with it are a museum, chemical laboratory, propagating gardens, and a library. Its monthly reports of the prospects of the staple crops are especially valuable. At the propagating gardens plants received by exchange from foreign governments and botanic gardens are tested with a view to introducing new and useful plants into this country.

Agrigen'tum (now *Girgen'ti*), an ancient city of Sicily, situated on the slope of a mountain on the S. coast of the island. It was founded about 582 B. C., and once had about 200,000 inhabitants. Here are magnificent ruins, among which are the temple of Concord (said to be the most perfect extant structure of the early Greek architecture), and the temple of Olympian Jupiter, about 350 feet long. (See GIRGENTI.)

Ag'rimony [Lat. *Agrimo'nia*], a genus of herbaceous plants of the natural order Rosaceæ. The *Agrimonia Eupatoria*, a native of Europe and the U. S., has been used in medicine. Several species grow in the Southern U. S.

Agrippa, King. See HEROD AGRIPPA.

Agrip'pa (HENRY CORNELIUS), a celebrated German physician, philosopher, and astrologer, was born at Cologne Sept. 14, 1486. He cultivated many departments of knowledge, and engaged in various pursuits in many countries of Europe. He acquired fame by his talents and his supposed skill in occult science, but he was regarded as an impostor and heretic by some of his contemporaries. He lectured on theology at Cologne and other places, and practised medicine in France. Among his works is a satire "On the Vanity of the Sciences" (in Latin, 1530). Died Feb. 18, 1535.

Agrip'pa (MARCUS VIPSANIUS), an eminent Roman statesman and general, born in 63 B. C. He became in his youth a friend of Octavius (afterwards the emperor Augustus), to whom he rendered important military services, especially at the battle of Actium, where he commanded the fleet, in 31 B. C. Agrippa and Mæcenas were the principal ministers and advisers of Augustus after he had obtained the supreme power. He married Julia, the daughter of Augustus, about 21 B. C., and had several sons, two of whom were adopted by the emperor. Died in 12 B. C.

Agrippi'na I., a Roman lady, the daughter of M. Vipsanius Agrippa and his wife Julia, was married to the famous Germanicus. Her virtue is highly commended. Died about 32 A. D.

Agrippina II., a daughter of the preceding, was born about 14 A. D. She was the mother of the emperor Nero, and was notorious for her profligacy and her crimes. Her third husband was the emperor Claudius, whom she killed by poison. She was put to death by her son Nero in 60 A. D.

Ag'telek, or **Bar'adla,** the name of one of the largest and most remarkable stalactitic caverns of Europe, is in the county of Gömör, in Hungary. Here is a labyrinth of caverns, one of which is 96 feet high, 90 feet wide, and extends about 900 feet in a direct line.

A'gua, Volcan' de (*i. e.* "volcano of water"), a mountain of Central America, in the state of Guatemala, situated about 25 miles S. W. of Guatemala; so called from the fact that it sometimes pours forth torrents of water. The old town of Guatemala has been twice destroyed by it. Its crater is 15,000 feet above the sea-level.

A'guas Calien'tes (*i. e.* "warm springs"), a state of Mexico, is bounded on the N. by Zacatecas, on the E. by Guanajuato, on the S. by Lake Chapala, and on the W. by Xalisco. Area, 2217 square miles. The surface is partly level and partly hilly, and in the N. are branches of the Sierra Nevada. The soil is very fertile, but poor in minerals. Pop. in 1868, 140,630.

Aguas Calientes, a town of Mexico, the capital of the state of its own name, is on a plain or table-land 6000 feet above the level of the sea, and 250 miles N. W. of the city of Mexico. It has numerous churches and three convents, and is surrounded by gardens and orchards of olives, pears, figs, etc. Hot springs occur in the vicinity. Pop. about 39,000.

A'gue [probably from the Fr. *agu*, an old form of *aigu*, "sharp," in allusion to the violence of the disease] is the common name for the INTERMITTENT FEVER (which see).

Aguilar' de la Fronte'ra, a town of Spain, on the Cabra, 22 miles S. S. E. of Córdova, is noted for the whiteness of its houses and the cleanness of its streets. It has several fine public squares, a town-hall, and a dismantled Moorish castle. Pop. 11,836.

Aguilar (GRACE), a Jewish authoress of Spanish extraction, was born at Hackney, near London, June 2, 1816. Among her numerous works are "Women of Israel," "Home Scenes and Heart Studies," and "Home Influence, a Tale." She died at Frankfort Sept. 16, 1847.

Agulhas, Cape, the most southern point of Africa, is about 100 miles E. of the Cape of Good Hope. A lighthouse was erected on it in 1849; lat. of lighthouse, 34° 49′ 8″ S., lon. 20° 0′ 7″ E.

Agusti'na, called the "Maid of Saragossa," died at Cueta, Spain, in 1857. She greatly distinguished herself during the siege of Saragossa by the French in 1809, and as a reward for her services was made a lieutenant in the Spanish army, and received numerous decorations. Byron extols her in "Childe Harold," canto i., stanzas 54, 55, 56.

Agyn'ians [from the Gr. *α*, neg., and *γύνη*, a "woman"], a Gnostic sect of the seventh century who condemned marriage and the use of certain kinds of meat.

A'hab [Heb. *Achab*], eighth king of Israel, who reigned B. C. 915–895. His wife was Jezebel, daughter of Ethbaal, the usurping king of Tyre. He dwelt at Jezreel, which he adorned with splendid buildings. The story of his weakness, his idolatry, and the stern opposition of the prophet Elijah is related in the first book of Kings. Ahab was killed in battle with Benhadad, king of Damascus.

Ahan'ta, a negro kingdom in Upper Guinea, which was formerly independent, but was conquered by Ashantee. It is one of the healthiest, richest, and most civilized districts on the coast, having a fertile and well-cultivated soil. The chief productions are sugar-cane, rice, and timber. The chief articles of export are palm oil, ivory, and gold. In 1683, Frederick William, the great elector, attempted to start a colony here, but in 1718 Prussia sold all her possessions on the Gold Coast to the West India Company in Amsterdam. The Dutch took possession of several other districts in this neighborhood, but in 1872 ceded all their possessions on the Gold Coast to Great Britain.

Ahasue'rus, the name of one Median and two Persian kings mentioned in the Old Testament. The Ahasuerus of Esther was probably Xerxes, the invader of Greece, who reigned from 486 to 465 B. C. He invaded Greece in 480, and is supposed to have married Esther the year after.

A'haz [Heb. *Achaz*, "possessor"], twelfth king of Judah after its secession from Israel, reigned B. C. 740–726. His reign was greatly disturbed by the attacks of Rezin, king of Damascus, and Pekah, king of Israel, as well as those of the Edomites and Philistines. Ahaz called to his aid the powerful Tiglath-Pileser, king of Assyria, who overthrew the enemies of Judah, but made Ahaz his vassal, and carried off rich treasures from the temple and palaces of Jerusalem. Ahaz was an idolater. A statement in 2 Kings xvi. 2 as to his accession would make his son and successor, Hezekiah, to have been born when he was eleven years old, but this must be a transcriber's error or the date of a viceroyship.

Ahazi'ah, ninth king of Israel, succeeded his father Ahab, and ruled under the direction of Jezebel, his mother, B. C. 895–894.—Also the name of the sixth king of Judah, B. C. 884–883. A famous error of some transcriber (2 Chron. xxi. 5, 20) makes him younger than his own son.

Ahith'ophel [Heb. *Achithophel*, "foolish"], a Hebrew politician and councillor of David. He took the side of Absalom in his rebellion, but, foreseeing the failure of the enterprise, went home and hanged himself.

Ahl'feld (JOHANN FRIEDRICH), an eminent German preacher, born Nov. 1, 1810, became in 1847 clergyman in Halle, and in 1851 in Leipsic, and gained in both places the reputation of an excellent pulpit orator. He published several collections of sermons, all of which have had a large sale.

Ahl'quist (AUGUST ENGELBERT), a celebrated Finnish philologist, born Aug. 7, 1826, not only made the Finnish language his especial study, but also made it his object to raise it to the rank of a written language, and to create a national Finnish literature. For this purpose he travelled under the greatest difficulties through Northern Russia and Siberia to acquaint himself with the tribes of the Uralian-Altaic race living there. At present he is professor of Finnish language and literature in the University of Helsingfors. His chief works are "An Attempt at a Moksha-

Mordwinian Grammar" (1862), a "Grammar of the Wotish Language," and a description of his travels in Siberia (1853–58). He has also written many poems in the Finnish language, and made several translations from the German of Schiller.

Ahl'wardt (THEODORE WILHELM), a German Orientalist, born July 4, 1828, became in 1861 librarian and professor of Oriental languages at the University of Greifswalde. He published "Chalef el Ahmars Qasside" (1859), besides several historical works.

Ah'med IV., sometimes called **Abd'ul-Hâmid,** a Turkish sultan, born in 1725, succeeded to the throne in 1773. His reign is chiefly notable on account of the two disastrous wars with Russia, in which Turkey lost the Crimea, a portion of Circassia, with some other territories, and a number of important fortresses. Died in 1789.

Ah'medâbâd' (*i. e.* "the abode of Ahmed"), a city of British India, in the presidency of Bombay, is on the river Subbermuttee, 16 miles by rail N. N. W. of Surat; lat. 23° 1′ N., lon. 72° 48′ E. It was formerly a large and magnificent capital, but is now much decayed. Here are several beautiful mosques and other remains of its ancient splendor. It was founded by Ahmed Shah in 1412. Pop. estimated at 130,000.

Ah'mednug'gur (*i. e.* the "fort of Ahmed"), a city and fortress of British India, in the presidency of Bombay, on the Seena, 162 miles by rail E. of Bombay. It was taken by General Wellesley in Aug., 1803, and the fortress is now held by a British garrison. Pop. about 20,000.

Ah'medpoor'-Barra (*i. e.* "great Ahmedpoor"), a town of Hindostan, situated in a fertile tract 30 miles S. W. of Bhawlpoor. It has manufactures of matchlocks, gunpowder, cotton, and silk stuffs. Pop. about 20,000.

Ah'mood, a town of British India, in the presidency of Bombay, 12 miles N. by W. of Baroach. Pop. about 13,000.

Ahn (JOHANN FRANZ), a German writer and author of a new method of learning foreign languages, born at Aix-la-Chapelle Dec. 15, 1796, published a "Practical Course for the Quick and Easy Acquisition of the French Language" (167th ed. 1870), and other similar works, which have found an immense circulation. His method has been imitated by many other writers. Died Aug. 21, 1865.

Ah'napee, a post-village of Kewaunee co., Wis., in a township of its own name. Pop. of township, 1544.

Ah'rens (HEINRICH), an eminent German, born July 14, 1808, lectured in Paris in 1833 on the history of German philosophy since the time of Kant, and became in 1834 professor of philosophy in Brussels, in 1850 professor of abstract law and political economy at Graz, in 1859 of practical philosophy and political science at Leipsic, and in 1863 was elected representative of the university in the first chamber of Saxony. His principal works are "Cours de droit naturel" (6th ed. 1869; German ed. 1846); "Philosophie des Rechts" (1851–52; 6th ed. 1870); "Juristische Encycl." (1855–57), which has been translated into several foreign languages.

Ah'riman, the principle of evil among the ancient Persians. (See ORMUZD.)

Ai, the native name of the *Bradypus tridactylus*, or three-toed sloth, an edentate mammal of South America. There are several varieties of this animal. It takes its name from the loud cry which it makes while moving in the forests. It is very tenacious of life, and will move its legs long after it has been disembowelled and beheaded. In habits it resembles the other sloths.

A'i (a "ruin"), a city of Palestine, which was destroyed by Joshua. Its site is not positively known.—Also a city of Ammon, destroyed by the Babylonians.

Aid, a post-village of Lawrence co., O., in a township of the same name. Pop. of township, 1476.

Aid'an, SAINT, first bishop of Lindisfarne, was born in Ireland, and was sent as a missionary bishop to Northumbria by the bishop of Iona about 635 A. D. He was successful in establishing Christianity, being aided by the king and nobles. His life was adorned by charity, humility, and all the Christian virtues. Died Aug. 31, 651.

Aides-de-Camp, confidential officers selected by general officers to assist them in their military duties, are *ex-officio* assistant adjutants-general (act Mar. 2, 1821). They are in the U. S. service attached to the person of the general, and receive orders only from him. Their functions are difficult and delicate. Often enjoying the full confidence of the general, they are employed in representing him, in writing orders, in carrying them in person if necessary, in communicating them verbally upon battle-fields and other fields of manœuvre. It is important that aides-de-camp should know well the position of troops, routes, posts, quarters of generals, composition of columns, and orders of corps. It is necessary that their knowledge should be sufficiently comprehensive to understand the object and purpose of all orders, and also to judge in the varying circumstances of a battle-field whether it is not necessary to modify an order when carried in person, or if there be time to return for new instructions. (*Scott's Military Dictionary.*) The existing law of the U. S. allows six aides-de-camp (colonels) to the general; two and a military secretary (lieutenant-colonels) to the lieutenant-generals; three (captains or lieutenants) to a major-general; and two (lieutenants) to a brigadier-general.

Aidin', or **Guzel-Hissar** (anc. *Tral'les*), a town of Asiatic Turkey, in Anatolia, on the river Mender (Meander), about 68 miles S. E. of Smyrna, with which it is connected by railroad. It has a large trade, being next to Smyrna in commercial importance, and is the residence of a pasha. Here are several fine mosques and synagogues. American missionaries have established here a flourishing Protestant mission. Pop. estimated at 15,000.

Aido'ne, a town of Sicily, in the province of Caltanisetta, 20 miles E. S. E. of Caltanisetta. Here are mineral springs. Pop. in 1861, 5229.

Aiguebelle, a small town of France, in Savoy. Pop. about 1100. Here the combined French and Spanish armies defeated Duke Charles Emmanuel III. of Savoy in 1742.

Aiguebelle, d' (PAUL ALEXANDRE NEVEUE), a French naval officer in the service of China, was born Jan. 7, 1831. He took part with the Franco-Chinese corps against the Taï-Pings, and took in 1864 the important city of Hang-Chow-Foo. He entered the Chinese service, was created a mandarin of the first rank, organized an important military arsenal at Foo-Chow-Foo, and in June, 1869, he launched the first man-of-war of the new navy built on the European plan. He was then made grand admiral of the Chinese fleets, which title was expressly created for him.

Aigues Mortes, a town of France, in the department of Gard, 19 miles from Nîmes. Pop. in 1866, 3932. The large saline works of Peccais are in the neighborhood. An interview between Francis I. of France and the emperor Charles V. took place here in 1538.

Aiguille [Fr., a "needle"], the name of numerous sharp-pointed peaks in the Alps.

Aiguillon (ARMAND VIGNEROD DUPLESSIS RICHELIEU), DUKE OF, a French statesman, born in 1720, was governor of Alsace, and afterwards of Brittany. He gained the favor of the king's mistress, Madame du Barry, and through her influence was made prime minister. Upon the accession of Louis XVI. he was removed from office and banished from court, and died in 1782.

Aiken, a county of South Carolina, formed in 1873 from parts of Barnwell, Edgefield, Lexington, and Orangeburg counties. It is bounded on the W. by the Savannah River. Area, 900 square miles. The principal minerals are kaolin (which is largely exported) and burr mill-stone. Cotton goods, paper, and pottery are manufactured.

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Aik'en, the county-town of the county of the same name in South Carolina, is noted as a resort for invalids, especially those suffering from pulmonary complaints. Being situated on a plateau 600 feet above the level of the sea and 400 feet higher than the city of Augusta, which is 17 miles distant, and the soil being sandy and porous, the system of natural drainage is almost perfect, rendering the atmosphere peculiarly dry and elastic. The dew-point is invariably low. The climate is a mean between the dry, cold region of Minnesota and the moist, temperate section of Florida, and has proved efficacious in restoring health to invalids in thousands of cases. It is easily accessible by means of the South Carolina R. R., on which it is located. The appearance of the town, with its broad streets, 150 feet wide, is pleasing and attractive. Besides public or free schools, there are several private schools, seven churches (Methodist, Baptist, Catholic, Presbyterian, and Episcopalian, and colored Methodist and Baptist), two weekly newspapers and one daily, a lyceum hall, and a reading and club room supplied with the daily papers and periodicals. The hotels, of which there are two capable of accommodating over 100 guests each, and the private boarding-houses, are well kept and adapted to the requirements of invalids. Each year the number of visitors increases as the characteristics of this locality become better known. During the season of 1872–73 some 1850 names were registered. Pop. of township, 2259. JOHN S. SHUCK, ED. "AIKEN JOURNAL."

Aiken (CHARLES AUGUSTUS), D. D., LL.D., was born at Manchester, Vt., Oct. 30, 1827, graduated at Dartmouth College in 1846, and at Andover Theological Seminary in

1853, was pastor of a Congregational church in Yarmouth, Me., from 1854 to 1859, professor of the Latin language and literature at Dartmouth from 1859 to 1866, professor of Latin in the College of New Jersey from 1866 to 1869, president of Union College from 1869 to 1871, and is now professor of Christian ethics and apologetics in the Princeton Theological Seminary. He translated and edited the book of Proverbs in the American edition of Lange's "Commentary," and has published several articles in the "Bibliotheca Sacra" and "Princeton Review."

Aiken (William), born in Charleston, S. C., in 1806, graduated at South Carolina College in 1825. He was prominent in public affairs, was governor of South Carolina (1844–46), and a Democratic member of Congress (1851–57). He was a man of great wealth, being proprietor of Jehossee Island, where he formerly employed 1000 slaves in rice-culture. He was distinguished while in public life by his wisdom and moderate views, and has contributed largely to the cause of education and to benevolent objects. While in Congress in 1857 he lacked but one vote of becoming Speaker of the House of Representatives.

Aik'in (John), M. D., an English writer, born in Leicestershire Jan. 15, 1747. He produced, conjointly with his sister, Mrs. Barbauld, an instructive juvenile book called "Evenings at Home" (1792–95), which had great popularity. He practised medicine in London and other places. Among his numerous works is a biographical dictionary, entitled "General Biography" (10 vols. 4to, 1815). He edited the "Monthly Magazine" (1796–1806). Died Dec. 7, 1822.

Aikin (Lucy), a daughter of the preceding, born Nov. 6, 1781, wrote, besides other works, a memoir of her father (1823), and "Life of Joseph Addison" (1843). Died Jan. 29, 1864.

Aik'man (William), a distinguished Scottish painter, born at Cairnby Oct. 24, 1682; died in London June 7, 1731.

Ailan'thus, or **Ailan'tus** (*i. e.* "tree of heaven"), a tree which is a native of China, and has remarkably large pinnate leaves. It grows rapidly, and is often planted as an ornamental or shade tree in the cities of Europe and the U. S. The foliage is handsome, but it causes much annoyance by the rapid spread of suckers from the parent tree. The staminate flowers, which are borne on distinct trees, have an offensive odor that often produces headache and nausea. The female plants are free from this objection, and the clusters of winged fruit which they bear are quite ornamental, so that they should always be chosen for shade trees. Besides the above (*Ailanthus glandulosus*) there are several other species, chiefly tropical. They belong to the order Simarubaceæ.

Ailanthus Silkworm (the *At'tacus cyn'thia* of the naturalists) is so named from its feeding on the leaves of the ailanthus tree. The silk obtained from this worm is extensively used in China and it is even thought by some that it will, for most purposes, ultimately supersede the culture of the common silkworm, as it is much hardier and not subject to many diseases to which the other is liable. In addition to this, the tree is easily cultivated, being readily acclimatized in most temperate countries. The eggs are hatched in a similar manner to those of the common silkworm, and the larvæ, after being fed through their first moult with picked leaves, are transferred to the trees, and there left.

Ailanthus Silkworm.

Ailly, Peter of, an eminent French prelate, born in Picardy in 1350. He became archbishop of Cambray in 1395, and a cardinal in 1414. He denounced and wished to reform some abuses in the Church. He was called "Malleus Hæreticorum" and "Aquila Doctorum." Died about 1420.

Ailred (**Æthelred** or **Alured**), Saint, Cistercian abbot of Rievaulx, Yorkshire, born in England in 1109, was educated in Scotland. He wrote numerous sermons, histories, and other works, part of which were edited by Twisden (1652), by Camerarius (1631), and by one Gibbon (Douai, 1631). Died Jan. 12, 1166.

Ail'sa, Marquesses of (1831), Barons Ailsa (1806, in the United Kingdom), earls of Cassilis (1509); Barons Kennedy (1452, in Scotland); baronets (1632, in Scotland), a prominent family of Great Britain.—Archibald Kennedy, the third marquess, born Sept. 1, 1847, succeeded his father in 1870.

Ail'sa Craig, an island 10 miles from the coast of Ayrshire, Scotland. It is a crag of trap-rock of a somewhat columnar character. It is 1098 feet high, and 2 miles only in circumference. It is not inhabited. It gives his title to the marquis of Ailsa, its proprietor.

Ailu'rus* Ful'gens, the scientific name of an animal of the class Mammalia, order Carnivora, family Ursidæ, found in the mountains of Nepal. By the inhabitants of that country it is termed *panda, chitwa,* and *wah,* the last name having been given it on account of its peculiar cry. It is about the size of a large cat, and is remarkable for its singularly rich and beautiful fur, which is mostly of a bright chestnut-brown, but deepens into a fine rich black on the chest and outside of the legs. It has a short head and a thick muzzle. The head is of a whitish fawn-color, with a ruddy chestnut spot under each eye. The tail is of the same color as the body, being marked with a series of dark rings. "The coat of the panda is not only handsome in appearance, but is very thick, fine and warm in texture, being composed of a double set of hairs—the one forming a thick woolly covering to the skin, and the other composed of long glistening hairs, that pierce through the wool and give the exquisitely rich coloring to the surface of the fur." Cuvier regarded the panda as the most beautiful of known quadrupeds. It is much to be regretted that these animals do not exist in sufficient numbers to render their fur an article of commercial value. The food of the panda is chiefly of an animal character, consisting of birds, their eggs, the smaller mammalia, etc. Its habits are partly arboreal.

Aimard (Gustave), a French novelist, born about 1818, came to America at an early age, and after a short stay travelled throughout Southern Europe. Among his works are "Les Trappeurs de l'Arkansas" (1858), "Les Aventuriers" (1863), "L'Araucan" (1864), etc.

Aimé-Martin (Louis), a French writer, born in 1786, became in 1815 secretary of the Chamber of Deputies. He published, among other works, "Lettres à Sophie sur la physique, la chimie et l'histoire naturelle" (1810), and "L'éducation des mères de familles" (1834). He also published the complete works of Bernardin de St.-Pierre, with a biography of the author. Died June 22, 1847.

Ai'mon, or **Ay'mond,** a French Benedictine of Fleury, wrote a "Historia Francorum," extending from 253 to 654; also a life of Abbo of Fleury, and other works. Died in 1008.

Ain, a department of Eastern France, is bounded on the N. by the departments of Saône-et-Loire and Jura, on the E. by Haute Savoye, on the S. by Isère, and on the W. by Rhône and Saône-et-Loire. Area, 2239 square miles. The department is watered by the Rhône and the Saône, which flow along its boundaries, and by the Ain. The western part consists of a large plateau, which is very fertile. In the E. large mountain-ranges prevail, which contain iron, asphaltum, and the best lithographic stones in France. It it is subdivided into 5 arrondissements, 35 cantons, and 450 communes. Pop. in 1872, 363,290. Chief town, Bourg-in-Bresse.

Ain'müller (Maximilian Emanuel), a German painter, born at Munich Feb. 14, 1807, is noted as the restorer of the art of painting on glass. Among his works are the windows of the cathedrals of Ratisbon and Cologne. Died Dec. 8, 1870.

Ai'nous, or **Ainus,** a savage race inhabiting the Koorile Islands. They have mainly attracted attention from the greatly exaggerated, though not utterly false, statements of travellers, that their bodies were entirely covered with hair; from which circumstance they are often called "hairy Kooriles." They are said to be of a mild and amiable disposition. They worship the sun and moon, but have no priests or places set aside for religious services. They have a written language. (See "My Last Cruise," by Lieut. A. W. Habersham, of the U. S. Navy, 1857.)

Ains'worth, a post-village of Washington co., Ia.

Ainsworth (Robert), an English classical scholar, born near Manchester in 1660, taught school in London. He published a well-known Latin dictionary (1736). Died April 4, 1743.

Ainsworth (William Francis), an English physician and geologist, born at Exeter Nov. 9, 1807. He accompanied Colonel Chesney on an expedition to the Euphrates in 1835. He published "Researches in Assyria" (1842), and "Travels and Researches in Asia Minor, Mesopotamia, Chaldea, etc." (2 vols., 1842).

* Ailurus signifies "having a waving tail," like that of a cat; from αἰόλος, "quickly moving" or "waving," and οὐρά, a "tail."

Ainsworth (William Harrison), an English novelist, born in Manchester Feb. 4, 1805. He published "Rookwood" (1834) and "Jack Sheppard" (1839), the latter of which had an extraordinary success, and "The Tower of London." In 1845 he became the proprietor of the "New Monthly Magazine." His numerous stories have had great popularity.

Aintab′, a town of Asiatic Turkey, on the S. slope of Mount Taurus or Alma-Dagh, about 60 miles N. of Aleppo, and 92 miles N. E. of Antioch. It is well built, and has manufactures of leather, woollen cloths, etc. The American Protestant missionaries have had for years a flourishing mission among the Armenians of this town. Pop. 43,410.

Air [Gr. *ἀήρ*, from *ἄω*, to "breathe;" Lat. *a′ĕr*] was considered an element by the ancient philosophers, but it is now known to be a mixture of oxygen and nitrogen with some other gases. (For information respecting the properties and phenomena of the air, see Acoustics, by Prof. O. N. Rood, A. M.; Barometer, by Pres. F. A. P. Barnard, S. T. D., LL.D., L. H. D.; and Pneumatics.)

Air (in painting). See Aërial Perspective.

Air, a town of Africa. See Asben.

Air-Bed, a sleeping apparatus made of air-tight cloth or vulcanized india rubber, divided into compartments and inflated with air. The coolness, cleanness, and elasticity of this bed render it desirable for the use of the sick.

Air-Bladder, or **Swimming-Bladder,** an organ in fishes which enables them to modify their specific gravity, and to move easily upward or downward, by increasing or diminishing the volume of air (in some instances replaced by nitrogen) in the bladder. This air is supposed to be obtained by secretion. The mackerel and some other species of fish have no air-bladder. It is the analogue of the lungs of air-breathing animals.

Air-Cells, in birds, are cavities connected with the respiratory system, and are distributed over the inside of the chest and abdomen. They also penetrate the bones and quills. Communicating with the lungs, they give a great extension to the surface with which the air inhaled comes in contact, and serve to increase the muscular energy and the animal heat, and to diminish the specific gravity.

Air-Cells, in plants, are spaces in the cellular tissue, containing air. They occur chiefly in aquatic plants.

Air′drie, a market-town and parliamentary borough of Scotland, in the county of Lanark, 11 miles E. by N. of Glasgow, with which it is connected by railway. It is well built and lighted with gas. The growth and prosperity of Airdrie have been increased by mines of iron and coal which are worked in the vicinity. Pop. in 1861, 12,922.

Aire-sur-l'Adour, an old town of France, on the river Adour, 20 miles S. E. of Mont de Marsan, is the seat of a bishop, has a cathedral and a college. It was once the capital of the Visigoth kings. Pop. in 1866, 4885.

Aire-sur-la-Lys, a fortified town of France, in Pas de Calais, on the river Lys, 10 miles S. E. of St.-Omer. It has a Gothic church, and manufactures of woollen stuffs, hats, and soap. Pop. in 1866, 8803.

Air-Gun, an instrument for projecting bullets or other missiles by means of the elastic force of condensed air. A strong reservoir of metal is constructed, into which air is forced by a condensing syringe. The reservoir may be of any form, but it is most conveniently disposed of by placing it within the stock. The bullet should fit the barrel very exactly, so as to leave no windage. On pulling the trigger, the condensed air escapes through the valve and rushes with violence into the barrel, propelling the bullet before it; and the instant the finger is withdrawn from the trigger, the valve is closed by the pressure of the air in the magazine, which remains in a somewhat less condensed state for the next discharge. Thus the same supply of air in the magazine will serve for several successive discharges, but the force becomes weaker and weaker after each. The force with which a projectile is propelled from an air-gun is commonly much less than that produced by an ordinary discharge of gunpowder, but they may be so made as to be very formidable weapons.

Air′lie, Earls of, Barons Ogilvy of Airlie (1491), Barons Ogilvy of Alyth and Lintrathen (1639, in the Scotch peerage), a prominent family of Great Britain. The first earl of Airlie was created in 1639.—David Graham Drummond Ogilvy, the tenth earl, was born May 4, 1826, and succeeded his father in 1849.

Air-Plants, a term applied to certain epiphytic tropical plants, which hang in festoons from forest trees, and are able to live suspended in the air, without the presence of earth or water. The family of Orchidaceæ furnishes some beautiful specimens of air-plants.

Air-Pump, a machine by which a partial vacuum is formed and air is exhausted from a vessel, was invented by Otto Guericke in 1654, and subsequently improved by several persons. It consists of a circular brass plate, on which is placed a bell-glass, called a receiver, and two vertical brass cylinders, each of which is furnished with a piston. By means of a hole in the centre of the plate, and a connecting tube, a communication is formed between the receiver and the cylinders. The movement of the piston expels the air from the cylinders, into which a portion of air then rushes from the receiver, and a valve is placed at the mouth of the connecting tube, so that no air can return into the receiver. Another valve in the piston opens outward and permits the air to escape. The air-pump is used in many scientific experiments to demonstrate the pressure of the atmosphere and various other properties of air.

Air′y (George Biddell), C. B., LL.D., D. C. L., F. R. S., born at Alnwick, Northumberland, June 27, 1801, graduated B. A. at Trinity College, Cambridge, in 1824, being senior wrangler. In 1826 he became Lucasian professor of philosophy, and in 1828 Plumian professor of astronomy. In 1835 he was appointed astronomer-royal, and placed in charge of the Greenwich Observatory. Dr. Airy has attained a very high rank as an astronomer and physicist, and has written much upon weights, measures, coinage, railways, and other kindred subjects. He has made important improvements in astronomical and philosophical instruments. He wrote the article "Gravitation" in the "Penny Cyclopædia," and "Trigonometry," "Figure of the Earth," and "Tides and Waves" in the "Encyclopædia Metropolitana;" also "Mathematical Tracts," "Ipswich Lectures on Astronomy," "Errors of Observation," treatises on "Sound," "Magnetism," etc., besides very numerous and important monographs and papers for periodicals.

Aisne, a river of the N. part of France, rises in the department of Meuse, flows nearly westward, passes by Soissons, and enters the Oise near Compiègne. Length, about 150 miles. The canal of Ardennes connects it with the Meuse.

Aisne, a department in the N. of France, is bounded on the N. by the department Nord, on the E. by Ardennes and Marne, on the S. by Seine-et-Marne, and on the W. by Oise and Somme. Area, 2839 square miles. It is traversed by the Oise, the Aisne, and the Marne rivers. The soil is fertile, and the manufacturing industry in this department is very large. Wheat and hay are among the staple productions. It is subdivided into 5 arrondissements, 37 cantons, and 837 communes. Chief town, Laon. Pop. in 1872, 552,439.

Aissé (Mademoiselle), a Circassian woman, born in 1693, was bought at the age of four years by the French ambassador in Constantinople, who brought her to France. Her position in society, together with her romantic adventures, gave her quite a celebrity in the last century. Died in 1733. Her letters were published, with notes, by Voltaire in 1787, and with notes by Mad. St.-Beuve in 1846.

Ait′kin, a county in the central part of Minnesota. Area, 720 square miles. It is bounded on the S. W. by Lake Mille Lacs, and the N. by Cass and Itasca counties. It is traversed by the Northern Pacific R. R. The surface is undulating. Pop. 178.

Aitze′ma, van (Lieuwe), a Dutch historian, born at Doccum in 1600, wrote a "History of the Netherlands from 1621 to 1668" (15 vols.), which is highly commended. Died in 1669.

Aix, āks (anc. *A′quæ Sex′tiæ*), a city in the S. E. part of France, in the department of Bouches-du-Rhône, 33 miles by rail N. of Marseilles. It was formerly the capital of Provence, and was a celebrated seat of learning in the Middle Ages. It is the seat of an archbishop, has a fine cathedral, a city hall (hôtel de ville), a museum, a royal college, and a public library containing about 100,000 volumes. Here are manufactures of silk and cotton, and warm mineral springs, from which it derived its ancient name. Pop. in 1866, 28,152.

Aix, a small town of France, in Savoy, in a delightful valley 8 miles N. of Chambéry. It is near Lake Bourget, and has thermal springs, which are much frequented. Here are some ancient Roman ruins. Pop. in 1866, 4430.

Aix-la-Chapelle [Lat. *A′quis Gra′num;* Ger. *Aa′chen*], a city of Rhenish Prussia, is situated on the frontier of Belgium, and on the railway which connects Liege and Cologne, 44 miles by rail W. S. W. of the latter. It was once a famous city, and the capital of the empire of Charlemagne, who made it his favorite residence. It is a well-built, handsome city, with a cathedral founded in 796 A. D., a large town-hall, an elegant theatre, a public library, and several hospitals. Here are celebrated mineral springs, the

temperature of which is about 112° Fahrenheit. They are considered efficacious for the cure of the gout, rheumatism, and cutaneous diseases. This city has important manufactures of fine broadcloths, needles, and pins. The cathedral contains the tomb of Charlemagne and a collection of relics, which attract a multitude of visitors. The successors of Charlemagne and the emperors of Germany were crowned here from the ninth century until 1531. P. in 1871, 74,238.

Aix-la-Chapelle, Congress of. This congress was held in 1818 for settling the affairs of Europe after the war of 1815. The king of Prussia and the emperors of Russia and Austria were present in person. The different representatives were Metternich, Wellington, Castlereagh, Hardenburg, Bernstorff, Nesselrode, and Capo d'Istrias, with Richelieu on behalf of France. Their deliberations resulted in the withdrawal from French territory of the army of occupation, and prepared the way for what was afterwards known as the "HOLY ALLIANCE" (which see.)

Aix-la-Chapelle, TREATIES OF. I. *Treaty of* 1668. This treaty was concluded May 2, 1668, between Louis XIV. of France on the one side, and the "Triple Alliance," including England, Sweden, and Holland, on the other. At the death of Philip IV., Louis laid claim, in the name of his wife, and under the laws of succession of Brabant and Namur, to a large portion of the Spanish Netherlands. He had already seized several strongholds and fortresses, when Holland, becoming alarmed at his rapid progress, concluded the triple alliance with England and Sweden. Louis, rather than resort to a war against so powerful a league, determined to accept mediation; and a treaty of peace was concluded at Aix-la-Chapelle, by which France retained possession of Charleroi, Valenciennes, and other strong towns, which she had already seized.

II. *Treaty of* 1748. This treaty ended, in 1748, the Austrian war of succession, in which all the great powers of Europe were, either on one side or the other, engaged. Several German princes had disputed the claim of Maria Theresa to the throne of Austria, and from this cause the war arose. It lasted with various success for eight years (from 1740 to 1748); at the end of which time a peace was concluded which left the different states with nearly the same possessions as before.

Aiza'ni, an ancient town of Asia Minor, now in ruins. Among its ruins, the theatre, with accommodations for over 12,000 spectators, is in a fine state of preservation.

Ajaccio, å-yåt'cho, or **Ajazzo,** å-yåt'so, a seaport, the capital of Corsica, is on the W. coast, in lat. 41° 54′ N., lon. 8° 44′ E. It has a good port defended by a citadel. It has also a cathedral and a library of 18,000 volumes. Wine and olive oil are exported from this town. Napoleon Bonaparte was born here on Aug. 15, 1769. A magnificent monument, representing the emperor Napoleon I., surrounded by his four brothers, was finished in 1865. Pop. in 1866, 14,558.

Aj'alon, a town of Palestine belonging to the Levites, in the land of Dan. It was probably on the spot now occupied by the village of Yâlo. Over the valley in which this town was situated the moon stood still while Joshua pursued the five kings.

Ajan', a region of Eastern Africa whose coast extends from Cape Guardafui indefinitely southward.

A'jax [Gr. Αἴας], surnamed THE GREATER, the son of Telamon, a Grecian hero, was king of Salamis. He acted a prominent part at the siege of Troy, and exceeded the other Greek warriors in strength and stature. Having been defeated by Ulysses in a competition for the armor of Achilles, he became insane and killed himself.

Ajax, the son of Oïleus, surnamed THE LESSER, to distinguish him from Ajax the son of Telamon, was king of Locris. He was one of the Greek heroes that fought at the siege of Troy, and excelled all the Greeks in swiftness, except Achilles. According to tradition, he offended Minerva by his impiety, for which he was drowned on his homeward voyage from Troy.

Ajmeer, Ajmere, or **Rajpoota'na,** a city of British India, in the North-west Provinces, capital of a division and a district of the same name, is 220 miles S. W. of Delhi, and situated in a picturesque valley. It contains several massive temples and mosques; also an English and Oriental school. Pop. estimated at 25,000.

Ak'abah, a fortified village of Arabia, near the N. extremity of the Gulf of Akabah. (See ELATH.)

Akabah, Gulf of, a portion of the Red Sea, lying in the N. W. part of Arabia, and bounded on the W. by the peninsula of Sinai. It is about 100 miles long, and has high and steep shores.

Akan, a post-township of Richland co., Wis. P. 675.

Ak'bar, or **Ak'ber** (written also **Acbar** and **Ackbar**), **Mohammed,** surnamed JALÂL-ED-DEEN, a famous and excellent Mogul emperor, was born at Amerkote, in the valley of the Indus, in 1542. He was a son of Humâyoon, whom he succeeded in 1556. He displayed great military talents and political wisdom, and extended his dominions by the conquest of Bengal and part of the Deccan. Under his reign the Christians and Jews were tolerated and protected. He encouraged literature and promoted commerce. He ordered a complete survey and census of his empire, the result of which, with minutely detailed statistics, was recorded in a book called "Ayeen Akbery" ("Institutes of Akbar"), which is very celebrated. Akbar was greatly distinguished for his justice, humanity, and magnanimity. He died in 1605, and was succeeded by his son Selim, surnamed Jehân-Geer.

A'ken, a town of Prussia, in the province of Saxony, on the left bank of the Elbe, 24 miles S. E. of Magdeburg, has factories of beet-sugar and chemicals. Pop. in 1871, 5273.

A'kenside (MARK), M. D., an English didactic poet of high reputation, was born at Newcastle-on-Tyne Nov. 9, 1721. He studied medical sciences at Edinburgh, graduated as M. D. at Leyden in 1744, and practised in London, where he settled in 1748. His success as a physician was hindered in some degree by his reserve or lack of affability. His reputation is founded chiefly on "The Pleasures of the Imagination," in blank verse (1744), which was received with great favor. It was commended by Dr. Johnson "as an example of great felicity of genius and uncommon amplitude of acquisitions." He wrote several shorter poems and medical treatises. His "Treatise on Dysentery" (in Latin, 1764) proved him to be an excellent classical scholar. He was appointed a physician to the queen in 1760. Died June 23, 1770. His character is represented as estimable and dignified in a high degree.

A'kerblad (JOHAN DAVID), a Swedish antiquary and Orientalist, born in 1760. He visited Jerusalem in 1792, and the Troad in 1797, gained distinction by deciphering the demotic writing of ancient Egypt, and wrote a "Letter on the Egyptian Inscription of Rosetta" (1802). Died Feb. 8, 1819.

Akerman', sometimes written **Akjerman,** or **Akkerman,** a fortified town of Bessarabia, on the right bank of the Dniester, about 4 miles from the Black Sea, and 28 miles S. W. of Odessa. It has a port, numerous factories, and an extensive trade in salt, etc. A treaty concluded at Akerman on Sept. 4, 1826, exempted the Danubian provinces from all but a nominal dependence on Turkey. Pop. in 1867, 29,343. Lat. 46° 12′ N., lon. 30° 22′ E.

Ak'erman (AMOS T.), attorney-general of the U. S. for a short time under Gen. Grant, was born in N. H. in 1823, but for fourteen or fifteen years previous to his appointment had been a citizen and practising lawyer of Georgia. He sided with the Confederates in the late war, but after the surrender of the Southern arms he advocated the sanction of the reconstruction measures of Congress, was a member of the State convention of 1867–68, and acted a prominent part in shaping the new constitution formed by that body.

A'ker's, a township of Tuscaloosa co., Ala. Pop. 367.

A'kers (BENJAMIN), commonly known as PAUL AKERS, an American sculptor, born at Sacarappa, Me., July 10, 1825, went to Boston in 1840, and made busts of Longfellow, Samuel Appleton, and others. Mr. Akers lived much in Italy, and executed some of his finest works there. The pieces done in America were chiefly portrait busts and medallions, which were highly esteemed as likenesses and as works of art. He died in Philadelphia May 21, 1861. A man of fine sensibility and pure genius, he lived up to the highest ideal of his art, and was beloved by many friends.

Akhalies, a class of religious warriors among the Sikhs in Hindostan. They deny God, believe in fate, and are very fanatical and turbulent. (See NANEKISM.)

Akhalzikh, Akalzik, or **Akis'ka,** a city of Asiatic Russia, in Georgia, on an affluent of the Koor, about 92 miles W. of Tiflis. It contains a mosque and several churches, and has some trade in silk and honey. Many of the inhabitants are Armenians. The Russians defeated the Turks near this place in 1828, and it was ceded to Russia in 1829. Pop. in 1867, 15,977.

Ak-Hissar (*i. e.* "white castle"), written also **Ek-Hissar** (the ancient *Thyati'ra*), a town of Asia Minor, in Anatolia, 53 miles N. E. of Smyrna. It contains several bazaars and about 1300 houses. Here are many ancient remains. Pop. about 10,000.

Akhlat', a town of Asiatic Turkey, in Armenia, on the N. W. shore of Lake Van, 203 miles S. E. of Trebizond.

It was formerly the seat of the Armenian kings, and is at present the seat of an Armenian bishop. Pop. about 4000.

Ak'iba (Ben Joseph), a Jewish rabbi of great learning and influence, was president of the school of Bene Barak in the second century A. D. Having joined the rebellion of Barchochebas, he was flayed and burned by the Romans at the age of 120 years.

Akmol'linsk, a province of Russia, in Central Asia, is situated S. of the government of Tobolsk. Area, 244,280 square miles. It consists of a plateau, in the N. level, and in the S. mountainous, having very little rain. It is frequently visited by heavy snow-storms. Chief town, Akmollinsk. Pop. in 1867, 226,788.

Ak'ron, a post-township of Peoria co., Ill. Pop. 1185.

Akron, a post-township of Tuscola co., Mich. P. 585.

Akron, a village in Erie co., N. Y., one of the most important centres of production of hydraulic cement. It is in Newstead township, and on the Niagara Falls branch of the N. Y. Central R. R., 14 miles W. of Batavia. Pop. 444.

Akron, a flourishing city, capital of Summit co., O., on the Ohio Canal, 36 miles S. of Cleveland, on the highest point of land between Lake Erie and the Ohio River. The Atlantic and Great Western, the Cleveland Mount Vernon and Columbus, and the Valley R. Rs. pass through the city, which contains 2 woollen, 2 paper, and 7 flouring-mills, 4 foundries, 1 rolling-mill, 1 blast-furnace, 1 forge, 3 planing-mills, 2 manufactories of reapers and mowers, 1 of pearl barley, 1 of oatmeal and farina, 1 of knives and sickles, 1 of rubber goods, 1 of chains, 1 of matches, and 3 of sewer-pipes, 2 oil-refineries, 3 machine-shops, 1 manufactory of boilers, 2 of ploughs, 1 of woollen cards, 1 of horse hay-rakes, 1 of stoves, 1 of iron fences, 10 of stone-ware, 1 of blank-books. It has also 4 printing-offices, 1 daily and 3 weekly papers, 4 banks (with an aggregate capital of $1,300,000), 3 public parks, a beautiful cemetery, a public library, and a high school. It is the seat of Buchtel College, and has all the adjuncts of an enterprising and prosperous inland city. Pop. 10,006.

S. A. Lane, Ed. "Beacon."

Akshehr', or **Ak-Sheher** (*i. e.* "white city"), a city of Asiatic Turkey, in Karamania, about 70 miles N. W. of Konieh, contains near 1500 houses. It is the ancient *Philomelion* of Strabo.

Ak'su, a town of East Toorkistan, on a river of its own name, 250 miles N. E. of Yarkand. It has manufactures of woollen stuffs and jasper, and is visited by many caravans from all parts of Central Asia. Pop. about 60,000.

Ak'yab, a town of British Burmah, at the mouth of the Aracan River, 550 miles S. E. of Calcutta. Its situation is healthy and very advantageous for commerce, with a commodious and safe harbor. It has a large trade, especially of rice, large quantities of which are exported hence. Pop. about 10,000, mostly Bengalese and Chinese. Here is a Protestant missionary station.

Al, the Arabic definite article, forms a prefix to many Oriental names, as Al-Mansoor, "the victorious," Al-Amin, "the faithful," etc.

A'la [a Latin word signifying a "wing"], a Roman military term, denoting the wing of an army. At first, when the whole legion consisted of Roman citizens, it was applied to the body of horsemen who served with the foot-soldiers, but after the admission of *socii*, whether Latini or Italici, it was applied to the troops of the allies, both horse and foot, which were stationed on the wings. At a still later time, the alæ were composed of foreign troops serving with the Roman armies; while under the empire the term was given to bodies of horsemen raised generally in the provinces, and serving apart from the legion. (See Wing.)

Alaba'ma, a river of the U. S., is formed by the Coosa and the Tallapoosa, which unite about 10 miles above Montgomery, in Alabama. It flows nearly westward to Selma, and afterwards in a general S. W. direction, and unites with the Tombigbee to form the Mobile River. It is navigable for large steamboats through its whole extent, which is about 300 miles. It traverses a fertile region, of which cotton and maize are the staple products.

Alabama (signifying, in the Creek language, "Here we rest"), one of the Southern States of the Union, the twenty-first in the order of its admission. Its extreme limits are between lat. 30° 15′ and 35° N., and between lon. 84° 56′ and 88° 48′ W. from Greenwich, but the main body of the land of the State lies between lat. 31° and 35° N., and between lon. 85° 10′ and 88° 31′ W. from Greenwich. The extreme length of the State from N. to S. is 336 miles, and it varies in breadth from 148 to 200 miles. Its boundary on the N. is the State of Tennessee on the line of the 35th parallel of N. lat.; on the E. the State of Georgia, the Chattahoochee River forming the dividing line from West Point to the 31st parallel, about 120 miles, and for the small south-western section of the State, the Perdido River, which separates it from Florida, forms the eastern boundary for nearly 60

miles; the southern boundaries are the State of Florida from the Chattahoochee to the Perdido River, and the Gulf of Mexico from the mouth of the Perdido to the State line of Mississippi. On the W. it is bounded by the State of Mississippi, the Tennessee River forming the extreme north-western boundary, and causing a slight deviation westward in the boundary. Its area is 50,722 square miles, or 32,462,080 acres. Negotiations are now in progress for the acquisition from Florida of the seven counties lying between the Chattahoochee or Apalachicola and the Perdido, which will give it about 200 miles of coast, and the excellent harbor of Pensacola. The surface of the State is generally level, except in the northern portion, through which the Blue Ridge extends, but nowhere attains any great elevation. From this broken but very beautiful portion there is a gradual declination towards the S., the surface expanding into broad prairies with gentle swells, and reaching in the vicinity of Mobile Bay a level but very little above that of the Gulf of Mexico. The principal rivers are the Tennessee, the Mobile, Tombigbee, Alabama, Coosa, Black Warrior, Perdido, and Chattahoochee, all of them, except the Tennessee, having numerous affluents. The Tennessee sweeps across the entire northern section of the State from the N. W. to the N. E. corner, forming an irregular curve, or rather an obtuse angle, at Guntersville, where it is about forty miles S. of the northern line of the State. It receives no considerable tributary on its southern side, and only Elk River, Flint River, and Paint Rock River, three small streams, on the northern side in its course through the State. The Chattahoochee, a large stream, but having no considerable tributaries in the State, forms a part of its eastern boundary, and discharges its waters into the Gulf. The Perdido, a smaller but considerable stream, rises in Escambia county, and falls into Perdido Bay after a course of about 100 miles. The Escambia and Choctawhatchie rivers, with their affluents, drain a portion of the southern part of the State, and discharge their waters into Pensacola and Choctawhatchie Bays on the Florida coast. But much the greater part of the waters of the State finds their way into Mobile Bay through the Mobile River and its tributaries. The Tombigbee, the Alabama, the Coosa, the Cahawba, the Tallapoosa, and the Black Warrior are all, directly or indirectly, affluents of the Mobile. The Tombigbee, coming from Mississippi, receives the waters of the Black Warrior, and at 50 miles above Mobile Bay unites with the Alabama, which had already received the Coosa, the Tallapoosa, and the Cahawba. After the junction of the Tombigbee and the Alabama the united rivers receive the name of the Mobile River. The Tensaw River, a considerable stream, unites by natural canals with both the Alabama and the Mobile rivers, but finally makes its way, as an independent and parallel stream, to Mobile Bay. The Black Warrior is navigable for light-draft steamers for 285 miles, and the Alabama for 300 miles. The Tensaw, Chattahoochee, Tennessee, and Perdido are all navigable for a considerable distance. The whole extent of steamboat river navigation in the State is nearly 1500 miles. Mobile Bay, the main outlet of the navigable waters of the State, is in the extreme south-western part, is about 30 miles long, and from 3 to 8 broad, and has fifteen feet of water at low tide at its main entrance. The smaller bays, Grand, Bonsecours, and Perdido, are not of much commercial importance, being shallow, though mostly landlocked.

Geology and Soil.—The southern portion of the State, extending for 132 miles northward from the Gulf of Mexico and 40 from the Florida State line, and embracing an area of 11,000 square miles, belongs to the alluvial, diluvial, and

tertiary formations, and has a light but productive soil, easily tilled and well adapted to raising fruits. Corn and cotton also do well on this soil. There are extensive forests of pine, and excellent timber and considerable quantities of tar and turpentine are produced in this region. On the low lands near the Gulf the cypress and several varieties of the oak abound. The pine forests afford good natural pasturage for cattle. North of this tract, and extending 102 miles northward on the W. side and 60 on the E. side of the State, is the region known as the Cotton Belt, underlaid mostly with the Jurassic limestone, with some chalk, mostly prairie land, declining very slightly towards the S.—a fertile region well adapted to agriculture, and in the past largely devoted to the culture of the great Southern staple, cotton. In the eastern and north-eastern part of the State we find the great mineral region, an extension of the eozoic rocks from Virginia, North and South Carolina, and Georgia, in which gold has been found in paying quantities for so many years. These primitive rocks extend no farther, however, than Eastern Alabama, and do not quite reach the banks of the Tallapoosa River, occupying a portion of Lee, Chambers, Tallapoosa, and Randolph counties. Contiguous to them on the N. N. W. and W. are carboniferous rocks, the bituminous coal region occupying a tract of 4332 square miles. In this region are also many other valuable minerals. West of this is a belt of about 35 miles in width from N. to S. underlaid by palæozoic rocks, with a broken surface and a poor soil, but a healthy region, affording great facilities for manufacturing from its abundant water-power. In the extreme northern part of the State we come to the valley of the Tennessee, a limestone region, with broken surface, but with many rich and fertile valleys, and scenery of great beauty. Here are found lands adapted to grazing, as well as those which yield large crops of cotton, corn, cereals, and fruits.

Mineralogy.—The State is rich in minerals. Gold was discovered in Randolph county in 1836, and mined so successfully that $213,750.66 of it had been coined at the U. S. mint and its branches to June 30, 1872, and the greater part previous to 1859. The gold is generally found combined with silver, but there is also in the mineral districts argentiferous galena in considerable quantities. Copper is also found, but not in ores sufficiently rich to make its mining profitable, though it has been attempted in Baine county. Among other minerals scattered through the State the mineralogists report syenite, steatite, cobalt, vivianite, carite, calcite, dolomite, and quartz crystals as existing in considerable quantities. Potter's, porcelain, and fire clays, and materials for the production of hydraulic lime; lithographic stone, manganese, sulphate of baryta, slate, and red ochre, as well as various building stones, are found in such quantities as to make their exploitation profitable. The granite of Coosa county is superior, for statuary and monumental purposes, to any other in the U. S., and the white marble of the same county, and the variegated marbles of Talladega and the adjacent counties, are not surpassed on this continent.

But the most valuable portion of the mineral wealth of Alabama consists in her mines of coal and her abundant iron ores. The coal-fields contain seams of bituminous coal from one to eight feet thick, of several varieties, some well adapted for the generation of steam, others equal to the Liverpool coals for the production of gas and coke, and still others, of the splint coal variety, admirable for smelting iron ores. In close proximity to the latter are extensive beds of iron ore; the Red Mountain extends across the State for more than 100 miles, having in its whole course a stratum of solid red iron ore from two to eight feet thick. Very extensive beds of the brown hematite iron ore of the best quality are found in Bibb, Shelby, Jefferson, Talladega, St. Clair, and Claiborne counties. The iron manufactured from these ores is of excellent quality. There are numerous mineral springs, mostly of chalybeate and sulphur waters, in the State.

Vegetation.—Extending over more than four degrees of latitude, and to a point within seven degrees of the tropics, Alabama combines the vegetable products of the temperate and semi-tropical regions. In the N. the white, red, cup, pin, and post oak, the hickory, chestnut, poplar, cedar, elm, mulberry, and pine, are the principal forest trees. Below latitude 33° the trees are festooned with the long Spanish moss, and the forests begin to assume a more semi-tropical character. In Marengo and Greene counties there were extensive canebrakes, where the cane, a species of bamboo, had made large tracts almost impassable by its dense growth. In the midst of these canebrakes gigantic cedars in groves or islands, of sombre foliage, towered up through the jungle. These canebrakes have now been cleared, and reveal a soil of the most extraordinary fertility. In this region, below 33°, the deciduous trees very generally give place to the live-oak, the cypress, the loblolly, the yellow pine, the magnolia, and other forest trees of the Gulf region, while the apples, pears, plums, and hardy peaches are partially replaced by the fig, the pomegranate, the olive, the apricot, the scuppernong grape, and the orange. The northern part of the State is best adapted to the culture of the grasses, the cereals, and maize, though in the more fertile valleys considerable cotton is raised. The central and most of the southern portion is admirably adapted to cotton, and the State produced, until recently, more of that staple than any other of the Southern States. Large quantities of maize are also grown in the central counties. In the S. W. the sugar crop is usually successful, and considerable rice is grown on the wet and low lands. At one time indigo was raised somewhat extensively and successfully in that portion of the State, but the competition with the East Indian crop, raised by ryot labor, made it so little profitable that other crops were substituted for it. The Ramie is now grown largely in some of the southern counties. Tobacco is also a crop of some importance.

Zoology.—There are still great numbers of deer in the northern counties, and wild turkeys are abundant. Wild pigeons, partridges, rabbits, gray squirrels, and other game are plentiful, while opossums, raccoons, wild-cats, wolves (the prairie wolf), foxes, and bears are occasionally met with. Along the rivers and bays wild ducks and teal, and in their season rice-birds, etc., afford abundant employment for the sportsman. Lizards and snakes abound in the swampy regions, and the moccasin and milk snake are particularly venomous. In some of the streams and bayous the alligator is found, though less abundant than in Louisiana. Fish are abundant in Mobile Bay and in most of the rivers, and many of them are of excellent quality and flavor.

Climate.—This varies with the latitude and elevation. In the northern counties the climate is delightful. The temperature is seldom below 32° Fahrenheit in winter, and the elevation is sufficient to prevent the intense heats of a Southern summer. Huntsville and Florence on the Tennessee River are favorite resorts for invalids. There is some malaria in parts of the valley of the Tennessee, as well as in some of the other river valleys. In the central counties the heat is greater, but not oppressive. In 1869 the highest temperature in the central counties was Aug. 22, 105° Fahrenheit; the lowest, Feb. 28, 20° Fahrenheit; and the average mean temperature of the year 62° Fahrenheit. The average monthly rainfall was 4.58 inches, February being the wettest, and May the dryest month. In the southern counties there is more malaria and a greater tendency to fevers. The heat is at times intense, but the nights are rendered comfortable by the Gulf breeze. In the central and southern portions of the State, though there is no lack of water, much of it is not potable or is of very poor quality. In some of the cities and large towns this evil has been remedied by boring artesian wells, which often furnish an ample supply of excellent water. The wells and springs of the northern counties are of the very best quality.

Agricultural Products.—Our latest dates of these are for the year 1871, except cotton, of which the estimate for 1872 is 507,430 bales, or 235,955,240 pounds. According to the careful estimates of the agricultural department, the crop of maize or Indian corn of 1871 was 19,080,000 bushels, 1,315,862 acres being cultivated in that crop, and its estimated value was $17,558,600; of wheat the crop was 832,000 bushels, raised from 132,063 acres, and having an estimated value of $1,297,720; of rye, only 24,000 bushels, raised on 2608 acres, and valued at $43,200; of oats, 672,000 bushels, raised on 50,149 acres, and worth $584,640; of barley, 6000 bushels, occupying 387 acres, and worth $6600; of potatoes (probably *Solanum tuberosum*), 157,000 bushels, from 1847 acres, worth $166,420 (the census return of sweet potatoes in the State in 1870 was 1,871,360 bushels); of tobacco (in 1870), 152,742 pounds; and of rice, the same year, 222,945 pounds (both returns undoubtedly far below the truth); hay, in 1871, 18,600 tons, from 13,984 acres, and valued at $362,700; of sugar (cane) in 1870, 31 hogsheads, and of molasses (cane), 166,009 gallons; of sorghum molasses, 267,269 gallons; of butter (in 1870), 3,213,753 pounds; of cheese, the same year, 2732 pounds, and of milk sold, 104,675 gallons; of beeswax (in 1870) 22,767 pounds, and of honey, 320,674 pounds. The number of acres of improved land in farms, in 1870, was 5,062,204; of unimproved lands included in farms, 8,380,332 acres of woodland, and 1,518,642 acres of other unimproved lands. The cash value of farms the same year was $67,739,036, and of farming implements and machinery, $3,286,924. The estimated value of farm products for the census year (ending June, 1870) was $67,522,335. The value of orchard products in that year is stated at $37,500; of market-gardens, at $139,636; of forest products, $85,933; of home manufactures, $1,124,513; of animals slaughtered or sold

for slaughter that year, $4,670,146. The number of horses in the State in Feb., 1872, was estimated by the agricultural department at 106,700, and their value at $9,297,838; the number of mules at 101,600, and their value at $10,752,328; the number of oxen and other cattle at 337,800, and their value at $3,847,542; the number of milch cows at 180,700, and their value at $3,402,581; the number of sheep at 188,100, and their value at $342,342; the number of swine at 981,000, and their value at $3,590,460.

Manufactures.—Alabama has only recently given much attention to manufactures, and though her manufacturing establishments are now increasing with considerable rapidity, she still ranks low in the amount of her manufactured products. In 1860 there were 1459 manufacturing establishments in the State, of which 336 were saw-mills, 140 blacksmith-shops, 236 grist-mills, 132 tanneries and leather-dressing establishments, 110 boot and shoe shops, 27 turpentine distilleries, 123 carriage, wagon, and cart factories, and 32 saddlers' shops, or in all 1136; so that eleven-fourteenths of the whole were occupied with the simple and ordinary mechanisms of an agricultural State. The total capital invested in manufactures in 1860 was $9,098,191; the cost of raw material was $5,489,963; the number of hands employed, 7889; the annual cost of labor, $2,132,940; and the value of products for the year 1859, $10,588,571. During the war of 1861-65 some of the cities and larger towns of Alabama were largely engaged in the manufacture of war material—iron plates, cannon, firearms, powder, steamboats, etc.—as well as in the packing of provisions. In 1870 the statistics of her manufactures were—number of establishments, 2231; capital invested, $5,713,607; cost of raw material, $7,643,784; number of hands employed—males, 7489, females, 860—total, 8349; annual cost of labor, $2,211,638; value of products in 1869, $13,220,655. The manufacture of iron, of machinery, and of cotton goods had received a remarkable impulse, and there had been a general increase in all the higher branches of industry. The manufactured product of the 13 cotton manufactories in 1870 was $1,088,767, and several large factories have since been erected.

Railways.—In Jan., 1872, there were 1671 miles of completed railways in Alabama, of which 786 miles had received aid from the State, either in direct bonds or in endorsements, to the aggregate amount of $15,420,000. The aggregate cost of the nine railroads which make up this aggregate for road and equipment cannot be exactly ascertained, but it does not vary much from $64,000,000. Most of the Alabama railroads are portions of great trunk roads connecting the Northern or Southern Atlantic States with the ports of the Gulf or the Mississippi River, and in some cases destined to form links in the connection with the Pacific coast or with Mexico. Thus, the Alabama and Chattanooga R. R. forms one of the important links in that great combination of railroads now extending from the St. John's River in the province of New Brunswick almost in an air-line to Meridian, Miss., and destined by the speedy completion of its few remaining gaps soon to reach the Rio Grande. The Selma Rome and Dalton is another and perhaps still more direct link in the same line, soon to connect directly with New Orleans. The Mobile and Montgomery and the Montgomery and West Point are portions of a line which, with the completion of two or three insignificant gaps in South Carolina, will connect by a very direct line New Orleans and points still farther south-west with Richmond, Yorktown, and Norfolk. The Selma and Meridian and the Montgomery and Eufaula lines form portions of the railroad chain extending from Brunswick, Ga., which, crossing the Mississippi at Vicksburg, takes the name of the Southern Pacific, and following mainly the 32d parallel of latitude will reach the Pacific coast in Southern California. The Mobile and Ohio is the terminal link in a line of railroad which, with but one short gap, extends from Duluth on Lake Superior to Mobile. The Memphis and Charleston, crossing the upper portion of the State, forms an important section of the long line which now connects Little Rock, Ark., and Memphis, Tenn., with Richmond, Washington, New York, and New England, and which will soon be extended westward along the 35th parallel of latitude to the Pacific. Another road, as yet incomplete, is destined to connect Mobile and Charleston, S. C. Two shorter roads connect respectively Selma and Montgomery with the fine port and harbor of Pensacola, which by the consent of Florida is soon to become a port of Alabama; while other roads already finished make a continuous railroad connection between Pensacola, Selma, and Montgomery in the South, and Nashville, Louisville, Evansville, Indianapolis, Chicago, Milwaukee, and the upper peninsula of Michigan in the North. No State in the Union is more indissolubly linked to every other portion by the iron bands of its railways than Alabama.

Financial Condition.—The assessed valuation of property in Alabama in 1870 was $155,582,595, of which $117,223,043 was real estate, and $38,359,552 personal property; the census valuation the same year, which approximates more nearly to the actual value, though considerably below it on personal property, was $201,855,841. The total taxes of that year, aside from the national taxation, were $2,982,929, of which $1,456,024 were State taxes, $1,122,971 county, and $403,937 town, city, and ward taxes. The entire public debt other than national, in Jan., 1872, was $20,219,136, of which $15,420,000 was the State debt, mostly incurred in aiding railroads; $1,704,173 was county debt, and $3,094,963 was the debt of towns and cities. The average wealth to each individual of the population of the State in 1870 was $202.46; the rate of taxation per $1000, $14.77; the rate of taxation per head, $2.99; and the ratio of public debt to the population, $20.30 per head. The taxes are levied on real estate, and on the following articles of personal property: real estate bonds, town property, stocks of goods and merchandise, horses, mules, sheep, and hogs. There are also licenses, and a poll-tax of about $1.50 for school purposes.

The foreign *commerce* of the State is mostly conducted through its principal port, Mobile; the imports into that port and district for the year ending June 30, 1872, were $1,761,402, and the exports (a large proportion being cotton) for the same year were $13,938,605. Probably cotton, etc. to the value of about $2,000,000 was exported through New Orleans by way of Memphis, and through Pensacola and Savannah by railroads and the Chattahoochee River. The vessels belonging to the customs district of Mobile in the year ending June 30, 1871, were 42 schooners, 32 sloops, 52 steamers, 96 unrigged vessels, or 222 vessels in all, having a total tonnage of 18,047 tons. For the year ending June 30, 1872, there were 78 sailing vessels, 34 steamers, and 92 unrigged vessels, having a total tonnage of 13,808 tons. For the year ending June 30, 1870, 105 American and foreign vessels entered the port of Mobile, the tonnage of which was 70,249 tons, and the crews numbered 1739 men. The same year 128 vessels cleared from the port, having a tonnage of 79,738 tons, and crews numbering 1865 men. In addition to these, 9 ocean steamers, having an aggregate tonnage of 13,115 tons, entered and cleared from the port the same year. There are no means of ascertaining the internal commerce of the State.

Banks.—There were in Jan., 1873, nine National banks in Alabama—viz. the First National Bank of Mobile, capital $300,000; the National Commercial Bank of Mobile, capital $500,000; the First National Bank of Montgomery, capital $208,208; the Merchants' and Planters' National Bank at Montgomery, capital $100,000; the National Bank of Huntsville, at Madison, capital $100,000; the Selma City National Bank, capital $250,000; the Gainesville National Bank, at Gainesville, capital $100,000; the First National Bank of Tuscaloosa, capital $60,000; and the National Bank of Birmingham, capital $50,000. There were also at the same time two State banks, both located in Mobile, having an aggregate capital of $1,000,000, and five savings banks, with capital and accumulations amounting to $672,000, all of them doing a discount as well as a deposit business. There were also twenty-two private banking-houses, besides three agencies of the National Freedmen's Savings Bank and Trust Company, acting as bankers in the State.

Insurance.—There are two life insurance companies chartered by the State, organized in 1868 and 1871, having an aggregate capital of $500,000 and aggregate assets of $1,074,311; and eleven fire insurance companies, with an aggregate capital of $1,385,000 and aggregate assets of $1,406,000. The greater part of the underwriting, both of life and fire insurance, is, however, in the hands of agencies of companies from other States and countries.

Population.—Alabama appears for the first time in the census of 1820, when her population was 127,901, and her relative rank among the States in population was nineteenth. In 1830 it was 309,527, and she ranked fifteenth; in 1840 it was 590,756, entitling her to the twelfth place; in 1850 it was 771,623, and she still maintained the twelfth place; in 1860 it was 964,201, but owing to the rapid growth of the Western States she was now thirteenth. In 1870, owing to her heavy losses during the war, the population had only increased to 996,992, and she held the sixteenth place in population. In 1820 there were 41,879 slaves and 571 free colored persons in the State; in 1830, 117,549 slaves and 1572 free colored; in 1840, 253,532 slaves and 2039 free colored; in 1850, 342,844 slaves and 2265 free colored; in 1860, 435,080 slaves and 2690 free colored; in 1870 there were no slaves, but 475,510 free colored persons. The number of white persons at these dates was—in 1820, 85,451; in 1830, 190,406; in 1840, 335,185; in 1850, 426,514; in 1860, 526,271; in 1870, 521,384. In 1860 there were 160 Indians, and in 1870, 98 Indians. But a

very small portion of the population are of foreign birth or parentage. Only 9962 are reported as foreign born, 16,981 as having both parents foreigners; 20,765 as having a foreign father, and 18,060 a foreign mother; and previous enumerations vary but little from these numbers. In the matter of sex, of the entire population 488,738 are males, and 508,254 females; of the native population, 482,470 are males and 504,560 females; of those of foreign birth, 6268 are males and 3694 females; of the whites, 255,023 are males and 266,361 females; of the colored, 233,677 are males and 241,833 females; a further distinction is made between negroes, of whom 213,987 are males and 219,711 females, and mulattoes, of whom 19,690 are males and 22,122 females. The density of population for the whole State is 19.66 persons to the square mile; but the density map of the ninth census report shows that while the eastern, north-eastern, and a small district of the northern and western portions have a population of about thirty to the square mile, the remainder of the State, except the city of Mobile, has not more than eight or nine inhabitants to the square mile.

Education.—The number of children of school age (between five and twenty-one years) in the State in 1871 was 387,057; of these 77,139 (38,600 males and 38,539 females) reported themselves as having attended school during some part of the year 1869–70. Table xii. of the ninth census gives the reported attendance upon the schools of the State as 75,866 (37,223 males and 38,643 females), under the charge of 3364 teachers (2372 males and 992 females). The attendance on schools is said to have increased somewhat since 1870, but no statistics are given. The income of all educational institutions in the State in 1869–70 was $976,351, of which $39,500 was from endowments, $471,161 from taxation and public funds, and $465,690 from other sources, including tuition. Of this income $629,626 belonged to the public schools, of which there were 2812, which had 3008 teachers and 67,263 pupils that year. This income was composed of the following items: from endowments, $8000; from taxation and public funds, $447,156; from other sources, $174,470. In 1871 the funds were increased from taxation to the extent of over $90,000, and in 1872 about $110,000 more. Of these public schools, 14 were normal schools, or rather normal classes, mostly connected with the colleges, having 25 teachers and 488 pupils; 4 were high schools, with 6 teachers and 170 scholars; 10 were grammar schools, with 10 teachers and 200 scholars; and 2784 were graded and ungraded common schools, with 2967 teachers (817 females) and 66,405 pupils. Of the schools not public, 9 were colleges and universities, besides 7 other female colleges and seminaries, with 65 instructors and 667 students. The colleges had 63 professors and teachers, 1026 students, and $108,800 income, of which $31,500 was from endowment. There are 46 academies, with 132 teachers, 3086 pupils, and $142,750 of income. There are 2 theological and 1 medical professional school, the former having 4 instructors and about 25 students, and the latter 7 instructors and 30 students. The University of Alabama, at Tuscaloosa, was liberally endowed with lands by the U. S., the greater part of which have been sold, and yield a large income for its support. It still owns about 500 acres, and has new, large, and commodious buildings for instruction and dormitories, an observatory, a president's mansion, and five houses for professors. Its coal-lands yield an annual rental of sufficient coal for fuel. The university has been, however, since the war, in a greatly depressed condition, and has had but a small number of students. Some changes were made in its officers and organization in 1871, since which it is reported to be doing better. Howard College, at Marion, is a flourishing college, though insufficiently endowed. It is under the control of the Baptists, and in 1872 had 6 professors, 121 students, and a library of 5000 volumes. The East Alabama College, at Auburn, which in 1871–72 established a scientific, industrial, and agricultural department, and received the Congressional agricultural land-grant to the State, is under the control of the Methodist Episcopal Church South, and in 1871–72 had 7 professors and 98 students in the collegiate department, and 3 professors and 59 students in the scientific department. The Southern University, at Greensborough, founded in 1855, is also under the control of the Methodists. Spring Hill College, at Spring Hill, near Mobile, is a Roman Catholic institution, founded in 1835. In 1872 it had 18 instructors and 52 students. The other colleges of the State are Florence University (Presbyterian) and Wesleyan College (Methodist) at Florence, La Grange College (Presbyterian) at La Grange, and Talladega College at Talladega. The seven female colleges are respectively under the control of the Presbyterians, Methodists, Episcopals, Baptists, and the Methodist Episcopal Church South. They are all prosperous, and had an aggregate in 1872 of 58 teachers and 667 students. There are two theological seminaries in the State—the theological department of Howard College (Baptist) at Marion, and the Ecclesiastical Seminary of the diocese of Mobile (Roman Catholic) at South Orange. The Medical College of Alabama, at Mobile, organized in 1856, has 11 instructors, and gives a free course of lectures. There is one institution for the deaf and dumb and the blind, at Talladega, having, in 1871, 4 teachers, 64 pupils (50 deaf mutes and 14 blind), and $12,005 income. Besides these there were 83 day and boarding schools, having 97 teachers, 3129 pupils, and an income of $70,870; and 17 parochial and charity schools, with 52 teachers and 1256 scholars, and a reported income of only $500. The management of educational affairs in the State is in the hands of a State board of education, consisting of the State superintendent of public schools, who is its presiding officer, and two members from each of the eight Congressional districts, who are elected by the people for four years. The governor is an *ex officio* member of the board, but has no vote. The State superintendent is elected on the State ticket for four years. The board of education are also a board of regents of the State University, and appoint its president and faculties. There is a county superintendent for each of the sixty-five counties, elected by the voters of the county, and in each county these superintendents, with two other persons, constitute the county boards. There are also township boards, consisting of three trustees, who are the contracting parties in engaging teachers, who must, however, have the certificate of the county board before they can teach. The school fund (from the sale of school lands) amounted in 1872 to $3,051,746.92. It is invested so as to yield 8 per cent. interest. The other sources from which school income is derived are—special appropriations by the State or individuals, escheated estates, military exemptions, an annual appropriation of one-fifth of the revenue, and a poll-tax of $1.50. In Jan., 1872, the amount devoted to public schools was about $855,000. After paying the other expenses of the school department, there remained a dividend of $1.33 for each child of school age.

In 1869–70 there were in the State 383,012 persons over ten years of age who could not write, and 349,771 of these could not read. Of these, 22,856 were white males and 20,773 white females between the ages of ten and twenty-one years; while 48,430 whites were over twenty-one years of age; 50,007 were colored males and 51,530 colored females between the ages of ten and twenty-one years; while 189,361 were colored persons over twenty-one years of age. In Mobile, while there were 5473 children attending school, there were 7916 of ten years old and over who could not read, and 9106 of the same age who could not write. Of these, 1004 were whites and 8102 colored.

Libraries.—Of these, of all classes, there were in 1870 in the State 1430, containing an aggregate of 576,882 volumes. Of these, 1132 were private libraries, containing 490,305 volumes, while 298, containing 86,577 volumes, were public libraries. Among these, 1 was the State Library, having 3000 volumes; 4 were town or city libraries, having only 800 volumes in all; 33 were court or law libraries, with 7785 volumes; 12 were college or school libraries, having 23,300 volumes; 239 were Sabbath-school libraries, with 49,517 volumes; and 9 were church libraries, with 2175 volumes.

Newspapers and Periodicals.—The ninth census gives to Alabama 89 periodicals of all classes, having an aggregate circulation of 91,165, and issuing annually 9,198,980 copies. In 1860 there were 96 periodicals, with an aggregate circulation of 93,595, but issuing annually only 7,175,444 copies. Of those published in 1870, 9 were daily newspapers, having a circulation of 16,420; 2 tri-weekly, with a circulation of 700; 2 semi-weekly, with a circulation of 2870; and 76 weekly, with a circulation of 71,175. Of these, 87 were political, having a circulation of 88,665, and issuing annually 9,068,980 copies; and 2 were religious, having a circulation of 2500, and issuing annually 130,000 copies.

Churches.—The statistics of the census of 1870 in regard to churches in all the Southern States are necessarily incomplete, and at best only an approximation to the facts. The census reports 2095 church organizations of all denominations; 1958 church edifices, 510,810 sittings, and $2,414,515 as the value of church property. These aggregates are unquestionably considerably below the truth. It reports 786 Baptist churches, 769 church edifices, 189,650 sittings, value of church property $535,650 (the "Baptist Almanac" for 1873 gives the number of associations as 44; of churches, 1162; of ordained ministers, 574; of communicants, 74,871); of minor Baptist organizations it reports 3 churches, 3 church edifices, 550 sittings, $1000 of church property; of the Christians, 19 churches, 19 church edifices, 5750 sittings, $10,050 of church property; of Congregationalists, 4 churches, 2 church edifices, 650 sittings, $7300 of church property (the "Congregational Quarterly" for Jan., 1873, reports, for 1872, 5 churches, 6 ordained min-

isters, 204 communicants); of the Protestant Episcopal Church, 50 churches, 38 edifices, 15,520 sittings, $264,600 of church property (the "Church Almanac" for 1873 reports 1 diocese, 30 clergymen, 42 parishes, 3046 communicants); of Jews, 2 congregations, 2 synagogues, 1650 sittings, $300,000 of ecclesiastical property; of Methodists, 991 churches, 892 edifices, 218,945 sittings, $787,265 of church property (the "Methodist Episcopal Church Minutes" report for 1872, 84 itinerant ministers, 165 local preachers, 131 church edifices, 9052 communicants; and the Methodist Episcopal Church South, the same year, 228 itinerant ministers and local preachers, 483 churches, and 25,514 members); of Presbyterians (Church South), 145 churches, 143 edifices, 50,215 sittings, $322,550 of church property; of other Presbyterian bodies, 57 churches, 57 edifices, 17,400 sittings, $37,150 of church property; of Roman Catholics, there were 1 diocese, 20 congregations, 19 church edifices, 6730 sittings, $409,000 of church property; of Universalists, 6 congregations, 2 edifices, 550 sittings, $1400 of church property; of union churches, 12 congregations, 12 edifices, 3200 sittings, $8550 of church property.

Constitution.—The present constitution of Alabama was adopted in 1866, but has been largely amended. The governor, lieutenant-governor, secretary of state, auditor, treasurer, and attorney-general are chosen by the electors on the Tuesday after the first Monday in November. All hold office for two years, except the auditor, whose term is four years. The house of representatives must not exceed 100 members, apportioned according to the population, but each county has at least one member. The senators are elected from senatorial districts; they must not be less than 25 or more than 33 in number, and serve for four years, while the representatives are elected for but two years. They must be electors and residents of the State, and the senators must in addition be twenty-seven years of age or upward. In all elections by the people the vote is by ballot. All male citizens, twenty-one years of age, who have resided in the State for six months next preceding the election, and have taken the oath to support the Constitution and laws of the U. S. and of Alabama, are entitled to vote. All persons resident in the State, born in the U. S., or persons who have legally declared their intentions to become citizens of the U. S., shall be citizens of Alabama. Temporary absence from the State does not cause a forfeiture of residence. All able-bodied male citizens between the ages of eighteen and forty-five are liable to military duty. One major-general and three brigadier-generals are appointed by the governor, subject to confirmation by the senate. The adjutant-general and other staff officers are appointed by the governor. The militia is divided into two classes, the volunteer and the reserve force. Officers and men receive no pay when not in active service.

Judiciary.—The judicial power is vested in a supreme court, circuit courts, chancery courts, courts of probate, and such inferior courts as the General Assembly may establish from time to time. The supreme court has appellate jurisdiction only, and must be held at the seat of government twice every year. The State is divided into circuits, each of which must include not less than three nor more than eight counties, and a judge is chosen for each circuit, whose term of office, like the supreme and chancery court judges, is six years. He must reside in the circuit for which he is chosen, and hold court in each county of his district twice every year. The circuit court has original jurisdiction in all matters civil and criminal within the State not otherwise excepted by the constitution, but in civil cases only when the sum in controversy exceeds $50. There are now twelve circuit districts in the State. There are three supreme court judges, twelve circuit court judges, and five chancellors of the court of chancery. The judges of these higher courts can hold no other office of profit and trust under the State or U. S. during their term of office. Judges of the lower courts, justices, and constables are elected by the people in each county. The clerk of the supreme court is appointed by the judges. The other clerks of courts are elected by the people for six years. The attorney-general must reside at the seat of government. A solicitor must be appointed for each county.

Principal Towns.—Mobile, the only considerable seaport of the State, and next to New Orleans the most important commercial city of the Gulf States, is situated on Mobile Bay, and had a population in 1870 of 32,034. Montgomery, the capital of the State, situated on the Alabama River, had in 1870 a population of 10,588. The other towns and cities of the State having between 3000 and 7000 inhabitants are—Selma, on the Alabama, 6484; Huntsville, on the Tennessee, 4907; Eufaula, on the Chattahoochee, 3185. Those having between 1000 and 2000 inhabitants are—Talladega, 1933; Tuscaloosa, on the Black Warrior, 1689; and Tuscumbia, on the Tennessee, 1214.

Representatives in Congress.—Under the new apportionment of Dec. 14, 1871, Alabama is entitled to eight representatives in Congress. They are all chosen by districts.

Counties.	Population 1870.	Population 1860.	Population 1850.
Autauga	11,623	16,739	15,023
Baker	6,194		
Baldwin	6,004	7,530	4,414
Barbour	29,309	30,812	23,632
Bibb	7,469	11,894	9,909
Blount	9,945	10,865	7,367
Bullock	24,474		
Butler	14,981	18,122	10,836
Calhoun	13,980	21,539	17,163
Chambers	17,562	23,214	23,960
Cherokee	11,132	18,360	13,884
Choctaw	12,676	13,877	8,389
Clarke	14,663	15,049	9,786
Clay	9,560		
Cleburne	8,017		
Coffee	6,171	9,623	5,940
Colbert	9,574	11,311	9,322
Conecuh	12,537		
Coosa	11,945	19,273	14,543
Covington	4,868	6,469	3,645
Crenshaw	11,156		
Dale	11,325	12,197	6,382
Dallas	40,705	33,625	29,727
De Kalb	7,126	10,705	8,245
Elmore	14,477		
Escambia	4,041		
Etowah	10,109		
Fayette	7,136	12,850	9,681
Franklin	8,006	18,627	19,610
Geneva	2,959		
Greene	18,399	30,859	31,441
Hale	21,792		
Henry	14,191	14,918	9,019
Jackson	19,410	18,283	14,088
Jefferson	12,345	11,746	8,989
Lauderdale	15,091	17,420	17,172
Lawrence	16,658	13,975	15,258
Lee	21,750		
Limestone	15,017	15,306	16,483
Lowndes	25,719	27,716	21,915
Macon	17,727	26,802	26,898
Madison	31,267	26,451	26,427
Marengo	26,151	31,171	27,831
Marion	6,059	11,182	7,833
Marshall	9,871	11,472	8,846
Mobile	49,311	41,131	27,600
Monroe	14,214	15,667	12,013
Montgomery	43,704	35,904	29,711
Morgan	12,187	11,335	10,125
Perry	24,975	27,724	22,285
Pickens	17,690	22,316	21,512
Pike	17,423	24,435	15,920
Randolph	12,006	20,059	11,581
Russell	21,636	26,592	19,548
Sanford	8,893		
Shelby	12,218	12,618	9,536
St. Clair	9,360	11,013	6,829
Sumter	24,109	24,035	22,250
Talladega	18,064	23,520	18,624
Tallapoosa	16,963	23,827	15,584
Tuscaloosa	20,081	23,200	18,056
Walker	6,543	7,980	5,124
Washington	3,912	4,669	2,713
Wilcox	28,377	24,618	17,352
Winston	4,155	3,576	1,542

History.—The first settlement made in the limits of this State by whites was in 1702, when Bienville erected a fort near Mobile Bay. In 1711 a small French colony was planted on the present site of Mobile, and in 1713 was fully organized. In 1763 all the territory now comprised in the State lying N. of the 31st parallel, and extending westward to the Mississippi River, was ceded by France to Great Britain, and by the treaty of peace with Great Britain in 1783 became a part of the territory of the U. S. It was attached to Georgia, except a strip 12 miles wide, adjoining the State of Tennessee, which was claimed by South Carolina. In 1802 the territory from the Chattahoochee to the Mississippi, lying between the 31st and 35th parallels, was ceded to the U. S. by Georgia and South Carolina, and organized as Mississippi Territory. As yet, however, this territory had no access to the Gulf except through French or Spanish territory, the peninsula of Florida and the Gulf coast to the mouth of Amite River, and thence across to the Mississippi, extending northward to the 31st parallel, having been ceded by France to Spain. During the war of 1812 with Great Britain that part of the Spanish territory lying between the Perdido and Pearl rivers was occupied by the U. S. troops as a precautionary measure, and finally annexed to Mississippi Territory. The difficulties growing out of this seizure were subsequently settled by the purchase of the entire territory held by Spain in 1819. In 1813 and 1814 the Creek Indians inhabiting the present State of Alabama became very troublesome, and finally attacked and captured Fort Mimms on the Alabama River, near its junction with the Tombigbee, Aug. 30, 1813, and killed 380 whites who

had taken refuge there. Gen. Jackson at once marched into the Creek country with a strong force, and, following up the Indians very promptly, reduced them to complete subjection in a series of engagements in which their loss was 1617 killed, and his 100 killed and 400 wounded. After the battle of Horseshoe Bend, Mar. 27, 1814, in which the Creeks lost about 600 killed, they signed a treaty of peace in which they gave up three-fourths of their territory. Emigration to the fertile lands along the Alabama River and its tributaries now increased, and in 1817, Mississippi having been admitted into the Union as a State, Alabama was organized as Alabama Territory, and on the 2d of Aug., 1819, adopted a constitution under which it was admitted to the Union Dec. 14, 1819, having at that time 127,901 inhabitants. Alabama was actively concerned, with Georgia and Mississippi, in effecting the removal of the Indian tribes in those States to the present Indian Territory. As one of the largest slaveholding States in the Union, Alabama uniformly acted up to what were considered the interests of its section, taking strong ground in favor of the annexation of Texas, resisting all measures for the restriction of slave territory, and opposing with great vehemence what its political leaders characterized as Northern aggressions. In the presidential campaign of 1860, when it became probable that Mr. Lincoln would be elected, or at all events that Mr. Breckinridge would be defeated, an active correspondence was maintained between the political leaders in Alabama and those of other Southern States as to the best measures to bring about the secession of the Southern States and the formation of a Southern confederacy. Gov. Moore of Alabama sent a commissioner to the convention of South Carolina, which met Dec. 17, 1860, urging them to secede. He had issued his proclamation for an election of delegates to a convention in Alabama on Dec. 6. The delegates were elected on the 24th of that month, and met at Montgomery Jan. 7, 1861, and the ordinance of secession was passed Jan. 11, 1861—yeas 61, nays 39; and before adjourning the convention called for delegates from all the Southern States to meet at Montgomery, Ala., on the 4th of Feb., 1861, to organize a Southern confederacy. That convention met, organized a provisional government, elected Jefferson Davis President of the Confederacy, and Alexander H. Stephens Vice-President, and the new President having chosen his cabinet and a Confederate Congress being provided for, they adjourned, making Montgomery, for the time, the capital of their Confederacy. In July, 1861, the capital and Congress were removed to Richmond. Gov. Moore had already (in Jan., 1861) seized the U. S. arsenal and arms in Mobile, had occupied with State troops Fort Morgan in Mobile Bay, and had taken possession of the revenue cutter Cass. In the progress of the war Alabama took an active part, though the northern portion of the State contained a strong Union party. Several severe battles were fought within the limits of the State—notably, the naval actions and the capture of the forts in Mobile Bay in Aug., 1864, the siege and capture of Mobile in Mar. and April, 1865, and the capture of Selma and other towns by Gen. Wilson in April, 1865. There were also minor conflicts at Athens, Montevallo, Scottsboro', Talladega, and Tuscumbia. After the close of the war Alabama was in the same condition with the other Southern States. President Johnson appointed a provisional governor June 21, 1865, and pending measures of reconstruction the State was placed under military control. On the 25th of Sept., 1865, a State convention met and annulled the ordinance of secession, and in December following the provisional governor was withdrawn and the State allowed to manage its own affairs, subject only to some slight supervision of the military authorities. In Aug., 1867, Gen. Pope, commanding the third military district, ordered an election of delegates to a State convention to prepare a new constitution and civil government for the State. The convention met Nov. 5, 1867, and the constitution was submitted to the people Feb. 4, 1868. There was much opposition to it, and many of those opposed stayed away from the polls. The result was, that though the constitution received a majority of the votes cast, it did not receive a majority of those registered, and hence was deemed to have been rejected. Most of its provisions have, however, since been engrafted on the existing constitution. The State was admitted to a representation in Congress by an act passed over the President's veto June 25, 1868.

There was great suffering in consequence of the desolation of the country by the war, the failure of crops, and the difficulty of readjusting labor on the new basis, during the transition period of 1865–67; and subsequently the number of disfranchised persons at first, though these were mostly soon restored to their political rights, the attempts of a few misguided men to coerce the newly enfranchised people of color by threats, and the suspicions entertained by many of these against their former masters, led to some disturbances and outrages, and to fears of more. Happily, ere long better counsels prevailed; the necessity of retrieving her position as a State financially, socially, and politically led the citizens of Alabama to unite to preserve peace and order, and with returning prosperity a better state of feeling took the place of the old bitterness, and mutual toleration led the way to mutual regard. The State officers and legislature granted the State credit somewhat too freely for their existing financial condition to some of the great railroad enterprises of the State, as they found to their cost in 1870 and 1871; but fortunately, the error, though complicated by the mismanagement of the officials of a neighboring State, was not irretrievable, and the judicious management of the governor and his advisers and the legislature relieved the State from what seemed at first a serious embarrassment. On the whole, Alabama has passed through the crucial period of her history, the period of reconstruction, with less disturbance or disorder than most of the Southern States; and with the return of financial prosperity, and the development of the mineral, agricultural, manufacturing, and commercial resources of the State by the great railroad lines now traversing it, there is every reason to believe that she will enter on a new and more rapid period of growth and advancement. There will be occasional troubles, of course, but these will be adjusted without the interference of the general government and without serious disorder. In the autumn and winter of 1872–73 there was a marked instance of such an adjustment. The two political parties which divide the State were so evenly balanced that both claimed a majority in the Legislature, a part of whose members were elected in Nov., 1872; and so strenuous was their opposition to each other that there was a bolt at the very commencement of the session. One party, calling themselves Conservatives, assembled at the capitol in Montgomery, were duly organized by the officers of the previous legislature, and secured a quorum in both houses. The other party, claiming to be Republicans, organized as a legislature in the U. S. court-room at Montgomery, but Mr. Lindsay, the retiring governor of the State, himself a Conservative, refused to recognize the court-room legislature. The incoming governor, Mr. David P. Lewis, who was elected as a Republican, recognized each in turn; at first, there seemed to be danger of collision, but after some bitterness and denunciation the two legislatures were fused into one, and a spirit of harmony gained the ascendency.

Governors of the State.

William W. Bibb	1819–20	Henry W. Collier	1849–53
Thomas Bibb	1820–21	John A. Winston	1853–57
Israel Pickens	1821–25	Andrew B. Moore	1857–61
John Murphy	1825–29	John Gill Shorter	1861–63
Gabriel Moore	1829–31	Thomas H. Watts	1863–65
John Gayle	1831–35	Lewis E. Parsons, *Prov.*	1865–65
Clement C. Clay	1835–37	Robert M. Patton	1865–68
Arthur P. Bagby	1837–41	William H. Smith	1868–70
Benjamin Fitzpatrick	1841–45	Robert B. Lindsay	1870–72
Joshua L. Martin	1845–47	David P. Lewis	1872–
Reuben Chapman	1847–49		

Electoral and Popular Vote at Presidential Elections.

Year.	No. of Electoral Votes.	For what Candidate.	Popular Vote for each Candidate.
1820	3	Monroe.	Unanimous for Pres'dt Monroe.
1824	5	Jackson.	Jackson, 9443; Adams, 2416; Crawford, 1680; Clay, 67.
1828	5	Jackson.	Jackson, 17,138; Adams, 1938.
1832	7	Jackson.	Unanimous for Pres'dt Jackson.
1836	7	Van Buren.	Van Buren, 20,506, White, 15,612.
1840	7	Van Buren.	Van Buren, 33,991; Harrison, 28,471.
1844	9	Polk.	Polk, 37,740; Clay, 26,084.
1848	9	Cass.	Cass, 31,363; Taylor, 30,482.
1852	9	Pierce.	Pierce, 26,881; Scott, 15,038.
1856	9	Buchanan.	Buchanan, 46,739; Fillmore, 28,552.
1860	9	Breckinridge.	Breckinridge, 48,831; Bell, 27,875; Douglas, 13,651.
1864	—	No vote.	No vote.
1868	8	Grant.	Grant, 76,366; Seymour, 72,088.
1872	10	Grant.	Grant, 90,272; Greeley, 79,444.

L. P. Brockett.

Alabama, a township of Columbia co., Ark. P. 866.

Alabama, a township of Sacramento co., Cal. P. 336.

Alabama, a post-township of Genesee co., N. Y. It contains fine water-power, and the "Oak Orchard" acid mineral springs, nine in number. Their waters are largely used for their tonic effect. One-fourth of the township is occupied by the Tonawanda Indian Reservation. P. 1805.

Alabama Claims. The protracted negotiations, the treaty of Washington resulting therefrom, and the arbitration at Geneva by which this treaty was in part executed, may justly be deemed as forming the most important *cause célèbre* of modern diplomacy. The claims themselves were

made by the government of the U. S. in favor of certain of its citizens and of itself upon the government of Great Britain, on account of the acts of certain warlike vessels which sailed from British ports in the interest or employ of the Confederate States during the war of the rebellion in the U. S. The treaty of Washington describes them as "differences [which] have arisen between" [the two governments], "and still exist, growing out of the acts committed by the several vessels which have given rise to the claims generically known as the Alabama claims." The Confederate cruisers in respect of which the U. S. made any reclamations before the tribunal of arbitration at Geneva should be separated into two classes: *first*, those which were substantially fitted out and adapted to warlike use in Great Britain, so that they actually commenced their hostile careers by sailing from a British port; and *secondly*, those which commenced their hostile careers in the Confederate service within other territorial jurisdictions.

First Class.—The Florida was an iron screw gunboat. The contract for her was made in 1861 by Bullock, the Confederate agent in England having the matter in charge, with a firm of builders in Liverpool. Her object and destination were well known at that place, but the formal pretence was kept up that she was designed for the Italian navy. She sailed for Nassau on the 23d of Mar., 1862, with a crew of fifty-two men, all British except three or four, of whom only one was an American. She was in every respect a man-of-war, except that her armament was not in place, but she could have been put in complete preparation for battle in twenty-four hours. While she was preparing to sail, shot, shells, etc. were sent by river from Liverpool to Hartlepool, and there shipped on board the steamer Bahama, which left for Nassau, and there joined the Florida. All these facts were from time to time diligently brought to the attention of the British authorities by Mr. Adams, the American minister, and by Mr. Dudley, the American consul at Liverpool. At Nassau certain abortive proceedings against the Florida were undertaken by the colonial government. She sailed from Nassau on the 8th of August, having cleared for St. John, New Brunswick. At the same time, a schooner laden with the shot, shell, and other munitions of war sailed from Nassau, and met her at a neighboring island, where the transfer was made, and the Florida immediately set out on a hostile cruise. On the 4th of September she ran through the blockading squadron into Mobile, by pretending to be a British man-of-war and flying the British flag. On the 26th of Jan., 1863, she escaped from Mobile. Her career as a Confederate cruiser ended Oct. 7, 1864. Three of her captures, the Clarence, the Tacony, and the Archer, were fitted out and armed as her tenders, and aided in the work of destruction. During her cruises she was repeatedly received into British ports, and permitted to repair and to take in full supplies of provisions and coals. She and her tenders captured and destroyed American merchant-vessels and cargoes amounting in value to many millions of dollars.

The Alabama was built for speed, and not intended for fighting, and was manned by British subjects. She was a wooden steam sloop of about 1040 tons register, built for the Confederate States by Laird & Sons at Birkenhead, in England, and was called "No. 290," from her number in the list of steamers constructed by that firm. She was barque-rigged, was furnished with two engines of 350 horse-power each, and was pierced for twelve guns. Strict precautions were taken to keep her destination a secret, but the suspicions of the agents of the U. S. having been excited before she was quite finished, the minister of the U. S. requested the British government to detain her. The British ministers consulted the Crown lawyers, and after some delay, caused by the illness of the queen's advocate, an opinion was given in favor of detaining her. In the mean time, the "No. 290" had escaped, under a pretext of a trial trip, near the end of July, 1862. She was not equipped with guns and warlike stores when she left the Mersey, but received them at Terceira, whither they were conveyed by another vessel. In August, 1862, Capt. Semmes took command of the steamer, which he named the Alabama, and began his cruise with a crew of eighty men. He burned the merchant-vessels which he captured, being unable to take them into any port of the Confederate States in consequence of the blockade. The Alabama never entered any port that was possessed by the Confederate States.

It is stated that she captured sixty-five vessels, and destroyed property valued at $6,000,000. Much greater than this amount was the damage inflicted on ship-owners of the U. S. by the heavy insurance for war-risks to which they were subjected, and by the difficulty in obtaining freight for their vessels.

After a long cruise in the Pacific Ocean, she returned to Europe, and entered the port of Cherbourg to refit and obtain a supply of stores, June 11, 1864. A few days later the war-steamer Kearsarge, of seven guns, commanded by Capt. Winslow of the U. S. navy, arrived at Cherbourg. Capt. Semmes came out of the port and offered battle on the 19th of June. When the vessels were about one mile apart, the Alabama began to fire rapidly and wildly, while the guns of the Kearsarge were served with cool precision and effect. Both vessels during the action moved rapidly in circles, swinging round an ever-changing centre. After they had described seven circles, the Alabama began to sink and raised a white flag. Capt. Semmes, who had lost thirty killed and wounded, escaped in the English yacht Deerhound. Capt. Winslow lost three killed and wounded, and took sixty-five prisoners. The Alabama went to the bottom.

The Georgia was built for the Confederates on the Clyde. She sailed early in 1863, and proceeded to a point off the French coast, where she met the steamer Alar, which had been sent from Liverpool with her arms, ammunition, etc. Some steps were taken by the British government to prevent her escape, but they were too late. After a warlike career of about a year, she returned to Liverpool, and was there sold by the Confederate agents, Mr. Adams remonstrating in vain against this proceeding. Shortly after the sale she left the port, and was captured by the U. S. cruiser Niagara.

The Second Class.—The Sumpter, the Nashville, the Retribution, the Tallahassee, the Chickamauga. These were all armed and equipped in, and sailed from, Confederate ports. The claims made in respect of them were based upon allegations that they were received into British ports, and permitted to augment their supplies of coal and supplies, in excess of the maximum amount permitted by the queen's proclamation of neutrality; and also in respect of the Retribution, that she was permitted to take captured cargo into one of the Bahamas, and there sell or dispose of it without any judicial process. The case of the Shenandoah was quite different. She was originally a British steamer, called the Sea-King, and had been engaged in the East India trade. She sailed Oct. 8, 1864, for Bombay in ballast, with a crew of forty-seven men. She was not then armed and equipped or fitted out as a man-of-war. On the same day another steamer, the Laurel, sailed from Liverpool, ostensibly for Nassau, having on board a number of Confederates and a quantity of guns, gun-carriages, and other munitions of war. These steamers met at Funchal, in the island of Madeira, where the transfer was made. Here she was taken command of by Captain Waddell of the Confederate service, and manned. A small part only of the original crew consented to remain with her, and she sailed with less than one-half of her regular force of men. On the 25th of Jan., 1865, she arrived at Melbourne, where she was permitted to repair and to coal. She also at the same place enlisted a large number of men, augmenting her crew by forty-five new enlistments. This was done so openly that it was the common talk of the town, and was freely commented upon by the local papers. The tribunal of arbitration decided that the colonial authorities did not exercise due diligence in preventing these enlistments. Leaving Melbourne, she proceeded to the Arctic regions, and there, beyond the reach of any U. S. cruisers, she made great havoc among the American whaling ships. This was continued for several months after the complete overthrow of the Confederacy. She finally arrived at Liverpool on the 6th of Nov., 1865, and was surrendered to the British government, and by it delivered over to the U. S.

A diplomatic correspondence arose at once from the foregoing events. We can only state in the briefest manner the points which were urged by either side. It should be carefully borne in mind that the protracted negotiations growing out of the recognition of the Southern States as belligerents by the queen's proclamation of neutrality on the 13th of May, 1861, had no necessary connection with the Alabama claims. Although the two alleged causes of complaint were often mingled, and perhaps deemed inseparable, in the popular opinion of Americans, yet they were entirely distinct, and were finally and definitively held to be so by the treaty of Washington. During the war the immediate object of all communications made on the part of the U. S. was to induce the British government to interfere and prevent the escape of the Confederate cruisers; the remote object of the same communications, and the sole purpose of those made after the war, was to present and urge a demand for compensation.

Mr. Secretary Seward and Mr. Adams placed themselves upon the fundamental position that a neutral nation is bound by the principles and doctrines of the international law, independent of any mere municipal regulations, to use all the means in its power to prevent its territory from being made the base of military operations by one belligerent against the other. To this it was added that if further legislation was necessary to enable the authorities to carry out their international duties, it was always within the power

of the Parliament to enact the needed statute, and that an international obligation therefore rested upon that body to pass the act. The British government took issue with all these propositions; they denied all international duty antecedent to or beyond the existing statute; this statute, they claimed, was the limit of their power and responsibility. The statute referred to, known as the Foreign Enlistment act, was passed in 1819. In substance it provides "that if any person within any part of the United Kingdom shall . . . equip, furnish, fit out, or arm" any vessel, or attempt to equip, etc. any vessel, or procure any vessel to be equipped, etc., or knowingly aid in equipping, etc. any vessel, with intent that it may be employed in the service of one belligerent, he shall be guilty of a misdemeanor, and shall be fined and imprisoned, and the vessel, with its arms, etc., shall be forfeited. Lord Russell refused to go beyond this statute, and declared that the executive as such could not act, and that all proceedings under it must be judicial. To this end he demanded from Mr. Adams such preliminary technical proofs as would warrant a conviction by the courts. There was thus thrown upon Mr. Adams and Mr. Dudley the duty of acting as police agents and detectives for the British government in obtaining the evidence which the local officials did not busy themselves with discovering. At last, a construction was given to this statute by the English courts in the case of the Alexandra which, upon the theory before urged by Lord Russell, rendered the British government powerless. Like the Florida and the Alabama, she was constructed for the Confederates, in every respect a man-of-war ready for action, except that her guns and ammunition were not on board. She was proceeded against under the statute, which makes it the offence "to equip, furnish, fit out, or arm any vessel." The judge at the trial held that each one of these words means the same thing, and, as the Alexandra was not actually armed in a British port, the law was not violated. This ruling was sustained on appeal by the higher court. As the government had denied all international obligation, so this decision removed all municipal duty to interfere with the operations of the Confederate agents. Such was the course of the negotiations during the war.

In the year 1868 a change in the sentiments of British statesmen was apparent, and it was conceded that the matter was one for amicable adjustment. Under the influence of these opinions a convention was signed on the 14th of Jan., 1869, by Mr. Reverdy Johnson, the American minister, and Lord Clarendon, the British secretary for foreign affairs. It provided that "all claims upon the part of individuals, citizens of the U. S., upon the government of Her Britannic Majesty, and all claims on the part of individuals, subjects of Her Britannic Majesty, upon the government of the U. S.," arising since Feb. 8, 1853, shall be referred to commissioners or arbitrators to be settled. This treaty was rejected by the U. S. Senate, receiving but one vote in its favor. The reasons for this action were many: the most important were, that the treaty was expressly limited to claims of individual citizens, and ignored the existence of any on the part of the U. S. as a nation, and that it provided for the payment of claims against the U. S.

The long negotiations were ended by the treaty of Washington. The operative clause in this treaty is found in Art. I., which after reciting the "differences existing," as quoted before, proceeds: "Now, in order to remove and adjust all complaints and claims on the part of the U. S., and to provide for the speedy settlement of such claims, the high contracting parties agree that all the said claims growing out of acts committed by the aforesaid vessels, and generically known as the Alabama claims, shall be referred to a tribunal of arbitration," etc. This language is broad and without limit. A correspondence had taken place between Mr. Secretary Fish and Sir Edward Thornton, the British minister to the U. S., in Jan., 1871, preliminary to the negotiation of this treaty, in which Mr. Fish wrote, Jan. 30th, that "the removal of the differences which arose during the rebellion, and which have existed since, growing out of the acts committed by the several vessels which have given rise to the claims generically known as the Alabama claims, will also be essential to the restoration of cordial relations." To this suggestion Sir Edward Thornton acceded, and a joint high commission was agreed upon to negotiate the treaty. It will be noticed that the language of Mr. Fish's note is the same as that found in the first article of the treaty. The high commission consisted, on the part of the U. S., of Hamilton Fish, the secretary of state, Robert C. Schenck, the American minister to Great Britain, Samuel Nelson, one of the justices of the Supreme Court, Ebenezer R. Hoar, and George H. Williams; and on the part of Great Britain, of Earl de Grey and Ripon, president of the queen's council, Sir Strafford Northcote, M. P., Sir Edward Thornton, Sir John Macdonald, and Professor Montague Bernard. They completed the treaty of Washington on the 8th of May, 1871. In the deliberations the U. S. commissioners claimed compensation for "*direct losses*" in the destruction of vessels and cargoes, and in national expenditure in the pursuit of the Confederate cruisers, and for "*indirect injury*" in the transfer of American shipping to the British flag, in the enhanced rates of insurance, in the prolongation of the war, and in the addition to the cost of the war; they proposed that Great Britain should pay a lump sum, to be agreed upon, for all these claims. The British commissioners in answer proposed arbitration. The American commissioners would not agree to arbitration "unless the principles which should govern the arbitrators were first agreed upon." Finally, the latter suggestion was accepted; arbitration was adopted, and the rules which should govern the arbitrators were agreed upon. Articles I. to XI. of the treaty relate to the Alabama claims. The first describes, as has been shown, the matters submitted for decision; the others describe the constitution of the tribunal, its procedure, and the form of its decision. The seventh contains the important three rules, as follows:

First. That a neutral government is bound, first, to use due diligence to prevent the fitting out, arming, or equipping, within its jurisdiction, of any vessel which it has reason to believe is intended to cruise or carry on war against a power with which it is at peace; and also to use like diligence to prevent the departure from its jurisdiction of any vessel intended to cruise or carry on war as above, such vessel having been specially adapted in whole or in part within such jurisdiction to warlike use. *Secondly.* Not to permit or suffer either belligerent to make use of its ports or waters as the base of naval operations against the other, or for the purpose of the renewal or augmentation of military supplies or arms, or the recruitment of men. *Thirdly.* To exercise due diligence in its own ports or waters, and as to all persons within its jurisdiction, to prevent any violation of the foregoing obligations and duties; it being a condition of this undertaking that these obligations should in future be held to be binding internationally between the two countries.

These rules Great Britain denies to have been parts of the international law when the acts complained of were done, but for reasons of comity only consents that they retroact and apply to those acts, and be made the basis of decision. The article concludes as follows: "The high contracting parties agree to observe these rules as between themselves in future, and to bring them to the knowledge of other maritime powers, and to invite them to accede to them." In pursuance of the treaty, the following persons constituted the tribunal of arbitration: Count Edward Sclopis, named by the king of Italy; Mr. Jacob Staempfli, named by the president of the Swiss Confederation; Viscount d'Itajuba, named by the emperor of Brazil; Mr. Charles Francis Adams, named by the President of the U. S.; and Sir Alexander E. Cockburn, named by the queen of Great Britain. Each sovereign litigant was to present its claim to the tribunal in the form of a printed "case," and subsequently in an answer termed a "counter-case." Each case was to contain the facts and arguments relied upon by the party, and the counter-case was to be a reply to the case of the adversary. The American case was separated into six parts; it gave a minute history of the acts of the British government towards the U. S. during the rebellion, and of the fitting out and subsequent operations of each Confederate cruiser; and discussed the questions of international law involved in the controversy, and concluded with a demand of the compensation to be awarded. The British case was separated into ten parts, and covers a similar ground to the American case, though from a different point of view. Both were supplemented by many volumes of evidence. Two very distinct questions arose upon these papers: (1) What matters were submitted by the treaty to the arbitrators? and (2) By what rules and principles of law were the arbitrators to be guided in deciding the matters submitted to it? The consideration of the first and preliminary one of these questions gave rise to a controversy which for a while threatened to interrupt the whole scheme of arbitration. In Part VI. of the American case the U. S. presented the items of damage to which it claimed to be entitled. Quoting the language used by the American high commissioners, the case described claims for "direct" losses or damages, and other claims for "indirect" losses. The "direct" were said to include "losses growing out of the destruction of vessels and their cargoes by the insurgent cruisers, and the national expenditures in pursuit of those cruisers." The "indirect" were said to embrace "the loss in the transfer of the American commercial marine to the British flag," "the enhanced payments of insurance," "the prolongation of the war," and the "addition to the cost of the war." The presentation of these so-called indirect claims caused a great opposition in England. The government denied that they were included,

or intended to be included, in the terms of the treaty. Fresh negotiations were opened; a supplemental treaty was proposed; the controversy was continued after the meeting of the tribunal, and for a while it seemed possible that the whole proceeding would be a failure. The British agent asked for an adjournment of the tribunal for eight months, to allow formal negotiations. Finally, on the 19th of June, Count Sclopis, president of the tribunal, announced that the arbitrators, without deciding the question whether these claims were included in the treaty, "had arrived, collectively and individually, at the conclusion that these claims do not constitute, upon the principles of international law applicable to such cases, good foundation for an award of compensation or computation of damages between nations." The difficulty was then ended and the arbitration went on.

The argument upon the merits which was presented by the litigant nations to this high tribunal was most able and exhaustive. There is not space to present it even in the briefest outline. It turned mainly upon the true meaning of the phrase "due diligence" used in the three rules. The counsel on the part of Great Britain was Sir Roundell Palmer, then the acknowledged leader of the English bar, and afterwards made lord high chancellor with the title of Lord Selborne. The counsel on the part of the U. S. were William M. Evarts and Caleb Cushing. The final decision of the tribunal was announced Sept. 14. The arbitrators decided unanimously in favor of Great Britain in respect of the Georgia, Sumpter, Nashville, Tallahassee, and Chickamauga, and similarly in respect of the Retribution, by a vote of three to two. They all decided (Sir Alexander Cockburn for reasons peculiar to himself) that Great Britain was liable for the original fitting out and escape of the Alabama, and for her subsequent free admission into British ports. The same conclusion was reached in respect to the Florida, Sir Alexander Cockburn alone dissenting. The ruling as to these vessels applied also to their tenders. The tribunal was unanimous that no liability arose in respect of the Shenandoah prior to her arrival at Melbourne; but three of the arbitrators, Count Sclopis, Mr. Staempfli, and Mr. Adams, held that the colonial authorities failed to exercise due diligence to prevent the enlistment of men at that port, and that Great Britain was liable for captures made after her departure thence. The tribunal, in making their award, formulated and announced the following general principles, a portion of which lie at the basis of the whole decision, while a portion apply only to the estimate of the quantum of damages: "Due diligence should be exercised by neutral governments in exact proportion to the risks to which either one of the belligerents may be exposed by failure to fulfil the obligations of neutrality on their part." The effects of a violation of neutrality, as committed by the Alabama and other such cruisers, were not done away with by a commission subsequently issued by the Confederate government. "The government of Great Britain cannot justify itself for its failure in due diligence on the plea of the insufficiency of the legal means of action which it possessed." The claim of the U. S. for the national cost of pursuing the Confederate cruisers cannot be distinguished from the general expenses of the war, and is therefore an indirect loss which cannot be allowed. Prospective injuries to shippers and ship-owners, such as loss of future profits, are equally uncertain and indirect. All double claims for the same losses are rejected, but interest is allowed. Upon these principles the tribunal awarded, for actual losses of ships and cargoes and interest, the sum of $15,500,000. It is thus seen that the tribunal wholly overruled the position maintained by Great Britain from the beginning, that its statute was the sole criterion of its power and duty. In like manner the tribunal brushed away all claims by the U. S. for indirect and national losses, and strictly confined its judgment to the compensation of American private citizens for losses of ships, cargoes, freight, and wages.

J. N. Pomeroy.

Alabama Indians, a remnant of the once powerful tribe of that name, reside in Polk co., Tex. They are under the care of the State, but are also assisted by the general government. They are peaceable and quite industrious. They use the English language, but no woman is allowed to speak to a stranger. They retain the dress and many of the peculiar habits of the aborigines, but the women are clothed somewhat like their white neighbors. The people are remarkably tall, strong, and well formed. They number about 260.

Alabas'ter [Lat. *alabastri'tes* and *alabas'ter;* Gr. *ἀλάβαστρος*], a name applied to two kinds of white mineral substances which are similar in appearance, but different in composition. The alabaster proper is a fine-grained variety of gypsum or sulphate of lime; the finest quality of this is found near Volterra, in Tuscany; the other is a crystalline carbonate of lime, and is harder than the first. Both are manufactured into ornaments.

Alabaster, a post-township of Iosco co., Mich. Pop. 235.

Alabaster Box, or **Alabas'trum,** a vessel for containing precious perfumes, used by the ancients in various countries. They were made commonly of onyx-alabaster, but other materials were used. When the woman broke the "alabaster box of ointment" to anoint the feet of Jesus, as mentioned in the Gospels, it is probable that she had a vessel with a long tapering neck, which was sealed, and that she broke off the neck to get at the perfume. Alabastra of this form were not unfrequent.

Alabaster Cave, in Placer co., Cal., is a remarkable cavern 8 miles S. E. of Auburn, and 1 mile from the North Fork of the American River. This cave contains beautiful chambers incrusted with alabaster of various tints. It also contains a lake of undetermined extent.

Alach'ua, a county in the N. part of the peninsula of Florida. Area, about 1000 square miles. It is bounded on the N. by the Santa Fé River, on the W. by the Suwanee. The surface is rolling or nearly level; the soil is generally fertile. Sea-island cotton, grain, wool, molasses, and sugar are produced. Bog-iron ore has been found. It is intersected by the Florida R. R. Capital, Gainesville. Pop. 17,328.

Alago'as, a maritime province of Brazil, is between 9° and 10° S. lat. It is bounded on the N. and W. by Pernambuco, on the E. by the Atlantic, and on the S. by Sergipe and the river San Francisco. Area, 15,300 square miles. The surface is partly mountainous; the soil of the valleys and lowlands is fertile, and produces cotton, sugar, maize, etc. Capital, Maceio. Pop. of the province in 1867, estimated at 300,000, of whom 50,000 were slaves.

Alagoas [Port. "the lakes"], a town of Brazil, in the province of the same name, on the Lake Maysuaba, was until 1839 the capital of the province. It was formerly a large and important city, but since the change of the seat of government it has declined very much. It has a considerable trade in tobacco. Pop. about 4000.

Alagon', a river of Spain, enters the Tagus about 2 miles N. E. of Alcántara. Length, about 120 miles. It is noted for its fine trout and other fish.

Alaiedon, a township of Ingham co., Mich. Pop. 1296.

Alain de Lille [Lat. *Ala'nus de In'sulis*], a French philosopher and ecclesiastic, surnamed the Universal Doctor. He was born in 1114. He wrote many works in prose and verse, and was one of the most learned men of his time. Died about 1200.

Alais (anc. *Ale'sia*), a town of Southern France, in Gard, on the Gardon, and at the foot of the Cevennes, 31 miles by rail N. W. of Nîmes, with which it is connected by a railway. It is in a productive coal-field, and has several manufactories, a college, and a school of mines. Pop. in 1866, 19,964.

Al'amance', a county in the central part of North Carolina. Area, about 500 square miles. Is drained by Haw River and Alamance Creek. The surface is undulating, the soil productive. Very valuable iron ore abounds. Grain, tobacco, and wool are raised. It is intersected by the North Carolina R. R. Capital, Graham. Pop. 11,874.

Alame'da, a county in the W. part of California. Area, 820 square miles. It is bounded on the W. by San Francisco Bay, and drained by Alameda and Calaveras creeks. The surface in the E. part is mountainous, being occupied by the Coast Range; the soil of the lowlands is fertile. There are numerous warm mineral springs. Cattle, grain, and wool are produced, and saddlery, harness, and metallic wares are manufactured. Capital, San Leandro. Pop. 24,237.

Alameda, a post-township of Alameda co., Cal. It has a weekly newspaper. Pop. 1557.

Al'amo, a post-township of Kalamazoo co., Mich. Pop. 1148.

Alamo, a post-village, capital of Crockett co., Tenn.

Al'amo, The [*alamo* is the Sp. for "poplar" tree], a celebrated fort at San Antonio, Tex. A small body of Texans, mostly from the U. S., here bravely resisted a Mexican force of ten times their number from Feb. 11 to Mar. 5, 1836, and nearly all perished rather than surrender to a foe whom they despised. The six who finally surrendered were murdered by the Mexicans; Travis, Crockett, and Bowie were here killed. In consequence of this heroic defence, Alamo is styled the "Thermopylæ of America." "Remember the Alamo!" became the war-cry of the Texans in their struggle for independence.

A'lamos, Los, a town of Mexico, province of Sonora, 110 miles N. W. of Cinaloa, has rich silver-mines in the vicinity. Pop. in 1865, about 6000.

Å'land Islands, or **O'land,** a numerous group of small islands in the S. part of the Gulf of Bothnia, near the Baltic, belong to the grand-duchy of Finland, government of Abo. About eighty of them are inhabited. Pop. about 15,000. They were ceded to Russia by Sweden in 1809. The Russian fortifications here were destroyed by the English and French troops in 1854, and by a separate convention annexed to the treaty of Paris (April, 1856) the emperor of Russia agreed "that the Aland Isles should not be fortified," etc.

Alangia'ceæ [from *Alan'gium*, one of its genera], a natural order of plants closely allied to the Myrtaceæ. It consists of Indian species having aromatic roots and eatable fruit. Their long, strap-shaped petals afford one of the principal distinctions between them and the true myrtles.

Ala'ni, an ancient warlike tribe of unknown origin, who made incursions into the Roman empire as allies of the Goths and Vandals. They invaded Asia Minor in the reign of Aurelian, and co-operated with the Vandals in the invasion of Gaul in 406 A. D.

Alapayevsk, a town of Russia, in the government of Perm, 200 miles E. of Perm. It has large iron-works. Pop. in 1867, 5447.

Alarcon' y Mendo'za, de (Don Juan Ruiz), an eminent Spanish poet and dramatist, born in Mexico about 1590. He became a resident of Spain in 1622, after which he obtained the office of reporter of the royal council of the Indies. A volume of his dramas was published in 1628. Among his works, which present a faithful delineation of Spanish manners, and are commended for elevation of sentiment, are "Las Paredes Oyen" ("Walls have Ears") and "La Verdad Sospechosa" ("Suspicious Truth"), which Corneille imitated in his "Menteur." Died in 1639.

Al'aric [Lat. *Alari'cus*], a celebrated conqueror, a Visigoth, was born about 350 A. D. Soon after the accession of Arcadius as emperor of the East, Alaric invaded Thrace, Macedonia, and other provinces, in 395 A. D. He took Athens and entered the Peloponnesus, from which he was driven out by Stilicho. Hostilities were then suspended by a treaty, and Arcadius appointed Alaric governor of Illyria in 396. He invaded Northern Italy in 402, but was defeated by Stilicho at Pollentia and Verona. Stilicho having been killed in 408, Alaric renewed the invasion of Italy, which the emperor Honorius was unable to defend. The army of the Visigoths invested Rome, then the richest and most important city in the world, but they were induced to retire by the payment of 5000 pounds of gold and 30,000 pounds of silver. After unsuccessful efforts to negotiate, Honorius rejected the terms of Alaric, who in 410 took Rome, and permitted his soldiers to pillage it for six days. He was marching to Sicily when he died at Cosenza, in 410 A. D. (See Simonis, "Kritische Untersuchungen über die Geschichte Alarich's," 1858.)

Alaric II., king of the Visigoths, began to reign in 484 A. D., at the death of his father Euric. His dominions included parts of Spain and of Gaul. He was killed in battle by the hand of Clovis, king of the Franks, in 507.

A Las'co, Alas'co, or **Alas'ko** (John), a Polish Protestant, born in 1499, became Catholic bishop of Vesprim in 1529. He was afterwards converted, went to London, preached there a few years, but on the accession of Queen Mary, in 1553, he retired for safety to Germany. He wrote several theological works. Died Jan. 13, 1560.

Ala Shehr (the ancient *Philadelphia*, founded about 200 B. C. by Attalus Philadelphus), a walled city of Asia Minor, at the N. E. base of Mount Tmolus, 93 miles E. of Smyrna. Here are five Christian churches and numerous ancient ruins. Pop. about 15,000.

Alas'ka, or **Alias'ka,** a Territory forming the N. W. part of North America, is bounded on the N. by the Arctic Ocean, on the E. by British America, on the S. by the Pacific Ocean, and on the W. by the Pacific Ocean, or Sea of Kamtchatka, and Behring's Strait, by which it is separated from Asia. It lies between lat. 54° 40′ and 71° 23′ N., and between lon. 141° and 168° W. (except a narrow strip S. of Mount St. Elias). Area, 580,107 square miles. The most northern extremity is called Point Barrow. The peninsula of Alaska, which is about 350 miles long and 25 miles in average width, extends south-westward into the Pacific. The south-eastern part of Alaska is a long, narrow strip of land extending along the sea-coast from Mount St. Elias to the parallel of 54° 40′ N., and bounded on the N. E. by a mountain-ridge which is parallel to the Pacific. This strip is only about thirty-three miles wide. This territory, which includes a great number of large and small islands in the Pacific and in Behring's Strait, was formerly called Russian America. It was purchased by the U. S. from Russia in 1867 for $7,200,000.

The surface of the southern and western parts is mountainous, but the northern coast on the Arctic Ocean is flat. The principal rivers are—the Colville, which flows northward into the Arctic Ocean; the Kooskovime, which flows south-westward, and after a course of about 300 miles enters the Kamtchatka Sea; and the Yukon (or Kwichpak), which traverses the central part of Alaska and falls into Norton Sound. The length of the Yukon (or Youkon) is estimated by some writers at 2000 miles.

The climate is humid, and less severe than that on the Atlantic coast in a corresponding latitude. The mean annual temperature at Sitka is about 42°, and it is said that the mercury seldom falls below zero at Kodiak. The highest mountain-peak is Mount St. Elias, which is a volcano; its height is estimated at nearly 18,000 feet. Mount Fairweather is of nearly equal height, and there are several other volcanoes.

The parts of Alaska which are near the Pacific Ocean are mostly covered with forests of spruce, cedar, fir, etc., which grow to a great size. It is stated that some of these trees attain a height of 200 feet or more. Here occurs a species of *Cupressus*, called yellow cedar, which is an excellent timber for shipbuilding. The value of this region consists chiefly in its fisheries, timber, and furs, and perhaps in its coal, the value of which is not determined. The coal is of tertiary origin. Among the fishes that abound here are the salmon and the cod. The majority of the native inhabitants are Esquimaux. The principal wild animals are the elk, deer, bear, and seal. In the session of 1872 Congress annexed this territory to Washington Territory as a county. (See Washington Territory.) (See F. Whymper, "Travels and Adventures in Alaska," 1869; and Dall, "Alaska and its Resources," 1870.) Pop. of Alaska in 1870, 29,097 (whites and half-breeds), besides about 65,000 Indians.

Revised by L. P. Brockett.

Ala'tri, a town of Italy, in the province of Rome, 45 miles E. S. E. of Rome. It is the seat of a bishop. In the neighborhood is a large stalactitic cave. Pop. in 1861, 11,370.

Alatyr', a town of Russia, in the government of Simbirsk, at the junction of the Alatyr and Soora Rivers, 70 miles N. W. of Simbirsk. Pop. in 1867, 8085.

Alau'da, a genus of passerine birds which includes the skylark (*Alau'da arven'sis*), after the nightingale the most

Alauda cristata: the Crested Lark.

celebrated song-bird of Europe. The flesh of the skylark is esteemed a delicacy, and traps and nets of many kinds are employed for its capture. Its food consists of grasshoppers and other insects, worms, spiders, and grubs of various kinds. The beautiful *Alauda cristata*, or crested lark, is one of the most common birds of Europe and

Northern Africa. For other species of this interesting genus, see LARK.

Al'ava, one of the Basque Provinces in Spain, is bounded on the N. by Biscay and Guipuzcoa, on the E. by Navarre, on the S. by Logroño, and on the W. by Burgos. Area, 1205 square miles. The country is mountainous, but fertile, especially along the shores of the Ebro. The chief products are fruit, wine, grain, and hemp. Here are also several mineral springs. Chief town, Vitoria. Pop. in 1867, 102,494.

Alb, or **Albe** [Lat. *al'ba*, from *al'bus*, "white"], a long white linen vestment worn by the clergy of the Roman Catholic Church while they are performing the service. It sometimes has a cross embroidered upon the breast. At the end of the tunic and around the wrists are ornaments called "apparels."

Alb (called also the **Swabian Alps**), a chain of mountains which extends about 75 miles, and forms the watershed between the Danube and the Neckar, and is mostly comprised in Würtemberg. The average height of this range is nearly 2200 feet. Some remarkable caverns occur in the limestone formation of this chain.

Alba, DUKE OF. See ALVA.

Al'ba (the ancient *Al'ba Pompe'ia*), a town of Italy, province of Cuneo, on the Tánaro, 30 miles S. E. of Turin. Wine, silk, grain, and oil are the staple productions of the district, in which are also quarries of marble and rock-salt. Pop. of the town in 1861, 6367.

Alba, a township of Henry co., Ill. Pop. 295.

Albace'te, a province of Spain, comprises the N. part of the kingdom of Murcia and a portion of New Castile. It is bounded on the N. by Cuenca, on the E. by Valencia, on the S. by Murcia, and on the W. by Ciudad Real. Area, 5972 square miles. It is bounded on the N. W. by the Sierra de Alcaraz, and the surface is diversified by mountains, hills, and fertile valleys. It is drained by the river Segura, which rises within its limits. Among its staple products are grain, wine, tobacco, oil, cattle, and sheep. Capital, Albacete. Pop. in 1867, 221,444.

Albacete, a town of Spain, capital of a province of the same name, 172 miles by rail S. E. of Madrid. It stands on a fertile plain, has manufactures of knives and other steel goods, and considerable trade. Large cattle-fairs are held here in September. Pop. in 1860, 17,088.

Al'ba Lon'ga, a very ancient city of Latium, in Italy, was founded, according to tradition, by Ascanius, the son of Æneas, several centuries before the foundation of Rome. It was situated near the Alban Lake, about 16 miles S. E. from Rome. Its remains have been discovered.

Al'ban [Lat. *Alba'nus*], SAINT, the first person who suffered martyrdom in England for the Christian religion. His death occurred about 286 A. D.

Albanen'ses [from *Alba*, a town of Piedmont], that division of the Catharists who believed in absolute dualism. They taught that the world was created by the Evil Spirit. (See CATHARI.)

Alba'ni (ALESSANDRO), an Italian cardinal, a nephew of Pope Clement XI., was born at Urbino in 1692. He made a rich and celebrated collection of statues and other works of art at Rome. Died in 1779.

Albani (FRANCESCO), an eminent Italian painter, born at Bologna Mar. 17, 1578, was a pupil of Denis Calvart and L. Caracci. He excelled in painting the female form and rural prospects. Among his best works are highly finished oil pictures of "The Toilet of Venus," "Diana Bathing," and "The Four Elements or Seasons." His wife and children, who were remarkable for their beauty, served him as models for angels and cupids. Died Oct. 4, 1660.

Alba'nia, the ancient name of a country bounded on the E. by the Caspian Sea, and comprising the modern Daghestan and Shirvan. Its inhabitants were often defeated, but never conquered, by Rome.

Alba'nia (called *Shkiperi* by the natives, and *Arnaoutlik* by the Turks), the south-western part of European Turkey, lies between lat. 39° and 43° N., and is bounded on the W. by the Adriatic and Ionian seas. Its length N. and S. is about 290 miles, and its width varies from 40 to 90 miles. It nearly coincides with the ancient Epirus. The surface is mountainous, being occupied with nine ridges that are nearly parallel. The highest peaks rise about 8000 feet above the level of the sea. Among the remarkable features of Albania are its subterranean rivers and its beautiful lakes. The chief articles of export are wool, horses, timber, and maize. The Albanians are rude and warlike mountaineers, more addicted to robbery than industry. They are probably descended from the ancient Illyrians and Epirotes. Philologists are not agreed respecting the affiliations of their language, which has several strongly marked dialects, and is probably Indo-European. The inhabitants are often called *Arnaoots* or *Arnaouts*, and *Skipetar*. Pop. estimated at 1,300,000. Besides these, a large number of Albanians live in Greece and other parts of the Levant.

Albano, a lake and mountain in Italy, about 14 miles S. E. of Rome. The lake, which is six miles in circumference, occupies the crater of an extinct volcano, and is 1000 feet deep or more. The lake has no natural outlet, but discharges its waters through an artificial tunnel cut through tufaceous rock. This tunnel or "emissary" was undertaken by the Romans in 397 B. C. It is one of the most remarkable remains of ancient Roman engineering. It is 6000 feet long. Alba Longa stood on the N. E. margin. From the E. shore of this lake rises Mount Albano or Monte Cavo, which is over 3000 feet high, and commands an extensive and magnificent prospect. On its summit are the ruins of the temple of Jupiter Latialis.

Alba'no (anc. *Alba'num*), a city of Italy, on or near Lake Albano, and on the Via Appia, 18 miles by rail S. E. of Rome. It occupies the site of Pompey's villa, is celebrated for beauty of scenery, and is a favorite summer residence of the wealthy citizens of Rome. Here is a museum of antiquities and a large convent. Pop. 5200.

Al'bany, or **Al'bainn,** an ancient name of the Highlands of Scotland. It is supposed that Albany, or Albion (see ALBION), was the original name given to the whole island by its Celtic inhabitants, and that it was afterwards restricted to the north-western part of Scotland, when the Celts had retired from the other parts of Britain. The title of duke of Albany was given to the second sons of several kings of Scotland and England.

Albany, a small maritime division of Cape Colony, South Africa, about 450 miles E. of Cape Town, is about 65 miles long and from 30 to 40 miles wide. It is traversed by Great Fish River. The soil produces maize, barley, cotton, and other commodities. Capital, Grahamstown. Pop. in 1865, 16,264.

Albany, a county in the E. part of New York. Area, 482 square miles. It is bounded on the E. by the Hudson River, and on the N. (partly) by the Mohawk. The Normanskill and Catskill creeks afford good water-power in this county. The surface is mostly hilly; the soil near the streams is fertile, but in some parts is sandy and sterile. Magnesian limestone, marl, gypsum, and iron are found. The county is intersected by several important railroads, terminating at Albany, the capital. Grain, wool, hay, milk, butter, and cheese are the staples, and the manufactures are extremely various and important. Pop. 133,052.

Albany, a county of Wyoming Territory, bordering on Colorado. It is intersected by the North Fork of Platte River, and also drained by the Laramie River. The surface is partly mountainous, and occupied by the Black Hills. Laramie Peak, the highest point in this county, rises over 10,000 feet above the level of the sea. Valuable lignitic coal is found, and iron ore abounds. Stock-raising is an important pursuit. The soil in some parts is fertile, especially in Laramie Plains. The Union Pacific R. R. passes through the county. Cattle and wool are the staples. Capital, Laramie. Pop. 2021.

Albany, a city and capital of Dougherty co., Ga., is on the right bank of Flint River, on the South-western R. R., 106 miles S. S. W. of Macon. It is also the northern terminus of a division of the Atlantic and Gulf R. R., and is the present terminus of the Brunswick and Albany R. R. It has two weekly papers. Large quantities of cotton are here shipped by rail. The Flint River is navigable to this point only at high water. Pop. 2110.

C. W. STYLES, ED. OF "ALBANY NEWS."

Albany, a post-village of Whiteside co., Ill., in a township of its own name, on the Mississippi, 177 miles N. by W. of Springfield. Pop. of village, 606; of township, 805.

Albany, a post-village, the capital of Clinton co., Ky., 126 miles S. of Frankfort. Pop. 163.

Albany, a post-township of Oxford co., Me. Pop. 651.

Albany, a township of Stearns co., Minn. Pop. 231.

Albany, a post-village, the capital of Gentry co., Mo., on Grand River, 52 miles N. E. of St. Joseph. It has manufactures of furniture, brooms, wagons, harness, lumber, etc.; five churches, two newspapers, graded schools, a grist-mill, a foundry, and a machine-shop. Three railroads are under construction to this point. Pop. 607.

R. N. TRAVER, ED. OF "ALBANY NEWS."

Albany, a township of Carroll co., N. H. Pop. 339.

Albany, in Albany co., is the capital of New York, and is situated on the W. bank of the Hudson River, 145 miles N. of New York City, and 164 miles (or 201 by railroad) W. of Boston, in lat. 42° 39′ 49″ N., lon. 73° 44′ 33″ W.

The place was first settled by the Dutch in 1614 as a trading-post, and after Jamestown was the earliest settlement by Europeans within the limits of the thirteen States. Fort Orange, or Aurania, was erected here in 1623. The village was successively called Beverwyck and Williamstadt. In 1664 it was called Albany, for the duke of York and Albany, afterwards James II. Till the Revolution it was the centre of a large Indian trade. The colony continued to be inhabited by the Dutch, brought over largely by the Van Rensselaer family, who secured twenty-four miles square on both sides of the river, and leased the land. Feudal tenure was abolished in 1787. After the Anti-rent war the State prohibited in 1846 leases of land for a longer period than twelve years. It was incorporated as the city of Albany in 1686 and became the capital of the State in 1797.

The site of the city extends from the bank of the river, with two miles of frontage, over the alluvial plain, and after a few hundred feet rises up on the sides of the hills to and upon the table-land 150 to 200 feet high. The slope is divided by three or four valleys, worn by former streams into the clay-beds on which the city is built; these valleys have been largely filled up and covered with houses. The

New State Capitol (Albany, N. Y.).

view of the city from the E. bank of the river is picturesque and imposing, from the full exposure of the public edifices, with their domes and steeples, the Helderberg and Catskill Mountains being visible in the S. W. The corporate limits reach to Schenectady in a strip of land thirteen miles long and a mile wide. The principal streets are Broadway and Pearl street, which run parallel with the river, and State street, 100 feet wide, which ascends the hill to the Capitol, and thence narrower to the limits of the city proper westward. Washington avenue runs parallel to it, commencing from in front of the City Hall, and continues as the Schenectady turnpike.

The chief public edifices and institutions are the Capitol, of which the corner-stone was laid in 1806; the State Hall for State offices and the City Hall for city offices, both of marble and fronting on small parks near the Capitol; the State Museum of Natural History, chiefly of geology, with a cabinet of Indian curiosities, and is in the same building with the collection of implements and productions of the field of the State Agricultural Society; the State Library, containing, with the law department, over 90,000 volumes; the Bureau of Military Record, containing memorials of past wars; the Dudley Observatory, inaugurated in 1856, possessing the best astronomical instruments and Scheutz's tabulating machine, and now having also a physical observatory; the Medical College, which, with the Law School and the Observatory, now has an organic connection with Union College at Schenectady, under the name of Union University; two public hospitals, and a State normal school. The Albany Institute is a society first formed in 1791 for the advancement of science, and publishes its transactions. There is a public high school, one academy for boys, and three for girls. In 1870 there were 10,737 children attending school, and 2398 persons over ten years of age who could not read or write. There are sixty places of worship; the largest and most imposing church being the cathedral of the Immaculate Conception. There is also a Young Men's Association (founded 1833), a Young Men's Christian Association (1857), numerous Catholic sodalities, and other benevolent societies. The Roman Catholic diocese of Albany (founded in 1847) includes all the State N. of 42° N. lat., and E. of the E. lines of Tioga, Tompkins, and Cayuga counties; the Protestant Episcopal diocese of Albany (founded in 1868) is bounded on the W. by that of Central New York. The city contains numerous lodges of Masons, Odd Fellows, and other social and benevolent organizations. The Sisters of Mercy and of Charity, and the Christian Brothers, have institutions here. The Academy of the Sacred Heart at Kenwood, but within the city limits, occupies a building of immense size. At present (1873) the Rt. Rev. John J. Conroy, D. D., is the Roman Catholic bishop of Albany, and the Rt. Rev. Francis McNeirny is his coadjutor. The present bishop of the Protestant Episcopal diocese of Albany is the Rt. Rev. William Croswell Doane, S. T. D.

The penitentiary, opened in 1848, was under the charge of A. Pilsbury to 1873, receiving annually, mostly for short terms, over 1000 prisoners, and has almost uniformly been more than self-supporting. Washington Park is an extension of a small parade-ground with that name on the W. side into a park of 250 acres, with a lake and carriage drives of several miles. The Rural Cemetery, about four from the city northward, contains 230 acres, and is admired for its picturesque beauty and its monuments, especially Palmer's statue of the "Angel at the Sepulchre."

The advantages of Albany for trade are derived from the fact that it is near the head of tide-water and navigation, and is the eastern terminus of the Erie Canal and the southern terminus of the canal from Lake Champlain. There are six or seven railroads leading from Albany; the Hudson River and the Harlem to New York City, the Boston and Albany to Boston; the Rensselaer and Saratoga to Vermont and Canada; the New York Central to Buffalo; and the Albany and Susquehanna to Binghamton on the Erie R. R., besides steam and horse railroads to Troy. The river is crossed by two railroad bridges, and a company is incorporated for a third, over which teams will also pass. The most prominent manufacture has hitherto been stoves, including now hollow-ware, averaging annually $2,500,000 in value. Latterly, nine shoe-factories have been estab-

lished. There are thirty-three brewers and maltsters, and several manufactories of aniline colors, furniture, flour, brick, oilcloth, paper collars, safes, pianos, jewelry, soap, candles, boilers, machinery, etc. The lumber-market in the value of its lumber is second to none, the quantity received being valued at $13,000,000 a year. Its cattle-trade is of the greatest importance, being the central market for New York City and New England, and its stock-traffic amounts to $20,000,000 a year. Grain and the products of the extensive local manufacturing interests are also exported. Lumber is brought chiefly from Michigan, Canada, Pennsylvania, and Northern New York. Commerce is facilitated by a large number of slips for vessels, by a large dock, and by a pier, forming a great canal basin. There is also a very large grain elevator, owned by the New York Central R. R. The various receipts by canal amounted to $15,806,259; clearances by canal, $4,753,971. The city has a board of trade and a board of lumber-dealers. Albany is a port of survey in the U. S. customs district of New York. On June 30, 1870, there were 24 schooners, 40 sloops, 57 steamers, and 194 unrigged vessels belonging to this port. Albany has 8 national banks, with large assets exclusive of the stock. It has 11 savings banks. Albany has twelve miles of street railway. In 1873 there were 4 stock-and-mutual fire insurance companies, besides 1 purely mutual and 1 life insurance company. It has 10 weekly, 2 semi-weekly, 1 monthly, and 7 daily periodicals.

The city is supplied with water by gravitation from an artificial lake in the Sand Plains about 5 miles W. Some will also be pumped from the river in future. The fire department has seven steam fire-engines and a fire-alarm telegraph system.

A magnificent edifice for a new Capitol is building, back of the present one, of New England granite, the corner-stone of which was laid June 24, 1871. It covers more than three acres of ground, being 290 feet wide by 390 feet long, and may cost at least $10,000,000 before completion. With the basement it will be four stories high, besides the mansard story. It is in the Renaissance style, and has, in addition to high pavilions and turrets, a main tower 320 feet high. The entire structure will weigh 150,000 tons.

The population in 1790 (according to the Federal census) was 3506; in 1800, 5349; in 1810, 10,762; in 1820, 12,541; in 1830, 24,238; in 1840, 33,762; in 1850, 50,762; in 1860, 62,367; in 1870 (old limits, 69,422), 76,216. In the latter year parts of Watervliet and Bethlehem were annexed to Albany, and a part of Albany to Watervliet. The U. S. census gives the population both before and after the change.

H. A. Homes, *State Library, Albany, N. Y.*

Albany, a post-village, capital of Linn co., Or., on the Oregon and California R. R., is situated on the right (E.) bank of the Willamette River, at the mouth of the Calapooya, 28 miles by rail S. of Salem. The situation is beautiful. Small steamboats can ascend to this point for eight months in the year. Albany has a collegiate institute, a brick court-house, two weekly newspapers, and three or more churches. Pop. of precinct, 1992.

Albany, a post-township of Berks co., Pa. Pop. 1510.

Albany, a township of Bradford co., Pa. Pop. 1379.

Albany, a post-township of Orleans co., Vt., 32 miles N. E. of Montpelier. It has an academy, three villages, six churches, and manufactures of lumber, boots, shoes, etc. Pop. 1151.

Albany, a post-township of Green co., Wis. Pop. 1374.

Albany, a township of Pepin co., Wis. Pop. 275.

Albany (Louisa), Countess of, a daughter of the German prince Stolberg-Gedern, born Sept. 22, 1753. She became in 1772 the wife of the Pretender Charles Edward Stuart, a grandson of James II. of England. Her husband having died in 1788, she was mistress of the poet Alfieri. Died Jan. 29, 1824. (See Alfieri.)

Al'batross (*Diomedea*), a genus of web-footed birds of the family Laridæ, remarkable for their great size and powers of flight. The wandering albatross (*Diomedea exulans*) is the largest of all oceanic birds, having wings which measure twelve feet or more from tip to tip, but are narrow in proportion to their length. This bird is sometimes seen by voyagers over 100 miles from land. It feeds chiefly on fish. "Sometimes for a whole hour together," says the duke of Argyll, "this splendid bird will sail or wheel round a ship in every possible variety of direction, without requiring to give a single stroke to its pinions." There has been much discussion as to the means which enable the albatross to maintain this remarkable kind of motion; and the matter is not well explained. The above bird, known also as the man-of-war bird and the Cape sheep, is found near the coasts of most seas, but especially near those of Asia and Africa. Besides the above, there are the sooty albatross, *Diomedea fuliginosa*, of Eastern Asia, and the *Diomedea chlororhynchus;* and still other species are described.

Albatross.

Albay, a town in Luzon, one of the Philippine Islands, 258 miles S. E. of Manila, is the capital of a province. Pop. about 13,000. Pop. of the province, about 204,840.

Al'bee, a township of Saginaw co., Mich. Pop. 197.

Al'bemarle, a town of France. See Aumale.

Albemarle, a county near the central part of Virginia, has an area of about 700 square miles. It is bounded on the N. W. by the Blue Ridge, and on the S. by the James River. It is drained by the Rivanna and Hardware Rivers. The surface is finely diversified by hills and valleys. The soil is generally fertile. This county is intersected by the Chesapeake and Ohio R. R. It was the native place of Thomas Jefferson. Grain, tobacco, and wool are the staples. Pop. 27,544. Capital, Charlottesville.

Albemarle Sound, in the N. E. part of North Carolina, extends from the mouth of the Roanoke River 60 miles eastward to a narrow island which separates it from the Atlantic. Its average width N. and S. is about 12 miles. It communicates by narrow inlets with Pamlico and Currituck Sounds. The water in it is nearly fresh. Its greatest depth is 24 feet; average depth, 20 feet.

Albemarle (George **Monk**), Duke of, a famous English general, chiefly known to history as the principal agent in the restoration of the Stuarts in 1660, was born of an ancient Devonshire family near Torrington Dec. 6, 1608. He joined the army in order to escape punishment for mishandling a sheriff who was about to arrest his father for debt. In 1625 he engaged in the expedition against Spain, and took part at the attack upon Rhé, and served ten years in the Netherlands. In the campaign against the Scots he served as lieutenant-colonel. He led a regiment against the Irish, and was governor of Dublin until peace was struck by the marquess of Ormond in 1643. In the civil war Monk was taken prisoner by Fairfax in 1644, and imprisoned in the Tower, and only regained his liberty after a confinement of two years by taking the Covenant. He was given a command by the Parliamentarians, but drew upon him suspicions of treachery, and cleared himself with difficulty before Parliament. After the defeat of the royalist cause Cromwell appointed Monk a lieutenant-general and chief of artillery, in which capacity he did such service at the battle of Dunbar that Cromwell made him general-in-chief of the army in Scotland. In 1652 he took part in the commission which drew up a pact of union between England and Scotland, and went to Scotland as governor in 1654; in which position he had great difficulties in maintaining his rule against the Presbyterians. The royalists had already some hopes of his support, and Charles sent him secret overtures in 1656. Monk delivered this letter up to Cromwell. After the death of the dictator, Monk declared in favor of Richard Cromwell, and assumed the authority of a defender of public order only when Lambert threatened to establish a military despotism. On the 1st of Jan., 1660, he marched over the border with 6000 men, joining Fairfax at York, and marched into London on the 3d of February, without drawing sword from scabbard. At first he kept every one in the dark as to his intentions. On Feb. 28 he recalled the Presbyterian members expelled from Parliament in 1648, thus creating a majority for the king. He held negotiations with Charles, and Parliament declared the latter king on the 8th of May. Charles gave Monk the offices of privy councillor, chamberlain, and lord lieutenant of Devon and Middlesex, besides creating him duke of Albemarle. In 1666 the duke of Albemarle commanded the naval expedition against Holland, was beaten by De Ruyter in the three days' conflict at Dunkirk, but defeated the Dutch admiral at North Foreland. Died Jan. 3, 1670.

Albemarle, Earls of (Viscounts Bury and Barons Ashford), one of the prominent families of England.—The first earl of this family, Arnold van Keppel, born in 1669, was a Dutch favorite of William, prince of Orange, with whom he went to England in 1688. After that prince became King William III., Van Keppel was created earl of Albemarle, and was a rival of the duke of Portland in competing for royal favor. Died in 1718.—The sixth earl, George Thomas Keppel, born June 13, 1799, was member

of the House of Commons for East Norfolk from 1832 to 1835, and for Lymington from 1847 to 1850. He succeeded his brother as earl of Albemarle on Mar. 15, 1851. He is a lieutenant-general in the British army.

Albemarle, a post-village, the capital of Stanley co., N. C., is situated in a township of its own name, about 60 miles S. by W. from Greensboro'. Pop. of township, 1600.

Alberic I., a ruler of Rome, was born in the beginning of the tenth century, the son of a Lombardian noble. He became margrave of Camerino, and, through his marriage with the celebrated Marozia, ruler of Rome. He was banished by John X. from Rome, and was murdered in 925. His son, Alberic II., was a powerful and wise ruler, and died in 954, after a reign of twenty-three years. He was succeeded by his son, Ottaviano, who was elected pope under the name of John XII. in 956.

Albero'ni (GIULIO), CARDINAL, an ambitious Italian, born near Piacenza May 31, 1664. He began his public career as envoy of the duke of Parma to the court of Madrid, and, having gained the favor of Philip V., became prime minister of Spain in 1715. His foreign policy was so audacious and violent that nearly all the powers of Europe combined against Spain. Among his offensive acts was the invasion of Sardinia in time of peace. He was removed from office in 1719, and banished from Spain. Died Jan. 26, 1752. (See BERSANI, "Storia del Cardinale Giulio Alberoni," 1862.)

Al'bers (JOHANN FRIEDRICH HERMANN), an eminent German physician, born Nov. 14, 1805, became in 1831 professor of pathology in Bonn, established a celebrated asylum for insane and nervously affected persons in Bonn, and in 1856 became director of the pharmacological cabinet of the university. Died May 12, 1867. He has published, among other works, "Handbuch der allgemeinen Pathologie" (2 vols., 1842–44), "Lehrbuch der allgemeinen Arzneimittellehre" (1853), and "Die Spermatorrhöe" (1862).

Albert, a town of France, in the department of Somme, 18 miles N. E. of Amiens, has cotton-factories and paper-mills. Pop. in 1866, 4019.

Al'bert, a county in the S. E. part of New Brunswick, bordering on Chiegnecto Channel. The coal-like mineral called Albertite is found here, and petroleum has been obtained. Area, about 650 square miles. Capital, Hopewell Cape. Pop. 10,672.

Albert, crown prince of Saxony, born April 23, 1828, took part in the campaign in Sleswick-Holstein in 1849, was made lieutenant-general in 1853, and general in 1857, commanded the Saxon army in the war against Prussia in 1866, received the command of the twelfth army corps after the admission of Saxony into the North German Union, in which position he took part in the battles of Rezonville, Gravelotte, and Sedan in the German-French war of 1870, and received the command of the fourth army (of the Meuse). In July, 1871, he was created field-marshal of the empire, and soon after field-marshal of Russia.

Albert [in German, commonly *Albrecht*] **I.,** archduke of Austria, born in 1248, was a son of the emperor Rudolph of Habsburg. He was elected emperor of Germany in 1298, but his title was contested by Adolphus of Nassau, who had occupied the throne. These rivals fought a battle, in which Adolphus was killed. Albert, who was noted for his cruelty and avarice, was assassinated May 1, 1308, by his nephew, John the Parricide.

Albert V., a son of Albert IV., was born in 1397, and became duke of Austria in 1404. He was chosen king of Hungary in 1437, and emperor of Germany in 1438. His title as emperor was Albert II. Died in 1439.

Albert, archduke of Austria, a son of the emperor Maximilian II., was born in 1559. He was appointed governor of the Netherlands in 1596 by Philip II. of Spain, whose daughter Isabella he married about 1598. In 1600 he was defeated by Maurice of Nassau, who fought for the Dutch republic. The war was suspended in 1609 by a long truce. Died in 1621.

Albert I., margrave of Brandenburg, surnamed THE BEAR, was born about 1106. He was the founder of the House of Brandenburg. Died about 1170.

Albert III., of Brandenburg, born in 1414, was surnamed ACHILLES and ULYSSES, on account of his courage and wisdom. Died in 1486.

Albert (OF BRANDENBURG), first duke of Prussia, a grandson of the preceding, was born in 1490. He was elected grand master of the Teutonic Order in 1511, and was the last who held that office. In 1525 he became a Protestant, and duke of Prussia, which he held as a fief of the king of Poland. Died in 1568.

Albert (PRINCE), or, more fully, **Albert Francis Augustus Charles Emmanuel,** prince of Saxe-Coburg-Gotha and consort of Queen Victoria of England, was born near Coburg Aug. 26, 1819. He was a son of Duke Ernest I. His marriage with Victoria was celebrated in Feb., 1840, soon after which he obtained the rank of field-marshal in the British army. He patronized science and art, was a liberal promoter of benevolent institutions, and acquired great influence in public affairs as the prudent and trusted adviser of the queen. In 1857 he received the title of prince consort. Died Dec. 14, 1861. His death was lamented as a national loss. (Compare MORTON, "The Prince Consort's Farms" (1863), GREY, "The Early Years of the Prince Consort" (1867), and "Leaves from the Journal of Our Life in the Highlands from 1848–61" (1868).)

Albert Edward, prince of Wales, the eldest son of Queen Victoria, was born Nov. 9, 1841. He is the heir-apparent to the British throne. In 1860 he visited the U. S. He married, Mar. 10, 1863, the princess Alexandra of Denmark. Among his children by this marriage are—Prince Albert Edward Victor Christian, duke of Cornwall, born Jan. 8, 1864; Prince George Frederick Ernest Albert, born June 3, 1865; and Princess Louisa Victoria Dagmar, born Feb. 20, 1867. In Dec., 1871, the British nation was kept for some weeks in a state of painful anxiety by the dangerous illness of Prince Albert Edward at Sandringham.

Albert, a French revolutionist and mechanic, whose original name was ALEXANDRE MARTIN, was born at Bury (Oise) April 27, 1815. He founded in Paris in 1840 a journal called "L'Atelier" ("The Workshop"), and was a member of the provisional government formed in Feb., 1848.

Albert (FREDERICK RUDOLPH), archduke of Austria, eldest son of Archduke Charles, was born Aug. 3, 1817. In 1851 he was appointed military and civil governor of Hungary, which position he retained until 1860. In 1859 he was sent to Berlin to bring about an understanding between the two great powers of Germany, and in 1863 was created field-marshal.

Alber'ta, a township of Benton co., Minn. Pop. 158.

Albertinel'li (MARIOTTO), an eminent Italian painter, born about 1475, was a pupil of Raselli, and a friend and imitator of Fra Bartolommeo, with whom he painted several pictures. Among his most celebrated paintings is the "Affliction of Mary and Elizabeth" in Florence, "The Virgin Mary with Saint Domenico" on the Monte Cavallo, "Saint Catherine" and the "Virgin Mary with the Child" in the Louvre. Died about 1520.

Albert Lea is the shire-town of Freeborn co., Minn. It is 128 miles W. of the Mississippi River, at the intersection of the Southern Minnesota and the contemplated line of the St. Louis and Minneapolis R. Rs. It has several small manufactories, public park, library association, high school, and two newspapers. It is beautifully situated between two lakes, one of which bears its name, and the surrounding country of undulating prairie and timber is charmingly picturesque. An abundance of game has made it a popular resort for pleasure-seekers. Pop. of Albert Lea township, 1167. D. G. PARKER, PUB. OF "STANDARD."

Al'bert Mausole'um, erected in commemoration of Prince Albert, consort of Queen Victoria. The first stone of this building, at Frogmore, was laid by Queen Victoria in Mar., 1862, and the remains of Prince Albert were removed from St. George's Chapel to the mausoleum in December of the same year.

Al'bertson's, a post-township of Duplin co., N. C. Pop. 667.

Alber'ti (LEON BATTISTA), an eminent Italian architect, poet, and writer on art, was born at Genoa (or, as some say, at Florence) in 1404. He was employed as an architect by Pope Nicholas V., completed the Pitti Palace at Florence, and designed the church of St. Francis at Rimini. His "Treatise on Architecture" ("De Re Ædificatoria," 1485) is highly commended. Died April, 1472.

Al'bert Nyan'za (written also **Albert N'Yanza**), a large lake of Africa, and one of the sources of the White Nile, is situated under the equator, about 90 miles W. of Victoria Nyanza. It is 300 miles long or more, and is 92 miles wide where it is crossed by the equator. The northern extremity is in lat. 2° 45′ N. The southern part has not been fully explored. The surface of this lake is 2720 feet above the level of the sea. On the eastern side it is enclosed by rocky cliffs of granite and porphyry, the average height of which is about 1500 feet, and by isolated peaks, which are supposed to rise 5000 feet or more above the lake. Near the western shore is a range called the Blue Mountains, about 7000 feet high. The scenery around this lake is described as extremely beautiful. The water is fresh, sweet, and very deep. The Albert Nyanza was discovered and named by Sir Samuel White Baker, who with his wife reached Vacovia, on the eastern shore, in Mar.,

1864, after several years of arduous and perilous adventures. "It was," he says, "a grand sight to look upon this vast reservoir of the mighty Nile, and to watch the heavy swell tumbling upon the beach, while far to the south-west the eye searched as vainly for a bound as though upon the Atlantic. It was with extreme emotion that I enjoyed this glorious scene." Embarking in a boat, he explored the lake to Magungo, which is near its northern extremity, and in lat. 2° 16′ N. The lake here was about 16 miles wide. The Somerset River, or Victoria Nile, which is the outlet of Lake Victoria Nyanza, enters Lake Albert near Magungo. Ascending the Victoria Nile, he discovered a grand cataract, 120 feet high (perpendicular), which he named Murchison Falls. (See Sir S. W. BAKER, "The Albert Nyanza, Great Basin of the Nile," 1866.)

Alber'tus Mag'nus (*i. e.* "Albert the Great"), sometimes called ALBERT DE BOLLSTADT. He was born in Bavaria in 1193, and became a Dominican friar. In 1254 he was chosen provincial of the Dominican Order, and in 1260 became bishop of Ratisbon. He lectured for many years at Cologne, and wrote numerous works on theology, logic, philosophy, and other subjects. He was reputed one of the most learned men of the Middle Ages, and was regarded as a magician by some of his contemporaries. Died in 1280. Thomas Aquinas was one of his disciples.

Al'bi, or **Al'by** [Lat. *Albi'ga*], an old city of France, capital of the department of Tarn, on the river Tarn, and on a hill 42 miles N. E. of Toulouse. It has a museum of natural history, a college, a normal school, a cathedral, a public library, and a theatre; also manufactures of coarse linens, tablecloths, and cotton goods. Here is an archbishop's see. The Albigenses derived their name from this town, which suffered much in the religious wars of France. Pop. in 1866, 16,596.

Al'bia, the county-seat of Monroe co., Ia., on the Burlington and Missouri River R. R. where it is crossed by the Central R. R. of Iowa, 100 miles N. W. of Burlington, and about 65 miles S. E. of Des Moines. It has one national bank and two weekly papers. Two other railroads are projected to the place. The county is mostly underlaid with coal of a good quality, and mines are being opened in numerous places. The country around it is rich and productive. Pop. 1621.

JAMES HAYNES, ED. "SPIRIT OF THE WEST."

Albigen'ses [from *Albi'ga*, the Latin name of Albi, a town of France], a name given to several sects of reformers in the south of France which called themselves Catharists. In 1208, Pope Innocent III. proclaimed a crusade against these reformers and against Raymond VI., count of Toulouse, one of their principal leaders. A large army was led against them by Simon de Montfort, earl of Leicester. The war was carried on with great bitterness of feeling on both sides, and with little intermission till 1229, when a treaty between the contending parties was concluded at Paris. Many of the Albigenses emigrated to other countries, while others perished in the Inquisition, which was established about the same time that the pope proclaimed his crusade. The name gradually disappears in the early part of the fourteenth century. (See FABER'S "Inquiry into the History and Theology of the Ancient Vallenses and Albigenses," London, 1838.)

Al'bin, a township of Brown co., Minn. Pop. 194.

Albi'ni (FRANZ JOSEPH), an able German statesman and lawyer, born in Rhenish Prussia May 14, 1748. He passed some years in the service of the emperor Joseph II., after whose death (1790) he became chief minister of the elector of Mentz, whom he served with fidelity until 1802. Died Jan. 8, 1816.

Albi'no [Port., from the Lat. *al'bus*, "white"], a person who has a great deficiency or an absence of pigment in the hair, skin, and eyes. The complexion is very light, the hair often snowy white, the eyes red. Albinism in the human species may be observed in white and black races, and in the negro is sometimes partial, patches of the skin having the normal color. Albinism is frequent among Zuni Indians and other tribes in Arizona. A degree of nyctalopia (day-blindness) is common among albinos. Elephants, birds, mice, and other animals sometimes exhibit the phenomena of albinism, which is often hereditary.

Al'bion, the ancient Celtic name of Great Britain. The name, said to signify "white island," is supposed by some, though without good reason, to have been given on account of the chalky cliffs of Kent.

Albion, a post-village, capital of Edwards co., Ill., in a township of the same name, and on the New Albany Mt. Carmel and St. Louis R. R. It has a high and healthy location, good schools, a chemical laboratory, a wagon-factory, and two newspapers. Pop. of village, 613; of township, 2856. J. E. CLARKE, PUB. "ALBION INDEPENDENT."

Albion, a post-village, the capital of Noble co., Ind., in a township of its own name, about 26 miles N. W. of Fort Wayne. Pop. of township, 598.

Albion, a township of Butler co., Ia. Pop. 1039.

Albion, a township of Howard co., Ia. Pop. 682.

Albion, a post-township of Kennebec co., Me. Pop. 1356.

Albion, a post-village of Calhoun co., Mich., on the Kalamazoo River and Michigan Central and N. C. M. R. R., 37 miles S. of Lansing and 96 miles W. of Detroit. It is the seat of Albion College, under the control of the Methodist Episcopal Church. The village has four fine primary school buildings, besides an excellent central school; a national bank, two weekly papers, two large flouring and other mills, two door, sash, and blind factories, a tannery, an extensive agricultural tool manufactory, machine-shop and furnace, a library, five churches, and two benevolent societies. Pop. of Albion township, 2409.

S. W. COLE, PUB. "ALBION MIRROR."

Albion, a post-township of Wright co., Minn. P. 281.

Albion, the capital of Orleans co., N. Y., on the Erie Canal and the New York Central R. R., 30 miles W. of Rochester, has a brick court-house, a jail, a furnace, two banks, two newspapers, two public parks, six churches, a free library, and several important manufactories. It is the seat of a fine academy, and of Phipps' Union Seminary. It is in Barre township. Pop. 3322.

C. G. BEACH, ED. "ORLEANS REPUBLICAN."

Albion, a township of Oswego co., N. Y. It has manufactures of leather, lumber, etc. Pop. 2359.

Albion, a post-borough of Erie co., Pa. Pop. 452.

Albion, a thriving village and township of Dane co., Wis., is situated in an important tobacco-growing region. Albion Centre is the seat of Albion Academy, also of a prosperous Sabbath school publishing-house, both under the patronage of the Seventh-Day Baptist denomination. It has one semi-monthly paper, and is three miles from Edgerton, on the Milwaukee and St. Paul R. R. Pop. of township, 1142.

REV. J. E. N. BACKUS, PUB. OF "GEM."

Albion, a township of Jackson co., Wis. Pop. 1991.

Al'bite [from the Lat. *al'bus*, "white," and the Gr. λίθος, a "stone"], a silicate of alumina and soda, sometimes called soda felspar. It is a constituent of granite, being associated with true felspar, from which it may be distinguished by its greater whiteness and translucency. It also occurs in syenite and greenstone.

Al'boin [Lat. *Alboi'nus*], the founder of the Lombard kingdom in Italy, was a son of Alduin, whom he succeeded in 543 A. D. He conducted an army of Longobards into Italy in 569, and conquered the northern provinces. He married Rosamund, a daughter of King Cunimund, whom he had killed. Alboin was assassinated in 573 A. D., at the instigation of Rosamund.

Albo'ni (MARIETTA), a popular Italian singer, born at Cesena Mar. 10, 1824, was a pupil of Rossini. She performed with great applause in Paris and London in 1846–47, and afterwards visited the U. S. She was married to the count de Pepoli. Her voice is a contralto, in the highest degree sweet and sonorous.

Al Borâk' (*i. e.* "the lightning," so called on account of its fleetness), the name of a creature on which Mohammed is said to have made journeys to the celestial regions.

Albornoz' (GIL ALVAREZ CARILLO), or **Ægid'ius de Albornoz',** a Spanish cardinal, born at Cuenca. He was appointed archbishop of Toledo by Alfonzo XI. of Castile, whose life he saved in a battle against the Moors. In 1353, Pope Innocent VI. sent him as legate to Italy, where he distinguished himself by his military and political talents, and restored the authority of the pope over many cities. Died Aug. 24, 1367.

Al'brecht, the name of many German princes. (See ALBERT.)

Al'brechtsberger (JOHANN GEORG), one of the most learned contrapuntists of modern times, born Feb. 3, 1736, became director of the choir of the Carmelites in Vienna, organist to the court in 1772, musical director at St. Stephen's cathedral in Vienna in 1792, and died Mar. 7, 1809. He published "Gründliche Anweisung zur Composition" (1790; 3d ed. 1821).

Al'bright (JACOB), an American divine of the Lutheran Church, born in Montgomery co., Pa., in 1759. He founded in 1808 the EVANGELICAL ASSOCIATION (which see). Died in 1808.

Al'bright's, a township of Alamance co., N. C. Pop. 625.

Albue'ra, La, a village of Spain, in Estremadura, on a small river of its own name, 13 miles S. E. of Badajos. Here on the 16th of May, 1811, the British general Beresford defeated the French marshal Soult, who lost nearly 9000 men. The allies lost about 7000.

Albufe'ra, a lake of Spain, 7 miles S. of Valencia, is 11 miles long, and abounds in fish and wild fowl. It is near the sea, with which it is connected by a narrow channel. The Spaniards were defeated near this lake in 1812 by the French under Marshal Suchet.

Albu'men [from *al'bus*, "white"], a Latin term signifying the "white of an egg," denotes in chemistry an organic compound of great importance, which, besides being the characteristic ingredient in the white of an egg, abounds in the serum of the blood, in chyle, lymph, the juice of flesh, and forms an important part of the skin, muscles, and brain. In Bright's disease it is found in considerable quantity in the urine. "It is obvious," says Liebig, "that albumen is the foundation, the starting-point, of the whole series of peculiar tissues which constitute those organs which are the seat of all vital actions." Albumen is also found in small quantities in most vegetable juices.

When heated to a temperature from 140° to 160°, albumen coagulates and becomes insoluble in water. It is also coagulated by alcohol and most of the acids. According to Liebig, the albumen of blood is $C_{216}H_{338}N_{51}S_3O_{68}$. Lieberkühn considers it $C_{72}H_{112}N_{18}SO_{22}$.

The fibrine of the muscles and the albumen of blood contain the same elements in the same proportion.

Egg albumen differs from serum albumen by being precipitated by ether and by turpentine, and being almost insoluble in strong nitric acid. When injected into the veins of dogs or rabbits it passes into the urine unchanged, while serum albumen injected in the same way does not appear in the urine at all.

Coagulated albumen is white, opaque, and elastic. It dries to a brittle, translucent, horny mass, which when placed in cold water swells up to its original form.

Albumen is a weak acid, apparently dibasic. Its salts with the alkaline metals are soluble; they are obtained by adding the caustic alkalies or alkaline carbonates directly to albumen. The other albuminates are insoluble, and are obtained by precipitation: Potassic albuminate $= K'_2C_{72}H_{110}N_{18}SO_{22}$; calcic albuminate $= Ca''C_{72}H_{110}N_{18}SO_{22}$.

The white of egg is recommended as an antidote to corrosive sublimate, mercuric chloride, as it forms mercuric albuminate, which is insoluble in water. As it is, however, slightly soluble in saline solutions, the physician should also secure vomiting, to remove the mercury from the stomach. Albumen is much used for clarifying syrups and other liquids. When boiled with them, it coagulates to flocks, entangling the suspended impurities, and carrying them either to the surface as a scum or to the bottom as a sediment. In cooking, the white of egg is employed; in sugar refining, bullock's blood. Albumen is also used for preparing the surface of paper for photographic printing, and for making a cement with lime.

Egg and serum albumen are now manufactured in large quantities by simply drying the natural fluids in thin layers in warm air, taking care that the temperature shall not be so high as to coagulate the albumen, and thus render it insoluble. The chief application of this albumen in the arts is in calico-printing. It is employed in fastening certain colors upon the fibres of cotton cloth, especially pigments such as ultramarine, chrome yellows, and oranges, Guignet's green, etc., and also the aniline colors. The pigments or colors are simply mixed with a solution of albumen, printed on the cloth, and fixed by steaming, which coagulates the albumen and renders it insoluble. A dark-colored, inferior quality of serum albumen, sold under the name of "dried blood," is used by sugar refiners to clear the solutions of raw sugar. C. F. CHANDLER.

Albu'minoids, or **Pro'teids,** an extensive class of organic bodies found in animals and plants. They form the chief constituents of blood, muscles, nerves, glands, and other organs of animals; and though present in plants in much smaller proportions than cellulose, starch, sugar, etc., they still play a most important part in plant life. Their exact constitution has not been determined. Analysis shows them to contain—

Carbon,	52.7 to 54.5.
Hydrogen,	6.9 " 7.3.
Nitrogen,	15.4 " 16.5.
Oxgyen,	20.9 " 23.5.
Sulphur,	0.8 " 1.6.

They are amorphous, more or less soluble in water, insoluble or nearly so in alcohol, insoluble in ether, soluble in excess of strong acetic acid, soluble in alkalies, and soluble in strong mineral acids. Nitric acid produces yellow xanthoproteic acid. Strong alkalies change them to leucine, tyrosine, oxalic acid, carbonic acid, ammonia, etc., according to the temperature. From their solutions they are precipitated by excess of mineral acids, by potassic ferrocyanide with acetic or hydrochloric acid, by acetic acid in presence of a considerable quantity of alkaline or alkaline earthy salt, gum arabic or dextrine, by mercuric nitrate, Millon's reagent.

They have been classified as follows:

I. Albumens, soluble in water: 1. Serum albumen; 2. Egg albumen.

II. Globulins, insoluble in water, soluble in very dilute acids and alkalies, soluble in dilute solutions of sodic chloride and other neutral salts: 1. Myosin; 2. Globulin; 3. Fibrinogin; 4. Vitellin.

III. Derived albumens, insoluble in water and in solutions of sodic chloride; soluble in dilute acids and alkalies: 1. Acid albumen; 2. Alkali albumen, or albuminate casein.

IV. Fibrine, insoluble in water, sparingly soluble in dilute acids and alkalies, and in neutral saline solutions.

V. Coagulated proteid.

VI. Amyloid substance, or lardacein.

VII. Peptones, produced by the action of the gastric juice on all albuminoids.

For further information on this important class of bodies see HOPPE-SEYLER, "Handbuch der Physiologisch-Chemischen Analyse;" the eleventh English edition of FOWNES' "Manual of Chemistry;" and the "Handwörterbuch der Chemie," 2t Auf. II., p. 124. C. F. CHANDLER.

Albuminu'ria [from *albumen* and the Lat. *uri'na*, "urine"] is the presence of albumen in the urine, constituting a very important symptom of disease. Albumen is sometimes observed in small proportion in the urine of persons apparently healthy. Artificial obstruction (by vivisection and ligation) of the emulgent veins in the lower animals produces albuminuria, thus illustrating the fact that passive engorgement of the kidney may cause this symptom, as in organic disease of the heart. Albuminuria has been reported as following the injudicious use of oil of turpentine, in which case it results from an active congestion of the kidney. Albuminuria is sometimes associated with dyspepsia, in which case it may be either a temporary and probably unimportant symptom, or a precursor of Bright's disease—a malady which is among the most formidable of all with which we have to deal. This symptom has also been observed in malarial and typhoid fevers, pneumonia, smallpox, scarlet fever, measles, erysipelas, peritonitis, consumption, pregnancy, rheumatism, leucocythæmia, purpura, and a great variety of other conditions. In most cases it results from a degeneration of the kidney, characterized by swelling, opacity, and molecular decay of the renal epithelium.

Albuminuria is best detected either by slightly acidulating and then boiling the urine in a test-tube, or by adding nitric acid. In either case the albumen coagulates into a white, semi-solid mass. Albuminuria is best treated by attention to hygienic conditions.

Albuñol', a town of Spain, in the province of Granada, near the Mediterranean, 35 miles W. by S. of Almería. It is well built and has several convents. Pop. about 5000.

Albuquer'que, a town of Spain, in the province of Badajos, 26 miles N. of Badajos. It has a castle, and manufactures of cotton and wool. Pop. about 7500.

Albuquerque, a post-town, the capital of Bernalillo co., N. M., on the Rio Grande, 75 miles S. W. of Santa Fé. It has a trade in wool, hides, grain, and wine. Gold, silver, iron, lead, copper, and coal are found near this place, which is 5032 feet above the sea-level. Pop. 1307.

Albuquerque, or Alboquerque, d' (AFFONSO), surnamed THE GREAT and THE PORTUGUESE MARS, a celebrated general, born at Alhanda, near Lisbon, in 1452, was related to the royal family. After he had distinguished himself in several expeditions to Africa and the East Indies, he was appointed viceroy of the Indies in 1509. He took the city of Goa in 1510, and conquered Malacca, in which he obtained booty of great value, in 1511. In 1513 his fleet entered the Red Sea, which had never before been navigated by Europeans. He captured the rich emporium of Ormuz in 1515. Having been removed from command, he died at Goa Dec. 16 of that year. He is said to have been eminent for justice and other virtues, which, combined with his military skill, greatly increased the power of Portugal in India.—ALBOQUERQUE (BRAS AFFONSO), a natural son of the preceding, was born at Alhandra in 1500. He was a naval officer, and was noted for his integrity and public spirit. He wrote a narrative of his father's campaigns, entitled "Comentarios do grande Affonso d'Albóquerque" (1557). Died in 1580.

Al'burg, a post-township of Grand Isle co., Vt. This township has a celebrated mineral spring which is of a decidedly alkaline character, and contains lithia. It is useful

in gout and rheumatism, and other diseases. It has been recommended for cancer, but has no marked effect on that disease. Alburg has an academy, and is on the Vermont Central R. R. Pop. 1716.

Albur'num [from the Lat. *albus*, "white"], or **Sap-wood,** is that part of the wood of exogenous trees which is most recently formed and is contiguous to the bark. It consists partly of tubes through which the sap ascends, and is of a white or pale color, whence its name is derived. It gradually hardens with age, and is converted into duramen or heart-wood, which is more valuable than alburnum.

Alcæ'us [Gr. Ἀλκαῖος], a celebrated Greek lyric poet, born at Mitylene, flourished about 600 B. C. In the violent contests between the democracy and the nobles of Lesbos he took side with the latter. He wrote in the Æolic dialect, and invented the metre called Alcaic. His poetry is impassioned and full of enthusiasm. Horace admired and imitated the odes of Alcæus, who, among the nine lyric poets of the Alexandrian canon, was recognized as the second, or, as some say, the first. He is said to have been a friend and admirer of Sappho, to whom some of his verses were addressed. His works are lost except small fragments.

Alca'ic Me'tre, in Greek and Latin poetry, was named from Alcæus, the reputed inventor. The greater alcaic verse consists of two iambic feet, a long catalectic syllable, a choriambus, and an iambus. The lesser alcaic is two dactyls, followed by two trochees.

Alcaide. See ALCAYDE.

Alcala' de Guadai'ra, a town of Spain, in the province of Seville, 9 miles S. E. of Seville, has a Moorish castle, and considerable trade in grain. Pop. about 7400.

Alcala' de Hena'res, a city of Spain, in the province of Madrid, on the river Henares, 21 miles by rail E. of Madrid, was built in 1083 near the site of the ancient Complutum. It was the seat of a celebrated university founded by Ximenes, which has been removed to Madrid. After this removal, Alcalá (which had 22,000 inhabitants in 1768) rapidly declined. Cervantes was born here in 1547. The celebrated Complutensian Bible was printed at Alcalá in 1514. Pop. about 8600.

Alcala' la Real', a city of Spain, in the province of Jaen, stands in an elevated glen about 2700 feet above the sea, and 24 miles S. W. of Jaen. It has a court-house, several convents, a hospital, etc. Pop. 6738.

Alcal'de [probably a corruption of the Arabic *al cadi*, "the judge"], the title given by the Moors, Spaniards, and Spanish American nations to a judicial or administrative officer, is sometimes erroneously confounded with *alcayde*. *Alcalde pedaneo* signifies justice of the peace.

Alcam'enes [Gr. Ἀλκαμένης], an eminent Athenian sculptor, a pupil of Phidias, flourished about 420 B. C. He was equal in celebrity to any sculptor of his time except his great master. Pausanias states that he was living in 400 B. C.

Al'camo, a town on the island of Sicily, in the province of Trapani, 24 miles S. W. of Palermo, has a college and picturesque ruins of an old castle. Pop. in 1872, 20,890.

Alcañiz', ål-kån-yeeth', a town of Spain, in the province of Pernel, on the Guadalupe River, 57 miles S. E. of Saragossa. Pop. about 7500.

Alcántara, a town of Spain, in the province of Caceres, is situated on the left bank of the Tagus, near the Portuguese boundary. Here are ruins of a grand bridge built by the emperor Trajan in 103 A. D., of which a triumphal arch forty feet high still remains. The duke of Alva here defeated the Portuguese in a great battle on Aug. 25, 1580. Pop. about 4100.

Alcántara, Order of, also called the **Order of Saint Julian,** a religious order of Spanish knighthood, founded in 1156 at Alcántara for the defence of the Christians against the Moors. In 1495 the office of grand-master of this order was united to the Spanish crown. Their crest was a pear tree.

Alcatraz' (or **Alctra'ces**) **Island,** of California, sometimes called **Pelican Island,** is in the bay, 2½ miles N. of San Francisco. Length, 1650 feet; height, 130 feet. It is fortified, and commands the entrance of the Golden Gate. On its summit is a lighthouse 36 feet high, in lat. 37° 49′ 27″ N., lon. 122° 24′ 19″ W.

Alcava'la, or **Alcaba'la,** a tax formerly imposed in Spain and her colonies on all property sold, and payable as often as it changed hands. This tax, which was at first 10, and afterwards 14 per cent. *ad valorem,* was very injurious to the prosperity of the country.

Alcay'de, or **Alcaide** [from the Arabic *al*, "the," and *cadi*, a "magistrate"], a term applied by Spaniards, Moors, and Portuguese to a jailer or inferior magistrate.

Alca'zar (or **Alcazer**) **de San Juan',** a town of Spain, in the province of Ciudad Real, 47 miles N. E. of Ciudad Real, has manufactures of soap, nitre, and gunpowder. Pop. 7942.

Alca'zar Kebîr' ("the great castle"), a city of Morocco, 83 miles N. W. of Fez. Pop. in 1864, about 25,000. Near it is a bridge (*Alcántara*) where Sebastian, king of Portugal, was defeated and killed Aug. 4, 1578.

Alces'tis [Gr. Ἄλκηστις], in classic mythology, was a daughter of Pelias and the wife of Admetus, king of Thessaly. The poets feigned that she prolonged the life of her husband by suffering voluntary death as his substitute, and was rescued from Hades by Hercules. The story of her devotion is the subject of one of the tragedies of Euripides.

Al'chemy [for etymology, see below] is commonly understood to mean the occult science or art of transmuting the baser metals into gold. Some writers suppose that alchemy originated in Egypt, the ancient name of which was *Chem* ("dark," "mysterious"), and that it was introduced into Europe by the Arabs. The origin of alchemy seems to be connected with the widespread notion that the manifold forms of matter have a common basis, and that the individual properties of material bodies are due to formative force separable in thought, if not in fact, from this common substratum. Hence it followed that if this first matter could be dissolved or separated from all special formative forces, and the special "form" of gold or other precious substance discovered and got under control, these or any material body could be produced at will. From this point of view we may understand the reason of the alchemists' search for the "universal solvent" and for the special "forms" of things. The union of the *materia prima* and the "form" of gold would produce the actual metal. In like manner, if the vital principle or form of the bodily organization could be found and controlled, the tendencies to disease and decay in the bodily organization could be resisted. Hence the search after the elixir of life and the philosopher's stone. It was this search after "forms" and the *materia prima* which so vitiated the method of the Middle Age investigators. It was a reaction against this false analysis of Aristotle which led to the bitter opposition to his name and doctrines which marked the rise of modern science in Europe. When belief in the reality of the Aristotelian analysis passed away, alchemy ceased.

In the Middle Ages the alchemists expended immense labor and time in experiments, the object of which was to discover the philosopher's stone and an elixir vitæ (the elixir of life) which could cure all diseases and restore old people to youth. Many useful discoveries were the results of these visionary pursuits, in which the most eminent men of those times took part. Roger Bacon (1214–92) was a believer in the doctrine that base metals can be transmuted into gold. The works which he wrote on alchemy are the oldest extant European writings on that subject. Among the other famous alchemists were Basil Valentine, R. Lully, and Paracelsus. As late as the sixteenth century many men of superior intellect devoted their time and money to alchemy, and hoped to discover the grand arcanum. According to Liebig, "The great (Francis) Bacon, Luther, Benedict Spinosa, and Leibnitz believed in the philosopher's stone, and in the possibility of the transmutation of metals." (*Familiar Letters on Chemistry.*) The same writer affirms that "Alchemy was never at any time anything different from chemistry. It is utterly unjust to confound it, as is generally done, with the gold-making of the sixteenth and seventeenth centuries. Among the alchemists there was always to be found a nucleus of genuine philosophers, who were often deceived in their theoretical views; whereas, the gold-makers, properly so called, knowingly deceived both themselves and others." REVISED BY M. B. ANDERSON.

Alcia'ti [Fr. *Alciat*], (ANDREA), an eminent Italian lawyer, born in 1492 at Alzato. He lectured on law at Bourges from 1528 to 1532, after which he was professor of law at Bologna, Pavía, and Ferrara. He wrote, besides other works, "Commentaries on the Digest" and a book of emblems. Died in 1550. Erasmus said of him, as Cicero said of Scævola, "He was the most jurisprudent of orators, and the most eloquent of lawyers."

Alcibi'ades [Gr. Ἀλκιβιάδης], a famous Athenian general and politician, born of a noble family about 450 B. C., was a son of Cleinias. He was educated at the house of his relative, the illustrious Pericles, and inherited a large estate. Pericles was a second cousin to the mother of Alcibiades. From nature he received great personal beauty and transcendent abilities, with strong passions and proclivities to licentious habits. As a favorite pupil and companion of Socrates he enjoyed in his youth great advantages for the cultivation of his mind. (See SOCRATES.) In 420 B. C. he began his political career as the leader of the democratic party and an opponent of Nicias, who advocated peace with

Sparta. Having induced the Athenians to send a great expedition (in 414 B. C.) against Syracuse, the ally of Sparta, he was chosen to command it, in conjunction with Nicias and Lamachus. Soon after the fleet had reached Sicily, Alcibiades was recalled to defend himself against a charge of sacrilege, but he escaped to Sparta, and in his absence was condemned to death by the people of Athens. He acquired much influence with the Spartans, whom he aided in their operations against his native country, but several jealous Spartan leaders having conspired against him, he fled to the Persian satrap Tissaphernes, and again changed sides. The next scene in the drama of his eventful and wayward career presents him as the commander of the Athenian fleet, in 411 B. C. He defeated the Spartans at Abydos in 411, and at Cyzicus in 410 B. C. Having by these and other victories restored the naval supremacy of Athens, he returned in triumph to the capital in 407, and regained his popularity. He was removed from the command in 406, in consequence of a reverse which his fleet suffered in his absence, and he again went into exile. He sought refuge in Phrygia, where he was assassinated by night in 404 B. C. (See PLUTARCH, "Life of Alcibiades;" GROTE, "History of Greece," vol. viii.; THIRLWALL, "History of Greece.")

Al′ciphron [Αλκίφρων], a Greek epistolary writer, who is supposed to have lived about 180–200 A. D. He represented the manners and opinions of various classes of society in fictitious letters, the style of which is admired as a specimen of Attic purity.

Alci′ra, an ancient walled town of Spain, on an island in the river Jucar, in the province of Valencia, 25 miles S. of Valencia, has two fine stone bridges, besides an iron railway bridge. Near it is a curious cavern. Pop. 14,022.

Alcmæ′on, a Greek philosopher, a native of Crotona, and a pupil of Pythagoras, lived about 530 B. C. He is said to have been the first anatomist who dissected animals.

Alc′man [Gr. Αλκμάν], a celebrated Spartan lyric poet, born at Sardis, was originally a slave. He flourished about 650 B. C., and became a free citizen of Sparta. He wrote songs called "Parthenia," also bridal-hymns and other erotic poems which were greatly admired. According to some writers, he was the inventor of erotic poetry. Some small fragments of his works are extant.

Alcme′ne [Gr. Αλκμήνη], a daughter of Electryon and Anaxo, the daughter of Alcæus. She is said to have been the mother of Heracles by Zeus. Hera, jealous of Alcmene, delayed the birth of Heracles for seven days, that Eurystheus might be born first, and thus be entitled to greater rights, according to a vow which Zeus had made. There are different accounts of her death. According to Plutarch, Agesilaus opened her tomb at Haliartus in Bœotia, and carried her remains to Sparta.

Al′co, a kind of dog found wild in Mexico and Peru. It has been domesticated, and is described as having a very small head, with large and pendulous ears. It is not known whether it has escaped from domestication or is a native of these countries.

Al′cohol [from the Arabic definite article *al*, "the," and *kohol*, originally a "powder of antimony," used for painting the eyebrows, afterwards applied to anything very subtle], a limpid, colorless liquid, which has a hot, pungent taste, and is the essential principle of all spirituous liquors and intoxicating drinks. It is the product of the fermentation of sugar or saccharine substances, and is extracted by distillation from spirituous liquors, such as whisky and brandy, which contain nearly fifty per cent. of water. Pure alcohol is very inflammable, has a strong affinity for water, is a powerful solvent, boils at 173° Fahrenheit, and has never been congealed by the greatest degree of cold that could be produced. It is composed of carbon, oxygen, and hydrogen, the proportions being about 52 per cent. of the first, 35 of the second, and 13 of the last. Its symbol is $C^4H^6O^2$, or C_2H_6O (according to the new nomenclature). In medicine, alcohol is used as a stimulant or excitant, mostly in the form of wine, brandy, or whisky. In pharmacy, alcohol is extensively used as a solvent; its solutions are called tinctures. The strongest alcohol that can be procured is termed absolute alcohol or anhydrous alcohol; it is prepared by removing the last few per cent. of water by quicklime.

Alcohol may be produced synthetically by causing strong sulphuric acid to absorb ethene gas (olefiant gas), by which ethyl-sulphuric acid is produced, $C_2H_4 + H_2SO_4 = H.C_2H_5.SO_4$. On distilling this acid with water, alcohol is obtained, while dilute sulphuric acid is left in the retort or still, $H.C_2H_5.SO_4 + H_2O = C_2H_6O + H_2SO_4$.

C. F. CHANDLER.

Alcoholom′etry [from *alcohol*, and the Gr. μέτρον, a "measure"] is the method of obtaining the amount of absolute alcohol in a given quantity of spirits. This may be done—(1) by determining the specific gravity of the spirits, provided they contain nothing besides water and alcohol. The specific gravity of water being 1, that of pure or absolute alcohol is 0.7938 at 60° F. Tables have been carefully prepared showing the percentage of alcohol corresponding to different gravities between these extremes. (See SPECIFIC GRAVITY.) If the spirits contain sugar, etc., they must be purified by distillation before determining the gravity. (2) The percentage of alcohol may be determined by observing the boiling-point. Water boils at 212° F., absolute alcohol at 173° F. (3) By observing the tension of the vapor. The first method is always employed in practice.

Alcohols. The term alcohol, originally limited to spirit of wine, is now applied to a large class of bodies, some of which are solids. They are all similarly constituted, being saturated hydrocarbons, in which one or more hydrogen atoms are replaced by an equal number of molecules of hydroxyl (.OH). They may also be regarded as compounds of hydroxyl with alcohol radicals. Thus, propane yields three alcohols: propane, C_3H_8; propyl alcohol, $(C_3H_7)(OH)$ monatomic; propene alcohol, $(C_3H_6)''(OH)_2$ diatomic; propenyl alcohol, $(C_3H_5)'''(OH)_3$ triatomic. The last-mentioned is glycerine. The simplest alcohol is methyl alcohol or wood-naphtha, $CH_3.OH$. Common alcohol comes next in order, $C_2H_5.OH$. Cetyl alcohol ($C_{16}H_{33}$ OH), derived from spermaceti, and ceryl alcohol ($C_{27}H_{55}.OH$), derived from Chinese wax, are white crystalline solids. Those alcohols containing one molecule of OH are called *monatomic*. Other series of hydrocarbons yield similar alcohols; phenol or carbolic acid, $C_6H_5(OH)$, is the alcohol of benzol, C_6H_6. Diatomic alcohols contain two molecules of OH; those derived from the marsh gas or methane series of hydrocarbons are called glycols. Triatomic alcohols contain three molecules of OH; glycerine or propenyl alcohol, $C_3H_5(OH)_3$, is the last example. Tetratomic, pentatomic, and hexatomic alcohols are known. Manna sugar, or mannite ($C_6H_{14}O_6 = C_6H_8(OH)_6$), is a hexatomic alcohol, derived from the hydrocarbon sextane, C_6H_{14}. Glucose or grape-sugar is the aldehyde of this alcohol. (See ALDEHYDE.) Cane-sugar ($C_{12}H_{22}O_{11}$) is intimately related to glucose, as it corresponds to two molecules of glucose, less one molecule of water; it is called a polyglucosic alcohol. Starch and cellulose ($C_{18}H_{30}O_{15}$) are regarded as being the oxygen-ethers or anhydrides of the polyglucosic alcohols.

By replacing the OH in alcohols by chlorine, bromine, etc., haloid ethers are produced; thus:

Common or ethylic alcohol	$= C_2H_5.OH$.
Ethyl chloride	$= C_2H_5Cl$.
Methenyl alcohol (triatomic)	$= CH(OH)_3$.
Methenyl chloride, chloroform	$= CHCl_3$.

By replacing the hydroxyl by acid radicals, compound ethers are produced:

Amyl alcohol,	$C_5H_{11}.OH$.
Amyl acetate,	$C_5H_{11}.C_2H_3O_2$.
Propenyl alcohol, glycerine,	$C_3H_7(OH)_3$.
Glyceryl tristearate, stearine,	$C_3H_7(C_{18}H_{55}O_2)_3$.

C. F. CHANDLER.

Alco′na, a county in the N. E. part of Michigan. Area, about 630 square miles. It is bounded on the E. by Lake Huron, and traversed in the S. W. part by the Au Sable River. It is an almost solid forest of pine timber, but has excellent farming lands. Oats and potatoes are the staples. Capital, Harrisville. Pop. 696.

Alcona, a post-township of Alcona co., Mich. P. 146.

Alco′ra, a town of Spain, in the province of Castellon, 11 miles N. W. of Castellon. It has potteries and distilleries of brandy. Fruits are the chief articles of export. Pop. about 6000.

Al′corn, a county in the N. part of Mississippi, bordering on Tennessee. It is drained by the Big Hatchie River, which rises within its limits. The surface is undulating or nearly level; the soil is fertile. Capital, Corinth. This county is intersected by the Memphis and Charleston R. R. Cattle, grain, cotton, and wool are the staples. Pop. 10,431.

Al′cott (AMOS BRONSON), an American ideal philosopher, and one of the principal contributors to the "The Dial," was born at Wolcott, Conn., Nov. 29, 1799, and now resides at Concord, Mass. He has acquired some reputation as an educational reformer, but is chiefly distinguished for his conversational powers. He has held formal "conversations" in many of our principal cities on a wide range of speculative and practical themes, and has published two volumes of essays—"Tablets," 1868; "Concord Days," 1872.

Alcott (LOUISA MAY), an American writer, daughter of the preceding, was born in 1833. She has published a number of very popular works for children and youth; among these may be named "Little Women" (1867), "The Old-Fashioned Girl" (1869), "Little Men, or Life at Plumfield" (1871), and "Work" (1873).

Alcott (William Alexander), M. D., an American writer on education, was born at Wolcott, Conn., Aug. 6, 1798. He contributed to several journals, lectured at various places on education, hygiene, and other subjects, and published a number of popular works, among which are "The House I Live In," "The Young Man's Guide," "The Library of Health," "The Young Woman's Guide," and "Moral Reform." Died Mar. 29, 1859.

Al'cove [Fr. *alcove;* Sp. *alco'ba;* supposed to be derived from the Arabic *al-kauf,* a "tent"], in architecture, a recess in an apartment, separated by an estrade or partition of columns, and occupied by a bed of state; a recess in a library or a lateral apartment for books.

Alco'y, a town of Spain, in the province of Alicante, 30 miles N. of Alicante. It is built on uneven ground among the hills, and has manufactories of paper and woollen goods. About 200,000 reams of paper are made here annually. A large part of this paper is consumed in the form of cigars (*papelitos*). Pop. in 1860, 25,196.

Al'cuin, or **Al'cwin,** an English prelate and scholar, whose full name was Flaccus Albinus Alcuinus, was born at York about 735 A. D. He went in 782 to the court of Charlemagne, of whom he became the confidential friend and adviser. He is said to have founded schools at Aix-la-Chapelle and Paris. In 796 he was appointed abbot of St.-Martin at Tours. He is regarded as the most learned man of his age. He died May 19, 804, leaving many letters, poems, and works on theology, etc.

Alcy'one, or **Halcy'one** [Gr. Ἀλκυόνη], in classic mythology, a daughter of Æolus and the wife of Ceyx. She was so inconsolable for the death of her husband that she threw herself into the sea. Tradition adds that Ceyx and Alcyone were changed into kingfishers to reward their mutual devotion.

Alcyo'nium [Gr. *ἀλκυόνιον,* from *'αλκυών,* a "kingfisher," so called from its supposed resemblance to the nest of a kingfisher], a genus of zoophytes belonging to the order Alcyonaria, presents a curious polype mass and star-like pores, through which polypes protrude themselves. The *Alcyonium digitatum* abounds on the shores of Great Britain. The *Alcyonium carneum* is found along the American coast from Cape Cod northward.

Aldan', a river of Siberia, the largest tributary of the Lena, rises in the Yablonoi Mountains, near the frontier of the Chinese empire. Flowing north-eastward, and afterwards in a N. W. direction, it enters the Lena about lat. 63° N., and nearly 60 miles below Yakutsk. Length, estimated at 1300 miles.

Aldan Mountains, a chain of mountains in the E. part of Siberia, connected with the Stannovoi Mountains, and extending about 400 miles, from lat. 61° 20′ N. to 67° 30′ N. The highest summit of these is Mount Kapitan, about 4200 feet high. Some geographers give the name a more extensive application—to all the mountain-ranges in the N. E. of Asia.

Ald'borough, Earls of, viscounts of Aldborough (1766), Viscounts Amiens (1777), and barons of Baltinglass (1763, in the Irish peerage), a prominent family of Great Britain. The first earl was created in 1777.—Benjamin O'Neale Stratford, the sixth earl, was born June 10, 1808, and succeeded his father Oct. 4, 1849.

Aldeb'aran [from the Arabic *al,* "the," and *dabaran,* "following," because this star follows the Pleiades], the name of a star of the first magnitude in the constellation of Taurus, otherwise called *α* Tauri. It is the brightest star of a group called the Hyades.

Aldegonde, Saint. See Marnix.

Al'degre'ver, or **Aldegraef** (Heinrich), a distinguished German painter and engraver, born at Soest, in Westphalia, in 1502, was a pupil and imitator of Albert Dürer. Among his numerous engravings are "The Labors of Hercules" and a portrait of Luther. Died about 1562.

Al'dehyde [from *al,* first syllable of *alcohol,* and *dehyd,* first two of *de-hydrogena'tus,* "deprived of hydrogen"], compounds formed by depriving alcohols of hydrogen. The term aldehyde was first applied to acetic aldehyde, produced from common alcohol by limited oxidation, effected by (1) imperfect combustion, as when a spirit-lamp burns out for want of alcohol; (2) by the action of potassic dichromate and sulphuric acid; (3) by the action of chlorine and water. Thus,

Alcohol. Oxygen. Aldehyde. Water.

$$C_2H_6O + O = C_2H_4O + H_2O.$$

Acetic aldehyde is a limpid, colorless liquid of a peculiar ethereal odor, which when concentrated is very suffocating. By exposure to the air it absorbs oxygen, and passes into

Aldehyde. Acetic Acid.

$$C_2H_4O + O = C_2H_4O_2.$$

It reduces oxide of silver to the metallic state. This aldehyde has been prepared in large quantities during the past few years, to be used in the manufacture of aldehyde green, one of the most beautiful of the aniline colors.

The aldehydes are intermediate in composition between the alcohols and the corresponding acids. By the loss of hydrogen the alcohol becomes an aldehyde; by the addition of oxygen the aldehyde becomes an acid:

Common ethylic alcohol, C_2H_6O.
Acetic aldehyde, C_2H_4O.
Acetic acid, $C_2H_4O_2$.

By substituting an alcohol for hydrogen in an aldehyde, a ketone is produced, acetic ketone or acetone $= C_2H_3(CH_3)O$.

Among the other more important aldehydes may be mentioned acrylic aldehyde or acrolein (C_3H_4O), a very offensive liquid produced by the dehydration of glycerine. It is always found in the destructive distillation of oils and fats containing glycerine, and is the chief cause of the very pungent odor produced. Chloral (C_2HCl_3O), produced by the prolonged action of chlorine on alcohol, is trichlorinated acetic aldehyde. By combining with water it produces the "chloral-hydrate" so extensively used of late on account of its hypnotic effects. It is supposed to be transformed by the alkali of the blood into chloroform and formic acid, thus:

Chloral-hydrate. Potassic-hydrate. Potassic-formiate. Chloroform. Water.

$$C_2HCl_3O.H_2O + KHO = KCHO_2 + CHCl_3 + H_2O.$$

Bitter-almond oil (C_7H_6O) is benzoic aldehyde.

Aldehydes possess three characteristic properties: (1) they unite with alkaline bisulphites; (2) they unite with aniline; (3) when fused with caustic potash they give off hydrogen, forming the potassic salt of the corresponding acid. C. F. Chandler.

Al'den, a post-township of McHenry co., Ill. Pop. 722.

Alden, a post-township of Hardin co., Ia. Pop. 739.

Alden, a post-township of Freeborn co., Minn. Pop. 381.

Alden, a post-township of Erie co., N. Y. It is traversed by the New York Central and the Buffalo division of the Erie R. R. Its station on the latter road is 14 miles E. of Buffalo. Pop. 2547.

Alden, a post-township of Polk co., Wis. Pop. 390.

Alden (Bradford R.), an American officer, born May, 1811, in Meadville, Pa., was descended from the famous Pilgrim Alden, who came out in the Mayflower and married the beautiful Priscilla Mullens, and his father, Roger Alden, was a major in the Revolutionary army. He graduated at West Point in 1831, captain Fourth Infantry June 14, 1842, served at Florida posts 1832–33, assistant instructor in various departments of the Military Academy 1833–40, aide-de-camp to Major-General Scott 1840–42, in military occupation of Texas 1845, commandant of cadets at Military Academy 1845–52, on frontier duty on the Pacific 1853, engaged as acting colonel commanding two volunteer battalions (which he had raised) on an expedition against the Rogue River Indians, engaged at Jacksonville, Or., Aug. 24, 1853 (severely wounded). After his resignation, Sept. 29, 1853, he travelled three years in Europe, endeavoring to regain his health. Subsequently, while on a visit to Western Pennsylvania, he became satisfied, by his extensive explorations, of the abundance of petroleum, and was among the first to appreciate and give effect in 1859 to the value of this discovery. After repeated efforts to serve in the civil war, the paralysis caused by his wound compelled him to desist. Devoting himself to the study of literature and art, in which he was accomplished, to the culture of Christianity, of which he was a bright exemplar, and to works of active benevolence, for which he was famed, he spent his after years till he died, Sept. 10, 1870, at Newport, R. I., aged fifty-nine.

George W. Cullum, U. S. A.

Alden (James), U. S. N., born June 19, 1809, in Maine, entered the navy as a midshipman April 1, 1828, became a passed midshipman in 1834, a lieutenant in 1841, a commander in 1855, a captain in 1863, a commodore in 1866, a rear-admiral in 1871. He served in the Mexican war, and participated in the capture of Vera Cruz and Tobasco. In command of the steamer South Carolina, he engaged the batteries off Galveston, Tex., Aug. 3, 1861, and commanded the steamer Richmond in the engagement with Forts St. Philip and Jackson, and at the capture of New Orleans, April 24, 1862, and during the passage up and down the Mississippi River by Vicksburg, June 28 and July 15, 1862; in the engagement at Port Hudson, Mar. 14, 1863, commanded the Brooklyn at the great victory over forts, rams, and gunboats in Mobile Bay, Aug. 5, 1864, and in both the Fort Fisher fights, Dec., 1864, and Jan., 1865. Of his conduct in these affairs, Rear-Admiral David D.

Porter, in his official report of Jan. 28, 1865, speaks in terms of exalted admiration, and concludes his remarks thus: "I consider him able and worthy to fill the highest rank, and I know that the government has no one in its navy more full of energy, zeal, or intelligence in his profession. I shall feel much disappointed if Captain Alden is not promoted to a rank he has won more than once during this rebellion. I am sure the department will appreciate all I have said of this gallant officer. His record speaks for him." In 1869 he was appointed chief of the bureau of navigation, and in 1871 was appointed to the command of the European station. He retired from active service in 1873.

FOXHALL A. PARKER, U. S. N.

Alden (JOHN), one of the Pilgrim Fathers who came over in the Mayflower in 1620. He was a magistrate of Plymouth Colony for more than fifty years. He was born in 1599, and died at Duxbury Sept. 12, 1689.

Alden (JOSEPH), D. D., LL.D., was born at Cairo, N. Y., Jan. 4, 1807, and graduated at Union College in 1829, studied theology at Princeton, and was ordained pastor of a Congregational church at Williamstown, Mass. (1834), was a professor in Williams College (1835–52), in Lafayette College, Pa. (1852–57), president of Jefferson College (1857–67), and since 1867 principal of the New York State Normal School at Albany.

Alden (Rev. NOAH), a prominent advocate of religious liberty in Massachusetts. He represented the town of Bellingham in the convention which formed the constitution of that State. He was also a member of the convention which ratified the Constitution of the U. S. In 1766 he became pastor of the Baptist church at Bellingham, where he exercised his ministry with great influence and success for about thirty years.

Alden (TIMOTHY), D. D., born at Yarmouth, Mass., Aug. 28, 1771, graduated at Harvard in 1794. He was pastor of a Congregational church in Portsmouth, N. H. (1799–1805), and was for many years afterwards a prominent educator in Portsmouth, Newark, New York, Boston, Cincinnati, etc. He was the founder and first president (1817–31) of Alleghany College, Meadville, Pa. He published a collection of epitaphs (5 vols., 1814), "An Account of Missions among the Senecas" (1827), and other works. Died at Pittsburg, Pa., July 5, 1839.

Al'denhoven, a market-town of Prussia, in the Rhine province. Here the Austrians defeated the French on Mar. 1, 1793, and the French defeated the Austrians on Oct. 2, 1794. Pop. in 1871, 2898.

Al'der [Lat. *Al'nus*], a genus of trees and shrubs of the natural order of Betulaceæ or Amentaceæ. They are natives of the temperate parts of Europe and North America. The wood of the common alder of Europe (*Alnus glutinosa*) is used by turners and joiners, affords good charcoal for the manufacture of gunpowder, and is valuable for mill-wheels and the piles of bridges. The alder is prized as an ornamental tree in landscapes. The *Alnus cordifolia*, a native of Italy, is a large and beautiful tree. The alders of the Eastern U. S. are shrubs or small trees, but *Alnus Oregona* of the W. coast grows to the height of sixty to seventy feet.

Al'derman (originally signifying an "older" or "senior" man), the title of a municipal officer or magistrate in the corporations of England and the U. S. The London court of aldermen exercises judicial and legislative authority in the corporation. In New York City the term is applied to the members of the city council, who are elected by the people. In some cities they are magistrates; in others councillors.

Alderney, aul'dẹr-ne, or **Aurigny,** an island in the English Channel, 7 or 8 miles from Cape la Hogue (France), belongs to England. It is about 4 miles long, and less than 2 miles wide. Guernsey, another of the Channel Islands, is about 15 miles from this place. The people of Alderney are mostly of French extraction. This island produces a celebrated breed of small cows. It is separated from France by the Race of Alderney, a strait about 8 miles wide, the navigation of which is dangerous in stormy weather. It is politically a dependency of Jersey. Pop. in 1871, 2718.

Al'dershott Camp, a permanent camp formed in 1855 for the improvement of the British army in tactics and in evolutions on a large scale. It is situated on Aldershott Heath, on the confines of Surrey, Hampshire, and Berkshire. The area of ground appropriated to this purpose is about 7000 acres. Pop. in 1871, including Frimley and Farnborough, 35,864.

Al'dine Edi'tions, the name given to the editions of Greek and Roman classics which were issued by Aldus Manutius and his descendants in Venice between 1490 and 1600. These editions are highly prized for the correctness of the text and the beauty of the typography. (See MANUTIUS.)

Aldobrandi'ni, a celebrated noble family of Florence. Among its most prominent members were Salvestro, born 1499, died 1558; Ippolito, born 1536, died 1605, who was elected pope in 1592 as Clement VIII.; his brother Tommaso, the fourth son of Salvestro; and Francesco, who was created a prince by his uncle Clement VIII. "Aldobrandine Wedding" is the name of a painting which probably dates from the time of Augustus, and was found in 1606 on the site of the former garden of Mæcenas. It was named after Prince Aldobrandini, who first came into possession of it.

Ald'rich (HENRY), D. D., an English scholar and composer of sacred music, was born at Westminster in 1647. He was one of the ablest champions of Protestantism in the reign of James II., and became dean of Christ Church, Oxford, in 1689. He composed anthems which are used in the English cathedrals. Died Dec. 14, 1710.

Aldrich (THOMAS BAILEY), a poet, born in Portsmouth, N. H., Nov. 11, 1836. He lived in his youth in Louisiana, and then in New York, where he was for a time a clerk, then a proof-reader, and afterwards attained eminence as a writer and editor. He has been connected with "The Home Journal," the "Atlantic Monthly," and other periodicals, and has published "The Bells" (1854), "The Course of True Love" (1858), "Pampinea" (1861), several volumes of poems, "The Story of a Bad Boy" (1869), "Marjorie Daw" (1873), and other works.

Ald'ridge (IRA), a negro tragedian, born in Maryland in 1804, was in his youth a personal attendant of Edmund Kean. He performed with success in England and other countries of Europe. He received medals or tokens of honor from the king of Prussia and the emperor of Austria. Died Aug. 7, 1867.

Aldrovan'dus (ULYSSES), an eminent Italian naturalist, born at Bologna Sept. 11, 1522. He graduated as doctor of medicine in 1553, and became professor of natural history at Bologna in 1560. Having expended much time and money in collecting specimens and in the study of nature, he began in 1599 the publication of his "Natural History" (13 vols.), of which three volumes on birds and one on insects appeared during his life. The other volumes were edited by several persons after his death. His "Natural History" is a laborious and ill-digested compilation. Died Nov. 10, 1607.

Ale, a sort of beer, a fermented liquor produced from malt. Ale contains more alcohol than common beer, and is a favorite beverage of the British. Scotch ale and Burton ale have a high reputation. There are three varieties of malt liquor in general use in this country—ale, porter, and lager beer. All are prepared from malt, which is barley which has been allowed to germinate (sprout), and has then been dried by artificial heat. Hops are added to give the aromatic bitter flavor. The lower the temperature at which the malt is dried the lighter will be the color of the malt and the beverage. Ale and lager beer are made from light, porter from dark-colored malt. Ale and porter are fermented at temperatures of from 65° to 90° F. while lager beer is fermented at from 46° to 50° F.

In the manufacture of ale the first fermentation is checked at such a point as to leave a considerable quantity of saccharine matter in the liquor. By the subsequent fermentation in the barrels or bottles this is changed to alcohol and carbonic acid; the latter substance causing the characteristic effervescence. (See BEER, by C. F. CHANDLER.)

Alean'dro [Lat. *Alean'der*], (GIROLAMO), a learned Italian cardinal, born at Motta Feb. 13, 1480. He was appointed librarian of the Vatican in 1519, and was sent by Leo X. as papal nuncio to Germany in 1520, to counteract the influence of Luther. He showed a violent animosity to Luther at the Diet of Worms. Died Jan. 31, 1542.

Ale'do, a post-village, the capital of Mercer co., Ill., on a branch of the Chicago Burlington and Quincy R. R., 120 miles N. W. by N. from Springfield. It has two weekly papers, is the seat of a college, and is in a fine agricultural district. Coal is found in the vicinity. Pop. 1076.

H. BIGELOW, ED. OF "RECORD."

Alegam'be (PHILIP), a learned Flemish Jesuit, born at Brussels Jan. 22, 1592. He removed to Rome, where he became superior of the order of Jesuits. He wrote a valuable contribution to the biography and bibliography of the Jesuit authors, entitled "Bibliotheca Scriptorum Societatis Jesu" (1643). Died Sept. 6, 1652.

Aleman'ni (*i. e.* "all men"), the name of certain German tribes who formed a confederacy against the Romans about 200 A. D., and at that time lived on the Main. They invaded Gaul in the reign of Julian the Apostate, who gained a victory over them in 357 A. D. Having been de-

feated by Clovis in 496, their confederacy was dissolved. From this word is derived the French *Allemand*, signifying "German."

Alembert, d' (JEAN LE ROND), a celebrated French geometer and philosopher, born in Paris Nov. 16, 1717, was an illegitimate son of M. Destouches-Canon and Madame de Tencin. Having been abandoned by his mother in the street, he was nursed by the wife of a glazier, and continued to live with her for about forty years. He received from his father an annual pension of 1200 livres, and was educated in the Mazarin College, which he entered in 1730. His favorite study was mathematics. In 1741 he was admitted into the Academy of Sciences, and in 1743 produced his celebrated "Treatise on Dynamics," which opened a new epoch in mechanical philosophy, by the demonstration of the principle "that there is an absolute equality at all times between the entire amount of force applied and the sum-total of the effects produced." His treatise "On the Theory of the Winds" gained the prize of the Academy of Berlin in 1746. In 1752, Frederick the Great offered him the presidency of the Royal Academy of Berlin, which he declined. D'Alembert was associated with Diderot as joint editor of the famous "Encyclopédie," for which he wrote an admirable "Preliminary Discourse" and many mathematical articles. He was admitted into the French Academy in 1754. He formed a *liaison* with the accomplished Mademoiselle l'Espinasse, who lived with him twelve years. He showed his independence and indifference to riches by refusing, in 1762, the invitation of Catherine II. of Russia, who offered him a salary of 100,000 francs to direct the education of her son. In 1772 he was elected secretary of the French Academy. He was an intimate friend of Voltaire, and assumed toward Christianity the attitude of a skeptic—*i. e.* a doubter and candid inquirer—while he openly avowed his hostility to the Church of Rome. His moral character is generally represented as noble and benevolent. Among his works are "Researches on some Important Points of the System of the Universe" (3 vols., 1754–56), "Mélanges of Literature and Philosophy," "Elements of Philosophy" (1759), and eulogies on the members of the French Academy who died between 1700 and 1772. He died in Paris on the 29th of Oct., 1783. An edition of his works was published by Bossange in 5 vols. 8vo, 1821. "His literary works," says Lacroix, "constantly directed to the perfection of reason and the propagation of correct ideas, were highly appreciated by all good judges. They are all remarkable for a pure diction, a neat style, and strong or pithy thought."

Alemb'ic [from the Arabic article *al*, and the Gr. ἄμβιξ, a "cup or pot"], an apparatus formerly used by alchemists and chemists in the process of distillation and sublimation. It has been superseded by the retort and receiver.

Alemte'jo, or **Alente'jo** ("beyond the Tagus"), a province of Portugal, is bounded on the N. by Beira, on the E. by Spain, on the S. by Algarve, and on the W. by Estremadura and the Atlantic. Area, 9416 square miles. It is intersected by the Gaudiana River, and is washed by the Tagus, which forms part of the northern boundary. The climate is hot and dry, the surface is hilly, and the soil of the northern and eastern valleys is fertile. The chief productions are wheat, maize, barley, grapes, rice, and figs. Capital, Evora. Pop. in 1868, 332,237.

Alençon, a city of France, capital of the department of Orne, is situated on the Sarthe and in a plain, 65 miles by rail W. S. W. of Paris. It is well built and handsome, has a cathedral, a public library, and a church about 1000 years old. Here are manufactures of various articles, including muslin, leather, and a celebrated lace called Point d'Alençon. Pop. in 1866, 16,115.

Alep'po, called by the Arabs **Ha'leb** (anc. *Chal'ybon* and *Berœ'a*), an important city of Syria, and one of the chief emporiums of the Ottoman empire, is on the Kowek, about 55 miles E. of Antioch; lat. 36° 11′ N., lon. 37° 10′ E. It is surrounded by limestone hills, and presents a picturesque appearance. The houses are well built of stone, two or three stories high, mostly in the Saracenic style, with richly ornamented walls and ceilings. In the environs are celebrated gardens about twelve miles in extent. Aleppo has a castle, a Mohammedan college, and many Christian churches. It has an extensive trade in cotton and silk stuffs, tobacco, wine, oil, indigo, etc., and is visited by large caravans from Bagdad, Diarbekir, Mosul, and Armenia. It was a great emporium of trade during or before the Middle Ages. Its prosperity was greatly injured by the earthquake of 1822, which destroyed a large part of the city. The population, which before that event was more than 200,000, was about 100,000 in 1867.

Aleppo, a post-township of Greene co., Pa. Pop. 1382.

Alesh'ki, a town of Russia, in the government of Tauria, 8 miles E. of Kherson. Pop. in 1867, 8484.

Ale'sia (Ἀλεσία), the fortified capital of the Gallic tribe Mandubii, was built, according to a legend, by Hercules. Here the last desperate battle for freedom was fought by the Gauls, under Vercingetorix, against the Romans, under Julius Cæsar, in 52 B. C. The Gauls were completely defeated and the city destroyed. Alesia was rebuilt, and again destroyed by the Northmen in 864. It was on the present Mont Auxois, at the foot of which the modern town of Alise is situated.

Ale'sius [Gr. ἀλείνω, "to be a wanderer"], the name given, probably by Melanchthon, to Alexander Alane, who was born in Edinburgh April 23, 1500, was canon of St. Andrew's, turned Protestant, went to Germany in 1532, and again in 1540; was made professor at Leipsic, and died there Mar. 17, 1565. He wrote much and ably. It was he who translated the Book of Common Prayer into Latin.

Alessandres'ku (GREGORY), a celebrated Rumanian poet, born in 1812, was sent in consequence of political agitations to a convent, where he wrote his most celebrated work, "The Year 1840," in which he gives expression to the hopes of his party. In 1859 he was for a few months minister of finance, since which time he has belonged to the liberal opposition, which he has effectively aided with his poems and fables. A second edition of his collected works appeared in 1863.

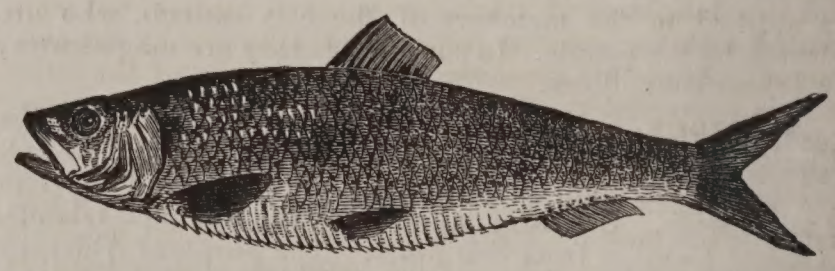
Alessan'dri (BASIL), the most prominent Rumanian poet of modern times, born in 1821, took part in the liberal movement of 1848, was minister of foreign affairs for a few months in 1859–60, and has since resided a part of the time in Yassy and part of the time in Paris. Among his works are "Doinas" (1853), "Doine si lacrimivare" (1863), and "The Popular Ballads of Rumania" (2 vols., 1853).

Alessan'dria, a province of Northern Italy, is bounded on the N. by Novara, on the E. by Pavia, on the S. by Genoa, and on the W. by Cuneo and Torino. Area, 1952 square miles. The country consists partly of large fertile plains and partly mountains, and is traversed by the Tanaro, the Scrivia, and the Bormida. Chief town, Alessandria. Pop. in 1871, 683,473.

Alessandria (sometimes called *Del'la Pa'glia*, from its first houses having been roofed with straw), a fortified city of Italy, the capital of the province of the same name, is situated on a plain on the river Tánaro, and on the railway from Turin to Genoa, 46 miles E. S. E. of Turin. It is well built, has a cathedral, a royal college, several hospitals, and about fourteen churches. Here are manufactures of silk, linen, and woollen goods, and other articles. Two miles S. E. of this place is the village and battle-field of Marengo. The citadel is regarded as one of the largest and strongest fortresses in Europe. Pop. in 1872, 57,079.

Aleu'tian (or **Aleu'tan**) **Islands,** a group of 150 or more islands, sometimes called the **Catharine Archipelago,** in the North Pacific, extending in a row from the peninsula of Alaska towards the S. point of Kamtchatka. They are rocky and volcanic, having some active volcanoes, and are inhabited by rude natives, who subsist by fishing and hunting. The inhabitants are of a race essentially Esquimaux. These islands belong to the U. S. Onemak or Unimak, the largest of the Fox Islands, is about 50 miles long. Pop. about 1200.

Ale'wife [supposed to be a corruption of the Indian name *aloof*], (the *Alo'sa tyran'nus*), a species of American fish, belonging to the family Clupeidæ, and nearly allied to the herring and the shad. It abounds in the Chesapeake Bay, and is found along the Atlantic coast of the U. S. As many as 5000 barrels have been caught in one year in the waters of Massachusetts. In the spring the alewives ascend the rivers to deposit their eggs.



Alewife.

Alexan'der, a county forming the S. extremity of Illinois. Area, 245 square miles. It is situated between the Ohio and the Mississippi rivers, at their confluence. The surface is flat, and partly subject to inundation. Cairo, which is in this county, is the southern terminus of the Illinois Central R. R. Grain, wool, and potatoes are the staples. Capital, Cairo. Pop. 10,564.

Alexander, a county of the N. W. of North Carolina. Area, 300 square miles. It is drained by the South Yadkin River. The surface is hilly. Grain, tobacco, and wool are the staples. Capital, Taylorsville. Pop. 6868.

Alexander, a post-township of Washington co., Me. Pop. 456.

Alexander, a post-village and township of Genesee co., N. Y., on the New York Central and Rochester division of the Erie R. R. It containes a seminary, a flouring-mill, and three churches. Pop. 1605.

Alexander, a township of Athens co., O. Pop. 1511.

Alexander [Gr. Ἀλέξανδρος; surnamed THE GREAT, the third Macedonian king of the name, the most famous of all military heroes, was the son of Philip, the celebrated king of Macedon, and Olympias, the daughter of the king of Epirus, who claimed descent from Achilles. At the age of fourteen, Alexander was placed under the instruction of Aristotle, and soon distinguished himself by his rare intellectual powers and by his rapid advancement in every kind of knowledge. His descent from Achilles, for whose character and achievements he cherished an enthusiastic and misplaced admiration, appears to have given his mind an early direction towards military glory. Among all books the "Iliad" was his favorite, and we are told that every night a copy of that poem was placed, along with his sword, under his pillow. King Philip had such confidence in his son's courage and capacity that he left him, although only sixteen years of age, the regent of his kingdom during his expedition against Byzantium. At the age of eighteen years, Alexander greatly distinguished himself in the battle of Chæronea, and the victory won by the Macedonians on that occasion was due, in no small measure, to the valor of the young prince. On the death of Philip, in 336 B. C., Alexander, not yet twenty years of age, succeeded to the throne. Several of the states which his father had subjugated deemed this a favorable opportunity for recovering their liberty, but the courage and celerity of Alexander defeated all their schemes. While, however, the young king was engaged in reducing the Triballi, the Thebans raised the standard of revolt. He instantly directed his march towards Bœotia; Thebes was taken by storm, the houses were levelled to the ground, and the citizens who had escaped slaughter in the assault sold as slaves, excepting only the posterity of Pindar, the celebrated Theban poet, and those who had opposed the rebellion. Not long after, at an assembly of the Grecian states held at Corinth, Alexander was chosen generalissimo of the Greek and Macedonian troops destined for the invasion of Persia. Early in the spring of 334 B. C. he entered Asia with an army of about 35,000 men, including 4500 cavalry. At the river Grani'cus the Persians sought to prevent his passage. The Macedonians, though fighting at a great disadvantage, gained a signal victory. At Gordium he attempted to untie the famous knot, for he had been told that the empire of the world had been prophesied to him who should succeed in this attempt. But having for some time tried in vain, he at last drew his sword and cut it, saying that this was the only way to untie it. It is said that those whose office it was to decide upon the interpretation of the prophecy, either sincerely or from motives of policy, declared that the Macedonian king had fulfilled it. Having received reinforcements in 333 B. C., he engaged Darius, the Persian king, who commanded at the river Issus an army of 600,000 men. The Persians were defeated with immense slaughter; the mother, wife, and two daughters of Darius were taken captive, but were treated with the greatest respect and kindness by the conqueror. After this great success scarcely any of the cities of Asia presumed to offer resistance to his victorious arms. But Tyre, then a powerful maritime and commercial city, had the courage or temerity to oppose his progress. The city was taken after a most determined resistance, which lasted seven months, but the conqueror fixed an indelible stain upon his reputation by his merciless cruelty towards the conquered Tyrians, thousands of whom were cruelly slaughtered, and the rest, numbering nearly 30,000, were sold into slavery. Gaza soon after met with a similar fate. Alexander then advanced into Egypt, where the people, weary of the Persian domination, welcomed him as a liberator. In Egypt, on one of the principal mouths of the Nile, he founded a city called Alexandria.

He next visited the temple of Jupiter Ammon, situated on an oasis in the desert of Libya, with the hope, it is said, that the god would acknowledge him to be his son. This having been done through the priest of the temple, he again turned his thoughts to the invasion of Persia, where Darius had succeeded in collecting another army of more than a million men, with not less than 40,000 cavalry. Alexander had scarcely more than 40,000 infantry and 7000 horse. The opposing armies met at Gaugamela, not far from Arbela, in 331 B. C. The Persians were defeated with prodigious slaughter. Not long afterwards, Darius was murdered by Bessus, one of his satraps. As the dying king, covered with wounds, lay extended in his chariot, Alexander came up; at the tragic spectacle the conqueror could not restrain his tears. He caused the body of Darius to be taken to Persepolis, where it was interred in the tombs of the Persian kings. Bessus having been taken and put to death, Alexander carried his victorious banners beyond the Jaxartes (now called the Sihon, or the Sir Daria), subdued Sogdiana, and married Roxana, the daughter of a Bactrian prince whom he had conquered. After this he turned his thoughts to the invasion of India. He crossed the Indus 327 B. C., formed an alliance with Taxiles (or Taxilus, as the name is sometimes written), an Indian king, and advanced to the banks of the Hydaspes (now the Jhylum), where he encountered Porus at the head of an immense army, accompanied by a multitude of elephants. After a sanguinary battle, the Indian king was totally defeated and taken prisoner. Alexander's favorite horse, Bucephalus, having been mortally wounded in this battle, the conqueror founded a town on the spot where he was buried, which he called Bucephala. Taking one city after another, he had advanced as far as the Hyphasis (now called Gharra), when his troops, alike uninfluenced by his menaces and his entreaties, positively refused to go any farther. Being thus under the necessity of returning, he committed the fleet which he had ordered to be built on the Hydaspes to Nearchus, while he himself proceeded by land through what is now Beloochistân to Susa. His army encountered in this march incredible hardships and suffering, so that many soldiers perished from thirst and hunger. Having arrived at Susa, he married as his second wife a daughter of Darius. As he was forming schemes for the extension and improvement of his empire, he died, 323 B. C., at Babylon, in the thirty-third year of his age.

It would be unjust to Alexander to regard him merely as a great and successful military hero. He possessed some moral qualities of a high order, especially generosity and magnanimity. Many of his views of state policy were liberal and enlightened. But all that was most excellent and admirable in his character was impaired and vitiated by mistaken ideas of the dignity and glory which belonged to a great king. As his passions were stronger than his intellect, extraordinary as the latter undoubtedly was, they gradually acquired, during his long career of uninterrupted success, an almost unlimited ascendency over him. His uniform prosperity may be said to have been his greatest misfortune. Being a stranger to the "sweet uses of adversity," it was impossible for him to see his own character and conduct in their true light. After his unparalleled successes had turned his brain, regarding himself as little less than a god, he could not brook the slightest freedom of speech, even from his most faithful and most meritorious officers. In a paroxysm of ungovernable rage he slew his friend and foster-brother Clitus, who had once saved his life, after which a grief, scarcely less violent than his anger had been, took possession of his soul, so that if he had not been restrained he would probably have taken his own life. Pope (in "The Temple of Fame") sums up his career and character in one short line—

"The youth who all things but himself subdued."

(See ARRIAN'S "History of Alexander's Expeditions;" QUINTUS CURTIUS'S "Life of Alexander;" WILLIAMS'S "Life and Actions of Alexander the Great," 1829; DROYSEN, "Geschichte Alexanders des Grossen von Macedonien," 1833; GEIER, "Alexandri Magni historiarum scriptores ætate suppares," containing the fragments of contemporaneous historians, 1844; THIRLWALL'S "History of Greece.")

J. THOMAS.

Alexander I. (Pope), SAINT, a Roman by birth, became bishop of Rome in 108 A. D. Died in 117.—ALEXANDER II. (ANSELMO BADAGIO) was elected pope in 1061. He declared William the Conqueror the true heir to the English crown. Died in 1073.—ALEXANDER III. (ROLANDO RANUCCIO BANDINELLI), one of the ablest men that ever sat on the papal throne, was a native of Sienna. He was elected pope in 1159. He was involved in a long contest with Frederick Barbarossa, and with the anti-popes who were supported by that emperor. Having been twice compelled by his enemies to leave Rome, he was in 1163 acknowledged pope by a council at Tours. The emperor, whom he had excommunicated in 1167, made his submission soon after the battle of Legnano, and was absolved. Thomas à Becket, who had been encouraged by Alexander in his resistance to Henry II. of England, was, after his assassination, canonized by the pope. According to Voltaire, Alexander proclaimed that no Christian should be held as a slave. He is said to have been the first who reserved to the Holy See the right of canonization. Died Aug. 1, 1181. (See

Reuter, "Geschichte Alexanders III. und der Kirche seiner Zeit," 1860, 2 vols.)—Alexander IV. (Rinaldo di Anagni) became pope in 1254. Died May 12, 1261.—Alexander V. (Pietro Filargo) was chosen pope in 1409. Died May 3, 1410.—Alexander VI. (Rodrigo Lenzuoli Borgia), born at Valencia, in Spain, in 1430, was a nephew of Pope Calixtus III. Before his election to the papacy he had several illegitimate children, among whom were the infamous Cæsar and Lucretia Borgia. He became a cardinal in 1456, and was chosen pope in 1492. Among the events of his pontificate was the death of Savonarola. Died Aug. 18, 1503. His character was an infamous compound of cruelty, treachery, licentiousness, and other vices. —Alexander VII. (Fabio Chigi) was born at Sienna Feb. 13, 1599, and became pope in 1655. He embellished Rome with architectural works. Died May 22, 1667.—Alexander VIII. (Pietro Ottoboni) was born in Venice April 19, 1610, and elected pope in 1689. He assisted the Venetians in a war against the Turks. Died Feb. 1, 1691.

Alexander I., king of Scotland, a younger son of Malcolm Canmore, began to reign in 1107. He was an able ruler. He died in 1124, and was succeeded by his brother, David I.—Alexander II., born in 1198, succeeded his father, William the Lion, in 1214. He married a sister of Henry III. of England in 1221. He is said to have been a wise and able prince. Died in 1249.—Alexander III., of Scotland, born in 1241, was a son of the preceding, and became king in 1249. He married, in 1251, Margaret, a daughter of Henry III. of England. His reign was peaceful and prosperous. He fell with his horse over a precipice, and was killed in 1286.

Alexander I. (or **Alexan'der Pav'lovitch**), emperor of Russia, the son of Paul I. and Maria, a princess of Würtemberg, was born at St. Petersburg in Dec., 1777. He married, in 1793, Elizabeth, a daughter of the crown prince of Baden, and succeeded his father, who was assassinated in Mar., 1801. He promoted civilization, education, industry, and trade. His foreign policy was pacific until he joined a coalition against Napoleon in 1805. In December of that year the Russian and Austrian armies were defeated at Austerlitz. After the Russian armies had sustained several other defeats, the war was ended by the treaty of Tilsit in 1807. Alexander then became the friend and ally of Napoleon, and declared war against England. But, alarmed by the insatiable ambition of Napoleon, he resolved on a change of policy, and formed an alliance with England and Sweden. Russia was invaded in 1812 by Napoleon, who took Moscow, but his army was soon compelled to retreat, and nearly all perished with cold and hunger or were taken prisoners. After the abdication of Napoleon, Alexander entered Paris with the victorious armies in 1814, and exhibited more generosity and clemency towards the French than the other allies showed. He again entered Paris in triumph in July, 1815, and in the same year formed, with the emperor of Austria and the king of Prussia, a coalition called "the Holy Alliance," the tendency of which was reactionary and hostile to the cause of liberty. The professed object of this alliance was to promote religion and peace. As he advanced in years be became more contracted and less liberal, a prey to hypochondria and suspicion. His projects of reform were abandoned, a rigid censorship of the press was maintained, and all liberal or progressive tendencies were repressed. He died without issue at Taganrog, Dec. 1, 1825, and was succeeded by his brother Nicholas. (See Russia.)

Alexander II., surnamed Nicolaevitch (*i. e.* "the son of Nicholas"), emperor of Russia, the eldest son of Nicholas I., was born April 29, 1818. His mother was a sister of William I. of Prussia and emperor of Germany. He married in 1841, Marie, a daughter of the grand duke of Hesse-Darmstadt, and ascended the throne on the 2d of Mar., 1855, during the Crimean war, which Russia waged against France, England, and Turkey. The war was terminated by the treaty of Paris, signed in Mar., 1856. His domestic policy has been more moderate and liberal than that of his ancestors. He is commended for punishing official corruption and liberating public instruction from military discipline and control. Among the memorable events of his reign was the emancipation of about twenty million serfs, which was decreed in 1861. (See Russia.)

Alexander Alexandrovitch, grand duke of Russia and cesarevitch, the second son of the emperor Alexander II., was born Mar. 10, 1845. He married in Nov., 1866, Marie Sophie Frederike Dagmar, who is a daughter of Christian IX., king of Denmark, and who then assumed the name of Marie Feodorovna. He became, after the death of his elder brother Nicholas, in 1865, the heir-apparent to the throne. He has two sons—Nicholas Alexandrovitch, born in 1868, and George Alexandrovitch, born in 1871.

Alexander (Archibald), D.D., an eminent divine, born near Lexington, Rockbridge co., Va., April 17, 1772. He became president of Hampden-Sidney College in 1796, and pastor of a Presbyterian church in Philadelphia in 1807. In 1812 he was chosen the first professor of the Theological Seminary of Princeton, N. J., then just founded. He was distinguished as a pulpit orator and as a writer on theology. Among his works are "Outlines of the Evidences of Christianity" (1824), a "History of the Israelites," and "Outlines of Moral Science" (1852). The first of these works has been translated into several languages. He married, in 1802, Janetta Waddell, a daughter of a well-known blind preacher. Died Oct. 22, 1851.

Alexander (Barton Stone), an American officer, born in 1819 in Kentucky, graduated at West Point 1842, and Mar. 7, 1867, lieutenant-colonel of engineers. He served as assistant engineer, repairing fortifications, 1842–47, in the war with Mexico 1848, at the Military Academy as treasurer and erecting buildings 1848–52, constructing military asylum (Soldiers' Home) near Washington, D. C., 1852–55, altering Smithsonian Institution 1854, building Chelsea Marine Hospital, Mass., 1855–59, and erecting Minot's Ledge lighthouse, entrance to Boston harbor, 1855–61. In the civil war was aide-de-camp, with the rank of lieutenant-colonel, chiefly employed in the construction of the defences of Washington, D. C., 1861–66, in Manassas campaign 1861, engaged at Blackburn's Ford and Bull Run (brevet major), in Virginia peninsula campaign 1862, engaged at Yorktown (brevet lieutenant-colonel), West Point, Chickahominy, Fair Oaks, Gaines's Mill, and Golden's Farm, as consulting engineer of Major-General Sheridan's army in Shenandoah Valley 1864, present at Cedar Creek, and in preparation of bridge equipage, devising defensive works, and member of various boards 1861–66. He was made brevet colonel and brigadier-general Mar. 13, 1865, for meritorious services. Since the war he has had charge of most of the public works in Maine till Jan. 7, 1867, when he became senior engineer and member of the Pacific board of engineers for fortifications.

George W. Cullum, U. S. A.

Alexander (James Waddell), D.D., an eminent divine, was born near Gordonsville, in Louisa co., Va., Mar. 13, 1804. He graduated at Princeton in 1820, and became in 1833 professor of rhetoric at the College of New Jersey (Princeton). From 1844 to 1849 he was pastor of the Duane street Presbyterian church in New York. From 1849 to 1851 he was professor of church history in the Princeton Theological Seminary. In 1851 he took charge of the Fifth avenue Presbyterian church in New York City, and died July 31, 1859. He was a man of various culture, and had uncommon unction and power as a preacher. He published numerous articles in the "Princeton Review," and a number of volumes, such as "Discourses on Christian Faith and Practice" and "Sacramental Discourses."

Alexander (John Henry), an American savant, born at Annapolis, Md., in 1812, published a "Treatise of Mathematical Instruments" (1835), "Contributions to the History of Iron" (1840), "Introits" (1844), "Dictionary of Weights and Measures" (1850), "International Coinage" (Oxford, 1857), and other works. Died at Baltimore Mar. 2, 1867. (See his Life by W. Pinkney, 1867.)

Alexander (Joseph Addison), D.D., was born in Philadelphia April 24, 1809. He graduated at the College of New Jersey in 1826. He was chosen adjunct professor of Latin in 1833. In 1838 he went into the Theological Seminary as associate professor of Oriental and biblical literature, and in one chair and another continued to serve the institution till his death at Princeton, Jan. 28, 1860. He made extraordinary attainments in the Semitic and other languages. He was also an impressive preacher. He wrote much for the "Princeton Review." His most important works are commentaries: "Isaiah" (2 vols. 8vo, 1846), "Psalms" (3 vols. 12mo, 1850), "Acts" (1 vol., 1857), "Mark" (1 vol., 1858). "Matthew" was published posthumously in 1860.

Alexander (Nathaniel), born in Mecklenburg, N. C., in 1756, graduated at Princeton in 1776, served in the Revolutionary army, and afterwards practised medicine. He was member of Congress (1803–05) and governor of North Carolina (1805–07). Died at Salisbury, N. C., Mar. 8, 1808.

Alexander (Stephen), LL.D., a distinguished astronomer, born at Schenectady, N. Y., Sept. 1, 1806, graduated at Union College in 1824. He became professor of astronomy at the College of New Jersey in 1840, and obtained in 1845 an additional chair of mechanics. He has acquired distinction as a writer on astronomy.

Alexander (William), earl of Stirling, a Scottish poet, born in 1580. He wrote, besides several dramas, a

didactic poem entitled "Doomesday" (1614), which was much admired. He was appointed secretary of state for Scotland in 1626. Died in 1640.

Alexander (William), styled Lord Stirling, an American general, born in New York in 1726. He claimed the earldom of Stirling, but did not succeed in obtaining the estate belonging to it. Having espoused the popular cause in the Revolution, he served with distinction at Long Island, Germantown, and Monmouth, and obtained the rank of major-general. He also promoted the cause by exposing the intrigues of Conway. Died Jan. 15, 1783.

Alexan'der Ba'las, a usurper of the throne of Syria, was a person of low origin, and lived in the second century B. C. He pretended to be the son of Antiochus Epiphanes, and with the aid of Rome and several Greek princes defeated his rival Demetrius Soter in 150 B. C., and Demetrius was killed in the flight. After a short reign he was defeated by his father-in-law, and in 146 B. C. was murdered by an Arabian emir with whom he had taken refuge.

Alexander John I., prince of Rumania, born Mar. 20, 1820, was elected in 1858 to the assembly of Moldavia, became in the same year minister of war of the united principalities, was elected in 1859 first prince of Moldavia, and then prince of Wallachia, in both cases by a unanimous vote, but had to pledge himself to complete the union of the two principalities, and then resign in favor of some European prince. But he was not recognized by Turkey until Dec. 23, 1861, as prince of both principalities, on which day the union of the two principalities under the name of Rumania was proclaimed. But in consequence of several unpopular measures the most prominent men of Rumania planned a revolution, and in the night of Feb. 23, 1866, entered his apartments and forced him to sign his resignation. After that time he lived in Vienna as a private citizen. He died in 1873.

Alexander Karageorgevitch, prince of Servia, the son of Gerny George (which see), the first prince of Servia, born Oct. 11, 1806, was elected prince of Servia in 1842. Russia protested against his election, but Mar. 27, 1843, he was again elected, and this time by a unanimous vote. In consequence, however, of his peace policy towards the foreign powers, he became obnoxious to the people, and was deposed Dec. 11, 1858. In 1868 he was accused of complicity in the murder of Prince Michael, his successor, and was sentenced in 1871 by the authorities of Austria, where he had resided since his deposition, to eight years' imprisonment and the costs.

Alexan'der Nev'ski (or **Nev'skoi**), a Russian prince and hero, born in 1219, was a son of the grand duke Yaroslaf II. He gained in 1240 a signal victory over the Swedes on the Neva; hence his surname. On the death of his father, about 1246, he became grand duke of Vladimir. Died in 1263. By the Russians he is regarded as a saint.

Alexan'der of Aphrodis'ias, a celebrated Greek commentator on Aristotle, lived at about the close of the second century after Christ. Like his masters, Herminus and Aristocles the Messenian, he tried to free the Peripatetic philosophy from the syncretism of Ammonius and others, and to restore the true interpretation of Aristotle's works.

Alexan'der Seve'rus, a Roman emperor, born about 205 A. D. His original name was Alexianus Bassianus, but when upon his removal to Rome he was created cæsar, pontiff, consul, and *princeps juvenis* elect by his cousin, the emperor Elagabalus, he assumed the name M. Aurelius Alexander, and added Severus afterwards. In 222 A. D., upon the death of his cousin, Alexander was proclaimed emperor by the prætorians, and confirmed by the senate. In 232 he gained a great victory over the Persians; in 234 he marched into Gaul against the Germans, but was waylaid and murdered by some mutinous soldiers in 235.

Alexan'dra (Caroline Marie Charlotte Louise Julie), princess of Wales, a daughter of Christian IX., king of Denmark, was born in 1844. She was married in Mar., 1863, to Albert Edward, prince of Wales.

Alexan'dri, or **Aleksandri** (Vasilio), a Moldavian poet and *littérateur*, born at Yassy in 1821, was educated in Paris. He produced, in French and Moldavian, a number of dramas which were performed with success at Yassy. In 1852 he published "Popular Ballads of Rumania." His novels, songs, and ballads have been much admired.

Alexan'dria [classical accentuation, *Alexandri'a*; Gr. Ἀλεξάνδρεια], an ancient and celebrated city and seaport of Lower Egypt, named from Alexander the Great, by whom it was founded in 332 B. C. It was situated on a low and narrow tract which separates Lake Mareotis from the Mediterranean, near the western mouth of the Nile, and 117 miles N. W. of Cairo. Lat. of Pharos, the Alexandria lighthouse, 31° 12′ 9″ N., lon. 29° 53′ E. Soon after its foundation it became the capital of the Grecian kings who reigned in Egypt, and one of the most populous and magnificent cities in the world. It was a great emporium of commerce, for which its position between Europe and India was very advantageous. Before, as well as after, the Christian era this city was a celebrated seat of learning and philosophy. Here was founded the greatest library of antiquity (see Alexandrian Library), and the celebrated Museum. Among the principal edifices was the Serapeion, or temple of Serapis. In front of the city stood a famous lighthouse called Pharos, on an island of the same name. It is supposed that during its greatest prosperity Alexandria had 600,000 inhabitants, a majority of whom were Greeks and Jews. Even after Egypt had been conquered by the Romans, this city was second only to Rome in size and importance. About the period 300–640 A. D. it was a great focus of Christian theology and sectarianism. It was captured by the Saracen caliph Omăr about 640, after which its prosperity declined. The discovery of a passage to India by the Cape of Good Hope (1497) contributed to its ruin, so that the population was reduced in 1778 to 6000. The principal remains of its ancient grandeur are—a granite monolith erroneously called Pompey's Pillar; the Catacombs; and two obelisks named Cleopatra's Needles, one of which, about seventy-two feet high, is standing, and the other lies prostrate on the ground.

The modern city, which has again become populous and important, is built near the site of the ancient, and on a mole or isthmus connecting the main land with the island of Pharos. It is connected with Cairo by a canal and railway, and with Suez by a railway, which is continued from Cairo. Here are a palace of the pasha, a custom-house, a large naval arsenal, and medical, naval, and other schools. Some of the new streets present the aspect of a European city, but in the Turkish quarter the streets are narrow and dirty. In consequence of steam navigation, Alexandria has again become a great emporium of the commerce between Europe and India. The chief articles of export are grain, sugar, drugs, cotton, gums, rice, dates, and hides. Steamers ply regularly between this port and Brindisi, Malta, and Constantinople. Eleven newspapers are published here in the Italian, Greek, and French languages. Pop. in 1871, 219,602; among whom there are 25,000 Greeks, 20,000 Italians, 15,000 French, 8000 Germans and Swiss, and a large number of other foreigners.

Revised by A. J. Schem.

Alexandria, a town of Russia, in the government of Kherson, 148 miles N. E. of Kherson. Pop. in 1867, 10,434.

Alexandria, a town in Wallachia. Pop. 8596.

Alexandria, a county in the N. E. part of Virginia. Area, about 36 square miles. It is bounded on the N. E. by the Potomac, which separates it from the city of Washington. The surface is hilly. This county was formerly a part of the District of Columbia, and was retroceded to Virginia in 1844. Grain is the chief crop. Capital, Alexandria. Pop. 16,755.

Alexandria, the capital of Glengary co., Ontario, is about 130 miles N. E. of Kingston.

Alexandria, a township of Calhoun co., Ala. Pop. 1689.

Alexandria, a township of Leavenworth co., Kan. P. 1179.

Alexandria, the capital of Rapides parish, La., is on the S. bank of the Red River, 350 miles by water N. W. of New Orleans. It has a convent of the Sisters of Mercy, four well-established and prosperous institutions of learning, five churches (Catholic, Episcopalian, Methodist, colored Methodist, and colored Baptist), a large three-story brick hotel, two well-organized companies of firemen, three shipping warehouses, a large number of stores, and two weekly papers. It has two weekly packets to New Orleans, besides which the Shreveport, Jefferson, Tex., and other boats, some thirty-five in all, stop here. In 1872 Alexandria shipped 8265 bales of cotton, 3662 hogsheads of sugar, and 5845 barrels of molasses, besides large quantities of hides, peltries, moss, beeswax, tallow, pecan-nuts, and fruit. Pop. 1218.

E. R. Biossat, Ed. "Louisiana Democrat."

Alexandria, a post-village, capital of Douglas co., Minn., in a township of the same name, 140 miles W. N. W. of St. Paul, on the proposed line of the St. Vincent branch of St. Paul and Pacific R. R. It has a weekly paper, a U. S. land-office, and steam grist and saw mills. The village is pleasantly situated on one of the many beautiful lakes which abound in that part of the State. Pop. of Alexandria township, 503.

Joseph Gilpin, Ed. "Post."

Alexandria, a township of Benton co., Mo. Pop. 921.

Alexandria, a post-village of Clarke co., Mo. It has one weekly newspaper. Pop. 688.

Alexandria, a post-township of Grafton co., N. H. It has manufactures of lumber. Pop. 876.

Alexandria, a township of Hunterdon co., N. J. Pop. 3341.

Alexandria, a post-village of Jefferson co., N. Y., in a township of its own name, on the St. Lawrence River, 25 miles N. by E. of Watertown. Alexandria Bay is a port which is visited by steamboats. It has a lighthouse. The township embraces a part of the Thousand Isles, and is a great summer resort. It contains a glass-factory and eight churches. Pop. of township, 3087.

Alexandria, a post-borough of Huntingdon co., Pa. Pop. 556.

Alexandria, a city, port of entry, and capital of Alexandria co., Va., is pleasantly situated on the right bank of the Potomac, 7 miles below Washington. The river is here 1 mile wide, and forms a good harbor, which is deep enough for the largest ships. The streets are regular and well paved, and the principal thoroughfare is traversed by a horse railway. The city contains a court-house, a new and very handsome market-house, fifteen churches, several banks, has two daily and three weekly newspapers, an efficient steam fire department, and is lighted with gas and supplied with water. An extensive cotton-factory has been in operation for a number of years, with flouring-mills, machine-shops, plaster-mills, and other industries. The city is noted for the number and excellence of its institutions of learning, and has a large public library. It is the terminus of a number of railroads; one crosses the State to the North Carolina border; another, to connect with the Ohio River, is being constructed; one to Richmond, *viâ* Fredericksburg; and a short line affords hourly communication with Washington. Alexandria enjoys an extensive coal-trade by the Chesapeake and Ohio Canal from the Cumberland region, a large number of vessels being employed in the shipment of the product of the mines to Northern ports. Pop. 13,570.

E. Snowden, Ed. "Alexandria Gazette."

Alexan'drian Li'brary, the largest and most celebrated library of antiquity, was founded by Ptolemy Philadelphus, king of Egypt, about 275 B. C. He purchased many books at Athens, Rome, and other places. This library is said to have been partially destroyed by fanatical Christians about 395 A. D. According to some authorities, it was burned in 642 A. D. by order of the caliph Omăr, who argued that if books agree with the Koran they are unnecessary, if they differ they should be destroyed. (See Ritschl, "Die Alexandrinischen Bibliotheken," 1838.)

Alexandrian (or **Alexandrine**) **School** is the name given to a certain type of thought and culture which began to prevail in Egypt about 300 B. C. The intercourse of the Jewish and Greek colonists who had previously settled in that country had given rise to a blending of the peculiar religious ideas of each. The Gnostics, whose system was a mingling of Oriental with Christian thought, originated chiefly in Alexandria; and Philo-Judæus, generally regarded as the founder of Neo-Platonism, was also a native of that city. Athanasius, Gregory of Nazianzus, and other eminent Christian Fathers favored the Alexandrian School, and adopted to a certain extent the doctrines of the Neo-Platonists. This school was likewise renowned for the culture of mathematics and physical science, and numbered among its disciples Euclid, Aristarchus of Samos, and, according to some writers, Archimedes. The celebrated critic Aristarchus is said to have passed the greater part of his life in Alexandria, where he founded a school. With regard to correctness and elegance of expression the Alexandrian writers were highly distinguished, but they were deficient in life and spirit. In a school where imitation and rule took the place of inspiration, each generation became more artificial and lifeless than its predecessor, and both prose and poetry often became labored affectation. Special works on the history of the Alexandrine School have been written by Matter, 2 vols., 2d. ed., 1840–44; Barthélemy St.-Hilaire (1845), and Simon (2 vols., 1844–45).

Alexan'drine, a poetical metre or verse, formed of twelve syllables, which was first used by a French poet of the twelfth century, named Alexander of Paris. The second line of the following couplet from Pope's "Essay on Criticism," part ii., line 156, furnishes an example:

"A needless Alexandrine ends the song,
Which, like a wounded snake, drags its slow length along."

See also Virgil's "Georgics," iii., 424.

Alexandrine Age, a name applied to a period during which Alexandria was the principal centre of literature and science in the world. It extended from about 300 B. C. to 600 A. D., and was represented by many eminent grammarians and critics, who excelled in correctness and elegance of style, but were deficient in genius and originality.

Alexandro'pol (called also **Huenri** or **Guenri**), a fortified town of the Caucasus, in the government of Erivan, on the Arpa-Chai River, 85 miles S. W. of Tiflis. The fort, which lies about 2000 feet from the city, 300 feet above the level of the river, commands the entire vicinity, and can hold 10,000 men. Alexandropol is an important strategical point, as it is the key to Armenia. Pop. in 1867, 17,272.

Alexan'drov, a town of Central Russia, in the government of Vladimir, 70 miles W. N. W. of the city of Vladimir. It contains a convent founded by Ivan IV., who is said to have also established here the first printing-press in Russia. Pop. in 1867, 5810.

Alex'is (or **Alex'ius**) Comnenus, the name of several emperors who reigned at Trebizond (Trapezus) in the thirteenth, fourteenth, and fifteenth centuries. They belonged to the same family as the Alexis Comnenus mentioned below.

Alexis (or **Alexius**) **I.,** Comnenus, emperor of Constantinople, born in 1048. Having distinguished himself by his military talents, he was proclaimed emperor by his soldiers about 1080, in place of Nicephorus, who was then deposed. He showed himself an able and a crafty ruler. Some writers censure him for his failure to support the operations of the first Crusade, which occurred in his reign. He died in 1118, and was succeeded by his son John.

Alexis Alexandrovitch, grand duke of Russia, a younger son of the emperor Alexander II., was born in Jan., 1850. He visited the U. S., making an extensive tour in 1872, and meeting nearly everywhere a warm reception among the Americans.

Alexis Michaelovitch, czar of Russia, was born Mar. 10, 1629, and succeeded his father Michael in 1645. He promoted civilization and improved the laws. He was the father of Peter the Great. Died Jan. 29, 1676.

Alexis Petrovitch, or Petrowitsch, a Russian prince, a son of Peter the Great, was born in 1690. He showed such a hostility to the reforms of his father that the latter resolved to exclude him from the throne. While Peter was travelling in Western Europe in 1717, Alexis fled to Vienna and Naples. He was soon brought back, and condemned to death on a charge of treason or rebellion. He was found dead in prison in July, 1718. Scarcely a doubt can be entertained that he was poisoned by the order of his father. His son Peter became emperor in 1727.

Alex'isbad, a watering-place of Germany, in the Harz Mountains, 9 miles from Ballenstädt, was established as a watering-place by the duke of Anhalt-Bernburg in 1810. It has two springs—the Selke spring, which contains no carbonates, and very little carbonic acid gas, but large quantities of chloride and sulphate of iron, and is only used for bathing; and the Alexis spring, containing carbonate of iron, is used for drinking. The scenery in the neighborhood is beautiful.

Alex'ius, Saint, the son of a noble Roman, who lived at the time of Pope Innocent I. (402–416). He married at the wish of his father, but fled after the marriage, and after having lived for a long time as a hermit, he returned and devoted himself to a life of charity, and only made himself known a short time before his death. His life was dramatically treated in the Middle Ages in most of the European languages.

Alfalu, a town of Austria, in Transylvania. Pop. in 1869, 5041.

Alfie'ri (Vittorio), Count, the most popular Italian poet of his time, was born at Asti, in Piedmont, Jan. 17, 1749, and inherited a large fortune. He was sent to the Academy of Turin, in which he learned little, and which he quitted about 1764. Recoiling with disgust and resentment from the stupid pedantry and tyranny of his teachers, he plunged into dissipation and neglected the cultivation of his mind. He passed many years in travel, for which he had a strong passion, and visited nearly all the countries of Europe, impelled by morbid unrest and love of excitement, rather than a rational resolution to complete his education. He began his literary career by the drama of "Cleopatra," which was performed with applause in 1775. About this time he entered a more regular course of life, and devoted himself with passionate ardor to study and composition. It is stated that he commenced the study of Greek after he was forty years old. His literary success was promoted, as he affirms, by the influence of the countess of Albany, the wife of the Pretender Charles Edward Stuart. (See Albany, Countess of.) He passed many years in her society at Florence and Rome, and in France. He composed numerous tragedies, comedies, sat-

ires, and lyrical poems. His reputation is founded chiefly on his tragedies, among which we notice "Virginia," "Filippo II.," "Orestes," "Abel," "Mary Stuart," "Myrrha," "Octavia," and "Saul." His dramas, which display great energy of language and intensity of passion, and abound in noble sentiments, were well adapted to reform the national literature, which had become effete, insipid, and destitute of manly vigor. "The aim of his works," says Madame de Staël, "is so noble, the sentiments which the author expresses accord so well with his personal conduct, that his tragedies ought always to be praised as actions, even when they may be criticised as literary works." (*Corinne.*) Alfieri was liberal in politics, and ardently desired to improve the political and social condition of Italy by his writings. Among his works are an "Essay on Tyranny," five odes on the American Revolution, and his interesting Autobiography. He died at Florence Oct. 8, 1803. His complete works were published at Pisa in 22 vols. 4to, 1808. A new edition of his dramatic works was published by Milanesi (1855, 2 vols.). His life was written by TEZA (1861).

Alfon'sine (or **Alphon'sine**) **Tables,** the name of the astronomical tables prepared by the order of Alfonso X. of Castile and Leon, at a cost of 400,000 gold ducats—say, $800,000. They were published in 1252. They were first printed in 1483, and were the first printed tables that ever appeared. For about three centuries they were all that astronomy had to depend on.

Alfon'so III. of Asturias, surnamed THE GREAT, began to reign in 866 A. D. He enlarged his dominions by victories over the infidels of Spain. Died in 910.

Alfonso I. of Castile (or **Alfonso VI.** of Leon), surnamed THE BRAVE, was a son of Fernando I. He became king of Leon in 1065, and of Castile in 1073. Aided by the famous Cid, he defeated the Moors in several battles. He died in 1109.—ALFONSO VIII. of Castile (sometimes called ALFONSO III.) was born about 1155, and became king in 1158. He defeated the sultan Mohammed An-Nâsir in a great battle in 1212. Died in 1214.—ALFONSO XI. of Castile, born in 1311, succeeded his father, Fernando IV., in 1312. He gained a great victory over the sultan Abool-Hassan at Tarîfa in 1340. Died in 1350.

Alfonso X., king of Leon and Castile, surnamed EL SABIO ("the Wise"), was born in 1221. He succeeded his father, Fernando III., in 1252. He was one of the most learned men of his time, and was distinguished as a patron of literature and science, but he was not prosperous in political and military affairs; his reign was disturbed by rebellions. Under his auspices an excellent code of laws was given to Spain, and the Bible was translated into Castilian. He wrote several works in verse and prose which are highly commended. Died April 4, 1284.

Alfonso I., king of Naples and Sicily, born about 1385, was a son of Fernando I. of Aragon, whom he succeeded in 1416. On the death of Joanna II., queen of Naples (1435), that kingdom was claimed by Alfonso and René of Anjou. After a long war between these rivals, Alfonso obtained the throne of Naples in 1442. He died June 27, 1458, and was succeeded by his son, Ferdinand I.

Alfonso [Port. *Affon'so*] **I.,** the first king of Portugal, born about 1100, was a son of Henry of Burgundy. He inherited from his father the title of count of Portugal. Having gained a great victory over the Moors at Ourique in 1139, he then assumed the title of king. He afterwards took Lisbon, and became master of all Portugal. He died Dec. 6, 1185, and left the throne to his son, Sancho I.

Al'ford, a post-township of Berkshire co., Mass. It has valuable marble-quarries. Pop. 430.

Alford (HENRY), D. D., an English poet and theologian, born in London in 1810. He became a fellow of Trinity College, Cambridge, in 1834, incumbent of Quebec street chapel, London, in 1853, and dean of Canterbury in 1856. His most popular poetical work is "The School of the Heart, and other Poems" (1835), which was highly commended by the "Edinburgh Review" for Jan., 1836. He gained a high reputation as a biblical critic by his edition of the Greek New Testament (1844–52). A revised edition of it appeared in 4 vols. (1859 *et seq.*). He published also a small volume entitled "The Queen's English," which attracted some attention. Died Aug. 13, 1871.

Alford (JOHN), born in 1686, was the founder of a professorship of natural religion, moral philosophy, and civil polity in Harvard College, and also a benefactor of Princeton College and other institutions. Died at Charlestown, Mass., Sept. 29, 1761.

Al'fordsville, a township of Robeson co., N. C. P. 1041.

Al'fred, surnamed THE GREAT, written also **Ælfred, Alured,** or **Alvred** [Lat. *Ælfre'dus*], king of the West Saxons in England, was born in Berkshire in 848 or 849 A. D. He was a younger son of Ethelwolf, and succeeded his brother Ethelred in 871, when he found the country in a miserable condition. In the preceding reign the kingdom had been invaded and ravaged by an army of Danes, whom the Saxons were unable to resist. After the accession of Alfred these piratical incursions were continued or renewed, and nearly all of the kingdom was conquered by the Danes. Alfred was forced to flee from his court and conceal himself in the hut of a cowherd. Having by furtive measures raised a small army, he attacked and routed the Danes at Eddington in 878. Soon after this battle the Danish king Godrun (or Guthrun) surrendered himself, was converted to Christianity, and remained a peaceable subject of Alfred, who now directed his attention to civil affairs. He founded or improved the British navy, rebuilt cities and forts, established schools, compiled a code of laws, and reformed the administration of justice. In that age of ignorance he was distinguished as a scholar, as well as a patron of learning. He translated several works from the Latin into Anglo-Saxon. About 886 he was recognized as the sovereign of all England. His kingdom was again invaded in 894 by an army of Northmen under Hastings, who is said to have had a fleet of 300 ships. Alfred defeated them in several battles, and finally drove them out of the island. He died in 901, and was succeeded by his son, Edward the Elder. Alfred is regarded as the wisest and greatest of all the kings of England. He was, says Freeman, "a saint without superstition, a scholar without ostentation, a conqueror whose hands were never stained with cruelty, a prince never cast down by adversity, never lifted up to insolence in the day of triumph." (See also SHARON TURNER, "History of the Anglo-Saxons.")

Alfred, a post-village, the capital of York co., Me., in a township of its own name, on the Portland and Rochester R. R., 32 miles W. by S. of Portland. It has manufactures of lumber and woollen goods, and contains a Shaker village. Pop. of township, 1224.

Alfred, a post-village and township of Alleghany co., N. Y., has a sash, blind, and door factory, cheese-box factory, one academy, and one weekly paper. It is the seat of Alfred University, a Seventh-Day Baptist institution. Pop. of township, 1555.

N. V. HULL, ED. "SABBATH RECORDER."

Alfred (or **Alured**) **of Beverly,** an English priest and historian, born about 1100. He wrote a history of Britain in Latin, which is supposed to be an abridgment of the work of Geoffrey of Monmouth.

Al'freton, a market-town and parish of England, in Derbyshire, 12 miles N. N. E. of Derby. It is supposed to have been named in honor of Alfred the Great. Pop. in 1871, 11,805.

Alfs'borg, a township of Sibley co., Minn. Pop. 264.

Al'gæ (the plu. of Lat. *alga*, a "sea-weed"), the scientific name of the sea-weeds, etc., a division of cryptogamous plants belonging to the class Thallogens, and comprising many species which grow in salt or fresh water, and are greatly diversified in form, size, and structure. Some are too small to be seen by the naked eye, while the stem of the "giant kelp" of the W. coast of America sometimes attains a length of from 1000 to 1500 feet. Having no true roots, they sometimes adhere to rocks or the sea bottom, and sometimes they float on the surface. Navigators sometimes meet with masses of gulf-weed (*Sargassum*) many miles in extent. An area of this kind in the Atlantic is said by Maury to be as large as the Mississippi Valley. There are several such areas in the ocean, called SARGASSO SEAS (which see). Algæ are cellular in structure, are useful as manure, and some species, like Irish moss, are used as food. Kelp or barilla, made by burning sea-weeds and other marine plants, yields soda and iodine. The Algæ proper are divided into three groups—the green-spored, the red-spored, and the brown-spored Algæ, each containing many orders.

Algan'see, a post-twp. of Branch co., Mich. P. 1421.

Algar'di (ALESSANDRO), an eminent Italian sculptor and architect, born at Bologna about 1600, studied design under the Caracci. His masterpiece in sculpture is a colossal work in relief in St. Peter's church, Rome, the subject of which is Pope Leo forbidding Attila to enter Rome. He was, according to some critics, equal or superior to any sculptor of his age. Died in 1654.

Algarot'ti (FRANCESCO), COUNT, an eminent Italian writer, born at Venice Dec. 11, 1712. He was a skilful connoisseur of the fine arts, and wrote, besides other works in prose and verse, "Letters on Painting," which are highly commended. He removed to Berlin, where he passed many years, enjoying the favor and intimacy of Frederick the Great, who gave him the title of count in 1740. He corresponded with Voltaire. Died at Pisa in 1764.

Algarovil'la, an astringent substance procured from a

tree called *Juga marthæ*, which grows in New Carthagena, in South America. It is a powerful agent for tanning leather.

Algar've, the southernmost province of Portugal, is bounded on the N. by Alemtejo, on the E. by Spain, and on the S. and W. by the Atlantic Ocean. Area, 1872 square miles. The surface is mostly mountainous. The main exports are wine, salt, dates, and other fruits. The chief towns are Faro and Lagos. Pop. in 1868, 177,342.

Al'gebra [supposed to be derived from the Arabic *al*, "the," and *gabara* (or *jabara*), to "bind," to "consolidate"], an important branch of mathematics, sometimes called universal arithmetic, but it may be more properly described as a calculus of symbols. The symbols it employs are of three kinds: (1) those of quantity, known or unknown, which consist of ordinary numbers and letters of the alphabet; (2) those of operation, amongst which are $+, -, \times, \div, \surd$, etc.; and (3) mere abbreviations for ordinary words. (See SIGN.) The combination of these symbols according to fixed laws leads to algebraical expressions or formulæ, in which actual computations are indicated rather than performed. The universality of algebra as compared with arithmetic consists in the fact that in the latter, computations being effected as they arise, all traces of the intermediate steps are obliterated, and the result is applicable to a single case only; whereas in algebra the formulæ contain implicitly the answers to an unlimited number of questions. Again, to the equivalence of two algebraical formulæ always corresponds a general theorem, which arithmetic can only *verify* in particular cases. Thus, from the algebraical identity,

$$(a+b)\,(a-b)=a^2-b^2,$$

we learn that the "product which results from multiplying the sum by the difference of *any* two numbers is equal to the difference of their squares."

The systematic notation, to which algebra owes its chief power as an instrument of research, has been of very gradual growth, and is still being extended. In the first known treatises on the subject, by Diophantus, who probably lived in about the fourth century of our era, the few symbols employed are mere abbreviations for ordinary words. The Arabians, who obtained their algebra from the Hindoos, did little or nothing towards its extension, though their treatises, after being carried into Italy by a merchant of Pisa, Leonardo Bonacci (1202 A. D.), gave rise to important improvements. Scipio Ferreus of Bononia is said to have solved the first problem of the third degree (1505); but it was Tartaglia, or rather Cardan, who first gave the general solution of a cubic equation, and employed letters to denote the unknown quantities, the *given* one being still mere numbers. Without extending algebraic notation, Ferrari, a disciple of Cardan, discovered the general solution of a biquadratic equation, and thus, unknown to himself, reached the barrier which, as has since been proved, will ever remain impassable to the searcher for *general* solutions of equations of the fifth and higher degrees. (See EQUATIONS.) Towards the middle of the sixteenth century algebra was introduced into Germany, France, and England, by Stifelius, Peletarius, and Robert Recorde, respectively. In doing so, the latter also invented the very convenient symbol of abbreviation =, and Stifelius the far more important symbols of operation $+$, $-$, $\surd$. In the same century, through her far-famed son Vieta, France contributed still more to the progress of the science. Vieta introduced letters as symbols for known as well as for unknown quantities, and by the increased power thus acquired he laid the foundation of the general theory of equations. In this direction he was followed by Girard, Harriot, Descartes, and others; in short, the science now advanced rapidly towards its present state of perfection. It would be fruitless here to attempt to trace its progress. (The reader who wishes to do so may consult with advantage HUTTON'S "Mathematical Tracts," vol. ii., BONNYCASTLE'S translation of BOSSUT'S "Histoire des Mathématiques," or the works of MONTUCLA.) The last great improvement in algebraic notation, that of determinants, is of quite recent date. (See DETERMINANTS, by PROF. H. A. NEWTON.)

Algeci'ras, or **Algezi'ras,** a seaport-town of Spain, in the province of Cadiz, 6 miles W. of Gibraltar, from which it is separated by the Bay of Gibraltar; lat. 36° 8′ N., lon. 5° 26′ 5″ W. Pop. in 1860, 18,216. Leather and charcoal are exported from this port. Here occurred a naval battle between the English and French in July, 1801.

Al'ger (CYRUS), born at West Bridgewater, Mass., in 1782, became in 1809 an iron-founder in South Boston, and became famous as a founder of cannon. He was also distinguished for his benevolence and public spirit. Died Feb. 4, 1856.

Alger (Rev. HORATIO, JR.) was born at North Chelsea (now Revere), Mass., Jan. 13, 1834, and graduated at Harvard in 1852. He studied divinity at Cambridge, and in 1864 was ordained over the Unitarian church at Brewster, Mass. He published "Bertha's Christmas Vision" (1855), "Paul Preston's Charge" (1865), besides other volumes of prose and poetry and contributions to periodical literature.

Alger (WILLIAM ROUNSEVILLE), an American writer, born at Freetown, Mass., Dec. 11, 1823, graduated at Harvard in 1857. He has been a clergyman and a diligent and various author. Besides his most important work, "A Critical History of the Doctrine of a Future Life" (1861), his "Genius of Solitude" (1867) and "Friendships of Women" (1870) have been admired. He has also translated a volume of Oriental poetry from the German. His last work relates to the drama.

Alge'ria is the name of a country on the North African coast which since 1831 has belonged to France. It is situated between Tunis on the E. and Morocco on the W., while in the S. it extends indefinitely into the Sahara. In the main, the French rule may be said to be established over the territory from lat. 37° to 32° N., and from lon. 2° W. to 8° E. The coast, which is mostly high and steep, has but few and poor harbors, although the rocky promontories form many inlets of the sea. At a distance from the coast the country forms a plateau with an elevation of 2000 to 3000 feet, which gradually declines in the S. towards the Sahara. In regard to formation of the ground, three divisions are distinguished. Along the coast is the zone of the Tell, or Little Atlas, a mountainous region with many coast-streams, fertile valleys, and deep gaps. The principal plain of this zone is the Metidjah, immediately south of Algiers, 50 miles by 20, fertile, well watered, and covered with an abundant vegetation. To the S. of the Little Atlas lies the Shott or Sbakh, the zone of the large, arid plains, which are mostly covered only by a long dry grass called *halfa* (*Stipa macrochloa*, the esparto grass of commerce), but in summer present a most remarkable appearance, from the shining crust of salt which covers the beds of the saline lakes. In the S. the Greater Atlas separates the Shott from the third zone, the Sahara, whose loose sand extends to the wooded heights of the southern slopes of the mountains. The entire area is estimated at 258,000 square miles.

The climate of Algeria is warm and of a very uniform character. The winter, from September to April, is the rainy season of the country, but this rainy season is often interrupted by a period of good weather lasting many weeks. The summer is almost entirely without rain. The plants and animals are those of the temperate and subtropical zone. The coast produces vegetables, such as cauliflowers and artichokes, which are exported in large quantities to Europe. Other products are wheat, barley, tobacco, and tropical fruits of all kinds. The dwarf fan-palm, with its rankling roots, has long been a plague to the agriculturist, but recently it has been extensively used for industrial purposes. Forests of palms, cedars, and cork-oak, as well as different kinds of shrubs, cover the Little Atlas. The grasses and reeds of the Shott afford rich nourishment for the beautiful Arabian horses and large herds of asses, mules, and sheep. The fruit of the date-palm begins to ripen in the oases of the Sahara. The beasts of prey, which formerly were very numerous in Algeria, are almost entirely exterminated, hyænas and jackals occurring now and then. Among the valuable minerals of the country are iron, copper, lead, marble, sulphur, and salt.

The total number of Europeans, without the army, in 1866, was 217,990, of whom the majority live in the cities; of these, 122,119 were French, 58,540 Spaniards, 16,655 Italians, 10,627 English and Maltese, 5436 Germans, and 4643 of other nationalities. The three provinces of Algeria had, according to the census of 1866, the following population: Algiers (39,120 square miles), 200,060; Oran (111,830 square miles), 146,302; and Constantine (107,367 square miles), 139,910; so that there is, inclusive of 2,434,974 natives, and exclusive of 67,774 soldiers, a total population of 2,921,246. The population remains stationary, as immigration has almost ceased in late years. The native Jews were estimated in 1866 at 33,952. The native Mohammedans are chiefly divided into Arabs and Kabyles. In 1857 the number of the former was estimated at 1,385,000, the number of mountain Kabyles at 580,000, and Kabyles of the plains at 379,000; but other statements of the numerical strength of these two races widely differ. Both Kabyles and Arabs live in tribes, the total number of which in Algeria is 1364. As regards the religion of the inhabitants, there were, according to the census of 1866, 211,195 Catholics, 5002 Protestants, 33,952 native Jews, 1785 European Jews, 17,232 members of other Christian sects or persons of unknown religion; the remainder, more than 2,600,000, were Mohammedans. The Roman Catholics have an archbishop at Algiers, and bishops at Oran and Constantine. For the Protestants there are consistories at Algiers, Oran, and

Constantine, under which both the Lutheran and Reformed churches are placed. The highest authority for the Mohammedan worship are the muftis of the two principal mosques at Algiers. There are lyceums at Algiers, Bona, Constantine, Philippeville, and Oran. At the head of the administration is (since 1870) a civil governor-general, who directs the action of both the civil and the military authorities in the settled districts, the territory of the Algerian Sahara and the adjoining districts, inhabited chiefly by nomad tribes, remaining under exclusive military rule. The country under civil government is divided into three provinces, Algiers, Constantine, and Oran, at the head of each of which is a prefect. The imports of Algeria in 1869 amounted to 118,000,000 francs, the exports to 154,000,000. The aggregate number of vessels entered and cleared was, in the same year, 6232, of 1,125,343 tons. The commercial navy consisted of 152 sailing vessels, of 4609 tons.

History.—Numidians in the E. and Moors in the W. ruled in ancient times in Algeria, until by the capture of Carthage (146 B. C.) the foundation for the Roman power in Northern Africa was laid. Extensive ruins of forts, cities, roads, and aqueducts, buried in the deserts at the present, show what a high state of civilization the country reached at that time. Algeria then supplied Rome to a great extent with grain. The conquest of the country by the Vandals, and subsequently by the Arabs, cast it back into barbarism. Although the nomadic tribes accepted Mohammedanism, and although there were some well-cultivated districts and thriving cities, still no well-regulated, lasting state could be formed. Christianity, which had flourished in the early centuries, was entirely suppressed. In 1505 the emir of the Metidjah, being hard pressed by the Spaniards and Portuguese, called to his aid the renowned pirates Horuk and Khaireddin Barbarossa, who by cruelty and treachery made themselves rulers of the country. Being again attacked by the Spaniards, Khaireddin acknowledged the supremacy of Turkey. He received Turkish assistance, and now begins a new period in the history of Algeria, during which it was a constant terror to the navigation and the coasts of the Mediterranean. Several expeditions against Algeria by the Christian powers were either unsuccessful or remained without lasting results. The Turkish authority was gradually restricted, until in 1705 the ruler or dey of Algeria made himself entirely independent. Large French fleets held the Algerians partly in check during the rule of Napoleon I. But after the restoration of peace the Algerian piracies recommenced on a large scale, and at length called forth energetic measures on the part of the Christian countries. The U. S. took the lead. On June 20, 1815, the fleet under Commodore Decatur won a brilliant victory at Cartagena, and forced the dey to sign a treaty of peace, in which the flag of the U. S. was recognized as inviolable. In the next year the city of Algiers was bombarded by the English, and the dey compelled to surrender all the Christian slaves. But soon the piracies were again resumed, and the pirates even ventured into the German Ocean. A conflict which arose in consequence of a disputed claim of France on Algeria at length put an end for ever to this state of affairs. A personal insult offered by the dey to the French consul induced the French government to send out a fleet, which began the blockade of the Algerian ports on June 12, 1827. But as nothing was effected in this way during three years, a large expedition was fitted out, which set sail on May 25, 1830. The city of Algiers was besieged, and surrendered after a bombardment of three days on July 5. The French captured in the city about 1500 cannon and 50,000,000 francs. But the real difficulties had but just begun, for every inch of land was only gained by a fight with the Kabyles. The French committed many blunders and cruelties, so that provinces, like Constantine and Oran, which had already declared their submission, again revolted. The marabouts commenced to preach the holy war against the oppressors, and Abd-el-Kader placed himself at the head of the natives. The French authority decreased more and more, and even the energetic duke of Rovigo, who was appointed governor in Dec., 1831, was not able to improve the situation, but only made matters worse by his unparalleled cruelties. Only when Abd-el-Kader, who, as the head of thirty hostile tribes, had been elected emir of Mascara, signed a treaty of peace in 1834 did the province of Algiers (and that province only) have peace for a short time. Soon the French again began hostilities, and were severely defeated on the river Makta (1835). In Dec., 1835, the French took Mascara, but Abd-el-Kader was in a short time more powerful than ever, so that the French were forced to make peace with him (1837), giving him, under French sovereignty, the administration of the entire west of Algeria, with the exception of the large cities. Oct. 13, 1837, Constantine was taken by the French, and then the French rule was firmly established in the east. In 1839, Abd-el-Kader again opened the war, and devastated the French colonies on the lowlands. Mascara and Saida were taken by the French, and Abd-el-Kader was compelled to fly to Morocco, where the French followed him, forcing the sultan of Morocco, after several decisive victories, to sue for peace. But Abd-el-Kader again succeeded in raising fresh forces, and continued to devastate the French border districts, until a conflict with Morocco (Dec., 1847) compelled him to surrender to the duc d'Aumale (Dec. 21), as he found the passes of Karbens, through which he had hoped to escape, occupied. A large number of expeditions under Pelissier, Jussuf (a chief of Turkish troops, who had joined the French in 1832), and others secured for the French the oases of Laghuat, Tuggurt, Wadi-Suf, and Wargela. In 1856–57, Random undertook a large and successful expedition against the Kabyles. From Oct., 1865, to the beginning of 1867, Algeria was the scene of new insurrections under the leadership of Si Lala and Si-Hamed-ben-Hamza, the latter of whom was a commander of the Legion of Honor. The great events of 1870 in Europe produced a sensation in Algeria. When the news of the surrender of Napoleon and the continued defeats of the French army under McMahon, whom the Arabs had considered invincible, became known among the southern tribes, their hopes of throwing off the French rule were again revived. The first disturbances arose in the S. E. part of the province of Constantine; as the rebels were in want of war-material, the troubles spread slowly, but in October the situation became more dangerous, as large hordes of Arabs from the extreme S. of Oran began to move towards the E. In Mar., 1871, the Arab chief Sidi-Mokrani was said to be within twenty-five leagues of the city of Algeria with 40,000 men, having declared war against France. Sidi-Mokrani was killed in May, but nevertheless several districts remained in insurrection. In October several tribes recommenced hostilities in Constantine, but in November order was again restored throughout Algeria.

The history of the French administration in Algeria indicates anything but success. The colony has cost, and still costs, large amounts of money, without giving to France anything in return except the belief that it is a good training-school for French generals. In 1858 an attempt was made to give the colony a separate ministry under Prince Napoleon, who was followed by Count Chasseloup-Laubat in 1859. But as early as Dec. 11, 1860, the old system was again taken up, and yielded as small results as before. In 1863, Napoleon addressed a letter to the governor-general, Pelissier, which indicated an intention to try a radical change of administration. Algeria was to be treated as an Arabic kingdom, rather than a French colony, and the tribes should be made the owners of the lands they occupied. In May, 1865, Napoleon himself visited Algeria, and in a proclamation addressed to the whole population the sentiments of his letter to Pelissier were repeated. The hopes of the emperor were, however, not fulfilled, the new system remaining as unsuccessful as its predecessors. In 1870 the European inhabitants demanded the abolition of the military rule, under which they had thus far been placed, in common with the natives, and which was regarded as the chief impediment to the prosperity of the colony. The republican government in Paris immediately granted their demand. The military rule was abolished for all the districts occupied by the settlements of the Europeans and their descendants. A civil governor, assisted by a colonial council, is the highest authority, and the colony is represented by six deputies in the National Assembly of France. The transition from military to civil rule was attended by some revolutionary troubles, which, however, did not last long. (See MacCarthy, "Géographie Physique, économique et politique de l'Algérie," 1858; Nettement, "Histoire de la conquête d'Algerie," 2d ed. 1871.)

A. J. Schem.

Alghe'ro, or **Alghe'ri,** a fortified town and seaport of the island of Sardinia, is on the W. coast, 15 miles S. W. of Sassari. It has a cathedral and several convents. Wine, grain, tobacco, coral, etc. are exported from it. Pop. in 1861, 8092.

Algiers' [Arab. *Al-Jezair'*; Fr. *Alger*], a seaport and city of North Africa, on the Mediterranean; lat. 36° 47′ 3″ N., lon. 3° 4′ 5″ E. It was formerly the capital of the dey of Algiers, but since 1830 has been the capital of the French colony of Algeria. Built on the slope of a steep hill which rises to the height of 500 feet, it presents from the sea an imposing appearance, which is partly owing to the whiteness of the houses. The old streets are mostly narrow and crooked, but several straight and elegant streets have been made since the French became masters of the city. The houses are built of stone and brick, have flat roofs, and are annually whitewashed.

Among the public buildings are numerous mosques, several Roman Catholic churches, a fine cathedral and exchange, and a public library. The beauty and prosperity of the city have been much improved by the French, and its commerce has been greatly increased. Among the articles of export are wheat, coral, animal skins, and olive oil. Steam vessels ply frequently between Algiers and Toulon and Marseilles. This city was for three centuries the rendezvous of the Algerine pirates, who, though few in number, defied the power of the greatest nations of Europe. It was bombarded by the English admiral Lord Exmouth in July, 1816, when a large part of the city was reduced to ruins, and was taken by the French in July, 1830. Pop. without the military, was estimated in 1866 at 52,614.

Algiers, a suburb of New Orleans, is a post-village on the Mississippi River, opposite New Orleans. It has important drydocks and yards for ship and boat building. It is the northern terminus of the Louisiana and Texas R. R. Steam ferryboats ply between Algiers and the city proper.

Algo'a Bay is on the S. coast of Africa, in Cape Colony, about 425 miles E. of Cape Town. Here is a good harbor, and a flourishing seaport called Port Elizabeth, situated at the mouth of the Baasher River.

Al'gol, a star in the constellation of Perseus, is remarkable for its periodical variation in brightness.

Algo'ma, a district which forms the north-western portion of the province of Ontario in Canada. It borders on Lakes Huron and Superior. It has recently become famous for its rich silver-mines, and also contains copper, tin, and iron, and abundance of timber. Pop. in 1871, 4807.

Algoma, a township of Kent co., Mich. Pop. 1959.

Algoma, a township of Winnebago co., Wis. P. 807.

Algo'na, a post-village, the capital of Kossuth co., Ia., on the East Fork of the Des Moines River, and on the Iowa division of the Milwaukee and St Paul R. R., 51 miles W. of Mason City, and about 120 miles N. by W. of Des Moines. It has two weekly newspapers. Pop. 860; of Algona township, 2157. J. H. Warren, Ed. "Upper Des Moines."

Algonac, a post-village of St. Clair co., Mich. P. 754.

Algon'kins, one of the two great families of Indians that formerly occupied the Valley of the Mississippi and the regions east of it. The Indians of New England were Algonkins. The Chippewas are at present the most numerous tribe of the Algonkins. Their migration eastward (some 1200 years ago) is supposed to have been later than that of the Iroquois. (See Parkman's "The Jesuits in North America," and Baldwin's "Ancient America," 1872.)

Algon'quin, a post-township of McHenry co., Ill. It contains the villages of Algonquin, Cary, and Crystal Lake. The first is noted as a milk-shipping station, about 65,000 gallons being monthly sent to Chicago; also celebrated for its fine water-power and three flouring-mills, and its mineral spring. Crystal Lake is a fine summer resort; the lake of the same name is a beautiful sheet of water, from which ice is harvested for the Chicago market. Pop. 2157.

G. E. Earlie.

Algonquin, a township of Ontonagon co., Mich. P. 54.

Al'gorithm [Fr. *algorithme;* It. *algoris'mo,* formed from the Arabic *al,* "the," and the Gr. ἀριθμος, "number," with the insertion of the letter *g* between the article and initial vowel of *arithmos*], the art of computing in reference to some particular subject or in some particular way, as the *algorithm* of numbers, of surds, etc.

Algreen-Ussing (Tage), a contemporary Danish jurist and statesman, born at Frederiksborg, in Seeland, in 1797. He became in 1848 procurator-general for the kingdom of Denmark, and professor of law at Copenhagen. He has published several legal works. Died in 1870.

Alguazil', or **Alguacil',** the name given in Spain to an inferior officer appointed to execute the law, corresponding to a constable, bailiff, or policeman.

Al-Hak'em-Ibn-At'tâ (called **Al-Moken'na, -Mokanna,** or **-Mukanna,** *i. e.* "the veiled one"), an impostor who in 774 A. D. announced himself as a prophet and lawgiver in Khorassân. Having been attacked by the troops of the caliph Mahdi in 780, he set fire to his castle and consumed himself to ashes. His story is the subject of Moore's "Veiled Prophet of Khorassân."

Alha'ma (*i. e.* "the bath"), a town of Spain, in the province of Granada, in a beautiful valley 23 miles S. W. of Granada. Here are celebrated warm springs. Pop. 6931.

Alham'bra (the "red citadel"), a famous palace and citadel of the Moorish kings of Granada, was built 1248–1314 in a suburb of the city of Granada. It is surrounded by beautiful gardens and groves of aromatic trees. The interior of the palace is exceedingly gorgeous, and richly ornamented with arabesques, filigree, and fretwork. Among the portions now standing are the Court of the Lions and the Court of the Fish-pond. The former, which is built of white marble and alabaster, is named from a fountain in its centre supported by twelve lions, and surrounded by a gallery resting on columns and arches which are admirably light and elegant. This place capitulated to the Spaniards in 1491, and was entered in triumph by Ferdinand and Isabella in 1492. (See Irving, "The Alhambra," 1832.)

Alhaurin' el Gran'de, a town of Spain, in the province of Malaga, 15 miles S. W. of Malaga. Marble and granite quarries are worked in the vicinity. Pop. 5514.

A'li, pasha of Yanina, born in 1741, was the son of an Albanese chief. Upon the death of his father, who had been robbed of all his possessions by his neighbors, his mother placed him, when only sixteen years old, at the head of their partisans. At first he was unsuccessful, owing to a want of funds, but at last defeated his enemies and returned in triumph to Tepelen, his native town. The day after his return he murdered his brother, and then imprisoned his mother in the harem, where she soon died, he having accused her of this crime. He now rendered some important service to Turkey, so that he was first appointed in the place of Dervendshi Pasha, who had to look out for the safety of the highways, and then pasha of Tricala in Thessaly. He seized the city of Yanina by means of a forged firman, and then forced the inhabitants to demand him as ruler from the sultan. He was for a time in correspondence with Napoleon, but afterwards occupied the places on the Albanian coast belonging to Napoleon. In 1803 he was made governor-general of Rumelia. In 1820, in consequence of his treasonable intercourse with France and Russia, an army was despatched against him, but owing to the Greek revolution, which he used for his own ends, he succeeded in keeping Yanina until 1822, when he surrendered, having been promised amnesty. He was nevertheless executed, and his head was sent to Constantinople.

A'li, or **A'li-Ibn-A'bi-Tâ'lib',** surnamed the Lion of God, an Arabian caliph, a cousin-german of the prophet Mohammed, was born at Mecca in 602 A. D. He married Fâtimah, a daughter of Mohammed, whose doctrines he adopted and enforced with great ardor and courage. In 632 his rival, Abu-Bekr, was chosen caliph, after a contest which caused a schism and the formation of the sects of Sunnites and Shiites, the latter of which were partisans of Ali. He succeeded Othmân as caliph in 655, and was assassinated about 661 A. D. His son Hassan became caliph. Ali was distinguished as an author of maxims and proverbs. His religious party, the Shiites, are especially numerous in Persia and Turkestan. His descendants have ruled in Egypt, Spain, Western Africa, and Syria. The sentences ascribed to him were published by Fleischer (1837); a new edition of his "divan" (lyrical poems) was published at Boulâk, near Cairo, in 1840.

Alia, a town of Italy, on the island of Sicily, in the province of Palermo, is situated on a high mountain, 28 miles S. E. of Palermo. Pop. in 1861, 5425.

Ali-Bey, a celebrated chief of the Mamelukes, born in Abkhasia in 1728. He was taken to Egypt at an early age, and raised himself from a servile condition by his ability, became bey of the Mamelukes, and in 1757 bey of Egypt, and succeeded in becoming independent of Turkey. He attempted to restore the ancient Egyptian empire, and had almost conquered Syria when his chief general, his adopted son, was bribed by the Turks, and drove him from Egypt. He succeeded in getting up another army, but after a few victories was again defeated and captured, and died a few days after, in 1773.

Alibert (Jean Louis), a distinguished French medical writer, born in Aveyron May 26, 1766. He was first physician-in-ordinary to Louis XVIII. after 1815. He wrote, besides other able works, a "Description of the Diseases of the Skin" (1806–25), which is commended for its style and other merits. Died Nov. 6, 1837.

Al'ibi [Lat., meaning "elsewhere"], in law, is the absence of a person accused of crime from the place where the offence is charged to have been committed. If established, it is a defence to the accusation.

Alican'te, a province in the south-eastern part of Spain, is bounded on the N. by Valencia, on the E. by the Adriatic, and on the S. and W. by Murcia. Area, 2118 square miles. The country consists partly of fertile plains and partly sterile mountains. Pop. in 1867, 426,656. Chief town, Alicante.

Alicante (anc. *Lucen'tum*), a fortified city and seaport of Spain, the capital of the above province, is on the Mediterranean Sea; lat. 38° 20′ N., lon. 0° 26′ W. It is well built, with high and substantial stone houses, and contains

several hospitals, one college, and a theatre. Wine, grain, soda, oil, oranges, etc. are exported from this place, which is the chief seaport of Valencia. Pop. in 1860, 31,162.

Alica'ta, or **Lica'ta,** a seaport-town of Sicily, in the province of Sicily, on the S. coast, 25 miles S. E. of Girgenti. It exports grain, wine, sulphur, etc. Near it are the ruins of the ancient *Gela*. Pop. in 1861, 14,338.

A'lien [from the Lat. *alienus*, "belonging to another" (*alius*)]. An alien by English law is a person born out of the allegiance of the king. In this country he is one born out of the jurisdiction of the U. S., who has not been naturalized or made a citizen under their laws. By the common law the children of public ministers born abroad are citizens, for their fathers owe allegiance to no foreign power. By the laws of Congress, children of American fathers born abroad, where such fathers have resided in the U. S., are American citizens. (See CITIZEN.) It has been claimed that, independent of this statute, such children are American citizens. (The arguments against this view are stated with great cogency and learning by the venerable Horace Binney in an article upon "The Alienigenæ of the U. S.") Aliens are subject to certain disabilities affecting their exercise of political rights. After naturalization they are ineligible to the office of President and Vice-President of the U. S. The principal disability affecting aliens concerns the acquisition of the title to real estate. There are two general modes of acquisition —by purchase and by descent. An alien may acquire title by purchase (including conveyance and devise) in the absence of statutes to the contrary, and can hold it subject to a proceeding by the state termed "office found." This is in substance an inquiry through an authorized officer into the fact of alienage; and if that be found, the land is adjudged to belong to the state. An alien can convey no better title to a citizen than he himself possesses. This defect in the title can be cured by a private act of the State legislature. In the case of descent no title at all passes to the alien, and no inquest of office is necessary. A citizen brother can inherit from a brother, though their father be an alien, owing to the common-law rule that inheritances never ascend, and it is accordingly not necessary to trace title through the alien father. This disability is wholly removed in a number of the U. S., and modified in others. Where the disability is not removed, legislation is almost universal in favor of resident aliens, allowing them, if they intend to become citizens, to acquire land for a limited period, and to dispose of it and to transmit it to heirs. Aliens are capable of acquiring, holding, and transmitting personal property in the same manner as citizens, and may freely resort to courts of justice to maintain and protect their rights. Under the laws of Congress they are not, however, entitled to take out a copyright. Aliens have been distinguished in time of war into friends and enemies. An alien enemy cannot make a contract with a citizen. It is illegal in its inception, and cannot be enforced even after peace. Nor can such an alien prosecute actions of any kind while the war lasts, though, if there be no illegality in the claim, the right to sue revives in time of peace. An alien becomes a citizen through naturalization. The difficulties growing out of this subject have led to the negotiation of various treaties between the U. S. and foreign powers. (See NATURALIZATION.)

T. W. DWIGHT.

Align'ment [from the Fr. *aligner*, to "arrange in a line"], a military term, signifies the arrangement of men in line. The alignment of a camp is the rectilinear disposition of the tents. The word sometimes denotes the laying out or regulation of a street by a straight line.

Aliment. See FOOD, by EDWARD SMITH, M. D., LL.B., F. R. S.

Alimentary Canal, the cavity in the body of an animal in which food enters to be digested before it is conveyed by the nutritive vessels into the system. In some animals it is a simple cavity, with only one opening; in others it is a proper canal, with an outlet or anus distinct from the inlet or mouth, and is a continuous passage of variable dimensions from the mouth to the anus. The principal portions of the alimentary canal of Mammalia are the œsophagus, a duct or tube leading from the mouth to the stomach; the more expanded cavity of the stomach; the small intestines, which are long and convoluted; and the large intestines. The canal is lined throughout its whole length with mucous membrane. Its entire length in man is about thirty feet.

Al'imony [Lat. *alimonia*], in law, an allowance granted by a court to a wife from the husband's estate, either during a litigation between them or at its termination. Originally, it was only granted in suits for separation, but now by statute it is usual to make the allowance in proceedings for divorce dissolving the bonds of matrimony. In England the ecclesiastical court had jurisdiction of this subject until 1857, when it was vested in a court of divorce. In this country the jurisdiction is conferred in general on courts of equity. Alimony is of two sorts—*pendente lite*, and permanent. (1.) The object of the first is to enable the wife to carry on a litigation with her husband, or to sustain herself during its pendency. It is immaterial whether the proceedings be instituted by or against her. Should the wife have sufficient means of her own, no allowance of this kind will be made. The amount rests in the sound discretion of the court, and is subject to increase or diminution. (2.) *Permanent Alimony.*—This is a periodical allowance given from the husband's estate as the result of the litigation in the wife's favor. No allowance is made when the proceedings terminate unfavorably to her. The amount varies with the husband's wealth and position, and is commonly from one-third to one-half of his income. It is subject from time to time to variation by the action of the court, depending upon the circumstances of the case. The court has ample power to make its decree effectual, and may have recourse to the writ of *ne exeat* to prevent the husband's withdrawal from the State without proper security for its payment. Should the husband depart to another State, the parties might become "citizens of different States," within the view of the U. S. Constitution; so that she could enforce her claim to alimony in the Federal courts. The ordinary rule that the domicil of the wife follows that of the husband would not be applicable to this case, even though the case were one of judicial separation rather than of total divorce.

T. W. DWIGHT.

Alisal, a township of Monterey co., Cal. Pop. 2723.

Alisma'ceæ [from the Gr. ἄλισμα, a "water-plant"], a natural order of endogenous plants, natives of temperate climates. They are herbaceous, and usually grow in swamps or shallow waters. Among the genera of this order are *Alis'ma* and *Sagitta'ria* (arrowhead).

Aliso is the name of a fortification erected by Drusus in the year 11 at the entrance of the Eliso into the Lupia (Lippe). It was the scene of several severe contests between the Romans and the Germans.

Al'ison (ARCHIBALD), a Scottish writer, born in Edinburgh Nov. 13, 1757, was educated at Oxford. He took orders in the Church of England in 1778, and became curate of Kenley, in Shropshire, in 1790. In 1800 he removed to Edinburgh, where he preached for many years. His chief works are "Essays on the Nature and Principles of Taste" (1784), and two volumes of sermons (1814). Died May 17, 1839.

Alison (Sir ARCHIBALD), BART., D. C. L., a son of the preceding, was born at Kenley, in Shropshire, Dec. 29, 1792. He graduated in the University of Edinburgh, studied law, and was called to the bar in 1814. In 1832 he published his "Principles of Criminal Law," a work of standard authority. His chief work is a "History of Europe during the French Revolution" (10 vols. 8vo, 1833–42), which comes down to 1815, and has had a great popularity. "Its merits," says the "Edinburgh Review" for Oct., 1842, "are minuteness and honesty—qualities which may well excuse a faulty style, gross political prejudices, and a fondness for exaggerated and frothy declamation." He wrote a continuation of this History to the year 1852, a "Life of John, duke of Marlborough" (1847), and other works. In politics he was ultra Conservative. Died May 23, 1867.

Alison (WILLIAM PULTENEY), M. D., a physiologist, a brother of the preceding, was born in Edinburgh in 1790. He became professor of the institutes of medicine at Edinburgh in 1828, and professor of the practice of medicine in 1832. He published "Outlines of Physiology and Pathology" (1833), and other works. Died in 1859.

Aliz'arine [from *ali-zari*, the commercial name of madder in the Levant] is the coloring-matter of madder (*Rubia tinctorum*). Alizarine was discovered in 1824 by Robiquet and Colin, by treating madder with strong sulphuric acid, producing a black mass, which they called *charbon de garance*. On heating this, it yielded a sublimate of alizarine crystals.

Preparation.—Several processes have been employed for the extraction of alizarine, more or less pure, from madder. Kopp's plan, which has been applied on a larger scale by Schaaf and Lauth of Strasburg, consisted in treating the madder with an aqueous solution of sulphurous acid, by which both alizarine and purpurine, another coloring-matter, were dissolved. On adding 3 per cent. of sulphuric acid to the solution, and heating to 95° or 104° Fahrenheit, the purpurine was precipitated. In the filtrate from the purpurine the alizarine was precipitated in an impure state. This was extensively sold under the name of "green alizarine." From the washings a brown alizarine of inferior

quality separated. The green alizarine was sometimes purified by dissolving it in rectified petroleum, withdrawing the alizarine by agitating with soda lye, and precipitating it by sulphuric acid. It was thus obtained comparatively pure in yellow flakes, which dried to a yellow powder. Another process for extracting alizarine was based upon the observation of Leitenberger that purpurine is soluble in water from 77° to 131° Fahrenheit, while alizarine requires a much higher temperature. Alizarine is largely sold to the calico-printers in the form of a yellowish-brown paste, under the name of "madder extract;" also in the form of a dry powder. It may be crystallized from solution in red prisms or by sublimation in yellow needles.

Properties.—It is but slightly soluble in water, except under pressure at temperature much above the boiling-point. One hundred parts of water dissolve

at 212°	Fahrenheit,	0.034	alizarine.
302°	"	0.035	"
392°	"	0.820	"
437°	"	1.700	"
482°	"	3.160	"

It is soluble in alcohol and in ether, forming yellow solutions. It is also soluble in wood-naphtha, benzol, bisulphide of carbon, turpentine, glycerine, and petroleum. In sulphuric acid it dissolves with a deep-red color, and is precipitated unchanged on adding water. It is soluble in caustic alkalies and alkaline carbonates, forming a violet solution, from which it is precipitated by acids. Akaline solutions of alizarine form, with soluble lime and baryta salts, precipitates of a beautiful purple color; with alumina salts, a red; with iron salts, a purple precipitate. If a piece of cotton cloth which has been printed with the common alumina and iron mordants is placed in water holding a little alizarine in suspension, it will be found on heating the whole that the cotton will become permanently dyed in shades of red and purple. Alizarine is a feeble acid, forming, as above shown, soluble salts with the alkaline metals, insoluble colored salts with most other metals. Turkey-red, madder-pink, and the various shades of purple and chocolate on calico, are compounds of alizarine with metallic bases.

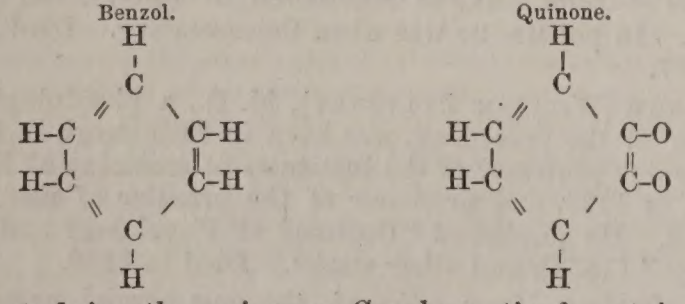
Origin of Alizarine.—Little if any alizarine exists in the living madder root, and after the root is gathered it is found that the alizarine increases in quantity by keeping for several years. It is now believed that the alizarine is produced from a substance called rubian or rubianic or ruberythrinic acid, a glucoside, by a peculiar fermentation induced by a peculiar madder ferment called erythrozone:

Rubian. Alizarine. Glucose.
$$C_{26}H_{32}O_{16}(?) = C_{14}H_8O_4 + 2C_6H_{12}O_6.$$

Rubian undergoes the same change under the influence of dilute acids.

Artificial Alizarine.—One of the greatest triumphs of modern chemistry was the artificial production of alizarine by Graebe and Liebermann in 1869. By a careful study of an extensive class of bodies, Graebe established the existence of a peculiar series of compounds called quinones, which contain the *phenyl nucleus*, and in which two atoms of oxygen are united together by a common bond, forming a dyad radical $(O_2)''$, which aids in binding together two adjacent carbon atoms. The molecular structure of the lowest quinone, that derived from quinic acid or from benzol, is shown in the following graphic formulæ:

Benzol. Quinone.



In studying the quinones, Graebe noticed certain general characteristics, which he attributed to their peculiar molecular structure. Thus, two of the hydrogen atoms associated with the oxygen radical $(O_2)''$ may be replaced by HO, H_2N, or HSO_3, the product being an acid, an amide, or a sulpho-acid. The following table illustrates the most important relations in this connection of the quinones:

Primary Hydrocarbons.	Quinones.	Acids.
Benzol.	Quinone.	Quinonic Acid.
C_6H_6.	$C_6H_4=(O_2)''$.	$(HO)_2=C_6H_2=(O_2)''$.
Naphthalene.	Naphtho-quinone.	Naphtho-quinonic Acid.
$C_{10}H_8$.	$C_{10}H_6=(O_2)''$.	$(HO)_2=C_{10}H_4=(O_2)''$.

Five years before, Martins and Griess, while investigating some derivatives of naphthalene, discovered a body very similar but not identical with alizarine; and Graebe had obtained a body from a naphtho-quinone derivative which resembled alizarine in some respects. Graebe came therefore to the conclusion that alizarine belonged to the quinone series, and, associated with Liebermann, he began his investigation upon it. The starting-point was to ascertain the primary hydrocarbon from which the alizarine could be constructed. They therefore subjected alizarine from madder to the process devised by Bayer for the conversion of phenol into its hydrocarbon, benzol. They passed alizarine vapor over heated zinc-dust, and obtained the hydrocarbon anthracene, $C_{14}H_{10}$. It only remained to change the anthracene into its quinone, and then into its quinonic acid, to form the alizarine:

Anthracene,	$C_{14}H_{10}$.
Anthraquinone,	$C_{14}H_8=(O_2)''$.
Anthraquinonic acid or alizarine,	$(HO)_2=C_{14}H_6=(O_2)''$.

A body, anthracenuse, had been prepared years before by Laurent and Anderson, which Graebe and Liebermann now recognized as the quinone of anthracene, $C_{14}H_8=(O_2)''$. They heated this with bromine, by which they replaced H_2 by B_2H_2, obtaining bibrom-anthraquinone, $C_{14}H_6Br_2=(O_2)''$. To replace the Br_2 by hydroxyl $(HO)_2$, they heated it with caustic potassa, KOH, and thus obtained the potassium salt of the new acid, from which the acid was precipitated by hydrochloric acid as a yellow powder indentical with the alizarine derived from madder. The practical importance of this discovery attracted to it the attention of numerous chemists, and simpler processes, avoiding the use of the expensive bromine, were soon devised. An abundant supply of anthracene is obtained from the refuse coal-tar of gas-works, and in a few months anthracene, which had never been seen except as a chemical curiosity, became a regular article of commerce. (See ANTHRACENE.)

The annual consumption of madder in dyeing and calico-printing is estimated to exceed $10,000,000. Large tracts in Holland, Alsace, Italy, and the Levant are devoted to its culture. It not only supplies dyestuffs, but in Alsace it yields a large proportion of the alcohol of commerce; the root containing sugar, which is extracted and subjected to fermentation.

This brilliant discovery of Graebe and Liebermann seems destined to effect a very serious change in the agricultural system of people as remote from each other as the shores of the North Sea and Asia Minor. In addition to alizarine, an anthra-purpurine has been obtained from anthracene, which is apparently identical with madder purpurine, and another color called pseudo-purpurine:

Alizarine,	$(HO)_2=C_{14}H_6=(O_2)$.
Anthra-purpurine,	$(HO)_3=C_{14}H_5=(O_2)$.
Pseudo-purpurine,	$(HO)_4=C_{14}H_4=(O_2)$.

Thus, we now have four classes of beautiful colors derived from coal: 1, Phenol colors; 2, Aniline colors; 3, Naphthaline colors; 4, Anthracene colors. Theoretically, 1 pound of alizarine would require 0.60 pound anthracene, which would be obtained from 30 pounds of coal-tar, requiring 660 pounds of coal. In practice, the yield is less than half this amount. There are now about twenty factories, chiefly in Germany and Switzerland, engaged in the manufacture of alizarine. (For further details with regard to alizarine, consult "Die Farbstoffe," von P. SCHÜTZENBERGEN, uebersetzt von Dr. H. SCHRÖDER, Berlin, 1873.)

C. F. CHANDLER.

Al'kali [from the Arabic definite article *al*, and *kali*, the plant from which soda was first obtained], a chemical term applied to an important class of bases which combine with acids to form salts, turn vegetable yellows to red, and vegetable blues to green, and unite with oil or fat to form soap. The proper alkalies are potash, soda, lithia, cæsia, rubidia, and ammonia, which are extremely caustic. Potash is called vegetable alkali, soda is called mineral alkali, and ammonia, volatile alkali. Lime, magnesia, baryta, and strontia, having some properties of alkalies, are called *alkaline earths*. The alkalies and alkaline earths are metallic oxides, except AMMONIA (which see). When an alkali and an acid combine in due proportion they are said to neutralize each other; they really produce metallic salts:

$$KOH + HCl = KCl + H_2O.$$
$$NaOH + HNO_3 = NaNO_3 + H_2O.$$

(See ACIDS, by PROF. C. F. CHANDLER, PH. D., LL.D.)

Alkalim'eter [from *alkali*, and the Gr. μέτρον, a "measure"], an instrument used to ascertain the proportion of pure carbonate of potash or of soda in a commercial sample of those articles, and to test the strength and purity of soda-ash, potash, etc. It consists of a graduated glass tube divided into 100 degrees (numbering from the top), and filled with diluted sulphuric acid, which is poured into a given quantity of the solution of the alkali until it is neutralized. If this process empties the tube to the eightieth degree, it shows that the article contains 80 per cent. of pure alkali. This process is called alkalimetry. The same instrument is also used to test the strength of acids, by filling the tube with a solution of alkali and reversing the process. (See VOLUMETRIC ANALYSIS.)

Alkalimetry. See preceding article.

Al′kaloids [from *alkali*, and the Gr. εἶδος, "form"], an important class of substances of organic origin, having the qualities of alkalies more or less strongly marked, and being capable of forming salts with acids, like the inorganic bases. They are often substitution products of ammonia. They are divided into two classes—*natural* and *artificial*. The natural alkaloids are found in plants and animals. They are composed essentially of carbon, hydrogen, and nitrogen; besides which a great number contain oxygen. The alkaloids have generally an energetic action on the animal system, and hence are employed as medicine; in comparatively large doses they are often powerful poisons. They have generally a bitter taste, and form in many instances the active principles of the plants in which they are found. Such are morphine, found in opium; quinine and cinchonine, in cinchona bark; strychnine, in nux vomica; hyoscyamine, in henbane; atropine, in belladonna; caffeine or theine, in coffee and tea, etc.

The animal alkaloids are few, the more important being urea, found in the urine of the Mammalia; and kreatine and kreatinine, two of the constituents of the juice of flesh. The artificial alkaloids are those organic bases which are formed in the researches of chemists. Recently several of the natural alkaloids have been manufactured on a small scale without the intervention of the living plant or animal. Urea can be formed from the simplest form of dead organic nitrogenous matter. Coniine, the alkaloid of hemlock, has been prepared artificially. (See AMINES, UREA, etc.)

Alka′na, or **Alkan′na** [Sp. *alca′ña*], a name of the coloring-matter obtained from the plant *Lawsonia inermis*, of the order Lythraceæ, which is used by the Oriental ladies to color their nails and teeth.

Al′kanet (*Anchu′sa*), a genus of herbaceous plants found in Europe, belong to the natural order Boraginaceæ. They have five stamens. Some of the species are cultivated for the beauty of the flowers. The root of the *Anchusa tincto′ria* affords a resinous red coloring-matter, and is used to color pomades, lip-salves, hair-oils, etc.

Al-Katif′, or **El-Chatif,** a town of Arabia, on the bay of the same name, which is part of the Gulf of Persia. It has a fort, a bazaar, and a citadel which is said to have been built by the Portuguese. Pop. about 6000.

Alkmaar′, or **Alckmaer′,** an old and important fortified town of Holland, in the province of North Holland, 20 miles N. N. W. of Amsterdam, and 5 miles from the ocean. It is well built, and is traversed by several canals, by which it carries on an active trade in butter and cheese. It is said to be the greatest mart for cheese in the world. Here are manufactures of soap, leather, sail-cloth, etc. This town was defended with success against the Spaniards in a long siege which began in 1573. Pop. in 1867, 11,609.

Alkmaar, van (HENRY), a Low-German poet who lived about 1475–1500. He was the author or translator of a very popular poem and satire entitled "Reinecke Fuchs" ("Reynard the Fox"), which he published in Low German at Lübeck in 1498. He professed that he translated this from the Walloon and the French, but no such original is extant.

Alkoran. See KORAN.

Al′la Bre′ve, ål′lå brā′vå, in music, the name of a movement whose bars or measures consist of the note called a breve, equal therefore to two semibreves or four minims. It is sometimes marked thus, ¢.

Alla Capella, the same as ALLA BREVE (which see).

Al′lah, the Arabic name of the Supreme Being, the only true God, as distinguished from the deities worshipped by idolaters.

Allard (JEAN FRANÇOIS), born in 1785, went to Egypt in 1815, and thence to Persia, where Abbas Mirza gave him the title of colonel, but with no command. For that reason he went to Lahore, where he gained the confidence of the maharajah of the Sikhs, who made him commander-in-chief of his army, which he organized according to European custom. He died in 1839.

Al′lahâbâd′ (*i. e.* "the city of God"), an ancient and holy city of Hindostan, the capital of the North-western Provinces, is at the confluence of the Ganges and the Jumna, 498 miles by rail N. by W. of Calcutta; lat. 25° 25′ 26″ N., lon. 81° 51′ E. Many thousand pilgrims annually resort to this place to bathe in the sacred rivers which here unite. The houses of the natives are mostly mean. This city is important as a military point, and is advantageously situated as an emporium of trade on the East Indian Railway, and also on the Grand Trunk road. A large part of the city was reduced to ruins by the hostile operations between the mutinous Sepoys and the British in 1857. Pop. in 1861, 64,785.

Allamakee′, a county which forms the N. E. corner of Iowa, has an area of 667 square miles. The soil is fertile, and the surface undulating and well timbered. Grain, wool, hay, and dairy products are the staples. Carriages and wagons are manufactured. Capital, Lansing. Pop. 17,868.

Al′lan (DAVID), a Scottish painter of domestic and humorous subjects, was born at Alloa Feb. 13, 1744, and was called the "Scottish Hogarth." He studied and worked for many years in Rome, whither he went in 1764. Among his works are "The Origin of Painting," which represents a Corinthian maiden drawing her lover's profile on the wall; and illustrations of Allan Ramsay's "Gentle Shepherd." Died Aug. 6, 1796.

Allan (Sir HUGH), born in Ayrshire, Scotland, in 1810, emigrated at an early age to Canada, where he became, in conjunction with his brother Andrew, proprietor of a line of steamships. In 1870 they had eighteen steamships plying between Montreal and Great Britain. He was one of the canal commissioners "inspecting the internal navigation" of Canada (1870–71), and in 1873 became prominent in operations in support of the Canadian Pacific Railway.

Allan (Sir WILLIAM), an eminent Scottish historical painter, born in Edinburgh in 1782. He worked some years in St. Petersburg, visited Circassia and Turkey, and returned to Edinburgh in 1814. He received 1000 guineas for his picture of "Circassian Captives." In 1835 he was elected academician of the Royal Academy of London, and in 1840 succeeded Wilkie as limner to Her Majesty for Scotland. Among his works are "The Death of Regent Murray," "Peter the Great Teaching Shipbuilding to his Subjects," "Knox Admonishing Queen Mary," and two pictures of the battle of Waterloo. Died Feb. 22, 1850.

Allan′toin ($C_4N_4H_6O_3$), a colorless crystalline substance found in the allantoic fluid of the fœtal calf and in the urine of the sucking calf. It is produced artificially by boiling uric acid with lead dioxide and water.

Allan′tois [from the Gr. ἀλλᾶς, ἀλλᾶντος, a "sausage," and εἶδος, a "form"], a thin membranous sac developed during incubation in the eggs of birds and reptiles, and in the embryo of viviparous animals during gestation. (For its development and uses, see EMBRYOLOGY, by PROF. J. C. DALTON, M. D.)

Allatoo′na, a post-village of Bartow co., Ga., on the Western and Atlantic R. R., 40 miles N. W. of Atlanta. Gen. J. E. Johnston, when pursued by Gen. Sherman, made a stand in the strong position of Allatoona Pass, in May, 1864, until his flank was turned. The Union general Corse defended this place with success against the assault of a superior force in Oct., 1864, while Gen. Sherman, from the top of Kenesaw Mountain, signalled that he should hold out to the last.

Al′legan, a county of the W. S. W. of Michigan, bordering on Lake Michigan, contains 840 square miles. It is traversed by the navigable Kalamazoo River. The surface is undulating or nearly level; the soil is fertile, and produces good timber, fruit, grain, wool, hay, and cattle. Lumber, brick, carriages, etc. are manufactured. Capital, Allegan. Pop. 32,105.

Allegan, a post-village, capital of the above county, on the Kalamazoo River, and on the Kalamazoo division of the Lake Shore and Michigan Southern R. R. and Mansfield Coldwater and Lake Michigan R. R. It has a national and private bank, two newspapers, two foundries, five hotels, the Holly water-works, car-works, and twenty-four other manufactories propelled by water and steam, an academy, two Masonic and two Odd Fellows' lodges, nine churches, and the library of the Allegan literary and library association. Pop. 2374; of Allegan township, 3642.

D. C. HENDERSON, ED. "ALLEGAN JOURNAL."

Allega′ny, a county of the W. S. W. of New York, bordering on Pennsylvania. Area, 1033 square miles. It is intersected by the Genesee River. The soil is generally fertile and adapted to grazing. Bog-iron ore and limestone are found. This county is traversed by the New York and Erie R. R. Cattle, grain, wool, and hay are produced, and metallic wares, leather, lumber, flour, carriages, etc. are manufactured. Capitals, Belmont and Angelica. P. 40,814.

Allegany, a post-village and township of Cattaraugus co., N. Y. It contains a Roman Catholic college and Franciscan convent, and has important manufactures. Pop. of village, 746; of township, 2485.

Allegha′ny, a river which rises in Potter co., Pa., makes a short circuit in New York, and returns into the former State. Flowing afterwards in a S. S. W. direction through the hilly oil-regions, it unites with the Monongahela at Pittsburg, forming the Ohio. It is navigable for small steamboats 150 miles or more above Pittsburg. It

is over 400 miles long, and its waters are remarkably clear and pure.

Alleghany, a county which forms the N. W. extremity of Maryland, bordering on Pennsylvania and West Virginia. Area, 800 square miles. The Potomac River and its north branch form the southern boundary of this county, which is traversed by several ridges of the Alleghany Mountains. Between these are fertile valleys called *glades*, adapted to pasture and dairies. Iron ore, excellent bituminous coal, limestone, and hydraulic cement are abundant. Coal is extensively mined. Grain, wool, hay, fruit, and dairy products are the staples, and lumber, leather, firebrick, and metallic wares are manufactured. The water-power is very extensive. Garrard county was cut off from it in 1873. Capital, Cumberland. Pop. 38,536.

Alleghany, a county of the N. W. of North Carolina, bordering on Virginia. It contains important deposits of copper ore. The Alleghany Mountains pass through it. Grain and wool are raised. Capital, Gap Civil. Pop. 3691.

Alleghany, a county in the W. of Virginia. Area, 500 square miles. It is drained by Jackson's River, which unites with the Cow Pasture River on the E. border to form the James River. The main Alleghany ridge forms the N. W. boundary of this county, which is traversed by other mountain-ranges, and contains fine scenery and valuable mineral springs. The Chesapeake and Ohio R. R. and the James River Canal connect this county with Richmond. Grain, tobacco, and wool are raised. Capital, Covington. Pop. 3674.

Alleghany, a township of Davidson co., N. C. P. 436.

Alleghany, a township of Armstrong co., Pa. P. 2568.

Alleghany, a township of Blair co., Pa. Pop. 1913.

Alleghany, a township of Butler co., Pa. Pop. 890.

Alleghany, a township of Cambria co., Pa. P. 1230.

Alleghany, a township of Potter co., Pa. Pop. 625.

Alleghany, a township of Somerset co., Pa. P. 1133.

Alleghany, a township of Venango co., Pa. P. 1485.

Alleghany, a township of Westmoreland co., Pa. P. 1710.

Alleghany, a township of Craig co., Va. Pop. 938.

Alleghany, a post-township of Montgomery co., Va. Pop. 2504.

Alleghany College. See COLLEGES.

Alleghany Mountains, or **Alleghanies,** a name sometimes used as synonymous with the Appalachian system of mountains. (See APPALACHIAN MOUNTAINS.) In a more restricted sense it is applied to the parallel ranges which traverse Pennsylvania, Maryland, and Virginia, and form the most prominent features in the physical geography of those States. The general direction of these ridges is nearly N. E. and S. W., and their mean height about 2500 feet. Among their highest summits are the Peaks of Otter, in Virginia, rising to 4200 feet above the sea. These ridges are remarkable for the parallelism of their direction and the uniformity of their outline and altitude, and enclose several beautiful and fertile valleys. The rocks of the Alleghanies are the Silurian and Devonian limestones and sandstones, and the group of strata called the coal-measures.

Alleghany Springs, in Montgomery co., Va., 3 miles from Shawsville, on the Virginia and Tennessee R. R., and 77 miles S. W. of Lynchburg, are a popular resort for invalids and others. The springs are highly saline, and produce laxative, tonic, or alterative effects, according to the method of use. They are especially recommended for dyspeptics. Eight miles distant are the sublime Puncheon Run Falls, and the scenery near is wild and picturesque.

Alleghe'ny, a county of the W. S. W. of Pennsylvania. Area, 750 square miles. The Allegheny and Monongahela rivers unite near the centre of the county, and form the Ohio. The surface is diversified by hills, valleys, rolling uplands, and deep ravines, which present a variety of picturesque scenery. The soil is fertile and the land nearly all arable. Among the products of this county are bituminous coal, iron, and limestone. In population and manufactures this county exceeds all others in the State except Philadelphia. Cattle, grain, wool, and hay are staples. The manufactures are extremely varied and important. Capital, Pittsburg. Pop. 262,204.

Allegheny, a city of Allegheny co., Pa., separated from Pittsburg by the Allegheny River. Five fine bridges connect the two cities. It contains over 100 large manufacturing establishments, including extensive iron and steel rolling-mills, locomotive-works, cotton and woollen mills, 10 foundries, 8 machine-shops, 10 tanneries, 2 flouring-mills, salt-works, white-lead works, etc. It has 45 churches, including 15 Presbyterian of the different branches, 9 Methodist Episcopal, 10 Roman Catholic, 2 Protestant Episcopal, 2 Baptist, 3 Methodist, 2 Lutheran, 1 Disciples, 1 Congregational. There are in Allegheny 3 theological seminaries, numerous benevolent and reformatory institutions, the Western Penitentiary, 2 national banks; a soldiers' monument, costing over $40,000; a beautiful park, embellished with costly fountains, statues, etc.; 2 beautiful cemeteries—Union Dale and St. Mary's; 1 public library, a fine market-house, 4 horse railroads, and very extensive water-works. Allegheny City is growing very rapidly. Pop. 53,180. W. D. CUMMINGS.

Alle'giance [Fr. *allégeance*], in law, is the tie or obligation which binds a citizen or subject to a state. The common law distinguishes between natural and local allegiance. The former is that which a citizen owes to the state of which he is a member; the latter is due from a person who is not bound by the rules of natural allegiance, but who is temporarily subject to the laws of the state by which the allegiance is claimed. Under this theory a foreigner temporarily residing in a country is subject to its laws. Under such circumstances, should he conspire to overturn the government he may be guilty of treason. When he departs his allegiance is at an end. Natural allegiance, on the other hand, cannot be shaken off at the will of the citizen. Should he abandon the country to which he belongs, and engage in war on the part of a foreign state against it, he might, in strictness, if taken prisoner, be treated as a traitor. Such a treatment would, under some circumstances, be extremely harsh, as where the state had encouraged emigration, and the consequent assumption by an emigrant of relations naturally leading to a duty to take sides in a controversy with an adopted country. The doctrines of allegiance are of feudal origin, and it has been found difficult to reconcile them with the requirements of modern times. The U. S. in their legislation upon naturalization have proceeded upon the theory that a citizen of a foreign country might, at his will, shake off his allegiance and become a citizen here. The European nations have quite uniformly denied that there is any such general rule of public law, whatever may be the opinion of individual jurists. The perplexing and irritating questions thus raised have been for the most part recently disposed of by treaties between the U. S. and the leading foreign nations. (For these treaties see NATURALIZATION.) T. W. DWIGHT.

Al'legory [Gr. ἀλληγορία; Lat. *allegoria*], a figure of speech which may be termed a prolonged metaphor; a narrative in which abstract ideas are personified, as Bunyan's "Pilgrim's Progress," which furnishes one of the finest examples of allegory to be found in literature. Allegory is not confined to literature, but may also be employed in painting, sculpture, and pantomimic representations. It differs from symbol with respect to the relation between idea and form. In a symbol the form is naturally indicative of the idea, as when a lion rising from its couch is taken as a representative of the awakening spirit of democracy, while in an allegory idea and form are entirely disconnected, as when a city is represented by a female figure. Mere allegory without any power of symbolization is tiresome, and often stupid.

Allegret'to [a diminutive of the It. *allegro*, "lively"] is a musical term which denotes a movement or time quicker than *andante*, but not so quick as *allegro*.

Al'legri (GREGORIO), an Italian composer of sacred music, born in Rome about 1580. He was a singer in the pope's chapel and a pupil of Nanini. His masterpiece is the "Miserere," which is annually performed in the pontifical chapel during Passion Week. Died in 1652.

Al'legro (*i. e.* "lively," "cheerful"), in music, one of the principal degrees of movement; a term which signifies that the piece to which it is prefixed is to be performed in a brisk and lively manner. The word is sometimes used as a substantive, and a name of an entire musical composition.

Al'lein, or **Al'leine** (JOSEPH), an English non-conformist minister and writer, born at Devizes in 1633, was educated at Oxford. He was ejected from a curacy at Taunton in 1662, after which he was persecuted by imprisonment in Ilchester jail, and was fined for preaching. His death was hastened by ill-treatment, and he died Dec. 22, 1668. Among his works is an "Alarm to the Unconverted" (1672), which is highly esteemed.

Allein, or **Alleine** (RICHARD), an English non-conformist and Puritan, born in Somersetshire in 1611, educated at Oxford, was rector of Batcombe in that county, but was ejected in 1662. He published "Vindiciæ Pietatis" ("Vindication or Defence of Piety," 1663), and other works. Died Dec. 22, 1681.

Al'len, a county of Indiana, bordering on Ohio. Area, 638 square miles. The St. Joseph and St. Mary rivers unite in this county to form the Maumee. It is also drained by the Aboite River and several creeks. The surface is nearly level; the soil is very fertile. Cattle, grain, wool, and hay are staple products. Machinery, flour, carriages, metallic wares, etc. are among the manufactures. It is intersected by the Pittsburg Fort Wayne and Chicago R. R., and the Toledo Wabash and Western, Fort Wayne Jackson and Saginaw, and Fort Wayne Muncie and Cincinnati R. Rs. Capital, Fort Wayne. Pop. 43,494.

Allen, a county in the S. E. of Kansas. Area, 432 square miles. It is intersected by the Neosho River, and drained by Elm and Deer creeks. The surface is undulating; the soil is fertile. Excellent timber abounds. The county contains a large proportion of prairie, and is well adapted to the raising of stock. Grain, wool, potatoes, and hay are staple products. It is traversed by the Leavenworth Lawrence and Galveston R. R. The most valuable mineral found here is coal. Capital, Iola. Pop. 7022.

Allen, a county of Kentucky, bordering on Tennessee. Area, 300 square miles. It is bounded on the N. E. by the Big Barren River. The surface is generally level, and the soil moderately fertile. Limestone caverns are found in this county. Cattle, grain, tobacco, and wool are produced. Capital, Scottsville. Pop. 10,296.

Allen, a county in the W. N. W. of Ohio. Area, 405 square miles. It is intersected by the Auglaize and Ottawa rivers. The surface is generally level and well timbered; the soil is fertile. Cattle, grain, wool, hay, and lumber are produced. Carriages and wagons are manufactured. This county is traversed by the Dayton and Michigan and the Pittsburg and Chicago R. Rs. Capital, Lima. Pop. 23,623.

Allen, a township of Pope co., Ark. Pop. 225.

Allen, a township of Lasalle co., Ill. Pop. 877.

Allen, a township of McLean co., Ill. Pop. 1224.

Allen, a post-township of Miami co., Ind. Pop. 1042.

Allen, a township of Noble co., Ind. Pop. 1754.

Allen, a township of Polk co., Ia. Pop. 732.

Allen, a township of Warren co., Ia. Pop. 788.

Allen, a post-township of Hillsdale co., Mich. Pop. 1759.

Allen, a township of Worth co., Mo. Pop. 1352.

Allen, a post-village and township of Allegany co., N. Y. Pop. 794.

Allen, a township of Darke co., O. Pop. 781.

Allen, a township of Hancock co., O. Pop. 969.

Allen, a township of Union co., O. Pop. 1198.

Allen, a township of Northampton co., Pa. Pop. 2040.

Allen, a township of Washington co., Pa. Pop. 815.

Allen, a township of Morgan co., West Va. Pop. 766.

Allen (Charles), LL.D., a jurist, was born at Worcester, Mass., Aug. 9, 1797, and was admitted to the bar in 1818, was a judge of various State courts of Massachusetts between 1842 and 1859, and chief-justice of the Massachusetts superior court (1859–67). From 1849 to 1853 he was a Free-Soil member of Congress. He published fourteen volumes of legal reports (1861–68), and was long an influential lawyer and an able jurist. Died Aug. 6, 1869.

Allen (David Oliver), D. D., an American divine, born at Barre, Mass., in 1800. He graduated at Amherst College in 1823, and labored as a missionary in India from 1827 to 1853, in which latter year he returned to America. He published a "History of India" in 1856. Died July 17, 1863.

Allen (Elizabeth Akers), known as "Florence Percy," was born in Strong, Me., Oct. 9. 1832. Her first husband was the sculptor Akers. She is now the wife of E. M. Allen of New York. She published in 1867 a volume of poems of decided merit, and has contributed much to periodical literature.

Allen (Ethan), General, born at Litchfield, Conn., Jan. 10, 1737. He became an owner of iron-works at Salisbury, Conn., and in 1766 removed to Vermont, where he became a leader in the popular resistance to the claims of New York. The province of New York declared Allen an outlaw, and offered £150 for his arrest. On the outbreak of the Revolution, Allen heartily joined the movement, and on the 10th of May, 1775, he surprised and captured the fort at Ticonderoga, summoning its astonished commandant to surrender "in the name of the great Jehovah and the Continental Congress." This capture gave the army a valuable supply of artillery and stores. He had but eighty-three men under him, among whom was Benedict Arnold. On the 25th of Sept., 1775, he attacked Montreal with a small force, but was captured and sent to England as a prisoner. He was treated with great cruelty, and was not exchanged till 1778. The British authorities tried in vain to bribe him to induce the Vermonters to join their cause, but he skilfully contrived by his negotiations to keep the British troops out of Vermont. He published pamphlets against the New York domination, a narrative of his captivity (1799), a "Vindication of Vermont" (1779), and "Allen's Theology, or the Oracles of Reason" (1784), an attack upon the Christian religion. He professed to believe in the transmigration of souls. He was courageous, humane, and generous, but ambitious, rash, and eccentric. Died of apoplexy near Burlington, Vt., Feb. 12, 1789. (See his "Life" by Hugh Moore (1834), and by H. W. de Puy (1853).)

Allen (Heman), LL.D., born at Poultney, Vt., Feb. 23, 1779, graduated at Dartmouth 1795, became a lawyer, was chief-justice of a Vermont State court (1811–14), member of Congress (1817–18), U. S. minister to Chili (1823–28), and held various other important positions. He was a nephew of Ethan Allen. Died at Highgate, Vt., April 9, 1852.

Allen (Henry), an enthusiast, born at Newport, R. I., June 14, 1748, founder of the "Allenites." He maintained that Adam and Eve before the fall had no corporeal bodies, and denied the resurrection of the body. He preached in Nova Scotia, and published some hymns and religious treatises. Died Feb. 2, 1784.

Allen (Ira), General, born in Cornwall, Conn., April 21, 1751, was a younger brother of Ethan Allen. Emigrating in 1772 to Vermont, he became a prominent and public-spirited citizen. While he was colonel of militia his regiment did good service at the battle of Bennington. He bore a prominent part in settling the early difficulties of Vermont with the neighboring States. In 1795 he went to France to purchase arms for his State, but was taken on the voyage home, carried to England, and there sustained with success an eight years' lawsuit on the charge of attempting to supply the Irish with arms. He was afterwards imprisoned in France. He wrote a "Natural and Political History of Vermont" (1798) and other works. Died Jan. 7, 1814.

Allen (Joseph W.), an English landscape painter, born at Lambeth, in Surrey, in 1803. He was the principal scene-painter at the Olympic Theatre, and is said to have corrupted his style in landscape by the "brilliant effects" which are only adapted to the stage. He had previously painted rural scenery with success. Died Aug. 30, 1852.

Allen (Rev. Moses), a patriot, born at Northampton, Mass., Sept. 14, 1748, graduated at Princeton in 1777. He was taken prisoner by the British and confined in a prison-ship at Savannah. He was drowned Feb. 8, 1779, in an attempt to escape.

Allen (Paul), born at Providence, R. I., Feb. 15, 1775, graduated at Brown University in 1796, studied law, and removed to Philadelphia, where he engaged in journalism, serving as editor and correspondent to various journals. He published a volume of poems (1801), "Lewis and Clarke's Travels" (1814), "Life of Alexander I." (1818), and other works. His "History of the Revolution" (1819) was written by John Neal and others. He was for a time insane. Died at Baltimore (where he was an editor of the "Morning Chronicle") Aug. 18, 1826.

Allen (Philip), born in Providence, R. I., Sept. 1, 1785, graduated at Brown University in 1803. He was an extensive cotton-manufacturer, and built the first Watt steam-engine ever made in Providence; was governor of Rhode Island (1851–53), and U. S. Senator (1853–59). Died Dec. 16, 1865.

Allen (Richard), first bishop of the African Methodist Episcopal Church in the U. S. He was originally a preacher in the Methodist Episcopal Church, and was ordained deacon by Bishop Asbury in 1799. He was elected bishop of the African Methodist Episcopal Church in 1816. Died in Philadelphia in 1831. (See Methodism.)

Allen (Richard L.), born in Hampden co., Mass., Oct., 1803, was a merchant of New York in 1832, and became a farmer on the Niagara River. With A. B. Allen, his brother, he established the "American Agriculturist," which became a very successful paper. He was the author of "The Diseases of Domestic Animals" (1848), "American Farmer's Muck-Book," etc. Died at Stockholm, Sweden, Sept. 22, 1869.

Allen (Robert), an American officer, born in 1812 in Ohio, graduated at West Point in 1836, and, July 20, 1866, assistant quartermaster-general (rank colonel), and brigadier-general U. S. volunteers, May 13, 1863. Served in the

artillery till May 11, 1846, and subsequently in the quartermaster's department; on engineer duty in 1836, and in Florida war in 1837–38, in emigrating Cherokees to the West in 1838, in quelling the Canada border disturbances in 1840–41, in garrison in New York harbor in 1841–46, in the war with Mexico in 1846–48 on quartermaster duty, being present at the battles from Vera Cruz to the city of Mexico (brevet major), on quartermaster duty at New Orleans and New York in 1848–49, as chief quartermaster of Pacific division in 1849–52 and 1854–61. In the civil war served as chief quartermaster at St. Louis, Mo., in 1861–63, and at Louisville, Ky., 1863–66; from which points he directed the furnishing of transportation and supplies for the various armies operating in the Mississippi Valley (brevet lieutenant-colonel and brigadier-general July 4, 1864), and for several expeditions, including those against the North-west Indians; as chief quartermaster of the division of the Pacific in 1866–69, and senior assistant in quartermaster-general's office in Washington, D. C., since 1869. GEORGE W. CULLUM, U. S. A.

Allen (SAMUEL), a London merchant, born about 1635, was one of the proprietors of New Hampshire under Mason's patent, and was governor of the colony (1691–99). His claim involved him and his heirs in expensive litigation. Died May 5, 1705.

Allen (SOLOMON), an American patriot and preacher, born in Northampton, Mass., Feb. 23, 1751, was a brother of Moses, noticed above. He served as a major in the Revolutionary war. Died Jan. 20, 1821.

Allen (STEPHEN), born in New York City in 1767, became mayor of the same in 1821. He was distinguished for his public spirit and public services, being one of the persons who originated the enterprise of supplying New York with Croton water. He was a victim of the burning of the steamer Henry Clay in July, 1852.

Allen (STEPHEN), D. D., an eminent divine and educator of the Methodist Episcopal Church, was born in Maine in 1810, graduated at Bowdoin College in 1835, entered the ministry in the Maine Conference in 1839, and has devoted much of his life to education in his native State, particularly as principal of the Maine Wesleyan Seminary.

Allen (THOMAS), an American patriot, born at Northampton, Mass., Jan. 17, 1743, was a brother of Moses, noticed above, and the father of William Allen (1784–1868). He was the first minister in Pittsfield, where he began to preach in 1764. In the Revolution he served as chaplain in the American army. Died Feb. 11, 1810.

Allen (WELD N.), U. S. N., born Mar. 27, 1837, in Maine, graduated at the Naval School in 1856, became a lieutenant in 1861, a lieutenant-commander in 1863, a commander in 1871, served during the summer of 1861 at Fort Dahlgren near Alexandria, and was for some weeks in command of that important post. In 1862 and 1863 served on board the gunboat Kanawha, and in 1864 commanded the steamer New London, Western Gulf blockading squadron. In 1865, while attached to the steam-sloop Tuscarora, Allen led the men of that vessel in the assault upon Fort Fisher, and was wounded in the left arm.
FOXHALL A. PARKER, U. S. N.

Allen (WILLIAM), a lawyer, who was chief-justice of Pennsylvania before the Revolution, and a royalist after it began. He aided Dr. Franklin in founding the College of Philadelphia. Died in 1780.

Allen (WILLIAM), F. R. S., an English chemist and philanthropist, born in London Aug. 29, 1770, was a friend of Sir H. Davy. He was elected F. R. S. in 1807, and in conjunction with W. H. Pepys made researches on respiration, etc. He devoted much time to benevolent enterprises, and as a minister of the Society of Friends travelled in France, Germany, and Russia, in which latter country he had an interview with the emperor Alexander in 1822. In 1825 he founded two manual-labor schools at Lindfield, Sussex. Died Dec. 30, 1843.

Allen (WILLIAM), D. D., a learned clergyman and author, was born at Pittsfield, Mass., Jan. 2, 1784. He graduated at Harvard in 1802, was licensed to preach in 1804, in 1810 succeeded his father as pastor in Pittsfield, was chosen president of Dartmouth College in 1817, and was president of Bowdoin College from 1820 to 1839. His last days were spent at Northampton, Mass., where he died July 16, 1868. He published numerous volumes, both of prose and of poetry. His best known work is an "American Biographical and Historical Dictionary" (1809; 2d ed. 1832; 3d ed. 1857).

Allen (WILLIAM HENRY), a naval officer, born at Providence, R. I., Oct. 21, 1784. He served with distinction under Decatur when the latter captured the Macedonian, in Oct., 1812. Having obtained the command of the Argus, Captain Allen took several prizes from the English. He was mortally wounded in a battle between the Argus and the Pelican Aug. 14, 1813.

Allen (WILLIAM HENRY), M. D., LL.D., was born at Readfield, Me., Mar. 27, 1808, educated at Bowdoin College, Me., 1833, was professor of Latin and Greek in the Cazenovia Methodist Seminary, N. Y., from 1833 to 1835, professor of chemistry and natural philosophy in Dickinson College, Carlisle, Pa., from 1836 to 1846, professor of philosophy and English literature at the same institution from 1846 to the close of 1849, president of Girard College, Philadelphia, from 1850 to 1863, president of the Agricultural College of Pennsylvania during 1865 and 1866, and was reappointed president of Girard College in 1867, which office he still sustains with eminent ability. In 1872 he was elected president of the American Bible Society. He is author of "A Manual of Devotion for Girard College of Orphans," and of numerous and able addresses, reviews, etc.

Allen (WILLIAM HOWARD), an officer of the U. S. navy, was born at Hudson, N. Y., July 8, 1790. He commanded the Argus after William Henry Allen was mortally wounded, in 1813. Nov. 8, 1822, he was killed by pirates whom he attacked near Matanzas.

Allen (WILLIAM STICKNEY), an American journalist, born at Newburyport, Mass., in 1805, was for nearly twelve years editor of the "Newburyport Herald." He removed in 1837 to Missouri, where he afterwards edited the "St. Louis Republican." Died June 16, 1868.

Al'lendale, a post-village and township of Ottawa co., Mich. Pop. 799.

Allendale, a post-village of Bergen co., N. J., on the Erie R. R., 26 miles from New York. Large quantities of berries are here shipped to New York.

Allendale, a township of Barnwell co., S. C. P. 1847.

Al'len's, a township of Winston co., Ala. Pop. 553.

Allen's Creek, a township of Hanover co., Va. Pop. 2844.

Allen's Factory, a post-township of Marion co., Ala. Pop. 587.

Allen's Fresh, a post-township of Charles co., Md. Pop. 4584.

Allen's Grove, a township of Mason co., Ill. P. 1199.

Allen's Grove, a post-township of Scott co., Ia. Pop. 646.

Al'lenstein, a Prussian town, province of East Prussia, situated on the Alle, 65 miles S. of Königsberg. Pop. in 1871, 5514.

Al'lenstown, a township of Merrimack co., N. H., on the Suncook Valley R. R., has manufactures of cottons, twine, brick, etc. Pop. 804.

Al'lensville, a post-township of Person co., N. C. Pop. 1120.

Al'lenton, a post-township of Wilcox co., Ala. P. 1954.

Al'lentown, a borough of Allegheny co., Pa. P. 772.

Allentown, a city, capital of Lehigh co., Pa., on the right bank of the Lehigh River, 60 miles N. by W. of Philadelphia. It is on the Lehigh Valley R. R. The Lehigh and Susquehanna R. R., leased by the Central R. R. of New Jersey, runs on the opposite bank of the river. The East Pennsylvania R. R. connects at this place with the Lehigh Valley R. R. Some seven trains run daily to New York. There are ten blast-furnaces at this place, two large rolling-mills, foundries and machine-shops, large tanneries, shoe manufactories, tube-works, woollen-mills, fire-brick works, etc. There is a fine court-house, a prison costing $250,000, three national banks, public school property worth $300,000, and five weekly and two daily newspapers. It is the seat of Muhlenberg College. Pop. 13,884.
W. J. S. COXWORTH, ED. "LEHIGH VALLEY DAILY NEWS."

Al'ler, a river of Germany, an affluent of the Weser, rises near Magdeburg and flows north-westward. It is about 150 miles long.

Al'lerton (ISAAC), one of the "Pilgrim Fathers," left London in 1608, and went to Holland. He came to New Plymouth in the Mayflower's first voyage. He was a man of some wealth, and was at first a man of influence, but was afterwards unpopular. He became a merchant of New Amsterdam (New York), residing at Marblehead, New Haven, and other points. The second of his three wives was Fear, a daughter of William Brewster. Died in 1659.

All-Hal'low, the old English name for All Saints' Day (the 1st of November).

Al'lia, or **A'lia,** according to Livy, a small stream which entered the Tiber 11 miles above Rome, was the scene of the battle in which Brennus and the Gauls defeated the Roman army, about 388 B. C. It has not been identified in modern times.

Alli'ance, Stark co., O., at the crossing of the Pittsburg Fort Wayne and Chicago and the Cleveland and Pittsburg R. Rs., is a very thriving and prosperous town, containing many extensive manufactories of horse-rakes, reapers, pumps, terra-cotta ware, steam-hammers, tin presses, besides rolling-mills, white-lead works, etc. etc. Two newspapers are published here. It has one national bank, extensive gas-works, excellent public schools, a college, and good libraries. Pop. 4063.

W. H. PHELPS, PUB. "ALLIANCE MONITOR."

Alliance, Holy. See HOLY ALLIANCE.

Al'libone (SAMUEL AUSTIN), LL.D., an author, born in Philadelphia April 17, 1816. His principal work is a "Critical Dictionary of English Literature and Authors" (3 vols., 1859–70), an excellent work, of very great value to the student.

Al'lier, a river of France, is the most important affluent of the Loire. It rises in the S. of France, near the source of the Loire, flows nearly N., and enters that river at Nevers. Its entire length is about 260 miles.

Allier, a department of France, is bounded on the N. by Cher and Nièvre, on the E. by Saône-et-Loire, on the S. by Puy-de-Dôme, and on the W. by Creuse and Cher. Area, 2822 square miles. It is intersected by the Allier, and bounded on the N. E. by the Loire. The soil is fertile. The chief productions are wine, grain, timber, cattle, horses and sheep. Iron, coal, and marble are found here. It is subdivided into 4 arrondissements, 28 cantons, and 317 communes. Chief town, Moulins. Pop. in 1872, 390,812.

Alliga'tor [corrupted from the Sp. *el lagarto,* the

Alligator.

"lizard"], a genus of American saurian reptiles (nearly allied to the crocodile) which abound in the rivers and swamps of the Southern U. S. They have broader heads, more numerous teeth, and more obtuse snouts than crocodiles. Various reptiles of this genus are called caymans in South America. They all hibernate in the winter or dry season, when they bury themselves in the mud. The alligator is about fourteen feet long, including the tail, which is a powerful weapon for defence. It is a fierce and voracious animal, and sometimes attacks and kills men both on water and land, but it cannot turn quickly on land. During the heat of the day it is often seen basking in the sun on the dry ground. Its back and sides are defended by hard mailed plates, which are proof against a rifle-ball. The alligator is an oviparous animal, its eggs being small, but numerous. The parent deposits them in the sand of the river-side, scratching a hole with her paws, and placing the eggs in a regular layer therein. She then covers these with sand, grass, mud, etc., and deposits another layer on top of them, and so on until she has laid from fifty to sixty eggs. These are hatched by the heat of the sun and the decaying vegetable matter. The name alligator is also frequently applied to the muggur of India. The common alligator of the Southern States is the *Alligator Mississippiensis,* but among the so-called alligators of Florida a true crocodile has been discovered.

Al'ligator, a township of Tyrrel co., N. C. Pop. 778.

Alligator, a township of Chesterfield co., S. C. P. 659.

Alligator Pear. See AVOCADO PEAR.

Alligator Swamp, an extensive marshy tract in North Carolina, occupies a large part of the peninsula between Albemarle and Pamlico sounds.

Al'lingham (WILLIAM), born at Ballyshannon, Ireland, about 1828, published "Poems" (1850), "Day and Night Songs" (1854), "Lawrence Bloomfield in Ireland" (1864), in which year he obtained a literary pension.

Allio'li (JOSEPH FRANZ), a German Catholic theologian, born at Sulzbach Aug. 10, 1793. He became professor of theology at Munich in 1826, resigned in 1835, and became soon after canon at Ratisbon. His German translation of the Bible (6 vols., 6th ed. 1839–45) was approved by the pope, and has had a very wide circulation. He also published a "Manual of Biblical Antiquities" (1841). Died May 22, 1873.

Al'lison, a township of Lawrence co., Ill. Pop. 855.

Al'lison (FRANCIS), D. D., a Presbyterian minister, born in Ireland in 1705, came to America in 1735. He was for many years vice-provost and professor in Philadelphia College. Died Nov. 28, 1777.

Alliso'nia, a village of Franklin co., Tenn., on the Elk River and on the Nashville and Chattanooga R. R., 77 miles S. E. of Nashville. Here is an abundant water-power.

Allison's Mills, a township of Jackson co., Ala. Pop. 564.

Allitera'tion [from the Lat. *ad,* "to," and *litera,* a "letter"], in composition, the frequent recurrence of the same letter, or of words beginning with the same letter, as "When friends were few and fortune frowned." It is often used in proverbial phrases, as, "Wilful waste makes woeful want," and in poetry for the production of effect, as in this line of Gray: "To high-born Hoel's harp or soft Llewellyn's lay." In the Celtic and early Gothic languages alliteration was a recognized ornament of poetry, and was used instead of rhyme.

Al'lium [from the Gr. ἀλέομαι, to "avoid," because of its offensive smell], a genus of herbaceous plants of the natural order Liliaceæ, natives of the temperate and cold regions of the northern hemisphere, including the garlic, onion, leek, and chive. They have mostly bulbous roots, umbellate flowers, narrow and fistulose leaves, and a peculiar smell and taste called *alliaceous.*

Al'loa, a seaport and market-town of Scotland, in the county of Clackmannan, on the left (N.) bank of the Forth, and at the head of its frith, 28 miles W. N. W. of Edinburgh. It has a good harbor and an active trade. Glass, ale, whisky, woollen goods, and leather are manufactured here, and coal is an important article of export. Steamboats ply daily between Alloa and Edinburgh. Pop. 6676.

Allob'roges, a nation of ancient Gaul which occupied the territory now comprised in Dauphiny, Savoy, and Piedmont. They were allies or peaceable subjects of Rome.

Allocu'tion [Lat. *allocu'tio,* from *ad,* "to," and *lo'quor, locu'tus,* to "speak"], a formal address; a term used especially by the court of Rome, and applied to a speech which the pope addresses to the college of cardinals on some political or ecclesiastical subject. The pope often resorts to this method to define his position or explain his policy, or reserve a claim which he cannot enforce in the present circumstances.

Allo'dium, or **Allo'dial Ten'ure,** in feudal law, freehold estate, land held by an individual in his own absolute right, and free from feudal tenure or obligation. There is no allodial land or property in England, the laws

of which declare that the king is the original proprietor and lord paramount of all the land in the kingdom.

Allom'erism [from the Gr. ἄλλος, "different," and μέρος, a "portion" or "share"], a term denoting constancy of crystalline form under variation in the proportion of the constituents of a compound. Thus, an alloy of zinc and antimony containing 36 per cent. of the latter metal crystallizes in needles which do not vary in angular measurement, though the antimony be increased 20 per cent.

Allop'athy [from the Gr. ἄλλος, "other," "different," and πάθος, an "affection"], a supposed theory of medicine, according to which remedies are used whose effects are opposite to the symptoms of the diseases treated. The term allopathy was formed after that of homœopathy, and both terms were introduced by Hahnemann. The two terms are contrasted, the one teaching that medicines must produce a *similar affection* to the disease itself, the other a *different affection*. The idea of this method of medication is at least as old as Hippocrates, who used the expression, "τὰ ἐναντία των ἐναντίων ἔστιν ἰήματα"—"opposites are remedies of opposites." It has been contrasted in modern times especially with the maxim of Hahnemann, "*similia similibus curantur*," or "like cures like," which is the fundamental principle of homœopathy—an idea which is also advanced by Hippocrates. It is altogether an error to designate the prevalent and ancient science and practice of medicine as allopathy. The teachers and adherents of this science insist that its scope legitimately embraces all positive truth concerning disease and its treatment; no more to be narrowed down to an exclusive principle, such as that of allopathy, than astronomy can be made synonymous with the nebular theory, or zoology with the theory of development.

Allo'ri (Alessandro), a skilful Italian painter, born in Florence in 1535, excelled in the science of anatomy. Among his masterpieces are "The Last Judgment" and "Christ disputing with the Doctors." Died in 1607.

Allori (Cristofano), an eminent painter, a son of the preceding, was born at Florence in 1577. He was a good colorist, and excelled in portraits. Among his works, which are exquisitely finished, is a Magdalene. Died in 1621.

All'otta'va, in music, is a direction to play an octave higher or lower.

Allot'ment Sys'tem, or **Allotment of Land,** an expression commonly used in England in reference to small portions of land cultivated as gardens by peasants and other poor laborers, who hold the land as tenants. Allotment, as a legal term, may be defined as the grant or allowance of a portion of land too inconsiderable to be the subject of a formal conveyance.

Allot'ropy, or **Allot'ropism** [from the Gr. ἄλλος, "other," and τροπή, "conversion"], in chemistry, a term applied to the diversity of form and properties which some elements exhibit under certain circumstances, as, for example, when exposed to a great heat or to an electric discharge. Many chemists believe that every element is capable of existing under several allotropic modifications. Among the substances which afford examples of allotropy are sulphur, phosphorus, oxygen, and carbon. If the solid and brittle sulphur be heated to 480° F., and then poured into water, it ceases to be brittle and becomes very elastic. Sulphur in its ordinary state is slightly soluble in turpentine and some fixed oils, but in its elastic condition it becomes insoluble in those oils. Phosphorus affords a remarkable illustration of the same principle. In ordinary circumstances, when freshly prepared, it is a pale yellow solid, resembling wax. In this form it is extremely combustible, requiring to be kept under water to avoid taking fire spontaneously. But if this same substance be excluded from air and kept several days at a temperature of about 450° Fahrenheit, it becomes red, and ceases to be readily combustible, so that it need not be kept under water to prevent its taking fire. Oxygen, which in its common state has no odor, may, by an electric discharge through a glass tube or bottle containing air, be transformed into ozone, which has a peculiar odor and other new properties. (See Ozone.) The diamond and graphite are allotropic forms of carbon.

Allouez (Claude Jean), a Jesuit, born in France in 1620, went to Quebec in 1658 as missionary to the Algonkins, settled on Lake Superior in 1665, at Kaskaskia, Ill., in 1676, and visited numerous tribes in the North-west. Died in 1690. He was bitterly disliked by La Salle.

Allow'ances, Officers', are the payments made to officers in the British army for special duties. An officer commanding and paying a company receives a contingent allowance for the expense of repairing arms, etc. An officer sent on duty from one place to another has a travelling allowance of so much a mile. A somewhat similar system is observed in the U. S. army.

Al'loway Kirk, an old ruined church in the parish of Ayr, near the mouth of the river Doon, is the scene of Burns's poem of "Tam O'Shanter." A monument has been erected here to the memory of Burns, who was born near the kirk.

Allox'an ($C_4N_2H_2O_4$), a white crystalline substance formed by the action of cold strong nitric acid on uric acid. It is converted by baric hydrate into alloxanic acid, $H_2.C_4N_2H_2O_5$.

Alloxan'tin ($C_8N_4H_4O_7.3Aq$), a colorless crystalline compound produced by the action of hot dilute nitric acid on uric acid; also by the action of deoxidizing agents, as H_2S, on alloxan.

Alloy' [from the Fr. *alloyer*, to "mix" (as metals), probably from the Latin *al'ligo*, to "bind to," to "join," and hence to "mix"], a mixture or compound of two or more metals fused together; sometimes a compound of precious metal with a metal of less value; thus, in coinage, the term alloy is applied to a baser metal mixed with gold or silver in order to make it harder. Chemists apply this term to all combinations obtained by fusing metals together; thus, brass is an alloy of copper and zinc; bronze is an alloy of copper and tin; pewter is an alloy of tin and lead. In many cases the metals do not unite in definite or invariable proportions. The density—or, in other words, the specific gravity—of an alloy is sometimes greater and sometimes less than the mean of its components. Most alloys have greater cohesion than either of the metals of which they are composed, so that a bar of an alloy will bear a greater longitudinal strain than a bar of either metal. British gold coin contains 11 parts of pure gold and 1 of copper; the law of the U. S. requires that in 1000 parts of coin there must be 900 parts of gold; and the intent of the law is, that the alloy shall be of copper only; but, as in parting silver from native gold it has been heretofore impossible to separate the whole, except at an expense too great to be economical, it has been permitted to allow the residual silver to be counted as part of the alloy, provided the proportion of silver be *not greater* than one-half. The more effectual processes introduced of late years into the U. S. assay offices have made it possible to make the parting nearly complete; and it is now provided that the silver shall not exceed *one-tenth* part of the whole alloy. A compound of mercury with another metal is an *amalgam*.

All Saints' Day, or **All Hallows** [Ang.-Sax. *all*, and *hâlig*, "holy"], a festival of the Roman Catholic, Anglican, Lutheran, and the various Oriental churches. Observed on the 1st of November, in honor of the saints in general.

All Souls' Day, a festival of the Roman Catholic Church, observed on the 2d of November, in order to alleviate the sufferings of the souls in purgatory.

All'spice, a common name of pimento, or Jamaica pepper, the dried berry of the *Euge'nia pimen'ta*, which is a native of the West Indies. It is called allspice because it is supposed to combine the flavor of several spices.

All'ston (Joseph), an American planter, born in 1778, became governor of South Carolina (1812–14). He married Theodosia, the only child of Aaron Burr. Died Sept. 10, 1816.

Allston (Robert F. W.), an American officer and governor, born April 21, 1801, in All Saints' parish, S. C., graduated at West Point in 1821, served as lieutenant of artillery on topographical duty till he resigned, Feb. 1, 1822, to become a rice-planter on the Great Pedee River; surveyor-general of South Carolina 1823–27, member of the house of representatives of South Carolina 1828–32, of the senate 1832–56, presiding 1847–56, deputy adjutant-general of South Carolina 1831–38, and governor of South Carolina 1856–58. He was much interested in agriculture and public education, and wrote valuable memoirs upon both subjects. Died April 7, 1864, on his plantation, near Georgetown, S. C. George W. Cullum, U. S. A.

Allston (Washington), an American painter of celebrity, both at home and abroad, born Nov. 5, 1779, on his father's plantation, at Waccamaw, S. C.; died at Cambridge, Mass., July 9, 1843. Being of delicate constitution, he was sent to school at Newport, R. I., at the age of seven. There he formed the acquaintance of Edward Malbone, the miniature painter, a kindred spirit, two years his senior, whose taste, enthusiasm, and unusual culture stimulated the lad's ambition and fixed the bent of his genius. On graduating from Harvard College in 1800, he went to Charleston, and at once began his art-life under the influence of his Newport friend, whom he found there. The opportunities for intelligent study of good masters were small at that time, but zeal and patience used them all. The young man scorned no helps, but copied the best he could find, and felt grateful, especially to Robert Edge Pine, whose portraits of General Gates,

Charles Carroll, Baron Steuben, and Washington were much admired as examples of color. In 1801, Allston, accompanied by his friend Malbone, is in London, a student of the Royal Academy, whereof Benjamin West was president. West became his intimate friend, and so remained to the last. London opened to the young artist a new world of opportunity and sympathy. His three years there were full of improvement and delight. Then the Louvre in Paris offered to him its superb gallery, rich with gems of Italian art. This prepared him for Italy, where, principally in Rome, he spent four years in close companionship with Thorwaldsen the sculptor and Coleridge the poet. In 1809 he returned, richly freighted, to his native country, but soon went back to London with his wife, a sister of Dr. William E. Channing. There he produced his first great work, "The Dead Man Restored to Life by the Bones of Elisha." The picture obtained the prize from the British Association, and was afterwards purchased by the Pennsylvania Academy of Fine Arts. Allston's reputation was made. Other great paintings followed: "St. Peter Liberated by the Angel," "Uriel in the Centre of the Sun," "Jacob's Dream," with smaller things between—all eagerly sought by purchasers. But toil and confinement, and sorrow from the death of his wife, impaired his health; in 1818 he came to America again. The next twelve years were passed in Boston, where, in spite of a feeble body and a saddened mind, he painted the "Jeremiah," "Saul and the Witch of Endor," "Miriam," "Beatrice," and other pieces exquisite in color and feeling. In 1830, Allston married, as his second wife, a daughter of Chief-Justice Dana of Cambridge, Mass.; and at Cambridge he thenceforth lived, writing and painting, in great seclusion, but enjoying the society of a group of intimate and noble friends. To this period of his activity belong "Spalatro's Vision" and "Rosalie," the former one of his most weird, the latter one of his loveliest creations. The work which he meant should be his masterpiece, and on which he bestowed immense labor in the latter years of his life, "Belshazzar's Feast," was never finished. It was after a week of steady, severe labor on it that the artist gently expired from an attack of heart disease. The sketch, probably never intended by the painter to be exhibited, is in the Athenæum Gallery in Boston.

If Allston had not been a painter, he might have been distinguished as an author. The few writings from his pen that have been published indicate a rare penetration and refinement of mind. His novelette, "Monaldi," deserves to be still read and admired for its literary excellence. His poems were light and incidental productions, and have been forgotten. He prepared a course of lectures on art, which were published after his death.

Allston had the poetic temperament; his passion was for beauty—not for the sensuous beauty that charms the eye, so much as for the intellectual beauty that enchants the soul. Neither the landscape nor the human face interested him so much as the forms that stood before his imagination. He was of a thoughtful, interior, speculative cast of mind, meditative and dreamy. His sensibility to spiritual impressions was acute; he was a lover of the supernatural and the mysterious, with a love of the romantic. He never wholly outgrew his liking for ghost-stories, and the awful, the grand, the wild possessed an unfailing attraction for him to the end of his life. This peculiarity of his mind displays itself in the subjects of his greatest paintings—"Uriel," "Saul and the Witch of Endor," "The Vision of the Bloody Hand," "The Dead Man Coming to Life"—and not less in his last and most ambitious piece, "Belshazzar's Feast;" the great feature of which was the awful handwriting on the wall, glaring down on the scene of revelry, making the light of the candles dim and striking consternation into royal hearts. Conceptions like these transcend any artist's power of execution, and much of the disappointment with Allston's work arises probably from the sense of inadequacy of the performance. The grandeur is there, the impression of intellectual power is always conveyed, the spiritual influence of a subtle imagination is always felt; but the skill to tell satisfactorily the wonderful story is wanting. It is when he descends from such ambitious flights and paints a "Rosalie," a "Beatrice," a "Lorenzo and Jessica," that the exquisite quality of his art appears. These are creations of the fancy too, pure dreams of the poet, attempts to catch and portray what the eye cannot perceive, and only the most ethereal touch can feel. Their charm is indescribable. It is not in the composition, which is not always admirable, nor in the drawing, which is now and then deficient in freedom and grace, nor even in the color, rich and mellow as it is: it lies rather in the refined delicacy of sentiment which pervades the work, spiritualizing whatever the master touches. His most tremendous creations are touched with this subtle grace. They are never appalling or grotesque; they are always, in some aspects, lovely.

The technical excellence of Allston's art was its color. Leslie is quoted as saying that the harmony of tint in the "Uriel" suggested the best pictures of Paul Veronese; and the appellation given him in Rome, "the American Titian," proved that the artists there discovered in his canvas something more than the adroit use of pigments, something of the strange art of mingling them that in the great master was so inimitable. Artists could even rejoice in the melancholy incompleteness of the "Belshazzar," because it allowed them an opportunity to study the painter's method.

The personal qualities of Allston were exceedingly attractive. His high-toned moral integrity, his enthusiasm, his utter singleness of mind, his maidenly purity of heart, fascinated all who approached him. He was free from envy and jealousy and guile. Artists revered him. Horatio Greenough, a man of culture as well as an artist, said, "He was a father to me in what concerned my progress of every kind." And Washington Irving wrote of him: "To the last he appeared to retain all those elevated, refined, and gentle qualities which first endeared him to me—a man whose memory I hold in reverence and affection as one of the purest, noblest, and most intellectual beings that ever honored me with his friendship."

Allston was slight in form, and carried about him an air of refined dignity that at once attracted attention. His countenance wore an expression of serene abstraction. His brow was broad, his eye large; his white hair fell long upon his shoulders in his latter years. In the public street he seemed wrapped in thought till a friend spoke to him, and then he seemed the soul of love. Before his death, in 1839, his paintings, those that were in America, forty-two in number, were collected a short time for exhibition. The best of them are in private galleries; some of the very best are in England. Mr. Allston was chosen a member of the Royal Academy soon after his return from his first long residence in England. O. B. Frothingham.

Allu'vion [from the Lat. *ad*, "to," and *luo*, to "wash"], the soil imperceptibly formed by the constant washing of the waters along the banks of a river or the sea. (See Accretion.) It differs from "avulsion," as the latter is not gradual, but sudden and perceptible.

Allu'vium, a geological term, signifies gravel, sand, and other matter washed down by rivers and floods, and spread over land that is not permanently submerged. Such deposits, which belong to the post-tertiary formation, often accumulate at the mouths of large rivers and form deltas. (See Delta.) All the land of Lower Egypt is alluvial. It has been estimated that the Mississippi annually carries down a quantity of sediment sufficient to cover 144 square miles with a stratum one foot deep. Alluvial soil is frequently the most fertile part of the earth's surface.

Al'lyl, Ac'ryl, or **Propyle'nyl** (C_3H_5), the third term in the homologous series C_nH_{2n-1}. Oil of garlic is the sulphide of allyl $(C_3H_5)_2S$. Oil of mustard is the sulphocyanate of allyl, $C_3H_5.CNS$.

Al'lyn (Robert), D. D., an eminent clergyman and educated in the Methodist Episcopal Church, born at Ledyard, Conn., Jan. 25, 1817, graduated in 1841 at the Wesleyan University, Conn.; mathematical teacher in Wilbraham Academy, Mass., 1841–43, joined the New England Conference 1842, was elected principal at Wilbraham 1845, principal of the Providence Conference Academy 1848; commissioner of public instruction for Rhode Island 1854, served three terms in the Rhode Island legislature, appointed professor of ancient languages in Ohio University at Athens 1857, president of the Wesleyan Female College, Cincinnati, O., 1859, and president of McKendree College, Ill., 1863–73.

Al'ma, a small river of Russia, in the Crimea, flows W. and enters the sea about 20 miles N. of Sevastopol. On its banks the allied armies of England and France, commanded by Lord Raglan and Marshal St.-Arnaud, defeated the Russians on the 20th of Sept., 1854.

Alma, a post-township of Marion co., Ill. Pop. 794.

Alma, a post-village, the capital of Wabaunsee co., Kan., in a township of its own name, about 65 miles W. of Lawrence, situated at the crossing of the prospective Manhattan Alma and Burlingame, and the Mill Creek Valley and Council Grove R. Rs. It contains several stores, wagon and other shops, one flouring-mill and one saw-mill, run by water-power. The town is at the junction of four creeks, each furnishing water-power. Boring for coal is now going on, which geological experts say is to be found at a depth of about 350 to 400 feet. The town is growing very rapidly. Six important mail-routes centre at this point, and stages arrive and depart daily. One newspaper is published here. Pop. of Alma township, 890.

A. Sellers, Pub. "News."

Alma, a post-township of Allegany co., N. Y. It has manufactures of lumber. Pop. 766.

Alma, the county-seat of Buffalo co., Wis. It has one weekly paper. It is on the Mississippi River, 60 miles N. of La Crosse, and within 4 miles of the celebrated Beef Slough Boones. It has manufactures of bricks, wagons, flour, etc. Pop. of village, 565; of township, 1049.

ED. OF "EXPRESS."

Alma, a township of Jackson co., Wis. Pop. 731.

Al'mack's, a suit of assembly-rooms in King street, St. James, London, was formerly celebrated as a fashionable place of resort for the aristocracy. Annual balls were given in these rooms, the managers of which were ladies of high rank, who conducted them with great exclusiveness. These rooms were built in 1765 by a person named Almack, an anagram of McCall, his original name. The desire of admission to the balls and parties at Almack's was so eager that it is said votes in Parliament have been purchased by tickets offered to the wives and daughters of members.

Almaden', or **Almaden' del Azo'gue** (*i. e.* "the mines of quicksilver"), a town of Spain, in the province of Ciudad Real, 50 miles S. W. of Ciudad Real. Here are mines of quicksilver (cinnabar), which are said to be the richest and most ancient in the world, producing annually about 2,000,000 pounds. They were worked by the ancient Spaniards, and afterwards by the Romans. Almaden has a practical school of mines and three hospitals. The mines were rented in the sixteenth century by the Fuggers, the famous bankers of Antwerp, and in 1843 the Rothschilds obtained the contract from the Spanish government. Pop. 8645.

Al'maden, a township of Santa Clara co., Cal. Here are important mines of mercury and valuable mineral springs. Pop. 1647.

Almaden Quicksilver-mines, The, of Santa Clara co., Cal., are named after those of Almaden in Spain, the latter being the most important in the known world. The Santa Clara mines are the New Almaden, Providence, Enriquita, and Guadalupe. The first mentioned is 14 miles from San José and 65 miles S. of San Francisco, in a region remarkable for its picturesque scenery. The ore (cinnabar) has from time immemorial been known to the Indians, who used it for making vermilion paint. Some Mexicans having bribed them to disclose the profound secret of its place, a company was formed in 1846, which began to work the mine. The presence of this deposit has been of incalculable benefit to California, since enormous quantities are employed in gold and silver mining. The metallic mercury is separated from the ore by a simple process of distillation.

Al'magest [from the Arabic *al*, "the," and the Gr. μέγιστος, "greatest"], a name given by the Arabs to Ptolemy's great work on astronomy, which was written in Greek, and translated in the ninth century into Arabic.

Alma'gro, a city of Spain, in the province of Ciudad Real, 14 miles S. E. of Ciudad Real. It is well built, has a town-hall, two hospitals, and one Latin school. Large quantities of lace are made here; also brandy, soap, and earthenware. Pop. 10,273.

Almagro, de (DIEGO), a Spanish soldier of fortune, and one of the conquerors of Peru, was a foundling, and was named after the city in which he was found in 1475. At an early age he went to America, where he is said to have enriched himself by plunder. Pizarro, Almagro, and Luque in 1525 united in an enterprise to conquer Peru, in which they were successful. (See PIZARRO, FRANCISCO.) In 1535, Almagro invaded Chili and gained some victories over the natives, but his progress was hindered by the enmity and perfidy of Pizarro. He returned from Chili in 1536, and took Cuzco, which Pizarro claimed as part of his possessions. In April, 1538, Almagro was defeated in battle and taken prisoner by Pizarro, who put him to death.

Almagro, de (DIEGO), a son of the preceding, was born about 1520. He became the leader of a party which was hostile to Pizarro, whom they assassinated in 1541. He then took the title of captain-general of Peru, but he was defeated in battle by the royal army under Vaca de Castro, and was executed in 1542.

Alma'li, a large town of Asiatic Turkey, in the S. part of Anatolia, on the river Myra, 25 miles from the Mediterranean Sea. It is beautifully situated in a valley, contains several factories and mills, and has a prosperous trade. The appearance of the town is uncommonly picturesque. Pop. about 20,000.

Al'ma Ma'ter (*i. e.* "fostering or propitious mother"), a name used to express the relationship of a university to its "foster-children" (alumni) who have been educated in it.

Al'manac, or **Almanack** [Arab. the "register"], an annual publication containing a calendar of the days and months of the year, the time of the sun's rising and setting, a notice of the eclipses of the sun and moon, and other astronomical phenomena. To these essential topics are often added predictions of the weather, and sometimes useful information of different kinds. The origin of almanacs is very ancient. They correspond in some respects to the Fasti of the Romans. The first printed almanac was that of George von Burback, resident at Vienna, in 1460. Regiomontanus began in 1474 a series of almanacs in their present completed form. In the sixteenth and seventeenth centuries they were often used as organs of political parties, were filled with the absurdities of astrology and vain prognostications, and were enlisted in the service of superstition and imposture. Among the most widely-known almanacs of the present time is the "Gotha Almanack," which was first published in German in 1763. It is also published in French. It contains statistics respecting all nations, with much political information.

The first American almanac was that of William Bradford of Philadelphia, published in 1687. In 1732, Franklin first published his celebrated "Poor Richard's Almanac." The "American Almanac" appeared in Boston from 1828 to 1861. At present over 100 almanacs are published in the U. S., embracing every possible subject, a number of which appear in foreign languages, especially the German.

Almanac, Nautical, an annual work devoted to astronomical phenomena and used in navigation. The "British Nautical Almanac" was planned by Maskelyne, and first published in 1767. A similar French work, entitled "Connaissance des Temps," was commenced by Picard in 1678, and has been continued to the present time. There is an excellent almanac published in Berlin under the title of *Ephemeris*. The "American Nautical Almanac," which first appeared in 1853, has a high reputation. It is published annually by the U. S. navy department through the board of navigation. It is a large volume, published for the use of the navy, and sold at cost to others. (See EPHEMERIS, by PROF. J. H. C. COFFIN, LL.D.)

Alman'sa, or **Alman'za,** a town of Spain, in the province of Albacete, 52 miles by rail E. of Albacete. It has manufactures of linen and cotton fabrics, brandy, leather, and soap. Near this town the French under the duke of Berwick defeated the British and Spanish armies, April 25, 1707. Pop. 7900.

Alman'sor (ABU JAAFAR), the second caliph of the family of the Abbasides, was born in 712. He ruled from 754–775, persecuted the Christians in Syria and Egypt, founded Bagdad, and promoted arts and sciences.

Almas, a town of Hungary, in the county of Bacs, 16 miles W. N. W. of Maria-Theresienstadt. Pop. in 1869, 8193.

Al'meh, or **Al'mah,** written also **Almé** (plu. **Awâlim**), a name applied to the professional female singers and dancing-girls of Egypt. The singers are hired to perform in the harems of the rich. The common dancing-girls are a different and less respectable class, belonging to a tribe called Ghawazi. They perform lascivious pantomimes in the streets.

Almei'da, or **Almey'da,** a fortified town of Portugal, in Beira, and on the Coa, 83 miles N. E. of Coimbra. It is an important stronghold. Here Lord Wellington defeated the French general Massena, Aug. 5, 1811. Pop. about 1150.

Almeida, a town of Brazil, province of Espirito Santo, is on the ocean, about 20 miles N. of Victoria. It was founded by the Jesuits in 1580. Pop. about 4000.

Almeida, de (DON FRANCISCO), a famous Portuguese commander and viceroy of India, was born in Lisbon about 1450. He was a son of the count of Abrantes. Having gained distinction in wars against the Moors, he was appointed viceroy of India in 1505. He built several forts on the Indian coast, and extended the dominion of Portugal by his conquests. In 1507, Albuquerque was sent to India with a commission to supersede Almeida, but the latter refused to resign. He gained a decisive victory over the Egyptian fleet near Diu in 1508, and resigned his office about the end of that year. As he was returning to Portugal, he was killed by some Caffers near the Cape of Good Hope Mar. 1, 1510.

Almeida-Garrett, de (JOÃO BAPTISTA), a Portuguese poet and politician, born Feb. 4, 1799, minister of public education 1820–24, was compelled to leave the country several times, and was elected a member of the Cortes in 1836. Died in 1854. Among his works (16 vols., 1854–55), the most celebrated are the epic-lyrical poems "Camões" and "Adozinda," the satirical poem "Dona Branca," as well as several dramas.

Alme'na, a post-township of Van Buren co., Mich. Pop. 980.

Al'mer, a township of Tuscola co., Mich. Pop. 671.

Almeri'a, a province of Spain, forms the E. part of the former kingdom of Granada. It is bounded on the N. by Murcia, on the E. and S. by the Mediterranean, and on the W. by Granada. Area, 3299 square miles. It contains rich mines of silver and lead. Grain, silk, and wine are the chief productions. Capital, Almeria. Pop. in 1867, 352,946.

Almeria, ål-må-ree'å, a city and port of Spain, on the Mediterranean, 104 miles E. of Málaga, is the capital of a province of the same name. Under the reign of the Moorish kings it was one of the richest and most important towns in the kingdom of Granada. It has a safe harbor, defended by two forts, and a fine cathedral. Wine, silk, cochineal, and other articles are exported from this port. Pop. in 1861, 29,426.

Almi'ra, a post-township of Benzie co., Mich. P. 393.

Al'mohades [Arabic, *Al-Mowahidoon, i. e.* "unitarians," or advocates of the unity of God, as taught in its original purity by Mohammed], a Mohammedan dynasty that reigned in Spain and Northern Africa from 1129 to 1269. It was founded by Abu-Abdillah Mohammed, surnamed AL-MAHDI, "the director." The Almohades were the conquerors and successors of the Almoravides. The first Almohade who took the title of sultan was Abd-el-Mumen.

Almoji'a, a Spanish town in the province of Málaga, 10 miles N. W. of Málaga, is noted for its baths. Pop. 7041.

Almonacid', a town of Spain, in the province of Toledo, on the Tagus. Here the French under King Joseph defeated the Spaniards under Vanegas on Aug. 11, 1809.

Al'mond (*Amyg'dalus*), a genus of plants of the natural order Rosaceæ, composed of trees and shrubs nearly allied to the peach. The common almond (*Amyg'dalus commu'nis*) is a tree from twenty-five to thirty feet high, a native of Barbary, but it now abounds in the south of Europe, from which great quantities of the fruit (kernels) are exported. Sweet almonds, which contain a large proportion of bland fixed oil, are an agreeable article of food. Bitter almonds contain a peculiar principle called *amygdalin*, and yield a poisonous oil. The leaves of the almond contain prussic acid. The dwarf almond tree is cultivated for the beauty of its flowers, which resemble the blossoms of the peach, but are generally double.

Almond, a township of Clay co., Ala. Pop. 967.

Almond, a post-village and township of Allegany co., N. Y. It contains an academy, a mowing-machine factory, four churches, several quarries, mineral springs, and has manufactures of boots, shoes, etc. Pop. 1686.

Almond, a post-township of Portage co., Wis. P. 651.

Almond'bury, a large village, township, and parish of England, in the West Riding of Yorkshire. The village is on the Calder, 36 miles S. W. of York, and has cotton and woollen mills. Pop. in 1871, 12,268.

Almon'de, van (PHILIPPUS), sometimes written **Allemon'da,** a Dutch admiral, born at Briel in 1646. He was the second in command under De Ruyter when the latter was killed in 1676, and contributed to the victory which Van Tromp gained over the Swedes in 1677. He commanded the Dutch fleet which, aided by the English, defeated the French at La Hogue in 1692. Died in 1711.

Al'mond's, a township of Stanley co., N. C. P. 792.

Almonds, Oil of. Both sweet and bitter almonds yield by pressure a fixed oil, which is of a light-yellow color and odorless. It consists chiefly of olein; is soluble in 25 parts of alcohol. It is used in medicine, having a mild laxative property. It is sometimes given to newborn infants, mixed with syrup of roses. One hundred pounds of almonds yield about fifty pounds of oil. Bitter almonds, macerated with cold water and distilled, yield a volatile oil known as the "oil of bitter almonds," or hydride of benzoyl. This does not pre-exist in the almonds, but is produced, together with hydrocyanic or prussic acid, from the glucoside amygdalin under the influence of the ferment emulsin:

Amygdalin.		Water.		Hydride of Benzoyl.		Prussic Acid.		Glucose.
$C_{20}H_{27}NO_{11}$	+	$2H_2O$	=	C_7H_6O	+	HCN	+	$2C_6H_{12}O_6$

It is a colorless, limpid oil, smelling of bitter almonds. When freed from prussic acid it is not poisonous. It oxidizes to benzoic acid, $C_7H_6O_2$. It is regarded as the aldehyde of the benzoic group. It is also produced by the action of manganese dioxide and sulphuric acid on albumen, fibrine, caseine, and gelatine. It has been used to a considerable extent for flavoring confectionery and for scenting soap. For the former purpose the prussic acid which it usually contains makes it dangerous. For the latter purpose it has been entirely superseded by the much cheaper nitrobenzol or essence of mirbane ($C_6H_5NO_2$), also called artificial oil of bitter almonds, which possesses the same odor.

Al'moner [Fr. *aumônier;* Lat. *eleemosyna'rius*], an officer whose duty is to distribute alms for a king or other person of rank, or for a monastery. The grand almoner of France was a functionary of high rank, and usually a cardinal. This office was abolished during the Revolution. In England there is a lord high almoner, who distributes the bounty of the queen twice a year.

Al'mont, a post-township of Lapeer co., Mich. P. 2298.

Al'monte, a village of Lanark co., Ontario, on the Brockville and Ottawa R. R., 6 miles N. of Carlton Place. It has one weekly newspaper, and large manufactures of woollen goods. Pop. about 2500.

Almon'te (DON JUAN NEPOMUCENO), a Mexican general and statesman, born in 1804 of Indian descent, was attached to the embassy in London in 1824 and 1832, minister of war under Bustamente, and in 1841 minister plenipotentiary. He distinguished himself in the war against the U. S., was sent to Washington in 1853, and in 1857 to Paris. He went to Mexico with the French expedition in 1862, and was declared president in Juarez's place, but was not able to gain recognition. He entered the capital with the French army June 10, 1863, and was made president of the government junta. Died Mar. 22, 1869, in Paris.

Almo'ra, or **Almo'rah,** a town and important fortress of Northern Hindostan, is situated among the Himalayas, 85 miles N. of Bareilly, and at a height of 5337 feet above the sea.

Al'moravides [a corruption of the Arabic *Almorabitun,* signifying those "bound" or "devoted" to the service of God], the name of a Moslem or Arabian dynasty that reigned in Northern Africa and Spain. It was founded by Adballah-Ibn-Yaseen about 1050, and continued to reign until 1145, when the last Almoravide sultan was conquered by the Almohades.

Alm'quist (KARL JONAS LUDWIG), a Swedish poet and prose writer, born in 1793. He published histories, works on grammar, romances, epic poems, etc. Among his works are "Amorina," a romance, and a collection of poems entitled "Book of Thorn Roses" (*i. e.* "Sweet Briars"). Died Oct. 26, 1866.

Alms'houses, institutions for the reception and support of indigent and sick persons who are unable to maintain themselves. Almshouses (officially called "workhouses" in England and "poorhouses" in Scotland) have been long maintained in the latter country, in a few of the larger towns, at the public expense, but there was no general statutory provision to that effect until 1845. In England public provision was made for the poor in 1535, houses for their reception were established by statute in 1563, and the employment of the poor in compulsory labor was inaugurated in 1601. Workhouses in London were established in the reign of William and Mary, and the workhouse system has been since extended by numerous statutes. A similar system was introduced into Ireland in 1838. All paupers who are able to earn their subsistence are compelled to do so. On the continent of Europe outdoor relief is much more frequent, the helpless and homeless poor being cared for in the hospitals. In most of the U. S., almshouses are maintained by county or municipal authorities. In Massachusetts, almshouses, with farms attached, are maintained in nearly all the towns, though some of the smaller towns board their paupers in private families. The "State paupers" of Massachusetts, chiefly of foreign birth, who have no legal residence in any town, are maintained in the State almshouses, of which that at Tewksbury is the principal. Among the other celebrated institutions of this character may be mentioned that on Blackwell's Island, N. Y., that on Deer Island, near Boston, and the Philadelphia county almshouse, West Philadelphia, Pa. (See PAUPERISM.)

Al'mug Tree, a name found in the Old Testament, is supposed to denote a species of sandal-wood.

Almuñecar', a seaport-town of Spain, in the province of Granada, and on the Mediterranean, 33 miles S. of Granada. It exports fruits and other articles. Pop. about 6000.

Al'my (JOHN J.), born in Rhode Island April 25, 1814, became in 1829 a midshipman in the U. S. navy, a lieutenant in 1841, served in the Mexican war and in the Nicaragua and Paraguay expeditions, became a commander in 1861, a captain in 1865, and a commodore in 1869. During the civil war he was an officer of the blockading squadron, and subsequently chief signal-officer of the navy.

Al′my (William), an American philanthropist, born Feb. 17, 1761, was a member of the Society of Friends. He lived at Providence, R. I., and amassed a large fortune in the cotton manufacture. He endowed a large boarding-school at Providence. Died Feb. 5, 1836.

Al′na, a post-township of Lincoln co., Me. Pop. 747.

Aln′wick, a market-town of England, in the county of Northumberland, on the river Alne, 32 miles N. of Newcastle. It is well built of stone, and has a town-hall, a theatre, a mechanics' institute, etc. Pop. in 1871, 7055.

Alnwick Castle, the seat of the duke of Northumberland, adjoining the above town, is one of the most magnificent baronial castles in England. It is supposed to be 1200 years old or more, and has belonged to the Percy family since the reign of Edward II. In 1830 it was repaired at a cost of £200,000. Malcolm III., king of Scotland, while besieging this castle in 1093, was killed, with his eldest son, by the earl of Northumberland. William the Lion of Scotland, having laid siege to it in 1174, was defeated and made prisoner.

Al′oë, a genus of endogenous plants of the order Liliaceæ, natives of Africa and other warm regions, and chiefly valuable for their medicinal properties. The drug called aloes is obtained from several species, among which the *Aloe Socotrina,* found in the island of Socotra, affords the best quality. (See Aloes.)

Aloe, American. See Agave.

Al′oes, a stimulating, purgative drug having a bitter taste, is the inspissated juice or extract obtained from the leaves of several species of the aloe. It is imported from Bombay, Socotra, the Cape of Good Hope, the West Indies, etc. "Cape aloes" is obtained from the *Al′oe spica′ta;* "Socotrine aloes," from the *Al′oe Socotri′na;* and "Barbadoes aloes," from the *Al′oe vulga′ris.* Aloes is much used combined with other cathartics; from its stimulating effect upon the lower bowel it is unsuitable for those suffering from piles. Heated with nitric acid, aloes yields chrysammic acid. (See Wood and Bache's "Dispensatory.")

Aloes Wood, called also **Agila** or **Eagle Wood,** is the inner part of the trunk of the *Aquila′ria ova′ta* and the *Aquila′ria agal′lochum,* trees which are natives of tropical Asia. It is supposed to be the lign-aloes of the Bible. Aloes wood contains a fragrant resinous substance, which emits a pleasant odor when burned, and is highly prized as a medicine by the Orientals.

Al′ogi, a sect of religionists opposed to the Montanists, was formed about 160 A. D. They were styled Alogi, a name of double meaning, signifying their rejection of writings in which the Logos is mentioned, and also that they were without reason.

Aloï′adæ (*i. e.* "sons of Aloeus"), in Greek mythology, Otus and Ephialtes, two giants of extraordinary strength who attempted to storm Olympus, and were condemned to suffer in Tartarus.

Alom′pra, the founder of the reigning dynasty of Burmah, was born about 1700. He revolted against the king of Pegu in 1753, was victorious in several battles, and became master of Burmah, in which he founded Rangoon. Died May 15, 1760.

Alopecia. See Baldness.

Alo′ra, a city of Spain, in the province of Málaga, 17 miles N. W. of Málaga. Soap and oil are manufactured here. Pop. 6818.

Alosa. See Shad.

A′lost, or **Aalst,** an ancient walled town of Belgium, in East Flanders, on the navigable river Dender, 18 miles by rail W. N. W. of Brussels. It contains the church of St.-Martin, one of the largest and finest in Belgium, a town-hall, a college, and an academy of design. Here are cotton-mills, copper-foundries, distilleries, and manufactures of lace, leather, etc. Alost has an active trade, and exports hops, corn, and oil. It was formerly the capital of Austrian or imperial Flanders. Pop. in 1866, 18,978.

Aloysius (Saint) of Gonzaga. See Gonzaga.

Alpa′ca (the *Auche′nia pa′co,* supposed by several zoologists to be only a domesticated variety of the *guana′co*), a ruminant animal nearly allied to the lama, and belonging to the family Camelidæ, is a native of the mountains of Peru and Chili. It is rather smaller than the lama, and has a long neck, which it carries erect. Flocks of domesticated alpacas are kept by the Peruvians, who export great quantities of their wool. This wool, which varies in color,

Alpaca.

is remarkable for its length, fineness, silken texture, and a lustre almost metallic. It is longer and straighter than that of sheep. The most extensive manufactures of alpaca cloth are in England, which imports annually about 3,000,000 pounds of this wool. It first became an article of commerce in England in 1829. The alpaca has also been introduced into Australia, whence the wool was first obtained in 1859. A great part, however, of the so-called alpaca goods of commerce are made of the wool of the Cotswold, Leicester, and other long-wooled breeds of sheep.

Alp-Arslân′ (*i. e.* "strong lion"), written also **Alp-Arselan,** a famous Persian sultan of the Seljookide dynasty, was born in Turkistan in 1030. He ascended the throne in 1063, and embraced Islamism. Under the direction of his wise vizier, Nizâm-ul-Mulk, Persia enjoyed great prosperity, many colleges were founded, and learning was promoted. In 1071, Alp-Arslân defeated and took prisoner Romanus Diogenes, emperor of Constantinople, whom he treated generously. He was assassinated in Dec., 1072.

Alpe′na, a county in the N. E. of Michigan, bordering on Lake Huron, has an area of about 700 square miles. It is drained by the Thunder Bay River, and is heavily timbered. Oats, barley, potatoes, and lumber are produced. Capital, Alpena. Pop. 2756.

Alpena, a city, the capital of Alpena co., Mich., at the head of Thunder Bay. It manufactures 125,000,000 feet of lumber yearly, contains a large hemlock-extract factory, two weekly papers, an excellent harbor, and is situated about 210 miles N. by W. from Detroit on Lake Huron. Pop. of township, 2612.

A. C. Tefft, Ed. of "Alpena County Pioneer."

Alpes, Basses. See Basses-Alpes.

Alpes, Hautes. See Hautes-Alpes.

Alpes-Maritimes, a department forming the S. E. extremity of France, bordering on Italy. It is bounded on the N. and E. by Italy, on the S. by the Mediterranean Sea, and on the W. by Var and Basses-Alpes. Area, 1518 square miles. It is drained by the river Var. The surface is diversified by mountains and fertile valleys. This department includes the county of Nice, which was ceded by Italy to France in 1860; also the arrondissement of Grasse, detached from the department of Var. It is partly covered with forests of valuable timber. Among its staple products are grapes, olives, oranges, lemons, figs, and silk. The chief towns are Grasse, Antibes, Cannes, and Nice, which is the capital. It is divided into 3 arrondissements, 25 cantons, and 146 communes. Pop. in 1872, 199,037.

Al′pha and **Ome′ga,** the names of the first and last letters of the Greek alphabet, Α, Ω. These words occur in the book of Revelation as a title of the Lord Jesus Christ. The two letters were used by the early Christians as symbols of faith, and were sometimes marked on coins, tombs, ornaments, etc.

Al′phabet, a word formed of the first two Greek letters (α, β, *alpha, beta*), and used to denote the entire series of letters (arranged in a certain order fixed by custom)

with which any language is written. Nearly all the modern European tongues, deriving their letters, for the most part, from the ancient Romans, have, with slight exceptions, the same characters (though pronounced differently), arranged in precisely the same order as the Roman (or Latin) alphabet. The *ä* (*ae*), *ö* (*oe*), and *ü* (*ue*), occurring in the German, Danish (or Norwegian), Swedish, and Hungarian, but not found in the other languages, are to be considered as diphthongs, or at least as compound characters, rather than single letters. *W* is not found in the Italian, Spanish, or Portuguese alphabet, nor in French, except in words or names of foreign origin. *K* is scarcely used in French, Spanish, or Portuguese, except in a few words of foreign derivation. The Italians discard not only *w* and *k*, but also *x* and *y*. The ancient Romans used *k* and *y* in a very few words, but *w* was entirely unknown to them. It was originally written *vv*, whence the English name of the letter, *u* and *v*, like *i* and *j*, having formerly been equivalent to each other.

The order of the letters is the same in the alphabets of most of the European languages; in the Greek, however, the letters, though nearly corresponding in power, and often similar in form, to those of the Roman alphabet, are arranged very differently, *g* (γ) being the third and *z* (ζ) the sixth in the order of the letters; and *x* (ξ), instead of being almost at the end, as in our alphabet, is near the middle, not to mention other differences. In Russian, Hebrew, Arabic, and Sanscrit the order of the alphabet varies still more from the Roman, while many of the letters differ not only in form, but in power, from those of the languages of Western Europe.

Not only the origin of letters, but also the successive steps or stages by which they were brought to their present perfection, is involved in great obscurity. According to a commonly-received theory, all writing was in the first instance *ideographic* (from the Gr. εἰδέα, an "image," and γράφω, to "write" or "paint"), that is, representing images or scenes directly to the eye (and hence called picture-writing), instead of being *phonetic, i. e.* representing sounds or words which are merely the signs of ideas. Picture-writing, which even a few years since prevailed very extensively among our aboriginal tribes, was doubtless one of the earliest arts known to the human race. To convey, for example, the idea that one man had killed another, they would represent the figure of a dead man stretched upon the ground, and another man standing by erect, with some deadly weapon in his hand. Since, however, this kind of writing would only be adapted to represent images or scenes, and not thoughts, as mankind advanced in culture and required a more perfect instrument for communicating their ideas, phonetic writing, representing sounds by means of signs (which we term letters), was at length invented. But between the primeval ideographic writing and the fully-developed phonetic method there was, we have every reason to believe, an intermediate stage—namely, symbolic writing. Thus, the ancient Egyptians represented, it is said, a siege by a scaling-ladder, a battle by two hands holding a bow and shield, etc. In the progressive steps towards a perfect system of writing by phonetic signs, it seems probable that those signs were at first used to represent entire syllables. But such a system would obviously require many different characters, rendering it extremely complicated and difficult to learn. To obviate this difficulty, signs were at last employed to represent the simple elementary sounds produced by the human voice.

There is reason to believe that the forms of the letters were first suggested by some animal or object whose name had as its initial sound that which was to be represented by the letter. Thus, in Hebrew, the word *âleph*, an "ox," has for its initial syllable the sound of the first letter, and this letter was originally represented by the mere outline of the head of an ox; so also *bêth*, a "house," having *b* for its initial sound, that letter was formed after a rude picture, in outline, of a house; and so on. (For a presentation of the most remarkable alphabets, see the notices of the various languages under their respective heads, as ARABIC, GREEK, HEBREW, etc., etc.) J. THOMAS.

Alphæ'us (in John xix. 25 called **Clopas**), the father of the apostle James the Less, and also possibly of Jude.

Alpharet'ta, a small post-village, the capital of Milton co., Ga., about 100 miles N. W. of Milledgeville. Pop. 126.

Al'phen, van (HIERONYMUS), a popular Dutch poet and jurist, born at Gouda in 1746. He became treasurer-general of the United Provinces. He produced, besides other works, "Poems and Meditations" (1777), "Short Poems for Children" (1781), which are highly commended, and an admired imaginative poem on "The Starry Heavens" ("De Starrenhemel," 1783). Died in 1803.

Alphe'us, or **Alphei'us** [Gr. Ἀλφειός], the modern Rouphia, a celebrated river of Greece, in the Morea. It rises in Arcadia, flows westward by Olympia, and enters the Mediterranean after a course of about 100 miles. Flowing through a formation of cavernous limestone, it sometimes sinks and is lost in a subterranean channel.

Alpheus, in classic mythology, a river-god and a son of Oceanus. According to the poetical legend, he loved the nymph Arethusa, who fled from him to the island of Ortygia, and was transformed into a fountain. Alpheus pursued her under the sea and was united to the fountain.

Al'pine, a county of the E. part of California, bordering on Nevada. Area, estimated at 1000 square miles. It is drained by the Carson River, by the North Fork of the Mokelumne, and by the North Fork of the Stanislaus River. The surface is mountainous, the county being traversed by the great Sierra Nevada. It contains rich mines of silver. It was formed in 1864. Cattle, grain, and wool are produced. Capital, Silver Mountain. Pop. 685.

Alpine, a post-township of Clarke co., Ark. Pop. 828.

Alpine, a post-township of Kent co., Mich. Pop. 1445.

Alpine Club, a society for the promotion of Alpine discovery, was formed in England in 1858. Three members of this club, Mr. Hudson, Lord Francis Douglas, and Mr. Haddo, perished with their guide in the descent of the Matterhorn in July, 1865. Other Alpine clubs were formed in Austria, Switzerland, Italy, and Germany. In 1873 an American Alpine club was formed.

Alpine Plants are those plants, usually of a somewhat arctic character, which are found in elevations approaching perpetual snow in the Alps and in other regions in different parts of the world. On the Andes, near the equator, at an elevation of from 12,000 to 15,000 feet above the sea, many kinds of plants are found resembling in their general appearance those which occur in Switzerland at an elevation of 6000 feet; and these, again, resemble, or are even identical with, the species which in Lapland grow upon hills of very little elevation, or which are found at the level of the sea. Similar plants occur also in all lofty mountain-ranges at elevations varying greatly within narrow geographical limits. When the alpine plants of Central Europe are spoken of, those are meant which grow at an average height of 6000 feet, marking what, in the language of science, is called a *zone*. This on the Riesengebirge falls as low as 4000 feet, and rises in the Southern Alps and Pyrenees to 9000 feet, and even higher. Although rich in forms peculiarly its own, this zone contains many plants which are likewise found on much lower hills. But the number of these diminishes as the elevation increases. Hence the spaces clear of snow in the highest regions possess a characteristic flora, the plants of which are distinguished by a diminutive habit, and an inclination to form a thick turf, frequently also by a covering of wool, whilst their stems are often partly or altogether woody, and their flowers are in many instances remarkably large, of brilliant colors, and very odoriferous. In the Alps, gentians, saxifrages, rhododendrons, and various species of primrose abound. With the phanærogamous plants are associated a number of delicate ferns and exceedingly beautiful mosses. Many alpine plants are limited to a very small district.

Alpi'nus, or **Alpin** (PROSPER), M. D. [It. *Pros'pero Alpi'ni*], a celebrated Italian botanist, born at Marostica, in the Venetian state, Nov. 23, 1553. Having passed several years in Egypt, he published in Latin a work "On the Plants of Egypt" (1591), and obtained a chair of botany at Padua in 1593. He made important contributions to the science of botany. Among his works is one "On Exotic Plants." Died Feb. 5, 1617.

Alp'nach, or **Alp'nacht,** a Swiss village in the canton of Unterwalden, at the foot of Mount Pilatus, 8 miles S. S. W. of Lucerne. Here was the famous *slide of Alpnach*, a wooden trough or railway on which timber was moved down with great velocity from a height of 2500 feet. Pop. in 1870, 1630.

Alps [Lat. *Al'pes;* Fr. *Alpes;* Ger. *Al'pen;* etymology uncertain], the most remarkable system of mountains in Europe in regard to both extent and elevation, may be said to extend from the Mediterranean between Marseilles and Nice irregularly eastward to near 18° E. lon. and 45° 30′ N. lat. They form a crescent-shaped chain, and stretching across the country cover a part of France, the greater part of Switzerland, and a considerable portion of Northern Italy and Austria. They culminate in Mont Blanc, and form the watershed or dividing line between the rivers that flow into the Mediterranean and those which discharge their waters into the German Ocean and Black Sea. Several important rivers of Europe take their rise in Alpine valleys; the largest are the Rhine, Rhone, and Danube. This system of mountains is included between the parallels of 44° and 48° N. lat. and 6° 40′ and 18° E.

lon., and covers an area of about 95,700 square miles. It is estimated that the Alps, with their various windings, have an extent from W. to E. of about 700 miles, and a breadth varying from 50 to 200 miles. The bases of the northern and the southern sides are encircled by an extensive series of lakes, those on the former side being from 1200 to 2000, and those on the latter from 600 to 700 feet above the level of the sea, while in the interior some are found at an elevation of 6000 feet. The different ranges have an average elevation of above 7700 feet, from which altitude over 400 peaks rise into the limits of perpetual snow. From these snowy heights descend, under various forms, the destructive avalanches. In the numerous valleys of these lofty regions are collected the immense quantities of snow which form the long streams of ice called glaciers. (See GLACIERS, by J. BALL, F. R. S.) The Alps are generally divided into three parts, which are distinguished as the East, the West, and the Middle Alps. I. WEST ALPS.—The principal ranges included within these are: 1. The Maritime Alps, commencing not far from Genoa, extend westerly along the coast of the Mediterranean to near Barcelonette in France, and attain in their highest part an elevation of nearly 10,000 feet. 2. The Cottian Alps, culminating in Monte Viso, 12,600 feet high. 3. The Graian Alps, forming the boundary between Savoy and Piedmont, and rising in Mont Iseran to an elevation of 13,272 feet, and in Mont Cenis to 11,785 feet. II. MIDDLE ALPS, *Central Chain.*—1. The Pennine Alps, between the plains of Lombardy and the valley of the Rhône. Their most lofty peaks are—Mont Blanc, 15,784 feet high, and Grand Cervin, 14,815 feet high. 2. The Helvetian Alps, extending from the pass of the Simplon along St. Gothard (10,000 feet) to the pass of Splügen. 3. The Rhætian Alps, between the Inn, the Adda, and the Upper Adige. *Northern Chain.*—1. Bernese Alps, between the Rhône and the Aar. The highest summits are Finsteraarhorn, 14,025 feet, Jungfrau, 13,114 feet, and Schreckhorn, 13,393 feet high. *Southern Chain.*—1. Oertler Alps, between the Adda and the Adige, the highest peak being Oertlerspitze, 12,823 feet high. 2. The Tridentine Alps, between the Adige and the Piave. III. EAST ALPS.—The principal chains of these are: 1. The Noric Alps, highest summit Gross-Glockner, 12,957 feet high. 2. The Carnic Alps. 3. The Julian Alps. 4. The Dinaric Alps. Generally speaking, the Alps are lowest where the system is broadest, and highest where the system is narrowest.

The passes over the Alps are called, in French, *cols.* They are about sixteen in number, and now most of them can safely be travelled over by carriages. One of the most noteworthy is the Great St. Bernard, connecting the valley of the Rhône with Piedmont. It was crossed by Napoleon in 1800. Its highest summit is about 8170 feet. The Little St. Bernard connects Geneva, Savoy, and Piedmont. This is the pass by which some suppose Hannibal to have crossed into Italy. Its highest point is about 7190 feet above the level of the sea, and is now but little used. The Splügen Pass, connecting the sources of the Rhine with the Adda, was used by the Romans in their intercourse with the countries bordering on the Danube and the Rhine, by the Germans in the Middle Ages, as well as by modern tourists. In some places bridges, terraces, and long galleries are constructed of stone to afford protection against the avalanche and whirlwinds. The latter are not only destructive in themselves, but frequently set the former in motion. The Alps, with the exception of Switzerland, are rich in minerals, and offer one of the finest fields in the world for the geologist. It has been shown that the highest central mass, the primary Alps, consists chiefly of the crystalline rocks, gneiss and mica-slate, with a small proportion of granite. Representatives of the carboniferous and Jurassic formation appear among the Central Alps. In the Pennine, Graian, and Rhætian Alps are found large masses of serpentine. Quartz-porphyry is found in the N. of Piedmont and in the upper valley of the Adige; and in the E. of Piedmont, on the N. and S. sides of the chief range, extensive deposits of clay-slate and grauwacke, mixed with transition limestone, occur. Precious stones are found in considerable numbers. Among these is the well-known rock-crystal of St. Gothard. Most of the mining and smelting is done in the eastern part of the Alps; gold and silver are found in Tyrol, Salzburg, and Carinthia; copper exists in the French Alps, in Tyrol, and in Styria. The amount of iron and lead extracted from the mines of Carinthia and Styria is about 745,000 hundredweight per annum. Large quantities of quicksilver are extracted from the mines in Carniola. Salt exists in almost every part. Coal is found in abundance in Switzerland and Savoy, and hot springs are numerous. Many animals inhabit the Alps. Among them are the chamois, the ibex, marmots, wolves, bears, lynxes, wild-cats, and various species of birds. Of the domestic animals, goats and oxen abound, but horses, sheep, dogs, etc. are found in small numbers. Fish are found in some of the lakes at an elevation of 6000 feet. The inhabitants of the Alps are industrious and simple-hearted, but the spirit and manners of the neighboring plains have penetrated the larger valleys; the true Alpine life has passed away, and the simplicity and characteristic industry of the Alpine farms are now preserved only in the higher valleys. REVISED BY A. GUYOT.

Alpujar'ras, a mountain region or range of Spain, in Granada, between the Sierra Nevada and the Mediterranean. The direction of the range is nearly parallel to the sea-coast. The highest peaks rise to the altitude of about 7000 feet. Rich pastures abound on the slopes and in the valleys of the northern side of the range.

Alrau'nen, or **Alru'næ,** a name given by the ancient Germans to certain prophetic women who were employed in sacrificing victims, and were supposed to have magical or supernatural skill. Also applied to small images carved out of mandrake roots, and exhibiting a rude imitation of the human form. These were venerated or superstitiously prized by the Germans and other northern nations.

Alsace and **Alsace-Lorraine.** See ELSASS and ELSASS-LOTHRINGEN.

Alsace, a post-township of Berks co., Pa. Pop. 1294.

Alsa'tia, a name formerly given to Whitefriars, London, which was used as a sanctuary by criminals in the early part of the seventeenth century. This privilege was abolished by an act passed in 1697. (See WHITEFRIARS.)

Alsatia. See ELSASS and ELSASS-LOTHRINGEN.

Al Se'gno, in music, a notice to a performer that he must return and commence again that part of the movement to which the sign 𝄋 is prefixed.

Al'sen, an island belonging to the Prussian province of Sleswick-Holstein, in the Baltic, near the coast of Sleswick, is 18 miles long, and has an area of 106 square miles. It is remarkable for its picturesque and beautiful scenery, is very fertile, and produces excellent apples. Christian II. of Denmark, who was deposed in 1523, was imprisoned here for nearly seventeen years. Pop. in 1860, 23,188.

Al Sirat' (literally, the "road" or "passage"), a bridge as narrow as the edge of a razor, supposed by the Mohammedans to extend from this world over hell to paradise.

Al'sop (CHARLES RICHARD), born in 1802, graduated at Yale in 1821, became a lawyer of Middletown, Conn., was mayor of that city (1843–46), and State senator in 1855, besides holding other responsible positions. Died Mar. 5, 1865.

Alsop (RICHARD), born at Middletown, Conn., Jan. 23, 1761, was versed in Greek, Latin, French, and other languages. In conjunction with Theodore Dwight and others, he edited the "Echo," a satirical publication, the first number of which was issued at Hartford in 1791. He published a "Monody on the Death of Washington" (1800), and translated from the Spanish Molina's "Natural and Civil History of Chili." Died Aug. 21, 1815.

Al'stead, a post-township of Cheshire co., N. H., has five churches, and manufactures of paper, edge tools, lumber, etc. Pop. 1213.

Al'ston (JOHN), celebrated as the introducer of an improved system of printing books for the blind with embossed or raised Roman capital letters, was a merchant of Glasgow, Scotland, who died in 1846. He was long a director of an asylum for the blind in that city.

Alston (WILLIS), a native of North Carolina, represented a district of that State in Congress from 1803 to 1815, and from 1825 to 1831. He was chairman of the committee of ways and means during the war of 1812–14. Died April 10, 1837.—His father, WILLIS ALSTON, was a member of Congress 1799–1803.

Alstrœme'ria, or **Al'strœmer's Lily,** a genus of plants of the order Amaryllidaceæ, natives of Peru and Chili. Several species of this genus have beautiful flowers, and are cultivated in gardens. The tubers of the *Alstrœmeria Salsilla* are cultivated for food in the West Indies.

Al'strömer, or **Alstrœmer** (KLAUDIUS or KLAS), a Swedish naturalist, was born at Alingsås Aug. 9, 1736. He was a pupil of Linnæus, who named in his honor a genus of plants, Alstrœmeria. He travelled in Spain and other countries, and published a "Discourse on the Breeding of Fine-woolled Sheep" (1770). Died Mar. 5, 1796.

Alt, in music, a term applied to the high notes of the scale.

Alt, or **Al'ten,** a German word signifying "old," forms the prefix of numerous names in Central Europe, as "Alt-Ofen" ("Old Ofen").

Altai', or **Al'ta Yeen Ooo'la** (*i. e.* "the golden mountain"), the name of a system or range of mountains

of Central Asia, near the S. border of Siberia. They extend from the sources of the Irtish to Lake Baikal. One range, called the Little Altai, forms the boundary between Siberia and Chinese Tartary. According to some authorities, the Altai proper extends from 84° to 100° E. lon., and lies between 48° and 54° N. lat. The Obi and other large rivers rise in the Altai Mountains, and flow northward. On the west the range terminates in the Katoonsk or Katoonya mountains, a small isolated group, in which Mount Bielookha or Beluka rises to the height of 11,063 feet. Their flanks in many places are covered with magnificent forests of cedar. A large portion of this system of mountains is covered with perpetual snow. Rich mines of gold, silver, and copper have been opened in them. Porphyry and several kinds of precious stones are also found.

Altamaha′, a river of Georgia, formed by the union of the Oconee and Ocmulgee in the central part of the State. Flowing south-eastward through sandy plains, it enters the Atlantic 12 miles below Darien, after a course of about 140 miles. It is navigable for vessels of thirty tons.

Al′tamont, a post-township of Alleghany co., Md. Pop. 1133.

Altamont, a post-village, capital of Grundy co., Tenn., about 120 miles S. W. of Knoxville.

Altamu′ra, a handsome town of Southern Italy, in the province of Bari, at the foot of the Apennines, 33 miles S. W. of Bari. It is defended by a castle, and has a fine cathedral. It was formerly the seat of a university. Here is the site of the ancient *Lupatia.* Pop. in 1861, 17,198.

Al′tar [Lat. *alta′re*], a table or elevated place on which the ancient Jews and pagans offered sacrifices. The first altar mentioned in history was built by Noah immediately after the Flood. Altars were sometimes erected as memorials of some great event by the religious personages of sacred history. The ancient Greeks and Romans used a great number of altars, each of which was dedicated to some particular deity. They were constructed of different materials and in various forms. The name is also applied to a part of the furniture of Christian churches. The altar of Episcopalian churches is the communion-table. In the Prayer Book of Edward VI. (1549), the word altar was retained in the communion service, but "table" was substituted a few years later for the word altar. The Lutheran Church retains the altar.

Alt′dorf, or **Al′torf,** a town of Bavaria, on the river Schwarzbach, 13 miles E. S. E. of Nuremberg, had a university from 1623 to 1809. Pop. in 1867, 3317.

Altdorf (Switzerland). See ALTORF.

Alt′dorfer (ALBRECHT), an eminent German painter and engraver, a pupil of Albert Dürer, born at Altdorf, in Bavaria, in 1488. He is called by the French "Le Petit Albert" (in allusion, doubtless, to the great Albert Dürer). His works are characterized by a romantic spirit. A painting of the victory of Alexander over Darius is called his masterpiece. He left many engravings on copper and on wood. Died in 1538.

Alte′a, a seaport-town of Spain, in the province of Alicante, on the Mediterranean, 38 miles N. E. of Alicante. Pop. 5193.

Al′tena, a town of Prussia, in Westphalia, on the Lenne, 18 miles S. E. of Dortmund. It has manufactures of iron and steel. Pop. in 1871, 7122.

Altenburg, Saxe, German duchy of. See SAXE-ALTENBURG.

Al′tenburg, a walled town of Germany, capital of Saxe-Altenburg, is 24 miles by rail S. S. E. of Leipsic. It is the seat of the higher courts, and contains seven churches, one theatre, and several hospitals. Linen goods, brandy, porcelain, and optical instruments are made here. Pop. in 1871, 19,966.

Altenes′sen, a town of Prussia, in the Rhine province, has some iron-works. Pop. in 1871, 10,099.

Al′tengaard′, a seaport-town of Norway, capital of the province of Finmark, on the Alten, at the head of a fiord, 53 miles S. S. W. of Hammerfest. It is often visited by Russian vessels.

Al′ten-Oet′ting, or **Alt′ötting,** a small town of Bavaria, near the river Inn, 42 miles S. W. of Passau. It is visited by great numbers of Roman Catholic pilgrims, who are attracted thither by an image of the Virgin Mary, called the "Black Virgin." Several German emperors held their court here in the Middle Ages. Pop. in 1867, 2408.

Al′tenstein, a castle in Saxe-Meiningen, Germany, near the watering-place Liebenstein. Near this castle is the beech tree where Luther was captured and taken to the Wartburg on May 4, 1521.

Alt′enstein, von (KARL), BARON, a Prussian minister of state, born at Anspach Oct. 7, 1770. In 1815, he rendered important services to Germany by the recovery of works of art and literature which the French had removed to Paris. He was appointed minister of public instruction and worship in 1817, and held that office for many years. Died May 14, 1840.

Al′teratives [from the Lat. *al′tero, altera′tum,* to "change"], a term applied to medicines which are often irritant or poisonous in full doses, but which almost imperceptibly alter disordered secretions, acting specially on certain glands, or upon absorption in general, when given repeatedly in small doses. Thus, mercury is an irritant capable of producing salivation and other distressing symptoms; but if small doses are given at intervals, they produce alteration in disordered actions, which may result in an improvement in the nutrient functions, and they may effect these changes without otherwise affecting the constitution or inducing salivation. So iodine, also an irritant in large doses, and poisonous in some forms, is most useful, when given in proper doses, in correcting a scrofulous condition, promoting the absorption of tumors, etc. Preparations of arsenic are powerful alteratives in some cases of skin-disease. So also are the decoctions of certain plants, which, taken in large quantities of water, operate partly by their solvent properties, and partly by their stimulant effect on the organs of the body. Properly speaking, any medicine is an alterative which, when given either in large or small quantities, has the power of gradually correcting or modifying a diseased condition. The term "alterative" is less used than formerly, and physicians differ as to the propriety of using drugs of this class.

Al′ter E′go ("my other self"), a term used in the former kingdom of Naples to signify the king's deputy, who was authorized to perform the functions of royalty during the compulsory absence of the king.

Alter′nate [Lat. *alterna′tus,* from *alter′no, alterna′tum,* to "interchange"] **Generation,** in biology, is that modification of generation in which the young do not resemble the parent, but the grandparent, or even some more remote ancestor, so that the successive series of individuals seem to represent two or more different species alternately reproduced. The salpa, a floating gelatinous molluscoid animal, is an example; it may be found as a solitary individual, pregnant with numerous minute salpæ of a more simple structure, which continue after birth to be united together in the form of a long chain floating on the sea. In each individual of this chain there is generally developed an egg from which is hatched a solitary salpa, of the form and organization of its grandparent (*i. e.* the parent of the chain of aggregate salpæ); thus the species is represented by an alternation of simple and aggregate salpæ. (See PARTHENOGENESIS and CESTOID WORMS.)

Althæ′a [Gr. *ἀλθαία,* from *ἄλθω,* to "heal"], a genus of plants of the natural order Malvaceæ, natives of Europe and naturalized in the U. S. It includes the hollyhock (*Althæ′a ro′sea*) and marshmallow (*Althæ′a officina′lis*), which is used in medicine as a demulcent or emollient. Althæa, or shrubby althæa, is also a common name of the *Hibis′cus Syri′acus.*

Althen (EHAN or JEAN), a Persian who gained distinction by introducing madder into France, was born in 1711. He was taken captive by the Arabs in his youth, and sold as a slave in Smyrna, whence he escaped to France with some seeds of madder. He made successful experiments in the cultivation of that plant, which was afterwards extensively cultivated and became very profitable. Died in 1774.

Althorp, LORD. See SPENCER.

Altin′ Nor, or **Altyn′ Nor** (*i. e.* "sea of gold"), or **Teletskoi,** a lake of Siberia, in the S. part, is about 320 miles S. of Tomsk, and is traversed by one of the headstreams of the Obi. It is about 48 miles long and 8 miles in average width.

Al′titude [Lat. *altitu′do,* from *al′tus,* "high"], a scientific synonym for height. In astronomy, it signifies the height of a star or other body above the horizon—that is, the angle of elevation of a celestial body. This altitude is expressed in degrees, the greatest possible altitude being 90 degrees. It is measured in observatories by means of a telescope attached to a graduated circle, which is fixed vertically. The altitude of a triangle is measured by a straight line drawn from the vertex perpendicular to the base; that of a cone by a straight line drawn from the vertex perpendicular to the plane of the base.

Alt′mühl, a river of Bavaria, rises near the village of Hornau, flows S. E. and E. and enters the Danube at Kelheim, after a course of 100 miles. The Ludwigs Canal connects this river with the Regnitz, and opens communication between the Danube and the Rhine.

Al'to, a township of Lee co., Ill. Pop. 832.

Alto, a township of Fond du Lac co., Wis. Pop. 1448.

Al'to, in music, the counter-tenor part, or that immediately below the treble; the deepest and lowest kind of musical voice in females and boys.

Altomün'ster, a place of pilgrimage in Northern Bavaria, has a nunnery which was founded by the Scotchman Saint Alto in the eighth century. Pop. about 1000.

Al'ton, a city and port of entry in Madison co., Ill., on the Mississippi River, 21 miles above St. Louis and 3 miles above the mouth of the Missouri. It stands on a high limestone bluff. It is connected with Chicago by the Chicago Alton and St. Louis R. R., and its trade is facilitated by the St. Louis Alton and Terre Haute R. R. The city has important manufactures. Large quantities of grain, hay, fruit, stone, and lime are shipped here. It has two national banks and a female seminary. Alton contains a large Roman Catholic cathedral and ten churches. One daily and two weekly papers are issued here. It has an excellent system of public schools, has a large number of factories, foundries, glassworks, etc., and is connected by horse railroad with Upper Alton, 2 miles distant. Upper Alton is the seat of Shurtleff College. Pop. 8665.

L. A. Parks & Co., Pubs. "Alton Telegraph."

Alton, a post-township of Penobscot co., Me. P. 500.

Alton, a township of Waseca co., Minn. Pop. 429.

Alton, a post-village, the capital of Oregon co., Mo., about 150 miles S. S. W. of St. Louis. Pop. 76.

Alton, a post-township of Belknap co., N. H., on the Dover and Winnipiseogee R. R. It has a savings bank and some manufactures. Pop. 1768.

Al'tona, the most populous and important city of the Prussian province of Sleswick-Holstein, is on the right bank of the Elbe, one or two miles below Hamburg. It is connected by railroad with Kiel, and has an extensive trade by the navigation of the Elbe. Many of the merchants of Hamburg reside in Altona, which contains an observatory, a gymnasium, and a library of 12,000 volumes or more. Here are important manufactures of tobacco, soap, chemicals, leather, ropes, etc. Altona is a free port, accessible to large vessels. In 1869, 1185 ocean vessels entered the port. Pop. in 1871, 74,131.

Alto'na, a post-village of Knox co., Ill. Pop. 902.

Altona, a post-township of Clinton co., N. Y. P. 2759.

Alton Bay, N. H., on Lake Winnipiseogee, and at the terminus of the Dover and Winnipiseogee R. R., 96 miles from Boston, is a place of summer resort. It is connected by steamer with Centre Harbor.

Alton-Shee, d' (Edmond), Comte, a French democrat, born in 1810. He promoted the revolution of Feb., 1848, after which he acted with the socialists and radical reformers.

Altoo'na, a growing city in Blair co., Pa., on the Pennsylvania R. R., 237 miles W. of Philadelphia, and 117 E. of Pittsburg, at the E. base of the Alleghany Mountains, which the railroad here crosses. It contains fifteen churches, one national bank, one daily and three weekly newspapers; the principal offices and extensive machine-shops of the Pennsylvania R. R., in which locomotives and cars are manufactured, and in which over 2000 men are employed; large individual car-works, several extensive planing-mills, one large rolling-mill, partly in the city; extensive water-works, costing over $300,000; mechanics' library, containing about 3000 volumes. Pop. 10,610.

E. B. McCrum, Ed. "Altoona Tribune."

Alt'orf, or **Alt'dorf,** a town of Switzerland, the capital of the canton of Uri, is near the S. extremity of the Lake of Lucerne, and at the foot of the Grunberg. Here is an old tower which is said to mark the place where William Tell shot the apple off his son's head. Pop. in 1870, 2724.

Al'to-Rilie'vo (*i. e.* "high relief"), a term used in sculpture to designate the mode of representing objects by figures which stand completely out from the ground, being attached to it only in a few places, and in others worked almost entirely round like single statues. This branch of art was brought to the highest perfection by Phidias in the metopæ of the Parthenon, which are now in the British Museum. Figures which have only a slight projection from the ground are said to be in basso-rilievo (or bas-relief).

Altran'städt, a town of Saxony, at which Charles XII. of Sweden concluded a treaty with Augustus, elector of Saxony, in 1706. A treaty was also signed here in 1714 between the emperor Charles VI. of Germany and Louis XIV. of France.

Al'tringham, a market-town of England, in Cheshire, is on the Cheshire Midland R. R. and on Bowden Downs, 8 miles by rail S. W. of Manchester. It is a very neat town, and has some cotton factories. It is a resort for invalids, because of the salubrity of the air. Pop. 6648.

Alt'stät'ten, a town of Switzerland, in the canton of St. Gall, 8 miles S. E. of St. Gall. Pop. in 1870, 7575.

Altu'ras, a county in the S. part of Idaho, borders on Nevada and Utah. It is intersected by the Lewis or Snake River, and also drained by the Malade River. The surface is generally mountainous. Gold and silver are found in this county in quartz rocks. The silver ore is particularly rich. Wheat, oats, and barley are produced. Capital, Rocky Bar. Pop. 689.

Alturas, a village of Rockland co., N. Y., on the Erie R. R., 28 miles from New York. It has a public park of twelve acres, and is the seat of Alturas Home Institute, an industrial school for young women.

Alt'wasser, a town and watering-place of Prussia, in the province of Silesia. It has iron-foundries, coal-mines, and porcelain-factories. Pop. in 1871, 6985.

Al'udels (plu.), [a word of Arabic origin], pear-shaped glass or earthen vessels used as receivers in the distillation of certain substances, especially mercury and hydrochloric acid. They are generally arranged in the form of a chain on an inclined surface.

Al'um [Lat. *alu'men*]. Common alum is a double salt of great importance, the chemical name of which is "sulphate of alumina and potash." It occurs in colorless octahedral crystals, having a sweet astringent taste. It is a powerful styptic, and is applied sometimes as a mild caustic. Its formula is $KOSO_3 + Al_2O_3 3SO_3 + 24HO$ (or, by the new notation, $K_2Al_2 4SO_4.24H_2O$). Alum is largely manufactured, and is much used in preparing skins, as a mordant in calico-printing, and in glazing paper, and occasionally for the adulteration of bread.

Ammonia alum, $(NH_4)_2 \ldots 24SO_4.24H_2O$, containing ammonium in place of potassium, has of late largely replaced potash alum in the arts, owing to the low cost of the ammonic sulphate prepared from gas liquor. The term alum is now applied to a class of isomorphous double sulphates containing a monad sulphate, a trivalent sulphate, and 24 molecules of water. The monad metals which are known to form alums are potassium, sodium, lithium, cæsium, rubidium, thallium, and silver, and also ammonium, etc.; the trivalent metals aluminium, iron, chromium, manganese. Next to the alums above mentioned, the most common is potassic-chrome alum, $K_2Cr4SO_4 24H_2O$. Ammonio-ferric alum is used in medicine and the arts.

Al'um Bagh, a fort in Oude, about 4 miles from Lucknow, was originally a palace surrounded by a fine garden and a park. During the mutiny of 1857 it was used as a fort by the Sepoys, from whom it was taken by the British under Outram and Havelock. It was afterwards defended with success by Sir James Outram and a garrison of 3500 men against the Sepoys, who attacked it in Jan., 1858. Sir Henry Havelock died here Nov. 25, 1857.

Alu'mina, the oxide of aluminium, is the most abundant of all the earths, and is the principal constituent of clay. In 100 pounds of alumina there are 52.94 of aluminium and 47.06 of oxygen. Its symbol is Al_2O_3. In its common state this earth is a soft white powder, without taste, and in the crystalline form it occurs as sapphire and ruby, two of the hardest and most valuable of the precious stones. An impure alumina, which is found in the islands of the Grecian Archipelago, Asia Minor, and Chester, Mass., is the emery used as a polishing-powder for glass and metals, on account of its hardness. The clay of arable land is mostly produced by the disintegration of felspar, which is a compound of alumina, potash, and silica. Alumina has two properties which render it of great importance in the useful arts: one is that its silicate forms with water a plastic material adapted for pottery; the other is its strong affinity for coloring and extractive matter, by which it is useful as a mordant in printing calico and in dyeing.

Alumin'ium, or **Alu'minum,** a white metal which is the base of alumina, was discovered by Wöhler in 1828. Its symbol is Al; its equivalent is 13.7 (by the new notation, 27.4). Aluminium is ductile, tenacious, and very malleable, and remarkable for its sonorousness and levity. The specific gravity of aluminium when fused is only 2.56, but when it has been hammered or rolled it is 2.67. As this metal is not found in nature in a separate or metallic state, it was formerly very rare, and cost as much as gold, but the price has been reduced to ten dollars a pound or less. It is now obtained from a mineral called cryolite, which is a double fluoride of aluminium and sodium, and is imported in large quantities from Greenland. When this cryolite is mixed with an excess of soda and heated, the metal is readily separated. It is not oxidized by exposure to air

and moisture, and is not tarnished by sulphuretted hydrogen. Fused with copper, it forms useful alloys resembling fine brass, though much more beautiful, and specially adapted for gun-metal.

Alum'nus, plu. **Alumni** (fem. sing. **Alum'na,** plu. **Alumnæ**), a Latin word signifying a "foster-child," is applied in modern times to the graduates of a university or college, in order to express the relation between them and their ALMA MATER (which see). In Germany there were recently institutions called *alumnat*, founded for the gratuitous education of poor boys, who were termed alumni.

Alum Ridge, a township of Floyd co., Va. Pop. 1035.

Alum Root, a name of two species of plants, natives of the U. S., the *Gera'nium macula'tum* and the *Heuche'ra America'na*. Their roots are astringent, and are used in medicine.

Alum Shale, Alum Slate, or **Alum Schist,** consists of clay, combined with much iron pyrites and some bituminous or carbonaceous matter. From it the alum of commerce is obtained by a double decomposition, induced by burning the alum schist slowly until its condition is sufficiently changed, leaching, and then adding sulphate of potash or ammonia to the solution.

Al'unite, or **Alum-stone,** a mineral found in various localities, which was formerly largely used for the preparation of Roman alum. It is a basic sulphate of aluminium and potassium, $K_2Al_64SO_4.6H_2O$.

Alu'nogen, a mineral which has the composition of a simple sulphate of aluminium, $Al_2.3SO_4.18H_2O$.

Alu'ta, called also **Alt,** a rapid river of Transylvania, rises in the Carpathian Mountains, flows southward through Wallachia, and enters the Danube at Nicopolis. Length, 341 miles.

Al'va, or **Al'ba** (FERNANDO ALVAREZ DE TOLEDO), DUKE OF, a celebrated Spanish general, was born of a noble Castilian family in 1508. He entered the army in his youth, and accompanied Charles V. in his campaign against the Turks in 1530. In 1547 he gained a decisive victory over the German Protestants at Mühlberg. In 1555–56, as commander-in-chief of the army of Philip II., he defeated the French and papal forces in Italy. As a general he was inclined to pursue a Fabian policy. He was distinguished for cool determination and remorseless cruelty. In 1567 he was sent by Philip II. to the Netherlands with an army of about 10,000 veterans, to suppress the revolt of the Protestants. He established the "Council of Blood," beheaded Count Egmont after a mockery of a trial, and commenced a reign of terror and sanguinary persecutions of persons suspected of heresy. To defend the country against this bloody despotism, William, prince of Orange, raised an army in 1568, but the duke of Alva avoided a battle, and by delay compelled William to retire from the contest, because he could not pay his troops. Although Alva defeated or outgeneralled the Dutch patriots in war, he utterly failed to subdue or pacify them, and he was recalled in 1573. He boasted that he had put to death 18,000 persons in the Netherlands, besides those killed in battle. In 1580 he invaded and conquered Portugal. Died Jan. 12, 1583. (See PRESCOTT, "Philip II.," vol. ii.; MOTLEY, "History of the Dutch Republic.")

Al'va Planta'tion, a post-township of Aroostook co., Me. Pop. 496.

Alvara'do, a post-village of Washington township, Alameda co., Cal., on Alameda Creek, 6 miles from San Francisco Bay. Salt is here procured for market. P. 315.

Alvara'do, de (PEDRO), a Spanish general and adventurer, born at Badajos, went to America in 1518. He served with distinction under Cortez in the conquest of Mexico, and in 1520 was selected by Cortez to command in the city of Mexico during the absence of his chief, who marched against Narvaez. He conducted a successful expedition against Tehuantepec and Guatemala in 1523, and was appointed governor of Guatemala. After a voyage to Spain, he led an army across the Andes into the province of Quito, which he found already occupied by Pizarro. This chief induced Alvarado to retire by the payment of a large sum of money. Alvarado was killed in a fight with some natives in 1541.

Al'varez (FRANCISCO), a Portuguese priest, born at Coimbra, went to Abyssinia in 1515 in company with the Portuguese ambassador, Duarte Galvam. He passed about six years in that country, which he explored, and returned to Portugal in 1527. An interesting account of his travels was published in 1540, entitled a "True Account of the Country of Prester John." Died about 1540.

Alvarez (Don JOSÉ), an eminent Spanish sculptor, born at Priego, in the province of Córdova, in 1768. He gained a prize in 1799, after which he pursued his studies in Paris. He removed to Rome, where he passed many years, and was intimate with Canova. Among his works are "Orpheus Sleeping," "Antilochus and Memnon," and "Grupo Colosal de Zaragoza," which represents a scene in the defence of Saragossa. He was appointed court-sculptor to Ferdinand VII. Died at Madrid in 1827.

Alvarez (JUAN), a Mexican general, born in 1790. He was a leader of the insurgents who took arms against Santa Anna in the spring of 1854, and drove him from power in Aug., 1855. Alvarez became president of Mexico in October, but he resigned in December of the same year. During the French invasion of 1863–66 he was one of the most determined opponents of Maximilian and his party. Died in 1863.

Al'verson (JAMES LAWRENCE), LL.D., born at Seneca, N. Y., in 1816, graduated at Wesleyan University in 1838, was a successful teacher in the institutions at Elmira, Cazenovia, and Lima, N. Y., and was professor of mathematics in Genesee College (1849–64). Died Sept. 12, 1864.

Al'vinczy, or **Al'vinzy, von** (JOSEPH), BARON, an Austrian general, born in Transylvania Feb. 1, 1735. He served with distinction in the Seven Years' war, and obtained the rank of lieutenant-field-marshal in 1789. In the summer of 1796 he took command of an army of about 55,000 men sent to oppose Bonaparte in Italy. He was defeated at Arcola in Nov., 1796, and at Rivoli in Jan., 1797, soon after which he was superseded in the command. Died Sept. 25, 1810.

Alvi'so, a post-township of Santa Clara co., Cal. Pop. 588.

Al'vord (BENJAMIN), A. M., an American officer, born Aug. 18, 1813, at Rutland, Vt., graduated at West Point 1833, paymaster-general U. S. A. Jan. 1, 1872, and brigadier-general U. S. volunteers April 15, 1862. He served chiefly at frontier posts 1833–54, in Florida war 1835–37 and 1841–42, engaged at Camp Izard, Olaklikaha, Thlonotosassa, and Big Cypress Swamp, as assistant professor at the Military Academy 1837–39, in Cherokee nation 1839–40, adjutant Fourth Infantry 1840, in military occupation of Texas 1845–46, in the war with Mexico 1846–47, engaged at Palo Alto and Resaca de la Palma (brevet captain), Paso Ovejas, National Bridge, Cerro Gordo (Aug. 15), Las Animas (brevet major), and Huamantla, and, upon being transferred from the infantry to the pay department, as chief paymaster of the department of Oregon 1854–62. In the civil war was in command, as brigadier-general of volunteers, of the district of Oregon. Brevet lieutenant-colonel, colonel, and brigadier-general U. S. A. Aug. 9, 1865, for faithful and meritorious services. Since has been paymaster in New York City 1865–67, and chief paymaster of the district of Omaha and Nebraska 1867–72; and is now paymaster-general U. S. A., head-quarters at Washington, D. C. Author of a memoir on the "Tangencies of Circles and of Spheres," 1855, "The Interpolation of Imaginary Roots in Questions of Maxima and Minima," 1860, and of numerous essays and reviews, 1833–73.

GEORGE W. CULLUM, U. S. A.

Alyat'tes [Gr. Ἀλυάττης], a king of Lydia, who ascended the throne about 618 B. C., was the father of Crœsus. During a battle between him and Cyaxares of Media an eclipse of the sun occurred, and made such an impression that they ceased fighting and made a treaty of peace. Some astronomers identify this eclipse with that of 610 B. C. Died about 560 B. C.

Al'zei, an old city of Germany, in the grand duchy of Hesse, on the Selz, 19 miles S. of Mayence. It has a real-schule. Alzei and the vicinity is the scene of the events of the Nibelungenlied. Pop. in 1867, 5102.

Al'zog (JOHANNES BAPTIST), a German Catholic theologian, born at Ohlau, in Silesia, in 1808, became in 1853 professor of ecclesiastical history at Freiburg. His "Manual of Universal Church History" ("Handbuch der Universalkirchengeschichte," 1840; 9th edit. 1872, two vols.) has been translated into the principal European languages.

Amade'us [It. *Amede'o* or *Amade'o*], the name of nine counts and dukes of Savoy, the first of whom was a son of Count Humbert, and lived in the eleventh century. —AMADEUS V., count of Savoy, a son of Count Thomas II., was born in 1249. He succeeded his uncle Philip in 1285, increased his dominions by marriage, and was the first prince of Savoy that made any considerable figure in history. Died in 1323.—AMADEUS VI., of Savoy, was born in 1334, and became count in 1343. He was an able and successful ruler, defeated the French in battle in 1354, and added a part of Piedmont to his dominions. Died in 1383.

Amadeus VIII., duke of Savoy, a grandson of the preceding, was born in 1383, and succeeded his father in 1391. He received the title of duke from the emperor

Sigismund in 1416. In 1434 he resigned his power to his son Louis, and retired to the monastery of Ripaille. Having a high reputation for wisdom, he was chosen pope by the Council of Bâle in 1439, and took the name of Felix V. As Eugenius IV., who had been deposed by that council, was still recognized as pope by a strong party, a schism ensued in the Church. Felix V. resigned the papacy in 1448, and died in 1451.

Amade'us [It. *Amede'o ;* Fr. *Amédée*], king of Spain, a son of Victor Emmanuel, king of Italy, was born May 30, 1845. He received the title of duke of Aosta, and married, in May, 1867, Marie Victoire Charlotte, a daughter of the prince dal Pozzo della Cisterna. On the 16th of Nov., 1870, the Spanish Cortes, by a vote of 191 against 98, elected him king of Spain, the throne of which had been vacant for two years. It had been offered to several foreign princes, who declined. Amadeus accepted it, and arrived at Madrid Jan. 2, 1871. Feb. 11, 1873, he abdicated the throne and the republic was proclaimed.

Am'adis of Gaul, or **Am'adis de Gaul'a,** a celebrated hero of romance, was called a son of the fabulous King Perion of France. The story of his adventures, entitled "Amadis de Gaula," was written by Vasco de Lobeira, a Portuguese, in the twelfth century. This work, which has been translated into several languages, is commonly admitted to be the best of all the romances of chivalry. There were other fictitious heroes of romance, called Amadis of Greece and Amadis of Trebizond.

Amador', a county of the E. central part of California. Area, about 600 square miles. It is bounded on the N. by the Cosumne River, and on the S. and S. E. by the Mokelumne. The surface is hilly or mountainous. This county contains mines of gold and copper, and quarries or beds of marble. Cattle, grain, wool, and wine are produced. Capital, Jackson. Pop. 9582.

Amador, a post-village of Amador co., Cal., on Amador Creek, 6 miles N. W. of Jackson.

Amador, a township of Chisago co., Minn. Pop. 77.

Am'adou ("German tinder"), a name given to several species of fungus called agarics, growing on oak and ash trees in Europe. The hard amadou (*Polyp'orus ignia'rius*) and the soft amadou (*Polyp'orus fomenta'rius*) are used for tinder, and applied to wounds as styptics. Some varieties are prepared for tinder by charging them with saltpetre.

A'mager, a small island of Denmark, adjoining the harbor of Copenhagen, is partly occupied by a suburb of that city. Area, 22 square miles. Here are gardens which supply that capital with vegetables, and a large chemical factory. Pop. 6500.

Am'alek, a grandson of Esau and one of the chieftains of Edom (Gen. xxxvi. 12, 16). A remnant of his posterity existed in the time of Hezekiah (1 Chron. iv. 43).

Amal'ekites, a nomadic and warlike people, occupying, at the time of the Exodus, the Sinaitic peninsula and the wilderness between Egypt and Palestine. Opposing the march of the Israelites, they were signally defeated at Rephidim. Centuries later, they were severely punished by Saul, and finally destroyed by David.

Amal'fi, an ancient and decayed city and seaport of Southern Italy, on the Gulf of Salerno, 25 miles S. E. of Naples. During the several centuries of the Middle Ages it was a great commercial emporium and the capital of a republic. It is the seat of an archbishop. Its situation is rocky and very picturesque. Amalfi was the birthplace of Masaniello and of Flavio Gioja, called the inventor of the mariner's compass. Pop. in 1861, 4186.

Amal'gam [perhaps from the Gr. μάλαγμα, a "poultice"], a combination or alloy of mercury with another metal. Some amalgams are definite chemical compounds. Glass plates are converted into mirrors or looking-glasses by covering one surface with an amalgam of tin. Gold and silver are dissolved in mercury, and form amalgams which are used in the processes of gilding and plating various objects.

Amalgama'tion, the act or process of combining mercury with another metal, applied especially to the process of separating gold and silver from the quartz rock in which they are found imbedded. The quartz is first crushed, and then shaken in a barrel or machine in contact with mercury, which unites with and collects the small particles of gold or silver. The precious metal is afterwards easily separated from the amalgam by the application of heat.

Ama'lie, or **Ame'lia** (Anna), duchess of Saxe-Weimar, a daughter of the duke of Brunswick-Wolfenbüttel, was born Oct. 24, 1739. She was married in 1756 to Ernest, duke of Saxe-Weimar, who died in 1758. She was a generous patron of men of genius, and attracted to her court the greatest German authors, including Goethe, Wieland, Schiller, and Herder. She died April 10, 1807.

Amalie (Marie Friedrike Auguste), duchess of Saxony, a sister of Frederick Augustus II., was born in 1794. She wrote a number of dramas which were performed with success, among which are "The Marriage Ring," "The Coronation Day," and "Falsehood and Truth." Died Sept. 18, 1870.

Amalthe'a, or **Amaltheia** [Gr. Ἀμαλθεία], in classic mythology, the name of the nurse of Jupiter. This nurse was supposed to have been a goat, the horn of which, broken off by Jupiter, was endowed by him with magical power, and became famous as the cornucopiæ, or the "horn of plenty."

Amamba'hi, or **Amamba'y,** a South American mountain-range, is about 200 miles long, and forms the watershed between the Paraná and the Paraguay rivers. The river Amambahi rises in this range, flows eastward about 100 miles, and enters the Paraná.

Amana, a township of Iowa co., Ia. Pop. 1441.

Aman'da, a township of Allen co., O. Pop. 1376.

Amanda, a post-village and township of Fairfield co., O., 130 miles from Cincinnati. Pop. of township, 1547.

Amanda, a township of Hancock co., O. Pop. 1469.

Amani'ta [Gr. ἀμανῖται], a genus of fungi nearly allied to *Agar'icus,* from which is derived a poisonous principle called *amanitine.* The *Amani'ta musca'ria,* a native of Europe, is very poisonous, and is used to kill flies.

Amapa'la, a city and seaport of Honduras, is situated on Tigre, the most important island of the Bay of Fonseca, which contains a number of excellent harbors. The chief articles of export are tobacco, hides, precious woods, and indigo. Pop. about 1000.

Amar (J. P.), a French Jacobin notorious for his cruelty, was born at Grenoble in 1750. He became a member of the Convention in 1792, voted for the death of the king, and in Oct., 1793, presented to the Convention a report which condemned to death twenty-two Girondists. He contributed to the ruin of Robespierre on the 9th Thermidor, 1794. Died in Paris in 1816.

Am'aranth [Lat. *amaran'thus ;* Gr. ἀμάραντος, *i. e.* "unwithering," from α, priv., and μαραίνω, to "wither"], a flower which does not wither or fade; also the poetical name of an imaginary flower, considered as an emblem of immortality; a genus of plants of the order Amaranthaceæ, has in some species richly colored flowers, that are scarious, persistent, and not liable to wither. The *Amaran'thus cauda'tus* ("prince's feather"), "love-lies-bleeding," and other exotic species are cultivated in the gardens of the U. S. Several other unsightly species are naturalized as weeds.

Amarantha'ceæ [from *Amaran'thus* or *Amaran'tus,* one of the genera], a natural order of plants comprising about 300 species, which are mostly natives of tropical countries. They are herbaceous or fruticose, with simple leaves, and dry persistent flowers in heads or spikes. This order includes, besides the genus *Amaranthus,* the *Gomphrena globosa* (globe amaranth), the purple flowers of which retain their beauty for several years.

Am'arapoo'ra, or **Ummerapoora,** a fortified city of Burmah, on the Irrawadi River, about 8 miles N. E. of Ava. It was formerly the capital of Burmah, and had a population of about 170,000, but after the seat of government was removed in 1819 it rapidly declined. The houses are mostly built of bamboo. Pop. in 1870, estimated at 90,000.

Am'ara-Sing'ha, or **-Sin'ha,** an eminent Hindoo poet and grammarian, of unknown period, is supposed by some to have lived about 50 B. C. He belonged to the sect of Buddhists, and wrote works which were all destroyed by the Brahmans, except his "Amara Kosha," which is a vocabulary of about 10,000 Sanscrit words.

Ama'ri (Michele), an Italian historian, born at Palermo in 1806. His chief work is "The War of the Sicilian Vespers" (2 vols., 1842), which was very popular, but was proscribed by the government. He escaped to France, and acted a prominent part in the revolution of Sicily in 1848. After the defeat of the Italian patriots in 1849 he became a resident of Paris. During the dictatorship of Garibaldi, in 1859, he was minister of foreign affairs; subsequently he became a member of the Italian senate, and in 1863 minister of public instruction. He resigned in 1864. Among his other works are a "History of the Mussulmans of Sicily" (1853), and "I Diplomi Arabi del Archivo Fiorentino" (1863). He died Sept. 20, 1870, at Palermo.

Amaryllida'ceæ (so called from *Amaryl'lis,* one of its genera), a natural order of endogenous herbaceous plants,

which generally have beautiful flowers and bulbous roots. The species of this order are very numerous, and most abundant in tropical regions, especially near the Cape of Good Hope. It comprises the *Amaryllis*, the *Narcissus*, the *Fourcroya*, the *Nerine*, the *Coburgia*, the *Agave*, *Snowdrop*, etc. The U. S. have several genera.

Amaryl'lis (gen. **Amaryl'lidis**), a genus of bulbous-rooted plants of the natural order Amaryllidaceæ. They have beautiful flowers, with six stamens. The *Amaryl'lis formosis'sima* and *Amaryl'lis amab'ilis* are cultivated in gardens, and much admired. The Atamasco lily (*Amaryllis Atamasco*) is a native of the U. S.

Ama'sia, Amasieh, or **Amasiyah,** a city of Asia Minor, on the Yeshil-Irmak, 355 miles E. of Constantinople. It contains nearly 4000 houses, many of which are of stone, a strong citadel, and a fine mosque. Silk is produced here and is exported. Strabo was a native of Amasia, which was formerly the capital of the kings of PONTUS (which see). Pop. between 20,000 and 25,000.

Ama'sis, a famous king of Egypt, who succeeded Apries about 570 B. C., was more friendly to the Greeks and other foreigners than his predecessors. Under his reign Egypt enjoyed peace and prosperity. He built some magnificent monuments at Memphis, his capital. He died about 525 B. C., and was succeeded by his son, Psammenitus.

Am'athus [Gr. Ἀμαθοῦς], an ancient city of Cyprus, especially addicted to the worship of Venus, who was hence called Amathusia.

Ama'ti (ANDREA), an Italian who lived at Cremona about 1550, made excellent violins, which are equal or superior to any made in the present time.—ANTONIO, a son of the preceding, was born about 1565. He was a celebrated maker of violins. Died 1635.—NICOLÒ, ANTONIO (1550–1635), and GERONIMO, all excelled in the art, but Nicolò, junior (born Sept. 3, 1596, died Aug. 12, 1684), excelled the rest of the family in the number and quality of his violins.

Amatitlan', or **Amatitan',** a town of Central America, in Guatemala, 19 miles S. W. of the city of Guatemala, and near the lake of the same name; lat. 14° 28′ 39″ N., lon. 90° 37′ 50″ W. The houses are made of mud, and are only one story high. Wells of boiling hot water occur in this vicinity. The chief business of this town is the production of cochineal. Pop. about 7000.

Ama'to, d' (GIOVANNI ANTONIO), an Italian historical painter and theologian, called THE ELDER, was born at Naples in 1475. He painted religious subjects, and no others, in a style which resembled that of Perugino. Among his works is a "Dispute on the Sacrament." Died in 1555.—His nephew of the same name, surnamed THE YOUNGER, born at Naples in 1535, was an able painter. He excelled in coloring. Died in 1598.

Amauro'sis [Gr. ἀμαύρωσις, from ἀμαυρόω, to "darken"], a term formerly much employed to designate total or partial blindness dependent upon diseases of the optic nerve, either at its origin, in its course, or in the retina; the last-mentioned seat of the disease being by far the most frequent. If the local disease be temporary or functional, the sight will probably be regained, but in the majority of cases there is no such hope. It may arise from many causes, one of the most remarkable of these being the existence of Bright's disease; and in cases resulting from this cause there is an organic change in the structure of the retina, readily discernible by the aid of the ophthalmoscope. Amaurosis sometimes comes on at once, but is generally gradual in its attack. The treatment varies with the extremely various pathological conditions. Active treatment is seldom called for, and no item in the cure of this disease is more important than strict attention to the hygienic condition.

Amau'ry (or **Amal'ric**) **I.** [Lat *Amalri'cus*], king of Jerusalem, a son of Baldwin II., was born in 1135. He began to reign at the death of his brother, Baldwin III., in 1162 or 1163. In 1168 he invaded Egypt, from which he was soon forced to retreat by Saladin, who in turn invaded Amaury's dominions in 1170. Died July 11, 1173.

Amaury II., sometimes called **Amaury de Lusignan,** became king of Cyprus as heir of his brother Guy, and took the title of king of Jerusalem in 1194. His dominions were occupied by the victorious Saracens, so that his reign was only nominal. Died in 1205.

Amaxichi, the capital of the Ionian island of Santa Maura (or Leucadia), is on its E. coast. It has a lighthouse, and a harbor adapted for small vessels. It is the residence of a Greek archbishop. Pop. about 4000. Earthquakes often occur here. The remains of cyclopean walls are found in the vicinity.

Amazi'ah, king of Judah, succeeded his father Joash about 837 B. C. He waged war with success against the Edomites, and reigned twenty-eight or twenty-nine years. He was killed by conspirators in 809 B. C.

Am'azon, Marañon', or **Orellana,** a South American river, and the largest river on the globe, rises among the Andes in Peru. It is formed by the union of several large head-streams called the Beni, Apurimac, Ucayale, and Tunguragua, which last is the most western branch, and is sometimes called the Upper Marañon. Geographers have not unanimously decided which of these is the main stream. The Apurimac, the most southern of all the branches, rises about lat. 15° S.

According to the statements of recent explorers, this river is known under three different names in different parts of its course; from its mouth to the mouth of the Rio Negro it is called the Amazon or Amazonas; from the mouth of the Rio Negro, through Ecuador, to Tabatinga, on the borders of Ecuador, it is known as the Solimoẽs or Solimoens; and from Tabatinga to its source in the Andes, it is called the Marañon. The Amazon, from its junction with the Napo in Ecuador, has a nearly due eastern course, varying therefrom not more than two or three degrees throughout its whole length; it is therefore almost wholly in the same latitude, which is not the case with any other river of large size on the globe. It is also entirely within the tropics, and only about three or four degrees from the equator, but the climate is not so hot and sickly as might, from this, be supposed, the average temperature being 84°, and the extremes 72° and 92°. The waters of the river, owing to the white clay which they contain, are turbid and of a milky color. Those, however, which rise in the woody plains have their waters black or of a dark amber color, and in some cases of a deep green, being dyed by the vegetable matter found so abundantly along their banks. This mighty stream, flowing through Ecuador and the boundless forests of Brazil, and increased to an immense volume by the great tributaries that enter it from the right and from the left, empties itself into the Atlantic Ocean under the equator. Its whole length is about 3500 miles, and the area of the countries which it drains is estimated at 2,264,000 square miles or more. It is said to be four miles wide at the mouth of the Japura, more than 1000 miles from the sea. The navigation of the Amazon is nowhere obstructed by cataracts. One of the most interesting facts, indeed, connected with the Amazon, is the smallness of its fall; at a distance of 3000 miles from its mouth the elevation is only 210 feet; the descent is therefore considerably less than an inch to the mile. According to Lieut. Herndon, the river and its Ucayale branch are navigable for a distance of about 3300 miles from the ocean. The Tunguragua is likewise navigable for many miles above the mouth of the Ucayale. Vessels can also pass from the Amazon, through the Rio Negro and the Casiquiare, into the Orinoco. It is estimated that the Amazon and its affluents open to the ocean 10,000 miles of interior navigation for large vessels. The tide ascends it nearly 400 miles, and about the time of full moon the great tidal wave which passes round the globe from E. to W. rushes into the mouth of the river with such violence that it raises the water nearly fifteen feet high. This wave, which is very dangerous to small vessels, is called *bore* in English and *pororoco* by the natives.

The principal affluents that enter the Amazon from the right are the Ucayale, the Yurua, the Purus, the Madeira, the Tapajos, and the Tocantins. Those that enter it from the left are the Napo, the Putumayo, the Japura, and the Rio Negro. During the rainy season the Amazon overflows its banks and submerges a large extent of country. It is well supplied with fish, and flows through a region of great fertility, which is densely covered with primeval and almost impassable forests, in which jaguars, panthers, pumas, monkeys, tapirs, and other wild animals abound. The river encloses numerous large islands, besides that named Joannes or Marajo, which is 150 miles in diameter. This island divides the mouth of the river into two channels, one of which is nearly 100 miles wide. The mouth of the Amazon was discovered by Yanez Pinçon in 1500, but the first European who explored the river was Orellana, in 1539. Among the recent voyages of discovery and exploration, those of Lieutenant Herndon in the employ of the U. S. government, in 1850, of the Brazilian government in 1862–64, and of Prof. Agassiz, who discovered 1163 new species of fish, in 1867, are the most important. Since 1867 the river has been opened for trade to all nations. The dense and unbroken forest that covers the whole valley of the Amazon is a remarkable feature of its physical geography. (See HERNDON and GIBBON, "Exploration of the River Amazon," 2 vols., 1853–54; AGASSIZ, "A Journey in Brazil," 1867.) A. J. SCHEM.

Amazo'nas, or **Al'to Amazo'nas,** a province in

Northern Brazil, is bounded on the N. by Dutch and British Guiana and Venezuela, on the E. by the province of Para, on the S. by Bolivia and Matto Grosso, and on the W. by the United States of Colombia, Ecuador, and Peru. Area, about 574,000 square miles. It consists chiefly of forests, inhabited by independent tribes of Indians. The entire civilized population amounted, according to a census of 1862, to 40,259; according to an official work published in 1867 ("l'Empire du Brésil"), to 95,000 free persons and 5000 slaves. Capital, Barra do Rio Negro.

Amazonas, a department of Peru, is bounded on the N. by Ecuador, on the E. by Loreto, on the S. by Junin, and on the W. by Caxamarca and Libertad. The soil is fertile, but, owing to the thinness of the population, very little is done to cultivate it. Straw hats of a superior quality are made here and exported. Chief town, Chachapoyas. Pop. about 38,000.

Am'azons [Lat. *Ama'zones;* Gr. Ἀμαζόνες, perhaps meaning "without breasts;" they are said to have cut off the right breast, which interfered with their aim in archery], female warriors; a semi-fabulous nation of martial women which was celebrated by the ancient Greek poets. According to tradition, they lived in Asia Minor, and fought against the Greeks at the siege of Troy, where they were commanded by their queen, Penthesile'a. Another queen of the Amazons, named Thalestris, is said to have made amorous overtures to Alexander the Great. The battles of the Amazons were favorite subjects with ancient Greek painters and sculptors.

Ambale'ma, a town in the United States of Colombia, in the state of Cundinamarca, on the Magdalena, about 50 miles W. of Bogotá. Excellent tobacco is produced in the neighborhood. Pop. about 9700.

Ambal'la, a city in the East Indies, in the Northwestern Provinces. Pop. about 22,000. Here a treaty was concluded between the governor-general of India, Lord Mayo, and the emir Shere Ali of Afghanistan in 1869, to strengthen the friendly relations of these two countries.

Ambarva'lia [derived from a Latin term, *ambi're ar'va, i. e.* to "go round the fields"], applied to a religious festival observed by the ancient Romans in the month of May, in order to propitiate Ceres and invoke her blessing on the coming harvest. It was so called from the victims being carried round the fields by the priests.

Ambas'sador, or **Embassador** [Fr. *ambassadeur;* It. *ambasciato're;* originally, a "servant" or "minister"], a diplomatic minister of the highest order, sent by a prince or nation to the court of another power to manage special affairs of state. He is expected not only to be the agent of his government, but to represent the power and dignity of his sovereign or his country. By the law of nations he and his suite are entitled to peculiar privileges and immunities. They are exempt from the control of the municipal laws of the country in which they perform diplomatic duties, and are not amenable to punishment for acts which are only *mala prohibita* (*i. e.* "evils or offences [merely] prohibited by statute"), and not *mala per se* (*i. e.* "things evil or criminal in themselves"). They are usually exempt from direct taxation, and are allowed to import goods without paying custom-house duties. The word ambassador is recognized as an official title of the highest rank of diplomatic service of the U. S. (See INTERNATIONAL LAW No. I., by PRES. T. D. WOOLSEY, S. T. D., LL.D.)

Amba'to, a town of Ecuador, 65 miles S. S. W. of Quito, has an active trade in grain, sugar, and cochineal. It was destroyed in 1698 by an eruption of Cotopaxi, but was soon rebuilt. Pop. estimated at 13,000.

Am'ber [Lat. *suc'cinum;* Fr. *ambre;* Gr. ἤλεκτρον], a fossil resin, usually of a pale-yellow color, sometimes nearly transparent. It is found in many parts of the world in deposits of cretaceous or more recent age, and is now known to be the resinous exudation from several species of extinct coniferous trees, of which one, called *Pinites succinifer*, is supposed to have produced the greater part. Over 800 species of insects have been found preserved in amber, and leaves or other fragments of 163 species of plants. Amber is extensively used for ornaments, and especially for the mouthpieces of pipes, the consumption being greatest in Eastern Europe, Turkey, Persia, etc. Fine pieces of it are worth more than their weight in gold. The largest mass known is in the Cabinet at Berlin; its weight is eighteen pounds, and it is valued at $30,000. Most of the amber of commerce is obtained from the shores of the Baltic, between Königsberg and Memel. Small pieces are frequently found in the green sand of Gay Head and New Jersey, and in the cretaceous coals of the far West. Amber was highly prized and much used by the ancients. It was one of the chief articles of commerce among nations. It was the special object of many of the voyages of the Phœnicians, and it was an article of exchange long anterior to the dawn of history, as we know by its frequent occurrence in the remains of the lake-dwellings of Switzerland.

Amber exhales a fragrant odor when burned, and was formerly in high repute as a medicine. An acid obtained from it (succinic) is a useful agent in chemical operations. When rubbed, amber becomes strongly electro-negative, and the first exhibition of electric force which received intelligent attention was the attraction exerted on light bodies by amber. This force, at first supposed to be possessed by amber alone, took the name of that substance, ἤλεκτρον, from which "electricity" is derived.

Amber, a post-township of Mason co., Mich. P. 392.

Am'berg, a walled town of Bavaria, on the river Vils, 39 miles E. of Nuremberg, was formerly the capital of the Upper Palatinate. It is well built, and has a gymnasium, a normal school, and a large public library; also a royal manufactory of muskets, and several breweries and potteries. The French Republican army under Jourdan was defeated near this town by the archduke Charles, commanding the Austrians, in 1796. Pop. in 1871, 11,688.

Am'bergris [from the Fr. *ambregris, i. e.* "gray amber"], a peculiar perfume, a gray substance found floating on the sea or lying on the sea-coast, and in the intestines of the spermaceti whale (*Physe'ter macroceph'alus*). It is supposed to be a morbid secretion of this animal. When heated or dissolved in alcohol it emits a peculiar and agreeable odor, not easily described or imitated, and exceedingly diffusive. It has also the remarkable power of increasing the odor of other perfumes. The price of it is about five dollars an ounce. It affords about 85 per cent. of a peculiar fatty and crystalline substance called *ambrein*. The specific gravity of ambergris is about 0.8.

Ambergris (so called from the ambergris found on its shores), a barren island in the Gulf of Mexico, belonging to Yucatan, is 30 miles long from N. E. to S. W., and 3 miles wide.

Ambert, a town of France, in the department of Puy-de-Dôme, on the river Dore, 37 miles S. E. of Clermont. It has extensive manufactures of paper and silk ribbons. Pop. in 1866, 7519.

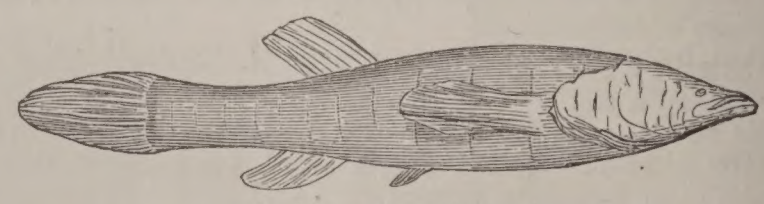
Ambidex'ter [from the Lat. *am'bo,* "both," and *dex'ter,* "right-handed"], a person who uses both hands with equal facility. The proportion of such persons in the world is small. The term is sometimes applied to a double-dealer, and to a juror who takes a bribe from each party in a lawsuit.

Ambi'orix, a famous Gallic chief who ruled over the Belgic tribe of Eburones, and waged war against Julius Cæsar. By insidious measures and stratagem he gained a decisive victory over the Roman generals Sabinus and Cotta, whose army he annihilated in 54 B. C., during the absence of their commander. He was afterwards signally defeated by Cæsar. (See CÆSAR'S "Gallic War," book v.)

Am'bitus [from the Lat. *am'bio, ambitum,* to "go round"], a term used by the ancient Romans to designate the going about and soliciting votes by candidates for office. The practice of offering one's self as a candidate in an open and honorable way was called *am'bitus popula'ris.* Another kind, which was common, but disreputable, consisted in cajolery, bribery, etc.

Ambleteuse, a decayed seaport of France, on the English Channel, 6 miles N. of Boulogne, and about 25 miles from the English coast. Here James II. of England landed after his abdication in 1689, and here Napoleon I. erected a granite column in honor of the grand army in 1805.

Amblyop'sis [from the Gr. ἀμβλύς, "blunt," "dulled," and ὄψις, "vision"], the term applied to a genus of blind



Amblyopsis spelæus.

fish. One species of this genus (*Ambylop'sis spelæ'us*) is found in the great Mammoth Cave of Kentucky. The eyes of this fish, though seemingly absent, exist in a rudimentary state, enclosed beneath the epidermis. The amblyopsis is quite small, the largest specimens averaging from four and a half to five inches in length. The body is nearly white, and partly covered with scales. Prof. Cope, describing the habits of these fish, says, "They are easily taken by the hand or net if perfect silence be preserved, for they are unconscious of the presence of an enemy except through the sense of hearing. This sense is, however, evidently very acute, for at any noise they turn suddenly

downward and hide beneath stones, etc. on the bottom." Their food consists in a great part of the crayfish found in the cave, but they sometimes feed on other fish, in the pursuit of which they show remarkable activity, thus proving that the tactile sense is well developed. According to Prof. Cope, the amblyopsis belongs to the order Haplomi, its nearest kindred being minnows, pickerels, and herrings. The *Amblyopsis spelæus* is not confined to this cave alone, but has also been found in two or more places north of the Ohio. (See an interesting account of the Blind Fishes of the Mammoth Cave in the "American Naturalist" for Jan., 1872.)

Am'bo [Gr. ἄμβων], a reading-desk or pulpit which was common in ancient Christian churches, and is still found in Oriental churches. The Gospels and Epistles were read from the ambo.

Amboina. See AMBOYNA.

Amboise (anc. *Ambacia*), an old town of France, in the department Indre-et-Loire, on the railway from Orleans to Tours, 14 miles by rail E. N. E. of Tours. It is celebrated as the place of imprisonment of Abd-el-Kader from 1848–52. Here the "Conjuration d'Amboise," a conspiracy of the Huguenots against the Guises, was formed in 1560. It has been the residence of several of the kings of France. Pop. in 1866, 4188.

Amboise, d' (GEORGES), CARDINAL, a French statesman, born at Chaumont-sur-Loire in 1460. He became archbishop of Rouen in 1493, and a faithful adherent of the duke of Orleans, who, on ascending the throne as Louis XII. in 1498, chose him for his prime minister. He became a cardinal in 1499. He was an able administrator and a prudent counsellor. He retained power until his death, Mar. 25, 1510.

Am'boy, near the centre of Lee co., Ill., at the crossing of the Illinois Central and Chicago and Rock Fall R. Rs., 94 miles almost due W. of Chicago. It has one weekly paper, seven churches, a fine public hall, four free-school buildings, two flouring-mills, three grain elevators; the Illinois Central shops, employing over 400 hands; is division head-quarters of the Illinois Central road from Dunleith to Centralia; was laid out in 1854. Pop. 2825; of Amboy township, 1279.

W. H. HASKELL, ED. "AMBOY JOURNAL."

Amboy, a post-township of Hillsdale co., Mich. Pop. 1160.

Amboy (N. J.). See SOUTH AMBOY.

Amboy, a township of Oswego co., N. Y. Pop. 1431.

Amboy, a township of Fulton co., O. Pop. 1089.

Amboy'na, or **Amboi'na** [Malay, *Amboon'* or *Ambun*], the most important, though not the largest, of the Moluccas or Spice Islands, situated E. of Booro, in lat 3° 46′ S., lon. about 128° E. It is about 30 miles long, and has an area of 282 square miles. The surface is mountainous, and granite rock occurs on the summits of some of the mountains. The staple production is cloves, the trade in which is monopolized by the Dutch. About 500,000 pounds of cloves is the average quantity annually produced here. This island belongs to the Dutch. Pop. 30,000.

Amboyna, the capital of the Dutch government of Amboyna, is on the island of the same name, and is defended by Fort Victoria. It is regularly built, has a public garden and a good harbor. Pop. about 9000.

Ambra'cia, a town of ancient Greece, on the site of the modern Arta, was the capital of Epirus during the reign of King Pyrrhus, who was killed 272 B. C.

Am'briz, a small native kingdom on the W. coast of Africa. Its capital is Quebranza. The port of Ambriz, about 70 miles N. of Loando, at the mouth of the Ambriz River, has considerable trade.

Am'bros (AUGUST WILHELM), a German composer, born Nov. 17, 1816, became in 1869 professor of music in the University of Prague. Among his works are overtures to "Genofeva" and "Othello," and a "History of Music" ("Geschichte der Musik," vols. i.–iii., 1862–68).

Am'brose [Lat. *Ambro'sius*], SAINT, one of the Latin Fathers of the Church, was born in Gaul about 340 A. D. He was a son of the Roman prefect of Gaul, and is supposed to have been born at Treves. Having studied law, he was appointed governor of Liguria and Milan about 370, and distinguished himself in that position by his wisdom and moderation. On the death of the bishop of Milan, in 374 A. D., a violent contest ensued between the Catholics and Arians about the choice of his successor. By general consent, Ambrose, who was not obnoxious to either party, was elected bishop, although he had never been a priest. He accepted the office with reluctance, and performed its duties with great ability and zeal. He favored the Catholics and earnestly opposed Arianism, but he does not appear to have been a violent persecutor. On several occasions he manifested moral courage by denouncing the sins and checking the arrogance of temporal rulers and potentates. The emperor Theodosius the Great having ordered a massacre of the Thessalonians in 390, Ambrose forbade him to enter the church, and extorted from him the performance of a public penance. Died in 397 A. D. He was the author of a method of singing called the "Ambrosian Chant," and left numerous religious works and letters. He is commended by Villemain as "a man who, amidst the turbulence and instability of the empire, never had a foible or a stain on his character, and whose magnanimity was adequate to all trials."

Ambro'sia [from the Gr. ἄμβροτος, "immortal"], in classic mythology, "the food of the gods," which was supposed to confer immortal youth. According to a poetical legend, it was sometimes given to mortals who were favorites of the gods, and was used by Jupiter and Venus to anoint their hair. Ambrosia is also the name of a genus of weeds, one species of which, common in the U. S., is known by the name of hogweed or Roman wormwood.

Ambro'sian Chant, the choral music of the early Christian Church, derived its name from Saint Ambrose, bishop of Milan, who introduced it into the Western Church about 386 A. D. The style of singing was Greek; the musical notation was, no doubt, borrowed from the Greek, and adapted to the church services to relieve their monotony. The Ambrosian chant is the foundation of church music.

Ambrosian Library, a library founded at Milan in 1609 by Cardinal Federigo Borromeo, and named in honor of Saint Ambrose, the patron saint of that city. It contains over 90,000 printed volumes and 15,000 manuscripts, including some rare palimpsests discovered by Angelo Mai, and a MS. of Virgil enriched by marginal notes of Petrarch.

Ambula'cra [from the Lat. *am'bulo,* to "walk"], a name of the peculiar organs of locomotion of the starfish and sea-urchin; the narrow longitudinal portions of the shell of the sea-urchin (*Echinus*), which are perforated by small orifices, giving passage to tentacular suckers.

Am'bulance [probably from the Lat. *am'bulo,* to "walk" or "move slowly," because a gentle motion was necessary for the wounded], a military term applied in France to a movable hospital which is attached to each division of an army, and furnished with apparatus for the relief of the sick and wounded. It was invented or improved by Baron Larrey. The name is now commonly given to a covered vehicle by which wounded men are removed from the field of battle. Improvements were made in the construction of ambulances by the Americans in the civil war of 1861–65, the excellence of which was recognized by their use during the Franco-German war of 1870.

Ambulance Corps, a body of men employed in the British army in the Crimean war to drive ambulances and attend the sick and wounded. The experiment was not successful, and the ambulance corps was superseded by the land transport corps. In the late civil war of the U. S. the officers and men of the ambulance corps were detailed from the line.

Amelan'chier, a genus of plants of the natural order Rosaceæ, comprises a small number of species, natives of Europe and North America. The *Amelanchier Canadensis,* called June-berry or service-berry, is a shrub or small tree which bears a pleasant fruit, and is sometimes cultivated in the U. S.

Ame'lia (anc. *Ame'ria*), a town of Italy, 22 miles S. W. of Spoleto, has a cathedral and is a bishop's see. *Ameria* was one of the oldest cities of ancient Umbria, and the native place of Roscius. Pop. about 5000.

Ame'lia, a county of S. E. Virginia, has an area of 300 square miles. It is bounded by the Appomattox River on nearly all sides except the S. The surface is diversified, the soil fertile. The county is intersected by the Richmond and Danville R. R. Grain, tobacco, and wool are produced. Capital, Amelia Court-house. Pop. 9878.

Amelia, a township of Orangeburg co., S. C. P. 2040.

Amelia Court-house, a small post-village, the capital of Amelia co., Va., on the Richmond and Danville R. R., 36 miles W. S. W. of Richmond.

Amelia Island, in the Atlantic, is a part of Nassau county, which forms the N. E. extremity of Florida. It is 16 miles long and 4 miles wide. The town of Fernandina is near the N. extremity. Amelia Island light, in lat. 30° 40′ 23″ N., lon. 81° 28′ 20″ W., is at the N. end of the island. The lighthouse is of brick, 58 feet high, and shows a flashing white light 112 feet above the sea.

Amen' [Heb. אָמֵן, signifying "So be it," or "Let it be irrevocably fixed;" Gr. Ἀμήν, "verily," "of a truth"] has been adopted in the service of the Christian Church as a

response and an expression of assent at the end of a prayer. In some passages of the New Testament at the beginning of an emphatic declaration, it is translated "verily."

Amende Honorable, in French law, a form of infamous penalty to which criminals who offended against public decency or morality were condemned. The simple *amende honorable* consisted of a confession in open court made by a bareheaded and kneeling criminal. The *amende honorable in figuris* was made by a culprit kneeling in his shirt, with a torch in his hand and a rope round his neck. In modern speech the term is applied to a public recantation or apology.

Amend'ment, in law, is the correction of an error committed in any process, or the alteration of the record or of any pleadings in a civil or criminal cause. The deficiency of means of amendment in pleading at common law led to the statutes of amendments and jeofails.

Amendment, in legislation, is an alteration in the words of any bill, motion, or resolution. Any member may move an amendment to a bill or resolution after it has been read twice, and it is usual to take a vote on the amendment first, and next on the main question. An opponent of a bill has a right to move an amendment to it by a motion to strike out all after the enacting clause, and to substitute a contrary principle. Either house of Parliament (or Congress) has a right to amend a bill which has been approved by the other, but such amendments must receive the assent of both houses before the bill can become a law.

The term amendment is also applied to an alteration of the Constitution of the U. S. To render an amendment valid it must be first proposed by two-thirds of both houses of Congress, and must be ratified by the legislatures of three-fourths of the several States. The most recent of these changes in the organic law is the Fifteenth Amendment, which ordains that no man shall be disfranchised on account of color or race. (See Constitution.)

Ame'nia, a post-village and township of Dutchess co., N. Y., on the New York and Harlem R. R., 85½ miles N. N. E. of New York. It has a distributing post-office, five iron-mines, yielding in the aggregate some 250 tons of ore per day, and a condensed-milk factory, using nearly 6000 quarts of milk per day. It has five churches, a seminary, one weekly paper, and a national bank with $500,000 capital. Pop. of township, 2662.

C. H. Scott, Jr., Pub. "Amenia Times."

Amenites. See Omish.

Ameno'phis (or **Am'enoph**) [Gr. Ἀμενῶφις], **I.,** a powerful king of Egypt, the second of the ten kings of the eighteenth dynasty, began to reign about 1500 B. C.

Amenophis (or **Amenoph**) **II.,** the sixth king of the eighteenth dynasty, is regarded by some authors as identical with Memnon, who fought against the Greeks at the siege of Troy. (See Memnon.)

Amenophis III. was a grandson of the preceding, and the eighth king of the eighteenth dynasty. He came to the throne about 1400 B. C. His reign was long, and greatly promoted the prosperity of Egypt, which he adorned with many noble monuments. He is supposed to have built the palace of Luxor (El-Ukser) at Thebes, which was his capital. His military exploits are recorded on the obelisk which now stands in the Place de la Concorde in Paris. According to Bunsen, Amenoph III. was the king whom the Greeks called Memnon.

Amenta'ceæ [from the Lat. *amenta'ceus,* "having an amentum"], a name given by Jussieu to a natural order of exogenous trees or shrubs having their flowers arranged in amenta or catkins. It included the birch, willow, alder, and other common trees. By recent botanists this order has been broken up into the Betulaceæ, Salicaceæ, and others.

Amen'tum [a Latin word meaning a "thong"] is applied in botany to a kind of inflorescence (also called catkin) which occurs in the willow, poplar, and birch. It differs from a spike in being deciduous.

Amer'ica [so called from Amerigo Vespucci, a Florentine navigator in the Spanish service, who visited South America in 1499], one of the grand divisions of the globe, being smaller than Asia, but larger, perhaps, than both Europe and Africa taken together. It is the only one of these divisions that is washed by all the four great oceans —the Northern, the Southern, the Atlantic, and the Pacific. It extends from Point Barrow, lat. 71° 24′ N., to Cape Horn (on Horn Island), lat. 55° 58′ 40″ S. (the continental portion reaching only to Cape Froward, on the Straits of Magellan, in lat. 53° 53′ 7″ S.). The continent may be said to consist of two vast peninsulas, called, respectively, North and South America, which are connected by the Isthmus of Panamá or Darien (in its narrowest part only 28 miles wide). The American continent, stretching as it does from N. to S. for about 9000 miles in a nearly straight line, is the longest continuous body of land on the globe. Its greatest breadth in South America is between Cape St. Roque in Brazil and Cape Parina in Peru, between lat. 4° and 7° S., a distance of over 3250 miles. In North America its greatest breadth is over 3100 miles, between Cape Canso in Nova Scotia and Cape Lookout in Oregon. America is bounded on the E. by the Atlantic, and on the W. by the Pacific, and is separated from Siberia by Behring's Strait.

The physical features of this portion of the globe are on the most gigantic scale, for here are found the greatest rivers and lakes, the largest valleys, the loftiest mountains (with the exception of the Himalayas), and the finest forests in the world. Here (particularly in the Andes) also is exhibited the greatest development of volcanic phenomena in the world. The whole number of active volcanoes on the earth is estimated at about 270. Of these, 190 (over two-thirds of the whole) occur on the coast and islands of America.

As the northern limits of America are not yet accurately ascertained, and as the statements of the area of most of the large political divisions widely differ, the area of America can only be roughly estimated. The following table (see Behm and Wagner, "Bevölkerung der Erde," Gotha, 1872) exhibits the area and population of each political division, according to the latest official censuses and the most recent scientific calculations:

Names of Countries.	Square Miles.*	Population.*
North America	**8,657,000**	**51,964,000**
Greenland	759,800	10,000
British America	3,524,200	3,888,557
Bermudas	24	11,796
St. Pierre and Miquelon	81	3,971
United States (with Alaska)	3,611,800	38,877,000
Mexico	761,600	9,173,052
Central America	**188,000**	**2,671,000**
Guatemala	40,780	1,180,000
Honduras	47,080	350,000
San Salvador	7,340	600,000
Nicaragua	58,170	350,000
Costa Rica	21,500	165,000
British Honduras	13,500	25,635
West India Islands	**92,000**	**4,214,000**
Spanish possessions	49,475	2,068,870
British "	12,625	1,054,116
French "	1,000	306,244
Dutch "	400	35,482
Danish "	122	37,821
Swedish "	8	2,898
Republic of Hayti	10,200	572,000
Republic of San Domingo	17,800	136,500
South America	**6,959,000**	**25,675,000**
Brazil	3,252,900	10,000,000
French Guiana	35,080	25,151
Dutch Guiana	59,800	59,885
British Guiana	99,900	152,932
Venezuela	368,200	1,500,000
United States of Colombia	357,200	3,000,000
Ecuador	219,000	1,300,000
Galapagos Islands	2,955	Uninhabited.
Peru	510,000	2,500,000
Bolivia	535,900	2,000,000
Chili	132,615	2,000,000
Argentine Republic (with the Gran Chaco and the Pampas Argentinas)	871,700	1,812,000
Patagonia	376,300	24,000
Paraguay	63,800	1,000,000
Uruguay	66,700	300,000
Falkland Islands	4,741	686
Aurora Islands	210	Uninhabited.
South Georgia Islands	1,570	Uninhabited.
Total America	15,896,000	84,524,000

America, North, exclusive of Central America, extends from the Arctic Ocean to lat. 16° N. It is bounded on the N. by the Arctic Ocean, on the E. by the Atlantic Ocean and Gulf of Mexico, on the S. by the Gulf of Mexico and Central America, and on the W. by the Pacific Ocean. Its contour is more irregular than that of South America, being deeply indented by gulfs, bays, etc. The length of the eastern coast, from Hudson's Strait to Florida Channel, is about 13,700 miles; on the Pacific its length is estimated at 10,500, on the Arctic Ocean at 3500 miles; thus making a total of 27,700 miles of coast-line for North America. Along the E. coast of the continent some important changes of elevation are being wrought; in some places the coast is rising, and in others subsiding. The area of North America is estimated at 8,657,500 square miles.

* As most of the following figures are not official statements, but estimated, no regard could be taken in summing up the totals of the grand divisions to any hundreds, tens, and units.

MAP OF NORTH AMERICA

Drawn and Engraved on Copper-Plate

EXPRESSLY FOR

JOHNSON'S UNIVERSAL CYCLOPÆDIA

Scale of Miles 50 100 200 300 400 500

COAL FIELDS

Carboniferous and Triassic basins.

Lignite deposit.

Longitude West 177 147 137 127 117 107 97 87 57 47 37 27 from Greenwich

Longitude West 40 30 20 10 from Washington

Latitude 60 50 40 30 20 10

ARCTIC OCEAN

PACIFIC OCEAN

ATLANTIC OCEAN

ASIA

ALASKA

BRITISH AMERICA

UNITED STATES

MEXICO

GREENLAND

BAFFIN BAY

DAVIS STRAIT

HUDSON BAY

DOMINION OF CANADA

LABRADOR

GULF OF MEXICO

CARIBBEAN SEA

CENTRAL AMERICA

SOUTH AMERICA

WEST INDIES

Behring Strait

Behring Sea

Kotzebue Sea

Arctic Circle

Tropic of Cancer

Mt St Elias 17906 FT.

Mt Parry

Open Sea

Dr. Hayes Farthest

Dr. Kane's Farth!

Lady Franklin B.

Washington Land

Grinnell Land

Kane Basin

U.S. or Hayes Sd.

Ellesmere Land

N. Lincoln

North Devon

Lancaster Sd.

Jones Sd.

Melville I.

Banks Land

Pr. Albert Ld.

Pr. of Wales Land

Victoria Land

Cockburn Land

Magnetic Pole

Boothia Felix

Fury & Hecla Str.

Barrow Str.

Melville Penin.

Fox Land

Southampton I.

Melville B.

York

Uppernavik

Disco I.

Upernavik

Scoresby Sd.

C. Brewster

Arctic Circle

Iceberg

C. Farewell

Julianis Hope

C. Desolation

Frobisher B.

Hudson Str.

Cumberland Inlet

Resolution I.

C. Chudleigh

Mansfield

Hamilton Inlet

Mecatina I.

Belle Isle

Anticosti I.

Mt. Albert

Wellington Chan.

Prince of Wales I.

Victoria I.

Banks I.

Melville I.

Parry or Melville Sd.

Mackenzie or Beaufort Sea

Franklin B.

Kellett Str.

Prince Patrick I.

Baring Land

Bathurst I.

Byam Martin Ch.

Wollaston Land

Boothia Felix

Fury & Hecla Str.

Barrow Str.

Prince Regent Inlet

Melville Penin.

Fox Land

Southampton I.

Chesterfield Inlet

Repulse Bay

Wager B.

Melville B.

Lancaster Sd.

Jones Sd.

North Somerset

Pr. of Wales Land

Cockburn Land

Boothia Felix

Fury & Hecla Str.

Barrow Str.

Face of the Country, Mountains, etc.—In North America the mountains and plains almost balance each other. To the N. of the basin of the Gulf of Tehuantepec, in lat. 17° N., a mountain-range rises, which becomes wider the farther N. it proceeds, and up to lat. 21° N. occupies almost the entire country between the two oceans. This is the table-land of Anahuac. It is cut up by several rows of hills into plateaus, between which volcanic peaks rise to a great height. Among the highest are the peak of Orizaba (17,809 feet), Cofre de Perote (14,310 feet), and the Popocatepetl (17,744 feet). Northward from the 21st degree of N. lat. the character of the mountains begins to change, and the isolated peaks become connected mountain-chains. Three chains branch off from this point: the north-western branch, the Cordillera of Sonora, runs along the coast of the Gulf of California to its northern point in lat. 33° N.; the central branch, or Sierra Madre, goes farther N.; the Eastern Cordillera is low until it reaches the Rio del Norte, after that it becomes higher and higher, until it reaches the region of the head-waters of the Rio del Norte, where it again joins the central branch and forms with it a wild mountainous region. These chains enclose the plateau of New Mexico, which rises to a height of 4000 to 6000 feet. Between the parallels of 35° to 40° N. lat., the Rocky Mountains attain as a whole their greatest elevation, a large number of peaks exceeding 14,000 feet, while the passes retain an elevation of 8000 to 11,000 feet. Farther N., from 42° to 45° N. lat., the Wind River Mountains, with their northern prolongation, form a remarkable hydrographical centre, from which flow the waters of the Columbia and Colorado rivers on the W., and on the E. those of the Missouri and its branches, the Yellowstone, Wind River, and South Platte. It is in this region of mountain lakes, of boiling springs and geysers, that a national park has been reserved by an act of Congress around the Yellowstone Lake. The western branch, the Wahsatch Mountains, encloses a wide plateau, with an elevation of 4000 to 5000 feet, which contains its own system of lakes and rivers. The most important of its lakes is the Great Salt Lake. The western border of this plateau is formed by the Sierra Nevada and the Cascade Mountains, which run along the ocean and enter Alaska. The highest peaks in this range are Mount Fair Weather (14,735 feet) and Mount St. Elias, in lat. 60° 17′ 35″ N. (about 16,000 feet). To the N. E. of the Wind River Mountains are the Black Hills, rising isolated from the plains, in lat. 46° N. The most northern branch is the most important, and runs in a N. W. direction to the Arctic Ocean. Between lat. 42° and 53° N. many peaks reach above the line of perpetual snow. Among the highest of these are Mount Hooker (15,700 feet) and Mount Brown (16,000 feet). From lat. 52° N. the range gradually descends to 4200 feet, then branches off into several chains, and terminates at the Mackenzie at an elevation of only 2100 feet. Among the isolated systems of North America the most prominent are the Coast Range in the W., and the Appalachian system in the E. The Coast Range begins at Cape San Lucas in Lower California, and running parallel to the coast has openings at only two points for rivers to pass through, and continues through Vancouver and the other islands in that region. The Appalachian system (also called from one of its parts the Alleghanies) is separated from the other mountains of this continent by large plains, the plain separating it from the Rocky Mountains being, with the exception of the great desert plain of Africa, the largest in the world. The highest peak in this system is Mitchell's Peak, in North Carolina, 6707 feet. Mount Washington, the highest peak of the White Mountains, rises to a height of 6288 feet. Farther N. a rocky plateau extends between the Atlantic and the lower St. Lawrence; Mount Katahdin, its highest peak, is 5385 feet high. To the N. of the St. Lawrence the rocky plateau of Labrador rises to a mean elevation of 2000 feet.

Geology.—The geology of North America is so complicated that no detailed description of it could be compressed into the necessarily limited space of this article. It may, however, be very briefly sketched as follows: N. of the St. Lawrence is a belt of old crystalline rocks—Laurentian and Huronian—which stretches from Labrador to Lake Superior, and thence northward. The Adirondacs in New York, and a similar space on the S. shore of Lake Superior, may be said to form part of this eozoic belt. This is the oldest known portion of the earth's surface, and has not been submerged since the beginning of the Silurian age. New England is, for the most part, underlaid by metamorphic rocks, which are of Laurentian, Silurian, Devonian, and carboniferous age. S. of the great lakes, and between the Atlantic and the Mississippi, is an extensive district, chiefly of palæozoic age, having been elevated above the ocean at the close of the carboniferous period, when the Alleghanies were raised. This area is skirted on the Atlantic coast by a belt of trias, which fills the valley of the Connecticut, underlies much of New Jersey, and holds the coal of Eastern Virginia and North Carolina. Outside of the triassic area, and reaching around from New York to the mouth of the Mississippi, are more or less broken belts of cretaceous and tertiary strata. W. of the Mississippi the great area of "the Plains" is underlaid on the E. by carboniferous and permian, more westerly by triassic, Jurassic, and cretaceous rocks, with broad areas of fresh-water tertiary of miocene and pliocene age. The Rocky Mountains have axes of granite and crystalline slates, flanked in some localities by Potsdam sandstone, more generally by carboniferous and more recent strata; all of which, even to the tertiary, are more or less upheaved. Volcanic rocks also abound in this chain. W. of the Rocky Mountains is a high plateau reaching to the Sierra Nevada, and extending N. and S. from the city of Mexico far into the Canadian territory. This plateau is cut by the cañons of the Colorado and its tributaries to the depth of over 6000 feet, and is shown to include representatives of almost the entire geological series. The western part of the plateau exhibits a great prevalence of modern volcanic rocks, and from the number and richness of its veins of silver may be called the silver belt of the continent. The Sierra Nevada has a granitic axis, flanked by metamorphosed triassic and Jurassic slates, which contain quartz veins rich in gold. The "placer" or surface deposits of gold skirt the western base of the Sierra Nevada for 700 miles, and have yielded nearly $1,000,000,000 since 1848. The Coast Mountains of California are mainly composed of cretaceous and tertiary strata, are more recent than the Sierra Nevada, and are richer in mercury than in gold and silver. The mercury is contained in metamorphosed cretaceous rocks.

The geological structure of Mexico is essentially the same as that of the adjacent portions of the U. S., with the same richness in the precious metals. The only noteworthy elements in the mineral resources of Mexico not found farther N. are the tin of Durango and the triassic anthracite of Sonora.

In the region about Hudson's Bay, and farther N., Silurian rocks have been found in various localities. On Melville's Island carboniferous strata occur, while on Disco Island, Greenland, on the lower Mackenzie and Yukon rivers, tertiary rocks are exposed. These contain great quantities of fossil leaves, which prove that in the miocene epoch a luxuriant vegetation covered all the shores of the Arctic Sea, and that the climate was then as mild as that of the State of Virginia is now. In the glacial epoch ice covered the continent as far S. as the 40th parallel, grinding down the rocks and spreading the drift over most of the country N. of this line.

Copper is abundant, especially in Mexico and on the shores of the great lakes. In the latter locality it has been chiselled out from its native bed in masses weighing as much as 150 tons of nearly pure metal. Quicksilver occurs in Mexico and California. Probably the richest lead district in the world is that on both banks of the Mississippi, between 41° and 44° N. lat. Over 54,000,000 pounds have been extracted at this point in a single year. The coal-fields of North America are immense, extending over an area in the U. S. alone of more than 150,000 square miles; large beds occur also in New Brunswick, Nova Scotia, the Rocky Mountains, and on the Pacific coast. Both bituminous and anthracite coal exists; the former is most abundant, but the latter is found in large beds in Eastern Pennsylvania, where millions of tons are mined every year. Since 1862 great quantities of petroleum have been obtained in Western Pennsylvania, West Virginia, Canada, and other districts. Iron is abundant. Antimony, zinc, cobalt, arsenic, titanium, and chrome are also found. Salt is found abundantly in various localities.

Bays, Gulfs, Lakes, and Rivers.—By the indentations of the bays, gulfs, and rivers the interior of North America is at once laid open to the commerce of the world. On the E. coast we first meet with Baffin's Bay, which separates British America from Greenland; Hudson's Bay, which opens into the Atlantic by Hudson's Strait; the Gulf of St. Lawrence, connecting the great lakes with the Atlantic; the Bays of Fundy, Cape Cod, Delaware, and Chesapeake; Long Island, Pamlico, and Albemarle sounds; the Gulf of Mexico, Gulf of Campeche, Bay of Honduras, and Mosquito Bay—all on the E. coast. The indentations on the Pacific coast are neither so large nor so numerous as those on the E.; among the more important are the Gulf of Tehuantepec, Gulf of California, San Francisco Bay, Straits of Juan de Fuca (opening into Puget's Sound, St. George's Channel, and Admiralty Inlet), Queen Charlotte's Sound, Cook's Inlet, and Bristol Bay. To the N. of the basin of the Mississippi is found the region of the great lakes and of the St. Lawrence River. These lakes form together the greatest mass of fresh water found in any one spot on the globe. They are five in number. Lake Superior has an

area of more than 31,400 square miles; Lake Erie has an area of 10,000 square miles, and is connected by canals with the Hudson and the Mississippi; Lake Ontario, from which the St. Lawrence passes, has an area of 7300 square miles; Lake Huron covers 23,800 square miles; and Lake Michigan 25,600 square miles. Other large lakes in North America are Lake Winnipeg, Athabasca, Great Slave, and Great Bear lakes in British America; Lake Champlain and Great Salt Lake in the U. S.; Lake Nicaragua in Central America; and Lake Chapala in Mexico. Besides these, numerous other beautiful sheets of water of smaller sizes occur, especially N. of 42° N. lat. No other continent is more favored with large rivers than North America, nearly every portion being accessible from the sea. In the N. the Mackenzie River empties into the Arctic Ocean, and the Saskatchawan into Hudson's Bay; the St. Lawrence eastward into the Atlantic; and the Mississippi and Rio Grande del Norte southward into the Gulf of Mexico. The Columbia and Colorado of the West take their rise in the western declivities of the Rocky Mountains; the former, after a course of 1200 miles, empties directly into the Pacific; the latter, after flowing 1000 miles, empties into the Gulf of California. In lat. 32° 30′ N., Frazer's River empties opposite to Vancouver's Island into the Pacific. The Atlantic slope is drained by a large number of rivers of different lengths. The largest river-system in North America is that of the Mississippi. Its most important tributaries are the Arkansas, Red River, the Illinois, the Ohio, and the Missouri, which in itself forms another great river-system. The most important tributaries of the Missouri are the Yellowstone and the Platte River.

Islands.—South-east of Florida, in the recess formed by the narrowing of the continent at Central America, lies an extensive archipelago called the West Indies. This group extends E. into the Atlantic to about 60° W. lon., whence it turns almost directly S. and reaches to the mouth of the Orinoco River, thus enclosing the Caribbean Sea on the N. and N. E. The larger of these islands are Cuba (the most western), Hayti, Jamaica, and Porto Rico. Near the mouth of the St. Lawrence are the islands of Newfoundland, Cape Breton, Prince Edward, Anticosti, etc. Besides these, Long Island and the Bermudas are the only islands of any account on the E. coast. The principal ones on the Pacific coast are Vancouver's; Queen Charlotte's and King George III.'s Archipelagoes, W. of British America; and Prince of Wales, Sitka, and Admiralty on the coast of Alaska, and the Aleutian Islands reaching westward towards Asia. A large number of barren islands lie in the Arctic Ocean of which but little is known.

Climate.—In comparing the climate of the western with that of the eastern continent, we must compare not the E. with the W. coast, but E. with E. and W. with W.; which comparison will show that the difference of temperature lies not between the two continents, but between the opposite shores of each continent. Take, for example, Nain in Labrador: while the mean temperature of this place is 25° F., at Archangel, on the western coast, it is 44°. This difference of 19° between the eastern and western coasts of the New World is but very little less than the difference between the eastern coast of the New and the western coast of the Old, for the temperature of Gothenburg, in Sweden, is only 21° higher than that of Nain. This difference decreases the farther S. we go. But, generally speaking, the climate of North America is 10° lower than the same parallels in Western Europe. On the E. side and middle of the continent N. of 50° N. lat. it is so intensely cold that it is almost uninhabitable. In Mexico and Central America the climate is similar to that of the torrid zone, being very changeable; the table-lands of the former generally have a delightful climate. In Canada the change from winter to summer is very sudden, the spring being of short duration.

Vegetable Productions.—North America abounds in immense forests, in which are found vast numbers of large and valuable trees. One of the most noted is the *Sequoia gigantea*, belonging to the cedar family and a native of California, which is one of the greatest wonders of the vegetable world. It sometimes attains a height of 400 feet and a diameter of from 30 to 40 feet. By the Spaniards it is called the *Palo colorado*. Another remarkable tree is a species of pine or fir in Oregon, which grows from 200 to 300 feet in height, and has a girth of from 60 to 80 feet. The forests contain pine, oak, ash, hickory, red beech, the lofty Canadian poplar, several species of chestnut, walnut, several species of maple (among them the sugar-maple), cedar, cypress, juniper, hemlock, basswood, palmetto, dogwood, willow, catalpa, wild-cherry, tulip tree (or American poplar), elm, sycamore, magnolia, gum, locust, etc. The most important farinaceous plant peculiar to the New World is maize or Indian corn. It extends over a large part of North America, but is found mostly in the Central U. S. It is also naturalized, or nearly so, in the warmer parts of the Old World. Cacao, vanilla, pimento, copaiba, jalap, cinchona, tobacco, sweet potatoes, and the cochineal plant (*Cactus cochinilifer*), are also indigenous. Wheat, barley, peas, oats, and rice are cultivated with success throughout the greater portion of the continent. Many vegetables, besides various fruit trees, are grown. Among the latter are the orange, lemon, apple, peach, etc.; the principal native fruits are of the nut kind. Coffee, sugar, and cotton are staple products. The vine generally succeeds when properly cultivated. An interesting native cereal is the *Zizania aquatica*, the wild rice of the North-west, yielding an important supply of food to the native tribes. The true potato (*Solanum tuberosum*) is a native of both North and South America.

Zoology.—The number of ferocious animals found in America is comparatively very small. Of those that are found the principal ones are the polar and grizzly bear. The former (sometimes called the white bear) is the largest of his genus, and is an inhabitant of the Arctic regions, being seldom seen S. of 55° N. lat. The latter is a native of North America, and is found in the regions of the Rocky Mountains, from New Mexico to as far N. as 61° N. lat. Besides these may be mentioned the cougar or panther, lynx, and wild-cat. The bison, or American buffalo, roams over the prairies W. of the Mississippi in immense herds, but is rapidly disappearing in consequence of the advance of civilization. The musk-ox is smaller, seldom weighing more than 300 pounds. The deer family is represented by several species, the largest being the moose, whose height is about six feet. A single specimen of the antlers of these animals has been found to weigh over 50 pounds. Reindeer are numerous in the frozen regions. Among the Rocky Mountains are found peculiar sheep and a goat-like antelope; the former are covered with short, fine, and flexible wool, and are much larger than the domestic sheep; the latter, inhabiting the highest cliffs of the mountains, are covered with long hair, beneath which is a very fine wool. Among the wolves, the prairie-wolves are found in great numbers on both sides of the Rocky Mountains. Among the domestic dogs are the Newfoundland dog, Mackenzie River dog, the Arctic dog, etc. Of the foxes there are several kinds—viz., the red, gray, and Arctic. The other principal quadrupeds are beavers, otters, raccoons, badgers, opossums, weasels, hares, muskrats, marmots, squirrels, porcupines, gophers, and antelopes. There are numerous species of reptiles, the rattlesnake being among the most dangerous. The alligator, a native of the Southern U. S., attains a length of from fourteen to sixteen feet. Tortoises, sea-turtles, toads, and frogs abound. Several hundred species of birds are found, the greater number of which are peculiar to this continent. The wild turkey, one of the principal native birds, formerly existed in large numbers, but is rapidly disappearing. Wild pigeons are so numerous in some localities as to darken the air when they fly over, and to break the limbs of the trees on which they roost. Among the rapacious birds are the bald eagle, the sparrowhawk, the swallow-tailed hawk, falcon, vulture, turkey-buzzard, and owl. Among the gallinaceous birds are turkeys, pheasants, grouse, and quails. The representatives of the Grallæ are cranes, herons, flamingoes, spoonbills, rails, and purple gallinules. Swans, wild-geese, ducks, pelicans, etc. constitute the principal water-fowls. Some of the smaller birds are larks, orioles, buntings, magpies, jays, cedar-birds, thrushes, shrikes, mocking-birds, robins, grosbeaks, blue-birds, parrots, woodpeckers, humming-birds, kingfishers, chuckwills-widow, whippoorwills, etc. Of fish there are almost endless varieties; the chief ones are sturgeon, salmon, salmon-trout, shad, white fish (peculiar to the great lakes), mackerel, herring, halibut, sheepshead, trout, bass, perch, pike, etc.

Population, Races, etc.—The aboriginal races of Mexico and Central America still constitute an important part of the population. Many of the North American Indians are yet in existence, but they are fast disappearing before the advance of the white man. Almost all the authorities on the subject agree with the traditions of the Indians and Esquimaux that an immigration of the native race took place at an early period—probably from Asia. In spite of the difference existing between many tribes in different localities, one race seems to have inhabited the whole continent, to which the Esquimaux bear the same relation as the Lapps and Samoyedes to the other Mongolians of the Old World; and this race resembles most closely the Mongolians. According to ancient Chinese legends, an early Mongolian emigration and Chinese colonization appear very probable; while the original languages, in spite of their great variety, in their uniform formation resemble those of Eastern Asia more than any others. Much is still in the dark with respect to the original inhabitants. Their character at the present day shows a great capability of being

civilized, as they had their own civilization in Mexico and Central America, and in South America in Peru and New Granada, and as is shown by the fact that under the Jesuits, the Quakers, and the Moravian Brethren some have attained a considerable degree of civilization. The African race constitutes a large portion of the population, especially of the southern part of North America. It was introduced for the purpose of slavery, but seems to prosper better than in its native continent. From 1789 to 1860 (*i. e.* while it was in slavery) it increased in the U. S. 28 per cent. every ten years, or 5 per cent. less than the Caucasian race; while in San Domingo, where it was in a free state, its increase from 1793 to 1868 was larger than that of the Caucasian race, while the natives have decreased everywhere. The Caucasian race is only represented in North America by the Germanic and the Romanic families, the latter chiefly in Mexico and the Central American republics, the former in the U. S. and British America. Among the 40,000,000 of the Germanic family, the Anglo-Saxons predominate largely, constituting over two-thirds of the population as regards the descent, and over three-fourths with regard to the language.

History.—If we except the reputed early visits of the Danes and Norwegians to Greenland in the ninth and tenth centuries, America was first made known to the civilized world by Christopher Columbus, who set sail under the patronage of Ferdinand and Isabella from Palos on the 3d of Aug., 1492, with a view of finding Eastern Asia by a western passage. He first landed at San Salvador, on the 12th of October. During the ensuing months he visited Cuba, Hispaniola, and other islands. But the continent of North America was first discovered by John Cabot and his son Sebastian in 1497, one year before Columbus reached the continent of South America. The Cabots sailed under the patronage of Henry VII. of England, and touched the first year at Labrador, and the next at Newfoundland. Gaspar de Cortereal, a Portuguese nobleman, who made two voyages to the coast of Labrador, is supposed to have been murdered on his second voyage, as he never returned. In 1512, Ponce de Leon discovered Florida. In 1524, Giovanni Verrazzano, a Florentine navigator, under the patronage of Francis I. of France, explored more than 2000 miles of the coast of the present U. S. and British America. A few years later, Jacques Cartier made several voyages and explored Newfoundland, and first ascended the St. Lawrence. Not many years subsequent a French fortress was erected near the present site of Quebec. While these discoveries were being made, Cortez discovered and conquered Mexico. Within the last twenty-five years it has been clearly established that there is a communication by water between the Atlantic and Pacific by an Arctic sea. But the passage has never been made by vessels alone, the voyage in question having been partly effected by means of sleds and partly by sailing. As the discovery and exploration of North America by Europeans advanced, it became a political dependency of several European nations, in particular of Spain, France, England, Holland, and Denmark. In 1776 most of the English colonies established an independent American commonwealth under the name of the United States of America; they have since become one of the greatest states of the globe. In 1821 Mexico became independent of Spain. The remainder of North America, comprising about one-half of its extent, is either a dependency of European powers, or, like the greater portion of Greenland, is without any organized government.

Central America is that narrow strip of land which unites North and South America, but which properly belongs to the former. It lies between the parallels of about 7° and 18° of N. lat. It is about 800 or 900 miles long, its breadth varying from 20 miles in its narrowest to 400 in its widest part. It is bounded on the N. by Mexico, on the E. by the Caribbean Sea, on the S. by New Granada, and on the W. by the Pacific. Its area, according to Behm and Wagner, is 188,370 square miles.

Face of the Country, Mountains, etc.—Central America consists almost entirely of mountainous regions, but the mountains are entirely distinct from those of North and South America. They are separated from the cordilleras of South America by a row of hills ranging in height from 300 to 1000 feet, while in the W. the Mesa de Tarifa (600 feet high) separates the Isthmus from the North American continent. N. of Panama rises the plateau of Veragua, in which the Silla de Veragua (8000 feet high) is the highest point. Farther N. is the plateau of Costa Rica, with an average height of 2000 feet, and that of Cartago, 4400 feet. Numerous peaks of 10,000 feet and over are interspersed. In the N. the plateau gradually descends, until it forms the plain of Nicaragua. To the N. of this plain rises the table-land of Honduras, with an average height of 4000 feet. Apart and on the S. of the plateau are two rows of volcanoes, the highest of which are San Miguel, a peak of 15,000 feet, San Vincente, San Salvador, and Izalco. A mountain of not quite 2000 feet connects the table-land of Honduras with that of Guatemala, rising to an average height of 5000 feet. Here also are a number of high volcanoes, among which are the Pacaya, the two volcanoes of Guatemala, those of Amilpas, 12,200 feet high, Quezaltenango, 12,300 feet, and the more distant Soconusco.

Geology.—The central axis of the Isthmus is composed of crystalline and volcanic rocks. These are flanked on either side by strata of tertiary age, which contain, in some places, valuable beds of lignite. Gold, silver, lead, and mercury are found in many localities, and rich mines of all these are known to exist in Costa Rica and Honduras; but the obstacles presented by the climate, the governments, and the population of these countries have limited their productiveness. The ancient inhabitants of Central America, who constructed the cities of which the ruins have been so frequently described, possessed large quantities of gold, as we know from the numbers of gold images and implements found in their sepulchres. The exploration of the graves of Chiriqui was at one time an exciting industry. Jasper and marble are worked in Honduras, and sulphur is collected near the volcano of Quezaltenango. Large quantities of salt are produced on the Pacific coast, and also from the salt springs, which are numerous.

Bays, Gulfs, and Rivers.—Central America is intersected by numerous streams of considerable size, but necessarily short from the narrowness of the country. All the longer streams are on the northern and eastern sides of the mountains, and flow into the Atlantic. Among these the Usumasinta is the largest, and the San Juan, which forms the outlet of Lake Nicaragua, is next in size. Among the bays and gulfs, the most important are the Gulf of Honduras on the E. coast, the Bay of Panama, the Gulf of Dulce, Coronada Bay, Gulf of Nicoya, and the Gulf of Fonseca on the Pacific coast. Besides Lake Nicaragua, which has an area of 3400 square miles, we find in Central America the lakes of Managua in Nicaragua, Ilopongo in San Salvador, Amatitlan (or Atitlan) in Guatemala, and the Yojoa in Honduras.

Climate.—In Central America the year consists of two seasons—viz., the wet and the dry. In the former the sun is always vertical, and is seldom seen, the skies being filled with clouds and falling rain, while in the latter the temperature does not rise near so high, but hot and dry weather prevails, with a clear and more healthy atmosphere. In the higher regions, where the land is more open, few noxious vapors are generated, and health is comparatively good, but in the low marshes, where decomposition is rapid, many contagious diseases prevail.

Vegetable Productions.—Central America is remarkably adapted to the growth of vegetables and tropical fruits. Indian corn, sweet potatoes, sugar-cane, indigo, tobacco, cacao, the cactus, mandioca, and bananas flourish. Many other tropical fruits, among them the cherimoya (said by Humboldt to be the most delicious fruit in the world), grow abundantly. In the large forests mahogany, logwood, lignumvitæ, pimento, sarsaparilla, vanilla, black balsam, etc. are met with. There are not less than ninety-seven different kinds of trees growing luxuriantly in the forests of Panama that are fatal to animal life.

Zoology.—The zoology of Central America is very similar to that of the other divisions of America. Its birds are chiefly remarkable for their brilliant plumage. Among them are many species of humming-birds and the quezal. Serpents are numerous, many of them being dangerous. Two species of locusts, a brown and a green, are known here. The former is very destructive. Fish abound in the seas, rivers, and lakes.

History.—In 1502, Columbus visited the E. coast of Central America, and passed along the shores of Honduras, Mosquito territory, Costa Rica, and Veragua, but being opposed in his undertakings, both by the inhabitants and his crew, he was forced to return home. In 1523, Pedro Alvarado was despatched by Cortez to conquer Central America, and within two years had subdued the whole country. After that it remained subject to Spain till 1823, when it was formed into a federal republic and became independent; but in 1833 the republic of Central America was dissolved, and the separate republics of Guatemala, Honduras, San Salvador, Nicaragua, and Costa Rica were formed. Since then several attempts have been made to reunite these five republics in a confederation, but they were not successful. Only a small portion of Central America (British Honduras) is a European dependency.

Inhabitants.—The population of Central America consists of whites and creoles; mestizoes, or the offspring of whites and Indians; aboriginal natives, and a few blacks. It is estimated that one-twelfth of the inhabitants are whites, four-twelfths mixed races, and seven-twelfths In-

dians. Generally speaking, the inhabitants are immoral, ignorant, and superstitious.

South America, a vast triangular-shaped piece of land, with its apex S., extends from lat. 12° 30′ N. to Cape Horn, in lat. 55° 59′ S., a distance of about 4800 miles, its greatest breadth from E. to W. being about 3300 miles. Its area is estimated by Behm and Wagner at 6,958,600 square miles. At least three-fourths lie within the temperate zone. Its coast-lines, particularly the western, have but few indentations, except near the S., where both on the E. and W. sides there are many inequalities. Here also lies an extensive group of mountainous islands, forming the archipelago of Tierra del Fuego. These islands are indented on all sides by numerous bays and narrow inlets.

Mountains and Volcanoes.—The mountains of South America comprise four great systems; the most remarkable of these are the Andes, which stretch along the Pacific coast from N. to S., in a continuous chain, for a distance of about 4200 miles in a nearly straight line. This range is of no great width, but of very great altitude, ranking in this respect next to the Himalayas, the highest point of the former, the Sorata, being 24,800 feet high, and the highest of the latter, Everest, 29,000 feet high. The second system is that of Parime or Parima, also called the Highlands of Guiana, consisting of numerous irregular groups of mountains of about 2000 feet in height, which separate the plains of the lower Orinoco from those of the Rio Negro and the Amazon. The culminating peak of this range is Maravaca, about 8200 feet high. The third system is generally known by the name of the Coast Chain of Venezuela, the culminating point of which is the Silla de Caraccas, 8600 feet high. The fourth is that of Brazil, which consists of two great ranges running nearly parallel to the coast, and numerous other smaller ranges stretching far into the interior and crossing the country at different angles. It may be well to remark that all the higher mountains of South America are confined to the Pacific and Atlantic coasts, while the interior is occupied by a series of low, level plains, with an elevation of near 1000 feet, that reach from one extremity of the continent to the other. The active volcanoes of South America are about thirty in number. They all occur among the Andes, and consist of three distinct series—those of Chili, those of Peru and Bolivia, and those of Quito. The loftiest of these mountains is Sahama, one of the Peru and Bolivian series, 23,000 feet high. The heights of the others vary from 13,000 to 18,000 feet.

Plains.—The plains of South America are of vast extent, stretching for hundreds of miles with but few perceptible inequalities. During the rainy season they are covered with verdant grasses, but when the dry season comes on the grass dies out entirely in some sections, so that they present the appearance of a desert. These great plains are variously designated the Pampas of Buenos Ayres, the Selvas of the Amazons, the Llanos of the Orinoco, etc. The Pampas of Buenos Ayres are about 900 miles in breadth, cover an area of about 315,000 square miles, and have an elevation of about 1000 feet above the sea. The several regions of these plains are marked by the growth of different kinds of vegetation, such as thistles, lucerne, grasses, etc. The thistles in some cases grow so large and have such formidable spines that they form an almost impenetrable barrier, individual stalks being ten or twelve feet high. Thousands of cattle and horses roam over these grassy plains, where they find inexhaustible quantities of food. The Selvas of the Amazon, in the centre of the continent, are so densely covered with wood (hence their name) that the country in some parts, were it not for the rivers, would be impenetrable. They extend along the Amazon for about 1500 miles, and vary in width from 350 to 800 miles. The Llanos of the Orinoco and Venezuela are also very extensive, occupying a tract of about 153,000 square miles. They lie between the deltas of the Orinoco and the river Coqueta, and present a remarkably level surface. It is stated that there is scarcely an eminence one foot high in the space of 270 square miles. Trees are not very numerous, except on the banks of the Orinoco, where the forests are dense. Besides these, there is also the desert of Patagonia, occupying an estimated area of 100,000 square miles. This is the most barren of all the plains in America.

Rivers and Lakes.—Of the three most important rivers of South America, the Amazon, the Orinoco, and the Plata, the first is the largest on the globe. It takes its rise among the Andes, and after a course of 4000 miles empties its waters into the Atlantic directly under the equator. Its waters are navigable from its mouth, which is 96 miles in width, for a distance of about 2300 miles. The Orinoco rises among the Parime Mountains, and has a course of about 1400 miles. This river has many affluents that are large streams. It is connected with the Amazon by one of its affluents, the Rio Negro, by means of a natural canal, called the Cassiquiare. This is one of the most remarkable phenomena in physical geography. The Plata (Rio de la Plata) is more of an estuary than a river, and is formed by the confluence of the Paraná and Uruguay Rivers. It is about 185 miles long, and at its mouth, between Punta del Este and Cape San Antonio, it is near 130 miles wide. The navigation of this stream is obstructed by frequent shoals, and its waters are so turbid that they tinge the sea for a distance of near 200 miles from its mouth. There are many other important rivers in South America, of less magnitude than those just enumerated, but equal, if not superior, in size to Europe's largest streams. The principal ones are the San Francisco, the Rio Negro, Colorado, Essequibo, etc. But few lakes of any considerable size exist in South America, the chief one being Titicaca, which is situated on the frontiers of Bolivia and Peru, and covers an area of about 4000 square miles. It is at an elevation of about 12,800 feet above the level of the sea, and in some parts is 120 fathoms deep. There are many small lakes on the table-lands of the Andes and in the elevated mountain-valleys. Their water is of the purest blue and green colors, and in many of them intensely cold, being near the line of perpetual congelation.

Climate.—The climate of South America is neither so extremely hot in the N. nor so intensely cold in the S. as one would be led to suppose from its geographical position. This may be attributed to the operation of the trade-winds, the influence of the lofty Andes, and other physical causes. The burning heat felt in the plains of Arabia is wholly unknown in the new continent. Throughout the entire basin of the Amazon the climate is greatly moderated by the breeze that is always blowing up the river. But in some of the deep recesses, where the dense forests ward off the breeze, it is almost suffocating. Brazil and all the countries west of it have an equable and temperate climate. The mean temperature of Rio Janeiro is 74° F. The southern portion of the continent is so acted on by the Antarctic breezes and immense tracts of surrounding ocean that its climate is rendered cool and moist. The strip of land on the W. coast lying between about 7° and 32° S. lat. and 65° and 68° W. lon. is an exception to this, as rain never falls there.

Geology.—The geology of South America is as yet but imperfectly known, but it may be briefly sketched as follows: In the southern part of the continent, E. of the Andes, the surface is mainly occupied by drift and the loess-like deposits of the Pampas, the latter containing the remains of the great edentates, *Megatherium, Glyptodon,* etc.—a fauna almost peculiar to South America, and now represented by her sloths, armadilloes, and ant-eaters. N. of Paraguay, and S. of the Amazon, is a broad area underlaid by crystalline and palæozoic rocks, a part of which are of carboniferous age. The valley of the Amazon forms a great plain, of which the longest diameter is E. and W., lying between the palæozoic highlands which have been referred to and a somewhat similar region of old metamorphic and probably palæozoic rocks in Northern Brazil and Venezuela. The immediate banks of the great river are composed of soft, horizontally stratified red sandstone and shales, shown by Prof. Orton to be of tertiary age, and not drift as supposed by Agassiz. Along the coast, near the mouth of the Amazon, cretaceous rocks were found by Hartt and others, containing *Ammonites, Inoceramus,* etc. of species common to the chalk of Europe. The country bordering the upper Orinoco, both by its geological structure and by its minerals (gold, itacolumite, etc.), shows a marked resemblance to the southern portion of the Alleghany belt in North America. At the northern end of South America we find near the mouth of the Magdalena tertiary rocks with beds of lignite; higher up, and near Bogotá, cretaceous strata, with ammonites of European species; still farther inland, crystalline rocks and the famous emerald-mines. The great chain of the Andes is composed mainly of granite and crystalline slates, with vast masses of trachyte, porphyry, basalt, and other rocks of purely igneous origin. On the W. flanks of the chain carboniferous, triassic, Jurassic, cretaceous, and tertiary strata have been recognized; all of which are more or less disturbed, and locally, like the underlying granite, are metalliferous. All the southern extremity of South America shows marks of glacial action, but the view advanced by Prof. Agassiz, that the valley of the Amazon was once occupied by a glacier, is not generally accepted by geologists. Many parts of South America contain rich deposits of the precious metals and gems, but the most precious minerals of all, coal and iron, are far less abundant here than in North America. Brazil furnishes gold from several districts. Beautiful topazes are also found there, and the most productive diamond-mines in the world are in Brazil. Gold and emeralds are obtained in Venezuela. Chili, Ecuador, and Peru are famous for their mines of silver, and Chili now produces half the copper consumed in the world. Extensive though not rich de-

posits of mercury are also found at various points on the W. coast.

Vegetation.—As there is such a variety of climate in South America, no special character can, with propriety, be given to its vegetation. The most distinguishing feature are the great forests. They cover the greater part of the entire continent, and in some places are so dense that to force an entrance, even with an axe, to any considerable distance, is almost an impossibility. Many of the largest trees are adorned with the most brilliant flowers. In almost every part of tropical America vegetation is exhibited on the grandest scale. In certain districts, that are specially favored with due proportions of heat and moisture, the magnitude of the trees and variety and beauty of the flowers are extraordinary. Fruits, such as oranges, lemons, limes, cocoanuts, pineapples, mangoes, bananas, pomegranates, mammoons, goyabas, jambas, aracas, mangabas, and others, grow in great profusion. Many of the most important and most widely known varieties of fruit are, however, naturalized, rather than strictly native products. The bitter quassia, rosewood, tonka-bean, indigo, coffee, sugar-cane, maize, and the cacao tree (from the seed of which chocolate is made) are important productions. Tapioca and cassava are also made from the root of the *Janipha Manihot.* Several medicinal plants of great value are natives of this country, among which are cinchona, or Peruvian bark, ipecacuanha, copaiba, the balsams of Peru and Tolu, and many others. Among the remarkable plants we may mention the wax-palm, the vegetable-ivory palm, the maté or Paraguay tea, and the guarana (both containing theine, the active principle of tea and coffee, and both similarly used); also the vanilla-plant; several caoutchouc-yielding trees; several cow trees, yielding a valuable milk-like latex or juice; varnish trees, and an immense number of orchidaceous epiphytes. In short, the botany of South America is very rich, and is by no means yet thoroughly known. Its palm trees are numerous and useful, but are not equal in commercial importance to those of the Old World. Towards the S. the character of the forests is greatly changed by the coldness of the climate.

Zoology.—South America has but few formidable beasts of prey. The most ferocious one peculiar to the country is *Felis onca,* or jaguar. It is larger and stronger than the panther, but inferior in both these respects to the Bengal tiger. The puma, or American lion, is also found. Monkeys of the family Cebidæ and of an inferior type are abundant both in species and individuals. Of the winged mammals the most remarkable are the vampire bats. These animals are mostly confined to Guiana, Colombia, and Brazil, where they are very troublesome, attacking and sucking the blood of both men and beasts while they are asleep. In the low, marshy places are found the anaconda and boa-constrictor. Lamas, alpacas, and vicuñas are peculiar; horses, asses, sheep, oxen, alpacas, goats, and swine are the chief domestic animals. Horses and cattle have greatly increased; the former can be bought for a few dollars, and the latter are mostly valued for their hides and tallow, the flesh being generally thrown away. South America is especially rich in birds; the most remarkable one in respect to size is the condor; one of the largest specimens yet captured measured about fourteen feet between the tips of the wings. It seldom exceeds eleven, however, the body being from three to three and a half feet in length. It frequents the most inaccessible cliffs of the Andes. Eagles, falcons, vultures, and other rapacious birds are found. Many birds of bright plumage also exist. Alligators, lizards, electric eels, and snakes are numerous. Fish abound in the seas, lakes, and rivers. Immense numbers of centipedes, scorpions, spiders, ants, termites, and locusts occur. The latter are especially numerous in Buenos Ayres, sometimes covering the earth for a distance of 200 miles, and eating every vestige of green substance that protrudes from the ground. The mosquito and chigoe are also much dreaded.

Races of Men.—Many of the aborigines still exist in South America. The aboriginal Araucanians of Chili are more advanced in civilization than the other Indians. They associate in small communities, are industrious workers, weave and dye cloth with much skill, have fewer vices than the other tribes, and are firm and courageous. They are fond of spirituous liquors, and manufacture a drink called chicha. Like other Indians of South America, they have long been acquainted with the art of working the metals, particularly gold and silver. The Indians of the Pampas have a dark complexion, are low in stature, and ill made, but they are muscular and athletic, and are remarkably good horsemen. They do not cultivate the soil or apply themselves to any sort of labor, but lead a roving life, are cruel and ferocious in disposition, and generally settle disputes with the knife. In the southern extremity of the peninsula, below the 38th parallel, is found the Patagonian, whose stature and bulk, though very remarkable, have been much exaggerated. The average height of this race is about six feet. The head and features are large, and the complexion of a dark copper-brown. They lead a nomadic life, and subsist on the flesh of the animals they kill.

History.—The first discoverer of South America was Columbus himself, who landed at the mouth of the Orinoco in 1498. Alonzo de Hojeda, an enterprising Spanish cavalier, with a fleet of four ships, soon followed in the track of Columbus, and having reached South America near the equator, passed the mouths of the Essequibo and Orinoco rivers, and examined the greater part of the coast of Venezuela. On this expedition Hojeda was accompanied by Amerigo Vespucci, who was a native of Florence. He (Vespucci), being an experienced mariner and a man of considerable talent, published in the year 1500, after their return, an account of their voyage and explorations, and thus his name became inseparably associated with the new continent. Nearly the whole of South America was until the beginning of the nineteenth century a dependency of Spain and Portugal. About 1810 the war of independence began in the Spanish colonies, which, after about ten years, ended in the complete overthrow of Spanish rule and the establishment of a number of republics. Brazil also became (in 1823) independent of Portugal, but retained the monarchical form of government, and now is the only monarchy on the entire American continent.

Literature.—See HUMBOLDT, "Examen critique de l'histoire de la géographie du Nouveau Continent" (5 vols., 1836–39); MACGREGOR, "The Progress of America from the Discovery of Columbus to the year 1846" (2 vols., 1847); SQUIER, "The States of Central America" (1857); WAPPÄUS, in the new edition of Stein's and Hörschelmann's "Handbuch der Geographie und Statistik" (1855 seq.); KOHL, "Geschichte der Entdeckung von Amerika" (1861); "Naturalist's Directory of North America and the West Indies" (published by the Essex Institute, Salem, Mass., 1865); J. DISTURNELL, "Influence of Climate in North and South America, etc." (1867); DR. D. G. BRINTON, "The Myths of the New World" (1868); B. F. DE COSTA, "The pre-Columbian Discovery of America by the Northmen, illustrated by translations from the Icelandic Sagas" (Albany, 1868). REVISED BY J. S. NEWBERRY.

American, a township of Sacramento co., Cal. P. 416.

American Antiquities. Under this appellation are commonly included the various remains of aboriginal fortifications, mounds, etc., as well as those of architecture and art, whether existing in North, Central, or South America. This name is obviously too general and of too extensive an application for a work in which the various articles are designed to be distributed as much as possible under separate heads, so as to adapt it to convenient and ready reference. The various architectural and other remains, therefore, of Mexico and Central and South America will be noticed respectively under MEXICAN ANTIQUITIES, COPAN, PALENQUE, PERUVIAN ANTIQUITIES, TIAHUANICO, etc. But as there is no other more appropriate head under which the peculiar though widely extended remains found in the valley of the Mississippi and its tributaries can be treated, it is proposed to describe them in the present article.

Most of these monuments are mounds and walls of earth. They are usually found overgrown by the primeval forests, and in the living and decaying trees which cover them we have a record that they have been *abandoned* at least a thousand years. As they are plainly the relics of a sedentary people, very different in their habits and modes of life from the Indians who occupied all the country at the time of the advent of the whites, they have been generally regarded as the work of a distinct and now extinct race, to whom the name of Mound-Builders has been given. Besides the mounds and other earth-works left by the Mound-Builders, one occasionally finds very wide walls laid up of rough stones without mortar, some of which will be referred to farther on. We have proof also that the Mound-Builders worked the copper-mines of Lake Superior, lead-mines near Lexington, Ky., and oil-wells in Canada and North-western Pennsylvania. (*Newberry.*)

The remains of the Mound-Builders are spread over a vast extent of country. They are found on the sources of the Alleghany, in the western part of the State of New York, and in nearly all the Western States, including Michigan and Iowa. They were observed by Lewis and Clarke on the Missouri, 1000 miles above its junction with the Mississippi. They line the shores of the Gulf of Mexico from Texas to Florida, whence they extend through Alabama and Georgia into South Carolina. They are especially numerous in Ohio, Indiana, Illinois, Wisconsin, Missouri, Arkansas, Kentucky, Tennessee, Louisiana, Mississippi, Alabama, Georgia, Florida, and Texas. Many of these remains were evidently designed as works of defence

or as watch-towers in war. No inconsiderable number appear to have been formed as sepulchral monuments or places of burial for the dead; while others seem obviously to have been constructed as temples or places of worship and sacrifice. Among those evidently works of defence are the fortifications found in Ross co., O., near the village of Bourneville. These occupy the summit of a lofty hill, the sides of which are remarkably abrupt, so as to be at some points absolutely inaccessible. The defences consist of a wall of stone, now in ruins, carried around the hill a little below its brow, and extending across the neck which connects the hill with the range beyond. On the eastern side, where the declivity is least abrupt, the wall is stronger and higher than on the other sides, except across the neck (which is about 700 feet wide), where it is strongest of all. In this portion of the wall are three gateways about eight feet wide. In one place on the western side, where the abruptness of the hill makes it wholly inaccessible, the wall is discontinued for some distance. Everything, indeed, connected with these works clearly indicates that they were designed for purposes of defence. It may be added that the space enclosed within the wall is more than 140 acres, while the entire line of the fortifications measures about two and a quarter miles. The enclosure is abundantly supplied with water, which can readily be obtained at the depth of a few feet by digging, and is also found in two considerable ponds or small lakes, one of which covers about two acres. Another work of a similar character, in the southern part of Highland co., O., is known as Fort Hill. The fortifications are on the summit of a hill 500 feet high. They are composed of mingled earth and stone. Measured from the bottom of the ditch, from which the earth used in building the embankment has been excavated, the wall is in some places fifteen feet high, while the average breadth of the base is from thirty to forty feet. That these fortifications were constructed several centuries ago is rendered more than probable by the fact that a chestnut tree twenty-one feet in circumference was found growing some years since on the embankment, and an oak tree twenty-three feet in circumference, though now fallen and much decayed, had evidently grown upon the earth of the fortifications. The entire length of the wall at Fort Hill is more than a mile and a half: it encloses a space of about fifty acres. Among the remains, which give evidence of their having been constructed for religious purposes, are a large number consisting of an embankment or wall of earth in the form of a perfect circle, adjacent to which there is often a square or parallelogram made with an embankment similar to that of the circle. In Ross co., O., east of the Scioto River, near Chillicothe, are works of this description. The circle is 1050 feet in diameter, the side of the adjoining rectangle being about 900 feet. The wall of the latter is about twelve feet high, with a base of fifty feet, without any ditch on either side. The wall of the circle is somewhat lower. Nearly similar to the above, and of about the same extent, are the celebrated remains at Circleville, O., though they have (or rather had, for the lines have become almost obliterated by the repeated cultivation of the ground) this peculiarity, that the circle is formed by a double embankment, with a ditch between.

One of the most remarkable works of this kind is the Great Serpent, situated on the summit of a hill in Adams co., O. It extends 700 feet, terminating in a triple coil at the tail. The line of the body is gently and gracefully undulating, and the entire length, if extended in a straight line, would not be less than 1000 feet. Its jaws are widely distended, and it seems attempting to swallow an oval figure (perhaps designed to represent an egg) which is 160 feet long and 80 wide. The embankment which forms the body of the serpent is five or six feet high, with a base of from twenty to thirty feet. It would seem that it might have been designed as some mystical emblem. No small number of the remains consist of mounds, generally nearly conical in their form, at other times resembling a parallelogram. Of the former class is the great mound at Grave Creek, in Ohio, about twelve miles below Wheeling. It is about 70 feet high and 1000 feet in circumference at the base. In 1838 a shaft was sunk from the apex to the base; two sepulchral chambers were found constructed of logs, and covered with stones; the lower chamber contained two skeletons, the upper but one, in an advanced stage of decay. It is supposed that as a general rule each mound was raised over a single individual, although some may have been designed as general cemeteries.

Near Cahokia, in Illinois, is a very extensive earthwork in the form of a parallelogram, 700 feet long by 500 wide at the base, with a height of 90 feet. The top is level, having an area of near five acres.

Many implements and ornaments have been found in the mounds. They are usually composed of stone, though sometimes of copper, more rarely still of shell or bone. The copper is always in its native state—never alloyed, nor even cast—and shows specks of silver, such as are found only in the copper of Lake Superior. The stone implements—except the flint spear and arrow heads—are wrought with much care and skill. Pottery is found in most of the mounds; it is sometimes graceful in form and highly ornamented, oftener coarse and rude. Masses of galena, calc-spar, quartz crystals, sheets of mica, and marine shells found in the mounds, with copper and stone implements composed of materials brought from distant localities, indicate some internal but no foreign commerce. Fragments of coarse cloth have been discovered, but all fine fabrics are wanting, perhaps from the lapse of time. No bones taken from the mounds indicate that their builders had domestic animals. In many instances the human skeletons have almost entirely disappeared, attesting their great antiquity. No tablets or inscriptions yet discovered indicate that the Mound-Builders had a written language, and the inscriptions on rocks so common in the country they occupied, and usually referred to them, are of rude execution, mythical character, and of doubtful parentage; so that they throw little light on the history of this ancient race.

From all the facts before us, we can at present say little more than this: that the valley of the Mississippi and the Atlantic coast were once densely populated by a sedentary, agricultural, and partially civilized race, quite different from the modern nomadic Indians, though possibly the progenitors of some of the Indian tribes; and that after many centuries of occupation they disappeared from our country at least one thousand, perhaps many thousands, of years before the advent of the Europeans. The prehistoric remains found so abundantly in Arizona appear to be related to the civilization of Mexico; and the remnants of semi-civilized Indian tribes now found there are perhaps descendants of the ancient builders of the great houses and cities whose ruins are there found. (See SQUIER, "Memoir of the Ancient Monuments of the West," and "Aboriginal Monuments of the State of New York," 1849; BALDWIN, "Ancient America," 1872; DAVIS, "The Monuments of the Mississippi Valley;" FOSTER, "Pre-historic Races of the U. S." (1873). REVISED BY J. S. NEWBERRY.

American Indians. See INDIANS, by J. HAMMOND TRUMBULL, LL.D.

American Indians, Languages of. See INDIAN LANGUAGES, by J. HAMMOND TRUMBULL, LL.D.

American Institute. The American Institute was organized on the 19th of Feb., 1828, by a few prominent business-men of the city of New York, who were strongly impressed with the importance of fostering American manufactures; and they proposed to direct immediate attention to this subject by a public display of the best specimens of domestic skill and industry. In October of the same year the first exhibition was held in the Masonic Hall, then located on Broadway, and at its close gold and silver medals valued at more than $1000 were awarded to the successful competitors. As the expenses incurred at this exhibition were less than the receipts for the admission of visitors, the association wisely inferred that industrial expositions by judicious management could be made self-sustaining, and accordingly it took measures for ensuring a permanent organization.

By an act of the N. Y. legislature, passed May 2, 1829, the American Institute of the city of New York was incorporated "for the purpose of encouraging and promoting domestic industry in this State and in the U. S. in agriculture, commerce, manufactures, and the arts, and any improvements therein, by bestowing rewards and other benefits on those who shall make such improvements or excel in any of the said branches; and by such other ways and means as to the said corporation, or the trustees thereof, shall appear most expedient." Under this act, and without external aid, the Institute continued its operations, depending chiefly for support on the attractions of its annual fairs, yet from time to time enlarging the sphere of its usefulness, until its beneficial influence was felt and acknowledged throughout the whole country. Forty-one exhibitions have been held, a number far exceeding that of any other organization in the world. A single comparison will show the actual progress made in this department of the Institute. Its first exhibition (in 1828) was open for three days, and the number of entries of articles for competition was less than one hundred; its exhibition in 1872 continued for nearly three months, and the number of entries exceeded 1400, and embraced more than 5000 different articles.

Although several public displays illustrating progress in the useful arts had been made previous to the foundation of the American Institute, yet it is fairly entitled to the credit of having first inaugurated the system of self-sustaining annual exhibitions, which has since been success-

MAP OF SOUTH AMERICA

Drawn and Engraved on Copper-Plate EXPRESSLY FOR JOHNSON'S UNIVERSAL CYCLOPÆDIA

Scale of Miles 50 100 200 300 400 500

Longitude West 50 from Greenwich

Longitude 17 East from 27 Washington

CARIBBEAN SEA
ATLANTIC OCEAN
PACIFIC OCEAN
VENEZUELA
U.S. OF COLOMBIA
ECUADOR
PERU
BRAZIL
BOLIVIA
PARAGUAY
ARGENTINE REPUBLIC
PATAGONIA
BRITISH GUIANA
SURINAM OR DUTCH GUIANA
CAYENNE OR FRENCH GUIANA
FALKLAND ISLANDS
CENTRAL AMERICA
EQUATOR
Tropic of Capricorn
Andes Mts.
Pampas
Cordillera Geral
Sierra Acara
Sierra Pacaraima
Sierra de Mantiqueira
Sierra do Espinhaço
Sierra Geral
Sierra de Maracaju
Sierra de Apucarania
Sierra de Santa Martha
Sierra Nevada
Llanos
Gran Chaco
Desierto de Atacama
Desierto de Sechura
Desierto de Tarapaca
Desierto de Coquimbo
Desierto de Iquique
Desierto de Caravaya
Desierto de Arequipa
Desierto de Tamaya
Desierto de Tarija
Desierto de Paraguay
Desierto de Parahiba
Desierto de Santa Catharina
Desierto de Pernambuco
Desierto de Ceara
Desierto de Maranhao
Desierto de Para
Desierto de Rio Negro
Desierto de Orinoco
Desierto de Barcelona
Desierto de Barquisimeto
Desierto de Valencia
Desierto de Maracaibo
Desierto de Cartagena
Desierto de Panama
Desierto de Darien
Desierto de Choco
Desierto de Cauca
Desierto de Magdalena
Desierto de Bolivar
Desierto de Cundinamarca
Desierto de Boyaca
Desierto de Santander
Desierto de Merida
Desierto de Trujillo
Desierto de Lambayeque
Desierto de Piura
Desierto de Huanuco
Desierto de Huancavelica
Desierto de Ayacucho
Desierto de Tarma
Desierto de Junin
Desierto de Huaraz
Desierto de Chachapoyas
Desierto de Cajamarca
Desierto de Loja
Desierto de Quito
Desierto de Imbabura
Desierto de Pasto
Desierto de Popayan
Desierto de Neiva
Desierto de Mariquita
Desierto de Tolima
Desierto de Antioquia
Desierto de Medellin
Desierto de Socorro
Desierto de Pamplona
Desierto de Merida
Desierto de Maracaibo
Desierto de Coro
Desierto de Carabobo
Desierto de Caracas
Desierto de Cumana
Desierto de Barcelona
Desierto de Trinidad
Desierto de Orinoco
Desierto de Angostura
Desierto de Barinas
Desierto de Apure
Desierto de Guaviare
Desierto de Caqueta or Japura R.
Desierto de Putumayo or Iça R.
Desierto de Napo R.
Desierto de Maranon or Amazon R.
Desierto de Ucayali R.
Desierto de Huallaga R.
Desierto de Pastaza R.
Desierto de Morona R.
Desierto de Santiago R.
Desierto de Zamora R.
Desierto de Yupura R.
Desierto de Uaupes R.
Desierto de Isana R.
Desierto de Atabapo R.
Desierto de Caura R.
Desierto de Paragua R.
Desierto de Carony R.
Desierto de Trombetas R.
Desierto de Tapajos R.
Desierto de Madeira R.
Desierto de Purus R.
Desierto de Beni R.
Desierto de Mamore R.
Desierto de Guapore R.
Desierto de Paraguay R.
Desierto de Araguay R.
Desierto de Tocantins R.
Desierto de Xingu R.
Desierto de Iriri R.
Desierto de Curua R.
Desierto de Trombetas R.
Desierto de Nhamunda R.
Desierto de Jamunda R.
Desierto de Negro R.
Desierto de Branco or Rupunuri R.
Desierto de Essequibo R.
Desierto de Demerara R.
Desierto de Berbice R.
Desierto de Corentyn R.
Desierto de Surinam R.
Desierto de Marowijne R.
Desierto de Oyapock R.
Desierto de Araguary R.
Desierto de Parahiba R.
Desierto de Rio Grande
Desierto de Jacuhy R.
Desierto de Uruguay R.
Desierto de Parana R.
Desierto de Salado R.
Desierto de Dulce R.
Desierto de Colorado R.
Desierto de Negro R.
Desierto de Chupat R.
Desierto de Santa Cruz R.
Desierto de Gallegos R.
Desierto de Chico R.
Desierto de Deseado R.
Desierto de Chubut R.
Desierto de Senguerr R.
Desierto de Negro R.
Desierto de Colorado R.
Desierto de Rio Colorado
Desierto de Cusu Lebu or R. Negro
Desierto de Cobu Lebu or Rio Colorado
Desierto de Valdivia
Desierto de Concepcion
Desierto de Araucco
Desierto de Antuco
Desierto de Maule
Desierto de Rio Claro
Desierto de Curico
Desierto de Colchagua
Desierto de Rancagua
Desierto de Aconcagua
Desierto de Quillota
Desierto de Valparaiso
Desierto de Santiago
Desierto de Melipilla
Desierto de Rancagua
Desierto de Colchagua
Desierto de Curico
Desierto de Maule
Desierto de Rio Claro
Desierto de Araucco
Desierto de Antuco
Desierto de Concepcion
Desierto de Valdivia
Desierto de Chiloe I.
Desierto de Chonos Archipelago
Desierto de C. Tres Montes
Desierto de G. of Penas
Desierto de Capar I.
Desierto de Wellington I.
Desierto de Hanover I.
Desierto de Adelante I.
Desierto de Strait of Magellan
Desierto de Desolation I.
Desierto de C. Froward
Desierto de Terra del Fuego
Desierto de Staten I.
Desierto de Barbadoes
Desierto de Trinidad
Desierto de Tobago
Desierto de Grenada
Desierto de St. Vincent
Desierto de St. Lucia
Desierto de Martinique
Desierto de Dominica
Desierto de Guadaloupe
Desierto de Montserrat
Desierto de Antigua
Desierto de St. Christopher
Desierto de Nevis
Desierto de St. Eustatius
Desierto de Saba
Desierto de St. Martin
Desierto de Anguilla
Desierto de St. Barthelemy
Desierto de St. Croix
Desierto de St. Thomas
Desierto de St. John
Desierto de Tortola
Desierto de Virgin Gorda
Desierto de Anegada
Desierto de Aruba
Desierto de Curacoa
Desierto de Bonaire
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Desierto de Orchila
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Desierto de Los Roques
Desierto de Orchila
Desierto de Aves
Desierto de Tortuga
Desierto de Dragonera
Desierto de Blanca
Desierto de Sola
Desierto de Los Monges

fully imitated by other associations. Its persistent efforts in fostering the genius of invention which has wrought such magical changes in the material condition of this and other lands, probably suggested the plan of international expositions. Doubtless these have accomplished much by their general diffusion of practical knowledge; nevertheless, as financial investments not one of them has been remunerative.

One feature peculiar to the competitive displays of the American Institute which deserves especial commendation is the requirement of satisfactory practical tests of steam-engines, pumps, and other working machinery, also of harvesters and other agricultural implements, in which the power expended in the operation of each is carefully measured, thus furnishing a criterion for impartial awards.

It was early found that the interests of agriculture required a free and frequent interchange of opinions as to the best methods of tilling the soil; accordingly the Farmers' Club was established. For many years it has held weekly meetings, at which communications from all parts of the Union are read and made the subjects of interesting discussions. Full reports of these discussions appear in leading metropolitan weekly journals, and by this means it is estimated that in the year 1872 each meeting interested not less than a million readers. Through the agency of this club many farmers, even in most remote States, have been supplied with improved varieties of cereals and other seeds, the number of packages gratuitously distributed by mail in a single year having reached 12,000.

The Polytechnic Association is another important branch of the Institute, which holds weekly sessions for the purpose of examining new inventions and discoveries, and of discussing all questions relating to technology. To these and other organizations under the control of the Institute the public have free access.

During each winter the Institute gives a course of scientific lectures, which is free to the members and their families. The high character of each course has been maintained by selecting as lecturers professors in colleges and other gentlemen of acknowledged ability and culture. The library of the Institute contains about 10,000 volumes, the most of which relate to science and its useful applications. By vote of the members works of fiction are now excluded.

Since the year 1841 the Institute has made annual reports of its transactions to the legislature. The volumes printed by their authority have been widely circulated throughout the State and among kindred associations in this country and Europe. Within the last ten years these volumes, containing an average of 1200 pages each, have been increasing in interest and value. It has been the aim of the corresponding secretary, under whose supervision they are prepared, to give in each a summary of progress in science and art, both at home and abroad, and at the same time to exclude from them all discussions on abstract questions or disputed points which might tend to excite religious, political, or social prejudices.

The Institute had about 3000 members in 1873, and the value of its property was then estimated at $300,000. It has never received a bequest or endowment, but in anticipation of such an event the legislature of New York, by an act passed April 21, 1866, enlarged its powers, and directed that all donations, bequests, and devises hereafter made for its benefit should be taken and held by a board of regents, among whom are the governor of the State and the mayor of the city of New York.

The exhibition buildings owned and occupied by the Institute in 1873 extend from Second to Third avenue, and from Sixty-third to Sixty-fourth street, their length being 610 feet, and the extreme width 200 feet. They are, however, of a temporary character, and it is proposed to erect at no distant day a permanent fire-proof structure of such ample dimensions as to accommodate under one roof all the departments of the Institute.

It will be seen by this brief sketch that the American Institute is exactly adapted to meet certain intellectual wants of almost every class of citizens, and at the same time to give material aid to the inventor and manufacturer. It does not seek to educate the young, but rather to diffuse among those who have arrived at maturity a knowledge of the latest triumphs of science, the most important improvements in the arts, and the best machines and methods for increasing material productions. Its mission is not limited to its own members, for its highest aim is the public good.

The names of those who have labored long and faithfully for its success are too numerous to be here enumerated. Prominent among its early friends were Thaddeus B. Wakemann, its first corresponding secretary, who held that office for twenty years, and Gen. James Tallmadge, for twenty years its president. Among those who have more recently increased its fame and influence by their pens and personal efforts we may mention the late Horace Greeley, president of the Institute from 1866 to 1871, and the distinguished scientist and divine, the Rev. F. A. P. Barnard, LL.D., who at this time (1873) most worthily fills the same responsible post. SAMUEL D. TILLMAN.

Amer'icanism, a term applied to certain peculiar expressions or forms of the English language prevailing in the U. S.; such as *fall*, for "autumn;" *clever*, for "kind" or "obliging;" to *fix*, instead of to "arrange" or "put in order," to "dress;" *go ahead*, etc., etc. It may, however, be remarked that some of the so-called "Americanisms" are nothing more than old English words, the original signification of which has become partly or wholly obsolete in England, while it is still retained in America; for example, *sick, sickness*, instead of the modern English "ill," "illness;" and *ride*, which originally signified to be conveyed either in a carriage or on horseback, but limited to the latter exclusively by the present English usage. Both of these words are often used in the common translation of the Bible in what we may call their American signification. Others are words which in England are provincial or local, but which are in extensive, if not universal, use in the U. S.; to *wilt*, in the sense of to "droop" or "wither," is an instance of this kind. It is an obvious error to call those words "Americanisms" which have been introduced as the name of something which does not exist or is comparatively little used in England, as *prairie, molasses*, etc.

The following are some of the most remarkable Americanisms extensively prevailing in the U. S.: *Baggage*, used instead of the English word "luggage" to denote the trunks or what contains the wearing apparel, etc. of one who is travelling.—*Boss* (a corruption of the Dutch *baas*, a "master"), one who has the employment or direction of a set of workmen.—*Creek*, which signifies in England a small arm or inlet of the sea, is used almost universally in the U. S. for a "small river."—*Hack*, signifying, according to English usage, a horse let out for hire, is employed in the U. S. for a "hackney coach," of which it is doubtless an abbreviation.—*Sleigh* is in universal use in the U. S. for what the English call a "sledge."—*Woods* is almost invariably used in America instead of the English words "wood" and "forest."

Many expressions are reproachfully termed Americanisms which have the sanction of some of the best English writers; we may cite, among others, *talented*, which Coleridge condemned as an Americanism, but which is as legitimately formed as *gifted*, a word fully sanctioned by the usage of the best English authors; and *in this connection*, which, if not a very elegant expression, has at least the merit of brevity, and was used by Hazlitt long before the reproach of its being an Americanism was attempted to be fastened upon it. (See BARTLETT'S "Dictionary of Americanisms;" PICKERING'S "Vocabulary of Words and Phrases peculiar to the U. S.;" LOWELL'S Introduction to the "Biglow Papers," second series.) J. THOMAS.

American River, in the N. central part of California, formed by the union of its North and South Forks in the western part of El Dorado county; it flows in a S. W. direction, and empties into the Sacramento River a short distance above Sacramento City. Gold is found along the banks of this river and its forks.

Amer'icus, capital of Sumter co., Ga., on the Southwestern R. R., 70 miles S. S. W. of Macon, has six churches, one female college, one male high school, several common schools, one large carriage manufactory, and 150 stores and shops of all kinds. It has one weekly paper and one national bank. Pop. 3259.

JOHN R. WORRIL, FOR ED. OF "SUMTER REPUBLICAN."

Americus, a post-village and township of Lyon co., Kan., on the Missouri Kansas and Texas R. R., 8 miles N. W. of Emporia. The Neosho River furnishes valuable water-power. Pop. of township, 884.

Americus, a post-village, capital of Jackson co., Miss., near the Pascagoula River, about 150 miles S. E. of Jackson.

Americus Vespucius. See VESPUCCI.

A'mersfort', or **A'mersfoort',** a town and port of the Netherlands, in the province of Utrecht, on the river Eem, 12 miles N. E. of Utrecht. It has a Jansenist seminary, a Latin school, and manufactures of cotton and woollen stuffs. Tobacco, grain, and dried herrings are exported from this town. Pop. in 1867, 13,258.

Ames, a post-village of Washington township, Story co., Ia., on the Iowa division of the Chicago and Northwestern R. R. It has one weekly newspaper, and is the seat of the State Agricultural College. Pop. 636.

Ames, a post-village of Canajoharie township, Montgomery co., N. Y., is the seat of an academy. Pop. 150.

Ames, a township of Athens co., O. Pop. 1229.

Ames (Adelbert), an American officer, born Oct. 31, 1835, at Rockland, Me., graduated at West Point 1861, lieutenant-colonel Twenty-fourth Infantry July 28, 1866, and brigadier-general U. S. volunteers May 20, 1863; served in the artillery in the Manassas campaign 1861, engaged at Bull Run (wounded and brevet major), in defences of Washington 1861–62, in command of battery in the Virginia Peninsula 1862, engaged at Yorktown, Gaines' Mill, and Malvern Hill (brevet lieutenant-colonel), as colonel Twentieth Maine Volunteers Aug. 29, 1862, in Maryland campaign 1862, engaged at Antietam, in Rappahannock campaign 1862–63, engaged at Fredericksburg, Chancellorsville, and Beverly Ford, in Pennsylvania campaign 1863, engaged at Gettysburg (brevet colonel), in operations in the department of the South 1863–64, in command of a division in the operations before Petersburg 1864, engaged at Port Walthall Junction, Cold Harbor, and Darbytown road, in expeditions to Fort Fisher 1864–65, engaged in the assault and capture of the place (brevet brigadier-general U. S. A. and brevet major-general U. S. volunteers), and in operations in North Carolina 1865–66. Breveted major-general Mar. 13, 1865, for gallant and meritorious services in the field. Since the war was made provisional governor of Mississippi June 15, 1868, in command of fourth military district, department of Mississippi, 1869. Resigned Feb. 23, 1870, and was elected to the U. S. Senate from Mississippi on the reconstruction of that State, and took his seat April, 1870.

George W. Cullum, U. S. A.

Ames (Edward R.), D. D., a bishop of the Methodist Episcopal Church, born at Athens, O., May 20, 1806. He was educated at Ohio University, was tutor at McKendree College (1823–29), began to preach in 1830, and was appointed a bishop in 1852. Since 1861 he has resided in Baltimore.

Ames (Fisher), LL.D., an eminent orator and statesman, born in Dedham, Mass., April 9, 1758. He graduated at Harvard College in 1774, after which he studied law in the office of William Tudor of Boston, and was admitted to the bar in 1781. In several political essays which he wrote for the newspapers of Boston about 1785 he displayed practical wisdom and literary ability of a high order. He was a member of the convention of Massachusetts which in 1788 ratified the Federal Constitution, and he advocated its adoption in an eloquent speech. Having identified himself with the Federal party, he was elected a member of Congress in 1789 by the voters of the district which included Boston. He supported the administration of Washington, spoke frequently in Congress, and soon acquired a national reputation as an orator of the foremost rank. Among the most memorable of his parliamentary efforts was a powerful speech in support of Jay's treaty with England, April, 1796, which has been preserved. At the close of this speech an opponent of the treaty moved to postpone the vote on the question, giving as a reason that the members were too much excited to make a just and rational decision. After he had served four terms in Congress he retired to private life in 1797, on account of his delicate health. He married Frances Worthington of Springfield in 1792. In 1799 he pronounced a eulogy on Washington before the legislature of Massachusetts. He was elected president of Harvard College in 1804, but he declined that position. He died on the 4th of July, 1808, leaving several sons. His character was eminently pure and honorable. He was distinguished for his wit, his colloquial powers, and his brilliant imagination. His orations abound in happy metaphors and illustrations. His works, consisting of orations, essays, and letters, were published by his son, Seth Ames, in 2 vols., 1854.

Ames (Joseph), born in Roxbury, N. H., in 1816, became an artist, studied in Rome, painted excellent portraits and genre pictures, became a resident of Boston, Mass., and afterwards of Baltimore, and died in New York City, Oct. 30, 1872. Among his best works are portraits of Pius IX., Rufus Choate, and Ristori as "Medea," "Maud Muller," and "The Old Stone Pitcher."

Ames (Nathan P.), an American machinist, born in 1803, was remarkable for his sound judgment and practical ability. He owned extensive manufactories of firearms, bronze statuary, cannon, machinery, and edge-tools at Chicopee Falls and Cabotville, Mass. Died April 23, 1847.

Ames (Oakes) was born in Easton, Mass., Jan. 10, 1804. His father was a blacksmith, and the son was brought up to the same trade. The elder Ames had established his reputation as a maker of shovels; and his two sons, Oakes and Oliver, Jr., continued the manufacture of these and other implements, chiefly agricultural, upon a large scale, and acquired great wealth. He was a member of Congress from Massachusetts (1862–73), and his opinion upon financial matters had great weight. Mr. Ames was largely interested in the building of the Union Pacific R. R. and in the Credit Mobilier enterprise. Died at North Easton, Mass., May 8, 1873.

Amesbury, a township of Washington co., Me. Since 1850 depopulated.

Amesbury, a post-township of Essex co., Mass., extending from the navigable Merrimack River, its southern boundary, to the State of New Hampshire, is 40 miles by rail N. of Boston. There is a horse railroad extending to Newburyport, 5 miles distant, and also a branch railroad connecting with the Eastern R. R. Here are extensive manufactures of flannels, carriages, boots and shoes, cassimeres, broadcloths, etc. It has two weekly newspapers and seven churches. Amesbury is the residence of the poet Whittier. It has a national and a savings bank. Pop. of township, 5581. W. H. B. Currier, Ed. "Villager."

Am'ethyst [Gr. ἀμέθυστος, from α, priv., and μεθύσκω, to "make drunk"], a purple variety of rock-crystal or quartz, colored by manganese, so named from its reputed virtue of preventing intoxication. It is found in Brazil, Ceylon, India, and many other places, and is worn in the form of seals and ornamental articles. The Oriental amethyst is a variety of spinel, and is a more valuable gem than the common amethyst.

Amha'ra, the central division of Abyssinia, capital Gondar. (See Abyssinia.)

Amhar'ic Lan'guage, so called from the province of Amhara, has been, since the extinction of the Ethiopic Language (which see), the chief language of Abyssinia, and is spoken by the majority of the population in the countries between the rivers Tacazze and Abai, and in the former kingdom of Shoa, while in the countries in the N. E. of Abyssinia, N. of the Tacazze, the Tigre language predominates. Among the Semitic languages, the Amharic is nearest related, both grammatically and lexicographically, to the Ethiopic, but is by no means a new form of the Ethiopic, but rather a descendant of the Old Amharic, which is closely allied to the Ethiopic. Although the Amharic has retained many peculiarities of the Old Semitic, it still represents a later stage of development of the southern Semitic than does the Ethiopic. In all its phonetic relations the Amharic has degenerated very much, while many of its grammatical forms have been abolished, and have been only in part replaced by new forms. After the Amharic language had been used for many centuries by the people, and after the extinction of the Ethiopic, it became a written language, the Ethiopic alphabet being employed, while for the sounds peculiar to the Amharic new characters were introduced by a modification of the Ethiopic characters. Although the Amharic cannot be called a literary language in the true sense of the word, still many works have been written in it within the last three centuries, partly translations and explanations of biblical and other Ethiopic books and vocabularies, partly short historical works, dogmatical and ethical compendia, formulæ for confession, etc. for the people, and partly medical and magical treatises. In the Ethiopic-Amharic books of the history of the native kings some of the older Amharic poems are given. But of these works very little is known in Europe. Up to the present time, only missionary works have been printed. The Amharic has been treated grammatically and lexicographically by Ludolf (1698), more completely by Isenberg (Lexicon, 1841; Grammar, 1842).

Am'herst, a town and seaport of British Burmah, is on the E. shore of the Bay of Bengal, 30 miles S. S. W. of Maulmain. It was founded in 1826. The harbor is exposed to the S. W. monsoon. Pop. about 30,000.

Amherst, a village of Cumberland co., Nova Scotia, is situated near the N. W. extremity of the Bay of Fundy, on the Intercolonial R. R. It has one weekly newspaper, a considerable lumber-trade, agriculture, coal-mining, manufacturing, and shipbuilding. Pop. about 2000.

Amherst, a county of the central part of Virginia, has an area of 418 square miles. It is bounded on the S. W. and S. E. by the James River, and on the N. W. by the Blue Ridge. The surface is diversified, and presents beautiful scenery where the James River passes through the Blue Ridge. Grain, tobacco, and wool are produced. Capital, Amherst. Pop. 14,900.

Amherst, a post-township of Hancock co., Me. P. 350.

Amherst, a post-village and township of Hampshire co., Mass., on the New London Northern R. R., 85 miles N. of New London, and on the Mass. Central R. R., 82 miles W. of Boston. It is the seat of Amherst College and of the Mass. Agricultural College. (See Amherst College.) The town has one high school, four grammar schools, four intermediate and nine primary schools. It has one national and one savings bank, nine churches, two newspapers, three paper and two planing mills, one manufactory of leather, four of children's wagons, one of palm-leaf hats,

and one of planes. Amherst is also one of the healthiest and best agricultural towns in Mass. The village is situated upon an elevation which affords a beautiful view of the fertile and picturesque valley of the Conn. and of the surrounding mountains—the Holyoke range to the S. W., and on the N. Mettawampe, Sugar Loaf, and others. Pop. of township, 4635. W. H. HOBBIE.

Amherst, a post-township of Fillmore co., Minn. Pop. 1115.

Amherst, one of the three shire-towns of Hillsborough co., N. H., a beautiful village 48 miles from Boston, 11 from Nashua, and 30 from Concord, on the Wilton R. R. It has Congregational, Baptist, and Methodist churches, court and town-house, high school house and a fine hotel. The township contains Babboosuck Lake and a mineral spring. It is a fine summer resort. It has one weekly paper, and was the birthplace of Horace Greeley. Pop. of township, 1353.

E. D. BOYLSTON, PUB. "FARMERS' CABINET."

Amherst, a township of Erie co., N. Y. It contains a copious sulphur spring, natural gas-works, which yield illuminating gas, and has also quarries of hydraulic limestone. Williamsville, the principal village, contains an academy, four churches, and a number of manufactories. Pop. 4555.

Amherst, a post-township of Lorain co., O. Pop. 2482.

Amherst, the county-seat of Amherst co., Va., 13 miles N. of Lynchburg, on the W. C. V. M. and G. R. R. It contains two churches (Episcopal and Methodist), a high-school, one newspaper, and a fine public hall. Pop. of township, 3632. ED. "ENTERPRISE."

Amherst, a post-township of Portage co., Wis. P. 982.

Amherst, EARLS OF, and Viscounts Holmesdale (1826, in the peerage of the United Kingdom) and Barons Amherst (1788, in the peerage of Great Britain), a noble family of Great Britain.

Amherst (JEFFERY), called **Lord Amherst,** a British general, born in Kent Jan. 29, 1717. He entered the army in 1731, became a colonel in 1756, and a major-general in 1758. He rendered important services in the war against the French which resulted in the conquest of Canada in 1760, and at the end of that war was appointed commander-in-chief of the British army in America. He became governor of Virginia in 1763, was created Baron Amherst in 1776, and was commander-in-chief of the army in England from 1776 to 1782. In 1796 he obtained the rank of field-marshal. Died Aug. 3, 1797.

Amherst (WILLIAM PITT), FIRST EARL OF, a nephew of the preceding, was born in England Jan. 14, 1773. He was sent as ambassador to China in 1816, and reached Pekin, but he failed to effect the object of his mission, as he refused to comply with the degrading ceremonies which Chinese etiquette prescribed, and was not admitted into the presence of the emperor. He was governor-general of India in 1823–26, and was created an earl in 1826. Died Mar. 13, 1857.—His son, WILLIAM PITT, born Sept. 3, 1805, succeeded him as second earl.—His eldest son, WILLIAM ARCHER, Viscount Holmesdale, born Mar. 25, 1836, was from 1859 to 1868 member of the House of Commons for West Kent, and was in 1868 re-elected as member for Mid-Kent.

Am'herstburg, a town of Essex co., Ontario, Canada, on the Detroit River, 5 miles from its entrance into Lake Erie, and 225 miles W. S. W. of Toronto. It contains a court-house, five or more churches, and one newspaper-office. Pop. in 1871, 1936.

Amherst College, one of the leading colleges in the United States, is situated in Amherst, Hampshire co., Massachusetts. It was founded in 1821, and at its semi-centennial in 1871 it had 1936 alumni, of whom 1450 are supposed to be living. Of the 1936 graduates up to the last triennial, 751 were ministers, 75 missionaries in foreign lands, 129 doctors of medicine, 186 lawyers, and 208 professors and teachers; 195 served in the late war, and 26 sacrificed their lives in the service. The college edifices, 12 in number, have been erected at a cost of $300,000. The pecuniary value of the scientific and archæological collections cannot be estimated at less than $125,000, and the whole property of the institution, including permanent funds, professorships, scholarships, prizes, etc., is more than a million of dollars. All this is the gift of private charity and munificence, with the exception of about $50,000 granted by the State. The donors have been the Christian men and women of Massachusetts. The largest benefactors are Hon. Samuel Williston and Dr. William J. Walker; the former has given $150,000, and the latter a quarter of a million. The Hitchcock Ichnological Cabinet, the Adams Collection in Conchology, and the Shepard Mineralogical and Meteoric Collections, are known the world over as of unsurpassed value and excellence. The Barrett Gymnasium, with its accompanying system of exercise and instruction, constitutes a feature peculiar to this institution; all the students, unless excused for special reasons, are required to exercise half an hour daily, chiefly in the light gymnastics, under the direction of a professor who is an educated physician, and who has charge of their health and physical culture. The faculty of Amherst College at present consists of 21 persons, including the president, 12 professors, 3 lecturers, 4 instructors, and an assistant librarian. The number of students in 1871, the year of jubilee, all in the four classes of the regular college course, was 261—65 seniors, 49 juniors, 76 sophomores, and 71 freshmen. The annual income is about $50,000. The presidents of the college have been Rev. Zephaniah Swift Moore, D.D. (1821–23); Rev. Heman Humphrey, D.D. (1823–45); Rev. Edward Hitchcock, D.D., LL.D. (1845–54); and Rev. William A. Stearns, D.D., LL.D.

The Massachusetts Agricultural College, although the offspring of Amherst College, and situated in the same place for the purpose of securing the advantage of its scientific treasures, has no organic connection with it, having a separate faculty and a distinct board of trustees, elected by the legislature of the State. It was opened for students in the fall of 1867, and held its first commencement, with the graduation of its first class, in the summer of 1871. It has three college halls, two boarding-houses, the Durfee Plant-house, and a botanic museum, besides the buildings pertaining to the farm, which consists of over 300 acres. The students work on the farm a certain number of hours each week, under the direction of the superintendent and the professor of agriculture. They also receive regular military exercise and drill under the professor of military science and tactics. The real estate of the college cost about $200,000. Its permanent funds, derived from the sale of lands given by Congress, from grants by the State, and from private donations, amount to half a million. The faculty, as exhibited in the catalogue of 1871, consists of 28 persons, including the president, Dr. William S. Clark, 7 professors, 2 instructors, 16 non-resident lecturers, a gardener, and a farm superintendent. There were then 147 students—30 seniors, 34 juniors, 27 sophomores, 32 freshmen, 22 select, and 2 resident graduates. (See "History of Amherst College," by Prof. W. S. TYLER, D.D., 1872.)

W. S. TYLER.

Amherst Islands, a group in the Yellow Sea, near the S. W. coast of the peninsula of Corea.

A'mia Cal'va, the scientific name of a species of fish found in the fresh waters of North America. It is one of the few living ganoids, is interesting from its relationship to the ancient fossil fishes, and remarkable for the cellular structure of its air-bladder, which somewhat resembles the lung of a reptile. It is known as the "dog-fish" or "lawyer," and is worthless as food.

Amian'thus [Gr. ἀμίαντος, "undefiled," from α, priv., and μιαίνω, to "defile"], a delicate and fibrous form of serpentine, so called because cloth made of it can be purified by fire. It is sometimes called mountain flax. The cloths in which the ancients wrapped the bodies that were burned on the funeral pyre were sometimes made of amianthus.

Am'ic Ac'ids, acids in which a portion of the hydroxyl (OH) has been replaced by amidogen (NH_2). When dry ammonia gas is passed over a thin layer of sulphuric anhydride (SO_3), the gas is absorbed, and a white crystalline compound results which contains $N_2H_6SO_3 = (NH_4)_2SO_4 - H_2O$, or ammonic sulphate, less one molecule of water. On dissolving it in water it fails to give the reactions of sulphuric acid; it is the ammonium salt of a new acid, sulphamic acid. Its relation to sulphuric acid is thus shown:

$$\text{Sulphuric acid, } H_2SO_4 = \left.\begin{matrix}HO\\HO\end{matrix}\right\} SO_2,$$

$$\text{Sulphamic acid, } H.NH_2.SO_3 = \left.\begin{matrix}HO\\NH_2\end{matrix}\right\} SO_2.$$

Sulphamic acid is monobasic, and forms numerous salts:

Ammonic	sulphamate,	$NH_4.NH_2.SO_3$,
Potassic	"	$K.NH_2.SO_3$,
Baric	"	$Ba(NH_2.SO_3)_2$.

Dry carbonic anhydride (CO_2) unites with dry ammonia (NH_3), forming ammonic carbamate, $NH_4.NH_2.CO_3 = N_2H_6CO_2$, or equivalent to ammonic carbonate, $(NH_4)_2CO_3$, less H_2O. This salt contains carbamic acid, the relation of which to carbonic acid is thus shown:

$$\text{Carbonic acid, } H_2CO_3 = \left.\begin{matrix}HO\\HO\end{matrix}\right\} CO,$$

$$\text{Carbamic acid, } H.NH_2.CO_2 = \left.\begin{matrix}HO\\NH_2\end{matrix}\right\} CO.$$

Ammonic carbamate exists in common ammonic carbonate, and was formerly called anhydrous carbonate of ammonia. It dissolves readily in water, and by combining one mole-

cule of water passes into ammonic carbonate, $NH_4.NH_2.CO_2 + H_2O = (NH_4)_2CO_3$.

When both molecules of hydroxyl in a bibasic acid are replaced by amidogen, a neutral amide results. Carbamide or urea, $(NH_2)_2CO$, is such an amide. Bibasic acids may thus form an amic acid or a neutral amide, according as one or both molecules of hydroxyl are replaced by amidogen. Tribasic acids may form two amic acids and a neutral amide. Monobasic acids containing only one hydroxyl yield no amic acids, only neutral amides.

C. F. CHANDLER.

Am'ice, or **Amic'tus,** an upper garment worn by the Romans over the tunic; also a linen vestment worn over the shoulders of Roman Catholic priests during the celebration of the mass.

Ami'ci (GIOVANNI BATTISTA), an Italian optician and savant, born at Módena Mar. 25, 1784. He was skilful in the fabrication of mirrors and lenses for telescopes and microscopes. He was for many years director of the observatory of Florence, where he gained distinction as an observer. He wrote on double stars and other topics of astronomy. The achromatic microscope which he constructed was considered a valuable improvement. Died April 10, 1863.

Am'ides, compounds derived from ammonia, NH_3, by the replacement of one or more atoms of H by a metal or by a compound radical, acid or basic. According to the character of the replacing body, they are either—

1. Amides proper, in which one or more hydrogen atoms are replaced by an acid radical; as,

Acetamide, $N.C_2H_3O.H_2$,
Diacetamide, $N.(C_2H_3O)_2.H$.

2. Amines, in which one or more hydrogen atoms are replaced by a basic radical; as,

Potassamine, $N.KH_2$,
Diamylamine, $N.(C_5H_{11})_2.H$.

3. Alkalamides, in which hydrogen is replaced by both acid and basic radicals; as,

Mercurobenzamide, $N.Hg.C_7H_5O.H$,
Ethylformamide, $N.C_2H_5.CHO.H$.

Monamides are derived from one molecule of ammonia, NHHH.
Diamides " " two " " $N_2H_2H_2H_2$.
Triamides " " three " " $N_3H_3H_3H_3$.

Amines and alkalamides present corresponding classes.

According as one-third, two-thirds, or all the hydrogen of the ammonia is replaced, the amide, diamide, or triamide is said to be primary, secondary, or tertiary. Amides are well illustrated by

$$\text{Acetamide, } N.C_2H_3O.H_2 = N\begin{cases} C_2H_3O \\ H \\ H. \end{cases}$$

It is a white crystalline solid, which melts at 172° F., and boils at 430° F. Heated with acids or alkalies, it unites the elements of water, forming acetic acid and ammonia, $N.C_2H_3O.H_2 + H_2O = NH_3 + H.C_2H_4O_2$. It is formed by the action of heat on ammonic acetate, and by other methods: $NH_4.C_2H_3O_2 = N.C_2H_3O.H_2 + H_2O$. It acts both as a base and as an acid. By uniting with hydrochloric and nitric acids it forms compounds analogous to ammonic salts, while by admitting silver in place of hydrogen, silver-acetamide is produced. (See AMINES.) C. F. CHANDLER.

Amidine. See STARCH.

Amid'ogen [contracted from *ammonia* and the Gr. *γεννάω*, to "produce"], a compound of one atom of nitrogen and two atoms of hydrogen. Its symbol is NH_2. It has not been obtained in a separate state, but may be traced in combination with other substances, with which it forms important organic compounds called *amides*. Potassiamide, NH_2K, is a compound of the metal potassium with amidogen. Ammonia is a compound of NH_2 with H. (See AMIC ACIDS, AMIDES, and AMINES, by C. F. CHANDLER.)

Amiens (anc. *Samarobri'va* and *Ambia'ni*), an ancient and important town of Northern France, capital of the department of Somme, is on the river Somme, and on the Paris and Boulogne R. R., 81 miles by rail N. of Paris. It was once very strongly fortified, and still has a citadel. It is the seat of a bishop, and contains a magnificent Gothic cathedral 415 feet long, 182 feet wide, having a spire 420 feet high, which was founded in 1220 and finished in 1288. Among its other fine edifices are the hôtel de ville, Château d'Eau, and the library, containing 60,000 volumes. Here are extensive manufactures of cotton velvet, serges, plush, and other cotton and woollen stuffs. The river, which is here divided into many canals, affords water-power for mills and manufactories. Amiens was the native place of Peter the Hermit and of Delambre. An important treaty, called "the Peace of Amiens," was signed here by the French and British in Mar., 1802. On Nov. 27, 1870, the German general Manteuffel obtained here a great victory over the French army of the Loire, and soon after the Germans took possession of the town. Pop. in 1866, 61,063.

Am'ines, amides in which the radical replacing hydrogen is basic, an alcohol radical. They are monamines, diamines, triamines, etc., according as they are formed from one, two, three, or more molecules of ammonia. The nitrogen may be replaced by phosphorus, arsenic, antimony, etc., giving rise to phosphines, arsines, stibines, etc.

The natural organic bases, alkaloids, found in plants, probably belong to this class of bodies. The amines have of late acquired great theoretical and practical importance. They are basic compounds, resembling ammonia to a greater or less degree in odor, alkaline reaction, and readiness to form salts with acids. A few examples will best illustrate the class: Ethylamine, $NC_2H_7 = NH_2(C_2H_5)$, a mobile liquid which boils at 66° F. It has a pungent odor, very like that of ammonia, turns reddened litmus blue, forms a cloud with hydrochloric acid, produces salts with acids very similar to the corresponding ammonic salts, is readily soluble in water. Diethylamine, $NH(C_2H_5)_2$, and triethylamine, $N(C_2H_5)_3$, are similar compounds. When triethylamine is mixed with ethyl iodide, C_2H_5I, a crystalline tetrethyl-ammonium-iodide, $(C_2H_5)_4I$, is formed, analogous to ammonium iodide, NH_4I. On treating this compound with precipitated silver oxide suspended in water, a tetrethyl-ammonium hydrate is formed, which resembles in many respects potassic and sodic hydrates. Its solution is strongly alkaline, very bitter, destroys the skin, saponifies the fats, decomposes many metallic salts, precipitating hydrates. With acids it forms neutral salts. Its chloride unites with platinic chloride, forming orange-yellow octahedra. The analogy with ammonia is shown by the following symbols:

Ethylamine, $NH_2(C_2H_5)$, ammonia, NH_3.
Diethylamine, $NH(C_2H_5)_2$.
Triethylamine, $N(C_2H_5)_3$.
Tetrethyl-ammonium, $N(C_2H_5)_4$, ammonium, NH_4.
" iodide, $N(C_2H_5)_4I$, ammonium iodide, NH_4I.
" hydrate, $N(C_2H_5)_4(OH)$, ammonic hydrate, $NH_4(OH)$.

Phenylamine or aniline, $C_6H_7N = N(C_6H_5)H_2$, is a very important member of this class. (See ANILINE.)

Diamines represent two molecules of ammonia in which two, four, or six atoms of H are replaced by one, two, or three molecules of a diatomic radical:

Ethylen-diamine, $N_2(C_2H_4)''H_4$.
Diethylen-diamine, $N_2(C_2H_4)''_2H_2$.
Triethylen-diamine, $N_2(C_2H_4)''_3$.

(See ETHYLENE BASES.) Triamines, triglyceryl-triamine, $N_3(C_3H_5)'''_3$, tetramines, and pentamines are supposed to exist. (See ROSANILINE.) C. F. CHANDLER.

Amite, a river rising in the S. W. part of Mississippi, enters Louisiana, flows southward to Ascension parish, where it turns towards the E., and falls into Lake Maurepas. Length, about 100 miles.

Amite, a county of Mississippi, bordering on Louisiana, has an area of about 700 square miles. It is traversed by the Amite River, and bounded on the N. W. by the Homochitto. The surface is somewhat diversified; the soil is adapted to cotton. Cattle, rice, wool, and corn are also produced. Capital, Liberty. Pop. 10,973.

Amite, a post-village, capital of Tangipaho parish, La., on the Amite River, and on the New Orleans Jackson and Great Northern R. R., 68 miles N. N. W. of New Orleans. It has one weekly newspaper. Pop. 910.

Am'ity, a post-township of Livingston co., Ill. P. 790.

Amity, a post-village of Page co., Ia., in a township of its own name, 115 miles S. W. of Des Moines. Pop. of township, 1010.

Amity, a post-township of Aroostook co., Me. P. 311.

Amity, a township of Allegany co., N. Y. It has considerable manufactures. Pop. 2087.

Amity, a township of Berks co., Pa. Pop. 1646.

Amity, a township of Erie co., Pa. Pop. 924.

Am'ityville, a post-village of Huntington township, Suffolk co., N. Y., is on the South Side R. R. of Long Island, 29 miles from the N. Y. ferries. Pop. 500.

Am'leth, or **Ham'leth,** an ancient prince of Jutland, who is considered a fabulous personage by some writers. He is said to have lived about 150 B. C. His story is related by Saxo Grammaticus, and was formerly considered the foundation of Shakspeare's "Hamlet."

Am'lwch, a seaport and parliamentary borough of North Wales, is on the N. coast of the island of Anglesey, 15 miles N. W. of Beaumaris. It owes its growth and prosperity to the Parys and Mona copper-mines. Pop. in 1871, 7034.

Am′man, or **Am′mon** (the ancient *Rabbah*, the capital of the Ammonites), a ruined city of Syria, in the pashalic of Damascus, is picturesquely situated on the Zurka, an affluent of the Jordan, 55 miles E. N. E. of Jerusalem. Here was an important city in ancient times, originally named Rabbah, which was besieged and taken by the army of King David. (See 2 Samuel xi. and xii.) After it had been once ruined, it was rebuilt by Ptolemy Philadelphus, and called Philadelphia. It has extensive ancient remains. As late as 300 A. D. it was a remarkable city, having a magnificent theatre and temples. It was one of the cities of the Decapolis.

Am′man (Johann Conrad), M. D., a Swiss physician, born at Schaffhausen in 1669, practised at Haarlem, in Holland. He acquired distinction by his successful efforts to teach the deaf and dumb to speak, and wrote on that subject an essay called "Surdus Loquens" (the "Deaf Speaking," 1692). Died in 1724.

Amman (Jost or Justus), an eminent Swiss engraver and designer, born at Zurich in 1535. He removed about 1560 to Nuremberg, where he worked for many years, and illustrated numerous books with his designs. He engraved on copper and on wood. Among his works are "Portraits of the Kings of France from Pharamond to Henry III." (1576), and wood-cuts of "Reinecke Fuchs." Died in 1591.

Ammana′ti, Ammana′te, or **Ammana′to** (Bartolommeo), an eminent Italian sculptor and architect, born at Florence in 1511, was a pupil of Sansovino. He was patronized by Pope Julius III., who employed him to adorn the Capitol (in Rome) with sculptures. He completed the Pitti palace of Florence. Among his best works are a bridge called Ponte della Trinità at Florence, and three statues which adorn the tomb of Sannazar at Naples. Died about 1590.

Am′meline, a white crystalline, feebly basic substance, resulting from the action of acids or alkalies on melam, is considered to be an amic acid of cyanuric acid. Its composition is $C_3N_5H_5O$.

Am′men (Daniel), U. S. N., born May 15, 1820, in Ohio, entered the navy as a midshipman July 7, 1836, became a passed midshipman in 1842, a lieutenant in 1849, a commander in 1863, a captain in 1866, a commodore in 1872. During the latter part of 1861, and all of 1862, he commanded the gunboat Seneca in the South Atlantic blockading squadron; he bore a conspicuous part in the battle of Port Royal, Nov. 7, 1861, where he gained the admiration of his officers and men for his skill, coolness, and intrepidity. He engaged afterwards in all the operations of Dupont's command on the coasts of Georgia and Florida. In an official report to Flag-officer Dupont of Dec. 6, 1861, Commander C. R. P. Rodgers writes: "I have to thank Lieutenant-commanding Stevens for the most earnest, cordial, and efficient co-operation, and also Lieutenants-commanding Ammen and Bankhead, whose vessels were always in the right place, and always well handled." And again in a despatch of Jan. 3, 1863, Rogers says: "Lieutenant-commanding Ammen will make a separate report of the Seneca and Ellen at Seabrook before I met him. It is unnecessary for me to say to you that his work was *thoroughly* done." He was engaged as commanding officer of the monitor Patapsco with Fort McAllister, Mar. 3, 1863, and complimented by his superior officer, Captain Percival Drayton, for his services during the action; in the ironclad attack on Fort Sumter, April 7, 1863, and commended by Flag-officer Dupont in his despatch of April 15, 1863, for "the highest professional capacity and courage;" in both attacks on Fort Fisher Dec., 1864, and Jan., 1865, and for the "cool performance" of his duty on these occasions recommended for promotion by Rear-admiral David D. Porter; in 1866 and 1867 a member of the board assembled to examine volunteer officers for admission into the regular navy; in 1869 appointed chief of the bureau of yards and docks, and on Oct. 1, 1871, chief of bureau of navigation, in the discharge of which duty he is now engaged.

Foxhall A. Parker, U. S. N.

Ammen (Jacob), an American officer and teacher, born Jan. 7, 1808, in Botetourt co., Va., graduated at West Point 1831, and became, July 16, 1862, brigadier-general U. S. volunteers. While a lieutenant of artillery he served at the Military Academy as an assistant instructor, 1831–32 and 1834–37; at Charleston harbor 1832–33, during South Carolina's threatened nullification, and at Fort Trumbull, Conn., 1833–34. After his resignation from the army, Nov. 30, 1837, he was professor of mathematics in Bacon College, Ky., 1837–39, of mathematics in Jefferson College, Miss., 1839–40 and 1843–48, of mathematics in the University of Indiana, 1840–43, and of mathematics and astronomy in Georgetown College, Ky., 1848–55; and civil engineer at Ripley, O., 1855–61. During the civil war he was captain and lieutenant-colonel of the Twelfth Ohio Volunteers, colonel of the Twenty-fourth, and brigadier-general U. S. volunteers, serving in the West Virginia campaign 1861; engaged at Cheat Mountain and Greenbriar, in the Tennessee and Mississippi campaign, engaged at battle of Shiloh and siege of Corinth, in various movements of the army of the Ohio, 1862–63, and in command of several districts in Illinois, Kentucky, and Tennessee, till he resigned, Jan. 14, 1865.

George W. Cullum, U. S. A.

Am′mergau′ Mys′tery [Ger. *Ammergauer Passionsspiel*], the name given to the representation of our Saviour's Passion which since 1634 has taken place every ten years at the village of Ober-Ammergau, in Bavaria. The custom originated in a vow made by the inhabitants, on their deliverance from the plague, to celebrate the Passion Tragedy every tenth year. The last took place in 1870, but was interrupted by war, and finished in 1871. (See Holland, "Das Ammergauer Passionsspiel im Jahre 1870," 1870.)

Ammia′nus Marcelli′nus, an eminent Roman historian, born at Antioch, was of Greek extraction. He served in the army in his youth (about 350 A. D.), and in the expedition which the emperor Julian conducted against Persia. Having abandoned the military profession, he settled at Rome, and there composed in Latin his "History of the Roman Empire," in 31 books, of which 13 are lost. The entire work comprised the period from 96 A. D. to 378 A. D. His history is highly prized for its impartiality and other merits. (Best ed. by Wagner and Erfurdt, 1808, 3 vols.) He is supposed to have been a pagan. Died about 395 A. D.

Ammira′to (Scipione), an Italian historian, born at Lecce, in the kingdom of Naples, Sept. 27, 1531. He became a resident of Florence in 1569, and was patronized by the grand duke Cosimo. In 1596 he obtained a prebend in the cathedral of Florence. He wrote, besides other works, a "Discourse on Cornelius Tacitus" (1594), and a "History of Florence" ("Istorie Fiorentine," 2 vols., 1600–41), which is regarded by some critics as the most accurate work on that subject. He has been styled the modern Livy. Died Jan. 30, 1601.

Ammod′ytes [from the Gr. ἀμμοδύτης, a "sand-burrower"], the name of a Linnæan genus of apodal fishes, characterized by a compressed head narrower than the body, and both elongated. The sand-eel is an example of this genus.

Am′mon, or **Ham′mon** [Gr. Ἄμμων], an ancient pagan deity worshipped in Egypt, Greece, and other countries, was called *Amun* by the Egyptians, and *Jupiter Ammon* by the Romans. He was sometimes represented in the form of a ram. There was a great temple of Ammon in the oasis of Siwah or Ammonium in the Libyan Desert, and another at Thebes, which city was called No-Ammon by the ancient Hebrews. Alexander the Great visited the temple of Ammon in the oasis (B. C. 331), and assumed the title of the son of Ammon. Remains of this temple still exist.

Ammon, von (Christoph Friedrich), an eminent German Protestant theologian and pulpit orator, born at Baireuth Jan. 16, 1766. He became professor of theology at Göttingen in 1794, obtained a chair at Erlangen in 1804, and removed in 1813 to Dresden, where he was appointed court-preacher to the king of Saxony. He was a man of great and varied erudition, and belonged to the Rationalist school in theology. His most important work is "Fortbildung des Christenthums zur Weltreligion" (4 vols., 1833–40). Died May 21, 1820.

Ammo′nia [for etymology see below], or **Volatile Alkali,** an important chemical compound in the form of a transparent, colorless, and pungent gas, is formed by the union of one atom of nitrogen and three atoms of hydrogen. Its symbol is NH_3. Priestly, who first obtained it in a separate state, called it *alkaline air*. The name *ammonia* is derived from *sal-ammoniac*, which was formerly procured near the temple of Ammon, in Libya, by burning camel's dung. It is now obtained as a by-product by the distillation of bituminous coal in making gas, and from refuse animal matter in preparing bone-black, etc. It combines with acids to form salts. As it supplies to plants the nitrogen they require, it is one of the most important ingredients in manures. (See Guano.) A solution of this gas in water is used in medicine, and is called spirits of hartshorn or *liquor ammoniæ*. One volume of water will dissolve or absorb 500 volumes of ammonia. Liquid ammonia has been employed as a motive-power by Tellier, and for the production of artificial cold by Carré. (See Ice.) This gas can also be liquefied by pressure and cold, and then becomes a colorless liquid, with the properties of ammonia much intensified. The smelling salt, or volatile salt of hartshorn, used as a restorative in faintness, is a carbonate of ammonia. Ammonic sulphate, $(NH_4)_2SO_4$, is manufactured in large quantities, by boiling "gas-liquor" with lime, and

conducting the ammoniacal gas which is liberated into sulphuric acid. On evaporating the solution, the sulphate is obtained as a white salt. It is extensively used in the manufacture of alum in place of potassic sulphate, as a constituent of artificial fertilizers, and for the preparation of other ammoniacal salts. Ammonic nitrate is used for the preparation of nitrogen monoxide (N_2O), laughing-gas. Ammonic chloride, NH_4Cl, has long been known as *sal-ammoniac*. The "ammonia type" is one upon which a few inorganic and many organic compounds are formed. (See AMIDES, AMINES, etc., by PROF. C. F. CHANDLER, PH. D., LL.D.)

Ammo'niac [Lat. *ammoni'acum*], a gum-resin used in medicine, is imported from Africa and India. It is obtained from the *Dore'ma ammoni'acum*, an umbelliferous plant containing a milky juice, which by drying is converted into this gum. It is used as an expectorant, and sometimes applied externally as a plaster.

Ammoni'tes [from *Am'mon*, and the Gr. λίθος, a "stone;" so named from their resemblance to the horns of Jupiter Ammon; English *Am'monite*], an extinct genus of mollusks belonging to the order Cephalopoda, and one of the most striking features in the fauna of the mesozoic ages. The ammonites were discoid, chambered, spiral shells, sometimes four feet in diameter, and often beautifully ornamented exteriorly.

Ammonite.

The internal structure was similar to that of the *Nautilus*, except that the siphon was external, and the septa (partitions between the chambers) were arched outward, and were convoluted at their margins, so that their intersecting with the walls of the shell produced beautiful foliated figures. The ammonites began in the trias, were immensely multiplied in the Jurassic and cretaceous ages, and became entirely extinct at the close of the latter. More than 500 species have been described, and they are found in the mesozoic strata of all parts of the world. Beautiful ammonites occur in the cretaceous rocks of the country bordering the upper Missouri, in the Indian Territory, and in Texas. The old genus *Ammoni'tes* has been lately much subdivided by Prof. Alph. Hyatt, Prof. von Hauer, and others. (See "Bulletin Mass. Comp. Anat. Cambridge," and article AMMONITIDÆ, by J. S. NEWBERRY.)

Am'monites, an ancient Semitic tribe or nation, descendants of Ben-Ammi, a son of Lot. They inhabited the east side of the Jordan, between the rivers Arnon and Jabbok, and adjoining the northern part of Moab. Their chief city was Rabbah. (See AMMAN.) They frequently waged war against the Israelites, and were conquered by Jephthah, and afterwards by King David. (See 2 Samuel xi. and xii.) About 164 B. C. they were defeated by Judas Maccabæus. They are called "the children of Ammon" in the Old Testament.

Ammonit'idæ, a family of cephalopodous mollusks, of which the genus *Ammoni'tes* is the type. The genera of this group are all extinct, beginning with *Goniati'tes* in the Devonian and carboniferous, followed by *Cerati'tes* and *Ammonites* in the trias; *Ammonites* in great development in the Jurassic and cretaceous; *Baculi'tes, Scaphi'tes, Ancylo'ceras, Crio'ceras, Helico'ceras, Hetero'ceras, Ptycho'ceras, Hami'tes, Turrili'tes*, etc., being exclusively cretaceous, and the family ending with them.

The shells of the Ammonitidæ are all chambered, and were generally, though not always, external; the animal inhabiting the last and largest, called the body-chamber. The series of smaller chambers are supposed to have served as a float, by which the specific gravity of the animal was harmonized with that of the surrounding medium, and this shell maintained in a position best suited to its movements.

The septa are arched outward at the centre, and ruffled at the margins; are nearly simple in the earliest stages of growth, most convoluted at full maturity, more simple again in old age. The ornamentation of the external surface, which consists of ridges, knobs, and spines, and is often very elaborate, follows the same law.

In most of the Ammonitidæ the shell is a discoid spiral, but the cretaceous genera exhibit great diversity of form; as *Ammonites*, with a symmetrical spiral coiled in the same plane; *Scaphites, Ancyloceras, Crioceras*, and *Toxo'ceras*, showing a gradual unrolling of the coil, until in *Baculites* the shell is quite straight. In *Helicoceras* it forms an open elevated spiral; in *Turrilites*, an elongated conical closed spire, like that of a gasteropod, but sinister, turned to the left.

The life-history of the Ammonitidæ is very peculiar and interesting. After a long term of existence, during which they show a modest simplicity of structure and little diversity of form, in the mesozoic ages the family is expanded and developed in the most wonderful way, their numbers being enormously increased, their size becoming gigantic, their forms being almost infinitely varied, their structure more complicated, their ornamentation more elaborate, diversified, and beautiful. The cretaceous period was the golden age of the Ammonitidæ, when they attained such numbers, size, variety, and beauty as to far eclipse all other tribes of shelled mollusks, living or extinct. Their greatness ended here, however. Like the flowering of a plant or the splendor and extravagance of an over-civilized nation, their extraordinary development seems to have been exhaustive of the vital energies, as in the age next succeeding their grand climacteric, so far as now known, they had no representative.

The peculiar features in the career of the Ammonitidæ are best seen in contrast with that of their nearest relatives, the Nautilidæ. The latter began their existence in the earliest palæozoic seas as mollusks, with straight (*Orthoceras*) or coiled (*Nautilus*) shells, of which the structure was very simple. Of this family the Orthocerata are extinct, but the genus *Nautilus* has held its undeviating way through all past ages, and is now represented by living species which can hardly be distinguished from those that lived millions of years ago. The full explanation of the difference in the history and fate of these two closely allied families is perhaps beyond our reach, but it seems probable that we have here another illustration of the truth which underlies the diversity of fate in human individuals and nations, as well as of species, genera, and orders in the life-history of the globe—viz., simplicity of structure and habit promotes longevity by its adaptation to general and prevailing circumstances in time and space, while a highly specialized organization will flourish only in special and rare conditions. J. S. NEWBERRY.

Ammo'nium (NH_4), a hypothetical metal which is supposed to exist in the salts of ammonia, and to be composed of one volume of nitrogen and four of hydrogen. It is the analogue of potassium and sodium, but has never been obtained in a separate state; a supposed amalgam of ammonium, however, may be formed by the action of the galvanic battery on a globule of mercury surrounded by a solution of ammonia, and by the action of sodium amalgam on a solution of ammonium chloride.

Ammo'nium Ba'ses, compounds analogous to $NH_4.H.O$, ammonic hydrate, in which the H atoms are replaced to a greater or less extent by basic radicals, such as ethyl, C_2H_5, amyl, C_5H_{11}, etc. (See AMINES, by C. F. CHANDLER.)

Ammo'nium, or **Am'mon,** the ancient name of an oasis in the Libyan Desert, about 300 miles W. S. W. of Cairo. It is now called El Siwah. Here was a celebrated oracle and temple of Jupiter Ammon, in a grove of palms; also royal palaces and the "Fountain of the Sun," the water of which was cold at noon and warm at midnight. The ruins of the temple may still be seen.

Ammo'nius, surnamed SACCAS (because in his youth he was a porter and carried sacks), a Greek philosopher, born in Alexandria, was the founder of the school called Neo-Platonic about 193 A. D. Though born of Christian parents, he went over to paganism. Among his pupils were Longinus, Origen, and Plotinus. He left no writings, and died about 243 A. D.

Ammonoo'suc, Lower, a river of New Hampshire, rises in Coos county, near Mount Washington, and flowing south-westward through Grafton county, enters the Connecticut River. It is about 100 miles long.

Ammonoosuc, Upper, a river of Coos co., N. H., which empties into the Connecticut at Northumberland. It is about 75 miles long.

Ammoph'ila (*i. e.* "delighting in sand"), [from the Gr. ἄμμος, "sand," and φιλέω, to "love"], (the *Calamagrostis* of Gray), a genus of grasses nearly allied to *Arundo*, and distinguished by a spikelike panicle, and by the glumes being nearly equal, keeled, and longer than the palæ of the single floret. The *Ammophila arundinacea*, called sand-reed, mat-grass, or marum, grows on the sandy shores of Europe, and is of great utility in fixing the shifting sand. It is also used to make mats.

Ammuni'tion [from the Lat. *ad*, "for," and *munitio*, "defence"], a military term applied to cannon-balls, shells, bullets, fuses, cartridges, grenades, gunpowder, and all the projectiles and explosive substances used in war. The ammunition of field artillery consists of shot, loaded shells, case-shot, shrapnel, cartridges, priming-tubes, matches, and rockets. An infantry soldier generally carries sixty rounds in his cartridge-box.

Am'nesty [from the Gr. ἀμνηστία, "non-remembrance"], an act of oblivion of past misconduct granted by the gov-

ernment to those who have been guilty of some offence. It is usually granted to whole communities or classes of individuals who have taken part, or are supposed to have participated, in some movement against lawful authority; it may be granted either before or after conviction, and its effect is entirely to efface the crime and cause it to be forgotten by the law. An instance is an act of amnesty in England in the 20th Geo. II. c. 52, called "an act for the king's most gracious general and free pardon." This subject has recently excited much interest in the U. S., owing to a provision in the fourteenth amendment to the Constitution creating certain disqualifications as to holding office by persons who have participated in rebellion, and at the same time allowing their removal by a special vote of the Congress. Such a removal is in the nature of an act of amnesty.

Am′nion, or **Am′nios** [etymology doubtful], the soft, delicate, and most internal membrane containing the waters which surround the fœtus *in utero;* also called *agni′na tu′nica.* It secretes a fluid called *li′quor am′nii.* (See EMBRYOLOGY, by PROF. J. C. DALTON, M. D.)

Am′nios, in botany, a thin, semi-transparent, gelatinous substance in which the embryo of a seed is suspended when it first appears, and by which the embryo is probably nourished in its first stages.

Amœ′ba Dif′fluens, an organism of the order Rhizopoda, is one of the lowest animal structures with which zoologists are acquainted. It is a mere gelatinous mass of a rounded form, capable of emitting processes and lobes from all parts of its body, and retracting them at will. This animal abounds in the bottom of fresh-water ponds, and is well known to amateur microscopists under the name of *Proteus.* With the exception of a clear pulsating space, it appears to be a structureless mass of sarcode.

Amol′, a city of Persia, in the province of Mazanderan, on the river Heraz, about 12 miles from its entrance into the Caspian Sea, and 85 miles N. E. of Teheran. A bridge of twelve arches crosses the river here. Pop. estimated at from 35,000 to 40,000.

Amo′mum [from the Gr. ἄμωμος, "blameless," "without fault"], a genus of plants of the order Zingiberaceæ or Scitamineæ, and of the Linnæan class Monandria. They are natives of the tropical parts of Asia and Africa, and produce aromatic seeds called cardamom and grains of Paradise.

Amoo′, or **Amu,** also called **Amoo Darya** (anc. *Oxus;* Arab. *Gihon*), a river of Western Asia, rises on the Belur Tagh, nearly 15,000 feet above the level of the sea, receives many affluents from the mountains of Turkestan and the Hindukush, flows through Turkestan, and falls into the Aral Sea. The length of its course is 1610 miles. According to the treaty of peace concluded in July, 1873, between Russia and Khiva, this river will hereafter constitute the boundary-line between Khiva and Bokhara.

Amoor′, Amur, or **Saghalien,** a large river of Eastern Asia, formed near lat. 53° N. and lon. 122° E. by the union of the Shilka and the Argoon, the latter of which forms for about 400 miles the boundary between Siberia and the Chinese empire. The Amoor flows alternately eastward and south-eastward, forming the boundary between China and Siberia, until it arrives at a point about lat. 48° N. It afterwards pursues a general N. E. direction through the Littoral province of Siberia, and enters the Sea of Okhotsk or Gulf of Saghalien. Its length, exclusive of the branches, is estimated at 1800 miles. It is stated that steamboats have ascended from its mouth to the junction of the Shilka and Argoon. The navigation is obstructed by ice until May. In the lower part of its course it traverses a fertile country, covered with extensive forests of oak, ash, elm, maple, pine, etc. The largest tributary of the Amoor is the Soongari, which enters it on the right.

Amoor, Country of the [Ger. *Amurland*], the name given to a part of Mantchooria which in 1858 was ceded by China to Russia. It includes the island of Saghalien and the whole tract on the left side of the Amoor lying between 43° and 54° N. lat., and containing an area of 276,000 square miles. It is divided into the province of the Amoor and the Littoral province. The area of the province of the Amoor is 109,000 square miles; and the pop. in 1867, 22,297. The winters are very severe, and navigation is generally closed from the end of October to the beginning of May. The soil is fertile, and in the more sheltered parts many plants of Southern Asia grow luxuriantly. The forests are magnificent, abounding in oaks and nut-bearing trees. Fur-producing animals are very numerous, and the rivers yield great quantities of fish. Gold-fields have been recently discovered, and coal is abundant in the island of Saghalien.

Amoret′ti (CARLO), an Italian naturalist and writer, born at Oneglia, near Genoa, Mar. 13, 1741. He produced a good biography of Leonardo da Vinci (1784), and a work on the natural history and geography of Lakes Como, Maggiore, and Lugano, called a "Journey from Milan to the Three Lakes" (1794). In 1797 he became librarian of the Ambrosian Library of Milan. Died Mar. 24, 1816.

Amor′gos, or **Amor′go** [Gr. Ἀμοργός], a fertile island in the Archipelago, 18 miles S. E. of Naxos, belongs to the kingdom of Greece. It is 13 miles long and 6 miles wide, and contains a small town called Amorgos. The surface is mountainous. The poet Simonides was born here. It has a good harbor; lat. of E. end, 36° 54′ N., lon. 26° 6′ E. Pop. about 3700.

Am′orites ("mountaineers"), a powerful nation of Canaan that occupied the country on both sides of the Jordan in the time of Moses, and resisted the Israelites in their march towards the Promised Land. Moses defeated their two kings, Sihon and Og, who reigned at Heshbon and Bashan respectively. Og is said to have been the last "remnant of giants" (Deuteronomy iii. 11). The Amorites were afterwards subdued by Joshua, but he was not able to exterminate them. They appear to have been long hostile to the Israelites, but in Solomon's time were reduced to a tributary condition.

A′mos, one of the minor Hebrew prophets, was a contemporary of Isaiah, and lived about 785 B. C. He was a herdsman and a gatherer of sycamore fruit. He denounces the prevalent idolatry in vigorous and eloquent terms, using many images taken from rural and pastoral life.

Amoskeag′, a manufacturing village of Hillsborough co., N. H., on the Merrimack River, which here falls 54 feet in a mile and a half, thus affording great water-power. It is now a part of the city of MANCHESTER (which see).

Amo′tion [from the Lat. *a* (*ab*), "away," and *moveo, motum,* to "move"], in law, the removal of an officer of a corporation from his office. It differs from disfranchisement, which refers to the removal of a member. Amotion may accordingly take place without disfranchisement.

A′moy, a seaport-town of China, on an island of the same name, in the province of Fo-Kien, and on the Channel of Formosa; lat. 24° 28′ N., lon. 118° 4′ E. It is situated at the mouth of a river which passes by the large city of Chang-Choo-Foo, of which Amoy is the port. Amoy is one of the chief commercial towns of China, and its merchants are noted for their enterprise. It was taken by the British in 1841, and has been open to the trade of all nations since 1843. Among the articles of import are cotton, cotton goods, iron, sugar, camphor, and pepper. The chief articles of export are tea, sugar, porcelain, silks, and paper. Amoy is one of the chief centres of the Protestant missions in China. Pop. estimated at 300,000.

Ampel′ic Açid, a white solid produced by the action of nitric acid on schist oils.

Am′pelin, a substance resembling creasote, obtained from schist oil.

Ampelop′sis [from the Gr. ἄμπελος, a "vine," and ὄψις, "resemblance"], a genus of creeping, vine-like, woody plants, to which the Virginia creeper or American woodbine (*Ampelopsis quinquefolium*) belongs. This is one of the most beautiful of our hardy creeping ornamental plants. It is highly esteemed in England, and is better adapted to the climate of America than the ivy, and is also more rapid in its growth, and has handsomer foliage. The leaves are deciduous, but they die in a blaze of crimson glory when touched by the frost, so that the plant is lovely even in death. It is of the order Vitaceæ.

Ampère (ANDRÉ MARIE), an eminent French natural philosopher and mathematician, born at Lyons Jan. 20, 1775. He produced in 1802 an interesting essay "On the Mathematical Theory of Games of Chance." He became inspector-general of the University (1808), professor of analysis in the Polytechnic School (1809), chevalier of the Legion of Honor (1809), and a member of the Institute (1814). Having made important discoveries in electromagnetism, he published in 1822 a "Collection of Observations on Electro-Dynamics," a work which displays remarkable sagacity. "The vast field of physical science," says Arago, "perhaps never presented so brilliant a discovery, conceived, verified, and completed with such rapidity." He attributed the phenomena of natural magnetism to electric currents which continually pass around the earth from east to west. He further explained his discoveries in this department of science, to which he gave the name of Electro-Dynamics, in his "Theory of Electro-Dynamic Phenomena deduced from Experiments" (1826). Among his other works are treatises on optics and an "Essay on the Philosophy of the Sciences," etc. (1834). He was a man of genial disposition, and noted for simplicity of character. Died in Marseilles June 10, 1836.

Ampère (JEAN JACQUES ANTOINE), an accomplished scholar and *littérateur,* a son of the preceding, born at

Lyons Aug. 12, 1800. He enjoyed in his youth the society of Madame Récamier, and devoted much attention to English and German literature. In 1833 he succeeded Andrieux as professor of French literature at the College of France. He became a member of the Academy of Inscriptions in 1842, and a member of the French Academy in 1847. He travelled extensively in Egypt, the Levant, and the U. S. Among his works are "Literature and Travels" ("Littérature et Voyages," 1833), "Literary History of France before the Twelfth Century" (3 vols., 1839), an "Essay on the Formation of the French Language" (3 vols., 1841), "Greece, Rome, and Dante" (1850), and "Roman History at Rome" ("Histoire Romaine à Rome," 4 vols., 1856–64). His style is very brilliant and pungent. Died Mar. 27, 1864.

Amphib'ia [Gr. *ἀμφίβια*, from *ἄμφω*, "both," and *βιόω*, to "live"], a term applied to animals that live both on the land and in the water. In the Linnæan system it included all reptiles and cartilaginous fishes, although some reptiles would be drowned if they remained very long under water. This classification has been modified by the removal of the cartilaginous fishes from the class of *Amphibia*. Cuvier applied the term to such mammals as the seal and walrus, which inhabit both the land and water.

Naturalists now divide the Reptilia of the olden zoologists into two classes—viz., Reptilia, which includes the lizards, snakes, and turtles; and Amphibia, which comprises the serpent-like cecilians, salamanders, and batrachians (frogs and toads). Most amphibians pass through a metamorphosis like that of the frog, which emerges from the egg as a tadpole, when it is fishlike in form and breathes by gills, being truly aquatic; subsequently the tail and gills disappear, legs and lungs are developed, and the mature animal, though perhaps inhabiting the water, is an air-breather. In some amphibians the first or embryonic condition continues unchanged through life, as *Menobranchus, Menopoma*, etc., the water-puppies and young alligators of the Western rivers. The largest of these aquatic carnivorous salamanders is *Sieboldia*, which inhabits the lakes of Japan, and attains a length of three feet. Though now regarded as dull and disgusting creatures, this latter group of amphibians once stood at the head of all then existing members of the zoological series. The amphibians first appeared in the carboniferous age, and the lagoons in the coal-marshes swarmed with aquatic salamanders, some of which were six feet in length, very active, and predaceous, and the monarchs of the animal world of that age. More than twenty species of amphibians have been obtained by Dr. Newberry from the cannel coal of one mine in Ohio. The amphibians had their golden age in the trias, when *Labyrinthodon*, with a body as large as that of an ox, and teeth four inches long, ruled the animal kingdom. In the succeeding age (Jurassic) the sceptre passed from the amphibians to the true reptiles. Prof. Newberry.

Amphib'ole [from the Gr. *ἀμφίβολος*, "equivocal"], a name given by Haüy to hornblende, on account of its resemblance to augite. (See Hornblende.)

Amphic'tyon [Gr. *Ἀμφικτύων*], an ancient and perhaps fabulous hero and king of Attica, supposed to have been a son of Deucalion.

Amphictyon'ic Coun'cil, a celebrated congress or politico-religious court of the confederated tribes of ancient Greece, which met twice every year—in the temple of Apollo at Delphi in the spring, and at Thermopylæ in the autumn. It was composed of the deputies of twelve tribes—viz., Thessalians, Bœotians, Dorians (or Spartans), Ionians (or Athenians), Locrians, Dolopians, Magnetes, Malians, Achæans, Phocians, Ænianians, and Perrhæbians, who each sent one or two members. The predominance of northern and Pelasgic tribes proves the great antiquity of this institution, which in course of time declined, and in the age of Demosthenes had lost its authority. The members of this council bound themselves by an oath that "they would not destroy any Amphictyonic city nor cut off its streams in war or peace." One great object of the council was the protection of the temple at Delphi. (See Tittmann, "Ueber den Bund der Amphiktyonen," 1852.)

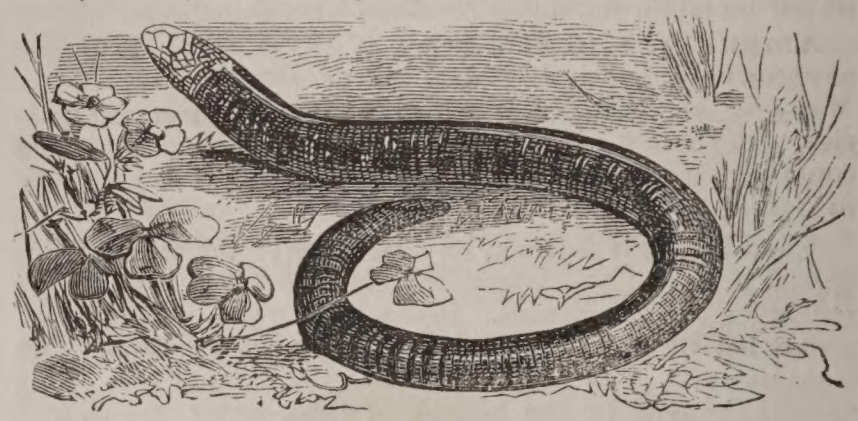
Amphil'ochus, a brother of Alcmæon, took part in the march of the Epigoni to Thebes, and of the Greeks to Troy. After his death he was raised among the gods.

Amphi'on [Gr. *Ἀμφίων*], in classic mythology, a Theban prince and musician, a son of Jupiter and the husband of Niobe. According to the poetic legend, he availed himself of his skill in music to build the walls of Thebes, and the stones, attracted by the sound of his lyre, moved and arranged themselves in the proper position.

Amphiox'us [from the Gr. *ἄμφω*, "both," and *ὀξύς*, "sharp"], the name of a genus of fishes (Leptocardii), so called because they are sharp at both ends. They are recognized as vertebrate animals only by their gelatinous dorsal cord, which supports a medullary spinal cord. They are without brain or true heart, and have various other exceptional characters. The genus is often called *Branchiostoma*. The popular name is lancelet. One species is found in the marine waters of the Southern U. S.

Amphip'olis [from the Gr. *ἀμφί*, "around," and *πόλις*, "city"], an ancient and important city of Thrace or Macedonia, was founded by an Athenian colony about 437 B. C. It was situated at the mouth of the river Strymon, which here enters the *Strymon'icus Sĭn'us*, the modern Gulf of Contessa. The waters of the river are said to have once surrounded the town (whence the name). In the Middle Ages it was called Popolia. Its site is now occupied by a small Turkish town called Yenikeui.

Amphisbæ'na [Gr. *ἀμφίσβαινα*, from *ἀμφίς*, "on both sides," and *βαίνω*, to "go"], a genus of serpent-like reptiles, of which the head and tail are so similar in appearance that it is difficult on a cursory inspection to determine at which extremity the head is situated. They are found in Brazil, the West Indies, etc., and, according to the statements of respectable naturalists, are able to creep forward or backward with nearly equal facility. Several species are known. They burrow in the earth, have rudimentary eyes, and are usually classed with the saurians.



Amphisbæna Fuliginosa.

Amphis'sa, a town of ancient Greece, in Locris, was situated 7 miles from Delphi, on the site of the modern town of *Salona*. Here was a temple of Athena, containing an image of the goddess.

Amphithe'atre [Gr. *ἀμφιθέατρον*, from *ἀμφί*, "around," and *θέατρον*, a "theatre"], a spacious and uncovered edifice of an elliptical or circular form, in which the ancient Romans witnessed the exhibition of public games and the combats of gladiators and wild beasts. It was constructed so that all the spectators could behold the performance, which was exhibited in an open level space called the arena, surrounded on all sides by tiers of seats, which rose higher as they receded from the arena. The most famous of these edifices was the Flavian Amphitheatre, or Colosseum of Rome, which was built by the emperors Vespasian and Titus, finished about 80 A. D., and is still standing. It is about 620 feet long, 513 feet wide, and 157 feet high. The longest diameter of the arena was 287 feet. It is said to have had seats for 80,000 spectators, and standing-room for 20,000 more. The exterior was adorned by three rows of columns—Doric, Ionic, and Corinthian. The Colosseum is regarded by many as the most august and imposing ruin in the world.

Amphithe'rium [from *ἀμφίς*, "on both sides," and *θηρίον*, "beast;" named probably in allusion to its double or doubtful character], a genus of fossil insectivorous mammalia found in the oolitic strata in Oxfordshire, England. It presents many points of analogy with the living marsupial genus *Myrmecobius*.

Amphitri'te [*Ἀμφιτρίτη*], in the Greek mythology, a Nereid, a goddess of the sea, the wife of Neptune and the mother of Triton. She is represented sitting in a car of shells drawn by tritons, or on a dolphin.

Amphit'ryon [Gr. *Ἀμφιτρύων*], in classic mythology, a son of Alcæus. Having accidentally killed his uncle Electryon, he was banished from Mycenæ. He married Alcmena, who was the mother of Hercules.

Am'phora [from the Gr. *ἀμφί*, "on both sides," and *φέρω*, to "bear," from its being borne by its two handles], the Latin name of a vase with two handles which was used by the ancient Greeks and Romans to hold wine and oil. It was also a liquid measure, containing about eight and a half gallons among the Greeks, and six among the Romans.

Amplifica'tion [Lat. *amplifica'tio*, from *am'plus*, "large," and *fa'cio*, to "make"], in rhetoric, is the enlargement and expansion of a subject or discourse by the use of epithets and illustrations and the enumeration of circumstantial accessories, with a view to produce a deeper impression. Cicero was much inclined to amplify his orations. Exaggeration is a vicious kind of amplification.

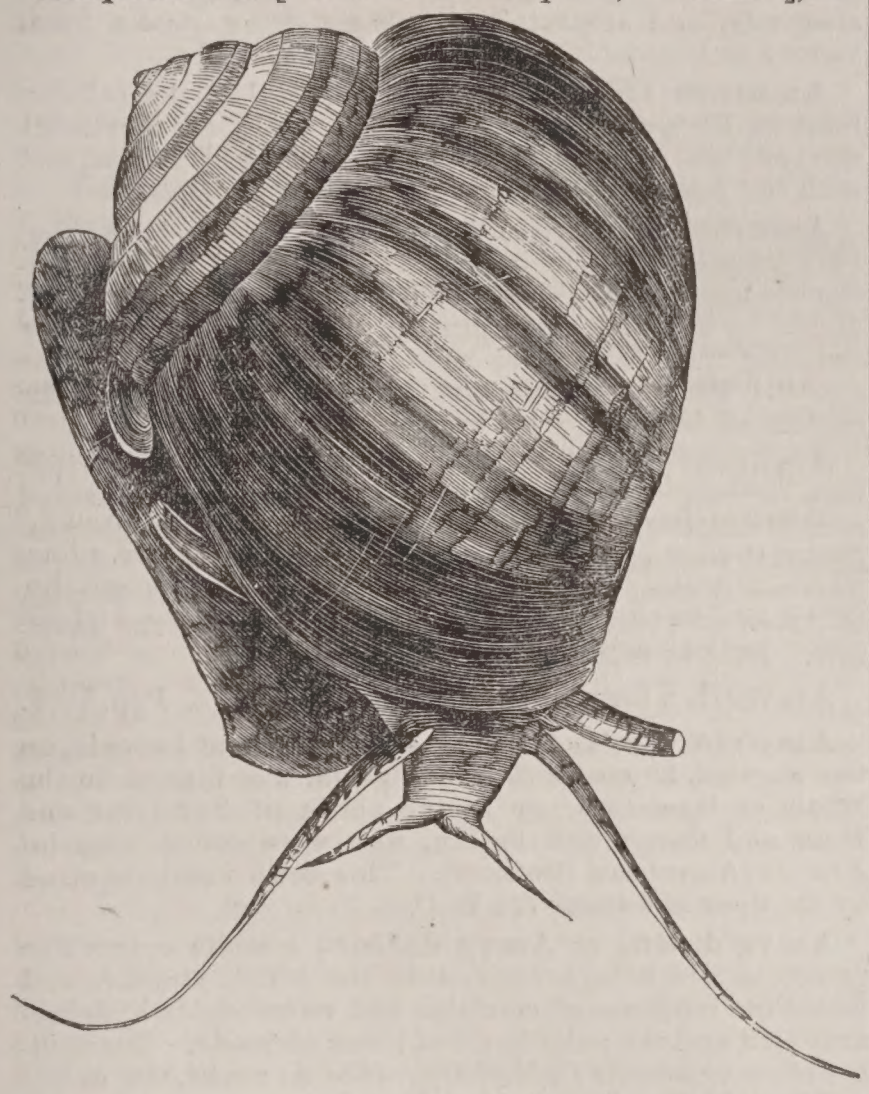
Am′plitude [Lat. *amplitu′do*, from *am′plus*, "large," "great"], in astronomy, is the angular distance of a heavenly body, when it rises or sets, from the east or west points of the horizon. The amplitude of a fixed star remains the same all the year, but that of the sun changes daily, and on a given day varies according to the latitude of the observer.

Amplitude, in mechanics and physics, is used in reference to oscillating and vibrating bodies, to indicate the distance between the extreme positions assumed by the body. Thus the amplitude of oscillation of a pendulum is the angle between the extreme positions of the line joining the centres of suspension and oscillation.

Ampu′dia, de (Pedro), a Mexican officer who obtained the rank of general in 1840. He fought against the Texans in 1842, and commanded the Mexican troops which defended Monterey in 1846 against Gen. Taylor, to whom he surrendered in September of that year.

Ampul′la, a Roman vessel of glass or earthenware, used for holding oil, wine, etc., was nearly globular in form. Many of these are preserved in the collections of antiquaries. In the Catholic Church an ampulla is a vessel which contains wine for the sacrament. *Ampulla Remensis* (in Fr. *la Sainte Ampoule*) was a famous vessel of holy oil which, according to tradition, was brought from heaven by a dove, and was used to anoint Clovis when he was crowned at Rheims in 496 A. D.

Ampulla′ria [from the Lat. *ampulla*, a "flask"], an



Ampullaria Dubia.

interesting genus of gasteropod mollusks, called apple-shells, idol-shells, pond-snails, etc. Fifty or more species are known, mostly tropical, and all inhabiting fresh water and mud, though some are occasionally found in salt and brackish waters. They are remarkable for their tenacious hold on life, many being able to live away from the water for years. One species is occasionally found alive in hollow logs of mahogany and logwood from Honduras. The *Ampullaria dubia* is brought from the Nile.

Amputa′tion [from the Lat. *amputo*, *amputatum*, to "prune," to "lop off"], in surgery, is the removal, by operation, of any part of the body or limbs on account of disease or injury, such as would endanger life if the part were allowed to remain. The term of late denotes more especially such removal of a limb, but is still sometimes used for the excision of a tumor or gland.

Amputations are properly resorted to not only after severe and very dangerous injuries, but in such diseases as gangrene, cancer, etc., which are without rational prospect of cure by other means. In general, cases where the chances of cure will probably be much increased by this operation afford legitimate subjects for its exercise. This rule would include some cases of intractable ulcers of the leg, of aneurism, and of diseased bones and joints. Incurable and unsightly deformities, where they put the patient to great inconvenience, may in some circumstances be removed by the knife. An amputation in which a bone is cut off is said to be "in the continuity." An amputation at a joint, when no bones are divided, is in "the contiguity;" the latter operation is not often performed, though it has had recent advocates. Amputations are chiefly either "flap" or "circular" operations. The "flap" operation, in some of its many modifications, is probably the most frequently employed. One, two, or even three flaps have been employed, the size, shape, and thickness of these flaps of skin and flesh varying with circumstances. In general, they ought to be large enough to cover amply the end of the stump, and not so large as to be redundant after the wound shall have healed. The flap amputation, practised by certain mediæval surgeons, and revived by Lowdham of England nearly 200 years ago, was made general by Liston, and has since his time been variously improved and modified.

"Circular amputation" is performed by first dividing the skin and superficial fascia by a sweep of the knife around the limb, dissecting up the skin for two or three inches, and at that part dividing the muscles down to the bone. The flesh is removed from the bone to allow the saw to be applied.

The danger attending amputation is generally in proportion to the nearness of the operation to the trunk, as well as to the size of the limb. Thus, amputation at the hip-joint is the most doubtful of all in its results; but even this, in some cases, especially in military surgery, may improve the chances of life under severe injury. Amputations at the joints are by most surgeons considered as more serious than in the continuity of the limbs. Of the foot alone several different modes of amputation are in use, as Lisfranc's, Chopart's, Syme's, and Pirogoff's amputations.

Amrit′, the richest place in ruins on the whole Phœnician coast (Syria), near the city of Tortosa. It is the ancient Marathus, and was discovered in the seventeenth century by Pococke, but was not explored until the present century, by Ernest Renan. The most important ruin found here is "El Maabed" (*i. e.* "the temple").

Am′rita [from the Sanscrit *a*, signifying "without," and *mrita*, "dead," also "death"], sometimes incorrectly written **Amreeta,** in Hindoo mythology, is the name applied to the water of immortality, which is said to have been obtained by the churning of the ocean. The term amrita or amrit is sometimes given to the food as well as the drink of the gods, and likewise to any delicious drink.

Amrit′sir, or **Amritsur,** written also **Umritsir,** the sacred city of the Sikhs, in the Punjâb, in Northern India, 40 miles E. of Lahore; lat. 31° 40′ N., lon. 74° 56′ E. It is said to contain 399 Hindoo places of worship. Here is a magnificent temple of the Sikhs, on an island, in a large tank or reservoir, called "the Pool of Immortality," which is visited by many pilgrims. Runjeet Singh built here the large fortress of Govindghur, which is one of the most remarkable objects in the place. Amritsir has manufactures of shawls, silk stuffs, and cotton goods; also an extensive transit trade with India and Central Asia. Pop. in 1866, about 180,000.

Am′rou Ben el As, a famous Arabian warrior, born about 600 B. C., at first opposed Mohammed, but became a zealous proselyte, aided in the conquest of Syria, conquered Egypt, of which he became emir, taking Alexandria in 640 A. D., and Tripoli three years later. He became an opponent of Ali. He was a man of energy and prudence. Died in 663.

Ams′dorf, von (Nikolaus), a Reformer, born in Saxony Dec. 3, 1483. He became a zealous Lutheran, and accompanied Luther to the Diet of Worms in 1521. He was afterwards an opponent of Melanchthon, and was much addicted to controversy about doctrines. In 1542 he was appointed bishop of Naumburg. He wrote numerous polemical works. Died May 14, 1565.

Ams′ler (Samuel), a skilful engraver, born in Switzerland in 1791. He became professor of engraving in the Academy of Fine Arts in Munich. He engraved many of the works of Raphael and Thorwaldsen, and reproduced the former with peculiar fidelity. Among his best works are the "Triumph of Alexander the Great," after Thorwaldsen, a "Holy Family," and a "Burial of Christ," both after Raphael; also a "Christ," after Dannecker. Died in 1849.

Am′sterdam′, formerly **Amstelredamme,** or **Amsteldamme** ("the dike or dam of the Amstel"), [Lat. *Amsteloda′mum*], an important commercial city and capital of the kingdom of Holland, is situated at the junction of the Amstel with the Y, and near the Zuyder-Zee, through which it has access to the ocean; lat. 52° 22′ N., lon. 4° 53′ E. It is the largest city of Holland and its constitu-

tional capital, but the royal court is at The Hague. Amsterdam stands on flat, marshy ground, into which piles, fifty feet long, are driven to form a foundation for the houses, which are mostly built of brick. The city is divided into ninety islands by a number of canals, which are crossed by 280 bridges. A part of the old ramparts have been pulled down, and twenty-eight windmills for grinding grain have been erected on the bastions. The principal streets are the Heerengracht, Keizergracht, and Prinzensgracht, each of which is about two miles long and describes a semicircle. Canals occupy the middle of these streets, which are scarcely surpassed in elegance by those of any capital in Europe. Among the grand public buildings of this metropolis is the palace or town-hall, a stone edifice 282 feet long and 235 feet wide, resting on 13,659 piles, driven into the ground to the depth of 70 feet. This palace contains a remarkable hall 120 feet long, 60 feet wide, and 100 feet high, lined with white Italian marble. The city has a beautiful justiciary hall, a modern building of Grecian architecture. The most beautiful church of Amsterdam is the Nieuwe Kerk (founded in 1408), which is 350 feet long and 210 wide, and contains monuments of the poet Vondel, Admiral de Ruyter, and of several other Dutch admirals. This Nieuwe Kerk and the Oude Kerk ("old church"), which has a remarkable organ, both belong to the Reformed Church. There are twelve other Reformed churches, and eighteen Roman Catholic churches. Amsterdam is liberally supplied with hospitals and other charitable institutions. Among the most important educational and literary institutions are the Athenæum Illustre, which has a botanic garden, a school of anatomy, and chairs of art, law, medicine, and theology; the city Latin school; the Royal Academy of Fine Arts, founded in 1820; the Arti et Amicitiæ society of painters; the naval school; the Royal Dutch Institution for science, literature, and art; the antiquarian society; and the society of literature and fine arts, called Felix Meritis. The Museum of Pictures, the Museum van der Hoop, and the Feodor Museum (since 1866) contain rich collections of the works of the Dutch masters.

The chief products of the manufactures of Amsterdam are tobacco, soap, canvas, glass, jewelry, cordage, machinery, steam-engines, etc. Its commerce is more important than its manufactures. That great trade which in the sixteenth century placed Amsterdam at the head of the commercial cities of Europe gradually declined, partly from the rise of other ports, but principally from the difficulties of navigation caused by the silting up of the Zuyder-Zee, and, above all, the Pampus Bar. Large vessels were obliged to discharge their cargoes outside, and were then floated over the bar by means of *camels*, which, when the water was pumped out of them, raised the vessel with them. To remedy this, the North Holland Canal was cut to the Helder, a distance of 51 miles. It is 124 feet broad at the surface and 31 feet at the bottom, and is available for vessels drawing 18 feet of water. But even this great highway is now inadequate, and moreover is obstructed in winter by ice. To maintain the rank of Amsterdam as one of the great commercial entrepôts of Europe, one of the most remarkable engineering works of modern times was commenced in 1863, and is now far advanced towards completion—the *direct* connection of the port of Amsterdam with the North Sea, 15 miles distant, by a canal terminating in an artificial harbor on that sea. (See CANAL; also "Prof. Papers Corps of Engineers," No. 22.)

Amsterdam is the terminus of a railway which connects it with Utrecht and the cities of Prussia. The chief articles of export are butter, cheese, sugar, coffee, oil, spices, colors, etc. In 1868, 1465 vessels, of 430,739 tons, entered the port of Amsterdam, and 1508 were cleared.

Amsterdam was founded about 1250, before which it was a mere fishing-village, with a castle, the residence of the lords of Amstel. It was fortified in 1482, and became a part of the United Provinces in 1578, after which its commerce and population rapidly increased. Between 1630 and 1750 it was the foremost commercial city of Europe. This city was the native place of Spinoza, Admiral de Ruyter, Swammerdam, and other eminent men. Pop. in 1857, 259,873; in 1867, 267,627; and in 1870, 281,805, of whom about 59,000 are Catholics, 35,000 Lutherans, 4000 Mennonites, 1000 Remonstrants, and 30,000 Jews.

REVISED BY J. G. BARNARD, U. S. A.

Amsterdam, a township of Hancock co., Ia. P. 259.

Amsterdam, a post-village and township of Montgomery co., N. Y., on the Mohawk River and on the Central R. R., 33 miles N. W. of Albany. It has 6 churches, 19 manufactories, 4 banks, 1 horse railroad, and 2 weekly newspapers. Pop. 5426; pop. of township, 7706.

C. P. WINEGAR, ED. OF "RECORDER."

Amsterdam, a post-village and township of Botetourt co., Va., 50 miles W. of Lynchburg. Pop. of township, 3828.

Amuck′, or **Amook,** a word used among the Malays. Men who are rendered insane and desperate by the habitual use of opium or hasheesh run along the streets armed with a dirk, and kill or wound all persons in their reach. This is called "running amuck." It is generally deliberately planned, and is the Malay mode of suicide. Where a Japanese would commit hari-kari, the Malay runs *amuck*—*i. e.* by attacking all he meets he seeks and finds death at the hands of others.

Am′ulet [Lat. *amule′tum*], an object worn on the person as a charm, and supposed to have power to protect the wearer against evil spirits, sickness, and other real or imaginary evils. Amulets were worn by the ancient Egyptians, Greeks, and Jews. The Greeks and Romans wore a variety of gems and small figures of heroes, deities, and animals. Amulets were also used by the early Christians, but that form of superstition was condemned by the Council of Laodicea about A. D. 360. They are common among the Turks at the present day. An astrological amulet called talisman was highly prized by the Arabs.

Am′urath, or **Mu′rad I.,** sultan of the Turks, born in 1326, succeeded Orkhan, his father, in 1359, took Adrianople in 1361, and waged with success long and bloody wars, chiefly with the Christians, in what is now European Turkey. He was assassinated June 15, 1389.

Amurath II. succeeded his father, Mohammed I., in 1421, attacked Constantinople in 1423, contended with varying success for many years against the Hungarians under Hunyady, and against Scanderbeg. He gained a great victory at Kosovo in 1488. Died Feb. 9, 1541.

Amurath III., one of the most cruel of the sultans, born in 1545, came to the sultanate in 1574. His reign was marked by long wars with Austria and Persia, and with the janizaries at home. Died Jan. 17, 1595.

Amurath (Murad) IV., sultan of Turkey, born about 1610, succeeded his uncle Mustafa in 1623. He had a passionate temper, which was rendered more violent and dangerous by habitual drunkenness. He amused himself by shooting from his palace windows at passengers in the streets. The most important event of his reign was the capture of Bagdad by his army in 1638. Died in 1640.

Amussat (JEAN ZULÉMA), a French surgeon and writer, born in Deux-Sèvres in 1796. He invented and improved several surgical instruments, and published some able professional treatises, among which are "Researches into the Nervous System" (1825), and a "Memoir on the Torsion of Arteries" (1829), which obtained a prize of the Institute. Died in 1856.

Amwell, a township of Washington co., Pa. Pop. 1879.

Amy′clæ [Gr. Ἀμύκλαι], an ancient town of Laconia, on the Eurotas, 20 stadia S. E. of Sparta, was famous in the heroic or legendary age as the abode of Tyndarus and Leda and Castor and Pollux, who were called *Amyclæi Fratres* (Amyclæan Brothers). This town was conquered by the Spartans about 775 B. C.

Amyg′dalin, or **Amyg′daline,** a white crystalline principle which is contained in the bitter almond, and under the influence of emulsine and water yields hydrocyanic acid and the volatile oil of bitter almonds. The symbol of amygdalin is $C_{20}H_{27}NO_{11}$. (See ALMONDS, OIL OF.)

Amyg′daloid [from the Gr. ἀμύγδαλον, an "almond," and εἶδος, a "form"], having the form of an almond; applied in geology to certain volcanic rocks in which once existed oval cavities or cells now filled with nodules of some crystalline mineral deposited from an infiltrated solution. These nodules are composed of agate, chalcedony, calcareous spar, etc., and are commonly found in a basis of basalt, greenstone, or other trap rock. Empty cells often occur in the same rocks that contain these nodules, the cavities in each case having been originally formed and filled with gas or steam.

Amyg′dalus [from the Gr. ἀμύγδαλος, the "almond tree"], a genus of plants of the order Rosaceæ, consists of trees whose fruit is a drupe. It comprises the almond (*Amyg′dalus commu′nis*) and the peach (*Amyg′dalus Per′sica*).

Am′yl (C_5H_{11}), a compound radical belonging to the alcohol series, exists in amylic alcohol, $C_5H_{11}.O.H$, or fusel oil. It forms a series of compound ethers (see ETHERS), some of which are used as substitutes for the essences of natural fruits. The nitrite of amyl is an ethereal liquid of agreeable odor, which has been recently brought to the attention of medical practitioners on account of its peculiar action on the circulation. A few drops inhaled causes a sudden acceleration of the pulse and flushing of the face.

Amyl′amines, organic bases formed on the ammonia type by the substitution of amyl, C_5H_{11}, for H. Amylamine is $N(C_5H_{11})H_2$, diamylamine is $N(C_5H_{11})_2H$, tri-

amylamine is $N(C_5H_{11})_3$, tetramylammonium is $N(C_5H_{11})_4$. (See AMINES, by PROF. C. F. CHANDLER, PH. D., LL.D.)

Am′ylene (C_5H_{10}), a diatomic radical homologous with ethylene. It is produced by the dehydration of amylic alcohol, and is a transparent liquid of a faint but offensive odor. It possesses anæsthetic properties, and has been used as a substitute for chloroform, but was abandoned after having produced fatal results. (See ETHYLENE.)

Amyot (JOSEPH), a French Jesuit missionary, born at Toulon in 1718. He sailed to China in 1750, was invited to Pekin by the emperor, and passed the rest of his life there. He learned the Chinese language, from which he translated several works into French, and compiled a "Mantchoo-Tartar-French Dictionary" (Paris, 3 vols., 1789–90). Few European authors have done so much to illustrate the history and customs of China. He wrote a large portion of the "Memoirs concerning the History, Sciences, Arts, and Customs of the Chinese" (16 vols., 1776–1814). Died in Pekin in 1794.

Amyrida′ceæ, a natural order of exogenous plants (trees or shrubs), natives of tropical regions, and abounding with balsamic and resinous juice. The type of the order is the genus *Am′yris,* which produces elemi. They have compound leaves, three to five petals, and stamens twice or four times as many as the petals. Among the products of this order are myrrh, frankincense, bdellium, elemi, olibanum, and balsam of Gilead. It comprises, besides *Amyris,* the genera *Balsamodendron, Boswellia, Icica,* and *Bursera.* Southern Florida has two trees of the order —the cachibou gum tree, *Bursera gummifera* (a large tree), and *Amyris Floridana* (torchwood), a small tree.

A′na [ἀνά], a Greek word signifying "upward," "through," "again." In medical prescriptions, *Ana,* or *aa,* denotes an equal quantity of each ingredient.

Ana, a suffix which often occurs as the termination of words which are the titles of books containing collections of the anecdotes, conversations, and sayings of eminent men. Among the most remarkable of these are "Scaligerana" (1666), "Menagiana," "Heutiana," "Walpoliana" (relating to Horace Walpole), and "Johnsoniana." They abound most in French literature. The "Scaligerana" was the first publication of this kind that ever appeared.

Anabap′tists [from the Gr. prep. ἀνά, "again," and βαπτίζω, to "baptize"], a name applied during the sixteenth century to various bodies of Swiss and German Christians, who, while differing widely in personal character, in social and political opinions, and religious faith, agreed in discarding infant baptism, and in re-baptizing (according to the popular notion) those who personally accepted of Christianity. While in this respect the German Anabaptists held a position similar to that of the Baptists of to-day, they did not, as a general thing, insist that immersion only is valid baptism. Indeed, they generally practised pouring or affusion. (See "Christian Review" for July, 1861.)

Many of the early Anabaptists were men of irreproachable character and true Christian devotion. (See HUBMEYER, MENNO.) Some of them believed that it was wrong, in any circumstances, to bear arms. Others, however (whose vices and follies have been imputed to all who agreed with them in rejecting infant baptism), aspiring with a fanatical zeal to purify the Church and reform society, taught that, among men living under the gospel and having the Spirit of God to direct them, human government was not only unnecessary, but an unlawful encroachment on their spiritual liberty; that the distinctions of birth, rank, and wealth should be abolished; and that all Christians, throwing their possessions into one common stock, should live together as members of one family. Many of their leaders claimed to be enlightened and directed by supernatural visions and revelations. One of these, Thomas Münzer, claimed, it is said, a divine commission to establish a holy community, and to overthrow the then existing governments by the sword. He assembled a considerable force, which was totally defeated in May, 1525, near Mühlhausen, and Münzer, with the other leaders, was put to death. Many of his followers, however, survived, and spread their doctrines through Germany, Holland, and Switzerland. A numerous body of them, under John Matthias of Haarlem and John Boccold (or Bockholdt) of Leyden, established themselves in 1533 at Münster, deposed the magistrates, and having confiscated the property of many of the more wealthy citizens, they deposited it in a public treasury for the common use. The inhabitants were drilled to military duty, and vigorous preparations were made for the defence of Münster, which they styled Mount Zion. Count Waldeck, bishop and prince of Münster, having surrounded the city with an army, Matthias sallied from the gates, and was at first successful in several engagements. But having once gone forth with a small company, they were all killed. Boccold succeeded him, with the title of King John. He wore a crown, clothed himself in purple, and took to himself numerous wives, only one of whom, however, was honored as queen. Encouraged by the example of their monarch, many of Boccold's followers, it is said, gave themselves up to sensuality and license. At length, in 1535, Münster was taken, and Boccold and other leaders of the Anabaptists were put to death with torture. (See CORNELIUS, "Geschichte des Münsterischen Aufruhrs," Leipsic, 1855, and the "Dutch Martyrology;" BOUTERWEK'S "Literatur und Geschichte der Wiedertäufer;" WINTER'S "Geschichte der Baierischen Wiedertäufer;" CALVARY'S "Mittheillungen aus dem Antiquariate," vol. i., p. 111, *seq.*)

The word Anabaptist is sometimes applied, at the present day, to those who baptize by immersion, and on profession of their faith, persons who have been sprinkled in infancy; but the name is repudiated by modern Baptists, since they regard the immersion of a believer as the only valid baptism, and maintain that they do not rebaptize. As no historical connection can be established between the Baptists and the fanatics of Münster, the name "Anabaptist" ought not to be applied to them. J. H. GILMORE.

Anaba′ra, a river of Siberia, rises about lat 66° 30′ N., and lon. 107° E., flows northward about 300 miles, and enters the Arctic Ocean.

Anabas′idæ [from *An′abas,* one of the genera], a family of acanthopterygious fishes, in which the membrane of the pharynx is divided into numerous appendages and cells. These retain water sufficient to moisten the gills for a considerable time, so that when the pools which these fish inhabit dry up, they are able to move about on land in search of other water. They are all fresh-water fishes, and have spines on their fins. They are found in South-eastern Asia and Southern Africa. One of this family, the *An′abas scan′dens* (or *Per′ca scan′dens*), found in India, is especially remarkable for its climbing powers. Unlike the eel, which only passes over moist ground, the anabas takes its journey over hard, dry, and dusty roads, and frequently up steep ascents heated with the burning beams of the noonday sun, and does not seem to feel any serious inconvenience from these. It is even asserted by some writers that this fish is able to climb a tree.

Anabas Scandens: Climbing Perch.

Anab′asis [from the Gr. ἀνά, "up," and βαίνω, to "go"], a Greek word signifying an "ascension," a march from a lower into a higher region. In medicine, it is sometimes applied to the increase of a disease or paroxysm. Also the title of two Greek historical works: 1. Xenophon's account of the expedition of Cyrus the Younger against his brother Artaxerxes, king of Persia, and of the retreat of the ten thousand Greeks who had served in the army of Cyrus. 2. Arrian's "Anabasis," in which are recorded the expeditions of Alexander the Great into Persia and India.

An′ableps [from the Gr. ἀναβλέπω, to "look up"], a genus of malacopterygian viviparous fishes, characterized by a remarkable projection of the eyes from the sides of the head, and by a singular structure of the cornea and iris, in consequence of which it has two pupils on each side, and seems to have four eyes. They are found in Guiana and Surinam.

Anacan′thini [from the Gr. ἀν, priv., and ἄκανθα, a "spine"], an order of fishes distinguished by an ossified endoskeleton, the surface covered in some cases with cycloid, in others with ctenoid, scales; fins supported by flexible or jointed rays; ventrals beneath the pectorals, or wanting; swimming-bladder without air-duct. This order includes the cod and other edible fishes.

Anacardia′ceæ [from *Anacar′dium,* one of the genera], a natural order of exogenous trees and shrubs, mostly natives of tropical regions, and often abounding in a resinous fluid of extreme acridity. The leaves are alternate and without dots, the petals perigynous, and the fruit is usually a drupe. The order is founded on *Anacardium occidentale* (cashew-nut), and contains many species, among which are poison ivy, mastic, sumac, pistachio-nuts, and the mango.

Anach′aris Canaden′sis, an herbaceous plant of the order Hydrocharidaceæ, is a native of North America, growing in ponds and slow streams, in which it is entirely submerged. It has a much-branched perennial stem, and is remarkable for the rapidity of its growth. It is naturalized in Great Britain, where it suddenly appeared in such abundance as to obstruct the navigation of the

Trent, Derwent, and other rivers. It was first observed in Great Britain about 1842. It causes no such trouble in the U. S.

Anachar'sis [Gr. Ἀνάχαρσις], a celebrated Scythian philosopher who lived about 600 B. C., and was a friend of Solon. He was the only "barbarian" admitted to the privilege of a citizen of Athens, and according to some authorities was reckoned among the Seven Wise Men of Greece. It is said that on his return to Scythia he was put to death, because he practised some Greek religious rites. Some of his pithy sayings have been preserved by Diogenes Laertius and others. A French author, Jean Jacques Barthélemy, published a popular work entitled "Travels of Anacharsis the Younger in Greece" (1788), which represents with considerable fidelity the life and customs of the ancient Greeks. It was translated into English.

Anach'ronism [Gr. ἀναχρόνισμος, from ἀνά, used for "against," and χρόνος, "time"], an error in chronology, an inversion or disturbance of the order of time. The use of cannon in Shakspeare's "King John" is an anachronism, as cannon were not employed in England until a hundred years or more after his reign. Painters who represent ancient patriarchs in modern costumes are censured for anachronism.

Anacla'che, a snowy peak of the Bolivian Andes, is supposed to be 22,000 feet or more above the level of the sea; lat. 18° 12′ S., lon. 69° 20′ W. It is covered with perpetual snow.

Anacle'tus, bishop of Rome, was a native of Athens. He was the successor (or, according to others, the predecessor) of Saint Clement. Died about 100 A. D.

Anacletus, an antipope, was elected by a party of cardinals in 1130 as a rival pope to Innocent II., who was recognized by the majority of the European powers. Anacletus was supported by the Romans. Died in 1138.

Anacon'da [*Eunec'tes muri'nus, Bo'a muri'na* of some naturalists], a large serpent allied to the *Boa constrictor,* is a native of tropical America, especially of Brazil and Guiana. It sometimes grows to the length of forty feet, and is the largest serpent of America. It passes much of the time in the water, preferring the shallow parts of a lake or stream. Among the generic characters that distinguish it from the boa are the small size and position of its nostrils, which open at the upper part of the end of the muzzle, and are directed upward. It is not venomous.

Anac'reon [Ἀνακρέων], a famous Greek lyric poet, born at Teos, in Ionia, about 560 B. C. He emigrated from Teos when that town was taken by the Persians, about 540, and passed many years at Samos, where he was patronized by King Polycrates. After the death of this patron, 522 B. C., he became a resident of Athens, to which he was invited by Hipparchus. Love and wine were the favorite themes of his muse. Died in 476 B. C. According to tradition, his death was caused by a grape-stone which stuck fast in his throat. Some fragments of his poems are extant.

Anadir', or **Anadyr,** a river of Siberia, near the extreme N. E. part of Asia, rises north of Kamtchatka, flows nearly eastward, and enters the Sea of Anadir. Length, about 450 miles. The Sea or Gulf of Anadir is in Siberia, near the N. E. extremity of Asia, and is a large inlet of the Pacific Ocean. It is separated from the Arctic Ocean by a peninsula about 150 miles wide.

Anadyom'ene [Gr. Ἀναδυομένη], (the goddess "rising up out" of the sea), a surname given to Venus; also the name of a masterpiece of Apelles, representing Venus rising from the sea and wringing her flowing hair with her fingers. This picture was purchased by the people of Cos, who sold it to the emperor Augustus for one hundred talents, or more than $100,000 of our money.

Anæ'mia [from the Gr. *a,* priv., and αἷμα, "blood"], also called **Spanæ'mia** [from σπανός, "scarce," "rare," and αἷμα, "blood"], a morbid condition of the body in which the blood is of an abnormal composition, there being usually a deficiency in the normal number of red corpuscles, a poverty of albumen, and an excess of salts, the absolute amount of the blood being usually below that observed in health. This condition is not properly a disease, so much as a result of some disease or lesion, such as dyspepsia, hæmorrhage, excessive secretion from any gland or surface, insufficient nutrition, defective aëration of the blood, consumption, cancer, malarial or other slow poisoning, leucocythæmia, excessive labor, or long-continued mental troubles. The symptoms are, first, great debility, paleness of face, lips, and tongue, wasting of the tissues, various cardiac, arterial, and venous murmurs, a small and often rapid pulse, clearness and low specific gravity of the urine. Late in the disease the feet swell and sweating is observed. The treatment is, first, if possible, to remove the cause. Next, the proper conditions for recovery must be established, such as proper food, due exercise, and good air. Tonics, if they are well borne by the patient, are generally useful. Strychnia, quinia, and, above all, iron, are often extremely useful. The iron is generally thought to act as food, there being an actual deficiency of iron in the blood.

Anæsthe'sia [from the Gr. *av,* priv., and *αἰσθάνομαι,* to "perceive," to "feel"], in medical language, when used to designate a symptom, denotes a diminution or a complete loss of the sense of feeling, either general or much more frequently local. In this sense it is opposed to the term hyperæsthesia, which denotes an exaltation or excess of sensibility. Both these conditions are symptoms of disease of the nervous system. When feeling proper is abolished while pain exists, it is called "anæsthesia dolorosa;" when both pain and the sense of touch are absent, it is "analgesia." But of late the term commonly denotes a total or partial, local or general, suspension of all the senses as the result of the application or inhalation of some chemical agent. Local anæsthesia is produced by the rapid evaporation of some highly volatile substance, like ether or rhigolene, and consequent chilling of the part to be affected. The local application of certain drugs, such as aconitine, will also produce a degree of anæsthesia. General anæsthesia is, however, by far the most common result of this kind to which the physician directs his efforts. The Chinese have used preparations of hemp for this purpose for many centuries. The "Arabian Nights" contain numerous allusions to a similar use of this drug. Mandragora, opium, and many other soporifics were used by the ancients as anæsthetics, though such use is dangerous from the profound effects produced. Surgical operations in later times have been successfully performed while the patient was in the mesmeric sleep or condition of "hypnotism." Such a condition is, however, usually regarded as a diseased one, and its production is outside the province of the physician. The anæsthetics generally in use are common or ethylic ether, chloroform, and nitrous oxide gas, each of which is administered by inhalation. There is some reason to believe that the anæsthetic property of ether was not unknown in the sixteenth century, soon after the discovery of this agent by the alchemists. Several physicians in the eighteenth century recommended the use of ether by inhalation for the relief of pain. Sir Humphry Davy in 1800 observed the anæsthetic effect of nitrous oxide, and proposed its use in surgery, but it was not till 1844 that Horace Wells, a dentist of Hartford, Conn., successfully employed this gas for the prevention of pain in removing teeth. The subject, however, fell for the time into undeserved neglect, though at present this gas is extensively employed in dentistry and in some other surgical operations.

Between 1816 and 1846 several American physicians proposed the use of ether as an anæsthetic. In October of the latter year, Dr. W. T. G. Morton of Boston (who had successfully used ether in dentistry) administered it to a patient in the Massachusetts General Hospital during a surgical operation by the late Dr. Warren. In Nov., 1847, Sir J. Y. Simpson of Edinburgh first announced chloroform as an anæsthetic, it having been used for the relief of difficult breathing by Ives of New Haven, Conn., in 1832, and its anæsthetic effect upon the lower animals having been shown by Flourens ten months before Simpson's experiments. The use of both ether and chloroform has spread rapidly since the above discoveries. Various other agents (amylene, amyl hydride, carbon bichloride, Dutch liquid, methylene bichloride, etc.) have been proposed, but for the most part they have turned out to be more dangerous than the older and better known anæsthetics.

With regard to the relative superiority of the various agents used, opinions differ. It is claimed by some that ether is much safer than chloroform, while other practitioners of eminence assert that chloroform is pleasanter, cheaper, and more speedy in its effect, and equally safe if the requisite skill is employed in administration. The principal objections to nitrous oxide are, that it is not easily portable, and that its effects are very transitory. Experiments tend to show that ether produces anæsthesia by causing anæmia of the brain, while chloroform appears to act by producing hyperæmia. Further observations are constantly being made on these points, and these experiments may be fairly expected to throw great light on the subject.

CHAS. W. GREENE.

Anæsthet'ics, the name applied to certain preparations having the property of producing ANÆSTHESIA (which see).

Ana'gni (anc. *Anag'nia*), a town of Italy, 37 miles E. S. E. of Rome, is the seat of a bishop. It is the residence of several noble families, and was the birthplace of several popes, among whom were Innocent III. and Gregory IX. Anagnia was nearly as old as Rome, was the chief city of the Hernici, and was an important place dur-

ing the whole period of the ancient Roman history. Virgil mentions it as the wealthy Anagnia. Pop. 6000.

An′agram [from the Gr. *ἀνά*, "backward," and *γράμμα*, a "letter" or "writing"], a word or sentence formed by the transposition of the letters of some word, phrase, or sentence. The most perfect or proper anagram, called palindrome, is formed by reading backward—*i. e.* reversing the order of the letters—as "evil," *live*. The making of anagrams was a fashionable exercise of ingenuity in the sixteenth and seventeenth centuries, as well as in the Dark or Middle Ages. A very curious specimen of anagram is the transmutation of Pilate's question, *Quid est Veritas* ("What is Truth?") into *Est Vir qui adest* ("It is the Man who is present"). Dr. Burney made the felicitous discovery that the Latin sentence *Honor est a Nilo* ("Honor is (or comes) from the Nile") is concealed in the name of Horatio Nelson. The opponents of the Dutch theologian Jacobus Arminius transformed his name into *Vani Orbis Amicus* ("A Friend of the Vain World").* Among recent examples of the anagram are—Florence Nightingale, "Flit on, cheering Angel;" Sir Robert Peel, "Terrible Poser;" French Revolution, "Violence, run forth." (See WHEATLY on "Anagrams.")

An′aheim, the second town in size and importance in Los Angeles co., Cal., situated in the centre of the largest valley in California, is 12 miles from the sea, and is the head-quarters of the wine interest of Southern California. It produces over 1,000,000 gallons of wine annually. It has one weekly paper. Pop. 881.

RICHARD MELROSE, PUB. "SOUTHERN CALIFORNIAN."

Anahuac′, a Mexican word used vaguely or in various senses, sometimes applied to the great central table-land or plateau of Mexico, which comprises more than half of the Mexican republic, and lies between lat. 15° and 30° N. and lon. 95° and 110° W. It is elevated from 6000 to 9000 feet above the level of the sea, contains several lakes, and is bounded on the E. and W. by chains of high mountains. From this plateau rise several high volcanoes, one of which, Popocatepetl, has an altitude of 17,784 feet.

Anahuac Mountains, a branch of the Rocky Mountains, is a chain in the northern part of Mexico, W. of the Rio del Norte, with which it is nearly parallel, and connected with the Anahuac table-lands.

An′akim, the ancient race of giants who lived in the S. of Palestine at the time of the exodus of the Israelites. They are called "the children of Anak" in Numbers xiii. 28. "Joshua destroyed them utterly with their cities," but a remnant of them was left in Gaza, in Gath, and in Ashdod (Joshua xi. 21).

Anal′cime, or **Anal′cite** [from the Gr. *α*, priv., and *ἄλκιμος*, "strong"], a hydrated silicate of soda and alumina, generally occurring in twenty-four-sided crystals, which are sometimes transparent. By friction it becomes *feebly* electrified, whence its name. It is found in the trap-rocks of Ireland, Scotland, Nova Scotia, and Lake Superior.

Analem′ma [Lat. *analem′ma;* Gr. *ἀνάλημμα*, a "support" or "object supported," from *ἀνά*, "up," and *λαμβάνω*, to "take"], in geometry, the projection of a sphere upon the plane of a meridian, the eye being supposed to be placed at an infinitely distant point of the radius perpendicular to that plane. In this projection (which is also called *orthographic*) all small circles whose planes are parallel to that of projection are represented by concentric circles of the same magnitude as the originals, all circles in planes perpendicular to that of projection are seen as chords or diameters of the meridian circle, and all other circles of the sphere are projected into ellipses.

A′nal Glands, in comparative anatomy, are organs for secreting substances which, though not always so, are generally repulsive in their character, and are commonly employed for purposes of defence. They present every grade of the glandular structure, nearly always opening into the termination of the intestine near the anus. The sweet fluid ejected by the aphides, and of which the ants are so fond, is the product of secerning tubules opening on the posterior part of the body; and the singular defensive acrid vapors discharged explosively by the insects called "bombardiers" are likewise the products of anal glands. In the mollusks the most remarkable example of these glands is presented by certain cephalopods, such as the cuttle-fish, in which there is sometimes a single and sometimes a bilobed or trilobed cyst, that secretes an inky fluid which these animals eject to blacken the water around them, for the purpose of concealment in time of danger. In reptiles the anal bags are either single, double, or triple, and in many species, as in frogs and tortoises, are developed to a great size, and serve for aquatic respiration. In birds the anal follicles consist of a single cavity, which is termed the *bursa Fabricii*. In quadrupeds the anal follicles generally consist of two sacciform cavities, each having an opening near the verge of the anus. In the skunk (*Mephi′tis va′rians*) the secretion of these glands furnishes to the animal its principal means of defence. In the civet (*Viverra civetta*) and the beaver (*Castor fiber*) the secretions from the anal glands have long been an article of commerce; the former is sometimes employed, when combined with other substances, as a perfume; the latter, under the name of castor, is used in medicine.

An′alogue [from the Gr. *ἀνά*, "according to," and *λόγος*, "ratio" or "proportion"], in comparative anatomy, a member or organ of an animal that performs the same function as a part or organ in a different animal. Thus, the wing of a bird is the analogue of the wing of an insect, though different in structure.

Anal′ogy [Lat. *analo′gia;* Gr. *ἀναλογία*, from *ἀνά*, "according to," and *λόγος*, "ratio" or "proportion"], literally, the state or circumstance of having proportion one to the other; used to denote a relation or agreement between different things in certain respects. The conclusions to which we are led respecting one thing, by reasoning from our experience concerning another similar thing, form what is termed analogical knowledge. The word analogy is generally employed to designate an imperfect degree of similarity. Thus, a physician, arguing from the effects which he had seen produced by a certain drug on one man to its probable effects on another man, would be said to reason from *experience;* but reasoning from the effects produced on an inferior animal to the probable effects on man, he would be, more properly, reasoning from analogy. Thus also, Bishop Butler, in his celebrated treatise on the "Analogy of Religion, Natural and Revealed," has argued that the same sort of difficulties which are found in the constitution of nature must be looked for in the spiritual world, and that the existence of this analogy is a good reason for believing that revealed religion proceeds from God, the Creator of the material universe.

In rhetoric, the word analogy designates, not the direct resemblance between two objects, but a resemblance between the relations in which they stand to other objects. For example, to term youth "the dawn of life" is said to be an analogical metaphor, because there is no direct resemblance between youth and morning, but the one may be said to bear the same relation to life that the other does to day. In grammar, analogy means a conformity in the principles of organization of different words or collections of words. In geometry, analogy signifies nearly the same thing as proportion, or the equality or similitude of ratios.

In zoology, the term analogy is usually restricted to the relation which animals bear to one another in the similarity of a smaller proportion of their organism; thus, the *Ascalaphus Italicus*, in the length and knobbed extremities of its antennæ, the coloring of its wings, and its general aspect, exhibits a striking resemblance to the butterfly, but in all the essential parts of its organization it conforms to the neuropterous type of structure; its relation to the Lepidoptera is therefore said to be one of analogy, while it is, in fact, connected with the ant-lions by affinity.

Reasoning from analogy consists in inferring that certain facts are true with reference to objects which have afforded us no examples of those facts, on the basis of the similarity of those objects to other objects better known. It warrants only probable conclusions, but the probability may often become very strong, and in the affairs of life it is often necessary to act upon conclusions thus attained. Even when its conclusions are very uncertain, they may often serve to guide inquiry and lead to discovery.

REVISED BY J. H. GILMORE.

Anal′ysis [Gr. *ἀνάλυσις*, from *ἀνά*, "throughout," and *λύω*, to "untie"], in geometry, a method of conducting geometrical inquiries, invented by the philosophers of the school of Plato, or, according to Theon of Alexandria, by Plato himself, and one of the most ingenious and beautiful contrivances in the mathematics.

"Analysis," says Pappus, "may be distinguished into two kinds: in the first, which may be called contemplative analysis, we propose to discover the truth or falsehood of an affirmed proposition; the other belongs to the solution of problems, or the investigation of unknown truths. In the first we assume the subject of the proposition advanced to be true, and proceed through the consequences of the hypothesis till we arrive at something known. If this result is true, the proposition is true also, and the direct demonstration is obtained by stating in an inverse order the different parts of the analysis. If the ultimate consequence at which we arrive is false, the proposition was also false. In the case of a problem, we first suppose it to be resolved,

* It is usual for anagrammatists to treat *i* as the same with *j*, and *u* as identical with *v*.

and deduce the consequences resulting from that solution till we arrive at something known. If the last consequence involves only something which can be executed, or is comprised among what geometers called *data*, the proposed problem can be solved; and the demonstration—or rather, in this case, the construction—is obtained, as in the former case, by taking the different parts of the analysis in an inverse order. If the last result is impossible, the thing demanded is also impossible."

The names of the ancient writers on the geometrical analysis are—Euclid, in his "Data and Porismata;" Apollonius, in his treatise "De Sectione Rationis" and in his "Conic Sections;" Aristæus, "De Locis Solidis;" and Eratosthenes, "De Mediis Proportionalibus;" but of these only the "Data" of Euclid and some fragments of Apollonius have come down to our times. A complete system of the ancient geometrical analysis may be found in the works of Dr. Simson of Glasgow. The reader may also consult with advantage Leslie's "Geometrical Analysis."

Analysis is directly opposed to synthesis, which advances step by step through known propositions, from the data to the quæsita in the case of a problem, or from the hypothesis to the predicate in the case of a theorem. Analysis is the chief though not the sole instrument of *discovery*, whilst synthesis adapts itself naturally to *instruction*. Euclid's direct demonstrations, for example, are all synthetical; his indirect ones, however, retain the analytical character. The methods of conducting analysis and synthesis are the same in kind, the only difference being that, in the hands of the investigator at least, the several steps of the former are experiments suggested by experience, for which no rule can be assigned, whereas in the latter these steps are suggested by previous knowledge, gained, in fact, very frequently from a preliminary analysis.

The ancient geometers conducted their analysis by means of ordinary language only; their successors, however, frequently availed themselves of the powerful resources of algebra. As a consequence of this habit the word analysis, until a very recent reaction set in, lost entirely its original meaning as a *method* of reasoning opposed to synthesis, and by a strange perversion of terms became synonymous with algebra and the calculus; that is to say, with the *instruments* employed in investigation. The fact that algebra may be, and often is, employed synthetically as well as analytically appears to have been overlooked.

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Analysis, Chemical. See CHEMICAL ANALYSIS, by PROF. S. W. JOHNSON, A. M., and VOLUMETRIC ANALYSIS.

Analytical Geometry. See GEOMETRY.

Anam′, or **Annam′, Empire of,** called also **Cochin China,** a country of South-eastern Asia, is bounded on the N. by China, on the S. and E. by the Chinese Sea, and on the W. by Laos, Siam, and the Gulf of Siam. Area, about 198,000 square miles. It lies between lat. 8° 40′ and 23° 22′ N. The length from N. to S. is about 800 miles, and the width is very unequal in different parts. It is traversed by a long range of high mountains, the direction of which is nearly N. and S. The principal river is the Mekong (or Cambodja), which is navigable, and flows southward into the Chinese Sea. The empire of Anam was formed at the beginning of the present century out of the former kingdoms of Tonquin and Cochin China (Ko-Tchin-Tching), to which were added the province of Champa and a part of the ancient kingdom of Cambodja. The population is variously estimated at from 9,000,000 to 27,000,000, the latter figure being given by the Catholic missionaries.

TONQUIN is the most northern part of Anam, and borders on the Gulf of Tonquin. It is intersected by the river Sang-koi, which enters the Gulf of Tonquin. The soil is fertile, and produces rice, cotton, and spices, with a variety of varnish trees and palms. Gold, silver, copper, and iron abound in Tonquin, which is the only part of Anam that is rich in metals.

COCHIN CHINA is a long and narrow district, bounded on the E. by the Chinese Sea, and on the W. by a range of barren mountains, which have not been explored. A large part of the soil is sterile. The scenery of the coast is grand and beautiful. The chief products are eagle-wood (*Aloex′ylon*), sugar, and cinnamon.

CAMBODIA, or KAMBOJA, is S. W. of Cochin China, and borders on the Gulf of Siam. (See CAMBODIA.)

CHAMPA, or TSIAMPA, is the most southern part of Anam, bordering on the sea. The soil is sterile, consisting of sandhills and granite formations, but yields one valuable product, the fragrant eagle-wood. Several good harbors occur on the coast of Champa.

The government of Anam is despotic. Mandarins appointed by the emperor govern the provinces, and are the commanders of the army. Buddhism is the religion of the majority of the people; among the higher classes Confucius has many adherents. Roman Catholic missions were planted in the seventeenth century, soon became prosperous, and have maintained themselves in spite of the most cruel persecutions. In 1862 the emperor engaged in a treaty of peace concluded with France to tolerate Christianity and protect the Christians in their lives and property throughout the empire. In 1872 the Catholic Church of Anam (inclusive of the French Cochin China) was divided into eight vicariates apostolic, of which four were in Tonquin, three in Cochin China, and one in Cambodja. The Christian population was in 1854 estimated at 500,000; and though from 1854 to 1862 it greatly decreased, it is now believed to exceed that number, as in 1865 the apostolic vicariate of Tonquin alone had 127,852, and that of Eastern Tonquin 43,315 Catholics. The commerce of Anam is to a large extent in the hands of Chinese merchants; the chief branch of industry is silk manufacture. The capital is Hue, at the mouth of the river of the same name.

The Anamese language is, like the Chinese, monosyllabic; the literature consists almost exclusively of imitations of Chinese works. About 214 B. C., Tonquin and Cochin China were conquered by a Chinese prince and settled by Chinese colonists. From that time to 1428 they were in turn sometimes subject to China, sometimes independent. In 1428 they threw off the Chinese yoke and formed an independent empire, under the dynasty Leh. But the authority of this house became soon merely nominal, Tonquin being ruled (since 1545) by the dynasty of the Trinh, Cochin China (since 1600) by that of Nguyen. A new dynasty, Tay-song, arose in 1765, and exterminated the dynasties of Leh, Trinh, and Nguyen. Only one scion of the latter, Nguyen-anh, escaped, was educated in France, and having returned to Anam, and conquered and exterminated the dynasty Tay-song, was under the name Gya-long proclaimed as the first emperor of Anam. His natural son and successor, Minh-menh (1820–41), and the son and grandson of the latter, Thien-tri (1841–47), and Tu-duc (since 1847), were all cruel persecutors of the Catholic Church, and thus became involved in hostilities with France and Spain. A four-years' war (1858–62) ended in a treaty of peace, by which the emperor of Anam ceded three provinces of Cochin China, Saigon, Bienhoa, and Mytho, to France. In 1867 three other provinces of Cochin China, Vinh-long, Chan-doc, and Ha-tien, were annexed to the French dominions, which have an area of 21,728 square miles, and a population of 1,204,287. (See VEUILLOT, "La Cochin Chine et la Tonquin," 1859; CORTAMBERT and DE ROSNY, "Tableau de la Cochin Chine," 1863; BASTIAN, "Die Völker des östl. Asiens," vol. iv., 1868.)

A. J. SCHEM.

Anam′boe, or **Anamaboe,** a seaport and British fort on the Gold Coast of Africa, 11 miles E. N. E. of Cape Coast Castle, is the residence of a governor. It exports palm-oil, gold-dust, ivory, etc. Pop. about 3000.

Anamirapucu′, a river of Brazil, in the province of Pará, enters the estuary of the Amazon after a course of about 200 miles.

Anamor′phosis [Gr. *ἀναμόρφωσις*, from *ἀνά*, "again," and *μορφόω*, to "form"], in natural history, denotes the ideal change of form or development which may be traced through the species or higher members of a natural group of animals or plants. Some naturalists adopt the theory that living species have been developed from extinct species by the process of anamorphosis. The term is sometimes applied in botany to an unusual development of an organ, as the calyx of a rose assuming the form of a fruit.

ANAMORPHOSIS, in perspective, denotes a drawing which when viewed in the usual way appears distorted or presents an image of something different, but when viewed from a particular point or reflected by a curved mirror, it appears in its proper form and just proportions.

Anamo′sa, a post-village, capital of Jones co., Ia., on the Wapsipinicon and Buffalo rivers, 50 miles S. W. of Dubuque, on the Dubuque and South-western and Iowa Midland R. Rs. It has two weekly newspapers, a national bank, excellent quarries of building-stone, and a State penitentiary. Pop. 2083. ED. "ANAMOSA EUREKA."

Ananassa Sativa. See PINEAPPLE.

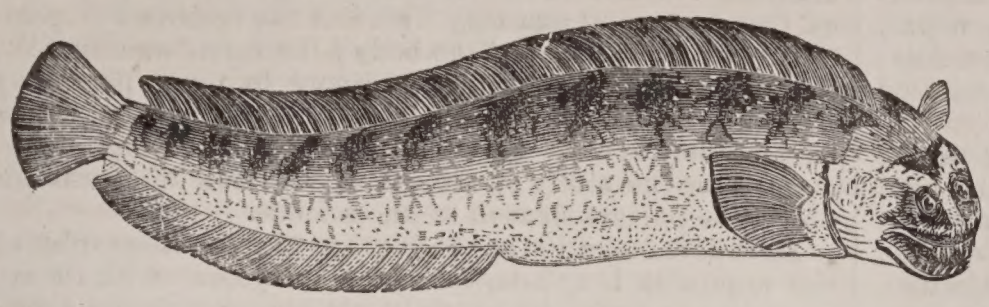
Ananyev, a town of Russia, in the government of Kherson, 90 miles N. W. of Odessa. Pop. in 1867, 11,402.

Anapa′, a seaport and fortified town of Russian Circassia, on the N. shore of the Black Sea, near the mouth of the Kuban. The harbor is not safe in stormy weather. The town has been by turns the property of Turks and Russians, and now belongs to the latter. Pop. about 9000.

Anaph′ora [Lat. *anaph′ora;* Gr. *ἀναφορά*, from *ἀνά*, "again" or "back," and *φέρω*, to "carry"], in rhetoric, a repetition of a word or phrase at the beginning of two or more consecutive sentences or clauses, as, "It is sown in

corruption; it is raised in incorruption. It is sown in dishonor; it is raised in glory. It is sown in weakness; it is raised in power."

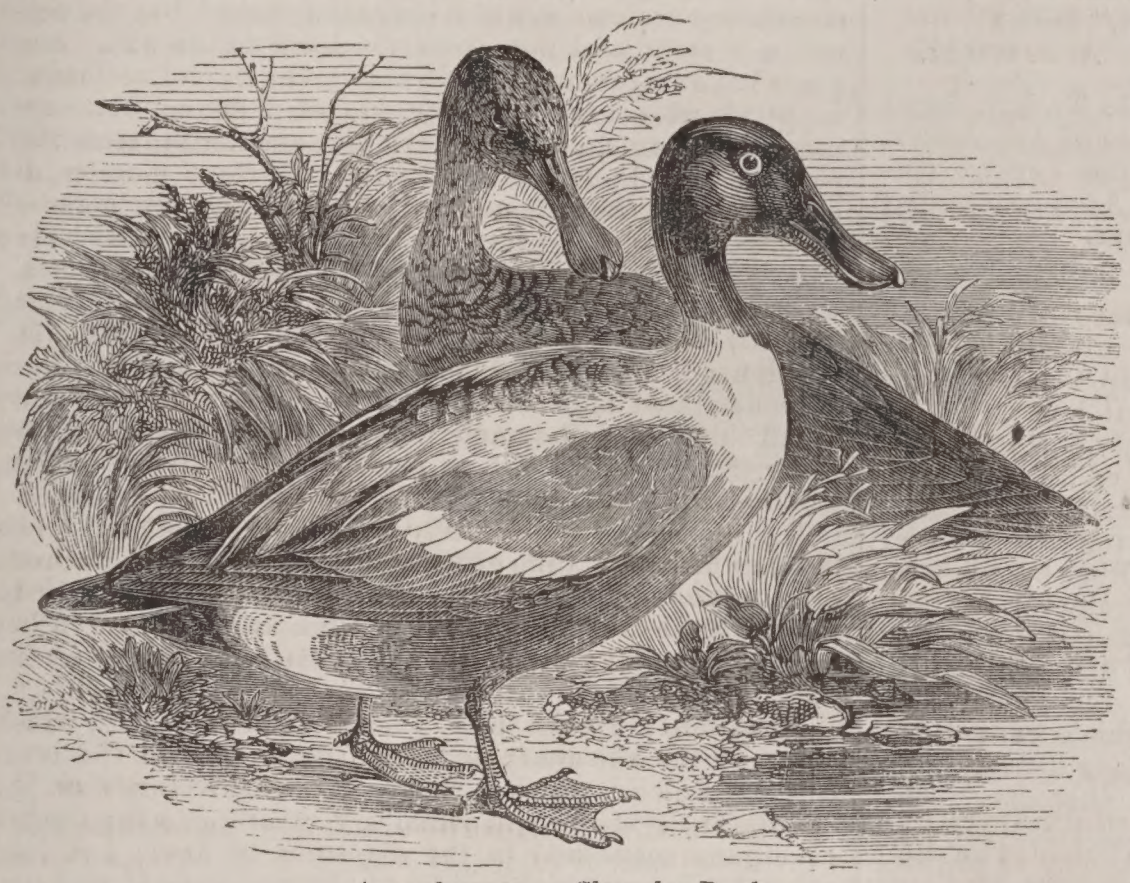
Anar'rhichas [from the Gr. *ἀνά*, "up," and *ἀῤῥίχασθαι*, to "clamber"], the name of a genus of spiny-finned osse-



Anarrhichas lupus, Sea Wolf.

ous fishes, characterized by having their mandibular, palatine, and vomerine bones armed with large osseous tubercules bearing on their summits enamelled teeth. It includes the wolf-fish, which is common to both sides of the Atlantic.

A'nas [from the Lat. *a'nas*, a "duck"], a Linnæan genus of web-footed birds belonging to the order Palmi-



Anas clypeata, or Shoveler Duck.

pedes, has been divided by recent ornithologists into many genera—namely, *Anas* (the duck), *Anser* (the geese), *Cygnus* (the swans), *Aythya* (red-head), *Somateria* (eiders), etc. The anas in this restricted sense has a flattened bill, the base of which has a greater breadth than depth, and the bill is as wide (or wider) at the extremity as at the base.

Anasarca. See DROPSY.

Anasta'sius I., emperor of Constantinople, was born at Durazzo about 430 A. D. He succeeded the emperor Zeno in 491. The orthodox, who considered him a heretic, revolted and defeated his army in 514. Died in 518 A. D.

Anastasius II. became emperor of the East in 713 A. D. Theodosius was chosen emperor by his army, which took Constantinople and deposed Anastasius in 716. Died in 720 A. D.

Anastasius I., SAINT, a native of Rome, became pope about 398 A. D. He condemned the doctrines of Origen. Died in 402 A. D.—ANASTASIUS II., SAINT (Pope), a native of Rome, succeeded Gelasius I. in 496 A. D. Died in 498.—ANASTASIUS III. was chosen pope in place of Sergius III. in 911. Died in 913.—ANASTASIUS IV. succeeded Eugenius III. as pope in 1153. He died at an advanced age Dec. 2, 1154.

Anastasius, surnamed THE LIBRARIAN, a Roman priest who was librarian of the Vatican, and lived about 860 A. D. He compiled an "Ecclesiastical History" in Latin, and wrote other works. Died about 890.

Anastasius, SAINT, surnamed ASTRIC, the apostle of the Hungarians, was born in 954. He converted the duke Stephen, and many other Hungarians. Died in 1044.

Anastasius Grün. See AUERSPERG.

Anastat'ica [from the Gr. *ἀνάστασις*, "resurrection"], the name of a genus of cruciferous plants, one species of which, called the rose of Jericho (*Anastatica Hierochuntina*), grows in Palestine and has singular hygroscopic properties. Under the influence of drought it rolls up into a ball, becomes detached from the ground, and is carried away by the wind. When it comes into contact with moisture it expands into its natural form. It retains for many years this property of expanding when moistened.

Anastat'ic Printing, a process by which printing and engravings may be transferred to metal, from which impressions exactly like the original can be taken. The printed sheet is moistened with dilute phosphoric or nitric acid, and pressed with great force upon a zinc plate, which is afterwards washed with an acid solution of gum, and then inked with a roller.

Anas'trophe [from the Gr. *ἀνά*, "up," "back," "over," and *στρέφω*, to "turn"], a term in rhetoric applied to a species of inversion or departure from the usual order of succession in words, as when Scott, in the "Lady of the Lake," says, "Clattered a hundred steeds along," for "A hundred steeds clattered along;" so Virgil in the "Æneid," lib. i., l. 32, has "*Maria omnia circum*" for "*circum omnia maria*" ("around all the seas").

An'atase [from the Gr. *ἀνάτασις*, "extension," so called from the length of its crystals], a name of titanic acid or oxide of titanium, which occurs in octahedral crystals, having a splendent and adamantine lustre. Some specimens found in Brazil resemble diamonds so much as to be mistaken for them. Called also *octahedrite*.

Anath'ema [*ἀνάθεμα*, from *ἀνά*, "up," and *τίθημι*, to "set" or "place"], a Greek word, the primary meaning of which was something "placed" or "hung up" in the temples of the gods, and hence "consecrated" or "devoted." Among the Jews and Christians it is a curse or denunciation uttered by ecclesiastical authority, and a form of excommunication of heretics and other offenders.

An'athoth, or **A'nata,** an ancient Jewish city of refuge, about 4 miles N. E. of Jerusalem, is supposed to have been the native place of the prophet Jeremiah.

Anat'idæ, the name of a family of web-footed birds, of which the genus *Anas* is the type. It includes the duck, goose, swan, and others. Cuvier gave them the name of Lamellirostres.

Anato'lia, Anado'li, or **Nato'lia** [from the Gr. *Ἀνατολή*, the "rising" or "orient"], the modern name of Asia Minor, which is a large peninsula, bounded on the N. by the Black Sea and the Sea of Mármora, on the S. by the Mediterranean, and on the W. by the Grecian Archipelago. The Euphrates forms part of its ill-defined eastern boundary. It lies between lat. 36° and 42° N., and between lon. 26° and 41° E. The length from E. to W. is about 700 miles, and the area is estimated at 204,434 square miles. The western coast is indented with numerous gulfs, and presents many high and precipitous cliffs. The interior is an elevated plateau, enclosed by two mountain-ranges—namely, Mount Taurus, which extends through the southern part from the Euphrates to the archipelago; and Anti-Taurus, which traverses the northern part. The general direction of these ranges is nearly E. and W. Some peaks of Mount Taurus attain a height of 10,000 feet or more. Between these two long ranges are several others which rise to a great height. The highest summit in Anatolia is the volcanic Arjish-Dagh, or Mount Argæus, which is situated 13 miles S. of Kaisareeyeh, and is 13,000 feet above the level of the sea. Mount Olympus, about 8 miles S. of Brusa, has an altitude of 8800 feet.

The largest river of Anatolia is the Kizil-Irmak (anc. *Halys*), which rises in the E. part and enters the Black Sea. The western part of the peninsula is drained by the Meander and the Hermus (Sarabat), which flow westward into the Ægean Sea. In the central part are a number of salt lakes and barren steppes of large extent. The Katakekaumene, or "burnt country," a volcanic waste, is the best known of these regions.

The rocks which underlie the upper regions of Anatolia are mostly granite, serpentine, and schist. Along the southern and western coasts calcareous rocks predominate, and marble is abundant. Numerous extinct volcanoes and rocks of volcanic origin occur in different parts of the country. The climate presents a great diversity in consequence of the inequality of the surface. The western shores have been celebrated in all ages for their mild and genial climate, and the coast of the Black Sea is favored in that respect. The central plateau is very hot in summer and cold

in winter, partly because it is not well watered and is generally destitute of forest trees. The northern region and the other sea-coasts are covered with extensive forests of oak, ash, beech, plane, and other trees good for timber. The coasts of the Ægean and Black seas have a very luxuriant vegetation and a fertile soil. Among the chief products are sugar, wine, opium, tobacco, olives, figs, wheat, barley, and silk. The flora of Southern and Western Anatolia is extremely beautiful. The mountains are infested by panthers, bears, and wolves.

Anatolia, which forms a part of the dominions of the sultan of Turkey, comprises the pashalics of Anatolia, Itchelee, Karamania, Marash, Sivas (or Room), and Trebizond. The population, which is estimated at 10,970,000, consists of Ottoman Turks (who are a large majority), Turkomans, Greeks, nomadic Koords, and Armenians. The cultivation of the soil is generally neglected here, and the principal branches of industry are the production of opium, wine, and oil, and weaving shawls and carpets. The chief cities are Smyrna, Brusa (or Bursa), Sinope, Angora, Konieh, Kutaieh, and Trebizond. In ancient times this peninsula was occupied by many powerful kingdoms and famous cities. (See Asia Minor, Ionia, Lydia, Pontus, etc. Hamilton, "Researches in Asia Minor," 1842; Tchihatcheff, "Asie Mineure," 1853–60; and Barth, "Reise von Trapezunt bis Skutari," 1860.)

A. J. Schem.

Anatolia is also a pashalic of Asiatic Turkey, forming the western portion of the peninsula called Asia Minor. It is the largest and richest province in the Turkish empire, and the most populous in Western Asia, comprising nearly half of the Anatolia described above.

Anat'omy [from the Gr. *ἀνά*, "up," "through," and *τέμνω*, to "cut"], the science of the structure of organized bodies; so called because its results are attained and its investigations are pursued by "cutting up" or dissecting organisms. The widest and most general knowledge of organized structures is to be attained only by the examination and comparison of the structure of all species of animals and vegetables. Such a comparison has given name to the science of Comparative Anatomy (which see)—a science embracing in its field all the other branches of anatomical knowledge. That branch of comparative anatomy which seeks to trace the unities of plan which are exhibited in diverse organisms, and which discovers, as far as may be, the principles which govern the growth and development of organized bodies, and which finds functional analogies and structural homologies is denominated "philosophical" or "transcendental" anatomy. The study of the structure of animals is called zootomy, or animal anatomy; vegetable anatomy is known as phytotomy, or more frequently as structural botany. That branch of anatomy which describes the organs or viscera, etc. of any one species, and the relations of these organs to each other, is called descriptive or special anatomy, or organography. Histology treats of the "tissues" or *immediate* structural elements. Microscopic anatomy is minute histology, or the science of the more *remote* structural elements of which the body is built up. The examination of the *ultimate* structural elements is the province of organic chemistry, but between that science and histology there is yet an uncrossed, perhaps an impassable, barrier. (See Histology, by Col. J. J. Woodward, M. D.)

Vegetable anatomy is, and must be, chiefly histological, since the various parts of plants are structurally much less differentiated from their typical histological elements than those of most animals. Indeed, the organography of plants is very simple, the philosophical anatomist being able to show that all the proper organs of the vegetable are modifications of the leaf.

Human anatomy, the science of the structure of the human body, is not only a subject of interest and vital importance to the physician and the surgeon, but should be understood in its general outlines by parents and teachers, and by every one who recognizes the importance of the knowledge of that self of which the body is so important a part. To the painter and sculptor the study of the superficial muscles and bones is considered indispensable. Such knowledge is primarily sought in the dissecting-room; but the slowly accumulated results of the practical anatomist's work have been minutely recorded; and for ordinary instruction the published text-books are sufficient; while for the surgeon, and even for the artist, practical work with the scalpel is all important, as substituting certainty and familiar personal knowledge for the less valuable knowledge that is acquired by reading and tradition. Practical anatomical work is pursued and legalized in most civilized nations; and the (much exaggerated) abuses to which it has led in former times are now for the most part prevented by law.

Human anatomy is "general," "special," "topographical," or "surgical." "General anatomy" applies the result of philosophical anatomy to the human body, assigns various organs to appropriate groups, and divides the whole subject into suitable branches or heads; "special anatomy" describes the constituent parts; "topographical" or "regional anatomy" studies the relations of parts in important portions of the body; "surgical anatomy" is the application of regional anatomy to parts peculiarly liable to surgical operations, and its study is entered into as a preparation for such operations. "Pathological anatomy," or the study of organs as modified by disease, is also an important branch of the science.

As the leaf and its appendages in the organography of the vegetable kingdom, and as the segment with its appendages in articulate animals, are regarded as the single structural elements upon which the whole organism is built, so in man and in all vertebrates the vertebra with its apophyses or branches is the typical element of which the osseous framework is composed, and all the symmetrical or bilateral parts are in a manner dependencies of the osseous system.

This great truth was first fully grasped by Oken. Another remarkable generalization was made by the great Bichat—that all non-symmetrical parts, such as the digestive and circulatory systems, are of a character resembling the vegetative growth, and not directly subject to the will. Such parts have in general non-striated muscles, and are largely supplied with nerves of the so-called sympathetic system; while, on the other hand, bilateral and symmetrical parts, as the limbs and the most important muscles, are largely under the direction of the will, and are supplied by cerebro-spinal nerves. Two hundred and twenty-nine pairs of voluntary muscles are recognized by anatomists.

The muscles, in accordance with this theory, are divided into—1, striated muscles, or "muscles of animal life," which are symmetrical or found alike on both sides; and, 2, non-striated muscles, those of "organic life," which are found chiefly in non-symmetrical parts, or if in symmetrical parts they always exist as parts of some special organ, while striated muscles are never so found.

We have seen incidentally that there are likewise two systems of nerves—the cerebro-spinal and the sympathetic or ganglionic systems, which are somewhat analogous to the two classes of muscles. Some theorists, perhaps rather fancifully, make a similar twofold division in almost all the animal tissues.

Anatomists divide their science into osteology, which treats of the skeleton; myology, the science of the muscles; angiology, which describes the blood-vessels or the circulatory system; splanchnology, relating to the viscera or organs concerned in the digestion of food; and into other branches which relate to the respiratory, nervous, and reproductive systems and the organs of special sense. These minor sciences, however, treat of the physiology (functions) as well as the anatomy (structure) of the various parts. (For descriptions of the various organs and tissues, see Eye, Ear, Heart, Bone, Muscle, etc.)

History.—It is said that the priests of ancient Egypt were familiar with the facts of human anatomy. The ancient Greeks practised the dissection of animals, and gained considerable knowledge of their structure. Alcmæon, Democritus, Hippocrates, Diocles, and Aristotle were zootomists, but no ancient Greek seems to have suspected the existence of a nervous system or of the circulation of the blood. Erasistratus (300 B. C.) is said to have been the first to dissect the human body. Herophilus and Parthenius followed him. Later, Galen, Seranus, and Moschion practised dissection of the human body. The science of anatomy, except so far as taught by Galen, perished with the old Roman empire. Its restorers were Mundinus (born 1315), Guy de Chauliac, Vigo (1516), Sylvius (1539), Ingrassias, Horman, Fallopius (1523–62), Eustachius (1500–75), but especially the Flemish Vesalius (1514–64). Leonardo da Vinci (1452–1519) had practically studied anatomy in its relations to art. Servetus (1509–53) is believed to have first announced the circulation of the blood; Cæsalpinus, Paolo Sarpi, and others soon after made the same announcement, but its truth was first shown by Harvey (1578–1657), a pupil of Fabricius. The later names of Asellius, Bartholine, Wharton, Willis, Ruysch, Pachionius, Malpighi, Valsalva, Cotunni, Monro, and Meckel are among the most brilliant; but the number of eminent anatomists is very great. In recent times microscopical and pathological anatomy have been the fields of numerous and important discoveries. Drs. John Bard and Peter Middleton of New York are said to have made the first dissection in America in 1750.

Chas. W. Greene.

Anaxag'oras [*Ἀναξαγόρας*], an eminent Greek philosopher of the Ionic School, was born at Clazomenæ, near Smyrna, about 500 B. C. He passed nearly thirty years at

Athens, to which he removed about 480, and enjoyed the friendship of Pericles. He wrote a "Treatise on Nature," of which small fragments are extant. In 450 B. C. he was accused of impiety, and, though defended by Pericles, was condemned to death or banishment, and retired to Lampsacus, where he died in 428 B.C. He appears to have maintained the eternity of matter. Combining great sagacity and close reasoning with diligent observation, he rendered important services to physical science. He ascribed the origin of the world and the order of nature to the operation of an eternal self-existent and infinitely powerful principle which he termed Nous (Mind). He taught that generation and destruction are only the union and separation of elements which can neither be created nor annihilated, demonstrated that air is a substance, explained the theory of eclipses, and refuted the doctrine that things may be produced by chance. (See RITTER, "History of Philosophy," 1838.)

Anaxar'chus [Ἀναξάρχος], a Greek philosopher, born at Abdera, in Thrace, accompanied Alexander the Great in his expedition against Persia in 334 B. C. He gained the favor of that prince, whom he survived a short time.

Anaximan'der [Ἀναξίμανδρος], an eminent Greek philosopher, born at Miletus about 610 B. C., was a disciple of Thales. He is said to have discovered the obliquity of the ecliptic, and to have invented the sun-dial. According to tradition, he taught that the earth is a cylinder, that the sun is a globe of fire as large as, or larger than, the earth, and that infinity is the beginning and end of all things. He appears to have been the first Greek who wrote any work in prose on geometry or philosophy. Died about 546 B. C.

Anaxim'enes [Ἀναξιμένης], a Greek philosopher of whom little is known, was born at Miletus, in Asia Minor, about 550 B. C. He taught that the original principle or primary form of things was air, or a subtle ether which is in perpetual motion.

Anaximenes (OF LAMPSACUS), a Greek historian and preceptor of Alexander the Great, about 340 B. C. He wrote a history of the reign of Philip of Macedon, and another of the exploits of Alexander, neither of which is extant.

An'cach, a department of Peru, is bounded on the N. by the department of Libertad, on the E. by the littoral province of Loreto and the department of Junin, on the S. by the department of Lima, and on the W. by the Pacific. Area, estimated at 43,100 square miles. The department extends from the Andes to the Pacific, and contains all climates and their products. The chief occupations of the inhabitants are agriculture and the raising of cattle. The rich silver-mines in the mountains, as well as the rivers containing gold, are but very little worked at present. Chief town, Huaraz. Pop. about 190,000.

Ancelot (JACQUES ARSÈNE FRANÇOIS POLYCARPE), a French dramatic poet, born at Havre Feb. 9, 1794, produced in 1819 a tragedy entitled "Louis IX.," which was warmly applauded, and procured for him a pension of 2000 francs. Among his other works are an epic poem called "Marie de Brabant" (1825), "Fiesque," a tragedy (1824), and "Olga," a drama (1828). He was admitted into the French Academy in 1841. Died Sept. 7, 1854.

His wife, Marguerite Virginie Chardon, born at Dijon Mar. 15, 1792, was a novelist and an artist. She wrote several dramas and tales which are worthy of commendation.

An'cestor [remotely from the Lat. *an'te*, "before," and *ce'do*, to "go"], one who has preceded another in the direct line of descent. In law it signifies one from whom an estate has been derived by inheritance; a deceased person from whom, on account of his decease, an estate has passed to another, called an heir, by operation of law. Ancestor and heir are correlative terms. In this sense a brother may be the ancestor of a brother, or a child of a father, wherever those persons can take land from such relatives by inheritance.

Anchi'ses [Gr. Ἀγχίσης], a Trojan prince related to Priam, was, according to tradition, a favored lover of Venus, and the father of Æneas, with whom he escaped from Troy. He is said to have died in Sicily.

Anchithe'rium, an equine quadruped of which the remains are found in the lower miocene strata, supposed to be the progenitor of *Hipparion* in the upper miocene, and hence of *Equus* in the pliocene. It is also regarded as a connecting link between the tapiroid *Paleotherium* of the eocene and our modern horses. In *Anchitherium* the foot was composed of three toes, all of which rested on the ground; in *Hipparion* the lateral toes were dwarfed, but present; in *Equus* they are obsolete, or represented only by the internal splint-bones.

Anch'or [Lat. *an'chora;* Gr. ἄγκυρα], an iron implement used to fasten a vessel to the ground in comparatively shallow water. It consists of a round straight bar called the *shank*, at the upper end of which is a transverse piece called the *stock*, and of two curved arms at the lower end of the shank, each of which arms terminates in a triangular plate called a *fluke* or *palm*. The lower end of the shank is the *crown*. The stock is at right angles to the plane of the flukes. The cable is fastened to a ring in the upper end of the shank. When the anchor is cast from the ship into the sea, the crown first strikes the ground. The anchor then falls over, so that one end of the stock rests upon the ground, and the movement of the ship causes one of the flukes to enter the ground, and to penetrate deeper in proportion as the strain or traction on the cable increases. Mr. Porter invented an improved form of anchor, the arms of which are pivoted to the stock, instead of being rigidly fixed. Men-of-war and large ships carry two large anchors of equal size at the bows, thence called bower anchors, and two of smaller size, called the sheet anchor and spare anchor. For particular and special services they have also the "stream" and the "kedge" anchor. Smaller vessels have fewer anchors and of inferior size. When one anchor is down, the ship is said to be at single anchor. When the anchor is dragged out of the ground by the movement of the vessel, it is said to come home, and when the cable becomes twisted around the anchor or stock, the anchor is said to be foul. *To weigh anchor* signifies to heave or raise the anchor out of the ground into the ship.

Anch'orage, ground fit to hold a ship's anchor, so that she may ride safely. Hard sand or stiff clay forms the best anchorage. A landlocked harbor is also a requisite of good anchorage. The water should not be too deep, as in that case the cable, extending nearly vertically, will be apt to pull the anchor out of the ground. The term is also applied to the toll or harbor-dues which the owner or captain of a ship pays for permission to cast anchor.

Anch'orite, or **Anch'oret** [from the Gr. ἀνχωρητής, from ἀνά, "up," "back," and χωρέω, to "retire"], a hermit or person who has retired from the world and devoted himself to ascetic religion in solitude. The term was first applied to Christians of the third century who retired to caves and solitary places in the deserts of Palestine, Egypt, and Syria, to which, in some cases, they were driven by persecution. They often subjected themselves to painful privations and various forms of penance. The first of these anchorites was Paul of Thebes, who died in 340, aged 104 years. The so-called "father of monachism" was Antony of Coma, in Upper Egypt, who was born in 251 and died in 356, aged 105 years. One anchorite, Simeon Stylites, is said to have lived many years on the top of a pillar in Syria, about 420–450 A. D. The chief difference between an anchorite and a monk is that the former lived alone, and the latter associated with other monks. The first monastery was founded by Pachomius, on the island of Tabenna in the Nile, about the year 340; the first nunnery, some eight years later.

Ancho'vy (the *Engrau'lis encrasich'olus* of the naturalists), a small fish, from five to seven inches long, which abounds in the Mediterranean Sea and the Atlantic shores of Europe. It belongs to the Clupeidæ, or herring family, and is distinguished by a sharp-pointed head, the upper jaw longer than the lower, and the deeply-cleft mouth extending behind the eyes. It is salted and packed in small barrels for exportation, and used for sauces, pastes, etc. The *Engraulis vittatus*, an anchovy of the Atlantic shores of the U. S., might easily be taken in immense quantities. Anchovies also abound on our Pacific coast.

Anchovy.

Anchovy Pear (*Gri'as cauliflo'ra*), a tree which grows in the West Indies in moist ground or shallow water, and is allied to the Myrtaceæ. It bears a fruit (a drupe) which is pickled and used for food.

Anchylosis. See ANKYLOSIS.

Ancienne Lorette, a post-village of Quebec co., province of Quebec, Canada, 7 miles S. W. of Quebec. About 250 Huron Indians live here, descendants of those who settled here after the dispersion of the Hurons by the Iroquois in the seventeenth century. Pop. in 1871, 2333.

An'cients [Lat. *antia'nus*, from *an'tea* or *an'te*, "before"], those persons who lived in former ages; a term

applied somewhat indefinitely to men of all generations except those that are modern, but there is no exact line of demarcation between the ancient and the modern. The term is also applied to gentlemen of the Inns of Court and Chancery in London.

Ancients, Council of, in French history, one of the two assemblies composing the legislative body in 1795–99. It consisted of 250 members, each of whom had to be at least forty years old. It was dissolved by the revolution of the 18th Brumaire.

Anci'le (plu. **Ancil'ia**), the shield of Mars, which, according to tradition, fell from heaven in the reign of Numa, when an oracle declared that Rome could never be taken while this shield remained in that city. Numa committed it to the custody of the Salii or priests of Mars, and had eleven other shields made precisely like it, in order to prevent the genuine shield from being stolen.

Ancillon (JOHANN PETER FRIEDRICH), an able German historian and statesman of French extraction, was born at Berlin April 30, 1766. He was the pastor of a Protestant church in that city in the former part of his mature life. In 1801 he published "Mélanges of Literature and Philosophy." His principal historical work is a "View of the Revolutions of the Political System of Europe since the Fifteenth Century" (in French, 4 vols., 1803–05), which was very successful. He was soon appointed royal historiographer and councillor of state. In 1831 he became minister of foreign affairs. His policy was prudent and moderate. Died April 19, 1837.

Anc'karswärd (KARL HENRIK), a Swedish statesman, born at Sweaborg in 1782. He was elected a member of the Diet in 1817, and soon became the leader of the opposition party, but retired to private life in 1829. Died in 1865.

Anco'na, a province of Central Italy, is bounded on the N. by Pesaro and Urbino, on the E. by the Adriatic Sea, on the S. by Macerata, and on the W. by Perugia. Area, 740 square miles. The country is chiefly mountainous, and is traversed by the Esino and Musone. The chief articles of export are grain, oil, wine, and hazel-nuts. The chief branch of industry is the silk manufacture. Chief town, Ancona. Pop. in 1871, 262,359.

Ancona, an important city and seaport of Central Italy, on the Adriatic, 132 miles by rail N. E. of Rome, capital of the province of Ancona. It is built on the slope of a hill, and presents a picturesque appearance from the sea. It is supposed to have been founded about 400 B. C. Among the remarkable public buildings are a cathedral, the government palace, the town-house, and a triumphal Corinthian arch, which was built by Trajan of white marble. It has a college, ten churches, and several convents. The harbor is one of the best on the Adriatic. In 1732 it was declared a free port. Ancona is connected by railways with Rome, Bologna, and Brindisi. It has considerable trade, carried on by steamships which ply between this point and the Levant. The chief articles of export are wool, grain, silk, oil, alum, sulphur, fruit, and soap. Ancona was taken in 1832 by the French, who occupied it until 1838. Lat. 43° 38′ N., lon. 13° 30′ E. Pop. in 1871, 45,741.

Anco'na (SYDENHAM E.), born at Warwick, Lancaster co., Pa., Nov. 20, 1824, became connected with the Reading R. R., and was a member of Congress from Pennsylvania (1860–66).

An'cram, a post-township of Columbia co., N. Y. Iron ores are obtained here, and lead was formerly mined. Pop. 1793.

Ancre, d' [It. *D'Ancora*], (CONCINO CONCINI), LE MARÉCHAL, an Italian courtier, born at Florence. He formed a part of the retinue of Maria de Medici (queen of Henry IV. of France) when she went to Paris in 1600, and he married Eleonora Galigai, who had much influence with that queen. His talents for intrigue and the favor of the queen (who in 1610 became regent) raised him suddenly to power. In 1613 he was appointed a marshal of France and prime minister. Having excited general odium by his rapacity, he was assassinated at Vitry April 24, 1617, by De Luynes and other conspirators.

An'cus Mar'tius, fourth king of Rome, a grandson of Numa, succeeded Tullus Hostilius about 636 B. C. He promoted the religious institutions of Numa, and is considered the founder of the plebeian order. He waged war against the Latins, whom he subdued, founded Ostia, and built the Pons Sublicius (Bridge of Piles). Died about 612 B. C.

An'cylus, a genus of small, patelliform, fresh-water gasteropod mollusks, of which several species inhabit the streams and lakes of North America.

Ancy'ra [Gr. Ἄγκυρα], an ancient city of Galatia, in Asia Minor, said to have been built by Midas, was about 30 miles W. of the river Halys. Under the Roman empire it was an important city and the capital of Galatia. Its site is occupied by the modern city of ANGORA (which see). Two councils of the Church were held here—one in 314, and the other in 358 A. D.

An'da, a genus of plants of the order Euphorbiaceæ. The only known species is the *Anda Brasiliensis*, a Brazilian tree, the fruit of which contains two seeds, called *Purgados Paulistas*. These afford a valuable fixed oil, which is used in medicine as a cathartic, and as a drying-oil by painters. The bark is astringent.

Andalu'sia [formerly called *Vandalusia*, from the Vandals; Sp. *Andaluci'a*], the southern portion of Spain, is bounded on the N. by Estremadura and La Mancha, on the E. by Murcia and the Mediterranean, on the S. by the Mediterranean, and on the W. by Portugal and the Atlantic Ocean. Area, 33,665 square miles. It is supposed to correspond to the *Tarshish* (the western) of the Bible and the *Bætica* of the Romans. The Sierra Morena extends along the northern border, and the southern part is traversed by the Sierra Nevada, the highest summits of which rise about 11,000 feet above the sea. The largest river is the Guadalquivir, which flows south-westward and enters the Atlantic. The soil of the valleys and plains is fertile. Silver, copper, iron, lead, and mercury are found here. The chief products are grain, cotton, wine, wool, sugar, olives, oranges, and figs. The climate is delightful. The Andalusian breed of horses has long been celebrated. Andalusia is divided into eight provinces—viz., Almería, Granada, Jaen, Cadiz, Córdova, Málaga, Huelva, and Sevilla, in each of which is a town of the same name. Pop. in 1867, 3,200,944.

Andalusia, a post-village, capital of Covington co., Ala., 30 miles E. of Sparta.

Andalusia, a post-township of Rock Island co., Ill. Pop. 878.

Andalu'site, an anhydrous silicate of alumina, which is found in Andalusia and other places, and occurs in four-sided prisms. It may be distinguished from felspar by its greater hardness and infusibility. A peculiar variety called chiastolite or macle is very abundant at South Lancaster, Mass. It occurs in stout crystals, having the axis angles of a different color from the rest, exhibiting a tessellated appearance on the cross section. (See DANA'S "System of Mineralogy," 5th ed.)

Andaman' Islands, a group of small, densely-wooded islands in the Bay of Bengal, between lat. 10° and 13° N., and about 93° E. lon. Area, 2550 square miles. They are 180 miles S. W. of Cape Negrais. The inhabitants are in the lowest stage of barbarism, and are said to resemble none of the races of the adjacent parts of Asia. It has been used as a penal colony for Hindoos by Great Britain. The earl of Mayo, the governor-general of India, was murdered here by a convict on Feb. 8, 1872. The native population does not exceed 1000, and is dying out. They wear no clothing except a coating of mud. The number of convicts in 1868 was 7230, and the number of free inhabitants (inclusive of officers, soldiers, etc.), 1400. The chief settlement is Port Blair.

Andan'te [the present participle of the It. verb *anda're*, to "walk," to "go"], an Italian musical term directing the time, or rather the style, in which a piece is to be performed. It denotes a movement that is moderate, rather slow and sedate, but distinct and flowing.

Andaquies Wax, a peculiar beeswax from South America.

Andelys, Les, lā zôNd'le', a town of France, in the department of Eure, near the Seine, 20 miles N. E. of Evreux. Pop. in 1866, 5161.

Andennes, a town of Belgium, in the province of Namur, on or near the Meuse, and on the railroad from Namur to Liege, 12 miles by rail E. of the former. Porcelain is made here. Pop. in 1866, 6278.

An'derlecht, a market-town of Belgium, in the province of Brabant, 10 miles S. W. of Brussels. It has breweries and large dyeing establishments. Pop. in 1866, 11,663.

Anderlo'ni (PIETRO), a skilful Italian engraver, born near Brescia Oct. 12, 1784. He lived at Milan, and engraved some works of Raphael, Titian, and Poussin. Died Oct. 13, 1849.

An'dersen (HANS CHRISTIAN), an eminent Danish poet and novelist, born at Odense, in the island of Fünen, April 2, 1805, was a son of a poor shoemaker, who died when Hans was nine years old. In 1819 he went to Copenhagen to seek employment in the theatre, but was rejected because he was too lean. Before this period he had written

several tragedies and poems, among which was the "Dying Child." He made various unsuccessful efforts to obtain employment, and passed several years in adversity, until he found generous friends, who in 1828 placed him in the university, where he was educated at the public expense. In 1830 he published a volume of his collected poems. Having received a gift of money from the king, he visited Germany, France, and Italy in 1833, and produced in 1834 a romance called "The Improvisatore," in which the scenery and manners of Italy are described with admirable fidelity. He related some episodes of his early life in a book entitled "Only a Fiddler" (1837). Among his other works are "The Poet's Bazaar" (1842); "Ahasuerus," a drama; "The Two Baronesses," a tale in English; and several volumes of fairy tales, which display original genius and a rich imagination. His works have been translated into many languages. (See HANS ANDERSEN, "True Story of my Life," new edition, 1871.)

Anderson, a county in the S. E. of Kansas. Area, 576 square miles. It is drained by the three forks of the Pottowatomie Creek, which rise within its limits, and by Sugar Creek. The surface is undulating or nearly level; the soil is fertile. It is traversed by the Leavenworth Lawrence and Galveston R. R. Grain, tobacco, cattle, wool, hay, and butter are produced. Capital, Garnett. Pop. 5220.

Anderson, a county in N. Central Kentucky. Area, 300 square miles. The Kentucky River, here navigable, bounds it on the E. The county is intersected by Salt River. Gold and lead have been found. The surface is mostly undulating; the soil is fertile. Grain, tobacco, wool, hay, and butter are produced. Capital, Lawrenceburg. Pop. 5449.

Anderson, a county in the N. W. of South Carolina, on the Savannah River. Area, 800 square miles. It is bounded on the N. E. by the Saluda River, and intersected by the Kiowee. The surface is diversified; the soil is generally fertile and well watered. The Greenville and Columbia R. R. passes through it. Cattle, grain, cotton, tobacco, and wool are produced. Capital, Anderson. Pop. 24,049.

Anderson, a county in the N. E. of Tennessee. Area, 600 square miles. It is intersected by the Clinch River, and also drained by Powell's River. Between the Cumberland Mountain, which extends along the N. W. border, and Chestnut Ridge, is a large and fertile valley. The county has abundance of timber and valuable salt springs. Coal is found here. Grain, tobacco, and wool are produced. Capital, Clinton. Pop. 8704.

Anderson, a county in E. Central Texas, containing 1098 square miles. It is bounded on the E. by the Neches, and on the W. by Trinity River, which flows through a rich valley covered with good timber. The surface is undulating; the soil is fertile. Iron ore is abundant. Petroleum has been found. It is intersected by the International R. R. Cattle, wool, corn, rice, and cotton are produced. Capital, Palestine. Pop. 9229.

Anderson, a township of Clarke co., Ark. Pop. 504.

Anderson, a post-township of Mendocino co., Cal. Pop. 679.

Anderson, a township of Clarke co., Ill. Pop. 947.

Anderson, a city, capital of Madison co., Ind., on the West Fork of White River, and at the crossing of the Cleveland Columbus Cincinnati and Indianapolis and the Pittsburg Cincinnati and St. Louis R. Rs. It is a manufacturing city, having a hydraulic canal with 44 feet fall. It has three banks (one national) and two newspapers. Owing to increase in manufacturing interests, it increases rapidly in population. Pop. 3126; of Anderson township, 4713. HARDESTY & METCALF, PUBS. "HERALD."

Anderson, a township of Perry co., Ind. Pop. 1136.

Anderson, a township of Rush co., Ind. Pop. 1452.

Anderson, a township of Warrick co., Ind. Pop. 842.

Anderson, a township of Mills co., Ia. Pop. 531.

Anderson, a post-township of Pope co., Minn. P. 74.

Anderson, a township of Hamilton co., O. Pop. 4077.

Anderson, capital of Anderson co., S. C., on the Greenville and Columbia R. R., 127 miles W. N. W. of Columbia. It is prosperous, and has a thriving, industrious population. It is the seat of Carolina High School for boys and girls. It has a national bank and two weekly newspapers. Pop. 1432. J. A. HOYT, ED. "INTELLIGENCER."

Anderson, a township of Williamsburg co., S. C. P. 576.

Anderson, a post-village, capital of Grimes co., Tex., 140 miles N. E. of Austin and 9½ miles from the Texas Central R. R. It has excellent schools, and is the seat of Patrick Academy, a first-class institution. It has manufactures of wagons, carriages, etc., and one weekly paper. Pop. 495. J. A. KIRGAN, ED. "GRIMES CO. JOURNAL."

Anderson (ALEXANDER), M. D., born in New York City in 1774, graduated as M. D. at Columbia College, and became the earliest wood-engraver in the U. S. He made the cuts for Webster's "Spelling Book," illustrations for an edition of Shakspeare, and published an illustrated "General History of Quadrupeds" (1804). Died at Jersey City Jan. 16, 1870.

Anderson (CHRISTOPHER), pastor of a Baptist church in Edinburgh from 1808 till 1850, published sacred works, of which the most important is "The Annals of the English Bible" (2 vols. 8vo, 3 editions—1845, 1848, and 1855; the last two enlarged and improved), characterized by Allibone as "by far the best book on the subject." Died in 1851.

Anderson (HENRY JAMES), M. D., LL.D., born in 1798, graduated at Columbia College, N. Y., in 1818, and at the College of Physicians and Surgeons in 1824. He became professor of mathematics and astronomy at Columbia College in 1825, and emeritus professor in 1866. He published "Geology of Lynch's Expedition" and "Geological Reconnaissance of the Holy Land" (1848).

Anderson (Rev. H. T.), born in 1811, was an eminent scholar of the denomination known as the "Disciples" and "Campbellites," and was the author of an interlinear translation of the New Testament. Died in Washington, D. C., Aug. 19, 1872.

Anderson (HUGH J.), born in Maine in 1801, became a lawyer, was a member of Congress from Maine (1837–41), governor of Maine (1844–47), a presidential elector in 1849, U. S. commissioner of customs (1853–58), and in 1866 became sixth auditor of the U. S. treasury.

Anderson (ISAAC), D. D., an American Presbyterian minister, born in Rockbridge co., Va., Mar. 27, 1780. He emigrated in his youth to Tennessee, and was noted as a pioneer preacher in the West. He founded a theological seminary at Maryville, Tenn. Died Jan. 28, 1857.

Anderson (JAMES), LL.D., an able Scottish writer on political and rural economy, was born near Edinburgh in 1739. He was a practical as well as a scientific farmer, and invented an improved form of plough. In 1777 he published "Essays relating to Agriculture and Rural Affairs" (3 vols.). He removed to London in 1797, and there issued a monthly periodical called "Recreations in Agriculture, Natural History," etc. (1799–1802), in which he anticipated the famous theory of rent afterwards adopted by Malthus and Ricardo. Died Oct. 15, 1808.

Anderson (JOHN), F. R. S., a Scotch naturalist, born in Dumbartonshire in 1726, was educated in the University of Glasgow. He became in 1760 professor of natural philosophy in that institution. In 1786 he published a valuable work entitled "Institutes of Physics." He gave gratuitous scientific lectures to the working-classes for many years. By his last will he founded a useful institution (in Glasgow) called ANDERSONIAN UNIVERSITY (which see). Died Jan. 13, 1796.

Anderson (JOHN JACOB), born in New York City in 1821, was long at the head of one of the public schools of that city, and has published numerous works, chiefly educational histories.

Anderson (JOSEPH) was born in New Jersey Nov. 5, 1757, was an officer in the Revolutionary war, became a lawyer, was appointed a territorial judge by Washington (1791), was U. S. Senator from Tennessee (1797–1815), and first comptroller of the U. S. treasury (1815–36). Died April 17, 1837.

Anderson (MARTIN BREWER), LL.D., of Scotch-Irish descent on his father's side, was born in Brunswick, Me., Feb. 12, 1815, graduated at Waterville College (now Colby University), Waterville, Me., in 1840, was tutor in the college two years, and then professor of rhetoric nearly seven years. In 1850 he removed to New York City, and became editor-in-chief, and in part proprietor, of the "New York Recorder." In 1853 he was chosen president of the Rochester (N. Y.) Baptist University, which position he still (1873) holds. He has published numerous review articles, addresses, and educational papers.

Anderson (RICHARD CLOUGH, JR.), born in Louisville, Ky., Aug. 4, 1788, graduated at William and Mary College, was a member of Congress from Kentucky (1817–21). He was appointed minister to the republic of Colombia in 1823, and envoy extraordinary to the Congress at Panamá in 1826. Died July 24, 1826.

Anderson (RICHARD HENRY), a general, born in South Carolina about 1822, graduated at West Point in 1842, and served with honor in the Mexican war. He became a brigadier-general of the Confederate States in 1861, major-general in 1862, and commanded a division at Gettysburg, July, 1863.

Anderson (ROBERT), M. D., a Scottish biographer, born in Lanarkshire Jan. 7, 1750, became a resident of Edin-

burgh in 1784. He wrote a "Life of Dr. Johnson," and published a good edition of "The Works of the British Poets; with Prefaces Biographical and Critical" (14 vols., 1792–1807). Died Feb. 20, 1830.

Anderson (Robert), an American officer, born June 14, 1805, near Louisville, Ky., graduated at West Point, 1825, and May 15, 1861, brigadier-general U. S. A. His father was colonel in the Revolutionary army, and his mother a cousin of Chief-Justice Marshall. He was private secretary 1825–26 to a relative upon his mission as U. S. minister plenipotentiary to the republic of Colombia, served at artillery school for practice 1826–28, chiefly on ordnance duty 1828–35, assistant inspector-general of Illinois volunteers in the Black Hawk war 1832, engaged at the battle of Bad Axe, at Military Academy as instructor of artillery 1835–37, in Florida war 1837–38 (brevet captain), in several actions, as aide-de-camp to Major-General Scott while removing Cherokees to the West 1838, as assistant adjutant-general eastern department 1838–41, chiefly in garrison 1845–53, in war with Mexico 1847, engaged at Vera Cruz, Cerro Gordo, Amozoque, and Molino del Rey (severely wounded and brevet major), member of artillery boards 1841–60, governor of Harrodsburg Military Asylum 1853–54, inspector of iron-work for public buildings 1855–59; in command of defences of Charleston harbor, S. C., 1860–61. In the civil war, after evacuating Fort Moultrie, he moved to Fort Sumter, which he surrendered, after a heavy bombardment, April 12–13, 1861 (brevet major-general); in command of department of Kentucky and of the Cumberland 1861, which his shattered health compelled him to relinquish. Till he was retired from active service, Oct. 27, 1863, he performed but little duty. He translated "Instructions for Field Artillery, Horse and Foot," 1840, and "Evolutions of Field Batteries," 1860. In vain he sought restoration of health abroad, his strength gradually failing till he died Oct. 26, 1871, at Nice, France, aged sixty-six.

George W. Cullum, U. S. A.

Anderson (Rev. Rufus), D. D., LL.D., born in North Yarmouth, Me., Aug. 17, 1796, graduated at Bowdoin College in 1818. He studied theology at Andover from 1819–22. In 1824 he became assistant secretary, and in 1832 secretary, of the American Board of Foreign Missions, which position he filled with distinguished ability for thirty-four years. He visited the Mediterranean missions (1843–44), the Indian missions (1854–55), and the Sandwich Islands in 1863. At the age of seventy he resigned his position in the Board of Missions (1866), at which time, without any previous knowledge on his part, he was presented, as a testimonial to his faithful and meritorious services, with $20,000 (contributed chiefly by the merchants of New York and Boston), which sum he made over to the Board, reserving to himself the right to draw from it whatever might be necessary for his support. Among Dr. Anderson's numerous publications may be named—"Observations on the Peloponnesus and Greek Islands" (Boston, 1830); "The Hawaiian Islands, their Progress and Condition under Missionary Labors" (Boston, 1864); "A Heathen Nation Evangelized: History of the Mission, etc. to the Sandwich Islands" (1870); "History of the Missions of the American Board of Commissioners for Foreign Missions to the Oriental Churches" (2 vols. 12mo, 1872).

Anderso'nian University, an institution of Glasgow, in Scotland, was founded in 1795 by John Anderson, noticed above. His design was to impart by popular lectures a knowledge of the sciences to mechanics. He bequeathed to it his valuable library and apparatus. It has a high reputation, especially in the medical department. The number of professors is about fifteen.

An'derson's, a township of Caswell co., N. C. Pop. 1544.

An'dersonville, a post-village of Sumter co., Ga., on the South-western R. R., 11 miles N. E. by N. of Americus. During the civil war it was the site of a Confederate military prison for captured Federal soldiers. The mortality at this prison was very great, 12,926 prisoners of war having died here. One Henry Wirz, a Swiss adventurer, was the superintendent of the prison, and after the close of the war he was tried and convicted by a military commission on charge of excessive cruelty to the prisoners, and was executed Nov. 10, 1865. The Confederate authorities, in at least two official reports, attributed the excessive mortality to the bad management of the prison. Andersonville is now the site of a national cemetery, in which the deceased Union soldiers are buried. The cemetery is well laid out, trees have been planted, and the names, rank, etc., of most of the dead have been ascertained and inscribed on head-boards.

Andersonville, a village of Fine township, St. Lawrence co., N. Y., on Oswegatchie River, has manufactures of oars, tubs, lasts, etc. Iron ore is found in the vicinity.

An'derssen (Adolf), a German chess-player, born at Breslau in 1818. At the London chess tournament in 1851 he defeated the famous player Staunton, but he was defeated by Paul Morphy in Paris in 1858.

An'dersson (Charles John), a Swedish traveller, born in 1827, was the natural son of an Englishman. He went to Southern Africa in 1850, and passed several years in the exploration of the natural history and geography of that region. He published a narrative of his travels, "Lake Ngami" (1855), and "Okawango River" (1859). Died in Southern Africa July 5, 1867.

An'des [Sp. *Cordille'ra de los An'des*], a grand South American range of mountains which is one of the most prominent features in the physical geography of the globe. It extends along the western border of the entire continent, nearly parallel to the Pacific coast, from the Strait of Magellan to the Isthmus of Darien, a distance of about 4500 miles. In length it far exceeds every other mountain-chain on the earth. The general direction of this chain is nearly N. and S. The southern part of the Andes, for a distance of about 2500 miles, consists of a single range or ridge, extending through Patagonia and along the eastern border of Chili. The Patagonian Andes rise to the height of 8000 feet. The Chilian Andes, which are included between lat. 24° and 42° S., have an average width of about 130 miles, and in some places are not more than 100 miles from the Pacific. The highest summit of the Chilian Andes (but not of the whole chain, as formerly believed) is the porphyritic Nevado of Aconcagua, which rises 22,422 feet above the level of the sea, and is about 100 miles N. E. of Valparaiso. In Chili also occur the volcanic peaks of Tupungato, 20,270, and Maypu, 17,764 feet high. The line of perpetual snow in the Andes of Northern Chili is about 14,000 feet above the sea.

About lat. 19° S. the chain is divided into two parallel branches called the Cordillera of the Coast and the Cordillera Real. The former extends north-westward along the coast of Peru, the summits of the range being about 100 miles from the ocean. The Cordillera Real, which traverses Bolivia and is about 250 miles from the other range, is nearly equal in height to the Chilian Andes. The peak of Illampu, in Bolivia, has an altitude of 24,800 feet. These two parallel cordilleras are connected at several points by transverse ranges or groups called *knots*, and enclose the table-land of Desaguadero and Lake Titicaca, which is 12,800 feet above the level of the sea. The highest summit of the Peruvian Andes is the volcano of Arequipa, 20,000 feet high, and 55 miles from the Pacific Ocean.

Proceeding northward, we come next to the Andes of Ecuador, or Andes of Quito, which extend from lat. 5° S. to the table-land of Quito, enclosed between two ranges of enormous volcanoes. Among these the highest are Chimborazo, 21,424 feet, and Cotopaxi, 18,875 feet (Humboldt says 19,069). The form of the latter is almost a perfect cone. "Among all the volcanoes that I have seen," says Humboldt, "the conical form of Cotopaxi is the most beautifully regular." (See Cotopaxi.)

There are a number of passes which cross the Andes, but all at a great elevation, and mostly dangerous as well as arduous. Several passes among the Peruvian and Bolivian Andes are about 15,000 feet above the sea, and the lower passes are not less than 12,000 feet.

Minerals.—The rocky foundations of these grand barriers are granite, gneiss, mica-slate, greenstone, porphyry, quartz, limestone, red sandstone, and metamorphic rocks. Humboldt saw in Peru vast masses of quartz 7000 or 8000 feet in height. The Andes are celebrated for their mineral riches, consisting of large quantities of gold and silver. Platina, mercury, copper, tin, and iron are also found among them. The most productive gold-mines are in Peru and New Granada; the silver-mines of Potosi are among the richest in the world. Few parts of the globe are subject to so frequent and destructive earthquakes as the countries adjacent to the Andes and enclosed between its different ranges. The cities of Quito, Lima, Callao, and Valparaiso have been nearly ruined by them in recent times. The number of volcanoes among the Andes is about fifty, thirty-six of which are classified as active, and the others are doubtful, not having been seen in a state of eruption by any European. "It is but rarely," says Humboldt, "that the elastic forces at work within the interior of our globe have succeeded in breaking through the spiral domes which, resplendent in the brightness of eternal snow, crown the summits of the Cordilleras; and even where these forces have opened a permanent communication with the atmosphere through circular craters or long fissures, they rarely send forth currents of lava, but merely eject ignited scoriæ, steam, sulphuretted hydrogen gas, and jets of carbonic acid." (*Cosmos.*) This illustrious traveller states that he found pelagic shells on a ridge of the Andes more than 15,000 English feet above the sea.

The geological structure of the Andes is as yet but imperfectly known, and is probably not the same in all parts of the chain. Like all great mountain-systems, the Andes have been produced by elevatory forces acting at different, and in some instances widely separated, periods. Carboniferous, triassic, Jurassic, and tertiary rocks have been recognized on their flanks; and the older palæozoic will undoubtedly be found to make up a part of their mass.

Climate.—The limit of perpetual snow on the Andes that are near the equator is about 15,000 feet, and among the Bolivian Andes, about lat. 20° S., it is said to be 17,000 feet. Glaciers rarely if ever occur in the central or tropical portions of the Cordilleras. Between the equator and lat. 30° S. the prevailing wind blows from E. to W., and the eastern side of the Cordillera intercepts nearly all the moisture, so that little or no rain falls in Peru and Northern Chili on the western slope, or on the narrow tract between the Andes and the ocean. The changes of weather among these mountains are sudden and violent, and the electric storms are very terrific. Here are exhibited greater variations and contrasts of climate than in any other region of the globe. The elevated plains within the tropics have a cool and salubrious climate, and the fruits of the temperate zone here flourish under the equator. Although the Andes are inferior to the Himalayas in altitude, they present a more remarkable variety of phenomena. "This portion of the surface of the globe," says Humboldt, "affords in the smallest space the greatest possible variety of impressions from the contemplation of nature. Among the colossal mountains of Cundinamarca, of Quito, and of Peru, furrowed by deep ravines, man is enabled to contemplate alike all the families of plants and all the stars of the firmament. There at a single glance the eye surveys majestic palms, humid forests of bambusa, and the varied species of Musaceæ, while above these forms of tropical vegetation appear oaks, medlars, the sweetbrier, and umbelliferous plants, as in our European homes. . . . There the depths of the earth and the vaults of heaven display all the richness of their forms and the variety of their phenomena. There the different climates are ranged the one above the other, stage by stage, like the vegetable zones whose succession they limit; and there the observer may readily trace the laws that regulate the diminution of heat as they stand indelibly inscribed on the rocky walls and abrupt declivities of the Cordilleras." (See also Humboldt's "Travels.")

A. J. Schem.

Andes, a post-village and township of Delaware co., N. Y. It has a collegiate institute, a national bank, one weekly newspaper, and one furnace. Pop. 2840.

F. G. Barclay, Ed. "Andes Recorder."

And'esin, or **And'esite,** a mineral resembling felspar in appearance, is essentially a silicate of soda, lime, and alumina. It was originally brought from the Andes, but is found also in the Vosges, Canada, etc.

Andi'ra, a genus of plants of the natural order Leguminosæ. The *Andira inermis*, called cabbage tree or cabbage-bark tree, is a native of the West Indies, and bears a pod containing a single seed. The bark of the *Andira*, called worm-bark, is a powerful anthelmintic.

An'diron [a corruption of *hand iron*], a term applied to the metallic utensils used to support the wood which is burned in an open fireplace. They are called firedogs in some parts of Great Britain. They are often called "dog irons" in many parts of the U. S. The andiron consists of a horizontal bar, supported by three feet, and having an upright standard at one end. This was sometimes silver, and ornamented with arabesques or a human figure.

And'law, von (Heinrich), a German politician and zealous Catholic, born in 1802. He was chosen a member of the legislature of Baden in 1833, and opposed all liberal movements and reforms. He published in 1864 "The Priesthood and Christian Life, with Regard to the Great Questions of the Present." Died in Mar., 1870.

Andoc'ides [Gr. Ἀνδοκίδης], an Athenian orator, born about 467 B. C. He took an active part in public affairs, and was banished several times. He went into exile when the Thirty Tyrants became masters of Athens, in 404 B. C., and returned when they ceased to rule. Died about 390 B. C. Several of his orations are extant.

Andor'ra, a valley and small republic among the Eastern Pyrenees, between the French department of Ariège and the Spanish province of Lérida. Area, 149 square miles. It is surrounded by high mountains, and has rich mines of iron and a lead-mine. It has been independent since the time of Charlemagne, and is governed by twenty-four consuls. The inhabitants are a hospitable and industrious people, and are mostly farmers and cattle-raisers. Capital, Andorra. Pop. in 1865, estimated at 12,000.

An'dover, a market-town and parish of England, in Hampshire, 63 miles W. S. W. of London. The origin of the town is very ancient. It has a handsome church, which cost about $150,000. Pop. in 1871, 5501.

Andover, a post-twp. of Tolland co., Conn., on the Hartford and Providence R.R., 5 miles W. of Willimantic. P. 461.

Andover, a post-township of Henry co., Ill. P. 1767.

Andover, a post-township of Oxford co., Me. It has manufactures of starch, lumber, etc. Pop. 757.

Andover, a post-township of Essex co., Mass., on the S. bank of the Merrimack River. The village of Andover is pleasantly situated on the Shawsheen River and on the Boston and Maine R. R., 23 miles N. of Boston. It has a national bank, a savings bank, an insurance company, a free public library of over 3000 volumes and an endowment of $20,000. It also has extensive water-power, and manufactures of shoe-thread, woollen goods, rubber goods, printers' ink, lampblack, etc. Here are Abbot Female Academy, founded in 1829, and Phillips Academy, a well-endowed institution founded in 1778. It is also the seat of Andover Theological Seminary, founded in 1807, and under the direction of the Congregationalists. It has a library of about 30,000 volumes. The buildings of the above institutions stand on an eminence which commands a fine prospect. Two quarterlies are published here, one of which is the "Bibliotheca Sacra," an able religious periodical, edited by professors of the seminary. It has nine churches, and a good system of public schools. Pop. 4873.

W. F. Draper, Pub. "Bibliotheca Sacra."

Andover, a post-township of Merrimack co., N. H., on the Northern R. R., 21 miles N. W. of Concord. It has manufactures of woollens, hosiery, lasts, etc. Pop. 1206.

Andover, a post-twp. of Sussex co., N. J. Pop. 1126.

Andover, a post-village and township of Allegany co., N. Y., has seven manufacturing establishments, five churches, one furnace, one graded school, one weekly paper, and a good trade. It is in a good farming region, and is on the Erie R. R., 110 miles E. of Dunkirk. Pop. of township, 1873.

E. S. Barnard, Ed. "Andover Enterprise."

Andover, a post-township of Ashtabula co., O., at the junction of two railroads, has a weekly paper, cheese-factories, and mills. Pop. 921.

D. L. Calkins, Ed. "Andover Advertiser."

Andover, a post-township of Windsor co., Vt. P. 588.

Andover (North Surplus), a township of Oxford co., Me. Pop. 38.

Andover (West Surplus), a township of Oxford co., Me. Pop. 4.

Andover Theological Seminary. See Andover.

Andra'da e Sil'va, or **Sylva** (Jozé Bonifacio), a distinguished Brazilian, born at Santos June 13, 1765. He acted a prominent part in the revolution by which Brazil became independent in 1822, and was prime minister in 1822–23. He wrote some scientific treatises and poems. Died April 3, 1838.

Andral (Gabriel), M. D., a celebrated French physician, born in Paris Nov. 6, 1797, married a daughter of Royer-Collard. He published an able work called "Clinique Médicale" (4 vols., 1824–27). In 1839 he succeeded Broussais as professor of pathology and therapeutics in Paris, and in 1842 became a member of the Institute. Among his works is a "Summary of Pathological Anatomy" (3 vols., 1829).—His father, Guillaume Andral, was a celebrated physician.

Andrássy (Julius), Count, a Hungarian statesman, born Mar. 8, 1823, of an ancient and noble family. He took a prominent part in the revolution of 1848 as an adherent of the popular cause, and was condemned to death in 1849, but he escaped and went into exile. When the right of self-government was restored to Hungary, in Feb., 1867, Andrássy was appointed premier of a new Hungarian ministry by the emperor. He succeeded Von Beust in Nov., 1871, as minister of foreign affairs in the common ministry of the whole empire.

An'dré (John), a British officer, born in London, of Swiss parents, in 1751, entered the army in 1771. Having obtained the rank of lieutenant, he was sent to America in 1774. His superior talents and fine personal qualities procured for him a rapid promotion to the important position of adjutant-general, with the rank of major (1779). He was a good scholar, an artist, a versifier, and a man of varied accomplishments. Benedict Arnold having offered to betray West Point, Major André was selected by Sir Henry Clinton, the British commander, to make the necessary arrangements for carrying out the plot. André, assuming the name of Anderson, ascended the Hudson, and, having had a private interview with Arnold, by whom he was furnished with maps and plans of West Point and a

pass through the American lines, was, while returning to New York City by land, intercepted near Tarrytown by three armed Americans, who, discovering by incautious remarks on his part that he was a British officer, took him prisoner. On searching his person, they found the plans in his boots. He made an unsuccessful effort to bribe his captors, who conducted him to Lieut.-Col. Jameson, who, with singular obtuseness, resolved to send him to Gen. Arnold, but was dissuaded by Major Tallmadge. Major André was tried as a spy, and condemned to be hung, by a board of six major-generals and several brigadier-generals. Sir Henry Clinton made earnest efforts to save his life, but they were unavailing, and he was executed at Tappan Oct. 2, 1780. He behaved with dignity and fortitude on this occasion, and his fate excited deep and general sympathy. The day before his death he drew with a pen and ink a portrait of himself, which is now in the Trumbull Gallery of Yale College. A monument was erected to his memory in Westminster Abbey.

Andre'æ (JACOB), D. D., a German Protestant theologian, born at Waiblingen, in Würtemberg, Mar. 22, 1528. He became professor of theology at Tübingen in 1562, and distinguished himself by his learning and eloquence. He wrote against the Calvinists and Roman Catholics, and was a principal author of the "Formula Concordiæ" which was adopted by the Lutherans in 1580. Died Jan. 7, 1590.

Andreæ, or **Andreä** (JOHANN VALENTIN), an eminent German writer, born at Herrenberg, in Würtemberg, Aug. 17, 1586, was a grandson of Jacob, noticed above. He became pastor at Calw in 1620, and chaplain or court-preacher at Stuttgardt in 1639. Among his chief works, which evince a liberal philosophical spirit, are a "Hundred Satirical Dialogues" (in Latin, 1617), a "Mythologica Christiana" (1619), an Autobiography, and an allegory in verse called "Die Christenburg." He has been regarded as the founder of the order of Rosicrucians, but without sufficient evidence. Died May 1, 1654. "Andreæ," says Hallam, "was a man above his age, and a singular contrast to the pedantic herd of German scholars and theologians."

Andre'æ (LAURENTIUS), [Sw. *Lars Anderson*], a Swedish Reformer, born in 1482. He was converted to Protestanism, and in 1523 was appointed chancellor of Sweden by Gustavus Vasa. He produced in 1526 a Swedish translation of the New Testament. Died in 1552.

Andrea'ni (ANDREA), a skilful Italian engraver, surnamed IL MANTUA'NO (*i. e.* "the Mantuan"), was born at Mantua in 1560. He improved the art of engraving on wood in chiaroscuro. Among his works is an engraving of a Deluge, after Titian. Died in 1623.

Andre'a Pisa'no, or **Andre'a da Pi'sa,** an eminent Italian sculptor and architect, born at Pisa in 1270. He preferred the antique models of Grecian art to the Gothic style which had prevailed in Italy. He adorned with sculptures the façade of Santa Maria del Fiore at Florence, and became superintendent of the public works of that city about 1300. As an architect he designed the arsenal of Venice and the church of San Giovanni at Pistoia. His masterpiece in sculpture is the bronze rilievi of the gates of the Baptistery at Florence. Died in 1345.

An'dree (KARL THEODOR), a German writer, born in Brunswick Oct. 20, 1808, was from 1838 to 1853 editor of several periodicals, as the "Deutsche Reichszeitung" and "Bremer Handelsblatt," and was 1858 appointed consul to Chili. Among his principal works are "Nordamerica" (2d ed. 1854), "Buenos Ayres und die Argentin. Republik" (1856), "Geographische Wanderungen" (2 vols., 1859), and "Geographie des Welthandels" ("Geography of the World's Commerce," 2 vols., 1863–69).

Andréossy (ANTOINE FRANÇOIS), COUNT, an eminent French military engineer, born at Castlenaudary Mar. 6, 1761. He served in Egypt as general of brigade in 1798, and became a member of the Institute of Egypt. He was the chief of Bonaparte's staff on the 18th of Brumaire, 1799, obtained the rank of general of division, and was sent as ambassador to England in 1802. Between 1804 and 1814 he represented France at the courts of Vienna and Constantinople. In 1826 he was chosen a member of the Academy of Sciences. He wrote, besides other works, "Constantinople and the Thracian Bosphorus during the years 1812–14" (1828). Died Sept. 10, 1828.

An'drés (JUAN), a Spanish Jesuit distinguished for learning, was born at Planes Feb. 15, 1740. He was versed in Hebrew, Greek, Latin, Italian, and French. On the expulsion of the Jesuits from Spain in 1767 he removed to Italy. He produced in 1776 an able "Essay on the Philosophy of Galileo," in Italian. His principal work is "On the Origin, Progress, and Present State of All Literature" (in Italian, 7 vols., 1782–99). He was appointed keeper of the royal library at Naples in 1806. Died Jan. 13, 1817.

An'drew, a county of Missouri, on the Missouri River, which separates it from Kansas. Area, 425 square miles. It is bounded on the W. by the Nodaway River, and intersected by the Platte River and the Kansas City St. Joseph and Council Bluffs R. R. The soil is fertile. Wheat, corn, oats, and tobacco are the products. Coal is found. Capital, Savannah. Pop. 15,137.

Andrew, the county-seat of Jackson co., Ia., at the "geographical centre" of the county, is the only direct post point between Maquoketa and Bellevue, the two commercial cities in the county. It is 8 miles N. E. of Maquoketa, and 12 miles S. W. of Bellevue. It has one weekly paper. The citizens of the township (Perry) have voted a tax and subscribed $20,000 in aid of a railroad from Maquoketa to Andrew, to be completed in the fall of 1873. Pop. 352.

ED. "PICKET."

Andrew [Lat. *An'dreas*], SAINT, one of the twelve apostles, was, like his brother Simon Peter, a fisherman of Galilee. He is supposed to have been the first disciple of Christ. The latter part of his life is involved in obscurity. According to tradition, he preached the gospel in Greece and Scythia, and suffered martyrdom in Patræ, in Achaia. He is the patron saint of Scotland. A cross formed by oblique beams, thus, ⨯, is called Saint Andrew's cross.

Andrew (or **András**) **I.,** king of Hungary, was of the family of Arpad. He began to reign in 1046, and waged war against the emperor Henry III. Died in 1058.

Andrew II. of Hungary was born about 1176, and became king in 1205. He conducted an unsuccessful crusade against the Mohammedans in 1217. In 1222 he convoked a diet, to which he granted the Golden Bull, called the Magna Charta of Hungary. It confirmed the rights and privileges of the Hungarian bishops and nobility, whose revolts had disturbed his reign. Died Mar. 7, 1236.

Andrew III. of Hungary, a grandson of the preceding, was born in Venice. He succeeded Ladislas III. in 1290, and was the last king of the dynasty of Arpad. His claim to the throne was opposed by the pope, who supported Charles Martel (son of Charles II. of Naples) as the rival of Andrew. The latter defeated Charles Martel in battle in 1291. Died in 1301.

Andrew (JAMES OSGOOD), D. D., bishop of the Methodist Episcopal Church South, was born in Wilkes co., Ga., May 3, 1794. He entered the itinerant ministry in the South Carolina Conference of the Methodist Episcopal Church Dec. 12, 1812, and was consecrated bishop at Philadelphia in May, 1832. Having become connected with slavery by marriage, the General Conference of 1844 took such action in his case as led to the division of the Methodist Episcopal Church, and the organization of the Methodist Episcopal Church South; in which he continued to exercise his episcopal functions efficiently till the session of the General Conference in New Orleans April, 1866, when he was placed on the retired list. He died at the residence of his son-in-law, the Rev. John W. Rush, in Mobile, Ala., Mar. 2, 1871. He was an eloquent, devout, and successful minister. He resided during a part of his episcopate in Oxford, Ga., and then in Summerfield, Ala. He published a work on "Family Government," which is highly esteemed, and a volume of "Miscellanies."

Andrew (JOHN ALBION), LL.D., an American statesman, born at Windham, Me., May 31, 1818. He graduated at Bowdoin College, studied law, and was admitted to the bar of Boston in 1840. Having distinguished himself as an opponent of slavery, he was elected governor of Massachusetts by the Republicans in 1860. In answer to the President's call for volunteers, April 15, 1861, he despatched five regiments in one week from that date. He was again elected governor in 1861, and was afterwards thrice annually re-elected. During the civil war he rendered important services to the cause of the Union by his eloquent speeches and messages, and gained great popularity by his assiduous attention to the welfare of the soldiers. Died Oct. 30, 1867. A meeting of the members of the legislature of Massachusetts adopted a resolution "that in his decease the commonwealth and the nation alike have suffered an irreparable loss; that his reputation had become national, and we might well have hoped for him the highest national offices and honors."

Andrew, Saint (or **The Thistle**), ORDER OF, a Scottish order of knighthood, named in honor of Saint Andrew, the patron saint of Scotland. It was founded in the reign of James V., was revived by James II. of England in 1687, and re-established by Queen Anne in 1703. The star of the order of the Thistle consists of a Saint Andrew's cross of silver embroidery, with rays emanating between the points of the cross, in the centre of which is a thistle of gold and green. On a circle which surrounds this thistle is inscribed the motto "Nemo me impune lacessit" (literally, "No one provokes me with impunity").

Andrew, Saint, Order of (Russian), founded by Peter the Great in 1698, is the highest in the empire, bestowed only on the imperial family, princes, generals-in-chief, and persons of high rank. The badge of this order bears on one side a cross enamelled in blue, and in the four corners of the cross the letters S. A. P. R. (*Sanctus Andreas Patronus Russiæ*). On the reverse is a spread eagle, with a legend signifying "For Religion and Loyalty."

Andrews (Alexander), born Aug. 4, 1824, in England, began in youth to contribute to the periodicals of London, and was the author of several books, the best known of which is a "History of British Journalism" (1856). Died Nov. 8, 1873.

Andrews (Annie M.), an American lady, born about 1835. She volunteered to nurse the sick at Norfolk, Va., during the prevalence of yellow fever in 1855. In acknowledgment of her great services the Howard Association of New York presented her with a gold medal.

Andrews (C. C.), an American general of volunteers during the civil war (1861–66), born in New Hampshire, appointed brigadier-general of volunteers Jan. 5, 1864, honorably mustered out Jan. 15, 1866. At present is U. S. minister to Sweden.

Andrews (Edward Gayer), D. D., an eminent preacher and bishop of the Methodist Episcopal Church, was born in New Hartford, N. Y., Aug. 7, 1825, graduated at the Wesleyan University, Conn., in 1847, entered the ministry in 1848, became teacher in the Oneida Conference Seminary, Cazenovia, N. Y., in 1854, was elected its president in 1855, resumed the pastorate in New York East Conference in 1864, and was elected bishop in 1872.

Andrews (Ethan Allen), LL.D., an American scholar, born at New Britain, Conn., in 1787. He graduated at Yale College in 1810. He published, besides a number of school-books, a good Latin-English lexicon (1850). Died Mar. 25, 1858.

Andrews (Gen. George L.) was born at Bridgewater, Mass., in 1827, and graduated first in his class at West Point in 1851. He was acting assistant professor of engineering at West Point (1854–55), and for distinguished services in the army of the Potomac became brigadier-general and brevet major-general of volunteers. In 1871 he was appointed professor of French at West Point.

Andrews (James Petit), an English historical writer, born near Newbury, in Berkshire, in 1737. He published, besides other works, an amusing "Collection of Anecdotes, etc., Ancient and Modern" (1789). His most important work is a "History of Great Britain in connection with the Chronology of Europe" (1 vol., 1794, unfinished). Died Aug. 5, 1797.

Andrews (Joseph), born at Hingham, Mass., Aug. 17, 1806, was apprenticed to an engraver in 1821, studied his art in London (1836–37), and subsequently became a line engraver in Boston, Mass. His reputation is very high.

Andrews, or **Andrewes** (Lancelot), a learned English theologian, born in London in 1555, was educated at Cambridge. He was one of the chaplains of Queen Elizabeth, who appointed him dean of Westminster. He was one of the divines selected to translate the Bible under the auspices of James I., and became bishop of Chichester in 1605. In 1609 he was translated to the see of Ely, and appointed a privy councillor. He was considered the most learned English theologian of his time, except Ussher, and had a high reputation as a pulpit orator, but his style was pedantic and artificial. He became bishop of Winchester in 1618. He was the author of several religious works, among which was a "Manual of Private Devotions," etc. Died Sept. 25, 1626.

Andrews (Rev. Lorrin), born in East Windsor, Conn., April 29, 1795, was educated at Jefferson College, Pa., and at Princeton, sailed as a missionary to Hawaii in 1827, founded in 1831 the Lahainalula Seminary, which became the Hawaii University, in which he was a professor. He was long a judge and privy councillor under the government, and published parts of the Bible in the native tongue, wrote a Hawaiian dictionary, and various works on the history, etc. of the Sandwich Islands. Died at Honolulu Sept. 29, 1868.

Andrews (Stephen Pearl), born in Massachusetts in 1812, devoted himself to the study of social questions, the civil and common law, theories of government, a universal language, etc., and has written numerous works on these and kindred subjects.

Andrews (Timothy P.), an American officer, born in Ireland, died at Washington, D. C., Mar. 11, 1868. He was appointed paymaster in the U. S. army May 22, 1822, and served as such till April 9, 1847, when he was appointed colonel of a regiment of voltigeurs raised for the war with Mexico, and served in command of his regiment till July 20, 1848, when it was disbanded and he was restored to the pay department; deputy paymaster-general Dec. 17, 1851, and paymaster-general, with the rank of colonel, Sept. 6, 1862, brevet brigadier-general Sept. 13, 1847, for gallant conduct at the battle of Chapultepec, Mex.; retired from active service on his own application Nov. 29, 1864, but continued on special duty till the day of his death.

G. C. Simmons, Clerk Board of Engineers.

Andrews (William D.), born at Grafton, Mass., in 1818, removed to New York in 1840, and became distinguished as the inventor of an oscillating engine, and especially of a centrifugal pump of great excellence.

An'dria, a town of Southern Italy, in the province of Bari, 14 miles by rail E. of Canosa. It is the seat of a bishop, and has a fine cathedral, built in 1046; also a college. In the vicinity are numerous caverns (in Latin, *antra*), from which the name is said to be derived. Pop. in 1871, 34,034.

Andrieux (François Guillaume Jean Stanislas), a popular French dramatic poet, born at Strasburg May 6, 1759. He produced in 1787 a comedy called "Les Étourdis" ("The Giddy-heads"), which was performed with applause. In 1798 he was chosen a member of the Council of Five Hundred. He became professor of belles-lettres in the Polytechnic School in 1804, and professor of French literature in the College of France in 1814. He was admitted in 1816 into the French Academy, of which he was chosen perpetual secretary in 1829. Among his works are "Brutus," a tragedy, and a drama called "Molière with his Friends." He belonged to the classical school of literature. Died May 10, 1833.

An'dro, or **An'dros,** an island of Greece, in the archipelago, about 10 miles S. E. of Eubœa, is the most northern of the Cyclades. Length 21 miles, width 8 miles. The surface is hilly, the soil is fertile. Andros is also the name of a town and port on the eastern coast. Lat. of Cape Guardia, its N. W. point, 37° 58′ N., lon. 24° 43′ E. Pop. of the island in 1870, 19,674.

An'drocles, or **An'droclus,** a Roman slave, whose adventures and friendship with a lion are mentioned by Aulus Gellius. He ran away from his master into Africa, and there entered a cave, in which he met a lion that was lame. The lion presented to him a paw, from which Androcles extracted a thorn. To recompense him for this service the lion afterwards supplied the man with food as long as he remained in that region. Androcles finally was captured, and was condemned to fight with a lion in the amphitheatre of Rome. This lion proved to be the same that he had met in the cave, and, though purposely kept from food to increase his ferocity, he instantly recognized his benefactor as a dog would his master. The man was then pardoned and liberated.

Androm'ache [Gr. Ἀνδρομάχη], a celebrated and beautiful Trojan lady, was the wife of Hector, and one of the most admired characters of the "Iliad." After the destruction of Troy she became the captive of Pyrrhus, and finally the wife of Helenus, a son of Priam. She is the subject of a tragedy of Euripides.

Androm'eda [Gr. Ἀνδρομέδη], in classic mythology, was a daughter of Cepheus, king of Ethiopia, and of Cassiopeia. She boasted that she was more beautiful than the Nereids. Neptune, to avenge this affront, sent a sea-monster to plague the Ethiopians. The oracle of Ammon having declared that the sacrifice of Andromeda would appease Neptune, she was chained to a rock, but was rescued by Perseus, and after death was transformed into a constellation.

Andromeda, a genus of shrubs of the order Ericaceæ, found in America, Europe, and Asia. The *Andromeda polyfolia,* common to both hemispheres, has fine rose-colored flowers. The *Andromeda floribunda* of the U. S. also has abundant and very fine flowers, appearing in April. The *Andromeda nitida* of the Southern States has fragrant blossoms. The U. S. have at least eight species, some of which are reputed poisonous to cattle.

Androni'cus I., Comnenus [Gr. Ἀνδρόνικος Κομνηνός], a Byzantine emperor, was a grandson of Alexis I., Comnenus. He had superior talents, but was profligate and cruel. In his youth he engaged in treasonable intrigues against the emperor Manuel, who confined him in prison many years. Having been appointed regent during the minority of Alexis II., he murdered that prince and usurped the throne in 1182. He abused his power by the execution of many Greek nobles, victims of his revenge or jealousy, and carried his cruelty to such excess that his subjects revolted and tortured him to death in 1185.

Andronicus II., Palæologus, a son of the emperor Michael, was born about 1260. He began to reign at Con-

stantinople in 1283. He waged war against the Turks without decisive result. His reign was inglorious, and he was dethroned in 1328 by his grandson, Andronicus III. Died Feb. 13, 1332.

Andronicus III., Palæologus, was a grandson of the preceding. He became emperor of Constantinople in 1328, and was defeated by the Turks in 1330. His reign was disastrous, and the Turks conquered several of his provinces. Died June 15, 1341.

Androni'cus Cyrrhes'tes, a Greek architect and astronomer, who is supposed to have lived about 100 B. C., and to have erected at Athens the octagonal building called the Tower of the Winds, which is still standing. It was intended to indicate the direction of the wind.

Androni'cus Rho'dius (*i. e.* "of Rhodes"), a Greek Peripatetic philosopher who lived about 60 B. C., and is said to have invented the word Metaphysics. He collected and arranged the works of Aristotle.

Andropo'gon [from the Gr. *ἀνήρ*, a "man," and *πώγων*, a "beard," alluding to the bearded rhachis and flowers], an extensive genus of grasses, mostly coarse and many of them tropical. The U. S. have about fifteen species E. of the Mississippi. The most important of the genus is the *Andropogon Schœnanthus*, extensively cultivated in Ceylon and other Oriental regions for its oil. Ceylon exports several tons of this oil annually. It is called oil of citronella, and is chiefly used in perfuming the so-called "honey soap." Several foreign species are cultivated for their oils, which are sold as "oil of verbena," "lemon-grass," "geranium," etc.

An'dros (Sir Edmund), an English governor, born in London Dec. 6, 1637. He was governor of New York from 1674 to 1682, and was appointed governor of New England in 1686. His arbitrary and oppressive conduct rendered him very unpopular. Recent historians, however, have asserted that his private character was excellent, and that he had to contend with the unjust prejudices of the colonists. In April, 1689, the people of Boston revolted and deposed him. He governed Virginia from 1692 to 1698. Died Feb. 24, 1714.

Androscog'gin, a river which rises in Umbagog Lake, and flows southward through Coos co., N. H., to the western boundary of Maine, which it crosses. Running then in a general S. E. direction, it passes through Oxford and Androscoggin counties in Maine, and enters the Kennebec River 4 miles above Bath. Its length is 145 miles.

Androscoggin, a county in the S. W. central part of Maine, drained by the Androscoggin and Little Androscoggin rivers, which furnish extensive water-power. There are also several lakes in the county. It has an area of 400 square miles, and is traversed by the Maine Central R. R. Manufactures and agriculture are both prosperous. Grain, potatoes, and dairy products are largely exported. Capital, Auburn. Pop. 35,866.

Andujar', or **Anduxar** (the ancient *Illitur'gis*), a town of Spain, in the province of Jaen, on the Guadalquivir, at the foot of the Sierra Morena, 27 miles N. W. of Jaen. It has a trade in grain, fruit, and porous jars and pitchers, of which great numbers are made here for the purpose of cooling water. Pop. 12,605.

Anduze, a town of Southern France, in the department of Gard, 7 miles S. W. of Alais. It has manufactures of silk, hats, and leather. Pop. in 1866, 5303, principally Protestants.

Anel (Dominique), an eminent French surgeon and oculist, born at Toulouse in 1678, practised in Paris. He invented a probe and syringe, and was skilful in the treatment of aneurism and *fistula lachrymalis*. Died about 1728.

Anemom'eter [from the Gr. *ἄνεμος*, the "wind," and *μέτρον*, a "measure"], an instrument used for measuring the force or velocity of the wind. Several different kinds of anemometers have been invented, but the one most generally used was devised by Dr. Robinson of Armagh, and made by Casella of London. It consists of four hemispherical cups affixed to the ends of two horizontal cross-rods, which are attached to a vertical axis. The cups are so arranged that their diametrical planes catch any passing current, and are caused to rotate. Motion is thus communicated to a combination of wheelwork, and by two indices the velocity of the wind is shown. Dr. Robinson found that the cups, as well as the vertical axis to which they were attached, revolve with a velocity equal to one-third of the wind's velocity. Lind's anemometer is also used. Whewell and Casella have devised instruments for registering the direction and velocity of the wind. (See Meteorological Instruments, by Prof. G. W. Hough.)

Anem'one [from the Gr. *ἄνεμος*, "wind"], a genus of herbaceous plants of the natural order Ranunculaceæ, natives of Europe, Asia, and North and South America. The species of anemone are numerous, and mostly have beautiful flowers, the size of which is increased by cultivation. The *Anemone hortensis*, or garden anemone, is highly prized and is extensively cultivated in Holland. It prefers a light soil. Among the other beautiful species are the *Anemone coronaria*, sometimes called poppy anemone; the *Anemone Japonica*, a native of Japan; the *Anemone pratensis*, which has blue flowers; the *Anemone pulsatilla* (pasque flower), which grows wild in England, and has purple flowers; and the *Anemone nemorosa* (wood anemone), which has white flowers. In North America are found several species peculiar to this hemisphere, besides some which are common also in the Old World. Pulsatilla, a favorite remedy with homœopathists, is produced by a plant of this genus.

Anemone, Sea, a popular name of marine radiated

Sea Anemone.

animals belonging to the order Actinaria. They are polypes of a soft gelatinous texture, and have numerous tentacles disposed in circles and extending like rays around the mouth. When they are expanded in the water they resemble a polypetalous flower, and are admired for beauty of form and color. They abound on the shores of the sea, and are generally attached to rocks, stones, or shells, but have some power of locomotion. When they are left dry by the receding tide they contract into a mass of jelly. They are very voracious, and will seize by their tentacules and swallow animals as large as themselves. Some species of the Actinaria can be kept in an aquarium, and can be fed on fish or other animal food. Among the most beautiful of the sea anemones are the *Actinia mesembryanthemum*, which is common on the British shores, and has around the margin of its mouth a circle of azure tubercles; the *Actinia crassicornis*, which is also found on the British shores, and displays a variety of colors; and the *Actinia dianthus*, which is found in deep water.

Anem'oscope [from the Gr. *ἄνεμος*, "wind," and *σκοπέω*, to "look"], an instrument which indicates the direction of the wind, as a vane or weathercock. Sometimes the vane turns a spindle which descends through the roof of the house into the chamber of the observer. An index fixed to the spindle indicates the direction of the wind on a compass-card fixed to the ceiling.

Aneroid Barometer. See Barometer.

Anet, a town of France, in the department of Eure-et-Loir, 9 miles N. E. of Dreux. Near it is the plain of Ivry, where Henry IV. gained a decisive victory over the army of the League in 1590. Pop. about 1400.

An'eurism [Gr. *ἀνεύρυσμα*, a "widening"], a pulsating tumor filled with blood, and communicating more or less directly with an artery, the tunics of which are wholly or partially destroyed. A "true" aneurism has one or more arterial coats in its wall. A "false" aneurism has a wall of condensed areolar tissue, the arterial coat having disappeared. A "traumatic" aneurism originates in a wound or other accidental injury. A "varicose" aneurism communicates with both an artery and a vein, but the term sometimes signifies a mere symmetrical dilatation of an artery. When such dilatations occur in groups or knots, it is a "circoid" aneurism. When the blood gets between the coats of an artery, and thus forms a tumor, it is a "dissecting" aneurism. The heart and its valves are liable to aneurismal dilatations.

Aneurisms not traumatic are frequently traceable to the degeneration of the arterial coats known as atheroma. In general, aneurism of the extremities, when sufficiently near the surface, as when it occurs in the "popliteal space" (the hollow of the knee), may be treated with a fair prospect of success by long-continued compression, mechanical or digital. "Ligation," or tying the artery, sometimes succeeds. Galvano-puncture has its advocates as a means of cure. The injection of powerful astringents has succeeded in some cases, but is not to be regarded as a safe proceeding.

The prospect, especially in aneurisms of the aorta and its great branches, is that the disease will prove fatal, though there are very unfrequent cases which spontaneously recover by the formation of a clot within the tumor, which gradually shrinks into a hard, sometimes a chalky, mass. The administration of sedatives and medicines which increase the proportion of fibrine in the blood has been often advocated. Prolonged fasting has been recommended; but in general the safest way is for the patient to avoid all excesses, and to make use of a nutritious diet, without attempting a cure. One of the most remarkable effects of aneurism is the absorption of neighboring tissues, and even of bones, from the continual pressure. The aneurism sometimes finally bursts internally, causing almost immediate death. REVISED BY WILLARD PARKER.

Angara′, or **Upper Tungus′ka,** a river of Siberia, rises in Lake Baikal, about 30 miles S. of Irkutsk. Passing by that town, it flows first northward and afterwards in a westerly direction, and enters the Yenisei, of which it is the principal tributary. Length, about 1000 miles.

An′gel [from the Gr. ἄγγελος, a "messenger"], a ministering spirit; a spiritual, intelligent being employed by God to carry commands, to announce glad tidings, and administer comfort to men. The Scriptures record many instances in which angels became visible to men. The ancient Hebrews believed in the existence of several orders of angels, among which were the seraphim and cherubim, and archangels. The only angels mentioned by name in the Bible are Michael and Gabriel. Raphael is mentioned in Tobit, a book of the Apocrypha. The popular notion that angels have wings is rather a poetical invention than a revealed truth. The belief in guardian angels has been cherished by Jews and Christians of all ages.

ANGEL, an ancient English gold coin, so called from the figure of the archangel Michael piercing the dragon, which was on its obverse. The value of the angel (which continued to be coined until 1650) varied from 6s. 8d. to 10s.

Angel-Fish (*Squati′na*), called also **Monk-Fish** and **Shark-Ray,** a fish allied to the shark, is found on the coasts of England and France and the southern coasts of the U. S. It is about seven feet long, and is remarkable for its ugliness of form. The body is nearly four feet wide, and is flattened horizontally.

An′geli (FILIPPO), an eminent painter of the early seventeenth century, was born in Rome and patronized by Cosimo, grand duke of Florence. His aërial perspectives are famous, and his works are highly prized.—GIULIO CESARE ANGELI (1570–1630), and GIUSEPPE ANGELI of Venice (born 1715), were also successful painters.

Angel′ica [so called from its supposed angelic virtues], a genus of plants of the natural order Umbelliferæ, natives of the north temperate zone. They are mostly herbaceous and perennial, having bipinnate or tripinnate leaves. The *Angelica archangelica* (garden angelica) grows to the height of six feet, has greenish flowers, is aromatic, and contains resin and essential oil. Its root is used in medicine as an aromatic stimulant and tonic. This plant was formerly cultivated for the table, being blanched and used as celery. The U. S. have several species of *Angelica* and *Archangelica*, a kindred genus. It yields angelica balsam and angelic acid.

Angelica, a half-shire village and township of Allegany co., N. Y., on Angelica Creek. The village is 262 miles W. by S. from Albany, 5 miles N. of the Erie R. R., and on the line of the Rochester Nunda and Pennsylvania R. R. It has five churches, a newspaper printing-office, a paper-manufacturing establishment, a national bank, excellent water-power, and a beautiful park. Pop. 991; of the town, 1643.

P. S. NORRIS, ED. "ANGELICA REPUBLICAN."

Angelica, a post-township of Shawanaw co., Wis. P. 233.

Angelica Tree, or **Hercules' Club,** a small tree or large shrub, found from Florida to Pennsylvania and westward. It is the *Aralia spinosa* of the order Araliaceæ. It has a stout trunk, covered, like the branches, with prickles, and its leaves are very large and decompound. Its flowers appear in July and August in great clusters, composed of very numerous umbels. This tree is common in cultivation.

Angelico, Fra. See FIESOLE.

Angeli′na, a county in the E. part of Texas. Area, 1059 square miles. It is bounded on the N. E. by the Angelina River, an affluent of the Neches, and on the S. W. by the Neches River, both navigable. Petroleum is abundant. Cotton, beef, pork, and sugar-cane are produced. The surface is heavily timbered. Capital, Homer. Pop. 3985.

Ange′lio, or **de′gli An′geli** (PIETRO), [Lat. *Pe′trus An′gelus*], an eminent Italian scholar and Latin poet, born at Barga, near Lucca, in 1517. He was professor of belles-lettres at the University of Pisa for many years. His chief works are a poem on hunting called "Cynegeticon vel de Venatione" (1562), and a mediocre Latin epic poem entitled "The Syriad" (1591), the subject of which is the Crusades and the conquest of Palestine. This poem was admired by his contemporaries. Died Feb. 29, 1596.

Angelis (PIERRE), a French painter of landscapes and conversation-pieces, was born at Dunkirk in 1685. He worked in England, and his productions were praised by H. Walpole. Died in 1734.

Angel Island, California, is in the bay of San Francisco, 5 miles N. of San Francisco. It has an area of 800 acres, and extensive quarries of brown sandstone, valuable for building.

An′gell (JAMES BURRILL), LL.D., born at Scituate, R. I., Jan. 7, 1829, graduated at Brown University, studied two years in Europe, was professor of modern languages and literature at Brown University (1853–60), editor of the "Providence Daily Journal" (1860–66), president of the University of Vermont (1866–71), and president of the University of Michigan since 1871. He is the author of various articles in the "North American Review" and other quarterlies.

Angell (JOSEPH KINNICUT), an American lawyer and able legal writer, born at Providence, R. I., April 30, 1794, graduated at Brown University in 1813. Among his works are a "Treatise on the Right of Property in Tide-Waters" (1826) and "The Limitation of Actions." Died May 1, 1857.

An′gelo, a township of Monroe co., Wis. Pop. 461.

An′gelo (or, more correctly, **Ag′nolo**) **Buonarot′ti** (MICHAEL), an Italian sculptor, born at Lettignano, 3 miles from Florence, on Mar. 6, 1475. The Buonarotti (or Buonarotti Simoni, as they designated themselves) were a distinguished Florentine family. The name is often found in connection with offices in the state. They held fast to a tradition that the Simoni were descended from the counts of Canossa, in whose veins flowed imperial blood; but modern historians attach no value to the tradition. The child was entrusted to a nurse, wife of a stone-mason, and Michael used in after years to say in jest that it was no wonder he had such love for his profession, since he had imbibed it with his mother's milk. He began to draw as soon as he could use his hands. They used to show his early paintings on the walls of the house in which he grew up. He was destined to be a scholar, but gained little from his teachers, preferring to lounge in the studios of the artists and try his hand at drawing. His father and uncles protested against his pursuing the artist's career, but he persevered till he carried his point. On the 1st of April, 1488, the lad being fourteen years old, he was apprenticed for three years to David and Domenico Ghirlandajo, the latter being one of the first masters at Florence. He agreed to pay him six gold florins the first year, eight for the second, and ten for the third. While with him, Michael produced his first painting, a copy of a plate of Martin Schangauer representing the temptation of St. Anthony. The copyist colored the animals from nature. The pupil left the studio before the three years had expired—some say because the master was jealous of his ability. The gardens of Lorenzo the Magnificent, richly stored with works of art, were tempting and accessible to a youth of his promise, and soon the attention of the merchant-prince was attracted by a fawn modelled by his hand. Lorenzo took the young Michael into special favor, showed him his treasures, and introduced him, among others, to Poliziano, at whose suggestion the group of Hercules and the Centaurs was executed. At this time, too, he made a Madonna, after the manner of Donatello. Such advantages as these were of the rarest, and they were improved to the utmost. On the death of his patron and the overthrow of the Medici, the artist left the city and hastened to Venice; thence to Bologna, where he stayed about a year. In July, 1495, he was again in Florence, executing works for the Medici, a Sleeping Cupid among others, which became the occasion of his going to Rome under strong inducements from an agent of the cardinal San Giorgio, who had purchased the Cupid, but whose after-promises were finer than his performance.

The first great work executed in Rome was the statue of the Drunken Bacchus, a naked youth intoxicated with wine. Next came a *pietà*, the mourning Mary with the dead Christ in her lap, now placed in a side-chapel of St. Peter's, near the entrance. On the completion of the "pietà" in 1499, the artist was induced by a change in the government to return to Florence. Two years later he received an order to cut a statue from an immense block of

marble, eighteen feet long, which had been brought from Carrara for a figure of colossal size designed for the church of Santa Maria del Fiore. The order had not been executed, and the block, the despair of architects, lay in the workshop yards adjoining the cathedral. From this block Michael Angelo evoked the "David" of the Piazza del Gran Duca. The statue was finished early in 1504. Owing to its enormous weight, 18,000 pounds, three days were required to transport it from the studio to the square in front of the Palazzo Vecchio, where it still stands. The erection of the "David" was an event in Florence; occurrences were dated from it; a superstitious feeling even attached to it in the minds of citizens, who apprehended disaster to their city in case it should be disturbed.

The fame of the great sculptor had by this time reached the ears of Pope Julius II., who was meditating the erection of a colossal mausoleum for himself in St. Peter's, which was already enriched with costly monuments of art. A dispute arising between the pope and the sculptor, the high-spirited artist abruptly left Rome for Florence. It was there that he designed the great painting for the ducal palace, of which the cartoon only was finished, representing soldiers startled by the trumpet while bathing in the Arno. At present only a copy of small size remains, but this discloses the wonder of the work, the drawing of so many naked bodies in the various attitudes required by such a subject. A reconciliation with the pope having been effected, his next work was a bronze statue of Julius II., placed at the principal portal of San Petronio in Bologna. The unveiling took place Feb. 21, 1508. On All Saints' Day, 1509, so swiftly did this extraordinary man work, all Rome was gazing enraptured at the ceiling of the Sistine Chapel, which he literally covered in twenty months with frescoes by the order of Julius, the astonished but impatient pope admiring with the rest. In 1513 the sumptuous pontiff died, mentioning the mausoleum in his will, with directions for its completion; and Michael resumed work on it. New plans were drawn on a reduced scale, and a new contract was made, with higher estimates of cost. For three years the architect was completely absorbed in this task. It was estimated that the bronze ornaments for the tomb would require more than 22,400 pounds of metal. The blocks of marble were conveyed from his studio near the Vatican to the neighborhood of the Capitol, where were the sculptor's workshops, and where he himself took up his abode. He seems to have begun with the "Moses," with which the photograph has made all men familiar. Then, perhaps, come the two chained youths which now stand in the Museum of the Louvre in Paris.

The completion of the façade of San Lorenzo was the next great task proposed to the sculptor by Leo X., the pope undertaking that the work should not interfere with the completion of the mausoleum, which he was under contract to finish. The new work required not only a sculptor, but an architect, and besides these an engineer and a superintendent of authority. Angelo undertook the whole, would accept no aid, passed a spring and summer in the mountains, discovered and opened marble-quarries, directed workmen in several places, arranged for transportation, manufactured figures in wax; in a word, made himself felt in every department of the enterprise. Buonarotti possessed prodigious powers, and tasked them to the utmost, but it seemed to be his destiny to complete none of his gigantic enterprises. Partly through the impetuosity of his own nature, partly from the multitude and splendor of his ideas, and partly by reason of the caprices of his princely employers, his career was full of abortive schemes. The building of the façade of San Lorenzo, the work at which he had toiled for years as he had at no other —a work the magnitude whereof threw the mausoleum into the shade—was brought to a stand-still finally by the disasters which befell the family of Medici. Instead of it, the construction of the Medicean chapel in Florence was assigned to him by Clement VII. But neither was this completed. The two statues of Lorenzo, duke of Urbino, and of Giuliano, duke of Nemours, the two famous figures which all the world are familiar with, attest the grandeur of the design. The efforts of the sculptor were amazing; he worked with passion; the toil would have killed another man. In a few months the colossal statues Morning, Evening, Day, and Night, which are regarded as his greatest conceptions, were placed in their niches.

In 1533, at the age of fifty-eight, and after a rest from similar labor of thirty years, Angelo, at the instance of the pope, took up his brush to paint the "Last Judgment" on the altar-wall of the chapel whose ceiling had been covered with the creations of his hand. The mausoleum was perforce discontinued again. The artist wished to resume it on the completion of the Last Judgment, but was again overruled by papal authority; a new chapel, the Capella Paolina, had been added to the Vatican, and no one but Michael Angelo must adorn it. The dilemma was painful, for he felt bound in honor to complete the mausoleum; but being released finally, he went forward with the decorations of the chapel. The two vast paintings representing the "Crucifixion of Peter" and the "Conversion of Paul" were finished, but they no longer exist as he left them.

Michael Angelo was an old man when Antonio di San Gallo, the director of St. Peter's church, died, and the responsible office was conferred on him. Other architects were talked of. Had Rafael been living, the post would doubtless have been his. Giulio Romani declined being a candidate for the position, on account of his ill-health. Bramante had laid the foundation of the present structure in 1506. After him several architects submitted plans and made alterations—Rafael, Fra Giacondo, Peruzzi. Antonio di San Gallo succeeded him. But Angelo took the work up as from the beginning, with full power to do as he would; and though his designs were never carried out, the main credit for what was done afterwards belongs to him. The front façade was not his work; the colonnades surrounding the square were not his design; the obelisk and the fountains were placed where they are by later hands; in other points his designs were crippled; but to him belongs the glory of the great dome, which he never saw suspended, but which he lived to model. What the whole would have been could his conceptions have been put into stone, none can tell, for his inward vision alone contemplated it.

The touch of the mighty hands was felt on other Roman buildings. It converted the Baths of Diocletian into the magnificent church "Degli Angeli." His brain teemed with ideas. He would have rebuilt half Rome had he possessed the power. His actually-formed plans would have transformed a conspicuous portion of the city if they could have been executed. But years impaired even his prodigious force. He drew till his hand could no longer hold a pencil; he carved as long as he could guide a tool; but he felt old; to use his own language, "Death often pulls me by the coat to come with him." His last group, a Christ lying dead in his mother's lap, was unfinished; a flaw in the marble condemned it, and nearly sacrificed it. The artist gave it to one of his pupils. It is now in Florence, beneath the dimly-lighted dome of the Santa Maria del Fiore. Urgent solicitations to return to his native Florence might have prevailed with him at this time but for his unwillingness to leave the milder climate of Rome, and his deeper unwillingness to abandon his great labor on St. Peter's, now running through five pontificates, which political disturbances, and failing funds, and continual misunderstandings had suspended. Saddened and solitary from the loss of friends, shadowed by the disappointment of unrealized hopes, he dwelt in Rome, his thoughts turning sometimes gloomily to things immortal and invisible.

> "The fables of the world have robbed my soul
> Of moments given me for thoughts of God."

He pours out his heart in sonnets which betray a spirit of fatigue and passionate longing for rest. The end came on the 18th of Feb., 1564, when he was ninety years old. He sank exhausted under the weight of three laborious generations.

The above is the barest possible outline of the career of this great man. An attempt to characterize his work even thus baldly would be impossible here; nor is it necessary, for the main features of his genius are familiar to all who are in the smallest degree acquainted with the productions of his hand. He was architect, sculptor, painter, poet, eminent in each, skilful in anatomy, a master of mechanics. In poetry, Dante was his model for style, the delight of his kindred spirit. He entreated the pope's permission to erect a worthy monument to Dante at his own expense in an honorable place. The finer monument he is said to have actually erected—a book of drawings illustrating the "Inferno"—was lost.

Michael Angelo was rather short of stature, with broad shoulders, firm and strong limbs, thin but robust frame. Habits of abstemiousness, continence, frugality, and industry steeled his constitution. The wealth his genius brought him did not spoil his simplicity. "Rich as I am," he once said in his old age, "I have always lived like a poor man." His head was wide, his forehead prominent, his eye small and light. His face was disfigured in early life by a blow dealt him by a fellow-student in the Medici gardens, which broke his nose. The disfigurement had its effect on a temper inclined to melancholy; but by nature he was kind, gentle, generous, self-reliant, independent, ambitious, proud, but magnanimous; too tenacious of his own rights, but not unready to concede the claims of others. His family position, his genius, and his fame gave him every social advantage, but he lived in retirement, rarely appeared on public occasions, avoided the companionship of

artists, wrote Italian, the language of Dante, instead of Latin, and was satisfied to stand on his merit as an artist. The great sculptor lies buried in Santa Croce, in Florence. In the same church the duke had a monument erected in his honor.

Many points relating to the life and works of Michelagniolo, as he signed himself, have been left obscure from the withholding of important family papers—first, by the count Buonarotti, and afterwards by the city of Florence, to which the count bequeathed them. Even yet all is not known.

The Life by Herman Grimm, translated into English by Miss Bunnett (reprinted in Boston, 1866), contains much new matter of interest. A list of Michael Angelo's works may be found in the shorter biography by Richard Duppa, LL.B. (Bohn's "European Library"). An edition of the "Poems" was published in Florence about ten years ago.

O. B. FROTHINGHAM.

An'gels' Camp, a post-village of Calaveras co., Cal., 25 miles E. of Stockton, has one weekly paper.

An'gelus Dom'ini ("the angel of the Lord"), a form of prayer which Roman Catholics repeat at sunrise, noon, and sunset, when they ring a bell called the Angelus bell.

An'gelus Sile'sius, one of the most prominent German poets of the seventeenth century, whose proper name was JOHANN SCHEFFLER, was born at Breslau, in Silesia, in 1624, and in 1652 joined the Roman Catholic Church. He wrote several mystical devotional works, among which are the "Cherub's Guide-Book" and the "Angelic Book of Wonders" (1674). Died July 9, 1677. Special works on him have been written by Kahlert and Schrader (1853).

An'germann, a navigable river of Sweden, rises in the mountains between Sweden and Norway, collects the water of several lakes, and flowing south-eastward enters the Gulf of Bothnia near Hernösand. Length, about 250 miles. Its banks abound with beautiful scenery.

An'germannland, or **Angerma'nia,** an old province of Sweden, is now included in the province of Hernösand or Westernorrland.

Ang'ermün'de, a town of Prussia, in the province of Brandenburg, on Lake Münde, and on the Berlin and Stettin Railway, 44½ miles by rail N. E. of Berlin. Pop. in 1871, 6412.

Angers, formerly **Angiers** (the ancient *Juliom'agus*), a fortified city of France, capital of the department of Maine-et-Loire, and once the capital of the province of Anjou. It is on the Mayenne River, 4 miles N. of the Loire, and on the railway which connects Tours with Nantes, 60 miles by rail S. W. of Le Mans. The old walls are converted into boulevards lined with handsome houses. It has a cathedral, a college, a library of about 35,000 volumes, a museum, and a school of arts and trades; also manufactures of linen and woollen stuffs, hosiery, silk twist, leather, etc. Here are the ruins of an ancient castle of the dukes of Anjou, and the Hospice of St. Jean, founded by Henry II. of England. Lord Chatham and the duke of Wellington attended a military school in Angers. Pop. in 1866, 54,791.

Anghie'ra, de (PIETRO MARTIRE), [Lat. *Pe'trus Mar'tyr Angle'rius*], an eminent Italian scholar and historian, born of a noble family at Arona, on Lake Maggiore, in 1455. He emigrated to Spain in 1487, and became a priest. In 1501 he was sent by King Ferdinand on a mission to the sultan of Egypt, and in 1505 he was appointed prior of the church of Granada. He was also a member of the Council of the Indies. His most important work is a history of the New World and American discovery, entitled "De Rebus Oceanicis et Orbe Novo Decades" (1530), which is highly esteemed. Died in 1526.

An'gilbert, or **En'gilbert** [Lat. *Angilber'tus*], SAINT, an eminent statesman and Latin poet, was born in Northwestern Gaul. He married Bertha, a daughter of Charlemagne, and became a confidential minister of that monarch. In the latter part of his life he entered a monastery. He wrote several short poems, and was called the Homer of his time. Died Feb. 18, 814 A. D.

Angi'na [from the Gr. ἄγχω; Lat. *an'go*, to "strangle"], applied to diseases attended by a sense of suffocation. (See next article.)

Angi'na Pec'toris ("angina of the breast"), called also **Breast Pang** and **Heart Stroke,** an intense pain occurring in paroxysms, and usually commencing in the region of the heart or at the lower end of the breast-bone, and extending along the left arm, more rarely going towards the right side. It is characterized by a sense of suffocation, faintness, and often by the apprehension of approaching death. This symptom has been called the "spasm of a weakened heart," and is very seldom experienced by any but persons with an organic disease of that organ. The exciting cause is not unfrequently a strong and sudden emotional disturbance. Men over fifty years of age are most frequently attacked. Valerian, gentle aromatic stimulants, and saline cathartics are considered useful in the attack, which is usually, not always, short. Between paroxysms the patient should lead a tranquil, retired life, and make use of a plain, nutritious diet.

Ang'le [from the Lat. *an'gulus*, a "corner"], in popular language is a point formed by the meeting of two lines whose direction is not the same. In geometry a *rectilineal angle* is the inclination of two straight lines which meet, but have not the same direction. The point of meeting is called the *vertex* of the angle, and the lines are its *sides* or *legs*. Angles are measured by degrees of a circle, as their magnitude depends on the quantity of rotation round the vertex which would be required to make the lines coincide. An angle of ninety degrees is called a *right angle;* if it is more than ninety, it is *obtuse*, and if less than ninety, it is *acute*. When three or more planes meet at the same point, the corner thus formed is a *solid* angle.

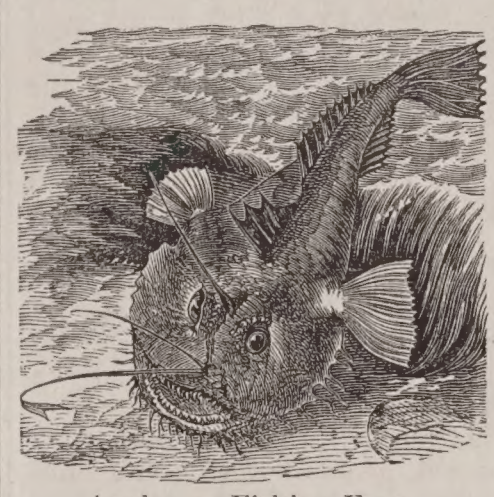
ANGLE, CURVILINEAR, is the angle formed by the tangents to two curves at the point where the latter meet.

ANGLE, DEAD, in fortification, an angle of the wall so formed that a small piece of ground in front of it can neither be seen nor defended from the parapet.

ANGLE, FACIAL, in zoology, is regarded as an important indication of the relative intelligence and sagacity of men and other animals. It signifies the angle made by the meeting of two straight lines, drawn, the one from the most prominent part of the frontal bone to the anterior margin of the upper jaw; the other from the external auditory foramen to the same point. The facial angle of a European is about eighty degrees; of an African negro, about seventy; of an ape, about fifty.

ANGLE, VISUAL, in optics, is the angle formed by two rays of light, or two straight lines drawn from the extreme points of an object to the centre of the eye. The apparent magnitude of an object depends on the magnitude of the visual angle which it subtends.

Ang'ler (*Lo'phius America'nus*), a fish found on the American coasts, and called the sea-devil or goose-fish. It belongs to a family of acanthopterygious fishes called Lophiadæ. It is from three to five feet long, has an enormous head and a very large mouth, furnished with worm-like appendages. By means of these, and the filaments which rise from the top of its head, it is supposed to attract the fishes on which it preys. The Lophiadæ are remarkable for the elongation of the carpal bones, by which they are enabled to leap up suddenly and to seize fish that are above them.



Angler, or Fishing-Frog.

Ang'les [Lat. *An'gli*], an ancient Low German tribe from which England derives its name (*Angle-land,* England). They occupied a narrow district in the S. of Sleswick, between the Schlei and Flensburg, whence some of them passed over, in the fifth century, in conjunction with other Saxon (or Low German) tribes, into Britain, where they conquered the native Britons and established the Anglo-Saxon Heptarchy. That the Anglian settlers of Britain should have given their name to the island is due, possibly, to the fact that the tribal name "Angles" had come to be used as a generic term for the Saxon (or Low German) tribes; just as the word "Yankee" has come to signify, to a European, any citizen of the U. S.; but, more probably, to the fact that the Anglians were the first of the Low German settlers of Britain to accept Christianity, and hence to be recognized in the Latin literature of the period. (See ANGLO-SAXON, by PROF. J. H. GILMORE, A. M.)

Ang'lesey, or **Ang'lesea** (*angle's + ei*, or "island;" anc. *Mo'na*), an island and county of North Wales, in the Irish Sea, about 1 mile from Caernarvon, from which it is separated by the Menai Strait. It is about 20 miles long and 17 miles wide. The surface is nearly level and the scenery rather tame; the soil is generally fertile, producing wheat, barley, oats, and potatoes. The principal rocks are mica-schists and limestone. Here are rich mines of copper and lead. The island is connected with the mainland by the Menai suspension bridge and the great Britannia tubular bridge, over which the Chester and Holyhead Railway passes. The ancient *Mona* was an important seat of Druidical power. Pop. in 1871, 35,090.

Anglesey, Earls of, and Barons Newport-Pagnell, in the English peerage (1661), Viscounts Valentia and Barons Mountnorris in the Irish peerage. The earldom was established in the Annesly family by Charles II., but became extinct 1761 in Richard Annesly, the sixth earl of this family. The title had been borne by Christopher Villiers, brother of the duke of Buckingham, and his son Charles.

Anglesey (Henry William **Paget**), Marquis of, a British general and statesman, born May 17, 1768, was the eldest son of the earl of Uxbridge. He entered the army, gained distinction as a cavalry officer, and became a major-general in 1808. He inherited the title of earl of Uxbridge on the death of his father in 1812, and entered the House of Lords. At the battle of Waterloo, 1815, he commanded the British cavalry, and lost a leg. Soon after this event he received the title of marquis of Anglesey. In 1828 he was appointed lord lieutenant of Ireland, but having become an advocate of Catholic emancipation, he was removed by Wellington in 1829. He held the same office from 1831–33, and was raised to the rank of field-marshal in 1846. Died April 29, 1854.

Anglesey, Marquesses of (1815, in the United Kingdom), earls of Uxbridge (1784, in Great Britain), Barons Paget (1550, in England) and baronets (1730, in Ireland).—Henry William George Paget, the third earl, was born Dec. 9, 1821, and succeeded his father in 1869. He was a member of Parliament for South Staffordshire from 1854 to 1857.

Ang'lesite, a sulphate of lead produced by the decomposition of galena, was so named because first observed in Anglesey. It occurs in rhombic prisms with dihedral terminations, and of a white, gray, or yellowish color.

Ang'lican Church, a name of the Established Church of England, sometimes called the Anglo-Catholic Church. The creed of this Church is legally defined in the Thirty-nine Articles, first adopted in 1562. The term is also sometimes used as a collective name for all the religious denominations comprised under the name of Episcopalians. (See England, Church of, by Rev. B. R. Betts, A. M.)

Ang'ling [from the Lat. *an'gulus*, a "corner" or "angle," a "hook"], catching fish by means of a hook attached to a line and rod, the hook being furnished with bait, which is either some object upon which the fishes naturally prey, or is a counterfeit of such an object. The practice has prevailed through all ages and in almost all countries. In 1496, Wynkin de Worde "emprented at Westmestre a 'Treatise of Fysshinge with an Angle,' by Dame Juliana Berners." Izaak Walton in 1653 gave to the world his "Complete Angler," afterwards enriched with additions by his friend Charles Cotton, highly esteemed for correctness of details and happy humor. In angling the first consideration is what is termed "fishing-tackle," which consists of the rod, line, and hook, with the requisite baits, worms, flies, etc. The line should be strong, smooth, or even, flexible, and of a material not easily injured by wet. To the rod is attached a reel, on which a part of the line is wound when it is too long for the occasion, but especially when, having caught a strong fish, it is necessary to draw it in gradually and cautiously, lest the line should be broken. The reel should be made so as to wind or unwind freely. The baits may consist of various kinds of worms or flies, little fishes, small pieces of fish, meat, etc. Artificial lures are much used, particularly for catching the trout and salmon. They are variously made; usually the feathers of some bird (as the cock or pheasant) are so disposed as to resemble insects on which the fish are wont to feed. (See G. C. Scott, "Fishing in American Waters;" H. W. Herbert, "Fish and Fishing in the U. S.," 1850; Hallock, "The Fishing Tourist," 1873; Roosevelt, "Superior Fishing," 1865.)

Anglo-Cath'olics, a party of High Church Anglicans, often called **Puseyites,** from one of their leaders, Dr. Pusey, otherwise known as **Tractarians,** from the series of ninety tracts issued by them between 1833 and 1841. They emphasize these four "Catholic principles:" apostolic succession, baptismal regeneration, the real presence in the Eucharist, and the authority of tradition.

Angloma'nia [from the Lat. *An'glus*, "English," and the Gr. *μανία*, "madness" or "infatuation"], a term applied among the French and Germans to an indiscriminate admiration of English institutions and national peculiarities, or a propensity to imitate English customs and conventionalities. An Anglomania prevailed in France just before the revolution of 1789. The opposite state of feeling is called *Anglophobia.*

An'glo-Sax'on, a name given to the people and language which resulted from the consolidation of the different Low German tribes which in the fifth century overran Southern Britain. The name would seem to point to a blending of two distinct races, the Angles (which see) and the Saxons; but according to Latham ("Ethnology of the British Islands"), there is no distinction to be made between the Angles and the Saxons on the ground of the difference in name. "If," says he, "the Saxons of Anglo-Saxon England were other than Angles under a different name, they were North Frisians." According to the "Saxon Chronicle," which is, with reference to these events, a mere paraphrase of Bede's "Ecclesiastical History of Britain"—the latter work being written about 150 years after the last of the Saxon invasions, which the "Chronicle" records as if it were contemporaneous with them—there were seven distinct Teutonic "invasions" of Britain, beginning A. D. 449, and including parties of Jutes, Frisians, Saxons, and Angles. That Jutes, in the sense of people from Northern Denmark or people of Scandinavian stock, were the first of the Gothic invaders to land in Southern Britain, is highly improbable; and the topographical nomenclature of Kent, where Hengist and Horsa, with their party of Jutes, are said to have settled, bears no traces of Danish influence. By "Jutes" we are probably to understand, generically, "Goths." Indeed, in Alfred's Anglo-Saxon translation of the passage in Bede which the "Chronicle" manifestly follows, the Latin *Jutis* is rendered by *Geatum* (Goths), a term which is elsewhere applied to Alfred himself. The "Chronicle" itself, by the way, explicitly asserts (Bohn's ed., p. 341) that 787 was the first year when ships of Danish men sought the land of the English nation; one manuscript of the "Chronicle" says that Hengist landed with a party of *Angles;* while tradition calls him a Frisian, which he probably was.

The Saxon settlement of Britain was probably participated in by all the Low German tribes between the Elbe and the Schlei, although, on the ground of linguistic affinity, the Frisians would seem to have been most prominent. (See Latham's "Ethnology of the British Islands;" Marsh's "Origin and History of the English Language;" Nicholas's "Pedigree of the British People;" "Proceedings of the London Philological Society," vol. v.) As soon as the Saxons had subjugated the Keltic inhabitants of Britain (who resolutely opposed the invaders, and many of whom were driven before them into the fastnesses of Wales, and across the sea into Armorica, though most of them were, doubtless, amalgamated with the invading race), they began to contend with each other. The various kingdoms forming the famous "Heptarchy" (or, to speak more correctly, the "Octarchy"*) were at length, in 827, reduced by Egbert, king of Wessex, into a single monarchy, which attained its highest point of power and glory under Egbert's grandson, Alfred the Great (871–901). The Saxon power was completely overthrown by William the Conqueror at the battle of Hastings, in 1066. (For a full account of the Anglo-Saxons, their history, their laws, customs, etc., see Sharon Turner, "History of the Anglo-Saxons;" J. M. Kemble, "The Saxons in England;" also, Lappenberg's "History of the Anglo-Saxon Kings," and Freeman's "Old English History.") J. H. Gilmore.

Anglo-Saxon Language and Literature. The pagan conquerors of England described in the article Anglo-Saxons spoke many dialects, but all of them were Low German. Missionaries were sent from Rome (A. D. 597) to convert them to Christianity. The Roman alphabetic writing was thus introduced, and a single tongue gradually came into use as a literary language through the whole nation. It was at its best in the reign of Alfred the Great (A. D. 871–901). It continued to be written till the colloquial dialects, through the influence of the Normans, had changed so much as to make it unintelligible to the people; then there grew out of these dialects of mingled Anglo-Saxon and Norman a new literary language, the English. The old language was long called Anglisc, Englisc (English), and some scholars insist that it should still be called so, and that it is nothing but Early English. But it differs more from English than Latin does from Italian, and it needs a separate name, and has come to be called Anglo-Saxon. It belongs to the Indo-European family—has similar roots and grammatical structure with German, Latin, Greek, and Sanscrit. It was the most highly cultivated of the Germanic languages of its time; it attained the capacity of translating the Latin classics with accuracy and ease; and it has original literature worthy of study. Its chief interest, however, is as the mother-tongue of the English. It has given us the names of the objects, relations, and affections which we speak of most, the words laden with the dearest associations, the idioms on which the beauty of our poetry and the power of eloquence, wit, and humor depend. From it almost all our grammatical forms are derived. The following sketch of its grammar has been made full enough to explain our English grammar.

* See on this particular subject, Sharon Turner's "History of the Anglo-Saxons," vol. i., book ii., chap. 4.

PHONOLOGY.—The alphabet has twenty-four letters.

Old Forms.		Roman.		Names.
Ā	a	A	a	å
Æ	æ	Æ	æ	å
B	b	B	b	bå
C	c	C	c	kå
D	ð	D	d	då
Ð	ð	DH	dh	edh
E	e	E	e	å
F	f	F	f	ef
G	ȝ	G	g	gå
H	h	H	h	hå
I	ı	I	i	ee
L	l	L	l	ĕl
M	m	M	m	ĕm
N	n	N	n	ĕn
O	o	O	o	o
P	p	P	p	på
R	ɲ	R	r	ĕr
S	ſ	S	s	ĕss
T	t	T	t	tå
Þ	þ	TH	th	thorn
U	u	U	u	oo
Ƿ	ƿ	{VV (W)	vv (w)}	wên
X	x	X	x	ex
Y	ẏ	Y	y	ypsilon

The vowels sounded nearly as in German: *a* as in *far*; *â* as in *fall*; *æ* as *a* in *glad*; *æ̂* as *a* in *dare*; *e* as in *let*; *ê* as in *they*; *i* as in *dim*; *î* as *ee* in *deem*; *o* as in *opine*; *ô* as in *holy*; *u* as in *full*; *û* as *oo* in *fool*; *y* nearly like *u* in *music*, or the French *u*; *ŷ* the same sound prolonged. There were many dialectical variations of the vowels, and there are also certain regular variations which are carefully represented in the Anglo-Saxon writing. Words originally spelt with *a* sometimes appear with *æ*, sometimes with *ea*, sometimes with *e*, sometimes with *o*, showing that the sound of *a* was as seldom pure, and as variously flattened and broken, as it is in the Middle and Southern States of America. When *a* or *i* would come before *l*, *r*, or *h*, the broken sound produced by those letters, such as we make in *hear*, *leer*, is written as *ea* and *eo*. So after *c* and *g* the breaking heard in our Southern States in *cear* for *car*, *gearden* for *garden*, is carefully represented by the same *ea*, *eo*. Before *m* or *n*, *o* often appears for *a*; as *mon* for *man*.

A vowel is also modified by the vowel of the following syllable, the German umlaut: *a* followed by *i* changes to *e*: man, *man*, meni, *men*; *ô* to *ê*: gôs, *goose*, gêsi, *geese*; *û* to *ŷ*: mûs, *mouse*, mŷsi, *mice*; and the like.

Many of the niceties of pronunciation were neglected in the Norman spelling, but they were long kept up in the folk-speech. The changes of the old to the present sounds of these vowels have been made in modern times, mostly during the Elizabethan age and since. These changes have an important peculiarity. All through the Indo-European languages, beginning with Sanscrit and coming down through Greek, Latin, Gothic, Anglo-Saxon, and the like, there is a regular gradual weakening of the vowels: *a* weakens to *o*, *e*, *i*; *u* to *o*, *e*; *i* to *ĕ*. But in English there is a vigorous strengthening of accented vowels. The weakest vowels, *u* and *i*, change to strong diphthongs: mûs becomes *mouse*, hûs, *house*, and the like; lîf becomes *life*, which is pronounced *lâife*, or nearly so; and *a*, though it becomes oftenest the mixed sound of *a* in *fate*, yet in words from Anglo-Saxon *â* is *aw* or *ô*: þâs becomes *those*; hâm, *home*; brâd, broad (brawd); and the like. Unaccented vowels weaken or disappear. This gravitation of our words to accentual centres indicates a special vigor of utterance accompanying the new manly vigor of the English race. Similar changes are found in modern German, French, and most vigorous modern tongues, but only in particular words, or within very narrow limits, compared with the English.

The consonants were pronounced in general as in English, but *c* was always pronounced as *k*; *g* like German *g*, as in *give*, or nearly enough to alliterate with it—never as in *George*; *i* consonant like *y*; p like *w*; *qu* was represented by cp; *wh* by hp, in which a strong *h* was heard before the *w*, as a weak one now is in New England; the two sounds of *th*, as in *thin* and *thine*, had two characters, þ *thin*, and ð *thine*, which, however, are not found in any manuscript uniformly so used. *Hl*, as in hlâford, *lord*; *hr*, as in hraðor, *rather*; *pl*, as in plâtung, *loathing*; *pr*, as in prîtan, *write*; *cn* as in cniht, *knight*, had the first letter distinctly sounded, as the last two had in the Elizabethan age. The weakening of *c*, *sc*, and *g*, and of the combinations here mentioned, mostly occurred at the first mixture of Norman and Anglo-Saxon, several of the sounds being unpronounceable to the Normans.

INFLECTION.—The Anglo-Saxon has three genders, three numbers, and five cases. The dual number and the instrumental case are rare, except in the pronouns.

THE NOUN.—There are four declensions distinguished by the endings of the genitive singular—ES, E, A, and AN. The first three are from the old vowel declensions, and are called strong; the fourth is from the N-declension, and is called weak. Most nouns of the masculine and neuter gender belong to the first or fourth declension, and are thus declined:

FIRST DECLENSION.

SINGULAR.	*Anglo-Saxon.*	*English.*	*Latin.*	*German.*
Nominative,	fisc,	*fish*,	sol,	Sohn.
Genitive,	fisces,	*fish's, of a fish*,	solis,	Sohnes.
Dative,	fisce,	*to* or *for a fish*,	soli,	Sohne.
Accusative,	fisc,	*fish*,	solem,	Sohn.
Instrumental,	fiscê, *or* ŷ,	*by* or *with a fish*,	sole (ablative).	
PLURAL.				
Nominative,	fiscâs,	*fishes*,	solês,	Söhne.
Genitive,	fiscâ,	*of fishes*,	solum,	Söhne.
Dative,	fiscum,	*to* or *for fishes*,	solibus,	Söhnen.
Accusative,	fiscâs,	*fishes*,	solês,	Söhne.
Instrumental,	fiscum,	*by* or *with fishes*,	solibus (ablative).	

FOURTH DECLENSION.

SINGULAR.	*Anglo-Saxon.*	*English.*	*German.*
Nominative,	oxa,	*ox*,	Knabe.
Genitive,	oxan,	*of an ox*,	Knaben.
Dative,	oxan,	*to an ox*,	Knaben.
Accusative,	oxan,	*ox*,	Knaben.
PLURAL.			
Nominative,	oxan,	*oxen*,	Knaben.
Genitive,	oxena,	*of oxen*,	Knaben.
Dative,	oxum,	*to oxen*,	Knaben.
Accusative,	oxan,	*oxen*.	Knaben.

From the first declension the English endings of the possessive case and of the plural number are derived. In Anglo-Saxon, as in German, most secondary formations and new words were declined according to the N-declension, and that seemed likely to be the leading one; but the Normans formed their plural in *-s*, and in English the Norman *-s* joined with the Anglo-Saxon *-s* to kill it, and *oxen*, with the irregular *children*, *brethren*, is almost its only memorial in current speech.

The possessive *-es* is a distinct syllable, and is so in English as late as Shakspeare. Many persons imagined it to be a contraction of *his*, and we often find *his* written in its place in Early English and Semi-Saxon: *Anak his children* for *Anak's children*; and Bacon, carrying out the mistake, has *Pallas her glass* for *Pallas's glass*.

The plural *-âs* is also a separate syllable, and the English *-es* remains so in words ending with a hissing sound: *glass, glasses; church, churches; box, boxes*; in other words it is now contracted: *king, kings*.

Words from Anglo-Saxon ending in *f* change it to *v*: *wolf, wolves*; while those from French mostly retain *f*: *chief, chiefs*; *gulf, gulfs*.

Words in Anglo-Saxon from stems in *-i* have umlaut, as described above under *Phonology*, in the dative singular and in the nominative and accusative plural. Thus, man, *man*, is declined: Nom. man; Gen. mannes; Dat. men(i); Acc. man; Plural Nom. men(i); Gen. mannâ; Dat. mannum; Acc. men(i). The *i* is dropped, and hence our plural *men*; so fôt, *foot*, plu. fêt(i), *feet*; gôs, *goose*, plu. gês(i), *geese*; tôð, *tooth*, têð(i), *teeth*; mûs, *mouse*, plu. mŷs(i), *mice*; brôðer, *brother*, brêðer, whence *brethren*, with the *-en* of the fourth declension irregularly added.

Neuters generally have no plural sign; sceâp, *sheep*, for example, is the same in the singular and plural. Hence several English words from such neuters remain without any plural sign: *sheep, deer, swine*; and some are used with or without one; as *folk, hair, head, hundred, pound, sail, score, year, yoke*.

A few neuters end in *-ru*: cild, *child*, plu. cildru, whence first *childer*, and then, with a second plural ending from the fourth declension, *childer-en, children*.

GENDER has two aspects: (1.) It represents a tendency to use different sounds for relations to males from those to females; long vowels and liquids are oftenest used for females. (2.) A tendency to couple words agreeing in their

endings. From the first point of view there can be but three genders; some languages have two, some one, some none. From the second point of view there may be as many genders as there are sets of endings. Some languages have none; some (*e. g.*, Congo and Caffer) have many.

In Anglo-Saxon the endings control the gender; pîf-man, *woman*, is masculine, because it ends in *man;* pîf, *wife*, is neuter, as in German.

Many stems have pairs of endings—one masculine, the other feminine. Remains of these in English are sang-ere, masc., *singer*, sang-estre, fem., *songster;* bæc-ere, m., *baker*, bæc-estre, f. (whence the old bakster), a female baker; pebb-ere, m., *weaver*, pebb-estre, f., whence webster, a female weaver. Such pairs are common: fox, m., *fox*, fixen, f., *vixen;* hlâford, m., *lord*, from hlâf, *loaf*, and peard, *keeper*, hlâf(or)dige, f., *lady;* gans, gôs, *goose*, gandra, m., *gander*.

Many compounds are formed whose first part marks sex, and last part gender. pæpned-, *weaponed*, carl-, man-, are common for males; pîf-, *wife*, mægden-, *maiden*, cpên-, *queen* or *quean*, for females: pæpned-man, m.; carl-cat, not now *Charles-*, but *Tom-cat;* man-cild, n., *man-child;* pîf-man, m., *woman;* mæden-cild, n., *girl;* cpên-fugol, m., *quean-bird;* so also the expressions spere-healf, f., *spear-half*, on the male side; spindel-healf, f., *spindle-half*, on the female side.

Man in his various relations and the common domestic animals have pairs of words from different roots in use through many of the Indo-European languages. The English come mostly from Anglo-Saxon: fæder, môdor, *father*, *mother;* sunu, dôhtar, *son*, *daughter;* oxa, cû, *ox*, *cow;* for *sheep*, ram, m., eôpu, f.; for *dogs*, hund, *hound*, bicce, f.; for *poultry*, coc, m., hen, f.; for *bees*, drân, *drone*, m., beô, f.; and the like.

The gender adopted for objects without life, when personified in English, often differs from the Anglo-Saxon gender; sunne, *sun*, is feminine; mônа, *moon*, is masculine; scip, *ship*, is neuter. The German generally agrees with the Anglo-Saxon. English literature has rather taken these genders from the mythology of Greece and Rome.

The Adjective.—The Anglo-Saxon adjective, like the Greek, Latin, and others, is declined; and, like the German, has two sets of endings for each gender. The common forms are called the strong, or indefinite, or pronominal declension, and are like those of the demonstrative pronoun. When an adjective is preceded by a definite article, demonstrative, or like word, or is in the vocative case, it is declined like a weak noun (see *oxa*, above), and this is called the weak or definite declension. Thus blind, *blind*, is commonly declined in the masculine thus: Nom. blind; Gen. blindes; Dat. blindum; Acc. blindne; Instrumental, blindê; Plural Nom. blinde; Gen. blindrâ; Dat. blindum; Acc. blinde; Instr. blindum; but "the blind man" would be thus declined: Nom. se blinda man; Gen. þæs blindan mannes; Dat. þam blindan men; Acc. þone blindan man; Vocative, blindan man; Instrumental, þŷ blindan men, etc. English adjectives, especially monosyllables, sometimes in Chaucer have an *-e* added, a relic of the definite declension or the plural number; but they are now undeclined.

Comparison.—Adjectives are generally compared by adding *-ir, -er, -ôr* for the comparative, *-ist, -est, ôst* for the superlative. The *i* of the endings works umlaut like that of *man, men* described in the declension of nouns: strang, *strong*, compar. streng(i)ra, superl. strengest; ald, *old*, compar. eld(i)ra, superl. eldest, whence the English *elder, eldest*.

Some words form their superlative in *-ma:* for-ma, *first*. Some of these form a double superlative, fyr-m-est, from forma; æfte-m-est, which the English has converted into *aftermost*, as though compounded with *most*. In the same manner are to be explained *hindmost, uttermost, southmost*, and the like.

The irregular comparison of *good, bad, much, little*, is already in Anglo-Saxon. The comparison by *more* and *most* is not used.

Pronouns.—The personal pronouns are thus declined:

First Person.

Singular.	*Anglo-Saxon.*	*German.*
Nominative,	ic,	[ich], *I.*
Genitive,	mîn,	[meiner or mein], *mine*, or *of me.*
Dative,	mê,	[mir], *me*, or *to me.*
Accusative,	mec, mê,	[mich], *me.*
Dual.		
Nominative,	pit,	*we two.*
Genitive,	uncer,	*of us two.*
Dative,	unc,	*to us two.*
Accusative,	uncit, unc,	*us two.*
Plural.		
Nominative,	pê,	[wir], *we.*
Genitive,	ûser, ûre,	[unser], *our*, or *of us.*
Dative,	ûs,	[uns], *us*, or *to us.*
Accusative,	ûsic, ûs,	[uns], *us.*

Second Person.

Singular.	*Anglo-Saxon.*	*German.*
Nominative,	þû,	[du], *thou.*
Genitive,	þîn,	[deiner or dein], *thine*, or *of thee.*
Dative,	þê,	[dir], *thee*, or *to thee.*
Accusative,	þec, þê,	[dich], *thee.*
Dual.		
Nominative,	git,	*ye two.*
Genitive,	incer,	*of you two.*
Dative,	inc,	*to you two.*
Accusative,	incit, inc,	*you two.*
Plural.		
Nominative,	gê,	[ihr], *ye.*
Genitive,	eôper,	[euer], *your*, or *of you.*
Dative,	eôp,	[euch], *you*, or *to you.*
Accusative,	eôpic, eôp,	[euch], *you.*

The dual was rare, and has disappeared. The English pronouns are plainly from the Anglo-Saxon. It is worth notice that gê, *ye*, is nominative, eôp, *you*, always objective in the English Bible. The first person plural is used for the singular by authors, preachers, and chiefs in Anglo-Saxon sometimes; *ye* and *you* appear first as pronouns of reverence for *thou* in Old English.

Third Person, Singular.

Masculine.

	Anglo-Saxon.	*German.*
Nominative,	he,	[er], *he.*
Genitive,	his,	[seiner or sein], *his*, or *of him.*
Dative,	him,	[ihm], *him*, or *to him.*
Accusative,	hine,	[ihn], *him.*

Feminine.

Nominative,	heô (or hie),	[sie], *she.*
Genitive,	hire,	[ihrer or ihr], *her*, or *of her.*
Dative,	hire,	[ihr], *her*, or *to her.*
Accusative,	heô (or hie),	[sie], *her.*

Neuter.

Nominative,	hit,	[es], *it.*
Genitive,	his,	[seiner or sein], *its*, or *of it.*
Dative,	him,	[ihm], *it*, or *to it.*
Accusative,	hit,	[es], it.

Plural for all the Genders.

Nominative,	hî, hie (or heô),	[sie], *they.*
Genitive,	heorâ (hyrâ, or hirâ),	[ihrer], *their*, or *of them.*
Dative,	him,	[ihnen], *them*, or *to them.*
Accusative,	hî, hie (or heô),	[sie], *them.*

The article and demonstrative *se* is thus declined:

Singular.

	Masculine.	*Feminine.*	*Neuter.*
Nom.,	se,	seô,	þæt, *the*, or *that.*
Gen.,	þæs,	þâre,	þæs, *of the*, or *of that.*
Dat.,	þam,	þâre,	þam, *to the*, or *to that.*
Acc.,	þone,	þa,	þæt, *the*, or *that.*
Instr.,	þŷ,		þŷ, þê, *by the*, or *that.*

Plural of all the Genders.

þâ, *the*, or *those.*	þâm, *to the*, or *to those.*
þâra, *of the*, or *of those.*	þâ, *the*, or *those.*

þis, "This."

Singular.

	Masculine.	*Feminine.*	*Neuter.*
Nom.,	þis,	þeos,	þis, *this.*
Gen.,	(þisses),	þisse,	þises (or þisses), *of this.*
Dat.,	(þissum),	þisse,	þisum (or þissum), *to this.*
Acc.,	þisne,	þas,	þis, *this.*
Instr.,	þŷs,		þŷs, *by this, thus.*

Plural for all Three Genders.

Nom., þâs, *these.*	Dat., þisum, *to these.*
Gen., þisserâ (or þissâ), *of these.*	Acc., þâs, *these.*

Interrogative.

	Masculine. Singular	*Feminine is wanting. (Plural wanting).*	*Neuter. Singular.*
Nom.,	hpâ, *who*,		hpæt, *what.*
Gen.,	hpæs, *whose*,		hpæs, *of what.*
Dat.,	hpam, *to whom*,		hpam, *to what.*
Acc.,	hpone (or hwæne), *whom*,		hpæt, *what.*
Instr.,	hpŷ,		hpŷ, *by what, why.*

In the third personal pronoun it will be noticed that the feminine heô has given place in English to *she*, from seô, the demonstrative, and the plural throughout to *they, their, them*, from the same demonstrative. This personal pronoun is a weak demonstrative. Hit, *it*, has lost its *h;* the neuter genitive his has given way to *its*, a late English growth, not in the first edition of our Bible, and seldom used by scholars even as late as Milton. The English objectives come from the old datives, and *him, them*, etc. are still datives in some idioms: *I gave him the book, I taught them grammar*, and the like.

The origin of English *that, this, them, they, these, those* (þâs), *who, what, whom,* is obvious; *which,* hpylc, German *welcher,* is from hpâ, *who,* and lîc, *like,* and means *of what kind.* Hpâ and hpæt are interrogatives in Anglo-Saxon; whas, *whose,* and wham, *whom,* appear as relatives in Semi-Saxon; the nominative *who* is not a full relative till the fourteenth century, and *what* does not now admit of an antecedent.

From these pronouns are derived a large number of ADVERBS in Anglo-Saxon, which have come into English: *where,* at *what* place; *there,* at *that* place; *here* (from *he*), at *this* place; so *whither,* to *what* place; *thither,* to *that* place; *hither,* to *this* place; and *whence,* from *what* place; *thence; hence; when,* at *what* time; *then; how, why* (from hû, hpŷ), in *what* way; *thus,* in *this* way.

The DEFINITE ARTICLE *the* is a weakened form of the demonstrative *that,* like French *le* from Latin *ille;* it is common in Anglo-Saxon. The indefinite article *an, a,* is a weakened form of the numeral ân, *one,* like French *un* from Latin *unus;* though not uncommon, it is not as frequent as in English.

The personal pronouns are used as REFLEXIVES. *Self* is sometimes added, and then the pronoun and *self* are both declined: ic selfa, *I self,* not *my self;* Gen. mîn selfes, *of my self,* etc. The English *him-self, it-self, them-selves, her-self,* preserve the old construction.

NUMERALS.—The cardinals are like the English: ân, *one;* tpâ, *two;* þreô, *three;* . . . endleofan, *eleven;* tpelf, *twelve;* þreô-tŷne, *thirteen;* . . . tpêntig, *twain-ten, twenty;* . . . from seventy to one hundred and twenty, the great hundred, *hund* is prefixed: hund-seofon-tig, *seventy;* . . . hund-teôn-tig, or hund alone for *hundred;* hund-endleofan-tig, *one hundred and ten;* hund-tpelf-tig, *one hundred and twenty;* then hund and þrittig, *one hundred and thirty.*

The ordinals are—fyrsta, *first;* ôðer, *other, second;* þridda, *third;* feôperðа, *fourth;* and so on as in English, except fift, sixt, twelft, which have only lately changed to *fifth, sixth, seventh;* and except that a modern *-teenth* has taken the place of the old -teôða in *thirteenth, fourteenth,* etc.

VERBS.—The CONJUGATIONS are determined by the past tenses, the old perfects. The old way of forming the perfect in the Indo-European languages was by repeating the root, a process familiar in Greek and Latin under the name of reduplication; tan, *to extend,* has its perfect tan-tan; these two syllables tend to run together, either by weathering out the unaccented one or by contraction. In Sanscrit we have *ta-tan,* in Greek *te-ta(n)-ka,* Latin *te-tin-i,* Gothic *than* and *thên.* In this way grew up five conjugations in Anglo-Saxon, called ancient or strong conjugations:

1. Root vowel *a* unchanged in the past tense; as, gife, *give;* geaf, *gave;* gifen, *given:* bidde, *bid;* bæd, *bade;* beden, *bidden.*

2. Root vowel *i* changed to *â* in the past tense; as, drîfe, *drive;* drâf, *drove;* drifen, *driven:* rîse, *rise;* râs, *rose;* risen, *risen.*

3. Root vowel *u* changed to *eâ* in the past tense; as, cleôfe, *cleave;* cleâf, *clove;* clofen, *cloven.*

4. Root vowel *â* changed to *ô* in past tense; as, tace, *take;* tôc, *took;* tacen, *taken.*

5. Root long or diphthong contracting with reduplication to *eô, ê* in the past tense; as, feallen, *fall;* feôl, *fell;* feallen, *fallen.*

In this classification the variations produced on the root vowel by adjacent vowels and consonants, as described above under *Phonology,* are not taken into account; and they are so numerous as to leave few verbs exactly alike to serve as models for new forms. Hence all new forms took the sixth or weak conjugation:

6. Past formed by suffixing *-de,* from dide, *did;* lufe, *love;* lufô-de, *loved;* lufôd, *loved.*

English verbs which change their vowel in the past tense come from Anglo-Saxon, and generally from verbs of the strong conjugations; but there are a few from weak verbs which had umlaut or breaking; thus selle, *sell,* sealde, *sold,* where the root *a* has umlaut to *e* in *sell,* as in *man, men,* and has breaking to *ea* before *ld;* so sêce, *seek;* sôhte, *sought,* where root *ô* has umlaut to *ê,* like *goose, geese,* and the *-de* is changed to *-te.* Similar are *tell, told; bring* from brengen, *brought; think, thought; buy, bought; work, wrought.* The vowels are pretty badly mixed up in English irregular verbs, and it is an inviting field for the grammarian to clear them up one by one.

Some of our auxiliaries come from old perfects used as presents, on which new past tenses are formed: mæg, *may,* meahte, *might;* can, cûðe, *cou(l)d;* the *l* is bad spelling, in analogy with *would* from *will, should* from *shall.*

Verbs without a connecting vowel are eom, *am;* dôn, *do;* gân, *go,* past eôde, *yode.* Stande, *stand,* stôd, *stood,* has an *n* inserted, a relic of an old Sanscrit conjugation.

INDICATIVE MOOD.

Present and Future.	*Past.*
ic hŷre, *I hear.*	ic hŷrde, *I heard.*
þû hŷrest, *thou hearest.*	þû hŷrdest, *thou heardest.*
hê hŷreð, *he heareth,*	hê hŷrde, *he heard.*
pê hŷrað, *we hear.*	pê hŷrdon, *we heard.*
gê hŷrað, *ye hear.*	gê hŷrdon, *ye heard.*
hî hŷrað, *they hear.*	hî hŷrdon, *they heard.*

SUBJUNCTIVE MOOD.

ic, þû, *or* hê hŷre.	ic, þû, *or* hê hŷrde.
pê, gê, *or* hî hŷren.	pê, gê, *or* hî hŷrden.

IMPERATIVE.	INFINITIVE.
hŷr þû.	hŷran.
hŷrað gê.	Gerund, tô hŷranne.

PARTICIPLES.

Present, hŷrende, *hearing.* Passive, hŷred, *heard.*

The *-s* of *hears* is a softening of -ð, used already in Anglo-Saxon in the northern dialect. The same *-s* is found in the plural. In the Midland Counties the plural, eð-changed to *-n* to conform with the past tense and this subjunctive: forms like *those loves, they loves, they loveth* and *they loven,* are found as late as Shakspeare and Spenser. There are said to be 168 plurals in *-s,* and 46 in *-th* in the Shakspeare folio of 1623.

The subjunctive is used for our potential and imperative, as well as the subjunctive. Relics of these uses are in English: *It were a grievous fault*=It *would be* a grievous fault; *Be it so*=*Let it be so.* But a periphrastic potential, with the auxiliaries *may, can, must, might,* etc., is used in Anglo-Saxon as in English. The infinitive is regularly without *tô,* hence forms with auxiliaries still reject it, and familiar idioms in which the infinitive is the object of a verb, and *to* is not needed to express purpose or the like.

There was a verbal noun ending in *-ing, -ung,* which seems to have been confused with the participle in *-ende,* and given form to our present participle.

The participle (hŷred or gifen) is the only passive form. All the modes and tenses of the passive voice are made by joining auxiliaries with it, as in English, German, and other like languages.

The two tenses given above answer for all times—one for all past times, the other for present and future; but forms with auxiliaries are also used. Hæbbe, *have,* for the perfect, and hæfde, *had,* for the pluperfect, are in full use: hê hæfð mon geportne, *he has made man,* in which it is to be noticed that mon is the object of hæfð, and geportne a participle in the accusative masculine, agreeing with mon.

Some intransitives form these tenses by the verb *to be:* hê is hiðer gefered, *he is* (has) *come hither;* hê pæs âgân, *he was* (had) *gone.* These forms, which are like the German, are common in Shakspeare, Bunyan, and some of them still in conversation. *Have* with an intransitive does not bear analysis, but we do not want two tense signs for the same tense.

For the future, sceal, *shall,* and pille, *will,* are common, though seldom free from some meaning of *duty, promise, determination,* such as indeed goes with them in English. The present distinction between *shall* and *will* in the different persons is not established in Anglo-Saxon; *will* is more common in Northumbrian, as now in Scottish. The future perfect is not discriminated.

Other ways of expressing the future occur: hê gâð rædan, *he is going to read*—French, *Il va lire;* ic tô drincenne hæbbe, *I have to drink*=*I shall drink;* is tô syllenne, *is to be betrayed*=*will be betrayed.*

The progressive form is common, with also a slightly different use from the English: is feohtende, *is fighting, continues fighting;* beôð feohtende, *will continue fighting,* etc. The passive progressive *is being fought* does not occur; an ambiguous verbal noun in *-ing* answers the purpose: he pæs on huntinge, *he was a-hunting,* said both of the hunter and the game.

Of the emphatic form in *do* only rare examples are found, perhaps only when the verb is repeated.

PARTICLES.—Most English prepositions and conjunctions are from Anglo-Saxon, and the forms are often so full that we can easily connect them with corresponding words in other languages, and trace their origin and primary meaning. Most of those which look most primitive are from pronouns.

SYNTAX.—There is nothing in which Anglo-Saxon differs more from English than its syntax, which is that of a highly inflected language like Latin or Greek. The most general laws are common to all speech; a much larger number are common to all Indo-European tongues. The frequency with which different combinations are used by each makes the great difference between them. Apparent anomalies of English syntax may often be easily understood by study of the Anglo-Saxon, from which they sprang: "*Me thinks I*

saw him," seems strange; but in Anglo-Saxon the *thinks* is found to be a different verb from the common English *think*, and to mean *seem*, and govern a dative; *it seems to me=methinks.* "*He taught me grammar*"—tæ̂can, *teach*, governs an accusative and dative, *taught to me.* "*I asked him a question*"—âcsian, *ask*, governs an accusative of the person asked. "*He went a-hunting*"—*a* is the preposition *on* in Anglo-Saxon. "*I loved him the more*"—*the* is in Anglo-Saxon the instrumental case of the demonstrative (þŷ, þê), more *for that*, or *by that.* And so examples might be given without end. No difficult point in English syntax can be safely discussed by one who does not know its history.

For study of the language the English books are—MARCH'S "Comparative Grammar of the Anglo-Saxon," New York, 1870; HADLEY'S "Brief History of the English Language," in Webster's Dictionary, 1865; KLIPSTEIN'S "Anglo-Saxon Grammar," New York, 1853; RASK'S "Grammar," translated by Thorpe, London, 1865; BOSWORTH'S "Anglo-Saxon Dictionary," London, 1837; MARSH'S "English Language, and its Early Literature," New York, 1862; CORSON'S "Hand-book of Anglo-Saxon and Early English," New York, 1871; SHUTE'S "Manual," New York, 1867; MARCH'S "Introduction to the Study of Anglo-Saxon," New York, 1870. In German: HEYNE, "Kurtze Laut- und Flexionslehre," Paderborn, 1862; KOCH, "Historische Grammatik der Englishen Sprache," Weimar, 1863; MAETZNER, "Englische Grammatik," Berlin, 1865; ETTMÜLLER, "Lexicon cum Synopsi Gram.," Qued. & Lips., 1851; GREIN, "Sprachschatz der Angelsächs. Dichter," Cassel and Göttingen, 1864; GRIMM, "Deutsche Grammatik," Göttingen, 1840.

ANGLO-SAXON LITERATURE.—The pagan Anglo-Saxons had their poets and orators, and after their conversion to Christianity there was an unbroken succession of good scholars in England. Most of their writings are, however, in Latin.

The *prose* writings in the Anglo-Saxon language may be classified as follows:

1. *Theological.*—The Gospels were read in the native tongue as part of the church service, and several manuscripts are preserved. Editions have been printed by Parker, 1571, Mershall, 1665, Thorpe, 1842, reprinted in America by Klipstein, Bouterwek, 1857, Surtees Society, 1854–63, Bosworth, 1865. Ælfric's translation of the Heptateuch was published by Thwaites, 1698. We have also versions of the Psalms. There are many *Homilies.* Ælfric, an eminent scholar, compiled or translated a series of eighty of them about A. D. 990, which were edited by Thorpe for the Ælfric Society, 1844–46. Others are promised by the Early English Text Society.

2. *Philosophical.*—King Alfred translated Boethius, "De Consolatione Philosophiæ." It is freely rendered, with large additions and omissions by the royal author. Editions are by Rawlinson, 1698, Cardale, 1829, and Fox in Bohn's Library, 1864.

3. *Historical.*—The most illustrious of the Anglo-Saxon scholars, Beda, known to many generations as "the Venerable Bede," wrote in Latin an "Ecclesiastical History of the Angles and Saxons," translated by King Alfred into Anglo-Saxon, abounding in picturesque details of the heroic adventures and characters of his time, has been often reprinted, and its best scenes repeatedly rendered into verse. (See, for some of them, WORDSWORTH'S "Ecclesiastical Sonnets.") The Anglo-Saxon translation was edited, with a Latin translation, by Abraham Wheloc, folio, 1644, and by Dr. John Smith, 1722.

"The Anglo-Saxon Chronicle" gives an outline of the history of Britain from the earliest times to Henry II., A. D. 1154. Copies were kept at the monasteries as early as the time of Alfred. As far as Beda's history extends, the Chronicle has been drawn from it or a common source. It is in general a meagre affair. There are many editions: Thorpe's, 1861, has seven parallel texts, a translation and indexes.

The general "History of the World," by Orosius, was translated by Alfred, with additions of some value. It has often been printed. Thorpe's edition in Bohn's Library has a translation and glossary, 1857.

Many brief biographies are found in Beda and the Homilies, and some separate lives. That of St. Guthlac (see WRIGHT'S "Biographia Literaria") has been several times printed; Goodwin, London, 1848.

4. *Law.*—A considerable body of laws have been got together. They begin with those of Æthelbirht, who was king of Kent at its conversion. Those of Alfred have an introduction on the history of law, the laws of Moses, and their relations to Christ and Christian nations. The laws are full of valuable knowledge. The ecclesiastical rules relating to confession, penance, and the like are particularly suggestive. The best editions are Thorpe's and that of Schmid, Leipsic, 1858. The latter has translations into Latin and German, and valuable notes and a glossary.

5. *Natural Science and Medicine.*—Such are in "Popular Treatises of Science," Thorpe, 1841, and Leechdom's, Cockayne, 1864–66.

6. *Grammar.*—There is a grammar by Ælfric in Somner's Dictionary, 1659; A Colloquy and glossaries, Wright, 1857.

ANGLO-SAXON POETRY is very different in metrical structure from the English. It is like the Old Icelandic, the Old Saxon, and the Earliest German. It is marked off into verses by alliteration, the recurrence of the same initial sound in the first accented syllables of words. A perfect verse of the common narrative kind has three alliterating syllables—two in the first section, and one in the second; but the first section has but one in many verses. A very artificial rhythm is used. Each section has four beats or metrical accents. Every root-syllable has its beat, and so has the final syllable of each section, and almost any syllable may have a beat if the poet chooses.

þæ̂r′ pæs *hæl′eðâ hleah′tor′*; *hlyn′* spyn′sôde′,
word′ pæ̂r′on *wyn′sume′*, Eôd′e *Wealh′ðeôp′* forð′,
cpên′ Hrôð′gâr′es′ *cyn′nâ′* gemyn′dig′,
grêt′te gold′-hrod′en′ *gum′an′* on heal′le,′
and′ þâ *freô′lîc′* pîf′ *ful′* ge′seal′de′,
æ̂r′est *Eâst′*-Den′â′ *êð′el′*-pear′de′,
bæd′ hin′e *blîð′ne′* æt þæ̂r′e *beôr′*-þeg′e′.

There was *lordly laughter*; there the *lute's* vibration,
words were winsome. Forth yode *Wealhtheow.*
queen of Hrothgar, of *courtesies* mindful,
greeted in *gold*-array the *guests* in the hall,
and then the *gladsome* wife *gave* the beaker
first to the sovereign *liege*, *lord* of the East-Danes,
blithe she *bade* him be at the *beer*-drinking.

Knowledge of the popular poetry was universal. It was disgraceful not to be able to chant in turn at the feasts. Beda, Aldhelm, Alfred learned and loved the old ballads, and made verses. Most of the poetry has perished. The early Christians condemned whatever was mixed with the old superstitions, and the Normans despised or neglected all Anglo-Saxon literature. But we have specimens of various kinds:

1. *The Ballad Epic.*—The old ballads are brought together, beautified, exalted, and fused into a long poem. "Beowulf" is the "Iliad" of the Anglo-Saxons. The exploits celebrated in it are for the most part combats with monsters after the manner of Hercules, but it has the usual epic variety—the wrath of the monster, the rousing of the hero, the fitting out of the ship, the voyage, the banquet, the wordy war of rivals, woman's graceful presence, the arming for fight, and desperate and long-drawn struggles. Only one manuscript of it remains. Little notice of it was taken till the late revival of Anglo-Saxon scholarship; but the interest in it has risen to a great height, and many editions, translations, and essays of elucidation and interpretation have appeared in Germany, England, and Denmark. We may mention Kemble, 1833–37; Ettmüller, 1840; Thorpe, 1855; Grein, two editions, 1857–67; Gruntvig, 1861; Heyne, two editions, 1863–68.

There are a few fragments to be classed with "Beowulf." Such are the "Traveller's Song" and the "Fight at Finnsburg," both which are given with "Beowulf" in many editions.

2. *The Bible Epic* is a treatment of the Bible narrative similar to that of the ballad epic. The great master in this sphere is Cædmon, who is often called the Anglo-Saxon Milton. Beda, who lived in the same region, and may have seen him, tells us that he was an unlearned man, who could not sing the common secular ballads, and that a vision appeared to him and directed him to sing the Creation, and that his success was esteemed inspiration. He had many imitators, and whether the poems which remain are his is not known. These are four poems, called, by Grein, Genesis, Exodus, Daniel, Christ and Satan. Similar are a fragment of Judith, Cynewulf's "Christ," "The Harrowing of Hell," and some fragments. Of all these we have a critical edition and translation by Grein, and of Cædmon editions by Thorpe, 1832; Bouterwek, 1849–54. The manuscript is illuminated, and the illuminations were copied and published in 1833.

3. *Ecclesiastical Narratives.*—These are versified lives of saints and chronicles. We have Andreas (1724 lines), Juliana (731 lines), Guthlac (1353 lines), Elene (1321 lines).

4. *Psalms and Hymns.*—Translations of a large part of the Hebrew Psalms, and a few Christian hymns and prayers.

5. *Secular Lyrics.*—A few from the "Chronicle," celebrating the kings or others.

6. *Allegories, Gnomic Verses, and Riddles.*—"The Phœnix" (677 lines), "The Panther" (74 lines), "The Whale" (89 lines), Gnomic Verses and Riddles; "Dialogue between Solomon and Saturn," in Grein, vol. ii., pp. 339–407—a favorite style with the Anglo-Saxons.

7. *Didactic, Ethical.*—Alfred's "Metres of Boethius" are versifications of parts of Boethius referred to under Prose Writings above. The best edition is Grein, vol. ii., pp. 295–339. Grein's "Bibliothek der Angelsächsischen Poesie," Göttingen, 1857, with his translations and complete glossary, gives the apparatus for the study of all these poems. His "Bibliothek der Angelsächsischen Prosa," now in process of publication, promises to render an equal service for Anglo-Saxon prose.

(Outlines of this literature are to be found in MARCH'S "Introduction to Anglo-Saxon," New York, 1870; MORLEY'S "English Writers," London, 1867; WRIGHT'S "Biographia Brit. Literaria," London, 1842; ETTMÜLLER'S "Scopas" and "Boceras," Qued. and Lips., 1850.)

F. A. MARCH.

Ango'la (formerly **Don'go** or **Ambonde**), a country in the S. W. part of Africa, bordering on the Atlantic Ocean, is bounded on the N. by Congo, from which it is separated by the Danda River, and on the S. by the Coanza River. It is included between lat. 8° and 10° S. The interior is said to be mountainous or hilly; the land is well watered, and produces a luxuriant tropical vegetation. Angola is rich in minerals, among which are gold, silver, copper, and iron. Lions, leopards, elephants, and hippopotami abound here. The chief articles of export are ivory, gold, wax, and slaves. This country is subject to the Portuguese, who have several forts on the coast. Nominally, a large proportion of the population belongs to the Roman Catholic Church, which, since the middle of the sixteenth century, has had a bishop in the capital; but their Christian belief is still largely mixed with pagan notions and practices. Pop. of the colony, about 600,000. Area, 25,500 square miles. Capital, San Paulo de Loando; pop. about 12,500.

Angola, the county-seat of Steuben co., Ind. It has a large school building, a machine-shop, two foundries, a flouring-mill, two saw-mills, two planing-mills, two weekly papers, ten dry goods stores, three drug stores, two hardware stores, and two printing-offices. Pop. 1072.

W. C. MCGONIGAL, ED. "REPUBLICAN."

Angola, a post-village of Evans township, Erie co., N. Y., on Big Sister Creek and on the Lake Shore R. R., 21 miles S. W. of Buffalo. It was the scene of a memorable railroad accident Dec. 18, 1867, when 40 persons were wounded and 70 killed, many of them burned alive. Pop. 600.

Ango'ra (the ancient *Ancy'ra;* in Turk., *Engoor'*), a town of Asiatic Turkey, about 217 miles E. S. E. of Constantinople. It is situated on an elevated plain adapted to pasturage, and is celebrated for its breed of goats, having long silky hair which is manufactured into shawls and a stuff called mohair. Large quantities of this hair are exported, and goats of this breed have been successfully introduced into the U. S. Here are remains of Greek and Byzantine architecture. In 1402 a decisive victory was gained near Angora by Tamerlane over Bayazeed (Bajazet), who was taken prisoner. The pop. is estimated at 50,000. (For a notice of the ancient city, see ANCYRA.)

Angor'no, or **Angornu,** a town of Central Africa, in Bornu, is near the W. bank of Lake Tchad and 15 miles S. E. of Kuka. It has an extensive trade in cotton, amber, and slaves. Pop. estimated at 30,000.

Angostu'ra, or **Bol'ivar City,** an important city of Venezuela, capital of the province of Guiana, is on the right bank of the Orinoco River, 263 miles S. E. of Caracas. It is advantageously situated for trade, and exports cotton, indigo, coffee, tobacco, cattle, etc. It contains a college, a hospital, and a fine hall in which the congress of Angostura met in 1819. Pop. about 7000.

Angostura Bark, or **Angustura Bark,** the aromatic bitter bark of certain trees of the natural order Rubiaceæ, natives of the tropical parts of South America. The bark is so named because it is imported from Angostura. It is tonic and stimulant, and has been used in the cure of fever, dysentery, diarrhœa, etc. It is obtained chiefly from the *Galipæ'a officina'lis* or *Cuspa'ria febrif'uga.*

Angoulême (anc. *Inculis'ma* or *Iculis'ma*), a city of France, capital of the department of Charente, on the river Charente and on the Paris and Bordeaux Railway, 83 miles by rail N. E. of Bordeaux. It is situated on a hill, and has a cathedral, college, theatre, public library, and several paper-mills. Linen and woollen stuffs are manufactured here. This town was the birthplace of Marguerite de Valois and Balzac. Pop. in 1866, 25,116.

Angoulême, d' (CHARLES DE VALOIS), DUKE, a natural son of Charles IX. of France, born April 28, 1573. Having formed a plot against King Henry IV., he was imprisoned from 1604 to 1616. He had the chief command of the royal army when it began the famous siege of Rochelle in 1628. Died Sept. 24, 1650.

Angoulême, d' (LOUIS ANTOINE DE BOURBON), DUKE, born Aug. 6, 1775, was the eldest son of the Comte d'Artois, afterwards Charles X. of France. He emigrated with his father in 1789, and in 1799 married his cousin, Marie Thérèse Charlotte, a daughter of Louis XVI., with whom he lived in exile until 1814. He commanded the French army which intervened against the Spanish liberals in 1823, and restored Ferdinand VII. to absolute power. His abilities were mediocre. Died at Göritz June 3, 1844.

Angoulême, d' (MARIE THÉRÈSE CHARLOTTE), DUCHESS, the wife of the preceding, was born Dec. 19, 1778, and was a daughter of Louis XVI. In Aug., 1792, she was confined in the Temple with the king and her mother, Marie Antoinette. She was released in 1795, and exchanged for Camus and others who had been captured by the Austrians, after which she passed many years in exile. She appears to have had more energy than the other Bourbons. She became again an exile in 1830. Died Oct. 19, 1851.

Angoumois, a former province of France, included the present department of Charente and part of Dordogne. Its capital was Angoulême.

An'gra,* a seaport-town, and the capital of Terceira, one of the Azores; lat. 38° 39′ N., lon. 27° 12′ W. It has a beautiful situation and a good harbor. It contains a cathedral, a military college, and an arsenal. Wine, grain, honey, etc. are exported from this town. Pop. in 1863, 11,839.

An'gri, a town of Italy, in the province of Salerno, on the railway from Naples to Eboli, 15 miles by rail N. W. of Salerno. Pop. in 1861, 6921.

Anguil'la, or **Snake Island,** an island in the Leeward group, in the West Indies, 4 miles N. of St. Martin. Area, 34 square miles. The island is low and covered with forests, and belongs to Great Britain. The staple products are sugar, tobacco, and cotton. Pop. about 3100.

Anguil'lula (*i. e.* "little eel," from the Lat. *anguil'la,* an "eel"), a genus of minute animals allied to the nematoid worms. Best known are those called "vinegar eels," found abundantly in cider vinegar. They are remarkable for tenacity of life. *Anguilla fluviatilis,* after being dried until it becomes brittle, will recover its activity when placed in water. *Anguilla tritici,* found on blighted wheat, has been known to revive after being kept dry for five years.

An'guis [a Latin word signifying "serpent"], a systematic name of a genus of serpent-like reptiles having the maxillary teeth compressed and hooked, and the palate not armed with teeth. (See BLIND WORM.)

Anguiscio'la, or **Angusso'la** (SOFONISBA), an eminent Italian painter, born at Cremona about 1534, excelled in portraits. Invited by Philip II. of Spain, she went to Madrid, and painted portraits of the queen and others. In the latter part of her life she became blind. It is said that Van Dyke acknowledged he had derived much benefit from her conversations on art. Died in 1626.

Angular Motion of a point or a body is the same as that of the line or radius vector joining the moving point to some fixed point. The *angular velocity* of the body in reference to the fixed point is the ratio of the angle described by the radius vector to the time occupied by its description.

Angus, EARL OF. See DOUGLAS.

An'gus (Rev. JOSEPH), D. D., born Jan. 16, 1816, educated at the University of Edinburgh, president of Regent's Park College (Baptist), London, and author of "The Bible Handbook," "Handbook of English Literature," "Handbook of the English Tongue," and other works, and editor of the best edition of Butler's "Analogy" (1855, 12mo, pp. 551). He is one of the revisers of the English New Testament for the American Bible Union, a member of the committee of the convocation of Canterbury for revising the New Testament, and a prominent member of the Evangelical Alliance, as a delegate of which he visited the U. S. in 1873.

Angus (SAMUEL), a naval officer born at Philadelphia in 1784. He became a captain in the U. S. navy, and commanded the vessel which in 1814 conveyed Adams and Clay to Ghent on a diplomatic mission. He served with distinction in the French troubles of 1800, in the war of 1812, and was four times wounded. Died May 29, 1840.

An'halt, a duchy of Germany, almost completely surrounded by the Prussian province of Saxony, consists of two larger parts and four enclaves, having together an area of 897 square miles. The duchy is traversed by the Saale, the Elbe, and the Selke. While the eastern part is level, the western is mountainous and wooded. The soil is

* *Angra* in Portuguese denotes a "creek," "bay," or "station for ships."

generally fertile. Cattle-raising is extensively and successfully carried on here. Here are also mines of silver, copper, iron, and lead. The duchy has five gymnasia and three seminaries. Pop. in 1871, 203,354. Capital, Dessau. According to the budget of 1872, the receipts and the expenses were both estimated at 2,231,000 thalers. The public debt in 1871 amounted to 2,259,219 thalers. The dukes of Anhalt claim to have descended from the celebrated ALBERT THE BEAR (which see), the first margrave of Brandenburg. In 1212 Anhalt was divided into three parts; it was united in 1570 by Joachim Ernst, and again divided into four branches—Dessau, Bernburg, Köthen, and Zerbst—upon his death in 1586. In 1793, after the extinction of the house of Anhalt-Zerbst, its dominions were divided by the remaining three. In 1807 the three houses joined the Confederation of the Rhine, and in 1814 the German Confederation. In 1847 the house of Anhalt-Köthen became extinct, and the duke of Anhalt-Dessau took the administration of its dominions upon himself; and when, in 1863, the house of Anhalt-Bernburg also became extinct, Anhalt was again united under one ruler. (See the works of HEINE, 1865; KRAUSE, 5 vols., 1861–66; and SIEBIGK, 1867.)

An'halt-Bern'burg (CHRISTIAN), PRINCE OF, a German general, born in 1568, was a man of superior abilities. He was the chief promoter of a league of Protestant princes formed against the emperor in 1608. He commanded the army of Frederick elector Palatine, which was defeated at Prague in 1620. Died in 1630.

An'halt-Des'sau (LEOPOLD), PRINCE OF, an able German general, born in 1676, commanded the Prussian troops under Prince Eugène in Italy and Flanders in 1706–12, and was second in command of the Prussian army which opposed Charles XII. of Sweden in 1715. Died in 1747.

Anhandu'hy-Mirim' and **Anhandu'hy-Guazu'**, two rivers of Brazil, in the province of Matto-Grosso. They rise in the Serra Galhano, and enter the Rio Vermelho. The former is about 150 miles, and the latter about 200 miles, in length.

An'holt, an island of Denmark, in the Cattegat, is 7 miles long and about 4 miles wide; lat. of the lighthouse, 56° 44′ N., lon. 11° 39′ E. It is surrounded by dangerous shoals. Pop. 200.

Anhy'dride, an oxygen compound formed by the abstraction of water from an acid. Thus, for instance, by taking (new notation) water, H_2O, from carbonic acid, H_2CO_3, we have carbonic anhydride, CO_2. (See CHEMISTRY.)

Anhy'drite [from the Lat. *adhy'drus*, and the Gr. λίθος, a "stone"], a mineral composed of anhydrous sulphate of lime. It is harder and heavier than common sulphate of lime (gypsum), into which it is slowly converted by the absorption of water. It occurs in several varieties—viz. granular, fibrous, radiated, and translucent, sparry anhydrite or cube-spar, and compact anhydrite.

Anhy'drous [from the Gr. ἀν, priv., and ὕδωρ, "water"], "without water," a chemical term applied to a compound which contains no water, as pure and absolute alcohol, which is called *anhydrous alcohol;* quicklime as it comes from the kiln is *anhydrous lime,* but when it comes into contact with water, the lime and water combine and form *hydrated* lime.

Anice'tus, SAINT, was bishop of Rome about 155 A. D. The time of his death is uncertain.

An'il, one of the plants from which indigo is obtained; a kind of indigo said to be a native of America, but now cultivated in the East Indies. It is very similar to *Indigof'era tincto'ria.*

An'iline [from *anil,* "indigo"], **Phenyl'amine,** or **Am'ido-benzol',** discovered in 1826 by Unverdorben as a product of the distillation of indigo, and called by him *crystalline,* on account of the ready crystallization of its salts. It attracted much attention from chemists, and was made the subject of many researches, which contributed greatly to enlarge the facts and theories of modern chemistry. It did not acquire any commercial importance till 1856, when Perkin prepared from it the beautiful purple dye *mauve.* The brilliancy and intensity of this color attracted the attention of chemists and dyers, and in a short time an entirely new series of colors was discovered, by which the art of dyeing has been almost revolutionized.

Aniline is found among the products of the distillation of bituminous coal (in "coal-tar"), of peat, bones, etc. It is prepared, however, from benzol derived from the more volatile portions of coal-tar. The benzol, C_6H_6, is converted by the action of nitric acid into nitrobenzol, $C_6H_5NO_2$, and this compound is changed by the action of ferrous acetate, produced by iron filings and acetic acid, into aniline:

$$\underset{\text{Nitro-benzol.}}{C_6H_5NO_2} + 6FeO + H_2O = \underset{\text{Aniline.}}{C_6H_7N} + 3Fe_2O_3.$$

Aniline is a colorless, mobile, oily liquid, having a faint vinous odor and aromatic burning taste. Its specific gravity is 1.002; boiling-point, 182° C. It is very poisonous. It dissolves very slightly in water, in all proportions in ether, alcohol, wood-naphtha, bisulphide of carbon, and in oils, fixed and volatile. The aqueous solution is faintly alkaline, and precipitates many metallic bases from solutions of their salts. With bleaching-powder it produces a violet-blue color, with sulphuric acid and potassic bichromate, a bluish-black precipitate, and when treated with arsenic acid, stannic chloride, etc., it is converted into rosaniline. When exposed to the air, aniline acquires a yellow or red color, which is always noticed in commercial "aniline oil." It forms a numerous class of salts, most of which crystallize readily.

Aniline is an amine, a monamine, or an ammonia, in which one atom of hydrogen is replaced by a radical *phenyl,* C_6H_5:

$$\text{Ammonia, } N\begin{Bmatrix} H \\ H; \\ H \end{Bmatrix} \quad \text{Aniline, } N\begin{Bmatrix} H. \\ C_6H_5. \\ H. \end{Bmatrix}$$

Aniline is now manufactured in enormous quantities for the preparation of the different colors. (See AMINES, BENZOL, PHENYL.)

C. F. CHANDLER.

Aniline Colors. In 1835, Runge noticed the violet-blue color produced by chloride of lime with aniline, and Fritzsche subsequently showed that chromic acid formed with aniline a blackish-blue precipitate. In 1853, Beissenhirtz obtained a blue by acting upon aniline with potassic dichromate and sulphuric acid. It remained for W. H. Perkin to develop this reaction, and to lay the foundations of the great aniline industry which is now so extensive. In 1856 he isolated the color found in the last-mentioned reaction, called it mauve, and showed that it could be used as a dye. Many chemists at once turned their attention to the subject, and a great number of new colors of almost every tint and shade were discovered, which have taken the place in dyeing, and to a considerable extent in calico-printing, of the animal and vegetable colors in previous use. The chemical composition of many of these colors has been established, and many chemical facts of great importance have been developed by their study.

ANILINE REDS.—*Rosaniline* salts are the most important of all the aniline colors. They are not only used for the production of brilliant tints on cotton, wool, and silk, but they constitute the material from which many of the other colors are prepared. Rosaniline has been shown by Hofmann to be a colorless base, a triamine (see AMINES), having the formula $C_{20}H_{19}N_3$, or $N_3\begin{Bmatrix} (C_6H_4)''. \\ 2(C_7H_6)''. \\ H_3. \end{Bmatrix}$ It is produced by the union of one molecule of aniline with two molecules of toluidine, and the abstraction of six atoms of hydrogen:

$$\underset{\text{Aniline.}}{C_6H_7N} + 2\underset{\text{Toluidine.}}{C_7H_9N} = \underset{\text{Rosaniline.}}{C_{20}H_{19}N_3} + H_6.$$

A great variety of dehydrogenizing agents may be employed to effect this reaction. It is found that the best results are obtained when an aniline oil is employed which contains about 25 per cent. of toluidine. Hofmann in 1858 prepared rosaniline by treating aniline with tetrachloride of carbon, but on a manufacturing scale Medlock's process with arsenic acid is now in most general use. The aniline oil, 1 part, is heated with 1½ parts of a 75 per cent. solution of arsenic acid in a closed iron still provided with a stirrer. The product is boiled with water and filtered, and on adding to the solution common salt in excess, the crude hydrochlorate of rosaniline is precipitated. This is dissolved in boiling water, filtered, and allowed to crystallize. This salt of rosaniline, $C_{20}H_{19}N_3.HCl$, is known as *aniline red, magenta, fuchsine, solferino, roseine, azaleine,* etc. It appears in magnificent green crystals, with a metallic lustre like that of the wing-covers of Brazilian beetles or cantharides. It is soluble in water and in alcohol, with a color varying from a beautiful cherry-red to a crimson.

Verguin and Rénard of Lyons, who first made aniline red on a manufacturing scale, used tetrachloride of tin, $SnCl_4$. Gerber-Keller prepared rosaniline nitrate, *azaleine,* by the action of mercuric nitrate. Lauth and Depouilly heat aniline with nitrate of aniline. Laurent and Castelhaz prepare aniline red directly from the crude nitrobenzol, which contains nitrotoluol, by heating it with iron filings and hydrochloric acid. The first reaction of the FeCl on the nitrobenzol results in the removal of oxygen from the nitrobenzol and nitrotoluol, and the addition of hydrogen, producing aniline, toluidine, and Fe_2Cl_6. On heating this mixture further, the Fe_2Cl_6 removes hydrogen from the aniline and toluidine, and rosaniline is the result. Coupier heats together aniline, nitrotoluol, hydrochloric acid, and

a little iron. Rosaniline hydrate, $C_{20}H_{19}N_3.H_2O$, may be precipitated from the solutions of its salts by alkalies; it is rose-red and somewhat crystalline, but by proper care may be obtained colorless.

Ammonic sulphide, or zinc-powder, converts rosaniline salts into leucaniline, $C_{20}H_{21}N_3$, which is colorless; by adding H_2, oxidizing agents change it back to rosaniline. Advantage is taken of this fact to produce discharge patterns, the zinc-powder, thickened with gum, being printed upon goods previously dyed with aniline red. Silk and wool take up aniline red very readily, but cotton must be previously mordanted. For dyeing cotton the mordant generally used is tannate of tin, produced by subjecting the cotton first to a solution of sumach, then to sodic stannate, and finally to dilute sulphuric acid. In calico-printing the color is mixed with albumen or the preparation of Perkin and Schultz, a solution of aluminic arsenite in aluminic acetate. On drying and steaming the goods the color is rendered insoluble or fixed.

Other reds of less importance are di-hydriodate of trimethyl chrysaniline, $C_{20}H_{14}(CH_3)_2N_3.(HOI)_2$, called chrysaniline red; nitrosophenyline, $C_6H_6N_2O$; toluidine red, xylidine red, etc.

Aniline Pink.—*Safranine* is a coloring-matter produced by the oxidation of aniline. It is supposed to be $C_{21}H_{20}N_4$. It forms crystallizable salts.

Aniline Violets and Blues.—These colors shade into each other so gradually that they cannot well be separated.

1. *Mauve*, or aniline purple (of Perkin), was the first of the aniline products used as a dye. It is the sulphate or other salt of the base mauveine, $C_{27}H_{24}N_4$. It may be prepared from pure aniline, free from toluidine, by the action of potassic dichromate and sulphuric acid. It may also be prepared by the action of cupric chloride (Dale and Caro), or by chloride of lime. This dye has been entirely superseded by other preparations. It was known while in commerce as mauve, aniline purple, Perkin's violet, indisine, aniline harmaline, violine, and mauve rosolane.

2. *Hofmann's Violets and Blues.*—Rosaniline contains, as shown in the formula given above, three atoms of replaceable hydrogen. By substituting for one, two, or all of these, various alcohol radicals, as *methyl*, *ethyl*, *amyl*, etc., a great variety of colors, ranging from the red of rosaniline salts through purples and violets to the purest blue, are obtained. Hofmann's violets are produced by heating rosaniline, alcohol, and the iodide of methyl, ethyl, or amyl under pressure. A violet syrup results, containing the hydriodate of the new substitution product; for instance, hydriodate of trimethyl rosaniline, $C_{20}H_{16}(CH_3)_3N_3.HI$. To recover the iodine, the solution may be boiled with caustic potash, which precipitates trimethyl rosaniline, which may be washed, and redissolved in alcohol containing hydrochloric acid, or in acetic acid and water. The following are some of the more important colors of this group: Hydrochlorate of methylrosaniline, $C_{20}H_{18}(CH_3)N_3,HCl$; hydriodate of methylrosaniline, $C_{20}H_{18}(CH_3)N_3HI$; hydrochlorate of dimethylrosaniline, $C_{20}H_{17}(CH_3)_2N_3,HCl$; hydrochlorate of trimethylrosaniline, $C_{20}H_{16}(CH_3)_3N_3,HCl$; hydrochlorate of monethylrosaniline, $C_{20}H_{18}(C_2H_5)N_3,HCl$, called also Hofmann's red violet; hydriodate of ethylrosaniline, $C_{20}H_{18}(C_2H_5)N_3,HI$, called also Hofmann's red violet; ethyliodate of ethylrosaniline, $C_{20}H_{18}(C_2H_5)N_3,C_2H_5I$, called also fuchsine with a blue tint, and Hofmann's violet red; hydrochlorate of diethylrosaniline, $C_{20}H_{17}(C_2H_5)_2N_3$, HCl, called also Hofmann's blue; ethyliodate of diethylrosaniline, $C_{20}H_{17}(C_2H_5)_2N_3,C_2H_5I$, called also Hofmann's red violet and ethylic rosaniline violet; hydrochlorate of triethylrosaniline, $C_{20}H_{16}(C_2H_5)_3N_3,HCl$, called also Hofmann's blue; ethyliodate of triethylrosaniline, $C_{20}H_{16}(C_2H_5)_3N_3C_2H_5I$, called also Hofmann's blue and ethylic rosaniline violet; ethylbromate of triethylrosaniline, $C_{20}H_{16}(C_2H_5)_3N_3,C_2H_5Br$, called also brimula. Wauklyn used isopropyl iodide in a similar manner.

As the successive atoms of hydrogen are replaced by the alcohol radical, the shade passes farther and farther from the original red, giving first a reddish-purple, then a full purple, then violet, then reddish-blue, finally a full blue. The picrate of triethylrosaniline yields a fine green tint.

3. *Phenyl-rosanilines.*—By heating rosaniline salts with aniline (phenylamine) the radical phenyl, C_6H_5, is introduced in the place of H, giving rise to a series of purples and violets, terminating in the most beautiful blue triphenylrosaniline—*bleu de Lyon*, the only blue which has come into extensive use. This blue is insoluble in water, which rendered its application somewhat troublesome, as an alcoholic solution was necessary. Nicholson found that sulphuric acid produced a compound analogous to sulphindigotic acid, soluble in water; this is now extensively manufactured under the name of "Nicholson's blue" or "soluble blue." The following are the more important compounds of this series: Hydrochlorate of monophenylrosaniline, $C_{20}H_{18}(C_6H_5)N_3,HCl$, called also rosaniline violet, red monophenylrosaniline, and Hofmann's violet; hydrochlorate of diphenyl rosaniline, $C_{20}H_{19}(C_6H_5)_2N_3$, HCl, also known as rosaniline violet and Hofmann's violet; triphenylrosaniline or triphenylic rosaniline, $C_{20}H_{16}(C_6H_5)_3N_3$, called also aniline blue, rosaniline blue, Hofmann's blue, bleu de Paris, bleu de Lyons, bleu de Mulhouse, bleu de Mexique, bleu de nuit, bleu lumière, bleuine, azurine, and night blue; hydrochlorate of triphenylrosaniline, $C_{20}H_{16}(C_6H_5)_3N_3,HCl$, known also by the same names as the above; acetate of triphenylrosaniline, $C_{20}H_{16}(C_6H_5)_3N_3,H,CH_3O_2$, known also by the same names as the above; bisulphotriphenyl rosaniline acid, $C_{20}H_{16}(C_6H_5)_3N_3,(H_2SO_4)_2.H_2SO_4$, called also Nicholson's blue and soluble blue. In this acid the last H_2 are replaceable by metals with the formation of salts.

4. *Tolyl-rosanilines* correspond to the phenyl-rosanilines. The most important is tritolyl-rosaniline, $C_{20}H_{16}(C_7H_7)_3N_3$, known as toluidine blue.

5. Many other derivatives of aniline, rosaniline, etc. have been introduced, which exhibit shades from red to blue, passing through purple and violet, as dahlia-colored salts of ethylmauveine, $C_{27}H_{23}(C_2H_5)N_4$; the violet salts of methylaniline, $C_6H_6(CH_3)N$; salts of violanile, $C_{18}H_{15}N_3$, and of mauvaniline, $C_{19}H_{17}N_3$. Besides these there are many colors the composition of which is not known, such as regina blue, opal blue, regina purple, bleu de Fayolle, violet de Mulhouse, Britannia violet, geranosine, violet imperial.

Aniline Greens.—1. *Aldehyde green*, called also *aniline green*, *viridine*, and *emeraldine*.—In 1861, Lauth obtained a beautiful but fugitive blue by the action of aldehyde on a solution of a rosaniline salt in sulphuric acid. A young chemist, Cherpin, endeavored to fix the color, and was advised by a photographer's apprentice to use sodic hyposulphite, a salt used for fixing photographs, on account of its property of dissolving argentic chloride, bromide, and iodide. Cherpin followed the unscientific advice, and obtained the most beautiful green. The original process of Lauth and Cherpin is still pursued, and is so simple that many dyers prepare the color for themselves. Aldehyde green is principally employed in silk-dyeing.

2. *Iodine green*, known also as *iodide of methyl green*.—It is produced by heating trimethyl or triethyl rosaniline violets (Hofmann's violets), or methylaniline violets, with the iodide of methyl, ethyl, or amyl. The color is a salt of a new base, which may be separated by the action of sodic hydrate. It is extensively used for cotton and silk. Its tint is bluer than that of aldehyde green, and it is more useful, as it yields a greater variety of shades in connection with picric acid.

3. *Perkin's green*, or *iodide of ethyl green*.—This dye resembles iodine green, but differs in solubility; it is much used, especially in calico-printing.

4. *Emeraldine.*—A green which may be produced in the fibres of cotton cloth by printing on a mixture of an aniline salt and potassic chlorate, and allowing it to dry for twelve hours, when the green color will have been developed. Hot dilute alkalies or boiling soap solutions change it to blue.

Aniline Yellows.—Aniline yellows are little used in dyeing or printing.

1. *Chrysaniline*, $C_{20}H_{17}N_3$, called also *phosphine*, *aniline yellow*, *yellow fuchsine*, is a secondary product in the manufacture of rosaniline. Owing to the insolubility of its nitrate, it has been proposed to use its acetate or hydrochlorate as a reagent to precipitate nitric acid.

2. Other yellows are chrysotoluidine, $C_{21}H_{21}N_3.H_2O$, the isomeric compounds diazo-amidobenzene and amido-diphanylimide, $C_{12}H_{21}N_3$, and zinaline, $C_{20}H_{19}N_2C_6$.

Aniline Browns and Maroons.—Several browns have been produced directly or indirectly from aniline. De Laire obtained a maroon by adding rosaniline hydrochlorate to fused aniline hydrochlorate. Schultz prepared a fine garnet color by passing nitrous vapors through a solution of soda holding rosaniline in suspension. Jacobsen prepares a rich brown by heating picric acid and aniline together, dissolving the product in hydrochloric acid, and precipitating with caustic soda. He obtains another by heating ammonium chromate with aniline formate. Koechlin produces a brown on wool by printing on a mixture of rosaniline hydrochlorate (fuchsine), oxalic acid, and potassium chlorate, and on cotton by adding to this mixture some cupric sulphide. Browns are generally made from the residues of rosaniline.

Aniline Gray.—Castelhaz has patented a process by which a beautiful gray is produced, which has, however, found little favor among dyers on account of its high cost. He subjects mauveine (Perkin's violet) to the action of sulphuric acid and aldehyde. Carves and Thierault prepare a rich gray, called by them *murein*, by mixing aniline,

hydrochloric acid, potassic dichromate, copperas, and sulphuric acid.

ANILINE BLACK.—No one has yet succeeded in producing a good black dye from aniline, though the color produced on cotton, silk, or wool by immersing first in a solution of an aniline salt, and then in potassic dichromate, is very near a black. In calico-printing, however, blacks of great intensity and durability have been discovered, which are now extensively used; in fact, except for mourning goods, in which the black predominates over the white, the aniline black is now used almost exclusively. Lightfoot discovered the first aniline black in 1863. He printed on the cotton a mixture of aniline hydrochlorate, potassic chlorate, cupric chloride, sal-ammoniac, acetic acid, and starch paste; exposed the cloth to the air for two days, and fixed the color with an alkali. Lauth improved the process by substituting cupric sulphide for the cupric chloride. Cordillot substituted potassium ferridcyanide for the copper salt. Alfred Paraf in 1865 introduced a mixture of aniline hydrochlorate, potassic chlorate, and hydrofluosilicic acid, properly thickened. On exposing the goods in the "ageing-room" to a temperature of 32° to 35° C., the chloric acid is liberated, and oxidizes the aniline to a black. In 1867, Paraf patented the use of a new agent, the "chromium chromate." His mixture for printing contained aniline hydrochlorate, potassic chlorate, chromium chromate, starch, and water. In the ageing-room chromic acid is set free to act upon the aniline salt.

APPLICATION OF ANILINE COLORS IN DYEING AND CALICO-PRINTING.—In silk-dyeing no mordant is required; to produce an even color, however, it is found best to use a weak soap solution with the dye; and sometimes a little acid is added, sulphuric or tartaric. For printing on silk the colors are thickened with gum-senegal, printed from blocks, and when dry the goods are steamed and washed. A discharge style may be produced by dyeing silk with a rosaniline salt, then printing on zinc-dust thickened with gum. The rosaniline is reduced to colorless leucaniline, producing white figures on a colored ground. By mixing colors with the zinc which are not affected by it, colored figures are produced. For dyeing wool no mordant is required; the goods are simply handled in hot solutions; except in the case of Nicholson's blue, which is dissolved in an alkali, the goods after passing through the solution being subjected to an acid bath. For dyeing cotton, mordants are necessary. By subjecting the goods to (1) a decoction of sumach, (2) to sodic stannate, and finally (3) to dilute sulphuric acid, a stannic tannate is produced on the fibre which has a great affinity for aniline colors. For printing, the colors are thickened with albumen, or a solution of aluminum arsenate in aluminum acetate, and fixed by steaming.

Aniline colors are also used for inks, for coloring leather, soaps, vinegar, candies, ivory, horn, etc.; and lakes are prepared from them for paper-staining, printers' ink, etc. etc.

The high cost of aniline colors is counterbalanced by the brilliancy of their tints and the simplicity of dyeing. The aniline color industry has acquired greater proportions in Germany than in any other country. In the U. S. manufacturers chiefly confine their attention to rosaniline salts. Although coal-tar is extensively distilled here, and benzole is exported, all the aniline is imported.

(For further details see WATT'S "Dictionary of Chemistry" and supplement; WURTZ, "Dictionnaire de Chimie," and specially "Die Farbstoffe," von M. P. SCHUTZENBERGER; "Deutsche Uebertragung," von DR. H. SCHRÖDER, Berlin, 1868–73. Special works on the subject are BECKER'S "Anilin-Färberei," Berlin, 1871; REIMANN'S "Aniline and its Derivatives," New York, 1868; KRIEG'S "Theorie und practische Anwendung von Anilin in der Färberei und Druckerei," Berlin, 1866. WAGNER'S "Jahresbericht der chemischen Technologie," from 1858 to date, contains the record of the progress of this important branch of chemical industry.) C. F. CHANDLER.

An'imal [Lat. *animal*, from *animus*, "spirit;" Gr. ἄνεμος, "wind," "breath"], an organized being, distinguished from plants, at least in the higher and more developed groups, by the power of voluntary motion, the faculty of digesting food, which is usually, not always, received into an alimentary canal, and the possession of a nervous system, which regulates the acts of the animal and receives impressions from without. An organism, according to Kant's felicitous definition, is that structure wherein each part is at the same time the means and the end of all the rest. The distinction is not easily made out between some of the lower animals and plants; but recent observers claim to have made the discovery that all plants, even the most minute, have the power of taking up nitrogen from ammonia compounds—a power which, it is asserted, is possessed by no animal. The power possessed by green plants of taking up carbon from carbonic acid, and by other plants of taking it from hydrocarbons, is probably not shared by animals.

(The structure and functions of animals are treated of under the heads COMPARATIVE ANATOMY, PHYSIOLOGY, EMBRYOLOGY, etc. See also ZOOLOGY, and the names of the various groups of animals.)

Animal'cule [Lat. *animal'culum*, the diminutive of *animal*], literally, a "minute animal," commonly denoting one whose figure can only be discerned by the aid of a microscope. In popular language it is mostly applied to the microscopic animals which zoologists call Infusoria and Protozoa. Many of the so-called animalcules are now known to belong to the lower ranks of the vegetable kingdom.

Animal Electricity. See ELECTRICITY, ANIMAL.

Animal Heat is the persistent and uniform elevation of temperature which a great proportion of living animals possess. This elevation does not appear to be a constant factor of animal any more than vegetable life; for in those animals which are fixed and almost motionless there is often great difficulty in detecting any animal heat. But even in the so-called cold-blooded animals there is a normal range of elevated temperature. Infusoria, earthworms, snails, fishes, and especially reptiles, possess an appreciable amount of animal heat, and the temperature in health of some species has been pretty accurately determined, though it appears to vary decidedly in these animals with seasons of functional activity or rest. In all animals there seems to be a relation between the temperature and the habitually fast or slow rate of motions.

Mammals, birds, and insects have special powers of maintaining heat. In insects it is scarcely discernible in the pupa state, except when the pupa is about to enter the condition of perfect development. Hymenopterous insects especially have a high range of temperature. Humble-bees' nests have been observed with a heat 18° above that of the surrounding earth. Mr. Newport in one instance found a bee-hive with a temperature of 102° F. while the bees were aroused, though in a neighboring hive with quiet bees the thermometer stood at 48½°. It would appear that the variation of heat within the limits of health is greater in insects than in birds and mammals.

The heat of birds is in most species much higher than that of mammals; that of the swallow, an extreme example, reaching 111¼° F. The temperature of mammals varies from 94° to 107°, that of man being 98° F. in health, while in some fevers it exceeds 105°. It appears that any excess over the latter temperature is a bad symptom in fevers, while any long-continued depression of even a very few degrees below the normal range is also a prognostic of approaching dissolution. The thermometer of late has become an important means of diagnosis and prognosis in disease. Many of the Rodentia and Cheiroptera during a part of the year lose a great proportion of their ordinary heat, the temperature falling nearly to the freezing-point, while many of the vital functions pass into a state of abeyance. This condition is called *hibernation*.

The principal direct source of animal heat is generally believed to be the slow oxidation of carbon (perhaps also hydrogen, sulphur, and phosphorus), the material thus slowly burnt being introduced in the food, while the oxygen comes in from the air by the lungs; but it is objected by many physiologists that the amount of material consumed, with all possible economy of heat, seems inadequate to the effect produced. It is observed that the cutting of certain nerves in vivisection (notably those belonging to the sympathetic system) leads to great temporary increase of heat in the parts which had been supplied by the wounded nerve, the increase being followed by a permanent decrease of heat. This appears to show that the production of animal heat is, to some extent at least, under control of the nervous system. CHAS. W. GREENE.

Animal Magnetism. See MESMERISM.

Animal Mechanics. See LOCOMOTION OF ANIMALS.

Animals, Worship of, a form of worship prevalent in many ancient lands, as once in Egypt and Persia, and even now in India, where the earlier and purer knowledge of God had become obscure, and the likeness of the Deity was sought, and supposed to be found, in the forms of animated nature. The historical fact is exactly sketched by Paul in Romans i. 21–23.

An'ima Mun'di is a Latin phrase signifying "soul of the world." It was used by ancient philosophers, who supposed that nature or all matter was pervaded by an ethereal essence and vital force, which organized and actuated created beings, but was inferior to the Divine Spirit. The Atmăn (Atmâ) or Părămâtmâ of the Hindoos was also regarded as the soul of the world in a somewhat different sense. The Atmăn was supposed to be the original life-principle from which the universe was evolved.

An'imé, a resin which exudes from *Hymenæa Courbaril,* a tree of the natural order Leguminosæ, and a native of Brazil. It has been used as a medicine and as incense. In England the name animé is applied to a resin known in India as copal, and obtained from the *Vateria Indica.*

A'nio (the modern *Tevero'ne*), a river of Latium (Italy), flowed nearly westward, passed by Tibur, and entered the Tiber 4 miles N. of Rome. Length, about 55 miles. Ancient Rome was in part supplied with water from the Anio by two aqueducts, respectively 43 and 62 miles long.

Anion. See ANODE.

An'ise, Oil of, an essential oil obtained by distilling anise seeds or star anise with water. Oil of fennel, from *Anethum fœniculum* and *Artemisia Dracunculus,* is of a similar chemical composition. Oil of anise and of fennel contain a hydrocarbon oil, said to be isomeric with oil of turpentine, and an oxidized oil, $C_{10}H_{12}O$, called anethol or anise camphor, which solidifies at temperatures below 10° C.

An'ise Seed, the fruit of the *Pimpinel'la Ani'sum,* an annual herbaceous plant of the order Umbelliferæ, is a native of Egypt. It is cultivated in Syria, Malta, Spain, and Germany, and is used in medicine as a stimulant and a carminative. It is also used to flavor liqueurs and as a condiment. Anise seed contains a volatile oil which is employed for similar purposes. A large part of the anise oil of commerce is from star anise, the fruit of *Illicium anisatum,* a small tree of the order Magnoliaceæ. The whole plant is carminative, and is used by the Chinese as a spice. Its properties are those of the *Pimpinella.* It is imported from Anam and China.

An'ise Tree [so named from the smell, which resembles that of anise], a name applied to two small trees or large shrubs of the order Magnoliaceæ, growing in the Gulf States—the *Illicium Floridanum* and the *Illicium parviflorum.* Both are evergreen, the former with dark purple and the latter with small yellow flowers, appearing in May and June. The star anise oil of commerce is the product of the *Illicium anisatum* of Eastern Asia; and it is believed that the same oil might be obtained from the *Illicium Floridanum.* The *Illicium parviflorum* has a taste and smell resembling those of sassafras. The *Illicium religiosum* of China yields a fragrant incense for temple-worship.

Anis'ic Ac'id ($H.C_8H_7O_3$), produced by the oxidation of anise-camphor and of the oils of anise and fennel. Hydride of anisyl, $C_8H_7O_2.H$, is formed at the same time.

Anis'ic Al'cohol ($C_8H_9O.H.O$) is formed by heating hydride of anisyl with potash.

Anisodac'tyls, or **Anisodac'tylæ** [from the Gr. ἄνισος, "unequal," and δάκτυλος, a "finger" or "toe"], the term applied to an order of birds, including those insessorial species the toes of which are of unequal length, as in the nuthatch. The name has been also applied to the odd-toed section of ungulate Mammalia, in which the toes are of unequal number, more often called perissodactyls.

An'isol, or **Phe'nate of Me'thyl,** ($C_7H_8O = CH_3.C_6H_5O$), a colorless aromatic liquid formed by the action of caustic baryta on anisic acid.

Anisson-Duperron (ALEXANDRE JACQUES LAURENT), a French political economist, born in 1776. He became director of the imperial printing-office in 1809, and was created a peer in 1844. He wrote, besides other works, a treatise in favor of free trade.

Aniu'y, or **Aniuj** (GREATER), a river of N. E. Siberia, rises about lat. 67° N., and, after a course of 270 miles, enters the Kolyma near lat. 68° N. The LESSER ANIUY rises in lat. 66° 30′ N., and falls into the Kolyma near the mouth of the Greater Aniuy. Length, about 250 miles.

Anjier', a seaport of Java, on the Sunda Straits, 69 miles W. of Batavia, is often touched at by vessels bound for Batavia, to take in provisions, and to land the mails and passengers, which go to Batavia overland.

Anjou, a former province and duchy of France, intersected by the river Loire, was inhabited in ancient times by the Andegavi, who were conquered by Cæsar. It now forms the department of Maine-et-Loire and part of Sarthe, Mayenne, and Indre-et-Loire. Its capital was Angers. Geoffroy, count of Anjou, married Matilda, a daughter of Henry I. of England, and was the founder of the royal house of Plantagenet. His son Henry was count of Anjou and king of England. Anjou was annexed to the crown of France about 1204, and was bestowed as a fief on Charles (a brother of Saint Louis), who became king of Naples. Louis, a son of King John, was the first duke of Anjou, which was erected into a duchy about 1360. Anjou was finally annexed to the French crown in 1480, after which the younger sons of several kings bore the honorary title of duke of Anjou. Pop. about 550,000.

Ank'arström (JOHAN JAKOB), a Swedish regicide, born in 1761, was a partisan of the aristocracy. Having formed a conspiracy with Count Horn and others, he assassinated Gustavus III. at a masked ball, Mar. 16, 1792. He was condemned to death, and, after he had been publicly whipped, was beheaded April 29 of that year.

An'ker, the name of an old European liquid measure of capacity, now disused everywhere except in Denmark and Norway, and having different values in different countries. The anker of Copenhagen is a little more than 9⅞ U. S. gallons, or a little less than 8¼ imperial gallons. The anker of Hamburg was 9.54 gallons; of Bremen, 9.57 gals.; of Lubec, 9.89 gals.; of Amsterdam, 10¼ gals.; and of Berlin (old measure), 12.45 gals.; later measure, 9.07 gals.

Ank'lam, or **Anclam,** a town of Prussia, in Pomerania, is on the Peene, 109 miles by rail N. of Berlin. It has manufactures of linen and woollen goods. It belonged formerly to the Hanseatic League. Pop. of the town in 1871, 10,739.

Anko'ber, Ankobar, or **Ancober,** a town of Abyssinia, the capital of Shoa, is situated 8200 feet above the level of the sea, and about 265 miles S. E. of Góndar. It contains a royal palace, and is a favorite residence of the monarch. Pop. estimated at from 12,000 to 15,000.

Ankylo'sis, or **Anchylosis** [from the Gr. ἀγκύλος, "bent"], in surgery, a stiffened and more or less fixed and immovable joint, so called from the crooked position often seen in limbs with such joints. Ankylosis may result from suppurative inflammation, as in "white swelling" of the knee, and is to be regarded as a favorable termination of such disease. These cases result often in neo-plastic exudations—new tissues—adhering to the cartilages of both articulating bones; and not unfrequently these new growths are partly or completely ossified, converting the two bones into one. The cartilages or ligaments of a joint may become shrunken from disease, the opposing synovial membranes may adhere to each other, or other important structural changes may prevent motion. "Spurious ankylosis" is a case in which a spasm or cicatricial contraction of the muscles, or even of the skin, prevents motion, while the joint itself is not the seat of disease. Cases of so-called hysteria sometimes are accompanied by a stiffness of one or more joints; but such cases are readily detected after the adminstration of an anæsthetic, when the joint at once becomes movable.

The prospect of recovery of motion in an ankylosed joint is small indeed. Joints stiffened at an inconvenient angle may be put into better shape during anæsthesia, and then be allowed to become ankylosed again in the desired position. Excision of joints has been considerably practised, and with some success as a means of cure.

An'na, a post-village and township of Union co., Ill., 37 miles N. of Cairo. Pop. of village, 1269; of township, 2697.

Anna, SAINT, is supposed to have been the mother of the Virgin Mary, but she is not mentioned in the Bible. The Roman Catholic Church in Austria and other countries celebrates an annual festival in her honor on the 26th of July.

An'naberg', a mining-town of Saxony, in the Erzgebirge, 18 miles S. of Chemnitz. It has mines of silver, cobalt, and tin, and manufactures of lace and silk ribbons. Pop. in 1871, 11,693.

An'na Carlov'na, regent of Russia, born in 1718, was a daughter of the duke of Mecklenburg, and a niece of Anna Ivanovna, empress of Russia. She was married in 1739 to Anton Ulrich, duke of Brunswick-Wolfenbüttel, and had a son, Ivan, whom Anna Ivanovna designated as her successor. Soon after the death of that empress, in Oct., 1740, Anna Carlovna assumed the office of regent. She was deprived of power by a conspiracy which raised Elizabeth to the throne in Dec., 1741. Died Mar. 18, 1746.

An'na Comne'na, a learned Byzantine princess and writer, born Dec. 1, 1083, was a daughter of Alexis I., emperor of Constantinople. She became the wife of Nicephorus Bryennius. On the death of her father, in 1118, she conspired against her brother John, and attempted to usurp the crown or to place it on the head of her husband, but failed. She wrote in Greek a life of her father, entitled the "Alexiad," which is an important historical document. The style is rather affected. Died in 1148.

An'nadale, a flourishing village of Richmond co., N. Y., on the Staten Island R. R. It has good school and hotel accommodations.

An'na Ivanov'na, empress of Russia, born at Moscow Jan. 25, 1693, was a daughter of Ivan, a brother of Peter the Great. She was married in 1710 to the duke of Courland, who died in 1711. She succeeded Peter II. on the throne in 1730, and permitted her favorite Biren to control the empire. He abused his power with great cruelty, and

executed and banished many thousand persons. She died Oct. 28, 1740, and was succeeded by Ivan.

An'nals [Lat. *anna'les*, from *an'nus*, a "year"], a term derived from the ancient Roman *annales pontificum*, which were official records of public events kept by the pontifex maximus. These were burned by the Gauls, who took Rome about 390 B. C. The name was afterwards applied to historical works, as the "Annals" of Tacitus. Some persons define annals to be materials for history, or a species of history arranged in order of time, each event being recorded under the year in which it occurred.

An'naly, a township of Sonoma co., Cal. Pop. 2374.

An'nandale, a post-village of Red Hook township, Dutchess co., N. Y., the seat of St. Stephen's College (Episcopalian). Pop. 347.

Annap'olis, a county in the W. S. W. part of Nova Scotia, bordering on the Bay of Fundy. Area, about 1100 square miles. The county contains much excellent land, and has beds of valuable iron ore. Pop. 18,121.

Annapolis, or **Annapolis Royal,** a seaport of Nova Scotia, at the mouth of the river Annapolis (which enters the Bay of Fundy), 95 miles W. of Halifax. It is the western terminus of the Windsor and Annapolis R. R. It was founded in 1604 by the French, who called it Port Royal. The harbor is good, but difficult of access. This town was the capital of the province until 1750. Pop. of census sub-district in 1871, 2127.

Annapolis, a city and port of entry, capital of Maryland and of Anne Arundel county, is on the S. bank of the Severn River, 2 miles from its entrance into Chesapeake Bay, 20 miles S. by E. of Baltimore, and 22 miles E. by N. of Washington, 40 miles by rail to either of these cities, and 30 miles by water (steamboat) to Baltimore. The Annapolis and Elkridge R. R., 21 miles long, connects it with the Washington branch of the Baltimore and Ohio R. R. Annapolis contains a state-house, governor's mansion, court-house, jail, two national banks, two hotels, three newspapers, six churches, an Episcopal mission, colored Bethel, and Catholic college. There are several oyster-packing houses—a business which is assuming some proportion. It is also the seat of St. John's College and the U. S. Naval Academy, which was founded here in 1845. (See NAVAL ACADEMY, by PROF. R. S. SMITH.) The railroad building from Baltimore to Drum Point (mouth of Patuxent River) crosses the A. and E. R. R., 3 miles from the city, making the distance to Baltimore by rail 22 miles. The harbor, or Annapolis Roads, is one of the finest in the country, there being a depth of 60 feet in the channel up to Round Bay in the Severn River, 7 miles from the city. The city has both gas and water works. Lat. 38° 58′ 50″ N., lon. 76° 29′ W. Pop. 5744.

A. P. SOUTHWICK, FOR ED. "GAZETTE."

Annapolis, a post-village of Penn township, Parke co., Ind. Pop. 279.

Ann Ar'bor, a city, capital of Washtenaw co., Mich., on the Huron River and on the Toledo Ann Arbor and Northern and Michigan Central R. Rs., 38 miles W. of Detroit. The situation is elevated and pleasant. Here is the State University, a flourishing institution, founded in 1837. (See MICHIGAN UNIVERSITY.) Ann Arbor contains ten churches, a national bank, a publishing-house, one monthly, one semi-monthly, and three weekly papers, and manufactures of wool, iron, ploughs, and furniture. It has a valuable mineral spring. Pop. 7363; of Ann Arbor township, 8746.

ED. "CHRONICLE."

An-Nâ'sir (or **Al-Nassir**) **Ledinil'lah** (*i. e.* "the defender of the religion of God"), one of the Abasside caliphs, began to reign at Bagdad in 1180. He was a liberal patron of learning, and successfully defended his dominions against several aggressive enemies. Died in 1225.

An'nates (plu.), [Late Lat., from *annus*, a "year" (*i. e.* a "year's wages")], the tax of "first-fruits," a tax anciently imposed by the popes on all bishops on their accession, and equal to one year's revenue of the benefice. Boniface IX. extended the tax to all livings. The Council of Pisa (1409) complained of the custom; that of Basel (1435) called it simony; that of Trent (Nov. 11, 1563) prohibited it. Nevertheless, the practice did not become extinct, and was recognized by concordat with Naples in 1818. In England, annates were first levied in 1213. In 1534 they were made payable to the king (Henry VIII.), instead of the pope. A levy of taxes of this kind is made in England for the benefit of the poorer clergy, and now called QUEEN ANNE'S BOUNTY (which see), because that queen gave up her right to it for the benefit of the Church. In Scotland the "ann" or "annat" is now a half year's extra pay, due to the widow or children of a deceased minister of the Kirk.

Annatto. See ANNOTTO.

An'nawan, a post-township of Henry co., Ill. Pop. 1261.

Anne of Austria, queen of France, a daughter of Philip II. of Spain, was born Sept. 22, 1601. She was married in 1615 to Louis XIII. of France, and became the mother of Louis XIV. She failed to gain the favor of Louis XIII., and is said to have felt the effects of Cardinal Richelieu's enmity. On the death of the king in 1643, she became regent, and appointed Cardinal Mazarin prime minister. During her regency occurred the civil war of the Fronde (1648–52) between Mazarin and some factious malcontent nobles, who were finally subdued. Died Jan. 20, 1666.

Anne of Brittany, the heiress of the duke of Brittany, was born at Nantes Jan. 26, 1476. Several princes were eager competitors for her hand. She was married in 1491 to Charles VIII. of France, and after his death to Louis XII. She was wise and virtuous, and had much influence in the affairs of France. Died Jan. 9, 1514.

Anne of Cleves, the fourth queen of Henry VIII. of England, who married her, to please the Protestants, in Jan., 1540. She was divorced in July of the same year. She was daughter of John, duke of Cleves, and was born Sept. 22, 1515. Died at Chelsea July 16, 1557.

Anne, queen of Great Britain and Ireland, the last sovereign of the house of Stuart, was born at Twickenham, near London, on the 6th of Feb., 1664. She was the second daughter of James II. and Anne Hyde, who was a daughter of the famous Lord Clarendon. She was educated in the Protestant religion, to which she afterwards manifested a constant devotion, although her father, after his accession to the throne, attempted to convert her to the Roman Catholic faith. In 1683 she was married to Prince George of Denmark, a brother of Christian V. At an early age she formed an intimacy with Sarah Jennings (afterwards the duchess of Marlborough), who exercised an almost unbounded influence over her, both before and after her accession to the throne. Anne was the mother of many (seventeen) children, all of whom died young and before she became queen. In the revolution of 1688 she supported the cause of the prince of Orange, but she was afterwards implicated in intrigues for the restoration of her father. Anne succeeded William III., who died Mar. 8, 1702, at a time when the strife of parties was extremely violent. She pursued the foreign policy of the late king, which involved England in the long war of the Spanish succession as the ally of Austria and the enemy of France. Among the important events of her reign were a number of signal victories gained by the duke of Marlborough over the armies of Louis XIV., and the union of England and Scotland in 1707. Her political principles, if she had any, were favorable to royal prerogative rather than constitutional liberty, and rendered her partial to the Tories. Anne became gradually alienated from the duchess of Marlborough, who was a Whig, and transferred her favoritism to Mrs. Masham, whose intrigues undermined the Whig party so effectually that the Tory statesmen, the earl of Oxford and Lord Bolingbroke, came into power in 1710. The queen and these Tory ministers concurred in designs and intrigues to secure the succession to her brother, the Pretender. The European war was ended by the treaty of Utrecht, April 11, 1713. Lord Bolingbroke became prime minister in place of the earl of Oxford in July, 1714. Anne died of apoplexy on the 1st of Aug., 1714, and was succeeded by George I. The period of her reign, illustrated by the genius of Newton, Addison, Pope, Bolingbroke, Swift, De Foe, and Arbuthnot, was almost as celebrated in literature as the Augustan age of Rome. (See OLDMIXON, "Life of Queen Anne," 1716; STRICKLAND, "Lives of the Queens of England.")

Anneal'ing [from the Saxon *on-ælan*, to "set on fire," to "make hot," to "burn"], a process of tempering glass and certain metals by heating them and then cooling them slowly, in order to render them less brittle and more tenacious. The extreme brittleness of glass that has not been annealed is seen in the glass toys called "Prince Rupert's Drops," which if scratched with a file will collapse into powder or small fragments. Glass vessels are annealed in a long oven, one end of which is hotter than the other, and the trays in which the vessels are placed are slowly drawn into cooler and cooler parts. The operation of annealing large vessels requires several days. Iron, brass, and other metals which are hammered into plates or drawn into wire become brittle during the process, and require to be annealed by cooling them slowly in water or air. Steel is tempered and hardened by a process of annealing, being placed in an oil-bath or surrounded by a metallic compound which has a low fusing-point.

Anne Arun'del, a county in the central part of Maryland, having an area of 750 square miles. It is bounded

on the N. by the Patapsco River, on the E. by Chesapeake Bay, and on the S. W. by the Patuxent River. It is also drained by the river Severn. The surface is undulating; the soil is generally fertile. The staple products are wheat, maize, and tobacco. Among its mineral resources are red sandstone, copper, and iron. The county is intersected by the Baltimore and Washington R. R. Capital, Annapolis. Pop. 24,457.

Annecy, a town of Eastern France, in Upper Savoy, is pleasantly situated at the N. W. extremity of Annecy Lake, 42 miles by rail S. of Geneva. It has a cathedral, a bishop's palace, an old castle, glass-works, cotton-mills, etc. Pop. in 1866, 11,554.

Annecy, Lake of, is in Upper Savoy, 22 miles S. of Geneva, about 24 miles W. of Mont Blanc, and 1426 feet above the sea. It is about 9 miles long and from 1 to 2 miles wide. Its waters are discharged through the Fieran into the Rhone.

An'nelides, or **Annel'ida** (plu.), [Lat. *annel'lus,* a "little ring"], an order of articulate animals belonging to the class Vermes, comprising those true worms which have red blood circulating in a complicated double system of vessels. As at present constituted, the order contains three families—1, the Serpuladæ, or Tubicolæ; 2, the Arenicolæ, or sand-worms, called Dorsibranchiatæ; 3, Lumbricidæ, or earth-worms—but writers variously expand or limit the order; some making it to include a part or all of the Brachiopoda and other molluscoids.

An'ni, or **Ani** (anc. *Ab'nicum*), a ruined city of Asiatic Turkey, on the Arpa-Chai River, 28 miles E. by S. of Kars. It was the capital of the Bagratian kings of Armenia until 1064, when it was taken by Alp-Arslân, and was destroyed by an earthquake in 1319. Here are ruins of an ancient palace and citadel; also some Armenian churches nearly entire.

An'nin, a township of McKean co., Pa. Pop. 760.

An'nius of Viter'bo [It. *An'nio da Viter'bo*], a learned Italian Dominican monk, whose proper name was Giovanni Nanni, was born at Viterbo about 1432. He wrote a Latin "Treatise on the Empire of the Turks" (1471). He published at Rome, in 1498, "Seventeen Volumes of Various Antiquities, with Commentaries," containing extracts from the lost works of Berosus, Manetho, and other ancient historians. These are generally believed to be forgeries. Died in 1502.

Anniver'sary [from the Lat. *an'nus,* a "year," and *ver'so,* to "turn"], the annual return of a memorable day; the day on which some remarkable event is annually celebrated. Among the Jews the Passover was an anniversary in commemoration of the exodus from Egypt. The principal religious anniversaries of Christians are Christmas, Epiphany, and Easter. Anniversary days in the Roman Catholic Church are days on which an office is annually performed for the souls of the deceased. The most popular anniversary of the U. S. is the Fourth of July.

Annonay [Lat. *Annonæ'um* or *Annoni'acum*], a town of France, in the department of Ardèche, is situated 37 miles S. S. W. of Lyons, at the junction of the rivers Cance and Déaume. It has a suspension bridge, and large manufactories of glove-leather. Paper of fine quality is made here. The Montgolfiers, who invented balloons, were natives of the town. Pop. in 1866, 18,445.

Annot'to, or **Annat'to,** a red coloring-matter, is the pulp of the seeds of the *Bixa orellana,* an exogenous shrub which grows in South America and the West Indies, and belongs to the natural order Flacourtiaceæ. It is soluble in alcohol, ether, and in potash and soda, either caustic or carbonated. It contains a yellow principle called bixin. It is used as a dye, but its colors are fugitive. The pulp is used to color cheese, is an ingredient in some varnishes, and is employed in medicine to color ointments and plasters. In South America annotto is mixed with chocolate to improve the flavor.

Anns'ville, a township of Oneida co., N. Y. It is a fine dairy-town, and has four churches and several manufactories. Pop. 2716.

Annuaire [from the Lat. *an'nus,* a "year"], a name given to certain French publications which appear annually, as the "Annuaire historique" or "Annuaire des Deux Mondes," which corresponds to the English "Annual Register." The "Annuaire" published by the bureau of longitudes is a celebrated scientific periodical.

An'nual [Lat. *annua'lis,* from *an'nus,* a "year"], a botanical term applied to a plant which lives only one year; a plant which within the space of a year passes from a seed into a perfect plant, bears its fruit, and perishes. The duration of the life of annuals is generally much less than a year. Some plants which are annuals in one climate are perennial in another, as the castor-oil plant.

Annual, a name given by the English to a class of illustrated publications which were designed for Christmas gifts and birthday presents, and enjoyed for some years extraordinary popularity. They contained contributions in verse and prose from distinguished living authors, and were illustrated with engravings by the best artists of the time. The first of these annuals was the "Forget-me-Not," edited by Frederick Shoberl, in 1822. "The Literary Souvenir," edited by A. A. Watts, appeared in 1824; and the "Keepsake" was commenced by Charles Heath in 1827. It was afterwards edited by the countess of Blessington. Among the other remarkable annuals was Heath's "Book of Beauty," first issued in 1833. After 1840 the demand for annuals diminished and their quality deteriorated. They have all been long discontinued.

Annu'ity [Lat. *annu'itas,* from *an'nus,* a "year;" Fr. *annuité*], a rent or sum of money which a person is entitled to receive every year. If the payment is to be continued through a period of uncertain length, it is called a *contingent annuity;* if it is payable for a definite number of years, it is an *annuity certain.* A person who has unemployed capital may find it advantageous to convert it into an annual income, which he is entitled to receive as long as he lives, and which is called a life annuity. The person who receives an annuity is called an annuitant. An annual income which is not to be paid until a number of years have elapsed is a deferred annuity. Those who invest money in the national debt of England are entitled to an income which is virtually a perpetual annuity, so that when each annuitant dies he may leave it to his heir. The accurate determination of the value of annuities in present money is a complex question of great importance and considerable difficulty, for the solution of which correct tables of vital statistics are requisite. The rate of interest is also an important element in the calculation of annuities. Great labor has been expended by several learned men in the formation of tables of the value of life annuities at all the different ages of human life.

Annuity, in the law of England, is a sum of money payable every year, and charged on the person or personal estate of the individual who is bound to pay it; thus differing from a rent-charge, which is charged on real estate. Annuities are often paid by a person who borrows money (who is called the grantor) to the person who lends the money (who is the grantee). An annuity is either for a term of years, for a life or lives, or in perpetuity; and the last, although charged on personal property, may descend as real estate.

An'nulus [Lat., a "ring"], a botanical term used in several senses. In mosses it denotes a rim external with respect to the peristome; in ferns it is an elastic rib which girds the theca or spore-case, and by its contraction disperses the spores: the collar which surrounds the stipes of some fungi just below the hymenium is also called an annulus.

Annuncia'da (the Order of Knights of the Annunciation) was founded by Amadeus VI. of Savoy in 1362, and was originally called the Order of the Collar. The reigning king of Italy is grand master of the order.

Annuncia'tion, Feast of, a festival of the Church in commemoration of the announcement of the conception of the Saviour to the Virgin Mary by the angel Gabriel. It is celebrated on the 25th of March, which is called Lady Day.

Ann'ville, a post-village of Lebanon co., Pa., in North Annville township, on the Lebanon Valley R. R., 5 miles W. of Lebanon. It is the seat of Lebanon Valley College.

Ano'a, a species of ruminating animal of the genus *Bu'bulus,* having the horns erect; it is considered by some to be a connecting link between an antelope and a buffalo. It lives in Celebes.

An'ode [from the Gr. ἄνοδος, a "way up"], a term used in the science of electrolysis to denote the positive pole, or that surface by which the galvanic current enters the body (electrolyte) undergoing decomposition. The negative pole, or the surface by which the current goes out, is called *cathode.* The elements of electrolytes are called *ions,* and those which go to the anode are named *anions.* Thus, in the decomposition of water by a galvanic battery, water is the electrolyte, the platinum plate connected with the positive pole is the anode, and the oxygen is the anion.

An'odyne [from the Gr. ἀν, priv., and ὀδύνη, "pain"], a medicine which diminishes pain. Opium, morphine, the anæsthetics, belladonna, cannabis Indica, etc. are the chief anodynes—most of which tend actively to cause sleep. Some hypnotics, or sleep-producers, however, like chloral, are not anodynes.

Anoint'ing [from the Lat. *in,* and *un'go, unc'tum* (Fr. *oindre,* part. *oint*), to "anoint"], an Oriental custom of

pouring aromatic oil on the head as a mark of honor. It was practised at the coronation of kings and the consecration of high priests and prophets, as in the case of Saul, David, Aaron and his sons. Spikenard, myrrh, and olive oil were sometimes used for this purpose. Anointing forms a part of the ceremonial of various sacraments in the Roman Catholic and the different Oriental churches.

Ano'ka, a county in the E. part of Minnesota, bounded on the S. W. by the Mississippi River, and intersected by Rum River. Area, 420 square miles. The surface is diversified, the soil fertile. Wheat, corn, oats, and potatoes are staple crops. The county is well wooded, and contains several small lakes which abound in fish. Capital, Anoka. Pop. 3940.

Anoka, a post-village, capital of Anoka co., Minn., on the left bank of the Mississippi, at the mouth of Rum River, or Mille Lac, and on the St. Paul and Pacific R. R., 27 miles N. N. W. of St. Paul. Two weekly newspapers are published here. It has a valuable water-power. Pop. of Anoka township, 1498.

Ano'lis [from *ano'li*, the name of a lizard found in the Antilles], a genus of saurian reptiles, natives of the warm parts of America. It comprises the iguanoid species of lizard, which have teeth on the palate of the mouth, as well as on the interior jaw-bones, and are remarkable for their power of inflating the skin of the throat. They move with great agility, and exceed all other saurians in brilliancy of color.

Anomalis'tic Year, the interval of time in which the earth completes a revolution with respect to any point in its orbit, or the interval which elapses between two successive passages of the earth through its perihelion. It is four minutes and thirty-nine seconds longer than a sidereal year, and its length is 365 days, 6 hours, 13 minutes, and 45 seconds.

Anom'aly [from the Gr. *ἀν*, priv., and *ὁμαλός*, "level," "even," "regular"], an irregularity; an exception to, or deviation from, a general rule. In astronomy it denotes the angular distance of a planet from its perihelion, as seen from the sun. It is so called because it was in it that the first irregularities of planetary motion were discovered. There are three different anomalies—the true, the mean, and the eccentric.

Ano'mia [from the Gr. *α*, priv., and *νόμος*, a "law," so called because it does not conform to the law of structure characterizing other mollusks], a Linnæan genus of the Vermes Testacea. Modern naturalists have limited the term to a genus of acephalous mollusks having two unequal, irregular thin valves, of which the flatter one is deeply notched at the cardinal margin. The central muscle traverses this opening to be inserted into a third piece (calcareous or horny), which is always attached to foreign bodies. Numerous species, living and fossil, are found in nearly all parts of the world.

Ano'na [from *ano'na*, the Sp. name of the custard-apple], a genus of exogenous trees of the natural order Anonaceæ, natives of hot climates. *Anona squamosa* bears an edible fruit called the custard-apple, because its seeds are surrounded by a whitish, sweet, cream-like pulp. The cherimoya, an excellent fruit of Peru, is produced by the *Anona Cherimolia*.

Anona'ceæ [so called from *Ano'na*, one of its genera], an order of exogenous trees or shrubs, mostly natives of tropical countries, and evergreen, having simple, alternate leaves. They are generally aromatic and fragrant. The distinguishing mark of the order is that they have trimerous polypetalous flowers and a ruminated albumen. This order comprises about 300 species, some of which bear delicious fruits. The fruit of the *Xylopia aromatica* is used as pepper by the natives of Africa. The order is represented in the U. S. by four species of pawpaw (*Asimina*) or custard-apple.

Anon'ymous [from the Gr. *ἀν*, priv., and *ὄνυμα*, a "name"], nameless; a term applied to books published without the name of the author. Those which appear under an assumed name are called *pseudonymous*. The political articles of the English journals are generally anonymous, and so are the critical articles in the great quarterly reviews. Anonymous books cause much difficulty and perplexity to bibliographers and the compilers of catalogues. The best account or catalogue of such works is Barbier's "Dictionnaire des Ouvrages Anonymes et Pseudonymes" (3 vols., 1822–24).

Anoplothe'rium [from the Gr. *ἄνοπλος*, "unarmed," and *θηρίον*, a "beast"], a genus of extinct artiodactyle quadrupeds, found in the strata of the upper eocene formation near Paris, and in Lapland, India, etc. They are characterized by the shortness and small size of the canine teeth, and have teeth arranged in a continuous series without vacant interspaces—a structure which occurs in no existing animal except man. The *Anoplotherium commune* was about the size of a wild boar.

Anor'thite, a felspathic mineral found at Vesuvius and elsewhere; essentially an anhydrous silicate of lime and alumina.

Anotto. See Annotto.

Anquetil-Duperron (Abraham Hyacinthe), an eminent Orientalist, was born in Paris Dec. 7, 1731. Having studied Arabic and Persian, his desire to visit India was so strong that he enlisted as a private soldier in an expedition which was sent thither in 1754. He traversed a great part of Hindostan, collected MSS., procured the religious books of the Parsees, and returned to France in 1762. In 1763 he became a member of the Academy of Inscriptions. He published in 1771 his "Zend-Avesta," the first translation of the sacred books of the Parsees that ever appeared in any European language. It is not esteemed very accurate. He wrote "India in Relation with Europe" (2 vols., 1798) and other works. Died Jan. 17, 1805.

Ansaries. See Nusairiyeh.

Anscha'rius, or **Ans'gar,** Saint, called the "Apostle of the North," was born in Picardy Sept. 8, 801 A. D. He propagated Christianity with success in Denmark and Sweden, and became the first archbishop of Hamburg in 832. Died Feb. 3, 865 A. D.

An'schütz (Karl), born at Coblentz, Germany, in Feb., 1813, became royal musical director at Coblentz, and was afterwards director in Nuremberg, Amsterdam, London, etc. In 1857 he came to America, founded the German opera in New York in 1862, and became a leading conductor and teacher of music. Died Dec. 30, 1870.

Ans'dell (Richard), an English painter of animals, born at Liverpool in 1815. He obtained the gold medal in Paris in 1855.

Anse de Panier [literally, "handle of a panier"], a French term applied to arches which are the result of elliptical curves in section. This is the most elegant form of arch for bridges.

An'selm, Saint [Lat. *Sanc'tus Ansel'mus*], archbishop of Canterbury, was born at Aosta, in Piedmont, in 1033. He is regarded as the originator of scholastic theology. In 1060 he became a pupil of Lanfranc, and an inmate of the abbey of Bec in Normandy, of which he was chosen prior in 1063, and abbot in 1078. Under his direction Bec became a celebrated school. He was appointed archbishop of Canterbury in 1093, after which he was involved in a long contest with King William Rufus. He was distinguished as a philosopher, and is considered as the reviver of metaphysics. Among his principal works are his "Monologium," his "Proslogium alias Fides quærens Intellectum," and "Cur Deus Homo." He surpassed his contemporaries in acuteness of intellect, originality of mind, and dialectical skill. Died April 21, 1109. (See Möhler, "Life of St. Anselm," in German, translated into English by Cox; Hasse, "Anselm von Canterbury," 2 vols., 1843–52; Rémusat, "St. Anselm de Cantorbéry," 1853.)

An'son, a county of North Carolina, bordering on South Carolina. Area, 650 square miles. It is bounded on the N. by the Rocky River, and on the E. by the Yadkin. The surface is undulating, and the soil productive, cotton, wheat, corn, and oats being the chief staples. Capital, Wadesborough. Pop. 12,428.

Anson, a post-township of Somerset co., Me., 12 miles from Norridgewock. It is the seat of an academy, has four churches, four hotels, and various manufactures. Pop. 1745.

Anson, a township of Chippewa co., Wis. Pop. 455.

Anson (George), Lord, born in Staffordshire April 23, 1697, became a post-captain in the royal navy in 1724, after which he passed several years on the Carolina station. In 1740 he was appointed commander of an expedition to the South Sea, in which he exhibited great prudence and courage amidst disasters and dangers caused partly by the unseaworthiness of his vessels. Having circumnavigated the globe and made some important discoveries, he returned in 1744 with several Spanish prizes. He defeated a French fleet in May, 1747, and for this service was rewarded with the title of Baron Anson of Soberton. He was first lord of the admiralty from 1751 to 1757, and admiral of the fleet in 1761. Died June 6, 1762. A narrative of his voyage round the world was published.

Anso'nia, an incorporated borough in the town of Derby, New Haven co., Conn., on the Naugatuck River, at the junction of the Naugatuck and New Haven and Derby R. Rs., 10 miles W. N. W. of New Haven. It is a manufacturing village, and has 1 national bank, 1 savings bank, 4 churches, 3 brass rolling-mills, 1 brass-foundry, 1 iron-

foundry, 2 clock-shops, 1 copper-mill, 2 wire-mills, 1 hardware factory, 2 hoop-skirt factories, 1 woollen mill, 1 weekly newspaper, and 2 water companies. Pop. 2749.

ED. "NAUGATUCK VALLEY SENTINEL."

Ansonians, or **Ansyreeh.** See NUSAIRIYEH.

Ans'pach, or **Ans'bach,** a fortified city of Bavaria, on the Rezat, 27 miles S. W. of Nuremberg. It has a castle, the former residence of the margraves of Anspach-Baireuth, a public library, and manufactures of cotton and half-silken stuffs, tobacco, earthenware, cutlery, etc. Pop. in 1871, 12,635.

Anspach (ELIZABETH BERKELEY), MARGRAVINE OF, a daughter of Augustus, earl of Berkeley, was born in 1750. She was accomplished, and remarkable for versatility of genius. In 1767 she was married to Mr. Craven, who became earl of Craven, and died in 1791. She was married in that year to the margrave of Anspach. She wrote and performed dramas, and published entertaining autobiographic memoirs. Died at Naples Jan. 13, 1828.

An'sted (DAVID THOMAS), F. R. S., an English geologist, born in London in 1814, was educated at Cambridge. He became in 1840 professor of geology in King's College, London, travelled in America and other countries, and published a great number of works, among which are "Geology, Introductory, Descriptive, and Practical" (2 vols., 1844), "The Ancient World, or Picturesque Sketches of Great Britain," "The Great Stone Book of Nature" (1863), and "The World we Live in" (1869).

An'ster (JOHN), LL.D., born in Cork county, Ireland, 1798. He was a friend of Coleridge, and regius professor of civil law in the University of Dublin. He produced "Poems and Translations from the German" (1819), and contributed many articles to "Blackwood's Magazine." His translation of Goethe's "Faust" (1835) was praised by the "Edinburgh Review." Died June 9, 1867.

An'swer [Ang.-Sax. *and,* "against," and *swarjan,* to "swear," to "affirm"], in the law of evidence, is the reply of a witness to a question put to him. It also means a pleading interposed in a court of equity by the defendant to the bill or information of the plaintiff. In New York, since the adoption of the code of procedure, and in a number of the other States, it is the name given to the defendant's pleading in all cases, except where he resorts to a demurrer. (See DEMURRER.)

Ant, or **Emmet** [Lat. *formi'ca*], a genus of hymenopterous insects remarkable for their industry, ingenuity, and muscular strength. It comprises numerous species, which are widely distributed in temperate and tropical countries. They have geniculate antennæ; strong jaws; a small, rounded, spoon-like ligula; a thorax compressed at the sides; an abdomen nearly oval. They live in societies composed of males, females, and neuters, the last of which are workers and are destitute of wings. Some of the neuters, it is said, serve the community as soldiers. The males and females have wings, and are larger than the neuters, but less numerous. After the pairing season is past the females are deprived of their wings to prevent their escape, as they have a propensity to desert their home and go astray. It appears that ants realize the advantages of a division of labor, as well as those of co-operation. In winter most species remain dormant, and neither work nor eat, although it is a popular notion that they collect in summer a hoard of grain for their subsistence during the winter. They are mostly carnivorous, and will attack a living animal many times larger than themselves, as a mouse, for example. Another favorite food of some species is honey-dew, the sweet excretion of aphides. According to some authorities, they confine these aphides in stables, as man does his milch cows, and obtain from them, by a process like milking, a regular supply of honey-dew. Perhaps the most remarkable of all this interesting group of insects are the "honey ants" of Mexico. The honey ants inhabit Mexico, New Mexico, and Arizona. They live in colonies, of which the greater number closely resemble the common brown ant of the United States. Certain members of the community, however, during the summer secrete honey in the abdominal cavity, and soon become incapable of locomotion. They are then placed in rows in subterranean galleries set apart for that purpose, and are systematically fed by the others. In time the distension of the abdomen becomes so great that the victim ants resemble small, spherical, pellucid grapes, the head and thorax simulating the grape-stem. Later in the season, when food is scarce, these fattened ants are in turn devoured by the other members of the colony. Ants appear to be endowed with greater muscular strength than almost any other insect of equal size. They display great ingenuity in the construction of their habitations, called ant-hills, which are mostly placed on the surface of the ground. The large ants of South America raise their ant-hills to the height of fifteen feet or more. Some species, called mason ants, perforate galleries in the clay, and support by pillars and arches the roof of their house. Others, called carpenter ants, excavate cells and labyrinthine galleries in the trunks of living trees. Ants are supposed to have a faculty of conversing or communicating with each other by means of their antennæ, which, according to some naturalists, are organs of hearing. These insects are generally very pugnacious, and often fight pitched battles with other ants. The Swiss naturalist Huber has given a detailed account of their battles, martial exploits, and predatory expeditions. Still more marvellous and paradoxical is the well-attested fact that some species, as the *Formica rufa* and the *Formica rufescens* (or amazon ant), reduce other ants to slavery, and that the principal motive of their wars and piratical excursions is to capture larvæ and pupæ or nymphs, which they carry home for slaves. "At the head of these daring slave-makers," says Pouchet, "we must put the red ant or amazon, the military expeditions of which have been most carefully observed by the naturalists of our epoch. They are so frequent that one may enjoy the sight of them any fine day during the summer season." After describing the siege and capture of a nest by these amazons, he adds: "Then the whole army, laden with booty, and sometimes stretching out in a line forty mètres in length (130 feet), triumphantly returns to its city in the same order as at its departure." (*The Universe.*) These slaveholding ants have a great aversion to labor, and when they perform a journey are carried by their slaves. These are darker colored than their masters, and are called *Formica fusca.* The fact that ants work all through the night, and seem never to sleep, was noticed more than one hundred and fifty years ago in the "Guardian" (vol. ii., No. 156). It is asserted that certain ants in warm countries (one species in Texas) actually plant grass-seeds, and cultivate, harvest, and store the grain. Some also construct, and even pave their roads. A battle of ants has been described by Huber in these terms: "I shall not say what lighted up discord between these two republics, the one as populous as the other. The two armies met midway between their respective residences. Their serried columns reached from the field of battle to the nest, and were two feet in width. . . . The field of battle, which extended over a space of two or three square feet, was strewn with dead bodies and wounded; it was also covered with venom, and exhaled a penetrating odor. The struggle began between two ants, which locked themselves together with their mandibles while they raised themselves upon their legs. They quickly grasped each other so tightly that they rolled one over the other in the dust." At the approach of night the two armies effected a retreat, but the next day the carnage was renewed with equal or greater fury. Some species of *Formica* eject from their abdomen a peculiar volatile, acrid, and pungent liquid called *formic acid,* the offensive odor of which defends them against other animals. The carnivorous species of ants perform a useful service by devouring the carcasses of dead animals. Their voracity is such that a clean skeleton of a small animal may be obtained by burying it for a short time in an ant-hill. The termites of tropical countries, sometimes called white ants, are not properly ants, but belong to another genus. (See TERMITES.) (See P. HUBER, "Traité des Mœurs des Fourmis Indigènes.")

REVISED BY J. S. NEWBERRY.

Antaç'id [*anti* and *acid*], a remedy for acid in the stomach or in the blood. The alkalies, lime-water, magnesia, etc., are mostly used for this purpose, vegetable acids, like the citric (lemon juice, etc.), being often administered with them. These acids become carbonic acid in the blood, forming bicarbonates with the alkalies. This antacid treatment is much resorted to in acute rheumatism.

Antæ'us [Gr. Ἀνταῖος], a fabulous Libyan giant, a son of Neptune and Terra, was a famous wrestler. He was invincible as long as he continued in contact with the earth (Terra), but he was conquered by Hercules, who raised him into the air and strangled him to death.

Antagonist Muscles. Every muscle and set of muscles in the animal body is opposed in its action either by some other muscle or muscles, or by elastic ligaments. Generally it is the former; thus, in the human arm we have the *triceps extensor* muscle antagonized by the *biceps flexor* and the *brachialis anticus;* in the forearm, there are the *flexor* and *extensor* muscles of the hand and wrist, as well as the *pronators* and *supinators* of the hand. Similarly in the lower extremity opposed muscles exist, although not always of corresponding names. The great *adductor* muscles of the thigh, whose action draws the limbs together, are antagonized by the *glutei* and *obturator* muscles and others. The diaphragm, the contraction of which aids in expanding the cavity of the chest, is opposed by the ex-

ternal abdominal muscles, whose action is perceptible in expiration. So constant is this provision of muscular antagonism in the animal kingdom that there is no well-ascertained example of *active dilatation* of any muscle. The *diastole* of the heart in man and other vertebrates can be explained best by elasticity only, as it exerts very little power. In Myriapoda each section of the elongated aortic heart has triangular muscles connected with the sides of the body, by which the *diastole* after contraction is effected. The *predominance* of power in opposing groups of muscles determines the position of different parts of the body when at rest; hence, in man the naturally bent position of the fingers during sleep, from the prevailing power of the flexors. Disease sometimes disturbs the natural balance of the muscles.

Anta′kia, a city of Syria, on the Orontes, is situated on the site of the ancient ANTIOCH (which see).

Antal′cidas [Gr. Ἀνταλκίδας], a Spartan diplomatist, who was sent on a mission to Persia when Sparta was in a critical position, and negotiated a treaty called the Peace of Antalcidas, in 387 B. C. This treaty excited general indignation among the Greeks, whose interests the Spartans sacrificed to gratify their enmity to Athens and Thebes. One of the articles of this treaty stipulated that all the Greek cities of Asia Minor should be subject to the king of Persia.

Antanacla′sis [Gr. ἀντανάκλασις, from ἀντί, "against" (and hence implying contrast), and ἀνάκλασις, a "bending back"], in rhetoric, a figure in which a word is repeated, but in a different sense or different inflection from the first, which gives a kind of antithetical force to the expression; as, "Learn some *craft* when young, that when old you may live without craft."

Antanana′rivo′, or **Tananarivo′,** the capital and chief city of Madagascar, is situated in a mountainous region in the middle of the island, 166 miles S. W. of Tamative. It is about 7000 feet above the level of the sea. It is reported to be a large city, and to have manufactures of gold chains and silk stuffs. The private houses are mostly of wood. Pop. estimated at 80,000.

An′tar, An′tara, or **An′tarah-Ibn-Sheddâd′,** a celebrated Arabian prince, poet, and warrior who lived about 550 A. D. He was the author of one of the seven poems which are called Mo'allakat, and were suspended in the Kaaba or temple at Mecca. His martial exploits were a favorite theme of Arabian poetry and romance. He is the hero of a celebrated romance, translated into English by T. Hamilton, entitled "Antar, a Bedouin Romance" (1819).

Antarc′tic [from the Gr. ἀντί, "against," "opposite," and ἀρκτικός, "pertaining to the north"], opposite to Arctic. The Antarctic Circle is one of the small circles of the sphere parallel to the equator, and distant 23° 27½′ from the South Pole.

Antarctic Current. This drift-current commences on the shores of Victoria Land, in the region of perpetual frost. It carries vast quantities of ice and cold water towards the N. E. and E., and becomes converted into a coast-current, washing and cooling the western shores of South America, thus performing a work nearly the converse of that performed by the Gulf Stream on the shores of Europe. It conveys drift ice to the latitude of about 55°.

Antarctic Ocean, or **Southern Ocean,** the name applied to that large body of water around the South Pole included within the Antarctic Circle; and also a general term designating that vast sea S. of the Atlantic, Pacific, and Indian oceans. It has not been explored so thoroughly as the Arctic Ocean, and was long considered impenetrable for ships, on account of the ice, which extends much farther from the Pole (about 10°) than in the Arctic Ocean. Sir James Ross has explored the Antarctic Ocean as far as 79° S. In Jan., 1841, he discovered in lat. 77° 32′ S. and lon. 167° E. a volcano 12,400 feet high, which he called Mount Erebus. The portions of land which have been discovered in this ocean are called New Georgia, Sandwich Lands, New Orkneys, Enderby's Land, Sabrina, Victoria Land, etc.

Antarctic Researches. The first navigator who explored these regions was Capt. Cook, who in Jan., 1774, reached lat. 71° 10′ S. in lon. 106° 54′ W. In 1823, Capt. Weddell penetrated to lat. 74° 15′ S. in lon. 34° 16′ 15″ W., and found there an open sea. In 1839, Capt. Wilkes, of the U. S. navy, conducted an exploring expedition towards the South Pole. He discovered in Jan., 1840, a portion of a large continent in lat. 61° 30′ S. and lon. 161° E. He traced the coast westward to lon. 101° E., but was prevented from landing by an impassable barrier of ice. Capt. James Ross, who commanded a British expedition in 1841, penetrated as far as 78° or 79° S. He computed the position of the southern magnetic pole to be in Victoria Land, lat. 75° 5′ S., lon. 154° 8′ E.

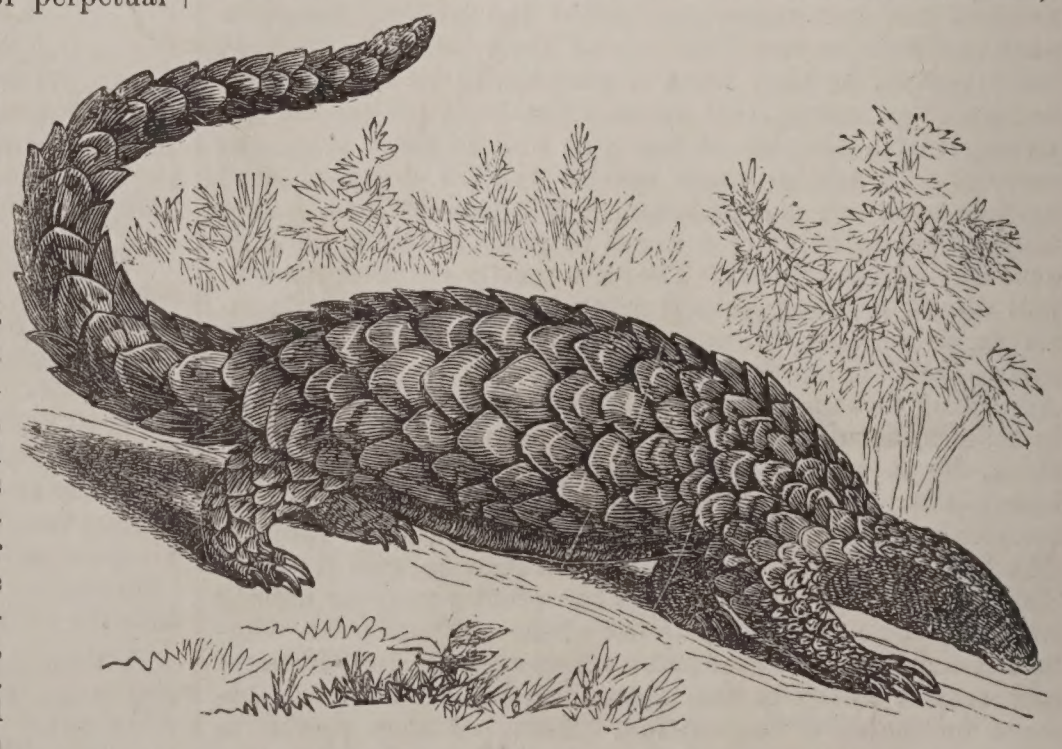
Anta′res [from the Gr. ἀντί, in a sense implying "comparison," and Ἄρης, "Mars," because this star was thought to resemble Mars], a ruddy double star, the most conspicuous in the constellation Scorpio. It is important in navigation in computing longitude.

Ant-Catcher and **Ant-Thrush,** names given to birds of tropical and sub-tropical countries that feed upon

Giant Ant-Catcher.

ants, and are nearly allied to the thrushes. They have very powerful voices, a straight, sub-cylindrical bill, hooked at the tip, slender legs, and short tail. Some of them belong to the genera *Pitta* and *Grallaria*. The giant ant-catcher of Sumatra (*Pitta gigas*) is of a fine green color.

Ant-Eater, a South American family of mammals, animals of the order Edentata. Ant-eaters have no teeth,



Manis laticaudata, the Asiatic Ant-Eater.

and feed on ants and other insects, which they catch by thrusting among them the long tongue covered with a viscid saliva. The head is much elongated, and the tail is about as long as the body, which is covered with long hair. The toes are united as far as the base of the claws, which are very large and strong, adapted for the purpose of tearing open ant-hills. The great ant-eater (*Myrmecophaga jubata*), sometimes called the ant-bear, is about four and a half feet long, exclusive of the tail, which is about two and

a half feet. It has four toes on the fore feet, and five on the hind feet. It is a sluggish animal, whose movements are not much more rapid than those of a sloth. The little ant-eater (*Cyclothu'rus didac'tylus*) is not more than twenty or twenty-one inches in entire length. It is remarkable for a peculiar structure of the skeleton. On a side view the cavity of the chest is completely hidden by the ribs, which are greatly flattened and overlap each other, so that on a hasty glance the ribs appear to be formed of one solid piece of bone. It has two claws on the fore feet and four on the hind feet; these claws are compressed, curved, and very sharp. The name ant-eater is sometimes given to the aard-vark (*Orycteropus Capensis*) of South Africa, to the pangolins, the *Echidna*, and other mammals which subsist on ants and other insects. One of the best known of these is the *Manis laticaudata*, or pangolin of Hindostan. (See PANGOLIN.)

Antece'dent [Lat. *antece'dens*, from *an'te*, "before," and *ce'do*, to "go"], that which goes before or precedes in time or in place. In grammar, the noun to which a relative pronoun refers; in logic, the first of two propositions in an enthymeme, and the first member of a hypothetical proposition; opposed to the consequent; in mathematics, the first of two terms composing a ratio. Thus, in the ratio A : B, A is the antecedent, and B is the consequent.

The word in the plural is used in a different sense, as in speaking of a person's *antecedents*—*i. e.* his previous conduct and character, his early history or primordial relations.

Antedilu'vian [from the Lat. *an'te*, "before," and *dilu'vium*, the "deluge"], a term applied to any person or thing that existed before the Flood—*i. e.* the Noachian Deluge. According to the chronology of the Hebrew text of the Bible, this flood occurred 1656 years after the creation of man. The date of this event, according to the Septuagint version, is several centuries later. Chevalier Bunsen adopted the theory that the Flood occurred about ten thousand years ago. Geologists do not recognize that the earth was ever inundated by a simultaneous universal deluge since it was inhabited by man.

An'telope [Lat. *antil'ope* and *antel'aphus*; Fr. *antilope*], a family of Mammalia, of the order Ruminantia, characterized by hollow horns, which are annulated and permanent, not annually renewed (except the *Antilocapra*), and not longitudinally rigid. The family comprises numerous genera and species, the genus *Antilope* being the typical one, natives of Europe, Asia, Africa, and America, remarkable for their elegant figure and extreme agility. They are mostly gregarious, inoffensive, and timid animals, and vary greatly in size as well as form. The greater numbers of them are found in Southern and Central Africa. Asia produces numerous species. Among the various species are the gazelle (*Gazella dorcas*), the beauty of whose eye is proverbial; the addax or Nubian antelope; the stein-boc, eland, and spring-boc of South Africa; and the chamois of Europe. The antelopes are probably the fleetest of all quadrupeds. Their flesh is a favorite article of food. Great numbers of the prong-buck (*Antilocapra America'na*) roam over the plains between the Mississippi River and the Rocky Mountains. The Rocky Mountain goat is another antelope (*Aploceras montanus*). "Born in the scorching sun," says Sir S. W. Baker, "nursed on the burning sand of the treeless and shadowless wilderness, the gazelle is among the antelope tribe as the Arab horse is among its brethren—the high-bred and superlative beauty of the race. Entirely free from fat, and nevertheless a mass of muscle and sinew, the gazelle is the fastest of the antelope tribe."

The "common" or bezoar antelope (*Antilope bezoartica*) is found in India and throughout Southern Asia. It is a very beautiful animal, and is distinguished for its timidity and swiftness. Its flesh, like that of most antelopes, is dry and rather unpalatable. The Oriental bezoar, a phosphatic concretion prized in the East for its supposed medicinal virtues, is derived from the intestines of this animal. (See ANTILOCAPRA.)

Antilope bezoartica, the Common Antelope.

Antelope, a township of Mono co., Cal. Pop. 162.

Antelope, a township of Tehama co., Cal. Pop. 320.

Antelope, a county in the N. E. part of Nebraska. Area, 864 square miles. Capital, Oakdale. This county has been constituted since the Federal census of 1870.

Antelope, a post-township of Jefferson co., Neb. Pop. 296.

An'te Na'ti [a Latin term signifying "born before"] was a term applied to such of the Scotch as were born before the accession of James I. to the throne of England, and who were considered as aliens by the English.

An'tennæ, singular **Anten'na** [a Latin word meaning the "yard of a ship"], jointed filaments or tubular sensiferous organs attached to the heads of insects and crustaceans. They are sometimes called feelers, and are supposed to be organs of touch (or, according to some naturalists, organs of hearing). An insect has two antennæ, which are very flexible, and are composed in some species of a great number of joints. A crustacean has four antennæ.

Anteque'ra, a city of Spain, in the province of Malaga, 22 miles N. N. W. of Malaga, on the left bank of the Guadalhorce. It has many monasteries and convents, and large factories of flannel, paper, silk, and soap. The population of Antequera consists largely of hidalgos, with whom the vendetta was a common practice as late as 1845. Pop. in 1860, 25,581.

Ant'eros ['Αντέρως], in the Greek mythology, a being opposed to Eros or Cupid; also the deity who avenges unrequited love.

An'tes, a township of Blair co., Pa. Pop. 1893.

Anthe'lia [from the Gr. ἄντήλιος or ἀνθήλιος, "opposite the sun"], luminous colored rings observed under certain conditions around the shadow of the spectator's own head. The conditions of the phenomenon are two: first, that the sun be near the horizon, and secondly, that the shadow be projected on a surface covered with dew-drops, as a field of grass, or on a dense fog-bank distant about fifty yards. They occur chiefly in the polar regions.

Anthelmin'tics [Gr. ἀντί, "against," and ἕλμινς, a "worm"] are medicines which either destroy or drive out intestinal parasites; the former are called vermicides, the latter vermifuges. The last named are most commonly employed. Against the ordinary lumbricoid worm (*As'caris lumbricoi'des*) an infusion or fluid extract of senna and spigelia (pink-root) is safe and efficacious. To drive out the worrying seat-worms or thread-worms (*Oxyu'rus* or *As'caris vermicula'ris*) nothing is better than santonin, introduced into the bowels in the form of a suppository. For the more formidable tape-worm (*Tæ'nia*) oil of turpentine, oil of fern, kousso, pumpkin seeds, and pomegranate seeds are used. It is important that the *head* of the tape-worm shall pass away, as, till that happens, the joints continue to be reproduced. In all cases of worms attention is needed to the general condition of the digestive organs.

An'them [Gr. ἀντίφωνος, "returning a responsive sound"], a mixture of motett and cantata, with instrumental accompaniment, adapted to scriptural words. It was carried to great perfection by Handel.

Anthe'mion, the ornament or ornamental series used in Greek and Roman decoration which is derived from floral forms, more especially the honeysuckle, very common in the early period of Greek art.

Anthe'mius ['Ανθέμιος], an eminent Greek architect and mathematician, surnamed TRALLIANUS, from his native place, Tralles, in Lydia, was a brother of Alexander Trallianus. He was patronized by Justinian at Constantinople, and designed the celebrated church of St. Sophia, which was finished about 537 A. D., and is sur-

mounted by a dome in the Byzantine style, of which it is probably the original type. It is now a Turkish mosque. Died in 534 A. D.

Anthe'mius, or **Anthe'mius Proco'pius,** a Roman emperor, who began to reign at Rome in 467 A. D., before which he was a favorite general of Leo, the emperor of the East. He was the father-in-law of Ricimer, who became his enemy. Anthemius was defeated in battle by Ricimer, and put to death in 472 A. D.

An'ther [Lat. *anthe'ra*, from the Gr. ἄνθος, a "flower"], the essential part of the stamen, is the case which contains the pollen, and is the male organ of a plant. Theoretically considered, the anther is the lamina of a transformed leaf divided into two lobes or cells by the connective, which corresponds to the midrib of the leaf. When the anther is attached by its base to the apex of the filament, it is called *innate*, as in the carex; when it grows to the face or side of the filament, it is *adnate*, as in the magnolia; and when the apex of the filament is attached to the middle of the anther, the latter is *versatile*, as in the grasses. The anther has a curious property or habit of opening to discharge the pollen at the precise time when the stigma is ready to receive it.

Antherid'ium, plural **Antherid'ia** [from the Lat. *anthe'ra*, an "anther," and the Gr. εἶδος, "form"], a name applied to organs of cryptogamous plants supposed to be analogous in functions to the anthers of the phænerogamous flowers. They are variously situated on the surface of plants or within their tissue, and are in some cases collections of cells containing small bodies called *phytozo'a*, which at certain periods exhibit rapid movements.

Antho'dium [from the Gr. ἄνθος, "flower," and εἶδος, "form"], a head of flowers, the same as a capitule, applied to the flower of the thistle and other Compositæ, in which a number of florets are combined in a head and surrounded by a common involucre.

Anthol'ogy [from the Gr. ἀνθολογία, a "collection of flowers"], a term applied metaphorically in ancient literature to a collection of short pieces of poetry on amatory, convivial, or moral subjects, or a selection of beautiful thoughts and sentences in prose or verse, mostly epigrams. The first collection in Greek entitled an Anthology was made by Meleager, a Syrian poet who lived about 80–60 B. C. Another collection, compiled by Constantine Cephalas in the tenth century, was discovered by Salmasius, and is now extant. This anthology, augmented by epigrams found on ancient monuments, was edited by Brunck, under the title of "Analecta Veterum Poëtarum Græcorum" (1776). A revised edition of the same was published by Jacobs, entitled "Anthologia Græca sive Poëtarum Græcorum Lusus ex Recensione Brunckii" (Leipsic, 1794–1814). Scaliger published a Latin anthology in 1573 entitled "Catalecta Veterum Poëtarum" ("Selections from the Old Poets"). Collections of poetry which may not inappropriately be termed anthologies are also found in the literatures of Arabia, Turkey, Persia, and China.

An'thon (Charles), LL.D., an American classical scholar, born in the city of New York Nov. 19, 1797, graduated at Columbia College in 1815. He studied law, and was admitted to the bar in 1819, but he never practised that profession. In 1820 he became adjunct professor of ancient languages in Columbia College, and in 1835 principal professor of the classics in that institution. He published, besides other works, an edition of Horace with notes (1830), a "Dictionary of Greek and Roman Antiquities," and a "Classical Dictionary" (1841). His works have been reprinted in England. Died July 29, 1867.

Anthon (John), LL.D., a brother of the preceding, born in Detroit in 1784, graduated at Columbia College in 1801. He was a very eminent lawyer, and was president of the Law Institute of New York. He published several legal works of importance. Died in New York City Mar. 5, 1863.

An'thony, a township of Lycoming co., Pa. Pop. 543.

Anthony, a township of Montour co., Pa. Pop. 959.

Anthony (Henry B.), a statesman, was born at Coventry, R. I., April 1, 1815, graduated at Brown University in 1833, was editor of the "Providence Journal" (1838–59), governor of Rhode Island (1849–51), and U. S. Senator (1859–71).

Anthony (Susan Brownell), born at South Adams, Mass., Feb. 15, 1820, was the daughter of a Quaker. She was for fifteen years a teacher in New York. Since 1852 she has been an active leader of the woman's right movement; she has also been long distinguished for her zeal and eloquence in the temperance and anti-slavery causes. Since the civil war she has given most of her labors to the cause of woman's suffrage.

Anthony, Saint. See Antony, Saint.

Anthony's Creek, a township of Greenbrier co., West Va. Pop. 632.

Anthony's Nose, a mountain in the Highlands, E. of the Hudson River, is partly in Philipstown township, Putnam co., and partly in Cortlandt township, Westchester co., N. Y. It rises 1228 feet above the river. In making the railroad cutting through its base many beautiful minerals were found.

Anthony Village, a post-village in Coventry township, Kent co., R. I., has a national bank and important manufactures. It is on the Hartford Providence and Fishkill R. R., 13½ miles S. W. of Providence.

Anthoph'yllite, a silicate of magnesia and iron from Norway. A fibrous mineral of similar composition, called *hydrous anthophyllite*, is found on New York Island, near the corner of Fifty-ninth street and Tenth avenue, which is supposed to be an altered hornblende.

Anthosid'erite [from the Gr. ἄνθος, a "flower," and σίδηρος, "iron"], a hydrated silicate of iron occurring in fine fibrous tufts, with a radiated structure. It is found at Antonia Pereira, in Minas Geraes, in Brazil.

Anthoxan'thum [from the Gr. ἄνθος, a "flower," and ξανθός, "yellow"], a genus of plants of the natural order Graminaceæ, natives of Europe. The flowers are a dull yellow when ripe. It includes the sweet vernal grass (*Anthoxanthum odoratum*), which grows in meadows and perfumes the air with an exquisite fragrance. It is naturalized in the U. S.

An'thracene, or **Paranaph'thaline** ($C_{14}H_{10}$), a hydro-carbon existing in coal-tar, and extracted from the last portions of the distillate from this substance. The products of the distillation of coal-tar as ordinarily conducted are: (1) Crude coal-tar naphtha, containing benzol, toluol, etc., lighter than water. (2) Heavy oil of coal-tar, or "dead oil," heavier than water, and containing about 10 per cent. of Phenol (which see) and cresol, and much naphthaline. (3) Green oil, which becomes semi-solid on cooling, owing to the crystallization of anthracene. (4) Pitch, which remains in the still. Versemann and Fenner have patented the further distillation of pitch till only coke remains in the still. They thus obtain a much larger yield of green oil, and increase the product of anthracene from one-half of 1 per cent. to 2 per cent. of the original tar. The semi-solid green oil has been used in England to some extent as a cheap lubricator or wheel-grease, under the name of "green grease." The anthracene is separated from the green oil by chilling and pressing. In its crude state it contains considerable oil, naphthaline, pyrene, chrysene, chrysogen, retene, anthraflavic acid, etc. To purify the crude anthracene cake, it may be subjected to distillation, the first and last portions being rejected, the intermediate portion being recrystallized from benzol or coal-tar naphtha; or the crude cake may be washed with petroleum naphtha to remove oils, etc., and then recrystallized from benzol. Thus obtained, anthracene is always colored yellow by chrysogen, which may be destroyed by exposing its solution to the direct rays of the sun. Graebe and Liebermann prepared anthracene by the action of zinc-dust on alizarine, the coloring-matter of madder, and were from this led to devise a method for preparing alizarine from anthracene—an operation which is now the basis of a very important industry. (See Alizarine.)

Anthracene may also be formed artificially by benzyl chloride (C_7H_7Cl) with water, and by exposing to a red or white heat mixtures of ethylene with benzol, cinnamene, diphenyl, chrysene, or naphthaline. Anthracene is obtained in beautiful white crystalline laminæ, melting at 213° C., and distilling at 360° C. Anthracene is insoluble in water, soluble in alcohol, benzol, and bisulphide of carbon to the extent of 0.6, 0.9, and 1.7 per cent. respectively. Heat greatly increases its solubility in these liquids. It is also soluble in ether and the essential oils, especially oil of turpentine. Light petroleum naphtha, which dissolves naphthaline readily, has little effect on anthracene. Oxidizing agents, such as potassic dichromate and sulphuric or acetic acid, change anthracene into oxanthracene or anthraquinone ($C_{14}H_8O_2$), which, by the addition of O_2, becomes anthraquinonic acid or alizarine, $C_{14}H_8O_4$. Oil of vitriol dissolves anthracene, forming a conjugated acid. With bromine and chlorine, anthracene forms several substitution products. On mixing alcoholic solutions of picric acid and anthracene, beautiful ruby-red needles of picrate are obtained. (See "Anthracene und seine Derivate," by G. Auerbach, Berlin, 1873; Kopp's articles in "Le Moniteur Scientifique du Quesneville," Aug. 15, 1870, Aug. 1 and 15, 1871; also "Jahresbericht über die Fortschritte der Chemie," 1868 *et seq.*, and Wagner's "Jahresbericht der Chemischen Technologie," 1868 *et seq.*)

C. F. Chandler.

An′thracite [Lat. *anthraci′tes*, from the Gr. *ἄνθραξ*, a "coal"], an important fossil fuel, the hardest variety of stone coal, consisting, when pure, almost exclusively of carbon. It has a conchoidal fracture, a black color, and an imperfectly metallic lustre, from which it is sometimes called *glance coal*. It burns slowly, with intense heat, without smoke, and with little flame. Anthracite, like all other varieties of coal, is of vegetable origin, and is, in fact, formed from softer and more bituminous coals by the action of subterranean heat, which has driven off most of their volatile matter. The composition of anthracite is the same as that of coke formed artificially from bituminous coal, and it is more dense than coke only because it has been heated under great pressure. Anthracite has no definite composition, but shades imperceptibly into graphite on one hand, and into bituminous coal on the other. The anthracite beds of Pennsylvania are all of carboniferous age, and were once connected with the bituminous coals of the Alleghany coal-field, having been separated and changed in character by the upheaval of the Alleghany Mountains. The coals of that State show a regular gradation of composition in going from the east to the west, and receding from the focus of metamorphic action in the Alleghanies. For example, the coal of the Lehigh basin is most baked, and contains the least amount of volatile matter—3 to 7 per cent.; the Scranton coal, from 9 to 12 per cent.; the semi-bituminous coal of Blossburg and Broad Top, from 17 to 25 per cent.; the bituminous coal of Western Pennsylvania, from 30 to 50 per cent. In Rhode Island a small basin of carboniferous rocks has been still more thoroughly calcined, and the coal is partially converted into graphite (graphitic anthracite). Anthracite may be of any geological age. In China the coals are mostly, if not altogether, of mesozoic age, and over large areas they are anthracitic. Near Richmond, Va., trap dikes bursting through the triassic coal-beds have changed some of them locally into a spongy anthracite, a "natural coke." Near Santa Fé, N. M., an outburst of volcanic rock has, over many square miles, converted a cretaceous lignite into anthracite. The triassic coal of Los Bronces, Sonora, has been extensively metamorphosed by the action of igneous rocks, and on Queen Charlotte Island, N. of Vancouver's Island, a local eruption of trap has converted a cretaceous lignite into one of the most compact and brilliant anthracites known.

The density and great heating power of anthracite make it the best of all fuels for metallurgic purposes, while its freedom from smoke specially commends it for combustion in cities. For the generation of steam, anthracite has no superiority over the best bituminous and semi-bituminous coals; and as a household fuel, cannel is preferred for open fires from its cheerful flame and the facility with which it is kindled; but the steadiness, cleanliness, and economy of an anthracite fire will always make it the staple fuel of the communities which can obtain it.

Anthracite occurs and is largely mined in Wales, Ireland, and other parts of Europe, but the most extensive and productive beds of anthracite are those of Pennsylvania. These form several detached basins lying between the folds of the Alleghany Mountains. Their aggregate area is only about 500 square miles, but from their proximity to the chief centres of population and manufacture they have had a most important effect on the development of the industry and wealth of America. (See COAL.) (See TAYLOR'S "Statistics of Coal;" DADOW'S "Coal, Iron, and Oil;" and MCFARLANE'S "Coal Formations of America.")

J. S. NEWBERRY.

Anthraquinone. See ANTHRACENE and ALIZARINE.

Anthropol′atry [from the Gr. *ἄνθρωπος*, "man," and *λατρεία*, "service," "worship"] signifies the worship of man. The primitive Christians accused the heathen of anthropolatry, because they deified certain heroes or represented their gods as having a human form.

Anthropol′ogy [from the Gr. *ἄνθρωπος*, "man," and *λόγος*, a "treatise"] is a term used in several senses: (1) It signifies the science of man as an object of natural history, and as compared with other animals; (2) the science which treats of man's whole nature, as distinguished from psychology, which treats of the mind or spirit of man; (3) in a theological sense it denotes the study of man in his relations to God. (For a notice of anthropology in the former senses, see MAN AND HIS MIGRATIONS, by President M. B. ANDERSON; and MANKIND, by Prof. A. GUYOT.)

ANTHROPOLOGY [*ἀνθροπολογία*, "doctrine respecting man"], in the theological as distinguished from the physiological sense, is that part of the Christian system which treats of man in distinction from God. In its entire extent it includes the description of man both as created and as fallen, and therefore properly includes both the holiness and the sin of the human race. It begins with the creation of man as composed of body and soul, and thus supposes a basis in physical anthropology. It then considers the soul as created in the image of God, and thus discusses the nature of holiness and the happiness of an unfallen creature in the paradisaical state. But inasmuch as man continued in his primitive holy condition but a brief time, his history is made up mainly of his apostasy and its consequences, so that practically the subject of anthropology relates to such topics as original and actual sin, the free and the enslaved will, the relation of the human to the divine efficiency in regeneration, and the related doctrines. The great controversies which have resulted in the several anthropologies that have a place in the history of religious opinions were concerned almost exclusively with sin, and it is in this reference that we shall examine the subject.

In the primitive Church of the first three centuries the fact of apostasy was universally acknowledged, but only in a general form. The doctrines of sin and grace in their more difficult and scientific aspects did not seriously engage the attention of the Church. The theological mind was occupied with the doctrine of the Trinity and the great controversy concerning the deity of Christ. The statements of Scripture concerning the fall of Adam and its consequences were taken without much discussion, and no acute and powerful exegesis was expended upon them for the purpose of answering the more difficult questions respecting the nature and depth of human depravity. When, however, these latter points were presented, and any direct response was given, sin in its nature was referred, to a considerable degree, to a sensuous ground, and its intensity was not regarded as so great as to deprive the human will of all power to good. The origin and development of human corruption was traced to the body full as much as to the activity of the spirit itself, and hence a remainder of energy was assumed to exist in the fallen will, by which it could co-operate with the Holy Ghost in regeneration. This view appears particularly in the writings of Clement of Alexandria and Origen, and colors the anthropology of that Alexandrine School which acknowledged those theologians as its great leaders.

It would be a mistake, however, to regard Clement and Origen as the only representatives of the anthropology of the primitive Church. In Tertullian and Cyprian a tendency appears towards that theory which was afterwards elaborated by Augustine. While the part which the sensuous nature has in determining the origin and nature of sin is still asserted, yet more weight is attached to the self-determination of the human will itself—to the purely mental and spiritual energy that originates and perpetuates it. This naturally leads to more assertion of the bondage of the will, and a more profound conception of sin as enfeebling and ruining the moral power of the soul. This tendency was strengthened by the adoption by Tertullian of the traducian view of the origin of the individual. This North African Father, in a somewhat crude and materializing manner, held that both the body and soul are propagated. Both the immaterial essence of the soul and the material substance of the body are individualized portions of human nature as created in Adam. There is no creation from nothing after the creative act on the sixth day, when "God created man male and female, and blessed them, and called their name Adam." (Gen. v. 1, 2.) There is only procreation, or the deduction of individual after individual from this original unity. Such a theory of the propagation of the soul, however difficult in itself, yet made the propagation of sin more intelligible, and prepared the way for the subsequent doctrine of the propagation of sin itself, and not of mere physical evil.

The anthropology indicated in this brief statement of the views of the early Church received a subsequent modification in the later Alexandrine and Antiochian Schools. The best representatives of the first were Athanasius, the two Gregories, and the two Cyrils; of the second, Theodore of Mopsuestia, Theodoret, and Chrysostom. The influence of Origen upon these Greek theologians is apparent, but they receded from his extreme positions and modified his anthropology, (1) by the adoption of creationism instead of pre-existence; (2) by recognizing more distinctly the effects of the Adamic transgression upon the soul itself, including the will; and (3) by making a more guarded assertion of power to good in the fallen man. They agreed, however, with the earlier anthropology in affirming that original sin, or inherited corruption, is not culpable. It is only a propagated disorder of the sensuous nature seen in exorbitant physical appetites, from which temptation issues, and to which every human individual yields without exception. But until this act of the individual will there is no sin, properly so called, no sin in the sense of guilt, in any man. The mortal Adam could beget mortal descendants, but the sinful Adam could not beget strictly sinful and guilty descendants. "What, then," says Chrysostom, "is the meaning of the phrase 'were made sinners?'

(Rom. v. 19.) It seems to me to denote liability to suffering and death." In this exegesis, Chrysostom put a secondary meaning upon the verb "to sin," which has come down to the present time, and which has unquestionably exerted an influence upon many theologians who would agree with the Golden-mouthed in most of his positions, and also upon many who would be unwilling to adopt his anthropology.

The question as to the guilt of original sin, and the justice of imputing that "disobedience of one man whereby many were made sinners" (Rom. v. 19), is, in truth, the hinge upon which the whole subject of anthropology must turn. And the way in which it is answered constitutes the dividing line between the two great dogmatic divisions which from Augustine down to the present day appear in the history of the Church. Augustine, in his controversy with Pelagianism, but still more with Semi-Pelagianism, maintained that the first sin of Adam is imputable to the posterity as guilt, and is a just ground of condemnation, because the posterity existed in the progenitor, and in some real but inexplicable manner acted in him in the first transgression. "We were all," he says, "*in* that one man, since we all *were* that one man. The particular form in which we were to live as individuals had not been created and assigned to us, man by man, but that *seminal nature* was in existence from which we were to be propagated." (*De Civitate Dei*, xiii. 14.) If the mystery of such a generic existence and such a natural union between the progenitor and the posterity could be believed and the fact conceded, then the imputation of Adam's sin to his descendants would be made upon the same principle that it is imputed to Adam himself—upon the principle, namely, of attributing to every real and veritable agent every real and veritable act of the agent. The consequence of this primal act of apostasy was the total depravation of the entire human species, then existing in the progenitors, and consequently every individual produced out of this species is born entirely depraved. Beginning in the higher parts of the soul, the reason and will, sin penetrates and poisons the lower powers, and vitiates the bodily appetites and propensities. Sin is spiritual evil in its very outset, and becomes sensuous corruption in its final issue. The soul itself falls from God, and carries the body with its sensuous nature along with it. Unlike the anthropology of Origen, that of Augustine explains the disordered appetites of the flesh by the rebellion in the spirit, and not the rebellion in the spirit by the disorder of the flesh.

Another point of difference between Augustine and his Semi-Pelagian opponents relates to the question as to the amount of power to holiness in man after apostasy. Pelagianism, as defined and defended by its ablest advocate, Julian of Eclanum, contended for plenary power in every man to keep the moral law. The apostasy still left the will free, and freedom means the liberty of indifference, or the power of choosing either good or evil at any instant. This view was deemed to be extreme by those who would find a middle view between Pelagius and Augustine. Cassian and Faustus of Rhegium, the best representatives of the so-called Semi-Pelagianism, maintained that by the fall of Adam his posterity were greatly weakened, but not made absolutely impotent to good. There still remained a minimum of goodness, which is capable of co-operating with God, and therefore regeneration is a joint product of grace and free-will. Neither can do without the other. In opposition to this, Augustine contended that there is no power to good, not even a minimum, left in the human soul since apostasy. The heart and will are wholly determined to evil, and there is no remainder, however small, of either inclination or affection that is friendly to God and holiness. The carnal mind is enmity towards God, and nothing but enmity. Hence, man cannot co-operate with God in regeneration. Not until the sinner is made willing (Ps. cx. 3; Phil. ii. 12, 13) can he will the right.

The Pelagian anthropology, which was the occasion of forcing out the systematic statements of Augustine, denied that any physical or moral corruption of human nature resulted from the Adamic transgression, interpreted the statements of the fifth chapter of Romans as teaching the influence of bad example, and asserted that sin is not strictly universal, but that some have lived without transgression. Pelagianism itself never exerted much influence within the Church. It contained too few elements of truth, and was too utterly at variance with the Scripture representations of sin and grace, to get the advocacy of any who possessed an evangelical experience. It was rejected as heresy. But the middle view of Semi-Pelagianism held its ground by reason of its recognition of the injurious effects of Adam's apostasy upon his posterity, and its acknowledgment of the need of grace in order to recovery therefrom. Moreover, the *degree* of power to good which many of the Semi-Pelagians asserted was much less than that asserted in the Alexandrine anthropology, and in some instances it was reduced to so low a minimum as to border closely upon the Augustinian impotence. Wiggers compares the three systems with each other as follows: Augustinianism asserts that man is morally *dead;* Semi-Pelagianism maintains that he is morally *sick;* Pelagianism holds that he is morally *well.*

The Augustinian and Semi-Pelagian anthropologies (that of Pelagius being rejected by all parties within the Church) continued to hold their ground with varying success. The Augustinian theory of sin and grace was adopted by the Western Church at the Councils of Orange and Valence, in 529, as the catholic orthodoxy, not merely in opposition to Pelagianism, but also to Semi-Pelagianism and all grades of the synergistic theory of regeneration. But it would be an error to suppose that the Western Church as a body continued to adhere to the views of the venerated North African Father. Theologians like Leo and Gregory in the fifth and sixth centuries, and like Bede, Gottschalk, and Alcuin in the eighth and ninth centuries, propagated the teachings of Augustine respecting the corruption of human nature and the agency of the Holy Spirit in regeneration, but the middle theory found increasing currency in the mediæval Church. Its less rigorous character, together with its comparative silence upon the more difficult parts of the doctrines of original sin, predestination, and the enslaved will, recommended it to a large class of minds; while the element of human efficiency which it introduced into the doctrine of regeneration was thought to render it a more intelligible and practical doctrine. It was not strange, consequently, that in course of time the Latin Church, though holding the name of Augustine in the highest veneration, and claiming not to depart from his teachings, should have lapsed very generally into Semi-Pelagianism. It came thus upon the same doctrinal position with the Greek Church, which, during all the controversy at the West respecting sin and grace, continued to adopt the views of Chrysostom and the Greek Fathers generally. In the eleventh century the wonderful intellect and saintly piety of Anselm maintained the Augustinian view with great power and depth of reasoning, but was not able to turn the current which was sweeping with an increasing flood in the other direction. Schoolmen like Bernard and Aquinas were nearer to Augustine than to any other great authority of the past, but the main influence of Scholasticism as a whole tended to undermine his positions. The dawn of a new era at the Reformation opened the old questions. Luther, Calvin, and the Protestant theologians generally not only adopted the Augustinian anthropology, but stated the doctrines involved in it with still greater clearness, and defended them with still closer reasoning. The papal Church took the opposite view. The Council of Trent enunciated Semi-Pelagianism, and endeavored to give it currency under the great authority of Augustine, whose opinions were in some instances honestly misconceived, and in others knowingly misrepresented.

Wherever Protestantism prevailed, Augustinianism prevailed also. Augustine's theory of sin and grace pervaded and moulded the symbols of the Reformation almost without an exception, and from them passed into the heart and life of the Protestant Church. But in process of time the same transition occurs in Protestantism which we have seen taking place in the Latin Church. The more rigorous type gives way to the milder in some quarters. The Arminian controversy in reality turned upon the same points that were discussed between Augustine and the monks of Adrumetum, between Prosper and Cassian. Calvinism is the revived Augustinianism, and Arminianism is the revived Semi-Pelagianism. These two types of doctrine in reality exhaust and include all the varieties of doctrinal opinion that prevail in modern evangelical Christendom. There are minor differences, but churches and individuals are either Calvinistic or Arminian, as in the Patristic period they were either Augustinian or Semi-Pelagian. There is no real mid-point between these two, although schools and theologians have frequently attempted to find one.

The difference between these anthropologies is due to logic rather than to practical experience. The follower of Arminius agrees with the adherent of Calvin in holding the fundamental doctrines of the Trinity and the incarnation, of apostasy and redemption, and the religious experience of both alike is evangelical; that is, it springs out of faith in the atonement of the Son of God. The difference between them relates not to the general facts and truths of the New Testament, but to the more specific and exact definitions of them. The modern Arminian, like the ancient Semi-Pelagian, while confessing sin and trusting in the blood of Christ, urges what he believes to be a valid argument against the doctrines of predestination and irresistible grace, and that particular form of the doctrine of

original sin out of which the doctrines of predestination and irresistible grace issue as necessary corollaries. And his opponent shows his respect for this belief by entering into the debate, and defending what he thinks to be the more exact and self-consistent and all-comprehending statement of that same evangelical system. The issue of a controversy that originates in logic must therefore be left to logic. The closest reasoner from the scriptural premises and the evangelical experience must be adjudged to be the victor. If the Arminian anthropology shall in the course of time prove itself to be the more scientific and self-consistent system of the two, it will be recognized and accepted as such. But if in the same calm and cool atmosphere the Augustinian statements shall evince their superiority, they must pass for Christian science.

(For the sources of information see, among others, AUGUSTINE'S Pelagian and Semi-Pelagian treatises; VOSSIUS, "Historia de Controversiis quæ Pelagius ejusque reliquæ moverunt;" CALVIN'S "Institutes," book ii.; USSHER'S "Works," vol. iii.; CHEMNITZIUS, "Examen Concilii Tridentini;" WIGGER'S "Darstellung;" GANGAUF, "Metaphysiche Psychologie des Augustines;" NEANDER'S "Church History," ii., 557–627; GUERICKE'S "Church History," § 91–93; MÜLLER, "Christian Doctrine of Sin;" BAUR'S "Gegensatz;" MÖHLER, "Symbolik;" REDEPENNING'S "Origenes;" HASSE, "Anselm;" ARMINIUS'S "Works;" EPISCOPIUS, "Opera;" LIMBORCH'S "Theologia Christiana;" BELLARMINE, "Disputationes;" JEREMY TAYLOR, "On Original Sin;" WHITBY, "On Original Sin;" EDWARDS, "On Original Sin;" HAGENBACH'S "History of Doctrine;" SHEDD'S "History of Doctrine;" CUNNINGHAM'S "Historical Theology;" NEANDER'S "History of Christian Dogmas.")

W. G. T. SHEDD.

Anthropomor'phism [from the Gr. ἄνθρωπος, a "man," and μορφή, a "form"], the representation of the Deity under a human form or with human affections; the figurative application to God of terms which properly relate to human beings. Also the heresy of the ANTHROPOMORPHITES (which see).

Anthropomor'phites, or **Anthropomor'phists,** persons who believe or imagine that the Deity has naturally a human form, as the ancient Greeks and other pagans. This error has been also entertained by some Christians, especially the Audæans or Audians, a Syrian sect formed about 350 A. D. The tendency to anthropomorphism arises from the inability of man to form any conception of a divine Person except by imagining that there is some similarity between the human and the divine nature.

Anti [ἀντί, "against"], a Greek preposition which occurs as a prefix to many English words, denoting opposition, as *antidote*, "given against" [poison]; *antipodes*, "opposite [our] feet," etc.

Antibes, ôN'teeb' (anc. *Antip'olis*), a fortified seaport-town in the S. E. of France, in the department of Alpes Maritimes, is on the Mediterranean, 17 miles by rail S. W. of Nice. Its port is small but deep, and is furnished with a lighthouse. Lat. 43° 35′ N., and lon. 7° 81′ E. It has a college, and a considerable trade in olives, fruits, oil, salt fish, etc. Here are some remains of great antiquity. It was founded by a Greek colony about 340 B. C. Its Provençal name *Antiboul* readily recalls the ancient Greek appellation. Its coins, the remains of its theatre and of certain Roman constructions, have excited the interest of antiquaries, but its ancient history is obscure. Pop. in 1866, 6064.

An'tichlore, a name given by papermakers to substances which are employed to remove from the pulp the chlorine which, in the form of chloride of lime, had been used to bleach it, and which, if allowed to remain in the pulp, would not only damage the machinery, but injure the strength of the paper. Sulphite and bisulphite of soda were first employed, but at present hyposulphite of soda is almost invariably used. Sulphide of calcium, proto-chloride of tin, and coal-gas have been used. (See BLEACHING.)

An'tichrist [Gr. Ἀντίχριστος, from ἀντί, "against," and Χριστός, "Christ"], a name which has been variously applied by Christian writers to a supposed powerful individual or institution destined to arise in opposition to Christianity, and to obtain a partial or temporary triumph over it. This idea has been traced back beyond the Christian era by some writers, who cite in favor of this view the prophecy of Ezekiel concerning Gog and Magog. The word Antichrist occurs in the Scriptures only in the First and Second Epistles of John. He says "that every spirit that confesseth not that Jesus Christ is come in the flesh" is Antichrist. The "Man of Sin" and "Adversary" of Paul's Second Epistle to the Thessalonians are commonly identified with the Antichrist of John. Many writers, both before and since the Protestant Reformation, have made the pope, or the papacy, Antichrist. Many writers, both Roman Catholics and Protestants, have suggested one or another of the persecuting emperors, such as Nero or Diocletian. Others say a succession of Roman emperors.

Anticli'max [for etymology, see CLIMAX], in rhetoric, a sentence in which the ideas become less important or impressive at the close; a sentence which descends from great to little, and is the reverse of a climax, as in this verse of Pope: "Die and endow a college or a cat;" and this line from Horace: "Parturiunt montes, nascetur ridiculus mus."

Anticli'nal Ax'is, in geology, a term used to denote an imaginary line dividing the portions of a stratum which dip in opposite directions. It may be compared to the ridge of a house which has a steep roof sloping in opposite directions.

Anti-Corn-Law League, in British politics, an association formed about 1839 to procure the repeal of the corn laws, in order that breadstuffs might be imported free from duty. The constitution of the League was dated Mar. 20, 1839, and the central office was located at Manchester. This free-trade movement was opposed by the Conservative party and by the landed interest. The principal orators of the League were Richard Cobden and John Bright. A large amount of money was expended by the League in paying lecturers and in the distribution of printed arguments on the subject, among which was General Thompson's "Catechism of the Corn-Laws." The prime minister, Sir Robert Peel, and a majority of Parliament having been converted to the principles of free-trade in grain, the corn laws were repealed in 1846.

Anticos'ti, a large island of the province of Quebec, Dominion of Canada, in the Gulf of St. Lawrence, between lat. 49° 04′ and 49° 58′ N., and lon. 61° 45′ and 64° 35′ W. Area, more than 3750 square miles, over one-half of which is arable land of excellent quality. Its length is 140 miles, and its greatest breadth is 35 miles. The climate is healthful, and remarkably fine for the latitude. The island was long regarded as worthless, but it has been surveyed and pronounced to abound in valuable forests of pine, spruce, tamarac, ash, and other valuable timber; also in coal, peat, plumbago, salt-springs, marl, marble, building-stone, grindstones, and valuable minerals. The island abounds in fur-bearing animals, and its waters already afford valuable fisheries. In 1873 the island was divided by the "Anticosti Company" into twenty counties of five townships each. Ellis Bay (the chief settlement) and Fox Bay are the only tolerable harbors.

Antic'ȳra [Gr. Ἀντίκυρα], an ancient city of Thessaly, on the river Sperchius. Another Anticyra was a city of Phocis, with a harbor on the Corinthian Gulf. Both were noted for the production of hellebore.

Antidicoma'rianites ("enemies of Mary") were followers of Bonosus and Helvidius, two Italians of the fourth century who taught that the Virgin Mary, the mother of Jesus, was also the mother of other children.

An'tidote [from the Gr. ἀντί, "against," and δίδωμι, to "give"], a medicine given to overcome or prevent the injurious effects of poisons. Antidotes are chemical or physiological. The first act by neutralizing the poison, converting it into an insoluble or harmless substance. Physiological antidotes produce action within the body which enables it to resist the effect of the poison. Thus, belladonna and opium, both poisonous, are physiological antidotes or counter-poisons to each other. Alcohol or ammonia is the physiological antidote of certain snake-poisons. The more important antidotes are mentioned in this work under the name of the poison for which they are administered.

Antietam, a township of Washington co., Md. P. 854.

Antietam Creek is the name of a small but deep river in Maryland, which empties into the Potomac about 6 miles above Harper's Ferry, and which gives name to the battle fought near Sharpsburg on Sept. 17, 1862, between the Federal troops, under Gen. McClellan, and the Confederates, under Gen. Lee. The Confederate army had crossed the Potomac near Leesburg on the 4th, 5th, and 6th of September, and had occupied Frederick and the surrounding country along the Monocacy. McClellan threw a part of his army between the enemy and the fords of the Potomac, and thus forced Lee to leave Frederick on the 12th, who then marched towards Hagerstown. Two days previously, Jackson had separated himself from the main army, and hurried by forced marches towards Harper's Ferry, which was occupied by Col. D. S. Miles. On Sept. 15 this important position was surrendered to the Confederates, and Jackson made over 12,000 prisoners. In the mean while, the Federal army had followed Lee towards the N., and on the 14th had taken Crampton's Gap and the heights of South Mountain, which commanded the road to Hagerstown, thus forcing Lee to re-

treat over the Antietam to Sharpsburg. On the afternoon of the 16th he was followed by Hooker, who, after a sharp engagement, secured a favorable position. On the following morning the real battle was begun by Hooker, who rapidly drove back the left wing of the Confederates under Jackson, while at the same time Burnside engaged the right wing. The battle at first raged around a corn-field surrounded by woods, to which Hooker had in the beginning driven the enemy. Twice the Federal troops had been repulsed, before a party detached from Franklin's division succeeded in holding it. But Hooker had already been wounded and carried from the field, and the command had devolved upon Gen. Sumner. In the mean while, Burnside on the extreme left had made two unsuccessful attempts to cross the Antietam, when at three o'clock in the afternoon he placed himself at the head of the troops and drove back the enemy, until a row of hills occupied by batteries checked his farther advance. At four o'clock Burnside received orders to gain this position at any price. The first battery was then taken. But by this time Lee had succeeded in strengthening the second hill by A. P. Hill's division, so that Burnside declared himself not able to hold the ground gained, if not assisted by McClellan with the reserve. McClellan did not accede to this demand, and the Federal troops were driven back to the bridge, which the Confederates did not venture to attack. In the centre, French's division steadily advanced, without being able, however, to occupy the hills. Richardson, who commanded another division of Sumner's corps, drove the Confederates from the river halfway back to Sharpsburg. Thus, the Federal army, when darkness put an end to the battle, had gained a few advantages at all points, but had not been able to gain a decisive success. The following morning the Confederates asked for an armistice to bury their dead, which was granted, and under cover of these operations Lee retreated in the night of Sept. 18–19 to the right bank of the Potomac, without encountering much resistance. With regard to the forces at the disposition of the two commanders-in-chief, the statements vary considerably. McClellan states that his army numbered 87,164, and estimates that of the Confederates at 97,445 men, while Lee himself states it to have been only 40,000. According to the Richmond "Enquirer," Lee had 60,000 under his personal command, while Pollard ("Southern History of the War") estimates Lee's forces in the morning at 45,000 and in the afternoon at 70,000 men. The losses seem to have been pretty nearly equal. McClellan gives his at 12,469, inclusive of 2010 dead, while official accounts for Lee's losses are wanting. According to the reports of the commanders of the several corps, they amounted during the fortnight's campaign in Maryland to 13,533. According to McClellan's report, they were several thousand more.

Antig'one [Gr. Ἀντιγόνη], a daughter of Œdipus, king of Thebes, and Jocasta. She attended her father in his exile, and buried her brother Polynices in defiance of the edict of the tyrant Creon, who, for her disobedience, immured her alive. Her tragic story is the subject of one of the dramas of Sophocles.

Antigo'nish, a county in the extreme N. E. part of Nova Scotia, bordering on St. George's Bay. Area, about 500 square miles. Coal is found. Capital, Antigonish. Pop. in 1871, 16,512.

Antigonish, capital of the above county, is situated on the Gulf of St. Lawrence, 40 miles from New Glasgow. It is surrounded by a fine agricultural district, and has one weekly newspaper. Pop. about 4000.

Antig'onus [Gr. Ἀντίγονος], king of Asia, surnamed Cyclops (*i. e.* "one-eyed"), a Macedonian general, was born about 382 B. C. He took part in Alexander's campaign against Persia, and became satrap of Phrygia in 333. In the division of the empire which followed the death of Alexander, Antigonus received the provinces of Lycia, Pamphylia, and the Greater Phrygia. Having become an enemy of Perdiccas, he formed an alliance with Antipater and Ptolemy in 321 B. C. After the death of Perdiccas (321 B. C.), Antigonus waged war in Asia Minor against Eumenes, whom he defeated and put to death in 316. He obtained by conquest several provinces in Asia, and indulged an immoderate ambition, to restrain which Ptolemy, Cassander, Seleucus, and Lysimachus formed a league against him in 315 B. C. In the long war that ensued, Demetrius Poliorcetes, the son of Antigonus, defeated Ptolemy in a naval battle in 306, soon after which Antigonus took the title of king. He encountered the united armies of the allies at Ipsus in Phrygia, where he was defeated and killed in battle in 301 B. C.

Antigonus, king of the Jews, a son of Aristobulus II., was born about 80 B. C. After the death of his father he was expelled from Judea by Antipater and Herod. He was restored to the throne by the Parthians about 39 B. C., but the Roman senate refused to recognize him as king. Mark Antony took Jerusalem and put Antigonus to death about 36 B. C.

Antig'onus Do'son [Gr. Ἀντίγονος Δώσων], king of Macedon, was a descendant of Antigonus surnamed Cyclops, and a nephew of Antigonus Gonatas. He became regent or king in 229 B. C., during the minority of Philip V., who was heir to the throne. He was an ally of the Achæan League in a war against Sparta, and he defeated the Spartan Cleomenes in 221 B. C. He died in the same year, and left the throne to Philip V.

Antig'onus Gona'tas [Gr. Ἀντίγονος Γονατᾶς], a son of Demetrius Poliorcetes, was born about 320 B. C. at Gona, or Gonni, in Thessaly, whence his surname. Having defeated an army of Gauls who under Brennus had invaded Macedonia, he became king of that country in 277 B. C. He was expelled from his kingdom by the famous Pyrrhus, king of Epirus, in 273, but he recovered the throne after the death of Pyrrhus in 271. He died about 240 B. C., and was succeeded by his son, Demetrius II.

Antig'orite, a species of serpentine in which a portion of the silica is replaced by alumina. It has a weak lustre, and feels smooth but not greasy. It is found in the Antigoria valley in Piedmont.

Anti'gua, a British West India island, the most important of the Leeward Group, was first settled in 1632; the area is 89 square miles. It is 22 miles S. of Barbuda. The capital, St. John's, is in lat. 17° 8′ N., lon. 61° 52′ W. The surface is diversified, the climate dry and healthy, and the soil of the interior is fertile. Sugar, molasses, and rum are the chief articles of export. The exports in 1870 amounted to £234,012, and the imports amounted to £164,178. Pop. in 1862, 37,125.

Antilegom'ena [from the Gr. *ἀντί*, "against," and *λέγω*, to "speak"], literally, "spoken against," a theological term applied in ancient times to certain books of the New Testament, the authority of which was questioned by some biblical critics—namely, the Second Epistle of Peter, those of James and Jude, the Epistle to the Hebrews, the Second and Third of St. John, and the Apocalypse. They were, however, ultimately admitted into the canon.

An'ti-Lib'anus, or **An'ti-Leb'anon,** a mountain-range of Palestine and Syria, extending about 90 miles in a N. E. and S. W. direction nearly parallel with Lebanon, from which it is separated by the valley of Cœle-Syria. It is of Jura limestone formation. The highest summit of this range is Mount Hermon, which has an altitude of about 10,000 feet. The valley of Cœle-Syria, between the two ranges, now called *Bŭkâ'a,* is from 4 to 6 miles wide. (See Robinson's "Physical Geography of the Holy Land," 1865.)

Antilles, The [some have supposed the name to be corrupted from the Latin words *ante,* "before," and *insulæ,* "islands," because they seemed placed before the continent, which is only reached after the islands had been passed], a term applied generally to all the West India Islands except the Bahamas. They lie between the Atlantic Ocean and the Caribbean Sea, and extend from the Gulf of Mexico nearly to the Gulf of Paria. They are divided into two groups—the Greater Antilles, and the Lesser Antilles, or Caribbean Islands, which are the most eastern of the two groups. The Greater Antilles comprise the four largest islands of the archipelago—namely, Cuba, Hayti (or St. Domingo), Jamaica, and Porto Rico, with the small islands along their coasts. They are situated in the torrid zone, and are subject to frequent hurricanes and earthquakes. In the central parts of these islands rise high mountains of granitic formation. The staple products are sugar, rum, tobacco, cotton, and coffee.

The Lesser Antilles are small in size, but very numerous, and are arranged in a long curved line or row like a crescent, the convex side of which is towards the east. They are divided into two groups—viz. the Windward, or South Caribbee Islands, and the Leeward, or North Caribbee Islands. The Windward Islands are Barbadoes, Grenada, the Grenadines, Martinique, St. Lucia, St. Vincent, Trinidad, and Tobago. All these belong to England except Martinique, which is a French colony. The Leeward Islands are Anguilla, Antigua, Barbuda, Deseada (French), Dominica, Guadeloupe (French), Marie Galante (French), Montserrat, Nevis, Saba, St. Bartholomew (Swedish), St. Christopher, St. Eustatius, St. Martin (French and Dutch), Santa Cruz, and a group of several small isles called the Virgin Islands, British, Danish, and Spanish. The Leeward Islands are British, except those otherwise designated, and three of the Virgin Islands. Many of the Lesser Antilles are of volcanic origin, and some are of coral formation. The staple productions are similar to those of the Greater An-

tilles. A large portion of the population of the Antilles are negroes and mulattoes, who are free, except in the Spanish islands of Cuba and Porto Rico. Pop. about 4,000,000.

Antiloca'pra ("antelope-goat"), the generic name of the prong-horned antelope (*Antilocapra Americana*), which inhabits the drier portions of the North American continent W. of the Mississippi. With the possible exception of the so-called Rocky Mountain goat, this is the only antelope found in America, and it differs widely from all the Old

Prong-Horned Antelope.

World antelopes in this, that the sheaths of its horns are shed annually, like the deciduous horns of the Cervidæ. In this respect the prong-horned antelope stands quite alone, and forms a kind of connecting link between the hollow-horned and solid-horned ruminants.

Antim'achus [Ἀντίμαχος], a distinguished Greek epic poet, a native of Colophon or Claros, lived about 400–360 B. C. He was a friend of Plato, and author of an epic poem entitled "Thebais," which was highly commended by some ancient critics, but is not extant. He wrote an admired elegy called "Lyde," and other works, which are all lost except small fragments.

Anti-Masonry is a term which indicates repugnance to secret societies (that is, societies which conserve secrets) in general; but it more directly implies opposition to the order known as Masons or Free Masons, for which a high antiquity and wide influence are claimed. This order early excited the suspicions of European governments, some of which regarded it as a mask for conspiracies against throne and altar. Some of them protected themselves, so far as they might, by procuring the election of princes or other eminent personages to the chief offices of the order.

In the summer of 1826 a thriftless tailor, named William Morgan, living in the village of Batavia, in Western New York, it was whispered, was engaged in preparing a revelation of the secrets of the Masonic order, whereof he was a member. Other Masons, including the editor of the village gazette, were understood to be engaged with him in the enterprise. Suddenly, Morgan disappeared one evening, and it was soon proved that he had been forcibly abducted. Excitement naturally arose, committees of vigilance and safety were organized, and he was traced westward to Fort Niagara, near Lewiston, N. Y., where he was temporarily imprisoned, and whence, it was ultimately testified, he was taken out into deep water in Lake Ontario and there sunk, though this was strenuously denied, and various stories from time to time affirmed that he was subsequently seen alive at Smyrna in Asia and other places. Such reports did not allay the excitement, which deepened and diffused itself, finding vent in a political party, which cast 33,000 votes in the State of New York in 1828, about 70,000 in 1829, and 128,000 in 1830; but of this last a fraction were not Anti-Masons, but only Anti-Jackson. The party spread into other States, and nominated William Wirt for President and Amos Ellmaker for Vice-President in 1832, when they were heartily supported in several States, but carried Vermont only. They probably diverted votes enough from Clay to give the States of Ohio and New Jersey to Jackson. They nearly elected Joseph Ritner governor of Pennsylvania in 1832, and did elect him in 1835, through a split in the Democratic ranks. The excitement gradually died out, and absorbing questions of finance and political economy soon dissolved the Anti-Masonic party.

HORACE GREELEY.

Anti-Me'los, or **Antimi'lo** (*i. e.* "over against Melos"), a small island of the Grecian Archipelago, is 5 miles N. W. of Melos or Milo.

Anti-mission Baptists, called by themselves **Old-School Baptists,** a denomination of Baptists of the U. S. who have no Sunday schools, missions, colleges, or theological schools, holding that these things make the salvation of men to depend on human effort, and not upon divine grace.

Antimo'nial Wine, a solution of tartar emetic in sherry or other wine.

Antimon'ic Acid, the acid of antimony. It exists in two modifications—antimonic acid, $HSbO_3$, and metantimonic acid, $H_4Sb_2O_7$.

An'timony [etymology uncertain; Lat. *stib'ium*, from which is derived the chemical symbol, Sb], a brittle metal of a silver-white color and of a peculiar taste. It occurs in nature native, combined with other metals, as nickel, silver, etc., with oxygen and with sulphur. The sulphide, "stibnite" or "gray antimony," is the source of all the antimony of commerce. The most abundant supplies of this ore are obtained from Borneo. It also occurs in considerable quantities in Hungary, Cornwall, New Brunswick, California, and Nevada. The sulphide, being very fusible, is often separated from the accompanying gangue-rock by heat, and cast in blocks or loaves. The metal, or "regulus of antimony" as it is called in commerce, is separated from the sulphide in various ways, such as heating with metallic iron, sodic carbonate, and charcoal, or cream of tartar and nitre. The extraction of antimony from its ores is mainly carried on at Linz, in Germany, where the sulphide of antimony is found extensively, and in Great Britain, which receives its supply of ore from Singapore and Borneo, commonly as ballast. The process consists in heating the crude ore, covered with charcoal, on the bed of a furnace, when the sulphide of antimony fuses, leaving unmelted the earthy impurities; and thereafter the liquid is drawn off into iron moulds, where it solidifies into cakes or loaves. The latter are reduced to coarse powder, placed on the bed of a reverberatory furnace, and heated with access of ordinary air containing oxygen, when the sulphur passes away as gaseous sulphurous acid, SO_2, leaving behind the antimony as the teroxide, Sb_2O_3. The roasted mass is now mixed with one-sixth of its weight of powdered charcoal, the whole moistened with a solution of carbonate of soda, and raised to bright redness in crucibles, when the metal antimony trickles to the bottom, and the impurities are left above in the spent flux or scoria, which is known in the arts by the name of *crocus* of antimony. The antimony thus prepared is more or less contaminated by sulphur, copper, arsenic, iron, lead, etc. It may be freed from all these metals except lead by reducing it to a coarse powder and fusing with one-sixteenth of gray sulphide and one-eighth of dry sodic carbonate. The resulting metal must then be pulverized and fused with one-tenth of dry sodic carbonate, and the process repeated.

Owing to the extensive use of antimony preparations in medicine, the removal of arsenic is of special importance. This can be effected by mixing 4 parts of powdered antimony with 5 parts nitre and 2 parts dry sodic carbonate, projecting the mixture into a red-hot crucible. The semi-fused mass is boiled with water, and the insoluble potassic antimoniate is reduced to metal by fusion with cream of tartar. Several successive fusions of pulverized antimony with one-eighth of nitre are said to completely remove the arsenic.

Antimony is a brilliant metal of a bluish-white color and highly crystalline or laminated structure. Its density is 6.7 to 6.86. It is extremely brittle, and may be easily pulverized in a mortar. Its melting-point is 450° C. (842° F.). It may be distilled in an atmosphere of hydrogen at a white heat. Heated in the open air, it burns with a bluish-white flame, and forms copious fumes of antimonious oxide (Sb_2O_3), or "flowers of antimony." A peculiar *amorphous* antimony was prepared by G. Gore (*Proc. Roy. Soc.*, ix., 70 and 304) by electrolyzing certain solutions of the metal. A mass having the appearance of polished steel, with a bright, metallic, amorphous fracture, was obtained of a density of 5.78, which, on being broken or heated, suddenly passed into the crystalline form, with the evolu-

tion of sufficient heat to make it take fire (*Feuererscheinung*). Antimony is oxidized by nitric acid, with the formation of antimonous oxide (Sb_2O_3), antimonic oxide (Sb_2O_5), or antimonoso-antimonic oxide ($Sb_2O_3.Sb_2O_5$). Antimony forms with acids or chlorous radicals two classes of compounds: 1, antimonous or tri-compounds, as the trichloride, $SbCl_3$; trioxide or antimonous oxide, Sb_2O_3; trisulphide, Sb_2S_3. 2, Antimonic or penta-compounds, as pentachloride, $SbCl_5$; pentoxide or antimonic oxide, Sb_2O_5; pentasulphide, Sb_2S_5.

Antimonous chloride, or *trichloride* ($SbCl_3$), called *butter of antimony*, is obtained by dissolving antimonic sulphide in hydrochloric acid. In its concentrated form it appears as a yellow oily liquid of the consistence of melted butter. Poured into water, it produces a buttery white precipitate of oxychloride (*powder of algaroth*), $SbCl_3$, Sb_2O_3, or SbO.Cl. Mixed with olive oil, butter of antimony is used for bronzing gun-barrels. Powdered antimony poured into a jar of chlorine takes fire, forming $SbCl_3$ or $SbCl_5$.

Antimonic chloride, or *pentachloride* ($SbCl_5$), is a colorless volatile liquid, prepared by heating antimony in an excess of chlorine. By the action of water it is changed to antimonic acid and hydrochloric acid.

Antimonous hydride, or *antimonetted hydrogen* (SbH_3), a colorless gas produced by the action of zinc and sulphuric acid on a solution of antimony. It burns with a greenish flame, evolving fumes of Sb_2O_3. Passed through a red-hot tube, it is decomposed, with the formation of a black deposit of Sb. A similar deposit is formed on cold porcelain held in the flame. When the gas is passed into a solution of argentic nitrate, a black precipitate of antimonide of silver ($SbAg_3$) is formed. This gas (SbH_3) is the analogue of ammonia, NH_3, phosphine, PH_3, and arsine, AsH_3; as is also the silver compound, $SbAg_3$. A class of organic bases, represented by triethyl stibine, $Sb(C_2H_5)_3$, belongs to the same group. (See AMINES.)

Antimonous, or *trioxide* (Sb_2O_3), found native in beautiful crystals, as *valentinite* and *senarmontite*. Boiled with cream of tartar ($K.H.C_4H_4O_6$), antimonous oxide dissolves, with the formation of *potassio-antimonous tartrate*, or *tarter emetic* ($K.SbO.C_4H_4O_6$). An impure oxide is manufactured for the preparation of this salt, by roasting the powdered sulphide, and fusing the product at the end of the process. It is known as *glass of antimony*.

Antimonic, or *pentoxide* (Sb_2O_5), is formed by heating powdered antimony with excess of strong nitric acid, by decomposing $SbCl_5$ with water, or by fusing powdered antimony with nitre. Potassic antimoniate is the only reagent for the precipitation of soda. There are two modifications of this acid, known as antimonic acid, $HSbO_3$, and metantimonic acid, $H_4Sb_2O_7$.

Tetroxide, or *antimonoso-antimonic acid* (Sb_2O_4 or $Sb_2O_3.Sb_2O_5$), occurs native as *cervantite*. It is the ultimate product of the action of heat and air on the metal.

Trisulphide, or *antimonous sulphide* (Sb_2S_3), the ore *stibnite*, or *gray antimony*, prepared artificially by fusing antimony with sulphur, or as an orange precipitate by passing sulphuretted hydrogen through a solution of tartar emetic. This sulphide is a sulphur-acid, which unites with basic sulphides, forming salts in every way analogous to the oxygen salts. Such are $3K_2S.Sb_2S_3$; zinkenite, $PbS.Sb_2S_3$; miargyrite, $AgS.Sb_2S_3$; pyrargyrite, $3AgS.Sb_2S_3$.

Pentasulphide, or *antimonic sulphide* (Sb_2S_5), is also a sulphur-acid, forming sulpho-antimoniates, analogous to the ortho-phosphates. The sodic sulpho-antimoniate is Na_3SbS_4. Precipitated from a mixture of antimonic pentachloride and tartaric acid, it appears as a yellowish-red powder, the golden sulphuret.

Kermes is an oxysulphide ($Sb_2O_3.2SbS_3$) which occurs native as the beautiful cherry-red kermesite.

ALLOYS OF ANTIMONY.—*Type-metal* is composed of antimony 1, lead 4 parts, and when used for stereotype plates receives an addition of one-eightieth to one-fiftieth of tin. This alloy is not only hard, but, owing to the fact that it expands at the moment of solidification, it takes a very sharp impression of the mould. *Britannia* is composed of antimony 1, tin 9 parts. *Pewter* is another alloy of antimony and tin. Antimony also enters into the composition of some of the *anti-friction* alloys. Tartar emetic is the most important preparation of antimony used in medicine; in large doses it is very poisonous. The old-fashioned "family pill" was a small bullet of metallic antimony, which was swallowed for certain difficulties, and carefully preserved for future occasions. C. F. CHANDLER.

Antino'mians [from the Gr. *ἀντί*, "against," and *νόμος*, "law"], a name applied to those who maintained that the law is of no use or obligation under the gospel dispensation. They took their rise from JOHN AGRICOLA (which see), who was originally a disciple and friend of Luther, and who contended that his views were the legitimate deductions from the principles taught by Luther himself. He taught, among other things, that good works do not promote our salvation, nor evil ones hinder it. Luther attacked the Antinomian heresy with great zeal, and at length, in 1540, Agricola recanted his more obnoxious tenets, and pledged himself to teach in conformity to the Church of Wittenberg. Antinomianism afterwards appeared in a more extravagant form in England, where, during the protectorate of Cromwell, some zealots maintained that if they should commit any kind of sin, it would do them no harm, nor affect in the slightest degree their condition in a future state, and that it is one of the distinguishing characteristics of the elect that they cannot do anything displeasing to God. English Antinomianism survived till the present century. Crisp was one of its warmest advocates—Wesley and Fletcher its sharpest assailants.

Antinoöp'olis, an ancient city built by the emperor Hadrian in Egypt, on the site of a more ancient city named Besa, and named in honor of his favorite Antinous. It was on the E. bank of the Nile, near the modern village of Ababde. Here the ruins of its theatre and hippodrome are still visible.

Antin'öus, a beautiful youth, a native of Bithynia, became a favorite and attendant of the emperor Hadrian. Having accompanied that emperor to Egypt, he was drowned in the Nile in 122 A. D. As a monument to him, Hadrian built the city of Antinoöpolis, in Upper Egypt. Statues almost innumerable were also erected to perpetuate his memory and his form, by artists whose emulation gave a new impulse to the fine arts. Some of these statues are still extant.

An'tioch [Lat. *Antiochi'a*; Gr. Ἀντιόχεια; Turk. *Antakia*], an ancient city and the former capital of Syria, situated on a fertile and beautiful plain, on the left bank of the river Orontes, 57 miles W. of Aleppo; lat. 36° 11′ N., lon. 36° 9′ 30″ E. It was founded in 301 B. C., by Seleucus Nicator, and named in honor of his father Antiochus. It was the favorite residence of the Seleucid kings of Syria, was called "Antioch the Beautiful," and was widely celebrated for the splendor of its luxury and the magnificence of its palaces and temples. The population in the time of its greatest prosperity is supposed to have been 400,000 or more. Antioch has been nearly ruined by earthquakes, one of which occurred in 115 A. D., and one in 1822. On April 3 and 10, 1872, the city was visited by severe earthquakes, which destroyed many houses, and caused the death of a considerable portion of the population. The disciples of Christ were first called Christians in Antioch, which occupies a prominent position in the history of the primitive Church as the scene of the labors of the apostle Paul. In the fifth century the bishops of Antioch received the title of patriarch, and ranked equal to the patriarchs of Rome, Constantinople, and Alexandria. In the Greek Church the patriarchs still retain this rank. In the Roman Catholic Church four prelates (of the Greek, Syrian, Maronite, and Latin rites) have the title of patriarch of Antioch, but none of them at present reside in Antioch. The Jacobite patriarch of Antioch is the head of that Church. Many councils of the Church were also held here. The crusaders took Antioch from the Saracens in 1098, after which it was the capital of a Christian principality until 1269. Among the remains of its former grandeur are the ruined walls and aqueduct. The modern town, Antakia, is meanly built, has about twelve mosques, and some manufactures of pottery and cotton stuffs. The culture of silk is the chief branch of industry. Pop. variously estimated at from 6000 to 18,000.

ANTIOCH was also the name of an ancient city of Asia Minor, in Pisidia, visited by the apostle Paul (see Acts xiii. 14, and xiv. 21), who planted a church there. Of this city extensive ruins exist. Besides the above, there were at least six other Oriental towns of this name.

Antioch, a township of Hot Springs co., Ark. P. 320.

Antioch, in Contra Costa co., Cal., is a growing town on the Sacramento River, and is the trading-point of an extensive grain-growing district. Large quantities of wheat, barley, and coal are shipped from this place, which has 30 feet of water at low tide. It is the terminus of the projected King's River Canal, and is on the line of the overland railroad. It has two potteries, copper-smelting works, twelve stores, two churches, and a weekly paper.

J. P. ABBOTT, ED. OF "ANTIOCH LEDGER."

Antioch, a post-township of Lake co., Ill. Pop. 1595.

Antioch, a post-village of Dallas township, Huntingdon co., Ind. Pop. 449.

Antioch, a township of Wilkes co., N. C. Pop. 704.

Antioch, a post-village of Perry township, Monroe co., O. Pop. 165.

Antioch, Bay of, is a port of the Mediterranean, at the mouth of the Orontes River, and lies between high mountains on the N. and S., by which it is mostly well sheltered. The waters are deep.

Antioch College, at Yellow Springs, Green co., O., was founded in 1852, and opened in the following year. Though under the patronage of Unitarians, this college is designed to be free from sectarian influences, and to develop good character as well as mental excellence in its pupils. The sexes are educated together with the best results. The college was established with a view of diffusing education at the lowest possible cost, and thus far with encouraging success. There is a music school and a preparatory department. The presidents have been Hon. Horace Mann, LL.D. (1853–59), Thomas Hill, D. D. (1859–62), G. W. Hosmer, D.D. (1866–72), and Edward Orton, the present incumbent.

Anti'ochus I. [Gr. 'Αντίοχος], surnamed SOTER (*i. e.* "saviour"), a king of Syria, of the dynasty of Seleucidæ, was a son of Seleucus I. Nicator, and was born about 324 B. C. He commanded the cavalry which fought against Antigonus at Ipsus, in 301. Having succeeded his father in 280 B. C., he gained a victory over the Gauls, who had invaded his dominions, from which victory he derived the surname *Soter*. He was killed in battle by the Gauls in 261 B. C.

Anti'ochus II. THEOS, king of Syria, was a son of the preceding, and began to reign in 261 B. C. The people of Miletus, who had received a favor from him, gave him the title of *Theos*, "God." In his reign the Parthians revolted with success, and Arsaces became king of Parthia, which was previously subject to the king of Syria. A war which he waged against Ptolemy of Egypt was ended in 252 B. C. by a treaty, in accordance with which he married Berenice, a daughter of Ptolemy, and repudiated his first wife, Laodice. After the death of Ptolemy he reinstated Laodice, who poisoned him in 246 B. C.

Antiochus III., surnamed THE GREAT, a grandson of the preceding, and a son of Seleucus Callinicus, was born about 238 B. C. He succeeded his brother, Seleucus Ceraunus, in 223 B. C. His capital was Antioch, and his kingdom comprised Syria Proper, Babylonia, Media, and a part of Asia Minor. For the possession of Palestine he waged war against Ptolemy of Egypt, by whom he was defeated at Raphia, near Gaza, in 217 B. C. While he was suppressing a revolt of Achæus in Asia Minor, in 214, the Parthians occupied Media, but, after a successful campaign against Arsaces of Parthia, Antiochus reconquered Media in 212. He afterwards conducted a victorious expedition across the mountains of Hindu-Kush into India, and, having formed an alliance with several Indian princes, returned to Antioch, from which he had been absent seven years. He took Palestine from the king of Egypt in 198 B. C., and invaded Thrace in 196. By this movement he provoked the hostility of the Roman senate. He led an army into Greece, was defeated at Thermopylæ in 191 by Acilius Glabrio, and retreated into Asia Minor. The Roman army, commanded by L. Cornelius Scipio, passed over into Asia in 190 B. C., and gained a decisive victory over Antiochus at Magnesia. The war was then ended by a treaty dictated by the Romans, who required him to cede all the provinces west of Mount Taurus, and to pay about 15,000 talents. In order to raise this sum, he plundered a temple in Elymais, for which act the populace killed him in 187 B. C. He left the throne to his son, Seleucus Philopator. (See POLYBIUS, "History.")

Antiochus IV., surnamed EPIPHANES ("the illustrious"), was a son of the preceding. He passed about twelve years in captivity in Rome, whither he was sent as a hostage in 188 B. C. He became king on the death of his brother, Seleucus Philopator, in 176 B. C. He invaded Egypt in 170, and captured the king, Ptolemy Philometor, but was constrained by the Roman senate to retire from that country in 168 B. C. About this date he plundered the temple of Jerusalem and persecuted the Jews, who rose in arms and were led by Judas Maccabæus, who defeated the Syrian armies in several battles. (See 1 Maccabees ii.) Died in 164 B. C.

Antiochus VII., surnamed SIDETES, a son of Demetrius Soter, was born about 164 B. C. He became king of Syria in 137, and defeated the Parthians in several battles, but was killed in battle by them in 129 B. C.

Antiochus VIII., second son of Cleopatra (the wife, first of Alexander Balas, then of Demetrius II., and then of Antiochus VII.), who reigned over Syria with his mother from 126 to 122 B. C., and then alone till 114 B. C., when his authority was disputed by his half-brother, Antiochus Cyzicenus (Antiochus IX.). He was assassinated by an officer of his court 96 B. C.

Antiochus IX., surnamed CYZICENUS, son of Cleopatra by Antiochus VII., survived Antiochus VIII., and committed suicide 95 B. C.

Antiochus X., surnamed EUSEBES, son of the preceding, succeeded his father in 95 B. C., but was soon after expelled, and died in obscurity.

Antiochus XI., surnamed ASIATICUS, was the twentieth and last king of the dynasty of the Seleucidæ. He began to reign about 69 B. C., and was deposed by Pompey in 65 B. C., when Syria became a Roman province.

Anti'oco, an island in the Mediterranean, near the S. W. coast of Sardinia, is 8 miles long and 3 miles wide. The soil is fertile. Pop. about 2200.

Antioqui'a, one of the states of the United States of Colombia, is bounded on the N. by Bolivar, on the E. by Bolivar, Santander, and Cundinamarca, on the S. by Cundinamarca and Cauca, and on the W. by Cauca. Area, 22,790 square miles. The state is chiefly covered by large forests, and is rich in precious metals. The chief occupation of the inhabitants is mining. Capital, Medellin. Pop. in 1870, 365,974.

Antip'aros, Oli'aros, or **Ole'aros,** a Grecian island in the Ægean Sea, about 1 mile W. of Paros, is one of the Cyclades. It is 8 miles long and 2 or 3 miles wide, and consists of a mass of marble, covered with soil which produces some grain, wine, etc. Here is a celebrated stalactitic cavern called the Grotto of Antiparos, which is about 300 feet long and 80 feet high. The roof and sides are adorned with white incrustations of great splendor and beauty. This grotto was discovered by M. de Nointel in 1673. It was probably not known to the ancients. Pop. about 1200.

Antip'ater [Gr. 'Αντίπατρος], a Macedonian general, who was a pupil of Aristotle, and held a responsible position under Philip of Macedon. He was appointed regent of that kingdom by Alexander the Great in 334 B. C., when he departed to invade Persia. He defeated Agis, king of Sparta, in a battle near Megalopolis in 330. After the death of Alexander, his generals or successors agreed that Antipater should govern Macedonia and Greece. The Athenians, in alliance with other Greek states, made an effort to regain their independence in 322, and defeated Antipater near Lamia, but, having been reinforced by Craterus, he gained a decisive victory in the same year. The Lamian war was then ended by a treaty dictated by Antipater, who required the Athenians to deliver Demosthenes to him. He joined Antigonus in a league against Perdiccas, and on the death of the latter, in 321, succeeded him as regent of the empire. He died in 319 or 318 B. C., and left a son, Cassander. (See THIRLWALL, "History of Greece;" DIODORUS SICULUS, "History.")

Antipater, a son of Herod the Great and Doris, was notorious for his wickedness. Having procured the death of his half-brothers Aristobulus and Alexander, and conspired against his father, he was put to death in 1 B. C.

Antipater the Idumean, a son of Antipas, and the father of Herod the Great, became governor of Idumea. Having assisted Julius Cæsar in his war against the Egyptians, he was rewarded with the office of procurator or governor of Judea, about 46 B. C. Died in 43 B. C.

Antipater of Tarsus, a Stoic philosopher who lived about 140 B. C., wrote several works on philosophy and morality. He opposed the skepticism of Carneades. Cicero represents him as a man of remarkable subtlety.

Antip'athy [Lat. *antipathi'a;* Gr. ἀντιπάθεια, from ἀντί, "against," and πάθος, "feeling"] is a term applied to a peculiarity of the physical or mental constitution in which certain persons feel a strong aversion to particular objects not offensive to others. Some have from childhood an antipathy to animal food, while others dislike one particular kind. That this is not always the effect of caprice is shown by the fact that contact with the object of aversion produces very disagreeable, and in some cases injurious, effects on the system. Certain medicines affect particular persons dangerously; a single grain of mercury has been known to cause profuse salivation. The most remarkable antipathies are those affecting the special senses. Persons have been known to faint at the sight of reptiles and other animals. The smell of musk or ambergris has been known to throw some people into convulsions, and Zimmermann mentions the case of a lady who was similarly affected by touching silk, satin, etc.

Antiph'ilus ['Αντίφιλος], an eminent Greek painter, born in Egypt, is supposed to have flourished about 330 B. C., but according to Lucian he lived about 220. He was distinguished for facility of execution. Among his works were "Cadmus and Europa," and a portrait of Alexander the Great.

Antiphlogis'tic [from the Gr. ἀντί, "against," and φλέγω, to "burn"], a term applied to remedies and treatment adapted to subdue inflammation or excitement of the system in inflammatory diseases. Among these remedies are purgatives and blood-letting.

An'tiphon, or **An'tipho** [Gr. 'Αντιφῶν], one of the ten

Attic orators, born at Rhamnus in Attica about 480 B. C., was a son of Sophilus the Sophist. He opened a school of rhetoric at Athens, and made reforms in the art of oratory. Among his pupils was Thucydides, who expressed a high opinion of him. Declining to plead in court or appear as a public speaker, he gained much influence and distinction by composing orations for politicians and arguments for persons who were accused. He was an adversary of Alcibiades in politics, and was the chief promoter of the revolution which in 411 B. C. abolished democracy and converted Athens into an oligarchy ruled by a council of 400. A sudden reaction restored Alcibiades to power, and Antiphon was tried for treason. He made an able speech in his own defence, but was convicted and executed in 411 B. C. Fifteen of his orations are still extant. (See D. RUHNKEN and P. VAN SPAAN, "Dissertatio de Antiphonte Oratore Attico," 1763; A. DRYANDER, "Commentatio de Antiphontis Vita," 1838.)

An'tiphon [Gr. *ἀντίφωνος*, from *ἀντί*, "against," "in reply to," and *φωνή*, a "voice"], a piece of music performed in cathedral service by choristers, who sing alternately; a short verse which was sung in the ancient Church before the psalms and other portions of the service.

Antiph'ony [Gr. *ἀντίφωνον*], a term applied by the ancient Greeks to a species of musical accompaniment in the octave by instruments or voices.

ANTIPHONY is also a sacred song sung by two parties, each responding to the other; the answer of one choir to the other when an anthem is sung alternately. This practice prevailed amongst the ancient Hebrews and in the early Christian Church. Ignatius, bishop of Antioch, is said to have introduced it into the Eastern Church in the second century.

Antip'odes [from the Gr. *ἀντί*, "against," and *πούς, ποδός*, "the foot"], in geography, signifies people who live on opposite sides of the globe, and whose feet point against each other. The antipodes of any place are those who live at the other end of a straight line drawn from that place through the centre of the earth to its opposite surface. Thus, the antipodes of London, which is in lat 51° 30′ N. and lon. 0°, must be in lat. 51° 30′ S. and lon. 180° E. or W. The noon of any point corresponds with the midnight of its antipodes, and the summer of one coincides with the winter of the other.

Antipodes, a small island in the South Pacific Ocean, S. E. of New Zealand; lat. 49° 32′ S., lon. 178° 42′ E. It is so called because it is the nearest land to the antipodes of London.

An'tipope, one who assumes or usurps the office of pope, but is not regularly elected or generally recognized as such. The emperors of Germany in several instances, having quarrelled with the pope, appointed another person to the office. The emperor Henry IV. in 1080 appointed the antipope Clement III. in opposition to Pope Gregory VII. In some cases two rival popes have been elected by different parties of cardinals. The great Western schism began in 1378, when the Italian party chose Urban VI., and the French cardinals voted for Clement VII., who held his court at Avignon, and was recognized by France and Spain. This schism was continued after their death by another double election, but in 1415 the Council of Constance deposed both of the popes, and elected Martin V. The last antipope was Felix V. (originally Amadeus VIII. of Savoy), who was elected in 1439, and abdicated in 1449.

An'tiquaries, Society of, the title of several associations of learned men, formed to promote the study of antiquities. The London Society of Antiquaries was founded in 1572, and reorganized in 1707, but received its charter in 1751. The Scottish Society of Antiquaries was founded in 1780. The American Antiquarian Society was organized in Massachusetts in 1812.

An'tiquary [Lat. *antiqua'rius*, from *anti'quus*, "ancient"]. The term (in Latin) was originally applied to persons who copied old books in convents before the invention of printing. In modern language an antiquary is one who studies and collects ancient monuments and remains, such as medals, coins, statues, manuscripts, and inscriptions; or who makes researches into the history, manners, and customs of former generations. The antiquary renders an important service to society by collecting materials for history and rescuing many documents from the ravages of time. The word is nearly synonymous with archæologist. Pausanias is said by some to have been the first antiquary.

Antique, an-teek′, a French word derived from the Latin *anti'quus*, "ancient," signifies old, ancient, old-fashioned, antiquated. In the language of art, the epithet antique is applied to the style of the ancient Greek artists, especially the sculptors, in contradistinction to the mediæval and the modern styles. The word *antique*, variously defined, is generally understood to refer to a period antecedent to the revival of classical studies in the West and the *renaissance* of art. The Greek sculptors excelled in ideal beauty of form, and the antique style is by most critics considered more perfect than the mediæval or the modern.

Antiq'uities [Lat. *antiquita'tes*, from *anti'quus*, "ancient"], an important department of learning, comprises all memorable facts, ideas, and things which relate to or illustrate the origin, early institutions, and development of nations. Thus, the study of antiquities, in the largest application of the term, includes a knowledge of the religion, laws, language, arts, traditions, manners, and customs of ancient peoples, as well as a cognizance of ancient monuments of architecture, sculpture, and other arts. In a more restricted and perhaps more popular sense, the study of antiquities is limited to the discovery, collection, verification, description, and explanation of the relics of antiquity, such as medals, statues, inscriptions, manuscripts, ruined buildings, bas-reliefs, and hieroglyphics. About the time of the revival of learning after the Dark Ages the study of classical antiquities became a distinct branch of research, which was pursued by many eminent scholars. Grævius published a valuable work on Greek antiquities, entitled "Thesaurus Antiquitatum Græcarum" (12 vols. fol., 1697 et seq.); and Roman antiquities were amply illustrated by Gronovius in his "Thesaurus Antiquitatum Romanarum" (13 vols. fol., 1697). Champollion, Young, and Bunsen are the highest authorities in Egyptian antiquities. Among the best antiquarian works may be mentioned MONTFAUCON, "Antiquité Expliquée" (15 vols., 1719–24); HEEREN, "History of Ancient Commerce;" Dr. W. SMITH'S "Dictionary of Greek and Roman Antiquities;" MONTFAUCON, "Monuments de la Monarchie Française" (5 vols., 1725). (For the difference between archæology and antiquities, see ARCHÆOLOGY.)

Antiquity of the Human Race. See MAN AND HIS MIGRATIONS, by PRES. M. B. ANDERSON, LL.D.

Anti'quus (JAN), a skilful Dutch painter, born at Groningen Oct. 11, 1702. He passed many years in Rome, Florence, and Venice, and after his return to Holland was patronized by the prince of Orange. Among his works are a "Fall of the Giants," a "Parnassus," and many portraits. Died in 1750.

Anti-rent'ers, a name given to the inhabitants of several counties in Eastern New York, who refused to pay the rents and feudal services required of them by the so-called lord-patroons, the owners of the land. This disturbance, which at one time nearly amounted to insurrection, was at length ended by the triumph of the Anti-rent party in the constitutional convention of 1846, in which a clause was inserted abolishing thenceforth all feudal tenures and incidents.

Anti-Sabbata'rians, a sect of Christians who recognize no obligation to observe the Sabbath, and who affirm that the New Testament does not call for the observance of the Sabbath or any other day.

Antisa'na, a volcanic peak of the Andes, in Ecuador, 35 miles S. E. of Quito, and 20 miles N. E. of Cotopaxi, has an altitude of 19,140 feet.

Antis'cii (the plu. of **Antis'cius**), or **Antiscians** [from the Gr. *ἀντί*, "against," and *σκιά*, a "shade" or "shadow"], literally, having "opposing shadows" or having their shadows in opposite directions at noon; a term applied to the people N. and S. of the equator, considered in relation to each other.

Antiscorbu'tic [Lat. *antiscorbu'ticus*, from the Gr. *ἀντί*, "against," and the Lat. *scorbu'tus*, the "scurvy"], corrective of *scorbutus*, or scurvy. (See SCURVY.) Onions, lime-juice, potatoes, lemons, horse-radish, scurvy-grass, etc. are the best antiscorbutics. Diet, and not medicine, is needed to effect the cure.

Antisep'tic [from the Gr. *ἀντί*, "against," and *σήπω*, to "putrefy"], opposed to or preventing putrefaction. Antiseptics are substances which prevent or check the decay and putrefaction of organic matters. As air, moisture, and heat are necessary conditions of putrefaction, the exclusion of one of these from the animal or vegetable matter is an antiseptic process. The common practice of preserving fruit in air-tight cans of tin or glass is an illustration of this principle. Generally speaking, so long as the air is excluded no decomposition or decay can take place. Cold is a powerful antiseptic; intense cold will prevent change even in those substances which putrefy most readily. To render timber more durable and less liable to decay, corrosive sublimate, chloride of zinc, and heavy oil of tar are sometimes used. For this purpose the wood is placed in a steam-box, its pores are filled with steam, and a vacuum is formed in the pores by the condensation of the steam. The pores are then filled with the antiseptic substance.

The more important chemical antiseptics are—alcohol, wood-spirit (or pyroxylic acid), creasote, carbolic acid, heavy oil of tar, sugar, glycerine, sulphurous acid, common salt, charcoal, nitre, alum, chloride of zinc, sulphate of copper (blue vitriol), cresylic acid, sulphate of iron, aluminum chloride and acetate, and other aluminum compounds, corrosive sublimate, and arsenic. Sulphurous acid acts by deoxidizing the substance; sugar acts by combining with the water of the substance to be preserved; creasote, tannic acid, alum, chloride of zinc, sulphate of copper, corrosive sublimate, and arsenic form compounds with the organic matter which are not liable to become putrescent; alcohol, salt, and nitre act both by combining with the water of the putrescible substance, and by combining with the substance itself. (See PRESERVATION OF FOOD, PRESERVATION OF TIMBER, DISINFECTION, and FERMENTATION.)

Anti-Slavery, a term which originated during the long agitation that resulted in the overthrow of slavery in the U. S. It was used nearly synonymously with "abolition," but was preferred by many as being more definite, since the latter term might as well be applied to the "abolition of royalty" (a phrase much in vogue during the first French Revolution) as to the doing away with slavery. The anti-slavery sentiment in the U. S. became more and more widely diffused and more intense as the evils of slavery became more apparent, but it found its most decided and forcible expression through the organization known as the American Anti-Slavery Society. (See next article.)

Anti-Slavery Society, American. This society was organized in Dec., 1833, in the city of Philadelphia, by a convention of delegates from a few anti-slavery societies already in existence in the U. S., and of other persons who were friends of emancipation. The preamble and second and third articles of its constitution express the character and purposes of the society. The preamble asserts that, "Whereas, slavery is contrary to the principles of natural justice, of our republican form of government, and of the Christian religion, and is destructive of the prosperity of the country, while it is endangering the peace, union, and liberties of the States; and whereas, we believe it the duty and interest of the masters immediately to emancipate their slaves, and that no scheme of expatriation, either voluntary or by compulsion, can remove this great and increasing evil; . . . we do hereby agree to form ourselves into a society," etc. The second and third articles declare that "the object of this society is the entire abolition of slavery in the United States;" that the society "shall aim to elevate the character and condition of the people of color, by encouraging their intellectual, moral, and religious improvement, and by removing public prejudice, that thus they may, according to their intellectual and moral worth, share an equality with the whites of civil and religious privileges; but this society will never, in any way, countenance the oppressed in vindicating their rights by resorting to physical force."

The society, thus organized, immediately adopted and published a "Declaration of Sentiments," in which they declared: "The right to enjoy liberty is inalienable. To invade it is to usurp the prerogative of Jehovah. Every man has a right to his own body, to the products of his own labor, to the protection of law, and to the common advantages of society. It is piracy to buy or steal a native African, and subject him to servitude. Surely the sin is as great to enslave an American as an African. Therefore we believe and affirm that there is no difference in principle between the African slave-trade and American slavery; that every American citizen who retains a human being in involuntary bondage as his property is, according to Scripture, a man-stealer; that the slaves ought instantly to be set free, and brought under the protection of law; that if they lived from the time of Pharaoh down to the present period, and had been entailed through successive generations, their right to be free could never have been alienated, but their claims would have constantly risen in solemnity; that all those laws which are now in force, admitting the right of slavery, are therefore, before God, utterly null and void, being an audacious usurpation of the Divine prerogative, a daring infringement on the law of nature, a base overthrow of the very foundations of the social compact, a complete extinction of all the relations, endearments, and obligations of mankind, and a presumptuous transgression of all the holy commandments; and that therefore they ought instantly to be abrogated. We further believe and affirm that all persons of color who possess the qualifications which are demanded of others, ought to be admitted forthwith to the enjoyment of the same privileges, and the exercise of the same prerogatives, as others; and that the paths of preferment, of wealth, and of intelligence should be opened as widely to them as to persons of a white complexion."

Respecting the measures by which the society would seek the accomplishment of its purpose, the Declaration asserts: "Our principles forbid the doing of evil that good may come, and lead us to reject, and to entreat the oppressed to reject, the use of all carnal weapons for deliverance from bondage; relying solely upon those which are spiritual, and mighty through God to the pulling down of strongholds." "Our measures shall be such, only, as the opposition of moral purity to moral corruption; the destruction of error by the potency of truth; the overthrow of prejudice by the power of love; and the abolition of slavery by the spirit of repentance." "We shall send forth agents to lift up the voice of remonstrance, of warning, of entreaty and rebuke. We shall circulate, unsparingly and extensively, anti-slavery tracts and periodicals. We shall enlist the pulpit and the press in the cause of the suffering and the dumb. We shall aim at a purification of the churches from all participation in the guilt of slavery. We shall encourage the labor of freemen rather than that of slaves, by giving a preference to their productions. We shall spare no means to bring the whole nation to speedy repentance."

Arthur Tappan, Lindley Coates, William Lloyd Garrison, and Wendell Phillips successively presided over this society from the time of its organization to that of its disbandment. Among the persons who have held offices in it are—Benjamin Lundy, Lucretia Mott, William Jay, John G. Whittier, Abby Kelly Foster, Gerrit Smith, Samuel J. May, Owen Lovejoy, and Edward Beecher. Its organization was the signal for the concentration of the resistance of slaveholders and their allies, North and South, against the anti-slavery sentiment which had always existed, and which had, from time to time, found expression in the community. Numerous anti-slavery societies, of States, counties, and cities, were soon organized throughout the North; and these, with those which had been founded prior to the American Society, became its auxiliaries. Besides this organized aid, it received cordial sympathy and substantial help from men and women not enrolled as its members, who welcomed it as a mighty instrumentality for the overthrow of slavery. It represented the moral sentiment of the country, which was actively warring against American slavery. During its existence it adhered to its original constitution, and carried on its work in accordance with its Declaration of Sentiments. At its tenth annual meeting, held in New York in May, 1844, it adopted a resolution declaring that, whereas the Constitution of the U. S. contained provisions requiring the rendition of the fugitive slave to his master, therefore fidelity to the cause of freedom required the dissolution of the national compact, and forbade abolitionists to hold office or vote under that Constitution. During a long period of years this society and its adherents were opposed by a large portion of the press and of the pulpits of the nation, and were frequently the victims of the violence of mobs, who disturbed their meetings, assaulted their persons, destroyed their property, and imperilled their lives. In May, 1838, Pennsylvania Hall, a large building erected in Philadelphia for the use of public meetings, and especially for anti-slavery meetings (against which nearly all the churches and halls of the country were then closed), was burned to the ground by a furious mob on the fourth day after its opening and dedication. The purpose of this society—namely, the creation of a public sentiment which should overthrow American slavery—was at last accomplished. This moral force, which had been steadily increasing for more than a quarter of a century, and which had called into existence a small and earnest political party, at length pervaded the Republican party to the extent necessary for a successful resistance, first, to the *extension* of slavery, and then to its *existence*. When the thirteenth amendment of the U. S. Constitution was ratified, abolishing slavery within the jurisdiction of the U. S., and the fourteenth and fifteenth amendments had secured to the emancipated slave his personal freedom, by endowing him with the ballot of a citizen, the American Anti-Slavery Society (the work for which it was organized being finished) disbanded its members and ceased to exist, on the ninth day of April, 1870. HORACE GREELEY.

Antispasmod'ics, a name applied to medicines which cure or alleviate spasm. The name is frequently limited to a small class of drugs which have usually a strong and often an unpleasant odor, and which in some cases act as diffusive stimulants. Such are valerian, assafœtida, myrrh, musk, ammonia, ether, etc. Others are sedatives, as hydrocyanic acid. The term might well include the other nerve-sedatives or depressors of reflex action, like bromide of potassium, belladonna, Calabar bean, curari poison, etc. The best treatment for spasmodic symptoms aims, however, at the restoration of health by proper food, good air, and correct habits of life, and by such special treatment as the case may require.

Antis'thenes [Ἀντισθένης], an eminent Greek Cynic philosopher, called the founder of the Cynic sect or school, was born at Athens, and flourished about 400 B. C. He was a young man when he served at the battle of Tanagra, 426 B. C. He was a pupil and friend of Socrates, whose death he witnessed. After this event he opened a school at Athens in the gymnasium of Cynosarges, where the famous and witty Diogenes became one of his pupils. He was a man of temperate habits and simple mode of life, inculcating a contempt of riches and sensual pleasure. He maintained that virtue is all-sufficient for happiness, and directed his attention chiefly to practical morality. His works on various subjects are lost, but several of his sententious and pithy sayings have been preserved. Socrates reproved the poverty of his dress and his neglect of the conventional by saying, "I can see thy pride through the holes in thy robe." Antisthenes was living in 371 B. C.

Antis'trophe [Gr. ἀντιστροφή, from ἀντί, "against," and στρέφω, to "turn"], a term applied by the ancient Greeks to that part of a song or dance before the altar which was performed by turning from the left to the right. Hence a stanza or portion of poetry following the strophe, and responding to it, was called antistrophe.

An'ti-Tau'rus, a range of mountains in the N. part of Asia Minor, extends from the Bosphorus eastward, and is nearly parallel to the Black Sea. According to some authorities, it extends from Arjish-Dagh (Mount Argæus) north-eastward into Armenia, forming the watershed between the Euphrates and the Kizil-Irmak, which enters the Black Sea. The name Anti-Taurus was given to the range because it is "opposite to or over against the Taurus." As the latter extends along the coast of the Mediterranean, so the former runs along the coast of the Black Sea.

Antith'esis [from the Gr. ἀντί, "against," and θέσις, a "position"], in rhetoric, a figure of speech in which an idea is rendered more emphatic and impressive by juxtaposition and contrast with an opposite or converse idea. Thus a critic said of a certain book, "It contains many good things, and many new; but the good are not new, and the new are not good."

Anti-Trinitarians. See UNITARIANS, by ORVILLE DEWEY, S. T. D., LL.D.

An'titype [Gr. ἀντίτυπος, from ἀντί, "against," and hence "corresponding to," and τύπος, a "type"], a type or figure which corresponds to some other type. In theology, it denotes that of which the type was a prefiguration; the person in whom any prophetic type is fulfilled. "The holy places made by hands are figures of the true," which are the antitypes of the former. (See TYPE.)

An'tium [It. *An'zo*], an ancient city of Latium, on the sea-coast, 34 miles S. S. E. of Rome, was a favorite resort of opulent citizens of Rome, in whose villas famous works of art have been discovered. Among these was the Apollo Belvedere. The emperors Caligula and Nero were natives of Antium, the site of which is now occupied by a village called Porto d'Anzo (*i. e.* the "port of Antium").

Anti'vari, a town and seaport of Albania, on the Adriatic, 14 miles N. W. of Scutari. The harbor is shallow, and admits only small vessels. It exports oil, etc., and has, with its suburbs, about 1000 houses. Pop. about 5000.

Ant-Lion, the larva of several species of *Myrmeleon,*

Ant-Lion.

and other cognate genera, insects of the order Neuroptera, found in sandy tracts in different parts of the world. The perfect insect is similar in appearance to the dragon-fly. The larva is remarkable for the curious and insidious mode in which it catches the ants and other insects on which it feeds. It excavates a funnel-shaped cavity in the sandy soil, and lies in wait at the bottom until an insect comes so near to the edge of the pit that the loose sand gives way and the insect falls down the slope. If, before reaching the bottom, its victim begins to climb upward, the ant-lion throws sand upon it and brings it down. Several species of ant-lion are found in the U. S.

Antœci, an-tee'sī [from the Gr. ἀντί, "against," and οἶκος, a "house" or "dwelling-place"], in geography, is applied to people who live under the same meridian and at the same distance from the equator, but the one in north and the other in south latitude. The summer of one coincides in time with the winter of the other.

Antoine, a post-township of Clarke co., Ark. P. 1835.

Antoine, a township of Pike co., Ark. Pop. 238.

Antommar'chi (FRANCESCO), an Italian anatomist, born in 1780, a native of Corsica, became anatomical dissector to a hospital of Florence. In 1819 he was sent for to attend Napoleon at St. Helena. The ex-emperor was so well pleased with him that he left him a legacy of 100,000 francs. He published "The Last Moments of Napoleon" (2 vols., 1823). In 1836 he settled in New Orleans as a homœopathist. He died in Cuba April 3, 1838.

Anton Ulrich, a son of the duke of Brunswick-Wolfenbüttel, was born in 1714. He married in 1739 Anna Carlovna, who was a niece of the Russian empress, Anna Ivanovna, and who became regent in 1740. In Dec., 1741, Anna was deposed, and banished with her husband to the government of Archangel. He is supposed to have died about 1780.

Antonel'li (GIACOMO), an Italian cardinal and astute politician, born at Sonnino April 2, 1806. He became grand treasurer of the two apostolic chambers in 1845, and was appointed minister of finance by Pius IX., soon after his election. In 1847 he was made cardinal-deacon. He acquired much influence with the pope, and opposed the liberal movement of 1848. In 1849 he was appointed papal secretary of foreign affairs (*i. e.* prime minister), which place he still occupied when Rome, in 1870, was incorporated with the kingdom of Italy. He has strenuously opposed the cause of Italian unity.

Antonel'lo, or **Antonelli** (ANTONIO), surnamed DA MESSINA, from the place of his birth, an eminent painter, born at Messina in 1414. He is reputed to be the first Italian who painted in oil, having visited Bruges and obtained from J. van Eyck the secret of oil-painting. He returned to Italy about 1445, after which he worked at Milan, and removed to Venice about 1470. He gained distinction by the brilliance of his coloring. Died in 1475.

Anto'nia (MAJOR, or the ELDER), a Roman lady, a daughter of Mark Antony the Triumvir, was born in 39 B. C. Her mother was Octavia, a sister of Augustus Cæsar. She was married to L. Domitius Ahenobarbus, and was the grandmother of Nero.—Her sister, ANTONIA MINOR (the Younger), was born 36 B. C. She was the wife of Claudius Drusus Nero, and mother of the famous Germanicus and of the emperor Claudius. She is said to have been virtuous and fair. Died in 37 or 38 A. D.

Anto'nides van der Goes (JOHANNES), a Dutch poet, born at Goes in 1647. He held an office in the admiralty. His principal work is a national epic poem on the river Y, which is entitled "Ijstroom," or "Y-Stroom" (1671), and was very popular. Died Sept. 18, 1684.

Antoni'nus (MARCUS AURELIUS), usually called **Marcus Aurelius,** sometimes surnamed THE PHILOSOPHER, a Roman emperor highly distinguished for his wisdom and virtue, was born in Rome in April, 121 A. D. He was a son of Annius Verus and Domitia Calvilla, and his original name was MARCUS ANNIUS VERUS. His education was directed by Fronto and Herodes Atticus. He became a disciple of the Stoic philosophy, with the principles of which his habitual conduct was consistent. Having been adopted as a son by the emperor Antoninus Pius in 138 A. D., he assumed the name of M. Ælius Aurelius Verus Cæsar. He was chosen consul in 140, and married Faustina, a daughter of Antoninus Pius, whom he succeeded in 161 A. D. He then admitted Lucius Commodus (or Lucius Verus) to a share of the imperial power, but the latter died in the year 169. Before this date the Roman army gained several victories over the Parthians. Although the temper of Marcus Aurelius was pacific, he was involved in frequent wars by the aggressions of northern barbarians and the revolts of his subjects. He conducted in person an expedition against the Marcomanni, which was successful, in 168 A. D., and he afterwards drove them out of Pannonia. In 174 A. D. he gained over the Quadi a famous victory, which was reputed

miraculous. According to Dion Cassius and other writers, the Romans, who were suffering with thirst, were refreshed by a shower of rain, while their enemies were demoralized by a violent storm of hail. One of his generals, named Avidius Cassius, then commanding in Syria, revolted in 175 A. D. and obtained possession of Egypt and part of Asia, but he was killed by his own officers in the same year. In 176 the emperor visited Syria and Egypt, and displayed great clemency towards persons who had been implicated in the recent rebellion. On his homeward journey he passed through Athens, where he founded a chair of philosophy for each of the four sects, Platonic, Stoic, Peripatetic, and Epicurean. His ardent love of learning continued unabated in advanced age, and he cherished constantly, amidst the turmoil of war and the distractions of public life, his philosophic and philanthropic aspirations. No monarch was ever more warmly and generally beloved by his subjects. It is a strange anomaly in his character and conduct that he persecuted the Christians. During a campaign against his inveterate enemies, the Marcomanni, he died at Sirmium or at Vindebona (Vienna) in Mar., 180 A. D., and was succeeded by his son Commodus. He was author of an excellent ethical work in Greek, called "Meditations," a good English version of which, by George Long, appeared in 1862, under the title of "Thoughts of M. Aurelius Antoninus." "His writings," says the eminent philosopher, J. Stuart Mill, "the highest ethical product of the ancient mind, differ scarcely perceptibly, if they differ at all, from the most characteristic teachings of Christ. This man, a better Christian in all but the dogmatic sense of the word than almost any of the ostensibly Christian sovereigns who have since reigned, persecuted Christianity. To my mind this is one of the most tragical facts in all history." (See J. Capitolinus, "Marcus Aurelius Philosophus;" Ripault, "Histoire de l'Empereur Marc-Antonin," 5 vols., 1820; Tillemont, "Histoire des Empereurs;" De Suckau, "Étude sur Marc-Aurèle," 1857; Dion Cassius, "History;" Aurelius Victor, "De Cæsaribus Historia.")

William Jacobs.

Antoni'nus, Column of, a pillar which Marcus Aurelius erected in Rome to the memory of Antoninus Pius, or perhaps in his own honor. It is a combination of the Corinthian and Doric orders, and is adorned with bas-reliefs of the victories which Marcus Aurelius gained over the Marcomanni. It stands in the Piazza Colonna.

Antoninus, Itinerary of [Lat. *Antoni'ni Itinera'rium*], a valuable geographical work, the date and author of which are unknown. It contained the names of all places and stations on the roads of the Roman empire, with their distances in Roman miles.

Antoni'nus Pi'us (or, more fully, **Titus Aure'lius Ful'vus Boio'nius Ar'rius Antoni'nus**), a Roman emperor, born at Lanuvium Sept. 19, 86 A. D., was a son of Aurelius Fulvus. He was chosen consul in 120 A. D., and married Anna Galeria Faustina. Having, as proconsul in Asia, distinguished himself by his wisdom and equity, he was adopted by Hadrian in 138 A. D., and he ascended the throne on the death of Hadrian, in July of that year. He adopted as his successor Marcus Aurelius. His reign was so peaceful and prosperous that it furnishes but scanty materials for history. Antoninus promoted literature, and treated the Christians with mildness. As a man he was temperate, humane, learned, and eloquent. The name of "Pater Patriæ" ("Father of his Country") was given to him by the vote of the Roman senate. He had two sons, whom he survived. He died Mar. 7, 161 A. D., and was succeeded by Marcus Aurelius. His memory was greatly venerated by the Romans of his own and later ages. (See J. Capitolinus, "Vita Antonini.")

Antoninus, Wall of (anc. *Antoni'ni Val'lum*), a rampart or intrenchment raised in Scotland by the Romans under Lollius Urbicus, in the reign of Antoninus Pius, in 139 A. D. It extended from the Clyde to the Frith of Forth, was 35 miles long and 20 feet high, and was built of earth and stone. Its remains are called "Græm's dyke."

Anto'nio (Nicolas), [Lat. *Nicola'us Anto'nius*], an eminent Spanish critic and bibliographer, born at Seville in 1617. He published "Bibliotheca Hispana Nova" (2 vols., 1672), and "Bibliotheca Hispana Vetus" (2 vols., 1696), which contain catalogues of all the Spanish books, with biographical notices, and are highly esteemed. He was Spanish agent at Rome 1659–81. Died April 13, 1684.

Anto'nius (Caius Hybrida), a Roman consul, was a son of M. Antonius the Orator, and an uncle of Mark Antony the Triumvir. He was chosen consul as the colleague of Cicero in 63 B. C. He was a profligate politician, and did not earnestly co-operate with Cicero in opposing the conspiracy of Catiline. Died in 44 B. C.

Antonius (Marcus), called the Orator, an eminent Roman orator and lawyer, born in 143 B. C., was grandfather of the famous Mark Antony. He became prætor in 104, and consul in 99 B. C., and was attached to the aristocratic party. Having become an adherent of Sulla in the civil war, he was assassinated by the order of Marius in 87 B. C. He was perhaps the most eloquent Roman orator of his time. His eloquence is highly eulogized by Cicero in his treatise "De Oratore," and in his "Brutus." The orations of Antonius are not extant.

Antonius (Marcus), surnamed the Triumvir, commonly called in English **Mark Antony,** a celebrated Roman general and politician, born in 83 B. C., was a son of M. Antonius Creticus. His mother Julia was a daughter of L. Julius Cæsar, who was consul about 90 B. C. Though in his youth he was addicted to licentious vice and debauchery, he distinguished himself at an early age by his talents and riotous audacity. He obtained about 57 B. C. command of the cavalry of Gabinius in Syria and Egypt. Having been elected quæstor in 53 or 52, he served in Gaul as legate of Cæsar, and displayed superior talents in several campaigns. Through the influence of Cæsar he was elected augur and tribune of the people in 50 B. C. As tribune he promoted the interest of Cæsar, and vetoed a decree of the senate which ordered Cæsar to disband his army. Early in 49 B. C. he fled from Rome to the camp of the general last named. After the civil war began, and Cæsar passed into Spain, he appointed Antony commander-in-chief of his forces in Italy. The latter commanded the left wing at the battle of Pharsalia, 48 B. C. In the year 47 he became master of the horse to Cæsar, who was now invested with the office of dictator. He married Fulvia, the widow of the demagogue P. Clodius, about 45 B. C., and was chosen consul with Cæsar as his colleague in 44. Although he indulged freely in licentious orgies, and disgraced himself by the effrontery with which he violated the proprieties of life, he displayed great political ability, especially in the crisis which followed the death of Cæsar. He negotiated with Brutus and Cassius, and temporized with the senate, whom he induced to ratify the acts of the late dictator. His eloquent funeral oration over the body of Cæsar excited such popular indignation against the conspirators that they were compelled to retreat from Rome. In 43 B. C. Antony was defeated in battle by the consuls Hirtius and Pansa at Mutina (now Módena). About this time he was denounced by Cicero in a series of famous orations called "Philippics." Before the end of the year 43, Antony, Octavius, and Lepidus united to form a league (triumvirate) against the senate and the republicans, many of whom were put to death by the myrmidons of the triumvirs. At the instigation of Antony, Cicero was proscribed and killed. It was the military skill of Antony which defeated Brutus and Cassius at the decisive battle of Philippi (42 B. C.), which rendered the triumvirs masters of the Roman world. This victory was followed by another bloody proscription. Antony, who received for his share of the empire the Asiatic provinces and Egypt, now gave himself up to pleasure and luxury. He was so captivated by Cleopatra, queen of Egypt, that he neglected public affairs while Octavius was marching with stealthy steps towards supreme and undivided power. Antony and Octavius were involved in a quarrel in the year 41, but they were formally reconciled in 40 B. C., and Antony then married Octavia, the sister of his rival or colleague. About the end of the year 38 the triumvirate was renewed for a period of five years. Arousing once from his indolent and luxurious mode of life, he marched with an army into Armenia and invaded Parthia, in which he fought many battles. He soon divorced Octavia, and returned to his dalliance with Cleopatra. The conflict which had been postponed now became inevitable, and Antony was defeated at the naval battle of Actium in Sept., 31 B. C. He then retreated to Alexandria in Egypt, and was deserted by his fleet. Reduced to a desperate extremity, he killed himself in 30 B. C. He left two sons, Iulus and Antyllus. (See Plutarch, "Life of Antony;" Drumann, "Geschichte Roms;" Appian, "Bellum Civile.")

William Jacobs.

Antony, or **Anthony** [Lat. *Anto'nius*], Saint, surnamed Abbas, an eminent anchorite, called the founder of monachism, was born in Upper Egypt in 250 A. D. He reduced himself to voluntary poverty, and retired to a desert, where he passed many years in ascetic devotion and solitude. About 305 he founded a monastery near Faioom (or Phaiûm). He was an opponent of Arianism, and was venerated as a saint and oracle by his contemporaries. During the persecution of the Christians in 311 he went to Alexandria in the hope of obtaining the crown of martyrdom, but he was disappointed, and returned to the desert. He had an interview many years later with Athanasius, who wrote an account of his life. Some of the letters of Saint Antony are extant. Died Jan. 17, 356 A. D.

Antony, or **Anthony** (Saint), **of Padua** [It. *Anto'nio*], was born at Lisbon Aug. 15, 1195. He became a Franciscan monk, and preached at Toulouse, Bologna, and Padua, where he died June 13, 1231. According to a legend, he once preached to the fish in the sea an eloquent sermon, which attracted, it is said, the devoted attention of his finny auditors. This sermon is still extant. An abstract of it in Italian and English may be seen in Addison's "Remarks on Italy." He was canonized in 1232.

An'tony of Bourbon [Fr. *Antoine de Bourbon*], duke of Vendôme and king of Navarre, was born in Picardy April 22, 1518. He was a brother of the prince of Condé. He married, in 1548, Jeanne d'Albret, the only child of the king of Navarre. In 1560 he was appointed lieutenant-general of France. Soon after that date he formed a coalition with the duke of Guise and Constable Montmorency, and became a Roman Catholic. He commanded the royal army for a short time in the civil war, and was mortally wounded at Rouen, and died Nov. 17, 1562. He was the father of Henry IV. of France.

An'trim, the extreme N. E. county of Ireland, in Ulster, bounded on the N. by the Atlantic, on the E. by the Irish Channel, on the S. by the Lagan River, and on the W. by the river Bann. Area, 1164 square miles. The surface near the sea-coast is hilly, and the soil is mostly light. The rock which underlies it is basaltic trap, with some new red sandstone. Lignite of good quality is mined. On the N. coast is the famous Giants' Causeway, one of the most perfect examples of columnar basalt in the world. Oats and flax are the staple products of the soil. The county has extensive manufactures of linen and cotton. Chief town, Belfast. Pop. in 1861, 378,588; in 1871, 419,782.

An'trim, a county in the N. W. part of the southern peninsula of Michigan, is bounded on the W. by Grand Traverse Bay. Area, estimated at 700 square miles. It contains several lakes. Wheat, timber, fruit, butter, and potatoes are the chief products. Capital, Elk Rapids. Pop. 1985.

Antrim, a township of Shiawassee co., Mich. Pop. 992.

Antrim, a post-township of Watonwan co., Minn. P. 263.

Antrim, a post-township of Hillsborough co., N. H. It has manufactures of lumber, leather, furniture, sewing silk, etc. Pop. 904.

Antrim, a post-village of Morris, Charleston, and Delmar townships, Tioga co., Pa., at the southern terminus of the Corning Cowanesque and Antrim R. R., 38 miles from Lawrenceville. Here are mines of excellent semi-bituminous coal, and forests of timber of the best quality.

Antrim, a township of Wyandot co., O. Pop. 1061.

Antrim, a township of Franklin co., Pa. Pop. 3762.

Ant'werp, a province of Belgium, is bounded on the N. by Holland, on the E. by Limbourg, on the S. by South Brabant, on the W. by the river Scheldt. Area, 1093 square miles. The river Dyle forms part of its southern boundary. The soil is generally fertile, and produces grain, hemp, madder, hops, and pine timber. Capital, Antwerp. Pop. in 1869, 485,883.

Ant'werp [Dutch *Ant'werpen*; Lat. *Antuer'pia*; Fr. *Anvers*, ôn'vair'; Sp. *Ambéres*], the chief commercial city of Belgium, and capital of a province of its own name, is on the right bank of the Scheldt, 26½ miles by rail N. of Brussels; lat. 51° 13′ N., lon. 4° 24′ E. It is strongly fortified, and has among its defences a citadel built by the duke of Alva in 1567. The magnificent public buildings, the numerous churches, the stately and antique houses, and the profusion of ornamental trees, render the general appearance of the city very picturesque. The streets are tortuous and irregular, but one of them, called the Place de Meir, is scarcely surpassed in beauty by any street in Europe. Foremost among the public buildings is the cathedral, one of the largest and most beautiful specimens of Gothic architecture in Europe. It is 500 feet long and 240 feet wide, and contains the principal masterpieces of Rubens. Among the other public edifices are the exchange and the marble hôtel de ville. The principal institutions are—the Academy of Sciences, the Academy of Painting and Sculpture, a rich gallery of pictures, a public library, and a botanic garden. Antwerp has an excellent harbor, which will admit the largest vessels. Railways extend from this place to Holland, Prussia, Brussels, and Ghent. It has an extensive trade, and is an important market for hides. Here are manufactures of black silk stuffs, cotton, linen, lace, carpets, sewing-silk, and printers' ink. Antwerp was a city as early as the eighth century, and was formerly more populous than it is now. In the fifteenth and sixteenth centuries it was the great centre of European commerce, and had 200,000 inhabitants or more. It is stated that 500 vessels daily entered its port. It was besieged and taken by the prince of Parma in 1585, soon after which much of its commerce was transferred to Amsterdam. By the treaty of Paris, Antwerp, with the rest of Belgium, was annexed to the kingdom of Holland in 1814. In the popular rising of 1830 against that government the citadel was held by Dutch troops under command of General Chassé. The resulting siege of Antwerp by the French was a fine practical example of the science of sieges, which excited the interest of military amateurs of all nations. The defence exhibited a conspicuous example of fortitude and endurance. The capitulation took place Dec. 24, 1832, the trenches having been opened Nov. 30. During recent years, Antwerp, the true military capital of Belgium, has been fortified under a very distinguished engineer, Colonel Brialmont, as the central point of a great intrenched camp on the Scheldt, by a system of works "unrivalled in Europe in the intelligent application of the true principles of art to a great practical example." Pop. in 1869, 126,663.

Revised by J. G. Barnard, U. S. A.

Antwerp, a twp. of Van Buren co., Mich. Pop. 2690.

Antwerp, a village of Jefferson co., N. Y., in a township of the same name, on the Rome Watertown and Ogdensburg R. R. It has one newspaper and one bank, and is the seat of the Northern New York Conference Seminary. Two hundred thousand tons of iron ore are raised from beds in this vicinity per year. The Jefferson Iron Company is located here. Pop. of township, 3310; of the village, 773.

Ed. of "Antwerp News."

Antwerp, a post-village of Paulding co., O., on the Toledo Wabash and Western R. R., 23 miles N. E. by E. of Fort Wayne, Ind., and on the Wabash and Erie Canal. It has one weekly newspaper. Pop. 717.

Anu'bis, or **Anepu,** an idol of the Egyptians, was represented as a son of Osiris, and as having the form of a dog, or a man with a dog's head.

Anvari', or **Anwari,** a Persian poet, born in Khorassân. He rose to celebrity about 1150, and enjoyed the favor of the Seljukide sultan Sanjar, at whose court he passed many years. He wrote numerous lyrical poems, which are much admired. His elegy on the capture of Sanjar by the Ghaurians has been translated into English. Having turned his attention to astrology, and predicted that a great hurricane would occur in 1185 or 1186, he fell into disgrace when his prediction was not fulfilled. Died about 1200.

An'vil, an iron block with a smooth surface on which blacksmiths hammer and shape their work. It varies in form and in size. The common or middle-sized anvil, on which iron is forged with a sledge-hammer, is in the form of an oblong table, which has a conical horn at one end, and sometimes a pyramidal horn at the other end. The upper surface of the anvil is sometimes made of steel.

Anville, a township of Sumpter co., Ala. Pop. 410.

Anville, d' (Jean Baptiste Bourguignon), a celebrated French geographer, born in Paris July 11, 1697. He devoted his whole life to the study and improvement of geography, and is recognized as the first who raised geography to the rank of an exact science. He was appointed geographer to the king, and became a member of the Academy of Sciences. Among his works are "Orbis Romanus" ("Roman World"), "Orbis Veteribus Notus" ("The World known to the Ancients"), and a "Compendium of Ancient Geography" (in French, 3 vols., 1768). He published 211 maps and plans, which embrace nearly every country in the world. Although he never travelled, he delineated various foreign countries with remarkable accuracy. The correctness of his map of Egypt was confirmed by the French survey of 1798–99. Died Jan. 28, 1782. (See Condorcet, "Éloge de M. d'Anville," 1762.)

Anzas'ca, Val d', a picturesque valley of Piedmont, in the province of Novara. It has beautiful cascades, and affords fine views of Monte Rosa. Gold is found here.

Anzin, a town of France, in the department of Nord, 1 mile N. W. of Valenciennes. It has iron-foundries and glass-works, and is the centre of the greatest collieries of France. Pop. in 1866, 7283.

Ao'nia, a district of ancient Greece, in Bœotia, contained Mount Helicon (the Aonian Mount) and the fountain Aganippe. These were celebrated as the favorite resorts of the Muses, who were called *Aon'ides*.

A'orist [from the Gr. α, priv., and ὅρος, a "limit"], a form of the Greek verb which represents an action as taking place in an indefinite time. The Greek language has, in addition to the imperfect, perfect, and pluperfect, the aorist, which is peculiarly adapted to the narrative style. The aorist has two forms, called first and second aorist, but very few verbs have both in use.

Aor'ta [Gr. ἀορτή, from ἀείρω, to "raise up," to "support," to "suspend," because it is supported or suspended

from the heart], the large arterial trunk arising from the left ventricle of the heart, and giving origin directly or indirectly to all arteries except the pulmonary and its ramifications. The curve that it makes in the upper part of its course, during which it sends off the innominata and the left carotid and subclavian arteries, is called the arch of the aorta. The *thoracic* aorta extends from the third dorsal vertebra to the diaphragm, where it takes the name of *abdominal* aorta, which in the lower part of the abdomen, about opposite the fourth lumbar vertebra, divides into the two iliac arteries, going to supply the lower extremities. The thoracic aorta gives off two or three bronchial arteries to supply the tissue of the lungs. The abdominal aorta gives off two phrenic arteries to the diaphragm, and the cœliac axis, which divides into three branches to supply the stomach, liver, and spleen, besides several smaller arteries. (See CIRCULATION OF THE BLOOD.)

Aos'ta (anc. *Augus'ta Præto'ria*), a town of Italy, in the province of Turin, is on the river Dora, in a valley 50 miles N. N. W. of Turin. It has a Gothic cathedral, the remains of a Roman amphitheatre, and a fine triumphal arch. The valley of Aosta produces large forests of pine, and has mines of copper, silver, iron, and lead. Cheese, leather, wine, and hemp are exported. Pop. in 1861, 5958.

Apa'ches, a warlike tribe of savages who infest New Mexico and Arizona, and hitherto have persisted in hostility against the Mexicans and the white people of the U. S. They make frequent incursions into the states of Chihuahua and Sonora. They fight on horseback, and gain a subsistence by robbery. The rifle and bow and arrow are their principal weapons. They are divided into several bands or tribes.

Ap'afi (MICHAEL or MIHALY), prince of Transylvania, was born in 1632. He began to reign in 1661, and was for many years an ally of the Turkish sultan. In 1687 he became tributary to the emperor of Germany. Died April 15, 1690. He was succeeded by his son Mihaly, under whom Transylvania was invaded by the Turks, who took several towns. He sold his principality to Austria for a pension. Died in 1713.

Apalach'in, a post-village of Owego township, Tioga co., N. Y., on the S. bank of the Susquehanna. Pop. 300.

Apame'a, an ancient city of Syria, on the river Orontes, which here expands into a lake named Apamea, about 75 miles S. of Antioch. It was probably named in honor of Apame, the wife of Seleucus Nicator. The place was called *Famieh* in the time of the Crusades. Its extensive ruins still exist.

Ap'anage, or **Ap'panage** [from Lat. *ad*, "for," and *panis*, "bread," "living"], in feudal law, an allowance to the younger sons of a sovereign or prince out of the revenues of the country, generally joined with a grant of the public domain. In England the duchy of Cornwall is an apanage of the prince of Wales, but the younger sons of the sovereign are dependent upon the liberality of Parliament.

Apatin', a town of Hungary, in the county of Bacs, on the left bank of the Danube, 60 miles S. of Baja. It has a trade in silk, madder, and hemp. Pop. in 1869, 11,047.

Ap'atite [from the Gr. *ἀπάτη*, "deceit," so called because it deceives the observer by its resemblance to other minerals], the native phosphate of lime, which is extensively used as a manure in England and the U. S. It usually occurs in crystalline rocks, such as granite and greenstone, but is also found in granular limestone and serpentine. The most abundant supplies, however, are derived from beds of animal remains, bones, etc. When crystallized it appears in six-sided prisms, sometimes of a greenish color, and containing calcic phosphate, with a certain proportion of calcic chloride and fluoride, $Ca_3(PO_4)_2 + Ca(Cl_4F)_2$. The amorphous apatite which is used in the preparation of artificial manure is imported from Spain and Norway, and from Sombrero, Navassa, Swan, and some other small islands in the West Indies. Before it is applied to the soil it is ground to powder and subjected to the action of sulphuric acid, which renders the phosphoric acid of the apatite soluble in water. The efficacy of apatite as a fertilizer of the soil depends on the presence of phosphoric acid, which is essential to the growth of such plants as wheat, barley, and oats. It is often mixed with guano, bones, and other manures to make a complex fertilizer, which is better than the simple mineral phosphate. A rich deposit of apatite in the form of nodules has been found in the postpliocene marls of South Carolina, near the Ashley, Stono, and Edisto rivers. Large quantities of these nodules, which contain 25 or 30 per cent. of phosphoric acid, are converted into "superphosphate of lime" at Charleston, S. C., and at Camden, N. J. It is stated that about 13,000 tons of apatite (otherwise called phosphatic guano) were imported into the U. S. in 1868. Apatite occurs in large crystals, associated with white limestone, in St. Lawrence co., N. Y. Massive apatite is found in England, Ireland, Spain, and other countries. (See GUANO, BONE, FERTILIZERS, AGRICULTURAL CHEMISTRY.)

Apcheron. See APSHERON.

Ape [Gr. *πίθηκος*; Lat. *pithe'cus* or *sim'ia*], a name of a division of animals closely allied to monkeys, but having no tail. It comprises the chimpanzee, orang-outang, gorilla, gibbon, etc. The ape belongs to the order Quadrumana and class Mammalia, having four extremities, which are all adapted to grasping, like the human hand. Their structure is better adapted for climbing trees than for walking on the ground, and accordingly in the forest they swing from tree to tree with great agility and ease, but on the ground they are slow and almost helpless. A remarkable peculiarity in the habits of these animals is that they use clubs and stones as weapons for defence or offence. Apes are natives of Africa, India, Borneo, etc. (See CHIMPANZEE, GORILLA, ORANG-OUTANG.)

Ap'eldorn, or **Apeldoorn,** a beautiful village of Holland, in Gelderland, on the river Grift, 16 miles N. N. E. of Arnhem. Here are an agricultural school and manufactures of paper, blankets, and coarse woollen fabrics. Pop., with adjacent hamlets, in 1867, 12,411.

Apel'les [Gr. *Ἀπελλῆς*], a Greek painter, lived between 352 and 308 B. C. We do not know when or where he was born, nor when nor where he died, and not one of his pictures remains; yet his name stands for supreme excellence in the art of painting. Suidas says he was born at Colophon; Strabo and Lucian make him an Ephesian; and a doubtful reading in the case of each makes both Pliny and Ovid seem to call him a Coan. He studied first with Ephorus of Ephesus; afterwards with Pamphilus of Amphipolis. Plutarch (Aratus) says he joined the school of Melanthius at Sicyon, not to learn, but to gain credit. He painted many portraits of Philip, and also of Alexander, who would sit to no other painter. He probably accompanied Alexander to Asia, and after his death went to Egypt, from which time we hear no more of him. Apelles was generous to other painters and devoted to his art. He admitted that in some things he was excelled by other artists, but he claimed to surpass all others in grace. His industry gave rise to the proverb, "No day without a line." He knew when to stop correcting, declaring that "Too much labor is sometimes hurtful to a piece." To a cobbler, who, having rightly criticised the painting of a shoe in one of his pictures, went on to blame the leg, he said, "Let the cobbler stick to his last." He is thought to have invented the process known as glazing or toning, and he painted on movable panels—never, says Pliny, on walls. His most famous picture was that of "Venus Rising from the Sea" (*Venus Anadyomene*), painted for the temple of Æsculapius in Cos. (See PLINY, "Natural History XXXV. 10;" SUIDAS, "Apelles;" CARLO DATI, "Vite dei Pittori Antichi," 1667; DELLA VALLE, "Vite Pittori Antichi," 1795; WUSTMANN, "Apelles' Leben und Werke," 1870.)

CLARENCE COOK.

Ap'ennines [It. *Apenni'no*], (anc. *Mons Apenni'nus*), a long chain of mountains extending through the whole length of the Italian peninsula, and forming the watershed between the Adriatic Sea and the Mediterranean. This chain belongs to the system of the Alps, from which it branches off near the Col de Tenda. The northern portion, called the Ligurian Alps, is nearly parallel to the Gulf of Genoa, and is in close proximity to the coast. The entire length of the chain is about 800 miles, and its general direction nearly south-eastward. None of its summits rise to the limit of perpetual snow. The highest summit in the peninsula is Monte Corno, which has an altitude of 9546 feet, but Mount Etna, regarded by some as a part of the Apennine system, is 10,840 feet high. The average height of the chain is about 4000 feet. The geological formations of the Apennines are either metamorphic or secondary, and limestone is the predominant rock. They are remarkable for their rich quarries of marble of various colors, but are poor in metals. Rocks of volcanic origin abound in the former kingdom of Naples. The mineral riches of these mountains consist chiefly in the celebrated marbles of Carrara, Seravezza, and Sienna. The Apennines are somewhat deficient in sublime and magnificent scenery, and their general aspect is that of a wall, with few projecting peaks to break the monotony of the scene. The higher parts of these mountains are mostly dry, rocky, and destitute of trees, but below the altitude of 3000 feet they are covered with forests of the evergreen oak, chestnut, beech, and other trees. The olive, orange, and palm also flourish near their base, especially where they are in close proximity to the sea, as near the Gulf of Naples and at the

Riviera of Genoa. Some geographers divide this chain into four parts: 1. The Northern Apennines, extending from the Col de Tenda to the Pass of Borgo San Sepolcro, near Arezzo; 2. The Central Apennines, from Arezzo to the valley of the Pescara, which separates the provinces of Teramo and Chieti; 3. The Southern Apennines, from the Pescara to Cape Spartivento; 4. The Insular Apennines, in the island of Sicily. In Central Italy the western or southwestern side presents a very gradual descent, but in the northern part of the range, which approaches the coast, there is a very steep declivity next to the sea.

Apenra′de, a seaport-town in Sleswick, on a fiord of the same name in the Little Belt, 35 miles north of Sleswick. It has a good harbor and beautiful environs. Shipbuilding is carried on here. Near this town is the castle of Brundlund, built by Queen Margaret about 1410. Pop. in 1871, 5932.

Aphanip′tera, or **Aphanop′tera** [from the Gr. *ἀφανής*, "invisible," and *πτερόν*, a "wing"], *i. e.* with wings not apparent, although they have rudimental elytra (hence termed in English *aphanipterous*), the term applied to an order, sub-order, or family of wingless haustellate insects, composed of the different species of fleas, and forming the family Pulicidæ, and closely allied to the flies. There are many species, of which the common flea (*Pulex irritans*) may be regarded as the type. The female deposits her eggs, generally about a dozen in number, of a white color, in any favorable situation; and in about six days the larvæ are hatched, attaining their full size in ten or twelve days more. At the end of this time the larva spins itself a little silken cocoon, in which it passes into the pupa state, and in about twelve days afterwards emerges a perfect flea. This metamorphosis distinguishes the flea and chigoe from other blood-sucking parasitic insects; and they are further distinguished by the number of segments into which their bodies are divided, and by their five-jointed tarsi. The chigoe (*Sarcopsylla penetrans*) is a native of South America and the West Indies, and is an exceedingly annoying, and sometimes even a dangerous, insect. It penetrates the skin entirely out of sight, and in this way often forms troublesome ulcers, which, if neglected at first, are very difficult to heal.

Apha′sia [from the Gr. *α*, priv., and *φήμι*, to "speak"], a loss of speech which is a symptom of brain disease, as distinguished from *aphonia*, loss of speech from disease of the larynx or direct paralysis of that organ. Aphasia may coexist with the most perfect ability to utter words, or even to think, the patient sometimes persisting in giving things names which do not belong to them. At other times the patient, though he can utter words, cannot clothe his thought in articulate language, but manifests by signs, etc. a normal condition as regards intelligence. Aphasia is not necessarily a precursor of insanity, though sometimes observed in its early stages. One of the most remarkable facts in this connection is that apoplectic effusion, traumatic injury, or disease of the left frontal lobe, and especially of the third convolution, is notably liable to be followed by this symptom, which is not very frequent, and which sometimes ends in perfect recovery. (See APHONIA.)

Aphe′lion [from the Gr. *ἀπό*, "from," and *ἥλιος*, the "sun"], that part of a planet's orbit which is the most distant from the sun, and is opposite to the perihelion, or the point nearest the sun. In consequence of the mutual attractions of the planets, the figures and positions of their orbits are continually but slowly changed.

Aph′ides (sing. *a′phis*, gen. *aph′idis*, a "plant-louse"), the name applied to numerous homopterous insects of the family Aphidæ, and commonly known as plant-lice. They inhabit trees and plants, on the juices of which they feed. The aphides are remarkable for their saccharine secretion, but more especially for a peculiarity in their generative economy which consists in the first fecundation of the female influencing not only the ova developed immediately afterwards, but those of the females resulting from that development, even to the ninth generation, which are successively impregnated, and continue to produce without any intercourse with the male. In autumn the males are produced, when the last set of females are impregnated, and the fecundated eggs brought forth for the ensuing year. The body of these insects is generally flask-like, being furnished with six legs, a pair of antennæ, and two small tubes not far from the extremity of the abdomen through which the saccharine fluid is exuded. In some of the aphides wings are present, but in others they are not. The sweet fluid which they throw out is known as *honey-dew*, and is sometimes produced in such quantities as to fall in drops from the leaves of the trees to the earth. Ants have a special fondness for this substance, and often frequent plants on which it is deposited. They may sometimes be seen milking the aphides, as it is termed—that is, stroking these sugar-tubes with their antennæ, to induce them to furnish them the saccharine fluid more abundantly. Hence the aphides have been termed the milch-cows of the ants. Some species of this genus are very destructive to vegetation, as the hop-fly (*A′phis hu′muli*), and the aphis of the turnip cabbage (*A′phis bras′sicæ*), which have sometimes destroyed whole crops. The aphides are often infested by certain minute parasites, which, by laying their eggs in the bodies of those insects, cause the death of great numbers. It is remarkable that one of these parasites (*Aphid′ius*) has itself still more minute ichneumon parasites, whose eggs are deposited in its body.

Aphides.

Aphis. See APHIDES.

Apho′nia [from the Gr. *α*, priv., and *φωνέω*, to "make a sound"], a loss of speech in which the patient more or less completely loses power to utter sounds. This may arise from disease of the larynx, from direct paralysis of that organ, or from some functional disease, as hysteria or chorea. The treatment varies with the disease of which the aphonia is a symptom. As a general rule, these cases are temporary, unless there is a destruction or serious organic change in the tissues of the larynx.

Aph′rodite, a name of a hydrated silicate of magnesia found in Sweden. It is a soft, earthy mineral, with a waxy lustre, and resembles meerschaum.

Aphrodite. See VENUS.

Aph′tha, plu. **Aph′thæ** [from the Gr. *ἅπτω*, to "set on fire"], ulcers of the mouth, beginning with numerous minute vesicles and terminating in white sloughs. Aphthæ are usually the seat of microscopic vegetation, but whether the growth is an essential or only an accidental element is a disputed point. Aphthæ resemble "thrush" in appearance, but in the latter disease no vesicles are formed.

Aphthar′to-Doce′tæ [from the Gr. *α*, neg., and *φθαρτός*, "corruptible," and *δοκέω*, to "think," to "believe"], literally, "believers in [that which is] incorruptible," the name of the followers of Julian of Halicarnassus, who lived about 520 A. D., and taught that the body of Christ was divine and incorruptible.

A′pian [Lat. *Apia′nus*], or **Appian** (PETER), a German astronomer and mathematician, born in Misnia in 1495. His proper name was BIENEWITZ. He became professor of mathematics at Ingolstadt about 1524, and gained distinction by his writings, among which is a work on cosmography (1524). He first proposed the method of ascertaining the longitude by lunar observations. He was ennobled by the emperor Charles V. Died April 21, 1552.

Apiç′ius (MARCUS GABIUS), a celebrated epicure who lived at Rome in the reigns of Augustus and Tiberius. His name became proverbial for gluttony and luxury in eating. According to Seneca, he expended more than $3,500,000 in the indulgence of his taste for rare dishes, and then discovering that his fortune was reduced to ten million sesterces (about $360,000), he poisoned himself, because he could not continue his expensive style of living.

A′pion [*Ἀπίων*], surnamed PLISTONIÇES, a Greek grammarian and historian, born in the Great Oasis, Egypt, lived about 20–50 A. D. He opened a school of rhetoric in Rome about 45 A. D., and wrote several works, among which were a "History of Egypt" and a lexicon to Homer's poems. Josephus's work, usually called "Against Apion," was written in answer to a book which Apion wrote against the Jews. On account of his egotism and loquacity, Tiberius used to call him *Cymbalum Mundi* (the "Cymbal of the World"). His works are lost, except small fragments.

A′pios Tubero′sa, a papilionaceous plant of the natural order Leguminosæ, was formerly included in the genus *Glycine*. It is a native of Virginia, Ohio, New York, etc.,

has a twining stem, pinnate leaves, and tuberous roots, which are used as food, and resemble the potato. The roots are commonly called ground-nuts.

A'pis [Gr. Ἄπις], the name of the bull of Memphis, the favorite idol and object of worship of the ancient Egyptians. According to some authorities, he was sacred to Osiris, or was a symbol of Osiris, and was not permitted to live more than twenty-five years, at the end of which time he was secretly put to death by the priests. During his life he was kept in the temple of Ptah in Memphis, and served by a retinue of priests. His death was followed by a general mourning until a calf with the requisite color and marks was found to supply his place. The principal of these required marks were—black color with a white square on the brow, the figure of an eagle on the back, and a peculiar knot under the tongue.

Aplanat'ic Lens [from the Gr. α, priv., and πλάνη, "deviation"], in optics, a lens which causes all the rays of light that fall on it to converge to a single point or true focus. In order to be aplanatic, the lens must not only have the true geometrical figure necessary to destroy aberration, but must be formed of different media, so as to be achromatic. These conditions cannot be accurately fulfilled in practice.

Ap'lin, a township of Perry co., Ark. Pop. 439.

Apoc'alypse [Gr. ἀποκάλυψις, from ἀποκαλύπτω, to "reveal"], a word signifying "revelation," and usually applied to the last book of the New Testament. (See REVELATION.)

Apocalyp'tic Knights, a secret society of which scarcely anything is known, founded at Rome in 1692 by Agostino Gabrino, a citizen of Brescia. To defend the Roman Catholic Church against Antichrist is said to have been the avowed object of this society, but many suspected that the real design was hostile to the established social order, and that by Antichrist was meant the pope.

Apocalyptic Number, the mystical number 666 spoken of in the book of Revelation (xiii. 18). Some critics interpret this to be an enigmatical expression of the word *Latinus*, the Greek characters of which, taken as numerals, amount to 666. The connection between *Latinus* and the Roman power has given Protestants a reason, or pretext, to apply this passage to the Roman Church, and the Roman Catholics retort by making the same number stand for Luther, Calvin, and other Protestants.

Apocren'ic Ac'id [from the Gr. ἀπό, "from," and κρήνη, a "fountain," so called because derived from some fountains or springs], an extractive or brown matter found in some spring water and in ordinary vegetable mould. It is a product of the natural decay of wood and other vegetable tissue. (See HUMIC ACID.)

Apoc'rypha [from the Gr. ἀπόκρυφος, "hidden"], a term applied by Protestant theologians to a collection of writings which have been regarded as an appendage to the Old Testament, and sometimes as a part of it. They are valuable chiefly as historical records, and for the light they throw on the religious condition of the Jews from the period of the Old Testament to the Christian era. They are divided into three classes: 1st, those which originated in Palestine, such as the book of Jesus son of Sirach, first book of Maccabees, and book of Judith; 2d, those of Egypto-Alexandrian origin—the book of Wisdom, second of Maccabees, and the addition to Esther; 3d, those which show traces of Chaldaic or Persian influence, as Esdras, Tobias, Baruch, and the additions to Daniel. The Council of Laodicea in Phrygia, between 343 and 381 (commonly referred to cir. 360), condemned the use of "uncanonical books;" but the list of canonical books which follows is now generally thought to be an interpolation. The third Council of Carthage (Aug., 397), in the forty-seventh of its fifty canons, gives a list which includes Ecclesiasticus, Wisdom, Tobit, Judith, First and Second Maccabees. There are in all fourteen apocryphal books, or portions of books, all but three of which were pronounced canonical by the Council of Trent in 1546. The Roman Catholic Church calls these books deuterocanonical or antilegomena, and applies the name "apocryphal" to those books to which a reception into their canon of the books of the Old Testament has been refused. By Protestants these books are generally called PSEUDEPIGRAPHA (which see). The Church of England in her Articles mentions the Apocrypha as books which "the Church doth read for example of life and instruction of manners, but yet doth it not apply them to establish any doctrine." They are entirely rejected from public worship by Protestants in America, and by the dissenting churches in Great Britain. REVISED BY R. D. HITCHCOCK.

Apocyna'ceæ, or **Apocyn'eæ** [so called from *Apocynum*, the name of one of its genera], an order of exogenous herbs, trees, and shrubs. The calyx is usually 5-partite, persistent; the corolla monopetalous and hypogynous; the stamens are five, inserted on the corolla. Many of the species have a poisonous milky juice, and others are used in medicine. The whole number of the species is said to be more than 550. This order comprises the oleander; the hya-hya, or cow tree, the milk of which is wholesome; the *Cerbera*, which produces the Tanghin poison of Madagascar; the *Carissa edulis* of Arabia; and the *Apocynum cannabinum*, or Indian hemp, which grows in North America.

Ap'odal Fishes, or **Ap'odes** [from the Gr. α, priv., and πούς, ποδός, a "foot"], a term applied to fishes destitute of ventral fins or homologues of the posterior extremities. In the Linnæan system, Apodes was the name of an order of such fishes, but in the system of Cuvier less importance is attached to this distinctive character. Eels are apodal fishes.

Ap'ogee [from the Gr. ἀπό, "from," and γῆ, the "earth"] signifies the point of the moon's orbit most remote from the earth; the point which is opposite to the perigee. The apogee of the lunar orbit advances eastward among the stars, and completes a revolution in nine years.

Apolac'on, a township of Susquehanna co., Pa. P. 528.

Apol'da, a town of Central Germany, in Saxe-Weimar, on the railway from Berlin to Weimar, 11 miles by rail N. E. of Weimar. Here are mineral springs. Pop. in 1871, 10,507.

Apollina'ris (or **Apollina'rius**) THE YOUNGER, a learned bishop and philosopher, was a son of a grammarian of the same name. He became bishop of Laodicea in 362 A. D., and gained distinction as an orator and writer. Among his works were "Thirty Books against Porphyry" and commentaries on the Bible. He was an opponent of Arianism, and in 375 founded the sect of Apollinarians, who were regarded as heretics. The heresy of which he was accused was the denial of the human soul in Christ, the place of which, he taught, was supplied by the *Logos*. His heresy was condemned at Alexandria in 362, and at Rome in 374. At the Council of Constantinople, in 381, he was condemned by name. He died in 390, and by the middle of the subsequent century the sect he founded was extinct. (See WERNSDORFF, "Dissertatio de Apollinare Laodiceno," 1694.)

Apollina'ris Sido'nius (CAIUS SOLLIUS), SAINT, a Latin poet and ecclesiastic, born at Lugdunum (Lyons), in Gaul, in 430 A. D. He was a son-in-law of Avitus, who was emperor of Rome for a few months in 455–456 A. D. Anthemius, who became emperor in 467, appointed him chief of the senate. In 471 he was elected bishop of Clermont (Augustonemetum). He wrote "Carmina" and "Epistolæ," which are extant, and have some historical value. Died in 482 A. D. (See GERMAIN, "Essai sur Apollinaris Sidonius," 1840.)

Apol'lo [Gr. Ἀπόλλων], in Greek mythology, the god of light or day, of poetry, music, archery, etc., was a son of Jupiter and Latona. He was often called Delius, because he was born on the island of Delos; and Phœbus, which signifies "shining." As the god of light (the presence of which is necessary to the existence of beauty) he presides over poetry, the arts, etc. According to the later poets, he was the god of the sun, and was identified with Helios, but Homer represents them as distinct deities. Apollo may be considered the ideal representative of the Hellenic people, and the impersonation of Hellenic life in its most noble and beautiful forms. He was recognized as the author of the healing art, and as the god of prophetic inspiration as especially manifested in the oracle of Delphi. Under the name of Pæan he was invoked as a healer of disease and as a destroyer, for his arrows were believed to deal out pestilence. Apollo was also worshipped by the ancient Romans, who derived their idea of him from the Greeks. He was represented by artists as a beautiful young man, crowned with laurel, and holding in his hand a harp or a bow and arrow.

Apollo, a post-borough of Armstrong co., Pa., on the Kiskiminetas River, and on a branch of the Central R. R., 40 miles E. N. E. of Pittsburg. Pop. 764.

Apol'lo Belvede're, a beautiful antique marble statue of Apollo which was discovered at Antium about 1503, and was placed in the Belvedere of the Vatican. The name and date of the artist are unknown. This statue, which is about seven feet high, is considered the most perfect model of manly beauty. The attitude of the statue is generally supposed to represent Apollo as he appeared after he had discharged the arrow that killed the Python. (See BYRON'S "Childe Harold," canto iv., stanzas clxi., clxii., and clxiii.) But another opinion is gaining ground that it represents the god with the ægis in his hand, as he appeared to the Goths who were invading his sanctuary at Delphi. (See "Apollon Boëdromios bronzn. Statue im Besitz des

Grafen Sergei Stroganoff erläutert, von LUDOLF STEPHANI, mit vier Kupfertafeln," St. Petersburg, 1860.) CLARENCE COOK.

Apollodo'rus [Gr. Ἀπολλόδωρος], a celebrated Greek painter, surnamed THE SHADOWER, was born at Athens about 440 B. C. He was a rival of Zeuxis, the founder of a new school, and the reputed inventor of chiaroscuro. His works are highly praised by Pliny, who says he was the first who painted objects as they really appear.

Apollodorus of Athens, a celebrated grammarian and historian who lived about 140 B. C., was a pupil of Aristarchus. He wrote numerous works, which are lost, and a manual of Greek mythology entitled "Bibliotheca," a large part of which is extant. It is considered very valuable by classical scholars as the best work on the subject. It was published by Heyne in two volumes; 2d ed. 1803.

Apollodorus of Damascus, a distinguished architect, born at Damascus, lived about 100 A. D. He was patronized by Trajan, and erected in Rome numerous works, among which were the Basilica Ulpia, the Forum of Trajan, and the Column of Trajan, which is still extant. His capital work was a noble bridge over the Danube, near the mouth of the Aluta, built in 105 A. D. He was put to death about 128 A. D. by Hadrian, whom he had offended by criticising a temple which that emperor had designed.

Apollo'nia [Gr. Ἀπολλωνία], an ancient city of Illyricum, on the Adriatic Sea, about 40 miles S. of Dyrrhachium. It was founded by colonists from Corinth and Corcyra, and became an important city. The site is now occupied by a village called Polina or Pollina, and some ruins of temples.

Apollo'nius [Gr. Ἀπολλώνιος] **of Rhodes,** an eminent Greek sculptor, lived probably about 200 B. C. Aided by his brother Tauriscus, he executed a group of Zethus and Amphion tying Dirce to the horns of a bull. Some persons identify this with the group called "Toro Farnese" which is now at Naples.

Apollonius, a skilful Athenian sculptor, a son of Nestor. His date is unknown, and nothing is known about him but that he executed the marble statue of Hercules, of which a large fragment, called the Torso of the Belvedere, is now in Rome.

Apollonius, a grammarian and Sophist of Alexandria, lived in the time of Augustus. His lexicon to Homer's "Iliad" and "Odyssey" is extant, and is highly prized.

Apollonius, surnamed DYSCOLUS (the "Morose"), an eminent Greek grammarian of Alexandria, was the father of Ælius Herodian. He lived about 120–160 A. D., and wrote many works which are lost, but a "Treatise on the Syntax of the Parts of Speech" and three others are extant. He was styled by Priscian *grammaticorum princeps* —"prince of grammarians."

Apollonius, surnamed PERGÆUS, a celebrated and profound Greek geometer, born at Perga, in Pamphylia, about 250 B. C. Little is known of his life, except that he resided in Alexandria in the reign of Ptolemy Philopator (222–205 B. C.). His most important work is a Greek "Treatise on Conic Sections," in eight books, which is extant except one book. He wrote other works, which are lost. He was also distinguished as an astronomer.

Apollo'nius Mo'lon, a Greek rhetorician, born at Alabanda, in Caria. He taught rhetoric at Rhodes and Rome, which he visited in 81 B. C. Cicero and Julius Cæsar were his pupils soon after that date.

Apollo'nius Rho'dius [Ἀπολλώνιος ὁ Ῥόδιος], a Greek poet, born at Alexandria (or at Naucratis) about 235 B. C., was a pupil of the poet Callimachus, and at an early age removed to Rhodes, of which he became a citizen. He taught rhetoric at Rhodes for many years, and afterwards returned to Alexandria. About 194 B. C. he was appointed keeper of the great Alexandrian library. His chief work is an epic poem entitled "Argonautica," on the expedition of the Argonauts, which displays great erudition, and was much admired by the ancient Romans. Critics generally agree that it contains beautiful passages. (See WEICHERT, "Ueber das Leben und Gedicht des Apollonius," 1821.)

Apollo'nius Tyanæ'us (or **Apollo'nius of Tyana**), [Gr. Ἀπολλώνιος Τυανεύς], a Pythagorean philosopher, born at Tyana, in Cappadocia, lived about 30–70 A. D. He performed a journey to India in order to learn the doctrines of the Brahmans, and after his return gained a high reputation as a sage, an oracle, and a worker of miracles. He is considered by some authors as an impostor, and by others as a prophet or magician of extraordinary powers. He travelled extensively in Europe and Africa, and is said to have passed his latter years at Ephesus. Many marvellous and absurd stories are related of him by Flavius Philostratus, who wrote his life. Apollonius wrote in reply to Euphrates an Apology, which is extant. (See JOHN H. NEWMAN'S "Life of Apollonius Tyanæus," 1853; PHILOSTRATOS, "Life of Apollonius," in English, 1809; F. C. BAUR, "Apollonius von Tyana und Christus," 1832.)

Apol'los, an eloquent preacher among the early Christians, was originally a Jew and a native of Alexandria. He is said to have been ordained bishop of Corinth. (See Acts xviii. 24; 1 Corinthians i. 12; iii. 4.)

Apol'lyon [Gr. Ἀπολλύων, from ἀπολλύω, to "destroy"] signifies the "destroyer," and answers to the Hebrew *Abaddon*, and to the *Asmodeus* of Tobit.

Apologet'ic Fa'thers, a name given to those early Christians who addressed to pagans and Jews apologies for the Christian religion. Some of these were remonstrances against the judicial punishment of Christians as such, addressed to the Roman emperor or senate. Others were defences of Christianity against the charges of the Jews and pagans. Among the former were the apologies of Justin Martyr, Melito, bishop of Sardis, and the Liber Apologeticus of Tertullian. Origen, Tertullian, Clement of Alexandria, and Justin were among the principal writers of the latter class.

Apol'ogy [Gr. ἀπολογία], a term originally used to denote a written defence or answer to an accusation; a work written in defence of certain doctrines, as Plato and Xenophon's "Apology for Socrates." Tertullian, Justin Martyr, and other early Christians wrote treatises in defence of the Christian religion, which they called Apologies. Among the modern works of this class are Bishop Watson's "Apology for Christianity," and Robert Barclay's "Apology for the True Christian Divinity." In its modern or recent acceptation apology signifies the acknowledgment of a fault, usually accompanied by some explanation which may palliate or excuse it.

Apoph'yllite [from the Gr. ἀποφυλλίζω, to "exfoliate"], a zeolitic mineral with a lamellar structure, is so called because it exfoliates before the blowpipe. It is a hydrated silicate of lime and potash occurring in square prisms, the solid angles of which are sometimes replaced by triangular or rhombic planes. It is brittle, and has a white or grayish color, often tinged with green, yellow, blue, or red. It is found in beautiful crystals in the Hartz Mountains, in Poonah, and in the Bergen Tunnel at Jersey City.

Ap'oplexy [Lat. *apoplexia*, from the Gr. ἀπό, "away," and πλήσσω, to "strike;" as we speak of a *stroke* of apoplexy or of paralysis], a disease marked by the sudden failure of volition, sensation, motion, and mental action, the symptoms being caused by a pressure upon the brain originating within the cranium. Apoplexy is of various kinds, differing not so much in symptoms as in pathology. The typical form is characterized by an escape of blood into the substance of the brain from a ruptured vessel. The rupture itself may be caused (1) by a non-inflammatory, fatty degeneration of the blood-vessel, caused by bad nutrition, etc.; (2) by a brittle condition of the vessel, resulting from an inflammatory process. These causes may be supplemented by a full habit of body or by a hypertrophied heart, or both; and it is easy to see how such secondary causes might assist in the rupture of a weakened blood-vessel. Apoplexy may, however, be produced by an extravasation of blood between the meninges, by a sudden and large serous effusion into the ventricles of the brain, or even by a congestion (hyperæmia) of the brain. The apoplectic stroke may end in partial recovery or in speedy death. Cases not fatal generally result in permanent or temporary paralysis of one side of the body (hemiplegia), often on the side opposite that in which the mischief has occurred.

The symptoms of apoplexy are often unexpected. The patient falls suddenly (with or without an outcry), his respirations are long, slow, and stertorous, the pulse is slow, one or both the pupils usually small. If the patient does not die during the attack, a secondary inflammation follows which may destroy life. Bleeding may be resorted to if the pulse be strong and the heart and lungs in good condition, but it is often injurious. Mustard to the extremities and frictions of the skin should be resorted to, and the bowels should be moved by enema. Persons having reason to fear apoplexy should avoid excesses of all kinds, yet live upon nutritious food, paying special attention to hygienic conditions.

REVISED BY WILLARD PARKER.

A posterio'ri and **A prio'ri.** Before the time of Kant the former of these terms denoted a reasoning from effect to cause, and the latter a reasoning from cause to effect. Since Kant's time, and owing to his influence and that of his school, these terms are generally used more in relation to the doctrine of knowledge; *a posteriori* knowledge being empirical knowledge, or knowledge through experience, and *a priori* knowledge being rational knowledge, or a

knowledge through the reason of that which is prior to experience.

Apos'tle [Gr. Ἀπόστολος, *i. e.* "one sent forth," from ἀπό, "away" or "forth," and στέλλω, to "send"], the name given originally to the twelve disciples of Jesus, whom he had chosen to make known his doctrines to the world. The greater part were Galileans, laboring people, and destitute of high culture. Their names were Simon Peter (called also Cephas and Bar-Jona), Andrew, James the Elder (son of Zebedee), John his brother, Philip, Bartholomew (Nathanael), Thomas (Didymus), Matthew (Levi), James the Younger (son of Alpheus), Thaddeus, Simon, and Judas Iscariot. Matthias was chosen in the place of Judas, and subsequently Paul and Barnabas were called to the apostleship. It is a disputed point between the advocates and the opponents of episcopacy, whether or not the term apostle is applicable to any except the original twelve, and to Barnabas, Matthias, and Paul; some maintaining that the office is perpetuated in bishops, while others hold that it was temporary, and belonged only to those who were witnesses of the resurrection of Christ, and were employed by him to found the Christian Church. In the third year of the Saviour's ministry the apostles were commissioned by him to preach the gospel to the Jews only, but a short time before his ascension he commanded them to "Go and teach all nations, baptizing them in the name of the Father, and of the Son, and of the Holy Ghost." On the day of Pentecost the apostles received miraculous gifts, and began their work with the public announcement of Christ as the Messiah. They travelled over Greece, Syria, and Asia Minor, but there appears to be no foundation for the tradition that they divided the known world into twelve parts, each taking one for his special sphere. We have little information concerning the time or the place of the death of most of the apostles. The Epistles and the Acts of the Apostles are the only genuine records concerning them now extant.

Apostles, Acts of [Gr. Πράξεις τών Ἀποστόλων], the fifth book of the New Testament, written by Luke, containing the history of the period from the ascension of our Lord to Paul's arrival at Rome; that is, in all probability, from 33 to 60 A. D. It is proper to observe that though this portion of the Scriptures is styled the Acts of the Apostles, it treats only of the acts of Peter, Paul, and James; and of these, only Paul's career is narrated fully and connectedly. The book is avowedly a continuation of the third Gospel, and, though restricted within such narrow limits, may be said to give those great events in the history of the apostles in which the Christian Church would naturally feel the greatest interest. Among these events the pouring out of the Holy Spirit at Pentecost, the martyrdom of Stephen, and the conversion of Saint Paul, as well as most of his subsequent journeys and labors, are fully related.

Apostles' Creed [Lat. *Sym'bolum Apostol'icum*], called also the Creed or Confession of Faith, is the most universal creed of the Christian Church. It is as follows: "I believe in God the Father Almighty, maker of heaven and earth; and in Jesus Christ his only Son our Lord; who was conceived by the Holy Ghost, born of the Virgin Mary; suffered under Pontius Pilate, was crucified, dead, and buried. He descended into hell [or hades]; the third day he rose again from the dead; he ascended into heaven, and sitteth on the right hand of God the Father Almighty; from whence he shall come to judge the quick and the dead. I believe in the Holy Ghost; the Holy Catholic Church; the communion of Saints; the forgiveness of sins; the resurrection of the body; and the life everlasting. Amen." According to a tradition prevailing in the fourth century, but now generally discredited, this creed was composed by the apostles themselves, each contributing one of the articles. Some churches omit the clause, "He descended into hell," asserting that it was not a part of the original creed. (This subject is more fully discussed under CREED (which see).)

Apostles' Islands, or the **Twelve Apostles,** a group of twenty-seven islands in Lake Superior, 70 miles W. of Ontonagon. The principal islands are Ile au Chêne, Madeline, Bear, Stockton, and Outer Island. The islands belong to Wisconsin. They are covered with fine timber, and their cliffs have been worn into strange forms by the action of the waves. The land area is estimated at 200 square miles. Brown sandstone is quarried and exported from the islands. La Pointe, on Madeline Island, is the capital of Ashland co., Wis. This place was settled by the French in 1680. These beautiful islands have several Jesuit missions, one of which was established in 1658.

Apostol'ic, or **Apostol'ical,** a general term given to everything directly derived from, or bearing the character of, the apostles. The Roman Catholic Church styles itself the Apostolic Church, and the papal chair is called the Apostolic chair, because the pope is supposed to be the legitimate and lineal successor of Peter, the chief apostle. The Church of England claims to be apostolic in virtue of regular episcopal ordination from the Church before the Reformation; so also do the Protestant Episcopal churches in Scotland and the U. S. Several churches of Jerusalem, Antioch, Ephesus, Corinth, and Rome, which were the special scenes of the labors of the apostles, were called apostolic churches. With the increasing power of the Roman Catholic Church, the word apostolic was more exclusively applied to whatever belonged to that Church, as Apostolic See, Apostolic Canons, etc.

Apostol'ic Can'ons and Constitu'tions are notes of ecclesiastical customs regarded as apostolical. The Apostolic Constitutions (*Constitutiones Apostolicæ*) consist of eight books, the first six of which contain a comprehensive rule for a Christian life. These are supposed to have been written about the end of the third and beginning of the fourth century. The Apostolic Canons (*Canones Apostolici*) were composed at a later period. The first fifty, translated from Greek into Latin by Dionysius Exiguus, were acknowledged by the Latin Church alone. The Greek Church accepted the thirty-five canons put forth early in the sixth century; and this became a point of dissension between the Eastern and Western churches. The Apostolic Constitutions have been ascribed by some writers to Clement of Rome.

Apostol'ic Fa'thers, the name given to the disciples and fellow-laborers of the apostles, especially to those who have left writings. They are Barnabas, Clement of Rome, Ignatius, bishop of Antioch, Polycarp, bishop of Smyrna, Hermas, and Papias of Hierapolis. Some also include the author of the epistle to Diognetus among these Fathers. Cotelerius (Paris, 1672) issued an edition of the works of the Apostolic Fathers, which was improved by Clericus in 1698, and again in 1724. Of recent editors, the best are Jacobson (1838; 4th ed. 1866), Hefele (1839; 4th ed. 1855), and Dressel (1857; reissued 1863).

Apostol'ici, or **Apostol'ic Breth'ren,** a name given to a sect of religious reformers who originated in Italy in the latter part of the thirteenth century, and had for their leader Gherardo Segarelli of Parma. They travelled over Italy, France, and Switzerland, preaching the duty of renouncing worldly ties, property, etc. Having denounced popery, they were condemned by Pope Honorius IV., and Segarelli was burnt at the stake (1300). His place was filled by Dolcino, formerly a priest of Milan, who, after a brave resistance, was, with his adherents, taken by the forces of the pope, and perished at the stake in 1307.

Apostol'ic Maj'esty, a title of the kings of Hungary, was first conferred on the duke of Hungary by Pope Sylvester II. in 1000 A. D. The title was renewed in 1758 by Pope Clement XIII. in favor of Maria Theresa.

Apostol'ic Par'ty, a party of fanatical Spanish Catholics formed about 1820 for the promotion of an absolutist political policy. Their leaders were priests. In 1830 they merged themselves into the Carlist party.

Apostool' (SAMUEL), a Dutch Mennonite theologian, born in 1638. He became in 1662 a minister of a Waterlandian congregation in Amsterdam. He and Galenus engaged in a doctrinal dispute which divided the Church into two sects, called Apostoolians and Galenists. Died about 1700.

Apos'trophe [from the Gr. ἀπό, "from," "away," and στροφή, a "turning"], in rhetoric, a digressive address; a figure of speech by which the orator suddenly changes the course of his oration, and addresses with emotional emphasis a person present or absent, or some inanimate object. Frequent examples of it occur in the speeches and writings of great orators and poets.

Apoth'ecary [from the Gr. ἀποθήκη, a repository where anything is kept], a person who compounds and sells medicines and makes up medical prescriptions. In England the profession of an apothecary may be not incorrectly described as an inferior branch of the medical profession. He is legally entitled to attend sick persons and prescribe for them, as well as to make up and dispense medicines. It is not, however, usual for him to prescribe medicines to be prepared and supplied by others. But although he may attend sick persons and prescribe for them, he cannot charge both for his attendance and his medicines, but must make his election between the two. Although, therefore, the apothecary is inferior in professional rank and authority to the physician and surgeon, he is considered to be of a higher grade than the chemist and druggist, who merely vends drugs and medicinal compounds, but whose qualification, beyond the payment of a small annual tax by way of license, does not necessarily offer any test or guarantee of skill. The rules of the Pharmaceutical Society of Great Britain, incorporated in 1843 by royal charter, and the

powers of which have been considerably enlarged by a statute passed on the 30th June, 1852, operate as some restraint on ignorance and want of skill. Apothecaries and grocers (like surgeons and barbers) were in England and other countries formerly members of the same guild, and hardly distinguishable from each other. They were chartered as one company in London in 1606, but in 1617 James I. granted the apothecaries a charter as a separate corporation.

In the U. S. the vocation of the apothecary is mostly quite distinct from that of the medical practitioner. Among physicians it is generally regarded as contrary to professional ethics for a practitioner, in large cities at least, to be directly interested in the retailing of medicines. The education of pharmacists in the U. S. has greatly advanced of late years. Many of them are now graduates of colleges of pharmacy (the most important of which are in New York and Philadelphia), wherein excellent scientific and practical training is obtained. There is also a well-organized national pharmaceutical association. To limit the danger connected with the unskilful dispensing of drugs, a law has recently (1871) been put in force in New York and other States, requiring all apothecaries to pass a rigid examination.

Apothe′osis [from the Gr. ἀπό, "away," and θέος, a "god;" the idea being to take one away from among mortals, and to place him among the gods], a Greek word meaning deification, or the practice of raising a human being to a place among the gods. This practice was common among the ancient Greeks, who deified and worshipped heroes and benefactors after their death. Among the Romans, Romulus was the first who received such an honor, and Julius Cæsar appears to have been the second. Alexander the Great sent to all the states of Greece an order that they must recognize his divinity, and received from Sparta this laconic answer: "Since Alexander desires to be a god, let him be (or become) a god!" Several Roman emperors apotheosized themselves and their favorites.

Appalach′ee Bay, a large open bay near the northern part of Florida, is a part of the Gulf of Mexico, and is about 30 miles S. of Tallahassee. It extends inland about 50 miles.

Appalach′ee In′dians, a once powerful tribe of West Florida. They were conquered and converted to Christianity by Spanish missionaries, but the oppression and cruelties of the colonial authorities, together with the destructive invasions of English colonists and Indians from Carolina, greatly diminished their numbers. Soon after 1700 a part removed to what is now Alabama, and the tribe soon ceased to exist.

Appala′chian Moun′tains, a general term for the numerous ranges of mountains traversing the eastern part of the U. S., mostly parallel to each other, and in the main parallel to the Atlantic coast. This mountain-system is about 1300 miles long, extending, under various names, from the northern part of Alabama to Maine, and occupying, with the valleys which it forms, a space nearly 100 miles wide. The portion of this chain in New Hampshire is called the White Mountains, the highest summit of which, named Mount Washington, rises 6288 feet above the level of the sea. In New York the system takes the name of the Adirondacs, the Catskill Mountains, and the Highlands. In Pennsylvania and the Southern States they are called the Alleghany Mountains, and the name of Blue Ridge is applied to the range in Virginia which is nearest to the Atlantic Ocean. These ranges are remarkable for the uniformity of their outline, and for the parallelism of their ridges and long narrow intervening valleys of limestone formation. Among the latter is the Great Valley of Virginia, which is bounded on the S. E. by the Blue Ridge, and extends across the whole State. The ridges are remarkable for their near approach to a rectilinear direction, and the comparative uniformity of their height. The highest summit of the system is the Black Dome, or Mitchell's High Peak, in N. C., which rises to 6707 feet.

The geological formations of this chain include all those from the metamorphic rocks to the coal-measures, including the latter, and the strata belong entirely to the oldest or palæozoic division of the fossiliferous rocks. The aggregate thickness of these, measured in Pennsylvania as they appear in succession at the surface, is about seven miles. They may be classed under the three great divisions of sedimentary rocks—namely, sandstones, slates, and limestones, between which are interstratified beds of coal and iron ore. Geologists affirm that the origin of the Appalachians is more ancient than that of the Andes and the Alps, as is proved by the fact that on the high summits or slopes of the latter are found strata of a formation more recent than the carboniferous age. Their original height has been greatly diminished by the long-continued degrading agency of rain, frost, etc. The strata of this system are remarkable for their plications and complexity of flexure, in consequence of which some parts of the strata are nearly vertical. "The coal-measures of Pennsylvania," says Dana, "which were originally spread out in horizontal beds of great extent, are now tilted at various angles or rise into folds, and the strata are broken and faulted on a grand scale. The folds vary from a few rods to one hundred or more miles in breadth, and are in many successions over the region, wave succeeding wave." . . . "The following are some of the most important facts established with regard to the Appalachian flexures: 1. They occupy the whole *Appalachian* and *eastern border-regions* of the continent, nearly or quite to the Atlantic Ocean. 2. They are parallel with the general course of the mountains, and nearly so with the Atlantic coast. 3. They are most crowded and most abrupt over the part of the regions which is towards the ocean—that is, the S. E. side. 4. The steepest slope of a fold is that which faces the N. W." "A uniform series of S. E. dips over such a region is evidence that the strata correspond to a number of decapitated folds." (*Manual of Geology.*) Among the mineral resources of this chain are coal, copper, iron, zinc, nickel, and lead.

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Ap′palachico′la, a river, formed by the union of the Chattahoochee and Flint, at the S. W. extremity of Georgia. It flows southward through Florida, and after a course of 100 miles enters Appalachicola Bay, a part of the Gulf of Mexico. It is navigable for steamboats.

Appalachicola, a port of entry, the capital of Franklin co., Fla., is on the river of its own name at its entrance into St. George's Sound, a bay of the Gulf of Mexico, 85 miles S. W. of Tallahassee. Large quantities of cotton were once shipped here. At present there is a trade in timber and fish. Pop. 1129.

Ap′panoose, a county of Iowa, bordering on Missouri. Area, 492 square miles. It is intersected by the Chariton River, which affords water-power, and also drained by the South Fork of the Chariton. The surface is undulating; the soil is fertile. This county contains beds of coal, which is extensively mined. Grain, dairy products, cattle, wool, and tobacco are largely produced. It is traversed by the S. W. branch of the Chicago Rock Island and Pacific and Burlington and South-western R. Rs. Capital, Centreville. Pop. 16,456.

Appanoose, a post-twp. of Hancock co., Ill. P. 1018.

Appara′tus [from the Lat. *ap′paro, appara′tum,* to "prepare," to "arrange"], a term which in modern language is applied to a complete set of instruments or utensils for performing a scientific experiment or operation; the implements or machinery used in the operations of practical chemistry, or in the illustration of the principles of natural philosophy.

Appa′rent [Lat. *appa′rens,* the present part. from *appa′reo,* to "appear"], that which appears to the eye in distinction from true or real. This term is used in astronomy to express several important distinctions, as "apparent time," which is indicated by the sun, and differs from true time. The apparent magnitude of a heavenly body is the dimension of the angle formed by two lines drawn from the ends of its diameter to the spectator's eye. The apparent diurnal motion of the sun and moon is an optical illusion caused by the rotary motion of the earth, and the real motion of the moon is contrary to its apparent motion. An heir-apparent to a throne is a person whose title is better than any other except the actual occupant of the throne, and whose succession does not depend on any contingency if he survive the reigning monarch.

Appari″tion [Lat. *appari″tio*; for etymology see preceding article], literally, an "appearance" or "appearing," in common language signifies a spectre, a ghost, a visible spirit. In astronomy it means the first appearance of a heavenly body after it has been eclipsed or obscured. Stars which appear to revolve around the Pole, and which never set below the horizon, are said to be within the circle of perpetual apparition, which circle grows larger and larger in proportion as the spectator approaches the Pole.

Appar′itor [from *appa′reo,* to "appear"], a general name among the ancient Romans for the officers or public servants who attended the magistrates and judges, including heralds, lictors, scribes, etc. In England it is applied to the beadle of a university, who carries the mace, and to a messenger of a spiritual court, who serves its process.

Appeal′ [from the Lat. *appello,* to "call"], in law, is an accusation of a private citizen against another of some heinous crime, demanding punishment for the peculiar injury suffered, rather than for the offence against the public. This proceeding has been entirely abolished in England, and does not exist in this country. The word also means the removal of a cause from an inferior to a superior court

for the purpose of obtaining a review and re-trial of the case. It differs from a *writ of error* and a *certiorari*, inasmuch as they merely bring up for review the questions of law involved in the proceedings in the lower court, while by an appeal the questions both of law and fact may be re-examined. In a popular sense, the word signifies the removal of a cause, or of a proceeding in a cause, from an inferior to a superior court for the purposes of review, by whatever means effected. Codes of procedure in a number of States abolish writs of error in civil cases, and establish a review by appeal in all actions, whether of a common-law or equity nature. The word "appeal" is used in parliamentary law to indicate the mode of questioning the decision of the presiding officer as to a parliamentary rule.

Appear'ance [from the Lat. *appareo*, to "be seen"], in law, the act by which a party to an action brings himself, or is brought, into court, usually applied to the defendant. Appearance is either voluntary or compulsory. It is said to be voluntary when no process has been served. It is also special or general. It is said to be special when made for special purposes, not extending to the entire subject of litigation. It is general when absolute and unconditional. A notice of appearance will suffice, or the performance of some act from which an appearance can be inferred, such as serving a pleading. In civil cases it may be made by an attorney as well as by a party. In criminal cases personal appearance of the accused is frequently requisite, particularly in cases of felony.

Appen'dage [Lat. *appen'dix*, from *ad*, "to," and *pen'do*, to "weigh" or "hang"], in botany, is applied to all parts which are regularly arranged around any other part. Thus, leaves are appendages of the axis; so are all the flowers, theoretically. The supernumerary sepals in a strawberry are appendages of the calyx, and so on. In zoology, the bones of vertebrate animals are appendages of the vertebræ; the limbs of articulates are appendages of the segments.

Ap'penzell, a canton in the N. part of Switzerland, is bounded on every side by the canton of St. Gall. In consequence of religious differences it was divided in 1597 into two half cantons—Appenzell Inner Rhodes (Catholic) and Appenzell Outer Rhodes (Protestant). Inner Rhodes has an area of 62 square miles, and had in 1870 a population of 11,909. Outer Rhodes has an area of 100 square miles; pop. in 1870, 48,726. It consists completely of a wild mountain country, intersected by narrow valleys. It has manufactures of embroideries, linen, and calico. In 1864 the expenses of Inner Rhodes amounted to 176,026 francs, and of Outer Rhodes to 203,736 francs. Appenzell contributes 4060 men to the federal army. Capital of Inner Rhodes, Appenzell, and of Outer Rhodes, Trogen. The canton was formerly subject to the abbey of St. Gall, gained its independence early in the fifteenth century, and joined the confederation in 1513. (See ZELLWEGER, "Geschichte des appenzeller Volkes," 4 vols., 1830.)

Appert (BENJAMIN NICOLAS MARIE), a French philanthropist, born in Paris Sept. 10, 1797. He founded schools for the mutual instruction of the poorer classes, and devoted much time to the improvement of the condition of prisons and their inmates. He published, besides other works, a "Treatise on the Education of Prisoners" (1822).

Ap'pian [Gr. Ἀππιανός; Lat. *Appia'nus*], an historian, born at Alexandria, in Egypt, flourished about 120–160 A. D. He removed to Rome in early life, distinguished himself as an advocate, and obtained the important office of procurator. He wrote in Greek a valuable work on "Roman History" (Ῥωμαικὴ Ἱστορία) in twenty-four books, of which eleven are extant. His style is commended as clear and agreeable, but some critics estimate him as a mere compiler. (See DOMINICUS, "Programma de Indole Appiani," 1844.)

Appia'ni (ANDREA), an eminent Italian painter, born at Bosizio May 23, 1754, imitated the style of Correggio. He is thought to have excelled all the artists of his time in fresco-painting. About 1805 he was appointed court-painter to Napoleon, whose portrait he painted. His principal merits are grace, purity of design, and brilliancy and harmony of color. Among his masterpieces are the frescoes on the ceiling of the royal palace of Milan, and those in the church of Santa Maria Vergine, in the same city. Died Nov. 8, 1817. (See G. LONGHI, "Elogio Storico di A. Appiani," 1826.)

Ap'pian Way [Lat. *Vi'a Ap'pia*], the most celebrated of the ancient Roman roads, was constructed by Appius Claudius Cæcus about 313 B. C. It extended originally from Rome to Capua, 125 miles, but was eventually continued to Brundisium. It was built in a very expensive manner, and was paved with large polygonal blocks of the hardest stone, accurately fitted to each other, so as to appear like a solid mass. The substructure was solidified by cement. The road has been partly restored by excavation, and is found to be in a remarkable state of preservation.

Applause [from the Lat. *applau'do*, *applau'sum*, to "strike upon," to "clap"], a shout of approbation; an approving acclamation; a public expression of approbation and praise by striking upon the floor or the clapping of hands. This custom prevailed among the ancient Greeks and Romans. The Roman comedians usually terminated their performances with a request that the audience would applaud, *valete et plaudite!* Three species of applause were used by the Romans—namely *Bombus*, a confused hum, like the buzzing of bees, produced by the mouth or the hands; and *Imbrices* and *Testæ*, which were sounds made by striking vessels placed in the theatre for this purpose. The last was like the sudden crash produced by the fall and fracture of a set of china-ware.

In modern times, French politicians and dramatists often avail themselves of the services of hired applauders, called *claqueurs*, who cry *Bis, bis!* ("twice," "again," "encore"), or *Bien, très bien!* The audiences of English actors signify their approbation by the cry of *Encore!* but in the British House of Commons applause is expressed by cries of *Hear! hear!*

Ap'ple (*Py'rus ma'lus*), a fruit of a tree of the natural order Rosaceæ, which is native or naturalized in the temperate regions of Europe and Asia. It was cultivated by the ancient Romans, who called it *pomum*. The fruit called apple in the English translation of the Bible was probably different from the fruit now known by that name. The wild crab-apple of the Old World is the parent of almost all the varieties of apple which are cultivated, and which have been much improved by cultivation. The apple is considered the most valuable fruit of temperate climates, and is more extensively cultivated than any other. The fruit in botanical language is a *pome;* the leaves are ovate, acute, serrate, or crenate; the blossoms are beautiful and fragrant. The tree, which is hardy and slow in growth, will live probably two hundred years under favorable circumstances. The number of varieties of cultivated apples is over 200, and is continually increasing. This fruit may be divided into three classes, with respect to the season in which it matures: namely, summer, autumn, and winter apples, the former of which, in the Middle States of the Union, begin to ripen about June.

Among the best varieties of winter apples are the Baldwin, Spitzenberg, Rhode Island Greening, Bellflower, Swaar, Northern Spy, Rambo, Roman Stem, Peck's Pleasant, Roxbury Russet, Wine Apple or Winesap, Ashmore, Belmont, Hubbardston Nonsuch. Large quantities of apples are exported from the Northern U. S. to Great Britain. The finest quality of this fruit is produced in New York and other States in the same latitude. Among the products obtained from the apple is a beverage called cider, and a chemical substance called MALIC ACID (which see). The wood, which is hard, durable, and fine-grained, is used to make weaver's shuttles, shoe-lasts, cog-wheels, etc.

The Siberian crab (*Pyrus baccata* or *Pyrus prunifolia*), a native of Siberia, is cultivated in Europe and the U. S. for preserves. The *Pyrus coronaria* (or American crab) is a small tree which grows wild in the U. S., and bears a sour and harsh-tasted fruit scarcely an inch in diameter. This is used for preserves. An important distinction among apples is expressed by the terms natural fruit and grafted fruit. The former, which is raised from the seed, is mostly very inferior in quality. (See POMOLOGY.)

Apple Blight, a disease of apple trees, caused by a species of aphis (the *Aphis lanigera*). This little insect penetrates the chinks in the bark, extracting the sap, causing diseased excrescences, and ultimately the death of the tree.

Apple Creek, a township of Cape Girardeau co., Mo. Pop. 2626.

Apple Creek, a post-village of East Union township, Wayne co., O., 7 miles S. E. of Wooster, and on the Cleveland Mount Vernon and Delaware R. R. Pop. 300.

Ap'plegrove, a township of Morgan co., Ala. Pop. 1379.

Apple Oil (artificial), a solution of valerianate of amyl in six parts of alcohol.

Apple River, a post-township of Jo Daviess co., Ill. Pop. 1108.

Ap'ples of Sod'om, a fruit mentioned by Josephus and other ancient writers as growing near the Dead Sea. It was fair in appearance, but when grasped in the hand collapsed into dust and ashes. Some modern writers have supposed that it was the fruit of *Sola'num Melon'gena* (nightshade), but Robinson identifies it with the *Ascle'-*

pias gigante'a, the fruit of which looks like an orange, but disappoints those who touch it by its nauseousness in an immature state, and its emptiness when fully ripe.

Ap'pleton, a post-township of Knox co., Me. It has manufactures of lumber, leather, agricultural tools, and lime. Pop. 1485.

Appleton, a city, capital of Outagamie co., Wis., on the Lower Fox River, 30 miles S. of Green Bay. Its railroad facilities include the Chicago and North-western, the Milwaukee Lake Shore and Northern, the Milwaukee and Northern, and the Wisconsin Central R. Rs. The river is navigable for steamboats, and is the route of the Green Bay and Mississippi Improvement Company. The manufactures include woollens, iron, machinery, farming-tools, flour, beer, hubs and spokes, barrels, baskets, pulp for paper, etc. The river has here a constant fall of forty-nine feet, furnishing inexhaustible water-power. There are one daily and three weekly papers, two national banks, and nine churches. The city is the seat of Appleton Collegiate Institute and of Lawrence University. Pop. 4518.
STONE & FULLER, EDS. "DAILY TIMES."

Appleton (JESSE), D. D., an American theologian, was born at New Ipswich, N. H., Nov. 17, 1772, and settled over the Congregational church in Hampton, N. H., in Feb., 1797. In 1803 he was one of the most prominent candidates for the chair of theology in Harvard University. In 1807 he was chosen president of Bowdoin College, and died Nov. 12, 1819. A man of rare abilities and high classical culture, he was distinguished also for saintliness of character, and singular dignity and grace of manners. His works, in two vols. 8vo, with a memoir prefixed, were published by his son-in-law, Prof. Alpheus S. Packard, in 1837.

Appleton (JOHN), LL.D., a jurist, was born in 1804, graduated at Bowdoin College in 1822, became a judge of the supreme court of Maine in 1852, and chief-justice in 1862. He published two volumes of "Reports" (1841).

Appleton (JOHN), born at Beverly, Mass., Feb. 11, 1815, graduated at Bowdoin College in 1834, became a lawyer and prominent Democratic editor in Portland, Me., where he settled in 1837, became chief clerk of the U. S. treasury department in 1845, and afterwards held a similar position in the state department; was *chargé d'affaires* to Bolivia (1848–9), member of Congress (1850–59), secretary of legation in London (1855–56), U. S. minister to Russia (1860–61). Died Aug. 22, 1864.

Appleton (NATHAN), LL.D., a merchant, born at New Ipswich, N. H., Oct. 6, 1779, became a partner of his brother Samuel in Boston. He was one of the founders of Lowell. He was chosen a member of Congress in 1831, and again in 1842. Died July 14, 1861.

Appleton (SAMUEL), an eminent merchant and philanthropist, brother of the preceding, was born at New Ipswich, N. H., June 22, 1766. He removed to Boston about 1794, and amassed a fortune by trade and the manufacture of cotton. He gave $25,000 annually for charitable purposes, and made a donation of $10,000 to Dartmouth College. He died July 12, 1853, without issue, and left $200,000 to be applied to "scientific, literary, religious, and charitable purposes."

Appleton (WILLIAM), born at Brookfield, Mass., Nov. 16, 1786, became a successful merchant of Boston, to which he removed in 1807. He was a member of Congress (1851–55, 1861–62), and was distinguished for his benevolence. He gave $30,000 to the Massachusetts General Hospital. Died Feb. 15, 1862.

Appleton City, a post-village of St. Clair co., Mo., on the Missouri Kansas and Texas R. R., 59 miles S. W. by S. of Sedalia.

Ap'pling, a county in the S. E. part of Georgia. Area, 1060 square miles. It is bounded on the N. and N. E. by the Altamaha River, and drained by Little Satilla River. The surface is level, and the soil is sandy. Corn, rice, molasses, and honey are among the chief products. It is intersected by the Macon and Brunswick R. R. Capital, Holmesville. Pop. 5086.

Appling, a post-village, the capital of Columbia co., Ga., 27 miles W. of Augusta.

Appoggiatura, åp-pod-jå-too'rå, literally, a "support," an Italian musical term, indicates a form of embellishment by insertion of notes of passage in a melody. The notes are printed in a smaller character than the leading notes of the melody.

Appoint'ment [remotely from the Lat. *ad*, "to," and *punctum*, the "point"], in law, a disposition of property made by one authorized by a power contained in a deed, will, or other instrument to direct its use; an instrument executed pursuant to a power of appointment directing the disposition of property agreeably to such power. (See POWERS.) The word is also used to indicate the designation by lawful authority of some person to hold an office or to perform a public duty. Under the U. S. Constitution the President has the power to nominate, and, with the consent of the Senate, to "appoint," persons to hold certain specified offices.

Ap'pold (J. GEORGE), F. R. S., an English mechanician, born in 1800, was the inventor of a celebrated centrifugal pump, of machinery for paying out marine telegraph cables, and of a process for dressing furs, which last gave him the control of that business. His house was a museum of wonderful mechanical devices, which opened and closed doors, shutters, and gates, and performed many other surprising acts, by automatic machinery. Died Aug. 31, 1865.

Appold Centrifugal Pump. See PUMP.

Appomat'tox, a river of S. E. Virginia, rises in Appomattox county, flows in a general easterly direction, and enters the James River at City Point. Length, estimated at 150 miles. It is navigable for large vessels to Petersburg, 20 miles from its mouth.

Appomattox, a county in the S. central part of Virginia. Area, 260 square miles. It is bounded on the N. W. by the James River and canal, and drained by the Appomattox, which rises in it. The surface is hilly; the soil mostly productive. Tobacco, grain, and wool are its chief products. It is intersected by the South Side R. R. Capital, Appomattox Court-house. Near this place General Lee surrendered his army to General Grant, April 9, 1865, and thus terminated the civil war. Pop. 8950.

Appomattox Court-house, a post-village, capital of Appomattox co., Va., was the scene of the surrender of Gen. R. E. Lee, with the Confederate army of Northern Virginia, to Gen. Grant, April 9, 1865.

Apponyi (GEORG), COUNT, born in 1808, became the leader of the Conservative party in Hungary, and opposed the revolutionary movements in 1848. He was appointed in 1859 a life-member of the imperial council of Vienna, As royal commissary he opened the Diet at Buda in 1861.

Appoquin'imink, a hundred of New Castle co., Del. Pop. 4299.

Appor'tionment [from the Lat. *ad*, "to," and *portio*, a "share"], in law, the division of a thing into parts; the distribution of a claim or charge among different persons in proportion to their interests in the subject-matter to which it attaches. The leading cases concern—1, Incorporeal rights in land, such as commons and rents; 2, Encumbrances upon land; 3, Contracts. 1. The principal case under this division is that of rents. The question of apportionment may arise as to the rights of different owners either of the rent or of the land to which the burden of the payment of the rent attaches, or it may occur in case of a partial failure of the title as to the territorial extent of the land rented, or because the right of the tenant to hold the land ceases before the time agreed upon, on account of the expiration of the landlord's estate. Thus, a landlord, after a lease of two houses by one contract for a specified rent, may sell one of them. The purchaser would be entitled to collect a proportionate part of the rent. So, if the lessee should assign to a stranger all his rights in one of the houses, the latter would during his ownership be bound to pay a proportionate part of the rent. In case the title to a portion of the premises failed, as if in the case supposed the landlord did not own one of the houses that he assumed to lease, and the tenant was accordingly evicted, he would pay a proportional part of the rent for the remaining house. By the common law there was no apportionment where there was a failure as to time. This case is illustrated by a lease made by a life tenant for a specified period—*e. g.* a year. Should he die before the time expired, the lease would of course instantly terminate, and the tenant would pay no rent for the time intervening since the last payment of rent fell due. This defect in the law has been remedied by statute. It should be added that there is by common law no apportionment where the property leased is simply diminished in value. Should a house and lot be hired and the house be destroyed by fire, no deduction can be claimed, as the rent is deemed to be paid for the land, which still remains. This rule may be obviated by agreement of the parties. 2. *Encumbrances.*—It is a general rule that several owners of land must bear the burden of an encumbrance upon it in proportion to their respective interests. Thus, if land were mortgaged, and then conveyed to A for life, and, subject to A's estate, to B, the respective owners should share between themselves the burden of payment; while the mortgage remained, A should pay the interest. If it became necessary to pay the mortgage, A would need to raise a sum equivalent to his entire duty to pay the interest during his life. His

probabilities of life are estimated by well-known tables indicating longevity, such as the Northampton, Carlisle, and others. On a similar principle, if mortgaged lands be sold in parcels, the duty to pay the mortgage is apportioned among the owners of the respective parcels. This is clearly the rule where the sales are contemporaneous; but if successive in point of time, the better opinion is that there is no apportionment, but that the lots must be taken to satisfy the mortgage in "the inverse order of alienation." By this is meant that the lands last sold by the proprietor must be first resorted to as a means of paying the mortgage. As soon as enough money is thus realized the remaining lots are discharged. 3. *Contracts.*—As a general rule, there is no apportionment of contracts. In other words, a party to a contract must completely fulfil his own obligation before he can enforce the agreement against the other party. Thus, if a servant agreed to labor for a year at a specified salary, and should work for a portion of the time, and leave without cause, he could collect no portion of his wages. There are special cases where a contract is apportioned. One is where, after it has been partly performed, it is dissolved by mutual consent. So also in a contract for personal service there is an implied understanding that the contract is not to be completely fulfilled unless life should continue. Accordingly, if the servant should die before the expiration of the time specified in the contract, his wages would be apportioned according to the time of actual service. Some jurists have objected to the severity of the general rule, and would allow an apportionment, even where a contract is deliberately broken by a party, corresponding to the benefit received by the other party; but the prevailing opinion of courts is, and the better philosophy would seem to be, to adhere to the rule as modified by the special cases referred to.

T. W. Dwight.

Apportionment Bill, in American politics, denotes an act of Congress which determines the total number of members sent by all the States of the Union, and also the number that each State shall send, to the House of Representatives. A new apportionment is made after each decennial census. The same term is applied to the act by which a State legislature distributes among the counties their respective portions of representation. A populous county often forms a district by itself, and elects several members, while another district is formed by the union of two or three small counties. Those of the dominant party of the State sometimes so contrive the apportionment that they gain an advantage in the election, by forming districts in each of which a county that gives a majority against them is joined to a county that gives a larger majority for their side. This is called *gerrymandering.*

Appraise'ment, or **Apprize'ment** [from the Lat. *appre'cio,* to "value," to "set a price upon"], the act of estimating the value of property; the valuation of property made by an authorized person, who is called an appraiser. The mode of appointing appraisers varies in the different States of the Union. The law of the U. S. requires that there shall be an appraisement of the inventoried property of decedents and insolvent debtors, of property appropriated to public use, and of real estate seized upon execution. In England, appraisement, as a legal term, signifies a valuation of goods taken under a distress for rent by two appraisers, who are sworn by the sheriff or constable. The appraisers of England must be licensed for the office.

Appren'tice [remotely from the Lat. *apprehendo,* to "comprehend," to "learn"], a person, ordinarily a minor, bound in due form of law, usually by indenture, to another for a certain time to learn some art, trade, or business. In most of the States of this country statutes borrowed from English legislation allow minors, with their own consent, and with that of their father, mother, or guardian, to be bound out to service—if males, till the age of twenty-one; if females, till the age of eighteen, or for a shorter time. When the child is a pauper, he may be bound without his consent by public officers or by orphan asylums, houses of refuge, or of industry. The same rule is followed in the case of children charged with petty crimes. Apprenticeship is thus to some extent a mode of penal discipline, and is reformatory in its nature, particularly where some central authority oversees from time to time the conduct both of the apprentice and the master. The master in many respects stands in the relation of a parent. It is his duty to instruct the apprentice in the art which he has undertaken to teach him, to give him a reasonable support, and to provide for him in case of sickness. The apprentice, on his part, is bound to render faithful service and obedience to his master, who may administer for misconduct reasonable corporal punishment. This relation is not regulated by the ordinary rules governing master and servant, but depends upon special grounds of public policy. It may usually be dissolved by magistrates where the object of the apprenticeship has failed, and in special cases the apprentice may be punished by them for wilful neglect to perform his duties. The contract of apprenticeship is of a personal nature, and is not assignable.

T. W. Dwight.

Approach'es, a military term which denotes the entire system of works employed in the methodic *approach* by siege of a fortification. The works consist of enveloping trenches called *parallels,* and trenches of communication called *boyaux* or *zigzags* (terms indicating the tortuous or *zigzag* form given them, in order to screen from the fire of the place), *places of arms,* etc. The earth removed is thrown upon the side towards the besieged place, by the height of which and the depth of the trench itself adequate cover is gained for the passage of troops, and even of artillery. Approaches sometimes acquire great development, as at Sebastopol, where, as is stated, the allies dug seventy miles of trenches. Recent changes in artillery and small-arms have rendered almost obsolete the methodic rules for the location and construction of approaches laid down in text-books on sieges.

Appropria'tion [from the Lat. *ad,* "for," and *proprius,* "one's own"] **of Payments,** in law, the application of money paid by a debtor to his creditor to one of several debts. The general rule is that when the payment is voluntary, and not under process of law, the debtor has a right to direct the application of the money. If he does not exercise this right, the creditor may elect to which debt to apply it; and in case of the failure of both parties to make such election, the law will apply the money in accordance with certain rules, so as best to promote the rights of the parties. When the payment is not voluntary, but is made under compulsion, the rules as to election give way, and the money should be applied ratably to all the claims. Where a debt bears interest, that is extinguished before application to the principal.

Approx'imate [from the Lat. *ad,* "to," and *prox'imo, proxima'tum,* to "approach," to "draw near"], in zoology, is applied to that arrangement of the teeth in the jaws where one is placed against the side of the next, and there is no intervening vacancy or diastema. The disposition of the teeth in the human species and in the *Anoplotherium* forms an example.

Appui, åp'pwe', a French word signifying "support." In military language the phrase *point d'appui* is applied to a base or position fitted to give support to troops; a fixed point at which troops form and on which operations rest. Lakes, marshes, hills, or steep declivities sometimes serve as *points d'appui.*

Appur'tenances [remotely from the Lat. *appertineo,* to "belong to"]. In law, this word signifies something belonging or appertaining to another thing as principal, as a right of way appurtenant to land. In a conveyance of land with the "appurtenances," all easements and privileges in use and necessary to the enjoyment of the estate granted will be included. Land itself will not be considered as appurtenant to land. It is often a difficult question of construction to determine whether land can be regarded as *a part* or *parcel* of the thing granted; in which case it will pass, while it would not be embraced in the word "appurtenances." Thus, in the conveyance of a "mill" or a "mansion-house," land which in the narrow acceptation of the terms "mill" or "mansion-house" would not be included, might be in a comprehensive sense, since there could be no complete enjoyment of the mill or mansion-house without them.

Aprax'in (Feodor Matveievitch), a Russian admiral, called the creator of the Russian navy, was born in 1671. He was one of the principal coadjutors of Peter the Great in his efforts to civilize Russia, and enjoyed his confidence in a high degree. He built several ships-of-war, became an admiral and president of the admiralty in 1707, and took Viborg from the Swedes in 1710. In 1713 he ravaged the coasts of Finland, and commanded a fleet in the war against Sweden. Died Nov. 10, 1728.

Apraxin (Stepan Feodorovitch), a Russian general, a grandson of the preceding, was born in 1702. He served in a war against the Turks, rose rapidly, and became a field-marshal. Having the command of a large army in the Seven Years' war, he defeated the army of Frederick the Great at Gross-Jägerndorf in Aug., 1757. He neglected to improve the victory by marching to Berlin, and was recalled and tried by a court-martial, but before the trial was finished he died, Aug. 26, 1758.

Aprice'na, a town of Italy, in the province of Foggia, 23 miles N. of Foggia. Pop. in 1861, 5272.

Ap'ricot [from the Lat. *apri'cus,* "sunny"], (*Pru'nus Armeni'aca*), a fruit tree of the natural order Rosaceæ, is a native of Armenia, and is extensively cultivated in

Europe and the U. S. It is nearly related to the plum. The blossoms appear before the leaves, which are ovate, subcordate, and acuminate. The fruit, a velvety drupe, ripens earlier than the peach, which it resembles in some respects. The color of the apricot is mostly yellow, with a red-brown or ruddy cheek on the side which is most exposed to the sun. It is propagated by budding on plum, peach, or wild-cherry stocks. Among the numerous varieties of the apricot, the Moorpark is by many persons the most esteemed. A variety called Breda is preferred for standards in some places.

A'pries [Gr. Ἀπρίης], a king of Egypt, called in the Bible PHARAOH-HOPHRA, was a son of Psammuthis (or Psammis), whom he succeeded about 595 B. C. He waged war against the Greeks, by whom he was defeated. His subjects revolted and killed him about 568 B. C., and Amasis then obtained the throne.

A'pril [Lat. *Apri'lis*], the name of the fourth month of the year, was derived from the Romans, but in the early age of the Roman republic it was the second month.

April Fool's Day, the name given to the first of April, from the prevailing custom of playing tricks upon people or sending them upon bootless errands on that day. It is supposed to have been derived from some ancient pagan custom, such as the Huli festival among the Hindoos, or the Roman Feast of Fools. In France the person tricked is called *poisson d'Avril* ("April fish"), and in Scotland he is called a *gowk* (cuckoo).

A Priori. See A POSTERIORI.

A'pron, a term applied to a piece of sheet lead which covers the touchhole of a cannon, tied by two pieces of rope. In shipbuilding the apron is a piece of curved timber fixed behind the lower part of the stem, and just above the foremost end of the keel, in order to fortify the stem. Apron is also a platform or flooring of plank at the entrance of a dock.

Apse [Lat. *ap'sis*], a semicircular recess usually formed at the east end of the choir or chancel of a Romanesque or Anglo-Norman church. Such structures are numerous in England and in Germany. (See APSIDES.)

Apsheron', Apcheron, or **Abcheron,** a peninsula which extends into the Caspian Sea at the S. extremity of Daghestan. It forms the eastern termination of the Caucasian chain of mountains. It is famous as the place of the sacred flame which is venerated by the fire-worshippers (Ghebers), and is produced by inflammable gas rising from the soil. Large quantities of naphtha are procured here.

Ap'sides [from the Gr. ἀψίς, a "circle" or "curvature"], sing. **Ap'sis,** the two points in the orbit of a primary planet which are at the greatest and the least distance from the sun, corresponding to the aphelion and perihelion. The term is also applied to the extreme points in the orbit of a satellite, which in the case of our moon are the same as the apogee and perigee. The straight line connecting them is called the line of the apsides.

Ap'tera [from the Gr. α, priv., and πτερόν, a "wing"], in the Linnæan system an order of insects without wings, called *apterous insects*. This word is not recognized as the name of an order by recent entomologists, the wingless insects being assigned to various orders.

Ap'teral, a term applied to those temples of the ancient Greeks and Romans which had no lateral columns. The Greek temples were generally peripteral—*i. e.* with columns on the sides and ends.

Ap'teryx [from the Gr. α, priv., and πτέρυξ, a "wing"], a genus of birds, natives of New Zealand, allied to the ostrich and emeu. It is called by the natives of New Zealand *kiwi-kiwi*. It has scarcely any trace of wings, but has fine plumage, and a long bill, on which it supports itself when it rests. It feeds upon insects of various kinds, more especially on worms, which it is said to attract to the surface by jumping and striking on the ground with its powerful feet. Its skin is very tough but flexible, and is prized by the chiefs for the manufacture of their state mantles. Three species have been found, but they are believed to be nearly extinct.

Apteryx.

Ap'thorp (EAST), a clergyman of the Anglican Church, was born at Boston, Mass., in 1733, and educated at Cambridge University. He passed many years in England, and obtained a benefice at Finsbury. His four letters to Gibbon in defence of Christianity (1778) were very favorably received. Died April 17, 1816.

Apule'ius (AULUS LUCIUS), a celebrated Latin Platonic philosopher and satirical writer, was born at Madaura, in Africa. He lived about 150 A. D., travelled extensively, and was distinguished for his learning and eloquence. After he had spent his fortune in travel, he married a rich widow, and was involved in a lawsuit with her relatives, who accused him of using magical arts to gain her affection. He defended himself with success by an "Apology" which is still extant. He became popular as an orator at Carthage, the senate of which raised statues in his honor. His chief work is a romance entitled the "Metamorphoses, or the Golden Ass," which is supposed to be intended as a satire on priests, quacks, magicians, etc. It has been translated into English by T. Taylor (1822), by Sir George Head (1851), and by several others. Some of his works are lost. (See F. HILDEBRAND, "Commentarius de Vita et Scriptis Apuleii," 1835.)

Apu'lia [It. *La Puglia*], an ancient province of Southern Italy, was bounded on the N. E. by the Adriatic Sea, and was a portion of Græcia Magna. It was bounded on the S. W. by Lucania and Samnium. Among the chief towns of this once populous and famous region were Canusium, Arpi, Luceria, and Arpinum. The battle of Cannæ, and most of the important events of the second Punic war, occurred in Apulia. It was conquered by the Normans about 1042 A. D. Apulia is included in the modern provinces of Foggia, Bari, and Lecce. Area, 8541 square miles. Pop. in 1871, 1,416,792.

Apulia, a post-village of Fabius township, Onondaga co., N. Y., on the Syracuse Binghamton and New York R. R., 19 miles S. by E. of Syracuse. Pop. 181.

Apu're, a river of Venezuela, rises in the Andes near lat. 7° N. and lon. 72° W. It flows eastward, and enters the Orinoco in lat. 7° 36′ 43″ N. and lon. 66° 45′ W. Length, estimated at 736 miles.

Apure, a province of Venezuela, is bounded on the N. by Merida, Barinas, and Caracas, on the E. by Guiana, and on the S. and W. by Colombia. Area, about 22,250 square miles. This province is in the most level and lowest part of Venezuela, and is almost entirely without trees. The chief occupation of the inhabitants is the raising of cattle. Chief town, San Fernando de Apure. Pop. 32,485.

Apu'rimac', a river of South America, and one of the head-streams of the Amazon, rises in the Andes, in Peru, about lat. 15° 38′ S., and about 75 miles from the Pacific Ocean. It flows nearly northward, and unites with the river Urubamba about 8° 38′ S. The stream thus formed is called the Ucayale. Its length from its source to the Ucayale is estimated at 600 miles.

A'qua, plu. **A'quæ,** the Latin name for water; the pharmacopœial name for spring water, or natural water in its purest attainable state. It is a compound of oxygen and hydrogen; symbol H_2O, or Aq. The principal varieties of water are distilled water (*aqua distillata*), river water (*aqua ex flumine*, or *aqua fluvialis*), sea water (*aqua marina*), rain water (*aqua pluvialis*), and spring water (*aqua fontana*). These terms are used in pharmacy, in which various watery solutions are also called *aquæ*.

A'qua For'tis (*i. e.* "strong water"), a name given to nitric acid by the alchemists, is still the common commercial name of that compound. (See NITRIC ACID.)

Aqua Marine, a name sometimes given to the BERYL (which see).

A'qua Re'gia (*i. e.* "royal water"), a name given to a mixture of nitric acid with hydrochloric (muriatic) acid. The usual proportion is one of the former and two of the latter acid. This is remarkable for its power of dissolving gold, regarded as the king of metals. The product is auric terchloride, $AuCl_3$. (See GOLD, by PROF. R. W. RAYMOND.)

A'qua Regi'næ (*i. e.* "queen's water") is a mixture of concentrated sulphuric acid and nitric acid, or of sulphuric acid and nitre. It has been used as a disinfectant.

Aqua'rians [from the Lat. *a'qua*, "water"], a name given to those ascetic persons who used water in the sacrament instead of wine, because they had scruples against the use of the latter. This practice is said to have originated with Tatian in the second century.

Aqua'rium (plu. **Aquaria**), or **Aquaviva'rium,** a Latin term commonly applied to a glass tank or vessel containing either salt or fresh water, in which living aquatic animals and plants are kept as an ornament of drawing-rooms, an aid to scientific study, and a source of rational amusement. It must contain both animals and plants in something like a due proportion, as the animals depend for breath on the oxygen which is given out by the plants, and

the latter are nourished by the carbonic acid gas which the animals exhale. The water should be often aërated by agitation, which may be effected by dipping up portions of it and pouring them in again from a small height. Aquaria are stocked with Mollusca, Algæ, Confervæ, Crustacea, zoophytes, gold-fish, sticklebacks, minnows, and other fish, sea-anemones, etc. The presence of molluscous animals is necessary for the consumption of the vegetable matter which is about to decay and the numerous spores of the Confervæ, unless the water be continually renewed, as in the "fountain aquarium." No dead animal or decaying plant should be permitted to remain in the aquarium, the temperature of which should be kept between 50° and 70° F. (See P. H. Gosse, "Handbook of the Marine Aquarium," 1855.)

Aqua'rius [from the Lat. *a'qua*, "water"], the "Water-Bearer," is the eleventh sign of the Zodiac, into which the sun enters about the 20th of January. It is represented by ♒. Aquarius is also the name of a constellation which coincided with that sign at the time when the signs were named, but in consequence of the precession of the equinoxes it is now in juxtaposition with the sign Pisces.

Aquas'co, a post-township of Prince George's co., Md. Pop. 1723.

Aquat'ic An'imals are those which live constantly in the water, as fishes, and those which frequent the water to swim on its surface or dive in search of food, as ducks and other web-footed birds, otters and beavers among quadrupeds, etc. Among the aquatic animals are the majority of the grand division of Mollusca; numerous tribes of the Articulata, as crabs, lobsters, and shrimps; and a large portion of the Radiata. Whales and dolphins are examples of aquatic animals of the class Mammalia. The total number of aquatic animals is greater than that of all terrestrial animals (exclusive of insects). Those which live partly on land, and cannot breathe under water, are called amphibious. The peculiarities of structure by which they are fitted for swimming, wading, etc. are very admirable. Some water-fowls have long legs for wading; others have webbed feet which enable them to swim with ease, and have waterproof plumage adapted to their mode of life. In aquatic animals of the higher vertebrate classes provision is made for the maintenance of the proper degree of animal heat by a coat of blubber, fur, or plumage, as in the case of otters, ducks, etc. The air-breathing animals that inhabit salt water have an organic structure greatly modified, and their extremities resemble the purely aquatic type more than the terrestrial.

Aquatic Plants, or **Water Plants,** a term applied to various vegetable organisms that grow either partially or entirely immersed in water. The latter mode of life is mostly confined to cryptogamous plants. Many phænerogamous plants which take root at the bottom of ponds, ditches, and running streams are called aquatic, although the flowers and leaves are raised above the water or float upon its surface. A primary distinction occurs between the plants that grow in salt water and those which grow in or near fresh water. The most of the plants which live in the sea belong to the division Algæ (which see). Among the cryptogamous plants that inhabit fresh water are the Confervæ. Aquatic plants have a less compact structure than most other plants, and are generally deficient in rigidity and firmness of stem. Some water-plants are furnished with air-bladders, which enable them to rise to the surface and float upon it. Besides those which grow in the sea, there are plants whose habitat is the sea-shore, and which require the influence of salt water. These are sometimes called saline or maritime plants. Among the aquatic plants growing in fresh water are the species of the orders Alismaceæ, Naiadaceæ, Ceratophyllaceæ, and Nymphæaceæ.

Aquatint. See Engraving, by Pres. M. B. Anderson.

A'qua Tofa'na, a secret poison, the invention of which is ascribed to a Sicilian woman, a notorious poisoner, named Tofana. She lived about 1650–1730. It is said that there was, about 1660, a society of young married women in Rome who used this aqua Tofana to poison their husbands. It was sold in vials marked "Manna of St. Nicholas of Bari." Some suppose it to have been a solution of arsenic.

A'qua Vi'tæ (*i. e.* "water of life"), [Fr. *eau de vie*], a Latin term applied to brandy, and sometimes to other ardent spirits.

Aquavi'va (Claudio), a son of the duke of Atri, born at Naples in 1543, was appointed Feb. 19, 1581, general of the Jesuits. His principal work is entitled "Ratio Studiorum" ("Method of Studies"), 1586. Died in 1614.

Aq'ueduct [Lat. *aquæduc'tus*, a "channel for conducting water"]. The name is applied more especially to artificial constructions for bringing water from a distance for the supply of cities, and to those bridges which serve to convey the water of canals of navigation and of irrigation, and of mill-races, at an elevation across deep valleys or streams.

As no very large city could exist without an abundant supply of water, we may assume that aqueducts were constructed very early in history. The Romans built many aqueducts, not only for Rome, but for their principal cities in Europe, Asia, and Africa, and the massive and picturesque ruins of the great bridges of these aqueducts are at once suggested to the scholar by the word "aqueduct."

Rome, the capital of the ancient civilization, was bountifully supplied with water by many aqueducts. Twenty are said to have existed in its period of greatest prosperity, bringing water from the hills and lakes of Italy from distances of from five to sixty miles. The greater part of the courses of all these aqueducts were subterraneous, but as the Romans were not as skilful in the working of metals as the moderns, as metal pipes were with them much more costly than masonry, and as cast iron was unknown, they were compelled to construct lofty bridges of stone and brick to conduct the channels of water at a regular slope or descent from the elevated ranges to the N. and E. of Rome across the wide and gradually descending slopes of the Campagna or country immediately surrounding the city. These bridges were generally built of rude masonry of brick or of rubble stones. The mortar was good, and the stone and brick, though rough, were durable. The masses, though not generally remarkable for their height, were in the aggregate immense, and hence, while the greater part of these constructions have perished, very considerable remains exist to this day.

Rome has never been without inhabitants, and the rulers of the city have from time to time repaired and utilized the different conduits, so that at the present day the city is amply supplied with water, the greater part of which is brought over ancient aqueducts repaired by the popes. The Appian aqueduct, attributed to Appius Claudius Cæcus, is said to have been completed 311 years before the Christian era, after the building of the Appian Way. Its length was about 6 miles, and it brought, by a devious course, to Rome the waters of a spring whose fountain-head was 5 miles from the city, near Rustica on the Via Collatina. The Aqua Augusta was at a later period added to this aqueduct. It supplied the most ancient portion of the town and the Transtiberine city.

The Anio Vetus was built B. C. 272 by Manius Curius Dentatus. It brought its supply from near Augusta in the valley of the Anio, 43 miles from Rome. It was almost entirely subterraneous, and the only fragment now visible lies below the road and under the Aqua Marcia, outside the Porta Maggiore.

The Aqua Marcia (B. C. 145), built by the prætor Quintus Martius Rex, was 37 miles long, of which 6 miles were on arches still visible, crossing the Campagna by the Frascati and Albano roads. This aqueduct is crossed by the Claudian aqueduct, which for some distance runs parallel to it. It might be restored, but the city is for its present population already amply supplied with water.

Aqua Tepula (B. C. 126), the work of Cneius Servilius Cæpio and Cassius Longinus, is 10 miles long. Its channel or *specus* can still be seen at the Porta San Lorenzo and Porta Maggiore in connection with the channels of the Aqua Marcia and Aqua Julia.

Aqua Julia (B. C. 34), by Augustus, named in honor of Julius Cæsar, 12 miles long. Its water was brought to the city in a *specus* or conduit above the Tepula, and, like that, upon the arches of the Aqua Marcia, which thus brought the waters of three different sources separately to Rome. Its channel is still to be seen at the gate of San Lorenzo and at the Porta Maggiore.

Aqua Virgo, also by Augustus. Its source is said to have been pointed out by a young girl, whence its name. Its course is mostly subterraneous, about half a mile only being on arches. It was restored by Pope Nicholas V. as the Aqua Vergine, and it still supplies Rome with its best water. The fountains in the Piazza di Spagna, Piazza Navona, and the magnificent fountain of Trevi are supplied by this aqueduct, as are many others. On the fountain of Trevi, the virgin pointing out the source to the soldiers sent by Augustus appears among many other marble reliefs and statues. This is perhaps the finest fountain in the world. An inscription, still legible, in a cellar of No. 12 Via del Nazareno, near the Palazzo del Bufalo, states that it was repaired A. D. 52 by Claudius, after having been disturbed by Caligula in the construction of his wooden amphitheatre.

Aqua Alsietina, 30 miles in length, built by Augustus; restored by Trajan, who added to its waters those of several springs along the hills to the W. of Lago Bracciano. Its original sources were around the smaller lake Alsietinus, now the Lago de Martignano. It was restored by Paul V.,

and now supplies the fountains of the great Piazza of St. Peter's and the magnificent fountain Paolina, and turns the wheels of many flour-mills on the slopes of the Janiculum. It is known indifferently as the Aqua Alsietina and the Aqua Paolina.

Aqua Claudia, built by Caligula and Claudius (A. D. 36 to 50). Its sources were near Agosta, about 38 miles from Rome. Its devious course was over 46 miles in length, of which 36 were below the surface and 10 miles were on arches. Six miles of arches stretching across the Campagna still attest the power and liberality of the Roman empire. Repaired by Septimus Severus, by Caracalla, and by Pope Sixtus V., its arches now bring to Rome the Aqua Felice from the springs near the Osteria dei Pantani, on the road to Palestrina. They supply the Fontana dei Termini, near the railroad dépôt in the Baths of Diocletian, the fountain of the Triton, that of Monte Cavallo, and some twenty-four others in different parts of the city.

Anio Novus, also by Claudius, from the forty-second mile of the Via Sublacencis. This was the longest of the ancient aqueducts, having a course of 62 miles, 48 of which were under ground. Its channel or *specus* is still visible above the Aqua Claudia on the arches of the Porta Maggiore. It is also visible at the Villa Braschi, near Tivoli, where it is nine feet high by four feet in width, but is choked up by a calcareous deposit, which encrusted, and finally, unless removed, obstructed the channels of many of these ancient aqueducts, especially those from the valley of the Anio.

It is estimated that Rome was supplied daily with 377,000,000 gallons of water. The Aque Vergine, Felice, and Paola, having their sources in volcanic districts, supply a pure and delicious water, which does not obstruct its channels, and at this day they bring into Rome 153,000,000 gallons of water daily. By channels of masonry the water is led to fountains in every part of the city, and by pipes of metal and of burned clay it is distributed to most of the great houses or palaces, in each of which it flows constantly into a basin, frequently an ancient sarcophagus, of stone or marble. The water is rarely carried by pipes to the upper stories.

Rome being the capital of the civilized world for so long a time, its aqueducts were on a greater scale than any others, but the chief cities of the ancient world were supplied with water by aqueducts, many of which were built during the Roman domination.

During the Middle Ages also aqueducts were constructed, and the pointed arch of the Goths is seen in some of the existing remains. Among those most noted, generally lofty bridges of masonry forming part of the channels of true aqueducts, are those of Lyons, Nîmes, Segovia, Spoleto, Carthage, Constantinople, Lisbon, Marly, Caserta, Metz, Tarentum, and many others.

In modern times many aqueducts have been constructed. The New River of London and the Canal de l'Ourcq of Paris are true aqueducts. The new aqueduct of the Vanne is one of the supplies of Paris. The aqueduct of Roquefavour carries the water of the Durance to Marseilles; that of Loch Katrine supplies Glasgow.

Vienna is now constructing an aqueduct to bring the water of two springs a distance of 59 miles. The conduit is of masonry, the channel itself varying in size from five feet eight inches by six feet to two feet nine inches by four feet, according to the slope, on which depends the velocity of the current. The sources are at a height of about 1000 feet, and the principal distributing reservoir is 277 feet above the site of the city. The supply is estimated at 24,000,000 gallons daily, or 24 gallons to each of 1,000,000 inhabitants. Whenever Vienna attains to this population it will appear that the supply is only one-fourth of that which modern civilized man requires.

In the U. S. there has been of late years great activity in the construction of aqueducts for its rising cities. The city of New York has the Croton aqueduct, 50 miles in length. Boston has the Cochituate; Baltimore, that of Jones's Falls; and Washington, the Washington aqueduct.

Fig. 1 is a view of High Bridge (so called) over Harlem River, N. Y. The Croton Aqueduct passes over this bridge in three pipes, one wrought and two cast iron. The wrought iron is seven feet six inches in diameter, and the two cast iron are each three feet. The bridge is 1460 feet in length, having eight arches, in the river, of 80 feet span and 100 feet high, and seven others, of fifty feet span, on the two banks. The bridge is 116 feet above high-water mark.

The Washington aqueduct, which supplies the capital of the U. S., we select as one of the most recent and important examples of modern aqueduct construction for fuller illustration and description.

It is a circular conduit of brick and rubble masonry laid in hydraulic cement. Brick and stone were used indifferently in its construction, each section being built with the material which would be most easily and cheaply obtained. Its clear internal diameter is nine feet. Its descent or inclination is nine and a half inches to the mile. The length

Fig. 1.

High Bridge, Harlem River.

of the conduit from the Great Falls of the Potomac to the distributing reservoir is 11 miles; from the latter the aqueduct is continued by large iron pipes to the capitol, 5 miles. Its capacity is 70,000,000 gallons per day. Its construction is shown in ordinary ground (side-hill) by Fig. 4.

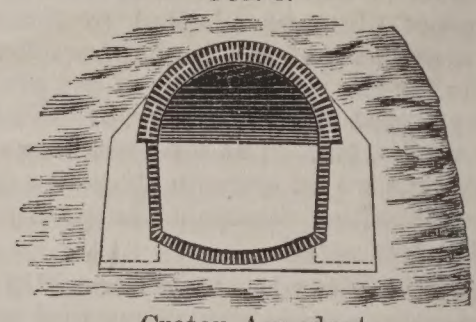
It takes its water at the Great Falls from the Potomac River at an elevation of 150 feet above tide-water by a deep rock-cut passing under the Chesapeake and Ohio Canal (Fig. 5), to a gate-house (Fig. 5), furnished with gates and screens to regulate the flow of water and to exclude injurious substances. A dam raises the water of the river about six feet to the level of the aqueduct, 150 feet above tide. The aqueduct follows the valley of the Potomac, crossing the drainage of its left bank by six bridges and many culverts. It passes through several tunnels. A waste-weir permits any excess of water to escape before it can do injury to the conduit.

Its course is generally subterranean; embankments have been avoided wherever possible, as more liable to degrada-

Fig. 2.

Cochituate Aqueduct.

Fig. 3.

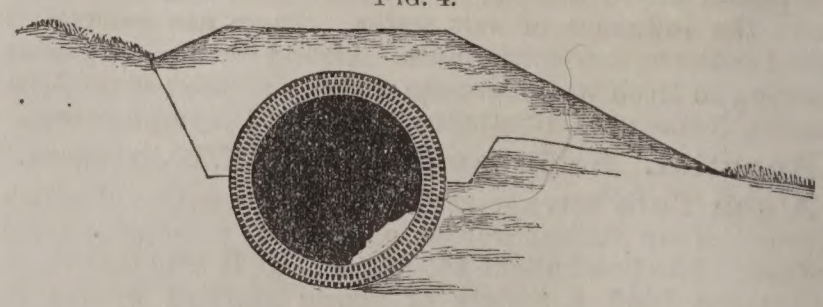


Croton Aqueduct.

tion and injury than a masonry conduit deep below the natural surface. There are four bridges under the conduit. Fig. 6 is the most important of these, the Cabin John Bridge or Union Arch, a granite arch of 220 feet span, the *longest* stone arch in existence. This bridge is 101 feet high and 20 feet wide. The water is delivered into the receiving reservoir, of about fifty-six acres, made by damming up the valley of Little Falls Branch. (Fig. 7.) Two miles farther on the aqueduct enters the distributing reservoir of forty acres by a gate-house. A branch of the conduit, seven feet only in diameter, leads around this reservoir for use when the reservoir is being cleaned.

In Fig. 8 is a section of the tower, in which the branch terminates in a four-foot iron pipe, with regulating sliding iron

Fig. 4.

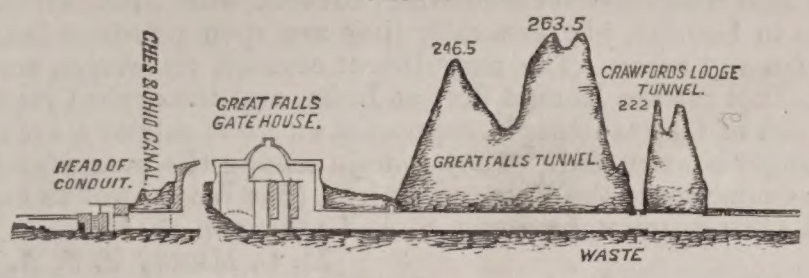


gate. Fig. 9 is a profile of the outlet gate-house and screen-well, and of the subterranean vault in which are the stop-cocks and connections of the iron mains which convey the water into the cities. There are connections for four pipes of forty-eight inches diameter in this vault. There are now three mains laid, the original two, 30 and 12-inch, and a 36-inch main recently added, the cities having already outgrown the smaller ones laid fourteen years ago.

At College Branch two 30-inch mains, braced as in Fig. 10, cross a small inlet and valley by an arch of 120 feet span. Rock Creek is crossed by an iron bridge (Fig. 11) composed of two cast-iron pipes of four feet diameter, which serve as the ribs of an arch of 200 feet span and 20 feet rise. These pipes convey the water, and also sup-

port a platform bearing a road and railway track. This bridge, the College Branch, and the Cabin John bridge

FIG. 5.



are unique. The highest portion of the streets of Washington is forty-five feet below the level of the reservoir; but a part of Georgetown is at a greater height than any part of the aqueduct. To supply this a circular reservoir covered by a brick dome (Fig. 12) has been constructed. It is supplied with water by a water-pressure engine situated in the vaults of the west abutment of the Rock Creek bridge, capable of pumping 10,000 gallons per hour into this reservoir, at a height of 226 feet above tide. It is worked by the pressure of water from the 30-inch main.

The aqueduct is capable of delivering 70,000,000 gallons per day. The three iron mains as yet laid, with 120 miles of small iron distributing pipes, which now supply 120,000 people, and are connected with 10,000 houses, are capable of bringing into the cities of Washington and Georgetown 30,000,000 gallons daily. The actual consumption of the cities is already 17,500,000 gallons in twenty-four hours.

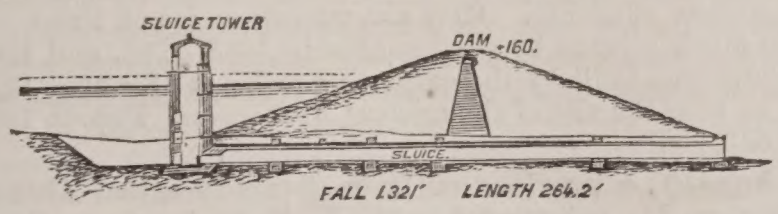
In California gold-mining the agent for the separation of the gold from the soil is water, and this has led to the construction of many large aqueducts, there called mining ditches. Some of these are 100 miles in length, and the ingenuity of their builders has made some veritable improvements in the science and art of hydraulic engineer-

FIG. 6.

Washington Aqueduct: Cabin John Bridge (Union Arch), 220 feet span.

ing. These aqueducts are generally open channels or ditches, which follow winding courses along the mountain-slopes, preserving regular grades, which are regulated by the necessity of the case, the limit being whatever the soil will bear without washing away. These grades are as high in some cases as thirteen feet to the mile. The channels are very crooked. Gulches, gullies, valleys, and streams are crossed by wooden troughs supported on trestles. These are estimated to last for about fifteen years. Deeper valleys are crossed by sheet-iron pipes. In one example a mining aqueduct brings to the mine, with a head of 300 feet, from 80,000,000 to 90,000,000 gallons of water daily. A valley is crossed by pipes of No. 14 to No. 16 gauge sheet iron—*i. e.* one-sixteenth of an inch in thickness—which are twenty-seven inches in diameter. These pipes are put together on the line of the work, the

FIG. 7.



sheets, perforated with rivet holes, being brought into the mountains on wagons, and finally on pack-mules. They are bent to shape and riveted in place. The joints are slip-joints, like those of stove-pipe, and they are kept together against the pressure and shocks of the water by lashings of wire around lugs secured to the sheet iron.

Chopped straw is thrown into the water at the head, and soon packs all the imperfectly fitted joints and makes them water-tight. It is recorded that the Romans, who made much use of earthenware or terra-cotta pipes, used ashes in this way to stop all leaks. The cost of these 27-inch sheet-iron pipes is about $4 per foot, or $20,000 per mile. Many cities which hesitate to provide themselves with the best of all water-supplies—that by gravitation, natural flow—on account of the great first cost of the aqueduct, may profit by this California experience. While the wooden and sheet-iron pipes will not last as long as bridges of masonry and pipes of heavy cast iron, they will still last for many years, and the saving in interest upon the original capital needed for the more solid construction will not only keep them in repair, but rebuild them every fifteen years. The lighter constituents of the soil through which the aqueduct is carried as an open ditch or canal are soon removed by the current, leaving the bottom and sides of the channel protected by the gravel and pebbles, too heavy to be removed by the regular current, which remain and form a covering for the softer and lighter soil. Aqueducts thus constructed may be built for $15,000 to $20,000 per mile, and thus bring ample and cheap supplies of water to many cities which now depend upon steam-engines and a daily expense of fuel for scanty supplies of this precious element.

It has been customary in America to estimate twenty-eight to thirty gallons per day for each inhabitant, old and young, as a sufficient supply for a great city. But the experience of all those in which aqueducts have been in use for twenty years shows that in the U. S. the supply should not be less than 100 gallons per head per day. This consumption is reached in Boston, New York, Philadelphia, and Washington, and, where the works afford it, it promotes health and contributes to cleanliness, to pleasure, and to safety. It is better that this quantity be assumed in all projects for building aqueducts.

FIG. 8.

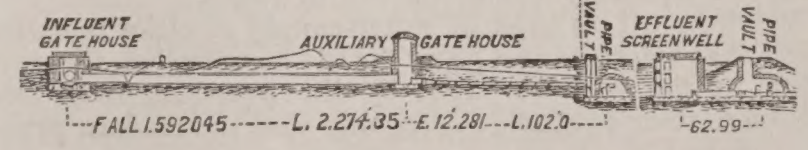


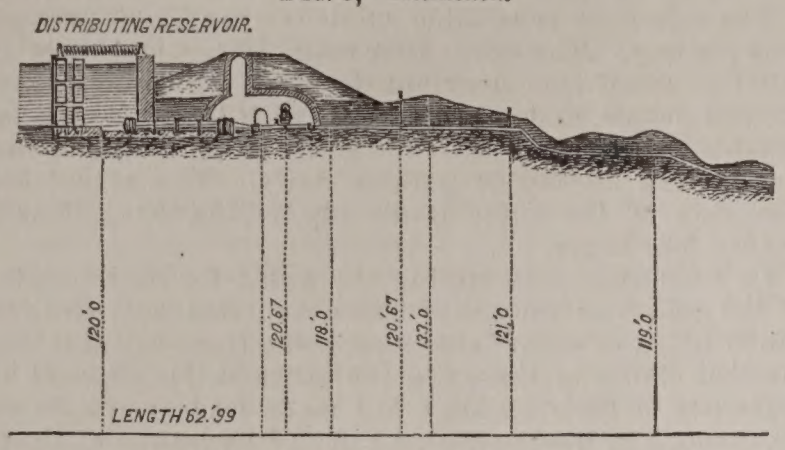
FIG. 9.

We have seen that the cross-sections of the *specus* or channel of the Roman aqueducts were generally rectangular. In modern times a great variety of forms have been used—rectangular, two-side walls with flat floor and roof; curved floor and arched roof, with vertical sides; oval, or egg-shaped, with the smaller end of the oval at the bottom; and finally circular.

As the circle is that geometrical figure which with the least circumference encloses the greatest area, it follows that in lining with masonry a channel cut through the earth the circular form will convey the most water with the least masonry. Moreover, this form gives the channel with the least wetted perimeter. As it is at the surface of contact of the water and its channel that friction occurs, the flow of the water will be less retarded by friction in a circular channel than in any other of the same capacity. Therefore, in building a covered channel for conveyance of water this form will generally be found the best and cheapest.

Bricks or flat rubble stones are laid with great rapidity into the form of a circular conduit. The excavation in the earth is cut carefully at the bottom to the form of a semi-

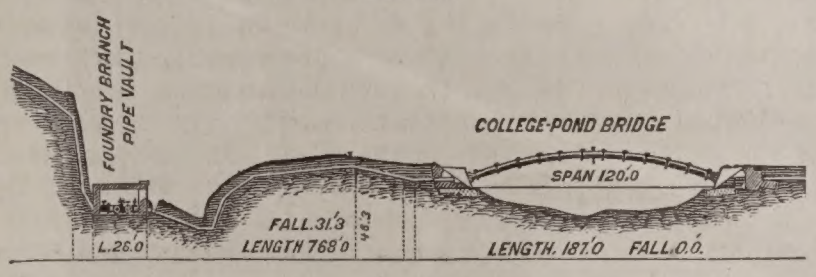
FIG. 9,—*continued.*



cylinder to receive the masonry, which is laid in hydraulic mortar simply upon the earth, until the lower half cylinder of masonry is formed. Then two portable wooden centres, each of which is one quarter of the cylinder, are placed in position on props of wood, and the upper half of the conduit is laid as an arch upon them. The inside of the pipe is to be plastered with mortar of hydraulic lime and sand, and, the whole being covered to a proper depth, we have a conduit which will serve for ages, and is liable to no decay or destruction except by earthquakes or waterspouts, which may break it open or wash it away.

As the cost of the excavation and construction of the conduit is but a part of the aggregate cost of an aqueduct, it is wise in all such constructions for cities and villages to

FIG. 10.



at first make the conduit itself large enough to convey all the water of the source. The conduit should also in any case be large enough for a man to pass through conveniently, for the purposes of cleaning it and repairing any cracks, which in long lines of masonry resting upon soils of different natures will occur from settlement of the soil and from expansion and contraction of the masonry itself.

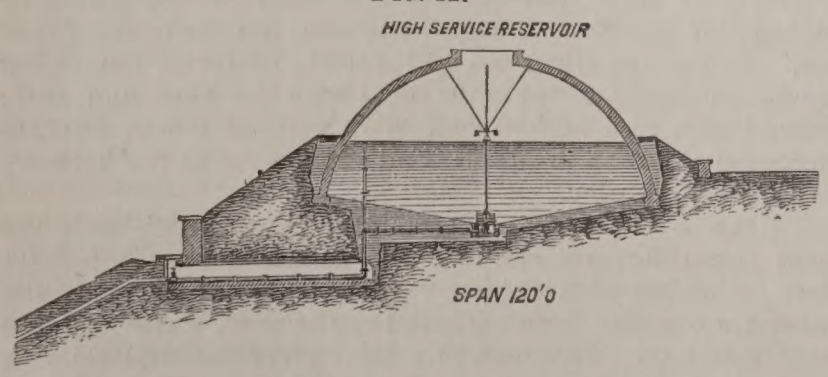
When the source of supply is a great river or lake, the conduit should be built to convey more water even than 100 gallons a day for each inhabitant. Cities continually increase, and while at present this quantity appears to be enough for actual needs, the greatest abundance of water flowing through the fountains and cleansing the streets,

FIG. 11.

courts, and drains of a city adds to the health, the pleasure, and comfort of the people. There is scarcely a city in the U. S. which in the course of twenty years has not found its aqueduct insufficient for its wants.

We defer till we treat of water-supply of cities remarks upon the reservoirs and pipes for the distribution through them of the water brought by the aqueduct from the source to their confines, noting only that the modern prac-

FIG. 12.



tice makes reservoirs much more extensive and capacious than the ancient. The Romans brought large supplies through aqueducts of rapid flow. A small portion only was stored in reservoirs, generally of masonry covered with arches, and the surplus was allowed to flow out through great fountains and cascades in constant streams. The moderns provide large reservoirs in which the water not used is stored up to compensate during periods of scarcity for the scanty supply of the original source. These reservoirs are sometimes covered with brick arches, as in London, but generally they are open ponds or lakes of many acres. The magnificent covered reservoirs, such as that for the Roman fleet at Baiæ, and the arched reservoirs of Constantinople, supported on stone columns, are no longer constructed. They remain among the most stately monuments of the Roman empire. (See WATERWORKS and WATER-SUPPLY, by PROF. S. A. LATTIMORE, A. M.)

M. C. MEIGS, U. S. A.

A'queous Hu'mor. See EYE.

Aqueous Rocks, a geological term synonymous with sedimentary rocks, is applied to rocks and strata which have been formed by the agency of water, and have been deposited at the bottom of seas and lakes. The materials of these strata were partly derived from the disintegration of older rocks, which, being reduced to particles of small size, have been carried along the rivers in the form of mud, sand, and sediment, and deposited in the sea. Humphreys and Abbott estimate that the Mississippi conveys into the Gulf of Mexico annually an amount of silt equal to a mass one square mile in area and 241 feet in depth. The waves of the sea also, dashing continually against the shores and undermining the rocks, contribute to this process of erosion and disintegration. Some aqueous rocks, as chalk and limestone, are formed by the accumulation of the calcareous shells of marine animalcules, called Foraminifera. Other strata of the carboniferous formation which are of vegetable origin are included among the aqueous rocks, which in reference to their composition are distinguished as arenaceous, argillaceous, calcareous, carbonaceous, and saline. The rocks termed metamorphic are now generally regarded as aqueous in their formation. (See LITHOLOGY and ROCKS.) (For further information about these rocks the reader is referred to the articles on the Silurian, Devonian, Carboniferous, Cretaceous, Oolitic, Triassic, Eocene, Miocene, and Pliocene formations.)

Aqui'a, a post-village and township of Stafford co., Va., 13 miles N. E. of Fredericksburg. Pop. of township, 2085.

Aqui'a Creek, in the eastern part of Virginia, flows south-eastward through Stafford county, and enters the Potomac River. It is navigable for schooners. It is also the name of a station on the railroad from Washington to Richmond, and on the Potomac River, 75 miles N. of Richmond. Passengers going northward are here transferred from the cars to a steamboat.

Aquifolia'ceæ [from *Aquifo'lium*, a former name of the holly], a natural order of exogenous plants, all trees or shrubs with simple leaves, and mostly natives of America. The ovary is superior, with two or more cells, each of which contains a solitary anatropal ovule, and generally becomes bony as a stone in the fruit, which is fleshy. Among the species of this order is the holly (*Ilex*). The species are quite numerous in the U. S.

Aq'uila ("the Eagle"), a constellation of stars near the equator, and on its N. side.

A'quila, a fortified town of Italy, capital of the province of Aquila, is situated on the Pescara, near the Apennines, 58 miles N. E. of Rome. It is well built, and has numerous churches. Here are manufactures of linen. It was much injured by earthquakes in 1688, 1703, and 1706. Aquila was built by the emperor Frederick II. about 1240, on or near the site of the ancient *Amiternum*. Pop. in 1861, 12,627.

Aquila, a province of Italy, formerly called Abruzzo Ulteriore II., is bounded on the N. E. by Ascoli, on the E. by Teramo and Chieti, on the S. by Campobasso and Caserta, on the W. by Rome and Perugia, and on the N. W. by Perugia. Area, 2510 square miles. The chief products are grain, vegetables, rice, wine, oil, and fruits. Pop. in 1871, 333,791.

Aquilaria'ceæ [so called from *Aquila'ria*, one of the genera], a natural order of exogenous plants, all of which are trees and natives of the tropical parts of Asia. The leaves are entire; the perianth coriaceous, turbinate, or tubular; the stamens usually ten; the ovary 2-celled, with two ovules; the fruit a drupe or capsule. The order comprises only ten known species, one of which produces the fragrant ALOES WOOD (which see).

Aquile'ja, Aquileia, or **Aglar,** an old town of Austria, in the Littoral provinces, near the Adriatic or Gulf of Venice, with which it is connected by a canal, is 22 miles W. N. W. of Trieste. During the Roman empire it was an important city, was called the second Rome (*Roma Secunda*), and was the chief emporium of the trade between the north and south of Europe. The emperor Augustus often resided here, and here were held several councils of the

Church, the first of which was in 381 A. D. The bishops of Aquileja in the sixth century took the title of patriarch, and assumed the rank next to the pope. Aquileja was burned by Attila in 452 A. D., at which time it is said to have had 100,000 inhabitants. Pop. 1728.

Aqui'nas (THOMAS), SAINT, a celebrated scholastic doctor and theologian, surnamed THE ANGELIC DOCTOR, was born in the kingdom of Naples in 1227. He was a grandnephew of the emperor Frederick I. Barbarossa. About 1243 he joined the order of Dominican monks, and became a pupil of Albertus Magnus. After he had studied theology and scholastic philosophy, he began to teach and preach at Paris with great applause. Having acquired a European reputation by his talents and learning, he left Paris in 1261, and was induced by Pope Urban IV. to remove to Rome, where he taught philosophy. He was distinguished for his modesty, and refused the offer of a bishopric, but he had great influence in the Church. The greatest of the schoolmen were the Dominican Thomas Aquinas and the Franciscan Duns Scotus. They were founders of rival sects, which wrangled with each other for two or three centuries. Aquinas wrote a number of works, the most important of which is his "Sum of Theology" ("Summa Theologiæ"), which was regarded as the most complete compendium of scholastic divinity. He died at Fossanuova, in Naples, 1274. His disciples were called Thomists. Aquinas was a great admirer of the philosophy of Aristotle. He was canonized in 1323. (See RENN D. HAMPDEN, "Life of Thomas Aquinas," 1848; MAFFEI, "Vita di Tommaso d'Aquino," 1842; THOLUCK, "Dissertatio de Thoma Aquinate," 1842; P. S. CARLE, "Histoire de la Vie et de Écrits de Thomas d'Aquin," 1846; "Philosophie de Thomas d'Aquin," par CHARLES JOURDAIN, Paris, 1857; "The Life and Labors of S. Thomas of Aquin," by the Very Rev. ROGER BEDE VAUGHAN, 2 vols., 1871–72. See DUNS SCOTUS.)

Aquita'nia [Fr. *Aquitaine*], the ancient Latin name of the most south-western of the three divisions of Gaul. It originally included the country between the Pyrenees and the Garonne, but Augustus added to it the territory between the Garonne and the Loire. The ancient inhabitants were Iberian tribes. It was an independent duchy under the feeble princes of the Carlovingian dynasty, and became an English possession in 1152 by the marriage of Henry II. with Eleanor of Guienne, who was the heiress of the duke of Aquitaine. It was united to France in 1451.

Arabesque, år-a-bĕsk', signifies "in the Arabian style or manner." It is applied to the fantastic decoration which was profusely employed in the architecture of the Arabs or Moors in Spain. As employed by the Arabs, it consisted of infinitely diversified combinations of curved and straight lines, and imaginary foliage and flowers, curiously intertwined with other vegetable forms. The figures of animals were excluded from the arabesques of the Moors, because the religion of Mohammed prohibited their representation. The Moors are supposed to have derived this kind of ornament from the Romans, by whom it was extensively used. Among the most beautiful specimens of Moorish arabesques are the decorations of the famous palace of the Alhambra. The name of arabesque was applied to this mode of decoration because it had been long known and admired in the works of the Arabs before the discovery of the beautiful paintings in the Baths of Titus, by Raphael and his pupil Giovanni da Udine, made the world acquainted with a magnificent specimen of the original. The early Italian painters and sculptors, however, had always taken delight in this style of decoration, as they found it in the antique Roman sculpture, where scrolls, flowers, fruit, and leaves are mingled with animals and genii. Raphael painted his famous arabesques in the Loggie of the Vatican in direct imitation of the frescoes on the Baths of Titus. He was largely assisted by Giovanni da Udine. CLARENCE COOK.

Arabgir', or **Arabkir',** an important city of Asia Minor, on the Arabgir-Su, and on the road from Aleppo to Trebizond, 100 miles E. S. E. of Siwas. It has considerable trade, and a large community of Protestant Armenians. Pop. estimated at from 25,000 to 30,000.

Ara'bia [Arab. *Jezee'ret* (or *Jeziret*) *-el-A'rab, i. e.* the "isle or peninsula of the Arabs;" Turk. and Pers. *Arabistan;* Lat. *Ara'bia*], a peninsula forming the extreme S.W. part of Asia, is encompassed by the sea on all sides except the N. It is bounded on the N. by Asiatic Turkey, on the N. E. by the Persian Gulf and Sea of Oman, on the S. E. by the Indian Ocean, and on the S. W. by the Red Sea. It extends from lat. 12° 35′ to 34° N., and from lon. 32° 10′ to 59° 40′ E. Its area is estimated (Behm and Wagner, "Bevölkerung der Erde," Gotha, 1872) at 1,030,000 square miles. It is connected with Africa by the Isthmus of Suez at the N. W. corner. The Euphrates forms a part of the N. E. boundary of Arabia, the southern part of which is included in the torrid zone. The topography of the interior of this peninsula is imperfectly known to European geographers. We know, however, that it is generally arid and sterile, destitute of forests, has no large rivers, and few permanent streams. The surface is diversified by hills of naked rock, plains of sand, and ranges of mountains of no great elevation. The central part of Arabia appears to be occupied by an elevated table-land. A long range of mountains extends through the W. part nearly parallel with the Red Sea, from which it is not more than eighty miles distant, and in some parts less than that. The peaks of these mountains are from 5000 to 8000 feet high. In the vicinity of the mountains, and of the torrents which flow from them, are a number of fertile valleys called *wadys*. Among the remarkable features in the geography of Arabia is Mount Sinai, which is 7497 feet high. Ancient and foreign geographers divided this country into three parts—namely, ARABIA FELIX, the Happy; ARABIA PETRÆA, the Stony; and ARABIA DESERTA, the Desert. The first comprises the south-eastern part, bordering on the Persian Gulf, the Indian Ocean, and part of the Red Sea; Arabia Petræa includes the north-western part, bordering on the Red Sea; and Arabia Deserta, the interior and northern portions. According to the native geographers, the principal divisions are—1, Hedjaz, or Hejaz, which extends along the Red Sea from lat. 19° N. to 29° N., and is bounded on the N. E. by the desert; 2, Yemen, which borders on the Red Sea, and extends from Hejaz to the Strait of Bab-el Mandeb, and along the Gulf of Aden to Hadramaut; 3, Hadramaut, a large tract bounded on the S. E. by the Indian Ocean; 4, Oman, which extends from the Persian Gulf to the Indian Ocean, and borders on the Sea of Oman, being bounded on the W. by the desert; 5, Lahsa (El Achsa), or Hadjar, which extends along the Persian Gulf from Oman to the mouth of the Euphrates; 6, Nej'd or Nedjed, the central desert region, nearly coinciding with Arabia Deserta. The climate is hot and extremely dry. Muscat and Mocha, both on the sea-coast, are among the hottest inhabited spots on the earth. The temperature of the plains is often 100° in the shade. In many parts of Arabia rain never falls in the course of the year, and the sun is rarely obscured by a cloud. On the coasts of the Red Sea there is a rainy season of two or three months in summer, but on the southern or south-eastern coast the scanty supply of rain falls in the winter, so that the hottest months of the year are also the driest. To the extreme dryness of the atmosphere may be ascribed the remarkable degree of cold sometimes felt in Arabia, for ice and snow frequently occur on mountains ranging from 6000 to 8000 feet in height in the part of the peninsula which is in the torrid zone. Among the remarkable phenomena of the climate is a hot south wind called *simoom*, the poisonous quality of which has been exaggerated by travellers. The soil, where it is irrigated, produces cotton, coffee, indigo, tobacco, tamarinds, the date-palm, barley, rice, sugar, and many aromatic plants. The flora of Arabia comprises the characteristic plants of its neighboring countries. Among the wild plants are the mimosa, the Euphorbiaceæ, lavender, jasmine, the aloe, and the trees which yield gum-arabic and olibanum. The animal kingdom is here represented by the camel, the antelope, the ibex, hyena, wolf, jackal, wild-ass, wild-boar, the jerboa, monkey, ostrich, eagle, etc. The Arabian horse is celebrated, and perhaps unrivalled, for docility, endurance, beauty, and speed. Among the mineral resources of Arabia are copper, iron, lead, coal, emeralds, carnelians, agate, onyx, alabaster, marble, sulphur, and saltpetre. Few nations of the world have been more nearly stationary or have made such little progress in industrial arts. The division of the Arabs into numerous independent and unsettled tribes, with consequent absence of national unity, is a great obstacle to their improvement and organization. The government is neither a monarchy, a republic, nor an aristocracy, but each tribe is subject to a chief called an emir, sheik, or imâm. Having the advantage of occupying the coasts between India on the east and Africa and Europe on the west, the Arabs distribute the cotton goods of India among the peoples of Africa, and carry back ivory, gums, dyewoods, etc. Merchandise is conveyed across the deserts by large caravans of camels, which are styled "the ships of the desert." The principal exports of Arabia are dates, coffee, gum-arabic, myrrh, aloes, pearls, balsam, and other drugs. The population, formerly estimated at from 10,000,000 to 15,000,000, amounts, according to the recent calculations, to only 4,000,000, and is divided into two classes—the nomadic Bedouins, who have no habitations but tents, and have loose notions of the rights of property; and agricultural and mercantile Arabs, who live in towns and villages. The chief towns are Mecca, Medina, Loheia, Mocha, Aden, Muscat, Yembo (or Yambo), and Rostak.

History.—Owing to its desert character, Arabia was never touched by any of the great conquerors of ancient times.

After the death of Alexander the Great, the Arabians conquered a part of Chaldæa, and founded the empire of Hira. Another tribe founded the empire of the Ghassanides, on the river Ghassan. In 107 A. D. the Roman emperor Trajan was the first to penetrate to the interior. With the advent of Mohammed the different tribes began to unite and act in concert, and, leaving their peninsula, founded large and powerful empires in three continents. (See MOORS and CALIPHS.) At the time of the conquest of the caliphate of Bagdad in 1258, and the expulsion of the Moors from Spain in 1492, the Arabian rule in Europe and Asia Minor came to an end. In the sixteenth century the Turks conquered Yemen, but were driven back in the seventeenth, but again gained the nominal authority over the holy cities and Hejaz. From 1508 to 1609 Muscat was subject to Portugal. The most important event of recent times in the internal history of Arabia is the advent of the WAHABEES (which see) in 1770, and their defeat by Mehemed Ali in 1811. At present, the only European power having possessions in Arabia is England, which has taken possession of Aden. In consequence of an attack made on the Christians in Djidda in 1858, the city was bombarded by the British. (See CRICHTON, "History of Araby," 1852; SEDILLOT, "Histoire des Arabes," 1854; MÜLLER, "Beiträge zur Geschichte der westlichen Araber," 1868; WEIL, "Geschichte der islamitischen Völker," 1868; MALTZAN, "Wallfarth nach Mekka," 1865; WREDE, "Reisen in Hadhramaut," 1870, and the accounts of NIEBUHR, BURCKHARDT, BURTON, PALGRAVE, and others.)

A. J. SCHEM.

Ara'bian Ar'chitecture, a style sometimes called MOORISH, originated almost simultaneously with the Mohammedan religion, and followed the progress of that religion into Eastern Europe, Spain, and Africa. The early temples or mosques of the Moslem Arabs were modifications of Byzantine architecture. The most peculiar and original feature of the Arabian architecture is the horseshoe arch. The pointed arch was also very extensively used by the Moors or Saracens. Among the finest specimens of Arabian style is the ALHAMBRA (which see).

REVISED BY CLARENCE COOK.

Arabian Language and Literature. The Arabic belongs to what is termed the Semitic (or Shemitic*) family of languages, and is closely related to the Hebrew, which it resembles in its general grammatical structure, as well as in the form of many of its words. Like the Hebrew, it is written from right to left, and like it, also, the vowels are not written in the body of a word or name, but are indicated (if indicated at all) by certain marks placed above or below the consonants to which they belong (see 29). The alphabet consists of twenty-eight letters, as follows:

	Unconnected.	Final Connected.	Medial.	Initial.	Name.	Power.
1.	ا†	ـا	ـا	ا	alif,	a.
2.	ب	ـب	ـبـ	بـ	bâ,	b.
3.	ت	ـت	ـتـ	تـ	tâ,	t.
4.	ث	ـث	ـثـ	ثـ	thâ,	th.
5.	ج	ـج	ـجـ	جـ	jeem or jîm,	j.
6.	ح	ـح	ـحـ	حـ	hâ,	h.
7.	خ	ـخ	ـخـ	خـ	khâ,	kh.
8.	د†	ـد	ـد	د	dâl,	d.
9.	ذ†	ـذ	ـذ	ذ	dhâl,	dh.
10.	ر†	ـر	ـر	ر	râ,	r.
11.	ز†	ـز	ـز	ز	zâ,	z.
12.	س	ـس	ـسـ	سـ	seen or sîn,	s.
13.	ش	ـش	ـشـ	شـ	sheen or shîn,	sh.
14.	ص	ـص	ـصـ	صـ	sâd,	s or ss.
15.	ض	ـض	ـضـ	ضـ	dsâd,	ds or dh.
16.	ط	ـط	ـطـ	طـ	tâ,	t.
17.	ظ	ـظ	ـظـ	ظـ	dza,	dz or dh.
18.	ع	ـع	ـعـ	عـ	ain (å'in or īn),	‡
19.	غ	ـغ	ـغـ	غـ	ghain (gå'in or gīn),	‡
20.	ف	ـف	ـفـ	فـ	fâ,	f.
21.	ق	ـق	ـقـ	قـ	kâf,	k.
22.	ك	ـك	ـكـ	كـ	kâf,	k.
23.	ل	ـل	ـلـ	لـ	lâm,	l.
24.	م	ـم	ـمـ	مـ	meem or mîm,	m.
25.	ن	ـن	ـنـ	نـ	noon or nûn,	n.
26.	و†	ـو	ـو	و	waw,	w.
27.	ه	ـه	ـهـ	هـ	hâ,	h.
28.	ى	ـى	ـيـ	يـ	yå,	y.

1. ا at the beginning of a word is sounded variously, according to the vowel-points upon it (see the paragraph on Vowels given below); in the middle of a word it is sounded as *a* long, as in باب (*bâb*), a "gate."

2. ب sounds like *b* in English.

3. ت has the sound of the Spanish *t*, which is pronounced by placing the tip of the tongue against the upper teeth.

4. ث sounds like our *th* in *thin*.

5. ج is usually pronounced like the English *j*, though in some dialects (for example, in that of Egypt) it has the sound of our *g* hard.

6. ح sounds nearly like the German *ch* in *ach*, but it is formed lower in the throat.

7. خ sounds like the German *ch* in *ach*, *doch*, etc. It is usually represented in the French and English languages by *kh*, and in the German by *ch*.

8. د nearly resembles in sound the English *d*, but, in pronouncing it, the tip of the tongue is placed against the teeth. It may be said to bear the same relation to our *d* that the Spanish *t* does to our *t*.

9. ذ has no exact equivalent in any European language, though it resembles the sound of our *th* in *thy*. It is often represented by *dh*, and sometimes by *ds*, *dhs*, or simple *d*.

10. ر sounds like the French or Italian *r*, or like *rr* in the English word *terror*.

11. ز has the sound of *z* in English.

12. س sounds like our *s* in *this*.

13. ش is like the English *sh*.

14. ص sounds nearly like the English sharp *s*; but, in pronouncing it, the teeth are not brought so nearly into contact. It is sometimes represented by *ss*, or by *ç*.

15. ض has no equivalent in any European language. It is variously represented by *dz*, *dh*, *dd*, and *ds*.

16. ط is in sound nearly like the English *t*, but is pronounced somewhat harder. It is commonly represented by *t* or *tt*, and often, especially by German writers, by *th*.‖

17. ظ somewhat resembles ض in sound. It cannot be represented by any English letter or combination of letters.

18. ع has no exact equivalent in any European tongue. It nearly corresponds to the Hebrew ע. In the hiatus produced in uttering å—å in quick succession, we make a sound similar to the Arabic *ain*, but the latter is formed lower in the throat.

19. غ has no equivalent in English. It bears nearly the same relation to hard *g* that *kh* does to *k*. It is sometimes represented by *g*, but more frequently by *gh*, especially by French and English writers.

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* A term derived from Shem, the eldest son of Noah.

† The letters thus marked ought never, according to the rules of Arabic orthography, to be connected with those that follow them.

‡ These letters have in sound nothing like them in English.

ʔ Written, also, ⊃.

‖ In such cases *th* is not intended to indicate a sound like *th* in English or the Greek θ, but rather one similar to that of the Hindoo *th*.

20. ف has the sound of our *f*.

21. ق is similar to our *k*, but is formed lower in the throat. It is sometimes represented by *ḳ* (with a dot under it), and sometimes by *q*.

22. ك in sound is exactly like our *k*.

23. ل is like the English *l*.

24. م is pronounced like our *m*.

25. ن is in sound like the English *n*.

26. و, as a vowel, is equivalent to ōō or û; as a consonant, it sounds like the English *w* or *v*.

27. ه sounds like our *h;* when final, it is nearly silent.

28. ى, as a vowel, sounds like *ee* (or *î*), in which case a *kasra* is implied or expressed; as a consonant, like *y*. In the middle of a word the sound of ى may be doubled by means of the *tashdeed*, which, in writing, is often omitted. Preceded by *fatha* (see Vowels below), this letter assumes the sound of our long *ī*, and is represented by *ai*.

☞ All the foregoing characters are regarded by Arab grammarians as consonants. Alif has been compared to the soft breathing (*spiritus lenis*) of the Greeks; Ain is a similar breathing, though the place of its formation is lower in the throat.

VOWELS.

29. In Arabic the true vowels are three. They are called —1. *Fat'ha* (*a**); 2. *Kas'ra* (*i*, sometimes *ĕ*); and 3. *Dhamma* (*oo* or *u*†). Fatha is written over the consonant to which it belongs, thus ـَ; kasra is placed beneath its consonant, thus ـِ; dhamma (which is in fact a minute و) is written over its consonant, thus ـُ. These vowels are always joined to the consonant which in pronunciation they follow: thus, in قَلَم (kălăm), a "reed" or "pen," the first fatha is considered to belong to the *kâf*, over which it is placed, the second to the *lâm* (not to the *meem* which comes after it); and so in all similar cases: it necessarily follows that no vowel can stand by itself.‡ Hence, if we wish to write an initial short fatha, it must be associated either with *alif* or *ain*, as أَحَد (ăhăd), a "unit," عَفُو (ăfû), "forgiveness." If we would write a short initial kasra or dhamma, we must begin the word in the same manner: *e. g.*, إِبن (ĭb'n), a "son," عِبَاد (ĭbâd), "servants," أُف (uf or ŏŏf), "fie!" عُبُور (ubûr or ŏŏbōōr), a "passage" or "crossing."

30. If any one of the simple vowels is joined to an ordinary consonant, or to an initial *alif* or *ain*, it is generally short, as will be seen from the foregoing examples; but if in any syllable *not initial* they are joined with any of the (so-called) consonants (*alif, ain, waw*, etc.) to which they naturally correspond, they become long: thus, fatha with *alif* or *ain* gives us the sound of *â*, as بَاب (bâb), a "gate," بعد (bâd or bå-ạd), "after;" so kasra with *yâ* gives the sound of *î* (or *ee*), as سِين (seen or sîn), the name of the letter س; so also dhamma with *waw* gives the sound of û or ōō, as نُون (nûn or nōōn), the name of the letter ن. It should be observed that the fatha or dhamma is not written *on* the *alif* or *waw*, nor the kasra *under* the *yâ*, but is joined to the previous consonant, the semi-consonants coming after, for the sole purpose, it would seem, of prolonging the vowel.‖ In order to indicate the sound of *â* at the beginning of a word, it is usual to place a circumflex over the *alif*,—thus, آ. The initial long *i* (*î* or *ee*) is represented by إِ, and long *u* (*û* or *ōō*) by أُو.

The vowels are usually omitted in Arabic manuscripts, and they are scarcely needed by the native Arabs, who are already familiar with the language; but they are of the utmost importance to foreigners in learning Arabic. The same may be said of the jăzm or jĕzm (ْ), a mark placed upon a consonant to show that it has no vowel following it, as أَزْرَق (ăzrăk, "blue," which without the jăzm might be pronounced ăzărăk), and the tashdeed or tashdîd (ّ), placed on a consonant to show that it is to be doubled in pronunciation; as مُحَمَّد (Mohammed).

It is proper to observe that when the Arabic article *al* or *el* is followed by certain letters, the sound of the *l* is changed to that of the letter following; thus, *el-Deen* becomes *ed-Deen; el-Dowlah, ed-Dowlah; al-Rahman* or *el-Rahman, ar-Rahman* or *er-Rahman; al-Temeemee, at-Temeemee;* and so on.

The Arabic characters are supposed to have been derived from the Syriac, and to have been introduced into Arabia by Christian missionaries before the time of Mohammed. The oldest form is called the Cufic (or Kufic), from Koofa, a town in the Euphrates, where it is said the transcription of the Koran was extensively carried on. These characters were extremely rude and coarse, and, being only sixteen in number, could but very imperfectly represent the twenty-eight consonant sounds of the Arabic tongue. In the tenth century they were replaced by the *neshki* characters, as they are called, which are still in use. At present the Cufic letters are scarcely to be met with, except in ancient inscriptions or in the books of antiquarians.

Of the Arabic tongue there are two principal dialects—namely, the northern or prevailing dialect, in which the Koran is written, and the southern, which included the Himyaritic, originally spoken in Yemen and the extreme southern portion of Arabia. The Himyaritic (a term derived from Himyar, an ancient king of Yemen) is supposed to have been the basis of the Ethiopian language.

The Arabic is one of the most extensively diffused languages in the world. It not only prevails in Arabia, in Syria, and in a part of Mesopotamia, but it is spoken in its various dialects (which are more or less corrupted) throughout a large part of Northern Africa, from the shores of the Atlantic to the Red Sea. The language is spoken with much purity in Egypt, which, since its conquest during the caliphate of Omăr, in 640 A. D., has been one of the principal centres of Arabian culture. From about the ninth to the twelfth or thirteenth century it was the prevailing tongue of a large part of the Spanish Peninsula, and its traces are still seen not merely in many of the names, but in the language, of Spain at the present day.

Arabian Literature is very rich, especially in poetry and other productions of the imagination. Even before the time of Mohammed, the Arabs had celebrated poets, who sang the praises of heroes and the charms of beautiful women. During the great fairs at Mecca poetic contests were held in much the same manner as at the games of ancient Greece, and the poems which received the prizes were, it is said, written out in golden characters, and suspended in the Kaaba (Caaba) at Mecca, the famous temple which was said to have been built by Ishmael. From this circumstance they are called Mo'allakât (معلقات) —that is, "suspended."

Among the Arabian poets, Mohammed is admitted to hold, beyond all comparison, the highest place. His followers were wont to refer their opponents to the sublimity and beauty of the Koran as an unanswerable proof that its author was divinely inspired.

It may be said that, with perhaps the exception of Mohammed, the Arabs have had no poet of the highest class, nor have they produced any great epic, or any drama worthy of the name. It is in lyric and romantic composition that they most excel.

There is one kind of poetical fiction, called "Assemblies" (Arab. Makâmât مقامات), which may be said to be peculiar to Arabic literature. The "Assemblies" may be regarded as the first step towards dramatic composition. The author of this species of writing was Hamadânee (or Al-Hamadânee), who flourished towards the close of the tenth century. He imagined a witty and unscrupulous improviser wandering from place to place, and living on the presents which the display of his marvellous talents procured from his hearers, and a narrator, or story-teller, who should be continually meeting with the other, should relate his adventures and repeat his excellent improvisations. He gave to these compositions the name of "Assemblies," because the improviser was always introduced as making his appearance in some company or assembly of strangers, where the narrator also happens to be, and is sure to be greatly astonished at the tricks, wit, and genius of the other, which he afterwards relates in his own language, and these relations constitute the "Assemblies" as they are presented to us. Of this species of composition the "Assemblies" of Hareeree (Harîrî) furnishes, perhaps, the best

* Often represented by *e*, and sometimes (in English) by *u* short.

† Often represented by *o*, as in the name of Mohammed.

‡ It may be remarked as an apparent exception to this rule that Ibn, "son," is often written simply بن (*bn*); but this is usually to be considered as an abbreviation for إبن, though *ben* or *bin* is not unfrequently used instead of the longer form *ibn*.

‖ The long vowels in Arabic are to be pronounced very full and long, especially the long *a*, which is not only longer, but somewhat broader, than our *a* in *far*.

specimen. Hareeree is regarded by the Arabs as a consummate master of diction, and the highest authority in the use of language. "For more than seven centuries," says a recent writer, "his work (the 'Assemblies') has been esteemed as, next to the Koran, the chief treasure of the Arabic tongue. Contemporaries and posterity have vied in their praises of him. His 'Assemblies' have been commented on with infinite learning and labor in Andalusia and on the banks of the Oxus." (See Introduction to the "Assemblies of Al-Harîrî," translated by T. CHENERY, London, 1867.)

In romance especially the Arabs may be said to excel. Among the works of this class we may name the "Feats of Antar," the stories or fables of Ibn Arabshâh, etc. But perhaps the most universally popular, not merely of Arabian fiction, but of all fiction of which we have any knowledge, is the famous collection of tales known as the "ARABIAN NIGHTS" (which see).

In philosophy, mathematics, history, geography, medicine, and physics, the Arabs, during the period of their power, rendered important services to science and civilization; the Arabic terms still found in the language of science, such as *alcohol*, *algebra*, *almanac*, *azimuth*, *nadir*, *zenith*, etc., sufficiently attest their influence on the early intellectual culture of Europe. During the period known as the Dark Ages the scientific works of Aristotle and other Greek philosophers were translated for the most part by Christian scholars, who resided as physicians at the courts of the califs in great numbers. These works were diligently studied in the Mohammedan capitals of Bagdad, Damascus, and Córdova, and served to diffuse a knowledge of those great writers among nations who otherwise would have remained in utter ignorance of them and their writings.

The most glorious period of Mohammedan culture extended from about 750 to 1200 A. D. During this period the Abbasside califs, Haroun-al-Raschid, Motassem, and Mamoon, reigned at Bagdad, which, under their auspices, became a magnificent centre of science, letters, and the arts. In the far East, Mahmood of Gazna (about 990–1030), though a sanguinary conqueror, was ambitious of the distinction of a patron of literature. At his court flourished Firdousee* (Firdausi), the greatest not only of all Persian but of all Moslem poets, Mohammed only excepted. In Spain, under the califs of the Omeyyade dynasty, the period of Arabian culture was not less glorious, and was of much longer duration, than that under the Abbassides. Al-Hakem, calif of Córdova (961–76), had, it is said, a library of 600,000 volumes. The high reputation for learning of the Spanish Arabs is shown by the fact that some of the best students of Christendom visited Córdova in order to study the philosophy of Aristotle, medicine, and mathematics under Arabian professors. To the Arabs we are indebted for the preservation of many works from classical antiquity, which without their care and zeal would in all probability have perished during the long period of darkness and semi-barbarism that followed the overthrow of the Western Roman empire.

Among the most distinguished Arabian authors, besides those already mentioned in this article, we may name—1. In poetry, Khansâ, a female poet contemporary with Mohammed; Ibn-Doreid (838–933); Al-Mootenabbee (about 900–965); and Booseeree (or Busîrî), who flourished in Upper Egypt (about 1250). 2. In philosophy, Alchindus flourished under the calif Mamoon (about 820); Alfarabius, who lived at Damascus (about 950); Avicenna (980–1037), who was even more celebrated as a physician than as a philosopher; Averroes (about 1120–98), wrote at Córdova, in Spain, a commentary on Aristotle, to which Dante alludes. 3. In medicine the Arabs excelled all the nations of that period; they are commonly regarded as the earliest experimenters in chemistry (alchemy). Among their celebrated physicians were Razes (or Rhazes), (870–930), who is said to have been the first to describe the smallpox accurately; Avicenna (Iba Sînâ), already mentioned, the most famous of all the Arabian physicians; Averroes was also distinguished as a physician; Abulcasem (Abulcasis), the most distinguished of Arabian surgeons, is supposed to have practised in Córdova (about 1050–1110); he left a treatise on surgery, the most valuable that has come down to us from early times. 4. In mathematics the labors of the Arabs were not less useful than in other branches of science, though they cannot perhaps boast of so many famous names as in philosophy and medicine. They contributed greatly to simplify and improve the science of numbers by the introduction of the Indian numerals, with the decimal notation. They appear to have been the first to introduce the knowledge of algebra (which had been previously cultivated by the Greeks and Hindoos) into Western Europe. Mohammed Ibn Moosa (who flourished at Bagdad from about 810–833) is said to have been the first of his countrymen who wrote on algebra. He also wrote on optics and astronomy. Albategnius (Albatenî), who died at Bagdad in 929, wrote some valuable works on astronomy; Aboolfeda combined mathematics and astronomy with geography. 5. In history and geography, Masoodee, one of the first of Arab historians, was born at Bagdad, and died at Cairo in 956. His "Meadows of Gold and Mines of Gems" comprises the history, the politics, the religion, and the geography of many Oriental and European nations. Aboolfeda (1273–1331) has left works of great value in this and other departments of knowledge. His "Description of the Countries" is considered the best work on geography which the Arabian writers have bequeathed to us. Abulfaragius and Elmacin (or Elmâkin), though Christians, wrote in the Arabic language valuable general histories. Ibn Khaldoon (1332–1406) wrote a valuable history of the Arabs, Persians, and Berbers. Makreezee flourished at Cairo (1360–1442), and wrote some excellent historical works. Makkaree, or Al-Makkari (1585–1631), wrote a history of the "Mohammedan Dynasties of Spain," which has been translated into English by Gayangos, London, 1840.

Those who seek for a general view of Arabian literature are referred to HAMMER-PURGSTALL'S "Encyklopädischen Uebersicht der Wissenschaften des Orients" (Leipsic, 1804), and his "Literaturgeschichte der Araber" (7 vols. 4to, 1850–56); RENAN, "Averrhoes et l' Averrhoisme;" WHEWELL, "History of the Inductive Sciences."

J. THOMAS.

Arabian Nights, sometimes called **The Thousand and One Nights,** the title of a collection of wild and fanciful Oriental tales, first brought to the notice of Europe in the latter part of the seventeenth century, by Antoine Galland, a French Orientalist. These fascinating fictions are probably more widely diffused and read than almost any other production of the human mind. The origin and author of this collection are still unknown. According to some authorities, the "Arabian Nights" may be properly divided into three portions, which may be respectively traced to a Persian, an Indian, and an Arabian origin. Throughout the entire work, however, everything appears to be conformable to the character and customs of the Arabian people and to the Mohammedan faith. The fact that Haroun-al-Raschid figures in several of the stories goes to prove that they, at least, must have been written after his death; while the omission of any mention of coffee and tobacco (except in two or three instances, where the names are supposed to be interpolations) shows that the work must have been composed before the introduction of those articles into Western Asia (in the latter half of the fifteenth century). "Many of the tales," says Mr. Lane, referring to this remarkable work, "are doubtless of different and early origins, and its general plan is probably borrowed from a much older production bearing the same title." After some further remarks, he states it as his opinion that the composition in its present form was probably commenced in the last quarter of the fifteenth, and completed in the first quarter of the sixteenth, century, and that the author or authors must have been Egyptian, because the description of Arab life as it is seen in Cairo is so minutely accurate in all respects. But respecting the date and place of its composition, Oriental critics are far from being agreed. The work has been translated by W. Beaumont (1811), Macnaghten, Scott, Torrens, E. Foster (1802), and Lane (1839). Most of these translations were from the French. It is noteworthy that the tales differ considerably in various Arabic texts. Among the best translations of the "Arabian Nights" is that of the celebrated Oriental scholar already mentioned, Mr. Edward Lane. The translation is perhaps unequalled for its thoroughness and accuracy, and in the graces of style is probably not inferior to any other in our language. The "Arabian Nights" has given rise to many imitations, among the best of which in English is "Tales of the Genii," by Sir Charles Morell. J. THOMAS.

Arabian Numerals or **Figures,** a name given to the characters 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, which the Europeans received through the Arabs from the Hindoos. The use of these numerals was not general in Europe before the invention of printing.

Arabic, Gum, exudes spontaneously from the stems of several species of acacia. (See ARABIN and GUM.)

Arab'ici (*i. e.* "Arabians"), an heretical sect which arose in Arabia in the third century, the founder of which

* All Mohammedan culture may be considered to be in one sense an offshoot of Greek culture. Not only was the genius of the poetry of the modern Persians greatly modified by the influence of Islamism, but the Persian language itself includes a very large mixture of Arabic words and phrases. This is especially remarkable with respect to some of the later poets. To understand thoroughly the works of Saadi, for example, a very considerable knowledge of Arabic is absolutely requisite.

was Beryllus, bishop of Bostra. They denied Christ's divinity, and believed that the soul dies, and is raised again with the body. They were confuted by Origen.

Ar'abin, the essential principle of gum-arabic, is obtained pure by adding alcohol to a solution of gum-arabic in water. It dissolves readily in cold water, forming a gummy solution, and is precipitated by alcohol. It appears to be a weak acid, and to exist in the natural gum in combination with lime, magnesia, and potash. Its composition, like that of cane-sugar, is $C_{12}H_{22}O_{11}$.

Aracan', or **Arracan** [called by the natives **Rakhaing'**], a British province of Farther India, extending along the E. side of the Bay of Bengal, and bounded on the E. by the Burmese empire, from which it is separated by a range of high mountains. The greatest length from N. to S. is about 280 miles, and the area is 15,104 square miles. The surface is diversified, and extensively covered with forests. The chief productions are rice, tobacco, indigo, cotton, salt, oil, ivory, hides, and timber. Aracan was conquered from the Burmese by the British in 1826. Chief town, Akyab. Pop. 321,522.

Aracan, or **Arracan,** a town of Farther India, in the above province, situated on the river Aracan, about 50 miles from its entrance into the Bay of Bengal, about lat. 20° 45′ N., and lon. 93° 15′ E. It was formerly the capital of the province and a populous town, but it is now much reduced. Pop. estimated at 10,000.

Araça'ri, or **Aricari** (*Pteroglos'sus*), a genus of birds,

Curl-Crested Araçari.

natives of tropical South America, and nearly allied to the toucan, but generally smaller, with longer tails. The bill of one species is white, with a blood-red stripe along the middle. One of the most remarkable is the curl-crested araçari, having the feathers upon its head beautifully curled.

Araca'ty, a port in the province of Ceará, Brazil, has three churches, several schools, and a trade in hides and cotton. It is on the river Jaguaribe; lat. 4° 31′ S., lon. 37° 48′ W. There is a bad bar at the river's mouth. Pop. about 9000.

Ara'ceæ [so named from *Arum*, one of its genera], a natural order of endogenous herbaceous plants, natives of temperate and especially of tropical countries. The leaves are sheathing at the base, convolute in the bud; the flowers are naked, arranged on a spadix, which is usually enclosed in a spathe; the male flowers at the upper part of the spadix, and the female at the base. The genus *Arum* is the type of this order, which is characterized by an acrid juice and a nutritious amylaceous substance which is used for food. The *Amorphopallus* is cultivated in India for its roots (or corms), which are edible. (See ARUM.)

Arachis. See PEA-NUT.

Arach'nida, or **Arach'nides** [from the Gr. ἀράχνη, a "spider"], an order of articulated animals which resemble insects in many respects, and are properly regarded as a subdivision of that class, but they have no antennæ, have simple eyes, and generally have eight legs. Like the Crustacea, they have the head and thorax united into one piece. They are mostly carnivorous, and some of them are parasitic. The primary divisions of this class are Araneina (spiders), Pedipalpi (scorpions, etc.), and Acarina (ticks and mites).

Arach'noid [from the Gr. ἀράχνη, a "spider," also "spider's web," and εἶδος, "form" or "resemblance"], resembling a spider's web, applied to the second or middle membrane of the brain. (See next article.)

Arach'noid Mem'brane (sometimes called *me'ninx me'dia*), the fine cobweb-like serous membrane situated between the dura and pia mater. It covers both brain and spinal cord. It is a closed sac, disposed in two layers.

Arad, a county of Hungary, is bounded on the N. by Bihar, on the E. by Zarand and Transylvania, on the S. by Temes and Krasso, and on the W. by Csanad. Area, 2322 square miles. In the E. it consists of high mountain-ranges, but the W. is a fertile plain, traversed by the White Körös. Grain of all kinds, wine, and tobacco are produced here in large quantities and of an excellent quality. Chief town, Arad. Pop. in 1869, 304,713.

Arad, NEW [Hun. *Uj Arad*], a town of Hungary, in the county of Temesvár, and on the left bank of the Máros. Here is an extensive fortress, which is one of the strongest in the Austrian empire, and is used as a prison for political offenders. Pop. in 1869, 4960.

Arad, OLD [Hun. *O Arad*], an open town, capital of the county of Arad, is on the right bank of the Máros, 35 miles E. of Szegedin. It is a bishop's see, has a Greek theological seminary, a normal school, and manufactures of tobacco, etc. It is an important cattle-market, and has a considerable trade in grain. Pop. in 1869, 32,725.

Ar'adus [the *Arvad* or *Arpad* of the Bible], one of the chief cities of ancient Phœnicia, was built upon the island now called *Ruad*, which is small and rocky, and is situated 35 miles N. of Tripoli, and 2 miles from the main land. It long continued to be a place of great population and importance. It was supplied with water from submarine springs. It was destroyed and depopulated by the Moslems in the seventh century. Many relics of its former greatness remain. It has still a small population.

Arafat', Mount, or **Jebel-er-Rahm** (*i. e.* the "mountain of mercy"), a granite hill of Arabia, 15 miles E. of Mecca, rises about 200 feet above the plain. It is visited annually by a great multitude of Mohammedan pilgrims, who believe that this is the place where Adam and Eve first met after they had been expelled from Paradise and had been separated 120 years.

Ar'ago, a post-village of Richardson co., Neb., on the Missouri River, about 28 miles below Brownville. Pop. of village, 364; of Arago township, 1245.

Arago (DOMINIQUE FRANÇOIS), a French astronomer and savant, was born at Estagel, near Perpignan (Eastern Pyrenees), Feb. 26, 1786. He entered the Polytechnic School in 1803, and became in 1805 secretary to the bureau of longitudes. In 1806, Arago and Biot were employed by the government to perform the measurement of an arc of the meridian from Barcelona to the Balcaric Isles, in order to complete an important operation which Delambre and Méchain had commenced. While he was engaged in this arduous work among the mountains, war broke out between the French and Spaniards. Arago escaped from the violence of the Spaniards, who suspected him to be a spy, but on his voyage towards home was driven by a tempest to Algiers, where he was held as a slave. He was finally liberated, and returned to France in July, 1809. In consideration of his services and sufferings he was elected a member of the Institute in 1809, although he was under the age that the rules required. About the same time he was appointed professor of analysis in the Polytechnic School, where he lectured for many years. He afterwards devoted much attention to optics, astronomy, and magnetism. In 1812 he commenced a course of lectures on astronomy, which were rendered very popular by a brilliant style added to their other merits. Arago and Gay-Lussac founded in 1816 the "Annales de Chimie et de Physique." He advocated the undulatory theory of light, and made several discoveries in the science of electro-magnetism. For his discovery of the development of magnetism by rotation, he received the Copley medal of the Royal Society of London in 1825. He became in 1830 director of the Observatory of Paris and perpetual secretary of the Academy of Sciences. His reputation as a writer was increased by the eulogies which he composed on Condorcet, Ampère, and Carnot, and other members

of that academy. He displayed a remarkable faculty of popularizing science in his writings and lectures.

Arago promoted the revolution of 1830, and was elected in 1831 to the Chamber of Deputies, in which he acted with the *extrême gauche*, the advanced republicans. He was a member of the provisional government formed by the republicans in Feb., 1848, and co-operated with Lamartine in resistance to the socialists and in the maintenance of order. He officiated as minister of war and the marine for several months, and was one of the executive committee of five elected by the Assembly in May, 1848. About this time the voters of his native department elected him to the National Assembly. He opposed the election of Louis Napoleon to the presidency, and refused the oath of allegiance after the *coup d'état* of Dec., 1851. The emperor recognized his eminent services by excepting him from the enforcement of the law on this point. Arago died on the 2d of Oct., 1853, leaving a son, Emmanuel, noticed below. He was a friend of Alexander von Humboldt and of Faraday; was a man of a generous disposition, an ardent temperament, and great energy of character. "The popularity of M. Arago," says De Loménie, "the European reputation which he enjoys, his marked position in politics, have all combined to attach to his name the idea of a species of intellectual royalty." The same biographer attributes to him a "marvellous faculty of illumining with unexpected radiance the most abstract theories." (See L. de Loménie, "Galerie des Contemporains;" D. F. Arago, "Histoire de ma Jeunesse," 1854; Charles Robin, "Biographie de D. F. Arago," 1848; J. A. Barral, "F. Arago," 8vo, 1853; Bertrand, "Arago et sa Vie Scientifique," 1865; Audiganne, "François Arago," 1869.) William Jacobs.

Arago (Emmanuel), a son of the preceding, born at Paris Aug. 2, 1812. He studied law, and gained distinction as an advocate and counsel for the defence in political trials. Like his father, he was a keen republican, and took an active part in the revolution of 1848. In this crisis he was selected by the republicans to protest in the Chamber of Deputies against the appointment of a regency. He was sent as commissary-general to Lyons in March, was elected to the Constituent Assembly in April, and was sent as minister to Berlin in May, 1848. He resigned this position in Dec., 1848, in consequence of the election as president of Louis Napoleon, whose designs he constantly opposed. The *coup d'état* of Dec., 1851, and the *régime* that followed, excluded Arago from the public service. On the formation of a provisional government by the republicans in Sept., 1870, he became a member of the same. He was elected a member of the National Assembly in 1871.

Arago (Étienne), a dramatic author, a brother of the great savant, D. F. Arago, born at Estagel, near Perpignan, Feb. 7, 1803, produced a number of successful comedies and vaudevilles, which exhibit a talent for satire. Among his works is "The Aristocrats" (1847), a comedy in verse. He fought for the popular cause in the revolution of 1830, and founded the "Reform," a daily republican journal, in 1834. He was director-general of the post-office from Feb., 1848, until December of that year, and in that position acted with much vigor and ability. As a member of the National Assembly he voted with the *gauche* and opposed the policy of Louis Napoleon. He was exiled in June, 1849. After the proclamation of the republic in Sept., 1870, he was appointed maire of Paris, which position he held until November. In Feb., 1871, he was elected a member of the National Assembly, but soon resigned on account of his age.

Arago (Jacques Étienne Victor), a French *littérateur*, brother of the preceding, was born at Estagel Mar. 10, 1790. He accompanied the exploring expedition of Freycinet, as draughtsman, in 1817, and on his return in 1821 published a "Tour round the World in the Uranie," etc. (2 vols., 1822). Among his works are several dramas. Although he had become blind, he joined a party that went to California in 1849 to dig for gold, and published "Travels of a Blind Man in California," etc. (1851). Died in 1855.

Ar'agon, a former kingdom of Spain, bounded on the N. by France, on the E. by Catalonia, on the S. by Valencia, and on the W. by Navarre and the Castiles. Length from N. to S., about 200 miles. Area 17,980 square miles. It is now divided into the provinces of Huesca, Saragossa (Zaragoza), and Teruel. The Pyrenees, which extend along the northern border of Aragon, rise to the height of 11,000 feet. The surface is diversified by several ranges of mountains and many fertile and beautiful valleys. Aragon is intersected by the river Ebro, which flows southeastward and divides it into two nearly equal parts. A considerable portion of the soil is sterile. Among the mineral resources of this region are copper, iron, lead, cobalt, quicksilver, marble, stone coal, alum, and salt. Aragon was conquered by the Moors in the eighth century. The Christian kingdom of Aragon, founded in 1035, became a powerful state, which was united with Castile by the marriage of Ferdinand of Aragon and Isabella of Castile in 1469. The chief towns are Saragossa and Huesca. Pop. in 1867, 925,773. (See Schmidt, "Geschichte Aragoniens im Mittelalter.")

Arago'na, a town of the island of Sicily, in the province of Girgenti, 8 miles N. of Girgenti. It has a ruined castle and large sulphur-mines. Pop. in 1861, 7947.

Ar'agonite, or **Ar'ragonite,** a variety of carbonate of lime, first found in Aragon. It crystallizes in hexagonal prisms, or in crystals of which the primary forms a rhombic prism. It resembles calcareous spar in composition, but differs from it in the form of its crystals, and is reduced to powder by a heat in which calcareous spar remains unchanged. Satin spar is a variety of aragonite.

Ara'gua, a province of Venezuela, is bounded on the N. by Carabobo and Caracas, on the E. by Caracas, on the S. by Guarico and Carabobo, and on the W. by Carabobo. Area, about 3720 square miles. This province is one of the most beautiful and fertile parts of Venezuela, and is traversed by the river Aragua, from which it takes its name, and numerous other small rivers, which all enter Lake Valencia. The hills and mountains are covered with plantations, gardens, and country-seats. Here the strange scene strikes the eye of wheat-fields and plantations of sugar and coffee side by side at an elevation of 3000 feet. Chief town, Victoria. Pop. 81,500.

Araguay', or **Araguay'a,** a large river of Brazil, rises in the mountains about lat. 18° 10′ S. and lon. 51° 30′ W. It flows northward, forms the boundary between Goyaz and Matto-Grosso, and after a course of 1300 miles joins the Tocantins at São João. It is navigable for about 1100 miles. About midway from its source to its mouth it encloses the island of Santa Anna, 210 miles long. The stream on the E. side of this island is called *Furo*.

Ara'lia, a genus of plants of the order Araliaceæ, natives of the U. S., of the Himalaya Mountains, and other regions. It comprises a number of species which are used in medicine, as the ginseng, *Aralia quinquefolia; Aralia nudicaulis*, called wild sarsaparilla, which grows in the U. S.; *Aralia spinosa*, a native of Virginia, which is a stimulant diaphoretic, called angelica tree or toothache tree; and *Aralia racemosa*, or American spikenard, which produces an aromatic gum-resin. Chinese rice-paper is cut from cylinders of the pith of *Aralia papyrifera*.

Aralia'ceæ [so called from *Ara'lia*, one of its genera], a natural order of exogenous plants, natives of tropical, temperate, and cold regions in various parts of the globe. It comprises about 160 known species (trees, shrubs, and herbaceous plants), generally possessing stimulant or aromatic properties. The fruit consists of several one-seeded cells. The leaves of several species are used as fodder for cattle in India. One species of this order, the ivy, is a native of England.

Ar'al, Sea of, a large inland sea or lake in Independent Tartary, is about 150 miles E. of the Caspian Sea. It is included between lat. 43° and 47° N. Length, estimated at 262 miles; breadth, about 184 miles. Area, 26,900 square miles. Next to the Caspian, it is the largest inland sea or lake of Asia. Having no outlet, it is consequently saline or brackish. The S. W. part, called Lake Landau, is shallow, and not more than five feet deep in the deepest part. The Aral is fed by the large river Oxus or Amoo, which enters the sea at its S. side: it also receives the river Sihon or Sir-Daria from the E. The latest measurements make it twenty-six feet above the level of the sea. Seals, sturgeons, and other fish are found in it.

A'ram (Eugene), an English felon, born in Yorkshire in 1704. He had not the advantage of a liberal education, but he acquired a good knowledge of the Latin, Greek, Hebrew, Chaldee, Arabic, and Welsh languages. He became a schoolmaster at Knaresborough, where he was intimate with a shoemaker named Daniel Clarke. The latter, having purchased some goods on credit, suddenly disappeared, leaving his debts unpaid. Aram was suspected of being an accomplice of Clarke in an attempt to defraud. A portion of the goods which Clarke had purchased was found in the garden of Aram, who was tried, but acquitted, after which he removed from Knaresborough. In 1759 a man named Houseman having confessed that he was accessory to the death of Clarke, whom Aram had killed, Aram was tried for the murder, and made an elaborate argument in his own defence, but was convicted, and afterwards confessed his guilt. He was hung Aug. 6, 1759. His story forms the subject of one of Bulwer's novels and of a poem by Hood. (See Scatcherd, "Memoirs of Eugene Aram," 1832.)

Aramæ'a [from *A'ram*, the son of Shem], the ancient name of a region of Asia, the boundaries of which are not well defined. It extended from Mount Taurus on the N. to Arabia on the S., and coincided nearly with the countries called by the Greeks Syria, Babylonia, and Mesopotamia. The Aramaic language, a branch of the Semitic, was divided into two forms or dialects—the Syriac or West Aramaic, and the Chaldee or East Aramaic. The former was the language commonly spoken by the Jews in Palestine at the Christian era.

Aran'da (Don Pedro Abaraca de Bolea), Count of, an able Spanish statesman, born of a noble family at Saragossa Dec. 21, 1718. He served many years in the army, and rose to the rank of general. In 1765 he became president of the council of Castile and prime minister. He used his power to promote reform and a liberal policy, and procured the expulsion of the Jesuits from Spain in 1767. In 1773 he was removed from power by the intrigues of the clergy, but he was sent as an ambassador to France, where he remained until 1787. He was again prime minister for a short time in 1792, and was driven from power by Godoy. He died in 1799.

Aranjuez' (anc. *A'ra Jo'vis, i. e.* "altar of Jupiter"), a town and royal residence of Spain, in New Castile, on the left bank of the Tagus, 30½ miles by rail S. S. E. of Madrid. It is situated in a beautiful valley, has spacious streets, elegant squares, and a royal palace and gardens laid out by Philip II. Here are also a theatre, a hospital, and several summer-houses in the royal gardens. Aranjuez was the scene of the abdication of Charles IV. in Mar., 1808. Pop. 10,725.

Aran'sas, a small river of Southern Texas, rises in Bee county, flows south-eastward and enters Aransas Bay.

Aransas, a post-village of Bee co., Tex.

Aransas, a village of Refugio co., Tex., on the inside of St. Joseph's Island and on Aransas Bay. It has a government warehouse.

Aransas Pass, the principal inlet to Aransas Bay and Corpus Christi Bay, Tex., between St. Joseph and Mustang islands. It is becoming commercially important, but has a troublesome shifting bar. The lighthouse is of brick, forty feet high, and stands on Low Island, inside the pass; lat. 27° 51′ 51″ N., lon. 97° 2′ 58″ W. The Confederate works at this pass were captured by the Federal troops, with 100 prisoners and some guns, Nov. 20, 1864.

Arany (János), a popular Hungarian poet, born at Nagy-Salonta in 1817, became in 1851 professor at Nagy-Körös, in 1859 member of the Hungarian Academy, and in 1860 director of the Kisfaludy Society at Pesth. His first work was a humorous poem called "The Lost Constitution of the Past" (1843), which gained a prize. He afterwards produced poems entitled "Toldi" (1847), "The Conquest of Murány" (1848), "Catherine" ("Katalin," 1850), and "Buda Halála," the first part of an epic trilogy, which in 1864 was crowned by the Hungarian Academy.

Arap'ahoe, a county in the N. E. part of Colorado. Area, estimated at 4500 square miles. It is drained by the South Fork of Platte River, and by Beaver, Bijou, and Terrapin Creeks. The eastern part is a plain, and the western part is hilly or mountainous. Irrigation renders the soil extremely productive. Wheat, corn, oats, butter, and live-stock are extensively raised. Large quantities of gold have been found near the western border. This county is partly intersected by the Kansas Pacific R. R. and the Denver Pacific R. R., which connect at Denver, the county-seat. Pop. 6829.

Arapahoe, a new county of Southern Nebraska, bounded on the N. by the Platte River.

Arapahoe Indians, a tribe of savages who live between the South Fork of the Platte River and the headwaters of the Arkansas. They are associated with the Cheyennes. The two tribes together numbered nearly 4000 in 1870.

Arapai'ma, a genus of fresh-water fishes found in the rivers of South America, and highly esteemed for food. They are the largest fresh-water fishes in the world, and are allied to the Clupeidæ or herring family. Some of them measure about fifteen feet long, and weigh 400 pounds or more. The body is covered with strong, bony, compound scales.

Ar'arat, a celebrated mountain of Western Asia, rises from the plain of the Aras (or Araxes) about 33 miles S. W. of Erivan. It is called by the Persians Koh-i-Nooh, "Mountain of Noah." It is on the boundary between Persia, Asiatic Turkey, and the Russian possessions. The highest peak is in lat. 39° 42′ N. and lon. 43° 38′ E., is covered with perpetual snow, and has an altitude of 16,915 feet above the level of the sea, or 14,200 feet above the plain of the Aras. It is a volcano, the last eruption of which occurred in July, 1840.

Ararat, Little, a peak which is S. E. of the preceding, and rises in the form of a cone to the height of about 13,700 feet above the level of the sea. The summits of these two mountains are seven miles apart in a direct line, but their bases are nearly in contact. According to the eighth chapter of Genesis, the ark rested "upon the mountains of Ararat."

Ararat, or **Pilot Mountain,** a hill in Surrey co., N. C., between the Ararat and Dan rivers, is 3000 feet high. It is visible at a distance, and serves as a landmark to travellers.

Ararat, a township of Susquehanna co., Pa. P. 771.

Arari'pe, Ser'ra de, a table-land or chain of mountains in Brazil. It forms a semicircle around the plain in which Crato is situated, and is near the boundary between Ceara and Pernambuco.

Aras' (the ancient *Arax'es*), a river of Western Asia, rises in the Turkish pashalic of Erzrum. It flows eastward, passes near the northern foot of Mount Ararat, and traverses the Persian province of Adzerbijan. It afterwards turns towards the N. E., and enters Georgia or the Russian dominions, and unites with the river Kur about 60 miles from its entrance into the Caspian Sea. Its whole length is about 500 miles.

Ara'tus [Ἄρατος], an eminent Greek poet and astronomer, born at Soli, in Cilicia, flourished about 290–260 B. C. He was patronized by Antigonus Gonatas, king of Macedonia, at whose court he passed his latter years. He wrote an astronomical poem entitled "Phenomena," which is the oldest extant poem on that subject, and was much admired by the ancients. It was translated into Latin by Cicero, and was the subject of a commentary by Hipparchus. He is supposed to be the poet quoted by St. Paul in a discourse to the Athenians. (See Acts xvii. 28.) Aratus also wrote a poem on the weather, called "Diosemeia," or "Prognostica." A good edition of his poems was published by Buhle, 1793–1801.

Ara'tus of Sic'yon, a celebrated Greek general and statesman, born at Sicyon in 271 B. C., was a son of Clinias, who was assassinated about 264. Aratus then escaped to Argos, where he was liberally educated. In 251 B. C., with the aid of other exiles, he liberated Sicyon from the tyrant Nicocles, and united it with the Achæan League, of which he was chosen general (*strate'gos*) in 245. An important object of the league was to maintain the independence of the Greek states against the king of Macedonia. He expelled a Macedonian garrison from Corinth in 243 B. C., was many times re-elected general-in-chief, and managed the affairs of the league with much ability. About 226 the league was involved in a war against Cleomenes, king of Sparta, who defeated Aratus in several battles. Aratus formed in 222 an alliance with Antigonus of Macedon against the Spartans. He died in 213 B. C., leaving the reputation of a true patriot. (See Plutarch, "Life of Aratus;" Polybius, "History.")

Arauca'nia, or **Arauca'na,** an independent state in the S. part of Chili, is bounded on the E. by the Andes and on the W. by the Pacific Ocean. It extends from the river Bio-Bio on the N. to Valdivia, or to lat. 40° S., being about 190 miles long. The physical features, climate, and productions are similar to those of Chili. The Araucanians are remarkable for their independent spirit and their successful resistance to foreign domination. The Spaniards made an unsuccessful attempt to subdue them in 1537 and at several subsequent periods. On this subject Ercilla, a Spaniard, wrote a celebrated epic poem called "Araucana." It is said that they possess many noble qualities, and cultivate poetry, but abhor the restraints of civilization. They recognize a Supreme Being and a future state, but build no temples. The government is administered by four hereditary *toquis*, each of whom rules over one of the provinces into which their country is divided. The most important national questions are decided by the grand council composed of these *toquis*, or by a general assembly. In 1860, a French lawyer, De Tonnens, who had gained considerable influence among the Araucanians, proclaimed himself, under the name of Orélie Antoine I., constitutional king of Araucania. He was in 1861 taken prisoner by the Chilians and sent back to France. In the treaty of Jan. 22, 1870, the Araucanians promised to recognize the authority of Chili, but subsequently King Orélie once more made his appearance in Araucania and defied the Chilian troops. In 1873 financial agents of Orélie made great efforts to effect a loan in London. (See Molina, "History of Chili;" Edward R. Smith, "The Araucanians," etc., New York, 1855.)

Arauca'ria [said to be derived from Araucania (which

see)], a genus of plants of the natural order Coniferæ, natives of South America. They are all evergreen trees, and are distinguished by having the male and female flowers on separate trees, the pollen contained in from ten to twenty cases pendent from the apex of each scale, the female flowers two under each scale, each having one ovule. The *Araucaria imbricata*, or Chili pine, a native of the Chilian Andes, attains the height of 150 feet, and produces a seed which is an important article of food; also a fragrant resin in abundance. The timber is hard, heavy, and suitable for the masts of ships. This tree is cultivated as an ornament of landscapes. The Norfolk Island pine, which is about 200 feet high, was formerly called *Araucaria*, but botanists now include it in the genus *Altingia* or *Eutassa*.

Arau'co, a province of Chili, is bounded on the N. by Concepcion, on the E. by the Andes, on the S. by Valdivia, and on the W. by the Pacific Ocean. Area, 13,714 square miles. The soil is fertile, but as the ground is covered for a large part by forests, agriculture has made very little progress. The chief article of export is timber. Chief town, Arauco. Pop. in 1870, 87,677.

Arau'jo d'Azeve'do (Antonio), Count da Barca, a Portuguese statesman, born at Ponte de Lima May 14, 1754. He negotiated at Paris, and signed, a treaty of peace with France in 1797, but the French Directory annulled it. He became minister of foreign affairs in 1806. After Napoleon had invaded Portugal and captured Lisbon, Araujo accompanied the king, John VI., to Brazil in 1808. He was appointed minister of marine in 1814, and in 1817 sole minister. He was a man of various accomplishments; he wrote poetry and gained distinction by his scientific attainments. Died June 21, 1817.

Arau'jo Por'to-Alle'gre, de (Manoel), one of the most prominent poets of Brazil, was born at Rio Pardo in 1806. He was appointed in 1859 consul-general for Brazil to Prussia. His principal works are an epic entitled "Colombo," and lyric poems called "Brasilianas."

Aravul'li, or **Aravali,** a mountain-range of Hindostan, traverses Ajmeer, and is about 300 miles long. The highest summits are about 5000 feet above the level of the sea. It constitutes the watershed between the Arabian Sea and the system of the Ganges. The general direction of the range is N. N. E. and S. S. W.

Ar'baces [Gr. Ἀρβάκης], a Median general who revolted against Sardanapalus, captured Nineveh, his capital, and on the ruins of the Assyrian empire founded the kingdom of Media, about 876 B. C.

Ar'balest, or **Arbalast** [Lat. *arcuballis'ta*, from *ar'cus*, a "bow," and *ballis'ta*, "an engine for shooting;" Fr. *arbalête*], a name of the crossbow, which was much used in the battles of the Middle Ages. It was sometimes made of steel. The arrow or other missile was placed in a barrel or groove which was perpendicular to the cord or bowstring. The arrow discharged by these bows was called a quarrel.

Arbe'la, now **Arbeel** (**Arbîl** or **Erbil**), a small town of Asiatic Turkey, in Koordistân, about 40 miles E. of Mosul. The modern town has some large mosques and bazaars. Arbela gave its name to the battle in which Darius was finally defeated by Alexander the Great, in 331 B. C., but it was fought at Gaugamela. Pop. about 6000.

Arbela, a township of Tuscola co., Mich. Pop. 870.

Ar'biter [a Latin word signifying "umpire"], a person chosen by parties in a controversy to decide a question; sometimes applied to a person who has the power of judging and determining, or who is able to control the destiny of others. Some cases among the ancient Romans were decided by an arbiter, especially when the parties differed in respect to the amount of money which one of them should pay to the other.

Arbitra'tion [from the Lat. *arbitror*, to "act as judge" (*arbiter*)], a submission of some matter in dispute to the judgment and decision of a person called an "arbitrator." It applies to civil cases only, and may be either oral or written. It is voluntary in its nature, as any party has a legal right to have an adjudication upon his case by a court of justice. Statute law sometimes makes arbitration compulsory, as where the investigation of a long account is necessary. Even after parties have agreed to submit a controversy to arbitration, one of them may withdraw his consent against the will of the other at any time before the hearing is closed. The only remedy of the other party is to bring an action for damages, which would usually be nominal. However, when parties enter into a contract, they may stipulate that no rights of action shall accrue under its provisions unless there is a submission on their part to arbitration; in which case the duty to submit becomes a condition precedent, and cannot be avoided. The result of the arbitration is termed an *award*. It is not, however, equivalent to a judgment of a court, and if not performed the regular course of the successful party would be to bring an action upon the award, and thus make it a judgment of a court. To avoid this inconvenience, statute law frequently provides that on reducing the submission to writing a clause may be inserted that the award may be entered on the records of a specified court as a judgment, whereupon it shall have the like force and effect. Having the characteristics of a judgment, the award falls under the control of the court, and modes are provided by which mistakes and errors may be rectified by judicial action. As a general rule, there is no review of the result of an arbitration. There are no methods of appeal provided, as the theory of the proceeding is that the arbitrator is to be the judge of the difference between the parties. This rule does not prevent the rectification of mistakes in matters of fact, nor does it include the case of fraud or the violation of the first principles of justice; as, for example, the act of hearing one party, and not the other.

Arbois, a town of France, department of Jura, about 25 miles S. W. of Besançon. It is celebrated for its wine, and has manufactures of paper and earthenware. Here are some Roman antiquities. Pop. in 1866, 5895.

Arbol-a-brea, the resin of *Canarium album* (an amyridaceous tree), from the Philippine Islands. Baup (*Ann. Ch. Phys.* [3], xxxi., 108) obtained several distinct principles from it.

Arbor'iculture [from the Lat. *ar'bor*, a "tree," and *cultu'ra*, "culture" or "cultivation"], the art of cultivating trees, includes the raising of plantations of forest trees for timber and fuel, and ornamental trees for landscape gardening; but the culture of fruit trees is commonly assigned to a separate head, or to horticulture and pomology. Arboriculture is becoming an art of increasing necessity in the U. S., as the native forests are rapidly disappearing by the consumption of wood for building, manufactures, railway structures, and many other purposes.

Its Importance.—Though at the present time the timber crop is more important than any other product of the land, yet little attention is paid to it by land-owners. We have extended treatises on the management of wheat, corn, and other grain crops, on the best systems of rotation, and on the many details of farm management, but little is said on tree-planting; and not one farmer in a thousand sufficiently appreciates the importance of growing young timber on an extensive scale to supply the deficiency which will soon be felt everywhere as our native woodlands are rapidly cut away. An approximate statement of the amount of consumption may serve to show the absolute necessity of urging the importance of arboriculture on the attention of land-owners at large. In the State of New York alone about 1,500,000 acres are cleared of timber in ten years; and in the U. S. about 3,000,000 yearly, or 30,000,000 acres in ten years, are stripped of their trees. Of the wood thus obtained, about 6,000,000 cords are consumed annually for railroad fuel; and over fifty million dollars' worth of ties has been used in the construction of the railroads of the Union. The wood value of freight and passenger cars is over seventy million dollars, and of wooden bridges fifty million dollars. More than one hundred million dollars' worth of sawed lumber is annually used for shipbuilding, cooperage, and the vast number of manufactures wherein this material is extensively employed. The wood used as fuel cannot be less than twenty-five million cords per annum. Such facts as these naturally suggest the same thoughts that were uttered three hundred years ago by the illustrious and far-seeing Bernard Palissy, when expressing "his indignation at the folly of men in destroying woods." He adds, "I cannot enough detest this thing, and I call it not an error, but a curse and calamity to all France; for when the forests shall be cut, all arts shall cease, and they who practise them shall be driven out to eat grass with Nebuchadnezzar and the beasts of the field. I have divers times thought to set down in writing the arts which shall perish when there shall be no more wood, but when I had written down a great number, I did perceive that there could be no end to my writing, and having diligently considered, I found that there was not any that could be followed without wood."

Forming Wood-plantations.—But we cannot ask land-owners to keep their old woods untouched. They cannot afford to hold a large amount of dead capital in the shape of the original forests. But new timber should be carefully restored as fast as the old is cut away. It is more economical to renew a dense growth of young wood, and to clear it off frequently, or once in about twenty years, than to allow the trees to grow a hundred and fifty years. The land will in the former case yield five or six times as great a quantity as in the latter. There are two modes of renewal. One is to clear away the old trees entirely, and to allow the new growth to spring up spontaneously or from the closely-cut stumps; and the other is to make new plantations on well-cultivated land. The value of the new growth

from the renewal of old trees depends much upon its character and denseness. To secure a good start, the old trees should be entirely cleared away, and not, as is too often the case, merely thinned out, leaving the middle growth standing, for the few scattered trees of medium size which remain will shade and greatly retard everything below them. Every farmer knows that no young crop can flourish under the shade of thin woods. Young trees require the same advantages of air and sunshine as Indian corn, and shaded trees grow only one-fourth or fifth as fast as those under full exposure. To induce free sprouting from the stumps the old trees must be cut away in autumn, winter, or early spring, and not while growing or in full leaf.

Thinning.—The young plantations having been started a few years (cattle being carefully excluded), the first work is thinning. If this is not attended to, trees will crowd and enfeeble each other. The first thinning may be done when the trees are large enough for hoop-poles. The more crooked and feeble growth may be cut out, leaving the best and straightest at as uniform distances as practicable. If the plantation is a fine one, the hoop-poles will more than pay the interest on the land, if not afford a handsome revenue. The first thinning may leave the trees about four feet apart, and should never be so severe that the shade and fallen leaves will not prevent the growth of grass—the leaves mulching the surface. It will be found more convenient, when the growth is abundant enough, to leave the thinned trees as nearly as practicable in straight lines, to allow the free passage of wagons for drawing out the timber. A good approximate rule for distance in successive thinnings, as the trees become larger, is to allow a height of two or three times as great as the distance asunder. If too much sunlight is let in, the growth of side-limbs will render the timber knotty; if too little light is admitted, the trees will be feeble and slender. Experiments show that thinning not only increases the amount of wood grown in a given time, but renders it more valuable and free from defects. A well-managed wood-plantation, on fertile soil, will yield an amount of wood equal to forty cords per acre if cut every twenty years, or two cords per acre annually.

Raising trees from seed, although attended with more labor and care at first, gives more perfect and profitable plantations in the end. The land must be well prepared by ploughing, as for corn or other farm-crops. The seed may be planted in drills or in hills, like corn, and the young trees kept well cultivated a few years, till large enough to shade the ground. If the seeds are of free-growing kinds, the hills may alternate the first year with hills of corn; or if in drills, the corn and trees may be in alternate rows. Such large seeds as those of the chestnut, black walnut, hickory, and oak may be planted in this way, if the seeds have been properly kept through winter. To ensure evenness, a surplus of seed should be used, and the supernumerary plants afterwards thinned out. The smaller and more delicate kinds of seeds should be planted in seed-beds of fine mould, and covered by sifting it over them, and the trees transplanted into rows when they have attained a few feet in height. The depth for covering all these seeds may be nearly determined by observing the general rule (liable to slight exceptions) of burying them at a depth of about three times, and never more than five times, their diameter. At a much greater depth few of the young plants will find their way to the surface, and in most germination will be prevented. The only objection to planting very shallow is the want of sufficient moisture to sprout the seeds. Young evergreen seedlings, in addition to the care here prescribed, will require a partial shading through most of the first summer, gradually removing it to harden the young plants. With the larger seeds which have a horny covering—such, for instance, as the chestnut and horse-chestnut—entire failure to germinate commonly results from permitting this covering to become dried and impervious to moisture; and the only way, therefore, to ensure success is to plant them soon after the seeds ripen, or to keep them from drying by packing in moist sand or pulverized moss. It is for this reason that experiments in planting chestnuts which are bought in market nearly always fail.

Transplanting young trees from seed-beds, after they have been once removed to nursery-rows, is extensively adopted in Britain and other parts of Europe for obtaining woodlands. Setting them out when not more than three or four feet high is attended with less labor, less check in growth, and more certainty of all the trees surviving, than if taken at a greater size. Setting out very large trees is never profitable for any purpose. Much more depends on a good deep soil and thorough after-culture for a few years. The great arboriculturist Loudon confidently affirmed that he could show larger, finer, and more luxuriant trees in five years by setting those of moderate size in deeply-trenched ground, and giving them constant cultivation, than could be obtained in a shorter period by the removal of larger ones—an assertion that was corroborated by the experiments of Sir Henry Stewart in the moist climate of Scotland, where he formed in a single year a landscape garden of large trees set out at great expense, these trees never entirely recovering from the sickly appearance which their removal gave them.

Woodland belts, for protection against winds, are found of much utility and value, both in the Eastern States and on the vast plains of the West. Where the face of the country has become denuded, and wintry winds and summer storms sweep farms with more fury than formerly, belts of this character are found to protect young crops and to increase the product of the land. Young plants of grass and winter grain, after heaving by frost, are beaten about and sometimes torn out by the action of the winds on the bare surface. Grain-crops and meadows are prostrated by tempests. We are informed by landowners who have planted screens of evergreens that in some instances the increase of crops raised within the range of their protection, and out of their immediate shade, has amounted to fifty per cent. greater than with entire exposure. Belts of timber a few rods in width, traversing farms fully exposed to winds, are therefore profitable in two ways: First, by the increased amount of the crops; and secondly, by the timber perpetually furnished by these belts. They should be placed at intervals of from sixty to eighty rods. Where rising land faces prevailing winds they should be nearer; but where it falls, they may be more remote. If the belts are evergreen, a rod wide will be sufficient; if deciduous, they should be three or four rods, or more. When cut, one half in breadth may be taken at a time. Or the belts may be planted thirty or forty rods apart, and alternate ones removed for timber. By selecting thrifty growers, such as the Norway spruce (evergreen) and the Scotch larch (deciduous), a growth of from twenty-five to thirty feet may be reached in about ten years, if the young trees are well cultivated at first, and fifty feet in twenty-five years. If planted closely, they will spread less and will shoot up higher than if thin and scattered.

The profits of timber plantations must become greater each year as the forests of the country are consumed. For ordinary fuel alone, the two cords per acre which may be yearly obtained would be a constant revenue of ten dollars in many portions of the country; and when good timber trees are raised, which may be employed in the innumerable manufactures of tools and machinery, for cooperage, ships, buildings, carriages, and cabinet-work, the annual revenue would be several times greater.

If the planting of the timber-belts already described were generally adopted throughout the country, they would occupy about one twenty-fifth part of the two hundred million improved acres of the Union; would possess a money value when grown of at least $800,000,000, afford a yearly revenue in wood and timber of more than $80,000,000, and render the land they shelter more valuable than before.

But it is not merely the pecuniary profit that should induce our people generally to raise trees. The improved and polished appearance which ornamental trees would give the country at large, if planted along roadsides and on the lawns of farm-residents, would increase the attractions of country life and make their homes more desirable to young people. The moral influences of tree-planting would in this way become an important agency for improving the character of the people. JOHN J. THOMAS.

Ar′bor Vi′tæ (literally, the "tree of life"), a term applied to the thick mass of white substance in either hemisphere of the cerebellum. This mass, when cut parallel to the median line, presents an arborescent or tree-like appearance.

Arbor Vitæ [see preceding article], (*Thu′ya*), a genus of plants of the natural order Coniferæ, consisting of evergreen trees or shrubs, with compressed or flattened branchlets, and small, scale-like, and imbricated leaves. The *Thuya occidentalis* is a native of the U. S., and is often planted as an ornamental tree in the parks and pleasure-grounds of America and Europe. It is one of the trees known as white cedar. The Chinese arbor vitæ (*Thuya orientalis*), a native of China, has larger strobiles and more upright branches than the preceding. It is cultivated in Europe and the U. S. as an ornamental tree, and produces a resin which has been supposed to possess medicinal virtues. The genus comprises several other species.

Ar′broath, Ab′erbroth′wick, or **Ab′erbroth′ock,** a seaport-town of Scotland, in Forfarshire, at the mouth of a small stream called the Brothock, 16 miles N. E. of Dundee, with which it is connected by railway. It has a public library, and manufactures of coarse linens, canvas, leather, etc. About 100 vessels (tonnage 13,896) belong to this port. Here are picturesque ruins of a richly-endowed

abbey, founded by William the Lion in 1178. Robert Bruce and the Scottish nobles met in this abbey in 1320 to organize a resistance to Edward II. Pop. of the municipal burgh in 1861, 8500; of the parliamentary burgh, 17,591; of the parliamentary burgh in 1871, 19,974.

Ar'buckle, a post-township of Mason co., West Va. Pop. 1301.

Arbuckle (MATTHEW), an American general, born in Greenbrier co., Va., in 1775. He served many years on the frontier among the Indians; also in the Mexican war (1846–47). Died June 11, 1851.

Arbuth'not (ALEXANDER), a Scottish theologian and poet, born about 1538. He became principal of the University of Aberdeen in 1569. Among his works are a poem called "The Praises of Women" and a "History of Scotland." Died in 1583.

Arbuthnot (JOHN), M. D., F. R. S., an eminent physician, born at Arbuthnot, near Montrose, in Scotland, in 1660. He studied at Aberdeen, where he graduated, and settled in London. His first work was an "Examination of Dr. Woodward's Account of the Deluge" (1697). His reputation was increased by his "Tables of the Greek, Roman, and Jewish Measures, Weights, and Coins" (1705). He was appointed physician to the queen in 1709, and obtained an extensive practice. He was an intimate associate of Pope, Swift, and Lord Bolingbroke. In 1712 he published a humorous political allegory entitled a "History of John Bull," in which the great powers then involved in war were personated by John Bull the clothier, Nick Frog the linen-draper, and Louis Baboon (Louis XIV.). This work displays a great talent for satire. He produced another humorous and ironical work, called "The First Book of the Memoirs of Martinus Scriblerus." This was part of an unfinished work which Pope, Swift, and Arbuthnot projected in partnership, and which was designed to be a satire against pedantry and the abuse of learning. In 1723 he was chosen second censor of the Royal College of Physicians, and in 1727 was made an elect of the college. Died Feb. 27, 1735. He was a man of amiable character. "He has more wit than we all have," said Swift, "and his humanity is equal to his wit." Comparing him with contemporary British authors, Dr. Johnson said, "I think Dr. Arbuthnot the first man among them. He was the most universal genius, being an excellent physician, a man of deep learning, and a man of much humor."

Ar'butine, a principle found in the leaves of the red bearberry (*Arctostaphylos uva ursi*).

Ar'butus, a genus of plants of the order Ericaceæ, mostly natives of America and Southern Europe. They are evergreen shrubs, bearing a fleshy fruit which has five cells and many seeds. The arbutus mentioned by Virgil was the *Arbutus unedo* or strawberry tree,* which bears bright red and yellow berries, with beautiful foliage, and is cultivated as an ornamental evergreen. The fruit has narcotic properties, and is used for making wine in Corsica. Another species, the *Arbutus Andrachne*, a native of the Levant, is admired as an ornamental plant, and bears an esculent fruit. The Pacific States have one or more native specimens of this genus. The bearberry, a trailing shrub which is used as an astringent or tonic in medicine, was formerly called *Arbutus uva ursi*, but is now considered to be a species of *Arctostaphylos*. The trailing arbutus (*Epigæ'a re'pens*), a small but very beautiful flower, is found in many parts of the U. S.

Arc [from the Lat. *ar'cus*, a "bow"], in geometry, any part of a curved line. An arc of a circle is any portion of the circumference. The straight line joining the extremities of an arc is its *chord*, which is always shorter than the arc itself. Arcs of circles are similar when they subtend equal angles at the centres of their respective circles. To rectify an arc is to find the length of a straight line to which it would be equal if it had the same length in a right direction as it has in a curved. The area included between an arc and its chord is a segment of a circle.

Ar'ca, or **Arc Shell,** a genus of bivalve mollusks which are lamellibranchiate, and are the type of a family called Arcadæ. The hinge is straight, and is coextensive with the whole breadth of the shell, the breadth being greater than the length. Numerous species of *Arca* occur in tropical and other seas. Many others are fossil. One living species occurs in fresh water in India.

Arca'da, a township of Gratiot co., Mich. Pop. 1202.

Arcada, a township of Lapeer co., Mich. Pop. 418.

Arcade [from the Lat. *ar'cus*, a "bow," an "arch"], a row of arches supported by columns or square pillars. This term is sometimes applied to a long arched building or gallery lined on each side with shops; also to a row of piers or columns and arches by which the aisles are divided from the nave of a church. The arcade in Gothic corresponds to the colonnade of classical architecture. Arcades were employed by the ancient Romans in theatres, aqueducts, amphitheatres, and temples.

Arcade, a post-village and township of Wyoming co., N. Y., on the Buffalo New York and Philadelphia R. R., 35 miles S. E. of Buffalo, has extensive woollen mills, mowing-machine works, furniture manufactory, academy and union school, three churches, and one weekly newspaper. Pop. of village, 573; of township, 1742.

S. W. WADE, ED. OF "TIMES."

Arca'dia [Gr. Ἀρκαδία], a celebrated state of ancient Greece, was the most central part of the Peloponnesus (now called the Morea). It was bounded on the N. by Achaia, on the E. by Argolis, on the S. by Laconia and Messenia, and on the W. by Elis. The area was about 1600 square miles. It was enclosed on nearly all sides by mountains, and a large part of it was occupied by fertile valleys and verdant mountain-ridges. The principal river was the Alpheus. The Arcadians were a simple, pastoral people, inferior to most of the other Greeks in genius and culture. This inferiority may be ascribed to their isolated position, which deprived them of the influence of the sea and of the advantages of commerce. The chief towns of Arcadia were Mantinea, Tegea, Orchomenos, and Megalopolis. The Arcadians resembled the Swiss in their love of freedom and money, and in their tendency to enlist as mercenaries in foreign armies. Among the Ten Thousand whose famous retreat Xenophon described, more than two thousand were Arcadians. This country was a favorite of ancient pastoral poets, who praise the peaceful and happy life of the Arcadian shepherds. At present, Arcadia is one of the thirteen nomarchies of the kingdom of Greece. Area, 2028 square miles. Pop. in 1870, 131,740.

Arcadia, a post-township of Morgan co., Ill. P. 1251.

Arcadia, a township of Manistee co., Mich. Pop. 175.

Arcadia, a post-village and township of Iron co., Mo., about 4 miles S. of Pilot Knob. Pop. of township, 3058.

Arcadia, a post-village and township of Wayne co., N. Y. Pop. of township, which contains the village of Newark, 5271.

Arcadia, a post-township of Davidson co., N. C. Pop. 720.

Arcadia, a township of Halifax co., N. C. Pop. 2898.

Arcadia, a post-village of Washington township, Hancock co., O. Pop. 288.

Arcadia, a post-township of Trempealeau co., Wis. Pop. 1651.

Arca'dius [Gr. Ἀρκάδιος], emperor of the East, the eldest son of Theodosius the Great, was born in Spain in 383 A. D. In 395 Theodosius died, after he had divided his empire between Arcadius and Honorius, the latter of whom received the western part. The eastern empire, of which Byzantium was the capital, included Thrace, Asia Minor, and Syria, and extended from the Adriatic to the Tigris. During the minority of Arcadius, Rufinus and Eutopius successively acted as regents of the empire. The empress Eudoxia acquired the control over Arcadius, who was a feeble and indolent prince. He died in 408 A. D., and was succeeded by his son, Theodosius II.

Arca'ni Discipli'na (*i. e.* the "Discipline of Secrecy"), a term for the first time used by the Protestant theologian Dallæus in 1666 for the secrecy observed in the early Church with respect to certain doctrines; as, for example, those of baptism, the Eucharist, and some others. These were withheld from candidates until after they had been received into full communion with the Church. Soon after the introduction of the term, the subject gave rise to a very animated controversy between Catholic and Protestant theologians, which has continued ever since. The former used it to account for the silence of the early Church writers as to certain doctrines and practices of their Church. Protestant writers generally regard it either as a natural outgrowth of the oppressed condition in which the Church found itself at that time, or a degeneration of the simple forms of primitive Christianity in the interest of the hierarchy. The best Catholic treatises on the subject are those by Döllinger (1826), Toklot (1836), Hefele (1846), and Mayer (1868); the best Protestant, those by Richard Rothe (in Herzog's "Real Encyclopädie"), Zezschwitz ("Katechetik," 1863), Niedner ("Kirchengeschichte," 1846), Harnack ("Der christliche Gemeindegottesdienst," 1854), and, in particular, Bonwetsch (in "Zeitschrift für historische Theologie," 1873), who gives a complete history of the controversy.

Arca'num (plu. **Arca'na**), a secret, a mystery; some-

*In the U. S. the name of strawberry tree has been applied to the *Euonymus Americanus*, a plant of a different order.

times applied to a medicine the composition of which is kept a secret. This term was much used by the alchemists, whose object was to discover the grand arcanum, the philosopher's stone.

Arcanum, a post-village of Twin township, Darke co., O. Pop. 450.

Arca'ta, a post-village and township of Humboldt co., Cal., situated at the head of Humboldt Bay. It is a place of considerable trade. Pop. 924.

Ar'ce (Manuel José), a general who in 1824 was chosen president of the republic of Central America for four years. He favored the clerical party, at whose instigation he arrested Barrundia, governor of Guatemala, in Sept., 1826. This act provoked a popular revolt and a civil war, in which Arce was defeated in 1827. He was expelled in 1829.

Arcesila'us [Αρκεσίλαος], a Greek philosopher, born at Pitane, in Æolia, in 316 B. C., was the founder of the New (or, as it is sometimes called, the Middle) Academy. He was a pupil of Theophrastus, and was an admirer of Plato, but taught a modified form of Platonic philosophy. He was eloquent, witty, and ingenious in argument, revived the Socratic method of teaching, and recommended an abstinence from dogmatism. It appears that he left no written statement of his doctrines, which are known to us only through the medium of his adversaries, the Stoics. Among the sayings ascribed to him is, that "he knew nothing, not even his own ignorance." Died in 241 B. C. (See Ritter, "History of Philosophy;" G. H. Lewes, "Biographical History of Philosophy.")

Arch [Lat. *ar'cus*, "a bow," "an arch"], a curved structure of stone or brick supported by the mutual pressure of its component parts, intended to cover the space between two piers or two columns, and to support at the same time a superincumbent weight. The wedge-shaped pieces of which the arch is composed are called *voussoirs.* The middle stone of the arch is called the *key-stone,* and the lowest stone on either side is the *springer.* The highest part is the *crown,* the sides are termed *haunches,* the inner curve is the *intrados,* and the exterior or upper curve is the *extrados;* while the base which supports the lowest *voussoir* or *springer* on each side is the *impost.* Arches are of various shapes, but the principal distinction is into *round* and *pointed.* All other shapes are merely described in one of these, and the principle of construction is the same for all. The arch was known to the Egyptians, the Ethiopians, the Assyrians, the Greeks, and the Etruscans, though no one of these peoples made any extensive use of it, since the post-and-lintel system met all their wants. Its first considerable use was by the Romans, who employed exclusively the round form. They used it in doors and windows, in their aqueducts, bridges, and triumphal arches, and they early developed from it a complete system of vaulting. (See Vault.) Among the oldest arches known is the Cloaca Maxima, a great sewer built in Rome in the time of the Tarquins, and still in good condition. The pointed arch came into use later. It was at first sparingly employed, but lending itself more easily than the round arch to the increasing desire for height in building, it gradually superseded the round arch, and became so inherent a feature of the Gothic style that the name of Pointed Architecture is often applied to the works of the mediæval builders.

Clarence Cook.

Arch, Triumphal [Lat. *ar'cus triumpha'lis;* Fr. *arc de triomphe* or *arc triomphal*], a monumental structure erected in honor of a victorious general or in commemoration of some important event or victory. It was usually placed at the entrance of a city or over a grand avenue. The ancient Romans built numerous triumphal arches at Rome and elsewhere. Scipio Africanus erected one on the Capitoline Hill, about 190 B. C. Magnificent structures of this class were raised by Augustus at Rimini and Ancona. Three triumphal arches at Rome are still extant—namely, the Arch of Titus, which commemorates the conquest of Judea; the Arch of Septimius Severus; and the Arch of Constantine, a beautiful and imposing structure adorned with bas-reliefs. The most magnificent of modern triumphal arches are those of Paris, and the finest among these is the Arc de l'Étoile, erected by Napoleon I. at the Barrière de Neuilly. It has three arches, the central one of which is 95 feet high. The whole structure, which is equal in grandeur and splendor to the ancient Roman arches, is about 160 feet high and 150 feet in length.

Arch (Joseph), president of the English National Agricultural Laborers' Union, was born in Barford, Warwickshire, England, in 1828. He was the child of laboring people, and was brought up as a laborer, with no education but what he has picked up by himself. He has learned from the newspapers all he knows about the important questions of the day, and has taught himself to read and write. Being a total-abstinence man and a Methodist, he added to his daily labor the duties of "a local preacher;" that is, a layman who preaches in the chapel or in the open air within a certain district, and without pay. He says of himself that in his twenty-seven years as a preacher he walked over 7000 miles to expound the gospel to his fellows. When a young man, Arch felt that he and his kind were badly treated, and he rebelled against it. In a speech at Leamington in 1872 he said: "Men, I'll tell you what I had to do. I had a wife and two children, and one-and-sixpence a day (thirty-six cents) was all I was getting, working hard, morning and night. I asked my master for more; he said, 'One-and-sixpence a day is all I shall give you.' I had sworn at the altar to love and cherish my wife, and I knew that would not keep her and the children; so I struck. I went away to work where I could get higher wages. Sometimes I could not get anything but straw to sleep on, and once I slept for nights and nights on corded wood; but I thought if any one was to suffer, it was not my wife and children, but myself." He roamed over England, working at job or piece work, sending all he earned to his wife, and preaching on Sundays on the village-greens. After a long time, and with much labor and sacrifice, Arch saved money enough to buy the freehold of his little cottage at Barford. When the Warwickshire farm-laborers struck they appealed to Arch to be their leader. The strike began in Feb., 1872, at Wellesbourne, 7 miles from Warwick. The laborers there and in the neighboring hamlets struck for an advance of four shillings ($1) per week. Their leader was one John Lewis, who proposed that they should form a union, but it was necessary to have for leader a better-taught man; so Joseph Arch, the local preacher, was sent for. After much foolish opposition from high-placed people, both lay and clergy, the union was fairly started by the active assistance of rich Radicals in Birmingham, with Mr. Auberon Herbert, Mr. Edward Jenkins (the author of "Ginx's Baby"), Dr. Langford, and other reformers. Arch travelled through all parts of England, organizing branches of the union wherever he went. In two months such progress was made that on the 29th and 30th of May a meeting was held at Leamington of delegates from all parts of the country, presided over by Mr. G. Dixon, M. P. for Birmingham. At this meeting Arch was unanimously elected president of the union. The movement, which at first was only a demand for a few more shillings a week, has now become one of political importance, and the laborers demand a vote in the counties, as the artisans have already done in the cities. Arch at first avoided all political references, but when the queen, through her steward, discharged the laborers on her private estate for demanding a few more shillings a week, he spoke strong words, and even as the movement has advanced there is no doubt his ideas have advanced also. The union did not at first encourage emigration. Arch said, "I wish to assist a man to get a living in England, not to run away from it." Emigration had been tried, and many laborers had been persuaded to go to Brazil, where they had suffered terribly from the insufficient food and from the yellow fever. Their fate was learned from some of their number, who were sent to New York by the Brazilian authorities. (See on this subject, "Reports respecting the Condition of British Emigrants in Brazil, presented to Parliament by Her Majesty's Command," 1873, and a heartrending letter from one of the emigrants, Thomas Sheasby, published by order of the earl of Kimberley in the *Times* of Aug. 29, 1873. See also, for a thorough exposure of the whole nefarious business, a little book, "Brazilian Civilization, from an European Point of View," by Jacaré Assu (a *nom-de-plume*), London, 1873.) As the men sent by the Brazilian authorities to New York immediately got good places, and as the superintendent declared that they were just the sort of men needed here, and that he could obtain places for all such who should arrive, Arch determined to visit America and look into the matter for himself. He accordingly came over in the summer of 1873, and made a careful study of Canada, returning to England in the late autumn of the same year, and promising to return to America in the following spring and make an equally careful study of the U. S. as a field for emigration. His report will be looked for with great interest, and if it shall prove favorable the results cannot fail to be of importance to both countries. (We are indebted for the facts in this notice mainly to an article in the New York "Tribune" for Aug. 16, 1873. A brief review of Jacaré Assu's book will be found in the "Athenæum" for Oct. 18, 1873.) Clarence Cook.

Archæol'ogy [from the Gr. ἀρχαῖος, "ancient," and λόγος, a "discourse," a "science"], literally, "the science of antiquities." The term in its widest sense includes the knowledge of the origin, language, religion, laws, institutions, literature, science, arts, manners, customs—everything, in fact, that can be learned of the ancient life and

being of mankind. Archæology may thus be made to comprehend a part, in greater or less degree, of many branches of knowledge which are recognized as distinct or independent pursuits; but in its narrower, and perhaps more popular signification, it is understood to have reference to the *materials* from which a knowledge of the ancient condition of a country is to be attained. These materials may be divided into three groups—written, monumental, and traditional. The first, or written archæology, includes both the science of ancient writings and the knowledge of printed books. The second, monumental archæology, admits of almost endless subdivisions, according to the character of the remains to be studied, which may be works of art, such as buildings, sculptures, paintings, inscriptions, coins, armorial bearings, furniture, enamels, glass, porcelain, etc.; works of engineering, such as roads, canals, aqueducts, mines, etc.; articles of dress, armor, or personal ornament; tools, weapons, utensils, etc.; forms of sepulture; vestiges of man and animals, such as bones, etc. The third, or traditional archæology, may be said to include the oral literature of a people, their dialects, legends, proverbs, ballads, as well as their sports, customs, and superstitions.

In regard to the application of the words Archæology and Antiquities, it may be remarked that the latter has reference properly to the objects studied, the former to the study itself. And though archæology in its more limited signification refers to the materials studied, those materials are considered not as individuals, but in their totality. Thus, while we might say a "collection of antiquities" (*i. e.* of antique objects), we could not so properly say "a collection of archæology," though we might say "an archæological collection." The study of archæology was long almost exclusively confined to the antiquities of the Greeks and Romans, but about the middle of the sixteenth century attention was turned to the antiquities of other ancient nations and of the Middle Ages. Since the discovery of the Rosetta Stone, which gave a key to its hieroglyphics, the archæology of Egypt has made considerable progress; while the discoveries of Layard, Rawlinson, and others have already far advanced that of Assyria. Within the last few years the archæology of India and that of China have been successfully prosecuted. The rude and scanty remains of the aboriginal inhabitants of North America have occupied the attention of men of letters in this country; while the more stately and instructive monuments of Central and South America have fully rewarded the investigations of antiquaries. Pre-historic archæology, or the study of the relics of man as he existed before the dawn of history, is of late attracting much attention, the Royal Society of Antiquaries at Copenhagen having given this branch of the subject especial attention, Northern Europe being peculiarly rich in remains of the pre-historic ages.

In Great Britain, too, pre-historic remains of the most ancient origin have been abundantly found, and there can be but little doubt that many ancient relics which have been regarded as Druidical are in reality ante-Celtic. But in France and Belgium, especially, have the labors of Boucher de Perthes, Lartet, De Vibraye, and others been rewarded by the discovery of very ancient human relics. In Switzerland (see LAKE DWELLINGS), in Italy, Turkey, Germany, India, America, and in many other lands, the study of these profoundly interesting pre-historic remains has aroused much enthusiasm. But the work is as yet in its early infancy. The Cyclopean walls of the southern peninsulas of Europe are now generally assigned to the pre-historic ages. The fruits of the discoveries near the supposed site of ancient Troy are by many referred to pre-historic times. Still, the presence of inscriptions with what seem like Semitic characters must link these supposed "treasures of Priam" with historic peoples. The later heroic age of Greece has left but few undoubted relics. The discovery of Phrygian ruins bearing the name of King Midas is interesting in this connection, though it does not appear that these ruins can with confidence be referred to the age of Midas. The deeply interesting discoveries in Cyprus (see CYPRUS and CESNOLA, DI) have shown us unquestionably the works of historic times. The recent (1873) discovery of the key to the reading of the strange inscriptions in the syllabic alphabet of Cyprus have thus far given no evidence of their being of very remote origin, and the inscriptions themselves are in Greek of a very marked dialect.

While pre-historic archæology opens to us a world of mystery and wonder, the archæology of later times serves to dispel mysteries; the resulting effect of the two being to remove the mysterious age farther backward into the past. Much that has hitherto been unexplained is receiving light from the labors of archæologists in the valley of the Euphrates-Tigris, as well as in that of the Nile. Biblical archæology is greatly forwarded by the labors of the English and Americans in the Holy Land. The Asiatic societies find abundant material for examination in South-eastern India, a new and almost untrodden field. Osiander, Fresnel, and other Semitic scholars would appear to have solved the riddle of the Himyaritic inscriptions in Arabia; and the wonders of the semi-civilizations of America before the time of Columbus have been much diminished by the simple and yet admirable generalizations which have been of late brought forward with regard to them. (See the article ARCHITECTURE OF THE AMERICAN ABORIGINES in the present work, by LEWIS H. MORGAN, LL.D.) But an interest hardly less intense than attaches to the above-mentioned works is, and long has been, felt in the antiquities of the Middle Ages, both ecclesiastical and social. The civilizations of ancient Rome and Greece are quite clearly marked off from ours, while the Christian civilization that sprang up on the ruins of the old is our own civilization, and must possess for ever a deep interest to the student of the science of humanity. The French and Italians have given special attention to this department.

Among other archæological works going on at present or quite recently, may be mentioned the interesting and quite important excavations at Ephesus and other points in Asia Minor; those at Cyrene and Carthage; and the labors of Mariette Bey in Egypt, so pregnant with important consequences, extended, by the direction of the khedive of Egypt, to Nubia and the Soudan. The British war in Abyssinia has led to discoveries of much interest in regard to the literary archæology of that remarkable region. The monumental archæology of Brazil, Ecuador, Peru, and the rest of South America has been studied with important results.

The quite modern science of "folk-lore," which examines and compares the traditions, legends, superstitions, and immemorial customs of existing peoples, links itself inseparably with some departments of archæology; and it is from the study of long-overlooked traces of the old Ayran and Sanscrit traditions, legends, superstitions, and customs that they receive much of the light which has lately been shed upon them—a light which shows very plainly that a common, if very remote, kinship unites all the Indo-European peoples. Such considerations show that the true archæologist is no mere antiquarian curiosity-hunter, but a student of matters which have a very wide and deep interest to nearly every thoughtful mind.

The science of archæology has been greatly promoted by the publication of chronicles, records, catalogues, etc., by the formation of clubs and societies, and by the establishment of museums for the collection and classification of antiquities. Among the societies formed for this purpose may be mentioned the Society of Antiquaries of London, which was founded in 1572, but was not incorporated by royal charter until 1751; the Society of Antiquaries of Scotland, chartered in 1780; and the Royal Irish Academy, for promoting "the study of science, polite literature, and antiquities," which was chartered in 1786. The last two have good museums of national antiquities. Among the most celebrated antiquarian collections are those of the British Museum in London, which contains, besides a great collection of early manuscripts, galleries of Assyrian, Egyptian, Etruscan, Greek, Roman, British, and mediæval antiquities; the museums of the Louvre and the Hôtel de Cluny in Paris, which contain an unrivalled collection of mediæval in addition to more ancient antiquities; and the Royal Museum at Naples, which contains most of the objects recovered during the last one hundred years from the ruins of Herculaneum and Pompeii. Among the best works on classic antiquity are those of MONTFAUCON, particularly his "Antiquité Expliquée" (10 vols., 1719), and WINCKELMANN's "Geschichte der Kunst des Alterthums" (1766), and his "Monumenti antichi inediti" (1766). On Egyptian archæology, see the works of Champollion and Bunsen. Among the recent works on archæology those by WESTROPP, "Handbook of Archæology" (1867), and JAHN, "Aus der Alterthumswissenschaft" (1869), deserve to be here mentioned. On pre-historic archæology see LUBBOCK, "Pre-historic Times" (2d ed. 1869); BALDWIN, "Pre-historic Nations" (1869) and "Ancient America" (1872); C. C. JONES, "Antiquities of the Southern Indians" (1873); FOSTER, "Pre-historic Races of the U. S." (1873). Among the writers upon Scandinavian pre-historic remains we may mention N. M. PETERSEN, FINN MAGNUSEN, and WAARSAAE. (See also the articles HIEROGLYPHICS; CUNEIFORM INSCRIPTIONS, by W. HAYES WARD; BIBLICAL ARCHÆOLOGY; and PRE-HISTORIC RACES.) REVISED BY C. W. GREENE.

Archæology, Biblical. See BIBLICAL ARCHÆOLOGY.

Archæop'teryx [from the Gr. ἀρχαῖος, "old," and πτερύξ, "wing"], a remarkable fossil bird found in the lithographic limestones (Jurassic) of Solenhofen, Bavaria, and named by Prof. Owen. This bird exhibits some peculiarities of anatomical structure which have led zoologists to consider it as a kind of connecting link between birds

and reptiles. The head is not distinctly shown in the fossil. The wings are short, but provided with long plumes spread somewhat like a fan. The tail is long, and composed of a large number of vertebræ, from which feathers diverge on either side. The feet are similar to those of birds.

Archaig′ (or **Arkeg**), **Loch,** a beautiful lake of Scotland, in the county of Inverness, 1 mile W. of Loch Lochy (or Lochie). It is about 17 miles long and 1 mile wide. The adjacent scenery is picturesque.

Archan′gel [Gr. ἀρχάγγελος, from ἄρχω, to "be first," and ἄγγελος, a "messenger" or "angel"], an angel of the highest order; a ruling angel. (See ANGEL.) This term is used in the New Testament—Jude 9 and 1 Thess. iv. 16.

Archan′gel, or **Archangelsk′,** a government or province of European Russia, is bounded on the N. by the Arctic Ocean, on the E. by the Ural Mountains, on the S. by Wologda and Olonetz, and on the W. by Finland. It comprises Russian Lapland, and is divided into two parts by the White Sea. The surface is flat, and the soil mostly barren, but produces valuable timber. The climate is very severe. Area, 286,739 square miles. Pop. in 1867, 275,779.

Archangel, a seaport-town of Russia, the capital of the province of that name, is on the Dwina, about 20 miles from its entrance into the Bay of Archangel (or the White Sea); lat. 64° 32′ N., lon. 40° 33′ E. The houses are mostly of wood. It has about twelve churches and an ecclesiastical college. The harbor is closed by ice except about three months, from July to September, during which period it is visited by many foreign vessels. The chief articles of export are fish, furs, lumber, tallow, flax, linseed, tar, iron, and bristles. This place, which was founded in 1584, was for a long time the only seaport of Russia. Pop. in 1867, 19,936.

Archbish′op [Lat. *archiepis′copus;* Gr. ἀρχιεπίσκοπος, from ἄρχω, to "be first," and ἐπίσκοπος, an "overseer," a "bishop"], the term applied to the head-bishop of an ecclesiastical province containing several dioceses, who has also a diocese of his own. The title came into use during the fourth century, and is said to have been first employed by Athanasius.

Arch′bold, a post-village of German township, Fulton co., O. Pop. 373.

Arch′dale (JOHN), an Englishman and member of the Society of Friends, became governor of Carolina in 1695. He introduced the cultivation of rice, and in several respects promoted the prosperity of the colony. In 1707 he published a "Description of the Province of Carolina."

Archdea′con [Lat. *archidiac′onus*], an ecclesiastic whose jurisdiction is immediately subordinate to that of a bishop. An archdeacon was originally an assistant of the bishop, and an overseer of the deacons and younger clergy. The authority of the archdeacons gradually increased, and became distinct from that of the bishops, so that in the twelfth century they were recognized as influential prelates. Since that time their power and influence have been much reduced. The Church of England has seventy-one archdeacons, who have a limited vice-episcopal territorial jurisdiction. (See DEACON.)

Archduke′ and **Archduch′ess,** titles assumed by all the sons and daughters of the emperor of Austria, and inherited by their descendants through the male line. The title of archduke was first taken by the dukes of Austria in the fourteenth century, or earlier, but their claim to that mark of precedence over the other dukes of the German empire was not recognized by the emperor and the electors until 1453.

Archegosau′rus [from the Gr. ἀρχηγός, a "leader" or "beginner," and σαύρος, a "lizard" or "saurian"], a fossil animal, so named because it was supposed to have been the beginning of reptilian life. It is found in the Bavarian coal-measures. Goldfuss in 1847 described three species discovered in the coal-field of Saarbrück, and gave them the generic name of *Archegosaurus.* Professor Owen considers this animal as a remarkable connecting link between reptiles and fishes. Agassiz and Dana regard it as a ganoid fish, while others class it with salamandroid batrachians.

Archela′us, a Greek philosopher, surnamed PHYSICUS, because he applied himself chiefly to physical science, was a native of Miletus, or, as some say, of Athens. He was a pupil of Anaxagoras, and flourished about 450 B. C. Socrates was one of his pupils. Archelaus taught that there were two principles of generation—heat, which moves, and cold, which remains at rest. His works, if he wrote any, are not extant.

Archelaus [Gr. Ἀρχέλαος], king of Macedonia, was a son of Perdiccas II., whom he succeeded in 413 B. C. He patronized Euripides and Zeuxis and other Greek poets and artists. Socrates was invited to his court, but did not go. This king promoted the prosperity of Macedonia by roads and other internal improvements. Died in 399 B. C.

Archelaus, an able general of Mithridates the Great, was a native of Cappadocia. He commanded a large army which that king sent to oppose the Romans in Greece in 87 B. C. He captured a number of islands and occupied Athens, where he was attacked and besieged by Sulla. Having been forced to evacuate Athens, he retired to Thessaly in 86 B. C., and was defeated by Sulla at Chærone′a and Orchomenus. He signed a treaty of peace with Sulla in the year 85, and deserted to the Romans in 81 B. C.

Archelaus, a son of the preceding, became high priest of Comana about 63 B. C. He pretended to be a son of King Mithridates, and by that imposture induced Berenice, queen of Egypt, to marry him. After he had reigned about six months in Egypt, he was defeated and killed by the Romans in 55 B. C. He left a son, Archelaus, who was high priest of Comana until he was deprived of that office by Cæsar in 47 B. C.

Archelaus, a son of Herod the Great by Malthace, a Samaritan woman. On the death of his father (4 B. C.) he became ethnarch of Judea, Samaria, and Idumea; his full brother Antipas and his half brother Philip receiving the rest of the kingdom. Fear of him sent the parents of Jesus into Galilee. In 6 A. D. he was deposed by Augustus, and banished to Vienne, Gaul, where probably he died.

Archelaus, a Greek sculptor, a native of Priene, is supposed to have lived about 30–60 A. D. He produced an admirable marble bas-relief representing the apotheosis of Homer, which is now in the British Museum.

Archenceph′ala [from the Gr. ἀρχή, the "first or highest place," and ἐγκέφαλος, the "brain"], a term applied to the highest division of the class Mammalia, to which the order Bimana, composed of the solitary genus *Homo,* belongs.

Ar′chenholz′, von (JOHANN WILHELM), BARON, a German historian, born at Dantzic Sept. 3, 1745. He served in the Prussian army in the Seven Years' war, after which he travelled in England and other countries. He wrote, besides other works, "England and Italy" (2 vols., 1785), and a popular "History of the Seven Years' War" (2 vols., 1793), which was translated into many languages. Died Feb. 28, 1812.

Ar′cher [from the Lat. *ar′cus,* a "bow; Fr. *archer*] and **Archery.** An archer is one who shoots with a bow. In ancient times archers formed an important portion of the armies of most Oriental and of all barbarous or semi-barbarous nations. Among the ancients, the Cretans, Parthians, and Thracians, and in the Middle Ages the English, were especially distinguished for the skill and efficiency of their archers. The English archers decided the fate of the day in the important battles of Crécy, Poitiers, and Agincourt. Among the Asiatic Turks, the Persians, the Tartars, and other nations of the East, as well as certain native African tribes and some American Indians, the bow and arrow are still used as weapons of war. In England archery is now no more than a pastime; it is promoted by archery clubs or societies. During the reign of Charles II. of England archery was much patronized by the court. After his reign archery fell into disuse for about a century. Towards the latter part of the last century it was revived as a fashionable pastime; even ladies often taking part in the trials of skill. The exercise, especially in the form of target-shooting, is still popular. (See BOW AND ARROW.)

Ar′cher, a county in the N. of Texas. Area, 900 square miles. It is drained by the Little Wichita River and its North and South Forks. It has only a small settled population. It is well adapted to pasturage. Bismuth, copper, and other metals are found. The county was returned as having no population in 1870.

Archer, a post-township of Harrison co., O. Pop. 726.

Archer (BRANCH T.), M. D., born in 1790 in Virginia, studied medicine in Philadelphia, and was long a prominent physician and politician in Virginia. He went to Texas, in 1831 took part in the revolution, was in 1835 president of the "Consultation," and was sent as a commissioner to the U. S. He was a member of the first Texan Congress, and speaker of the house of representatives and secretary of war 1839–42. Died Sept. 22, 1856, in Brazoria co., Tex.

Archer (JOHN), M. D., born in Harford co., Md., in 1741, graduated at Princeton in 1760, was the first person who received the degree of M. D. in America. This degree he received from the Philadelphia Medical College in 1768. He served for a time as an officer in the Revolutionary

war, and was a member of Congress from Maryland (1801–07). Died in 1810.

Archer (Stevenson), LL.D., a son of Dr. John Archer, born in Harford co., Md., and graduated at Princeton in 1805. He was a member of Congress from Maryland (1811–17 and 1819–21), and was a judge in the State court of appeals, and for a time U. S. judge in Mississippi Territory. Died June 5, 1848.

Archer (Stevenson), Jr., a son of the preceding, born in Harford co., Md., in 1827, graduated at Princeton College in 1846, became a lawyer, and in 1866 was elected to Congress, of which he is still (1873) a member.

Archer (William S.), a Senator, born in Amelia co., Va., Mar. 5, 1789. He was educated at William and Mary College, was a member of Congress from 1820 to 1835, and was elected to the U. S. Senate by the Whigs of Virginia in 1841. He was chairman of the Senate's committee on foreign relations. Died Mar. 28, 1855.

Archer Fish, the name of certain small East Indian fishes of the acanthopterygious family of Bramidæ. They

Archer Fish.

project drops of water at insects, which they thus cause to fall from the air into the water, and then devour them. The *Toxo'tes jacula'tor*, one of these archer fishes, is a native of Java, and about six inches long. The only remarkable peculiarity in the form of this fish is its greatly elongated lower jaw, which perhaps may aid it in directing the liquid missile upon which its subsistence partially depends, as does that of the hunter on the accuracy of his rifle. "So powerful," says Wood, "is the projectile force, and so marvellously accurate is the aim [of the *Toxotes jaculator*], that it will strike a fly with certainty at a distance of three or even four feet."

Ar'ches, Court of, a court of ecclesiastical law in England, is the chief court of appeal in the province of Canterbury, which includes nearly all England. The dean of arches is usually the deputy of the archbishop of Canterbury. This court is so called because it was once held in the church of St. Mary le Bow (*de Arcubus*).

Ar'chetype [from the Gr. ἀρχή, a "beginning," "origin," and τύπος, "a type"], the original pattern or model of a work; the original type on which others are formed. Among Platonic philosophers the term archetype was applied to the original patterns or ideas existing in the Divine mind before the creation.

Archiac, d' (Etienne Jules Adolphe Desmier de Saint-Simon), Vicomte, a French geologist and author, born at Rheims in 1802. He published, besides other works in French, a romance entitled "Zizim, or the Chivalry of Rhodes" (3 vols., 1828), and a "History of the Progress of Geology from 1834 to 1863" (8 vols., 1847–62). The latter was published at the expense of the state.

Ar'chias (Aulus Licinius), a Greek poet, born at Antioch, became a resident of Rome in 102 B. C., and obtained the right of citizenship. He was intimate with Cicero and Lucullus, and was courted or patronized by several eminent men on account of his genius or learning. Having been accused of being an alien, he was defended by Cicero in an able oration ("Pro Archia") about 60 B. C. Among the works of Archias which are lost was a poem on the Mithridatic war. (See Wallenius, "Dissertatio de Aulo Licinio Archia," 1806.)

Archia'ter, or **Archiator** [Gr. ἀρχίατρος, a "chief physician," from ἄρχω, to "be first," and ἴατρος, "physician"], a title given by the Roman emperors to some of their medical attendants; also to certain officials who were paid by the state or city, and were expected to give gratuitous medical treatment to the poor.

Arch'ibald, a post-borough of Luzerne co., Pa., on the Delaware and Hudson R. R., about 12 miles N. E. of Scranton. Here are rich coal-mines. Pop. 2571.

Archibald (Adams G.), born in Truro, Nova Scotia, May 18, 1814, became a lawyer in 1839, solicitor-general of Nova Scotia in 1856, and was a prominent legislator in that province. In 1867 he was president of the Canadian council and one of the secretaries of state, and in 1871–72 lieutenant-governor of Manitoba and the North-west Provinces.

Archida'mus II., of Sparta, became king about 470 B. C. He waged war against the Messenians, and commanded the army which invaded Attica in 431 B. C., but the Athenians declined a battle. This was one of the earliest campaigns of the Peloponnesian war. He was the father of the famous Agesilaus. Died in 427 B. C.

Archidamus III., king of Sparta, was a grandson of the preceding and son of Agesilaus II. He defeated the Arcadians and Argives in 367 B. C., in a battle which was called the "scarless" or "tearless," because no Spartan was killed in it. In 362 he defended Sparta with success against Epaminondas. He began to reign on the death of his father, 361 B. C., and was an ally of the Phocians in the Sacred war. Having led an army to Italy to aid the Tarentines, he was killed in battle in 338 B. C.

Archidamus V. was the last king of the Proclid line. He was a brother of Agis IV., whom he succeeded in 240 B. C. He was soon killed by the parties that murdered Agis.

Archido'na, a village of Spain, in the province of Malaga, 9 miles E. N. E. of Antequera. It is on the railway from Granada to Antequera. It has large quarries of marble, and many Roman antiquities. Pop. 7410.

Ar'chil, Or'chil, or **Orseille** [perhaps a corruption of *roccel'la*, a "little rock," so named because the plant grows on rocks], a reddish-purple dye obtained from various species of lichens, among which are the *Lichen roccella* or *Roccella tinctoria*, *Roccella fuciformis*, and *Lecanora tartarea*. These are gathered from rocks near the shores of the Canaries, the Azores, the Cape de Verde Isles, Sardinia, Corsica, Ceylon, Madeira, Lower California, Auvergne, the Pyrenees, Sweden, and many other countries. The lichens do not contain the coloring-matter ready formed, but they contain colorless acids, *erythric*, *lecanoric*, *orsellinic*, *evernic*, etc., which readily change to Orcin (which see). By the action of air and ammonia the colorless orcin changes to purple *orcein*, which is the coloring-principle of archil. To produce the archil, the weeds are reduced to pulp, a little putrid urine or ammonic carbonate is added, and the whole is allowed to putrefy or ferment. In a week or ten days the color is fully developed. By adding potassic or sodic carbonate, instead of ammonia, a blue color, Litmus (which see), is obtained instead of archil. *Cudbear* is a variety of archil made at Glasgow. Archil produces beautiful shades of purple, violet, mauve, red, etc., but, unfortunately, they are not, as generally employed, permanent. Dr. Stenhouse suggested some improvements in the manufacture of archil, which were in 1856 put in practice by M. Marnas of the firm of Guinon, Marnas & Bonnet of Lyons. He treated lichens with milk of lime, filtered, precipitated the color-producing principles by hydrochloric acid, washed them on a filter, dissolved them in ammonia, and subjected the solution to a temperature of from 153° to 160° for twenty or twenty-five days. The color being at this time fully developed, he precipitated it by adding calcic chloride. The purple lake thus obtained was sold as *French purple*. To dye with this lake it is mixed with oxalic acid and water, boiled, and filtered. The color all goes into solution, a little ammonia is added, and on introducing the silk, wool, or mordanted cotton (mordanted with albumen, or as for Turkey-red), they become dyed with magnificent fast shades of purple. Unfortunately for M. Marnas, in the same year that he developed his *French purple* (1856) Mr. Perkin discovered his *mauve*, which was the starting-point in the great aniline-color industry. Archil has therefore a comparatively limited application. C. F. Chandler.

Archil'ochus [Gr. Ἀρχίλοχος], a Greek poet, was born

in the island of Paros. He flourished about 710–670 B. C. At an early age he emigrated to Thasos and became a soldier, but he lost or threw away his shield in a battle between the Thasians and Thracians. He afterwards went to Sparta, from which he was banished, probably for the licentiousness of his verses. He wrote odes, elegies, and satires, which were extremely severe and personal, was regarded as the inventor of iambic verse, and was ranked by ancient critics as second to Homer. His versatile and brilliant genius is highly praised by Quintilian. According to tradition, he was killed in a battle between the Parians and the people of Naxos. The extant fragments of his poetry have been edited by Bergk in his "Poetæ Lyrici Græcorum" (1854). (See MÜLLER, "Literature of Ancient Greece.")

Archima'gus, the chief of the ancient Persian magi. This title and office belonged to the reigning king of Persia after the time of Darius I., who, having ordered a general massacre of the magi, directed that it should be recorded on his monument that he was the master of the magi. It is also the name of a powerful and wicked magician in Spenser's "Faerie Queene."

Archiman'drite [Lat. *archimandri'ta,* from the Gr. *ἀρχή,* the "first place or power," and *μάνδρα,* a "retreat" or "resting-place"], an ecclesiastic who presides over monasteries of the Greek Church. The Russian bishops are chosen from the archimandrites. The title is retained in the Greek rite of the Roman Catholic Church.

Archime'des [Gr. *Ἀρχιμήδης*], the greatest of ancient geometers, was born at Syracuse about 287 B. C., and was of Greek extraction. He is said to have been a pupil of Conon and a kinsman of Hiero II., king of Syracuse, by whom he was patronized. He enriched geometry, mathematics, and mechanics with important discoveries, and invented several useful and powerful machines. King Hiero suspecting that a goldsmith had mixed alloy with a golden crown which he had made for him, applied to Archimedes to detect the fraud. The solution of this problem suggested itself to him as he entered a full bathing-tub, and perceived that his body must displace a volume of water equal to its own bulk. Greatly delighted with the discovery, he ran out of the bath, without having dressed (as the story goes), exclaiming "Eurēka!"—"I have found it!" He discovered the proportion which a sphere bears to a cylinder by which it is enclosed. He was the author of a famous saying, "*Δὸς ποῦ στῶ καὶ τὸν κόσμον κινήσω*"—"Give me where I may stand and I will move the world" (or "universe"). When Syracuse was besieged by the Roman general Marcellus, Archimedes exerted his ingenuity in the invention and construction of powerful machines or engines for the defence of that city. The tradition that he burned the Roman ships by mirrors is not confirmed by Polybius and Plutarch, and is discredited by many writers. He was killed, it is said, at the capture of Syracuse, in 212 B. C., by a Roman soldier, who would have spared his life if Archimedes had not been so absorbed in a problem that he would not comply with the soldier's summons to surrender or to follow him. He wrote numerous works, of which eight are extant, namely: "On the Sphere and Cylinder;" "The Measurement of a Circle;" "On the Equilibrium and Centre of Gravity of Planes;" "On Conoids and Spheroids;" "On Spirals;" "The Quadrature of the Parabola;" "The Arenarius;" and "On Floating Bodies." According to his direction, a cylinder enclosing a sphere was engraved on his tombstone, to commemorate his discovery of their relation. His extant works were edited by Torelli, Oxford, 1792. "He possessed," says Professor Donkin of Oxford, "in a degree never exceeded, unless by Newton, the inventive genius which discovers new provinces of inquiry, and finds new points of view for old and familiar objects, and the power and habit of intense and persevering thought, without which other intellectual gifts are comparatively fruitless." (See HENNERT, "Dissertation sur la Vie d'Archimède," 1766; DOMENICO SCINÀ, "Discorso intorno ad Archimede," 1823.) WILLIAM JACOBS.

Archimedes, a genus of fossil Bryozoans found in the lower carboniferous limestone of the Mississippi Valley, of which the calcareous portion consists of a central axis, around which is spirally wound a reticulated, poriferous, divergent, ribbon-like band, forming a screw. Several species have been described, and they are so abundant in the rock which contains them that this has been sometimes called the *archimedes limestone.*

Archimedes, the Principle of, an important principle in the science of hydrostatics, the discovery of which is ascribed to Archimedes, is this: "A body immersed in a fluid loses exactly as much of its weight as is equal to the weight of the fluid which it displaces."

Archimedes' Screw, a machine for raising water, supposed to have been invented by Archimedes. The most simple form of it is a flexible tube bent spirally around a solid cylinder, the ends of which turn on pivots. The machine is placed in an inclined position, the lower mouth of the tube being under the surface of the water, which can be raised to a limited height by turning the crank at the upper end. It is often formed of a centre shaft, on which metal plates are fixed like the thread of a screw, and enclosed in a cylindrical trough, the lower end of which is inserted in the water. It is used in Holland for draining low grounds.

Archine, a measure of length in Russia exactly equal to twenty-eight British or American inches.

Archipel'ago [from the Gr. *ἄρχι,* "first," "chief," and *πέλαγος,* "sea"], a name originally applied to a part of the Mediterranean called the Ægean Sea, which lies between Greece and Asia Minor and encloses numerous islands. These are mostly arranged in two groups, the Cyclades and Sporades. The principal islands of the former group are Melos or Milo, Naxos, Paros, Andros, Tenos, Delos, Seripho, Syra, Cythnos, and Thera. These islands, with Negropont, which is the largest island in the Archipelago, belong to Greece. Some writers include Crete in the Archipelago. Among the Sporades, which belong to Turkey, are Rhodes, Samos, Scio (Chios), Lemnos, Metelin or Mitylene, Imbro, Samothraki, and Thasos. The islands of this sea are generally of calcareous formation, and have a fertile soil, beautiful scenery, and a pleasant climate. Many of them have produced famous philosophers, artists, and poets, and have been the scenes of interesting events of ancient history. (See ÆGEAN SEA.) In modern times the term is applied to any sea or expanse of water which contains many islands, or to a group of islands, as the Malay or Eastern Archipelago.

Archipelago (EASTERN). See EASTERN ARCHIPELAGO.

Arch'itecture [Gr. *ἀρχιτεκτονική,* "chief art;" Lat. *architectu'ra;* It. *architettu'ra;* Fr. *architecture;* Ger. *Baukunst,* the "building art"]. The art of architecture, like all the fine arts, except, perhaps, the art of music, has its roots in pure utility. It begins everywhere with the construction of a shelter against the elements. The rudest peoples, and even those who live in the mildest climates, feel the need of a roof. The Otaheitan has his hut, the American Indian his tent, the Esquimaux his dome of ice, the Indian his cave. Every race shows that there is inherent in man the instinct of building. He shares it with the beaver, the ant, and the bird. It exists in him as the power of language exists in him, and, like that, as like any one of his native powers, it may be developed or may remain undeveloped. So long as it continues in this merely rudimentary condition, serving man's necessary physical needs, and them alone, it is not a fine art, and it is sometimes questioned whether, even when it is at its highest, it deserves that distinction. But without entering upon too subtle an argument, it may at least be asserted that building only becomes architecture and enters the region of art when man begins to decorate his shelter in order to gratify a craving for beauty, a love of proportion. Still, it is necessary in studying the history of architecture to observe and to record its rudimentary condition in the several countries where it has been developed to a high point. For man's social experience is written in his buildings; their grandeur and beauty are a measure of his civilization. They are the material mould of his politics, his religion, and his laws.

Egyptian Architecture.—Any sketch of the history of architecture, however slight, must necessarily begin with Egypt, because there the oldest civilization of the human race is recorded in the oldest buildings of which we have any knowledge. Scholars are now generally agreed that the date of the Pyramids of Ghizeh is not less that 3000 years B. C. It is suspected that the Sphinx and the small temple of granite and alabaster near it may be very much older than this. But, whatever may be the result of the researches that are now being pushed by scholars and explorers in the domain of Egyptian history written all over these stupendous monuments, that Time has only partly overthrown and partly buried, it is not possible their age can be reckoned at much less than is at present believed,* and the oldest buildings of other peoples are but young in comparison with these.

The architecture of Egypt consists of temples, palaces, and tombs. The Pyramids are now believed to be tombs. They have been thoroughly explored and patiently studied by many able people, and there seems no explanation of their purpose more simple and intelligible than this. They were built by the different kings whose names they bear as receptacles for their bodies, which were concealed in them with the most ingenious art; the object in piling up these

* According to Poole, Sir Gardiner Wilkinson, and others, the three great Pyramids of Ghizeh were built B. C. 2450; Bunsen puts the date at B. C. 3209; and Mariette at B. C. 4235.

mountains of stone being to make an indestructible resting-place for the body during the ages that must elapse before the soul should return and take again her accustomed seat. The entrances to the Pyramids are carefully concealed, and have been discovered only by stripping off the outer coating of stone. The passages that lead to the chambers where the royal mummies once reposed (for every pyramid has been entered and rifled) were purposely made difficult, and even dangerous, to traverse, and the entrances to the burial-chamber, when reached, were so artfully and securely closed as to be passable only to force. Even when entered, the sarcophagus of polished granite in which the mummy lay could only be opened by breaking the solid stone that formed the lid, for this had been closed by a device at once so simple and effectual that no wit of man could better it. All these devices for concealment can have but one reasonable interpretation; and it may be said, we think, without fear of contradiction, that the many theories by which a mystic or scientific origin has been proposed for the Pyramids are none of them held at present by any Egyptologists of eminence, who are all agreed that the Pyramids were intended simply as tombs. They stand in the midst of a vast necropolis, and are in all about a hundred in number. The three largest, named after their builders, Cheops or Soofoo, Chepheren or Shafra, and Mycerinus, Menkeres, are the best known. The pyramid of Cheops originally covered a little over thirteen acres of ground, and was 480 feet 9 inches in perpendicular height. Owing to the removal of the coating of polished granite with which this pyramid, like both the others, was originally covered, and the heaping of the ruins about the base, both these dimensions are somewhat reduced. Col. Vyse makes the present area slightly in excess of twelve acres, and the present height 450 feet 9 inches. But in the case of the Pyramids, as with all great buildings, the measurements of no two persons agree, and these must be taken as merely approximative. Beside the Pyramids, the necropolis of Memphis contains many smaller tombs, the greater part of which are structural, others being hewed out of the solid rock where there was a good opportunity, as was the case at Ghizeh. At Beni-Hassan, farther up the Nile, there are tombs, all of which are excavated from the rocky hillside, and are of singular interest from an architectural point of view. Both the exterior and the interior of these tombs are carved in imitation of a post-and-lintel system. The entrance consists of a portico of two columns supporting a pretended architrave; the stone above is cut into an imitation of projecting eaves, with rafters showing underneath. The whole of this portico, end-piers, columns, architrave, and eaves, is carved out of the solid face of the rock, which behind it is smoothed down to the appearance of a wall, in which is the door that gives entrance to the chamber. The roof of this chamber is carved into the semblance of architraves, between which it is hollowed out in the form of shallow barrel-vaulting. These make-believe architraves are supported by rock-cut columns. In several of these grotto-tombs the pillars within and without have so strong a resemblance to the Doric column that they have been called *proto-Doric*, and many modern writers on the subject are persuaded that the Greeks borrowed the Doric column from the Egyptians. We cannot enter on the subject here, but we may express a doubt whether at present this belief ought to be considered as having any better foundation than conjecture and a striking resemblance.

The buildings next in antiquity to the Pyramids are the palaces of Thebes. The principal ruins of this once magnificent city lie on both sides of the Nile, covering an area that extends about two and a quarter miles N. and S. and three and a half miles E. and W. The principal group is at Karnac, on the eastern bank, and consists of a palace-temple 1200 feet long, with five or six smaller buildings grouped about it with that lack of symmetry which was a characteristic of the builders of that age and of the later times, as distinguished from the period of the Pyramids. Farther S., about two miles, but once united with it by an avenue of sphinxes now in ruins, was the temple of Luxor, 820 feet long, and with no other buildings connected with it. The rest of this astonishing Theban group is found on the opposite side of the river, and consists of the temple of Medinet Habou, the Rhamsession, the temple of Gournou, and the temple of Thotmes and Amenophis, but of the last two little remains above ground. The river on whose bank they were directly built has played a double part in their destruction. The inundations have undermined and swept them away, and their neighborhood to the water has enabled boats to come and carry away their stone for building purposes. Our narrow limits utterly forbid any minute description of these buildings. Everything about them was huge. Their ground-plans were not only really extensive, but they were so subdivided as to make them seem much larger than they were. Court succeeded to court, room to room, until the sense of size and the sense of distance were wearied. The long avenues of sphinxes, the mighty columns supporting roofs of solid stone, the tower-like pylons that guarded the entrance, were all calculated to overawe the human spirit by the notions of vastness and the sense of power in the monarchs that could command the erection of such structures. Nor must we forget that the enormous size and extent of these palace-temples (for they contained within themselves the abodes of the kings as well as the shrines of the gods) were tempered by a noble sense of proportion, by sculpture of a grandeur of which we never weary, by the most delicate carving, and by a system of ornamentation alike perfect in form and color. Any notice of the Egyptian buildings of this period that should fail to hint at their beauty would leave an incomplete impression, but we too often find this praise forgotten in the wonder excited by their stupendous feats of building.

Still farther S., in passing from Thebes to the Second Cataract, we find the ruins of temples which, once reckoned coeval with the Pyramids, or even more ancient, are now known to be the most modern of the Egyptian buildings. Of these the best known are the temples at Edfou, Denderah, Philæ, and Kalabsche, but the shore on either side is scattered with ruins, and they differ from those of Thebes in being exclusively temples. Some of these buildings are of a grandeur of design and size that would have done credit to the time of the Pharaohs, and, as a rule, the inferiority of these temples, built under the dominion of the Ptolemies, is more apparent in the sculpture and painting that decorate them than in their architecture. In style and general arrangement the later buildings differ surprisingly little from the more ancient, but many of the buildings are better preserved; they make, for this reason, a clearer impression on the visitor, and while it would seem as if this fact should have militated against the idea of their greater antiquity, it was perhaps counteracted in its effect by their greater remoteness, by the difficulty of access to them, and the loneliness that invests them.

"A spirit of simplicity, grandeur, and solidity reigns throughout all the Egyptian temples, and every precaution seems to have been taken to make them eternal." Doubtless the ease with which large masses of stone were procured, and the fact that labor cost but little—for the laborer was a slave and the land was inexhaustibly fertile—had much to do with the peculiar massiveness of the style. Every original style of architecture, and even those derived styles, such as the Greek, which modified their model by the laws of a higher ideal in art and a purer taste, until it became almost an independent style,—all these genuine workers have been controlled in great measure by their material, or rather, let us say, have known how to take advantage of it. The Egyptian architecture is in thorough harmony with the physical characteristics of the country. The monotony of this flat valley is varied, and at the same time accented, if we may so express it, by these gigantic piles of masonry that suggest mountain forms. At the same time, in piling them up, their builders obeyed the laws of structure; they played no tricks with gravitation, as the Gothic and Renaissance builders did; and if man could have been restrained from violating the pyramids and the tombs, and from making quarries of the temples, time would have preserved them unharmed until to-day and for centuries to come. Acquainted with the arch, they rarely used it, as knowing doubtless that "an arch never sleeps," and they would employ no feature that would jeopard the durability of their work. Perfect sculptors, they knew how to subordinate their carving perfectly to the architecture it was to adorn, and as all their sculpture had an important meaning, they studied that reserve in its treatment that would best enable it to resist all accidents of time and human violence. Their buildings have been reproached with monotony, but it may be questioned whether any architecture has ever made so wide spread, so profound an impression, or has given such enduring pleasure. They would seem to have early discovered the best way of piling up enormous masses of stone, the best way of supporting their architraves and roofs, and the best way of ornamenting their work; and having found what they wanted, they rested in a sublime content, continuing to build for ages without the wish to change, and with no motive to attempt improvement in what seemed to them doubtless, as it seems to us, incapable of being improved.

Grecian Architecture.—What we shall have to say about Greek architecture will begin, properly, with the introduction into the peninsula of the Doric order. This, supposing the temple at Corinth to be the oldest example existing, does not carry us back very far, since its date is supposed to be only about 650 B. C. The Ionic order was no doubt introduced from Asia as early as this, or, it may be, earlier, but all the oldest examples have perished, and the few buildings in which it is now found in Greece itself

are of a date far much more recent than the oldest Doric temples. There are a few buildings in Greece much older than the temple at Corinth, but they are in a ruinous condition, and with the exception of the tomb of Atreus (the so-called "treasury" of Atreus) at Mycenæ, and the Gate of Lions in the wall of the same city, they have little interest for any one but the antiquary; nor do they belong to the history of the development of Grecian architecture, properly so called. We shall not therefore stop to describe the tumuli of Mycenæ and Orchemenos, but shall pass at once to the consideration of the later buildings.

In Greece itself the most famous temples were all Doric. The temple at Corinth, that at Ægina, the temple of Theseus at Athens, with those of Jupiter at Olympia, of Minerva at Sunium, and finally the Parthenon at Athens, with many others, were all in this style, for which the Greeks had a peculiar liking, and which they treated with the most perfect skill and taste.

The Parthenon, indeed, stands in men's minds as the type of the perfection of Greek architecture. Even if we felt it necessary to admit—as we certainly do not—that the Greeks borrowed the Doric columns and every architectural idea and feature from the Egyptians and the Assyrians, we may assert that in the Parthenon they so perfected their model, and invested it with such poetic beauty, that they deserve to be called creators rather than copyists. We cannot understand the Doric order until we have studied it in the Parthenon. It united in itself all the beauties and refinements of which the style was capable, and it is perhaps the highest praise that can be given it if it be admitted that it gained little essentially by the addition of the sculptures of Pheidias. They were a glorious ornament, but the Parthenon was perfect as a building without them.

The Parthenon was the only temple in Greece that had eight columns in its end porticoes. It was a small building, being only 228 feet long by 101 feet wide, and it was built of the finest white marble. Like all the Doric temples, it was painted over its whole surface, internally as well as externally. The sculpture was relieved by a colored background, the coverings of the roof were certainly painted, and all the mouldings. This seems to be the general opinion of scholars and artists on this much-vexed question, but it is still disputed by some persons of authority. Fergusson in England, Viollet-le-Duc in France, and Semper in Germany maintain the affirmative, however, and their authority, singly or combined, is very great. The fact that color was used cannot be disputed, seeing that there are plenty of traces of it still existing. The question seems to be, How extensively was it used, and was it applied to the buildings when they were first erected or at a later date?

The Parthenon was built by Pericles about 440 B. C. The architects Ictinus and Callicrates were charged with the construction, and Pheidias was entrusted with the commission to fill the two pediments and the metopes with sculpture. Whatever may have been the origin of the Doric order, by the time the Parthenon came to be built Greek delicacy and perception had so ripened as to give the order that final grace which has made this celebrated temple a standard of architectural perfection to the whole civilized world. So delicate are the refining processes by which this final perfection was reached that it was long before they were discovered, and people wondered why the most careful and conscientious attempts made by skilful architects to reproduce the Parthenon always failed to please like the original. The truth is, that these refinements are too delicate to be detected except by the most accurate measurement; they were never intended to be discovered by the eye, since their only object was the correction in each instance of an optical delusion, and the error in which the refinement consisted was only meant to be sufficient to just counterbalance this delusion. The first of these refinements was the *entasis* or swelling of the columns, a peculiarity noticed by Vitruvius, and in our own time first verified by Mr. Allanson, though it is to Mr. Penrose's measurements and analyses that we owe our present knowledge on this subject, and indeed on all the minute points connected with the Athenian architecture. That the columns diminished from the bottom to the top was always known, and is evident enough to the eye, but it was long before it was proved that this diminishing was not regular, and that, owing to their swelling slightly out, they were bounded not by straight lines, but by a very delicate hyperbolic curve, only discoverable by the nicest measurement. When this was found out it explained why the modern columns made with such good faith and cleverness in close imitation of the Greek looked so stiff and lifeless. And yet we have never known how to profit by our knowledge. Modern Doric columns either have not enough entasis, and look as if the sides sank in, or they have too much, and look like bolsters set on end. The entasis of the columns of the Parthenon is $\frac{1}{550}$ of the whole height. By another refinement the architrave in all the temples was curved upward, so as to correct the optical delusion caused by the sloping lines of the pediment, which would otherwise have made the straight line of the architrave appear to sag. This curving of the end-architraves was, as we have said, common to all the temples, but in the Parthenon the architraves of the sides also were curved upward to correct the error of the eye in regarding a long straight line. The same nicety of perception led to the curving upward of the roof-ridge, to the giving all the columns a slight inward inclination, and to the making the columns at the angles thicker than the others—in the case of the Parthenon by $\frac{1}{44}$ of the diameter, and in the case of the Theseum by $\frac{1}{28}$. All the curves are hyperbolas or parabolas, and in the adjustment of the parts one to another a system of proportions was adopted and elaborately carried out so recondite that by most persons it was long regarded as more fanciful than real. Now, however, the discoveries of Mr. Penrose are universally admitted, and it is seen that they explain the charm the Greek architecture has even for persons who have no scientific acquaintance with the subject. We must not overlook in passing the theory that the Doric temple was an imitation in all its parts of a wooden original, the *columns* being the trunks of trees; the *architrave* the beam that was laid from post to post; the *triglyphs* the ends of the joists; and the *metopes* the spaces between them filled up with slabs of marble; that the *mutules* were the ends of the roof-rafters, and the *guttæ* the drops of rain that collect on the under side of horizontal beams. This theory might by this time, we think, be allowed to rest with the myths of Romulus and Remus or the story of William Tell and the apple. It has no foundation in fact, and deserves no consideration. It is all one with the story that the Doric column was designed to suggest the male figure, and the Ionic the female. The Doric temple was essentially a stone construction, the cella and the portico being covered with a wooden roof, and no part of the masonry was imitative of anything.

It seems to be admitted by those who have the most right to be heard on the subject that the Ionic order was in use as early in Greece as the Doric; that in Asia Minor it was in use even earlier; and that it was employed in many of the finest temples in that region, which were destroyed during the Persian war. The fact that the few existing buildings in Greece in which this Ionic order is found are of a much later date than the oldest Doric buildings led earlier writers on the subject to consider it as of much later introduction, but it is now admitted that the Ionic order was in use as early in Greece as the Doric order, and that in Asia Minor it was perhaps of greater antiquity. The famous temple of Diana at Ephesus, that of Apollo at Miletus, and others at Sardis, Priené, and Teos, all of which have perished, were built in this style. On the other hand, the temple of Juno at Samos was originally of the Doric order, but was perhaps destroyed and rebuilt, since the ruins now found there are Ionic. Architectural forms often indicate changes in fashion or the prevalence of certain influences, as well as deeper-seated modifications of ideas. Thus, at Pompeii, immediately after the first great eruption of Vesuvius (63 B. C.), the Roman officials caused all the temples and public buildings to be either rebuilt or restored in the Corinthian order, which was as much a favorite at Rome as the Doric was in Greece, and the traces of this fashionable remodelling are evident enough to the most careless observers. In the so-called temple of Venus near the Forum the Doric capitals were changed into Corinthian by means of stucco, which to-day is falling off and shows the Doric marble underneath. This is only one instance of what has been going on in the practice of building since the earliest times. The Egyptians seem to have been the only Western people who never were influenced in their architecture by their conquerors or their allies. Their architecture does not show a single trace of foreign influence, but in Western Europe the history of architecture is only the history of modifications, many of them vital, it is true, like those produced by the use of the arch, of iron, and of painted glass, but many of them, also, due to fashion, to the influence of conquest, to the exigencies of climate, and to changes in political and social life. It is not easy to understand why the Ionic buildings should have suffered so much more than the Doric, but it is true that even in Greece there is but little left by which to judge of the progressive history of the Ionic order. We can trace the Doric from its clumsy beginnings in the temple of Corinth to the perfect beauty of the Parthenon, but when we first meet the Ionic in the Erectheium and the temple of the Wingless Victory, it is in full development; the stages by which it arrived at this point, in Greece at least, are all destroyed. The loss of these intermediate buildings is much to be regretted. Without them it is almost impossible to acknowledge the relationship between

the stilted and awkward capitals of the Hall of Xerxes at Persepolis and the elegant capitals of the Erectheium at Athens.

The Corinthian order was not introduced into Greece until the age of Alexander the Great (B. C. 356–323), unless we are to accept what Pausanias says about the temple in Tegea, in Arcadia. According to this doubtful authority, that temple was rebuilt by Scopas, the celebrated architect of Paros, after its destruction by fire about 400 B. C. It was surrounded by an Ionic peristyle externally, but the internal peristyle was Doric, with a gallery above, with Corinthian columns supporting the roof. Supposing this to be trustworthy, this temple would mark a very important era in the history of Greek architecture, as showing the influx of new ideas and a definite departure from the older style. Nothing, however, remains in the presumed locality of the temple but shapeless ruins, and we must await regular explorations before we can know anything with certainty about the building. So far as we know, the oldest example of the Corinthian order in Greece is found in the Choragic Monument of Lysicrates (one remaining of many small structures erected as trophies of victory in the musical contests). This was built B. C. 335, and has long been considered a model of elegance. Much later in date, and by no means so beautiful, was the Tower of the Winds, a small octagonal building erected to contain a clepsydra or water-clock, and having a dial on one side and a vane at the top. This was built in the second century B. C. The only traces of the Corinthian order are found in the fragments discovered near it, out of which the archæologists have constructed two small porches, and it is most likely that they did originally belong to the building. The most important example in Athens of the Corinthian order was the temple of Jupiter Olympus, but this was not a Greek work, having been begun by Cosentius, a Roman architect, in the second century B. C., and finished by Hadrian in the second century of our era. The Greeks were not fortunate in their attempt with the Corinthian style. Strangely enough, it was left for the Romans to bring this order to perfection, though perhaps the Greek failure was due rather to the fact that the style was introduced at a time when the arts were in decay than to an inherent inability to deal with it. Judging from the earliest remains we have of the Corinthian as used in Asia Minor, the ancient examples may have been in purer taste than those that remain to us at Athens. In one of these older examples the capital has the acanthus leaf at the base, and the honeysuckle ornament above. Later, the volutes of the Ionic order were added, but in the Greek examples the union was never successfully accomplished. In the Monument of Lysicrates we have the best that Greek hands could do in this doubtful mingling of two styles. In the Tower of the Winds this was not attempted, nor is the spreading Asiatic base of the pillars in the Choragic Monument retained. The pillars of the Tower of the Winds, on the contrary, are without any base whatever. There is something not easily understood in this return to an older severity and purity.

Roman Architecture.—The Greeks were not great builders, but they were supreme architects. With the exception of a few small monuments of no great importance, they have left us nothing besides temples, but in these the system of the post-and-lintel architecture was made to show all the grace, elegance, and dignity of which it was capable, just as in the Egyptian temples and palaces it had reached the highest point of sublimity. The Romans were in general only middling architects, but the Egyptians alone could compare with them as builders. It is asserted of them that everything in their architecture was borrowed, but even if this were admitted, it must be admitted, on the other hand, that they were not slavish copyists: in many instances they made what they borrowed their own. If they inherited the round arch from the Etruscans, they made such an individual use of it that it has its name from them, and not from their neighbors and ancestors. To all intents and purposes they were the inventors of it. They borrowed, we believe, all the orders from the Greeks, and though they spoiled, or at least materially changed, the Doric and the Ionic, they made of the Corinthian a new creation far more beautiful and elegant than it had been in Greek hands. If they borrowed the amphitheatre from the Etruscans, its employment became so important in their society that it soon left its rock-excavated original far behind, and took on a characteristic and essentially new form. The Romans derived in their blood a love for the arch and the circular forms that spring from it and harmonize with it; but it is not perhaps necessary to look elsewhere for an explanation of the development of the arch and dome in Roman hands than to the differences in the climate of Greece and Italy, and in the social needs of the Greeks and Romans. As has been remarked, the only public buildings the Greeks have left us are their temples. They lived in the open air, and had no need of the roofs by which the Romans protected themselves from the excessive heats of their summers and the rigors of their damp and cold winters. Whether it were a simple climatic reason, or a something in the disposition of the people difficult to trace and analyze, as such things are and must be, we cannot tell. Only, here are the facts. The Greeks have left us only temples; the Romans have left us temples, baths, amphitheatres, bridges, aqueducts, triumphal arches, triumphal columns, market-places (*fora*), palaces, houses, and tombs. They took from the Greeks the plans of their rectangular temples, but the Greek temple was merely a wall admirably built and decorated, with a portico running about it; often this wall enclosed an uncovered court, or if the court were roofed it was generally roofed with wood, the wall and its portico being sufficient for the vertical pressure, which was all it had to sustain. Whatever led the Romans to desire plans in which a number of small rooms, or one large room, were to be covered with a roof, as we have said, does not appear, but they showed a marked determination to this sort of building, and of necessity were obliged to invent some stable and at the same time simple means of roofing these rooms. We confess we find something childish in the supposed necessity of finding out whence the Romans borrowed the great principle of the arch, and how they learned to make vaults. Is not man endowed with every faculty that is necessary to his well-being, and did not the Roman derive his skill in arch-building from the same source from which the Esquimaux derives his? Who played Etruscan to the Esquimaux? Nay, for that matter, who played Etruscan to the Etruscans themselves? The Romans, then, wanted roofs, and roofs that were to cover spaces much larger than could be covered by any wooden roofing without the aid of columns. The circular vault was the simplest, most natural device, and we are ready to believe that they came upon it in their own minds without the need of any ancestor from whom to borrow it.

The Roman buildings are imposing and magnificent from their mass, but in their details there is too often a lack of delicacy and proportion, while the ornamentation is almost always coarse in execution, though not unfrequently spirited in design. The Romans employed Greek workmen and artists to decorate their buildings—the structures themselves were of their own designing—and of necessity much fine sculpture and sculptured ornament was executed, not only in Rome, but in other cities in Italy and in the provinces. But, as always happens in cases where the employer has no knowledge of the work he is paying for, and little feeling for it or interest in it beyond a desire to get the most show he can for his money, the skill and taste of the Greek workman deteriorated under Roman employment, just as, if we may be allowed the comparison, the skill and taste of the French artist and workman deteriorate when they work for English and American employers.

If in this slight sketch we do not attempt to give an account of the more celebrated Roman buildings, it is because in point of architecture they have little originality; in nearly every case a Roman building was a skilful pile of masonry, with an external mask made up of details borrowed from Greece. Besides, few of their buildings proper are sufficiently well preserved to be described with accuracy. The Pantheon is the only temple in Rome that still retains its walls, its roof, and its portico; the Flavian Amphitheatre (the Colosseum) is in ruins, though it still keeps the greater part of the mask of arches, columns, and entablatures that covered its masonry and concealed its true structure; the stupendous baths of Titus, of Diocletian, of Caracalla are heaps of nearly indistinguishable ruin; of the Forum nothing remains but a puzzle for the antiquaries, and the palace of the Cæsars is a vast desolation. But though these buildings were constructed with great solidity, and in many cases with admirable science, they showed in almost every instance a lamentable ignorance of the true principles of architectural design, coupled with a singular lack of invention. The Romans piled up mountains of stone, and thought they had showed themselves architects when they had concealed their masonry behind screens consisting of monotonous rows of columns and pilasters, arches, niches, architraves, and entablatures. Still, if we fix our eyes upon what the Romans did, rather than upon what they failed to do, we shall find we owe them a considerable debt. Their delight in building gave a stimulus to the art all over Western Europe, and if they were not architects themselves in the true sense of the term, they were at least the cause why others were architects, since they laid the broad and deep foundations on which the men of the Middle Ages built so well.

We know very little of the architecture of Rome during

the republic: it was with the empire that the long line of Roman achievement in the art of building began. The Pantheon, the temples of the Forum, the Colosseum, the great aqueducts, the bridges, the baths, were all of late construction, and when the empire fell to pieces every place on the earth's surface that had been subject to it contained the proofs of that subjection in buildings that still remain, and that would still be in their original condition, so solidly were they built, if man had not destroyed them from wantonness or cupidity.

One class of buildings, however, owed a longer life than was granted to the rest to the fact that they easily fitted themselves to the new order of things that came in with the toleration of Christianity by the state, under Constantine. These were the basilicas or halls of justice. They were of several kinds—those that were roofed with stone vaults, and those that were roofed with wood—and they were either rectangular or circular in form. They were built wherever the Romans founded or took possession of cities and towns. The larger and more splendid basilicas of Trajan and Maxentius, of which the ruins still exist in Rome, were vaulted with stone, and splendidly if also somewhat barbarously coated with a false decoration of pillars and entablatures in costly marbles; but in the provinces, and later in Rome itself, these buildings were often small and roofed with wood, and when the Christians first began to look around them for places in which to worship, they either took possession of basilicas already erected or put up new ones modelled on the old, but smaller and less expensive. However, their inexpensiveness was not always the measure of their decoration, for they were in most cases built of the materials of older edifices, and adorned, and that often splendidly, with columns and slabs of rare and beautiful marble from the despoiled palaces and temples of imperial Rome. The arrangement of every Christian church that has a ritual is borrowed directly from the original arrangement of the basilicas, though this was considerably modified at an early period in the history of the Church as it changed from a democratic to an aristocratic organization. This will be easily seen by examining the plan of a Roman basilica, where will be found the quæstor's seat in the apse (which was afterwards occupied by the bishop), the altar in front of the apse where sacrifice was performed before commencing any important public business, and the rostra or pulpits at the sides where the clerks were placed. These last became the reading-desks and pulpits of the new occupants. Originally, the whole space in front of the apse was open to the public, who came and went as in a modern court-room; but with the change of ideas in the rulers of the Church, a separation was established between the clergy and the laity; the apse was railed off, and access forbidden; then a rectangular space was railed off in front of the apse for the inferior clergy, and little by little the present disposition of ritualistic churches was established. In passing, we may refer the reader to the highly interesting church of San Clemente at Rome, where abundant proofs of these early conditions may still be studied, and where the arrangement of the basilica as built by the Christians under the full influence of these aristocratic notions of church government are yet to be seen in perfect preservation. Historically and artistically, the church of San Clemente is much more interesting than St. Peter's, but it is only lately that it is getting to be known to the ordinary traveller.

As the world began to revive after the blasting influences of the downfall of the Roman empire were somewhat spent, the rapid growth of the new religion called for new churches everywhere, and not only churches, but monasteries and convents to house the thousands of men and women who thronged to fill the ranks of the monastic orders, then forming on all sides.

The Eastern Roman empire, having its seat at Byzantium, continued to erect buildings which, until the rise of the Mohammedan powers, showed the influence of the traditions of Rome, with features borrowed from the countries with which the Eastern empire came into more intimate relations. It is to this modification in the Eastern empire of the classic Roman by barbarian influences that the term *Byzantine* is strictly applicable. The similar modification that took place in the classic style in the Western empire, principally in the countries N. of the Alps, under the influence of the so-called Gothic races, is rightly distinguished as *Romanesque*. The period of greatest activity in the Byzantine style was that which is included between the removal of the empire to Byzantium and the death of Justinian (A. D. 328–565). Yet, though the styles of the East and the West became later so different, during this period the line of demarcation can hardly be perceived. Constantinople, Rome, and Ravenna were the chief cities of one great empire, and throughout the whole region whatever building was done was building for the same new uses out of the materials that had once done service for the old religion and the old society. But, as when a family is separated by one of its members leaving the old home and going to dwell in a distant region, while both he who goes and they who stay long continue to keep up the old traditions and to maintain the former ways of living, yet each is sure in time to be subjected to new influences, and so to become widely different from the other,—so each division of the Roman empire, subjected during this long period of nearly three hundred years to severe experiences, developed a new society, and of course a new phase of architecture. Before the age of Constantine one style pervaded the whole empire. Then came the period of transition, "during which the Western empire was in a state of decay, ending in a débâcle from which the Gothic style did not emerge until some four centuries later, while the Eastern empire, on the contrary, was during that time progressively forming itself, and did form a style of its own of singular beauty and perfection." This style culminated in the erection of the great church of Santa Sophia at Constantinople (A. D. 532–563), which the Turks afterwards converted to their own worship. After this glorious achievement the art gradually declined, but many buildings of great skill and beauty were erected all over the East, not only in Constantinople, but in Syria, Russia, Armenia, Asia Minor, and Greece.

Meanwhile, in Western Europe the story of architectural progress runs on almost without interruption from the grand days of the Roman empire down to the time of the great revival of learning which we call "the Renaissance" or "the Reformation." Christian architecture began in pagan Rome, and every Christian church edifice—parish church or cathedral—traces its ancestry back to the Roman basilica. While the countries N. of the Alps were yet struggling to create their new civilization on the ruins of the Roman empire, in Italy the state of society was undergoing a less violent transformation, and the old Roman forms were modified, but not overthrown nor outgrown. The one reason for this we have already noticed in the fact that the buildings erected in this period were either restored on the ruins of older structures, or were made of old materials, and adorned with the marble columns, capitals, friezes, and slabs that were found in such abundance in the Roman cities. The same thing was done in cities in France and Spain and England—principally in France, of course, though even there to a much less extent than in Italy; but in the North there were new exigencies of climate to be met, and there were the wants and tastes of a new society demanding new forms in which to enshrine themselves. But there was wanted the shock of a new crisis, the stir and emotion of a great conflict—not of bodies merely in battle, but of ideas; and the conquests of the Turks, which led to the final absorption and disappearance of the Byzantine style in Eastern Europe, had much to do with developing the Romanesque and the full splendor of the Gothic, by introducing into the society of Western Europe a new and powerful disturbing force, stimulating the old faith into new ardor, and bringing the whole population, directly or indirectly, into contact and conflict with the civilization of the East, through those enterprises in which religion and the trading spirit were so curiously yet so inextricably mingled, and which we call the Crusades. Gothic architecture was not derived from the East; no single feature of it can be traced to that source; it was the fruit of religious enthusiasm roused to fever-heat by the menace of a new persecution; of thought stimulated by adventure, discovery, and contact with new societies; of the wealth that poured into Europe with the rapidly increasing trade with the East.

While the new religion was getting itself established in Western Europe, it contented itself with working in the channel of Roman ideas, and wherever it could find them employing Roman materials. But not only did these materials give out before long, but, as the nations progressed more and more in their own development and got farther away from the Roman influence, and as the Northern ideas and sentiments ever grew stronger, it was inevitable that there should come a change over the style of building. For a very slight study of the subject will convince any one that of the history of the human race a large chapter at least is written in its buildings, and no great change ever came over the spirit of man without a corresponding change coming over the more important of the works of his hand; and none of his works have a more essential importance than the buildings in which he lives and worships and makes his laws.

It would, however, be a serious mistake if we should think that any new principle was discovered by which the architecture we call Christian was separated from the pagan Roman. It was only development, nothing more.

When the Romans neglected the architrave system—or, as it is better called, the post-and-lintel system—of the Greeks and Egyptians, and took up and developed the arch (known long before their time, but never used to any extent), they left nothing useful to be discovered in the field of architecture, and these two principles, used separately or in combination, are all that since their day men have found it necessary to employ. The pointed arch was developed as naturally, in obedience to man's needs, as the round arch had been; it was even, as it would appear, a local discovery, and was used in Provence in France while the rest of Western Europe was still building round arches under Roman influence. Mr. Fergusson shows that its use was very ancient, it having been employed by the Assyrians in the eighth century B. C., and by the Ethiopians in the seventh century B. C.; while the Ethiopians and early settlers in Greece (Pelasgi) used the form, though constructed with horizontal courses, twelve centuries B. C., and while, to come nearer to our own time, the Saracens adopted it in Cairo in the first century of the Hejira, and never apparently used a round arch after the erection of the mosque of Ebn Touloun (A. D. 885); yet, although he shows very clearly that its use by the builders of Provence in the time of Charlemagne was dictated by necessity, he finds it difficult to believe that they could have reinvented it for the purposes to which it was applied. But we are so far from being surprised at any such fact as this, and so unwilling to insist that an ancestor must be found for every achievement of man, that we see no reason to doubt that the people of Provence invented the form, nor should we be surprised to come upon it or the round arch in any land, if such remain to be discovered, as impossible to connect with any ancestry as Palenque or Japan.

The pointed arch was, then, merely a new and fortunate step in the march of architectural progress, but its introduction was gradual, and at first it was combined with the still lingering traces of Roman architecture, appearing like a new element in the buildings so well called Romanesque from the preponderance in them of Roman features. It would be impossible in our small space to so much as glance over the immense field covered by the buildings of the Gothic period. The Gothic architecture reached its culmination in the thirteenth century, when the most beautiful buildings were erected that the world has ever seen. "Not even the great Pharaonic era in Egypt, the age of Pericles in Greece, nor the great period of the Roman empire, will bear comparison," says Fergusson, "with the thirteenth century in France, whether we look to the extent of the buildings executed, their wonderful variety and constructive elegance, the daring imagination that conceived them, or the power of poetry and of lofty religious feeling that is expressed in every feature and in every part of them." The Gothic style is seen in its purity in France and in England, but even in Venice and some other cities of Northern Italy, where it is mingled with Byzantine and Roman features, there is a beauty about it, a poetic charm, which has of late years especially excited a high degree of admiration.

We have said that no new principle was introduced in the pointed architecture, but it is important to remember that the exigencies of the Northern climate, the less amount of sunlight, and the double necessity of admitting as much light as possible while excluding rain and snow, inevitably led to the development of the manufacture of glass and its employment in windows. The Greeks, Egyptians, and Romans were all well acquainted with glass, and manufactured and used it as freely in proportion to their population as we of to-day; but of window-glass the southern people had no need in the olden time any more than they have to-day. No native of Italy ever feels the necessity for interposing a window-sash between himself and the outer air; it is only foreigners who feel that need, and have taught the Italians to think it necessary. The builders of the Pantheon left an opening of twenty-six feet in diameter, making an area of thirty-two square feet, in the centre of the dome, through which the rain and snow are free to fall; but in the Roman climate no practical inconvenience is ever felt from this exposure. North of the Alps such freedom as this would be impossible, and man's old possession of glass was soon made to serve a new use. As it lent itself easily to staining with lovely color, the Gothic builders found a natural delight in using it, and they enlarged and multiplied the windows of their churches merely for the pleasure of filling them with painted glass. These windows are the glory and chief beauty of their buildings. Some of them—the Sainte Chapelle at Paris, for instance—are nothing but lovely tents or tabernacles of glass, incomparable in design and color. And so strong a hold did this new element of decoration take upon the minds of the people of that age that "after the middle of the twelfth century the principal and guiding motive in all the changes introduced into the architecture of the age was to obtain the greatest possible space and the best-arranged situations for its display."

The Gothic architecture, after crowding Europe with the beautiful or grand performances of its prime, and leaving to the world a heritage of wonder that is inexhaustible, was struck by decay, and died at last in the fifteenth century. Then, after a pause in which much interesting, much picturesque, and much very ugly building went on, there came slowly on with the dwindling of the old faith, with the vital change in society, with all the elements that made the sixteenth century a period of revolution, another great change in architecture, which is called the Classic Revival, the Renaissance. And just as in the growth of the Gothic style we saw the old Roman forms slowly displaced by new, so now we see the new forms as slowly displaced by the old elements that had once given place to them. The pointed arch was gradually dropped, the stained-glass windows faded out of sight, and the old architecture of Rome was revived in principle, though shorn of much of its grandeur, in these buildings crowned by domes and with their surfaces masked by the old screens of columns and entablatures.

Still, in the beginning, much that was magnificent in public buildings, in churches, town-halls, châteaux, and palaces, was accomplished by the architects of the Renaissance, and much that was picturesque and charming—if not always defensible—in domestic buildings. In Italy and France the architecture of the Renaissance produced its most splendid fruit, but there is much that is interesting in Germany, in Spain, and in England.

What the chapel of Henry VII. is to the Gothic architecture, the sign of its approaching death, the church of St. Peter at Rome was to the Renaissance; nor did it long survive that colossal blunder. The work of many years and many hands, one of the costliest buildings ever erected in modern times, and the product of the skill of the greatest architects and artists of the age, it is a building every way unsatisfactory, and one which the world has long ceased to regard with enthusiasm. But, in truth, the world had become wearied with building, and since that unfortunate experiment has only trifled with brick and stone. For times are changed, and the zeal that once burned to build churches for the glory of God, the love of art that delighted to adorn them, are grown cold, and stir men not any more. For nearly three hundred years not a single building has been erected in Europe or anywhere that has an original claim to admiration, or that would occasion the least regret by its loss except on grounds of convenience or utility. This could not have been said of any three centuries, nor of any one century, that elapsed between the building of the Pyramids and the close of the sixteenth century of our era. During all that unrolling of centuries architecture was a living art, employing man's highest skill and covering the earth with beautiful and stately buildings. It is often brought as a reproach that man has long ceased to take delight in architecture. But, while we may regret the fact, it is useless to mourn over it, and infidelity to man to argue from it that he is on the road to hopeless degradation. We are living in an era of revolution as striking and as momentous as the race has ever seen, and man's faculties are everywhere busy with the pressing needs of the time. It may be well to remember that the triumphs of architecture have been won in building churches for a worship that was suited to the infancy of our civilization; in building palaces for rulers who subjected their people's bodies as the Church subjected their minds; and in other structures suited to social and political conditions that have passed away, apparently for ever. The race is everywhere in fermentation, and when it has settled down into the new order which will surely come out of chaos, the building instinct and the delight in building which are a part of the nature of man will once more take up the task, and Architecture be born again. (For the styles of architecture contemporary with the European development of the art, but independent of it, see the various articles ASSYRIA, INDIA, and CHINESE ARCHITECTURE. Also for later modifications, see RENAISSANCE ARCHITECTURE.) The historical study of architecture is made easy in our day by a multitude of excellent books upon the subject, some dealing with it in the general, others in detail. For the English reader no book is more valuable than Fergusson's "History of Architecture, Ancient and Modern," beginning with the earliest times and coming down (in a volume published in 1873) to our own day. This latest volume contains also an account of the principal buildings in America, with criticisms upon them. Kügler's "Handbuch der Baukunst" is a complete and valuable dictionary for consultation, too dry to read. The invaluable "Dictionnaire de l'Architecture" of Viollet le Duc covers the architecture of France from the twelfth century to the Renaissance.

CLARENCE COOK.

Architecture of the American Aborigines. When America was first discovered in its several regions, the aborigines were found in two dissimilar conditions. First were the Village Indians, who depended almost exclusively upon horticulture for subsistence; such were the nations of New Mexico, Mexico, and Central America, and upon the plateau of the Andes. Second were the Non-horticultural Indians, who depended upon fish, bread-roots, and game; such were the Indians of the Valley of the Columbia, of the Hudson's Bay Territory, of parts of Canada, and of all other sections of North America where cultivation was unknown. Between these, and connecting the extremes by insensible gradations, were the partially Village and partially Horticultural Indians; such were the Iroquois, the New England and Virginia Indians, the Creeks, Cherokees, Mandans, Minnitarees, Shawnees, and Chichemecs of Mexico. The weapons, arts, usages, inventions, dances, architecture, and form of government of all alike bear the impress of a common mind, and reveal, through their wide range, the successive stages of development of the same original conceptions. Our first mistake consisted in overrating the comparative advancement of the Village Indians; and our second in underrating that of the Non-horticultural, and also that of the partially Village Indians; whence resulted a third, that of separating one from the other, and regarding them as different stocks. The evidence of their unity of origin has now accumulated to such a degree as to leave no reasonable ground for doubt upon the question, although this conclusion is not universally accepted. The latter classes always held the preponderating power, at least in North America, and furnished the migrating bands which replenished the continent with inhabitants.

It is a singular fact that the Village Indians, who first became possessed of corn, the great American cereal, and of the art of cultivation, did not rise to supremacy over the continent. With their increased and more stable means of subsistence it might reasonably have been expected that they would have extended their power, and spread their migrating populations over the most valuable areas, to the gradual displacement of the ruder nations. In this they signally failed. Their civilization, such as it was, did not enable them to advance, either in their weapons or in the art of war, beyond the more barbarous nations, except as a superior house-architecture rendered their habitations impregnable to Indian assault.

Besides this, their governmental institutions had not advanced beyond the *societas*, founded upon the gentes, and which created personal relations, into the *civitas*, founded upon territory and upon property. This argument, when extended, demonstrates the impossibility of potentates or privileged classes under their institutions, with power to enforce the labor of the people for the erection of houses or palaces for their individual use.

It should be further observed, with respect to their relative advancement, that the Non-horticultural Indians were, in general, without the art of pottery, and therefore in a state of savagery; that the partially Village Indians, who practised the ceramic art, were in the First Period of Barbarism; whilst the Village Indians, who, in addition, cultivated by irrigation, constructed houses of adobe bricks and stone, and a portion of whom, the Peruvians, had domesticated the llama as well as invented bronze, were in the Middle Period of Barbarism. It remained for them to invent the process of smelting iron ore to attain to the Closing Period of Barbarism; and beyond that, to invent a phonetic alphabet to reach the First Stage of Civilization.

The indigenous architecture of the Village Indians has given to them, more than aught else, their position in the estimation of mankind. The facts of their social condition, which unfortunately are obscure, have done much less in fixing their status than existing architectural remains. The Indian edifices of the period of the Conquest, from the materials used in their construction, from their palatial extent, and from the character of their ornamentation, may well excite surprise and even admiration; but, as we think it can be shown, a false interpretation has, from the first, been put upon this architecture, and inferences constantly drawn from it, with respect to the social condition and advancement of the people, both fallacious and deceptive, where the plain truth would have been more creditable to the aborigines themselves.

There is a common principle running through this architecture, from the "long house" of the Iroquois to the pueblo houses of New Mexico, and to the so-called "Palace" at Palenque and the "Governor's House" at Uxmal. It is the principle of *communism in living*, restricted, in the first instance, to groups of persons mutually related, and extended, finally, to all the inhabitants of a village or encampment by the *law of hospitality*. Hunger and destitution were not known at one end of an Indian village whilst abundance prevailed at the other. Communism in living and the general law of hospitality seem to have accompanied all the phases of Indian life. These great facts of their social condition embodied themselves in their architecture, and will contribute to its elucidation.

It will be the object of this article to present, briefly, some of the facts tending to show the practice of communism in living amongst the Non-horticultural and also the partially Village Indians, and after that to show its expression in their architecture; and, in the second place, to bring into notice the principal features of the architecture of the Village Indians of New and Old Mexico and Central America, from which the inference will be drawn that communism in living entered into and determined its character. Concerning the social condition of the latter our information is limited and defective.

Communism in living has its origin in a union of effort to procure subsistence, and to a great extent it was a necessary result of the mode of life of the aborigines. A few examples will illustrate the proposition. The Blackfeet, during the buffalo-hunt, follow the herds on horseback in large parties, composed of men, women, and children. When the pursuit of the herd is commenced the hunters leave the dead animals in the track of the chase, to be appropriated by the first persons who come up behind. This method of distribution is continued until all are supplied. All the nations who hunt upon the Plains observe the same custom, making a common stock of the capture. During the fishing-season in the Valley of the Columbia, where the fish are more abundant than in any other river on the earth, all the members of a band encamp together and make a common stock of the fish obtained. They are divided each day according to the number of women, giving to each an equal share. This makes a general distribution at the outset. When cured and packed they are removed to their homes. Among the Iroquois—and the same was substantially true of the principal Indian nations—each party made a common stock of the fish and game obtained on their hunting and fishing expeditions. This usage led to an equal participation in the means of subsistence, as well as an equal division of the surplus, which was cured and reserved for winter use. Those forming a common household who cultivated a garden-bed enjoyed the product in common. After gathering the harvest it was stored as a common stock in their dwelling. Each house, as will presently be shown, was constructed large enough to accommodate several families, among whom the communal principle was carried out, but it was limited to the household. The village did not make a common stock of their provisions, and thus offer a bounty to improvidence, but the principle of hospitality came in to relieve the consequences of destitution.

It should be observed that the family, consisting of a married pair and their children, was a weak organization in barbarous life, and still weaker in savagery, unable alone to cope with the hardships of their condition. It was made by pairing, with divorce at the option of either party. But the gens, in which the family practically was merged, was sufficiently powerful as an organism to face the difficulties of daily life. Accordingly, it will be found that the household, which formed a communal group, was mostly composed of members of the same gens.

The law of hospitality may be illustrated by Iroquois usages. If a man enters an Indian house in any village, it is the duty of the women therein to set food before him. An omission to do this would be a discourtesy amounting to an affront. If hungry, he ate; if not, courtesy required that he should taste the food and thank the giver. This would be repeated at every house he entered and at whatever hour in the day. As a custom it was upheld by a rigorous public sentiment, and seems to have been universal amongst the American aborigines. Lewis and Clarke refer to the same practice among the nations of the Missouri. "It is the custom," they remark, "of all the nations of the Missouri to offer every white man food and refreshment when he first enters their tents." (*Travels*, Longman's ed., 1814, p. 649.) This was simply applying their rules of hospitality among themselves to their white visitors. It tended, obviously, to equalize subsistence, and prevent destitution in any portion of an Indian community whilst any household possessed a surplus. Notwithstanding this generous custom, it is well known that the Northern Indians were fearfully pressed for the means of subsistence during a large portion of the year. From the intensity of the struggle to maintain existence it is not surprising that immense areas were entirely uninhabited, that other large areas were thinly peopled, and that dense populations were impossible.

Lands were universally held in common, but after tillage commenced a possessory right to cultivated tracts or gardens

was recognized so long as used. When occupation ceased they reverted.

I. *Communal Houses of the Non-horticultural Indians.*—We are first to show that communism in living entered into and determined the character of the architecture of the Non-horticultural and also the partially Village Indians. If it can be shown that their houses were constructed on this principle, then, wherever houses obviously communal are found, although in ruins, and although the people who erected them have disappeared, a presumption will arise that this principle prevailed among them, and led to the construction of their houses in this form. The architecture of the ruder Indians is of but little importance, in itself considered, but as an outcome of their usages, and in its relations to the architecture of the Village Indians, it is highly significant.

FIG. 1. Ojibwa Wig-e-wam.

The Non-horticultural Indians differed among themselves in the plan of the lodge. The figure, which is copied from Schoolcraft's work, shows the form of an Ojibwa cabin of the best class, as it is still seen on the S. shore of Lake Superior. Its mechanism is sufficiently explained by the figure. Over it is placed a covering of bark, usually the canoe birch, taken off in large pieces and attached with splints. Its size on the ground varied from ten to sixteen feet in diameter and from seven to ten in height. Twigs of spruce or hemlock were strewn around the inner border of the ground-floor, upon which blankets or skins were spread for beds. The fire-pit was in the centre of the floor, over which in the roof was an opening for the exit of the smoke. Such a lodge would accommodate two or three pairs, with their children. Several such lodges are usually found in a cluster, and the several households were made up of related persons, the principal portion being of the same gens. Carver, who visited a village of this nation on the Chippewa River in Wisconsin in 1767, observes: "This town contains about forty houses, and can send out upwards of 100 warriors, many of whom are fine stout young men." (*Travels*, Philadelphia ed., 1796, p. 65.) It would give a total of 500 persons, and an average of twelve persons to a lodge.

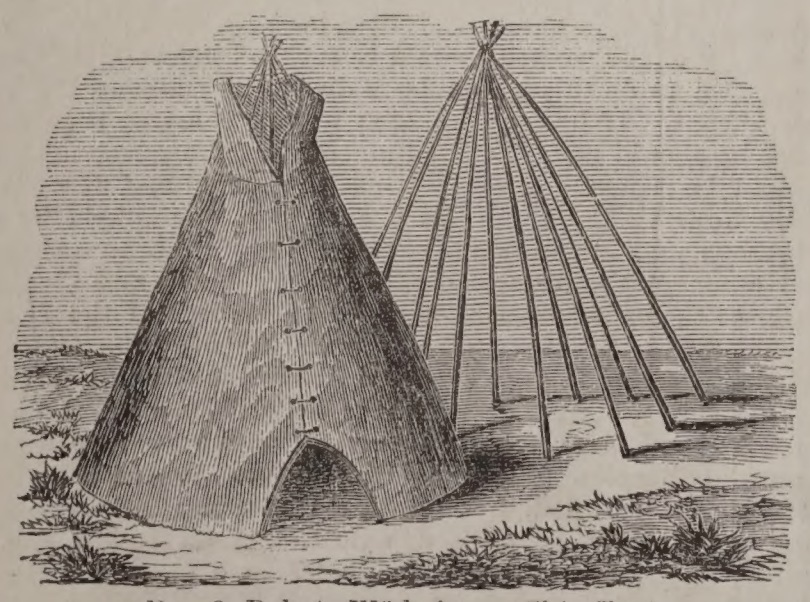

FIG. 2. Dakota Wä-ka'ya, or Skin Tent.

When first discovered the Dakotas lived in houses constructed of poles and covered with bark, each of which was large enough for several families. Forced upon the Plains, after obtaining the horse they invented a skin tent superior to any other in use among the aborigines, from its roominess, its portable character, and the facility with which it can be erected and struck. The frame consists of some twelve poles, from fifteen to eighteen feet in length, which, after being tied together at the small ends, are raised upright with a twist, so as to cross the poles above the fastening. They are then drawn apart at the large ends, and adjusted upon the ground in the rim of a circle which is usually ten feet in diameter. A number of unhaired, tanned buffalo skins, stitched together in a form adjustable to the frame, are drawn around it and lashed together as shown in the figure. The lower edges are secured to the ground with tent-pins. At the top there is an extra skin adjusted as a collar, so as to be open on the windward side to facilitate the exit of the smoke. A low opening is left for a door, which is covered with an extra skin, used as a drop. The fire-pit and arrangement for beds are the same as in the Ojibwa lodge. When their tents are struck the poles are attached to a horse, half on each side, like thills; the covering and scanty camp-furniture are packed upon other horses, and even upon their dogs, and are thus transported over the Plains. This tent is so well adapted to their mode of life that it has spread far and wide among the Indian tribes. We have seen it in use among seven or eight Dakota tribes, among the Iowas, Otoes, and Pawnees, and among the Blackfeet, Crows, Asiniboines, and Crees. A collection of fifty of these tents, which would accommodate 500 persons, makes a picturesque appearance.

The aborigines of the Valley of the Columbia were more or less Village Indians, but without horticulture. They found an abundant subsistence upon shell- and scale-fish, upon fruits and game, and upon the kamash and other bread-roots, which they cooked in ground ovens. When Lewis and Clarke visited this valley (1805–06) they found the Indians living in houses of a higher communal type than those previously described, and approaching the pueblo houses in New Mexico. They speak of a village of the Chopunish (Nez Perces) as follows: "The village of Tumachemootool is in fact only a single house, 150 feet long, built after the Chopunish fashion, with sticks, straw, and dried grass. It contains twenty-four fires, about double that number of families, and might perhaps muster 100 fighting men." (*Travels, loc. cit.*, p. 548.) This would give 500 people in a single house; and the fires probably indicate the number of groups, practising communism among themselves, into which they were subdivided, though it may have been general to the entire household.

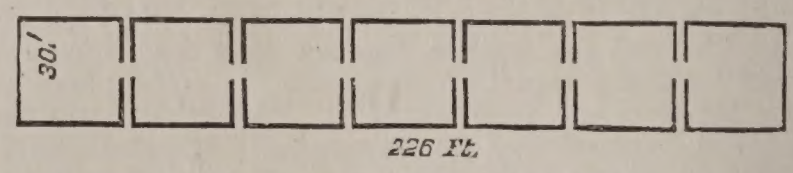

FIG. 3. Ground-Plan of Neerechokioo.

Another great house, Neerechokioo, is thus described: "This large building is 226 feet in front, entirely above ground, and may be considered a single house, because the whole is under one roof; otherwise it would seem more like a range of buildings, as it is divided into seven distinct apartments, each thirty feet square, by means of broad boards set up on end from the floor to the roof. The apartments are separated from each other by a passage or alley four feet wide, extending through the whole depth of the house, and the only entrance is from this alley through a small hole about twenty inches wide and not more than three feet high. The roof is formed of rafters and round poles laid on horizontally. The whole is covered with a double roof of bark of white cedar." (*Ib.*, p. 503.) The apartments indicate the number of groups. Elsewhere (p. 515), speaking of the houses of the Clahclellah, they remark: "These houses are uncommonly large; one of them measured 160 by 40 feet. . . . Most of the houses are built of boards and covered with bark, though some of the more inferior kind are constructed wholly of cedar bark."

These first explorers found the houses of the natives large enough to accommodate several families, with from twenty to thirty persons in each. They name the following villages together (*Ib.*, p. 428): "The Clamoitomish, of twelve houses and 260 souls; the Potoashees, of ten houses and 200 souls; the Pailsk, of ten houses and 200 souls; the Quinults, of sixty houses and 1000 souls; the Chillates, of eight houses and 140 souls," etc. The formation of large groups in single houses or in apartments of a house is thus fully shown. Our explorers do not speak of the practice of communism in these groups. When the usages of other nations, which are known, are presented, the inference of communism in living in these aboriginal houses in the Valley of the Columbia will be plain. The tendency to aggregation in groups, which is clearly shown in the numbers occupying each house, reveals the weakness as well as inability of the single family to cope with the hardships of savage, and even of barbarous, life. Com-

munism in living, as elsewhere stated, was the law of their condition.

II. *Communal Houses of the Partially Village Indians.*—

FIG. 4. Pomeiok.

The houses of this class are equally communal in character. Wythe, in his "Sketches of Virginia," first published in 1690, furnishes an engraving of the village of the Powhattan Indians, called Pomeiok, consisting of seventeen long houses, besides a council-house, arranged around an open central space and surrounded with a palisade. Here the Algonkin lodge gives place to round-roofed long houses, framed with poles, and covered with movable matting instead of bark, and large enough for several families. The suggestion of Wythe that "the buildings were mostly those of chiefs and men of rank" (*Sketches*, etc., Langley ed., 1841, pl. 21) embodies the precise error which has repeated itself, from the first, with respect to the architecture of the American aborigines. Because the house is large, as the Governor's House at Uxmal, therefore it must have been the exclusive residence of an Indian potentate—a conclusion opposed to the whole theory of Indian life and institutions. Indian chiefs were housed with the people, and no better than the poorest of them.

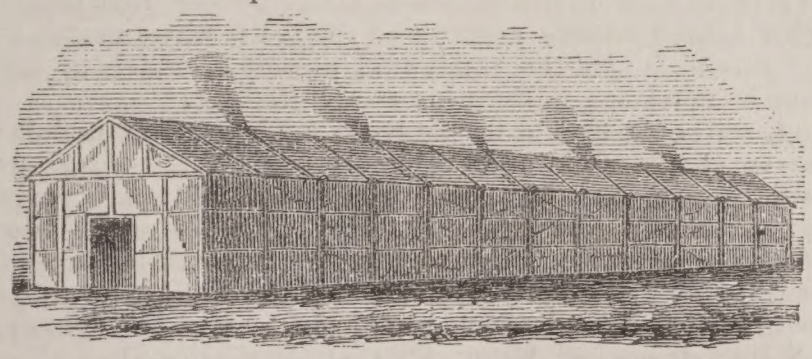

FIG. 5. Ho-de'no-sote of the Iroquois.

During the greater part of the year the Iroquois resided in villages. The size of the village was estimated by the number of houses, and the size of the house by the number of fires it contained. One of the largest villages of the Seneca-Iroquois, situated near Mendon in the county of Monroe, N. Y., is thus described by Mr. Greenhalgh, who visited it in 1677: "Tiotohatton is on the brink or edge of a hill, has not much cleared ground, is near the river Tiotohatton, which signifies *bending*. It lies to the westward of Canagora about thirty miles, contains about 120 houses, being the largest of all the houses we saw, the ordinary being fifty to sixty feet long, with twelve and thirteen fires in one house. They have a good store of corn growing to the northward of the town." (*Doc. Hist. N. Y.*, i. 13.)

The "long house" of the Iroquois, from which they called themselves, as one confederated people, *Ho-de'no-sau-nee* ("People of the Long House"), was from fifty to eighty, and sometimes more than 100 feet long. It consisted of a strong frame of upright poles set in the ground, strengthened with horizontal poles attached with withes, and covered with a triangular roof. It was covered over with large shingles of elm bark tied to the frame with strings or splints. An external frame of poles and rafters was then adjusted to hold the shingles between them, the two being tied together.

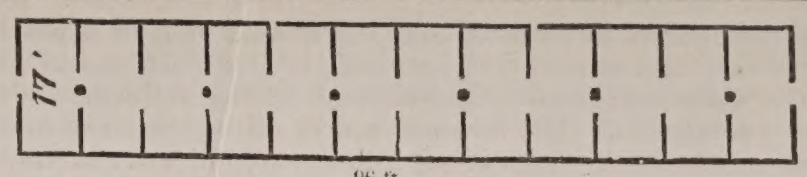

FIG. 6. Ground-Plan of Iroquois House.

The interior was comparted at intervals of six or eight feet, leaving each chamber entirely open, like a stall, upon the hall which passed through the centre from end to end, where were the only doors. Between each four apartments, two on a side, was a fire-pit in the centre of the hall, used in common by their occupants. Thus a house with five fires would contain twenty apartments and accommodate twenty families, unless some were reserved for storage. An elderly Seneca woman, now deceased, informed the writer that she remembered living in one of these houses of the ancient model when a child, which contained eight families and two fires. Raised bunks were constructed around the walls of each apartment for beds. From the roof-poles were suspended their strings of corn in the ear, braided by the husks, also their strings of dried squashes and melons. Spaces were left between the partitions here and there for storage. Each house was usually occupied by related families, the women and children belonging to the same gens. Whatever was taken in the hunt or raised by cultivation by any member of the household was for the common benefit. Provisions were made a common stock within the house.

It should be observed, further, that among the Iroquois there was but one regular meal each day, and that in the morning. At this time the cooking for the day was done, and the food was served to all within the household from wooden bowls, ladles, or platters, and without the use of tables. What remained was reserved for use during the day, each one partaking whenever hunger prompted. Hommony, which formed their usual lunch, was cooked at the close of the day. The separate fires were for convenience alone, all the stores within the house being common.

Here we find communism in living carried out in practical life, and an expression of the principle in the plan of the house itself. Having found it in one stock so well developed as the Iroquois, a presumption of its universality in the Ganowanian family at once arises, requiring proof of the negative in other cases for its rebuttal.

In 1790, Mr. Caleb Swan, under the direction of Gen. Knox, secretary of war, visited the Creek villages in Georgia and Alabama. Without describing their houses specially, he remarks in his report that "the smallest of their towns have from twenty to forty houses, and some of the largest contain from 150 to 200 that are tolerably compact. These houses stand in clusters of four, five, six, seven, and eight together, irregularly distributed up and down the banks of the rivers and small streams. Each cluster of houses contains a clan or family, who eat and live in common." (Schoolcraft, *History, etc. of Indian Tribes*, v., 262.) The cluster of houses among the Creeks was equivalent to one of the long houses of the Iroquois; and the clustered household of the former, who *ate and lived in common*, was made up of related families, as the large Iroquois household within a single house, the relationship being partly gentile and partly marital.

Carver, in describing the "great town of the Sawkees" on the Wisconsin River, remarks (*Travels, loc. cit.*, p. 29) that "it contains about ninety houses, each large enough for several families. They are built of hewn plank, neatly jointed, and covered with bark so completely as to keep out the most penetrating rain."

The Mandans and Minnitarees of the Upper Missouri constructed a timber-framed house superior in design and

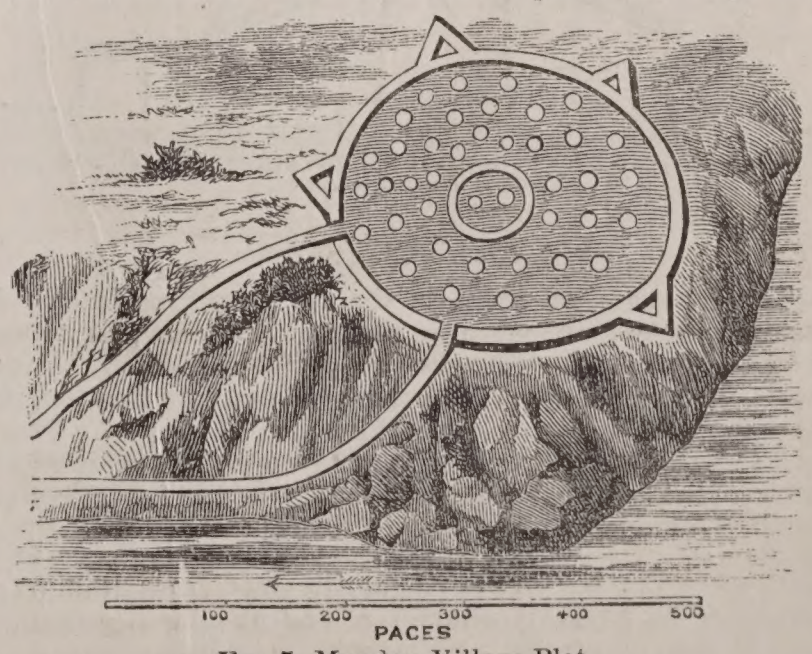

FIG. 7. Mandan Village Plot.

workmanship to those of any Indians N. of New Mexico. In 1862 the writer saw the remains of the old Mandan village shortly after its abandonment by the Arickarees, its last occupants. The houses, nearly all of which were of the same model, were falling into decay, but some of them were still perfect, and the plan of their structure easily made out. The annexed ground-plan of the village is taken from the work of Prince Maximilian, and the remaining illustrations from sketches and measurements of the author. The village was situated upon a bluff on the W. side of the Missouri, and at a bend in the river which formed an obtuse angle, and covered about five acres of land. It was surrounded with a stockade made of timbers set vertically in the ground, but then in a dilapidated state.

The houses were circular in external form, the walls being about five feet high and sloping upward from the ground, with an inclined roof, both exterior wall and roof being plastered over with earth a foot and a half thick.

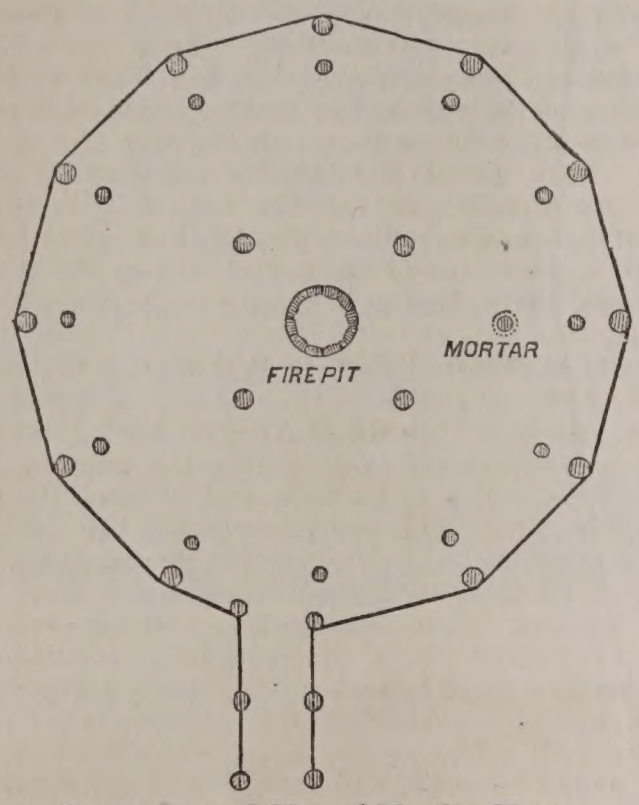

FIG. 8. Ground-Plan of Mandan House.

These houses are about forty feet in diameter, with the floor sunk a foot or more below the surface, six feet high on the inside at the line of the wall, and from twelve to fifteen feet high at the centre. Twelve posts, six or eight inches in diameter, are set in the ground at equal distances in the circumference of a circle, and rising about six feet above the level of the floor. String-pieces, resting on forks upon the top of each post, connect them with each other, thus forming a polygon at the base of the roof and also upon the ground floor. Against these, and opposite to each post, an equal number of braces are sunk in the ground about four feet distant, which, slanting upward, are adjusted by means of forks or depressions cut in the ends, so as to hold both the posts and the stringers firmly in their places. Slabs of wood or round timbers are then placed in the spaces between the braces, at the same inclination from the ground, and resting against the stringers, which when completed surrounded the lodge with a wooden wall. Four posts, each six or eight inches in diameter, are set at the four angles of a square in the centre, ten feet apart, and rising from twelve to fourteen feet above the floor. These are again connected by stringers resting in forks on their tops, upon which, and the external walls, the rafters rest.

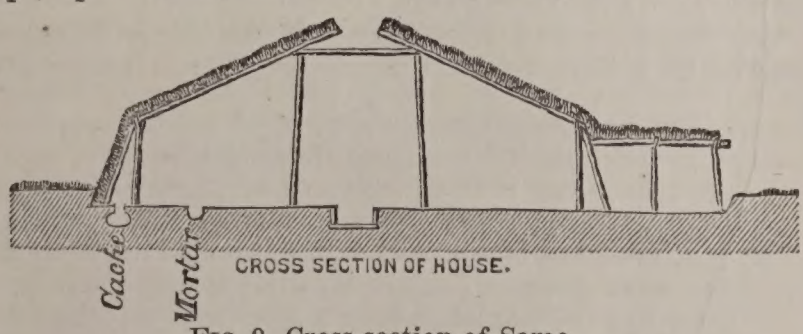

FIG. 9. Cross-section of Same.

The cross-section exhibits the framework as described. Poles three or four inches in diameter are placed as rafters from the external walls to the string-pieces upon the central posts, and near enough together to give the requisite strength to support the earth covering which formed the roof. These poles are first covered over with willow matting, upon which prairie grass was spread, and over this a deep covering of earth. An opening was left in the centre, about four feet in diameter, for the exit of the smoke and for the admission of light. The interior is spacious and tolerably well lighted, although the opening in the roof was the only one through which light could penetrate. There is but one entrance, and that protected by an Eskimo doorway; that is, by a passage five feet wide, ten or twelve feet long, and about six feet high, constructed with split timbers, roofed with poles and covered on the top with earth. Buffalo robes suspended both at the outer and inner entrances supply the place of doors. Each house, when occupied, was comparted by screens of willow matting or unhaired skins suspended from the rafters, with spaces between for storage. These slightly constructed apartments extended back to the wall and opened towards the centre, like stalls, thus defining an open central area which formed the gathering-place of the inmates of the lodge. The fire-pit was in the centre, about five feet in diameter and a foot deep, and encircled with flat stones set up edgeways. A hard smooth earthen floor completed the interior. Such a lodge would accommodate five or six families of related persons. In fact, it was a communal house, in accordance with the usage and institutions of the American aborigines, and growing naturally out of their customs and mode of life. We counted forty-eight of these houses which would average forty feet in diameter, besides several rectangular houses constructed of hewn logs at a more recent day.

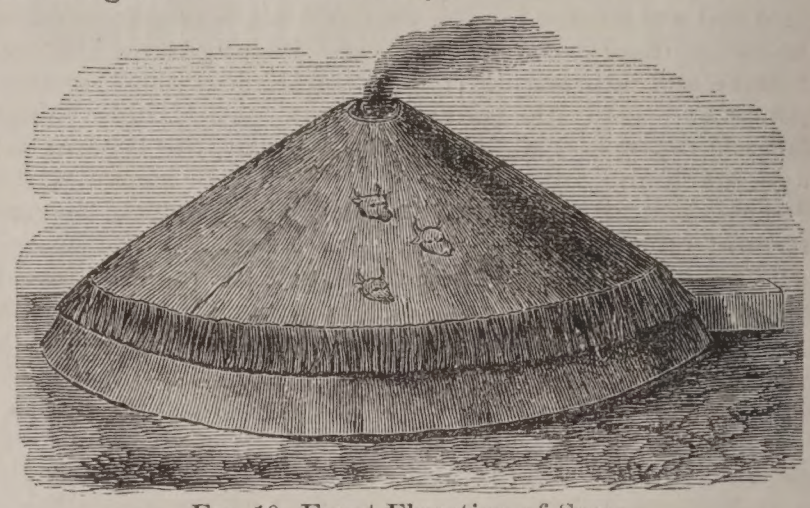

FIG. 10. Front Elevation of Same.

Not the least interesting fact connected with these creditable homes was the quantity of material required in their construction, and the amount of labor necessary for its transportation long distances down the river, and to fashion it with the aid of fire and stone implements into such a comfortable dwelling. To cut the timber without metallic inplements, and to transport it without animal power, indicate a degree of persevering industry highly creditable to a people who are generally regarded as averse to labor.

These houses were thickly studded together to economize the space within the stockade, so that in walking through the village you passed along semicircular footpaths. There is not only no street, but it was impossible to see in any direction except for short distances.

It is plain, from the facts thus far presented, that the Indian household was a group of related families united for subsistence upon the communal principle, which in turn found expression in their house-architecture.

A reference should be made to the Maricopas and Mohaves of the Colorado, who, although Village Indians, still live in ordinary communal houses of the northern type, which are thus described by Gen. Emory: "They [the Maricopas] occupy thatched cottages thirty or forty feet in diameter, made of twigs of cottonwood trees, interwoven with the straw of wheat, corn-stalks, and cane." (*Notes, etc. in N. M.*, p. 132; cf. Bartlett's *Pers. Nar.*, 230.) Those occupied by the Mohaves, as described by Capt. Sitgreaves, are similar in character. (*Expedition, etc. Zuñi and Colorado Rivers*, p. 19.) Although their antecedent history is not well known, they seem to be in the transitional stage, having passed into the horticultural and village condition, without being far enough advanced to imitate their near neighbors in the use of adobe brick and stone. They seem to be existing examples of that recurring advancement of ruder tribes in past ages, through which the Village Indians were constantly replenished from the more barbarous nations.

III. *Communal Houses of the New Mexicans.*—We are next to consider the architecture of the Village Indians, among whom it exhibits a higher development, with the use of durable materials, and with the defensive principle superadded. It will not be difficult, however, to discover and to follow the communal principle as the chief characteristic of this architecture—first, in the pueblo houses in New Mexico, and after that in those of Central America. The necessary limits of this article will prevent a full exposition of the subject, but it will be possible to present the controlling facts.

The Indians N. of New Mexico never constructed a house more than one story high, or of more durable materials than a wooden frame covered with matting or bark or coated over with earth. Chimneys were unknown,

and also stairs, except in the form of ladders. In New Mexico, going southward, are met, for the first time, houses constructed of adobe brick and of stone, and four, five, even six stories high. Sun-dried brick must have come into use earlier than stone. The practice of the ceramic art would suggest the brick sooner or later. At all events, what are supposed to be the oldest remains of architecture in New Mexico, such as the *casas grandes* of the Gila and Salinas rivers, are of adobe brick. They also used rubble stone with mud mortar, and finally thin pieces of tabular sandstone, prepared by fracture, and giving a solid and durable stone wall. Some of the existing pueblo houses in New Mexico are as old as the expedition of Coronado (1540–42), as those at Acoma and Taos, and probably Zuñi, and those of the Moquis, whilst others, constructed since that event, and now occupied, are upon the aboriginal model. There are at present about twenty of these pueblos in New Mexico, inhabited by 7000 Indians, the descendants of those found there by Coronado. They are still living substantially under their ancient organization and usages. Besides, there are the seven Moqui pueblos near the Little Colorado, occupied by 4000 Indians, who have remained pure and undisturbed to the present time, and among whom the entire theory of Indian village life might be obtained if some adventurous ethnologist would seek their secluded homes and study the subject on the spot. These Village Indians represent, at the present moment, the type of village life found from Zuñi to Cuzco at the epoch of the Discovery, and, whilst they are not the highest, they are no unfit representatives of the entire class.

The Central Americans were, in their architecture, in advance of the remaining aborigines of North America. Next to them, probably, were the Aztecs and some few nations southward; and holding the third position, though not far behind, were the New Mexicans. All alike they depended upon horticulture for subsistence and cultivated by irrigation. Their houses, with those previously described, represent together an original, indigenous architecture, which, with its diversities, sprang out of their necessities. Its fundamental communal type, we repeat, is found not less plainly in the comparted long house of the Iroquois than in the so-called palace at Palenque. An examination of the plan of the structures in New Mexico and Central America will tend to establish this proposition.

New Mexico is a poor country for civilized man, but quite well adapted to Village Indians. It possesses a number of narrow fertile valleys, which were occupied in 1540 by thirty or forty pueblo villages, containing possibly 50,000 or 60,000 Indians, and it is occupied now by their descendants in manner and form as it was then. Each pueblo consisted then, as now, either of a single great house or of three or four such houses grouped together; and, what is more significant, the New Mexican pueblo is a fair type of those found in ruins in Central America in general plan, in the mode of life it indicates, and in situation. All the people lived together in these great houses on terms of equality and also for security. Common tenements for common Indians around these structures were not found there by Coronado in 1541; neither have any been found there since. There is not the slightest ground for supposing that any such tenements ever existed around the ruined structures in Central America. This suggestion should be kept in mind.

This pueblo or village is composed of three or four

FIG. 11. Pueblo of Santo Domingo.

structures of adobe brick grouped together, one of which is shown in the engraving. It is about 200 feet long, with two parallel rows of apartments on the ground, of which the front row is carried up one story and the back two, the flat roof of the first story forming a terrace in front of the second. The first story is closed up solid for defensive reasons, with the exception of small window-openings. The first terrace is reached by means of ladders from the ground; the rooms in the first story are entered through trap-doors in the terrace, and in the second through doors opening upon the terrace. This structure is typical of all the aboriginal houses in New Mexico. It shows two principal features: first, the terraced form of architecture, with the housetops as the ordinary gathering-places of the inmates; and second, a closed ground-story for safety. Every house, therefore, is a fortress. Lieut. Abert, from whose report the engraving is taken, remarks that "the upper story is narrower than the one below, so that there is a platform or landing along the whole length of the building. To enter, you ascend to this platform by means of ladders that could be easily removed; and, as there is a parapet wall extending along the platform, these houses could be converted into formidable forts." (*Ex. Doc.* No. 41, 1st Sess. 30th Congress, 1848, p. 462.) The number of apartments is not stated, but, judging from the window-openings, there may be thirty-eight on the first floor, of which half are dark, and nineteen in the second story. The different houses at that time were inhabited by 800 Indians. Chimneys now appear rising above the roof, the fire-place being at the angle of the chamber in front.

The defensive element, so prominent in this architecture, was not so much to protect the Village Indians from each other as from the attacks of the migrating bands flowing down upon them from the Valley of the Columbia. The pueblos now in ruins throughout the original area of New Mexico testify to the perpetual struggle of the former to maintain their ground, as well as prove the general insecurity in which they lived. It could be shown that the second and additional stories were suggested by the defensive principle.

Zuñi is the largest occupied pueblo in New Mexico at the present time. It once contained 5000 or 6000 inhabitants, but in 1851 they were reduced to 1500. The village consists of several structures, most of them accessible to each other from their terraced roofs. They are constructed of adobe brick, and of stone embedded in mud mortar, and plastered over. In the engraving, which is copied from Sitgreaves' report, a section of one of the principal structures is given, the left end being cut off by another building in front of it, and the right showing a series of angles. It shows three stories in the terraced form, with two square buildings standing apart on the summit, and forming a fourth, giving it the appearance somewhat of a temple, and perhaps suggesting an explanation of the application of this term by the Spanish invaders to so many of the buildings seen in and around the pueblos of Mexico.

The living-rooms, as shown by engravings in the same report, are about ten by fifteen feet, and ten feet high, with plastered walls, a hard earthen floor, and usually a single window-opening. To form a durable ceiling, round timbers about six inches in diameter are placed three or four feet apart from the outer to the inner wall. Upon these small poles are placed transversely in juxtaposition, over which is a deep covering of mud mortar, which forms the terrace roof in front and the floor of the rooms within. Water-jars of fine workmanship, and of capacity for several gallons, closely-woven osier baskets, blankets of cotton and wool woven by their own hand-looms are among the objects

seen in these apartments. They are neatly kept, roomy and comfortable, and differ in no respect from those in use at the period of the Conquest.

It should be noticed that this architecture, and the necessities that gave it birth, led to a change in the mode of life from the open ground to the terraces or flat roofs of these communal houses. When not engaged in tillage, and during the morning and evening hours, the terraces were the gathering and living places of the people. They lived, practically, in the open air, to which the climate was adapted, and upon their house-tops, first for safety, and afterwards from habit.

FIG. 12. Section of Pueblo House at Zuñi.

Elevations of the principal New Mexican pueblos have been published. They agree in general plan, but show considerable diversity in details. Rude but massive structures, they accommodated all the people of the village within their walls. Since most of them are of adobe brick, or of rubble stone embedded in mud mortar; our remaining illustrations will be taken from the pueblos in ruins in the valley of the Rio Chaco, which are constructed entirely of stone, are unquestionably as old as the epoch of the conquest of Mexico, and superior architecturally to those now occupied, showing that a decadence in the art commenced with European intrusion.

About 110 miles N. W. from Santo Domingo on the Rio Grande, there are seven great edifices, now in ruins, situated within an extent of ten miles in the valley of the Rio Chaco, an affluent of the Colorado. They were visited and described in 1849 by Lieutenant (now General) Simpson, with ground-plans and measurements. (*Report of James H. Simpson of an Expedition in the Navajo Country in* 1849, Ex. Doc. No. 64, 1st Sess. 31st Cong., pp. 55–139.) In an architectural point of view they are the most interesting and remarkable structures in New Mexico. The ground-plans, elevations, and the detailed particulars are taken from this report. They are probably the remains of the Seven Cities of Cibola, against which the expedition of Coronado was directed in 1540–42.

These great edifices were all constructed of the same materials, and upon the same general plan, but they differ in size upon the ground, in the number of rows of apartments, and consequently in the number of stories. They contained from 100 to 600 apartments each, and would severally accommodate from 1000 to 3000 or 4000 persons. Some of them are also the largest structures in ground dimensions and in the extent of their accommodations ever found in any part of North America. It may be remarked here that it is doubtful whether any single pueblo in New Mexico at its most prosperous period contained more than 5000 or 6000 inhabitants, and in such a case it would be made up of more than one of these structures, grouped together, as at Zuñi. This would probably hold true with the great majority of the ancient pueblos in Mexico and in Central America.

Ground-plans are furnished of five of the seven edifices. They all, save one, agree in being constructed on three sides of an open court, the fourth being protected by a low stone wall. The outer faces of the walls are constructed of thin pieces of tabular sandstone, prepared by fracture, and laid in courses without mortar, the inner faces being composed of rubble masonry with mud mortar. The walls are about three feet thick. There were no doors or openings to enter the buildings from the ground, but in the stories above the first are window-openings through the walls. General Simpson remarks that they are "built of tabular pieces of hard, fine-grained, compact, gray sandstone, to which the atmosphere has imparted a reddish tinge;" that "in the outer faces of the building there are no signs of mortar, the intervals between the beds being chinked with stones of minutest thinness;" and that the "filling and backing are done in rubble masonry, the mortar presenting no indications of the presence of lime." "So beautifully diminutive are the details of the structure as to cause it, at a little distance, to have all the appearance of a magnificent piece of mosaic work." (*Report*, p. 76.) The layers are not usually thicker than three inches, and sometimes as thin as one-fourth of an inch. Their ancient names are of course unknown. General Simpson adopted those given to him by his Spanish guide.

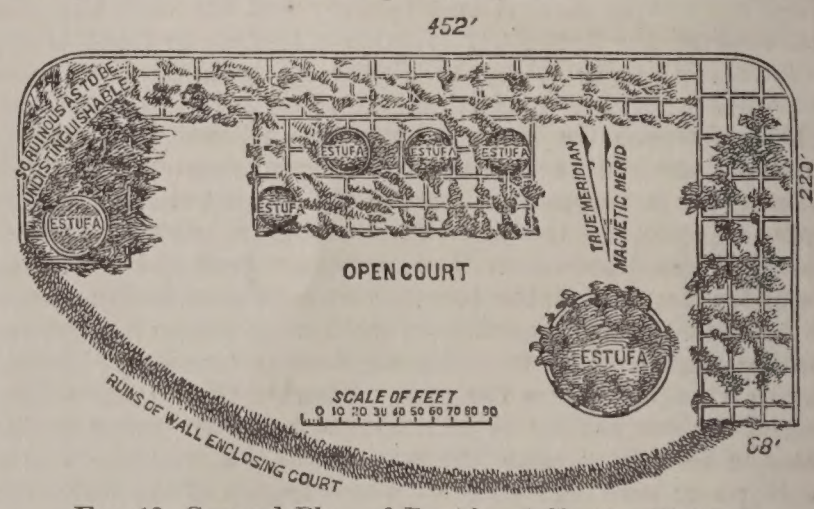

FIG. 13. Ground-Plan of Pueblo of Chettro Kettle.

The general plan of all the edifices on the Chaco will be made intelligible by the annexed ground-plan. The main building and the wings face the court, from which alone they are entered, and from which the several stories recede outward. Including the court, this great house has an exterior development of 1300 feet. The exterior wall of the main building measures 454 feet in length, and the longest of the wings 220 feet. At the centre, where four additional rows of apartments have been added on the inside, the structure is 110 feet deep, and for the remainder 44 feet. One of the wings is 50 and the other 58 feet deep, showing three rows of apartments in each, and consequently they were three stories high; the first row on the court side being carried up one story, the second two, and the third

three, in the usual terrace form as before shown. If carried up in the same manner at the centre, it would be seven stories high on the back row.

From the measurement some impression may be formed of the extent of the accommodations such an edifice would afford, especially in Indian life, where more than one pair with their children are usually found in one lodge, and, it may be supposed here, in one apartment. The plan shows 124 rooms on the ground-floor, exclusive of the left wing, which was too ruinous to identify the number. Excluding one row of apartments for the terrace in front of the second story, and counting one row less for each successive story, there would be an aggregate in this single house of some 300 apartments, capable of accommodating 1500 or 2000 Indians.

The circular estufas, of which there are six, and five of which are incorporated in the body of the structure, were their council-houses. They were sunk below the surface, and carried up, in some cases, two and three stories. Similar estufas are still in use in New Mexican pueblos as places for holding councils. The number indicates a sub-organization analogous to the gens. It may be supposed, therefore, that each estufa was the council-house of a gens, or, if the gentes were numerous, then of a phratry composed of two or more gentes derived by subdivision from an original gens.

In the N. W. corner, Gen. Simpson remarks, "we found a room in an almost perfect state of preservation. This room is fourteen by seven and a half feet in plan, and ten feet in elevation. It has an outside doorway three and a half feet high by two and a quarter wide; and one at the W. end leading into an adjoining room. . . . The stone walls still have their plaster upon them in a tolerable state of preservation. . . . The ceiling showed two main beams, laid transversely; on these, longitudinally, were a number of smaller ones in juxtaposition, the ends being tied together by a species of wooden fibre, and the interstices chinked in with small stones; on these, again transversely, in close contact, was a kind of lathing of the odor and appearance of cedar, all in a good state of preservation. Depending from the ceiling were several pieces of short rope." (*Report*, p. 79.) This ceiling agrees in form with that at Zuñi, previously described. Elsewhere he says that these floor-beams are six inches in diameter, and were hacked off by means of some imperfect instrument, there being no evidence of the use of the metallic axe.

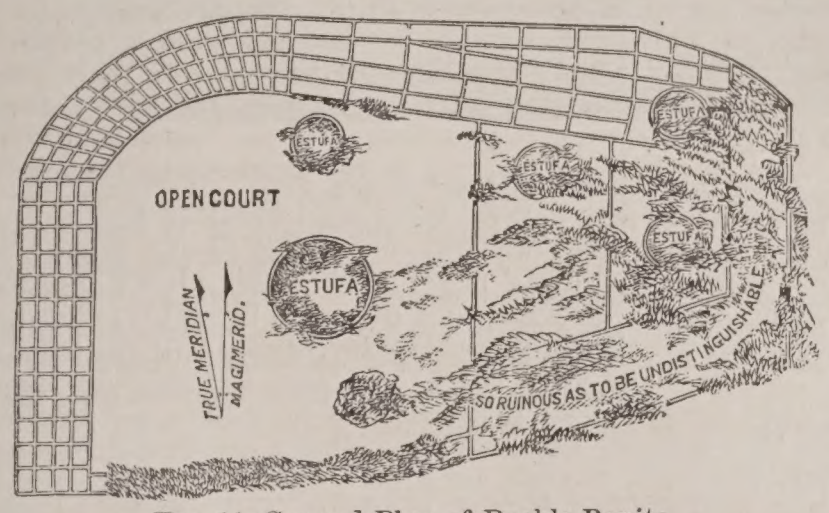

FIG. 14. Ground-Plan of Pueblo Bonito.

This edifice is the most interesting, in some respects, of the seven, as well as the best preserved in certain portions. In exterior development, including the court, it is 1300 feet. Its corners are rounded, and the E. wing, now the most ruinous part of the structure, appears to have had row upon row of apartments added until nearly one-third of the area of the court was covered. "Its present elevation," Simpson observes, "shows that it has had at least four stories of apartments. The number of rooms on the ground-floor is 139. In this enumeration, however, are not included the apartments which are not distinguishable in the E. portion of the pueblo, and which would swell the number to about 200. There, then, having been at least four stories of rooms, . . . there must be a reduction . . . of one range of rooms for every story after the first," which would increase "the number to 641." (*Ib.*, p. 81.) No single edifice of equal accommodations, it may here be repeated, has ever been found in any other part of North America. It would house 3000 Indians.

This room will compare, not unfavorably, with any of equal size to be found at Palenque or Uxmal, although, from the want of a vaulted ceiling, not equal in artistic design. The nice mechanical adjustment of the masonry and the finish of the ceiling are highly creditable to the taste and skill of the builders. "It is walled up," says Simpson, "with alternate beds of large and small stones, the regularity of the combination producing a very pleasing effect. The ceiling of this room is also more tasteful than any we have seen, the transverse beams being smaller and more numerous, and the longitudinal pieces which rest

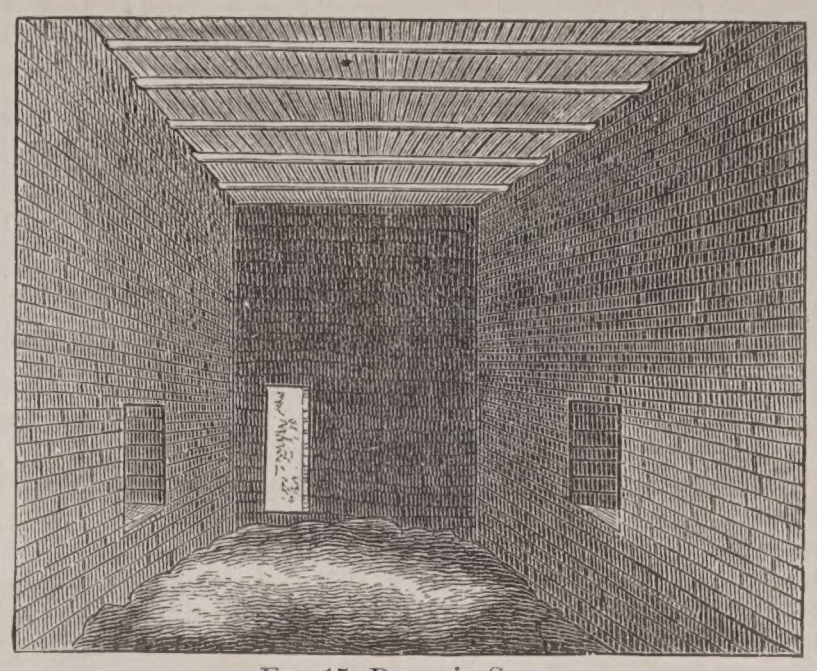

FIG. 15. Room in Same.

upon them only about an inch in diameter, and beautifully regular. These latter have somewhat the appearance of barked willow. The room has a doorway at each end, and one at the side, each of them leading into adjacent apartments. The light is let in by a window two feet by eight inches, on the N. side." (*Ib.*, p. 81.)

The largest of the seven pueblos is Peñasca Blanca, which has an exterior development of 1700 feet. "This," he further remarks, "differs from the others in the arrangement of the stones comprising its walls. The walls of the other pueblos are of one uniform character in the several beds composing them, but in this there is a regular alternation of large and small stones, the effect of which is both unique and beautiful. The largest stones, which are about a foot in length and half a foot in thickness,* form but a single bed, and then, alternating with these, are three or four beds of small stones, each about an inch in thickness. The ground-plan of the structure also differs from the others in approaching the form of a circle." (*Ib.*, p. 82.)

One of these remaining, Una Vida, seems to have been in process of construction, and designed, when completed, to have been the largest of the seven. The main building is 300 feet in length along the exterior wall, and 65 feet deep, showing four rows of apartments; and the wing is 290 feet long and but 16 feet deep, showing but a single row. It appears, however, from a projection near one end of the width of two apartments, that two more rows were to be constructed outside of the existing row, which were necessary to complete the wing according to its original design. Moreover, it seems to prove that these great houses were of slow construction by the process of addition from year to year with the increase of the people in numbers, and that the enlargement is by adding row to row and story to story until the edifice is several rooms deep and several stories high. Upon this theory of construction, the first row of the main building on the court side would first be completed one story high, and covered with a flat roof; after which, by adding one parallel wall, with partition walls at intervals, as many more apartments would be obtained; and by a third and fourth parallel wall, with partitions, as many more. The second row was carried up two stories, the third three, and the fourth four; the successive stories receding from the court side in the form of great steps or terraces, one rising above the other. The wings would be commenced and completed in the same manner. Further than this, it seems to be evident, from the present condition of this structure, that the main building was to be extended at least 200 feet, with a second wing like the first, to fill out the original design and produce a symmetrical edifice. If these inferences are warranted, the interesting fact is reached that these Indian architects commenced their great houses upon a definite plan, which was to be realized after years, and perhaps generations, had passed away.

The highest portion of the walls still standing are stated at fifteen feet in height at Una Vida, twenty-five feet in Wegegi, and thirty feet in Hungo Pavie. The rooms back of the front row in the first story, and the middle rooms in the second, were dark, except as they were dimly lighted from contiguous apartments.

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* Norman, speaking of the size of the stones used in the edifices in Yucatan, says: "The stones are *parallelopipeds* of about twelve inches in length and six in breadth."—*Rambles in Yucatan*, p. 127.

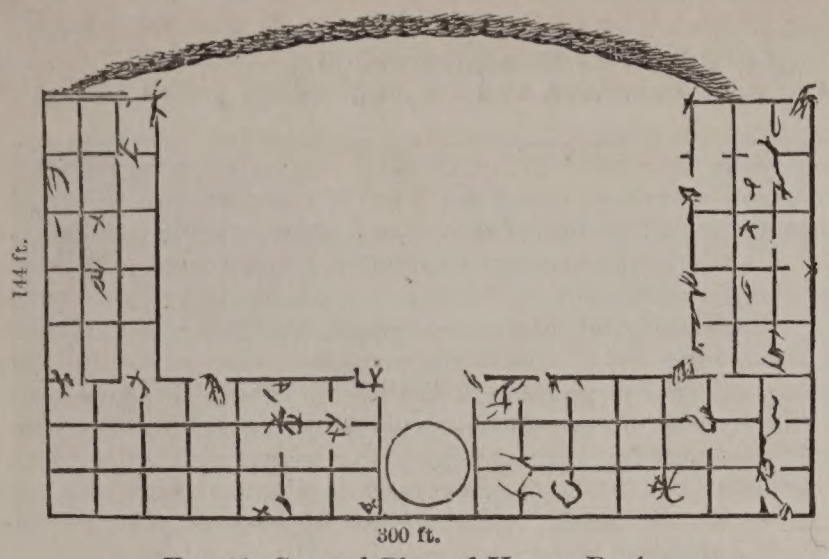

FIG. 16. Ground-Plan of Hungo Pavie.

This pueblo has been reserved to the last for the purpose of giving both a ground-plan and a front elevation. In exterior development, including the court, it is 872 feet, of which the back wall measures 300 and the side walls 144 feet each. It is of medium size, but symmetrical, and larger than any single structure in Central America in ground dimensions. There are seventy-two apartments in the first story, some of which are unusually large, being about thirteen by eighteen feet; and, with forty-eight in the second and twenty-four in the third, contained an aggregate of 146 apartments. It would accommodate from 1200 to 1500 Indians.

To complete the representation of the architectural design of these "great houses of stone" the annexed elevation is given. It is a restoration of the pueblo of Hungo Pavie, made by Mr. Kern, who accompanied Gen. Simpson as draughtsman, and copied from his engraving. We may recognize in this edifice, as it seems to the writer, a very satisfactory reproduction of the so-called palaces of Montezuma, which, like this, were constructed on three sides of a court which opened on a street or causeway, and in the terraced form. From the light which this architecture throws on that of the Aztecs, it appears extremely probable that these famous palaces, considered as exclusive residences of an Indian potentate, are purely fictitious, and that, on the contrary, they were neither more nor less than great communal houses of the aboriginal American model, and with common Indians crowding all their apartments. From what is known of the necessary constitution of society among the Village Indians, it scarcely admits

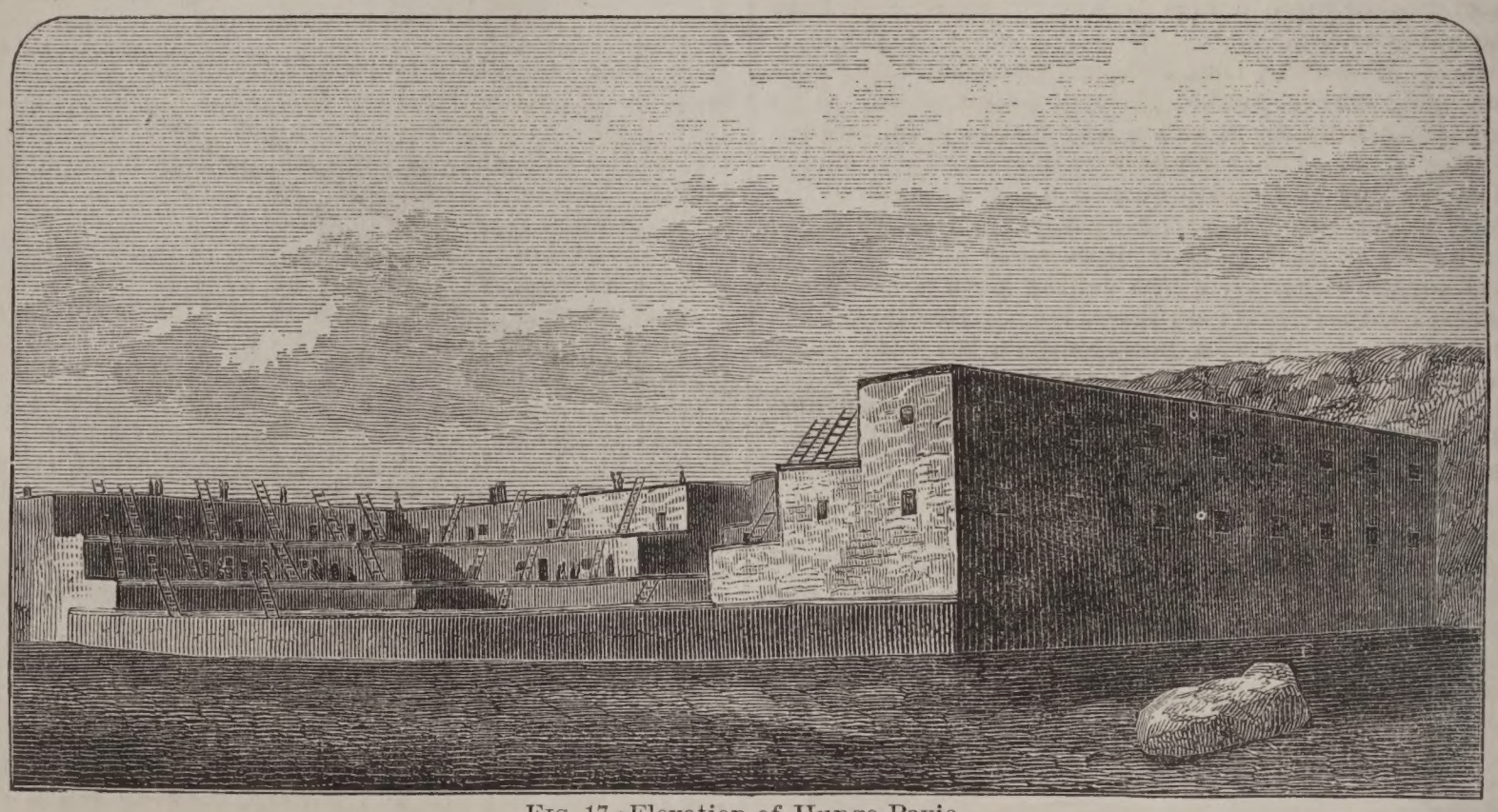

FIG. 17. Elevation of Hungo Pavie.

of a doubt that the great house in which he lived was occupied on equal terms by a hundred other families in common with his own, all the individuals of which were joint proprietors of the establishment which their own hands had raised.

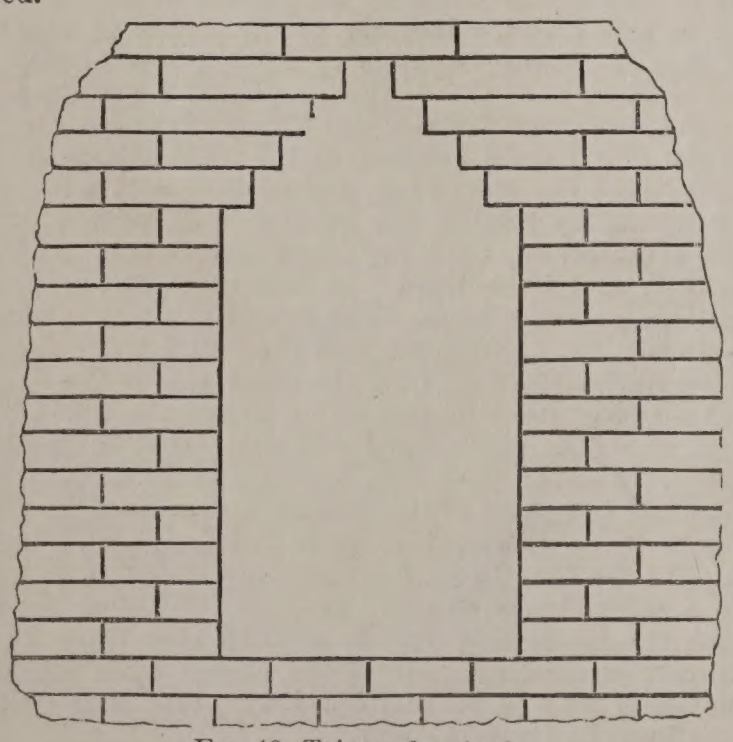

FIG. 18. Triangular Arch.

One of the remarkable features of the architecture of Central America is the triangular arch, which has been regarded as evidence of mechanical advancement. The same arch, of which the above is a representation, was found by Gen. Simpson in the structures on the Chaco, used as a doorway. It is copied from his report. In the edifices at Uxmal, Palenque, and elsewhere the rooms are vaulted with this arch, the angles being bevelled to a uniform surface. The principle of construction is the same in both.

After the capture of the "Seven Cities of Cibola," Coronado made a report to Mendozo, viceroy of Mexico, in which he expresses his disappointment in the following language: "And to be brief, I can assure your honor he [Friar Marcos de Niza] said the truth in nothing that he reported, but all was quite contrary, saving only the names of the cities and great houses of stone; for although they be not wrought with turquesces, nor with lime, nor bricks, yet they are very excellent good houses, of three or four or five lofts high, wherein are good lodgings and fair chambers, with ladders instead of stairs, and certain cellars [estufas] under ground, very good and paved. . . . The seven cities are seven small towns, all made with these kind of houses that I speak of; and they all stand within four leagues together, and they are all called the kingdom of Cibola, and every one of these have their particular name. . . . The people of this town seem unto me of a reasonable stature, and witty, yet they seem not to be such as they should be, of that judgment and wit, to build these houses in such sort as they are." Coronado further states that on the fourth day after the capture "they set in order all their goods and substance, their women and children, and fled to the hills, leaving their town as it were abandoned, wherein remained very few of them." (Hakluyt, *Coll. of Voyages*, London ed., 1600, iii.. p. 377.)

No evidence has been adduced of the practice of communism by the present Pueblo Indians of New Mexico.* Information upon this and other questions concerning their organization and mode of life has not been sought by those who have visited this isolated country. The Moqui and Laguna Indians are organized in gentes, which raises a presumption of its universality among the Village Indians. Their arts, weapons, usages, implements and utensils,

* Since writing this article, Mr. David J. Miller of Santa Fé, N. M., has informed me by letter that the Pueblo Indians still hold their lands in common, with a possessory right in each to cultivated lands so long as the individual chooses to occupy it, but that he had not observed any evidence of the practice of communism in living among them.

dances, and general characteristics, so far as they are known. are either precisely the same as those of the partially Village Indians of the North, or more advanced forms of the same original conceptions. The practice of communism must be deduced, for the present, from the structure of the houses themselves. Both in New Mexico and Central America they are strikingly adapted to communistic life. So much is this the case that their peculiar internal arrangement cannot be explained on any other hypothesis. In all the houses in Central America the rooms are usually in pairs, which have no connection with the remainder of the building. In some cases four, and in one six, apartments are found connected with each other by doorways. They are thus divided into sections adapted to groups, which are separated from each other by solid walls. The presumption arises that the houses in New Mexico are similarly constructed, although the fact has not been as yet ascertained.* The published engravings, however, show less than one-fourth as many chimneys as the inhabited houses contain apartments.

IV. *Communal Houses of the Aztecs.*—The writers on the conquest of Mexico have alike failed to describe the Aztec house or the mode of life within it. All that can safely be said is, that the houses were large; that they were constructed of adobe brick and of stone embedded in mud mortar, in both cases plastered over with gypsum, which made them a brilliant white; and that some were constructed of a red porous stone. For working this stone, according to Clavigero, flint implements were used. (*Hist. Conq. Mex.*, Cullen's trans., 1817, ii., 238.) Some of these edifices were constructed on three sides of an open court, like those on the Chaco, but the court opening upon a street or causeway. In most cases they appear to have been two or more stories high, and built in the terraced form. All the roofs were flat. The situation of the pueblo of Mexico, partly on solid ground and partly in the waters of a shallow artificial pond, led to some diversities in its architecture; but the essential type of the latter was the same as that of New Mexico wherever its features distinctly appear. We are able to give one illustration in point. Cortez made his first entry into the pueblo, according to the statement of Bernal Diaz, with 450 Spaniards, accompanied by 1000 Tlascalan allies. (*Conq. of Mexico*, Keating's trans., London ed., 1803, i., 181 and 189.) They were lodged, Diaz naïvely tells us, in a vacant palace of the late father of Montezuma, remarking that "the whole of this palace was very light, airy, clean, and pleasant, the entry being through a great court." (*Ib.*, i., 191.) Suffice it to say, that one of the great houses of the Aztecs was sufficiently large to accommodate Cortez and his total number of 1450 men. One of the great houses then standing on the Rio Chaco would have accommodated twice that number.

It will be noticed that this Mexican house was entered from the court into the first story, in which respect it differed from the present and ancient houses in New Mexico. The reason is obvious. The pueblo could only be entered along its three causeways, which indicate the true places for its defence. The causeways had sluices through them, traversed by bridges that could be taken up.

It is quite plain, we think, that the house occupied by Cortez was constructed on three sides of a court, which opened on a causeway or street, the type of which is still found in New Mexico. When we are gravely told that Cortez and his followers are invited by Montezuma to occupy a vacant palace of his late royal father, we are much impressed with the surroundings of the Indian potentate thus introduced. But a glance at the contemporary edifices on the Chaco tends to unravel the marvel, and to show how it was that Cortez and his men could find ample acommodations in a single house constructed on the aboriginal American model; and when it is found to be wholly unnecessary to call it a *royal palace* in order to account for its size, an ungracious suspicion at once arises in the mind that one of the great communal houses of the Aztecs was emptied of its inhabitants to make room for the unwelcome intruders.

V. *Communal Houses in Central America.*—At the epoch of its discovery Central America was probably more thickly peopled than any other portion of North America of equal area, and its inhabitants more advanced than the remaining aborigines. Their pueblos were planted along the rivers and streams, often quite near each other, and presented the same picture of occupation and of village life found about the same time on the Rio Chaco and upon the Rio Grande and its tributaries. They consisted of a single great house, or of a cluster of houses forming one pueblo. In some cases four or more structures are grouped together upon the same elevated platform. But there is no reason for supposing, from any ruins yet found or from what is known of the people at the time, that any one pueblo contained, at most, more than 10,000 inhabitants. No one nation had risen to supremacy within this area by the consolidation of surrounding nations. They were, on the contrary, found in that state of subdivision and independence which invariably accompanies the gentile organization. Confederacies in all probability existed among such contiguous pueblos as spoke the same dialect or closely related dialects, as the Cibolans were probably confederated, as the Aztecs, the Tlascalan, and Michuacan tribes are known severally to have been. Such confederacies never reached beyond the language of the people confederated. Even the Aztec confederacy was surrounded on all sides except the S. by independent and hostile nations, living within 100 miles of the border of the Valley of Mexico; as witness the Tlascalans on the E., the Michuacans on the W., the Otomies on the N. W., and the Meztitlans and Huextecas on the N. E.

The tropical region of Central America, then as now, was undoubtedly covered with forest, except the limited clearings around the pueblos, and substantially uninhabited. Field agriculture was of course unknown, but the Indians cultivated corn, beans, squashes, pepper, cotton, and tobacco in garden-beds, which tended to localize them in villages. Herrera remarks of the Village Indians of Honduras that "they sow thrice a year, and they were wont to grub up great woods with hatchets made of flint." (*Hist. of America*, London ed., 1725, Stern's trans., iv., 133.) Without metallic implements to subdue the forest, or even with copper axes such as were found among the Aztecs, a very small portion of the country only would be brought under cultivation, and that would be confined mainly to the margins of the streams.

Las Casas, bishop of Chiapa, who was in Central America about 1539, after remarking of the people of Yucatan that they were "better civilized in morals and in what belongs to the good order of societies than the rest of the Indians," proceeds as follows: "The pretence of subjecting the Indians to the government of Spain is only made to carry on the design of subjecting them to the dominion of private men, who make them all their slaves." (*An Account of the First Voyages, etc. in America*, London ed., 1699, trans., p. 52.) And again he quotes from the letter of the bishop of St. Martha to the king, as follows: "To redress the grievances of this province, it ought to be delivered from the tyranny of those who ravage it, and committed to the care of persons of integrity, who will treat the inhabitants with more kindness and humanity; for if it be left to the mercy of the governors, who commit all sorts of outrages with impunity, the province will be destroyed in a very short time." (*Ib.*, p. 61.)

Two material questions which have been raised remain to be considered: First, whether the houses now in ruins in Central America were occupied at the time of the Spanish conquest; and second, whether the present Indians of the country are the descendants of the people who constructed them. There is no basis whatever for the negative of either proposition; but it is assumed by those who regard the palace at Palenque and the Governor's House at Uxmal as the ancient residences of Indian potentates, that great cities which once surrounded them have perished, and further, that these ruins have an antiquity reaching far back of the Spanish conquest.

Mr. Stephens commits himself to the conclusion "that at the time of the Conquest, and afterwards, the Indians were actually living in and occupied these very cities." (*Incidents of Travel in Yucatan*, ii., 348, and to the same effect, ii., 375.) He also regarded the present Indians of the country as the descendants of those in possession at the period of the Conquest. (*Ib.*, ii., 299.) He might have added that as the Maya was the language of the aborigines of Yucatan at the epoch of the Discovery, and is now the language of the greater part of the natives who have not lost their original speech, there was no ground for either supposition. Herrera remarks of the inhabitants of Yucatan that the "people were then found living together very politely in towns, kept very clean; . . . and the reason of their living so close together was because of the wars which exposed them to the danger of being taken, sold, and sacrificed; but the wars of the Spaniards made them disperse." (*Ib., loc. cit.*, iv., 168.) Mr. Stephens, whose works and whose observations are in the main so valuable, is responsible to no small extent for the delusive inferences which have been drawn from the architecture of Central America. If he had repressed his imagination, and confined himself to what he found—namely, certain Indian pueblo villages built of dressed stone and in good architecture, which are sufficiently remarkable just as they are—and had omitted altogether such words as "palaces" and "great cities," his readers would have escaped the deceptive conclusions with respect to the actual condition of society which his mode of treatment and his terminology were certain to suggest.

* Mr. Miller also informs me that the rooms generally are not connected with each other in the New Mexican pueblo house.

It is sufficiently ascertained that within a few years after the conquest of Mexico, Central America was overrun by military adventurers, whose rapacity and violence drove the harmless and timid Village Indians from their pueblos into the forests, thus destroying in a few years a higher culture than the Spaniards, then or since, substituted in its place. Nothing can be plainer, we think, than this additional fact: that all there ever was of Palenque, Uxmal, Copan, and other Indian pueblos in Central America, building for building and stone for stone, is now there in ruins.

One of the most extensive groups of ruins in Central America is that at Uxmal. The several structures are known as "The Governor's House;" the "House of the Nuns," which consists of four disconnected buildings, facing the four sides of a court; the "House of the Pigeons;" the "House of the Dwarf;" and the "House of the Old Woman"—in all eight, with some traces of smaller buildings of inconsiderable size. The dimensions of the largest will be given for comparison with those in New Mexico. They are situated in a cluster quite near each other, and evidently formed one Indian pueblo. They are constructed of stone laid in courses and dressed to a uniform surface, with the upper half of the exterior walls decorated with grotesque ornaments cut on the faces of the stones. Foster states that "these structures are composed of a soft coralline limestone of comparatively recent geological formation, probably of the tertiary period." (*Pre-historic Races of the United States*, p. 398.) Norman had previously described the material used as a "fine concrete limestone." (*Rambles, etc.*, p. 126.) Elsewhere, with respect to the nature of the tools for cutting this stone, he remarks that "flint was undoubtedly used." (*Ib.*, 184.) According to the same author, "the stones are cut in *parallelopipeds* of about twelve inches in length and six in breadth, the interstices filled up with the same materials of which the terraces are composed." (*Ib.*, 127.) This statement denies the use of mortar made of lime and sand. Stephens is equally explicit in stating that the mortar was of lime and sand; and he is perhaps the better authority, having taken the masonry apart. A soft coralline limestone could be easily worked when first taken from the quarry, and would harden after exposure to the air. The size and nature of the stones used is some evidence of limited advancement in solid stone architecture.*

These structures, as reproduced by Stephens and Catherwood, may well excite surprise and admiration for the taste, skill, and industry they display. When rightly understood they will enable us to estimate the material progress they had made, which was truly remarkable for a people still in barbarism, but well advanced in the middle period.

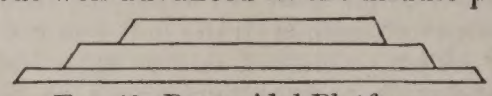

FIG. 19. Pyramidal Platforms.

We have seen that the style of architecture in New Mexico brought the Indians to the housetops as the common place of living, to which the flat roofs were adapted. At first suggested for security, it became in time a settled habit of life. The same want was met in Central America by a new expedient—namely, a pyramidal platform or elevation of earth, twenty, thirty, and forty feet high, and for small buildings still higher, upon the level summits of which their great houses were erected. Selecting, when practicable, a natural elevation, the top was levelled or raised by artificial means, the sides made rectangular and sloping, and faced with a dry stone wall; the ascent being made by a flight of stone steps. It was not uncommon to form two such platforms, and sometimes three, one above the other, as shown in the figure.

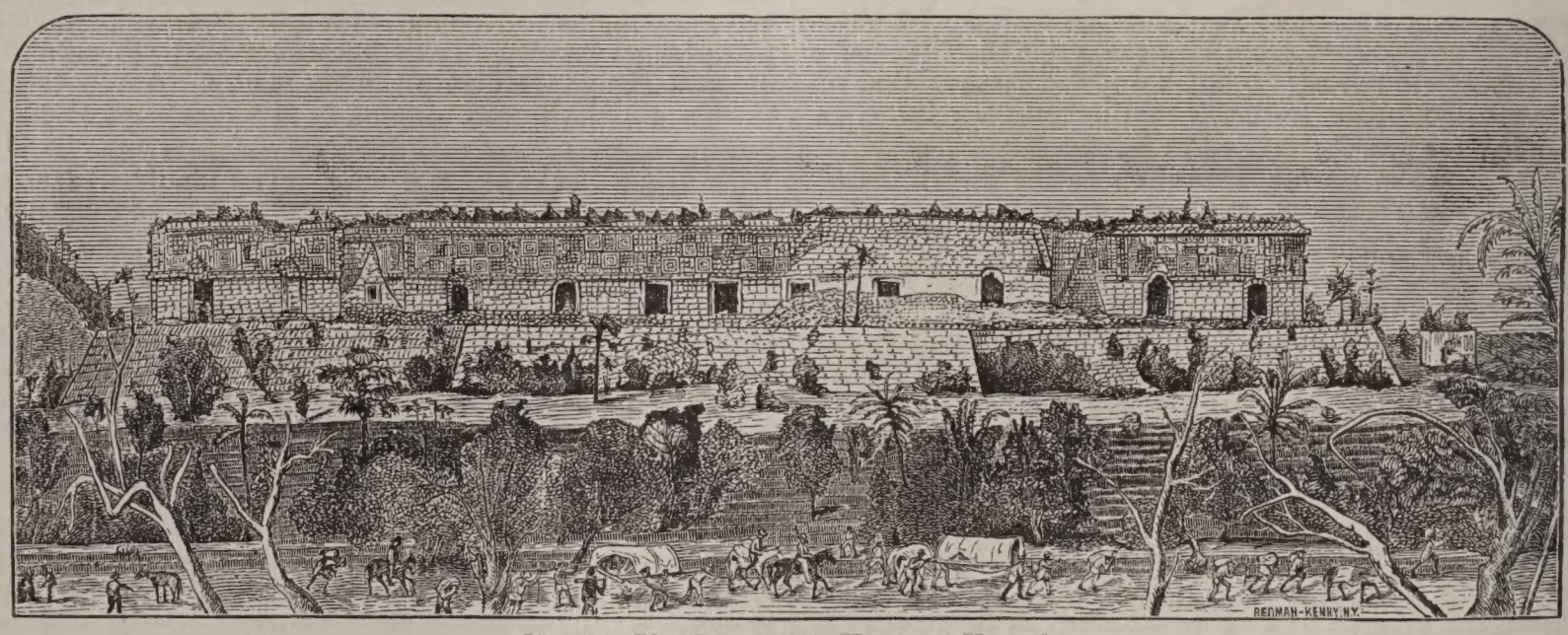

FIG. 20. The Governor's House at Uxmal.

These edifices are almost invariably but one story high, and but two rooms deep, the walls being carried up vertically to an equal height on all sides, and terminating in a flat roof. The doorways opened upon a platform-area, usually called the terrace, and the place was defended on the line or edge of the terrace-walls. Neither adobe brick nor rubble masonry nor timber roofs could withstand this tropical climate with its pouring rains during a portion of the year. Stone and a vaulted ceiling were indispensable to a permanent structure. Thus elevated, they enjoyed the same security as the Village Indians of New Mexico on their roof-tops and within their walls. They were also above the flight of the mosquitoes and other flies, the scourge of this tropical region. Considering the surrounding conditions, single-storied houses upon raised platforms was a natural suggestion, and harmonizes with this communal type of architecture as fully as the forms found in New Mexico.

For the details of this architecture reference must be made to published works which are easily accessible. The front elevation of the Governor's House, taken from Stephens's work, will answer as a sample of the whole. It stands upon the upper of three platforms, of which the lowest is 575 feet long, 15 feet broad to the base of the middle platform, and 3 feet high; the second, 545 feet long, 250 feet broad, and 20 feet high; and the third is 360 feet long, 30 feet broad, and 19 feet high. The upper platform is formed upon the back half of the middle one; of which last Stephens observes that "this great terrace was not entirely artificial. The substratum was a natural rock, and showed that advantage had been taken of a natural elevation so far as it went, and by this means some portion of the immense labor of constructing the terrace had been saved." (*Incidents of Travel, etc.*, i. 128.)

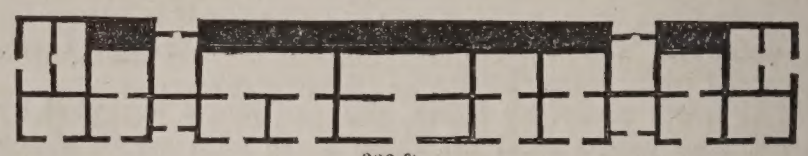

FIG. 21. Ground-Plan of Governor's House.

The house is symmetrical in structure—322 feet long, 39 feet deep, and about 30 feet high. It has eleven doorways, besides two small openings in front, and contains twenty-four apartments, two of which are each sixty feet long. The rear wall is solid, and in the central part nine feet thick. A parallel wall through the centre divides the interior into two rows of apartments, of which those in front are eleven feet six inches deep, and those back of them thirteen feet deep. Both inside and out the walls are of dressed stone, laid in courses.

This view of the interior of a room in the House of the Nuns shows the form of the triangular ceiling common to

* The so-called *idols* at Copan are the largest stones worked by the Central Americans. They are about eleven feet high, by three feet wide and deep, each face being covered by sculptures and hieroglyphics. In a field near the ruins, and near each other, are nine of these elaborately ornamented statues. By the side of each is a so-called *altar*, about six feet square and four feet high, made of separate stones. They have been supposed to have some relation to their religious system, with human sacrifices in the background. From their position and character it may be conjectured that these idols are the grave-posts and the altars the graves of Copan chiefs. The type of both may still be seen in Nebraska in the grave-posts and grave-mounds by their side of Iowas and Otoes, and formerly in all parts of the country E. of the Mississippi. If Mr. Stephens had opened one of these altars, and this conjecture proved true, he would have found within or under it an Indian grave, and perhaps a skeleton, with the personal articles usually entombed beside the dead.

all the edifices at Uxmal, Palenque, and in Central America generally. It is a triangular arch without a key-stone, with

FIG. 22. Section of Interior of Room.

the edges of the stones bevelled, and forming a perfect vault over each apartment, except a space a foot or more wide in the centre, which is carried up vertically about two feet and covered with a cap of stone. The mechanical principle is the same as in the New Mexican arch, but here applied on a more extended and more difficult scale. It is the most remarkable feature in this architecture, mechanically considered. But when we come to know that this vaulted ceiling was constructed over a core of solid masonry within the chamber, afterwards removed—which was the fact—it will be seen that these Indian masons and architects were still feeling their way towards a scientific knowledge of the art of arts. A projecting cornice is seen above the doorway, which balances somewhat the interior inward projection of the ceiling; and, as it is carried up flush with the cornice, the down-weight of the superincumbent mass sustained the masonry. The front rooms are twenty-three feet high to the top of the arch, and the back rooms twenty-two. Over the front doorways were originally wooden lintels, upon the decay of which a portion of the masonry had fallen. Those over the doorways through the partition walls were found in place. The proof of the comparatively modern date of these structures is conclusive from these facts alone.

It will be noticed that there are six single apartments, which have no connection with the remainder of the building, and that the others are in pairs, a back room connecting with the one in front, and neither with any others. It seems to show very plainly, in the plan of the house itself, that it was designed to be occupied by distinct groups of families, each group a large household by itself. If the communal principle existed in fact among them, its expression in the interior arrangement of the house, and in this form, might have been expected. This striking and significant feature runs through all the structures in Central America of which ground-plans have been obtained.

"The House of the Nuns," says Mr. Stephens, "is quadrangular, with a courtyard in the centre. It stands on the highest of three terraces. The lowest is three feet high and twenty feet wide; the second, twelve feet high and forty-five feet wide; and the third, four feet high and five feet wide, extending the whole length of the front of the building. The front [building] is 279 feet long, and above the cornice, from one end to the other, is ornamented with sculpture. In the centre is a gateway ten feet eight inches wide, spanned by the triangular arch, and leading to the courtyard. On each side of this gateway are four doorways, with wooden lintels, opening to apartments averaging twenty-four feet long, ten feet wide, seventeen feet high to the top of the arch, but having no connection with each other. The building that forms the right or eastern side of the quadrangle measures 264 feet long; that on the left

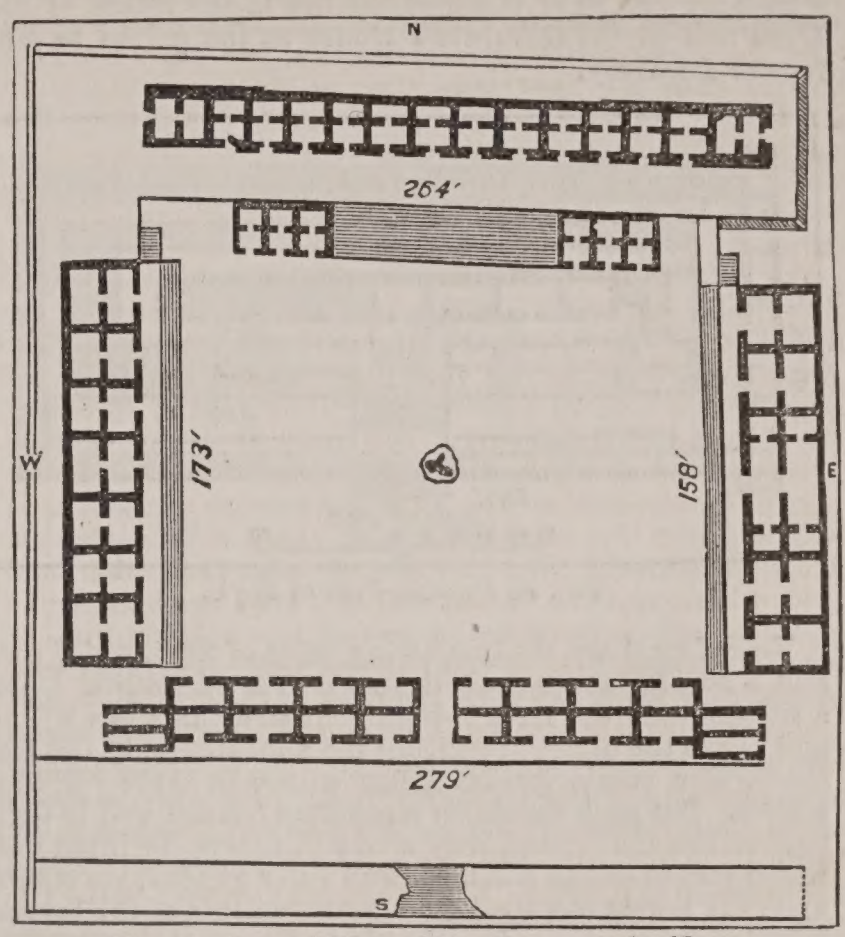

FIG. 23. Ground-Plan of the House of the Nuns.

is 173 feet long; and the range opposite, or at the end of the quadrangle, measures 264 feet. These three ranges have no doorways outside, but the exterior of each is a dead wall, and above the cornice all are ornamented with the same rich and elaborate sculptures." (*Ib.*, i., 299.)

The four buildings contain, in all, seventy-six apartments, which in size vary from ten to twelve feet wide and from twenty to thirty feet long. There are twenty single apartments and twenty-four pairs of apartments, half of which, as in the Governor's House, are dark, except as they are lighted by the doorways connecting with the rooms in front. In the structure on the right there are six rooms connecting with each other, which number is so unusual as to attract attention. Each of these great edifices would accommodate, after the fashion of Village Indians, from 600 to 1000 persons.

It should also be noticed that there is neither a fire-place nor a chimney in either of these houses; neither has one been found, so far as the writer is aware, in any ancient structure in Central America. Fires were not needed for warmth, but since they were for cooking, it shows that no cooking was done within these houses. A presumption at once arises that the inmates prepared their food in the open court or on the lower terraces by household groups, making a common stock of their provisions, and dividing from the earthen caldron. It may be presumed, also, that the Iroquois usage of but one daily meal prevailed among them. Fortunately, we are able to present some proofs bearing directly upon the question of the ancient practice of communism in these houses. It is found in the present usages of their descendants, which may reasonably be supposed to have been derived from their ancestors, although they may show a deteriorated form of those usages. At Nohcacab, a short distance E. of the ruins of Uxmal, there is a settlement of Maya Indians, whose communism in living was accidentally discovered by Mr. Stephens when among them to employ laborers. It will be remembered that Yucatan was inhabited by Maya Indians at the epoch of the Conquest. He remarks as follows: "Their community consists of a hundred labradores or working men; their lands are held in common, and the products are shared by all. Their food is prepared at one hut, and every family sends for its portion; which explains a singular spectacle we had seen on our arrival—a procession of women and children, each carrying an earthen bowl containing a quantity of smoking hot broth, all coming down the same road, and dispersing among the different huts. . . . From our ignorance of the language, and the number of other and more pressing matters claiming our attention, we could not learn all the details of their internal economy, but it seemed to approximate that improved state of association which is sometimes heard of among us; and as this has existed for an unknown length of time, and can no longer be considered experimental, Owen and Fourier might perhaps take lessons from them with advantage. . . . I never before regretted so much my ignorance of the Maya language." (*Ib.*, ii., 14.) A hundred working men indicate a total of five hundred persons who were then depending for their daily food upon

a single fire, the provisions being supplied from common stores, and divided from the caldron. It is, not unlikely, a truthful picture of the mode of life in the House of the Nuns and in the Governor's House at the period of European discovery.

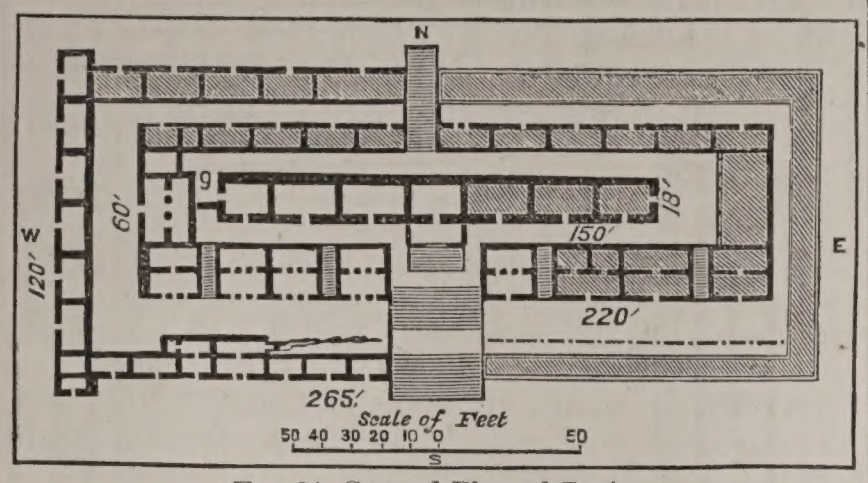

FIG. 24. Ground-Plan of Zayi.

Near Uxmal are the interesting ruins of Zayi, which present a new feature in Central American architecture. Upon a low eminence are three independent structures, one within and above the other, presenting the appearance, in the distance, of a single quadrangular edifice in three receding stories. But each stands on a separate terrace, and is built against the one immediately above it, except the inner one, which stands on the summit. The outer quadrangle stands upon the lowest terrace. The measurements of the several buildings are indicated on the plan. Together they contain eighty-seven apartments, assuming the part in ruins to have corresponded with the parts preserved. The rooms, as usual, are mostly single or in pairs. A staircase upon the front and rear sides interrupts the buildings on these sides from the lower terrace to the upper. The dots in the apertures indicate columns, which are found in this and several other structures.

Attention has been called to this pueblo—which would accommodate 2000 or more persons—for a special reason. It seems to furnish conclusive proof of the manner in which these great edifices were erected in order to make the peculiar triangular ceiling which is the striking characteristic of this architecture. The annexed cross-section of a single apartment shows the relations of the walls to the chamber and its ceiling. The chamber, with its ceiling, was constructed over a solid core of masonry, laid simultaneously with the walls, which was removed after the latter had become seasoned and settled. It tends to show that with small stones of the size used the triangular ceiling, as it projected towards the centre in rising, required the interior support of a core to ensure the possibility of construction by their methods. Once put together over such a core, and carried up several feet over the top of the arch, the down-weight of the superincumbent mass would articulate and hold the masonry together. It shows, further, that the essential feature of the arch is wanting in this contrivance.

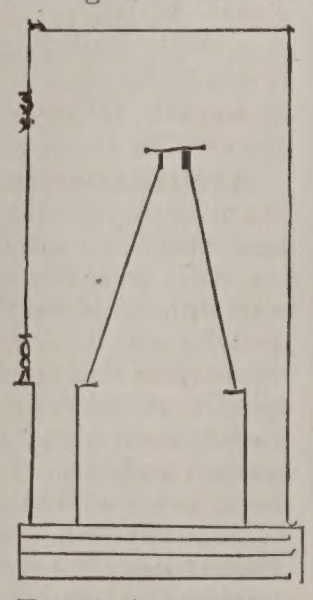

FIG. 25. Cross-Section through one Apartment.

The proof of this assertion is the actual presence of the unremoved core in one of these edifices in all of its apartments. Mr. Stephens found every room of the back building on the second terrace filled with masonry from bottom to top. He remarks that "the north side of the second range has a curious and unaccountable feature. It is called the *Casa Cerrada*, or 'closed house,' having ten doorways, all of which are blocked up on the inside with stone and mortar. . . . In front of several were piles of stones which they [his men] had worked out from the doorways, and under the lintels were holes through which we were able to crawl inside; and here we found ourselves in apartments finished with walls and ceilings like all the others, but filled up, except so far as they had been emptied by the Indians, with solid masses of mortar and stone. There were ten of these apartments in all, 220 feet long and 10 feet deep, which, thus being filled up, made the whole building a solid mass; and the strangest feature was, that the filling up of the apartments must have been simultaneous with the erection of the buildings, for, as the filling in rose above the tops of the doorways, the men who performed it never could have entered to their work through the doors. It must have been done as the walls were built, and the ceiling must have closed over a solid mass." (*Ib.*, ii., 22.)

It does not seem to have occurred to Mr. Stephens that the masonry within each room was a core, without which a vaulted chamber in this form could not have been constructed with their knowledge of the art of building. It shows the rudeness of their mechanical resources and the real condition of the art among them, but at the same time increases our estimate of their originality, ingenuity, and industry. They were working their way experimentally in architecture, as all other people have done; and they might well point with pride to these structures as extraordinary memorials of the progress they had made.

An important conclusion follows — namely, that this "closed house" was the last, in the order of time, erected, and had not been emptied of its core and brought into use when the Spanish irruption forced the people to abandon their pueblo. It would fix the period of its construction at or after 1520; thus settling the question of its modern date, and removing one of the delusions concerning the Central American ruins.

A brief reference to Palenque will conclude this article, already too long, but far from exhaustive of the facts. There are four or five pyramidal elevations at this pueblo, quite similar in form and relative situation to those at Uxmal. One is much the largest, and the structures upon it are called the "Palace." Several distinct buildings are here grouped upon one elevated terrace and are more or less connected. Altogether, they are 228 feet front and 180 deep, occupying not only the four sides of a quadrangle, but the greater part of what originally was, in all probability, an open court. Nearly all the edifices in Central America agree in one particular — namely, in being composed of three parallel walls with partition walls at intervals, giving two rows of apartments under one roof, usually, if not invariably, flat. Where several are grouped together on the same platform, as at Palenque, they are under independent roofs, and the spaces between, called courts, are simply open lanes or passage-ways between. The plan of the Palenque structures, like all the others in Central America, seems to show that they were designed to be occupied by groups of persons, consisting of a number of families, whose private boundaries were fixed by solid partition walls. They are exactly adapted to this mode of occupation; and this special adaptation, so plainly impressed upon all this architecture, leads irresistibly to the inference that they were occupied on the communal principle, and were consequently neither more nor less than communal houses, of a model which may be called, distinctively, that of the American aborigines. None of these edifices are as large as those on the Rio Chaco, and, besides, they have but a single story; but with the broad terraces which were their gathering-places, they would probably accommodate more persons, in equal spaces, than the former.

The structures upon each pyramidal elevation were also a fortress. It proves the insecurity in which they lived. An impression has been propagated that they were surrounded by dense populations living in temporary habitations, to which Stephens has given some countenance (*Central America, Chiapas, and Yucatan*, ii., 235), but the suggestion is preposterous. It does not even need refutation. It sprang from the assumed existence of a state of society far enough advanced to develop potentates and privileged classes, with power to enforce labor from the people for personal objects. There is no evidence whatever to support such an assumption. They were animated by the same spirit as the Cibolans in what related to personal independence. Rather than live in subjection to Spanish taskmasters, the very Indians who erected these houses with so much labor "set in order all their goods and substance, their women and children, and fled to the hills, leaving their towns as it were abandoned," preferring a return to a lower stage of barbarism rather than a loss of personal freedom.

American aboriginal history has been perverted, and even caricatured, in various ways, and among others by a false terminology, which of itself is able to vitiate the truth. When we have learned to substitute Indian confederacy for Indian empire, head-chief and chief for emperor, king, and prince, Indian villages for great cities, communal houses for palaces, together with a large number of similar substitutions of simple for deceptive as well as improper terms, the Indian of the past and present will be presented understandingly, and placed in his true position in the scale of human advancement. While the Aryan family has lost nearly all traces of its experiences anterior to the closing period of barbarism, the Indian family, in its different branches, offered to our investigation not only the state of savagery, but also that of both the first and of the middle period of barbarism. The facts of these several conditions, and particularly of the last, were more perfectly and strikingly exemplified among them than else-

where upon the entire earth. It was because of their undisturbed development upon a great continent. Further than this, their organizations were living and their works existent. Through a study of their progressive development a rational knowledge of the experience of our own ancestors while in the same condition might have been recovered. But the rare opportunity has been wasted; and worse, for we have romance where we might have had the truth.

Finally, the following conclusions may be stated as reasonable from the facts presented: First, that all there ever was of Uxmal, Palenque, Copan, and other Central American pueblos, building for building and stone for stone, is there now in ruins. Secondly, that the inhabitants were Village Indians, living in single great houses of the communal type, or in several such houses grouped together and forming one pueblo. Thirdly, that they were probably organized in gentes, and as a consequence were broken up into independent nations or tribes, with confederacies here and there for mutual protection. Fourthly, that from the plan and interior arrangement of these houses the practice of communism may be inferred, and that it entered into and determined their character. Fifthly, nothing herein stated is inconsistent with the supposition that some of the structures in the Central American pueblos may have been devoted to religious uses. And lastly, that a common type runs through all the architecture of the American aborigines—that of communism in living, which in turn tends to show their common origin.

When we attempt to understand the Palace at Palenque or the Governor's House at Uxmal as the residences of Indian potentates, they are wholly unintelligible; but as communal houses, embodying the social, the defensive, and the communal principles, we can understand how they could have been erected and so elaborately and laboriously finished. It is evident that they were the work of the people, constructed for their own protection and enjoyment. Enforced labor never created them. On the contrary, it is the charm of all these edifices that they were raised by the Indians for their own use with willing hands, and occupied by them on terms of entire equality. And it is highly creditable to the Indian mind that while in the middle period of barbarism they had developed the capacity to plan, and the industry to rear, structures of such architectural design and imposing magnitude. LEWIS H. MORGAN.

Ar'chon [Gr. ἄρχων, from ἄρχω, to "be first"], the title of the highest magistrates or rulers of Athens. On the death of Codrus, king of Athens (1068 B. C.), the title of king was abolished, and Medon, the son of Codrus, became the first archon, with limited power. The office was at first hereditary and held for life, but in 752 B. C. the term of office was limited to ten years, and in 714 it ceased to be hereditary and became open to all patricians. In 683 the number of archons was increased to nine, who were elected annually. One of the nine was called archon *eponymus* (ἐπώνυμος), because his name was used to designate the year; the second, who was styled *king* (βασιλεύς), had charge of religious affairs; the third was called *polemarch* (commander-in-chief), and originally had the command of the army. The other six, who were styled *thesmothetæ* (θεσμοθέται), "law-givers," conducted criminal trials, and had power to ratify treaties with foreign states. In the latter period of Athenian history all citizens were eligible to the office of archon. The word archon (translated *ruler*) occurs in the New Testament as the title of several Jews, among whom was Nicodemus (John iii. 1).

Archy'tas ['Αρχύτας], a celebrated Greek philosopher, general, and mathematician, was born at Tarentum. He flourished about 400–350 B. C., was a Pythagorean in philosophy, and was an intimate friend of Plato, whose life he is said to have saved when the tyrant Dionysius was about to put him to death. As general of Tarentum, to which office he was elected seven times, he commanded with success in several campaigns. He was also employed in important civil affairs, for which he displayed excellent capacity. His virtue was as conspicuous as his ability. He is reputed the first that applied geometry to practical mechanics, and the first to solve the problem of the doubling of the cube. He was drowned on the coast of Apulia. Only fragments of his works are extant.

Arcis-sur-Aube, AR'se'sÜR-ōb, a town of France, in the department of Aube, and on the river Aube, 16 miles N. by E. of Troyes. It has manufactures of cotton hosiery. On the 20th of Mar., 1814, an indecisive battle was fought here between Napoleon and Prince Schwartzenberg, who commanded a portion of the allied army. Pop. in 1866, 2784.

Arco'la, a village of Northern Italy, on the Alpone, near its entrance into the Adige, 15 miles E. S. E. of Verona. Here Napoleon gained an important victory over the Austrian general Alvinzy. The French commenced the battle on the 14th of Nov., 1796, by an attempt to cross a bridge over the Alpone, but were repulsed. The action was renewed on the 16th, and ended on the 17th, when Alvinzy retreated. Pop. 2185.

Arcola, a post-village and township of Douglas co., Ill., on the Chicago division of the Illinois Central R. R., 158 miles from Chicago. It has three weekly newspapers. Pop. of township, 2332.

Ar'cos de la Fronte'ra, a town of Spain, in Andalusia, on the right bank of the Gaudalete, 30 miles N. E. of Cadiz. It is called Arcos, because it is built in the form of a "bow." Its site is a high rock, which commands an extensive and beautiful prospect. Here are celebrated manufactures of tanned leather. This town was once strongly fortified. In 1519, Magelhaens started from here for the first circumnavigation of the globe. Pop. 11,532.

Arcot, or **Aruca'ti,** a city of British India, in the presidency of Madras, is situated in the Carnatic, on the river Palaur, 71 miles by rail W. S. W. of Madras; lat. 12° 54′ N., lon. 79° 23′ E. It was ceded to the British in 1801, before which it had been the capital of the Carnatic. Here are the ruins of the nawab's palace. It is one of the centres of the Protestant missions in India. Pop. estimated at 45,000, mostly Mohammedans.

Arc'tic [Lat. *arc'ticus*; Gr. ἀρκτικός, "belonging to [the constellation of] the Bear" (ἄρκτος), which is near the North Pole], a term signifying "northern," or, rather, "far to the north," "near the North Pole."

ARCTIC CIRCLE, a circle drawn around the North Pole of the earth, 23° 28′ from the Pole and 66° 32′ from the equator. It forms the boundary between the north temperate and the north frigid zone. Within this circle the sun does not set at the summer solstice nor rise at the winter solstice.

ARCTIC CURRENT, so called because it is supposed to originate in the ice of the Arctic seas, whence it runs along the eastern shore of Greenland and round Cape Farewell to the western shore of Greenland, in N. lat. 66°, where it turns southward, forming the *Hudson's Bay Current*. Thence it passes near the Bank of Newfoundland, and, meeting the Gulf Stream, crosses it as an undercurrent, flowing into the Caribbean Sea. Another portion passes along the coast of North America, and reduces the temperature of the land. The Arctic Current, which is cold, replaces the warm water removed by the Gulf Stream.

Arctic Discovery. See POLAR RESEARCH, by I. I. HAYES, M. D.

Arc'tic O'cean, or **Sea,** the ocean which surrounds the North Pole, washes the northern shores of Europe, Asia, and America, and is nearly coextensive with the Arctic Circle. It communicates with the Pacific by Behring's Strait, and with the Atlantic by a wide passage between Greenland and Norway. The navigation of this ocean is obstructed by perpetual congelation, but it is supposed that a portion N. of 80° is an open polar sea. The Arctic Ocean encloses many large islands, and comprises large bays and gulfs, which deeply indent the adjacent continents, as Baffin's Bay, the White Sea, and the Gulf of Obi. The water of this ocean is extremely pure and clear, and the ice is remarkable for the beauty and variety of its tints. Those parts of this sea which have been explored are occupied by large fields of floating ice and icebergs in almost perpetual motion. Captain Ross measured an iceberg which rose 325 feet above the water in which it floated. There are masses that present a front of 200 feet in height, and fields from ten to forty feet thick sometimes extend over 100 miles. Icebergs often have a violent rotation, and are dashed against each other with a tremendous force. Fogs, storms, and almost endless night add to the dangers which beset the explorer. Among the navigators who have explored it in search of a north-west passage are Parry, Ross, Sir John Franklin, and Kane. Drs. Hayes and Hall, and various Scandinavian and Dutch navigators, are among the recent explorers. Parry in 1827 reached lat. 82° 45′ N., lon. 19° 25′ E., and found there floes of ice, with open water between. In 1854, Kane penetrated to lat. 81° 22′ in lon. 65° 35′ W. He argued that there is an open sea, not frozen, around the Pole, from the fact that "a gale from the N. E. of fifty-four hours' duration brought a heavy sea from that quarter, without disclosing any drift or other ice." There are valuable whale-fisheries in the Arctic Ocean.

Arctu'rus [from the Gr. ἄρκτος, a "bear," and οὐρά, a "tail"], a fixed star of the first magnitude in the constellation Bootes, so called because it is near the tail of the Great Bear. It is designated in catalogues as α Bootes.

Arcua'tion [from the Lat. *arcus*, a "bow"], a term formerly applied to a mode of propagating trees; the shoots of the trees, cut off near the ground, are bent over and

partly covered with earth, which causes them to take root. It is generally called *inarching*.

Arcueil, a village of France, 3 miles S. of Paris, on the railway from that capital to Sceaux, has a fine aqueduct constructed by Marie de Médicis; also the remains of a Roman aqueduct built by the emperor Julian. It is a place of resort on holidays for the Parisians. Pop. in 1866, 5024.

Arcy, Grotto of, an ancient limestone quarry in France, in the department of Yonne, remarkable for its size and the beauty and extent of its stalactites and incrustations, which have almost completely obliterated all traces of the labor of man.

Ardabil′, or **Ardebil,** a town of Persia, in the province of Azerbijan, on the Kara-Soo, 90 miles E. by N. of Tabriz. It is visited by the trading caravans from Tiflis, Derbend, and Ispahan. Pop. estimated at about 10,000.

Ardèche, a river of France, rises among the mountains of Cevennes, flows south-eastward through the most magnificent and romantic scenery, and enters the Rhone 1 mile from Pont Saint Esprit, after a course of 45 miles. Near its mouth is a natural curiosity called the Bridge of Arc.

Ardèche, a mountainous department in the S. E. of France, is bounded on the N. by the department of Loire, on the E. by Drôme, on the S. by Gard, and on the W. by Lozère and Haute-Loire, and drained by the Ardèche. Area, 2134 square miles. The surface is diversified by extinct volcanic peaks, deep craters, ranges of basaltic columns, and romantic valleys, forming combinations of scenery which are highly magnificent and picturesque. The valleys near the Rhone produce good wine, olives, figs, almonds, and Spanish chestnuts, the annual crop of which latter is about 400,000 bushels. Mines of copper, iron, lead, antimony, and coal are worked in this department. It is subdivided into 3 arrondissements, 31 cantons, and 339 communes. Capital, Privas. Pop. in 1872, 380,277.

Ar′den (commonly written ARDENNES, which see), a forest in which Shakspeare places the scene of his play called "As You Like It." There was formerly a forest of this name on the western borders of Warwickshire, which is believed to have occupied a great part of the midland counties, and it is noteworthy as the maiden name of Shakspeare's mother.

Ar′den, a township of Berkeley co., W. Va. Pop. 1528.

Ardennes, or **Arden** (anc. *Arduen′na Syl′va*), a hilly and densely-wooded tract which includes a part of Belgium and of France, and is situated on both sides of the river Meuse. The forest of Ardennes in Cæsar's time was more extensive, and occupied nearly all the space between the Sambre, Moselle, and Rhine. The highest points of the Ardennes are about 2200 feet above the sea. The predominant rocks are clay-slate, grauwacke, and limestone. The channel of the Meuse presents rugged and precipitous rocks about 600 feet high. Many important military events have occurred among the Ardennes, at Rocroi, Sedan, Mézières, etc.

Ardennes, a department in the N. E. of France, bounded on the N. by Belgium, on the E. by the department of Meuse, on the S. by Marne, and on the W. by Aisne, was part of the old province of Champagne. Area, 2020 square miles. It is intersected by the Meuse, which flows northward, and by the Aisne, which flows westward. The surface is partly hilly, and covered with the forest of Ardennes. The valley of the Aisne is fertile and produces much grain. Among the mineral resources of this department are iron, lead, marble, and slate. The canal of Ardennes, connecting the Meuse and the Aisne, affords facilities for trade. Here are manufactures of glass, metallic wares, woollen cloths, shawls, firearms, earthenware, etc. It is subdivided into 5 arrondissements, 31 cantons, and 478 communes. Capital, Mézières. Pop. in 1872, 320,217.

Ar′doch, a small village of Scotland, in the county of Perth, 8 miles S. S. W. of Crieff. Here is an ancient Roman camp, the most entire now in Britain. The intrenched works form a rectangle 500 by 430 feet, the north and east sides of which are protected by five ditches and six ramparts.

Ar′dor [from *ar′deo*, to "burn"], a Latin word signifying heat, fervor of passion, zeal, intensity of feeling. In medicine it denotes an intense or morbidly-increased sensation of heat, as *ar′dor febri′lis*, "feverish heat."

Ardoye, a town of Belgium, in the province of West Flanders, 6 miles N. W. of Courtray. Pop. in 1866, 6253.

Ardshîr′, or **Ardsheer′** (BÂBEGAN), a king of Persia, the founder of the dynasty of the Sassanides, was a man of obscure origin. He raised himself by his courage and energy, and revolted against Artabanus (or Ardovan), king of Persia, whom he defeated and killed. He extended the boundaries of Persia by conquests, and afterwards reigned in peace for many years. He was celebrated as a sage and a legislator, and was the author of maxims which are still preserved by the Persians. The Greeks called him Artaxerxes. He died about 260 A. D., and was succeeded by his son Shapur (or Sapor).

Are [Fr., from the Lat. *area*, a "space of ground"]. In the metric system of weights and measures the are is the unit of measure of surface. It is the square of ten mètres = 119.60332 square yards. The are is not practically employed, the hectare = 100 ares, or 2.47114 English acres, the deciare (one-tenth of an are), and the centiare (one-hundredth of an are), being the only agrarian measures practically used in this system.

A′rea [a Latin word signifying, originally, an "open space," a "courtyard," a "threshing-floor"], any plane surface. In geometry it means quantity of surface, the surface included within any given lines. The calculation of areas is one of the ultimate objects of geometry, and the measuring units employed are a square inch, a square foot, etc. The area of a rectangle is equal to the product of the length and breadth. That of a circle is found by multiplying the square of the diameter by the decimal .7854.

Are′ca, a genus of palm trees having pinnate leaves and double spathes, a fruit which is a one-seeded drupe, or nut with an outer fibrous husk. The *Areca Catechu*, called pinang palm or betel-nut palm, is a native of the East Indies, and grows to the height of forty or fifty feet. It bears a fruit called areca-nut or betel-nut, which is astringent and tonic, and is extensively used in the East as a masticatory. (See BETEL.) It also yields a part of the catechu of commerce. The *Areca oleracea* (the cabbage-palm) grows in the West Indies, and is more than 100 feet high, but has a very slender stem. The terminal leaf-bud is nutritious, and is used for food. It also bears nuts, the kernel of which is sweet.

A′remberg′, or **Arenberg,** the name of a noble family of Germany, which adhered to the Roman Catholic Church and to Philip II. of Spain. They own large estates in Hanover and Prussia.

Are′na, a Latin word signifying "sand," was anciently applied to an open space of ground strewed with sand on which athletes and pugilists contended for mastery, and to the open central part of the amphitheatre where gladiators and wild beasts fought. This was usually covered with sand. In modern language, *arena* signifies any scene of contest or field of intellectual exertion; any public place in which men display their talents or contend for mastery in debate.

Are′na, a post-township of Iowa co., Wis. Pop. 2131.

Ar′enac, a post-township of Bay co., Mich. Pop. 459.

Arena′ceous [Lat. *arena′ceus*, from *are′na*, "sand"], sandy, of the nature of sand; a geological term applied to strata which are composed entirely or chiefly of grains of sand. Such are the beds of loose sand which occur in the tertiary or more recent formations. The arenaceous rocks of the carboniferous and Devonian ages are composed of grains of sand cemented together, and are called sandstone. When the sandstone is coarse-grained it is called *grit*, or, if the particles are as large as pebbles, it is termed *conglomerate* or "pudding-stone."

Ar′endahl, a post-township of Fillmore co., Minn. P. 853.

Ar′endal, a city of Norway, 41 miles N. E. of Christiansand, on the Cattegat, in lat. 58° 23′ N., lon. 8° 53′ E. It is built partly on the mainland and partly on islands, giving it the name of "Little Venice." Pop. in 1865, 7181.

Arenic′ola [literally, an "inhabitant of the sand," from *are′na*, "sand," and *co′lo*, to "till," to "inhabit"], the lugworm, *Arenic′ola piscato′rium* (*i. e.* "of fishermen"), found in the sand of the seashore, is much used by fishermen as a bait. It bores in the sand, and forms for itself a tube in which it moves with perfect freedom. When touched, the lugworm throws out a quantity of yellow fluid that stains the hand.

Ar′enzville, a post-township of Cass co., Ill. P. 884.

Areoi. See ARREOY.

Areom′eter, or **Aræometer** [from the Gr. ἀραιός, "thin," and μέτρον, a "measure"], an instrument used to measure the specific gravity of fluids and ascertain the strength of spirituous liquors, usually called HYDROMETER (which see).

Areop′agus [Gr. Ἄρειος πάγος], (*i. e.* "hill of Mars"), a hill in Athens W. of the Acropolis; also a celebrated court of justice which held its sessions on the same spot in ancient times. This court or council was remarkable for its high character and great antiquity, having been organized before the first Messenian war, the date of which

was 740 B. C. It was merely a criminal tribunal before the time of Solon, who made important changes in its constitution, and extended its jurisdiction to political and moral affairs. He ordained that this court should be composed of those archons who had performed their official duties faithfully, and who had passed with credit the scrutiny to which all archons were subjected at the expiration of their term of office. Its influence was conservative, and tended to restrain the excesses or the progress of democracy. The political power of this court was much reduced by Pericles about 458 B. C., but it maintained a high reputation long after that date. The name of the Areopagus occurs in the history of the apostle Paul, who uttered a memorable discourse on Mars' Hill. (See Acts xvii. 22–31.)

Arequi'pa, a department of Peru, bordering on the Pacific Ocean, is bounded on the N. by Ayacucho and Cuzco, on the E. by Cuzco and Puno, on the S. by Moquega, and on the W. by the ocean. Area, estimated at 201,000 square miles. The eastern part is mountainous. The soil is fertile, and produces chiefly wine. Gold, silver, zinc, lead, and coal are found here. Capital, Arequipa. Pop. about 180,000.

Arequipa, a city of Peru, capital of the above department, is finely situated about 40 miles from the Pacific Ocean, on the river Chili and on the plain of Quilca, 7850 feet above the level of the sea; lat. 16° 24′ 28″ S., lon. 71° 37′ 30″ W. It is reputed one of the best built and most beautiful towns of South America. It is the seat of a bishop, and has a cathedral, a college, and several convents. The public edifices and private houses are built of stone, one or two stories high. It has been ruined by earthquakes several times. It has an active trade, facilitated by a railroad which extends to Mollendo on the Pacific. Gold and silver are found in the vicinity. The adjacent country is fertile. Here occurred a great earthquake, Aug. 13 and 14, 1868, destroying property worth more than $12,000,000, and said to have caused the death of more than 500 persons. Pop. estimated at 40,000.

Arequipa, Volcano of, a celebrated volcanic peak of the Peruvian Andes, is about 14 miles E. of the city of Arequipa. It rises to the height of 20,300 feet above the level of the sea, and has the form of a regular truncated cone, with a deep crater, from which ashes and vapor continually issue.

A'res [Ἄρης], the god of war in the Greek mythology, corresponded to the Roman Mars (which see).

Aretæ'us [Gr. Ἀρεταῖος], an able Greek medical writer of Cappadocia, is supposed to have lived between 50 and 150 A. D. The events of his life are not known, but he is considered by some persons to rank next to Hippocrates. He wrote a work in eight books on the causes, symptoms, and cure of acute and chronic diseases, which is still extant and is highly esteemed. The style is singularly elegant and concise. The Greek text has often been printed, and has been translated into English by T. F. Reynolds (1837).

Arethu'sa [Gr. Ἀρέθουσα], in classic mythology, one of the Nereids, of whom Alpheus was enamored. Also the name of a fountain near Syracuse, into which it is said she was transformed. (See Alpheus.) Arethusa was invoked by Virgil as a source of inspiration in his tenth eclogue.

Aretin'ian Syl'lables are *ut, re, mi, fa, sol, la,* which Guido d'Arezzo used to designate his notes in his musical system of hexachords.

Aretino (Guido). See Guy d'Arezzo.

Areti'no (Pietro), [Lat. *Areti'nus*], a satirical and licentious Italian writer, born at Arezzo in 1492. He was a man of low birth, and was not liberally educated. He became a resident of Venice in 1527, and found several powerful patrons, among whom were the emperor Charles V. and Francis I. Among his numerous works were comedies, dialogues, sonnets, and letters (6 vols., 1538–57). He gained by his writings great applause and large sums of money. His satires, which were personal and bitter, procured for him the surname of the Scourge of Princes. His habits were extremely licentious. Died in Venice in 1557. (See Berni, "Vita di P. Aretino," 1537; Dujardin, "Vie de Pierre Arétin," 1750; Mazzuchelli, "Vita di Pietro Aretino," 1763.)

Aretino (Spinello), a skilful Italian painter, born at Arezzo about 1315. He painted frescoes at Florence, Arezzo, and other towns, and acquired a high reputation. Some frescoes which he painted in San Miniato, near Florence, are still preserved. His invention and coloring are highly commended. The best of his extant works is a "History of Pope Alexander III.," painted in the town-hall of Sienna. Vasari considers him superior to Giotto. Died about 1400.

Are'zzo, a province of Central Italy, is bounded on the N. by Florence, on the E. and S. by Perugia, and on the W. by Sienna. Area, 1279 square miles. The country is chiefly mountainous, and is traversed by the Arno and Chiano. Chief town, Arezzo. Pop. in 1871, 239,901.

Arezzo (anc. *Arre'tium*), a city of Italy, capital of the province of its own name, is on the Chiana, 55 miles by rail S. E. of Florence. It is a very ancient town, having been founded by the Etruscans several centuries before the Christian era. Its walls are evidently Etruscan. It has two colleges, a seminary, a lyceum, a school of technology, an academy of sciences and arts, and many silk, cloth, iron, and other factories. Among the public edifices are a cathedral, several churches rich in works of art, a museum, and the famous *Loggie* of Vasari. Arezzo is remarkable for the great number of eminent men who were born in it—namely, Mæcenas, Petrarch, Vasari, Pietro Aretino, Guy d'Arezzo, Redi the physiologist, and Cesalpino. Pop. in 1872, 38,907. Ancient Arretium was celebrated for the manufacture of terra-cotta vases.

Arezzo, d' (Guy). See Guy d'Arezzo.

Argæ'us, Mount [Turk. *Arjish-Dagh*], the highest mountain of Asia Minor, is in the pashalic of Karamania, about 12 miles S. of Kaisariyeh, and is connected with a branch of Mount Taurus. It rises 13,100 feet above the level of the sea.

Argali (*Capro'vis ar'gali,* the *O'vis am'mon* of some writers), the large wild sheep of Central Asia and Siberia. Another variety or species is found in North America W. of the Rocky Mountains (*O'vis Monta'na*). It is sometimes called Big-horn or Rocky Mountain sheep, and has enormous horns about four feet long and from eighteen to twenty inches in circumference. It is about four feet high, has coarse hair, and moves with great agility.

Argali.

Ar'gall (Sir Samuel), born at Bristol, England, in 1572, was deputy-governor of Virginia (1617–19), and was detested by the colonists for his tyranny and rapacity. Died in 1639.

Argand (Aimé), a Swiss chemist, born at Geneva about 1750, is noted as the inventor of the Argand Lamp (which see). He lived in England, and produced the model of the lamp in 1782. It appears that he derived little profit from the invention. Died in 1803.

Argand Lamp, a lamp invented in 1782 by A. Argand, noticed above, was designed for burning oil. He invented a wick in the form of a hollow cylinder, through which a current of air ascends, so that the supply of oxygen is increased. This contrivance prevented the waste of carbon, which in the old lamps escaped in the form of smoke, and it greatly increased the amount of light. He also added the glass chimney, by which a draft is created and the flame is rendered more steady. This lamp was patented in 1787.

Ar'gelan'der (Friedrich Wilhelm August), a distinguished German astronomer, born at Memel March 22, 1799, was a pupil of Bessel. He became in 1823 director of the observatory at Abo, in Finland, and commenced observations on the fixed stars which have a perceptible proper motion. The observatory of Abo having been burned in 1828, another was erected for him at Helsingfors. In 1837 he was appointed professor of astronomy at Bonn. He published a celestial atlas entitled "Uranometria Nova" (1843), and "Astronomical Observations" (1846), in which he gives the positions of 22,000 stars. He demonstrated that the solar system has a progressive motion in space.

Argemo'ne, a genus of plants of the natural order Papaveraceæ. The *Argemone Mexicana* is an annual herbaceous plant, with yellow flowers and sinuated spiny leaves, a native of Mexico and the U. S., now naturalized in India, Africa, South America, etc. It has seeds which are emetic and purgative, and have been used as a substitute for ipecacuanha.

Argens, d' (Jean Baptiste de Boyer), Marquis, a French writer, born at Aix, in Provence, June 24, 1704. He served in the army in his youth, and gained distinction by his "Jewish Letters" ("Lettres Juives," 6 vols., 1738–42), and "Chinese Letters" (6 vols., 1739–42). These procured for him the favor of the crown prince of Prussia, afterwards Frederick the Great. He went to Berlin, and became an associate of that prince, who after his accession

appointed him director of the Academy of Fine Arts. Among his works is "Histoire de l'Esprit Humain," 14 vols., 1765–68. Died at Toulon Jan. 11, 1771.

Argenso'la, de (Bartolomé Leonardo), an eminent Spanish poet, born at Barbastro, in Aragon, in 1566. Having entered the Church, he became a canon of Saragossa, and historiographer of Aragon. He published a number of poems and a "History of the Conquest of the Moluccas" (1609). He and his brother were called the Horaces of Spain. Died Feb. 26, 1631.

Argensola, de (Lupercio Leonardo), a popular poet, born at Barbastro in 1565, was a brother of the preceding. He was appointed historiographer of Aragon by Philip III., and secretary of state by the viceroy of Naples in 1610. He produced tragedies, entitled "Filis," "Isabela," and "Alejandra;" also lyric poems which were very successful. The poems of these two brothers display much similarity. Died in 1613. Bouterwek commends his true poetic feeling, and recognizes in his works an imagination more plastic than creative. (See Ticknor, "History of Spanish Literature;" N. Antonio, "Bibliotheca Hispana Nova.")

Argenson, d', a French family which has produced many men eminent in letters and in public affairs.—Marc René de Voyer d'Argenson (1652–1721) was a prominent academician and public officer.—His son René Louis, marquis d'Argenson (1694–1757), was a foreign minister and an author of distinction.—Marc Pierre, count d'Argenson (1696–1764), a brother of the foregoing, was an able statesman and a patron of letters.—Marc Antoine René de Paulmy d'Argenson (1722–87), a son of the marquis René Louis, was an academician and the collector of a famous library.—Marc René, born in Paris Sept. 10, 1771, served as the adjutant of General La Fayette, and fought afterwards for the republic. Throughout his life he was a prominent leader of the ultra-republicans. Died Aug. 2, 1842.

Argentan [Lat. *Argen'uæ*], a town in the N. W. of France, in the department of Orne, on a railway which connects Alençon with Caen, 16½ miles by rail N. N. W. of the former. It is well built, and has a fine Gothic church and a college; also manufactures of linen, and lace called *point d'Argentan*. Pop. in 1866, 5401.

Argenteuil [Lat. *Argento'lium*], a town of France, in the department of Seine-et-Oise, on the Seine, 11¾ miles by rail from Paris. Here was a convent to which the celebrated Héloise retired about 1120. It is now in ruins. Pop. in 1866, 8176.

Argenteuil, a county of Canada, in the western part of Quebec, and in the district of Terrebonne. The Ottawa River forms its southern boundary. Area, 850 square miles. Much of the soil is excellent. Burr millstone is found, and there is extensive water-power. Capital, Lachute. Pop. in 1871, 12,806.

Argen'teus Co'dex, an old uncial manuscript of the Four Gospels, written in the Mœso-Gothic dialect on vellum, is so called because the letters are formed of silver, except the initials. It is supposed that it was written in the sixth century. It is a copy of the translation made by Ulphilas, bishop of the Mœso-Goths, and was found in the abbey of Werden, Westphalia, in 1597.

Ar'gentine (*Scopelus*), a genus of small fishes of the family Salmonidæ, found in the Mediterranean and the Atlantic. They derive their name from the silvery lustre of their scales, and are valuable for the *nacre* which is obtained from the outside of their air-bladders. One or more species occur in the U. S. waters, but no commercial use is made of them.

Argentine [from the Lat. *argen'tum*, "silver"], a variety of carbonate of lime, having a silvery-white lustre and a slaty or curved lamellar structure.

Argentine, a post-township of Genesee co., Mich. Pop. 1061.

Argentine Republic [Sp. *La Republica Argentina*, named from the *Rio de la Plata*, *i. e.* the "river of silver," *argentum*], a South American federal republic, is bounded on the N. by Bolivia and Paraguay, on the E. by Brazil, Uruguay, and the Atlantic Ocean, on the S. by Patagonia, Paraguay, and the Atlantic Ocean, and on the W. by the Andes, which separate it from Chili. It extends from lat. 22° to 41° S., and lon. 54° to 72° W. The area is estimated at 871,000 square miles. The disputes with Bolivia and Paraguay concerning the boundary-line are not yet (1873) settled. If the claims of the Argentine government should ultimately prevail, the area of the republic would be about 1,000,000 square miles. The population, according to the census of 1869, amounted to 1,877,490. The area and population of the fourteen states or provinces into which the republic is divided are, according to the latest official reports (see Behm and Wagner, "Bevölkerung der Erde," Gotha, 1872), as follows:

Provinces.	Area in sq. miles.	Pop. in 1869.	Capitals.	Population.
1. Buenos Ayres..	82,900	495,107	Buenos Ayres...	177,787
2. Santa Fé.....	24,000	89,117	Santa Fé.....	10,670
3. Entre Rios.....	47,900	134,217	Concepcion.....	6,513
4. Corrientes.....	70,100	129,023	Corrientes.....	11,218
5. La Rioja.....	42,500	48,746	La Rioja.....	4,489
6. Catamarca.....	42,500	79,962	Catamarca.....	5,718
7. San Juan.....	39,300	60,319	San Juan.....	8,353
8. Mendoza.....	71,600	65,413	Mendoza	8,124
9. Cordova	71,600	210,508	Cordova	28,523
10. San Luis.....	23,700	53,294	San Luis.....	3,748
11. Santiago.....	42,500	132,898	Santiago.....	7,775
12. Tucuman.....	15,900	108,953	Tucuman.....	17,438
13. Salta.....	59,500	88,933	Salta.....	11,716
14. Jujuy.....	36,100	40,379	Jujuy	3,071
Army in Paraguay.....		6,276		
Gran Chaco.....		45,291		
Missiones.....		3,000		
Pampas Argentinas.....		21,000		
Patagonia		24,000		
In foreign countries.....		41,000		

Physical Geography.—The country, which has the form of an elongated quadrilateral, can be divided with regard to the formation of the ground into four regions: 1st, the regions of the Andes, which run along the western boundary; 2d, "the Argentine Mesopotamia," between the Uruguay and the Parana; 3d, the Pampas or southern plains; 4th, the northern or interior plains, which extend into the Gran Chaco far into Bolivia. The characteristic feature of the country, excepting the region of the Andes, is the plain. The true Pampas are situated between the Rio Negro and the Rio Salado. About the mouth of the Rio Negro, beyond Buenos Ayres and some distance up the Parana, the ground consists of a fine deposit of sand and clay, which have been washed down from the mountains in the course of time. For hundreds of miles S. and W. of Buenos Ayres not a stone is to be found. In the Pampas the principal vegetation consists of grasses, which serve as food for the numerous herds of cattle. In the interior cacti and thorny mimosæ are frequent. Timber trees are not met with. Towards the N. the vegetation becomes extremely varied; along the rivers it becomes luxuriant; the trees, however, are not extraordinarily high. Land capable of being cultivated is found only along the rivers. The strip of country between the eastern branches of the Andes and the Parana is more or less sterile and deserted, and even the western states are partly separated from each other by deserts. Large tracts in the interior are covered by volcanic ashes and pumice-stone. The southern plains are broken by several ranges of hills, some of which stretch 150 miles to the S. and S. W. of Buenos Ayres, and run from S. E. to N. W. Their elevation above the plain never exceeds 300 feet. Parallel to these are the Ventana Mountains, whose highest point is 3500 feet above the level of the plain. These ranges mostly consist of granite, which in some parts is covered by quartz. In the lower diluvian strata many fossil remains of marine animals occur, which are also found occasionally in the mountains at a height of 14,000 feet. The next higher stratum to the one last mentioned is rich in fossil remains of extinct mammals of an enormous size, which have a striking resemblance to the present mammals of South America and Africa (*e. g.* the large armadillo, the giant sloth, the mastodon, fossil horses). The mountains, especially the Aconquija Cordilleras, which separate Tucuman from Catamarca, are rich in valuable metals, especially gold, silver, and copper. In the Famatina range, in the province of Rioja, much iron ore is found. In the Gran Chaco it was ascertained by the expedition of Peter Cornelius Blyss in 1863 that the ground is covered for miles around with iron, which contains about 10 per cent. of nickel. A piece of this was brought to the British Museum weighing about 1400 pounds. Up to the present time, however, the republic imports the iron it uses from Europe. In the south-western provinces extensive coal-fields have been discovered, while sulphur, alum, etc. are found in large quantities in the Andes.

Rivers, Lakes, and Swamps.—Almost all the rivers which come down from the Andes, the southern slope of the central Brazilian ranges, and the heights forming the watershed of Buenos Ayres, unite to form the Rio de la Plata, which has a wider mouth than any other river on the globe. Between the capes San Antonio and St. Mary it has a width of 170 miles; 50 miles farther up-stream, at Montevideo, it has narrowed down to 75 miles, and the water becomes fresh. At Buenos Ayres, 150 miles farther up, the low shores cannot be seen from the middle of the river. The current can be noticed as far as 100 to 200 miles out in the ocean, although the depth of the river is not very great. Above Montevideo, which is the only good port on it, its navigable channels are so obstructed by sand-banks that vessels of light draught, which go to Buenos Ayres, are

compelled to anchor from six to nine miles from the city. Even small boats have such difficulty in getting ashore that the passengers are generally landed by means of wagons with very high wheels. The chief branches of which the La Plata is formed are the Parana (with its affluent, the Paraguay) and Uruguay, which are respectively navigable for steamers for 1000 and 250 miles. Many of the eastern tributaries, especially the Rio Vermejo and the Rio Salado, are navigable for smaller vessels for 400 or 500 miles. The smaller tributaries coming from the E. are generally unsuited to navigation by reason of their strong currents. Those coming from the Andes, however, slowly wend their way through the endless plains, and are of the greatest importance for commerce. The rivers of the interior which do not belong to the system of the La Plata are mostly unimportant, as they are lost in swamps or temporary lakes, or entirely dry up in summer. These temporary lakes, lagoons, and swamps are found in great number, and are sometimes of considerable extent. Those to the E. of the Paraguay and Parana generally contain fresh water, while those W. of these rivers are brackish, almost without exception. Among the former the lake of Ybera in the province of Corrientes is the most important. Those to the W. of the great rivers usually dry up at the end of the rainy season, and leave the ground covered with a crust of saline matter several inches in thickness. The salts are of different kinds. In the plain around Fort Melincue, W. S. W. of Buenos Ayres, sulphates of magnesia are found which yield a profitable article of commerce. Good cooking-salt is found in large quantities S. of Buenos Ayres and in the neighborhood of San Luis.

Climate.—The most prominent characteristic of the climate of the Argentine Confederation is extreme dryness. Although the territory W. of the Parana has plenty of rain, still the plains in the interior suffer extremely from drought, because the S. W. winds, being stopped by the Andes, discharge their rain in Chili, and the eastern equatorial winds have already exhausted their rain at the tropic. Buenos Ayres and the country immediately surrounding are often exposed to warm N. winds, which come down the valley of the Parana loaded with vapor. The mean temperature of Buenos Ayres is 64° F.; the mean for the summer 72°, for the winter 52°. In many places a warm and a cool season can be distinguished, the former lasting from October to May, the latter from May to September. The time of the change from one to the other is the chief rainy season. The heavy thunder-storms, sometimes accompanied by hail-storms, often produce very sudden changes of temperature. Nevertheless, the climate is very healthy. This is partly due to the Pampero, a strong S. W. wind coming from the Andes. Also the nights, which are cool throughout the year, and which tend to make the heat of the day less felt, contribute much towards this end. In the plains of the interior the hot Zonda, the strong and lasting N. wind, is very much dreaded.

Animal and Plant Life—Products.—With very few exceptions, the animals of the present day have the same characteristics as the gigantic fossils found in the country, except that they are considerably smaller. The animal peculiar to the plains is the llama. The vicuña, related to the llama, is hunted in the W. Of other wild animals are found the puma, the tapir, the capibara, and the ounce. Among the birds the birds of prey, as the condor and the Caracara vulture, are especially numerous. The American ostrich and different kinds of humming-birds and parrots are also often met with. The vegetation of the plains of the La Plata is poor. Even in Entre Rios the lack of wood is often seriously felt. To the S. clumps of willows are found here and there. But the shores of the Parana are covered with beautiful forests, and both towards the tropics and the Cordilleras the vegetation becomes varied and luxuriant. The most characteristic plants of the Gran Chaco, as well as of the Pampas, are mimosas and cacti, and not until the foot of the Cordilleras in Salta and Mendoza is reached are palms and the other ornaments of tropical forests met with. The native plants and animals of these regions are, however, mostly superseded by naturalized species. The apple tree, which at the present day forms large woods in the S. of Chili and towards the sources of the Rio Negro, has been transplanted by the Indians farther N. on the eastern slopes of the Cordilleras. The peach tree is largely cultivated on the islands at the mouth of the Parana. A wild species of artichoke and impenetrable thickets of thistles cover the ground for miles to the W. and N. W. of Buenos Ayres. Wine is extensively grown in Mendoza and La Rioja.

Agriculture, Industry, Trade.—Only during the last fifteen years has agriculture been generally introduced, especially in the coast provinces. In the region of the Andes, where the ground is more easily irrigated, considerable wheat, wine, and fruits of all kinds have been produced for a long time. At present, wheat, corn, oats, and other grain and vegetables are cultivated on a large scale. Sugar-cane, tobacco (especially in Corrientes and Tucuman, but also in Salta and Catamarca), cotton, peanuts, and flax are also cultivated, although these plants have only been lately introduced. Labor, instruction, and inclination are sadly wanting. Even now the raising of cattle, the old national occupation, is much more important than agriculture. The natives had at the time of the discovery no other domestic animal than the llama or guanaco. Mendoza introduced the horse in 1536; in 1550 goats and sheep were brought from Peru; in 1553 the ox was brought from the coast of Brazil. From these importations have descended the millions of cattle which now roam over the plains of the republic. The breeds are almost all good. The sheep have been greatly improved. In recent times the breeders of cattle have suffered considerable losses, as, in consequence of the high tariff of the U. S., they have no market for their products. Wild cattle are no longer to be found. All are enclosed, though often in very large ranges. The large *estancias* of former times are becoming a thing of the past, and they are cut up more and more into smaller estates. While the price of land has risen considerably (in some places it has doubled within twenty years), the increase of the cattle has been so large that the supply exceeds the demand largely, and manure is made of the unsold meat. About 3,000,000 hides of cattle are exported annually, and in the large slaughter-houses (*saladeros*) 60,000 cattle are killed annually. The herds of horses seem to diminish gradually, but are still so large that 250,000 horse-hides are annually exported. The Pampa horse is small and of coarse build, but excels in fleetness and endurance. It roams about in herds of 6000 or 8000, and is caught by the Gauchos with the lasso or the bolas. Mules are raised in large numbers, and are exported to Peru and other places. General industry and manufactures are unimportant in the La Plata states. The manufacture and export of "Liebig's extract of meat" is extensive. Besides this, tanning and the soap manufacture are carried on on a large scale. Valuable embroidered cloths, wearing apparel, gorgeous blankets, and ponchos are made of the finest wool. The Indian women of the S. also make wonderfully fine quilted ponchos, belts, horse-blankets, and harness. A laborer is paid from $1 to $3 in gold per day.

The commerce with the interior is unimportant; that with Chili and Bolivia is of more consequence. To these countries oxen, mules, and asses are exported in large numbers. The commerce by sea is about twenty times as large as that by land. It is limited almost entirely to Buenos Ayres and Rosario. The river-ports, Santa Fé, Parana, Corrientes, Gualeguay, Concepcion, and Concordia, supply themselves from Buenos Ayres. The inland trade is almost entirely carried on by caravans of thirty or forty wagons. The articles of export are, besides those obtained from the herds of cattle, horses, and sheep, chiefly ostrich feathers, Patagonian and artificial guano, furs, honey, copper, gold and silver bars. The total exports amounted in 1870 to $23,320,000, and the imports to $39,400,000. In 1870, 1154 vessels, of 388,796 tons, entered, and 1074 vessels, of 339,759 tons, cleared from the port of Buenos Ayres. About one-half of the exports are hides and three-eighths wool.

Roads are sadly wanting throughout the entire country. Diligences run from Rosario to Mendoza, San Juan, Cordova, Rioja, Catamarca, Santiago del Estero, Tucuman, Salta, and Jujuy. Couriers keep up the communication between the 125 post-offices. In 1865, 1,167,611 letters were transmitted. According to the president's message in 1871, 605 miles of railroad were in operation, 139 miles in construction, and 2248 miles were projected. According to the same message, 1461 miles of telegraph were in operation, and 2414 miles were projected in 1871. A submarine telegraph from Buenos Ayres to Montevideo has been in operation since 1866. In the same year the Americans, Hopkins & Cary, received a charter to construct a telegraph from Buenos Ayres to Chili.

Inhabitants.—The native tribes are divided into three different groups: 1st, the Araucanians, who roam as far N. as the Rio Salado; 2d, the Quichuas, who were formerly subject to the incas of Peru, and live E. of the Cordilleras as far as Santiago; 3d, the Guaranis, who formerly ruled from the Gulf of Mexico to the Rio de la Plata, and from the Atlantic to the Andes. These races are uncivilized to the present day. But the most of the Guaranis, Quichuas, and some of the Araucanians, have been blended together with the Spaniards, and this mixed race constitutes the larger part of the population of the republic. The number of the foreign-born population is very large, and is increasing rapidly. The immigration from 1858 to 1862 amounted to 28,066, and from 1863 to 1867 to 65,599 souls. The following table presents the immigration of each year, arranged according to nationalities:

	1863.	1864.	1865.	1866.	1867.
Italians	4,494	5,435	5,001	4,245(?)	8,455
Frenchmen	2,334	2,736	2,282	2,870	3,671
Spaniards	1,377	1,586	1,701	954(?)	1,258
British	883	1,015	1,583	1,370	1,672
Swiss	567	329	502	958	933
Germans	527	289	363	274	436
Other nations	216	192	335	3,025(?)	597
Total	10,398	11,582	11,767	13,696	17,022

In 1868 the number of immigrants amounted to 29,384, in 1869 to 37,934, in 1870 to 39,667, and in 1871 to 31,614. T. C. Ford says in his report of 1867 that there were ten colonies in the republic, each having on an average 7000 or 8000 inhabitants, which were all Europeans. In recent times much has been done to promote immigration.

Manners and Customs.—In Buenos Ayres, where the foreign population gains the ascendency more and more, European dress and manners have been rapidly naturalized. The lower classes, which are chiefly mestizoes and half-breeds, combine the inclination of the higher classes for gaming and a dissolute life with the plain and rough mode of living of the Gaucho of the Pampas. The Gaucho wears a jacket of coarse cloth or sheepskin, and pantaloons of the same stuff, which are open from the knee down. His poncho is a square piece of cloth with an opening in the middle for the head. His ornaments consist of spurs with large silver rowels, and a large knife, with the handle inlaid with silver, which is carried in the belt. The women are dressed almost exactly like the men, only they have the neck and arms bare. The rancho or hut of the Gaucho consists of a trellis-work of brushwood, which is covered with mud. The roof is covered with straw or cow-hides, and in the place of a door is a horse-hide. The food of the Gaucho consists almost entirely of meat and water. From 1850 to 1860 there was one marriage for every 140 inhabitants, 1 birth for every 22, 1 death for every 44, and 5 children for every family; one-fifth of all the children are illegitimate. The mean length of life in the country and the smaller cities is 40 years. Since 1780 the population has almost quadrupled itself. The predominating religion is the Roman Catholic; Protestants are only found among the immigrants. Under the archbishop of Buenos Ayres are the bishop of the Littoral (with his seat in Parana), of Cordova, of Cuyo (San Juan), and of Salta. There are very few monasteries, but a large number of nunneries. There are missions on the Indian frontier, where several hundred have been converted. Popular education until recently has been very poor. Only 28,000 persons can write. But since the accession of President Sarmiento much has been done to improve the education of the people. Universities have been established at Buenos Ayres and Cordova, while colleges exist in those two cities and in Concepcion, and several others are in course of erection. Of the forty-three printing establishments, Buenos Ayres has sixteen, and of the thirty-seven newspapers published in the republic, it has sixteen. In 1869, Congress passed a law that the new civil code (*codigo civil*) compiled by Dr. Sarsfield, at that time minister of the interior, was to be introduced throughout the whole republic on Jan. 1, 1871.

Constitution.—The constitution was adopted May 11, 1853, and was revised in 1860 and 1862. At the head of the republic is a president, elected for a term of six years by 133 representatives of the provinces. The congress consists of a house of representatives with fifty-four members, and a senate with two members for each state. In 1862, Congress transferred the seat of government to Buenos Ayres, and introduced several clauses into the constitution with regard to the relations of the city to the confederation. The province of Buenos Ayres elects its own governor, but the city is under the direct jurisdiction of the president and congress. The judiciary is entirely independent. There is a supreme court and tribunals in every state. The freedom of the press, of religion, of association, of education, and free disposition of property, as well as equality before the law, is guaranteed to everybody.

Army, Navy, and Finances.—The army consists, exclusive of the militia and national guard of Buenos Ayres, of 7414 men, inclusive of 29 generals, 273 commandants, and 632 other officers. The republic possesses seven men-of-war, one of which is armed with twelve guns. The public debt in 1871 amounted to 76,576,385 pesos fuertes (1 peso fuerte = $1.01). The income in 1870 amounted to 14,833,904, the expenditures to 22,199,445, leaving a deficit of 7,365,544 pesos. Each province has its own budget.

History.—The La Plata was discovered by Juan Diaz de Solis in 1516, who took possession of the country for the crown of Spain. Buenos Ayres was founded by Don Pedro de Mendoza, who became governor in 1535. The city was not, however, firmly established against the attacks of the Indians until after its third rebuilding in 1580, and after Santa Fé, Mendoza, and other cities in the interior had been founded. The government of the countries of the La Plata was subject to the viceroy of Peru until 1778, in which year a viceroyalty was formed of the provinces of Rio de la Plata, Paraguay, Uruguay, and Bolivia, with Buenos Ayres as its capital. After 1806–07, Buenos Ayres and Montevideo were for a short time in the hands of the British, who, however, were not able to hold them. Soon after liberal ideas began to gain ground. The viceroy was expelled, and on May 25, 1810, a *junta gubernativa* was installed. Cordova, Paraguay, and Uruguay, however, did not recognize this junta, and a long succession of civil wars ensued. Soon after the districts in the interior also joined the Confederation. In 1813 a constituent assembly met in Buenos Ayres, the Spanish flag was given up, and the republic issued its own coin. In the previous year Montevideo, which had remained longest connected with Spain, had been taken. In 1816 the representatives of all the provinces assembled in congress at Tucuman, declared the La Plata states independent, and appointed General Pueyrredon dictator of the republic. The Spanish troops were severely defeated at Chacabuco in 1817, and at Maypu in 1818. The last and decisive victory was gained in 1821. In the mean while the republic was the scene of serious encounters between several ambitious leaders. In 1825 the "Unitarians" (who favored a strong central government) succeeded in restoring unity and established a new constitution. But Rivadiva was their only president. Juan Manuel de Rosas, the leader of the Gauchos, in connection with other malcontents, forced him to resign, and caused Dorrego to be elected governor of Buenos Ayres. After a counter-revolution under Lavalle, which was for a time successful, Rosas was elected governor in 1826, in which position he remained for six years. In 1835 he declined a re-election, but accepted the position of dictator of the republic with unlimited powers, which he held until 1852. During this entire period Congress did not assemble. The civil wars nevertheless continued uninterruptedly. The independence of Uruguay, which had assumed the title of "Republica Oriental del Uruguay," had been recognized in 1828. But Rosas did not relinquish his plans. He assisted Governor Oribe, while France took sides with his rival, Rivera. Peace was concluded in 1840, but in 1845 new difficulties arose, which led to an armed intervention of France and England. They blockaded Buenos Ayres and occupied the island Martin Garcia, but were compelled to recall their fleets the next year. The provinces of Corrientes and Entre Rios seceded from Rosas soon after, and on Feb. 3, 1852, he was defeated by the united forces of Brazil, Uruguay, Paraguay, and Urquiza, the head of the opposition, in the battle of Monte Caseras, in consequence of which he was compelled to fly to England. After a short administration of Vincente Lopez, Urquiza declared himself president, and recognized on June 23, 1852, the independence of Paraguay. In September another revolution took place, and Buenos Ayres resolved to secede from the Confederation. In the mean while, Congress had adopted a new constitution (May, 1853), and Urquiza was elected president. Buenos Ayres remained independent, but consented to the conclusion of two treaties in Dec., 1854, and Jan., 1855. The attempts at a reunion were not suspended, but several difficulties caused the suspension of the treaties. A war followed, and Buenos Ayres was defeated. Urquiza gained a victory at Cepada on Oct. 23, 1859, and by the treaty of peace of San José de Flores of Nov. 10, 1859, and the union of Parana, Buenos Ayres again entered the Confederation. In 1861 new difficulties arose on account of taxation, and General Mitré completely defeated the federal troops on the Pavon (a small tributary of the Parana) on Sept. 17, 1861. The president, Santiago Derqui, resigned in consequence of this, and General Mitré was appointed president *pro tem.*, with the direction to call a congress on May 25, 1862, at Buenos Ayres. Mitré was elected president of the reunited Confederation on Dec. 14 of the same year. In 1866 great dissatisfaction arose in several provinces in consequence of the war with PARAGUAY (which see). In several places, as Mendoza and Catamarca, serious disturbances arose, which were secretly encouraged by Peru, Chili, and Bolivia. In 1867 the disturbance, under the command of Videla, began to assume serious proportions in Mendoza, and even extended to La Rioja and San Juan. General Pannero, although not till Mitré had joined him with 4000 men, completely defeated the insurgents, and triumphantly entered Mendoza on May 14. Both houses of Congress passed a resolution to transfer the seat of government to Rosario, which was, however, vetoed by the president. In 1868, Sarmiento was elected president for a term of six years. Since that time the country has been rapidly increasing in prosperity. In 1870 a rebellion broke out in Entre Rios, at the head of which was General Lopez Jordan, a son-in-law of Urquiza. This old patriot was

murdered by the rebels in his palace at San José. The rebellion, although rapidly gaining, was opposed by almost all the other states. On Sept. 23, Jordan was completely routed at Santa Rosa, and lost all his infantry and artillery. In April, 1871, he was again completely defeated, and the rebellion was suppressed. In Mar. and April, 1871, the city of Buenos Ayres was visited by the yellow fever, and suffered terribly from its ravages. The citizens and the government did their utmost to prevent its spread, but still the total of its victims was found to be 13,403—a figure which, although large, was still considerably below the estimate made by the press. In Feb., 1872, a revolution broke out in Corrientes, which, however, was soon ended. In Entre Rios, Lopez still continued to agitate in secret, but without success. On Jan. 1, 1872, a band of Gauchos, under a Bolivian fanatic calling himself a *Dios medico* (God physician), entered the town of Tandil, and crying "Death to the Masons and Gringos!" massacred thirty-five persons. They were afterwards captured; fourteen were put to death, fifteen imprisoned for fifteen years, and the Dios medico was shot by the populace.

In April, 1872, Gail Jordan was reported to be on the frontier of Brazil, at the head of 2000, intending to revive the dream of Artigas and Urquiza concerning the establishment of an independent republic, to consist of the Argentine provinces of Corrientes and Entre Rios and the republic of Uruguay. At the beginning of the year the border provinces had to suffer from a new invasion of the Araucanian Indians under their chief Calfucura, who are reported to hold more than 3000 Argentine citizens as prisoners. In May, 1873, the province of Entre Rios was once more invaded by Lopez Jordan, who captured several towns and threatened the two neighboring littoral provinces. The government declared Entre Rios in a state of siege, and at once placed a number of the national guard in the field; at the same time President Sarmiento sent a special message to Congress requesting the adoption of vigorous measures for the suppression of the invasion.

Literature.—Compare, besides the works of Nuñez, King, Mansfield, and Page, ANDRÉE, "Buenos Ayres und die Argentinischen Provinzen" (1856); MANNEQUIN, "Les provinces argentines et Buenos Ayres" (1856); DE MUSSY, "Description géographique et statistique de la Confederation Argentine" (1861 and 1864); BURMEISTER, "Reise durch die La Plata Staaten" (1861); FORD, "La Republique Argentine" (1867); TRELLES, "Registro Estadistico" (1867); L. BECK BERNHARD, "Le Rio Parana, etc." (1865); MOUCHEZ, "Nouveau Manuel de la navigation dans le Rio de la Plata, etc." (1865); SCHNEPP, "Mission Scientifique dans l'Amerique du Sud" (1864); the "Annales del Museo publico de Buenos Ayres," published yearly by Burmeister since 1864; DOMINGUEZ, "History of the Argentine Republic," translated by G. Williams (1866); M. G. and E. T. MULHALL, "Handbook of the River Platte" (1869); WAPPÄUS, "Argentinische Republik," in Stein and Hörschelmann's "Handbuch der Geographie und Statistik" (7th ed. 1863–70). A. J. SCHEM.

Argenton-sur-Creuse (anc. *Argentom'agus*), a town of France, in the department of Indre, on the river Creuse, 19 miles by rail S. W. of Châteauroux. It has ruins of an old castle, and manufactures of woollen cloth. Pop. in 1866, 5219.

Ar'ges, a genus of small fishes of the family Siluridæ, which are often thrown out by some of the South American volcanoes with torrents of hot and muddy water. This remarkable fact was noticed and published by Humboldt, who described one species, now called *Arges cyclopum*. They are ejected near Quito in such quantities that fevers are caused by their putrefaction. It is supposed that they come from lakes in the caverns of the mountains. The craters from which they are ejected are 16,000 feet or more above the level of the sea.

Ar'gil [from the Lat. *argil'la*, "white clay"], a term sometimes applied to clay or potter's clay, and, in a technical sense, to pure clay or to alumina.

Argilla'ceous [from the Lat. *argil'la*, "clay"], clayey; having the properties of clay, or partly composed of clay. Limestones are called argillaceous if they contain as much as 10 per cent. of clay. A conchoidal fracture usually indicates the presence of clay in a mineral.

ARGILLACEOUS ROCKS. This term is generally applied to rocks or strata of which clay is the principal ingredient. Pure clay, called *kaolin* or porcelain clay, is a hydrated silicate of alumina, and is derived from the decomposition of felspar. Common clay contains also sand and other impurities. Among the argillaceous rocks are shales and slates. Clay which has been indurated and metamorphosed is called clay-slate. Plastic clays fit for pottery occur in the tertiary formation and more recent deposits. The argillaceous rocks may be distinguished by the odor which they emit when a person breathes on them.

Ar'gives, or **Argi'vi,** the inhabitants of Argos and of Argolis, a state of ancient Greece. During the Trojan war Agamemnon was king of the Argives, who were then the most powerful or prominent among the Greek tribes. The name Argives was used by Homer and other ancient authors as a generic appellation for all the Greeks.

Ar'go, an extensive southern constellation, so called from the mythical ship of the Argonautæ. It is usually divided into four: Argo, Argo in Carina (in the keel), Argo in Puppi (in the stern), and Argo in Velis (in the sails). Canopus, a star of the first magnitude, belongs to this constellation, part of which is invisible in our latitude.

Ar'gol, crude tartar, a salt which is deposited by wine in crystalline crusts on the interior of vats, barrels, and bottles. Being less soluble in alcohol than in water, the increasing proportion of alcohol during fermentation causes it to separate. It consists chiefly of potassic bitartrate, $KHC_4H_4O_6$, but contains also variable quantities of calcic tartrate, coloring and mucilaginous matter. It is purified by solution in hot water, clarification by the addition of clay, and recrystallization. By repeating the process it becomes white, and is then sold under the name of *cream* of tartar, and extensively used in connection with sodic bicarbonate for raising bread. Cream of tartar is shamefully adulterated with gypsum, flour, etc., many samples containing two-thirds or more of such fraudulent admixtures. Argol is used for the preparation of tartaric acid, Rochelle salt, and potassic carbonate, the latter being often called *salt of tartar*.

Ar'golis ['Αργολίς], a state of ancient Greece, in the N. E. part of the Peloponnesus (Morea), bordering on the sea. It consists partly of a peninsula between the *Saronicus Sinus* (Gulf of Ægina) and the *Argolicus Sinus* (Gulf of Nauplia). It was bounded on the S. by Laconia and on the W. by Arcadia. The surface is diversified by mountains which are about 5000 feet high. Near the sea is the large plain of Argos, which is rendered unhealthy by marshes. Argolis was one of the most famous and powerful states of ancient Greece, and was the scene of many memorable events or myths in the heroic ages. Here Hercules was born, and Pelops and the Atridæ reigned. The inhabitants were called Argives (Argivi). The chief towns were Argos, Mycenæ, Epidaurus, Hermione, Sicyon, and Trœzene, each of which was a separate kingdom. The Argives were skilful musicians, and cultivated the fine arts with success, but were never distinguished as poets or philosophers.

ARGOLIS AND CORINTH is the name of a nomarchy of modern Greece. Area, 1447 square miles. Pop. in 1870, 127,820. Capital, Nauplia.

Ar'gonaut (*Argonau'ta*), a genus of mollusks of the

Argonaut within its shell.

class Cephalopoda, is commonly called "paper nautilus." The latter name is derived from the fragile nature of the boat-like shell in which the argonaut floats on the surface of tranquil seas. The shell is not chambered like that of the true nautilus, but has one spiral cavity, into which the animal can retire and be completely hidden. There is no muscular attachment of this animal to the shell, which is said to be peculiar to the female, who uses it for incubation as a nest. Several species are known. They have eight arms, two of which are expanded into broad membranaceous disks, which were formerly believed to be sails, and the other arms were regarded as oars; but, though the fable is perpetuated by the poets, it has long been known

that the animal really propels itself by ejecting water from its funnel. When it desires, it folds its arms, retires within its shell and sinks to the bottom.

Ar′gonau′tæ [Gr. Ἀργοναῦται, *i. e.* "the sailors of the Argo"], in English **Ar′gonauts,** the famous Greek heroes who, according to tradition, lived before the Trojan war, and acquired celebrity by an adventurous navigation of unknown seas. This is the most ancient voyage of discovery mentioned by classic poets or historians. They derived their name from the ship Argo, in which, under the command of Jason, they performed the expedition to Colchis, on the Euxine, in order to recover the Golden Fleece, which was guarded by a sleepless dragon. Among the Argonauts were Hercules, Theseus, Castor, Pollux, and Orpheus. In the course of the voyage they landed at several points and passed through many perilous adventures. Among the obstacles which they encountered were the enmity and treachery of Æetes, king of Colchis, but they were aided by his daughter Medea, a powerful sorceress, and finally carried off the Golden Fleece.

Ar′gos [Ἄργος], a capital city of ancient Greece, situated in Argolis, about 3 miles from the *Argolicus Sinus,* or Gulf of Nauplia. It was considered the oldest city of Greece, and was supposed to have been founded by Inachus, the father of Io, about 1500 B. C. It was a famous city in the heroic age, and was the residence of Pelops and Agamemnon. Argos was the head of a league of Doric cities before Sparta acquired the supremacy in the Peloponnesus. Its site is occupied by a modern town of the same name, 6 miles N. N. W. of Nauplia. Pop. about 10,000. Here are remains of ancient cyclopean structures.

Argos, a post-village of Marshall co., Ind.

Argos′toli, a seaport-town of Greece, the capital of Cephalonia, one of the Ionian Islands, is on the S. W. coast. It has a good haven. Pop. 8000.

Argot, a word of uncertain derivation, applied in France to a peculiar language or gibberish invented for purposes of concealment by those whose pursuits make them dread the arm of the law. In all the countries of Europe a language of this kind prevails, and has prevailed perhaps to some extent from immemorial time. In England it is called "thieves' Latin," "St. Giles's Greek," "peddler's French," "flash," and other names; in Italian, "zergo" (or "gergo") and "furbesco" (from *furbo,* a "rogue"); in Spanish, "Germania;" in German, "rothwelsch" (or "rothwälsch"). An able French writer, M. Nodier, remarks that "Argot, a language invented by thieves, often sparkles with imagination and wit." The following examples may serve to illustrate the truth of the foregoing remark: *Apôtre* ("apostle") applied to the fingers, because they are "sent forth." *Sans feuille* ("without leaf"), the "leafless" tree—that is, the "gallows." *Epouser la veuve* (to "marry the widow"), to "be hung;" implying that those who had previously been joined in the same marriage were deceased. *Aspic* (an "asp," or poisonous serpent), a "slanderer." *Sancho Panza,* "justice of the peace," in allusion to Sancho Panza having been under Don Quixote magistrate of the Isle of Barataria. *Sanglier* (a "boar," an animal having long teeth), applied to priests, in allusion to their frequent fasting; the phrase "having long teeth" was equivalent to "being very hungry." Sometimes the principle on which the word (in argot) is formed is a mere resemblance of sound: thus, *arsenic* is used for "arsenal." In a somewhat similar manner *solir* is used for *ventre* ("belly"), because *sollir,* "to sell," in argot signifies the same as *vendre,* which resembles *ventre* in sound. Considerable attention has of late years been paid to the study of argot. Francisque Michel has written a large volume on argot (Paris, 1856), which is said to be by far the most complete work on the subject. Several distinguished novelists, including Bulwer, Dickens, and Victor Hugo, have introduced frequent specimens of this language into their works; it may suffice to refer the reader to "Pelham," "Paul Clifford," "Oliver Twist," and "Les Misérables."

Argout, d' (Antoine Maurice Apollinaire), Count, born in Isère in 1782. He became prefect of Gard in 1817, and a peer of France in 1819. In July, 1830, during the revolution, he negotiated between the popular party and the king, from whom he obtained concessions, but it was then too late. He was appointed minister of commerce in 1831, minister of the interior in 1833, and governor of the Bank of France in 1834. He retained that office many years. Died in 1858.

Argue′lles (Augustin), a liberal Spanish statesman, born in the Asturias in 1775. He was elected to the Cortes, and was a member of the committee which produced the liberal constitution of 1812. He gained distinction as an orator, and became very popular with the liberal party. On the restoration of Ferdinand VII., in 1814, he was imprisoned for several years, but was released by the revolution of 1820. He was minister of the interior for several months in that year, and was an exile from 1823 to 1832. After that date he was a leader of the moderate party in the Cortes, and in 1841 was appointed tutor to the young queen Isabel. Died in 1844. (See Evaristo San Miguel, "Vida de D. A. Arguelles," 1850.)

Ar′gument [Lat. *argumen′tum,* from *ar′guo,* to "make clear"], a reason offered for or against a proposition, opinion, etc.; a series of reasonings; a debate or disputation. In logic, an expression in which, from something laid down as granted (*i. e.* the premises), something else (*i. e.* the conclusion) is to be deduced. "Socrates," says Addison, "introduced a catechetical method of arguing. He would ask his adversary question upon question, until he had convinced him out of his own mouth that his opinions were wrong. . . . Aristotle changed this method of attack, and invented a great variety of little weapons called syllogisms. As in the Socratic way of dispute you agree to everything which your opponent advances, in the Aristotelic you are still denying and contradicting some part or other of what he says. Socrates conquers you by stratagem, Aristotle by force. . . . When our universities found there was no end of wrangling this way, they invented a kind of argument which is not reducible to any mode or figure in Aristotle. It was called the *argumentum basilinum* (others write it *bacilinum* or *baculinum*), which is pretty well expressed in our English word *club-law.* When they were not able to confute their antagonist, they knocked him down." (*Spectator,* No. 239.) In the tables used in the exact sciences, the term *argument* signifies the leading numbers, or quantities, arranged in order at the top or sides to guide to the tabular number sought.

Argumen′tum ad Hom′inem (*i. e.* an "argument [applied] to [the particular] man" whom you are addressing), an argument derived from the principles or conduct of an antagonist, or an appeal to the prepossessions or prejudices of a person to whom the argument is addressed.

Ar′gus [Gr. Ἄργος], a fabulous personage who, according to an ancient Greek legend, had a hundred eyes, some of which were always awake. Having been employed by Juno to guard the cow into which Io was transformed, he was killed by Mercury. Juno is said to have transferred his eyes to the tail of her favorite bird, the peacock. Another mythical Argus was king of Argos, and a son of Jupiter and Niobe.

Argus [named in allusion to the Argus of the Greek mythology, having a hundred eyes; for a more particular explanation see below], a genus of gallinaceous birds remarkable for rich and brilliant plumage. The only known species is the *Argus giganteus,* formerly called *Phasianus Argus,* and now commonly called argus pheasant. It is a native of Sumatra and other parts of the East Indies, and is about equal in size to a common barndoor fowl. Two of the tail-feathers of the male are about four feet long. The name argus is given in reference to the beautiful circular, eye-like markings which adorn the plumage of the male, especially on the secondaries of the wings.

Argyle, ar-gīl′, a post-township of Penobscot co., Me. It has manufactures of lumber. Pop. 307.

Argyle, a township of Sanilac co., Mich. Pop. 151.

Argyle, a post-village and township of Washington co., N. Y., 46 miles N. N. E. of Albany. It is the seat of an academy. The township contains beautiful lakes and a mineral spring. Pop. of village, 351; of township, 2850.

Argyle, a post-township of La Fayette co., Wis. Pop. 1634.

Argyle, or **Argyll,** Dukes of, marquesses of Lorne and Kintyre, earls of Campbell and Cowal, viscounts of Lochow and Glenilla, barons of Inverary, Mull, Morven, and Tiry (1701), earls of Argyll (1457), barons Campbell (1445), barons of Lorne (1470, in Scotland), Lords Sundridge and Hamilton (1766, in Great Britain).

Argyle (Archibald **Campbell**), Marquis of, a Scottish peer, born in 1598, was a son of the seventh earl of Argyle. In the civil war he fought against Charles I., and was a leader of the Scottish Covenanters. He was defeated in battle by Montrose in 1644. Having become an adherent of Charles II., he took arms for him against Cromwell in 1651. After the restoration of 1660 he was convicted of submission to the usurpation of Cromwell, and was beheaded May 27, 1661.

Argyle (Archibald **Campbell**), ninth earl of, was the eldest son of the preceding. He fought for Charles II. at Dunbar in 1650. The estate of his father was restored to him, with the title of earl, in 1663. When he took the test-oath which was exacted in 1681, he added the phrase, "So far as is consistent with the Protestant faith." For

this offence he was condemned to death, but he fled to Holland. He returned with a small body of armed men, was captured, and executed June 30, 1685.

Argyle, or **Argȳll′** (GEORGE DOUGLAS **Campbell**), THE NINTH DUKE OF, born April 30, 1823, succeeded his father, the seventh duke, in 1847, before which he was styled the marquis of Lorne. He published in 1848 "Presbytery Examined," in which he defends the Presbyterian system against prelacy. Having entered the House of Lords, he supported the liberal party, and distinguished himself by his oratorical ability and soundness of judgment. He became lord privy seal in 1852, and postmaster-general in 1855. When the Tories obtained power in 1858, he resigned office, but he was reappointed postmaster-general in 1860. In 1866 he published a philosophical work called "The Reign of Law," one of the ablest of recent works advocating a theistic view of creation. He has also published "Primitive Man" (1869) and other works. He resigned with his colleagues in June, 1866, and was appointed secretary for India in Dec., 1868. He married Elizabeth Gower, daughter of the late and sister of the present duke of Sutherland. His son, the marquis of Lorne, married H. R. H. the princess Louise, daughter of Queen Victoria.

Argyle′shire, a large county of Scotland, bordering on the Atlantic Ocean. It is bounded on the N. by Inverness-shire, on the E. by Perthshire and Dumbarton, on the S. and W. by the sea. It includes the islands of Mull, Islay, Jura, Tiree, Coll, Iona, Lismore, Colonsay, etc. Area, 3255 square miles. The surface is rugged and mountainous, and presents some of the grandest and most picturesque scenery in Scotland. The highest peaks are Bedanambran, 3760 feet, and Ben Cruachan, 3668 feet. The rocks which predominate here are granite, mica-slate, trap, limestone, and quartz. Long arms of the sea, called Loch Linnhe and Loch Fyne, extend into this county, which also contains Loch Awe, a fresh-water lake. The chief occupation of the farmers is the raising of cattle and sheep. The land is owned by a few proprietors, among whom are the duke of Argyle and the marquis of Breadalbane. Inverary and Campbellton are the chief towns. P. in 1871, 75,635.

Ar′gyro-Cas′tro (modern Gr. *Arguron-Kastron;* Turk. *Ergree-Kastree*), a town of Albania, on the river Deropuli, 50 miles N. W. of Yánina. It is built on the steep declivity of a mountain. The best Turkish snuff is manufactured here. Pop. estimated at 8000.

A′ria ("air"), in music, a rhythmical song, a tune, a measured lyrical piece for one or several voices; commonly applied to a song introduced into a cantata, opera, or oratorio, and intended for one voice supported by instruments.

Ariad′ne [Gr. Ἀριάδνη], a daughter of Minos, king of Crete, became the lover of Theseus when he visited Crete. She gave him a clue of thread by which he was enabled to find his way out of the Cretan labyrinth. Her mythus is not uniform, but, according to one account, she was abandoned by Theseus at Naxos, and subsequently became the wife of Bacchus. Others say that Diana slew her at Naxos with her arrows. She bore twin sons to Theseus. Her name is given to the forty-third asteroid. (See THESEUS.)

Arial′dus, a deacon of the church of Milan, noted for his zeal against the marriage of priests, was born in Lombardy. His preaching led to a schism in the Church, attended with violent tumults. Arialdus was killed June 28, 1066. (See MURATORI, "Annali d'Italia.")

Arian (nations). See ARYA.

Aria′na, the ancient name of a region in the W. central part of Asia, inhabited by the Aryan or Arian race. It probably comprised ancient Persia and Bactriana. "The latest and most vigorous offshoot of these branches" [the Semitic and Iranian], says Bunsen, "the glorious Arian tribe, has outgrown all the rest, as it is the Arian races that have given a new turn to the wheel of history and remodelled the earth." (See ARYA and ARYAN.)

Aria′na, a township of Grundy co., Ill. Pop. 337.

Aria′no, a town of Italy, in Avellino, among the Apennines, 23 miles N. E. of Avellino. It is the seat of a bishop. It has a mountain-fortress, a fine cathedral, several churches, a gymnasium, a normal school, and considerable manufacture of silk. Wine and butter are exported. Pop. in 1861, 12,588.

Arians. See ARIUS.

A′rias Monta′nus (BENEDICTUS), [Sp. *Beni′to A′rias Monta′no*], an eminent Spanish biblical scholar and Orientalist, born in Estremadura in 1527. He was a member of the Council of Trent in 1562, and under the auspices of Philip II. edited a Polyglot Bible, which was published at Antwerp (1568–72), and is highly commended. He wrote, besides other works, "Jewish Antiquities" (1593). Died at Seville in 1598. (See LOUMYER, "Vie de B. A. Montano," 1842; N. ANTONIO, "Bibliotheca Hispana Nova.")

Ari′ca, a maritime town of Peru, in Moquega, on the Pacific Ocean, 239 miles S. W. of La Paz. It was once more important than it is now. It is the principal shipping-place of the exports of Bolivia, which are copper, silver, alpaca-wool, and guano. Pop. about 4000.

Arichat, a seaport-town, capital of Richmond county, Nova Scotia, situated on the S. coast of Madame Island, near the Gut of Canso, and on a small bay or inlet of the Atlantic; lat. 45° 28′ N., lon. 61° W. It owes its importance to fisheries. It is the seat of a Roman Catholic bishop. Pop., including Little Arichat, 2719.

Ariç′ia, an ancient and celebrated city of Latium, on the Appian Way, at the foot of Mons Albanus, 16 miles S. E. of Rome. It was an important town in the reign of Tarquin the Proud. The Aricians took part in a war of the Latins against Rome, which ended in their defeat at Lake Regillus, 498 B. C. Cicero speaks of it as in his time a wealthy and flourishing *municipium*. Here was a celebrated temple of Diana, and here is a beautiful lake called Lago di Nemi. The modern town, *La Riccia,* is on or near the site of the ancient Aricia.

Ar′icine, Cincho′natine, Cusco′nine, or **Quin′onine,** an alkaloid found in the white cinchona-bark from Arica. Its salts are easily soluble and crystalline. Its formula is $C_{20}H_{26}N_2O_4$. It is useless in medicine.

Ariége, a river of France, rises in the Pyrenees, flows nearly northward through the department of its own name, passing by Foix and Pamiers, and enters the Garonne a few miles S. of Toulouse. Length, about 90 miles.

Ariége, a department in the S. of France, is bounded on the N. and W. by Haut-Garonne, on the E. by Aude and Busillon, and on the S. by Spain, from which it is separated by the Pyrenees. Area, 1889 square miles. The surface is mostly mountainous, the highest mountains being in the southern part. Among the highest summits are Montcalm, about 10,600 feet, and Serrère, 9592 feet high. It is drained by the rivers Ariége and Salat. The soil of the lower lands is fertile. Here are rich iron-mines, which furnish the chief article of export. It is subdivided into 3 arrondissements, 20 cantons, and 335 communes. Capital, Foix. Pop. in 1872, 246,298.

A′riel, a word signifying "lion of God" or "ark of God," was sometimes applied to the city of Jerusalem. Among the Jews of a more recent date the name was given to a water-spirit.—ARIEL is also the name of one of the principal characters in Shakspeare's drama of "The Tempest," where he is represented as a spirit of air.

Ariel Gazelle (*Gazella dorcas,* var. *Arab′ica*) is the gazelle of Western Asia, the true gazelle belonging to Northern Africa. The ariel gazelle is one of the most beautiful of antelopes, is twenty-one inches high at the shoulder, of a dark-fawn color, the belly white, with a black or brown band running along the flanks. It is a variety of the species to which the African gazelle belongs. It is hunted both for sport (by falconry) and for its flesh and skin, both highly prized. Gazelles are often hunted in *battue,* for they cannot be successfully followed in the chase, their speed excelling that of the greyhound. They are great favorites in the East when tamed, and the beauty of their eyes is proverbial.

A′ries [the Latin of "ram"] is the name of a sign of the Zodiac; that is, the first thirty degrees of the Zodiac measured from the point at which the equator intersects the ecliptic—*i. e.* the vernal equinox. Longitudes (celestial) are reckoned from this point. Aries is also the name of a constellation of the Zodiac which once coincided with that sign, but which now occupies the same place as the sign *Pisces.* Among the ancient Romans, *aries* was the name of a battering-ram—a machine with an iron head used to batter down the walls of besieged towns or forts.

Ariet′ta, a township of Hamilton co., N. Y., in the Adirondack regions, contains Piseco Lake, a popular summer resort. Pop. 139.

Ar′il [Lat. *aril′lus*], a botanical term applied to a membrane or peculiar covering of some seeds, formed by an expansion of the *funiculus* or of the placenta. Mace, for example, is the *aril* of the nutmeg. The aril never appears until after the seed is fertilized.

Ari′on [Ἀρίων], an ancient Greek musician and poet, a native of Lesbos, lived probably about 700 B. C. Herodotus has preserved a curious legend, according to which he was returning from Sicily to Corinth by sea with much treasure, to get which the mariners resolved to kill him. Having obtained permission to play one tune, he threw himself into the sea, and was received on the back of a dolphin, which had been charmed by the music, and carried him to land. This dolphin is supposed to be the same as that which figures among the stars.

Arios'to (Lodovico), a celebrated Italian poet, was born at Reggio, near Módena, Sept. 8, 1474. He was educated at the College of Ferrara, and afterwards, in compliance with the wish of his father, studied law, which he disliked and soon abandoned. After the death of his father, who left many children younger than Lodovico, he devoted much time to the support and education of his brothers and sisters. His early lyrical poems procured for him the patronage of Cardinal Ippolito d'Este, whose service he entered in 1503. He was employed by this cardinal, and his brother, the duke of Ferrara, in embassies to several Italian courts. In the intervals of his busy life he meditated and matured his great romantic and fantastic poem, "Orlando Furioso," which was published in 1516, and soon acquired universal popularity. More than sixty editions of it were issued in the sixteenth century. The subject of this imaginative epic is the chivalrous adventures of the paladins of the age of Charlemagne. The best English translations of it are those of Harrington and William Stuart Rose. In 1517 he entered the service of Alfonso, duke of Ferrara, in whom he found a liberal patron. He is said to have been a favorite associate of that prince, and to have enjoyed some ecclesiastical revenues. In 1521 he was appointed governor or commissary of Garfagnana, where he was required to enforce order among a turbulent and rude population addicted to brigandage and violence. In the latter part of his life he married privately a widow named Alessandra Benucci. He had continued to polish and revise his "Orlando Furioso," of which he published an enlarged edition in 1532, in forty-six cantos. He also produced, in Italian, five comedies in verse, seven satires formed on the Horatian model, a number of sonnets, and some Latin poems. He died at Ferrara June 6, 1533, leaving two natural sons. "Ariosto," says Hallam, "has been, after Homer, the favorite poet of Europe. His grace and facility, his clear and rapid stream of language, his variety and beauty of invention, his very transitions of subject, so frequently censured by critics, but artfully devised to spare the tediousness that hangs on a protracted story, left him no rival in general popularity. . . . The 'Orlando Furioso,' as a great single poem, has been very rarely surpassed in the living records of poetry. He must yield to three, and only three, of his predecessors. He has not the force, simplicity, and truth to nature of Homer, the exquisite style and sustained majesty of Virgil, nor the originality and boldness of Dante." (See Harrington, "Life of Ariosto," 1634; Giuniore, "La Vita di Lodovico Ariosto," 1807; Barotti, "Vita di L. Ariosto," 4 vols., 1766; Fabroni, "Elogi di Dante, di Poliziano, di Ariosto, e di Tasso," 1800; Carl L. Fernow, "Lebenslauf L. Ariosto's des Göttlichen," 1809.) William Jacobs.

Ariovis'tus [Ger. *Ariovist* or *Ehrenvest*], a chief of the ancient Suevi or Marcomanni, was a German. Solicited by the Sequani to aid them in a war against the Ædui, he marched (72 B. C.) with an army into Gaul, and took possession of that part which was afterwards Burgundy. The Gauls then applied to the Romans to liberate them from their new master. Ariovistus was defeated by Cæsar near Vesontium (Besançon) in 58 B. C., and fled across the Rhine.

Aris'pe, a township of Bureau co., Ill. Pop. 1216.

Aris'ta (Mariano), a Mexican general, born July 16, 1802, entered the army in his youth. Having served in several civil wars, he was made general of brigade in 1833, and was banished in that year by Santa Anna. He returned in 1835, became a general of division in 1841, and commanded the army which was defeated by General Taylor at Palo Alto in May, 1846. In June, 1848, he was appointed minister of war, and in 1850 was elected president of Mexico. Under his administration Mexico was disturbed by the usual chronic revolts and anarchy, and Arista was driven from power by Santa Anna early in 1853. He died in Spain Aug. 9, 1855.

Aristæn'etus [Ἀριστaίνετος], a Greek rhetorician of Bithynia, was a friend of Libanius. He was killed by an earthquake at Nicomedia in 358 A. D. He, or another of that name, is the reputed author of some fifty fictitious erotic letters (edited by Boissonade, 1822).

Aristæ'us [Gr. Ἀρισταῖος], a personage of classic mythology, represented as a son of Apollo and Cyrene. He married Autonoë, a daughter of Cadmus, was the father of Actæon, and a lover of Eurydice. He was worshipped as a divinity who presided over flocks and herds, and taught men the art of raising or managing bees. (See Virgil, "Georgics," book iv.)

Aristar'chus [Gr. Ἀρίσταρχος] **of Samos,** an eminent Greek astronomer, supposed to have flourished about 275 B. C. The events of his life are unknown. Archimedes, in one of his works, states that "Aristarchus of Samos supposes that the earth revolves about the sun in the circumference of a circle." All of his writings are lost except a short treatise "On the Magnitudes and Distances of the Sun and Moon." He calculated that the sun is twenty times farther than the moon from the earth. (See Fortia d'Urban, "Histoire d'Aristarque de Samos," 1810.)

Aristarchus, a Greek grammarian, educator, and critic, born in Samothrace, was a pupil of Aristophanes of Byzantium. He flourished about 150 B. C., and founded a school of grammar at Alexandria, in Egypt, where he passed the greater part of his life. He educated the sons of Ptolemy Philopator. His life was chiefly devoted to the critical study, explanation, and restoration of the works of Homer and other Greek poets. He is regarded by some persons as the greatest critic and philologist of antiquity; and it is generally agreed that as a commentator and critic of Homer he was more successful and meritorious than any other. He wrote commentaries on various poets, and some works on grammar, of which only fragments are extant. Died at the age of seventy-two. (See C. L. Matthesius, "Disputatio de Aristarcho Grammatico," 1725; K. Lehrs, "De Aristarchi Studiis Homericis," 1833.)

Aristi'des, or **Aristei'des** [Gr. Ἀριστείδης], surnamed the Just, an eminent Athenian statesman, a son of Lysimachus, was born in Alopeke, a demos of Attica. His political tendencies were conservative or aristocratic. He was one of the ten generals who had the command of the army when the Persians invaded Greece in 490 B. C. Each general had a right to the chief command for one day, but Aristides persuaded his colleagues to resign or waive their claims, so that Miltiades commanded at Marathon when it was not his turn. Aristides became chief archon in 489, and a political adversary of Themistocles, the leader of the democracy. On the pretext that his influence was dangerous to the public interest, he was ostracised in 483 B. C. On this occasion a citizen who was personally a stranger to him, and who could not write, requested him to write *Aristides* on a shell to be used in voting. He asked this voter if Aristides had injured him. "No," replied the citizen, "but I am tired of hearing him always called Aristides the Just." When Xerxes, king of Persia, invaded Greece with a mighty army in 480 B. C., Aristides sought an interview with Themistocles, took a prominent part in the battle of Salamis, and recovered his popularity. He commanded the Athenian troops, which, aided by other Greeks, defeated the Persians at Platæa in 479. Aristides and Cimon were appointed in 477 B. C. commanders of the Athenian forces which co-operated with other Greek armies against the Persians. Pausanias the Spartan had the chief command of the allied army, but he offended the allies by his arrogance, while Aristides by mildness and prudence gained general favor, and promoted the supremacy or predominance of Athens among the states of Greece. He died poor in 467 B. C., leaving a son and two daughters, who received dowries from the public treasury. Few statesmen have left so pure and honorable a reputation as Aristides. (See Plutarch, "Life of Aristides;" Cornelius Nepos, "Life of Aristides.") William Jacobs.

Aristides (Ælius), a Greek Sophist and rhetorician, born in Bithynia about 124 A. D., was a pupil of Polemon and Herodes Atticus. He acquired a high reputation for eloquence, and produced many orations and panegyrics, which display a brilliant style and skill in the choice and arrangement of words. He resided at Smyrna when that city was ruined by an earthquake in 178 A. D., and persuaded the emperor Marcus Aurelius to rebuild it. Died in 189 A. D. About fifty of his orations and treatises are extant. These were published by Dindorf in 3 vols., 1829.

Aristides of Thebes, an eminent Greek painter who lived about 350 B. C., and was a contemporary of Apelles. He had a brother, Nicomachus, who was a skilful painter. According to Pliny, Aristides was the first who expressed on the countenance the passions and movements of the soul. He painted a battle between the Greeks and Persians, which the Roman consul seized among the spoils of war and took to Rome.

Aristip'pus [Gr. Ἀρίστιππος], a Greek philosopher, the founder of the Cyrenaic school, was born at Cyrene, in Africa, about 425 B. C. He was a pupil of Socrates, but did not adopt his principles or imitate his mode of life. He travelled extensively, indulged freely in sensual pleasure, was intimate with the courtesan Lais at Corinth, and flourished as a courtier and philosophic voluptuary at Syracuse in the reign of Dionysius the Elder. Though he recognized pleasure as a proper subject of pursuit, he appears to have observed some moderation in that pursuit, and to have been remarkable for self-control and equanimity as well as versatility, and a faculty of adapting himself to the vicissitudes of fortune. Plato is reported to have said that "Aristippus was the only man he knew who could wear with equal grace fine clothes and rags." He was celebrated for his witty sayings and repartees, some of which are recorded

by Diogenes Laertius. His works, if he wrote any, have not come down to us. He despised or neglected mathematics and physical sciences. He died after 366 B. C., and left a daughter, Arete, who was distinguished as a philosopher. Wieland wrote in German a romance of "Aristippus and his Contemporaries" (4 vols., 1800–02). (See G. H. LEWES, "Biographical History of Philosophy;" F. MENTZ, "Aristippus Philosophus Socraticus, sive de ejus Vita," 1719; RITTER, "History of Philosophy.")

Aris'to or **Aris'ton** [Gr. Ἀρίστων] **of Chios,** surnamed THE SIREN, a Stoic philosopher who lived about 275 B. C., was a disciple of Zeno. He taught at Athens, and confined his attention to moral philosophy. He maintained that the chief good consists in indifference to everything except virtue and vice.

Aristobu'lus [Gr. Ἀριστόβουλος], a Greek historian who took part in the expedition of Alexander the Great against Persia, about 332 B. C., and wrote a history of the same, which is not extant. It was highly esteemed by the ancients.

Aristobulus, a Jew and philosopher who lived at Alexandria about 175–150 B. C. He was the reputed author of a Commentary on the Books of Moses, the aim of which was to show that the ancient Greek writers had borrowed much from the sacred books of the Hebrews.

Aristobulus I., high priest of the Jews, was a son of Joannes Hyrcanus. He assumed the title of king in 107 B. C., and died in 105, when he was succeeded by his brother, Alexander Jannæus.

Aristobulus II., a nephew of Aristobulus I., and a son of Alexander Jannæus, became king of the Jews about 70 B. C. Jerusalem was taken in 63 by Pompey, who gave the throne to Hyrcanus, a brother of Aristobulus, and carried the latter as a captive to Rome. Died about 48 B. C.

Aristoc'racy [Gr. ἀριστοκρατία, from ἄριστος, the "best," and κρατέω, to "govern"] signifies ideally a form of government controlled and administered by the best or noblest citizens. It is enumerated by Aristotle among the principal forms of government. Aristocracy is of very ancient origin, and in some countries of ancient times it prevailed as subsidiary to monarchy. The word may be defined as a government controlled by the nobility or privileged class, or a government in which a minority of adult males constitutes the ruling class. Such was the republic of Venice. The aristocratic element also predominated originally in the republic of ancient Rome, which was governed by patricians, whose power was hereditary. The feudal system of the Middle Ages favored the formation of powerful aristocracies. Among modern nations England is perhaps that in which the aristocracy is most influential and respectable. A title of nobility is the great prize for which British statesmen and soldiers compete, and the ranks of the ancient noble families are often reinforced by men of genius, who are raised to the peerage. There is probably no country where rank is more highly prized and ardently coveted, although the political power of the aristoracy has been reduced by the Reform Bill of 1867. In modern language, this word is used to denote nobility, or the higher class of society, without reference to government.

Aristogi'ton, or **Aristogeiton** [Gr. Ἀριστογείτων], an Athenian conspirator, an accomplice of Harmodius in the assassination of Hipparchus. He was put to death by Hippias in 514 B. C. He was regarded as a patriot by the Athenians, who erected statues to him and to Harmodius.

Aristolo'chia [from the Gr. ἄριστος, the "best," and λοχεία or λόχια, "childbirth"], a genus of plants of the natural order Aristolochiaceæ, are mostly natives of tropical countries, and have twining stems. The genus is characterized by a tubular oblique perianth, and by stamens adherent to the style. Some of the species climb to the tops of high trees and have handsome flowers. The *Aristolochia serpentaria,* or Virginian snakeroot, is a native of the U. S., possesses stimulant and tonic properties, and was once supposed to be a remedy for the bite of serpents. Similar virtues are ascribed to various species in different parts of the world. The root of this plant is exported from the U. S. to Europe, and is highly esteemed as a remedy in certain fevers. The *Aristolochia Clematitis* (birthwort) is a native of Europe, a perennial plant, with cordate leaves, erect stem, and grows in waste places, hedges, and among rubbish. The roots of these and many other species, which possess powerfully stimulating properties, have been used in medicine.

Aristolochia'ceæ, an order of exogenous plants, of which *Aristolochia* is the type. It comprises more than 130 species, mostly herbaceous plants or climbing shrubs, natives of warm climates, and particularly abundant in South America. The leaves are alternate, simple, and petiolate; the flowers are tubular perianths, axillary and solitary, and the stamens are epigynous. Several species are cultivated in hot-houses, and prized for the beauty of their flowers. The *Aristolochia Sipho* (pipe-vine or Dutchman's pipe), a native of the U. S., and a climbing shrub, is planted in Europe to form shady bowers. The U. S. have several other species.

Aristom'enes [Gr. Ἀριστομένης], a famous Messenian general who commanded the army of his state in the Second Messenian war. He was renowned for personal valor and daring enterprises. Having been finally defeated in 668 B. C., he went with his daughter and son-in-law to Rhodes. (See JOURDAN, "Histoire d'Aristomène," 1749.)

Aristoph'anes [Gr. Ἀριστοφάνης], the greatest comic poet of Greece, was born about 444 B. C., and is supposed to have been a native of Athens. Considering his celebrity, the materials for writing his biography are surprisingly meagre. His first work was "The Feasters" (427 B. C.), which is not extant. In 426 he produced "The Babylonians," the aim of which was to satirize the demagogue Cleon, who was his personal enemy. His "Acharnians" obtained the first prize in 425, and is still extant. Among his most admired dramas is "The Knights" (424 B. C.), in which he attacked and caricatured Cleon with great wit and virulence. In the performance of this play, which gained the first prize, the author acted the part of Cleon, as no other actor would venture to incur the resentment of that powerful popular favorite. Aristophanes was a conservative, and opposed innovations in politics, religion, and the social order. He was more distinguished for his ability to expose the depravity of human nature than for his capacity to appreciate its noble attributes and manifestations. Among his masterpieces is "The Clouds" (423 B. C.), an ingenious and powerful satire directed against the Sophists, of whom he represented Socrates as the head and master-spirit. He ridiculed and vilified Socrates, and excited the popular prejudice against him as a skeptic and corrupter of youth. He composed about fifty-four comedies, of which only eleven are extant, viz.: "The Acharnians" (425); "The Knights" (424); "The Clouds" (423); "The Wasps," which gained the prize in 422; "The Peace" (419); "The Birds" (414); "Lysistrata" (411); "Thesmophoriazusæ" (411); "Plutus" (408); "The Frogs" (405); "Ecclesiasuzæ" (392 B. C.). These plays belong to the old comedy. His wit is so involved in allusions to local events that modern readers find it difficult to appreciate or enjoy it. The purity of his style is greatly admired, and is said to be the only thing pure about his works. He died about 380 B. C. "The Acharnians," "The Knights," "The Birds," and "The Frogs" have been translated into English by J. Hookham Frere. (See H. T. RÖTSCHER, "Aristophanes und sein Zeitalter," 1827; H. POL, "Dissertatio de Aristophane," 1834; C. F. RANKE, "Commentatio de Aristophanis Vita," 1845.) WILLIAM JACOBS.

Ar'istotle was born at Stagira, a city of Thrace, but a Grecian colony, in the first year of the 99th Olympiad, or 384 B. C. His father was Nicomachus, a physician and friend of Amyntas, king of Macedon and father of Philip. The family of Aristotle was distinguished by the hereditary profession of medicine, and was wont to trace its origin to Machaon, son of Æsculapius. Left an orphan at an early age, he was brought up by Proxenus of Atarneus, in Mysia, to whose guardianship he seems to have been entrusted by his father, and whose memory Aristotle held so dear in after life that he erected a statue to him, and both instructed his son Nicanor in the liberal arts and adopted him as his heir. In his seventeenth year he went to Athens, and became a pupil of Plato, with whom he continued twenty years, and by whom he was called the reader and the intellect of the school, and likened, in his ardor and restiveness, to a colt, which needed the bit more than the spur. Upon the death of Plato (348 B. C.) he accepted an invitation of Hermeas, tyrant of Atarneus, his former fellow-pupil in the school of Plato, to take up his residence with him. Here Aristotle spent the three following years of his life, when Hermeas, conquered by a Persian invader, was sent a prisoner to Persia, where he was put to death by Artaxerxes. To avoid a like fate, Aristotle fled to Mitylene, taking with him Pythias, whom he married, and who is variously described as the mistress, the sister, and the niece of Hermeas. After her death he married his concubine Herpyllis, the mother of his son Nicomachus.

When Alexander of Macedon was born, Philip, his father, is said to have sent this letter to Aristotle: "Be it known unto you that I have a son, and that I am thankful to the gods, not so much for his birth as that he was born in your time. For if you will but take the charge of his education, I assure myself that he will become worthy of his father and of his future kingdom." The philosopher accepted the commission of the king, and there is evidence that he gave early directions respecting the care and cul-

ture of the infant prince. When Alexander was fifteen, Aristotle assumed the personal oversight of his instruction, taking up his residence at the court, and continuing there during the lifetime of Philip, and for two years after his pupil had ascended the throne. When the conquest of the East was undertaken, Aristotle returned to Athens, and taught philosophy in the Lyceum, a temple dedicated to the Lycian Apollo, with walks ornamented by trees, fountains, and colonnades. From these shady walks (περίπατοι) his school received the name of Peripatetic. He here abode and taught thirteen years, when, after the death of Alexander, he was accused by the Athenians of impiety, and fled to Chalcis in Eubœa, the present Negropont, in order to escape the fate of Socrates, or, as he said, that Athens might not have the opportunity to sin against philosophy again. Here he died (B. C. 322), in his sixty-third year.

His Character.—Aristotle's was one of the most highly gifted intellects of all the ages. All agree that his wealth of scientific knowledge, his unbiassed judgment, his constructive power, and his depth and breadth of speculative insight are unsurpassed in ancient or modern times. But the verdict is not so unanimous respecting his moral traits. By some of the ancients he is extolled for his patriotism, his reverence, his modesty, his moderation, his love of truth, and his attachment to his friends, while others hold him up as selfish, ungrateful, sordid, gluttonous, and impious. It must be owned, however, that few of the stories told in proof of either of these sides will bear a sharp look. They rest on frail grounds. But while we have little direct showing that can be trusted respecting the personal character of Aristotle, some points seem clear. The regard in which he ever held the memory of Proxenus, and the beautiful hymn to virtue which he composed in honor of Hermeas, and which we still have, show that he was not incapable of gratitude or of love to his friends. The charge often made that he was jealous of Plato does not hang with the fact of Aristotle's continued intimacy with Xenocrates, Plato's devoted disciple and successor, nor with an elegy, some verses of which have come down to us, in which Aristotle calls Plato one whom the bad might not even praise, and who first taught the world how a man could be at the same time good and happy. In his will he shows not only a judicious care, but an affectionate solicitude, for his family, while in his writings a lofty moral tone appears and a winning frankness and sincerity seem to shine.

His Writings.—These were very numerous, though only a small part, perhaps a fourth, remain, all of which probably differ more or less from the state in which Aristotle left them. Incompetent editors and ignorant transcribers have made almost as much mischief as the mould and mildew by which some of the original manuscripts are said to have been sadly injured, and some destroyed. But while the fragmentary and skeleton-like form which many of the so-called Aristotelian writings possess, joined to the evident omissions and the repetitions and contradictions which they contain, show the work of some other hands than those of the great master, there remains a solid nucleus of considerable size, whose purity of style and depth of speculative content bring us into the unmistakable presence of Aristotle himself.

His Philosophy.—Aristotle's method is exactly the reverse of Plato's, which he does not tire of making manifest. The attention which Plato had given to the unity of all being, Aristotle directs to the manifoldness of the phenomenal world. He is as analytic and discursive as Plato is synthetic and intuitive. While Plato finds in the universal the only light in which the particular can be seen, Aristotle sees the particular to be necessary in order that we may have any knowledge of the universal. So he gathers particulars from all quarters. History, the human mind, and all departments of nature furnish him contributions. He has no rival in the variety and extent of the facts which he has collected, and has never been surpassed in the patient industry of his investigations. But it is a great mistake, though one easily and often made, to judge thereby that Aristotle sought for nothing beyond experience, or that he and Plato represented only the opposite extremes of empiricism and idealism. The idea was as truly the object of Aristotle's search as it was of Plato's. Both Plato and Aristotle also agreed that the reality or the essence of individual things was in the idea. Aristotle also held as strongly as Plato to the objective existence of the idea. The doctrine of the Nominalists in the Middle Ages, that the idea or the universal is only a subjective product in which objects are represented, and by which they are named, though often ascribed to Aristotle, is but little less foreign to him than to Plato. But while to Plato the idea had an objective existence independent of the individual object which participated in it, to Aristotle the idea was immanent in the individual, and had no being separate from it. This accounts for the prodigious attention which Aristotle gave to individual facts. He collected these in such vast measure, not because they had any interest in themselves, and not because their collection and classification could give a satisfying science, but only for the sake of the idea which was immanent in them, and which was the only proper object in scientific inquiry, since it was the only object which could be truly known.

This immanence of the idea in the individual shows what was the most essential difference between Plato and Aristotle, and also what was the most characteristic and important doctrine in the Aristotelian philosophy. Aristotle criticises Plato because the Platonic ideas, being separate from and independent of phenomena, could not explain the existence of the phenomenal world. They are, in the Aristotelian view of Plato's doctrine, only potential, not actual, sources of individual things. But to the idea as universal Aristotle ascribes an activity which individualizes, but this individualization is not a change to anything without, nor because of anything without, but is wholly within the universal itself; it is a change thus into a difference which is at the same time an identity, a determining which is a self-determining, wherein the universal or the idea realizes or actualizes itself. This self-realizing of the idea is conformity to an end which is at the same time a self-end, a true Final Cause, wherein is the living principle and rational explanation of individual things. This doctrine of the final cause, or sufficient reason, which it is the immeasurable merit of Aristotle to have introduced into philosophy, carries us back to a principle deeper than that of efficient causation, and brings us from the world of necessity to that of freedom. Our modern physicists would gain a profounder view of nature and a more successful pursuit of science if they could know this principle as Aristotle taught it. They would find him, as the ancients called him, "the father of those who know." (See STAHR, "Aristotelia;" LEWES, "Aristotle;" GRANT, "Ethics of Aristotle;" TRENDELENBURG, "Comm. ad 'De Anima;'" HEGEL, "Geschichte der Philosophie;" RITTER, UEBERWEG, and SCHWEGLER, ditto.) J. H. SEELYE.

Aristox'enus [Gr. Ἀριστόξενος] **of Tarentum,** a Greek philosopher, a pupil of Aristotle, lived about 350–320 B. C. He wrote numerous works, which are lost, and a treatise on music ("Elements of Harmony"), which is extant and is accounted valuable. It was published by Meursius in 1616. He founded a school of musicians, who rejected the system of Pythagoras, and judged of the notes in the diatonic scale by the ear exclusively.

Arith'metic [Gr. ἀριθμητική, from ἀριθμός, a "number"], the science which treats of numbers or the art of computation, is a branch of mathematics. In the ordinary use of the term it is the art of expressing numbers by symbols, combining these symbols, and applying to them rules of the greatest practical utility. Among the ancient Greeks, Pythagoras, Archimedes, and others cultivated the science of numbers, but they labored under the disadvantage of a clumsy mode of notation, and had no sign for zero or naught. The Roman numerals, I, V, X, L, C, etc., continued to be commonly used in Europe until the fifteenth century. The invention of the symbols called Arabian numerals, now in use, is attributed to the Hindoos. The use of the cipher (0) gives the modern arithmetic a great advantage over the ancient. In the modern system of notation every symbol has a *local* as well as an *intrinsic* value. The intrinsic value of a symbol is the number it represents; the local value depends, *first*, upon the number of symbols used, and *secondly*, on the position of that symbol with respect to the others. The ordinary system is called *decimal*, because the calculations are performed by ten symbols or digits.

Arithmet'ical Mean, The, of two numbers is equidistant from those numbers, and is found by adding them together and dividing by 2. The mean of a series of numbers is the quotient obtained by dividing their sum by their number; thus the arithmetical mean of 1, 2, 7, and 10, is 5.

Arithmet'ical Progres'sion, a series of three or more numbers that increase or diminish by a common difference, as 5, 7, 9, 11, 13. To find the sum of such a series, multiply the sum of the first and last terms by half the number of terms.

A'rius (classical pronunciation *Ari'us*), or **Arei'us** [Gr. Ἄρειος], the founder of Arianism, was born at Cyrene, in Africa, near the middle of the third century. He was made a deacon by the patriarch Peter at Alexandria, and was placed in the highest rank in the clergy by the patriarch Alexander. About 318 A. D. a controversy arose between Arius and Alexander, which caused Constantine to summon a general council at Nicæa (Nice). This council pronounced the doctrines of Arius (who denied that the Son was coessential and coeternal with the Father) to be

heretical, and Arius, who was present at the council, was exiled to Illyricum. This sentence, however, was soon after revoked. Arianism was approved by the Synods of Tyre and Jerusalem in 335 A. D., soon after which Arius returned to Alexandria, where his presence created such a disturbance that he was under the necessity of retiring to Constantinople. He suddenly died in 336 A. D. Arianism was supported as the state religion by the emperor Constantine and by Valens. The Goths, Vandals, Suevi, and Longobardians of the fifth, sixth, and seventh centuries were mostly Arians. After the reunion of the Longobardians with the Catholic Church (662), Arianism as a sect soon ceased to exist. The followers of Arius were sometimes called Eusebians, from Eusebius, bishop of Berytus and Nicomedia. They became divided into two portions—the "Hetero-ousians" (strict or ultra-Arians), and "Homoiousians," who allowed the "similar essence" of the Son with the Father. (See NEANDER, "History of the Christian Church," and MAIMBOURG, "Histoire de l'Arianisme," a popular though not very trustworthy work.)

Arius, a genus of siluroid fishes in which the body is partially protected by strong bony plates. It has been suggested by Huxley that the ancient placoderm fishes (*Pterichthys* and *Coccosteus*) may have modern representatives in the plated siluroids, such as *Arius, Clarias,* etc.

Arizo'na, a Territory of the U. S., lying between the Rocky Mountains and the Sierra Nevada, bounded by Nevada and Utah on the N., New Mexico on the E., the republic of Mexico on the S., and California and Nevada on the W. It extends from 109° to 114° 25′ W. lon. from Greenwich in breadth, and from 31° 37′ to 37° N. lat., and has an area of 113,916 square miles, or 72,906,240 acres, varying very little from the united areas of New York, New Jersey, Pennsylvania, Delaware, and Maryland.

Surface, Mountains, Rivers, etc.—The surface of the Territory is generally elevated, and consists of wide plateaus, having a mean elevation in the N. of 7000 to 7500 feet above the sea-level, and sloping gradually southward, though occasionally broken by precipitous cliffs, till in the region S. of the Gila it has a height of from 60 to 100 feet above the sea. These plateaus are occasionally crossed by ranges of high mountains, and diversified by towering, isolated peaks, reaching an altitude of 12,000 to 14,000 feet above the sea. They are also riven in all directions by rivers and streams, which have, by ages of erosion, cut for themselves channels through the different strata to a depth varying from 1000 to nearly 7000 feet. These cañons, as they are called, are in some instances of great length, and their perpendicular walls of from 4000 to 7000 feet in height are occasionally broken by side cañons, of less depth, from tributaries of the larger rivers, which discharge their waters in cataracts over these walls. The Grand Cañon of the Colorado, 400 miles in length and ranging from 1500 to 6000 feet in height, with its numerous cataracts and its dark cavernous rapids and whirlpools, is one of the wonders of the world. The mountain-chains, which are mostly spurs and outliers from the Rocky Mountains, traverse the country, with one or two exceptions, from N. E. to S. W. The principal ranges are the Piloncillo, the Pinaleno, and Santa Catarina in the S. E.; a low range along the N. bank of the Gila; the Mongollon in the E., between the Gila and the Colorado Chiquito; the Zuni Mountains, between the Zuni and Rio Puerco, also in the E.; the Sierra de Tuni or Catamaza Mountains in the N. E.; the Sierra del Carizo and the San Francisco Mountains in the N.; the North-Side Mountains in the N. W.; the Aquarius and Black Mountains in the W.; and the Castle Dome Mountains in the S. W. There are also many isolated peaks and buttes in the Territory, some of them of great height. In the N. there is an isolated table-land of considerable extent, more than 1000 feet above the elevated plateau, called the Mesa de la Vaca, or "Table-land of the Cows." Nearer the centre of the Territory are the Blue Peaks, and farther W. Mount Kendrick, Mount Sitgreaves, Music Mount, Picacho Mount, and Mount Bill Williams. The San Francisco Mountains, which we have already mentioned, seem to have been a group of volcanoes, none of them now active, but centuries ago they poured out immense streams of lava, which flowed northward to the banks of the Colorado Chiquito. The geological formation of most of these mountains and mountain-ranges is granitic, though in the more western ranges there are indications of gneiss and of talcose, micaceous, and clay slates. The soil of the valleys and plateaus between the ranges generally consists of the detritus of these rocks, thus indicating that they underlie much of the surface of the country. It is computed that the successive cañons of the Colorado and its upper affluents expose to view, in all, geological strata to the thickness of 25,000 feet of the earth's surface; and all the formations known in American geology, up to the tertiary and drift formations, are found in their regular places. Nowhere on the globe is there a better opportunity of studying the geological structure of the earth. The whole Territory is drained by the Colorado of the West and its tributaries. This magnificent river, which has a length of more than 1200 miles, and drains a region more than 300,000 square miles in extent, is formed in Utah by the junction of the Green and Grand rivers; the former rising in Western Wyoming, the latter in the mountains of Colorado. From their union the Colorado flows S. W. to the northern boundary of Arizona, and, continuing in the same direction there for a short distance, turns sharply to the S. S. E., and thence W. N. W., until it strikes the Nevada boundary, where for 35 miles more, flowing N. W., it forms the northern boundary of Arizona; and at Fortification Rock turns directly S., and, forming the western boundary between Arizona, Nevada, and California, discharges its waters into the Gulf of California. For nearly 600 miles of its course in Arizona it flows through deep cañons, receiving numerous streams (more than 200 in all), and effecting a descent in its course through the Territory of not less than 3000 feet. The descent of the river through these formidable cañons, rapids, and cataracts has been several times attempted, and Colonel Powell, U. S. A., accomplished it with great peril to himself and party in 1869, and again in 1871. It is navigable, though with some difficulty, from its mouth as far as Callville, Nev., at the entrance to the Grand Cañon. The other rivers of Arizona, all of them affluents of the Colorado, are the Colorado Chiquito, or Little Colorado, a large stream, which, like the preceding, flows through deep cañons; the Gila, which crosses the Territory from E. to W. between the 33d and 34th parallels, and discharges its waters into the Colorado near its mouth; Bill Williams' Fork, Yampa Creek, and Diamond River, tributaries to the Colorado between the Colorado Chiquito and the Gila; the Zuni, Rio Puerco of the West, Cottonwood Fork, Bouche's Creek, Chevelon's Creek, and Cataract Creek, affluents of the Little Colorado; and the Rio de los Palos, Rio Prieto, Rio San Carlos, Rio Salinas, Rio Verde or San Francisco, which lower down takes the name of the Saladas, Agua Frio, Copper Creek; and on the S. side, Rio San Domingo, Rio San Pedro, and Rio Santa Cruz, affluents of the Gila. None of these rivers have much value for navigation, their principal importance depending on the demand for their waters for irrigation, mining, and manufacturing purposes.

Mineralogy.—Arizona probably surpasses every other State and Territory of the Union in the abundance and variety of its mineral treasures. Gold is found in every part of the Territory, both in placers and veins; silver is abundant and easily mined in the southern part of the Territory, the Heintzelman mine, or Cerro Colorado, yielding from $350 to $1000 to the ton of ore, and the Mowry, Santa Rita, Salero, Cahuabi, and San Pedro mines proving profitable for many years. Many gold and silver mines had been worked by the Spaniards and Mexicans successfully for years before the Territory came into possession of the U. S., and these mines are still largely productive. There are quicksilver-mines near La Paz; tin, nickel, and cinnabar are found in several localities; copper of great purity; lead, platinum; iron ore of several varieties, including the ores best adapted to making the finer qualities of iron and steel; bituminous coal near Camp Apache, and other qualities adapted to smelting purposes at several other localities; salt, sulphur, and gypsum, valuable mineral springs, natural loadstones of great magnetic power, and fossil woods in great variety occur in different portions of the Territory. There are also opal pebbles, garnets, red, white, and yellow; azurite, malachite, chalcedony, opals, sapphires, and possibly some diamonds.

Soil and Vegetation.—Aside from the barren and lava-covered sides of the isolated peaks, and the precipitous cañons and *mesas* or lofty table-lands, the soil of Arizona is generally fertile, needing only systematic irrigation to make it yield abundantly. Even those apparently worthless alkaline deserts, on which the candelabra cactus, the chapparal, the sagebush and the greasewood constitute the only vegetation, yield abundant crops when water is conducted to them. The region of the lower Colorado, which is often overflowed by the Colorado and the Gila, yields most astonishing crops. The great Colorado plateau of North-eastern and Eastern Arizona is for the most part covered with a heavy growth of forest trees—mainly the short-leaved southern pine, fir, and hemlock, scrub-oak, cedar, and juniper; while the mesquite, cottonwood, piloverde, and mountain mahogany are found in the more elevated valleys, and the cactus of numerous varieties in the lower and drier plains. The greater part of Arizona is an excellent grazing region, and if it could be protected from the raids of the Indians the Territory might become the finest stock-raising country on the continent. By the aid of irrigation where it is needed, and without it in the south-

ern portion along the lower Colorado and Gila, the cereals, maize, beans, onions, and semi-tropical fruits can be cultivated with great success. There is abundant evidence that this Territory once maintained a very dense population. The ruined cities, and the numerous and costly *acequias* (aqueducts) for conducting water for irrigation and other purposes, show that the intelligent and industrious tribes who were driven out by the Apaches had made great advances in civilization. Many of these acequias are still capable of being used with but moderate repairs.

Zoology.—All the wild animals of the Rocky Mountain and Sierra Nevada slopes are found here, and some genera and species which are rare or unknown farther N. The bison or American buffalo is not as abundant here as farther N., but deer of at least two species, antelopes, the big-horn or mountain sheep, are found in great numbers; the plains of Southern Arizona have large herds of wild horses, or mustangs; and of the beasts of prey there are pumas, jaguars, ocelots, black and grizzly bears, wild-cats, the red and the gray wolf, foxes, some peccaries, raccoons, and opossums, the sage-rabbit, several species of squirrels and prairie-dogs. Of birds there is a very great variety, Lieut. Wheeler's exploring expedition having sent to the Smithsonian Institution 500 specimens of 183 species; among them, a swamp-swallow never before found W. of the Rocky Mountains, and another species supposed heretofore to inhabit only the Arctic regions. Game birds are very abundant, especially in Southern Arizona, as well as many of the vulture and eagle tribes; the king vulture, or king of the buzzards, an enormous vulture, little inferior in size to the condor or the lämmergeier, being occasionally seen. Fish of species elsewhere unknown are found in the Colorado and its tributaries, and some species have been discovered in the mineral springs. Many of the fishes of these rivers are of very fine flavor and delicate flesh. There are also numerous species of mollusks. The serpents and reptiles of Arizona are very numerous and formidable. The rattlesnake abounds on the sandy mesas or table-lands, and among the chapparal and around the gigantic cereus or saguana, scorpions, lizards, centipedes, and horned toads are found. In some of the rivers of Southern Arizona there are alligators.

Climate.—In Northern and Central Arizona the air is dry and pure, sometimes cold, but there is seldom any snow, except on the mountain-summits, and frosts are rare. The heat of summer on the table-lands, where the forests are wanting, is sometimes great, but transient, and owing to the dryness of the atmosphere and the cool breezes from the mountains the nights are invariably comfortable and refreshing. Southern Arizona has a mild and delightful climate in winter, but the summers are excessively warm. The mercury rises at the mouth of the Gila to 120°, or even 126° F. in the shade, and to 160° or higher in the sun. This lower valley of the Colorado is overflowed every summer by the river, and there is considerable sickness from malarial fevers in consequence. The rainfall throughout the Territory occurs principally in June, July, August, and September, this being known as the rainy season. During the remainder of the year the cultivated fields must rely upon irrigation for their moisture.

Products.—According to the census of 1870, there were in that year 14,585 acres of improved land, and 7222 acres of unimproved land, in farms in Arizona, the value of which was estimated at $161,340, and the value of farming implements on them was $20,105. The wages paid to farm-laborers was $104,620, and the total estimated value of farm products was $227,998. This was exclusive of the lands cultivated by the Indians on reservations in the Territory, which must have been quite as much more. The number of horses broken to saddle or harness was 4432, of which only 335 were on farms; the number of neat cattle was 38,632, of which 33,500 were on the stock-ranges and the remainder on farms. The agricultural products reported were 27,052 bushels of wheat, 32,041 of corn, and 55,077 of barley. The commissioner of the land office estimated in 1870 that 6,000,000 acres of the Territory by the aid of irrigation are capable of yielding very large crops; that 55,000,000 acres were excellent grazing-lands, and the remainder was inarable from its broken and mountainous surface or the persistent drought. From the report of Lieut. Wheeler, now engaged in the survey of the Territory, it would appear that the fertile and arable lands are of larger extent than the commissioner had estimated. Lieut. Wheeler states that the Territory contains more good and arable lands than Nevada, and that even the high and apparently barren mesas or table-lands under the influence of irrigation, which, from their relation to the rivers, is almost universally practicable, would yield abundant crops.

There are few *manufactures*, and these only of the simpler and ruder kinds. The great industry of the Territory is *mining*, and this is prosecuted at so much hazard, from the depredations and outrages of the Apaches and some Mexican outlaws, that comparatively little is accomplished. Many of the gold and silver mines have been worked for nearly 200 years, but are now abandoned from the danger incurred in working them; others are of more recent discovery. There is no definite information concerning either the number or the annual yield of gold and silver in the mines now opened and worked in the Territory. There are probably fifty or sixty mines and placers on which some work has been done; but many of the mines, besides the danger from the Indians, have as yet an inadequate supply of water, and many others, yielding so far only the lower grade of silver ores (those yielding from $15 to $40 per ton of ore), are rendered unprofitable by the great expense of transportation between the mines and the smelting establishments. These difficulties will soon be obviated by the construction of mining canals and aqueducts and the building of railways. The Heintzelman mine is thus far the most productive, but the Mowry, Santa Rita, Salero, Cahuabi, San Pedro, Vulture, Tiger, and some of the newer mines, are yielding well.

Railroads.—There are as yet no railroads in the Territory, but two lines from the Mississippi to the Pacific coast: one starting from Vicksburg, following the 32d parallel to the vicinity of Tucson, and thence along the valleys of the Santa Cruz and Gila to the Colorado River, and having its termini at San Diego, San Pedro, and San Francisco; and the other starting from Memphis, following, with some deviations, the 35th parallel, is to cross Central Arizona, along the valley of the Rio Puerco of the West, and bridge the Colorado at the mouth of Pahute Creek, having for its ultimate destination San Francisco. Both these roads are now in active progress, work being prosecuted on them at both ends, and they will probably be completed in four or five years.

Finances.—The assessed value of real and personal property in Arizona in 1870 was $1,410,295; the true value, $3,440,791, exclusive of government property—forts, barracks, stores, etc.—and of property in the hands of Indian agents for distribution. The total local taxation the same year was $31,323, and the local debt, $10,500. This debt was paid off before Jan., 1872. The government expenses for territorial offices amount to $15,000. There are no banks, savings banks, or insurance companies in Arizona. The commerce of the Territory is conducted mainly through San Francisco and Santa Fé, N. M. The Territory had sent for coinage to the U. S. mint, up to June 30, 1872, $1,015,274.47, although much the greater part of its silver ores was sent to Swansea, Wales, for reduction, and the bullion subsequently sold in London. Several of the mining companies which reduced their own ores were English, and these shipped the bullion directly to England.

Population.—The population of Arizona, then a portion of New Mexico, was in 1860, 6482, leaving out of the count Indians not taxed—that is, still retaining their tribal organization. In 1870 there were 9658 of the settled population, including 9581 whites, 26 colored persons, 20 Chinese, and 31 civilized Indians. There were also 32,052 Indians sustaining tribal relations, of whom 4352 were on reservations or in villages, and it was estimated that 27,700 were nomadic. Of the 4352 Indians in villages or in reservations, 1277 were men, 1396 women, 925 male children, and 754 female children. Of the 9658 persons regularly enumerated, 5809 were of foreign birth. Of these, 4348 were natives of Mexico, 686 were natives of Great Britain and Ireland, 379 of Germany, 202 from other European states, 142 from British America, and 20 from China. Of the native-born population, 3849 in number, 1240 were born in the Territory, and the remainder in New York, Pennsylvania, Ohio, California, and Missouri. Of the 9658 persons, 6887 were males and 2771 females. The density of the population, excluding tribal Indians, is .085 to the square mile. The settlements of whites are mostly along the lower Colorado, the lower Gila, and the Santa Cruz rivers, in which regions are the greater number of silver and gold mines which have been worked of late. The Indian tribes of the Territory are the Apaches, who are subdivided into Tontos, Pinals, Arivapas, Mescaleros, Bonitos, and Cochise's Apaches; the Seviches, Apache Mohaves, Apache Coyoteros, and Cosninas; the Pimos, Maricopas, Papagos, Yumas, Mohaves proper, Pahutes, Hualapais, Chemehuevis, and Utes. There are also on the elevated mesas of the northern plateau some villages of the Moquis and other *pueblo* or town Indians, the small remainder of the ancient Aztec race, and some of them, perhaps, of a still earlier race, who had acquired many of the arts and refinements of civilization. Of these tribes, the six Apache tribes are all hostile, and have constantly been the terror of the settlers, as well as of the other Indians. Guerrillas, robbers, and murderers by profession, no portion of the settlements has been exempt from their daring and bloody raids. The territorial

legislature in 1871, in a memorial presented to Congress, furnished sworn evidence that in the two years previous 166 persons had been murdered, and 801 horses and mules and 2437 cattle killed or stolen by these lawless tribes. Recently, after a very severe punishment, they have for the first time sued for peace, and pledged themselves to remain on the reservations the government had assigned to them. Their repentance is not likely to be very enduring unless enforced with the strong hand. The other Indian tribes are either indifferent or strongly friendly to the whites.

Education.—The census statistics of 1870 report 149 children, all whites, as attending school, 64 natives and 85 of foreign birth, 79 males and 70 females, while 2690 persons of ten years of age and over could not read, and 2753 could not write. Of the latter, 262 were natives and 2491 of foreign birth. Under the heading "schools of all classes," it gives 1 school, with 7 teachers and 132 pupils, having an income of $6000 per annum. In Nov., 1871, Governor Safford stated in his message that by the first of January following they would have a free school in every district (there are thirty-four districts) in the Territory.

Libraries and Newspapers.—There were in the Territory in 1870 one public (territorial) library, with 1000 volumes, and five private libraries, with an aggregate of 1000 volumes in the five. There was at the same time one weekly newspaper, having a circulation among 280 subscribers, and issuing annually 14,560 copies.

Churches.—In 1870 there were 4 churches (all Roman Catholic) in the Territory, and 4 church edifices, having 2400 sittings and property worth $24,000.

Constitution, etc.—The Territory was organized from New Mexico Feb. 24, 1863, and its constitution and government are still territorial. The legislature meets annually in January. The governor is appointed by the President, and serves four years. The secretary of state, the treasurer (who is also receiver-general), and the auditor, as well as the delegate to Congress, are elected by the people. There is a U. S. district court for the Territory, the judge of which is also chief-justice of the territorial supreme court. There are two associate judges of this supreme court, and all three are appointed by the President. The supreme court holds one session annually at Tucson. There are also probate courts in each county. The territorial legislature has passed an act concerning common schools, which provides for the organization of districts and the levying of taxes for their support by the boards of county supervisors.

Counties—There were in 1870, 4 counties—viz. Mohave, population 179; Pima, 5716; Yavapai, 2142; and Yuma, 1621. In 1872 the N. W. corner of the Territory, embracing the lowest of the great bends of the Colorado River, and what is known as the Black Cañon, was set off as Pahute county. Its population must be very small.

Principal Towns.—Tucson, the capital, in 1870 had 3224 inhabitants. It is situated on the Santa Cruz River, in Pima county, in the southern part of the Territory, in lat. 32° 14′, and within a short distance of some excellent mines. The only other towns of importance are Arizona City, in Yuma county, situated in the S. W. corner of the Territory, on the Colorado, at the mouth of the Gila, and opposite Fort Yuma; population in 1870, 1144; Prescott, the county-seat of Yavapai county, and the former capital of the Territory, situated in about lat. 34° 35′ N., and lon. 112° 10′ W. from Greenwich; it had in 1870 a population of 668; Adamsville, Apache Pass, and Camp Grant, in Pima county; Ehrenberg and La Paz, in Yuma; Salt River Valley and Wickenberg, in Yavapai.

History.—The southern part of this Territory was occupied by the Spaniards and Spanish missionaries very early. The Jesuits had missions on the Santa Cruz River as early as 1600, and the ruins of their churches and convents are still in existence. There were also settlements in the seventeenth century on the Gila, the Rio Verde, and the Salinas. The whole Territory, as well as that of New Mexico, formed an integral part of the Mexican republic until 1848, when that portion lying N. of the Gila was ceded to the U. S. The Territory of New Mexico had originally for its northern boundary the 37th parallel to the 117th meridian, where it touched the boundary of California. In 1853 the U. S. government purchased from Mexico the territory lying S. of the Gila River and W. of the Rio del Norte, now known as the "Gadsden Purchase," and the triangular section S. of the 37th parallel, and between the 114th and the 117th meridians, was transferred to Nevada. Arizona was a county of New Mexico until Feb., 1863, when it was set off as a separate Territory and organized Feb. 24 of that year. Its growth and prosperity have been much hindered by the constant depredations and outrages of the Apaches, and prior to its organization as a Territory it was also the favorite haunt of outlaws from Mexico, Texas, Nevada, and California. These have now been mostly driven out, and its population is enterprising and law-abiding.

Governors.—

John A. Gurley, 1862–63.	Richard C. McCormick, 1866–68.
John N. Goodwin, 1863–64.	A. P. K. Safford, 1869–73.
M. M. Crocker (military), 1864–66.	

L. P. Brockett.

Arizo′na, a post-township of Burt co., Neb. Pop. 534.

Arizo′na Cit′y, a post-village of Yuma co., Arizona Ter., on the Colorado River, at the mouth of the Gila, 175 miles from the mouth of the Colorado. It has an extensive river-trade carried on in steamers. Pop. 1444.

Arjish′, a river of European Turkey, rises in the East Carpathian Mountains, flows south-eastward through Wallachia, and enters the Danube 42 miles S. S. E. of Bucharest. Length, estimated at 175 miles.

Arjish-Dagh. See Argæus, Mount.

Ark [Lat. *ar′ca*], a chest, a coffer, a large vessel. The term is principally used in a scriptural signification.

Ark of the Covenant [Heb. *aron;* Gr. κιβωτός]. This ark, together with the mercy-seat, was especially invested with sacredness and mystery by the ancient Jews. It is said to have been an oblong chest two and a half cubits long by one and a half broad and deep, overlaid within and without with gold, and supporting upon its lid the mercy-seat, with the cherubims. Its principal purpose or use was to contain inviolate the tables of stone upon which were written that "covenant" from which it derived its title. It was also the receptacle for the pot of manna and the rod of Aaron. It occupied the most holy spot (the "Holy of Holies") of the whole sanctuary, and thus excluded any idol from the centre of worship. (See Exodus xxv., xxxvii., xl.; also Smith's "Dictionary of the Bible.")

Arkadel′phia, a post-village, capital of Clark co., Ark. It is situated at the head of steam-navigation on the right shore of Washita River, 65 miles S. W. of Little Rock, on the Cairo and Fulton R. R. It has water-power, an active trade, one weekly newspaper, and is the seat of a State normal school; and was, during the first two years of the late civil war, a principal military dépôt for the States of Arkansas, Missouri, and Louisiana. On Feb. 15, 1863, a skirmish took place between a detachment of Union troops under Capt. Brown and a party of Confederates, in which the latter were defeated. Pop. 948.

Arkan′sas, a river of the U. S., next to the Missouri the longest affluent of the Mississippi, rises in the Rocky Mountains and in the W. central part of Colorado. Its general direction is eastward for more than 500 miles through extensive plains, large portions of which are sterile. Having crossed the eastern boundary of Colorado into the State of Kansas, and reached nearly the 98th degree of W. longitude, it turns and flows south-eastward through Kansas and the Indian Territory to Fort Smith, on the western boundary of Arkansas; continuing thence in a south-eastern course, it traverses the State of Arkansas, which it divides into two nearly equal portions, and enters the Mississippi in lat. 33° 54′ N., lon. 91° 10′ W. The whole length is 2170 miles. It is navigable by steamers 800 miles from its mouth during nine months of the year. The difference between high and low water in this river is about twenty-five feet.

Arkansas, one of the South-western States of the Union,

the twenty-fifth in the order of its admission as a State, bounded on the N. by Missouri, on the E. by Missouri, Tennessee, and Mississippi, being separated from the two latter by the Mississippi River; S. by Louisiana, and W. by Texas and the Indian Territory. Its area is 52,198 square miles, or 33,406,720 acres—about the same size as

England without Wales. It lies between the parallels of 33° and 36° 30′ N. lat., and between the meridians of 89° 40′ and 94° 42′ W. lon. from Greenwich.

Surface.—The surface of the State presents great variations of altitude. The eastern portion, from 30 to 100 miles W. of the Mississippi, is generally low, containing numerous lakes, bayous, and swamps, and, except some of the more elevated bluffs, is subject to inundation by the annual overflow of the Mississippi River. Beyond this level region the surface is moderately hilly, rising gradually towards the W. and N. W. The western and north-western sections consist of extensive and elevated prairies, broken by the passage across them of the Ozark Mountains in a north-westerly direction from Little Rock to South-western Missouri, and S. of the Arkansas River of the Masserne range, which stretches south-westerly from nearly the same point. The hills of the Ozark range rise to a general elevation of 1500 to 2000 feet, while some of the higher ridges and summits attain an altitude of 3000 feet. Besides these two ranges there are the Black Hills in the N., and the Ouachita or Wachita Hills in the W. The country N. of the Ozark range is very beautiful with its diversified scenery of hills, plains, prairie, and woodland, and the soil is very fertile and well watered. Indeed, the whole State may be said to be extremely well watered. The Mississippi River washes its eastern boundary from the N. line of Tennessee to the northern boundary of Louisiana. The Arkansas River, entering the State on the W. in lat. 35° 15′, crosses it diagonally, and discharges its waters into the Mississippi in about lat. 33° 40′. The St. Francis, the White River (with its large affluent, the Big Black), the Ouachita (with its tributary, the Saline), and the Red River (with one or two large branches), traverse portions of the State, and discharge their waters into the Mississippi at different points. These are all navigable rivers for at least three-fourths of the year. Almost every county is drained by these or some of their smaller tributaries. Forty-three counties are traversed by navigable streams, and the navigable waters of the State exceed 3000 miles in length.

Geology.—The eastern portion of the State, including the swampy and overflowed lands, is of alluvial or post-tertiary formation, and at no distant geological period formed a portion of the great lake or estuary which occupied the whole valley of the lower Mississippi. At the mouth of the Arkansas River this post-tertiary belt attains its greatest width in the Mississippi Valley, about 75 miles. It passes as the land rises gently into tertiary, which in turn is succeeded by a wedge-shaped tract of cretaceous rocks, narrow N. E. of the Arkansas River, and coming to a point nearly opposite Cairo, but widening rapidly between that and the Red River. N. of the Red River, and occupying some of the south-western counties, is a tract of primitive or azoic rocks, which extends into the Indian Territory, and is the only azoic tract in the State. Adjoining the cretaceous rocks on their N. W. border is a triangular tract of Silurian rocks, having its apex in Saline county and its base in Missouri. W. of this, and occupying all the remaining territory of the State except the small tract of azoic rocks already mentioned, are the carboniferous rocks, and on either side of the Arkansas River, between Little Rock and the western boundary of the State, are the two tracts of coal-measures which will eventually make Arkansas one of the largest coal-producing States in the Union. It will be seen, then, that the geological formations of the State include azoic, Silurian, carboniferous, cretaceous, tertiary, and post-tertiary rocks.

Mineralogy.—Gold has been found, but it is thought not in paying quantities, in White county. The galena of Sevier and Pulaski counties, and it is believed also the deposits of lead ore in Washington, Benton, Madison, Carroll, Newton, Marion, Searcy, Izard, Independence, Lawrence, and Randolph counties are argentiferous, yielding in some instances 73 per cent. of lead and 52½ ounces of silver to the ton. This is a higher percentage of silver than most of the argentiferous galena ores elsewhere yield. The zinc ores of the State are said to be equal to those of Silesia. Copper, manganese, and iron of the best quality are among the other metallic products of the State. The iron ores are of two or three kinds, and when combined produce an iron of great purity and tenacity. Some of the ore-beds are situated in close proximity to the coal-mines, and are worked to great advantage. The coal-fields cover about 12,000 square miles on both sides of the Arkansas River, and coal of good quality has been mined in Washington, Crawford, Sebastian, Franklin, Scott, Johnson, Yell, Pope, Perry, Conway, White, and Pulaski counties. The veins are from three to nine feet in thickness, and the coal is semi-bituminous, easily accessible, and containing very little sulphur. An analysis of a five-foot vein at Green's Bank in Sebastian county gave the following result: volatile matter, 13.75; coke, 86.25; and for the ultimate constituents, water, 1.40 per cent.; gas, 12.35; fixed carbon, 82.25; ashes, flesh-color, 4 per cent. There are also extensive beds of lignite in the south-eastern part of the State, of such quality as to be in demand for steamboat fuel. Marble of the pink and gray tints, and of excellent quality, has been found in various localities; Madison county has many quarries of it. Slate, said to be equal to the best Vermont, and suitable for all purposes, is quarried in Pulaski, Polk, Pike, and Sevier counties. There are extensive quarries of novaculite or "Arkansas hone or oil stone," by far the best hone-stone known, in Hot Springs and Grant counties. The Ozark Mountains are composed of the "millstone-grit formation," and the grindstones from that region are superior to the Nova Scotia burr-stones. Rock or quartz crystals of marvellous purity and transparency, and of large size, are found in Montgomery county and elsewhere in what are called the Crystal Mountains. Kaolin or porcelain clay, mineral paints or ochres, nitre earths, granite of excellent quality, building stone (both sandstone and limestone), marls, greensand, and salt are among the other mineral treasures of the State. "The Hot Springs of Arkansas," very widely known everywhere for their healing qualities, are situated in Hot Springs county, about 60 miles S. W. from Little Rock. The springs are fifty-four in number, and range in temperature from 93° to 148° F. They contain a large amount of carbonic acid and the carbonates of the alkalies and alkaline earths, and have a very high reputation in diseases of the lungs and liver, and indeed in most chronic diseases. There are many other mineral springs in the State, and in Fulton county a mammoth spring, apparently charged with carbonic acid, which is constantly effervescing, has a uniform temperature of 60° F. in winter and summer, and flows at the rate of 8000 barrels per minute.

Vegetation.—Arkansas has extensive forests of valuable timber. Pine of the finest quality is found in the hill-country, and occasionally in the bottom-lands. It is said that the yellow-pine timber-lands cover one-fourth of the area of the State. Dense forests of cypress grow on the bottom-lands and along the lakes and bayous, and single trees are often met with that will yield 6000 feet of lumber. There are many varieties of oak in the State, the most valuable of which are the white oak and a kindred species called the "overcup oak," which grows to a great size, its trunk being often five feet or more in diameter. This is much used for the manufacture of pipe-staves for sugar and tobacco hogsheads. The other timber trees of the State are red cedar, of which there are large tracts in the northern and western sections; black walnut, tupelo gum, wild cherry, maple, black locust, sassafras, red mulberry, and Osage orange, the latter growing to a great size in the Red River valley. There are also among the forest trees ash, hickory, gum, beech, pecan, sycamore, elm, cottonwood, cedar, buttonwood, and hackberry, and of ornamental trees and evergreens the holly, willow, catlep, China tree, box-elder, butternut, palmetto, dogwood, plum, hornbeam, ironwood, mockernut, juniper, and laurel. The undergrowth of the forests consists chiefly of scrub oak, arrowwood gum, sassafras, hazel, sumac, hickory, dogwood, and kinnikinnick, with extensive canebrakes in the lowlands. Among the wild fruits and berries are the pawpaw, persimmon, haw, whortleberry, wild plum, and chinquapin. The cultivated fruits are abundant and of excellent quality. Apples are especially fine in the hill-country. Peaches ripen from the first of June to the first of November, and pears from midsummer to January. Plums, apricots, cherries, nectarines, and all the small fruits, as grapes, blackberries, strawberries, etc., are of fine quality and yield profusely. The grape is extensively cultivated both for the table and for wine, and in the long and moderately warm seasons it comes to a rare perfection. All the cereals, as well as Indian corn, yield abundant crops. Root crops do well, and the native grasses of Arkansas, which include thirty-five varieties, are remarkable for their succulence and their fattening properties. The hay crop is more important in Arkansas than in any other Southern State. Cotton is the great staple, and is largely grown, both on the alluvial lands and on the hills. There is hardly another State in the Union which has so large a proportion of arable lands.

Zoology.—Wild game, consisting of bears, deer, turkeys, ducks, prairie-chickens, and quail, is abundant, and the rivers, lakes, and bayous are well stocked with fish, among which are pickerel, black bass, buffalo, and catfish, the latter sometimes weighing 150 pounds. In the bayous and lakes, and in the Red, Ouachita, and Arkansas rivers, the alligator occasionally makes his appearance, though less abundant than in Louisiana and Texas. Serpents and other reptiles are plentiful in the lowlands, and the rattlesnake and moccasin are found in the hills.

Climate.—Arkansas has as a whole a very fine climate. It is sheltered from the northers by the mountains on the N. and N. W., and from the fierce heats of the Louisiana lowlands by its diversified surface and its long river-valleys. The eastern portion of the State is low and hot, and in the swampy and overflowed lands there is considerable malarial disease —fever and ague, congestive chills, and sometimes yellow fever—but on the higher lands the temperature is equable and the range of the thermometer not excessive. In 1870 the extreme range of the thermometer for the year at Little Rock was 92°; the highest point reached was 96° for one day in September; the lowest point was 4° above zero for one day in December; the average temperature of the four months, June, July, August, and September, was 78° 30′; and the average of the three winter months, December, January, and February, 43°. The mean temperature for the year was 62°. The rainfall ranges from 55 to 60 inches annually. The climate has a high reputation for the relief of pulmonary diseases, and from the vital statistics of the census of 1870 would seem to deserve it.

Products.—The agricultural products of the State in 1872 were: Indian corn, 17,710,000 bushels; wheat, 702,000 bushels; rye, 40,000 bushels; oats, 703,000 bushels; rice (in 1870), 73,021 pounds; peas and beans, 47,376 bushels; potatoes, Irish (*Solanum tuberosum*), 400,000 bushels; potatoes, sweet (*Batatus edulis*), 712,000 bushels; tobacco, 770,000 pounds; hay, 12,500 tons; cotton, 283,372 bales of 450 pounds each; wool (in 1870), 214,784 pounds; beeswax (in 1870), 12,789 pounds; honey, 276,324 pounds; butter (in 1870), 2,753,931 pounds; cheese, 2119 pounds; milk sold, 31,350 gallons. The orchard products in 1870 were $157,219; products of market-gardens, $55,697; forest products, $34,225; wine, 3734 gallons; cane-sugar, 92 hogsheads; maple sugar, 1185 pounds; cane molasses, 72,008 gallons; sorghum molasses, 147,203 gallons; maple molasses, 75 gallons. The number of acres of improved land in farms in 1870 was 1,859,821; of unimproved land in farms, 5,737,475 acres, of which 3,910,325 were in woodland, and 1,827,150 in other unimproved lands; so that only 22.6 per cent. of the land of the State is as yet taken up in farms. The present cash value of the farms of the State (in 1870) was $40,029,698, and of farming implements and machinery, $2,237,409. The total amount of wages paid for farm labor during that year was $4,061,952, and the total estimated value of all farm productions, including betterments and additions to stock, was $40,701,699. The valuation of all live-stock in 1870 was $17,222,556, and of animals slaughtered for provisions, $3,843,923. In Jan., 1873, the number of horses, as estimated by the agricultural department, was 160,700, and their value, $14,302,300; the number of mules was 82,800, and their value, $9,108,000; the number of milch cows was 150,300, and their value, $3,081,000; the number of oxen and other cattle was 251,300, and their value, $4,523,400; the number of sheep was 160,400, and their value, $321,200; the number of swine was 1,067,400, and their value, $4,269,600; making the total value of live-stock at that time, $35,604,500.

The manufacturing industry of the State, though not fully represented in the census, is not large; but it will doubtless increase, as no State in the Union has more abundant water-power, cheaper fuel, or a larger supply of the raw material for manufactures in close proximity to fuel and to good markets. The State had in 1870 two cotton-mills, capital $13,000, using 66,400 pounds of cotton of the value of $13,780, and producing $22,362 worth of goods, at a cost for labor of $4100. There were at the same date 13 woollen manufactories, with $32,500 capital, using 115,330 pounds of domestic wool, valued at $55,782, and producing goods valued at $78,690, with a cost of labor of $6870. There were also 283 establishments for ginning cotton, with a capital of $344,825; 35 for the manufacture of leather, capital $32,100; 212 saw-mills, capital $694,400; 272 flour and meal mills, capital $477,151. The whole number of manufacturing establishments in the State was 1364, capital $2,137,738; steam-engines, 300, with 6980 horse-power; water-wheels, 134, with 1599 horse-power, employing 4133 males above sixteen years of age, 48 females above sixteen, and 271 children; wages paid during the year, $754,950; value of materials used, $4,823,651; value of annual products, $7,699,676. The home manufactures of the State, not included in these, were reported in the census of 1870 to amount to $807,573.

Railroads.—The railroads already completed, and to be completed by Jan. 1, 1874, have an extent of 1169 miles. Of these roads, only 128 miles were completed on the first of Jan., 1870, and ten years earlier there were but 38½ miles in operation. Of the roads now nearly or quite completed, several are trunk-roads, forming portions of the great routes to the Pacific or to Texas. Thus, the Memphis and Little Rock and the Little Rock and Fort Smith, both, we believe, now in operation, form important sections of the Pacific road which is now in progress along the 35th parallel. They will also connect by a short link with nearly 3000 miles of complete railway to the North-west. The Mississippi Red River and Ouachita R. R., starting from Chicot on the Mississippi River and extending westward to Fulton on the Red River, will sustain nearly the same relations to the Pacific road along the 32d parallel and to the International of Texas as the roads previously named do to the line of the 35th parallel. More than 70 of its 155 miles are completed. The Cairo and Fulton R. R., extending from Cairo (Ill.) and from St. Louis, *viâ* the Iron Mountain R. R., to Fulton on the Red River, where it joins the International of Texas, traversing fifteen counties of the State, and forming a part of the grand trunk-line from Chicago and St. Louis to Texas, and ultimately to Mexico, is one of the most important of the Arkansas railroads. It is 301 miles in length, is nearly completed, and will be finished by Jan. 1, 1874. Other important railways in the State are the Arkansas Central, from Little Rock to Helena; the Little Rock Pine Bluff and New Orleans R. R. and its branch, extending from Little Rock to the Mississippi River at Chicot and to the Louisiana line; the Helena branch of the Cairo and Fulton R. R.; the Memphis Shreveport and Jefferson Branch R. R., which leaves the Memphis and Little Rock at Duvall's Bluff; the Arkansas and Louisiana R. R. from Little Rock to Alexandria (La.), not yet graded; and the Arkansas Western, which is to be the connecting link between the road on the 35th parallel and the network of railroads in Kansas and South-western Missouri. There have been awarded to these railroads by the State the loan of its credit to the extent of $15,000 per mile to roads having no land-grant, and $10,000 per mile to those having land-grants. These credits and bonds, having thirty years to run and bearing interest at 6 per cent., the interest to be paid by the roads, have been awarded to the extent of 850 miles, or $11,400,000, but only a portion of the bonds have yet been issued. The land-grants to these companies are not far from 6,000,000 acres.

Finances.—The State debt of Arkansas, present and (so far as the railroads are concerned) prospective, amounts to $19,398,000, and is classified as follows: funded debt, including the amount due to the Smithsonian Institution, loaned to the State many years ago by the general government, $4,430,000; State-aid railroad bonds, as specified above, $11,400,000 (not all issued yet); levee bonds, $3,000,000 (only about $1,600,000 yet issued); ten-year bonds to supply casual deficits, $300,000; floating debt, $268,000. The railroads will generally be able to pay the interest on their bonds, so that the financial position of the State is not discreditable to it. The valuation of property is rapidly increasing: in 1870 the entire assessed valuation, real and personal (which was about 50 per cent. of the real values), was $94,528,843; in 1872 it had increased to nearly $120,000,000, of which a little more than $80,000,000 was real estate, and not quite $40,000,000 personal property. The true valuation in 1870, according to the ninth census, was $156,394,691. Aside from the State debt, there are county debts, mostly the issue of county bonds to railroads, etc., and town and city debts. The former amounted in 1870 to $536,649, and the latter to $154,986. The taxation (aside from national taxes) in 1870 reached the sum of $2,866,890, of which $950,894 was the State tax, $1,738,760 county taxes, and $177,236 town and city taxes. The State tax now yields a little more, and the credit of the State is fast improving. As an interior and riparian State, Arkansas has no foreign commerce and no large river-port. Her cotton is mostly shipped through Memphis and New Orleans. Her interior commerce through her navigable rivers and her rapidly extending railroad system is already considerable, and is fast increasing.

Banks and Private Banking-houses.—There are two national banks in the State—the Merchants' National at Little Rock, with a capital of $150,000, and the National Bank of Western Arkansas at Fort Smith, capital $55,000. There are no State banks and no savings banks. There are ten private banking-houses—three at Little Rock, two at Fayetteville, two at Pine Bluff, and one each at Augusta, Camden, and Helena.

Insurance.—There were no life, fire, or marine insurance companies in the State up to Oct., 1872, but several of the St. Louis, Memphis, Richmond, and New Orleans companies, and perhaps others, had agencies at Little Rock and other points.

Population.—Arkansas was organized as a Territory in 1819, and its first appearance as a distinct Territory in the census was in 1820, when it had 14,255 inhabitants, though settlements within its present boundaries, but then belonging to the Territory of Louisiana, had been reported in 1810 as having 1062 inhabitants; in 1830 the number was 30,388; in 1840, after it had been admitted as a State, 97,574; in 1850, 209,897; in 1860, 435,450; and in 1870, 484,471. Its

population now considerably exceeds 525,000. The density of the population at the last census was nearly 9.3 inhabitants to the square mile. The greater part of the State is considerably below this average, and only a tract comprising six or seven counties on both sides of the Arkansas River in the centre of the State is materially above it. Of the population in 1870, 362,115 were whites, 122,169 colored, 98 Chinese, and 89 Indians. Of the whole number, 479,445 were natives of the U. S., and 5026 were of foreign birth; of the natives, 10,617 had one or both parents foreign, 9893 had a foreign father, 8484 a foreign mother, and 7760 had a foreign father and foreign mother. Of the natives, 170,398 whites, 62,463 colored, and 21 Indians, or nearly one-half, were born in Arkansas, about 230,000 in the other Southern and South-western States, and the remainder in the Northern and Western States and Territories. The foreigners were mostly Germans and Irish. Of the total population, 248,261 were males and 236,210 females; of the native population, 244,491 were males and 234,954 females; of the foreign population, 3770 were males and 1256 females; of the whites, 186,445 were males and 175,670 females; of the colored races, 61,680 were males and 60,489 females. Dividing these, again, into negroes and mulattoes, there were 55,436 male negroes and 54,395 females; 6244 male mulattoes and 6092 females. Of the whole population, 84,645 males and 80,847 females were of school age, or between five and eighteen years.

Education.—The whole number of children attending school during some part of the year 1869–70 in the State was 62,572, of whom 62,546 were natives and 26 foreigners; 56,788 were whites and 5784 colored; 33,068 males and 29,504 females. Of persons ten years old and over, 111,799 could not read, and 133,339 could not write. Of these, 28,298 were white males and 35,797 white females; 34,896 were colored males and 34,326 colored females. There were in the State, according to the census, 1978 schools of all classes, with 2297 teachers, of whom 1653 were males and 644 females; 81,526 pupils, of whom 41,939 were males and 39,587 females. The total income for the support of these schools for the year ending June 1, 1870, was $681,962, of which $7300 was from endowment, $555,331 from taxation and public funds, and 119,331 from other sources, including tuition. Of these 1978 schools, 1744 were public, including 1 normal school, with 3 teachers and 62 scholars, with $10,061 income; 3 high schools, with 6 teachers and 140 scholars, and $3600 income; 225 graded common schools, with 289 teachers and 11,887 pupils, and an income of $93,500; 1515 ungraded common schools, with 1668 teachers, 59,956 scholars, and an income of $445,300. There were also 3 colleges, with 10 professors, 235 students, of whom 125 were males and 110 females, and $7700 income. Of these, St. John's College at Little Rock was founded in 1857 by the Masons, and is sustained by them; Judson University at Prospect Bluff is sustained by the Baptists, and Cane Hill College at Cane Hill by the Christians. There were 30 academies, with 61 teachers and 2144 pupils, of whom 1102 were males and 1042 females, and $25,387 income. There were four technical schools; a State asylum for the blind at Little Rock, established in 1859, which, according to the census, had 4 teachers and 30 pupils (a later report makes the number of teachers and employés 11, and of pupils 40), and an income of $11,000 (the report of commissioner of education says $18,000); one institute for the deaf and dumb, also at Little Rock, with 22 teachers and employés, 72 pupils, and an income of $22,452; 2 schools of art and music, with 3 teachers, 20 pupils, and $1000 income. There were also 187 day and boarding schools, with 241 teachers, 6818 scholars (3484 males and 3334 females), and $67,214 income; and 10 parochial and charity schools, with 11 teachers, 210 pupils, and $6300 income. The "Educational Year-Book" for 1873 makes the number of teachers in the public schools 2035; their salaries in the country, $40 to $100 per month, in the cities, $75 to $125 per month. There are 10 school superintendents, one to each judicial circuit, each having a salary of $3000 per annum. The school fund is $95,501. The number of children of school age is 194,314, of whom 182,474 are registered, but the average attendance is only 32,863. The newly established school system of the State, organized in 1868, and since amended, is very efficient. By the amendments adopted in 1873 education is made compulsory between certain ages. The board of education, which possesses large powers, consists of the State superintendent of schools and the ten circuit superintendents. The State superintendent is elected by the people on the general State ticket, and serves for four years; the circuit superintendents are appointed by the governor for four years. A district trustee is elected annually in each school district, who has charge of the school affairs and local educational interests of his district, and is the executive school officer within his jurisdiction. The State board of education prescribes lists of text-books, puts in operation the provisions of the school law, and makes all needful rules and regulations respecting common schools and the general educational interests of the State. It directs also the establishment of separate schools for white and colored children and youth. The teachers are examined by the circuit superintendents. The schools of Arkansas have received hitherto about $9500 annually from the Peabody fund. A State industrial university to receive the agricultural land-grants was established at Fayetteville in 1871.

Libraries.—The census of 1870 reports 1181 libraries of all classes, public and private, in the State, with an aggregate of 135,564 volumes; of these, 888 were private, and contained 81,232 volumes; of the remaining 293, 1 is the State Library, with 12,500 volumes; 6 are town or city libraries, with an aggregate of 250 volumes; 29 are court or law libraries, with 5747 volumes; 216 were Sabbath-school libraries, with 29,412 volumes, and 37 church libraries, with 4930 volumes. There were also 4 circulating libraries, with 1493 volumes.

Newspapers and Periodicals.—In 1870 there were 56 newspapers and periodicals of all descriptions in the State, having a circulation of 29,830, and issuing 1,824,860 copies annually. Of these, 3 were dailies (4 dailies in 1872), having a circulation of 1250; 1 was a tri-weekly, with a circulation of 300 (there were 2 tri-weekly papers in 1872); 48 were weeklies, having a circulation of 26,280, and 4 were monthlies, with a circulation of 2000. Two of these were agricultural, with a circulation of 1000, and printing 12,000 copies annually; 52 were political—viz. 48 weekly, 1 tri-weekly, and 3 daily—with an aggregate circulation of 27,830, and printing annually 1,800,860 copies; 1 was religious, a monthly, with a circulation of 500, and an annual issue of 6000 copies; and 1 educational, with the same circulation and annual issue.

Churches.—There were, according to the census in 1870, 1371 church organizations of all denominations in the State, and 1141 church edifices, having 264,225 sittings, and holding church property valued at $854,975. Of these, 463 were regular Baptist churches, with 394 edifices, 103,250 sittings, and $195,725 of church property (the "Baptist Almanac" for 1873 gives the number of churches in 1872 as 648, with 408 ministers and 36,040 members); of other Baptist denominations (Christians, Disciples, etc.), there were 100 churches, 68 church edifices, 15,150 sittings, and property valued at $38,725; of Episcopalians there were 15 churches, 13 church edifices, 3695 sittings, and property valued at $43,450 (the "Protestant Episcopal Almanac" for 1873 gives Arkansas 1 diocese, 1 bishop, 11 presbyters, 715 communicants, 153 baptisms, and 131 confirmations); there was 1 Jewish synagogue, with 300 sittings and $6500 of property; 2 Lutheran churches and 2 church edifices, with 1025 sittings and property valued at $10,000; there were 583 Methodist congregations, 485 church edifices, 91,890 sittings, and property valued at $276,850. It is difficult to ascertain the exact numbers of the Methodists in the State, as they belong to four or five different organizations, some of which do not publish detailed statistics. The Southern Methodist Church had about 34,000 members in 1872; the Protestant Methodists about 4000; the colored Methodists probably 6000 or 7000, and all others perhaps 10,000; of regular Presbyterians (*i. e.*, Presbyterian Church South and Associate Reformed Synod of the South) there were 106 churches, 87 church edifices, 23,175 sittings, $101,625 of church property (there were in 1872 only 39 ordained ministers reported in the "Presbyterian Almanac"); of other Presbyterians (Cumberland) there were 55 churches, 44 edifices, 10,425 sittings, $77,500 of church property (the Cumberland Presbyterians in 1872 had 87 ordained ministers in Arkansas, and probably a larger number of churches); there were 11 Roman Catholic congregations, 11 church edifices, 5250 sittings, $82,500 of church property, 1 diocese, that of Little Rock, or "Petropolis," and 1 bishop; there was 1 Universalist congregation, 1 church edifice, valued at $400, and with 200 sittings; there were 34 congregations designated as Union, 35 church edifices, 9865 sittings, $21,700 church property.

Constitution, Courts, Representatives in Congress, etc.—The present constitution of the State was adopted by the constitutional convention of the State Feb. 11, 1868, and ratified by the people Mar. 13, 1868. It provides, among other things, that the paramount allegiance of every citizen is due to the Federal government in the exercise of all its constitutional powers, as defined by the Supreme Court of the U. S., and that no power exists in the people of this or any other State of the Union to dissolve their connection therewith, or perform any act tending to impair, subvert, or resist the supreme authority of the U. S. The equality of all persons before the law shall be recognized and ever remain inviolate, nor shall any citizen ever be deprived of

any right, privilege, or immunity, nor exempted from any burden or duty, on account of race, color, or previous condition. The State officers are a governor, lieutenant-governor, secretary of state, auditor, treasurer, attorney-general, and superintendent of public schools, all chosen by the qualified electors at a general election. Their term of office is four years. The legislature consists of a senate of 24 members, chosen for four years, and a house of representatives of 82 members, chosen for two years. The legislature meets biennially in January. Every male person born in the U. S., and every male person who is naturalized or has declared his intention to become a citizen, who is twenty-one years old or upward, and has resided in the State for six months next preceding the election—except criminals, idiots, insane persons, soldiers and sailors in the service of the U. S., and certain classes who participated in the civil war—shall be deemed an elector. The supreme court of the State consists of one chief-justice and four associate justices, all appointed by the governor for eight years. It has appellate jurisdiction. There are ten circuits, to each of which there is a circuit court, which has original jurisdiction over all criminal cases not otherwise expressly provided for by law. The judges and district attorneys of these courts are appointed by the governor, with the advice and consent of the senate, for the term of four years. The constitution makes it the duty of the general assembly to establish and maintain free schools. By the act of Congress of Dec. 14, 1871, Arkansas is entitled to four representatives in Congress during the present decade.

Counties.—There are 64 counties in the State, as follows:

Counties.	Pop. in 1870.	Pop. in 1860.	Pop. in 1850.
Arkansas	8,268	8,844	3,245
Ashley	8,042	8,590	2,058
Benton	13,831	9,306	3,710
Boone	7,032		
Bradley	8,646	8,388	3,829
Calhoun	3,853	4,103	
Carroll	5,780	9,383	4,614
Chicot	7,214	9,234	5,115
Clarke	11,953	9,735	4,070
Columbia	11,397	12,449	
Conway	8,112	6,697	3,583
Craighead	4,577	3,066	
Crawford	8,957	7,850	7,960
Crittenden	3,831	4,920	2,648
Cross	3,915		
Dallas	5,707	8,283	6,877
Desha	6,125	6,459	2,911
Drew	9,960	9,078	3,276
Franklin	9,627	7,298	3,972
Fulton	4,843	4,024	1,819
Grant	3,943		
Greene	7,573	5,843	2,593
Hempstead	13,768	13,989	7,672
Hot Springs	5,877	5,635	3,609
Independence	14,566	14,307	7,767
Izard	6,806	7,215	3,213
Jackson	7,268	10,493	3,086
Jefferson	15,733	14,971	5,834
Johnson	9,152	7,612	5,227
La Fayette	9,139	8,464	5,220
Lawrence	5,981	9,372	5,274
Little River	3,236		
Lincoln	new co.		
Madison	8,231	7,740	4,823
Marion	3,979	6,192	2,308
Mississippi	3,633	3,895	2,368
Monroe	8,336	5,657	2,049
Montgomery	2,984	3,633	1,958
Newton	4,374	3,393	1,758
Nevada	new co.		
Ouachita	12,975	12,936	9,591
Perry	2,685	2,465	978
Phillips	15,372	14,877	6,935
Pike	3,788	4,025	1,861
Poinsett	1,720	3,621	2,308
Polk	3,376	4,262	1,263
Pope	8,386	7,883	4,710
Prairie	5,604	8,854	2,097
Pulaski	32,066	11,699	5,657
Randolph	7,466	6,261	3,275
St. Francis	6,714	8,672	4,479
Saline	3,911	6,640	3,903
Sarber	3,764	new co.	
Scott	7,483	5,145	3,083
Searcy	5,614	5,271	1,979
Sebastian	12,940	9,238	
Sevier	4,492	10,516	4,240
Sharpe	5,400		
Union	10,571	12,288	10,298
Van Buren	5,107	5,357	2,864
Washington	17,266	14,673	9,970
White	10,347	8,316	2,619
Woodruff	6,891		
Yell	8,048	6,333	3,341

Lincoln, Nevada, and Sarber counties were organized by the legislature in 1871.

Principal Towns.—Little Rock, the capital of the State, is also the largest town. It is pleasantly situated on the Arkansas River at a point where it is always navigable, and is now also a railroad centre for six or seven important railroads, several of them trunk-lines. It has also some manufactories. It is growing very rapidly. Its population in 1850 was 2167; in 1860, 3727; in 1870, 12,380; and it has now (1873) nearly 20,000 inhabitants. The other towns of importance are Fort Smith, in Sebastian county, also on the Arkansas River, on the W. line of the State, population 2227; Van Buren, nearly opposite Fort Smith, but in Crawford county, population 3296; Pine Bluff, on the Lower Arkansas, in Jefferson county, population 2081; Helena, on the Mississippi, in Phillips county, population 2249; Hot Springs, in Hot Springs county, the site of the famous mineral springs, population 1276; Camden, in Ouachita county, population 1612; Fayetteville, in Washington county, in the N. W. part of the State, population 955; and Dardanelle, in Yell county, in the W. part of the State, population 926.

History.—The first settlement within the present limits of Arkansas was made in 1670 by the French, on or near the St. Francis River, where it discharges its waters into the Mississippi. It was a portion of the French territory until 1803, when Louisiana Territory, of which it was a part, was purchased from France by President Jefferson to give the U. S. control of the Mississippi River. In 1812, Louisiana having been admitted into the Union as a State, the remaining territory was reorganized as Missouri Territory, and in 1819, Missouri having framed a State constitution, Arkansas and the Indian Territory were organized as Arkansas Territory, and remained in that condition until June 15, 1836, when the State with its present boundaries was admitted into the Union as the twenty-fifth State. Its progress was slow for a time. It had, as we have seen, less than 100,000 inhabitants in 1840, and but 209,897 in 1850. Between 1850 and 1860 its fertile lands and facilities for shipping cotton attracted large numbers of cotton-planters to it from the Atlantic and Gulf slave States, and its population more than doubled during that decade. Settled almost exclusively from the Southern States, its population were very thoroughly identified with the maintenance of slavery, and it entered heartily into the secession movement, though not quite so early as some of the States E. of the Mississippi. The State convention assembled at Little Rock and passed the ordinance of secession Mar. 4, 1861. During the war Arkansas had its full share of the disasters and wretchedness caused by war. A large number of its own citizens were with the Southern armies, and much of its territory was overrun by the hostile forces. The battles of Pea Ridge and Fayetteville, as well as several lesser engagements, were fought in its N. W. section in 1862, the capture of Arkansas Post took place in Jan., 1863, and during the same year Helena and Little Rock were captured, and Gen. Grant's army marched through the bottom-lands W. of the Mississippi to Bruinsburg and Hard Times landings, on their way to the siege and capture of Vicksburg. Before the close of 1863 the State was substantially controlled by the Federal troops. On the 8th of Jan., 1864, a convention was assembled to revise the State constitution. The amended constitution was adopted by the people Mar. 18, 1864, by a vote of 12,177 in its favor and 226 against it. The legislature was reorganized under the new constitution, but it was not recognized by Congress as a legal government. Though ready to abolish slavery, the people were not at that time prepared to remove the disabilities under which the adherents to the Union party had labored, and for the next four years they were remanded to the control of a military government. This was administered generally with lenity and justice, but the people were restless under it. In 1867, Arkansas was united with Mississippi as the fourth military district, and Brigadier-General E. O. C. Ord was placed in command of it. He directed an election for a State constitutional convention to be held in Nov., 1867. The election resulted in a majority of 14,000 for a convention, which met Jan. 8, 1868, and on the 4th of Feb. following reported a constitution, which was adopted and ratified by the people Mar. 13, 1868. The State was restored to the Union by vote of Congress June 22, 1868, over the veto of President Johnson. At the first election of State officers held under the new constitution, Col. Powell Clayton, who had been an officer in the Federal army, was elected governor, and held the office until 1871, when he was elected U. S. Senator, and the lieutenant-governor became acting governor. In 1872 an election took place for governor at the same time with the Presidential election, and Elisha Baxter, Republican, was reported elected by a majority of 3266 over Mr. Brooks, the Democratic and Liberal Republican candidate. There was, however, a contest as to the legality of the vote in some of the districts, and some of the supporters of Governor Baxter becoming dissatisfied with his action, an effort was made to unseat him by a vote of the legislature, declaring the election void through fraud. The supreme court

of the State having decided that this could not be accomplished, Mr. Brooks in June, 1873, proceeded against the governor with an action of *quo warranto* brought in one of the counties of the State.

Governors.—The governors of the State have been as follows:

Territorial.		State.	
James Miller	1819–25	James S. Conway	1836–40
George Izard	1825–29	Archibald Yell	1840–44
John Pope	1829–35	Samuel Adams (acting)	1844–44
William S. Fulton	1835–36	Thomas S. Drew	1844–48
		John S. Roane	1848–52
		Elias N. Conway	1852–60
		Henry M. Rector	1860–64
		Isaac Murphy	1864–68
		Powell Clayton	1868–71
		Ozro A. Hadley (acting)	1871–72
		Elisha Baxter	1872–

Presidential Votes.—Arkansas was admitted into the Union in 1836, and cast her first vote for President in November of that year. This and the subsequent votes have been as follows:

Elect. year.	Elec. vote.	Successful candidate.	Democratic candidate.	Pop. vote.	Whig and Rep. cands.	Pop. vote.
1836	3	Van Buren..	Van Buren..	2,400	Harrison.	1,238
1840	3	Harrison.....	Van Buren..	6,049	Harrison.	5,160
1844	3	Polk.....	Polk.....	9,546	Clay.	5,504
1848	3	Taylor	Cass.....	9,300	Taylor.	7,588
1852	4	Pierce.....	Pierce.....	12,173	Scott.	7,404
1856	4	Buchanan ...	Buchanan ...	21,910	Fillmore.	10,787
1860	4	Lincoln	Breck'ridge.	28,732	Bell. / Dougl's.	20,094 / 5,227
1864		no vote	no vote			
1868	5	Grant	Seymour.	19,078	Grant.....	22,112
1872	6	Grant	Greeley.	37,927	Grant.....	41,073

L. P. Brockett.

Arkansas, a county in the E. S. E. of Arkansas, contains about 1200 square miles. It is bounded on the S. W. by the Arkansas River, and bounded on the E. by the White River, both of which are navigable for steamboats. The surface is generally level, and forms part of the Grand Prairie. This county is made up of fine prairie and bottom lands. Corn and cotton are the staple crops. Capital, De Witt. Pop. 8268.

Arkansas, a township of Arkansas co., Ark. Pop. 683.

Arkansas City, on the southern border of Kansas, in Cowley co., is at the confluence of the Arkansas and Walnut rivers. The town commands the trade of the adjoining country and territory. Although the town is but three years old, it has one weekly newspaper, a wagon-and-carriage manufactory, stores, shops, etc. in abundance. Three years ago it was the hunting-ground of the Osage Indians, who frequently visit the place to trade. The location of the town is high, dry, and healthy. Its support is from the vast farming region by which it is surrounded, and from the Texan cattle and Indian trade.

C. M. Scott, Pub. "Arkansas City Traveller."

Arkan'sas In'dians, now generally called **Quapaws,** a tribe allied by language to the Dakotas, formerly resided on the Ohio. Like the northern Dakotas, they appear to have been once divided into several bands or minor tribes. Driven from their old haunts by the Illinois and other Indians, they went southward, and became the constant and powerful allies of the French of Louisiana. They number at present some 200, and live in the Indian Territory.

Arkansas Post, a post-village of Arkansas co., Ark., on the left bank of the Arkansas River, 50 miles from its mouth, 117 miles S. E. of Little Rock, settled by the French in 1685. During the civil war this post was garrisoned and fortified by the Confederates. On Jan. 11, 1863, a combined attack of the U. S. military and naval forces under General McClernand and Admiral Porter was made upon the place, and its works were finally carried by storm. A large number of prisoners were captured, and immense quantities of *matériel,* stores, etc.

Arkansas Stone, a material largely employed for hones and oil-stones, consists of novaculite, which is quarried extensively in Hot Springs and Grant counties, Ark. Some of it is wrought in the neighborhood, but most of it is carried to New Albany, Ind., where it is cut and prepared for market. It is a very beautiful and valuable stone.

Ark'ansite, a name given to the thick black crystals of brookite (titanic acid), found at Magnet Cove in the Ozark Mountains of Arkansas.

Arko'na, or **Arcona,** a promontory on the N. side of the Prussian island of Rügen, in the Baltic. Here is a lighthouse on the site of the heathen temple of Swantewit, which King Waldemar of Denmark burned in 1168.

Ar'kose, a rock composed of fragments of felspar; a kind of felspathic sandstone.

Ark'wright, a township of Chautauqua co., N. Y. Pop. 1030.

Arkwright (Sir Richard), an English inventor noted for his great improvements in the cotton manufacture, was born at Preston, in Lancashire, Dec. 23, 1732. He learned the trade of a barber, which he soon abandoned, and applied himself to the invention of machinery for spinning cotton. At that time no machine had been invented that could produce cotton yarn of sufficient strength and tenuity to be fit for warp. In 1768 he set up at Preston his first spinning-frame, for which he obtained a patent in 1769. He removed to Nottingham in 1769, and formed a partnership with Need and Strutt. His machine caused a great extension of the cotton manufacture, and greatly promoted the prosperity of the nation. He became the proprietor of several cotton-mills moved by water-power, which he managed with great ability and success, and he may be called the founder of the factory system, for he introduced a system of management so admirable that it was generally adopted, and has never been materially improved. Although his patent was infringed, and he was defeated in several lawsuits which he instituted to defend his rights, his business prospered, and he amassed a fortune of about £500,000. He was knighted by George III. in 1786. Died Aug. 3, 1792. (See "Edinburgh Review" for June, 1827; Baines, "History of the Cotton Manufacture in Great Britain," 1835.)

Arlar'ka, a township of Macon co., N. C. Pop. 542.

Arlaud (Jacques Antoine), a Swiss miniature-painter, born at Geneva May 18, 1668, worked in Paris and London with success. He was a friend of Sir Isaac Newton. Died at Geneva May 25, 1746.

Arles (anc. *Ar'elas, Arela'te,* or *Arela'tum*), a city of France, in the department of Bouches-du-Rhône, and on the E. bank of the Rhone, 15 miles from the Mediterranean and 53 miles by rail N. W. of Marseilles. The railway which connects Lyons with Marseilles passes through it. It has a cathedral of the seventh century, a museum, a college, and a public library. It was once the capital of the kingdom of Arelate. Important councils of the Church were held here in 314, 354, 452, and 475 A. D. Here are the remains of a grand Roman amphitheatre, and an ancient granite obelisk which was dug out of the Rhone about 1389. Arles has manufactures of hats, silk, brandy, etc. Its trade is facilitated by the steamboat navigation of the Rhone and by two canals. A famous statue called "Venus of Arles" was discovered here. Pop. in 1866, 26,367.

Arlincourt, d' (Victor), Vicomte, a French poet and novelist, born near Versailles in 1789. Among his chief works is an epic poem called "Charlemagne, ou la Caroléide" (1818), and "Le Solitaire," a novel (1825), which had some success. His style is eccentric. Died in 1856.

Ar'lington, a post-village of Westfield township, Bureau co., Ill., on the Chicago Burlington and Quincy R. R., 92 miles S. W. of Chicago.

Arlington, a post-village and township of Middlesex co., Mass., 7 miles by railroad N. W. of Boston. It has a gas company, water-works, and horse and steam railroad to Boston. A large supply of ice is sent to market. There are five churches, and important manufactures. The principal business is market-gardening. The town has a savings bank, a public library, and a weekly newspaper. Pop. of township, 3261. J. L. Parker, Ed. "Advocate."

Arlington, a post-township of Van Buren co., Mich. Pop. 1360.

Arlington, a post-township of Sibley co., Minn. Pop. 752.

Arlington, a post-township of Phelps co., Mo. Pop. 1190.

Arlington, a post-village and township of Bennington co., Vt., 15 miles N. of Bennington. Here are marble quarries, a mineral spring, and a cave with stalactites. It has extensive manufactures of wooden ware, lumber, sash, blinds, doors, etc. Pop. of township, 1636.

Arlington, a post-township of Alexandria co., Va. Here are the old mansion of the Custis family, two national cemeteries, a "freedmen's village," and other points of interest made historic during the late civil war. Pop. 1374.

Arlington, a township of Columbia co., Wis. Pop. 822.

Arlington (Henry **Bennet**), Earl of, born in 1618, served as a royalist in the civil war (1642–45), was knighted at Bruges (1658), became secretary of state (1662), a baron (1664), a member of the "Cabal" (1667), received the Garter, and was sent as ambassador to the king of France in the same year; was impeached by the Commons, resigned, and was appointed lord chamberlain (1674). Died July 28, 1685.

Arlon (anc. *Orolannum*), a frontier town of Belgium, capital of the province of Luxembourg, 22 miles by rail W. N. W. of Luxembourg. It has manufactures of wool-

len stuffs, and an active trade in grain, etc. Pop. in 1866, 5779.

Arlt (FERDINAND), a distinguished German oculist, was born April 18, 1812. He wrote, among other works, "Krankheiten des Auges" (3 vols., 1851–56; 4th ed. 1867), "Pflege der Augen im gesunden und kranken Zustande" (3d ed. 1865).

Arm (THE HUMAN) consists of two portions—the arm proper and the fore arm; the former having one bone, the humerus, which moves freely upon the scapula, forming the shoulder-joint; and the latter having two bones, the radius and ulna, which move upon each other and upon the humerus, forming the elbow-joint. These connect below with the eight small bones of the carpus or wrist. The humerus is attached to the acromion process of the shoulder-blade by a ball-and-socket joint, allowing great freedom of motion; and were it not for the muscles surrounding the joint, it would be frequently dislocated, but it is supported by muscles on all sides except at the armpit, into which the head of the bone is sometimes driven. The roundness of the shoulder is due to the head of the humerus, so that displacement is generally accompanied by a flattening which suggests the nature of the accident. On the shoulder is a large muscle, the deltoid, which lifts the arm from the side. At the back is the triceps, which extends the fore arm; in front are two muscles which bend it—the biceps and the brachialis anticus; and on each side below are muscles passing to the fore arm and hand; while above the great muscle of the back (latissimus dorsi) and that of the chest (the pectoralis major) are inserted on each side of the groove, wherein lies one of the tendons of the biceps. The motions of the ulna are flexion and extension, its projections being received in these movements into corresponding depressions on the humerus. The rotatory movements of the hand are principally due to the radius, the head of which rolls upon the ulna, turning the palm downward (pronation), or upward (supination), these movements being effected by muscles which, taking their fixed points from the humerus and ulna, turn the radius upon the latter. The elbow-joint is hinge-like, and has strong lateral ligaments; but it is liable to dislocations, often accompanied by fracture, especially in the young. The arm affords interesting illustrations of some principles of mechanics. The insertion of the muscles so near to the fulcra or centres of motion involves a loss of power; there is, however, a corresponding gain in velocity at the end of the lever; and for most of the purposes to which the hand is put agility is of far greater moment than dead strength. The arm is supplied with blood by the brachial artery, the continuation of the axillary. The superficial veins collect into large trunks, which unite at the bend of the elbow, and then pass to the axillary—on the outside by the cephalic vein, on the inside by the basilic. The nerves pass from the brachial plexus by the side of the artery, and diverge from it to their ultimate distribution; the musculo-spiral passing back to appear on the outside, and giving off the radial and posterior interosseous nerves; the ulnar running behind the internal condyle, for which it has obtained the name of "crazy bone," from the electric-like thrill which passes along the arm when the nerve is struck. The median, as its name implies, keeps a middle course with the artery. In wounds of the fore arm the bleeding may be controlled by pressure of the brachial artery, on the inner side of the biceps, against the bone. Much interest is also furnished by the comparison of the arm and hand of man (see HAND) with the anterior extremities of other animals. Essentially the same bones and other parts are found in the fore limb of a mole, the fore leg of a horse, the paddle of a whale, and the wing of a bird, although modified in each to suit the uses of the animal. In variety of movement and facility of prehension the arm of man far excels that of any other creature.

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Arma'da, a post-township of Macomb co., Mich. Pop. of village, 494; of township, 1721.

Arma'da, The Spanish, often called the "Invincible Armada," a great Spanish fleet or armament which was fitted out by Philip II. for the conquest of England in 1588. It consisted of about 130 vessels, some of which were of enormous size, carrying in all 2431 guns and more than 19,000 soldiers. The command of this armada was given to the duke of Medina Sidonia, who was not a competent naval commander. Lord Howard of Effingham commanded the English fleet, which was greatly inferior in size. The armada sailed from Spain about the end of May, 1588, and in passing through the English Channel was harassed by the English, who avoided a general engagement. During a night in August, Lord Howard sent eight fire-ships against the armada, and produced a panic and great disorder, in consequence of which the English captured or destroyed about twelve ships early the next morning. This defeat induced the Spanish admiral to abandon the invasion of England, and he resolved to return to Spain by sailing around the Orkney Islands, the passage of the English Channel being closed by the enemy. Many of the Spanish ships were wrecked on their circuitous voyage, and only fifty-three returned to Spain.

Armadil'lo (*i. e.* in Spanish, the "little [animal] in armor"), (the *Dasypus* of the naturalists), a genus of animals of the order Edentata, natives of South and Central America. They derive their name from a bony armor which covers the body, and consists of polygonal plates not connected by joints, but united to form solid bucklers, one over the rump and one over the shoulders. Between these two bucklers are a number of plates disposed in transverse bands, which are movable and allow freedom of motion. The head is protected by a similar buckler, not connected with that of the body. The largest species is about three feet long, exclusive of the tail. They have short legs and feet adapted to burrowing in the ground, in which, when pursued by enemies, they bury themselves quickly. These animals are nocturnal, and feed on insects, carrion, and vegetable food. Their flesh is often eaten by the natives, but, owing to its rank and strong flavor, it is not agreeable to European palates. The *Glyptodon* is an extinct and gigantic kind of armadillo.

Armadillos.

Armaged'don [supposed to be equivalent to *Ar-Megiddo*, "mountain of Megiddo"] is applied by some writers to the elevated table-land of Esdraelon, the great battle-field of Palestine.

Ar'magh, an inland county of Ireland, in Ulster, is bounded on the N. by Lough Neagh, on the E. by Down, on the S. by Louth, and on the W. by Monaghan and Tyrone. Area, 512 square miles. The surface is undulating or level, except the S. W. part, where Slieve Gullion rises to the height of 1893 feet. The soil is mostly fertile. The chief rivers are the Bann, Blackwater, and Callan. Granite, trap, carboniferous limestone, and lower Silurian rocks underlie the county. Capital, Armagh. Pop. of the county (exclusive of the city) in 1871, 179,221.

Armagh (*Ard-magha*, the "high field"), a city of Ireland, capital of the above county, is situated on high ground 36 miles by rail S. W. of Belfast. It is built of limestone quarried in the vicinity, and has a Protestant cathedral of red sandstone crowning the central eminence, down the sides of which the streets diverge. Armagh is the archiepiscopal seat of the primate and metropolitan of all Ireland, both in the Anglican and Roman Catholic churches. It has a Roman Catholic cathedral, a large public library, and a lunatic asylum. It was the capital of Ireland in the sixth and seventh centuries, and was renowned as a school of theology, etc. Pop. in 1871, 8952.

Armagh, a post-village of East Wheatfield township, Indiana co., Pa. Pop. 177.

Armagh, a township of Mifflin co., Pa. Pop. 1873.

Armagnac, a former name of a region in France, now comprised in Gers and parts of Haut-Garonne, Tarn-et-Garonne, and Lot-et-Garonne. Its ancient counts were feudal to the crown of France until the time of Henry IV., who united it in his own person to the crown. In later times the title of count of Armagnac was an honorary one.

Armagnac, d' (BERNARD), COUNT, constable of France, was an ambitious and turbulent nobleman. He became in 1407 the enemy of the duke of Burgundy and the chief of the faction called "Armagnacs," who waged a civil war against the Burgundians. In 1415 he obtained the office of constable of France, the highest in the nation. Having excited by his tyranny the odium of the Parisians, he was killed by the populace June 12, 1418.

Armagnac, d' (JEAN V.), COUNT, a grandson of Bernard, noticed above, was born about 1420. He was notorious for his crimes, and was excommunicated by the pope. As a party to the League of Public Good, he revolted against Louis XI. in 1465. He was put to death by order of that king Mar. 5, 1473.

Armand (CHARLES), MARQUIS DE LA ROUARIE, a French officer, born in 1756, fought for the U. S. 1777–83. He rose to the rank of general of brigade. Died in France Jan. 30, 1793.

Arman'di (PIERRE DAMIEN), an officer of the French army, was born in Italy in 1778. He served as colonel under Napoleon I. In 1848–49 he fought for the Italian patriots against Austria. He wrote in French an able "Military History of Elephants" (1843). Died in 1855.

Ar'mansperg', von (Joseph Ludwig), Count, an able German statesman, born in Bavaria in 1787. He became a leader of the liberal party, Bavarian minister of finance in 1826, and minister of foreign affairs in 1828. By the influence of the Catholic priests he was removed from office in 1831. From Jan., 1833, to Feb., 1837, he governed Greece as regent or chief minister under King Otho, who was a minor. Died in 1853.

Armato'li, or **Ar'matoles,** a body of Greek militia organized about 1500 A. D., or earlier. They lived and operated in mountainous regions that were difficult of access, and were very tenacious of their independence. They were employed by the Turkish sultan to protect the fertile plains from the raids of the *klephts* (mountain-robbers) of Thessaly. Northern Greece was divided into about sixteen districts, each of which was placed under the supervision of an armatol. In the war of Greek independence the armatoles fought against the Turks, and distinguished themselves by daring exploits.

Ar'mature [from the Lat. *armatu'ra,* "armor"], a piece of soft iron which is placed in contact with the poles of an artificial magnet to preserve its magnetic power. If a magnet remains long idle, having no object on which to exert its attractive force, it loses part of its strength. The armature when placed against the poles of a magnet becomes itself a magnet, the north pole of which is in contact with the south pole of the horseshoe magnet. A larger weight can be suspended from the armature, thus placed, than the poles of the other magnet can sustain without an armature.

Arme'nia [Turk. *Erminee'yeh*], an important country of Western Asia which has now no political existence, but is historically very interesting as the original seat of an ancient civilized people (Armenians), who have preserved their nationality to the present time. Armenia, the boundaries of which varied in different periods, was situated between Asia Minor and the Caspian Sea. It was mostly included between lat. 37° and 42° N., and between lon. 36° and 49° E. It was divided into Armenia Major and Armenia Minor, the former of which was bounded on the N. E. by the river Kur, on the E. by the Caspian Sea, and on the W. partly by the Euphrates. The Lesser Armenia was situated on the western side of the other. This country is an elevated table-land, enclosed on several sides by the ranges of Taurus and Anti-Taurus, and partly occupied by other mountains, the highest of which is the volcanic peak of Ararat. It is drained by the Euphrates and Tigris, which rise within its limits, and traversed by the river Aras (Araxes). Among its physical features are the large lakes of Van and Sevan, the former of which is saline. It abounds in romantic mountain-scenery. The chief towns of ancient Armenia were Artaxata, Anni, and Tigranocerta. The Armenians call themselves *Haiks,* or *Haikans,* a name derived from Haik or Haig, represented as the first king of Armenia and a descendant of Japhet. Among the most famous of their ancient kings was Dikran or Tigranes, who lived about 550 B. C., and was a friend and ally of Cyrus the Great. The kingdom was conquered by Alexander the Great in 325 B. C., and recovered its independence about 190 B. C. It was afterwards ruled by the Parthian Arsacidæ, among whom was Tigranes the Great, a son-in-law of Mithridates, king of Pontus. He waged war against the Romans, and was defeated about 63 B. C. The Armenians adopted the Christian religion about 250 A. D., and still adhere to that faith. Since the Christian era this country has been the subject and scene of many bloody contests between the Romans, Persians, Byzantine Greeks, Saracens, Turks, etc., who have successively been masters of it. It is now divided between Russia, Persia, and Turkey. The scourge of war and persecution for religious opinions drove great numbers of the Armenians from their native land, and they are now dispersed in various parts of Europe and Asia Minor. The number of Armenians is estimated at from 2,500,000 to 3,000,000, of whom about 1,000,000 live in Armenia. The climate of Armenia is very cold in the highlands, while the summer heat of the valleys is intense. Here is a variety of soils, some of which in the valleys produce good crops of cotton, rice, tobacco, and grapes. Grazing and cattle-breeding are more extensively followed than agriculture. Among its mineral resources are copper, iron, lead, alum, and salt. The chief modern towns are Erivan, Erzroom, and Van. The Armenians (who are now only a small minority of the population) are physically a fine variety of the Indo-European race. They have excellent talents for business, and are especially skilful in banking and mercantile pursuits. (See St.-Martin, "Mémoire historique et géographique sur l'Arménie," 1818; Curzon, "Armenia," 1854; Strecker, "Beiträge zur Geographie von Hoch-Armenien," 1869.)

A. J. Schem.

Armenia, a township of Bradford co., Pa. Pop. 391.

Armenia, a post-township of Juneau co., Wis. P. 254.

Armenian Church. Christianity is said to have been introduced into Armenia by the apostle Thaddæus, and is admitted to have become, through the influence of Gregory the Illuminator, the established religion of the state in 289. Political troubles prevented the Armenian Church from taking part in the Council at Chalcedon (451). Hence a misunderstanding, which led the Armenians to set up a separate communion in 491, without ever having become really monophysitic. Among their greatest divines was Nerses of Klah (about 1150), whose works have been repeatedly published. The head of the Armenian Church, called catholicos, resides near Erivan, the capital of Russian Armenia, to which place every Armenian is required to make a pilgrimage once in his life. The Armenians believe in the worship of saints, but not in purgatory, and are especially rigid in the observance of fasts. A small portion of the Armenians in Turkey, Persia, Austria, and Russia have recognized the supremacy of the pope, and are called United Armenians. Of late, a split has taken place among the United Armenians of Turkey, as the majority of their bishops opposed the changes which the pope made in the ancient constitution of their Church. They were on that account excommunicated by the pope, and in 1872 entered into official communication with the Old Catholics of Germany. In 1830 a Protestant mission among the Armenians was organized by the American Board of Commissioners of Foreign Missions. The mission was very successful, and in 1872 more than 3000 Armenians were members of the Protestant churches. (See the "Life and Times of S. Gregory the Illuminator," by Rev. S. C. Malan, London, 1868; Hamachod, "Chronological Succession of Armenian Patriarchs," 1865.) Revised by R. D. Hitchcock.

Armenian Language and Literature. The Armenian language is a branch of the Indo-European stock, and, according to Fr. Müller, belongs to the Iranian group. The old Armenian, the language of the classic literature, is now extinct, and has been supplanted not only as conversational language, but even in literature, by the modern Armenian, which is mixed with many Turkish elements, and is divided into four principal dialects. The Armenian language has its own alphabet, which was introduced by Miesrob in 406, and contains thirty-six letters. Grammars of the Armenian language have been published by Petermann (1837; an abridgment of it in 1841) and Lauer (1869); dictionaries by Aucher (1821, 2 vols., Armenian and English) and Tchaktchak (1837, Armenian and Italian).

Except a few old songs or ballads, no remains of the literature of Armenia exist of a date earlier than the introduction of Christianity into that country. After this event, however, the Greek language and literature became favorite objects of study, and the works of many Greek authors were translated into Armenian. The most flourishing period of Armenian literature extended from the fourth to the fourteenth century. The Armenian Bible, translated from the Septuagint version by Miesrob and his scholars (411 A. D.), is a model of classic style. The theological writers and chroniclers of this era are considered, both in adherence to facts and good taste, superior to the general order of Oriental historians. (See Neumann, "Gesch. der armen. Literatur," 1836.)

Armentières, a town of France, in the department of Nord, on the river Lys, 12 miles by rail N. W. of Lille. It has manufactures of cotton, linen, lace, and sailcloth. Pop. in 1866, 15,579.

Arm'felt (Gustaf Mauritz), a Swedish general and courtier, born in the province of Abo in 1757. He became a favorite of Gustavus III., who, after he was mortally wounded by an assassin in Mar., 1792, appointed Armfelt governor of Stockholm. This appointment was nullified by the duke of Sudermania, who was the enemy of Armfelt, and acted as regent during the minority of Gustavus IV. The regent sent him on a mission to Naples, and during his absence charged him with treason, for which he was sentenced to death. When Gustavus IV. began to reign in 1799 he restored Armfelt to honor and office. He became governor-general of Finland in 1805, and commanded the army in a war against Norway in 1808. Having entered the service of Russia in 1810, he obtained several high civil offices. Died in 1814.

Armi'da, the name of a beautiful sorceress in Tasso's poem of "Jerusalem Delivered." She attempted to seduce Rinaldo and other crusaders. The former was fascinated for a time, but finally returned to the war against the infidels, and converted Armida to Christianity.

Ar'millary [from the Lat. *armil'la,* a "bracelet" or "large ring"] **Sphere,** an ancient and obsolete astronomical machine, consisted of an assemblage of rings or circles

fixed together, so as to represent the principal circles of the celestial sphere in their proper relative positions. These rings were movable round the polar axis within a meridian and horizon, as in the celestial globe. The observations of Hipparchus were made by means of the armillary sphere.

Arminius, Arminianism. The name of Arminius in his native language was JACOBUS HERMANS, identical with Herman, the name of the hero of Germany, who destroyed the Roman legions under Varus. And as this name was transformed into Arminius by Tacitus and other Roman writers, so, in accordance with the custom of the age when Latin was the language of current literature, this name was Latinized, and has come down in modern English as JAMES ARMINIUS. He was born in 1560 at Oudewater ("old water"), a small town in the Southern Netherlands. He lost his father in early childhood, and his mother being left in straitened circumstances, the promising intellect of the boy so attracted the attention of patrons that he was taken to school at Marburg. When fifteen years of age his native town, Oudewater, was taken by the Spaniards, and his mother, brother, and sister were all massacred, leaving him the sole survivor of his family. He was sent by his patrons to the new university at Leyden, where he remained six years. Such was his proficiency that the city of Amsterdam adopted him as her *vesterling* or foster-child, to be educated at the public expense, being bound by a written obligation to be at the command of the city through life. He studied at Geneva under Beza, as well as at Basle under Gryneas. At the latter place he was offered a doctorate, but declined the honor on account of his youth. By Beza he was commended to Amsterdam in high terms. He then went to Italy to become accomplished in philosophy under Zarabella, and having visited Rome and the other principal cities, returned to Amsterdam, where he was installed minister at the age of twenty-eight.

Arminius's ministry in Amsterdam, of fourteen years' duration, forms the second period of his life. His learning and eloquence were rapidly rendering him one of the leading theologians and preachers of his age. He was of middling size, had dark, piercing eyes, and voice light but clear, and possessing a winning mellowness. His manners were magnetic, and he had the power of fastening firm friends. He was condescending to the lowly and a sympathizing guide to the religious inquirer. At the same time he was an independent seeker and follower of truth.

In 1585, the extreme predestinarianism prevalent in the Netherlands had been for ten years so effectively attacked by Richard Coornhert, an eminent patriotic and acute layman of Amsterdam, that Arminius was invited by the city to refute him. In a debate at Delft between Coornhert and two high Calvinistic clergymen, the latter were so hard pressed that they yielded, and took the lower or sublapsarian ground, and published a pamphlet against the higher view. The extreme Calvinists called upon Martin Lydius, professor of theology in Friesland, to refute them, but he handed over the task to Arminius, who had thus a double request on his hands. He bravely undertook the task, but was soon convinced of the untenableness of either the higher or lower predestination. At the expense of an ignominious failure in even *attacking* Coornhert, he resolved to pursue the light of honest conviction. Avoiding the entire subject in public, he prosecuted his investigations with earnest study. Yet, in lecturing on Romans vii., having given the non-Calvinistic interpretation, he found himself generally assailed by the high Calvinists as a Pelagian and Socinian. He was arraigned before the ecclesiastical courts, where he successfully defended himself on the ground that, though adverse to the prevalent opinions, his interpretation contradicted nothing in the standards—namely, the Belgic Confession and the Catechism. Being questioned as to predestination, he declined to answer, as no fact was alleged against him.

In prosecuting his inquiries he determined to consult privately the best theologians of the day. He commenced a confidential correspondence with Prof. Francis Junius of the University of Leyden, the most eminent of the Dutch theologians. He was delighted to find how far Junius coincided with him, but when he addressed to Junius the arguments for still more advanced views, the professor kept the letter by him unanswered for six years, when he died. The friends of Arminius believed that this silence arose from the fact that Junius found more than he could answer or was willing to admit. Unfortunately, this correspondence was inadvertently exposed by Junius to discovery, and was used to the disadvantage of Arminius. Arminius also, having received a treatise in favor of predestination by Professor Perkins of Cambridge, prepared an epistle to him, but was prevented by Perkins's death from sending it. His letters both to Junius and Perkins are embodied in his published works, and, whatever may be thought of the validity of the argument, no one will deny that in candor, courtesy, and Christian dignity they are hardly to be surpassed.

On the death of Junius the curators of the University of Leyden looked to Arminius as his successor. The reluctant consent of Amsterdam being at length gained, Arminius assented. But the predestinarians, led by Gomarus, senior professor of theology at Leyden, opposed his election. After a long series of strifes, Arminius offered to meet Gomarus and satisfy his objections. The meeting took place, and Gomarus, admitting that he had judged Arminius by hearsay, after Arminius had fully declared his entire opposition to Pelagianism and Socinianism, fully renounced his objections. So far as predestination was concerned, each professor was to deliver his own sentiments with moderation, and all collision with the other was to be avoided; and Arminius was thereupon elected.

The six years of his Leyden professorship closing with his death are the most important yet troublous period of his career. The terms of peace were broken within the first year by Gomarus, who delivered a violent public harangue on predestination in terms of insult to Arminius, who was personally present; to which the latter prepared a refutation clothed in terms of personal respect towards his opponent. Gomarus afterwards confessed that he could easily live at peace with Arminius but for the clergy and churches, who were intensely hostile to his liberal doctrines. Their Belgic Confession, Calvinistic as it was, was sacred in their hearts as being the banner under which they had fought the battle of civil and religious liberty against Spain and popery; and they now, alas! were making it the instrument of religious intolerance. Arminius was held as invalidating that Confession, and so was everywhere traduced by the clergy as a papist, a Pelagian, and a Coornherter. Yet, really, the doctrines he taught were essentially the doctrines of Saint Chrysostom, Melanchthon, Jeremy Taylor, and John Wesley. In regard to the Confession, he ever treated it with reverence, and only claimed the right of that same liberality of interpretation which Lutherans exercised with the Augsburg Confession—a liberality similar to that which the English clergy now exercise in regard to the seventeenth of their Thirty-nine Articles. A voluntary Church may, like any other voluntary association, be, if it pleases, stringent in its interpretations, but a state Church, which strains all to a tight interpretation of a very specific creed under pain of state disabilities, runs into religious despotism. This was therefore a genuine contest for religious liberty. Arminius was proscribed by the clergy, harassed by irresponsible deputations, and his students were subjected to persecutions and exclusions from the ministry. The more intelligent laity, including the magistracy, and especially the chief magistrate, Olden Barnevelt, were favorable to Arminius, who at length appealed to the national legislature (called the States General) for protection. That body appointed a committee or council, who, having heard both Gomarus and Arminius in full, reported that the latter taught nothing but what could be tolerated. Before the States General themselves Arminius delivered a full oration, expounding his entire views, which is published in the American edition of his works. The clergy demanded the appointment of a national synod, consisting purely of ecclesiastics, but the States General, well knowing what would be the fate of Arminius in their hands, refused. Under the constant pressure of these years of persecution the gentle spirit of Arminius at length sunk. He was taken from the bloody times that followed the Synod of Dort. His nervous system was prostrated, and, attended by his faithful pupil, the afterwards celebrated Episcopius, he died in the faith he had maintained, Oct. 19, 1609, a martyr to his views of truth.

ARMINIANISM, as the customary antithesis to Calvinism, is, within the limits of the evangelical doctrines, the theology that tends to freedom in opposition to the theology of necessity or absolutism. This contrast rises into thought among all nations that attain to reflection and philosophy. So in Greek and Roman thinking, Stoicism and all materialistic atheism held that mind, *will*, is subject to just as fixed laws in its volitions as physical events are in their successions. When, however, men like Plato and Cicero rose to a more transcendent sense of moral responsibility, especially of eternal responsibility, they came to say, like Cicero, "Those who maintain an eternal series of causes despoil the mind of man of free-will, and bind it in the necessity of fate."

Theistic fatalism, or Predestination, consists in the predetermination of the Divine Will, which, determining alike the volitions of the will and the succession of physical events, reduces both to a like unfreedom; but those who hold Predestination very uniformly hold also to volitional necessity, or the subjection of will in its action to the con-

trol of strongest motive force. And as the Divine Will is held subject to the same law, so Necessity, as master of God, man, and the universe, becomes a universal and absolute Fate. This doctrine, installed by Saint Augustine, and still more absolutely by John Calvin, in Christian theology, is from them called Augustinianism, or more usually Calvinism.

In opposition to this theology, Arminianism maintains that in order to true *responsibility, guilt, penalty,* especially *eternal penalty,* there must be in the agent a *free-will;* and in a true responsible free-will the freedom must consist in the power, even in the same circumstances and under the same motives, of *choosing either way.* No man can justly be eternally damned, according to Arminianism, for a choice or action which he cannot help. If fixed by Divine decree or volitional necessity to the particular act, he cannot be held responsible or justly punished. In all such statements, however, it is presupposed, in order to a just responsibility, that the agent has not responsibly abdicated or destroyed his own power. No agent can plead in bar of responsibility any incapacity which he has freely and wilfully brought upon himself. It is also to be admitted that there may be suffering which is not penalty—finite sufferings for which there are compensations, and for which every one would take his chance for the sake of life. But eternal suffering, for which there is no compensation, inflicted as a *judicial penalty* on the basis of *justice,* can be justly inflicted only for avoidable sin. If Divine decree or volitional necessity determine the act, it is irresponsible, and judicial penalty is unjust.

Arminianism also holds that none but the person who freely commits the sin can be guilty of that sin. One person cannot be guilty of another person's sin. A tempter may be guilty of tempting another to sin, but then one is guilty of the sin, and the other of solely the sin of temptation. There can thus be no vicarious guilt; and as punishment, taken strictly, can be only infliction *for guilt upon the guilty,* there can literally and strictly be no vicarious punishment. If innocent Damon die for Pythias guilty of murder, Damon is not guilty because he takes Pythias's place in dying, and his death is not *to him* a punishment, but a suffering, which is a substitute for another man's punishment. The doer of sin is solely the sinner, the guilty, or the punished. These preliminary statements will elucidate the issues between Calvinism and Arminianism on the following points:

1. *Foreordination.*—Calvinism affirms that God does unchangeably and eternally foreordain whatsoever comes to pass. That is, God from all eternity predetermines not only all physical events, but all the volitions of responsible agents. To this Arminianism objects that the predetermination of the agent's volitions destroys the freedom of his will; that it makes God the responsible predeterminer and willer of sin; and that it makes every sinner to say that his sin accords with the Divine Will, and therefore, so far as himself is concerned, is right. It makes God first decree the sin, and then punish the sinner for the sin decreed. The Arminian theory is this: God does from all eternity predetermine the laws of nature and the succession of physical and necessary events; but as to free moral agents, God, knowing all possible futurities, does choose that plan of his own conduct which, in view of what each agent will ultimately in freedom do, will bring out the best results. His system is a system of his own actions. And God's predeterminations of his own acts are so far contingent as they are based on his prerecognition of what the agent will freely do; yet as his omniscience knows the future with perfect accuracy, so he will never be deceived nor frustrated in his plans and providences.

Some Arminians deny God's foreknowledge, on the ground of the intrinsic impossibility of a future contingency being foreknown. As the performance of a contradictory act is impossible, intrinsically, even to Omnipotence, so, say they, the knowability of a future contingency, being an essential contradiction, is impossible even to Omniscience. A contradiction is a nothing; and it is very unnecessary to say in behalf of God's omnipotence that he can do all things, and all nothings too. So it is equally absurd to say in behalf of his omniscience that he knows all things, and all nothings too. The exclusion of contradictions does not *limit* God's omnipotence or omniscience, but *defines* it. Arminians do not condemn this reasoning, but generally hold that their theory is maintainable against Calvinism on the assumption of foreknowledge. They deny, as against the Calvinist, that foreknowledge has any influence upon the future of the act, as predetermination has. Predetermination *fixes* the act—foreknowledge *is fixed* by the act. In foreordination God determines the act as he pleases; in foreknowledge the agent fixes the prescience as he pleases. In the former case God is alone responsible for the creature's act; in the latter case God holds the creature responsible, and a just divine government becomes possible. Yet most Arminians probably would say, with the eminent philosopher Dr. Henry More, If the divine foreknowledge of the volitions of a free agent contradicts the freedom, then the freedom, and not the foreknowledge, is to be believed.

2. *Divine Sovereignty.*—Calvinism affirms that if man is free God is not a sovereign. Just so far as man is free to will either way, God's power is limited. Arminians reply that if man is not free, God is not a sovereign, but sinks to a mere mechanist. If man's will is as fixed as the physical machinery of the universe, then *all* is machinery and not a government, and God is a machinist and not a ruler. The higher man's freedom of will is exalted above mechanism, so much higher is God elevated as a sovereign. Here, according to Arminians, Calvinism degrades and destroys God's sovereignty, and Arminianism exalts it; that the freedom of man no more limits God's power than do the laws of nature by him established; that in both cases, equally, there is simply a self-limitation by God of the *exercise* of his power; that Arminianism holds to the absoluteness of God's omnipotence just as truly as Calvinism, and to the grandeur of his sovereignty even more exaltedly.

3. *Imputation of Adam's Sin.*—Calvinism affirms that Adam's posterity is truly *guilty* of Adam's sin, so as to be eternally and justly punishable therefor without a remedy. As *guilty* of this sin, God might have the whole race born into existence under a curse, without the power or means of deliverance, and consigned to eternal punishment. Upon this Arminians look as a dogma violative of the fundamental principles of eternal justice. They deny that guilt and literal punishment can, in the nature of things, be thus transferred. Their theory is, that upon Adam's sin a Saviour was forthwith interposed for the race as a previous condition to the allowance of the propagation of the race by Adam, and a provision for inherited disadvantages. Had not a Redeemer been provided, mankind, after Adam, would not have been born. The race inherits the nature of fallen Adam, not by being held *guilty* of his sin, but by the law of natural descent, just as all posterity inherit the species-qualities, physical, mental, and moral, of the progenitor. Before his fall the presence of the Holy Spirit with Adam in fulness supernaturally empowered him to perfect holiness—the tree of life imparted to him a supernatural immortality. Separated from both these, he sunk into a mere *nature,* subject to appetite and Satan. The race in Adam, without redemption, is totally incapable of salvation; yet under Christ it is placed upon a new redemptive probation, is empowered by the quickening spirit given to all, and through Christ may, by the exercise of free agency, attain eternal life.

4. *Reprobation.*—Of the whole mass of mankind thus involved in guilt and punishment for sin they never actually committed, Calvinism affirms that God has left a large share "passed by"—that is, without adequate means of recovery, and with no intention to recover them—and this from the "good pleasure of his will" and for a display of his "glorious justice." The other portion of mankind God does, from "mere good pleasure," without any superior preferability in them, "elect" or choose, and confers upon them regeneration and eternal life, "all to the praise of his glorious grace." Arminians pronounce such a proceeding arbitrary, and fail to see in it either "justice" or "glorious grace." The reprobation seems to them to be injustice, and the "grace," with such an accompaniment, unworthy the acceptance of honorable free agents. Election and reprobation, as Arminianism holds them, are conditioned upon the conduct and voluntary character of the subjects. All, submitting to God and righteousness, by repentance of sin and true self-consecrating faith, do meet the conditions of that election; all who persist in sin present the qualities upon which reprobation depends. And as this preference for the obedient and holy, and rejection of the disobedient and unholy, lies in the very nature of God, so this election and reprobation are from before the foundations of the world.

5. *Philosophical or Volitional Necessity.*—Calvinism maintains the doctrine that all volitions are determined and fixed by the force of strongest motive, just as the strokes of a clock-hammer are fixed and determined by the strongest force. The will can no more choose otherwise in a given case than the clock-hammer can strike otherwise. There is no "power of contrary choice." Calvinism often speaks, indeed, of "free agents," "free-will," "self-determining power," and "will's choosing by its own power;" but bring it to analysis, and it will always, say the Arminians, be found that the freedom is the same as that of the clock-hammer—the freedom to strike as it does, and no otherwise. Arminianism affirms that if the agent has no power to will otherwise than motive-force determines, any more than a clock-hammer can strike otherwise, then there is no justice in requiring a different volition any more than a different

clock-stroke. It would be requiring an impossibility. And to punish an agent for not performing an impossibility is injustice, and to punish him eternally, an infinite injustice. Arminianism charges, therefore, that Calvinism destroys all just punishment, and so all free volition and all divine government.

6. *Infant Damnation.*—Holding that the race is truly *guilty*, and judicially condemnable to endless torment for Adam's sin, Calvinism necessarily maintains, according to Arminians, that it is just for God to condemn all infants to eternal punishment, even those who have never performed any moral act of their own. This was held by Augustine, and wherever Calvinism has spread this has been a part of the doctrine, more or less explicitly taught. Earlier Calvinists maintained against the Arminians that there is actual reprobation—that is, a real sending to hell—as well as particular election, of infants. Arminianism, denying that the race is judicially *guilty*, or justly damnable for Adam's sins, affirms the salvation of all infants. The individual man as born does, indeed, irresponsibly possess within his constitution that nature which will, amid the temptations of life, commence to sin when it obtains its full-grown strength. He is not, like the unborn Christ, "that holy thing." There is, therefore, a repugnance which God and all holy beings have towards him by contrariety of nature, and an irresponsible unfitness for heaven and holy association. If born immortal, with such a nature unchangeable, he must be for ever unholy, and for ever naturally unhappy under the divine repugnance. Under such conditions Divine Justice would not permit the race, after the fall, to be born. But at once the future Incarnate Redeemer interposes, restores the divine complacency, and places the race upon a new probation. Man is thereby born in a "state of initial salvation," as Fletcher of Madely called it, and the means of final salvation are amply placed within the reach of his free choice.

7. *Pagan Damnation.*—On its own principle, that power to perform is not necessary in order to obligation to perform, Calvinism easily maintains that pagans, who never heard of Christ, are rightly damned for want of faith in Christ. They may be damned for original sin, and for their own sin, and for unbelief in Christ, without any Saviour. Arminianism, on the contrary, maintains that there doubtless are many in pagan lands saved even by the unknown Redeemer. They, not having the law, are a law unto themselves. Nay, they may have *the spirit of faith*, so that were Christ truly presented he would be truly accepted. They may have faith in that of which Christ is the embodiment, like the ancient worthies enumerated in Heb. xi. There may not be as great differences in the chances for salvation in different lands as Calvinism assumes. Where little is given, much is not required. Arminianism holds that no one of the human race is damned who has not had full chance for salvation. Missions are none the less important in order to hasten the day when *all* shall be converted. If that millennial age shall come, and be of long duration, Arminianism hopes that the great majority of the entire race of all ages may be finally saved.

8. *Doctrines of Grace.*—Calvinism maintains that the death of Christ is an expiation for man's sin: first, for the guilt of men for Adam's sin, so that it is possible for God to forgive and save; and second, for actual sin—that thereby the influence of the Spirit restores the lapsed moral powers, regenerates and saves the man. But these saving benefits are *reserved for the elect only.* Arminianism, claiming a far richer doctrine of grace, extends it to the very foundations of the existence of Adam's posterity. Grace underlies our very nature and life. We are born and live because Christ became incarnate and died for us. All the institutes of salvation—the chance of probation, the Spirit, the Word, the pardon, the regeneration, the resurrection, and the life eternal—are through him. And Arminianism, against Calvinism, proclaims that these are for ALL. Christ died for all *alike;* for no one man more than for any other man, and sufficient grace and opportunity for salvation is given to every man.

Calvinism maintains the irresistibility of grace; or, more strongly still, that grace is *absolute*, like the act of creation, which is called *irresistible* with a sort of impropriety from the fact that resistance in that connection is truly unthinkable. Against this Arminians reply that will, aided by prevenient grace, is free even in accepting pardoning grace; that though this acceptance is no more meritorious than a beggar's acceptance of an offered fortune, yet it is accepted freely and with full power of rejection, and is none the less grace for that.

9. *Justifying and Saving Faith.*—Faith, according to Calvinism, is an acceptance of Christ wrought absolutely, as an act of creation in the man, whereby it is as impossible for him not savingly to believe as it is for a world to be not created or an infant to be not born. And as this faith is resistlessly fastened in the man, so it is resistlessly kept there, and the man necessarily perseveres to the end. Faith, according to Arminianism, is, as a *power*, indeed the gift of God, but as an *act* it is the free, avoidable, yet really performed act of the intellect, heart, and will, by which the man surrenders himself to Christ and all holiness for time and eternity. In consequence of this act, and not for its meritorious value or its any way compensating for or earning salvation, it is accepted for righteousness, and the man himself is accepted, pardoned, and saved. And as this faith is free and rejectable in its beginning, so through life it continues. The Christian is as obliged, through the grace of God assisting, to freely retain it as first freely to exercise it. It is of the very essence of his probationary freedom that he is as able to renounce his faith and apostatize as to reject it at first.

10. *Extent of the Atonement and Offers of Salvation.*—Earlier Calvinism maintained that Christ died for the elect alone; later Calvinism affirms that he died for one and all, and so offers salvation to all on condition of faith. But Arminianism asks, With what consistency can the atonement be said to be *for all* when, by the eternal decree of God, it is foreordained that a *large part* of mankind shall be excluded from its benefits? How also can it be *for all* when none can accept it but by efficacious grace, and that grace is arbitrarily withheld *from a large part?* How can it be for *all* when God has so fastened the will of a large part of mankind, by counter motive-force, that they are unable to accept it? The same arguments show the impossibility of a rightful *offer* of salvation to *all*, either by God or by the Calvinistic pulpit. How can salvation be rationally offered to those whom God by an eternal decree has excluded from salvation? What right to exhort the very men to repent whom God determines, by volitional necessity, not to repent? What right to exhort men to do otherwise than God has willed, decreed, and foreordained they shall do? If God has decreed a thing, is not that thing right? What an awful sinner is the preacher who stands up to oppose and defeat God's decrees! If a man is to be damned for fulfilling God's decrees, ought not that imaginary God to be, *a fortiori*, damned for making such decrees? If a man does as God decrees, ought he not to be by God approved and saved? And since all men do as God decrees, wills, and determines they shall do, ought not all men to be saved, so that the true theory should be Universalism? How can grace be offered to the man whom God had decreed never to have grace? or faith be preached to those to whom God has made faith impossible? or conditions proposed to those from whom God withholds the power of performing conditions? Hence, the Arminian affirms that in all public offers of a free or conditional salvation to *all* the Calvinistic pulpit contradicts its own creed.

11. Such is an outline of the usual argument on the subject; and it is not difficult to determine on which side the logic predominates. If we consider the question from its more abstract, more metaphysical premises, the Arminian theory has equally the advantage. Most of the difficulties of this and all similar inquiries doubtless arise from the limitations of our faculties, or rather of our language. We unwarrantably attribute to the Infinite Mind the modes of thought which are peculiar to our finite intellects. The most subtle perplexity of this controversy grows out of the idea of *time*—its past, present, and future—and the attempt to reconcile foreknowledge with contingency or free-will. But what is time? It is no entity, no substance, like iron, air, oxygen. It is, as Kant teaches, subjective, not objective. It is but a habit of the mind, an association of thought, suggested, as Locke says, by the succession of ideas, and arising from the finite limitations of our faculties. We cannot, therefore, logically transfer to the Infinite Mind the temporal distinctions of past, present, and future. A succession of ideas, by which alone the conception of time is possible, necessarily implies a limitation which cannot be predicated of the Absolute Mind. Nor is it necessary for us to assume that all duration is an *eternal now* with God; for here, again, we use a distinction of time. We can rightly assume but three facts: first, that, owing to limitations of our faculties, and especially of language, we have habitudes of thought which do not belong to the Infinite Mind, and from which arise our baffling difficulties in the investigation of themes like the present. Secondly, that, however incomprehensible, to us, may be the nature and action of the Divine Mind, yet the obvious facts of the conscious freedom of man's will and his moral responsibility—facts which are the indisputable basis of laws and rights, of reward and penalty, of virtue and society—must remain incontestable, and be, in some way, perfectly reconcilable with the divine government. They are facts within the comprehension of our finite faculties, they are positive and certain, and therefore the mysterious, the unknown, cannot be incompatible with them. With better

faculties, and especially with a better terminology, the chief difficulties of this controversy may vanish, and it may be seen that we have been contending only about words, and confounded in a mere logomachy. Hence, as Buckle (*History of Civilization*, i. 1) says, "Among more advanced thinkers there is a growing opinion that both doctrines (predestination and free-will) are wrong, or, at all events, that we have no sufficient evidence of their truth."

12. *Analogy of Temporal Superiorities.*—Calvinism argues that in this world God distributes advantages, such as wealth, rank, beauty, vigor, and intellect, not according to desert, but purely as a sovereign. Hence, in the same way he may bestow on one faith and eternal life, and on others unbelief and eternal death. Arminianism replies that this very analogy between the temporal and the eternal bestowment proves the precise reverse. In this probationary world advantages are *professedly* distributed *without regard to judicial rectitude*. Men are not rewarded according to their works or voluntary character. The wicked are set on high, and Satan is this world's god. And the very difference between the dispensation of the world and that of the kingdom of God is, that in the latter blessedness is placed at every man's choice, and the result is judicially according to voluntary faith and works. The Bible nowhere places beauty or intellect at our own choice, but it does declare faith, repentance, and eternal life to be in our own power, and holds us responsible for not exerting the power.

Basis of Morality.—Calvinism claims that the very severity of its system, its deep view of human guilt and necessary damnability by birth and nature, its entire subjection to divine absolutism irrespective of human ideas of justice, tend to produce a profound piety. Arminianism replies that this is missing the true ideal of piety. It seems to be basing Christian morality on fundamental immorality. For God to will and predetermine the sin, and then damn the sinner—for him to impute guilt to the innocent, and so eternally damn the innocent as guilty—are procedures that appear fundamentally unrighteous, so far as the deepest intuitions of our nature can decide. Thus, first to make God in the *facts* intrinsically and absolutely bad, and then require us to *ascribe* holiness and goodness to his character and conduct, perverts the moral sense. It is to make him what we are in duty bound to hate, and then require us to love and adore him. Such adoration, secured by the abdication not only of the reason, but of the moral sense, and the prostration of the soul to pure, naked absolutism, naturally results in the sombre piety of fear; just as children are frightened into a factitious goodness by images of terror. While the piety of Jesus is serene, firm, winning, and gently yet powerfully subduing, the piety of absolutism tends to be stern and Judaic-like. While thus apparently defective at the roots, it does nevertheless often present an objective character of rectitude, a practical hardihood and aggressive energy in the cause of morality and regulated freedom. Arminianism, in order to a true and rational piety, sees the ideal of rectitude in the divine character and conduct, not by mere *ascriptions* contradicted by *facts*, but both in the *facts* and the *ascriptions*. A harmony of facts and intuitive reason is produced, love to the Divine Being becomes a rational sentiment, and a piety cheerful, hopeful, merciful, and gladly obedient becomes realized.

Civil and Religious Liberty.—As the freedom of the individual, and his own intransferable responsibility for his own voluntary character and conduct, are fundamental principles with Arminianism, it is in its own nature adverse to civil or religious despotism. It has been said that when Romanism persecutes, it accords with its fundamental *principle*, the denial of right of private judgment, while when Protestantism persecutes, it contradicts itself. So when Calvinism persecutes, it obeys an intrinsic absolutism, while if Arminianism persecutes, it contradicts its own freedom and individualism. Yet *position* has often in history produced in all these parties palpable violations of, and discordances with, their *principle*. Romanists often become by *position* asserters of ultra-democracy, and Protestants of absolute despotism. And so Calvinism has, historically, been *by position* the advocate for revolution, and Arminianism the asserter of authority. In fact, as Arminianism has been, as above shown, the ruling doctrine of the Church, and Calvinism an insurgent specialty, so the historical *position* of the first has been favorable to the assertion of authority, and the normal position of the latter has been revolt. This may be called one of the *accidents of history*. So the learned Selden in his "Table-Talk" remarked on the curious contradiction in the English civil war, that the advocates of absolutism in religion were the advocates of political liberty, and *vice versâ*. Yet it may perhaps be truly said that when the religious absolutist gains the power he is apt to be an absolute though a conscientious despot. He makes a better rebel than ruler. Prof. Fisher, a Calvinist, gives a severely true picture of the conscientious despotism of Calvin at Geneva. A similar despotism on a larger scale in England under Cromwell rendered the nation willing by reaction to rush into the depravities of the Restoration. Driven to America, even while under the rule of an Arminian monarchy, a similar despotism on a small scale overspread New England.

Nor was Calvinism, as Prof. Fisher truly affirms, the advocate of liberty of conscience. Not only did Calvin himself banish Bolsec, ruin Castellio, and favor the execution of Servetus, but he maintained, doctrinally, the *duty of the magistrate to punish heresy*. Beza, his learned successor, wrote a treatise in favor of punishing heretics. Bogerman, the president at the Synod of Dort, was the translator of Beza's essay. It is but too evident that the Protestant Calvinists differed with the Romanists not about the punishment of heretics, but about who the heretics to be punished were. In this respect the Calvinism of the new Church and the Arminianism of the old were nearly upon a par. The new Church, however, belonged to the progressive order of things; but whether, finally, the Calvinism or the Arminianism of the new Church first actually proclaimed toleration is a matter of question.

Comparative Morality.—Mr. Froude endeavors by comparison to show that Calvinism is superior to Arminianism in morals by selecting his own examples. But the Arminian may perhaps in reply make also *his* selections. Scottish Calvinism has an unquestioned severity of morals, but are Scotch character and history, as a whole, even ethically superior to the English? Is the morality of Presbyterianism in its entire aspect superior to that of Moravianism, Quakerism, or Wesleyan Methodism? Are our American Calvinistic Baptists more Christian in morals than the Free-will Baptists? Is there any umpire qualified to decide that the devout Presbyterian is superior to the devout Episcopalian? Did Jonathan Edwards present a type of piety superior to that of Fletcher of Madely? or John Calvin to that of James Arminius? Can Calvinism show a grander type of an evangelist than was John Wesley in England or Francis Asbury in America? Has she produced, in all her history, a system of evangelism as earnest, as self-sacrificing, as aggressive as the itinerant ministry of English and American Methodism? Taking the entire body of Calvinism since the Reformation, does it excel in purity, martyrdom, doctrine, and missionary enterprise the (Arminian) Church of the first centuries? If it comes to counting persons, has any section of the Church nobler names than Justin Martyr, Ignatius, Irenæus, Origen, Athanasius, Tertullian, Jerome, Chrysostom, John of Damascus, Hincmar of Rheims, Erasmus, Luther, Melanchthon, Sir Thomas More, Calixtus, Savonarola, Arminius, Grotius, Episcopius, Limborch, Curcellæus, John Milton, John Goodwin, Jeremy Taylor, Cudworth, Bishop Butler, Bishop Bull, Bengel, Wetstein, Wesley, Fletcher, and Richard Watson?

Comparative Republicanism.—Nor did, nor does, Predestination as compared with Arminianism, possess any peculiar affinity with republicanism against monarchy. By its very nature Calvinism establishes an infinite and eternal distinction between different parts of mankind made by divine prerogative, by which one is born in a divine aristocracy, and the other in an eternal helpless and hopeless pariahism; whilst Arminianism, holding every man equal before God, proclaims an equal yet resistible grace for all, a universal atonement and Saviour alike to all, an equal power of acceptance in all, a free, unpredestined chance for every man to be the artificer of his own eternal, as well as temporal, fortunes. Caste, partialism are the characteristics of the former; equality, universality, republicanism, of the latter. It is as plain as consciousness can make any fact that it is the latter that is the natural ally, not of monarchies, aristocracies, or hierarchies, but of regulated freedom. Hence, neither Luther nor Calvin was any more a republican than Eck or Erasmus. Augustine and Gottschalk were good papists, and Augustinianism was as entirely at home under the tiara of Gregory the Great as under the cap of Bogerman—in the court of Charlemagne as in the camp of the Covenanter. Irrespective of their Calvinism, the Reformers everywhere acted *according to conditions*. Where kings and nobles favored them, they favored kings and nobles; where (as was generally the case) they were rejected by rank and power, and had nothing to make royalty and aristocracy out of, they fashioned a theocratic Commune, out of which modern political experience has picked some aids and methods for voluntary government. Modern experience has eliminated the theocracy, the intolerance, and the predestinarianism, and added the elements to make republicanism. For all this it duly thanks the Reformers, but does not thank their Calvinism.

HISTORY OF ARMINIANISM.—The theology of freedom, essentially Arminianism, in opposition to predestination, necessitated volitions, and imputation of guilt to the inno-

cent, is universally acknowledged to have been the doctrine of the entire Christian Church through its most glorious period, the martyr age of the first three centuries. The Calvinistic historian of theology, Hagenbach, says (vol. i., p. 155): "All the Greek Fathers, as well as the apologists Justin, Tatian, Athenagoras, Theophilus, and the Latin author Minucius Felix, exalt the autonomy or self-determination of the human soul. They know nothing of any imputation of sin, except as a voluntary and moral self-determination is presupposed. Even Irenæus and Tertullian strongly insist upon this self-determination in the use of freedom of the will." Again (157): "Even the opponents of human liberty, as Calvin, are compelled to acknowledge this remarkable unanimity of the Fathers, and in order to account for it they are obliged to suppose a general illusion about this doctrine!"

Arminians contend that we know as well when predestination was introduced into the Church—namely, by Augustine—as we do when transubstantiation and image-worship were introduced; that it was in the fourth century, when Pelagius upon one extreme made free-will dispense with divine grace, Augustine on the other extreme made divine grace irresistibly nullify free-will, and thus both lost their balance; that both invented dogmas never before recognized in the Church; that, tried by the previous mind of the Church, both were equally heretical; that the heresy of one, pushed to extreme, becomes rationalism and pure deism—the heresy of the other, pushed to extreme, becomes presumptuous antinomianism. They assert that the Eastern Church maintained her primitive position, neither Pelagian on one side nor Augustinian on the other, essentially in the position of modern Arminianism; that hence Arminianism is not a *compromise*, but the primitive historical position, the permanent centre, rejecting innovations and extremes on either side; that the Western Church, in spite of the great name of Augustine, never became Augustinian. It is indeed customarily said by anti-Arminian writers that this was because the "age of systematic theology" had not then arrived. Arminians reply that a theology not only unrecognized during that best period of the Church, but, still more, a theology unanimously condemned as heretical by that period, has little right now to lay claim to pre-eminent Christian orthodoxy. The Eastern Church—namely, the churches of Asia, with whom the language of our Lord and his apostles was essentially vernacular; the Greek Church, to whom the language of the New Testament was vernacular; and the Russian Church, embracing many millions—all inherited and retain, firmly and unanimously, the theology of freedom, essential Arminianism. The learned Calvinistic scholar Dr. Shedd, in his "History of Doctrines" (vol. ii., p. 198), says: "The Augustinian anthropology was rejected in the East, and, though at first triumphant in the West, was gradually displaced by the semi-Pelagian theory, or the theory of inherited evil [instead of inherited guilt] and synergistic [or co-operative] regeneration. This theory was finally stated for the papal Church in exact form by the Council of Trent. The Augustinian anthropology, though advocated in the Middle Ages by a few individuals like Gottschalk, Bede, Anselm, slumbered until the Reformation, when it was revived by Luther and Calvin, and opposed by the papists." It will thus be seen, on a review of the universal Church in all ages, how small though respectable a minority Augustinianism or Calvinism, before the Reformation, ever was. With minor exceptions, Arminianism was the doctrine of the universal Church.

The accuracy of Dr. Shedd's statement of the general non-existence of Augustinianism during the Middle Ages is not invalidated by the fact of the great authority of Augustine's name, arising from the powerful genius and voluminous writings of the man. It was no proof that a man was truly Augustinian because he belonged to the "Augustinian order" or quoted Augustine's authority. Such Schoolmen as Bernard, Anselm, and Peter Lombard modified Augustine's doctrine materially; Bonaventura and Duns Scotus were essentially Arminians, and Hincmar of Rheims and Savonarola literally so. Gottschalk, the high predestinarian, was condemned for heresy, and Thomas Bradwardine, the "second Gottschalk," made complaints, doubtless overstrained, that in his day "almost the whole world had become Pelagian."

At the Reformation, however, we encounter the phenomenon that all the eminent leaders at first not only adopted, but even exaggerated, the absolutism of Augustine. This might seem strange, for it was apparently natural that the absolute papacy should identify itself with the absolute, and that asserters of freedom would have stood on the free-will theology. The twin doctrines of the supremacy of Scripture and of justification by faith were amply sufficient, without predestination, for their purpose to abolish the whole system of popish corruption. The former dethroned alike the authority of tradition and the popedom; the latter swept away alike the mediations of Mary, saints, and priests. But the first heroic impulse of reform tends to magnify the issues to their utmost dimensions. The old free-will theology belonged universally to the old historic Church, and was identified by the first Reformers with its corruptions. Luther at first, in his reply to Erasmus "On the Bondage of the Will," uttered fatalisms that probably had hardly ever before been heard in the Christian Church, and perhaps it would be hard to find a Calvinist at the present day who would adopt the trenchant predestinarian utterances of Calvin. Under the indoctrinations of these leaders, especially of Calvin at Geneva, the absolute doctrines were diffused and formed into the creeds of Germany, the Netherlands, France, England, and Switzerland. But in Germany the "second sober thought" of Melanchthon, who at first coincided with Luther, receded from predestination, and Melanchthon himself intimates that Luther seceded with him; so that the Lutherans are now essentially Arminian. In the Netherlands the same "second thought," led by Arminius himself, was suppressed by state power. In France, Protestantism, which was Calvinistic, was overwhelmed in blood. In England the Calvinism was generally of a gentle type, and the same "second thought" was awakened by the Arminian writings of Grotius and Episcopius diffused through Europe. And as the English Church gradually inclined to the ancient high episcopacy of the old Church, so it adopted the ancient Arminianism. Calvinism, persecuted and oppressed, overthrew monarchy and Church, and for a brief period ruled with hardly less intolerance, until, overthrown in turn, Calvinism took refuge in America, and laid foundations here. Even here past sufferings did not teach tolerance, and that doctrine had to be learned from checks and lessons administered by surrounding sources. Calvinism has, nevertheless, here acted a noble part in our Christian civilization. It perhaps about equally divides the evangelic Church with Arminianism.

Arminianism, proper and Protestant, came into existence under the severe persecution by Dutch Calvinism, in which the great and good Arminius himself was a virtual martyr. The Synod of Dort, the standard council of the Calvinistic faith, made itself subservient to the unprincipled and sanguinary usurper Maurice; and even during its sessions the judicial murder of the great Arminian and republican statesman Olden Barnevelt was triumphantly announced at Dort to overawe the Arminians at the synod, who were bravely maintaining their cause under the leadership of the eloquent Episcopius. Then followed the banishment of Episcopius, the imprisonment of Grotius, the ejection of hundreds of Arminian ministers from their pulpits, and the firing of soldiers upon the religious assemblies of Arminian worshippers. The great Arminian writers of Holland, Episcopius, Grotius, and Limborch, are claimed by Arminian writers to be the first public proclaimers of the doctrine of liberty of conscience in Europe, as those two Arminian Puritans, John Milton and John Goodwin, were its earliest proclaimers in England.

Wesleyan Methodism is now by all admitted to be a great modern Arminian development. Beginning most humbly as a half-unconscious awakening amid the general religious chill of Protestantism, it has not only quickened the religious life of the age, but gathered, it is said, twelve millions of worshippers into its congregations throughout the world. Its theology is very definite, and very nearly the exact theology of James Arminius himself, and of the first three centuries. Cradled in both the Arminianism and High-Churchism of the English establishment, Wesley's maturer years earnestly approved the Arminianism, but severed it from the High-Churchism. The connection between Arminianism and High-Churchism is hereby clearly revealed to be historical and incidental rather than intrinsic or logical. Yet, even after adopting the doctrine that every Church has the right to shape its own government, as a lover of the primitive, post-apostolic Church, as well as from notions of Christian expediency, Wesley preferred, and provided for American Methodism, an episcopal form of government. Arminian Methodism has, in little more than a century of her existence, apparently demonstrated that the Augustinian "systematic theology" is unnecessary, and, what it deems, the primitive theology amply sufficient for the production of a profound depth of piety, a free ecclesiastical system, an energetic missionary enterprise, and a rapid evangelical success. She exhibits in her various phases every form of government, from the most decisive system of episcopacy to the simplest congregationalism, all voluntarily adopted, and changeable at will. The problems she has thus wrought suggest the thought that the free, simple theology of the earliest age may be the universal theology of the latest. (See CALVINISM, by PROF. A. A. HODGE, S. T. D.)

D. D. WHEDON.

Arminius. See HERMANN.

Ar′mistead (LEWIS ADDISON), a general, born at Newbern, N. C., Feb. 18, 1817, graduated at West Point in 1836. He served in the Mexican war (1846–47), and joined the Confederate army in 1861. He was killed at Gettysburg July 3, 1863.

Armistead (WALKER KEITH), an American general, born in Virginia about 1780. He became chief of the corps of engineers, and served in the war of 1812. He commanded an army against the Indians in Florida. Died Oct. 13, 1845.

Ar′mistice [from the Lat. *ar′ma*, "arms," and *sto* (or *sis′to*), to "stand still"], a truce; a suspension of hostilities between two armies or belligerent powers, which often agree to suspend operations for a definite time while the diplomatists are negotiating the preliminaries of a peace. During the third Crusade, Richard Cœur de Lion and Saladin made a truce for three years three months and three days. In modern times the duration of armistices is much less. After the Germans captured Paris, Jan. 30, 1871, the French people, having no regular government, desired to elect a national assembly, for which purpose an armistice was granted by the Germans. The armistice, during which the armies on both sides were bound to remain stationary, ended in a treaty of peace, the preliminaries of which were ratified on Feb. 26, 1871. The definitive treaty of peace was signed at Frankfort in May of that year.

Ar′mitage (EDWARD), an English historical painter of high reputation, born in London in 1817. Among his masterpieces are "St. Francis before Pope Innocent III.," and the frescoes in the new Houses of Parliament.

Armitage (THOMAS), D. D., was born at Pontefract, England, Aug. 2, 1819, and became in his youth a Methodist preacher. In 1838 he came to New York, and entered the ministry of the Methodist Episcopal Church. In 1848 he became a Baptist, and settled as a pastor in New York. He warmly advocated the movement for Bible revision, which led in 1850 to the formation of the American Bible Union, of which organization he became an efficient officer, and subsequently the president. He occupies a high rank as a pulpit orator and as a writer of great power and elegance. His position as a leader in the denomination with which he is identified is generally acknowledged.

Armitage (WILLIAM EDMOND), D. D., a bishop of the Protestant Episcopal Church, was born in New York City Sept. 6, 1830. He graduated at Columbia College in 1849 and at the General Theological Seminary in 1852. He became rector of an Episcopal church at Portsmouth, N. H., and afterwards at Augusta, Me. In 1859 he accepted a similar position in Detroit, Mich. In 1866 he was appointed assistant bishop of Wisconsin, and in 1870 he became bishop of that diocese, which position he held until his death. Died in New York City Dec. 7, 1873.

Ar′mor [Lat. *armatu′ra*], the defensive covering or coat-of-mail worn by a soldier; the apparatus which in former times men used for personal defence in war, and was often called *harness*. Since the invention of gunpowder, armor has fallen into disuse. The principal parts of the ancient armor were the helmet, breastplate, and shield. The material generally used for this purpose by the Greeks, Romans, and other nations of antiquity was brass or bronze. The most ancient description of such a panoply or complete armor is given in 1 Samuel xviii., which says Goliath "had an helmet of brass upon his head, and he was armed with a coat-of-mail; and the weight of the coat was five thousand shekels of brass. And he had greaves of brass upon his legs, and a target of brass (margin, *gorget*) between his shoulders; . . . and one bearing a shield went before him." The Greeks of the Homeric age used a large circular shield made of several folds of bull's hide, bound and embossed with brass. They also wore a helmet, a breastplate, and greaves, and a leather petticoat which descended nearly to the knee, and was covered by narrow strips of metallic plates or scales hinged together so as to permit freedom of movement. The coat-of-mail worn by the knights of the Middle Ages, and sometimes called chain-armor, was formed of a network of steel or iron rings attached to a foundation of leather. The modern Europeans also used an interlaced ring-armor of Oriental origin, which was made in the form of a shirt with small steel rings, which were not stitched to any foundation. Chain-mail or ring-armor fell into disuse in the fourteenth century, and was succeeded by plate-armor. The cuirass, almost the sole existing relic of mediæval armor, is now of no practical importance. The term is also applied to iron-plate covering applied to modern war-vessels and fortifications. (See IRON-CLAD, IRON PLATING, and SHIELDS.)

Armor′ica [from the Cymric *ar*, "upon," and *mor*, "sea"], the ancient name of the north-western part of Gaul, bordering on the ocean, and extending from the Seine to the Loire. The Armoricans had numerous ships, and were extensively engaged in maritime pursuits. About 400 A. D. Mariadec, a Briton, obtained the chief power in Armorica, which became an independent state. In consequence of the immigration of Britons or Welsh in the sixth or seventh century, the name of Armorica was changed to Bretagne. The language of the country is closely allied to the Welsh.

Ar′mory [Lat. *arma′rium*, from *ar′ma*, "arms"], a storehouse for arms; a place where arms and instruments of war are deposited; a collection of ancient armor, as that in the Tower of London. In the U. S., armory signifies a place where arms are manufactured. The U. S. government has extensive armories at Springfield, Mass., and Rock Island, Ill. (See ARSENAL, by GEN. P. V. HAGNER, U. S. A.)

Arms [Lat. *ar′ma*], weapons of war; offensive weapons or instruments, which are divisible into two great classes—firearms, and arms which are used without gunpowder or any explosive substance. The latter, which are the more ancient, are the sword, spear, dart, javelin, lance, arrow, battle-axe, cutlass, dagger, dirk, bayonet, scimetar, pike, sling, etc. The ancient Greeks, according to Homer, used the spear chiefly as a missile, which they hurled at a distant enemy. The most effective weapon of the steel-plated cavalry of the Middle Ages was a ponderous lance nearly eighteen feet long. The principal varieties of firearms are described in the article under that head. (See FIREARMS.)

Arms, or **Armo′rial Bear′ings,** the name given in heraldry to devices borne on shields; ensigns armorial. "There is no doubt," says Hallam, "that emblems somewhat similar have been immemorially used both in war and peace. The shields of ancient warriors, and devices upon coins or seals, bear no distant resemblance to modern blazonry. But the general introduction of such bearings as hereditary distinctions has been sometimes attributed to tournaments, wherein the champions were distinguished by fanciful devices; sometimes to the Crusades, where a multitude of all nations and languages stood in need of some visible token to denote the banners of their respective chiefs. In fact, the peculiar symbols of heraldry point to both these sources, and have been borrowed in part from each. Hereditary arms were perhaps scarcely used by private families before the beginning of the thirteenth century. From that time, however, they became very general, and have contributed to elucidate that branch of history which regards the descent of illustrious families."

Arm′strong, a county in W. Central Pennsylvania. Area, 750 square miles. It is intersected by the Allegheny River, bounded on the N. by Red Bank Creek, and on the S.W. by the Kiskiminetas, and also drained by Mahoning Creek. The surface is hilly or rolling, the soil is mostly fertile. Dairy products, wool, grain, and hay are extensively raised. Iron, coal, salt, and limestone are found here. The county is traversed by the Allegheny Valley R. R., and has important manufactures. Capital, Kittanning. Pop. 43,382.

Armstrong, a post-tp. of Vanderburg co., Ind. P. 1290.

Armstrong, a township of Indiana co., Pa. P. 1435.

Armstrong, a township of Lycoming co., Pa. P. 1424.

Armstrong (GEORGE DODD), D. D., a brother of Dr. W. J. Armstrong, born in 1813 in Mendham, N. J., graduated at Princeton in 1832, studied theology in Union Seminary, Prince Edward co., Va., was professor of chemistry and mechanics in Washington College, Lexington, Va. (1838–51), and since then pastor of a Presbyterian church in Norfolk, Va. He has been a large contributor to periodicals, and has published "The Summer of the Pestilence," "The Doctrine of Baptism," "The Christian Doctrine of Slavery," "The Theology of Christian Experience," etc.

Armstrong (JAMES), U. S. N., born at Shelbyville, Ky., Jan. 17, 1794, entered the navy as a midshipman in 1809, was captured by the British while serving in the Frolic in 1814, received the regular promotions, becoming a captain in 1841, commanding the East India squadron (1855–58), and captured the Barrier Forts in the Canton River in 1857. Jan. 12, 1861, he was compelled to surrender Pensacola navy-yard to a greatly superior force of Confederates. He became a commodore in 1866, and died Aug. 27, 1868.

Armstrong (JAMES F.), U. S. N., born Nov. 20, 1817, in New Jersey, entered the navy as a midshipman Mar. 7, 1832, became a passed midshipman in 1838, a lieutenant in 1842, a commander in 1861, a captain in 1862; retired at his own request Sept. 27, 1866. From 1862 to 1866 he commanded the State of Georgia in the North Atlantic blockading squadron, and April 25, 1862, took part in the bombardment of Fort Macon, which resulted in its surrender to the combined army and naval forces.

FOXHALL A. PARKER, U. S. N.

Armstrong (JOHN), M. D., a poet, born at Castleton, in Roxburghshire, Scotland, in 1709. He studied medicine at Edinburgh, where he graduated in 1732, and soon after began to practise in London. His poem called "The Economy of Love" (1739) was censured as indecent. In 1744 he produced a didactic poem on "The Art of Preserving Health," which is his principal work, and has had an extensive popularity. He was physician to the English army in Germany in 1760. Among his other works are "Benevolence," a poem (1751), "Taste," an epistle in verse (1753), and a volume of "Medical Essays" (1773). He was a friend of the poet Thomson and Dr. Young. Died Sept. 7, 1779.

Armstrong (JOHN), an American general, born at Carlisle, in Pennsylvania, Nov. 25, 1755. He served in the Revolutionary war with the rank of major. He was the author of the anonymous and celebrated "Newburg Addresses," written in Mar., 1783, in order to obtain from Congress a payment of the money due to the officers of the army. He was a member of the old Congress, and in 1800 was sent to the U. S. Senate from New York. He was sent as minister to France in 1804, and was appointed secretary of war in Jan., 1813. He was censured because he failed to defend Washington in 1814, and resigned in September of that year. Died April 1, 1843.

Armstrong (JOHN), M. D., an English writer, born in the county of Durham in 1784. He graduated as M. D. in the University of Edinburgh in 1807, after which he practised at Sunderland. In 1816 he published a work on "Typhus Fever," which widely extended his reputation. He removed in 1818 to London, where he practised with great success. Dr. Armstrong and Edward Grainger founded in 1821 a medical school in Webb street, where the former lectured and acquired popularity. He died Dec. 12, 1829. (See F. BOOT, "Memoir of the Life of J. Armstrong," 1834.)

Armstrong (JOHN), a native of Pennsylvania, commanded successfully the expedition sent in 1756 against the Indian allies of the French at Kittanning, served as brigadier-general in the Revolutionary army at Fort Moultrie, and commanded the militia at Brandywine and Germantown. He was a member of Congress (1778–80 and 1787–88). Died at Carlisle, Pa., Mar. 9, 1795.

Armstrong (RICHARD), D. D., born in Northumberland co., Pa., in 1805, graduated at Dickinson College in 1827, studied theology at Princeton, and went in 1832 as a missionary to the Sandwich Islands, where he served as minister of instruction, privy councillor, and president of the board of education. He received fatal injuries by a fall from his horse, and died Sept. 23, 1860.

Armstrong (ROBERT), BRIGADIER-GENERAL, born in 1790 in Eastern Tennessee, served in the Creek war of 1813–14, and at the battle of New Orleans as an officer of Tennessee volunteers, and in 1836 as a brigadier-general of volunteers in the Florida war. He was consul at Liverpool (1845–52), and for a time editor of the "Washington Union." Died Feb. 23, 1854.

Armstrong (SAMUEL T.), a bookseller of Boston, born in 1784. He was chosen lieutenant-governor of Massachusetts, and acted as governor in 1836, in consequence of the resignation of Governor Davis. Died in 1850.

Armstrong (Sir WILLIAM GEORGE), F. R. S., LL.D., D. C. L., noted as the inventor of the Armstrong gun, was born at Newcastle-upon-Tyne in 1810. He became in 1845 a proprietor of an establishment for the manufacture of hydraulic cranes, engines, and bridges. After numerous experiments, he invented, in 1854, a wrought-iron rifled cannon of extraordinary power and precision, which bears his name. These guns are made of bars of wrought-iron two inches wide, heated to whiteness, twisted spirally round a steel bar or core, and welded; other bars are twisted over these in a similar way, but with an opposite turn of the spiral. Another heating to whiteness precedes a thorough welding of all the layers of bars by a steam hammer. The internal core is removed, and the bore is rifled by machinery. It is stated that one of these guns will throw a ball of thirty-two pounds to the distance of five miles. The inventor was knighted by the queen, and appointed chief engineer of rifled ordnance. (See ARTILLERY, by GEN. BARRY.)

Armstrong (WILLIAM JESSUP), D. D., a clergyman of the American Presbyterian Church, born at Mendham, N. J., Oct. 29, 1796, was pastor of the First Presbyterian church in Richmond, Va., from 1824 to 1834. In this latter year he accepted the appointment of secretary of the American Board of Commissioners for Foreign Missions, which office he held till his death, which occurred by shipwreck in a voyage between New York and Boston Nov. 27, 1846. His Life and a collection of his sermons were published.

Armstrong's Grove, a post-township of Emmet co., Ia. Pop. 45.

Army. The title or expression "army" is of modern origin. During the Italian wars of Louis XII. his soldiers began to Frenchify the expression *armata,* which the Italians used, or rather *armada,* the term employed by the Spaniards. The latter term is constantly used not only in the German, but even the Swedish reports of the Thirty Years' war; whence from *armada, armée, army.* Previous to this the French indicated that which we look upon as appropriately styled army, by *bataille, ost* (*host, harst,* Germano-Swiss), *exercite* (*exercitus,* Latin; *exercito,* Span., Ital.), or *milice.* The latter word was preferred by several writers of the eighteenth century as having a more precise and general signification, as *milice* (*militia*) has its root in *miles,* a "soldier," which, in the accepted meaning of soldier, a "paid fighter," a militiaman certainly is not.

Since the earliest history of the world, fabulous or authentic, not alone the physical fate of empires, but the intellectual progress of humanity, the very development of mind, has depended upon the efficiency of the force which is defined an army. There is no doubt that civilization and Christianity—for the development of true civilization is the extension of Christianity—have been wafted to the end of the world upon the wings of commerce; but trade is transitory, and whatever is fixed has been made so by the force of arms. Even the most commercial nations, Phœnicia, Carthage, Holland, and England, could have accomplished little had they not occupied and held with an army or the fragments of an army what their sailors had discovered.

"Peace is the dream of philosophers, but war is the history of men;" and if almost universally, but erroneously, admitted to be "the greatest of evils," it is also one of the oldest. It is doubtful if some attempt at reducing war to a science is not the eldest of man's efforts at progress. "It preceded among all nations the arts and sciences proper, and perished in proportion as these developed." "The means of attack and defence appear to have been among the first essays of human invention, and to have called forth the powers of the mind in a greater degree than any of the arts of peace." The first expression of the art and science of war was an army. This may be defined as a certain proportion of a nation raised by means of "election" (Roman), conscription, voluntary enlistment, or otherwise, organized, armed, disciplined, and administered conformably to a digested system. It is an artificial combination of human and mechanical forces into a movable engine for defensive or aggressive purposes, of which discipline is the motive and regulating power. An army, in fact, is an aggregated force of men converted into soldiers, of each of whom it has been well said:

> "'Tis drilling that makes him, skill and sense—
> Perception—thought—intelligence,"

under a chief

> "Who has the energy—who the mind—
> The flashing thought—and the fearless hand—
> Together to bring, and thus fastly bind,
> The fragments"

into a homogeneous unit of force of which the soul is discipline.

An army as it should be is as Foy represented it to be in his time: "The army constituted a homogeneous and individual mass, in which, ascending from the conscript six months under arms to the field-marshal, there was no difference encountered in seeing and feeling."

In this connection a curious fact presents itself. Some of the most successful commanders on sea have been those who had their training in the land-forces of their country; more than one as cavalrymen. Not to encumber this article with names, consider almost all the Carthaginians' admiral-generals; Duilius, who first taught the Roman soldiers how to conquer on the most opposite element; Cæsar, Pompey; in modern times, Wrangel, Monk, Blake, Rupert, Opdam; the last three originally officers of cavalry.

Great captains have likewise proved the ablest organizers, administrators, statesmen, and negotiators: witness Gustavus, Torstenson, William III., Marlborough, Prince Eugène, Villars, Bentinck, Boufflers (the last two negotiated the Peace of Ryswick), Frederick the Great.

Although recent explorations have thrown some light upon the national military organizations of Nineveh and of Babylon, they are too vague to entitle them to more than the passing remark that they were based on scientific principles and administered in obedience to laws—laws which were sufficient for their era and extremely practical. They carried on campaigns at long distances from their base, and they besieged strong places, and took them after protracted efforts, and they fought battles; all of which proves that they must have comprehended and applied that which constitutes the art and science of war. Indeed, it would be very safe to assert that recent discoveries demon-

strate that all the ancient armies were better organized, administered, and manipulated than we have been accustomed to believe. This remark, indeed, applies to all armies worthy the appellation. Even Tamerlane has left behind him a treatise that shows that his wild hordes were subjected to a military direction by which skill and tact were enabled to employ their very native habits to the best advantage. The armies of antiquity had peculiar tactics, it is true, but these were congenial to the people and country; and, however peculiar, they understood them and applied them. Whoever will examine the Bible carefully will find in its descriptions the strongest evidence of a discipline of iron, of order, cadenced step, organization, tactics, stratagem, and strategy—all that modern pride considers the result of its intelligence—such as has not existed even within the last four centuries except in the small armies of Alva, Maurice, Gustavus, and on a larger scale in those of Marlborough and Frederick the Great. Some of the passages are magnificent in their portrayal of an army worthy of the inspection and leading of the greatest captains, complete in every arm or branch of the service. There we find expressions which cannot be surpassed in descriptive grandeur and comprehensiveness (*procellæ equestres*, "hurricanes of cavalry," "whirlwinds of chariots," etc.). The finest light cavalry of all times, imitated with so much success by the Saracens, were the Numidians of Hannibal ("the Cossacks of the ancient world"), and the Parthians were the predecessors of those arrays which culminated under Timour (Tamerlane) in the overwhelming of an antagonistic system under Bajazet at Angora, 28th July, A. D. 1402. Their tactics might be expressed by the term "swarm attack," which, against a force broken into by the other arms, is no despicable method of employing mounted troops. Tamerlane's heavy cavalry was likewise admirable.

The first army of which we know anything definite was the Egyptian. Perhaps since men have aggregated into nations no army has ever been maintained in every sense in a better condition commensurate with the times; and if history is at all reliable, the results were stupendous, considering the difficulties against which logistics had then to contend. If Sesostris (Se-seos-t-re or Rameses, "son of the Supreme and Gift of the Sun") and his campaigns are not a myth, the conception and campaigns of Alexander shrink into dwarfs before those of the armies which he made and directed; likewise those of the Romans, although they planted their eagles against the arctic and within the equatorial circle. The genius and generalship of Sesostris, which carried his own peculiar aquiline symbols of Apis eastward beyond the Ganges and northward of the Caspian, westward to the Ister or Danube, and southward towards the swell of the Mountains of the Moon, were not inferior to that "inspiration" of Alexander which bore those of the Macedonian Jove to the Indus, or that other inspiration which bore the eagles of the first triumvir to his unfulfilled invasion of Britain.

One question, however, presents itself which has a parallel in a more recent period, and this within a century and a half. Did Sesostris make his army or simply make use of it? The organization of the greatest of Egyptian armies, and the creation of the military spirit with which it was imbued, are said to have been due to his father, Amenophis III. Here we have an exact type of the preparation of Frederick William I., and the application by his son, Frederick (II.) the Great, although the latter has been compared in a critical analysis and examination to Philip II., the founder of the Macedonian power, rather than to Alexander the Great, its developer. To compare Frederick the Great to the son, rather than to the father, is preferable.

Between the Egyptian and better known organizations of civilizations more clearly understood, the Persian army deserves consideration, in that its cavalry was excellent, and even in the period of its decay it demonstrated that if properly commanded it was capable of achieving great things. This was shown at the battle of the Granicus, where its gallant behavior excited the admiration of every Macedonian officer, from the royal general-in-chief down to the humblest commander of a company. This is one side of the question. The conduct of the Persian horse at Platæa (B. C. 479) scarcely justifies a favorable criticism, although their defeat is mainly attributable to the fall of their leader, Masistius.

Close following on the Egyptian comes the better understood phalangian array of the Greeks, doubtless derived from the idea of that "impregnable phalanx" of the Nilish genius and organization which Cyrus found that even his Persians were unable to break. This disposition of force was exquisitely adapted to the Greek systematic and geometrical mind. The mutual dependence which made a phalangite nothing more than a particle of a grand machine was in perfect accordance with the national character. And it would be almost sufficient to prove the thorough efficiency of the discipline arrived at through the training *in* and *for* the phalanx to cite one example which it would trouble the critic to parallel—the march described by Xenophon, known as the "Retreat of the Ten Thousand."

Even although the career of the phalanx was short (say 200 years, from B. C. 550, Cyrus, to B. C. 350, Pyrrhus of Epirus), and it did go down before the Roman legion, its spirit revived from time to time in the return to dense formations, since, after all, the Greeks recognized the phalanx in any army corps disposed in compact order or "in mass," and even applied the term to Roman armies when they were drawn up without intervals (*ordre plein*). Short-lived in comparison, it had already accomplished great things in the "exact" wars which made Greek generals famous, and the tactics of Epaminondas proved a guide for the greatest, a key to success on modern fields. It is claimed that the three classes of the Greek infantry may be considered analogous—the first, the *hoplitæ*, to the grenadiers or to the line infantry; the second, the *peltastai*, to the light infantry; the third, the *gumnetai*, to the riflemen, tirailleurs, or sharpshooters of modern armies. It was in the time of Pericles that the Athenian soldiers were first paid, material changes made in clothing and armor, the second class of infantry intermediate between the heavy troops and skirmishers was added, and the distinction drawn between heavy and light cavalry. This was the acme of the glory of the Greek national citizens. With Alexander, artillery (ballistæ and catapultæ) accompanied armies to the field, and the commissariat became an acknowledged branch of the art of war.

In comparing the phalanx with the legion, in order to express the deficiencies of the former and the better characteristics of the latter, the critic is almost justified in claiming that the first was human, the second divine—the first the creation of human intelligence, the second the result of an inspiration of a superior power, or as Vegetius (A. D.? 375–390) has it: "Non tantum humano consilio sed etiam divinitatis instructu, legiones a Romanis arbitror constitutas," which Clarke translates well: "Heaven certainly inspired the Romans with the establishment of the legions, so superior does it seem to human invention" (xxi. 77), "or the idea of the legion must have been inspired by a god (Saxe, *Traité des Legions*, p. 39), for man was incapable of originating so perfect a military machine"—one destined in the course of events to conquer and consolidate for the future.

A clear idea of the striking difference between the phalanx and the legion can be conveyed to any reader's mind by saying that the first was mass or weight, and the second mobility or momentum; or, as a further demonstration, the first possesses little, the second perfect elasticity; the first little, the second perfect adaptability to any ground. The field had to be fit for the phalanx; the legion could be fitted to any stage of action. The best proof of the inferiority of the phalanx and the superiority of the legion was in one case its limited sphere as to theatre and existence; in the other, the fact that it outlived itself, that its spirit continued to conquer when the substance had almost completely deteriorated—when the legions of Fabius, Marcellus, Marius, Scylla, Cæsar, and Pompey had degenerated into a feeble militia; for instance, when Rome had ceased to be anything but a name; when Stilicho (A. D. 405–406) defeated Radagasius, and compelled a capitulation at Florence which had no parallel in the circumstances, of a monarch made prisoner and in the numbers surrendered, for fourteen centuries and a half, until Sedan, 1870.

It is a somewhat extraordinary fact that the only Eastern nation, the sixth Oriental monarchy, Parthia, the only one which successfully resisted the Roman armies at a period when as yet they had lost none of their efficiency—when it is claimed that among the Romans "the art of war had been brought to its highest point"—never possessed a standing army; their military organization was nearer that of the feudal times than any that we know of in antiquity. In A. D. 217 the Parthian king Artabanus fought a three days' battle at Nisibis with the Romans, and if he did not actually defeat them utterly, he compelled them "ignominiously to purchase a peace" (the mere permission to retreat cost $8,000,000); and, what is still more curious in this consideration, the tactics which lost the battle of the Pyramids won the battle of Nisibis, gunpowder having restored to the infantry the relative force or shock which was previously inherent in the cavalry. In the heavy horsemen (*καταφραχτοί*) of the Parthians is to be found a perfect exemplification of Marmont's cuirassiers armed with lances, or the feudal chivalry. The Parthian light horse represents, as well as the Numidians of Hannibal, the modern hussar, or rather mounted riflemen, if riflemen could shoot from the saddle at full speed, or the estradiots of the Venetian military era.

The principles of the phalanx survived in the Saxon

wedge of Harold, and revived again in the Swiss wedge of Sempach, July 9, 1386. In the condition of arms in the ninth, tenth, and eleventh centuries the Saxon wedge (the Roman *cuneus*, only one of the many phases of Roman formation) would have been irresistible had the Saxons, bravest of people, maintained anything like a regular army. It was the scientific wedge to all intents and purposes, driven by the beetle of invincible determination. As in the era of Hastings, even so the principle of the legion gives vitality to the very tactics of our own time. The tactics of Leo VI. (Flavius the Wise, or the Philosopher, A. D. 865–911), with a change of nomenclature and weapons, would serve as a valuable text-book for to-day; and when Gustavus Adolphus inaugurated a new system of tactics, it was a new birth of those of republican Rome, and his triumph at Leipsic (Aug. 28–Sept. 7, 1631) was simply a modern victory of the legion over the phalanx, of the Swedish brigade (open order) over the Tercias (masses) of Tilly.

If this antagonism should be traced back to first principles, it would be found that the contest between the phalanx and the legion has been going on ever since the first shock in arms of organized bodies of men. Even at this day we recognize the principles of the phalanx in the dense column (for instance, that of the English at Fontenoy, that living tower of strength which Foy represented as possessing the magic power of repairing the breaches made in it), and the legion in the deployed line-of-battle. The battle of the Pyramids is a curious example in a case the reverse of one previously stated. Whenever weight was required to resist the shock of momentum the idea of the phalanx revived. On the other hand, whenever the ground would not permit of this massed organization the legionary system prevailed, and the primary idea of the legion was revived in the lines-of-battle. In the Macedonian phalanx was combined all that was excellent in the other different Greek systems, while all their defects were avoided, and every improvement introduced which expediency recommended or necessity required. Thus completed, the Macedonian phalanx was capable of conquering every opposing organization, to be in turn conquered by the world-conquering Romans, as its principle and direction ever must be by superior tactics and greater mobility and adaptability.

The real birth of the modern standing army, in the present comprehension of the term, does not date back farther than the middle of the fifteenth century (1445–48). There were, it is true, from time to time, if not always, imperial and royal guards maintained, like the Varangians of the Byzantine court; also municipal guards, such as those recently in the service of the Free Cities, but standing armies, none. This occurred at the East in the reorganization of the Janizaries by Amurath I., 1350–72, originated by his father, Orchan, 1329. These Janizaries, organized into a regular force when the arrays of the Christian powers consisted of a disorderly militia, were invincible for a long period through a species of discipline to which fanaticism, blind obedience, courage, and enthusiasm gave a strength which it did not possess in reality. It was *esprit de corps*—a substitute, but an imperfect one, for true discipline. Amurath or Murad I. perfected likewise the institution of the *Spahis* (cavalry), and, wonderful foresight, of the *woinaks* (a sort of soldiers of the train). If this is correct, he was 450 years ahead of the first train corps in any Christian army. It is claimed that the Turkish regular army dates from Aladin or Ala-Eddyn (1219–36), but whether this is true or not, it certainly preceded that of Charles VII. by a whole century. Be this as it may, the new birth of the army took place at the West by the establishment of the "Companies of Ordonnance" by Charles VII. of France. It would not be an actual error to style him the father of standing armies, were it not that his regular force did not combine the three arms; it embraced only the second, mounted troops. It remained for his astute son, Louis XI., to perceive that no arm of the three could develop itself without the appropriate support of the other two. He was to Charles VII. what Remington cum suis, and previously Col. Poncharra, as to rifled and breech-loading small arms, and Louis Napoleon (or whoever was the real factor) as to rifled and breech-loading artillery, were to Colonel Ferguson of King's Mountain celebrity; what Torstenson was to Wurmbrand in mobilized cannon 250 years ago; what the infantry system of to-day and of the future is to that of de Guibert. Louis XI. was the father of field-artillery. What his wily brain conceived has been better done or further developed, but the glory of the conception *by* him it is impossible to deny *to* him, the most sagacious, at the same time most unprincipled, king that ever administered French affairs—the first sovereign of Europe styled "majesty." The result was, that his son, Charles VIII., invaded Italy in 1494 (he entered Rome on New Year's day, 1495) with the first real army which the modern world had seen—with the first real army that the Romans, with whom the legion originated, had seen since the legion disappeared from its soil (Charlemagne in Italy, A. D. 773) nearly a thousand years previous, swarmed out by the hordes or hosts of barbarians which superficial history deceives careless readers by styling armies.

Moreover, it is very remarkable that the new birth of a permanent force, with its first train of real artillery, its cavalry, the heavy, very much like that of the Parthians (Κατάφρακτοι), and resembling that recommended by Marmont in his "Institutions," and partially adopted in Russia (cuirassiers with lancers), and its light types of hussars,—this new birth in arms and its advent in the country of art led to a new birth of the arts and sciences. This discovery of Italy had more effect upon the sixteenth century, says Michelet, than that of America. War and commerce inevitably seek the same channels; even so do the arts, for scientific war is always the precursor of peace, and the triumphs of tranquillity are borne along on the lava-floods whereon fertility resumes its sway with greater force and beauty when the fiery torrents have cooled.

It is impossible to refrain from translating a few paragraphs which present a lively picture of the first national army whose descent into Italy cleft the barrier of centuries, whence issued forth to the world through the re-birth (*renaissance*) of the art of war—the new birth of all that elevates, refines, beautifies the advance of humanity; of all that can justify luxury, the inevitable consequence of the development of combined industry and art.

The army, 60,000 strong when it passed the Alps, having left detached corps all along the road, scarcely numbered 30,000 when it reached Rome. But these constituted the very sinew, the boldest and the best armed; relieved of its weaklings and stragglers, it was only the more formidable. To the music of its drums, with cadenced step, the wild battalion of Swiss and Germans led the march. In short tunics and tight pantaloons they shone in a hundred various colors. Many were of enormous stature, and to exalt it the more their casques were surmounted with lofty plumes. Besides the sword, they were armed as a rule with sharp lances of ash; one quarter of them carried halberds—the blade hatchet-shaped, surmounted with a four-sided spike. This (originally the Danish or pole-axe) was a deadly weapon in their hands. It served both to slash and to stab; in fact, represented a gigantic sword-blade bayonet. To each thousand halberdiers there were one hundred musketeers. The Swiss despised the cuirass; the front rank alone wore iron corselets. Behind these Swiss giants marched five or six thousand little, dark-complexioned, sunburnt men, vicious-looking, Gascons, the best marchers in Europe, full of fire, of intelligence, of resources, hard and quick hitters, each of whom was good for ten mortal shots.

The mounted gendarmes followed, 2500, covered with iron, each accompanied by his page and two valets; plus, 6000 light cavalrymen. In appearance these were feudal troops, but in reality the very contrary. As a rule, the captains were no longer noblemen leading their vassals, but the king's men commanding those more noble than themselves. "In France," said Guichardini, "every one can attain command." The heavy horses of this cavalry, bobbed and cropped in French fashion, without tails and without ears, astonished the Italians, and appeared to them as monsters.

The light-horsemen carried the English long bow of Agincourt and of Poitiers, which, bent with a wheel-lock, launched strong cloth-yard arrows. Thus the French had adopted the weapons of their enemies.

Around the king, on foot, besides the Scotch guard, 300 archers and 200 knights, all gold and purple, shouldering iron maces, served as escort.

Behind these came thirty-six bronze cannon, each weighing 6000 pounds; then the long culverins (guns of position); then 100 falcons (lightest field-pieces), rolling briskly along, not dragged slowly by oxen, according to the Italian method. Each piece had a team of six active horses, on a mobilized carriage, which in action was unlimbered and at once was in battery.

Every beholder comprehended that this display indicated a great revolution in military affairs, and not the mere passage of an ordinary army.

This era of Charles VII., father, Louis XI., son, and Charles VIII., grandson, was an era of warlike innovations in every branch of the military service. Louis XI. was the first French monarch who had a large quantity of cannon. He first introduced cast-iron and bronze guns; cast-iron shot superseded stone bullets, and in his intrenched camp of instruction in 1480 he had a large and respectable park of artillery. During his reign the medical service began to hold up its head for the first time since the legionary organization foundered, with its surgeon to each cohort, its hospital attendants and much of what is now deemed

indispensable, but had not been dreamed of for centuries. In the succeeding reign of Louis XII., France had one of those terrible awakenings whose vigor astonishes the world. In 1510, Gaston de Foix being commander-in-chief, a native French Napoleon of the first quarter of the sixteenth century, the French *Enfants Perdus*, or light troops (footmen) appeared, the best marchers for centuries which Europe had seen, and for centuries were to feel. At Ravenna, on Easter Sunday, 1512, they had a fearful baptism of blood and fire. This was the era of the introduction of the German Landsknechts (mercenary foot) and Hachenschützen (arquebusiers), the regimenting of infantry, the protection or support of artillery with picked troops, and "the disappearance of chivalry." Immediately the order of battle of necessity had to be adapted to the use of the rapidly improving firearms, and armies, as men of this century comprehend the term, were in being.

Thus the passage of the Alps by the young king Charles VIII., feeble, big-headed, six-toed to each foot, realized what Bismarck remarked of the Prusso-French war of 1870–71. This invasion of Italy by an organized national army was more than an invasion or an episode of war in the common application of the term—it was a historical phase. The existing conditions of society were crumbling and ready to pass away, and new developments of civilization were in the process of germination or ready for the shock to fecundate them. War is ever the necessary agent of this, and this new birth, like every other bringing forth of any new existence in human affairs, like human parturition, must be accompanied with anxiety intense, agony extreme, and loss of blood profuse; with an actual tearing to pieces. Thus armies are the midwives of progress.

It is in vain for other nations to attempt to deny that the military art and science owe the *impulse* of their progress to France and to French ideas; witness the introduction into all other services of so much of its nomenclature; but they also owe their highest practical development and close application to the Saxo-Germanic mind.

The military forces of Greece and Rome, of all antiquity indeed, except Egypt (native) and Phœnician or Carthaginian (mercenary), and of every other nation prior to 1450, were militia, more or less highly organized, subjected to a greater or lesser degree of discipline and instruction. Whether or not Philip of Macedon maintained a standing army is open to discussion. The advantage of an army of natives over one composed of mercenaries is shown especially in reverses. A national army may be beaten, but it is difficult to destroy it so that it may not revive from its very ashes; as, for instance, that of Rome after Cannæ. It will learn by experience, by being beaten, to conquer or persevere, as was the case with the Romans against Hannibal, the Russians against Charles XII., the Austrians against Frederick the Great, the Allies against France republican and imperial. With mercenaries, however, disaster or dearth is dissolution or worse, as happened more than once to Carthage, and to those who employed German or Swiss landsknechts and reiters. Still, the iron hand of Discipline and the genius of a master like Hannibal could organize invincible troops from the most discordant materials. This would indicate that while nothing can afford an antidote to indiscipline, discipline can remedy almost everything. An idea can make good defective discipline, and ideas amounting to fanaticism almost, but not entirely, supply the place of discipline; but, *cæteris paribus*, discipline is the *nephesh* or living spirit of an army, without which it is dead. Such armies as Hannibal's are like the "Grand Company" of Werner and Fra Moreale in the fourteenth century—vast forces of condottieri, which, led by great captains such as Saxe-Weimar, Baner, Torstenson, and Frederick the Great; their "Monks of the Flag" anneal into masses almost as irresistible as fate. Indeed, Hannibal, greatest of generals and war administrators, has been actually compared to a condottiere on the grandest scale, even though no one was fit to be named as his parallel for eighteen centuries, until Baner, the second Gustavus, and Torstenson, "the inimitable," demonstrated, under similar circumstances, that armies are ever subjected to the same laws and influenced by the application of like qualities in a leader. There was comparatively no discipline in the French republican armies, especially that wonderful army which from the Maritime Alps carried victory eastward to the last Alpine ridge before it sinks into the Austrian plain, and southward to the Gulf of Tarentum. Critics, eye-witnesses, and associates admit this. Enthusiasm took its place, and a belief in its innate force, its invincibility, such as permeated the U. S. army in Mexico, and made the escort of a wagon-train willing to encounter any force which sought to bar its way.

The only existing national army which continues to be militia, pure and simple, is that of Switzerland, unless the old Bonder system still holds good in Norway. The military force or army of Holland was a union of regulars and militia, to the uninitiated something like that of the U. S., but in reality vastly superior and more reliable. Prussia's organization is a union of regulars and militia in the strictest definition of the term (using the word "militia" in the sense of "the gallant and well-exercised militias of the principal republics of Greece," which were overthrown by the forces of Philip of Macedon, that "*may be termed* a standing army"). The Prussian system has been imitated in Sardinia—a feeble imitation, as was demonstrated in the campaigns of Custozza and Novara—and, later, in Turkey, and may be said to operate wherever a Landwehr and Landsturm, "ordinary and extraordinary militia," are recognized as the bases, constituting besides the regular force, equally important elements of the national army.

The famous English bowmen—who won such victories as Falkirk, 22d July, 1298; Halidon Hill, 19th July, 1333; Crecy, 25th Aug., 1346; Poitiers or Maupertuis, 19th Sept., 1356; Agincourt, 25th Oct., 1415; Pinkey, 10th Sept., 1547—were warlike militia, and nothing else—militia in the true sense of the expression, as were the Franks of Charles Martel, and not in the signification in which the term is misunderstood in the U. S. From the time of the Balearic slingers, taught in childhood to rely upon their peculiar weapons for their food (fifth century B. C.), and the Carducians, who slaughtered the legionaries of Crassus, there were no marksmen or sharpshooters for many centuries, until the Indian wars in America developed the capabilities of the rifle (whose regular introduction into European armies dates from the American Revolution), with the exception of the above-mentioned English long-bowmen, who well deserved the proud term applied to them: "In the forefrount, he (Richard III., no mean general nor authority) placed the archers like a strong fortified trench or bulwarke." These archers were equivalent to such unsurpassed skirmishers as were many of our woodsmen who glorified the war for the Union. Even so from Maharbal to Ziethen and Seydlitz no cavalry existed worthy of the fame which these have connected immutably with their names. Charlemagne's armies are claimed to have been organized according to the old Roman discipline, but this is impossible. Still, that there was an acknowledged system needs no other proof than the success and extent of his campaigns against the most different peoples—from the obstinate Saxon to the intellectual Moor, from the brutish Hun to the Latinized Goth. Each of these had an army of its own, with peculiar weapons and tactics. To meet them the Netherlandish hero and emperor must have had armament, discipline, and a system of logistics. Even without proof the results obviate any demonstration that his armies could not have been mere hordes like those of the Crusaders.

Modern war as a *fixed* or exact science dates from Maurice of Nassau or Gustavus Adolphus, in the beginning of the seventeenth century. The first real articles of war published were those of the latter. The first infantry which, in square, laughed to scorn the efforts of the best existing cavalry, the Polish, at Wallhof, 7th Jan., 1626 (type of Bonaparte's battle of the Pyramids), were likewise his. His was the first artillery, whether its effective development was due to him or Torstenson, which manœuvred and played the part of modern artillery according to modern ideas. His was the first cavalry which charged in successive lines, with reserves or supports to rally on. (Here it may be as well to remark that in appearance, except as to armor, the cavalry of the Thirty Years' war resembled in dress and duties those of the "great American conflict" as near as might be. With their felt hats, drooping feathers, short tunics, heavy boots, scraggy, ill-groomed horses, and accoutrements, the picture of one of their columns might pass for one of ours on a raid.) His were the first field-engineers, although the Turks had retained a rude knowledge of this art, derived from the Romans or Byzantines. Vauban, Montecuculi, and Prince Eugène have left their testimony of this. Witness the last's successful operations against Lille in 1708, "a happy medium between the Turkish mode of never relieving their people until the end of a siege, and our system (British) of so frequently changing." (See "*War in Low Countries*," 34, 35.) His was the first organized staff administered systematically. His was the first camp which bred a series of scientific generals, who, through a succession of great captains, changed the fate of every European nation in whose service they were commissioned. Even in England this was so through Leslie, who crushed Montrose, victor in seven battles, and it might be said in as many campaigns, at Philipshaugh, 13th Sept., 1645. "These warriors, trained in the school of Gustavus and his successor, Bernard of Weimar, Baner, Horn, and the *inimitable* Torstenson, were scattered through the different countries of Europe," etc.

There is no doubt that a number of men ahead of their time, but imbued with the principles of the scientific military past, or taught by personal experience of what was needed, worked in to the result achieved by Gustavus

Adolphus: Simon Stevin of Bruges in fortification; Coligny in rapid marches and concentration and combination; de Rohan in tactics and handling of troops, especially mountain-warfare; Maurice of Nassau in equipment and detail—Maurice, whose camp was the finest school of officers which had existed for centuries; Torstenson for artillery; Königsmark for partisan operations, flying columns, so styled, on a grand scale demonstrating their effectiveness.

But the time has now arrived when a standing army has become a necessity for the maintenance of government. With the introduction of firearms it was no longer a question of individual foresight and exertion, but of national effort and preparation. These last involved time and outlay, the application of a sovereign's prerogatives, a national expenditure. "Among his arguments in favor of standing armies in modern times, Adam Smith enumerates the greater difficulty of preserving any considerable degree of order and prompt obedience from the noise of firearms, the smoke, and the invisible death to which every man feels himself every moment exposed as soon as he comes within cannon shot, and frequently a long time before the battle can be well said to be engaged. 'In an ancient battle,' he says, 'there was no noise but what arose from the human voice; there was no smoke; there was no invisible cause of wounds or death. Every man, till some mortal weapon actually did oppose him, saw clearly that no such weapon was near him.'" With the introduction of small-arms and artillery another new element of success had to be taken into consideration, precision of aim, as well as rapidity of fire. The effects of a point-blank volley delivered by an extensive deployment of cool and practised troops would invariably determine a battle were there no supports or reserves to retrieve the effect of such a volcano. Witness that scathing discharge at thirty paces of Wolfe's veterans upon Montcalm's gallant charge at Quebec, in 1759; or those volleys, again, of the duke of Cumberland's column at Fontenoy, in 1745, which actually annihilated in succession every French line of battle which attempted to stop their audacious advance. It was not until the ammunition of the English was wellnigh exhausted, their formation breached with point-blank discharges of artillery, and the gaps penetrated by fresh and furious cavalry, that, with victory almost within their grasp, the intrepid troops were compelled to relinquish their efforts, and sullenly withdraw from the field of their everlasting glory. (*Henderson's Duke of Cumberland*, 77–96.) The republic of Venice, wisest in its generation, comprehended this at once, and passed laws for the training of its arquebus-men. Very few students are aware of the immense influence in this regard exercised by the elector Maximilian of Bavaria. Had the other Roman Catholic sovereigns evinced a like prescience, the Thirty Years' war might not have eventuated in favor of free thought. Few monarchs ever paid more attention to musketry fire or thorough organization. Fortunately, his sphere was small, and he found few imitators, and his enemies, not his allies, profited by his examples and efforts.

With the Thirty Years' war began a new era of military history, and the world was henceforth to bow beneath the crushing weight of standing armies.

Prussia, which now stands first in rank as a military power, was the first to set an example of the mobilization of cavalry proper and of horse-artillery. Fehrbellin was a turning-point. There the great elector, Frederick the Great's great-grandfather, vanquished those Swedes, hitherto unconquered, who had beaten all others. He demonstrated what singleness of objective, the perception of it and of the value of time and celerity, and determination in execution, must accomplish. These, when combined, constitute the secret of success in war. From this time forward Prussian troops made their mark on almost every battle-field of Europe. The reign which saw these great changes inaugurated—that of Louis XIV.—saw them almost completed. The introduction of the bayonet restored to infantry that aggressive power which was lost with the just contempt of the knights on horseback for the villain or serf on foot. Since then but little changes have occurred, except in amelioration and perfection. The general introduction of uniforms has even been attributed to Louis XIV. This is an error. In his army, however, the identifying regimental clothing was first carried out thoroughly and splendidly. The distinctive dress dates back to the Carthaginians, in whose army every nationality wore peculiar clothing and bore particular arms. For instance, their Spanish forces wore white faced with purple; so the Grecian phalanx had made all the field resplendent with crimson and gold, or brass burnished into the brightness of the more precious metal. In the first we have the type of the Austrian, in the second that of the English uniform. Ezekiel (600 B. C.) alludes to blue as the distinguishing color of the Assyrian uniforms, "clothed most gorgeously." Nahum (710 B. C.) speaks of the "valiant men" of the forces confederated against Nineveh as wearing scarlet garments and as carrying red shields. At Angora (1402), in Tamerlane's army, Mohammed's contingent from Samarcand were uniformed complete by regiments. In the fifteenth century, at the relief of Neuss, the bishop of Münster's troops (7400 men) were clad all in green. In the army of Gustavus Adolphus different organizations wore distinctive colors in cloth and facings. With Louis XIV., however, uniform became the rule, the law. Here we have an army in the strictest sense of the word—regular, paid, permanent, uniformed, armed alike in each arm and branch of the service, disciplined, with pontoon trains, engineer corps; in fact, every appliance which science and service demanded. Never before had such existed. There was room for improvement, but nothing required a beginning. The idea was born and had a strong growth. The future could add little but adaptability to changed customs, habits, advanced and extended civilization. Armies were now tolerably complete as to all working purposes, if not perfectly complete in every particular and detail with staff and staff corps, for the first time since the legion was in its prime. It is well, however, to bear in mind that it was not until the end of 1797 that the staff (*état major*) of armies assumed its present form. In 1682 companies of cadets were formed for the instruction of young men destined for the service. Companies of miners (engineer troops) were now also, for the first time, regularly instructed and embodied. In the next few years and campaigns the value of these organizations was fully tested, and their efficiency proved. At the first siege of Luxembourg, 1684, in which they were present, exercising functions such as engineers of to-day discharge, eight were killed and nineteen wounded. In 1692 another less important but more remarkable change occurred. The pike, which since the first formation of armies, and for thousands of years, had been the principal weapon of infantry, was superseded by the bayonet, introduced, like many other notable ameliorations, such as copper pontoons, improved tactics, etc., by General Martinet, an officer the reverse of the popular opinion entertained of him. Steinkirk, 1692, was the last battle in Europe in which any bodies of infantry were armed with pikes. The contest in which the bayonet was first used is much disputed. According to some, it was at Turin, 1692, and the first charge at Spire in 1703. The pike or half pike, eight feet long, still lingered in the hands of officers, under the name of esponton or spontoon, down to the beginning of this century, and its manual or mention was to be found in our militia regulations within the memory of the writer: "The militia law of the United States requires that the commissioned officers shall, severally, be armed with a sword or hanger, and esponton." It is doubtful if this law of 1792 has been repealed.

The armies of Louis XIV. and those confederated against him accomplished all any army had accomplished or can accomplish. Witness Marlborough's march to Blenheim, 13th Aug., 1704, and Eugène's to Turin, 7th Sept., 1706. The first has never been surpassed, the second seldom equalled, in the annals of warlike achievements. Henceforward, the histories of European armies present magnificent efforts in obedience to surpassing genius, but it is always the same old story over again, with a variation of detail, but no important difference.

If judging from cause and effect is a criterion, one of the finest armies that ever existed was that of Cromwell, 1643–58. It deserves attention because it constituted a connecting link between the organizations of Maurice and Gustavus and those of William III., Louis XIV., and Marlborough. For its size it was as complete a working army as the world ever saw. England never possessed a native army but that of Cromwell, if indeed at any time it exhibited one to compare with it. For their day, and perhaps for any day, Cromwell's "Ironsides" were the best mounted, equipped, armed, uniformed, disciplined, and effective cavalry that ever charged an enemy. Their "get up" was in its way perfect, but they were so few they can only be considered as a model *in petto* of what all cavalry should be. In this they resembled the Swedish hussars of the Guard upon whom Nolan dwelt with so much emphasis—a very perfect text for the head of an exercise, with a blank page below.

English infantry, likewise, had already made a name which justified Bugeaud's remark, quoted by Trochu, that it was lucky for the world there were so few of them. Napoleon I. said, "I think that if I were at their head I could make them capable of anything."

But to return to the armies of the close of the seventeenth and first decade of the eighteenth centuries. Little has been better done than they did with the means at their commands, either in field operations or sieges. The siege of Maestricht, 29th of June, 1673, is remarkable for being the first at which European armies made use of the zigzags, or the present mode of tracing approaches in attacking a fortified place. They were introduced by Vauban, who

borrowed them from the Turks. It is generally believed that parallels were first employed at this siege; but this is a mistake, and Vauban's talents and skill do not require any erroneous statements to give them a false glare. Trenches, to contain the assailants, had been excavated parallel to the works of the fortress to be attacked from the earliest times. Vauban's improvement consisted in tracing the approach or communication from the parallel, so that it should not be enfiladed, and which the Turks had done long before. Montecuculi, in his Mémoires, talking of the Turks, of whose military skill, as it existed in his time, he had very deservedly a high opinion, says: "They do not construct their trenches upon the shortest line, flanking them with redoubts from distance to distance, but they make them in curved lines, transversal, parallel to the place they are approaching, so that they can neither be enfiladed from the place nor damaged by its cannon."

There is another article in the Turkish system of discipline relative to sieges, as quoted by Montecuculi, which, in a modified degree, might be with advantage introduced into our service. Those who have witnessed the little labor performed by soldiers, the negligence in general of (in other respects) good officers, when employed upon working-parties, the time lost in relieving the detachments, and the hurry they are invariably in to be relieved, will perhaps agree that a medium between the two customs would be an improvement. "They (the Turks) do not change the guards of the trenches nor the working-parties: when they (the troops) have once been assigned to a position, they remain there to the end of the siege; their food, water, wood, and every other necessary are brought to them."

In reflecting upon the stupendous lines of earthworks executed almost at a nod by the opposing armies in the Low Countries in the wars of William III. and Marlborough, thinking men are at a loss whether most to admire the docility and good-will of the soldier, or the great and capacious minds which could conceive and direct such operations. They are equal to anything ever done by the Romans, and only require the pen of a Cæsar to be duly appreciated. Take those thrown up by Villeroi and Boufflers in 1695, from the Lys to the Schelde, twenty miles; those from the Schelde to the Mehaigne in 1701; those from the Little Gette to the Meuse, not less than thirty-two miles, in 1705; from Mons to the Sambre in 1707; those of Marlborough against Villars in 1711, twenty-two miles. Moret, in his "Fifteen Years of Louis XIV." (i. 131), speaks of Boufflers' lines as 150 miles long, enveloping Belgium; and Captain Parkes, who saw them, states in his "Memoirs" (77) that "Villeroi's lines were prodigiously strong;" they "surrounded the whole Spanish Netherlands." Our late civil war furnishes examples parallel to the above; for instance, the defensive works about Washington, D.C., 37 miles long, and strongly fortified; and the lines of the Union and Confederate armies before Richmond and Petersburg, Va.

Some of the marches of that era were likewise extraordinary; twenty-eight miles on a day, with such heavy arms, equipments, and clothing, is astonishing, when carefully considered and the condition of the roads and country taken into account. In Aug., 1711, in turning Villars' "*ne plus ultras*," Marlborough's troops marched sixteen hours without once halting (*Alison*, 281), and in Sept., 1791, the prince of Hesse, 49 miles in fifty-six successive hours (*Ibid.*, 224). Even as late as 1776 the British army in America carried sixty pounds per man, when uniform and equipments, everything, had been greatly simplified and mobilized. The British light infantry wore then a model dress. How much greater was the load under which Marlborough's veterans bore up! Nevertheless, the very movements of the day of Oudenarde are exemplary. In motion at 2 A. M., the allies marched 15 miles and crossed the Schelde to begin a battle which lasted from 3 P. M. until the obscurity of night alone put an end to the firing, and diminished the already wonderful results of the victory.

"Since the days of Marlborough," remarks a distinguished officer of British engineers, Sir James Carmichael Smith, "a most excellent system of tactics has been unquestionably introduced into the British army. Changes of front are made with rapidity and precision; columns are deployed, or the line formed into columns, with an accuracy and celerity formerly never even contemplated. It appears, however, open to discussion, whether, in the great and essential points which ought to form the character of the soldier, such as cheerfulness under privations, readiness to encounter fatigue as well as danger, perseverance under toil, and courage in the field, the army of Marlborough has, or ever can be, excelled."

The next stride in advance in all army organization matters was made by Frederick II. (the Great). With him, however, in many cases it was the practical application of improvements in theory originated in the reign of his common-sense father, so misjudged and misunderstood. As early as the first decade of the eighteenth century the Prussian was the pattern discipline, and Prussian *esprit de corps* acknowledged and renowned. The introduction of the iron ramrod was due to the "Old Dessauer," general-field-marshal of the Prussian armies; and this simple improvement gave a double force to the Prussian infantry, which his tactics—he is considered the father of the world's present tactics—quadrupled again by augmenting their manœuvring capacity. Frederick the Great was his pupil in beginnings, but he soon soared far beyond the vision of the pedagogue. The pupil seemed competent to realize the impossible. He lent "wings to the lightning" by the introduction of flying (horse) artillery (first battery 1759). Under him the reforms in the tactics of the three arms became accomplished facts in active service, but especially on the battle-field. His line tactics were as the working of machinery, and his revival or application of the oblique order of battle gave him victories such as Fame has seldom recorded—gave him one, Leuthen, such as has never been equalled since war has had reliable annals. Under him and his lieutenants, Ziethen and Seydlitz, Europe, the world, first saw cavalry such as it never yet had beheld since those of Hannibal's lieutenant, Maharbal—unless, perhaps, those Trabants of Charles XII. of Sweden, if they were what they were represented to be, and the chimeras dire of opponents without discipline—cavalry such as it should be, such as it never has been since. When the Seven Years' war was forced upon Frederick in 1756 the "use of cavalry in the Prussian army was at its highest perfection." These, whose magnitude can scarcely be comprehended by an unmilitary mind, were still but a few of the great and beneficial changes he inaugurated. He administered, marched, moved, and fought armies as they never had been before handled and battled, and he appreciated, first had a realizing sense, of what was well known, no doubt, as a theory and neglected as a fact, that "an army, like a serpent, goes on its *belly*." But why dwell on Frederick? This world has existed six thousand years, and with the means at his command no equal to "der Einzige" has ever appeared on its stage. Through his army he elevated little Prussia to the rank of a first-rate power. He did more: he showed it the possible future—the way through its army to that future. He did even more: while he enforced a discipline which was hailed as exemplary, he permeated his army and his people with an idea. And Napoleon has left us his witness of a fact that he discovered too late, and to his ruin—that "the moral is to the physical in war as three to one." In regard to every subordinate matter which unites in the consideration of the subject "Army," Frederick's stand is the pre-eminent position of the statue upon the column. He must rank among the very first generals and administrators of the world. Others had and have fought armies grandly and successfully; but he made one—an example of a fighting army, susceptible of everything required of an army. He left an army which, notwithstanding its misfortunes, served as an example, a base-course qualified to bear any weight imposed upon it, as time has shown. It still exists imbued with the Frederickian idea of its invincibility—the first, the cynosure, among the six or seven military powers of Europe: 1, Prussia (or Germany, but Prussia is the vital force); 2, Russia; 3, France; 4, Austria; 5, England; 6, Italy; 7, Spain.

Before closing this article upon the army organization of the seven great Christian powers of Europe in the past—of which, however, only four, Prussia, Russia, France, and Austria, were truly great—the pre-eminence in every respect must be given to Prussia. Russia may have a larger numerical force, but Prussia (or Germany) has the most reliable, and must be regarded as the greatest military power. If the opinion of Napoleon is entitled to consideration, it may be looked upon as perfect. He said that a country in which the whole male population fit to bear arms were cemented together by discipline or grouted into a cohesion by thorough organization, would have a perfect army. Were Prussia's national resources derivative from commerce, internal and external, from fertility of soil and agricultural proficiency, from manufacturing industry and mining commensurate with her military organization—were the nation on a par with the army—there would be scarcely any limit to its aggressive capabilities.

It is a curious fact that the elements or principles of the military system or organization of Prussia are the oldest of which there are authentic records. Of course, in this view of the case the Egyptian must be omitted, because the critic is dependent for his facts upon records which, whatever reliability is conceded, are nevertheless very open to question. Although in the Rosetta Stone a key was discovered, it does not follow that that key unlocks every difficulty. Like the method of interpretation of the inscriptions disentombed at Nineveh, worked out with so much skill and perseverance by the German scholar Grotefend, the result is by no means

fixed, and until further corroboration is found it is little better than a process of more or less accurate guesswork.

"The principles of the Prussian system are to be observed in the military institutions of David, the second king of Israel. Like those of Prussia, it is remarkable that the natural foundation of all this grandeur was laid in the very beginning of a civil war of five years' continuance, which, to all appearance, was wasteful, and would be ruinous, both to him and his people. But whilst his enemies, for that reason, left him unmolested, he employed that whole time partly in gaining over the tribes to him, and partly in training up all those who sided with him to arms—his own tribe first, and all the rest gradually as they joined him; and all this under a specious and unsuspected color of keeping up a proper force against Ishbosheth his rival. And as his army at no time exceeded the number of twenty-four thousand men, so small a number created no suspicion, nor gave any jealousy to his neighbors, who never reflected that these troops were changed every month, and an equal number of new men brought into military discipline; or if they observed that it was so after some time, possibly this gave them less suspicion, apprehending that there was less to be feared from a body of raw, undisciplined men; little considering that by this monthly and regular rotation every man in his dominions must in a little time be trained up to arms, and in the course of a few circulations thoroughly disciplined, as in fact it came to pass. For we find him, in little more than eight or nine years, able to withstand the united force of all his neighbor nations invading him at once, which perhaps never was the case of any other prince from the foundation of the world."

"It is true, other princes (Alexander the Great, for example, and Charles XII. of Sweden) have been combined against and invaded by some of their neighbors in the beginning and (as they deemed it) infancy of their reigns; but I cannot recollect that ever I heard or read of any general combination unanimously entered into against any princes of any nation, and yet totally defeated, except David."

Thus far is a quotation from "The Historical Account of the Life and Reign of David," published in London in 1752, just four years before the commencement of the Seven Years' war, when Frederick the Great of Prussia was assailed by a confederation of nations whose population was to his own as nearly, if not more than, twenty-five to one—when the same Prussia which he raised to such a rank among the European kingdoms had fallen lower than he found it in consequence of the Peace of Tilsit: a system analogous to that of David raised it again, through its army, and its army alone, to its pristine position of pride and strength.

Scharnhorst was the chief of the commission for the reorganization of the army. Among its other members was von Boyen, who afterwards became minister of war under Frederick William III. and IV.; Grolmann; and, lastly, the gentle, kind, but particularly clever, Augustus von Gneisenau.

Although to Scharnhorst was entrusted the carrying out the reform of the army, Stein, who reorganized the civil administration, influenced the result materially with his clear sense and master mind. Whatever credit enures to the military men, without Stein all would have come to naught, for he it was first recognized in action that the true foundation of the state was "*the people in its unity*," and that a nation which wished to be respected had first to prove its own self-respect by a spirit of freedom and independence. Scharnhorst's system, in the new organization of the army, was based on the general obligation of all citizens to carry arms for the defence of the country; the monopoly of the nobility with regard to commissions in the army was abolished; any man might rise from the ranks, even to be a general—in war, by bravery and presence of mind; in peace, by military knowledge and acquirements. Corporal punishment was done away with, the pigtail was cut off, and "the worship of pipeclay" vanished. The restrictive clause of the Peace of Tilsit, according to which Prussia was allowed to keep only 42,000 troops, Scharnhorst quietly evaded by making new levies every year, and the trained soldiers returning to their homes, from whence they might be summoned in right time to form the nucleus of an army. The first idea of the "Landwehr" and "Landsturm," which afterwards led to such surprisingly fortunate results, was, even at that time, conceived and first developed by Scharnhorst.

The Russian army, the offspring of Peter the Great, has always, since it deserved the title of an army, been remarkable for the steadiness of its infantry. Zorndorf is one of the most wonderful instances of an infantry blasted away by a superlative infantry, mowed down by an efficient artillery, and stormed into by the finest cavalry in the world, all three arms directed by pre-eminent ability, "beaten without flying;"—an infantry which under a Suwarrow could emulate, and even surpass, the dash of the republican French. But solidity and obedience need nevertheless something more; and it is well to remember the remark of Wellington, who, after witnessing a review of 132,000 Russian infantry, 28,000 cavalry, and 540 guns on the plains of Vertus, 10th of Sept., 1815, said to the marquis of Londonderry, "Well, Charles, you and I never saw such a sight before, and never shall again; the precision of the movements of these troops was more like the arrangements of a theatre than those of such an army; but still, I think my little army would move round them in any direction while they were effecting a single change."

The organization of the English army, based upon voluntary enlistment, has been pronounced by foreign officers of thorough education and acute observation as unworthy of scientific study—that is, for home application, although the United States have borrowed a great deal from it—in the writer's opinion, to their detriment. Great merit, however, has been conceded to the British engineers and artillery. The excellence of the British infantry has been ascribed to the natural qualities of the people, and the dash of its cavalry to their habits of life. Almost all the marvellous achievements of England's footmen must be credited to their unshakable determination or pluck, and the judgment of the Russian general upon the charge at Balaklava, that "it was very magnificent, but it was not war," can be applied with some exceptions to the most notable exploits of the British horse. The staff corps, whose service is connected with logistics, have proved themselves as unreliable as our own developed a capacity which excited the admiration of all competent to criticise. If the former had not been backed by the resources of the wealthiest of nations—profuse expenditure making good the shortcomings of red-tape and misdirection—they would have neutralized all that bravery and fortitude could achieve—qualities which have rendered the British arms pre-eminently conspicuous. The military organization of Spain affords little to instruct, and less to imitate. With rare exceptions—and even the majority of these attributable to foreign direction—the military forces of the Spanish Peninsula have demonstrated a want of efficiency, especially within three centuries, which almost raises a doubt as to the validity of the encomiums lavished upon the Spanish infantry said to have been destroyed at Rocroi. So much so, that unbiassed criticism can equitably ask if the superiority of the Spanish arms in the zenith of their renown was not attributable to circumstances and comparison with inferior opponents, and (except in certain cases, as, for instance, that of Gonsalvo de Cordova, the "great captain") to Teutonic elements, much more than to those of Spanish proper or cognate origin.

Prior to the Prusso-French war of 1870–71 the French army organization was considered the best in Europe, and yet a few days sufficed to demonstrate the hollowness of that which seemed the acme of solidity, and the feebleness of that which appeared adequate to resist any strain. In theory perfect, in application it proved directly opposite. Why? Because it wanted vitality, living, sentient discipline. Thus, for a practical application it was the antithesis to that of the United States—scarcely considered worthy of more than a short paragraph or passing notice in any work consulted upon military affairs. Looked upon by experts as too defective for study, the military system of the U. S. displayed an elasticity and strength which showed that our skeleton formation, through the inherent force of our people, could be clothed upon with the muscle of an athlete, reversing the opinion of the duke of Alva—held for three centuries in Europe as an irreversible judgment—that veterans constituted the bone, sinew, and vital force of an army, to which new troops added no strength, but only plumpness and appearance. This capacity for expansion without destroying efficiency called forth from the famous French engineer-officer Rossel, shot at Sartory by the Thiers administration of vengeance, one of the most eloquent tributes ever paid by an able and accomplished officer to the military force and army of a foreign nation (*Abregé de l'Art de la Guerre*, Paris, 1871): "Since the grand wars (terminating in 1815) progress has been especially a question of technology. In Europe the Prussians alone have shown themselves investigators, and have made war subservient to great political designs, but there is little of art in their campaigns. Theirs are lessons thoroughly learned, theirs are improvisations studied out for fifty years and recited to perfection. But if there is a difference between modern war and war as it was made at the beginning of the nineteenth century, it must be sought out in the study of the war of secession in the U. S. The war of secession was an industrial, progressive war—humane, if the term is acceptable.

"As a military element, the corps of West Point officers is assuredly better (I do not say more instructed) than all the

officers of Europe; as a political, a giant democracy, rugged for work, jealous of all its leaders. There all the new methods were tried, all the old ones were resurrected again; now, chambers of mines, such as were constructed in the sixteenth century; now, again, railroad trains brought into play against cavalry. As soon as a warlike procedure is recognized and appreciated, it is pushed to the extreme; abuse or excess of field fortifications; abuse of battles; abuse of skirmishers; of the navy, of guns. There were defences of forts such as should make all the commandants of fortified places in France and Alsace sink into the ground; battles of eight days, without termination and without pity; improvised armies staked and lost in less time than is necessary in Europe for a declaration of hostilities. There war constructed railroads, created ports, turned the course of rivers; to sum up, there the world beheld the application to this terrible science of all the exuberance of life, of a people seriously active, young, intelligent, and incapable of fear.

"Of military genius there was little or none, or at least confined to the second rank. Genius is something not practical, nor of commodious employment—above all, among these republicans. But, to make up for this, there was a very great deal of practical intelligence; the genius of commerce applied to war; the fever of production made use of to destroy. There war is not a speculation or a result, as with us; it is a business; and he was the good general who was capable of figuring out his balance-sheet and passing to his profit account the active and passive balances of the wise use of the time, of the money, and of the blood at his disposal. If we wish to begin anew, it is there in the United States that we must seek the elements and bring them down to our measure." In Von Hardegg's "Vorlesungen über Kriegsgeschichte," published at Stuttgart in 1852, the curious reader will find "chronological tables" that refer to leading works on military matters, which will enlighten him on almost every point referred to under this head, "Army." This valuable work was republished at Darmstadt and Leipsic, 1868, under the title of "Anleitung zum Studium der Kriegsgeschichte." (For a *Review of the present armies of Europe and America*, see ORGANIZATION — *Existing Army*.) J. WATTS DE PEYSTER.

Army Corps. See CORPS D'ARMÉE.

Army List, an official publication issued by the British war office, contains the names of all the commissioned officers in the British army, arranged according to the dates of their commissions. Then come the officers of that portion of the queen's army which belongs exclusively to India. The bulk of the work is filled with an enumeration of all the regiments in the queen's army, and all the officers in each regiment.

Army Register is an annual register published by order of the secretary of war, in compliance with an act of Congress, containing lists of the departments, regiments, and commissioned officers of the U. S. army, with the promotions and casualties for the year.

Army Regulations is the name of a volume published by the U. S. war department, containing rules for the management of troops in camp and field, with instructions for keeping accounts and making returns to the army bureaus. It is based upon the Articles of War and other acts of Congress. (See ARTICLES OF WAR.)

Army Worm, in the Northern States the larva or grub of a night-flying moth (*Leuca'nia unipunc'ta*). It varies considerably in color and size with age and locality, but its markings are characteristic. It is usually from less than an inch to an inch and three-quarters in length; dark gray, with three narrow yellowish stripes above, and a broader one of nearly the same color on each side; thinly clothed with short hairs, especially about the head, which is of a dull yellow color. The ravages of these worms, which sometimes march over grain-fields in great numbers, are best prevented by ploughing a double furrow around or across the field on which they are moving. Then they may be killed by setting fire to straw in the furrows or by turning pigs and fowls (after removal of the crop) into the field. Crows and blackbirds will also destroy them rapidly.

The army worm of the Southern States, a near relative of the above, sometimes appears in countless hosts and devours the cotton. In the West Indies its ravages have led to a general abandonment of the cotton crop. Water mixed with 2 per cent. of carbolic acid will, it is said, prevent the mischief. Various other destructive larvæ are called by this name.

Arna. See ARNEE.

Arnal'do, or **Arnold of Brescia,** an eloquent Italian reformer, born at Brescia about 1100. He was a pupil of the celebrated Abelard in France, and adopted the monastic life. As a preacher he boldly reproved the prevalent venality, luxury, and corruption of the clergy. He affirmed that the clergy ought not to possess temporal power or property. The second Council of the Lateran, in 1139, condemned Arnaldo as a disturber of the peace, and banished him from Italy. He retired first to France, where he encountered the hostility of Saint Bernard, and next to Switzerland, where he gained many adherents. In the mean time there was formed in Rome a numerous party which favored the principles of Arnaldo and were friends of civil liberty. These revolted in 1143 against the pope, who fled or was driven out of the city. Arnaldo in 1146 returned to Rome, again raised his voice for religious reform, and endeavored to organize a republic. His success was hindered by the violence and excesses of the populace, which filled the city with disorder for nearly ten years. A reaction ensued, and Pope Adrian IV. reduced the Romans to submission by laying the city under an interdict in 1154. Arnaldo was arrested by the aid of the emperor Frederick Barbarossa, and was hanged in 1155. (See D. H. FRANKE, "Arnold von Brescia," 1825; GREGOROVIUS, "Geschichte der Stadt Rom im Mittelalter;" CLAVEL, "Arnauld de Brescie, et les Romains du XII. Siècle," 1868.)

Arnal'dus Villanova'nus [It. *Arnal'do di Villano'va*], sometimes called ARNALDUS NOVICOMENSIS, an eminent physician, born about 1235. He devoted much attention to alchemy, wrote treatises on medicine, alchemy, and religion, and was suspected of heresy. He was employed in diplomacy by the king of Naples. Died in 1312. (See CAMPEGIUS, "Arnaldi Vita.")

Arnaouts. See ALBANIA.

Arnatto. See ANNOTTO.

Arnaud (HENRI), a pastor of the Waldenses and an able military commander, was born in Piedmont in 1641. He commanded the Waldenses (Vaudois), who in 1689 defeated the French in several actions, and recovered their native valleys, from which they had been driven by persecution. He served as colonel in the allied army in the war of the Spanish succession (1702–13). He published a "Histoire de la glorieuse Rentrée des Vandoes" (1710), translated by Ackland (1827). Died in 1721.

Arnauld (ANGÉLIQUE), called also ANGÉLIQUE DE SAINT JEAN, an eminent French nun, born Nov. 28, 1624, was a daughter of Robert Arnauld d'Andilly. She was educated at Port Royal by her aunt, Marie Angélique, and was a zealous Jansenist. In 1669 she was elected prioress of the convent of Port Royal. She acquired a high reputation for piety, learning, and courageous endurance of persecution. She became abbess of Port Royal in 1678, after which she was persecuted by the Jesuits. She wrote memoirs of her aunt, the abbess Marie Angélique Arnauld (1591–1661). Died Jan. 24, 1684. (See SAINTE-BEUVE, "Port Royal;" also BEARD, "Port Royal.")

Arnauld, formerly written **Arnaud** (ANTOINE), surnamed L'AVOCAT, a famous orator, born in Paris in 1560, was the most eloquent French advocate of his time. He was also distinguished for his probity. He became procureur-général in 1585. His most memorable performance was his defence of the University of Paris against the Jesuits in 1594. He was the father of four distinguished sons (the eminent Arnaulds of Port Royal) and of six daughters. Died in 1619.

Arnauld (ANTOINE), called LE GRAND ARNAULD, a celebrated Jansenist theologian and philosopher, a son of the preceding, was born in Paris on the 6th of Feb., 1612. His mother was Catherine Marion. He was educated in the Sorbonne, ordained a priest in 1641, and published in 1643 a work "On Frequent Communion," which was highly esteemed, but gave offence to the Jesuits, of whom he was a constant and strenuous adversary. This book promoted a reform in the style of French theologians. He became a doctor of the Sorbonne in 1641, and engaged in the controversy between Jansenius and his opponents on the subject of grace. Having retired to Port Royal, a convent near Paris, he passed there many years in seclusion, and wrote numerous works on theology and philosophy. In 1650 he published an "Apology for the Fathers" ("Apologie pour les Saints Pères"). He was expelled from the Society of the Sorbonne in 1656, after which the Jansenists were generally proscribed and persecuted, both by the civil and ecclesiastical powers. He aided Pascal in his "Provincial Letters," and Lancelot in a "Grammaire générale et raisonnée." Among his other works are "Logic, or the Art of Thinking," commonly called "The Port Royal Logic" (1662); "The Moral Theology of the Jesuits;" "The Perpetuity of the Catholic Faith touching the Eucharist defended against Sieur Claude" (1669); and "The Practical Morality of the Jesuits" (8 vols., 1683–94). To escape the persecution which the Jesuits instigated, he became an exile in 1679, and passed the remainder of his life in Flanders and Holland. He died near Liege Aug. 8, 1694.

Boileau, who wrote his epitaph, pronounced him the "most learned mortal who ever wrote." Arnauld was distinguished for his earnestness and simplicity of character, his industry, and his alacrity in controversy. His works occupy forty-five closely printed quarto volumes, which were published in 1775–83. (See P. QUESNEL, "Histoire de la Vie et des Ouvrages de M. Arnauld," 1697; LARRIÈRE, "Vie d'Antoine Arnauld," 1783; SAINTE-BEUVE, "Port Royal," vol. ii.; VARIN, "La Vérité sur les Arnaulds," 2 vols., 1847.)

Arnauld d'Andilly (ROBERT), an able French writer, born in Paris in 1589, was a brother of Antoine Arnauld (1612–94), and the father of Angélique (de Saint-Jean), noticed above. He was appointed intendant of the army in 1634, and retired to the monastery of Port Royal about 1645. He produced a translation of Josephus's "History" (1669), and wrote autobiographical memoirs (1734), besides two volumes of lives of saints, called "Vies des Saintes Pères du désert." Died Sept. 27, 1674. His son Simon was marquis de Pomponne, and his brother Henry (1597–1694) was a devout and zealous Jansenist, and in 1649 became bishop of Angers.

Arnault (VINCENT ANTOINE), a French poet and dramatist, was born in Paris Jan. 22, 1766. He produced a tragedy, "Marius at Minturnæ" (1791), which was warmly applauded, and other tragedies, entitled "Lucretia" ("Lucrèce," 1792) and "Germanicus" (1816). He was appointed in 1808 secretary-general to the University. He was admitted in 1829 into the French Academy, of which he was chosen perpetual secretary in 1833. Among his works is "Souvenirs of a Sexagenarian" (4 vols., 1833). Died Sept. 16, 1834.

Arnd, or **Arndt** (JOHANN), a German Lutheran "pietist," born at Ballendstädt Dec. 27, 1555. He began to preach at Quedlinburg in 1590, and removed to Brunswick in 1599. He published a very popular work "On True Christianity" ("Vom wahren Christenthum"), which was translated into many languages. W. Jacques produced an English translation of it in 1815. He was called the Fénelon of the Protestants. He became superintendent at Zelle in 1611. Died May 11, 1621. (See FR. ARNDT, "Johann Arnd, ein biographischer Versuch," 1838; F. W. KRUMMACHER, "J. Arnd's Leben," 1842; WEHRHAN, "Lebensgeschichte J. Arndts," 1848; H. L. PERTZ, "Commentatio de J. Arndtio," 1852.)

Arndt (ERNST MORITZ), a German patriot and popular political writer, was born in the island of Rügen Dec. 26, 1769. He travelled extensively in Europe after he left college, and was appointed professor of history at Greifswalde in 1806. He published a "History of Serfdom in Pomerania and Rügen," and animated the Germans to resistance against Napoleon in his "Spirit of the Times" ("Geist der Zeit," 1807). He also promoted the patriotic cause by many eloquent and spirited poems and prose-writings. His celebrated national song, "What is the German's Fatherland?" ("Was ist des Deutschen Vaterland?"), is, perhaps, the most popular of all the patriotic songs of Germany. He married in 1817 a daughter of the celebrated Schleiermacher. In 1818 he was appointed professor of history at the University of Bonn. He was suspended in 1819 on account of his liberal opinions, but was restored to his chair in 1840. He was a member of the national assembly which met at Frankfort in 1848, but he seceded with the constitutional party in 1849. Among his works is "Souvenirs of my Outward Life" ("Erinnerungen aus dem äussern Leben," 1840). Died Jan. 29, 1860. (See SCHENKEL, "E. M. Arndt; eine Biographie," 1866.)

Arne (THOMAS AUGUSTINE), MUS. DR., a distinguished English musician, born in London May 28, 1710. He was a skilful performer on the violin. He set to music Addison's "Rosamond" in 1731, and gained a high reputation by the music which he composed for Milton's "Comus" (1738). This formed an era in the history of English music. The national air "Rule Britannia" was his composition. Among his chief productions were "Artaxerxes," an opera (1762), and "Eliza," an opera. He married a vocalist named Cecilia Young in 1740. He excelled especially as a composer of songs. Died Mar. 5, 1778. His sister Susanna was a noted performer.

Ar'nee, or **Ar'na,** a large animal of the order Ruminantia, a native of India, is nearly allied to the ox, and is sometimes called *Bos arnee.* It is regarded by some naturalists as a wild variety of the buffalo. It is larger than an ox, and in the full-grown animal one of the horns measures sometimes more than six feet in length.

Arn'heim, von, or **Arnim** (JOHANN GEORG), a German general and diplomatist, born in Brandenburg in 1581. He gained the rank of field-marshal in 1628, and entered the service of Saxony in 1630. He commanded a wing of the army of Gustavus Adolphus at Leipsic in 1631, and was opposed to Wallenstein in 1633. In May, 1634, he defeated the imperialists at Liegnitz. Died April 18, 1641.

Arn'hem, or **Arn'heim** (anc. *Arenacum*), a fortified town of Holland, capital of the province of Gelderland, on the right bank of the Rhine, 57 miles by rail S. E. of Amsterdam. It is very ancient, well built, has a governor's palace, and a famous church containing the tombs of the dukes of Gelderland; also manufactures of paper and cotton and woollen stuffs. A bridge of boats crosses the river here. Sir Philip Sidney died at Arnhem in 1586. It was taken in 1795 by the French, who were driven out by the Prussians in 1813. Pop. in 1869, 31,626.

Ar'nica [from the Gr. ἄρς, ἀρνός, a "lamb," on account of the softness of its leaf], a genus of herbs of the order Compositæ, sub-order Tubulifloræ. The flowers of the ray are pistillate and ligulate, those of the disk hermaphrodite and tubular. The receptacle is naked, the pappus bristly. The root, leaves, and flowers of *Arnica montana,* or leopard's bane of Europe, are poisonous when swallowed, and are even irritant to the skin, but are administered as a stimulant in paralytic affections, fevers, and other diseases. They are also applied with benefit to bruises. They contain a volatile oil, a resin, and an alkaloid, arnicine. The root is perennial, the stem about two feet high, simple, with few leaves, bearing a head of flowers of a dark yellow, often two inches in breadth. The *Arnica multicaulis* and *mollis* of North America possess similar properties. Besides these there are five or more species in the Far West.

Arnim. See ARNHEIM, VON.

Ar'nim, von (ELISABETH or BETTINA), a German authoress, born at Frankfort-on-the-Main April 4, 1785, was a sister of Clemens Brentano. She had a very sensitive spirit and ardent imagination. In her youth she cherished a passionate admiration and platonic affection for Goethe, with whom she corresponded. She was married in 1811 to L. J. von Arnim, noticed below. Among her works are "The Correspondence of Goethe with a Child" (3 vols., 1835), which she translated into English, and "Die Günderode" (2 vols., 1840), which are commended as graceful and fascinating. Died in Berlin Jan. 20, 1859. Her daughter, Gisela von Arnim, is married to Herman Grimm, and published "Dramatische Werke" (3 vols., 1857–63). (See "Blackwood's Magazine," vol. lviii.)

Arnim, von (KARL OTTO LUDWIG), a German traveller and writer, born in Berlin Aug. 1, 1779, wrote several poems, and a work entitled "Passing Remarks by a Passing Traveller" (6 vols., 1837–50). He also published "German National Melodies," with an English version (1816). Died in Berlin Feb. 9, 1861.

Arnim, von (LUDWIG JOACHIM), generally called ACHIM VON ARNIM, a popular and fantastic German poet distinguished for his originality, was born in Berlin Jan. 28, 1781. He devoted some years to the study of the physical sciences, and published a "Theory of Electricity" (1799). He was one of the founders of the romantic school of German literature. In conjunction with Clemens Brentano, whose sister, Bettina, he married, he published a collection of songs entitled "The Boy's Wonder-Horn" (3 vols., 1806). Among his works, which exhibit a rich imagination, are "The Poverty and Riches, Guilt and Repentance of the Countess of Dolores," a novel (1810); "Angelica the Genoese and Cosmus the Rope-dancer;" and "The Crown Guardians" (1817). Died Jan. 21, 1831. A new edition of his works ("Sämmtliche Werke") was published 1853–56, in 22 vols.

Ar'no [Lat. *Arnus*], a celebrated river of Italy, which rises at Mount Falterona in the Apennines, and falls into the sea 7 miles below Pisa, which city, like Florence, is intersected by this stream. Its valley (Val d'Arno) is one of the most beautiful regions in Italy. The banks of the river are dyked on account of the floods which sometimes occur, and the river is made navigable by locks during high-water nearly to its source, and ordinarily small vessels can ascend to Florence. Its length is 150 miles.

Ar'no, a post-village, the capital of Douglas co. Mo., 126 miles S. S. W. of Jefferson City.

Arno'bius (AFER), an African rhetorician and Christian writer, born probably near Carthage. He flourished about 300 A. D., and was originally a pagan. The events of his life are mostly unknown. Having been converted to Christianity, he wrote an eloquent work called "Disputations against the Gentiles" ("Disputationes contra Gentes"), in which he exposes the absurdities of paganism. This is not considered strictly orthodox, but it is interesting as an historical document. According to M. Villemain, "It has a character of originality, and a real importance in relation to philosophy and history." (See NEANDER, "History of

the Christian Church;" BAYLE, "Historical and Critical Dictionary.")

Ar'nold (ALBERT NICHOLAS), D. D., born at Cranston, R. I., Feb. 12, 1814, graduated at Brown University 1838, and Newton Theological Institute 1841, ordained pastor of the Baptist church at Newburyport, Mass., Sept. 14, 1841, missionary to Greece 1844–54, professor of church history in Newton Theological Institute 1855–57, pastor at Westborough, Mass., 1858–64, professor of biblical interpretation and pastoral theology in Hamilton (N. Y.) Theological Seminary 1864–69, professor of New Testament Greek in the Baptist Union Theological Seminary at Chicago 1869–73, and author of "Prerequisites to Communion" (1860) and "One Woman's Mission" (1871).

Arnold (BENEDICT), an American general and notorious traitor, was born at Norwich, Conn., Jan. 3, 1740. He was apprenticed to an apothecary, from whom he ran away and enlisted in the army, but soon deserted. In his boyhood he was noted for his audacity and unruly disposition. He became a merchant at New Haven, and the owner of several small vessels employed in trade with the West Indies. In this business he failed, and incurred a suspicion of fraudulent dealing. He obtained a commission as colonel in the service of Massachusetts soon after the war broke out, in April, 1775. In the autumn of that year he commanded a force of about 1000 men sent to capture Quebec, and in the long march through the pathless forests of Maine proved himself well fitted for such a service. Having reached the St. Lawrence River, he effected a junction with General Montgomery, who had the chief command. They attacked Quebec in Dec., 1775, but failed to take it, and Arnold was severely wounded. He was raised to the rank of brigadier-general for his service in this campaign. Before and after this event he was involved in difficulties by his rapacity and pecuniary frauds. He commanded a small flotilla which encountered a superior force on Lake Champlain, Oct. 11, 1776, and displayed there such unflinching courage as well as skill that he gained much applause, although he was not victorious. He was deeply mortified by the action of Congress, which neglected him, while it gave the rank of major-general to five of his juniors in rank. In 1777 he was appointed a major-general, but as he remained below the other five, he was still discontented. He took part in the battle of Bemus Heights, Sept. 19, 1777, where he was involved in a quarrel with General Gates. At the battle of Stillwater, Oct. 7, he entered the field without permission from Gates, rushed into the hottest part of the action, rode about issuing orders in every direction, and acted like a madman. He received on that day a severe wound, which disabled him for some months, and Congress at last accorded him full rank. In June, 1778, he was appointed to the command of Philadelphia, where he lived in an extravagant style and ran into debt. While here he married a daughter of Edward Shippen (afterwards chief-justice of Pennsylvania). His official acts here were so rapacious that a court-martial sentenced him (Jan., 1780) to be reprimanded by the general-in-chief. Before this date he had been for six months plotting treason, and had made overtures to the enemy. He now solicited and obtained (in Aug., 1780) command of West Point, the most important fortress in the U. S., which he offered to betray into the possession of Sir Henry Clinton. The agent chosen by the British general to conduct the negotiations with Arnold was Major John André. (See ANDRÉ, JOHN.) Arnold and André had an interview on the 21st of Sept., and made the final arrangements for the surrender of West Point, but in consequence of the capture of André, Sept. 23, 1780, the plot was detected, and Arnold escaped in the British sloop Vulture, Sept. 25. He received about £6300 from the British government as a reward of his treachery. Having joined the British army and issued an address to the American people in vindication of his course, he obtained command of an expedition against Virginia, which sailed from New York in Dec., 1780, passed up the James River, and burned and pillaged a considerable amount of property. In the autumn of 1781 the troops under his command burned New London, Conn. He went to England about the end of the war, and passed many years in that country, where he was generally despised and shunned. He died in London June 14, 1801. (See SPARKS's life of Benedict Arnold in his "Library of American Biography," vol. iii.) WILLIAM JACOBS.

Arnold (BENEDICT), a Rhode Island colonist, born in England Dec. 21, 1615, was president of Rhode Island 1663–71. He was a citizen of Providence in 1636, and one of the purchasers of Conanicut Island in 1657. He had a good knowledge of the Indian tongues, and thus greatly befriended the New England colonies. Died in June, 1678.

Arnold (GEORG DANIEL), a writer and jurist, born at Strasburg Feb. 18, 1780, became professor of civil law in that city. He published a work on Roman law (1812), and wrote in the Alsatian dialect a comedy of "Whit-Monday," which was praised by Goethe. Died Feb. 18, 1829.

Arnold (GOTTFRIED), a German Lutheran theologian, born at Annaberg, Saxony, Sept. 5, 1666. He preached at Werben and Perleberg. Among his numerous works are "Sophia, or the Mysteries of Divine Wisdom" (1700), and a "History of the Church from the Christian Era to 1688" (3 vols., 1700), which gave offence to the orthodox. Died May, 1714. (See COLERUS, "Historia G. Arnoldi," 1718; ADOLPHE RIFF, "G. Arnold, Historien de l'Église," 1847.)

Arnold (ISAAC N.) was born at Hardwicke, Otsego co., N. Y., in Nov., 1815, was called to the bar in 1835, removed to Chicago in 1836, was a member of Congress from Illinois (1861–65), sixth auditor of the U. S. treasury (1865–66), and published a "Life of Abraham Lincoln" (1866).

Arnold (JOHN), an English watchmaker, born at Bodmin, in Cornwall, in 1744. He improved the chronometer by the invention of the expansion balance and detached escapement. Died Aug. 25, 1799.

Arnold (Dr. JONATHAN), born at Providence, R. I., Dec. 14, 1741, as a member of the colonial assembly brought forward in 1776 a bill repealing the oath of allegiance to Great Britain; was a surgeon in the Revolution, a member of Congress (1782–84). Becoming a resident of St. Johnsbury, Vt., he was long a judge of the Orange county court. Died Feb. 2, 1798.

Arnold (LEMUEL HASTINGS), born at St. Johnsbury, Vt., Jan. 29, 1792, graduated at Dartmouth in 1811, became a lawyer and manufacturer in Rhode Island, was governor of that State, 1831–33, member of Congress, 1845–47. Died at Kingston, R. I., June 27, 1852.

Arnold (LEWIS G.), a general, born in New Jersey, graduated at West Point in 1837, served gallantly in Mexico, and in 1862 became a brigadier-general of U. S. volunteers. Stricken with paralysis in that year while on duty, he was placed on the retired list in 1864. Died Sept. 22, 1871, aged fifty-four.

Arnold (MATTHEW), LL.D., an English poet, a son of the celebrated Thomas Arnold of Rugby, was born at Laleham, in Middlesex, Dec. 24, 1822. He was educated at Rugby and Oxford, and was chosen a fellow of Oriel College in 1845. In 1847 he became private secretary to Lord Lansdowne. He married Frances Wightman in 1851. Among his earliest works is a volume called "The Strayed Reveller, and other Poems" (1849). He was elected professor of poetry at Oxford in 1857, and published in 1865 a volume of "Essays in Criticism," which are highly esteemed. "The strain of his mind," says an anonymous critic, "is calm and thoughtful; his style is the reverse of florid; deep culture and a certain severity of taste have subdued every tendency to gay or passionate exuberance." He published a volume of "New Poems" in 1867, "St. Paul and Protestantism," "Literature and Dogma" (1873), etc.

Arnold of Brescia. See ARNALDO.

Arnold (PELEG) was a delegate to Congress from Rhode Island 1787–88, and afterwards was long chief-justice of the supreme court of Rhode Island. Died at Smithfield, R. I., Feb. 13, 1820.

Arnold (Gen. RICHARD) was born at Providence, R. I., April 12, 1828, and graduated at West Point in 1850. He entered the artillery, and in 1862 became a brigadier-general of U. S. volunteers, serving chiefly in the Gulf States. In 1866 he was brevetted major-general U. S. A.

Arnold (SAMUEL), MUS. DR., an English musician, born in London Aug. 10, 1740. He became composer to the Covent Garden Theatre about 1762. His opera, "Maid of the Mill" (1765), was very popular. He produced many other operas, among which are "Rosamond" (1767) and "Inkle and Yarico" (1787). He was appointed organist to the king in 1783. His "Cathedral Music" in 4 vols. is still popular. Died Oct. 22, 1802.

Arnold (SAMUEL GREENE), born at Providence, R. I., April 12, 1821, graduated at Brown University in 1841, and at Cambridge Law School in 1845. He was several times lieutenant-governor of Rhode Island, served for a time as a volunteer in the late civil war, and became U. S. Senator in 1863. He published a "History of Rhode Island" (7 vols., 1859–60), and numerous addresses, reviews, and articles for periodicals.

Arnold (THOMAS), D. D., an eminent English teacher and historian, born at Cowes, in the Isle of Wight, June 13, 1795. He entered the University of Oxford in 1811, graduated in 1814, and became a fellow of Oriel College in 1815. At college his habits were studious and his opinions liberal. He gained the chancellor's prize for Latin and Eng-

lish essays in 1815 and 1817. He removed to Laleham, near Staines, in 1819, and married Mary, a daughter of Rev. John Penrose, in 1820. In 1828 he was ordained a priest, and became head-master of Rugby School, which he conducted with eminent wisdom and decided success. He cultivated among the students a sense of duty and a high moral and religious tone, and enforced by his example and personal qualities the influence of Christian principles. He was much interested in the political and religious movements of the time, was a Whig or Liberal in politics, and a strenuous opponent of the High Church and new school of theology represented by Pusey. He would not recognize in the clergy any peculiar sacredness or any trace of mediatorial function. In 1832 he purchased Fox How, a small estate between Rydal and Ambleside, where he afterwards spent his vacations. He contributed to the "Quarterly Review" and "Edinburgh Review," published a good edition of Thucydides (1830–35), and five volumes of sermons (1828–42). His capital work is a "History of Rome" (3 vols., 1838–42), which he did not live to finish. It terminates near the end of the second Punic war. "Intellectually," says A. P. Stanley, "his chief excellence lay not so much in the philosophical and biographical department of history, as in analyzing laws, parties, and institutions." He was appointed regius professor of modern history at Oxford in 1841, and delivered there an introductory course of lectures, which were published in 1842. He died June 12, 1842, leaving two sons—Matthew, an eminent poet, and William D. "He will strike those who study him more closely," says the "Quarterly Review" for Oct., 1844, "as a complete character—complete in its union of moral and intellectual gifts; . . . for his greatness did not consist in the pre-eminence of any single quality, but in several remarkable powers, thoroughly leavened and pervaded by an ever-increasing moral nobleness." (See A. P. Stanley, "Life and Correspondence of Dr. Arnold," 2 vols., 1844; Zinzow, "Thomas Arnold," 1869.)

Arnold (Thomas Kerchever), an English clergyman, born in 1800. He published a number of popular text-books for schools, among which are manuals for the Greek, Latin, French, and German languages. Died Mar. 9, 1853.

Ar'nott (Neil), M. D., F. R. S., born in 1788, near Montrose, Scotland, was educated at Aberdeen and London, became a surgeon in the East India Company's service, settled in London in 1811, as a physician, published "Elements of Physics" (1827), "Essay on Warming and Ventilating" (1832), a "Survey of Human Progress" (1861), etc. He is distinguished as an inventor and as a benefactor of institutions of learning.

Arnott (William), D. D., born in Perthshire, Scotland, in 1808, was educated at the University of Glasgow, was ordained in 1839, and subsequently joined the Free Church movement, of which he became one of the ablest champions. In 1863 he removed to Edinburgh. He was a delegate to the meeting of the Evangelical Alliance in 1873 at New York.

Arnotto. See Annotto.

Arnould, or **Arnoult** (Sophie), a popular French actress, born in Paris Feb. 14, 1744. She was very successful as an opera-singer, and was distinguished for her wit and conversational powers. Her society was sought by such men as D'Alembert and Diderot, and her beauty was praised by several eminent poets. Died in 1803.

Arn'prior, a village of McNab township, Renfrew co., Ontario, on the Madawaska River, near the Ottawa, and on the Brockville and Ottawa R. R., 40 miles W. of Ottawa, with which it is also connected by steamboat lines. It has excellent water-power, two weekly newspapers, several mills, and there are marble-quarries in the vicinity. Pop. 1740.

Arns'berg, or **A'rensberg,** a town of Prussia, in Westphalia, is situated on the river Ruhr, 46 miles S. S. E. of Münster. It contains several churches and a gymnasium; also manufactures of broadcloth, linen, etc. In the Middle Ages it was one of the seats of the Vehmic court. Pop. in 1867, 4621.

Arn'stadt, an old town of Germany, in Schwarzburg-Sondershausen, on the river Gera, 10 miles S. of Erfurt, with which it is connected by a railway. It is one of the most ancient Thuringian towns. Here are manufactures of gloves, pottery, etc. A copper-mine has been opened in the vicinity. Pop. in 1871, 8603.

Arns'walde, written also **A'renswalde,** a town in the Prussian province of Brandenburg, 66 miles N. E. of Frankfort-on-the-Oder, has extensive chemical manufactures. It is on the railroad from Stettin to Posen. Pop. in 1871, 6522.

Ar'nulf [Lat. *Arnul'phus*], emperor of Germany, a son of Carloman of Bavaria. The latter was a grandson of Charlemagne. Arnulf was elected king of Germany in 887 A. D., invaded Italy about 894, and captured Rome in 896. He was crowned as emperor by the pope at Rome. He died in 899, and was succeeded by his son, Louis IV. (See Gagern, "Arnulfi Imperatoris Vita," 1837.)

A'rolsen, a town of Germany, capital of Waldeck, on the Aar, 23 miles N. N. W. of Cassel. It has manufactures of woollen cloth. Here is a fine castle of the prince of Waldeck, with a library of 30,000 volumes. Pop. in 1867, 2148.

Aro'ma (gen. **Aro'matis**), [Gr. ἄρωμα], the principle in plants or other substances which constitutes their fragrance; the peculiar odor of aromatic plants, such as nutmeg, cloves, vanilla, and lavender. It is extremely subtle, and seems to be almost imponderable, as these substances diffuse their odors for a long time without sensible diminution of weight. The aroma of plants is imparted to fixed oils by maceration.

Aro'ma, a post-village and township of Kankakee co., Ill., on the Kankakee River, about 60 miles S. of Chicago. Pop. of township, 1100.

Aromat'ics [Lat. *aromat'ica*, from *aro'ma*, a "spice"], spicy plants or drugs; substances which emit aroma or agreeable perfumes, and are generally characterized by a warm, pungent taste, as cloves, cinnamon, ginger. They often contain essential or volatile oils or resins. The term aromatic is also applied to several animal substances, as ambergris, musk, and castor. (See Aroma.)

Aromat'ic Vin'egar is a compound or mixture of ordinary vinegar with aromatic essential oils, and is a powerful perfume. As it is very volatile, and is an excitant when snuffed in the nostrils, it is used as a remedy for fainting and nervous debility. It is often prepared by combining crystallizable acetic acid with the oils of cloves, lavender, rosemary, and *Acorus calamus*.

Aroos'took, a river of the U. S., rises in Piscataquis co., Me., flows north-eastward through Aroostook county into New Brunswick, and enters the St. John's River. Length, about 120 miles.

Aroostook, a county which forms the N. extremity of Maine, bordering on New Brunswick. Area, about 6800 square miles. It bounded on the N. by the river St. John's (which traverses the western part of the county before it reaches the northern boundary), and is also intersected by the Aroostook. The surface in some parts is hilly, and a large part of the county is covered with forests. The chief settlements are in the southern part, the soil of which is productive. Lumber, cattle, wool, butter, oats, buckwheat, hay, maple sugar, and potatoes are extensively produced. Capital, Houlton. Pop. 29,609.

Arpád, the national hero of Hungary and the chief of the Magyars, who in 889 A. D. migrated from Galicia, and conquered the Slavonic people of Croatia and Transylvania. He is called the founder of the kingdom of Hungary. Died in 907 A. D. The dynasty of Arpád terminated in Andrew III., in 1301.

Arpeggio [It. *arpeggia're*, "to play on the harp"], in music, a chord of which the notes are given in succession; or the sounding the notes of a chord in quick succession, so as to imitate the harp.

Arpent, a French land-measure nearly equivalent to an English acre. The French now measure land by the *hectare* instead of the *arpent*, which is obsolete.

Arpi'no (anc. *Arpi'num*), a town of Italy, in the province of Caserta, is pleasantly situated on high ground, 5 miles S. of Sora. It is surrounded by very beautiful scenery, has a royal college, several churches and convents; also manufactures of woollen cloth, paper, etc. Here is a cyclopean wall and other remains of Arpinum, which was founded by the Volsci, and became a Roman *municipium* about 188 B. C. It is celebrated as the native place of Caius Marius and of Cicero. Variegated and white marbles are quarried in the vicinity. Pop. in 1861, 6240.

Ar'quebus, Arquebuse, or **Harquebus,** a hand-gun used by infantry before the invention of the musket. It was originally discharged by a match applied to the touchhole. The battle of Morat (1476) is said to have been nearly the first in which it was used. It was at first so heavy and clumsy that it had to be supported on a forked rest planted in the ground before the arquebusier.

Arraca'cha, the native name of an umbelliferous South American plant (*Arracacha esculenta*). It grows in Colombia, Jamaica, and other tropical regions, and is cultivated for its roots, which are large and sweet, and are eaten after being boiled or roasted. The taste is described as between that of a parsnip and a sweet chestnut. This plant was recommended as a substitute for the potato, and attempts were made to cultivate it in England, but that climate was found to be unfavorable.

Ar'rack', or **Rack,** an alcoholic liquor distilled from

fermented rice, is a common intoxicating drink in the East Indies and other Oriental countries. The term is also applied to a strong drink which is obtained from the fermented sap of the palm tree, and is often called palm wine or toddy. Among the species of palms which yield this drink are the cocoanut-palm and the date-palm. Arrack is imported into England, and used to make punch. When new it has an oily and disagreeable taste, which is improved by age.

Arragon. See ARAGON.

Ar'rah, a town of British India, in the presidency of Bengal, 25 miles W. of Dinapoor. The British here gained a victory over the mutinous Sepoys in 1857. Arrah was the scene of several exciting incidents of that mutiny. Pop. about 15,000.

Ar'ran, an island of Scotland, in the Frith of Clyde, county of Bute, 13 miles W. of Ayrshire, and 4 miles E. of Cantire. It is about 20 miles long, 12 miles wide, and has an area of 165 square miles. The surface is mountainous, the granite peaks of the northern part being remarkably grand. Here is a cavern in which Robert Bruce once hid himself. The geology of Arran, it is said, presents a greater succession of strata than any other equal portion of the British isles. The south-eastern half consists of Devonian sandstone, trap-rock, and carboniferous strata. The north-western half exhibits a central granite nucleus, bordered by mica-slate on one side, and by lower Silurian rocks on the other sides. Pop. about 6000.

Arran, EARLS OF (1762); Viscounts Studley and Barons Saunders (1758, in Ireland), and baronets (1662), a noble family of Great Britain.—PHILIP YORKE GORE, the fourth earl, was born Nov. 23, 1801, and succeeded his uncle in 1837. The dukes of Hamilton in Scotland also have the title of earls of Arran.

Arran, SOUTH ISLES OF, three small islands at the entrance to Galway Bay, about 4 miles from the W. coast of Ireland, and 27 miles W. of the city of Galway. They are named Inishmore, Inismain, and Inishere (or Innishere). Area, 18 square miles. They once contained twenty churches and monasteries, and a church built in the seventh century is still standing in one of them. Here are also remains of cyclopean forts of unhewn stone, supposed to have been built in the first century, and described as among the most magnificent barbaric monuments of Europe.

Arrangement, a musical term, denotes the adaptation of a piece of music to an instrument different from that for which it was originally composed, as when orchestral compositions are adapted to the piano. The arrangements of Franz Liszt are said to be superior to nearly all others.

Arras (anc. *Nemetacum*, afterwards *Atreb'ates*), a fortified city of France, capital of the department of Pas-de-Calais, on the river Scarpe and on the Railway du Nord, 48 miles by rail N. E. of Amiens, and 120 miles by rail N. N. E. of Paris. It was formerly the capital of Artois, and was the seat of a bishop as early as 390 A. D. It was fortified by Vauban, and ranks as a fortified town of the third class. The citadel is separated from the town by an esplanade, but it is enclosed within the same wall. Arras is well built, partly on a declivity and partly on flat ground, and is adorned by fine public buildings, among which are a cathedral, a town-hall, and a theatre. It has a museum, a school of design, and a public library of about 36,000 volumes. Here are manufactures of hosiery, lace, woollen and cotton goods, etc. In the Middle Ages it was so famous for its tapestry that this article was commonly called *arras* by the English. It was the birthplace of Robespierre. The grain-market of Arras is said to be the most important in the N. of France. Pop. in 1866, 25,749.

Arras'tre, a mill used in Spain and the Spanish colonies for grinding gold and silver ores. It is a circular basin of granite or other hard rock, in the centre of which a vertical wooden shaft revolves, with four horizontal arms, to which large flat stones are attached by chains. The ore is broken into small fragments before it enters the arrastre. The revolution of the shaft is produced by two mules. (See SILVER, by PROF. W. P. BLAKE.)

Ar'rawak In'dians, a race or collection of tribes in Guiana, remarkable for the euphony of their language and their mild and friendly disposition towards the whites. They were formerly very numerous and powerful. They have been much benefited by the labors of Moravian missionaries.

Arreoy', or **Areoi,** the name of a licentious society in the Society Islands, composed of both sexes. They were bound to kill all their offspring immediately after birth. The arreoy was first noted by Captain Cook, and more fully described by Ellis in his "Polynesian Researches."

Arrest' [Old Fr.], the apprehension or seizure of a person by lawful authority, usually by the command or direction of some court or officer of justice. It may take place either in civil or criminal cases.

(1) *In Civil Cases.*—In this instance it may be either on *mesne* or final process. The object of the first is to make it certain that the defendant will answer the order of the court. He may either remain in custody or give bail, according to the rules of practice, as security for his appearance. On final process the arrest is in the nature of an execution. The defendant is to be kept in confinement, either in jail or within prescribed limits, until the judgment is satisfied, or until he is discharged by order of the court. In the early common law an arrest was allowed almost as a matter of course, imprisonment for debt being the regular practice. This rule is now greatly modified, and by a statute in England and in a number of the American States an arrest can only be had in special cases and upon a judge's order. The facts necessary to be shown as a basis for the order are presented on affidavit. There are certain persons privileged from arrest by rules of general prevalence, such as members of legislatures, or witnesses while attending the sessions of the legislature or courts, and while going to and returning from the same. The arrest in such cases is irregular, and the party arrested may be discharged on motion. This privilege is secured to members of Congress by the U. S. Constitution. An original arrest cannot be made on Sunday, nor is it lawful to break into a house for this purpose, owing to the legal rule that "a man's house is his castle." This rule does not apply where the defendant has been rescued, and the officer is proceeding regularly to retake him. The common law permits an arrest by night as well as by day. This rule is sometimes affected by statute.

(2) *In Criminal Cases.*—The power to arrest in this class of cases is much less restricted. None are privileged (except ambassadors and their servants), outer doors may be broken open, Sunday is not regarded, and a warrant is not in all cases essential. Such an arrest is made either under a warrant, or by an officer without a warrant, or by a private person without a warrant. A warrant is granted by a magistrate on information in writing and supported by oath, and is executed by the person to whom it is addressed, usually a sheriff or constable. An arrest may be made without a warrant by a peace officer, such as a sheriff or constable, when a felony or breach of the peace is committed in his presence, or where a felony has been committed, or he has reasonable ground to suspect that it has been, though not in his presence, and he has also reasonable ground to suspect the party arrested. The right of a private person to make an arrest without a warrant is much more restricted. He must be prepared to show that a felony has been *actually* committed, as well as reasonable grounds of suspicion that the party arrested was the wrong-doer. A private person is bound to arrest for a felony committed in his presence. In making an arrest necessary force may be used, and in case of felony even life may be taken where arrest is enjoined. An arrest can only properly be made within the jurisdiction of the court. When a person charged with crime escapes from one State to another, his return may be demanded under the laws of Congress. Should he escape to a foreign country, he may in certain cases be retaken under an extradition treaty with that country. (See EXTRADITION.)

The word "arrest" is also used in law in connection with judgment. This means that judgment is not to be entered, although a verdict has been given, on account of some reason appearing upon the record, as where the allegations in the pleadings are not a sufficient basis for an action.

T. W. DWIGHT.

Arrest', d' (HEINRICH LUDWIG), a German astronomer, born in Berlin in 1822. He discovered in 1851 the comet called by his name, and in 1862 the asteroid Freia.

Ar'rian [Gr. Ἀρριανός; Lat. *Arria'nus Fla'vius*], a distinguished Greek historian, born at Nicomedia, in Bithynia, about 100 A. D., was a pupil and friend of Epictetus. He was a Stoic in philosophy, edited his master's "Manual of Ethics" ("Enchiridion"), and wrote the "Lectures of Epictetus" in eight books, of which four are now extant. In 136 A. D. he was appointed governor of Cappadocia by Hadrian. He is said to have served in the army against the Goths and Alani. He chose Xenophon as his model in composition. His most important work is a "History of the Expedition of Alexander the Great," Ἀνάβασις Ἀλεξάνδρου ("The Ascent of Alexander"), which is the chief authority on that subject, and is highly esteemed for accuracy, good judgment, and impartiality. Among his extant works are "Indica," an account of India, a "Treatise on Hunting," and a "Voyage Around the Euxine Sea." (See MAUERMANN, "Arrianus Nicomediensis et Quintus Curtius Rufus," 1835; ELLENDT, "De Arrianeorum Librorum Reliquiis," 1836.)

Arria′za (JUAN BAUTISTA), a Spanish poet, sometimes called **Arriaza y Superviela,** was born at Madrid in 1770. He passed some years in London as secretary of legation, and published in 1803 "Emilia," a poem on the influence of the fine arts. Having returned to Spain in 1807, he took an active part in politics, and wrote in support of absolute monarchy. He obtained an important position in the department of foreign affairs. In 1810 he produced "Poesias Patrioticas." Died in 1837.

Arri′ghi di Casanova (JEAN TOUSSAINT), duke of Padua, a Corsican general, was born at Corte in 1778. He entered the French army in early youth, and served with distinction at Marengo, Austerlitz, and Friedland, and was raised to the rank of general of division on the field of Essling in 1809. He lived in exile from 1815 to 1820; was elected to the Legislative Assembly in 1849. Died in 1853.

Ar′rington, a township of Wayne co., Ill. Pop. 1640.

Arrington (ALFRED W.), born in Iredell co., N. C., in Sept., 1810. His father, Archibald, was a member of Congress 1841–45. The younger Arrington was a Methodist preacher (1829–34), winning much distinction for eloquence. In 1834 he became a lawyer, practising in Missouri, Arkansas, and Texas. He was a district judge in Texas (1850–56), and in 1857 removed to Chicago, where his career as a lawyer was very brilliant. He was the author of a celebrated "Apostrophe to Water," often quoted. Died Dec. 31, 1867.

Ar′ris [from the Lat. *aris′ta*, the "beard of an ear of grain," the "prickle of a fish"], in architecture, the edge or angle formed by two surfaces meeting each other, or the line of meeting of two planes in a sharp edge; a term sometimes applied to the edges which separate the flutings of a Doric column.

Arro′ba, a Spanish weight and measure, used also in Brazil and the Spanish colonies. There are ten kinds of *arroba* for weight, ranging between $21\frac{82}{100}$ pounds avoirdupois and $32\frac{52}{100}$ pounds avoirdupois. Only two of the number are as great as 28 pounds. There are eleven kinds of *arroba* for liquid measure, ranging from $2\frac{72}{100}$ gallons to $9\frac{91}{100}$ gallons. The arroba for Spain generally is (or was, as it is abolished) $4\frac{26}{100}$ gallons.

Arrondissement, a French term, signifies a district or circuit, and is the name of the principal civil divisions of the departments of France. Each department is divided into arrondissements, each arrondissement into cantons, and each canton into communes.

Ar′roo′, Aroo, or **Arru Islands,** a group of islands in Australasia, situated between lat. 5° 20′ and 6° 55′ S., and between lon. 134° 10′ and 134° 45′ E. The largest island is 70 miles long and 20 miles wide. Some of the natives have adopted Christianity. Here is a town called Dobbo, into which British goods are imported annually to the amount of about £30,000. The exports are pearls, trepang, and birds of paradise.

Ar′row, a long, pointed, and barbed missile formerly much used in war and the chase, and discharged from a bow, cross-bow, or ballista, and even now used by some savage nations. Among the varieties of the arrow were the "cloth-yard arrow" once used by the English archers, and about one yard in length, and the "quarrel," a heavy arrow discharged from the cross-bow. Some South American Indians discharge light poisoned arrows from a blow-pipe. Poisoned arrows are used by many barbarous peoples.

Ar′rowhead (*Sagitta′ria*), a genus of aquatic plants of the order Alismaceæ, natives of both cold and tropical climates. They have unisexual flowers, with many stamens and many carpels, which are compressed and one-seeded. The *Sagittaria sagittifolia*, a native of Europe, is a beautiful plant with arrow-shaped leaves, which rise above the surface of the water. The *Sagittaria variabilis* of the U. S. is very similar to it. The *Sagittaria Sinensis* (Chinese arrowhead) is cultivated in China in ponds and ditches for the sake of its nutritious corms, which abound in starch.

Arrow-Headed Characters. See CUNEIFORM INSCRIPTIONS, by REV. WILLIAM H. WARD.

Ar′row Rock, a post-village and township of Saline co., Mo., on the right bank of the Missouri River, 15 miles above Boonville. Pop. of township, 3174.

Ar′row-Root, the starch or fecula from the root of the *Maranta arundinacea* and other species of *Maranta*. It is much esteemed as an easily digestible diet for infants and invalids. Large quantities of it are imported into the U. S. and Europe from Bermuda and Jamaica, where it is cultivated. It is also raised in Georgia and Florida. The roots, or rather rhizomes, yield about 25 per cent. of this starch, which is in the form of a light, opaque, white powder. It is often adulterated with potato-starch and other substances. The name arrow-root is said to refer to the use of the fresh roots as an application to wounds inflicted by poisoned arrows; and the expressed juice has been recommended as an antidote to poisons, and a cure for the stings and bites of venomous insects and reptiles. Some think that the name is really another form of *ara*, which is said to be the Indian appellation of the plant; but it is not improbable that the scales on the root, resembling the

Arrow-root.

point of an arrow, may have suggested the name. In preparing "arrow-root," the rhizomes of the plant, when a year old, are washed, carefully peeled, and beaten in a wooden mortar or by a mill or wheel-rasp to a milky pulp. The pulp is then diluted with water, passed through a sieve of coarse cloth or hair to separate the fibres, and the starch is allowed to settle. Albumen and salts are held in solution, while the starch settles down as an insoluble powder, which is finally dried in the sun. According to Benzon, the fresh rhizomes contain—

Starch	26.00
Cellular fibres	6.00
Albumen	1.58
Gummy substances	0.60
Volatile oil	0.07
Chloride of calcium	0.25
Water	65.50
	100.00

The prepared arrow-root is almost pure starch. It has a peculiar firm feel between the fingers, and when rubbed produces a peculiar crackling sound, like that of dry snow in very cold weather. Like starch from other sources, it is insoluble in cold water, but forms on boiling a gelatinous solution.

The purity of arrow-root is best determined by microscopic examination, as, while the starch granules of different plants (see STARCH) are almost identical in chemical composition and properties, they are often very peculiar in size, form, and structure. The granules of the genuine Maranta arrow-root are of a regular ovoid form, of nearly equal size, and smooth on their surface; while the granules of potato starch, one of the most common adulterants, are irregularly ovoid, very variable in size, from $\frac{1}{2000}$ to $\frac{1}{300}$ of an inch in diameter, and streaked and furrowed on their surface. The fecula of many other plants is used either as a substitute or an adulterant for the true arrow-root. *Zamia integrifolia* yields an arrow-root in the West Indies and the neighborhood of St. Augustine, Fla. *Arum vulgare* (wake-robin) yields Portland arrow-root in the isle of Portland. *Curcuma angustifolia* yields East Indian arrow-root. *Jatropha Manihot*, the cassava or tapioca plant, yields Brazilian arrow-root. *Tacca oceanica* yields Tahiti arrow-roots. *Alstrœmeria pallida* yields Talcahuana arrow-root. The *potato* yields, by careful preparation, the English arrow-root. Starch similar to arrow-root is also prepared in the West Indies from the roots of *Dioscorea sativa* or yam, of *Colocasia esculenta*, and from the fruit of *Artocarpus incisa* or bread-fruit tree.

For use, arrow-root should be rubbed to a paste with a little cold water, and while this is stirred a considerable quantity of boiling water should be added. It may be sweetened with sugar and flavored with lemon-juice or

with wines and spices. For infants it may be prepared with milk. A table-spoonful is sufficient for a pint of water or milk. C. F. CHANDLER.

Ar'rowsic, a township of Sagadahoc co., Me. It has an important lumber trade. Pop. 252.

Ar'rowsmith, a township of McLean co., Ill. Pop. 927.

Arrowsmith (AARON), an English geographer, born at Winston, Durham, in 1750, became distinguished as a publisher of excellent maps, over 100 in number. Died in 1823.—His son AARON (now deceased), and his grandson JOHN, also became distinguished for the excellence of their maps.

Arroy'o Gran'de, a post-township of San Luis Obispo co., Cal. Pop. 776.

Arsa'ces I. [Gr. Ἀρσάκης], the founder of the Arsacidæ and of the kingdom of Parthia, lived about 250 B. C. His origin and history are involved in much obscurity, as the statements of ancient historians are confused and contradictory. He is said to have been the chief of a nomadic tribe of Scythians or Bactrians. All his successors assumed the name of Arsaces.

Arsaces III., king of Armenia, was a son of Tiridates III., whom he succeeded about 340 A. D. He waged war against Sapor, king of Persia, and formed an alliance with Julian the Apostate about 360. The defeat and death of Julian are ascribed to the treachery of Arsaces, who deserted him in the campaign of 363 A. D.

Arsaces VI., or **Mithridates I.,** king of Parthia, enlarged his dominions by the conquest of Bactria, and extended his conquests to the Indus. In 138 B. C. he defeated Demetrius Nicator of Syria. After a reign of twenty-five years or more, he died about 135 B. C.

Arsac'idæ, the name of a dynasty of Parthian kings which was founded by Arsaces in 250 B. C., and continued to reign until 226 A. D. The last king of this dynasty was Artabanus IV. (Arsaces XXIX.).

Arsamas, or **Arzamas,** a town of Russia, in Nizhni-Novgorod, is on the river Tiosha, 249 miles E. of Moscow. Pop. in 1867, 10,517.

Ar'senals, public establishments designed for the manufacture and storage of arms and military equipments. The name is derived from the Latin *Arx*, applied to the citadel or central tower of a fortified place, as the part best capable of defence. This became the storehouse for spare arms and warlike material, and hence like depositories were called *Arsenals.*

Weapons of war used more than 1700 years before the Christian era are known to us from sculptures upon old monuments and from arms found in catacombs and tombs of that period. The earliest Egyptian sculptures show foot-soldiers armed with swords, javelins, clubs, slings, and the bow and arrow; and kings, or high officers, on horseback or in chariots, with like offensive weapons, and protected by helmets, shields, or shirts-of-mail. As the Egyptians are the first nation known to have had a military system, we may consider their weapons to have been the earliest weapons of war. Succeeding nations changed very slowly; all of those prominent during the period known as the "*warfare of antiquity*" used nearly the same kind and shape of weapons. Thebes, Carthage, Babylon, Athens, Tyre, and Rome were then the great cities of the world whence the warrior-kings started their military expeditions, and must have all been in turn active workshops for the manufacture of weapons.

The warfare of the Middle Ages is usually said to date from the time of the emperor Augustus of Rome, and to extend to the introduction of the use of gunpowder in war. Although this epoch witnessed great improvements in the organization and discipline of the better class of troops, and in the character of some of the warlike implements used by them—especially in the mechanical excellence and skill shown in their construction—the general form and kind of the chief personal weapons appear to have remained much the same as during the period of ancient warfare. Weapons and armor of the Middle Ages have been preserved to our day in numerous Arsenals and Museums, and specimens of the workmanship of many centuries can be found, requiring almost the same words to describe and name them as those we use for the Egyptian arms nearly 3000 years older.

The chief changes in offensive weapons were in the greater length of the horseman's spear and sword, and in the stronger bows (made of steel and hard wood), giving greater propulsive force to the missiles used with the cross, and long, bows. The usual range of this last, we are told, became (in the hands of the Scythians and English) from 3000 to 4000 yards, and experts could shoot *three arrows per minute.*

In the fifteenth century defensive armor for man and horse had reached the highest point of excellence and embellishment. The trade of the armorer was in great repute, and personal contests for prowess and display were the chief occupation of the Nobles. Foreign wars were mere invasions by hosts hurriedly marched into unprepared countries, where, like an army of locusts, they devoured and destroyed all they met. Surrounding walled cities not anticipating attack, the besiegers could by mere numbers shut off assistance, starve the inhabitants into submission, and by the use of catapults, ballistas, and battering-rams, destroy the walls, or by towers, overleap them. Cities thus attacked were often found so helpless against their fate that the besiegers at Rhodes were enabled to construct and move against its walls, without successful opposition, towers 240 feet high by 47 feet wide, and having twenty stories for troops; and, by the use of towers, the Crusaders captured Jerusalem after only two months' siege.

The cities of Europe now most famous for possessing valuable military relics of the Middle Ages are Dresden, Vienna, Delft, Berlin, Paris, Madrid, and London; possibly, interesting and valuable collections may still exist, unvisited by travellers, in some of the once famous cities of Persia, India, China, and Japan, which more intimate intercourse may soon make known to us.

Although gunpowder was used in cannon about the fourteenth century, it was not until near the middle of the sixteenth century, that the first arm light enough to be carried and handled by a single soldier was introduced upon the battle-field. This became the signal not only for a general change in arms and warfare, but in the whole constitution of civil society. Spears, javelins, and bows and arrows were useless to oppose the musketeer; helmets, breast-plates, and coats-of-mail could not resist the bullet. Hence, personal armor became a useless encumbrance, as the drilled peasant, with his arquebuse, was found to be superior to the mail-clad warrior and his host of spearmen. The supremacy of the Knights could no longer exist, and the defence of states soon passed from their hands to those of the peasant. War now became a science wherein skill and discipline and *preparation* conquered; not mere numbers, artifice, and brute force. Standing armies and well-supplied arsenals became a necessity for every nation aiming at conquest or independence, for none but the experienced could wage war.

It was near the close of the seventeenth century before all the nations of Europe were supplied with firearms which could be handled with facility and aimed from the shoulder. At this period the Dutch, Spanish, French, and English were the most efficient in war; soon Prussia became distinguished in discipline and organization, and France surpassed others in systematizing its military manufactures and improving its weapons. Each nation sought by drill in the field and skill in the workshop to devise and adopt a *special* system of military organization and of war-material. The French, Prussians, Spaniards, and English established arsenals, armories, foundries, and powder-works, many of which have been diligently improved and extended to our day.

At the time of the Revolutionary war, the U. S. had few arms and no Armories or Arsenals. The arms used at first were gathered from citizens; soon after, supplies were obtained by purchase in France. The earliest manufacture of war-material mentioned is that of powder in Virginia in 1776. Springfield (Mass.) was selected by Gen. Washington as a site for a foundry and laboratory in 1777, and supplies were sent from there to Gen. Schuyler's army in Western New York in July of that year. Brass cannon (chiefly howitzers) were cast in Philadelphia in 1777 (some of which are now at Watervliet Arsenal), and an arsenal was established about this year in Carlisle, Pa. Small-arms were manufactured at Springfield Armory prior to 1787. An armory was commenced at Harper's Ferry (Va.) in 1795, and "three or four additional arsenals and magazines" authorized by Congress at the same time, and others in 1808.

During the war of 1812 small-arms were procured from Springfield and Harper's Ferry, and other ordnance stores, by purchase in the country, or manufacture at the Arsenals. After that war, with the policy apparently of having U. S. Arsenals in each State, several more were authorized, so that in 1847 there were two armories and seventeen arsenals in operation. Of the arsenals, *five* were "Arsenals of construction," and the others "Arsenals for repairs and deposit."

In 1838 Congress authorized a new organization of the Ordnance Corps, and in 1842 placed the Armories (previously under civil superintendence) under the charge of its Officers. The advantages of the change were soon apparent in the publication of a regular "System of Construction—with Drawings," and the "Ordnance Manual," descriptive of the material and dimensions for every article of war-ma-

terial, and the adoption of patterns which proved efficient and satisfactory during our next war. The siege and field guns, carriages and mortars, friction-primers for cannon, and harness of U. S. MODELS, used in Mexico *for the first time in war*, differed in important details from other systems. The mortar-firing and siege-equipage were especially satisfactory. The advantage of the U. S. system of small-arms (made chiefly by machinery, and of interchangeable parts) was very great. They were promptly repaired in the field, using spare parts ready fitted. The arms, as well as other articles of equipment in the hands of the troops, were kept in serviceable order by Ordnance Soldiers, who, serving siege-guns in action, also opened shops after each day's halt, and established an active arsenal at the citadel of Mexico during the occupation of the city, where many supplies were manufactured as well as repaired.

In 1860 there were twenty-three Arsenals and Armories, and during the civil war nine of the Northern and Western Arsenals were enlarged and employed as "Arsenals of construction," and the working capacity of the Springfield Armory was extended to complete 1000 muskets per day. In addition, a large number of private workshops—for the manufacture of guns and carriages and stores of all kinds—were kept employed, and twenty-five private armories, under charge of the Inspector of Contract Arms, made muskets, carbines, pistols, and swords, according to gauges verified at the National Armory, so that like parts were interchangeable with armory work. A daily product of 1000 muskets was obtained from those making these arms, in addition to the arms made at Springfield.

The Ordnance Department has devoted much attention to the manufacture of cast-iron cannon and powder for use in large guns, improving greatly the endurance and certainty of cast iron in cannon. The results obtained both in smooth-bore and rifled guns have been so favorable that other nations have either adopted or are experimenting with like methods. Great credit is due to the late Gen. Rodman for the many successes achieved in guns and carriages by him, and his name is now inseparably connected both with the mode of *casting cannon cooled from within*, and with the use of *mammoth-grain powder* for large cannon, first suggested and made by him.

It has been proposed to reduce the number of Arsenals, and concentrate all ordinary operations at three or four, so that all (or nearly all) ordnance manufactures could be conducted at each. Rock Island Arsenal, on the Mississippi, is in course of building on this plan, and is to include an armory, arsenal, powder-works, and foundry. A similar establishment is proposed for California, and one east of the Alleghenies, either in connection with, or in addition to, the Springfield Armory. It is also under consultation to have some supplies heretofore purchased by the Quartermaster's Department manufactured at the Arsenals,—such as wagons, harness, canteens, and infantry valises.

The following table gives a list of all U. S. Arsenals, with date of establishment and present condition:

Name of Arsenal.	Post-office.	Date of building or authorized.	Kind and extent of work.	Present condition.
Springfield Arsenal.....	Springfield, Mass.....	1777	Making ammunition, etc.....	Armory in operation.
" Armory.....	" "	1785 (about)	Small-arms.....	Armory in operation.
Carlisle Arsenal.....	Carlisle, Pa.....	1777	Ordnance stores.....	Broken up.
Harper's Ferry Armory.	Harper's Ferry, Va.....	1794	Making small-arms.....	"
Schuylkill Arsenal.....	Philadelphia, Pa.....	1800	Laboratory.....	Transferred to quartermaster's department.
Rome "	Rome, N. Y.....	1814	Depository.....	Sold.
Pikesville "	Pikesville, Md.....	1808	"	Occupied.
Washington "	Washington, D. C.....	1808	Arsenal of construction.....	In operation.
Watertown "	Watertown, Mass.....	1808	" " "	" "
Watervliet "	West Troy, N. Y.....	1813	" " "	" "
Bellona "	Richmond, Va.....	1815	Foundry and Arsenal.....	Broken up.
Champlain "	Vergennes, Vt..	1827	Depository.....	"
Allegheny "	Pittsburgh, Pa.....	1814	Arsenal of construction.....	In operation.
Frankford "	Bridesburg, Pa.....	1816	Arsenal of construction and laboratory for metallic cartridges, caps, and primers for cannon.....	" "
St. Louis "	St. Louis, Mo.....	1827	Arsenal of construction.....	Broken up.
Augusta "	Augusta, Ga.....	1826	Depository and arsenal for repairs...	"
Kennebec "	Augusta, Me.....	1827	" " "	In operation.
Baton Rouge "	Baton Rouge, La.....	1819	" " "	Broken up.
Mount Vernon"	Mount Vernon, Ala.....	1830	Depository.....	"
Apalachicola "	Chattahoochee, Fla.....	1832	"	"
Detroit "	Dearbornville, Mich.....	1832	"	Occupied.
Fort Monroe "	Old Point Comfort, Va.....	1826	Arsenal of construction.....	In operation.
Fayetteville "	Fayetteville, N. C.....	1836	Depository.....	Broken up.
Little Rock "	Little Rock, Ark.....	1837	"	"
San Antonio "	San Antonio, Tex.....	1857	Depository and arsenal for repairs...	In operation.
Charleston "	Charleston, S. C.....	1836	Depository.....	Broken up.
Leavenworth "	Fort Leavenworth, Kan....	1858	Depository and arsenal for repairs...	In operation.
New York "	Governor's Island, N.Y. H.	1835	Depository.....	Occupied.
Liberty "	Liberty, Mo.....	1837	"	Broken up.
Columbus "	Columbus, O.....	1863	"	Occupied.
Indianapolis "	Indianapolis, Ind.....	1863	"	"
Fort Union "	Fort Union, N. M.....	1854	Depository and arsenal for repairs...	In operation.
Vancouver " ...	Fort Vancouver, Washington Ter.....	1859	" " "	Occupied.
Rock Island "	Rock Island, Ill.....	1862	Arsenal of construction and armory, foundry, and powder-works.....	Building.
Benicia "	Benicia, Cal.....	1852	Arsenal of construction.....	In operation.

P. V. HAGNER, U. S. A.

Ar'senic (symbol As, equivalent, 75), [Lat. *arsen'icum*, from the Gr. ἄρσην, "masculine," "strong," so named on account of its power as a poison], the common name of arsenious acid or white oxide of arsenic, a virulent poison. (See ARSENIOUS ACID.) The name arsenic is limited in scientific language to the metal. Arsenic is found native to a limited extent, but occurs usually in combination with metals or with sulphur, or both. Mispickel or arsenical pyrites (FeAsS) is the most abundant arsenical mineral; other minerals containing arsenic are domeykite, Cu_6As_2; algodonite, $Cu_{12}As_2$; whitneyite, $Cu_{18}As_2$; niccolite, NiAs; kaneite, MnAs; smaltite, $(Co,Fe,Ni)As_2$; skutterudite, $CoAs_3$; cobaltite, $Co(S,As)_2$; gersdorffite, $Ni(S,As)_2$; ullmannite, $Ni(S,As,Sb)_2$; leucopyrite, $FeAs_2$; rammelsbergite, $NiAs_2$; lœlingite; glaucodot, $(Co,Fe)(S,As)_2$; pacite, $FeS_2,4FeAs_2$; alloclasite; sartorite, PbS,As_2S_3; binnite, $3Cu_2S,2As_2S_3$; dufreynoisite, $2PbS,As_2S_3$; proustite, $3Ag_2S$, As_2S_3; tetrahedrite or fahlerz; tennantite; geocronite; polybasite; enargite, $3Cu_2S,As_2S_5$; realgar, AsS; orpiment, As_2S_3; dimorphite, As_4S_3; arsenolite, As_2O_3; mimetite, $3Pb_3(AsO_4)_2,PbCl_2$; berzelite; carminite; pharmacolite, $Ca_2H_2(AsO_4)_2.5H_2O$; hoernesite, $Mg_3(AsO_4)_2.8H_2O$; roesslerite, $Mg_2H_2(AsO_4)_2.12H_2O$; symplesite, $Fe_3(AsO_4)_2.NH_2O$; erythrite, $CO_3(AsO_4)_2.8H_2O$; annabergite, $Ni_3(AsO_4)_2.8H_2O$; cabrerite; köttigite; chondrasenite; trichalcite; olevenite; adamite; conichalcite; bayldonite; euchroite; irroconite; erinite; cornwallite; tyrolite; clinoclasite; chalcophyllite; scorodite; pharmacosiderite; chenevixite; arsenosiderite; pitticite; bendantite; lindadserite. The most important arsenical minerals are those in which arsenic is combined with iron, cobalt, and nickel. Arsenic also occurs in small quantities in many other minerals, specially in antimony ores, iron pyrites, etc., hematite iron ores, the soil, mineral waters, etc. Arsenic is in fact one of the most widely diffused elements in nature.

Owing to its occurrence in antimony ores and iron pyrites, it is liable to find its way into the various preparations of antimony, into sulphuric acid, and the various chemical products of which this acid is the basis, as sodic sulphate and carbonate, hydrochloric acid, superphosphates, etc. In the chemical examination of the bodies of persons supposed to have been poisoned the greatest care is necessary to procure reagents entirely free from arsenic.

Metallic arsenic is prepared by sublimation: (1) from arsenical pyrites; (2) from a mixture of arsenious acid and charcoal.

Arsenic is a brittle metal, of a steel-gray color. On the fresh fracture it exhibits a bright metallic lustre, which soon tarnishes. Its specific gravity varies from 5.62 to 5.96. Its atomic weight is 75. Its vapor density is 10.3995 (air = 1) or 150 (hydrogen = 1); this is double the atomic weight. Hence, the atomic volume is anomalous, being only half that of hydrogen. (See ATOMIC VOLUME.) It crystallizes in rhombohedra. It volatilizes at a dull red heat without previous fusion, with a peculiar odor, described as resembling that of garlic. When heated in the open air it burns with a bluish flame.

Arsenic belongs to the group of elements which includes nitrogen, antimony, and phosphorus. It forms two principal series of compounds: (1) those in which it is triatomic, as $As'''H_3$, $As'''Cl_3$, As'''_2O_3, As'''_2S_3; (2) those in which it is pentatomic, as $As^{v}_{2}O_5$, $As^{v}_{2}S_5$.

(For the detection of arsenic see ARSENIOUS ACID.) With oxygen, arsenic forms two important compounds—arsenious oxide, As_2O_3, and arsenic oxide, As_2O_5, which give rise to arsenious acid, $HAsO_2$, and arsenic acid, H_3AsO_4. With sulphur, arsenic forms three important compounds—realgar, AsS, orpiment, As_2S_3, and As_2S_5. Besides these there is a subsulphide, $As_{12}S$ (?), and a persulphide, AsS_9. Arsenic combines with metals in the same manner as sulphur and phosphorus, which it resembles, especially the latter, in many respects; so much so that it is hardly proper to consider it a metal. Its compound with hydrogen, arsine, AsH_3, is analogous to ammonia, NH_3, and like ammonia is the type of a class of bases, arsines, which correspond to the AMINES (which see).

Metallic arsenic is rarely used in the arts. Lead containing a small proportion of arsenic is used for the manufacture of shot, and iron containing a little arsenic is very fluid when melted, and better adapted for fine castings for which strength is not essential. C. F. CHANDLER.

Ar'senic Ox'ide (symbol As_2O_5), a compound of oxygen and the metal arsenic; in its hydrated state it constitutes arsenic acid. It is found in nature in combination with iron, cobalt, lead, etc., in the minerals symplesite, erythrite, mimetite, etc., mentioned under ARSENIC. It is prepared by heating arsenious oxide with nitric acid. It is deliquescent and very poisonous. It is extensively used in calico-printing, in place of tartaric acid, for developing white patterns on colored grounds in the chloride-of-lime vat. It is also extensively used in the manufacture of aniline red. Combined with metals, it forms an important class of salts, called arseniates, which are analogous to the phosphates.

Arsenious Oxide (or **Anhydride**), As_2O_3, in the hydrated state **Arsenious Acid.**

Occurrence.—It is found native, as the mineral arsenolite, in silky, crystalline crusts on ores of silver, lead, nickel, antimony, etc., in the Hartz Mountains and other localities.

Preparation.—At Reichenstein, in Silesia, arsenious oxide is prepared by roasting arsenical pyrites (mispickel), FeAsS, in a muffle furnace. The vapors pass into a condensing chamber, and are deposited as a powder. This is then twice purified by resublimation from iron pots, being condensed first in powder in a chamber, finally in vitreous masses in the upper part of the subliming vessels. At Ribas, in Catalonia, mispickel is roasted in reverberatory furnaces without muffles, the crude product being subsequently purified, as at Reichenstein. At Andreasberg, in the Hartz, native arsenic is roasted for the silver it contains, the arsenious oxide being obtained as an incidental product. Much arsenious oxide is produced in the roasting of tin and cobalt ores at Altenberg, in Saxony, and of tin ores in Cornwall.

Properties.—Arsenious oxide appears crystallized in one of two different forms, or amorphous: (1) in octahedral crystals, as usually sublimed and condensed on cold surfaces, or as crystallized from its solution in water or hydrochloric acid; (2) in right rhombic crystals, obtained occasionally by sublimation or solution in potash; (3) amorphous, vitreous, or glassy, produced when arsenious oxide is sublimed and condensed on a hot surface, so that before solidifying it passes through a semi-fluid state. It is transparent when first prepared, but gradually becomes opaque and crystalline.

Arsenious oxide usually appears as a very heavy, white, gritty, crystalline powder. It has no decided taste. At 218° C. it volatilizes to a heavy, colorless, odorless vapor, of a specific gravity of 13.85, which condenses to octahedral crystals on cool surfaces. When heated with charcoal, it is reduced to metallic arsenic, with a peculiar odor like that of garlic. In its common octahedral form it is soluble in about 30 parts of cold or 10 parts of boiling water. When thrown into water, a portion floats like wheat flour, while the portion which sinks rolls itself into little round pellets, dry within. It is nearly insoluble in alcohol, absolutely insoluble in ether. It is soluble in hot dilute acids to a greater extent than in water, but it mostly separates on cooling, possessing but little basic power. It dissolves readily in alkalies, forming *arsenites*. It acts as a reducing agent on nitric, manganic, chromic, and hypochloric acids, being changed by them to arsenic acid. It reduces gold from its terchloride. To potassium, carbon, sulphur, phosphorus, and zinc it gives oxygen, with the liberation of metallic arsenic. Distilled with acetates, it yields cacodyl, $As(CH_3)_2$, a compound of a peculiar intolerable odor.

Effect of Arsenious Oxide on the Animal Economy.—Arsenious oxide when taken into the stomach is soon absorbed into the blood, and circulates with that fluid, exhibiting power over certain diseases, especially intermittent fever and skin diseases, as psoriasis, lepra, eczema, etc. It is also classed among the tonics, and is given for nervous disorders, especially those which are periodic. Among the remedies for chorea (St. Vitus's dance) it holds a prominent place. The usual method of administering arsenic is in small doses (from three to five drops) of the *liquor arsenicalis*, largely diluted with water, twice or thrice in the day. It is frequently administered in small granules, which should not contain more than one-tenth of a grain each. Numerous other arsenical preparations are in use in medicine. Externally, arsenious oxide is a powerful caustic, and is considerably used in destroying cancers and malignant growths. Arsenic is sometimes given combined with iodine and mercury (Donovan's solution). Caution is necessary in its use.

The quantity necessary to destroy life varies considerably. Under circumstances favorable for its operation the fatal dose for an adult is from two to three grains. Death from a poisonous dose of arsenic may occur in a few hours, or after the lapse of many days. Arsenic has been used as a slow poison, the symptoms being attributed to inflammation of the bowels from natural causes. In most cases its detection is easy. Arsenic is used by anatomists as an antiseptic, but is dangerous, as it is apt to get into cuts on the hands, and cause disagreeable symptoms. In some countries, especially in Styria, arsenic is taken by the young female peasants to increase their personal attractions. That arsenic can be taken habitually for any length of time would seem an impossibility; and yet such statements are made on unquestionable authority. (See JOHNSTON'S "Chemistry of Common Life.")

The most effective chemical antidote for arsenic is the hydrated sesquioxide of iron, prepared by the rapid precipitation of a solution of a per-salt of iron (as the persulphate or terchloride) by an alkali (as ammonia). The mixture of ferric hydrate with magnesia, obtained by precipitating the iron solution with an excess of calcined magnesia, is still more efficacious. In case of an overdose or of intentional poisoning the following treatment is recommended: Evacuate the stomach by the stomach-pump, using lime-water; administer large draughts of tepid sugar and water, magnesia and water, or lime-water; avoid the use of alkalies, but administer charcoal and hydrated sesquioxide of iron. If the fatal symptoms be averted, let the patient for a long time subsist wholly on farinaceous food, milk, and demulcents.

The Detection of Arsenious Oxide.—Hydrosulphuric acid merely imparts a yellow color to the aqueous solution. If hydrochloric acid be added, a yellow precipitate of tersulphide of arsenic is formed, soluble in sulphide of ammonium, from which it is reprecipitated by acids. The sulphide of arsenic is soluble in carbonate of ammonia, especially on heating. Acids reprecipitate it from this solution. It is readily dissolved by hot nitric acid; also by hydrochloric acid, with potassic chlorate. Argentic nitrate causes no precipitate in the aqueous solution of arsenious acid, but if ammonia be cautiously added, a yellow precipitate of argentic arsenite is produced, readily soluble in an excess of ammonia and in nitric acid. In making this test, add the argentic nitrate, and then (inclining the test-tube) let one or two drops of ammonia run down, so as to form a layer on the surface of the liquid to be tested. Where the two liquids are in contact a bright yellow ring of argentic arsenite will be seen. Cupric sulphate causes no precipitate in the aqueous solution of arsenious acid; but if ammonia be added, as in the last experiment, a yellowish-green cupric arsenite (Scheele's green) is precipitated.

Reinsch's Test.—Metallic copper boiled in a solution containing arsenic, to which hydrochloric acid has been added, becomes coated with a gray incrustation of metallic arsenic, which, if present in considerable quantity, may be detached in scales by long boiling. If the copper, with the incrustation, be removed, dried between pieces of filter-paper, and introduced into a tube closed at one end, the application of heat causes the arsenic to sublime as a shining black ring if much is present, or as a white crystalline ring of arsenious acid if the quantity is small. Metallic zinc precipitates arsenic if the solution be previously acid-

ulated with hydrochloric or sulphuric acid. At the same time arseniuretted hydrogen (AsH_3) is evolved.

Marsh's Test.—This experiment is best conducted in a flask provided with a funnel tube, and an exit tube containing calcic chloride to dry the gas evolved. Into the flask containing granulated zinc and distilled water dilute sulphuric acid is introduced. Hydrogen is liberated, which, passing through the chloride-of-calcium tube, where it is dried, escapes at the extremity of the apparatus. As soon as the air is completely expelled the hydrogen may be ignited. If the solution containing arsenic be now poured into the flask, arseniuretted hydrogen will be evolved, and the color of the flame changed to a livid blue. 1. If a piece of cold porcelain (the cover of a porcelain crucible) be held in the flame, a black deposit of metallic arsenic is produced. This stain disappears when moistened with calcic hypochlorite. 2. If one or two drops of strong nitric acid be poured on an arsenic stain, and then gently evaporated, it is converted into arsenic acid. By adding a drop of argentic nitrate solution, and cautiously neutralizing with ammonia, a brick-red argentic arseniate is produced. An excess of ammonia dissolves the red arseniate. 3. If the exit tube (which should be of hard glass and free from lead) be strongly heated beyond the calcic chloride tube, the arseniuretted hydrogen is decomposed, metallic arsenic being deposited in the form of a shining black mirror on the cold part of the tube. 4. If a short tube be adjusted, by means of a caoutchouc connector, to the extremity of the exit tube, and the gas passed into a solution of argentic nitrate, a black precipitate of metallic silver is produced, while the arsenic passes into solution. On neutralizing the filtered liquid with ammonia, the yellow argentic arsenite is precipitated.

Fleetman's Test.—If a solution containing arsenic be mixed with a large excess of a concentrated solution of potassic hydrate, and boiled with granulated zinc, arseniuretted hydrogen is evolved. A piece of filter-paper, moistened with a solution of argentic nitrate, assumes a purplish-black color if exposed to this gas. This experiment may be conducted in a small flask or large test-tube supplied with a cork, through which passes a small tube drawn to a point.

Dry compounds of arsenic, when heated with sodic carbonate on charcoal in the inner flame of the blowpipe, emit a peculiar garlic odor. Heated with sodic carbonate and a little potassic cyanide in a dry tube, closed at one end, a black mirror of metallic arsenic sublimes.

Arsenites.—Arsenious acid forms with bases a series of salts, which are not very stable, and have been but little studied. "Fowler's Solution" is a solution of equal weights of arsenious oxide and potassic bicarbonate, boiled with water and flavored with spirits of lavender. It contains 64 grains of arsenious oxide in one pint. The sheep-dipping mixtures commonly employed are composed of arsenious acid, soda, sulphur, and soap, which, when used, are dissolved in a large quantity of water, and thus constitute essentially dilute solutions of arsenite of soda. Arsenite of copper, or Scheele's green, is a pigment largely used as a pretty and cheap green paint. The same substance is extensively employed in the manufacture of green paper-hangings for the walls of rooms; and recent inquiries would lead to the belief that rooms covered with paper coated with this green arsenite of copper are detrimental to health, from the readiness with which minute particles of the poisonous pigment are detached from the walls by the slightest friction, are diffused through the room, and ultimately pass into the animal system. It is also said that arsenetted hydrogen, H_3As, a very poisonous gas, is generated in damp weather. Another green pigment is named Schweinfurth's green; it contains arsenious acid, oxide of copper, and acetic acid, and is a double arsenite and acetate of copper. With tartaric acid arsenious oxide forms a salt analogous to tartar emetic. Its formula is $K.AsO.C_4H_4O_6$.

C. F. CHANDLER.

Arse'nius [Gr. Ἀρσένιος], SAINT, was born in Rome about 355 A. D. The emperor Theodosius appointed him in 383 tutor to his son Arcadius. Arsenius retired in 394 to a desert in Egypt, where he lived as an anchorite. Died in 449 A. D.

Ar'sie, a town of Italy, in the province of Belluno, 50 miles N. W. of Venice. Pop. 5317.

Arsin'oë, daughter of Ptolemy I., king of Egypt, was born about 316 B. C. About 300 B. C. she was married to Lysimachus, king of Thrace. She instigated Lysimachus to put to death his son Agathocles (born before her marriage), in order to promote the succession of her own son. By this crime Lysimachus was involved in war with Seleucus, king of Syria, and was killed in 281 B. C. Her sons having been murdered by Ptolemy Ceraunus, she fled to Egypt, and became the wife of her brother, Ptolemy Philadelphus.

Arsinoë, an Egyptian princess, was a daughter of Ptolemy Auletes, and a sister of the famous Cleopatra. Cæsar having conquered Egypt (48 B. C.), took her as a captive to Rome, but soon released her. She was assassinated by Mark Antony in 41 B. C.

Arsinoë, an ancient city of Egypt, capital of a nome, was situated near Lake Mœris, about 50 miles S. S. W. of Cairo. It was originally called Crocodilopolis ("the city of crocodiles") because it had a temple devoted to the worship of those reptiles. Ptolemy Philadelphus gave it the name of Arsinoë in honor of his queen. The site is now occupied by the town of Medinet-el-Faium.—Arsinoë was the name of another city of Egypt, situated at the N. W. extremity of the Red Sea, near the modern Suez. It was an important emporium, connected with the Nile by a canal.

Ar'sis and **The'sis** [ἄρσις, θέσις], two Greek words, signifying "raising up" and "laying down." This musical term denotes the rising and falling of the hand in beating time. It is also applied to the elevation and depression of the voice, and the accentuation of syllables in the scansion of poetry, *arsis* being the stress of voice given to strongly accented syllables, and *thesis* the lesser stress given to other syllables.

Ar'son [from the Lat. *ardeo, arsum,* to "burn"], the wilful and malicious burning of the house of another. There must be an actual burning—an unexecuted attempt to fire a house does not constitute the offence. If the act be negligent instead of wilful, the crime is not committed, and the wrong-doer is only liable to a civil action. The English law on this subject has been modified in this country. Arson is in some instances divided into degrees, and cases included in it which were not offences at common law. It is made a crime by statute law to set fire to one's own house with intent to injure another—as, for example, to defraud insurers. The punishment of arson is severe, and in some of its degrees capital.

Ars-sur-Moselle, a town of Germany, in Alsace-Lorraine, 5 miles by rail from Metz, has vineyards and iron-works, manufactures of paper, instruments, and iron goods. Pop. in 1871, 5330.

Art [from Fr. *art,* which is from Lat. *ars, artem*], signifies (1), the systematic application of knowledge in producing a desired result; and (2), a systematic collection of principles and rules for attaining a desired end. Under this last head the arts are divided scientifically into (1), those which are intended to produce material results, termed the useful arts (those useful arts in which the effects are produced entirely or mostly by machinery or by mechanical contrivances are termed MECHANIC ARTS, which see); and (2), those intended to produce æsthetic results, termed the FINE ARTS (which see), The application of æsthetic principles or the laws of taste to works which are intended to produce a religious effect is termed religious art; the application of the laws of taste to works of a material nature is termed industrial art. (See FINE ARTS.) The word *art* is often used as a collective term for any or all of the fine arts (as the "study of art," a "patron of art"); as relating to the fine arts are also used various derivatives and compounds of the word art (as "artist," "artistic," "art-museum"). (For formative arts, arts of design, etc., see FINE ARTS.)

The term "liberal arts" (*artes liberales*) was applied by the Romans to the higher studies, which only freemen were permitted to pursue. They were summed up in the following verse:

"Lingua, Tropus, Ratio, Numerus, Tonus, Angulus, Astra."

The term "servile arts" (*artes serviles*) they applied to trades which were practised only by slaves. They were summed up in the verse:

"Rus, Nemus, Arma, Faber, Vulnera, Lana, Rates."

In modern times, the term "liberal arts" is applied to the collection of studies in philosophy, science, art, and history which compose the academic and collegiate (ante-professional) course of study; hence, to graduate in the arts, bachelor of arts (A. B.), master of arts (A. M.).

G. F. COMFORT.

Ar'ta (anc. *Ambra'cia*), a town of Albania, 46 miles S. S. E. of Yánina, on the river Arta, here crossed by a remarkable bridge. It is the seat of a bishop, and has a large cathedral, a citadel, and manufactures of coarse cottons, woollens, and capotes. Here are remains of ancient Hellenic walls. Pop. estimated at 6000. (See AMBRACIA.)

Arta, Gulf of (the ancient *Si'nus Ambra'cius*), a gulf of the Ionian Sea, in the N. W. of Greece, lies between Acarnania and Albania, and is nearly landlocked. It is about 25 miles long and about 10 miles wide. The naval battle of Actium was fought near this gulf.

Artaba'nus [Gr. Ἀρτάβανος], written also **Ardavan**

or **Ardovan,** king of Parthia, and the last of the dynasty of the Arsacidæ. He began to reign about 216 A. D., and waged war against the Roman emperor Macrinus. He was defeated and taken prisoner by the Persians under Ardshir, who put him to death in 226 A. D.

Artaba'zus [Gr. Ἀρτάβαζος], an eminent Persian general, a favorite of Xerxes, commanded a large division of the army which invaded Greece in 480 B. C. He took part in the battle of Platæa (479 B. C.), after which he retreated with his division by forced marches to Byzantium, and thence crossed into Asia.

Artabazus, a Persian general and satrap, revolted against Artaxerxes III. in 356 B. C. Having been defeated in battle, he took refuge at the court of Philip of Macedon. He was pardoned, returned to Persia, and fought for Darius at Arbela. He was satrap of Bactria under Alexander after 330 B. C.

Artapher'nes [Gr. Ἀρταφέρνης], a Persian satrap and a half-brother of King Darius Hystaspis. He was appointed satrap of the western part of Asia Minor in 506 B. C. He used his power to restore Hippias, who had been expelled from Athens. About 498 B. C. he subdued the Ionians, who had revolted against the king of Persia.

Artaphernes, a general, a son of the preceding, was associated with Datis in the command of the Persian army which invaded Greece in 490 B. C., and was defeated at Marathon. He also served in the army of Xerxes in Greece, in 480.

Artaud (Nicolas Louis), a French writer noted as a Greek scholar, was born in Paris in 1794. He became inspector of the Academy of Paris soon after the revolution of 1830. He translated the dramas of Sophocles (3 vols., 1827); the comedies of Aristophanes (6 vols., 1830), and the tragedies of Euripides (1832). He obtained the office of inspector-general. Died in 1861.

Artaud de Montor (Alexis François), Chevalier, born in Paris in 1772. He was for many years secretary of legation at Rome, and became chargé-d'affaires at Florence in 1805. Among his works are "Machiavel, his Genius and Errors" (1833), and a "History of the Sovereign Pontiffs" (8 vols.). Died in 1849.

Artax'ata, the former capital of Armenia, on the Araxes, was destroyed by the Roman general Corbulo, rebuilt by Tiridates, and was captured by the Persians in 370 A. D. It is now a mass of ruins.

Artaxerx'es I., Longimanus [Gr. Ἀρταξέρξης Μακρόχειρ; Pers. *Ardsheer Darâzdăst*], a king of Persia, was a son of Xerxes I., whom he succeeded in 465 B. C. He was called Longimanus ("long-handed") because his right hand was longer than his left. The Egyptians revolted against him about 460, but they were reduced to subjection about 455 B. C. In 449 the Persians were defeated by the Athenian forces of Cimon, near Salamis, in Cyprus. Artaxerxes died in 425 B. C., and left the throne to his son, Xerxes II.

Artaxerxes II., surnamed Mnemon, because he had a good memory, was the eldest son of Darius II. of Persia. He became king in 405 B. C. His younger brother, Cyrus, who was governor of Asia Minor, revolted and raised a large army, in which were 10,000 Greeks. The king, commanding in person, defeated the army of Cyrus at Cunaxa in 401. Cyrus was killed in this action, which was followed by the famous retreat of the Ten Thousand. (See Ten Thousand, Retreat of.) Agesilaus, the Spartan, invaded the dominions of Artaxerxes, and gained several victories, but this war was ended by the peace of Antalcidas (387 B. C.). He put to death Darius, his eldest son, for a conspiracy. He died in 362 B. C., aged about ninety-four, and was succeeded by his son, Artaxerxes III. (See Plutarch, "Life of Artaxerxes;" Diodorus Siculus; Thirlwall, "History of Greece.")

Artaxerxes III. (or **Ochus**), king of Persia, was a son of the preceding. He began to reign in 361 B. C., and disgraced himself by his cruelty and sensuality. Among the important events of his reign was the subjugation of Egypt, which he effected about 350 B. C. Died in 338 B. C. It is supposed that he was poisoned by his eunuch, Bagoas.

Arte'di (Peter), [Lat. *Pe'trus Arcte'dius*], a Swedish naturalist, born at Anund Feb. 22, 1705. He was educated at Upsal, where he formed an intimate friendship with Linnæus. They co-operated on the principle of a division of labor in the field of natural history, and Artedi chose the department of ichthyology, in addition to physiology and mineralogy, which they both cultivated. He visited England in 1734. Soon after his return he was drowned in a canal at Amsterdam in 1735. He left a Latin work on fishes, which Linnæus published in 1738, and which is highly commended. (See Linnæus, "Life of Artedi," prefixed to the work mentioned above.)

Ar'temis [Ἄρτεμις], the Greek name of the goddess Diana (which see).

Artemis'ia [Gr. Ἀρτεμισία], a martial queen of Halicarnassus, was a tributary or ally of Xerxes I., king of Persia. She commanded in person her fleet, which fought for Xerxes against the Greeks, and she displayed skill and courage at the battle of Salamis (480 B. C.). According to tradition, she jumped from the Leucadian rock into the sea and was drowned, because she was disappointed in love.

Artemisia, an Oriental princess celebrated for her conjugal affection and her grief for the loss of her husband, Mausolus, prince of Caria, who died in 352 B. C. She erected to his memory at Halicarnassus a magnificent mausoleum (so called in honor of Mausolus), which was considered one of the seven wonders of the world. Remains of it still exist. According to tradition, she mingled his ashes with her wine and died of grief. (See J. C. Avenarius, "Dissertatio de Artemisia et Mausoleo," 1714.)

Artemisia, a genus of plants of the order Compositæ, sub-order Tubulifloræ, comprises numerous species of herbs and shrubs, natives of the temperate regions of Asia and Europe. They generally have an aromatic odor, and a warm or acrid and bitter taste. The *Artemisia Absinthium* (or wormwood) grows wild in England and the U. S., is perennial, and has bipinnatifid leaves. Containing a bitter principle and an essential oil, both very strong, it is used in medicine as an anthelmintic or vermifuge. Among the other species which have medicinal properties are the *Artemisia santonica* (Tartarian wormwood or southernwood), a native of Tartary; *Artemisia Indica* (Indian wormwood), which grows on the Himalaya Mountains; *Artemisia arborescens* (tree wormwood), which is a native of the Levant; and *Artemisia vulgaris* (mugwort), which is a native of England. The dried flower-buds of several species of *Artemisia* are sold under the name of wormseed, *semen contra.* The great western plains and arid tablelands of Nevada, Utah, and Colorado are overgrown with the *Artemisia Ludoviciana* (popularly called sage brush), which indicates a soil impregnated with alkaline or saline substances.

Ar'tery [Lat. *arte'ria*, plu. *arte'riæ*, from the Gr. ἀήρ, "air" or "spirit," and τηρέω, to "keep" or "preserve," the arteries, until Galen's time, having been supposed to contain air]. Arteries are the vessels which convey the blood passing from the heart to the various parts of the body. The arterial tube is divided into three layers, called the coats of the artery—an external, which is elastic; a middle, which is muscular with elastic layers; and an internal, smooth and lined with fusiform epithelium. The tube is also enveloped in a fibrous sheath. When an artery is completely divided by a sharp instrument, its walls do not collapse, but the orifice contracts, and also retracts into its sheath; a clot then forms and stems the flow till the cut edges of the artery have time to throw out lymph, and heal. All the arteries of the human body (with the exception of the pulmonary) are branches more or less direct of the aorta. Each main trunk divides into two principal divisions—one, the artery of *supply,* which breaks up into branches for the supply of the tissues in the vicinity; and another, the artery of *transmission,* which passes to the parts beyond. These, however, anastomose freely. Thus the femoral artery divides into the *deep* femoral, to supply the thigh, and the *superficial,* to supply the leg below the knee; the common carotid divides into the *external* carotid, to supply the neck, scalp, and face, and the *internal* carotid, to supply the brain. Although arteries have generally in different persons the same distribution of branches, they occasionally vary, and thereby are apt to perplex the anatomist. Wounds of arteries can be detected by observing that the escaping blood is of a bright-red color, and flows in jets or spirts at each pulsation; while blood from a vein is dark, and flows in a steady current. Arterial bleeding is controlled by tying with a thread, by acupressure, by compression, or by the application of styptics, etc.

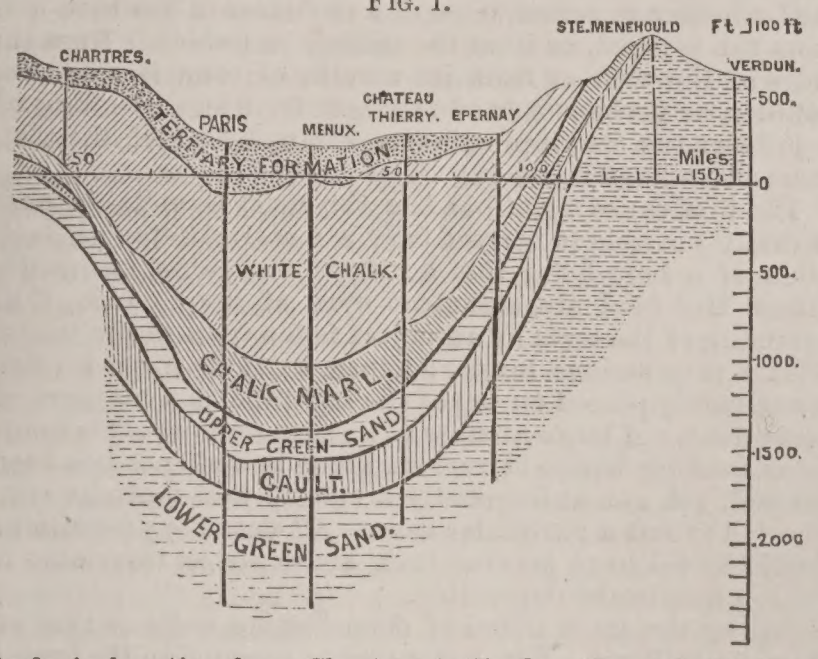
Arte'sia, a township of Iroquois co., Ill. Pop. 1269.

Arte'sian Wells are holes of small diameter (usually between three and six, and rarely exceeding twelve, inches) sunk into the earth, through which the water of subterranean reservoirs or streams rises near to or above the surface. Their name is derived from the province of Artois in France (ancient *Artesium*), where they have long been used; but they were known to the ancients, by some of whose writers they are occasionally mentioned. They were also used in China at a very early period, not only as sources of water, but also of combustible gas and petroleum. A well at Lillers, Pas-de-Calais, bored in 1126, still flows undiminished.

Artesian wells are most readily obtained where the geological formations possess a moderate inclination or "dip," and are composed of strata of materials impervious to

water (rock or clay), alternating with such as, like sand or gravel, allow it to pass more or less freely. The rain-water falling where such strata approach to or reach the surface will in great part accumulate in the pervious strata, rendering them "water-bearing." Thus are formed sheets of water confined between two inclined, impervious walls of rock or clay, above as well as below, and exerting great pressure at their lower portions. Where water so circumstanced finds or forces for itself natural outlets, we shall have springs; when tapped artificially by means of a bore-hole, we have an artesian well, from whose mouth the water may overflow if its surface-level be below that of the head of pressure as shown in the figure; the principle being

FIG. 1.



Geological section from Chartres to Verdun through the Paris basin. Horizontal scale, 90 miles to the inch; vertical scale, 1500 feet to the inch.

substantially the same as that upon which artificial fountains are constructed. Even in the absence of properly water-bearing pervious strata, accumulation of water may take place or subterranean streams may exist in crevices and fissures. These occur with especial frequency in limestone beds, whose material is more or less dissolved by water; thus very commonly caves and subterranean channels are formed in such regions, and if the beds be sufficiently inclined, head for the rise of water in artesian bores may thus be furnished.

In regions where unstratified rocks prevail, or where the stratified rocks are much disturbed, the finding of artesian water becomes a matter of great uncertainty, and can in general be expected only at considerable depths and at low surface-levels. In formations possessing but a slight inclination or "dip" the head of water-pressure may be many miles distant, and a difference of level between its locality and that of the well may not be at all apparent to ordinary observation. It is thus obvious that the study of the geological structure and general surface-conformation of a region is primarily needful in determining the probability of success in obtaining artesian water in any given locality. Not only can the practicability, as well as the difficulties to be met, be thus in a great measure foreseen, but it can also be ascertained how far the experience acquired in one bore may serve in other cases, and what allowance must be made for difference of location with reference to the head of pressure, as regards depth and the kind of strata to be penetrated. Sometimes a single well-conducted experiment will thus demonstrate the feasibility of artesian wells over extensive areas.

As a matter of course, artesian water brings up with it such other solid, liquid, or gaseous substances as are present in the contiguous rocks, and are either soluble in it, or, like petroleum, will float on it. And as from the depth from which it is brought it is liable to have come in contact with a great variety of materials, and at a temperature which increases with a certain degree of regularity as we descend (on an average at the rate of one degree Fahrenheit for every 60 to 70 feet), it is very common to find artesian water more or less strongly impregnated with a variety of mineral matters, amongst which common salt is perhaps the most frequent. In this respect artesian wells are quite analogous to natural warm springs.

The manner of sinking a bore for artesian water varies with the depth and with the nature of the material or materials to be penetrated. In the surface-soil stratum or other loose alluvial deposits pipes of wood or iron are very commonly driven down by means of a pile-driver. In the alluvial region of the lower Mississippi "drove" wells obtained in this way are quite common, being formed of gas-pipe one and a half to two inches in diameter, whose lower end is a sharp steel cone, perforated for the passage inward of the water, which is struck at depths varying from 20 to 70 feet, and even more. The same mode of obtaining water quickly and easily has been extensively employed during the building of the Pacific Railroad, the pipes being withdrawn and carried forward as the work progressed. It is but rarely, however, that water thus reached rises above the surface.

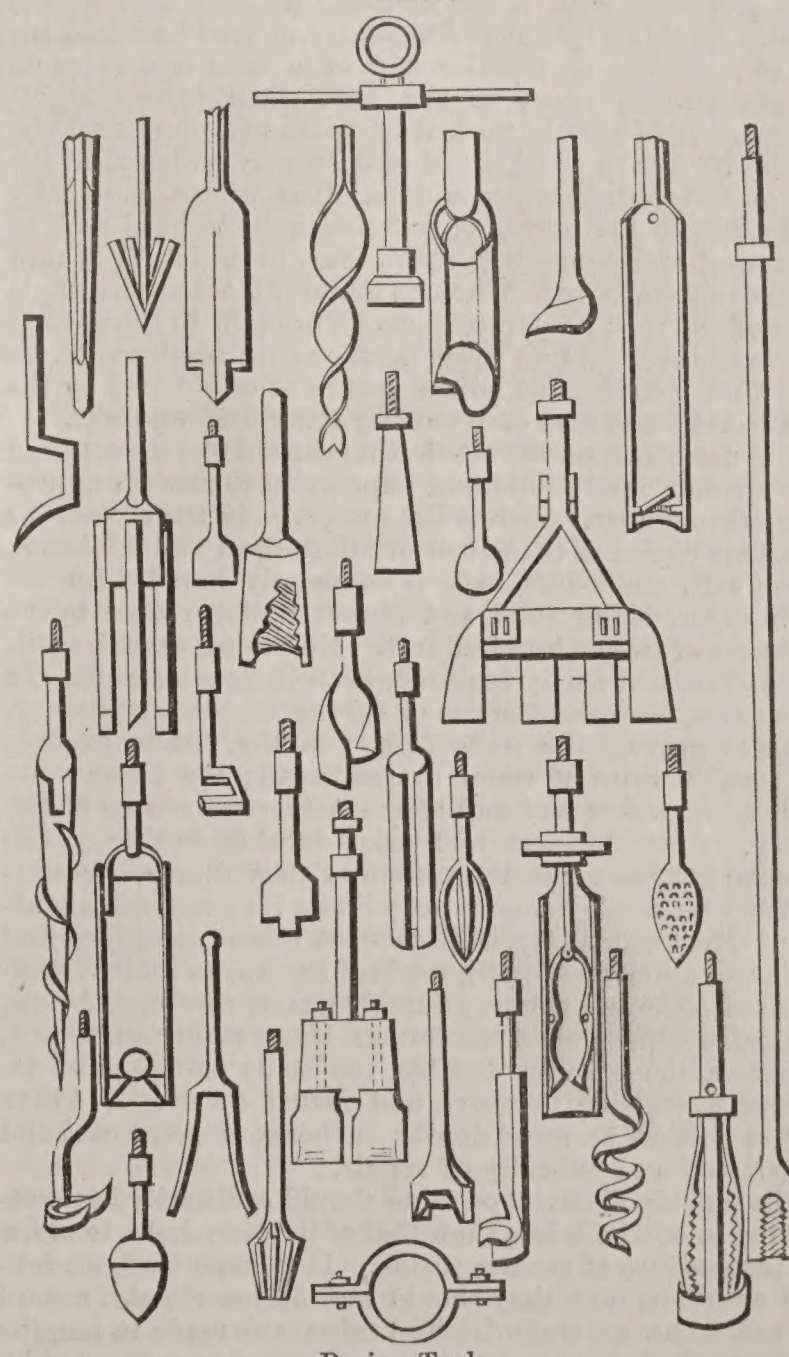
When the material is of a more resisting character, and greater depth has to be attained (as is usually the case), the soil-pipe, whether driven in or set into a hole previously bored by means of an earth-auger, serves to prevent the loose earth from falling in, and as a guide to ensure the verticality of the bore, which is of the utmost importance.

The boring tools are of very various shapes, adapted to the different kinds of rock, clay, or sand of various degrees of consolidation. For hard rock the most generally useful tool is a flat chisel; for clay and soft rock, a long, scoop-shaped bit with a slanting cutter, or with a tapering, twisted, spiral band (somewhat like a "gimlet screw") at the lower end; for sand, the same, or, should it be very clean and damp, a bit resembling a common wood auger, with broad spiral flanges.

In the case of soft rock, clay, and sand, the auger-bit is attached to stiff bars of wood or iron connected by screws, and provided with a cross handle at the mouth of the well, whereby they can be revolved by the workmen. The whole is suspended by a rope working over a pulley attached to the top of a tall tripod or other scaffold or derrick, and winding on a windlass or whin; the connection between the head of the auger and the rope being so arranged that the latter is not twisted by turning the former. Thus, whenever by boring the auger has become so full as to threaten clogging, it is readily hoisted out with its contents, and the latter discharged. Whenever the depth of the bore exceeds the height of the derrick, it becomes necessary to unscrew successively the sections of poles or bars as they are drawn up, while a collar attached to the pole at the mouth of the well prevents it from falling back. When working at great depths the operation of discharging the borings thus becomes a very tedious one, consuming far more time than actual boring.

The presence of water in the hole generally facilitates operations materially; it is therefore poured in from above when not naturally present. Sand, especially, can thus be

FIG. 2.



Boring Tools.

discharged more readily and boring continued for longer intervals of time. The auger being drawn up, the "sand-pump" can then be sent down at the end of a rope. The sand-pump is a long tubular bucket of sheet iron, with a

light valve at the bottom opening inward, enabling it to sink down into the semi-fluid mass of water and sand until it is full, the valve closing when the pump is raised. The same implement serves to clear the bore of quicksand, when met with in moderate quantities.

When hard rock has to be penetrated it must be pecked through with chisels, in the same manner that blast-holes are drilled by quarrymen and miners. The bits may then be attached either to stiff poles, as is done in boring soft materials, or, preferably, they may be altogether suspended by a rope. The rapid deterioration of the screw connections by repeated heavy shocks, the liability to deviate from the vertical, and the greater difficulty encountered in withdrawing the boring tool and discharging the borings, have caused the former mode of suspension to be almost altogether superseded, in this country, by rope-boring—a method extensively adopted by the Chinese long since in sinking their numerous deep bores.

When boring in rock by hand the upper end of the rope or pole bearing the drill is attached to a spring pole or bar, vibrated by the workmen, who at the same time give a slight turn to the cross-bar at each stroke, so as to complete the circle in from twenty to thirty strokes, varying with the kind of rock and the diameter of the hole. The lift varies, usually, between ten and twenty inches.

When boring by steam-power the boring-rope is connected with a walking-beam vibrated by the engine, which also works the whin or windlass (the "bull-wheel") when required. To obviate the necessity of too frequently lengthening the rope as the bore deepens, it is attached to the walking-beam by means of a long screw working in a stirrup-shaped nut, by turning which the rope can be let out to the extent of fifteen to eighteen inches.

The drill, also, is not directly attached to the rope's lower end, but first to a long and heavy stem of iron, connecting at its upper end with a long stirrup-shaped piece, which can be made to slide upward into another similar one attached to the rope in the reverse position. This arrangement, expressively called the "jars," serves to facilitate the loosening of the tools when they get fast by the jarring motion that can thus be given. At the Pennsylvania oil-wells the entire length of such a set of tools is about thirty feet; its weight, 800 to 1000 pounds.

A most valuable improvement made of late years in the boring of hard rock is the diamond-pointed drill of Leschot. In this implement diamonds are firmly set into the conical, concave, or annular end of a steel bar, so as to present cutting edges to the rock when turned right-handed. It is usually worked by steam or compressed air, and by its means the hardest granite may be bored at the rate of several inches per minute. It is, of course, equally applicable to the boring of artesian wells in hard rock as to mining and tunnelling operations, in which it is now extensively employed. When an annular bit is used, sample cores of the rock penetrated may be brought to the surface and examined. As in most labor-saving implements, its somewhat considerable prime cost is soon covered by the gain in time and cost of repairing other drilling tools.

It is not often, on the whole, that the sides of an artesian bore are sufficiently solid and impervious to remain unprotected throughout. Such is the case, *e. g.*, in the cretaceous limestone region of the States of Mississippi and Alabama, whose soft, chalk-like rock is commonly bored with the earth-auger, being solid and almost uniform even to the thickness of twelve hundred feet. No tubing save the soil-pipe is here ordinarily required, even in flowing wells. In most cases, however, the use of tubing becomes necessary, either to prevent the walls from "caving," or to exclude undesirable veins of water or quicksand; the latter especially being a frequent and most troublesome source of difficulty. The cheapest and most durable tubing is the wooden, but the great diminution of clear diameter resulting from its employment greatly limits its practical usefulness. Most commonly, wrought-iron tubes (gas-pipes, and for larger diameters tubing made of sheet iron and riveted) are used, although not very durable; more rarely, cast-iron, bronze, or copper ones, the former being rather cumbrous, the latter, though very durable, too easily collapsed or deformed by outside pressure, and rather costly. Yet they should be used at great depths in bores of great cost and importance and difficulty of repair.

The outside diameter of tubes should ordinarily be three-fourths to one inch less than that of the bore-hole, to allow for inequalities of surface inside. It is important, on several accounts, that they should not fit too closely, except for excluding quicksand. The tubes are made in lengths of about six feet, screwing into each other or connected by outside "thimbles" riveted to the lower, and successively attached by screw-rivets to the upper section as the tube is lowered into the well.

If after tubing any portion of a well the boring is to be continued below, it must ordinarily be done with a correspondingly diminished diameter, both of drills and tubing if the latter be required. A deep well thus sometimes contains three or four different successive sets of tubing, and even more, so that, although begun with a clear diameter of eight or nine inches, it may be diminished down to two or three. It may then become necessary to extract all the tubing, and widen the bore by "reaming." Expanding drills are sometimes used to undercut a set of tubing, and thus lower it, but this is a slow process, and somewhat uncertain of success.

The accidents to which the well-borer is liable are very numerous in kind and of very frequent occurrence. The most common one is that the tools get "jammed" in the well, whether in consequence of a deviation of the bore-hole from the vertical, or from the falling in (whether from the sides of the well or from its mouth) of some fragment or boulder, or perhaps a hard fossil, or from the breaking of a joint or the "stripping" of a screw, by which the tools themselves have fallen in.

The first cause mentioned is the most formidable, as it is rarely possible to correct fully a material sidewise deviation of a bore-hole; this accident, therefore, frequently causes the final abandonment even of deep bores. The jamming of the tools by an object fallen from above is also often a very serious matter: hence a double-hinged valve is commonly placed on top of the soil-pipe as a measure of precaution. A large number of most ingenious implements for extracting bodies of various kinds and shapes has been devised, yet not unfrequently a special tool must be constructed to suit a particular case. All possible precautions should be taken to prevent such accidents, as their cure is but too frequently impossible.

Among the most noted of deep-flowing wells is that of Grenelle at Paris. The latter city is situated in the lowest portion of a basin-shaped mass of formations, so that the strata slope towards the city. It was begun in 1833 under the auspices of the government, and, advancing slowly, was completed on Feb. 26, 1841, when, at the depth of 1792 feet, the auger, penetrating a ledge of rock, fell suddenly several yards, evidently into water. In a short time the water rose 112 feet above the surface in an immense volume, bringing up sand and mud. It exerts a pressure equal to a rise of 812 feet above the surface (in pipes), and discharges half a million of gallons per day of very pure water, which is distributed to that part of the city. Since, however, its temperature at the mouth of the well is 82° F., it requires to be cooled for drinking purposes, and is used for warming the hospitals at Grenelle. A large number of other wells have since been sunk in and near Paris, as well as London, which is similarly situated as regards geological structure. Among the most remarkable of the locality is that of Passy, which was sunk with a diameter of two feet to a depth of nearly 2000 in the years from 1855 to 1860, inclusive. It discharges 5,660,000 gallons of water per day; the yield of the Grenelle well having, at the same time, diminished by one-fourth.

Among the noted deep artesian wells of Europe is that of Kissingen in Bavaria, completed in 1850. It is 1878½ feet in depth, the last 138½ feet being sunk in pure rock-salt. Hence the water is strongly salt; its temperature is 66° F., and the discharge is 100 cubic feet per minute; it will rise to the height of 58 feet above the surface. Wells have been sunk to greater depths in Germany since then; the deepest of all, and doubtless the deepest in the world, being that lately sunk at Sperenburg in Prussia, to a depth of 3900 feet.

In the U. S. artesian wells are numerous, especially in New York, Pennsylvania, Virginia, Alabama, and Mississippi. In the latter two States they alone furnish the supply of water without which the fertile prairie regions would suffer severely in summer. It has frequently happened here, as elsewhere, that the discharge from the wells first sunk has been seriously diminished or altogether stopped by the opening of other bores in the same neighborhood or at a lower level. A nine-inch bore made at the foot of the hill on which the city of Columbus, Miss., is situated caused the sudden cessation of the discharge from the numerous wells in the town, while itself emitting a stream copious enough to run a mill. On the partial closing of the orifice the wells above resumed their flow.

The numerous bored wells of Western Pennsylvania, West Virginia, and adjoining parts of Ohio are chiefly remarkable as the source of the world's largest supply of petroleum, which flows or is pumped from them, accompanied by salt water and combustible gas. Their spontaneous flow seems frequently to be caused not so much by water-pressure as by that of the combustible gas, which is sometimes emitted by them in vast volumes, spouting to the height of 60 to 100 feet a mixture of water and petroleum. Disastrous conflagrations have at times resulted

from such inordinate manifestations of energy. These wells rarely exceed 500 feet in depth. At Cleveland, O., as well as at a few other points, the natural gas is used both for lighting and heating purposes by the proprietors.

The oil-region of Pennsylvania, with its numerous wells, has its parallel in North-eastern China, where the wells are said to count by tens of thousands, some of them approaching a depth of 3000 feet. They are not, however, as productive of petroleum as those of the U. S.

A number of wells of moderate depth (not exceeding 500 feet) have also been sunk at the city of New York. The structure of Manhattan Island is exceedingly unfavorable to their success; but good water has been obtained in large quantity, and rising to within twenty feet of the surface.

One of the deepest artesian wells in this country is that sunk by the Messrs. Belcher at St. Louis, in the hope of getting a supply suitable for their sugar-refinery. It was begun in 1849 at 300 feet distance from the banks of the river, and with a diameter of nine inches down to 457 feet, where it was contracted to three and a half inches; but subsequently enlarged to five and a half inches down to the depth of 1050 feet, from which point down to 2199 feet, the extreme depth reached (in Mar., 1854), its diameter is three and a half inches, since carried to 3843 feet 5 inches. The water, discharged at the rate of seventy-five gallons per minute, is a saline chalybeate, sulphur water; its temperature is 73.4° F. This well is remarkable for having been sunk mainly in hard rock—limestone, sandstone, and shale—steam-power having chiefly been used. The same applies to the Louisville artesian well, 2066 feet in depth; its water likewise is strongly mineral.

At Terre Haute, Ind., several wells have been sunk to depths varying from 1600 to 1900 feet. One of these yields only a strong sulphur water; two others also yield petroleum. Water quite similar to that of the Terre Haute wells, and likewise connected with a petroleum-bearing formation, though of much later date, is spouted by the artesian well near Lake Charles in Calcasieu parish, La. The main stream comes from the surface of the great sulphur-bed of that locality, at a depth of 440 feet, at the rate of about sixty-five gallons per minute, and with a rise of twelve feet above the surface.

One of the deepest bores in the U. S. is the well sunk at the State-house, Columbus, O. Its depth is 2775½ feet, but the water struck (which is salt) does not rise above the surface; its temperature at the bottom is 91° F., or that of hot summer weather.

In the vicinity of Chicago artesian water of great purity is readily obtained at a moderate depth and in great abundance, rising to convenient heights above the surface. It is of material importance as furnishing a supply both fit for domestic use and adequate for manufacturing purposes.

Among the artesian wells which have encountered great difficulties in their construction we may mention those sunk at Charleston, S. C., to the depth of 1250 feet, and at New Orleans to that of 630. The strata penetrated here being but little consolidated, and alternating with quicksand layers, the auger had to be closely followed by tubing, which itself was very liable to sidewise displacement and collapse. At New Orleans no satisfactory result was obtained at the depth mentioned; at Charleston, a somewhat saline, yet soft water, of a temperature of 87°, rises ten feet above the surface, at the rate of twenty gallons per minute; it is used for steam-boilers.

The boring of artesian wells is likely to become a matter of capital importance in the arid regions of the West, where both surface and spring water is so frequently not only very scarce, but undrinkable. An expedition under the command of Capt. (now Major-General) Pope was sent out by the U. S. government in 1855 for the purpose of testing the feasibility of sinking artesian wells on the waterless plateau of the Llano Estacado, which forms a formidable obstacle on the most direct route between the South-western States and Mexico. It was shown that water would rise to within an available distance of the surface in bores between 800 and 900 feet in depth.

In California artesian wells are largely used in providing water for irrigation. The same is being done in the Sahara desert of Africa, where such wells have been sunk to the depth of 1200 feet, each one creating around itself an oasis.

Bore-holes are sometimes sunk from the surface into sand or other pervious strata for the discharge of waste water that would otherwise prove a nuisance. These are called absorbent or drain wells.

E. W. HILGARD, *Oxford, Miss.*

Ar'teveld' (or **Artevelde**), **van** (JACOB), a famous Flemish demagogue, born at Ghent, became a rich brewer. By his talents and eloquence he acquired much influence and popularity. The people of Ghent, who had revolted against the count of Flanders, chose Arteveld as their commander. He banished a number of Flemish nobles and knights, and adopted a despotic and arbitrary policy. As an ally of Edward III. of England, he waged war against France. Having formed a design to give the sovereignty of Flanders to the English Black Prince, he provoked a revolt of the Flemings, who killed him July 9, 1345. (See FROISSART, "Chronicles;" J. DE WINTER, "J. van Artevelde," 1846.)

Arteveld, van (PHILIP), a son of the preceding, was born at Ghent in 1340. He was also a popular favorite, but passed many years of his mature life as a private citizen. When Ghent was besieged by the count of Flanders in 1381, and reduced to a desperate condition, Arteveld was appointed to the chief command. In May, 1382, he defeated the count, and then assumed the title of regent. Charles VI. of France intervened in favor of the count of Flanders with an army, and Arteveld was defeated and killed Nov. 27, 1382. (See FROISSART, "Chronicles.")

Art Exhibitions, public exhibitions of the works of living artists, for the purpose of affording pleasure and instruction to the people on the one hand, and on the other of promoting the sale of the works exhibited. They originated before the art-unions, with which they are now usually connected. As in modern times artists depend for patronage on private persons, and as their works, if sold, are usually kept in the obscurity of private houses, the necessity arose that some plan should be adopted for their public exhibition. Among the earliest of such displays was that of the French Academy of Art in 1673. The regular exhibitions of the Royal Academy of London commenced in 1796. Similar exhibitions are held in all civilized countries. The annual exhibition of the National Academy of Design at New York is one of the most important in the U. S. Its exhibitions commenced in 1825.

Arthabas'ka, a county of Canada, in the central part of Quebec, intersected by the Becancour River. Area, about 850 square miles. The county is traversed by the Grand Trunk Railway. Capital, St. Christophe (or Arthabaskaville). Pop. in 1871, 17,611.

Arthabas'kaville, or **St. Christophe,** the capital of Arthabaska co., province of Quebec, Canada, has a convent and an academy of the Nuns of the Congregation of Montreal, and two weekly papers.

Arthritis [from the Gr. ἄρθρον, a "joint"], literally, "inflammation of a joint;" a term inclusive of gout and rheumatism, though properly applicable to inflammations of the joints of whatever character.

Arthro'dia [Gr. ἀρθρωδία, from ἄρθρον, a "joint" or the "socket of a joint"], a connection of bones, in which the head of one is received into a very superficial cavity in another, so as to admit of motion in almost all directions, as in the joint between the humerus and the scapula.

Ar'thur, a thriving town in the N. Riding of Wellington co., Ontario, Canada, on the Toronto Gray and Bruce Railway, 73 miles W. by N. of Toronto. It is the seat of important manufactures. Pop. of census sub-district, 4376.

Ar'thur, Ar'tur, or **Ar'tus,** a semi-fabulous British hero and king of the Silures, is supposed to have flourished about 500 or 550 A. D., after the Romans evacuated the island of Britain. He is celebrated as the hero of the romances of the Round Table, and his exploits were favorite themes of mediæval bards and romancers. According to the popular legends, he defeated the Saxon invaders in several battles, and bravely defended the independence of the Britons, but was finally killed in a battle fought at Camlan against his rebellious nephew Modred. His fame and adventures were magnified and embellished by writers of various nations in the Middle Ages. Some of these affirm that his residence was at Caerleon, on the Usk, in Wales, where he lived in grand state, surrounded by multitudes of knights and ladies—that twelve knights of eminent valor formed the centre of this retinue, and sat with the king at a round table. Another of his capitals was Camelot, identified by tradition with Queen's Camelot in Somersetshire. The name of his wife was Guinivere. (See TURNER, "History of the Anglo-Saxons;" RITSON, "Life of King Arthur," 1825; TENNYSON, "Idyls of the King." See also SIR THOMAS MALORY'S "Byrth, Life, and Actes of Kyng Arthur," London, 1485; new ed. by Southey, 1817, 2 vols. quarto.) The Arthurian romances were probably thrown into their present form, if not largely invented, by Walter Map. (See MORLEY'S "Writers before Chaucer," *sub voce.*)

Arthur (TIMOTHY SHAY), an American writer of tales, was born near Newburg, Orange co., N. Y., in 1809. He became a resident of Philadelphia in 1841, and published many popular tales having an excellent moral tendency. Among his works are "Lights and Shadows of Real Life," "Library for the Household" (12 vols.), and "The Good Time Coming."

Arthur's Seat, a rocky hill which rises in the environs of Edinburgh to the height of 822 feet above the level of the sea, and commands a prospect of great extent and superlative beauty. It is supposed to derive its name from King Arthur. It is formed of several varieties of trap-rock upheaved through the carboniferous strata, and presents on the southern and western sides perpendicular precipices.

Ar'tichoke [supposed to be a corruption of *al-kharciof,* the Arabic name of the plant], (*Cyna'ra scol'ymus*), a perennial herbaceous plant of the natural order Compositæ, is nearly allied to the thistle. It is a native of Southern Europe, and is cultivated for food. The genus is distinguished by the bracts of the involucre being fleshy at the base, and emarginate with a hard point. The part which is eaten is the succulent receptacle of the flower-head, gathered before the flowers expand, and boiled or made into a salad. The Jerusalem artichoke (*Helian'thus tubero'sa*) is an entirely different plant, which is sometimes cultivated for its tubers.

Ar'ticle [Lat. *artic'ulus,* literally signifying a "joint" or "single part"], a word used in various senses, usually denoting a distinct part of a systematic work. It may signify a single clause in a contract, treaty, or other written document, a particular, separate charge or item in an account, or a point of faith. In grammar, it is a part of speech, usually the shortest and simplest of all; in mercantile language, it denotes a particular commodity; in journalism, the principal editorials are called *leading articles.*

Articles, in law, a word used to denote various kinds of instruments drawn up under distinct heads or divisions. Instances of the use of the word are a libel in admiralty, where the libellant (or plaintiff) is said to "articulately propound;" "articles of agreement," "articles of impeachment," "articles of partnership," or of peace or of war. "Articles of Confederation" is a phrase employed to designate the compact made between the original thirteen States of the U. S., forming a general government before the present Constitution, and which, having gone into effect Mar. 1, 1781, continued in force until the first Wednesday of Mar., 1789.

Articles, The Six, were imposed on the English nation by Parliament in 1589 during the reign of Henry VIII. They asserted the doctrine of transubstantiation, condemned the marriage of priests, enjoined the continued observance of vows of chastity, and sanctioned private masses and auricular confession. The act imposing these articles was popularly called the "Six-stringed Whip."

Articles of Faith, an expression usually employed to denote the particular points of doctrine which together make up the sum of Christian belief. The various churches of Christendom, not being agreed upon all these points, have for the most part set forth their own exposition of them; and it is to these creeds, symbols, or confessions that the term Articles is most commonly applied. The Articles of the English Church, formerly forty-two in number, are now reduced to thirty-nine, and by the Methodist Church to twenty-five. (See THIRTY-NINE ARTICLES.)

Articles of War, a name applied to an act of Congress approved April 10, 1806, to establish rules for the government of the U. S. army. Separate articles (those now in force, approved in 1864, to supersede the old articles of 1802) establish rules for the government of the navy. Also applied to the code of military law embodied in the Mutiny Act annually passed in the British Parliament. For the enforcement of such Articles of War power is given to the Crown to establish courts-martial to try and punish offences according to the Articles themselves. Another annual Mutiny Act embodies "Articles of War for the Marine Forces," which relates exclusively to the royal marine forces *while employed on shore.* The navy is not controlled by any annual Mutiny Act, but the Articles of War relating to it are contained in an old act of Parliament, the 22d Geo. II., c. 33.

Articula'ta [the plu. neuter of the Latin past part. *articula'tus,* "jointed" or "furnished with joints," from *artic'ulus,* a "joint"], or **Artic'ulated An'imals,** one of the four primary or grand divisions of the animal kingdom according to the system of Cuvier, which is generally adopted by naturalists. The Articulata are characterized by bilateral symmetry and an external skeleton composed of a series of rings or segments. These rings in some cases appear externally as mere transverse folds in a soft skin, but are often covered with a bony or horny substance. They are also characterized by an internal gangliated nervous system, the ganglia being arranged symmetrically along the ventral aspect of the central or median line of the body. Optic nerves and other nerves of special sense proceed from a ganglion in the head, which is sometimes called the brain, but is not much like the brain of vertebrate animals. The Articulata have no proper heart, but instead of it a *dorsal vessel,* a tube carried along the central line of the body near the back. The blood is usually white. They surpass all other animals in muscular performances in proportion to their size. Many of the Articulata have articulated members or legs, symmetrically arranged in pairs. By most recent naturalists they are divided into three classes—Insects, Crustaceans, and Worms. Huxley subordinates the Articulata under the name of Arthropoda, and introduces the divisions Annulosa and Annuloida, to include some classes of animals otherwise placed by Cuvier.

Artific'ial Hori'zon, a horizontal mirror, usually the surface of a basin of mercury, used to determine the altitude of a star or other object when the sensible horizon is ill defined.

Artificial Stone. See CEMENT, by GEN. GILLMORE.

Arti'gas (JOSÉ), a South American general, born at Montevideo in 1755, became in early life a leader of the Gauchos, a class of outlaws. In 1811 he entered the service of the Junta of Buenos Ayres, for which he fought against the Spaniards or royalists. He defeated the latter in several battles, and became in 1815 master of the Banda Oriental. Aided by the democratic party, of which he was the leader, he conquered Buenos Ayres in 1820, but was removed from power about the end of that year. Died in 1851.

Artil'lery [Fr. *artillerie,* remotely from the Lat. *ars, artis,* "art," "ingenuity," implying that it is the product of skill]. The term *artillery* was in early times used to designate all kinds of missiles employed in warfare, and the machines by which they were propelled. In modern times, however, and especially since the introduction of gunpowder for military purposes, the term is understood to denote cannon of all sizes and varieties, their carriages, projectiles, implements, and equipments, the machines necessary to transport, serve, and manœuvre them, and lastly the troops specially instructed and employed in their service.

Artillery is classified according to the particular service for which it is adapted, and in each class according to its size, weight, or the character or weight of its projectile. Its primary classification is *light* and *heavy.* The former includes field, mountain, prairie, and boat guns, rockets, etc.; the latter comprises siege, garrison, sea-coast, and ship guns. *Field artillery* is subdivided into horse artillery, in which all the artillerymen are mounted on horses, and "mounted batteries," in which the officers, sergeants, and certain other enlisted men only are mounted on horses, the cannoneers marching by the side of the guns, or, for manœuvres on the field of battle or a rapid but prolonged movement elsewhere, mounting upon the ammunition-chests on the carriages. The size of guns is designated either by the diameter of the bore in inches or by the weight of their solid shot in pounds. In England they are often designated by the weight of the guns in hundredweights.

The artillery engines in use by the ancients were chiefly the *ballista* and *catapult* for throwing stones and heavy darts, and the *battering-ram* for effecting breaches or demolishing walls. These engines were rude, bulky, heavy, clumsily constructed, and required many men and much time and labor for their transportation, placing in position, and manœuvring; but, for the period and purpose, they were doubtless of great power and sufficiently effective. The effective range of the ballista and catapult did not exceed 100 or 150 paces, but at this distance they were capable of discharging missiles of 300 pounds weight.

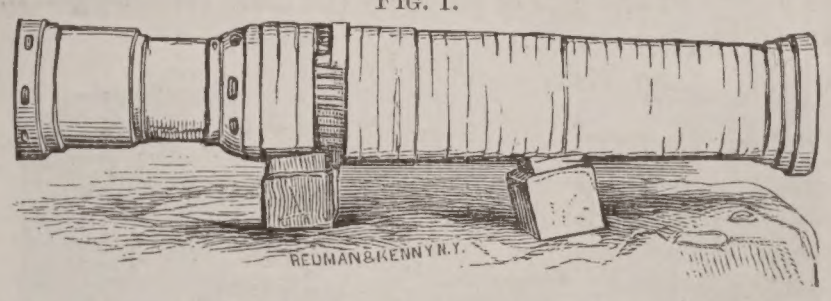
In the Middle Ages the cross-bow came into military use, and gradually supplanted the catapult. It is probable that an engine of similar construction took the place of the ballista. These engines were constructed of tough, fibrous wood, and in some instances of steel. By their introduction greater portability and some increase of range were obtained.

The birth of artillery, as we of to-day understand it, must date from that of gunpowder. Although there is but little doubt that a compound of nitre, charcoal, and sulphur was well known to the Chinese as early as the ninth century as an explosive agent, and had been heard of in Europe about the era of the first Crusade as adapted simply for such a purpose, it does not appear that it was well known in Europe until it was introduced by Roger Bacon in the twelfth century. Its uses for artillery or projectile purposes did not seem to be understood until demonstrated in the early part of the fourteenth century by the Friburg monk Berthold Schwartz, to whom this important attribute was made known by an accident.

The earliest record of the construction of cannon is about

the middle of the fourteenth century. It is alleged that cannon were employed by Edward III. of England, A. D. 1327, in his campaign against the Scots, and also by the French, A. D. 1338–39, and at the siege of Algesiras, A. D. 1342, but contemporaneous mention is obscure, and refers to cannon more as curiosities than as engines of war. The first well-authenticated use of cannon in battle was by Edward III. of England in the battle of Cressy, A. D. 1346. Even on this occasion it would appear that their effect upon the French was due more to astonishment than to any inherent power of the novelty itself. From this date, however, the construction and use of cannon increased with great rapidity. At the very first they were of small calibre, throwing stone or leaden balls of only three or four pounds weight, but before the close of the century they were capable of throwing stone projectiles of forty or fifty pounds for field-guns and of 200 pounds for siege or fortification guns. In fact, their excessive size and weight not only seriously interfered with, but actually prevented, their general use. The earliest cannon were constructed of iron bars joined together longitudinally, and strengthened by exterior hoops of iron. Wood, wound with rope, and sometimes with wire, was also used upon the exterior to strengthen them. One of the most interesting of ancient *monster* cannon still extant is the "Mons Meg," made in

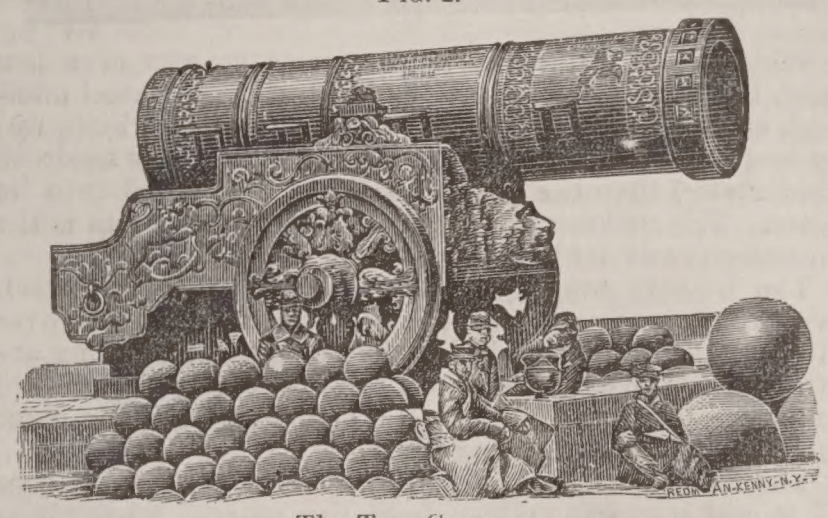
FIG. 1.



1486 at Mons, Brittany, and now in the castle of Edinburgh. An inscription on the carriage states that it was employed at the siege of Norham Castle in 1513. It burst in 1682 in firing a salute. It is made of iron bars hooped together, and its bore is twenty inches in diameter. (Fig. 1.)

Another superb specimen of early cannon—of much later date than the preceding—is the "Tsar Cannon" (or King of Cannon) in the arsenal of the Kremlin, Moscow. It was made early in the seventeenth century under the emperor Theodore. It is of bronze, with a calibre of

FIG. 2.

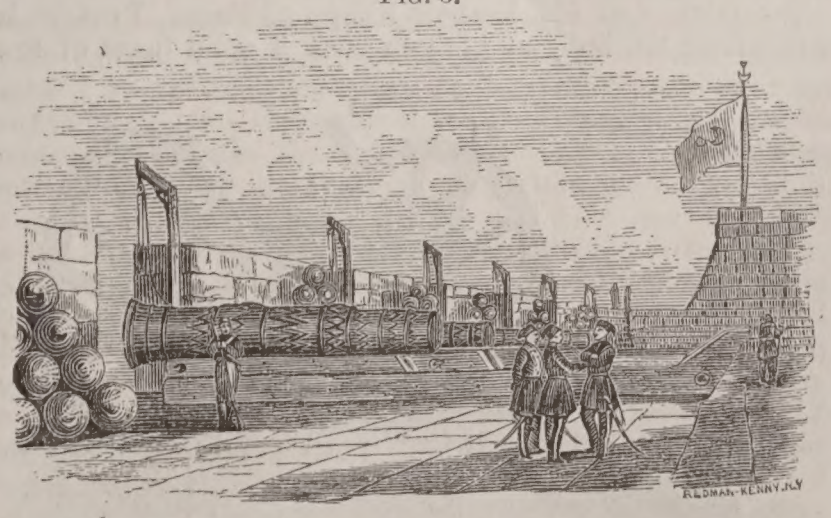


The Tsar Cannon.

about thirty inches. The carriage upon which it stands is merely an ornamental support. Cast without trunnions, it was probably laid in permanent position for firing. (Fig. 2.)

Still more curious (for they are even *yet*, if we mistake not, *in battery*) are the famous Turkish guns defending the

FIG. 3.



Dardanelles. The engraving shows the interior of the fort of Chanak Kalesi on the Asiatic side. There are said to be 102 guns (it is not stated that *all* are like those shown and described). The diameter of the shot is thirty-six inches, length of guns fifteen feet. They were cast at Bagdad. The gun in the foreground is that which hit the Windsor Castle in the famous passage up the Dardanelles of the British fleet under Admiral Duckforth in 1807. It will be observed that the wooden carriages form (only) permanent supports, affording no angular motion to the gun, the direction of which is necessarily invariable. (Fig. 3.)

Ancient cannon were in some instances made of *leather*, and as so made were used to some extent by Charles XII. of Sweden, A. D. 1697.

In the very infancy of cannon construction the breech-loading principle suggested itself, and was made use of in a crude manner, but the low state of the mechanic arts forbade the exact mechanism necessary to perfect the idea. About the middle of the fifteenth century cannon began to be cast in iron, and towards the latter portion in various alloys. A. D. 1477, Louis XI. of France caused many cast-iron cannon to be fabricated for use against the cities of Picardy and of Flanders. About this period the projectiles for large cannon, which had hitherto been of stone, were made of cast iron, but to some extent stone balls continued in use for a number of years afterwards. Shells were also introduced at this time, and we have a record of their use by Charles VIII. of France at the siege of Naples, A. D. 1494. Brass cannon were first cast in England by John Owen, 1535, and a few years later in Scotland by order of James IV. During the last half of the sixteenth century mortars for throwing shells were introduced in Germany, and in the first half of the seventeenth century in France. Mortars were at first discharged by igniting the shell before it was introduced, and then igniting the charge in the mortar. The great danger of such a practice caused its abandonment, but not until it had been followed for half a century. Towards the latter part of the seventeenth century a short cannon, called after its inventor (the German Haubitz) a *howitzer*, was introduced for the purpose of using large shells by direct fire. In 1799 there was introduced a short cannon of large relative calibre called a *carronade*, named from the Carron Iron-works, where it was first cast. No long guns for firing hollow projectiles at long range by direct fire were known until 1812, when Colonel Bomford of the U. S. ordnance department invented a gun for that purpose, which he improved in 1814, and called a "columbiad." Some years afterwards this invention was introduced into France by General Paixhans, and was generally called in Europe by his name. In 1841 a gun of this character, but of somewhat different model, and called a sea-coast howitzer, was introduced into the U. S. service; and three years later these were followed by columbiads of altered model, increased weight, and greater power. Up to this period all ordnance was smooth-bore, the rifle principle, although suggested very early in the history of cannon, and put into practice in military weapons A. D. 1600, having never been perfected or brought into general use. About 1847–48, soon after the application of the rifle principle to small-arms, experiments commenced to be made with rifled cannon, but ten or more years were consumed before the proper form, number, and twist of the grooves, and form of the elongated projectile, had been sufficiently ascertained to justify any general use of rifled cannon. These varying elements are still the subject of scientific research and experiment, although rifled cannon have now very nearly superseded smooth-bore cannon throughout the world.

Gunpowder was first used in the form of dust, but its great loss and inconvenience in use, and the discovery of its increased power in a granulated form, led, after some years, to its sole use for cannon in that form.

In gun construction the prime considerations are tenacity, elasticity, and hardness. Cast iron, wrought iron, steel, and (for the smaller ordnance) an alloy of 90 parts copper and 10 parts tin, are found to meet these conditions best. Since 1860 the alloy has gradually fallen into disuse, England, France, and the U. S. being the only nations who use it now, and even these nations use it to a very limited extent.

The present condition of gun construction is mainly experimental. Iron in one form or another is the only material used for heavy artillery, but the particular form in which it is to be used, whether as cast, wrought, or steel, or whether in bars, coils, or ingots, or in combination—as, for instance, steel or wrought iron interior and cast-iron or wire-wrapped exterior—is still undecided, and it is left for experiments which are still in progress or to be made hereafter to decide which is best. In the U. S. cast iron is used for smooth-bore guns, and also for rifle guns, but as its use for the latter has not proved satisfactory, experiments are now being made with wrought iron, and with wire-wrapped and other built-up guns, with fair prospect of success. In England modern gun construction at one period inclined to the use of a steel interior tube, strengthened by an exterior casting of iron, which is the system of Palliser. But the superior excellence of the inventions of Sir William

Armstrong, improved by those of Fraser, have resulted in the exclusive use, in that country at present, of the system of these two inventors. This method of gun construction is, in brief, a steel core (or body of the gun) strengthened by three or more exterior tubes of coiled wrought iron. The system is at present popularly known as the "Woolwich."

In Germany and Russia, and some other European nations, the Krupp system of heavy forgings of steel ingots is preferred. This last is by far the most expensive, and does not always produce the most durable guns. The question of breech or muzzle loading is still an undecided one. The Germans seem to prefer the first named, while the English, after several years' adoption of the first, have of late abandoned its use and returned to the muzzle-loader. In the U. S. experiments still going on have not yet demonstrated which principle is the best. The advantages of loading at the breech with heavy guns are numerous and great, but the serious mechanical difficulties of perfecting the movable breech attachments have not yet been satisfactorily overcome.

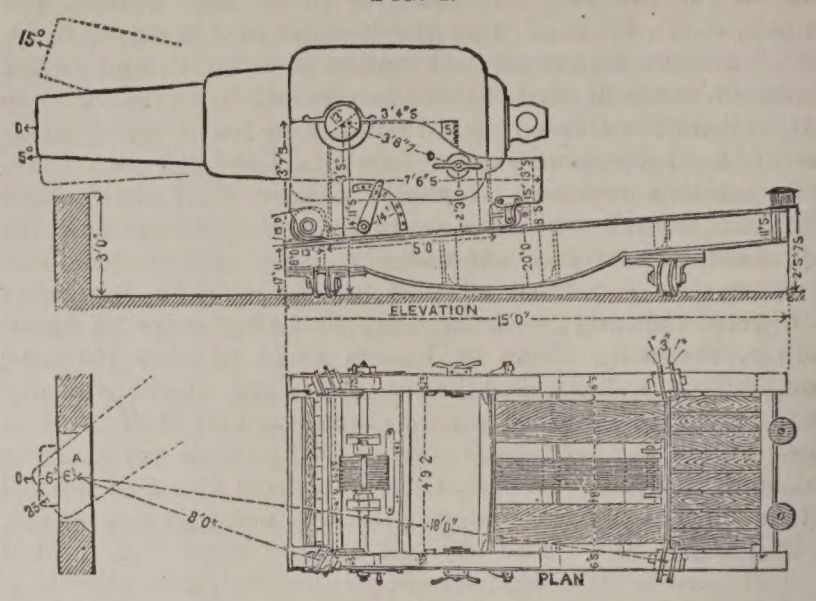
During the half decade (1855–60), and the succeeding decade (1860–70), enormous strides were made in gun construction, and in that of carriages and projectiles, and the manufacture of gunpowder.

The plating of vessels of war with iron, and the increasing thickness of this armor, have led of late years to a very great increase in the size, weight, and calibres of sea-coast and naval cannon, and this in turn has necessitated very radical changes in the material and methods of gun construction. In England the lead in this direction was taken by Sir William Armstrong, who was subsequently followed by Whitworth, Fraser, Palliser, Blakely, and others. In Prussia, Krupp at Essen struck out a new method, which has proved so successful as to cause his guns to be adopted in large numbers by Russia, Austria, Belgium, and Spain, in addition to his own country. In the U. S., Rodman, Dahlgren, and Parrott have made their names famous by successful improvements in heavy gun construction. Each of the above-named inventors has given his name to his invention, and the guns are so recognized throughout the civilized world.

The method of Armstrong is to form the barrel or body of the gun by welding at their ends several wrought-iron tubes, each of which is two or three feet in length, and is formed by winding a square bar of iron around a mandrel and welding the edges. The part of the gun in rear of the trunnions is strengthened first by an enveloping tube composed of a plate of iron bent in a circular form and its edges welded, and secondly by another enveloping tube made, as in the body of the gun, of spiral coils. As at first constructed, the Armstrong guns were all breech-loaders, the movable breech arrangement consisting of a hollow screw, through which the charge was passed into the bore, and a wedge which fitted into a slot cut in the breech of the gun closing the rear end of the bore. This wedge was slipped into its place by a hand, and kept there by a few turns of the screw. The breech-loading principle having proved unsatisfactory in practice, it was abandoned, and all Armstrong guns were subsequently constructed as muzzle-loaders.

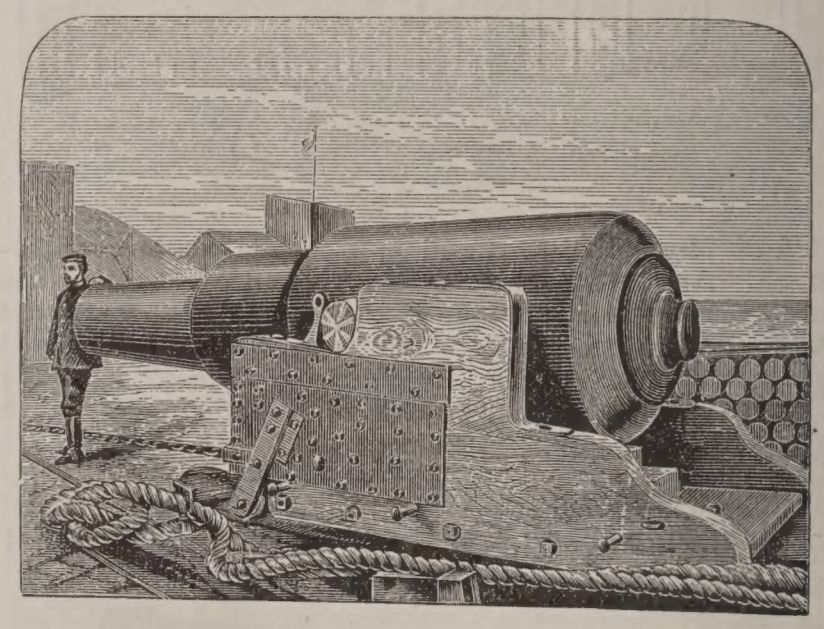
Armstrong's method of construction has been considerably modified by the suggestions of Mr. Fraser, a leading employé in the royal arsenal at Woolwich. These modifications consisted, in brief, in reducing the number of coils, shrinking on the outer coils and trunnion-block together, introducing offsets or shoulders for hooking or securing the different parts to each other, and in using a cheaper iron for the outer coils. These modifications, while they did not improve the strength of Armstrong's original invention, reduced the cost of the gun nearly 50 per cent. As thus reduced the cost of Woolwich guns is about double that of cast-iron guns in the U. S. of equal weight. Early in 1867, Fraser still further modified his method by constructing his guns, up to those of 9-inch calibre or 250-pounders, of four separate parts: 1st, the inner (or A) tube, a solid steel forging, tempered in oil, roughly bored out to a calibre slightly less than the proper one; 2d, an outer (or B) tube, composed of two single and slightly taper coils of wrought iron, united together endways, rough turned and shrunk on to the inner (or A) tube, which is accurately turned down to receive it, the process being easier to *turn down* the inner tube than to bore the outer one; 3d, a breech-coil or jacket, composed of a triple coil, a double coil, and a trunnion-ring made and welded together; and 4th, the cascable. Guns of this character have been constructed of 7-inch (115-pounder), 8-inch (180-pounder), 9-inch (250-pounder), 10-inch (350-pounder), and, more lately (1871), 12-inch (600-pounder). Fig. 4 shows the Woolwich 25-ton (12-inch) gun on its carriage. Still more recently, a gun of 11.6 calibre, of greater weight and throwing a projectile weighing 700 pounds, has been

Fig. 4.



made. This last gun is what is popularly known as the 35-ton gun, or "the Woolwich Infant." (Fig. 5.) In the calibres of the Fraser system above 9-inch one or two additional exterior coils are used. For its size and weight, the 9-inch Fraser gun is probably the most efficient gun in the world.

Fig. 5.



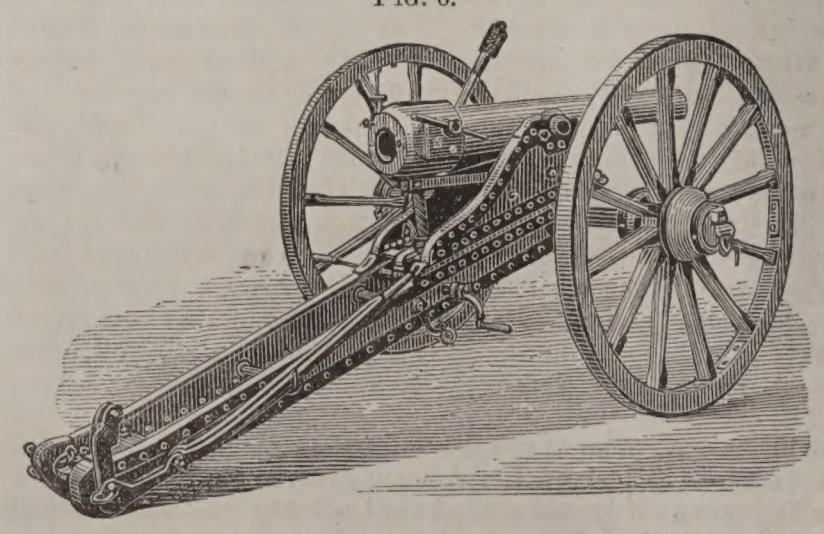
Whitworth's method is to construct the gun of a low steel, the hoops cast hollow, hammered over a steel mandrel, annealed, and forced together (or the gun built up) by hydraulic pressure. The breech-pin, which is made of harder steel than the body of the gun, is screwed into its place. The striking peculiarity of Whitworth's gun is the cross-section of its bore, which is hexagonal.

The Blakely gun is composed of a barrel of low steel, over which is shrunk a tube of less elastic steel, and over all a cast-iron tube or jacket, to which the trunnions are attached. The two steel tubes are cast hollow, hammered over mandrels, and annealed. The projectiles for these guns are on the expanding principle.

The Palliser method is to insert a steel tube in the bore of a cast-iron gun, either from the muzzle, where it is secured by one or more steel screw-washers, or from the breech, in which case the steel tube only extends a short distance beyond the seat of the charge, and is secured in its place by a screw breech-plug. This method affords the opportunity of utilizing smooth-bore guns of older systems by their conversion into rifle guns of considerable power and endurance.

The method of Mr. Francis Krupp of Essen, Prussia, is to fabricate the body of his gun from a solid ingot of low

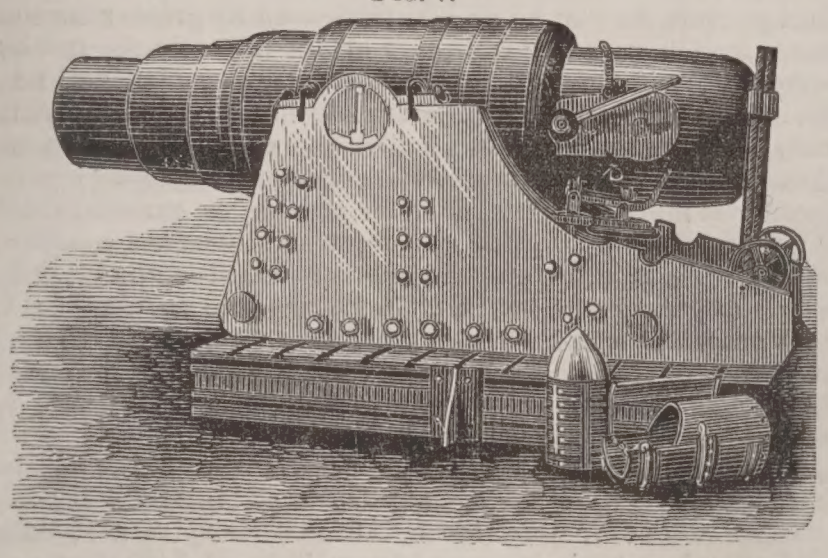
Fig. 6.



steel worked under heavy steam-hammers. The gun is strengthened by three or more steel tubes, which are

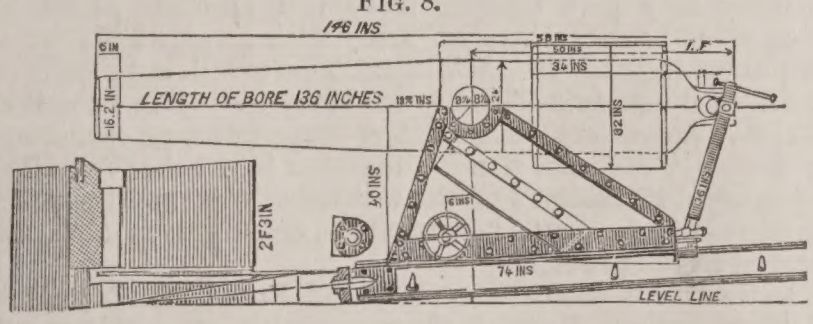
shrunk upon the central tube or mass of the gun, the last ring or tube enclosing the breech being forged in one piece with the trunnions, and made without any weld. The rings are of different lengths, as is usual with built-up guns, and the whole gun is diminished in thickness towards the muzzle, not by tapering, but by being turned with concentric steps of diminished heights. Fig. 6 shows one of Krupp's field-guns on its carriage. Besides several thousand field-guns, Krupp has fabricated nearly 2000 of 6-inch, 7-inch, 8-inch, 9-inch, 11-inch, 12-inch and 14-inch calibre. Of the last-named monsters (of which two have been made), both have successfully stood the proof of nearly 170 pounds of prismatic powder and a 1200-pound projectile. The 14-inch Krupp gun weighs fifty tons. (Fig. 7.) The first of its kind required the continuous labor, night and day, of sixteen months, and, with its carriage and the turn-table (both of steel) on which it is mounted, cost $110,000, gold. Krupp's partiality for steel induces him to make all of his projectiles and gun-carriages of that material.

Fig. 7.



In the Parrott method the body of the piece, or rather the gun itself, is of cast iron, cast hollow, and cooled from the inside (after the plan of Rodman) for the larger calibres, and strengthened about the seat of the charge by an exterior tube of wrought-iron bars spirally coiled and shrunk on. For this purpose this portion of the gun is turned down to a cylindrical form. Besides his field-guns of 3 inches (10-pounder) and 3.62 inches (20-pounder), and his siege-gun of 4.2 (30-pounder), Captain Parrott has constructed sea-coast and ship-guns of 6.4 inches (100-pounder), 8 inches (200-pounder), and 10 inches (300-pounder). His mode of rifling is the increasing or gaining twist. The Parrott gun is serviceable, of considerable endurance, and, when Parrott projectiles are used, of most excellent accuracy. The 10-pounder, 30-pounder, and 100-pounder seem to give better results than the other calibres. Fig. 8 shows the Parrott 200-pounder.

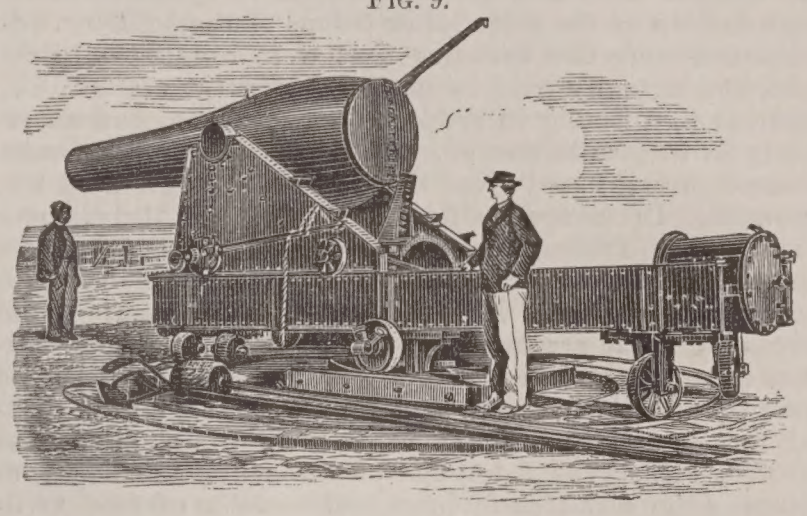
Fig. 8.



The method of Admiral Dahlgren of the U. S. navy has been illustrated only in guns for naval uses. His guns are of cast iron cast solid, and cooled from the exterior; they are of great thickness at the breech and as far forward as the trunnions, and from thence to the muzzle rapidly diminishing in thickness, so that their external configuration is not unlike that of a champagne-bottle. Dahlgren guns are chiefly of 9-inch and 11-inch calibre, and are adapted exclusively for hollow projectiles. A 10-inch Dahlgren gun for firing solid shot has, however, been put in service. The 15-inch and 20-inch naval guns, although they have in great degree the exterior form of the Dahlgren, are cast hollow, cooled from the inside, and have the elliptical bottom of the bore, which are characteristic features of the Rodman plan. The 9-inch, 10-inch, and 11-inch Dahlgren guns have the bottom of bore in the conical form of what is known as "the Gomer chamber."

The guns of Gen. Rodman of the U. S. ordnance corps are all of cast iron, and are cast hollow and cooled from the inside, the exterior being meantime kept from rapid cooling by fires built around the gun in the casting-pit. Rodman guns are further distinguished by great thickness of metal at the breech, by graceful curves of their exterior lines, by the absence of all exterior ornamentations, sharp angles, or edges, and of the cascable and swell of the muzzle, and by having the trunnions at the centre of gravity, thus doing away with preponderance and greatly facilitating the service of the gun. Rodman guns are both smooth-bore and rifled. The calibres of the smooth-bore guns are 8 inches, 10 inches, 13 inches, 15 inches, and 20 inches, and of the rifle, 8 inches (corresponding exteriorly to 10-inch s.-b), 10 inches (to 13-inch s.-b.), and 12 inches (to 15-inch s.-b.), three dimensions of carriage thus answering for six guns. All Rodman guns are adapted to the use of solid as well as hollow projectiles. The 15-inch Rodman gun weighs 25 tons, the solid shot 450 pounds, and the powder-charge 100 pounds mammoth powder. The 20-inch Rodman weighs 58 tons, its solid shot 1060 pounds, and its powder-charge 180 pounds mammoth powder. Fig. 9 shows the Rodman 15-inch gun.

Fig. 9.



In the U. S., in 1856, the systems of artillery in use for the land service were as follows:

Field Artillery.—6-pounder and 12-pounder guns and 12, 24, 32-pounder howitzers—six different pieces of ordnance, and seven different kinds of carriages; the 12-pounder howitzer mounting on three different kinds of carriage.

Siege Artillery.—12-pounder, 18-pounder, and 24-pounder guns; 8-inch howitzer; and coehorn, 8-inch and 10-inch mortars—six different pieces of ordnance, and as many different carriages.

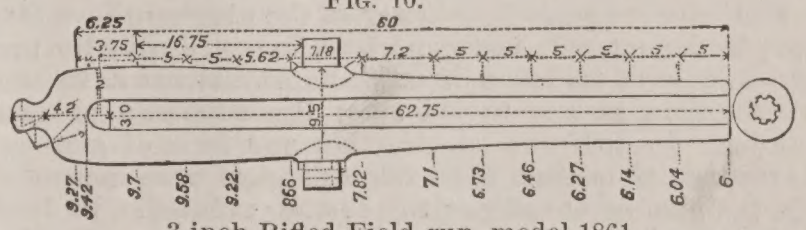
Sea-Coast Artillery.—24-pounder, 32-pounder, and 42-pounder guns; 8-inch and 10-inch columbiads; and 10-inch and 12-inch mortars—seven different pieces of ordnance, and as many different carriages.

All of the various carriages were of wood.

The system of artillery for the land service in use in the U. S. in 1873 are as follows:

Field Artillery.—3-inch rifle and 12-pounder smooth-bore—two guns and two carriages. Fig. 10 is the 3-inch rifle, model of 1861, and at present in use.

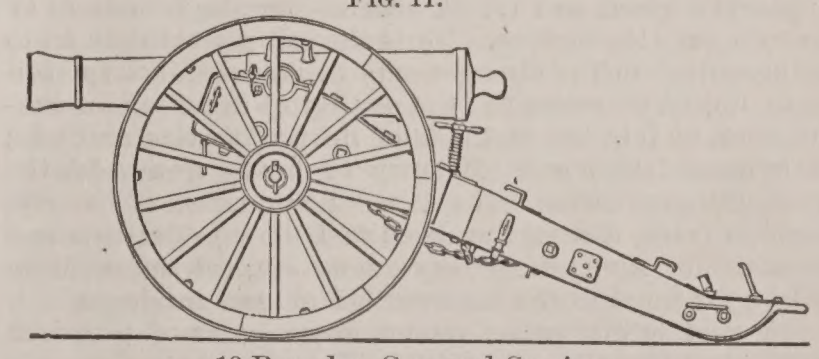
Fig. 10.



3-inch Rifled Field-gun, model 1861.

Fig. 11 shows the 12-pounder smooth-bore on its carriage.

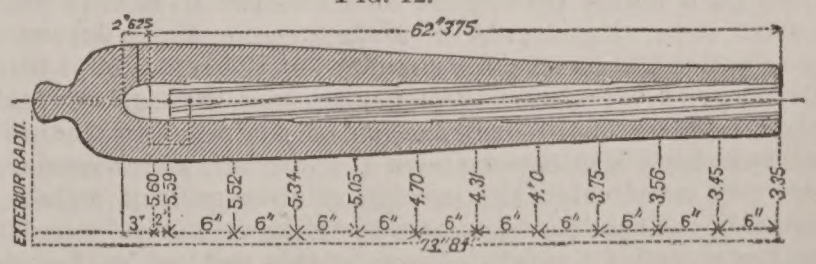
Fig. 11.



12-Pounder, Gun and Carriage.

The 3-inch rifle (Fig. 10) is soon to be superseded by a

Fig. 12.



new 3½-inch (Rodman) rifle, model of 1870, shown in Fig. 12. This is to be mounted on the same carriage as the 12-

pounder smooth-bore (Fig. 11), the weight being about the same.

Siege Artillery.—4½-inch rifle, 8-inch howitzer; 8-inch, 10-inch, and coehorn mortars—five pieces of ordnance and five carriages.

Sea-Coast Artillery.—10-inch, 13-inch, 15-inch, and 20-inch smooth-bore guns; 8-inch, 10-inch, and 12-inch rifle guns; 10-inch, 13-inch, and 15-inch mortars—ten different pieces of ordnance and seven carriages, the 10-inch smooth-bore and 8-inch rifle, the 13-inch smooth-bore and 10-inch rifle, and the 15-inch smooth-bore and 12-inch rifle, having respectively the same exterior dimensions and mounting on the same carriage.

All of the sea-coast ordnance and the mortars of the siege system have wrought-iron carriages.

For two centuries after the invention of cannon no attempts appear to have been made to classify or arrange the various sizes and descriptions, or to systematize the organization of the material or troops of the artillery. So numerous were the varieties that were brought into the field, and actually used in battle, that great confusion in manœuvre, difficulty in supply of ammunition, and uncertainty as to results ensued. These disadvantages finally became so many and great that reform of some kind was essential. In the first half of the sixteenth century, under Francis I. of France, this confusion was reduced to some sort of system, and about the middle of the same century, under Henry II. of France, greater simplification and more systematic arrangement were introduced. The varieties of guns were reduced to six in all. It was not until more than a century and a half afterwards that any radical and permanent classification and organization was effected. Gustavus Adolphus of Sweden made improvements in the direction of increased *mobility* of field artillery, and the genius of Frederick the Great of Prussia aided materially in the same direction, particularly by the introduction of horse artillery. Napoleon Bonaparte also, in his day, instituted many advantageous changes in the organization, mobility, and use of artillery. Early in the eighteenth century the French general of artillery, De la Vallière, reduced the number of calibres to five, and improved the construction and reduced the number of gun-carriages. Soon after the middle of this century, or about 1765, the French general of artillery, De Gribeauval, effected more extensive and advantageous reforms. He separated the field system from the siege, reduced the charges of powder, and diminished the weight of field artillery; introduced iron axletrees, cartridges, elevating screws, tangent scales, perfect uniformity in carriage construction, and improved the draught of artillery when upon the road by increasing the diameter of the wheels, altering the position of the siege-gun on its carriage, and the manner of attaching the horses to all guns. These reforms were great, and were so excellent as to ensure the permanency of many of them as the basis of the system of the present day.

The improvements in artillery of the nineteenth century have been numerous and important, in fact, during the first two decades of its last half these improvements have been greater than at any period since the discovery of gunpowder. In 1827 the construction and form of gun-carriages were simplified, the models of guns were improved, and the number of calibres still further reduced. In 1850, Louis Napoleon, afterwards emperor of France, simplified the field-artillery system by the invention of a gun-howitzer, a 12-pounder, which took the place of the 8, 9, and 12-pounder guns, and 12, 24, and 32-pounder howitzers of the then existing system. Since the last-named date up to the present the chief changes may be stated in brief as follows: 1st, improvement in the quality of iron for gun-construction, and in the methods of its preparation and use; 2d, increased size and efficiency of heavy guns; 3d, the successful application and general introduction of the rifle principle; 4th, more general use of hollow projectiles, and especially of shells for heavy guns; 5th, the substitution of iron for wood in the construction of gun-carriages.

The greatly increasing size of heavy guns of cast iron involved many mechanical difficulties of construction, and finally exceeded the limits of the possibility of perfect castings. As early as 1844–45, Captain (afterwards General) Rodman, a highly intelligent officer of the U. S. ordnance corps, instituted a series of scientific investigations, followed by experiments, having for their object the removal of this difficulty. These investigations, pursued through several years, resulted in the introduction of Rodman's system of hollow casting and cooling from the interior, which renders perfectly practicable the casting of iron guns of reliable endurance of the largest necessary calibre. Perfect success having attended the fabrication, by this method, of 8-inch and 10-inch guns, Rodman suggested the casting of a 15-inch gun, which was successfully accomplished in 1860, and was followed by the subsequent fabrication of several hundred others. A 20-inch gun was next projected by Rodman, and the first one was successfully cast in 1863. Rifle guns of large calibre have also been cast by the same method, but, whether caused by imperfect form or construction of the projectile, or for other reasons, those of the largest calibre (12 inches) have not possessed sufficient endurance to resist the immense strains to which such guns are subjected. The further fabrication of such cannon has therefore been suspended in the U. S.

Many changes, looking to the substitution of some other explosive compound for gunpowder, have been projected from time to time, but, although about ten years ago gun-cotton promised to afford the advantages sought after, its use, at no time extending beyond Austria, was soon found inexpedient, and was discontinued. Gun-cotton, nitro-glycerine, and its various compounds, dualin, dynamite, lithofracteur, etc., while they are excellent for mining, blasting, or ordinary explosive purposes, are found to be too quick and powerful for use in firearms, either small or great. A wide range of experiment, however, has shown that gunpowder can be greatly improved by greater care in the selection and manipulation of its ingredients, and by increased uniformity in the form and size of its grains. Experiment has further demonstrated that it is essential to vary the size of the grain for different calibres of cannon; that is to say, a large-grained (or slower-burning) gunpowder is more advantageous for the larger cannon, since it gives increased initial velocity with decreased pressure on the walls of the gun. This has resulted in the classification of gunpowder in the U. S. service into five kinds: 1, *rifle powder,* for pistols and carbines; 2, *musket,* for rifled muskets; 3, *mortar,* for field and siege-guns and mortars; 4, *cannon,* for the smaller calibres of sea-coast guns; 5, *mammoth,* for 15-inch and larger guns.

Within the last few years the improvements in the manufacture of mammoth powder have been so marked that with charges of similar weights the initial velocity of a 15-inch projectile has been increased from 1300 or 1400 feet per second, with a pressure of 40,000 to 60,000 pounds per square inch, to 1800 feet per second, with a pressure of less than 30,000 pounds per square inch. As the work done by the impact of a projectile is in direct proportion to the square of its velocity, it is obvious how great are the advantages which have thus been obtained.

The condition of artillery throughout the civilized world is at the present time in a great degree tentative or experimental—probably more so than at any time since gunpowder was discovered. The proper proportion of artillery to other arms, of the various classes and calibres to one another, and of the different kinds or varieties of projectiles most suitable for use, are all at present unsolved problems.

In the organization of armies for the field the proportion of artillery to the other arms has at various periods of the world's history varied between the limits of one gun per 1000 infantry to six per 1000. Too great a proportion of artillery may give confidence to raw and inexperienced troops, but it encumbers an army with an unwieldy train, and thus impairs its mobility. Too small a proportion weakens the army's efficiency for many defensive as well as offensive operations, and renders some military operations exceedingly difficult, if not altogether impracticable. The topographical features of the theatre of war, and the peculiarities of the enemy's organization, exercise a material influence in the problem.

In the war in the Crimea (England, France, Sardinia, and Turkey against Russia) the proportion of artillery was rather less than three guns per 1000 infantry and one per 1000 cavalry. In the Italian campaign (France and Sardinia against Austria) the proportion was rather more, say three and a quarter to three and a half guns per 1000 infantry. In the seven weeks' war (Prussia against Austria, Saxony, and Bavaria) the proportion was about the same, with perhaps a slight excess on the part of Austria. In the Franco-Prussian war of 1870–71 the proportion was three guns per 1000 infantry on the part of the French, and about four per 1000 on the part of the Germans.

In our recent civil war (1861–65) the proportion was fixed at the outset at three guns per 1000 infantry, and two per 1000 cavalry, with the intention of reducing the former to two guns as the infantry became more experienced and staunch. During the last year of the war the proportion was reduced in the armies commanded by General Sherman to about one and a half guns per 1000 infantry and one gun per 1000 cavalry, in order that the mobility of the armies for the extraordinarily long and rapid marches they had to make might be increased. Under the circumstances this proportion was found to be quite sufficient. These circumstances were exceptional and abnormal, and perhaps unlikely to occur again. It is therefore not considered to be advantageous to reduce the proportion

of artillery below two and a half to three pieces per 1000 infantry, unless the topographical features of the theatre of war are mountainous or densely wooded.

The organization of the artillery of the armies of the U. S. during the civil war was designed and executed by the writer. Peculiar circumstances compelled this organization to be somewhat hastily decided upon and adopted. It therefore unavoidably included at the outset a variety of unsuitable calibres, but as soon as better and more uniform material could be fabricated and placed in the hands of the artillery troops this temporary anomaly ceased, and but two calibres of field-guns were kept in the service—the 3-inch rifle and the light 12-pounder smooth-bore, and in the proportion of one of the former to two of the latter. The generally wooded character of the theatre of war neutralized in a great degree the advantages of rifled guns, and rendered this proportion the most desirable. For siege purposes the ordnance used were 4.2-inch and 4.5-inch rifled guns, 8-inch howitzers, and 8-inch and 10-inch mortars. At the siege of Yorktown, where unusual facilities of water-transportation greatly favored their use, 100-pounder and 200-pounder rifle guns and 10-inch and 12-inch sea-coast mortars were put in battery. For guns of position in permanent field-works and fortified intrenched lines, such as the defences of Washington, 24 and 32-pounders of the sea-coast smooth-bore system were extensively employed, these guns having been found on hand at the Washington Arsenal.

The whole number of field-guns which were equipped and took the field with the various armies of the U. S. during the civil war was about 1500, and they were transported or accompanied by 40,000 horses, and served by about 48,000 men.

The number of guns of position in use in the various field-works or intrenched lines during the same war was about 1200, and they were served by about 22,000 men. In the defences of Washington alone the number of implacements for cannon were 1500, and there were actually mounted and in position 807 guns and 98 mortars, which were served by 18,500 men. These defences, thrown up by the engineers under the direction of General Barnard, were the most extensive known in history, exceeding even the famous lines of Torres Vedras designed by Wellington for the defence of the British army in Spain. They were 37 miles in circuit, consisted of 68 separate forts (whose aggregate perimeter was 13 miles) and 93 batteries, the whole connected by 20 miles of rifle-trenches. More than 30 miles of road practicable for artillery were constructed concentric with the interior of this extensive line. The armament of these defences was served by 18,500 skilled artillerymen, for whose organization, instruction, and progress especial care was taken by the writer when chief of artillery. Every foot of the approaches to these works was cleared of obstructions, and was directed in orders to be so carefully scrutinized and studied by the artillerymen of the various forts that the elevation of the guns and the length of fuse for the hollow projectiles were ascertained by actual experiment for every part of them. There were no finer and better instructed troops in the world than the heavy artillery regiments which garrisoned the defences of Washington during the year 1863 and a portion of the years 1862 and 1864.

The personnel of the field artillery of the armies of the U. S. during the great war alluded to was composed in great part of volunteers, but, though raw and uninstructed at first, such was the zeal and intelligence of officers and enlisted men that most of them finally became as well instructed, as rapid in their movements, as accurate in their fire, and as steady in their courage, as veteran regular troops. The horse-artillery portion of the field artillery was, with only three exceptions, composed entirely of batteries of the regular army. They were of course attached to the cavalry, opened and maintained the action for them in regular fields of battle, accompanied that body even on those rapid and sometimes remote "cavalry raids" upon the enemy's communications and completely around his rear which constituted so extraordinary a feature in the late civil war. The services of this body of artillery could not possibly be excelled in brilliancy and *élan*.

The *troops* of the artillery in the regular army of the U. S. are at present (1873) organized in regiments, the details of which are as follows: Five regiments, each consisting of 1 colonel, 1 lieutenant-colonel, 3 majors, 1 adjutant, 1 quartermaster, 1 sergeant-major, 1 quartermaster-sergeant, 2 principal musicians, and 12 batteries. Each battery consists of 1 captain, 2 first lieutenants, 2 second lieutenants, and 150 enlisted men (sergeants, corporals, artificers, musicians, and privates). In time of peace the President is authorized to reduce the battery organization to 1 captain, 1 first lieutenant, 1 second lieutenant, and 60 privates. The law requires that one battery in each regiment *shall be* "mounted"—*i. e.* equipped with guns, horses, etc.—and gives the President discretion to mount as many of the others as the exigency of the public service may seem to him to demand. For the purpose of diffusing throughout the regiment instruction in light artillery the orders of the war department require that each lieutenant shall serve a tour of two years in the mounted battery. When not thus mounted the remaining batteries of artillery serve as heavy or garrison artillery in the sea-coast fortifications.

The personal armament of an artilleryman of the mounted batteries, whether field or siege, is a pistol and sabre for the sergeants, trumpeters, and drivers, and a sabre only for each cannoneer. The personal armament of the artilleryman of the heavy or garrison batteries, which serve in the sea-coast fortifications, is the rifle-musket and other equipment of the infantry soldier.

The organization, as regards matériel, of a mounted battery of the U. S. field artillery, when on a war-footing, is 6 guns, 6 caissons, 1 battery-wagon, 1 travelling forge, and 112 horses; and when on a peace footing it is 6 guns, 6 caissons, and 80 horses, or sometimes 4 guns, 4 caissons, and 60 horses. Guns of different calibres or descriptions are never assembled in the same battery; and in times of war field-batteries are attached to divisions (sometimes to corps d'armée), and not to brigades. The equipment of ammunition of a field-battery for active service in war is 400 rounds per gun, of which 200 rounds are carried with each rifle-gun (3-inch) and its caisson, or 128 rounds with each 12-pound gun (smooth-bore) and its caisson; the remainder being carried in the ordinary army transport-wagon, but accompanying the battery and under the exclusive control of its captain.

The organization of a siege-battery in the U. S. service is 4 guns, 1 battery wagon, 1 travelling forge, and 60 horses. The amount of ammunition which accompanies the siege-battery is 250 rounds per gun, and it is transported in the ordinary army transport-wagon.

WILLIAM F. BARRY, U. S. A.

Artillery, Schools of. Special schools for instruction in artillery have for many years been organized and maintained by the various nations of the civilized world as a component part of their military establishment. As early as A. D. 1515 such a school was organized by the Venetians. A few years later, Charles V. established a school of artillery in Spain, and another in Sicily. Towards the end of the next century (1675) a school for *practical* instruction in artillery was established by Louis XIV. of France at Douai, and a few years later instruction in the *theory* of the science was added to its course. About the same time an artillery school was organized in Saxony, and some years subsequently by the other nations of Germany. In Sweden, Austria, and Russia such schools were in existence before the close of the seventeenth century. About the middle of the eighteenth century the artillery school at Woolwich was established in England.

In some nations the school is a joint one for artillerists and engineers, but this is exceptional, the general rule being to keep the instruction of these two scientific corps separate and distinct. In the U. S. an artillery school for practice was established at Fort Monroe, Va., in 1823, and it continued in existence for about six years, and as a *practical* school solely, when the exigencies of the military service (due chiefly to Indian wars) caused its discontinuance. This school was commanded successively by Col. Fenwick and Lieut.-Col. Eustis. In May, 1858, a school for practical and theoretical instruction was organized at the same place, under the command of Lieut-Col. Harvey Brown, who in less than two years was succeeded by Lieut.-Col. Dimmick. This school languished after the first year and a half of its existence, and was finally brought to an end in 1861 by the great civil war. In Nov., 1867, an artillery school for theoretical as well as practical instruction was again established at Fort Monroe, and has since continued uninterruptedly up to the present date (1873). This school was organized under the command of Brevet Maj.-Gen. Barry, who still remains at the head of its direction.

The general course of instruction at all artillery schools is divided into the *practical* and *theoretical*. The theoretical comprises mathematics, military surveying, as much of physical science as is essential for the artilleryman, military engineering, military history, etc. etc.; and in the practical is included the drill and service of, and target practice with, all kinds of ordnance, the laying out and construction of batteries, and the duties of the artillery laboratory. In some schools of artillery the instruction only of the commissioned officers of that arm is the object, while in others instruction is extended to the non-commissioned officers and other enlisted men. In the artillery school of the U. S. army the instruction is theoretical and practical, and is designed for the benefit of enlisted men of all ranks, as

well as for commissioned officers. This school is commanded by a colonel of artillery, assisted by a lieutenant-colonel (who superintends the theoretical instruction) and a major (who superintends the practical instruction). The scholastic affairs of the institution are supervised by a staff composed of the commandant, the two other field-officers, and the ordnance-officer who commands the arsenal at Fort Monroe. The adjutant of the school is the secretary of the staff. Each of the five regiments of artillery in the army of the U. S. has one foot-battery and its captain stationed at the school. Upon each of these five captains are devolved the duties of instructor. From each regiment of artillery two first lieutenants and two second lieutenants are annually sent to the school for instruction. The course of instruction extends over one year, and is conducted on a similar plan to that at the Military Academy at West Point. There are two examinations in each year for the officers, and one for the enlisted men. The first, during the last week in August, is for the officers, and is in mathematics only; the second, commencing April 1, is for officers and enlisted men, continues about twenty days, and covers the entire ground of the theoretical and practical course of instruction. Those who pass the examination successfully are awarded an engraved certificate, signed by the members of the staff, setting forth that fact.

The practical instruction comprises the drill-service and mechanical manœuvres of, and ample target practice with, every kind of ordnance used in the military service of the U. S.; the laying of platforms; the laying out and construction of field-works or intrenched lines for artillery; the embarkation, disembarkation, and transportation of heavy ordnance, carriages, and artillery machines; the practical use of all known artillery machines; the estimation of distances and their determination by plane-table and portable telemeters; and the duties of the military laboratory as far as they concern the artillerist. The theoretical instruction includes mathematics, military surveying, astronomy, ordnance and gunnery, military history, the preparation and public delivery of written essays on military campaigns or biography, constitutional, international, and military law, and the theory and use of surveying, astronomical, and ballistic instruments and apparatus.

The school term commences on the 1st of May, annually. All reports from the school are made direct to the general of the army. Twenty lieutenants and from thirty to forty non-commissioned officers pass through the school annually.

WILLIAM F. BARRY, U. S. A.

Artiodac'tyla [from the Gr. ἄρτιος, "entire," "even," and δάκτυλος, a "finger" or "toe"], the term applied to an order of hoofed Mammalia having toes in even number, as two or four, and having a subdivided or complex stomach, and a moderate-sized simple cæcum. To this order all those animals belong which are chiefly used for human food, and which have been domesticated from a period before the historical epoch.

Artocarpa'ceæ [from the Gr. ἄρτος, "bread," and καρπός, "fruit"], a natural order of exogenous plants, of which the *Artocar'pus inci'sa*, or bread-fruit, is the type; it is regarded by some botanists as a sub-order of Urticaceæ. This order comprises more than fifty species, nearly all natives of tropical countries. The milky juice of some yields CAOUTCHOUC (which see), and that of the cow tree (*Brosimum*) is a rich and wholesome food, like cow's milk. With these is associated the virulent poisonous upas tree (*Antiaris toxicaria*). The seeds of this order are all innocuous, and those of the *Musanga* of Western Africa are esculent. The fruit is often a *sorosis*, a single succulent fruit formed of the aggregated germens of a whole spike of flowers, as in the case of the bread-fruit.

Artois (anc. *Atreba'tes*), a former province of France, bordering on Flanders, is included in the department of Pas-de-Calais. The capital of Artois was Arras. Artesian wells derive their name from Artois (in Latin *Arte'sia*). Charles X. of France before his accession was styled count of Artois.

Arts, Degrees in. The term arts (in Latin *artes*) or liberal arts (*ar'tes libera'les*), as applied to certain studies, was derived from the ancient Romans; and as early as the ninth century was used in the schools of Paris, which probably received it from Martianus Capella, and on the establishment of universities the term "faculty of arts" denoted instructors in science and philosophy, as distinguished from the faculties of theology, medicine, and law. The number of arts was seven: grammar, logic, rhetoric (the *Trivium*), music, arithmetic, geometry, and astronomy (the *Quadrivium*). The terms master and doctor were applied synonymously to persons teaching by authority from the universities. In process of time the first was restricted to the liberal arts, the other to divinity, law, and medicine. Music, however, had its doctorate, as well as philosophy and letters. When regulations were established to prevent unqualified persons from teaching, and an initiatory discipline was prescribed, these terms were called *gradus*, "steps" or "degrees." The passing of the initiatory stage, first instituted by Gregory IX. (1227–41), conferred the title of bachelor, and an additional course was necessary to obtaining that of master. Later, the doctorate became, in some countries, the third or highest degree. The titles of master and doctor implied the duty of publicly teaching some of the branches included in the "arts"—a custom still retained, to some extent, in the German universities, but in other countries the titles are simply honorary, or at most indicate the passage of certain examinations. The doctorate in medicine, and in some countries that of law, are exceptions to this rule. (See DOCTOR.)

Art-Union [Ger. *Kunst'verein*], an institution for the promotion of a liberal patronage of the fine arts; a society formed to encourage the fine arts by the purchase of pictures with a common fund raised by subscription. The works they purchase are sometimes distributed by lot or lottery. Art-unions originated in France about 1812, and were introduced in 1823 into Germany, where they produced probably greater results than in any other country. The Düsseldorf Art-Union, formed in 1829, has given a powerful impulse to the fine arts, and has promoted the execution of monumental works of art of the highest class. In the course of twenty years it expended on works of art 268,000 thalers. These institutions were introduced into Great Britain in 1834, the first being formed in Edinburgh. The London Art-Union was organized in 1837, and was very successful. The oldest of these societies in the U. S. was the American Art-Union, founded at New York in 1839. It had, in 1849, 18,960 members, and an income of about $96,000. This society was discontinued because the lottery business was illegal in that State. It is usual to give an engraving to each of those who draw blanks in the lottery.

A'rum [Lat. *a'rum*; Gr. ἄρον], a genus of endogenous herbaceous plants of the order ARACEÆ (which see). This genus has a convolute spathe, the spadix naked at the point. In some of its species a stench like that of carrion is produced during flowering, and in some a remarkable degree of heat. The flower of *Arum cordifolium* has a temperature of 121° F. when the air is only 66°. The *Arum maculatum* (wake-robin) is a native of England, has arrow-shaped leaves, often spotted, and a tuberous, poisonous root, which is a drastic cathartic too violent to be taken in a fresh state. A nourishing farina called Portland arrow-root is prepared from the root after the acrid juice is removed. The *Arum Indicum* is cultivated in Bengal for its stems and tubers, which are eatable. The *Arum triphyllum* of Linnæus (which recent botanists call *Arisæma triphyllum*), or Indian turnip, is a native of the U. S. The tubers of this plant have medicinal properties like those of *Arum maculatum*, and yield a pure white starch.

Ar'un, a river of England, in the county of Sussex, enters the English Channel at Little Hampton, after a course of 35 miles. It is connected by a canal with the Wey.

Ar'undel, a small market-town of England, in Sussex, on the Arun, 5 miles from the sea and 50 miles S. S. W. of London. It is on the south side of the South Downs. Here, on the summit of a hill, is a magnificent castle which was built soon after the Norman Conquest, and is the residence of the dukes of Norfolk. Arundel returns one member to Parliament. Pop. in 1871, 2956.

Ar'undel (or **Arunde'lian**) **Mar'bles,** a collection of ancient Greek sculptures purchased in Smyrna and elsewhere, chiefly by Sir William Petty, for Thomas, earl of Arundel. They were sent to England in 1627, and presented in 1667 to the University of Oxford by his grandson, Henry Howard, afterwards duke of Norfolk. They consist principally of fragments of the "Parian Chronicle," supposed to have been executed in the island of Paros about 263 B. C. This Chronicle, inscribed on marble, contained (when perfect) a table of the principal events in Grecian history, from the times of Cecrops (1582 B. C.) to the archonship of Diognetus, 264 B. C. The inscription for the last ninety years is lost.

Arus'pices, or **Harus'pices** [probably from *haru* (=*hira*, "entrails"), and *specio*, to "see" or "examine"], were Roman soothsayers, who foretold future events from the inspection of the entrails of the victims offered at the altars of the gods. Their art, as perhaps that of the augurs, was brought from Etruria.

Ar'va, a county of Hungary, is bounded on the N. and E. by Galicia, on the S. by Liptau, and on the W. by Trencsin and Galicia. Area, 802 square miles. It consists entirely of a high mountain-valley, sterile, but beautiful in its grandeur. The chief article of export is lumber. Pop. in 1869, 82,364.

Arvic'ola [from the Lat. *ar'vum*, a "field," and *co'lo*, to "inhabit"], a genus of small animals of the order Rodentia, allied to the rat and mouse. They are distinguished by the prismatic form and fangless structure of the molar teeth. The *Arvicola agrestis* (field campagnol) and the *Arvicola riparia* (bank campagnol) are natives of England. The U. S. have more than twenty species, called field-mice.

Arvieux, d' (Laurent), Chevalier, a French traveller and Orientalist, born at Marseilles in 1635. He negotiated a treaty with the dey of Tunis in 1668, and was consul at Aleppo from 1679 to 1686. He wrote a "Treatise on the Manners and Customs of the Arabs" (1717). From his papers Labat compiled "Memoirs of Chevalier d'Arvieux, containing his travels in Asia" (6 vols., 1735). His works are commended by Niebuhr. Died in 1702.

Arx (gen. **Ar'cis**), a Latin name given to the citadel of an ancient city. The arx was a fortified eminence or rock, either within the walls or close to the city, and sometimes bore a particular name, as the Cadmea of Thebes, the Acrocorinthus of Corinth, the Acropolis or Cecropia of Athens. The arx of Rome was part of the Capitoline Hill.

A'rya, or **Ar'yan.** *Arya*, a Sanscrit word, signifying "respectable," "honorable," was applied to the Sanscrit-speaking people of India, whose ancestors came across the river Indus from Central Asia probably between 1600 and 2000 years before the Christian era. The three higher castes of the Hindoos are comprehended under the general term of Arya; the lowest of the four principal castes (the Sudras) belonging to the races whom the Aryas had conquered. *Arya* is supposed to have originally signified "agriculturist," at a time when the most respectable portion of the people of that part of Asia were engaged in cultivating the earth, raising herds of cattle, flocks of sheep, etc., whence it came to signify "respectable." The Aryas were of the same race as the ancient Persians, and it is said that even so late as the reign of Darius Hystaspes the Persians could converse with the light-complexioned Hindoos without the aid of an interpreter. Prof. Bopp of Berlin, in his "Comparative Grammar," has shown that many of the languages of Europe are closely related to the Sanscrit; or, to adopt the words of the late Prof. Wilson of Oxford, "He may be considered to have established, beyond reasonable question, a near relationship between the languages of nations separated by the intervention of centuries and the distance of half the globe, by differences of physical formation and social institutions—between the forms of speech current among the dark-complexioned natives of India and the fair-skinned races of ancient and modern Europe; a relationship of which no suspicion existed fifty years ago, and which has been satisfactorily established only within a recent period." (See Preface to the translation of Bopp's "Comparative Grammar," London, 1845.) All those nations whose relationship has been proved "beyond reasonable question" by a careful comparison of their languages, are designated as the Indo-European (or, less correctly, the Indo-Germanic) family of nations. Their ancestors, we have every reason to believe on purely scientific grounds, were originally one people, and therefore Aryan, as a convenient general term to denote the race, has been applied not merely to the ancestors of the modern Hindoos, and to their nearest of kin, the ancient Persians, but to the whole of this extensive family, whose forefathers, there is reason to believe, once inhabited Central Asia, whence they migrated in search of fresh pastures and more room, some going south-eastward to India, some northward or north-westward to Russia, and others westward to Asia Minor, thence to Southern and Central Europe. J. Thomas.

Ar'zachel, a Jewish astronomer, who was born in Spain, and lived about 1050–1100. He ascertained the obliquity of the ecliptic, and prepared astronomical tables, called "Toledo Tables."

As (gen. **As'sis**), a Roman weight, also called **Libra,** was nearly equal to the modern pound. It was divided into twelve unciæ, "ounces," and was equal to 10 ounces 18 pennyweights $13\frac{5}{7}$ grains Troy. *As* was also the name of a brass Roman coin which originally weighed a pound, but in consequence of the increase of the value of metal compared with that of food and other commodities, it was gradually reduced to half an ounce. During the second Punic war the value of the *as* was about two farthings, but its weight and the prices of articles in Rome were so variable that its value cannot be accurately fixed. (See Sestertius.)

A'sa Dul'cis (*i. e.* "sweet asa"), a drug highly prized by the ancients as an antispasmodic and diuretic. It was considered to be worth its weight in gold, and was obtained from a plant of the genus *Thapsia*, a native of Barbary and Southern Europe.

Asafœtida. See Assafœtida.

Asagræ'a (named in honor of Asa Gray, the botanist), a Mexican plant which has bulbous stems, linear, grass-like leaves, and spikes of whitish flowers. The *Asagræa officinalis*, which is said to be the only species of this genus, produces the cebadilla-seeds from which the poison veratria is prepared.

Asan'der [Gr. Ἀσανδρος], a Macedonian general, a brother of Parmenio, was appointed governor of Lydia by Alexander the Great in 334 B. C. After the death of that king he was satrap of Caria, an ally of Ptolemy, and an enemy of Antigonus, against whom he waged war about 314 B. C.

A'saph, a Hebrew musician who lived in the reign of David. He was a Levite, and was chorister in the musical services which David organized in connection with religious worship. He wrote several of the Psalms of the Bible.

Asarabac'ca (*As'arum Europæ'um*), an herbaceous plant of the natural order Aristolochiaceæ, having kidney-shaped leaves, is a native of Europe. The roots and leaves are stimulant, purgative, and emetic, and contain a bitter principle or crystalline substance called *asarin*.

As'arum [Gr. ἄσαρον], a genus of herbaceous plants of the natural order Aristolochiaceæ, is distinguished by 12-horned stamens, distinct from each other and from the style, and by a bell-shaped, 3-lobed perianth. The *Asarum Canadense*, a native of North America, called wild ginger, is a stimulant and diaphoretic. Two other species grow in the Atlantic States.

As'ben, called also **A'ir,** a country of Central Africa, situated between about 15° and 20° N. lat., and 6° and 11° E. lon., borders on the Desert of Sahara. It includes a large tract of desert, and some fertile land which produces dates. The climate is hot and dry. Capital, Agades.

Asbes'tos, or **Asbestus** [from the Gr. ἄσβεστος, "indestructible"], a fibrous mineral composed of fine, flexible, and easily separable filaments of a silky lustre. It is a variety of actinolite and tremolite, and consists chiefly of silica, magnesia, and lime, or pyroxene. The fibres of a very silky variety of asbestos are called amianthus. Asbestos may be woven into cloth which is incombustible, and if soiled may be cleansed by fire. The ancients wrapped the bodies of the dead in such cloth, in order that when they were burned on the funeral pyre their ashes might be kept separate. It was also used for the wicks of the lamps in the temples. Mountain cork and mountain leather are varieties of asbestos. It is now employed as a material for roofing, boiler-felting, etc. Asbestos is abundant in Corsica, Savoy, and the Tyrol.

As'boline, a nitrogenous substance contained in soot.

As'both (Alexander Sandor), a Hungarian officer, born Dec. 18, 1811, fought in the revolution of 1848, and in 1851 visited the U. S. He entered the Union army on the breaking out of the war in 1861, distinguished himself in various engagements, and was made a major-general in 1864. He was minister to the Argentine Republic in 1866, and died at Buenos Ayres Jan. 21, 1868, from the effects of wounds received in battle.

As'bury (Francis), born at Handsworth, Staffordshire, England, Aug. 20, 1745, of Methodist parents, was converted at the age of thirteen, became a local preacher at sixteen, an itinerant under Wesley at twenty-two, came to America in 1771 as missionary; in 1772 became Wesley's "general assistant" in America. During the Revolutionary war, though extremely prudent, he was the object of much annoying suspicion from the fact that he had scruples against taking the oath of allegiance. In 1784 he was elected bishop of the new Methodist Episcopal Church, and was consecrated by Bishop Coke. His labors and success in establishing his Church (chiefly in fields where churches were almost unknown) are among the most remarkable of which history bears record. Died in Spottsylvania, Va., Mar. 21, 1816.

As'calon (Ἀσκάλων of the Greeks), called *Ash'kelon* in the Bible, one of the five capital cities of the Philistines, a former seaport of Palestine, 14 miles N. of Gaza, 12 S. by W. of Ashdod or Azotus, and 42 W. S. W. of Jerusalem. It was anciently a place of much importance, and was especially so in the time of the Crusades, when its small and insecure harbor was filled with stones by the sultan Bibars, A. D. 1270. It is now a small village called *Asculan*, and has extensive ruins.

As'caris [Gr. ἀσκαρίς], (plu. **Ascar'ides**), a genus of intestinal parasites, of which the most common is the round-worm, *Ascaris lumbricoides*, found in the intestines of man. Children frequently have them, principally in the small intestines. The body of this worm is round, elastic, with a smooth surface, of a whitish or yellowish color; it

tapers especially towards the anterior extremity, which commences abruptly by three tubercles which surround the mouth. The body is transversely furrowed with numerous fine lines, and marked also with four lines from head to tail. In the female there is usually a constriction of the body at the distance of about one-third of its length from the mouth. Sometimes, especially in young and weakly children, their accumulation may cause serious disturbance; even convulsions may be thus produced. There are no symptoms (apart from the passage of the worms from the bowels) invariably connected with their presence. Itching of the nose, capricious appetite, swelling of the abdomen, and grinding the teeth when asleep, may all occur, but they may also be produced by other causes. *Ascaris vermicularis* is the small white thread-worm or seat-worm, which, although called *ἀσκαρίς* by Hippocrates, is by most recent writers called *Oxyuris vermicularis*. Its length is from two-twelfths to five-twelfths of an inch, the female being larger than the male. The head is blunt, widening on each side; the body tapers (at least in the female) to a point. Seat-worms, by the itching they produce, often distress children very much; they are less freqently met with in adults. (For *treatment* of worms, see ANTHELMINTICS.)

Ascawa'na Lake, a beautiful sheet of water, 2 miles long and 1 mile wide, in Putnam Valley township, Putnam co., N. Y. It is a place of summer resort.

Ascen'sion, an island in the Atlantic Ocean, 800 miles N. W. of St. Helena, belongs to Great Britain. It is 10 miles long and 6 miles wide. It is volcanic and mountainous, one peak rising to the height of 2870 feet. It has a fort in lat. 7° 55′ 55″ S. and lon. 14° 25′ 5″ W. Turtles, vegetables, and birds' eggs are procured here. It was discovered in 1501. Capital, George Town. Pop. about 400.

Ascension, a parish in the S. E. part of Louisiana. Area, 420 square miles. It is intersected by the Mississippi River, and bounded on the N. by the Amite. The surface is an alluvial plain, partly subject to inundation; the soil is fertile, producing sugar, rice, cotton, and maize. Capital, Donaldsonville. Pop. 11,577.

Ascension [from the Lat. *ascen'sio*, an "ascent"]. In astronomy, the right ascension of a star is the arc of the equator intercepted between the first point of Aries and that point of the equator which comes to the meridian at the same instant with the star. Measured always from west to east, the right ascension of a star corresponds or is analogous to the longitude of a place on the earth. The most convenient mode of designating the position of a star is to refer it to the equator, and to a certain fixed point in the equator. The point chosen for this purpose is the vernal equinox or first point of Aries, from which the degrees are reckoned eastward all round the circle. The right ascension and the declination are thus the two co-ordinates by means of which the place of any star is determined. The right ascension is ascertained by a sidereal clock, and is reckoned or expressed in time. For example: if a star come to the meridan five hours after the first point of Aries passes the meridian, then five hours is the star's right ascension in time, which is equivalent to seventy-five degrees, because one hour corresponds to 15° in space. *Ascensional difference* is the difference between the oblique and the right ascension of a celestial object. On account of almost all astronomical elements being now computed from observations of right ascension and declination, instead of oblique ascensions and ascensional differences, this term is at present but little used.

Ascension Day, or **Holy Thursday,** one of the great religious festivals of the Roman Catholic and Episcopal churches, is held on the fortieth day after Easter, to commemorate the ascension of Christ into heaven. Ascension Day has been observed at least since 68 A. D., and perhaps earlier. Saint Augustine believed it to have been instituted either by the apostles themselves or the bishops immediately succeeding them.

Ascet'icism [from the Gr. *ἀσκέω*, to "exercise," to "discipline"], a term applied to a voluntary retirement from the world and the practice of acts tending to mortify the body; so called from the rigid discipline to which the devotee subjects himself, the object of the ascetic being to advance the spiritual interests of himself or others. Asceticism was practised among Jewish and pagan nations long before the time of Christ, especially in India. The Essenes in Judæa and the Therapeutæ in Egypt were bodies of Jewish ascetics. At the present day, asceticism is most prevalent among Brahmans, Booddhists, and Christians of the Armenian, Coptic, Greek, and Roman Catholic churches. Early in the second century zealous members of the Christian Church devoted themselves to lives of poverty, celibacy, and abstinence from all sensual gratification. Some of these remained among men, others dwelt apart as hermits. The union of numbers of hermits into one body was first made by Pachomius, 340 A. D. This was the virtual origin of MONASTICISM (which see).

Ascet'ics [for etymology see preceding article], a name commonly given to those who in the early ages of Christianity devoted themselves to a solitary and contemplative life, practising great austerities, with a view to mortify the flesh and withdraw the mind from worldly objects; also applied to those persons in India and other countries who lead a life of ASCETICISM (which see). The ascetics of India are especially celebrated on account of the severe and even terrible austerities which they practise. One man will stand all day in one position exposed to the rays of a burning sun; another will hold his hands clenched till his fingernails grow through them.

Asch, a town of Austria, in Bohemia, 100 miles W. of Prague. It has factories of linen, calico, paper, hosiery, and leather goods, and many dyeing establishments and breweries. Pop. in 1869, 9405.

Aschaf'fenburg, a town of Bavaria, in the circle of Lower Franconia, on the right bank of the Main, 24 miles by rail E. S. E. of Frankfort. It has a royal castle, a Gothic church, a library of about 22,000 volumes, a hospital, a gymnasium; also manufactures of woollen goods, paper, straw goods, etc. It belonged to the elector of Mentz for many centuries, and was ceded to Bavaria in 1814. A victory of the Prussians over the Austrians was gained here July 14, 1866. Pop. in 1871, 9212.

As'cham (ROGER), an eminent English scholar and writer, born in Yorkshire in 1515. He graduated at St. John's College, Cambridge, in 1534, and distinguished himself as a classical scholar. In 1544 he published a work in defence of archery, entitled "Toxophilus," which is remarkable as a specimen of pure English style. He was appointed in 1548 tutor to the princess Elizabeth, whom he instructed in Greek and Latin, but he resigned that position in 1550. Soon after this event he was sent as secretary of embassy to the court of the emperor Charles V., and passed three years in Germany. Although he was a Protestant, he was appointed Latin secretary to Queen Mary in 1553, and after her death (in 1558) he was retained at court in the double capacity of secretary and tutor to Queen Elizabeth, who again took lessons in Greek and Latin. He remained at her court until his death, Dec. 30, 1588, having by his prudence or good fortune passed through very perilous times without persecution or dishonorable temporizing. His chief work, "The Schole-Master" (1571), contains excellent advice on the subject of learning Latin. (See DR. JOHNSON'S "Life of R. Ascham," prefixed to his works, 1767; GRANT, "De Vita Rogeri Ascham.")

Asch'bach (JOSEPH), a German historian, born at Höchst, near Frankfort-on-the-Main, in 1801. He obtained a chair of history at Bonn about 1842, and in 1853 at Vienna. His most important works are a "History of the Emperor Sigismund" (3 vols., 1838–45); "Allgemeines Kirchenlexicon" (4 vols., 1846–50), and "Roswitha und Conrad Celtes" (1867). He also wrote a "History of the Visigoths" (1827) and a "History of the Omeyyades in Spain" (2 vols., 1829–30).

Asch'ersle'ben, a town of Prussia, in the province of Saxony, is on the river Eine, 18 miles W. S. W. of Magdeburg. It has about seven churches, one synagogue, and a gymnasium, and is surrounded by a strong wall. Here are manufactures of flannel, frieze, linens, pottery, and brandy. Pop. in 1871, 16,734.

As'cians, or **As'cii** [from the Greek *α*, priv., and *σκία*, a "shade" or "shadow"], literally, "without shadow." A term applied to the people of the torrid zone, who have twice in the year the sun perpendicular above their heads, and hence are without shadow.

Ascid'ia, or **Ascid'ians** [from the Gr. *ἀσκίδιον* (dimin. of *ἀσκός*), a "leathern bottle"], a group of molluscoids of the class Tunicata. They have no shell, but are enclosed in an elastic tunic with two orifices, and resemble a bottle or jar. Within the external tunic is a muscular membrane, regarded as corresponding to the mantle of the other Mollusca. The greater part of the cavity of the mantle forms a branchial sac, the folded lining of which constitutes the gills (branchiæ). The movements of numerous cilia around the mouth bring into it a current of sea-water, which passes out at the vent or anal orifice. They have no eyes or other organs of special sense, but they have hearts and a circulation of blood, with the remarkable peculiarity that its direction is sometimes reversed. In their mature state they are fixed by the base to some solid substance, as a rock or seaweed, but the young, resembling tadpoles in form, swim by means of a vibratile tail, which disappears when they settle. The group is divisible into solitary or simple (Ascidiadæ) and compound ascidians (of several families), members of which are connected by a tubular stem, and to some extent

have a common circulation of blood, though each has its own heart, respiratory apparatus, and digestive organs. In other kinds, more strictly called compound ascidians, the tunics of many are united into a mass, and they form systems like zoophytes. The individuals in these systems have always sprung by gemmation from one, and both the solitary and compound ascidians propagate by eggs. "In the dim obscurity of the past," says Darwin, "we can see that the early progenitor of all the Vertebrata must have been an aquatic animal provided with branchiæ, with the two sexes united in the same individual, and with the most important organs of the body (such as the brain and heart) imperfectly developed. This animal seems to have been more like the larvæ of our existing marine ascidians than any other known form." (See "Descent of Man," vol. ii., p. 372.)

Ascid'ium [from the Gr. ἀσκίδιον (dimin. of ἀσκός), a "small leathern bag or bottle"], a hollow, pitcher-shaped body which occurs on the stems of certain plants, as *Nepenthes* and *Sarracenia*. It usually contains water, and is sometimes furnished with reflexed hairs, which prevent the escape of insects that fall into it. (See NEPENTHES.) *Ascidium* is also a genus of simple tunicaries, which gives name to the family Ascidiadæ and the whole group of ascidians.

Asci'tes [from the Gr. ἀσκός, a "skin," a leathern bag for water, alluding to the shape of the patient's abdomen], dropsy of the abdominal cavity, is most frequently an indication of portal obstruction, caused by "cirrhosis" or other disease of the liver, which hinders the return of venous blood to the heart and causes pressure in the veins, leading to transudation of serum into the peritoneal (abdominal) cavity. In other cases it is a symptom of general dropsy; or it may result from cancer or tubercle of the peritoneum; or, in children especially, it may appear as a temporary and quite inexplicable phenomenon, without serious danger or distress. Ascites must be regarded in almost all cases as a very grave symptom of disease, yet there are not a few cases where the immediate danger passes away, and the patient becomes, for the time, comfortable; but such results are temporary and unfrequent. The treatment is palliative. Diuretics may be useful, but hydragogue cathartics are much more effective in relieving the symptom. Tapping may be practised where the dropsy very seriously distends the abdomen. The diagnosis between ascites and ovarian dropsy is sometimes very difficult. The distinctive marks can be appreciated only by the skilled physician.

Asclepiada'ceæ [so named from *Ascle'pias*, one of its genera], a natural order of exogenous plants, which often have twining stems, and almost always have a milky juice. The leaves are entire; the flowers are monopetalous and regular, but peculiar in their structure. The corolla is divided into five lobes; the filaments of the five stamens are usually united so as to form a tube, which is generally furnished with a crown or coronet of hood-shaped appendages. The fruit consists of two follicles, with many seeds terminating in long down or silky fibres. This order comprises about 1000 species, mostly natives of warm climates. Many of them are used in medicine, and others are cultivated for their beautiful flowers, as the *Stephan'otis floribun'da* and the *Hova carnosa*, a hothouse climber, to each flower of which a drop of honey is always suspended. The type of the order is the *Asclepias*, several species of which are natives of the U. S. Among the medicinal plants of this order are *Calot'ropis gigante'a*, or mudar, *Tyloph'ora asthmat'ica* of India, and *Vincetoxicum officinale*. Useful fibres are obtained from the stems of several species of *Calotropis*, from *Orthanthera viminea*, and *Ho'ya viridiflo'ra*.

Asclepi'adæ [Gr. Ἀσκληπιάδαι]. This term was first applied, among the ancient Greeks, to those who were reputed to be the descendants of Æsculapius, the god of medicine; afterwards, to those who were trained in his temples (Asclepions) in the science and art of healing. Aristotle, though not a physician, was one of the family of the Asclepiadæ. Young men designed for the medical vocation, if sons of physicians, began their studies before their twentieth year; others, after a preparatory education lasting from the seventeenth to the twentieth year; in both, the special medical training probably did not end before their twenty-fifth year. Much secresy and exclusiveness were observed in their initiation; and after the first ordeal of preparation had been passed, at the commencement of the ceremonies of illumination, the HIPPOCRATIC OATH (which see) was administered to the candidate. At the close of the period of training came the ceremony of coronation, by which the young Asclepiadæ were fully introduced into the profession of medicine. (See WATSON, "Medical Profession in Ancient Times," New York, 1856.)

Asclepiade'an, or **Ascle'piad** [from Asclepiades, a poet who invented this metre], the name of a metre in ancient poetry consisting of four feet, a spondee, a choriamb, and two dactyls (or, according to some, two choriambs and an iambus). The first ode of Horace furnishes an example:

"Mæcēnās ătăvīs ēdĭtĕ rēgĭbŭs."

Asclepi'ades [Gr. Ἀσκληπιάδης], a celebrated Greek physician, born at Prusa, in Bithynia, flourished about 100–80 B. C. He practised at Rome, where he founded a school, and was very popular with the Romans on account of his pleasant and simple remedies. His maxim was, that a physician ought to cure his patients safely, speedily, and agreeably. He relied much on diet, bathing, and exercise or gestation. He wrote several works, of which only small fragments are extant. (See GUMPERT, "Asclepiadis Bithyni Fragmenta," 1798; BIANCHINI, "La Medicina d'Asclepiade," 1769.)

Ascle'pias [named, on account of its medicinal virtues, from Ἀσκληπιός, the Greek name of Æsculapius, the god of medicine], a genus of perennial herbaceous plants, the type of the order Asclepiadaceæ, mostly natives of the U. S. The corolla is wheel-shaped and reflexed, the crown or coronet is fleshy, and each of its hooded appendages has an incurved horn. The *Asclepias cornuti* (milk-weed or silk-weed), formerly called *Asclepias Syriaca*, is an American plant, abounding in an acrid milky juice, which contains caoutchouc. The seed-vessels are filled with a silky down, which is sometimes used for stuffing pillows. The fibre of the stem is said to be valuable for ropes. The *Asclepias tuberosa*, sometimes called pleurisy-root, has handsome flowers. Its root is used as an expectorant and diaphoretic. Many other species of *Asclepias* grow in the U. S.

As'coli di Satria'no, an episcopal city of Italy, in the province of Foggia, 25 miles by rail S. E. of Foggia, on the eastern slope of the Apennines. Near it, Pyrrhus, in 279 B. C., won a great victory over the Romans, and in 1246 A. D. an imperial army crushed the Apulian insurgents led by Cardinal Rainer. Pop. in 1861, 5669.

As'coli-Pice'no, a province of Central Italy, is bounded on the N. by Macerata, on the E. by the Adriatic Sea, on the S. by Teramo, and on the W. by Perugia. Area, 808 square miles. The province consists chiefly of mountain-ridges running parallel to each other, the portion on the coast being of superior beauty. Chief town, Ascoli-Piceno. Pop. in 1871, 203,009.

Ascoli-Piceno (anc. *Asculum Picenum*), an old episcopal city of Central Italy, in the province of the same name, is situated on a hill and on the river Tronto, 53 miles S. of Ancona. It commands a fine view of the Apennines, a few miles distant. It is well built, and has a cathedral, a museum, a theatre, a library, and many private palaces. It was annexed to the Papal States in 1426. A battle was fought here between Tancred of Sicily and the emperor Henry VI. of Germany, in which the latter was defeated (1190). Pop. in 1871, 22,937.

Asco'nius Pedia'nus (QUINTUS), a Roman critic and commentator, was born probably at Padua, and lived about 50 A. D. He taught at Rome, and is said to have been the master of Quintilian. Among his works were valuable commentaries on Cicero's "Orations." Poggio Bracciolini found in 1416 at St. Gall commentaries on seven orations—viz., "In Verrem," "In Divinationem," "Pro Cornelio," "In Toga Candida," "In Pisonem," "Pro Scauro," and "Pro Milone." He wrote a Life of Sallust, which is not extant. He died, aged eighty-five, in the reign of Domitian.

Ascut'ney Moun'tain, an isolated mass of granite in Windsor co., Vt., 3300 feet above the level of the sea. Its summit affords an extensive and beautiful view of the valley of the Connecticut River.

Asel'li [Lat. *Asel'lius*], (GASPARO), an Italian anatomist and physician, born at Cremona about 1580. He became professor of anatomy at Pavía, and acquired distinction by the important discovery of the lacteal vessels in 1622. He wrote on this subject a treatise entitled "De Lactibus sive Lacteis Venis" (1627). Died in 1626.

Asfeld, d' (CLAUDE FRANÇOIS BIDAL), MARQUIS, an able French general, born in 1667. He served with distinction in Spain, and commanded the French cavalry at Almanza in 1707. He was second in command under Villars in Italy in 1733, was commander-in-chief in Germany in 1734, and became a marshal of France in that year. Died Mar. 7, 1743.

As'gill (Sir CHARLES), a British general, born in 1762. He served against the U. S., and having been captured at Yorktown, was selected by lot from the prisoners to be hung in retaliation for the death of an American officer, but he was saved by the intercession of the French court. Died in 1823.

Ash (*Frax'inus*), an important genus of trees belonging to the family Oleaceæ, distinguished by imperfect flowers, sometimes destitute of corolla, and leaves unequally pinnate. The fruit is a *samara*, a winged pericarp. It comprises about fifty species, mostly natives of Europe and North America, and valuable for timber, for fuel, and shade trees. The *Fraxinus excelsior*, the common ash of England, is a beautiful ornamental tree, and the timber is much esteemed by carpenters, joiners, coachmakers, and wheelwrights. It grows to the height of 100 feet or more. Cultivation has produced several varieties of it, among which is the weeping ash, the branches of which droop nearly to the ground. The *Fraxinus Ornus*, or flowering ash, a native of Southern Europe, has more perfect flowers than the other species. A saccharine substance called manna is obtained from it by making incisions in the bark, and sometimes exudes spontaneously. Among the noblest trees of the genus is the *Fraxinus Americana*, or white ash, which is abundant in the Northern and Middle U. S. It leaflets are petiolate, ovate, or lance-oblong, entire, acuminate, and in autumn are changed to a dark brown or purple tint. The timber is tough, and valuable for the same purposes as the *Fraxinus excelsior*. In the forests of the U. S. occur also the *Fraxinus pubescens* (black or red ash) and *Fraxinus quadrangulata* (blue ash), and others. The black ash (*Fraxinus sambucifolia*) is used in basket-making. The mountain ash, conspicuous for its clusters of red berries, is a species of *Pyrus*, having no affinity with the genus *Fraxinus*.

Ash, a township of Monroe co., Mich. Pop. 1451.

Ash (Joseph P.), an American officer, born in Pennsylvania. On the outbreak of the civil war he entered the army as a lieutenant of volunteers, was appointed a second lieutenant in the Fifth U. S. Cavalry April 30, 1861, and a captain Sept., 1863. In the action near Warrenton, Va., he was wounded in six places before leaving the field; on recruiting service during convalescence. In the campaign of 1864 of the Army of the Potomac, while endeavoring to rally a wavering division of troops at the action of Tod's Tavern, he was killed May 8, 1864. (Brevet major and lieutenant-colonel U. S. A. for conspicuous gallantry.)

G. C. Simmons, *Clerk Board of Eng'rs.*

Ashan'tee, written also **Asiente,** an extensive kingdom of Western Africa, on the Gold Coast, Upper Guinea, is between lat. 5° and 9° 30′ N., and between lon. 0° 55′ E. and 4° 7′ W. It is bounded on the N. by the Kong Mountains, on the E. by Dahomey, on the S. by the Atlantic, and on the W. by Liberia. Area, about 75,000 square miles. It is generally mountainous, well watered and fertile, and covered with dense forests, which are almost impenetrable. The staple products are maize, rice, sugar, yams, tobacco, cocoanuts, gums, and dyewoods. Gold is said to be abundant here, and the chief articles of export are gold-dust, palm oil, and slaves. The people are warlike and fierce, and human sacrifices are common. They have some skill in the manufacture of sword-blades, cotton cloths, and golden ornaments. The government is a despotism. Capital, Coomassie (or Kumassi). The British, who have a fort on the coast at Cape Coast Castle, were involved in a war with the Ashantees, which began in 1807 and continued until 1825. The Dutch also had a colony on the coast until 1871, when they ceded it to the British.

In 1873 a war arose between the Ashantees and the British, because the British refused to pay the annual tribute to the king of Ashantee which the Dutch had formerly paid him. The Ashantees first attacked the Fantis, living under British protection, entirely defeated them, and subsequently succeeded in driving all the natives friendly to the British into the two forts Elmina and Cape Coast Castle. The British troops under Sir Garnet Wolseley then invaded Ashantee, and at one time the disturbances seemed to have been stopped; but as white troops cannot serve in these regions except in the winter months, and as the Ashantees are a fierce and warlike people, a satisfactory settlement may require more time and greater exertions.

Ash'away, a post-village of Hopkinton township, Washington co., R. I., has a national bank and important manufactures.

Ash'borough, a post-village, capital of Randolph co., N. C., is 78 miles N. W. of Fayetteville, and 5 miles S. W. of Deep River. Pop. of village, 182; of township, 1172.

Ash'bourne, or **Ashburn,** a market-town of England, in Derbyshire, near the river Dove, 12 miles N. W. of Derby. It is on the S. slope of a high hill, and has a large church, built about 1240; also manufactures of cotton goods and lace. The troops of Charles I. were defeated here in 1644. Pop. in 1871, 4945.

Ash'burnham, a post-village and township of Worcester co., Mass., 55 miles N. W. of Boston. It has one national bank, three churches, and manufactures of chairs, lumber, wooden ware, matches, and cotton goods. Ashburnham Dépôt is at the junction of the Cheshire and the Vermont and Massachusetts R. Rs. Pop. of township, 2172.

Ashburnham, a large village of Peterborough co., province of Ontario, Canada, on the Otonabee River, opposite Peterborough. It has extensive lumber-mills and considerable trade in grain.

Ashburnham, Earls of, and Viscounts St. Asaph (1730, in the peerage of Great Britain), barons of Ashburnham (1689, in the English peerage), a noble family of England.—Bertram Ashburnham, the fourth earl, was born Nov. 23, 1797, and succeeded his father in 1830.

Ash'burton (Alexander **Baring**), Lord, an English diplomatist, born in 1774, was a son of Sir Francis Baring, an eminent merchant. He was employed in his youth in mercantile affairs in the U. S., and married a daughter of Senator William Bingham of Pennsylvania. In 1810 he became the head of the firm of Baring Brothers & Co. of London, and in 1812 was chosen to represent Taunton in Parliament, in which he acted with the Liberal party until 1831, when he became a supporter of Sir Robert Peel and a moderate Conservative. He was returned to Parliament for North Essex in 1832, and was created Baron Ashburton in 1835. In 1842 he was sent as a special ambassador to the U. S. to settle a dispute which had long been pending in relation to the north-eastern boundary. He was selected for this mission because he was acquainted with the American people and institutions, and was inclined to a pacific policy. Lord Ashburton and Mr. Webster negotiated this important treaty, which was signed at Washington in Aug., 1842, and was called the Ashburton Treaty. Died in May, 1848. He left a son, William Bingham Baring, who inherited the title.

Ash'by, a post-village and township of Middlesex co., Mass. It has manufactures of lumber, tubs, etc. Pop. 994.

Ashby, a township of Rockingham co., Va. Pop. 2268.

Ashby, a township of Shenandoah co., Va. Pop. 2645.

Ashby (Turner), a Confederate general, born in Fauquier co., Va., about 1824. He was appointed a brigadier-general in 1862, and was greatly distinguished as a cavalry commander. During Banks's pursuit of Jackson in the Shenandoah Valley, Gen. Ashby was in command of cavalry covering the rear of Jackson's army, and in an engagement near Harrisonburg, June 5, 1862, he was shot through the body and killed. His loss was severely felt by the Confederates, he being one of their ablest and bravest cavalry leaders. G. C. Simmons, *Clerk Board of Eng'rs.*

Ashby-de-la-Zouche, a market-town of England, in Leicestershire, 20 miles by rail N. W. of Leicester. It has a ruined castle in which Mary queen of Scots was once confined, and an ancient church in which was the burying-place of the Hastings family. Here are iron smelting-works and manufactures of hats and hosiery. Coal-mines and salt-springs occur in the vicinity. Pop. in 1871, 9153.

Ash'dod, or **Azo'tus** (modern *Asdood* or *Esdûd*), an ancient city of the Philistines, in Palestine, about 3 miles from the Mediterranean and 12 miles N. E. of Ascalon. It was an important city and stronghold of the Philistines, who, after defeating the people of Israel in the time of Samuel, captured their ark and carried it to the temple of Dagon in Ashdod. It was dismantled by Uzziah, besieged by Psammetichus, and destroyed by the Maccabees. It is called *Azotus* in the New Testament (Acts viii. 40). Near its site is a village of mud houses, called *Asdood* or *Esdûd*, on the sea 21 miles S. of Jaffa.

Ashe, a county which forms the north-western extremity of North Carolina. Area, 325 square miles. It is drained by New River. This county is a mountainous tract between the Blue Ridge on the S. E. and Stone Mountain on the W. The soil in some parts is productive. Cattle, sheep, and grain are extensively raised. Excellent ores of copper abound. Capital, Jefferson. Pop. 9573.

Ashe (John), a general and patriot of the Revolution, born in England in 1721, emigrated to North Carolina in 1727. He took an active part in the political movements which preceded the Revolution, and served as a brigadier-general during the war. Died, a prisoner of war, Oct. 24, 1781.

Ashe (Samuel), a brother of John, mentioned above, was born in 1725. He became chief-justice of North Carolina in 1777, and governor of that State 1795–98. Died Feb. 3, 1813.

Ash'e, Ashi, or **As'ser** (Rab or Rav), a celebrated Jewish rabbi of Babylon, was born in 353 A. D. He was eminent for his learning and genius, and was the reputed author or compiler of the "Babylonian Talmud," a vast collection of traditions and legal documents, which was

regarded among the Jews as the highest authority on legal questions. Died in 427 A. D.

Ash'er, a tribe of ancient Israelites, descended from Asher, eleventh son of Jacob by the handmaid Zilpah. They were assigned a portion of land in the N. W. of Palestine, but never dispossessed the Canaanites and Phœnicians who dwelt there. The tribe furnished but one noteworthy person, the prophetess Anna, who lived during the infancy of Christ (Luke ii. 36–38). The territorial boundaries and the history of this tribe are very obscure.

Ash'erville, a post-township of Mitchell co., Kan. Pop. 144.

Ash'es, the solid or earthy residuum left after the combustion of wood, coal, or other organic substances. The most important ingredient of the ashes of land-plants is potash, or a salt of potash with a portion of lime and silica. The potash is extracted from ashes by a process called lixiviation—leaching. By dissolving the salt contained in the ashes the water is converted into ley, which is afterwards evaporated by boiling. The insoluble part of the ashes remaining after lixiviation is called leached ashes, which is composed of carbonate of lime, phosphate of lime, oxide of iron, etc. The ashes of marine plants, and those that grow near the sea, contain soda instead of potash, with a small portion of iodine. The soda is also separated from the insoluble mass by lixiviation. Wood ashes are extensively used in the manufacture of soap, and are useful as manure. The salts obtained from them by lixiviation are called potash and pearl-ash, which latter is a carbonate of potassa. Bone ashes consist mostly of phosphate of lime, which is a valuable manure. (See POTASH, SODA, and also AGRICULTURAL CHEMISTRY, by PROF. S. W. JOHNSON, A. M.)

Ashes, Volcanic, pulverulent lava, thrown out by volcanoes, consisting of minute fragments of various minerals, as mica, felspar, magnetic iron ore, augite, olivine, etc.

Asheville, the capital of Buncombe co., N. C., is 1 mile E. of French Broad River, 255 miles W. of Raleigh, and is an important centre of trade. It has one female college, three academies, a foundry, machine-shops, three furniture-factories, six churches, and three weekly newspapers. Pop. 1400; of township, 2593. R. M. FURMAN, ED. "CITIZEN."

Ash'field, a post-township of Franklin co., Mass. It has an academy, an insurance company, and a public library. It is a place of summer resort. Pop. 1180.

Ash'ford, a post-village and township of Windham co., Conn., 30 miles E. N. E. of Hartford. P. of township, 1241.

Ashford, a post-village and township of Cattaraugus co., N. Y., 35 miles S. E. of Buffalo. P. of township, 1801.

Ashford, a post-township of Fond du Lac co., Wis. Pop. 1799.

Ash Grove, a post-township of Iroquois co., Ill. Pop. 1146.

Ash'grove, a township of Shelby co., Ill. Pop. 1499.

Ash Hills, a township of Butler co., Mo. Pop. 491.

Ash'ippun, a post-township of Dodge co., Wis. Pop. 1623.

Ashkelon, or **Askelon.** See ASCALON.

Ash'kum, a post-township of Iroquois co., Ill. Pop. 1315.

Ash'land, a county of the N. E. central part of Ohio. Area, 390 square miles. It is drained by the Lake Fork and Black Fork, which unite to form the Mohican River. The surface is mostly undulating; the soil is very fertile, and adapted to wheat, grass, or fruit. Grain, wool, and live-stock are largely raised. The county is intersected by the Atlantic and Great Western and the Pittsburgh Fort Wayne and Chicago R. Rs. Capital, Ashland. Pop. 21,933.

Ashland, a county in the N. W. of Wisconsin. Area, 2150 square miles. It is bounded on the N. by Lake Superior, and includes a group of islands called the "Twelve Apostles," in that lake. It is drained by the head-streams of the Chippewa River. The surface is uneven or hilly, and partly covered by extensive forests. Great quantities of pine lumber are exported. Among the resources of this county is iron ore, which abounds in a ridge called the Iron Mountains. Capital, La Pointe. Pop. 221.

Ashland, a post-village, the capital of Clay co., Ala., 75 miles N. E. of Montgomery. It has one weekly newspaper, two schools, and abundant water-power. Pop. of the township, 1499. J. B. STEDHAM, ED. "TIMES."

Ashland, a township of Lawrence co., Ark. Pop. 147.

Ashland, a township of Morgan co., Ind. Pop. 969.

Ashland, a post-village of Boyd co., Ky., on the Ohio River, 13 miles below Catlettsburg, and on the Lexington and Big Sandy R. R., running 20 miles into the interior to the celebrated coal-mines. It has two of the largest blast pig-iron furnaces on the Ohio River, and also one of the largest and most complete rolling-mills in the country. Iron ore, pig iron, and coal are shipped from this point. It has one national bank and one weekly paper. Pop. 1459.

F. R. FRENCH, ED. "ASHLAND JOURNAL."

Ashland, the residence of Henry Clay, the eminent orator and statesman, is situated in Fayette co., Ky., about 2 miles S. E. of Lexington. The estate of Ashland contained about 600 acres, of which 200 were appropriated to a beautiful park.

Ashland, a post-township of Middlesex co., Mass., at the junction of the Boston and Albany and Hopkinton R. Rs., 24 miles S. W. of Boston. It has one weekly paper. The chief business is the manufacture of boots and shoes, boxes and lasts, emery, and grain-grinding. Pop. 2186.

GEORGE P. MAYHEW, ED. "ADVERTISER."

Ashland, a post-twp. of Newaygo co., Mich. P. 770.

Ashland, a post-township of Dodge co., Minn. P. 611.

Ashland, a post-village, capital of Benton co., Miss., on the Tennessee line. It has one weekly paper.

HENRY S. FALCONER, ED. "ARGUS."

Ashland, a post-village, capital of Saunders co., Neb., is on Salt Creek, about 3 miles from its entrance into Platte River, and on the Burlington and Missouri River R. R., 24 miles N. E. of Lincoln. Superior magnesian limestone is found here. It has two weekly newspapers and a national bank. Pop. 653.

Ashland, a post-township of Grafton co., N. H. It has important manufactures of paper, card-board, flannel, gloves, etc. It is on the Boston Concord and Montreal R. R. Pop. 885.

Ashland, a township of Chemung co., N. Y. Pop. 1016.

Ashland, a post-village and township of Greene co., N. Y. The township contains six churches, and has beautiful scenery, being partly occupied by spurs of the Catskill Mountains. Pop. 992.

Ashland, a handsome post-village with paved streets, capital of Ashland co., O., is on the Atlantic and Great Western Railway, 85 miles N. N. E. from Columbus and 65 S. W. from Cleveland. It has eight churches, two newspapers, two banks (one national); one mutual fire insurance company, chartered in 1851; two foundries, two machine-shops, a clover-thrasher-and-huller manufactory; an adjustable boot- and shoe-pattern factory, which sends goods to all parts of Europe; excellent schools, and three grain-elevators. Pop. 2601.

L. J. SPRENGLE, ED. "ASHLAND TIMES."

Ashland, a post-village of Jackson co., Or.

Ashland, a township of Clarion co., Pa. Pop. 758.

Ashland, an important town in the Mahanoy Valley, the centre of the anthracite coal-fields of Schuylkill co., Pa., on the line of the Philadelphia and Reading R. R., 97 miles from Philadelphia, within 2 miles of the Lehigh Valley R. R., and 13 miles from Pottsville, the county-seat. Ashland is the second town in the county in point of population and business. It has one national and two State banks, two large machine-shops, foundries, etc. It is surrounded by a number of the largest coal operations in the region. It has one newspaper. Pop. 5714.

J. IRVIN STEEL, PUB. "ASHLAND ADVOCATE."

Ashland, or **Ashland City,** a post-village, the capital of Cheatham co., Tenn., on the Cumberland River, 20 miles below Nashville. Pop. 121.

Ashland, a post-village of Hanover co., Va., on the Richmond and Fredericksburg R. R., 17 miles N. of Richmond. In May, 1864, General Sheridan, in the course of a raid, destroyed a dépôt here. It is the seat of Randolph-Macon College. Pop. of Ashland township, 3942.

Ash'lar, or **Ashler,** a building-stone squared and hewn; dressed stones used for facing work when it is worked in regular beds and joints. Tooled ashlars are slabs marked with parallel flutings or grooves. Other varieties are called polished ashlar and rustic ashlar, the latter of which has an uneven surface.

Ash'ley, a small river of South Carolina, rises in Colleton county, and, flowing south-eastward, unites with the Cooper River at Charleston.

Ashley, a county of Arkansas, bordering on Louisiana. Area, 870 square miles. It is bounded on the N. W. by the Saline, on the S. W. by the Washita River, and is intersected by Bayou Bartholomew, which is navigable. Coal, copper, and lead have been found. The surface is gently rolling, and the soil sandy but fertile. Corn and cotton are the chief crops. Capital, Hamburg. Pop. 8042.

Ashley, a township of Independence co., Ark. Pop. 702.

Ashley, a township of Pulaski co., Ark. Pop. 2110.

Ashley, a post-village of Washington co., Ill., on the Central R. R. where it is crossed by the St. Louis and Southeastern R. R., 60 miles E. S. E. of St. Louis. Pop. 1030.

Ashley, a post-township of Pike co., Miss. Pop. 1222.

Ashley, a post-village of Oxford township, Delaware co., O., on the Cleveland Columbus and Cincinnati R. R., 10 miles N. by E. of Delaware. Pop. 454.

Ashley (James M.), born in Pennsylvania Nov. 14, 1824, removed to Ohio in 1849, was a member of Congress from 1860 until 1868, when he became governor of Montana Territory.

Ashley, Lord. See Shaftesbury.

Ash'mole (Elias), F. R. S., born at Lichfield, England, May 23, 1617, was educated at Oxford, and served as gentleman of ordnance under King Charles I. in the civil wars. In 1646 he turned his attention to the study of judicial astrology and Rosicrucianism, and Oct. 16 of that year became a brother of the Free and Accepted Masons. He was Windsor Herald (1660–75), and married as his third wife a daughter of Sir William Dugdale, Garter principal king of arms. In 1659 the younger John Tradescant gave him his collection of curiosities, which Ashmole presented in 1683 to Oxford University. It was the basis of the present Ashmolean Museum. He wrote "Theatrum Chymicum" (1652), "The Way to Blisse" (1658), "History of the Order of the Garter" (1672), "History of Berkshire" (3 vols. folio, 1715), and a whimsical "Diary." Died May 18, 1692. "He was," says Anthony Wood, "the greatest virtuoso and curioso that ever was known in England. . . . He did worthily deserve the title of *Mercurio-philus Anglicus*."

Ash'more, a post-village and township of Coles co., Ill., on the Indianapolis and St. Louis R. R., 94 miles E. S. E. of Springfield. Pop. of township, 2088.

Ash'mun (George) was born at Bradford, Mass., Dec. 25, 1804, graduated at Yale in 1823, became a lawyer at Springfield, Mass., in 1828, was a Whig member of Congress (1845–51), president of the Chicago Republican convention of 1860, and was distinguished as a patriotic and able man. Died July 17, 1870.

Ashmun (Jehudi), an American noted as a promoter of colonization in Liberia, was born in Champlain, N. Y., in 1794, graduated at Bowdoin College in 1816. He went to Liberia in 1822 as an agent of the Colonization Society, and rendered important service to the colony. He died in Boston Aug. 25, 1828.

Ashmun (John Hooker), an American jurist, born at Blandford, Mass., July 3, 1800. He graduated at Harvard in 1818, and became professor of law there in 1829. He acquired a high reputation as a jurist, but died prematurely Apr. 1, 1833.

Ashtabu'la, a county which forms the north-eastern extremity of Ohio. Area, 700 square miles. It is drained by the Grand and Ashtabula rivers. The surface is level; the soil contains much clay, and is adapted to grazing. Great quantities of grain, wool, fruit, and other crops are raised. It is intersected by the Lake Shore and Michigan Southern, the Ashtabula Youngstown and Pittsburgh, and the Franklin Division of the Lake Shore R. Rs. Capital, Jefferson. Pop. 32,517.

Ashtabula, the chief town of Ashtabula co., O., on the Lake Shore R. R., 58 miles from Cleveland, and the terminus of the Ashtabula Youngstown and Pittsburgh and the Franklin division of the Lake Shore R. Rs. Its harbor, one of the best on Lake Erie, admits vessels of the largest class, and it is becoming a port of considerable commercial importance, receiving iron ore in transit from Lake Superior to Youngstown and Pittsburgh, and is a point for the shipment of coal on the lake. It has two national and one other bank, two newspapers, and a population which has greatly increased since the last census. Pop. 1999; of Ashtabula township, 3394. Ed. "Telegraph."

Ashtaroth. See Ashtoreth.

Ash'ton, a post-township of Lee co., Ill. Pop. 1007.

Ashton, a township of Monona co., Ia. Pop. 106.

Ash'ton-in-Ma'kerfield, a town of England, in South Lancashire. The inhabitants are mostly employed in cotton-factories and in collieries. Pop. in 1871, 7463.

Ashton-under-Lyne, a town of England, in the S. E. part of Lancashire, on the Tame, 6½ miles by rail E. S. E. of Manchester. It is a great seat of the cotton manufacture, and is remarkable for the rapidity of its growth. It returns one member to Parliament. It has a church built in the time of Henry V., a theatre, a mechanics' institute, etc. Many of the inhabitants are employed in calico-printing, bleaching, dyeing, and the manufacture of machines. Pop. in 1841, 22,689; in 1861, 34,836; in 1871, 37,420.

Ash'toreth, or **Ash'taroth,** a Syrian goddess, worshipped by the ancient Israelites and other nations of Western Asia. She was called the Queen of Heaven, and appears to have been a personification of the moon. She is commonly identified with Astarte (which see). Her chief temples were at Tyre and Sidon.

Ash'ville, a post-village, the capital of St. Clair co., Ala., 115 miles N. of Montgomery. Pop. of township, 992.

Ashville (North Carolina). See Asheville.

Ash Wednesday [Lat. *Di'es Cin'erum;* literally, "day of ashes"], the first day in Lent, so called because in ancient times it was the custom for penitents to appear in the church covered with sackcloth and ashes.

A'sia, the largest of the great divisions of the globe. In extent of surface it is superior to America in about the proportion of 8 to 6, and it exceeds Europe and Africa taken together; while in the antiquity of its history and civilization, in the greatness of its population, and in the variety of its productions, it surpasses all the other great divisions of the globe. It was in Asia that the human race had its origin, and from it the arts and civilization were diffused over the other regions of the earth. It likewise has peculiar claims to the interest of Christians, as containing the principal scenes of the events recorded in sacred history. The name *Asia* was originally applied to a small district of Lydia, watered by the Cayster; it was afterwards extended to the whole peninsula now known as Asia Minor, and lastly to the entire continent east of the Mediterranean and Ægean seas. The ancient geographers usually included Egypt within the limits of Asia.

The area of Asia has been variously estimated. According to a very high authority,* it may be stated at 16,216,600 square miles. According to Behm and Wagner ("Bevölkerung der Erde," Gotha, 1872), it has, including the islands, 16,924,000 square miles. It is bounded on the N. by the Arctic Ocean, on the E. by the North Pacific, on the S. by the Indian Ocean, on the S. W. by the Red Sea, which separates it from Africa, and on the W. by Europe, the Black Sea, the Mediterranean, and the Grecian Archipelago. Its greatest length, from the Dardanelles to Behring's Strait, is about 10,000 miles, and its greatest breadth, from Cape Sievero Vostotchnoi Nos in Siberia, lat. 77° 30′ N., to Cape Buro, at the S. extremity of the Malay Peninsula, about 5100 miles. Its maritime coast-line may be reckoned, in round numbers, at 35,600 miles. Asia is separated from Europe by an imaginary line, the course of which is variously traced by different geographers; part of it, however, is formed by the Ural Mountains; it is joined to Africa by a narrow neck of land called the Isthmus of Suez, which is, however, crossed by the celebrated Isthmus Canal, thus virtually isolating Africa. On the E. it is separated from America by Behring's Strait, which is only 60 miles in width. The coasts of Asia are very irregular, being deeply indented on all sides by immense bays and gulfs. Among these are the Persian Gulf, Arabian Sea, Bay of Bengal, and Gulf of Siam on the S. coast, and the Gulf of Tonquin, Yellow Sea, Sea of Japan, Gulf of Tartary, Sea of Okhotsk, and Gulf of Anadir on the E. coast. The indentations on the N. are not of the same extent, but are equally if not more numerous, the Gulf of Obi being the largest. Asia has several large peninsulas, situated on the southern and eastern coasts; among them are Arabia, India, Malacca, Cochin China, Corea, Kamtchatka, and Anadir. The principal islands are also situated on the southern and eastern coasts; among them are Ceylon, Java, Borneo, Sumatra, the Laccadives, Maldives, the Chagos Archipelago, the Andaman and Nicobar islands, the Mergui Archipelago, Celebes, the Sunda and Banda islands, the Moluccas, Sooloo Islands, Philippines, the islands of Hainan, Formosa, Chusan, Hong Kong, the Japanese empire (including the great islands of Kioosioo, Sikokf, Niphon, Yesso, and Sagalien), and the Kuriles. On the N. are Kotelnoi, Fadievskoi, New Siberia, Livkoy, and Nova Zembla. Owing to its vast extent of surface, extending from N. to S. through more than 76 parallels, and from E. to W. through more than 165 meridians, Asia includes every variety of soil, climate, and production. The conflicting accounts given of the physical structure of a large part of the interior render it almost impossible to give a perfectly accurate and intelligible view of its general conformation. Its mean level above the sea does not exceed about 1150 feet, while a third part of it has a mean elevation of not more than 255 feet. The whole tract lying N. of the Altaï and N. W. of the Thian-Shan Mountains is one prodigious plain or lowland, a third larger than Europe, with very little elevation. The southern portion, lying along the Indian Ocean, is also, comparatively speaking, but little elevated, as is likewise a

*See the "Treatise on Physical Geography," by Professor Guyot, in Johnson's "Family Atlas of the World."

great part of the interior, where the height above the sea does not exceed about 4000 feet, though formerly supposed to be double that height. It is now believed also that the elevations of several of the other plateaux of Central Asia have been overestimated. But although a large portion of Asia rises but little above the sea-level, there are extensive tracts having a great elevation; and on the other hand, a considerable part of the continent is actually below the sea-level; as, for example, that portion of country lying around the Caspian Sea and Lake Aral, the whole of which region is a vast cavity of about 55,000 square miles in extent.

Political Divisions.—The area and population of the several divisions were estimated in 1872, by Behm and Wagner, as follows:

Names of Countries.	Square Miles.	Population.
Russian territory	5,944,600	10,730,000
Caspian Sea	178,900	
Aral Sea	26,900	
Turkey in Asia	672,500	16,463,000
Arabia	926,000	4,000,000
Persia	636,000	5,000,000
Afghanistan, with Herat	251,200	4,000,000
Beloochistan	106,700	2,000,000
Kafiristan	20,000	300,000
Khiva	54,200	1,500,000
Bokhara	76,300	2,500,000
Khokan	30,000	800,000
Turkomania	144,200	770,000
Other territory of Turkistan	134,500	2,000,000
Chinese empire	3,742,000	446,500,000
Japan	149,400	34,785,321
Hindostan and British Burmah	1,558,747	206,225,580
Ceylon	24,705	2,405,287
Farther India:		
Burmah	190,500	4,000,000
Siam	309,000	6,298,000
Anam	198,000	9,000,000
French Cochin China	21,700	1,204,287
Straits Settlements	1,084	306,775
Malay Peninsula	31,700	209,000
East India Islands:		
Sunda Islands and Moluccas	678,500	25,000,000
Philippine and Sooloo islands	114,100	7,450,000
Other islands	6,800	170,000
Total	16,924,000	794,000,000

Mountains, Face of the Country, etc.—More than two-thirds of the surface of Asia consists of mountain-ranges and plateaux, connected with each other by branches, and controlling the plains by other branches. The largest plateau is the Mongolian in Eastern Asia, so called because it is exclusively inhabited by the Mongolian race. It is almost double the size of Europe, and has the form of a trapezium with rounded sides and angles, having its shortest side in the W. and the longest in the N., and has an average height of 9000 feet. It is surrounded by mountain-chains on all sides. In the S. are the Himalaya Mountains, having many peaks with an elevation of more than 20,000 feet, among which Mount Everest, 29,000 feet high, is said to be the highest peak known. Connected with this by the range of the Hindu-Kush is the plateau of Persia, having in the E. an average height of 6000 feet, in the W. of 4000 feet, and in the centre of 2000 feet. It is surrounded by numerous mountain-chains, which have an average elevation of 10,000 to 12,000 feet. W. of this, and connected with it by Mount Ararat (16,000 feet), is the plateau of Asia Minor, which is also connected with the Caucasus by branches of the Armenian highland. Other important ranges and highlands are, in the S., the plateau of Syria and Arabia, the plateau of Hindostan, the ranges of Farther India; in the E., the range of Corea; in the N., the East Siberian range (with the Aldan and Stanowoi Mountains), the ranges of Kamtchatka; in the W., the Ural and Caucasian mountains. The plains situated between the different ranges may be divided into six separate parts: the plain of Siberia, containing 4,250,000 square miles; the Caspian plain, with the largest inland seas on the globe, containing 1,000,000 square miles, of which over one-fourth lies below the level of the sea; the Chinese plain, which is among the most fertile and best cultivated parts of the globe, contains 200,000 square miles; and the plains of Farther India, Hindostan, and Mesopotamia. Very few active volcanoes are found on the continent of Asia, though the islands abound in them. Only one active volcano is found in Western Asia—Mount Demavend, 70 miles S. of the Caspian Sea. Formerly the plateaux of Persia and of Asia Minor were the scenes of great volcanic action, which is now, however, limited to very few places. In the Thian-Shan Mountains in Central Asia two active volcanoes occur, which form the centre of a great volcanic region. Although numerous fire-springs and fire-hills occur in China, no mountains are known to have emitted lava. Not less than nine active volcanoes exist in Kamtchatka. Earthquakes are of frequent occurrence and of a violent character in Asia Minor, the Persian mountains, Cabul, South-eastern Tartary, and in Northern Hindostan.

It has not yet been definitely settled whether Asia or Africa contains a larger extent of desert or steppes. In Asia the great marshy plain of Siberia extends southward to Turkistan, which, in the neighborhood of the Caspian and Aral seas, assumes the character of a sandy and salt desert. The greater part of Asia Minor, Arabia, and Persia, half of Mesopotamia, a large part of Manchooria, and the entire Mongolia, all form deserts or steppes, with the exception of the borders of springs or the shores of rivers, the majority of which flow into saline lakes or swamps. The cause of this vast amount of desert is without doubt the general absence of forests on the continent. This very probably was not always the case, but large tracts of what in all probability was formerly cultivated land, have been transformed by the systematic destruction of the forests in the course of several thousand years into deserts or steppes.

Rivers and Lakes.—A very remarkable peculiarity of the river-systems of Asia is its double rivers—*i. e.* two streams rising together, flowing in almost parallel directions throughout their whole course, and uniting before entering the sea. Among these twin rivers are the Sihon and Gihon, flowing into Lake Aral; the Euphrates and Tigris, uniting at Koona, and emptying into the Persian Gulf; the Ganges and the Brahmapootra; the Yang-tse-Kiang and Hoang-Ho, in China, rising near each other, first separating and again approaching each other, the one falling into the Yellow Sea, the other into the Gulf of Pechelee; and the Yenisei and Lena, which empty into the Arctic Ocean. Among the other rivers of Asia are, in the northern part of the continent, the Obi (or Oby), the Irtish, the Indighirka, and the Kolyma; in Eastern Asia, the Amoor, the Hoang-Kiang, and the Sang-Koi (or Tonquin); in Southern Asia, the Indus, and its confluents, the Attock, Jhylum, Chenaub, Sutlej; the Irrawaddy, the Martaban, the Menam, and the Camboja, and the Amoo and Syr-Darya in Central Asia. The basins of some of these rivers are of vast extent. That of the Obi is 1,250,000 English square miles, being the largest in the world, with the exception of that of the Amazon. The basin of the Yenisei is 1,041,000 square miles; that of the Lena, 787,000 square miles; while those of the Amoor, Yang-tse-Kiang, and Hoang-Ho are all above 500,000 square miles. The Yang-tse-Kiang is the longest river, being about 3300 miles long. The Yenisei comes next, with 3200 miles, while the length of the other principal rivers varies from 1500 to 3000 miles.

A large number of lakes, which form a semicircle, commencing with the Dead Sea, run first in a N. E. and then in an E. direction along the highlands of Central Asia to the centre of the continent. Among these lakes are the highest, as Lake Baikal; as well as the lowest lakes known, such as the Dead Sea, the Caspian Sea, and Lake Aral. Besides these, the most prominent are Lake Balkash, Lake Tengrinoor, etc.

Minerals.—Asia is peculiarly rich in the precious gems, and although it is generally considered to abound less in metals than the other continents, it ought perhaps to be referred, at least in part, to the fact of this continent having been first settled by civilized nations, who early explored and exhausted a large part of its mineral wealth. Diamonds are found in the Ural Mountains, Borneo, Ceylon, as well as in various other places. Rock-crystals, amethysts, rubies, turquoises, carnelians, agates, onyxes, beryls, topazes, and various other gems are found in various places. Gold is most abundant in Siberia, in the Altaï chain, called the Gold Mountains, in Japan, Borneo, the Chinese province of Yunnan, and the mountains of the Indo-Chinese peninsula. It is also found in less abundance in many of the other countries. Silver is found in China, Asiatic Russia, Anam, Japan, and Turkey. Mercury abounds in China, Thibet, Japan, India, and Ceylon. Tin is met with in Burmah, China, the islands of the Indian Archipelago, and Farther India; copper and iron in Japan, in Siberia, in Thibet, Hindostan, Anam, Persia, and Turkey; which countries also contain lead in greater or less abundance, as well as in Siam, Georgia, and Armenia. Coal has been found in Siberia, Northern China, Bengal, and some of the islands of the Indian Archipelago, and probably exists in many unexplored localities. Salt (very often rock-salt) abounds in all parts of the continent, and few extensive districts are altogether destitute of salt lakes or springs.

Climate.—Asia, extending as it does from the polar circle to the neighborhood of the equator, must necessarily exhibit a great variety of temperature in its different regions. In the western and south-western parts—excepting Southern Arabia, which is within the tropics—the climate is generally temperate, but in the south-eastern the heat is often extreme; while throughout the northern half of the continent excessive cold predominates. The variations of

climate are increased by local influences, especially by the great height of its table-lands and mountains, its compact form, and the great extension of the land towards the Pole. The greatest heat experienced in Asia occurs in Beloochistan, where it is said that the thermometer sometimes reaches 130° F. in the shade. The remarkable variety of climate for which Asia is distinguished is not manifested by its larger regions alone, but it is equally exhibited within the limits of its different countries down to their provinces and districts. Thus, while at Peking, which is in the same latitude as Naples (40° N.), the mean annual temperature is 55° F., at Naples it is 62° F., and the temperature in summer is 77° higher than that of Naples, while its winter temperature of 28° F. is the same as that of Copenhagen in lat. 56° N. The violent winds called typhoons occur in South-eastern Asia, their sphere of action diminishing as we go westward. They blow at all seasons, though but rarely between May and December. The monsoons extend into Asia from the Indian Ocean, as far as lat. 36° N. They include China, all Hindostan, and part of Thibet. Their direction is from the S. W. in summer and from the N. E. in winter, the change being accompanied by heavy storms. South of the equator the monsoons blow from the S. E. and N. W. during the same periods.

Vegetation.—We find all classes of plants represented here, from the luxuriant vegetation in the S. to the mosses in the extreme N. The vegetation of the steppes and deserts is poor. Among the plants peculiar to Asia are certain palms, fig trees, precious woods, tea, cinnamon, pepper, ginger, nutmeg, and other spices, the camphor tree and soap tree. Coffee, cotton, rice, sugar, indigo, tobacco, the mulberry, and the vine are also grown extensively. The tea-plant is extensively grown throughout Assam, China, Cochin China, and Japan. In general, the botany of Eastern Asia resembles that of Eastern North America, most genera and many species being common to the two regions; but Eastern Asia has this peculiarity, that many genera and orders elsewhere exclusively tropical have here their representative northern species. This fact renders the botany of China and Japan peculiarly rich and interesting.

Zoology.—The animal life of Asia is distinguished by the same great variety as the plants and the climate, while the greatest variety is found in the S. E. Here we find the elephant, the rhinoceros, the Bengal tiger, the panther, the boar, the crocodile, the python, besides many species of poisonous snakes, monkeys, parrots, etc. On the southern slopes of the Himalaya Mountains large herds of wild goats, sheep, horses, asses, mules, and cattle roam about. In China the beasts of prey have been mostly superseded by domestic animals. The steppes and deserts of Mongolia abound in camels, buffaloes, horses, asses, mules, antelopes, goats, etc., as well as tigers, leopards, and smaller carnivorous animals. In Persia, Asia Minor, and Arabia we find, as the chief beast of prey, the lion instead of the tiger. Domestic animals are found almost exclusively in the mountains, while the camel is the most important animal of this region. In Arabia the animal life, as well as all other characteristic features, of Africa predominate.

Population, Races of Men, Languages, and Religion.—The population of Asia was estimated by Behm and Wagner in 1872 at 794,000,000—*i. e.* nearly two-thirds of the entire population of the earth's surface, while the area only constitutes one-third of the area of the earth.

Among the Christian churches in Asia, the Greek Church is the strongest in the Russian and Turkish territory, and is rapidly spreading in Central Asia and China. Other Oriental churches in Turkey, Persia, and India are the Armenians, Nestorians, and Jacobites. Catholicism chiefly prevails in East India and the Archipelago, while Protestantism has its strongest hold in India. The total number of Roman Catholics in Asia is estimated at 4,166,000, Protestants at 409,000, and other Christian churches at 8,324,000. Numerous descendants of Christians are thought by many to be spread throughout Asia. Thus, numerous native Christians were recently found to exist in Japan, where they had retained their faith for more than two centuries. Buddhism, Brahmanism, and the other religions of India, China, and Japan are supposed to have over 600,000,000 believers, while Mohammedanism has about 50,000,000. The number of Jews is estimated at 350,000.

Prof. Fr. Müller (*Linguistische Ethnographie*, in Behm's "Jahrbuch," 1868) divides the languages of Asia into four families: (1) The Northern Asiatic, comprising the Yukagirian, the Koryakian, Tchukchi, the language of Kamtchatka and of the Kooriles, Yenisei and Koltish, and also the languages of the Esquimaux, found also in North America. (2) The Southern Asiatic languages, comprising the Dravidian languages and the Singhalese. (3) The languages of Central Asia, which are divided into four large families: 1, the Ural-Altaic languages, comprising the Samoyede group, the Finnish, the Tartaric, the Mongolian, and the Tungusian group; 2, Japanese; 3, the language of Corea; 4, the monosyllabic languages, comprising the language of Thibet, the Himalaya languages, Burmese, Siamese, the languages of Anam, the languages of the Shan, Miaotse, Lolo, and other tribes, and the Chinese. (4) Some groups of the Caucasian family, comprising the languages of the Caucasus, the northern group of the Semitic languages; among these Chaldee, Syrian, Hebrew, etc., and the Indian and Iranian groups of the Indo-European languages.

History.—The ancient history of Asia may be divided into four great epochs, corresponding with the existence of the four world-empires—the Assyrian or Babylonian, the Medo-Persian, the Grecian, and the Roman, which last may be considered as extending to the period of the Mohammedan conquest, in A. D. 638. Christianity was introduced and established at the time of the highest power of the Roman empire.

The next division of Asiatic history, after the Roman, is that which comprehends what are usually termed the Middle Ages, extending from the beginning of the seventh to the end of the fifteenth century, when Vasco da Gama discovered a passage to India by the Cape of Good Hope. Not quite a century after Mohammed had fled from Mecca in 622, his religion, destined to exercise so great an influence in the East, had spread from the Red Sea to the Caspian, and from Tartary and India as far W. as the Atlantic. In 1037, Persia was conquered by Togrul Beg, and India, Tartary, Syria, and Egypt by his successors. Having taken Jerusalem, their cruelty to the Christian pilgrims called forth the Crusades. The dominion of the Saracens about the middle of the thirteenth century ultimately extended, under the sway of Kublai Khan, over the whole of Western Asia. The Crusades had contributed, in a more remarkable degree than formerly, to direct the mind of Europe towards Asia, and the result was the establishment of permanent commercial relations between them. About 1250 two Venetian noblemen, Nicolo and Maffio Polo, visited Asia as merchants, taking with them Nicolo's son, Marco, who afterwards became the most celebrated Asiatic traveller of the Middle Ages. He resided twenty-four years at the Tartar court, by which he was frequently employed as an ambassador, and during this time he traversed most of China, a considerable part of India, Java, Ceylon, and perhaps several other countries, making also a few voyages along the S. coast of Asia. He likewise collected much information concerning places which he never visited; and his correct description of countries formerly unknown to Europeans must be considered as having laid the foundation of modern Asiatic geography. Several other travellers also published notices of Asia, but their relations in general are full of fables; so that the partial knowledge of China and of portions of Northern and Central Asia, gleaned principally from the travels of Polo, with the discovery, by Rubruquis, that the Caspian is an inland sea, must be regarded as all the geographical knowledge that the Middle Ages had, in addition to that possessed by the ancients. The doubling of the Cape of Good Hope by Vasco da Gama in 1498 opened a new channel of intercourse with the East, and ultimately led to a more accurate and more extensive knowledge of its geography. From the end of the fifteenth century to the present time the history of Asia has gradually risen in importance, and the progress of its geography been much advanced. Within a few years after the arrival of Da Gama on the Indian coast the Portuguese had acquired a complete knowledge of the whole coast from Cape Comorin to the Bay of Cambay. At the death of their famous naval commander and hero, Albuquerque, in 1515, their colonies were established at various points on the Asiatic coast, and extended from the Cape of Good Hope to the empire of Japan, a distance of at least 12,000 miles. In 1600 a new and formidable enemy arose to the Portuguese in the Dutch, who by 1640 had subdued all the Eastern islands and seas, with the exception of some British settlements on the coast of Sumatra. During the protracted contest between the Dutch and Portuguese, the northern part of Asia, not previously known either to ancients or moderns, suddenly emerged from obscurity. Russia, having thrown off the Tartar yoke in 1461, proceeded to enlarge her dominion by the conquest of Kasan in 1552, and Astrakhan in 1555. In 1578 the Cossacks, having crossed the Ural range, entered Siberia, the discovery and survey of which were pursued so vigorously that in 1644 the mouth of the Amoor was reached, and in 1648 the separation of Asia from America by an open sea was proved. Somewhat later a complete geographical view of the vast empire of China and part of Central Asia was obtained from the Jesuits, who, having risen to high favor at Pekin, actually published a map of that country under the

MAP OF ASIA

Drawn and Engraved on Copper-Plate

EXPRESSLY

FOR

JOHNSON'S UNIVERSAL CYCLOPÆDIA

Scale of Miles

50 100 300 500 700 900

0 Long. East from 20 Greenwich 60 80 100 120 140 160 180

117 137 157 Longitude East from Washington 177 163 West 143

ARCTIC OCEAN
SPITZBERGEN
North Cape
Nova Zembla
KARA SEA
North East C.
Kotelnoi I.
New Siberia
Liakhoff I.
Wrangel I.
Arctic Circle
Archangel
ST PETERSBURG
Riga
Moscow
R. Volga
R. Dwina
R. Dniester
Warsaw
Vienna
Buda
R. Danube
Odessa
Cherson
Trieste
Rome
Constantinople
Athens
BLACK SEA
Sea of Azof
Crimea
R. Don
Astrachan
R. Ural
R. Volga
EUROPE
RUSSIA
Obdorsk
Turukansk
Yenisei R.
Surgut
Konjakofski
Mt. Ural
Vintka
Mt. Iaganai
Tobolsk
TOBOLSK
TOMSK
OMSK
Tara
Kolivan
Barnaul
Kuznetsk
Semipolatinsk
R. Irtish
Islim R.
Ob R.
Mt. Elburz
Mt. Ararat
ASIA MINOR
TURKEY
Smyrna
Trebizond
Angora
Tarsus
Aleppo
SYRIA
Tripoli
Jerusalem
Damascus
Palmyra
Euphrates R.
Tigris R.
Bagdad
Bassorah
Persian Gulf
Isthmus of Suez
CAIRO
EGYPT
Tropic of Cancer
River Nile
Mediterranean Sea
Sea of Marmora
Dardanelles
Archipelago
Ionian Sea
Gulf of Venice
Sea of Azof
Caspian Sea
Aral Sea
Kirghiz Tartars
Toorkistan
Khiva
Orus or Jihon R.
Samarcand
Bokhara
Tashkend
Khokand
Kashgar
Yarkand
Khotan
Ili R.
Tenerti L.
Balkash L.
Tian Shan Mts.
Kuchia
Khamil
L. Lop Nor
Great Sandy Desert
Taghurian Mts.
Tarbagtai
Ooliassootai
OUTER MONGOLIA
Jaongui Mts.
Orkhon R.
Toola R.
Selinga R.
Baikal or Holy Sea
Lake Baikal
IRKOUTSK
Krasnoyarsk
Yenisei R.
Ruchartsk
Karensk
Vitimskoi
Vitimsk
Olekminsk
Yakutsk
Aldan or Maulan Mts.
Jigansk
Lena R.
Ilensk
Kingsco
Nijnei Kolymsk
Stedni Kolymsk
Siberia
Arctic Circle
CHUKOTSKOI
Penjinskoe
KAMTCHATKA
Petropaulowski
Awatscha Bay
Behring I.
Copper I.
BERING OR KAMTCHATKA SEA
ALEUTIAN ISLES
Alaska Penin.
AMERICA
Behring Str.
Cape Prince of Wales
Cape Lisburne
Point Barrow
Mackenzie R.
Fort Simpson
Fort Good Hope
Fort Yukon
Fort Norman
Great Bear L.
Great Slave L.
Fort Resolution
Fort Chipewyan
Fort Vermilion
Fort Dunvegan
Fort Liard
Fort Simpson
Fort Halkett
Fort Nelson
Fort Simpson
Fort Liard

authority and at the expense of the Chinese government. The attention of the British had long been directed to Asia, and the discovery of the passage by sea gave them a new impulse. For many years following that event frequent voyages of discovery were made by British navigators, and several embassies and other journeys were performed by British subjects on land. But the formation, in 1600, of the East India Company, which ultimately established British authority in the East, has done more than any other event to extend our geographical knowledge in that quarter. At first the new information obtained was scanty, but from 1740, during the wars with the French in the Deccan, and more especially from 1757, after the conquest of Bengal, it rapidly increased.

The recent history of Asia has been under the controlling influence of Russia and England, both of which have, in the course of the last two centuries, and since the beginning of the nineteenth century, more rapidly than at any previous time, extended their boundaries, and are now indisputably the two great powers of Asia. Wherever they are allied they can dictate to the remainder of the Asiatic states; but as they are rivals for the ascendency, they zealously watch, and often try to check, each other's progress, especially in Central Asia, where the southern frontier of the Russian and the northern of the British are now separated by a comparatively small tract of land. Quite recently, France has gained a firm footing in Farther India, and the Netherlands are making great efforts to extend their rule over the islands of the Indian Archipelago. One of the most remarkable events in the recent history of the native states of Asia is the opening of Japan to a friendly intercourse with the civilized countries of Europe and America. Japan already is by far the most progressive among the native Asiatic states, and is likely to exercise a considerable influence upon the destinies of Eastern Asia. In China a powerful anti-foreign party desperately opposes the adoption of a similar policy, but there also the combined influence of the commerce, science, and religion of the Christian countries is smoothing the way for the beginning of a new era. Persia also has found it necessary to enter upon a reformatory career, and the journey of the shah to all the European courts—an event entirely unprecedented in the history of the country—has made a powerful impression upon the minds of the people. The advantages which Russia and England derive from the construction of railroads and telegraphs begin to be appreciated by all the native states. Considerable progress in this direction has already been made in Japan, and Persia in 1872 concluded a contract with Baron Reuter of London, which, if executed, would cover the whole country with a network of railroads. The connection of British India with Europe by railroad has for some time engaged the attention of engineers, and when, in 1873, Lesseps, the originator of the Suez Canal, came forward with a new scheme, great hopes of its speedy execution were entertained in scientific and commercial circles. The exploration of the interior of Asia has been very active since the beginning of the nineteenth century, and the unknown territory is at length confined within very small limits.

A. J. Schem.

Asi'ago, a town of Italy, in the province of Vicenza, 23 miles N. of Vicenza, is in a district called "Seven Communes." It has manufactures of straw hats and turned woodwork. Pop. 5140.

A'sia Mi'nor, the ancient name of a peninsula forming the western extremity of Asia, now called Anatolia (which see). It was bounded on the N. by the Euxine (*Pon'tus Euxi'nus*) and Propontis, on the S. by the Mediterranean, and on the W. by the Ægean Sea (*Ægе'um Ma're*). The principal divisions were Bithynia, Cappadocia, Cilicia, Galatia, Ionia, Lycaonia, Lydia, Lycia, Mysia, Pamphylia, Phrygia, Pontus, and Paphlagonia, which will be noticed under their own heads. The Mount Taurus range extends through the southern part, and Anti-Taurus through the northern. The principal rivers are the Halys (Kizil-Irmak), which rises in the eastern part and enters the Euxine; the Sangarius (Sakareeyah), which also flows into the Euxine; and the Meander, which enters the Ægean Sea. Here flourished many famous and powerful kingdoms of antiquity, and here many conquerors in successive generations contended for supremacy. "We are now," says Malte-Brun, "to tread upon a soil rich in interesting and splendid recollections, with an existing population completely debased by ignorance and slavery. The glory of twenty different nations which once flourished in Western Asia has been extinguished; flocks wander over the tombs of Achilles and Hector; and the thrones of Mithridates and Antiochus have disappeared, as well as the palaces of Priam and Crœsus. The merchants of Smyrna do not inquire whether Homer was born within their walls; the fine sky of Ionia no longer inspires either painters or poets; the same obscurity covers with its shades the banks of the Jordan and the Euphrates. . . . The wandering Arabian comes, indifferent and unmoved, to rest the poles of his tent against the shattered columns of Palmyra. . . . If, however, European arts and civilization were, by some new arrangement of Providence, to revisit this ancient cradle of the human race, we should still find there the charming coast of Ionia, with its picturesque islands; the fertile shores of the Euxine, shaded by inexhaustible forests; and in the distance the numerous chains of Mount Taurus, crowned with upland plains, representing on a small scale the vast plateaux of Central Asia."

William Jacobs.

Asiat'ic Soci'eties, societies formed for the promotion of the knowledge of the language, literature, and history of the Asiatic nations. The first society of this kind was established by the Dutch at Batavia in 1780. The next was the Royal Asiatic Society of Bengal, founded at Calcutta by Sir W. Jones in 1784. Among those of more recent date are the Société Asiatique, founded at Paris in 1822; the Royal Asiatic Society of Great Britain and Ireland, 1823; the Asiatic Society of Ceylon, 1845; the German Oriental Society in 1845; the Asiatic Society of China, established in 1847; and the American Oriental Society in 1842.

Asimago'my, a lake in Canada (Ontario), is about 12 miles long and from 2 to 4 miles wide. It discharges itself into the eastern extremity of Lake Superior by a stream about 36 miles long.

As'kew (Anne), a gentlewoman of high distinction in the reign of Henry VIII., and an intimate court-friend of his queen, Catharine Parr. She was the daughter of Sir William Askew of Kelsey, Lincolnshire. Falling a victim to the craft of Gardiner, she was attainted of heresy as a "fanatical Anabaptist," after an examination by Christopher Dare and Sir Martin Bowes, lord mayor of London. In the Tower she was tortured by the rack, Wriothesley, the lord chancellor, and Rich, inflicting this inhumanity with their own hands. Finally, being unable to walk to Smithfield, she was carried there in a chair, and her body chained to the stake, at which she was burnt in 1546.

As'mannshau'sen, a village of Germany, in Nassau, on the right bank of the Rhine, 2 miles N. W. of Rüdesheim. The red wine of Asmannshausen is highly esteemed, having a rare aromatic flavor and uncommon strength. It retains its fine qualities only about four years.

Asmode'us, or **Asmo'di,** a demon or evil genius, who, according to the apocryphal book of Tobit, killed the seven husbands of Sara. In the "Talmud" he is called the prince of demons. He is the same with Abaddon and Apollyon.

As'monæ'ans, or **Asmoneans,** a family of Jewish princes, partially identical with the Maccabees. The name was derived from Asmonæus, who lived about 300 B. C. His great-grandson, Mattathias, was a distinguished patriot and leader of a revolt against the king of Syria. He had several sons, who ruled over Judea and were called Maccabees (which see).

Asô'kă, Açoka, or **Ashoka,** an ancient king of Maghada, in India, was a grandson of Chandragupta (or Sandracottus). He reigned about 250 B. C., was converted to Buddhism, and erected a great number of monasteries. His dominion extended over the greater part of Hindostan.

Asp, or **As'pic** [Lat. *as'pis*; Gr. ἀσπίς], a species of venomous serpent mentioned by ancient writers. Some of these describe its bite as inevitably fatal, and as producing speedy death without pain. Modern naturalists identify it with the *Naja haje*, a species of hooded viper which is found in Egypt, and is from three to five feet in length. When it is irritated it dilates its neck. The figure of the *Naja haje* occurs on the sculptured monuments of the ancient Egyptians. The jugglers of modern Egypt cause it to dance to their music, and throw it into a cataleptic state. The name of asp is also applied to the *Vi'pera as'pis*, common in many parts of Europe, and frequent in Sweden and the neighboring countries. It is much dreaded on account of its bite.

Aspar'agus [Gr. ἀσπάραγος], a genus of plants of the order Liliaceæ, natives of Southern Europe and Africa. Its species are partly shrubs and partly herbaceous. They have a 6-parted perianth, six stamens, one style, and the fruit is a berry. The most important species is *Asparagus officinalis*, the common asparagus of gardens, which is a native of Europe, and is generally cultivated in Europe and the U. S. It was used as food by the ancient Romans. It grows to the height of four feet, and thrives best in a rich and deep soil. This plant is raised from the seed, and should not be used until about three years have elapsed after the planting of the seed. The perennial roots con-

tinue for many years to send up every spring a crop of tender shoots, which, after having attained the height of a few inches, are cut a little below the surface of the ground. A peculiar principle called *asparagine*, $C_4H_8N_2O_3$, is obtained from these shoots, and also from the root of the marshmallow.

Aspar'tic Ac'id ($C_4H_7NO_4$), an acid obtained by the decomposition of asparagine, or by the action of heat upon ammonic malate, maleate, etc.

Aspa'sia [Gr. Ἀσπασία], a celebrated woman of ancient Greece, remarkable for her genius, beauty, and political influence, was born at Miletus, in Asia Minor. She became in her youth a resident of Athens and the mistress of Pericles. Her house was a celebrated resort for the most eminent Athenians, including Socrates, who professed to be her disciple. She had a high reputation for talent, and a report obtained currency that she composed part of the great funeral oration which Pericles pronounced over the Athenians who fell in battle about 430 B. C. Having been accused of impiety by Hermippus, a comic poet, she was defended by Pericles and acquitted. After the death of Pericles she was married to Lysicles. There is extant an antique bust inscribed with the name of Aspasia. (See Burigny, "Vie d'Aspasie;" Plutarch, "Life of Pericles.")

Aspasia the Younger, an Ionian lady whose original name was Milto. She became the favorite mistress of Cyrus the Younger, who changed her name to Aspasia. She was distinguished for beauty and intellect. She was taken captive by King Artaxerxes at the battle in which Cyrus was killed, 401 B. C., and was consecrated by him as a priestess of Anaitis.

Aspa'siolite, a greenish mineral from Krageröe, Norway. It is a hydrated silicate of alumina and magnesia, and is a variety of fahlunite.

As'pe, a town of Spain, in the province of Alicante, 15 miles W. of Alicante. Here are numerous flour-mills, about twenty oil-mills, several soap-factories, and distilleries of brandy. Pop. 6700.

As'pect [Lat. *aspec'tus*], look, appearance, countenance. In astrology, the position of one planet with respect to another. Aspect is defined by Kepler as "the angle formed by the rays proceeding from two planets, and meeting at the earth." The ancients reckoned five aspects—namely, conjunction, indicated by the symbol ☌; opposition, by ☍; trine, by △; quartile, by □; and sextile, by ⚹. Planets in conjunction have the same longitude; in opposition the difference of their longitude is 180°; the aspect is trine when they are 120° apart, quartile when they are 90° apart, and sextile when they are 60° apart.

As'pen, a village of Uintah co., Wy., near the S. W. corner of the Territory, and on the Union Pacific R. R., 29 miles E. of Wahsatch. Coal is mined in the vicinity. The station is 7463 feet above the sea.

As'pen, or **Tremulous Poplar** (*Pop'ulus trem'ula*), a tree of the natural order Salicaceæ, is a native of Europe and Western Asia. It is remarkable for the mobility of its leaves, which, having long petioles laterally compressed, are caused to flutter by the gentlest breath of air. The wood is soft and light, is used to make trays and pails, and is valuable timber for the interior of houses. The name of aspen is also applied to the *Populus tremuloides* and *grandidentata*, natives of the U. S., resembling the European aspen in the proverbial quivering of their leaves.

Aspergil'lum, a remarkable genus of tubicular bivalve mollusks, characterized by the soldering of both valves to the inner surface of the calcareous sheath. The shell has the form of an elongated cone, the larger end of which expands into a disk, which is pierced by many small tubular holes. Hence it derives its popular name of "watering-pot." The animals of this genus are borers, which live in sand. They are chiefly found in the Indian and South Pacific oceans. Others have been found fossil in Europe.

As'pern, or **Gross Aspern,** a village of Austria, on the left bank of the Danube, 5 miles E. N. E. of Vienna. Aspern, with the adjacent village of Essling, was the scene of a great battle between Napoleon and the Austrian archduke Charles after the French army had taken Vienna. The French crossed the river by a bridge which they constructed at the island of Lobau, and began the attack on the 21st of May, 1809. After half of the French had crossed the river, the Austrians assumed the offensive. Both of the villages were taken and retaken, and the day closed without a decisive result. The fight was renewed on the 22d, when, after great slaughter, Napoleon retreated to the right bank of the river, having lost about 7000 killed and 30,000 wounded and prisoners. The Austrians lost about 20,500 killed and wounded.

As'phalt [Gr. ἄσφαλτος; Lat. *asphal'tum*] is a solid bituminous substance, often called **Mineral Pitch** or **Native Pitch.** (See Bitumen, by Gen. Q. A. Gillmore, U. S. A.)

Asphal'tic Coal, a name given to certain coal-like substances which are found filling irregular cavities and fissures, generally of the older rocks. They have been often classed as coals, but differ in composition and geological position from all true coals. They are not stratified, but fill fissures into which they have evidently flowed when in a fluid or plastic state. They are, in fact, ancient asphalts, which have become more compact and drier—*i. e.* containing less oil and gas—in the lapse of ages. These asphaltic coals are found in carboniferous rocks in New Brunswick and West Virginia, and in Devonian strata in Ohio and Kentucky.

As'phodel (*Asphod'elus*), a genus of herbaceous plants of the order Liliaceæ and sub-order Asphodeleæ, nearly related to the asparagus and onion. They are natives of Barbary, Sicily, Greece, and other parts of the Levant. Several species are cultivated in gardens for the beauty of their flowers, as the *Asphodel luteus* (yellow asphodel). The *Asphodel ramosus* is said to be the flower which Homer describes as growing in the meadows of Elysium. It is now abundant in Apulia. The ancients imagined that the manes of their friends fed on its roots, and they planted it near their tombs.

Asphyx'ia [from the Gr. *a*, priv., and σφύξις, the "pulse"], originally meaning cessation of the motion of the heart, has by usage come to signify arrest of breathing (properly *apnœa*) by suffocation or strangulation. It occurs in drowning, by water excluding air from the lungs; in hanging or choking, by the compression of the windpipe, preventing the entrance of air; in the presence of certain gases, as chlorine or pure carbonic acid, by spasmodic closure of the glottis or entrance to the windpipe. It has been proved by careful observations that after death by asphyxia the left cavities of the heart are empty, and the right distended with blood. This is owing to the fact that venous blood, not renewed by exposure to the oxygen of the air, will not circulate through the lungs, thus being forced to accumulate in the right or venous side of the heart. The mode of treatment of asphyxia must depend on its cause. (See Drowning.) In partial strangulation, abstraction of blood in moderate amount may unload the heart and promote the movement of the blood, after the cause of obstruction has been removed. For asphyxia from irrespirable gases the first necessity is a supply of pure air. When the heart has almost or quite ceased to beat for a few moments, life is sometimes restored by artificial Respiration (which see), or by application of galvanic electricity to the chest.

Asphyx'iants [from *asphyx'ia*, "suffocation"], chemical compounds enclosed in bombs or other projectiles, and designed to suffocate or poison the enemy, especially in naval warfare, where men are confined between the decks of a ship. These barbarous inventions are discountenanced in honorable warfare.

Aspidich'thys [from the Gr. ἀσπίς, a "shield," and ἰχθύς, a "fish"], a genus of fossil fishes, described by Dr. Newberry, from the Devonian rocks of Ohio. It is allied to *Pterichthys*, but is very much larger. The middle dorsal plate of the carapace is a foot wide and a foot and a half long, more than an inch thick at the centre, and its external surface is studded with smooth enamel tubercles as large as split peas.

As'pinwall (called **Colon** by the natives), a seaport of Central America, is situated on the N. side of the Isthmus of Panama, and on Navy Bay, 48 miles by rail from Panama, on the Pacific Ocean; lat. 9° 21′ N., lon. 79° 54′ W. It was founded in 1852 by the Panama R. R. Company, and is the northern terminus of the Panama R. R., which was opened in 1855. It has a good harbor, which is deep enough for large ships, and has several large hotels. Aspinwall was formerly a great thoroughfare of the travel between California and the Atlantic States. Steamers ply frequently between this place and New York, which is about 2000 miles distant. Pop. in 1869, 4000.

Aspinwall, a post-township of Nehama co., Neb. Coal is found here. Pop. 572.

Aspinwall (William), M. D., born in Brookline, Mass., May 23, 1743, graduated at Harvard in 1764, and subsequently took his medical degree in Philadelphia, became a surgeon in the Revolutionary army, and after the war was a prominent Jeffersonian politician in Massachusetts. He practised medicine with great success, and was distinguished for the practice of "inoculation" and his early adoption of vaccination. Died April 16, 1823.

As'pirate [from the Lat. *as'per*, "rough"] denotes in pronunciation a rough breathing, similar to the sound of the letter *h*. It occurs with various degrees of intensity,

being sometimes almost as strong as the German *ch*, at others so slight as to be scarcely perceptible. In Greek grammar it is commonly called *spiritus asper* ("rough breathing"), and is marked thus (῾), in contradistinction to the *spiritus lenis* ("smooth breathing"), represented thus (᾽). Οἱ Ἕλληνες would be represented in English letters thus: *Hoi Hellēnes*.

As′pirator [from the Latin verb *aspi′ro, aspira′tum*, to "breathe," or "breathe on or into," from *ad*, "to," and *spiro*, to "breathe"], an apparatus used by chemists to draw air or other gases through bottles or other vessels. It is a tight vessel filled with water, having a tube with a stopcock connected with the upper end, and another tube with a stopcock connected with the lower end. The former tube is attached to the vessel through which the gas is to be drawn; the stopcocks are both opened, and the weight of the water issuing from the lower tube acts as a suction, and draws in the gas.

As′pis, or **Clu′pea,** an ancient and important fortified city of the Carthaginians, on the Mediterranean, about 50 miles E. of Carthage, was founded about 310 B. C. It was the place where Regulus landed in the first Punic war, and was a distinguished episcopal see from 411 to 646 A. D. It was the last spot on which the African Christians made a stand against the Saracens. Remarkable ruins are to be seen there.

Aspromon′te, a mountain at the south-western extremity of Italy, 16 miles E. N. E. of Reggio, 6300 feet high. Here Garibaldi and the greater part of his army were taken prisoners in Aug., 1862.

Aspropot′amo (*i. e.* "white river"), the ancient *Achelous*, the largest river in the kingdom of Greece, rises in Albania. It flows in a S. S. W. direction, and after a course of about 100 miles enters the Mediterranean (or Ionian) Sea nearly 15 miles W. of Missolonghi.

Ass, or **Don′key,** a quadruped of the genus *Asinus* and family Equidæ. It is characterized by long ears, a black cross over the shoulder, and short hairs on the

The Ass.

upper part of the tail. It is remarkable for its patience, stolidity, and power of endurance, and has been the domesticated drudge of man from time immemorial. The ass is probably a native of Central Asia, as it is now found wild in that region. Vast numbers of the wild-ass (which the Romans called *onager*) roam over the great Asiatic deserts and steppes, feeding on saline herbage. They also inhabit Persia, Asia Minor, and Syria. An interesting notice of this animal is given in the thirty-ninth chapter of Job. The wild-ass is a high-spirited animal of extraordinary speed, and is one of the principal objects of the chase in Persia, where its flesh is highly esteemed as food. This animal (supposed to be the *Equus hemionus* of Pallas) surpasses the horse in swiftness of foot. There appears to be some doubt whether the domesticated ass is descended from this wild animal, so much superior in speed and other qualities. In Oriental countries the custom of riding on the back of the tame ass is very common; and the Old Testament informs us that it was thus used by patriarchs and kings in the earliest times. The asses which are raised in Syria and other parts of the East are a better breed than those of Europe. The animal is not much employed in the U. S., except for the propagation of mules, which are the hybrid progeny of the ass and mare. Being very sure-footed and able to live on scanty fare, the ass is well adapted for service as a beast of burden in rocky and mountainous regions. Its milk is recommended as a diet for dyspeptic and consumptive patients. The proverbial stupidity of the ass seems rather due to its patience and endurance than to any particular want of intelligence.

Assafœt′ida, or **Asafœtida** [from *asa*, an Oriental word said to signify "gum," and the Lat. *fœ′tidus*, "fetid"], a gum-resin or the concrete juice of the root of *Narthex assafœtida* (the *Ferula assafœtida* of Linnæus). It is a native of Persia and Afghanistân, has a peculiar and disagreeable odor, and is extensively used in medicine as an antispasmodic. It is considered an efficacious remedy for hysteria, nervous diseases, and spasmodic pectoral affections. In many parts of Asia it is used as a condiment.

Assai, a beverage which is commonly used on the Amazon, and is prepared from the fruit of *Euterpe oleracea* and other species of palm nearly related to the cabbage-palm. The fruit is nearly equal in size to a sloe, and consists of a hard seed enclosed in a thin covering of firm pulp. The assai, a thick creamy liquid of a purplish color, is composed of this pulp and water.

Assal′, a salt lake of Eastern Africa, 25 miles S. W. of Tajura, is about 760 feet below the level of the sea. It is 8 miles long and 4 miles wide, and has an area of 20 square miles. The shores are covered with crusts of salt about a foot thick. Large quantities of salt are carried hence by caravans to Abyssinia.

As′sam, a province or district of Farther India, borders on China, forming part of the valley of the Brahmapootra. It is included between lat. 25° 45′ and 28° 15′ N., and between lon. 90° 35′ and 96° 50′ E. The area is 21,805 square miles. It is well watered by numerous rivers, has a fertile soil, but a large part of it is swampy and subject to inundation. The staple products of the soil are rice, tea, cotton, opium, and mustard. Gold, silver, and precious stones are found here. The rainy season lasts about six months, from April to October, during which time the whole country is inundated. The large and dense forests of Assam are infested by great numbers of elephants, tigers, leopards, rhinoceroses, buffaloes, etc. Assam was ceded to the British by Burmah in 1826. The religion of the Assamese is Brahmanism. Pop. 710,000.

Assas′sin [for etymology see below], one who attacks and kills by treachery or surprise a person who is unprepared for defence. The word was originally the name of a fanatical sect or order, the disciples, it is said, of Alo-ed-Deen (Aloaddîn), commonly called Sheikh-el-Jebel, or the

"Old Man of the Mountain." The first founder of the order is said to have been Hassan-ben-Sabah, who flourished in Persia about 1080 A. D. According to some writers, they were called Assassins from their immoderate use of hasheesh (or hashîsh), an intoxicating drug obtained from Indian hemp. Hassan-ben-Sabah and his followers gained possession of several fortified castles in the mountainous parts of Persia, and intimidated princes and governors by a series of secret murders. The order consisted of members of several degrees, the lowest of which were *Fedavies* or *Fedais* (*i. e.* the "devoted"), who were not initiated into the secret doctrines and mysteries, but with blind obedience executed the bloody orders of the prince or Old Man of the Mountain, who was their absolute ruler. They mustered about 50,000 fighting men in the time of the Crusades, and sometimes came into collision with the crusaders. Hassan-ben-Sabah died about 1125. One of his successors was assassinated about 1163 by his brother-in-law, because he extended to the whole order an exemption from the commands of the Koran, which exemption had before been the exclusive privilege of the initiated. Alo-ed-Deen (Aloaddîn), the famous chief of the Assassins, is supposed to have been born about 1210. According to some authorities, this order was suppressed or dispersed by the sultan Bibars. (See Von Hammer (Hammer-Purgstall), "Geschichte der Assassinen," 1818; Weil, "Die Assassinen" in Sybel's "Histor. Zeitschrift," 1863.)

Assault' [from the Lat. *ad*, "upon," and *salio, saltum*, to "leap"], in law, an attempt or offer with force and violence to do a corporeal hurt to another, as by striking at him with or without a weapon. It is often coupled with the word "battery," which means the act of carrying the assault into effect. Every battery includes an assault, but the converse is not true. In order to constitute an assault there must be a present ability to carry the threat into effect. Thus, if the hand of a person at rest were raised against another at such a distance that no blow could be inflicted, there would be no assault, while if there were a weapon in the hand there might be. Assaults are either simple or with intent to commit some other criminal act, as to kill, rob, or ravish. Assaults of this class are frequently punished with severity by statute law, and are themselves declared to be felonies, though the principal offence is not committed. A simple assault is a mere misdemeanor. There are many instances in which an assault is justifiable, as in self-defence, and in arrest by officers, and in the punishment of children and apprentices. Even in these cases undue force must not be used, and if that which is reasonable under all the circumstances be exceeded, the party resorting to the force will be a wrong-doer.

Assault, in military language, is a sudden and vigorous attack of a fortified post or camp, or an effort to carry by open force a breach which has been made in a fortress. In the regular routine of sieges (as they *were* formalized, for recent changes in the art of fortification and in the character of firearms have rendered the old rules somewhat inapplicable) the "assault" is one of the last scenes of the drama called a "siege." In the regular siege the assault (if, instead of gaining the breach by covered "approaches," it is decided to resort to it) is delivered after the outworks are captured, and one or more "breaches" formed (by "breaching batteries") in the body of the place. It is usually performed by picked troops or volunteers (sometimes called a "forlorn hope"), who, at a concerted signal (upon which the besiegers' artillery ceases to fire), issue from the contiguous parallels or places of arms, descend into the ditch, and advance rapidly and without much order, but without firing, upon the breach. "Firing parties" are stationed in neighboring parallels to keep down the fire of the besieged, and "supports" are close at hand to follow up the assaulting party, if successful in effecting an entrance.

Under Louis XIV. commandants of besieged places were forbidden to capitulate before receiving *three* assaults. Under Napoleon it was declared dishonorable and punishable with death to capitulate before receiving at least one assault. According to Vauban and the "schools," the open assault is a "useless massacre," which, if successful, results only in the demoralization of the troops, the sacking of the place, and the destruction of resources valuable to the besiegers. Nevertheless, it is sometimes compulsory, as in the case of the assault of Constantine (1837) by the French, with a loss of 500 out of 1750. In Spain the English army delivered terrible assaults, as those at Badajos (1812) and St. Sebastien (1813); the loss at the former (which failed, the place being entered by *escalade*) cost 3700 men, and the latter (successful) 2000, killed and wounded. The bloody assault by which the siege of Sebastopol was terminated Sept. 8, 1855, was necessitated by the fact that the "approaches" could be pushed forward no farther. This so-called siege differed from an ordinary siege in this, that "the difficulty was to *conquer the Russian army* upon a ground preferred beforehand, quite as much as to surmount the material obstacle presented by the fortifications" (*Niel*). The allied loss in this assault (killed and wounded) was nearly 10,000; that of the Russians, 11,700 men; thus terminating a siege of eleven months' duration, and which cost the besiegers 150,000 and the Russians 84,000 men.

The protracted duration and fearful losses at this siege, though it cannot be taken as strictly typical of the changed character of modern siege warfare, are not without their confirmatory bearing upon the *dictum* of Col. Brialmont, one of the most accomplished and authoritative of European engineers (*Études sur la défense des États*), that "the advantage is no longer on the side of the besiegers, and that in *great places*, where materials, provisions, and men are never lacking, the superiority is incontestably acquired for the defence." And he adds: "Conclusion most encouraging to small states, and to those which limit their ambition to the worthy aim of preserving intact and developing their independence, their wealth, and their liberties."

J. G. Barnard, U. S. A.

Assay', or **Assay'ing** [from the Fr. *assayer*, to "try"]. This term, which is applied to metals or metallic compounds, is sometimes employed as synonymous with analysis, but more generally restricted to the process of ascertaining the proportion of gold or silver in an alloy, or of pure metal in a metallic ore. Silver plate and manufactured articles of gold and silver generally contain an alloy of copper or other metal. (See Alloy.) In Great Britain, each article, before it is sold, is assayed at Goldsmiths' Hall, so as to determine the proportion of precious metal in its composition. The process of assaying gold and silver depends on the principle that those metals cannot be converted into oxides by union with the oxygen of the air, while the baser metals with which they are alloyed can be oxidized if raised to a high temperature. The apparatus employed in this process consists of a *cupel*, a small shallow vessel made of bone-ash, and a *muffle*. The latter is made of fire-clay, is about eight inches long, three or four inches in diameter, and is shaped like a railway tunnel (that is, having a flat bottom and an arched top); it is open at one end and closed at the other, and has several apertures in its sides for air to pass through. Weighed fragments of mixed silver and lead are placed on cupels, which, introduced into a muffle, are exposed to the heat of a furnace until the metals are melted. The oxygen of the air unites with the lead, forming an oxide, which is partly volatilized, and partly absorbed by the porous cupel. At the end of this process of *cupellation* there remains a globule of pure silver, which by its diminished weight shows how much alloy was contained in the sample. During the assay of silver by the foregoing process, called the *dry method*, a small loss of silver occurs. For this reason the *humid* process has been adopted in the mints of France, of the U. S., and of other nations. This method consists in dissolving the compound or impure silver in nitric acid of density 1.25, and adding a solution of common salt (NaCl), which causes the precipitation of the chloride of silver (AgCl) in white flocculi. The solution of salt is made of a definite strength, and is poured out of a graduated vessel until all precipitation of pure silver ceases. The assay of gold ores or impure gold is performed in a manner similar to that of silver. If gold alloyed with copper is to be assayed, some silver must be added to the alloy. The alloy of the three metals, gold, silver, and copper, may be assayed by cupellation, by which the copper is oxidized and the gold and silver remain combined. These may be separated by a process called *parting*, which, however, is only practicable when the alloy contains three parts of silver to one of gold. The parting or quartation consists in acting on the alloy by hot nitric acid, which dissolves the silver, forming the soluble nitrate of silver, and leaves the gold in a solid and separate state. As no ore of gold or artificial alloy contains so much silver as three to one, it is necessary to incorporate an additional quantity of silver with it. This is done by wrapping the proper quantities of gold and silver in lead-foil, and heating them on a cupel. The metallic button which is the result of this cupellation is hammered on an anvil, and rolled into a thin plate or ribbon, which is coiled up and called a *cornet*. This is exposed in a glass vessel to the action of nitric acid, which, dissolving the silver, leaves a brown, spongy mass of gold. It is then heated in a crucible, annealed, and weighed. As jewelry and other articles cannot be assayed either by the dry or humid method without injuring their form, their purity is ascertained by the use of the *touchstone*, with which a streak is drawn on the surface of the gold. Black basalt is one of the minerals used as a touchstone. (For special methods of assay, see the respective metals.)

William Jacobs.

Asseman'ni (Giuseppe Simone), bishop of Tyre *in partibus*, a learned Maronite, born at Tripoli, in Syria, in

1687. He was sent in 1715 by the pope to Syria and Egypt to collect manuscripts, and was keeper of the Vatican Library (1738–68). He published a valuable work on Syrian literature, entitled "Bibliotheca Orientalis Clementino-Vaticana" (4 vols., 1719–28). Died Jan. 14, 1768.—His nephew, STEFANO EVODIO, an Orientalist, born at Tripoli in 1707, was educated at Rome. He was archbishop of Apamea *in partibus*. He succeeded his uncle, Giuseppe Simone, as keeper of the Vatican Library, in 1768. He published several catalogues of Oriental manuscripts. Died in 1782.

Assem'bly, in politics, a convention or body of men associated for civil or legislative business, and possessing more or less political power. In some of the U. S. the term is applied to the lower branch of the legislature, and the other house is called the senate. At the beginning of the French Revolution, the members of the *Tiers État* (Third Estate), who had been chosen to represent the common people in the States-General, assumed (Jan. 17, 1789) the title of *Assemblée Nationale*, and, having been joined by the more liberal members of the nobility and clergy, proceeded to frame a new constitution. The court denied their authority, and made a not very vigorous effort to dissolve the Assembly, but failed, and finally yielded to the popular current. This body, which was termed the Constituent Assembly, formed a constitution which was accepted by the king, and, having ordered the election of a legislative assembly, dissolved itself Sept. 30, 1791. The Legislative Assembly, from which all members of the Constituent Assembly were expressly excluded, met Oct., 1791, and continued to undermine or defy the royal authority, which was abolished Aug. 10, 1792. Having convoked a *National Convention*, the Assembly closed its labors and existence Sept. 21, 1792. The formation of the second French republic (Feb., 1848) was followed by the election of a National Assembly, which met in May of that year, and, having formed a constitution, transferred its power to the Legislative Assembly. This body was dissolved or abolished by the *coup-d'état* of Dec. 2, 1851. The third republic was proclaimed Sept. 4, 1870, but, on account of the presence of German armies in France, the election of deputies was postponed until the armistice, which began just after the capture of Paris, Jan. 30, 1871. The National Assembly met at Bordeaux in Feb., and elected Adolphe Thiers as *chef du pouvoir exécutif* ("chief of the executive power").

Assembly, General. See GENERAL ASSEMBLY.

As'sen, capital of the Dutch province of Drenthe, 16 miles S. of Groningen, is connected with the Zuyder-Zee by the Drenthe Canal. In the neighborhood are tumuli mentioned by Tacitus. Pop in 1867, 6443.

Asses'sor [Lat. *asses'sor*, from *assid'eo, asses'sum*, to "sit beside," to "assist"] is applied in England to a person, usually a lawyer or jurist, who is appointed to advise the judge and direct his decisions. In several inferior courts assessors are appointed by statute. The burgesses of every borough are required to elect annually two assessors, who assist the mayor in revising the burgess lists and in presiding at the municipal elections. In some of the U. S. an assessor is a person elected by the people to assess or appraise all taxable property, in order that the owner of the same may pay a tax proportioned to its value. This valuation or appraisement is called assessment. The assessed value is usually less than the real, or less than the price for which it could be purchased.

As'seteague Island, off the E. coast of Northampton co., Va., to which it belongs, has a brick lighthouse, 129 feet high, standing 2 miles from the S. W. extremity of the island and showing a fixed light of the first order, 150 feet above the sea, in lat. 37° 54′ 37″ N., lon. 75° 21′ 04″ W.

As'sets [from the Fr. *assez*, "enough"], in law, denotes the property in the possession of an heir or under control of an executor, administrator, or trustee, applicable to the payment of debts and charges against the estate which they represent. It is mainly applied to the case of heirs, executors, and administrators. Assets are either real or personal. Real estate is assets in the hands of an heir; personal property, in like manner, in those of an executor or administrator. If the real estate is devised to an executor, he takes it as trustee. Assets are also distinguished into legal and equitable, the first being under the control of a court of law, and the second administered by a court of equity; and the two courts are not governed by the same rules. In the U. S. this last distinction is by reason of statute law of little consequence, as all the estate of a deceased person becomes a fund for the liquidation of his debts, according to a prescribed statutory order. The distinction between real and personal assets is still of importance, as it is a general rule that real estate is not to be taken for the payment of debts until the personal property is exhausted. A testator may by a sufficiently clear direction in his will avoid the effect of this rule, and make his real estate the primary fund for the payment of his debts.

Assh'ur, or **Ash'ur,** an ancient and populous city, capital of Assyria, on the Tigris, 40 miles below Calah, and 60 miles S. of Nineveh. Its site is marked by extensive ruins at Kileh-Sherghat. Here is a large square mound or platform two and a half miles in circumference, about 100 feet above the level of the plain, and composed in part of sun-dried bricks. Cuneiform inscriptions of great interest have been found here.—A son of Shem was also called ASSHUR, from whom the name of the city was derived.

Assien'to, a Spanish word applied to treaties or contracts which the government of Spain made with several foreign nations for the purpose of supplying her colonies with negro slaves. The first of these assientos was made with the Flemings, in the reign of the emperor Charles V. The Genoese obtained the contract in 1580. The privilege was transferred to the Portuguese in 1696, and to the French in 1701. The English acquired it by the treaty of Utrecht, 1713, but resigned or sold it to Spain about 1750, since which no such contract has been made.

Assignat, paper money issued by the French government in 1790, and at subsequent periods of the revolutionary régime. It was based on the security of the national domains, which consisted of the confiscated estates of the Church and wealthy *émigrés*. The total amount of assignats issued was 45,578,000,000 francs. The public credit having been ruined by the reign of terror and anarchy, the value of the assignats declined lower and lower. In June, 1793, one franc in silver was worth three francs in paper. The government, in order to check their depreciation, passed a law to fix the maximum prices of commodities, the effect of which law was very injurious to trade. In Mar., 1796, one franc in gold was equivalent to three hundred francs in paper. In July of that year the assignats were recalled, and replaced by the *mandats*.

Assign'ment [from the Lat. *assigno*, to "appoint"], in law, the act of making over to another one's estate or interest. The person making the assignment is an *assignor;* the recipient is an *assignee*. The word is mainly used in reference to transfers of leases, incorporeal rights, such as copyrights and patents, and rights of action. Such transfers are to some extent by statute law required to be in writing. It is a rule of *common law* that a thing in action is not assignable, though this doctrine is not followed in a court of *equity*, an assignment being regarded in that court as in the nature of a declaration of trust, so that the assignor becomes a trustee for the assignee. There are some exceptions to this rule, as in the case of mere personal causes of action and cases where public policy intervenes. Such an assignee simply takes the rights of his assignor, and holds subject to any defences which the debtor could urge against his creditor. There is a class of things in action not subject to this infirmity, such as bills of exchange, promissory notes, checks upon banks, and public securities payable to order or bearer. He who purchases these in good faith and before maturity, for a valuable consideration, may shut out for the most part the defences which might have been urged against the payee. Such paper is termed negotiable. In this way the distinction between that which is negotiable and that which is assignable becomes of great practical consequence. It is a frequent practice on taking an assignment of a claim to obtain a statement from the debtor that he has no defence to it. He would then be precluded from setting up any that he might have on the doctrine of estoppel.

The word "assignment" is also used to indicate the act of setting apart dower for a widow in the real estate of her husband. It is also employed in case of bankruptcy or insolvency, to indicate the act of transfer of a failing debtor's property to a person called an assignee, who is substantially a trustee for the benefit of the creditors. A failing debtor by the laws of some States is permitted to make a voluntary and even preferential transfer to an assignee acting in the same general manner, though such laws are substantially superseded for the time being when there is a U. S. bankrupt law in operation.

T. W. DWIGHT.

Assi'si [Lat. *Assis'ium*], a town of Italy, province of Perugia, is built on a steep hill, 13 miles S. E. of Perugia. It is surrounded by a wall flanked with towers, and has a cathedral built in the eleventh century, and many monasteries. It is the native place of Saint Francis. Here is a large and beautiful Gothic structure called Convento Sacro, which is adorned with fine paintings. Among the remains of the ancient Assisium is a beautiful portico of the temple of Minerva. Pop. in 1861, 3333.

Assis'tance [from the Lat. *ad*, "near," and *sisto*, to "stand"], **Writ of,** a direction by the court of chancery to the sheriff to put a party in whose favor a decree has been

rendered in possession of land to which the decree has declared him to be entitled.

Assize [from the Lat. *assideo*, to "sit near"], the name of an ancient English court; a writ to recover the possession of a freehold. The word is used in the plural to denote the stated sittings of the judges of the superior courts in England in the various counties, by virtue of several commissions, to try civil and criminal cases.

Asso'ciated Press, an association of newspapers in the U. S. for the collection of news. Its principal centre is at New York, but there are subordinate centres, as at Cincinnati, Chicago, and Washington, to which items of news are transmitted, to be there condensed and distributed to the various journals. Besides this, there are rival associations which perform a similar work. In Europe the Baron Reuter has almost a monopoly of this kind of business, but American journals have always opposed the establishment of his system on this continent.

Asso'ciate Pres'bytery, in Scotland, dating from 1733, founded in opposition to aristocratic dictation in the settlement of ministers. In 1747 a split occurred on the question of the "Burgess Oath," resulting in the formation of the ASSOCIATE SYNOD and the GENERAL ASSOCIATE SYNOD. In 1820 this schism was healed, only a few ministers, belonging to the GENERAL ASSOCIATE SYNOD, protesting against the union. (See UNITED ORIGINAL SECEDERS and UNITED SECESSION CHURCH.)

ASSOCIATE REFORMED SYNOD OF NEW YORK, composed of two presbyteries which refused to join the UNITED PRESBYTERIAN CHURCH, formed in 1858 by bringing together the Associate and Associate Reformed churches. In 1860 they reported 16 ministers, 14 churches, and 1631 members; in 1867 they reported only 11 ministers.

ASSOCIATE REFORMED SYNOD OF THE SOUTH, a small Presbyterian body which in 1860 reported 68 ministers, in 1867, 65, and in 1872, 67.

ASSOCIATE SYNOD OF NORTH AMERICA, like the Associate Reformed Synod of N. Y., persons who declined the union of the Associate and Associate Reformed churches in 1858. In 1860 they reported 11 ministers, 32 churches, and 778 members, chiefly in Indiana, Illinois, and Iowa; in 1867, they reported 14 ministers, 40 churches, and 1221 members.

Associa'tion [from the Lat. *ad*, "to," "together," and *so'cius*, a "companion"], a union of persons; a company; a society formed for the transaction of some business for mutual advantage; a company formed for the advancement of science or literature.

Associa'tion, British, the title of an annual reunion of the most eminent scientific men of Great Britain, who meet at different places, and report the progress and new discoveries made in their respective departments of science. The American Association for the Advancement of Science was formed in 1847.

Association of Ideas (otherwise called **Mental Association,** or simply **Association, Suggestion, Connection of Ideas, Train of Thought, Succession of Thoughts**), etc., a principle or law in mental philosophy exercising an important influence upon the operations of the mind. "When a traveller visits the ruins of Athens or of Rome, the plain of Pharsalia or of Marathon, the sight of these places awakens the memory of the men and of the deeds which have made them glorious." The names of the great recall their achievements. A portrait revives similar memories, and calls up emotions which might have seemed dormant for ever.

> "It may be a sound,
> A tone of music, summer's eve, or spring,
> A flower, the wind, the ocean, which shall wound,
> Striking the electric chain."—*Byron.*

These facts rest upon the reciprocal power of thought to evoke thought. Under this power arises what is called the association of *ideas*, but its law is the law of intellectual gravitation—its sphere is the universe of mind. It is wider than "ideas," and extends to all our mental modifications. Our cognitions, emotions, and active powers, all come under the law of association. Our feelings, our willings, and our efforts are as completely held in groups by internal bonds as our ideas are.

Association may connect ideas by a simple link or by a multitude of links. The idea of the civil war of England prompts the question, "What is the value of a Roman denarius?" There are no two thoughts so remote as to have no link. Association has, therefore, infinite possibilities.

The laws of association have been variously enumerated. Some of the most obvious and important are—

1. Simultaneity and succession, synchronism and chronology. Thus, Cæsar and Pompey, Luther and Leo, Charles I. and Charles II.; Aristotle back to Plato, Descartes on to Spinoza.

2. Contiguity and remoteness between ourselves and the things, or between the things themselves: New York and Brooklyn, ourselves and our antipodes. We think of Mercury as nearest the sun, and that suggests Neptune as the farthest off.

3. Resemblance and contrast to the eye in works of art, which recall the original to the mind: metaphor; punning rests on the association of sounds that resemble with things that differ. Night recalls day, sickness recalls health, war recalls peace.

4. The logical relations involve association of ideas, though not all association of ideas is logical: cause and effect, workmen and work, father and child, the universe and God, object and means, analogy, premiss and conclusion, part and whole. The relations of physical, mechanical, and cosmical order are of the same kind, and hence association is the mother of invention and discovery.

5. The association of the verbal sign with the thing signified, which is the essence of language and the necessary preliminary to reasoning. Two or more of these causes may co-operate in particular cases, or the thing may in one aspect give rise to one association, in another aspect to another. Aristotle reduces the principle of association to three parts: Proximity in time and contiguity in place as one; resemblance, contrast. Hume says: "There appear to be only three principles of connection among ideas—namely, resemblance, contiguity in time or place, and cause or effect. A picture naturally leads our thoughts to the original (resemblance); the mention of one apartment introduces an inquiry concerning the others (contiguity); we think of a wound and the pain which follows it (cause and effect)." Augustine reduces the principle to one: What is once together is afterwards together. Hobbes says: "The cause of the coherence or consequence of one conception to another is their first coherence or consequence at that time when they are produced by sense." Cardaillac (1830) in substance repeats Hobbes when he says that simultaneity is the common condition of all the other connections: nothing can be linked now that has not been linked before. Hamilton in the same way reduces the laws to two, simultaneity and affinity; and these two laws, he asserts, are only modifications of one law, redintegration, or totality: "Those thoughts suggest each other which had previously constituted parts of the same entire or total act of cognition." This is ending where Augustine began. Hamilton maintains that a third thought may be associated with a first through a second which "does not rise into consciousness," "suggestions passing through one or more ideas which do not themselves rise into consciousness." This false theory in metaphysics he illustrates by an example drawn from a false theory in physics—to wit, that billiard-balls in a row, intermediate between the first one, which is struck, and the last one, which flies off, remain motionless. Hamilton's whole position and argument are marked by the crudity and self-contradiction which often mar his lectures. The true theory in such cases is, that the acts of consciousness are too rapid to mark themselves deeply and distinctly enough in memory to be carried on by it to the end of the process. Reflection usually with very little difficulty articulates all the parts. When Hamilton reflectively associated Ben Lomond with the Prussian system of education, he simply did slowly what he had done before rapidly. The human mind is subtler than light, far beyond the degree in which light is subtler than lead. Consciousness is the essential condition of an idea. Memory, as objectively separated in time from consciousness, is not essential to it. Both can be born together, and both die together. A precedence in the order of thought must not be confounded with a precedence objectively in time. Alexander Bain reduces the primary attributes of intellect to three, of which the third is retentiveness, the facts connected with which may, with few exceptions, "be comprehended under the principle called the law of contiguity or contiguous adhesion. The principle of contiguity has been described under various names—as Hamilton's law of 'redintegration,' the 'association of ideas.' The principle may be stated thus: Actions, sensations, and states of feeling, occurring together or in close succession, tend to grow together or cohere in such a way that when any one of them is afterwards presented to the mind, the others are apt to be brought up in idea." Bain further discusses agreement, law of similarity, compound association, constructive association.

Not all ideas once integrant are necessarily redintegrated. The strength of the impression which they originally made, their duration in fellowship, the time which has elapsed since we had them, the cogency of their connection, are all determining forces. But in advance of all this the tendencies of the law of association in the particular individual are determined by the native constitution of his mind and by the circumstances of his whole training, mental and moral. These tendencies carried out make the poet or the math-

ematician, the sensualist or the sage. An illegitimate association of ideas may mar a whole life, may work out crime and ruin. One and the same thing may be to two persons a deadly or a reviving savor. The same flag calls forth the fiercest assaults and the most vigorous defence. The same strain of music awakens joy, sadness, hope, or despair. The poem of Wordsworth on the "Power of Sound" is but an exquisite painting of one class of illustrations of the power of association. There are national tendencies under this law as well as individual. Governments and societies are built for ages on the ideas associated with a single central idea embodied in a word. It is the association of ideas which makes the mightiest and holiest bond of our life—the tie of the home, the native land, the Christian communion. It makes the heart of the Swiss sicken and die for the little rocky mountain-nook which is associated with the "Ranz-des-Vaches." The principle of the association of ideas is therefore not only of profound interest in psychology, but has great importance in morals. Like every power of man, it comes under the law of moral responsibility. Association is in certain respects involuntary, and habit can in any case carry it beyond the proper control of the will. But the will can largely determine what shall be the original links of association, and bear an important part in determining whether we shall follow up or repress a particular class of associated ideas. The association of a profane or ludicrous idea with a sacred name or fact may make that name or fact through a whole lifetime the means of recalling blasphemy or mockery.

The attempts to account for the association of ideas are of course affected by the general features of the different systems. The effort to give them in whole or in part an organic mechanical relation has been made by Descartes, Hartley, Bonnet, and a number of later writers, who relate them to brain-fibre and the nerve. Locke says: "They seem to be but traces of motion in the animal spirit." Kant ("Anthropologie") truly says: "It is in vain to look for a physiologic solution of them." This wonderful power of the human mind is part of the perfection which it owes to the Great Being who is its author. The thinker who makes ideas and their associations physical things, is as extravagant as the idealist who converts the solid earth into a mere relation between the mind that thinks of itself and the mind itself thus thought of. The materialist and the absolute idealist are the antipodes of the one world of extravagance in thought. The later psychologists, Herbart, Benecke, and others, have made clearer the twofold character in the association of ideas: First, where the associated elements are homogeneous, and produce what Herbart calls perfect fusion; second, where the elements are heterogeneous, and result in complication or imperfect fusion. This distinction is regarded as of great value for the entire soul-life, but especially with reference to the points at which the approaches of soul to the physiological processes are closest.

A well-regulated association of ideas on our own part, and a delicate perception of what is likely to be the association in the minds of others with particular words or things, are essential to the charm of conversation and of social intercourse. Without both of these a good and intelligent man may be a bore and a nuisance. One of the characteristic differences between logic and wit is, that logic keeps the association of ideas under the control of reason, while wit uses it for combinations which triumph over reason and carry it away a delighted captive. The active imagination is the result of this force of the association of ideas. The imagination no more creates its own primary elements than the painter creates the matter of his colors or his canvas. The imagination selects and combines what the law of association furnishes. Its most daring so-called "creations" are capable of an easy analysis, which shows that they are shaped under this law. The memory is largely dependent upon association. (See MEMORY and MNEMOTECHNICS.) Various uses have been made of the principle of association in philosophy. Hume employs it to explain the idea of causality; Reid and others to account for the force of habit. But though the association of ideas can become the subject of culture, it is, as we have seen, primary and innate.

The association of ideas has been observed by thinkers from an early period. Aristotle speaks of it in his "Treatise of Reminiscence" very briefly, but in a manner worthy of his wonderful acuteness. It is to Locke, however, in the latest edition of his "Human Understanding," we owe the first discussion of the subject with a fulness at all commensurate with its importance; and no system worthy of the name, since Locke, has failed to devote a large space to it.

C. P. KRAUTH.

As'sonet, a village of Freetown township, Bristol co., Mass., on a branch of the Old Colony and Newport R. R., 10 miles N. E. of Fall River.

Assolant (JEAN BAPTISTE ALFRED), a French author, born in 1827, who commenced active life as a teacher of history in Poitiers. He travelled over the American continent. Returning to France, he published in the "Revue des Deux Mondes" several novels founded upon his American adventures, and published later various romances. His best known works are "Butterfly," "Acacia," and "Une Fantaisie Americaine." He has been also a very popular journalistic writer.

Assoucy, d' (CHARLES COYPEAU), a French burlesque poet, born in 1604, who styled himself "The emperor of burlesque," and who was called by others "Scarron's ape." He wrote many humorous poems, among them "Ovide en belle Humeur" and "Ravissement de Proserpine," in which the humor was dull, and their author provoked the satire of Boileau, who wrote of him

> "Le plus mauvais plaisants ent des approbateurs
> Et jusq' a d'Assoucy, tout trouva des lecteurs."

Died in 1679.

Assump'sit [Lat. "he has undertaken"], an agreement not under seal, either express or implied; a common-law action to obtain damages for the violation of such an agreement. It is usually divided into common or *indebitatus assumpsit*, brought in general upon an implied promise; and special assumpsit, which is founded on an express promise.

Assump'tion, a parish in the S. E. of Louisiana, area 320 square miles. It is bounded on the W. by Grand River, and intersected by the navigable bayou La Fourche. The surface is nearly level; the soil is fertile and adapted to the sugar-cane. Sugar, molasses, rice, and corn are the chief crops. Capital, Assumption. Pop. 13,234.

Assumption [Sp. *Asuncion*], a city of South America, the capital of Paraguay, is situated on the left (E.) bank of the river Paraguay, 645 miles N. of Buenos Ayres; lat. 25° 16′ 29″ S., lon. 57° 42′ 42″ W. It was founded by the Spaniards in 1536. It has a cathedral, five churches, a government palace, a college, a public library, etc. Hides, tobacco, timber, and *yerba maté* (or Paraguay tea) are shipped here by the river. The houses are mostly built of brick, one story high. Pop. about 48,000.

Assumption, a post-village and township of Christian co., Ill., on the Illinois Central R. R., 23 miles S. of Decatur. It has a weekly paper, two flouring-mills, and a number of stores. Pop. 590; of township, 1246.

JOHN P. MARNEL, PUB. "ASSUMPTION PRESS."

Assumption, a post-village, the capital of Assumption parish, La., 40 miles S. of Baton Rouge.

Assump'tion of the Vir'gin, a festival of the Greek and Roman churches in commemoration of the resurrection and miraculous ascent of the Virgin Mary to heaven. It is held on the 15th of August. Protestant Christians unanimously reject the tradition of these events. The full tradition of the Assumption is given in Saint Alphonso Liguori's "Glory of Mary."

Assump'tion of Mo'ses, a pseudepigraphical or apocryphal book containing a pretended account of the death of Moses and of the assumption of his soul to heaven. Some suppose that Saint Jude alludes, in his reference to the contest between the archangel Michael and the devil, to the statements made in this book; but it is not certain that it existed in apostolic times.

Asswan, as-swân′, **Assouan,** or **Essuan** (anc. *Sye'ne*), a town of Upper Egypt, on the right bank of the Nile, near the border of Nubia, 115 miles S. of Thebes; lat. 24° 5′ N., lon. 33° E. It is two and a half miles below the First Cataract, and is remarkable for its picturesque situation and ancient monuments. Here are quarries of syenite, a variety of granite which derives its name from Syene. From these quarries came the red obelisks that adorned various temples of Egypt. Here are also ruins of a large Saracen or Arabian town, among which are found many Cufic inscriptions. Here, according to some authorities, the poet Juvenal died in exile about 125 A. D., but others deny the truth of the statement. Pop. 4000.

As'sye, or **As'saye,** a village of the Nizam's dominions, in Hindostan, 24 miles N. of Jaulna, was the scene of the duke of Wellington's first great victory. On the 23d of Sept., 1803, with a force of 2000 British and 2500 natives, he utterly defeated the Mahrattas, numbering from 30,000 to 50,000 men, partly officered by the French. Wellington, then Gen. Wellesley, captured 98 cannon, and lost 1560 killed and wounded.

Assyr'ia [Gr. Ἀσσυρία], the Latin name of an ancient and powerful kingdom (called also **Asshur** and **Assura**) of Western Asia, was bounded on the N. by Armenia, on the E. by Media, on the S. by Babylonia, and on the W. by Mesopotamia, or the river Euphrates. Assyria proper appears to have coincided very nearly with the modern Kurdistan, but the dominions of the most powerful

Assyrian monarchs had a much greater extent. According to George Rawlinson, "The site of the second or great Assyrian monarchy was the upper portion of the Mesopotamian valley. The cities which successively formed its capitals lay, all of them, upon the middle Tigris, and the heart of the country was a district on either side of that river enclosed between the 35th and 37th parallels of latitude. By degrees these limits were enlarged, and the term Assyria came to be used in a loose and vague way of a vast and ill-defined tract extending on all sides from this central region." The high mountain-chain of Zagros formed the natural eastern boundary of this region, which was also bounded on the N. by a snowy mountain-range called Mons Niphaʹtes. The surface was mostly a plain diversified with several ridges or ranges of limestone hills. The soil of the plains and valleys was exceedingly productive, so that the fertility of Assyria was a favorite theme of ancient writers. It is probable that this fertility was promoted by artificial irrigation, for Herodotus states that but little rain fell in Assyria. The country on the eastern side of the Tigris was well watered by rivers—namely, the Greater Zab, the Adhem, the Lesser Zab, and the Dialus or Diyâleh. The word *Assyria* is probably derived from Asshur (or Ashur), which was the name of a son of Shem and of the chief god worshipped by the Assyrians.

History.—The early history of Assyria is involved in obscurity. According to the book of Genesis (chap. x.), Nineveh, the capital of this kingdom, was founded by Nimrod, the son of Cush, or by Asshur, a son of Shem. This ambiguity arises from the fact that in the Hebrew text Asshur means sometimes Assyria, and sometimes a son of Shem. The cuneiform inscriptions indicate that the most ancient capital was the city of Asshur, on the Tigris, about 60 miles S. of Nineveh. The Assyrians belonged to the Semitic family of nations. Their features, sculptured on monuments recently discovered along the Tigris, present a striking resemblance to those of the Jews and Arabs. They were remarkably warlike, and, according to the prophet Isaiah, were "a fierce people." Their pride, treachery, and violence are also denounced by several Hebrew prophets.

In relation to the history and chronology of Assyria we have only three original authorities—Herodotus, Ctesias, and Berosus. According to Herodotus, who is confirmed to some extent by Berosus, the empire commenced about 1270 B. C., and endured about 650 years, but Ctesias gives it a duration of more than 1300 years. "The cuneiform monuments," says George Rawlinson, "while they generally confirm Herodotus, contradict Ctesias perpetually." It is probable that several kings reigned over Assyria before the empire was founded, as an empire implies the previous and gradual growth of a nation. Among the early kings whose names are found on bricks at Kileh-Sherghat is Bellush, who is supposed to have reigned about 1350–1330 B. C. His great-grandson, Shalmaneser I. (1290–70), is chiefly known in history as the founder of Calah, the second capital of Assyria. He was succeeded about 1270 B. C. by his son, Tiglathi-nin, called the conqueror of Babylon, who is the first king of whom extensive conquests are recorded. Passing over several kings of whom nothing is known but their names, we come to Tiglath-pileser I., a powerful monarch who reigned about 1150. His conquests are recorded on a terra-cotta cylinder which is now in the British Museum, and is perhaps the earliest Assyrian historical document that has been discovered. In his reign Assyria was probably the most powerful kingdom in the world, except Egypt. Among the other Assyrian conquerors was Asshur-danni-pal (the Sardanapaʹlus I. of the Greeks), who, according to Rawlinson, began to reign in 884 B. C., and extended the boundaries of Assyria by conquests. He compelled Tyre and Sidon to pay tribute to him, and reigned about twenty-five years, during which Assyria made rapid progress in wealth and art. He excelled all his predecessors in the grandeur of his public buildings, and erected a great palace at Calah (Nimrood), which is the most magnificent Assyrian edifice that has been discovered, except the palace of Sennacherib at Nineveh. This palace of Asshur-danni-pal, which was 360 feet long, was adorned with sculptures, many of which are now in the British Museum. He was succeeded by his son, Shalmaneser II., who defeated Ben-hadad, king of Damascus, and his successor, Hazael. The events of his long reign are recorded on an obelisk of black basalt (about seven feet high) which was discovered by Mr. Layard at Nimrood in excellent preservation. The statement of Ctesias, that Ninus founded the Assyrian empire, and that his wife Semiramis conquered Ethiopia and invaded India, is generally considered fabulous, but among the Assyrian monuments occurs the name of Sammuramit, the wife of Iva-lush (810–781 B. C.). Recent explorers of history have substituted this Sammuramit, "a very prosaic and commonplace princess," for the famous and heroic Semiramis of the Greek legends, which appear to have had a very slight basis of fact.

The second book of Kings states that Pul, king of Assyria, invaded Palestine, and received tribute from Menahem, king of Israel, about 750 B. C., but the name of Pul does not occur in the native inscription. The Hebrew sacred history also mentions Tiglath-pileser II., who began to reign about 745 B. C., and waged war with success against the kings of Syria, Israel, and Tyre (2 Kings xv. 29). By his victories over these and other nations he re-established the power of Assyria in the region between the desert and the Mediterranean. He was succeeded by Shalmaneser, who subdued Hoshea, king of Israel, and reigned about six years. The next king was Sargon, who usurped the throne about 721 B. C., and was victorious in expeditions against many nations or tribes. He defeated the army of Egypt, and dethroned Merodach-baladan, king of Babylon, which he annexed to his own empire. He was succeeded about 704 B. C. by his son, Sennacherib, who was the most celebrated of all the Assyrian kings, and was distinguished for his pride, ambition, and warlike enterprise. His long reign was signalized by many victorious expeditions. He defeated the Egyptians near Ekron, subdued the Philistines, and invaded the dominions of Hezekiah, king of Judah, from whom he took many fenced cities, and carried away about 200,000 Jews into captivity. Having forced Hezekiah to pay tribute to him, he returned to Nineveh, his capital, where he built a magnificent palace, which surpassed in size and splendor all earlier edifices, and was adorned with excellent sculptures. This palace was partly exhumed by Mr. Layard, who excavated on its ground floor sixty-eight chambers, and a hall 180 feet long. In a second expedition against the king of Judah and his ally, the king of Egypt, he failed disastrously (see 2 Kings xviii. and xix.), his army being destroyed by a miracle in the night at Pelusium. "The total destruction of the empire in consequence of this blow," says Rawlinson, "is an exaggeration of Josephus. Sennacherib did not die till 680 B. C., seventeen years after his misfortune. . . . He wisely turned his sword against other enemies, and was rewarded by important successes upon all his other frontiers." Sennacherib was assassinated by two of his sons, and was succeeded by another son, Esar-haddon, who reigned thirteen years, and held his court alternately at Nineveh and Babylon. Among his exploits was the conquest of Egypt. He died about 667 B. C., and left the throne to his son, Asshur-bani-pal (or Sardanapalus), who was eminent as a warrior, builder, and patron of art. He extended the limits of the empire in almost every direction, and built a grand palace at Nineveh (Koyunjik). This palace was remarkable for the beauty of the bas-reliefs and other ornaments. The sculptures of this reign are much superior to the earlier in spirit and freedom from conventionality. The empire declined rapidly after the death of Asshur-bani-pal, who was succeeded by his son, Saracus, a weak and effeminate prince. In his reign occurred a great inroad of Scythians, who ravaged Assyria and other civilized countries, about 630 B. C. Soon after this event, Cyaxares the Mede formed a league with Nabopolassar, governor of Babylon, against Saracus. These allies took and destroyed Nineveh in 625 (or, as some say, 606 B. C.), and Assyria then became a province of Media.

Language and Religion.—From the mounds of Mesopotamia have been exhumed a large mass and variety of documents in the Assyrian language, in cuneiform characters. These documents confirm the previous opinion of the learned that the language was Semitic. They were inscribed on slabs of stone, with which the walls of palaces were panelled, on obelisks of stone, on clay tablets, and on cylinders (or, more strictly, hexagonal prisms) of fine terra-cotta, two or three feet long, which the Assyrian kings deposited at the corners of temples. These so-called cylinders were covered closely with small inscriptions, which, says G. Rawlinson, "it often requires a good magnifying-glass to decipher." The materials which they used most extensively for records and literary documents were stone and plastic clay, the latter of which, being afterwards baked, has resisted the ravages of time as well as stone. The number of characters was very great—about 300, all wedge-shaped, but with a great variety in the form of the wedge. (See CUNEIFORM INSCRIPTIONS.) "The Assyrian characters," says George Rawlinson, "correspond not to letters, according to our notion of letters, but to syllables." A grammar of the Assyrian language has been published by Ménant, and a dictionary by Norris (London, 1869).

The religion of the Assyrians was a gross polytheism, and nearly identical with that of the Chaldeans or Babylonians. The principal objects of their worship were Asshur, Anu, Bel, Iva, Beltis, Nisroch, Nebo, Nin, Shamas, and Sin. At the head of the Assyrian Pantheon stood Asshur, a thoroughly national deity, whom they styled the "Great Lord," the "King of all the Gods." The tutelage

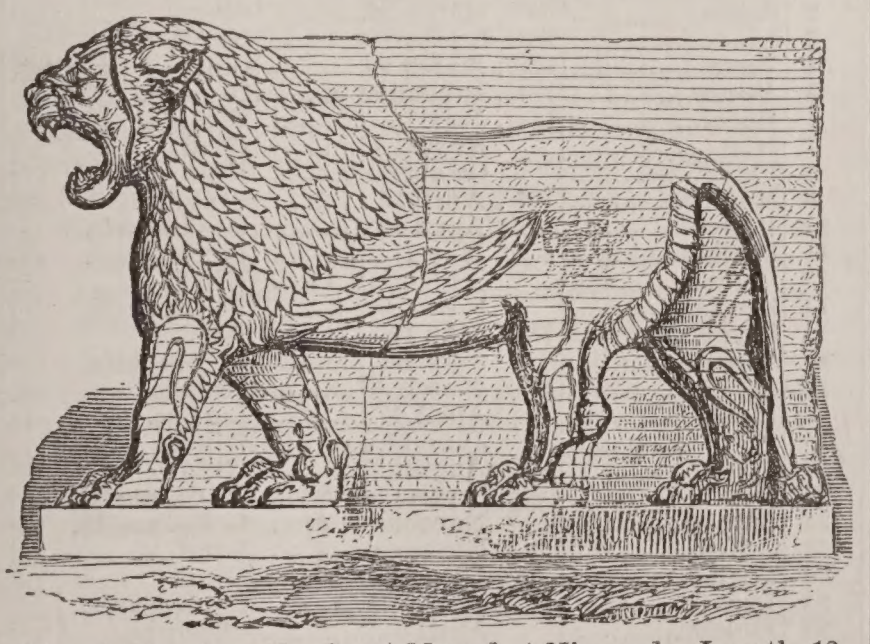
of Asshur over Assyria is strongly marked by the identity of his name with that of the country, which in the original is complete.

Architecture, etc.—The artistic genius and multifarious ingenuity of the Assyrians, and their highly civilized condition, are abundantly proved by the remains of art which have been exhumed near the Tigris by M. Botta and Mr. Layard. As architects, as sculptors, as designers and engravers, it is evident that they equalled or surpassed all other Asiatic nations. Ancient Hebrew and Greek traditions concur in representing the Assyrians as renowned in early ages for skill in architecture. They lavished great

Portal or Doorway of the Palace of Khorsâbâd. (Bas-relief.)

labor and ornament on royal palaces, compared with which their temples were rather insignificant. The Assyrian palace, constructed mainly of sun-dried bricks, uniformly stood on an artificial platform, which was commonly composed of bricks. It contained a great number of rectangular chambers and several grand halls, richly ornamented with sculptures, which are designed with excellent taste and display an artistic genius of a high order. These halls are lined or panelled with slabs of marble or other stone, which are profusely adorned with bas-reliefs and covered with historical inscriptions. "Of all the Assyrian works of art,"

Winged Bull with a human head, from Nimrood; now in the British Museum. (Bas-relief.)



Colossal Lion from the Great Mound at Nimrood. Length, 12 feet; height, 7 feet 8 inches. (Bas-relief.)

says Rawlinson, "which have come down to us, by far the most important are the bas-reliefs. They used the bas-relief for almost every purpose to which mimetic art is applicable." These represent battles, sieges, naval operations, hunting-scenes, processions, and scenes of ordinary life. The use of the column appears to have been rare in Assyrian palaces, where it sometimes occurs in interior doorways. The accompanying illustrations may serve to give the reader an idea of the general style of the Assyrian sculptures, discovered by Mr. Layard, M. Botta, and others.

"The imperial palace of Sennacherib," says Mr. Fergusson, "is, of all the buildings of antiquity, surpassed in magnitude only by the great palace-temple of Karnac; and when we consider the vastness of the mound on which it was raised, and the richness of the ornaments with which it was adorned, it is by no means clear that it was not as great, or at least as expensive, a work as the great palace-temple at Thebes." (*Handbook of Architecture*, vol. i.) Among the remarkable remains of Assyrian art now in the British Museum are the winged and human-headed lions, twelve feet high, and winged bulls of similar dimensions. (See NINEVEH.) (See also LAYARD'S "Nineveh and Babylon," 1853; LAYARD'S "Nineveh and its Remains," 2 vols., 1849; G. RAWLINSON, "The Five Great Monarchies of the Ancient Eastern World," 4 vols., 1862–67; BONOMI, "Nineveh and its Palaces," 1857; GUMPACH, "Abriss der Assyr. Babyl. Geschichte," 1859; NIEBUHR, "Geschichte Assurs und Babels seit Phul," 1857.) WILLIAM JACOBS.

Assyr'ia, a post-township of Barry co., Mich. P. 1175.

Ast (GEORG ANTON FRIEDRICH), an eminent German philologist and critic, born at Gotha in 1776. He was appointed professor of classical literature at Landshut in 1805, and obtained the same chair in the University of Munich in 1826. He wrote, besides other works, a "Manual of Æsthetics" (1805) and "The Life and Writings of Plato" (1816). He also published a good edition of the works of Plato, with a Latin version and a commentary (11 vols., 1819–32). Died Dec. 30, 1841.

As'tacus [a Latin word signifying "lobster"], a genus of crustaceans, including the cray-fishes of Europe and the Pacific States of the U. S.

Astar'te [Gr. Ἀστάρτη], or **Ash'taroth,** the chief goddess worshipped by the Phœnicians, Syrians, and Carthaginians. She is considered by some as the original of the Greek Aphrodite (Venus). Others identify her with Cybele, and others again with Juno. As Baal was the god of the sun, so Astarte was the goddess of the moon. She is variously represented, but more usually with four wings (the two uppermost of which are intended to symbolize the horns of the moon), wearing a pointed cap, and holding a dove in her hand; as shown in the accompanying illustration, taken from an image of Astarte found in Etruria. The Syrians built to her a famous temple at Hierapolis. Her chief temples, besides that at Hierapolis, were at Tyre and Sidon. (See Appendix (Essay I.) to book iii. in vol. ii. of RAWLINSON'S "Herodotus.")

Astarte.

Astar'te, a genus of bivalve mollusks, the type of the

family Cyprinidæ, nearly related to the Veneridæ. Fossils of some 200 extinct species are widely distributed over the world. Some of them are found in the lias formation. Fifteen or twenty species of *Astarte* now exist in the deep sea in various parts of the world.

Astat'ic [Lat. *astaticus;* from the Gr. *a*, priv., and ἵστημι, to "stand"], a term applied to the magnetic needle when it is withdrawn from the action of the earth's magnetism, and has no longer the *statical* position in which it is *in equilibrio* with the influence of this force. A needle is rendered astatic by placing the axis about which it is movable in the direction in which terrestrial magnetism acts, because it cannot then receive any motion from the force, and will rest in any position. This effect is more usually produced by neutralizing the action of the earth by means of an equal and opposite magnetic action; that is, by placing the needle vertically above or below a second magnetic needle, the N. pole of which is in juxtaposition with the S. pole of the first needle.

As'ter [from the Gr. ἀστήρ, a "star"], a genus of plants of the natural order Compositæ, which Lindley proposes to call Asteraceæ. This genus comprises a great number of species, generally herbaceous, mostly natives of the U. S. Many of them are cultivated in the gardens of Europe for the beauty of the flowers, which bloom from July to November. The ray-florets, which are never of the same color as the disk, are purple, blue, violet, white, etc. Among the remarkable American species are *Aster Novæ Angliæ, Aster puniceus, Aster cyaneus,* and *Aster spectabilis.* The China aster (*Aster Chinensis; Callistephus Chinensis*) is a favorite garden flower in England and the U. S. Many varieties are cultivated, and present a great diversity of colors. They prefer a rich soil, and continue to bloom until the end of autumn.

Asteracan'thus ["star spine"], a genus of fossil sharks, of which only the dorsal defensive spines are known. These are found in the mesozoic rocks of England, and were named by Agassiz from the stellate tubercles with which they are ornamented.

Aste'rius, or **As'ter,** a Father of the Church, supposed to have been born at Antioch about 340 A. D. Little is known of his life except that he was bishop of Amasea, in Pontus. Some of his homilies are extant.

As'teroids [Gr. ἀστεροειδής, "resembling a star," from ἀστήρ, a "star," and εἶδος, "form," "resemblance"], the name given to members of the zone of small planets travelling between the orbits of Mars and Jupiter. They are so called because they are not readily distinguishable from the fixed stars save by the experienced observer. The discovery of the first known members of this group of celestial bodies forms one of the most interesting chapters in the history of astronomy. It had long been noticed that a large gap separates the orbit of Mars from that of Jupiter. Not, indeed, that the actual distance between these orbits is even so great as that which separates the orbits of Jupiter and Saturn, but the orderly increase observable in the planetary distances as we proceed outward from the sun is obviously marred by the sudden increase which marks the interval between the orbits of Mars and Jupiter, as compared with that between the orbits of the earth and Mars. This circumstance led Kepler, and afterwards Titius, to express the opinion that an undetected planet revolves between Mars and Jupiter. The discovery of the planet Uranus, whose mean distance corresponds exactly with Bode's law (see Bode), led this eminent astronomer to recommend that search should be made for such a planet. Accordingly, for the first time in the history of astronomy, an empirical law—a law whose cause is even now not recognized—led astronomers to commence a systematic survey of the heavens. Through the exertions of Baron de Zach an association of twenty-four astronomers was formed. These observers divided the zodiac among them, and soon after the beginning of the present century the search for the new planet was fairly commenced. But the discovery did not fall to the lot of any of those who had undertaken the search. As in the case of the planet Uranus, an apparent accident brought the first discovered member of the family of asteroids under the notice of an astronomer who richly merited such a success, though actually engaged on work of another character. Piazzi, then at work on his great catalogue, was carefully surveying the constellation Taurus, when his attention was attracted by an apparent change of place in a small star which he had observed on the first day of the present century. By Jan. 3, 1801, he had convinced himself of the star's change of place. He communicated his discovery to Oriani and Bode, and continued his own observations until Feb. 11, when his labors were interrupted by dangerous illness. When his letters reached Oriani and Bode the planet had already approached too near to conjunction with the sun to be discernible. There seemed great risk that after all the planet would escape astronomers, since it would not be discernible before Sept., 1801, and the observations of Piazzi were deemed insufficient for the calculation of the planet's place after so long an interval. But Gauss, the eminent mathematician, came to the rescue, and after a careful study of all the observations made by Piazzi, he formed an ephemeris of the planet's path for several months in advance. At length, after an arduous search, De Zach redetected the planet on Dec. 31, 1801, Olbers (independently) discovering it on the following evening. After one year of doubt and difficulty, astronomers had succeeded in achieving a well-earned triumph for their science. It was found that the new planet travels at a mean distance of 2.767 from the sun, the earth's distance being unity, while Bode's law had indicated for it a distance of 2.8. It therefore fulfilled even more closely than was to have been expected this empirical law. It was called Ceres by Piazzi. But while astronomers were congratulating themselves on this new proof of the existence of law and harmony within the solar system, a fresh discovery threatened to throw all into disorder again. While searching for Ceres, Olbers had noticed with special care the arrangement of the small stars which lay near its assigned geocentric path. On Mar. 28, 1802, while examining a part of the constellation Virgo, he noticed a small star in a part of the heavens which had thus been rendered familiar to him, the star occupying a place where he felt sure no star had been visible while his search for Ceres had been in progress. In two hours he had recognized the planetary motion of this body. By April 28, Gauss had assigned to the newly-discovered planet, which received the name of Pallas, an orbit having a mean distance very little less than that of the planet Ceres. Thus there were now two planets where only one had been wanted to supply the gap in the planetary scheme. Olbers was led to expect that others would be found; and a search being instituted for the purpose of testing this view, Harding of the Lilienthal Observatory discovered, on Sept. 2, 1804, the planet Juno. Subsequently, on Mar. 29, 1807, exactly five years after his discovery of Pallas, and in the same region of the heavens, Olbers discovered Vesta.

No further addition was made to the family of asteroids until Dec. 8, 1845, when Astræa was discovered at Driessen by a German observer named Hencke. But from the discovery of Hebe, on July 1, 1847, not a year has passed without adding one or more asteroids to the list of known planets. In some years the progress of discovery has gone on more rapidly than in others. Thus, in 1861 *ten* asteroids were discovered; in 1868, *twelve;* while in each of the years 1863 and 1869 only *two* were discovered. But at present there seems to be no reason to expect that a year will ever pass without adding to the list. The following table presents all the asteroids discovered up to the date of writing, with the name of the discoverer and the date of discovery:

No.	Name.	Date of Discovery.	Discoverer.
1	Ceres	1801, January 1	Piazzi.
2	Pallas	1802, March 28	Olbers.
3	Juno	1804, September 1	Harding.
4	Vesta	1807, March 29	Olbers.
5	Astræa	1845, December 8	Hencke.
6	Hebe	1847, July 1	Hencke.
7	Iris	August 13	Hind.
8	Flora	October 18	Hind.
9	Metis	1848, April 25	Graham.
10	Hygeia	1849, April 12	De Gasparis.
11	Parthenope	1850, May 11	De Gasparis.
12	Victoria	September 13	Hind.
13	Egeria	November 2	De Gasparis.
14	Irene	1851, May 19	Hind.
15	Eunomia	July 29	De Gasparis.
16	Psyche	1852, March 17	De Gasparis.
17	Thetis	April 17	Luther.
18	Melpomene	June 24	Hind.
19	Fortuna	August 22	Hind.
20	Massilia	September 19	De Gasparis.
21	Lutetia	November 15	Goldschmidt.
22	Calliope	November 16	Hind.
23	Thalia	December 15	Hind.
24	Themis	1853, April 5	De Gasparis.
25	Phocea	April 6	Chacornac.
26	Proserpina	May 5	Luther.
27	Euterpe	November 8	Hind.
28	Bellona	1854, March 1	Luther.
29	Amphitrite	March 1	Marth.
30	Urania	July 22	Hind.
31	Euphrosyne	September 1	Ferguson, U. S.
32	Pomona	October 28	Goldschmidt.
33	Polyhymnia	October 28	Chacornac.
34	Circe	1855, April 6	Chacornac.
35	Leucothea	April 19	Luther.
36	Atalanta	October 5	Goldschmidt.
37	Fides	October 5	Luther.
38	Leda	1856, January 12	Chacornac.
39	Lætitia	February 8	Chacornac.
40	Harmonia	March 31	Goldschmidt.

No.	Name.	Date of Discovery.	Discoverer.
41	Daphne	May 22	Goldschmidt.
42	Isis	May 23	Pogson.
43	Ariadne	1857, April 15	Pogson.
44	Nysa	May 27	Goldschmidt.
45	Eugenia	June 27	Goldschmidt.
46	Hestia	August 16	Pogson.
47	Aglaia	September 15	Luther.
48	Doris	September 19	Goldschmidt.
49	Pales	September 19	Goldschmidt.
50	Virginia	October 4	Ferguson, U. S.
51	Nemausa	1858, January 22	Laurent.
52	Europa	February 6	Goldschmidt.
53	Calypso	April 4	Luther.
54	Alexandra	September 10	Goldschmidt.
55	Pandora	September 10	Searle, U. S.
56	Melete	1857, September 9	Goldschmidt.
57	Mnemosyne	1859, September 22	Luther.
58	Concordia	1860, March 24	Luther.
59	Elpis	September 12	Chacornac.
60	Erato	September 14	Forster & Lesser.
61	Echo	September 15	Ferguson, U. S.
62	Danaë	September 19	Goldschmidt.
63	Ausonia	1861, February 10	De Gasparis.
64	Angelina	March 4	Tempel.
65	Cybele	March 8	Tempel.
66	Maia	April 9	Tuttle, U. S.
67	Asia	April 17	Pogson.
68	Leto	April 29	Luther.
69	Hesperia	April 29	Schiaparelli.
70	Panopea	May 5	Goldschmidt.
71	Niobe	August 13	Luther.
72	Feronia	May 29	Peters, U. S.
73	Clytie	1862, April 7	Tuttle, U. S.
74	Galatea	August 29	Tempel.
75	Eurydice	September 22	Peters, U. S.
76	Freia	October 21	D'Arrest.
77	Frigga	November 12	Peters, U. S.
78	Diana	1863, March 15	Luther.
79	Eurynome	September 14	Watson, U. S.
80	Sappho	1864, May 2	Pogson.
81	Terpsichore	September 30	Tempel.
82	Alcmene	November 27	Luther.
83	Beatrix	1865, April 26	De Gasparis.
84	Clio	August 25	Luther.
85	Io	September 19	Peters, U. S.
86	Semele	1866, January 4	Tietjen.
87	Sylvia	May 16	Pogson.
88	Thisbe	June 15	Peters, U. S.
89	Julia	August 6	Stéphan.
90	Antiope	October 1	Luther.
91	Ægina	November 4	Borelly.
92	Undina	1867, July 7	Peters, U. S.
93	Minerva	August 24	Watson, U. S.
94	Aurora	September 6	Watson, U. S.
95	Arethusa	November 23	Luther.
96	Ægle	1868, February 17	Coggia.
97	Clotho	February 17	Tempel.
98	Ianthe	April 18	Peters, U. S.
99	Dike	May 29	Borelly.
100	Hecate	July 11	Watson, U. S.
101	Helene	August 15	Watson, U. S.
102	Miriam	August 23	Peters, U. S.
103	Hera	September 7	Watson, U. S.
104	Clymene	September 13	Watson, U. S.
105	Artemis	September 16	Watson, U. S.
106	Dione	October 10	Watson, U. S.
107	Camilla	November 19	Pogson.
108	Hecuba	1869, April 2	Luther.
109	Felicitas	October 9	Peters, U. S.
110	Lydia	1870, April 19	Borelly.
111	Ate	August 14	Peters, U. S.
112	Iphigenia	September 19	Peters, U. S.
113	Amalthæa	1871, March 12	Luther.
114	Cassandra	July 24	Peters, U. S.
115	Thyra	August 6	Watson, U. S.
116	Sirona	September 8	Peters, U. S.
117	Lomia	September 11	Borelly.
118	Peitho	1872, March 15	Luther.
119	Althæa	April 3	Watson, U. S.
120	Lachesis	April 10	Borelly.
121	Hermione	May 12	Watson, U. S.
122	Girda	July 31	Peters, U. S.
123	Brunhilda	July 31	Peters, U. S.
124	Alceste	August 23	Peters, U. S.
125	——*	September 11	Prosper-Henry.
126	——*	November 5	Paul Henry.
127	——*	November 5	Prosper-Henry.
128	Nemesis	November 25	Watson, U. S.
129	Antigone	1873, February 5	Peters, U. S.
130	Electra	February 17	Peters, U. S.
131	Vala	May 25	Peters, U. S.
132	Aethra	June 12	Watson, U. S.
133	Cyrene	August 16	Watson, U. S.
134	Sophrosyne	September 27	Luther.
135	——*	1874, February 18	Peters, U. S.

A new planet was also discovered by Watson July 29, 1873, but subsequent observations were prevented by cloudy weather, and it has not therefore been included in the list.

The most remarkable characteristic of the asteroids besides their smallness is the relatively wide range of eccentricity and inclination among their orbits; so that in this last respect they may be said to be intermediate between the planets and comets. Their distances vary between two hundred and more than three hundred millions of miles. The eccentricity of Polyhymnia is no less than .339119, so that its greatest distance is more than twice its least. The inclination of Pallas is 34° 43′, so that the excursions of this planet above and below the ecliptic exceed, when taken together, the mean distance of the planet from the sun. Leverrier has shown, by means of calculations founded on the secular motion of the perihelion of Mars, that the combined mass of all the asteroids (discovered and undiscovered) cannot greatly, if at all, exceed one-fourth of the mass of our earth, and in all probability is much less than this. REVISED BY J. C. WATSON.

* These asteroids have not yet been named.

Asterol'epis [from the Gr. *ἀστήρ*, a "star," and *λεπίς*, a "scale," alluding to the marks on the dermal plates of the head], a genus of fossil ganoid fishes, described by Hugh Miller, from the Scotch old red sandstone. It is believed to have sometimes attained a length of twenty feet.

Asthma, az'ma [Gr. *ἄσθμα*, a "gasping for breath"], a term somewhat vaguely used to designate diseases characterized by difficulty of breathing, occurring in paroxysms; thus, spasm of the glottis is sometimes called "thymic asthma;" autumnal catarrh is known as "hay asthma;" the dyspnœa (difficult breathing) of Bright's disease has been, with questionable propriety, called "uræmic asthma;" and similar symptoms arising from heart or lung disease have also been mistaken for true asthma, which, however, may be associated with these various diseases. True asthma, according to Niemeyer, includes only those cases where the point of the irritation producing the attack is either at the origin of the vagus nerve or in some remote part of its course. This does not exclude cases of reflex asthma, such, for example, as may occur in uterine disease. Others state that irritability and hyperæmia of the bronchial mucous membrane are essential elements of the disease; and the readiness with which powdered ipecac., the exhalations from feathers, etc., will excite paroxysms, would appear to confirm this view. It is rare to find structural changes of any organ in cases of simple asthma. The trained diagnostician alone can discriminate between asthma and dyspnœa from other chest diseases. True or nervous asthma consists in a paroxysmal spasm of longer or shorter duration, attacking the muscular elements of the bronchial tubes, diminishing temporarily their calibre, and thereby obstructing respiration. Notwithstanding the great distress which may accompany the attack, the immediate danger is not great. The smoking of saltpetre-paper or of stramonium-leaves, the administration of opiates, coffee, belladonna, conium, cannabis, chloral, vapor of chloroform, etc., may or may not relieve the paroxysm. Iodide of potassium benefits many cases, permanently or temporarily. Quinia, Fowler's solution, iron, and other tonics are often useful. A nutritious diet, with careful regulation of the bowels, is important. The compressed air-bath is recommended as affording great relief during the paroxysm.

As'ti (anc. *As'ta Pompe'ia*), a city of Italy, in the province of Alessandria, is on the river Tanaro, and on the Turin and Genoa Railway, 36 miles by rail E. S. E. of Turin. It is a bishop's see, has a fine Gothic cathedral, a royal college, a theological seminary, a printing-office established in 1479, and many elegant mansions. Here are several manufactories of silk stuffs. This is the native place of the poet Alfieri. Asta Pompeia was a town of great antiquity, having been captured by the Gauls in 400 B. C. Having been destroyed by them, it was rebuilt by Pompey the Great. In the Middle Ages it was the capital of a republic. Pop. in 1871, 31,033.

Astig'matism [from the Gr. *α*, priv., and *στίγμα*, a "mark" or "spot"] is the term applied to a peculiar defect in the eye which consists in its refracting the rays of light differently in different planes. The defect may be detected by looking at a small pinhole in a card held up against any bright object, and moved to different distances from the eye. To an ordinary eye the image of the hole remains circular at all distances, but to an eye having the peculiar defect in question the image of the hole, as the card is moved away from the eye, becomes elongated, and at a certain distance passes into a straight line. This imperfection may be corrected by means of a cylindrical or spherico-cylindrical lens.

Astol'phus, or **Astul'phus** [Fr. *Astolphe;* Ger. *Aist'tulf*], king of the Lombards, obtained the throne in 749 or 750 A. D. Having seized Ravenna about 752, he threatened Rome. The pope then applied for help to Pepin, king of the Franks, who defeated Astolphus in 754, and forced him to cede Ravenna and the Pentapolis to the pope. This is said to have been the origin of the temporal power of the popes. Died in 756 A. D.

As'ton, a township of Delaware co., Pa. Pop. 1845.

As'tor (John Jacob), born at Waldorf, near Heidelberg, in Germany, July 17, 1763, emigrated to the U. S. in 1783, and invested his capital in furs, which he took to London and sold with much profit. He next settled at New York, and engaged extensively in the fur-trade. He exported furs to Europe in his own vessels, which returned with cargoes of foreign commodities, and thus rapidly amassed a fortune. In 1811 he founded Astoria on the western coast of North America, near the mouth of the Columbia, as a dépôt for the fur-trade, for the promotion of which he sent two expeditions to the Pacific Ocean. He was remarkable for his sagacity and diligence in business. He purchased in New York a large amount of real estate, the value of which increased enormously. At his death (Mar. 29, 1848) his fortune was estimated at $20,000,000. He left $400,000 to found a public library in New York. (See Astor Library.)

Astor'ga, d' (Emanuele), Baron, an eminent musical composer, born in Sicily Dec. 11, 1681. He passed some years at the court of the emperor Leopold I., by whom he was patronized. After the death of Leopold (1705) he travelled in many countries of Europe. His chief work is a "Stabat Mater," which is much admired. He also produced "Daphne," an opera, and cantatas, one of which is called "Quando Penso." Died Aug. 21, 1736.

Astoria, a post-village and township of Fulton co., Ill., on the Rockford Rock Island and St. Louis R. R., 50 miles N. W. of Springfield. Pop. 2118.

Astoria, a post-village of Queens co., N. Y., on the East River, opposite New York City, now a part of Long Island City (which see). Pop. 5204.

Astoria, a post-village and port of entry, capital of Clatsop co., Or., on the S. bank of the Columbia River, 9 miles from its mouth. It was once an important dépôt of the fur-trade, having been founded by John Jacob Astor in 1811. Pop. 639.

Astor Library, of New York City, one of the largest in the U. S., was founded by John Jacob Astor, who bequeathed $400,000 for that purpose. His will directed that the government of the library should be vested in eleven trustees—namely, Washington Irving, William B. Astor, Daniel Lord, Jr., James G. King, Joseph G. Cogswell, Fitz-Greene Halleck, Henry Brevoort, Jr., Samuel B. Ruggles, Samuel Ward, Jr., the mayor of New York, and the chancellor of the State. The library, erected on La Fayette place, was opened in 1854, before which J. G. Cogswell had been appointed superintendent. William B. Astor, a son of the founder, added to his father's bequest a sum nearly equal. The library has about 150,000 volumes.

Astrâbâd', or **Asterâbâd,** a town in the northern part of Persia, capital of a province of its own name, is on a small river which enters the south-eastern part of the Caspian Sea, from which it is about 20 miles distant. It is near the N. foot of the Elbrooz Mountains. The situation is unhealthy in summer, but the appearance of it is rendered attractive by extensive gardens. The greater part of the town is in ruins. Here are some manufactures of silk and cotton stuffs. Pop. estimated at 10,000.

Astrachan. See Astrakhan.

Astræ'a [Gr. Ἀστραία], goddess of justice, a personage of classic mythology, was said to be a daughter of Jupiter and Themis. At the termination of the Golden Age, when violence began to prevail in the world, she ascended to heaven, being the last of the goddesses to leave the earth.—Astræa is also the name of an asteroid discovered by Hencke in 1845. Its mean distance from the sun is 2.577 times that of the earth. It completes a revolution in 1511 days.

Astræa, a genus of radiated animals of the class Polypes, order Madreporaria. They live in the sea, and form calcareous skeletons (star-corals), which are characterized by sessile, star-shaped, lamellate cells, crowded on the upper surface. The polyps are often an inch in diameter. They form large, hemispherical masses of coral.

Astræa Viridis.

As'tragal [Lat. *astrag'alus;* Gr. ἀστράγαλος], a convex moulding, which was first introduced at the base of the capital of the Ionic order, and has since been applied in other positions. It is also called a collarino.

As'tragalus, in anatomy, the first or uppermost bone of the tarsus, which forms with the leg-bones the hinge of the ankle-joint. Its lower surface is concave, and rests on the os calcis, or heel-bone, with which it is connected by a strong ligament.

Astrag'alus, a genus of herbaceous and shrubby plants of the natural order Leguminosæ, sub-order Papilionaceæ. The leaves are pinnate, with an odd leaflet, and the pod is two-celled. It comprises numerous species, mostly natives of the temperate and cold parts of the eastern hemisphere. Several species of *Astragalus* growing in Persia and Asia Minor yield gum-tragacanth. The *Astragalus Bœticus* is cultivated in Hungary and Germany for its seeds, which are used as a substitute for coffee. Numerous species of *Astragalus* are found in the U. S., especially westward.

Astrakhan', a government in the south-eastern part of European Russia, is bounded on the N. by Samara, on the E. by Orenburg and the Caspian Sea, on the S. by Caucasia, and on the W. by the country of the Don Cossacks and Saratov. It is intersected by the Volga, which divides it into two nearly equal parts. Area, 85,012 square miles. The surface is nearly level, and the soil mostly sterile and saline. A large part of it is occupied by salt marshes and saline lakes. The fisheries of the Volga in this government are very valuable, many sturgeon being caught in it. Pop. in 1867, 573,954.

Astrakhan, or **Astrachan,** a city of Russia, capital of the above government, is situated on an island of the river Volga, 40 miles from its entrance into the Caspian Sea. It has crooked and dirty streets, and houses mostly built of wood. It contains a cathedral, about thirty-five churches, fifteen mosques, an archiepiscopal palace, a botanic garden, an Indian temple, and a gymnasium. Immense quantities of fish are exported hence. The other articles of export are leather, furs, linen, and woollen goods. This place is the seat of Greek and Armenian archbishoprics. It has an extensive trade, and manufactures of silk and cotton. Steamboats ply between this place and the ports of the Caspian Sea. Pop. in 1867, 47,839.

As'tralite, a variety of glass resembling aventurine, containing crystals of a cuprous compound, which exhibits a dichroitic iridescence of dark-red and greenish-blue. It is made by fusing and cooling slowly a mixture of 80 parts of silica, 120 of litharge, 72 of carbonate of soda, 18 of borax glass, 24 of scale oxide of copper, and 1 of scale oxide of iron.

As'tral Spir'its, spirits which the ancient Persians and other Orientals supposed to animate the stars. This opinion or superstition was adopted by some of the Greeks and Jews. The demonologists of the Middle Ages conceived them as fallen angels or souls of departed men.

Astrin'gent [Lat. *astrin'gens,* active part of *astrin'go,* to "bind," to "contract"], an agent which produces a persistent contraction in organic tissues, and thus checks discharges from the body, such as excessive purging or diarrhœa and hæmorrhages. Astringents are of two classes, vegetable and mineral. Of the former, tannic and gallic acids are the prevailing active principles; and these may be obtained and used in the pure state. The most common vegetable astringents are galls, oak-bark, logwood, blackberry root, rhatany, catechu, and kino. Of mineral astringents, the most important are acetate of lead, sulphate and chloride of iron, nitrate of silver, alum, carbonate of lime, and the mineral acids, sulphuric, nitric, and hydrochloric.

Astroca'ryum, a genus of palms, comprises about sixteen known species, natives of tropical America, and remarkable for the sharp spines with which the stem and almost every part is armed. They have pinnated leaves. The murumuru palm (*Astrocaryum Murumuru*), a small tree about ten feet high, grows on the Amazon, and bears a fruit about one inch long, which is esculent and highly esteemed. Another edible fruit is produced by the tucuma palm (*Astrocaryum Tucuma*), which grows near the Amazon to the height of thirty to forty feet. The *Astroca'ryum vulga're,* called tucum palm, is more lofty than the tree last noticed. It is cultivated by the natives, who obtain from the epidermis of its unopened leaves a fine and strong fibre of which they make cordage, nets, etc.

As'trolabe [Gr. ἀστρόλαβος, from ἄστρον, a "star," and λαμβάνω, to "take"], a name given by the Greeks to a circular instrument used to make astronomical observations, which is now superseded by better instruments. The ancient astrolabe consisted of two or more circles having a common centre, and so inclined to each other as to enable the astronomer to observe in the planes of different circles of the sphere at the same time.

Astrol'ogy [from the Gr. ἄστρον, a "star," and λόγος, a "discourse," also "science"], literally, the "science of the stars." This term was originally synonymous with astronomy, but was subsequently applied to a spurious science

which professed to explain the events of human life by the influence of the stars or planets. Astrology, which is a very ancient form of superstition, may be defined as the study of horoscopes, and an attempt to predict the fortunes of men by the positions and aspects of the stars. Judicial* astrology is supposed to have originated in Chaldæa. The Jews, after their captivity in Babylon, were much addicted to it, and the same delusion has prevailed among all the nations of Europe. In ancient Rome, during the empire, astrologers were a numerous and influential class. In the Middle Ages, astronomy proper was chiefly studied as subsidiary to astrology, which was considered as the more important of the two sciences. The relation between astrology and astronomy was like that between alchemy and chemistry. The Copernican system contributed greatly to bring astrology into discredit. The fundamental conception of astrology seems to have been drawn from the actual influence of the sun upon the earth in affecting health, fertility, and temperature. Connected with these facts was the worship of the heavenly bodies as divinities. The notion of Aristotle, set forth in the twelfth book of the "Metaphysics," that the heavenly bodies were "ensouled," and that each moved in its orbit by a conscious volition, gave currency to similar ideas among the students of the Peripatetic system. The power of these heavenly beings was supposed to *flow out* from their dwelling-places, and affect beings on the earth for good or evil. Astrological predictions are founded on the relative positions and aspects of the sun, moon, and planets at the moment of birth, and on certain arbitrary influences supposed to belong to each of these bodies. To facilitate the determination of the aspects, the whole heaven, visible and invisible, is divided into twelve equal parts by the horizon, the meridian, and four other circles passing through the N. and S. points of the horizon and the points of the equator (or prime vertical) which are at the distance of thirty and sixty degrees from the meridian. These equal spaces are called the twelve houses of the heavens, and the circles by which they are circumscribed are called circles of position. The circles of position are supposed to remain fixed, so that a celestial body is carried through each of the twelve houses in the course of a day by the diurnal rotation. The first house is contained between the eastern horizon and the next circle of position going to the eastward. The beginning of the first house, or the point of the ecliptic just rising, is called the horoscope. The first house is the house of life; the second, of riches; the third, of brothers; the fourth, of parents; the fifth, of children; the sixth, of health; the seventh, of marriage; the eighth, of death; the ninth, of religion; the tenth, of dignities; the eleventh, of friends; and the twelfth, of enemies. Each of the houses has one of the heavenly bodies as its peculiar lord. They have different powers, the first being the most powerful. The next object is to consider the aspects or configurations of the influential bodies. The ancients reckoned five aspects. (See Aspects.) The quartile and opposition were considered malignant or adverse, the trine and sextile as benignant or propitious, and the conjunction was an indifferent aspect. The influences ascribed to the planets were as arbitrary as those ascribed to the aspects. Saturn, being at the greatest distance from the sun, was supposed to be of a cold nature; Jupiter, Venus, and the Moon, temperate and benignant; Saturn and Mars were the most dangerous. The influence of the sun and Mercury varied according to circumstances.

Revised by M. B. Anderson.

Astron'omy [from the Gr. ἄστρον, a "star," and νόμος, a "rule" or "regulation"], the science which treats of the constitution, motions, and appearances of the heavenly bodies. Its scope includes the whole visible universe outside our atmosphere. Its principal divisions are—1, Descriptive or Physical Astronomy, which, as its name implies, includes the simple description of celestial phenomena and laws, and is to the heavenly bodies what physical geography is to the earth; 2, Theoretical Astronomy, which comprises the investigation of the celestial motions; 3, Practical Astronomy, which teaches the art of using astronomical instruments, and, by their means, of determining positions on the earth and in the heavens.

The material universe, as revealed by the telescope, is formed of a vast collection of stars and nebulæ, to the number of which no definite limit can be set, scattered through an immeasurable and inconceivable extent of space. Of the stars, about 5000 are usually visible to the naked eye, but very keen observers can detect as many as 8000. The number visible is greatly increased when a small telescope is pointed at the heavens, and continues to increase with every increase in the power of the instrument, rising, in the case of the most powerful telescopes, to forty or fifty millions, or six to eight thousand for every one visible to the naked eye. Even then there is no evidence that the smallest stars are seen, but every reason to believe that larger instruments would show millions more in every direction. The telescopic stars are for the most part scattered at random, except that they are many times thicker in some regions than in others. But great numbers of clusters are known in which great telescopes show a whole firmament of stars in a spot hardly visible to the naked eye.

The first inquiry which suggests itself in considering the stellar universe is, Can we form any estimate of its magnitude or of the scale on which it is constructed? The most difficult and refined investigations of recent times have been devoted to this question, but with only partial success. Until near the middle of the present century the distances even of the nearest stars eluded measurement, and even now there are not a dozen of which the parallax is known with anything like certainty. But these are sufficient to enable us to form a sort of judgment, at least, of the scale on which the universe is constructed. It is roughly estimated that the stars of the first magnitude have, on the average, an annual parallax of two-tenths of a second, and are therefore at an average distance of about a million times that of the earth from the sun. This distance may be most conveniently expressed by saying that light, moving around the earth eight times in a second, would require fifteen years to traverse it. Now, supposing that, on a general average, the more distant stars are of the same real magnitude with the nearer ones, but look smaller owing to their distance, we may conclude that the smallest stars visible to the naked eye are ten times as far as the nearest ones; and, allowing for their range of real magnitude, we may conclude with considerable probability that they lie at distances which light traverses in from fifty to two hundred years. In other words, if we conceive two spheres described around our sun as a centre, the smaller with a radius over which light would pass in fifty years (in round numbers, three hundred million of millions of miles), and another with a radius four times as great, it is probable that a large portion of the stars of the sixth magnitude will be included between these two spheres. Applying the same reasoning to the telescopic stars, we may conclude that the smallest stars visible in the most powerful telescopes are at distances which light would traverse in from five to fifty thousand years. Of what is beyond we know nothing as yet.

Of the form and boundaries of this agglomeration of stars which forms the visible universe nothing certain is known, but it is certain that there is a great tendency to aggregation near the plane of the Milky Way. The latter is well known to consist of vast aggregations of telescopic stars, too small to be separately visible to the naked eye. This fact was first clearly shown by Herschel, and led him to his celebrated theory that all the visible stars form a comparatively thin stratum, near the centre of which our sun is placed. That the densest portions of the universe are spread out into such a stratum or plate there can be no doubt, but of the limits of the thinner portions, composed of stars scattered outside of this stratum, nothing positive can be asserted.

Nothing indicating either growth or decay has been actually observed in the stellar universe. There is no established instance either of a known star disappearing from the heavens, or of a really new one coming into view. The supposed cases of the latter kind are now found to be due to extraordinary variability; a small star, perhaps invisible to the naked eye, suddenly bursting forth into brilliancy, and after a time subsiding to its former magnitude. Several instances of this kind are on record, the last as late as 1866, when a star of the second or third magnitude suddenly appeared in the Northern Crown. An examination of Argelander's great star-catalogue showed that it was formerly a telescopic star of the ninth magnitude. After a few days it gradually returned to this magnitude, and has not since shown any kind of disturbance.

A large number of stars—probably one out of every forty or fifty—are of variable brilliancy. Usually, the variations are so slight as to be discovered only by the careful watching of the trained observer, but in a few cases they are so striking as to be plain to any one who will observe. The star η Argus, in the southern hemisphere, varies in an extraordinary and irregular manner. Mira Ceti, usually hardly visible to the naked eye, rises nearly to the second magnitude once in every ten or eleven months, and after a week or two fades away again. Generally, the variations take place in a regular period, so that the times of greatest and least brilliancy admit of tolerably exact prediction.

The stars are found to be moving among themselves in a way that must ultimately lead to an entire change of their distribution, and perhaps to their entire separation. The

Judicial is often applied to astrology in the sense of pronouncing judgment (or sentence) upon a man's character or destiny, in contradistinction to simple astrology, signifying merely the knowledge of the stars or heavenly bodies.

velocity of motion is usually from twenty to fifty miles per second, but in one instance it probably exceeds 200 miles per second. So far as observation can show, the rule is that each star moves forward independently in a straight line with a uniform velocity. From the few estimates of the masses of the stars which have been made, there is no reason to believe that their motions can be appreciably affected by their mutual gravitation. The combined attraction of all the stars visible with the most powerful telescope, supposing their masses to be correctly judged by those of the stars which have been weighed, would never stop, and would hardly turn aside, the star Arcturus in its course of sixty or eighty miles per second, nor Groombialze 1830 in its course of 200 miles per second. There is, in fact, no certain evidence that the stellar universe is held together by any bond of attraction whatever, as our solar system is. Mädler's view, that Alcyone is the central sun of the universe, is a piece of groundless speculation which has never received the assent of astronomers qualified to judge it. The stellar motions take place in every possible direction, and without regard to any known law, except that, as a general rule, stars in the same region of space move nearly in the same direction.

Besides stars, we have nebulæ as component parts of the telescopic universe. They are cloud-like patches of light scattered all over the heavens, but less numerous in the Milky Way than at a distance from it. Two of them, situated in the northern hemisphere, the great nebulæ of Orion and of Andromeda, are clearly visible to the naked eye. Before the discovery of spectral analysis it was not possible to draw the line between nebulæ and clusters of stars, because large numbers of objects which look like nebulæ through small telescopes are found, with large ones, to be clusters of stars, and every increase in the power of the instrument was found to change objects from the former to the latter class. It was therefore doubtful whether all nebulæ were not really clusters of stars too small or too distant to be resolved with the telescope. But, as soon as the spectroscope was turned upon such of these objects as could give a visible spectrum, it was found that many of them were not solid bodies at all, but masses of incandescent gas, generally hydrogen or nitrogen. To this class belongs the nebula of Orion, which is therefore a true nebula. On the other hand, the nebula of Andromeda gives a continuous spectrum, showing that the luminous matter is in the solid or liquid state, and probably consists of an agglomeration of stars, though no telescope has yet resolved it.

We have no data whatever for forming a judgment of the distance of the nebulæ, as we have in the case of the fixed stars. A favorite theory is, that the forty or fifty millions of stars separately visible through the largest telescopes, the greater number of which, as we have said, are spread out in a thin, widely extended stratum, form a system to which our sun belongs, and that many of the resolvable nebulæ are similar systems situated far outside of our own. In favor of this view is to be said that our Milky Way, viewed from a point 500 times the distance of the most remote star in it, would have the appearance of a nebula, and would give a continuous spectrum, although no telescope we possess would resolve it. It is therefore possible that many of the more distant resolvable nebulæ may be such systems. But the greater number of visible clusters cannot compare with our Milky Way in the number of their stars, as they only comprise a few hundreds or thousands. We can really draw no line of demarcation between the agglomerations of stars within our own system and the most distant cluster, the whole range from one extreme to the other being filled with known objects. We must therefore regard the views in question as forming a very grand but yet unproven hypothesis.

Our description of the stellar universe may be summed up by saying that it is composed of an unknown host of stars, certainly more than 50,000,000, mostly scattered in irregular aggregations forming the Milky Way, while many are aggregated in yet closer clusters, some of which are situated within the Milky Way and some without it, and of a number of enormous masses of incandescent gases situated at unknown distances. Our sun is simply one of these 50,000,000 of stars, without, so far as we know, any mark to distinguish him among his fellows. He is probably rather smaller than the average: removed to 1,000,000 times his present distance, which is probably the average distance of the stars of the first magnitude, he would shine only as a star of the third or fourth magnitude. He is, indeed, accompanied by a number of non-luminous planets, while, with one possible exception, no such companions are seen to the stars; but this does not disprove their existence, because every planet of our system would disappear from view in our most powerful telescopes at a distance far less than that of the nearest star.

The physical constitution of the sun and stars is a subject which has greatly occupied investigators in recent times, without leading them to an entirely certain and complete conclusion. The theory of Wilson and Herschel, that the sun is a dark, cool body, surrounded by a stratum of luminous clouds floating in an atmosphere, has been one of the best known, but it is completely disproved by the modern discoveries of the conservation of force and the equivalence of heat and force. The enormous volumes of heat sent off by the sun can be supplied only by a continuous expenditure of force, and any theory which accounts for the solar light and heat must show whence that force comes. We know that our sun has been radiating light and heat in quantities as great as at present for thousands, or even millions, of years, while the sun of Herschel would cool off very quickly, and then cease to give either light or heat. In one respect, however, the theory in question is now universally agreed to: the "photosphere"—that is, the shining surface of the solar sphere—is composed of cloud-like matter, apparently floating in some kind of fluid, the whole being at an extremely high temperature. The spots are known to be dark depressions in the photosphere, as to the cause of which investigators are not yet agreed. Of the interior of this enormous globe we can see nothing, but there is good reason for holding that it is mostly formed of materials similar to those which compose the crust of the earth, heated to so high a temperature as to be completely vaporized and reduced to a state of *dissociation*, or one in which chemical union of different elements is no longer possible. At the same time, the pressure to which this vaporous interior is subjected by the weight of its outer layers is so great that it is compressed into the smallest possible space, so that the mean density of the sun is not much less than that of water.

On the outside, this mass is continually cooling off by radiation, and hence condensing to the solid or liquid state. The matter thus condensed forms the photosphere, which seems to be in a state of continual change.

Immediately above the photosphere lies a comparatively shallow, but extremely complex, incandescent atmosphere, the absorption of which causes the dark lines in the solar spectrum. This atmosphere consists of hydrogen gas, mixed with the vapors of many of the metals, especially magnesium, calcium, sodium, and iron; the metallic vapors, except that of magnesium, mostly lying so near the base that they are not visible, even with a spectroscope, except just at the beginning and end of a total eclipse. This atmosphere shines with a red light, and was frequently seen during total eclipses of the sun, but its existence and nature were first clearly brought to light by Mr. J. N. Lockyer's spectroscope. This gentleman termed it the chromosphere. It is agitated by storms of fire, the fury of which exceeds anything ever pictured by the wildest imagination of the poet, the velocity of the wind sometimes rising to 100 miles per second, and masses of fiery vapor many times the size of our earth shooting up to the height of 20,000, 50,000, or even 80,000, miles. These masses constitute the red "protuberances" always visible during total eclipses of the sun, the nature of which was a complete mystery until the spectroscope was turned upon them by Janssen in India during the great eclipse of 1868. They are now the subjects of daily observation by spectroscopists.

Outside the chromosphere lies an appendage the nature of which is still involved in mystery, as it can be studied only during the rare moments afforded by total eclipses of the sun. It is seen in the glow of light which then surrounds the whole sun, extending to a height greater than the semi-diameter of that body, and is known as the solar corona. Its spectrum consists principally of a single green line, not identified with that of any terrestrial substance, but Janssen also recognized some of the lines of hydrogen during the eclipse of Dec., 1871. (See SPECTRUM ANALYSIS.)

One of the most difficult questions respecting the sun is, Whence come the floods of heat which he is continually radiating into space? Why did he not cool off hundreds of thousands of years ago? Why does he not now grow cooler from year to year? Only in recent years have serious attempts been made to answer these questions, because only then was it recognized that heat was a form of force which could not be expended without being continually renewed. The theory now most generally received is that of *contraction*. It is supposed that as the sun cools off he contracts in volume; and it is found, by calculation, that a very small contraction will develop an enormous amount of heat in a mass so immense as that of the sun, so long as it does not condense to the solid or liquid state. Thus, the supply of heat may be kept up for a million of years to come, but it must give out some time, unless renewed from some unseen source, and our system will then be involved in darkness and death.

By the motion of the spots it is found that the sun rotates on his axis in about twenty-five days, this being the period at the equator. But as we approach the poles the rate becomes slower and the period longer, approaching twenty-six days at a distance of 45°. Beyond this point very few spots are to be seen, and the law of rotation is not completely known. The liquid or gaseous character of the sun's surface is conclusively proved by the variation in the rate of rotation.

The sun is accompanied by a retinue of eight major planets, of which our earth is one, and by a large group of minor planets. The major planets may themselves be divided into two groups of four each, the four inner and smaller ones being Mercury, Venus, the Earth, and Mars, and the four outer and larger ones being Jupiter, Saturn, Uranus, and Neptune. The smallest of the outer group (Uranus) has more than ten times the mass of the largest of the inner group (the Earth), and is more than fifty times its size. Between the two groups is a wide gap in which the minor planets are found. The principal numerical elements of each planet are given in a table appended to the present article; the principal of the remaining peculiarities are given in the following condensed description:

Mercury, the nearest to the sun, and the smallest of the major planets, shines with a light exceeding that of any of the fixed stars, with the possible exception of Sirius. Owing to its proximity to the sun, it can be seen by the naked eye only when near its greatest elongation, which occurs about once in four months on each side of the sun. The same circumstance, together with its intense brilliancy, has prevented the certain discovery of any peculiarities of physical constitution. This planet is quite often seen to pass between us and the sun, the transits usually occurring at intervals of three, seven, ten, or thirteen years. From a careful discussion of all the transits hitherto observed, Leverrier concluded that the motion of its perihelion is 36″ per century greater than the motion calculated from the attraction of all the known planets, and was hence led to the hypothesis that a group of small plants circulated between Mercury and the sun. But the most careful search by the best observers has uniformly failed to show any trace of such bodies, and there are strong reasons for disbelieving in their existence. No satisfactory explanation of Leverrier's result has ever been given.

Venus, the second planet from the sun, is at times, next to the sun and moon, the most brilliant object in the heavens. When east of the sun it is seen in the west, after sunset, as the evening star, and when west of him it rises before him as the morning star. It gives strong evidence of being surrounded by an atmosphere more dense than that of the earth. Several astronomers have announced the existence of mountains twenty miles high on this planet, but the evidence is too weak to be relied on. Twice in every 120 years Venus passes between us and the sun. (For an account of this very rare phenomenon, see PARALLAX, SOLAR.)

The Earth is the first planet accompanied by a moon. Its equator is inclined to the ecliptic, or the plane in which it moves round the sun, at an angle which in 1850 amounted to 23° 27′ 31″, and which is now diminishing at the rate of about 47″ per century, to increase again in the course of ages, as it fluctuates between comparatively narrow limits. The earth's axis at the same time changes its direction very slowly in the heavens, describing a complete circle around the pole of the ecliptic in about 26,000 years, the time varying somewhat in consequence of the motion of the ecliptic itself. The change of seasons is due to the inclination of these two planes, the earth's northern hemisphere being turned towards the sun from Mar. 21 till Sept. 21, and its southern hemisphere being so turned during the remainder of the year. About these two dates the plane of the earth's equator passes through the sun, and day and night are consequently equal all over the globe, whence the term *equinox*. The civil year has always been measured by the interval between the returns of the earth to the same equinox, because this return brings round the change of the seasons. (See CALENDAR.)

The Moon, being the nearest of the heavenly bodies, is that one with the physical peculiarities of which we are best acquainted. She has the appearance of a perfectly arid desert, on which the most careful scrutiny has failed to reveal a trace of air, water, or life. Her surface is broken up by great inequalities, but they are entirely different in character from those on the surface of the earth. Instead of undulating hill and valley, with chains of mountains, we find saucer-shaped depressions, generally of considerable regularity, with flat bottoms, and mounds or hillocks, great and small, scattered over nearly the entire surface. Large regions are comparatively smooth, and, from their dark color, were supposed by the first users of the telescope to be seas. Several maps of her visible hemisphere have been prepared, on which many of the features are named after the great astronomers or philosophers of ancient and modern times. The moon's revolution on her axis coincides exactly with her mean motion around the earth, and consequently she always presents the same face to us. Her farther hemisphere is for ever hid from view, but there is not the slightest reason to believe that it differs in any respect from the one we see. The size of the moon is such that her dark shadow, cast by the sun, is about 240,000 miles in length, narrowing down to a point at this distance. Whenever the earth is in the line of this shadow we have an eclipse of the sun. (See ECLIPSE and ACCELERATION.)

Mars, the fourth planet from the sun, and the last of the inner group, has always been scrutinized by astronomers with the greatest interest, owing to the variegated character of its surface, and its seeming resemblance to the earth. The whole disk is clearly divided into light and dark portions, which have been supposed to be seas and continents. The supposed seas present a dull greenish hue, while the continents are reddish and give rise to the characteristic color of the planet. Near each pole a brilliant white patch is seen, which is attributed to arctic snows and ice. The conclusion that the markings are due to land, water, snow, and ice are to be received with caution.

Outside of Mars we have the group of minor planets, or asteroids, of which 133 are now known, and of which from five to ten have been discovered annually for some years past. The total number probably amounts to several hundred. As a general rule, their orbits are much more eccentric and much more inclined to the ecliptic than those of the major planets. Nothing is known of their physical constitution, their small size preventing any peculiarities of form or structure from being seen. Their diameters are supposed to range from thirty or forty miles to 300 or 400. These estimates are founded not on measurement, but on the apparent brilliancy of the bodies, and are therefore very uncertain. Most readers are acquainted with the celebrated hypothesis of Olbers, that these bodies are the fragments of a planet which was shattered by some unknown force. Recent researches have rendered this hypothesis very improbable, and it has almost ceased to be a subject of discussion among astronomers.

Jupiter, the next planet in order, is the largest of the system, so that, notwithstanding its great distance, it is brighter than any other star or planet except Venus. Its appearance through the telescope is quite peculiar, a dark band or belt being always visible on each side of its equator, and sometimes another near each pole. When closely scrutinized these belts are found to be of irregular shape and ragged, cloud-like formation. They are subject to occasional changes in color and appearance, and within a year or two have been of a rosy hue, which never seems to have been seen before. It is doubtful whether the solid body of Jupiter is visible at all; in fact, it is not certain that it has any solid body. It has been supposed that the belts are clouds floating in the Jovian atmosphere, but all such analogies between the surfaces of the planets and that of our own globe are little better than pure speculation. Jupiter is accompanied by four satellites, which were discovered by Galileo when he first pointed his telescope at the planet. They are about as bright as the smallest stars visible to the naked eye, and could therefore be seen without a telescope if they were not overpowered by the brilliancy of the planet. Indeed, it is claimed that they actually have been seen by unusually good eyes; and some of these claims are too strongly supported to be lightly set aside. Most of the satellites pass through the shadow of the planet, and suffer a consequent eclipse in every revolution. These eclipses, being visible at the same time all over the globe, furnish one of the easiest methods of roughly determining the longitude, but very little accuracy can be thus attained. By these eclipses the progressive motion of light was first determined by Roemer. (See ABERRATION.)

Saturn, the sixth planet from the sun, with his rings and satellites, is perhaps the most striking telescopic object in the heavens. He has belts like Jupiter, but much fainter. His rings are very broad and thin, their edges being turned towards the planet. Nothing like these rings has been seen anywhere else in our system, nor even in the heavens, and the question, What keeps them from falling upon the planet? is one which has occupied several generations of mathematicians and astronomers, without being definitely solved. The corpuscular or cloud theory is that now most generally admitted. This theory is that the rings are not solid or liquid masses at all, but only a vast swarm—or rather two or three vast swarms—of very minute satellites, too small to be seen separately, but so numerous that they present the appearance of a continuous body. Just within the inner bright ring is a faint dusky ring, first discovered by Bond at Cambridge, which this theory explains very

easily by supposing the swarm of satellites to be here so thin that they are scarcely visible, and permit light to pass freely between them. Saturn is accompanied by eight satellites, twice as many as are known to surround any other planet, but none of them present any characters of especial interest.

Uranus was discovered by Sir William Herschel in 1781. It had frequently been observed before that time, but was not known to be a planet. It is accompanied by four satellites, two of which were discovered by Herschel.

Neptune was discovered in 1846 by one of the most remarkable achievements in the history of astronomy, its position in the heavens having been calculated by Leverrier and Adams before its existence was known. (See NEPTUNE, DISCOVERY OF.) It is attended by one satellite. Both Uranus and Neptune are too far off both from the earth and the sun to admit of any peculiarities being seen upon their disks, but the spectroscope shows them both to be surrounded by atmospheres of great density and remarkable constitution, in which carbonic acid is perhaps the principal ingredient.

Besides the planets which we have described, quite a number of comets are known to be members of the solar system, and a great number of others are suspected to be such, even though their time of revolution is so great that they have never been recorded as seen but once. The general rule is that a comet comes into view suddenly and unexpectedly, falling nearly towards the sun as if dropped from an infinite distance. It whirls around the sun in a parabolic orbit, and flies off into space nearly in the direction from which it came. If astronomers have an opportunity of observing it carefully for several months, they can tell whether it is or is not flying so fast that the attraction of the sun will never bring it back again. It is thus definitely ascertained that the great comet of 1858 will return, in consequence of the sun's attraction, in about 1950 years, probably between the years 3800 and 3820, after flying off into space to the distance of fifteen thousand million miles.

The physical constitution of comets is still one of the enigmas of astronomy. Large comets are generally found to consist of three distinct formations: (1) a small bright, but ill-defined nucleus; (2) a round mass of hazy, nebulous, or foggy matter surrounding this nucleus, and indeed seeming to rise from it; and (3) a tail of extremely rare matter, but of enormous length, extending off from the comet in a direction opposed to the sun, growing wider and fainter as it extends, until it gradually becomes invisible. But the smaller telescopic comets often exhibit neither nucleus nor tail, but consist only of an irregular, ill-defined, nebulous mass, perhaps brighter at one point. As the comet approaches the sun the tail develops enormously, and frequently shows itself when none was visible at a distance. It is now generally considered that the tail of a comet is not a permanent appendage, but a stream of finely divided matter continually driven off from the comet into space by some repulsive force residing in the sun, the nature of which is not yet understood. It may be compared to the steam rising from a boiling pot, or to smoke from a chimney. If this view be correct—and it can hardly be disputed—all the comets are continually evaporating into space, and must in time be entirely dissipated.

This theory of the constant dissipation of comets has recently received a striking confirmation in the ascertained coincidence of meteor-streams with the orbits of comets, and in the disappearance of Biela's comet from the heavens. It has long been known that we have either a meteoric shower or an unusual number of meteors every year on the nights of Aug. 9 and Nov. 14, and they are now found to be produced by the earth's atmosphere meeting a swarm of very minute particles which move in the respective orbits of two comets. The particles are supposed to be the fragments or dust of the comets which have become separated in the course of ages. (See METEORS.)

The foregoing is the briefest possible description of the material universe as revealed by the telescope, and may be considered as an epitome of descriptive astronomy. Of *practical astronomy* we can say no more than that it teaches the construction and use of such instruments as the telescope, the transit instrument, the meridian circle, and the zenith telescope, and the calculation of the observations made with them. The usefulness of practical astronomy, and the perfection it has attained, may be judged from this consideration: take an astronomer blindfolded to any part of the globe, give him the instruments we have mentioned, a chronometer regulated to Greenwich or Washington time, and the necessary tables, and if the weather be clear, so that he can see the stars, he can in the course of twenty-four hours tell where he is in latitude and longitude within a hundred yards.

For *theoretical astronomy*, though scientifically the most important branch of the subject, we can do no more than give the reader a general idea of what it has been and is. This science has existed in a rude state from the earliest ages of which we have any written record; indeed, astronomy has very properly been called the most ancient of the sciences. Its progress may be conveniently divided into three eras.

The first era is that of the ancient system, in which the earth was considered as the centre of the universe, and all the heavenly bodies were believed to revolve about it in the course of twenty-four hours. Far from the truth as this system was, the ancients discovered the rotundity of the earth, and the difference of local time or of the hour of the day between places of different longitudes, knew the causes and laws of eclipses, and constructed tables which gave the motions of the sun, moon, and planets with considerable accuracy. The annual motion of the earth round the sun produces an *apparent* annual revolution of the sun among the stars, and this apparent revolution was perfectly understood in the earliest historical times. The annual course of the sun was mapped out on the heavens, and divided into twelve signs, known as "signs of the zodiac." The year was known to consist of 365¼ days, and the connection of the seasons with the position of the sun in the zodiac was fully understood and described. The great body of ancient knowledge on these subjects has been preserved in the "Almagest" of Ptolemy, a work which remained an authority in astronomy for nearly 1600 years.

The second era was that of Copernicus and Kepler, in which the sun was assigned to its true place as the centre of the solar system; the earth was classified as one of the planets moving around it; and all the orbits of these bodies were found to be ellipses having the sun in one focus. A comparatively simple geometrical system was thus introduced, which did away with the complicated epicycles of Ptolemy, and at the same time represented the apparent motions with much more accuracy. Indeed, if the orbits had really been perfect ellipses, hardly any further advance in accuracy would have been made possible, even by the discovery of gravitation.

The third era is that of gravitation, in which all the heavenly bodies are considered as flying through space with perfect freedom, but each gravitating towards all the others. The sun, being 700 times as heavy as all the planets, keeps them moving in orbits around him by his own gravitation, while the motion of each planet is affected with small irregularities caused by the attraction of all the others. By this theory the courses of all the planets, and of the moon and many of the satellites, are predicted with an astonishing degree of accuracy. The first thing which gravitation settles is the motion of the earth itself on its axis. The daily revolution around its axis seems to take place with perfect regularity, but the axis itself is subject to several very slow motions, which make its direction decidedly different in the course of ages. These motions cannot well be described without a globe, but as the whole earth and the instruments with which observations are made partake of them, they change all observed positions of the heavenly bodies, and these changes must be carefully allowed for in all calculations.

The Copernican system and the theory of gravitation have reduced theoretical astronomy almost to branches of pure mathematics—mechanics, geometry, and trigonometry. The system is quite simple in its original conceptions, but very complex when we descend to minute details. A number of imaginary planes are conceived of as passing through the earth or sun, and extending out into infinity in every direction. The positions of the heavenly bodies are defined by their distances from these planes, and the angles which the line drawn from the sun or the earth to the body makes with different lines drawn in the planes. The most common mode of defining position is by giving three data: (1) the distance of the heavenly body from some point, either the centre of the earth or the centre of the sun, in a straight line; (2) the angle which this straight line makes with one of the planes in question; (3) a perpendicular being dropped from the body on the plane, the angle which the line to the point of intersection makes with some fixed line in the plane. When the distances are reckoned from the earth, it is usual to take the plane of the equator as that of reference; when from the sun, the ecliptic is usually selected. Both these planes are constantly changing their position in consequence of the attraction of the moon and planets on the earth, and this change has always to be calculated and allowed for. This operation makes the subject a very intricate one, which can be fully developed only in works devoted especially to the subject.

The following table gives the numerical details of the different elements pertaining to each major planet of the solar system. We shall explain such of the columns and numbers as need explanation. The "apparent semi-diameter" is half the angle which the diameter of the planet

subtends when seen from some usual or mean distance from the earth. In the case of the four inner planets this distance is that of the earth from the sun, while in the case of the four outer ones it is the mean distance of the planet itself from the sun. The actual distance of many of the planets from us varying very much at different times, their apparent magnitudes vary in a corresponding manner.

The "mass" of the planet signifies not its size, but its weight compared with the weight of the sun. The masses of Mercury and Mars are still uncertain; the former by perhaps a fourth, or even a third, of its entire amount, and the latter by a tenth.

Dividing the mass of the planet by its solid contents, we have its specific gravity or "density," which we give as compared with the density of the earth. The column of densities shows a remarkable difference between the materials of the inner and those of the outer planets, the lightest of the former (Mars) being nearly three times as heavy, in proportion to its size, as the heaviest of the latter. In fact, a piece of the planet Saturn would float in water, which is hardly true of a single solid constituent of our globe.

Among the "diurnal revolutions" of the planets on their axis we give those of Venus and Mercury, as some astronomers have thought they observed them, but that of Mercury is entitled to no reliance at all, and that of Venus to very little.

The "mean distance" of the earth from the sun is the astronomical unit or measuring-rod, with which all distances in the universe farther than the moon are ordinarily measured. We give the mean distances of the several planets, first in terms of this unit, which are very exact, and then in miles, which are still somewhat uncertain, because the distance of the sun from the earth in miles is not yet known with entire certainty. The most complete determination of this element yet made gives a distance of 92,380,000 miles, and this is probably within 300,000 miles of the truth; but all we can say with reasonable certainty is, that the distance is between 92,000,000 and 93,000,000. Calling the uncertainty half a million for the earth, it will be proportional to their distance in the case of the other planets, and therefore nearly 5,000,000 in the case of Saturn, and 15,000,000 in the case of Neptune.

The "periodic time," or time of making one revolution around the sun, is given in days for the inner group, and in Julian years—that is, years of 365¼ days each—for the outer group.

TABLE OF THE PLANETARY ELEMENTS FOR 1850.

Planet.	Apparent Semi-Dia.	Diameter in miles.	Mass (⊙ = 1).	Density (earth = 1).	Diurnal Revolution.	Mean distance from ⊙		Periodictime (days).	Eccentricity	Long. of Perihe'n.	Inclination of Orbit.	Long. of Node.
						In astron. units.	In mills. of miles.					
					h. m. s.					° ′ ″	° ′ ″	° ′ ″
Mercury...	3″.30	2,955	1/5000000	1.25	24 5 0	0.387099	35¾	87.96926	0.2056048	75 7 14	7 0 7.7	46 33 9
Venus.....	8″.50	7,610	1/420000	0.875	23 21 24	0.723332	67	224.700787	0.0068433	129 27 14	3 23 34.8	75 19 52
The Earth	8″.83	7,912	1/326800	1.000	23 56 41	1.000000	92⅛	365.256358	0.0167711	280 21 22	0 0 0.0	
Mars.....	4″.70	4,210	1/3000000	0.723	24 37.22.6	1.523691	141	686.979714	0.0932611	333 17 54	1 51 2.3	48 23 53
								(Years.)				
Jupiter....	18″.30	85,300	1/1048	0.249	9 55 21	5.20280	480	11.86197	0.0482273	11 54 51	1 18 41.1	98 56 10
Saturn.....	8″.20	70,080	1/3502	0.134	10 16	9.53890	881	29.45694	0.0560660	90 6 26	2 29 39.2	112 20 0
Uranus....	1″.80	30,900	1/22000	0.249	Unknown	19.18338	1772	84.0205	0.0463592	170 38 49	0 46 20.9	73 14 38
Neptune...	1″.30	34,000	1/19700	0.209	Unknown	30.05682	2770	164.782	0.0084962	43 17 30	1 47 2.0	130 7 33

S. NEWCOMB, *U. S. Naval Observatory.*

Astroph'yllite, a variety of mica found at Brevig in Norway.

Astruc (JEAN), an eminent French medical writer, born at Sauve, in Languedoc, Mar. 19, 1684. He was appointed professor of anatomy at Toulouse in 1710, and of medicine at Montpellier in 1716. Having removed to Paris in 1728, he became consulting physician to the king, and in 1731 professor of medicine at the Royal College. He had a high reputation as a professor. He published, besides other works, "De Morbis Venereis" ("On Venereal Diseases," 1736), which displays much erudition. Died May 5, 1766. (See LORRY, "Vie d'Astruc.")

Astu'ria, a former kingdom in the N. of Spain, bounded on the N. by the Bay of Biscay, and on the S. by the Cantabrian Mountains. The Asturians made a long and brave resistance to the Goths and Vandals who invaded Spain about 500 A. D., but were finally subdued. Asturia was the only part of Spain that was not conquered by the Moors. The famous Pelayo, who became king of Asturia in 719 A. D., defeated the Moors in battle. (See ASTURIAS.)

Astu'rias, an ancient division of Spain, now the province of Oviedo, has an area of 4094 square miles. It is bounded on the N. by the Bay of Biscay, on the E. by Santander, on the S. by Leon, and on the W. by Galicia. The surface is mountainous, and abounds in wild and picturesque scenery. Along the southern border extends a chain of mountains, the summit of which, called Peña de Peñaranda, is about 11,000 feet high. It has extensive forests of oak, chestnut, beech, and fir. Among the mineral resources are copper, iron, lead, cobalt, antimony, marble, coal, and zinc. The eldest sons of the kings of Spain formerly took the title of prince of Asturias. The eldest son of the ex-queen Isabella still has the title. The chief town is Oviedo. Pop. in 1867, 588,031. (See ASTURIA.)

Asty'ages [Gr. Ἀστυάγης], king of Media, was a son of Cyaxares I., and reigned from 593 to 569 B. C. He had a daughter, Mandane, who was married to Cambyses, a noble Persian, and bore a son who was Cyrus the Great. He was succeeded by Cyaxares II., the last king of Media (569–536 B. C.).

Asuay', or **Assuay,** a department of Ecuador. It is bounded on the N. E. by the United States of Colombia, on the S. by Peru, and on the W. by Peru and the departments of Quito and Guayaquil. Area, about 28,800 square miles. The western part is traversed by several chains of the Andes, and partly occupied by the desert of Paramo or Asuay. In the middle and eastern parts are extensive and fertile plains. It is watered by the Napo, Pequena, and other rivers, which flow south-eastward into the Amazon, besides the Amazon and Putumayo, which flow along its boundary. The chief town is Cuenca. Pop. 243,459, mostly aborigines.

Asy'lum [Gr. ἄσυλον, from α, neg., and συλάω, to "rob," to "carry off," because, originally, it was a place of refuge against violent and lawless men], a sanctuary and place of refuge and security for criminals and others; any place of retreat and security. In ancient Greece the temples, altars, and sacred places were appointed as asylums for criminals and persecuted persons, and it was considered a sacrilege to kill or remove by force those who had taken refuge in them. They were, however, sometimes surrounded and watched until they died of starvation. Among the ancient Jews cities of refuge were appointed for the benefit of persons who had accidentally committed manslaughter. Romulus is said to have attracted men from other states to Rome by offering an asylum to criminals, debtors, or outlaws. Asylums became so numerous under the Roman empire that they were considered nuisances by honest people, and were nearly all abolished by Tiberius. In the reign of Constantine the Great all Christian churches were asylums. The privilege was afterwards extended to convents, and was much abused by criminals in the Middle Ages. Several popes, in order to prevent this abuse, excluded murderers and some other classes of offenders from the privilege of sanctuary, which was abolished in England by acts passed in 1534 and 1697. In modern usage, the term asylum is applied to charitable institutions for the relief of the blind, insane, orphans, etc.

Asylum, a post-township of Bradford co., Pa. Pop. 1155.

As'ymptote [Gr. ἀσύμπτωτος, from α, neg., and συμπίπτω (composed of σύν, "together," and πίπτω, to "fall"), to "coincide," to "fall together"], a right line or curve which approaches nearer and nearer to some other line, but would never meet it though infinitely extended.

At'abek, a title of honor given to viziers or ministers of state by Persian sultans of the Seljook dynasty. The atabeks were the governors of several provinces, exercising almost royal power.

Ataca'ma, a province of Bolivia, of which it is the most south-western part, is bounded on the W. by the Pacific Ocean, on the N. by Peru, on the E. by the department of Potosi and the Argentine Republic, and on the S. by Chili. The Andes extend along the eastern border. It is about 290 miles long and 150 miles wide, and has an area of 70,181 square miles. The greater part of it is a desert, rendered uninhabitable by the want of rain. Gold, silver, and copper are found here. The volcano of Atacama, 18,000 feet high, is in the northern part. The desert of Atacama was a favorite burial-place of the aborigines of Peru, because in it bodies are preserved from decay by the saltness of the soil. Capital, San Pedro de Atacama. Pop. in 1858, 5273.

Atacama, a province of Chili, is bounded on the N. by Bolivia, on the E. by the Argentine Republic, on the S. by the province of Coquimbo, and on the W. by the Pacific Ocean. Area, 41,121 square miles. The country is for the most part mountainous and sterile, and produces only along the banks of a few rivers some vegetables and a few fruits. It contains, however, rich copper-mines. The climate is dry and warm; most of the springs contain salt water, and the largest river, the Rio Salado, is almost always without water in its lower course! Capital, Copiapo. Pop. in 1869, 82,328.

Atac'amite, an ore of copper, abundant in the desert of Atacama (whence its name), and occurring also as a crust on the lavas of Vesuvius and Etna. It may be defined as a hydrated oxychloride of copper, or a combination of protoxide of copper with chloride of copper. It is a rich ore, containing 55 or 60 per cent. of copper. The natural varieties of atacamite are crystallized, massive, and pulverulent or granular. The primary form of its crystals is a rhombic prism. The greenish incrustation which is formed on antique bronze weapons, utensils, etc., and which is called *ærugo nobilis,* is composed of this salt.

Atahuall'pa, or **Ataba'lipa,** the last inca of Peru, was a son of Huayna Capac, who died in 1529. By his will he divided his dominions between his two sons, Huascar and Atahuallpa, who obtained the kingdom of Quito. These brothers reigned in peace about five years, after which Huascar sent an envoy to Atahuallpa, and required him to render homage for the kingdom of Quito. That inca, who was ambitious and warlike, refused to pay homage, and, having invaded Peru with an army, defeated Huascar and took him prisoner in 1532. He spared the life of Huascar, but deprived him of his throne and liberty. In the same year Peru was invaded by Pizarro and a small army of Spaniards. The inca, with an unarmed retinue, approached the camp of Pizarro, in Nov., 1532, for a friendly interview, during which a Spanish priest informed the inca that the pope had given Peru to the king of Spain. As he rejected with indignation the authority of the pope, the treacherous Spaniards seized him and massacred his attendants. The captive inca offered to ransom himself by a quantity of gold which would fill the room in which he was confined as high as he could reach. The Spaniards accepted the gold, but refused him liberty. Pizarro accused Atahuallpa of plotting against him, and ordered him to be tried by a court-martial, which condemned him to be burned alive. After he had consented to be baptized his sentence was commuted to strangulation, and he was executed Aug. 29, 1533. According to Prescott, "he showed singular penetration and quickness of perception." (See PRESCOTT, "Conquest of Peru," vol. i.)

Atalan'ta [Gr. Ἀταλάντη], a mythical personage, was, according to ancient Greek legends, the most swift-footed of mortals, and was renowned for martial courage. She took part in the Argonautic expedition and the Calydonian hunt. Having many suitors, she offered to marry any man who should defeat her in a foot-race, with the condition that if he lost he must be put to death. Milanion, who had received from Venus three golden apples, became the successful competitor by dropping them one by one before Atalanta, who could not resist the temptation to stop and pick them up.

Atasco'sa, a county in the S. part of Texas. Area, 1097 square miles. It is intersected by Atascosa Creek, and also drained by several other creeks. This county is two-thirds prairie, and stock-raising is carried on. The soil is good and easily cultivated. Corn is the chief crop. Lignite is found. Capital, Pleasanton. Pop. 2915.

At'aulf, Adaulf, or **Adolf** [Lat. *Ataul'phus*], king of the Visigoths, and a brother-in-law of Alaric I., whom he succeeded in 411 A. D. He had aided Alaric in the capture of Rome in 410, and had captured Placidia, a sister of the emperor Honorius, whom he married. In 412 he retired from Italy into Gaul, where he defeated Jovinus, took Bordeaux (*Burdigala*), and conquered Aquitania. He was assassinated by one of his own officers in 415 A. D.

At'avism [from the Lat. *at'avus,* a "great-grandfather" or "ancestor"] is a word of recent introduction, with two modifications of meaning: 1. In natural history atavism is the reappearance in animals or plants of traits belonging to their remote progenitors which their immediate parents did not present. *Reversion* is a term nearly synonymous, used (by Darwin and others) to indicate not only the occasional or individual appearance of such remotely-descended traits, but the actual returning to them of a variety or species. Domesticated breeds of animals allowed to run wild become, after a time, nearly (seldom exactly) like their wild ancestors. This is a familiar fact with horses, cattle, hogs, and pigeons. The wild horses on the great North American prairies and on the pampas of South America, though all derived from those imported to the Western continent by Europeans, are nearly of one size, shape, and color; and the same is true of the wild herds of cattle of the South American pampas and llanos. Domestic hogs running wild assume, in a few generations, a moderate size, slender figure, and (in some places at least) a nearly black color, with head and tusks approaching those of the wild boar of Europe. Darwin mentions the fact that in all the breeds of domestic pigeons there appear occasionally birds of a slaty-blue color, with bars and other marks characteristic of the ancestral rock-pigeon (*Columba livia*). He also considers the occasional appearance of stripes upon a horse or mule as indicating ancestral identity between the now distinct species of the equine genus. This opinion may be accepted as probable by some of those who are not ready to adopt the whole Darwinian theory. 2. In human pathology atavism is a reversion (similar to the above) to morbid traits existing in ancestors, but not in immediate parents. This may be briefly illustrated by an example (from "Lectures on Practice of Medicine," by Sir T. Watson): A deaf-mute man married a woman whose hearing was perfect, and had two children by her—one a deaf-mute son, who died childless; the other, a *hearing* daughter, who married a *hearing* man, and gave birth to two *deaf-mute* daughters and a *hearing* son. This son married a woman also with good hearing, and had by her a deaf-mute son. One of the daughters married a deaf-mute, and bore a hearing son. Gout, consumption, insanity, and other diseases sometimes thus disappear for one, two, or more generations in a family, and yet return in a manner evidently due to hereditary (though interrupted or latent) transmission.

Atba'ra (*Astab'oras*), a river of North-eastern Africa, rises in Abyssinia, near Lake Dembea (or Tsana), and flows north-westward. After receiving several tributaries from the mountains, it traverses the desert of Southern Nubia, and enters the Nile in lat. 17° 37′ N., and about 25 miles S. of Berber. It is the last tributary that the Nile receives, and is one of the principal causes of the inundation of Egypt. Its length is estimated at 550 miles. In the dry season, October to June, it contains no water except standing pools. According to Sir Samuel W. Baker, "its dry bed was filled in one night with a mighty stream. To-day (June 24) a magnificent stream, some 500 yards in width, and from fifteen to twenty feet in depth, flowed through the dreary desert." (*The Nile Tributaries of Abyssinia,* 1868.) The same traveller states that "the grand rush of water pouring down the Blue Nile and the Atbara into the parent channel inundates Lower Egypt, and is the cause of its extreme fertility." Crocodiles and hippopotami abound in this river, on the borders of which are great numbers of elephants, rhinoceroses, giraffes, lions, etc.

Atchafalay'a Bay'ou, in Louisiana, is an outlet of Red River, from whence it issues near the mouth of the latter at the N. extremity of Point Coupée parish. It flows nearly southward through Chetimaches Lake, and enters Atchafalaya Bay, a part of the Gulf of Mexico. The whole length is estimated at 225 miles. It is navigable for steamers. At the entrance to the bay is South-west Reef, with an iron lighthouse 50 feet high.

Atch'ison, a county in N. E. Kansas. Area, 424 square miles. It is bounded on the E. by the Missouri River, which separates it from the State of Missouri, and is intersected by Sauterelle River or Grasshopper Creek. The surface is pleasantly diversified; the soil is very fertile. Wheat, corn, oats, dairy products, potatoes, and hay are largely raised. The streams are bordered with forest trees. Coal is found. The county is traversed by the central branch of the Union Pacific, and by several other railroads. Capital, Atchison. Pop. 15,507.

Atchison, a county which forms the N. W. extremity of Missouri, bordering on Iowa. Area, 700 square miles. It is bounded on the W. by the Missouri River, and intersected by the Nishnabatona and Tarkeo Rivers. Large quantities of corn, wool, and dairy products are raised. It is traversed by the St. Joseph and Council Bluffs R. R. Capital, Rockport. Pop. 8440.

Atchison, the capital of Atchison co., Kan., is beautifully situated on the W. bank of the Missouri River, at the extreme western point of the "Great Bend." It is the western terminus of the Missouri Pacific, Chicago Rock Island and Pacific, and Hannibal and St. Joseph R. Rs. It is the northern terminus of the Atchison Topeka and Santa Fé R. R., the eastern terminus of the central branch of the Union Pacific R. R., the southern terminus of the Atchison and Nebraska R. R., and the western terminus of the Burlington and Missouri R. R. The Kansas City St. Joseph and Council Bluffs R. R. also runs through the place. It is therefore the centre of a great system of railroads, and one of the principal commercial towns in the State. It

has 3 daily, 3 weekly, and 3 monthly papers; 2 national and 2 private banks; 4 public school buildings, one of which cost $50,000; St. Benedict's College, and 3 private schools and academies; 8 fine church buildings, including a large Catholic cathedral; a foundry, and 2 large furniture manufactories. Pop. 7054.

J. A. MARTIN, ED. "DAILY CHAMPION."

Atchison, a township of Nodaway co., Mo. P. 1219.

Atchison (DAVID R.), an American politician, born in Fayette co., Ky., Aug. 11, 1807, emigrated to Missouri in 1830. He was elected a Senator of the U. S. in 1843 by the Democrats, and was re-elected for a term of six years ending Mar., 1855. He advocated the repeal of the Missouri Compromise, and was a leader of the Democratic party of Missouri in its conflicts with the Free-State party of Kansas.

A'te [Gr. Ἄτη], a goddess in classic mythology, supposed to avenge crimes, and also to stir up mischief. According to Homer, she was a daughter of Jupiter, who, for her mischief-making character, banished her from Olympus.

At'eles [from the Gr. ἀτελής, "imperfect"], a genus of South American monkeys, characterized by the absence of

Ateles.

a rudimentary condition of the thumb of the anterior hands. They have long, prehensile tails. The genus comprises the marimonda (*Ateles Beelzebub*), which is very numerous on the Orinoco, besides a dozen other species.

Ateliers Nationaux, ăt-le-ā′ nā′se-o′nō′, or "National Workshops," the name of establishments organized in Paris by the republican government in 1848 for the benefit of operatives and mechanics who lacked employment. These men entertained an idea that the government was bound to find them employment. The number of workingmen who depended on the government for subsistence was about 100,000. The experiment failed, and when the ateliers nationaux were closed a bloody sedition broke out in Paris, June, 1848.

Atella'næ, Fab'ulæ, also called **Ludi Osci,** rustic comedies which were performed in ancient Rome, and derived their name from Atella, a town of Campania. The actors of these plays spoke the Oscan dialect, and amused the people with decent drollery. The *Maccus* and *Bucco* of the Fabulæ Atellanæ are said to be the origin of the modern Harlequin and Pulcinello.

A Tem'po (literally, "to time"), a musical term, used to denote that after some short relaxation in the time the performer must return "to the [proper] time," or original degree of movement.

A Tem'po Gius'to ("to the correct time"), in music, a direction to the performer, after a recitative, to keep the measure true and correct, which during the recitative had been altered to suit the action and passion of the scene.

Ates'sa, an Italian town in the province of Abruzzo Citeriore, 14 miles W. of Vasto d'Ammone. It has a fine church and numerous convents, a hospital, and three *monti de pietà*. Pop. in 1861, 10,729.

Ath, or **Aath,** a fortified town of Belgium, province of Hainaut, on the river Dender, and on the railway from Brussels to Lille, 20 miles by rail E. by S. of Tournay. It has an arsenal, a college, a town-hall, an orphan asylum, and a remarkable church; also manufactures of calico, lace, gloves, cutlery, etc. Pop. in 1866, 8260.

Athabas'ca, or **Athapes'co,** a river and lake of the N. W. provinces of British North America. The lake is about lat. 59° N., and between lon. 106° and 112° W. It extends E. and W. about 230 miles, and has an average width of 20 miles. The river rises in the Rocky Mountains, flows north-eastward, and enters the lake near its western extremity. The water of this lake is discharged through Slave River, and eventually passes into the Mackenzie River.

Athali'ah, a queen of Judah, was a daughter of Ahab, king of Israel, and Jezebel. She was married to Jehoram, king of Judah, whom she survived, and became a notorious idolater. After the death of her son Ahaziah, about 884 B. C., she usurped the royal power and murdered all the males of the royal family except Joash. In 878 B. C. she was killed by the partisans of Joash. Her story is the subject of one of Racine's most celebrated tragedies. (See 2 Kings viii. and xi.)

Athana'sian Creed [Lat. *Sym'bolum Athanasia'num*], so called because it was supposed to have been written by Athanasius (died 373). But this is a mistake. It did not appear in Greek till the eleventh or twelfth century, and was then evidently a translation. In the West it was commented upon by Venantius Fortunatus in 570. And it contains extracts from Augustine's "Trinity" (415 A. D.), and from the "Commonitorium" of Vincentius Lirinensis (434 A. D.); so that it was probably written not far from 450 A. D., and apparently in Gaul.

The Athanasian Creed is the sharpest and most rigid of the three catholic symbols. It sometimes takes as its title the words *Quicunque vult*, with which in its Latin version it commences. The entire passage of which those words are a part is in English as follows: "Whosoever will be saved, before all things it is necessary that he hold the catholic faith; which faith except every one do keep whole and undefiled, without doubt he shall perish everlastingly." Then follows a minute and precise exposition of the Trinity, and an equally exact statement of the doctrine of the incarnation; after which this clause occurs: "This is the catholic faith; which except a man believe faithfully he cannot be saved." The common inference would be that unless a man held the doctrine precisely as it is taught in the creed he cannot be saved. On account of these "damnatory clauses," as they are sometimes called, many Christians, while substantially accepting the doctrines of the creed, disapprove of its being used in the churches. Though still retained in the church-service in England, it is omitted from the Book of Common Prayer used by the Episcopal churches in the U. S. REVISED BY R. D. HITCHCOCK.

Athana'sius [Gr. Ἀθανάσιος], SAINT, a celebrated Greek Father of the Church, was born at Alexandria about 296 A. D. His education was directed by Alexander, arch-

bishop of Alexandria. After he had been ordained as a deacon he was appointed a member of the general Council of Nice (325), in which he distinguished himself by his eloquence, learning, and zeal against Arianism. In 328 A. D. he was elected archbishop of Alexandria by the clergy and the people. He refused to comply with the will of the emperor Constantine the Great, by restoring to communion Arius, who had recanted or renounced some doctrines which the Council of Nice condemned. He was summoned to appear at the Council of Tyre, in 335 A. D., to answer several charges, and was there deposed. The emperor Constantine banished him to Treves, but the emperor Constantius, on the death of Constantine, restored him (338) to his see. In 339 about ninety Arian bishops assembled at the Council of Antioch, condemned Athanasius, and, their decision being approved by the emperor, he was suspended, and retired to Rome. He recovered his office in 346. The Arians prevailed in the Council of Arles (353) and the Council of Milan, which, under the influence of the emperor Constantius, condemned Athanasius in 355 A. D. He was again driven out of Alexandria, and took refuge in the solitudes of Upper Egypt, where he passed six years, and wrote several doctrinal works. On the accession of Julian the Apostate (361 A. D.) he returned to Alexandria, but he was exiled in 362. In 367 he was restored by Jovian; in 367 he was once more exiled by the Arian emperor Valens, but after a few months (368) he was allowed to return, and now continued in peaceable possession of his office until his death, in 373 A. D. Athanasius was the most eminent and influential leader of the orthodox party (who were sometimes called Athanasians), and was distinguished for his fortitude under persecution, and other virtues which qualified him to be a pillar of the militant Church in stormy and perilous times. He left numerous polemical and religious works, written in Greek in a simple, nervous, and perspicuous style. Among them are a "Discourse on the Incarnation," "Five Books against Arius," "Epistles to Serapio," an "Oration against the Gentiles," and an "Apology for his own Flight." An edition of his works was published at Paris in 3 vols. folio, 1628. (See SOCRATES, "Historia Ecclesiastica;" SOZOMEN, "Historia Ecclesiastica;" MÖHLER, "Athanasius der Grosse," 1827; VOIGT, "Lehre des Athanasius," 1861.) REVISED BY A. J. SCHEM.

A'theism [Lat. *atheis'mus;* from the Gr. *a*, neg., and *θεός*, a "god"], the denial of the existence of God, or the doctrine that there is no God. Atheism may be either speculative or practical; the former consists in denying the existence of God; the latter in living as if there were no God. Speculative atheism is, strictly speaking, impossible, for the denial of the Divine existence necessarily affirms it. For if one deny God's being, his denial is worthless unless it rests upon some reason; but this reason must be absolute, or it can be no sufficient warrant for his denial, and this will only be to adduce absolute reason to declare that the Absolute Reason cannot be, which is the very absurdity of all absurdities. To suppose the existence of some nature of things whose chain of invincible necessity stretches above and around the Deity, is to suppose what, if it have any meaning, must itself be invested with the being and the attributes of the Godhead. Strictly speaking, the belief in a God would seem to imply a belief in his personality—that is, in his existence as a *conscious* being. But, according to its modern acceptation, atheism is understood to deny not merely the existence of a personal Deity, but also the presence in the universe (apart from *individual* intelligences) of any Principle of intelligence, beauty, or goodness. (See PANTHEISM.) Perhaps the most remarkable phase of systematic atheism is that which is set forth in the writings of Epicurus and his followers; for although that philosopher nominally acknowledged the existence of gods, he doubtless did so (as Cicero suggests) merely to avoid the popular odium which by a denial of their existence he was certain to incur. In his system of philosophy there is no all-pervading Intelligence, as in that of Anaxagoras—no principle of order, no law except the law of chance. All possible forms of existence had been tried in the fortuitous concourse of the primitive atoms, and those beings only which had at last attained, by repeated accidental trials, a certain regularity and completeness of parts, possessed any permanent existence. Among many of the ancient nations in very early times to deny the gods was much the same as to deny all religious and moral obligations; hence the name *atheos* (*ἄθεος*), or "atheist"—that is, "without God" or "denying the gods"—became a term of the greatest reproach; at length those who had political ends to serve came to use it, not very unfrequently, as a convenient method of exciting popular odium against an opponent; and it has been repeatedly applied to worthy and virtuous men, both in ancient and modern times.

REVISED BY J. H. SEELYE.

Ath'elard of Bath, an English natural philosopher of the twelfth century who travelled in the East and published numerous works, some original and some translated from the Arabic. A few of these works have been printed, and others exist in MS.

Ath'elstan, or **Æthelstan,** an able Anglo-Saxon king of England, born about 895 A. D., was the natural son of Edward the Elder, and a grandson of Alfred the Great. He began to reign in 925, and was the first actual sovereign of all England. On the death of Sigtric, king of Northumbria, Athelstan annexed that country. A league was formed against him by the Welsh, Scots, and Picts, whom he defeated in a great battle at Brunenburg, 937 A. D. He reigned over nearly all the island, except Scotland and Wales. He promoted learning and civilization, and was reputed one of the wisest of the Anglo-Saxon kings. He died without issue Oct. 27, 940, and was succeeded by his brother Edmund. (See FREEMAN, "Norman Conquest," vol. i.; HUME, "History of England.")

Athe'na [Gr. *Ἀθήνη* or *Ἀθηνᾶ*], sometimes called **Pallas Athena,** the goddess of wisdom, and one of the principal divinities of the Greek mythology. According to an ancient legend, she was the daughter of Jupiter, from whose head she issued in full armor. She was the favorite national divinity of the Athenians, whose capital was named in her honor. She presided over the sciences, inventions, arts of peace, laws, etc., and was supposed to have invented every kind of art or work proper to women. *Athena* corresponds to the Roman MINERVA (which see).

Athenæ'um [Gr. *Ἀθήναιον*], a general name for the temples of Athena; a temple at Athens, dedicated to Athena, in which poets and orators assembled to recite their works and to instruct the young. Also, a school which was founded at Rome on the Capitoline Hill by the emperor Hadrian, and long continued to be an important institution. In the reign of Theodosius II. it had ten professors of grammar, three of oratory, five of dialectics, one of philosophy, and two of jurisprudence. The name was given to it in honor of Athens, the great seat of ancient learning. In modern times the term is applied to literary institutions, public reading-rooms, etc.

Athenæ'us, an eminent Greek *littérateur* and antiquary, born at Naucratis, in Egypt, lived about 200 A. D. The events of his life are mostly unknown. He resided for some years at Rome, and appears to have been a great reader, and an epicure in his habits. He wrote, in the form of a dialogue, a very interesting work called *Δειπνοσοφισταί* ("The Banquet of the Learned"), which is extant. It is an account of an imaginary banquet given by a noble Roman to a number of eminent men, and contains a rich fund of anecdotes, criticisms, and extracts from the works of about seven hundred poets and historians, some of whose works are lost. Although it does not indicate much literary ability, it is considered extremely valuable as a *mélange* of literary, social, and domestic gossip. A good edition of this work was published by W. Dindorf, Leipsic, 3 vols., 1827. An English translation of it may be found in Bohn's "Classical Library," London, 1854. (See FABRICIUS, "Bibliotheca Græca;" "Edinburgh Review," vol. iii., 1803.)

Athenag'oras [Gr. *Ἀθηναγόρας*], a Greek philosopher and Christian writer, born at Athens, flourished about 170. Philip Sidetes (about 400 A. D.) makes him the first principal of the catechetical school at Alexandria (161–180 A. D.). He wrote an elaborate treatise on the "Resurrection," also an "Apology," addressed, some say, to Marcus Antoninus and Lucius Verus, about 166 A. D.; others, to Marcus Aurelius and his son Commodus, about 177 A. D. The best recent edition of his works is that by Otto, 1857.

Athe'nion [Gr. *Ἀθηνίων*], an eminent Greek encaustic painter, born at Maronea, in Thrace, was a pupil of Glaucion. He lived about 320 B. C., and died prematurely. Among his works was "Ulysses detecting Achilles disguised as a Female."

Ath'ens [Gr. *Ἀθῆναι*; Lat. *Athe'næ;* Turk. *Seti'nes*], an ancient and celebrated Hellenic city and republic, unrivalled in art and literature, immortal in the records of genius and glory. No state, ancient or modern, has produced in proportion to its extent and population so many authors, orators, artists, and statesmen of the first order, or has contributed so largely to the education and improvement of humanity. Athens is situated about 5 miles N. E. of the Saronic Gulf, in the plain of Attica, which is enclosed by mountains on every side except the south, and forms a grand natural amphitheatre; lat. 37° 56′ N., lon. 23° 38′ E. The plain is bounded on the N. W. by Mount Parnes, on the N. E. by Mount Pentelicus (now often called Mendeli), on the S. E. by Mount Hymettus, on the S. W. by the sea, and on the W. by Mount Ægaleos. About 1 mile N. E. of the city rose Mount Lycabettus, an isolated conical peak, which forms a prominent and beautiful feature in the land-

scape, and is now called the "Hill of Saint George." Within the city walls were four hills—namely, the Acropolis; the Areopagus, or Mars' Hill; the Pnyx, on which political assemblies were held; and the Museum. The Acropolis, or citadel, an isolated, rocky hill, rises abruptly nearly 300 feet above the plain, near the centre of the space enclosed by the walls of Themistocles. It has a flat top about 1100 feet long and 450 feet wide, inaccessible on all sides except the W., where the ascent is also steep. The city stands on a bed of hard limestone, partly covered by a thin, light, and rather sterile soil. It has a delightful climate, and an atmosphere of almost matchless purity and transparency. Mr. Stanley speaks of "the transparent clearness, the brilliant coloring of an Athenian sky; of the flood of fire with which the marble columns, the mountains, and the seas are all bathed and penetrated by the illumination of an Athenian sunset." The same traveller notices "the *violet* hue which Hymettus assumes in the evening sky, in contrast to the glowing furnace of the rock of Lycabettus and the rosy pyramid of Pentelicus." Hence, Athens has been called the "City of the Violet Crown." Among the physical features of the environs of Athens are two rivulets, the Cephissus and the Ilissus, both of which are nearly exhausted and waterless in summer. The walls of Athens in its most prosperous state enclosed not only the city proper (τὸ Ἄστυ), but also a long, narrow suburb extending to the harbor of Piræus, which was four and a half miles S. W. of the Acropolis, and was connected with it by two long walls, 550 feet apart. The Piræus was a rocky peninsula enclosing several good harbors, and defended by a citadel and fortress, called Munychia, built on a high rock. This was sometimes termed the Acropolis of the Piræus.

History.—According to an ancient legend, Athens was founded by Cecrops, and was originally called Cecropia. In the reign of Erechtheus the name was changed to *Athenæ*, in consequence of the prominence which was given to the worship of Athena (Minerva). Theseus, the national hero of Attica, is said to have united into one political body the twelve independent *demi* or communities into which Cecrops had divided Attica, and to have made Athens the capital of the new state. Homer in the "Iliad" mentions Athens and its temple of Athena. The last king of Athens was Codrus, who sacrificed himself for his country, in compliance with the advice of an oracle, about 1068 B. C. The state then became a republic or oligarchy, ruled by an archon or archons, the first of whom was Medon, a son of Codrus. An important event in the history of the Athenians was the institution of the Olympic Games (which see), celebrated once in four years at Olympia, in Elis. The first Olympiad began in 776 B. C., the era to which all subsequent events were referred by the ancient Greek historians. The term of office of the archons was reduced to one year about 684 B. C., before which date the archon ruled the state for ten years. (See Archon.) Among the powerful and conservative elements in the Athenian constitution was the council or court of the Areopagus (which see), the origin of which was very ancient. The great legislator and statesman who laid the stable foundations of the glory and prosperity of Athens was Solon, who became archon in 594 B. C., at a time when many of the poor were reduced to slavery and violent party dissensions tended to civil war. He reformed the constitution, abolished slavery for debt, improved the condition of the poor and the common people, and divided the population into four classes, according to their property. The fourth or lowest class were not eligible to office, but they were exempt from taxation, and could vote for archons and other officers. He also enlarged the jurisdiction and authority of the court of the Areopagus, which tended to counteract the excesses of the democratic element which he infused into the constitution. Pisistratus usurped the chief power in 560 B. C., ruled as a mild and liberal tyrant for many years, and left his power to his sons Hippias and Hipparchus. The first effort to embellish the city during the historical period appears to have been made by Pisistratus and his sons. They erected many temples and other public buildings, and commenced the temple of Jupiter Olympius, which was the largest temple in Greece, but it remained unfinished about seven hundred years. The state was liberated from the mild tyranny of the Pisistratidæ by Harmodius and Aristogi'ton, who killed Hipparchus in 514. Hippias was expelled in 510 B. C. Soon after Clisthenes made some liberal reforms in the constitution, which he rendered essentially democratic. He divided the people of Attica into ten tribes (which were subdivided into δῆμοι, townships or parishes), instead of the four ancient Ionic tribes (φυλαί). It is important to observe that the *demi* assigned to each tribe were in no case all adjacent to each other; and "the tribe as a whole," says Mr. Grote, "did not correspond with any continuous portion of the territory, nor could it have any peculiar local interest separate from the entire community." This arrangement was adopted as a precaution against factious movements arising out of local feuds. About 500 B. C. the Greek colonies of Ionia revolted against the king of Persia, and were aided by the Athenians. Provoked by this affront, Darius resolved to subjugate Greece, and to punish the Athenians in an especial manner, for which purpose he sent a large army in 490 B. C. Among the ten generals who commanded the Athenian army were three illustrious men—Aristides, Miltiades, and Themistocles. The armies met on the plain of Marathon, where Miltiades gained a decisive victory which was one of the most momentous events of universal history. The Spartans did not arrive in time to take part in this battle. The sagacious Themistocles, foreseeing that this was only the beginning and not the end of the war, persuaded the Athenians to build a large fleet. Having spent several years in diligent preparation for another invasion of Greece, Xerxes (called the Great) crossed the Hellespont with an immense army in 480 B. C. The Persians forced the pass of Thermopylæ, defended by a small band of Spartans, for whose epitaph Simonides wrote two famous lines which may be thus translated:

"Go tell the Spartans, friendly passer-by,
That we obeyed their orders, and here lie."

The Athenians in this crisis consulted the oracle of Delphi, and received at first an alarming or sinister response, to which was finally added this emphatic prediction: "But this assurance I will give you firm as adamant: when everything else in the land of Cecrops shall be taken, Jupiter grants to Athens that the wooden wall alone shall remain unconquered to defend you." Concluding that the wooden wall signified the fleet, the Athenians removed their women and children to Ægina and Salamis, and evacuated Athens, which was taken and burned by the Persians. The Greeks were reduced to a desperate extremity, but in one day the great naval battle of Salamis (480 B. C.) made an immense change in their situation, and restored them to security and triumph. This event was followed by the rapid development of the maritime power of Athens. Themistocles fortified the Piræus, and surrounded Athens with massive walls sixty stadia in circumference. The courage and public spirit of the Athenians in the conflict with the Persians raised their reputation and influence so high that when many of the Greek states formed a league for mutual defence, they gave to Athens the hegemony or chief control of the confederacy. Soon after the battle of Salamis the Athenians began to rebuild their capital and to erect those masterpieces of architecture which have excited the admiration of all succeeding ages. The most brilliant period in Athenian art was the age of Pericles, who became the most powerful statesman of Athens about 469 B. C. During his long and able administration Æschylus, Sophocles, Euripides, Socrates, and Phidias flourished. He made Athens the most splendid city of Greece, and erected, on the Acropolis, the Parthenon, Erechtheum, and Propylæa. It was here that Art achieved her greatest triumphs. "In order to form a proper idea of the Acropolis, we must imagine the summit of the rock stripped of everything except temples and statues, the whole forming one vast composition of architecture, sculpture, and painting, the dazzling whiteness of the marble relieved by brilliant colors, and glittering in the transparent clearness of the Athenian atmosphere." (*Smith's Dictionary of Greek and Roman Geography.*) In 431 B. C. a long war broke out between the Athenians and the Spartans, who were the aggressors. This was called the Peloponnesian war, which continued about twenty-seven years, and was disastrous to the Athenians. During this period, Thucydides, Nicias, and Alcibiades were prominent public men of Athens. Nicias conducted a large fleet and army against Syracuse (an ally of Sparta) in 413 B. C. But the expedition proved a disastrous failure. Nearly all of his men were killed or captured. In 404 B. C. the war ended with the capture of Athens by the Spartan general Lysander, who abolished the democracy, and established the rule of the Thirty Tyrants. Thrasybulus, aided by a body of exiles, expelled these tyrants within one year after their accession to power. Athens had lost her political and military supremacy, but she still surpassed all other states in art and literature, and was illustrated by the genius of Plato and Demosthenes. The latter began his public career about 354 B. C., when the liberty of Athens was menaced by Philip of Macedon. He became the leader of the party that opposed Philip, whom he assailed in his celebrated "Philippics," the eternal monuments of his political foresight, wisdom, and magnanimity. The army of Philip gained a decisive victory over the Athenians and Thebans at Chæronea, in 338 B. C. Athens and the other Greek states then became subject to Macedon. In 146 B. C., Greece was reduced to a Roman province. Athens under the Roman power continued to enjoy much prosperity, and was the centre of Grecian philosophy, literature, and art. The great monu-

ments of the age of Pericles still remained in their original beauty and perfection. The Athenian schools of eloquence and philosophy attracted great numbers of students from Rome and all parts of the civilized world. Here Cicero, Virgil, and Horace received part of their education. It is difficult to determine the population of ancient Athens, which, according to Xenophon, was the most populous city of Greece. He states that it contained more than 10,000 houses. Leake estimates the population at 192,000, including the Piræus. The private houses were small and poor compared with the public edifices. The climate was so genial that the Athenians passed nearly all their time in the open air.

Monuments and Antiquities.—At the W. end of the Acropolis stood the Propylæa, one of the masterpieces of Athenian art, constructed of Pentelic marble, and finished in 432 B. C. The central part of this building (called Propylæa because it formed a vestibule to the gates by which the Acropolis was entered) consisted of two Doric hexastyle porticoes, covered with a roof of white marble. Of these porticoes the western faced the city and the eastern the interior of the Acropolis; the latter, owing to the rise of the ground, being higher than the former. They were divided into two parts by a wall pierced by five gates or doors, which were the only public entrance into the Acropolis. Considerable remains of the Propylæa are still visible. Passing through the Propylæa, we come to the Parthenon, or temple of Athena Parthenos, regarded as the most perfect specimen of architecture ever executed. It was designed by Callicrates and Ictinus, was built in the Doric order of white Pentelic marble, and was completed in 438 B. C. The dimensions were 228 feet long, 101 feet wide, and 66 feet high to the top of the pediment. It consisted of a cella, surrounded by a peristyle of forty-six columns, which were six feet two inches in diameter and thirty-four feet high. Within the peristyle at either end there was an interior range of six columns five and a half feet in diameter. In technical language this temple was a peripteral octastyle, so called because it had eight columns at each front. "Such," says Leake, "was the simple structure of this magnificent building, which, by its united excellencies of materials, design, and decorations, was the most perfect ever executed. Its dimensions were sufficiently great to give an appearance of grandeur and sublimity; and this impression was not disturbed by any obtrusive subdivision of parts. . . . There was nothing to divert the spectator's contemplation from the simplicity and majesty of mass and outline which form the first and most remarkable object of admiration in a Greek temple." The whole building was adorned within and without with exquisite pieces of sculpture, the grandest of which was a colossal statue of Athena, executed by Phidias and formed of ivory and gold. This statue stood in the largest apartment of the cella. The Parthenon remained almost entire, except the roof, until 1687, when Athens was besieged by the Venetians. A quantity of powder which the Turks had placed in the cella exploded, and reduced the centre of the Parthenon to a heap of ruins. The columns of the two fronts escaped, and are still standing, with part of the walls. The Erechtheum (Ἐρέχθειον), standing on the Acropolis, was a beautiful temple of the Ionic order, and the most revered of all the sanctuaries of Athens, being connected with the origin of the Athenian religion. It was completed about 393 B. C., and adorned with three porticoes and columns, many of which are now standing. Among the finest edifices of Athens was the Theseium (Θησεῖον), or temple of Theseus, which was built of Pentelic marble about 465 B. C. Its architecture was of the Doric order, and it was surrounded by a peristyle of thirty-four columns. The Theseium is the best preserved of all the monuments of ancient Athens. The temple itself is nearly perfect, but the sculptures have received much injury. The site of the Olympeum, or temple of Jupiter Olympius, is indicated by sixteen gigantic Corinthian columns of marble standing S. E. of the Acropolis. This exceeded all other temples of Greece in magnitude, being 354 feet long and 171 wide. It consisted of a cella surrounded by a peristyle, which had ten columns in front and twenty on each side. The peristyle, being double in the sides and having a triple range at either end, consisted of 120 columns six and a half feet in diameter and above sixty feet high. Among the interesting places in the suburbs of Athens were the Academy—in which Plato taught, and which long continued to be a sanctuary of philosophy—and the Lyceum, over which Aristotle presided. Towards the end of the sixth century of the Christian era Athens began to decline. In 1204 it became the capital of a duchy which during the fourteenth century belonged to Naples. In 1394 the Florentine Nerio Acciajuoli became duke of Athens, and his family held this position until 1456, in which year it was taken by the Turks. During the time of the Turkish rule Athens declined more and more, and had a population of only 6000 or 8000. The ancient monuments were falling to ruin, and the city itself presented a true picture of the demoralization of the whole nation. The Greek war of independence was the cause of great destruction to the city, so that when in 1830 Attica was incorporated with Greece, the city was nothing more or less than a heap of ruins. But when in 1834 it became the capital of the new kingdom of Greece, it rapidly changed, and was greatly improved. A royal palace, 300 feet in length and 280 feet wide, was completed in 1843 near Mount Lycabettus. Among the finest modern buildings are the university, the cathedral, the mint, the theatre, and the chamber of representatives. The university, founded in 1836, has about forty professors, and a library of nearly 90,000 volumes. It is said to be well organized and flourishing. Athens has also several gymnasia, and a system of graded free schools. Since the liberation of Greece from the Turkish yoke the Hellenic people have been animated by an ardent desire to regenerate their country by the promotion of education. Athens has a good harbor, the ancient Piræus, now called Drâko. Pop. in 1870, 48,107. Pop. of the Piræus, in 1870, 11,049. (See Leake, "Topography of Athens," 1841; Stuart and Revett, "Antiquities of Athens," 4 vols., 1762–1816; Grote, "History of Greece;" Wordsworth, "Athens and Attica," 1836; Mure, "Journal of a Tour in Greece," 1842; K. O. Müller, article *Attica* in Ersch and Gruber's "Encyklopädie;" Breton, "Athen," 1868; Welcker, "Tagebuch einer griechischen Reise," 1865.) Revised by R. D. Hitchcock.

Ath'ens, a county in the S. E. part of Ohio. Area, 430 square miles. It is bounded on the S. E. by the Ohio River, and drained by the Hockhocking. The surface is hilly; the soil is fertile. Grain, wool, and tobacco are extensively raised. Salt is made from salt-wells. A bed of coal underlies the whole county and is extensively worked. Iron is found in this county, which is intersected by the Marietta and Cincinnati R. R. Capital, Athens. Pop. 23,768.

Athens, a township of Dallas co., Ala. Pop. 3565.

Athens, a post-village, capital of Limestone co., Ala., is on the Nashville and Decatur R. R., 27 miles W. N. W. from Huntsville. On Sept. 23, 1864, the Confederate general Forrest, with a large body of cavalry, invested the town, held by Colonel Campbell, of the One Hundred and Tenth U. S. Colored Troops, and 600 men, and demanded its surrender, which was finally made just as reinforcements were on their way. The place was again occupied by U. S. forces, and again attacked by the Confederate general Buford Oct. 2–3, 1864, but this time the place was firmly held by Colonel Slade, of the Seventy-third Indiana, and Buford repulsed. Athens has two weekly newspapers. Pop. 887; of Athens township, 2618.

Athens, a city of Clarke co., Ga., on the Oconee River, the north-western terminus of the eastern branch of the Georgia R. R., which connects it with Augusta, 114 miles distant, and the southern terminus of the North-eastern R. R., now being constructed to Rabun Gap, which will connect with the West at Knoxville, Tenn. It is the seat of the University of Georgia, the State College of Agriculture, the Lucy Cobb Institute, several other schools of a high grade, and a number of common schools. It has 10 churches, 2 banks, 1 insurance company, 2 cotton-factories, 1 foundry, 1 street railway, 1 gas company, 4 fire companies, and 4 newspapers and periodicals. In the contiguous country are four or five cotton-mills and other manufactories. Pop. 4251.

Hon. J. H. Christy, Ed. "Southern Watchman."

Athens, a township of Ringgold co., Ia. Pop. 502.

Athens, a post-village of Menard co., Ill. Pop. 351.

Athens, a post-township of Somerset co., Me. It is the seat of an academy, and has manufactures of lumber, etc. Pop. 1540.

Athens, a post-township of Calhoun co., Mich. Pop. 1294.

Athens, a township of Gentry co., Mo. Pop. 2211.

Athens, a post-village of Greene co., N. Y., on the W. bank of the Hudson River, 29 miles below Albany and opposite the city of Hudson. It is the southern terminus of a branch of the Central R. R. Lime, limestone, bricks, and ice are extensively produced. Pop. 1793; of Athens township, 2942.

Athens, a post-village, capital of Athens co., O., is on the Hockhocking River, and on the Marietta and Cincinnati R. R., 41 miles W. S. W. of Marietta. It is the south-eastern terminus of the Columbus and Hocking Valley R. R., which connects it with Columbus, 76 miles distant. Here is the Ohio University, founded in 1804; also a national bank, two weekly papers, and a State lunatic asylum. Pop. 1696; of township, 3277. Ed. "Messenger."

Athens, a township of Harrison co., O. Pop. 1232.

Athens (borough and township), Bradford co., Pa., embraces the junction of the North Branch of the Susquehanna with the Chemung (once called Tioga) River. Athens was early known as "Tioga" or "Tioga Point," and was the most important trading-post in the region. The canal once used along the Susquehanna and Chemung is now abandoned from Elmira to Pittston, and its bank is occupied by the Lehigh Valley R. R. Company, lessee of the Pennsylvania and New York Canal and R. R. Company. The Ithaca and Athens R. R., and also the Southern Central R. R. (to Owego and Auburn, N. Y.), unite with the Lehigh Valley R. R. at Sayers, in Athens township. The borough is 15 miles N. of Towanda, the county-seat, and 4 miles S. from Waverley—Athens township including the S. part of Waverley village, which is mostly in N. Y. There is a post-office at Athens borough, and one at Orcutt's Creek, in the N. W. part of the township; a national bank and two weekly papers in the borough, and a savings bank in South Waverley (the N. end of the township); two bridges over the Chemung, two over the Susquehanna, and several mills, factories, etc. Athens has the oldest academy in the section, and had Nathanael P. Tallmadge among its early tutors. Joshua R. Giddings was born at Queen Esther's Flats, below the borough, during the migration of his parents from Connecticut to the Western Reserve. "Spanish Hill," S. W. of Waverley, had a fortification on its summit, the origin of which is unknown. The region is one of historical interest and physical beauty. Pop. in 1870, borough, 965; township, 2256; total, 3221.

ED. OF "GLEANER."

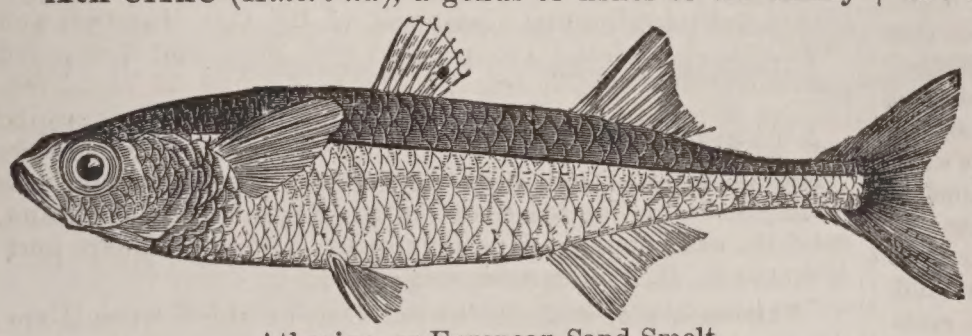
Athens, a township of Crawford co., Pa. Pop. 1317.

Athens, a post-village, capital of McMinn co., Tenn., on the East Tennessee Virginia and Georgia R. R., 55 miles S. W. of Knoxville. It has one weekly newspaper, and is the seat of East Tennessee Wesleyan University. Pop. 974.

Athens, a post-village, capital of Henderson co., Tex., 178 miles N. of Houston, and 180 miles N. E. of Austin City. Pop. 545.

Athens, a post-township of Windham co., Vt. P. 295.

Ath'erine (*Atheri'na*), a genus of fishes of the family



Atherine, or European Sand-Smelt.

Atherinidæ, related to the mullet. They have more than twice as many vertebræ as the mullet, are about six inches long, and have a broad silvery band along each flank. The genus comprises many species which abound in the Mediterranean. The *Atherina presbyter* is sold in England under the name of *smelt*. Those of the U. S. coast are called "silversides" and "sand-smelts." They are mostly small fishes.

Atherosperma'ceæ [from *Atherosperma*, the name of one of the genera], the name of a natural order of incomplete aromatic exogenous shrubs found in New Holland and South America, remarkable for having their flowers in a cup-shaped involucre, and the peculiar anthers of Lauraceæ.

Ath'erton (CHARLES GORDON), an American politician, born at Amherst, N. H., July 4, 1804. He graduated at Harvard in 1822. He was a member of Congress 1837–43. He procured in 1838 the passage of a resolution that all petitions or papers relating to slavery should be laid on the table without being debated, printed, or referred. In 1843 and '53 he was elected to the Senate of the U. S. Died Nov. 15, 1853.

Atherton (CHARLES HUMPHREY), born at Amherst, N. H., Aug. 14, 1773, graduated at Harvard in 1794, became a lawyer, and was an enthusiastic Federalist. He was a member of Congress from New Hampshire (1815–17). Died at Amherst, N. H., Jan. 8, 1853.

Atherton (HUMPHREY), a native of England who emigrated to Massachusetts about 1636. He became a major-general, and was employed in negotiations with the Indians. Died Sept. 17, 1661.

Ath'lete, plu. **Ath'letes,** or **Athle'tæ** [Gr. *ἀθλητής*, plu. *ἀθληταί*], a term applied by the ancient Greeks to a person who contended for a prize in public games as a wrestler, pugilist, or runner; a man who competed for honor or other rewards in contests of physical strength or agility. The arena in which the athletæ contended was at the great national festivals, the Olympic, Isthmian, Pythian, and Nemean games. The victor in these games was treated with extraordinary honor. He entered his native city through a breach made in the wall for that purpose, and his statue was erected in a public place. Plato and other eminent philosophers took part in athletic contests. At Rome the athletæ formed a college or corporation.

Athlone (*Athluan, i. e.* "ford of the moon"), a market-town of Ireland, on both sides of the river Shannon, about 67 miles W. of Dublin, is chiefly in the county of Westmeath and partly in Roscommon. It is on the railway from Dublin to Galway, and about two miles S. of Lough Ree. The Shannon is navigable for steamers above this town. Athlone Castle, built in the reign of King John, has been converted into an important military position. P. 6617.

Ath'ol, a thriving manufacturing village of Worcester co., Mass., in a township of the same name. It is at the junction of the Vermont and Massachusetts and the Springfield Athol and North-eastern R. Rs. It contains three post-offices, two weekly papers, one national and one savings bank, and five churches. Cottons, woollens, lumber, wooden ware, castings, and many other goods are manufactured. P. 3517. R. W. WATERMAN, PUB. AND ED. "CHRONICLE."

Ath'ole, DUKES OF, and marquesses of Tullibardine (1703), and of Athole (1676); earls of Tullibardine (1606), of Athole (1629), and of Strathtay and Strathardle (1703); viscounts of Balquhidar (1676), of Glenalmond and Glenlyon (1703); Barons Murray (1604); Barons Balquhidder (1606); Barons Balvenie and Gask (1676, in Scotland); Barons Strange of Knocklyn (1628, in England); Barons Percy (1722, in Great Britain); Barons Murray of Stanley (1786, in Great Britain); Earls Strange (1786, in Great Britain); Lords Glenlyon (1821, in the United Kingdom). —JOHN JAMES HUGH HENRY STEWART-MURRAY, the seventh duke, was born Aug. 6, 1840, and succeeded his father in 1864. The dukedom takes its name from Athole, a district in Perthshire, Scotland.

Athor, Athyr, or **Het-her,** an Egyptian goddess, the daughter of Ra, supposed to correspond to the Aphrodite of the Greeks. The cow was regarded as her symbol.

A'thos, Mount (called *Hagion Oros* (Ἅγιον Ὄρος) by the modern Greeks, and *Monte Santo* by the Italians; both names signifying "holy mountain"), a celebrated mountain of Greece, at the extremity of the peninsula of Chalcidice (which extends into the Ægean), 80 miles S. E. of Salonica. It rises abruptly to the height of 6350 feet above the sea. Xerxes, king of Persia, cut a canal through the narrow isthmus which connects the peninsula with the mainland, to avoid the dangerous navigation around the promontory. In the Middle Ages, Mount Athos was occupied by numerous monasteries (whence the modern Greek and Italian names), and was a celebrated seat of learning. Here were preserved the remains of famous libraries which furnished to scholars many valuable Greek manuscripts. A number of monks, estimated at 6000, still reside on this mountain, which abounds in beautiful scenery. Recently, the Russians have gained considerable influence among the monks. The Russians formerly submitted to all the regulations of the Greek monks. Of late, however, they have increased so much that the Russian monks now have a majority in two monasteries. (See GASS, "Zur Geschichte der Athosklöster," 1865.)

Atitlan', a lake and volcano of Central America, 80 miles N. W. of Guatemala. The lake is 24 miles long, 10 miles wide, and nearly 2000 feet deep. The volcano is 12,500 feet high, in lat. 14° 30′ 38″ N., lon. 91° 12′ 47″ W. The town of Santiago de Atitlan is on the S. side of the lake.

Atkarsk', a town of Russia, in the government of Saratov, 50 miles N. W. of Saratov. Pop. in 1867, 8311.

At'kins, a township of Coosa co., Ala. Pop. 543.

At'kinson, a post-township of Henry co., Ill. P. 1132.

Atkinson, a post-township of Piscataquis co., Me. Pop. 810.

Atkinson, a township of Worcester co., Md. Pop. 1312.

Atkinson, a post-township of Rockingham co., N. H. It has an academy. Atkinson Dépôt is a station on the Boston and Maine R. R., 37 miles N. of Boston. Pop. of township, 488.

Atkinson (ARCHIBALD), born in Isle of Wight co., Va., Sept. 13, 1792, studied law at William and Mary College, served as an officer in the war of 1812, held prominent State offices, and was a member of Congress from Virginia (1843–48). Died Jan. 10, 1872.

Atkinson (THEODORE), born at Newcastle in 1697, became chief-justice of New Hampshire in 1754. Died in 1779.

Atlan'ta, the seat of justice of Fulton county, and the present capital of Georgia. It is the great railroad centre of the Southern States. It owes its existence as a city to these great channels of overland transportation, which converge at the site on which it has sprung up and grown with astonishing rapidity. In 1843, where Atlanta now stands was an unbroken forest, but it in a few years afterwards became the terminal point of several important and extensive railroads, to wit: the Georgia R. R., 171 miles in length, from the city of Augusta, and, by means of the South Carolina and Hamburg R. R., connecting Atlanta with Charleston; the Macon and Western R. R., 101 miles in length, from Macon, thus connecting it, by means of the Georgia Central, with Savannah; the Atlanta and West Point R. R., 86 miles in length, connecting it by other routes with Montgomery and Mobile, Ala., and New Orleans; the Western and Atlantic R. R., 138 miles in length, connecting it, at Dalton and Chattanooga, by other routes, with Knoxville, Greenville, and other points in East Tennessee, Nashville in Middle Tennessee, and Louisville in Kentucky, and Memphis in West Tennessee; the Air Line R. R., connecting it with Richmond, Va., and with several intervening towns and cities of note and distinction. From the same common terminal point there is now being constructed the Georgia Great Western R. R., which when completed will bring it in connection with the inexhaustible coal-fields of Alabama.

Atlanta has sometimes been called the "Gate City." The first corporate name given to it was "Marthasville," in honor of the daughter of Hon. Wilson Lumpkin, ex-governor of the State. It was not until 1845 that the Georgia and Western and Atlantic R. Rs. were completed to this place. It was about this time that the first settlements were made. In 1847 a charter was granted for the municipal government of the new town under the new name of "the city of Atlanta." The population was then about 2500. The new name was suggested by J. Edgar Thomson, the then chief engineer of the Georgia R. R., but now at the head of the Pennsylvania R. R. The idea of the name occurred to him from the geographical position of the place. It is immediately on the dividing ridge separating the waters of the Gulf from those of the South Atlantic slope. The elevation of Atlanta is 1100 feet above the level of the ocean, its latitude a little S. of 34° N. It is on a high ridge, hence its climate is comparatively mild and delightful at all seasons, the thermometer seldom rising in summer above 90° or falling below 15° in winter. Its atmosphere is dry, pure, and healthy. These facts have doubtless contributed greatly to its growth, thrift, and prosperity. When the other connecting roads were completed it became the centre of an immense interior trade. In 1850 its population had more than doubled in three years, and in 1859 it was estimated at over 17,000.

During the late war Atlanta was the theatre of many important events. This was the objective point of Gen. Sherman in his famous campaign of 1864. After many sanguinary conflicts in his progress from Dalton (from the 7th of May to the last of August), he finally succeeded in reaching his goal and taking possession of the city on Sept. 2. This he held until Nov. 15, when he set out upon his grand "march to the sea." Before starting on this movement he compelled all the inhabitants to leave, and by general conflagration left the city in ruins. But after the war was over new life and energy animated the place. As early as the fall of 1865, Atlanta, Phœnix-like, was "rising from her ashes." In 1867 her population was thought to be quite as large as it was in 1859. In 1868, by the new constitution, made in pursuance of the requirements of the reconstruction acts of Congress, it was established as the future capital of the State. Since then it has continued to grow and prosper with its former wonderful rapidity. In 1870, according to the Federal census of that year, its entire population, white and black, was 22,789. Its population is now (1873) estimated at over 30,000. Its real estate is now valued at nearly $9,000,000. Several magnificent churches have recently been erected which would be ornaments to any city in the Union, while the Kimball House as a hotel, in size and dimensions, in interior arrangements, as well as grandeur of external structure, stands without a rival in the Southern country. It has three national banks, three daily, five weekly, and four monthly periodicals. Space will not allow details as to the various and numerous mechanical and manufacturing enterprises which now distinguish the energy and spirit of the place, such as workshops, factories, foundries, and furnaces of all sorts. One, however, of these should not be omitted; that is, the Schofield Rolling-Mill, with its nail-factory, etc. This mill turns out all kinds of railroad and merchant iron. It gives employment to several hundred operatives, and is said to consume forty tons of coal per day, and produces 400 tons of pig iron per month.

Atlanta is no less distinguished for its educational than its industrial enterprises. The Oglethorpe University has been removed from near Milledgeville to this place; besides this, it has the North Georgia Female College, the Atlanta Medical College, the Atlanta University (colored), Moore's Southern Business University, Eastman's Business College, English and German select school, Orphans' Free School, Storr's School (colored), and one of the best general systems of public schools to be found in any of the States. Atlanta is also now a port of delivery; the last Congress made a liberal appropriation for the erection of a custom-house here, and at no distant day it may be expected that this great centre of domestic trade will likewise become noted as an emporium of foreign commerce throughout that extensive region of country over which its network of railroad connections gives it such wonderful facilities for distribution.

ALEX. H. STEPHENS, ED. "ATLANTA CONSTITUTION."

Atlanta, a post-village and township of Logan co., Ill., on the St. Louis Alton and Chicago R. R., 39 miles N. N. E. from Springfield. There are two steam flouring mills, one carriage and wagon factory, five churches, two hotels, one newspaper, and one of the largest and best school buildings in Central Illinois. Pop. of township, 2339.

A. W. BRIGGS, ED. "ARGUS."

Atlan'tes [for etymology see below], in architecture, are statues of figures of the male human form used instead of columns by the ancient Greeks and Romans. The latter called them Telamones. *Atlantes* is merely the Latin plural form of *Atlas,* whose shoulders are said to have supported the heavens. Similar female figures are called *Caryatides.*

Atlan'tic, a county in the S. S. E. of New Jersey, bordering on the Atlantic Ocean. Area, 620 square miles. It is bounded on the N. E. by Little Egg Harbor River, and intersected by Great Egg Harbor River. The surface is level; the soil is sandy, and near the sea is marshy. Dairy and garden products are extensively raised. The Camden and Atlantic R. R. passes through this county. Capital, May's Landing. Pop. 14,093.

Atlantic, a post-village of Cass co., Ia., on the East Nishnabatona River, and on the Chicago Rock Island and Pacific R. R., 79 miles W. by S. from Des Moines. It has a national bank and two weekly newspapers. Pop. 1200.

Atlantic, a township of Monmouth co., N. J. Pop. 1713.

Atlantic, a township of Accomack co., Va. Pop. 4111.

Atlan'tic Cit'y, a fashionable watering-place of Atlantic co., N. J., on the Atlantic Ocean, 60 miles S. E. of Philadelphia, with which it is connected by the Camden and Atlantic R. R. This road was opened in July, 1854, since which time many large hotels have been erected here. Pop. 1043.

Atlantic City, a post-village of Sweetwater co., Wy., 4 miles N. E. of South Pass City, is on Rock Creek. It has rich placer gold-mines and an aqueduct several miles long.

Atlan'tic O'cean [Lat. *Atlan'ticus Oce'anus;* Gr. *Ἀτλαντικὴ θάλασσα* or *Ἀτλαντικὸν πέλαγος;* Ger. *Atlan'tisches Meer*] is that part of the ocean which separates America from Europe and Africa, and extends from the Arctic Circle to the Antarctic Circle. Its extreme breadth is about 5000 miles, and its area about half that of the Pacific. The part N. of the equator is called the North Atlantic, and that on the S. side of that line the South Atlantic. The following bodies of water are parts of the Atlantic: the Bay of Biscay, the German Ocean, the Irish Sea, the Baltic, Hudson's Bay, the Gulf of Mexico, the Caribbean Sea, and the Gulf of Guinea. Its chief affluents are the Amazon, La Plata, Orinoco, Mississippi, and St. Lawrence in America; the Niger, Senegal, and Congo in Africa; and the Rhine, Loire, and Tagus in Europe. The portion of America which is drained into the Atlantic is vastly greater than that which belongs to the basin of the Pacific. The greatest depth of the Atlantic yet discovered is about five miles. The main feature of the Atlantic basin seems to be a deep valley, which, with an average depth of 20,000 feet or more, extends along and parallel to the coasts of America. The so-called telegraphic plateau between Newfoundland and Ireland has an average depth of 12,000 feet. This is a remarkable ridge about 400 miles wide and 1640 miles long. (See DEEP-SEA SOUNDINGS.) The chief currents of the Atlantic are the Equatorial Current and the Gulf Stream. The former moves from the Bay of Benin westward along both sides of the equator with a mean velocity of about thirty nautical miles a day, but in some places the velocity is much greater. Its breadth varies from 200 to 400 miles. Near Cape St. Roque it divides into two branches, one of which, called the Brazil Current, runs southward, and the

other, called the Guiana Current, flows north-westward to the Caribbean Sea. The Gulf Stream originates in the Gulf of Mexico, passes between Florida and Cuba, and flows along the coast of the U. S. with a velocity of about eighty miles a day, gradually expanding in volume. As it proceeds northward its velocity and temperature both decrease. Its mean breadth is about 350 miles. Reaching the latitude of New York, it gradually turns to the E., and crosses the Atlantic to the Azores, where it divides. The northern branch flows to the British Isles, and the other, turning southward, is swept back by the force of the North Equatorial Current to the Gulf of Mexico. Thus is formed near the middle of the North Atlantic a great whirlpool or eddy, which accumulates a mass of matted sea-weed (*Fucus natans*). It is maintained by some that this weed has its origin at or near the place where it is found in such abundance, while others think that it is brought here by the action of the wind and water. This part of the sea, which is called *Mar de Sargasso*, is said to be 260,000 square miles in extent. The water of the Gulf Stream is sometimes twenty degrees warmer than that of the adjacent ocean. On issuing from the Gulf of Mexico it is of a dark-blue color. This stream contributes greatly to temper the climate of England and Ireland. Sailing-vessels from the U. S. to Europe take advantage of the Gulf Stream, and often make the voyage in twenty-three days; the voyage in the other direction is not often performed in less than thirty days, and the average duration is about forty days. The voyage from New York to Europe is favored by the prevalence of S. W. winds, as well as by the Gulf Stream. In the intertropical regions of the Atlantic the trade-winds prevail with great regularity, blowing nearly westward.

REVISED BY A. J. SCHEM.

Atlantic Telegraph. See TELEGRAPH, by PROF. A. M. MAYER, PH. D.

Atlan'ticville, a post-village of Southampton township, Suffolk co., N. Y., near the S. shore of Long Island. Pop. 179.

Atlan'tides [Gr. Ἀτλαντίδες], in classic mythology, the daughters of Atlas. They were also called Hesperides, Pleiades, and Hyades. (See HESPERIDES.)

Atlan'tis, the name of a large island which, according to an ancient tradition that was credited by the Greek geographers, was situated in the Atlantic Ocean W. of Africa. One of the earliest writers who mentions Atlantis is Plato, who states that an Egyptian priest gave Solon a description of it. Plato gives a beautiful picture of this island, to which he adds a fabulous history. Nine thousand years before the time of Plato, Atlantis was (so the legend ran) populous and powerful, and conquered the western part of Europe and Africa. An earthquake afterwards caused it to sink in the ocean. (See RUDBECK, "Atlantica," 4 vols., 1675–98; BAILLY, "Lettres sur l'Atlan de Platon;" and CARLI, "Lettres Américaines.")

At'las [Gr. Ἄτλας], a mythical personage, said to be a son of Japetus and Clymene, and a brother of Prometheus. He was represented by the ancient Greek legends as a leader of the Titans in the war against Jupiter, for which offence he was condemned to support the vault of heaven on his head or shoulders. According to some writers who have rationalized the myth, he was a king who acquired great skill in astronomy.

Atlas, in anatomy, the first cervical vertebra, the piece of the vertebral column nearest to the skull. It forms, with the occipital bone, the joint on which the head moves in bowing. It turns on the pivot of the second cervical vertebra, the "axis," when we look from side to side.

Atlas [so called because some early collections of maps had prefixed a picture of Atlas upholding the sphere], a volume containing a collection of maps, usually including more or less descriptive letter-press. The name was probably first applied as the proper title of such a book by Gerard Mercator (1512–94) to his "Atlas," published in the year of his death. Among the best atlases are the works of Stieler (in German, French, Swedish, Finnish, Italian, etc.), of Menke, Spruner, Berghaus, Sydow, and others, illustrating not only geography proper, but history, ethnography, geology, astronomy, botany, and other sciences; and the works of A. K. Johnston, Black, and numerous others in Great Britain. Among the oldest American atlases are those of Matthew Carey and Burr's "Atlas of New York," both valuable and well executed for the times. The number of American atlases in later years is very great, the most complete and widely-known being "Johnson's Family Atlas of the World," containing a very thorough treatise upon physical geography by Prof. Arnold Guyot, Ph. D., LL.D.

Atlas, a post-township of Pike co., Ill. Pop. 1584.

Atlas, a post-township of Genesee co., Mich. P. 1501.

Atlas Mountains, a mountain-system of Africa, mostly in Morocco and Algeria, extends from Cape Gher on the Atlantic to Cape Bon on the Mediterranean. It is a congeries of mountains, sometimes isolated and sometimes connected, with many irregular branches. The system is divided into the Greater and the Lesser Atlas, the latter of which is nearer to the Mediterranean. The highest point of the system is in Morocco, and is estimated at 13,000 feet above the sea. Mount Miltsin rises to 11,400 feet. The mineral resources have not been explored completely, but numerous metals are found.

At'lee (WASHINGTON L.), M. D., an eminent physician and surgeon, was born at Lancaster, Pa., Feb. 22, 1808, graduated as M. D. at Jefferson Medical College in 1829, practised at Mount Joy and Lancaster, and was professor of medical chemistry at the Jefferson College, Philadelphia, 1844–52. He has published more than eighty medical and scientific monographs, etc., but is especially distinguished for his great number of successful operations in ovariotomy.

Atmosphere [from the Gr. ἀτμός, "vapor," and σφαῖρα, a "sphere"], the aëriform fluid envelope which surrounds the earth or any celestial body. That of the earth is the only one with which we are familiar. It is composed of air (a mixture of 77 parts by weight of nitrogen and 21 of oxygen), with variable proportions of carbonic acid, aqueous vapor, and ammonia, the latter in exceedingly small amounts. (For its physical properties see ACOUSTICS, by PROF. O. N. ROOD, A. M., and PNEUMATICS; see also CLIMATE, STORMS, and WINDS, by PROF. ARNOLD GUYOT, PH. D., LL.D.)

Atmospheric Engine. See HOT-AIR ENGINE.

Atmospheric Railway. See PNEUMATIC RAILWAY.

Atoll', or **Atoln,** a name which the natives of the

Atoll.

Maldive Islands give to a peculiar kind of island that occurs in the Indian Ocean and parts of the Pacific. It is a low circular reef of coral, enclosing a lagoon, which in many instances, but not all, communicates with the ocean by a narrow inlet, or by more than one. (See article on CORAL ISLANDS, by PROF. ARNOLD GUYOT, PH. D., LL.D.)

At'om [Lat. *at'omus;* Gr. ἄτομος, "that which cannot be cut," "indivisible," from α, priv., and τέμνω, to "cut," to "divide"], a minute, indivisible particle of matter. According to one theory of speculative philosophy, matter is infinitely divisible. On the other hand, many modern chemists maintain that all matter consists of ultimate, indivisible, and indestructible particles. They believe that all the atoms of each element have the same weight and form, but the atoms of different elements have unequal weights. Many scientific men suppose that all atoms are spherical. The tendency of recent scientific research has been to prove that the chemical atom and physical atom are not identical. (See ATOMIC WEIGHTS and CHEMISTRY.)

Atomicity. See CHEMISTRY.

Atomic Theory. See CHEMISTRY.

Atom'ic Vol'ume of a gas is the space occupied by a quantity of it proportional to its atomic weight. It is ascertained that 1 equivalent or 16 grains of oxygen at 60° F., and at a barometric pressure of 30 inches, occupy 46.6 cubic inches; 1 equivalent or 1 grain of hydrogen occupies 46.7 cubic inches; and 1 equivalent or 35.5 grains of chlorine occupy 46.2 cubic inches; consequently the atomic volume of hydrogen, chlorine, and oxygen is the same. Other gases exhibit a similar relation, and an attempt has lately been made to carry out an analogous relation in regard to liquids and solids.

Atom'ic Weights, or **Chem'ical Equi'valents,** the proportions by weight in which chemical elements unite. One element must be selected as the starting-point of the

series, and an arbitrary value affixed to it, and thereafter all the other elements can have their values awarded to them according to the proportional amounts in which they combine. It can be demonstrated that a given amount of one element is equivalent to, and serves the same purpose in combining with, a second element as a greater or less amount of a third substance. Hydrogen is by some writers taken as 1, and all the other elements are represented by a quantity which is the minimum amount in which they unite with 1 of hydrogen. By others oxygen is regarded as the starting-point of the series, and is called 100, whilst the other elements have a proportional number attached. (For a table of the atomic weights, see CHEMISTRY.)

Atomiza'tion. In practical medicine this is the very minute subdivision of liquids for inhalation or application to the throat. It was first introduced in France by Sales-Girons. It is effected by forcing a fine jet of liquid against either a solid body or a strong current of air, so as to convert it into diffused spray. Bergson, for instance, applied to this use the tubes used as *odorators* to spread perfumed liquids through the air. Two glass tubes with minute orifices are fixed at right angles to each other, so that the end of the upright tube is near and opposite to the centre of the orifice of the horizontal tube. The upright tube being placed in the liquid to be atomized, air is forcibly blown through the horizontal one. The current of air passing over the outlet of the upright tube rarefies the air in the latter, causing a rise of the liquid through it, and its very minute subdivision (atomization, nebulization, pulverization) as it escapes. Siegle has applied steam-power, generated by the heat of a spirit-lamp, to the propulsion of vapor for atomization. Richardson's *hand-ball* spray-producer is a simpler apparatus, constructed essentially upon the same principle. One of its uses is, by the rapid evaporation of ether or rhigolene, to produce a great degree of cold for local *anæsthesia* (*i. e.* to annul sensibility in a part for a surgical operation).

Atone'ment [literally, "at-one-ment," *i. e.* being made *at one* with God] is generally applied to the reconciliation between God and man brought about by the sufferings and death of Christ. This doctrine of reconciliation, by means of expiatory suffering, was common to nearly all the ancient religions, hence their rites and sacrifices. The blood of man, as being the noblest of created beings, was esteemed the highest propitiation, and therefore the death of Christ, who was both God and man, was the greatest sacrifice that could possibly be made for the sins of the world. Various evangelical writers, while they all agree in resting the sinner's hope of salvation upon the sacrifice of Christ, have set forth somewhat different views concerning the nature and mode of operation of the Saviour's mediatorial work. To Anselm (who became archbishop of Canterbury in 1093) is ascribed the first explicit exposition of the doctrine of the atonement as it has been commonly taught in modern times. The following is a condensed statement of his doctrine: The infinite guilt which man had contracted by the dishonor of his sin against the infinitely great God could be atoned for by no mere creature; only the God-man Christ Jesus could render to God the infinite satisfaction required. God only can satisfy himself. The human nature of Christ enables him to incur, the infinity of his divine nature to pay, this debt. But it was incumbent upon Christ as a man to order his life according to the law of God; the obedience of his life therefore was not able to render satisfaction for our guilt. But although he was under obligation to live in obedience to the law, as the Holy One he was under no obligation *to die*. Seeing, then, that he nevertheless voluntarily surrendered his infinitely precious life to the honor of God, a recompense from God became his due, and his recompense consists in the forgiveness of the sins of his brethren. The following is a presentation of the views of some of the leading theological writers of the present age. The Rev. F. D. Maurice considers the doctrine of the atonement as the answer which the Bible gives to the demands of an awakened conscience. In his view the work of reconciliation has been accomplished substantially as follows: The will of God is good to all, and is right, just, and gracious; the Son of God being one in will, purpose, and substance with the Father, his whole life on earth was an exhibition of, and submission to, his Father's will; the Son was Lord, Root, and Head of humanity; being thus one with God and one with man, he brought the will of God into our nature, fulfilled it in our nature, which had fallen through sin. In our nature, as its Head, he shared that punishment which proceeded from love, with an anguish which only a perfectly pure and holy Being can feel; that Jesus was for this reason the object of his Father's continual complacency—a complacency fully drawn out by the death of the cross, which so perfectly brought out to view the uttermost power of self-sacrifice which lay hidden in the divine love, and consequently that he exhibited humanity, in its Head, atoned for, reconciled. In this way, to Mr. Maurice, is Christ "the Lamb of God, which taketh away the sin of the world." Archbishop Trench, who fairly represents the more thoughtful orthodox opinion of the present day, says: "The spirit of man cries out for something deeper than repentance, confession of sin, amendment of life—something which shall reach farther back, which shall not be clogged with sinful infirmities, as his own repentance even at the very best must be. Men cry for some work to rest upon which shall not be *their* work, but which shall be God's; perfect, complete. They feel that there must be something which God has wrought, not so much *in* them as *for* them; they yearn for this, for atonement, propitiation, ransom, and conscience purged from dead works by the blood of sprinkling; a rock to flee to which is higher than they, than their repentance, than their faith, than their obedience, even than their new life in the Spirit. Now, this rock is Christ; and John the Baptist pointed to this rock when, to those about him who longed after more than amendment of life, he exclaimed, in the memorable words, 'Behold the Lamb of God, which taketh away the sin of the world.'" In the writings of Rev. F. W. Robertson and Horace Bushnell there is an expansion of the scriptural teaching that the atonement was the act of God himself: "God was in Christ, reconciling the world to himself" (2 Corinthians v. 19). As Robertson says, "The death of Christ was the sacrifice of God—the manifestation, once in time, of that which is the eternal law of his life." With Bushnell, this law of divine love involves an "eternal cross," of suffering *from* the sin and *with* the pain of all his creatures who suffer; the life of Christ on earth and his humiliation and crucifixion being "lustral," or designed to *exhibit* this perfect sacrificing love; by which manifestation, through its moral influence upon the hearts of men, being "lifted up, he will draw all men unto him." (John xii. 32.) Bushnell endeavors (not without some success) to show that this participation in suffering by the Divine Being is not incompatible with the supreme felicity which we associate with his nature; as, even in our own experience, joy and sorrow are sometimes conjoined. By this view of the atonement Bushnell considers that we are enabled to set aside the popular idea of a judicial or penal satisfaction rendered by the sacrifice of Christ, or of a price paid or a ransom exacted in the literal sense. The general feeling of Protestant Christians, however, appears to require a recognition, in the doctrine of the atonement, of the benefit to man of Christ's sufferings, as not merely a manifestation of God's reconciling love, but as in some manner (though it be mysterious) *substitutive* for man, in accepting what men have deserved by sin, and as the means of procuring, in the divine economy of the universe, that grace of the Holy Spirit by the work of which our salvation is, individually, to be accomplished. By those who accept the Scriptures as divine revelation it is not considered strange that a part of this, as of other doctrines, may yet remain not fully understood. (See NEANDER, "Christliche Dogmengeschichte;" CALVIN, "Institutes of the Christian Religion;" EDWARDS, "Concerning the Necessity and Reasonableness of the Christian Doctrine of Satisfaction for Sin;" PAYNE, "Lectures on Divine Sovereignty;" CHALMERS, "Institutes of Theology;" CAMPBELL (JOHN M'LEOD), "Nature of the Atonement," etc.; J. J. TAYLOR, Unitarian, "Discourse on Christ the Mediator;" MAURICE, "Theological Essays;" TRENCH, "Five Sermons" (sermon on "Christ the Lamb of God"). See also F. W. ROBERTSON, "Sermons" (1st series, Sermon ix.; 3d series, Sermon vii.); HORACE BUSHNELL, "Vicarious Sacrifice;" WATSON (Methodist), "Institutes." REVISED BY HENRY HARTSHORNE.

Atra'to, a river of South America, in U. S. of Colombia, rises near the Cordillera, flows northward through Choco, and after a course of about 300 miles enters the Gulf of Darien by several mouths. It is navigable for small vessels about 140 miles, and traverses a region rich in gold. In 1857 the government of the U. S. sent an expedition to explore a route for a ship-canal from the Atrato to the Pacific. It is stated that the rainy season continues all the year in the valley of this river. In 1870–72 the explorations under the direction of Capt. Selfridge, U. S. navy, have been resumed, and all the routes between Panama and the Atrato examined, with results far from realizing the hopes entertained of a favorable route.

A'treus [Gr. Ἀτρεύς], an ancient and celebrated king of Mycenæ, was called a son of Pelops. He was the father of the famous *Atridæ—i. e.* Agamemnon and Menelaus. The story of Atreus and his family was embellished by the ancient fabulists and tragic poets with many wild legends, involving horrible crimes and calamities.

Atri'des [Gr. Ἀτρείδης], plural **Atri'dæ** [Ἀτρεῖδαι], a

patronymic from *Atreus*, signifies a son or descendant of Atreus. The name in the singular is more usually applied to Agamemnon, but the plural is used to designate the two brothers, Agamemnon and Menelaus.

A′trium, a Latin word signifying a court, a hall. In Roman architecture the atrium was an entrance-hall or central apartment, which was the principal part of a private house. In this room the family lived and took their meals. Here stood the Lares and Penates, and here the female servants were employed in weaving and other labors. The atrium was also used as a waiting-room for clients and other visitors. In ecclesiastical architecture the term denotes an open space before a church, forming part of the narthex or ante-temple.

At′ropine, or **Atro′pia,** a peculiar alkaline principle obtained from the *Atropa Belladonna*, is very poisonous. It exists in all parts of the plant. A very minute portion of it has the power to dilate the pupil of the eye. Atropine is composed of carbon, 70.98; oxygen, 16.36; hydrogen, 7.83; and nitrogen, 4.83.

A′trypa [from the Gr. *α*, priv., and *τρύπη*, a "foramen," *i. e.* "without a foramen;" an objectionable name, since it is not true of these shells], a genus of fossil brachiopod shells which closely resemble the *Terebratula*. It had a perforation for the passage of the peduncle, by which the animal attached itself to foreign bodies. Many species of it have been described, the most of which are Silurian, many Devonian, but all palæozoic.

Attach′ment [Fr. *attachement*], the apprehension of a person or seizure of a thing by virtue of a writ or order issued by a court or judge under authority of law. The word is sometimes used to denote the process itself. In respect to property, the term is usually applied to seizure on *mesne* process. Attachment was originally one of the common-law means of obtaining an appearance in an action by the defendant. In some of the States a plaintiff can at the commencement of any action to recover money attach the property of the defendant as a security for the payment of the judgment expected to be recovered; and in case of recovery the property is to be applied in satisfaction of the judgment. But the more usual rule is that there can be no seizure of property, except in specified cases, till the rights of the parties have been settled by judgment of the court. The exceptions are chiefly in cases where the defendant is a non-resident or a fraudulent debtor, or is attempting to conceal or remove his property for the purpose of defrauding or delaying his creditors. An attachment is said to be foreign where a creditor attaches property in the hands of a third person belonging to his debtor, or a debt due from a third person to such debtor. The name is said to arise from the fact that the proceeding is often resorted to for the purpose of collecting a debt against a non-resident. In some of the Eastern States this proceeding is called "trustee process;" in other States it is generally known as "garnishment," meaning a warning. Foreign attachment was derived from local customs in London and other cities, and formed no part of the general law of England.

2. *Against the Person.*—This is issued against officers of the court for any misconduct or neglect of duty, and against any one who has been guilty of contempt of court. The object of the attachment is to bring the guilty party actually before the court. He has then an opportunity to show cause why he should not be found guilty, or, in legal language, to "purge himself of the contempt." If he cannot do this, he is subject to such punishment as the law permits and the court may award. T. W. Dwight.

Attain′der [Old Fr. *attaindre*, to "stain"], in law, is the extinction of civil rights as the consequence of a judicial sentence of death for a capital crime. From this moment the criminal was deemed to be legally dead, incapable of bringing an action except to reverse the attainder, or of appearing in court as a witness. Its two most important consequences are forfeiture and corruption of blood. The effect of forfeiture upon the offender's land was such that it related back to the time of the commission of the offence, and avoided intermediate sales, even to purchasers in good faith. The consequence of corruption of blood was that the person attainted was incapable of inheriting himself or of transmitting an estate by inheritance to another. Thus, if a grandfather owned land, and a son were attainted, his descendant could not inherit from the grandfather, even though the son were dead when the land passed from the grandfather. This harsh rule is now modified in England by statute. Forfeiture, except in cases of treason and murder, does not extend in the case of estates of land beyond the natural life of the offender. By the U. S. Constitution no attainder of treason shall work corruption of blood or forfeiture, except during the life of the person attainted. In case of rebellion the U. S. might regard the rebels either as belligerents or traitors. In the former aspect of the case they would not be bound by the restriction just referred to, but might, under the rules of public law applicable to a state of war, confiscate their property. If, however, they were treated as subjects and as guilty of treason, the restriction of the Constitution would become operative.

Attakapas, at-tuk′a-paw, a large and fertile district in the southern part of Louisiana, comprising, according to old maps, several parishes. It produces large quantities of sugar and molasses. Though often used in conversation, the name has no legal existence, and is not employed in the census.

Atta′la, a county of the central part of Mississippi. Area, 630 square miles. It is bounded on the W. by the Big Black River, and intersected by the Yukamokluna (or Yockanockany) Creek. The surface is undulating or nearly level; a part of the soil is fertile. Cattle, grain, tobacco, cotton, wool, and potatoes are the chief crops. Capital, Kosciusko. Pop. 14,776.

Atta′lea, a genus of palms of numerous species, natives of tropical South America. They generally have lofty, cylindrical, and smooth stems, but some are stemless. Their large pinnate leaves are used for thatching, mats, etc. The fruit is a nut enclosed in a dry fibrous husk. The *Attalea compta* bears an eatable fruit about as large as a goose egg. The leaf-stalks of *Attalea funifera*, which grows in the maritime parts of Brazil, and is there called piassaba, yield a fibre much used to make cordage which is very strong and durable in salt water.

At′talus I., king of Pergamus, was born 269 B. C. He succeeded his cousin, Eumenes I., in 241 B. C., defeated the Gauls who had occupied Galatia, and became an ally of the Romans in a war against Philip of Macedon. He was reputed a wise ruler and able general. Died in 197.

Attalus II., surnamed Philadelphus, born about 220 B. C., was the second son of Attalus I. He succeeded his brother, Eumenes II., in 159 B. C., was a constant ally of the Romans, and patronized arts and sciences. Died in 138.

Attalus (Flavius Priscus), a Roman emperor, born probably in Ionia, was converted from paganism to Arianism. He was prefect of Rome when that city was captured by Alaric in 409 A. D., and was proclaimed emperor by that conqueror in the same year. He was deposed by Alaric in 410, and banished by Honorius in 416 A. D.

At′taman, or **Het′man,** the title of the chiefs of the Cossacks, formerly elected by the people. (See Cossacks.) After the revolt of Mazeppa the office was suppressed by the czar of Russia until 1750. Catharine II. abolished the office among the Cossacks of the Ukraine; among those of the Don it still exists, but its prerogatives have been greatly reduced. The heir-apparent of the Russian crown is principal attaman of the Cossacks, but there are numerous subordinate chiefs having the same title.

At′tar of Ro′ses [from the Arab. *itr*, "perfume"], the oil or essence of *Rosa centifolia* and its varieties, *Rosa damascena* and *Rosa moschata*. It is prepared by distillation of the petals in Persia, India, and other Eastern countries, whence it is exported in small vials. It is very costly, and is often adulterated: 100,000 roses, from 10,000 bushes, are said to yield but 180 grains of attar. It is often called *otto* of roses. That of Adrianople is called the best.

At′terbury (Francis), an eminent English prelate, writer, and politician, born at Middleton-Keynes, in Buckinghamshire, Mar. 6, 1662. He entered Christ Church, Oxford, in 1680, graduated in 1687, and became lecturer in St. Bride's Church, London, in 1691. Having gained distinction as a pulpit orator, he was appointed a chaplain to the king. He was the author of a witty but superficial "Examination of Dr. Bentley's Dissertations on the Epistles of Phalaris," which appeared under the name of "Charles Boyle" in 1698. He was a Jacobite in politics, and a zealous defender of High Church doctrines. He was appointed chaplain to Queen Anne in 1702, dean of Carlisle in 1704, and bishop of Rochester in 1713. His turbulent and imperious temper several times involved him in difficulties, and his hopes of promotion were blasted by the death of Queen Anne in 1714. He was a friend of Pope, Swift, and Bolingbroke. In Aug., 1722, he was committed to the Tower on a charge of treason as an accomplice in plots for the restoration of the Stuarts. He was convicted by the House of Lords in May, 1723, and was condemned to perpetual banishment. He became a resident of Paris, where he died Feb. 15, 1732. Four volumes of his sermons were published in 1740. His reputation as a writer is founded on his sermons and letters, which have great literary merits. (See his "Epistolary Correspondence," 4 vols., 1783, edited by J. Nichols; Thomas Stackhouse, "Memoirs of the Life of Francis Atterbury," 1727.)

At′tic [Lat. *At′ticus;* Gr. *Ἀττικός*], pertaining to Attica or to its capital, Athens; marked by such qualities as were

characteristic of the Athenians. An Attic style designates that which is pure, classical, and elegant. Attic base is the base of a column used in the Ionic and Corinthian, and sometimes in the Doric, orders. Attic wit and Attic salt signify a poignant and delicate wit especially characteristic of the Athenians.

Attic, a term in architecture applied to a low story rising above the cornice that terminates the main elevation of a building; a sky-lighted room next to the roof of a private dwelling-house.

At'tica [Gr. Ἀττική], a state of ancient Greece, bounded on the N. by Bœotia, on the E. by the Ægean Sea, on the S. W. by the Saronicus Sinus, and on the W. by Megaris. It occupied a triangular peninsula, at the S. E. extremity of which is the promontory of Sunium. A range of hills called Mount Cithæron extends along the northern border. The surface is diversified by limestone hills and plains, the soil of which is light and unproductive. About 10 miles N. E. of Athens rises Mount Pentelicus, which has an altitude of 3884 feet, and contains inexhaustible quarries of white marble of a superior quality. Among the prominent physical features of the country are Mount Hymettus, about 3500 feet high, and Mount Laurium, whose silver-mines have recently attracted again great attention. The principal streams are the Cephissus and Ilissus, which flow southwestward into the Saronic Gulf. The climate is dry and extremely pleasant. The chief productions are wheat, olives, figs, and grapes. Rich silver-mines were worked at Laurium. Attica was very advantageously situated for commerce, and was at one time the greatest maritime power of the world. The people of Attica, who belonged to the Ionic division of the Hellenic race, planted colonies in various distant lands. The region which they colonized on the western coast of Asia Minor was called Ionia. The capital of Attica was Athens (Athenæ), and the inhabitants of Attica were citizens of Athens, possessing the right to assemble in the capital, and take part in the legislative and judicial proceedings. The ancient population is estimated at 500,000, the majority of whom were slaves. Modern Attica is deficient in forest trees, and presents an arid and rather desolate aspect, except in spring. (For the history of Attica, see Athens.) Attica and Bœotia form a department of the modern kingdom of Greece, comprising Megaris and the islands of Egina and Salamis. It has an area of 2481 square miles. The soil is less fertile than it was in ancient times, and is not well cultivated, but it still produces olives, grapes, and some wheat. Pop. in 1870, 136,804.

Attica, a city of Fountain co., Ind., on the Wabash River and Canal, and the Toledo Wabash and Western R. R., 21 miles W. S. W. of Lafayette. It is also the northern terminus of the Indiana North and South R. R. It has a national bank, waterworks, a fine public school building, three wagon, carriage, and plough factories, and a weekly newspaper. Pop. 2273.

B. F. Hegler, Ed. of "Ledger."

Attica, a township of Lapeer co., Mich. Pop. 1620.

Attica, a post-village of Wyoming co., N. Y., is on Tonawanda Creek and on the Attica branch of the Erie R. R., 31 miles E. of Buffalo. It has several churches, two banking offices, and a weekly paper. Pop. 1333; of Attica township, 2546. C. F. Meloy, Ed. of "News."

Attica, a post-village of Venice township, Seneca co., O. Pop. 370.

At'ticus (Titus Pomponius), an accomplished Roman of the equestrian order, born in 109 B. C. During the war between Sulla and Marius he remained neutral, and passed many years (88–66) in Athens, to which city he rendered important services. He was an intimate friend of Cicero. Having returned to Rome in 65 B. C., he declined to take part in political affairs, and distinguished himself by his moderation, generosity, and mediatorial spirit. He was on friendly terms with the leaders of both parties that divided the Romans. He wrote, besides other books, an epitome of Roman history called "Annales," but all his works are lost. His daughter was the wife of M. Vipsanius Agrippa, the eminent statesman. Died in 32 B. C. (See Corn. Nepos, "Life of Atticus;" Hüllemann, "Diatribe in T. Pomponium Atticum," 1838.)

At'tila [Gr. Ἀττίλας; in Ger. *Et'zel* or *At'zel;* in Hung. *Ethele*], a famous barbaric conqueror and king of the Huns, was a son of Mundzuc (or Mundzuccus). He succeeded his uncle Roas as king of the Huns in 434 A. D., his subjects being nomadic hordes who occupied Pannonia and Sarmatia. He extended his dominion by conquest over Germany and Scythia, and obtained the surname of the Scourge of God. The Vandals, Ostrogoths, and Gepidæ fought under his banner. In 447 A. D. he invaded the Roman empire of the East, and defeated the armies of Theodosius II., who obtained peace by the payment of an annual tribute after the Huns had devastated Thrace and Macedonia. Marcian, who succeeded Theodosius II. in 450 A. D., refused to pay tribute to Attila, saying, "I have gold for my friends and iron for my enemies." In 451 A. D. Attila invaded Gaul with an army estimated at 700,000 men, and besieged Orleans (*Aurelianum*), which was relieved by the approach of a Roman army commanded by Aëtius. Attila retired to Champagne, and awaited the enemy on the Catalaunian plain, near the site now occupied by Châlons-sur-Marne. Here he was defeated in a great battle by the combined armies of Aëtius and Theodoric, king of the Visigoths, in June, 451 A. D. It is stated that 250,000 men or more were killed in this battle. Attila then retreated into Germany. In 452 he led an army into Northern Italy, which he ravaged, and threatened Rome. The emperor Valentinian III., unable to defend his capital, invoked the mediation of Pope Leo I., who had an interview with Attila, and persuaded him to grant the Romans a truce. Attila retired from Italy, and died in Pannonia in 453 A. D., on the night after his marriage with Ildico. He was buried by night, and the prisoners who dug his grave were killed, in order that the place of his burial might be kept secret. He had two sons, named Ellac and Dengezic. His actions form the principal subject of the "Niebelungen-Lied." (See Jornandes, "De Rebus Geticis;" Gibbon, "Decline and Fall of the Roman Empire," chaps. xxxiv. and xxxv.; Wm. Herbert's epic poem entitled "Attila," 1828; Callimachus Experiens, "De Gestis Attilæ," 1541; Fessler, "Attila, König der Hunnen," 1794; Amédée Thierry, "Attila dans les Gaules," 1852.)

At'tleborough, a township of Bristol co., Mass., 30 miles by railroad S. S. W. of Boston. It has one national bank, one savings bank, two public libraries, one loan and fund association, a newspaper, nine churches, two hotels, and two high schools. Its villages are connected by telegraph and railway. Here are extensive manufactures of jewelry, calicoes, clocks, buttons, braids, etc. Pop. 6769.

Ed. of "Chronicle."

Attor'ney [Old Fr. *attorner*, to "prepare," to "direct"], one who acts for or on behalf of another. Attorneys are of two kinds—in fact and at law. An attorney in fact is an agent, though the term is commonly applied to one who is authorized to act for another by a writing called a power of attorney. An attorney at law is one who is authorized by law to act in the place of another in the management or conduct of law proceedings. In England the term is employed to denote a class of legal practitioners whose duties are preliminary to those of the barrister, who conducts the cause in court. An attorney is admitted there after a prescribed term of study, on passing an examination directed by the court. Barristers come to the bar through the action of voluntary societies of lawyers which have existed for several centuries. In the U. S. the same person is in general admitted both as counsellor (answering to barrister) and attorney, and examined in the same manner and under the same authority as to his qualifications to perform both classes of duties. An attorney is an officer of the court, and liable to be punished for a breach of duty, and in aggravated cases to have his name stricken from the roll, and thus lose his right to practice. His duties to his client require the exercise of reasonable care. He is responsible for negligence or wilful default whereby his client sustains loss; for example, for the disclosure by him of confidential communications. He is entitled to compensation, and has a lien upon his client's papers or securities in his possession, and upon any judgment obtained through his exertions.

Attorney-General is an officer under the English government whose duty it is to prosecute for the king in criminal matters, and to manage civil actions or proceedings where his revenue or other property is concerned, as well as to enforce public rights. An illustration is a proceeding for the establishment of charitable foundations by a court of justice, and the correction of abuses in their management. The U. S. and the respective States have a public officer of the same name, with similar duties. Statute law affords a more complete definition of them.

Attorney, Power of. See Power of Attorney, by Prof. T. W. Dwight, LL.D.

Attrac'tion [Lat. *attractio*, from *ad*, "to," and *traho*, to "draw"], the tendency of bodies to approach each other and unite; the force which brings bodies together and resists their separation. The principal kinds of attraction are—the attraction of gravitation (see Gravitation); capillary attraction; chemical attraction (see Affinity); the attraction of cohesion, which unites the particles of a body, and operates only between two portions of matter that are in contact; and magnetic attraction (see Magnetism). These attractions are divisible into two classes—1, those which

act at sensible and measurable distances, as gravitation and magnetic attraction; and 2, those which extend only to extremely small or insensible distances, as chemical attraction and the attraction of cohesion.

ATTRACTION OF MOUNTAINS. In 1774, Maskelyne made an experiment on the mountain Schehallion, in Perthshire, to ascertain the attraction of mountains. This and subsequent experiments have established the fact that mountains are capable of producing sensible deflections of the plumb-lines of astronomical instruments.

At'tribute [from the Lat. *attribuo* (composed of *at* for *ad*, "to," and *trib'uo, tribu'tum*, to "give"), to "give to," to "assign"] denotes, primarily, any quality or power which is by universal consent attributed to a being. Hence, we speak of the "attributes of God," and in a similar manner of those of some particular man or of the human race. In logic, it signifies the opposite of *substance*, and the same as *predicate*.

ATTRIBUTE, in the fine arts, is a symbol used to distinguish and characterize certain figures. Thus, the trident is the attribute of Neptune; the caduceus, that of Mercury; the owl, that of Minerva. Attributes are either essential or conventional. Essential attributes have some real relation or resemblance to the object or idea to be represented.

At'tucks (CRISPUS), the leader of the mob in Boston which attacked the British troops Mar. 5, 1770, was a mulatto or half-breed Indian. He was killed in this affray, which was called "the Boston Massacre."

At'water, a post-township of Portage co., O. P. 1180.

Atwater (CALEB), born at North Adams, Mass., Dec. 25, 1778, graduated at Williams College in 1804, became a lawyer, went to Ohio in 1811, resided at Circleville, and was an Indian commissioner under Jackson. He published a "Tour to Prairie du Chien" (1831), "Western Antiquities" (1833), "History of Ohio" (1838), and other works. Died Mar. 13, 1867.

Atwater (JEREMIAH), D. D., born at New Haven, Conn., in 1774, graduated at Yale in 1793, was a college tutor (1795–99), first president of Middlebury College, Vt. (1800–09), and president of Dickinson College, Pa. (1809–15). Died July 29, 1858.

Atwater (LYMAN HOTCHKISS), D. D., born at Hamden, Conn., Feb. 23, 1813, graduated at Yale in 1831, was a tutor and theological student at Yale (1832–35), pastor of First Congregational church in Fairfield, Conn. (1835–54), became in 1854 professor of mental and moral philosophy, and afterwards of logic and moral and political science, at Princeton, N. J. He became editor of the "Princeton Review" in 1869. He has published a "Manual of Logic" (1867), and contributed much to periodical literature.

At'well, a township of Rowan co., N. C. Pop. 2051.

At'wood, or **Attwood** (GEORGE), F. R. S., an English mathematician, born in London in 1745. He was a fellow of Trinity College, Cambridge, where he lectured on natural philosophy. He published a "Treatise on the Rectilinear Motion and Rotation of Bodies" (1784), a "Dissertation on the Construction of Arches" (1801), and other works. He invented a machine noticed below. (See ATWOOD'S MACHINE.) Died July, 1807.

Atwood's Machine was invented by George Atwood (noticed above) to demonstrate the laws of uniformly accelerated motion, and illustrate the relations of time, space, and motion in the case of a body falling under the action of gravitation. This machine is so constructed by means of pulleys and wheels that turn with the least possible friction, that a weight (or falling body) suspended from one of the pulleys descends much more slowly than a body falling in free space, yet increases in velocity in the same ratio as when falling in the air. (See FALLING BODIES.)

Aubagne, a town of France, in the department of Bouches-du-Rhône, 22 miles by rail E. of Marseilles. It has manufactures of paper, pottery, and leather, and exports excellent wine. Pop. in 1866, 7408.

Aubaine, Droit d', a French term, denotes the right of a sovereign to inherit the property of a foreigner dying intestate without native-born heirs. This practice was abolished in 1790, but was restored by Napoleon I. (See INTERNATIONAL LAW No. I., by PRES. T. D. WOOLSEY, S. T. D., LL.D.)

Aubbeenaubbee, a twp. of Fulton co., Ind. Pop. 745.

Aube, ōb, a river of France, rises in Haute-Marne, flows north-westward through the department of Aube, and after a course of 124 miles enters the Seine about 24 miles below Troyes.

Aube, a department in the N. E. part of France, was formed of the southern portion of the province of Champagne and a small part of Burgundy. It is bounded on the N. by the department of Marne, on the E. by Haute-Marne, on the S. by Côte-d'Or and Yonne, and on the W. by Seine-et-Marne. Area, 2317 square miles. It is intersected by the rivers Seine and Aube. The surface is nearly level; the soil is fertile, especially in the S. E. part, which produces grain, wine, etc. It has manufactures of cotton and woollen stuffs, hosiery, glass, and leather. It is divided into 5 arrondissements, 26 cantons, and 446 communes. Capital, Troyes. Pop. in 1872, 255,687.

Aubenas, a town of France, in the department of Ardèche, is picturesquely situated on or near the river Ardèche, 14 miles S. W. of Privas. It stands in a magnificent basin, surrounded by the extinct volcanoes of the Vivarais. It has an old castle, a college, and manufactures of silk and woollen stuffs, paper, etc. Several important fairs are held here. Pop. in 1866, 7694.

Auber (DANIEL FRANÇOIS ESPRIT), an eminent French composer, born at Caen Jan. 29, 1782, a pupil of Cherubini, produced in 1813 "Le Séjour Militaire," an opera which was not successful, but his comic opera called "La Bergère Châtelaine" (1820) was warmly applauded. In 1821 he composed "Emma," an opera which was much admired. His works are remarkable for grace, originality, and ingenious combinations. The opera of "La Muette de Portici," or "Masaniello" (1828), is called his masterpiece. He was elected a member of the Institute in 1829. Among his most popular operas are "Fra Diavolo" (1830), "Le Domino Noir" (1837), "Haydée" (1847), and "Manon Lescaut" (1856). He was appointed chapel-master at the Tuileries by Napoleon III. Died May 13, 1871. (See FÉTIS, "Biographie Universelle des Musiciens;" L. DE LOMÉNIE, "Galerie des Contemporains.")

Au'ber (HARRIET), an English authoress, was born Oct. 4, 1773, and died Jan. 20, 1862. In 1829 she published "The Spirit of the Psalms," containing some of the best versions of modern times.

Au'berlen (KARL AUGUST), a prominent German orthodox theologian, born at Fellbach, in Würtemberg, Nov. 19, 1824. Among his works are "The Theosophy of Friedrich Christoph Oetinger" (1847) and "The Prophet Daniel and the Revelation of John considered in their Reciprocal Relations" (1854). Died in 1864.

Aubert (JEAN LOUIS), ABBÉ, a French poet and fabulist, born in Paris in 1731. He edited a journal called "Les Petites Affiches," and published in 1756 a collection of fables which gained a European reputation. They were highly commended by Voltaire, who wrote to Aubert, "You have placed yourself beside La Fontaine." He became professor of French literature in the College Royal, Paris, in 1773. Died in 1814.

Aubert du Bayet (JEAN BAPTISTE ANNIBAL), a French general, born in Louisiana Aug. 29, 1759. He fought for the U. S. under Rochambeau, and was chosen in 1791 a member of the French Legislative Assembly, in which he supported the same principles as La Fayette. He commanded at the siege of Mentz, which was taken by the Prussians in 1793, and was minister of war for several months in 1795. Died at Constantinople, where he was ambassador, Dec. 17, 1797.

Aubervilliers, a town in France, in the department of the Seine, 4 miles N. of Paris, and one of its suburbs. Pop. 9240.

Aubigné, d' (MERLE). See D'AUBIGNÉ.

Aubigné, d' (THÉODORE AGRIPPA), a French Protestant historian and soldier, distinguished for his wit, learning, and audacity, was born in Saintonge Feb. 8, 1550. He studied in a college at Geneva, and at an early age joined the Huguenot army, then waging a civil war against the court. He afterwards entered the service of Henry of Navarre, whose favor he enjoyed. He fought for Henry against the Catholic League, and distinguished himself at the battle of Coutras (1587). His chief work is a history of his own times, entitled "Histoire Universelle depuis l'An 1550 jusqu' à l'An 1601" (3 vols., 1616–20). He left autobiographic memoirs ("Histoire secrète de T. A. d'Aubigné," 1729–31). He had a son, Constantine, who was the father of Madame de Maintenon. Died at Geneva April 29, 1630. (See M. A. SAYOUS, "Vie d'Aubigné;" DAVILA, "History of the Civil Wars of France.")

Aubin, a French town, department of Aveyron, 20 miles N. E. of Villefranche, in a mining region, with furnaces, etc. Pop. 8863.

Au'brey, a post-township of Johnson co., Kan. Pop. 1125.

Au'brey (JOHN), F. R. S., an English antiquary, born in Wiltshire Mar. 12, 1625, inherited a large estate, and became a member of the club of Commonwealth's Men. He was a collector of antiquarian documents, and left several valuable works in manuscript. His "Natural History

and Antiquities of Surrey" was published in 1719. He also wrote memoirs of the English poets, which were published in 1813 under the title of "Letters written by Eminent Persons in the Seventeenth and Eighteenth Centuries." Died June 7, 1697.

Auburn, a post-village of Lee co., Ala., on the Montgomery and West Point R. R., 60 miles E. N. E. of Montgomery. It is the seat of East Alabama College. Pop. 1018; of the township, 3822.

Auburn, the county-seat of Placer co., Cal., on the Central Pacific R. R., 36 miles N. E. of Sacramento. Fruit is extensively grown in the vicinity. There are near the town very rich quartz and gravel mines, and eleven quartz mills with 101 stamps continually running. Auburn has a court-house and jail, a public hall, Masonic and Odd Fellows' halls, several churches and school-houses, and three large hotels. The principal buildings are of brick and stone. There are two weekly newspapers. Pop. 800.

W. B. Lyon, Ed. "Placer Argus."

Auburn, a township of Clark co., Ill. Pop. 602.

Auburn, a post-township of Sangamon co., Ill. Pop. 1303.

Auburn, the county-seat of De Kalb co., Ind., on the Baltimore Pittsburg and Chicago R. R., at the crossing of the Fort Wayne Jackson and Saginaw and the Detroit Eel River and Illinois R. Rs. It has large manufactories of hubs and spokes, staves, a weekly paper, and an extensive stocking factory. Pop. 677.

P. C. Mays, Ed. "Auburn Courier."

Auburn, a township of Fayette co., Ia. Pop. 1059.

Auburn, a post-township of Shawnee co., Kan. P. 662.

Auburn, a post-village of Logan co., Ky., on the Louisville and Memphis R. R., 18 miles S. W. of Bowling Green. Pop. 610.

Auburn, a post-village, capital of Androscoggin co., Me., 34 miles from Portland, on the Androscoggin and Little Androscoggin rivers, which furnish extensive water-power. The manufacture of cotton has recently been commenced, while that of shoes has attained considerable proportions. It is situated on the Maine Central R. R., and connected with the Grand Trunk system by the Lewiston and Auburn R. R. It has a national bank. Pop. in 1870, 6169. Ed. "Lewiston Journal."

Auburn, a post-township of Worcester co., Mass., on the Norwich and Worcester R. R. It has a public library, and manufactures of cottons, woollens, tape, worsted goods, etc. Pop. 1178.

Auburn, a post-twp. of Rockingham co., N. H. P. 815.

Auburn, a flourishing city, capital of Cayuga co., N. Y., on the New York Central R. R., 174 miles W. of Albany, and on both sides of the outlet of Owasco Lake, which is 2½ miles distant. The Southern Central R. R. connects it with Owego, 68 miles S., and with Fair Haven, 30 miles N., at which place they have the largest accommodations for storing coal in Central New York. The site of Auburn is moderately uneven; the streets are wide, well paved, and shaded with ornamental trees. The principal public buildings and mercantile houses are on Genesee street. Many of the private houses display an elegant style of architecture, and are adorned with beautiful gardens. Auburn contains fifteen churches, and is the seat of a theological seminary under the direction of the Presbyterians. This city was long the home of the late Hon. William H. Seward. Here is a large stone State prison, celebrated for its system of discipline. The convicts, numbering sometimes 1000 or 1200, are employed in the manufacture of boots, shoes, saddlery-ware, cigars, window-sashes, blinds, and doors. The city has eight banks, three daily and two weekly papers, and manufactures of wool, cotton, iron, paper, etc. Here are also five large manufactories of reapers and mowers, which are the most extensive in the Union. Pop. 17,225.

Ed. "Auburn Advertiser."

Auburn, a township of Crawford co., O. Pop. 910.

Auburn, a post-township of Geauga co., O. Pop. 783.

Auburn, a township of Tuscarawas co., O. Pop. 1251.

Auburn, a post-village of Baker co., Or., on Powder River, about 300 miles E. of Salem. Gold is found in this vicinity.

Auburn, a post-village of South Mannheim township, Schuylkill co., Pa., on the Philadelphia and Reading R.R., 9 miles S. E. of Pottsville. Pop. 611.

Auburn, a township of Susquehanna co., Pa. P. 2006.

Auburn, a township of Montgomery co., Va. P. 3171.

Auburn, a post-township of Fond du Lac co., Wis. Pop. 1626.

Au'burndale, a post-village of Newton township, Middlesex co., Mass., on the Boston and Albany R. R., 10 miles W. of Boston. It is the seat of Laselle Seminary.

Auburn Theological Seminary, or **The Theological Seminary of Central and Western New York,** occupies a large three-story stone building, with transept and wings, on elevated ground in the northern part of the city of Auburn. It was founded in 1820. In 1873 its removal was contemplated, but the friends of the seminary having by great exertions raised funds for its endowment, the institution will, it is understood, remain in Auburn. It is sustained by the Presbyterian denomination.

Aubusson, a town of France, department of Creuse, on the river Creuse, 22 miles S. E. of Guéret. It has a celebrated manufactory of carpets. Velvets and woollen stuffs are also made here. Pop. in 1866, 6625.

Aubusson, d' (Pierre), grand-master of the order of St. John of Jerusalem, was born of a noble French family in 1423. At an early age he joined the order, the head-quarters of which was at Rhodes. He distinguished himself by his energy and courage in fighting against pirates, and was employed on important missions to several courts. In 1458 he formed a league between the kings of France and Hungary against the sultan Mahomet II. He was elected grand-master of his order in 1476, and fortified Rhodes as an advanced post for the defence of Christendom against the victorious Turks. The great aim and idea of his life was the formation of a league of Christian princes against the infidels. Early in 1480, Mahomet II. commenced the siege of Rhodes with an army of about 100,000 men. The Turks were repulsed in several desperate assaults, in which Aubusson was severely wounded, and they were forced to abandon the enterprise in July, 1480. In 1501 he was chosen general-in-chief of the armies of the German emperor, the king of France, and the pope, who had formed a league against the Turks. His success was hindered by the jealousy and discord of these allies. Died in 1503. He is regarded as one of the ablest Christian statesmen and commanders of his time. (See Bouhours, "Histoire de Pierre d'Aubusson," 1676.)

Auch, ōsh (anc. *Augus'ta Ausco'rum* or *Elimberis*), an old town of France, capital of the department of Gers, on the river Gers, 43 miles by rail S. of Agen. In the time of Cæsar it was the capital of the Ausci or Auscii. It has a beautiful Gothic cathedral, an archbishop's palace, a royal college, a public library, a museum of natural science, and a town-hall. Here are manufactures of linens, cotton stuffs, leather, etc. Armagnac brandy is exported from this town, which was once the capital of Armagnac. Pop. in 1866, 12,500.

Auche'nia [from the Gr. *ἀυχήν*, the "neck" (so called from the length of their necks)], a genus of South American animals of the order Ruminantia and family Camelidæ. The genus comprises the alpaca and the llama, and other species, all of which inhabit the mountain-ranges of the Andes. They are nearly allied to the camel, which they resemble in general form and in the structure of the stomach. They differ from the camel in having no hump; also in dentition, and in the more cloven feet and movable toes. Some naturalists think that the alpaca is not a distinct species, but a variety of the llama. (See Alpaca.)

Auchmuty, å'mu-te (Robert), an eminent lawyer, born in Scotland, settled in Boston, Mass., about 1710. He held several high colonial offices. Died in 1750.

Auchmuty (Robert), an able lawyer, son of the preceding, practised at Boston, and was distinguished as an advocate in trials by jury. He was an admiralty judge (1767–76). Having become a zealous Tory in 1776, he went to England, where he died in 1788.

Auchmuty (Samuel), D. D., an Episcopal clergyman, a brother of the preceding, was born at Boston Jan. 16, 1722, and graduated at Harvard in 1742. He preached in Trinity church, New York, and obtained in 1764 the charge of all the churches in that city. He adhered to the royalist party in the Revolution. Died Mar. 6, 1777.

Auchmuty (Sir Samuel), a British general, a son of the preceding, was born in New York June 22, 1758, and graduated at King's (now Columbia) College in 1775. He fought against the U. S. in 1776–78, served many years in India, and in 1806 obtained command of an army sent to South America. He took the fortified city of Montevideo from the Spaniards in 1807, and captured Java from the Dutch in 1811. Died Aug. 11, 1822.

Auck'land, a seaport-town, the capital of the British colony of New Zealand, is situated on the N. E. coast of the island of New Ulster; lat. 36° 50′ S., lon. 174° 50′ E. It has two fine harbors and considerable trade. It is connected by steamships with Sidney, Melbourne, Honolulu, and San Francisco. It is the see of an Anglican bishop, and has four banks, three newspapers, and many fine

buildings. The mean temperature of the coldest month is about 50° F., and that of the warmest about 68°. Auckland was founded in 1840. Pop. in 1871, 12,937.

Auckland (George **Eden**), Earl of, an English peer, born in 1784, inherited the title of baron at the death of his father in 1814. He acted with the Whigs, became president of the board of trade in 1833, first lord of the admiralty in 1834, and governor-general of India in 1835. He was created earl of Auckland in 1839, and returned to England in 1841. He died without issue in 1849.

Auckland (William **Eden**), Lord, an English diplomatist and lawyer, was born in 1745. He was one of the three commissioners appointed in 1778 to negotiate with the revolutionists in the U. S. Having been sent as ambassador to France in 1785, he negotiated a commercial treaty with that nation. He published "Principles of the Penal Law" (1771) and other works. In 1793 he received the title of baron. Died in 1814.

Auckland Islands, a group of islands in the South Pacific, S. of New Zealand. The largest island is about 30 miles long and 15 miles wide, and has two good harbors. This group is valuable as a whaling-station, but is not inhabited.

Auc'tion [from the Lat. *augeo, auctum,* to "increase"], in law, the act of exposing property for sale by open competition to the highest bidder, by a person called an auctioneer. Every bid is deemed to be an offer, which is accepted by the auctioneer when his hammer falls. On general principles of the law of contracts, the offer may be withdrawn by the bidder at any time before acceptance. The acceptance of a higher offer is the rejection of the lower one. Such a sale must be fairly conducted, both on the part of the seller and buyer. The secret employment of "puffers" or fictitious bidders by the owner to unduly enhance the price is a fraud on the purchaser, who may avoid such a sale. The same rule applies to secret agreements between purchasers to stifle competition. Such sales frequently take place under conditions made known at the time of sale. These must be followed by the party to whom they are applicable. An auctioneer is to some extent an agent for both parties—as, for example, to sign on their behalf a written memorandum of sales, where that is required by law. The conduct of auctioneers is sometimes regulated by statute.

Au'cuba, a genus of plants of the order Cornaceæ. The only known species is the *Au'cuba Japon'ica,* an evergreen shrub which is a native of Japan and China, and is cultivated as an ornamental shrub. It is dicœcious, has small purple flowers, and its fruit is a small red drupe. The leaves are pale-green, curiously mottled with yellow.

Audæ'us, or **Au'dius** [in Syriac *U'do*], the founder of a religious sect called Audians, was a native of Mesopotamia. He was banished to Scythia in 338 A. D., and died about 370 A. D. He incurred the enmity of the clergy by censuring their luxury and vices. The Audians are accused of professing anthropomorphism.

Aude (anc. *A'tax*), a river in the S. of France, rises in the Eastern Pyrenees, flows northward to Carcassonne, and thence eastward until it enters the Mediterranean, 6 miles E. N. E. of Narbonne. Length, 133 miles.

Aude, a maritime department in the S. of France, is bounded on the N. by the departments of Tarn and Hérault, on the E. by the Mediterranean, on the S. by the Pyrénées-Orientales, on the W. by Ariège and Haut-Garonne, and has an area of 2437 square miles. It was formerly part of the province of Languedoc. The surface is partly mountainous, being near the foot of the Pyrenees; the soil of the valleys is fertile and calcareous. It is intersected by the river Aude and the canal of Languedoc (or Canal du Midi). Among the mineral resources of Aude are iron, coal, and marble. The staple productions are grain, olives, wine, and fruits. It has manufactures of silk and woollen stuffs, paper, and brandy. Capital, Carcassonne. It is divided into 4 arrondissements, 31 cantons, and 435 communes. Pop. in 1872, 285,927.

Audebert (Jean Baptiste), an eminent French artist and naturalist, born at Rochefort in 1759. He first acquired distinction as a miniature-painter, and subsequently applied himself to natural history, the love of which became his ruling passion. He published in 1800 a "Natural History of Apes, Lemurs, and Galeopitheci," with sixty-two admirably colored plates, printed in oil-colors by a new method which he invented. He was the first to use gold-leaf in illustrating the plumage of birds. His splendidly illustrated "History of Humming-birds, Flycatchers, Jacamars, etc." appeared in 1802. He died in 1800, leaving several works unfinished.

Au'denar'de, or **Oudenarde,** a town of Belgium, in East Flanders, on the Scheldt, 14 miles S. S. W. of Ghent. It has a fine Gothic town-hall. Tanning and brewing are the chief branches of industry here. Pop. in 1866, 4835. Here the prince Eugène defeated the French army in July, 1708.

Au'dience [from the Lat. *au'dio,* to "hear"], the act of hearing; admittance to a hearing; the reception of an ambassador by a sovereign at court; sometimes used to denote an auditory or assembly of hearers. In England it is the name of a court held by the archbishop of Canterbury.

Au'ditor [from the Lat. *audio,* to "hear"], a person whose duty it is to examine and pass upon the accounts of those who have been entrusted with money, or to examine a particular account and certify the result. The U. S. government, as well as most public and private corporations, have such officers. An auditor is appointed by courts in the course of some actions to examine and state accounts, and report them to the court for further proceedings.

Au'ditory Nerve, the nerve of hearing, is the seventh in order of origin from the base of the brain, counting from before backward. The seventh pair consists of the portio dura (or facial), the portio mollis (or auditory), and a small intermediate portion. The portio mollis apparently commences in the floor of the fourth ventricle; it then runs forward to the back of the petrous portion of the temporal bone, and enters the internal auditory meatus. It then divides into two portions, which diverge—the smaller one for the semicircular canals and the vestibule, the other for the cochlea. Those entering the semicircular canals divide into five branches, forming at last a nervous expansion somewhat analogous to the retina. (See Ear and Acoustics.)

Audley (Thomas), Lord Audley of Walden, an English lawyer, born in Essex in 1488. He became Speaker of the House of Commons in 1529, keeper of the great seal in 1532, and lord chancellor of England in 1533. He presided at the trial of Sir Thomas More. According to some authorities, he disgraced himself by his subservience to the arbitrary will of Henry VIII. Died April 30, 1544. (See Lord Campbell, "Lives of the Lord Chancellors.")

Audouin (Jean Victor), an eminent French naturalist and comparative anatomist, born in Paris April 27, 1797. He was one of the founders of the "Annales des Sciences Naturelles," first issued in 1824, and co-operated with Milne-Edwards in researches into the Crustacea and Annelida. He succeeded Latreille as professor of entomology at the Museum in 1833, and was chosen a member of the Institute in 1838. Among his works is a "History of the Insects which Infest the Vine" (1840–43). Died Nov. 9, 1841.

Audrain', a county of the N. E. central part of Missouri. Area, 680 square miles. It is drained by the Davis Fork and Long Branch of Salt River. The surface is undulating or nearly level; the soil is fertile. Cattle, wool, dairy products, grain, and tobacco are raised. Coal is found. It is intersected by the North Missouri and the Louisiana branch of the Chicago and Alton R. Rs. Capital, Mexico. Pop. 12,307.

Audran (Gérard), a French engraver of the first order, was born at Lyons Aug. 2, 1640. He studied under Carlo Maratta at Rome for several years, and returned to Paris about 1670. Having been appointed engraver to the king, he engraved for him the masterpieces of Le Brun, "The Battles of Alexander." Among his works are two cartoons of Raphael, representing the "Death of Ananias" and "Paul and Barnabas at Lystra," and "Coriolanus," after Poussin. He is estimated by some critics as the greatest historical engraver that ever lived. Died Feb. 8, 1691. (See Fontenai, "Dictionnaire des Artists;" Strutt, "Dictionary of Engravers.")—Other members of the Audran family attained eminence as engravers: as Benoît (1661–1721), Claude père (1592–1677), Claude fils (1640–84), Germain (1631–1710), and Jean (1667–1756).

Audry de Puyraveau (Pierre François), a French republican, born at Puyraveau in 1783. He was elected to the Chamber of Deputies in 1827, and acted a prominent and efficient part in the revolution of 1830, during which his manufactory in Paris was the rendezvous of the revolutionists. In 1848 he was a member of the Constituent Assembly.

Au'dubon, a county in the S. W. of Iowa. Area, 630 square miles. It is intersected by the East Nishnabatona River, and drained by the West Nishnabatona, which rises within its limits. The surface is nearly level; the soil is fertile. Grain and wool are the chief crops. Capital, Exira. Pop. 1212.

Audubon, a township of Montgomery co., Ill. Pop. 1250.

Audubon, a township of Audubon co., Ia. Pop. 381.

Au'dubon (John James), a celebrated naturalist, born

in Louisiana on the 4th of May, 1780. He was the son of an opulent French naval officer who owned a plantation in the then French colony. In his childhood he became deeply interested in the study of birds and their habits. He was educated partly in Paris, whither he was sent about 1794, and he studied design under David, the eminent painter. He returned to the U. S. about 1798, and settled on a farm which his father gave him, on the Perkiomen Creek, in Eastern Pennsylvania. Here he found time and opportunity for his favorite study. He married Lucy Bakewell in 1808, sold his farm, and became a merchant at Louisville, Ky. About 1810 he began to make extensive excursions through the primeval forests of the Southern and South-western States, in the exploration of which he passed many years. He made colored drawings of all the species of birds that he found. He resided with his wife and children for several years at Henderson, on the Ohio River. In 1824 he visited Philadelphia, where he met Charles Lucien Bonaparte, who encouraged him to publish a work on ornithology. Before this date he is said to have failed in trade and been reduced to poverty, and to have successively followed the occupation of portrait-painter and dancing-master. He went to England in 1826, and commenced in London the publication of his great work, for which he obtained a large number of subscribers at $1000 a copy. This admirable work was entitled "The Birds of America" (10 vols. folio, 1830–39), and was illustrated with 448 beautiful colored plates of 1065 species of birds, of the natural size. The work is divided into five volumes of letter-press, and five of engravings designed by the author. This was pronounced by Cuvier "the most magnificent monument that art ever raised to ornithology." Audubon returned to America in 1829, and again explored the forests, lakes, and coasts from Canada to Florida, to collect materials for another work. This was his "Ornithological Biography, or an Account of the Habits of the Birds of the United States, etc." (Edinburgh, 5 vols., 1831–39). He revisited England in 1831, and returned home in 1839, after which he resided on the Hudson River, near the city of New York. He published a cheaper edition of his "Birds of America" (7 vols. 8vo, 1844), and was associated with Dr. Bachman in the preparation of a work on "The Quadrupeds of North America," with plates (6 vols., 1846–50), the drawings of which were made by his sons, Victor Gifford and John Woodhouse Audubon. He died in New York City Jan. 27, 1851. Professor Wilson of Edinburgh expressed the opinion that he was "the greatest artist in his own walk that ever lived." (See "Life and Adventures of John J. Audubon," edited, from materials supplied by his widow, by Robert Buchanan, 1869; C. C. Adams, "Journal of the Life and Labors of J. J. Audubon;" article on "American Ornithology" in the "Quarterly Review" for July, 1832.)

William Jacobs.

Au'enbrug'ger von Au'enbrug' (Leopold), called Avenbrugger by the French, a German physician who introduced percussion of the chest as a means of diagnosis, was born at Gratz, in Styria, in 1722. He announced his discovery in a work called "Inventum novum ex Percussione Thoracis Humani" ("New Discovery by the Percussion of the Human Chest," 1761). He practised in Vienna. Died in 1809.

Au'erbach' (Berthold), a popular German author, born at Nordstetten, in Würtemberg, Feb. 28, 1812. He published "Spinoza," a biography or romance (1837); "The Poet and Merchant," a novel (1839); "The Jews and Modern Literature" (1836); and "The Cultivated Citizen" ("Der Gebildete Bürger," 1842). His most popular work is perhaps his "Village Tales of the Black Forest" (2 vols., 1843). Among his other works are novels called "Die Frau Professorin," "Edelweiss," "Baarfüssle" ("Little Barefoot," 1857), "Auf der Höhe" ("On the Heights," 1865), and "Das Land-Haus am Rhein" ("Country-House on the Rhine," 1869). A number of these have been translated into English, French, Dutch, and Swedish, and an Italian version of his "Village Tales" appeared in 1869.

Auerbach (Heinrich), a German medical professor, whose proper name was Stromer, was born at Auerbach, in Bavaria, in 1482. He was a friend of Luther and a citizen of Leipsic. According to tradition, Doctor Faust rode out of Auerbach's cellar on a barrel. Died in 1542.

Au'ersperg', von (Anton Alexander), Count, a German poet whose *nom-de-plume* is Anastasius Grün, was born at Laybach April 11, 1806. He displayed much wit and humor in a poem called "Spaziergänge eines Wiener Poeten" ("Promenades of a Poet of Vienna," 1831). He published in 1838 a volume of poems ("Gedichte").

Auersperg (Carlos), Prince, an Austrian statesman, born May 1, 1814. In 1867–68 he was for a short time president of the Cisleithan ministry. He has been a member of the Reichstag, of which he was president, and of the Bohemian Diet, where he acted with the German party.

Auerstädt, ŏw'er-stĕt, a village of Prussian Saxony, 10 miles W. of Naumburg, noted as the scene of an important victory gained by the French general Davoust over the Prussians, who were commanded by their king, on Oct. 14, 1806, which was also the date of the battle of Jena.

Au'erswald', von (Hans Adolph Erdmann), a Prussian general, born Oct. 19, 1792, gained distinction by his scientific attainments, and was elected to the Parliament at Frankfort in 1848. As he was walking in Frankfort in company with Prince Felix Lichnowsky, a mob attacked and killed them, Sept. 18, 1848. His death appears to have been an incidental consequence of his being in company with the prince, who was obnoxious to the populace.

Auf'fenberg', von (Joseph), Freiherr, a German dramatist and poet, born at Freiburg, in Brisgau, in 1798. Among his numerous works are "The Alhambra," a dramatic poem (1830), and "Louis XI. in Péronne," a drama. Died in 1857.

Au'fidus, the name of an ancient river in Italy, near the mouth of which was fought the great battle of Cannæ, 216 B. C. (See Ofanto.)

Au'geas [Gr. Αὐγέας or Αὐγείας], a mythical king of Elis, who is said to have owned 3000 oxen. One of the twelve labors imposed on Hercules by Eurystheus was to cleanse the Augean stables, in which the dung of these oxen had accumulated for many years. Hercules turned the rivers Alpheus and Peneus through the stables, and killed Augeas because he refused to pay his wages.

Augereau (Pierre François Charles), Duc de Castiglione, a French marshal, born in Paris Oct. 21, 1757, became a fencing-master at Naples before the Revolution, enlisted as a private in the French army in 1792, and gained the rank of general of division in 1796. In 1796 he contributed to the victories of Lodi, Castiglione, and Arcola. He enforced the will of the majority of the Directory in the *coup-d'état* of the 18th Fructidor, 1797, and was chosen a member of the Council of Five Hundred in 1799. He became a marshal of France in 1804, duke of Castiglione in 1805, served with distinction at Jena in 1806, and was wounded at Eylau in 1807. In 1813 he displayed intrepid courage at Leipsic. He transferred his allegiance to Louis XVIII. in 1814. Died June 12, 1815.

Au'gian Co'dex, a defective uncial manuscript of a part of the New Testament, was found in the monastery of Augia Major, at Rheinau, was purchased by Dr. Bentley in 1718, and is now in Trinity College, Cambridge.

Augier (Émile), a French dramatist and poet, a grandson of Pigault-Lebrun, was born at Valence, in Drôme, in 1820. He wrote a drama entitled "La Ciguë" ("Hemlock," 1844), which had complete success, and "Gabrielle," a comedy (1849), which gained the Montyon prize of the French Academy. In 1856 he produced a volume of poems, and in 1857 was admitted into the French Academy.

Au'gite [from the Gr. *αὐγή*, "splendor"], a crystalline mineral sometimes called **Pyroxene,** is nearly allied to hornblende. It often occurs in volcanic rocks, is composed of silica, lime, and magnesia, and is usually of a greenish color. It crystallizes in six or eight-sided prisms variously modified, and is an essential component of basalt, dolerite, and augite porphyry. Some mineralogists think that the difference between augite and hornblende arises only from the different circumstances in which they crystallize, the former being the result of a more rapid cooling.

Au'glaize, a river in the north-western part of Ohio, rises in Auglaize co., and after a course of about 100 miles enters the Maumee River at Defiance. Its general direction is nearly northward.

Auglaize, or **Grand Auglaize,** a small river of Missouri, rises in La Clede co., flows northward, and enters the Osage about 3 miles below Linn Creek.

Auglaize, a county in Western Ohio. Area, 400 square miles. It is drained by the Auglaize and St. Mary's rivers, which rise within its limits. The surface is nearly level; the soil is fertile. Dairy products, corn, wheat, oats, hay, and potatoes are the chief crops. This county is intersected by the Miami and Erie Canal, and by the railroad which extends from Dayton to Toledo. Capital, Wapakoneta. Pop. 20,041.

Auglaize, a township of Camden co., Mo. Pop. 1330.

Auglaize, a township of Miller co., Mo. Pop. 608.

Auglaize, a township of Allen co., O. Pop. 1696.

Auglaize, a township of Paulding co., O. Pop. 788.

Au Gres, a post-township of Bay co., Mich. Pop. 255.

Augs'burg (anc. *Augus'ta Vindelico'rum*), an ancient and important city of Germany, in Bavaria, capital of the

province of Swabia and Neuburg, is situated on the river Lech, at the mouth of the Wertach, 39 miles by rail W. N.W. of Munich; lat. 48° 21′ 42″ N., lon. 10° 54′ 16″ E. Several railways extend from it towards the four cardinal points, and connect it with Munich, Nuremberg, etc. The Roman emperor Augustus planted a colony here in 12 B. C. It became a free imperial city in 1276, after which it was an important commercial emporium. This city was also one of the chief centres of German art, and the native place of Holbein. It was also the native place of the Fugger family, at one time the richest family in Europe. Some decline in its prosperity occurred after 1500, but it still has an extensive trade and many large manufactories of cotton, silk, machinery, and paper. Augsburg is one of the principal money-markets of the Continent, and owes much of its importance to its banking-business and operations in stocks. The "Allgemeine Zeitung," issued in Augsburg, is one of the most celebrated and widely circulated journals of Germany. Pop. in 1871, 51,284.

Augs'burg Confes'sion, the first Protestant Confession of Faith, drawn up by Melanchthon, sets forth the doctrines held by Luther and his followers. This Confession was presented to Charles V. at a German Diet convened at Augsburg June 20, 1530. The original copies of this document, in German and Latin, are not known to be extant. The emperor forbade the publication of the Confession without permission obtained from himself; but a surreptitious and erroneous publication having been made, it became necessary for Melanchthon to issue correct copies of the text, both in German and Latin. This Confession, with its subsequent Apology, became a standard for the Reformers, and to this day is regarded as authoritative among the Lutheran churches. (See LUTHERANISM.)

Au'gur, a Latin word used by the ancient Romans to denote a soothsayer, a diviner, a person who professed to foretell events by the flight of birds or other omens. The augurs were supposed to be capable of interpreting the will of the gods, and divinely gifted with special qualifications for this service. Their office was considered as very important in the state, no public enterprise being undertaken unless they declared the omens favorable. Their divinations were called auguries or auspices, the latter of which terms, though properly applied to the inspection of the flight of birds, was extended by the Roman writers to other signs. In the early period of Roman history the number of augurs was only three or four, who must be patricians. The Ogulnian law, passed 300 B. C., rendered the plebeians eligible to the office of augur, and increased the number to nine. The augurs held office for life, and had the power of filling vacancies that occurred in their college. The college of augurs in some periods of Roman history had great political influence, it being contrary to the religion and usage of the Romans to hold an election, to commence a battle or campaign, or perform any important public business, without consulting the auspices. Sulla raised the number of augurs to fifteen, and Julius Cæsar to sixteen.

Augur (CHRISTOPHER C.), an American officer, born 1821 in New York, graduated at West Point in 1843, in infantry till Mar. 4, 1869, when he became brigadier-general U. S. army. He served chiefly at frontier posts 1843–61, in the military occupation of Texas 1845–46, in the war with Mexico 1846–48, engaged at Palo Alto, Resaca de la Palma, and as aide-de-camp to Brigadier-Generals Hopping and Cushing, scouting and on expeditions against Northern Pacific Indians 1855–56, engaged in several skirmishes, and as commandant of cadets at Military Academy 1861. In the civil war became, Aug. 9, 1862, major-general U. S. volunteers, and served in the defences of Washington 1861–62, in operations on Rappahannock and in the Shenandoah Valley 1862, in command of a division in the Fifth corps 1862, engaged at Cedar Mountain (severely wounded and brevet colonel), in General Banks's expedition to New Orleans 1862; in command of the district of Baton Rouge 1863, in expedition to Fort Hudson 1863 (brevet brigadier-general), engaged in action and siege of the place; in command of department of Washington 1863–66, of the Platte 1867–71, and of Texas since 1871. Brevet major-general Mar. 13, 1865, for gallant and meritorious services in the field.

GEORGE W. CULLUM, U. S. A.

Augur (HEZEKIAH), an American sculptor, born at New Haven, Conn., Feb. 21, 1791, was also noted for mechanical ingenuity. He invented a carving-machine which is in general use, and as sculptor produced "Jephthah and his Daughter." Died Jan. 10, 1858.

Au'gust [Lat. *Augus'tus;* Fr. *Août*], the eighth month of the year, was so named in honor of Augustus Cæsar. Before his time it was called *Sexti'lis*—that is, the *sixth* month, because the Roman year once began on the 1st of March. In the calendar of Julius Cæsar the first, third, fifth, seventh, ninth, and eleventh months consisted each of thirty-one days, and each of the other months of thirty, except February, which in common years had twenty-nine, and in leap-year thirty days. To gratify the vanity of Augustus, one day was taken from February and added to August.

Augus'ta, a county near the western part of Virginia, has an area of about 900 square miles. It is bounded on the S. E. by the Blue Ridge, and forms part of the Great Valley of Virginia. It is drained by the South Fork of the Shenandoah River, which rises by several branches within its limits. The surface is diversified; the soil is calcareous and very fertile. Corn, oats, wheat, and wool are largely raised. Fine limestone underlies a great part of the county, which is said to contain anthracite coal. It is intersected by the Chesapeake and Ohio R. R. Capital, Staunton. Pop. 28,763.

Augusta, a post-village, capital of Woodruff co., Ark., on White River, 69 miles N. E. of Little Rock. It has two weekly papers. Pop. of township, 2213.

W. E. ARMS, ED. "AUGUSTA SENTINEL."

Augusta, a city and the capital of Richmond co., Ga., the third city in size in the State, situated on the left bank of the Savannah River, 231 miles from its mouth, 120 N. N. W. from Savannah, and 136 N. W. from Charleston. It is at the head of steamboat navigation on the Savannah. Lat. 33° 28′ N., lon. 81° 54′ W. Its population in 1870 was 15,389; in 1860, 12,493; in 1850, 10,217. The city has a thriving trade, and does a good wholesale business with the towns of the State, with most of which it has a direct connection either by river or rail. It also draws considerable business from the hill-country of South Carolina. From its position it is actively engaged in the cotton trade, receiving cotton from a considerable portion of Georgia and South Carolina. What is not needed to supply its own cotton-mills is sent to Savannah and Charleston, and reported in their receipts. Augusta also furnishes a good market for the general produce of its region. For many years it was the centre of the wagon-traffic, sending out goods in all directions in the great lumbering wagons of that time, and receiving cotton and produce in return. After the railroads began to break up this trade, the city declined for a time, but soon regained its trade, and is now an enterprising and prosperous city. The Augusta Canal, 9 miles in length, brings the waters of the Savannah River from above the city at such an elevation as to give a head or water-power of forty feet. It is one of the largest manufacturing centres of the South. Its manufactories and those of Richmond county are of great importance. There were in the county in 1870, and by far the larger part in the city, 97 manufacturing establishments, of which 12 were driven by steam-engines, having an aggregate force of 180 horse-power, and 47 by water-power, employing an aggregate force of 1222 horse-power. In these manufacturing establishments 1280 hands were employed, of whom 1178 were men, 78 women, and 24 children. The amount of capital employed was $1,345,155; the wages paid $517,230; the material used was valued at $1,695,765, and the value of the manufactured products, $2,614,405. Probably about four-fifths in number and nine-tenths in value of these manufactures belonged to Augusta. Among its most important manufacturing establishments are two cotton-mills, employing 553 hands, having $648,000 capital, paying $182,939 for wages, and $782,506 for material, and producing goods of the annual value of $1,118,722. One of these manufactures cotton yarns, which are largely in demand at the North. There is also a car-factory, employing 90 men, and producing $108,370 worth of cars; 2 railroad machine-shops, employing 113 hands, and turning out $270,196 worth of machinery; and 5 or 6 other machine-shops, producing about $70,000 worth of work. There were 5 flouring-mills, employing 36 hands and turning out products of the value of $517,541. A beginning had also been made in foundries for iron castings, which produced nearly $40,000 worth of goods; in tobacco, snuff, and cigar factories, producing $86,250 of goods; 2 printing-offices turned out work worth $78,000, and 2 brick-kilns made brick to the extent of $39,042. The county of Richmond in 1870 had an assessed valuation of $14,075,615, and a true valuation, according to the ninth census, of $19,473,131, ranking as the second county in the State. Of this valuation about four-fifths pertained to the city of Augusta. The city tax the same year was $210,000, and the city indebtedness $1,355,250. Augusta has a medical school, the Medical College of Georgia, founded in 1830, and which in 1872 had 97 students. It has also an incorporated academy called the Richmond Academy, with 7 teachers and 300 scholars; a city normal school, with 2 teachers and 30 scholars; 7 grammar schools, with 7 teachers and 777 scholars; 17 primary schools, with 9 teachers and 1238 scholars. Of the 5439 per-

sons of school age (*i. e.* between six and twenty-one years), 3500 are enrolled either in public or private schools, and the average attendance is 2632. The income of the public schools from all sources is $25,000. There are two daily papers published in the city; both have a considerable circulation and issue weekly and tri-weekly editions. It has three national banks. There are about 20 churches, among which are 1 Roman Catholic, 1 Episcopal, 1 Presbyterian, 1 Lutheran, 1 Christian, 5 or 6 Baptist, and 6 or 7 Methodist—2 of them of the Northern Methodist Church. Of the Baptist and Methodist churches, several are for people of color. The number of sittings in these churches is over 12,000, and the estimated value of church property almost $400,000. The city has a hospital, a *clinique* connected with the medical college, a Masonic hall, and some other charitable institutions. Among its public buildings of note are a costly and very beautiful city-hall, Odd Fellows' hall, the Masonic hall, Richmond Academy, the medical college, the opera-house, Independence Monument, and several of the churches. The streets and avenues are broad and finely shaded, and many of the residences are tasteful and elegant. The principal avenue, Greene street, has a double row of widespreading trees on either side of the spacious highway, and with its elegant mansions forms a true boulevard. It is considered one of the most beautiful of Southern cities. The streets cross each other at right angles. There is a well-regulated police force. The city cemetery and the Cotton States' Agricultural Fair-Grounds, near the city, are both laid out in fine walks and drives, and are favorite places of resort. The city is connected with the coast by the Augusta and Port Royal R. R., the South Carolina R. R., and the Charlotte Columbia and Augusta R. R., in South Carolina, the Savannah being crossed to Hamburg, S. C., directly opposite, by a fine bridge; while the Georgia, and the Augusta and Macon, and the Savannah and Augusta R. Rs., with their branches, give it ready and speedy access to every portion of the State. There is also a horse-railroad from the city to Summerville, a beautiful suburb. Water is supplied to the city from the Augusta Canal, which is now being enlarged and its power greatly increased. It is lighted with gas. Though in a very level region, the grade of the city is sufficient to ensure a good and sufficient drainage.

History.—Augusta was settled by English colonists under Oglethorpe, and laid out in 1735 under royal charter, and was named in honor of an English princess. It was again chartered in Jan., 1798, and incorporated as a city in Dec., 1817. It was for many years the most important inland town of the colony. It had acquired a considerable trade at the commencement of the Revolutionary war, but in the beginning of 1779 was captured by the British and loyalists, who held possession of it till the spring of 1781, when the British force there was commanded by a loyalist named Brown. On May 23, 1781, an American force under command of General Henry Lee ("Lighthorse Harry") laid siege to it, and on the 5th of June Brown surrendered. The Americans lost 51 killed and wounded; the British lost 52 killed, and 334, including the wounded, were taken prisoners. During the war of 1812 or the Indian wars it was not molested. In the late civil war it was garrisoned by the Confederate troops, and twice threatened by Sherman—in his march to the sea, when he passed between it and Macon; and in his march through the Carolinas, when he made feints against both Augusta and Charleston—but it was not visited by a hostile force. Since the census of 1870 its population has greatly increased. It has long been distinguished for the intelligence, public spirit, and good order of its citizens. WALSH & WRIGHT,

PUBS. AND PROPS. "CHRONICLE AND SENTINEL."

Augusta (anc. *Megara*), a town of Italy, in the province of Nolo, is situated on an island, which is connected by a bridge with the peninsula Cape San Croce, 19 miles by rail N. N. W. of Syracuse. Pop. in 1861, 9223.

Augusta, a post-township of Hancock co., Ill. Pop. 1992.

Augusta, a post-township of Des Moines co., Ia. Pop. 584.

Augusta, a post-township of Butler co., Kan. It has one weekly newspaper. Pop. 515.

Augusta, a post-village of Bracken co., Ky., situated on the Ohio River, 43 miles above Cincinnati, is the seat of Augusta Male and Female College. It has good free and private schools; tobacco is the staple of the county; one paper is published here. The Kentucky and Great Eastern R. R. runs through the town. Pop. 960.

GEO. WINTER, PUB. "CHRONICLE."

Augusta, the capital of the State of Maine, and seat of justice of Kennebec co., is on the Kennebec River, at the head of sloop navigation, 43 miles from its mouth, and 63 miles by railroad N. N. E. of Portland; lat. 44° 19′ N., lon. 69° 50′ W. The Augusta division of the Maine Central R. R. passes through it. The main part of the city is on the right (W.) bank of the river, and many of the residences stand on ground which is much higher than the river. The State-house, a handsome granite structure, is on an eminence, and commands an extensive prospect. Among the public institutions are a hospital for the insane, a U. S. arsenal, and St. Catharine's school for young ladies. By the construction of a dam across the river just above the city, abundant water-power has been obtained, which is employed in manufactures of cotton goods and lumber. There is also a card-factory, an iron-foundry, a free library, and the Maine State Library. The National Military Asylum is just outside the city limits. Nearly all the business portion of the city was consumed by fire in Sept., 1865. Augusta has three national banks, one daily, one semi-monthly, one monthly, and four weekly newspapers. Pop. in 1870, 7808.

ALDEN SPRAGUE, ED. OF "KENNEBEC JOURNAL."

Augusta, a post-township of Kalamazoo co., Mich. Pop. 608.

Augusta, a township of Washtenaw co., Mich. Pop. 1470.

Augusta, a post-village, capital of Perry co., Miss., on Leaf River, 110 miles S. E. of Jackson.

Augusta, a post-village and township of Oneida co., N. Y., 20 miles S. E. of Oneida Lake and 100 miles W. N. W. of Albany. The township contains several manufacturing villages. Pop. of township, 2067.

Augusta, a post-township of Carroll co., O. Pop. 1015.

Augusta, a post-village of Eau Claire co., Wis., on the West Wisconsin R. R., 22 miles E. S. E. of Eau Claire. It has one weekly newspaper. Pop. 761.

Augus'ta Histo'ria (*i. e.* "Augustan History"), a collection of histories or biographies of the Roman emperors, from Hadrian to Carinus inclusive (117–285 A. D.). The authors of the "Augusta Historia" were Ælius Spartianus, Julius Capitolinus, Ælius Lampridius, Vulcatius Gallicanus, Trebellius Pollio, and Flavius Vopiscus.

Augus'tan Age, the reign of the emperor Augustus Cæsar, commenced about 30 B. C., and was the most brilliant period in the literary history of Rome. It was illustrated by the genius of Virgil, Horace, Livy, Ovid, Propertius, and Tibullus. Cicero also, and Julius Cæsar, may be included as contemporaries of Augustus. This age was also signalized by the most perfect development of the science of jurisprudence, in which the Romans excelled all other nations, and which was perhaps their only original intellectual property of much importance. A purer Latinity appears in the writings of the Augustan Age than in those of earlier and subsequent periods.

Augusta'na Col'lege and Theolog'ical Sem'inary. This institution was founded in 1860, and held its sessions in the basement of the Swedish Lutheran church in Chicago, Ill. In 1863 it was removed to Paxton, Ford co., Ill. Its primary object is the education of candidates for the gospel ministry of the Evangelical Lutheran Church among the Scandinavian population of this country. It also educates young men for the office of teacher in the parochial schools of the Church, and for business and professional life. It was incorporated by the legislature of Illinois Feb. 16, 1865, and its charter was amended Mar. 10, 1869. The course of instruction consists of three years in the preparatory department, embracing the study of the English, German, Swedish, Latin, and Greek grammars and languages, together with a thorough course in all the branches usually taught in a preparatory department; and four years in the college department, embracing the classical, the scientific, and the mathematical course usually taught in American colleges. The scholastic year consists of forty weeks, divided into two terms of sixteen and twenty-four weeks respectively, including a short recess during the holidays. The institution has a library of 7000 volumes. The faculty, at present, consists of the president and three professors; there is also one tutor. The first principal was the Rev. L. P. Esbjorn. In 1863, Rev. T. N. Hasselquist, D. D., was elected president, which office he yet holds. Measures are being taken for the removal of this institution to Rock Island, Ill. The institution has an endowment of 880 acres of improved land in Ford co., Ill., and efforts are now being made to raise $30,000 as an addition to the college endowment.

T. N. HASSELQUIST.

Augusti (CHRISTIAN JOHANN WILHELM), born Oct. 27, 1772, at Eschenburg, near Gotha, Germany, studied at Jena, where he became a professor extraordinary in 1800, professor of Oriental literature in 1803, and professor of theology in 1807. In 1812 he became professor of theology at Bres-

lau, and in 1819 at Bonn. In 1833 he became director of the conservatory at Coblentz, where he died April 28, 1841. He was a man of great learning, an orthodox conservative Lutheran. His writings are valued as books of reference, though they are not without serious faults. His best-known work is "Denkwürdigkeiten aus der Christlichen Archæologie" (12 vols., 1817–31). He published various other works, historical and dogmatical.

Au'gustine [Lat. *Aure'lius Augusti'nus*], SAINT, the most eminent of the Latin Fathers of the Church, was born at Tagaste, in Numidia, on the 13th of Nov., 353 A. D. He was a son of a pagan father and a Christian mother (Monica or Monnica), an excellent and devout woman, by whom he was instructed in religion. Educated at the best schools of Madaura and Carthage, he learned rhetoric, the Greek language, philosophy, etc. When, at the age of seventeen, he entered the great city of Carthage to complete his education, he was an eager, ambitious student and a youth of ardent passions, with a propensity to sensual pleasure. According to his own statement in his "Confessions," he deviated widely from the path of strict morality during this period, and became a father before he was married. About the age of nineteen he embraced the doctrines of the Manichæans, and returned to Tagaste, where he taught rhetoric and grammar. He adhered to Manichæism about nine years, during part of which he lectured on rhetoric at Carthage. In the mean time his mother, by her prayers and exhortations, strove to convert him to Christianity, without success. He wrote at Carthage in his twenty-seventh year a treatise, "De Apto et Pulchro," which is not extant. At length he perceived that the mystical phrases and futile speculations of the Manichæans were not capable of satisfying the wants of his spiritual nature. Much perplexed with doubts and unrest, he removed in 383 A. D. to Rome, and thence to Milan, where he was appointed professor of rhetoric in 384. He was deeply interested in the Platonic philosophy, and after he renounced Manichæism studied the Bible from a Platonic point of view. The sermons of Saint Ambrose, then bishop of Milan, made a deep impression on him, and after severe spiritual conflicts he became a Christian, and was baptized on Easter Eve, 387. In 388 he went back to Tagaste, was ordained presbyter at Hippo in 391, associate bishop in 395, and bishop in 396. Among his earlier writings was a treatise against the Manichæans ("De Genesi contra Manichæos"), and "On True Religion" ("De Vera Religione"). He published about 397 his "Confessions," in thirteen books, a very interesting autobiography. He was a zealous opponent of Pelagianism, against which he wrote two treatises, entitled "On the Grace of Christ" and "On Original Sin." Semi-Pelagianism was opposed by him, in 428, in two famous treatises on "Predestination" and on "Perseverance." He also wrote vigorously against the Donatists. He finished about 426 a work, "De Civitate Dei" ("On the City of God"), which is regarded as the greatest monument of his genius and learning. One aim of this book was to vindicate the Christian faith against those pagans who asserted that the capture of Rome by Alaric and other calamities were consequences of the prevalence of the new religion. Near the end of his life he wrote the "Retractationes," in which he reviewed carefully all his own works. Other important treatises are the "De Doctrina Christiana" and the "De Trinitate." He left behind him also exegetical treatises, sermons, and letters in great number. The best edition of his works is that published by the Benedictines at Paris (11 vols., 1679–1700). He died at Hippo while that city was besieged by the Vandals, on the 28th of Aug., 430 A. D. His character and writings exerted an immense and durable influence on the Church. "Of all the Fathers of the Latin Church," says Villemain, "Saint Augustine manifested the most imagination in theology, the most eloquence, and even sensibility, in scholasticism." For learning his reputation is not so high. He was a poor Greek scholar, and knew nothing of Hebrew. (See POSSIDIUS, "Vita Sancti Augustini;" G. MORINGO, "Vie de Saint-Augustin," 1533; TILLEMONT, "Mémoires Ecclésiastiques," 1702; RIVIUS, "Vita Sancti Augustini," 1646; POUJOULAT, "Vie de Saint-Augustin," 1852; BINDEMANN, "Augustine's Leben," 1844; BUTLER, "Lives of the Saints;" NEANDER, "History of the Church.")

REVISED BY R. D. HITCHCOCK.

Augustine, or **Austin,** SAINT, the "apostle of England" and first archbishop of Canterbury. He was a Benedictine monk, connected with a monastery in Rome, when he was sent by Pope Gregory I. to convert the Anglo-Saxons, in 596 A. D. He was received amicably by King Ethelbert, whose wife Bertha was already a Christian. He converted Ethelbert, and is said to have baptized 10,000 of his subjects. Augustine was appointed archbishop of Canterbury by the pope. Died in 604, or, as some say, 614. (See W. F. HOOK, "Lives of the Archbishops of Canterbury," vol. i.)

Augustin'ian Monks, a monastic order of the Roman Catholic Church. This order was formerly divided into three classes, of which two still remain: I. *Canons Regular.*—This class of ecclesiastics originated at Avignon in the year 1038, by authority of the bishop Benedict of Avignon. They were called Canons Regular because their ranks were recruited from the lay and clerical canons who had not previously taken monastic vows. They assumed the name and rule of Augustine in 1139. They had 170 houses in England and 28 in Scotland. II. The so-called *Hermits of St. Augustine,* one of the four great mendicant orders of the Church. This body incorrectly claims to have been founded by Saint Augustine. Its true origin was in 1256, when Pope Alexander IV. compelled eight small bodies of Italian monks to unite in one order under the rule of St. Augustine, and exempted them from the jurisdiction of bishops. The Hermits of St. Augustine have now about 200 houses. They are much diminished in importance. *The Special Congregations* consisted of those Augustinians who desired a severer rule and better discipline than commonly prevailed in the order. Martin Luther was a member of the Special Congregation of Saxony. III. *The Barefooted Augustinians* originated in 1582, by command of the king of Spain. They have a very severe rule. The number of monasteries in 1860 was about fifteen. This class is nearly or quite independent of the former.

Augustinian Nuns are of four classes: First, those under the guidance of Augustinian monks; secondly, those under the control of diocesan bishops; thirdly, barefooted nuns; fourthly, Augustines of the Interior of Mary. (See MIGUE, "Dictionnaire des ordres Religieux," tom. iv.; DUGDALE, "Onomasticon," vi. 37.)

Augusto'wo, or **Augustow,** a town of Russian Poland, in the government of Suvalki, on the Netta, 140 miles N. E. of Warsaw. It has manufactures of cotton and woollen goods. Pop. in 1867, 9354.

Augustowo, Canal of, unites the Vistula with the river Niemen, and connects it with the Baltic at Memel. It is 150 miles long, extending from Wizna on the Narew to a point on the Niemen, 14 miles N. of Grodno.

Augus'tulus (ROMULUS), the last Roman emperor of the West, was a son of Orestes, a rich patrician. He obtained the title of emperor in 475 A. D., and was deposed by Odoacer in 476.

Augus'tus, a Latin word equivalent to the Gr. Σεβαστός, signifies "majestic," "sacred," "venerable." It was a name or surname conferred on Caius Julius Cæsar Octavianus by the Roman senate, 27 B. C.

Augus'tus (or **August**) **I.,** elector of Saxony, a son of Henry the Pious, was born at Freiberg in 1526, and succeeded his brother Maurice in 1553. He was an intolerant promoter of Lutheranism, and persecuted the Calvinists, but was a liberal patron of learning, and under his administration the manufactures, agriculture, and commerce of the country were greatly promoted and improved; he also introduced some valuable reforms in jurisprudence. He was chiefly instrumental in negotiating the peace of Augsburg (1555). He died in 1586, and was succeeded by his son, Christian I.

Augustus II. of Saxony (and **Augustus I.** of Poland), born at Dresden in 1670, was the second son of John George III., elector of Saxony, and Anna Sophia of Denmark. He possessed extraordinary physical strength, and was not deficient in mental faculties. He became elector of Saxony on the death of his brother in 1694, and was elected king of Poland in 1697, having, for the sake of the crown, adopted the Roman Catholic religion. His competitor in this election was the French prince of Conti. Augustus formed about 1700 an alliance with Peter the Great against Charles XII. of Sweden, by whom he was defeated in several battles. By a treaty signed in 1706 he renounced the crown of Poland, which Charles XII. gave to Stanislas Leszczynski. In consequence of the defeat of Charles XII. by the Russians in 1709, Augustus recovered the throne of Poland, and as an ally of Peter the Great waged war against Sweden for several years. Augustus was luxurious, licentious, and fond of splendor. He squandered the revenues of Saxony on his mistresses and on alchemists, whom he patronized. He had many illegitimate children, among whom was the famous Maurice of Saxony (Marshal Saxe). He died in Feb., 1733, leaving the throne to his son Augustus. (See FASSMANN and HORN, "Friedrich August des Grossen Leben," 1734; DESROCHES DE PARTHENAY, "Histoire de Pologne sous le Roi Auguste II.," 4 vols., 1734.)

Augustus III. (FREDERICK), king of Poland, born at Dresden in 1696, was a son of the preceding. He was

inferior in talents to his father. Having joined the Roman Catholic Church, he married, in 1719, Maria Josephine, a daughter of Joseph, emperor of Austria. In 1733 he became elector of Saxony, and was chosen king of Poland by a party of the Diet. Favored by the courts of Austria and Russia, he prevailed over his rival Stanislas. In 1742 he formed an alliance with the empress Maria Theresa against Frederick the Great, who defeated the Saxons in 1745 and captured Dresden. This war was ended in 1746, but Augustus was soon involved in the Seven Years' war, which began in 1755, and his army was again defeated by the Prussians. He died in 1763, and his son, Frederick Christian, then became elector of Saxony.

Augustus (William), prince of Prussia, a younger brother of Frederick the Great, was born at Berlin in 1722. He distinguished himself at Hohen-Friedberg in 1745, became a general of infantry, and displayed skilful generalship at the battle of Lowositz in 1756. He died in 1758, and left a son, who became King Frederick William II.

Augus'tus Cæ'sar (often called simply **Augustus**), called in his youth Caius Octavius, and after he became the heir of Cæsar the dictator, Caius Julius Cæsar Octavianus, the first Roman emperor, was born at Velitræ in 63 B. C. He was the son of Caius Octavius, a senator, and Atia, who was a niece of Julius Cæsar. His father having died about 60 B. C., his mother was married to L. Marcius Philippus, who directed the education of young Octavius. At the age of sixteen he assumed the *toga virilis*, and was adopted as a son by Julius Cæsar, whom he attended in his expedition to Spain in 45 B. C. He became a pupil of Apollodorus of Pergamus, under whom he was pursuing his studies at Apollonia when Cæsar was killed, in Mar., 44 B. C. As he had been appointed the heir of the dictator, he hastened to Rome to claim his inheritance. Mark Antony, who then had the chief power in Rome, refused to deliver the property and papers of the late dictator. Octavius temporized, and in the turbulent and critical times that ensued exhibited the prudence and astuteness of a mature politician. He gained the favor of the senate, which in Jan., 43 B. C., gave him the command of an army which defeated that of Antony near Mutina (Módena). The adhesion of the army to his interest enabled him now to defy the authority of the senate. He marched to Rome, was elected consul in Aug., 43, and formed a triumvirate with Antony and Lepidus against Brutus, Cassius, and the senate. Antony and Octavius defeated Brutus and Cassius in the decisive battle of Philippi in 42 B. C., and, to confirm their power, proscribed and massacred thousands of their opponents in Italy. Augustus then obtained control of Italy by a new division of the provinces, but dissensions soon arose between him and Antony, who had command in Asia. An open rupture was, however, postponed, and Antony married Octavia, the sister of his great rival. About 38 B. C. the triumvirate was renewed for another period of five years, during which Octavius and Antony were virtually masters of the Roman world. Octavius defeated Sextus Pompey in battle in the year 36, and was chosen consul for the second time in 33. In the mean time, Antony, infatuated with passion for Cleopatra, neglected his own interests, and by his ill-treatment of Octavia broke the only bond of union with his colleague. The contest for supreme power was decided by a great naval victory which Octavius gained at Actium in 31 B. C., after which he was the sole master of the Roman empire. He was subsequently chosen consul several times, and professed an intention to restore the republic, but he usurped absolute power, partly disguised under republican forms. In 27 B. C. the title of Augustus was conferred on him by the obsequious senate, which retained the shadow of its former power. His favorite ministers and advisers were Agrippa, Mæcenas, and Asinius Pollio. He was thrice married; the names of his wives were Clodia, Scribonia, and Livia Drusilla. He had an only child, Julia. In 23 B. C. he accepted the *tribunitia potestas* (tribunitian power) for life. His reign was remarkably pacific and prosperous, and the Augustan Age was rendered the most brilliant in the Roman literature by the genius of Virgil and Horace, whom the emperor liberally patronized. He was a prudent and rather popular ruler, governing men with artful policy, and skilfully using their passions and talents to promote his own designs. The peace, order, and prosperity which his subjects enjoyed under his mild and modified tyranny reconciled them to the loss of their ancient liberty. He centralized the administration and enforced discipline in the armies. He adorned the city of Rome with public buildings, and made such improvement in that capital that it was said that he found it a city of brick and left it a city of marble. He was not happy in his domestic relations. His adopted sons, Caius and Lucius Cæsar, to whom he intended to leave the throne, died young. He was temperate in his diet and moderate and frugal in his style of living. He had studied oratory with some success, but on important occasions he would never speak without careful preparation. He composed numerous works in prose and verse on various subjects. Having designated his stepson Tiberius as his successor, he died in Aug., 14 A. D. (See Suetonius, "Life of Augustus" ("Vita Augusti"); Nicolas Damascenus, "De Vita Augusti;" Tacitus, "Annales;" Drumann, "Geschichte Roms;" Larrey, "Vie d'Auguste," 1840; Nougarède, "Histoire du Siècle d'Auguste," 1840.)

Revised by Abel Stevens.

Auk (*Al'ca*), a genus of web-footed oceanic birds of the family Alcadæ. The auks are remarkable for the shortness of their wings, which in some species are used as paddles or fins in swimming under water, while in others they are used in flight. These birds are adapted solely for an aquatic life, and swim with wonderful rapidity; they pass their lives mostly in the sea and on the shore near the water's edge. They are found only in the northern hemisphere, and are most abundant in the Arctic regions. The genus *Alca*, restricted by Cuvier, comprises only two species—the great auk (*Alca impennis*) and the razor-bill (*Alca torda*). The great auk is about as large as a goose, and resembles a penguin, having very short wings unfit for flight, and being compelled by the form and situation of its legs to hold itself in an erect position when on the land. It moves under the water with extraordinary rapidity. This bird, so numerous a few years ago, has been lost sight of, and is thought to be extinct. About thirty-four birds and forty-two eggs are known, they being distributed among the various scientific institutions of the world. The razor-bills or black-billed auks have longer wings, and can fly well. They breed in immense numbers within the Arctic Circle, and are very valuable to the Esquimaux, who eat their flesh and clothe themselves with their downy skins. They derive the name razor-bill from the sharpness of the edge of their bills. The common puffin (*Fratercula arctica*) is remarkable for the singular shape, enormous size, and

Labrador Auk, or Arctic Puffin.

the light colors of its beak, owing to which it is often called the *sea-parrot* or the *coulterneb;* it is also sometimes called the Labrador auk. The name of little auk is often given to a species of *Mergulus*.

Au'la Re'gia, Latin words signifying "king's hall" or "court." This name was applied to a court established in England by William the Conqueror, and afterwards regulated by Magna Charta.

Au'lic [from the Lat. *au'la;* Ger. *Reichshofrath*] **Council,** one of the two highest councils or courts of the former German empire, co-ordinate with the imperial chamber. The aulic council, which was organized in 1495, consisted of a president, vice-president, and eighteen councillors, six of whom were Protestants, whose unanimous votes could not be overruled by the Catholic majority. The

members and officers of this council were appointed by the emperor, and had jurisdiction over all matters of feudality in which the emperor was directly concerned; all questions of appeal made by states from decisions in favor of the emperor in inferior courts; and Italian affairs in which the emperor was interested. After the dissolution of the German empire in 1806, the term aulic council was applied to the emperor of Austria's council of state.

Au'lick (Commodore JOHN H.), born in Virginia in 1787, entered the U. S. navy in 1809. He was promoted to be a lieutenant in 1814 for bravery in the fight between the Enterprise and Boxer. He afterwards served with great honor, becoming captain in 1841, and commodore in 1862. Died April, 1873.

Au'lis, a town of ancient Greece, in Bœotia, on the Euripus, had a temple of Artemis (Diana). According to the poetical legend, Agamemnon here assembled the Grecian fleet before the siege of Troy, and here he offered his daughter Iphigenia as a sacrifice. Its present name is Vathi.

Aull'ville, a village of Lafayette co., Mo., on the Lexington and St. Louis R. R., has one wagon and carriage factory, one machine-shop, one manufactory of boots and shoes, and other industries. It has one weekly paper.

H. DULEY, ED. "AULLVILLE TIMES."

Au'lus Gel'lius, a Latin author who lived during the reigns of Hadrian and the Antonines. Little is known of the events of his life. He resided much at Athens, where he composed his "Noctes Atticæ," probably before 150 A. D. His book is a mass of curious information upon a great variety of subjects, and, though ill-arranged, is valuable to critics, from the light it throws upon many obscure points of ancient history and literature. The edition of Conradi (1762) is one of the best.

Aumale (formerly **Albemarle**), a small town of France, department of Seine-Inférieure, 13 miles E. N. E. of Neufchâtel. Pop. in 1866, 2229. In the reign of Henry II. Aumale was erected into a duchy, and the title of duke of Aumale was given to Claude, a brother of Francis, duke of Guise. (See the next article.)

Aumale, d' (CLAUDE II.), DUC, a French general, born in 1523, was a brother of the famous duke of Guise. He fought against the Huguenots at St. Denis (1567) and Moncontour (1569), and was one of the chief instigators of the massacre of St. Bartholomew (1572). He was killed in battle Mar. 14, 1573.—His son, CHARLES DE LORRAINE, duc d'Aumale, born about 1555, was an ardent partisan of the Catholic League. After the death of his cousin, Henry, duke of Guise, 1588, Aumale and the duke of Mayenne were the leaders of the League, and commanded the armies that fought against Henry IV. He had ill-success as a general. Having plotted treason with the king of Spain, he was condemned to death by Parliament in 1595, but escaped. Died at Brussels in 1631.

Aumale, d' (HENRI EUGÈNE PHILIPPE LOUIS D'ORLÉANS), DUC, the fourth son of Louis Philippe, king of the French, was born in Paris in 1822. He entered the army in 1839, served several campaigns in Algeria, and was rapidly promoted. In May, 1843, having defeated Abd-el-Kâder, whose camp and treasures became the spoil of the victors, he was raised to the rank of lieutenant-general. In Sept., 1847, he was appointed governor-general of Algeria, about three months after which Abd-el-Kâder surrendered to him. On learning the abdication of his father, he resigned his command, Mar., 1848, and went into exile, residing many years in England. He was chosen a member of the National Assembly in Feb., 1871, soon after which date that body annulled the decree or law which had excluded the Orleans princes from France. He was elected to the French Academy in the winter of 1871–72.

Aune [Lat. *ulna*, the elbow], an old European cloth measure, having many values in different places, varying between 27 and 54 inches. The French aune was about 46.8 inches. The name survives only in Switzerland, where it signifies a measure equal to four feet in length, the foot being thirty centimètres. The Swiss aune is therefore about 47¼ inches long.

Au'ra [a Latin word signifying a "breath," a "gentle breeze," from the Gr. ἄω, to "breathe"], a subtle vapor or exhalation.—*Aura electrica* (literally, the "electrical breeze"), the sensation as of cold air experienced when electricity is received from a sharp point.—*Aura epileptica*, the peculiar sensation felt by epileptic patients as of a cold fluid ascending towards the head.—*Aura hysterica*, the sensation as of cold air ascending to the head, said to occur sometimes in hysteria.—*Aura seminalis* or *aura seminis*, the supposed vivifying principle of the *semen virile*, formerly believed to ascend through the Fallopian tubes, thereby impregnating the ovum in the ovarium.—*Aura vitalis*, a name for the principle of life.

Aurantia'ceæ [from the Lat. *aurantium*, an "orange"], a natural order of exogenous trees and shrubs, natives of the warm parts of Asia and Northern Africa. All parts of these plants contain a fragrant volatile oil, which abounds especially in the leaves and in the rind of the fruit. The leaves are alternate, articulated with the petiole, and dotted or pellucid-punctate; the fruit is a *hesperidium*. The order comprises numerous species, some of which are remarkable for beauty and are highly prized for their fruits, as the orange, lemon, and citron. (See CITRUS.) The fruits of *Ægle marmelos*, *Cookia punctata*, *Glycosmis citrifolia*, and many others are also edible. The *Skimmia Japonica*, a beautiful shrub of Japan, is more hardy than the other plants of this order, and flourishes in the open air in England.

Aur'dal, a township of Otter Tail co., Minn. Pop. 85.

Aure'lian, or **Aurelia'nus** (CLAUDIUS DOMITIUS), a Roman emperor of humble origin, was born about 212 A. D. at Sirmium, in Pannonia, or, as some say, in Lower Dacia. He served with distinction in several campaigns, and raised himself by his merit to the highest rank in the army of Valerian. It is stated that he usually fought in the foremost rank. On the death of Claudius (270 A. D.), Aurelian was elected emperor by the army. Early in his reign the empire was invaded by the German tribe of Alemanni, whom he defeated. He abandoned Dacia to the Goths and Vandals, in order that the Danube might become the boundary of the empire. The most important and famous of his enterprises was an expedition against Zenobia, queen of Palmyra, whose extensive dominions included Syria and Egypt. Having defeated her army in battle near Emesa, he captured Palmyra and its queen in 273 A. D., after which he received at Rome a triumph of extraordinary magnificence. He recovered Gaul from Tetricus, who had usurped royal power, and obtained the title of "Restorer of the empire." His memory is stained by the judicial murder of Longinus the critic, and other acts of excessive severity. He was assassinated by his own officers between Byzantium and Heraclea in 275 A. D., and was succeeded by Tacitus. (See VOPISCUS, "Vita Aureliani;" TILLEMONT, "Histoire des Empereurs;" GIBBON, "Decline and Fall of the Roman Empire," chap. xi.)

Aure'lius, a post-township of Ingham co., Mich. Pop. 1506.

Aurelius, a post-township of Cayuga co., N. Y. Pop. 1952.

Aurelius, a township of Washington co., O. Pop. 799.

Aure'lius Victor (SEXTUS), a Roman historian who flourished about 380 A. D. He was appointed prefect of Pannonia Secunda by Julian the Apostate about 360, and was prefect of Rome under Theodosius I. He wrote a series of biographies of the Roman emperors from Augustus to Constantius, entitled "De Cæsaribus Historia," which is extant. Two other works are ascribed to him—namely, "The Lives of Illustrious Romans" and "Aurelii Victoris Epitome."

Aure'ola, Au'reole [Lat. *aure'olus*, "golden"], in painting, the golden glory which encircles the heads, or even the whole bodies, of saints and martyrs. The circle or *nimbus* when it encloses a cross belongs to Christ alone; without the cross it indicates canonized saints. There is also a form of aureole appropriated to saints who are called *beati*, "blessed," but are not canonized, whose heads are decorated with a radiation of golden lines. The idea of placing an aureole around the head of divine or sainted personages did not, there is reason to believe, originate with the Christians of the primitive or Middle Ages. Aureoles essentially resembling those which surround the heads of the saints appear to have been common in India in the representations of the Hindoo gods from early times. (See MOOR'S "Hindu Pantheon.")

Au'reus, or **Dena'rius Au'reus,** the standard and most ancient Roman gold coin, first struck in 207 B. C. The average weight of the aureus was about 121 grains—a little less than the Greek stater, and about the same as the Persian daric.

Au'ricle [Lat. *auric'ula*, the diminutive of *au'ris*, the "ear"], the external portion of the ear.

AURICLES OF THE HEART [Lat. *auricu'læ cor'dis*], the term applied to those cavities of the heart which receive the blood returning from the veins, and convey it to the ventricles. The auricles are popularly called "deaf-ears." (See HEART.)

Auric'ula (*Prim'ula Auric'ula*), a plant of the order Primulaceæ, nearly related to the primrose, is much cultivated in flower-gardens. It is a native of the Alps and

other mountains of Europe and Asia. It is prized for the beauty and fragrance of its flowers, which grow in the form of an umbel on a scape. The size and color of the flowers have been much improved by cultivation. Among the colors prevailing in the 1200 or more cultivated varieties are red, pink, crimson, and mulberry. Some varieties present a single color, and others are variegated or are adorned with a green margin. The flowers are covered with a fine meal or powder. The auricula blooms in April or May, and often has a second crop of flowers in autumn. It prefers a rich, light soil, and the finer varieties are usually cultivated in pots. The chief requisites of a good auricula are large flowers, which are nearly round, and have in the centre a white or yellow eye which is distinct and round, its color not mixed with the ground color; and a long scape, strong enough to hold itself erect.

Auricula, a genus of Auriculidæ, a family of Mollusca of the class Gasteropoda. They have a spiral shell covered with a horny epidermis. The spire is obtuse or short, and the aperture elongated and narrow. They have respiratory organs adapted for breathing in air, and they frequent salt marshes or the vicinity of the sea. They are chiefly found in and near warm seas. Several species are fossil.

Auric'ular Confes'sion [Lat. *auricula*, the "external ear"], private confession of sins to a priest. For certain offences the early Church required confession. In the fifth century, owing to some scandals in public confession, Leo the Great (440–461) authorized the parish priest to receive confessions. By the twenty-first canon ("*Omnis utriusque sexus fidelis*") of the Fourth Lateran Council, in 1215, under Innocent III., it is enjoined upon the faithful to confess their sins once a year, at least, to the parish priest, under pain of losing Christian burial.

Auri'ga, a Latin word signifying "charioteer," is the name of a northern constellation of the celestial sphere, sometimes called THE WAGONER. It contains Capella, a star of the first magnitude.

Aurillac, ō're'yăk' (anc. *Aureli'acum*), a town of France, capital of the department of Cantal, is pleasantly situated in a valley on the river Jourdanne, 272 miles S. of Paris. It is well built, and has wide and clean streets. The houses are covered with slate, which is quarried in the vicinity. Among its ancient and remarkable public buildings are the church of Notre Dame, built in the thirteenth century, the castle of St. Stephen, and the college, which has a valuable library. Here are manufactures of copper kettles, jewelry, paper, carpets, and woollen stuffs. Pop. in 1866, 10,998.

Auriol, a town of France, in the department of Bouches-du-Rhône, 16 miles N. E. of Marseilles. Pop. in 1866, 5182.

Au'rochs [Ger. pron. owr'oks], a contraction of the German *Auer-Ochs* (*i. e.* "wild-ox"), the *Bos urus* of some naturalists, and *Bison bonassus* of others, is a European species of BISON (which see). Though once found in great numbers in many parts of Europe, it is now chiefly, if not wholly, limited to the forests of Lithuania, Moldavia, Wallachia, and the Caucasus. It bears many points of similarity to the American bison. It is a very powerful animal, being somewhat larger than an ordinary ox, and, though clumsy in appearance, can run rapidly for a short distance. The body of this animal exhales a strong odor, somewhat resembling musk. The aurochs is a good swimmer, and delights in dabbling in the water and rolling in the mud. Its food consists in a great part of lichens, of which it is especially fond.

Aurochs.

Auro'ra, a Latin word signifying "morning" or the "goddess of morning," corresponding to the Greek Ἠως. The poetical legends represent her as the daughter of Hyperion, the wife of the Titan Astræus, the mother of Hesperus, Boreas, Zephyrus, and Memnon. According to one mythical tradition, she loved Tithonus (a son of Laomedon), for whom she asked and obtained immortality, but forgot to ask perpetual youth. She was sometimes represented as dressed in a saffron-colored robe, with a torch in her right hand.

Aurora, a post village of York co., Ontario, Dominion of Canada, on the Northern Railway, 30 miles N. of Toronto. It has one weekly newspaper, three churches, and a public park. Pop. in 1871, 1132.

Aurora, a city of Kane co., Ill., on Fox River, and on the Chicago Burlington and Quincy R. R., 39 miles W. S. W. of Chicago, at the junction of that road with the O. O. and F. R. V. R. R., and the Chicago and Iowa R. R. It has a city-hall, which cost $75,000, and a fine building for the Young Men's Christian Association, which is doing a large benevolent work. It has three national banks, an extensive silver-plate manufacturing establishment, a foundry, several machine-shops, a woollen mill, and the shops and works of the Chicago Burlington and Quincy R. R., which employ 1500 men. It has twenty churches, five newspapers, and excellent public schools, and is the seat of Jennings' Seminary. The city is protected from fire by the Holly waterworks system. Pop. 11,162; of Aurora township, 2033. ED. "BEACON."

Aurora, Dearborn co., Ind., on the Ohio River and the Ohio and Mississippi R. R., 25 miles W. by S. from Cincinnati. It has one national bank, four large barrel-factories, Ohio and Mississippi R. R. car-shops, an extensive hay-trade, one distillery, one large brewery, one chair-factory, one furniture-factory, one hay-press factory, one foundry of great capacity, and one weekly paper. Pop. 3304.
L. W. COBB, ED. "DEARBORN INDEPENDENT."

Aurora, a post-township of Hancock co., Me. P. 212.

Aurora, a post-township of Steele co., Minn. Pop. 422.

Aurora, a post-village, capital of Esmeralda co., Nev., is situated on a level space at the junction of two ravines which extend between Silver, Middle, and Last Chance Hills, and about 100 miles S. E. of Carson City. Its altitude is about 7500 feet above the level of the sea. Rich silver-mines have been opened here. Pop. 160.

Aurora, a post-village of Ledyard township, Cayuga co., N. Y., finely situated on the E. side of Cayuga Lake. It is a place of summer resort, has many fine residences, some manufactures, a weekly paper, and a national bank, and is the seat of Wells's college for ladies and of Cayuga Lake Academy. It is on the Cayuga Lake R. R., 25 miles N. W. of Ithaca. Pop. 450.

Aurora, a post-village and township of Erie co., N. Y., 18 miles S. E. of Buffalo. It has an academy and some manufactures. Pop. of township, 2573.

Aurora, a post-township of Portage co., O. Pop. 642.

Aurora, a township of Waushara co., Wis. Pop. 967.

Auro'ra Borea'lis (*i. e.* "northern light"), called also **Northern Lights,** the term applied to a certain luminous phenomenon generally appearing in the northern part of the sky, and presenting a light somewhat resembling the dawn or break of day. It is most frequent and brilliant in high northern and high southern latitudes; in the latter case it is called "aurora australis" or "southern light." The appearances are extremely various. Not unfrequently it seems to proceed from a sort of horizontal cloud or haze in the northern part of the sky, rising a few degrees above the horizon, and stretching from the north towards the east and west, so as to form an arc which in some instances has been observed to extend upward of one hundred degrees. The upper edge of the cloud is whitish and luminous, the lower part often dark or thick, and sometimes the clear sky may be seen between it and the horizon. From the upper part of the cloud streams of light shoot up in columnar forms, reaching sometimes only a few degrees, sometimes to the zenith, or even beyond it. Instances have occurred in which the whole hemisphere was covered with coruscations, but the brilliancy is greatest and the light strongest in the north, near the main body of the meteor. The streamers have in general a tremulous motion, and when close together present the appearance of waves or sheets of light following each other in rapid succession. When several columns, issuing from different points, meet at the zenith, a small meteor is formed of greater brilliancy than the separate columns. The aurora sometimes continues a few hours, occasionally the whole night, and even for several nights in succession. The height of the aurora above the earth has been variously estimated by different scientists. By taking observations of the altitude of the highest point of the arch of the same aurora at different stations, heights varying from five to five hundred miles have been calculated. It is now almost universally admitted that the aurora borealis occurs at various heights, and that it is seldom found less than forty-five miles above the surface of the earth. The distance of the stations at which the same aurora has been visible indicates the enormous geographical extent, and likewise the great altitude, which the phenomenon frequently attains. One aurora, for instance—that which occurred on Sept. 3, 1839—was seen in the Isle of Skye; at Paris; at Asti, in the Sardinian states; at New Haven, in Conn., and at New Orleans. That of Sept. 2, 1859, was seen all over Europe and North America, and in the Sandwich Islands. The aurora of Feb. 4, 1872, was seen in the U. S., Europe, and British India. On the other

hand, observers of eminence assert that the aurora sometimes descends to the region of the clouds. The noise that is alleged to accompany the aurora would indicate for it a moderate height. Some compare it to the noise that is produced by the rolling of one piece of silk upon another, and others to the sound of the wind blowing against the flame of a candle, or that attending the discharge of fireworks. It is proper to observe, however, that scientific Arctic voyagers, such as Parry and Franklin, throw doubt on the existence of any such noise, for not one of the numerous and brilliant auroras seen by them was attended with the faintest sound. It is now certain that the aurora has an electric origin, and it is believed by some that its phenomena are due to the passage of electric currents through highly attenuated air at considerable distance from the earth. Telegraphic communications are frequently so interrupted by electric currents upon the wires during the continuance of an aurora that messages for the time cannot be sent. Occasionally, however, the auroral current is so strong and continuous that it can be utilized in sending despatches.

Periodicity in auroral displays has lately been asserted. A maximum occurs about once in ten years, and a period of remarkable brilliancy about once in sixty years. Some physicists associate these periods with the variations in the sun's spots and with the planetary rotations.

Auro'raville, a township of Anson co., N. C. P. 1843.

Aurungâbâd', a city of Hindostan, in the territory of the Nizam, on the Doodna, 68 miles N. E. of Ahmednuggur; lat. 19° 54′ N., lon. 75° 33′ E. It was a favorite residence of Aurung-Zeb, in whose honor it was named. Among the monuments of its former grandeur are a ruined palace of Aurung-Zeb, and a mausoleum with domes of white marble erected by that monarch to the memory of his daughter. Many of the mosques and other public buildings are substantial, but signs of decay are visible. Pop. estimated at 60,000.

Au'rung-Zeb, or **Aurang'-Zebe** (*i. e.* the "ornament of the throne"), afterwards called **Alum-Geer** or **Alam-Gîr** ("conqueror of the world"), a famous Mogul emperor of Hindostan, was born Oct. 22, 1618. He was a younger son of Shah Jehân, who ceased to reign in 1657. The elder sons, Dara and Shuja, then contended for the crown in battle, while Aurung-Zeb affected indifference to temporal power, and craftily concealed his designs under the cloak of piety. Having procured the assassination of Dara and Shuja, he became master of the empire in 1658, and detained in prison his father until his death in 1666. As a bigoted Moslem he persecuted the Hindoos and provoked the Mahrattas to revolt. He added Bejapoor and Golconda to his empire, and was one of the most powerful of the Mohammedan monarchs of India. His long reign was a period of outward and specious prosperity, but the empire was diseased at heart, and soon entered a state of decadence, which was partly the effect of his policy, duplicity, and intolerance. Conscious of the crimes by which he obtained power, he lacked confidence in his ministers, and is said to have lived in continual fear of treachery. Died Feb. 21, 1707. (See Elphinstone, "History of India;" Bernier, "Voyages et Description de l'Empire Mogol;" J. Mill, "History of British India.")

Au Sa'ble, a township of Grundy co., Ill. Pop. 927.

Au Sable, a post-village of Iosco co., Mich.

Ausa'ble, a village and township of Clinton co., N. Y., on the Au Sable River, about 7 miles above its entrance into Lake Champlain. Excellent iron ore abounds, and iron is extensively manufactured. There is an academy at Keeseville. Pop. of township, 2863.

Au Sable Forks, a post-village of Jay township, Essex co., and Black Brook township, Clinton co., N. Y., on the Au Sable River, has extensive iron-works, which produce metal of the best quality, also nail-works, lumber-mills, etc.

Auscultation [Lat. *auscultо, auscultа'tum,* to "listen"], a method of determining the condition of the heart and lungs by listening to the sounds produced in the cavity of the chest. This is done either by the unassisted ear (called *immediate auscultation*), or by the aid of a simple sound-conveying instrument, the stethoscope (termed *mediate auscultation*). The stethoscope was invented by Laennec in 1816. By care and attention the normal sounds produced by respiration and the beating of the heart may be distinguished from the several abnormal sounds indicating disease. Auscultation is classed among the most important of discoveries in modern medical science. Its details were ably explained by Laennec, who published a treatise on it in 1819. Recent leading writers upon it have been Skoda in Germany, Walshe in England, and Flint in the U. S. (See Stethoscope.)

Auso'nius (Decimus Magnus), an eminent Latin poet, born at Burdigala (Bordeaux) about 309 A. D. He was liberally educated, practised law in his early life, and gained distinction as a professor of rhetoric at Burdigala. In 367 A. D. he was appointed tutor to Gratian by the emperor Valentinian. He held several high offices under the reign of Gratian, who raised him in 379 to the dignity of consul. The learned disagree on the question whether he was a Christian or a pagan. He wrote epigrams, epistles, idyllia, etc., which were admired by his contemporaries, but display little genius, and are very faulty in style. Died about 394 A. D. (See M. de Puymaigre, "Vie d'Ausone;" J. Demogeot, "Études historiques et littéraires sur Ausone," 1837.)

Au'spices [from the Lat. *auspiç'ium* (*i. e. avispicium,* the "observing of birds"), from *avis,* a "bird," and *specio,* to "see"], a term applied by the ancient Romans to divinations founded on the flight of birds or other omens, by which the augurs or soothsayers professed that they could ascertain the will of the gods and predict events. (See Augur.) No important enterprise or business was undertaken without consulting the auspices. In performing this ceremony the augur with a wand marked out a portion of the sky for his observations, which portion, called a *templum,* was divided into right and left. If the birds appeared on the right hand, the omen was favorable; if they flew towards the left (*ad sinistrum*), it was unfavorable. The chief magistrates also had the right to conduct this ceremony, and the commander of the army in time of war had the exclusive power of taking the auspices. If a victory was gained by his legate or lieutenant, it was said to be won under the auspices of the general-in-chief. Thus originated the common English phrase, "under the auspices" of some one. In such cases "auspices" signifies influence, patronage.

Aus'sig, an Austrian town, in Bohemia, on the Elbe, 46 miles W. N. W. from Prague, has coal-mines in the vicinity, and manufactures of linen, gold, and silver work. Pop. 10,933.

Aus'ten (Jane), an English authoress, born at Steventon, in Hampshire, Dec. 16, 1775. She was educated by her father, who was rector of Steventon, and after his death she lived at Southampton and Chawton. She is said to have been beautiful in features. Her first novel, "Sense and Sensibility," appeared anonymously in 1811. She afterwards produced "Pride and Prejudice," "Mansfield Park," "Emma" (1816), "Northanger Abbey" (1818), and "Persuasion" (1818), the first three of which were anonymous. These works represent with great fidelity the ordinary life of the middle classes of England. According to Sir Walter Scott, "she had a talent for describing the involvements, feelings, and characters of ordinary life which is to me the most wonderful I have ever met with." Died July 18, 1817. (See the "Quarterly Review" for Jan., 1821; "Atlantic Monthly" for Feb., 1863.)

Aus'terlitz, a small town in Moravia, on the Littawa, 12 miles E. S. E. of Brünn. It has a fine castle. Pop. in 1857, 3452. It is celebrated as the scene of a great victory which Napoleon I. gained over the combined armies of Austria and Russia, commanded by their respective emperors, on Dec. 2, 1805. Napoleon had taken Vienna about Nov. 12, after which he fixed his head-quarters at Brünn, where he had about 75,000 men. The armies of the allies, amounting to about 85,000, advanced in five columns to offer battle to the French, who occupied high ground partly covered by wooded eminences, morasses, and small lakes. The battle began about 7 A. M., when the allies attempted to turn the right wing of Napoleon, who attacked them in flank and at various points with great advantage. While a portion of the allied army was retreating across a frozen lake, the ice was broken by the French artillery, and nearly 2000 men perished in the water. The allies lost about 30,000, killed, wounded, and prisoners, and the French about 12,000. Among the results of this victory was the treaty of Presburg, Dec., 1805.

Austerlitz, a post-township of Columbia co., N. Y. Pop. 1442.

Aus'tin, a county in the S. E. central part of Texas, has an area of 1024 square miles. It is intersected by the Brazos River, which is navigable for steamboats. The soil is fertile; cotton is the staple crop, but corn, cattle, tobacco, and wool are raised. Manufacturing is carried on quite extensively. The Houston and Texas Central R. R. passes through the county, which is one of the most thriving in the State. Capital, Belleville. Pop. 15,087.

Austin, the capital of Texas and seat of justice for Travis county, is situated on the left bank of the Colorado River, in lat. 30° 16′ 25″ N., lon. 97° 43′ 58″ W. It is surrounded by fine scenery. The river has been recently made navigable for steamboats. Austin became the capital

of the republic of Texas in 1839, was chosen capital of the State in 1850, and in 1872 was made permanent capital by vote of the people. It is connected by rail with Houston and Galveston. Among the public buildings are the Capitol, the general land-office, the comptroller's and treasurer's building, governor's mansion, asylums for lunatics, for the blind, and for the deaf and dumb, and the supreme court building. It has a well-organized fire department, several steam saw-mills, two ice-factories, several planing-mills, and two sash-and-door factories. It is the seat of the flourishing Texas Military Institute, and has three daily and six weekly papers and one national bank. Pop. 4428.

STANLEY WELCH, ED. "STATE JOURNAL."

Austin, a township of Macon co., Ill. Pop. 713.

Austin, a post-village of Jennings township, Scott co., Ind., has three manufactories of shingles, two of barrel heads and staves, five saw-mills, two churches, and one weekly newspaper. Pop. 321.

J. H. J. SIERP, ED. "AUSTIN NEWS."

Austin, a township of Mecosta co., Mich. Pop. 346.

Austin, a township of Sanilac co., Mich. Pop. 349.

Austin, a thriving little city, capital of Mower co., Minn., on the Red Cedar River, and on the Milwaukee and St. Paul R. R., and terminus of the Burlington Cedar Rapids and Minnesota and Austin and Mason City R. Rs., 104 miles S. of St. Paul. It has two newspapers and two national banks. It is near the route of the Southern Minnesota R. R. Pop. 2039; of the township, 2631.

DAVIDSON & BASFORD, PUBS. "AUSTIN REGISTER."

Austin, a post-village, the capital of Tunica co., Miss., on the Mississippi River, 44 miles by land and 75 miles by water S. W. of Memphis, Tenn. It has two weekly papers.

ED. OF "COTTON PLANT."

Austin, a post-township of Cass co., Mo. Pop. 1366.

Austin, a city, the county-seat of Lander co., Nev., on the eastern slope of the Toyabe range of mountains, 90 miles S. of Battle Mountain Station, and 6 miles E. of Reese River. There are four quartz-mills and many rich silver-mines here. It has one daily paper. Pop. 1324.

CASAMAYOU & DENNIS, PUBS. OF "DAILY REVEILLE."

Austin, a township of Greenville co., S. C. Pop. 1512.

Austin (JAMES TRECOTHIC), LL.D., an American lawyer, born at Boston Jan. 7, 1784. He graduated at Harvard in 1802, and became in 1806 a son-in-law of Elbridge Gerry. He was attorney-general of Massachusetts from 1832 to 1843. He published, besides other works, a "Life of Elbridge Gerry." Died May 10, 1870.

Austin (JONATHAN LORING), a patriot, the father of the preceding, was born in Boston Jan. 2, 1748, and graduated at Harvard in 1766. He was sent to Paris in 1777 as a bearer of despatches, and remained there two years as Dr. Franklin's secretary. After the Revolutionary war he was secretary of state in Massachusetts. Died May 10, 1826.

Austin (MOSES), an American pioneer, born in Durham, Conn., about 1776. He emigrated to Texas about 1820, and obtained from the Mexican government a grant and permission to plant a colony in that province. As he was returning to Missouri for settlers, he died June 10, 1821, but the colony was founded by his son, Stephen F. Austin.

Austin, SAINT. See AUGUSTINE, SAINT.

Austin (SAMUEL), D. D., an American Congregational clergyman, born at New Haven, Conn., Oct. 7, 1760, graduated at Yale in 1783, was pastor at Fair Haven, Conn., for three years from 1786, and afterwards at Worcester, Mass., for nearly twenty-five years. In 1815 he accepted the presidency of the University of Vermont, which post he occupied for about six years. The last years of his life were spent in much bodily weakness and mental depression. Died Dec. 4, 1830.

Austin (SARAH), an English writer and accomplished translator, was a member of the eminent Taylor family of Norwich. She was married to John Austin, a barrister of London. She wrote, besides other works, "Characteristics of Goethe" (3 vols., 1833), which was very successful, and "Sketches of Germany from 1760 to 1814." She produced a good translation from the German of Prince Pückler-Muskau's "Travels in England," and also one of Ranke's "History of the Popes" (3 vols., 1840), which was highly commended by Macaulay. Died in 1867.

Austin (STEPHEN F.) was a son of Moses Austin, noticed above. About 1821 he conducted a company of emigrants from New Orleans, and planted a colony where the town of Austin now stands. The grant made to his father was confirmed to him in 1822 or 1823. Early in 1833 the Texan colonists formed a constitution, to obtain a ratification of which Austin and other delegates went to the city of Mexico. In consequence of the frequent revolutions and anarchy of Mexico they did not obtain the admission of Texas into the confederacy. In 1835, Austin was chosen commander of the Texan army, and joined in the movement for the liberation of Texas. He went as a commissioner to the U. S. to obtain the recognition of Texas as an independent state. Died Dec. 27, 1836. (See YOAKUM, "History of Texas," 1856.)

Aus'tinburg, a post-township of Ashtabula co., O. Pop. 1111.

Aus'tintown, a township of Mahoning co., O. P. 1948.

Australa'sia (*i. e.* "Southern Asia"), a part of Oceanica, extending between the equator and lat. 47° S., comprises Australia, Van Diemen's Land (Tasmania), New Zealand, and those parts of the Malay Archipelago and Polynesia between lon. 130° and 170° E.—viz. Papua, the Arroo Islands, New Britain, Timor-Laut, New Ireland, New Caledonia, and the Admiralty, Solomon, New Hebrides, and Queen Charlotte's Islands. Its area is estimated by Behm and Wagner at 3,425,000 square miles, and its population at 4,365,000.

Austra'lia [from the Lat. *australis*, "southern"], or **New Holland,** the largest island of the world, is so extensive that it may be not improperly called a continent. It is bounded on the N. by the Arafura Sea, on the E. and S. by the Pacific Ocean, and on the W. and N. W. by the Indian Ocean. It is included between lat. 10° 44′ and 39° 8′ S., and between lon. 113° 5′ and 153° 22′ E. Its greatest length from E. to W. is 2536 miles, and its greatest breadth from N. to S. 1585 miles. The area is about 2,975,000 square miles.

Surface, etc.—This continent is remarkably compact in form, is not indented by large inlets of the ocean (except the Gulf of Carpentaria), and presents no wide estuaries of rivers. The eastern, southern, and western coasts are almost destitute of indentations, and have few good harbors. Australia presents no great variety or inequality of surface, compared with its vast extent, and has no very high mountains. There are in its compact mass few well-marked, lofty mountain-chains, and the interior is consequently unfavorable to the production of large and permanent rivers. The central part of the island is an immense plain or low table-land, which is arid and barren except in the rainy seasons, and sends little or no tribute to the ocean.

Mountains.—The principal chain is the Blue Mountains and Australian Alps, called Warragong Mountains by the natives, which extend nearly parallel to the eastern coast at distances varying from thirty to ninety miles. The highest peaks of this chain are in New South Wales, and rise nearly 7000 feet above the level of the sea. None of these summits are covered with perpetual snow. The Australian Alps present scenery of remarkable grandeur and wildness, diversified by immense precipices and gigantic fissures. From the principal chain extend a number of spurs or detached ranges.

Rivers and Lakes.—Australia has no great navigable rivers, and is less fortunate than the other continents in its facilities for inland navigation. A scarcity of fresh water, whether in the form of rivers or lakes, is one of the most obvious characteristics of this great region. Many of the rivers flow towards the interior, and are evaporated or absorbed in the sand. Along the southern coast no permanent stream occurs for a distance of over 1500 miles. The poverty of the Australian hydrography is aggravated by an alternation of long droughts and violent floods. The lakes are not reservoirs for the supply of rivers, but rather marshes and landlocked receptacles of its streams. The largest of these lakes are Lake Torrens, Gairdner Lake, and Lake Eyre, in South Australia, and Lake Austin, Lake Moore, and Lake Barlee in Western Australia. The principal river of Australia is the Murray, with its large tributaries, the Darling and Murrumbidgee, rising on the W. or inner slope of the Australian Alps. The Murray rises in the south-eastern part of the island, flows westward, northwestward, and nearly southward, and enters Encounter Bay. The Darling rises much farther N., and flows southwestward, being apparently longer than that part of the Murray which is above the junction. Among the other rivers in the south-eastern and eastern parts of Australia are the Macquarrie, Lachlan, Lynd, and Burdekin. Along the northern coasts occur numerous small rivers, named Albert, Victoria, Roper, etc. In Western Australia the Gascoyne and Murchison rivers are among the largest in that part of the continent.

Geology and Minerals.—The geology of this vast region has not been fully explored, but is supposed to be remarkably simple. An immense central expanse of tertiary rocks extends from lon. 124° to 138° E., and from the southern coast to lat. 18° S. This tertiary formation is surrounded on all sides except the S. by a continuous belt of plutonic

MAP OF AUSTRALIA

Drawn and Engraved on Copper-Plate
EXPRESSLY
FOR
JOHNSON'S UNIVERSAL CYCLOPÆDIA

Scale of Miles
50 100 200 300 400

Long. East 130 from 135 Greenwich 140 150 155

Lat. 10 15 20 25 30 35 40

Longitude West 173 168 163 158 153 148 143 138 133 128 from Washington

INDIAN OCEAN
PACIFIC OCEAN
ARAFURA SEA
TIMOR SEA
CORAL SEA
TORRES STRAIT
GULF OF CARPENTARIA
CAMBRIDGE BAY
ARNHEM LAND
TASMAN LAND
NORTH AUSTRALIA
WEST AUSTRALIA
SOUTH AUSTRALIA
NEW SOUTH WALES
QUEENSLAND
VICTORIA
NEW GUINEA
MELANESIA
AUSTRALIAN BIGHT
Sandy Desert Country
Great Stony Desert
Stuart Plains
Nonda Country
Grassy Plains
Gowan Range
Expedition Range
Gilbert Range
Barwan R.
Darling Riv.
Liverpool Plains
Lachlan R.
Murrumbidgee R.
Murray R.
Wimmera
Gipps Land
Australian Alps
Flinders or Great I.
Kings I.
Bass Strait
Tasmania
Van Diemens Land
Launceston
Hobarttown
Melbourne
Sydney
Brisbane
Adelaide
Perth
Albany
Port Darwin
Port Denison
Maryborough
Wide Bay and Burnett
Darling Downs
Moreton I.
Great Sandy I.
Fraser I.
Stradbroke I.
Bruny I.
Flinders I.
Cape York Peninsula
Mitchell R.
Albert R.
Flinders R.
Gregory 1856
Gregory's farthest 1856
Stuart 1860
Burke & Wills 1861
Victoria R.
Roper R.
Daly R.
Fitzroy R.
Barcoo R.
Warrego R.
Darling R.
Murray R.
Hunter R.
Macquarie R.
Lachlan R.
Namoi R.
Gwydir R.
Condamine R.
Boyne R.
Burnett R.
Mary R.
Pine R.
Brisbane R.
Clarence R.
Richmond R.
Tweed R.
Hastings R.
Manning R.
Macleay R.
Bellinger R.
Nymboida R.
Clarence R.
Dividing Range
Great Barrier Reefs
Coral Sea
Bougainville Reefs
Wreck Reefs
Lihou Reefs
Frederick Henry I.
Prince of Wales I.
Melville I.
Bathurst I.
Groote Eylandt
Sir Edward Pellew Is.
Wellesley Is.
Sir Charles Hardy Is.
Timor
Flores I.
Sumbawa
Lombok
Bali
Java
Sandalwood or Sumba I.
Ashmore Is.
Scott Reef
Seringapatam Shoals
Great Sahul Shoal
Browse I.
Rowley Shoals
Lacepede Is.
Dampier Land
Barrow I.
Dampier Archipelago
North West C. or Vlaming Hd.
Exmouth G.
Tropic of Capricorn
Geographe Chan.
Dirk Hartog I.
Shark Bay
Steep Pt.
High Breakers
Murchison R.
North I.
Enster I.
Island Pt.
Moore L.
Salt
Swan R.
Blackwood R.
Geographe B.
C. Naturaliste
C. Hamelin
C. Leeuwin
C. Freycinet
Frenchman I.
Bald Hd.
Doubtful I. B.
Esperance B.
Recherche Archp.
Middle I.
Nuyts Land
Nuyts Archipelago
Investigator Is.
Spencer Gulf
St. Vincent Gulf
Yorke Penin.
C. Catastrophe
C. Jervis
Encounter Bay
Kangaroo I.
Port Lincoln
Port Augusta
Broughton R.
Burra-Burra Copper Mines
Flinders Range
Gray Range
Stanley Range
Stuart Range
Lake Gairdner
Lake Torrens
Middle Mt Eyre Land
Glens Sts.
L. Gregory
L. Eyre
Sandy Barren Coast
Head of the Great Australian Bight
Wellington
Portland Bay
Portland
Geelong
Port Fairy
Belfast
Alberton
Wilson Prom.
C. Howe
Twofold Bay
Eden
Port Jackson
Botany Bay
Newcastle
Maitland
Bathurst
Livetpool Range
Blue Mts
Smoky C.
Sandy C.
Double I. Pt.
Danger Pt.
Harbour Is.
Curtis I.
Lady Elliot I.
Lady Musgrave I.
Capricorn Is.
Swain Reefs
Northumberland Is.
Cumberland Is.
Horse Shoe Shoals
C. Townshend
C. Melville
C. Flattery
C. Grafton
C. Bodney
C. Deliverance
C. York
Prince of Wales I.
Murray Is.
Banks Is.
Torres Is.
Louisiade Archipelago
Fossil R.
Basilisk Is.
Trouble I.
Parquhar Is.
Alert Is.
Wreck I.
Bougainville Reefs
Wreck Reefs
Lihou Reefs
Coringa Is.
Willis Is.
Herald Is.
Diamantina R.
Cooper's Creek
Eyre's Creek
Barcoo R.
Thompson R.
Belyando R.
Albert R.
Flinders R.
Mitchell R.
Gregory 1856
Gregory 1858
Stuart 1860
Burke & Wills 1861
Victoria R.
Roper R.
Daly R.
Fitzroy R.
Barcoo R.
Warrego R.
Darling R.
Murray R.
Hunter R.
Macquarie R.
Lachlan R.
Namoi R.
Gwydir R.
Condamine R.
Boyne R.
Burnett R.
Mary R.
Pine R.
Brisbane R.
Clarence R.
Richmond R.
Tweed R.
Hastings R.
Manning R.
Macleay R.
Bellinger R.
Nymboida R.
Clarence R.
Dividing Range
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Roper R.
Daly R.
Fitzroy R.

and metamorphic rocks. This belt is separated from the sea on its eastern, western, and northern sides by a tract nearly 100 miles wide. Secondary strata prevail along the northern and western coasts, while the eastern shore from Cape York to Bass's Strait is composed of palæozoic strata, granite, basalt, and other primary rocks. The auriferous rocks of South-eastern Australia are lower Silurian.

The gold-mines of Australia, discovered in 1851, are among the richest in the world. Gold abounds in Victoria and New South Wales, in quartzose veins and in the vicinity of granite, porphyry, and greenstone. The discovery of gold stimulated a rapid emigration from foreign countries to Australia. The product of the mines in 1852 was about $70,000,000, and in 1867, $60,000,000. It is stated that a lump of pure gold weighing twenty-seven pounds was found at Mt. Alexander. Valuable coal-fields occur in New South Wales, in the basin of the Hunter River. The next most important mineral of this island is copper, a rich mine of which is worked at Burra-Burra in South Australia. Lead, iron, zinc, manganese, and quicksilver are also found, the iron being widely and abundantly distributed. Deposits of tin, supposed to be the richest in the world, have been recently discovered in Australia.

Climate.—The northern part has a dry, tropical climate, and is subject to monsoons which blow with much regularity. From the sterile plains of the interior come hot winds, which fill the air with fine dust, and raise the temperature to 120° in the shade. In New South Wales prevail long droughts, which sometimes last a whole year, dry up the rivers, and destroy the vegetation, while the rainy season often ravages the country with violent floods. The mean annual rainfall is reported to be 49 inches at Sydney, 29 inches at Port Philip in Victoria, 70 inches at Port Macquarrie, and 19.9 at Adelaide. The mean temperature of Melbourne (Victoria) is 59° F. In New South Wales the average temperature of spring is 65°, of summer 72°, of autumn 66°, and of winter 55°. As a whole, Australia is remarkably healthful. Intermittent and remittent fevers prevail in the extreme N., and rheumatism in parts of the N. W.

Soil and Productions.—The part of New South Wales lying W. of the mountains is fertile, and is generally based on limestone. A large portion of this colony is adapted to pasturage. "Between Port Macquarrie and Moreton Bay," says Sidney, "are vast tracts of well-watered land covered with heavy timber. Pasture-lands extend for hundreds of miles, now ascending the mountain-slopes to their very summits, and here spreading out into vast plains." Wheat and other cereals flourish in Victoria, the soil of which is generally very productive. Next to gold, wool is the chief article of export. In 1870, 177,728,247 pounds of wool were exported. Western Australia has much fine land, but the interior of the continent is to a great extent, it is believed, a desert.

Botany.—The vegetation of this region is very peculiar, Its trees, which seldom form dense forests, but are scattered as in a park, present generally a very singular appearance, and have evergreen leaves, except those that are leafless. Among them are many varieties of *Acacia*, the *Casuarina*, the Norfolk Island pine, the tree ferns, the palm, the grass tree, and several species of *Eucalyptus*, or gum trees, one species of which is reported to have examples which reach 500 feet in height—probably the highest trees in the world. These *Eucalypti* furnish valuable timber. The *Casuarina* and many species of *Acacia* are destitute of true foliage. Among the most beautiful plants is the fern tree, which grows to the height of twenty feet. Australia has no good indigenous fruits, and produces few native vegetables that are worthy of cultivation in gardens. It is stated that there are 5440 species of plants peculiar to Australia.

Zoology.—The zoology of Australia is perhaps even more anomalous than its vegetation. Here, before colonization, were found no ruminating animals,no Pachydermata, no true Carnivora except the dog; the carnivorous marsupials taking the place of the Carnivora proper. The island has many animals peculiar to itself. It has more than forty species of marsupial quadrupeds, the largest of which is a kangaroo. Here is found a wild dog called *dingo*. Perhaps the most remarkable animal is the *Ornithorhynchus paradoxus*, a quadruped with the bill of a duck and a body like an otter, which is regarded as a connecting link between quadrupeds and birds. Among the Australian birds are the emeu, eagle, hawk, owl, parrot, birds of paradise, cranes, pelicans, geese, and black swans. Here are numerous reptiles, the largest of which is the crocodile. The shores are frequented by whales, seals, sharks, codfish, and many species of fish which are not found elsewhere.

Population.—The aborigines of Australia are a distinct race from the natives of the Malay Archipelago, and are sometimes called Alfurus. They are nearly black, have usually coarse straight hair, and have often been described as among the most deformed and debased of the human species. They are inferior to the average European in stature, and are deficient in muscle and strength. Some of them practise cannibalism, go naked, and have no fixed habitations. Some tribes of them are gentle, and others fierce and warlike. They are very expert in the use of a missile weapon called the BOOMERANG (which see). The whole number of the aborigines is not large (in 1871 about 50,000), and is rapidly diminishing. The total population of the island in 1871 was 1,565,294.

Political Divisions.—Australia is divided into the following colonies:

COLONIES.	Square miles.	Population.
New South Wales	323,437	501,580
Victoria	86,831	729,868
South Australia	383,328	188,995
Queensland	678,000	120,066
Western Australia	978,000	24,785
Northern Territory	523,500	
Total	2,973,096	1,565,294

Finances.—The receipts, expenditures, and debts for the several colonies were as follows in 1870:

COLONIES.	Receipts.	Expenditures.	Debts in 1869.
New South Wales	£2,490,203	£2,688,264	£9,681,130
Victoria (1869)	3,210,324	2,214,303	11,924,800
South Australia	878,124	995,065	1,944,600
Queensland	786,349	812,238	3,509,250
Western Australia	98,132	113,046	

History.—Australia was first discovered by a Spaniard, Louis Vaez de Torres, who saw the north coast in 1605, but did not land. During the seventeenth century the Dutch navigators landed at several points on the northern and western coasts, but planted no colonies. Dampier visited the island, and coasted New South Wales. In 1776, Captain James Cook explored a large part of the eastern coast. The first settlement was made in 1788, at Port Jackson, to which about 850 convicts were transported from England. Convicts continued to be sent to Botany Bay until 1840. In 1829 a settlement was made at Swan River, in Western Australia. The colony of South Australia was planted in 1834. Victoria was separately organized in 1851, and gold was discovered in the same year. In 1859, Queensland became a separate colony. Among the recent explorers of Australia, the most prominent are Sturt (1860–61), Burke (1860), Howitt (1861), Walker (1861), Kinlay (1862), McIntyre (1865), and Barnitt (1866).

Literature.—Compare MEINICKE, "Das Festland Australien" (2 vols., 1837); HEISING, "Das Australische Festland und die Goldentdeckung" (1855); CHRISTMANN, "Australien" (1869); MUNDY, "Our Antipodes" (1857); FORSTER, "South Australia, its Progress and Prosperity" (1866); JEUNESSE, "Géographie de l'Oceánie" (1869); B. SMITH, "The Gold-fields and Mineral Districts of Victoria" (1869); and PETERMANN, "Australien in 1871" (in supplementary Nos. 29 and 30 of Petermann's "Mittheilungen," 1871).

A. J. SCHEM.

Austra'lian Alps, a range of mountains in the south-eastern part of Australia, in the colonies of New South Wales and Victoria. They are called Warragong Mountains by the natives. They are the highest mountains in Australia, but their tops hardly reach the line of perpetual snow. The highest peak is Mount Kosciusko, which has an altitude of 7176 feet above the level of the sea.

Austra'sia, the eastern dominions of the Franks under the Merovingians, made a kingdom by Clovis, 511 A. D., comprising the present Lorraine, Belgium, and some adjacent territory. It was merged in the empire of Charlemagne.

Aus'tria, Archduchy of, is the nucleus around which the Austrian empire has grown. Area, 12,270 square miles. It is bounded on the N. by Bohemia and Moravia, on the E. by Hungary, on the S. by Styria, and on the W. by Bavaria. It is intersected by the Danube, and is divided by the river Enns into two provinces, Upper Austria (Ober-oesterreich) and Lower Austria (Unter- or Nieder-oesterreich), in which Vienna is situated. Pop. of Upper Austria in 1869, 736,557; of Lower Austria, 1,990,708. Both provinces are mountainous and abound in beautiful scenery. The Noric Alps extend along the southern boundary, and the northern parts of the archduchy are occupied by mountains called the Böhmerwald. The climate is moderate, the average annual temperature of Vienna being 51° F. The soil in the valley of the Danube is fertile, and the hilly regions produce valuable timber. Among the staple products are grain, wine, and excellent fruits. Lower Austria

has a more extensive commerce than any other province of the empire.

Austro-Hungarian Monarchy, an empire of Europe, is, with regard to size, the second, and with regard to population the fourth, in the order of the European states. It has an area of 240,348 square miles, and according to the census of 1869 a population of 35,904,435. It consists since 1867 of two independent parts, which are only connected by a single ruler and several common institutions—Cisleithania and Transleithania. (See HUNGARY.) Cisleithania consists of the following crownlands, which are represented in the "Reichsrath," or national assembly:

PROVINCES.	Area.	Pop. in 1869.
Austria above the Enns	7,654	1,990,708
Austria below the Enns	4,632	736,557
Salzburg	2,767	153,159
Styria	8,670	1,137,990
Carinthia	3,995	337,694
Carniola	3,857	466,334
Littoral	3,085	600,525
Tyrol and Vorarlberg	11,324	885,789
Bohemia	20,061	5,140,544
Moravia	8,583	2,017,274
Silesia	1,988	513,352
Galicia	30,299	5,444,689
Bukowina	4,035	513,404
Dalmatia	4,940	456,961
Total	115,887	20,394,980

It comprises the S. E. part of Central Europe, and more than half of the territory of the Danube, and forms a nearly regular quadrilateral. It is almost entirely a continental state, touching an inland sea (the Adriatic) only at one side. Next to Switzerland, it is the most mountainous country of Europe, the mountainous regions comprising an area of over 170,000 square miles. The extensive alpine region (the Tyrol, Salzburg, southern part of Austria, Styria, Carinthia, and the northern part of Carniola) gradually changes its character, sloping down in terraces into a hilly region in the S. E., but in the N. E. is without such gradation (southern part of Carniola, Istria, Croatia, S. E. part of Dalmatia, N. E. part of Austria), and terminates in the valley of the Danube. Beyond the Danube rises the Bohemian-Moravian-Silesian plateau, enclosed by high mountains, and undulating in the interior. To the E. of the March are the Carpathian Mountains, which run in a curved line along the northern boundary of Hungary. The Carpathians are flanked on both sides by a plateau, which passes in the N. into the Polish-Russian plain, continues in the S. to the Danube and the Theiss, and in the S. E. is connected with the highlands of Transylvania. The plains occupy about one-fourth of the area of the empire; the largest are in Hungary and Galicia. Among the waters, the Adriatic Sea is the largest, which washes the coast of Austria for over 1000 miles, besides a coast-line of over 1400 miles in the islands belonging to Austria. The principal rivers are the Danube and Dniester (Black Sea), Vistula and Oder (Baltic), Elbe and Rhine (German Ocean), and the Etsch (Adriatic). The Danube has the largest river-basin in the empire (170,000 square miles), and the Rhine the smallest (850 square miles). The most important river in Austria is the Danube, which enters the empire at Passau, and after a course of 800 miles leaves it at Orsowa. It receives numerous tributaries on its course through Austria, of which the Theiss, March, and Grau on the left, and the Inn, the Enns, the Leitha, and the Drave on the right are the most important. A large number of lakes connect with the system of the Danube, while a number of smaller lakes are found in the interior of the alpine country. The Neustädter Canal leads from the Leitha to Vienna. Austria is rich in mineral springs. The most famous are Carlsbad and Marienbad in Bohemia, Gastein in Salzburg, Ischl and Hall in Upper Austria, and Baden-bei-Wien in Lower Austria. The large extent of the monarchy is the cause of considerable difference with regard to the mean annual temperature. Three climatic belts are generally distinguished: 1, the northern belt extends from the northern boundary to lat. 49° N., and comprises Northern Bohemia and Moravia, Silesia, and Galicia, and produces chiefly grain and flax, but very little wine; 2, the central belt, from lat. 49° to 46° N., contains Central and Southern Bohemia and Moravia, Upper and Lower Austria, Styria, Salzburg, the Northern Tyrol, Carinthia, Carniola, Northern and Central Hungary, Transylvania, and Bukowina, and, with the exception of the highlands, is favorable for the production of wine, fruit, and grain; 3, the southern belt, from lat. 46° to 42° N., includes the Southern Tyrol, the Littoral provinces, Dalmatia, Southern Hungary, Croatia, Slavonia, and the Military Frontier, and produces, besides the common kinds of grain, corn, rice, much wine, and along the southern boundary tropical fruits. The empire is entirely in the temperate zone. The mean annual temperature varies between 39° F. (Marienbad) and 56° (Trieste). The bora and sirocco winds often visit the southern part of the empire, and the latter, under the name of Föhn, causes great destruction in the alpine countries. Excepting platinum, no useful mineral is wanting; metals, salt, and coal are present in inexhaustible quantities. Gold is found in Transylvania, Upper Hungary, and in the gneiss formation of the Central Alps. Silver occurs in the lead and copper deposits of Upper Hungary, Bukowina, Bohemia, the Military Frontier, the Tyrol, and Styria. Besides these, copper, zinc, mercury, tin, lead, sulphur, petroleum, and salt are found in considerable quantities.

The manufacturing industry, which is almost entirely restricted to the western half of the empire, has enormously increased of late years. The most important manufactures are woollen goods in Bohemia, Moravia, and Vienna, glass and china-ware in Bohemia, linen in Bohemia, Moravia, and Silesia, cotton goods in the same regions and in Lower Austria, and iron-ware in Styria, Carinthia, Upper Austria, and Bohemia. Besides these, manufactures of silk, leather, paper, beet-sugar, chemicals, etc. are extensively carried on. Beer-breweries are found in Vienna and Bohemia, and distilleries in Galicia and Hungary, and twenty-seven state establishments manufacture all kinds of tobacco. Since May 1, 1860, freedom of trade exists throughout the empire. Commerce has also considerably increased in late years. From 428,800,000 florins in 1868 (1 florin = 47 cents) the imports have risen to 534,100,000 in 1871, and the exports from 475,099,000 in 1868 to 506,500,000 in 1871. The chief articles of export are woollen and cotton goods, linen, glass, silk, iron, steel, and leather-ware, musical instruments, tobacco, grain, wine, oil, salt, and timber. The chief articles imported are cotton, cattle, iron rails, coffee, etc. In 1872 the number of miles of railway in operation in the monarchy was 7470 miles, while 2819 miles were in construction. In 1870 the railways of Cisleithania forwarded 19,404,543 passengers, and received 30,511,311 florins as fare, while the transportation of freight amounted to 420,736,340 centner (1 centner = 123.426 pounds), with an income of 90,202,202 florins. The monarchy has 35 ports opened to trade in the Littoral provinces, 54 in Dalmatia, and 11 in Croatia and the Military Frontier. The commercial navy of Austria consisted in 1870 of 7843 vessels, with 375,822 tons, of which 91 were steamers. In 1870 the steam-navigation company of the Danube had 155 steamers, with 13,946 horse-power. In 1871 there were 3504 post-offices and 584 telegraph stations in Cisleithania, while the length of the lines amounted to 16,204 miles, and the wires to 38,297 miles. In 1870, Cisleithania had 42 chambers of commerce, 38 banks, of which the Austrian National Bank, with 23 branches, is the largest, and 197 savings banks.

The Roman Catholic Church has nine archbishoprics (Vienna, Salzburg, Goeritz, Prague, Olmütz, Zara, and Lemberg) and twenty-four bishoprics in Cisleithania. There are also one Greek Catholic and one Armenian archbishop at Lemberg. The vicars-general of Feldkirch and Teschen and the apostolic vicar of the army also act as bishops. The Oriental Greek rite has three bishoprics (Czernowitz, Zara, and Catharo) in Cisleithania.

Education.—In consequence of the neglect of the elementary schools, education has not advanced as much in the German crown-lands as in the other parts of Germany, while in the other parts of the monarchy it was until recently very low. But owing to the reform measures introduced of late, education has greatly advanced in the last few years. In 1870, Cisleithania had 419 high and 13,880 elementary schools. In 1871 it had 176 gymnasia, realschulen, and realgymnasien, 6 universities (Vienna, Gratz, Innsbruck, Prague, Lemberg, and Cracow), 8 polytechnic institutes, besides numerous other schools for special sciences.

Constitution.—Austria is, according to the Pragmatic Sanction of Dec. 6, 1734, a united, indivisible empire, hereditary according to the right of primogeniture in the male and female line of the dynasty of Habsburg-Lothringen. Since Oct. 20, 1860, it is a constitutional monarchy, and by an imperial decree of Feb. 17, 1867, is divided into two parts—the Germano-Slavic countries, and the countries belonging to the crown of Hungary. The two parts have only the sovereign, the dynasty, the finances, the army, and foreign representation in common. The sovereign has the title of emperor of Austria and king of Hungary, and as king of Hungary is styled "His Apostolic Majesty." The imperial ministry, which is presided over by the chancellor of the empire, consists of the minister of the imperial house, of foreign affairs, of finances, and of war. Both parts of the empire have their own parliaments and

cabinets. The parliament of the Cisleithan countries is called the *Reichsrath*, and consists of the Herrenhaus (181 members) and the house of delegates (203 members).

Finances.—In the budget of 1872, for the whole monarchy, the expenses are estimated at 110,647,500 florins, of which 17,208,900 florins were covered by receipts, and the balance, 93,438,600 florins, was to be furnished by both parts of the monarchy, Cisleithania contributing 70 per cent., and Transleithania 30 per cent. In the budget of the Cisleithan countries for 1872 the receipts are estimated at 308,599,800 florins, and the expenses at 359,380,900 florins, leaving a deficit of 50,781,100 florins. The public debt of the countries represented in the Reichsrath amounted on Dec. 31, 1871, to 412,001,426 florins.

Army and Navy.—Since 1866 compulsory military service has been introduced throughout the empire. In Aug., 1872, the army was constituted as follows:

Branches of Service.	On a peace-footing.	On a war-footing.
Infantry	121,440	486,320
Chasseurs	19,771	58,853
Cavalry	43,993	58,999
Artillery	27,447	70,614
Engineers, etc.	13,032	67,821
Frontier troops	5,547	45,235
Military establishments	9,147	19,883
Gensdarmes	4,586	8,519
Total	244,963	816,244

The navy consisted in 1872 of 46 vessels, of 93,270 tons, and with 365 guns.

History.—The germ of the empire was the archduchy of Austria. In 791, Charlemagne united it with Germany as the Eastern March. Under Henry I. (died 1018) the name "Oesterreich" (Osterrichi, "East empire") was first used. Henry II. received in 1156, from the emperor Conrad III., the two marches above and below the Enns. Under his son, Leopold V. (until 1230), Styria, and under Frederick (died 1246), Carniola, were united to Austria. In 1276, Rudolph of Habsburg was elected the first emperor of Germany from the ducal house of Austria. After him, Albrecht I. (died 1308) and Albrecht II. (died 1439) were also emperors of Germany from the same house. From Frederick IV. the crown of Germany remained with the Habsburg family until the dissolution of the empire in 1806. Ferdinand IV. raised Austria to the dignity of an archduchy. Ferdinand I. in 1526 gained by marriage the crown of Hungary and Bohemia, together with Moravia, Silesia, and Lusatia. In 1683 the Turks besieged Vienna. In the treaty of Vienna of 1738, Naples and Sicily and a part of Milan, and in 1739 Belgrade, Servia, Bosnia, etc., were lost to the Turks. In the treaties of 1742 and 1743 Austria lost Silesia and Glatz, which it was not able to recover in the Seven Years' war. In 1748, Parma, Piacenza, and Guastalla were taken by Spain. In 1772, Galicia was obtained at the first division of Poland, and in 1777 Bukowina. On Aug. 11, 1804, Francis II. (I. of Austria) assumed the title emperor of Austria. Much territory was lost in consequence of the treaty of Prēsburg in 1805, and the treaty of Vienna in 1809. In the treaty of Paris of 1814, its German territory, Milan, Venetia, and Dalmatia, were restored to Austria. After that time Austria followed a strictly conservative policy under Prince Metternich, which caused a revolution in Vienna and other parts of the country in 1848, when Metternich was dismissed and great concessions were made to the people. The revolt in Hungary was only suppressed in 1850 through the intervention of Russia. The revolutionary movements in the Italian provinces continued, and in 1859 Austria was compelled to cede Lombardy to Sardinia. In 1860 a new and liberal policy began to be introduced, the first result of which was the new constitution promulgated by the emperor on Feb. 20, 1861. (On the part taken by Austria in German affairs, as well as on the war of 1866, see Germany.) In consequence of this war it was excluded from the German Bund, and was compelled to recognize Prussia as the leader of the North German Confederation, to cede its Italian possessions to Italy, and to recognize the latter as a united kingdom.

With 1866 a new era began for Austria. Count von Beust, who now became minister of foreign affairs, instituted an entirely new policy. The chief danger that now threatened the empire was the national movement arising among all the different nationalities of Austria. Beust, in opposition to the old policy of favoring the Slavic races to the exclusion of the Germans and the Hungarians, attempted to make the Germans and Hungarians the leading nations of the empire. This led to a conflict between Beust and his opponents, with Belcredi at their head, and eventually to a ministerial crisis, which resulted in a complete triumph for Beust, who became premier on Feb. 7, 1867. On Feb. 17 an imperial decree granted to the Hungarians their principal demands. (See Hungary.) Beust now set to work to organize a common parliament for the German and the Slavic peoples, which met with general approbation among the Germans and the Poles, but did not satisfy the Czechs. On July 8, 1867, the emperor was crowned king of Hungary, and Hungary pledged herself to contribute to the common expenses for the army, navy, and foreign representation. After the compromise with Hungary had been effected the government also undertook to regulate the affairs of the Cisleithan countries. Among the privileges granted were a general citizenship for all inhabitants of Cisleithania, the equality of all before the law, the right of all to serve in any branch of the civil service, and the right to settle in any part of the country. Furthermore, religious freedom and freedom of the press were introduced, and besides the sectarian schools established by the Church, it was made lawful to institute non-sectarian schools. By the law of Dec. 22, 1867, all nations of Cisleithania were granted equal privileges, and an inalienable right to preserve their languages and nationalities was conceded. At the same time the jury system, publicity, and oral proceedings were introduced into the courts. The institution of the "delegations" is still another product of the year 1867. They meet annually, alternately in Vienna and Pesth, and each delegation consists of sixty members, who meet separately to decide on the common affairs of the empire. On Jan. 1, 1868, a cabinet was formed for the Cisleithan countries, with Prince Carlos Auersperg as president. A week before this time the emperor had formed a common ministry for the whole empire, and had appointed Beust chancellor. Although Beust in his despatches professed friendship for Prussia, still, the attitude of the Austrian court in several important questions showed that bitterness towards Prussia had not entirely disappeared. In the Luxemburg question Beust was induced by considerations of safety to strive to prevent by all means the impending war, and for that reason attempted to conciliate Prussia and France, although rumors of a Franco-Austrian alliance were not uncommon at that time. Austria's position, however, towards these two powers was entirely reserved, while in the East it was entirely without policy.

With regard to its commercial affairs, Austria has advanced considerably since 1866. As early as Dec. 21, 1866, important commercial treaties had been concluded with France, and a treaty with Prussia was concluded before the first German customs-parliament assembled in April, 1868. Commercial treaties were also concluded with Belgium, Holland, and Italy, and postal treaties with Greece, Italy, the North German Confederation, and the three South German states; and Austria also joined the coinage treaty of Dec. 25, 1865, concluded by France, Belgium, Italy, and Switzerland. A new question now arose in the abolition of the Concordat. The chancellor was supported by the public opinion and the Hungarian influence, but, though the government did not sanction its entire abolition, still its most important provisions were removed by legislative acts. This was done chiefly by the introduction of the civil marriage and the new school law, which places the entire schools under the supervision of the state, and makes them independent of all churches or religious associations. Another important act was the abolition of imprisonment for debt and the revision of the usury laws, while in the financial department many important reforms were introduced. After considerable difficulties a resolution was passed by a large majority to change all classes of the general funded debt into a uniform debt bearing 5 per cent. interest, which was to be taxed not more than 16 per cent. The object was to cover a deficit for the next three years of 150,000,000 florins annually. For this reason the direct taxes were increased, and the laws regulating the production of brandy, beer, and sugar were revised. On June 24 the Reichsrath adjourned until September. In August the separate diets were called, in which, especially in Bohemia, Carinthia, and Carniola, the Slavic inhabitants showed a strong spirit of resistance towards the new organization of the empire. In Bohemia especially the Czechs wished to restore the crown of Wenceslas. The proceedings of the delegations, which assembled in Vienna in the same year, took a prompt and satisfactory course. The bishops showed a considerable opposition to the confessional laws which were proclaimed on May 25, 1868, which opposition considerably increased when the pope in his allocution sanctioned the proceedings of the bishops. In consequence of this, Beust sent a despatch to Cardinal Antonelli protesting against the intervention of the clergy in political affairs. At the same time the government showed its determination to keep the clergy within bounds by arresting and convicting the bishop of Linz. In relation to the Œcumenical Council of the following year, the Austrian government assumed an expectant attitude. When the infallibility of the pope was

proclaimed, Beust declared in a despatch of July 30, 1870, that the Concordat of 1855 was regarded as abolished by the government.

A reduction of the rate of interest on the national debt caused great dissatisfaction among the foreign creditors of the empire. Compulsory service was made the basis of the reorganization of the army. But the most serious question, and the most difficult for the government to solve, arose in the question of nationalities. Even in the session of 1867 the Poles and the southern Slavic tribes had demanded separate concessions for their nationalities, while the Czechs had not taken any part whatever in the proceedings of the Reichsrath. The same thing was repeated, only in a more demonstrative manner, in 1868. The Diet of Galicia demanded in a resolution of Sept. 24 the complete political autonomy of that kingdom, while the Czechs in Bohemia and Moravia retired from the diets, and in their declarations proposed the complete independence of the crown of Wenceslas. In October, Prague was declared in a state of siege in consequence of excesses committed there. Soon the nationality question was brought before the Reichsrath. But this body adjourned on May 15, 1869, without having done anything in regard to this question. In the cabinet two parties had arisen on this point, and the minority, which was in favor of a compromise with the different nationalities, was forced to resign. But when the Poles and the South Slavic deputies resigned their seats in the Reichsrath, the emperor was forced to organize a more liberal cabinet. But even this was not liberal enough to effect a compromise, and the emperor was again compelled to receive the resignation of the cabinet and to call upon Count Hohenwart to form a new one. But although Hohenwart's policy was so reactionary and opposed to the Germans that in every part of the country a movement as general as it was sudden arose among that class, still, he was not able to satisfy the demands of the Czechs. After negotiations held under the auspices of the emperor himself with the two principal leaders of the Czechs, Rieger and Clam-Martinicz, had led to no result, Hohenwart, and even Count Beust, resigned on Nov. 6. A new cabinet, belonging to the German constitutional party, with Prince Adolf Auersperg at its head, was formed Nov. 25, 1871. On Feb. 20, 1872, an important law was passed at the suggestion of the government, which provided that when members chosen from a provincial diet to the Reichsrath resign their seats in the diet or in the Reichsrath during its session, or when in consequence of permanent absence they may be regarded as having resigned, the emperor can order new elections by a direct vote of the respective districts. At a new election for the Diet of Bohemia ordered by the government, the latter was victorious, and 40 of the 54 members elected to the Reichsrath were friendly to the government, its majority now being over two-thirds. In the Diet of the Tyrol a violent opposition was made to the government, because it had deprived the theological faculty of the University of Innsbruck, composed entirely of Jesuits, of its right to elect the rector of the university. The majority of the diet therefore refused to admit the new rector, and the government dissolved the diet. In Galicia a law favored by the Ruthenians to introduce direct elections to the Reichsrath was voted down by the Polish majority. In order to prevent the frequent refusal of members of the minority to attend the Reichsrath, the government immediately after the opening of the session on Dec. 12, 1872, proposed a new electoral law, according to which the members of the House of Deputies are no longer to be chosen by the diets, but are to be elected by a direct vote of the people.

Among other important events in Austria during the last few years was a disturbance in Dalmatia in Sept., 1869, occasioned by the new conscription laws. It was settled in Jan., 1870, by a compromise with the insurgents. But the German-French war of 1870 turned away the attention of Austria from its own affairs. Although a party at court, together with the Czechs and Slavic tribes, wished to make use of the opportunity to take revenge for 1866, the rapid success of the German arms and the position of Russia soon dispelled all such plans. On Aug. 23 a treaty of neutrality was concluded with Great Britain and Italy. Since then the relations of Austria to the German empire have been of the most friendly character, and have been strengthened by a series of conferences of the monarchs of the two countries, the last of which was held, with great pomp and splendor, in Berlin Sept. 6–11, 1872. In Vienna great preparations had been made since 1871 for the international exposition of 1873, which was formally opened by the emperor on May 1, and bids fair to eclipse in grandeur and variety all former expositions. A. J. Schem.

Autau'ga, a county in Central Alabama. Area, 700 square miles. It is bounded on the S. by the Alabama River, and also drained by the Autauga Creek. The surface is undulating; the soil is fertile. The Selma Rome and Dalton R. R. passes along the western border of the county. Cotton, corn, wool, and rice are the chief crops. Capital, Prattville. Pop. 11,623.

Autau'gaville, a post-township of Autauga co., Ala. Pop. 2387.

Author'ity [Lat. *auctoritas*, "right," "dominion"], power lawfully delegated by one person to another. In the plural, the word, as used in law, includes statutes, adjudged cases, and the opinions of text-writers or other persons learned in the law, relied on to support any legal proposition sought to be applied to a particular case. The opinions of counsel, of court, or of a text-writer are usually fortified by a citation of authorities. (See also Reports.)

Autobiog'raphy [from the Gr. *αὐτός*, "self," *βίος*, "life," and *γράφω*, "to write"], a life of a person written by himself. Such memoirs are divisible into two classes—those in which the object of the writer is to illustrate the history of his own mind and heart, as the "Confessions" of Saint Augustine and Goethe's "Dichtung und Wahrheit;" and those in which his purpose is to give a sketch of the events which have occurred within his own experience, and of characters with which he has associated. The "Mémoires d'Outre-Tombe" of Chateaubriand may be said to combine the characteristics of both classes. The autobiography of Franklin, the "Confessions" of Rousseau, and the "Recollections of a Busy Life" by Hon. Horace Greeley are valuable autobiographic works.

Autoch'thones [Gr. *αὐτόχθονες*, from *αὐτός*, "self," and *χθών*, "ground," "country"], a Greek term applied to the original inhabitants of a country, implying that they were sprung from the soil. The Athenians claimed to be autochthones, and wore on their headdress an emblematic grasshopper in reference to their origin. The same claim was made by many other peoples.

Au'tocrat [Gr. *αὐτός*, "one's self," and *κρατέω*, to "rule"], literally, "one who rules by himself," without the interference or restraint of any other person or persons; an absolute sovereign; a monarch who unites in himself the legislative and executive powers of the state or empire. Such are nearly all the Asiatic sovereigns. Among European rulers the emperor of Russia alone is styled an autocrat. He takes the title of "autocrat of all the Russias." The term autocracy is sometimes applied to the government administered by an autocrat.

Au'to-de-Fé (*i. e.* "act of faith"), the Spanish name of a public ceremony held in Spain and Portugal at the execution of heretics who were burned by order of the Inquisition. Multitudes of spectators assembled to witness the execution and the procession of monks and priests which formed a part of the ceremony. The first ceremony of this kind is said to have taken place at Valladolid in 1560. In 1761 an auto-de-fé was held at Lisbon, at which upwards of fifty persons perished.

Au'tograph [from the Gr. *αὐτός*, "one's self," and *γραφή*, "writing"], a manuscript written by the hand of the author; an original manuscript as distinguished from a copy. The term is sometimes applied to a specimen of the handwriting of any eminent person. In modern times many persons devote much time to the collection of autographs, which are articles of literary trade. Some men study autographs as exponents of the character or temperament of the writers. The signature of Shakspeare is one of the most scarce and highly prized of autographs. (See John G. Nichols, "Autographs of Royal, Noble, Learned, and Remarkable Personages conspicuous in English History from the reign of Richard II. to that of Charles II." (1829), and "Isographie des Hommes Célèbres," Paris, 3 vols., 1828–30.)

Autol'ycus [Αὐτόλυκος], a Greek astronomer and mathematician, born at Pitane, in Æolis, lived about 325 B. C. He wrote a work on the revolving sphere, and another on the rising and setting of the fixed stars; both are extant.

Autom'aton, plu. **Autom'ata** [from the Gr. *αὐτόματος*, "acting spontaneously"], a piece of mechanism so constructed as to imitate the actions of an animal. This exercise of mechanical ingenuity is of very ancient origin. Dædalus was among the first who excelled in this art. Archytas of Tarentum, who lived about 400 B. C., is said to have made a dove that could fly. Among the most wonderful automata of modern times was the flute-player which Vaucanson exhibited in Paris in 1738. This had the form of a man, and performed with its fingers. He also produced an automaton duck which swam, dived, ate and digested barley (!), and quacked like a real duck. Kempelen constructed a famous automaton chess-player, the mechanism of which was very ingenious and complex. This automaton could beat the most of the players who tested

its skill, but it was long suspected that a man was concealed in it—a Russian officer who had been sentenced to death and escaped by this contrivance. It was afterwards fully proved that the supposed skill of the automaton was due to the presence of a living man, who was concealed within the machine.

Auton'omy [from the Gr. *αὐτός*, "one's self," and *νομός*, a "law"], the power or right of self-government; political independence. The term is used to designate the characteristic of the political condition of ancient Greece, in which nearly every city was a separate state, and the people were very tenacious of the independence and sovereignty of their respective cities. For this reason they could not form a large centralized republic or stable government.

Au'toplasty [Lat. *autoplas'tia*, from the Gr. *αὐτός*, "one's self," and *πλάσσω*, to "form"], an operation by which lesions are repaired by means of healthy parts being taken from the patient himself (usually from the immediate neighborhood of the lesion to be repaired), and made to supply the deficiency caused by wounds or disease. The operations for this purpose have different names, according to the part affected, as *cheiloplastic* (the operation for the lips), *rhinoplastic* (for the nose), etc.

Autrefois Acquit [Fr. "formerly acquitted"], a plea by a person indicted for a crime or misdemeanor that he has previously been tried for the same offence and acquitted.

Autrefois Convict ("formerly convicted"), a plea by a defendant under the same circumstances as in the case of *autrefois acquit*, that he has previously been tried and convicted of the same offence. These pleas, if true, are a bar to the action by the rules of the common law. They are in this country established as constitutional rights, both by the U. S. Constitution and those of the respective States. The constitutional provision is that no person shall be subject for the same offence to be put twice in jeopardy of life or limb. This rule does not apply where a new trial is ordered for errors in a previous trial, nor where the judge in the course of a trial, in the exercise of a sound discretion, discharges the jury, so that there is no acquittal nor conviction. In each of these cases the accused may be tried again as often as the case arises. In a legal sense he has not been in jeopardy. The rule upon this point is the same in England under the common law as in the U. S. under constitutional provisions.

Au'tumn [Lat. *autum'nus;* originally, *auctum'nus*, from *au'geo, auc'tum*, to "increase," because it is in autumn that the earth yields its increase], the season of the year which follows summer, sometimes in the U. S. called Fall, in reference to the fall of the leaves. In a vague and popular sense it comprises September, October, and November. In the language of astronomy it is the time which elapses between the autumnal equinox and the winter solstice. In the southern hemisphere, March, April, and May are the months of autumn. Autumn may be regarded as occupying the same relative position among the seasons of the year as evening among the periods of the day, and mature age among the stages of human life.

Autun (anc. *Bibrac'te* and *Augustodu'num*), a city of France, department of Saône-et Loire, on the river Arroux, 26 miles by rail N. W. of Chalons-sur-Saône. It is picturesquely situated at the foot of mountains, has a fine Gothic cathedral, a college, and library; also manufactures of cloth, paper, and carpets. It is the seat of a bishop. The ancient Bibracte was the chief city of the Ædui. Here are ruins of an amphitheatre, temples, and other Roman antiquities. Autun was the scene of hostile operations between Garibaldi and the Germans in the winter of 1870–71. Pop. 12,398.

Auvergne (anc. *Arver'ni* or *Alver'nia*), a former province in the S. central part of France, coincided nearly with the present departments of Cantal and Puy-de-Dôme. It is a mountainous district of volcanic formation, presenting many conical and dome-like summits of extinct volcanoes. The soil in some parts is fertile, especially near the river Allier. Auvergne has produced many eminent men, among whom were Pascal, Turenne, Desaix, and La Fayette. The chief towns were Clermont and Aurillac.

Auvergne, d' (Latour). See Latour d'Auvergne.

Auvergne, Mountains of, a branch of the Cevennes, situated in the French departments of Cantal and Puy-de-Dôme. They separate the basins of the Allier, Cher, and Creuse from those of the Lot and Dordogne. The highest summits of these volcanic mountains are Mount d'Or, 6188 feet high, Cantal, 6093, and Puy-de-Dôme, 4806 feet high. The last is a remarkable specimen of an extinct volcano. They are generally like truncated cones. The scenery of Auvergne is grand and picturesque.

Auxerre (anc. *Autissiodo'rum*), a town of France, capital of the department of Yonne, on the left bank of the Yonne, 93 miles S. S. E. of Paris, with which it is connected by railway. It has a fine Gothic cathedral, a college, a museum, and a public library of 25,000 volumes. Calico, serge, hosiery, and good wine are manufactured here. Pop. 15,497.

Auxonne, a town of France, in the department of Côte-d'Or, on the Saône, here crossed by a bridge, 20 miles by rail S. E. of Dijon. It has an arsenal, a barrack, and a magazine, with manufactures of woollen cloth and nails. Pop. 5911.

Auxvasse, a township of Callaway co., Mo. Pop. 2050.

A'va, a city, the former capital of the Burman empire, is situated on a plain on the river Irrawaddy, 350 miles N. of Rangoon. The official native name of it is *Ratnapura*, "the city of pearls." It stands on an island formed by the Irrawaddy and two of its affluents. The most substantial buildings of this city were destroyed by an earthquake in Mar., 1839, after which the seat of government was removed to Monchobo. Pop. about 30,000.

A'va, a post-township of Oneida co., N. Y. Pop. 1160.

Ava (Kingdom of). See Burmah.

A'va, or **Ka'va** (*Macro'piper methys'ticum*), a narcotic plant of the natural order Piperaceæ, is a native of many South Sea islands, the inhabitants of which intoxicate themselves with a fermented liquor prepared from its root (rhizome). It is a shrubby plant, with cordate, acuminate leaves, and was formerly classed with the genus *Piper*. The effect of this liquor is a stupefaction like that caused by opium, and is followed by copious perspiration. The liquor is prepared by maceration in water.

Avadu'tas, a sect of Hindoo Brahmans, who practise excessive austerities, and mortify themselves by painful and disgusting forms of penance. They hold their bodies in contorted positions until they become permanently deformed. They procure a subsistence by begging.

Av'alanche [Fr. *lavanche*], a mass of snow or ice which collects on the steep declivity of a high mountain, and sliding down the side gathers accessions of snow until it attains an enormous bulk, and descends to the valley with ruinous momentum. Drift or powder avalanches consist of dry, loose snow which is set in motion by the wind and accumulates in its descent; these occur mostly in winter. Another kind is formed in spring, when the snow begins to melt, and slides down the declivity by its own weight, carrying with it trees and rocks which sometimes bury cottages in ruins. Avalanches are common among the Alps, but are rare in the Andes. A touch of the foot or a slight movement of the air, even that produced by the sound of a bell, is sometimes sufficient to set the avalanche in motion. On account of the frequent occurrence of avalanches, some parts of the Alpine valleys remain uninhabited.

Avallon (anc. *Aval'lon*), a town of France, department of Yonne, on the river Voisin, 18 miles S. E. of Auxerre. It has manufactures of paper and woollen cloth. The adjacent country is fertile, and renowned for its picturesque beauty. Pop. 6070.

Avant la Lettre, a French term applied to an engraving first printed from the plate, to serve as a proof for the artist before he delivers the plate to his publisher. Amateurs are eager to obtain these first proofs, as being finer than those which are printed for sale.

Ava'ri, or **A'vars,** a warlike tribe of Mongolians that entered the countries near the Don, the Caspian Sea, the Volga, and westward. Part of them remained near the Caucasus, and another part proceeded about 555 A. D. to Dacia. They served in the army of Justinian, and fought against the Gepidæ. They in 568 obtained Pannonia. They oppressed the Slavi, and made inroads into Germany and Italy. In 769 they were defeated by Charlemagne, and nearly exterminated. They used to intrench themselves in circular walled camps, traces of which, called "Avarian rings," are still visible in Hungary.

Av'atâr, or **Avatâra** [from *ava*, "off," "away," "down," and *târa*, a "crossing over" or "passing from one thing to another"], in Hindoo mythology, signifies "descent" or "transformation," and is applied to incarnations of some of the principal deities, especially Brahma, Siva, and Vishnu. The avatars of Vishnu, which are particularly celebrated, are reckoned as follows: 1, Matsya, the "fish;" 2, Kûrma, the "tortoise;" 3, Varâha, the "boar;" 4, Narasingha, the "man-lion;" 5, Vâmana (or Wâmana), the "dwarf;" 6, Parasurâma (called in the common dialect Pŭrasoorâm); 7, Râma Chandra; 8, Krishna; 9, Buddha; the tenth, which is yet to come, is called Kalki, or the "horse."

Avat'cha, or **Avatch'ka,** a bay in the south-eastern part of Kamtchatka, affords the best harbor of the whole peninsula. The capital, Petropaulowski, is on this bay, a

few miles from which is a volcano called Avatcha or Avatchinskaya. (See next article.)

Avatchinskay'a, or **Mount Avatcha,** an active volcano in Kamtchatka, near the sea; lat. 53° 15′ N., lon. 158° 50′ E. It has an altitude of 9055 feet, has a crater at its summit, and another at a height of 5000 feet.

A'vebury, A'bury, or **Abiry,** a small village of England, in Wiltshire, 25 miles N. of Salisbury. It is the site of extensive remains of the pre-historic period in Europe, and is in the vicinity of several remarkable barrows and cromlechs of great antiquity. The principal relics, formerly ascribed to the Druids, consist of 100 large blocks of stone placed on end in a circle, enclosing a level area of about 470 yards in diameter, which was surrounded by a ditch and a high embankment. Some of the stones measure twenty feet high above the ground. Nearly a mile S. of this temple is a barrow or conical artificial mound called Silbury Hill, which is 170 feet high, and covers a space of five acres. This was undoubtedly constructed long before the Roman conquest of Britain, and the opinion of the later archæologists refers the whole group to times of very remote antiquity.

Avei'ro, a seaport-town of Portugal, province of Beira, at the mouth of the Vouga, 35 miles by rail N. W. of Coimbra. It is the seat of a bishop, and has a considerable trade in oil, wine, sardines, oranges, salt, etc. Pop. 6557.

Avellane'da, de (Gertrude Gomes), a Spanish poetess, born in the island of Cuba in 1816. She became a resident of Madrid about 1840, and published a volume of lyric poems in 1841. Soon after this date she produced several novels, and successful tragedies entitled "Alfonso Munio" and "Egilona." She was married in 1846 to Don Pedro Sabator, who died the same year. Among her works are "La Cruz," a poem, and dramas called "The Glories of Spain" (1850) and "Sonambula."

Avellino (formerly called **Principato Ulteriore**), a province of Southern Italy, is bounded on the N. by Benevento, on the E. by Foggia and Potenza, on the S. by Salerno, and on the W. by Caserta. Area, 1410 square miles. The country is throughout mountainous. The soil everywhere is extremely fertile, and the harvests are therefore generally very large. The country is traversed by the Calore and the Ofanto. The chief products are cattle, Salami, linen, and leather. Chief town, Avellino. Pop. in 1871, 375,103.

Avelli'no (anc. *Abelli'num*), a fortified town of Italy, the capital of the above province, is 25 miles E. of Naples, and at the foot of Mount Vergine. It is the seat of a bishop, has a cathedral, a college, manufactures of paper, woollen goods, and maccaroni, and an extensive trade in hazelnuts (*Nuces Avellanæ*), chestnuts, and grain. It was much damaged by an earthquake in 1694. Pop. 13,446.

A've Mari'a, or **Angel'ica Saluta'tio,** a form of prayer to the Virgin Mary (commencing Ave Maria, "Hail Mary"), which in the time of Damiani (died 1072) was simply the "annunciation" or salutation of the angel in Luke i. 28, but grew by successive additions till it reached its present form in the time of Pius V. (1566–72). (See Rosary.)

Ave'na, a township of Fayette co., Ill. Pop. 1182.

Avenger of Blood. In early ages, as now in barbarous countries, the infliction of the penalty for murder did not take place by the action of public authorities, but was left to the nearest male relative of the murdered person, whose duty was to pursue and slay the murderer. He was called the "avenger of blood" (in Hebrew *göel*, which term, however, was of wider signification). The Mosaic law did not set aside this custom, but placed it under regulations, prohibiting the commutation of the penalty of death for money, and appointing six cities of refuge, three on either side of the Jordan, for the manslayer who was not a murderer. The Koran sanctions the avenging of blood by the kinsman, but also sanctions the pecuniary commutation. The custom prevails among the Arabs at present, as well as in other rude nations.

Aventi'nus (Johannes), a German historian whose proper name was Thürmaier or Thürnmaier, was born at Abensberg, in Bavaria, in 1466. He was invited to Munich in 1512, and appointed tutor to the sons of the duke of Bavaria. His principal work is a "History of Bavaria" ("Annales Boiorum," 1554), which was highly esteemed. The most complete edition is that published by Cisner in 1580. Died Jan. 9, 1534. (See J. Ziegler, "Vita Aventini.")

Aven'turine, a name applied to certain varieties of quartz or felspar which contain bright red, brown, or golden scales of mica, oxide of iron, etc. It is often used as a gem.

Aventurine Glass, also called **Gold Flux** or **Gold Stone,** a variety of glass used as an ornamental stone by jewellers. The ground is of a rich yellowish-brown color, with innumerable golden scales. It may be made by fusing together 300 parts of powdered glass, 40 parts of copper filings, 80 parts of iron filings, and cooling slowly.

Av'erage [Lat. *avera'gium*, from *ave'ro*, to "prove," to "estimate"], a mean proportion; a medial sum or quantity intermediate between several unequal quantities. The relation of the average to the other quantities is such that the sum of the excesses of the greater above the average is equal to the sum of the defects of the less below it. The average of several quantities—for example 3, 7, 9, and 13—is obtained by adding them together, and dividing the sum by the number of quantities. The sum, 32, divided by 4, gives 8 as the average.

Average, in law, is a term employed in maritime commerce, and is used in different senses when preceded by the words general, particular, or petty.

1. *General Average.*—This means the case where several interests connected together, as being engaged in a common adventure at sea, such as ship and cargo, are exposed to a marine peril, and one of these interests is voluntarily sacrificed, either in whole or in part, as the price of the safety of the residue of the property at risk; or expense is incurred for the same reason, and the amount of such sacrifice or expenditure is charged by law upon the respective interests in proportion to their value. The act of voluntarily casting away property under such circumstances is termed a "jettison." The elements of a general average case are said to be these: there must be a sacrifice of property, it must be voluntary, and must be successful. There is no general average allowed in cases of goods laden on deck, unless it is usual to place the goods there on a voyage such as the one in which this question arises. The master of the ship by the maritime law is entrusted with the power to order a jettison when the circumstances justify it. The American law allows general average where a ship which would have foundered is voluntarily wrecked in such a manner as to save the cargo or a part of it. Expenditures of money in some instances justify a contribution of the nature of general average, as where they are incurred for the preservation of the ship or cargo from extraordinary perils, or where they are necessary for the completion of the adventure in which all the interests at risk are concerned; as, for example, for the prosecution of the voyage. The property upon which the contribution is assessed is the ship, cargo, and freights. The property lost contributes as well as that which is saved. The general principle is substantially this: as the whole property at risk is to the whole amount of the loss, so is each owner's particular interest to his share of the loss. This rule results in assessing a certain percentage of the loss on each owner, according to the value of his interest. The values are estimated by rule: the ship and appurtenances are valued as at the end of the voyage, and the cargo at its value at the time and place of discharge. An adjustment made at the end of a voyage at the port of arrival is deemed to be valid everywhere, according to a settled maritime rule. The special rules applicable to the cases in which general average is allowed are not precisely the same in England and in the U. S., and the subject branches out into much detail in the books of maritime law. Practically, it is closely connected with the business of marine insurance, as the insurance on ship, cargo, and freight may be made by different underwriters, and under the law of abandonment the rights to claim general average, as well as the burden of its assessment, may vest in and rest upon the respective insurers. 2. *Particular Average.*—This signifies damage happening to interest (ship, cargo, and freight) at risk at sea in consequence of pure accident. The loss in such a case rests upon the owner of the property injured or upon his insurer. 3. *Petty Average.*—This term refers to certain petty charges in port for pilotage, lights, towage, anchorage, and the like, which were formerly apportioned upon the owners of the ship and cargo. The modern practice is to include these charges in the freight.

T. W. Dwight.

A'verell (William W.), born in the State of New York 1830, graduated at West Point 1855, appointed lieutenant Mounted Riflemen; served on frontier and fighting Indians till 1859, when wounded. During the civil war he was present at the battle of Bull Run, July, 1861; colonel Third Pennsylvania Cavalry, 1861; commanded cavalry brigade about Washington, D. C. In Virginia peninsular campaign 1862 was engaged at Yorktown, Williamsburg, Fair Oaks, Malvern Hill. In 1862 he was appointed brigadier-general of volunteers; engaged at Fredericksburg Dec., 1862; in command at Kelly's Ford Mar., 1863; participated in Stoneman's cavalry expedition towards Richmond April–May, 1863; engaged in, and in command of,

skirmishes, actions, and raids in West Virginia, Tennessee, Shenandoah Valley; at Opequan Sept. 19, 1864, and Fisher's Hill Sept. 22, 1864; captain Third Cavalry U. S. A. July, 1862, and brevetted major, lieutenant-colonel, colonel, brigadier-general, and major-general U. S. A. Resigned May, 1865. Appointed U. S. consul-general to Canada 1866; at present president of manufacturing company, New York.

A'verill, a township of Essex co., Vt. Pop. 14.

Averill, a township of Jefferson co., West Va. P. 2030.

Aver'nus [Gr. Ἄορνος, from α, priv., and ὄρνις, a "bird"], a famous lake [It. *Lago d'Averno*] of Italy, 10 miles W. of Naples. It occupies the crater of an extinct volcano, is about a mile in diameter, and 170 feet deep. It was supposed that the name Avernus was given to it because the mephitic vapors killed the birds that flew over it. The ancients imagined that this lake was the entrance to the infernal regions. Agrippa opened a canal from Avernus to the sea, converting it into a harbor, but the canal was destroyed by an earthquake in 1538.

Aver'röes, or **Averrhoes,** originally **Ibn-Roshd,** a celebrated Arabian philosopher and physician, was born at Cordova, in Spain, 1120. He rose to great dignity in the Moorish kingdom, but was accused of heretical opinions and deprived of his office, from which time he lived in poverty until the accession of the caliph Al-Mansur-Billah, whom he followed to Morocco, where he died in 1198. He was a great admirer of Aristotle, on whom he wrote a celebrated commentary. In the Middle Ages he was called "The Commentator," and was said to have translated Aristotle into Arabic, which story was repeated over and over again until in 1852 E. Renan proved it to be a fable; indeed, Averröes did not understand the Greek language.

Aver'sa (anc. *Atella*), a town of Italy, in the province of Caserta, and in a beautiful plain 9 miles N. of Naples. It is the seat of a bishop, is well built, has a cathedral, several convents, about ten churches, and a lunatic asylum. Pop. in 1872, 21,176.

A'very (Waightstill), born at Groton, Conn., May 3, 1745, graduated at Princeton in 1766, became in 1769 a lawyer in Mecklenburg co., N. C. He was an early and constant patriot in the Revolutionary war, being one of the signers of the Mecklenburg Declaration (1775), a member of the Hillsborough congress (1775), of the State congress (1776), first attorney-general of the State (1777), and was in 1779 a colonel of militia in active service. Died in Burke co., N. C., Mar. 15, 1821.

A'verysboro', a post-village and township of Harnett co., N. C., on Cape Fear River, about 40 miles S. of Raleigh. During Gen. Sherman's Carolina campaign, while his army was marching towards Goldsboro', a strong force of Confederates under Gen. Hardee was intrenched in front of Averysboro' (Mar. 16, 1865), the object being to check Gen. Sherman, and gain time for the concentration of forces at Smithfield under Gen. Johnston. After three or four hours' severe fighting the Confederates fell back to a second and stronger line. The attack being renewed along this line, fighting continued through the day, the Confederates being driven within their intrenchments; during the night, which was dark and stormy, their works were evacuated, and on the morning of the 17th it was found that the army of Gen. Hardee was retreating towards Smithfield. The Federal loss was about 600, killed and wounded, the Confederate loss was probably smaller, except in prisoners, of which many remained in Gen. Sherman's hands. This battle is known as the battle of Averysboro'. Pop. of township, 716.

A'very's Creek, a post-township of Buncombe co., N. C. Pop. 655.

Avery's Gores, a number of tracts of land in Vermont, granted to Samuel Avery in 1791. One of them is in Addison co., near the top of the Green Mountains. Another in Franklin co. has a pop. of 34.

Aveyron, a department in the S. part of France, is bounded on the N. by Cantal, on the E. by Lozére, Gard, and Hérault, on the S. by Tarn, and on the W. by Lot. Area, 3376 square miles. It is intersected by the river Lot and the Tarn, and also drained by the river Aveyron. The surface is mountainous, and the chain of the Cevennes extends along the south-eastern border of the department. Among its mineral resources are coal, copper, lead, zinc, and iron. The coal-mines are very valuable. It has manufactures of cotton yarn, paper, woollen stuffs, carpets, and leather. It is divided into 5 arrondissements, 42 cantons, and 285 communes. Among the chief articles of export is Roquefort cheese. Capital, Rodez. Pop. in 1872, 402,474.

Avezac, d' (Auguste Geneviève Valentin), a lawyer, born in St. Domingo (Hayti) in 1777, was a brother-in-law of Edward Livingston. He practised medicine in Virginia, and law in New Orleans with great success. He served in the army in the war of 1812, and afterwards removed to New York. He was chargé d'affaires at The Hague in 1831 and 1845–49. Died Feb. 15, 1851.

Avezac, d' (Pierre Valentin Dominique Julian), an uncle of the preceding, was born in St. Domingo July 17, 1769. He became a citizen of New Orleans, and translated Scott's "Marmion" into French. Died Feb. 1, 1831.

Avezza'na (Giuseppe), an Italian republican and patriot, born in Piedmont Feb. 19, 1797. He fought against Bustamente in Mexico in 1832, and became a merchant in the city of New York in 1834. Early in 1848 he returned to Italy to fight for the independence of his country, and was appointed commander of the national guard at Genoa. In Mar., 1849, he was chosen minister of war of the Roman republic and commander of the army. Rome was taken by the French in July of that year, and Avezzana escaped to the U. S.

Avia'no, a town of Italy, in the province of Udine, 48 miles N. N. E. of Venice. Pop. 6184.

Avicen'na [Fr. *Avicenne*], the Latin form of **Ibn-Sînâ,** the most eminent of Arabian physicians, was born near Bokhara in 980 A. D. He was well versed in mathematics, astronomy, philosophy, and other sciences. Before he was twenty years old he was reputed the most learned man of his time. He was employed as a physician by several Samanide sovereigns, and resided at Ispahân and Hamadân. He wrote in Arabic a large number of works on medicine and philosophy, the most important of which is his "System of Medicine" ("Canon Medicinæ"), which, translated into Latin by Gerardius Cremonensis (2 vols., 1595), was for five centuries a standard book of the highest authority in the schools of Europe. He died in 1037. (See S. Klein, "Dissertatio de Avicenni Medico," 1846; Ibn-Khallikân, "Biographical Dictionary," edited by De Slane, Paris, 1842; Freind, "History of Physic.")

Avicen'nia, a genus of plants of the natural order Myoporaceæ, consists of trees or shrubs resembling mangroves, and growing in salt swamps in tropical regions and in the southern hemisphere. The *Avicennia tomentosa,* the white mangrove of Brazil, has cordate, ovate leaves, downy on the lower side. Its bark is used for tanning. Its gum is used as food in New Zealand, and its seeds in India.

Avid'ius (Cassius), an able Roman general, born in Syria, commanded for Marcus Aurelius an army which defeated the Parthians in 165 A. D. Having become governor of Syria and commander of several legions, he revolted in 175 A. D., and took the title of emperor. He obtained possession of Egypt and part of Asia. He was killed by his own officers in 175 A. D.

Avigliano, a town of Italy, in the province of Potenza, 11 miles N. W. of Potenza, is near the Apennines. It has a fine church and a college. It was the scene of a landslip in 1824, which caused great destruction. P. 9236.

Avignon (anc. *Ave'nio*), an ancient city of France, capital of the department of Vaucluse, is situated on the left bank of the Rhone, 74 miles by rail N. N. W. of Marseilles. It is the seat of an archbishop, and is surrounded by a rich country with delightful scenery. It contains a college, a public library of about 45,000 volumes, a museum of natural history, a botanical garden, a fine theatre, a lunatic asylum, etc. Among the interesting and ancient public edifices is the former palace of the popes, a vast irregular Gothic structure, now used as a barrack and prison; and the cathedral called Notre Dame des Dons, rebuilt by Charlemagne, and containing a richly-sculptured chapel which is much admired. Petrarch passed several years at Avignon and at Vaucluse (which is about three miles distant), where he first saw Laura. The manufacture of silk is the principal branch of industry in this city, which also has several paper-mills, iron-foundries, and manufactures of velvets and woollen stuffs. It has an active trade in wine, brandy, grain, etc. Steamboats ply daily between Avignon and Lyons. Avenio was the capital of the Cavares before the time of Cæsar. It was taken by the Saracens in 730 A. D., and after many changes was purchased in 1348 by Pope Clement VI., and became the seat of the papal government. Seven successive popes resided at Avignon in the fourteenth century, during which it had about 100,000 inhabitants. The papal court was transferred to Rome in 1377, and Avignon was annexed to France in 1791. Pop. in 1866, 36,427.

A'vila, a province of Spain, in Old Castile, is bounded on the N. by Valladolid, on the E. by Segovia and Madrid, on the S. by Toledo and Caceres, and on the W. by Salamanca. Area, 3407 square miles. The surface is mountainous, except the northern part. The chief article of export is merino wool. Capital, Avila. Pop. in 1867, 176,769.

Avila (anc. *Ob'ila* or *Ab'ula*), an episcopal city of Spain,

the capital of the above province, is on the river Adaja, 71 miles by rail N. W. of Madrid. It was once a rich and more populous city, having a flourishing university, founded about 1482 and abolished in 1807. It has a fine cathedral and convent. Pop. 6892.

A′vila y Zuñi′ga, de (Luis), a Spanish historian and diplomatist, born in Estremadura about 1490. He enjoyed the favor of Charles V., who sent him as ambassador to Rome about 1558. He wrote "Commentaries on the War of Charles V. in Germany in 1546 and 1547" (1548). This work has considerable literary merit, but is not impartial. Died probably after 1560.

A′viles, a Spanish town at the mouth of the river of the same name, 15 miles W. N. W. of the city of Oviedo, is one of the most important trading-places in the province of Oviedo. Pop. about 8350.

A′vis, or **Aviz,** an order of knighthood in Portugal, instituted by King Alphonzo I. in 1143 to promote the defeat of the Moors. The king of Portugal is grand-master of the order.

Avi′tus (Alcimus Ecdicius), Saint, a poet and bishop of Vienne, obtained this dignity about 490 A. D. He was an adversary of Arianism. He wrote a poem on the "Creation of the World and on Original Sin," which is said to present some analogy to Milton's "Paradise Lost." Many other of his writings are extant.

Avitus (Marcus Mæcilius), a Roman emperor, born in Auvergne about 400, was the father-in-law of Sidonius Apollinaris. He became prefect of Gaul, and succeeded Maximus as emperor of the West in 455 A. D. He was deposed by Ricimer in 456. Died in 457 A. D.

Avlo′na, or **Valona** (anc. *Aulo′na*), a fortified town and seaport of Albania, on the Gulf of Avlona, which is an inlet of the Adriatic 10 miles long. It is 30 miles S. W. of Berat, and has the best harbor on the Albanian coast. Here are manufactures of arms and woollen stuffs. Pop. about 6000.

Avo′ca, or **Ovo′ca,** a small river in Wicklow county, Ireland, enters the sea at Arklow. It runs through a very narrow and picturesque valley, enclosed between wooded banks from 300 to 500 feet high. The Vale of Avoca is the subject of one of Moore's songs.

Avoca, a post-township of Lawrence co., Ala. P. 936.

Avoca, a township of Livingston co., Ill. Pop. 825.

Avoca, a post-village of Pottawatomie co., Ia., on the Chicago Rock Island and Pacific R. R., 35 miles from Council Bluffs. It has a considerable trade and one weekly newspaper.

Avoca, a post-township of Cass co., Neb. Pop. 480.

Avoca, a post-township of Steuben co., N. Y., on the Rochester division of the Erie R. R., 28 miles N. W. of Corning. It has three churches, an iron-foundry, and a lumber and flouring mill. Pop. of village, 492; of township, 1740.

Avoca, a post-village of Clyde township, Iowa co., Wis., on the Milwaukee and St. Paul R. R., 49 miles W. of Madison. Pop. 418.

Avoca′do Pear, or **Alligator Pear** (*Per′sea gratissima*), a fruit tree of the order Lauraceæ, a native of the warm parts of America. It has leaves which resemble those of the laurel. The fruit is a drupe, like a pear in shape, and has a soft pulp of delicate flavor, which dissolves like butter in the mouth, and is called "vegetable butter." It is much esteemed in the West Indies, and grows in Southern Florida.

Av′ocet, or **Avoset** (*Recurviros′tra*), a genus of web-footed birds, of the order Grallatores, having long legs, and very long, slender bills. They are easily distinguished from other wading birds by the upward curvature of the bill, which is like elastic whalebone, and is adapted to seeking in the mud for its food, which consists almost wholly of worms, insects, and little crustaceans. They are birds of powerful wing, and better adapted for flying and walking than swimming. The *Recurvirostra Americana* abounds in the U. S. Another species, *Recurvirostra avocetta*, is common in Europe. The length of both species is about eighteen inches.

Avocet.

Avoid′ance, in English ecclesiastical law, is the term by which the vacancy of a benefice is signified. It is the condition of a benefice void of an incumbent.

Avoirdupois′, or **Averdupois,** the name of the common system of weights by which we ascertain the weight of all commodities except medicines, gems, and precious metals. A pound avoirdupois contains 7000 grains, the legal standard of which is such that a cubic inch of water weighs 252.458 grains. The pound is divided into 16 ounces, and an ounce into 16 drams. An ounce is equal to 437½ grains.

TABLE OF AVOIRDUPOIS.

27 11/32 grains	= 1 dram,	dr.
16 drams	= 1 ounce,	oz.
16 ounces	= 1 pound,	lb.
28 pounds	= 1 quarter,	qr.
4 quarters	= 1 hundredweight,	cwt.
20 hundredweight	= 1 ton,	ton.

A cubic foot of water weighs 997.17 ounces avoirdupois.

Avo′la, a seaport-town of Sicily, in the province of Noto, 13 miles S. W. of Syracuse, is supposed to occupy the site of the ancient *Ibla* or *Hybla*, famous for honey. It has an active trade in grain, cattle, oil, and fruits. An earthquake in 1693 destroyed the ancient *Avola*. Pop. in 1861, 10,778.

A′von, a post-township of Hartford co., Conn. P. 987.

Avon, a post-village of Union township, Fulton co., Ill., on the Chicago Burlington and Quincy R. R., 19 miles S. by W. of Galesburg. Pop. 672.

Avon, a township of Lake co., Ill. Pop. 1005.

Avon, a post-township of Coffey co., Kan. Pop. 905.

Avon, a post-township of Franklin co., Me. Pop. 610.

Avon, a township of Oakland co., Mich. Pop. 1850.

Avon, a township of Stearns co., Minn. Pop. 211.

A′von, a post-village of New York, delightfully situated in Livingston co., on the right bank of the Genesee River, and on the Rochester division of the Erie R. R., 18 miles S. S. W. of Rochester, and on the Avon Geneseo and Mount Morris R. R. Avon stands on a terrace 100 feet above the river, and commands a beautiful prospect. Here are sulphur springs, with seven hotels, which are much frequented in summer by invalids. Pop. 900; of Avon township, 3038.

Avon, a post-village and township of Lorain co., O., 17 miles W. of Cleveland and 3 miles from the shore of Lake Erie. Pop. of township, 1924.

Avon, a township of Rock co., Wis. Pop. 886.

Av′ondale, a post-village of Chester co., Pa.

Av′on, Lower, a river of England, rises in Wiltshire, flows southward, then nearly north-westward, passes by Bath and Bristol, and enters the Bristol Channel after a course of about 80 miles. It is navigable for large vessels to Bristol, 7 miles. The valley of the Avon is very picturesque. Another river called Avon, or East Avon, rises in Wiltshire, flows southward, passes Salisbury, and enters the English Channel at Christ Church.

Avon, Upper, a river of England, rises near Naseby, in Northamptonshire, flows in a general S. W. direction through Warwickshire and Worcestershire, passing Rugby, Warwick, and Stratford, and joins the Severn at Tewkesbury. It is about 100 miles long.

Avo′nia, a township of Osage co., Kan. Pop. 588.

Avoyelles, a parish of Louisiana. Area, 800 square miles. It is intersected by the Red River, and bounded on the E. by that river and Atchafalaya Bayou. The surface is nearly level, and partly subject to inundation. Fertile prairies occur in the western part. Cotton, corn, rice, and molasses are largely exported. Capital, Marksville. Pop. 12,926.

Avranches (anc. *Abrin′cæ*), a town of France, in the department of the Manche, 32 miles S. W. of Saint Lo. It is beautifully situated on a hill, and has a ruined cathedral, a college, and a convent. Here reside many English families, attracted by the beauty of the position and the cheapness of living. Pop. in 1866, 8642.

'Awaj, the ancient Pharpar, one of the two rivers of Damascus. (2 Kings v. 2.)

Award′ [from the Old Fr. *awarder*, to "adjudge"], the result of an arbitration. (See Arbitration.) An award is governed by well-established rules, such as that it must conform to the agreement whereby the matters in dispute were submitted to arbitration; it must embrace them all; it must be final, as well as certain and reasonable. Where several matters are submitted, it is not necessary that each one should be specifically referred to in the award. If the arbitrators purport to dispose of the things submitted by a general result, it will be presumed that each subject was acted upon and embraced in their conclusion. An award does not have the force of a judgment in a court of justice.

If not performed, an action may be brought upon it. If a sum of money were directed to be paid, a debt would be created which could be collected by action. Statutes sometimes allow a clause to be inserted in the submission that judgment in a court of justice may be entered upon the award. In such a case no action is necessary, and a judgment may be taken in accordance with the statute.

Awe, Loch, a lake of Scotland, in the county of Argyle, 8 miles N. W. of Inverary, extends 24 miles in a direction N. E. and S. W. Its average width is about 1 mile, but in some places it is 2½ miles wide. The adjacent scenery is very picturesque. The north-eastern end is overshadowed by rugged mountains, one of which, Ben Cruachan, is 3669 feet high. The water of this lake is discharged through the river Awe into Loch Etive. Loch Awe encloses many islands, and abounds in trout. Its scenes are favorites with artists and with tourists. On its islands are the ruins of several convents and castles.

Awn (*aris'ta*), the botanical name of a stiff and pointed bristle which occurs in the flowers of many grasses, forming the extremity of a glume or palea, as the beard of wheat and barley. The flowers of some grasses are awnless. The parts which are furnished with this organ are called *aristate*. The awn is a prolongation of the midrib of a glume or palea, or is a rigid, barren branch of inflorescence. Sometimes it is twisted, and liable to twist and untwist hygrometrically; sometimes it is serrate, as in barley.

Aw'yaw' (**Aga-Ojo** or **Oyo**), the capital of Yoruba, in Central Africa. Pop. about 70,000.

Axe, a tool used by carpenters and others for cutting wood, is of very ancient origin. Savage peoples of antiquity formed axes of stone, copper, bronze, etc. The axe of modern civilized nations is constructed of wrought iron, with a cutting edge of steel, which is welded to the iron when they are heated to a white heat. After it has been hammered and ground into the proper form, it is carefully tempered by heat and cold water.

Axe'stone, a mineral regarded as a variety of nephrite, is hard, tough, and more or less translucent. It occurs in primitive rocks in Saxony and New Zealand; the natives of the latter use it to make axes, hence the name.

Ax'holme Isle, a level and once marshy tract of England, in the N. part of Nottinghamshire, was drained in 1634 by a Dutchman named Vermuyden, and was for a long time inhabited by French and Dutch Protestant refugees. After much litigation between the colonists and the proprietors, the lands were divided in 1691, and about one-sixth was given to the former. It is now extremely fertile of all kinds of crops.

Ax'ia, a town of ancient Etruria, whose remains are identified with the sculptured tufaceous rocks at Castel d'Asso, 6 miles W. of Viterbo. Here are many chambers believed to be sepulchral. There are many Etruscan inscriptions. The architecture is of the Tuscan order, closely resembling the Doric Greek. These remains were discovered in 1808. It is probable that Axia never was a large town, but it must once have been quite important.

Ax'inite [from the Gr. *ἀξίνη*, an "axe"], an anhydrous silicate of alumina, lime, etc. with boracic acid, so named because it occurs crystallized in oblique rhomboidal prisms, so flat as to appear tabular and sharp like the edge of an axe. The crystals have a brilliant, glassy lustre, and are translucent or sub-translucent.

Ax'iom [Gr. *ἀξίωμα*, from *ἀξιόω*, to "think worthy," also to "demand"], in geometry, a proposition which admits of no demonstration, but is taken for granted as a self-evident truth; as, "The whole is greater than its part." Every rational science requires such fundamental propositions and established principles, to which the assent of the student is demanded without proof as a basis for further argument. It is an axiom in logic that he who admits a principle admits its consequence.

Ax'is, plu. **Axes,** a Latin word signifying "axle." A straight line, real or imaginary, about which a body revolves is called the axis of rotation. Axis is an important term in astronomy, botany, crystallography, geometry, and mechanics. The axis of the earth or other planet is that diameter about which it revolves. In botany, the axis is the central part of a plant, around which various organs are arranged. The stem is called the ascending axis, and the root is the descending axis. The stem is an axis for the branches, the branch is an axis for the leaves, and the rachis is an axis of inflorescence. In geometry, the axis of any geometrical solid is the right line which passes through the centre of all the corresponding parallel sections of it, or the right line about which the parts of the figure are symmetrically disposed. Thus, the axis of a cone is a right line drawn from the vertex to the centre of the base. The axis of a curved line is formed by a right line dividing the curve into two symmetrical parts. A right line drawn through the foci of an ellipse is its transverse axis. The lines upon which the abscisass and ordinates of plane curves are measured are called co-ordinate axes, of which one is the axis of abscissas and the other the axis of ordinates. For determining points in space a third axis is used. In crystallography, each form of crystal except the hexagonal prism and the rhombohedron has three axes, one vertical and two lateral. In anatomy, the axis is the second cervical vertebra, which in man is the pivot on which the head turns. *Ax'is in Peritro'chio,* an old term for one of the five mechanical powers, commonly called the WHEEL AND AXLE. It consists of a wheel fixed immovably to an axle, so that both turn together around the axis of motion. *Axis of Elevation,* in geology, the line or direction in which rocks have been elevated by an internal force. This line generally governs the strike of the strata, or the direction of a horizontal line upon them, when removed from their natural or original position and inclined to the horizon.

Axis (*Axis maculatus*), a species of deer found in India and in many of the East Indian islands, is sometimes called *chittra* by the natives; *axis* is the ancient name of a kind of deer or antelope mentioned by Pliny. It resembles in

Axis Deer.

size and color the European fallow-deer, but its horns are slender, pointed, and little branched. The female has no horns. It is easily domesticated, and is kept in parks in Europe. Other species, or marked varieties, are known. The horns are brought to Europe and used for knife-handles.

Ax'le [Lat. *ax'is*], a bar of iron or a wooden shaft which supports the body of a carriage or wagon, and is supported on two wheels, in the hubs or naves of which its ends are inserted. Also, the part of machinery which forms the centre of the revolving portion, or the immediate bearing of the revolution of a piece of machinery which revolves on its own centre. Axles of railway cars, instead of revolving in the hubs of the wheels, are strongly keyed in them, and journals are turned on the portions outside the wheels. These journals pass through and revolve in boxes.

Ax'ley, a township of Johnson co., Ill. Pop. 1199.

Ax'minster, a town of England, in the county of Devon, 16 miles E. of Exeter. The Axminster carpets, whose manufacture is the chief employment of the inhabitants, are excellent imitations of those of Persia and Turkey, but most of the so-called Axminster carpets are made elsewhere. Pop. 2918.

Ax'olotl' (*Siredon lichenoides*), a remarkable batrachian found in the Mexican lakes, is a permanent larva of the Amblystoma type of salamanders. It resembles a fish in its general form, has four legs, and a long, compressed, and tapering tail. On each side of the neck the gills form three long feather-like processes, which give it a remarkable appearance. Length, about ten inches. It is much esteemed as food by the Mexicans. (See SIREDON.)

Axolotl.

Ax'um, or **Axoom** [Gr. Αὐξούμη or Ἀξώμη], an ancient and decayed town of Abyssinia, the former capital of the Axumite empire, is in the province of Tigre, 85 miles N. W. of Antalo. Here is a Christian church, built about 1657, which is held in great veneration. Among the antiquities of Axum and the monuments of its former grandeur are several finely-sculptured prostrate obelisks, and one granite monolith sixty feet high, which is still standing. The Axumite empire extended over Abyssinia and Yemen in Arabia. Through Adule, a port on the Red Sea, the people of ancient Axum carried on commerce with Arabia and India. Pop. between 2000 and 3000.

Ayacu'cho, a department of Southern Peru, bounded on the N. by Junin, on the E. by Cuzco, on the S. by Arequipa, and on the W. by Huancavelica. Area, estimated at 42,000 square miles. It is drained by the Apurimac and its affluents. Gold and silver are found here, and in agricultural respects it is the richest part of Peru. Pop. about 130,000.

Ayacucho, a town of Peru, in the above province, 25 miles E. N. E. of Huancavelica. Here the armies of Colombia and Peru completely defeated the Spaniards on the 9th of Dec., 1824. This victory, gained by General Sucre, ended the Spanish dominion on the American continent, and was followed by the speedy surrender of all the Spanish soldiers in Peru. Pop. about 25,000.

Ayamon'te, a seaport-town of Spain, in the province of Huelva, on the Guadiana River, about 2 miles from its mouth, and 71 miles W. S. W. of Seville. It has two churches, one hospital, and a town-house. The chief occupation of its people is fishing. Pop. 5969.

Aye-Aye (*Chei'romys Madagascarien'sis*), a very singular quadruped of Madagascar, ranked by Cuvier among the Rodentia, but placed by other naturalists in the family of lemurs. It has a long, bushy tail, and is about as large as a hare. Each of its four extremities has an opposable thumb, and the digits are armed with pointed nails, which it sometimes uses to pick kernels out of nuts. It sleeps during the day, and is very active in the night, feeding on insects and fruits.

Aye-Aye.

A'yer (PETER), one of the founders of the society of Shakers, was born in Canterbury, N. H., in 1760. He served in the war of the Revolution. Died Sept. 14, 1857.

Ayer, a post-village and township of Middlesex co., Mass., formerly known as Groton Junction, was incorporated as a separate town in 1870. It is at the junction of the Fitchburg, the Stony Brook, the Worcester and Nashua, and the Peterboro' and Shirley R. Rs., 35 miles from Boston, 15 from Lowell, and 27 from Worcester, Some thirty-six passenger trains pass through the town daily. It has manufactures of agricultural tools, leather, iron castings, and machinery, and has one weekly newspaper. ED. OF "AYER PUBLIC SPIRIT."

Ay'eshah, or **Aieshah** [Ger. *Aischah*], the favorite wife of the prophet Mohammed, born at Medina about 610 A. D., was a daughter of Abu-Bekr, who afterwards became calif. Mohammed wrote a chapter of the Koran expressly to vindicate her chastity, which had been questioned. After his death she took an active part in public affairs as an enemy of the calif Othman and his successor Ali, who defeated her in battle. Died in 677 A. D. (See IRVING, "Mahomet and his Successors.")

Aylesbury, an ancient market-town of England, the capital of the county of Bucks, is 38 miles by railway N. W. of London. It returns two members to Parliament. Many ducks are reared here for the London market. It has some manufactures of silk and lace. Pop. in 1871, 28,760.

Aylesford, EARLS OF (1714, in the peerage of Great Britain), and barons of Guernsey (1703, in the English peerage), a noble English family. —HENEAGE FINCH, the seventh earl, was born Feb. 21, 1849, and succeeded his father in 1871.

Ayl'mer, a lake in British North America, about 80 miles N. of Great Slave Lake. It is about 50 miles long and 30 miles wide.

Ayl'mer, or **El'mer** (JOHN), a learned English Protestant bishop, born at Tilney, in Norfolk, in 1521. He was tutor to Lady Jane Grey, and became an exile on the accession of Queen Mary. He published in 1559 an answer to John Knox's "Blast of the Trumpet against the Monstrous Regiment of Women." He was appointed bishop of London in 1576, after which he treated the Catholics and Puritans with severity. Died June 3, 1594. (See WOOD, "Athenæ Oxonienses.")

Aylmer, a village of Malahide township, Elgin co., Ontario, Canada. It has one weekly newspaper, and is actively engaged in manufactures. Pop. about 1400.

Aylmer, a village of Ottawa co., Quebec, is situated on Lake Deschênes. It has one weekly newspaper, and is engaged in lumbering and general manufactures. A line of steamers for the Upper Ottawa starts from here. Pop. about 2500.

Ayr, a small river of Scotland, flows nearly westward through Ayrshire, and enters the sea at the town of Ayr.

Ayr, a handsome seaport-town of Scotland, the capital of Ayrshire, is at the mouth of the Ayr, 32 miles S. S. W. of Glasgow. The river is here crossed by three bridges, which connect this town with Newton-upon-Ayr. Among the principal edifices are the assembly-rooms, with a spire 217 feet high, and the Wallace Tower. Ayr has many elegant villas, and is a place of fashionable resort. In the vicinity are objects of interest connected with the memory of the poet Burns. Coal is the chief article of export. Pop. of parliamentary borough in 1871, 17,851.

Ayr, a flourishing village of Dumfries township, Waterloo co., province of Ontario, Canada, has extensive lumber and flouring mills and is an important commercial point. Pop. about 1300.

Ayr, a township of Fulton co., Pa. Pop. 1247.

Ayres (ROMEYN B.), an American officer, born 1825, in New York, graduated at West Point 1847; lieutenant-colonel Third Artillery July 26, 1866, and Nov. 29, 1862, brigadier-general of U. S. volunteers; served in war with Mexico 1847–48, at various posts 1848–73, and on expedition to Yellow Medicine River 1857. In the civil war, served in the Manassas campaign 1861, engaged at Blackburn's Ford and Bull Run as chief of artillery of division 1861–62, and of corps 1862–63, in Virginia Peninsula 1862, engaged at Yorktown, Williamsburg, New Bridge, Garnett's Farm, Gaines's Mill, Golden's Farm, and Glendale; in the Maryland campaign 1862, engaged at South Mountain and Antietam, in Rappahannock campaign 1862–63, engaged at Fredericksburg and Chancellorsville, in the Pennsylvania campaign, in command of a division 1863; engaged at Gettysburg (brevet major), in suppressing New York draft riots 1863, in Rapidan campaign 1863, engaged at Rappahannock Station and Mine Run, in Richmond campaign 1864–65, engaged at Wilderness (brevet lieutenant-colonel), Laurel Hill, Spottsylvania, Jericho Ford, Tolopotomy, Bethesda Church, Petersburg (wounded), Weldon

Railroad (brevet colonel), Chapel House, Rowanty Creek, Dabney's Mill, Five Forks (brevet brigadier-general), and Appomattox Court-house; in command of a division in the district of Shenandoah 1865–66, and member of tactics board 1867–69. Brevet major-general U. S. army Mar. 13, 1865, for gallant and meritorious services in the field, and brevet major-general U. S. volunteers Aug. 1, 1864, for conspicuous gallantry in battles of Richmond campaign.

GEORGE W. CULLUM, U. S. A.

Ayr'shire, a maritime county of Scotland, bounded on the N. by Renfrew, on the E. by Lanark and Dumfries, on the S. by Kirkcudbright and Wigtown, and on the W. by the Frith of Clyde. Area, 1149 square miles. The surface is generally undulating or hilly, and the south-eastern part mountainous. It is drained by the Ayr, the Doon, the Lugar, and other small streams. The county is rich in minerals, especially coal, limestone, freestone, and iron. Silurian and Devonian strata occur here. The soil is generally fertile and well cultivated. Ayrshire is noted for its good dairies and superior breed of milch cows. It has important manufactures of cotton and wool. Capital, Ayr. Pop. in 1871, 200,745.

Ay'toun (WILLIAM EDMONDSTOUNE), an eminent British poet and essayist, born in Edinburgh in 1813, was educated in the university of that city. He studied law, was called to the bar in 1840, and married a daughter of Prof. John Wilson. He became professor of rhetoric in the University of Edinburgh in 1845. Under the assumed name of "Augustus Dunshunner" he contributed many articles to "Blackwood's Magazine," and distinguished himself as a humorist as well as a poet. In 1849 he produced "The Lays of the Scottish Cavaliers, and other Poems," which had great success. Among his other works are a humorous tale called "How I Became a Yeoman," "Firmilian, a Spasmodic Tragedy" (1854), and "Bothwell," a narrative poem (1856). Died Aug. 4, 1865. (See THEODORE MARTIN, "Memoir of William E. Aytoun.")

Ayuntamien'to (literally, a "joining" or "meeting"), the name of Spanish councils or governing bodies of towns, which acquired much political influence and importance during the wars between the Moors and Spanish Christians. The Spanish kings granted to the towns municipal privileges and institutions which were similar to those of the ancient Romans, and promoted a spirit of liberty. The councils were elected by the vote of the citizens. These institutions were abolished under the Bourbon kings, and were restored in 1837. They were deprived of political power in 1844.

Azad'irine, a bitter principle found in an East Indian tree (*Melia Azedirach*), used to some extent as a substitute for quinine. This tree is called "Pride of China" in the U. S.

Aza'lea [from the Gr. ἀζαλέος, "parched," probably so called because it is usually found in dry situations], a genus of plants of the order Ericaceæ and the Linnæan class Pentandria. It comprises 100 species or more, natives of North America, China, and other countries. Many of them are

Azalea Indica.

cultivated for their flowers, which are beautiful and fragrant. The *Azalea Pontica*, a small shrub growing near the Black Sea, has fragrant flowers covered with glutinous, hairy glands. The whole plant is narcotic and poisonous. Among the American species (which have deciduous leaves) are the *Azalea nudiflora*, sometimes called honeysuckle, which is cultivated in English gardens, and the *Azalea viscosa*, which has glutinous and fragrant flowers. The *Azalea Indica*, a native of India, is a favorite of florists, and is remarkable for its brilliant colors. The *Azalea calendulacea*, found in the Southern U. S., is said sometimes to clothe the mountains with a robe of living scarlet. Many hybrid azaleas are cultivated as flowering shrubs.

Aza'ni, an ancient and ruined city of Asia Minor, in Anatolia, on the Rhyndacus, which is here crossed by two Roman bridges, 73 miles S. S. W. of Brusa. Here are extensive remains, among which are an Ionic temple of Jupiter, with eighteen columns standing, and a theatre 232 feet in diameter.

Aza'ra, de (DON FELIX), a Spanish naturalist, born in Aragon May 18, 1 46. He was a member of a commission sent in 1781 to South America to determine the boundary between the Spanish and Portuguese possessions, and he remained there twenty years. He prepared numerous maps of South America, and published in Spanish "Observations on the Quadrupeds, Reptiles, and Birds of Paraguay and La Plata" (5 vols., 1802). He also wrote "Travels in South America," which were published in French (4 vols., 1809). These works are highly esteemed. He died in Aragon in 1811. (See WALCKENAER, "Notice sur F. Azara," prefixed to his "Voyage dans l'Amérique Méridionale," 1809.)

Azari'ah [Heb. עֲזַרְיָה, "the Lord helps"], a name of frequent occurrence in the Old Testament: (1) Another name for Uzziah, the tenth king of Judah, who began to reign, according to Winer, 809 B. C. (2) One of Daniel's three friends, a noble of the tribe of Judah, carried captive to Babylon in 605 B. C., whose name was changed to ABEDNEGO (which see). (3) The name of some twelve other persons mentioned in the Old Testament, most of whom were either priests or high priests.

Aze'glio, d' (MASSIMO TAPARELLI), MARQUIS, an eminent Italian statesman, author, and artist, was born at Turin Oct. 2, 1798. He studied and worked as an artist in Rome, where he passed eight years (1821–29), and became a skilful landscape-painter. Having removed to Milan, he married a daughter of the celebrated author Manzoni. He published in 1833 a historical novel entitled "Ettore Fieramosco," which was very popular. He stimulated the national spirit and patriotism of the Italians by another popular historical romance, "Niccolo di Lapi" (1841). His political principles were liberal but moderate. He wrote numerous political treatises, and fought against the Austrians at Vicenza in 1848. In May, 1849, he was appointed president of the council (prime minister) by King Victor Emmanuel. In this position he rendered important services to his country. He was superseded by Cavour in 1852. Died Jan. 15, 1866.

Azela'ic Ac'id, one of the products of the oxidation of oleic acid by nitric acid.

Azeve'do-Couti'nho (JOZE JOAQUIM), a bishop of Pernambuco and writer, born in Brazil Sept. 8, 1742. He wrote an essay on commerce, a pamphlet against the abolition of the slave-trade, and other works. Died Sept. 12, 1821.

Az'imuth [Arab. *as sumût*, "the path," a name of the zenith], an astronomical term, denotes the angle made at the zenith by the meridian and the vertical circle in which a heavenly body is situated, or the angle measured along the horizon between the north or south pole and the point where a circle passing through the zenith and the body cuts the horizon. In trigonometrical surveys on the surface of the earth the accurate determination of the azimuth of an object is very important. It is usually performed with a theodolite. Azimuth circles or vertical circles are great circles of the sphere, passing through the zenith and intersecting the horizon at right angles.

Azobenzole, $C_{12}H_{10}N_2$, produced by reducing nitrobenzole or oxidizing benzidine. It is obtained in reddish yellow scales.

Azobenzoyl', $C_{21}H_{15}N_2$, a white crystalline powder formed by the action of ammonia on crude oil of bitter almonds.

Az'of, Azoph, or **Azov, Sea of** (the anc. *Pa'lus Mæo'tis*, called by the Russians *More Azovskoe*), is situated between Russia and the Black Sea, with which it communicates by the Strait of Yenikale or Kertch (anc. *Cimmerian Bosporus*). It extends from the Crimea to the mouth of the Don, about 200 miles, and is in some places 100 miles wide or more. Its area is estimated at 14,000

square miles. The navigation is generally obstructed by ice from November to March. This sea, the water of which is nearly fresh, contains a great abundance of fish.

Azof, or **Azov** (anc. *Tan'ais*), a small town and fort of Russia, in the government of Ekaterinoslav, near the mouth of the river Don, 25 miles E. S. E. of Taganrog. It has declined in population and importance. Its harbor is shallow. Azof was taken from the Turks by Peter the Great. It was settled by the Carians, and in ancient times had the name Tanais. After the taking of Constantinople by the Italians it passed into the hands of the Venetians, who held it until, in 1410, it was captured by the Tartars. The Christians were put to death by the captors, from whom came its present name.

Azores [Port. *Aço'res*, from *açor*, a "hawk"], or **Western Islands,** are situated in the North Atlantic, about 500 miles W. of Portugal, to which they belong, and between lat. 36° 55′ and 39° 44′ N., and lon. 25° 10′ and 31° 16′ W. They are arranged in three groups, one of which consists of Flores and Corvo. About 114 miles S. E. of this group is the central group of Terceira, St. George, Pico, Fayal, and Graciosa. St. Michael and St. Mary form the third group, which is nearly 70 miles S. E. of the central group. St. Michael, the largest of all, is 50 miles long, and varies in width from 5 to 12 miles, and has an area of 340 square miles. They are of volcanic formation, and have fertile soils, though the surface is mostly mountainous. The highest point is the Peak of Pico, which has an altitude of 7613 feet. Volcanic disturbances of a terrible character have occurred at various times. Whole towns have disappeared in opening chasms, and in 1811 an island emerged suddenly from the deep, and later disappeared. The sugar-cane, coffee-plant, orange, and grapevine flourish here, but the soil is not well cultivated. The chief articles of export are wine, brandy, grain, and oranges. The inhabitants are extremely indolent and ignorant. The land is held by feudal tenure, and under such restrictions that the farmers never think of improving it, and simply gather the products which grow wild. It is owned in immense entailed estates. The people are extremely fond of music. They are not intemperate in their habits, but are prone to the grossest superstition, and filthy in their dress and persons to the last degree. The Azores have no good harbors. The Portuguese took possession of these islands in 1449. Area, 1149 square miles. Pop. in 1868, 252,480.

Az'otized Bodies (or **Principles**) are substances which contain nitrogen (azote), and form part of the living structure of an animal or plant. Among them are albumen, fibrine, caseine, gelatine, and kreatine.

Azo'tus, the Greek name of *Ashdod*, an ancient city and stronghold of the Philistines, on the Mediterranean, 21 miles S. of Jaffa.

Azoxybenzole, $C_{12}H_{10}N_2O$, a body which crystallizes in beautiful yellow needles. It is produced by the action of potassic hydrate on an alcoholic solution of nitrobenzole.

Az'talan, a post-township of Jefferson co., Wis. P. 1261.

Az'tec Children, the name commonly applied to a boy and a girl who were taken from America to England in 1853, and were represented as descendants of the Aztecs. They were under three feet high, had long black hair, olive complexions, and very prominent noses. They were exhibited to the public for money by a person who told an incredible story of their antecedents, and pretended that they had been abducted from the ancient city of Iximaga. It was commonly believed by naturalists that they were monstrosities—dwarfs that never attained their proper development.

Az'tecs, a name of a Mexican nation which inhabited the table-land of Anahuac at the time of the Spanish conquest of Mexico. According to tradition, they came originally from Aztlan to Mexico, which was inhabited by the Toltecs before the migration of the Aztecs. It is supposed that the latter founded the city of Mexico (or Tenochtitlan) about 1325, some say as early as 1216, and became the most powerful and dominant people of Mexico or Anahuac. They made considerable progress in civilization and the useful arts, derived partly from the Toltecs. They were a warlike people, and conquered several neighboring tribes. "At the beginning of the sixteenth century," says Prescott, "the Aztec dominion reached across the continent from the Atlantic to the Pacific." The government was an elective monarchy, and the sovereign was selected from the brothers or nephews of the preceding king, so that the choice was always restricted to the same family. As they had never learned the art of alphabetical writing, their laws were exhibited to the public in hieroglyphical paintings or picture-writing. Their religion was a gross polytheism. They sacrificed human victims to their gods on a larger scale than other nations—*i. e.* about 20,000 annually. Astronomy was the science which they cultivated with most success. "We cannot," says Prescott, "contemplate the astronomical science of the Mexicans without astonishment." They were acquainted with the cause of eclipses, and they recognized some of the most important constellations. They adjusted the times of their festivals by the movements of the planets, and fixed the true length of the tropical year with great precision. An immense dial, disinterred in 1790 in the great square of Mexico, has supplied us with interesting facts. The calendar engraved on it shows that they settled the hours of the day precisely; also the periods of the solstices and equinoxes, and the transit of the sun across the zenith. The Aztecs were diligent cultivators of the soil, and had acquired respectable proficiency in agriculture, but they had no horses, oxen, or other animals of draught. Their staple productions were maize and the agave or Mexican aloe, which supplied them with food, drink, and clothing. They were ignorant of the use of iron, but found a substitute in bronze, an alloy of copper and tin, of which they made weapons and tools. They also cast golden and silver vases of large size. In mimetic art they were much inferior to the Egyptians. The Spanish conquerors of Mexico destroyed nearly all the manuscripts which they found in the country, and it is not probable that the art of reading the picture-writing will ever be recovered. "The Aztec character," says Prescott, "was perfectly original and unique. It was made up of incongruities apparently irreconcilable. It blended into one the marked peculiarities of different nations, not only of the same phase of civilization, but as far removed from each other as the extremes of barbarism and refinement. It may find a fitting parallel in their own wonderful climate, capable of producing on a few square leagues of surface the boundless variety of vegetable forms which belong to the frozen regions of the north, the temperate zone of Europe, and the burning skies of Arabia and Hindostan." (See PRESCOTT, "Conquest of Mexico," vol. i.)

REVISED BY R. D. HITCHCOCK.

Az'uline, a fine permanent blue dye prepared from certain constituents of coal-tar. (See ANILINE COLORS.)

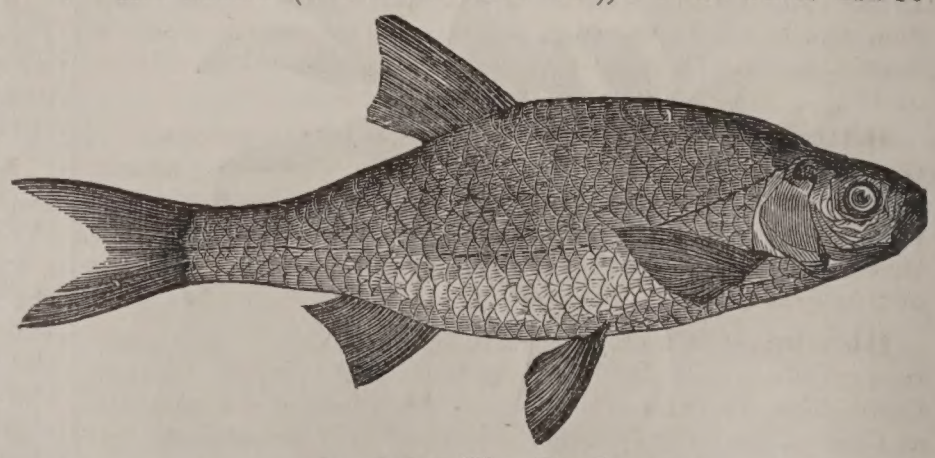
Azulin'ic Ac'id, a brown substance produced by the spontaneous decomposition of hydrocyanic (prussic) acid.

Azu'ni (DOMINICO ALBERTO), an Italian writer known from his researches in maritime law, born Aug. 3, 1749, was a judge in Genoa. He published "Droit Maritime de l'Europe" (Paris, 1805), and "Dizionario Universale ragionato della giuresprudenza mercantile" (2d ed., Livorno, 1822).

A'zure [Fr. *azur*], the fine blue color of the sky; also the blue pigment which is produced by melting a mixture of a salt of cobalt with quartz-sand and potash, and is used in coloring porcelain. In heraldry, azure is one of the colors employed in blazonry, and is represented in engraving by horizontal lines. It is equivalent to the color of sapphire among precious stones. In painting, azure is a sky-colored blue, called ultramarine.

Azure Stone. See LAPIS-LAZULI.

Az'urine (*Leucis'cus cœru'leus*), a fresh-water fish resembling the red-eye or rudd, is found in Lancashire, England (where it is called the blue roach), and in Switzerland. The color of its back is a slate-blue.



Azurine or Blue Roach.

Az'urite, a beautiful blue carbonate of copper, sometimes called **Blue Malachite.** It occurs in blue crystals which are very brittle, consequently this malachite is not well adapted for the ornamental purposes for which green malachite is so extensively used. Its composition is $2CuCO_3 + CuH_2O_2$. The most beautiful specimens are found at Chessy, near Lyons. The name *azurite* has also been applied to LAZULITE (which see).

Az'ymites [from the Gr. α, priv., and ζύμη, "leaven"], a name given to Christians who use unleavened bread in the sacrament, as the Latins, Armenians, and Maronites. The Greek and Protestant churches use the leavened bread.

B.

B, the second letter of most alphabets, is a consonant of the class known as labial mutes. It is cognate with the mutes *p* and *f*, and etymologically interchangeable with them and with the liquid *m* and the semi-vowels *w* and *v*. In ancient Rome, B sometimes stood for 300, and $\overline{B}$ for 3000. The Greek β stood for 2, and ,β for 2000. In music, B is the seventh letter in the natural diatonic scale. B also stands for *basso* as an abbreviation in music. On old French coins B stands for Rouen; on Prussian, for Breslau. B in chemistry is the symbol of the element boron. As an abbreviation, B., or b., signifies "born," and sometimes "book."

Ba'al, or **Bel,** the principal god of the Phœnicians, Chaldæans, and Carthaginians, is regarded as a personification of the sun. Among the Phœnicians, Baal was the god of the sun, the vivifier of nature, and Astarte (or Baaltis) the goddess of the moon. Baal was identical with the Bel or Belus of the Babylonians and Assyrians. The worship of Baal prevailed among the ancient Jews in the time of the prophet Elijah and earlier. (See 1 Kings xviii. and Romans xi. 4.) The word *Baal* enters into the composition of many Hebrew, Chaldee, and Carthaginian proper names, as Jezebel, Hannibal, Baal-Peor, Baal-bec ("city of Baal"), and Beelzebub.

Baal'bec, Balbec, or **Baalbek** [the final *bek* derived, perhaps, from the Arabic *bakka*, "to be thronged"], (called by the Greeks *Heliop'olis, i. e.* "city of the sun"), an ancient and magnificent city of Syria, situated in a valley or plain near the foot of Anti-Libanus, about 42 miles N. W. of Damascus; lat. 34° 1′ 30″ N., lon. 36° 11′ E., and about 3800 feet above the level of the sea. Its origin and early history are not known. It was formerly one of the most populous and important cities of Syria, and contained many palaces and monuments. Antonius Pius built here a grand temple, which subsequently became a Christian church. In 636, Baalbec fell into the hands of the Mohammedans, and in 748 was sacked by the calif of Damascus. The site is now occupied by a small modern village and extensive ruins of ancient temples, among which was the great temple of the sun. This was 324 feet long, and had a peristyle of fifty-four Corinthian columns, about seven feet in diameter and eighty-nine feet high, including capital and pedestal. Six of these columns are now standing. Some of the stones used in the walls or substructions of this temple are sixty-four feet long and twelve feet thick. The chief material of these temples was limestone or marble and granite. (See Wood and Dawkins, "Ruins of Baalbec," 1757; Cassas, "Voyage Pittoresque de la Syrie," 1799; Volney, "Voyage en Syrie;" Robinson's "Later Biblical Researches," 1852, pp. 505–527.)

Ba'ba-Dagh, a town of European Turkey, in Bulgaria, on a tributary of the Danube, is 93 miles N. E. of Silistria. It has considerable commerce with the coasts of the Black Sea, and has a Tartar high school. It was stormed by the Russians in 1771 and 1828, and was ineffectually besieged in 1854. Pop. about 10,000.

Babahoy'o, a town of Venezuela, in the province of Guayaquil, 20 miles N. E. of Guayaquil, on the Cabacol. The goods sent from Guayaquil into the interior go to this place, and are thence sent farther by mules. In consequence, there are large warehouses here. But Babahoyo is, in spite of this great trade, only a small, poorly-built town.

Bab'bage (Charles), F. R. S., an English mathematician, born Dec. 23, 1792, graduated at Trinity College, Cambridge, in 1814. He became professor of mathematics at Cambridge in 1828, and published in 1832 a work "On the Economy of Manufactures and Machinery," which was translated into several languages. Among his other works is a "Ninth Bridgewater Treatise" (1837). He invented and partly constructed a calculating-machine, which was never completed, although about £17,000 of the public money was expended on it. Died Oct. 20, 1871.

Bab'bitt (Isaac), was born at Taunton, Mass., July 26, 1799. He was a goldsmith, and made at his native town the first Britannia ware produced in this country. In 1841 he received a gold medal for his valuable invention of the alloy which bears his name. Congress also gave him $20,000. He afterwards engaged extensively in the manufacture of this alloy, and also of soap. Died insane at the McLean Asylum, May 26, 1862.

Bab'bitt's Met'al, a soft alloy invented by Mr. Isaac Babbitt of Boston, and used in lining boxes for axles and gudgeons, in order to diminish the friction and abrasion. These boxes are extensively used in the machinery of steamboats and locomotives. The alloy is prepared thus: to 4 pounds of melted copper add gradually 12 pounds of the best Banca tin, then 8 pounds of antimony, and finally 12 pounds more of tin.

Bab'cock (C. A.), U. S. N., born June 12, 1833, in the city of New York, entered the navy as a midshipman April 8, 1850, became a passed midshipman in 1856, a lieutenant in 1859, a lieutenant-commander in 1862, a commander in 1869. From 1862 to 1864 he commanded the steamer Morse, North Atlantic blockading squadron, and was repeatedly in action with Confederate batteries and troops while co-operating with our army on the James, York, and Pamunkey rivers. He was highly commended for his services by Rear-Admiral Lee, who, in the latter part of 1864, upon being appointed to the command of the Mississippi squadron, selected Babcock as his fleet-captain.

Foxhall A. Parker, U. S. N.

Babcock (Rufus), D. D., was born at North Colebrook, Conn., Sept. 18, 1798, and graduated at Brown University in 1821. He was ordained pastor of a Baptist church in Poughkeepsie, N. Y., in 1823, was president of Waterville College (1833–36), and has been pastor of churches in Salem, Mass., Philadelphia, Paterson, N. J., etc. He has published a number of biographical and religious works.

Ba'bel, or **Ba'bil,** was the Hebrew or native name of the city commonly called Babylon, which is the Greek form of the word Babel; it was also the name of a famous tower which the descendants of Noah began to build soon after the Deluge, on the plain of Shinar, but in consequence of the confusion of tongues they could not finish it. The projectors of this tower said, "Go to, now; let us build us a city, and a tower whose top may reach unto heaven, and let us make us a name, lest we be scattered abroad upon the face of the whole earth." (Genesis xi.) There is no evidence that the work was ever raised above the foundations, but several extravagant reports or traditions of its immense height have obtained currency. It is generally believed that the position of this tower was identical with the site of Babylon. Some persons have confounded the tower of Babel with the temple of Belus. Others have entertained the opinion that Birs-Nimrood, near Borsippa, is the remains of Babel. Others, again, have identified it with a ruin near Hillah. But it may well be doubted whether any remains of the tower long survived the defeat of its builders.

Bab-el-Man'deb (*i. e.* "gate of tears"), a strait which connects the Red Sea with the Gulf of Aden and the Indian Ocean. On the Arabian side of the strait is a cape called Bab-el-Mandeb. The strait is about 20 miles wide, and encloses the small rocky island of Perim, on which is a British fort. The name of Bab-el-Mandeb was given to the strait because the navigation of the sea to which it is the entrance, owing to numerous small rocky islets, was, before the introduction of steamers, extremely dangerous.

Bâ'ber, or **Babur** (Mohammed), written also **Babour,** surnamed Zaheer-ed-Deen ("protector of religion"), a celebrated emperor of India, and the first of the Great Moguls, was born Feb. 14, 1483. He was a descendant of Tamerlane (Timur-Leng). In 1494 he succeeded his father, who was king of Ferghâna. The first part of his reign was disturbed by wars with neighboring powers, and he experienced great vicissitudes of fortune. He performed remarkable exploits in war, and extended his dominions by the conquest of Kandahar, Cabul, etc. He made an incursion into the Punjâb in 1505, and a second time in 1519. Having again crossed the Indus in 1524, he defeated Ibrahim, king of Delhi, on the plain of Paniput in 1526, and became master of India. He was an able ruler, and had a genius for poetry and music. He died Dec. 26, 1530, and was succeeded by his son Humayoon. (See his autobiography, of which there is a review in Lord Jeffrey's "Essays;" R. M. Caldecott, "Life of Bâber, Emperor of Hindostan;" Ferishta, "Mohammedan Power in India," translated by J. Briggs, London, 4 vols., 1829; William Erskine's "History of India and the First Two Sovereigns of the House of Taimur," 2 vols., 1854.)

Babeuf (François Noel), a French conspirator and Socialist, who assumed the name of Caius Gracchus, was born at St.-Quentin in 1764. He founded in Paris, in 1794,

"The Tribune of the People," a journal in which he advocated equality and community of property. His disciples were called Babouvistes, and his system Babouvisme. He formed a conspiracy against the Directory, was arrested and tried, and the sentence of death being pronounced upon him, he stabbed himself with a dagger, May 23, 1797. (See SUDRE, "Histoire du Communisme" (1849).)

Babi, the Malay word for "hog," is the name of several islands in the Pacific and Indian oceans. One of these is about 85 miles W. of Sumatra, and near lat. 3° N. Length, about 40 miles.

Bab'ingtonite, a silicate of iron and calcium.

Bab'ists [in Arabic and Persian, *Bâbî*], a Mohammedan sect which originated in Persia in the second quarter of the present century. It is said to derive its name from a prophet named Bâb, who was shot by order of the king of Persia in 1835. Many of the early Babists took up arms to propagate or defend their religion, and no inconsiderable numbers were taken and put to death; but this does not appear to have checked the spread of the new doctrines. The adherents of Babism are said at present to amount to several millions. They profess to be reformers, assert the absolute unity of God, and claim that Bâb is as much superior to Mohammed as the latter is to Christ.

Bab'lah, the fruit of several species of acacia. It contains tannic acid and a red coloring-matter. It is used in dyeing and calico-printing for fawn colors.

Ba'boo, a Hindoo title equivalent to the English "Mr.," is usually given to gentlemen who are educated and wealthy. The Baboos are noted for generosity and public spirit, and are liberal in religion. Many of them are bankers and merchants.

Baboon' (*Cynoceph'alus*), a genus of Old World monkeys, distinguished by long truncated muzzles and cheek-pouches. Its face has a general resemblance to that of a

Common Baboon and Monkey.

dog, and the ridges over the eyes are very distinct. Baboons have callosities on the buttocks, and a repulsive physiognomy, which indicates the ferocity of their disposition. They walk or run easily on the ground, and climb trees with agility. They are exceedingly strong, cunning, and mischievous. Troops of these animals sometimes enter a plantation for plunder, and destroy much besides what they eat and carry away in their cheek-pouches. They are chiefly found in Africa and Southern Asia. They feed mostly on fruits and vegetables. The genus is divisible into two groups—the baboons proper, which have long tails, and the mandrills, which have very short tails. As examples of baboons of the first group may be mentioned the chacma, or pig-faced baboon, also called the ursine baboon (*Cynocephalus porcarius*), a native of South Africa, and the dog-faced baboon (*Cynocephalus hamadryas*), a native of Arabia, Persia, and Abyssinia. The latter species is often sculptured on the ancient monuments of Egypt, and it is supposed to have been the "Thoth" baboon to which divine honors were paid. It was frequently embalmed, and the mummies are still found. The chacma is one of the largest of the baboons, about the size of an English mastiff. The mandrill, or rib-nosed baboon (*Cynocephalus mor'mon*), a native of Guinea, is the largest, ugliest, and fiercest of the whole genus. Its muzzle is marked with blue and scarlet ribs. It is scarcely possible to imagine anything more hideous than its aspect. Numerous other species are known to the later naturalists.

Ba'brius, or **Babrias,** a Greek fabulist who is supposed to have lived a short time before the Augustan Age. He made a collection of fables ascribed to Æsop, and turned them into verse. Some of them were the original works of Babrius. In 1844, Minoides Minas discovered in the East a manuscript of 123 fables of Babrius, which were published in Paris in 1844.

Babuya'nes Islands, a group of small islands in the Pacific Ocean, between Formosa and the Loo Choo Islands. They are of volcanic formation, and very fertile. Among the largest of them are Calayan and Babuyan. Large quantities of sulphur are obtained on these islands. Pop. about 8000. Chief town, Batan.

Bab'ylas, SAINT, bishop of Antioch from 237 to 250 A. D., when he suffered martyrdom. Miracles are reported in connection with his remains. Chrysostom wrote a book about him in 382, and in 387 delivered a discourse in commemoration of him.

Bab'ylon [Gr. Βαβυλών; Heb. *Babel*], an ancient and celebrated city of Chaldæa, was situated in the plain of Shinar, on both sides of the river Euphrates, about 60 miles S. of Bagdad; lat. 32° 28′ 30″ N., lon. 44° 9′ 45″ E. Its site is partly occupied by the modern town of Hillah. It is generally believed that it was built near Babel, which is mentioned in Genesis (chap. x.) as the beginning of Nimrod's kingdom. We have no subsequent notice of Babylon or Babel in the Hebrew sacred history until the reign of Hoshea, about 730 B. C., when the people of Samaria were carried away captive to Assyria. (2 Kings xvii. 24.) The statements of ancient historians in relation to the origin of this city are confused and discordant. According to Greek tradition, it was founded by Semiramis or Belus, but Berosus affirms that this story is a fiction of the Greeks. The earliest historian who gives a description of Babylon is Herodotus, whose testimony is that of an eye-witness. He visited it about 450 B. C., but he does not inform us who founded the city. He says Babylon, which after the fall of Ninus (Nineveh) became the capital of the Assyrian empire, had already been ruled by several kings and by two remarkable queens, Semiramis and Nitocris. He states that the form of the city was a square, each side of which was 120 stadia (about fourteen miles) in extent, that it was enclosed by brick walls, the height of which was 200 royal cubits (about 335 English feet), and the breadth or thickness was 50 cubits (about 85 feet). Pliny, however, gives 235 feet as the height of these walls, which were reckoned among the Seven Wonders of the World. It is supposed that a large part of the space enclosed by them was occupied by gardens, orchards, and open fields. The houses were built of bricks, and the streets, which were wide, crossed each other at right angles. "Babylon," says G. Rawlinson, "was probably the largest and most magnificent city of the ancient world." The prophet Isaiah, who lived about 300 years before Herodotus, describes it (chap. xiii. 19) as "the glory of kingdoms, the beauty of the Chaldees' excellency." There is reason to believe that Babylon attained its highest prosperity and splendor in the reign of Nebuchadnezzar, who, inflated with pride and success, once exultingly asked, "Is not this great Babylon, that I have built for the house of the kingdom, by the might of my power, and for the honor of my majesty?" (Daniel iv.) The most remarkable buildings of this city were two royal palaces, one on either side of the river, and the great temple of Belus. Connected with one of these palaces was the "hanging garden," which the Greeks regarded as one of the Seven Wonders of the World. This singular structure, which is ascribed to Nebuchadnezzar, was a square, each side of which measured 400 Greek feet. It was supported on several tiers of open arches, built one over the other like the walls of a classic theatre, and sustaining at each stage or story a solid platform from which the piers of the next tier of arches rose. The top of the building, which was about seventy-five feet high, was covered with a large mass of earth, on which grew not only flowers and shrubs, but trees of a large size. Herodotus gives a description of the temple of Belus, the chief feature of which was the *Zigurat* or tower, a huge solid mass of brickwork, built with receding stages, square being emplaced on square, so as to form a rude pyramid, on the top of which the shrine was placed. The number of stages was eight, and the height of the tower, according to Strabo, was about 600 feet. "When we turn," says G. Rawlinson, "from this picture of the past to contemplate the present condition of the localities, we are at first struck with astonishment at the small traces which remain of so vast and wonderful a metropolis. The broad walls of Babylon are utterly broken down." God has "swept it with the besom of destruction."

(Isaiah xiv. 23.) On its site are visible no pillars, arches, or ruins in the common acceptation of the term, but the traveller finds here many heaps or mounds, some of which are of enormous size, scattered over the plain, so as to verify the prophecy of Jeremiah, "Babylon shall become heaps" (chap. li.). Between the "heaps" the soil is in many places filled with fragments of pottery and bricks, and impregnated with nitre, indicating that it was once covered with houses. Prominent among the remains of Babylon is the Babil mound, a pile of brickwork about 140 feet high, which is supposed to be the ruins of the temple of Belus. The palace of Nebuchadnezzar is identified with a mound which the native Arabs call *El-Kasr* ("the castle"), in which are found fragments of alabaster vessels, fine earthenware, and bricks of excellent quality stamped with the name of Nebuchadnezzar. According to M. Oppert, several slabs found in the Kasr mound bear the following inscription: "Grand palace of Nebuchadnezzar, king of Babylon, son of Nabopolassar, who walked in the worship of Nebo and Merodach his lords." About 6 miles S. W. of Hillah is a ruined building which the natives call Birs-i-Nimrood, which, says G. Rawlinson, "strikes moderns with more admiration than any other now existing in the country." It consisted of seven receding stages, representing the seven planetary spheres, and each stage painted with a different color. The first or basement stage was a square, each side of which measured 272 feet; the second stage was 230 feet square, and had a vertical height of 26 feet; the third stage was 188 feet square and 26 feet high; the fourth stage was 146 feet square; and the others diminished in a similar ratio. From the ruins of Babylon successive generations obtained materials with which Seleucia, Ctesiphon, and other great cities were built.

History.—About 1270 B. C. the Assyrian kings became masters of Chaldæa or Babylonia, of which Babylon was the capital. This country was afterwards ruled by an Assyrian dynasty of kings, who reigned at Babylon, and sometimes waged war against those who reigned in Assyria proper. At other times the kings of Babylon were tributary to those of Assyria. Several centuries elapsed in which the history of Babylon is almost a blank. In the time of Tiglath-pileser of Assyria, Nabonassar ascended the throne of Babylon in 747 B. C. He is celebrated for the chronological era which bears his name, and which began in 747 B. C. About 720, Merodach-baladan became king of Babylon, and sent ambassadors to Hezekiah, king of Judah (see 2 Kings xx. and Isaiah xxxix.). A few years later Sargon, king of Assyria, defeated and dethroned Merodach-baladan. Sennacherib completed the subjection of Babylon, which he annexed to the Assyrian empire about 690 B. C. The conquest of Nineveh and the subversion of the Assyrian empire, which was effected about 625 B. C. by Cyaxares the Mede and his ally Nabopolassar, the rebellious governor of Babylon, enabled the latter to found the Babylonian empire, which was the fourth of Rawlinson's "Five Great Monarchies," and included the valley of the Euphrates, Susiana, Syria, and Palestine. His reign lasted about twenty-one years, and was probably pacific, as the history of it is nearly a blank; but in 605 B. C. his army defeated Neco, king of Egypt, who had invaded Syria. He was succeeded by his more famous son, Nebuchadnezzar (604 B. C.), who was the greatest of the kings of Babylon. According to G. Rawlinson, "It is scarcely too much to say that but for Nebuchadnezzar the Babylonians would have had no place in history. At any rate, their actual place is owing almost entirely to this prince, who to the military talents of an able general added a grandeur of artistic conception and a skill in construction which place him on a par with the greatest builders of antiquity." Our records of his history are derived almost entirely from the Bible—*i. e.* the Second Book of Kings, Second Chronicles, Jeremiah, and Daniel. Zedekiah, king of Judah, having revolted, Nebuchadnezzar captured Jerusalem about 588 B. C., burned the great temple of Solomon, and carried away the Jews as captives to Babylon. (See BABYLONISH CAPTIVITY.) He also took Tyre and conquered Egypt, and became without doubt the most powerful monarch of his time. He promoted the Hebrew prophet Daniel to the second place in the kingdom. (For an account of his character, his marvellous experience, his loss of reason, and his restoration, the reader is referred to the Book of Daniel.) He died in 561 B. C., and was succeeded by his son, Evil-merodach, who reigned only two years. Nabonadius (or Labynetus), who became king in 555 B. C., formed an alliance with Crœsus against Cyrus the Great. He appears to have shared the royal power with his son Belshazzar, whose mother was a daughter of Nebuchadnezzar. Cyrus besieged Babylon, which he took by stratagem in 538 B. C., and with the death of Belshazzar, whom the Persians killed, the kingdom of Babylon ceased to exist. Alexander the Great died in Babylon, which he had selected as the capital of his empire. (See RICH, "Memoirs on the Ruins of Babylon," 1818; Sir R. K. PORTER, "Travels;" LAYARD, "Nineveh and Babylon;" RAWLINSON, "Herodotus," 1858; RAWLINSON, "Five Great Monarchies of the Ancient Eastern World," 4 vols., 1860–67; 2d ed. in 3 vols., 1871; MIGNAN, "Travels in Chaldæa," 1829.)

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Bab'ylon, a post-village and township of Suffolk co., N. Y., is on South Bay, and on the South Side R. R. of Long Island. It contains 4 churches, 6 hotels, 4 mills, 2 manufactories, and 1 weekly paper. It is connected with Fire Island by horse railroad and steam ferry, and is famed for the salubrity of its climate, and much frequented as a summer resort. Pop. of village, 1225.

H. LIVINGSTON, ED. "SIGNAL."

Babylo'nia, or **Chaldæ'a,** an ancient country of Asia, which the Scriptures call "the land of Shinar" and "the land of the Chaldees." It coincided nearly with the modern Irak-Arabee. Babylonia proper was a part of the great Mesopotamian plain, and was that alluvial tract which intervenes between the Arabian desert and the river Tigris, and was situated on both sides of the Euphrates. It extended from the Persian Gulf north-westward more than 300 miles, and had an area of about 23,000 square miles. The distance is *now* 430 miles, and the area about 30,000 square miles; but the Persian Gulf then ran up 120 miles farther than now. The great and almost sole physical features of this level region were the rivers Euphrates and Tigris, the former of which is navigable about 1200 miles from its mouth. It receives no tributaries from the right in the lower part of its course for a distance of 1000 miles or more, and few from the left, except the Tigris, so that its volume diminishes as it approaches the sea. The plain through which it passes is a dead level, and remarkable for its featureless character. The fertility of its soil in ancient times was proverbial. "Of all countries that we know," says Herodotus, "there is none that is so fruitful in grain, of which it yields commonly two hundred fold." The soil was irrigated by canals, and was well cultivated. The date-palm flourished here, and furnished several products of great value. Babylonia was favorably situated for commerce, and her people were among the most commercial nations of the ancient world. The Babylonians—the Chaldæans of the Hebrew prophets—were a mixed race, in which the dominant element was Semitic. They were distinguished for their intellectual ability, their high civilization, and martial spirit. Their "wisdom and learning" are attested by the prophets Isaiah and Jeremiah: "Thy *wisdom* and thy *knowledge*, it hath perverted thee" (Isaiah xlvii. 10). The luxury of the Babylonians is often censured by both sacred and profane writers. The Chaldæans excelled other ancient nations in astronomy, and were especially addicted to the study of astrology. They attained superior skill in architecture, although they had no better material than brick. Two of their structures, the walls of Babylon and the "hanging garden," were reckoned among the Seven Wonders of the World. Their grand temples and palaces were built of kiln-dried bricks of square form, and very hard and durable. The finest quality of brick was yellow. Brick or clay was also the material on which they wrote and made cuneiform inscriptions. Agriculture and commerce were the chief occupations of these people, who also excelled in the manufacture of textile fabrics and carpets. The Babylonian empire, which was the fourth of the five great Oriental monarchies, included, besides Babylonia proper, Susiana (Elam), Mesopotamia, Syria, Palestine, Idumea, and part of Arabia. (For an outline of its history see BABYLON.) The government was a loose organization of provinces under native princes, who paid tribute, but frequently revolted against the sovereign, who failed to win the affection of the subject nations. "Babylonian civilization," says G. Rawlinson, "differed in many respects from Assyrian, to which, however, it approached more nearly than to any other known type. Its advantages over the Assyrian were in its greater originality, its superior literary character, and its comparative width and flexibility. . . . Babylonia, so far as we know, drew her stores from no foreign country. To Babylonia, far more than to Egypt, we owe the art and learning of the Greeks. It was from the East, not from Egypt, that Greece derived her architecture, her sculpture, her science, her philosophy—in a word, her intellectual life."

REVISED BY R. D. HITCHCOCK.

Babylo'nish Captiv'ity. In the Hebrew sacred history there occurs frequent mention of the fact that the Israelites were carried away captive to Babylon. It was a part of the policy of the kings of Assyria and Babylon to transport a large part of the population of conquered countries and plant them in a distant part of the empire. One

political object of this deportation was the more easy government of a people separated from local traditions and associations. The captives were not enslaved or treated with severity, but they enjoyed probably the same privileges as the other subjects of the empire, and some of them were raised to the highest official positions. Sargon took Samaria in 721 B. C., and carried the ten tribes of Israel away to Assyria. The great Babylonish captivity of the Jews occurred in the reign of Nebuchadnezzar, who in 586 B. C. deposed Zedekiah, king of Judah, burned the temple at Jerusalem, and transported the Jews to Babylon. The tribes of Judah and Benjamin, by the permission of Cyrus the Great, returned to Palestine about 536 B. C., but the other ten tribes remained in exile, and disappeared from history. The seventy years are reckoned from 605, the date of Nebuchadnezzar's first invasion, when Daniel and his friends were carried captive.

Babyrous'sa (*Babyroussa alfurus*), an animal of the hog family, is a native of Borneo, Java, and the Molucca Islands. It is remarkable for the long tusks of the upper jaw, which are curved backward and resemble horns. Its legs are more slender than those of the hog.

Babyroussa.

Bacchana'lia (called by the Greeks *Dionysia*), the feasts and orgies of the votaries of Bacchus among the ancient Greeks and Romans. On account of the licentious practices and drunkenness which prevailed on these occasions, they were prohibited by the Roman senate in 186 B. C. In modern language the term is applied to wild revels and intemperate feasts.

Bacchan'tes [the plural of *bac'chans*, the present part. of the Latin verb *bacchor*, to "revel" or "riot"], the Latin term for those, whether male or female, who joined in the orgies of Bacchus among the ancient Greeks and Romans. Their conduct was very disorderly. They danced, swung about the thyrsus, and made a great noise. According to an ancient poetical legend, Orpheus was torn to pieces by some female Bacchantes.

Bac'chus [Gr. Βάκχος], the god of wine, was called Dionysus by the Greeks, and sometimes Liber by the Romans. He was said to be the son of Jupiter and Semele, or, according to one tradition, of Ammon, king of Libya, and Amalthea. He taught men the culture of the vine, and first produced from grapes an intoxicating drink. His worship was spread over many countries of the world, and the myth of Bacchus was variously modified by different peoples. Bacchus is usually represented as an effeminate young man, crowned with vine or ivy leaves, with a *thyrsus* in his hand. His votaries carried sticks or staves called *thyrsi* (sing. *thyrsus*), which were bound with leaves of the ivy and vine. He is said to have performed a successful expedition to India. The Greek festivals in honor of Bacchus were called *Dionysia*. (See Bacchanalia and Bacchantes.)

Bacciochi (Marie-Anne-Élise). See Bonaparte.

Bach, the name of a celebrated German family which for upwards of two centuries was distinguished for musical talent and produced more than fifty distinguished artists.—Veit Bach, the founder of the family, was a native of Presburg, in Hungary, and emigrated to Thuringia about 1600. Besides the great Johann Sebastian (1685–1750), other eminent members of the family were Johann Christian, called the "Milanese Bach" (1735–82); Johann Christoph (1643–1703), with his sons Johann Christoph and Johann Nikolaus; also Karl Philipp Emanuel (1714–88) and Wilhelm Friedmann (1710–84).

Bach (Johann Sebastian), youngest son of Johann Ambrosius, court-musician of Eisenach, born there Mar. 21, 1685, the most distinguished of the remarkable family of Bach, and one of the great musicians of the world. A North German and a Protestant, he was a patriarch and founder of German music, and has been not inaptly termed the Albert Dürer of his art. An extraordinary talent, united with enthusiasm and tireless industry, made his whole long life, from childhood on, a career of acquisition and greatness. Early throwing aside the traditions of the Italian school, he penetrated by severe study the secrets of musical science, sought the boldest masters, and pursued the most rigorous methods. Music in every style interested him—instruments of all kinds, but the organ was his great delight. He walked miles, as a boy, to hear a master's performance on that instrument. Such ability and enthusiasm were recognized from the first. Bach was spared the struggle with poverty, and rapidly, by his own efforts, rose to eminence. He had, till his voice became manly, sung treble in a choir at Lüneburg; at eighteen he was a violinist at the court of Weimar; at twenty he filled the place of organist at Arnstadt; at twenty-one he was at Mühlhausen; at twenty-two he was at Weimar again as court-organist; seven years later he resigned that most honorable position for that of concert-master to the duke, an office demanding high capacity, imposing varied responsibilities, and offering rich opportunity for study and practice in composition. His industry at this period was marvellous. Here, however, his stay was short. In 1723—in the mean time he had passed six years as chapel-master to the court at Köthen, capital of the duchy of Anhalt-Köthen—the city authorities of Leipsic chose him to the place of musical director of the St. Thomas School; he was thirty-eight years old. Here for the rest of his life, twenty-seven years, he lived, honored and happy, in the bosom of a large family, for he had ten sons, all musicians—beloved by numerous pupils, and occupied with the art he had done so much to create. Died at Leipsic July 28, 1750.

Bach's compositions were numerous, original, and in many styles. He wrote for voice and instrument—for orchestra, organ, pianoforte, instruments of wood and metal, himself being a performer on them all. He wrote for sacred occasions masses, oratorios, concerted pieces of every kind; his preludes, fugues, cantatas are famous; but his stately genius unbent at festive occasions, births, and weddings; and even comedy was not out of his range. In nearly every field of his art he was a discoverer—in some he was a prophet of future discoveries. The fame of Bach has been increasing since his death. For generations to come they who would study the difficult science of music will go to him, as students of literature or painting go to the grand masters. O. B. Frothingham.

Bache (Alexander Dallas), LL.D., a distinguished educator and scientist, born July 19, 1806, died Feb. 17, 1867, a native of Philadelphia, great-grandson of Benjamin Franklin, received his higher education at the U. S. Military Academy, where he graduated in 1825 at the head of his class. After serving there as assistant professor for one year, and on military engineering duty for two more, he was called to the chair of natural philosophy and chemistry in the University of Pennsylvania, which position he filled with great success for eight years, during which he was also constantly engaged upon scientific researches in physics and chemistry, and as member of the Franklin Institute conducted important experiments on steam-boiler explosions and kindred matters. In 1836 he was appointed president of Girard College, then about to be organized, and went to Europe to study the systems of education and methods of instruction and discipline adopted there. His report on education in Europe (1839), embodying the results of his studies, has done very much to improve the theory and art of education in America. The Girard College not being ready to go into operation, Bache undertook the organization of the school-system of Philadelphia; after accomplishing which he resumed his old chair at the university. He established at Girard College, and during five years directed, a magnetical and meteorological observatory, supported by the American Philosophical Society, of which he was a member. The results of these observations, which were made in correspondence with other observations in different countries, have largely added to our knowledge of terrestrial magnetism. In 1843 he was appointed superintendent of the U. S. coast survey, which important position he filled to the end of his life, displaying the highest administrative ability, combined with all the scientific knowledge requisite for the successful prosecution of that important work. By the confidence with which he inspired the government he was enabled largely to increase the scale of expenditure for the survey, resulting in a still greater ratio of progress. He omitted no opportunity of securing for science the collateral results that could be gathered during the prosecution of the work; he organized a systematic exploration of the Gulf Stream, an extended series of tidal observations, on the magnetism of the earth, on the direction of the winds, and instituted researches in regard to the bottom of the ocean within soundings, and the forms of animal life existing there. His annual reports to Congress are a monument, not only of his administration, but also of his personal investigations in regard to the subjects named, and many others connected with the improvement of methods of geodesy. In addition to the direction of the coast survey, Prof. Bache had, *ex officio*, charge of the construction of standard weights and measures for the U. S., and was a member of the light-house board. As a regent of the Smithsonian Institution from 1846 to the end of his life, he had a large share in shaping its operations. During the civil war he was active as a member of the Sanitary Commission, and in directing the resources of the coast survey to the assistance of the naval and military forces. When, in 1863, the National

Academy of Sciences was organized by Congress, Prof. Bache, as the acknowledged leader of science in the country, was elected its president; nor were his distinguished services to science less acknowledged abroad, as evinced by his election to membership of the most prominent scientific bodies of Europe. Prof. Bache married Miss Nancy Clarke Fowler of Newport, but had no issue. He left his property in trust to the National Academy of Sciences, the income to be devoted to researches in physical science. Died at Newport, R. I., after a lingering illness, on the 17th of Feb., 1867. J. E. HILGARD.

Bache (BENJAMIN FRANKLIN), an American journalist, son of Richard Bache, noticed below, was born in Philadelphia Aug. 12, 1769. He went to Europe with Dr. Franklin, and while there learned printing and type-founding in the famous establishment of Didot Brothers. After his return he established a paper called the "General Advertiser," the influence of which was in opposition to the administrations of Washington and Adams. Died Sept. 10, 1798.

Bache (FRANKLIN), M. D., a son of the preceding, was born in Philadelphia Oct. 25, 1792. He graduated at the University of Pennsylvania in 1810. He published a "System of Chemistry for the Use of Students of Medicine" (1819), became professor of chemistry in the Philadelphia College of Pharmacy in 1831, and obtained the same chair at the Jefferson Medical College in 1841. He was one of the authors of Wood and Bache's "Dispensatory of the United States," a work of much merit and an acknowledged standard of authority. Died Mar. 19, 1864.

Bache (GEORGE M.), U. S. N., born Nov. 12, 1840, in the District of Columbia, graduated at the Naval Academy in 1860, became a lieutenant in 1862, and a lieutenant-commander in 1866. He commanded the iron-clad Cincinnati during her various engagements on the Mississippi River, and until she was sunk by the Vicksburg batteries May 27, 1863. His conduct in this last affair elicited the admiration of Admiral Porter and General Sherman, and the secretary of the navy, Gideon Welles, in his "letter of thanks to Lieutenant-Commander Bache," says: "Amidst an incessant fire of shot and shell, even when the fate of the vessel had been sealed, and destruction both from the elements and the enemy was threatened, the officers and men appear to have stood bravely at their posts; and it is a proud record of the Cincinnati that when her last moments came she went down with the colors nailed to the mast. It is with no ordinary pleasure that I express to you, and to the surviving officers and crew of the Cincinnati, the department's appreciation of your brave conduct." He was in command of a little squadron of three vessels, the Tyler, the Naumkeag, and Fawn, in the very spirited action of June 24, 1864, at Clarendon, Ark., where in forty-five minutes he drove the enemy from their battery of seven guns, capturing guns, ammunition, and stores. He was in both attacks on Fort Fisher, and led the men of the Powhatan in the naval assault on the fort Jan. 15, 1865, where he was wounded in the right shoulder. Referring to this assault, Rear-Admiral Porter, in his despatch of Jan. 28, 1865, says: "Nowhere in the annals of war have officers and sailors undertaken so desperate a service. The names of some of these officers will be found on record on the files of the department, among which those of Lieutenant-Commander T. O. Selfridge and Lieutenant George M. Bache will be found most conspicuous."

FOXHALL A. PARKER, U. S. N.

Bache (HARTMAN), an American officer, great-grandson of Dr. Franklin, born Sept. 3, 1798, at Philadelphia, Pa., graduated at West Point in 1818, colonel of engineers Mar. 3, 1863, served chiefly as topographical engineer on surveys for coast defence, naval dépôts, harbor and river improvements, roads, and canals, and for lighthouse sites 1818–47, in constructing Brandywine screw-pile lighthouse and ice harbor, Del., 1848–51, on engineer boards 1852–55, as lighthouse engineer 1852–70, in charge of military roads on Pacific coast 1855–58, in topographical bureau, Washington, D. C., 1861–62, in charge 1861, and member of lighthouse board 1862–70. Became brevet brigadier-general U. S. A. Mar. 13, 1865, for long, faithful, and meritorious services, and retired from active service May 7, 1867. Died Oct. 8, 1872, at Philadelphia, Pa., aged 74.

GEORGE W. CULLUM, U. S. A.

Bache (RICHARD), an Englishman, born Sept. 12, 1737, emigrated to the U. S., and in 1767 married Sarah, only daughter of Benjamin Franklin. He became postmaster-general of the U. S. in 1776. Died in July, 1811.

Bache (SARAH), wife of Richard Bache, noticed above, and only daughter of Dr. Benjamin Franklin, was born in Philadelphia Sept. 11, 1744. She was a very accomplished lady, and was distinguished for her efforts to relieve the sick and disabled soldiers of the Revolution. Died Oct. 5, 1808.

Bach'man (JOHN), D. D., LL.D., an American naturalist, born in Dutchess co., N. Y., Feb. 4, 1790. He was pastor of a German Lutheran church at Charleston, S. C. He contributed to Audubon's great work on ornithology, and wrote the principal part of the work on the quadrupeds of North America, which was illustrated by Audubon and his sons. Among his other works is "Characteristics of Genera and Species, as applicable to the Doctrine of the Unity of the Human Race" (1854). Died Feb. 25, 1874.

Bach'mut, a Russian town, in the province of Ekaterinoslav, 127 miles S. E. of Kharkov. In the vicinity are large coal-mines. It manufactures much tallow, and is a market for meat and grain. Pop. 10,482.

Back (Sir GEORGE), F. R. S., D. C. L., an English navigator, born in Stockport Nov. 6, 1796. He accompanied Sir John Franklin on his Arctic voyage in 1819, and in 1833 commanded an expedition sent out in search of Capt. Ross. He wrote an account of this voyage, entitled "A Narrative of the Expedition along the Shores of the Arctic Ocean in 1833–34." He became an admiral in 1867.

Back Creek, a township of Frederick co., Va. P. 1895.

Back Creek, a township of Randolph co., N. C. Pop. 1212.

Back'gammon, a game of combined skill and chance, played upon a peculiar board or table with men and with dice. The men are of two colors, and the table is divided into two compartments, each with two sets of points, of which there are twenty-four in all. Upon these points the men are placed in playing, and their movements are determined by throws of the dice alternately made by each player; but the rules of the game are such that much skill may be exercised in executing the movements of the men as indicated by the dice. The object of the game is for the player to bring his own men into his own inner table, and to prevent his adversary from doing the same. There are several games of backgammon, for which the rules are given in "Hoyle's Games." Backgammon is a very ancient recreation, and is by many authorities said to have originated in England, or perhaps in ancient Britain.

Back'huysen, or **Bakhuysen** (LUDOLF), a celebrated Dutch marine-painter, born at Emden Dec. 18, 1631. He was a close student of Nature, and often ventured out to sea during storms. His paintings are said to express the poetry of the sea. Among his works is a marine view which the magistrates of Amsterdam presented to Louis XIV. of France. Died in 1709.

Back Swamp, a township of Robeson co., N. C. P. 800.

Back'us (AZEL), D. D., a nephew of Charles Backus, noticed below, was born at Norwich, Conn., Oct. 13, 1765, graduated at Yale 1787, in 1791 succeeded Dr. Bellamy as pastor of the Congregational church in Bethlehem, Conn., in 1812 was chosen first president of Hamilton College, and died Dec. 9, 1817. He took great interest in political questions, was an eloquent preacher, and a successful teacher and disciplinarian. He published only a few sermons.

Backus (CHARLES), D. D., was born at Norwich, Conn., Nov. 5, 1749, graduated at Yale 1769, was settled over the Congregational church in Somers, Conn., in 1774, and died there Dec. 30, 1803. For many years he was accustomed to receive theological students into his family. Nearly fifty were trained by him, among whom were Dr. Woods of Andover, President Moore of Amherst College, President Davis of Hamilton College, and several other distinguished men. He published many sermons.

Backus (Rev. ISAAC), born at Norwich, Conn., Jan. 9, 1724, ordained pastor of a Separatist church in Titicut (a parish of Bridgewater and Middleboro'), Mass., April 13, 1748, preached in Titicut till his death, which occurred Nov. 20, 1806. In 1751, Mr. Backus espoused Baptist principles, and soon became one of the most active and influential ministers of that denomination. He was for thirty-four years a trustee of Rhode Island College (now Brown University), was in 1774 agent of the Warren (R. I.) Association to advocate before Congress equal privileges for all religious denominations, and in 1788 delegate from Middleboro' to the Massachusetts convention which ratified the Federal Constitution. In 1777–84 Mr. Backus published "A History of New England, with especial reference to the Baptists," a work which is still of value to the general student of the history of New England, and especially so to one who is studying the progressive recognition of the principles of religious liberty in America. A new edition (carefully edited by Prof. David Weston of Madison University) was published by the Backus Historical Society, Newton Centre, Mass., in 1871, 2 vols. 8vo.

Backus (JAY S.), D. D., born Feb. 17, 1810, at Gran-

ville, Washington co., N. Y., educated at Granville Academy and Hamilton, N. Y., pastor of Baptist churches in Groton, Auburn, N. Y., and Syracuse, N. Y., now (1873) and for many years past the earnest and efficient secretary of the American Baptist Home Mission Society.

Baco'li, a village of Italy, near Naples. It is on the site of the ancient *Villa Bauli*, which was the seat of the country residences of the ancient Romans. Many ruins are found here.

Bacolor', a town on Luzon, one of the Philippine Islands, is the capital of the province of Pampanga. It is near the river Pampanga, and 38 miles N. W. of Manila. Pop. about 8500.

Ba'con, a township of Vernon co., Mo. Pop. 813.

Bacon, a township of Charlotte co., Va. Pop. 3683.

Bacon (Ezekiel), LL.D., born in Stockbridge, Mass., Sept. 1, 1776, graduated at Yale in 1794, was one of the chief-justices of the Massachusetts court of common pleas in 1813, first comptroller of the U. S. treasury (1813–15), and a member of Congress from Massachusetts (1807–13). Died at Utica, N. Y., Oct. 18, 1870.

Bacon (Francis), [in Latin *Francis'cus Baco'nus*], Baron Ver'ulam, Viscount Saint Albans, one of the most illustrious of modern philosophers, was born in London Jan. 22, 1561. His father, Sir Nicholas Bacon, was lord keeper of the great seal under Elizabeth. His mother, a lady of fine talents, whose maiden name was Anne Cooke, was a sister of Mildred, the second wife of Lord Burleigh. Bacon, soon after he had completed his twelfth year, was sent to Cambridge, where he is said to have distinguished himself by his diligence and by his rapid progress in his studies. While at the university he conceived, it is said, a decided dislike to the philosophy of Aristotle as it was then taught in the schools. Soon after leaving Cambridge he visited France, in order to acquire the French language and to continue his studies on the Continent, but his father's death, in 1579, obliged him to return to England. In 1582 he was admitted to the bar, and became in 1589 member of Parliament, and in 1590 counsellor-extraordinary to the queen—a distinction almost without example for one so young. Ben Jonson speaks in the highest terms of his gifts as an orator; he tells us that Bacon "commanded when he spoke, and had his judges angry or pleased at his devotion. No man had their affections more in his power. The fear of every man that heard him was, that he should make an end." Lord Burleigh, though Bacon's uncle by marriage, appears rather to have retarded than aided the promotion of his nephew. The latter, left wholly to his own exertions, applied himself diligently to his profession, and at length acquired a lucrative practice. He became in 1594 a candidate for the office of solicitor-general, but was unsuccessful. The earl of Essex, who appears to have conceived a warm and sincere friendship for Bacon, in order to console him under his disappointment made him a present of an estate near Twickenham worth £1800 sterling, which in real value was, in all probability, nearly if not quite equal to ten times that number of pounds at the present day.

It appears to have been Bacon's aim for many years to acquire a fortune by a wealthy marriage. He paid court to a rich widow by the name of Hatton, but, though aided by the intercession of Essex, who was then in great favor at court, he was not successful; which, according to Macaulay, was a very fortunate circumstance for Bacon. The lady afterwards married Bacon's rival and enemy, Sir Edward Coke, and "did her best to make him as miserable as he deserved to be." When Essex, seduced by a wild and reckless ambition, embarked on those schemes which afterwards led to his death on the block (see Essex), Bacon appears to have used whatever influence he had in order to mitigate the resentment of the queen against her misguided kinsman. Unhappily for his reputation, he was induced by the desire to advance his interest at court—for we can scarcely suppose he was influenced by a sense of duty—to abandon the office of intercessor, and to take an active and prominent part in the prosecution of his former friend. And worse still, after the death of Essex, in order to vindicate the conduct of the queen, he employed his talents and eloquence to blacken the character of his benefactor. After the accession of James I., Bacon appears to have enjoyed the highest favor at court. He was knighted before the king's coronation. His law practice had now become, if not very extensive, at least very lucrative. In 1606 he married Alice Barnham, the daughter of a rich London merchant. He had previously been appointed king's counsel, and in 1607 he was made solicitor-general. He became in 1613 attorney-general and a member of the privy council. He was selected by the king as his agent to conduct the prosecution against Peacham, in which affair Bacon is accused of having sought, against law and justice, to obtain the opinions of the judges before the case came up for trial. Bacon was appointed in 1617 keeper of the great seal, and in January of the ensuing year he was made lord high chancellor of England, the highest civil office to which any subject could then attain. In the following July he was created Baron Verulam, and admitted to a seat in the House of Peers. In 1619 he became Viscount Saint Albans, and in 1620 published his greatest work, the Novum Organum (which see). The cup of his prosperity and fame appeared to be full to overflowing, but a great reverse was near. It seemed as if Fate had raised him to the highest pinnacle of greatness that his fall might be the more tragic and more conspicuous. He was accused of accepting bribes by a man named Waynham, against whom Bacon had decided a suit in chancery. A committee of the House of Commons was appointed to inquire into the case, which was referred to the House of Lords as the only legitimate tribunal for trying it. At the beginning of the trial Bacon strongly asserted his innocence, but he subsequently abandoned his defence and confessed his guilt. He was sentenced (May 3, 1621) to pay a fine of forty thousand pounds, and to be imprisoned at the king's pleasure. James was disposed to show him every indulgence. As a mere form he was sent to the Tower, but two days afterwards he was set at liberty. His fine was also remitted, and he was allowed an income of £1200, a sum which may safely be pronounced fully equal to £6000 at the present day. He died April 19, 1626, and left no children. Bacon's celebrated "Novum Organum" and his "De Augmentis" are but parts of a more extensive work, entitled "Instauratio Magna," or "Great Restoration," so called because through its means he hoped to recall Philosophy from what he considered the vain and idle speculations of the Aristotelian school, and restore her to her true and legitimate office of interpreter of Nature. Among his other works should be mentioned his "Essays" (first published in 1597), doubtless the most popular and widely read of all his writings, and his "De Sapientia Veterum" ("On the Wisdom of the Ancients," 1609), of which a good translation by Sir A. Gorges was published in 1619. Although Bacon's celebrity as an author may be said to rest exclusively on his philosophical writings and his "Essays," he left some very able legal treatises; among others his "History of the Alienation Office," which Lord Campbell pronounces worthy of Hale. "No one," says the same able critic, "ever sat in Westminster Hall with a finer judicial understanding; no one ever more thoroughly understood the duties of a judge." In person Bacon was well formed, but not robust, of a middling stature, with a high and broad forehead, his countenance conveying the impression both of intellectual power and benevolence of disposition. In society he is said to have been "a most delightful companion, adapting himself to company of every degree, calling, and humor, . . . bringing out with great effect his unexhausted stores of jests new and old." (See Montague, "Life of Bacon," added to Bacon's collected works; William Rawley, "Life of Lord Bacon" (1658); Spedding, "Life of Bacon," in his very complete edition of Bacon's works (4 vols., 1861–68).) J. Thomas.

Bacon (Joel S.), D. D., born in Cayuga co., N. Y., in 1801, graduated at Hamilton College, Clinton, N. Y., in 1826, studied theology at Newton, Mass., was successively president of Georgetown College, Ky., pastor of a Baptist church in Lynn, Mass., professor in the institution at Hamilton, N. Y. (1834–37), president of Columbian College, D. C. (1843–54), and subsequently was a teacher in Alabama and in Virginia. Died at Richmond, Va., Nov. 9, 1869.

Bacon (Leonard), D. D., LL.D., the son of a missionary to the Indians, was born at Detroit, Mich., Feb. 19, 1802, graduated at Yale 1820, and at Andover 1824. From 1825 to 1866 he was pastor of the Centre church (Congregational), New Haven, Conn.; from 1866 to 1871 he was acting professor of systematic theology, and since 1871 has been lecturer on church polity and American church history in the Divinity School of Yale College. He has contributed largely to the "Christian Spectator" and the "New Englander," and was for several years one of the editors of the "Independent." He has been one of the foremost champions of New England Congregationalism. Besides numerous occasional sermons and addresses, he has published "Select Practical Writings of Richard Baxter" (1831; 2d ed. 1835), "Thirteen Discourses on the Two-Hundredth Anniversary of the First Church in New Haven" (1839), "Slavery Discussed" (1846), "Historical Discourse at the Old South Meeting-house, Worcester, Sept. 22, 1863."—One of his sons, Rev. Leonard Woolsey Bacon, M. D., born Jan. 1, 1830, graduated at Yale in 1850, is an able preacher and author.—Another son, Rev. George Blagden Bacon, born at New Haven May 23, 1836, was in 1861 ordained to the ministry at Orange Valley, N. J.

Bacon (Nathaniel), an English lawyer and leader of Virginian insurgents, was born in Suffolk about 1640. He practised law in Virginia, became an eloquent speaker and a popular favorite. He was chosen as leader of the people who about 1676 took arms ostensibly to defend the province against the savages, but partly to resist the policy of Governor Berkeley. Bacon defeated both these enemies, but in the midst of the contest he died Oct. 1, 1676. (See Sparks's "American Biography," vol. iii. of new series.)

Bacon (Sir Nicholas), an English statesman, born at Chiselhurst, in Kent, in 1510, was the father of the great Bacon, Baron Verulam. He was educated at Cambridge, studied law, and was appointed solicitor to the court of augmentations in 1537. In 1546 he obtained the office of attorney to the court of wards, of which he was deprived by Queen Mary in 1553 because he was a Protestant. He was appointed lord keeper of the great seal by Elizabeth in 1558. He was distinguished for his moderation, sagacity, and discretion, and rendered important services to the Protestant cause. Among the English statesmen of that age he was ranked next to Lord Burleigh, who was his friend and brother-in-law. Having held the office of lord keeper about twenty years, he died Feb. 20, 1579. (See G. Whetstone, "Memoir of Sir N. Bacon;" Lord Campbell, "Lives of the Lord Chancellors.")

Bacon (Roger), an eminent English philosopher and monk, called the Admirable Doctor, was born near Ilchester, in Somersetshire, about 1214. He studied at Oxford and at Paris, where he took the degree of doctor of laws. Having entered the order of Franciscan monks, he settled at Oxford and devoted much time to experimental philosophy. He was far in advance of his age, and made discoveries in several sciences. He wrote in Latin a number of works on chemistry, optics, physics, etc. By denouncing the immorality and ignorance of the clergy and monks he made many enemies. His mechanical skill and his insight into the secrets of nature were such that he was suspected of dealing in magic. His writings having been condemned by a council of Franciscan monks, he was thrown into prison about 1278, and confined at least ten years. Indeed, it is not certain that he ever came out of prison. Nor is it certain in what year he died, whether 1292 or 1294. His capital work, which treats of several sciences, is entitled "Opus Majus," and was written about 1266. It was first printed in 1733. Several of his works, such as the "Opus Tertium," "Opus Minus," and "Compendium Philosophiæ," were published for the first time in 1859. It appears that he was acquainted with the composition and explosive power of gunpowder. "The mind of Roger Bacon," says Hallam, "was strangely compounded of almost prophetic gleams of the future course of science and the best principles of the inductive philosophy, with a more than usual credulity in the superstitions of his own time." Giessler says of him that he "showed a wonderful keenness of vision on all points in every branch of human knowledge." And yet he believed both in alchemy and in astrology! (See Anthony Wood, "History and Antiquities of Oxford;" "Biographia Britannica.")

Bacon Level, a township of Randolph co., Ala. P. 515.

Ba'conthorp, or **Bacon** (John), an English Carmelite, surnamed the Resolute Doctor, was born in Norfolk about the beginning of the fourteenth century. He advocated the philosophy of Averroës, and had great reputation for learning. Among his works is a commentary on the "Master of Sentences" (Peter Lombard). Died in 1346.

Bacs, a county of Hungary, is bounded on the N. by the county of Pesth, on the E. by Torontal, on the S. by Slavonia, and on the W. by Torontal. Area, 3940 square miles. The Danube flows along the western boundary, and the Theiss along the eastern, while the two are connected by the canal of Bacs, which is about 60 miles long. The county is entirely level, and, with the exception of the swamps along the rivers, is very fertile. Chief town, Zombor. Pop. in 1869, 576,149.

Bacte'ria (plu.), [Gr. *βακτηρίον*, a "club," alluding to the form], in microscopy, a name for certain plant-cells which are cylindrical, spherical, or oblong, but sometimes distorted in shape. That they are of vegetable not animal character is shown by their power of taking up nitrogen from ammonia-compounds. They occur either single or compound, and multiply by transverse division. They are propagated in water, and are not (according to Cohn and Burdon-Sanderson) capable of transmission through the air, like fungus spores. Cohn divides them into four groups, and assigns them a place near the Algæ.

Bac'tria, or **Bactria'na,** an ancient country of Central Asia, bounded on the N. by the river Oxus (Amoo or Gihon), and on the S. by the Hindu-Kush Mountains (anc. *Paropamisus*). Its boundaries are not perfectly known, but it is considered to be identical with the modern province of Balkh. This is supposed by some to have been the native country of the Aryan race. Bactria was the centre of a powerful kingdom which flourished before the historical period. Its capital, Bactra or Zariaspa, which stood on the site of the modern Balkh, was the head-quarters of the Magi. In the time of Cyrus the Great, Bactria became a Persian province, and was conquered, with the rest of the Persian empire, by Alexander the Great. The history of Bactria has recently been elucidated by numerous Græco-Bactrian coins and other antiquities found in the *topes* or burial-places of Afghanistan. Some of these coins present Greek letters, and also letters of a dialect of Sanscrit. (See Wilson, "Ariana Antiqua," 1841; Lassen, "Indische Alterthumskunde," 1849.)

Bac'tris [from the Gr. *βάκτρον*, a "cane"], a genus of palms, comprising about fifty known species, all natives of America. They are generally small trees, with slender stems and pinnate leaves. Some of them are spiny, and form thickets which are almost impenetrable. The *Bactris Maraja*, or the maraja palm, bears clusters of fruit resembling small grapes, with a pulp of an agreeable flavor. The stems are used as walking-sticks.

Bactri'tes, a group of fossil Ammonitidæ, with a straight shell, and indented but not ramified septa. Several species of it have been found in the Devonian strata.

Baculi'tes [from the Lat. *bac'ulus*, a "stick"], a genus of fossil univalve mollusks of the family of Ammonitidæ, found in the upper chalk. The shell is chambered, perfectly straight, round (or compressed), and tapers to a point. Various species are found in Europe, North and South America, etc.

Bac'up, a flourishing town of England, in Lancashire, 22 miles by rail N. of Manchester. It is situated in a beautiful valley, and is a terminus of a branch of the Lancashire and Yorkshire Railway. It has many churches and chapels, a fine market-house, and a literary institute. Here are extensive cotton-factories and several brass and iron foundries and dye-works. Coal-mines are worked in the vicinity. Bacup is said to be increasing rapidly. Pop. in 1861, 10,935.

Badag'ry, a seaport-town of Africa, on the Gold Coast of Upper Guinea, 50 miles E. N. E. of Whydah. The Portuguese once had several factories at this place, which was a market for slaves. Pop. about 10,000.

Badajos, a province of Spain, is bounded on the N. by Caceres, on the E. by Ciudad Real and Córdova, on the S. by Seville and Huelta, and on the W. by Portugal. Area, 8688 square miles. It is for the greater part a poor and uncultivated region, and is chiefly used as pasture-grounds for immense herds of sheep and swine. Chief town, Badajos. Pop. 430,649.

Badajos' [Sp. *Badajoz;* anc. *Pax Augus'ta*], a fortified town of Spain, capital of the above province, is situated on the left bank of the Guadiana, 175 miles by rail E. of Lisbon. The river is here crossed by a good granite bridge of twenty-eight arches. The town contains an old cathedral, an arsenal, and a cannon-foundry. It has manufactures of soap, coarse woollen stuffs, and leather, and a brisk contraband trade. Badajos was the native place of the painter Morales. It has been the scene of several important military events. It was besieged and taken by the French general Soult in Mar., 1811. Wellington attempted to retake it in April, but he failed. Having renewed the siege in Mar., 1812, he took it by storm on the 6th of April ensuing, after a desperate contest, in which the British lost 4824 men, killed and wounded. Pop. in 1860, 22,895.

Badakhshan', or **Budukshan,** a territory of Central Asia, subject to the ruler of Khoondooz (Kunduz), lies between lat. 36° and 38° N. and lon. 69° and 73° E. It includes several valleys of the head-streams of the Oxus (Amoo). The surface is mountainous, and the great mountain-range of Bolor Tag extends along the eastern border. Here are ruby-mines and massive cliffs or quarries of lapis-lazuli. Iron, salt, and sulphur are also obtained here. The inhabitants are Mohammedans. Capital, Badakhshan.

Badakhshan, or **Fyzâbâd',** a town of Central Asia, capital of the above territory, is on one of the head-streams of the Amoo, about 210 miles N. E. of Cabool. It was once an important place.

Bad'deck, a post-village, capital of Victoria co., N. B., Dominion of Canada, in Cape Breton Island, on the Big Bras d'Or. It is visited by steamers, and has a trade in cattle and butter. It is in a township of the same name.

Badeau (Adam), an American officer, born in New York, became a captain and aide-de-camp of U. S. volunteers in 1862, served on the staff of Gen. Sherman, and was wounded at Port Hudson; became in 1864 lieutenant-colonel

and military secretary to Gen. Grant, and was colonel and aide-de-camp 1865–69. He received a brevet as brigadier-general U. S. army, and was some time secretary of legation in London. He published a "Military History of Gen. Grant" (1868).

Ba'den [Lat. *Ba'da*], **Grand Duchy of,** a state of Germany, bordering on Alsace and Switzerland, is bounded on the N. by Hesse-Darmstadt, on the E. by Würtemberg, and on the S. and W. by the Rhine. It has an area of 5912 square miles. Pop. in 1871, 1,461,428. The surface is mountainous. A long mountain-range called "The Black Forest" (Schwarzwald) extends along the eastern border. The highest point is the Feldberg, 4886 feet high. The western part of Baden is a long plain extending along the Rhine from Bâle to Mannheim. The chief rivers, besides the Rhine, are the Danube, which rises in Baden, and the Neckar. The valley of the Rhine has a mild climate and a very fertile soil, which is well cultivated. The grape and other fruits flourish here in abundance. Among the staple products are wheat, barley, maize, potatoes, and tobacco. Good pine timber abounds in the Black Forest. The average quantity of wine produced annually is about fourteen million gallons. Among the mineral resources are copper, coal, silver, iron, lead, and salt. Baden is rich in mineral springs, which are much frequented as watering places, as Baden-Baden, Badenweiler, etc. More than 9000 persons are engaged in the manufacture of cotton fabrics, ribbons, paper, toys and trinkets, wooden clocks, etc. The chief articles of export are wine and timber. A railroad extends along the valley from Mannheim to Bâle. The chief towns are Mannheim, Carlsruhe (the capital), Freiburg, Heidelberg, Pforzheim, and Constance.

Religion and Government.—A majority of the people are Roman Catholics, and about one-third Protestants. Baden has two universities (Heidelberg and Freiburg), an excellent system of public instruction, and the children are compelled to attend school. This state is governed by an hereditary grand duke, who in relation to foreign and military affairs is dependent upon the emperor of Germany. He governs according to a constitution which is among the most liberal in Germany. The parliament of Baden consists of a chamber of peers and a chamber of sixty-three deputies. Hermann II., who died in 1130, was the first to assume the title of margrave of Baden. The grand ducal family now reigning in Baden are lineal descendants of him. In 1746, Charles Frederick became margrave of Baden, which under his reign increased in extent and importance. He acquired the dignity of elector in 1803, and the title of grand duke in 1806. Having joined the Confederation of the Rhine, he gained a large accession of territory. His grandson, Charles Louis, granted in 1818 a charter which forms the basis of the present constitution. Under the impulse of the revolutionary movement which began in France in Feb., 1848, the popular party of Baden took arms to found a republic. The grand duke fled, and a constituent assembly was convened in May, 1849. By the aid of a Prussian army he was restored in July of that year. In Aug., 1866, Baden formed with Prussia a secret alliance, which was made public about April, 1867. Baden became, in 1870, a state of the new German empire, in the federal council of which she has three votes, the whole number of votes being 58.

A. J. Schem.

Baden (anc. *Ther'mæ Helvet'icæ*), a town and watering-place of Switzerland, in the canton of Aargau, on the Limmat, 14 miles by rail N. W. of Zurich. In Jan., 1834, the "conference of Baden" was held here, in which the representatives of Lucerne, Aargau, Thurgau, Soleure, Berne, Bâle-City, and St. Gall met to settle the relations of the Catholic Church to these cantons. The temperature of the baths is about 117° F. Pop. in 1870, 3412.

Baden, a post-village of Wilmot township, Waterloo co., Ontario, Canada, has important manufactures of linen and woollen goods, staves, lumber, flour, beer, etc. It is on the Grand Trunk Railway, 72 miles from Toronto. Pop. about 500.

Baden-bei-Wien (anc. *Ther'mæ Ce'tiæ* or *Panno'niæ*), a town and bathing-place of Lower Austria, on the river Schwächat, 16 miles by rail S. S. W. of Vienna. Here are warm mineral springs, which are frequented by the citizens of Vienna. Many of the Austrian nobility have mansions here. Pop. in 1869, 7590.

Ba'den-Ba'den (anc. *Civ'itas Aure'lia Aquen'sis*), a town and a celebrated watering-place in the grand duchy of Baden, is beautifully situated in a pleasant valley at the foot of the mountain called Schwarzwald (Black Forest), 23 miles by rail S. S. W. of Carlsruhe and 6 miles from the Rhine. Here are warm saline springs, the temperature of which ranges from 117° to 154° F., which were much resorted to in the time of the Roman emperors. They are efficacious in cases of gout and chronic cutaneous diseases. Baden-Baden is frequented in summer by visitors from all parts of Europe, to the number of about 30,000 annually. In former years its gambling-hell was a great attraction, but upon the restoration of the German empire gambling here, as in the other watering-places, was suppressed. Pop. in 1871, 10,083.

Badenwei'ler, a village and watering-place of Baden, 2 miles E. of Mülheim, has alkaline thermal springs, the temperature of which is 82° F. Large ruins of Roman baths were found here in 1784, which are among the grandest known. Inscriptions on old coins let us suppose that the baths flourished until the middle of the third century.

Badge [perhaps a contraction of *bandage*], a mark, sign, or token by which a person is distinguished; an honorary decoration or special cognizance; as, for example, the stars and crosses worn by persons of rank and princes in Europe, the button on the cap of a Chinese mandarin, or a medal given to a soldier as a premium for bravery. Finger-rings are mentioned in the Bible as badges of authority; for instance, Pharaoh took off his ring and put it on Joseph's hand as a token of the power delegated to him (Genesis xli.). The ambassadors of ancient Rome wore gold rings during their mission as badges of authority. Several countries have distinctive badges. The badge of England is a rose, white and red, ensigned with the royal crown, the origin of which was the union of the white rose of the House of York with the red rose which was the badge of the rival House of Lancaster. The badge of Scotland is a thistle ensigned with a royal crown. Ireland has two badges, the golden harp and the trefoil, both of which are carried ensigned with the royal crown. The badge of France was formerly a *fleur-de-lis*, a "lily or iris," sometimes called in English "flower de luce."

Bad'ger, a name applied to certain animals of the order Mustelidæ, assigned, however, by some to the bear family, which they approach in character. They were formerly ranked in one genus (*Meles*), but now are assigned by most naturalists to at least four different genera. They are plantigrades, have a pointed skull, and feet adapted for burrowing. They have anal glands which secrete substances with a disagreeable odor. The common badger, brock or grey, of Europe (*Meles taxus*), found also in Asia, is about the size of the common fox. It was formerly, and is even now, kept for "badger-drawing." The animal is put into a barrel and assailed by numerous dogs, which are trained to pull the badger out. The animal resists obstinately until overpowered, when he is allowed a short rest,

The Indian Badger.

and is then ready for another struggle with his enemies. The animal is quite harmless if not abused. The East Indian badger (*Arctonyx collaris*) is a more formidable animal. Japan has still another badger. Two American species of badger (*Taxidea Americana* and *Taxidea Ber-*

landieri) are known, the former found most abundantly in the valley of the Missouri, and the other in Mexico, California, etc. They are more carnivorous than the European badger, and are remarkable for their short ears, long hair, and the rapidity with which they burrow in the earth.

Badger, a township of Webster co., Ia. Pop. 431.

Badger (George Edmund), LL.D., an American statesman, born at Newbern, N. C., April 13, 1795. He graduated at Yale in 1813, practised law at Raleigh with distinction, and in Mar., 1841, was appointed secretary of the navy by President Harrison. He resigned in September of that year, because Tyler vetoed the bill to recharter the U. S. Bank. He was a Senator of the U. S. for about seven years (1846–53). Died May 11, 1866.

Badger (Joseph), an American minister, born at Wilbraham, Mass., Feb. 28, 1757, graduated at Yale in 1785. He served four years in the Revolutionary army, after which he obtained an education, and was sent as a missionary to Ohio, where he labored more than thirty years. Died May 5, 1846.

Badger (Milton), D. D., an American clergyman, born May 6, 1800, at Coventry, Conn., graduated with honor from Yale College in 1823, and studied theology at Andover Seminary. In 1826 he was appointed a tutor in Yale College, and in 1828 was ordained pastor of the South Congregational church, Andover. Dr. Badger was elected associate secretary of the American Home Mission Society in 1835, with which society he was officially connected thirty-eight years. He died Mar. 1, 1873.

Badger (Oscar C.), U. S. N., born Aug. 12, 1823, in Windham, Conn., entered the navy as a midshipman Sept. 19, 1841, became a passed midshipman in 1847, a lieutenant in 1855, a lieutenant-commander in 1862, a commander in 1866, a captain in 1872. He served in the steamer Mississippi on the E. coast of Mexico during the Mexican war. In 1861–62 he commanded the steamer Anacostia of the Potomac flotilla, was engaged at various times with the batteries on the Potomac River, and the "precision" of the fire of his vessel is more than once referred to by the commanding officer of the flotilla, Lieutenant-commanding Wyman, in his reports to the navy department. He was in command of the iron-clads Patapsco and Montauk in their many engagements with the forts and batteries of Charleston harbor in the summer of 1863; as fleet-captain was with Rear-Admiral Dahlgren on board the iron-clad Weehawken in a night-attack upon Fort Sumter, Sept. 1, 1863, when he received a severe wound in the right leg, from the effects of which he has never entirely recovered. His services, character, etc. are thus mentioned by Rear-Admiral Dahlgren, in his report to the secretary of the navy of Sept. 2, 1863: "I shall feel greatly the loss of Commander Badger's services at this time. He has been with me for more than eight years, and his sterling qualities have rendered him one of the very best ordnance officers in the navy." Foxhall A. Parker, U. S. N.

Badi'to, a post-village, capital of Huerfano co., Col., on the Huerfano River, 54 miles from Pueblo. It has a population partly of Mexican origin, and has a large trade in wool, hides, and stock.

Baena (bå-ā'nå), or **Vaena,** a town of Spain, in the province of Córdova, on the Marbella, 32 miles S. E. of Córdova. It occupies the site of an ancient Roman town. Grain and oil are exported from this place. Pop. 13,000.

Baëpen'di, a town of Brazil, in the province of Minas Geraes, is situated on one of the head-streams of the Rio Verde, in the Serra Mantiqueira, about 180 miles N. W. of Rio de Janeiro. Pop. about 9000.

Baer, von (Karl Ernst), a Russian naturalist of German extraction, born in Esthonia in 1792. He became in 1819 professor of zoology at Königsberg. He wrote, besides other works in German, a "History of the Development of Animals" (2 vols., 1828–37). In 1834 he removed to St. Petersburg, and was appointed librarian of the Academy of Sciences. He made several discoveries in physiology and zoology.

Ba'ez (Buenaventura), a mulatto politician, born in 1820, was elected president of Santo Domingo in 1849, and re-elected in 1856 and 1865. In 1874 he left the country and came to the U. S. (See Domingo, Santo, Projects of Annexation to the U. S., by Hon. A. D. White, LL.D.)

Bae'za, or **Baeça** (anc. *Biatia*), an old town of Spain, in the province of Jaen, 22 miles N. E. of the city of Jaen. It contains a cathedral and several monasteries in the Gothic style, which, with other buildings, present an imposing appearance. The university, established in 1533, has ceased to exist in recent times. Under the Moors it was the capital of the kingdom of Bajasat, and is said to have had 150,000 inhabitants. Cloth, leather, and soap are made here. Pop. 13,405.

Baf'fa (anc. *Pa'phos*), a seaport-town on the S. W. coast of the island of Cyprus. It was once an important place, but is now ruined or decayed and nearly deserted. In ancient times Paphos was a beautiful city, having several temples, and was a famous place for the worship of Venus. Lat. 34° 47′ N., lon. 32° 26′ E.

Baf'fin (William), an English navigator, born in 1584. He accompanied James Hall in an Arctic expedition in 1612, and discovered Baffin's Bay in 1616. He wrote two narratives of these voyages, and gave in the first a new method of ascertaining the longitude at sea by observation of the heavenly bodies. He was killed at the siege of Ormuz, May 23, 1622.

Baffin's Bay, or **Bylot's Bay,** a large gulf or inland sea of North America, communicates with the North Atlantic by Davis's Strait, and with the Arctic Ocean by Smith's Sound. It is about 950 miles long, and has an average width of about 300 miles. The greatest depth is about 1050 fathoms. The shores are generally high and rocky, backed by ranges of snow-covered mountains. It was first explored by William Baffin in 1616. Whales abound here.

Bagatelle [Fr. a "trifle"], the name of a game somewhat resembling billiards. A bagatelle-table is usually about seven feet long and twenty-one inches wide, and is lined with cloth. The other apparatus of the game consists of small ivory balls and a mace or cue.

Bag'by (Arthur Pendleton), a lawyer, born in Virginia in 1794, was governor of Alabama (1837–41), U. S. Senator (1843–49), and minister to Russia (1849–53). Died at Mobile Sept. 21, 1858.

Bag'dad, a pashalic forming the S. E. portion of Asiatic Turkey, bordering on Arabia and Persia. It extends from the Persian Gulf north-westward about 600 miles, and is intersected by the Euphrates and the Tigris. It includes the ancient Chaldæa, Susiana, and Mesopotamia. The part which lies between the Euphrates and Arabia is a barren, sandy plain. The soil of some other parts is fertile. The population is a mixture of Turks, Arabs, Kurds, Armenians, etc. Capital, Bagdad.

Bagdad, a celebrated city of Asiatic Turkey, formerly the capital of the empire of the califs, and now the capital of the pashalic of Bagdad, is situated on both banks of the Tigris, about 60 miles N. of Babylon; lat. 33° 20′ N., lon. 44° 22′ 38″ E. The river is here about 700 feet wide, and is crossed by a bridge of boats. The appearance of the city at a distance is rendered picturesque by groves of palm trees and numerous minarets, but the streets are narrow, crooked, and dirty. The dwelling-houses, having no windows on the side next to the street, present an unpleasing exterior, but the interior is often richly decorated. Bagdad contains about one hundred mosques, some of which have beautiful domes and lofty minarets. Here are large bazaars filled with the products of European and Turkish markets. It was formerly a very magnificent city, and was for many ages the great emporium of commerce of the surrounding countries, but its trade has declined. It has manufactures of silk and cotton stuffs and red and yellow leather. The population is 70,000. In 1831 an inundation destroyed a large part of the city. Bagdad was founded by the calif Almansur about 763 A. D., and built out of the ruins of Ctesiphon. In the ninth century it was enlarged by Haroun-al-Raschid, who built here a fine palace. In the tenth and eleventh centuries it is said to have had 2,000,000 inhabitants. It was sacked by Hulaku about 1258, and after several changes of masters was conquered by the Turks in 1638.

Bagdad, or **Boca del Rio,** a town on the Rio Grande, near its mouth, in the Mexican state of Tamaulipas, was during the late civil war in the U. S. a place of great importance to blockade-runners, who carried on from this point a heavy trade with Western Texas.

Bagdad, or **Blackwater,** a village of Santa Rosa co., Fla., on the navigable Blackwater River, 28 miles from Pensacola and 1½ miles below Milton. It has extensive lumber-mills and manufactures of juniper (red cedar) window-sash.

Bag'gage [Lat. *impedimen'ta*; Fr. *bagage*], a term applied to the tents, clothing, utensils, and other necessaries of an army, which are carried on carts, pack-horses, or mules. In every army the amount of baggage is limited by strict rules. A private soldier is allowed to carry nothing except that which his knapsack and other accoutrements can hold. The baggage of officers is more extensive. In the U. S. the trunks and carpet-bags of travellers are called "baggage," in England they are "luggage."

Bag'gesen (Jens), a Danish poet, born at Korsör, in the island of Seeland, Feb. 15, 1764. He was highly gifted, but of a weak character; with a fine fancy, but of

a restless spirit; excitable, but without passion; fantastic, but without imagination. Born between two periods, he could neither stay with the old nor march with the new. He was intimate with men of second rank, and enthusiastically received by the educated; but no man of first rank would acknowledge him, and the great public he never reached. Born a Dane, and married first to a German, then to a French lady, he fluttered from one country and language and literature to another—made a noise in all, and became great in none. Of his Danish writings, his "Komiske Fortällinger" and "Labyrinthen" are entertaining. Of his German writings, his "Haideblumen" are not without merit. His letters, of which he wrote thousands in different languages, are very interesting. Died in Hamburg Oct. 3, 1826.

Baghe'ria, a town of Sicily, in the province of Palermo, 8½ miles E. of Palermo. Here are numerous villas of the nobility of the island. Pop. in 1861, 11,762.

Bagli'vi (Giorgio), F. R. S., an Italian medical writer, born at Ragusa in 1668. He became in 1692 the pupil of Malpighi at Rome, and subsequently professor of anatomy at the college Della Sapienza in that city. He gained distinction as the author of the system of "Solidism"—*i. e.* the theory that diseases originate in the solids. He published "Opera Omnia Medico-practica" (1704). Died Mar., 1707. (See F. Ferrario, "Della Vita e delle Opere di G. Baglivi," 1839.)

Bagnacaval'lo, an Italian painter, whose proper name was Bartolommeo Ramenghi, born near Bologna in 1484. He was a pupil of Raphael, and is regarded as the greatest painter of the Bolognese school. Among his works is "The Coronation of Charles V. at Bologna." Died in 1542. (See Vasari, "Lives of the Painters.")

Bagnères de Bigorre (anc. *Vi'cus Aquen'sis*), a town and fashionable watering-place in the S. of France, in the department of Hautes-Pyrénées, and on the river Adour, 14 miles by rail S. S. E. of Tarbes. It is situated in the romantic valley of Campan, and is among the most frequented watering-places in France. It has a college, a public library, a theatre, a museum, and good hotels. The springs, of which there are thirty-two, and whose temperature ranges from 72° to 124° F., are visited by about 16,000 persons annually. Baréges and woollen stuffs are made here. Pop. in 1866, 9433.

Bagnères de Luchon (anc. *A'quæ Convena'rum*), a town of France, in the department of Upper Garonne, and in the Pyrénées, 42 miles by rail from Bagnères de Bigorre. It has sulphurous thermal springs, and is a place of summer resort. Pop. in 1866, 3921.

Bagnes, a French word signifying "galleys," is now the name of the convict prisons of France in which criminals were confined and employed at hard labor, since the galleys were abolished in 1748. Large numbers of convicts were thus confined at Brest and Toulon, and were employed in mechanical and other work. Various trades or mechanical arts were taught to the convicts. In the reign of Napoleon III. the bagnes were gradually abolished, and the penal colonies substituted in their place.

Bagnes-le-Chable, a parish and village of Switzerland, in Valais, on the Dranse, 12 miles E. S. E. of Martigny. Pop. of the parish, which is coextensive with the Val-de-Bagnes, 4256 (1870). This valley was inundated in 1818 by a *débâcle* which carried away 400 cottages.

Bagnoles, a village and summer resort of France, in the department of Orne, and in a valley 13 miles E. S. E. of Domfront. It has warm saline springs and cold ferruginous springs.

Bago'as, a Persian eunuch and soldier in the service of Artaxerxes Ochus. In 338 B. C. he poisoned that king and several of his sons. He raised to the throne of Persia Darius Codomannus, who put Bagoas to death about 336 B. C.

Bag'ot (Sir Charles), an English diplomatist, born Sept. 23, 1781. He was minister to France in 1814, ambassador to St. Petersburg in 1820, and to Holland in 1824. He in 1842 became governor-general of Canada, where he died May 18, 1843.

Bagot, a county of Canada, in the S. central part of Quebec, is intersected by the Grand Trunk R. R., and bounded on the W. by the Yamaska River. Copper ores and fine black limestone are found. Capital, St. Liboire. Pop. in 1871, 19,491.

Bag'pipe, a wind instrument supposed to be of great antiquity, consists of a leathern bag which the player inflates by blowing with his mouth through a tube, or, in some cases, by a bellows worked by the elbow. The music proceeds from three or four pipes, whose mouthpieces are inserted into the bag, the wind being forced out by pressing the bag under the arm. One of the pipes, called the "chanter," is pierced with eight holes, while the others, or "drones," sound each only one continuous low note. Though generally fallen into disuse, the bagpipe is still a popular instrument in the Highlands of Scotland and the west of Ireland, and the Highland regiments are always accompanied by their pipers, dressed in proper costume. The bagpipe is still used in Southern Italy, as formerly in Spain.

Bag'radites, the name of a royal family of Georgia and Armenia. It was founded by Bagrad, who had the privilege of crowning the Armenian monarchs. In the eighth century a younger son of the Bagradites became king of Georgia, and from him the Georgian Bagradites claim descent.

Bagra'tion (Peter), Prince, a Russian general, born in 1765, was descended from the noble Georgian family of Bagradites. He served with distinction under Suwarrow in Italy in 1799. In Nov., 1805, he kept in check for six hours a superior force of French under Murat. He led the vanguard at Austerlitz, December, 1805, and rendered important services at Eylau and Friedland (1807). He was mortally wounded at Borodino, Sept. 7, and died Oct. 7, 1812.

Bag'shot Beds [named from Bagshot Heath, Surrey], the lowest strata in the middle eocene formation of Britain. The strata are arranged into four groups: 1. The Upper Bagshot, yellow and white sands with ferruginous stains, generally unfossiliferous, though at Whitecliff Bay, Isle of Wight, a bed contains a large number of shells. 2. The Barton beds, colored clays interstratified with sand and loam, rich in fossils, shells of Mollusca, etc. 3. The Bracklesham beds, composed of marly clays and white sands, capped by a bed of flint-pebble conglomerate. This is the most fossiliferous group in the series. 4. The Lower Bagshot, consisting of variously-colored sands, gray, chocolate-colored, or white pipe-clays. The white clays contain the only fossil found in this group—beautifully preserved leaves in the layers of the clay. The series rests on the London clay. Its maximum thickness is about 1200 feet. Some writers restrict the term to this last group.

Bahama (bạ-hā'mạ), **Grand,** the most north-western island of the Bahama group, is 69 miles E. of Florida. It is 74 miles long and 9 miles wide. Area, 428 square miles. The soil is moderately fertile. Pop. 1020.

Baha'ma Islands, or **Lucay'os,** a group of islands in the Atlantic Ocean, lie N. E. of Cuba, from which they are separated by the old Bahama Channel. They belong to Great Britain. They consist of twelve islands, 661 keys, and 2387 reefs and cliffs, together 3060 islands and islets. They extend like a chain from latitude 21° to 27° 31′ N., in a north-western direction for a distance of about 700 miles. They are generally long and narrow, and have little elevation above the sea. The climate in winter is very mild and salubrious. The soil is thin, but produces maize, cotton, oranges, pineapples, etc. The area is variously estimated from 3012 to 5123 square miles. Capital, Nassau, in New Providence. In 1870 the receipts amounted to £46,000, and the expenses to £47,000. The value of the imports was £284,000, and of the exports £190,000. The names of the larger islands are Grand Bahama, Abaco, Eleuthera, New Providence, Andros, San Salvador (or Cat Island), Exuma, Long Island, Crooked Island, Inagua, and Caicos. These are mostly covered with forests of the madeira tree, the mastic, lignumvitæ, etc. San Salvador (or perhaps Watling's Island) was the first land discovered by Columbus in 1492. The Bahamas were then inhabited by a gentle race of aborigines, who were soon exterminated by the Spaniards. The English obtained possession of them in 1629. Among the exports are canella, arrow-root, sponges, salt, conch-shells, eleuthera bark, fresh and canned pineapples, etc. Pop. in 1871, 39,162.

Bahi'a, a province of Brazil, is bounded on the N. by Pernambuco, on the E. by Sergipe and the Atlantic Ocean, on the S. by Minas Geraes and Espirito Santo, and on the W. by Goyaz. Area, 176,500 square miles. The large river São Francisco flows along or near the north-western border of the province, which is traversed by a high mountain-range about 200 miles from the sea-coast. The soil of the lowlands is fertile. The chief products are sugar, tobacco, cotton, rice, manioc, and coffee. Diamonds and gold are found in this province. Pop. about 1,450,000.

Bahia, or **São Salvador,** an important maritime city of Brazil, capital of the above province, is situated about 740 miles N. N. E. of Rio Janeiro; lat. 13° 0′ S., lon. 38° 32′ W. The name is derived from Bahia de Todos-os-Santos (All Saints' Bay), at the entrance of which it is pleasantly situated. The upper part of the city is several hundred feet higher than the lower, and presents a very fine

appearance from the sea. The upper town is the most populous, most beautiful, and contains the important public buildings, among which are the governor's palace, the cathedral, the theatre, the mint, and many fine churches and convents. It is the seat of the archbishop of San Salvador. A public library was founded here in 1811. The harbor of Bahia is one of the best in America, and admits vessels of the largest size. It is defended by several forts, and has a lighthouse at the entrance. The chief exports of Bahia are sugar, cotton, coffee, tobacco, rum, dyestuffs, hides, and horns. The commerce is almost entirely in the hands of Englishmen. Bahia is the oldest city of Brazil, having been founded in 1549, and was until 1763 the capital. It is, next to Rio de Janeiro, the largest commercial city of Brazil. The Bahia Steam Navigation Company, organized in 1861, had sixteen steamers afloat in 1868. Pop. 120,000.

Bähr, or **Baehr** (JOHANN CHRISTIAN FELIX), an eminent German philologist, born at Darmstadt in 1798, and educated at Heidelberg, where in 1826 he became professor of classical literature. He published a "History of Roman Literature," 2 vols., 1828; 4th ed. 1868–70, 3 vols. 8vo, and edited several of Plutarch's "Lives." He also published Herodotus, with valuable notes, 2d ed. 1856–61, 4 vols.

Bahrdt (KARL FRIEDRICH), D. D., a German rationalist theologian, born at Bischofswerda, in Saxony, Aug. 25, 1741. He became professor of philosophy at Erfurt in 1762, but he professed such skeptical or deistical doctrines that he was ejected from that position in 1768. Among his works are "Aspirations of a Mute Patriot" and "Letters on the Bible in a popular style." He was successively professor, preacher, teacher, and tavern-keeper. Died April 24, 1792. (See his "Autobiography" ("Geschichte meines Lebens"), 4 vols., 1790.)

Bahrein', or **Aval Island** (anc. *Ty'los* or *Ty'ros*), is in the Persian Gulf, near the Arabian coast, about 200 miles S. of Bushire. It is 27 miles long and 10 wide, and is surrounded by several small islands. Manama, the capital, on the northern extremity, has a good harbor. These islands derive their importance from their pearl-fisheries, the annual product of which is estimated at $1,000,000.

Bahr-el-A'biad (*i. e.* "white river"), the Arabic name of the White Nile, which is the main branch of the Nile. It rises in Lakes Victoria Nyanza and Albert Nyanza, under the equator, flows N. along the eastern boundary of Kordofân, and unites with the Blue Nile at Khartum. It is said to be navigable 1000 miles above Khartum.

Bahr-el Az'rek (*i. e.* "blue river"), one of the two great branches of the Nile. It unites with the other branch, the Bahr-el Abiad ("white river"), in lat. 15° 37′ N. Its sources are in lat. 10° 58′ N., lon. 36° 50′ E., but its spiral course, traced through all its windings, will probably exceed 800 miles. In this distance it descends with immense impetuosity from an elevation of 9000 feet to one of 1500 feet, collecting the waters of a basin having an extent of 1000 miles or more. The Blue River is navigable up to Fazogle, under the twelfth parallel, 1500 miles from Rosetta.

Bai'æ (mod. *Ba'ja*), an ancient town of Italy, beautifully situated on the bay of its own name, in Campania, 10 miles W. of Naples. It was the favorite watering-place of the ancient Romans, who were attracted by the beauty of its position and adjacent scenery, the amenity of the climate, and the virtues of its warm mineral springs. Julius Cæsar and Pompey had country-houses at Baiæ, which Horace preferred to all other places. The society of Baiæ was proverbially voluptuous and dissolute. Ruins of ancient temples and villas are visible in this vicinity.

Bai'ersbronn, a town in Würtemberg, 40 miles S. W. of Stuttgart. It has manufactures of glass. Pop. in 1867, 5138.

Bai'kal [from the Mongolian *Bai-Kul, i. e.* "rich sea"], called also the **Holy Sea,** a large lake in the southern part of Siberia, in the government of Irkutsk, is an expansion of the river Angara. It is situated between lat. 51° 28′ and 55° 41′ N., and lon. 103° and 110° E. It is about 400 miles long, and has an average width of nearly 45 miles. Area, estimated at 12,118 square miles. It is said to be in some places 300 fathoms deep. It receives the Selenga and other rivers, and discharges its waters by the Angara, an affluent of the Yenisei. In summer steamboats navigate this lake, which is frozen from November to April. Here are valuable seal and sturgeon fisheries. The waters of this lake are said to have a curious ground swell called *zyb*, the nature of which has never been explained. The Christian kingdom of the Prester Johns, between the eleventh and the thirteenth centuries, was just S. of the Baikal Sea.

Baikal Mountains, in Siberia, extend eastward in three ranges, from the Egtag Altai, and enclose in their midst Lake Baikal. They appear to be mostly of volcanic origin, and possess considerable mineral resources.

Bail [Fr. *bailler,* to "deliver"]. The original signification of this word is to "deliver." It is used both as a noun and a verb, and refers to property, as well as to a person, in the custody of the law. It implies safe-keeping or delivery for a special purpose. It may signify the delivery of a person arrested, either on civil or criminal process, from the custody of the sheriff or some other officer of the law, into the safe-keeping of persons who bind themselves for his appearance in court or obedience to its processes. Again, it denotes the persons into whose keeping the party discharged from actual arrest is delivered, and sometimes the amount of security given or required for the defendant's appearance.

In all civil actions the defendant may give bail as a matter of right, and generally in criminal proceedings, unless he is charged with a capital offence. The amount of bail is in the discretion of the court, controlled by the somewhat vague constitutional provision that excessive bail shall not be required.

Bail *below,* or bail *to the sheriff,* is bail given to the sheriff to secure the appearance of the defendant in the action, or his putting in special bail on a required day. Bail *to the action,* or bail *above,* are bound either to satisfy the judgment if one should be recovered, or to deliver up the defendant to custody. In some of the States the defendant when arrested gives bail to render himself at all times amenable to the process of the court, which takes the place of bail below and bail above.

Common bail is the formal entry of fictitious security with the clerk of the court. It is given for the appearance of the defendant and his future obedience in cases where he has not actually been arrested. *Special* bail is responsible bail, given when the defendant has actually been arrested. Bail must in general possess certain prescribed qualifications. They must be *freeholders* or *householders;* must be within reach of the process of the court, and must not be privileged from arrest; must be competent to make a contract, and of sufficient means to pay the amount for which they become responsible. Bail can be compelled, on suitable application in the action, to justify; this means, to show by satisfactory evidence that they possess the qualifications required by law.

While the prisoner, when released on bail, is in fact generally allowed to go at large, he is regarded by the law as in custody of his bail. They can take possession of his person at any time or in any place, even though it is necessary to break into his house. By delivering him to the sheriff and complying with legal forms of surrender, they can discharge themselves from liability.

It should be remarked that when a prisoner is held under final process—that is, process to enforce a judgment of the court—he cannot be released on bail. However, by statute law he is sometimes allowed in civil cases, on giving security of the nature of bail, to be released from strict confinement in jail, at the same time being partially restrained of his liberty by the action of rules defining territorial limits beyond which he cannot lawfully go.

T. W. DWIGHT.

Bail'ey (GAMALIEL), M. D., born at Mount Holly, N. J., Dec. 3, 1807. In conjunction with J. G. Birney he founded in 1836 the "Cincinnati Philanthropist," an anti-slavery journal. Although his press was destroyed by a mob, he continued the publication till 1847, when he issued the first number of the "National Era" at Washington. The celebrated novel of "Uncle Tom's Cabin" first appeared in this journal. Died June 5, 1859.

Bailey (GILBERT STEPHENS), D. D., born at Abington, Pa., Oct. 17, 1822, educated at Oberlin College, O., pastor of a Baptist church in Cornwall, N. Y., 1845–46, pastor in Illinois 1846–63, superintendent of missions for the Baptist General Association of Illinois 1863–67, and since 1867 secretary of the Baptist Theological Union at Chicago. He is the author of several works, mostly denominational. Dr. Bailey originated the system of "minister's institutes" now prevalent in the Baptist denomination, holding the first at Chicago in 1864.

Bailey (GUILFORD D.), an American officer, born in New York 1833, killed at the battle of Seven Pines May 31, 1862, graduated at West Point July 1, 1856, and promoted second lieutenant of artillery; served on frontier duty and in Kansas border disturbance 1856–59, served during the civil war in defence of Fort Pickens, Fla., to June 27, 1861, appointed colonel First New York Light Artillery volunteers Sept., 1861, and was engaged in the various actions of the Army of the Potomac during the Peninsular campaign of 1862.

G. C. SIMMONS, *Clerk Board of Engineers.*

Bailey (JACOB WHITMAN), an American officer and nat-

uralist, born April 29, 1811, at Ward (now Auburn), Mass., graduated at West Point 1832, served as lieutenant of artillery in Charleston harbor, 1832–33, during threatened nullification of S. C., at Bellona Arsenal, Va., 1834–35, as assistant professor at Military Academy 1834–35, and acting professor of chemistry, mineralogy, and geology 1835–38, becoming, upon resigning his lieutenancy, July 8, 1838, full professor, which position he held, to the great benefit of the Academy and advantage to cadets, till his death. He was the inventor of "Bailey's Indicator," and of many improvements in the microscope, in the use of which he achieved the highest distinction, particularly in the examination of infusoria, algæ, and the products of the deep-sea soundings of the coast survey, U. S. exploring expeditions, and the Atlantic telegraph plateau, of which he made valuable collections and numerous delineations, bequeathing them to the Boston Society of Natural History. He was president of the American Association for the Advancement of Science 1857, and member of various societies of savants at home and abroad, and author of over fifty able papers in various scientific journals. His health, always delicate, was completely shattered by exposure in the Hudson River while attempting to rescue his wife and daughter, lost in the burning of the steamer Henry Clay, he dying five years after, Feb. 26, 1857, at West Point, aged forty-five.

GEORGE W. CULLUM, U. S. A.

Bailey (JAMES MONTGOMERY), editor of the "Danbury News," a well-known American humorist, born Sept. 25, 1841, in Albany, N. Y., commenced journalism on the Danbury "Times" (afterwards "News") in 1865, which paper soon acquired a celebrity throughout the U. S. from an incessant flow of rich, original, and healthy humor which the brilliant pen of its editor imparted to its columns. He has published "Life in Danbury" and "The Danbury News Man's Almanac."

Bailey (JOSEPH), an American officer who served on the Federal side in the late war, and distinguished himself by his successful attempt to save thirteen gun-boats, etc. of the Mississippi flotilla. The water of the Red River having fallen so low that Admiral Porter's squadron was unable to pass the rapids, Col. Bailey in the course of eleven days constructed dams which, by raising the water, enabled the boats to descend safely. He received for this service the thanks of Congress and was made a brigadier-general. Having removed to Missouri, he was shot by some ruffians Mar. 21, 1867.

Bailey, or **Bailay** (NATHAN), an English lexicographer and classical scholar, who kept a school at Stepney, where he died June 27, 1742. Soon after 1720 he published his "Universal Etymological English Dictionary," the first English dictionary which aimed at completeness, and which was the basis of Dr. Johnson's more celebrated work (1755). He wrote also a "Domestic Dictionary," and other books on education.

Bailey (PHILIP JAMES), an English poet, born at Nottingham April 22, 1816. He studied law, and was called to the bar in 1840. In 1839 he published "Festus" (8th ed. 1868), a poem which treats of the highest themes of philosophy and religion. It excited much admiration, and had a wide temporary success, to which its extravagance and defects contributed. "The faults of the poem are as great as the beauties; there is no congruity or proportion in it, and you lay it down with a sense of admiration qualified with disgust." He wrote other poems, entitled "The Angel World" (afterwards incorporated with "Festus"), 1850, "The Mystic" (1855), "The Age," a satire (1858), and "The Universal Hymn" (1867). (See "Blackwood's Magazine" for April, 1850.)

Bailey (RUFUS WILLIAM), D. D., was born at North Yarmouth, Me., April 13, 1793, and graduated at Dartmouth in 1813, was pastor of several Congregational churches in New England, was professor of languages at Austin College, Huntsville, Tex., and its president (1858–63). He published "The Issue" (1837) and several educational and other works. Died April 25, 1863.

Bailey (THEODORUS), U. S. N., born April 12, 1805, in Plattsburg, N. Y., entered the navy as a midshipman Jan. 1, 1818, became a lieutenant in 1827, a commander in 1849, a captain in 1855, a commodore in 1862, a rear-admiral in 1866. He did good service on the W. coast of Mexico in the Mexican war, and during a part of 1861–62 commanded the frigate Colorado, western Gulf blockading squadron. On April 24, 1862, he commanded the right column of Farragut's fleet in the passage of Forts St. Philip and Jackson, and at the capture of the Chalmette batteries and the city of New Orleans, where he led the fleet, and was conspicuous for his great gallantry and self-possession. From 1862 to 1865 he was in command of the eastern Gulf blockading squadron.

FOXHALL A. PARKER, U. S. N.

Bailey's Harbor, a post-township of Door co., Wis. Pop. 297.

Bail'eyville, a post-township of Washington co., Me. Pop. 377.

Bai'lie, a Scottish term having several legal applications. The most common and popular signification is a superior officer or magistrate of a municipal corporation in Scotland, with judicial authority within the city or burgh. In royal burghs the office is in some respects analogous to that of alderman in England.

Bail'iff [probably a corruption of the Lat. *baj'ulus* or *bai'ulus,* a "porter;" Fr. *bailli*], a term applied in England to a deputy of a sheriff or of a local magistrate; also to magistrates of certain towns and keepers of castles. Bailiff may be defined as the keeper or superintendent of some duty or charge legally imposed on him. As officers of the law, bailiffs arrest culprits, summon juries, and collect fines. There is a class of men employed by the sheriff on account of their adroitness and dexterity who are called bound bailiffs, because, the sheriff being responsible for their official misdemeanors, they are annually bound in an obligation, with sureties, for the due performance of their service. The sheriff himself is the queen's bailiff.

Bailleul, a well-built town of France, in the department of Nord, near the Belgian frontier, about 19 miles by rail W. of Lille. It has manufactures of woollen and cotton stuffs, hats, lace, etc. Pop. in 1866, 12,896.

Bail'lie (JOANNA), a British poetess, born in Lanarkshire in 1762. In early life she went to reside in London with her brother, Matthew Baillie, the celebrated physician. Her life was happy, but devoid of remarkable incidents. She published in 1798 the first volume of "Plays of the Passions," which had great success. Several other volumes of the same appeared in 1802, 1812, etc. Among the most popular of her other works are "De Montfort," a tragedy, and "Basil," a drama. She wrote several ballads and songs which are much admired. She was an intimate friend of Sir Walter Scott, and her house was the resort of many other British and foreign literary celebrities. She died Feb. 23, 1851, aged eighty-nine. Commenting on her "Plays of the Passions," the "Edinburgh Review" for April, 1836, says: "This great work is completed, and in a manner worthy of its commencement; a noble monument of the powerful mind and the pure and elevated imagination of its author."

Baillie (MATTHEW), M. D., a brother of the preceding, was born in Lanarkshire, Scotland, Oct. 27, 1761. His mother was a sister of the great anatomists, John and William Hunter. He studied anatomy under his uncle, and entered Oxford, where he graduated as M. D. In 1783 he succeeded Dr. Hunter as lecturer on anatomy in London. He acquired a high reputation as a teacher and expositor of that science. He published in 1793 an excellent work on "The Morbid Anatomy of some of the most Important Parts of the Human Body," which had a remarkable influence on the study of medicine. He practised medicine in London with great success, and was appointed physician to the king in 1810. Died Sept. 23, 1823.

Baillie (ROBERT), an eminent Scottish Presbyterian theologian, born at Glasgow April 30, 1602. He was distinguished for his learning and moderation. He was one of the commissioners sent to London in 1640 to prepare charges against Laud, became professor of divinity at Glasgow in 1642, and was principal of the University of Glasgow after the Restoration. He wrote various works and letters. Died in July, 1662.

Baillie of Jerviswood (ROBERT), a Scottish patriot of excellent abilities and character. He opposed the tyrannical measures of the duke of Lauderdale, and about 1676 was fined and imprisoned for four months. Having entered into a correspondence with Russell and Sidney, he was arrested and charged with complicity in the Rye-House Plot. He was condemned on insufficient evidence, and executed Dec. 24, 1684.

Bailly (JEAN SYLVAIN), an eminent French astronomer, born in Paris Sept. 15, 1736. He was admitted into the Academy of Sciences in 1763, and published in 1771 a remarkable "Treatise on the Light of the Satellites of Jupiter." In 1775 he produced the first volume of his "History of Astronomy, Ancient and Modern" (4 vols., 1775–83), which by its eloquent diction and ingenious ideas obtained great popularity. He became a member of the French Academy in 1784, and of the Academy of Inscriptions in 1785. Fontenelle was the only Frenchman who before that time had had the honor to be a member of the three great academies of Paris. He was the first president of the States-General or National Assembly in 1789, and was elected mayor of Paris in July of that year. His influence was exerted to promote order and moderation. He

offended the Jacobins by commanding the national guard to fire on a riotous crowd in July, 1791, and resigned his office soon after that date. During the Reign of Terror he was proscribed by the Jacobins, and after insulting treatment was guillotined Nov. 12, 1793. Among his works is "Memoirs of the Revolution by an Eye-witness" (3 vols., 1804). (See F. ARAGO, "Biographie de Bailly," 1852, and an English translation of the same, Boston, 1859; LALANDE, "Éloge de Bailly," 1794; LACRETELLE, "Éloge de Bailly," 1836; "Edinburgh Review" for April, 1805.)

Bailly (JOSEPH A.), a French sculptor, born in Paris in 1825, emigrated to Philadelphia in 1850. Among his best works are "Adam and Eve," a group of "Eve and her Two Children," and a marble monument of Washington (1869) placed in front of the State-house in Philadelphia.

Bail'ment [Fr. *bailler*, to "deliver"], a delivery of goods for some particular purpose, or on mere deposit, upon contract, express or implied, that after the purpose has been performed the identical goods shall be redelivered to the bailor, or otherwise dealt with according to his direction. If the contract permits the return of an equivalent instead of the goods bailed, there is no bailment, but the transaction constitutes a debt or some cognate engagement. Also, a delivery of a thing in trust for some special object, and upon contract, express or implied, to conform to the object of the trust.

Bailment includes the borrowing, lending, hiring, or keeping of chattels, and the carrying or working upon them for another. The party making the delivery, or *bailing* the property, is termed the *bailor;* the party to whom it is delivered, the *bailee.*

Bailments have been classified as follows: 1, *Depositum,* or deposit; a delivery of goods to be kept by the bailee, and returned on demand, without recompense. 2, *Mandatum,* or mandate; where the bailee agrees to do something with or about the thing bailed, without recompense. 3, *Commodatum,* or loan; where the thing bailed is lent for use, without recompense. 4, *Pignus,* or pledge; where the thing bailed is security for a debt or other engagement. 5, *Locatio,* or hiring; where the use of something is to be given, or labor performed about it, for a compensation. *Locatio* is subdivided as follows: *Locatio rei,* where the bailee by hire gains the temporary use of a thing; *Locatio operis faciendi,* where the bailee agrees to perform labor and services, or bestow care and attention upon the thing bailed, for a recompense; *Locatio operis mercium vehendarum,* where goods are delivered to a bailee to be transported to another place, for a recompense.

The question which most frequently arises and presents the greatest difficulty in the law of bailment relates to the responsibility which attaches to a bailee if the property is lost or injured, and the degree of care which he is bound to bestow upon it. With reference to this question, bailments have been divided into three groups: 1, Where the bailment is for the benefit of the bailor alone. This class includes deposits and mandates. Here, as the bailee receives nothing for his services, he is held only to the care which prudent men are supposed to give to their own affairs, and he is responsible only for such loss or injury as results from the absence of such care. The degree of care depends much upon the circumstances of each case; for example, upon the bulk of the article, its fragility, or its exposure to thieves from the dense population of a city as compared with the scanty population of a country district. In each case it is a question of fact whether the care which all the circumstances required was used. 2, Where the bailment is for the benefit of the bailee only. This class includes *commodatum.* Here the greatest care is required of the bailee, and he is responsible for the slightest negligence. It is also a rule that he must keep strictly within the privilege conferred on him with respect to the thing bailed, or he will be liable for any loss or injury to it, even though he is guilty of no negligence. 3, Where the bailment is for the benefit of both bailor and bailee. This is the case in *pignus* and *locatio.* Here the bailee is held to the exercise of the care and attention which prudent men under the circumstances would reasonably be expected to take.

There is a class of bailments of an exceptional nature, embraced under the head of *locatio,* where the policy of the law imposes upon the bailee responsibilities for loss or injury to the property delivered to his charge, entirely irrespective of the question of his care or negligence; this class includes innkeepers and common carriers, the liabilities of whom will be considered in another place. (See CARRIERS, HIRING, and INNKEEPERS.)

The relation of bailor and bailee is largely one of trust, and the law requires good faith of each party. As a rule, the bailee will not be allowed to dispute the title of his bailor. He has a right to the possession of the thing bailed during the bailment, and in some instances a special property in it. In other cases he has a bare custody. This would enable him to maintain an action against any one who should unlawfully interfere with the chattel or deprive him of its possession. In such an action he would hold the proceeds beyond what was sufficient to indemnify him for his special interest as a trustee for the bailor.

T. W. DWIGHT.

Bai'ly (EDWARD HODGES), an English sculptor, born at Bristol Mar. 10, 1788, was a pupil of Flaxman. He gained the gold and silver medals of the Royal Academy about 1809, and became a royal academician in 1821. Among his masterpieces are "Eve at the Fountain," which is exquisitely graceful; "Apollo Discharging his Arrows;" "The Graces Seated;" "Eve Listening to the Voice;" and a statue of Lord Nelson. Died May 22, 1867.

Baily (FRANCIS), D. C. L., an English astronomer, born at Newbury, in Berkshire, Mar. 10, 1744, became a stockbroker of London. He was one of the founders of the Astronomical Society, and rendered important services to astronomy by the improvement of the "Nautical Almanac" and the production of the "Astronomical Society's Catalogue of Stars." He wrote several standard works on life annuities, and a "Life of Flamsteed" (1835). Died Aug. 30, 1844.

Bain (ALEXANDER), LL.D., born at Aberdeen, in Scotland, in 1818, graduated as M. A. at Marischal College in 1840. In 1845 he was elected professor of natural philosophy in the Andersonian University at Glasgow, and in 1857 was appointed examiner in logic and moral philosophy in the London University. In 1860 he became professor of logic in the University of Aberdeen. He has published "The Senses and the Intellect" (1855), "The Emotions and the Will" (1859), "Study of Character, including an Estimate of Phrenology" (1861), "English Composition and Rhetoric" (1866), "Mental and Moral Science" (1868), "Logic, Deductive and Inductive" (2 vols., 1870), and an "Elementary English Grammar" (1872). Mr. Bain is a philosopher of the school of Mill and Herbert Spencer. His works on grammar, composition, and mental science have been republished in America.

Bain'bridge, a thriving town, capital of Decatur co., Ga., on Flint River, 50 miles from its mouth and at the head of navigation, is the western terminus of the Atlantic and Gulf R. R., 236 miles W. S. W. of Savannah, and is the southern terminus of the Bainbridge Cuthbert and Columbus R. R. It has a cotton manufactory, three academies, two weekly newspapers, and is a considerable shipping-point for cotton. Pop. 1351.

B. E. RUSSELL, ED. "DEMOCRAT."

Bainbridge, a township of Schuyler co., Ill. P. 1200.

Bainbridge, a township of Dubois co., Ind. P. 2521.

Bainbridge, a post-village of Monroe township, Putnam co., Ind., on the Louisville New Albany and Chicago R. R., 9 miles N. by E. of Greencastle.

Bainbridge, a post-township of Berrien co., Mich. Pop. 1337.

Bainbridge, an incorporated village of Chenango co., N. Y., on the Albany and Susquehanna R. R., 32 miles E. of Binghamton. It has two weekly newspapers, two hotels, some thirty business places, one foundry and machine-shop, four churches, and a handsome brick union school-house. In front of the churches is a beautiful park, and the sidewalks of the village are well flagged with stone and shaded with maples. Pop. 681; of Bainbridge township, 1793. G. A. DODGE, ED. "SATURDAY REVIEW."

Bainbridge, a township of Geauga co., O. Pop. 660.

Bainbridge, a post-village of Ross co., O., on Paint Creek, 19 miles S. W. of Chillicothe. It has four churches. Pop. 647.

Bainbridge, a post-village of Lancaster co., Pa., on the Susquehanna River and a branch of the Pennsylvania R. R., 20 miles S. E. of Harrisburg. Pop. 762.

Bainbridge (WILLIAM), an American commodore, born at Princeton, N. J., May 7, 1774. He obtained the rank of captain in 1800, and commanded the frigate Philadelphia in the war against Tripoli. This vessel, having run aground, was captured by the enemy in Oct., 1803. He remained a prisoner until peace was concluded, June, 1805, and was afterwards raised to the rank of commodore. In Sept., 1812, he obtained command of a squadron consisting of the Constitution, of 44 guns, the Essex, and the Hornet. In Dec., 1812, he captured the British frigate Java, mounting 49 guns. Died July 28, 1833. (See THOMAS HARRIS, "Life of Commodore Bainbridge," 1837.)

Bains (*i. e.* "baths"), the name of several watering-places in France. The most important of these is Bains-les-Bains, in the department of Vosges, 14 miles S. W. of

Épinal, situated about 1000 feet above the sea. The place has thirteen springs. Among these "La Grosse Source" has a temperature of about 120° F.

Bai'ram, a feast of the Mohammedans, begins at the end of the fast of Ramadan. It is inaugurated with great public rejoicings and illuminations. Its observance is commanded by the Koran. "Little Bairam" occurs seventy days later.

Baird (Absalom), an American officer, born Aug. 20, 1824, at Washington, Pa., graduated at West Point 1849 in artillery, captain and assistant adjutant-general Aug. 3, 1861, and major and inspector-general Nov. 12, 1861, and April 28, 1862, brigadier-general U. S. volunteers. He served at various posts 1849–61, in Florida hostilities 1851–53, as assistant professor at Military Academy 1856–59, assistant adjutant-general at Washington, D. C., 1861, in Manassas campaign 1861, engaged at Blackburn's Ford and Bull Run, in the adjutant-general's office 1861, in the Virginia Peninsula campaign 1862, engaged at Yorktown and Williamsburg, in command of a brigade in the army of the Ohio, 1862, engaged in the capture of Franklin in Rosecrans' Tennessee campaign, 1863, engaged at Tullahoma, Shelbyville, Dug Gap, Chickamauga (brevet lieutenant-colonel), and occupation of Chattanooga, in command of a division in the Fourteenth corps in the operations about Chattanooga (brevet colonel) 1863–64, engaged at Missionary Ridge and skirmished in pursuit of the enemy in the invasion of Georgia, 1864, engaged at Resaca, Pine Mountain, Kenesaw, Vining's Station, Peach Tree Creek, Atlanta (brevet brigadier-general), Jonesboro', pursuit of Hood's army, in the "march to the sea" and surrender of Savannah, in the invasion of the Carolinas 1865, engaged at Bentonville, Raleigh, and surrender of Johnston's army at Durham Station. He was brevetted major-general U. S. army Mar. 13, 1865, for gallant and meritorious services in the field, and major-general U. S. volunteers Sept. 1, 1864, for distinguished conduct in the Atlanta campaign and at Savannah.

George W. Cullum, U. S. A.

Baird (Charles Washington), son of Rev. Robert Baird, D. D., was born at Princeton, N. J., Aug. 28, 1828, and graduated at the University of the City of New York in 1848, and at the Union Theological Seminary in 1851. He was American chaplain at Rome in Italy from 1851 to 1853, pastor of the Reformed (Dutch) Church, Bergen Hill, Brooklyn, from 1859 to 1861, and since then has been pastor of the Presbyterian church at Rye, N. Y. Besides translations, fugitive contributions to the press, and works, part of which he wrote, he has published "Eutaxia, or the Presbyterian Liturgies," 1855, "A Book of Public Prayer, compiled from the Authorized Formularies of Worship of the Presbyterian Church, as prepared by the Reformers Calvin, Knox, and others," 1859, and a "History of Rye, N. Y. (from 1660–1870)," 1871.

Baird (Henry Martyn), Ph. D., son of the Rev. Robert Baird, D. D., was born in Philadelphia Jan. 17, 1832, graduated at the University of the City of New York 1850, attended lectures in the National University (then University of Otho), Athens, Greece, 1851–52, studied theology in the Union Theological Seminary, New York, 1853–55, and Princeton, N. J., 1855–56. He was tutor of Greek in the College of New Jersey 1855–59, and since 1859 has been professor of the Greek language and literature in the University of the City of New York. In 1866 he was ordained as an evangelist. He has published "Modern Greece," 1856, "The Life of the Rev. Robert Baird, D. D.," 1866, and a large number of articles in the "Methodist Quarterly Review," "Princeton Review," "New Englander," and other quarterlies.

Baird (Robert), D. D., an American theologian and writer, born in Fayette co., Pa., Oct. 6. 1798. He graduated at Jefferson College in 1818. He spent several years (1835 to 1843) in Europe, where he did much to promote Protestant Christianity and the temperance cause. Few American clergymen have had so wide an acquaintance with distinguished men, or have accomplished a greater amount of good. Among his works are "A View of Religion in America" (1842) and a "History of the Waldenses, Albigenses, and Vaudois." Died at Yonkers, N. Y., Mar. 15, 1863.

Baird (Spencer Fullerton), LL.D., a distinguished American naturalist, born at Reading, Pa., in 1823, became assistant secretary of the Smithsonian Institution. Among other works he translated the "Iconographic Encyclopædia." In conjunction with J. Cassin he wrote "The Birds of North America" (Philadelphia and Salem, 1870) and "The Mammals of North America," and, with Charles Girard, produced an excellent work on North American serpents. He has contributed valuable articles to the publications of the Smithsonian Institution and to the "Journal of the Academy of Natural Sciences of Philadelphia," etc., and is a member of the National Academy of Sciences.

Baireuth, bī'rūth [Ger. pron. bī'roit], a city of Bavaria, capital of the circle of Upper Franconia, on the Red Main, 126 miles by rail N. of Munich. It is pleasantly situated and well built; its streets are wide and well paved, and the city is adorned with gardens and public fountains. The principal buildings are the new palace, the mint, the opera-house, and town-hall. There are three palaces in the vicinity, named Fantasie, Sanspareil, and Hermitage. Here are manufactures of cotton and woollen stuffs, porcelain, and leather. Pop. in 1871, 17,837.

Bai'us, the Latinized name of De Bay (Michael), a Flemish theologian, born in Hainault in 1513. He became professor of divinity at Louvain in 1550, and in 1578 chancellor of that university. He adopted the doctrines of Saint Augustine, and wrote works on free-will and grace which were condemned by Pope Pius V. in 1567. Baius retracted or submitted, but his doctrines were afterwards maintained by the Jansenists. He was eminent for learning and piety. Died Dec. 16, 1589.

Ba'ja, an important market-town of Hungary, in the county of Bács, on the Danube, 115 miles S. of Pesth. It has Roman Catholic and Greek churches, a synagogue, and a castle. Here is an important market or annual fair for swine. Large quantities of grain and wine are produced in the vicinity. Pop. in 1869, 18,110.

Baja'da de Parana', or simply **El Parana',** a town of the Argentine Republic, in the province of Entre Rios, is situated on the Rio Parana, in lat. 31° 42′ 54″ S. and lon. 60° 32′ 39″ W., 230 miles N. W. of Buenos Ayres. It was founded in 1730, was the capital of the state from 1819 to 1862, and of the republic from 1852 to 1862. Among its numerous beautiful buildings are the palace of Gen. Urquiza, the government palace, and the theatre. It is well built, but has of late begun to decline. Pop. about 7000.

Bajazet. See Bayazid.

Bajmok, a town of Hungary, in the county of Bács, 20 miles S. E. of Maria-Theresiopol. Pop. in 1869, 6446.

Ba'ker, a county in Central Alabama, has an area of about 650 square miles. It is bounded on the E. by the Coosa River. The surface is undulating; the soil is fertile. Tobacco, cotton, corn, and wool are the chief crops. It is traversed by the Selma Rome and Dalton and the South and North Alabama R. Rs. Capital, Chestnut Creek. Pop. 6194.

Baker, a county in N. E. Florida, bordering on Georgia; it is partly bounded on the N. by St. Mary's River. Sea-Island cotton and sugar-cane are the chief crops. The surface is nearly level. Timber is abundant. It is traversed by the Jacksonville Pensacola and Mobile R. R. Capital, Sanderson. Pop. 1325.

Ba'ker, a county in S. W. Georgia. Area, 450 square miles. It is bounded on the S. E. by Flint River, and intersected by the Ichawaynockaway Creek. Corn, cotton, and wool are the chief crops. The surface is nearly level; the soil is fertile. Capital, Newton. Pop. 6843.

Baker, a county which forms the S. E. extremity of Oregon. It is intersected by the Malheur and the Owyhee rivers. Gold is found near the Malheur River. Silver is also found. The county is chiefly an agricultural and pastoral region. Oats, barley, and wool are largely raised. Capital, Baker City. Pop. 2804.

Baker, a township of Martin co., Ind. Pop. 1018.

Baker, a township of Morgan co., Ind. Pop. 456.

Baker, a township of Crawford co., Kan. Pop. 962.

Baker, a township of Linn co., Mo. Pop. 1269.

Baker (A. R.), D. D., born in Franklin, Mass., Aug. 30, 1805, graduated at Amherst in 1830, became a teacher in Medway, Dorchester, and Andover, Mass., ordained pastor of a Congregational church in Medford, Mass, and has subsequently been settled in Lynn, Wellesley, and Bosfon. He has published a "School History of the U. S.," "The Catechism Tested by the Bible," an "Exposition of the Sermon on the Mount," and numerous other works.—His wife, Harriette N. W. Baker, a daughter of Rev. Dr. Leonard Woods, was born in 1815. She has published over 160 volumes, mostly works for children, written under the pseudonym of "Madeline Leslie."

Baker (Charles M.), born in New York City about 1805, resided in Vermont, and after 1838 in Wisconsin, where he was a prominent lawyer, and was distinguished for his benevolence and piety. He was for some time a judge of the State circuit court. Died Feb. 5, 1872.

Baker (Daniel), D.D., born at Midway, Liberty co., Ga., in 1791, graduated at Princeton in 1815, was ordained

to the Presbyterian ministry in 1818, was pastor at Washington, D. C., Savannah, Ga., Frankfort, Ky., Tuscaloosa, Ala., and Holly Springs, Miss., was for a time president of Austin College, Huntsville, Tenn., was a popular and successful preacher, and author of several practical and polemical religious works. Died in 1857.—His son, Rev. WILLIAM MUMFORD BAKER (born in 1825, graduated at Princeton in 1846), is the author of a "Life" of his father and of several other popular works, such as "Inside, a Chronicle of Secession," "The New Timothy," "The Virginians in Texas," etc. He has been a Presbyterian minister in Galveston and Austin, Tex. (1850–65), and at Zanesville, O.

Baker (DAVID JEWETT), born at East Haddam, Conn., Sept. 7, 1792, graduated at Hamilton College in 1816, became a prominent lawyer of Illinois, was a probate judge in Randolph co., U. S. Senator (1830–31), and U. S. attorney for Illinois (1833–35). He was one of the leading anti-slavery men of Illinois in the contest of 1830. Died at Alton Aug. 6, 1869.

Baker (EDWARD DICKINSON), COLONEL, a lawyer, born in London, Eng., Feb. 24, 1811, emigrated to the U. S. in his youth. He was chosen a member of Congress in 1848, removed to California in 1852, and became a popular orator of the Republican party. In 1860 he was elected a Senator of the U. S. for Oregon. Having obtained command of a brigade of the Union army, he was killed at Ball's Bluff Oct. 21, 1861.

Baker (GEORGE A.), an American portrait-painter of great merit, born in New York City. His delineations of children are much admired.

Baker (OSMON CLEANDER), D. D., born in Marlow, N. H., July 30, 1812, studied at Wesleyan University, Conn., became teacher in the Newbury Wesleyan Seminary (Vt.), 1834, and subsequently its principal. He was one of the founders of the Methodist theological schools, and for some time professor in the Biblical Institute at Concord, N. H. In 1852 he was elected bishop. Died Dec. 20, 1871. "Baker on the Discipline" is a standard work.

Baker (Sir SAMUEL WHITE), K. C. B., the English explorer, was born June 8, 1821. Having a strong desire for adventure, he organized, with his brother, an extensive agricultural colony in Ceylon, where he went in 1848, remaining in that country eight years. In 1861 he went to Africa, with the design of visiting the sources of the Nile. He fell in with Speke and Grant, and afterwards explored the western arm of the Nile, and discovered the Albert Nyanza Lake. In 1869 he set out, under the direction of the khedive of Egypt, with 1000 picked men, with the design of suppressing the slave-trade, extending the boundaries of Egypt and spreading the cultivation of cotton. In 1873 he returned from this expedition, reporting complete success. His wife has accompanied him upon all his African expeditions.

Ba'ker Cit'y, a post-village, capital of Baker co., Or. It has one weekly newspaper. Pop. 312.

Baker's Creek, Miss. See CHAMPION HILLS.

Ba'ker's Falls, a cascade of the Hudson River, in Kingsbury township, Washington co., N. Y. The stream falls 56 feet in sixty rods, and the scene is one of remarkable beauty. The falls have been utilized, and furnish a great water-power. Here are two machine-shops and some paper-mills.

Ba'kersfield, a post-village of Kern co., Cal., is situated on Kern River, about 60 miles from Visalia. It has two weekly newspapers, and is the centre of a considerable cotton-trade.

Bakersfield, a post-township of Franklin co., Vt., 50 miles N. W. of Montpelier. It has an academy, and manufactures of leather, lumber, doors, sash, blinds, etc. Pop. 1403.

Ba'kersville, a post-village, capital of Mitchell co., N. C., 95 miles N. W. of Charlotte. Pop. of township, 1101.

Bakewell, an old market-town of England, in Derbyshire, on the river Wye, near its confluence with the Derwent, is 25 miles by rail N. W. of Derby. It has an ancient Gothic church, and chalybeate springs with warm baths, which are visited by many persons. Quarries of black marble and mines of coal and lead are worked in the vicinity. Chatsworth House, the splendid mansion of the duke of Devonshire, is three miles from this town, which is surrounded by beautiful scenery. Pop. in 1861, 11,254.

Bakewell (ROBERT), an English agriculturist, born in Leicestershire in 1726. He gained distinction by his improvement of domestic animals, especially sheep and horned cattle. He originated a breed of sheep formerly called by his name, but now known as the Leicester breed. Died Oct. 1, 1795.

Bakh'tchissaroi', or **Baktshi-Serai,** a Tartar town of Russia, in the government of Taurida (Crimea), 15 miles S. W. of Simferopol. It was formerly the capital of the Tartar khans, whose palace is a remarkable Oriental edifice and in good repair, with spacious galleries, brilliant paintings, and pavilions of light and airy form. The town consists of a single street at the bottom of a narrow valley, enclosed between steep rocks, and is one of the most singular in Europe. Pop. in 1867, 11,448.

Bakhtegan', Lake, in Persia, is 50 miles E. of Shiraz. It is 60 miles long, with an average breadth of 8 miles, and receives at its western extremity the river Bundemir (anc. *Araxes*). The lake yields large quantities of salt.

Ba'king is the mode of cooking food in an oven usually nearly or quite airtight. The term is also employed in the manufacture of bricks, porcelain, etc. (The baking of bread will be treated under BREAD.) In baking, strictly so called, the oven is so closed that the steam and aroma arising from the substances within are confined; but by opening ventilators a current of air may be produced, and then these ovens may be used for oven-roasting. The offensive taste that often characterizes baked dishes is thus avoided. Baking, although a convenient mode of cooking, is not so good a process for cooking meats as ROASTING (which see).

Ba'kony-Wald ("forest of Bakony"), a densely-wooded mountain-range of Hungary, extends between the river Raab, the Danube, and Lake Balaton. It is 56 miles long and 23 miles wide. The average height is 2000 feet. Large herds of swine are annually driven hither to feed on mast (acorns). Quarries of good marble are worked in these mountains.

Bak'sheesh', or **Bakshish,** an Arabic and Persian word signifying a "present," a "gratuity," is much used by beggars and others in Egypt, Palestine, and other Eastern countries. Travellers in those countries are much annoyed by the importunate, and even insolent, cries of the natives who demand baksheesh.

Ba'ku, a seaport-town of Asiatic Russia, capital of Baku, on the W. shore of the Caspian Sea, and on the S. side of the peninsula of APSHERON (which see). It has several fine mosques and bazaars. Here are naphtha springs which ignite spontaneously, and caused Baku to be regarded as a holy city by the Parsees, who built several temples here. Naphtha and salt are exported from Baku, which is an important entrepôt of trade between Europe and Persia. Pop. in 1867, 12,383.

Bal'abac', an island of the Malay Archipelago, between Borneo and Palawan, 30 miles S. of the latter. It has an area of 130 square miles.

Ba'la Beds, a local deposit of hard crystalline limestone, alternating with softer argillaceous bands, which occurs near Bala, in Wales, and forms a group of the Lower Silurian formation. Trilobites and Cystideæ are the predominant fossils of this group, which is believed to correspond to the Hudson formation of America. It is sometimes called the Caradoc limestone.

Balæn'iceps (the "whale-head"), a genus of wading birds of the stork family, includes the whale-headed stork (*Balæniceps rex*) or shoe-bird of Northern Africa, where it lives in the swamps, feeding on snakes and fishes. Its enormous bill is one of its most remarkable characteristics. It has been called shoe-bird, from a fancied resemblance of its bill to a shoe.

The Balæniceps.

Bal'aghauts' (*i. e.* "above or beyond the Ghauts"), an extensive district of India, in the presidency of Madras, extends from the river Cavery to the river Krishna. The surface is hilly; the soil is fertile, producing sugar, cotton, and indigo. It is stated that diamonds are found here.

Balakla'va, or **Balaclava,** a small port and town of Russia, in the Crimea, and on the Black Sea, about 7 miles S. from Sevastopol, is separated from the harbor of Sevastopol by a rocky peninsula. It has a good landlocked harbor, supposed to be the port of the Læstrigonians at which Ulysses landed. The ruins of churches and mosques attest the ancient magnificence of this town. Pop. in 1867, 742. A few days after the battle of Alma, which occurred in Sept., 1854, Balaklava was occupied by the British army,

and the harbor became the head-quarters of the fleet. The British army suffered here great privations in consequence of the inefficiency of the war office and the mismanagement of the commissariat. Soldiers perished with hunger and cold, while ample stores of food and clothing were in the holds of ships in the harbor. Here occurred the battle of Balaklava between the British and Russians, Oct. 25, 1854. The charge of the British cavalry in this action was a famous but unsuccessful exploit.

Bal'ance [supposed to be derived from *bilanx*, having two scales; from *bis*, "twice," and *lanx*, a "scale or plate"] is a lever of the first kind, the fulcrum being between the power and the weight; used to ascertain the weight of bodies in comparison with the standard units of weight. The ordinary balance consists essentially of a metallic bar or lever, called the beam, either delicately suspended, or supported on a stand by the intervention of a wedge-shaped prism, technically termed a knife-edge, exactly at its middle point. An index is fixed at right angles to the beam, and made to travel over a graduated arc, so as to show when the beam is horizontal. A scale-pan is suspended from each end of the lever. Since the arms of the balance are equal, it is plain that there cannot be equilibrium unless the weights placed in each scale are also equal. When this is the case, the beam is perfectly horizontal and the index vertical. The balance is then said to be true. When the beam is horizontal with unequal weights, the balance is false. Thus it is easy to test the truth of a balance by first placing in the scales weights which apparently are equal, and then transferring each into the other scale. If the weights are not really equal, one of them will appear heavier than the other after the transfer. There are, however, two methods of finding the exact weight of a body by means of a false balance. The body may be weighed with standard weights in each scale successively, and the true weight is the mean proportional between the two apparent weights. Or the body (placed in one scale) may be balanced by a sufficient quantity of any convenient substance—sand, for instance—so that the beam is horizontal, and then replaced by standard weights until the sand is balanced; the weight thus obtained is the true one. A good balance should have its beam in stable equilibrium, for which purpose the centre of gravity of the beam and its appendages should fall a little below the knife-edge. The points of suspension of the scale-pans and the fulcrum of the beam should be in the same straight line. Both when the scales are empty, and when equal weights are placed in them, the beam should be horizontal and the index vertical, the arms, of course, being exactly equal to one another. It is of great importance that the balance should be very sensitive and indicate very slight inequalities in the weights. The sensibility of a balance becomes greater, first, as the length of the arms is increased, which renders the movement about the fulcrum more obvious; and secondly, as the weight of the beam is diminished, for when the beam is displaced by the inequality of the weights, its own weight gives it a tendency to return to its first position. But this displacement is less for a given inequality in the weights as the weight of the beam is increased; so that the less the beam weighs the more sensitive it becomes. A form of balance, more convenient for counterpoising, but less exact than the common form, is that in which the scale-pans are placed above the beam.

The balance of a watch is a wheel nicely poised on its axis, the pivot on which it turns being frequently formed of rubies or other jewels. The natural effect of an impulse given to this wheel would be a complete rotation, but this is arrested by the balance-spring, so that it recoils, and a vibratory motion results. The balance-spring is a coil of steel wire so fine and delicate that 4000 springs weigh only about one ounce. One of the extremities of the spring is fastened to a point independent of the balance, and the other end is attached near its axis. When the impulse is given to the balance, it moves round just so far as the impulse given is able to overcome the elastic resistance of the spring. When that resistance becomes equal to the impulse, the balance is driven back by the elastic recoil of the spring. In marine chronometers a cylindrical helical spring is used. REVISED BY F. A. P. BARNARD.

Balance of Power [Fr. *équilibre politique, i. e.* "political equilibrium" or "equilibrium of states"], a phrase used in modern European diplomacy to express a state of political equilibrium among neighboring powers, or a political system so arranged and counterpoised that no nation or monarch may be so powerful as to endanger the independence of other states. Such a balance was aimed at in the political combinations in behalf of Greece; in those of Italy just before the Reformation; in the policy of Europe under the lead of France against Austria and Spain; in the alliances against Louis XVI., against Napoleon I., and more recently against Russia in order to preserve the independence of Turkey. Its object is to prevent *political* aggrandizement only. There were in Europe, after the overthrow of Napoleon in 1815, five monarchies recognized as the great powers—namely, France, Austria, Great Britain, Russia, and Prussia, to which, in 1859, the kingdom of Italy was added. The victories of the Prussians in 1866 and 1870 have so prostrated the armies of Austria and France that there now remain in Europe only two first-rate powers, Russia and Prussia (or Germany), and the balance of power is supposed to be destroyed, for if these two should form an offensive alliance they would be a match for all the other powers on the Continent. (See INTERNATIONAL LAW No. I., by PRES. T. D. WOOLSEY, S. T. D., LL.D.)

Balance of Trade [Fr. *balance du commerce*], in political economy, is the difference between the value of the exports and the imports of a country. If the exports exceed the imports in value, the balance of trade is in favor of that country which usually receives a quantity of gold equal to that excess. A nation may, however, derive profit from its foreign commerce even when its imports exceed its exports in value, for merchants who export commodities may find it more profitable for them to bring back some foreign produce than to bring the money which they receive for the articles exported.

Bal'anus, a genus of Cirripedia distinguished by the absence of a flexible stalk and the possession of a symmetrical shell. The name is derived from the Greek word for *acorn*, and was given to it because some species resemble an acorn. The base is usually formed of a thin calcareous plate, the sides of six valves; and four small valves form the operculum, exactly closing the aperture at the top. This genus comprises many species, known as sessile barnacles, which are found in nearly all seas, attached to stones, shells, and other objects. It is remarkable that in the early stage of their existence they are capable of active locomotion, and have large eyes, which disappear, along with the organs of locomotion, when they become stationary. Some of the large species were esteemed a delicacy by the ancient Romans. The Chinese collect and eat the *Balanus tintinnabulum*, which is said to resemble lobster in taste; and *Balanus psittacus*, a South American species, is also eaten. This species is sometimes four inches in diameter, its height considerably more. There are several species found in the U. S.

Bal'ashof, a town of Russia, in the government of Saratov, 138 miles W. of Saratov. Pop. in 1867, 7186.

Balasore, the chief town of the South Cuttack district, in Bengal, on the Boorabullung River, which has a bar at its mouth. It has an American mission, salt-works, and a coasting-trade. It is 145 miles S. W. of Calcutta. P. 11,000.

Bal'assa-Gyar'mat, a town of Hungary, in the county of Neograd, 40 miles N. of Pesth. Pop. in 1869, 6435.

Bal'aton, Lake [Ger. *Platten-see;* Hun. *Balatomy;* anc. *Pelso*], the largest lake in Hungary, 55 miles S. W. of Pesth, is 51 miles long and 7 miles wide. The area is estimated at 383 square miles. It receives numerous streams, the largest of which is the Szala, and discharges its water through the Sio and Sarvitz into the Danube. Fish of various kinds are found here. This lake is often celebrated in the old romantic ballads of the Magyars.

Bal'bi (ADRIANO), an eminent Italian geographer, born at Venice April 25, 1782. He became a resident of Paris, where he passed many years. He published in 1826 an "Ethnographical Atlas of the Globe," which is highly esteemed. His other chief work is a "Compendium of Geography" ("Abrégé de Géographie," 1 vol. 8vo), which is considered one of the best treatises on that science that has ever appeared. His works are mostly written in French. He removed from Paris to Italy in 1832. Died Mar. 14, 1848.

Bal'bo (CESARE), an Italian statesman and author, born at Turin Nov. 21, 1789. He was appointed commissioner of the Illyrian provinces by Napoleon in 1812. He advocated the independence of Italy in a work called "Speranze d'Italia ("Hopes of Italy," 1843), which widely extended his reputation. As a moderate and liberal patriot he took a prominent part in the revolutionary movements of 1848. Among his works is a "History of Italy from the Beginning to 1814" (1849), which is highly esteemed. Died June 3, 1853.

Balbo'a, de (VASCO NUÑEZ), a famous Spanish navigator and explorer, born in Estremadura in 1475. He emigrated to Hayti about 1500, and in 1510 accompanied Enciso in an expedition to Darien. Having quarrelled with Enciso, Balboa obtained the chief command of the party, and in Sept., 1513, discovered the Pacific Ocean from the top of a mountain. He descended to the shore and

took possession of the ocean in the name of his sovereign. In 1514, Pedrarias Dávila was sent from Spain to supersede Balboa, who was punished by a fine for his insubordination. He served as a deputy under Pedrarias, who, actuated by cruelty and jealousy, accused Balboa of treasonable designs, and put him to death in 1517. (See IRVING, "Voyages and Discoveries of the Companions of Columbus;" M. J. QUINTANA, "Vidas de Españoles Celebres.")

Balbue'na, de (BERNARDO), a Spanish poet, born at Val-de-Peñas in 1568. He became bishop of Porto Rico in 1620. Of his works, only three have been preserved: "La grandeza Mejicana" (Mexico, 1609; Madrid, 1829), "El Siglo de Oro" (1608), and "El Bernardo," an epic poem (1624 and 1808). Died at Porto Rico in 1627.

Bal'bus (L. CORNELIUS), surnamed MAJOR, a Roman officer, born at Gades (Cadiz), became an intimate friend of Cæsar, whom he accompanied to Spain in 61 B. C. In 40 B. C. he was chosen consul, being the first adopted citizen who received that honor. He wrote a diary of the events of his own and Cæsar's life.

Balch (GEORGE B.), U. S. N., born Jan. 3, 1821, in Tennessee, entered the navy as a midshipman in 1837, became a passed midshipman in 1843, a lieutenant in 1850, a commander in 1862, a captain in 1866, and a commodore in 1872. He served during the Mexican war on the east coast of Mexico, from 1862 to 1865 commanded first the steamer Pocahontas, and afterwards the steamer Pawnee, South Atlantic blockading squadron, during which period, in co-operation with our army, he was almost constantly engaged with the enemy's batteries and forts on the Stone and Black rivers, S. C. In one action the Pawnee was struck forty-six times, but finally succeeded in driving the Confederates from their guns "in the wildest confusion." Rear-Admiral Dahlgren spoke in the highest terms of Balch's bravery, conduct, and sound judgment.

FOXHALL A. PARKER, U. S. N.

Bal'cony [Fr. *balcon;* It. *balco'ne*], a platform or gallery projecting in front of a window or several windows, is supported by consoles or brackets fixed in the wall or by pillars resting on the ground, and has a parapet or balustrade before it. The term *balcony* is also applied to several seats in a theatre which are nearest the stage, and considered the most desirable seats in the house.

Bal'dachin [It. *baldachi'no*], a canopy in the form of a crown or umbrella, made of costly materials, richly adorned, and raised over a throne, couch, pulpit, or altar. In the church of St. Peter in Rome there is a magnificent baldachin cast in bronze by Bernini, and supported by four twisted columns. The baldachin is used in processions of the Roman Catholic Church. The name *baldachin* is said to have been derived from *Baldach,* a corrupted form of a name of Bagdad, and was originally applied to the canopy which was carried over an Oriental prince.

Bald (or **White-Headed**) **Eagle** (*Halia'ëtus leucoceph'alus*), so called on account of the snowy-white color of the head and neck, is a native of North America, where it is found along the sea-coasts and at the mouths of large rivers. The length of this bird is about forty inches, the stretch of wing from seven to eight feet. The nest of the bald eagle is generally made upon some lofty tree, and sometimes becomes of great size, as the bird is in the habit of using the same nest year after year, and making additions to it every season. The female bird generally lays her eggs in January, two or three in number and of a dull white color, and they are hatched by the middle of February. It is strongly attached to its young, and will not forsake them, even if the tree on which they rest be enveloped in flames. The bald eagle will eat almost anything, even carrion, but it is especially fond of fish, which it steals from the osprey when practicable, but also takes them from the water with much skill. For an interesting description of the manner in which it takes its prey the reader is referred to the account given by Audubon. The bald eagle has been adopted by the Americans as their national emblem.

Bald Eagle.

Bald Eagle, a township of Clinton co., Pa. Pop. 950.

Bal'der, or **Baldur** [from *balldr,* "good," "strong," "valiant"], often called BALDER THE GOOD, in the Norse mythology was the second son of Odin. He is supposed to typify the brightness of the summer sun, and to make all things bright and cheerful; hence he has been termed the "Apollo of the North." His abode was Breidablik ("widely shining"), where nothing impure could enter. The account of his death is as follows: He dreamed one night that his life was in the utmost danger; and when he related this dream, the gods were so distressed that his mother, Frigga, exacted an oath from all things, animate and inanimate, that they would not injure Balder. She did not, however, exact any oath from the mistletoe, because it seemed so harmless and insignificant. Now, the gods were accustomed to amuse themselves by shooting arrows and throwing stones at Balder, to all of which he proved invulnerable. When Loki, the god of evil, found that the mistletoe had not taken the oath, he obtained the plant and went to the assembly of gods, where he found Balder's brother Hoder, standing apart from the others. He asked him why he also did not throw something at Balder. "Because I am blind," answered Hoder, "and have nothing to throw." "Come," said Loki, "do like the rest; show honor to Balder by casting this trifle at him, and I will direct your hand." Hoder did as the tempter bade him, and Balder, pierced through by the mistletoe, fell dead. So great was the grief of the gods that Hermod visited the realms of death, and besought Hela to release her prey and allow Balder to return to the dwelling of the Æsir. Hela answered that if everything mourned him, then he should return, but if anything whatever failed to weep, then Balder must remain in the world of shades. All things animate and inanimate were requested by the Æsir to weep for Balder, and all did so except a giant hag named Thok (afterwards found to be Loki himself, who had assumed this form in order to prevent Balder from returning to life). She answered their request by jeers, and Balder was accordingly forced to remain in the abode of the dead. (See THORPE'S "Northern Mythology," vol. i.; KEYSER'S "Religion of the Northmen.")

J. THOMAS.

Balderic, or **Baudry,** a French chronicler, bishop of Dol, born about the middle of the eleventh century. He took part in all the Church councils of the time, and made active efforts to restore the rigor of monastic discipline. He visited England, and left an account of his travels. He wrote a chronicle of the first Crusade, entitled "Historiæ Hierosolomytanæ." We have also from him a life of Robert d'Arbrissel.

Baldi d'Urbino (BERNARDINO), a mathematician and man of letters, born at Urbino June 6, 1553, accomplished as a writer, and in science as well, under the tutelage of Commandino developed a remarkable zeal for the study of mathematics. He learned the Hebrew and Chaldean tongues in order to better understand the Bible, and every year he acquired some new language. His multitudinous writings deal with almost every branch of science. Chief among his works are "Cronica de' Matematici" ("Chronology of Mathematicians"), "Nautica," a didactic poem on navigation, an Arabic grammar and dictionary, and a translation of the Targum of Onkelos. He commenced a geographic dictionary, which he only brought to the letter C in four enormous volumes. Died Oct. 12, 1617.

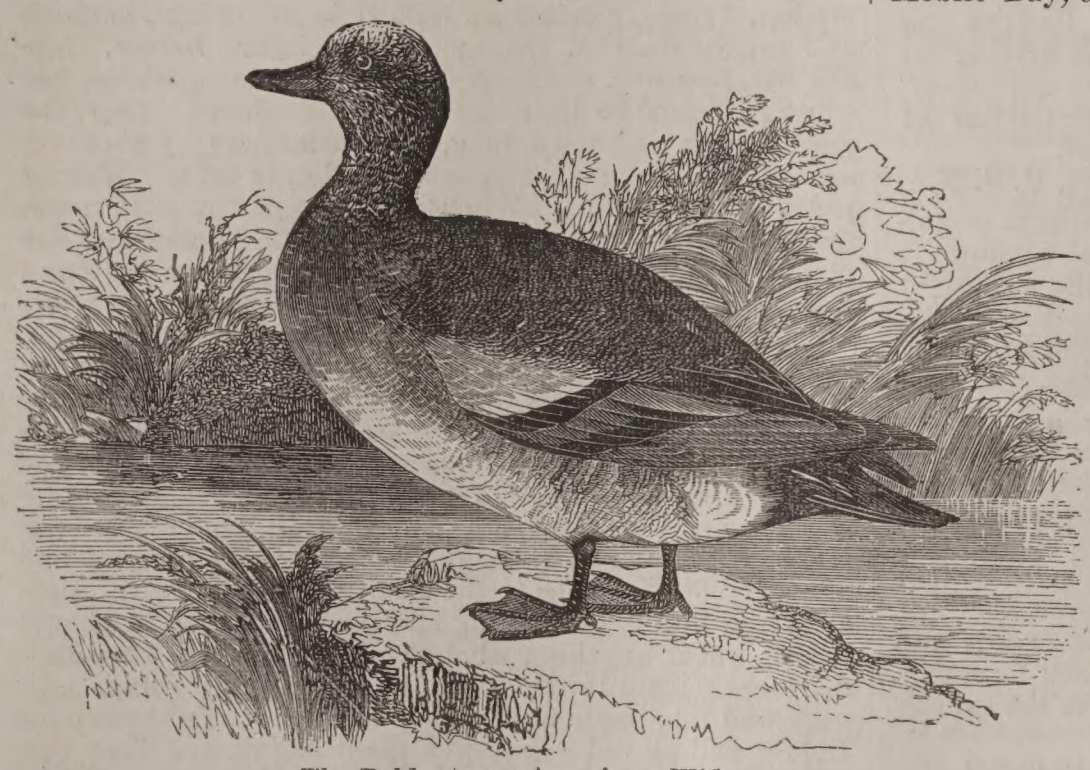
Bald Mountain Plantation, a township of Somerset co., Me. Pop. 8.

Bald Mountain, a post-village of Greenwich township, Washington co., N. Y., has extensive lime-kilns, which afford great quantities of lime.

Bald'ness (*Alopecia*), the loss or absence of the hair of the scalp. There are some few cases on record in which

the hair has never been developed. This is termed congenital baldness. Accidental baldness is caused by an atrophy of the hair-follicles. Baldness in the comparatively young may occur from wearing waterproof caps or unventilated hats, which, by preventing evaporation from the head, occasion an unhealthy state of skin. It may be complete, or partial, occurring in patches. Senile baldness (*calvities*) is the consequence of age; it arises, like the preceding variety, from an atrophy of those parts on which the hairs depend for nutrition. It generally commences on the crown of the head. Women are not so frequently bald as men. The causes of baldness are defective supply of nutrition, a hereditary tendency, dissipation, but especially old age. The hair falls off after severe illnesses, or after other causes of general debility. Alopecia is sometimes the result of syphilis. The treatment consists in cleanliness, and in exciting the circulation of the scalp by using a hairbrush and the application of stimulants, as the Spanish-fly ointment, two drachms to an ounce of lard, mixed with the same quantity of pomatum, or some equivalent preparation. Any constitutional debility should be remedied. Shaving the head is sometimes resorted to, and is often useful. FAVUS (which see) permanently destroys the hair.

Bald'pate, called also **American Widgeon,** the *Mareca Americana*, a duck which breeds in Mexico and the South-western States, and also along the western coast; found also throughout the U. S., Canada, the northern part of South America, and occasionally in Europe. It is highly prized for the delicacy of its flesh. It takes its name from its white crown. It is variously marked with reddish-brown, gray, white, and chestnut. The male has a green band running from the eyes to the nape. The bird is nineteen and a half inches long.



The Baldpate, or American Widgeon.

Bal'dung (HANS), also called **Hans Grün,** a German painter and engraver, born at Gmünd, in Swabia, in 1470. He belonged to the Swabian School, and derived from Dürer and Schöngauer the fantastic element which marked his works. He excelled those masters in the handling of color and light and shade. His chief work is the altar-piece at Freiburg. His wood-cuts are wonderful in their Gothic strangeness and bizarre fancifulness. Died in 1552.

Bald'win I., king of Jerusalem, born in 1058, was a brother of Godfrey of Bouillon. He joined the first Crusade in 1096, and fought bravely against the infidels. He was chosen count of Edessa by the Christian inhabitants of that city. On the death of Godfrey, in 1100, he succeeded him as king of Jerusalem. He defeated the Saracens in several battles, and captured Acre, Cæsarea, and Sidon. He was more ambitious and worldly than his brother Godfrey. Died in 1118. (See GIBBON, "Decline and Fall of the Roman Empire.")

Baldwin II. (BALDWIN DU BOURG), king of Jerusalem, was a cousin of Baldwin I., whom he succeeded in 1118. He waged war against the Saracens. During his reign the military order of Templars was instituted for the defence of the Holy Land. He died Aug. 21, 1131, and left the throne to his son-in-law, Foulques of Anjou.

Baldwin III., the son of Foulques of Anjou, was born in 1129, and became king of Jerusalem in 1143. He defeated Noor-ed-Deen, the sultan of Aleppo, at Jerusalem, in 1152 and 1157. He acquired much renown and influence, and was respected even by the Saracens. His wife was Theodora, a daughter of the Greek emperor Manuel. He died Feb. 10, 1162, and was succeeded by his brother, Amalric or Amaury.

Baldwin IV., king of Jerusalem, surnamed THE LEPER, was born in 1160. He succeeded his father Amalric in 1174. He defeated the famous Saladin near Tiberias in 1182, but was afterwards defeated by that prince. He died in 1186, and was succeeded by his nephew, Baldwin V., who died in childhood.

Baldwin I., the first Latin emperor of Constantinople, was born at Valenciennes in 1171. He was Baldwin IX., count of Flanders, having inherited that title from his father, Baldwin VIII. He joined the fourth Crusade in 1200, and co-operated with the Venetians in an enterprise against Constantinople, the throne of which was occupied by Alexis, an usurper. The crusaders defeated Alexis, captured the city, and elected Baldwin emperor in 1204. He was defeated and taken prisoner by the Bulgarians in 1205, and died in 1206, leaving the throne to his brother Henry. (See A. CAHOUR, "Baudouin de Constantinople," 1850.)

Baldwin II., emperor of Constantinople, born in 1217, was a son of Peter de Courtenay, and a nephew of Baldwin I. He succeeded to the throne in 1228, and was placed under the guardianship of John de Brienne. He began to reign in 1237, and encountered much opposition from the Greeks and Bulgarians. In 1261 his capital was taken by Michael Palæologus, and Baldwin fled to Italy, where he died. (The English family of Courtenay claims to be descended from the stock of this emperor.)

Baldwin, a county of Alabama, bordering on Florida and the Gulf of Mexico. Area, estimated at 1800 square miles. It is bounded on the W. by the Mobile River and Mobile Bay, and on the E. by the Perdido River. The surface is nearly level; the soil is sandy. Corn and wool are the chief products. The county is intersected by the Mobile and Montgomery R. R. Capital, Blakely. Pop. 6004.

Baldwin, a county in Central Georgia. Area, 257 square miles. It is intersected by the Oconee River, and bounded on the N. by Little River. The surface is mostly hilly; the soil near the Oconee is fertile. Corn, cotton, and wool are the chief crops. The dividing line between the primary and tertiary formations passes through this county. It is intersected by the Macon and Augusta R. R. Capital, Milledgeville. Pop. 10,618.

Baldwin, a post-village of Duval co., Fla., at the crossing of the Jacksonville Pensacola and Mobile and the Florida R. Rs., 47 miles W. by S. of Jacksonville.

Baldwin, a post-village of St. Mary's parish, La., is the seat of Thompson University.

Baldwin, a township of Cumberland co., Me., on the Portland and Ogdensburg R. R., 25 miles N. W. of Portland. It has manufactures of carriages, boxes, spokes, hay-rakes, etc. Pop. 1101.

Baldwin, a township of Sherburne co., Minn. P. 234.

Baldwin, a township of Chemung co., N. Y. Pop. 969.

Baldwin, a township of Allegheny co., Pa. Pop. 3104.

Baldwin (ABRAHAM), a distinguished statesman of Georgia, born in Guilford, Conn., in Nov., 1754, graduated at Yale in 1772, was five years a tutor there, and became in 1777 a chaplain in the army. In 1784 he became a lawyer of Savannah, Ga., was a member of Congress (1785–88 and 1789–99), of the convention which framed the U. S. Constitution (1787), and U. S. Senator from Georgia (1799–1807). He was the originator of the State University. Died Mar. 4, 1807.

Baldwin (CHARLES H.), U. S. N., born Sept. 3, 1820, in the city of New York, entered the navy as a midshipman April 24, 1839, became a passed midshipman in 1845, a lieutenant in 1853, a commander in 1862, and a captain in 1869. He served on the W. coast of Mexico during the Mexican war, and was in several sharp engagements with the enemy on shore near Mazatlan. He commanded the steamer Clifton of the mortar flotilla at the passage of Forts St. Philip and Jackson by Farragut's fleet, April 24, 1862, and at the attack on Vicksburg of June 28, 1862.

FOXHALL A. PARKER, U. S. N.

Baldwin (ELIHU WHITTLESEY), S. T. D., born at Durham, N. Y., Dec. 25, 1789, graduated at Yale in 1812 and at Andover in 1817, was pastor of the Seventh Presbyterian church in New York City (1820–35), and president of Wabash College, Ind. (1835–40). Died at Crawfordville, Ind., Oct. 15, 1840. (See a "Memoir" by E. F. HATFIELD, 1843.)

Baldwin (GEORGE COLFAX), D. D., born at Pompton,

N. J., Oct. 21, 1817, educated at Madison University, for twenty-nine years pastor of the First Baptist church in Troy, N. Y. He is the author of "Representative Men," "Representative Women," "The Model Prayer," etc.

Baldwin (Henry), LL.D., an American jurist, born at New Haven, Conn., in 1779, became a citizen of Pennsylvania. He was elected to Congress several times, and was appointed a judge of the Supreme Court of the U. S. in 1830. Died April 21, 1844.

Baldwin (Henry P.) was born in Coventry, R. I., Feb. 22, 1814, emigrated to Detroit in his youth, and was governor of Michigan (1869–71).

Baldwin (John Denison) was born at North Stonington, Conn., Sept. 28, 1810. After studying law and theology he became a journalist, and was long the editor and proprietor of the "Worcester (Mass.) Spy." He was a member of Congress from Massachusetts (1863–69), and has published "Raymond Hill and Other Poems" (1847), "Pre-historic Nations" (1869), "Ancient America" (1872).

Baldwin (Joseph G.), of Sumter, Ala., was a native of Virginia. He was an able lawyer and active politician, author of "Flush Times in Alabama and Mississippi" and of "Party Leaders," 1840.

Baldwin (Loammi), born at Woburn, Mass., Jan. 21, 1745, studied at Harvard College, and became an engineer, was a major, lieutenant-colonel, and colonel in the Revolutionary army, and was afterwards a prominent engineer in Massachusetts. Died Oct. 20, 1807.—His son, Loammi Baldwin (born May 16, 1780, graduated at Harvard in 1800), was also an eminent engineer, and was employed in the U. S. government works at Charlestown navy-yard and at Newport. Died June 30, 1838.

Baldwin (Matthias W.), an American machinist, born at Elizabethtown, N. J., in 1796. He is said to have constructed the first locomotive on the American continent. He also made several improvements in locomotives. Died in Philadelphia Sept. 7, 1866.

Baldwin (Roger Sherman), LL.D., an American statesman, born in New Haven Jan. 4, 1793. He became governor of Connecticut in 1844 and U. S. Senator in 1847. In 1841, Governor Baldwin was associated with J. Q. Adams in the famous Amistad trial before the Supreme Court of the U. S. Died Feb. 19, 1863.

Baldwin (Theron), D. D., born at Goshen, Conn., July 21, 1801, graduated at Yale in 1827, was sent as a home missionary of the Congregationalists to the West in 1829, was one of the founders of Illinois College, organized the Monticello Female Seminary near Alton, Ill., of which he was principal (1838–43). He was for twenty-seven years secretary of the "Society for Promoting Collegiate and Theological Education." Died at Orange, N. J., April 10, 1870.

Baldwin (Thomas), D. D., a Baptist minister, born in Norwich, Conn., Dec. 23, 1753. He became pastor of the Second Baptist church in Boston in 1790, preached there thirty-five years, and published a work in defence of the Baptists. Died Aug. 29, 1825.

Bald'win Cit'y, a post-village of Douglas co., Kan., on the Leavenworth Lawrence and Galveston R. R., 15 miles S. of Lawrence. Here is an institution called Baker University.

Bald'winsville, a village in Lysander and Van Buren townships, Onondaga co., N. Y., on the Seneca River and the Oswego and Syracuse R. R., 12 miles N. by W. from Syracuse. A branch of the Oswego Canal runs to this place. It has an academy, national bank, one weekly newspaper, fork-factory, axe-factory, and various other manufactories. Pop. 2130. G. S. Clark, Ed. "Gazette."

Baldwinsville, a village of Hempstead township, Queen's co., N. Y., on the South Side R. R. of Long Island, is situated 1 mile from the sea-beach, and is a place of summer resort.

Bald'winville, a post-village of Templeton township, Worcester co., Mass., on the Vermont and Massachusetts R. R., 21 miles W. by N. of Fitchburg. It has important manufactures.

Bâle, or **Basel** [Ger. *Basel;* Fr. *Bâle* or *Basle;* anc. *Basili'a* or *Basile'a*], an important city of Switzerland, beautifully situated on both sides of the Rhine, 65 miles by rail N. of Berne, and about 3 miles from the frontier of Alsace; lat. 47° 34′ N., lon. 7° 36′ E. The Rhine, which is here crossed by a bridge, divides it into two parts, named in German Gross Basel, "Great Basel," and Klein Basel, "Little Basel" (called in French *Grande Bâle* and *Petite Bâle*). A railway extends from this point south-eastward to Lucerne and north-westward to Mülhausen, in Alsace. Bâle is at or near the head of navigation on the Rhine, and is the most important commercial and manufacturing city of Switzerland. It was more populous in the Middle Ages than at present. Among its public buildings is a fine cathedral built by the emperor Henry II. between 1010 and 1019, with towers 218 feet high, which were not completed till 1500. The University of Bâle, founded in 1459, once had a high reputation. This city also has a valuable museum of natural history, a botanic garden, and the university library of about 85,000 volumes and 4000 MSS. A large majority of the inhabitants are Protestants. Bâle has extensive manufactures of ribbons, printed cottons, paper, gloves, jewelry, etc. It was first mentioned in 372 A. D., was destroyed by the Huns and rebuilt by Henry I. in 917, became a part of the German empire in 1032, and joined the Swiss Confederation in 1501. Pop. in 1870, 44,834.

Bâle, or **Basel,** a canton of Switzerland, bordering on Alsace and Baden, has an area of 176 square miles. The Rhine forms part of the northern boundary of the canton, which is bounded on the N. by Germany, on the E. by Aargau, on the S. by Soleure, and on the W. by Germany and Soleure. It is intersected by the river Birz. The surface is diversified with hills and valleys; the soil is fertile. Salt is made from salt-wells, and considerable quantities of good wine are made. It has extensive manufactures of ribbons, paper, woollen stuffs, etc. Bâle was first admitted as a Swiss canton in 1501. The town had previously been a free city of the German empire. In 1833, Bâle was divided into two independent portions or half-cantons—namely, Bâle city (Ger. *Basel Stadt*) and Bâle country (Ger. *Basel-landschaft;* Fr. *Bâle campagne*). Area of the former, 14 square miles; of the latter, 164 square miles. Pop. of the former in 1870, 47,760; of the latter, 54,127.

Bâle (or **Basel**), **Council of,** a memorable œcumenical council of the Church held in Bâle, was summoned by Pope Martin V., who died (Feb. 20, 1431) before the appointed time of its meeting. It was opened Dec. 14, 1431, under the pontificate of Eugenius IV. (elected Mar. 3, 1431). The pope tried repeatedly to dissolve the council, but in vain. A quarrel in regard to the manner and place of holding negotiations with the Greek Church led finally to a split. Many bishops, and all the cardinals but one, went off with Julianus Cesarini, the pope's legate, first to Ferrara (Jan., 1438), and thence to Florence (Feb., 1439). Those who remained chose a new president, and went on with their work. Excommunicated by Eugenius, they elected a new pope, Felix V., Nov. 17, 1439. Very few acknowledged him. This blunder broke the moral power of the council. Its forty-fifth and last formal session was held May 16, 1443, though the council was not technically "dissolved" till May 7, 1449, when it gave in its adhesion to Nicholas V., the successor of Eugenius IV. The Roman Catholic Church acknowledges only the first twenty-five sessions of the council, before the split. (See Wessenberg, "Die Allgemeinen Concilien des 15ten and 16ten Jahrhundertes," 2 vols., Constance, 1870.)

Bâle (or **Basel**), **Treaty of,** the name of an important treaty of peace signed at Bâle, April 5, 1795, between the French republic and Prussia. The latter then agreed to abandon the coalition against France, and to give up her possessions on the left bank of the Rhine. In July, 1795, another treaty was here concluded between France and Spain.

Bale (John), bishop of Ossory, was born at Cove, Suffolk, England, Nov. 21, 1495, became a Carmelite, and was educated at Cambridge, became a prior (1529), but becoming a Protestant, was obliged to leave the country; returning, he became a bishop in 1552. He was again exiled after Edward VI.'s death, but returned and became prebend of Canterbury in 1560. He wrote voluminously. His "Summarium" (1549), a catalogue of British authors, is his most celebrated work. Died Nov., 1563.

Balear'ic Isles (anc. *Balea'res* or *Balea'res In'sulæ*), a group of five islands in the Mediterranean, forming a Spanish province, the area of which is 1860 square miles. Pop. in 1867, 284,398. Capital, Palma. Their names are Majorca, Minorca, Iviça, Formentera, and Cabrera. The soil is mostly fertile, though badly cultivated. The climate is very fine. Vegetation has a tropical aspect. The chief exports are olive oil, figs, oranges, wool, mules, wine, hats, brooms, brandy, capers, saffron, cheese, salt, wooden ware, baskets, etc. The ancient natives of these islands were very expert slingers, and served in the Carthaginian army. The Baleares were made an independent kingdom in 1256, but soon became feudal to Aragon, to which kingdom they were annexed in 1344. The Moors were long masters here, but were expelled in 1285. The kings of Spain long retained the title of "king of the Balearic Islands" as one of their secondary honors. The language is made up of various dialects (Mallorquin, Minorquin, etc.) of the Catalan, mingled with Arabic (and perhaps Punic) elements. (See Majorca and Minorca.)

Balear'ic Crane (*Balearica pavonina*), a beautiful crane found in Northern and Western Africa, conspicuous

Balearic Crane.

for its crown of golden plumes and its scarlet cheeks. It is readily tamed, often indulging in fantastic dances, running about with great speed, and screaming with a harsh and ringing voice. It is of a bluish-slate color, and is four feet high. Its bill is shorter and thicker than that of other cranes. It is exceedingly gentle, and, unlike some other cranes, is quite harmless. It is doubtful whether this bird is the Balearic crane of the ancients.

Balechou (Jean Joseph Nicolas), a very eminent French engraver, born at Arles in 1715. He was the first burinist of his time. His works are remarkably neat, and his style brilliant, vigorous, and bold; but his drawing is often defective, and he paid too little attention to detail. His "Women Bathing," "Storm" and "Calm" (after Vernet), "Saint Genevieve" (after Charles Vanloo), and his full-length portrait of Augustus, king of Poland, are his most famous works. The last mentioned is one of the great triumphs of the engraver's art. Died Aug. 18, 1765.

Baleen' [from the Lat. *balæna;* Gr. *φάλαινα*, a "whale"], a substance commercially known as whale-fin and whalebone, is procured from the mouth of the right whale, the Greenland whale, the Bahia fin-back, the Cape whale, the humpback, and various other species. It grows from the roof of the mouth of all the Balænidæ or true whales, though in some it is too small to be of much use. It is never found in the sperm whales or the dolphins. From single whales as much as two tons of baleen has been taken. It consists of horny plates of albuminous matter charged with phosphate of lime. Baleen takes the place of teeth, and serves as a strainer for separating from the water the little animals which serve as food for the whale. (See Whalebone.)

Balen, or **Ballen, van** (Hendrik), a Flemish painter, born in Antwerp in 1560, studied with Adam van Oort and in Italy, and was the first instructor of Vandyck. In spite of a certain coldness and mannerism, his harmonious coloring, correct taste, and skilful composition have given him a more than respectable rank among painters. Of his numerous works, the best known are scriptural and ecclesiastical pieces. His nude figures are well executed. Died in 1632.

Bales'tra (Antonio), an Italian painter, born at Verona in 1666. After his father's death he followed commercial pursuits until he came of age, when he went to Venice and became a pupil of Belucci (an able colorist), and afterwards studied at Rome with Carlo Maratti. His "Defeat of the Giants" gained the prize at the Academy of St. Luke in 1694. Among his other famous pictures are a "Saint Theresa" at Bergamo, a "Virgin" at Mantua, a "Life of Saints Cosmas and Damian" at Padua, and his own portrait at Florence. He was one of the last able artists of the Venetian school, though not a slavish follower of any school. He was a skilful designer, a good colorist, a laborious and faithful student of his art, and was possessed of a vigorous hand and spirit. The works of Giovanni Balestra, a skilful engraver, are often incorrectly assigned to the subject of this notice. Antonio Balestra died April 2, 1740.

Balfe (Michael William), a distinguished musician and composer, born in Dublin, Ireland, May 15, 1808, was a skilful violinist. He visited Italy in 1825, gained distinction as a singer, and composed in rapid succession many operas, which are not remarkable for originality. Among his most popular operas are "Falstaff" (1838), "The Bohemian Girl" (1844), "The Rose of Castile," and "The Talisman," the latter a posthumous work now (Sept., 1873) in preparation for representation in London. Died Oct. 20, 1870.

Balfour (John Hutton), M. D., F. R. S., a British botanist and physician, born in Edinburgh Sept. 15, 1808. In 1845 he became professor of botany at Edinburgh. He published a "Manual of Botany" (1849), and a "Class-book of Botany" (1852) which is highly esteemed. He contributed the article on Botany to the eighth edition of the "Encyclopædia Britannica."

Balfour (Robert), a Scotchman, born about 1550, and for many years principal of the Guienne College at Bordeaux. He had great learning, and was called the "phœnix of the age." His principal works were commentaries on Aristotle, 1616, 1618, and 1620.

Balfour (Rev. Walter), born at St. Ninian's, Stirlingshire, Scotland, in 1777. He was brought up a Presbyterian of the national Kirk, but coming to the U. S. at the age of twenty, he became a Baptist ten years later. In 1823 he became a Universalist, and was long a preacher of that faith in Charlestown, Mass. He published, besides other works, "Inquiries concerning the Devil," "Scriptural Import of the Words translated Hell" (1824), "The State of the Dead" (1833), and controversial letters to Prof. Moses Stuart and others. Died Jan. 3, 1852.

Balfurosh', or **Balfrush,** originally **Barfurosh** ("the mart of burdens"), an important commercial town of Persia, in the province of Mazanderân, on the river Bahbul, 14 miles from its entrance into the Caspian Sea, and about 110 miles N. E. of Teherân. It has an extensive trade, and contains numerous colleges and caravanserais. The bazaars are large, and filled with a great variety of goods. A good road extends from this town to its port, Meshedi-Ser, on the Caspian. Pop. estimated at 120,000.

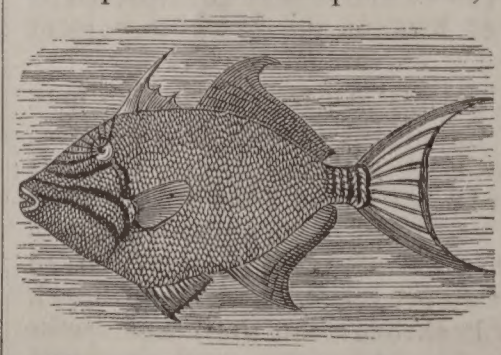
Ba'li, or **Bal'ly,** an island of the Malay Archipelago, is about 3 miles E. of Java. Area, 1999 square miles. It is nearly 70 miles long and 35 miles wide. The chief exports are rice, cotton, coffee, tobacco, hides, etc. The island is divided into several small states, of which Badong is the chief. The Balinese mostly profess Brahmanism. They are said to be superior to the Javanese in mind and other respects. Their language resembles that of Java. Pop. about 800,000.

Baliol, or **Bal'liol** (Edward), a son of King John Baliol, invaded Scotland in 1332. Having gained several victories over the Scottish army, he was crowned king at Scone in September of that year. About three months later he was surprised in his camp, and lost his crown. His subsequent career was unfortunate. Died in 1363.

Baliol, or **Balliol** (John), lord of Galloway and king of Scotland, was born about 1259. He became the rival of Robert Bruce, and claimed the crown as the grandson of David, who was a brother of King William the Lion. The dispute was referred to Edward I. of England as arbiter, who decided that Baliol was the rightful heir, and imposed the condition that he should do homage to the king of England. He was crowned in 1292, and swore fealty to Edward, but soon renounced his allegiance. Edward invaded Scotland, defeated Baliol's army, and compelled him to resign the crown in 1296. Baliol died in France in 1314.

Ba'liol College, Oxford, was founded about 1263 or 1268 by John de Baliol, whose son of the same name was king of Scotland. It was enriched by several benefactors separated by long intervals of time. Among the graduates of this college were John Evelyn and Bradley the astronomer.

Balis'tes, or **File-Fish,** a genus of osseous fishes of the order Plectognathi of Cuvier, is the type of the family Balistidæ or Sclerodermata. They are mostly found in tropical or sub-tropical seas, have brilliant colors, and a body which is remarkably compressed. They have a curious provision for fixing the first dorsal spine in an erect position or lowering it at the will of the fish. For this reason they are sometimes called trigger-fishes. One of the most remarkable species is the *Balistes vetulus*, or "unarmed trigger-fish," the flesh of which is regarded as poisonous. The dusky file-fish (*Balistes fuliginosus*) has been taken in N. Y. harbor; the



Unarmed Trigger-fish: *Balistes Vetula* (found in the Nile).

other file-fish of the U. S. coast are now referred to other but kindred genera.

Balize, or **Belize** [a Spanish name corrupted from *Wallis* or *Wallace*, an English pirate who infested that region], also called **British Honduras,** a British colony in Central America, on the Bay of Honduras, and in the south-eastern part of the peninsula of Yucatan. Area, estimated at 13,500 square miles. Mahogany, fustic, log-wood, etc. are exported from this colony. Pop. in 1861, 25,635.

Balize, or **Belize,** a town of Central America, is in the district noticed above, and on the Bay of Honduras, at the mouth of the Balize River. It is a dépôt of British goods destined for Central America. It contains a court-house, a hospital, several chapels, and an iron market-house. Pop. estimated at 6000.

Balize, a name sometimes given to a village at the North-eastern Pass, at the mouth of the Mississippi River, derived from the French *balise*, a "beacon." It is inhabited by pilots and their families.

Balkan' (the ancient *Hæ'mus*), a mountain-chain of European Turkey, extends from Sophia eastward to Cape Emineh on the Black Sea, and forms the southern boundary of the basin of the Danube. Some peaks of this range are over 5000 feet high. The Balkan is connected with the mountains of Middle Europe by the ranges of Montenegro and Herzegovina. It is an important natural barrier for the protection of Turkey against Russian invaders.

Balkash' (in the Calmuck language "large lake," is called by the Khirgiz **Ak Tenghiz,** *i. e.* "white sea," or simply **Tenghiz Sea**), a large lake of Central Asia having no visible outlet, is on the borders of Chinese Turkistan and the Russian government of Tomsk, between lat. 44° and 47° N., and lon. 77° and 81° E. Its length from N. E. to S. W. is 390 miles, and its greatest breadth 50 miles.

Balkh (the ancient *Bac'tria*), a province of Central Asia, now subordinate to the khanate of Bokhara. It is bounded on the N. by the river Oxus or Amoo, on the E. by Budukshan, on the S. by the Hindu-Kush Mountains, and on the W. by the desert. A large part of the soil is sterile. The natives are Usbek Tartars. Capital, Balkh.

Balkh (anc. *Zarias'pa* and *Bac'tra*), the capital of the province of Balkh, is about 22 miles S. of the Amoo River, and 150 miles N. N. W. of Cabul. The ancient Bactra was an important city, the remains of which cover a space about twenty miles in circuit, and comprise eighteen aqueducts now in ruins. It was destroyed by Jengis Khan. The modern town is insignificant. Pop. about 2000.

Ball [from the Gr. βάλλω, "to throw"], a word used in various applications; a round body or globe; a dancing-party; a solid shot or bullet discharged from a cannon or other gun. Also the name of a game. (See BALL, GAME OF.)

Ball, in military affairs. See BULLET.

Ball, a township of Sangamon co., Ill. Pop. 986.

Ball, Game of. This was a favorite gymnastic exercise among the ancient Greeks and Romans, the latter of whom called it *pila*. At Rome it was played by persons of all ages and by men of high rank. The Greeks prized the game as a means of giving grace and elasticity to their figures and motions. In the sixteenth century this game was fashionable in the courts of French and Italian princes. The French *jeu de paume* and English *tennis* were modifications of the game of ball. The ball was struck with a mallet (Fr. *mail* or *maille;* Eng. *mall*), sometimes called pall-mall or pell-mell, from the Italian *palla*, a ball. A form of this game, called *cricket*, is much played by the English at the present time. The popular game of the U. S. is *base-ball*.

Ball (EPHRAIM), an inventor, born in Stark co., O., in 1812. He had few educational privileges in his youth. He began the manufacture of ploughs in 1840, patented the "Ohio mower" in 1856, and the well-known "Buckeye" machine in 1858. He was long at the head of a large manufactory of farming tools at Canton, O.

Ball (THOMAS), a distinguished American sculptor, born in Charlestown, Mass., June 3, 1819. His works of art are numerous and highly esteemed. Among them are busts of Webster and Choate, and statues of Webster, Everett, and Washington.

Ballad Poetry. The word *ballad* signifies in English a narrative song, a short tale in lyric verse, which sense it has come to have, probably through the English, in some other languages. It means, by derivation, a dance-song, but though dancing was formerly, and in some places still is, performed to song instead of instrumental music, the application of the word in English is quite accidental. The *popular* ballad, for which our language has no unequivocal name, is a distinct and very important species of poetry. Its historical and natural place is anterior to the appearance of the poetry of art, to which it has formed a step among every people that has produced an original literature, and by which it has been regularly displaced, and, in some cases, all but extinguished. Whenever a people in the course of its development reaches a certain intellectual and moral stage, it will feel an impulse to express itself in literature, and the form of expression to which it is first impelled is, as is well known, not prose but verse, and in fact narrative verse. The condition of society in which a truly national or popular poetry appears, explains the character of such poetry. It is a condition in which the people are not divided by political organization and book-culture into markedly distinct classes, in which consequently there is such community of ideas and feelings that the whole people form an individual. Such poetry, accordingly, while it is in its essence an expression of our common human nature, and so of universal and indestructible interest, will in each case be differenced by circumstances and idiosyncrasy. On the other hand, it will always be an expression of the mind and heart of the people as an individual, and never of the personality of individual men. The fundamental characteristic of popular ballads is therefore the absence of subjectivity and of self-consciousness. Though they do not "write themselves," as William Grimm has said, though a man and not a people has composed them, still the author counts for nothing, and it is not by mere accident, but with the best reason, that they have come down to us anonymous. Hence, too, they are extremely difficult to imitate by the highly-civilized modern man, and most of the attempts to reproduce this kind of poetry have been ridiculous failures.

The primitive ballad then is popular, not in the sense of something arising from and suited to the lower orders of a people. As yet, no sharp distinction of high and low exists, in respect to knowledge, desires, and tastes. An increased civilization, and especially the introduction of book-culture, gradually gives rise to such a division: the poetry of art appears; the popular poetry is no longer relished by a portion of the people, and is abandoned to an uncultivated or not over-cultivated class—a constantly diminishing number. But whatever may be the estimation in which it may be held by particular classes or at particular epochs, it cannot lose its value. Being founded on what is permanent and universal in the heart of man, and now by printing put beyond the danger of perishing, it will survive the fluctuations of taste, and may from time to time serve, as it notoriously did in England and Germany a hundred years ago, to recall a literature from false and artificial courses to nature and truth.

Of the Europeans nations, the Spaniards and those of Scandinavian-German stock have best preserved their early popular poetry. We have early notices of the poetry of the Germans. Their ballads, mythical or historical, are several times spoken of by Tacitus, who says that these were their only annals. The earth-born Tuisco and his son Mannus were celebrated in the one, and the hero Arminius in the other. The historian of the Goths, Jornandes, writing in the sixth century, says that these people were accustomed to sing the exploits of their fathers to the harp, and seems to have taken not a little of his history from such songs. The like is true of Paulus Diaconus, the Lombard historian, who wrote in the eighth century, and mentions songs about Alboin (who died in 563) as existing among all the nations of German speech. Charlemagne had the old traditional songs of his people collected and committed to writing, and even made them one of the subjects of school instruction. Side by side with heroic ballads, social, convivial, and funeral songs (which may, to be sure, have been pretty much the same thing) seem to have been in use from the earliest recorded times. To all this popular poetry, by reason of its heathen derivation and character, the Christian clergy opposed themselves with the most determined hostility. Not succeeding in extirpating it by the use of the spiritual and legal means at their command, the German churchmen of the ninth century conceived the idea of crowding it out by substituting poetry of a Christian subject and tone—an expedient which has been tried more than once since then. Though popular song lived on in obscure places, the foreground of history is filled for six hundred years with religious and courtly poetry and with the chivalrous and native epic. Nothing is left of the old heroic songs but a fragment of the Hildebrandslied, from the eighth century (best known in a modernized form of the fifteenth century); and of the Christianized song we have also but a single specimen, the Ludwigslied, of the year 881. The former is in the ancient alliterative metre, the latter in the then newly-introduced rhymed stanza. During the fifteenth and the early part of the sixteenth centuries a second growth of the genuine popular

song appears, some of it springing, doubtless, out of shoots from the old stock which had lived through this long interval, some of it a fresh product of the age. These ballads were popular in the large and strict sense; that is, they were the creation and the manifestation of the whole people, great and humble, who were still one in all essentials, having the same belief, the same ignorance, and the same tastes, and living in much closer relations than now. The diffusion of knowledge and the stimulation of thought through the art of printing, the religious and intellectual consequences of the Reformation, the intrusion of cold reflection into a world of sense and fancy, broke up the national unity. The educated classes took a direction of their own, and left, what had been a common treasure, to the people in the lower sense, the ignorant or unschooled mass. German ballads have been collected in considerable numbers. The sources have been "flying leaves," manuscripts, printed song-books (mostly of the sixteenth century), and oral tradition. In interest they are decidedly inferior to the Scandinavian and English.

Christianity and foreign culture, which in different ways have been equally destructive in their effects upon ancient national poetry, were introduced into the Scandinavian countries much later than into Germany and England. In the Scandinavian countries, too, the peasantry long maintained a much higher position. They were not an oppressed and ignorant class, but free men, who shared fully in the indigenous culture, and so were well fitted to keep and transmit their poetical heritage. While, therefore, the heroic ballads of Germany and England have been lost—those of England utterly, those of Germany being preserved only in epic conglomerates like the Nibelungenlied—and while the mythical cycle in both countries is but feebly, if at all, represented, Scandinavia has kept a great deal of both. The story of Thor's Hammer forms the subject of a ballad still known in all the Scandinavian countries; a volume of ballads concerning Sigurd has been gathered from tradition in the Faroe Isles within this century, and several ballads of this cycle and of that of Dietrich of Bern are found in Danish manuscript ballad-books. Svend Grundtvig, the editor of the still unfinished but truly magnificent collection of the old Danish ballads, has arranged them in four classes: first, the Heroic; second, the Trylleviser, or ballads of giants, dwarfs, nixes, elves, mountain spirits, enchantment, spells, and ghosts; third, the Historic; and fourth, ballads of Chivalry. The historic ballads (intending their original, not their actual, form) mostly fall within the period from 1150 to 1300; the chivalrous are later, and the two other classes belong to a still earlier term, which may extend over the first half of the twelfth century, and into, or perhaps through, the eleventh; that is, to the epoch of the introduction of Christianity. Ballads are best preserved by oral tradition in Norway and the Faroe Isles, but not at all, there, in old manuscripts; Sweden has a few manuscripts, and Denmark a great number, written mostly by noble ladies living on their estates, and giving the ballads as they were sung three or four hundred years ago, as well in the lord's castle as in the peasant's hut. The Danish ballads were collected in a printed form earlier than any others except the Spanish. Vedel published a hundred in 1591; another collection, called Tragica, or old Danish historic love-ballads, appeared at Copenhagen in 1657; and in 1695 Syv republished Vedel's ballads, with the addition of another hundred.

The English have preserved but a moderate number of very early ballads, and the date of many of these it is impossible to fix. There are some narrative poems in Anglo-Saxon which, without stretch of language, might be called ballads. The Norman Conquest, and the predominance of the French language for more than two hundred years, had of course momentous literary consequences, but there is no reason why the production of the native ballad should have stopped. The story of the Saxon outlaw Hereward, which begins with the second year after the Conquest, and has been handed down to us in Latin prose of the twelfth century, is full of such adventures as form the themes of ballads, and very likely was made up from popular songs. Such ballads, if they existed, are lost, but ballads concerning outlaws are among the earliest and best ones of the English. In place of Hereward of the Conqueror's time, and Fulk Fitz-Warin of John's time (whose history was also extremely popular), we have Robin Hood of uncertain time. Songs of Robin Hood and of Randolph, earl of Chester (probably the third earl, who died in 1232), we know, from Piers Ploughman, were current among the lower orders at the middle of the fourteenth century, and one Robin Hood ballad exists in a manuscript which may be as old as the first quarter of the next century. Another occurs in a manuscript dated at about 1500, others in the Percy manuscript. The Little Gest of Robin Hood, which is a miniature epic made up of half a dozen ballads, was printed by Wynken de Worde, "probably," says Ritson, "in 1489." We may reasonably place the origin of the Robin Hood ballads as early as the thirteenth century. To the thirteenth century may belong Hugh of Lincoln, which is founded on an incident that occurred in 1255. An Anglo-Norman ballad on the same subject twice refers to a King Henry, and is therefore put within the reign of Henry III., which ended 1276. Sir Patrick Spens, if the occasion of the ballad has been rightly understood, dates from 1281. After this there are only one or two ballads with dates till we come to the Battle of Otterbourn, 1388, from which time we have a succession of ballads founded on ascertained events, down to the middle of the eighteenth century. Ballads like those of Grundtvig's second class exist in a small number; one of them in a manuscript of the middle of the fifteenth century. The little that we have of ballads of the Arthur cycle, and many of the best of all kinds, we owe to the Percy manuscript, written just before 1650. A few ballads besides those named have been gleaned from manuscripts and early prints, but a large part of our whole stock has been recovered within the last hundred years from the oral tradition of Scotland. The first impulse to the collecting of this poetry was given by the publication of Percy's "Reliques" in 1765. The "Reliques" inspired Bürger and Herder, through whom, and especially through Herder's "Volkslieder" (1778–79), that interest in the literature of the people was awakened in Germany which has spread over the whole of Europe, and has led to the collecting and study of the traditional songs and tales of all the European, and some of the Asiatic, African, and American races.

The Spanish alone of the Latin nations can boast a ballad poetry of great compass and antiquity. Following the law of analogy where documents are wanting, the origin of these ballads would be put between the years 1000 and 1200, the period when the Spanish nationality and language had been developed to that degree which invariably incites and leads to expression in epic song. Some sort of popular poetry about the Cid (whose time is 1040–99) is known to have been sung as early as 1147; the poem of the Cid itself is placed about 1200. During the century that follows we find occasional mention of ballad-singers, but no ballads. As in Germany, the popular poetry, after the first bloom of the national genius, was supplanted by art-poetry, among the higher classes, and it passed out of notice for two or three hundred years. A reaction set in in the sixteenth century. This was the glorious period of Spanish history, and the return to the national poetry was a natural consequence of the powerful stirring of the national mind. Omitting "flying leaves" or broadsides, and a few ballads in the "Cancionero General" of 1511, the earliest collection of Spanish ballads is an undated "Cancionero de Romances," printed at Antwerp about 1546; and this, it must be observed, is the first ballad-book printed in any language, and was gathered in part from the memory of the people. Other similar collections followed, from which was made in 1600 the great "Romancero General." Towards the end of the seventeenth century the national ballads declined in favor, with a decline of national spirit, but since the beginning of the present century they have been restored to a high estimation at home, and have gained the admiration of the world. The oldest ballads are those which relate to the history and traditions of Spain, and recount the exploits of Bernardo del Carpio, Fernan Gonzalez, the Seven Lords of Lara, and the Cid. Then comes a variety of romantic and chivalrous ballads, and then ballads of the Carlovingian cycle. These oldest and most characteristic of the Spanish ballads have been excellently edited by Wolf and Hofmann, and the entire body of this literature, amounting to more than 1900 pieces, is included in the "Romancero General," edited by Duran in 1849–51, a work which surpasses every other in the same line, except the Danish collection of Grundtvig. The collections of ballads in the other Latin languages will be found below. The most important are the Portuguese "Romanceiro," by Almeida-Garrett, 1863; the Piedmontese ballads, by Nigra, 1858–63, and the "Songs and Tales of the Italian People," by Comparetti and D'Ancona, begun in 1870, both first-rate works; Arbaud's, Puymaigre's, and Bujeaud's French collections.

The ballads of other European nations are scarcely less interesting than those which have been noticed, and those of races which possess little or no other literature are peculiarly instructive, by reason of the light which they throw on the history of national poetry; for instance, the songs of the Slavic races, and, most of all, of the Servians. The Slavic songs as a class are distinguished from the Teutonic by the absence of the sentiment of *romantic* love and of *chivalrous* heroism. In their form, too, they are much less dramatic, and even the division of epic from lyric songs is not easy. Many songs begin with a few narrative verses,

and then become entirely lyric, and the narrative part is almost always descriptive. The Servians—especially those of Turkish Servia, Bosnia, and Montenegro, who have not been much affected by civilization—afford a capital example of a race that has not outlived the ballad era. Vuk has collected five or six hundred of their songs, one third of them epic, and every one of them from the mouths of the people. A few of these are, in their actual form, as old as the fifteenth century, some belong to a remoter time, and indeed many retain marks of an ante-Christian origin. So far, the Servians are like the German nations: the distinction is that the fountain of popular poetry still flows, and that heroic poems have been produced among the Servians in this century which are essentially similar to the older ones, and not at all inferior. We find the national poetry, there, in a condition closely resembling that in which it was among the races of Northern and Eastern Europe many hundred years ago. New songs appear with new occasions, but do not supersede the ancient ones. The heroic ballads are chanted at taverns, in the public squares, in the halls of chiefs, to the accompaniment of a simple instrument. Sometimes they are only recited, and in this way are taught by the old to the young. All classes know them: the peasant, the merchant, the hayduk (the klepht of the modern Greek, a sort of Robin Hood), as well as the professional bard. No class scorns to sing them—not even the clergy or the chiefs.

One or two general remarks are required to prevent misconceptions and to supply omissions. From what has been said, it may be seen or inferred that the popular ballad is not originally the product or the property of the lower orders of the people. Nothing, in fact, is more obvious than that many of the ballads of the now most refined nations had their origin in that class whose acts and fortunes they depict—the upper class—though the growth of civilization has driven them from the memory of the highly-polished and instructed, and has left them as an exclusive possession to the uneducated. The genuine popular ballad had its rise in a time when the distinctions since brought about by education and other circumstances had practically no existence. The vulgar ballads of our day, the "broadsides" which were printed in such huge numbers in England and elsewhere in the sixteenth century or later, belong to a different genus; they are products of a low kind of *art*, and most of them are, from a literary point of view, thoroughly despicable and worthless.

Next it must be observed that ballads which have been handed down by long-repeated tradition have always departed considerably from their original form. If the transmission has been purely through the mouths of unlearned people, there is less probability of wilful change, but once in the hands of professional singers, there is no amount of change which they may not undergo. Last of all comes the modern editor, whose so-called improvements are more to be feared than the mischances of a thousand years. A very old ballad will often be found to have resolved itself in the course of what may be called its propagation into several distinct shapes, and each of these again to have received distinct modifications. When the fashion of verse has altered, we shall find a change of form as great as that in the Hildebrandslied, from alliteration without stanza to stanza with rhyme. In all cases the language drifts insensibly from ancient forms, though not at the same rate with the language of every-day life. The professional ballad-singer or minstrel, whose sole object is to please the audience before him, will alter, omit, or add, without scruple, and nothing is more common than to find different ballads blended together.

There remains the very curious question of the origin of the resemblances which are found in the ballads of different nations, the recurrence of the same incidents or even of the same story, among races distinct in blood and history, and geographically far separated. The Scottish ballad of May Colvin, for instance—the German Ulinger—is also found in the Swedish, Dutch, Spanish, Portuguese, Italian, French, Servian, Bohemian, Wendish, Esthonian, Breton, and perhaps other languages. Some have thought that to explain this phenomenon we must go back almost to the cradle of mankind, to a primeval common ancestry of all or most of the nations among whom it appears. But so august an hypothesis is scarcely necessary. The incidents of many ballads are such as might occur anywhere and at any time; and with regard to agreements that cannot be explained in this way, we have only to remember that tales and songs were the chief social amusement of all classes of people in all the nations of Europe during the Middle Ages, and that new stories would be eagerly sought for by those whose business it was to furnish this amusement, and be rapidly spread among the fraternity. A great effect was undoubtedly produced by the Crusades, which both brought the chief European nations into closer intercourse and made them acquainted with the East, thus facilitating the interchange of stories and greatly enlarging the stock.

The most important collections of ballads are—

English.—"Reliques of Ancient English Poetry," by Thomas Percy, fourth improved ed., London, 1794, and often since; "Ancient and Modern Scottish Songs," by David Herd, second ed., 2 vols., Edinburgh, 1776; "Minstrelsy of the Scottish Border," by Sir Walter Scott, 3 vols., Edinburgh, 1802–3, and often since; "Popular Ballads and Songs," by Robert Jamieson, 2 vols., Edinburgh, 1806; "Ancient Scottish Ballads," by George R. Kinloch, Edinburgh, 1827; "Minstrelsy, Ancient and Modern," by William Motherwell, Glasgow, 1827; "English and Scottish Ballads," by F. J. Child, 8 vols., Boston, 1860, which contains all but two or three of the ancient ballads, and a full list of collections; "Bishop Percy's Folio Manuscript," by J. W. Hales and F. J. Furnivall, 3 vols., London, 1867–68.

Scandinavian.—"Danmarks Gamle Folkeviser" ("The Ancient Ballads of Denmark"), by Svend Grundtvig, 3 vols., and part of a fourth, Copenhagen, 1853–72—by far the greatest work in this class of literature; "Ancient Danish Ballads," translated from the originals by R. C. Alex. Prior, 3 vols., London, 1860; "Norske Folkeviser" ("Norwegian Ballads"), by M. B. Landstad, Christiania, 1853; "Gamle Norske Folkeviser" ("Ancient Norwegian Ballads"), by Sophus Bugge, Christiania, 1858; "Svenska Folk-Visor" ("Swedish Ballads"), by Geijer and Afzelius, 3 vols., Stockholm, 1814–16; "Svenska Fornsånger," by A. I. Arwidsson, 3 vols., Stockholm, 1834–42; Rosa Warren's "Dänische Volkslieder," Hamburg, 1858, "Norwegische, etc. Volkslieder," Hamburg, 1866, "Schwedische Volkslieder," Hamburg, 1857; "Færöiske Kvæder" ("Ballads of the Faroe Isles"), by V. U. Hammershaimb, 2 parts, Copenhagen, 1851–55; "Islenzk Fornkvæði," by Grundtvig and Sigurðsson, 3 parts, Copenhagen, 1854–59.

High German.—"Des Knaben Wunderhorn," Arnim and Brentano, 3 vols., Heidelberg, 1806–08, 4 vols., Berlin, 1853–54; "Alte teutsche Volkslieder in der Mundart des Kuhländchens," Vienna and Hamburg, 1817; "Oesterreichische Volkslieder," Ziska and Schottky, Pesth, 1819; "Die Volkslieder der Deutschen," F. K. von Erlach, 5 vols., Mannheim, 1834–36; "Schlesische Volkslieder," Hoffmann von Fallersleben and Richter, Leipsic, 1842; "Alte hoch- und nieder-deutsche Volkslieder," L. Uhland, 2 vols., Stuttgart, 1844–45; "Deutsche Volkslieder," F. L. Mittler, Marburg and Leipsic, 1855; "Fränkische Volkslieder," F. M. von Ditfurth, 2 parts, Leipsic, 1855; "Deutscher Liederhort," L. Erk, Berlin, 1856; "Die historischen Volkslieder der Deutschen," R. von Liliencron, 4 vols., Leipsic, 1865–69.

Low-German, Netherlandish.—"Letterkundig overzigt en proeven van de Nederlandsche Volkszangen," J. C. W. le Jeune, Amsterdam, 1828; Uhland, as before; "Oude Vlaemsche Liederen," J. F. Willems, Ghent, 1848; "Niederländsche Volkslieder," Hoffmann von Fallersleben, second ed., Hannover, 1856; "Chants Populaires des Flamands de France," E. de Coussemaker, Ghent, 1856.

Spanish and Portuguese.—"Tesoro de los Romanceros," etc., Eug. de Ochoa, Paris, 1838, Barcelona, 1840; "Romancero Castellano," G. B. Depping and A. A. Galiano, 2 vols., Leipsic, 1844; "Romancero General" (vols. x. and xvi. of "Biblioteca de autores Españoles"), Madrid, 1849–51; "Observaciones sobra la poesia popular," etc., M. Milá y Fontanals, Barcelona, 1853; "Primavera y Flor de Romances," F. J. Wolf and C. Hoffmann, 2 vols., Berlin, 1856; "Romanzen Asturiens," u. s. w., José Amador de los Rios, in "Jahrbuch für romanische- u. englische Literatur," iii. 268, 1861; "Cancionero Popular," E. Lafuente y Alcantara, 2 vols., Madrid, 1866; "Cansons de la Terra, Cants populars Catalans," F. Pelay Bríz y Candi Candi, 3 vols., Barcelona, 1866–71; "Romanceiro," Almeida-Garrett, 3 vols., Lisbon, 1863; Th. Braga, "Cancioneiro Popular," Coimbra, 1867; "Romanceiro Geral," Coimbra, 1867; "Cantos Populares do Archipelago Açoriano," Porto, 1869; "Ancient Spanish Ballads," J. G. Lockhart, London, 1823; "Portugiesische Volkslieder u. Romanzen," C. F. Bellermann, Leipsic, 1864; "Romanzero der Spanier u. Portugieser," Stuttgart, 1866.

Italian.—"Canti popolari Toscani, Corsi, Illirici, Greci," N. Tommaséo, 4 vols., Venice, 1841–42, second ed. of vol. i., 1848; "Canti pop. inediti Umbri, etc.," O. Marcoaldi, Genoa, 1856; "Canzoni pop. del Piemonte," C. Nigra in the "Rivista Contemporanea" of Turin, 1858–63; "Saggio di canti pop. Veronesi," E. S. Righi, Verona, 1863; "Volkslieder aus Venetien, gesammelt von G. Widter," 1864; "Canti pop. Siciliani," G. Pitrè, vol. i., Palermo, 1870, vol. ii., 1871; "Canti e Racconti del Popolo Italiano," D. Comparetti and A. d'Ancona, Turin and Florence, vol. i., 1870; vol. ii., 1871; vol. iii., 1872.

French.—"Instructions relatives aux Poésies Populaires de le France," J. J. Ampère, Paris, 1853; "Étude sur la poésie populaire en Normandie," Eug. de Beaurepaire, Avranches, 1856; "Chants populaires du pays castrais," A. Combes, Castres, 1862; "Chants pop. de la Provence," Damase Arbaud, 2 vols., Aix, 1862–64; "Romancero de Champagne,"

P. Tarbé, 5 vols., Reims, 1863–64; "Chants pop. recueillis dans le pays messin," Compte de Puymaigre, Metz, 1865; "Chants et chansons pop. des provinces de l'ouest, Poitou, etc.," J. Bujeaud, 2 vols., Niort, 1866; "Des chansons pop. chez les anciens et chez les Français," C. Nisard, 2 vols., Paris, 1867; "Recueil de chants historiques français," Leroux de Lincy, 2 vols., Paris, 1841–42.

Rouman and Wallachian.—"Ballade," B. Alexandri, 2 vols., Jassy, 1853–54; and "Poesiĕ Populare ale Românilor," Bucharest, 1866; "Ballades et chants pop. de la Roumanie, recueillis et traduits par Alexandri," Paris, 1855; "Rouman Anthology, National Ballads of Moldavia," etc., H. Stanley, Hertford, 1856; (Alexandri's) "Rumänische Volkspoesie," deutsch v. W. v. Kotzebue, Berlin, 1857; "Poesia Popurala, Balade," Marienescu, Pesth, 1859; "Romänische Volkslieder," Schuller, Hermannstadt, 1859.

Romaic.—"Chants populaires de la Grèce moderne," C. Fauriel, 2 vols., Paris, 1824–25; the same in German, by W. Müller, Leipsic, 1825; "Neugriechische Volksgesänge," J. M. Firmenich, Berlin, 1840; "Canti popolari Toscani, Corsi, Illirici, Greci," N. Tomasséo, 4 vols., Venice, 1841–42; "Neugriechische Volks- u. Freiheitslieder," D. H. Sanders, Leipsic, 1842; "Das Volksleben der Neugriechen," etc., D. H. Sanders, Mannheim, 1844; "Die neugriechischen Volkslieder," Th. Kind, Leipsic, 1849; "Chants du Peuple en Grèce," Compte de Marcellus, 2 vols., Paris, 1851; "Ἄισματα δημοτικὰ τῆς Ἑλλάδος" (Popular Songs of Greece), Spyr. Zambelios, Corcyra, 1852; "Carmina popularia Græciæ recentioris," A. Passow, Leipsic, 1860; "Anthologie neugriechischer Volkslieder," Th. Kind, Leipsic, 1861.

Slavic, Eastern Branch.—I. *a, Russian.*—"Piesni russkago, naroda" (Songs of the Russian People), J. Sakharof, 5 parts, St. Petersburg, 1838–39; "Piesni sobranniya, P. V. Kirieevskim" (Songs collected by P. V. Kirievsky), 8 parts, Moscow, 1850–68; "Piesni, etc." ("Songs collected by P. N. Rybnikof"), 5 vols., Moscow, 1861–70; "Russkiya Narodniya Piesni" (Russian Popular Songs), collected and arranged by P. V. Shein, vol. i., Moscow, 1870; "Stimmen des russischen Volks in Liedern," P. v. Götze, Stuttgart, 1828; "Die Balalaika" (Russian Popular Songs, in German translation), J. Altmann, Berlin, 1863; "The Songs of the Russian People, as illustrative of Slavonic Mythology and Russian Social Life," by W. R. S. Ralston, London, 1872. *b, Malorussian, Ruthenian.*—"Malorossiiskiya Piesni" (Little-Russian Songs), M. Maximovitch, Moscow, 1827; "Pieśni Ludu ruskiego w Galicyi" (Songs of the Russian People in Galicia), Z. Pauli, Lemberg, 1839–40; "Sbornik ukrainskikh Piesen" (Collection of Songs of the Ukraine), M. Maximovitch, Kief, 1849; "Pisni, Dumki," etc. ("Songs, Thoughts, and Jests of the Russian People in Podolia, Ukraine, and Little-Russia"), A. Kotzipinsky, Kief, 1862; "Volkslieder der Polen" (*i. e.*, of the Ruthenian people in Poland), gesammelt u. übersetzt von W. P., Leipsic, 1833; "Die poetische Ukraine," F. Bodenstedt, Stuttgart, 1845.—II. *Illyrico-Servian.*—1, *a, Servian.*—"Narodne srpske Pjesme" ("Songs of the Servian People"), Vuk Stephanovitch Karadshitch, third ed., 6 vols., Vienna, 1841–66; "Volkslieder der Serben," Talvj (Mrs. Robinson), second ed., 2 vols., Leipsic, 1853; "Die Gesänge der Serben," 2 parts, S. Kapper, Leipsic, 1852; "Poésies populaires Serbes," A. Dozon, Paris, 1859. *b, Bosnian.*—"Srpske Narodne Pjesme iz Bozne" ("Songs of the Servian People in Bosnia"), J. V. Petranovitch, Serajevo, 1867. *c, Montenegrin.*—"Pjevanija Tzernogorska," etc. ("Popular Poetry of Montenegro and Herzegovina"), collected by Tshubar Tshoikovitch, ed. by J. Milovuk, Ofen, 1833; another collection, ed. by himself, Leipsic, 1839. *d, Dalmatian.*—"Razgovor ugodni" ("Entertaining Conversations"), by A. Cacich Miossich, Venice, 1759, Agram, 1862; "Viaggio in Dalmazia," Alberto Fortis, 2 vols., Venice, 1774. 2, *Croatian.*—"Narodne Pjesme" etc. ("Popular Songs of the Croats, Dalmatians, Bosnians, and Servians"), Leopold Zupan, Agram, 1848. 3, *Slovenian* (Slaves of Carniola and Carinthia), "Slovenske Pesmi krajnskiga naroda" ("Songs of the Slovenzi in Carniola") [Achazel and Korytko], Laibach, 1839–44; "Narodne Pésni ilirske," etc., Stanko Vraz, Part I., Agram, 1839; "Volkslieder aus Krain," übersetzt von Anastasius Grün, Leipsic, 1850. 4, *Bulgarian.*—"Bulgarske Narodne Pésni," D. and K. Miladinof, Agram, 1867. *Western Branch*, I. *Czekho-Slovakian.*—1, *a, Bohemian and Moravian.*—"Pjsně národnj w Čechach" ("Songs of the People in Bohemia"), J. Erben, 3 parts, Prague, 1842–45; "Morawské národnj Pjsně" ("Songs of the Moravian People"), F. Suschil, Brünn, 1835, 1840, also 1853–57; Böhmische Rosen," Ida v. Düringsfeld, Breslau, 1851; "Böhmische Granaten, Czechische Volkslieder," M. Waldau, 2 vols., Prague, 1858–60. *b, Slovak.*—"Slowanské Naródnj Pjsně," F. L. Czelakowsky (including, besides Slovak songs, Slovenian, Bohemian, etc.), 3 parts, Prague, 1822–27, and 1839–44; "Národnjé zpiewanky čili pjesně swietské Slowáků w Uhrach" ("Songs of the Slovaks in Hungary"), J. Kollar, 2 parts, Buda, 1823–27, 1834–35. 2, *Polish.*—"Pieśni polskie i ruskie Ludu galicyjskiego" ("Songs of the Polish and Russian people in Galicia"), W. z. Oleska, Lemberg, 1833; "Pieśni Ludu bialo-chrobatów, mazurów, i russinów z nad Bugu" ("Songs of the White Chrobatians, Massovians, and Russinians on the Bug"), K. W. Woicicki, Warsaw, 1836; "Pieśni Ludu polskiego w Galicyi" ("Songs of the Polish People in Galicia"), Z. Pauli, Lemberg, 1838; "Pieśni Ludu polskiego," P. Kolberg, Warsaw, 1857; "Pieśni Ludu polskiego w Górnym Szlasku" ("Songs of the Polish People in Silesia"), Juliusz Roger, Wrocław, 1863. 3, *Sorabian-Wendish.*—"Volkslieder der Wenden in der Ober- u. Nieder-Lausitz", L. Haupt and J. E. Schmaler, Grimma, 1841–43. *General Works.*—"Historical View of the Languages and Literature of the Slavic Nations," etc., Talvj (Mrs. Robinson), New York, 1850; "Slawische Volkslieder" (Russian, Bohemian, Slovak, Bulgarian), J. Wenzig, Halle, 1830; "Slawische Balalaika" (Russian, Little Russian, Carniolan, Polish), W. v. Waldbrühl, Leipsic, 1843.

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Of non-Indo-European races the more important collections are—

Finnish.—"Finnische Runen" (Finnish and German), by H. R. von Schröter, edited by G. H. v. Schröter, Stuttgart, 1834; "Suomen Kansan wanhoja Runoja" ("Ancient Songs of the Finnish People"), Oscar Topelius, 3 parts, Turussa, 1822–26; "Kanteletar," etc., "The Harp, or Ancient Songs and Hymns of the Finnish People," E. Lönnroth, 2 vols., Helsingfors, 1840. *Esthonian.*—"Ehstnische Volkslieder," original and translation, H. Neus, Reval, 1850–52. *Hungarian.*—"Népdalok és Mondák" ("Songs and Tales"), J. Erdélyi, 3 vols., Pesth, 1842–48; "Ausgewählte ungarische Volkslieder," translated and edited by K. M. Kertbeny, Darmstadt, 1851. *Turkish.*—"Proben der Volkslitteratur der türkischen Stämme Süd-Siberiens" ("Specimens of the Popular Literature of the Turkish Races of South Siberia"), W. Radlof, 3 vols., St. Petersburg, 1866–70.

Of comprehensive works and collections the most noticeable are—"Stimmen der Völker in Liedern," J. G. v. Herder, 1778, ed. by J. v. Müller, Tübingen, 1807; Talvj (Mrs. Robinson), "Versuch einer geschichtlichen Charakteristik der Volkslieder germanischen Nationen," etc., Leipsic, 1840; "Hausschatz der Volkspoesie," O. L. B. Wolff, Leipsic, 1853; "Volksdichtungen nord- u. südeuropäischer Völker alter u. neuer Zeit," J. M. Firmenich, 1867. F. J. Child.

Ballanche (Pierre Simon), a French social reformer, born at Lyons Aug. 4, 1776. He published "Antigone," an historical novel (1814), and "The Man Without a Name" (1820). He became a member of the French Academy in 1842, and was a friend of Chateaubriand and Madame Récamier. Among his works are an "Essay on Social Palingenesis" and "The Vision of Hebal." His philosophy is abstruse and mystical, but he is regarded as a profound thinker by some French critics. Died June 12, 1847. (See L. de Loménie, "M. Ballanche, par un homme de rien," 1841; J. J. Ampère, "Ballanche," 1849; Albert Aubert, "P. S. Ballanche," 1847.)

Bal'larat, an Australian town and gold-field in Victoria, 75 miles W. N. W. of Melbourne. The gold-mines of this place, which were opened in 1851, are among the richest in the colony of Victoria. Ballarat is unrivalled in the fineness of its gold, which averages twenty-three and a half carats, the pure metal being twenty-four carats. Pop. in 1871, including the suburbs, 64,260.

Bal'lard, a county in the W. of Kentucky, bordering on Illinois and Missouri. Area, 400 square miles. It is bounded on the N. W. by the Ohio River, and on the W. by the Mississippi. The surface is undulating. Indian corn and tobacco are the chief crops. Capital, Blandville. Pop. 12,576.

Bal'lard Vale, a post-village of Andover township, Essex co., Mass., on the Shawsheen River and the Boston and Maine R. R., 21 miles N. of Boston, has valuable water-power and extensive manufactories.

Bal'last [probably derived from *beal*, "sand," and the Ger. *last*, a "load;" Fr. *lest*], stone, sand, or other heavy substance which is placed in the bottom of a ship when her cargo is too light to give her sufficient hold of the water and

enable her to carry sail without danger of being upset. A vessel which does not carry enough ballast is said to be too crank. This condition renders her unsteady and topheavy. Iron, stone, and water are the principal substances used for ballast. Iron has the great advantage of taking up but little space. Water-ballast is sometimes contained in water-proof bags, or is confined beneath a false bottom in the vessel. A ship is said to be "in ballast" when she carries no cargo except the ballast, passengers, and the baggage and provisions of the passengers and crew. Balloons generally take up a quantity of sand as ballast, in order that the aëronaut may be able, by throwing it out, to increase the buoyancy of the balloon or arrest its too rapid descent. The term ballast is also applied to the broken stone or gravel which is laid as a packing between railway sleepers in order to give them solidity and prevent the rise of dust.

Ballet, bå′lå′, a French word signifying a dramatic or theatrical exhibition of dancing and pantomime, with music; a species of dance usually forming an interlude in theatrical performances, but confined principally to operas. The ballet has some resemblance to the pantomimic sacrificial dances of the ancient Greeks, among whom were dancers who expressed actions and passions by rhythm applied to gesture. The ballet was introduced into France under the auspices of Catharine de' Médici about 1580. Noverre about 1770 made improvements in it, to which he gave an independent dramatic form. The Vestris family were celebrated as performers in ballets. In recent times the public favor is almost exclusively bestowed on female dancers. The ballet has degenerated in many respects of late years.

Ballina′, a market-town and seaport of Ireland, partly in Mayo and partly in Sligo counties, and on the river Moy, 7 miles from its entrance into Killala Bay, and 18 miles N. N. E. of Castlebar. The part of the town on the E. bank of the Moy is called Ardnaree. Ballina has manufactures of coarse linens and snuff; also an active trade in fish, provisions, etc. Pop. in 1861, 5452.

Balliol. See BALIOL.

Ballis′ta, or **Balis′ta** [from the Gr. *βάλλω*, to "throw"], a military engine used before the invention of gunpowder to propel large stones or other heavy missiles. It probably originated with the ancient Romans, who used it in the siege and defence of fortified places. The construction of the ballista is not well understood. It appears that the elastic force with which a twisted rope uncoils itself was commonly used as the propelling power, with which other forces were perhaps combined. (For a vivid picture of the *effects* of the ballista see LUCAN'S "Pharsalia," lib. iii., l. 465 *et seq.*)

Ballis′tic Pen′dulum, an instrument used to ascertain the velocity of projectiles and to prove the quality of gunpowder. In its simplest form it consists of a large block of wood suspended, so as to turn very easily, before the mouth of the cannon, and having some means of measuring the angle through which the beam oscillates. When the magnitude of this angle (produced by the shot lodging in the mass) is known, together with the centres of suspension and oscillation of the mass, the velocity of the shot can be determined by calculation. The gun itself is also made a ballistic pendulum, being suspended, and its recoil observed. But these contrivances are both long since superseded by the several forms of electro-ballistic pendulums.

Bal′lium, or **Bai′ley,** the central part of the old Norman castle, sometimes called the donjon, or the whole space enclosed within the external walls of a castle except that covered by the keep. The walls of the lower stories were of great thickness. The entrance to the ballium was generally by a drawbridge over the ditch.

Ball Mountain, a township of Watauga co., N. C. Pop. 320.

Balloon. See AËRONAUTICS, by GEN. J. G. BARNARD.

Balloon-fish, a popular name of several marine fishes of the genera *Diodon, Tetraodon,* etc., of the family Gymnodontidæ and the order Plectognathes. They take their name from the power which they possess of inflating themselves with air. Many species are known, of which several are American. Our *Diodons* are all small.

Bal′lot [Fr. *ballotte*], originally a little ball used in secret voting. In modern times it is applied to the ticket or printed paper which the voter uses at an election, and the practice of secret voting is called "voting by ballot." The tickets are deposited in a wooden box called the ballot-box. The system of voting by ballot prevails in France and the U. S. The other mode of voting is called *vivâ voce* ("by the living voice"). The ancient Greeks elected their magistrates or decided political questions by secret vote, for which purpose they used beans of different colors. The English elections were conducted *vivâ voce.* The adoption of the ballot has for many years been advocated by the British radicals and advanced liberals. In 1871 the House of Commons, after a long contest, decided in favor of the ballot, but the House of Lords rejected the bill. In 1872 the Ballot act was passed by both houses, and at present all members of Parliament are chosen by ballot. In the election of members of social clubs ballots or balls are commonly used. A person who is rejected on such occasions is said to be *black-balled,* black balls being used by those who vote in the negative.

Ballou′ (HOSEA), one of the fathers of the Universalist denomination in the U. S., was born at Richmond, N. H., April 30, 1771. His early education was acquired by his own efforts, though he had to contend with unusual obstacles. He began to preach when about twenty-one years of age, and labored in various places in New England. In 1807 he settled in Portsmouth, N. H., in 1815 in Salem, Mass., and in 1817 in Boston. In 1819 he became editor of the "Universalist Magazine," and in 1831–32 was connected with the "Expositor." Died June 7, 1852. Among his works are "Notes on the Parables" (1804), and an "Examination of the Doctrine of a Future Retribution" (1846). (See his "Life" by M. M. BALLOU, and another by T. WHITTEMORE, 1854.)

Ballou (HOSEA, second), D. D., was born in Halifax, Vt., Oct. 18, 1796. He was a nephew of the foregoing. He entered the Universalist ministry in his youth, and preached at Stafford, Conn., and Roxbury and Medford, Mass. In 1822 became an editor of the "Universalist Magazine," and was long connected with various journals of his denomination. He displayed much ability as editor of the "Universalist Quarterly." He was (1853–61) the first president of Tufts College. He published "Ancient History of Universalism" (1829), an edition of Sismondi's "History of the Crusades" (1833), and a hymn-book (1837). Died May 27, 1861.

Ballou (MATURIN M.), a son of Rev. Hosea Ballou, born in Boston, Mass., in 1822, has long been editor of "Ballou's Pictorial," "Ballou's Monthly," and other periodicals, and has published a "History of Cuba" (1854), "Biography of Hosea Ballou," "Life-work of Hosea Ballou," and a valuable compilation of quotations from a great number of writers.

Ballou (SULLIVAN), an American lawyer and officer of volunteers, born at Smithfield, R. I., Mar. 28, 1829, educated at Brown University, studied law at Ballston, and was admitted to the bar in 1853, clerk of the house of representatives of his native State 1854–56, and speaker 1857. He entered the army on the outbreak of the late war, and was engaged at the battle of Bull Run July 21, 1861, where he was killed, thus ending a life marked by distinguished ability; and his military career, though brief, was distinguished by conspicuous gallantry and patriotism.

Ball Play, a post-township of Etowah co., Ala. Pop. 327.

Ball's Bluff, Loudon co., Va., on the right bank of the Potomac, about 33 miles N. W. of Washington. The bank here rises about 150 feet above the level of the river. It was the scene of a disastrous defeat of the U. S. forces under Col. E. D. Baker, Oct. 21, 1861. The hostile forces of the North and South had for several months confronted each other on opposite banks of the Potomac. On the 19th and 20th of October reconnoissances were made in the direction of Dranesville and Leesburg by the Federal forces under Gen. McCall, without encountering any opposition. Gen. McClellan being anxious to ascertain the strength of the Confederates in these positions, on Oct. 20 (10½ P. M.), instructions were sent to Gen. Stone at Poolesville, Md., directing him to keep a good lookout on Leesburg, to note the effect of this movement, and adding that "perhaps a slight demonstration on your (Stone's) part might have the effect to move them." Accordingly, Gen. Stone ordered the Fifteenth Massachusetts, Col. Devens, to be moved to Harrison's Island in the Potomac, opposite the bluff, and about 100 yards distant from the Virginia shore; which was promptly effected in flatboats. At dark Devens sent a detachment of fifteen men under Capt. Philbrick to the Virginia shore, to ascertain the whereabouts of the Confederates. After ascending the bluff they had proceeded but a short distance when they discovered what was supposed to be a camp, apparently but poorly guarded, which situation Philbrick reported to Col. Devens on his return. Devens forwarded this report to Gen. Stone, who immediately issued an order directing Col. Devens to land with five companies of his regiment and proceed to surprise the discovered camp at daybreak, and, after having accomplished this, to pursue as far as he deemed prudent, destroy the camp, and return to his position on the island, unless he saw a favorable position on the Vir-

ginia side which he could hold until reinforced. At the same time Col. Lee (Twentieth Massachusetts) was ordered to occupy Harrison's Island with his regiment, and to throw one company across to the heights on the Virginia shore to cover Col. Devens's return. These orders were carried into effect, and at daylight Devens advanced only to find the reported camp to be, in fact, no camp, the detachment of the night before having been deceived in the moonlight, and mistaken the openings between the trees for tents. Col. Devens, however, advanced to within a mile of Leesburg, where he halted and, concealing his force in the woods, reported to Gen. Stone that he had met with no opposition, and asking for further orders. About 7 A. M. a body of Confederates appeared, but retired when approached, and cavalry were also seen on the Leesburg road; whereupon Col. Devens fell back to the bluff without interference, and reported to Gen. Stone, who directed him to remain, and that he would be reinforced. At this time his force of officers and men was about 650. The position he had taken up was surrounded on three sides by woods, and here about noon he was attacked, and fell back to a more secure position; being again attacked, he retired still farther, to the edge of the bluff, where he was reinforced by Col. Baker with his regiment of First California Volunteers, and who by seniority of rank took command. Col. Baker's instructions were discretionary whether to remain or withdraw, but on finding an attack already commenced he decided to remain. The force at his command amounted to about 1900 men; the Confederate force in the woods was reported at 1700, not including, however, a regiment of Mississippi volunteers so stationed as to prevent succor to Col. Baker from Edwards's Ferry. Col. Baker had no more than disposed his men in line when he received a vigorous attack on his right, extending soon to his left and centre. For two hours a desperate conflict was maintained, the Federals from their exposed position suffering by far the heaviest loss. Col. Baker, who displayed the greatest bravery, was killed about five o'clock, and the command devolved upon Col. Cogswell (New York Tammany Regiment). The severe fire to which the Federal troops had been subjected, and the fearful loss they had sustained, caused them to waver, and the only hope that appeared to be left was to endeavor to join Gen. Stone, who was known to have a strong force at Edwards's Ferry, about two miles away; but this movement was met by a body of fresh Mississippi infantry, and under their attack the disheartened and reduced troops were routed, and, flying in great disorder down the bluff, were subjected to a galling fire from all directions. The boats to which they fled were upset or sunk by the Confederates' fire, and the few that escaped either swam out into the stream or concealed themselves along the banks of the river, reaching the Federal lines under cover of the darkness. In the mean time, Gen. Stone had ordered an advance across Edwards's Ferry to their assistance, but as they did not arrive on the field, they furnished no aid. The Federal loss in killed, drowned and wounded exceeded, probably, 1000 men; Gen. Evans, in command of the Confederate forces, reported his loss at 155. Much blame was attached to Col. Baker for recklessness, and Gen. Stone was subsequently arrested and confined in Fort La Fayette in New York harbor, but was afterwards discharged, and at a later period again given a command.

Ball'ston, a township of Saratoga co., N. Y. P. 2180.

Ballston Spa, sometimes called simply **Ballston,** a post-village, capital of Saratoga co., N. Y., on the Rensselaer and Saratoga R. R., 30 miles N. of Albany and 6 miles S. W. of Saratoga Springs. Here are mineral springs, somewhat frequented in summer. These springs rise from the lower part of the Hudson River (Silurian) shales, and rank among the best acidulous chalybeate springs in the U. S. The village has two national banks, 2 weekly papers, 5 churches, and several manufactories. It is in Milton township. Pop. 2970.

Ball'ville, a township of Sandusky co., O. Pop. 1731.

Bally. See BALL.

Bally, a Celtic word or prefix signifying "town" or "dwelling," enters into the composition of the names of a great number of places in Ireland and Scotland.

Ballyme'na, a market-town of Ireland, in the county of Antrim, on the river Braid, 2 miles above its junction with the Maine and 33 miles by rail N. N. W. of Belfast. It has large public schools, a cotton-spinning mill, and extensive bleaching-grounds, and is one of the greatest linen and flax markets in Ireland. Pop. 6774.

Ballyshan'non, a seaport-town of Ireland, in the county of Donegal, on the river Erne at its entrance into Donegal Bay, 120 miles N. W. of Dublin. A bridge of fourteen arches here crosses the Erne. It has about six churches and chapels. Here is a valuable salmon-fishery in the Erne. Pop. in 1871, 6739.

Balm (*Melis'sa officina'lis*), a perennial herbaceous plant of the natural order Labiatæ, a native of the south of Europe, is cultivated in American gardens, and prized for its lemon-scented leaves. The leaves, which are ovate and crenate, and the stem, are occasionally used in medicine as a gentle aromatic, stimulant, and tonic. Its properties depend on an essential oil called oil of balm. An infusion of balm is an excellent beverage in febrile diseases.

Balmacz-Ujvaros, a market-town of Hungary, in the county of Szabolcs, 14 miles N. W. of Debreczin. Pop. in 1870, 9481.

Bal'més (JAYME LUCIO), a Spanish Catholic priest, born at Vich, in Catalonia, Aug. 28, 1810. He was a remarkably precocious scholar. He wrote in reply to Guizot an able work entitled "Protestantism Compared with Catholicism in its Relations to European Civilization" (3 vols., 1848), which was translated into English, French, Italian, and German. Among his other works is "Filosofia Fundamental," which was translated into English by H. F. Brownson, New York, 1857. Died July 9, 1848. (See ANTONIO SOLER, "Biografia de D. J. Balmés," 1850; GARCIA DE LOS SANTOS, "Vida de Balmés," 1848; BLANCHE-ROFFIN, "J. Balmés, sa Vie et ses Ouvrages," 1849.)

Balm of Gilead. See BALSAM; GILEAD, BALM OF.

Balmor'al Castle, the autumnal residence of Queen Victoria, is in a beautiful valley in Aberdeenshire, Scotland, on the river Dee, 48 miles W. S. W. of Aberdeen. It commands a magnificent prospect and comprises 40,000 acres of beautiful grounds. Prince Albert purchased this estate in 1852 for £32,000, and erected a granite castle in the Scottish baronial style. It consists of two blocks of buildings united by wings, and a massive tower thirty-five feet square, rising to the height of eighty feet, and surmounted by a turret twenty feet high.

Balna'ves, or **Balnavis** (HENRY), **of Halhill,** an eminent Scottish Reformer and writer, born in Fifeshire in 1520. He studied law, and became secretary of state in 1543. In 1547 he, with other Protestants, took refuge in the castle of St. Andrew's, and was declared a traitor. The castle was captured by the French, who took him, with Knox, to Rouen as prisoner. While in prison he wrote a "Confession of Faith." He returned to Scotland in 1554. Died in 1570.

Bal'sam [Lat. *bal'samum;* Gr. *βάλσαμον*], a name including in popular language many resinous substances and oils to which great medicinal virtues are ascribed; also certain medicines compounded of resins and oils. The name was originally limited to a single substance, the balm of Gilead, Mecca balsam, or balsam of Judea. Balsams are natural mixtures of resins and essential oils, the resins originating from the oxidation of the oils. They are viscid, aromatic liquids, varying greatly in consistence. They are of two kinds: (1) the simple oleo-resins, as crude turpentine, Canada balsam, Copaiba balsam, Mecca balsam, etc.; (2) balsams containing, besides oil and resin, the fragrant cinnamic acid, as liquidamber, Peru and Tolu balsams, storax, etc. (For further details see each of the above.) Certain pharmaceutical preparations were once called balsams, as *balsamum opodeldoc,* an alcoholic soap solution containing ammonia; *balsamum arcæi,* a salve containing elemi gum; *balsamum sulphuris,* a solution of sulphur in linseed oil.

Balsam, Canada, the thick, terebinthine sap of *Abies balsamea,* which collects in blisters beneath the epidermis on the trunks of young trees. These blisters are punctured, and the balsam gathered as an article of commerce. It is used in medicine, for varnishes, for mounting microscopic objects, etc. *Abies grandis* of the W. coast furnishes a similar fluid.

Balsam'ina, a genus of herbaceous plants of the order Balsaminaceæ, includes numerous species which are natives of the East Indies, and are mostly annuals. The *Balsamina hortensis* (or *Impatiens balsamina*), commonly called balsam, is a favorite garden flower in the U. S., with unsymmetrical corollas finely variegated with white, pink, red, and purple. It has five stamens, and a capsule of five valves, remarkable for the elastic force with which it bursts. The term *balsam* is also applied to the *Impatiens noli-me-tangere,* a native of Europe, and two species of *Impatiens* which grow wild in the U. S.

Balsamina'ceæ, or **Balsamin'eæ** (so called from *Balsamina,* its principal genus), a natural order of succulent herbaceous plants, natives of the East Indies, Europe, China, and America. By Jussieu, Asa Gray, and others it is regarded as a sub-order of the Geraniaceæ.

Balsam Lake, a township of Polk co., Wis. Pop. 192.

Bal'ta, a well-built town of Russian Poland, in Podo-

lia, on the Kodema River, 132 miles E. S. E. of Kamieniec. It has over twenty factories of candles, soap, etc., and has an extensive trade in cattle, horses, hides, wool, and grain. Pop. in 1867, 14,528.

Bal'tic, or **Baltic Sea** [Ger. *Ostsee;* Lat. *Mare Balticum** and *Si'nus Coda'nus*], an inland sea or gulf of Northern Europe, is situated between Russia, Sweden, Germany, and Denmark, and connects with the German Ocean and the Cattegat by the Sound and the Great and Little Belts. It is 830 miles long. Its greatest width is 420 miles, and the area 154,570 square miles. On account of the small proportion of salt it contains (not over 2 per cent.), the Baltic freezes much more easily and early than the ocean. It is not affected by the tide. The numerous sand-banks and islands, and the violent storms with sudden changes of wind, render the navigation of the Baltic dangerous. It receives several large rivers—namely, the Oder, Vistula, Niemen, Düna, Narva, Neva, Torneå, Dal, etc. No sea has in proportion to its size so great an influx of fresh water. The largest islands in the Baltic are Seeland, Gothland, Rügen, Bornholm, and Oesel. The chief ports are St. Petersburg, Riga, Dantzig, Stralsund, Königsberg, Stockholm, and Copenhagen. A remarkable phenomenon connected with this sea is the slow and gradual rising of its shore in Sweden.

Baltic, a post-village of Sprague township, New London co., Conn., on the Hartford Providence and Fishkill R. R., 42 miles E. S. E. of Hartford. Here are important manufactures. The village contains one of the largest cotton-mills in the world, running 60,000 spindles.

Bal'tic Ques'tion, the name given to the controversy between the Russian government and the Baltic provinces of Courland, Esthonia, and Livonia. These countries, which never stood in the relation of conquered provinces to Russia, were promised by Peter the Great the maintenance of their German administration and security for freedom of conscience. These rights and privileges were confirmed by Alexander II. in Feb., 1856, but the actions of the government appear to have contradicted these professions. The priests of the Greek Church have sought to make converts among the peasants by false promises of land and of exemption from military service. Many efforts have also been made to compel the German inhabitants to adopt the Russian language in public affairs and in their schools, and a strict censorship has been exercised over the German press. (See A. J. Schem, "Deutch-Amerikanisches conversations-Lexikon.")

Bal'timore, a county in the northern part of Maryland, bordering on Pennsylvania, has an area of about 700 square miles. It is bounded on the S. E. by Chesapeake Bay, and on the S. W. by the Patapsco River, and intersected by the Gunpowder River. The surface is pleasantly diversified by hills, some of which are 800 feet high. Granite, gneiss, and limestone underlie the county, which contains mines of copper, iron, and chrome. The soil is productive. Corn, wheat, tobacco, and garden and dairy products are the chief crops. This county, the most populous in the State, is intersected by the Northern Central R. R. Other railroads meet at the city of Baltimore. It has important manufactures. Capital, Towsontown. Pop. 330,741.

Baltimore, the chief city of Maryland, is situated in 39° 17′ N. lat. and 0° 26′ E. lon. (76° 37′ 30″ W. from Greenwich), at the head of tide-water and of navigation on the Patapsco River, about 14 miles from the Chesapeake Bay, and nearly 200 from the ocean by ship-channel. The Patapsco to this point is a broad estuary; above, a small and swift stream, furnishing water-power to many mills and manufactories. The harbor is spacious and secure, but with a depth of but little over 20 feet. Its depth is preserved and is being increased, and an improved ship-channel provided by extensive dredging, prosecuted at the expense of the U. S., the State, and the city governments. The city covers about 10,000 acres of land, and the surface of its site was originally very hilly, and notwithstanding all the grading rendered necessary by improvements, much of the original inequality still exists; and the surrounding country being of similar character, with swift streams, excellent drainage is secured, and the healthfulness of the location greatly promoted.

The first steps for "erecting a town" on the Patapsco, to be called Baltimore Town, were taken by a legislative act in 1729, and it was laid out in half-acre lots in 1730. In 1752 it contained 25 houses and 200 persons; in 1765 the number had increased to 50 houses. After this the growth was more rapid, and in 1775 there were 564 houses and 5934 persons. In Dec., 1776, the Continental Congress transferred its sittings from Philadelphia to Baltimore, and met here for about two months. In 1797 it was incorporated as a city. The population in 1790 was 13,503; in 1800, 26,514; in 1810, 35,583; in 1820, 62,738; in 1830, 80,625; in 1840, 102,313; in 1850, 169,054; in 1860, 212,418; and in 1870, 267,354.

The city is laid out, for the most part, at right angles, the streets having generally a width of about sixty feet, and the buildings are mostly built of red brick, many of them with white marble bases; granite and iron are, however, largely used in the construction of stores and warehouses, some of which are very fine. The bricks used for building are made from immense clay-beds adjacent to the city, and are of unsurpassed quality. The white marble, of excellent quality, is procured from inexhaustible quarries about 10 miles N. of the city; the granite, from quarries about 15 miles W. Shipbuilding has always been one of the leading industries of the city, but it has greatly suffered, in common with the commerce of the country, during the last few years. There are several furnaces and foundries, producing iron in various forms from ores mined in the vicinity, one very extensive rolling-mill, several manufactories of agricultural implements, and very large machine-shops, employing many hundred hands. There are also extensive manufactories of clothing, leather, shoes, tobacco, etc. (in all about 400 manufactories of different kinds), and about 100 establishments for packing oysters and fruits. This is a very important industry, and gives employment to several thousand hands. These industries find their outlet both by land and water communication. There are lines of steamships to Liverpool, Bremen, Boston, Providence, Wilmington (N. C.), Charleston, Savannah, Havana, New Orleans, etc., and steamboat lines to Norfolk, Richmond, Fredericksburg, Washington, and all points on the Chesapeake Bay and its many estuaries. It has several excellent railroads, and they are rapidly multiplying. The Baltimore and Potomac road (to Washington) has just completed (June, 1873) a tunnel 7400 feet in length under the north-western part of the city; and the Northern Central road (to Harrisburg) is just perfecting its connection with tide-water by a similar tunnel 3500 feet long, passing under the north-eastern section. Passenger railways also connect the city with all the thriving suburban villages that surround it, where many of the business men of the city reside.

Its sobriquet "Monumental City" was derived from the Washington Monument and Battle Monument, erected by the gratitude and patriotism of its citizens. The former, located at Mount Vernon Place, North Charles street, is a Doric shaft of white marble 180 feet high, surmounted by a statue of Washington sixteen feet high, built 1816–30. Access to the top is had by 220 winding stairs within the column, and it affords a charming view of the city and surrounding country. Battle Monument, in Monument Square, North Calvert street, is also of white marble, 52½ feet high. Wildey Monument on Broadway, of white marble, 52 feet high, was erected to Thomas Wildey, a citizen of Baltimore, who died in 1861, and was the founder of Odd Fellowship in America. There is also in Greenmount Cemetery a creditable but plain monument and statue to John McDonogh, who bequeathed to the city a large sum (amounting now to about $1,000,000) to establish the McDonogh Institute "for the education of poor children." Greenmount and Loudon Park are its two beautiful cemeteries, and there are several others creditable, but of less pretensions. The city has about 160 churches and 6 Jewish synagogues. The first church founded in the city was St. Paul's (Episcopal) in 1731. The first Presbyterian church was erected in 1756; the first Roman Catholic, in 1770; the first Wesleyan Methodist, in 1773; the first Baptist, in 1780; the first Friends' meeting-house, in 1781. Several of the churches are imposing and beautiful structures. Among the most noticeable are the cathedral, St. Alphonsus', and St. Martin's (Roman Catholic); Grace, St. Peter's, and Christ (Episcopal); Mount Vernon (Methodist); Westminster, Brown Memorial, and First (Presbyterian), and the Unitarian.

The water-supply of the city has hitherto been taken from Jones's Falls, about seven miles above the city, and is abundant and of good quality. To guard against the possible contingency of protracted drought the Gunpowder River is now being added, and this supply is practically inexhaustible. The reservoirs now in existence have a storage capacity of 857,000,000 gallons. This is distributed everywhere in abundance, and there are about 800 fire-plugs for use in case of fire. The fire department is well organized, directed by a police and fire-alarm telegraph, and notably efficient. It has eight steam fire-engines, with a complement of horses and twelve men to each, and three hook-and-ladder companies, thirteen men to each.

Numerous public squares add to the beauty and healthfulness of the city. The largest of these, Patterson Park, in the N. E. section of the city, contains 54 acres. Druid

* The name *Baltic* is supposed to be derived from the Latin *balteus*, a "belt," on account of the famous belts of this sea.

Hill Park, just outside the N. W. limits of the city, contains 704 acres of ground, with fine forests, lakes, and lawns, about twenty miles of good carriage-drives, and has no superior as a pleasure-ground.

First among the public buildings should be named the new city-hall (not quite completed), built of white marble, occupying an entire square, and costing $3,000,000; the Maryland Institute, of brick, 355 feet long; the custom-house, 240 feet long, with a dome 115 feet high; the court-house, and Odd Fellows' Hall, all of brick; the Masonic Temple, of white marble; the U. S. court-house and the jail, both of granite, are remarkable structures. Outside of the city limits, but a part of its institutions, should be noted Bay View Asylum (city almshouse), 714 feet in length; the house of refuge, retaining about 500 juvenile delinquents; Spring Grove Asylum, a State institution for the insane, of granite, with capacity for 300 patients; the Maryland Institution for the Blind, a beautiful white marble building, where about fifty of these unfortunates are instructed; and the Sheppard Asylum (for the insane), endowed by the will of Moses Sheppard with about $1,000,000. The Peabody Institute of Baltimore was the recipient of over $1,000,000 from the late George Peabody. It has, in its fine white marble building by the side of the Washington Monument, a free library of 60,000 books and pamphlets, an art-gallery, musical conservatoire, rooms for lectures, concerts, etc., and is one of the most thriving of the institutions endowed by that great philanthropist, which will "keep his memory green." The Hopkins Hospital has been but begun. It originated in Mar., 1873, when Johns Hopkins, a merchant of the city, placed in the hands of trustees selected by him 13 acres of land in the eastern part of the city, with directions to establish thereon a free hospital for the "indigent sick of the city and its environs, without regard to sex, age, or color," guaranteeing to them for the purpose $100,000 a year during his life, and endowing it with $2,000,000 for its support thereafter.

The general education of the city is provided for in about 125 graded public schools, in which about 40,000 pupils are taught by about 550 teachers. Loyola College, a Catholic institution under the general supervision of the Jesuits, and the seminary of St. Sulpice (St. Mary's College), a Catholic theological institution, are both in a flourishing condition, while the medical department of the University of Maryland takes very high rank, and the law department a respectable position among professional schools. The city has 14 national banks, 6 daily, 7 weekly, 8 monthly, and 1 semi-monthly newspaper.

The principal libraries of the city are—Peabody Institute, 59,000 books and pamphlets; Mercantile Library Association, 33,278 (both rapidly increasing); Maryland Institute, 15,600; Baltimore Bar Association, 7500; Young Men's Christian Association, 2500; Odd Fellows', 19,356; Maryland Historical Society, 13,366; Loyola College, 22,000. HENRY STOCKBRIDGE.

Baltimore, a hundred of Sussex co., Del. Pop. 3380.

Baltimore, a township of Henry co., Ia. Pop. 1114.

Baltimore, a post-township of Barry co., Mich. Pop. 1155.

Baltimore, a post-village of Liberty township, Fairfield co., O. Pop. 489.

Baltimore, a township of Windsor co., Vt. Pop. 83.

Baltimore, Lord, a title (of the Calvert family) in the Irish peerage, created in 1624 by James I., who marked his confidence in Sir George Calvert by making him, though a Roman Catholic, baron of Baltimore (in Ireland). Calvert was born at Kipling, Yorkshire, England, in 1582. He graduated at Oxford, held several important public trusts, was knighted in 1617, became principal secretary of state in 1619, member of Parliament 1620–21, and first Lord Baltimore 1624. By grant of James I. he became proprietary of Avalon in Newfoundland, endeavored to plant a colony there, and went thither himself in 1625. Owing chiefly to the unfavorable soil and climate, the colony was a failure. He then (1628) visited Virginia, met an ungracious reception, and returned to England. He seems then to have petitioned the king (Charles I.) for a charter for founding a new colony, and to have met with favor; but before the charter was issued he died, April 15, 1632. The charter which his address had secured was issued in June, 1632, to his son Cecil, who became the second Lord Baltimore, and real founder of the colony of Maryland. The territory granted by the charter included the whole of the present State of Maryland. Cecil never visited it, but sent out an expedition in Nov., 1633, under the charge of his brother, Leonard Calvert, as governor. The Calverts have been much praised for their liberal and tolerant spirit, and their wise and equitable legislation in the colony. The successive Lords Baltimore were John (the third), Charles (fourth), Benedict (fifth), Charles (sixth), and Frederick (seventh). Frederick died in 1771, leaving no legitimate children, and with him the title Lord Baltimore became extinct. (See FULLER'S "Worthies of England;" BANCROFT'S and HILDRETH'S "Histories of the United States;" J. P. KENNEDY, "Character of George Calvert;" Proceedings of Maryland Historical Society; SPARKS'S American Biography," vol. ix. S. S.) HENRY STOCKBRIDGE.

Baltimore Bird, or **Baltimore Oriole** (*Icterus Baltimore*), sometimes called **Golden Robin,** a beautiful

Baltimore Bird.

bird which is found in all parts of the U. S., and migrates in winter to tropical or sub-tropical regions. The plumage of the male is brilliant, orange, vermilion, and black being the most conspicuous colors. This bird is very active, has an agreeable song of clear and mellow notes, and builds a curious nest, a pendulous pouch about six inches long, usually suspended from the drooping branch of a high tree. The name originated in the similarity of its colors to the livery of Lord Baltimore. The extended wings measure about twelve inches from tip to tip.

Baluze (ÉTIENNE), a French historian, born at Tulle Dec. 24, 1630, became in 1670 professor of canon law in Paris, and in 1707 director of the Royal College under Louis XIV. Among his works are "Lives of the Popes of Avignon," 1693, and "History of the House of Auvergne," in which he endeavored to show that the House of Bouillon was descended from the ancient dukes of Guienne, and therefore owed no allegiance to the king of France. The king suppressed this work, exiled the author, and confiscated his estates. He published forty-five works, among which were "Regum Francorum Capitularia" (1677), "Lives of the Avignon Popes" (1693), etc. Died in Paris July 28, 1718.

Balzac, de (HONORÉ), a popular French novelist, born at Tours May 16, 1799. After he had written several unsuccessful tales, he published in 1829 an historical romance called "The Last Chouans," which was received with favor. His reputation was increased by "The Physiology of Marriage" (1831), "Le Peau de Chagrin" (1831), "Scenes of Provincial Life" (1832), "Scenes of Parisian Life" (1832), "Le Père Goriot," and "Eugénie Grandet." He excelled in the analysis of emotions and in the delineation of individuality of character. He married the countess of Hanska, a Polish lady, in 1848. His works have been translated into many languages. Died in Paris Aug. 19, 1850. (See

G. Desnoiresterres, "Vie de Honoré de Balzac;" George Sand, "Notice biographique sur H. de Balzac," 1853; A. Baschet, "H. de Balzac," 1852.)

Balzac, de (Jean Louis Guez), Seigneur, a French writer, born in 1594. He was patronized by Cardinal Richelieu, and was admitted into the French Academy in 1634. He was considered the best French prose-writer of his time, and acquired a durable reputation by his successful efforts to improve and refine his native language. Among his works are "The Christian Socrates" (1652) and "Familiar Letters" (new ed., 1806). Died Feb. 15, 1654.

Bambar'ra, a state of Western Africa, in Soodan, lies on both sides of the river Niger or Joliba, which flows in a N. E. direction through the middle of this state. It is bounded on the S. by the Kong Mountains. The soil is well watered and fertile. The rainy season lasts from June to November. Two crops of maize, cotton, and yams are raised annually. The baobab, butter tree, and date-palm are found here. The wild animals are lions, elephants, leopards, panthers, etc. The population is composed mostly of Mandingoes. Area, about 21,300 square miles. Capital, Sego.

Bam'berg, a city of Bavaria, in Upper Franconia, is beautifully situated on the river Regnitz, 30 miles N. of Nuremberg and 3 miles from the river Main. It is connected by railway with Nuremberg and other towns. It is well built, and has spacious, well-lighted streets, which are lined with handsome houses. Among the remarkable public buildings are the magnificent cathedral (Domkirche) in the Byzantine style, founded in 1004 by the emperor Henry II.; the old palace of the bishops of Bamberg; and the Jesuit church of St. Martin's. Bamberg contains a theatre, a lyceum, a museum of natural history, and a royal library of about 50,000 volumes. Here are manufactures of porcelain, jewelry, musical instruments, gloves, etc.; also numerous breweries, which produce beer of superior quality. Pop. in 1871, 25,748.

Bamberg, a post-twp. of Barnwell co., S. C. P. 1907.

Bambi'no [the Italian for "infant"], a term applied to the swaddled figure of the infant Saviour which, carved or painted, forms the subject of many altar-pieces in Roman Catholic churches. The most celebrated of these is the Santissimo Bambino of the church Ara Cœli at Rome. This is a kind of wooden doll profusely adorned with jewels, said to have been carved from a tree which grew on the Mount of Olives. It is often carried in procession to the bedside of the sick. The festival of the Bambino occurs at Epiphany, Jan. 6.

Bamboccia'de [from the It. *bamboc'cio*, a "simpleton"], in painting, is a grotesque scene from common or low life, such as country fairs, rural sports and festivals, and boorish frolics. The name was derived from Bamboccio, the surname of Peter van Laer, who painted such subjects. He was born in 1613, and died in 1674.

Bam'boo' (*Bambu'sa*), [Fr. *bambou*], a genus of arborescent grasses which are natives of the tropical and warm parts of Asia and America, and grow to a large size. Some of the species are eighty feet high or more. The bamboo is a plant of great utility and importance. It has a jointed and hollow stem, which is very hard and light, and is externally coated with silex. It has been called the national plant of China, the natives of which make of it a great variety of articles, furniture, weapons, etc. It is sometimes used for building houses and bridges and for water-pipes. The smaller stems are converted into walking-sticks, and are employed in wickerwork and the seats of chairs. Some species of *Bambusa* secrete a silicious, phosphorescent substance called tabasheer, which possesses remarkable properties. (See Tabasheer.)

Bam'borough (or **Bambrough**) **Castle,** one of the oldest castles in Great Britain, is on the coast of Northumberland, 16 miles S. E. of Berwick. It stands on a basaltic rock 150 feet high, and accessible only on the S. E. side. It was founded in 1070. Connected with this castle is an extensive public library, a dispensary, life-boats to save the crews of shipwrecked vessels, and other charitable institutions. Near the castle is a village of the same name.

Bambuk', a country of Western Africa, included between lat. 12° 30′ and 14° 30′ N., and between lon. 10° 30′ and 12° 15′ W., is bounded on the N. E. by the Senegal River, and on the S. W. by the Faleme. The surface is hilly, and the soil of the valleys fertile. It is inhabited by Mandingoes, who are said to be very ferocious. The baobab and other trees here attain an enormous size. Bambuk has long been celebrated for its rich gold-mines. Pop. about 800,000.

Ba'mian', a valley and pass of Afghanistan, on the route from Cabul to Turkistan, and between the central and western ranges of the Hindu-Kush Mountains, is at an elevation of 8496 feet, and is important as the only known pass over the Hindu-Kush Mountains that is practicable for artillery. The valley is covered with ruins of the city of Gulgula, which was destroyed by Jengis Khan about 1220. Bamian was one of the chief centres of the Booddhist worship, and presents numerous caves with gigantic idols cut out of the rock. One of these is 160 feet high.

Ba'mo, B'ha'mo, or **B'han-Mo,** the most important commercial town in the empire of Burmah, in Farther India, is situated on the Irrawaddy at the entrance of the Tamping. Large caravans laden with silk and other goods arrive here from October to May, during which time a large business is carried on. Large quantities of raw cotton are also exported from this place. The annual imports and exports amount to about $1,500,000 each. Pop. about 12,000.

Bamp'ton Lec'tures, so called after the name of their founder, the Rev. John Bampton (1689–1751), canon of Salisbury, who in 1751 left his "lands and estates" to the University of Oxford for "the endowment of eight divinity lecture sermons," to be preached annually at "St. Mary's in Oxford." The subjects specified were: (1) "To confirm and establish the Christian faith, and to confute all heretics and schismatics; (2) upon the divine authority of the Holy Scriptures; (3) upon the authority of the writings of the primitive Fathers as to the faith and practice of the primitive Church; (4) upon the divinity of our Lord and Saviour Jesus Christ; (5) upon the divinity of the Holy Ghost; (6) upon the articles of the Christian faith as comprehended in the Apostles' and Nicene Creeds." When the lectures commenced, in 1780, the income of the estate was £120 a year. Ever since then (except in the years 1834, 1835, and 1841) these lectures have been delivered. Some of the more noted of the earlier lecturers were Dr. White, in 1784, on "Christianity and Mohammedanism;" Dr. Nott, in 1802, on "Religious Enthusiasm;" Bishop Heber, in 1815, and Archbishop Whately, in 1822. Mansel, in 1858, on "The Limits of Religious Thought," opened a new era in the history of the lectures. Since then we have had, among others, George Rawlinson in 1859, Farrar in 1863, Mozely in 1865, Liddon in 1866, and Bernard in 1867. (For a complete list, down to 1852, see Darling's "Cyclopædia Bibliographica.")

Ban, a word which occurs in many modern languages, signifying an edict; a public order or prohibition; an interdiction; a notice of marriage; a curse or excommunication. In the former German empire to put a prince under the ban of the empire was to divest him of his dignities and pronounce on him a sentence of outlawry. The French *ban* signifies "exile," "banishment."

Ban, and **Arrière Ban,** military terms used in France under the feudal system. When the feudal barons were summoned to the service of the king in time of war, they were called the *ban*. Their tenants or inferior vassals formed the second levy, or *arrière ban*. The ban and arrière ban constituted the entire military force of France in feudal times.

Ban,* or **Ba'nus,** the title formerly given to military governors of certain districts, called *banats*, in the eastern part of Hungary. The ban was appointed by the king with the consent of the Diet, and had formerly very extensive powers. In political, judicial, and military affairs his authority was supreme. In time of war he commanded the troops of his banat. The most important banats were those of Dalmatia, Croatia, Slavonia, Bosnia, and Makovia (or Machow), but their boundaries often changed, and they were at length united into the double banat of Dalmatia and Croatia.

Bana'na (*Mu'sa sapien'tum*), an herbaceous plant of the natural order Musaceæ, is extensively cultivated in all tropical regions of both hemispheres. It is regarded by many botanists as a mere variety of the plantain (*Musa paradisiaca*). It grows to the height of from fifteen to twenty feet, and the stem terminates in a tuft of leaves which are from six to ten feet long, and about one foot wide. The fruit, which is generally five or six inches long, has a soft, luscious pulp, and is a nutritious and very important article of food. It is commonly eaten raw. It is stated that no other plant produces so great an amount of nutriment on the same space of ground. It is successfully cultivated in South Florida.

Bananal', an island of Brazil, also called **Nueva Beira,** is in the river Araguay, and in the province of Matto Grosso. Its length from N. to S. is 290 miles, and its width about 35 miles. The soil is fertile, and covered with a dense forest. There is a large lake near the middle of the island.

Banat-Komlas, a town of Hungary, in the county

* Ban in some of the Slavonic dialects is said to signify "master."

of Torontal, has beer-breweries and sheep-markets. Pop. in 1870, 5715.

Ban'ca, an island of the Malay Archipelago, belonging to Holland, about 10 miles E. of Sumatra, from which it is separated by the Strait of Banca. It is about 100 miles long, and has an area of 4664 square miles. The surface is hilly. It is celebrated for its mines of tin, of which about 4700 tons were produced in 1865. Copper, iron, and lead are also found here. Pop. in 1870, 59,740.

Ban'co, the standard money in which a bank keeps its accounts, as distinguished from current money. The term is chiefly applied to the money in which the Hamburg bank keeps its accounts, which is not coined money. The Hamburg mark banco (=1*s.* 5¾*d.* sterling) is to the current mark (=1*s.* 2½*d.* sterling) as 20 to 17.

Ban'croft, a post-township of Freeborn co., Minn. Pop. 799.

Ban'croft (Aaron), D. D., a Unitarian minister, was born at Reading, Mass., Nov. 10, 1755. He graduated at Harvard in 1778, and became in 1785 pastor at Worcester, where he remained upwards of fifty years. Among his works, besides a great number of sermons, is a life of George Washington, which was very popular. He was the father of George Bancroft, noticed below. Died Aug. 19, 1839.

Bancroft (Edward), M. D., F. R. S., born at Westfield, Mass., Jan. 9, 1744, ran away from his native country in his youth, practised medicine in Guiana, and resided long in England. He was a friend of Dr. Franklin, and professed to labor in behalf of America, but is believed to have been a spy of the British government. He published several political works, a "Natural History of Guiana" (1769), "Charles Wentworth," a novel, and "Researches concerning the Philosophy of Permanent Colors" (2 vols., 1794–1813). He never visited America after her independence. Died Sept. 8, 1820.

Bancroft (George), Ph. D., LL.D., D. C. L., an eminent American historian, a son of Aaron, noticed above, was born at Worcester, Mass., Oct. 3, 1800. He graduated at Harvard College in 1817, and entered in 1818 the University of Göttingen, where he studied history and philology under Heeren, Bunsen, and others. In 1820 he took the degree of doctor of philosophy at Göttingen. Having returned home in 1822, he published a volume of poems (1823) and a translation of Heeren's "Reflections on the Politics of Ancient Greece" (1824). In 1834 he produced the first volume of his "History of the U. S." He was appointed secretary of the navy by President Polk in Mar., 1845, in which year he founded the U. S. Naval Academy, resigned that office in 1846, and was sent as minister plenipotentiary to England in the same year. He returned home in 1849, retired from the public service, and became a resident of the city of New York. His capital work is a "History of the U. S.," the ninth volume of which appeared in 1866. In a review of the third volume of this work, William H. Prescott observes: "The reader will find the pages of the present volume filled with matter not less interesting and important than the preceding. He will meet with the same brilliant and daring style, the same picturesque sketches of character and incident, the same acute reasoning and compass of erudition." (*North American Review* for January, 1841.) Mr. Bancroft was appointed minister to the court of Berlin in 1867, and negotiated a treaty by which Germans emigrating to the U. S. are released from their allegiance to the government of their native country. In 1871 he was appointed minister plenipotentiary to the German empire.

Bancroft Plantation, a township of Aroostook co., Me. Pop. 177.

Band, in architecture, is the name given to any kind of ornament which is continued horizontally along a wall, or an ornament by which a building is encircled. Bands often consist of foliage, quatrefoils, or of simple bricks. A band of a shaft is the moulding or suits of mouldings by which the pillars and shafts are encircled in Gothic architecture.

Ban'dages [from the Anglo-Saxon *bin'dan,* to "bind;" literally, anything used for binding], applied to the bands or wrappers used by surgeons to keep in their places the dressings of wounds, to compress bleeding vessels, to rectify the deformity produced by fractures or other injuries, and to unite parts in which there is a solution of continuity. They are commonly composed of soft muslin, linen, or flannel. Sometimes they are made to become immovable after application by being first soaked in starch or glue. The great art in bandaging consists in applying pressure with exactly the required firmness, and *evenly.* Especially is it important to avoid interrupting too much the circulation of the blood. Unskilful bandaging has sometimes caused fatal mortification of a limb. For this reason the arm should never be tightly bandaged (unless temporarily, to arrest hæmorrhage) without the hand being subjected to an equal amount of pressure; and the same rule applies with regard to the leg and foot. To make a continuous bandage fit well upon a limb or other part, the roller should be drawn smoothly as far as it can be, and then, if needful, *reversed* by a turn of the hand from time to time; producing a spiral, by the overlapping of the successive turns, each time, about one-third of its width. A bandage for the arm may be from two to two and a quarter inches wide; for the lower extremity, two and a half inches; for the chest, three inches. The *figure-of-eight* bandage is often required for the elbow or knee-joint. The T bandage is available for the lower part of the trunk. A *many-tailed* bandage is used especially in fractures of the thigh. It is composed of about eighteen transverse strips, with or without a longitudinal band, to which they may be fastened by stitching. These being laid under the limb, the lowest is folded over, and then the next, and so on until the whole thigh is secured. This bandage has the advantage that it can be undone without disturbing the position of the limb. For a more particular account of bandages we must refer to works on minor surgery. Handkerchiefs are sometimes employed instead. In the treatment of wounds, however, and of stumps of amputated limbs, bandages are less resorted to now than formerly, many surgeons preferring lighter and cooler dressings, with adhesive strips, etc. One of the most useful of bandages for emergencies is the "Spanish windlass," to check serious bleeding from any part of either extremity. It is merely a strip of muslin or a pocket handkerchief passed around the upper part of the limb, tied in a knot, and then twisted firmly by a stick or bayonet passed under it, so as to press with sufficient force to arrest the arterial circulation. It must not be left on many hours, but its temporary application has often saved life. In like manner, free bleeding from a wound of the scalp may be controlled by a compress and bandage tightly applied around the head.

Revised by Willard Parker.

Ban'da, a town in British India, province of Allahâbâd, is on the Crane River, 80 miles W. of Allahâbâd. It has increased rapidly of late years, and acquired considerable note for its cotton.

Ban'da Isles, a group of islands, forming part of the Molucca Archipelago, belonging to the Dutch. They are lofty and volcanic. One of them, named Goonong Apee, rises 7880 feet above the sea, and is an active volcano. The larger of these islands are exclusively appropriated to the cultivation of nutmegs and mace, and produce annually about 450,000 pounds of nutmegs. These islands were discovered by a Portuguese, Antonio Abreus, in 1512. The Portuguese took possession of the islands in 1524, and in 1599 they passed under the dominion of the Dutch. Area, 8748 square miles. Pop. in 1869, 272,000.

Banda'na, or **Bandan'na,** a silk or cotton handkerchief of East Indian origin, though now extensively manufactured in Great Britain. The cloth is dyed Turkey red, and then the pattern is made by discharging the color with bleaching-liquor in a hydraulic press. The spreading of this liquor is prevented by an enormous pressure. The patterns of the real bandana are spots and diamond prints.

Banda Oriental. See Uruguay.

Bandel'lo (Matteo), an Italian novelist and Dominican monk, was born in Piedmont in 1480. He emigrated to France in the reign of Francis I., and was appointed bishop of Agen in 1550. He published in 1554, in Italian, three volumes of tales or novels (*novelle*) which are immoral, but remarkable for originality of conception and other literary merits. A fourth volume was published after his death, which occurred in 1562. Shakspeare borrowed from him the plots of several plays.

Bande'ra, a county of Western Texas. Area, 938 square miles. It is traversed by Medina River, a beautiful stream. Grain, cattle, sheep, and swine are exported. The climate is very healthy and pleasant. Pop. 649. Capital Bandera.

Bandera, a post-village, capital of the above county, is on the Medina River, 30 miles N. W. of San Antonio.

Ban'derole, a small streamer under the crook on the top of a bishop's staff, sometimes applied to a small streamer carried on military weapons or on masts. Also, the flat inscribed band used in Renaissance buildings.

Bandes Noires ("Black Bands"), an opprobrious term applied during the French Revolution to companies of capitalists who bought the confiscated estates and buildings which had belonged to the Church or to *émigrés.* They were accused of vandalism and the destruction of old relics, works of art, churches, etc.

Band-Fish, or **Snake-Fish** (*Cep'ola*), a genus of fishes related to the ribbon-fish, are remarkable for singu-

Red Band-Fish.

larity of form and beauty of color. The body is much elongated and compressed. The red band-fish (*Cepola rubescens*) is about fifteen inches long, and is found in the Mediterranean.

Ban'dicoot (*Peram'eles*), a genus of marsupial quadrupeds, natives of Australia and Tasmania, having a long

Long-nosed Bandicoot.

head and pointed muzzle. Their dentition is remarkable, as they have ten cutting teeth in the upper jaw, and only six in the lower. They devour grain in granaries and potatoes in the field. The *Perameles nasuta* is about eighteen inches long. The name is popularly extended to several kindred genera of marsupials.

Bandie'ra (Atilio and Emilio), two brothers and Italian patriots, born respectively in 1817 and 1819, were sons of a vice-admiral in the Austrian service. In 1842 they opened a correspondence with Mazzini, and formed a design to liberate Italy by a conspiracy. They failed, and escaped to Corfu about Mar., 1844, but hearing a false or exaggerated rumor of a revolt in Naples, they returned with a few friends and landed in Calabria in June. They were executed July 25, 1844. (See Giuseppe Mazzini, "Ricordi dei Fratelli Bandiera, e dei loro compagni," 1845.)

Bandinel'li (Baccio), an Italian sculptor, was born in 1487. He was patronized by Cosimo de' Medici, the emperor Charles V., and Pope Clement VII. As a sculptor he was considered as second only to Michael Angelo, of whom he was a jealous rival. He adorned the choir of the Duomo of Florence with bas-reliefs. Among his best works are a group of Adam and Eve, a statue of Orpheus, "The Descent from the Cross," and "Hercules and Cacus." Died in 1559. (See Vasari, "Lives of the Painters and Sculptors;" Cicognara, "Storia della Scultura.")

Bandit'ti [It. *banditi*], bands of robbers in the mountainous parts of Italy and Greece, who fall upon travellers and hold them captive for a ransom. In former times there existed in the larger towns of Italy organized associations of bandits, whose stilettoes were ready for hire to accomplish any deadly scheme. They were called euphemistically *bravi* ("brave men"), and were not exterminated until the modern improvements in police organization. Hired assassination (*homicidium conductum, assassinatus*) was a worse crime than ordinary murder, and punished by the wheel.

Ban'don, Earls of, and Viscounts Bernard (1800), Viscounts Bandon (1795), Barons Bandon (1793, in the Irish peerage), a noble family of Great Britain.—Francis Bernard, the third earl, was born Jan. 3, 1810, and succeeded his father in 1856.

Ban'don, or **Ban'donbridge,** a town of Ireland, on the beautiful river Bandon, 20 miles S. W. of Cork. It is situated on both sides of the river, which enters the harbor of Kinsale. Bandon was formerly a prosperous manufacturing town, but its prosperity has considerably declined. Pop. in 1871, 6074.

Bands, Military, consist of a body of musicians attached to each army regiment or battalion. In the British service these bands generally comprise a band-master and about fifteen musicians, who are chiefly maintained at the cost of the officers of the regiment to which they belong. In the U. S. service the present law provides for a band at the Military Academy at West Point, and for each artillery, cavalry, and infantry regiment a chief musician, who shall be instructor of music, and for each artillery and infantry regiment two principal musicians; each cavalry regiment to have one chief trumpeter.

Ban'dy's, a township of Catawba co., N. C. Pop. 727.

Banér, written also **Bannier** or **Bannér** (Johan), a famous Swedish general, born near Stockholm June 23, 1595. He commanded the right wing under Gustavus Adolphus at the battle of Leipsic in Sept., 1631. His conduct in this action was highly applauded. On the death of Gustavus Adolphus (Nov., 1632) he became the commander-in-chief of the Swedish army. He gained a brilliant victory near Wittstock in Sept., 1636, and again defeated the imperial army near Chemnitz in 1639, after which he overran a large part of Germany. Died May 10, 1641. Schiller represents him as great in adversity, and formidable even after defeat. (See Schiller, "History of the Thirty Years' War;" Carl Manderfeldt, "Éloge de J. Banér," 1787.)

Banff, sometimes written and always pronounced **Bamf,** a seaport-town of Scotland, capital of Banffshire, at the mouth of the river Doveran, and on Moray Frith, about 40 miles N. N. W. of Aberdeen. A bridge over the river connects it with Macduff. Here is Duff House, the seat of the earl of Fife, with a park fourteen miles in circumference. Banff has manufactures of leather, soap, iron castings, linen, sails, and cordage, and has important fisheries of salmon, cod, and herring, which, with agricultural products, are exported from this town by sea. Banff has a lighthouse in lat. 57° 40′ N., lon. 2° 31′ W. The harbor is shallow and poor. The town has numerous and excellent schools and charitable institutions. The river is liable to floods, which have sometimes been destructive. Pop. in 1871, 7439.

Banff'shire, a county of Scotland, bounded on the N. by Moray Frith, on the E. and S. by Aberdeenshire, and on the W. by Elgin and Invernessshire, and partly by the river Spey, a very rapid stream. Area, 684 square miles. The surface is greatly diversified by mountains and valleys. Among its highest peaks is Cairngorm, 4090 feet high. Granite, slate, old red sandstone, limestone, and serpentine occur here. The soil of the valleys is fertile. The breeding of cattle is the chief occupation of the farmers. Capital, Banff. Pop. in 1871, 62,010.

Ban'galore', a strongly fortified town of India, the capital of Mysore, is on a high table-land 71 miles N. E. of Seringapatam; lat. 12° 58′ N., lon. 77° 38′ E. It is the chief British military station in Mysore, and is much frequented by Europeans, attracted by the salubrity of the air. The temperature seldom exceeds 90° F. Here are important manufactures of cotton and silk. It was taken by storm by Lord Cornwallis in 1791. Pop. 132,000.

Bang'kok', or **Bankok,** a large commercial city, the capital of Siam, is situated on the river Meinam, about 20 miles from its entrance into the Gulf of Siam; lat. 13° 38′ N., lon. 100° 34′ E. It is mostly built of wood, but has some brick and stone houses. Many of the houses are built on movable bamboo rafts on the river. The Chinese constitute a majority of the population, which is estimated at 400,000. Bangkok contains a large royal palace and numerous Booddhist temples, which are decorated in a gorgeous style. The stationary dwelling-houses are raised on piles six or eight feet from the ground, in order to protect them from inundations. The river is navigable for vessels of 250 tons from its mouth to Bangkok, which has an extensive trade. The chief articles of export are sugar, pepper, rice, ivory, cardamoms, hides, tin, etc. Iron-mines and forests of teak occur in the vicinity. It is the seat of Roman Catholic and of American Baptist and Presbyterian missions. It has some native Christians of Portuguese descent. (See Sir John Bowring's "Siam.")

Ban'gor, an episcopal city and seaport of North Wales, in the county of Caernarvon, on the S. E. shore of Menai Strait, 2½ miles from the Britannia Bridge, and 9 miles N. E. of Caernarvon. It is on the railway which

connects Chester and Holyhead, and is situated in a narrow, romantic valley. The grandeur and beauty of the scenery render it a favorite place of summer resort. Six miles from Bangor are slate-quarries which employ about 2000 men. This city is very ancient, having been raised to a bishopric in 550 A. D. The cathedral, founded in 525, was destroyed by the Saxons in 1071. Bangor has eight annual fairs, four of which are for cattle. They are visited by great throngs of buyers and sellers. The trade by sea is not important, the harbor not being accessible to large vessels. Pop. 6338.

Bangor, a post-township of Marshall co., Ia. Pop. 838.

Bangor, a city, port of entry, and capital of Penobscot co., Me., is on the right bank of the Penobscot River, about 60 miles from its mouth. It is 138 miles by the Maine Central R. R. N. E. of Portland, and 67 E. N. E. from Augusta, the present State capital. It is in lat. 44° 47′ 50″ N., lon. 68° 47′ W. from Greenwich. It is the north-eastern terminus of the Maine Central R. R., the western terminus of the European and North American R. R., the southern terminus of the Bangor and Piscataquis R. R., the northern terminus of the Bucksport and Bangor R. R., the northern terminus of the projected Bay and River R. R., the north-western terminus of another surveyed railroad from Bangor to Calais, as well as the head of navigation on the Penobscot River. Bangor is thus easily the railroad and commercial, as it is nearly the geographical, centre of the State, of which it must ultimately become the capital. The Kenduskeag River, navigable to the centre of the city, runs directly through it, dividing the city into two nearly or quite equal parts. Both rivers, above the city, are broken by waterfalls for about 12 miles, thus furnishing water-power unequaled in New England. Brewer, a beautiful suburb of Bangor, lying on the easterly side of the Penobscot, and commonly known as the "Eighth Ward," is the city's shipyard, being connected with it by a ferry and a covered bridge, and is rapidly filling up with manufactories of different sorts. Bangor is one of the greatest lumber-dépôts in the U. S., nearly 3000 vessels being employed in exporting lumber, mostly pine, spruce, hemlock, and cedar, to every quarter of the globe. It is also largely engaged in other foreign commerce. Steamboats ply regularly, by three different lines, between Bangor and the several ports along the Penobscot, between Bangor and Portland, and between Bangor and Boston. Besides the city schools, which are excellent, it has a theological seminary with five or six professors, and a library of about 15,000 volumes, a city library of about 12,000 volumes, a mechanics' library of about 9000 volumes, a law library of about 1000 volumes; a conservatory of music, a board of trade, and other similar organizations. Of banks, it has two State, two savings, and seven national, besides several brokers who lend money and receive deposits. Bangor has fourteen churches and two daily and three weekly papers. Four large iron-foundries, with two of which are connected shops for manufacturing machinery, several planing-mills, three or four furniture-factories, three extensive carriage and sleigh factories, one large trunk-factory, besides many similar establishments, together with a burnettizing works, do a very heavy manufacturing business. The city is surrounded by an excellent agricultural country, which sends to Bangor large quantities of farming produce for export. It is also doing a heavy business in insurance. With its natural suburb, before mentioned, Bangor has a valuation of about $11,000,000. There is now a movement on foot for building a stone dam across the Penobscot, which, it is believed, will soon make Bangor the leading manufacturing city of New England.

The city is divided into seven wards, each of which elects annually one alderman and three common councilmen, the aldermen constituting the upper and the councilmen the lower branch of the city government. The government is presided over by a mayor, elected annually. In 1870 there were 3252 ratable polls in the city, and estates valued at $9,851,561. Bangor has a fine granite custom-house, with a U. S. collector and two deputies. Besides the superior, probate, and commissioner's courts for Penobscot county, and the regular nisi prius term of the supreme judicial court of the State, it has an annual law term of the latter court, and an annual sitting of the U. S. district court.

History.—The French erected here a fort before 1656, and named it Norombega. There prevailed in the seventeenth century a belief in Europe that a great and flourishing Indian city called Norombega stood near this point. The name, variously spelled, occurs in Milton's "Paradise Lost," in Burton's "Anatomy of Melancholy," and other works of that time. It was settled in 1769, and was then called Kenduskeag. Its name was changed to Bangor by Rev. Seth Noble, in honor of a well-known psalm-tune of that name. In 1791 it was incorporated as a town, and in 1834 as a city. Its rapid growth since that time has been the result of its position, which combines the advantages of a noble and navigable tidal river with a large and constant water-power. It has also in the upper waters of the Penobscot the means of very cheap transportation of logs from the boundless forests of Northern Maine. These advantages made it for a long time the greatest lumber-market in the world, and even now but one or two places excel it in the amount and value of lumber sawed and shipped.

Bangor had by the census of 1800, 277 inhabitants; in 1810, 850; in 1820, 1221; in 1830, 2868; in 1840, 8634; in 1850, 14,432; in 1860, 16,408; in 1870, 18,296.

B. F. Tefft, Ed. "Northern Border."

Bangor, a township of Bay co., Mich. Pop. 3606.

Bangor, a township and village of Van Buren co., Mich., on the Chicago and Michigan Lake Shore R. R., 27 miles N. E. of St. Joseph, in a good farming and fruit region. The village has an iron-smelting furnace, an "excelsior" manufactory, five saw-mills, two hotels, one weekly paper, a union school, etc. Pop. of township, 1525. C. W. Gillett, Ed. "Journal."

Bangor, a post-village and township of Franklin co., N. Y., on the Ogdensburg and Lake Champlain R. R., 55 miles E. N. E. of Ogdensburg. It has manufactories of starch, cheese, and hemlock extract. Pop. of township, 2431.

Bangor, a post-township of La Crosse co., Wis. Pop. 1151.

Bango'rian Con'troversy, a controversy which rose between the adherents and opponents of ecclesiastical authority in Great Britain. It was brought about by a sermon preached before George I. by Dr. Benjamin Hoadley, bishop of Bangor. (See Hoadley.)

Bangs (Heman), a Methodist preacher, born in Fairfield, Conn., in 1790, joined the New York Annual Conference in 1815. He labored effectively in the pulpits of his denomination in New York and Connecticut. He was one of the principal founders of the Wesleyan University at Middletown, Conn., and one of the most powerful preachers of Methodism. Died Nov. 2, 1869.

Bangs (Nathan), D. D., a Methodist minister, born in Stratford, Conn., May 2, 1778. He became editor of the "Christian Advocate and Journal," and president of the Wesleyan University at Middletown, Conn. He wrote, among other works, a "History of the Methodist Episcopal Church." Died May 3, 1862.

Bangs (William M'Kendree), son of Nathan Bangs, was born in New York City in 1810, graduated in the University of Ohio in 1829, and served one year in a professorship in Augusta College, Ky. He resigned his chair there to enter the itinerant ministry of the Methodist Episcopal Church. From 1831 to his death, in 1852, he was a member of the New York Conference. He was some time principal of the Wesleyan Academy at Wilbraham, Mass. He was distinguished by his culture and by the force of his controversial writings.

Ban'ialu'ka, or **Banjaluka,** a fortified town of European Turkey, in Bosnia, on the river Verbas, 94 miles S. W. of Bosna-Serai. It has numerous mosques, many bazaars, a manufactory of gunpowder, hot springs, and Roman antiquities. Pop. 15,000.

Baniya (pronounced in India, bŭn'e-yå), less correctly, **Baniyan** or **Banian,** a word used in Hindostan to denote a shopkeeper, especially a dealer in grain, but also applied to the wholesale dealers and importers of Bombay, Surat, and Cambay, carrying on a trade with the interior of Asia by caravans and with Africa by ships. They usually belong to the caste called Vaisyas, and strictly abstain from animal food.

Ba'nim (John), an Irish novelist, born at Kilkenny April 3, 1798, excelled in the delineation of the life and character of the Irish peasantry. He published in 1825 "Tales of the O'Hara Family," which was very popular. Among his other works are "The Battle of the Boyne" (1828), "The Smuggler" (1831), and "The Mayor of Windgap." Died Aug. 1, 1842. (See P. J. Murray, "Life of John Banim," 1857.)

Ban'ister, a township of Halifax co., Va. Pop. 3731.

Banister (village). See Halifax Court-house.

Baniwas, a tribe of South American Indians living on the Amazon and the Rio Negro. A vocabulary of their language is given by Alfred Wallace in "A Narrative of Travels on the Amazon and the Rio Negro" (1853, pp. 521–541).

Banjermas'sin, or **Benjar-Massen** (*i. e.* "the river of plenty"), the name of a river, state, and town on the S. coast of Borneo. Owing to the inundations of the

river, the town is completely built on floating logs, held by ropes. It has a considerable trade in gold-dust, precious stones, birds' nests, wax, resin, rubber, rattans, pepper, and steel of native manufacture and excellent quality. Many of the inhabitants are Chinese, and most of the trade is with China. The Dutch government is the dominant power here. Trade is obstructed by a bad bar at the mouth of the river. Pop. estimated at 30,000.

Bank [from *bancus*, a "bench" or merchant's counter]. As a general thing, corporate banks, and particularly banks of circulation, have owed their origin to war or the necessities occasioned by it, for it is only at such times that government is disposed to offer or grant those extraordinary privileges which form the basis of corporate banking. War occasions demands for public loans, or renders it necessary that a country should be freely supplied with currency in order that its inhabitants may be able to readily meet the heavy taxation incident to the continuation of hostilities. The establishment of the banks of Venice (1157), Geneva (1345), Barcelona (1401), Genoa (1407), Amsterdam (1607), Hamburg (1619), Rotterdam (1635), Stockholm (1688), England (1694), and France (1716), though not all of them banks of circulation, is ascribable to war; and this was also the case with the banks of the U. S., established severally in 1789, 1791, 1816, and 1863.

The peculiar structure of the Bank of England, which rendered it different, in respect of its privilege of issue, from all its European predecessors, is traceable to the banking operations—for such they were, in fact—of the colony of Massachusetts on the occasion of its expedition against Quebec in 1690. To facilitate the payment of the heavy taxes which this war obliged it to impose, the colony issued in that year bills of credit payable on demand to bearer, receivable for taxes and all debts due the colony, and, until prohibited, first by act of Parliament, and afterwards by a general clause of the American Constitution, made a legal tender in payment of private debts. An adventurous Scotchman named William Paterson was in the colonies at the time, and, returning to England shortly afterwards, turned his American experience to account by suggesting the establishment of the Bank of England; an event which was consummated by act of Parliament dated April 25, 1694. It is a somewhat remarkable circumstance that to the study of American affairs by another adventurous Scotchman of the time is due the establishment of the first bank of issue in France. This man was John Law, who, having witnessed the success of a legal-tender paper currency and of a land bank in the colonies, introduced these measures, somewhat modified and as his own, to the attention of several countries in Europe, with the view of having them adopted by them. In this he at length succeeded, and France in 1716, during the regency of the duke of Orleans, became the scene of the most daring operations known to the history of banking. It required but three years' time—during which prices became so inflated that land rose to 100 years' purchase—for Law's bubble to burst. The Americans had meanwhile managed their inflated currency more deliberately; and it was not until after the additional emissions demanded by the necessities of the colonial campaign against Louisburg in 1745 that evidences of failure in the legal-tender system began to appear. Meanwhile, the Bank of France had failed, and the notes of the Bank of England fallen to 20 per cent. below par. The depreciation of colonial notes in 1748 was as follows: New England, 11 for 1; New York and East Jersey, 1.90 for 1; West Jersey and Pennsylvania, 1.80 for 1; Maryland, 2 for 1; Virginia, 1.20 to 1.25 for 1; North Carolina, 10 for 1; and South Carolina, 7 for 1. When, subsequently, Great Britain paid £180,000 sterling to Massachusetts for the expenses of the Louisburg expedition, the latter redeemed her outstanding notes at the price to which they had fallen in the market—11 for 1.

In 1712, South Carolina established a bank, and issued £48,000 in bills, to be lent on promissory notes and mortgages, and retired at the rate of £4000 a year. Soon after the emission of these bills prices rose, and in the first year advanced to 150; in the second, to 200 per cent. In Mar., 1723, Pennsylvania embarked in banking operations by issuing £15,000 in legal-tender notes, to be loaned out at interest on collateral security. The advantage of the plan induced her, towards the end of the same year, to issue £30,000 more on the same terms. In 1739–40, Massachusetts established a bank which emitted bills of credit on the South Carolinian plan. With these exceptions, it is believed that the only paper money in this country prior to the Revolution was that, already alluded to, emitted by the colonies to make good deficits in revenue. On May 10, 1775, at the outset of the war of independence, the Continental Congress directed the emission of $3,000,000 in legal-tender notes on the faith of the Confederation. This issue was soon followed by others. By the month of Oct., 1777, the "Continental" currency had become so redundant as to occasion depreciation. By the year 1779 the total issues amounted to $160,000,000, when Congress directed the emission of $40,000,000 more, and declared that under no circumstances should the sum of $200,000,000 be exceeded. But this declaration proved unavailing, and the depreciation of the notes became so rapid that in 1781 they ceased to perform the functions of money. They were subsequently redeemed by the present national government at the rate of 100 for 1.

Soon after the fall of Continental money, at the suggestion of Robert Morris, superintendent of finance, Congress established a bank in Philadelphia called the Bank of North America. This event took place Dec. 31, 1781. The bank also obtained charters from the States of New York, April 11, 1782, and Pennsylvania, April 18, 1782. The Bank of Massachusetts at Boston was chartered in 1784, and the Bank of New York at New York was established the same year. The Bank of North America went into operation with a capital of but $400,000. It enjoyed the unquestionable advantage of a general circulation for its notes, which were receivable for taxes and other dues to the Confederation, and the then somewhat questionable advantage of transacting the fiscal operations of the government; and it contributed, so far as its limited means would allow, to relieve the financial distress of the latter. But the position held by the bank demanded far greater resources than it possessed, and the dearth of circulating media became so great throughout the country as to compel several of the States to resort again to the emission of "bills of credit," and even to legalizing personal property as a tender for the payment of debts. Shay's insurrection in Massachusetts (1786) was caused by the scarcity of money and heavy taxes. On the adoption of the Constitution of the U. S., which took effect in Mar., 1789, the emission of bills of credit by the several States was interdicted, and by law gold and silver alone declared to be legal tender: (See FINANCE.) These measures, designed to strengthen the financial affairs of the country and invite a restoration of credit and commerce, would have proved exceedingly embarrassing but for the aid afforded to the operations of the treasury by the emissions of the banks, consisting, besides those of North America and Massachusetts, of the Bank of New York, which was chartered Mar. 21, 1791. This era marks the beginning of the now gigantic banking-system of the U. S.

The combined capital of the three banks still amounted to only $2,000,000, and if the new government was to successfully collect its revenues, it was necessary to provide a currency better fitted for its resources, expectations, and necessities. This could only be done at that time by making the fullest avail of the national credit. Accordingly, Alexander Hamilton, then secretary of the treasury, boldly recommended the establishment of a national bank, under charter from the national government, and with a capital of $10,000,000. This project met with the fiercest hostility. It was unconstitutional; it jeopardized the perpetuity of the Union; it thrust at the very foundation of States rights. After having been argued in Congress with extraordinary ability, the proposition was decided favorably, and on Feb. 25, 1791, the "first" national bank of the U. S. was chartered for twenty years. It was not until 1794 that it began operations. Of the capital, $8,000,000 were to be subscribed by individuals, and $2,000,000 by the U. S.; one-fourth of the private subscriptions to be paid in specie, and three-fourths in 6 per cent. U. S. stocks. During the continuance of the charter no other national bank was to be established. The bills were to be receivable for all payments to the government. Meanwhile, in 1785 the charter granted to the Bank of North America by the State of Pennsylvania was repealed. The bank, however, continued to transact business under its charter from the Continental Congress until the establishment of the Federal Constitution in 1789, when it was rechartered by the State of Pennsylvania, and its connection with the general government ceased. This bank, as well as the two other private banks of the Revolutionary era, still exists.

The Bank of the U. S. afforded many advantages to the government, and fully realized all the expectations formed of it by Hamilton; nevertheless, in 1809, when Congress was requested to renew its charter, then about to expire—a request endorsed by the secretary of the treasury, Albert Gallatin—it refused. This refusal is attributed to the issue concerning States rights between the two great political parties of the country, and the application of that issue to the bank question by the private banks of circulation chartered by the States. These had by this time increased in number to 88; their capital exceeded $40,000,000, their circulation amounted to over $22,000,000; evidences of a power difficult to contend against successfully. The Bank

of the U. S., after another unsuccessful attempt on Feb. 20, 1811, to obtain a renewal of its charter from Congress, and a similarly unsuccessful one to obtain a charter for its continuance from the State of Pennsylvania, wound up its affairs. During its continuance it had paid the stockholders dividends of from 8 to 10 per cent. per annum; its assets now yielded them 8½ per cent. more than their stock investments. Its career had been eminently creditable to the management; its dissolution was effected in an orderly manner, and without disturbing the money affairs of the country. The following table exhibits the condition of all the banks in the U. S., including the Bank of the U. S., in 1811:

Year.	Number of Banks.	Capital.	Specie.	Notes in circulation.
1811	89	$52,600,000	$15,400,000	$28,100,000

The currency, generally, had been in a tolerably healthy condition since 1796. Previous to that date there had been a scarcity following the extinction of the Continental bills, while from 1790 to 1795, inclusive, the emission of State bills of credit, despite the interdiction of the Constitution, had rendered the currency disturbed and fluctuating. There was now in the country currency to the extent of about five dollars per capita, and, what is of more importance, with a slight tendency to increase. (See MONEY.) Such a condition of the currency bespeaks an era of slowly rising prices and general industrial activity. In 1811 war with England was anticipated, and this led to such a large withdrawal of specie from the country as delayed that establishment of new State banks which the extinction of the first national bank had assured. In 1812 the war broke out. In 1813 the new State banks made their appearance. Together with the old ones, there were now 150 of them, with $62,000,000 in notes in circulation. This immense emission of currency was due to the necessities of the government, which had no resource in the emergency but to borrow from the banks all it could obtain. The country was but poorly prepared for such a forced extension of credit, and the result was, that in Sept., 1814, all the banks S. of New England stopped specie payment, and did not resume until Jan., 1817. In Sept., 1814, Baltimore bank-notes were at a discount of 20 per cent., and New York, 10 per cent.; in Jan., 1815, these notes stood respectively at 20 and 15 per cent. discount; in Feb., 1815, upon the first news of peace, at 5 and 2 per cent. discount; and in 1816 at 20 and 12½ per cent. discount—down again. The condition of the currency was now deplorable. The State had but little control over the banks, and the Federal government as little over the States. Each bank acted independently of the others; there was no restriction, no redemption, and no homogeneity. The constitutional provision, that "all duties, imposts, and excises shall be uniform throughout the U. S.," obliged the treasury, which was compelled to accept the bank currency, because there was no other, to "meet by extravagant premiums the mere act of transferring the revenue collected at one point to defray unavoidable expenditures at another." (*Rush, Rep. Fin.*, 1828.) The extinction of the first Bank of the U. S. was now generally regretted. The secretary of the treasury, during 1815 and 1816, made several attempts to unite the State banks in a resumption of specie payments, but without success, and there was no other practical course open to the government but to establish another institution similar to that which it had so lately suffered to dissolve. On April 3, 1816, an act was passed by Congress to authorize what is now known as the "second" Bank of the U. S. The capital of the new bank was to be $35,000,000, of which $7,000,000 to be subscribed by the U. S. government in 5 per cent. stocks, and $28,000,000 by private individuals or corporations, one-fourth in specie, the remainder in U. S. stocks; the charter to continue until Mar. 3, 1836, and in the mean time no other bank to be established by Congress; the notes to be receivable in all payments to the U. S., subject to other directions by Congress; the public moneys to be deposited in the bank *subject to other directions by the secretary of the treasury* (a notable provision, as events proved); the bank to act as the commissioner of loans for the several States, etc. As some time must elapse before it could go into operation, Congress prepared for a resumption of specie payments by directing the secretary of the treasury, after Jan. 20, 1817—about the date the bank commenced operations—to receive nothing in payment but gold and silver, treasury notes, and notes of the national bank, or of State banks which redeemed in specie on demand. The effect of this measure, and of arrangements made by the Bank of the U. S., was the resumption of specie payments by the State banks of New York, Philadelphia, Baltimore, and Virginia.

A new era now began for the banking system of the U. S.—an era to end only with the extinction of the national bank and the deplorable events of 1837. The last-named institution, aided by its numerous branches throughout the States, exercised a regulating function with regard to the State banks which proved of the highest importance to the government, and certainly at first checked them in the tendency to emit excessive issues. But its power over them was but remote and indirect, and it could not, and did not, prevent them from eventually proceeding to extremes. Nevertheless, so long as the evil day was put off, the country continued active and prosperous to an extent only attributable to the agency of the banks in diluting the currency and promoting a continual rise in prices. The following synoptical table shows the condition of all the banks in the U. S. from 1790 to 1837—sums in millions of dollars:

Dates nearest Jan. 1st.	No.*	Capital.	Specie.	Notes.	Deposits.	Loans and Discounts.
1790	3	2.	3.	1.		
1811	89	52.6	15.4	28.1		
1815	208	82.3	17.	45.5		
1816	246	89.8	19.	68.		
1820	308	137.1	19.8	44.9		
1830	330	145.2	22.1	61.3	55.6	200.5
1834	506	200.	.....	94.8	75.7	324.1
1835	558	231.3	44.	103.7	83.	365.2
1836	567	251.9	40.	140.3	115.1	457.5
1837	634	290.8	37.9	149.2	127.4	525.1

(For population and currency, see MONEY.)

With the exception of slight revulsions in 1826, 1829, and 1832, the growth of the banking-system and the currency, up to the close of the last-named year, was satisfactory. A good deal of this growth was based on expectations, but these expectations were warranted. The population was increasing rapidly, abundant harvests had rewarded the husbandman, and general industrial progress was to be observed on all sides. In Dec., 1829, President Jackson, in his message, "questioned the constitutionality and expediency of the law creating the (national) bank." This was the signal for which the State banks had been waiting. The bank charter would be allowed to expire, and the way paved for additional emissions of bank currency. In the winter of 1830 the reports of committees of the House and Senate took issue with the views expressed by the President, and the battle began. In the following winter a bill was introduced in Congress to recharter the bank. Its advocates stated that during sixteen years the bank had collected and disbursed $300,000,000 or $400,000,000 of public money, without the loss or expense to the government of a single dollar. It had not only frequently aided the government by loans, but had on more than one occasion saved it from dishonor. For example, a large instalment of the Louisiana debt, due and advertised to be paid on Oct. 21, 1820, could not be met by the treasury. Knowing the importance of the sum to the bank, its appeal to that institution had been couched almost in a tone of entreaty, but, large as the sum was, and difficult as it was for the bank to raise it, the credit of the government was not suffered to be injured. The bank had also repressed the tendency of the State banks to unduly expand the currency (a declaration, by the way, not calculated to improve its case with the President); it had compelled them to redeem their notes in specie, and so rendered the currency of the country of a tolerably uniform value; its own notes passed current at par except in the remotest parts of the Union—places much more remote from the seat of government than the great commercial cities of Europe from each other, and there they were rarely quoted at over one-fourth to three-fourths of 1 per cent. discount. In vain. The State banks were weary of the restraint exercised over them; a great political party was opposed to the bank; and the bill passed by Congress July 4, 1832, to recharter it was vetoed. The President next resolved to remove the public deposits from the safe-keeping of the bank, and in 1833 requested the secretary of the treasury, W. J. Duane, to sign an order to that effect. This the latter declined to do, whereupon the President removed him from office, and appointed R. B. Taney in his place, who on Sept. 23, 1833, removed the public moneys, some $9,000,000 or $10,000,000, from the U. S. Bank, and placed them in charge of certain designated State banks, setting forth his reasons therefor in a lengthy and able address to Congress. The effect of these measures is seen in a glance at the table given above. In 1830, before the extinction of the Bank of the U. S. was assured, there were 330 State banks in existence, with a combined capital of $145,000,000; notes at issue, $61,000,000; and loans,

* Branches excluded.

$200,000,000. In 1834, when the extinction of the bank was assured, these figures rose to $506,000,000, $95,000,000, and $324,000,000, respectively. Nor was this all. The inflation continued, and in 1837 we find 634 banks, with less than $38,000,000 in specie, issuing nearly $150,000,000 of notes, and discounting $525,000,000 of paper. It needed no prophet to foretell the result of such improvidence; yet the country had grown so rapidly, had continued so prosperous, was now about to reap such immense additional advantages from the introduction of steam-railways and other labor-saving inventions newly discovered or wrought to perfection, and had already, in 1826, 1829, and 1832, for example, received so many warnings which proved false, that one more step forward seemed safe enough, and every man was ready to take it. That step led into an abyss so frightful that for an entire generation afterwards the country felt its effects. The immediate cause of the suspension of 1837 was an event that in ordinary times would have proved a benefit instead of a disadvantage to the nation—an over-production of cotton. But credit had been extended so far that the slightest disturbance of the intricate relations which kept the dizzy edifice erect was sufficient to topple it over. In 1836 the cotton crop was unusually large, and by the spring of 1837 the price of cotton began to rapidly fall, and with it the credits based upon confidently assumed higher prices. In April, 1837, the New Orleans and Mobile cotton-factors failed, and soon afterwards their correspondents in New York failed, among them the celebrated banking-house of J. L. and S. I. Joseph, with assets amounting to $7,000,000. On the 26th of May the New York and Natchez banks suspended specie payments, and this was soon followed by a general suspension all over the country. The whole flood of high prices now suddenly fell to a lower level, and into the vortices and depleting currents thus formed were swept away the fortunes of myriads of families. The suspension in New York was legalized for one year by the legislature; stay-laws were enacted in the other States; and Congress on the 9th of Aug., 1841, enacted a general bankruptcy law; but until 1843, when either the statutes of limitations or liquidation had effaced the legal marks of this momentous wreck and restored mercantile confidence, the industrial affairs of the country remained prostrated (see PRICES); most of the States failed to pay the interest on their debts, and at least one repudiated them outright. (See REPUDIATION.) The poorer classes of the people were reduced to great privation. The high price of flour previous to the suspension had induced the New York bread-riot of Feb. 13, 1837; and to the scarcity of money after it is partly to be attributed that popular turbulence which expressed itself in the numerous local riots that occurred between the suspension of 1837 and the restoration of industrial activity ten years later.

The Bank of the U. S., after the extinction of its Federal charter in 1836, had obtained a charter from the State of Pennsylvania. In 1837, in common with all the banks in the country, it suspended specie payments. In May, 1838, the New York, and shortly afterwards the New England, banks resumed specie payments. In Aug., 1838, the Philadelphia banks (including the Bank of the U. S.) professed to resume specie payments, and on Jan. 1, 1839, there was at least a nominal resumption of specie payments throughout the Union. On Oct. 9, 1839, the banks of Philadelphia (including the Bank of the U. S.) suspended for the third time, and their example was quickly followed by all the banks to the S. and W., and also by the banks of West Jersey and Rhode Island. The Rhode Island banks soon after resumed. On July 4, 1840, Congress passed an act (repealed Aug. 9, 1841, and subsequently re-enacted, with amendments, Aug. 6, 1846, known as the Independent Treasury law) providing for the keeping of the public deposits by receivers-general in New York, Boston, Charleston, and St. Louis: meanwhile the public funds being deposited with State banks again. In June or July, 1840, the South Carolina banks resumed; all the other banks to the S. and W. of New York, except the East Jersey banks and a few scattered, continuing to refuse specie payment. On Jan. 15, 1841, the banks of Philadelphia (including the Bank of the U. S.) resumed—to suspend again Feb. 4, 1841. A bill to incorporate a "Fiscal Bank of the U. S." was passed by Congress Aug. 6, 1841, and vetoed by President Tyler Aug. 16. Another bill for a "Fiscal Corporation" was vetoed Sept. 9, 1841, and followed by a resignation of all the Cabinet except Mr. Webster. On the 18th or 19th of Mar., 1842, the Philadelphia banks resumed, but the Bank of the U. S. was defunct. On winding up its affairs the entire capital was found to be sunk. It paid its debts, and was soon forgotten. The condition of the banks from 1838 to 1843 inclusive is shown in the following table—sums in millions of dollars—the figures, the best extant, being partly based on estimates and not altogether reliable:

Date nearest Jan. 1st.	No.*	Capital.	Specie.	Notes.	Deposits.	Loans and Discounts.
1838	675	317.6	35.2	116.1	84.7	485.6
1839	672	327.1	45.1	135.2	90.2	492.3
1840	722	358.4	33.1	107.	75.7	462.9
1841	619	313.6	34.8	107.3	64.9	386.5
1842	563	260.2	28.4	83.7	62.4	324.
1843	577	228.9	33.5	58.6	56.2	254.5

(For population and currency, see MONEY.)

We now approach the palmy days of the State banks. The steady progress of the country in population and the development of its resources—the latter of which had been unduly hastened by the expansion of 1834–37, and as unduly retarded by the contraction of 1838–43—now reasserted their irresistible influence, and the State banks, warned by recent adversity to conduct themselves with prudence, entered upon an era distinguished for its healthy growth and the introduction of reforms in banking.

The Suffolk bank system, established in 1824, had grown gradually into favor, and although before 1837 it had not acquired strength enough to check the expansion which culminated in that year, it was now in a position to exercise a substantial check to further improvidence. It simply consisted in the voluntary association of certain Boston banks, employing the Suffolk Bank as their agent, to immediately return the notes of all New England banks which had found their way to Boston, to their issuers, and obtain specie therefor. When this system had been pursued for several years, the country banks found it to their advantage to keep a redemption fund in specie on deposit with the Suffolk Bank. The result of the system was, that all New England bank-notes were kept at par in Boston, and the emissions confined within reasonable bounds.

The safety-fund system of the State of New York had been tried and found inefficacious. It was enacted by the State legislature in 1829, and consisted in requiring all the banks of the State to contribute one-half of 1 per cent. of their capital to a common fund, from which were to be paid the liabilities of such banks as might fail. It was a system of mutual insurance, and, though perhaps sound enough in principle, became under the law unsafe and misleading in practice, by inducing the public to rely upon the resources of a safety-fund reserve which the inadequacy of the premiums demanded had rendered insufficient for the purposes in view.

On April 18, 1838, was enacted the Free-Banking law of New York. This system provided that any individual or association might engage in banking and the issuance of circulating notes on condition of securing the latter by deposits with the State of 5 per cent. par stocks of the U. S. or any of the States, or 6 per cent. bonds and mortgages on real estate worth double the amount, etc. The system was amended in 1840 so as to limit the stocks deposited to those of the Federal government or the State of New York; and in 1849, so that at least one-half of the stocks deposited should be stocks of the State of New York. The law provided that the banks should elect at the outset whether their notes should be secured wholly by stocks or by stocks and real estate, and thereafter no change was practicable; but in practice the banks were permitted to withdraw their deposits of bonds and mortgages (except a single one), and substitute stocks therefor as a "superior convertible medium in times of financial pressure." (*N. Y. Bank Rep.*, 1862.) The free-banking system of New York was enacted in many of the other States, though not always with like success. The general immunity of the banks from failure during its continuance has been regarded as convincing proof of its soundness, but this by no means follows. The healthy progress of the banking-system of the U. S. from 1843 to the outbreak of the civil war must be attributed to the resumption of industrial progress, checked in 1837, and the opening of California in 1849, which resulted in a general rise of prices all over the world, and by consequence in an unlooked-for appreciation of the securities which formed the basis of the free-banking system. With certain important modifications—mainly those of limiting the issues of the banks to a certain total amount (about $350,000,000), requiring the deposits to consist solely of U. S. stocks, and rendering the notes a legal tender to and from the government (except for customs, interest, and redemption) and between the banks, this plan forms the basis of the present national banking system.

The following synoptical table exhibits the condition of the State banks from 1844 to 1863, inclusive—sums in millions of dollars and tenths. These statistics were collated unofficially by the treasury department, and, although the only ones extant, are not altogether reliable. Although

* Branches excluded.

the civil war broke out in April, 1861, the banks in the insurrectionary States are included (by estimate) in the table up to 1863, inclusive:

Date nearest Jan. 1st.	No.*	Capital.	Specie.	Notes.	Deposits.	Loans and Discounts.
1844	578	211.	49.9	75.2	84.6	264.9
1845	580	206.	44.2	89.6	88.0	288.6
1846	587	196.9	42.0	105.6	96.9	312.1
1847	591	203.1	35.1	105.5	91.8	310.3
1848	622	204.8	46.4	128.5	103.2	344.5
1849	654	207.3	43.6	114.7	91.2	332.3
1850	685	217.3	45.4	131.4	109.6	364.2
1851	731	227.8	48.7	155.2	129.	413.8
1852						
1853						
1854	1059	301.4	59.4	204.7	188.2	557.4
1855	1163	332.2	53.9	187.0	190.4	576.1
1856	1255	343.9	59.3	195.7	212.7	634.2
1857	1283	370.8	58.3	214.8	230.4	684.5
1858	1422‡	394.6	74.4	155.2	185.9	583.2
1859	1476‡	402.	104.5	193.3	259.6	657.2
1860†	1562‡	421.9	83.6	207.1	253.8	692.
1861	1601‡	429.6	87.7	202.0	257.2	696.8
1862	1496‡	419.8	102.2	183.9	297.1	647.7
1863	1466‡	405.0	101.2	238.7	393.7	648.7

(For population and currency, see MONEY.)

In Oct., 1857, the State banks from one end of the Union to the other suspended specie payments, the Chemical Bank of New York being an exception. This event was vaguely ascribed, as all suspensions are, to "overtrading," but its extension to England and the Continent, and its speedy termination, together with the fact that the original suspending banks had more specie on hand than notes in circulation, ascribe it to another cause—the improvident loan of several hundred million dollars to railways adduced in the Finance Report for 1857 having probably had much to do with it. Within a few months the banks resumed. Conspicuous among the failures of the time was that of the Bank of Philadelphia in Feb., 1858. Until the eve of the late civil war no event of importance occurred after this to impair the strength or prosperity of the State banks. In Dec., 1860, a large number of the banks in the Southern States suspended specie payments, and the New York banks formed a syndicate to sustain in common the results likely to follow this action, and protect the business interests of the country against panic. In April, 1861, the civil war broke out. In July, Congress authorized a loan of $250,000,000 to carry on the war. The money was needed at once, and application was made to the State banks for $150,000,000 of this amount. Meanwhile, on Aug. 5, 1861, Congress suspended the Independent Treasury law of 1846, so far as to allow the treasury to deposit any of the borrowed money with the banks and employ them in its disbursement. This implied promise stimulated the banks to exert themselves energetically in raising funds for the emergency, and over $100,000,000 were loaned to the government by the banks of New York City, as follows:

August 19, for 7-3.10 per cent.	treasury notes	.....	$35,000,000
October 1, " 7-3.10 "	"	.....	35,000,000
November 16, for 6 "	coupon bonds	.....	17,500,000
" " " 6 "	registered bonds	.....	17,500,000
Total		.....	$105,000,000

The remainder of the $150,000,000 borrowed by the government was loaned by the banks of other cities. The whole amount subscribed by the banks of New York was paid into the treasury in coin (*N. Y. Bank Rep.*, 1863, p. 19) by the associated banks of New York City between Aug. 19, 1861, and Feb. 3, 1862; the first loan of $35,000,000 by the banks of New York was repaid, to the extent of $31,497,403, from sales to outside parties between Sept. 3, 1861, and Jan. 13, 1862; but none of the securities to be issued by the government for the remainder were received by the banks until Jan. 14, 1862, nor did the government deposit any of the borrowed funds with the banks, or employ the latter as disbursing agents. It was impossible to sustain such a depletion of treasure; and on the 28th Dec., 1861, the New York banks were reluctantly obliged to suspend specie payments—an example quickly followed by the banks throughout the country.

Congress met on Dec. 2, 1861; on the 9th the report of the secretary of the treasury was communicated. This report recommended the suppression of the State banks by taxation, and the substitution in their stead of national banks organized on the plan hereinbefore mentioned. Feb. 25, 1862, Congress authorized the issue of legal-tender notes, and specie disappeared from use within the country, except for the payment of customs and interest on the public debt. Feb. 25, 1863, an act was passed by Congress authorizing the establishment of national banks on the plan proposed by the secretary of the treasury, with permission to deposit the public moneys with them; which act, as amended June 30, 1864, and subsequently, is now the law of the land. Most of the State banks made preparation to reorganize under the national system. In Oct., 1863, 66 banks had organized under the new system; Jan. 4, 1864, 139 banks; Jan. 2, 1865, 639 banks; Jan. 1, 1866, 1582 banks. This substantially completed the change. Very few banks remained under the State system, and these were mainly those located in great money-centres, which could afford to relinquish their circulation, as the Federal law compelled, without suffering loss. The following synoptical table exhibits the change from the State to the national system (1863 to 1865, inclusive), and the progress of the latter since—sums in millions of dollars and tenths:

Date nearest Jan. 1st.	No.	Capital.	Specie.	Legal tenders and 3 per cent. certificates.	Cir. Notes.	Deposits.[b]	Loans and discounts.
1864	139	14.7	5.0		.....	19.5	10.7
1865	639	135.6	4.5	72.5	66.8	221.2	166.4
1866	1582	403.4	19.2	187.8	[c]258.7	552.2	500.7
1867	1648	420.2	19.7	186.9	[c]298.3	588.4	608.8
1868	1642	420.3	21.0	164.3	[c]298.2	562.2	616.6
1869	1628	419.0	29.6	142.6	[c]297.3	585.2	644.9
1870	1615	426.1	48.3	134.0	[c]295.2	555.6	688.9
1871	1648	435.4	26.3	124.6	[c]298.3	517.6	725.5
1872	1790	460.2	29.6	118.4	[c]320.1	616.8	819.0
[a]1873	1919	479.6	25.5	116.8	[c]335.1	625.7	877.2

(For population and currency, see MONEY; for treasury balances, see TREASURY.)

These returns, which are compulsory and official, prove that under the national banking-system credit has been carried to a greater height than it ever attained before.

One of the objections urged against the State in favor of the national system, which experience has since sustained, was the number of counterfeit and other false notes that circulated under the former system, and from which the latter is almost free. The number of State banks and branches in 1862 was 1496; and, according to the bank-note reporters of the period, the number whose notes were not counterfeited was 253; number of kinds of "imitations," 1861; number of kinds of alterations, 3039; number of kinds of spurious notes, 1685. Although these statistics would perhaps scarcely stand the test of close scrutiny, there is doubtless considerable strength in the conclusion to which they would lead. The State bank-notes were printed by the banks, each for itself, and of as many different designs as there were banks; the national bank-notes are printed by the treasury, and, according to denomination, are all of one design.

The State banking-system is by no means extinct. Although all the State banks have been compelled to withdraw their notes from circulation, many of them, scattered throughout the States, have never changed to the national system; while no inconsiderable number of the national banks, some of which were originally State banks, have changed to the State system, either to avoid participation in the danger which some foresee in the latter or to escape the taxes on circulation and deposits levied on national banks. On the 21st Sept., 1872, there were seventy of these institutions doing business under the laws of the State of New York, having a combined capital of $24,845,040; deposits, $75,491,383; loans and discounts, $66,076,361; "bills of solvent banks and U. S. legal-tender notes," $7,803,556; and specie, $1,261,772. ALEX. DELMAR.

Bank'head (JOHN PINE), U. S. N., born in South Carolina Aug. 3, 1821, entered the navy as a midshipman Aug. 6, 1838, became a passed midshipman in 1844, a lieutenant in 1852, a commander in 1862, and a captain in 1866. Died at Aden, Arabia, on his way home from the East Indies, April 27, 1869. He commanded the gunboat Pembina at the battle of Port Royal, Nov. 7, 1861, and during the subsequent operations on the coast of South Carolina; commanded the Monitor when she foundered off Hatteras on the night of Dec. 31, 1863, and displayed admirable coolness on that trying occasion. Rear-Admiral Lee, in his official report of the disaster, says: "The vessel filling rapidly, Commander Bankhead ordered the men then left on board to leave in the Rhode Island's boat, then cautiously approaching, as the sea was breaking violently over the Monitor's submerged deck. In this perilous position Commander Bankhead *held a boat's painter until as*

* Branches excluded.

† The census of 1860 (iv. p. 291) gives much higher figures for this year.

‡ Branches included.

[a] Oct. 3, 1872.

[b] Including deposits of the U. S. and of U. S. disbursing officers.

[c] Including State bank notes outstanding, as follows: 1866, 45.5; 1867, 7.0; 1868, 3.8; 1869, 2.7; 1870, 2.4; 1871, 2.1; 1872, 1.9; and 1873, 1.6 (millions). A portion of this is doubtless lost or destroyed.

many men got in as the boat could carry. He did not leave his vessel so long as he could do anything towards saving his crew." He was a son of General James Bankhead, U. S. A. (1783–1856). FOXHALL A. PARKER, U. S. N.

Bank-Notes, Manufacture of. An important object in making bank-notes is to guard against counterfeits. The engraving should be such that the public can distinguish the genuine note by its superiority of execution, and the officers of the bank by secret peculiarities of design. These ends are secured mainly by the use, in engraving, of rare and very expensive lathes. The writing, the emblems, and figures are so combined as to render forgery difficult. The ink is peculiar. The paper also is of peculiar manufacture, both in Europe and America. About 1837 a great improvement was made in the engraving of bank-notes. This was the production of designs by the mill and die, by mechanical pressure, invented by Jacob Perkins. The pattern is engraved on a soft steel plate, which is then hardened to transfer the pattern by pressure to a soft steel roller, on which, of course, the pattern is produced in relief. The roller is then hardened to reproduce the pattern in the plate on which the note is to be printed. (See ENGRAVING, BANK-NOTE, by JOHN E. GAVIT, Esq.)

Bank'rupt [Lat. *bancus*, a "bench," and *ruptus*, "broken"], a term originally applied to a merchant whose bench or counter had been broken by reason of inability to pay his debts. In its popular sense the word is now nearly synonymous with *insolvent*, and denotes any person unable to meet his liabilities. In England its legal signification is well defined. It embraces only traders, or persons whose business it is to buy and sell for gain, and the various statutes which have been enacted there since the reign of Henry VIII. in relation to bankrupts have been applicable to that class alone. By the English laws a bankrupt is a trader who has committed an act of bankruptcy, as defined by statute. A trader may have committed an act of bankruptcy, and have been formally adjudged a bankrupt, and yet be entirely solvent—that is, eventually able to pay his debts in full; and he may be wholly unable to pay his debts, and yet have committed no act of bankruptcy. A bankrupt was at first regarded as an offender against the law, and bankrupt laws were intended for the benefit of creditors. But at present they are founded on the interests of trade, and intended to be beneficial to both debtor and creditor. If the conduct of the bankrupt has been such as to entitle him to the consideration of the court, he is discharged for ever from all debts owing by him at the time he became a bankrupt. The law is confined to traders, because they are regarded as possessing peculiar facilities for delaying and defrauding creditors; and, on the other hand, they are considered, generally speaking, the only class subject to heavy accidental losses, and to an inability to pay their debts without any fault on their part. Insolvent laws, which in England merely release the debtor from liability to imprisonment for debt, but leave the debt still undischarged, are there regarded as affording sufficient relief to other classes of debtors.

In the U. S., Congress possesses the power, under the Constitution, to establish uniform laws on the subject of bankruptcies. Pursuant to this power, in the year 1800 Congress passed a bankrupt law, which by its own terms was limited to five years, but it was repealed in 1803. This law preserved the leading features of the English laws relating to bankruptcy. It could be enforced only on the application of creditors, and embraced only the mercantile class.

In the year 1841 the second bankrupt act was enacted by Congress. It could be taken advantage of by all persons whomsoever residing in the U. S. owing debts not contracted in a fiduciary capacity, although it could be enforced at the instance of creditors only against merchants, bankers, brokers, factors, and underwriters. This extended exercise of the power over the subject of bankruptcy was violently opposed as unconstitutional, on the ground that Congress was confined to the well-recognized meaning of the term bankruptcies as understood in the English courts when the Constitution was formed. The law was repealed in Mar., 1843.

But by act approved Mar. 2, 1867, Congress passed a third bankrupt law, even more general in its scope than the preceding. Under it any person residing in the U. S. and owing debts to the amount of $300 can, on his own application showing his inability to pay his debts in full, and his desire to surrender his property for the benefit of his creditors, take advantage of the act and be declared a bankrupt. So a debtor owing a specified amount can be forced to become a bankrupt upon the application of creditors if he has committed any of certain offences or acts specified in the statute. The bankrupt, after the distribution of his property amounting to a fixed per centage of his debts, obtains a discharge from all his indebtedness existing at the time the petition was filed, except in certain instances specified in the act.

The distinguishing feature of a bankrupt act is the summary seizure of all the debtor's property, and its division among his creditors in proportion to their claims. The race of diligence among creditors is entirely at an end, and all legal proceedings, except such as are in conformity to the statute, are stayed. It is against the policy of the bankrupt law to allow the debtor, in contemplation of bankruptcy, to give preference to one creditor over another. All such preferences are void, and an attempt to make them is of itself an act of bankruptcy.

The various States also possess the power to pass bankrupt laws, but no State bankrupt or insolvent law can impair the obligations of contracts. Hence they cannot release a debtor from obligations incurred before the passage of such law, nor act upon the rights of citizens of other States. And when Congress sees fit to exercise the power over the subject of bankruptcies granted it by the Constitution, the State laws on the same subject are suspended. On the repeal of the Congressional law the State laws would revive. The power of Congress over the subject is plenary, and its law may affect existing debts as well as those which are contracted after its enactment.

The judicial business in bankruptcy is in the main transacted by the district court of the U. S., with officers called registers to conduct the administrative or non-contested business. The estate is managed by an assignee, who acts as a trustee, and is accountable to the court referred to. T. W. DWIGHT.

Banks, a county in the N. E. part of Georgia. Area, 280 square miles. It is drained by the sources of Broad River. The surface is hilly or uneven. Indian corn is an important crop. Some rice and cotton is raised. Capital, Homer. Pop. 4973.

Banks, a township of Fayette co., Ia. Pop. 223.

Banks, a township of Antrim co., Mich. Pop. 504.

Banks, a township of Carbon co., Pa. Pop. 3982.

Banks, a township of Indiana co., Pa. Pop. 747.

Banks, a township of Upshur co., West Va. P. 1272.

Banks (NATHANIEL PRENTISS), a statesman and general, born at Waltham, Mass., Jan. 30, 1816. He learned the trade of a machinist, afterwards studied law, was elected to the legislature as a Democrat in 1849, and was chosen speaker of the house of representatives of Massachusetts in 1851. Having been elected a member of the national Congress in 1852, he was separated from the Democratic party by his opposition to the extension of slavery, and in 1854 was returned to Congress by the Republicans and Know-Nothings. In Feb., 1856, after an exciting contest which occupied two months, he was chosen Speaker of the House on the one hundred and thirty-third ballot. He was elected governor of Massachusetts, in Nov., 1857, for one year, and was re-elected in 1858 and 1859. In May, 1861, he was appointed a major-general of volunteers, and soon obtained the command of an army on the Potomac. Having gained some advantage at Winchester in Mar., 1862, he pursued the enemy to Harrisonburg. On the 24th of May he was attacked by Stonewall Jackson, and retreated rapidly to the Potomac. In Dec., 1862, he succeeded General Butler as commander of the department of the Gulf. About the end of May, 1863, he invested Port Hudson, which was taken with about 6000 prisoners, July 9. In the spring of 1864 he conducted an expedition up the Red River, in which Rear-Admiral Porter co-operated with the gunboats. He ascended above Grand Ecore. After several battles at Pleasant Hill (April 9) and other places, being pressed by superior numbers, he retreated towards New Orleans, and was relieved from the command in May, 1864. He was chosen a member of Congress by the Republicans of Massachusetts in 1864, in 1866, in 1868, and in 1870. He served as chairman of the committee of foreign relations in the fortieth and forty-first Congresses.

Banks (Sir JOSEPH), LL.D., F.R.S., an eminent English naturalist, born in London Jan. 4, 1743, inherited an easy fortune. He was educated at Oxford, which he quitted in 1763, was elected a fellow of the Royal Society in 1766, and sailed with Captain Cook in his voyage round the world in 1768. He returned in 1771 with rich collections of plants, animals, etc. In 1777 he was chosen president of the Royal Society, over which he presided forty-two years. He was a liberal patron of naturalists and scientific men, who under his auspices performed several voyages of discovery. The colony of Botany Bay owed its origin mainly to him. He contributed memoirs to the "Philosophical Transactions" and other publications. Died June 19, 1820. (See CUVIER, "Eulogy on Sir

J. Banks," 1821; DUNCAN, "Short Account of the Life of Sir J. Banks," 1821.)

Banks (THOMAS), the first great English sculptor, born at Lambeth Dec. 22, 1735. He gained the gold medal of the Royal Academy in 1770, and went to Rome in 1772. He remained for several years in Rome, and produced there "Caractacus pleading before Claudius," and an admirable statue of "Psyche and the Butterfly," which was purchased by Catharine II. of Russia. Among his masterpieces is the "Mourning Achilles." He excelled in imaginative works. He became a member of the Royal Academy. Died Feb. 2, 1805. (See CUNNINGHAM, "Lives of the Painters and Sculptors.")

Bank'sia, a genus of Australian shrubs and trees of the order Proteaceæ (named in honor of Sir Joseph Banks), have hard dry leaves, and an umbellate arrangement of branches, which bear near the extremities oblong heads of numerous flowers. One species (*Banksia grandis*) grows to a height of fifty feet.

Banks, Savings. See SAVINGS BANKS.

Bank, The, a port of entry of Albert co., New Brunswick, on the Shepody River, 82 miles N. E. of St. John. Coal is found in the vicinity.

Ban'nack City, or **Bannock City,** a mining-town, capital of Beaver Head co., Mon., is on or near the Jefferson Fork of the Missouri River, about 50 miles W. of Virginia City. Gold and silver are found in this vicinity. The name is derived from the Bannack tribe of Indians, who are now much reduced in numbers.

Ban'natyne Club, a literary club deriving its name from George Bannatyne, who was born in Scotland about 1545. He compiled a collection of manuscripts called "Corpus Poeticum Scotorum." This club was founded at Edinburgh in 1823 by Sir Walter Scott, its design being to promote the knowledge of Scottish history and antiquities, and to print rare works which tend to illustrate those subjects. The club originally consisted of thirty-one members, and gradually increased to one hundred, to which number it was finally limited.

Ban'neker (BENJAMIN), a negro mathematician, born in Maryland Nov. 9, 1731. He was the author of an almanac (1792 sqq.), of which a copy was sent by Thomas Jefferson to the secretary of the Academy of Sciences at Paris. Banneker assisted in laying out Washington City and running the boundary-lines of the District of Columbia. Died at Baltimore in Oct., 1806.

Ban'ner [Fr. *bannière;* It. *bandie'ra;* Sp. *bande'ra;* so called, probably, because it was *bound* to the flag-staff: it is doubtless from the same root as the German *Band,* a "ribbon"], a military ensign or flag; the standard of a prince or state. Banners have been used in all ages and all countries for the purpose of directing the movements of armies. The banner of the ancient Romans was a square piece of drapery suspended from a transverse bar and supported on a staff. It was marked by the figure of an eagle and the initials S. P. Q. R.—*Senatus Populusque Romanus.* After Constantine became a patron of the Christian religion the Roman banners displayed the cross as the national emblem, and took the name of *labarum.* During the Middle Ages new forms of banners were adopted. From the banner royal, which bore the national emblem, to the pennon of the knight or the small streamer attached to a lance, there was a regular subordination. No one except a person of high rank was permitted to use the square banner. Bishops and abbots had the privilege of displaying banners in religious processions. Soldiers and patriots are warmly attached to the banner or flag of their country as a symbol of nationality and as a visible sign of the national unity and life.

Banner, a township of Fulton co., Ill. Pop. 1104.

Ban'neret, a title formerly given to a soldier for some heroic action. The banneret was higher in rank than a knight, and was so called because he had the privilege of displaying a square banner. When a knight was promoted to the rank of banneret the points of his pennon were cut off, and it was thus converted into a square form. The first English banneret was created by Edward I., and the last was Capt. John Smith, who rescued the banner of Charles I. at the battle of Edgehill.

Ban'nister, a township of Pittsylvania co., Va. Pop. 3347.

Bannister (HENRY), D. D., born Oct. 5, 1812, at Conway, Mass., graduated at the Wesleyan University, Conn., in 1836, studied at Auburn Theological Seminary, was principal of the Methodist academy at Cazenovia for some years, and in 1856 was appointed professor of exegetical theology in the Garrett Biblical Institute at Evanston, Ill. He is author of several able published sermons, addresses, and reviews.

Bannister (WILLIAM B.), born in Brookfield, Mass., Nov. 8, 1783, graduated at Dartmouth in 1797, was a successful lawyer and merchant, and a distinguished friend of learning. He married Miss Grant, a celebrated teacher of Ipswich. Died at Newburyport, Mass., July 1, 1853, leaving $40,000 to various charitable institutions.

Ban'nockburn, a village of Scotland, in the county of Stirling, on the Bannock rivulet, 3 miles S. of Stirling. It was the scene of a famous and complete victory gained by Robert Bruce over the English army, led by the king Edward II., on the 24th of June, 1314. The English lost about 30,000 men. Here are important manufactures of woollens, especially tartans and carpets. Pop. about 2600.

Bannock City. See BANNACK CITY and IDAHO CITY.

Banns (or **Bans**) **of Marriage** [for etymology see BAN], a public notice of an intended marriage, given in a church or other place prescribed by law. The law of England requires that all banns of matrimony shall be published in an audible manner, according to the rubric prefixed to the marriage service in the Book of Common Prayer, upon three Sundays preceding the ceremony. This rubric is in the following terms: "I publish the banns of marriage between A, of ——, and B, of ——. If any of you know cause or just impediment why these persons should not be joined together in holy matrimony, ye are to declare it." The English law, however, dispenses with this preliminary publication if the parties obtain a license from a person authorized to grant it. The custom of banns has been abolished in most of the U. S. The practice was first directed in the times of the Fathers, was enacted afterwards by Odo, bishop of Paris, about 1176, placed in the canon law in 1200 by the Synod of Westminster, and prescribed for the whole Latin Church by the Council of Lateran in 1215. It is still required by the canon law of England and Roman Catholic countries.

Bantam', an old town of Java, on the N. coast, 44 miles W. of Batavia. It was formerly a large city and great entrepôt of trade, but on account of the unhealthy climate is at present almost deserted. In the fifteenth century it was the chief town of a powerful Mohammedan empire of the same name, which at one time even comprised the southern part of Sumatra and the W. coast of Borneo. In 1683 the sultan of Bantam became a vassal of the Netherlands, and in the beginning of the present century the Dutch took possession of the sultanate. The town is in lat. 6° 2′ S., lon. 106° 50′ E.

Ban'tam Fowl, a variety of the common fowl, first brought from the Indies, and supposed to derive its name from Bantam, Java. It is remarkable for its small size and its courage. There are many sub-varieties, most of which have the legs feathered.

Ban'teng' (*Bos* or *Bibos banteng,* or *Ban'teng Sonda'icus*), a species of ox, a native of Java and Borneo, which in color, shape, horns, and want of dewlap bears some resemblance to the gaur of India. It has short hair, slender limbs, and a sharp muzzle. Though extremely wild, it is often domesticated by the natives, and becomes a very serviceable animal.

Ban'tingism, a regimen for the reduction of corpulence; so called after an English gentleman named Banting, who introduced it as the result of his own experience. It consists essentially in the avoidance of food containing fatty matter, and of materials which may make fat in the body, as starch and sugar. Lean meat predominates in this diet; vegetables are almost excluded; butter, milk, sugar, and malt liquors are prohibited. With active exercise this method is often successful in reducing excessive weight.

Ban'try, EARLS OF, and Viscounts Berehaven (1816), Viscounts Bantry (1800), Barons Bantry (1797, in the Irish peerage), a noble family of Great Britain.—WILLIAM HENRY HARE HEDGES WHITE, the third earl, was born Nov. 10, 1801, and succeeded his brother in 1868.

Bantry Bay, a deep inlet in the S. of Ireland, in Cork county, is 25 miles long and from 3 to 5 miles wide. It is one of the finest harbors in Europe, affording safe and commodious anchorage for ships of all sizes. The coast of the bay is high and rocky, consisting of Devonian strata, and exhibits some of the finest scenery in the island. Near the entrance of this bay occurred a naval action between the English and French in 1689.

Banvard' (JOSEPH), D. D., born in New York City in 1810, has held many prominent pastorates in the Baptist denomination, and is the author of numerous Sunday-school Question-books and other works, chiefly tales and histories for the young.

Banx'ring (*Tupai'a*), a genus of insectivorous quadrupeds, natives of Sumatra, India, Borneo, etc.; they climb trees with agility, like lemurs and squirrels. They have an elongated muzzle and a long bushy tail.

Ban'yan,* or **Banian** (*Fi'cus In'dica*), an East Indian tree remarkable for its mode of propagation by means of branches, which descend to the ground and take root and become stems or trunks. The shoots at first hang like loose cords or ropes, but after they take root they are gradually tightened, till they become almost as firm as a rod of iron. In this manner a single tree spreads over a large extent of ground, and endures for many centuries. One of these trees has been described as having 350 large stems, and occupying so large a space that many thousand persons might stand under its shade. It is a species of fig, and produces a fruit about as large as a cherry, and of a rich scarlet color. An abundance of gum-lac is procured from

Banyan Tree.

this tree, the bark of which is esteemed as a tonic by Hindoo physicians. The above illustration may serve to give one an idea of a vigorous and comparatively young banyan tree. In very old trees many of the stems often become almost or quite as large as the original trunk.

Banyan, a township of Jefferson co., Ark. Pop. 615.

Banz, the name of one of the finest Benedictine abbeys known in history, is situated in Bavaria in the midst of a beautiful landscape. The monks of this abbey were noted for their learning and humane spirit. It was founded in 1058. The convent was abolished in 1802, and is now the summer residence of the princes of Bavaria. Here is a museum which is especially rich in petrifactions.

Baobab. See ADANSONIA.

Baour-Lormian (PIERRE MARIE FRANÇOIS LOUIS), a French poet of the first empire, born Mar. 4, 1770, translator of Tasso and Ossian, and author of many tragedies in the severely classic style, which were greatly admired in their time. Died 1857.

Baph'omet, a mysterious symbol of the Knight Templars, was a small human figure cut out of stone, having two heads, male and female. It was environed with serpents and astrological attributes, and marked with inscriptions, mostly in Arabic. The word is supposed to be a corruption of Mohammed or Mahomet (called by the Portuguese, Bafoma), to whose religion the Templars were suspected of leaning. Others derive it from Βαφὴ Μήτεως, the "bath of wisdom," a reputed name of the Gnostic baptism, often called in old writings "baphometic baptism." Quite a number of baphomets are preserved in European archæological collections.

Bap'tism [Lat. *baptis'ma*; Gr. *βάπτισμα*, from *βαπτίζω*, to "baptize"], the act of initiating a person, by the application of water, into the visible Church of Christ. (See BAPTISTS, by PROF. H. OSGOOD, S. T. D.)

Bap'tist Church, a township of Cabarrus co., N. C. Pop. 1032.

Bap'tistery [Gr. *βαπτιστήριον*], a name sometimes given to the tank or vessel in which the ordinance of baptism is administered; sometimes to a portion of a church in which the ceremony of baptism is performed, or a separate building erected near the church for the performance of that rite. These buildings were either octagonal, polygonal, or circular. The baptistery of Florence, among the most celebrated, is an octagonal structure about 100 feet in diameter, standing in close proximity to the cathedral. It is built of black and white marble. The most remarkable features of this baptistery are the magnificent bronze doors, adorned with bas-reliefs by Lorenzo Ghiberti. In the centre of each of these buildings erected for baptismal purposes is a tank, which is often of considerable proportions—that at Ravenna being about nine feet square, and that of the Lateran, at Rome, thirty-seven inches or more in depth.

Bap'tists, a body of Christians who maintain those views of Christian truth which are commonly regarded as "evangelical," but who differ from adherents of the Church of Rome and from most Protestants in the following respects:

1. They maintain that immersion is an essential condition of valid baptism—appealing, in support of their position, to the significance of the Greek word *βαπτίζω* and its Latin equivalents; to the circumstances in which the baptisms of the New Testament were administered; to the scriptural significance of the rite as a burial with Christ; to the practice of the Church in the early Christian centuries; and to the concessions of those who, while practically rejecting immersion, admit that it was practised by the apostles and the early churches. All pleas for a modification of the rite on the ground of indifference or expediency they meet by insisting on the duty of literal compliance with the precepts and example of Christ, and the importance of maintaining the emblematical significance of the rite.

2. They maintain that a visible Church should be composed of such only, and that such only should be admitted to baptism, as give credible evidence of regeneration—in opposition to those who would make the Church coterminous with a state or states, and those who would include in the Church the unregenerate members of Christian households. These views also they profess to derive from the New Testament, and enforce them on the ground of reason and common sense. They were the first among the various sects of modern Christendom to insist on "a spiritual church-membership;" and it is largely through their influence that that idea has gained such wide acceptance in this country, and is gradually spreading throughout Europe. (See CURTIS'S "Progress of Baptist Principles.")

3. They maintain that professed believers only should receive baptism. This position is a natural sequence of their view of the spiritual nature of the Church when coupled with the almost universally conceded doctrine that baptism is the initiatory rite of the Church. They point, however, to the baptisms of the New Testament as by explicit statement or fair inference the baptism of believers; and insist that the baptism of an unconscious infant, either on the responsibility of the Church, the State, or the religious household, is a violation of the rights of the individual conscience, which should, in their opinion, "give account of itself unto God" in all matters of religious faith and practice. They maintain, in short, that all the Christian ordinances are acts of faith, requiring the conscious consent of the subject. In reply to arguments drawn from the mention of the baptism of households in the New Testament, they reply that they would cheerfully baptize such households as that of Stephanas baptized by Paul (which is described as "the first-fruits of Achaia, and addicted to the ministry of the saints"), or the household of the Philippian jailer, of which it is explicitly affirmed that they were all believers; and point to the large number of believing households in membership with Baptist churches to show that household baptism does not necessarily imply infant baptism.

4. They maintain that there should be no organic connection between the Church and the State; and, further, that each individual church (by which they understand, "a body of baptized believers, with its pastor and deacons, covenanted together for religious worship and religious work") should be absolutely independent of any other body, whether ecclesiastical or political, being accountable for its doctrines and practices only to the great Head of the Church. As a consequence of this, though Baptist churches are frequently grouped together in "associations," and the "associations" of a State are further combined in "general associations" or "State conventions," though Baptists frequently call "councils" for the recognition of churches, the ordination of ministers, and the adjustment of difficulties, "associations," "conventions," and "councils" have with them no ecclesiastical authority whatever, save that with which the Christian comity of those constituting them invests them, and the moral weight which their conclusions carry.

In view of the facts just stated, the substantial homogeneity in doctrine and practice of a body of Christians which embraces, in the U. S. alone, more than 1,500,000 communicants, may be a matter of surprise; and that surprise will be enhanced when it is understood that the Baptists have no authoritative creeds or symbols, but appeal, in support of doctrine or practice, directly to the word of God. This homogeneity (as complete as that which exists in any denomination of Christians) is attributed by the Baptists to the fact that members enter their

* Probably derived from the Sanscrit *vânyâ* (pronounced *bânyâ* in Bengal), a "grove" or "thicket," a single banyan tree often forming a grove (or thicket) of itself.

churches consciously adopting a coherent, self-consistent, and scriptural system of Christian truth.

It is to reinforce their utterances in behalf of a spiritual church-membership and allegiance in religious matters to Christ alone, by an acted protest to what they believe to be a departure from the apostolic conception of the Christian Church, that the Baptists take a position with reference to the Lord's Supper similar to that taken by the Episcopalians with reference to ministers not episcopally ordained. While cordially co-operating with other religious denominations in all forms of moral and religious activity, they decline to invite them to participation in the Lord's Supper, taking the ground that there is an obvious and necessary distinction between Christian fellowship and church fellowship. Their position with reference to this matter is, briefly stated, that the Lord's Supper is an ordinance designed by Christ for his churches, and entrusted to their care; that baptism is the initiatory rite of the Christian Church; that valid baptism involves the immersion of a professed believer. In the first two particulars they agree with most Christian sects; and hence are accustomed to claim that they do not practise "close communion," but close baptism; that most of the other Christian sects are no more willing than they to invite to the Lord's Supper those whom they do not conscientiously regard as baptized.

In 1815, Robert Hall (one of the most gifted and influential Baptist ministers of England) published a treatise on the "Terms of Communion," in which he endeavored to satisfy himself and others that baptism was not a prerequisite to communion. His general conclusion has been accepted by many who reject the premise from which alone a Baptist could logically derive it; and since his day most of the Baptists of England, and a few in America, have been "open communionists."

History.—The name "Baptists" has been borne by the denomination whom it now designates only about 200 years. It was given to them, as is supposed, either during the Commonwealth in England or shortly afterwards. The name by which they were known previous to the Commonwealth was Anabaptist, and the same name in a German translation, "Wiedertaufer," had for more than a hundred years before been applied to the predecessors of English Baptists in Switzerland and Germany. But as in Switzerland, Germany, Moravia, and Holland these Christians had from the first denied the appropriateness of the name "Wiedertaufer" (Rebaptizer), so in England their first recorded Confession of Faith (A. D. 1644) is said to be of "churches of Christ in London which are commonly (but unjustly) called Anabaptists." In this historical sketch the name *Baptist* will be used to designate the German "Wiedertaufer," the Dutch "Doopsgezinden," and English "Anabaptists" and "Baptists," without intending by the name to assert a perfect similarity between them in all things. The German "Anabaptists" (see article ANABAPTISTS) more frequently practised pouring than immersion; and the same statement may be made (see below) respecting the Dutch "Mennonites." These bodies of Christians agreed with our modern Baptists, however, in admitting only professed believers to baptism, and in maintaining the independence of a gospel Church of ecclesiastical or political control. They are, in some sense, the progenitors of the Baptists of to-day, though the historical connection between the two cannot be easily traced.

Over the continental Baptists of the time of the Reformation has hung a cloud of misrepresentation for three centuries. The Peasant War (1525) and the Münster Rebellion (1535) have been laid at their door. That there were some renegade Baptists at Münster no one would deny, as there were more renegade Lutherans. But Baptists were no more responsible for that rebellion and its results than English missionaries were responsible for the Sepoy rebellion, or than Baptists of America are now responsible for Mormonism because Joseph Smith was a renegade Baptist and Mormons practise immersion. With respect to the Peasant War, Münzer, its leader, never was a Baptist, and never acted in concert with Baptists. In proof of this the letter of Baptist ministers of Switzerland (dated Oct., 1524) is still preserved at St. Gall, in which, while they express sympathy with some of his views (*i. e.* rejection of the mass and infant baptism), they rebuke him for taking the sword. In the discussions with Zwingle before 1525, the Baptists of Switzerland had maintained the view held by many of their descendants in Europe, that Christians had no right to use arms for self-defence or the defence of the land; and this view was maintained by the Swiss and German Baptists at their convention at Schleitheim, near Schaffhausen, Sept., 1527.

The Baptists in the earliest years of the Reformation consisted of the poor and obscure. The persecutions of centuries had taught them concealment. After 1522 there was in Switzerland a band of scholars who had been converted by means of these obscure men, and who literally gave their lives for the defence of the faith. Balthazar Hubmaier had been pro-rector of the University of Ingoldstadt, and was said by Eck to be the most eloquent man in Europe; Conrad Grebel was the scion of a noble house, and one of the first scholars of Vienna and Paris; Felix Mantz as a Hebraist occupied a high rank; Johann Denk and Ludwig Hetzer made a translation of the Prophets that compelled the praise of their enemies. These were the men whose names appear most frequently in the conflict which Zwingle provoked with the Baptists. There is not one of them who before becoming a Baptist was not the friend and associate of Zwingle and his fellow-workers.

Baptists, Zwinglians, and Lutherans agreed, in substance, in holding the doctrines of justification by faith and regeneration by the Holy Spirit, but they differed most widely in their view of the connection of these doctrines with the doctrine of the Church. Luther and Zwingle, though preaching the great doctrine of justification by faith, hesitated to institute radical changes either in the constitution or the worship of the Church. While they both in the earlier part of their work asserted that the Church should consist only of believers, and should be independent of the state, they both very soon came to consider the whole state Christian, and gave all power over the Church into the hands of the civil government, and infractions of the ecclesiastical laws, passed by the states for the protection of the Lutheran and Zwinglian reformations, were punished by fine, imprisonment, and death, with their approval. Baptists, on the contrary, held that the only churches spoken of in the New Testament are churches of believers, and claimed that to bring in as members of a Church those who give no evidence of regeneration is to institute a practice for which there is not the least scriptural warrant, and to subvert the fundamental principles of the Reformation itself.

The claims of Baptists were—freedom to form churches which should be separate from the world, to exercise church-discipline over their members, and to have the entire control of their own ecclesiastical affairs without interference of the state. As citizens they declared that they owed dutiful obedience to the state in all things not in conflict with God's laws, but the state had no right to compel to any religious faith or to punish men for their faith. By this position, which they held most firmly, they stood not only in antagonism to the Reformers, but to the states which had passed laws to enforce the Reformed views, and hence arose the cry which pursued them for three hundred years, of being both heretics and rebels.

The liberty of private judgment, which both Luther and Zwingle claimed in their discussions with Romanists, they were unwilling to grant to Baptists, and Protestant and Romanist joined hands in persecuting them unto death.

It is claimed by some writers that the Baptists of the period of the Reformation were wild and fanatical, and that Menno Simons of Holland (A. D. 1536–61) first introduced order and milder views among them. The writings of Grebel, Denk, Hetzer, Hubmaier, the confessions of Baptists before the Protestant inquisitors of Switzerland—all given before 1530—disprove the assertion. Fanaticism cannot be justly charged upon the early Baptists of Switzerland.

How furious the persecution was against Baptists from 1525 to 1530 may be learned from the fact that within these years all the great leaders had been either killed or banished from Switzerland, from what is now Elsass, Baden, Würtemberg, and Germany, and churches, many of them of large membership, were dispersed by fire and sword.

Hubmaier, during the two years of his banishment from Switzerland, under the protection of the counts of Liechtenstein at Nicolsburg, became the apostle of Moravia, and soon that land was filled with Baptists, and made the refuge of Baptists fleeing from other countries where the persecution was more severe. For a hundred years great numbers of the Swiss braved the loss of their goods, and the long journey through hostile territory, and the price set upon their heads by the Bavarian dukes, to reach Moravia, where they might enjoy some little religious freedom. From Moravia they sent out their missionaries to all parts of Germany, the Tyrol, and Switzerland, to Hungary, Silesia, and Poland. The Romish historians say that these missionaries were very successful in their efforts "to delude the people." The "Chronicle" of the Moravian brethren in manuscript in the town-library of Hamburg, the lately discovered complete works of Hubmaier, and Ryedeman's "Account," set before us the scriptural views and the steadfastness of these Moravian Baptists.

Until 1531–32, Baptists had been most numerous in Switzerland, in Southern Germany, the Tyrol, Austria, and

Moravia; after this date they appear in large numbers in the Netherlands, and in the countries bordering the Baltic up to the boundary of Russia. When they first appeared in the Netherlands cannot be decided. Ypeij and Dermout say Anabaptists were, according to the archives of Groningen, expelled in 1517. Professor van Oostersee (*Herzog's Encyclopædie*, vol. ix., 346) says of the Mennonites or Netherlands Baptists: "They are peculiar to the Netherlands, and are older than the Reformation, and must therefore by no means be confounded with the Protestantism of the sixteenth century, for it can be shown that the origin of the Baptists reaches much farther back and is more venerable. . . . The history of the Netherlands Baptists, particularly at first, is written in blood and tears. Unceasingly confounded with the fanatical party at Münster, they were persecuted in the most horrible manner by Catholics and non-Catholics. Their Church has given a great host of martyrs for the cause of Christ. The doctrines of baptism and of oaths raised up between them and their opponents walls of division as high as those between the defenders and opponents of the mass."

The Netherlands were the inheritance of Charles V., while in Germany he was emperor only by election, and the local government was largely in other hands. This accounts for the difference in the means used by him in resisting the Reformation. In Germany, till 1546, he temporized, but in the Netherlands he opposed fire and sword to the spread of the new doctrines. The history of the heroic contest here between the Protestants and Romanists is one of the most glorious in the history of the Church. Long before Menno, who is commonly regarded as the founder of the Netherlands Baptists, was converted and became a Baptist, Baptists were found in the Netherlands, and were united in churches from the borders of France to the northern bounds of Friesland, and proved steadfast unto death in the maintenance of their principles. In 1527, at The Hague, the daughter of Weynken Claes of Monickendam was strangled and burnt; also Jan Walen and two companions at Haarlem. In 1532, Kraen of Harzenswoude, his wife, and two others, were put to death at Haarlem. In the same year nine citizens of Amsterdam suffered martyrdom at The Hague. Between the Baptists of the Netherlands and those in the Rhine Provinces and in Switzerland there was an intimate union. In the writings of Menno and Philips we find the same views respecting Scripture doctrines which were held by the Swiss Baptists in 1524. Their church-government was the same, and they also agreed with respect to the unlawfulness of taking an oath or bearing arms or accepting civil office. The Moravian "Chronicle" and the Dutch martyrologies include the Swiss, German, and Netherlands Baptists as brethren together in their witness for the truth of God.

The Baptists in the Netherlands have been for a long time generally termed Mennonites, from Menno, one of their chief teachers. Menno Simons was a priest in the Roman Catholic Church in Friesland, who underwent a change of religious opinions and preached evangelical doctrines (though, as he afterwards asserted, without a change of heart) while still a priest. Influenced by the courageous martyrdom of a young Baptist, he examined and espoused Baptist principles, though he did not openly avow them until 1537, when the revolt at Münster had led him to realize that his influence ought to be felt as a Baptist on the side of order and humanity. From that time till his death (1561) he labored fearlessly and incessantly (though a price was set upon his head) to disseminate the principles which he had adopted; and with such pre-eminent success as to give his name to the Netherlands Baptists. The minister of no particular congregation, Menno's life was spent in travelling through the countries between the Rhine and the Elbe, from Cologne to Liefland. It is a great mistake, however, to suppose that he was their only prominent man at this time. He has left his impress upon his people by means of his writings, as well as his fearless and unceasing labors, but there were others who stood with him in the front rank as ministers. Dirk Philips found his field of activity mostly in Prussia and the lands bordering the Baltic, and Leenert Bouwens was the apostle of Friesland. Philips, like Menno, was a writer as well as a preacher and worker, and has left his interpretation of Baptist belief in his works. Leenert Bouwens deserves to be remembered for his marvellous exertions and almost unparalleled success in winning souls to God. His diary is still preserved, and reaches from 1551 to 1578, in which latter year he died. When we remember that these years are covered by the inhuman decrees of Charles V. and Philip II. against the Baptists, that during a portion of these years Alva ruled in the Netherlands, that a price was set on Bouwen's head, and every one in the land ordered on pain of death to arrest him if found, it is little short of the incredible that he should have during all these years been steadily at work, and should have baptized ten thousand persons as the fruit of his labors; yet the places where, and the persons whom, he baptized are set down with so much particularity that there seems to be no room for doubting the truthfulness of the record.

Is it any wonder that men like Menno, Philips, and Bouwens, who sought only to conform their faith and life to the word of God, and to gain others to the same living faith, should be stung into strong expressions against Catholic and Protestant preachers, who urged on, with all the arguments in their power, the civil authority to take the lives of Baptists? Like their brethren in Central Europe, they sought only freedom to serve God according to their understanding of the Scriptures, while they acknowledged their full duty of obedience to the civil power in all matters not contrary to God's word. Their church-discipline was strict even to severity, and wherever they were allowed to remain in peace they created centres of temporal as well as spiritual prosperity around them, were renowned for the probity of their dealings and for the purity of their domestic relations and life, and in their confessions and practices they urged the duty of complete religious liberty for all. Yet they were denounced from the pulpits of other confessions as "Münsterites, who if they could would seize land and city, draw the sword, steal, not only practise polygamy, but community of women and of property, revolt against the government, slay their children in body and soul," etc.

While William the Silent was a devoted courtier of Charles V., while he was a boon-companion of Egmont and Horn in their Belshazzar feasts, defenceless men and women were facing terrors more dreadful than death in battle for the sake of religious liberty. When, long years afterwards, William became the Christian hero and champion of the precious rights of liberty of conscience, at one of the darkest hours of his history, at Roermonde, he came to know the Baptists as fast friends of the cause. Opposed to the bearing of arms and to war, they yet recognized the duty they owed to their country to assist her in the hour of need, and when William despaired of help from other quarters he appealed to them, and they out of their poverty contributed a sum which was the token of their sympathy. His receipt for this money freely given, not lent, is still extant. He never forgot that act. Far in advance of his coreligionists, he was true as steel to the liberty of religious thought, and again and again lifted his arm against the tyranny which the hardly-emancipated Reformed sought to exercise over the Baptists. Motley's account has shown us with what disdain and indignation William rejected the request of the Reformed, through Aldegonde, in 1577, that Baptists should be excluded from citizenship because of their faith, and how he then indicated his high esteem of them by saying "their yea was equal to the oath" of the Reformed. He repeats this in his rebuke of the magistrates of Middleburg in 1578 for persecuting the Baptists, and praises their peaceful character.

From 1520 to 1575, Baptists had preceded the Reformed in all parts of the Netherlands, and in the long lists of martyrs for the faith ten Baptists suffered to one of the Reformed.

Though never opposed to general culture, and cordially welcoming to the ranks of the ministry men of the profoundest scholarship who felt it a duty to preach the gospel, the early Baptists held that mere education could not supply the lack of spiritual gifts, and maintained that any brother of good report, with sound knowledge of the Scriptures and evincing aptness to teach, should be licensed to preach the gospel. Shut out from all the higher institutions of learning in the sixteenth century, and observing that ministerial education was not incompatible with corruption in morals and bigotry in religion, they gradually fell into the tenet that special education was a disadvantage for the office of the ministry, and looked with disfavor on any attempt to prepare for it otherwise than by private reading of the Bible. The injurious effects of this view became apparent when, in the middle of the seventeenth century, the Socinians, expelled from Poland, came to Holland, and began to infect the churches with their views. In many churches the tares grew and choked the wheat. While full freedom under the law had not come for the Baptists, the time of severe persecution had passed. They pursued their callings in peace and with frugality, and riches flowed in upon them apace. They were largely concerned in commerce with foreign nations, and when Holland was in straits for money to carry on the war with England (1666–72) the Baptists lent the government large sums of money at a low rate of interest, and were rewarded with full religious and political liberty. But from that time to the present their numbers have steadily declined in Holland. The causes are not difficult to explain—the spread of Socinian doctrines among them, by which all the fervor

of life and missionary enterprise was lost; their church constitution altered, so that children who reached a certain age, whether converted or not, were baptized and made members of the Church; an uneducated ministry, with the members of churches far in advance of their pastors; the exclusion of all who married one of another religious confession; and last, but not least, riches not used for God.

Commerce, manufactures, and neighborhood had long bound England with many ties to the Netherlands. Those persecuted in the one country would flee to the other. During the sixteenth century there is frequent mention made in documents of state, as well as in the writings of private persons, of the presence of Anabaptists in England. The same cry was raised against them which was common in Europe, and they were exposed to the same persecutions. Some of those punished most severely were Hollanders who had fled to escape death in their own land. The English "Anabaptists" of the sixteenth century are shown by their statements, when on trial, to have been brethren of the Dutch Baptists. No persecution was severe enough to extirpate the Baptists from England, though it caused them to keep their meetings and their views very quiet. Banishishment, whipping, or death at the stake awaited any public "conventicles." Before a hand was laid to the reformation of the Established Church in England, Baptists were numerous in the kingdom, and the reigns of Henry VIII., Edward VI., Mary, and Elizabeth are blotted with the blood of martyred Baptists.

The same differences which existed among the continental Baptists on the schemes of doctrine, since termed Calvinism and Arminianism, were found among the English Baptists. Before and after the Synod of Dort these discussions in England and on the Continent increased in heat, and caused separation among confessors of the same views on other points. In the early part of the seventeenth century, in the reign of James I., the Arminian Baptists were numerous in England. But as in Holland, so in England, the Arminian Baptists gradually withered under the influence of Socinianism.

In Switzerland, in Germany, and in Holland it has been found impossible to decide when Baptists first appeared, or which were the first churches of Baptists in those lands (their simultaneous appearance on every hand being a natural result of that appeal to the Scriptures, in contradistinction to tradition, made by Luther, Zwingle, and Melanchthon); and it is quite as difficult to decide the question about the Baptists of England. If one would make the first Baptist church to appear under Helwisse in 1614, then we must deny the historical evidence for the conventicles of Baptists in the preceding century. If we make the church formed in London in 1633 the first Calvinistic Baptist church in England, we assume that all the Baptists and the Baptist churches of the sixteenth century were Arminian in their views, which has never been shown, and is contrary to all probability. Baptists were found in the north, in the west, but principally in the east, of England. Under the dreadful persecutions of the Tudors the churches knew little of each other unless they were situated near together. We hear more of the Calvinistic church formed in 1633, because it was situated in London, and performed an important work in the following years.

On the Continent some who have been classed with the Baptists, but who agree with them only in restricting baptism to believers, and in maintaining the independence of a Christian Church, regarded pouring as valid baptism, while others practised immersion. Pouring was most common among the Mennonites, though some among them held to immersion, and from those who practised immersion it was received by the English brethren, and has continued to be their practice to the present day. Crosby relates, on the authority of an old manuscript, said to be written by Kiffin, that a certain Richard Blount was sent from England to Holland to receive immersion from the hands of a regularly baptized minister, because the brethren did not know of any regularly baptized minister in England. Richard Blount was baptized in Holland, and returned and baptized others in England. It has been held that no Mennonites ever practised immersion, but facts are against the statement. The truth seems to be, that pouring or sprinkling was most common among the Mennonites, but there were some, and those who held Calvinistic views, who practised immersion in the seventeenth century, and by some one of these pastors Blount was baptized.

As the Dutch Baptists differed in some minor tenets from the Swiss, so the English differed from the Dutch and Swiss, while holding firmly to the principle common to them all, that the visible Church should be composed only of those who are baptized upon credible evidence of their being regenerated by the Spirit. The English Baptists did not regard it unlawful to take a solemn oath in court or to serve in the army. Like their brethren on the Continent, they were from the time of Henry VIII. the unflinching, unwearied witnesses and advocates of religious liberty—not for themselves only, but for all men, for the Turk as well as for the Christian; and when the upheaval of the English nation under Cromwell took place, by the pen and by the sword they strove to accomplish their ideal. They were found in the council of state, in the army, in the navy, while their ministers redoubled their labors, and God bore witness to their work by a rich harvest of converts. Raised to a height of influence and power, it is the striking manifestation of the grace of God in them that in prosperity as in adversity they advocated unlimited religious freedom for all men—"a free Church in a free State."

It is not a mere chance that the two greatest pleaders for the rights of conscience whom the centuries have produced—Milton in England and Roger Williams in Rhode Island—held, after mature consideration, those opinions for which Bunyan, the Baptist preacher, suffered fine and imprisonment. In simple devotion to God's word, in pleading for that word before the masses of men, in pleading for the highest and inalienable right of man against all spiritual and political tyranny, the entire denomination, in fact, have led the van of all Christian denominations and borne the brunt of the battle.

Under the Restoration, from Charles II. to William III., they suffered bitterly, as did all dissenters, and then with peace came the time of rest, degenerating to sloth. Calvinism hardened into hyper-Calvinism (only to be rationalized—humanized—scripturalized, through the influence of Andrew Fuller). Arminianism deliquesced into Socinianism, divisions separated the orthodox churches, and the eighteenth century was a period of stagnation in growth. But God had not forgotten them. Near the close of the century (when only the Moravians had preceded the English Baptists in the work of foreign missions), Carey, "the consecrated cobbler," as he was sneeringly called by Sidney Smith, went forth to India to overthrow heathenism, and then arose the Baptist Missionary Society (1792). Marshman and Ward soon followed and joined Carey, forming a triumvirate of Christian missionaries unexcelled in labor and results of work; while at the same time they made contributions of no slight importance to Oriental scholarship. Baptist missionaries from England have labored in India, Ceylon, China, Africa, and the West Indies, and with almost equal success.

The English Separatists who fled to Holland in the last part of the sixteenth century became very largely leavened with the views of the Baptists, who were numerous in Holland. When the tide of emigration set towards the bleak shores of North America, many who felt the strength of these views joined the emigration and came out boldly on the side of the Baptists after reaching America. The sorrowful history of the early continental Reformation was repeated in the New World. Those who had just escaped from oppressive ecclesiastical thraldom fitted a yoke for the necks of men guilty of no crime but devotion to God's word. The Church became political and the state ecclesiastical, and the union produced the unavoidable bastard fruit of persecution. In opposition to this error of the centuries, Roger Williams and a small band of Baptists, driven from Massachusetts, founded the colony which afterwards became Rhode Island, the type of all true democratic government, on the principle which Baptists had professed for more than a century—of freedom for God's word and freedom for man's conscience. From New England, Baptists emigrated to New York and to Virginia. They experienced in both colonies the lot of a proscribed people until the agitation of the country just preceding the Revolution turned the attention of the dominant parties to other issues than the persecution of their own people. During the Revolution the Baptists rendered effective service to the infant republic, and at its close were instrumental in securing the recognition of complete religious liberty in the Constitution of the U. S.

The nineteenth century has witnessed a marvellous increase in the Baptists of the U. S. From 77 churches, with hardly more than 5000 members, in 1770, they had increased in 1872 to 19,720 churches, with 1,585,232 members and 11,892 ordained ministers. For the latter year (1872) they reported 84,625 baptisms, 741,777 officers, teachers, and scholars in Sunday-schools, and $4,926,527.04 for benevolent contributions. In the same year the Baptists in England reported 1940 churches, 178,183 members, 1569 ordained ministers, and 4255 baptisms. The following table gives the statistics of the Baptists, by continents, for 1872:

	Churches.	Baptisms.	Members.
North America	20,469	87,482	1,676,937
Europe	2,960	8,663	272,437
Asia	408	1,888	26,814
Africa	31	.....	1,930
Australasia	144	.....	5,112
	24,012	98,033	1,983,230

In this statement no account is taken of the many religious sects in the U. S. which hold similar opinions to the "regular" Baptists with reference to the ordinance of baptism, though differing from them in other essential particulars. Among these may be mentioned the Free-Will Baptists (Arminian), with 1463 churches, 1145 ministers, and 69,910 members (mostly in the New England States); the Seventh-Day Baptists, with 7000 members; the Dunkers, with 50,000 members; the Disciples or "Campbellites" (found mostly in the Southern States), with 350,000 members. These denominations will be specifically mentioned under their respective names.

Allusion has already been made to the missionary-work of the English Baptists. Stimulated by the example of their English brethren, and providentially impelled to the work by Dr. Judson's adoption of Baptist views, the Baptists of the U. S. organized in 1814 the Baptist Foreign Mission Society (now the American Baptist Missionary Union), which had in 1872 eight missions in Asia, five in Europe, and one in Africa. In these missions there are 766 churches, 988 laborers of all classes, 1664 stations and outstations, with 52,700 church-members. The receipts of the "Union" in 1872 were $210,199. It has met with the most marked success in its missions among the Karens in India; in Germany (where 73 churches, numbering 13,970 members, have been gathered under the supervision of Rev. J. G. Oncken); and in Sweden, which now reports 220 churches and 8807 members. Under the auspices of this society 203,382,898 pages had, in 1864, been published in 33 languages and dialects, several of which were first reduced to writing by its missionaries. The Southern Baptist Convention sustains missions in China, Africa, and Italy. The American Baptist Home Mission Society, organized in 1832, supported, in 1872, 425 missionaries, and received into its treasury $256,182. It had received and expended since its organization $1,958,901, and reported 67,020 baptisms. The work of this society is prosecuted mainly among the feeble churches of the West and the freedmen of the South. The Baptist Bible and Publication Society, organized in 1824, received, in 1872, $386,368, and issued 369,121,076 pages.

It has already been said that the early Baptists were not especially interested in ministerial education, and reasons have been given why their indifference was natural. From the fact, however, that they appeal so constantly to the original Scripture in support of their opinions, education soon became a necessity with them, and for more than a century, both in England and America, they have given to this subject that attention which its importance demands. In 1764, when the Baptists of the U. S. numbered barely 5000, they established Rhode Island College (now Brown University). In 1872 they numbered 9 theological seminaries, with 40 instructors, 419 students, property to the amount of $866,000, endowment to the amount of $958,000, and 62,454 volumes in their libraries; 34 colleges, with 256 instructors, 4141 students, property to the amount of $4,492,000, endowment to the amount of $2,228,058, and 136,806 volumes in their libraries; and 51 academies, with 264 instructors, 4247 students, and property to the value of $1,203,700—making a total (according to the very imperfect return which we condense) of 560 instructors, 8807 students, and property and endowments to the amount of $9,849,558. The best of these institutions (which are noticed under their appropriate titles) will compare favorably with those of any other denomination; and efforts are being made, through the National Baptist Educational Commission, to excite a yet deeper interest in edcuation among the masses of the denomination, and secure for its institutions of learning a more generous patronage. The mention of such names as those of Francis Wayland, Barnas Sears, Horatio B. Hackett, Thomas J. Conant, Ezekiel G. Robinson, and Asahel C. Kendrick may serve as types of the Baptist educators of the present day. (With reference to Baptist history, reference may be made to the tracts of Denk; the works of Hubmaier; Ten Cate's "Geschiedenis der Doopsgezinden," etc.; Schyn, "Historia Mennonitarum," ed. Matschoen; Thomas Crosby, "History of the English Baptists from the Reformation to the Reign of George I." (1738–40); Ivimey, "History of the English Baptists" (1811–23); Taylor, "History of the General Baptists;" I. Backus, "History of Baptists of New England;" "The Publications of the Hansard Knollys Society;" Cramp's "Baptist History" (the best popular work); and Cutting's "Historic Vindications." For works in exposition and defence of Baptist principles and practices, see Wayland's "Principles and Practices of the Baptists;" Dagg's "Church Order;" Hiscox's "Baptist Church Directory;" Chase, Ripley, Judson, and Wiberg on Baptism; Arnold, Pepper, and Hovey on the Lord's Supper.)

Revised by M. B. Anderson.

Bar, a long and narrow piece of wood, metal, or other solid substance, generally round, quadrangular, and other uniform section. Bar in hydrography, an accumulation of mud or sand in any navigable channel by which navigation is obstructed, but more particularly a similar formation almost universally found across and exterior to the mouths of rivers and harbors, by which the draught of vessels entering is limited. Bar in music is a straight line drawn across the staff to divide the music into small portions of equal duration, and also comprises the musical notes written or played between such lines. Bar, in heraldry, is one of the important charges known as ordinaries. The bar is formed by two horizontal lines passing over the shield; it differs from the fess in size, the bar occupying only one-fifth of the shield.

Bar, in law. 1st, that part of the court-room in which prisoners are arraigned or sentenced, and in which the members of the legal profession usually sit. It takes its name from the bar or railing which generally separates it from the rest of the room. Hence the word often signifies lawyers, or persons admitted to practise in the courts; and in some cases it refers to or implies the presence of the court itself. A trial at bar is a trial before a full bench of judges, as distinguished from a *nisi prius* trial—that is, a trial before a single judge. 2d, a complete defence to an action in law. A plea in bar is a plea which, if true, completely defeats the plaintiff's action.

Bar, a town of Russia, in the government of Podolia. In 1768 the Confederation of Bar was formed here, by the nobility of Poland, to counteract the influence of Russia on the king, Stanislas Augustus. Bar was taken by the Russians in the same year, and the confederates were compelled to go to Wallachia. Here they declared the king dethroned, and had him carried off from Warsaw in 1771, and were only suppressed by Russia after four years' hard fighting. Pop. in 1867, 8077.

Bar'aba', a vast steppe of Siberia, extending between the rivers Obi and Irtish on the W. and the Altai Mountains on the N. W., occupies more than 100,000 square miles. Many salt lakes and marshes occur in it. It was colonized by the Russians in 1730.

Baraboo', capital of Sauk co., Wis., is noted for its wild and beautiful scenery. It is situated on Baraboo River, and on the North-western R. R., 33 miles N. W. of Madison. It is the centre of the Wisconsin hop-producing district, and contains seven or more churches, good schools, a weekly paper, woollen-mills, yarn-factory, furniture-factory, planing-mills, and an iron-foundry, and is in the neighborhood of valuable iron-mines. Altitude, about 900 feet above the level of the sea. It is in a good fruit, grain, and stock-producing region. It has one national bank. Pop. 1528; of Baraboo township, 2758.

J. J. Weirich, Ed. "Republic."

Barab'ra, or **Berab'era,** the name applied by the Egyptians to the inhabitants of a small district in Upper Nubia. They are not the same as the Berbers, the latter having derived their name from the Arabians. They trade with the Egyptians in cattle, which they pasture among the mountains beyond the Atbara and near the Red Sea.

Baraco'a, a seaport-town on the N. E. coast of Cuba, has considerable trade. In its vicinity is a remarkable mountain called the "Anvil of Baracoa."

Bara'da, a river of Syria, probably the Abana of the Old Testament. Its remotest, though not its largest, source is a lake, some 300 yards by 50, in the plain of Zebdany (8 miles by 3), 3349 feet above the level of the sea, in the heart of Anti-Lebanon. It flows south-eastward, passing the ruins of the ancient city of Abila, breaking through three ridges of the mountain, and reaching Damascus (23 miles from its source) after a descent of 1149 feet. Then it flows on eastward some 17 or 18 miles farther, emptying itself into two marshy lakes, each about 20 miles in circumference. In going through the city and gardens of Damascus it is parted into at least seven streams, which afterwards reunite. (See Porter's "Damascus.")

Bara'ga, a post-township of Houghton co., Mich. Pop. 160.

Baraga (Friedrich), D. D., a Catholic missionary, born near Dobernik, in Carniola, in 1797. He visited America in 1831, devoted himself to missionary labor among the Indians of the Lake Superior region, and was made bishop of Sault St. Mary and Marquette. He published numerous works in the Ojibbeway (or Chippeway) dialect, a "Grammar of the Otchipwe Language" (1851), and a "Dictionary of the Otchipwe Language" (1853). Died Jan. 19, 1868.

Baraguey d'Hilliers (Achille), Count, a French general, born Sept. 6, 1795. Having served with distinction in Algeria, he obtained the rank of general of division in 1843. In the autumn of 1849 he became commander of the army that occupied Rome. He returned to France in

1850, and in the Crimean war commanded a corps which co-operated with the British fleet in the Baltic. He was made a marshal of France in 1854.

Baraguey d'Hilliers (Louis), a French general, the father of the preceding, was born in Paris Aug. 13, 1764. He served in the Italian campaigns of 1796–97, soon after which he became a general of division. He commanded the dragoons of the grand army in Austria in 1805, and was appointed governor of Venice in 1808. In the Russian campaign of 1812 he was taken prisoner with all his division. He died in Berlin Dec., 1812.

Barante, de (Amable Guillaume Prosper Brugière), a French statesman and historian of great merit, was born at Riom June 10, 1782. He came of a literary stock, his father and his great-grandfather having distinguished themselves as writers. He was appointed collector-in-chief of customs in 1818, and became a peer of France in 1819. His chief works are a "History of the Dukes of Burgundy" (13 vols., 1826), and a "History of the National Convention" (1853). Died Nov. 22, 1866. (See Guizot, "Memoir of Prosper de Barante," 1867.)

Baran'ya, one of the most populous counties of Hungary, is bounded on the N. by Tolna, on the E. by Bacs, on the S. by Slavonia, on the W. by Somogy, and has an area of 1966 square miles. It is partly mountainous, but is very fertile. The Danube forms part of the western boundary. Capital, Fünfkirchen. Pop. 283,506.

Barataria Bay, Louisiana, an inlet of the Gulf of Mexico, lying between the Mississippi and the Bayou la Fourche, is about 12 miles long from N. to S., and 5 or 6 miles broad, communicating with bayous and lakes of the interior. Its shores are marshes little elevated above the tides, which extend to the cypress swamps. Grande Terre Island, a ridge of sand which lies across the mouth, was the head-quarters of the brothers Laffite, the so-called "pirates." (See Laffite.) The entrance to the bay has been fortified by the U. S. in 1840–50, by the construction of Fort Livingston on the W. end of Grande Terre Island. The bar has seven feet of water. Barataria lighthouse, on Grande Terre Island, is in lat. 29° 16′ 47″ N., lon. 89° 54′ 33″ W. It is of brick, and is 60 feet high.

Baratier (Johann Philipp), born of French ancestry at Swabach, near Nuremberg, Jan. 19, 1721, when five years old spoke French, German, and Latin; when seven could repeat the Psalms in Hebrew; and when nine composed a Hebrew dictionary; when thirteen years old translated the "Itinerary" of Benjamin of Tudela. He wrote a reply to Crellius's "Artemonius," called "Antiartemonius" (1735), and a "Disquisition on the Succession of the Roman Pontiffs in very Ancient Times" (1749). He was a Protestant, studied theology and law, and died at Halle Oct. 5, 1740, aged nineteen.

Barb [probably derived from *Barbary*], the name of a noble breed of horses which originated among the Moors of Barbary, who introduced it into Spain. Barbs are remarkable for their endurance, docility, and gentleness. The Carthaginian cavalry, which decided several victories over the Romans, are said to have been mounted on horses of this breed, which is a variety of the Arabian horse. The celebrated "Godolphin Arabian" was a barb, as were most of the progenitors of the thoroughbred horse of the present day.

Barbace'na (F. Caldeira Brant), Marquis of, a Brazilian soldier and diplomatist, born at Sabora in 1772. He was appointed by the emperor of Brazil to negotiate concerning the independence of that country with Portugal, and for his success was created a marquis. He was afterwards twice minister of finance. He introduced steam-engines, steamboats, and the printing-press into Brazil. Died in 1842.

Barba'does Cher'ry, the edible fruit of two small West Indian trees (the *Malpighia urens* and *Malpighia glabra*). Each fruit contains three seeds. The leaves of *Malpighia urens* have stinging hairs on the lower side.

Barbadoes Gooseberry, the edible fruit of *Pereskia aculeata*, a plant of the order Cactaceæ, having a round stem, thick, alternate leaves, and large spines. The fruit has expectorant properties. It grows in the West Indies.

Barbadoes Leg. See Elephantiasis.

Barbadoes Tar, or petroleum, is a black, opaque, inflammable liquid of the consistence of molasses. By distillation it yields naphtha, leaving a residuum of asphaltum.

Barba'dos,* or **Barba'does,** the most eastern of the Caribbee Islands, belongs to the British. Its capital, Bridgetown, is situated in lat. 13° 4′ N. and lon. 59° 37′ W. The island is 21 miles long, 14 miles wide, and has an area of 166 square miles. It is nearly encircled by coral reefs, which are dangerous to navigation. The highest point of the island has an altitude of 1140 feet. Destructive hurricanes often occur here. The soil is fertile, and produces sugar, cotton, arrow-root, etc. The population and prosperity of Barbados have increased since the abolition of slavery (Aug. 1, 1834). In 1870 the imports were £1,070,000, and the exports £973,000. P. in 1871, 162,042.

Bar'bara, Saint, a virgin martyr of the ancient Church, in regard to whom traditions clash. Baronius accepts the story of her martyrdom at Nicomedia in the reign of Maximinus (235–238), and says that she had been a pupil of Origen. Assemani thinks she suffered martyrdom under Galerius, about 306, at Heliopolis in Cœle-Syria. She is commemorated Dec. 4.

Barba'rian [Gr. βάρβαρος; Lat. *bar'barus*], a term applied by the ancient Greeks to all foreigners and all who could not speak the Greek language. Plato divided the human family into two great classes—*Hellenes* ("Greeks") and *Barbaroi* ("barbarians"). After the Persian invasion the Greeks used the word as a term of reproach, implying hostility to their own freedom and civilization. After the Romans had conquered Greece, and had become in some measure Hellenized, the word barbarian was applied to all nations except Greeks and Romans. Saint Paul uses the word in this sense in Romans i. 14 (see also Acts xxviii. 4).

Barbaros'sa, the name of two brothers, renegade Greeks and natives of Mitylene, who became Turkish corsairs, and were the scourge of Christendom for many years (1510–46). The elder, Arooj (Horush or Horuc), made himself master of Algiers in 1516. He was defeated and slain by the army of Charles V. in that year. He was succeeded in 1518 as ruler of Algiers by his brother, Hadher, or Khair-ed-Deen. He obtained Tunis by conquest in 1532, and became the chief admiral of Sultan Solyman. Died July 4, 1546.

Barbaroux (Charles Jean Marie), an eminent French Girondist and eloquent advocate, born at Marseilles Mar. 6, 1767. He was chosen a deputy to the Legislative Assembly in 1791, and a member of the National Convention in 1792. He denounced Robespierre, and on the trial of the king voted for an appeal to the people. He was distinguished for his energy and personal beauty. Having been proscribed by the Jacobins in May, 1793, he fled from Paris. He was guillotined at Bordeaux June 25, 1794. (See his "Mémoires," 1822.)

Bar'bary [derived from *Berber*, the name of a native race], an extensive region of Northern Africa, comprising the modern Barca, Tripoli, Tunis, Fezzan, Algeria, and Morocco, and extending from Egypt to the Atlantic Ocean. It is included between lat. 25° and 37° N., and lon. 10° W. and 25° E. It included the ancient *Mauritania, Numidia, Africa propria*, and *Cyrenaica*. Barbary is divided by the Atlas Mountains. The N. side comprises Tunis, Tripoli, Morocco, and Algeria. The S. is called Beled-el-Jereed (*i. e.* "the country of dates"). The soil is generally fertile. It was very rich and populous under the rule of the Carthaginians and of the ancient Romans, who became masters of this region about 146 B. C. It was conquered about 430 A. D. by the Vandals, who misgoverned it for a hundred years, and it fell under the domination of the Arabs in 647 A. D. The inhabitants are mostly Mohammedans.

Barbary Ape, Pigmy Ape, or **Magot,** a small species of tailless monkey, is a native of Europe, but is found in only one place in Europe—that is, the Rock of Gibraltar. It also abounds in Northern Africa, especially among rocky mountains and forests. It is gregarious, displays great agility in passing from tree to tree, and usually walks on four feet. It is of a greenish-gray color, and rather larger than a large cat. It belongs to the genus *Inuus*. The tail is reduced to a mere tubercle. Bands of these apes often plunder gardens. This species of monkey is frequently seen in captivity, and is capable of being trained to many tricks. It is not regarded as a true ape.

Barbas'tro, a walled town of Spain, in the province of Huesca, on the river Cinca, 57 miles N. E. of Saragossa. It has a cathedral and several convents. Pop. 7800.

Bar'bauld (Anna Letitia), an English authoress, born in Leicestershire June 20, 1743, was a daughter of Rev. John Aikin. She published a volume of poems in 1773, and was married in 1774 to Rochemont Barbauld, a dissenting minister, with whom she lived at Palgrave, in Suffolk, and taught a boarding-school for ten years. She published, besides other works, "Devotional Pieces" (1775) and "Early Lessons for Children," which are highly commended, and assisted her brother, Dr. John Aikin, in the composition of

* *Barbados* is a Spanish word signifying the "bearded:" it is said that as the Spaniards approached the island they saw a certain plant growing abundantly on the banks, which resembled (as they fancied) men with long beards, hence the name.

a popular work called "Evenings at Home." Her writings are characterized by an easy, flowing style and pure and elevated sentiment. Died Mar. 9, 1825. (See a "Life of Mrs. Barbauld," prefixed to her works, by LUCY AIKIN, 2 vols., 1825.)

Bar'becue, a township of Harnett co., N. C. P. 1111.

Bar'bee (Rev. WILLIAM J.), M. D., born in Winchester, Ky., in 1816, was educated at Miami University, O., practised medicine ten years in Cincinnati, O., and became widely known as a teacher, author, and preacher of the Christian ("Campbellite") denomination. He has published "Physical and Moral Aspects of Geology," "The Cotton Question," and various religious and scientific and other works.

Bar'bel (*Bar'bus*), a genus of fishes of the family of Cyprinidæ, having short dorsal and anal fins, and the mouth

European Barbel.

furnished with four soft barbules, suggesting the name, which is derived from the Latin *barba*, "beard." The upper jaw extends beyond the lower. The numerous species of barbel are all inhabitants of fresh water, and seek their food by inserting their snouts into the mud like swine. The *Barbus vulgaris* is abundant in the Thames, and affords sport to anglers, but is not much esteemed for food. It sometimes measures three feet long, and weighs about sixteen pounds. Another species, called binny or barbel, is abundant in the Nile and the Jordan, and is much esteemed for food. It grows to a large size, and sometimes weighs seventy pounds. The barbel of the U. S. is the horned sucker or dace (*Catostomus tuberculatus*), which is readily taken by the hook. It belongs to the same family with the true barbel.

Barbé-Marbois, de (FRANÇOIS), MARQUIS, a French statesman, born in 1745, was consul to the U. S. under Louis XVI., director of the treasury under Napoleon, and was made a senator in 1813. Died in 1837. He wrote a "History of Louisiana" (1829).

Bar'ber [Fr. *barbier*, from the Lat. *bar'ba*, "beard"], a person who shaves others and cuts their hair. This trade or profession is very ancient, and is mentioned by the prophet Ezekiel (chap. v. 1). In China and other Oriental countries barbers shave the whole or part of the head. The practice of shaving the beard was common among the ancient Egyptians, Greeks, and Romans. Among the ancient Israelites the removal of the beard by shaving or plucking it out was a sign of mourning. In former times barbers served the public in the capacity of surgeons, and performed the operation of bleeding. The spiral red stripe often seen on the barber's pole is said to symbolize the winding of a ribbon round the arm previous to letting blood. In London the barber-surgeons formed a corporation with certain privileges. They were incorporated in England in 1461, and were united with the surgeons in the reign of Henry VIII. The connection was dissolved in the reign of George II. by an act the preamble of which affirms that the trade of a barber is "foreign to and independent of the practice of surgery." Quite recently the surgeons of the Swedish navy were also barbers for the crews.

Barber, a post-township of Faribault co., Minn. Pop. 561.

Barber (FRANCIS), an American officer and teacher, born at Princeton, N. J., in 1751, graduated at Princeton in 1767. He entered the army in 1776 with the rank of major, and took part in the battles of Trenton, Princeton, Brandywine, Germantown, and Monmouth. He was afterwards raised to the rank of colonel, and in 1781 was selected by General Washington for the delicate duty of suppressing a mutiny of the troops, which he performed with success. He was killed accidentally by the fall of a tree at Newburg Jan. 11, 1783.

Barber (JOHN WARNER) was born at Windsor, Conn., in 1798. He published a "History of New Haven" (1831), "Historical Collections" of Connecticut (1836), Massachusetts (1839), New Jersey (1844), Virginia (1844), Ohio (1847), "Incidents of American History" (1847), "Elements of General History" (1844), "Our Whole Country" (1861), and several other works.

Barberi'ni (FRANCESCO), an Italian cardinal, a nephew of Pope Urban VIII., was born in 1597. He became librarian of the Vatican, and translated the twelve books of Marcus Aurelius from Greek into Italian. He was the founder of the great Barberini Library. Died in 1679.

Bar'berry (*Ber'beris*), a genus of plants of the natural order Berberidacæ, comprises many species, which are all shrubs and natives of temperate climates in both hemispheres. They have six stamens, which, when touched at the base, show signs of irritability. The fruit is a berry with two or three seeds. They are divided into two sub-genera, sometimes ranked as genera; those with simple leaves forming the *Berberis*, and those with pinnate leaves the sub-genus *Mahonia*. The barberries of Asia are numerous and important for their fruits. Those of our Pacific slope are *Mahonias*. The common barberry (*Berberis vulgaris*) is a native of Europe and the U. S., is an ornamental shrub armed with spines, and produces small oval red berries in pendulous clusters, which contain free malic acid, and are valuable for preserves and jelly. The bark is astringent, and is used in medicine, and the inner bark and root furnish a good yellow dye. A species called *Berberis dulcis*, which is cultivated in shrubberies, bears a sweet black berry which makes excellent jelly. Several fine species of *Berberis* grow in the central and western portions of North America. *B. aquifolium*, with spiny leaves and yellow flowers, is generally cultivated as an ornamental shrub. *B. pinnata* of Oregon bears blue acid berries, and is sometimes called the *Oregon grape*. *B. Canadensis* is a native of the Alleghanies. Parts of South America abound in native species of the barberry.

Barbès (ARMAND), a French conspirator and Red Republican, born in Guadaloupe Sept. 18, 1809. He was imprisoned in France for political reasons in 1834–35. As an accomplice of Blanqui and others in a seditious plot in 1839, he was condemned to imprisonment for life, but was released in 1848. Having conspired against the new régime in May, 1848, he was again confined for several years.

Bar'bet (*Laimodon*), a genus of birds related to the Picidæ or woodpeckers. They have a large conical beak surrounded with tufts of bristles, suggesting the name, which is derived from the Latin *barba*, "beard." They inhabit warm countries, particularly tropical Africa. They feed on insects.

BARBET is also the name given to birds of various genera, chiefly South American and Asiatic, together forming a connecting link between the kingfishers and the trogons. Among the numerous species are the *Bucco ver-*

Red-Throated Barbet.

sicolor of Sumatra and the *Tamatia maculata*, the red-throated barbet of Guiana.

Barbet, a small variety of the poodle-dog, remarkable for its activity, intelligence, and fidelity to its master, but equally distinguished for its ill-temper and its dislike of

all strangers. It is also very liable to disease, and hence is not a general favorite.

Barbette, a platform of earth on which guns are mounted to fire over a parapet.

Bar'bican, or **Barbacan,** a watch-tower or advanced work before the gate of a castle or town. The term was especially applied to the outwork intended to defend the drawbridge, which in modern fortifications corresponds to the *tête-du-pont*. Several perfect barbicans remain in England at Alnwick, Warwick, etc.

Barbier (Antoine Alexandre), a French bibliographer, born Jan. 11, 1765, became private librarian to Napoleon in 1807, and after the restoration of 1815 was superintendent of the private libraries of the king. His chief production is a "Dictionary of Anonymous and Pseudonymous Works" (4 vols. 8vō, 1806–08), which is highly commended. Died Dec. 6, 1825.

Barbour, a county of Alabama, bordering on Georgia. Area, 825 square miles. It is bounded on the E. by the Chattahoochee River and on the W. by Pea River. The surface is undulating; the soil in some parts is fertile. The county is partly covered by forests of pine. Cotton and corn are raised. It is intersected by the Montgomery and Eufaula R. R. Capital, Clayton. Pop. 29,309.

Barbour, a new county of Kansas, bordering on the Indian Territory. Area, 810 square miles. It is bounded on the E. by Harper, on the N. by Pratt, and on the W. by Comanche cos.

Barbour, a county of the N. part of West Virginia. Area, 330 square miles. It is intersected by the Tygart's Valley River, and also drained by Buchanan River. The surface is hilly or mountainous; the soil is very fertile. Grain and wool are largely raised. Coal and iron abound here. Capital, Philippi. Pop. 10,312.

Barbour, a township of Orange co., Va. Pop. 1323.

Barbour (James), an American statesman, born in Orange co., Va., June 10, 1775. He was governor of Virginia 1812–14, and a Senator of the U. S. 1815–25. He voted for a U. S. bank, and became president of the Senate *pro tem.* He was secretary of war in the Cabinet of J. Quincy Adams (1825–27), and was sent as minister to England in 1828, but was recalled in 1829. In 1839 he was president of the Whig national convention. Died in 1842.

Barbour, or **Barber** (John), an eminent Scottish poet, a contemporary of Chaucer, was born about 1320. He became archdeacon of Aberdeen in 1356, and went to Oxford in 1357 to complete his education. About 1374 he was appointed one of the auditors of the exchequer. His chief work is a national epic called "The Bruce," a history of Robert Bruce, which, in addition to its poetical merit, has much historical value. Died Mar. 13, 1396.

Barbour (John S.), born in Culpeper co., Va., Aug. 8, 1790, was educated at William and Mary College, was a staff officer in the war of 1812, and a prominent State Rights member of Congress, 1823–33. Died Jan. 12, 1855.

Barbour (Philip Pendleton), a jurist, born in Orange co., Va., May 25, 1783, was a brother of James, noticed above. He gained distinction as a criminal lawyer, and became a member of Congress in 1814. He was afterwards chosen Speaker of the House, and remained in that body until 1825. He was appointed an associate judge of the Supreme Court of the U. S. in 1836. Died Feb. 24, 1841.

Bar'boursville, a post-village, capital of Knox co., Ky., on the Cumberland River, 116 miles S. E. of Frankfort. Pop. 438.

Barboursville, or **Cabell Court-house,** the capital of Cabell co., West Va., on the Guyandotte River, 154 miles S. W. of Wheeling. It is the seat of a State normal school, and has one weekly paper. July 13, 1861, it was the scene of a brilliant action in which the Federal troops were successful. P. 371; of Barboursville township, 1228.

Barbu'da [Fr. *La Barboude*], one of the British West India Islands, 22 miles N. of Antigua. Its area is 75 square miles. It is of coral formation, has no harbor, and is partly covered with forests. Pop. in 1861, 713.

Bar'by, a walled town of Prussian Saxony, on the left bank of the Elbe, 15 miles S. E. of Magdeburg. It has an old castle and manufactures of woollen and linen stuffs. Pop. in 1871, 5212.

Bar'ca (anc. *Cyrena'ica*), a region of Northern Africa, bounded on the N. by the Mediterranean, on the E. by Egypt, on the S. by the Libyan desert, and on the W. by Tripoli and the Gulf of Sidra. It is deficient in permanent streams, and the southern part is a desert, but the soil near the sea is fertile. On the mountain-sides are pines, date-palms, and olive trees. The inhabitants are Arabs and Berbers, who are Mohammedans, and are subject to Tripoli. Capital, Benghazi. Pop. estimated at 302,000.

Barcello'na, a town of Sicily, in the province of Messina, 21 miles W. S. W. of Messina, near the coast. It has a gymnasium, and large vineyards in the neighborhood. Pop. in 1872, 20,464.

Barcelo'na, a province of Spain, comprising the south-eastern part of Catalonia, and sloping down towards the Mediterranean. It has an area of 2983 square miles, and a population of 749,143. It is one of the most fertile and best-cultivated provinces of Spain.

Barcelo'na [Lat. *Bar'cino;* Gr. Βαρκινών], the most important manufacturing city of Spain, and the capital of the province of the same name, in Catalonia, is beautifully situated on the Mediterranean, 113 miles E. of Lerida; lat. 41° 23′ N., lon. 2° 11′ E. Next to Cadiz, it is the most important seaport of Spain. Pop. in 1860, 189,948. It is surrounded by a wall, and defended by a citadel and the strong fort of Montjoi. The city is divided into two parts, the old and the new town, by a beautiful promenade called La Rambla. The streets of the new town are more spacious and regular than those of the old. Many of the houses are built of hewn stone, and have an imposing appearance. The most remarkable public edifices are the Gothic cathedral, which is about 600 years old, and the Audiencia, or Palacio de la Deputacion, which is now occupied by the courts of law. Barcelona has a university, several public libraries, a fine theatre, an academy of arts and sciences, and two museums. Here are extensive manufactures of silks, woollen stuffs, calicoes or figured cotton stuffs, lace, shoes, and firearms, which, with copper, wine, and brandy, constitute the principal exports of the city. The harbor is commodious, but is obstructed by a bar which excludes vessels drawing more than twelve feet of water. This is the most populous city of Spain, except Madrid. Barcelona is supposed to have been founded by Hamilcar Barca. The Romans became masters of it at the end of the third Punic war (146 B. C.). It was taken by the Saracens or Moors about 714 A. D., and became in 878 an independent state. In the twelfth century it was annexed to Aragon. In 1714 it was taken by the duke of Berwick after a long and heroic defence.

Barcelona, a province of Venezuela, is bounded on the N. by the Caribbean Sea, on the E. by Cumana, on the S. by Guiana, and on the W. by Guarica and Caracas. Area, 13,800 square miles. The country consists almost entirely of plains and low plateaux, and is crossed only in the N. by the Coast Range, which also is not very high. It has but very little commerce. Chief town, Barcelona. Pop. 78,634.

Barcelona, a town and seaport of Venezuela, and capital of the province of the same name, on the Caribbean Sea, at the mouth of the river Neveri; lat. 10° 10′ N., lon. 64° 48′ W. It is an unhealthy place. The houses are built of mud. Pop. about 6000.

Bar'clay, a post-village and township of Black Hawk co., Ia., 110 miles N. E. of Des Moines. Pop. 861.

Barclay, a post-village and township of Bradford co., Pa., on the Sullivan and Erie R. R., 110 miles N. W. of Easton. It has important mines of semi-bituminous coal. Pop. of township, 2009.

Barclay, or **Barklay** (Alexander), an eminent British writer and translator, supposed to have been born in Scotland about 1480. He wrote the lives of several saints, and translated Sallust's "Jugurthine War," and a French poem called "The Castle of Labor." His most popular work is his "Ship of Fools," a free translation from the German of Sebastian Brandt. Died in 1552.

Barclay (Robert), an eminent reformer and apologist for the Society of Friends, was born at Gordonstown, in Morayshire, Scotland, Dec. 23, 1648. He was educated in Paris at the Scottish College, of which his uncle was rector, and learned to write and speak Latin correctly and fluently. He returned to Scotland in 1664, and became a member and minister of the Society of Friends in 1666. In 1670 he published a defence of his religion, entitled "Truth Cleared of Calumnies." He married Christian Mollison in his early life. He afterwards published a "Catechism and Confession of Faith" (1675) and the "Anarchy of the Ranters" (1676). In 1677 he visited Germany on a religious mission, in company with George Fox and William Penn. In addition to superior talents, he had moral courage, which qualified him for the part of a reformer. His principal work is "An Apology for the True Christian Divinity, as the same is held forth and preached by the People called in scorn Quakers" (1676), written and published in Latin, and afterwards translated by the author into English. This work exhibits great logical acumen, and has been commended by eminent persons of different creeds. In 1679 he published a "Vindication" of his Apology, which had been criticised

by several writers. He was appointed governor of the province of East Jersey in 1682, but he never went to America. He died at Ury Oct. 13, 1690. (See JOSEPH G. BEVAN, "Life of Robert Barclay," 1802; W. SEWELL, "History of the Quakers.")

Bar'clay de Tolly (MICHAEL), PRINCE, a celebrated Russian genēral of Scottish extraction, was born in Livonia in 1759. He fought against the Swedes in 1790, and against the Poles in 1792 and 1794. With the rank of major-general he led Benningsen's advanced guard in 1806. In 1809, at the head of 10,000 men, he crossed the frozen Gulf of Bothnia, and advanced as far as Stockholm. In 1810 he was appointed minister of war. He became in 1812 commander-in-chief of the Army of the West, but having been defeated by the French at Smolensko in August of that year, he was soon removed. After the death of Kutuzof (1813) he again obtained the chief command of the army, which he directed at Bautzen, Culm, and Leipsic. He was raised to the rank of field-marshal in 1814. Died May 25, 1818.

Barcokh'eba, or **Barcoch'ebas** ("son of a star"), (SIMON), a famous Jewish impostor, claiming to be the Messiah. His real name was AKIBA. In the reign of Hadrian (A. D. 132) he excited an insurrection among the Jews, and seized Jerusalem and many fortified places. After a long and bloody contest the city was retaken by the Roman general Julius Severus, and Barcokheba was killed in the fortress of Bethar on the 9th of Ab (August), 135. His disappointed countrymen afterwards changed his name to Bar-cosba ("son of a lie").

Bard, the term originally applied to the ancient poets of the Celtic tribes, who composed and sang verses in honor of the exploits of brave men. In poetical language it is often applied by modern usage to any poet.

Bard (SAMUEL), M. D., LL.D., an American physician, born in Philadelphia April 1, 1742, was educated at Edinburgh, where he was an inmate in the family of Doctor Robertson, the historian. He practised in New York City, and was the family physician of General Washington. He published several medical works, and became president of the College of Physicians and Surgeons of New York. He was an active promoter of benevolent enterprises. Died May 24, 1821. (See Rev. J. MCVICKER'S "Life of Samuel Bard," 1822.)

Bardesa'nes (Bar-Deisan) of Edessa, founder of a Gnostic sect called Bardesanians. His treatise "On Fate," or "The Laws of Countries," was written during the last half of the second century. We had only a few fragments of it till in 1843 the entire treatise, in the original Syriac (the manuscript belonging to the sixth or seventh century), was obtained by Archdeacon Tatham from the Syrian convent in the desert of Nitria, and was published, with an English translation, by Rev. William Cureton in 1855. Ephraem Syrus, who flourished about two centuries later, says Bardesanes wrote also 150 hymns, which appear to have been more dualistic than the treatise just spoken of. The best compendious notice of Bardesanes is that by Gallandi, "Bibliotheca Veterum Patrum," 1765. (See also STRUNZIUS, "Historia Bardesanis," 1710; HAHN, "Bardesanes Gnosticus," 1819.)

Bard'ings, or **Bard,** the name applied to the horse-armor of the Middle Ages, which consisted of four pieces: 1, the chamfront (Norman-French, *cheveron*), protecting the forehead and face, and having a steel spike like the horn of a unicorn between the eyes; 2, the manifaire, which was made of articulated plates, and covered the crest and neck; 3, the poitrel, a solid piece of plate-armor, guarding the entire shoulders and chest; the bard proper, defending the croup of the charger from the cantle of the saddle to the tail. A steed thus armed was said to be "barded."

Bards'town, the capital of Nelson co., Ky., is situated on an elevated plain and on a branch of the Louisville and Nashville R. R., 39 miles S. E. of Louisville. Here are several academies, and St. Joseph's Roman Catholic college. Pop. 1835.

Bare'bones, or **Bar'bone** (PRAISE GOD), a fanatic who was a member of Cromwell's Parliament in 1653, which was named after him the "Barebones' Parliament." When General Monk came to London, Barebones headed a procession of the people, and presented a remonstrance to Parliament against the restoration of Charles II.

Barefooted Friars [Lat. *Discalceati*], an appellation of certain Roman Catholic monks who either wear sandals or go entirely barefoot. They are connected with various congregations of the strict observance in nearly all the orders. There are also barefooted nuns. In some places they wear shoes in severe weather.

Bar'egine, a mucus-like substance produced by the algæ which grow in mineral springs. It abounds in the hot springs of Barréges in France; hence the name. It imparts a flesh-broth flavor and odor to the water, and is prized for that reason.

Bare House, a township of Drew co., Ark. Pop. 458.

Bareil'y, a city of British India, in the North-west Provinces, is on the river Jooa, 151 miles E. of Delhi. It contains a number of mosques, a college, and many Hindoo schools. Here are manufactures of cutlery, carpets, brazen water-pots, tables, and ornamental chairs. Bareily was a scene of outrage and rapine during the mutiny of 1857, when the Sepoys murdered a number of Europeans. Pop. 111,332.

Barère de Vieuzac (BERTRAND), a French demagogue and lawyer, born at Terbes Sept. 10, 1755. He was elected in 1792 to the Convention, in which he voted for the death of the king. In April, 1793, he was chosen a member of the Committee of Public Safety. He supported the Jacobins in their contest with the Girondists, and became the reporter of the committee which usurped supreme power in July, 1793. He was the first who proposed that "terror should be the order of the day," and he dressed the atrocious decrees of the committee in such flowery language that he was called the "Anacreon of the guillotine." On the 9th Thermidor, 1794, he acted with the enemies of Robespierre. He was banished as a regicide in 1816, but was permitted to return in 1830. Died Jan. 14, 1841. (See "Mémoires de Barère," 4 vols., 1843, and the notice of Barère in MACAULAY'S "Essays.")

Baret'ti (GIUSEPPE), an Italian writer, born at Turin Mar. 22, 1716. He removed to London in 1751, and became a teacher of Italian and a friend of Dr. Johnson. He published an Italian-and-English dictionary (1760), and "Travels through Spain, Portugal, and France" (1770), which is highly commended by Dr. Johnson, and other works. Died in London May 5, 1789. (See G. FRANCHI, "Notizie intorno alla Vita di G. Baretti," 1790.)

Bar'gain [Old Fr. *bargaine*, "trade," from *barca*, a "bark," a "boat"] **and Sale,** the act of conveying and transferring real or personal property for a valuable consideration. The term is also employed to indicate the instrument by which the transfer is made. In the law of real estate this form of conveyance is in extensive use. The original mode of conveying corporeal real estate was by means of a ceremony termed livery of seisin, in which the seller delivered to the purchaser some visible symbol, such as a clod of earth or twig of a tree, in the name of the property to be conveyed. This method of conveyance came to be regarded as cumbersome and inconvenient. It was governed by strict and technical rules, and the estates that could be created by it were inelastic—not readily moulded to the demands of a growing civilization. The attention of conveyancers was attracted to other methods more suited to modern necessities. These methods were found in the doctrine of uses. A use in land was a notion derived from the Roman law, by means of which the formal title remained in one person, while the beneficial estate or enjoyment of the profits appertained to another. It corresponded in the main to the idea of trusts in modern law. A use could be created by a pecuniary or other legal consideration. For example, if an owner of land for a pecuniary consideration purported by present words to sell it, he would be at once converted into a formal owner, and the person advancing the money would be the beneficial owner, or, in technical language, would have "a use" in the land. He could become formal or legal owner by the action of a court of equity, which would, on application, direct that a conveyance should be made. While the law was in this condition an important statute was passed, 27 Hen. VIII., c. 10, called the "Statute of Uses," the effect of which, in substance, was to declare that one who had acquired a use under certain prescribed conditions in an estate in land should be the legal or formal, as well as the beneficial, owner. One great consequence of this statute was to introduce new conveyances. The principal one was "bargain and sale." The sale of land for a consideration, as already explained, created a use, and the statute gave the owner of the use the title. A subsequent statute (known as the statute of Frauds) requires conveyances to be in writing. This is the foundation of the modern system of conveyancing, both in England and the U. S. Other conveyances, proceeding either wholly or in part on the same theory, are "covenant to stand seised" and "lease and release." In the first of these the consideration is the affection between near relatives, technically called a "good" consideration, as distinguished from "valuable." In the second, the doctrine of uses is resorted to to put the purchaser in constructive possession of an estate for years in the land, whereupon he may receive a release, and thus become complete owner. T. W. DWIGHT.

Barge, a pleasure-boat, a boat of state elegantly furnished and propelled by oars; these are used on ceremonial occasions by princes and men of high station. Also a flat-bottomed vessel of burden employed in loading and unloading ships or in conveying freight from one town to another.

Ba'ri (anc. *Ba'rium*), a fortified city and seaport of Italy, capital of the province of Bari, is situated on the Adriatic Sea, 56 miles by rail N. W. of Brindisi; lat. 41° 9′ N., lon. 16° 54′ E. It is defended by a massive old castle of Norman origin. The harbor admits only small vessels. Bari is the see of an archbishop, and has some fine ecclesiastical buildings, among which is the priory of St. Nicholas, founded in 1087. It contains a cathedral, two theatres, an arsenal, etc.; also manufactures of silk, cotton, linen, and glass. *Barium* was a very ancient city, and was flourishing as early as 200 B. C. Pop. in 1872, 50,524.

Bari, a province of Italy, bounded on the N. E. by the Adriatic Sea, on the S. by Lecce and Potenza, on the W. by Potenza, and on the N. W. by Foggia. Area, 2293 square miles. The surface is mostly level; the soil is very fertile, producing wheat, fruits, and wine. The climate is very hot in summer. This province formed a part of ancient *Apulia*. Capital, Bari. Pop. in 1871, 604,365.

Bari, the name of a negro tribe on the White Nile, between lat. 3½° and 6¼° N., are well built and often attain a height of six feet. They are fetish worshippers and practise polygamy. The men go entirely naked and paint themselves with ochre, while the women only wear short aprons.

Baril'la [Fr. *barille*], a crude, impure carbonate of soda, which is a considerable article of commerce, and is used in the manufacture of soap and glass. It is procured by burning plants of the genus *Salsola* or other plants which grow near the sea. Large quantities of it are exported from Spain and the Balearic Isles. The *Salsola sativa* is cultivated on ground adjacent to the sea, by which it is occasionally submerged, the sea being admitted by floodgates through an embankment. The *Salsola* is cut in September, is dried, and burned in a hole in the ground.

Bari'nas, a province of Venezuela, between Truxillo, Portugueza, and Merida on the N. and W., Guarico on the E., and Apure on the S. Area, 17,008 square miles. It consists of fertile plains drained by numerous streams. The S. boundary is the river Apule. The chief products are hides, cacao, coffee, and tobacco. Capital, Barinas. Pop. 126,925.

Bar'inas, or **Vari'nas,** capital of the above province, near the river Santo Domingo. The city, founded in the sixteenth century, has suffered devastation twice within a century. It is noted for the exportation of the tobacco which bears its name. Pop. 14,000.

Bar'ing, a post-township of Washington co., Me. It is on the St. Croix and Penobscot R. R., and has manufactures of lumber, sash and blinds, boots and shoes, etc. Pop. 364.

Baring (Sir Francis), an English financier, born near Exeter in 1740, was the father of Lord Ashburton, and the principal founder of the great banking-house of Baring Brothers & Co. of London. Died in 1810.

Bari'tah, the name of certain large Australian birds belonging to the Corvidæ (crow family). The bill is large and conical, the base of it extending far backward on the forehead. The *Gymnorhina tibicen* (piping crow or piping grakle) has a melodious voice, is easily tamed, and learns to whistle tunes. There are several genera of these birds.

Baritah, or Piping Crow.

Ba'rium [from the Gr. βαρύς, "heavy," as it is an ingredient of "heavy spar"], one of the alkaline earthy metals. It occurs in nature chiefly in the forms of sulphate, barite, barytes, or heavy spar, of carbonate, witherite, and of silicate, harmotome. Its symbol is Ba, and its atomic weight 137. It is very rarely prepared in the metallic state. Barium salts are prepared either from the native carbonate by the action of acids, or from the native sulphate by first reducing it to sulphide by treating with sawdust or some other reducing agent, then acting upon this with the proper acids. The most important salts are the chloride and nitrate; both are used as tests for sulphuric acid and soluble sulphates. The chloride is used as a preventive of boiler incrustations, owing to its action on the sulphate of lime of the feed-water. It is also extensively used for the preparation of an artificial sulphate known as *blanc fix*, which is used in enamelling paper. Barium forms a protoxide, BaO, called baryta, and a dioxide, BaO_2. The latter is employed in the preparation of hydrogen dioxide, HO_2. Baric hydrate, BaH_2O_2, is the most soluble of the alkaline earthy hydrates; it is used in the laboratory as a test for carbonic acid, with which it forms a white precipitate. Baric sulphate is one of the most insoluble salts known. In its native form, barytes or heavy spar, it is extensively mined and used to adulterate white lead, an application for which it is specially adapted by its high specific gravity. The soluble barium salts are all poisonous. Any soluble sulphate, as sodic, Glauber's salt, or magnesic sulphate, Epsom salt, is an antidote.

C. F. Chandler.

Bark [Lat. *cor'tex*], the external covering of a tree, is composed of cellular tissue. The development of bark is most perfect in exogenous plants with perennial woody stems, in which only the distinction between wood and bark is plainly marked. The outermost layer of bark is called *epider'mis*, which, however, is generally seen only in annual stems or in the youngest parts of woody stems. Beneath the epidermis is the true bark, the outer layer of which is called *epiphlœ'um*, and the inner layer *mesophlœ'um*. Within the mesophlœum is a distinct layer named *liber* or *endophlœum* (*i. e.* "inner bark"), which is composed of bundles of woody fibre or vascular tissue, mixed with cellular tissue. The last layer of bark is contiguous to the *alburnum* or sap-wood. The bark increases by the addition of an annual layer on its inner surface, next to the alburnum or cambium, through which the sap circulates. The annual layers cannot long be distinctly recognized in the bark, and in the older portions of trees the outer layers of bark, becoming dry and lifeless, are gradually shed or thrown off. The peculiar juices and characteristic properties of a plant are often most abundant in the true bark, which is the most important part of many medicinal plants, especially of Cinchona (which see). In making leather, tanners prefer those kinds of bark which contain most tannic acid. Oak bark is chiefly used in the tanneries of Europe. In the U. S. the bark of several species of oak, and also that of the hemlock, is used. The Spaniards employ the inner layer of the bark of the cork tree (*Quercus suber*), and the Australians that of the *Eucalyptus*. The bark can be separated with facility from the wood only when the sap is flowing. It should be carefully dried, as it is liable to be injured by mould.

Bark Beetle, or **Bark Chafer,** a name of several genera of coleopterous insects, belonging to the family Scolylide. They bore holes in bark, deposit their eggs in the inner bark, and often kill the tree. One species (*Tom'icus typog'raphus*) infests the forests of Germany in great numbers. In 1783 it caused the death of a million pines or more in the Hartz Forest. The U. S. have several destructive species.

Bar'ker, a township of Broome co., N. Y. Pop. 1396.

Barker, a township of Barbour co., West Va. Pop. 1961.

Barker (A. J.), U. S. N., born Mar. 13, 1843, in Massachusetts, graduated at the Naval Academy in 1861, became an ensign in 1862, a lieutenant in 1864, and a lieutenant-commander in 1866. He served in the steamer Mississippi at the passage of Forts Jackson and St. Philip and capture of New Orleans, April 24, 1862, and in the attack on Port Hudson, Mar. 14, 1863, where the Mississippi grounded and was destroyed; and afterwards in the steam-sloop Monongahela at the siege of Port Hudson, and was in various engagements in her with batteries on the Mississippi River.

Foxhall A. Parker, U. S. N.

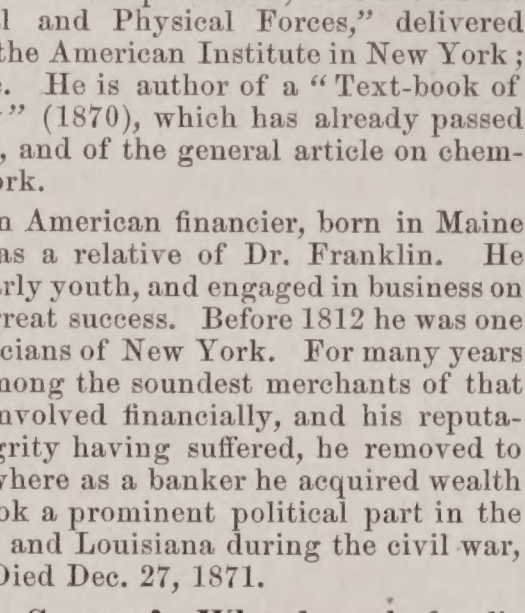
Barker (Edmund Henry), an English philologist, born in Yorkshire Dec. 22, 1788. He published a revised edition of Stephens's "Thesaurus Linguæ Græcæ" (13 vols., 1816–28). Among his works are "Classical Recreations" (1812) and "Parriana" (2 vols., 1829), which contains anecdotes, etc., relating to Dr. Parr. Died Mar. 21, 1839.

Barker (Fordyce), M. D., born May 2, 1819, at Wilton, Me., was educated at Bowdoin College, and studied medicine in Boston and Paris. He became in 1845 professor of midwifery in the medical school at Brunswick, Me., held the same position in the N. Y. Medical College (1850–57), and in 1860 became obstetric physician and professor of midwifery at the Bellevue Hospital, N. Y. He has published numerous papers on obstetrical and other kindred subjects, a treatise on "Sea-sickness," and one on "Puerperal Diseases."

Barker (George F.), M. D., an American chemist and physicist, born in Charlestown, Mass., July 14, 1835. He became an apprentice in 1851 in a philosophical instrument manufactory in Boston, where he remained until 1856, in which year he entered the Yale Scientific School, and graduated as bachelor of philosophy in 1858. He was chemical assistant for two winters (1858–61) in the Harvard medical school. In 1861 he was appointed professor of chemistry and geology in Wheaton College, Ill., and was acting professor of chemistry in 1862–63 in the Albany Medical College, where he graduated as M. D. in 1863. Early in 1864 he became professor of natural sciences in the Western University of Pennsylvania at Pittsburg, was instructor (1865) in the Yale Medical College, and was appointed professor of physiological chemistry and toxicology at Yale in 1867. In 1871 he was chosen vice-president of the American Association for the Advancement of Science. In 1873 he became professor of chemistry in the University of Pennsylvania. Among his various productions may be named a "Lecture on the Force of Nature," delivered (1863) before the Chemical Society of Union College, by whom it was published; and one on the "Correlation of Vital and Physical Forces," delivered (Dec. 31, 1869) before the American Institute in New York; republished in France. He is author of a "Text-book of Elementary Chemistry" (1870), which has already passed through eight editions, and of the general article on chemistry in the present work.

Barker (Jacob), an American financier, born in Maine Dec. 7, 1779. He was a relative of Dr. Franklin. He went to New York in early youth, and engaged in business on his own account with great success. Before 1812 he was one of the prominent politicians of New York. For many years he was regarded as among the soundest merchants of that city; but he became involved financially, and his reputation for business integrity having suffered, he removed to New Orleans in 1834, where as a banker he acquired wealth and influence. He took a prominent political part in the affairs of New Orleans and Louisiana during the civil war, loyally to the U. S. Died Dec. 27, 1871.

Barker's Mill, or **Segner's Wheel,** an hydraulic machine invented by Dr. Barker towards the close of the seventeenth century. The following description may serve to exhibit the principle of this machine in its simplest form. To those who have any knowledge of hydrostatics it is scarcely necessary to observe that every equal unit of surface of a vessel full of water is subject to a pressure proportional to the depth of the unit below the surface (see Lateral Pressure of Liquids); every unit of surface at the same depth is equally pushed outward. For each such pressure on one side of a vessel there is an equal and opposite pressure on the other, whereby the whole vessel is kept in equilibrium. If one such unit of area be removed—that is, if a hole be cut in the side of a vessel of water—the water in flowing out will no longer be able to press upon the surface which has been removed, but will nevertheless continue to press with equal force on the opposite unit of area. The consequence will be that the vessel will be urged in the direction opposite to that in which the water flows out. Barker's mill in its simplest form is shown in the annexed figure. A tube *a c c* with lateral arms below, shaped somewhat like an inverted T, rests upon a pivot at *b*. Now, suppose this tube to be supplied with water at the top, and an opening be made on opposite sides of the horizontal arms *c c;* the water, of course, ceases to press on the tube at the opening, while it continues to press on the opposite side; and if the wheel be so constructed as to turn with but little friction at *a* and *b*, the arms of the tube will be moved round in a direction opposite to that in which the water flows. It is obviously necessary that the opening in the two arms should be on opposite sides, for if they were on the same side the pressure on the one (supposing the openings to be of equal size) would exactly counterbalance the pressure on the other, and the wheel would remain stationary. But being on opposite sides, the arms are moved round in the same direction, the pressure on each co-operating with that on the other. As the rotation proceeds, the pressure at the extremities of the arms, *c c*, generated by centrifugal force is added to that due to the head, increasing correspondingly the driving power. Hence the machine is often called "the centrifugal mill." Various contrivances may be adopted to facilitate the supply of water, to lessen the friction, etc., but the above explanation may serve to show the general principle on which such a machine operates.



Barker's Mill.

Revised by F. A. P. Barnard.

Barker's Ridge, a township of Wyoming co., W. Va. Pop. 407.

Barkham'sted, a post-township of Litchfield co., Conn. Pop. 1439.

Bark'ing, an English town, county of Essex, on the Roding, 8 miles E. of London. The inhabitants pursue fishing or traffic with London in barges and market-carts. Pop. 5076.

Bark'ley, a township of Jasper co., Ind. Pop. 832.

Barks'dale (William), a brigadier-general in the Confederate service, born in Rutherford co., Tenn., Aug. 21, 1821, killed July 2, 1863, at Gettysburg, Pa. He was educated at Nashville University, removed to Mississippi, studied law, and was admitted to the bar. He served in the Mexican war. In 1853 he was elected to Congress from Mississippi, and resigned his congressional seat and became a brigadier-general in the Confederate army; and it was at the head of his brigade that he was killed on the second day of the battle of Gettysburg.

Bar-le-Duc, or **Bar-sur-Ornain,** a town of France, capital of the department of Meuse, is on the river Ornain, and on the railway which connects Paris with Nancy, 159 miles by rail E. of Paris. It has a communal college, a normal school, and a public library; also manufactures of cotton stuffs, hosiery, and calicoes. Its trade is facilitated by a canal which connects the Marne with the Rhine. Pop. in 1866, 15,334.

Barlet'ta (anc. *Barduli*), a fortified seaport of Italy, in the province of Bari, on the Adriatic, and on a rocky island 34 miles by rail W. N. W. of Bari; lat. 41° 20′ N., lon. 16° 19′ E. It is well built, has handsome stone houses, and wide, well-paved streets. It contains a fine cathedral, a college, a strong citadel or castle, and a colossal statue of the emperor Heraclius, said to have been found in the sea. Grain, wine, oil, and fruits are exported from this town. Pop. in 1872, 28,163.

Bar'ley [Lat. *hor'deum*], a plant of the order Gramineæ, is a valuable cereal, said to be more widely distributed than any other grain. It was cultivated by the ancient Hebrews, Greeks, and Romans, and was an important article of food in a remote antiquity. First mentioned in Exodus ix. 31. It is adapted to both cold and warm climates. The genus *Hordeum* is distinguished by a spiked inflorescence, has three spikelets at each joint of the rachis, and has three stamens. The lower palea or palet is long-awned. The species are mostly annual. Barley meal is used for bread in Northern Europe, but in many parts of the world this grain is mostly malted (*germinated*) for the manufacture of beer. It is also valuable as food for horses. When the pellicle of the grain is removed and the grain is rounded, it is called pearl barley, which is used as food for invalids. Two species or varieties of barley are cultivated in the U. S.—namely, *Hordeum vulgare*, with its grains arranged in four rows; and *Hordeum distichon*, in which there are only two rows. The farmers of Europe also cultivate the *Hordeum hexastichon*, the six-rowed barley. The sprat or battledore barley (sometimes called German rice) is much esteemed in Germany. It has only two rows, and has widely-spreading awns. The Nepaul or Himalaya barley is well adapted for cold and mountainous regions, as it produces good crops at the height of 14,000 feet above the level of the sea.

Bar'leycorn (John), a personification of the spirit of barley or malt liquor, used in humorous poetical composition and in jocular parlance. There is an old whimsical English tract entitled "The Arraigning and Indicting of

Sir John Barleycorn, printed for Timothy Tosspot," but John Barleycorn is best known by Burns's humorous poem of that name.

Bar'low, a post-township of Washington co., O. Pop. 1194.

Barlow (Francis Channing), Major-General, born at Brooklyn, N. Y., Oct. 19, 1834, graduated first in his class at Harvard College in 1855, served in the Union army 1862–65. He was at Fair Oaks and in almost every subsequent battle of the army of the Potomac, and won a distinguished reputation as a brave and able officer. He was secretary of state for New York in 1866–68.

Barlow (Joel), an American poet, born at Reading, Conn., Mar. 24, 1755, graduated at Yale College in 1778. He served as chaplain in the army in the Revolutionary war, after which he studied law. He produced in 1787 "The Vision of Columbus," a poem which was very popular. Having visited Europe on business in 1788, he passed some years in Paris during the French Revolution, and amassed a competence by trade or speculation. He returned to the U. S. in 1805, and published in 1808 "The Columbiad," a mediocre epic poem. He was sent as ambassador to France in 1811, and died near Cracow Dec. 22, 1812, while on his way to Wilna, whither he had been invited to meet Napoleon. (See C. E. Oelsner, "Notice sur la Vie de J. Barlow," 1813; Griswold's "Poets and Poetry of America.")

Bar'mecides (sing. **Bar'mecide**), a distinguished and powerful Persian family, whose name was derived from Barmak or Barmek. His son, Khâled-ben-Barmak, became the prime minister of the caliph Al-Mansur, and also of Al-Mahdi, who appointed him tutor to Haroun-al-Raschid. Yahya, the son of Khâled, was vizier under Haroun-al-Raschid, to whom he rendered important services. Yahya had three sons, named Yahya, Fadhl, and Jaafar, who enjoyed the favor of the sovereign. Fahdl was vizier for some time. Haroun-al-Raschid, who was jealous of their power and popularity, ordered them to be put to death about 802 A. D. (See Jaafar.) The virtues and misfortunes of the Barmecides have been celebrated by many Oriental poets and historians.

Barmecide's Feast, a celebrated tale from the "Arabian Nights;" a term often applied to an ostentatious display of worthless bounty. The tale is as follows: Schacabac being reduced to great poverty, and having eaten nothing for two days together, made a visit to a noble Barmecide in Persia who was very hospitable, but withal a great humorist. The Barmecide was sitting at his table, that seemed ready covered for an entertainment. Upon hearing Schacabac's complaint, he desired him to sit down and fall to. He then gave him an empty plate, and asked him how he liked his rice-soup. Schacabac, who was a man of wit, and resolved to comply with the Barmecide in all his humors, told him it was admirable, and at the same time lifted up the empty spoon to his mouth [apparently] with great pleasure. The Barmecide then asked him if he ever saw whiter bread. Schacabac, who saw neither bread nor meat, answered, "If I did not like it, you may be sure I should not eat so heartily of it." Several other nice dishes were served up in idea, which both of them commended and feasted on after the same manner. This was followed by an invisible dessert; and Schacabac, at length being tired of moving his jaws up and down to no purpose, desired to be excused, for that really he was so full he could not eat a bit more. "Come, then," said the Barmecide, "you shall taste of my wines, which, I may say without vanity, are the best in Persia." He then filled their glasses out of an empty decanter. Schacabac would have excused himself from drinking so much at once, because he said he was a little quarrelsome in his liquor; however, being pressed to it, he pretended to take it off, having beforehand praised the color and afterwards the flavor. Being plied with other imaginary bumpers of different wines, he pretended to grow flustered, and gave the Barmecide a box on the ear; but immediately recovering himself, "Sir," said he, "I beg ten thousand pardons, but I told you before that it was my misfortune to be quarrelsome in my drink." The Barmecide, who was pleased with the complaisance of his guest, then ordered a good substantial dinner to be served up.

Bar'men, a town and beautiful valley of Rhenish Prussia, is on the river Whipper, 17 miles by rail E. N. E. of Barmen. The town is 3 miles E. of Elberfeld, or, according to one statement, is a continuation of Elberfeld, with which it forms one uninterrupted street six miles long. Barmen is the principal seat of the ribbon manufacture on the Continent, and its fabrics are distributed to all parts of the world. Here are also manufactures of cotton and linen goods, velvet, lace, hardware, and chemical products. The district which contains Barmen and Elberfeld is the most populous, industrious, and thriving in Germany. Barmen has a handsome church, an asylum for the deaf and dumb, several banks, an exchange, etc. Pop. in 1871, 74,496.

Bar'nabas [Gr. Βαρνάβας], Saint, an early Christian and apostle, originally named Joseph, was born in the island of Cyprus. He was a companion and fellow-laborer of the apostle Paul, and appears to have been the principal founder of the church of Antioch, to which he was sent by the church of Jerusalem. "He was a good man, and full of the Holy Ghost and of faith" (Acts xi. 24). According to one tradition, he was the first bishop of Milan. (See Acts xiii.–xv.; P. Puccinelli, "Vita di S. Barnaba," 1649.)

Barnabas, Epistle of, an epistle of twenty-one chapters, which is supposed by Hefele to have been written between 107–120 A. D. After having been lost sight of for several centuries, this epistle was first published in 1645, but the first four chapters and a part of the fifth were only in Latin. In 1859, Tischendorf discovered the whole in Greek at Mount Sinai, and it was published in 1863. It was formerly ascribed to the apostle Barnabas, but it is evidently the work of another and later hand. It is frequently cited by the Fathers, and was by many regarded as being of authority in the Church; some even claiming for it a place in the sacred canon. It is chiefly directed against the Judaizing Christians, and its principal value now is in the light it throws upon the customs and doctrines of the Christians of that time. Several English translations have been published. (See Neander, "Church History," i., 381; Kitto, "Cyclopædia;" "American Presbyterian Review," Jan. and July, 1864.)

Bar'nabites, an order of monks which originated at Milan in 1533, and were so called because they preached in the church of St. Barnabas. Their duties were to attend the sick, to preach, to instruct the young, etc. They became numerous, and established monasteries or colleges in Italy, France, Austria, and Spain.

Barnacle. See Cirripedia.

Bar'nacle Goose (*An'ser ber'nicla* or *Ber'nicla leucop'sis*), a bird which frequents the coasts of Britain in winter, and migrates northward in spring. It is smaller than the common wild-goose, and is esteemed for food. The plumage of the upper part of its body is ash-gray and black, and that of the lower part white. The name of barnacle is sometimes applied to the brent goose (*An'ser bren'ta* or *torqua'tus*), which is smaller than the preceding, and has a darker plumage, which is nearly all black except the lower part of the body. It is remarkable for powerful flight and distant migrations, and is prized for the table. It is a winter bird of passage in the U. S. It takes its name from the old belief that barnacles were often transmuted into geese—a superstition which was once shared by learned and unlearned alike.

Barnacles, in heraldry, are frequently introduced into coats-of-arms as a charge. They were instruments used by farriers to curb and command unruly horses, and resembled what are now called twitchers.

Bar'nard, a post-township of Piscataquis co., Me. It has manufactures of roofing slate. Pop. 149.

Barnard, a post-township of Windsor co., Vt. It has manufactures of carriages, lumber, tubs, etc. Pop. 1208.

Barnard (Daniel Dewey), LL.D., a lawyer and Whig politician, born at Sheffield, Mass., in 1797, graduated at Williams College in 1818, was admitted to the bar at Rochester, N. Y., and in 1821 was a member of Congress from New York (1828–30 and 1839–45). He removed to Albany in 1832, and was U. S. minister to Prussia (1849–53). He was the author of many published reviews, speeches, etc. Died April 24, 1861.

Barnard (Frederick Augustus Porter), S. T. D., LL.D., L. H. D., mathematician, physicist, and educator, born in Sheffield, Mass., May 5, 1809, graduated at Yale College in 1828, tutor in Yale College 1830, professor of mathematics and natural philosophy in the University of Alabama 1837–48, professor of chemistry and natural history in the same 1848–54, professor of mathematics, natural philosophy, and civil engineering in the University of Mississippi 1854–61, president of the University of Mississippi 1856–58, and chancellor of the same 1858–61. In 1854 he took orders in the Protestant Episcopal Church, resigned his chancellorship and his chair in the university in 1861, and in 1863–64 was connected with the U. S. coast survey, in charge of chart-printing and lithography. In May, 1864, was elected president of Columbia College, New York City, which post he still holds. He received the honorary degree of LL.D. from Jefferson College, Miss., in 1855, and from Yale College in 1859; also the degree of S. T. D. from the University of Mississippi in 1861, and that of L. H. D. from the regents of the University of

the State of New York in 1872. In 1860 he was a member of the eclipse expedition sent to Labrador (Cape Chudleigh) by the U. S. coast survey; and during this absence was elected president of the American Association for the Advancement of Science. In the act of Congress establishing the National Academy of Sciences (1863) he was named as one of the original corporators, in 1867 he was one of the U. S. commissioners to the Paris Exposition, and was chairman of the physical section, 1870–72. He is also a member of the American Philosophical Society, an associate member of the American Academy of Arts and Sciences, corresponding member of the Royal Society of Liège, and member of many other scientific and literary associations. During his long residence in the South, Dr. Barnard was actively engaged in promoting public education, both primary and higher, encouraging and assisting in all departments of scientific research and literary culture. His publications have related chiefly to scientific and educational subjects. Among these may be mentioned "Letters on College Government" (1854), "Report on Collegiate Education" (1854), "Art Culture" (1854), "History of the American Coast Survey" (an extended Report to the American Association for the Advancement of Science, 1857), "University Education" (1858), "Undulatory Theory of Light" (1862), "Machinery and Processes of the Industrial Arts, and Apparatus of the Exact Sciences" (1868), "Metric System of Weights and Measures" (1871).

Barnard (Henry), LL.D., an eminent educator, born at Hartford, Conn., Jan. 24, 1811, graduated at Yale College in 1830, and was called to the bar in 1836. Having been elected to the legislature of Connecticut in 1837, he reorganized the public schools. He was superintendent of schools in Connecticut (1838–42 and 1850–54), in Rhode Island (1843–49), president State University of Wisconsin (1856–59), and of St. John's College (1865–67). He published, besides other works, the "Connecticut Common School Journal," which had reached several volumes in 1855; "Normal Schools in the U. S. and Europe" (1851); "Education in Factories" (1842); "School Libraries" (1854); "Hints and Methods for the Use of Teachers" (1857); and "National Education in Europe" (1851), when he commenced the publication of the "American Journal of Education." He was appointed in 1867 U. S. commissioner of education.

Barnard (John), a famous minister of Marblehead, Mass., was born in Boston Nov. 6, 1681, and graduated at Harvard in 1700. He was a chaplain in the Port Royal expedition of 1707, of which he wrote an unpublished account. Visiting England, he was offered a chaplaincy to Lord Wharton, but refused to conform. He was ordained colleague minister of Marblehead in 1716, and there remained for life. He took great pains in establishing the fisheries and commerce of his people. He published a version of the Psalms, sermons, etc. Died Jan. 24, 1770.

Barnard (John G.), LL.D., was born May 19, 1815, in Sheffield, Mass., graduated at the U. S. Military Academy 1833, and was commissioned as brevet second lieutenant in the corps of engineers. In 1835 was sent to the Gulf coast, where he served seventeen years as an assistant or principal engineer for the fortifications of Pensacola and New Orleans, and on works of harbor improvement. During the war with Mexico he was twice called to the field, and received the brevet of major "for meritorious services while serving in the enemy's country." In 1850 he was named by the President (Taylor) as chief of a scientific commission for the survey of the Isthmus of Tehuantepec, with the view of establishing a route of commerce and travel to our newly-acquired Pacific possessions. The report drawn up by J. J. Williams (1852) gives the first full account of that isthmus ever published. In 1854 he was in charge of the construction of the new fortifications of San Francisco, Cal., in 1855–56 superintendent of the U. S. Military Academy. Subsequently, till 1861, he was in charge of the fortifications of New York harbor. Serving as chief engineer under Gen. McDowell in the first Bull Run campaign, he was present on the field of that battle, as also at the earlier combat at Blackburn's Ford, the very first of the inchoate "Army of the Potomac." As chief engineer (with the rank of brigadier-general) of the Army of the Potomac in the Virginia Peninsular campaign of 1862, he directed the siege operations at Yorktown and before Richmond; and subsequently, as "Chief engineer of the defences of Washington," the extensive works for the defence of the national capital. In the campaign of 1864–65 he served on the staff of Lieut.-Gen. Grant as "Chief engineer of the armies in the field," until the surrender of Lee's army at Appomattox Courthouse, at which he was present. He was brevetted through several grades, and finally received the brevet of major-general U. S. army "for gallant and meritorious services in the field;" also brevetted July 4, 1864, major-general U. S. volunteers "for meritorious and distinguished services." Since the close of the civil war he has served as senior member of the board of engineers for permanent fortifications, and as a member of the U. S. lighthouse board. He is a member and an original corporator of the National Academy of Sciences. The degree of A. M. was conferred upon him by the University of Alabama in 1838, and of LL.D. by Yale College 1864. He is a member of the American Institute of Architects, and an honorary member of the American Society of Civil Engineers. His principal publications are "The Phenomena of the Gyroscope analytically examined" (1858), "Notes on Sea-Coast Defence" (1861), "Reports of the Engineer and Artillery Operations of the Army of the Potomac" (1863), in conjunction with Gen. W. F. Barry, chief of artillery; "Report on the Defences of Washington" (1871), "Report on the Fabrication of Iron for Defensive Purposes," etc. (1871), made in conjunction with Gen. H. G. Wright and Col. P. S. Michie; "The North Sea Canal of Holland, and Improvement of Navigation from Rotterdam to the Sea," "Problems of Rotary Motion presented by the Gyroscope, the Precession of the Equinoxes, and the Pendulum" (1872).

Barnaul′, a town of Siberia, in the government of Tomsk, at the junction of the Barnaul with the river Obi, 230 miles S. S. W. of Tomsk. It has a mining school, four churches, and several hospitals. All the gold of the Altai Mountains is brought here to be smelted, and three large gold and silver trains leave here every winter for St. Petersburg. A magnetic and meteorological observatory was established here about 1841. Pop. in 1867, 12,928.

Barnave (Antoine Pierre Joseph Marie), a French revolutionist and able advocate, was born at Grenoble in 1761. He was elected in 1789 to the States-General, and became a leader of the popular party. As a member of the National Assembly he opposed the absolute veto, and advocated the confiscation of church lands and the abolition of convents. He was a member of the committee appointed to attend the king on his return from Varennes to Paris in 1791, after which he became a more moderate reformer, and even defended the royal cause. This change of course rendered him unpopular. He retired to private life in Sept., 1791, and was guillotined Nov. 29, 1793. According to Macaulay, he was "the best debater in the National Assembly, but he flinched before the energy of Mirabeau." (See M. de Salvandy, "Vie de Barnave," 1833; Lamartine, "History of the Girondists.")

Barn′burners, a nickname given to that portion of the Democratic party of the State of New York which opposed the extension of slavery and supported Van Buren against Cass for President in 1848. They were esteemed too radical by their adversaries, one of whom illustrated his meaning by a story of a farmer who was so greatly annoyed by the rats who devoured his grain that he burned his barn to get rid of them. The Barnburners, led by Col. Samuel Young, Hon. Silas Wright, Michael Hoffman, etc., opposed further borrowing for the improvement or extension of their State canals, and were hostile generally to public debts, corporate privileges, etc.

Bar′negat, a post-village of Union township, Ocean co., N. J., on Double Creek and on the Tuckerton R. R., 1 mile from Barnegat Bay. It has an academy, and is a place of resort for sportsmen on account of the abundance of wildfowl. Its inhabitants are mainly engaged in navigation.

Barnegat Bay, in Ocean co., N. J., connects with the Atlantic by an inlet over a mile wide. The bay extends 23 miles N. to the mouth of Metetecunk River. There is a lighthouse 150 feet high on the S. side of the inlet, with a flashing white light; lat. 39° 45′ 48″ N., lon. 74° 6′ 3″ W.

Barnes, a township of Buena Vista co., Ia. Pop. 233.

Barnes (Albert), an eminent American divine, born at Rome, N. Y., Dec. 1, 1798. He graduated at Hamilton College in 1820. He became, in 1830, pastor of the First Presbyterian church at Philadelphia, where he preached upwards of thirty years. As a commentator on the Scriptures, Mr. Barnes has a high reputation, and his scriptural commentaries are popular with the religious community on both sides of the Atlantic. The circulation of his "Notes on the New Testament" (in eleven volumes) is said to have reached more than a million volumes. He commented also on Isaiah (1840), Job (1844), Daniel (1853), and the Psalms (1871). Among his other works may be named "The Church and Slavery" (1857), "The Atonement in its Relations to Law and Moral Government" (1859), "Lectures on the Evidences of Christianity" (1868), "Life at Threescore and Ten" (1868), and "Scenes and Incidents in the Life of the Apostle Paul" (1869). Mr. Barnes took a leading part in the controversy which divided the Presbyterian Church, and in 1837 was one of the most prominent advocates of the New School doctrines. Died Dec. 24, 1870.

Barnes's, a township of Montgomery co., Ala. Pop. 3680.

Barnes's Cross-Roads, a post-township of Dale co., Ala. Pop. 800.

Barnes (James), an American officer and engineer, born in 1806 at Boston, Mass., graduated at West Point in 1829, was a lieutenant of artillery till he resigned from the army July 31, 1836, serving at Military Academy as assistant instructor 1829–30 and 1833–36, at Fort McHenry, Md., 1830–32, in Black Hawk expedition 1832, and at Charleston harbor 1832–33, during the threatened nullification of South Carolina. He was a prominent civil engineer (1836–57), and constructed many important railroads. At the beginning of the civil war he resumed the military profession as colonel Eighteenth Massachusetts volunteers, was appointed Nov. 29, 1862, brigadier-general U. S. volunteers, and served in the Virginia peninsula 1862, Northern Virginia campaign 1862, in Maryland campaign 1862, and at Antietam; in Rappahannock campaign 1862–63, at Fredericksburg and Chancellorsville, in Pennsylvania campaign, in several skirmishes, and at the battle of Gettysburg (wounded), and was in command of the defences of Norfolk and Portsmouth, Va., 1863–64, of St. Mary's district 1864–65, and Point Lookout camp for prisoners of war 1864–65. Brevet major-general U. S. volunteers Mar. 13, 1865, for meritorious services, and mustered out of service Jan. 15, 1866. With health destroyed he remained at his home in Springfield, Mass., where he died Feb. 12, 1869.

George W. Cullum, U. S. A.

Barnes (Joseph K.), brigadier-general and surgeon-general U. S. army, born in Philadelphia July 21, 1817, educated in Philadelphia, receiving his degree of M. D. from the medical department of the University of Pennsylvania, class of 1837–38. He followed the practice of his profession in the hospitals and as physician to the outdoor poor of Philadelphia till June 15, 1840, when he was appointed an assistant surgeon in the army, and a surgeon Aug. 29, 1856. In 1863 (Feb. 9) he was appointed medical inspector, and Aug. 10 medical inspector-general with the rank of colonel. On Aug. 25 he was placed in charge of the surgeon-general's office, and Aug. 22, 1864, received the appointment of surgeon-general, which distinguished position he still retains, administering the responsible duties of his department with marked ability.

Barnes (Phineas), a politician of Maine, born in 1811, graduated at Bowdoin College in 1829, was professor of Greek and Latin at Waterville (1834–39), and afterwards editor of the "Portland Advertiser," and held many responsible offices in Maine. In 1860 he was nominated for governor on the Bell and Everett ticket. Died Aug. 21, 1871.

Barnesville, a post-village of Pike co., Ga., is situated on the Macon and Western R. R., 40 miles N. W. of Macon, and has one weekly newspaper. Pop. 754.

Barnesville, a post-town in the S. W. part of Belmont co., O., 32 miles W. of Wheeling, on the Baltimore and Ohio R. R. It has a machine-shop, foundry, planing-mill, woollen mill, carriage factory, national bank, and one newspaper, and is the commercial centre of a large and wealthy agricultural district. It is noted for its superior strawberries and tobacco. Pop. 2063.

Ed. "Enterprise."

Bar'net, a post-township of Caledonia co., Vt., on the Connecticut and Passumpsic Rivers R. R., 51 miles N. of White River Junction. It has manufactures of lumber, leather, etc. There is an academy at McIndoe's Falls. The township contains several manufacturing villages. P. 1945.

Bar'nett, a township of De Witt co., Ill. Pop. 1078.

Barnett, a township of Forest co., Pa. Pop. 504.

Barnett, a township of Jefferson co., Pa. Pop. 223.

Bar'neveld, a town in Holland, 6 miles S. S. E. of Nykerk, in the province of Gelders. There are fine monuments in one of the churches. Pop. 6167.

Bar'neveldt (John van Olden), an eminent Dutch statesman, born at Ameersfoort in 1549. He was a member of an important embassy sent to England in 1585, and after his return was appointed advocate-general of Holland. He was an adversary of the earl of Leicester, and became the head of the republican party, while Maurice of Nassau was the chief of its opponents. Barneveldt opposed the ambitious designs and warlike policy of Maurice, and in 1609 concluded a truce with Spain for twelve years. He was for many years grand-pensionary of Holland. The animosity between the two parties was aggravated by religious dissension. Barneveldt favored the Arminians or Remonstrants, while Maurice patronized the intolerant Gomarists, who were also supported by the majority of the army, the clergy, and the populace. The Synod of Dort having condemned the Arminians in 1618, Barneveldt was accused of treason, unjustly convicted, and beheaded May 13, 1619. (See Motley, "History of the United Netherlands.")

Bar'ney (Joshua), an American commodore, born in Baltimore July 6, 1759. Having passed through the inferior grades, he obtained command of the Hyder Ali, and captured the General Monk in 1782. He commanded a flotilla in 1813, and was wounded at the battle of Bladensburg in 1814. Died Dec. 1, 1818.

Barn'hill, a township of Wayne co., Ill. Pop. 2632.

Barns'ley, a market-town of England, in the West Riding of Yorkshire, on the river Dearne, 18 miles by rail N. of Sheffield, on the North Midland Railway. It is situated on a hill, has coal and iron mines, and manufactures of linen, glass, etc. The damasks and drills of Barnsley were considered to be unrivalled. Here are also bleaching and dye works and iron foundries. Pop. in 1871, 23,021.

Barns'ness, a township of Pope co., Minn. Pop. 153.

Barn'stable, the easternmost county of Massachusetts. Area, 290 square miles. It consists of a peninsula which is about 60 miles long and terminates in Cape Cod. It is bounded on the E. and S. by the Atlantic Ocean, and on the W. by Buzzard's Bay. The soil is mostly light and sandy. Dairy products, corn, and wool are raised to some extent. Many of the inhabitants are engaged in the fisheries and in navigation. Capital, Barnstable. Pop. 32,774.

Barnstable, a port of entry and shire-town of Barnstable co., Mass., is on Barnstable Bay and on the Old Colony R. R., 72 miles S. S. E. of Boston. The inhabitants are principally engaged in maritime pursuits. The southerly portion of the town, on Vineyard Sound, is largely frequented as a place of summer resort. Hyannis, Cotuit Port, Osterville, and other villages are in this township, which has eleven churches, a court-house, jail, and a weekly paper. Pop. of township, 4793.

Ed. "Patriot."

Barn'staple, a town and seaport of England, in Devonshire, on the river Taw, 6 miles from its mouth, and 40 miles by rail N. W. of Exeter. The Taw is here crossed by an old bridge of sixteen arches. Barnstaple is pleasantly situated and well built, and has manufactures of pottery, lace, etc. It sends two members to Parliament. The harbor has been filled with sand, so that it will not admit large vessels. Pop. in 1871, 11,636.

Barn'stead, a post-township of Belknap co., N. H. It has manufactures of lumber, woollen goods, etc. P. 1543.

Bar'num (Phineas Taylor), born in Bethel, Conn., July 5, 1810. He became an editor, a trader, and afterwards a public showman. In 1841 he established in the city of New York a museum which was very successful. In 1849 he engaged Jenny Lind to sing in America, and paid her $1000 per night for 150 nights. He afterwards experienced severe reverses of fortune, but displayed remarkable perseverance and energy in overcoming the difficulties which surrounded him. He also has some fame as a temperance lecturer, and gives freely to philanthropic enterprises. (See his "Life," written by himself, 1855.)

Barn'well, a county of South Carolina, bordering on Georgia. It is bounded on the N. E. by the Edisto, and on the S. W. by the Savannah River. The surface is undulating, the soil productive. Rice, corn, and cotton are the chief crops. The county is intersected by the South Carolina and Port Royal R. Rs. Capital, Blackville. Pop. 35,724.

Barnwell, a post-village of Barnwell co., S. C., 60 miles S. S. W. of Columbia. Pop. of township, 1181.

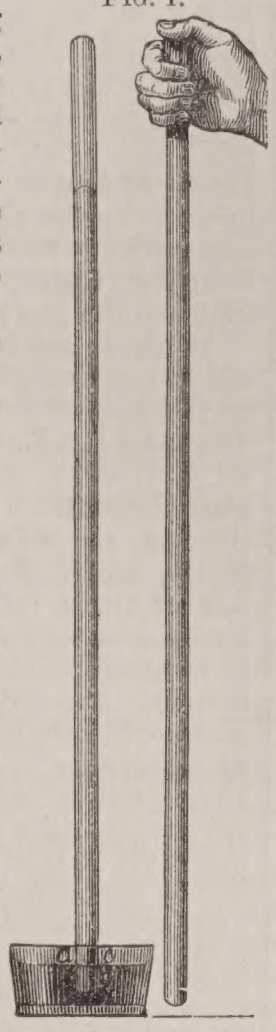
Barnwell (Robert Woodward), LL.D., a statesman, born at Beaufort, S. C., Aug. 10, 1801, and graduated at Harvard in 1821. He studied law, was a member of Congress from South Carolina (1829–33), U. S. Senator in 1850, and afterwards a member of the Confederate Congress. He was president of South Carolina College (now University of South Carolina) (1835–43), and after the civil war held the same position until 1873.

Baroach', a town of British India, in the province of Bombay, is on the Nerbudda, 40 miles N. N. E. of Surat. Here is a hospital for animals, receiving even insects, which is endowed by the Brahmanists. On an island near this town is the largest banyan tree in India, which is said to have sheltered an army of 7000 men.

Baro'da, a city of Hindostan, in Guzerat, about 90 miles by rail N. N. E. of Surat; lat. 22° 16′ N., lon. 73° 14′ E. It is the residence of the guicowar, a Mahratta prince, and has an extensive trade, for which its position is advantageous. A railroad extends from Baroda *viâ* Surat to Bombay, 231 miles. It is a rich city in proportion to its size. Pop. estimated at 140,000.

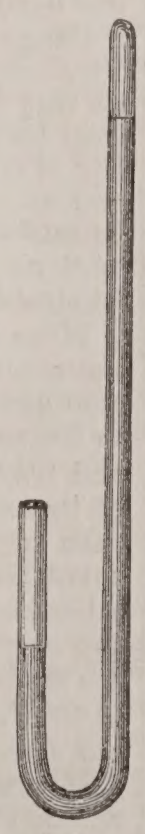
Barometer [Gr. *βάρος*, "weight," and *μέτρον*, "measure"], an instrument for measuring the weight or pressure of the atmosphere. If a tube of uniform bore be bent into the form of the letter U, and partially filled with a liquid, the height of the liquid column, as measured above the bend, will be found to be the same in both branches. This will continue to be true though the air be withdrawn from above the liquid on both sides—a thing which may easily be effected by suitably connecting the two extremities of the tube with an air-pump. But if, while things are in this condition, the air be gradually readmitted to one of the branches and not to the other, the column in that branch will steadily sink, and that in the other will correspondingly rise. Arresting this process at any moment, we may say that the difference of height of the two liquid columns is a measure of the pressure of the air on the surface of the lower; or that the *weight* of a column of the liquid having a height equal to this difference is just equal to the pressure on that surface. In this experiment it would be easy to expel the liquid entirely from one branch of the tube, without establishing an equilibrium with the column in the other, unless the apparatus should be of inconveniently large dimensions, or the liquid employed should be one having great specific gravity. Mercury, in fact, which is nearly fourteen times (13.6) heavier than water, is the only liquid convenient for the purpose of the experiment; and if this be used, the difference of height of the columns in the two branches will be found to be about 30 inches when the full pressure of the atmosphere is admitted to one branch, while it is wholly withdrawn from the other. The weight of a vertical column of mercury, therefore, of uniform horizontal section, 30 inches in height, is equal to the mean pressure of the atmosphere at the surface of the earth on an area equal to the base of the column. The same fact is demonstrated more expeditiously by simply taking a straight tube 32 or 33 inches in length (Fig. 1), closed at one extremity and open at the other, filling it entirely full of mercury, placing the thumb firmly on the open end, inverting it and plunging this extremity beneath the surface of mercury in a basin, and finally removing the thumb. The column will fall, and stand as before at about 30 inches above the level of the mercury in the basin. This is the original experiment of Torricelli, made early in the seventeenth century, by which he furnished the first satisfactory explanation of the phenomena which the old philosophers vaguely ascribed to Nature's abhorrence of a vacuum.

Fig. 1.



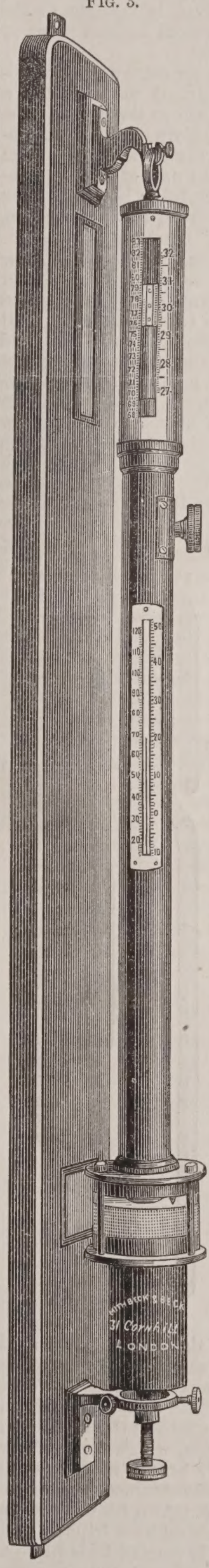
If the pressure of the atmosphere were invariable, the barometer would be an instrument of no practical use, and would simply serve to illustrate an interesting physical truth. But this pressure is constantly fluctuating, and its fluctuations are measured by the varying heights of the Torricellian column. All that is necessary to form a barometer, therefore, is to connect with the tube and basin of Torricelli some kind of scale suitable to measure these variations. In English and American barometers this scale is divided into inches and decimals; in France and in continental Europe generally, into millimètres. If the instrument is to be stationary, the scale need only have a range of three or four inches, since even in localities where the fluctuations are largest, they never transcend these limits. The divisions directly marked on the scale are made sufficiently large to be read by the unassisted eye. For smaller divisions a vernier must be employed. (See Vernier.) In the best instruments the height of the column may be read by means of the vernier to the $\frac{1}{1000}$th of an inch. Some little practice is required in order to learn to read with accuracy. The vernier carries a horizontal index which moves close to the glass tube containing the mercurial column; but the top of the column is rounded, so that the highest point is distant from the index by half the exterior diameter of the tube. Ordinarily, the bore of the tube is small, not exceeding three-sixteenths to three-eighths of an inch; but in large standards a tube an entire inch in bore is often employed, and in such instruments the index is a ring or thimble surrounding the tube entirely.

Fig. 2.



The height of the column must be measured from the surface of the mercury in the basin; but the level of this surface itself varies with the rising and falling of the column in the tube. To provide against error from this cause, the whole scale is, in some barometers, made movable, and is raised or depressed as may be necessary, by means of a thumb-screw, before observation. An ivory point directed downward from a short projecting arm carried by the scale is brought so as exactly to meet its image reflected in the mercury of the basin, and this indicates that the zero of the scale is in its true position. In other instruments, and generally in those in common use, the adjustment is made by raising or depressing the level of the mercury itself while the scale remains fixed. Instead of the ivory point, an ivory float is sometimes used, carrying an upright stem on which is a fiducial mark designed to be brought, in the adjustment, into coincidence with a similar fixed mark.

Fig. 3.



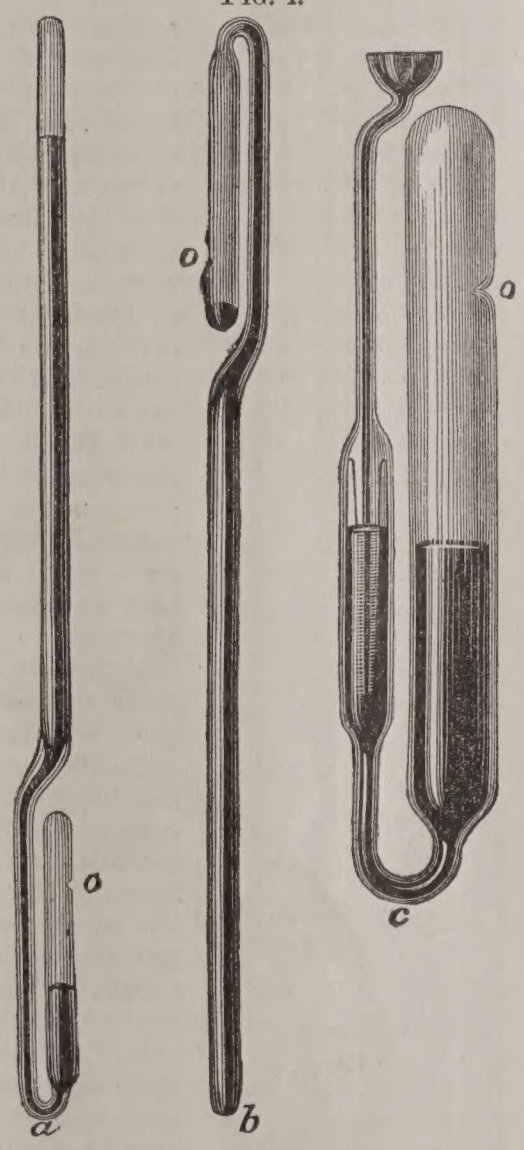
In tubes of small bore the mercurial column does not reach the full height due to the pressure, owing to the effect of Capillary Action (which see). A small correction is therefore necessary on this account, which depends on the diameter of the tube. With tubes of large dimensions this effect is insensible; and it may in any case be completely eliminated by giving to the barometer the form shown in Fig. 2, called a siphon barometer, in which the basin is dispensed with, and the tube is bent upward at the bottom, the recurved part serving as a substitute for the basin. In this form of the instrument, if the bore be uniform throughout, every fluctuation of pressure occasions equal and opposite movements of the two surfaces of mercury; and the reading on a fixed scale will change only half as much as in the common instrument. The whole scale should therefore be movable; or if a fixed scale only be used, the divisions should be made of only half their nominal magnitude. An attempt has been made to magnify the barometric indications of fluctuating atmospheric pressure, by transforming the vertical movements of the mercurial column into rotary movements of a long index upon a dial. The siphon barometer presents a convenient means of doing this. A float introduced into the open short arm of the siphon, and connected by a silk thread with a small pulley on the axis of the index, will render conspicuous even a very minute change in the altitude of the column. The uncertain action of this apparatus, however, owing to friction and other causes, is such as to deprive it of any scientific value.

The form of barometer now most generally approved, constructed originally by Fortin of Paris, and since adopted by Casella, Beck, and others of London, and by James Green of New York, who has made in it important improvements, is shown in Fig. 3. In this, the glass tube is entirely surrounded by a protecting tube of brass, somewhat enlarged at the top, for convenience in applying a scale and vernier, and having a vertical opening at the same part to allow the summit of the mercurial column to be seen. The cistern at the bottom, which is of boxwood,

except the upper portion, which is a short glass cylinder, is similarly protected—the glass portion, however, being uncovered, in order to allow the surface of the mercury in the cistern to be visible. The cistern has a bottom of flexible leather, which rests on a broad disk of metal supported by a vertical screw, of which the milled head is represented in the figure below the instrument. By turning this screw, the level of the mercury in the cistern is brought to the true zero of the scale, indicated by a fixed fiducial point of steel or ivory seen within the cistern.

Since the barometer measures the pressure of the atmosphere, and since this pressure is simply the weight of a vertical column of the aërial ocean above the level of the place of observation, it follows that, if we carry the instrument from a lower to a higher level, the barometric column will fall. One of the most important uses of the barometer, therefore, is as a means of determining heights. (See HYPSOMETRY.) But a barometer intended for this purpose, or a so-called "mountain-barometer," must have a construction in a number of respects differing from the barometer in common use. It must have, of course, a much larger range of scale, and especial care must be taken to guard it against the danger of fracture in transportation. If it is a cistern barometer, the cistern should be air-tight, and should have no communication with the atmosphere, except through an aperture which may be stopped by a closely-fitting screw or cock; and the adjusting screw at the bottom should have so large a range of movement as to allow all the air of the cistern to be expelled by raising the leather bottom, so that the cistern and tube may be both entirely filled with the mercury. The danger of fracture from the oscillations of this dense liquid may thus be avoided. The best mercurial mountain barometer, however, is the siphon barometer of Gay-Lussac, shown in Fig. 4, *a*, without its scale or mounting. In this instrument a tube bent in the manner shown, and closed at both ends, has two straight portions, of small but equal bore, connected by an intermediate portion so much smaller that when, after being filled with mercury, it is reversed, as shown in Fig. 4, *b*, the mercury will be held in the bend by capillarity. The only communication with the air is by the aperture *o*, which is so small that any drops of mercury which may fall into the short arm from the bend, when the instrument is reversed, cannot escape. The design, however, is to have no excess of mercury beyond what will be held by capillarity in the position *b*. This tube is suitably supported throughout its whole length, and protected by a surrounding tube of brass. The zero of its scale is at the middle of the length, and it reads from this zero both upward and downward. The readings are taken at both surfaces of the mercury, and their sum gives the true barometric height. The scale is usually inscribed on the tube itself. In transporting the instrument it is carried in the inverted position, where the mercury, filling the whole tube, is necessarily prevented from oscillating. It is usually carried by the mountaineer in a leather case swung over his back, and when set up for observation is suspended in gimbal rings, supported by a tripod.

FIG. 4.



When a barometer of this kind is carried from place to place, subject to occasional jars and concussions, sometimes perhaps in a horizontal position, there is a possibility that minute portions of air may now and then intrude into the tube, between the mercury and the glass. An effectual contrivance for preventing these from making their way into the Torricellian vacuum was devised by M. Bunten, which is represented in Fig. 4, *c*. The capillary part of the tube is divided; the extremity of the upper portion is drawn out to a minute orifice; that of the lower is widened, so as to form a globular or cylindrical chamber contracted at the mouth; and then the two are united again by fusion in the manner shown in the figure. Any air which may make its way into the tube from below is caught in this chamber, and afterwards, when the instrument is inverted for transportation, it escapes by the way it entered. The invention evinces a high degree of ingenuity.

An interesting form of the mercurial barometer, though one which wants the important property of portability, is the balance barometer, employed by Father Secchi of Rome in his "Meteorograph," or instrument for automatically recording the varying conditions of the atmosphere as to temperature, pressure, moisture, movement, etc. from day to day and from hour to hour. In this, the barometric tube is suspended from the short end of a lever or balance-beam, while the longer end may serve as an index, or may control, as in Father Secchi's apparatus, the registering pens. Of course, when the column rises, the weight is increased, and the arm of the lever which carries the tube descends. In Father Secchi's barometer the tube is of forged iron, bored truly to a diameter of two centimètres (0.8 inch), but in the superior part having the bore enlarged to six centimètres (2.4 inches) in order to increase the difference of weight caused by small variations of atmospheric pressure, and thus render the instrument more sensitive. Such a barometer requires, of course, a large cistern of mercury; especially since, in order to relieve the pressure on the pivot of the balance, it is advisable to connect with the lower end of the tube a cylinder of wood of some size, which, plunging into the mercury, sustains by its buoyancy the greater part of the weight.

Another very interesting form of mercurial barometer, which has in the highest degree the characteristic wanting in the last, of extreme portability, is one recently introduced by Mr. L. Casella, instrument-maker to the Admiralty, London, which may be called a measurer of the elasticity, rather than of the pressure, of the air—a distinction which is real, though the numerical results obtained are identical. In this instrument a glass cylinder two or three inches in height, resembling somewhat a Fortin's barometer cistern, closed at top, has a small and short glass tube descending into it to a point near the bottom. Mercury is contained in a chamber beneath this glass cylinder, and may be forced up into the cylinder by a screw acting on a flexible bottom, in the same manner as in Fortin's barometer. When the surface of the mercury reaches the extremity of the descending tube, it imprisons a certain quantity of air within the glass cylinder, and as the surface is raised higher, this air is compressed, and causes a column of mercury to rise in the tube. A scale and vernier connected with this tube enables the observer to read the height of this column, and when the level of the mercury in the cylinder reaches a certain fixed fiducial point, the reading is taken. The height of the column is really the measure of the difference between the elasticity of the compressed air and that of the free air of the atmosphere; but inasmuch as the first of these values is a simple function of the second, it is easy so to construct the scale that the readings may be the true barometric readings due to the pressure of the atmosphere at the time. This instrument possesses two important advantages: first, its very moderate dimensions; and secondly, its exemption from liability to fracture in transportation, since the quantity of mercury necessary in its construction is very small; and when this is withdrawn into the lower chamber, it may be confined there by turning a stopcock, and kept perfectly motionless. On all accounts, therefore, the instrument is admirably suited to the purposes of a mountain-barometer.

When scientific accuracy is necessary in barometric observations, all mercurial barometers require that their readings should be corrected for temperature. According to Regnault, the absolute dilatation of mercury between 0° and 100° C. = 32° and 212° F., is 0.01813, or about $\frac{1}{55}$th of its bulk. This corresponds to $\frac{1}{9916}$th of the bulk for each degree of Fahrenheit's thermometer, which would be equal, for the mean column of 30 inches, to an increase of altitude of about $\frac{3}{990}$ths, or $\frac{1}{330}$th per degree. Assuming the height at 32° F., therefore, to be the normal height, the reading at 54° F. will be $\frac{22}{330}$ths, or $\frac{1}{15}$th inch too great; at 76° F., or so-called "summer-heat," $\frac{44}{330}$ths, or $\frac{2}{15}$ths inch too great; and at 98° F., $\frac{66}{330}$ths, or 0.2 inch too great. The correction for any temperature may be made by calculation from the data here given; but it is more convenient to be provided with a table which has been calculated in advance for all the temperatures to which the observation is likely to extend.

The process of filling the mercurial barometer is one which requires great care. In pouring mercury into a

long and narrow tube it is almost impossible to avoid introducing along with it some bubbles of air, which adhere with tenacity to the sides of the tube, but which, after the tube is inverted, gradually find their way into the space above the column and vitiate the vacuum. These may be expelled by boiling the mercury in the tube before inversion, when they will be carried off with the vapor. The operation is attended with some danger to the tube, the boiling-point of mercury being above 660° F., and the concussions of the heavy column in ebullition violent. It is expedient, therefore, to introduce at first only a small quantity, and after boiling that to add more, and so proceed till the tube is filled, always applying the heat at a point but a few inches below the top of the column. Mr. Green, however, recommends filling the tube completely before beginning the operation, then boiling downward from the top, and finally upward from the bottom. There is a method of getting rid of air-bubbles, however, which is much less hazardous, and hardly less effectual, than this, and which only requires a little dexterity of manipulation to be successfully employed. In the process here referred to the tube is filled at first to within two or three inches of the open end, without any special precaution against the introduction of air. A piece of buckskin is then placed over this end and held firmly there, while the tube is carefully brought into the horizontal position, when the confined air will of course occupy the upper part of the bore throughout. If the tube in this position be slowly rotated around its own axis, the great bubble which extends along its whole length will swallow up all the small ones; so that, when it is once more made vertical they will be removed along with it. The filling is then to be carefully completed, and if any additional bubbles be noticed they will be near the mouth, and may be detached by the aid of a steel wire. Professional instrument-makers often, after employing this method, boil the mercury in the tube also for greater security.

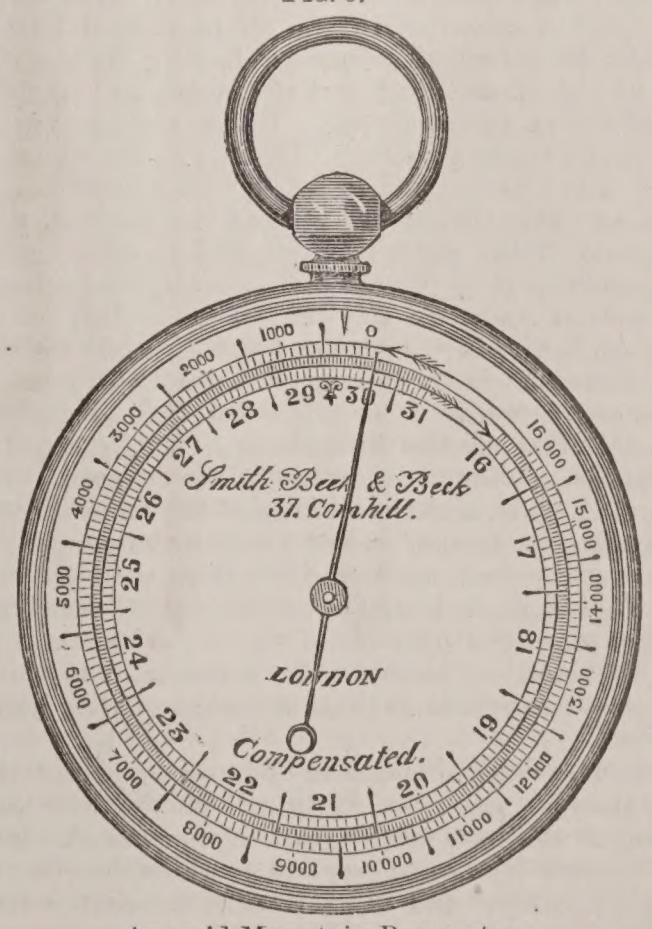
It is of the highest importance that the mercury used in barometers should be quite pure. To be entirely safe on this score, it is best that the metal should be distilled before using, but it may also be purified by chemical means. The effect of the presence of impurities is to diminish the specific gravity of the fluid, and therefore to make its indications uncertain; but it is also to tarnish the tube, and to render observation after a time difficult or impossible.

Other fluids besides mercury may, of course, be employed in the construction of barometers, but the height of the column will in every case be greater in proportion as the specific gravity of the liquid is less. Water, for example, requires a column of 34 feet, mean height. On the other hand, the fluctuations of height of the water column are proportionally large, and serve to render conspicuous slight changes of pressure, which, in the mercurial barometer, are nearly or quite imperceptible. It is an objection, however, to the water barometer that its indications are largely affected by the vapor from the liquid which occupies the space above the column, and that the error thus arising varies with the temperature. Thus, at 70° F. the column is depressed by this cause 10 inches; at 80° F., 14 inches; and at 90° F., nearly 20 inches; while even at 32° F., the freezing-point, below which the water barometer is unavailable, the depression from the same cause is no less than 2½ inches. To all observations of such a barometer, therefore, a tabular correction must be applied, depending on the state of the attached thermometer. Another source of error in these barometers is found in the fact that all natural waters contain more or less air, which, when the atmospheric pressure is removed, makes its escape; so that, if the water for such a barometer be taken directly from a natural source, the vacuum above the column will soon be to some extent vitiated by the pressure of permanent gases as well as of vapor. This evil may be prevented, at least for a time, by thoroughly boiling the water immediately before its introduction into the tube; but it will return in consequence of the absorption of air through the surface of the fluid which is exposed to the atmospheric pressure, unless that be protected by some covering impervious to air. In the water barometer erected in the rooms of the Royal Society in London, such a protection is provided in a stratum of solution of caoutchouc in glycerine. Very few water barometers have ever been constructed. The first of the kind was erected by Otto Guericke, the inventor of the air-pump, in his house at Magdeburg. The upper portion of the tube only, to an extent of about six feet, was of glass, and this was but partially exposed to view, the rest being concealed behind the woodwork of the apartment. Floating on the top of the liquid the inventor had introduced a diminutive figure of a man, which, with the rising of the column in fair weather, presented itself to view, but with the approach of foul weather retreated out of sight. The water barometer in the rooms of the Royal Society has just been mentioned. There is such a barometer also in the theatre of the natural philosophy class in the University of Edinburgh. At the Smithsonian Institution in Washington there was set up, some twenty-five years ago, by Mr. James Green of New York, under the direction of Prof. Henry, a barometer of large dimensions in which the fluid used was sulphuric acid. This liquid is free from the objection of forming vapor in the Torricellian void; and owing to its large specific gravity a column of it less than 20 feet high suffices to balance the mean atmospheric pressure. Such, however, is the avidity with which this acid absorbs watery vapor, that its exposed surface must be in some manner protected from direct contact with the atmosphere. The protection used in this case was a balloon of India-rubber firmly secured to the short arm of the siphon barometric tube. But, though moisture was thus excluded, air was found to make its way gradually into the void above the column, and the instrument was finally disused and taken down.

A description of barometer employing no liquid has, in recent years, come extensively into use, known as the Aneroid Barometer, the invention of M. Vidi, a physicist of France. The etymology of this word has been variously given. The inventor appears to have derived it from the verb ἀνέρομαι, "I inquire," but the books commonly give it as from ἀ, privative (*i. e.* signifying negation), νηρὸς, "wet," and εἶδος, "form;" understanding from the combination "a form without liquid," which seems to be an interpretation sufficiently far-fetched. A third derivation is presented by Prof. De Morgan ("Budget of Paradoxes," p. 385) from ἀ (or ἀν), privative, and ἀεροειδής, "like the air," or "having to do with the air;" so that anaëroid, or aneroid, would seem to mean an instrument which has nothing to do with the air, or one which has been named, like the grove in Latin, *lucus a non lucendo*.

The instrument itself consists essentially of a flat cylindrical box formed of thin corrugated metal, from the interior of which the air has been entirely, or nearly,* exhausted; the immediate effect being to bring the top and bottom into contact with each other by atmospheric pressure. The touching surfaces are then separated by means of a strong spring attached to the centre of the upper surface, while the lower is held down, the whole being placed within a larger box properly adapted to receive it. With the varying pressure of the atmosphere the separation of the surfaces is greater or less, or the spring is more or less bent, and the movements thus occasioned are transmitted by proper multiplying-apparatus to an index which traverses a dial like that of a watch. (Fig. 5.) Aneroid barometers often perform very well, and perform well for long periods; but in time, the spring is liable to lose its elasticity, so as to render the indications untrustworthy. These instruments should therefore be occasionally compared with standard mercurial barometers. They are very convenient for transportation, being constructed of various

FIG. 5.



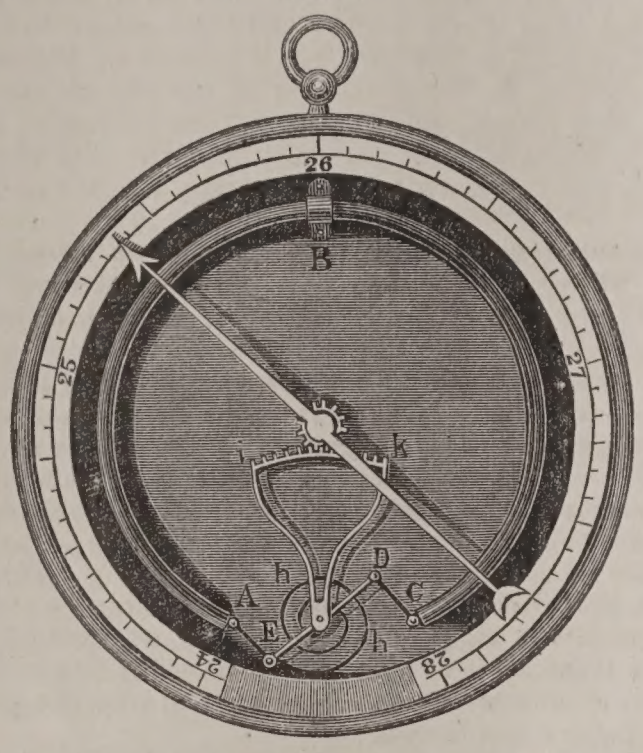
Aneroid Mountain Barometer.

* Not altogether. In recent constructions, a small portion of air is left within the box, as a means of compensating for variations of temperature; this air gaining as the spring loses in elasticity by elevation of temperature, and *vice versâ*.

dimensions, from eight or ten inches in external diameter down to two, and are often graduated to serve as mountain-barometers for heights as great as 12,000 or 16,000 feet.

Another form of barometer without liquid, and in external appearance resembling the aneroid, is Bourdon's Metallic Barometer, now greatly improved by M. Richard of Paris, and constructed almost or quite exclusively by him. In this, a broad and nearly flat tube of thin metal, bent into the form of a horse-shoe, having been exhausted of air, is secured by the middle part to the box enclosing it, while the ends, left free, are connected by delicate chains

FIG. 6.



or wires with the apparatus controlling the index. (Fig. 6.) The effect of increased atmospheric pressure upon an exhausted tube of this form is to bring the extremities nearer together, and that of diminished pressure to cause them to recede; and these changes are shown by the index on the dial. M. Richard's principal improvement consists in the introduction within the tube of a steel spring having the curved form of the tube, but nowhere touching its walls; giving to it greater rigidity, and much greater uniformity of action, than belonged to the instrument as originally constructed.

Long-continued observations of the barometer have demonstrated that there are certain fluctuations of atmospheric pressure which are periodical and regular, though not large; while such as are noticeable for their magnitude are subject to no obvious law. Of periodical fluctuations there is a semi-diurnal inequality having its maximum at about 10 o'clock morning and afternoon, and its minimum at 4, afternoon and morning. Its magnitude varies with the latitude, being greatest (0.104 in.) at the equator. In lat. 40° it is 0.05 in., and in lat. 70° only 0.003 in. There is also an inequality dependent on the seasons, which in some parts of the earth is large, and in others almost or quite imperceptible. Where it is noticed, the highest reading occurs in January, and the lowest in July, or a little later. At Pekin, in China, the mean pressure for the first of these months is three-fourths of an inch greater than that for the second. A large part of Asia is similarly affected. At Havana the fluctuation is hardly a quarter of an inch, the minimum seems not to be reached before the month of August, and the decline of the monthly means is not regular. At Boston and at London the monthly means throughout the year scarcely differ from each other by the tenth of an inch, and an annual inequality can hardly be said to exist. The position of the moon seems to have a slight influence on atmospheric pressure, but this, even where most observable, is little more than half a hundredth of an inch.

The non-periodic fluctuations of pressure are very much greater than the periodic. If we call the difference between the greatest and least readings of the barometer within any month the *monthly oscillation*, and combine the observations of many years for the same month, we shall obtain the mean monthly oscillation. This is least near the equator, and increases towards the poles. At the equator it hardly exceeds 0.1 inch; in lat. 30° it is 0.4 in.; in lat. 45°, over the Atlantic, it is 1 inch; in lat. 65° it is 1½ in. During the three winter months the mean is about one-third greater. On the continents bordering the Atlantic the means are usually less than over the intervening ocean. The *extreme* fluctuations of the barometer, however, very much exceed these means. In Boston the greatest height observed in thirty-seven years is 31.125 in., and the least, 28.47 in.—difference 2.655 in. The greatest observed range at London is 3 in.; at St. Petersburg, 3.5 in. Within the tropics the range is small. At Christiansborg, near the equator, the greatest range observed in five years was 0.47. (*Loomis's Meteorology.*)

The barometer is often spoken of as a weather-glass; and the scale of the instrument is often inscribed with words indicative of the weather which may be expected when the head of the column stands opposite them. This is, however, apt to convey very erroneous notions; for neither the actual nor the approaching weather can be correctly inferred from a knowledge of only a single one of the conditions which determine meteorological phenomena. The indications of the thermometer, the anemometer, and the hygrometer, and the progressive changes denoted by those instruments, are quite as important to the prediction of the weather as those of the barometer. Moreover, the prognostications derived from these instruments which would be justified in one part of the world, would not be at all so in another where the physical conditions are different. One remark, however, is true generally. Inasmuch as there can be no considerable change in the condition of the atmosphere as to heat or moisture or movement which is not accompanied or immediately preceded or followed by a change of pressure, therefore when the barometer continues steady, whether it be high or low, the actual state of the weather, whatever it may be, is likely to last. It may be added that a rapid movement of the barometer upward or downward, say three-fourths of an inch in twenty-four hours, is of unfavorable augury. Also that a very rapid fall will probably be followed by a violent wind. A slow movement upward gives assurance generally of fair weather. On the Atlantic coast of the U. S., however, according to Loomis, the approach of a violent N. E. storm is generally indicated by a rise of the barometer above its mean height; the wind veers to the N. E., and the atmosphere becomes hazy. Rain or snow follows, and afterwards the barometer begins to fall. When it reaches the lowest point, the wind changes to N. or N. W., and the barometer rises. If a gale sets in from the E. or S. E., and the wind veers by the S., the barometer will fall till the wind becomes S. W. A lull may then occur, followed by a renewal of the gale with the wind from the N. W., and a simultaneous fall of the thermometer and rise of the barometer. When a storm of rain or snow follows, as it usually will, a rapid fall of the barometer, the wind will be N. if the thermometer is low, and S. if it is high. If the barometer falls with a rising thermometer and increased dampness, wind and rain are likely to follow from the S. The result of all rapid changes in the weather, or in the indications of meteorological instruments, is of brief duration, while that of gradual changes is generally lasting. (See METEOROLOGICAL INSTRUMENTS.)

While observation enables us, thus, in some manner, to connect the fluctuations of the barometer with the varying conditions or aspects of the weather, it is not easy in all cases to assign satisfactory causes for the fluctuations themselves. The low state of the column which is commonly observed to accompany the formation of heavy clouds and the fall of rain or snow, shows that the popular language, which speaks of the atmosphere at such times as "heavy," is scientifically incorrect. Many hypotheses, among them some which, in the present state of science, would be pronounced absurd on the face of them, have been proposed to account for the phenomena; but the true reason of at least the more conspicuous variations of atmospheric pressure must be looked for in rarefaction by heat, of which the ultimate source is the sun. Different portions of the earth's surface become unequally heated by the solar radiation. The heat thus acquired is imparted by the earth to the atmosphere above it, of which the portions most heated are also most dilated, and, in consequence of their diminished specific gravity, tend to rise. In rising they are further dilated by diminished pressure, and their temperature consequently falls until their contained vapor is condensed to cloud, with evolution of its latent heat. The heat evolved increases the rarefaction, and the upward movement continues. The rarefied column is not changed in weight by the mere fact of its rarefaction; but as its altitude is increased it necessarily overflows at top upon the surrounding air, of which the pressure is thus augmented, while its own is correspondingly diminished. As a necessary consequence, the barometer below it falls; and as rain naturally follows the precipitation of vapor, the rain-area will usually be found to correspond with the area of low barometer. Of periodical oscillations, the diurnal are in like manner traceable to heat. Those of longer period depend on causes less easy to ascertain.

(For more full information as to the barometer and its uses, see "Smithsonian Miscellaneous Collections," vol. I., pp. 693, by PROF. GUYOT and J. W. C. COFFIN, 1862; also "Manual of the Barometer," by J. W. BELVILLE, London, 1849; also the "Smithsonian Annual Reports" of the

years 1855, 1856, 1859, and 1867. The report of 1856 has a detailed description of the construction of Green's Standard Barometer; that of 1867 contains an important memoir by Marshal VAILLANT on the horary variations. LOOMIS's "Meteorology," and REID's "Law of Storms" may also be consulted with advantage.) F. A. P. BARNARD.

Barometric Light. When an upright barometer is moved gently backward and forward from the vertical to an oblique position, so as to make the mercury oscillate in the tube through a range of a few inches, the Torricellian vacuum becomes lighted up, so as to be visible in the dark. This is called the *barometric light*, and is due to electricity arising from the friction of the mercury against the inner surface of the tube. The phenomenon may be exhibited on a large scale in the vacuum of an air-pump. The chief precaution is, that the mercury and the glass apparatus be quite dry; hence the experiment succeeds best in frosty weather.

Bar'ometz, sometimes called **Tartarian** (or **Scythian**) **Lamb,** the prostrate stem (rhizome) of a fern (*Aspidium Barometz*) which grows in salt plains near the Caspian Sea. It is covered with a shaggy, silky down, and has some resemblance to an animal. It was anciently believed to be half plant, half animal. It was also known as baranetz.

Bar'on, the title of the lowest degree of hereditary nobility in Great Britain and Ireland, is the next below that of viscount. The word was formerly used to include the whole English nobility, because all noblemen were barons. The distinction between the greater and lesser barons seems to have been made at an early period in most of the countries of Europe. The greater barons, who were the king's chief tenants, held their lands directly, or *in capite*, of the Crown; while the lesser held of the greater by the tenure of military service. The greater barons had a perpetual summons to attend the parliament or great councils of the nation. The practice of conferring the rank of baron by letters-patent, and as a mere title of honor apart from the possession of land, originated in 1387. Barons are sometimes created by writ, but this mode is nearly obsolete, and creation by patent is the surest way of ensuring the hereditary character of the peerage. On great occasions a baron wears a coronet adorned with six pearls set at equal distances on the chaplet. He is addressed as "my lord" or "your lordship," and is styled "right honorable." In France and Germany and in many other countries a baron is a nobleman next in rank to a count. Formerly in Scotland a baron was not necessarily a nobleman, but was a holder of land in what was called baronial right. There are at present several classes of barons: (1) barons of England; (2) barons of Great Britain; (3) barons of the United Kingdom (all the members of these classes have seats in the House of Lords); (4) barons of Scotland; and (5) barons of Ireland; the members of the two latter classes having no seat in the House of Lords unless chosen as representative peers. There are, moreover, life peerages, rarely conferred, which do not, at present, entitle the holder to a seat in the House of Lords. Certain judges of the exchequer courts of England and Ireland are called barons of the exchequer.

Baron (BERNARD), a distinguished French engraver, born at Paris in 1700, was a pupil of Nicolas Henri Tardieu, and resided for a number of years in England, where he died at London in 1762. He engraved several plates for J. A. Crozat's collection of prints. His style is coarse in mechanical execution, but his merits are acknowledged to be great. His works should not be confounded with those of John Baron (or Baronius) of Toulouse (hence called *Tolosano*), who was born in 1631, and lived at Rome, where he engraved historical scenes and portraits.

Baron, originally **Bayron** (MICHAEL), one of the greatest of French actors, was born at Paris Oct. 8, 1858. His father, a leather-merchant, having fallen in with a very beautiful travelling actress, left his business and entered the same troupe. The actress became the mother of Michael Baron. Going to Paris in after years, Michael, a very handsome young man, attracted the attention of the great Molière, who became his friend and instructor. Baron rose rapidly to the first rank of his profession, and was as eminent in tragedy as in comedy. He was with justice called "the honor and the marvel of the French stage." As a writer of plays he was very prolific. His beauty and talents caused his name to be mixed up with much of the gross scandal of the time. His personal vanity was very great. He used to say, "Every century might produce a Cæsar, but it took ten thousand years to produce one Baron." It is commonly reported that he died upon the stage, but in reality, though stricken with apoplexy on the stage, he lived after that event more than two months. He died at Paris Dec. 3, 1729.

Baron (PIERRE), called **Peter Baro,** a native of Etampes, in France, became a Protestant, and escaped to England in Queen Elizabeth's time. In 1575 he was appointed Lady Margaret professor of divinity at Cambridge, an office which he held till 1596, notwithstanding the strong opposition which his doctrinal teachings encountered. He was an opponent of Calvinism, then strongly maintained at the university and by the archbishop of Canterbury—Dr. John Whitgift. Baron was therefore subject to many vexatious annoyances, and was openly accused of heresy and of endeavoring to carry the university back to Romanism. He held to his course with great persistency, and even had the courage to preach against the famous Lambeth Articles, which had been drawn up to oppose him and his party. He was consequently forbidden to engage in polemics, and was made so uncomfortable that he was obliged to resign his position (1596) and retire to London, where he soon after died, leaving a number of Latin treatises, since published in English.

Baron and Femme, in heraldry, is the term used to designate the bearing by which the arms of husband and wife are carried per pale, or marshalled side by side on the same shield. The husband's arms are always carried on the dexter side.

Bar'onet, a diminutive of baron, is a title of honor which is hereditary. A baronet is the next lower than a baron, compared with whom, however, he is very inferior in rank. Baronets were first created in 1611 by James I., whose object was to raise money. The creation of baronets is limited only by the will of the sovereign, who confers the rank either by patent or by writ. A baronet is entitled to the prefix *Sir* to his name, and has precedence of all knights except bannerets, knights of the Garter, and privy councillors. Baronets are of four classes—those of Ulster, England, Nova Scotia (or Scotland), and the United Kingdom.

Baro'nius (CESAR), a Roman Catholic church historian, born Oct. 30, 1538, was a disciple of Saint Philip of Neri. He became cardinal and librarian of the Vatican. His celebrated "Ecclesiastical Annals" (Rome, 1588–93, 12 vols. fol.; Antwerp, 1589–1603; Mayence, 1601–05, rev. ed.) was a work of twenty-seven years. Baronius was a brilliant dialectician and stylist, but has been charged with many blunders, owing to his ignorance of Greek. Notwithstanding these errors and his strong partisan spirit, the "Annals" of Baronius are conceded to possess very great learning and value. They were written in reply to the Magdeburg Centuriators. He published a number of other works, characterized by the same faults and the same great learning as marked his "Annals." Died June 30, 1607.

Bar'ony, the lordship, honor, or fee of a baron. In England, manors were formerly called baronies, and a barony was a manorial and hereditary right arising out of land known to the law both of England and Scotland. In the Scottish law a right of barony is a right in relation to lands which have been erected or confirmed by a clause in crown charters, making the grant in *liberam baroniam*. It involved civil and criminal jurisdiction, but the clause in crown charters erecting baronies has become obsolete. The divisions of the Irish counties corresponding to the English hundreds, wapentakes, and wards, are called baronies.

Baro'zzo, or **Barozzio** (JACOPO), an illustrious Italian architect, was born at Vignola, near Modena, in 1507, from which fact he is often called **Vignola.** He studied painting at Bologna, but was so fascinated by the study of perspective that he abandoned painting for architecture, in which art he attained a great reputation. He was employed by an association of antiquaries in Rome to take measurements and execute models of the remains of the ancient statuary of Rome. These models were afterwards cast in bronze. In 1541 he went to Paris to superintend the casting of his copies, and while there was engaged in architectural pursuits. In 1550 he became architect to Pope Julius III. He designed the splendid palace of Cardinal Farnese (Caprarola), in which were placed some of his own pictures. He was engaged upon this work from 1555 to 1573. Meanwhile, upon the death of Michael Angelo in 1564, he succeeded the latter as architect of St. Peter's church. He published several valuable works on architecture, among which the best known is "Regole de' cinque ordini d'architettura" (1563), illustrated by engravings. This was long the standard authority in classic architecture. He was one of the designers of the Escorial Palace in Spain. His buildings show a happy combination of dignity and gracefulness. He died at Rome July 7, 1573.

Barquesime'to, a province of Venezuela, is bounded on the N. by Coro, on the E. by Carabobo, on the S. by Barinas and Trujillo, and on the W. by Trujillo and Maracaibo. The province of Yuracuy has lately been detached from this province, but nothing definite being known of

the boundaries, etc. of Yuracuy, we treat of the two as one. Area, 9350 square miles. The southern part of the province is mountainous, while the N. is level. The largest river of the province is the Tocuyo, which, however, does not become navigable until it enters the province of Coro. The soil is poor, but the climate, with the exception of one or two districts, healthy. The chief occupation of the inhabitants is agriculture, and the chief products are tropical fruits, wheat, coffee, cacao, indigo, and sugar. Chief town, Barquesimeto. Pop. 313,881.

Barquesimeto, a city of Venezuela, capital of the above province, and situated on a river of its own name, 175 miles W. S. W. of Caracas. It was almost destroyed by an earthquake in 1812, previously to which it had about 15,000 inhabitants. It has a college, and is situated in a fertile and well-cultivated district. Present pop. about 10,000.

Barr, a town of Germany, in Lower Alsace, 23½ miles by rail S. W. of Strasburg, has numerous vineyards. Pop. in 1871, 5651.

Barr, a township of Daviess co., Ind. Pop. 2758.

Bar'ra, a town of Italy, 3 miles E. of Naples, of which it is a pleasant suburb. It has many fine residences or country villas. Pop. 7656.

Bar'racks, buildings for the habitation of troops. The word is sometimes applied to any collection of buildings densely occupied by human beings.

The experience of the civil war in the U. S. has demonstrated that ventilation, abundance of pure air, is more important to the health of man than complete protection from cold and heat. While soldiers camped in small and crowded tents, kept closed to exclude the cold, suffered from typhoid fevers, the sick and wounded in hospital tents and in the light and open wooden barracks established as general hospitals, recovered more rapidly and certainly than those in what are called better buildings, closer and more substantial.

There are few large masonry barracks in the U. S., such as are found on the continent of Europe in almost every large town. Most of the military posts are beyond the frontier which separates the country of civilization and cultivation from the region occupied, or rather traversed, by the nomadic Indian tribes, and the scarcely less nomadic white miner and hunter. A very few of these posts built on the open prairies, where timber is scarce and costly, have been constructed of stone or brick; more are of sun-dried bricks, called by the Mexicans *adobes*. But the greater part of them are of wood—log houses in the timbered country, light frames covered with boards in the prairies. The open joints of the board wall-coverings and roofs and floors make it impossible to exclude fresh air, and they ensure a circulation of air, notwithstanding the efforts of the occupants of the building to close all ventilating openings.

The principal and more permanent barracks of the U. S. are Madison Barracks, Sackett's Harbor, N. Y.; the Citadel at Charleston; the barracks at Pensacola; Jackson Barracks, New Orleans, La.; Jefferson Barracks, St. Louis, Mo., now used as an arsenal; Baton Rouge Arsenal, and Mount Vernon Arsenal, Mississippi, now used as barracks for the army; Oglethorpe Barracks, Savannah; Benicia Barracks, California; Carlisle Barracks, Pa.; Omaha Barracks, Omaha; Fort Leavenworth, Kan.; Mobile Barracks, Mobile; Newport Barracks, Ky.; Presidio of San Francisco, Cal.; Ringgold Barracks, and Fort Brown, on the Rio Grande, Tex.; and Plattsburg Barracks, Lake Champlain. In the official list of the quartermaster's department there are 231 military posts, at all of which there are barracks, either owned or rented by the U. S. The army occupies about 5000 buildings.

At most of the U. S. navy-yards there are barracks for the marines, generally of masonry. Among them are the marine barracks of Washington, Charlestown, Brooklyn, Pensacola, and Benicia.

Since the Revolution, Paris has been enriched with very fine buildings as barracks. Those of the Prince Eugène, the Napoleon Barracks, and the new barracks on the Ile de la Cité, are noble and beautiful buildings. But it seems impossible to so arrange these great buildings as to secure thorough and satisfactory ventilation, and without fresh air, and disturbed by the movement which must take place night and day among large bodies of men occupying large rooms, these palaces are not believed to have as low rate of mortality as the temporary cheap structures in which the U. S. army lives on the frontier.

There are large barracks in all the great European capitals. Stuttgart, St. Petersburg, Paris, Naples, Rome, are noted for the beauty and extent of their barracks. The Museo Borbonico at Naples was built for a cavalry barrack; in it are now collected the many remains of Roman and Greek art unearthed at Pompeii and Herculaneum.

The Romans, who conquered the known world and held it by military occupation, built strong barracks wherever they established a permanent post. They had no firearms, and a small garrison depended upon the strength of their walls to resist the attacks of barbarians. The remains of such barracks, nearly perfect, have been found of late years at ancient Roman stations in the wilderness of Syria and Palestine. While the Roman legionary was trained and practised at hard work, he did not hesitate to use in all such constructions the forced labor of his captives of whatever rank or station. Our troops are obliged generally to build their own barracks, and, armed with rifles of long range, they depend upon superior knowledge and discipline, and seldom fight the savages from behind their barrack-walls.

There are two uses to which barracks are put: one is protection during a siege and bombardment from the missiles of the enemy; the other, and far more constant use, is protection mainly from the weather.

Many of the sea-coast forts of the U. S. make ample provision in vaulted casemates for the garrison during a siege, but such barracks in the climate of the coasts of the U. S. should never be occupied in time of peace. They are dark, damp, ill-ventilated, and unhealthy, and provision should be made for shelter outside the ramparts for the peace garrison in all cases. In the climate of Spain and Italy, of the West Indies, and of Mexico, it is probable that the custom of the tropics of living in rooms roofed with earth or masonry has not such disadvantages as farther N.

European practice allows from 420 to 1200 cubic feet of space per man in barracks and hospitals; and the latter is better than the former; but in practice the air-space is limited by the appropriations which the government grants for barracks and quarters for troops. Thorough drainage of the buildings and of the sites is essential to health. Temporary cantonments should never remain long in one place. The troops should remove to fresh ground, and the old site should not be reoccupied until time and frost have thoroughly destroyed the effete animal and vegetable matter which collects about any large body of men.

All barracks are liable, on any temporary increase of the garrison, to overcrowding. The "Regulations" of the U. S. army give to every six soldiers from 225 to 256 square feet of floor as the post is N. or S. of the 38th degree of latitude. This area, with a height of roof to average twelve feet, gives to each man 450 to 512 cubic feet of air-space. In a room intended to be occupied by thirty men, at least 60,000 cubic feet of fresh air per hour should be admitted from the outside, and as much more as can be borne without inconvenience. But all ventilating arrangements are liable to be obstructed by those for whose benefit they are intended, unless made on the most extensive and elaborate scale, and placed entirely beyond their control. A man feels the cold sensation from a draught more distinctly than the headache or oppression resulting from too close and impure an atmosphere. He knows that if he stops the ventilating inlet near him he will get rid of the draught. He does not realize that at a future time his health may break down as a consequence of this interference with ventilation. Practically, therefore, the most efficient barrack ventilation, except in the palaces of masonry built in Europe and ventilated by steam-power, is that inseparable from the imperfect construction of the building itself. These defects, beyond the skill and power of the soldier to remedy, save his health by supplying him continually with fresh air against his will.

The War Department has of late years adopted an iron barrack-bunk to be occupied by a single man, but which can be piled three tiers in height, so as to give space for circulation during the day, and has abolished the use of the two-story double wooden bunks in which soldiers formerly slept.

Books of reference: "Reports of the British Barrack Commission," London, 1861; "Circular Nos. 3 and 4 of the Surgeon-General of the United States;" "Reports on Barracks and Hospitals;" "Outline Description of Military Posts and Stations," published in 1871 by the quartermaster's department. M. C. Meigs, U. S. A.

Bar'rackpore, or **Barrackpoor,** a town and military cantonment of British India, on the left (or E.) bank of the Hoogly, about 15 miles above Calcutta. It contains the country residence of the governor-general of India, and many elegant mansions of the European citizens of Calcutta, who are attracted by the salubrity of the place. The adjacent country is covered with beautiful forests and a luxuriant tropical vegetation. Here is a noble park of 250 acres, which exhibits an admirable specimen of landscape-gardening. Barrackpore was called the cradle of the Sepoy mutiny of 1857. Several regiments of native troops were stationed here. They objected to biting off the ends of the cartridges for the Enfield rifle, believing

the paper to be polluted with animal fat. A Sepoy named Mungal Pandy wounded an officer (in Feb., 1857), whose blood was the first that was shed by the mutineers.

Barracu'da, or **Barracou'da,** a kind of fish (*Sphyrona Barracuda*) of the Atlantic Ocean. It is from six to ten feet in length, and very voracious. Its flesh is eatable, except at certain seasons, when, from some unknown cause, it becomes poisonous. It is common about the Bahama Islands.

Barrafran'ca, a town of Sicily, in the province of Caltanisetta, 11 miles S. E. of Caltanisetta. P. in 1861, 8706.

Barras, de (Paul François Jean Nicolas), Count, a French Jacobin and regicide, born in Provence June 30, 1755. He was chosen a deputy to the States-General in 1789, and a member of the National Convention in 1792. He acted with the party called the Mountain, voted for the death of the king, and joined the enemies of Robespierre on the 9th Thermidor, 1794, in which crisis he was commander of the national guard. On the 13th Vendemiaire (Oct. 5, 1795), he was again appointed commander of the troops by the Convention. With the aid of Bonaparte he defeated the royalist insurgents of Paris on that day. He was one of the first five members of the Directory appointed in Nov., 1795, and acted a prominent part in the conflict of the 18th Fructidor, 1797, after which he was perhaps the most powerful of the Directors. He was venal and dissolute, and abused his power. His political career was ended by the ascendency of Bonaparte in 1799. Died Jan. 29, 1829. (See Thiers, "History of the French Revolution;" C. Doris, "Amours et Aventures du Vicomte de Barras," 4 vols., 1816.)

Bar'ratry [from the Old Fr. *barater*, to "deceive"], in law, used in various branches with different significations:

1. *Marine Insurance.*—An act committed by the master or mariners of a ship for some unlawful or fraudulent purpose, contrary to their duty to the owners, whereby an injury is sustained. Under this definition an act of negligence would not be barratry, and such is the rule in England. The French writers use the word in a broader sense, and include in it gross negligence, without reference to the motive. Some of the American cases follow this view. The general rule is, that fraud is an element in an act of barratry, though the word *fraud* is employed in a broad sense to include acts done in opposition to the owner's instructions, and yet intended for his benefit, such as sailing out of port without payment of the duties, disregard of an embargo, or breach of a blockade. Insurance is frequently made specifically to include losses occasioned by acts of barratry, and sometimes with the exception that the master is not the owner of the vessel. Barratrous acts of a serious kind are declared to be crimes by the laws of Congress. Instances are the act of piratically or feloniously seizing or running away with the vessel or cargo, or voluntarily delivering the vessel into the hands of pirates. These are capital offences.

2. *In Criminal Law.*—The act of stirring up suits and quarrels. A person practising such acts is called a "common barrator," or, in the language of Lord Coke, a common mover and maintainer of suits in disturbance of the peace, etc. A person cannot be a barrator in respect of one act only. It must appear that he is a *common* barrator. The subject is usually regulated by statute.

3. In Scotch law, barratry is the crime of a judge who is induced by bribery to render a judgment. T. W. Dwight.

Bar're, in Worcester co., Mass., 21 miles N. W. of Worcester, is on the Ware River and Massachusetts Central R. Rs. It has a national bank, savings bank, an institute for feeble-minded children, several large mills and shops, five churches, important manufactures, and one weekly newspaper. It was named in honor of Colonel Isaac Barré. Principal business, farming and dairying. Pop. 2572. D. Lyman Crandall, Ed. "Gazette."

Barre, a township of Orleans co., N. Y. Pop. 6756. It contains the village of Albion (which see).

Barre, a post-township of Washington co., Vt., 6 miles S. E. of Montpelier. It has a national bank, an academy, is the seat of Goddard Seminary, and has manufactures of agricultural tools, castings, doors, sash, blinds, etc. P. 1882.

Barre, a township of La Crosse co., Wis. Pop. 1392.

Barré (Col. Isaac), born in Dublin, Ireland, in 1726, of French parents, entered the British army, where he served with great distinction, receiving a wound at Wolfe's victory at Quebec (1759), in consequence of which he ultimately became blind. He entered the British Parliament in 1761, where for years he nobly defended the rights of the American colonists. Died in London July 20, 1802.

Bar'ree, a township of Huntingdon co., Pa. P. 1237.

Barréges, or **Baréges,** a celebrated watering-place of France, in the department of Hautes-Pyrénées, 23 miles S. of Tarbes, is 3240 feet above the level of the sea. Here are warm sulphurous springs having a temperature of about 104° to 122° F., which are esteemed efficacious in cases of scrofula, gout, etc.

Bar'rel, a large wooden vessel for holding liquids or solids, is bound with hoops, and formed of staves, which are wider in the middle than at the ends, and have bevelled edges, which render the joints tight. Each end of the barrel is closed by a circular head. The arched arrangement of the staves enables it to resist pressure from without. The term is also applied to the quantity contained by a barrel, which varies for different substances. A barrel of flour in the U. S. is equal to 196 pounds, and a barrel of pork or beef contains 200 pounds. In wine measure, 31½ gallons make a barrel. A barrel of beer in England is equal to 36½ imperial gallons.

Bar'rel Or'gan, a musical machine in which the music is produced by a barrel or cylinder set with pins or staples, which, when driven round by the hand, open the valves for admitting the wind to the pipes. The number of tunes which a single barrel organ can play is small. Barrel organs are portable, and are mostly used by performers in the streets, called organ-grinders. A street organ usually costs from $150 to $240.

Bar'ren, a county in the S. of Kentucky. Area, 500 square miles. It is bounded on the S. W. by the Big Barren River. The surface is undulating, the soil fertile. Tobacco, grain, and wool are extensively raised. Cavernous limestone underlies this county. The Louisville and Nashville R. R. passes through the N. W. part. Capital, Glasgow. Pop. 17,780.

Barren, a township of Independence co., Ark. Pop. 887.

Barren, a township of Jackson co., Ark. Pop. 290.

Barren Creek, a township of Marion co., Ark. P. 320.

Barren Creek, a township of Wicomico co., Md. P. 1572.

Barren Island, a sandy tract of land at the entrance to Jamaica Bay, on the S. shore of Long Island, is a part of Gravesend township, King's co., N. Y. It has fat-rendering establishments for utilizing the offal of New York City.

Bar'rett, a township of Monroe co., Pa. Pop. 930.

Barr'head', a manufacturing town of Scotland, in Renfrewshire, 7 miles S. W. of Glasgow. It has cotton-mills, a machine-shop, print-works, bleaching-works, etc. P. 6069.

Barricade, a military barrier or defensive work, employed to obstruct the passage of an enemy through a road or a street of a city, or to protect troops against the fire of the enemy. Such works are formed of trees, wagons, paving-stones, chains, palisades, etc. They have been often used in popular revolts and street-fights, especially by the insurgents of Paris. In 1588 the Catholic faction raised barricades in Paris against Henry III., who was compelled to save himself by flight. A great number of barricades were erected in Paris by the popular party in the revolution of July, 1830, when Charles X. was dethroned. In June, 1848, the streets of Paris were again obstructed by barricades, and a bloody battle was fought between the government of Cavaignac and the Socialists or Communists, who were defeated. In order to counteract such operations, Napoleon III. widened and macadamized the principal streets of his capital, but barricades were again employed by the Communist insurgents in the spring of 1871.

Bar'rie, the capital of Simcoe co., Ontario (Canada), is at the W. extremity of Lake Simcoe, and on the Northern Railway, 65 miles N. N. W. of Toronto and 30 miles S. E. of Collingwood. It has excellent schools, a large trade, manufactures of woollen goods, and three weekly papers. Steamboats ply on the lake. Pop. in 1871, 3398.

Bar'rier Treat'ies, the name given to several treaties between England and foreign powers; the first between England and the Netherlands, negotiated by Lord Townsend in 1709. The Dutch pledged themselves to maintain the queen of England's title and the Protestant succession, while the English engaged to assist the Dutch in preserving their barrier-towns. The second was concluded between the same powers at Utrecht in 1713. The third was signed at Antwerp in 1715, between England, the Netherlands, and the emperor Charles VII.

Bar'ringer (Daniel Moreau), an American politician, born in North Carolina in 1807, graduated at the State University in 1826, and became a lawyer. He represented that State in Congress for six years (1843–49), and was American minister to Spain from 1849 to 1853. He was a delegate to the national union convention at Philadelphia in 1866. Died Sept. 1, 1873.

Bar'ringer's, a township of Iredell co., N. C. P. 998.

Bar'ring Out, a practice formerly common in English schools, consisted in the scholars taking possession of the

building and fastening the doors against the master. It seems to have been a rule that if the scholars could sustain a siege for three days, they were entitled to dictate terms regarding the holidays, hours of recreation, etc. for the ensuing year. If the master succeeded in forcing an entry, the insurgents were at his mercy. The masters, in most cases, appear to have acquiesced good-humoredly, but some exerted all their strength and ingenuity to storm the garrison. It is a singular fact that the scholars of Witton school, in Cheshire, were in 1558 directed by the statutes drawn up by the founder, Sir John Deane, to observe the practice: "To the end that the schollars have not any evil opinion of the schoolmaster, nor the schoolmaster should not mistake the schollars for requiring of customs and orders, I will that upon Thursdays and Saturdays in the afternoons, and upon holydays, they refresh themselves; and a week before Christmas and Easter, according to the old custom, they bar and keep forth the school the schoolmaster, in such sort as other schollars do in great schools."

Bar'rington, a post-village of Barrington township, Shelburne co., Nova Scotia, on the Atlantic coast, has thriving fisheries, shipbuilding, and coasting trade. Pop. about 800.—BARRINGTON PASSAGE, another village of the same township, has extensive fisheries, and is connected with Cape Sable Island by ferry. Pop. about 500.

Barrington, a township of Cook co., Ill. Pop. 1490.

Barrington, a post-township of Strafford co., N. H. Pop. 1581.

Barrington, a post-village and township of Yates co., N. Y. It has a mineral spring of some reputation. P. 1506.

Barrington, a post-township of Bristol co., R. I. P. 1111.

Barringtonia'ceæ, a natural order of exogenous trees and shrubs, natives of tropical countries, have generally very beautiful flowers and foliage. The stamens are numerous and conspicuous. Some species bear an edible fruit, as the *Careya arborea,* an East Indian tree, and *Gustavia speciosa,* which grows in America. The *Barringtonia speciosa,* or *moordilla,* is a remarkable tree of Ceylon, having dark glossy leaves, and delicate white flowers with crimson tips. Each flower has nearly one hundred stamens.

Bar'rister, in law, a person admitted to plead at the bar, and to take upon him the protection and defence of clients. Such persons are admitted in England by voluntary societies existing for several centuries, called Inns of Court. A barrister differs from an attorney principally in this respect, that an attorney prepares a cause for hearing, and a barrister conducts the trial in court. In England, a barrister can maintain no action for his fees. His services are deemed to be honorary. He may, however, receive a retainer. In the U. S., the distinction corresponding to that in England of "attorney and barrister" is attorney and counsellor-at-law. The common practice is to admit the same person to both degrees in the legal profession. A counsellor may maintain an action for his fees, as well as an attorney. Both are under the control of the courts, and may be removed for misconduct. In order to encourage freedom of speech, counsellors are not answerable for matter spoken in a cause and pertinent to the subject under discussion, even though it may reflect upon the reputation of another and be false; though it would be otherwise if the false charge was not pertinent. In England, some of the barristers and sergeants-at-law are selected to be KING'S or QUEEN'S COUNSEL (which see).

Bar'ron, a county in the N. W. of Wisconsin, drained by the Red Cedar River and several creeks. Area, 1000 square miles. Wheat, oats, and potatoes are the chief crops. Capital, Barron. Pop. 538.

Barron, a post-village, the capital of Barron co., Wis., in a township of its own name, on the Vermilion River, 121 miles N. N. W. of La Crosse. Pop. of township, 538.

Barron (JAMES), an American naval officer, born in Virginia in 1768, served in the navy under his father, who was a "commodore of all the armed vessels of the Commonwealth of Virginia," was commissioned lieutenant in the U. S. navy in 1798, and in 1799 was promoted to be a captain. He was employed on sea-service in the Mediterranean and other waters until 1807, and had acquired a high reputation for seamanship and discipline when the affair of the Chesapeake cast a shadow over his life. On the 22d of June, 1807, the Chesapeake, bearing the pennant of Com. Barron, sailed from Hampton Roads for the Mediterranean. The English war-vessel Leopard preceded the Chesapeake several miles, keeping in sight until about 3 o'clock in the afternoon, when the former bore down upon and hailed the latter, informing Com. Barron she had a despatch for him. A boat being sent alongside, the message proved to be the instructions of Admiral Berkeley of the British navy to search the Chesapeake for deserters. This Com. Barron indignantly refused to permit, and he wrote to Captain Humphreys, commanding, that he knew of no deserters on the Chesapeake, and that his orders would not permit his men to be mustered by any other than their own officers. The lieutenant who had brought this despatch to Com. Barron returned to the Leopard, and shortly after this vessel opened fire on the Chesapeake, which proved to be entirely unprepared for battle. Her decks were covered with various objects, and it was with great difficulty her batteries could be got ready; and when ready everything necessary to serve them was found to be wanting. But one gun was discharged from the Chesapeake before she struck her colors. Three deserters were found on board, and taken to the Leopard, Com. Barron being permitted to retain his ship, with which he at once returned to Norfolk. This outrage caused the greatest excitement throughout the nation. Barron was court-martialed for neglect of duty, found guilty, and suspended from the service for five years. Although restored to his rank and placed in responsible positions ashore, he never again did sea-service. A long correspondence with Com. Decatur on the Chesapeake affair terminated in a duel between them at Bladensburg, Md., in 1820, in which both were severely wounded, Decatur mortally. Barron died at Norfolk, Va., April 21, 1851, being at the time of his death the senior officer in the U. S. navy.

Barron (SAMUEL), a commodore, a brother of the preceding, was born at Hampton, Va., Sept. 25, 1765. He commanded a squadron of ten vessels which waged war against Tripoli in 1805. Died Oct. 29, 1810.

Barron (SAMUEL), a native of Virginia, entered the U. S. navy in 1812, and received the regular promotions, becoming a captain in 1855. In 1861 he entered the navy of the Confederacy, and became an admiral. He was made prisoner at the capture of Forts Clark and Hatteras, Aug. 27, 1861.

Barros, de (JOÃO), one of the most eminent of Portuguese historians, born at Viseu in 1496. He was appointed governor of the Portuguese possessions in Guinea in 1522. His greatest work is entitled "Asia, or the History of the Discoveries and Conquests of the Portuguese in the East Indies" (1552–62). He wrote only three decades of this work, which was continued by Diego de Couto to the twelfth decade. This history is admired for elegance of style and other merits. Died Oct. 20, 1570. (See MANOEL SEVERIM DE FARIA, "Vida de João de Barras," 1624; BARBOSA MACHADO, "Bibliotheca Lusitana.")

Barrot (CAMILLE HYACINTHE ODILLON), a French statesman and advocate, born at Villefort in Lozère July 19, 1791. He practised law with distinction in Paris, and acted with the popular party in the revolution of 1830. About the end of that year he was elected to the Chamber of Deputies, in which he was a leader of the opposition, and advocated electoral reform. During the revolution of 1848 he supported the proposition to appoint the duchess of Orleans as regent. He was minister of justice in the first cabinet of Louis Napoleon, from Dec., 1848, to Sept., 1849.—His brother, VICTORIN-FERDINAND, born Jan. 10, 1806, practised law with success. He was minister of the interior from Oct., 1849, to Mar., 1850, and became a senator in 1853.

Bar'row, a river of Ireland, rises in Queen's county, on the N. E. slope of the Slieve Bloom Mountain. It flows in a general southward direction, passes by Carlow and New Ross, divides the counties of Kildare, Carlow, and Wexford from the counties of Queen's and Kilkenny, and, after uniting with the Suir, enters the sea through Waterford harbor. It is about 100 miles long, and is next in importance to the Shannon among Irish rivers. It is navigable for ships of 300 tons to New Ross, 25 miles from its mouth.

Barrow [from the Anglo-Saxon *beorg,* a "hill or mound," allied to the Ger. *Berg,* a "hill"], a name of the artificial mounds which are found in many countries, and which were erected in ancient times in honor of eminent persons or for monumental purposes. They are formed of earth or stones, and contain in some cases human bones, with armor and utensils. In Great Britain there are numerous barrows, which are supposed to have been raised before the island was conquered by the Romans. One of the largest barrows in Europe is Silbury Hill, in Wiltshire, which has a vertical height of 170 feet and covers 5 acres. Many artificial mounds occur in the U. S., as at Grave Creek, W. Va., and near Marietta, O.; also in Central America.

Barrow (ISAAC), D. D., F. R. S., an eminent English pulpit orator and mathematician, born in London Oct., 1630. He graduated at Cambridge as M. A. in 1652, and became professor of Greek in that place in 1660. He was appointed Lucasian professor of mathematics in 1663, but he resigned that chair in favor of his pupil, the illustrious Newton, in 1669. In 1672 he was appointed master of Trinity College, Cambridge. He published, besides other

able works, "Lectiones Opticæ" (1669) and "Lectiones Geometricæ" (1670). His reputation as a theologian rests chiefly on his sermons, which were edited by Dr. Tillotson (3 vols., 1685). They are very remarkable specimens of clear and exhaustive argument. "The sermons of Barrow," says Hallam, "display a strength of mind, a comprehensiveness, and fertility which have rarely been equalled." Died May 4, 1677. His personal character was noble. (See ARTHUR HILL, "Life of Barrow," prefixed to his collected works, 1685; WARD, "Lives of the Professors of Gresham College.")

Barrow (Sir JOHN), BART., F. R. S., an English traveller, born in Lancashire June 19, 1764. As secretary to Lord Macartney he went to China in 1792, and to the Cape of Good Hope in 1797. He was secretary to the admiralty for nearly forty years, and rendered many services to geographical science by promoting scientific expeditions. He was the chief founder of the Geographical Society. Among his works are "Travels in Southern Africa" (2 vols., 1801–03), and a "History of Voyages in the Arctic Regions" (1818). Died Nov. 23, 1848. (See his "Autobiographical Memoir," 1847.)

Bar'row-in-Fur'ness, a seaport and important town of England, in Lancashire and on the Irish Sea, 18 miles W. N. W. of Lancaster. It is on the peninsula of Furness, and is the western terminus of a railway which extends to Dalton, and connects Barrow with the whole railway-system of England. It is separated by a narrow channel from Barrow Island, and has a good harbor, formed by the island of Walney, which is 8 miles long. This place, which about 1845 was only a small fishing-village, derives its prosperity from rich mines of iron ore (red hematite) and manufactures of iron and steel, and it has recently increased with great rapidity. In 1867 the Barrow Hematite Steel Company had eleven blast furnaces in operation, and the quantity of ore taken from the mines was estimated for that year at 400,000 tons. This ore yields about 57 per cent. of iron. The steel-works of Barrow are said to be the largest Bessemer steel-works in Britain. Nearly 20,000 tons of slate are annually quarried in the vicinity. Barrow has a town-hall, a public library, and numerous churches. Large sums of money have been expended in converting the channel between the town and Barrow Island into docks, and it is probable that Barrow will become an important commercial city. Pop. in 1871, 17,992.

Barrow Strait, the passage leading from Baffin's Bay into Melville Sound. Its average width is about 30 miles.

Bar'rows (ELIJAH PORTER), S. T. D., born at Mansfield, Conn., Jan. 5, 1805, graduated at Yale in 1826, taught school in Hartford 1826–31, was ordained in 1832, pastor of the first Free Presbyterian church, New York City, 1835–37, professor of sacred literature in Western Reserve College 1837–52, and of Hebrew language and literature at Andover Theological Seminary 1853–66. In 1872 he entered the same professorship in Oberlin Theological Seminary. He has published a "Memoir of Evertin Judson" (1852), "Companion to the Bible" (1869), "Sacred Geography and Antiquities" (1872). He was one of the authors and editors of the "Bible with Notes" (American Tract Society), and has published twenty-five articles in the "Bibliotheca Sacra."

Barr's Store, a post-township of Macoupin co., Ill. Pop. 999.

Barrun'dia (JOSÉ FRANCISCO), a statesman, born in Honduras in 1779, raised the standard of revolt against the Spanish government, and was chosen in 1829 president of the republic. As a member of the first republican assembly in 1824, he had introduced and carried a decree for the abolition of slavery. In 1854 he was minister to the U. S., and died Aug. 4, 1854, in New York City.

Bar'ry, a county of S. W. Central Michigan. Area, 576 square miles. It is intersected by the Thornapple River. The surface is undulating, and diversified by many small lakes, prairies, and forests of ash, sugar-maple, beech, etc. The soil is productive. Dairy products, wool, wheat, and corn are largely grown. The county is intersected by the Grand River Valley R. R., a branch of the Central R. R. Capital, Hastings. Pop. 22,199.

Barry, a county of Missouri, bordering on Arkansas. Area, 700 square miles. The White River of Arkansas flows through the S. E. part. The surface is hilly; the soil is partly based on limestone, and is mostly fertile. Grain, tobacco, and wool are raised. Lead is found here. Capital, Cassville. Pop. 10,373.

Barry, a city and township of Pike co., Ill., on the Hannibal and Naples R. R., 26 miles S. E. of Quincy, in a fine agricultural region. It has one weekly newspaper and a heavy trade in grain. Pork-packing is an important industry. Pop. of township, 2496. H. C. COBB, ED. "ADAGE."

Barry, a township of Barry co., Mich. Pop. 1297.

Barry, a post-township of Schuylkill co., Pa. P. 950.

Bar'ry (JAMES), an historical painter, born at Cork, Ireland, Oct. 11, 1741, was patronized by Edmund Burke. He passed about five years at Rome, and became a member of the Royal Academy of London, but he was expelled from the same in 1797 on account of his irritable temper. His masterpiece is "The Victors at Olympia." Died Feb. 22, 1806. (See CUNNINGHAM, "Lives of Painters and Sculptors;" "Edinburgh Review" for Aug., 1810.)

Barry (JOHN), COMMODORE, an American naval officer, born in Ireland in 1745, emigrated to America about 1760. He became commander of a U. S. frigate in 1776, and captured the English vessel Atalanta in May, 1781. Died Sept. 13, 1803.

Barry (JOHN S.) was born in Vermont in 1802. He studied law, but became a merchant of Constantine, Mich., where he removed in 1832. He became a prominent Democratic politician, and was governor of Michigan (1842–46 and 1850–52). Died Jan. 15, 1870.

Barry (MARTIN), M. D., F. R. S., an English physiologist, born in Hampshire in Mar., 1802. He graduated as M. D. in Edinburgh in 1833, and was chosen a fellow of the Royal Society in 1840. His most important work is "Researches in Embryology," for which he received the gold medal of the Royal Society of London. Died April 27, 1855.

Barry (Sir CHARLES), a distinguished English architect, born at Westminster in May, 1795. He visited Italy, Greece, and Egypt about 1818. He designed the Manchester Athenæum and the grammar-school of Edward VI. at Birmingham. In 1841 he became a royal academician. His design for the new Houses of Parliament was preferred to those of his competitors, and the work was commenced in 1840. He died in 1860. (See a "Memoir of Sir Charles Barry," by his son, the Rev. ALFRED BARRY, 1867.)

Barry (PATRICK), born near Belfast, Ireland, May, 1816, received a good English education, and devoted some years to teaching in one of the national schools. He arrived in New York May, 1836, and became clerk for Prince & Sons, nurserymen of Flushing. He removed to Rochester, N. Y., in 1840, and entered into the nursery business in partnership with George Ellwanger. The nurseries of Ellwanger & Barry are now the most extensive in the world. From 1844 to 1852 Mr. Barry edited the "Genesee Farmer;" from 1852–54, "The Horticulturist." In 1852 he published "The Fruit Garden," still a standard authority on pomological matters.

Barry (WILLIAM FARQUHAR), a distinguished American officer, colonel of the Second Artillery and brevet brigadier-general U. S. army, born Aug. 18, 1818, in New York City, graduated at West Point in 1838. His first active services were in the war against the Indians in Florida, 1852–53, when he was advanced to a captaincy. In the Mexican war he acted as aide-de-camp to Maj.-Gen. Worth. He served in the difficulties with the Indians in Dakota in 1856, and took part in the Utah expedition, 1858. When the civil war broke out he was appointed chief of artillery of the Army of the Potomac, with the rank of major and brigadier-general of volunteers. His gallant and meritorious conduct in the capture of Atlanta won him the brevet titles of colonel U. S. army and major-general of volunteers, Sept. 1, 1864. Mar. 13, 1865, he was brevetted brigadier-general U. S. A. for gallant services in the campaign terminating in the surrender of the army under Gen. J. E. Johnston, and was made brevet major-general U. S. A. in 1865. Gen. Barry organized the entire artillery of the Army of the Potomac, and served in the field with that army as chief of artillery from Mar., 1862, to Sept., 1862, participating in the siege of Yorktown and the Seven Days' battles ending with Malvern Hill. He subsequently commanded the artillery serving in the defences of Washington 1861–63, and served as chief of artillery in the armies commanded by Gen. Sherman. He has been a member of various boards, and after the war was assigned to the command of the northern (lake) frontier for the preservation of the national neutrality; and in 1867 appointed to command the U. S. Artillery School at Fortress Monroe, which post he now occupies. Gen. Barry is the author of "Engineer and Artillery Operations of the Army of the Potomac, A. D. 1861–62," in conjunction with the writer, and "A System of Tactics for the Field Artillery of the U. S.," in conjunction with Maj.-Gens. W. H. French and H. J. Hunt. J. G. BARNARD, U. S. A.

Barry (WILLIAM TAYLOR), born in Lunenburg, Va., Feb. 5, 1784, graduated at William and Mary College in 1803, became a lawyer, was member of Congress from Kentucky (1810–11), served in the war of 1812, was U. S. Senator (1814–16), was in turn a judge, lieutenant-governor,

State secretary, and chief-justice of Kentucky; postmaster-general under Jackson (1828–35), and died in Liverpool Aug. 30, 1835, while on his way to Spain as U. S. minister.

Barry, du (Marie Jeanne Gomart de Vaubernier), Countess, a mistress of Louis XV. of France, born Aug. 9, 1746, had a great influence in public affairs. She was guillotined during the Reign of Terror, Dec. 3, 1793. (See "Histoire de France pendant le dix-huitième Siècle," by de Lacretelle.)

Bar'rytown, a post-village of Red Hook township, Dutchess co., N. Y., on the Hudson River R. R., 94 miles N. of New York. It has an important trade. Pop. 248.

Bars, a county of Northern Hungary. Area, 1032 square miles. With the exception of a small part in the S., the country is mountainous, and is traversed by the Gran and the Zsitva. The soil of the plain in the southern part is very fertile, and produces chiefly grain. Pop. in 1869, 137,191. Chief town, Kremnitz.

Bar-sur-Aube [Lat. *Bar'rum ad Al'bulam*], an ancient town of France, in the department of Aube, on the river Aube, 33 miles by rail E. S. E. of Troyes. It has a trade in wine, hemp, grain, and wool. The allied sovereigns held a council here Feb., 1814, and here, in the same year, occurred two battles between the allies and the French. Pop. 4809.

Bart, a post-township of Lancaster, co., Pa. Pop. 1432.

Bart, or **Barth** (Jean), a French naval hero, was born at Dunkirk in 1651. He became the captain of a privateer, and fought against the Dutch. Having performed several bold and successful exploits, he was appointed a captain of the royal navy, and obtained command of a squadron in 1697. Died April 27, 1702. (See A. Richer, "Vie de Jean Bart," 1780; Vanderest, "Histoire de Jean Bart," 1841.)

Bart'enstein, a town of Prussia, in the province of Prussia, 35 miles S. W. of Königsberg. It has considerable manufactures. Pop. in 1871, 5880.

Bar'ter, the exchange of one commodity for another, is a method of trading sometimes practised by barbarous people and others who have no money or credit. Ships sailing to uncivilized countries often carry weapons, tools, or ornaments to be used in barter with savages. Farmers in the U. S. also take produce to country stores, and receive goods in exchange without the intervention of money. In law, barter or exchange is a contract for transferring property, the consideration being some other commodity.

Bart'fa, or **Bart'feld,** an old town of North Hungary, in the county of Saros, on the river Tepla, 20 miles N. of Eperies. It has hot baths, which are much frequented, and a considerable commerce in wine, brandy, linen, etc. Pop. in 1869, 5303.

Barth, or **Bardt,** a seaport-town of Prussia, in the province of Pomerania, on the Binnensee, 15 miles W. N. W. of Stralsund. It has shipbuilding docks, and a trade in grain and wool. Pop. in 1871, 5774.

Barth (Heinrich), an enterprising German explorer, born at Hamburg Feb. 16, 1821. He travelled in Northern Africa in 1845, after which he extended his explorations to Palestine, Arabia, and Asia Minor, and published "Wanderings along the Shores of the Mediterranean" (1849). He joined Richardson and Overweg in an expedition to Central Africa, but they died in 1851, and he explored that country alone for about five years. In 1863 he became professor of geography in Berlin. He published "Travels and Discoveries in Central Africa" (5 vols., 1857), which is a very valuable work. Died Nov. 25, 1866. (See "Edinburgh Review" for Jan. to April, 1859.)

Barthélemy (Auguste Marseille), a French satiric poet, born at Marseilles in 1796. He published a number of satires which had great success. Among them are the "Villéliade," directed against the ministry of Villèle (1826), "Napoleon in Egypt" (1828), and "La Némésis" (1831). The last named was the first of a series issued weekly for one year. Died Aug. 23, 1867.

Barthélemy (Jean Jacques), an eminent French antiquary, born near Aubagne, in Provence, July 20, 1716, was an uncle of the preceding. He learned the Greek, Hebrew, Arabic, and Chaldee languages, and became keeper of the royal cabinet of medals in 1753, after which he travelled in Italy and collected many medals. He wrote several treatises on numismatics and ancient inscriptions. His principal and most popular work is "Travels of Anacharsis the Younger in Greece" ("Voyage du jeune Anacharsis en Grèce," 4 vols., 1788), which is a very agreeable production. It has been translated into many languages. He was admitted into the French Academy in 1789. Died April 30, 1795. (See Mancini-Nivernais, "Essai sur la vie de J. J. Barthélemy," 1795; Villenave, "Notice sur les ouvrage de J. J. Barthélemy," 1821.)

Barthélemy Saint-Hilaire (Jules), a French scholar and journalist, born in Paris Aug. 19, 1805. He was an editor of the "National" and other liberal journals. In 1838 he became professor of Greek and Latin philosophy in the College of France in Paris. He translated into French the works of Aristotle (4 vols., 1839–44), and wrote several works, among which is "Du Bouddhisme" (1855). He was elected a member of the National Assembly in 1848. He was secretary to President Thiers in 1872–73.

Barthez, or **Barthès** (Paul Joseph), M. D., LL.D., an eminent French physician and writer, born at Montpellier Dec. 11, 1734. He became professor of medicine at that city in 1759, and removed to Paris in 1780, after which he was consulting physician to the king and a member of the council of state. He wrote, besides other works, "New Elements of the Science of Man" (1778). Died Oct. 15, 1806. (See Lordat, "Mémoires sur la vie de P. J. Barthez," 1818.)

Bar'tholin (Thomas), M. D., one of the most eminent physicians of his time, was born at Copenhagen Oct. 20, 1616. He became in 1648 professor of anatomy at Copenhagen, and wrote, among other works in Latin, one on the lymphatic vessels (the discovery of which he claimed), a treatise on the functions of the liver, and "Anatomia" (1641), which passed through many editions and obtained a high reputation as a text-book. The Bartholin family produced many eminent physicians. Died Dec. 4, 1680.

Barthol'omew, a bayou in Arkansas and Louisiana, rises in Jefferson county in the former State, flows nearly southward into Louisiana, and enters the Washita River at Washita City. It is navigable for steamboats for 250 miles.

Bartholomew, a county of the central part of Indiana, contains 400 square miles. It is drained by the Driftwood Fork of White River. The surface is partly hilly; the soil is fertile. Live-stock, grain, and tobacco are largely exported. It is intersected by the Jeffersonville Madison and Indianapolis R. R. Capital, Columbus. Pop. 21,133.

Bartholomew, a post-township of Drew co., Ark. Pop. 560.

Bartholomew, a township of Jefferson co., Ark. P. 459.

Bartholomew [Gr. Βαρθολομαῖος; Lat. *Bartholomæ'us*], Saint, one of the twelve apostles, supposed to be the same as the Nathanael mentioned in John i. 45–49. We have no authentic information respecting his labors or his death. According to tradition, he preached the gospel in India.

Bartholomew (Edward Sheffield), an American sculptor, was born at Colchester, Conn., in 1822. He practised dentistry for a time, and then learned painting, but afterwards became distinguished as a sculptor. From 1845 to 1848 he was in Hartford, and after two years spent in New York he went to Italy, where he died, at Naples, May 2, 1858. Some of his works are greatly admired. Among them are—"The Shepherd Boy," "Youth and Age," a monument to Charles Carroll, "Ganymede and the Eagle," etc.

Bartholomew Fair, a great English market held annually in West Smithfield, London, on the festival of St. Bartholomew (Aug. 24, old style). The charter of this fair was granted by Henry I. in 1133. It was originally connected with the Church, under whose auspices miracle-plays, mysteries, and moralities were represented at the fair. In the first centuries of its existence this was the chief cloth-fair of the kingdom. Leather, pewter, and live cattle were also sold here. Crowds of people were attracted to it by a variety of popular amusements and the exhibitions of acrobats, tumblers, mountebanks, mummers, and merry-andrews. Having ceased to be a place of traffic and become a nuisance, it was abolished in 1855. (See Henry Morley, "Memoirs of Bartholomew Fair," 1859.)

Bartholomew's Hospital, London, was founded in 1102 by Rahere, the king's ministrel, and was at first connected with a priory established by the same person. It was made a sanctuary by Edward II., but hospital and priory were both dissolved by Henry VIII., who founded the hospital anew, giving 500 marks yearly for its maintenance, on condition the city should give the like sum. There is a medical school attached to it, and the hospital relieves 70,000 patients annually.

Bartholomew, St., Massacre of, the massacre of French Protestants which commenced at Paris in the night between the 23d and 24th of Aug., 1572. During the minority of Charles IX. and the regency of his mother Catherine de Médicis, a long civil war raged in France between the Catholics and Huguenots, whose leaders were the prince of Condé and Admiral Coligny. In 1570 the court made to the Huguenots overtures which resulted in a treaty of

peace. Charles invited Coligny and other leaders of that party to court, and received them with warm demonstrations of friendship, which were probably perfidious. The false security of the Huguenots was increased by a marriage between Henry of Navarre and Margaret, who was a sister of Charles IX. Many Huguenots came to Paris to attend the wedding in Aug., 1572. Among the principal instigators of the massacre were Catherine de Médicis and her sons. Admiral Coligny was wounded by a shot from a window of the royal palace on the 22d. The general massacre commenced at two o'clock on Sunday morning, Aug. 24th, and continued for several days. The provinces followed the example of the capital, with some exceptions. In regard to the number of victims there is no certainty. Estimates have varied from 1000 to 10,000 for Paris, and from 2000 to 100,000 for the whole of France. (See SISMONDI, "History of France;" H. MARTIN, "History of France;" DE THOU, "Historia sui Temporis;" "The Massacre of St. Bartholomew," by HENRY WHITE, 1868.)

Bar'tizan, in Norman castles, a projecting balcony or small stone closet placed on corbels over doorways and on other parts, generally for defence, and designed to command some assailable point with the fire of its crossbow-bolts. It had perforated battlements for the defence of the archers and crossbowmen.

Bart'lett, a post-township of Carroll co., N. H. It has manufactures of lumber, etc. Pop. 629.

Bartlett, a post-village of Shelby co., Tenn. It has one weekly newspaper. Pop. 244.

Bartlett (ELISHA), M. D., an American physician, born in Smithfield, R. I., Oct. 6, 1804. He became professor of medicine in the University of Maryland in 1844, and took the same position in the University of New York in 1850. He was popular as a teacher, and wrote, among other medical works, one entitled "Essay on the Philosophy of Medical Science." Died July 19, 1855.

Bartlett (HENRY A.), U. S. M. C., born Aug. 19, 1838, in Patuxent, R. I., appointed a second lieutenant in the marine corps Oct. 16, 1861, became a first lieutenant Nov. 26, 1861, and a captain Nov. 29, 1867. From July, 1862, to Aug., 1864, he served on board the iron-clad New Ironsides during her numerous engagements with the forts and batteries of Charleston harbor.

FOXHALL A. PARKER, U. S. N.

Bartlett (ICHABOD), an eminent American lawyer, born at Salisbury, N. H., July 24, 1786, and graduated at Dartmouth in 1808. He was a member of Congress from 1833 to 1839. Died Oct. 19, 1853.

Bartlett (JOHN R.), U. S. N., born Sept. 26, 1843, in the State of New York, became an ensign in 1863, a lieutenant in 1864, and a lieutenant-commander in 1866. He served in the steamer Mississippi at the passage of Forts Jackson and St. Philip and capture of New Orleans, April 24, 1862. While attached to the steam-sloop Susquehanna he took part in both attacks on Fort Fisher, and was one of the assaulting party of Jan. 15, 1865. Commodore Godon, who commanded the Susquehanna, makes honorable mention of Bartlett in his official despatch of Jan. 17, 1865, and Lieutenant-Commander Blake, who led the men of the Susquehanna in the assault on the fort, refers to his conduct on that occasion in the following terms: "Lieutenant Bartlett, belonging to my command, remained at the 'palisades' until nightfall, and I beg to call your attention to his personal gallantry."

FOXHALL A. PARKER, U. S. N.

Bartlett (JOHN RUSSELL), an American writer, born at Providence, R. I., Oct. 23, 1805, was one of the founders of the American Ethnological Society. He was appointed in 1850 commissioner to determine the boundary between Mexico and the U. S. He published, besides other works, a "Narrative of Explorations and Incidents in Texas and New Mexico" (2 vols., 1854); "Progress of Ethnology" (1847); "Dictionary of Americanisms" (1848); "Bibliotheca Americana" (4 vols., 1865–70), etc.

Bartlett (JOHN SHERREN), M. D., an English journalist, born in 1790. He founded in New York in 1822 the "Albion," a journal which he edited with much ability until 1848. He was afterwards connected with other newspapers. Died Aug. 24, 1863.

Bartlett (JOSEPH), a satiric poet, born in Plymouth, Mass., June 10, 1762, graduated at Harvard in 1782, and after many vicissitudes of fortune became a lawyer. He wrote a poem on physiognomy, and one entitled "The New Vicar of Bray." Died Oct. 20, 1827.

Bartlett (JOSIAH), M. D., an American patriot, born at Amesbury, Mass., Nov. 21, 1729. He signed the Declaration of Independence, and was a member of the Continental Congress in 1776–78. He became president of New Hampshire in 1790, and governor of that State under the new constitution in 1793. Died May 19, 1795.

Bartlett (SAMUEL COLCORD), D. D., was born in Salisbury, N. H., Nov. 25, 1817, and in 1836 graduated at Dartmouth College, where he was afterwards tutor, and at the Andover Theological Seminary in 1842. In 1843 he was settled over the Congregational church in Monson, Mass., in 1846 became professor of intellectual and moral philosophy in Western Reserve College, in 1852 took charge of the Franklin street church, Manchester, N. H., in 1857 became pastor of the New England church, Chicago, Ill., and in 1858 was made professor of biblical literature in the Chicago (Congregational) Theological Seminary. In 1873 he had leave of absence for a year to travel in the East. He has published "Life and Death Eternal" and "Sketches of Missions of the American Board," besides a goodly number of sermons, orations, addresses, and articles in the leading reviews. He contributed to the American edition of Smith's "Dictionary of the Bible." He has also in contemplation other and more important works.

Bartlett (WILLIAM), born in Newburyport, Mass., Jan. 31, 1748. He acquired great wealth in mercantile pursuits, which he used liberally in promoting education, temperance, missions, and the cause of religion and morals. He gave $30,000 to found the Andover Theological Seminary, and added to this gift various benefactions, amounting in the aggregate to about $250,000. He also bestowed large sums upon other benevolent enterprises. Died Feb. 8, 1841.

Bartlett (WILLIAM FRANCIS), an American officer of volunteers, born in Haverhill, Mass., June 6, 1840, graduated at Harvard University in 1862. On the outbreak of the civil war he entered the service as a private soldier, and was appointed captain in the Twentieth Massachusetts July, 1861; at the siege of Yorktown, April, 1862, he lost a leg; was commissioned colonel of the Forty-ninth Massachusetts Infantry, which regiment he led in the assault on Port Hudson, La., May 27, 1863, where he was wounded in the leg and arm. On this occasion he displayed such daring, and was so conspicuous a mark, being mounted, that the Confederate officers gave orders not to shoot at him. Colonel of the Fifty-seventh Massachusetts Veteran Regiment, Aug., 1863, wounded in the battle of the Wilderness, and brigadier-general of volunteers June 22, 1864, for conspicuous gallantry. He led the assaulting column at the explosion of the mine near Petersburg July 30, 1864, and was wounded and taken prisoner. Brevetted major-general U. S. volunteers.

Bartlett (WILLIAM HENRY), an English artist and writer, born in London in 1809. He travelled in many parts of Europe and America, and visited Egypt and Palestine. He published numerous popular works, illustrated with engravings designed by himself. Among his works are "Walks in and about Jerusalem" (1844), and "The Nile-Boat, or Glimpses of the Land of Egypt" (1849). He died at sea in 1854.

Bartlett (WILLIAM H. C.), LL.D., an American officer and scientist, born in 1804 in Lancaster co., Pa., graduated at West Point in 1826. He served, while lieutenant of engineers, as assistant professor at the Military Academy 1827–29, in the construction of Fort Monroe, Va., and Fort Adams, R. I., 1828–32, as assistant to the chief engineer at Washington, D. C., 1832–34, and as acting professor of natural and experimental philosophy at the Military Academy 1834–36. On resigning his lieutenancy, April 20, 1836, he was appointed full professor of philosophy, continuing as such till retired from active service, Feb. 14, 1871. He is author of a "Treatise on Optics," 1839, of "Synthetical Mechanics," 1850–58, of "Acoustics and Optics," 1852–59, of "Analytical Mechanics," 1853–59, and of "Spherical Astronomy," 1855–58. He is a member of several scientific associations, corporator of the National Academy of Sciences from its formation, and, since 1871, actuary of the Mutual Life Insurance Company of New York City.

GEORGE W. CULLUM, U. S. A.

Bart'ley (MORDECAI) was born in Fayette co., Pa., Dec. 16, 1783. He removed to Ohio in 1809, and settled in Mansfield, Richland co. He served as a captain in the war of 1812, was a member of Congress (1823–31), and governor of Ohio (1844–46). Died Oct. 10, 1870. (See his Life, by A. T. GOODMAN.)

Bart'low, a township of Henry co., O. Pop. 126.

Bar'tol (CYRUS AUGUSTUS), D. D., a Unitarian divine and author, born at Freeport, Me., April 30, 1813. He graduated at Bowdoin College in 1832, at the Cambridge Divinity School in 1835; settled as colleague pastor of West church, Boston, in 1837. His principal writings are "Discourses on the Christian Spirit and Life" (1850), "Discourses on the Christian Body and Form" (1854), "Pictures of Europe" (1855), "Radical Problems" (1872),

and "The Rising Faith" (1873). His contributions to periodical literature are numerous and valuable, being characterized by fine literary taste and deep religious feeling.

Bartoli'ni (Lorenzo), an eminent Italian sculptor, born in Tuscany in 1777. He studied and worked in Paris, and was patronized by Napoleon, who in 1808 directed him to found a school of sculpture at Carrara. In 1815 he removed to Florence, where he worked for many years. Among his masterpieces are a colossal bust of Napoleon I., the group of "Hercules and Lycus," and a group called "Charity." His works are characterized by a classic repose and simplicity. He is ranked by the Italians as second only to Canova. Died Jan. 20, 1850.

Bartoloz'zi (Francesco), an Italian engraver, born in 1725, was a scholar of Ferreti and Joseph Wagner. He lived many years in London. He exerted a bad influence by spreading the stippled manner. His works are very numerous. Died in 1819.

Bar'ton, a county in the central part of Kansas. Area, 900 square miles. It is intersected by the Arkansas River and the Atchison Topeka and Santa Fé R. R., and also drained by Walnut Creek. Capital, Great Bend. Pop. in 1870, 2.

Barton, a county of Missouri, bordering on Kansas. Area, 600 square miles. It is drained by the North Fork of Spring River and several creeks. A large part of the county is prairie. Corn, wool, and tobacco are the chief crops. Among its mineral resources are coal and limestone. Capital, Lamar. Pop. 5087.

Barton, a township of Gibson co., Ind. Pop. 1626.

Barton, a post-township of Newaygo co., Mich. P. 383.

Barton, a post-township of Orleans co., Vt., is a thriving country town, with three villages and good railroad facilities. The fertile soil and abundant water-power make agricultural and manufacturing business profitable. The chief article of manufacture is lumber. There are four churches, two graded schools, one academy, one library, and one weekly newspaper. Pop. 1911.

G. H. Blake, Ed. of "Monitor."

Barton, a post-township of Tioga co., N. Y. It contains Waverley and other manufacturing villages. P. 5087.

Barton, a post-township of Washington co., Wis. Pop. 1376.

Barton (Benjamin Smith), M. D., born at Lancaster, Pa., Feb. 10, 1766, was educated at Pennsylvania College and in Europe, graduating as M. D. at Göttingen. In 1789 he became professor of natural history and botany in the College of Philadelphia, and in 1813 professor of materia medica. He published various works on natural science, materia medica, and other subjects, of which the best known is his "Elements of Botany" (1804 and 1812). Died Dec. 19, 1815.

Barton (Bernard), known as the "Quaker poet," born in London Jan. 31, 1784, was a member of the Society of Friends. He became a clerk in a bank at Woodbridge. He published "Poems" (1820), "Napoleon, and other Poems" (1822), "Devotional Verses" (1826), "The Reliquary" (1836), "Household Verses" (1845), and other works. Sir Robert Peel procured for him a pension of £100. His works are pervaded by pious sentiment and tenderness. Died Feb. 19, 1849. (See "Memoirs and Letters of Bernard Barton," edited by his daughter.)

Barton (William), a Revolutionary general, born in Providence, R. I., in 1747. As lieutenant-colonel of the Rhode Island militia he captured Gen. Prescott July 10, 1777. He was wounded and disabled in 1778 at Bristol Ferry. Congress gave him a colonel's commission and a sword, and he received a grant of land in Vermont. He was many years imprisoned in Vermont for debt, but was liberated in 1825 by La Fayette, who paid the demand against him. Died at Providence Oct. 22, 1831.

Barton (William P. C.), M. D., a botanist, nephew of Dr. B. S. Barton, graduated at Princeton in 1805, and received his degree of M. D. at the University of Pennsylvania in 1808. He published "Floræ Philadelphicæ" (1815–25), "Flora of North America" (3 vols., 1821–23), "Materia Medica," "Medical Botany," "Plan for Marine Hospitals" (1817), and several other works. He was professor of botany in the University of Pennsylvania. Died in 1855.

Barton Beds, a group of strata of clay and sand forming part of the middle eocene formation, included in the Bagshot Beds (which see).

Barton City, a township of Barton co., Mo. P. 270.

Barton's Buttons (called also **Iris Ornaments**). By means of a dividing-engine, Mr. John Barton succeeded in engraving lines on steel and other surfaces not more than from the two-thousandth to the ten-thousandth of an inch apart. These, owing to the action of grooved surfaces on light, shine in the light of candles or lamps with all the colors of the spectrum. From steel dies thus prepared impressions were stamped upon buttons and other articles, forming ornaments rivalling in colors the brilliant flashes of the diamond.

Barton's Creek, a township of Wake co., N. C. P. 1585.

Bar'tow, a county in the N. of Georgia, was formerly called Cass. Area, 550 square miles. It is intersected by the Etowah River. The surface is partly mountainous or hilly; the soil is fertile. Grain, cotton, and wool are the chief crops. Copper, iron, lead, marble, and limestone are found in it. It is traversed by the Western and Atlantic R. R. Capital, Cartersville. Pop. 16,566.

Bartow (Francis Stebbins), born in Savannah, Ga., Sept. 6, 1816, graduated at Franklin College, Ga., 1835, studied law at the law school, New Haven, Conn., became a prominent member of the Savannah bar, was a member of the Georgia legislature, of the senate, and of the Confederate Congress. During the civil war he entered the army as captain of the Oglethorpe Light Infantry, was appointed colonel of Eighth Georgia Infantry, and brigadier-general C. S. A. Killed at Manassas July 21, 1861.

Bar'tram (John), an American botanist, born in Darby, Chester co., Pa., in 1701. He planted a botanical garden on the Schuylkill near Philadelphia, made extensive excursions in the unsettled parts of North America, and sent specimens to Linnæus, who pronounced him "the greatest natural botanist in the world." He wrote a "Journal of a Tour to East Florida in 1766," and other works. Died Sept. 22, 1777. (See William Darlington, "Memorials of John Bartram and Humphrey Marshall," 1849.)

Bartram (William), a botanist, a son of the preceding, was born at Kingsessing, Pa., Feb. 9, 1739. He explored the animals, plants, etc. of several Southern States, and published "Travels through North and South Carolina, Georgia, and Florida" (1791). He also prepared a list of American birds. Died July 22, 1823.

Bartsch (Johann Adam Bernhard), a German engraver and writer, born at Vienna Aug. 17, 1757. His principal work is called "The Painter-Engraver" ("Le Peintre-Graveur," 21 vols., 1821). He also prepared a "Catalogue of all the Prints of Rembrandt," and other similar works. Died Aug. 21, 1821.

Ba'ruch, a Hebrew scribe, was a friend and companion of the prophet Jeremiah, whom he served as amanuensis. Shortly after 586 B. C. he accompanied Jeremiah to Egypt. His subsequent history is unknown. The book of Baruch, which the Catholics admit into the canon of the Holy Scripture, is considered apocryphal by Protestants and Jews. It is not without literary merit. In what language or by what hand it was first written is unknown. Its sixth chapter, the so-called "epistle of Jeremiah," is of later, though very ancient, date. There is a pseudepigraphic "epistle of Baruch" in the Syriac language, probably a monastic forgery, and certainly worthless.

Bar'wood, or **Camwood,** a red dyewood from the western coast of Africa. It is the wood of *Baphia nitida*, a leguminous tree. Its coloring principle is slightly soluble in boiling water, freely soluble in alcohol and alkaline solutions. It is supposed to be identical with santoline.

Bary'ta, or **Bary'tes** [Gr. βαρύς, "heavy," alluding to "heavy spar," its sulphate], (symbol BaO), the oxide of barium, is an alkaline earth and a virulent poison. It is an ingredient in sulphate of baryta, or heavy spar, from which it is obtained, but it is not useful for any purpose except chemical analysis. A solution of baric hydrate is used by the chemist as the best test of the presence of carbonic acid. Sulphate of baryta, or heavy spar, is a common crystallized mineral which is mixed with white lead and used as a pigment under the name of *permanent white*. Several mixtures of sulphate of baryta and white lead are manufactured and are known in commerce. *Venice white* contains 1 part sulphate of baryta and 1 part white lead. *Hamburg white* contains 2 parts sulphate of baryta and 1 part white lead. *Dutch white* contains 3 parts sulphate of baryta and 1 part white lead. The native sulphate of baryta was employed by the celebrated potter Wedgwood in the manufacture of jasper ware and for the formation of white figures, etc. on colored jars and vessels. It is also extensively used for adulterating white lead and for giving weight to paper. Baryta abounds in North Carolina.

Bar'ytone, written also **Baritone** [from the Gr. βαρύς, "heavy," and τόνος, "tone"], signifies the tone of a man's voice, about halfway between the bass and tenor.

It generally extends in compass from B flat to F, and occupies the same position as the *mezzo soprano* of the female voice. In Greek grammar, words with an unaccented final syllable are called barytones.

Basalt' [Lat. *basal'tes*], a rock of volcanic formation, is considered a variety of trap-rock, and is composed of felspar and augite or hornblende. It has a compact texture, a dark-green, dark-gray, or black color, and a conchoidal fracture. The most remarkable characteristic of basalt is the columnar structure which it often assumes. The columns have a regular prismatic form, which appears to be the result of a tendency or effort towards crystallization, but many theorists deny that it is at all analogous to crystallization. They generally have five or six sides, and are often divided transversely by joints at nearly equal distances. Beautiful specimens of vertical columns of basalt are found at the Giants' Causeway in the north of Ireland, and Fingal's Cave in the Scottish island of Staffa.

Bas'com (Henry Bidleman), D. D., LL.D., a bishop of the Methodist Episcopal Church South, was born at Hancock, Delaware co., N. Y., May 27, 1796. He was licensed to preach in 1813, and in 1823 was chosen chaplain to Congress; was president of Madison College, Pa. (1827–29), professor of morals, Augusta College, Ky., in 1832, and in 1842 president of Transylvania University, Ky. From 1846 to 1850 he was editor of the "Quarterly Review" of his Church. In 1850 he was made a bishop; died Sept. 8, 1850. In one of his earlier years he preached 400 times, and received a salary of twelve dollars and ten cents. Bishop Bascom was an extremely popular speaker. His sermons are considered to have been very brilliant and powerful. His complete writings were published in 1856.

Bascom (John), LL.D., born at Genoa, N. Y., May 1, 1827, and graduated at Williams College in 1849, studied law and theology, the latter at Andover Seminary. In 1855 he became professor of rhetoric in Williams College. He has published "Political Economy" (1861), "Æsthetics" (1862), "Rhetoric" (1865), "Elements of Psychology" (1869), "Science, Philosophy, and Religion" (1871), "The Philosophy of Religion," "The Philosophy of English Literature," and other works. In 1873 he was appointed president of Wisconsin University.

Base [Lat. *ba'sis*, from the Gr. *βάσις*, a "foundation"], a term having important applications in architecture, chemistry, geometry, heraldry, and music (It. *basso*). Base in general signifies the bottom of anything considered as its support, as the base of a mountain, the base of a pillar.

Base, in architecture, is the lower part of a pillar—*i. e.* the part between the lower end of the shaft and the top of the pedestal. The Doric column had no base. The base is composed of two parts—the *plinth*, which is a flat, square block; and the *moulding*, which is usually circular and rests upon the plinth. In botany, the base of a leaf is the part next to the petiole. The base of a fruit is the part next to the root, or the end to which the stem, peduncle, or pedicel is attached. The stem-end of a pear is called the base, although it is smaller and usually higher in position than the apex.

Base, in chemistry, is a compound body, generally consisting of a metal united with oxygen. For example, potassium (K) combines with oxygen (O), and thus forms the base potash (K_2O); sodium (Na) and oxygen, the base soda (Na_2O); lead (Pb) and oxygen, the base lead monoxide or litharge (PbO). Every oxygen base forms salts with oxygen acids to form oxy-salts. Thus, the base potash (K_2O) combines with sulphuric acid (SO_3) to make the salt sulphate of potash (K_2O,SO_3); potash with nitric acid (NO_5) to form the salt nitrate of potash or nitre (K_2O,NO_5). Occasionally sulphur or some other element replaces the oxygen in a base. Thus, the metal potassium (K) unites with sulphur (S) to form the *sulphur* base sulphide of potassium (K_2S), which can unite with a sulphur acid like sulpharsenious acid or orpiment (As_2S_3) to make the salt sulpharsenite of potash (K_2S,As_2S_3). The metal half of a base need not be a simple element, but may be a compound body which, for the time, plays the part of a simple substance. Thus, the compound ethyl (C_4H_5) can combine with oxygen to form ordinary ether ($(C_4H_5)_2O$; and the base thus produced can, in its turn, combine with acids to form salts. In the new chemistry, while the basic properties of certain oxides are necessarily recognized, a different statement is made in regard to their relations to acids. Thus, it is said that, 1. In some cases, basic oxides form salts by direct combination with acids; as when vapor of sulphuric anhydride (SO_3) is passed over red-hot barium oxide (BaO), barium sulphate (BaO,SO_3 or $BaSO_4$) is formed. 2. Mostly, however, metallic salts are formed by the substitution of a metal for hydrogen in the acid. Thus, nitric acid, or hydrogen nitrate (HNO_3) + potassium hydrate (KOH) = potassium nitrate (KNO_3) + water (H_2O). In geometry, the base of a solid is the lowest part, or the side on which it stands, as the base of a cone or plane.

Base (of operations), a military term denoting, in contradistinction to the *line* of operations, the (usually) contiguous and well-guarded (by our own or allied forces) region upon which an army depends for its supplies, reinforcements, etc., to which it sends back its sick and wounded, and upon which it (generally) would fall back in case of reverse and retreat. Much pedantry is expended upon these phrases in what were recognized as standard military treatises. The *essential* thing is, that an army *have* a base, though it may temporarily abandon one to acquire another; or in rare cases it may so thoroughly control the hostile region in which it operates as to use *it* for most of the purposes of a base.

Base, in heraldry, is the lower portion of the shield. There is a dexter base, a middle base, and a sinister base.

Revised by C. F. Chandler.

Base, in music. See Bass.

Ba'sedow (Johann Bernhard), originally Johann Berend Bassedau, a German educational reformer, born at Hamburg Sept. 11, 1723. He aimed to realize Rousseau's ideas of education, for which he founded at Dessau, in 1774, a model school called Philanthropin, and published a school-book entitled "Orbis Pictus" (1774), which was illustrated with 100 copper-plate engravings, and became very popular. His influence at one time was very great. He sought to render science and learning attractive and interesting by pictures and natural objects, instead of filling the memory with abstractions. Died July 25, 1790. (See J. C. Meyer, "Basedow's Leben und Schriften," 2 vols., 1792; H. Rathmann, "Beiträge zur Lebensgeschichte J. B. Basedow's," 1796.)

Basedow's Disease, called also **Graves' Disease** and **Exophthalmic Goitre,** is a disease more common among women than men, and characterized by prominent eyeballs, slightly enlarged thyroid gland, palpitation of the heart, and generally by anæmia. Basedow's disease frequently, though not always, ends in recovery. Its cause is stated by Niemeyer to be probably a paralysis of the vaso-motor nerves. It is best treated by good food, chalybeates, gentle exercise, and hygienic measures.

Basel'la, a genus of tropical plants of the order Chenopodiaceæ. The *Basella alba* and *rubra* have twining stems, and are commonly used as potherbs in the East Indies. In the vicinity of Paris they are raised in hotbeds, transplanted to borders, and used as a substitute for spinach. The *Basella rubra* yields a rich purple dye.

Base'ment, in architecture, the lowest story of a building, is often sunk below the level of the street, and is sometimes entirely subterranean.

Ba'shan [Heb. בָּשָׁן, of disputed significance], a district in Palestine E. of the Jordan, most of it high tableland, extending from Mount Hermon in the N. to Gilead in the S., the Yarmuk (Hieromax), which enters the Jordan just below the Sea of Galilee, being the boundary between Bashan and Gilead. At the time of the Exodus it was occupied by Amorites ("highlanders"), whose king, Og, was slain in battle with the Israelites, his people overpowered, and the whole territory assigned to the half-tribe of Manasseh. After the Captivity, Bashan consisted of four provinces: (1) Golan (modern Jaulan); (2) Argob, or Trachonitis (modern Lejah); (3) Hauran (name unchanged); (4) Batanæa (modern Bethanyeh). Iturea (now Jedur) in the N. W. was not strictly a part of Bashan, though taken by the Israelites. The whole district was, and still is, exceedingly fertile, and was famous for its oaks and its cattle. Remarkable ruins of ancient cities are found there. (See Porter's "Damascus," 1855; Wetzstein's "Reisebericht über Hauran und die Trachonen," 1860; and Porter's "Giant Cities of Bashan," 1865.)

Bashaw' [a corruption of *pâshâ*, which again is a contraction of the Persian *pâdâshâh*, a "king"], a title of honor given in the Turkish dominions to viceroys, provincial governors, generals, etc. The term is also used in English to denote a domineering, proud, or tyrannical man.

Bash'i, a township of Clarke co., Ala. Pop. 640.

Ba'shi-Bazooks', the name of certain irregular troopers in the service of the Turkish sultan. They are mostly Asiatics, and are wild, turbulent men, much addicted to plundering. They fought against the Russians in the Crimean war (1854–55).

Bash'kirs, the name of a nomadic race who inhabit the Russian government of Orenburg. In religion they are Mohammedans.

Ba'sil (*Oç'imum*), a genus of herbs and shrubs of the natural order Labiatæ. They are natives of tropical or

other warm regions, and generally have an aromatic smell and taste. The *Ocimum basilicum* (sweet basil) is an annual plant, a native of the East Indies, and is cultivated in Europe, where it is used to season food. The *Ocimum minimum*, or bush basil, another East Indian plant, is cultivated for the same use. The *Ocimum Campeachianum* is a native of Florida and of tropical America. Basil is also a common name for *Pycnanthemum*, a North American genus with numerous species, all erect, rigid herbs; also of the *Calamintha clinopodium* of Europe and North America, and other labiate herbs.

Ba'sil, or **Basil'ius** [Gr. Βασίλειος or Βασίλιος], SAINT, surnamed THE GREAT, an eminent Greek Father of the Church, was born at Cæsarea, in Cappadocia, about 329 A. D. He was older by about two years than his brother, Gregory of Nyssa, and was an intimate friend of Gregory Nazianzen. From 351 to 355 he was a student at Athens. Then he travelled extensively. Then he spent some seven years in monastic retirement in Pontus. In 370 he succeeded Eusebius as bishop of Cæsarea, and he died Jan. 1, 379, worn out by his ascetic habits. His works (in 3 vols., Garnier's ed., 1721–30) consist of treatises, homilies, and letters. He excelled as a letter-writer. He was the author of monastic rules and of a liturgy which still bears his name, and which is still used in the Russian Church. (See G. HERMANT, "Vie de Saint Basile," 1674; J. E. FEISSER, "Dissertatio de Vita Basilii Magni," 1828; KLOSE, "Basilius der Grosse nach seinem Leben," 1835.)

Basil I. [Lat. *Basilius*], surnamed THE MACEDONIAN, emperor of the East, was born in Macedonia in 820 A. D. His origin was obscure. He gained the favor of the emperor Michael III., who appointed Basil his own colleague in the empire in 866. After Michael was assassinated in 867, Basil became emperor. He obtained Asia Minor by conquest from the Saracens, whom he also drove out of Italy. He was an able ruler. He died in 886 A. D., and left the throne to his son, Leo VI. (See LE BEAU, "Histoire du Bas Empire;" G. IMPACCIANTI, "Basilio il Macedone," 2 vols., 1809.)

Basil II., emperor of the East, a son of Romanus II., was born in 958 A. D. He began to reign, in conjunction with his brother Constantine, in 975. He was an able commander, and waged war with success against the calif of Bagdad and the Bulgarians. He completed the conquest of Bulgaria in 1018. Died in 1025.

Basile'an Man'uscript [Lat. *Co'dex Basilen'sis*, from *Basile'a*, the Lat. name of Bâle], the name of two very valuable manuscripts of the Greek New Testament, now in the library of Bâle: 1. A nearly complete uncial copy of the Gospels. It is believed to belong to the eighth century, and to have been written at Constantinople. 2. A beautiful cursive manuscript of the whole New Testament except the Apocalypse. It dates from the tenth century.

Basil'ian Man'uscript (*Co'dex Basilia'nus*), an important uncial manuscript of the Apocalypse, now in the Vatican library. It takes its name from the Basilian monastery at Rome, to which it once belonged. It is referred to the eighth century.

Basil'ian Monks, or **Monks of St. Basil,** a religious monastic order founded by Saint Basil the Great in 363 A. D. He composed a system of monastic discipline which was approved by the pope, and was practised by great numbers of monks both in the churches of the East and the Latin or Western Church. Spain, Italy, Asia Minor, and many other countries contain monasteries of this order at the present time. Those of Italy are chiefly of the Greek rite, and those of Spain, etc. of the Latin rite. In Asia Minor the United Melchite Greeks have many Basilian monks. There is one convent of Basilians in Toronto, Canada. The monks of the Russo-Greek Church nearly all follow the rule of Saint Basil, variously modified, even the so-called monks of Saint Anthony following what is substantially the Basilian rule. The Armenian Church has also an order of Basilian monks.

Basil'ica [Gr. βασιλική, the fem. of βασιλικός, "royal," from βασιλεύς, a "king;" *i. e.* a "royal hall"], a name given by the ancient Greeks and Romans to a public hall or court-house in which princes and magistrates administered justice. Among the Romans it attained the greatest importance, and became, besides a court of justice, a market-place and exchange. The first basilica mentioned in Roman history was the Basilica Porcia, built about 182 B. C. Great numbers were subsequently erected in Rome, and each provincial town had its basilica, which was usually adjacent to the forum. The most ancient basilicas were open to the external air, and surrounded by a peristyle of columns, for which an external wall was afterwards substituted. After the reign of Constantine I. some basilicas were converted into Christian churches. The term basilica is still applied to the five great patriarchal churches in Rome and to several smaller ones.

Basilica, a code of laws, the compilation of which was commenced by Basil I., emperor of the East (867–886 A. D.), and completed by his son Leo. It is considered valuable for the interpretation of the Roman *corpus juris*, but a portion of it is lost. The "Basilica" was published by Heimbach (5 vols., 1833–50).

Basilica'ta (the ancient *Luca'nia*), a province of Italy, bounded on the N. by Capitanata, on the N. E. and E. by Bari and Otranto, on the S. E. by the Gulf of Taranto, on the S. by Calabria Citra, and on the W. by Principato Ultra and Citra. Area, 4122 square miles. It is drained by the Brandano and Basiento. The surface is mountainous. It contains a large fertile plain next to the Gulf of Taranto. Wine, grain, tobacco, and hemp are the staple products. Capital, Potenza. Pop. in 1862, 492,959.

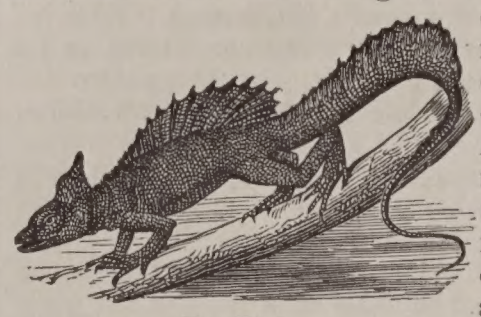
Basil'icon Do'ron ("royal gift"), two Greek words composing the title of a work which James I. of England wrote for the instruction of his son Henry (1599). It is interesting chiefly as a literary curiosity.

Basil'icon Oint'ment, sometimes written **Basil'icum** [from the Gr. βασιλικός, "royal," so named on account of its great virtues], the *Cera'tum resi'næ* of the Pharmacopœias, is composed of five parts of resin, eight of lard, and two of yellow wax. It is much used as a stimulating application to ulcers, burns, etc.

Basili'des [Gr. Βασιλείδης], a Gnostic and founder of a sect called Basilidians, lived in Egypt in the reigns of Trajan and Hadrian, about 100–140 A. D. The events of his life are not known. Like Zoroaster, he taught the existence of two independent creative principles or powers—Good, or Light, and Evil, or Darkness.

Basilis'cus [Gr. Βασιλίσκος], emperor of the East, was a brother of Verina, the wife of Leo I. In 468 A. D. he commanded a large armament which Leo sent against Genseric the Vandal, by whom he was totally defeated. He usurped the throne in 474, but was defeated and deposed by Zeno in 476. Died in 477 A. D. (See GIBBON, "Decline and Fall of the Roman Empire.")

Bas'ilisk [Lat. *basilis'cus*; Gr. βασιλίσκος, the diminutive of βασιλεύς, a "king," so called because the protuberance on its head was thought to resemble a crown], a genus of saurian reptiles of the family Iguanidæ, sub-order Pachyglossæ, natives of the tropical parts of America. They are characterized by a thin triangular fold of skin rising from the occiput and inclined backward. They also have an elevated crest along the back and tail, capable of being erected or depressed at pleasure. They are well adapted for swimming and for climbing trees, and are innocuous and inoffensive animals. The tail is much longer than the body. The *Basiliscus mitratus* (or *Americanus*) is from twenty-five to thirty inches long, including the tail. The term basilisk was also applied to a fabulous monster by ancient and mediæval writers, who supposed that it had the form of a snake or lizard, that it infested the deserts of Africa, and that it was hatched by a toad or serpent from an egg laid by a cock. According to popular opinion, its breath poisoned the air and burned up vegetation, and the glance of its eye was fatal to men and other animals. It was sometimes called cockatrice and the king of dragons. The only creature who could face the basilisk and live was believed to be the cock; and travellers were advised to carry loud-crowing cocks with them, for the basilisk was believed to stand in great dread of his near relative, the cock, and the crowing of the cock was considered the only means of driving him away.



Basilisk.

Ba'sin [Fr. *bassin*], in geography, is a great natural depression or concavity on the earth's surface, without reference to the stratification. The basin of a river is the whole tract of land drained by that river and its tributaries. The basin of the Mississippi, for example, is coextensive with all the country between the Rocky Mountains and the Appalachian chain. The area of this is estimated at 1,244,000 square miles. The basin of a lake includes, besides the space occupied by the lake, the land drained by the rivers that flow into it. The highest line between two basins is the *watershed*, or line of separation between the waters.

BASIN, in geology, is applied to depressions in the strata in which beds of a later age have been deposited. Thus, the site of the city of London, called the London basin, consisting of tertiary sands and clays, occupies a hollow in the chalk, which is bounded by the North Downs on the S.

and by the chalk-hills of Berks, Wilts, and Bucks on the N. The term is also applied to synclinal depressions of strata, especially in the coal-fields.

Ba'singstoke, a town of England, in Hampshire, on the South-western Railway, 46 miles W. S. W. of London. It has considerable commerce in grain, malt, coal, and timber, facilitated by the Basingstoke Canal. Here is a church built at the time of Henry VIII. Basingstoke has been a market-town ever since the Norman Conquest, and was anciently of more importance than at present. Pop. in 1871, 5574.

Bas'kerville (JOHN), a celebrated English printer and letter-founder, born in Worcestershire in 1706. He made great improvements in typography. From his press came editions highly prized of Virgil (1756), Milton, and the New Testament (1763), besides many other beautifully printed works. Died Jan. 8, 1775.

Bas'ket [Lat. *cor'bis* or *fis'cus;* Welsh, *basgawd,* "a weaving of splinters"], a vessel made of willows, twigs, or splints interwoven. Baskets have been in use from very early ages. The monuments of ancient Egypt abound in representations of baskets. They are frequently mentioned in the Bible. The ancient Britons were remarkably expert in the manufacture of baskets, which were much prized by the Romans for their neatness and elegance. The process of basket-making is very simple, and appears to be well known among the rudest peoples—even among the aborigines of Van Diemen's Land—and many tribes of American Indians display great skill and taste in making and ornamenting them. Willow, oak, and ash are chiefly made use of in the manufacture of baskets. In several parts of England and Scotland great attention is paid to the cultivation of the willow, and the returns yielded are very satisfactory. In the U. S. the rattan, oak, willow, and black ash are employed extensively. The Chinese export great numbers of beautiful baskets made of finely split bamboo.

Basnage de Beauval (JACQUES), an eminent French scholar and theologian, born at Rouen in 1653. In 1676 he became a Protestant minister at Rouen, whence he emigrated to Holland in 1685. He was appointed pastor of a church at The Hague in 1709. Among his works are "The Holy Communion, or a Treatise on the Necessity and Means of Communing Worthily" (1688), a "History of the Church" (2 vols., 1699), and a "History of the Jews from Jesus Christ to the Present Time" (5 vols., 1706). Died Dec. 22, 1722. (See NICÉRON, "Mémoires.")

Basque Provinces [Sp. *Vasconga'das*], a part of Spain, bounded on the N. by the Bay of Biscay, comprises the four provinces, Navarré, Biscay, Guipuzcoa, and Alava. These coincided with the ancient *Cantabria.* Area, 6827 square miles. Pop. in 1867, 778,229. The surface is mountainous and presents much picturesque scenery. The tops of the hills are mostly covered with forests of oak, chestnut, beech, etc. Among the mineral resources are copper, tin, iron, marble, and porphyry. The chief towns are Bilbao, Tolosa, and Vittoria. The Basques are celebrated for their bravery, vivacity, and love of independence. They speak a peculiar language, whose relation to other tongues is still in question. Some have found a relationship, real or fancied, to the Tartar and Ugrian tongues; others find a slight resemblance to the Coptic. It is called *Euscara* by the Basques, who call their country *Euscaleria.* They have never been subdued, and retain a separate constitution, which secures to them political privileges not enjoyed by the other Spanish subjects. The origin of the Basques is doubtful. W. von Humboldt considered them descendants of the ancient Iberi. Others have conjectured that they are descendants of the pre-historic races of Europe. The total number of Basques in France and Spain is estimated at about 785,000. (See FORD'S "Handbook of Spain;" KARL WILHELM VON HUMBOLDT, "Researches on the Aborigines of Spain by means of the Basque Language," 1821; and F. MICHEL, "Le Pays Basque, sa Population, sa Langue, etc.," 1857.)

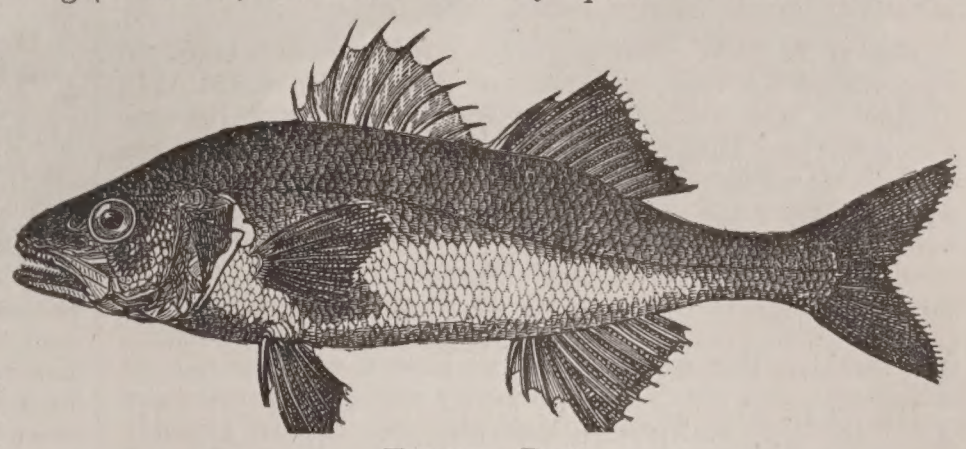
Bas-Relief [It. *basso-rilievo, i. e.* "low relief"], in sculpture, a term applied to figures which do not project or stand out far from the ground or plane on which they are formed. It is distinguished from haut-relief (alto-rilievo), in which the figures stand sometimes almost entirely free from the ground. Assyrian and Egyptian bas-reliefs were colored. Phidias in the Parthenon brought this style to a high degree of art. Relief was much cultivated by the Middle Age sculptors.

Bas-Rhin ("Lower Rhine"), a former department of France, in the northern part of Alsace, which was annexed to Germany in 1871. (See ELSASS.)

Bass, or **Base** [from the It. *bas'so,* "low"], in music, is the deepest or lowest part. In respect to harmony the bass is the most important part in music, containing more frequently the fundamental notes of the chords, while on it is formed that important and effective figure in music called "organ-point." The term is also applied to the deepest and gravest quality of the human voice, the usual compass of which is from G or F below the bass staff to D or E above it. The bass voice is mostly confined to adult males.

Bass [from the Anglo-Saxon *bæst;* Danish and Ger. *bast,* the "inner bark" of a tree, especially the linden tree], or **Basswood,** is the American name of a tree (*Til'ia America'na*), also called **Linden** or **Lime Tree.** It is common in the U. S., has serrate leaves, which are more or less heart-shaped, and bears a woody globular nut one-celled and one or two-seeded. The wood is light, soft, and not of much value for fuel. It is used in carriage-building. Several species of *Tilia* are found in the U. S., one of which, the *Tilia heterophylla,* or white basswood, is found in the West and South, and sometimes grows to an immense size and height. The flowers of the basswood abound in honey of excellent quality, and are eagerly sought by bees. The European linden (*Tilia Europæa*) is planted as an ornamental tree in many cities of Europe and the U. S. This species yields the bark which is made into Russia matting. (See LINDEN and BAST.)

Bass, the name of many species of fish of various



European Bass.

genera, but appropriately belonging to the genus *Labrax,* of the perch family, and other closely allied genera. The typical species is a common European sea-fish, which is prized as food. It ascends streams, and has become landlocked in fresh water without injury. The striped bass of the U. S. (*Labrax lineatus*), often called rock-fish, affords a valuable supply of food. It ascends rivers, and is caught in both salt and fresh water. The white bass or perch of the great lakes (*Labrax albidus*), the ruddy bass (*Labrax rufus*) of the coast, the white perch (*Labrax pallidus*), the little black bass (*Labrax nigricans*), the spotted bass of the St. Lawrence (*Grystes notatus*), the *Grystes multilineatus* of Western lakes, the *Grystes chrysops* of the lakes, the *Micropterus fasciatus* (black bass of the West), the *Centrarchus hexacanthus,* or grass bass, the *Centrarchus aëneus,* or rock bass of New York State and the West, are the best known of the very numerous American fishes of the true bass family, most of which are of great value as food. The stone bass (*Polyprion cernium*) of the Atlantic and the black sea-bass (*Centopristes nigricans*) of our Eastern coast are both highly prized. The so-called Otsego bass (*Coregonus Otsego*) is a fine fish of the salmon family. The "bass" of Charleston, S. C., is the red-fish (*Corvina ocellata*), a valuable sea-fish.

Bass (EDWARD), D. D., the first Protestant Episcopal bishop of Massachusetts, was born at Dorchester, Mass., Nov. 23, 1726, and graduated at Harvard in 1744. He was ordained in England in 1752 by Bishop Sherlock. He was consecrated bishop of Massachusetts May 7, 1797, and his episcopal authority was afterwards extended over Rhode Island and New Hampshire. Died Sept. 10, 1803.

Bassa'no, a town of Northern Italy, in the province of Venice, on the river Brenta, 19 miles N. E. of Vicenza. It stands on an eminence near the foot of the Alps, in a country which produces excellent wine and fruits. It is well built, has many churches and several fine palaces, also a theatre, a picture-gallery, a botanic garden, and the celebrated old printing-establishment of Remondini. Bonaparte here defeated the Austrian general Wurmser, Sept. 8, 1796. Pop. in 1857, 11,827.

Bassano (or DA PONTE, GIACOMO), a Venetian painter, born in 1510, was the pupil of Bonifazio Venetiano, and painted at Venice and Bassano. He excelled in the representation of familiar scenes and natural objects. His coloring is good, and his works are marked by a bold naturalistic tendency, and have some of the characteristics of modern genre-painting. Died Feb. 19, 1592.

Bas'saris [Gr. *βασσαρίς*, a "fox"], a genus of North American Bassaridæ, representing the true civets of the Old World. The *Bassaris astuta*, known as civet-cat or cacomixtle, and also very incorrectly called the raccoon, is found in Mexico, Texas, California, etc. These animals are about the size of a common cat, and very playful and easily tamed. When wild they live in trees. They catch rats, mice, and birds. The tail is bushy, and marked with rings like that of the raccoon.

The Ring-tailed Bassaris.

Bassein', a city of British Burmah, on an arm of the Irrawaddy, which joins the Bay of Bengal S. of Cape Negrais. It is 90 miles from the sea, and large ships ascend to the city. Much rice is exported hence. Pop. 20,000.

Basses-Alpes (*i. e.* "Lower Alps"), a department in the S. E. part of France, is bounded on the N. by Hautes-Alpes, on the E. by Italy and Alpes-Maritimes, on the S. by Var, and on the W. by Vaucluse. Area, 2685 square miles. The surface is mostly mountainous, with some fertile valleys. It is drained by the river Durance. Pop. in 1872, 139,332. Capital, Digne.

Basses-Pyrénées (*i. e.* "Lower Pyrenees"), a frontier department of France, is bounded on the N. by Landes, on the E. by Hautes-Pyrénées, on the S. by Spain, on the W. by the Atlantic. Area, 2945 square miles. It is intersected by the river Gave-de-Pau, an affluent of the Adour, which forms its N. W. boundary. The surface is partly mountainous; the soil of the lowlands is fertile. Copper, iron, and marble are found here. The chief towns are Bayonne and Pau. Pop. in 1872, 476,701.

Basse-Terre (*i. e.* "low land"), a seaport, capital of the French island of Guadeloupe, on the S. W. coast; lat. 15° 57′ N., lon. 61° 44′ W. It is the residence of a bishop, and has a botanic garden. It has no harbor. Pop. 9480.

Basse-Terre, a town of the British West Indies, capital of St. Christopher (or St. Kitts), on the W. coast. It has a harbor and an active trade. Pop. about 6500.

Bas'sett (Richard), a statesman of Delaware, was a member of Congress in 1787, and of the convention of the same year which framed the U. S. Constitution. He was U. S. Senator (1789–93), governor of the State (1798–1801), and U. S. district judge (1801–02). He was the father-in-law of Hon. James A. Bayard. Died in Sept., 1815.

Bas'set Horn [It. *cor'no di basset'to*], the richest and softest of all wind instruments, was invented in Passau in 1770, and afterwards improved. It is similar to a clarionet in tone and fingering, and its compass is two and a half octaves.

Bas'sia, a genus of plants of the order Sapotaceæ, comprises several species of trees, natives of tropical or sub-tropical countries. It produces flowers remarkable for their fleshy corolla, and a pulpy fruit enclosing three or four seeds, which contain an abundance of oil or butyraceous fat, which is used as food and for other purposes. The *Bassia latifolia*, an East Indian tree called madhuca or mahowa, is valuable for timber, and bears seeds from which oil is obtained. The Galam butter or Shea butter, an important article of commerce in Central Africa, which is procured from the seeds of *Bassia Parkii*, is more solid and more palatable than the butter of cow's milk. It is asserted that it will keep for a year without salt.

Bassi'ni (Carlo), born in Cuneo, Italy, in 1812, became celebrated as a violinist, musical director, and composer. He was long a successful music-teacher in New York. He published the "Art of Singing" (1857), "Melodic Exercises" (1865), "Method for the Tenor" (1866), "Method for the Barytone" (1868), and other valuable works. Died Nov. 26, 1870.

Bassompierre, de (François), Baron, a French general, born at Harnel, in Lorraine, 1579. He was an accomplished courtier, greatly addicted to intrigues, and gained the favor of Louis XIII., who raised him to the rank of marshal of France in 1622, and sent him on embassies to Spain and England. He fought against the Huguenots at La Rochelle. Having offended Cardinal Richelieu, he was confined in the Bastile about twelve years (1631–42). He died Oct. 12, 1646, leaving interesting "Mémoires" (2 vols., 1665), which were written in the Bastile, and are commended as attractive in style. (See Puymaigre, "Vie de Bassompierre," 1848.)

Bassoon' [Fr. *basson;* It. *fagot'to*], a wind instrument which consists of a perforated tube of wood in several pieces, which are fastened together, so as to bring the holes and keys within the reach of the fingers. At the end is attached a small tapering, crooked brass tube, at the termination of which is placed a reed to produce the tone. It has a compass of three octaves, from double B flat to B flat in alt.

Bas'sora, Bas'sorah, Bas'ra, or **Bus'sorah,** a city of Asiatic Turkey, in the pashalic of Bagdad, on the river Euphrates (here called Shat-el-Arab), 70 miles from its mouth. It is surrounded by a brick wall nearly eight miles in circuit, which encloses gardens, rice-fields, and groves of the date-palm. The houses are mean and the place is unhealthy. About half of the inhabitants are Arabs. Bassora has an extensive trade, being an entrepôt for the exchange of the productions of Turkey and Persia for the commodities of India. The river is navigable to this point for ships of 500 tons. Among the exports are horses, dates, raw silk, and precious metals. Bassora was founded by the calif Omăr about 636 A. D., and was once a rich and populous city. Pop. about 4000.

Bassora Gum, a whitish or yellowish opaque substance resembling gum-arabic, but differing from it by being mostly insoluble in water.

Basso-Rilievo. See Bas-Relief.

Bass River, a township of Burlington co., N. J. Pop. 807.

Bass's Strait separates Australia from Tasmania, and is about 140 miles wide. It was first explored by George Bass in 1798. The navigation of this strait is obstructed by small islands and coral reefs.

Bast, or **Bass** [Lat. *liber* or *endophlœ'um*], the fibrous inner bark of exogenous plants, consists mostly of sap-vessels or laticiferous vessels. It is most conspicuous in exogenous trees as the substance interposed between the true bark and the wood. It is sometimes valuable for medicinal purposes, and is often used in the fabrication of cloths, ropes, mats, sacks, etc. The Russians apply the name bast especially to the inner bark of the linden tree (*Tilia Europæa*), which is extensively used for making ropes, mats, and shoes. The trees are cut down in spring when the sap abounds. This matting is extensively imported, and used in packing furniture and other articles, covering tender plants in gardens, etc.

Bas'tard [Old Fr.], in law, a person born of parents not married to each other. It includes several distinct cases, as where the mother is unmarried, or she is a married woman, or where she was married at the time of conception, but not married at the time of birth—*e. g.*, being then divorced from the bonds of matrimony or a widow. By the rules of the common law the fact of the marriage of the

parents at the time of birth is the test of legitimacy, even though such marriage may have immediately preceded the birth. By the civil or Roman law, intermarriage after birth has a retroactive effect, and makes the child legitimate. This rule prevails in Scotland. This difference presents frequently an interesting question in private international law. Thus, if a person owning both land and personal property in England should become domiciled in Scotland, and there marry the mother of his bastard child, the marriage would make the child legitimate, so that he could succeed to the personal property in England, but he would not inherit the land there situated. Some of the States in this country follow the common-law rule, while others by statute have adopted the Scotch, so that the same point may arise in our inter-State jurisprudence. In the case where the mother is a married woman, and it is claimed that a child is the offspring of an adulterous connection, it will not be enough that the adulterer may have been the father. It must be proved that the husband could not have been, either by absence from the country or other sufficient reason. The presumptions of law favor legitimacy, and public policy requires that these should only be overcome by the most satisfactory proof. (The details of this branch of the law can be found in the work of Mr. NICHOLAS on the "Law of Adulterine Bastardy.") Public policy also requires that the mother should not be allowed, for the purpose of bastardizing the issue, to be a witness to prove want of access on the part of the husband. In the special case where the mother is at the time of the child's birth a widow, a question may arise as to the effect of the time intervening between the death of the husband and the birth of the child in raising a presumption of illegitimacy. No precise time is fixed by law, and the testimony of experts must be resorted to. Statutes sometimes fix a period after which the presumption of illegitimacy will arise. A similar question may arise after a divorce from the bonds of matrimony for the husband's fault. In the case of a divorce from bed and board, where a child subsequently comes into existence it is presumed to be illegitimate, as it will be supposed that the parties have obeyed the decree of the court and have lived apart. This presumption may be rebutted by satisfactory evidence.

By the common law, a parent is not bound to sustain an illegitimate child. By a series of statutes in England, commencing in the reign of Queen Elizabeth, the duty of support is imposed on the supposed father as well as the mother. This legislation proceeds upon the theory that it is a criminal act to bring such a child into the world and to cast its support upon the public. Accordingly, an inquiry is had before magistrates into the facts of the case, and if parentage is established an order is made for a periodical allowance for the child's support. Should the parent abscond, his or her property may be sequestered. Due provision is made for a review of the order of the magistrates. These statutes are substantially re-enacted in this country. This class of children do not have the same civil rights in all respects as those who are legitimate. They cannot inherit land from either father, mother, or collateral relatives, or transmit land to them. Natural ties are, however, regarded, it being the same crime for bastard relatives to intermarry as for those who are legitimate. Such a child has no name except as it may acquire it by reputation. It is deemed to have its domicil of origin at the place of its birth. These disabilities in this country are to some extent modified by statutes in the respective States. Thus, in New York an illegitimate child may inherit from its mother, in default of legitimate descendants; so the mother may in like circumstances inherit from the child. A bastard child may be made legitimate by a special act of the legislature both in England and in this country. Such an act cannot, however, interfere with vested rights of others. It could not divest property which had been previously transmitted to legitimate relatives.

T. W. DWIGHT.

Basti'a, a fortified seaport of Corsica, on the N. E. coast, 75 miles N. E. of Ajaccio; lat. 42° 42′ N., lon. 9° 27′ E. It is the richest and most populous town in the island, of which it was formerly the capital. It is picturesquely situated on the slope of a hill which rises in the form of an amphitheatre. It has a harbor which admits small vessels, and has a considerable trade in leather, wine, oil, coral, etc. Here are numerous tanneries. Pop. in 1866, 21,535.

Bas'tian (HENRY CHARLTON), M. D., F. R. S., born at Truro, England, April 26, 1837, is distinguished as an advocate of the doctrine of the spontaneous generation of living organisms. He early gained a brilliant fame as a pathologist. He has since his twenty-third year been officially connected with the London University, and in 1871 became professor of pathological anatomy in University College. He has published "Modes of Origin of Lowest Organisms" (1871) and "The Beginnings of Life" (1872).

Bastiat (FRÉDÉRIC), an eminent French political economist and advocate of free trade, was born at Bayonne June 29, 1801. He wrote against the protective system in the "Journal des Économistes." During a visit to England he became acquainted with Cobden, and on his return (1845) he produced translations of the speeches of British free-traders. He was chosen a member of the Constituent and Legislative Assemblies of 1848 and 1849. His chief work is "Harmonies Économiques" (1849). He died at Rome Dec. 24, 1850.

Bastide (JULES), a French republican and journalist, was born in Paris Nov. 22, 1800. He became chief editor of the "National" about 1836, and founded the "Revue Nationale" in 1846. He was minister of foreign affairs under Cavaignac from June to Dec., 1848. He has published important educational and historical works.

Bastile, or **Bastille** [from *bâtir* or *bastir*, to "build"], a French word signifying "fortress," applied especially to the state prison and citadel of Paris, which was built about 1370 by Charles V. Additions were made to it by several successive kings, and it was surrounded by a wide ditch. Among its prominent features were eight large round towers five stories high, having walls twelve feet thick or more. In these towers were many cells for prisoners. The inmates of this prison were generally noblemen, authors, politicians, etc., who had not been legally convicted of crime, but were victims of royal jealousy, political despotism, court intrigue, or ecclesiastical persecution. The only formula used in condemning a man to the Bastile was the *lettre de cachet*. Among the eminent men confined here were Voltaire, Bassompierre, and the Man in the Iron Mask. The prisoners were left in ignorance of the cause and duration of their punishment, and were completely debarred from intercourse with their friends. The first violent symptom of the French Revolution was the destruction of the Bastile, which the populace took by storm July 14, 1789. They killed the governor, De Launay, and released the prisoners, who were only seven in number.

Bastina'do [It. *bastona'ta*, a "blow with a stick," from *basto'ne*, a "staff" or "stick"], a name given by Europeans to a form of punishment which is common in Turkey and several Oriental countries, and was practised by the ancient Egyptians. It consists of blows inflicted with a stick on the soles of the feet.

Bas'tion [from the Fr. *bâtir* (formerly spelled *bastir*), to "build"], a bulwark; a projecting tower erected to defend the wall of a town or fortification. An unbroken wall enveloping a city or other place, for its defence, would be unseen at its foot; hence during ancient times and the Middle Ages towers of various kinds projected at intervals, from which the intermediate portions of the wall could be observed and reached by defensive projectiles (*i. e.* "flanked"). The invention of gunpowder made it necessary to cover enveloping walls (the *enceinte*) by earth in the form of a glacis in front of the ditch, and to enlarge these flanking towers to receive artillery. Thus enlarged, their own walls would have been undefended had not their outline been so contrived that they should *flank* each other. Hence arises the *bastion*, the two faces of which, directed upon the inner extremities of the flanks of the adjoining bastions, are *flanked* (that is, defended) by them; hence a bastion has two faces and two flanks; the fifth side of the figure, called the *gorge* (between the extremities of the *curtain* and towards the interior of the place), is usually open. That portion of the enceinte which fills the interval between two bastions, uniting with the inner extremities of their flanks, is called the *curtain*. The *ensemble* of a curtain and two half bastions is called a *bastioned front*. (See FORTIFICATION, by A. BRIALMONT, col. d'etat-major, Belgium.)

Bas'tress, a township of Lycoming co., Pa. Pop. 251.

Bas'trop, a county of the central part of Texas, has an area of 1001 square miles. It is intersected by the Colorado River, which is here navigable for steamboats. The surface is undulating; the soil is generally fertile, and produces cotton and maize. Lignite is abundant. It is intersected by the western division of the Houston and Texas Central R. R. Capital, Bastrop. Pop. 12,290.

Bastrop, a post-village, capital of Morehouse parish, La., on Bayou Bartholomew, 300 miles N. by W. of Baton Rouge. It has two academies, one weekly paper, and is in one of the best cotton regions in the State. Pop. 521.

ED. "MOREHOUSE CONSERVATIVE."

Bastrop, a post-village, capital of Bastrop co., Tex., on the Colorado River, 35 miles E. S. E. of Austin City. It has one weekly newspaper. Pop. 1199.

Bas'yle [from the Gr. βάσις, "base," and ὕλη, "timber," "substance"] is the name given by Graham to a substance,

whether simple or compound, which can unite with oxygen to produce a base. Thus, all the metals are examples of simple basyles, while ammonium, ethyl, methyl, etc. are compound basyles.

Bat [Lat. *vespertilio*], the common name for animals belonging to the order Cheiroptera, mammals possessing a fold of skin which commences at the neck and extends on each side between the fore legs or arms and the posterior limbs, serving as wings which enable the animal to fly. Bats are the only mammals which have the power of flight. The anterior extremities and digits are usually very long, the eyes small, ears large, thumbs short and armed with a hook-like nail, as are each of the toes of the hind feet. The clavicle is generally long. Some species have a spur on the heel. Bats fly for the most part only in the night, living by day in hollow trees, caves, and dark buildings. Even when their eyes have been destroyed, they can fly through narrow and tortuous passages without hitting. This is probably owing to their delicate sense of hearing and touch. Except in tropical climates, they hibernate in cold weather.

Bats are divided into two groups: the so-called frugivorous and the insectivorous bats. The former are found only in the Old World tropical regions. They feed chiefly on fruits, but also eat birds, small mammals, etc. They number forty or more species, and include the rousettes, kalongs, "flying foxes," etc. Some of them can spread their wings five feet from tip to tip. The principal genus is *Pteropus*, and its species are remarkable as having only twenty-four vertebræ, a smaller number than any other known vertebrate possesses. The insectivorous bats are by far the most numerous, some 200 species being described. The most formidable of these are the vampires—tropical American bats of the genus *Phyllostoma*, having a leaf-like membrane on the end of the nose. They are famous for their habit of fastening upon sleeping animals and men for the purpose of sucking their blood. Such witnesses as D'Azara, Tschudi, Waterton, and Darwin confirm this disputed statement. The bats of the U. S. are not very numerous in species, though abundant in individuals. They are of the genera *Vespertilio*, *Molossus*, *Plecotus*, etc. Europe is much more rich in species, the "long-eared bat," *Plecotus communis*, being one of the most common. Bats are extremely useful in destroying insects, and their excrement so accumulates in certain caves, as in Farther India, in Tennessee, Arkansas, etc., as to promise to become an important source of guano, of which the quality is in some cases excellent. Fossil remains of bats first appear in the eocene.

Flying Fox Bat.

Vampire Bat.

Long-eared Bat.

CHAS. W. GREENE.

Bat'aszek, a town of Hungary, in the county of Tolna, 70 miles W. of Szegedin, has large vineyards which produce an excellent wine. Pop. in 1870, 6452.

Batatas Edulis. See SWEET POTATO.

Bata'vi, an ancient German tribe or nation who inhabited the country now called Holland, especially an island called *Batavia* or *Insula Batavorum*, which was enclosed by the Rhine, the Waal (Vahalis), the Meuse (Mosa), and the ocean. They were conquered by Germanicus, and became loyal subjects of the Roman empire. They were exempted from the payment of taxes. The Batavian cavalry served in the Roman armies, and had a high reputation.

Bata'via, a city and seaport of Java, the capital of the Dutch possessions in the East Indies, is on the northern coast of the island and on the Java Sea; lat. 6° 8′ S., lon. 106° 50′ E. Its site is flat and marshy, and intersected by canals. The place was formerly very unhealthy, but has been improved by draining. The temperature continues about uniform throughout the year, the average being 78° F. Batavia, which has a good harbor, is the greatest commercial emporium of the Malay Archipelago. It has a stadthouse, an exchange, numerous churches, several Chinese temples, a bank, a school of arts and sciences, and a botanic garden. A telegraphic cable connects it with Singapore, about 600 miles distant. The chief articles of export are coffee, sugar, pepper, indigo, hides, cloves, nutmegs, mace, tin, rice, and rattans. Among the imports are various articles of European manufacture. Pop. estimated at 180,000. This city was founded by the Dutch in 1619.

Batavia, a post-village and township of Kane co., Ill., on Fox River, 38 miles W. of Chicago, with which it is connected by two railroad lines. It has two large schools, an institute for the insane, valuable quarries, extensive manufactures, a weekly newspaper, and a national bank. Pop. of township, 3018. ED. OF "NEWS."

Batavia, a post-township of Branch co., Mich. P. 1308.

Batavia, the county-seat of Genesee co., N. Y., on the Tonawanda Creek and the New York Central and Erie R. Rs. The Canandaigua and Tonawanda and Attica R. Rs. meet at this point, 36 miles E. of Buffalo and 32 miles W. of Rochester. It contains six churches, several important manufactories, two national banks, one savings bank, three newspaper-offices, union school, ladies' seminary, public library, and the State institution for the blind. Pop. of village, 3890; of Batavia township, 6485.

HENRY TODD, ED. "SPIRIT OF THE TIMES."

Batavia, a post-village, capital of Clermont co., O., on the East Fork of the Little Miami River, 21 miles E. of Cincinnati. It has a manufactory of tin-ware, one of carriages, a national bank, and two weekly papers. Pop. of township, 3334. ED. OF "CLERMONT SUN."

Bata'vian Repub'lic. Holland having been conquered by the French in 1795, the prince of Orange was deposed and a new government was established with the title of the Batavian republic. This was an ally or tributary to the French republic, and as such was involved in a war against the British, who nearly ruined the Dutch navy. In June, 1806, this republic was converted into a kingdom, of which Louis Bonaparte became king.

Bat'chelder (SAMUEL), born in Jaffrey, N. H., June 8, 1784, began the cotton manufacture in New Ipswich, N. H., in 1808. He superintended the erection of cotton-mills in Lowell, Saco, etc., invented a dynamometer for mill-work, and published a "History of the Cotton Manufacture in the U. S."

Bat'cheller (OLIVER A.), U. S. N., born June 1, 1842, in the State of New York, graduated at the Naval Academy in 1861, became an ensign in 1862, a lieutenant in 1864, and a lieutenant-commander in 1866. He was attached to the steamer Mississippi at the attack on Port Hudson, Mar. 15, 1863, when that vessel was destroyed. In 1864 and 1865 he was attached to the Western Gulf blockading squadron, and served on the steamer Monongahela as executive officer in the battle of Mobile Bay, Aug. 5, 1864, and in the subsequent operations leading to the fall of Mobile. He was commended for gallantry by his commanding officer, Commander Strong, in his official report to Rear-Admiral Farragut of Aug. 6, 1864.

FOXHALL A. PARKER, U. S. N.

Bateman (KATE JOSEPHINE), an actress, was born at Baltimore, Md., Oct. 7, 1842, and was the daughter of H. L. Bateman and Mrs. Bateman, both well known in theatrical circles; and her sister Ellen (Mrs. Greppo) was also an actress before her marriage. The sisters were brought up almost from infancy upon the stage. In 1862, Kate Bateman appeared at Boston as "Leah," her greatest character, and won great applause in the U. S. and Great Britain. In 1866 she was married to George Crowe, a former editor of the "London News."

Bates, a county of Missouri, bordering on Kansas. Area, 900 square miles. It is traversed by the Marais des Cygnes (or Osage River). Cattle, grain, and tobacco are extensively raised. The surface is undulating; a large part of the county is prairie. Capital, Butler. Pop. 15,960.

Bates, a township of Sebastian co., Ark. Pop. 623.

Bates, a township of Greenville co., S. C. Pop. 1400.

Bates (EDWARD), LL.D., an American statesman and lawyer, was born at Belmont, Goochland co., Va., Sept. 4, 1793, and emigrated to Missouri in his youth. He became a political friend of Henry Clay, and was elected a member of Congress in 1827. He presided at the national convention of the friends of internal improvement which met at Chicago in 1847, and opposed the repeal of the Missouri Compromise in 1854. In Mar., 1861, he was appointed attorney-general of the U. S. He resigned in 1864. Died Mar. 25, 1869.

Bates (ISAAC C.), born at Granville, Mass., in 1780,

graduated at Yale in 1802, became a lawyer at Northampton, Mass., was a Whig member of Congress (1827–35) and U. S. Senator (1842–45). Died Mar. 16, 1845.

Bates (JOSHUA), born in Weymouth, Mass., in 1788. He removed to London in 1826, and became a partner in the banking-house of Baring Brothers & Co. He was the principal founder of the Boston Free Library, to establish which he gave $50,000, on the condition that it should be "perfectly free to all, with no other restrictions than may be necessary for the preservation of the books." He afterwards contributed books to the value of $50,000. Died Sept. 24, 1864. (See "Memorial of Joshua Bates, from the city of Boston," 1865.)

Bates (JOSHUA), D. D., born at Cohasset, Mass., Mar. 20, 1776, graduated at Harvard in 1800, was ordained pastor of the Congregational church at Dedham, Mass., in 1803, was president of Middlebury College, Vt. (1818–39), was for a time chaplain of the U. S. Senate, and pastor in Dudley, Mass. (1843–54). He published various discourses, sermons, and other writings. Died Jan. 14, 1854.

Bates (MARTIN W.), born at Salisbury, Conn., Feb. 24, 1787, studied medicine, but became a lawyer of Delaware, from which State he was U. S. Senator (1857–59). Died at Dover, Del., Jan. 1, 1869.

Bates (SAMUEL PENNIMAN), LL.D., born at Mendon, Mass., in 1827, graduated at Brown University in 1851, was principal of Meadville Academy, Pa. (1852–57), where he did much to stimulate the cause of education. In 1857 he became superintendent of schools in Crawford co., Pa.; in 1860 deputy State superintendent; in 1865 State historian of Pennsylvania. He has published various works, among which are a "History of Pennsylvania Volunteers" (5 vols.), "History of the Colleges of Pennsylvania," "School Laws of Pennsylvania. He assisted in preparing Armor's "Lives of the Governors of Pennsylvania" (1873).

Bates (WILLIAM), D. D., one of the most ornate and learned of the English nonconformist writers, was born in Nov., 1625, and died at Hackney, July 14, 1699. He assisted at the Savoy Conference for reviewing the Liturgy. Soon after the restoration of Charles II. he was made one of His Majesty's chaplains, and but for his nonconformity might have become a bishop. His contemporaries called him the "silver-tongued." In 1681 he published (anonymously) "Vitæ Selectorum Aliquot Vivorum." His most valuable treatise is "The Harmony of the Divine Attributes in the Contrivance and Accomplishment of Man's Redemption," 1697. His collected works were published in 1700, again in 1723, and again in 1815, by Farmer, in 4 vols. 8vo.

Batesville, a post-village, capital of Independence co., Ark., on White River, 90 miles N. N. E. of Little Rock, and 115 miles W. N. W. of Memphis. It is the seat of Batesville Academy and Soulesbury Institute. The river is navigable for small steamboats to this point, and part of the year for large ones. It has 2 free schools, 2 hotels, 1 woollen factory, 5 flouring-mills, 2 wagon-shops, 1 cabinet warehouse, and 1 weekly paper. Pop. 881.

W. H. BAYNE, PUB. "REPUBLICAN."

Batesville, a post-village of Panola co., Miss. P. 227.

Bath [Ger. *Bad*], the application to the body of water or other liquid, or of spray or vapor, for the purpose of cleansing the surface or of preserving or restoring health. Water, employed in the bath, is an important agent in the treatment and prevention of disease. In ancient Greece, Rome, Germany, and Judea, in Mohammedan lands (by religious precept), as in modern Finland and some other countries, bathing may be regarded as almost universal, though in desert countries the Moslems use sand instead of the water which is there so precious. Some of the American Indians, though not otherwise remarkably clean, practise bathing in water or steam even to excess. Surf-bathing is a nearly universal pastime on many islands of the Pacific. The ancient Romans had extensive public baths—institutions which of late have been revived in Europe and America on a smaller scale, but in a manner not liable to the serious abuses which disgraced the Roman baths.

The "hot" bath and vapor bath are above 99° F., the normal heat of the blood; warm, tepid, and cold baths being of lower temperature. The vapor bath of water or alcohol accelerates the heart's action, softens the skin, and produces profuse sweating, and is useful in various skin diseases, in chronic rheumatism, and in some diseases of the kidneys, etc. The hot bath is also stimulant. Locally applied, it relieves pain and allays inflammation. The hot bath is often employed in the convulsive diseases of children, but its effect may be a profound one; and the tepid or warm bath is much safer, since the skin of a child is extremely sensitive to heat and cold. The hot bath sometimes causes a sense as of choking, and a degree of giddiness or headache. When its action is favorable, profuse sweating results. The warm bath is a sedative, usually inclining one to inactivity or sleep. It is useful in feverish or restless conditions and in eruptive diseases, but is not to be recommended in acute diseases of the chest, which may be aggravated by it. The cold and tepid bath are those most generally to be employed. Cold bathing ought never to be practised while the person is exhausted or perspiring freely; and there are many nervous, thin, and sensitive persons who cannot safely endure the shock and loss of heat which it occasions. The application of cold water by the sponge or "pack" is an excellent measure in many cases of typhoid and other fevers. The "hydropathic pack" (in which the patient is wrapped in a wet sheet and closely covered with blankets), the hip bath, the douche or jet, and the shower bath have each their important uses in therapeutics. Various sulphur and other springs have a direct effect in skin diseases, and useful saline and other principles are no doubt capable of absorption into the system by the skin. Various drugs are used in vapor baths, and act upon the patient after absorption. Sea-bathing has a peculiar tonic effect upon some patients. Besides the above, the "Turkish" and "Russian" baths have been devised, which combine a thorough and direct detergent effect upon the skin with the various advantages of the warm and tepid bath, adding thereto the often invaluable results of manipulation or "kneading" the patient, a process the importance of which in selected cases can hardly be overestimated. "Wine baths," "mud baths," and other devices have been tried in different diseases, often with more or less benefit to the patient.

REVISED BY WILLARD PARKER.

Bath (anc. *Aquæ Solis*), a city of England, capital of Somersetshire, is beautifully situated in a valley on the river Avon, 20 miles from its mouth and 102 miles by rail W. S.W. of London; lat. 51° 23′ N., lon. 2° 22′ W. The houses are mostly built of white freestone, "Bath oolite," quarried in the vicinity. Bath presents perhaps a finer appearance than any other city of England, which is partly a consequence of the configuration of its site. This is in the form of an amphitheatre, on the declivity of which the finest streets extend in successive terraces. The principal public buildings are the Abbey church, in the latest Gothic style, 210 feet long; St. Michael's church, the guild-hall, an elegant theatre, a masonic temple, and the assembly and concert rooms. The beauty of the situation, the mildness of the climate, and the curative efficacy of its hot saline springs render Bath a very fashionable place of resort. The temperature of the springs, four in number, varies from 97° to 117° F. They rise on the bank of the river, and discharge 184,320 gallons daily. This water is recommended for scrofula, palsy, gout, cutaneous diseases, etc. This city sends two members to Parliament. The Romans erected baths at this place in the first century, and called it *Aquæ Solis*. Numerous Roman antiquities have been found in and near Bath. The Great Western Railway passes through Bath. Pop. in 1871, 52,542.

Bath, a port of entry, capital of Addington co., province of Ontario, Canada, is on the N. shore of the Bay of Quinté, in Ernestown township, 18 miles W. S. W. of Kingston.

Bath, a county in N. E. Kentucky. Area, 290 square miles. It is bounded on the N. E. by the Licking River. The surface is partly hilly; the soil in the N. W. part is based on limestone, and is fertile. Grain, tobacco, and wool are among the chief crops. The county contains coal and medicinal springs. Capital, Owingsville. Pop. 10,145.

Bath, a county of Virginia, bordering on West Virginia. Area, 725 square miles. It is intersected by the Cowpasture River and Back Creek. The surface is diversified by ridges of the Alleghany Mountains with intervening valleys, and abounds in beautiful scenery. Grain, wool, and stock are raised. Limestone and iron ore are found here. The county is traversed by the Chesapeake and Ohio R. R. It contains many medicinal springs, including the "Hot Springs" (110° F.), the "Warm Springs," the "Healing Springs," the "Bath Alum Springs," etc. It also contains the famous "Blowing Cave," and abounds in fine scenery. Capital, Bath Court-house, or Warm Springs. Pop. 3795.

Bath, a post-village and township of Mason co., Ill., near the Illinois River, and on the Peoria Pekin and Jacksonville R. R., 34 miles N. by E. of Jacksonville. Pop. 464; of township, 2124.

Bath, a township of Franklin co., Ind. Pop. 675.

Bath, a city of Maine, and capital of Sagadahoc co., is on the right (W.) bank of the Kennebec River, 12 miles from the ocean, 30 miles S. of Augusta, and 36 miles N. E. of Portland. It is built on uneven ground, is lighted with gas, and contains five national banks and twelve churches.

It is advantageously situated for navigation, and has steamboat communication with Boston and Portland. The Knox and Lincoln R. R., running from Rockland, 45 miles long, connects with the Maine Central at Bath. The principal business of Bath is shipbuilding. In the year ending June, 1863, sixteen ships and barks, two brigs, and one steamer were built here. There are also many extensive manufactories of lumber, two of boots and shoes, one of carriages, and a large manufactory of railroad cars, a large iron-foundry, brass-foundry, cordage-factory, and machine and boiler shops. There are three printing-offices, one daily and one weekly paper, three bookstores, and one bookbindery. Bath has long been noted for the excellence of its schools. Pop. 7371.

E. Upton, Ed. "Daily Times."

Bath, a post-township of Clinton co., Mich. P. 1125.

Bath, a township of Freeborn co., Minn. Pop. 404.

Bath, a post-township of Grafton co., N. H., on the Connecticut River and on the Boston Concord and Montreal R. R., 15 miles S. W. of Littleton. It has an academy, and manufactures of lumber, leather, paper, boots, shoes, starch, etc. Pop. 1168.

Bath, a village of New Utrecht township, Kings co., N. Y., on Gravesend Bay, and on the Brooklyn Bath and Coney Island R. R., 2 miles from Coney Island. It is a summer resort.

Bath, a village of North Greenbush township, Rensselaer co., N. Y., on the Hudson River, opposite the upper portion of Albany. It has a mineral spring. Pop. 1465.

Bath, a post-village and semi-capital of Steuben co., N. Y., is on the Cohocton Creek and on the Erie R. R. (Rochester division), 74 miles S. S. E. of Rochester and 310 miles from New York. It has a jail and court-house, six churches, one national bank, several factories and mills, two newspapers, and an orphan asylum. Pop. of Bath township, 6236.

Bath, a post-township of Beaufort co., N. C. Pop. 1969.

Bath, a township of Allen co., O. Pop. 1255.

Bath, a post-township of Greene co., O. Pop. 2684.

Bath, a post-township of Summit co., O. Pop. 1034.

Bath, a post-borough of Northampton co., Pa., 10 miles W. of Easton, with which it is connected by railroad. Pop. 707.

Bath (or **Berk'ley Springs**), the capital of Morgan co., West Va., is situated 2½ miles S. of the Potomac River and the Baltimore and Ohio R. R., at Sir John's Run, 128 miles W. N. W. of Baltimore. Here are medicinal springs, which are much frequented, and have a temperature of 74° F. They are useful in rheumatic, calculous, nervous, and catarrhal diseases. It has a large tannery and one weekly newspaper. Pop. 407; of Bath township, 925.

C. H. Hodgson, Ed. "Mercury."

Bath Alum Springs, a post-village of Bath co., Va., 5 miles E. of Bath Court-house and 45 miles W. of Staunton. Here are several aluminous and chalybeate springs, which are much frequented by patients who require tonic and moderately astringent medication.

Bath Court-house, or **Warm Springs,** a post-village, capital of Bath co., Va., 50 miles W. of Staunton and 5 miles N. E. of Hot Springs. It has warm saline, chalybeate springs, which have a reputation for the cure of scrofula, rheumatism, and anæmia.

Bath King of Arms (called also **Gloucester King of Arms**), the principal herald of the order of the Bath and of the principality of Wales. Gloucester King of Arms was a title conferred only by Richard III. of England, until 1726, when George I. restored the office, and conferred the higher title of Bath King of Arms. This officer does not belong to the College of Heralds, but takes precedence of both Clarenceux and Norroy. He grants arms in his jurisdiction, subject to Garter and the Earl Marshal.

Bath, Knights of the, a military order in Great Britain, deriving its name from the ceremony of bathing which was performed at the initiation of the knights. The earliest authentic instance of this ceremony was at the coronation of Henry IV. (1399). The last occasion on which this ceremony was used was the coronation of Charles II., in 1660, after which the order fell into oblivion until it was revived by George I. in 1725. It is now the second in rank among the orders of England, the order of the Garter being the highest. The order of the Bath comprises three classes: first class, Knights Grand Cross (K. G. C.), the number of whom is limited to 50 military men and 25 civilians, besides the royal family; second class, Knights Commanders (K. C. B.) = 102 military and 50 civil; these and the first have the title of Sir; third class, Companions (C. B.) = 525 military and 200 civil.

Bath, Marquesses of (1789, Great Britain); Viscounts Weymouth, Barons Thynne (England, 1682), and baronets (England, 1641), a prominent family of Great Britain.—John Alexander Thynne, the fourth marquess, was born Mar. 1, 1831, and succeeded his father in 1837.

Bath Stone, a building-stone extensively used in England, is procured from quarries in the lower oolite in Somersetshire, near Bath. It is fine-grained, of a rich cream color, is easily wrought, and hardens on exposure to the air, but is not very durable. It contains about 94 per cent. of carbonate of lime and 2½ of carbonate of magnesia.

Bath'urst, a thriving town of New South Wales, capital of Bathurst county, is on the Macquarie River, 98 miles W. N. W. of Sydney. It is connected with Sydney by a fine road leading over the mountains. It is the centre of the mining district of New South Wales. Pop. in 1871, about 5000; of the town and district, 16,826.

Bathurst, a port of entry, capital of Gloucester co., New Brunswick, on the Bay of Chaleurs, 175 miles N. by E. of St. John, has a good harbor, and an extensive trade in lumber, trout, and salmon. Pop. in 1871, 4469.

Bathurst, Earls of, Barons Apsley (1771), Barons Bathurst (1712, in the peerage of Great Britain), a prominent family of Great Britain.—William Lennox Bathurst, the fifth earl, born Feb. 14, 1791, succeeded his brother, the fourth earl, in May, 1866.

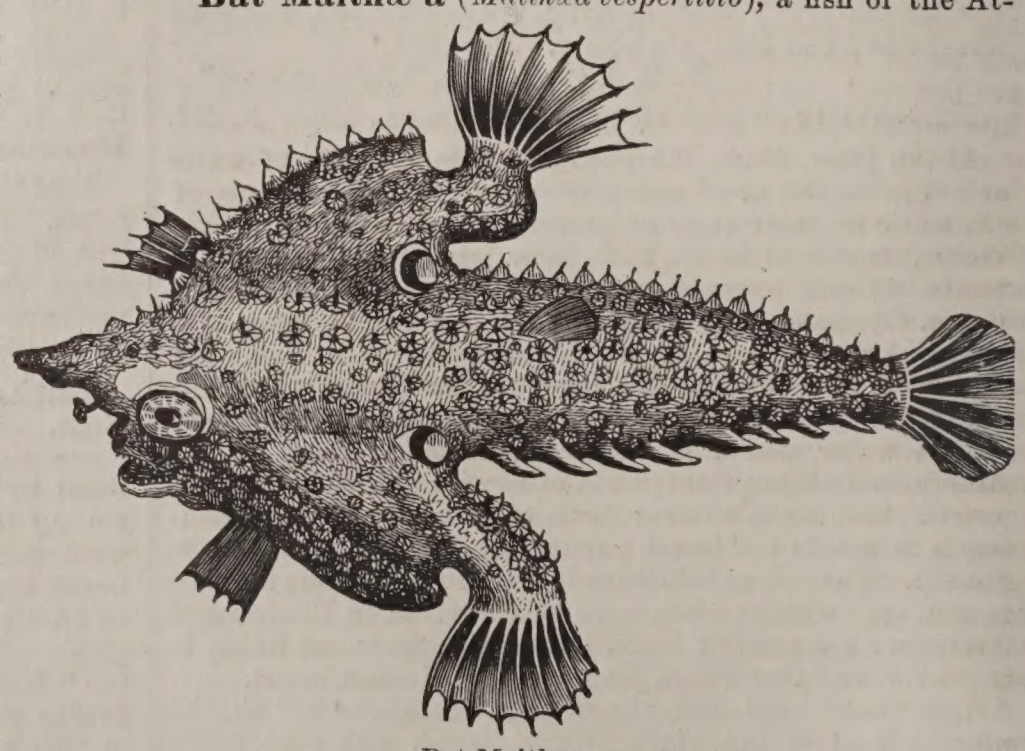
Bathyb'ius [from the Gr. βαθύς, "deep," and βίος, "life"], a name given by some biologists to a formless expanse of matter of an albuminous or protoplasmic character which is believed to cover large areas of the ocean's bed, and to manifest some characteristic evidences of possessing organic and perhaps animal life. Its existence is not universally admitted by savants.

Bathyl'lus [Gr. Βάθυλλος], a popular comedian and performer of comic pantomime, was born at Alexandria in Egypt, and lived about 30 B. C. He was a freedman of Mæcenas, and played in Rome.

Bat'iscan Bridge, a post-village of Champlain co., Quebec, Canada, on the N. shore of the St. Lawrence, 69 miles below Quebec, has two lighthouses and manufactures and exports of flour, lumber, and leather.

Batiste (bă'teest') **Cambric,** a fine white linen tissue, remarkable for the firmness and evenness of the threads, manufactured in India and France. The term is sometimes applied to a thin fabric which is partly cotton, or to a thin stuff made of silk and wool. Some of the Indian batistes are made of peculiar native fibres.

Bat Malthæ'a (*Malthæa vespertilio*), a fish of the Atlantic Ocean, found from South America to Newfoundland, chiefly remarkable for the monstrosity of its shape. Other species of the genus are known, but they are not very frequently taken.



Bat Malthæa.

Bat'on [originally, *baston;* a French word signifying "staff," "stick," or "truncheon"] a staff of office, a symbol of authority among many nations. The baton of a marshal of France or British field-marshal is a symbol of the highest military authority. The term is also applied by the French to a bishop's crook and to a flagstaff.

Baton Rouge, a city of Louisiana, capital of the

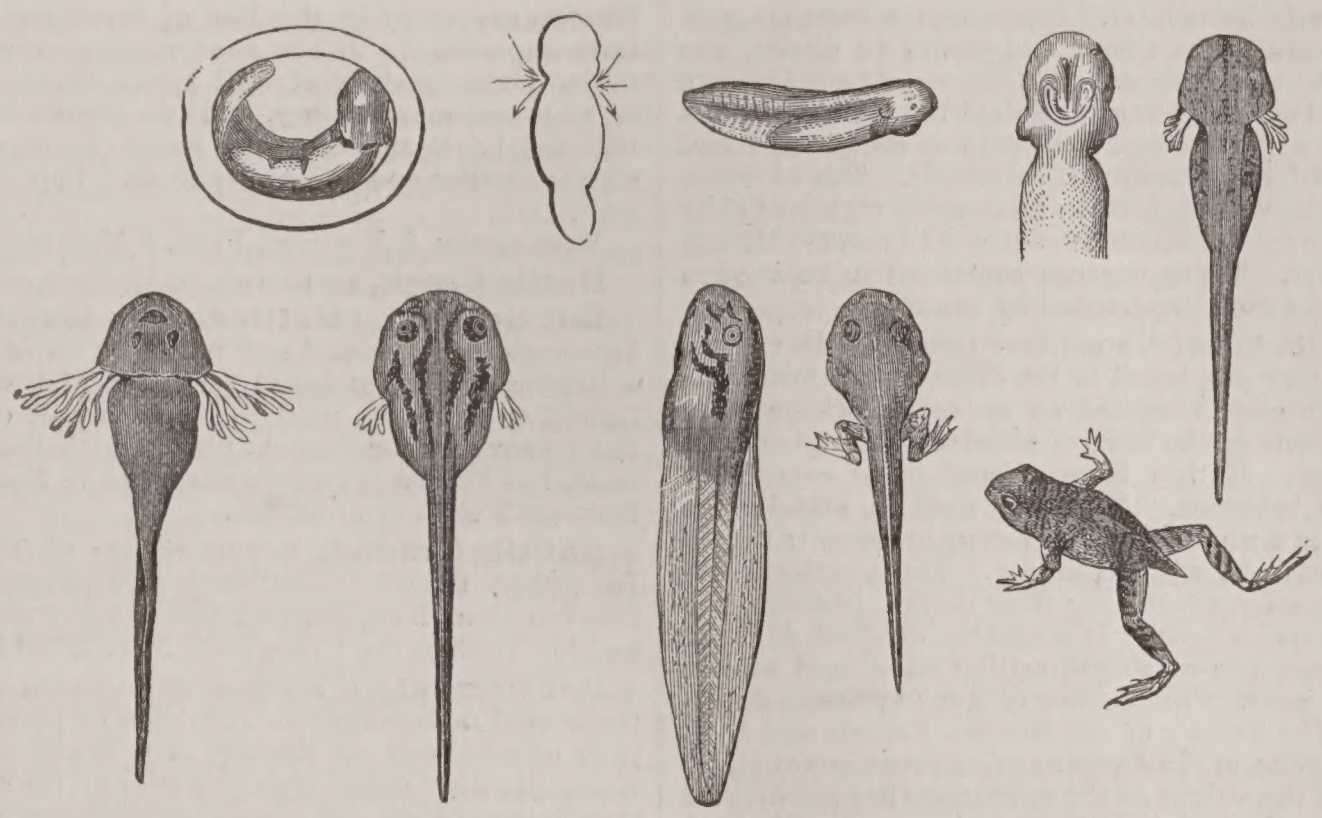
parish of East Baton Rouge, is on the left (E.) bank of the Mississippi, 129 miles above New Orleans; lat. 30° 28′ N., lon. 91° 11′ W. It stands on a bluff which rises about 25 feet above the highest inundations. The river below the city is bordered by plantations of sugar-cane, groves of tropical fruit trees, and handsome villas and gardens. The seat of government was established here in 1847. The capitol was completed in 1852 at a cost of $246,000. It contains a State-house (which was burned during the war, though its walls are still perfect), a college, four churches, asylums for the deaf and dumb and the blind, and a penitentiary in which are 600 convicts. The legislature met here Jan. 21, 1861, and on the 26th adopted the ordinance of secession. The city was taken by the U. S. forces May 7, 1862. On Aug. 5, 1862, a Confederate force, numbering 5000, under Gen. Breckenridge, attacked the garrison under Gen. Thomas Williams, but was repulsed after a fierce contest of two hours' duration, in which Gen. Williams was killed. The place was shortly after evacuated by the U. S. forces. The arsenal has been broken up. The climate is delightful and healthy, and the soil from which this city draws its support is rich and easy to cultivate. For the growth of grapes, peaches, plums, figs, etc. it has few equals. Baton Rouge has two weekly, one semi-monthly, and one tri-weekly paper. Pop. 6498.

W. C. Annis, Ed. "Gazette-Comet."

Baton Rouge, a village and township of Chester co., S. C., 54 miles N. N. W. of Columbia. Pop. of township, 3098.

Ba′too′ (Batou or **Batu) Khan,** said to have been the grandson of Jengis Khan, became governor of Kapchak in 1223. He conquered Russia, which he held in subjection ten years, and made war on Poland and Hungary. Died in 1255.

Batra′chia (plu.), [from the Gr. *βάτραχος*, a "frog"], called also **Batrachians** and **Amphibians,** one of the five great classes into which the vertebrate animals are usually divided, though some writers have reduced the class to the rank of an order of reptiles—a class with which they are popularly confounded. The batrachians are cold-blooded and oviparous, and in most living species are without scales, and the blood is partly aërated through the skin. The young, for the most part, breathe by gills like those



Hatching and Progress of the Frog.

of fishes. They generally have limbs, but not always. Their eggs are generally fecundated after extrusion. In most cases the eggs are laid in moist places or in water; the young assume a fish-like form (as the tadpole), and finally, when adult, with few exceptions, lose their gills and commence breathing by lungs like true or scaly reptiles. They further differ from reptiles in various points, such as in having two occipital condyles, while reptiles have but one, and in having very short ribs or none at all, while reptiles have a series of ribs. Batrachians are arranged in four orders: (1) Labyrinthodonts, all extinct, which approached the characters of ganoid fishes in their teeth, while in their scales and in some other points they resembled true reptiles. (2) Cæcilia, which approach the serpents in form, being long and without legs, and having also minute scales; but anatomically and in development they are batrachians. They are popularly classed with snakes. (3) The Anura, or tailless batrachians, including frogs, tree-frogs, and toads, whose young, when they leave the tadpole state, not only lose their gills and become lung-breathers, but also lose the tail, put forth legs, become carnivorous, and for the most part adopt a mode of progression by a series of leaps. It is stated that in waterless regions there are frogs which pass the tadpole state in the egg, and are hatched perfect. (4) The Urodela, or tailed batrachians, comprising, *a*, Salamandridæ (true salamanders which are terrestrial, and tritons or water-newts); *b*, Amphiumidæ, including the "Congo snake," the "hell-bender," etc., breathing by cervical spiracles and undergoing no metamorphosis; *c*, the Sirenidæ, having both lungs and external gill-tufts.

Bat′rachomyoma′chia [from the Gr. *βάτραχος*, a "frog," *μῦς, μυός*, a "mouse," and *μάχη*, a "battle"], the name of a mock-heroic poem, the subject of which was the battles of the frogs and mice. It has been erroneously ascribed to Homer. It was published by Matthiæ (1805) and by Baumeister (1852).

Batshian, or **Batchian,** an island of the group of Moluccas, belonging to the Dutch, lies S. W. of Gilolo. Area, about 900 square miles. The surface is mountainous; the soil is fertile, and produces excellent cloves.

Bat′ta, an allowance to the officers of the British army in India in addition to the ordinary pay. The batta varies according to the part of the country in which the officers are employed, and depends on the circumstance of their being in the field or in cantonments. The officers receive full batta if they are in the field or more than 200 miles from the presidential government cities. They receive half batta when they are in garrison or in cantonment within that distance.

Battaks, called also **Battas,** a race of people living in that part of Sumatra called Batta, which lies between the equator and the parallel of 2° 30′ N. They are addicted to gambling, and are passionately fond of cock-fights. They speak a peculiar language, have an original alphabet or character, and write treatises on pieces of bamboo. They commence at the bottom of the page, and write from right to left. They make books of the inner bark of a species of palm. (See Junghuhn, "Die Battaländer auf Sumatra," 2 vols., 1847.)

Battal′ion [Fr. *bataillon*], a tactical unit of infantry; a body of infantry amounting to nearly 1000 men. In the American cavalry and artillery service eight (in infantry ten) companies constitute a battalion. The full complement of a battalion of British troops is usually ten companies. The British infantry regiments in time of peace have each one battalion, but the regiment of the continental powers is mostly so large as to comprise several battalions. In the U. S. army an infantry regiment has one battalion, while regiments in the other arms of the service have two. A detachment of infantry of more than one company, and less than one regiment, is sometimes called a battalion.

Bat′tel [Fr. *bataille*], an ancient mode of trial by single combat, usually called "wager of battle." It had its origin among the German tribes, and was introduced into England by William the Conqueror at the time of the Norman conquest. It was used, however, in only three cases—in the court of chivalry, in appeals of felony, and in the issue joined in a writ of right to determine the title to real property. In criminal cases the accuser and the accused fought in person; in civil cases, by champions. The lead-

ing reason for requiring a champion in civil cases was that if the parties should engage in combat, and one of them should be killed, the proceeding would terminate by his death, and the object of the contest would be frustrated. This barbarous mode of trial, which was based on the idea that Heaven would give the victory to the injured or innocent party, though for a long time practically disused, continued to be recognized as part of the law of England till the year 1819, when it was abolished by statute. (The details of the method of proceeding in the case of a writ of right will be found in the third book of BLACKSTONE'S "Commentaries," p. 337.)

Battelle, a township of Lewis co., West Va. P. 2002.

Battelle, a township of Monongalia co., West Va. Pop. 1856.

Bat'tering-Ram [Lat. *a'ries*], an engine of war used by the ancient Greeks and Romans to make a breach in the wall of a town or fortress. It consisted of a heavy beam of wood nearly 100 feet long, one end of which was armed with a mass of iron or bronze in the form of a ram's head. It was suspended by a chain or rope from a crane or trivet, and was made to swing backward and forward in a direction nearly horizontal. Sometimes a huge mass of stone, armed with a ram's head and placed on wheels, was driven against the walls with great force. About 100 men were employed in impelling it against the wall. To protect these men a wooden roof (*testudo*) was constructed, and the whole machine was mounted on wheels. The blows of the ram were directed against the same point with gradually increasing momentum, which, if continued long, hardly any wall could resist. These engines continued to be used in the Middle Ages until superseded by cannon.

Bat'tery [Fr. *batterie*], a military term used in various senses. A battery employed in the defence of a fortress is a row of heavy guns mounted on an earthwork or other platform; any one of the lines of a fortress which is armed with siege-guns. If they have a bomb-proof cover they are casemated batteries. A battery used in attacking a fortified place is a number of siege-guns or mortars placed in a line and covered with a parapet. These batteries receive various names, expressing their design, position, etc. In field operations a battery is a number of guns, with the necessary horses, gun-carriages, artillerymen, and officers to manage the guns. The number of guns varies in different nations. The battery of the British, French, and U. S. consists of six guns, of the Austrians and Prussians of eight. In reference to the weight of the ordnance, they are divided into *heavy batteries* and *light batteries*. The term battery is also applied in a narrower sense to the *personnel* or complement of men and officers who serve a set of guns.

Bat'tery, in law, an unlawful touching of the person of another by the aggressor himself, or by any substance put in motion by him. It must be wilfully done, or proceed from want of due care. The law regards a man's person as sacred, and permits no one, without sufficient cause, to interfere with it. This rule prevails, no matter how slight the unlawful force may be. Every battery includes an assault. A battery is sometimes justifiable, and hence permitted by the law; as when it occurs in the exercise of parental authority, or is a means of defence of one's self or the members of one's family, or is committed while acting under process of a court or in aid of the officers of the law. In all these cases the force used must be necessary to accomplish the purpose, and not in excess of what is required. The remedy for a battery is an action for damages. It is also in general a crime, and the wrongdoer is subject to prosecution in the name of the people.

Battery, Floating. See FLOATING BATTERY.

Battery, Galvanic. See ELECTRICITY.

Batthyányi, or **Bathyanyi,** the name of an ancient and celebrated family of Hungarian magnates which has produced several statesmen and generals.

Batthyányi (LOUIS), COUNT, a Hungarian patriot, born at Presburg in 1806. He favored the liberal cause, and was appointed president of the ministry formed in Mar., 1848. Finding his position untenable, he resigned about six months later. After his friends had been defeated in battle by the Austrians, he was tried by a court-martial, and, though his conduct had been moderate, he was shot Oct. 6, 1849. (See HORVATH, "Louis Batthyányi, ein politischer Martyrer," 1850.)

Bat'tle. See GRAND TACTICS.

Battle, a town of England, in Sussex, about 7 miles N. W. of Hastings, is in a valley enclosed on three sides by wooded hills. It is noted for the manufacture of gunpowder. Pop. about 3400. It derived its name from the great battle (usually called the battle of Hastings) which was fought near it on the 14th of Oct., 1066, between William the Conqueror and the Saxon king Harold. The victorious Norman erected here a large abbey, called Battle Abbey, now in ruins.

Battle-Axe, a weapon much used by the early northern nations, Teutonic, Celtic, and Scandinavian, and requiring great strength in its use. The battle-axe had a longer handle and a broader, stronger, and sharper blade than the common axe. It was of various forms, which had different names, such as the bill and the gisarme. The halberd was the latest form of the battle-axe, a form which is even now scarcely obsolete, though used only on occasions of ceremony. Battle-axes were used on foot and on horseback.

Bat'tleboro', a post-village of Edgecomb co., N. C., on the Wilmington and Weldon R. R. It has one weekly newspaper.

Battle Creek, a post-township of Tehama co., Cal. Pop. 199.

Battle Creek, a city of Calhoun co., Mich., at the confluence of the Kalamazoo and Battle Creek rivers, on the Michigan Central R. R., 120 miles W. of Detroit. Its educational facilities are very fine; its manufactures extensive, especially in the line of threshing-machines and farm implements. It has good water-power, four flouring mills, a manufactory of knit goods, three iron-foundries, an edge-tool manufactory, and two furniture-factories, one national bank and one city bank (savings). There are eight churches and two newspapers. Pop. 5838; of township, 1188.

WOOLNOUGH & BORDINE, PUBS. "MICHIGAN TRIBUNE."

Battle Creek, a post-twp. of Madison co., Neb. P. 284.

Bat'tledoor, or **Battledore** [a corruption of the Sp. *batallador*, a "fighter" or "fencer"], an instrument with a handle and a flat board (or piece of leather stretched tightly on a frame), used to strike a ball or shuttlecock. Battledoor and shuttlecock, played with the above instrument, has been a favorite amusement in Europe since the fourteenth century or earlier.

Bat'tle-Ground, a post-village of Tippecanoe co., Ind., where the celebrated battle of Tippecanoe was fought between Gen. Harrison and the Indians under Tecumseh and his brother, the "prophet," Nov. 7, 1811.

Bat'tlement, a notched or indented parapet sometimes used in fortification, and often employed for the purpose of ornament on the top of a house or castle. The rising parts are called cops or merlons; the spaces or openings between them are crenels, embrasures, or loops. The soldier shelters himself behind a merlon while he shoots through the embrasure.

Battle Mountain, a post-township of Humboldt co., Nev. Pop. 261.

Battle-Pieces, paintings representing battles. Among the remarkable works in this department are Lebrun's "Battles of Alexander the Great" and Rubens's "Battle of the Amazons." Horace Vernet is the most eminent of recent painters of battles.

Bat'tletown, a township of Clarke co., Va. P. 1884.

Battonya, a town of Hungary, in the county of Csanad, 16 miles N. E. of Arad. Pop. in 1869, 8642.

Bat'tue [from the French *battre*, to "beat"], a mode of hunting wild animals or killing game on a large scale. A number of men, arrayed at equal distances, by beating the bushes drive the animals toward a stationary party of hunters, who are waiting to shoot them. Sometimes the array of beaters is circular, and they drive the game from different parts of a large tract of forest to a common centre. Battues in Great Britain are chiefly practised in extensive preserves of pheasants, rabbits, and hares during the autumn and winter, when country gentlemen invite their friends to their mansions for this purpose.

Baudelocque (JEAN LOUIS), a skilful French surgeon, born in Picardy in 1746. He was selected by Napoleon to attend the empress Marie Louise as first accoucheur. He wrote an able work on the "Art des Accouchements" (2 vols., 1781). Died May 1, 1810.

Baudissin (WOLF HEINRICH FRIEDRICH KARL), COUNT, a German author, born Jan. 30, 1789. He translated, together with Tieck, a number of Shakspeare's works. Under the title of "Ben Jonson und seine Schule" (2 vols., 1836) he published translations of the works of other English authors. He also has made translations of Molière's comedies (1865–67).

Bau'er (BRUNO), a German rationalistic theologian and biblical critic, was born in Saxe-Altenburg Sept. 6, 1809. He published numerous works, among which are "Das entdeckte Christenthum" (1843), "Geschichte Deutchlands unter der Französischen Revolution und der Herrschaft

Napoleon's" (2 vols., 1846), and the "Apostelgeschichte" (1850). In these writings he showed himself as a reckless critic of the extreme school of rationalism, who regarded the gospel as fabulous or untrue. In later years he wrote in the interest of the extreme conservative party of Prussia.

Bauer (GEORG LORENZ), a German theologian and linguist, born Aug. 14, 1755. He became professor of Oriental languages at Altdorf in 1789, and in Heidelberg in 1805. Among his works are "Hermeneutica Sacra Veteris Testamenti" (1797) and "Biblische Theologie des neuen Testaments" (4 vols., 1800–02). He was a rationalist, and maintained that the Bible should be interpreted by grammatical and historical principles, as the ancient classics are. Died Jan. 12, 1806.

Bauer (WILHELM), a German inventor, born at Dillingen Dec. 23, 1822. He constructed a diving-boat for submarine operations, with which several successful experiments have been made. He has also made improvements in torpedoes for the destruction of ships and in the firing of guns under water. Bauer served with distinction in the Sleswick-Holstein war of 1850, and has since been in the service of Russia.

Bau'erle (ADOLF), a German comic author, born April 9, 1786, gained considerable popularity from his grotesque representations of Viennese life. He wrote "Die falsche Primadonna," "Die moderne Wirthschaft," "Der Tausendsasa," and other comedies. He also published "The Comic Theatre," and in his later life numerous novels. Died Sept. 19, 1869.

Bau'ernfeld', von (EDWARD), a distinguished German dramatist, born at Vienna Jan. 3, 1802, has published numerous popular comedies, among which may be named "Die Bekentnisse" (1834), "Bürgerlich und Romantisch" (1825), and "Grossjährig" ("Of Age"), (1846).

Bau'gher (HENRY L.), D. D., a Lutheran divine, born at Abbotstown, Pa., about 1803, graduated at Dickinson College in 1825, studied theology at Gettysburg and Princeton, became pastor of a church at Boonsboro', Md., in 1829, was a teacher at Gettysburg, Pa. (1830–32), professor of Greek and belles-lettres (1832–50) at Pennsylvania College, Gettysburg, and was afterwards its president (1850–68). Died April 14, 1868.

Baugh'man, a post-township of Wayne co., O. Pop. 2067.

Bau'go, a township of Elkhart co., Ind. Pop. 749.

Bauhin (GASPARD), an eminent botanist and anatomist, born at Bâle in 1550. He became professor of anatomy and botany in his native city in 1588. He wrote valuable medical and botanical works, among which was "Prodromus Theatri Botanici" (1620). Died in 1624.

Bauhin (JEAN), a Swiss botanist and physician, born at Bâle in 1541, the brother of the preceding. He became physician to the duke of Würtemberg at Montbéliard in 1570. He wrote in Latin a "New Universal History of Plants" (3 vols., 1650–51). Died in 1613.

Baumé (ANTOINE), an eminent French chemist, born at Senlis Feb. 26, 1728. He improved the manufacture of porcelain, made several inventions, and simplified several processes in the useful arts. Baumé's hydrometer is in general use among chemists. Among his works is a "Manual of Chemistry" (1763). Died Oct. 15, 1804. (See CADET DE GASSICOURT, "Éloge de Baumé," 1806.)

Baum'garten (ALEXANDER GOTTLIEB), a German philosopher, born in Berlin July 17, 1714, was a disciple of Wolf. He became professor of philosophy at Frankfort-on-the-Oder in 1740. He did much for the science of æsthetics. He published, besides other works, "Metaphysica" (1739) and "Æsthetica" (2 vols., 1750, unfinished). Died May 26, 1762. (See MEYER, "Leben A. G. Baumgarten's," 1763.)

Baumgarten (MICHAEL), a German theologian, born Mar. 25, 1812, became professor of theology in Rostock in 1850. He has published many books and periodicals in opposition to the State Church of Mecklenburg, for which he has been imprisoned and fined. He has been a prominent member of the Protestantenverein since its establishment, and an earnest advocate of disestablishment. He has published "Schleiermacher as Theologian," an "Apostolic History," and many polemical writings and popular appeals in behalf of a people's Church.

Baumgarten-Crusius (LUDWIG FRIEDRICH OTTO), a learned German theologian, born at Merseburg July 31, 1788, was a brother of the preceding. He became professor of theology at Jena in 1817. Among his works is the "Handbuch der Christl. Sittenlehre" (1827), which is highly commended. Died May 31, 1843.

Baum'gartner, von (ANDREAS), a German savant and minister of state, born at Friedberg, in Bohemia, Nov. 23, 1793. He became professor of physics at Vienna in 1823, and Austrian minister of trade and public works in 1851. About this date he was chosen president of the Academy of Sciences in Vienna. He published a work called "Naturlehre" (1823). Died July 29, 1865.

Baum'gartner (GALLUS JACOB), a Swiss politician of the liberal party, born Oct. 18, 1797. He took part in the revision of the constitution of St. Gall, and promoted the separation of Bâle country from Bâle city. He founded in Oct., 1842, "Neue Schweizer Zeitung." He published, among other works, "Die Schweizin ihren Kämpfen und Umgestaltengen, 1830–50" (4 vols., 1853). Died in July, 1869.

Baum'stark (EDUARD), a German economist, born Mar. 28, 1807, became in 1848 professor of cameralistics at Greifswald. He has taken a prominent part in German politics as a liberal politician and writer. He has written "Concerning Means of Improving the Condition of the Working Classes" (1860), "Cameralistic Encyclopædia" (1835), and "Introduction to the Scientific Study of Agriculture."

Baur (FERDINAND CHRISTIAN), an influential German Protestant theologian and critic, the founder of the Tübingen school of theology, was born at Schmiden June 21, 1792. He obtained a chair of theology in Tübingen in 1826. Among his numerous works, which display a rare combination of speculative thought with solid erudition, are "Die christliche Gnosis" (1835) and "Die christliche Lehre von der Dreieinigkeit und der Menschwerdung Gottes" (1843). Died Dec. 2, 1860.

Bautain (LOUIS EUGÉNE MARIE), a French philosopher and theologian, born in Paris Feb. 17, 1796. He published several works, among which are "The Philosophy of Christianity" (1835) and "Moral Philosophy" (1842). He was a popular preacher at Paris, and became director of the College of Juilly in 1849. He died Oct. 18, 1867.

Baut'zen, or **Bu'dissin,** a town of Saxony, on the Spree, and on the railway from Dresden to Görlitz, 35 miles E. N. E. of Dresden. It has a royal palace, a cathedral, two public libraries; also manufactures of woollens, linens, leather, hosiery, paper, etc. Pop. in 1871, 13,165. Here occurred a great battle (May 20 and 21, 1813) between Napoleon and the allies, who finally retreated. The loss of the allies is estimated at 13,000, and that of Napoleon at 20,000 men.

Bavanistye, a town of the Austro-Hungarian monarchy, on the Military Frontier. Pop. in 1870, 6120.

Bava'ria [Lat. *Bava'ria* or *Baioa'ria, i. e.* the "country of the *Boi'i* or *Boia'rii;*" Ger. *Bay'ern* or *Bai'ern*], a kingdom forming part of the German empire. It is, next to Prussia, the largest German state. It consists of two isolated portions: the eastern and larger portion is bounded N. by Prussia, Saxe-Meiningen, Saxe-Coburg-Gotha, Reuss, and Saxony; E. and S. by Austria; W. by Würtemberg, Baden, and Hesse-Darmstadt; the western and smaller portion, known as Rhenish Bavaria or the Palatinate, is bounded by Prussia, Alsace, Hesse-Darmstadt, and Baden. Area, 29,373 square miles. The larger portion of the country is mountainous, the principal mountains being the Algäu and Bavarian Alps in the S., the former of which reach to an elevation of 9000 feet; the Bohemian and Bavarian Mountain forests on the eastern frontier; the Fichtel Mountains in the N. E.; the Franconia, Jura, and the Hardt. The main rivers are the Danube, which receives in Bavaria thirty-nine affluents, and the Main in the N. The Rhine forms part of the frontier of the Palatinate. The Danube and the Main are connected by the Ludwigs Canal. The number of lakes, most of which are alpine lakes, amounts to about fifty. The climate is, on the whole, temperate and healthy, but rough and severe in the mountains. The soil is fertile and rich in products, particularly in corn and cattle. There are celebrated mineral springs in Lower Franconia and Upper Bavaria (Kissingen and Brückenau). The total population, according to the census of Dec., 1871, was 4,861,402, of whom nearly three-fourths are Roman Catholics, and a little more than one-fourth Protestants. The Jews number 50,000. It is divided into eight provinces, which, according to the census of 1871, had the following population: Upper Bavaria, 841,579; Lower Bavaria, 602,005; Palatinate, 615,104; Upper Palatinate, 497,960; Upper Franconia, 540,963; Middle Franconia, 583,417; Lower Franconia, 586,122; Suabia, 582,888. As regards the descent of the inhabitants, about 1,750,000 are Bavarians (Old Bavarians or Bavarians proper), 2,250,000 Franconians, and 633,000 Suabians. Bavaria has 3 universities —at Munich, Würzburg, and Erlangen—9 lyceums, 28 gymnasia (colleges), 10 normal schools, polytechnical institutions at Munich and Nuremberg, and 7113 public schools

(4810 Catholic, 2150 Protestant, and 153 Israelite); also a number of Latin, technical, and special schools. All the kings of Bavaria have been liberal patrons of science and art. There is an academy of science and an academy of plastic arts in Munich, which is also celebrated for its rich collections of works of art. The principal occupations of the inhabitants are agriculture and the breeding of cattle; the latter chiefly in the mountainous districts, the former in the plains. Among the chief products are cereals, fodder, potatoes, hops, tobacco, wine (in the Palatinate and in the region of the Main). No less than 10,567 square miles are covered with wood, one-half of which belongs either to the state or to the communities. The culture of the forests is well regulated and profitable. The most active industry is found in the provinces of Middle Franconia, Suabia, and the Palatinate. Prominent among the industrial cities are Augsburg, Kempten, Nuremberg, Fürth, Schwabach, Baireuth, Würzburg, Bamberg, Erlangen, and Hof. The most celebrated branch of Bavarian industry is the brewing of beer. For 1870 the number of breweries was upwards of 5400, which produced annually over 131,000,000 gallons, beer measure. Beer is an important article of export. Bavaria has also flourishing manufactures of linen, woollen, iron, and wooden ware, fifty-one glass-works, manufactories of paper, chinaware, and guns, and celebrated melting-houses at Oberzell. The manufactories of tobacco produce annually about 1200 hundredweight of tobacco and upwards of 30,000,000 cigars. The most important commercial cities are Nuremberg and Augsburg (bills of exchange), Hof, Bamberg, Schweinfurt, Würzburg, Speier, Munich, Ratisbon, Passau (navigation of the Danube). Bavaria had, in 1871, 1508 miles of railroad and 1945 miles of telegraph. The navigation of the Danube engaged fifteen steamers and 2000 sailing vessels; that of the Rhine, twelve steamers and 236 sailing vessels; that of the Inn, 2000 vessels. The chief articles of export are, besides beer, corn, wood, cattle, wine, hops; total value of exports, about 50,000,000 florins.

Bavaria is a constitutional monarchy, the fundamental law of the state bearing date of May 26, 1818, and the electoral law now in force having been adopted on June 4, 1848. The crown is hereditary in the male line only, according to the right of primogeniture. The king exercises the administrative power; the legislative he shares with a legislature consisting of two chambers. The upper chamber, or chamber of the Reichsräthe (counsellors of the empire), had, in 1871, 72 members, of whom 51 were entitled to a seat as being chiefs of noble families, and 8 by their office, while 13 were life-members appointed by the Crown. The lower chamber, or chamber of representatives, had, in 1871, 154 members, who are elected for a term of six years. The chambers must be convoked at least once every third year. There are eight courts of appeal, and one supreme court of appeal in Munich. The receipts and expenditures of the state amounted in 1869 to $34,000,000; the public debt to $170,000,000; the civil list and appanages to $1,300,000. The Bavarian army, according to the treaty of Nov. 23, 1870, forms two army corps of the imperial army of Germany under the independent military administration of the king of Bavaria, though under the chief command of the emperor. The capital is Munich; the most important towns next to it are Nuremberg, Augsburg, Wurzburg, Ratisbon, and Bamberg.

Old Bavaria, or Bavaria proper, was originally inhabited by the Boii, a Celtic tribe. Under Augustus it constituted the Roman province of Noricum. During the great migration of nations in the fourth and fifth centuries, the country was occupied by Germanic tribes, from which the confederation of the Boioari arose, which, though governed by its own princes, was dependent upon the kings of Austrasia. At the head of the confederation was the family of Agilolfingians, who are mentioned for the first time in 556, and were deprived of the ducal dignity by Charlemagne in 777. From this time until 911, when the Carlovingian house died out, Bavaria belonged to the Franconian empire. During the following 250 years Bavaria was disturbed by endless civil wars. In 1180 the count palatine, Otto von Wittelsbach, was invested with Bavaria. His descendants, with but short interruptions, have remained the rulers of the country to this day. Two of them were elected German emperors—Louis the Bavarian (as Emperor Louis IV., 1314–47) and the elector Charles (as Emperor Charles VII., 1742–45). From 1255 the country was generally divided between two lines—the counts of the Rhenish Palatinate and the dukes of Bavaria. The electoral dignity repeatedly passed from one branch to the other, until the peace of Westphalia (1648) conferred the fifth electoral dignity permanently upon the dukes of Bavaria, while an eighth electoral dignity was expressly created for the Palatine line. In 1777 the line of the electors of Bavaria became extinct, and the elector of the Rhenish Palatinate, Charles Theodore, became ruler of Bavaria. Austria, however, claimed a large portion of the country, and the weak elector was willing to concede this claim; but Frederick the Great supported the protest of the next agnate, the duke Charles of Zweibrücken, against this arrangement, and thus the bloodless "war of the Bavarian succession" arose, which was ended May 13, 1779, by the treaty of Teschen, which gave to Austria the region of the Inn, with the town of Braunau, and guaranteed the succession in the remainder of the dominions of Charles Theodore to the duke Charles of Zweibrücken. In 1784 the emperor Joseph I. made a new attempt to obtain the whole of Bavaria, by offering to the elector Charles Theodore, in exchange for Bavaria, the Austrian Netherlands, with the title of king; but again the plan was foiled by the opposition of the duke of Zweibrücken and Frederick the Great. Charles Theodore died Feb. 16, 1799, and, as in the mean while the duke Charles of Zweibrücken had died childless, his brother Maximilian IV. Joseph, duke of the Palatinate-Zweibrücken, became elector of Bavaria and the Palatinate. In the history of Germany the dukes of Bavaria are chiefly noted for the leading part which they took in the defence of the Catholic Church against the Reformation. Throughout the sixteenth, seventeenth, and eighteenth centuries they were the heads of the Catholic party among the princes and states of the empire. The elector Maximilian lost in the peace of Lunéville the Zweibrücken Palatinate, but in place of these districts received a number of secularized bishoprics, the change adding to his dominions 2100 square miles, with nearly 200,000 inhabitants. In the war of 1805 the elector joined France against the emperor of Germany, and received a further increase of about 8000 square miles and 800,000 inhabitants. On Jan. 1, 1806, the elector assumed the title of king, and in July of the same year he joined the Rhenish Confederation, which he left again in 1813, in order to unite with the allies against Napoleon. The peace of Paris and that of Vienna regulated the territory of Bavaria as it has remained since, with the exception of a very small district which in 1866 was ceded to Prussia. In 1818 the constitutional form of government was introduced. Louis I. (1825 to 1848), the successor of Maximilian, was a liberal patron of the arts, and at the same time greatly favored the interests of the Catholic Church. His relation to the notorious Lola Montez led in 1848 to disturbances, in consequence of which he abdicated. The support which he had given to the insurrection of the Greeks against the rule of the Turks had secured the election of his second son, Otho, as king of Greece. In Bavaria he was succeeded by his eldest son, Maximilian II. (1848–64), who, like his father, liberally patronized science and art, but in politics had throughout his reign anti-liberal cabinets. In the Sleswick-Holstein question the Bavarian government acted as an ardent champion of the cause of German nationality. Maximilian, who died Mar. 10, 1864, was succeeded by his son, Louis II., who in 1866, in the war between Austria and Prussia, sided with Austria, and at the conclusion of peace had to pay 30,000,000 florins as expenses of war, and to cede a small district to Prussia. At the same time an offensive and defensive alliance was concluded with Prussia, and the relations of the two governments during the following years were of a friendly character. The Catholic party was greatly opposed, not only to the foreign policy of the prime minister, Prince Hohenlohe (appointed at the close of the year 1866), but still more to the educational and other reforms which he endeavored to introduce. When the new elections in 1869 gave to the Catholic party (the "Patriots") a majority in the second chamber, Prince Hohenlohe resigned (Jan., 1870). The new prime minister, Bray, remained, however, faithful to the treaties with Prussia, and after the outbreak of the war between France and Prussia, Bavaria at once joined Prussia and placed two army corps under the command of the crown-prince of Prussia. In Nov., 1870, the Bavarian government concluded a treaty providing for the entrance of Bavaria into the German empire, and in Jan., 1871, the treaty was ratified by both chambers, although the special committee of the second chamber proposed its rejection.

A. J. Schem.

Bawr, de (Alexandrine Sophie Goury de Champgrand), Baroness, a novelist of French extraction, born at Stuttgart in 1776. She became the wife of Saint-Simon, the famous Socialist, who obtained a divorce, although he had no cause for complaint, except that she was not an equal mate for "the foremost man in the world." She wrote several popular works, among which is "Raoul, ou l'Enéide," a novel. Died Jan. 1, 1861.

Bax'ter (De Witt C.), an American officer of volunteers, born in Dorchester, Mass., Mar. 9, 1829, entered the army in 1861 as lieutenant, and passed through the suc-

cessive grades to that of colonel of "Baxter's Fire Zouaves" (brevet brigadier-general U. S. volunteers). He is author of "Baxter's Manual and Company Tactics," 1861, and was naval officer of the port of Philadelphia 1869–71.

Baxter (Richard), an eminent divine, born at Rowdon, in Shropshire, England, Nov. 12, 1615. He was not educated at any college. Having been ordained in 1638, he became vicar of Kidderminster in 1640, and gained distinction as an eloquent preacher. He was neutral or moderate in the civil war, being friendly to the Puritans, but favorable to a monarchy. In 1650 he produced the "Saint's Everlasting Rest," which is highly esteemed. At the Restoration (1660) he was appointed one of the chaplains to Charles II., and refused the offer of a bishopric. In consequence of the passage of the Act of Uniformity, 1662, he seceded or was ejected from the Anglican Church. He became a resident of London in 1672, and preached there to a meeting of nonconformists. Among his numerous works are a "Call to the Unconverted" (1669); "Methodus Theologiæ" (1674), and "Catholic Theology." The notorious Judge Jeffries in 1685 fined him 500 marks on a charge of sedition, which was founded on a passage in his writings. For failure to pay the fine he was imprisoned nearly eighteen months. Died Dec. 8, 1691. He was a voluminous writer, having published 168 treatises. (See his "Autobiography," 1696; E. Calamy, "Life of Baxter," 1713; William Orme, "Life and Times of R. Baxter," 1830; August Neander, "R. Baxter, ein Mann der Wahrhaft rechten Mitte," 1833; Macaulay, "History of England," vol. i. chap. iv., and vol. iii. chap. xi.; "Miscellanies," by Wm. R. Williams.)

Baxte'rians, the term formerly applied to the adherents of Baxter's theological system, the doctrines of which were—1, that though Christ died in a special sense for the elect, yet he also died in a general sense for all; 2, the rejection of the dogma of reprobation; 3, that it is possible for even saints to fall away from saving grace.

Baxter Springs, a city of Cherokee co., Kan., 159 miles S. of Kansas City, Mo., at the terminus of the Missouri River Fort Scott and Gulf R. R., 1½ miles from the State line. It has one national bank, one weekly paper, and one lead-smelting furnace. It is a shipping dépôt for Texas cattle. The principal minerals are lead, zinc, and coal. On the 6th of Oct., 1863, Quantrell, with 600 guerillas, attacked a U. S. escort and encampment of three companies at this place. The escort was dispersed and all the wounded murdered; the attack on the encampment was repulsed. P. 1284. A. T. Lea, Ed. "Baxter Springs Republican."

Bay [Fr. *baie*], in geography, an inlet of the sea, or a portion of the sea extending into the land. The terms *bay* and *gulf* are vaguely and promiscuously applied to bodies of water of various forms and dimensions. Hudson's Bay, for example, might properly be called a gulf. The word *bay* is generally applied to smaller portions than *gulf*.

Bay, or **Bay Tree,** a name of the laurel tree (*Laurus nobilis*), which is sometimes called sweet bay. The *Prunus laurocerasus* is sometimes called bay laurel. Several other trees are popularly called *bay*. The "sweet bay" of the U. S. is the *Magnolia glauca*, which has fragrant flowers. The "red bay" of the South is the *Persea Caroliniensis*, an evergreen laurel tree with fine red timber. The "loblolly bay" (*Gordonia Lasianthus*) is a fine tree of the Southern States, with mahogany-colored wood. A smaller species (*Gordonia pubescens*) is cultivated at the North as a shrub, and has large and fragrant white blossoms. Some of the rhododendrons and azaleas are called rose bays. The leaves of the bay have long been subjects of popular superstition, and have been used with other evergreens to decorate churches at Christmas. *Bays* in the plural signifies an honorary garland or crown, bestowed as a prize for victory or meritorious action. It is not known what kind of tree is meant by the word in the Bible translated "bay tree."

Bay, a county in the E. of Michigan. Area, 725 square miles. It is bounded on the E. by Saginaw Bay, and intersected by the Saginaw and Rifle rivers. The soil is fertile. Wheat, oats, hay, and dairy products are raised. It contains forests of pine, from which lumber is exported. Coal is found, and salt is produced from salt-wells. It is intersected by the Jackson Lansing and Saginaw R. R. Capital, Bay City. Pop. 15,900.

Bay, a township of Ottawa co., O. Pop. 509.

Ba'ya (*Plo'ceus Philippi'nus*), a small East Indian bird of the family of Fringillidæ, and allied to the weaver-bird. It has been called *Loxia Philippina* by some ornithologists. It has a large conical beak. Its color is yellow, spotted with brown. It builds a curious nest, shaped like a Florence flask, and suspended from a small twig of a high branch. The entrance is in the lower part of the nest. The baya can be easily tamed and trained to obey commands.

Bayadeer', or **Bayadere,** a name given by Europeans to the dancing-girls and singing-girls of India, sometimes called nâtch- (or nautch-) girls. They are divisible into two classes, the first of which are called *Dêvadâsî* ("servants of the gods"), and belong partly to the caste of Vaisyas and partly to that of Sudras. Having passed through a course of systematic physical training, and acquired great agility and suppleness of joints, they are employed to sing the praises of some god at festivals, and to dance before his image or in his temple. Those of the higher rank are not permitted to leave the enclosure of the temple, and are forbidden to marry, but they are permitted to accept a lover of one of the higher castes. Dêvadâsîs of the Sudra caste live outside of the temple and have more freedom. There is another distinct class of singing-girls who travel about the country in troops, perform at private feasts, and entertain the people at taverns, etc. by singing and dancing. Their dance is, however, more properly a pantomime.

Baya'mo, or **San Salvador,** a town in the E. part of Cuba, 60 miles N. W. of Santiago, is near the river Cauto. It has eight churches and four schools. Pop. in 1861, 7411.

Bay'ard (Gen. George D.) was born in New York in 1835, and graduated at West Point in 1856. He entered the U. S. cavalry, and became, after the civil war broke out, colonel of the First Pennsylvania Cavalry. In 1862 he was made brigadier-general of volunteers. He served with the highest honor in the Army of the Potomac, and was killed at the battle of Fredericksburg Dec. 14, 1862, where he fought with the left wing, under Franklin.

Bayard (James Ashton), an American statesman and lawyer, born at Philadelphia July 28, 1767, graduated at Princeton in 1784. He began to practise law in Delaware, and in 1796 became a Federalist member of Congress, in which he attained eminence as an orator. The contest between Jefferson and Burr in 1801 was decided in favor of the former by the votes of Federalists acting under the influence of Mr. Bayard. He was elected U. S. Senator for Delaware in 1804, and remained in that body until 1813. He was one of the commissioners that negotiated the treaty of Ghent in 1814. Died Aug. 6, 1815.

Bayard (James Ashton, second), born in Delaware, graduated at Princeton, was U. S. Senator from his native State (1851–64 and 1867–69), resigning twice this office, to which he was four times elected, and once appointed to fill a vacancy.

Bayard (Jean François Alfred), a French *littérateur*, born at Charolles Mar. 17, 1796, wrote over 200 popular comedies and vaudevilles, among which were "La reine de seize ans," and "Les gamins de Paris," which was performed with great success 463 times in succession. Died Feb. 19, 1853.

Bayard (Pierre du Terrail), Chevalier, a heroic French knight, called "le chevalier sans peur et sans reproche" ("the knight without fear and without reproach"), was born at Castle Bayard, near Grenoble, in 1475. He was remarkable for his modesty, piety, magnanimity, and his various accomplishments. He served under Charles VIII. in his expedition against Naples in 1494, and distinguished himself at the battle of Tornovo. After the accession of Louis XII. of France, Bayard performed several remarkable exploits in war against the Spaniards and English. In the service of Francis I. he took Prosper Colonna prisoner, and gained a victory at Marignano in 1515. He defended Mézières with success against the invading army of the emperor Charles V. in 1522, and for this important service was saluted as the saviour of the country. He was killed in battle at the river Sesia April 30, 1524, having won the reputation of being a model of nearly every virtue. (See Symphorien Champier, "La Vie et les Gestes de Bayard," 1525; Guyard de Berville, "Histoire du Chevalier Bayard," 1760; Rev. Joseph Sterling, "Life of Chevalier Bayard," 1781; P. Cohen, "Histoire de Pierre du Terrail," 1821; W. Gilmore Simms, "Life of Chevalier Bayard," New York, 1847; Bucholz, "Bayard," Berlin, 1801.)

Bayard (Richard Bassett), son of James A. Bayard, was born at Wilmington, Del., in 1796, graduated at Princeton in 1814, became a lawyer, was U. S. Senator from Delaware (1836–39 and 1841–45), and U. S. chargé d'affaires at Brussels in 1850. Died Mar. 4, 1868.

Bayard (Thomas Francis), born at Wilmington, Del., Oct. 29, 1828, was elected for the term of six years (1869–75) to the U. S. Senate, to succeed his father, Hon. J. A. Bayard.

Bayazid' (often called **Baj'azet**) **I.,** sultan of the Turks or Ottomans, surnamed Ilderim (*i. e.* "the light-

ning"), was born in 1347. He succeeded his father, Amurath I., in 1389, and soon conquered Bulgaria, the greater part of Asia Minor, and part of Greece. In 1396 he gained a victory at Nicopolis over Sigismund, king of Hungary, and his allies, the Poles and French. His career of conquest was arrested by Tamerlane (or Timur), who invaded Asia Minor, and defeated Bayazid near Angora in June, 1401. Bayazid was taken prisoner here, and confined until he died Mar. 9, 1403. (See VON HAMMER, "Geschichte des Osmanischen Reichs.")

Bayazid II., sultan of the Turks, was born in 1447. He ascended the Ottoman throne on the death of his father, Mahomet II., in 1481. He built many mosques in Constantinople, his capital. He was involved in almost continual wars against the Hungarians, Poles, Persians, and Venetians. He died May 26, 1512, and was succeeded by his son Selim.

Bay'berry, the fruit of the bay tree; also the fruit of the wax-myrtle (*Myri'ca cerif'era*), a shrub which produces a kind of wax, sometimes called "bayberry tallow," and used in pharmacy. It has also been employed in making candles. The bayberry grows chiefly along our Atlantic coast, becoming an evergreen tree in the South. It has active medicinal qualities. The wax is found on the outside of the berries, and is obtained by boiling.

Bay'boro', a post-township of Horry co., S. C. Pop. 885.

Bay Bulls, a port of entry and post-town of Newfoundland, 19 miles S. of St. John's; lat. 47° 18′ N., lon. 52° 47′ W. It has an excellent harbor, which is much frequented as a port of refuge. Fishing and agriculture are carried on. Pop. 734.

Bay City, one of the most flourishing cities of the North-west, the capital of Bay co., Mich., is on the right (E.) bank of the Saginaw River, 4 miles from its mouth and at the head of navigation. It deals principally in lumber and salt, immense quantities of which are produced. It has excellent school facilities, one national and four private banks, two parks, the Holly Waterworks, one street railway, several important manufacturing interests, two railroads (a branch of the Flint and Père Marquette, and the Detroit and Bay City road, just opened). Several lines of steamers connect it with all lake points. It has two daily and four weekly newspapers. Pop. 7064.

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Bay de Verds, an important post-village of Newfoundland, 38 miles N. of Carbonear. It has no harbor, but its cod-fisheries are among the best in the province, yielding $50,000 worth of fish annually. Agriculture is also carried on. Pop. 650.

Bayeux (anc. *Baicas'sæ*), a city of France, in Normandy, and in the department of Calvados, is on the river Aure, 21 miles by rail W. N. W. of Caen. It has manufactures of porcelain, lace, damasks, calico, and leather. Pop. in 1866, 9138. Here is a cathedral which is said to be the oldest in Normandy, in which was preserved for a long time the famous BAYEUX TAPESTRY (which see).

Bayeux Tapestry, a web of canvas or linen cloth 214 feet long by 20 inches wide, on which is embroidered, with woollen threads of various colors, a representation of the invasion and conquest of England by the Normans. According to tradition, it was embroidered by Matilda, the wife of William the Conqueror. Some persons believe that she directed the work, which was performed by her maids or the ladies of her court. It is considered a valuable historical document, as it gives a correct and minute portraiture of the manners and customs of that age and of the Norman costumes. It contains the figures of about 625 men, 200 horses, 55 dogs, 40 ships and boats, and numerous quadrupeds, birds, etc. The tapestry was discovered in the cathedral of Bayeux about 1730, and is now preserved in the hôtel de ville of that place. (See BRUCE, "Bayeux Tapestry Elucidated," London, 1855; DUCAREL, "Anglo-Norman Antiquities," 1767.)

Bay'field, a port on Lake Huron, at the mouth of Bayfield River, in Stanley township, Huron co., province of Ontario, Canada, has an extensive trade in grain and fish.

Bayfield (formerly **La Pointe**), a county which forms the N. extremity of Wisconsin. Area, 1000 square miles. It is bounded on the N. by Lake Superior. It is partly covered with forests of pine. The soil is not extensively cultivated. Capital, Bayfield. Pop. 344.

Bayfield, a post-village, the capital of the above county, on an arm of Lake Superior, 281 miles N. N. W. of Madison. It has an excellent harbor. P. of township, 344.

Bayfield (HENRY WOOLSEY), a rear-admiral of the British navy, entered the service in 1806, served against the U. S. in 1814 on the great lakes, and surveyed the lakes, the St. Lawrence River and Gulf (1815–27), of which he published valuable charts.

Bay Hundred, a post-township of Talbot co., Md. Pop. 1322.

Bay Islands, a group of small islands in the Bay of Honduras. Ruatan, the largest, is about 30 miles from the N. coast of Honduras. The other islands are named Bonacca, Utila, Barbaretta, and Helena. This group became a British colony in 1854, but in consequence of a protest of the U. S. they were restored to Honduras in 1856.

Bayle (PIERRE), a celebrated French philosopher and critic, born at Carlat, now in Ariège, Nov. 18, 1647, was a son of a Protestant preacher. He studied at the College of Toulouse, and was employed for some years as a private tutor at Geneva and Rouen. In 1675 he obtained the chair of philosophy in the Protestant College of Sedan, which was closed or suppressed by the government in 1681. He then became professor of philosophy and history at Rotterdam, and commenced in 1684 a critical monthly review called "Nouvelles de la République des Lettres," which he continued to edit until 1687. Instigated by Jurieu, who accused Bayle of heretical or unsound opinions, the magistrates of Rotterdam deprived him of his professorship in 1693. Bayle was a skeptic, an eloquent advocate of religious liberty, and a very independent thinker. His most important work is a "Historical and Critical Dictionary" ("Dictionnaire historique et critique," 2 vols. folio, 1696), which exercised a great influence over literature and philosophy, and had a European reputation. Bayle was fond of paradox, was a subtle reasoner, a witty writer, and an excellent dialectician. He was amiable, courageous, and disinterested. According to Warburton, he had "a soul superior to the sharpest attacks of fortune, and a heart practised to the best philosophy." Died Dec. 28, 1706.

Baylen', or **Bailen',** a town of Spain, in the province of Jaen, 22 miles N. N. E. of Jaen. It has manufactures of linen, glass, soap, bricks, etc. The Spanish general De Castaños here gained a victory in July, 1808, over the French general Dupont, and took 18,000 prisoners. Pop. 7831.

Bay'ley (Most Rev. JAMES ROOSEVELT), D. D., a grandson of Dr. Richard Bayley and nephew of Mother Seton (who founded the original American congregation of Sisters of Charity), was born in New York City Aug. 23, 1814, graduated at Trinity College, Hartford, Conn., in 1835, was for a time a clergyman of the Protestant Episcopal Church, but became a Roman Catholic, studied theology in Paris and Rome, and was ordained a priest in 1842. He became professor of belles lettres at St. John's College, Fordham, and was its president (1845–46). In 1853 he became bishop of Newark, N. J., and in 1872 archbishop of Baltimore, Md. He has published "Memoirs of Bishop Bruté" and other works, and is distinguished by his ability as a prelate.

Bayley (RICHARD), an American physician, born in Fairfield, Conn., in 1745, began the practice of medicine in 1772. He introduced a new method of treating the croup, which was extensively used. He became in 1793 professor of surgery in Columbia College, N. Y. Died Aug. 17, 1801.

Bay'lor, a county in the N. part of Texas. Area, 900 square miles. It is traversed by Brazos River and the Big Wichita, and the soil along the banks of the former is very fertile, but the surface is generally high and rocky. Between the Brazos and the Little Wichita it is of a mountainous character. Stock-raising is the only important pursuit at present. No population in the census of 1870.

Baylor (WALKER KEITH), a native of Kentucky, settled in 1830 in Alabama, where he engaged in the practice of law. He entered the Senate in 1841, and in 1843 he was appointed judge of the third circuit, which position he held until the fall of 1845, when he was killed accidentally. He was very fond of astronomy.

Baylor University. This institution is situated at Independence, Washington co., Tex. It is 12 miles from the Brazos River, 12 miles from Brenham, on the western branch of the Houston and Texas Central R. R., and 18 miles from Navisota, on the main trunk of the same road. The vicinity is beautifully diversified by prairie, hill, valley, and live-oak groves. The village of Independence is near the centre of population, wealth, commerce, and railroads in the State. The university was chartered by the republic of Texas in 1845. One-third of its trustees are annually chosen by the Baptist State Convention of Texas. It owns nearly 700 acres of good land. The whole amount of endowment will not exceed $60,000; value of buildings, $30,000; libraries, 3700 volumes; apparatus respectable; reading-room good. The course of study is modelled after that of the University of Virginia. It is complete and thoroughly prosecuted. Whole number of students entered since 1845, 2700; college graduates, 38; law graduates, 31; law professors, 3; college officers, 6; whole number of

students, according to last catalogue, 126, six of whom were law students. Its presidents have been the Rev. Henry L. Graves, Rev. Rufus C. Burleson, D. D., Rev. George W. Baines, Rev. William Carey Crane, D. D., LL.D. Efforts promising entire success are now in progress fully to endow all the chairs, and otherwise to promote the efficiency of the institution. Hon. R. E. B. Baylor, LL.D., former member of Congress from Alabama, and for twenty-five years a judge in Texas, gives name to the university.

Bay'ly (Lewis), bishop of Bangor in Wales, is worthy of mention as the author of "The Practice of Piety," one of the most popular religious books ever written. It is mentioned by Bunyan as one of the books owned by his wife. In 1714 it had passed through fifty-one editions in England, besides several translations published in foreign lands. Bayly was born at Caermarthen, educated at Oxford, and consecrated as bishop in 1616. He died in 1632. He must not be confounded with Thomas Bayly, Anglican bishop of Killala in Ireland, who died in 1670.—Bishop Lewis Bayly had a son Thomas, who became a zealous Roman Catholic, and published "The End of Controversy" (Douai, 1654), besides other works.

Bayly (Thomas Haynes), an English *littérateur*, born in 1797 near Bath, was the son of a wealthy solicitor, and was educated at Oxford. He married in 1826, and in 1831 lost his fortune, and was thrown into poverty. He entered with the greatest industry upon a literary life, composing numerous plays, novels, and poems. He is best known by his very numerous songs, some of which will always be popular, though few are of a very high literary order. Among them are "Oh no, we Never Mention Her," "The Soldier's Tear," and "Why Don't the Men Propose?" He died in 1839.

Bayly (Thomas Henry), an American lawyer, born in Accomac co., Va., in 1810, graduated at the University of Virginia, and was a judge in the State courts. He became a member of Congress in 1844, and was chairman of the committee of ways and means in several sessions. Died June 22, 1856.

Bayn'am (William), an American surgeon and anatomist, born in Virginia in 1749, was educated in England, where he long resided. He performed many difficult operations with success. Died Dec. 10, 1814.

Baynes (Robert Hall), Anglican bishop of Madagascar, was born at Wellington, Somersetshire, England, Mar. 10, 1831. He was educated at Bath and at St. Edmond's Hall, Oxford, where he took his master's degree in 1859. He received a number of English church preferments, and in 1870 became bishop of Madagascar, now a Protestant Christian nation. He is the author of numerous religious works, among which are a "Book of Common Praise" (1863), "Lyra Anglicana," "Autumn Memories and other Verses" (1869), and "Sermons."

Bay of Islands, a large bay of the W. coast of Newfoundland. It abounds in islands, and its scenery is very fine. Good timber, gypsum, and marble abound. About 30,000 barrels of herring are annually taken here, besides cod and other fish. Agriculture is pursued to some extent. Pop. of settlements, 947.

Bay'onet [Fr. *baïonette*], so called, it is said, because invented or first used at Bayonne, in France, about the middle of the seventeenth century. It was originally a triangular-shaped blade, to be screwed into the muzzle of the musket, and used by infantry as an offensive or defensive weapon. Previous to its introduction pikemen formed a portion of an army, but, though retained in service to some extent till near the middle of the eighteenth century, the bayonet finally superseded them. By the original arrangement the musket could not be discharged while the bayonet was fixed; this contrivance was improved upon at a later day, and the bayonet was fitted exteriorly to the piece, thus permitting it to be fired without unfixing the bayonet. The French were undoubtedly the first to use the bayonet, and the first infantry charge made with this weapon was at the battle of Spire in 1703. Various modifications have been made in the mode of fastening the weapon, as well as in its shape. Among other forms is the "sabre" bayonet; the latest improvement being the "trowel" bayonet, capable of being used by infantry as a spade in throwing up earthworks, as well as in making or resisting a charge.

Bayonne, bâ-yonn' (anc. *Lapur'dum*), a fortified city of France, near its S. W. extremity, in the department of Basses-Pyrénées, on the river Adour, about 3 miles from the Bay of Biscay and 66 miles W. N. W. of Pau; lat. 43° 29′ N., lon. 1° 29′ W. It is pleasantly situated near the foot of the Pyrenees, at the mouth of the river Nive, and is well built. It has an old cathedral, a citadel built by Vauban, a mint, a theatre, and schools of commerce and navigation. Here are shipyards, glass-works, sugar-refineries, and distilleries. The chief articles of export are timber, tar, corks, liqueurs, hams, etc. Bayonne has often been besieged, but never taken. Here occurred an interview between Charles IV. of Spain and Napoleon I., who extorted from the former and his son a renunciation of the crown in 1808. Pop. in 1866, 26,333.

Bayonne, a post-township of Hudson co., N. J. Bayonne City, in this township, on the N. J. Central R. R., 4 miles from Jersey City, is a place of residence for people doing business in New York City. It has two weekly newspapers. Pop. 3834.

Bayou, bī'oo [supposed to be corrupted from the French word *boyau*, a "bowel" or "gut," and hence signifying "channel"], strictly means a stream which is not fed by springs, but flows from a lake or other stream. It is very often used, however, in the Southern U. S. as synonymous with "creek," and frequently designates the tidal channels occurring in swamps on the Gulf coast.

Bayou, a township of Pulaski co., Ark. Pop. 500.

Bayou, a township of Ozark co., Mo. Pop. 480.

Bayou Macon, a township of Chicot co., Ark. Pop. 753.

Bayou Metor, a township of Arkansas co., Ark. Pop. 306.

Bayou Sara, a post-village of West Feliciana parish, La., on the Mississippi River, at the mouth of the bayou of the same name, 36 miles above Baton Rouge. It is the southern terminus of a railroad to Woodville, Miss., and has considerable trade in corn and cotton. Pop. 440.

Bayr'hoffer (Karl Theodor), a German philosopher, born at Marburg in 1812, became in 1838 professor of philosophy in his native town, and in 1850 was forced to go to the U. S. He advocated the doctrines of Hegel, and wrote, among other works, "Ueber den Deutsch-Katholicismus" (1845), "Idee des Christenthums" (1836), and "Idee und Geschichte der Philosophie" (1838).

Bay Rob'erts, a port of entry of Newfoundland, 8 miles S. of Harbor Grace, on Conception Bay. Its inhabitants are chiefly engaged in the Labrador fisheries. It is visited by regular lines of coasting steamers, and has considerable imports. Pop. about 1000.

Bay Rum (*Spiritus myrciæ*, U. S. P.), a fragrant liquid obtained by distilling with rum the leaves of the *Myrcia acris*, and probably of other trees of the genus. These are large trees growing in Jamaica and other West India islands, and belonging to the Myrtaceæ. Bay rum is imported in large quantities, and is used as a perfume and as a cosmetic.

Bay Shore, a post-village of Islip township, Suffolk co., N. Y., on the South Side R. R. of Long Island, 40½ miles from New York. It is finely laid out with gravelled streets, and is in a good agricultural region. It is a fine summer resort, being one-fourth of a mile from Fire Island Bay. Pop. 1200.

Bay Side, a post-village of Flushing township, Queen's co., N. Y., on the New York and Flushing R. R. It has many fine country-seats of New York merchants. It is one of the most famous places for clambakes on Long Island.

Bay'town, a township of Washington co., Minn. Pop. 594.

Bay View, a post-village of Gloucester township, Essex co., Mass., has extensive quarries of granite. It is a place of summer resort.

Bay Win'dow, sometimes corrupted into **Bow Window,** a window which projects outward from a room, and often occurs in Gothic architecture. The external walls of such windows are generally polygonal or semicircular. The lower end of bay windows is often nearly on a level with the floor of the room. They are frequently supplied with a seat called a *bay stall*.

Ba'za (anc. *Basti*), a city of Spain, in the province of Granada, about 52 miles N. E. of Granada, is in a fertile plain. It is famous for its red wine. In 1489 it was taken from the Moors by the Spaniards after a long siege. The French marshal Soult here defeated the Spaniards Aug. 10, 1810. Pop. 7272.

Bazaar', or **Bazar,** an Oriental market-place, either open or covered with a roof; an Oriental assemblage of shops in which goods of various kinds are exposed to sale. Each bazaar is occupied by a number of retail traders, and is often divided into streets or passages having on each side a row of small shops, stands, or counters. The term is also applied in European and Western cities to a hall or suite of rooms fitted up with counters or stands for the sale of goods (mostly fancy articles).

Bazaar, a post-township of Chase co., Kan. Pop. 364.

Bazaine (François Achille), born at Versailles Feb. 13, 1811, and, after passing through all the intermediate grades, marshal of France Sept. 5, 1864. The son of a prominent and wealthy officer, he could have readily obtained an officer's commission, but he declared it his pride to seek his marshal's bâton from the knapsack in which for "every French soldier" the proverb potentially places one; and that bâton, when found, bore the inscription "Simple soldat en 1831, Maréchal de France en 1864."

His campaigns are thus stated: Africa—Constantina and Oran, 1833, 1834, 1835 (first half). Spain—1835 (second half), 1836, 1837, 1838. Africa—Algiers and Oran, 1840, 1841, 1842, 1843, 1844, 1845, 1846, 1847, 1848, 1849, 1850, 1851, 1852, 1853, 1854 (first half). Crimea—1854 (second half), 1855, 1856. Africa—1857. Italy—1859, 1860. Mexico—1862, 1863, 1864, 1865, 1866, 1867 (first half). Army of the Rhine—1870. Total 35 years of active service, of which 32 in campaigns, in the course of which he received six wounds or contusions. In the Legion of Honor he was Knight (Nov. 22, 1835), Combat of La Macta (Africa); Officer (Nov. 5, 1845), Combat of Sidy Kafir; Commander (Aug. 16, 1856), Taking of Kinburn (Crimea); Grand Officer (June 20, 1859), Combat of Marignan (Italy); Grand Cross (July 2, 1863), Battle of San Lorenzo (Mexico); Military Medal (April 28, 1865), Storming of Oajaca (Mexico); Medals of the Crimea, Italy, and Mexico.

On the breaking out of the war with Prussia Marshal Bazaine, who had expected the command of one of two powerful armies destined to the invasion of Prussia, in accordance with plans which had been prepared by the late Marshal Niel, found himself, in consequence of the sudden and unexpected decision of the Emperor to unite all the forces in the single "Armée du Rhin," in command of only a single corps. The disasters of Woerth and Forbach, compelling the Emperor to relinquish the command, and his sole competitor, MacMahon, being put *hors de concours* by his recent defeat, Marshal Bazaine on the 13th of August succeeded to the command of the Army of the Rhine. Reorganization and concentration compelled a falling back upon Metz, and thence upon Verdun, where the shattered commands of MacMahon's corps and the reserves of France were being concentrated. The execution of the resolution, too tardily taken, was, in consequence, further delayed by the battle of Borny (Aug. 14), brought on by the Prussians for that sole purpose. In continuing the retreat through Metz his columns were vigorously attacked by the Prussians, and the battle of Rézonville (Gravelotte) resulted. Undertaken by the advanced Prussian troops hastily thrown over the Moselle above Metz, solely to disorder and delay the French march, the attack was successfully repulsed, and, to the French, "the moment had arrived to strike a great blow and to resume the offensive, ... to drive back the Prussians in disorder upon the Moselle." Before evening, however, the Prussians had been so greatly reinforced as to recover their position and resume the offensive conflict, but with the advantage, on the whole, on the French side. There was yet opportunity to continue the march on Verdun, but the Marshal spent the next day in forming a line of battle from Rozereuilles to St. Privat, with his back on Metz, while the Prussians were allowed, unmolested, to march across his front to form their line. The battle of St. Privat was fought defensively in position, on the 18th, without an order from the Marshal,* or a reinforcement to, or change in, the position of any part of the French line. The French left and centre were strongly posted—the right "dans l'air" at St. Privat. Without natural obstacles on which to rest, powerful artillery alone could have given to it adequate power of resistance. It was held by the 6th Corps (Canrobert's), which corps, alone, was deficient in its complement of artillery. The Guards (Bourbaki's) and Reserve artillery were stationed in ravines in the rear. The French effective force was 150,000 men—Prussians (eight corps) 240,000. That the Prussians, unsuccessful and even disastrously repulsed on the French left and centre, and at liberty to use their immense force where weakness exhibited itself, should, failing elsewhere, finally concentrate their artillery fire (272 guns) and their infantry masses (three corps, 80,000 men) on the French right, is natural; but not so, that the guard and reserve artillery should lie idle while the French right was overwhelmed and driven back (4th and 6th corps) disorganized, upon Metz and the Moselle. The remainder of the army, which had held its strong positions, was withdrawn the next day into the intrenched camp in which ten weeks later it was destined to lay down its arms.

But it is an error to say that Bazaine was *shut up* in the intrenchments of Metz. No portion of the Marshal's army was within the *enceinte* of Metz; and the new and (incomplete) advanced detached works *favored* rather than obstructed egress. The question is can an army of 200,000 men or less, "shut up," in an intrenched camp *any more than in open field*, another of nearly equal numbers? If, in open field, an army gives time and opportunity to its adversary to encircle it with intrenchments, such is their defensive capability with modern arms, that egress, even with equal numbers, *may* become impracticable; but it is doubtful whether the slight works thrown up here and there by the Prussians ever deserved the name of an intrenched line. The loss of *morale* by such a succession of disastrous battles, and the resulting loss of confidence in the leaders, may perhaps account for the few and futile attempts at sorties (Ml. Canrobert testifies that as late as Oct. 15 vigorous sorties could have been made); for the failure to cooperate with the movement of MacMahon on Sedan, the plea of failure to receive despatches announcing it, is put forward, and credibly substantiated.

His attempt to negotiate with the Prussians through the Empress at Hastings must be judged of by his own language at his trial: "My position was unprecedented. I was, in a certain sense, my own government. The duties of a military chief when a legal government exists are strictly defined. I by no means admit that to be the case in presence of an insurrectionary government. There was then no government; there was nothing;" coupled with the comment of the duc d'Aumale, "What! *France*, then, no longer existed?"

Thus exhausting the last days in which action was possible, the marshal surrendered on the 27th Oct., 1870, an army of 160,000 men, Metz, "la Pucelle," and its fortifications, and 1800 pieces of artillery.

He was arraigned Oct. 10, 1873, before a court consisting of the duc d'Aumale (president), General de la Motte Rouge, Baron de Chabaud-Latour, Generals Tripier, Martimprey, Princeteau, and Martinez-Dechesnez, charged:

First—Of having capitulated with the enemy, and surrendered the fortress of Metz, of which he had the superior command, without having exhausted all the means of defence.

Second—Of having, as the head of the army before Metz, signed a capitulation in the open field, the result of which was to cause his troops to lay down their arms; and of not having, before treating verbally and by writing, done everything which he was bound to do by duty and honor—offences provided for and punished by articles 209 and 210 of the Code of Military Justice.

After a trial of two months' duration he was unanimously pronounced guilty, sentenced to be degraded and shot, with equally unanimous recommendation that the sentence should not be carried into execution, in terms substantially as follows: "As jurymen, our conscience alone must guide us, and as judges it has been our duty to apply an inexorable law. The marshal, however, received the command of the army under the most unfortunate circumstances, and the court cannot forget that under fire he was always equal to himself; that at Borny, Gravelotte, and Noisseville no one surpassed him in bravery; and that on 16th of Aug. (Gravelotte) he maintained the centre of his line of battle by the firmness of his attitude. Neither can the army forget the glorious services rendered by the Volunteer of 1831."

His sentence was promptly commuted by President MacMahon to twenty years' imprisonment in a fortress, without military degradation.

In conclusion I venture to use the words of Niemann's account of the war (*Army and Navy Gazette*, Dec. 13): "The conduct of the marshal at Metz roused the conjecture that he wished to act not only as a general, but as a statesman; that he wished independently to make military action accord with political events; that even he believed he could pursue his own ambitious views, and at the same time the interests of France. The temptation of playing an important political *rôle* in the general overthrow of existing affairs, while at the head of the largest military body which France possessed, no doubt came home to the ambitious Bonapartist general."

That his conduct of the military operations from Aug. 13 to Aug. 18 was inefficient; that his so-called sorties had scarce the energy in them to reveal a serious intention to go out; that he allowed himself to waste the last precious days of his army's efficiency in what were futile—and some would call treasonable—attempts to negotiate with the empress; and finally crushed the rising—the *last*—hopes of France by a premature surrender at the very moment when a protraction might have modified the history of the war, must, I think, be the conviction of all who have impartially studied his career. J. G. Barnard, U. S. A.

*"In a combat where the enemy arrayed nearly two-thirds of the force with which he had invaded France, the general artillery reserve was left in its camp at more than 6 kilimeters distance, the cavalry of the Guard did not put foot to stirrup, the heavy cavalry remained at Longueville (a suburb of Metz), and as to the infantry of the Guard, it lay without orders till 6 P. M. at more than a league from the field of battle." (*Metz, Campagne et Negotiations.*)

Bazalgette (Joseph William), C. B., an English civil engineer of French descent, was born in 1819. He has won great fame in the construction of sewers, street alterations, and other departments of city engineering. As engineer-in-chief to the Metropolitan Board of Works, London, he has constructed many hundreds of miles of sewers and river embankments, and has introduced subterranean passages for the carrying of gas and water pipes and telegraph-wires, so that it is not necessary to break up the pavements for repairs. He has also furnished plans for the drainage of many British and foreign cities.

Bazancourt, de (César), Baron, a French historian, born in 1810, wrote a "History of Sicily under the Norman Rule" (2 vols., 1846), histories of the Crimean, Italian, Chinese, and Cochin-Chinese wars of Napoleon III., a treatise on Fencing, and many novels. Under Louis Philippe, De Bazancourt was a director of the library of Compiègne, and under Napoleon III. he was official historiographer. Died at Paris Jan. 25, 1865.

Bazard (Amand), the founder of French Carbonarism, was born in Paris Sept. 19, 1791. He organized societies of Carbonari about 1820, and afterwards became a disciple of Saint-Simon the Socialist, and editor of the "Producteur," a Saint-Simonian journal. After the death of Saint-Simon (1825), Bazard and Enfantin were the chief priests of the sect, and they published an "Exposition of the Doctrine of Saint-Simon" (1828–30). Bazard became disgusted with the extreme innovations of Enfantin (who advocated a community of wives), and he seceded from the sect in 1831. Died July 29, 1832. (See Michaud et Villenave, "Histoire du Saint-Simonisme," 1847.)

Bazet'ta, a post-township of Trumbull co., O. It contains the village of Baconsburg (pop. 449), on the Atlantic and Great Western R. R. Pop. 1240.

Bazin (Antoine Pierre Ernest), a French dermatologist, born Feb. 20, 1807, at St. Brice, came of a long line of medical men. In 1847 he became physician and professor of dermatology in the hospital of St. Louis, Paris. He has written able works on venereal and skin diseases.

Bazin (Antoine Pierre Louis), a brother of the preceding, born Mar. 26, 1799, was a professor of the Chinese language, and published in 1856 a grammar of the Mandarin dialect. He also made many translations from the Chinese. Died in Jan., 1863.

Baz'ley (Sir Thomas), Bart., was born at Gilnow, Lancashire, England, in 1797. He learned cotton-spinning in his youth, went into business on his own account at Bolton in 1818, and removed in 1826 to Manchester, where his manufactory of fine cotton and lace thread was the largest in the world, employing more than 1000 persons, for whom he established schools, free lectures, and reading-rooms. An early anti-corn-law man and free-trader, he became a prominent liberal politician, first entering Parliament in 1858. In 1862 he retired from business, and in 1869 became a baronet.

Bdel'lium [Gr. *βδέλλιον*], a gum-resin resembling myrrh, but weaker and more acrid, was esteemed by the ancients for its supposed medicinal virtues. It is not often used by modern physicians. Two varieties of bdellium are obtained from the *Amyris commiphora* of India and the *Heudelotia Africana*, a tree or shrub of Senegal.

Beach, a term applied to the shore of a sea or lake, especially to the sandy or gravelly margin which is alternately covered and deserted by the tide. In the U. S. the word also signifies a long low sandy bar or tongue of land extending along the sea-coast, and separated from the mainland by a narrow harbor or portion of the sea, as Squan Beach and Long Beach on the coast of New Jersey, and several long beaches on the S. side of Long Island. Many smooth sandy beaches are fashionable places of resort in summer.

Beach, a township of La Fayette co., Ark. Pop. 984.

Beach, a township of Mower co., Minn. Pop. 101.

Beach (Abraham), D. D., a Protestant Episcopal divine, was born at Cheshire, Conn., Sept. 9, 1740, graduated at Yale College in 1757, and was ordained by the bishop of London in 1767. He was until 1783 rector of a church at New Brunswick, N. J., and afterwards an assistant minister of Trinity church, N. Y., for thirty years (1783–1813). He was the author of some religious works. In his last years he was a farmer in New Jersey. The degree of D. D. was conferred upon him by Columbia College in 1789. He was a strict Episcopalian, and opposed the liberalism of Bishop White. Died Sept. 11, 1828.

Beach (John), a Protestant Episcopal divine, born in 1700, graduated at Yale in 1721, and was for some years Congregational minister of Newtown, Conn. He conformed in 1732, was ordained by the bishop of London, and was for fifty years a minister of the English Church in Connecticut. He published sermons and polemical tracts. Died Mar. 8, 1782.

Beach (John Wesley), D. D., an able preacher of the Methodist Episcopal Church, was born at Trumbull, Conn., Dec. 26, 1825, graduated in 1845 at Wesleyan University, Middletown, Conn., was for nine years a teacher, and in 1854 entered the ministry. His labors have been mostly in New York City and vicinity. In 1872 he received the degree of D. D. from his *alma mater*, and in 1873 he became pastor of a church in New Haven, Conn.

Beach (Moses Yale), an American inventor and publisher, born at Wallingford, Conn., Jan. 7, 1800. He learned the trade of a cabinet-maker in youth, and afterwards experimented in machines for propelling balloons. He invented a rag-cutting machine, now in general use in paper-mills. In 1835 he became interested in the "New York Sun," and is regarded as a pioneer in the penny newspaper business. In 1857 he left his profession and retired to his native town, where he died July 18, 1868.

Beach Isle, a township of Hancock co., Me. Pop. 9.

Beach Plum, the *Prunus maritima*, a shrub of the order Rosaceæ, growing along the sea-beaches of the Atlantic coast of the U. S. It bears an edible fruit, sometimes not much smaller than that of the cultivated plum, which it resembles. Away from the sea-shore it degenerates.

Beach'ville, a post-village of Oxford co., Ontario, Canada, on the Great Western Railway and the river Thames, 4 miles from Woodstock, has three churches, manufactures of lumber, linen, cordage, machinery, castings, flour, etc., and an extensive trade. Pop. about 700.

Beach'y Head, the highest headland on the S. coast of England, 2½ miles S. S. W. of Eastbourne, Sussex. It consists of perpendicular chalk cliffs 564 feet high, forming the E. end of the South Downs. Here is a lighthouse 285 feet high. The French fleet defeated the Dutch and English near this point in 1690.

Bea'con, a fiery signal raised on an eminence as a guide to mariners, or to alarm the population of a country when a hostile army is approaching to invade it. Such alarm-fires were used by several ancient nations, including Greeks, Hebrews, and Persians, who kindled fires on the tops of mountains. In England the beacons were maintained by a tax levied on the counties, and were carefully organized while the Spanish Armada was expected in 1588. Horsemen were then employed to convey the tidings during the day, when the beacons could not be seen.

Beacon, in maritime affairs, denotes a signal erected near rocks and shoals to warn mariners against danger, or to indicate the proper entrance to a harbor or channel. A small lighthouse is frequently called a beacon. Beacons on the U. S. coast are either permanent or portable. Many floating beacons are now used in which a bell is sounded, instead of a light shown, as a warning. These are so constructed that the bell rings continually as long as the tide or current is flowing.

Bead, or **Bede,** in Anglo-Saxon and Old English signified a prayer, and hence the small perforated balls, of whatever material, used for keeping an account of the number of prayers repeated. Beads are small perforated globular bodies worn as ornaments by women and children around the neck and on other parts of the person, for which purpose they are arranged on strings. They are made of various materials—gold, amber, coral, pearl, crystal, glass, etc. More beads are made of glass than of any other material. They are often used in the ornamentation of slippers, purses, and other articles. The ancient Egyptians understood the art of making glass beads, which are now extensively manufactured at Murano, near Venice, and in China. There are three kinds of beads—the hollow, the common, and the bugle. Roman Catholics use a string of beads, called a "rosary," in saying prayers. Similar chaplets are used by Mohammedans and by some sects of Booddhists. Great quantities of beads are shipped to Africa, India, and the Eastern Archipelago.

Bea'dle [Ger. *Büttel*], in England, is an inferior parish officer appointed by the vestry. His business is to attend the vestry, to act as their messenger, to give notice of their meetings, to execute their orders, to assist the constable of the parish, etc.

Beads, Saint Cuthbert's, a name given to the single joints of the articulated stem of a fossil animal called Encrinite (which see). They have natural perforations, so that they can be strung like beads, and they were formerly used as rosaries, and popularly believed to have been made by Saint Cuthbert.*

* "On a rock by Lindisfarne
Saint Cuthbert sits, and toils to frame
The sea-born beads that bear his name."
Scott's "Marmion," canto ii., 16.

Bea'gle, a small variety of hound, formerly employed in England for hunting hares, but now nearly supplanted by the harrier. The beagle is about ten inches high at the shoulder, is compactly formed, and has long pendulous ears and smooth hair. It is remarkable for its keenness of scent and perseverance. During the chase it utters a musical cry. A small variety is used as a lap-dog.

Beak [Lat *ros'trum;* Fr. *bec*], the bill of a bird; in other words, the hard, horny mouth of a bird, consisting of two parts, called the upper and lower mandible. (See BILL.) The term was also applied to a pointed piece of wood fortified with metal, and fastened to the fore end of ancient galleys and modern steam-rams, in order to pierce the vessels of the enemy.

Bea'ker, a name formerly given to a kind of drinking-bowl or cup, derived from the same root as the German *becher*. The name is now applied to a glass vessel used in chemical laboratories.

Beale, a township of Juniata co., Pa. Pop. 1039.

Beale (LIONEL SMITH), F. R. S., an accomplished English microscopist and physiologist, born in 1828, graduated M. B. at the University of London in 1851, in which institution he was afterwards appointed professor. Many remarkable books and monographs upon histology and biology have been published by Dr. Beale. His papers written against the Darwinian hypothesis (1870) have attracted much attention. Among his numerous works are "How to Work with the Microscope" (1858), "The Structure of the Tissues of the Body" (1861), and "Protoplasm" (1870).

Beam [Ger. *Baum*, a "tree"], any large piece of timber; the principal piece of timber in a building, that lies across the walls and serves to support the rafters; also a collection of luminous rays emitted from the sun or other luminary. The word has several technical applications. The part of a balance from the ends of which the scales are suspended is called the beam; a weaver's beam is a wooden cylinder on which the web is wound. The term is also applied to the part of a steam-engine to which the piston is attached. In ships, a beam is a great main cross-timber, extending across the hull, supporting the deck, and preventing the sides from collapsing. Each of these beams is made of one solid piece of good timber, if possible, and is upheld at or near the middle by a pillar or pillars. In large steamships iron beams are often used instead of wood. A ship is said to be "on her beam ends" when so much inclined to one side that the beams become nearly vertical. The word also occurs in the phrase "on the starboard beam," which is applied to the position of an object at sea which is seen towards the right by a person who face is turned towards the bow. (See FLEXURE OF BEAMS.)

Beams'ville, a post-village of Clinton township, Lincoln co., Ontario, Canada, on the Great Western Railway, 11 miles W. of St. Catherine's, has manufactures of farming tools, carriages, etc. Pop. about 1000.

Beam Tree, White (*Py'rus A'ria*), a tree which is a native of Europe and Asia, grows to the height of from twenty-five to forty feet. It has ovate and serrate leaves, which are white and downy beneath, flowers in terminal corymbs, and bears a scarlet fruit about as large as a pea. This fruit, which is sometimes called sorb or service-berry, is acid and astringent, and is used to make beer. The hard, fine-grained wood is useful for cog-wheels.

Bean (*Fa'ba*), a genus of annual herbaceous plants of the order Leguminosæ, sub-order Papilionaceæ, was included by Linnæus in the genus *Vicia*, from which it may be distinguished by its leathery, tumid pods and a large scar on the end of the seed. The common European bean (*Faba vulgaris*) has been cultivated in Asia and Europe since the earliest ages. It has pinnate leaves, without tendrils, and fragrant flowers. The seeds, which are nutritious food, are enclosed in long pods which are woolly on the inside. Many varieties of this species are cultivated in gardens and fields, and are used as food for men, cattle, swine, etc. This plant prefers a dry and moderately rich soil. Garden beans are planted in the spring in rows. The kidney-bean or haricot (*Phaseolus vulgaris*) is a totally distinct plant from the proper bean. The beans cultivated for use in America are of various species of *Phaseolus*.

Bean Blossom, a township of Monroe co., Ind. Pop. 1316.

Bean'ville, a village of Willing township, Allegany co., N. Y., on the Genesee River, has manufactures of lumber, leather, etc.

Bear [Lat. *ur'sus*, female *ur'sa;* Ger. *Bär*], a genus of quadrupeds of the order Carnivora and tribe Plantigrada, is the type of the family of Ursidæ. Bears walk on the soles of their feet, have five toes on each foot, and have claws which are not retractile, but are adapted for digging in the earth or climbing trees. Their tails are very short. They have six cutting teeth in each jaw, and one canine tooth on each side in each jaw. Bears are found both in warm and cold climates in Europe, Asia, and America, but they are not known to live in Africa. The species that inhabit cold climates are generally more fierce and carnivorous than those of tropical regions. Some species pass the winter in a state of torpidity and hibernation, during which they eat nothing and remain stationary in hollow trees or holes in the ground.

The brown bear (*Ursus arctos*) is widely distributed over the continents of Europe and Asia, but it has been extirpated from the British Islands. It is generally believed to be the only European species. It is solitary, infests mountains and forests, eats fish and other animals, and subsists partly on fruits and vegetable food. The flesh of this bear is eaten by the people of Kamtchatka and other regions.

The black bear (*Ursus Americanus*) is found in all parts of North America. Its total length is about five feet. It prefers vegetable food, but when pressed by hunger will kill and eat small animals. It kills its prey by hugging or squeezing with its fore paws. Great numbers of black bears are killed for their skins, which have a smooth, glossy fur, and are valuable for cloaks, caps, etc. This animal is an expert climber, is very fond of honey and green corn (maize), and is less fierce and dangerous to man than the brown bear.

The Rocky Mountains and adjacent parts of North America are infested by the grizzly bear (*Ursus ferox* or *horribilis*), which is much larger and more carnivorous than the black bear. It sometimes measures nine feet from the nose to the tail, which is very short. The hair is long, and its color is a mixture of brown, white, and black. This bear, which is very tenacious of life, is the most formidable

Grizzly Bear.

beast of prey on the continent of America. It is able to master a buffalo (bison) and carry away its huge carcass. It is stated that it hunts for prey both by day and night. It can run swiftly, but does not climb trees.

The largest of all the family of Ursidæ is the polar bear

Polar Bear.

(*Ursus maritimus*), called also the white bear, the fur of

which is an impure white. It sometimes measures nearly ten feet long and five feet high. It is strictly marine in its habits, is never found far from the sea, and inhabits the most northern shores of Greenland, Asia, etc. It subsists chiefly on animal food, and pursues seals and fishes both on the ice and in the water. These bears display a remarkable affection for their cubs. It has not been ascertained whether the polar bear usually hibernates or not.

The bear mentioned in the Bible was probably the Syrian bear (*Ursus Syriacus*), which resembles the brown bear in its habits, and has a stiff mane of erect hairs between the shoulders. The color of its hair is mostly dingy white or brown. Among the other species is the *Ursus labiatus*, or long-lipped bear of the East Indies, an inoffensive and gentle animal, which is often led about by Indian jugglers for exhibition. Among the Andes of Chili occurs the *Ursus ornatus*, called spectacled bear, which is black except two semicircular yellow marks above its eyes. Remains of several extinct species of bears have been found in caves in England and Germany. Of these, *Ursus spelæus*, called the cave bear, is the best known. It is now thought that the "cave bear" was identical with *Ursus horribilis*, the "grizzly" of America. The bears are by some naturalists all arranged in one genus; by others in several genera.

REVISED BY J. S. NEWBERRY.

Bear-Baiting. A custom was formerly prevalent in many countries of baiting bears with dogs. The place in which the bears were kept was called a "bear-garden." Bear-baiting was a favorite sport in England, not only for the common people, but also for the higher classes. Queen Elizabeth is said to have enjoyed it. It was hated by the Puritans, Macaulay wittily says, "not because it gave pain to the bear, but because it gave pleasure to the spectators." This coarse and inhuman entertainment gradually died out, and was finally prohibited by act of Parliament Sept. 9, 1835.

Bear Creek, a township of Shelby co., Ala. P. 693.

Bear Creek, a township of Boone co., Ark. P. 314.

Bear Creek, a township of Phillips co., Ark. P. 170.

Bear Creek, a township of Searcy co., Ark. P. 865.

Bear Creek, a township of Sevier co., Ark. P. 159.

Bear Creek, a township of Christian co., Ill. P. 720.

Bear Creek, a township of Hancock co., Ill. P. 1117.

Bear Creek, a township of Montgomery co., Ill. Pop. 1650.

Bear Creek, a post-township of Jay co., Ind. Pop. 1247.

Bear Creek, a post-township of Poweshiek co., Ia. Pop. 1852.

Bear Creek, a township of Emmet co., Mich. P. 254.

Bear Creek, a township of Montgomery co., Mo. Pop. 2200.

Bear Creek, a township of Chatham co., N. C. P. 1328.

Bear Creek, a post-township of Luzerne co., Pa. Pop. 135.

Bear Creek, a township of Sauk co., Wis. Pop. 858.

Bear Creek, a post-township of Waupacca co., Wis. Pop. 462.

Beard, a name applied to the hair which grows upon the lower part of the face of a man, and in exceptional cases upon the faces of women, or even children. The wearing of the beard is universal in the East, where it has long been regarded as a mark of honor and dignity. Some races of men, like the American Indians, carefully pluck out the beard, which with them and others, such as the Mongolian peoples, is very scanty. Most white races have beards with hairs differing decidedly in structure and appearance from those of the scalp. The wearing or not of beards in European nations has been regulated partly by fashion and partly by legal enactments for or against the practice. The beard is believed to protect the throat and chest from colds.

Beard (RICHARD), D. D., a clergyman of the Cumberland Presbyterian Church, was born Nov. 27, 1799, in Sumner co., Tenn. His early education was not without care, yet limited. His education preparatory to the ministry was conducted better than usual for the time in his Church. He was licensed and commenced preaching in 1820, and was several years exclusively devoted to the work of the ministry. His health failing, he spent two or three years teaching. He was two and a half years at Cumberland College, Princeton, Ky., and graduated. He was immediately appointed professor of languages in that college. He afterwards spent five years at Sharon, Miss., in connection with Sharon College. In 1843 he became president of Cumberland College, Ky., and remained there ten years and a half, giving a great impetus to the classic training of young men, especially those seeking the ministry. In 1854, when the Cumberland Presbyterian Church established a chair of systematic theology in Cumberland University, at Lebanon, Tenn., his high character as a scholar and educator at once called him to that position, which he has ever since held. He has given to the Church an able and standard work on "Systematic Theology," in 3 vols. 8vo. It is regarded as the crystallization of Cumberland Presbyterian thought and faith. He has published two octavo volumes of biographical sketches of ministers. Also, "Why am I a Cumberland Presbyterian?" 1 vol. His contributions to the "Quarterly" and general literature of the Church have been constant and most valuable. His great dignity, purity, and gentleness of character have marked him as a representative man, calling him to the moderator's chair times almost without number. He is yet vigorous and earnest in the great work of education.

Beard (WILLIAM H.), an American painter, born at Painesville, O., about 1826. Among his most popular works are "Bears on a Bender" and "Grimalkin's Dream."

Beard'in's, a station of Etowah co., Ala. Pop. 445.

Beard's, a township of Pickens co., Ala. Pop. 446.

Beard's Bluff, a township of Marshall co., Ala. Pop. 373.

Beard'slee (LESTER A.), U. S. N., born Feb. 1, 1836, in Little Falls, N. Y., entered the navy as a midshipman Mar. 5, 1850, became a passed midshipman in 1856, a lieutenant in 1859, a lieutenant-commander in 1862, and a commander in 1869. He served in the iron-clad Nantasket in the engagement with Fort Sumter of April 7, 1863, and is thus commended by his commanding officer, Captain Fairfax, in his official report to Rear-Admiral Dupont of April 8, 1863: "I am gratified to be able to say that the officers and crew behaved with becoming coolness and bravery. Lieutenant-Commander L. A. Beardslee, the executive officer, and the senior engineer, Mr. George H. White, rendered me great assistance in the working of the guns, turret, and even the vessel."

FOXHALL A. PARKER, U. S. N.

Bear'field, a township of Perry co., O. Pop. 901.

Beards'ley (EDWARD E.), D. D., born in 1808 in Fairfield co., Conn., graduated at Trinity College, Hartford, in 1832, where he was two years a tutor. He was for a time principal of the academy at Cheshire, Conn., took orders in the Protestant Episcopal Church in 1835, and has been rector of a church in New Haven since 1848. He is the author of a "History of the Episcopal Church in Connecticut" (2 vols. 8vo) and a "Life of Samuel Johnson, D. D.," both valuable works.

Beardsley (SAMUEL), LL.D., a native of Otsego co., N. Y., practised law in Rome and Utica, N. Y., held various State offices, was a member of Congress from New York (1831–36 and 1843–1845), attorney-general of the State (1837), became a judge of the State supreme court in 1844, and its chief-justice in 1847. Died May 6, 1860.

Beards'town, the county-seat of Cass co., Ill., situated on the bank of the Illinois River. It is the terminus of the Springfield and Illinois South-eastern R. R., and is on the Rockford Rock Island and St. Louis R. R. It ranks as one of the oldest towns in the State. The celebrated "Lithia Springs" are here. The hotel accommodations are superior. There is a fine park near the business portion of the city. The Rockford machine-shops are located here, which employ from 100 to 200 men. There is a foundry, flouring, woollen, and two saw-mills, one large wagon manufactory, a distillery, and a very extensive brewery. The surrounding country consists of rich bottom-lands of a sandy nature, and produces abundant crops of grapes, corn, sweet potatoes, melons, and general marketing. A fine bay, on which saw-mills are established, affords a fine resort for boating and fishing. The railroad bridge of the Rockford road crosses the river at this point, and is a fine structure, costing some $300,000. The piers are of iron. It has two weekly newspapers. Pop. 2588; total pop. of Beardstown township, 3582.

J. S. NICHOLSON, ED. "CENTRAL ILLINOISIAN."

Bear Grove, a township of Fayette co., Ill. P. 992.

Bear Grove, a township of Cass co., Ia. Pop. 163.

Bear Grove, a post-township of Guthrie co., Ia. Pop. 417.

Bear House, a township of Ashley co., Ark. P. 525.

Bear Isle, a township of Hancock co., Me. Pop. 13.

Bear Lake, a post-township of Manistee co., Mich. Pop. 417.

Bear Mountain, in Pennsylvania, rises in the N. E. part of Dauphin co., to the height of about 750 feet. The

valley of Bear Creek, which flows at the base of this mountain, contains valuable beds of anthracite coal.

Bear River, a port of entry of Digby co. and township, Nova Scotia, at the head of navigation, has quite extensive manufactures of lumber, leather, etc.; shipbuilding is also carried on. It has a large trade in firewood and lumber, which are sent to the U. S. and West Indies. Pop. about 900.

Bear River, a river of the U. S., rises in the N. part of Utah, flows northward into Idaho, and changes its course abruptly towards the S. Having again crossed the S. boundary of Idaho into Utah, it flows south-westward, and enters Great Salt Lake about 25 miles N. W. of Ogden. The total length is about 400 miles.

Bears and Bulls, a phrase often used in connection with the purchase and sale of stocks, and applied to persons who speculate in government securities and in the stocks of railroads and other corporations. The "bears" are those who wish to depress the value of stocks, and the "bulls" are those whose interest prompts them to act in the other direction. If two men have contracted, the one to deliver and the other to take a certain stock at a specified price on an appointed future day, the former party will naturally belong to the bears, and the latter to the bulls.

Bear's Grease, or **Bear's Oil,** is said to be efficacious in promoting the growth of human hair. The genuine article being insufficient to supply the demand, perfumers and others sell under the name of bear's oil large quantities of beef-marrow, hog's lard, spermaceti, etc.

Bear'ytown, a village of Fayette and Varick townships, Seneca co., N. Y., has three churches and manufactures of staves and lumber.

Beas'ley (Frederick), D. D., an American clergyman and philosopher, born near Edenton, N. C., in 1777, graduated at Princeton in 1797, became an Episcopalian minister, and was long provost of the University of Pennsylvania. Among his works, which attracted attention in Europe, are "A Search of Truth in the Science of the Human Mind," and a "Reply to the Views of Dr. Channing." Died at Elizabethtown, N. J., Nov. 2, 1845.

Bea'son's Store, a township of St. Clair co., Ala. Pop. 305.

Beatifica'tion [Lat. *beatifica'tio*, from *bea'tus*, "blessed," and *fa'cio*, *fac'tum*, to "make"] in the Roman Catholic Church is a solemn act by which the pope pronounces a person blessed. It is the first step towards canonization, and permits the term "blessed" to be given to the new saint. This honor is reserved for those who have performed miracles, have suffered martyrdom, or have died in the odor of sanctity. The first solemn beatification was that of Saint Francis de Sales by Alexander VIII., Jan. 8, 1662.

Beating the Bounds, a popular phrase used in England to denote the periodical survey or perambulation by which the boundaries of parishes are preserved. It is the custom that the clergyman of the parish, with the parochial officers and the boys of the parish school, should march to the boundaries, which the boys strike with willow rods. The boys themselves were sometimes whipped in proximity to an important landmark, in order to impress the subject durably on their memories.

Bea'ton, Beatoun, or **Bethune** (David), a Scottish cardinal, born in 1494, was a zealous opponent of the Protestant Reformation. He was appointed lord privy seal in 1528, and was sent as ambassador to France in 1533. He became a cardinal in 1538, and succeeded his uncle as archbishop of St. Andrew's in 1539. On the death of James V., in 1542, Beaton produced a forged will of that king, appointing himself, with three others, regent of the kingdom; but his artifice failed, and the earl of Arran became the regent. Cardinal Beaton was a cruel persecutor of the Protestants, and caused George Wishart to be burned at the stake. He was assassinated in his own castle by Norman Leslie and others May 29, 1546. (See Knox, "History of the Reformation in Scotland;" Froude, "History of England," vol. iv.; Robertson, "History of Scotland.")

Be'atrice, a city, capital of Gage co., Neb., in a township of the same name, on the Big Blue River, 90 miles S. S. W. of Omaha. It has a weekly paper. It is the southern terminus of the Omaha and South-western R. R. It is noted for its fine water-power and excellent building-stone. The U. S. land-office for the Nemaha district is located here. Pop. of township, 624.

Theodore Coleman, Ed. of "Beatrice Express."

Beatri'ce Portina'ri, a beautiful Italian lady, a native of Florence, who excited the admiration of Dante, and was immortalized by him in his "Divina Commedia." She was married to Simone dei Bardi, and died in 1290, aged about twenty-four.

Beat'tie (James), LL.D., D. C. L., a Scottish poet, born in the county of Kincardine Oct. 25, 1735. He became in 1760 professor of moral philosophy in Marischal College, Aberdeen. To refute the doctrines of Hume he published his "Essay on Truth" (1770), which was extremely successful. His most popular poem is "The Minstrel" (1771–74), which excited general admiration. Among his other works are "The Evidences of the Christian Religion, briefly and plainly stated" (1786), and "The Elements of Moral Science" (1793). Died Aug. 18, 1803. (See Sir William Forbes, "Life of James Beattie," 2 vols., 1806; Alexander Bower, "Life of James Beattie," 1804.)

Beat'ty, a post-village of Westmoreland co., Pa.

Beatty (John), born near Sandusky, O., Dec. 16, 1828, was engaged in banking, but entered the Third Ohio Infantry as a private in 1861, became its lieutenant-colonel in that year, its colonel in 1862, and brigadier-general of volunteers in the same year. He distinguished himself in many important battles in West Virginia, Kentucky, and Tennessee in the late civil war.

Beat'tyville, a post-village, capital of Lee co., Ky. Pop. 123.

Beaucaire, a town of France, in the department of Gard, on the right (W.) bank of the Rhone, and on a railway from Cette to Tarascon, 15 miles by rail E. of Nîmes. A bridge nearly one mile long here crosses the Rhone. It has an active trade, which is facilitated by a canal extending to the Mediterranean. Here is held annually a great fair (July 25–28), which was formerly perhaps the largest in Europe. It is said to have been instituted by Count Raymond II. of Toulouse in 1217, although we do not find it mentioned until 1315. It has declined in modern times, but it is still frequented by merchants from all parts of Europe and the Levant. The number of annual visitors was formerly estimated at 100,000, but has at present greatly declined. The chief articles sold at this fair are silks, wine, oil, drugs, wool, leather, and spices. Pop. in 1866, 9395.

Beauce, a county of Canada, in the S. E. part of Quebec, intersected by the Chaudière River. Area, 1150 square miles. It has mines of copper. Capital, St. Joseph de Beauce. Pop. in 1871, 27,253.

Beauchamp, de (Alphonse), a French historian and publicist, born at Monaco, in Italy, in 1767, resided in Paris. He contributed to the "Moniteur" and the "Gazette de France," and published many works, among which are a "History of La Vendée" (3 vols., 1806), a "History of Brazil" (1815), and a "Life of General Moreau" (1814). Died June 1, 1832.

Beau'champ, Earls of, Viscounts Elmley (1815), Barons Beauchamp (1806, in the United Kingdom), a noble family of Great Britain.—Frederick Lygon, the sixth earl, was born Nov. 10, 1830, and succeeded his brother in 1866. He was lord of the admiralty in 1859, member of Parliament for Tewksbury 1857–63, and for West Worcestershire 1863–66.

Beau'ford, a post-township of Blue Earth co., Minn. Pop. 336.

Beau'fort,* a county of North Carolina, bordering on Pamlico Sound, is intersected by the navigable Pamlico River. The surface is level; the soil is sandy, and in some parts marshy. Corn, rice, tobacco, and cotton are raised. Capital, Washington. Pop. 13,011.

Beaufort,* a county which forms the southern extremity of South Carolina. Area, 1540 square miles. It is bounded on the N. E. by the Combahee River, on the S. E. by the Atlantic Ocean, and on the W. by the Savannah River. The surface is a level, alluvial plain; the soil is sandy, but produces good crops of cotton, maize, rice, and sweet potatoes. The county is intersected by the Charleston and Savannah and the Port Royal R. Rs. Capital, Beaufort. Pop. 34,359.

Beaufort, a port of entry, capital of Carteret co., N. C., at the mouth of Newport River, about 4 miles from the ocean and 168 miles E. S. E. of Raleigh. Its harbor is the best in the State, and is defended by Fort Macon. There is a lighthouse 156 feet high at Cape Lookout, 11 miles S. E. of Beaufort, in lat. 34° 37′ 16″ N., lon. 76° 31′ 07″ W. Pop. 2430; of the township, 2850.

Beaufort, a port of entry, capital of Beaufort co., S. C., on Port Royal Island, and on an arm of the sea called Port Royal River, about 55 miles W. S. W. of

* This name is usually pronounced bu'fort in South Carolina, and bō'fort in North Carolina.

Charleston. It has a good harbor, with nearly sixteen feet of water over the bar at the entrance. Lumber, rice, and cotton are exported. It has five churches and three weekly newspapers. Pop. 1739; of the township, 5511.

Ed. "Barnwell County Times."

Beau'fort (Henry), Cardinal, an ambitious English prelate, born about 1375, was a natural son of John of Gaunt and half-brother of King Henry IV. He became bishop of Lincoln in 1398, bishop of Winchester in 1405, lord chancellor in 1403, again in 1413, and a third time in 1424. He acted a prominent part in political affairs, for which he had superior abilities. During the minority of Henry VI. he was very powerful, and was a rival of his nephew, the duke of Gloucester. He was suspected of complicity in the murder of that rival. Died April 11, 1447. (See Lord Campbell, "Lives of the Lord Chancellors.")

Beaufort, de (François de Vendôme), Duc, born in Paris in 1616, was a grandson of Henry IV. of France, and a son of César de Vendôme. He was a leader of the malcontents or opponents of the court in the civil war of the Fronde. Having returned to his allegiance, he was appointed commander of the fleet by Louis XIV. about 1662. He was killed at the siege of Candia in 1669.

Beaufort, Dukes of (1682), marquesses of Worcester (1642); earls of Worcester (1514); earls of Glamorgan, Viscounts Grosmont, and Barons Beaufort (1642); Barons Herbert (1461); Barons Herbert of Ragland, Chepstow, and Gower (1506); Barons Bottetourt (1308, in England), an old and prominent family of Great Britain.—Henry Charles Fitzroy Somerset, the eighth duke, was born Feb. 1, 1824, and succeeded his father in 1853. He was member of Parliament for East Gloucestershire 1846–53, master of the horse 1858–59 and 1866–68, and is at present lord lieutenant of Monmouthshire.

Beaugency, an old town of France, in the department of Loiret, on the right bank of the Loire, and on the railway from Paris to Bordeaux, 16 miles S. W. of Orleans. It has manufactures of woollen and leather goods, and a trade in wine, grain, and wool. Pop. 5029.

Beauharnais, de (Eugène), a son of Vicomte Alexandre de Beauharnais, was born in Paris Sept. 3, 1781. His mother, Josephine, became the wife of Bonaparte, whom he accompanied to Egypt in 1798. He was rapidly promoted in the army, was appointed viceroy of Italy in 1805, and married the princess Amalie Augusta, a daughter of the king of Bavaria, in 1806. His functions as viceroy were performed with ability, prudence, and moderation. He also displayed superior military talents in the campaign against Austria in 1809 and in the invasion of Russia in 1812. Having obtained command of the army in Russia after it had suffered great disasters, he acted with remarkable firmness and constancy, and made a masterly retreat. After the battle of Lützen, May, 1813, in which he took part, he went to Italy, which he defended against the Austrians until the deposition of Napoleon. He afterwards resided at Munich, and obtained from the king of Bavaria the title and estate of duke of Leuchtenberg. Died in Munich Feb. 21, 1824. One of his sons married Donna Maria, queen of Portugal, in 1835. (See Léonard Gallois, "Histoire du Prince Eugène de Beauharnais," 1821; A. Aubriet, "Vie de Eugène de Beauharnais," 1824.)

Beauharnois, a county of Canada, in the S. W. part of Quebec, has an area of 200 square miles. It is bounded on the N. W. by the river St. Lawrence, and is drained by the Châteauguay River. The soil is productive. Butter, cheese, wool, and oats are the chief crops. Capital, Beauharnois. Pop. in 1871, 14,757.

Beauharnois, a post-village, capital of the above county, is on the St. Lawrence River, 27 miles S. W. of Montreal. It has a number of flax-mills, potteries, and factories, and one weekly paper. Pop. in 1871, 1423.

Beaumarchais, de (Pierre Augustin Caron), a French dramatist remarkable for his wit and versatility, and whose adventurous career and vicissitudes of fortune obtained for him great celebrity, was born at Paris Jan. 24, 1732, and was the son of a clockmaker. Although sent to the college (Anglicè, *school*) at Alfort, he was at the early age of thirteen apprenticed to his father. He soon discovered a decided taste for literature and an excessive fondness for music, in which art he became so proficient that he was enabled to procure an introduction to the court of Louis XV., and was employed to teach the princesses, his daughters, to play upon the harp, in the performance upon which he was skilled, and in the pedals of which he introduced an improvement. At the concerts given at the court he made the acquaintance of Duverney, the celebrated financier of that period, whom he was enabled to aid, by his influence with the princesses, in the accomplishment of certain projects in which the banker was at that time engaged. In return, Duverney instructed him in the affairs of finance, and aided him with funds and credit. The first literary production which attracted attention to Beaumarchais was his drama of "Eugénie," published in 1767, which, however, did not meet with success. In Nov., 1768, Beaumarchais's second wife died, and in July of the same year, Duverney. Although one-half of his wife's fortune was in a life-annuity, and the settlement of Duverney's affairs discovered a balance in favor of Beaumarchais, a rumor prevailed that he had poisoned his wife, and he was accused by Comte de la Blache, Duverney's heir, of embezzlement, fraud, and forgery. A seven years' litigation in securing the amount due him from Duverney was the occasion of his masterly "Mémoires" in his defence, which obtained for him great notoriety. These productions are admitted to be masterpieces in their way, and the interest and excitement produced by them is described as magical and electrical. Although thus occupied in the law and in his favorite literary pursuits, Beaumarchais was still actively engaged in various business speculations. He was prompt to foresee the success of our American Revolution, and engaged by connivance with, though unaided by, the French government, in supplying the Americans with arms and ammunition. How his services in this direction were appreciated the following will show: "By express order of the Congress sitting at Philadelphia, to M. de Beaumarchais: Sir,—The Congress of the U. S. of America, grateful for the great efforts you have made in their favor, presents you its thanks, and the assurance of its esteem. It grieves for the misfortunes you have suffered in support of its States. Unfortunate circumstances have prevented the accomplishment of its desires, but it will take the promptest measures for acquitting itself of the debts it has contracted with you. The generous sentiments and the exalted views which alone could dictate a conduct such as yours are your greatest eulogium, and are an honor to your character. Whilst by your great talents you have rendered yourself useful to your prince, you have gained the esteem of this rising republic, and merited the deserved applause of the New World. John Jay, *President.*"

Notwithstanding this, his claim, which Alexander Hamilton approved, was not paid until 1835, thirty-six years after his death, and then but one-fourth part of the principal.

In the midst of his manifold labors he undertook at this time an expensive reproduction of the works of Voltaire, one edition of which was to be in 92 volumes, by which he sustained a very heavy loss. Notwithstanding he gave his support to the principles of the French Revolution, and imported firearms for the use of the French, his property was confiscated, and he was for a time an exile from his native land. After undergoing persecution and accusation, he returned to France after the Revolution was over. His sufferings during this period were described by him in a published work entitled "Mes Six Époques." He recovered possession of his beautiful villa at Faubourg St. Antoine, where he remained till his death. The evening of May 17, 1799, he passed with his family and a few friends; on the morning of the 18th he was found dead in his bed.

Beaumarchais, besides the works mentioned, is also the author of various dramatic productions. "Le Mariage de Figaro," his masterpiece, produced the greatest excitement in Paris, and his "Barbier de Séville," which preceded it, was also a great success. The first formed an epoch in the dramatic, social, and political annals of France, and was styled by Napoleon "the Revolution already in action." It is but proper to add that no conception of its wit, vivacity, and telling social and political allusions and sarcasms can be had at the present day, especially from the opera librettos with which we are familiar. (See L. de Loménie, "Beaumarchais, sa Vie et son Temps," 1852; Saint-Marc Girardin, "Notice sur la Vie de Beaumarchais," 1835; E. Berger, "Essai sur la Vie et les Ouvrages de Beaumarchais," 1847; "Edinburgh Review," vol. civ., 1856; "London Quarterly Review," July, 1873, etc.)

J. G. Barnard, U. S. A.

Beauma'ris, a seaport of Wales, and the capital of the island and county of Anglesea, is on the E. coast of the island, 3 miles N. of Bangor and about 2 miles from the N. end of Menai Strait. It is a favorite place of resort for sea-bathing. The Bay of Beaumaris affords here safe anchorage. Here is a ruined castle built by Edward I. Pop. 2558.

Beau'mont, the capital of Jefferson co., Tex., on the Texas and New Orleans R. R., 85 miles E. by N. of Houston and 68 miles N. E. of Galveston, and at the head of tide-water navigation on the Neches River, which is navigable for 331 miles from the sea by steamers. The yellow pine and cypress lumber and shingles manufactured on the

Neches River (which has eight or ten mills) are shipped in steamers and schooners from Beaumont *viâ* Sabine Pass. It has one weekly paper.

W. F. M'Clanahan, Ed. of "News-Beacon."

Beaumont (Francis), an English dramatic poet, born in Leicestershire in 1586, was educated at Oxford. After he left college he associated with Ben Jonson in London, and became an intimate friend of John Fletcher, in partnership with whom he wrote several popular dramas, among which are "Philaster" (1611), "The Coxcomb" (1613), and "Cupid's Revenge" (1613). Beaumont also wrote "The Masque of the Inner Temple" (1612), and other poems. Died Mar., 1616. Beaumont and Fletcher are lyrical and descriptive poets of the highest order, but they are offensively coarse and licentious.

Beaumont (John C.), U. S. N., born Aug. 27, 1821, in Pennsylvania, entered the navy as a midshipman Mar. 1, 1838, became a passed midshipman in 1844, a lieutenant in 1855, a commander in 1862, and a captain in 1872. While commanding the steamer Aroostook, North Atlantic blockading squadron, he took part in the shelling of Drury's Bluff, May 15, 1862, and commanded the steamer Mackinaw in both attacks upon Fort Fisher, and for his services on these occasions was recommended for promotion by Admiral Porter in his official despatch of Jan. 28, 1865.

Foxhall A. Parker, U. S. N.

Beaumont (William), M. D., an American surgeon, born at Lebanon, Conn., in 1785. While in the U. S. army in 1825 a young man (Alexis St.-Martin) was brought to him who had received a wound from a musket discharged at the distance of only a few feet. The wound healed, and left an aperture about two and a half inches in diameter, through which the process of digestion could be seen. Doctor Beaumont availed himself of this to make various experiments on digestion, the results of which are extremely interesting and of great importance to physiological science. They were published in 1838, and afterwards in England and on the Continent. Died at St. Louis April 25, 1853.

Beaumont de la Bonnière, de (Gustave), an eminent French publicist and advocate, was born in Sarthe Feb. 16, 1802. He was a grandson of La Fayette. He visited the U. S. in 1831, in company with De Tocqueville, in order to study American systems of prison discipline. He wrote an able work "On the Penitentiary System of the U. S., etc." (2 vols., 1832), and "Slavery in the U. S." (1835). He was elected to the Chamber of Deputies in 1840, and was a moderate republican member of the National Assembly of 1848. Having opposed the *coup-d'état* of Dec., 1851, he was imprisoned for a short time. Died Mar. 2, 1866.

Beaune (anc. *Vellaunodu'num*), an old town of France, in the department of Côte-d'Or, is on the river Bouzoise, and on the Paris and Lyons Railway, 23 miles by rail S. S. W. of Dijon. It has the beautiful church of Notre Dame, and a splendid hospital founded in 1443. Here are manufactures of woollen cloth, cutlery, leather, etc. Good burgundy wine is produced in this vicinity. Pop. in 1866, 10,907.

Beauport, a post-village and parish of Quebec co., Canada, 3½ miles N. E. of Quebec. It has extensive manufactures and trade in flour, lumber, nails, etc., and is the seat of Beauport Lunatic Asylum, a large and well-conducted institution. Pop. about 1300.

Beauregard, a township of Drew co., Ark. Pop. 598.

Beauregard, a station on the New Orleans Jackson and Great Northern R. R., 139 miles N. by W. of New Orleans. It has one weekly newspaper.

Beauregard (Peter Gustavus Toutant), an American officer and engineer, born in 1818 near New Orleans, La., graduated at West Point in 1838, captain of engineers, U. S. A., Mar. 3, 1853, and general July 21, 1861, in the Southern army. He served in constructing fortifications 1838–45 and 1848–52, in the war with Mexico 1846–48, engineer at Tampico (erecting defences), Vera Cruz, Cerro Gordo, Pedregal, Contreras (brevet captain), Chapultepec (brevet major), and city of Mexico (twice wounded); as member of special engineer boards for harbor and river improvements and Gulf of Mexico defences 1852–58, and in construction of the New Orleans custom-house, marine hospital, and quarantine warehouses 1853–60. Resigning from the army Feb. 20, 1861, he joined the Southern Confederacy, taking an active part in the civil war; in command of the bombardment of Fort Sumter, S. C., 1861, in the Manassas campaign at Bull Run, Va., 1861, of the Corinth army 1862, after the death of Gen. A. S. Johnston at Shiloh; in defence of Corinth till compelled by Gen. Halleck to evacuate it, 1862; of the military department of South Carolina and Georgia, including the defence of Charleston, 1862–64; defence of Petersburg, Va., 1864; of the military division of the West 1864, and of Charleston, S. C.; from which he retired and joined Gen. J. E. Johnston upon the approach of Gen. Sherman, to whom his forces were surrendered at Durham Station, N. C., April 26, 1865. Since the war he has been a civil engineer in the South.

George W. Cullum, U. S. A.

Beausobre, de (Isaac), a learned French Protestant writer, born at Niort Mar. 8, 1659. He was ordained in 1683, but was compelled by persecution to go into exile in 1685. In 1694 he went to Berlin, and became pastor of the French church. Here he remained till his death (June 6, 1738), though his great talents caused him to receive frequent and tempting calls to go to London, Hamburg, and other Protestant cities. Beausobre's fame rests chiefly on his "Histoire Critique de Manicheïsme" (2 vols., 1734–39), a work of vast labor, learning, and ability. He also published a "History of the Reformation" (1785) and other important works, and, with L'Enfant, translated a part of the New Testament. He is charged with Socinian tendencies.

Beautiful, Science of the. See Æsthetics.

Beauvais (anc. *Bellov'acum*), an old city of France, capital of the department of Oise, is situated on the river Thérain, and in a rich valley enclosed by wooded hills, 64 miles by rail N. N. W. of Paris. It has a fine large but unfinished Gothic cathedral, a public library, a museum, and a college. Here are extensive manufactures of woollen cloths, flannels, shawls, Gobelin tapestry, printed cottons, and carpets. Pop. in 1866, 15,307. It was the chief town of the Bellovaci in the time of Cæsar. In 1443 it was besieged in vain by the English. The citizens of Beauvais, aided by the heroine La Hachette and other women, repulsed Charles the Bold, duke of Burgundy, who besieged the city in 1472.

Beauvais, a township of Sainte Genevieve co., Mo. Pop. 1306.

Bea'ver [Fr. *bièvre;* Lat. *cas'tor* and *fi'ber;* Ger. *Bi'ber*], (the *Castor Fiber* of the naturalists), a remarkable quadruped of the order Rodentia, is a native of Europe, Asia, and North America. Beavers were once abundant in the U. S., but they have gradually disappeared before the advance of civilization. They are characterized by industry, sagacity, and instinctive skill in building dams and houses. They have strong incisors or cutting teeth, in which a sharp, chisel-like edge is always preserved by the unequal abrasion of the hard enamel and the other part, which is softer. The body of the beaver is about two feet long. The toes of the hind feet are long, spreading, and webbed to the nails. Among its remarkable characteristics is a tail of an oval form, about ten inches long, horizontally flattened, and about three inches wide. The tail

Beaver.

is covered with horny scales, but the body is covered with a very fine and valuable fur, the color of which is sometimes chestnut-brown; this fur is used for making hats and caps. Its food consists of bark of trees, leaves, roots, and berries. The favorite haunts of beavers are rivers and lakes which are bordered by forests. "Their work is all performed in the night," says Dr. Godman. When they find a stream that is not sufficiently deep for their purpose, they build a dam across it with wonderful ingenuity and industry. The dam, which is formed of sticks, roots, stones, and mud strangely combined, is watertight, and presents a convex surface towards the current. To obtain material for it they cut down the trees growing on the margin of the stream above the dam, and float them down. They prefer small trees, but sometimes fell those that are ten inches or more in diameter. It is stated that they have built dams nearly 300 yards long. The sides of the dam incline towards each other, so that the bottom of it is much thicker than the top. There is a popular opinion that beavers use their tails as trowels in plastering. It is more

probable that the tail serves as a prop or support when they work with their fore feet or carry burdens with them. They pass the winter in houses or lodges which are two or three feet high, are built on the edge of the water, and afford them protection from wolves and other wild beasts. They also have holes or burrows in the ground (adjacent to their lodges), with entrances under the water, in which they take refuge if their lodges are destroyed or become untenable.

The houses or huts of beavers are not built of sticks first, and then plastered, but all the materials, sticks, mud, and stones, are mixed together, and this composition is employed from the foundation to the summit. "The tops of the houses," says Godman, "are generally from four to six feet thick at the apex of the cone." "The outside of the hut is covered or plastered with mud late in the autumn, and after frost has begun to appear. By freezing it soon becomes almost as hard as stone, effectually excluding their great enemy, the wolverine, during the winter. The door or hole leading into the beaver-hut is always on the side farthest from the land, and is near the foundation of the hut or at a considerable depth under water." When they are much disturbed by the presence of hunters and settlers, beavers renounce their original programme, cease to build dams and houses, and, adapting themselves to their altered circumstances, excavate in the banks of rivers holes for their residence—a signal manifestation of sagacity.

Beavers are easily tamed, but no wooden cage will keep them confined, because they gnaw through. Many of them are caught in traps by the Indians and other trappers. In 1820, 60,000 beaver skins were sold by the Hudson's Bay Company. Their numbers are rapidly diminishing in consequence of the exterminating warfare waged against them by hunters, who often kill the young before they have attained half their growth. The bait which is used to entice beavers is prepared from the substance called castor (*castoreum*), obtained from glandular pouches connected with the reproductive organs of the male beavers. "The only species of beaver known," says Dr. Godman, "is the one we have described," but others believe the Old World and New World beavers to be distinct species. The remains of an extinct beaver, very much larger than the living species, have been found in the surface deposits of Ohio and New York. It was first described by Col. J. W. Foster, and by him was called *Casteroides*. (See MORGAN, "The American Beaver," 1867.) REVISED BY J. S. NEWBERRY.

Beaver, a county of Pennsylvania, bordering on Ohio. Area, 650 square miles. It is intersected by the Ohio and Beaver rivers. The surface is undulating; the soil is very fertile. Grain, wool, hay, and dairy products are extensively raised. Bituminous coal and limestone abound in this county, which is liberally supplied with water-power. The Pittsburg Fort Wayne and Chicago and Cleveland and Pittsburg R. Rs. traverse the county. It has many important manufactures. Capital, Beaver. Pop. 36,148.

Beaver, a large county in the S. of Utah, bordering on Nevada. It is intersected by Green River. Cattle, wool, and wheat are the chief exports. Lead, silver, and iron are found here. Capital, Beaver. Pop. 2007.

Beaver, a township of Saline co., Ark. Pop. 240.

Beaver, a township of Iroquois co., Ill. Pop. 1278.

Beaver, a township of Newton co., Ind. Pop. 637.

Beaver, a township of Pulaski co., Ind. Pop. 489.

Beaver, a township of Butler co., Ia. Pop. 1084.

Beaver, a township of Dallas co., Ia. Pop. 343.

Beaver, a township of Grundy co., Ia. Pop. 401.

Beaver, a township of Guthrie co., Ia. Pop. 520.

Beaver, a township of Polk co., Ia. Pop. 1213.

Beaver, a township of Bay co., Mich. Pop. 141.

Beaver, a township of Newaygo co., Mich. Pop. 142.

Beaver, a township of Fillmore co., Minn. Pop. 419.

Beaver, a township of Renville co., Minn. Pop. 569.

Beaver, a township of Taney co., Mo. Pop. 581.

Beaver, a township of Mahoning co., O. Pop. 1933.

Beaver, a township of Noble co., O. Pop. 1684.

Beaver, a post-township of Pike co., O. Pop. 694.

Beaver, a post-borough, capital of Beaver co., Pa., on the right bank of the Ohio River, 2 miles below the mouth of the Beaver River, and on the Cleveland and Pittsburg R. R., 27 miles N. W. of Pittsburg. It is the seat of Beaver College, a female seminary, an academy, good union schools, and four churches. There is a fine park in the centre of the village. It has three weekly newspapers. Pop. 1120.

ED. "RADICAL."

Beaver, a township of Clarion co., Pa. Pop. 1338.

Beaver, a township of Columbia co., Pa. Pop. 958.

Beaver, a township of Crawford co., Pa. Pop. 1177.

Beaver, a township of Jefferson co., Pa. Pop. 1094.

Beaver, a township of Snyder co., Pa. Pop. 1766.

Beaver, a post-village, capital of Beaver co., Utah, is on Beaver River, about 50 miles S. by W. from Fillmore. Copper and lead are found in the vicinity.

Beaver Bay, a post-village, capital of Lake co., Minn., in a township of the same name, on Lake Superior, at the mouth of Beaver Bay River, 55 miles N. E. of Duluth; lat. 47° 12′ N., lon. 91° 20′ W. Pop. of township, 119.

Beaver Creek, a post-township of Dale co., Ala. Pop. 400.

Beaver Creek, a post-township of Bond co., Ill. Pop. 1490.

Beaver Creek, a post-township of Washington co., Md. Pop. 1366.

Beaver Creek, a post-township of Seward co., Neb. Pop. 565.

Beaver Creek, a township of York co., Neb. P. 129.

Beaver Creek, a township of Jones co., N. C. P. 1108.

Beaver Creek, a township of Wilkes co., N. C. Pop. 960.

Beaver Creek, a township of Greene co., O. P. 2289.

Beaver Dam, a township of Butler co., Mo. P. 786.

Beaver Dam, a township of Bladen co., N. C. P. 619.

Beaver Dam, a township of Cherokee co., N. C. Pop. 763.

Beaver Dam, a township of Haywood co., N. C. Pop. 1745.

Beaver Dam, a township of Richmond co., N. C. Pop. 635.

Beaver Dam, a township of Watauga co., N. C. Pop. 413.

Beaver Dam, a post-village and township of Hanover co., Va., on the Chesapeake and Ohio R. R., 40 miles N. N.W. of Richmond. Pop. of township, 3237.

Beaver Dam, a city of Dodge co., Wis., on Beaver Dam Creek and on the Milwaukee and St. Paul R. R., 61 miles N. W. of Milwaukee. It is the seat of Wayland University, and has a fine water-power, two woollen factories, a large seeder establishment, two large grist-mills, two newspapers, and various small manufactures. It is the commercial centre of a large and rich country. Pop. 3265; including Beaver Dam township, 4726.

ED. OF "BEAVER DAM ARGUS."

Beaver Falls, the capital of Renville co., Minn., on the Beaver River, about 2 miles above where it empties into the Minnesota, and 108 miles S. S. W. of St. Paul. It has mills and splendid water-power, breweries, stores, county buildings, and one newspaper. It is in an excellent agricultural region.

D. S. HALL, ED. "RENVILLE TIMES."

Beaver Falls, a post-borough of Beaver co., Pa., on Beaver River, 4 miles above its junction with the Ohio, and on the Pittsburg Fort Wayne and Chicago R. R., 31 miles N. W. of Pittsburg. It has important manufactures. Pop. 3112.

Beaver Head, a county of the S. W. part of Montana, bordering on Idaho. Area, 4393 square miles. It is drained by the Jefferson River, a branch of the Missouri. The surface is partly mountainous. Stock-raising is carried on. The Rocky Mountain chain extends along the S. W. border. Gold is found in it. Capital, Bannack City. Pop. 722.

Beaver Indians, a name given to a former tribe of Algonquins who lived on the Canada side of Lake Huron. It is also applied to a tribe allied to the Chippewyans. They live on the Peace River in the British N. W. provinces of North America.

Beaver Island, a township of Stokes co., N. C. Pop. 1247.

Beaver Islands, a group of islands in the N. part of Lake Michigan, are a part of the county of MANITOU (which see) in Michigan. St. James, on Big Beaver Island, is the chief town. Here a branch of the Mormons, under Joseph Strong, settled in 1846.

Beaver Meadow, a mining village of Carbon co., Pa., 11 miles N. W. of Mauch Chunk. Here are valuable coal-mines, from which the coal is conveyed by a railroad to the Lehigh River.

Beaver Pond, a township of Mercer co., West Va. Pop. 1277.

Bea'vertail, the S. point of Conanicut Island, in Narragansett Bay, R. I., has a square granite lighthouse 74 feet high, with a fixed white light of the third order 96 feet above the sea; lat. 41° 26′ 56″ N., lon. 71° 23′ 39″ W.

Bea'verton, a post-village of Ontario co., Canada, on the E. shore of Lake Simcoe, 60 miles N. by E. from Toronto. It is the N. W. terminus of the Midland Railway of Canada. It has one weekly paper.

Beaverton, a post-village of Croghan and New Bremen townships, Lewis co., N. Y., at the head of navigation of Beaver River, has extensive manufactures of lumber and a tannery.

Bea'vertown, a post-village of Beaver township, Snyder co., Pa., on the Sunbury and Lewistown R. R., 25 miles W. by S. of Sunbury. It has one weekly newspaper.

Bebee'ria, or **Bebee'rine** ($C_{19}H_{21}NO_3$), a vegetable alkali or alkaloid obtained from the bark of the bebeeru, or green-heart, a tree of British Guiana. It is used in medicine as a substitute for quinine, which it resembles in properties.

Bebee'ru, Bibiru, or **Beebeeru** (*Nectandra Rodiæi*), a tree of British Guiana, the timber of which is known in commerce by the name of green-heart. It is of the natural order Lauraceæ. (See GREEN-HEART.)

Becancour, a post-village, capital of Nicolet co., Quebec, Canada, 85 miles S. W. of Quebec, has a large trade in flour and lumber. Pop. about 600.

Beccafi'co, *i. e.* "fig-eater" (*Syl'via horten'sis* or *Curru'ca horten'sis*), a small bird of the family of Sylviadæ or warblers, is sometimes called the garden warbler. It is abundant in Southern Europe as a summer bird of passage. The flesh of it is esteemed as a delicate food by the Italians. It has an agreeable song.

Beccamoschi'no, the Italian name of the *Syl'via cistic'ola,* a small bird of the family of warblers, found in Italy. It builds a remarkable nest, which resembles that of the tailor-bird.

Becca'ria, a township of Clearfield co., Pa. Pop. 1239.

Beccari'a, di (CESARE BONESANA), MARQUIS, an eminent Italian economist and writer on penal laws, was born at Milan Mar. 15, 1738. His principles were formed by the influence of Montesquieu. His most important work is a "Treatise on Crimes and Punishments" ("Trattato dei Delitti e delle Pene," 1764), in which he advanced eloquent arguments against the severities and abuses of criminal law. It obtained great popularity, and was translated into many languages. Voltaire admired it, and wrote a commentary on it. In 1768 he was appointed professor of political philosophy at Milan. Died Nov. 28, 1794. (See C. P. VILLA, "Vita del Marchese C. Beccaria," 1821; P. CUSTODI, "Vita di C. Beccaria.")

Bêche-de-Mer [Fr. for "sea-spade," because they are pressed and dried in a shape not unlike that of a spade], or **Trepang,** a name given to the dried bodies of several species of *Holothu'ria,* or sea-cucumber, which are abundant in shallow lagoons and on reefs between Australia, the Fejee Islands, and the S. E. coasts of Asia. They are esteemed a luxurious article of food by the Chinese. The Malay divers catch them and prepare them in large quantities for the Chinese market. This animal is usually about nine inches long, but sometimes measures two feet. It is stated that 8000 hundredweight of the trepang are annually exported from Macassar to China. (See HOLOTHURIDÆ.)

Be'cher (JOHANN JOACHIM), a German chemist, born at Speyer in 1645, is called the author of the first theory of chemistry. He became aulic councillor at Vienna, but soon fell into disgrace, and removed to Mayence. He was addicted to speculation, and wrote, besides other works, "Physica Subterranea" (1669). His theory was the basis of that which was developed by Stahl. He died in London in Oct., 1682.

Becher (SEIGFRIED), a German political economist, born at Plan, in Bohemia, Feb. 28, 1806. Since 1835 he has been professor of history and geography in the Polytechnic Institute in Vienna. Among his works are "Das Oesterreichische Münzsystem von 1524–1838" (2 vols., 1838), "Organization des Gewerbwesens" (1851), and "Die Volkswirthschaft" (1853).

Bechua'na, Betjuans, Bechuans, or **Boshuana,** a nation of Southern Africa, occupying the country between 22° and 29° E. lon. Their southern boundary is near 28° S. lat. They are divided into numerous tribes, each governed by its chief. They are unwarlike and gentle in disposition, and are said to be superior to the Caffres in arts and civilization. They cultivate the soil with skill and diligence. Sheep and cows form an important part of their riches. The Bechuana worship several species of animals. Their language is called "Sechuana." "Bechuana" is a plural form; "Mechuana" is the singular. (See Dr. LIVINGSTONE, "Travels in Southern Africa;" MOFFAT'S "Southern Africa.")

Beck (CHARLES), PH. D., LL.D., a German philologist, born at Heidelberg Aug. 19, 1798. Having removed to America in 1824, he became in 1832 professor of the Latin language and literature at Cambridge, Mass. He obtained the degree of LL.D. from Harvard University in 1865. He published "The Manuscripts of the Satyricon of Petronius Arbiter Described and Collated" (1863), and other works. Died Mar. 19, 1866.

Beck (JOHN BRODHEAD), M. D., an American physician, born at Schenectady, N. Y., Sept. 18, 1794, graduated at Columbia College in 1813. He became in 1826 professor of materia medica in the College of Physicians and Surgeons in New York City. He published "Infant Therapeutics" (1849). Died April 9, 1851.

Beck (LEWIS C.), M. D., a brother of the preceding, was born at Schenectady Oct. 4, 1798. He graduated at Union College in 1817, became professor of chemistry in the medical college of Albany in 1840, and wrote several works on chemistry and botany. His report on the mineralogy of New York was published by the State in 1842. Died April 21, 1853.

Beck (THEODORIC ROMEYN), M. D., LL.D., a medical writer, a brother of the preceding, was born at Schenectady Aug. 11, 1791. He graduated at Union College in 1804, practised at Albany, and obtained in 1840 the chair of materia medica in the medical college of that city. He published "Elements of Medical Jurisprudence" (1823). Died Nov. 19, 1855.

Beck'er, a county of the W. N. W. part of Minnesota. Area, 1400 square miles. It is drained by the Red River of the North, which rises within its limits, and contains several lakes. The surface is elevated about 1680 feet above the sea. Since the census of 1870 it has been rapidly settled. The soil is productive. The grain crop is important. It is intersected by the Northern Pacific R. R. Pop. 308.

Becker (HERMANN HEINRICH), a German politician, called DER ROTHE BECKER (*i. e.* "the Red Becker," on account of his extreme radical views in politics), was born Sept. 15, 1820, took part in the revolutionary movement in 1848, and was imprisoned for several years. In 1862 he was elected a member of the Prussian house of deputies, and in 1867 and 1868 of the North German Parliament, and is one of the recognized leaders of the liberal party.

Becker (JAKOB), a German genre-painter of the Düsseldorf school, born Mar. 15, 1810. His best works present village scenes and idyllic subjects. Died Dec. 22, 1872.

Becker (JOHANN PHILIPP), a German patriot and radical, born at Frankenthal Mar. 19, 1809. He emigrated to Switzerland in 1837, and fought against the Sonderbund in 1847–48. During the revolutionary movements of 1848 and 1849 he served in the army of insurgents in Baden.

Becker (KARL), a German painter, born Dec. 18, 1820, painted in Berlin. His paintings are numerous, representing mostly old Venetian life.

Becker (KARL FERDINAND), a German composer and writer on music, was born at Leipsic July 17, 1804. He composed for the organ, and wrote, besides other works, "Trios" (1844) and "Die Torkünstler des 19. Jahrhunderts" (1849).

Becker (THOMAS A.), the first Catholic bishop of the diocese of Wilmington, Del., was born of German Protestant parents in Pittsburg, studied in Munich, where he joined the Catholic Church, and was consecrated as bishop Aug. 23, 1868.

Becker (WILHELM ADOLF), a learned German author, born at Dresden in 1796. He attempted to reproduce the social life of ancient Rome in "Gallus" (1838), and that of ancient Greece in his "Charicles" (1840), both of which were translated into English by Metcalfe. His chief work is "Handbuch der röm. Alterthümer" (1843–46). Died Sept. 30, 1846.

Beck'et, a post-township of Berkshire co. Mass., on the Boston and Albany R. R. Pop. 1346.

Beck'et (THOMAS À), archbishop of Canterbury, was born in London in 1109. He studied at Oxford and Paris, and was appointed high chancellor in 1158, being the first native Englishman who filled a high office after the Conquest. His style of living was sumptuous in this part of his life, but when he became archbishop of Canterbury in 1162 a remarkable change took place in his habits and deportment. He practised or affected great austerity, and appeared as a zealous champion of the Church against the aggressions of the king, whose policy tended to keep the clergy in subordination to the civil power. Becket having been involved in a conflict with Henry II., escaped in 1164 to France, and appealed to the pope, by whom he was supported. Henry confiscated his property and sequestered the revenues of his see, and received in return a menace of

a papal interdict. In 1170 a formal but hollow reconciliation was made between the king and the obstinate and haughty prelate, who returned to England and resumed his office. He also renewed his defiance of the royal authority, but on the 29th of Dec., 1170, was assassinated by four barons, servants of the king. He was regarded as a martyr by many patriotic Saxons, as well as by the zealous votaries of the Church. He was canonized by the pope in 1173, and his bones were deposited in a splendid shrine at Canterbury, which became the object of one of the great pilgrimages of Christendom.

Beckett (James M.), M. D., was a native of South Carolina, where he received his medical and literary education. He became a resident of Pickens, Ala., was a trustee of the State University in 1840, and entered the Senate as a State Rights Democrat in 1847. He acquired reputation as a debater, but his public life closed with the session of 1849.

Beck'ford (William), a celebrated author, was born in 1760. He inherited from his father an immense fortune, including the estate of Fonthill, in Wiltshire. His annual income was about £100,000. He married in 1783 Lady Margaret Gordon, a daughter of the earl of Aboyne. In 1784 he published his principal work, "Vathek," an Eastern tale (written in French), which was highly commended by Lord Byron. He was elected to Parliament in 1790, resided some years in Portugal, and expended an enormous sum in the erection of Fonthill Abbey, which he filled with rare and expensive works of art. In 1822 he sold this palace and the estate of Fonthill for £350,000, and built another palace at Bath. He published in 1834 a series of letters entitled "Italy, with Sketches of Spain and Portugal," 2 vols. He was a witty and graphic writer, and had much talent for sarcasm. Died May 2, 1844. (See "Memoirs of William Beckford," London, 2 vols., 1859; "Quarterly Review" for Mar. and June, 1834.)

Beckx (Peter John), a Belgian Jesuit, was born Feb. 8, 1795. He joined the Society of Jesus in 1819, was elected procurator of the province of Austria in 1847, was appointed, after the restoration of the Jesuits in Austria, provincial for Austria, and was elected in 1853 general of the order, in which position he has displayed great energy.

Becquerel (Antoine César), an eminent French savant, born at Chatillon-sur-Loing (Loiret) Mar. 8, 1788. He served in the army as an officer of engineers from 1810 till 1815, after which he gave special attention to the study of electricity, and made discoveries in electro-chemistry. He refuted and exploded Volta's theory of contact, and constructed the first constant pile. In 1837 he received the Copley medal of the Royal Society of London. He invented a method of electrotyping. He published, besides other works, "Traité expérimental de l'électricité et du magnetisme" (7 vols., 1834–40). He became a member of the Academy of Sciences in 1829.—His sons, Alexandre Edmond (born Mar. 24, 1820), a physicist, and Louis Alfred, a physician, born in 1814, have each attained distinction as scientific men.

Becse, Old (Hun. *O'Becse*), a market-town of Hungary, in the county of Bacs, 48 miles S. of Szegedin, on the Theiss. Pop. in 1869, 14,058.

Becse, New (Hun. *Uj-Becse*), a town of Hungary, in the county of Torontal, on the Theiss, 8 miles E. of Old Becse. Pop. in 1869, 7193.

Becskerek, Nagy ("Great Becskerek"), a town of Hungary, in the county of Torontal, on the left bank of the Bega, 59 miles S. W. of Temesvár, with which it is connected by a canal. It has a considerable trade. Pop. in 1869, 19,666.

Bed, in geology, a stratum or layer of stratified sedimentary rock of variable thickness. A bed often consists of numerous thin laminæ or plates, resulting from intermissions in the supply of materials, produced by such causes as the ebb and flow of the tide, and variable degrees of the turbidness of the water under which they were deposited. Seams become beds, or are so called if they have a considerable thickness, as coal-beds.

Bed of Justice [Fr. *lit de justice*], a term applied to the seat or throne occupied by the king of France when he was present at a session of Parliament; also to such a session, or the conference of the Parliament with the king, who came to overrule the decisions of Parliament and enforce edicts or ordinances to which that body was opposed. Decrees promulgated at such a session were more authoritative than the ordinary decisions of Parliament. The ceremony became synonymous with an act of arbitrary power. The last "bed of justice" was held by Louis XVI., in 1787.

Bédarieux, a town of France, in the department of Hérault, on the river Orbe, 27 miles by rail N. of Béziers. It is well built, and has manufactures of fine cloths, hosiery, cotton stuffs, paper, hats, and soap. Pop. 8985.

Bed-bug, a well-known hemipterous insect, the *Cimex lectularius*, infesting beds, houses, dove-cots, and the nests of swallows, bats, etc. The eggs are oval and white; the young vermin flat and transparent. In eleven weeks the insect reaches its full size. It is tenacious of life, and has been kept alive more than a year in a sealed bottle without food. Cockroaches devour them in large numbers. Mercurial solutions, benzine, etc. will extirpate these vermin, but prevention by cleanliness is better than cure.

Bed'-chamber, Lords of the, twelve officers of the British royal household who in the reign of a king wait in turn on the person of the sovereign. They are under the groom of the stole, who attends His Majesty only in public ceremonies and on occasions of state. During the reign of a queen these offices are performed by ladies of the bed-chamber and the mistress of the robes, who is substituted for the groom of the stole. Queen Victoria has about eleven ladies and extra ladies of the bed-chamber. These offices are usually filled by the "prime nobility" of the kingdom, who are appointed by the sovereign, and are not removed on each change of the ministry.

Bed'dington, a post-township of Washington co., Me. Pop. 134.

Bed'does (Thomas), M. D., an eminent English physician and writer, born at Shiffnal, in Shropshire, April 13, 1760. He was educated at Oxford, and was well versed in the Latin and other languages. He married Anna, a sister of Maria Edgeworth, and in 1788 was appointed to the chemical lectureship in the University of Oxford. In 1792 he resigned this position. He wrote for the benefit of the working-classes a popular work called "The History of Isaac Jenkins." He opened in 1798 at Bristol a pneumatic hospital for the cure of disease by medicated gases, in which Humphry Davy was his assistant. Among his works is "Hygeia, or Essays, Moral and Medical" (3 vols., 1802). Died Nov. or Dec. 24, 1808. (See E. Stock, "Life of T. Beddoes," 1811.)

Beddoes (Thomas Lovell), M. D., a poet, a son of the preceding, was born at Clifton July 20, 1803. He was a nephew of Maria Edgeworth. He studied medicine and anatomy at Göttingen, and resided many years in Germany. In 1822 he produced "The Brides' Tragedy," which excited general admiration by its profound thoughts, though not free from extravagance. Among his productions is a tragedy called "Death's Jest-Book" (1851), which displays great richness of imagery and passionate eloquence. He died at Bâle Jan. 26, 1849, in consequence of a dissection wound received in 1848.

Bede [Lat. *Be'da*], surnamed the Venerable, an illustrious and pious English scholar and monk, was born in the county of Durham in 673 A. D. He was ordained a priest at the age of thirty, and devoted much time to study and literary pursuits. His name is regarded as the greatest in the ancient literature of Britain. He wrote on astronomy, grammar, music, etc. His most important work is an "Ecclesiastical History of the English Nation" ("Historia Ecclesiastica Gentis Anglorum"), which King Alfred translated into Anglo-Saxon, and which has often been reprinted. He died May 26, 735 A. D. His whole works were published by Dr. Giles (London, 6 vols., 1844), including an English translation of his "Ecclesiastical History." (See Gehle, "De Bedæ Venerabilis Vita et Scriptis," 1838; J. A. Giles, "Life of Bede," prefixed to his complete works, 1844.)

Bedeau (Marie Alphonse), a French general, was born in Vertou, near Nantes, Aug. 10, 1804. He served with distinction in Algeria (1836–47), and became a general of division in Sept., 1844. He had the command (under Bugeaud) of the troops in Paris when the Parisians revolted in Feb., 1848, and under the new republican régime he became commander-in-chief of that city. As a member of the National Assembly (1849–51) he acted with the republicans and opposed Louis Napoleon. Died Oct. 29, 1863.

Bed'egar, or **Bedeguar,** a name of a remarkable gall which is sometimes called sweet-brier sponge, and is found on the branches of the sweet-brier and other species of rose. It is produced by the *Cynips rosæ* and other insects, and is often one inch or more in diameter. It was once used in medicine.

Be'del (Timothy), a Revolutionary patriot, born at Salem, N. H., removed to Haverhill, N. H., and was a lieutenant in 1760, serving in Canada. He became in 1775 a captain of rangers, and in 1776 colonel of the first regiment of New Hampshire troops, and served at Montreal and under Schuyler, and afterwards was major-general of New Hampshire militia. Died at Haverhill, N. H., in Feb., 1787.

Bedell' (Gregory Thurston), D. D., son of the following, an American Protestant Episcopal bishop, born

at Hudson, N. Y., Aug. 27, 1817, educated at Flushing, L. I., and Bristol College, Pa. He is at present bishop of the diocese of Ohio. He is the author of "The Divinity of Christ," "The Profit of Godliness," "Sacredness of the Grave," "The Principles of Pastorship," "The Age of Indifference," "Episcopacy—Fact and Law," etc.; his sermons have been published in the U. S. and in Scotland.

Bedell (Gregory Townsend), D. D., an eminent American Episcopal clergyman, born on Staten Island, N. Y., Oct. 28, 1793. He graduated at Columbia College in 1811, was greatly admired as a pulpit orator, and wrote, among other religious works, "Onward, or Christian Progression," "Renunciation," and two volumes of sermons. Died at Baltimore Aug. 30, 1834. (See his "Life" by Rev. Dr. Tyng, 1836.)

Bedell (William), an English Protestant prelate distinguished for his wisdom and virtue, was born in Essex in 1570. He went to Venice in 1604 as chaplain to Sir Henry Wotton, the English ambassador, and remained there eight years. In 1627 he was elected provost of Trinity College, Dublin, and in 1629 became bishop of Kilmore and Ardagh. He reformed abuses in his diocese, and acquired much influence by his acts of charity and his other virtues. He procured the translation of the Old Testament into Irish. Died Feb. 7, 1642. (See Burnet, "Life of Bishop Bedell," 1685; H. J. Monck Mason, "Life of W. Bedell," 1842.)

Bedesman (*i. e. beadsman*), [from the Saxon *bead*, a "prayer"], equivalent to petitioner, was a common affix at the end of English letters in the fifteenth and sixteenth centuries. A common form of signature at one time was, "Your bounden bedesman," or "Your humble bedeswoman."

Bed'ford, an old market-town of England, capital of Bedfordshire, is on the river Ouse, here crossed by a bridge, 48 miles by rail N. N. W. of London. Several railroads pass here. It has more charitable institutions and public endowments, in proportion to its size, than any town in England. It has several fine Gothic churches, a public library, a famous grammar-school, a lunatic asylum, a jail, a penitentiary, numerous schools and charities, including about sixty almshouses. Bedford has manufactures of farming implements, lace, and straw hats, and a trade in corn, malt, and timber. John Bunyan wrote "Pilgrim's Progress" in Bedford jail. Pop. in 1871, 16,849.

Bedford, a post-village, capital of Missisquoi co., Quebec, Canada, is in Stanbridge township, 2 miles from Stanbridge, and has good water-power and manufactures.

Bedford, a thriving post-village of Halifax co., Nova Scotia, on Bedford Basin and on the Nova Scotia Railway, 8 miles N. W. of Halifax. It has a large woollen mill. Pop. about 250.

Bedford, a county of Pennsylvania, bordering on Maryland. Area, 1000 square miles. It is intersected by the Raystown Branch of the Juniata River. The surface is mountainous, being diversified by several ridges of the Alleghanies, named Dunning's Mountain, Warrior Ridge, etc. The main Alleghany range extends along the W. border of the county. In the N. E. part of this county are the Broad Top coal-mines. Grain, cattle, and wool are important products. It has considerable manufactures. Capital, Bedford. Pop. 29,635.

Bedford, a county of Middle Tennessee. Area, 550 square miles. It is intersected by Duck River. The surface is undulating; the soil is fertile. Maize is the staple production. Wheat, cattle, tobacco, and wool are also raised. The Nashville and Chattanooga R. R. passes through this county. Capital, Shelbyville. Pop. 24,333.

Bedford, a county in the S. of Virginia. Area, 504 square miles. It is bounded on the N. E. by the James River, and on the S. W. by the Staunton River. The Blue Ridge, which extends along the N. W. border of the county, presents beautiful scenery. The Peaks of Otter rise to the height of 3993 feet on the boundary of this county, which is intersected by the Virginia and Tennessee R. R. The soil is fertile. Grain, tobacco, and wool are the chief crops. The "Bedford Alum Springs" afford a valuable chalybeate water. Capital, Liberty. Pop. 25,327.

Bedford, a township of Cross co., Ark. Pop. 319.

Bedford, a township of Wayne co., Ill. Pop. 1336.

Bedford, capital of Lawrence co., Ind., on the Louisville New Albany and Chicago R. R., 71 miles N. W. of New Albany. It has five churches, an academy, a college, eight school-houses, a large town-hall, a fine stone court-house, three newspapers, one monthly magazine, and one national bank. Ed. of "Bedford Independent."

Bedford, a post-village, capital of Taylor co., Ia., is on a prairie and on the river One-Hundred-and-Two, about 100 miles S. W. of Des Moines. It is on the branch of the Burlington and Missouri River R. R., 35 miles S. of Creston, and has considerable trade. It has a weekly newspaper. Pop. 720.

Bedford, a post-village, capital of Trimble co., Ky., about 40 miles N. W. of Frankfort. Pop. 200.

Bedford, a post-township of Middlesex co., Mass., on the Middlesex Central R.R. It has a mineral spring. P. 849.

Bedford, a post-township of Calhoun co., Mich. Pop. 1466.

Bedford, a township of Monroe co., Mich. Pop. 1459.

Bedford, a township of Lincoln co., Mo. Pop. 2325.

Bedford, a township of Nehama co., Neb. Pop. 195.

Bedford, a post-township of Hillsborough co., N. H., 21 miles S. of Concord. It has manufactures of brick, lumber, etc. Pop. 1221.

Bedford, a post-village and semi-capital of Westchester co., N. Y., in a township of the same name, on the New York and Harlem R. R., 39¾ miles from New York. There are twelve churches in the town. Pop. of township, 3697.

Bedford, a township of Coshocton co., O. It has beds of good cannel coal. Pop. 918.

Bedford, a post-village of Cuyahoga co., O., on the Cleveland and Pittsburgh R. R., 14 miles S. E. of Cleveland. Pop. 828; of Bedford township, 1788.

Bedford, a township of Meigs co., O. Pop. 1645.

Bedford, a post-borough, capital of Bedford co., Pa., is on the Raystown Branch of the Juniata, and on a railroad, 94 miles W. S. W. from Harrisburg. It is pleasantly situated on high ground and between two ridges, one of which rises about 1200 feet above the valley. The Bedford Springs, about one mile distant, are a fashionable place of summer resort. Iron ores abound, and iron is here manufactured. It has two weekly newspapers. P. 1247; of the township, 2333. Ed. "Bedford Gazette."

Bedford, a post-village, capital of Bedford co., Tenn.

Bedford, Dukes of (1694); earls of Bedford (1550); marquess of Tavistock (1694); Barons Russell of Cheneys (1539); Barons Russell of Thornaugh (1603); Barons Howland (1695, in England), a prominent family of Great Britain.—William Russell, the eighth duke (of this family), was born June 30, 1809, and succeeded his father in 1861. He was member of Parliament for Tavistock 1832–41.

Bedford (Gunning), a patriot of Delaware, served against the French in 1755, was a native of Philadelphia, an officer of the Revolutionary army, was wounded at White Plains, became mustermaster-general in 1776, was a member of Congress (1783–85), and governor of Delaware (1796–97). Died Sept. 30, 1797.

Bedford (Gunning), a cousin of the preceding, born in Philadelphia in 1747, and graduated at Princeton in 1771, was a member of Congress from Delaware (1785–86), and of the convention (1789) that formed the U. S. Constitution. He was U. S. district judge (1789–1812). Died Mar. 30, 1812.

Bedford (Gunning S.), M. D., was born at Baltimore in 1806, and graduated at Mount St. Mary's College in 1825. After serving as professor in Charleston, S. C., and at Albany Medical College, he settled in 1836 in New York City, where he was professor of midwifery in the University of New York (1840–42). He published an excellent treatise on obstetrics and "Lectures on the Diseases of Women," besides valuable translations from the French. Died at New York Sept. 5, 1870.

Bedford (John Plantagenet), Duke of, the third son of King Henry IV. of England, was born in 1389. He was created duke of Bedford in 1414, and was commander-in-chief of the forces in England during the absence of Henry V., who was his brother. After the death of Henry V. (1422) the duke of Bedford was regent of France, and waged war with success against the French dauphin. He gained a victory over the French at Verneuil in 1424, but his conquests were soon checked by Joan of Arc. He died at Rouen Sept. 19, 1735. His memory is stained by his abetting the murder of Joan of Arc. (See Hume, "History of England.")

Bedford Level, or **The Fens,** a tract of flat land in the eastern part of England, is bounded on the E. by the German Ocean, and comprises parts of Huntingdon, Northampton, Cambridge, Lincoln, Norfolk, and Suffolk. Its inland boundary is a range of highlands in the form of a horseshoe. Nearly all the marshy district called The Fens is included in the Bedford Level, which is intersected by the Cam, Ouse, Nene, and Welland rivers. It was formerly a vast morass, and was named in honor of Francis, duke of Bedford, who in 1634 undertook to reclaim it, and expended £100,000 in draining it. The work was completed

by his son, William, duke of Bedford, who spent £300,000 on it. This tract now produces good crops of grain and flax, and grass for pasture. Its drainage has been improved in the present century.

Bed'fordshire, an inland county of England, bounded on the N. E. by Huntingdon, on the E. by Cambridge, on the S. E. and S. by Hertford, on the S. W. by Bucks, and on the N. W. by Northampton. Area, 463 square miles. The surface is undulating or nearly level, except the Chiltern Hills in the S. part. The principal river is the Ouse. The southern part of the county consists of chalk, thinly covered with a soil which is fit only for sheepwalks. Stiff clay and rich loams occur in other parts of the county, which is more exclusively agricultural than any other in England. There are some manufactures of straw hats and of lace. Capital, Bedford. Pop. in 1871, 146,256.

Bedford Springs, Bedford co., Pa., are 1 mile from Bedford, yield valuable medicinal water, and are also attractive from their cool climate in summer, their pleasant mountain-scenery, and their agreeable society. The springs are—Anderson's (saline chalybeate), the Sweet Spring (nearly pure), the Sulphur, the Chalybeate, Fletcher's (saline chalybeate), and the Limestone. The waters are generally laxative and tonic, and act upon the skin and kidneys.

Bed'lam, a corruption of **Bethlehem,** which was the name of a religious house in London converted in 1547 into a hospital for lunatics. When Henry VIII. suppressed the religious houses, one of these, coming into the control of the corporation of London, was converted into an asylum for the insane. In 1814 the insane patients were removed to a new asylum in St. George's Fields, which has good accommodations for almost 500 patients, and is managed in an excellent manner. Bedlam is sometimes used as synonymous with a mad-house, or a place of uproar and disorder.

Bed'loe's Island, in New York harbor and in the city of New York, 1½ miles S. W. of the Battery. It was named from a former owner. In 1800 it was ceded to the U. S. government, and in 1841 Fort Wood, mounting seventy-seven guns, was erected upon it. Pop. 97.

Bedmar', de (Alfonso de la Cueva), Marquis, a Spaniard, born in 1572. He was sent as ambassador to Venice by Philip II. in 1607, and formed a daring and nefarious plot to betray the Venetian city and state into the power of the king of Spain. The plot was detected one day before that appointed for its execution, and Bedmar was expelled from Venice. He became a cardinal in 1622, and died in 1655. His conspiracy is the subject of Otway's "Venice Preserved." (See Daru, "Histoire de Venise;" Saint-Real, "Conspiration contre Venise.")

Bed'minster, a township of Somerset co., N. J. Pop. 1881.

Bedminster, a post-village and township of Bucks co., Pa., 38 miles N. of Philadelphia. Pop. of township, 2370.

Bedos de Celles (Jean François), a French Benedictine monk, born at Caux in 1706. He made several good organs at Toulouse, and wrote a work called "L'Art du Facteur d'Orgues" (4 vols., 1770), which is highly commended. Died in 1779.

Bed'ouin, or **Beduin,** written also **Bedaween** and **Bedawee** ("inhabitants of the desert"), nomadic Arabs who are, according to tradition, the descendants of Ishmael and the aborigines of Arabia. They are a pastoral people, having no houses but tents, and no permanent places of residence. They form the greater portion of the population of Arabia, but are not confined to that country. Though they are not united by a strong national organization, they have never been entirely subjugated by any foreign conqueror, as the desert into which they can retreat forms an almost insuperable obstacle to an invading army. They are now widely distributed over Northern Africa, Syria, etc. As they have no general government or political institutions, religious traditions and customs form the only bond of order and union among them. They are divided into tribes, each of which is ruled by a sheik, whose authority is patriarchal. Their riches consist chiefly in flocks of sheep, camels, horses, goats, etc. They are ignorant, fierce, depraved, addicted to robbery and fighting, and reckless of the rights of property. They profess the Mohammedan religion, but are not very strict in the practice of its discipline. Their complexion is brown of various shades. In person they are generally lean, sinewy, and active. An admirable picture of Bedouin life and character may be found in Palmer's "Desert of the Exodus," 1871.

Bed'straw (*Ga'lium*), a name of a genus of herbaceous plants of the order Rubiaceæ, distinguished by a wheel-shaped corolla, and a fruit which is dry or fleshy, 2-lobed, separating when ripe into two seed-like, indehiscent, 1-seeded carpels. It comprises numerous species, natives of Europe, Asia, and the U. S. The roots of several species, as *Galium verum, Galium tinctorium,* etc., contain a red coloring-matter which is said to be equal to madder. The *Galium verum,* which is a common weed in England, is sometimes called cheese rennet, because it has the property of curdling milk. It is naturalized to some extent in the U. S. The *Galium tuberosum* is cultivated by the Chinese, who eat its farinaceous roots. *Galium Aparine,* or cleavers, is a valuable diuretic.

Bee [Gr. μέλισσα; Lat. *apis;* Fr. *abeille;* Ger. *Bie'ne*], the name of a large family of insects of the order Hymenoptera. All bees were included by Linnæus in the genus *Apis,* but they are now divided into many genera. The name Apiaria is now used to include the entire family, which has also been styled Anthophila ("flower-loving") and Mellifera ("honey-producing") by different naturalists. The insects of this extensive family, when in their perfect state, feed on saccharine juices, such as the nectar of flowers, honey, and the juice of ripe fruit. The honey-bee, on account of the large quantities of honey which it collects and stores, has attracted the attention of man in all countries, and has been celebrated for its remarkable habits in both ancient and modern times. A late writer justly remarks: "That within so small a body should be contained apparatus for converting the various sweets which it collects into one kind of nourishment for itself, another for the common brood, a third for the royal brood, glue for its carpentry, wax for its cells, poison for its enemies, honey for its master, with a proboscis as long as the body itself, microscopic in several parts, telescopic in its mode of action, with a sting so exceedingly sharp that were it magnified by the same glass which makes a needle's point seem a quarter of an inch, it would yet itself be invisible, and this, too, a hollow tube,—that all these varied operations and contrivances should be included within half an inch of length and two grains of matter is surely enough to crush all thoughts of atheism and materialism."

This small insect has doubtless excited more admiration than any other individual of the whole animal creation, except man himself, and, with the exception of the silkworm and cochineal, is almost the only insect of any commercial value. Professor Jaeger remarks: "It is impossible for any reflecting person to look at a bee-hive in full operation without being astonished at the activity and surprising industry of its inhabitants. We see crowds constantly arriving from the woods, meadows, fields, and gardens, laden with provisions and materials for future use, while others are continually flying off on similar collecting expeditions. Some are carrying out the dead, others are removing dirt and offal, while others are giving battle to any strangers that may dare intrude. Suddenly a cloud appears, and the bees hurry home, thronging at the entrances to the hives by thousands, until all are gradually received within their enclosure. In the interior of the hive we see with what skill they work their combs and deposit the honey; and when their labor is over for the day, they rest in chains suspended from the ceiling of their habitation, one bee clinging with its fore feet to the hind feet of the one above it, until it seems impossible that the upper one can be strong enough to support the weight of so many hundreds."

Every swarm is composed of three different kinds or classes—the queen, the workers, and the drones. The

Fig. 1. Fig. 2. Fig. 3.

Drone. Worker. Queen.

"queen" is the only perfect female in the hive, and during the propagating season lays from one to two thousand eggs in a day. She is longer than either the drones or workers, but her size in other respects is a medium between the two; in color darker on the upper side, with legs and under side yellowish. When the season for swarming approaches, which is always early in the season (usually June in our Northern States), she deposits eggs, first for the workers, then in drone and queen cells, from which males and queens are developed. There seems to be no difference between the eggs for producing a worker or a queen, but the nature of the cell and the food effects the difference. The queen lives much longer than any other bee, or often four or five years, although this longevity is disputed by some writers

on theoretical grounds, but observation appears to have fully established the age to be from three to five years. She is furnished with a sting, which she uses exclusively in combat with other queens.

It was well known in ancient times that a large bee with long body and short wings existed in every hive, and this was called the "king," to whom also was attributed great wisdom in governing the whole swarm. This opinion was common till within two hundred years, when Swammerdam proved by anatomical investigation that this supposed king was a female, which lays all the eggs for the multiplication and growth of the throng of individuals which she governs. Aristotle and Virgil held the opinion that this bee laid no eggs, but brought home from flowers and fruits a peculiar substance from which first the maggots and then the bees originated.

The best way of making the acquaintance of the queen is to divide a swarm and place each portion in separate hives. The portion which retains possession of the queen will soon become quiet and contented. The swarm without the queen, although apparently satisfied at first, will soon be restless and uneasy, and cease working. Then if the apiarian (who has previously provided himself with an extra queen taken from the queen-cells of a hive) offers them a queen, they receive her with a peculiar buzz of triumph, which is quickly conveyed like a telegraphic despatch through the hive, and in a few seconds they become quiet and satisfied. In order to prove that bees always follow the queen, Swammerdam tied one by means of a fine hair to the top of a pole, which he then stuck in the ground in his garden. The whole swarm immediately followed, and surrounded the queen on all sides, and he was enabled to carry them all wherever he pleased. It is in this way that certain self-styled "bee-charmers" cause the swarm to alight on the hat, beard, or other place, by securing the queen within a gauze bag or cage.

The worker-bees are imperfect or undeveloped female bees, comprising most of the hive, usually nine-tenths or more, and commonly twelve or fifteen thousand in a single hive. All the labor is performed by the workers; they gather all the honey, bee-glue, and pollen, carrying the latter in little baskets on their thighs, and the former in a little sack; they secrete wax from honey, construct the combs, feed the young, and clean the hives. They usually live about six months through the winter, and not more than two or three months during the working season. A hive is therefore a community renewed repeatedly through the year, the queen only seeing successive seasons, and on her producing many thousands of eggs the existence of the colony depends. When deprived of a queen from accident or death the hive soon dwindles and dies out.

The drones are the male bees of the hive. They have no sting, they do no work, and their only use is in the propagation of progeny. Huber, the celebrated blind naturalist of Geneva, in Switzerland, who made more discoveries of the habits of the bee by means of an assistant than any other person, asserted that the drones while on the wing meet the queen for this purpose, and this opinion is commonly adopted, but other writers think the drones only fecundate the eggs after they are deposited, in the same manner that male fishes fructify the spawn. They are larger than the working bee, have a rounder head, and are generally more clumsy in their movements. They are destroyed by the workers soon after the close of the honey season.

Bees begin to breed early in spring, and they have usually increased their numbers greatly by the month of June. After the queen has deposited eggs, it requires about twenty-two days before the worker comes out a perfect insect, and about twenty-five days for the drone. The time for the development of the queen is only sixteen days from the laying of the egg. The egg is fastened by one end to the bottom of the cell, so that it appears as if suspended in the air. It is soft and smooth, and five times as long as thick. It is first developed into a maggot which has little motion, with two white eyes, a mouth like a caterpillar, and ten respiratory holes on the sides. The maggot is fed by the workers for about a week, after which a wax cover is placed over the cell, and it becomes a pupa, remains ten days in this condition, and then breaks its wax cover, creeps out, dries its wings, and in a short time passes out of the hive, and flies away with its companions for the collection of honey and materials.

The first swarm, in the climate of the Northern and Middle States, usually leaves the hive in the month of June. The migration seems to depend in a great measure on the want of space in the mother-hive, and not on an instinctive desire for change; for skilful apiarians sometimes, by making additions to the hive, retain the increase and prevent swarming. No certain signs have been discovered to indicate the time when the first swarm will issue from the parent hive. If the weather and yield of honey are both favorable, swarming may be looked for when the bees become crowded for room and hang in large numbers outside the hive (although this often takes place without swarming), and when the hive is well filled with comb and stores. The indications are increased if it is found on examination that the royal cells for new queens are in a forward state of preparation. The old queen invariably leads forth the first swarm, usually in the heat of the day, and if rainy weather has occurred the swarming is more likely to occur on the appearance of bright sunshine. It is supposed that the queen takes the lead, and it is certain that the swarm always keeps with her, and she exercises an inscrutable influence over all the movements of the thousands which compose it. Wherever she alights they follow, and if from any cause she returns to the old hive, they all return with her.

In about nine days from the first swarming a second may be looked for, if the swarm is a strong one and the weather and honey-harvest are favorable. If a third swarm should follow, it is commonly about three days after the second. The occurrence of these two swarmings may be commonly determined with accuracy by what is termed "the piping of the queen." The apiarian places his ear near or against the hive in the evening of the seventh or eighth day, and if a second swarm is to issue he will hear a peculiar whining and peeping note within the hive. The whining sound comes from the new queen which has been left to reign by the departure of the old one; and this sound is commonly followed by a lower and quicker note from the third queen, who is to remain when the second queen quits the hive with her swarm. As this insect sovereign appears to be impelled by strong jealousy of all rivals, she endeavors to sting to death in their cells all the young queens which the workers have been feeding; and when restrained by the guard placed for their protection, it is supposed that she utters a complaint known as "piping." This is probably a fanciful supposition; but every one who has listened attentively to these sounds has been struck with the strong resemblance which the notes of the older queen bear to the tone of complaint, and those of the younger to that of defiance. Whenever these notes are heard, which is always a week or so after the departure of the first swarm, the apiarian confidently expects a second or a third, as the case may be, within a day or two, the weather permitting and no accident supervening.

The swarming of the first colony usually takes place between the hours of ten A. M. and three P. M., but second and third swarms often leave earlier or later in the day. The bees issue by many thousands, and the air is filled with them for a space of from twenty to fifty feet as dense as a snow-shower. In a short time they settle, usually on the limb of a tree, from which they hang in the form of a bag. To prevent their alighting too high up for hiving, it is best to have no high trees near the apiary, and hiving may be greatly facilitated by providing artificial supports to attract them. These are made in many different ways, all with the same object in view. A block of wood, cut in the shape of a bag or settled swarm, may be covered with dark-brown or black cloth, and hung by a hook in a convenient shady place in sight of the hives as a decoy. A few dead bees, or a portion of the seed-stalks of the mullen, strung to the block, increase the attractions. A number of these may be placed in different parts of the yard. When the swarm has settled, the support may be unhooked and carried carefully to the place for hiving, and the bees shaken off on the hiving-board. Another contrivance is the hiving-box, consisting simply of any box holding nearly half a bushel, with one side open, and attached to a pole. When the swarm comes out, the operator takes his box by the handle or pole, the box being held over his head, and walks slowly in the midst of the flying swarm. They will be likely to alight upon it and enter its open side. As soon as this takes place, it is put in a fixed position, resting against a fence, or with the pole thrust into a hole made with a crowbar by an assistant. When the bees have all settled, it is carried to the hive already prepared for the new swarm. A third contrivance is made by taking a board about the size of the bottom of the hive, boring several holes and inserting corn-cobs dyed brown or the seed-stalks of the mullen, nailing a smaller board at the top to form a hood, and attaching it by nails to a pole eight or ten feet long. When the bees begin to alight upon it it is placed, facing downward, in a sloping position in a crowbar hole, as already mentioned. A broad projecting board, inserted under the hive intended for the swarm, allows the operator to empty the bees upon it, from which they will readily pass in. When the bees have entered the board is withdrawn. The whole process is usually completed in a few minutes. If the swarm should not enter the hiving-box, but alight on some tree, the box is to be held against the spot as soon as they begin to cluster, when they will usually leave the tree and pass into the box;

or if they do not, a few jars with the side of the box will induce them to loosen their hold and enter it. The operation is easily performed, and only a minute or two is occupied in their clustering. It is well to have one or two boxes with longer poles, to secure such swarms as settle too high up for ordinary reach. The weight of swarms is usually five or six pounds, small ones four pounds, and very large ones eight or ten pounds.

The loss of newly-hived swarms, occasioned by their leaving the hive, which frequently happens under ordinary management, may be prevented by simply placing the hive flat on the bottom board for a few days, after which it may be raised on supports at the corners a third of an inch, as is always practised with established swarms. Another effectual mode is to contract the entrance to a breadth of exactly ten sixty-fourths of an inch, which allows the workers to pass, but confines the queen. Without her the bees will never leave. A strip of tin may be tacked on for this purpose, to be removed in three or four days.

Hives.—The first or original hives selected by the bees were the hollow trunks of trees, which they cleansed from dust and rubbish, gnawing off with their mandibles any asperities or projections which might interfere with the future construction of the comb. Next, they were made artificially somewhat of a bell-shape, and constructed of straw and willow twigs; and lastly in the form of oblong or cubical boxes, with various modifications and appendages. For small apiaries, when the owner desires honey simply for home consumption, and can give only occasional attention, a simple box-hive with holes through the top, and a simple rough box to hold twenty-five or thirty pounds to set over, answers a good purpose. The size of the hive should not exceed a capacity of 2000 cubic inches; it should be smaller rather than larger, and some good apiarians prefer 1700 or 1800 cubic inches, or about twelve inches each way inside. Sticks are set across for the support of the combs. It is convenient to have a pane of glass set in one side, covered and kept shut by a wooden door, for occasional examination of the interior. If *guide-combs* (or small portions of empty combs) are attached to the ceiling of the hive, the combs may be so directed that their edges will rest against the glass, and enable the operator to see between them.

If the honey which is obtained from the upper movable box is made in small glass boxes placed within this upper box, or in a corresponding chamber made in the upper portion of the hive, it will present a finer appearance and sell at higher prices in market. This chamber may be entered by a side door, and four boxes may be placed within it.

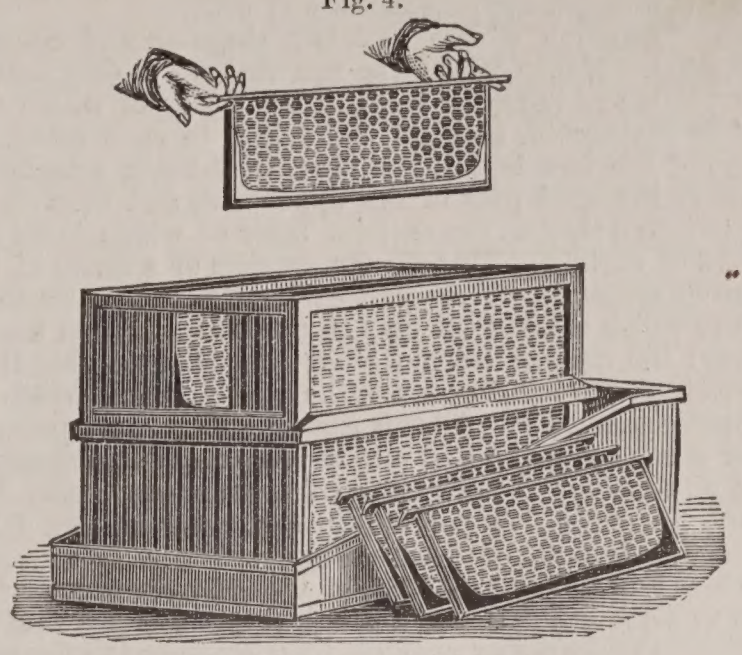
Artificial Swarms.—It often happens that the apiarian wishes to control the time and frequency of swarming, without leaving the bees themselves to decide this question at their own will. This is effected by making artificial swarms. The bees of the hive are separated into two nearly equal portions, as already alluded to, and the apiarian, having previously secured a new queen by cutting off a queen cell when she is about to come out, offers her to the unsupplied portion.

In performing all operations of this kind the bees will be rendered more quiet, and they may be handled more easily, by previously blowing upon them the smoke of rotten wood through a pipe made for the purpose. Cotton rags answer the same purpose, but tobacco smoke is too deadly. In addition to this a mask of gauze and thick gloves will afford ample protection.

Movable-comb Hives.—Apiarians who have a large number of hives for commercial purposes, who can give much personal attention, and who do not fear to approach and handle bees freely, have adopted of late years a contrivance known as movable-comb hives. These hives enable the owner to examine minutely every part of the interior, and any evil is readily discovered and remedied, each comb being made on a separate frame, which may be lifted out from the rest. If the hive should happen to be queenless, the fact may be at once determined without waiting till the numbers are ruinously reduced. Should the queen produce nothing but drones, the discovery may be at once made, and her place supplied with a more profitable incumbent. If too much drone-comb has been made, it may be replaced with worker-comb. If the moth has effected an entrance, the larvæ may be seen and at once taken out. He can limit the number of swarms, by taking out the combs and removing all the queen cells but one. When one hive has a surplus of honey and another is deficient, an equilibrium may be effected by exchanging a few combs. Old combs may be removed, all that is necessary being to substitute empty frames. Movable-comb hives greatly facilitate the making of artificial swarms.

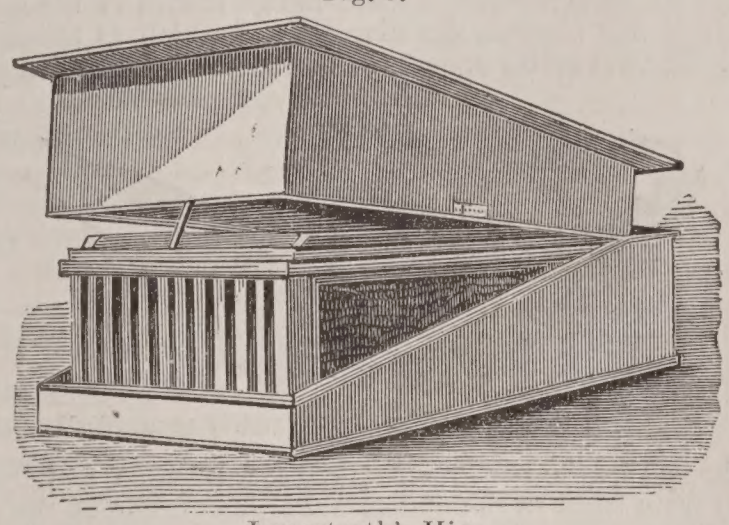
The simplest form of the frame for the movable comb is shown by Fig. 4. Guide-combs are attached to the bars to have the bees work them straight. Langstroth's hive (Fig. 5) consists of a series of these frames, so arranged that any one may be taken out separately from the rest. Many other forms of the movable-comb hive have been

Fig. 4.



Movable frames taken out.

Fig. 5.



Langstroth's Hive.

lately devised, obviating difficulties connected with those first made.

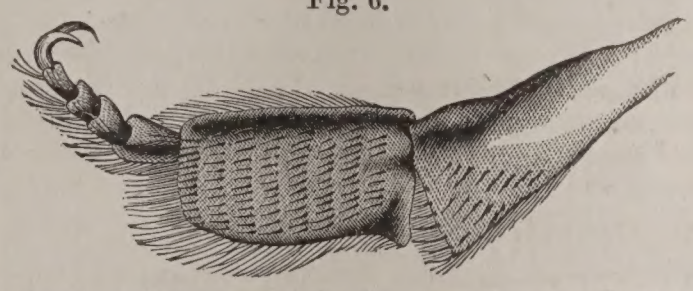
The following detailed description of the mode of making artificial swarms by the use of movable-comb hives is given by L. L. Fairchild in vol. iv. of "Rural Affairs." *Artificial swarms*, equal in value to natural swarms, can be made in this way. It should only be practised when the bees are gathering honey abundantly, and there are plenty of drones to mate with the young queens. A little before, or about the time of natural swarming, is the time to practise it. A good way is to make one good swarm from two strong stocks. Take the combs from a hive (No. 1), and shake the bees back into the hive, brushing off with a wing any that may remain after a shake or two. Put these combs, destitute of bees, into a new hive. Leave one comb, containing eggs and brood, and the queen, in the old hive. Put in empty frames to fill the place of those taken out, and leave the hive on its old stand. Remove a strong stock (No. 2) to a new location, and put the hive containing the combs taken from No. 1 on the stand formerly occupied by No. 2. If this is done while the bees are in full flight, those in the field belonging to No. 2 will enter the new hive containing the combs, brood, and stores taken from No. 1. Finding their queenless condition, they will immediately set to work and build queen cells, and, if everything works right, will have a queen ready to emerge from her cell the fourteenth day. Plenty of brood will hatch from day to day to keep up the strength of the swarm until the young queen commences laying. The old stock will prosper, as it retains its fertile queen, and is in nearly the condition of a natural swarm. If a few frames containing empty comb could be given to them, it would be a great help, as every pound of comb they build consumes fifteen or twenty pounds of honey in its elaboration. There are many other ways of making artificial swarms, but this is about the safest method for the inexperienced, and produces a moderate increase of stocks, and yields a good supply of surplus honey. It will be found very safe, and profitable in the long run. The inexperienced had better not divide or increase their stocks more than fifty per cent. in any one year. Too great an increase of stocks is the rock that many an apiarian has split upon when endeavoring to increase his apiary by artificial swarming. There is a considerable saving to be made by rearing queens artificially to supply every new artificial swarm, but it should only be attempted by those well versed in the natural history and management of the bee. If you give the

new swarm a sealed queen cell, it will save them time in rearing a queen.

As soon as a hive is occupied by a new swarm the first thing is to begin the manufacture of cells.

The formation of the wax is a singular and complex operation. Huber says, "The wax-makers, having taken a due portion of honey or sugar, from either of which wax can be elaborated, suspend themselves to each other, the claws of the fore legs of the lowermost being attached to those of the hind pair of the uppermost, and form themselves into a cluster, the exterior layer of which looks like a kind of curtain. This cluster consists of a series of festoons or garlands, which cross each other in all directions, and in which most of the bees turn their back upon the observer: the curtain has no other motion than what it receives from the interior layers, the fluctuations of which are communicated to it. All this time the nurse-bees preserve their wonted activity, and pursue their usual employments. The wax-makers remain immovable for about twenty-four hours, during which period the formation of wax takes place, and thin laminæ of this material may be generally perceived under their abdomen. One of these bees is now seen to detach itself from one of the central garlands of the cluster, to make a way amongst its companions to the middle of the vault or top of the hive, and by turning itself round to form a kind of void, in which it can move itself freely. It then suspends itself to the centre of the space which it has cleared, the diameter of which is about an inch. It next seizes one of the laminæ of wax with a pincer formed by the posterior metatarsus and tibia, and drawing it from beneath the abdominal segment, one of the anterior legs takes it with its claws and carries it to the mouth."

Fig. 6.



Brush and Pincers of the Bee (greatly magnified).

The wax has, perhaps, a nearer analogy to the sebaceous secretion of the integument than to any other animal secretion: it is formed beneath the scales on the under side of the abdomen, and, when accumulated there, seems to irritate the part, for the bee may then be observed wagging her body, and running round, or to and fro, as if endeavoring to shake out the little scales; and she is generally followed by one or two other bees which have been attracted by her movements, and are ready to seize upon the plates of wax as they fall. How the bees mould the scales into the walls of the cells is not yet exactly understood. Some have supposed that they bite pieces off and join them together; but the smooth and uniform surface of the cell shows that some other operation must take place: besides, the wall of the cell is sometimes thicker than a scale of wax. We must, therefore, suppose that the bees have the power of applying some dissolving or softening menstruum to the wax scales, by which they are enabled to knead and blend them into a ductile paste. And when we remember that the secretion of the salivary tubes of insects is generally alkaline, and that wax may be softened by alkali, it has been naturally supposed that it is by this means that the wax-scales are brought into a workable state. Reaumur, indeed, observed a frothy substance exuding from the mouth of a bee while working at a cell, which was applied to the proper place by the nimble tongue, and then kneaded in by the mandibles; and Huber has described the process very circumstantially: he says that the bee holds the laminæ of wax with its claws vertically—the tongue rolled up serving for a support—and by elevating or depressing it at will causes the whole of its circumference to be exposed to the action of the mandibles, so that the margin is soon gnawed into pieces, which drop, as they are detached, into the double cavity, bordered with hairs, of the mandibles. These fragments, pressed by others newly separated, fall on one side of the mouth, and issue from it in the form of a very narrow ribbon. They are then presented to the tongue, which impregnates them with a frothy liquor. During this operation the tongue assumes all sorts of forms: sometimes it is flattened like a spatula: then like a trowel, which applies itself to the ribbon of wax; at other times it resembles a pencil, terminating in a point. After having moistened the whole of the ribbon, the tongue pushes it so as to make it re-enter the mandibles, but in an opposite direction, where it is worked up anew. The liquor mixed with the wax communicates to it a whiteness and opacity which it had not before, and doubtless gives it that ductility and tenacity which it possesses in its perfect state.

Fig. 7.

Bee seen from below, with its ventral segments of wax (magnified).

Bees commonly begin at the top or roof of their chamber, and build downward, at first working irregularly, and as it were pasting over the surface, and then building horizontal cells of a more perfect form. These at length become so numerous that they extend downward in the form of a vertical wall; other congeries of cells are formed in succession, until the whole comb assumes the form of a series of perpendicular plates or partitions. Each plate consists of a double set of cells, the bottoms of which are applied to each other and form the partition between each set. The plates are not always regular, and the irregularities which may be observed are not always necessary adaptations to a peculiar form of the cavity in which they are built. The cells are not all of the same size, but a sufficient number of a given depth are reserved for receiving the eggs, and which are necessarily adapted to the size of the future maggot: the smaller or shallower cells are those in which the honey is stored. The breeding and store cells are placed horizontally, but the mouth of the cell is sometimes a little raised, the better to retain the honey. The interspace between the vertical combs is generally about half an inch; these streets, as they may be termed, in this city of industry, being just wide enough to allow two bees busied upon the opposite cells to pass without incommoding each other. In addition to these interspaces, the combs are perforated in various places, so as to allow a passage for the bees from one street to another, thus saving them much time.

The shape of each cell is not, as might have been expected, cylindrical, or that which seems best adapted to the form of the maggot, or even of the constructor bee; but it is hexagonal—the only form which allows the cell to be of the largest size in proportion to the quantity of matter employed, and at the same time to be so disposed as to occupy in the hive the least possible space. The form of the base of each cell, which is in apposition with the one on the opposite side, is also such as to gain greater strength, and more capacity, with less expenditure of wax; the latter consideration being one of great importance to bees, which do not secrete a very large quantity of this material; and the most profound mathematicians and most skilful geometers have found the solution of the problem, relating to the attainment of the preceding objects, as derived from the infinitesimal calculus, to have a surprising agreement with the actual measure of the different angles formed by the walls of the cell.

Bees do not gather honey indiscriminately from every flower. The oleander, which yields poisonous honey fatal to thousands of flies, is carefully avoided by bees, and the white nectaries of the crown-imperial tempt them in vain. The flowers of the white clover and of the basswood are especially attractive to them, and their hum may be heard among the branches of the latter at a considerable distance. Those flowers which yield a nectar innocuous to the bees themselves, but possessing poisonous qualities when taken by man (among which may be mentioned the *Kalmia latifolia*), are sometimes frequented by bees, and the honey derived from them acts like a poison.

The collection of the farina or pollen of flowers is a great object of the industry of bees. In large flowers, as the tulip, the bee dives in; and if the pollen receptacle or anther be not burst, she bites it open, and comes out singularly disguised, being covered over entirely with the fertilizing

dust, which adheres readily to the fringed hairs of her body and legs.

Aristotle, who was well acquainted with much that is interesting in the economy of the bee, was the first to observe that a bee during each single excursion from the hive limits her visits to one species of flower. Modern naturalists have confirmed the general accuracy of this statement, and have noticed that the pollen with which a bee comes home laden is always of the same color. The necessity of this instinct arises out of the operation which the pollen first undergoes when collected by the bee. She rakes it out with incredible quickness by means of the first pair of legs; then passes it to the middle pair, which transfer it to the hind legs, by which it is wrought up into little pellets. Now, if the pollen were taken indiscriminately from different flowers, it is probable that the grains, being heterogeneous, would not cohere so effectually. Certain it is, that bees enter the hive, some with yellow pellets, others with orange, pink, white, or even green-colored ones, but they are never observed to be party-colored. Through this instinct, another important end is gained in relation to the impregnation of flowers; the production of hybrid plants by the application of the pollen of one species to the stigma of another is avoided, while those flowers are more effectually fertilized which require the aid of insects for that purpose.

When a pollen-laden bee arrives at the hive, she generally walks or stands upon the comb beating her wings, and three or four of her fellow-citizens assist in lightening her of her load; or the laden bee puts her two hind legs into a cell, and with the intermediate pair or the extremity of the abdomen brushes off the pellets. These are then kneaded into a paste at the bottom of the cell, and several cells are thus filled with the packed and softened pollen, which is called bee-bread.

Besides the honey and farina, bees also collect a peculiar substance like gum-resin, which was called "propolis" by Pliny; and this they obtain principally from the balsamic buds of the horse-chestnut, birch, and poplar, especially the *Populus balsamifera*. The propolis is soft, red, will pull out in a thread, and is aromatic. It is employed in the hive not only in finishing the combs, but also in stopping up every chink or orifice by which cold, wet, or any enemy can enter. Like the pellets of pollen, it is carried on the posterior tibiæ, but the masses are lenticular. Having thus traced the operations of the working bees relating to the collection of the substances required in the economy of the hive, we shall now return to the larvæ, which are the immediate objects of all this industry.

The bees may be readily detected feeding the young maggot, which opens its lateral jaws to receive the bee-bread, and swallows it. The well-fed maggot soon grows too large for its tough outer skin, and accordingly casts it; when its bulk has increased so that it fills its cell, it then requires no more food, and is ready to be enclosed for the chrysalis state. The last care of the foster-parents is to cover over the mouth of the cell with a substance of a light brown color, apparently a mixture of wax and farina. This takes place generally four days after the larva has been excluded from the egg. The enclosed larva now begins to line the cell and the covering of the aperture before mentioned with a silk, which it spins from glandular tubes similar to those of the silkworm. When the first three segments of the trunk to which the locomotive organs of the perfect insect are attached begin to be enlarged, the last larva-skin splits along the back, and is pushed off from the head backward, and deposited at the bottom of the cell, and it then becomes a chrysalis. Now the wonderful changes take place, partly by a formation of new organs, partly by a development of pre-existing ones, which end at last in the completion of the perfect bee.

Bees, although inactive during winter, are not in a torpid state, but continue to devour honey and to maintain their animal warmth.

Mr. Hunter found during an evening in July, when the temperature of the atmosphere was 54° Fahrenheit, that of the interior of a hive full of bees was 82°; and in December, the external atmosphere being 35°, the bees preserved a temperature of 73°; and, what is at this season extremely rare in the lower animals, they maintain their digestive powers and subsist on the produce of the summer and autumn. Accordingly, they are ready to take advantage of any fine or mild day, and may be seen then flying abroad and appearing to enjoy it. They void their excrements at this time, for they are insects of singular cleanliness and propriety; and when purposely confined in the hive, with abundance of food, they have been known to fall a sacrifice to this instinctive repugnance to defile the hive.

In conclusion, we may remark that the keeping and management of bees was formerly considered as very precarious and uncertain. But modern science, and the various improvements which it has effected, have made the business in practised hands as certain and successful as most agricultural pursuits. Full, populous stocks only are profitable. A weak hive will cost many times the care required for a strong one, and pays nothing back. When many hives are kept, a few spare combs on movable frames, with sealed brood, may be introduced into a weak hive. Facilities for examining and controlling are the foundation of success. As with other kinds of business, the management of bees requires attention, vigilance, and industry, combined with a knowledge of the natural history of the insect.

The Italian bee, which has been introduced of late years, is distinguished from the common bee by the yellow bands on its body and by its more vigorous habits. It commences working earlier in the morning, and continues at work later in the evening. It has a longer proboscis, which enables it to take honey from the red clover. When properly managed, it has furnished large stores of honey, but apiarians are not fully agreed as to its general value and adaptation to common management, and some years will probably be required to settle the question. JOHN J. THOMAS.

Bee (BARNARD E.), a Confederate general, born in South Carolina 1824, graduated at West Point 1845 in the artillery, and served with distinction throughout the Mexican war (wounded at Cerro Gordo), his gallant conduct being recognized by his native State by the presentation of a sword of honor. He was on frontier duty principally from 1848 to Mar. 3, 1861, when he resigned, and was appointed a brigadier-general in the Confederate army. At the first battle of Bull Run, July 21, 1861, he was killed.

Bee, a county in the S. part of Texas. Area, 900 square miles. It is drained by the Aransas River, which rises within its limits, and is bounded on the N. E. by Blanco River. The surface is nearly level. The climate is healthful. Cattle and sheep are bred in great numbers. The soil is sandy, and wood and water are scarce. Capital, Beeville. P. 1082.

Bee Branch, a township of Chariton co., Mo. P. 1593.

Beech [Ger. *Buche*], (*Fa'gus*), a genus of trees of the order Cupuliferæ, natives of Europe, America, and Australasia. The sterile flowers have a bell-shaped calyx five to seven cleft, with eight to sixteen stamens. The fertile (or female) flowers grow on the same tree, the fruit of which is a triangular or sharply three-sided nut, two of which are enclosed in an urn-shaped, coriaceous involucre or husk. These nuts, called beechmast, are edible, and are valuable as food for swine. They yield a large proportion of a bland fixed oil which is used as food and burned in lamps by Europeans; the husks contain a volatile, narcotic, poisonous principle called *fagine*. The genus comprises several species of beautiful forest trees, with a close and smooth ash-gray bark and a light horizontal spray. The *Fagus sylvatica*, or common beech of Europe, forms whole forests in many parts of that continent. It grows to the height of about 100 feet, and sometimes has a diameter of four feet, and is a very ornamental tree, especially when it stands alone. The wood is hard and valuable for fuel, and, being durable under water, is employed in the erection of mills. The French use it extensively in the fabrication of *sabots* or wooden shoes. The white beech, which is a common tree in some parts of the U. S., is, according to some botanists, the same species as that which has been just described. The *Fagus ferruginea* (red beech or American beech) is abundant in the Northern U. S., sometimes growing gregariously in forests which contain few other trees. Its leaves are oblong-ovate, taper-pointed, distinctly and often coarsely toothed or serrate. This is an ornamental tree, which sometimes attains a height of 100 feet, and surpasses most trees in the depth of shade produced by its rich green and shining foliage. The wood is hard, heavy, good for fuel, plane-stocks, shoe-lasts, tool-handles, and other purposes. The color of the wood is a light brown or reddish; hence the name. Among the other species is the myrtle tree of Tasmania (*Fagus betuloides* or *Fagus Forsteri*), a very large and ornamental tree, with evergeen and coriaceous leaves, which resemble birch leaves in form. *Fagus procera*, which attains a lofty stature in the Andes of Chili, is a valuable timber tree. The *Fagus antarctica* is a characteristic tree or shrub of far antarctic regions, and is said to be found farther S. than any other shrub.

C. W. GREENE.

Beech Creek, a post-township of Ashley co., Ark. Pop. 269.

Beech Creek, a township of Clarke co., Ark. P. 448.

Beech Creek, a township of Greene co., Ind. P. 2059.

Beech Creek, a post-borough and township of Clinton co., Pa., 80 miles N. N. W. of Harrisburg. Pop of township, 887; of borough, 384.

Beech Drops. See EPIPHEGUS.

Beech'er (Catherine Esther), an American writer, a daughter of Lyman, noticed below, was born at East Hampton, Long Island, Sept. 6, 1800. She published, besides other works, "Domestic Service," "Treatise on Domestic Economy," "True Remedy for the Wrongs of Women," "Manual of Arithmetic," "Elementary Book of Instructive Theology," "Physiology and Calisthenics," and "Common Sense applied to Religion."

Beecher (Rev. Charles), a preacher and writer, a brother of the preceding, was born at Litchfield, Conn., in 1810. Among his works are a "Review of Spiritual Manifestations" (1853) and "Pen-Pictures of the Bible" (1855).

Beecher (Edward), D. D., a brother of the preceding, was born in 1804. He graduated at Yale in 1822, was president of Illinois College from 1831 to 1844, and pastor of Salem Street church, Boston, from 1846 to 1856. He published "The Conflict of Ages" (1856) and other works.

Beecher (Henry Ward), a celebrated American author and divine, son of Dr. Lyman Beecher, noticed below, was born at Litchfield, Conn., June 24, 1813. At an early age he had a strong predilection for a seafaring life, which, however, he renounced in consequence of the deep religious impressions which he experienced during a revival. Having graduated at Amherst College in 1834, he devoted himself to the study of theology at Lane Seminary under the tuition of his father, who was then president of that institution. He became in 1847 pastor of the Plymouth (Congregational) church in Brooklyn, where his genial and original eloquence has continued to attract the largest congregation, it is said, in the U. S. He was editor of the "Independent" from 1861 to 1863, when he visited Europe for the benefit of his health. His earnest addresses to large audiences on the subject of the American war appear to have had considerable influence in turning the current of public opinion in Great Britain in favor of the Union cause. Mr. Beecher has also been a prominent advocate of anti-slavery and temperance reform, and more recently of the rights of women. Among his principal works are "Lectures to Young Men" (1850), "Star Papers" (1855), "Life Thoughts" (1858), "Royal Truths" (1864), and a novel entitled "Norwood" (1864). He became editor of the "Christian Union," a religious journal, in 1870, and the next year issued a "Life of Christ."

Beecher (Lyman), D. D., an eminent American theologian, born at New Haven, Conn., Oct. 12, 1775. He graduated at Yale College in 1797, studied theology under President Dwight, and became in 1810 minister of the Congregational church at Litchfield, Conn. He was a popular preacher, and acquired great influence among the orthodox churches. To oppose the rapid progress of Unitarian doctrines he removed to Boston about 1826, and preached in the Hanover Street church. He was president of Lane Seminary at Cincinnati 1832–51. He published, besides other works, "Views in Theology" and "Sermons on Temperance," which had a great circulation. He was a man of very energetic character. Died at Brooklyn, N. Y., Jan. 10, 1863. (See his "Autobiography and Correspondence," edited by his son, Charles Beecher, 2 vols., 1864.)

Beecher (Thomas Kennicutt), an able Congregational minister, son of the preceding, born Feb. 10, 1824, graduated at Illinois College (Jacksonville, Ill.) in 1843. For about twenty years he has been pastor of a church in Elmira, N. Y. He is an influential speaker and writer, and distinguished for philanthropy. His especial work seems to be to discourage sectarian feeling in the churches, and to promote a fraternal spirit among Christian people.

Beech'ey (Frederick William), an English navigator, born in London Feb. 17, 1796. He accompanied Sir Edward Parry in an Arctic expedition in 1819, and explored the northern coasts of Africa in 1821. Having obtained the rank of commander or captain, he conducted an exploring expedition to the Polar Sea *viâ* Behring Strait. He discovered Port Clarence and Port Grantley, returned in 1828, and published a narrative of his voyage in 1831. He became a rear-admiral of the blue in 1854. Died Nov. 29, 1856. (See "Edinburgh Review" for Mar., 1831.)

Beechey (Sir William), R. A., an eminent English portrait-painter, the father of the preceding, was born in Oxfordshire Dec. 12, 1753. Died Jan. 28, 1839.

Beech Spring, a township of Spartanburg co., S. C. Pop. 3280.

Bee Creek, a township of Mitchell co., N. C. Pop. 189.

Bee'der, or **Bider,** a fortified city of Hindostan, capital of a district of the same name, is near the Manjera River and in the Nizam's dominions, about 75 miles N. W. of Hyderâbâd. It was formerly an important place, but is now chiefly remarkable for the manufacture of tutenag wares of an alloy of tin and copper.

Bee-Eater, a name given to various birds of the order Insessores, tribe Fissirostres and family Meropidæ, which

The Namaqua Bee-Eater.

is allied to that of kingfishers. The genus *Merops* comprises numerous species, found in Asia, Africa, and Europe, which feed on bees and other hymenopterous insects. The common bee-eater (*Merops apiaster*) abounds in the S. of Europe as a summer bird of passage. It seizes bees as they fly in the air, and watches for them near their hives. It breeds in holes which it excavates in the banks of rivers. There are several other genera called bee-eaters. The Namaqua bee-eater (*Rhinopomastes cyanomelas*) is a West and South African bird.

Beef-Eater, a term applied jocularly to certain British functionaries belonging to the yeomen of the guard, who form part of the train of royalty, and attend the sovereign at royal banquets, coronations, etc. This term appears to be a corruption of the French *buffetier*, one who serves at the *buffet* (sideboard).

Beef-Eater (*Bu'phaga*), a genus of birds of the order Insessores and tribe Conirostres, sometimes called ox-pecker. They are exclusively African, and have a remarkable habit of sitting on the backs of oxen, buffaloes, camels, etc., in order to feed on the larvæ of flies which they find on their hides. This genus comprises the species called buffalo-bird of South Africa.

Beefield, a township of Greenville co., Va. Pop. 2809.

Beef Tea, an article of diet of the greatest importance in the treatment of the sick and the nurture of infants. To prepare palatable beef tea is a matter of some difficulty, but the following rules are excellent and easy to follow: Take one pound of juicy, lean beef from the shoulder or the round, and mince it with a sharp knife on a board or a mincing-block. Put it with its juice into an earthen vessel containing a pint of tepid water, and let it stand for two hours. Strain off the liquid through a clean cloth, squeezing well the meat, and add a little salt. Place the whole of the juice thus obtained over the fire, but remove it as soon as it has become browned. Never let it boil, otherwise most of the nutritious matter of the beef will be thrown down as a sediment. A little pepper or allspice may be added if preferred.

Beehive House, a name given to certain ancient dome-shaped buildings found in Ireland, and supposed to have been erected in the twelfth century or earlier. They are round edifices, built, without cement, of long thin stones placed in horizontal layers, each slightly overlapping another, and so gradually converging to the top. They are supposed to have been dwellings of priests. In some places occur several hive-shaped subterranean chambers, connected by a passage or gallery.

Beek'man, a post-township of Dutchess co., N. Y. It contains limestone, slate, and mines of iron ore (hematite). Pop. 1486.

Beek'mantown, a village of Mount Pleasant town-

ship, Westchester co., N. Y., on Pocantico River. Pop. 2206.

Beekmantown, a post-village and township of Clinton co., N. Y., on the Montreal and Plattsburg R. R., 4 miles N. of Plattsburg. The township is on Lake Champlain. Pop. of township, 2552.

Beel'zebub [Gr. Βεελζεβούλ, *Beelzeboul*, or *Beelzebul*], (*i. e.* "the god of dung or of flies"), the name of a god worshipped by the people of Ekron, in Philistia. As the heathen deities were all regarded as demons by the Jews, the name Beelzebub came in course of time to be commonly applied to a prince or chief of evil spirits, and in this sense it is employed in the Gospels. This name is found only in the New Testament. The original and authorized spelling is Beelzebul, which appears to have been afterwards changed so as to resemble Baalzebub, which was the proper name of the heathen divinity.

Beer [Ger. *Bier;* Fr. *bière*]. The common beer known as *beer, ale, porter, stout,* etc. is the fermented infusion of malted barley, flavored with hops. In a wider sense the term *beer* is applied to beverages prepared from cereals, barley, rye, wheat, Indian corn, millet, etc., the chief constituent of which is starch. The treatment involves the preliminary operations of *malting* and *mashing,* or changing the starch to gum (dextrine) and sugar (glucose) by the aid of the natural process of germination. The term *wine,* on the other hand, is restricted to alcoholic liquids obtained by fermenting the saccharine juices of fruits, as the grape, apple, pear, currant, and gooseberry, or the sap of such plants as the sugar-cane, palm, American aloe, etc. There are, however, many beverages of inferior quality called beer, which consist of saccharine liquors more or less completely fermented, and flavored with various substances, such as spruce beer, ginger beer, root beer, etc.

The manufacture of beer from barley is divided into two distinct processes—*malting* and *brewing*—which are conducted in different establishments, the *malt-house* and the *brewery;* the brewer often purchasing his malt from the maltster. *Malting* consists of four successive operations: (1) *Steeping.* The barley is placed in wooden cisterns, covered with cold water, and allowed to soak for two or three days, when the water is drained off. By this operation the barley absorbs from 10 to 50 per cent. of water, softening and swelling up at the same time. (2) *Couching.* The softened barley is thrown out upon the floor of the malt-house in heaps or *couches,* where it heats spontaneously and begins to germinate, throwing out rootlets or *radicles,* and shoots or *acrospires.* At the same time it evolves a portion of its water, the operation being called *sweating.* (3) *Flooring* is resorted to in order to check the germination by reducing the temperature. It consists in spreading the barley over the floor, and repeatedly turning and respreading it over a constantly widening area in layers of diminishing thickness. When the process of germination has proceeded as far as is desirable, it is completely stopped by (4) *Kiln-drying.* This is effected in a large room with brick or tile floors, the *kiln,* which is heated to the desired temperature. Here the germinated barley is rendered perfectly dry and crisp. It is then *malt.* The appearance of the malt, and the color of the beer made from it, depend upon the temperature of the kiln. At between 90° and 100° F. pale malt results; at 120°–125°, amber malt; 150°–170°, brown malt for porter and stout. Black malt is prepared by roasting the malt in cylinders, at 360° to 400° F., such as are used for roasting coffee. It is used as a coloring for porter. During the process of malting the barley increases in volume and diminishes in weight; 100 measures of barley yield 101 to 109 of malt, but 100 pounds yield only about 80 pounds of malt. The loss in weight is largely due to the perfect drying in the kiln, fresh barley containing 10 to 16 per cent. of water. It is, however, in part due to the removal of some soluble constituents in the steeping, to the destruction of some during germination, and evolution in the form of carbonic acid, water, hydrogen, nitrogen, etc., and to the shoots and rootlets. An experiment made by C. John gave the following results, leaving out the percentages of water: 100 parts of barley lost in the steeping 0.391; 100 parts of steeped barley yielded—

Malt	83.09
Shoots	3.56
Rootlets	4.99
Gases	8.36
	100.00

The object of changing the barley to malt is to render its constituents soluble, and bring them into a condition suitable for fermentation. During germination the albuminous substances are changed to *diastase,* a body which exerts a wonderful action upon starch. One part of diastase is said to change 2000 parts of starch (which is insoluble) to dextrine (gum), and then to glucose (grape-sugar), both of which are soluble in water. It is very doubtful whether what Payen and Persoz called *diastase* is a distinct body, but the name is a convenient one for the albuminous matters, modified and rendered soluble by germination, which act as ferments, and possess the important properties above mentioned.

Germination is considered to have gone far enough when the acrospire has advanced two-thirds the length of the grain. Were the process of germination allowed to proceed farther, the various constituents of the seed would be assimilated by the young plant, and transformed into insoluble tissues, as they really constitute the supply of food designed to sustain the germ during its early development, until having acquired leaves and roots it can obtain its food from the atmosphere and soil. It was formerly supposed that the conversion of the starch into dextrine and glucose took place to a large extent during the malting, and the following analyses by Proust have long been quoted to sustain this view:

	Barley.	Malt.
Gluten	3	1
Starch	87	68
Gum	4	15
Sugar	5	15
Resin	1	1
	100	100

More recent investigations and analyses made by improved methods have shown that very little starch is changed to dextrine and sugar during the early stages of germination to which the barley is subjected during malting. While a larger quantity of starch is converted into dextrine during the kiln-drying, especially in the preparation of dark-colored malt, the starch is but little affected until the brewer exposes the malt to the action of warm water in his mash-tub. Here the changes supposed by Proust to occur during the malting actually take place.

The exact analysis of malt is attended with almost insurmountable difficulties, and it has not yet been possible to ascertain the precise nature of the chemical processes involved in its formation. Dr. Stein investigated the subject in 1860 (*Wilda's Centralblatt,* 1860, ii., p. 8) and C. John in 1869 (*Byer, Bierbrauer,* 1869, No. 5, p. 101). John found that in the conversion of barley into malt, not counting the shoots and rootlets, the fat diminished from 2.73 to 1.906 per cent., cellulose 12.24 to 7.18, while the dextrine increased to 8.600, the glucose from 0.34 to 1.49, and the substances soluble in alcohol and in water from 5.949 to 16.72. Stein reports that the fat diminished from 3.56 to 2.09, the cellulose 19.86 to 18.76, the starch 54.48 to 47.43, the insoluble albuminoids from 11.02 to 9.02, while the dextrine increased from 6.50 to 6.95, the soluble albuminoids from 1.26 to 1.96, the non-nitrogenous extractive matters from 0.90 to 3.68. These differences appear very slight; but although analysis thus fails to reveal the character of the changes, their extent and importance are at once seen on exposing barley and malt to the action of warm water. The former is hardly affected, while the latter quickly yields a sweet wort, containing large quantities of dextrine, glucose, albumen, etc.

The diastase of malt is capable of changing to glucose a much larger quantity of starch than exists in the barley; hence unmalted grain is sometimes added to the malt during the subsequent operation of mashing. In Belgium potato starch is largely employed.

Brewing.—The first operation of the brewer is the *bruising* or crushing of the malt, which is accomplished by passing it between iron rollers. It is then placed in the mash-tub with warm water, and raised gradually to about 167° F. It is here that the starch is transformed into dextrine and glucose, which, with the soluble albuminous and saline constituents, are taken into solution by the water. From one to four bushels of malt are used for each barrel of beer. When the price of malt is high, a portion of it is replaced by cheaper amylaceous or saccharine substances, such as potato starch, or glucose prepared from it by the action of sulphuric acid. The insoluble residuum from the malt is sold under the name of brewers' grains for feeding cows. The infusion is allowed to stand for a few hours to clarify or set, and the sweet clear *wort* is then drawn off into a copper boiler, when it is boiled with the hops. From one to five pounds of hops are added for each barrel of beer, the quantity varying with the strength of the beer, the length of time it is to be kept, and the climate to which it is going. The hops are the female flowers of the *Humulus Lupulus;* they contain a peculiar essential aromatic oil, a bitter principle, *lupuline,* tannic acid, resin, etc. They communicate an agreeable flavor to the beer, add to its tonic and stimulating properties, aid in clearing it by the action of the tannic acid on the albumen, and diminish its liability to spoil on keeping. (See Hops.) Dr. C. A. Seeley of New York has prepared an extract of hops by means of gasolene (petroleum spirits) which he con-

siders much preferable to the entire hops. The boiled wort is cooled as quickly as possible, either by placing it in shallow vessels or passing it over a series of tubes through which cold water circulates. It is then run into the fermenting vats or tuns, which in large breweries sometimes have a capacity of 1200 or 1500 barrels. The temperature of the wort best suited to successful fermentation depends upon the season. In summer, with the atmosphere at 75° F., it should stand at about 55°; with air at 55°, at 60°; while in the winter it should have a temperature of at least 64°. If a very quick fermentation is desired, it may be considerably higher. For every 100 gallons of wort about 1 gallon of yeast is added, which has been produced in a previous brewing of the same kind of beer. The yeast is usually mixed with a little wort, and left in a warm place till it begins to ferment. This *lobb*, as it is called, is then added to the tun. More yeast is employed in winter than in summer; twice as much at 50° F. as at 68°. In six or eight hours fermentation becomes active; the wort begins to work, the glucose, under the influence of the active ferment *yeast*, undergoes decomposition, yielding alcohol and carbonic acid, the latter escaping in bubbles, and bearing to the surface particles of yeast, which form a scum. The yeast itself, being a plant, develops rapidly, largely at the expense of the nitrogenous albuminous matters of the wort, which are thus withdrawn. (See YEAST.) The temperature rapidly increases, rising many degrees. This fermentation continues for six or eight days. When it has reached the proper point, the beer is separated from the yeast, and transferred to the *cleansing butts*. Here a slow, almost imperceptible, fermentation takes place. The solid particles of the yeast rise to the surface and escape through the bungholes of the casks. Finings are sometimes added to clear the beer; they generally consist of isinglass dissolved in a little sour beer. The beer is then transferred to store-casks, where a slow fermentation occurs, which produces no perceptible quantity of yeast; the beer develops its finer qualities, and is here finished for use. (See FERMENTATION.)

The composition of the water used in brewing is supposed to exert an important influence on the success of the process. Lime salts are said to aid in clearing the beer, as they form insoluble compounds with some of the acids present. Sulphate of lime, or gypsum, is sometimes added to the water. The spring water at Burton-on-Trent is said to contain considerable sulphate of lime. The strength and taste of beer depend upon the quantities of malt and hops employed and the mode of conducting each of the several operations, especially the fermentation. *Strong* beers contain much alcohol; *substantial* beers are those which have not been fermented so thoroughly, and which consequently contain more of the extractive matters of the malt. Bitter beers contain more of the hop extract.

Ale is prepared from pale malt, and the active fermentation is checked while there still remains a considerable quantity of sugar unchanged. This, by subsequent fermentation in the barrel or bottle, keeps up the briskness. *Pale ale* is made from malt dried in the sun or by steam. It is not allowed to rise above 72° during the fermentation. The formation of acetic acid is thus prevented, and the unpleasant flavor due to the solution of the yeast by the alcohol is avoided. *Scotch ale* is a sweet strong ale. *Small beer* is a weak liquor made by using little malt, or by mashing with fresh water the malt residuum left after the wort for ale or porter has been drawn off. *Porter* is a dark-colored beer made from a mixture of pale, amber, brown, and black malt. *Stout* is strong porter. *Berlin white beer* (*weiss beer*) is prepared by quick fermentation from a mixture of 1 part of barley malt and 5 parts of wheat malt with half a pound of hops per bushel.

Lager Beer.—The beer of Bavaria, which has of late years been so extensively manufactured in the U. S. under the name of *lager beer*, owes its name (from *lager*, a "storehouse") to the fact that it is stored in cool cellars or vaults for several months before it is used, and its remarkable keeping qualities and highly prized properties to the peculiar kind of fermentation by which it is produced. The fermentation of ordinary beer and ale takes place at high temperatures; it is consequently rapid, and the carbonic acid, evolved in bubbles, carries a portion of the yeast to the surface, forming a thick scum. This scum protects the beer from the oxygen of the air. The conversion of gluten into yeast is in part a process of oxidation, and the oxygen being excluded considerable gluten remains unchanged, and acting as a ferment leads to the subsequent change of alcohol to acetic acid. The fermentation of lager beer is conducted at a low temperature—between 40° and 50° F. It proceeds more slowly, and the carbonic acid does not carry the yeast to the surface. Consequently, the air has a freer access, and the gluten is more completely converted into yeast. This beer is usually fermented in the winter, or, if in summer, in rooms cooled by ice. This is called sedimentary or under-fermentation, to distinguish it from the ordinary surface fermentation. The yeast, called bottom yeast, is quite different from ordinary yeast, and has a tendency to induce the kind of fermentation by which it was produced. The following is a brief outline of the process employed at one of the largest lager-beer breweries in New York. The barley is soaked two or three days, changing the waters; it germinates six to ten days, till the radicles are brownish; it is then kiln-dried. It is crushed between rollers, mashed at 120° to 140° F., the temperature being raised by the addition of boiling water to 160° or 170°. By adding hot water to the residue a second wort is obtained. The first wort is boiled with the hops; the second wort is let in, and the whole is boiled three or four hours. After cooling to between 44° and 50° F., it is run into open fermenting tuns. One gallon of yeast is added for every twenty to twenty-five barrels. Fermentation continues from ten to twenty days. There is a heavy froth at first, which subsides, leaving the surface clear. It is racked off into hogsheads, when the yeast is found at the bottom of the tuns. It stands in these hogsheads with the bung open. A few days before it is to be put in barrels for use the bung is driven in to accumulate carbonic acid for *life*.

Three varieties of this beer are made: (1) "*Lager*," or summer beer, for which 3 bushels of malt and 1½ to 3 pounds of hops are used per barrel, and which is not ready for use in less than from four to six months. (2) "*Schenk*," winter or present-use beer: 2 to 3 bushels malt and 1 pound hops per barrel; ready in four to six weeks. (3) *Bock* bier, which is an extra strong beer, made in small quantity and served to customers in the spring, during the interval between the giving out of the schenk beer and the tapping of the lager. In its manufacture 3½ bushels of malt and 1 pound of hops per barrel are used, and it requires two months for its preparation.

The barrels for lager are coated with pitch on the inside, to prevent the beer soaking into the wood and giving rise to acetic acid when they are empty. Lager is therefore the product of a peculiar slow under-fermentation, which takes place at low temperatures.

Chica, or maize beer, was used by the South American Indians before the Spanish conquest. *Bourza*, or millet beer, is made by the Crim Tartars. *Quass*, or rye beer, is a sharp acid beverage prized by the Russians. *Koumiss*, or milk beer, is prepared by the Tartars from mares' milk, which they dilute and ferment.

Composition of Beer.—The stimulant and tonic properties of beer are due to the alcohol and the bitter principle of the hop, while its nutritive value is ascribed to the extractive matters derived chiefly from the malt. The exact character of many of the constituents of beer is not known. Besides water, alcohol, dextrine, and grape-sugar, the following substances have been identified: glycerine, succinic, acetic, lactic, propionic, glucic, and carbonic acids, albumen and albuminous principles, bitter and resinous matters and essential oil from the hop, and alkaline and earthy salts. The latter, which amount to from 0.15 to 0.28 per cent. of the beer, are from one-half to two-thirds alkaline and earthy phosphates. The unrecognized constituents of beer are grouped under the term extractive matters. In the following table the term *extract* includes all the substances left when the alcohol and water are removed by evaporation:

Analysis of Beer.

KINDS.	Percentages.		Contents per Imperial Pint.	
	Alcohol.	Extract.	Alcohol, fl. ounces.	Extract, ounces.
Burton ale (Allsopp's)	8.25	13.32	2.16	2.77
Bass's barley wine	8.41	11.75	2.18	2.42
Edinburgh ale	4.41	3.58	1.12	.72
Guinness's stout	6.81	6.17	1.74	1.25
Truman, Hanbury & Co.'s porter	4.02	5.12	1.03	1.01
Whitebread's porter	4.28	5.15	1.09	1.03
Hoare's porter	4.18	5.04	1.06	1.03
Perry's ale	3.87	3.65	0.98	0.73
Munich lager	4.70	6.10	1.19	1.22
New York lager	5.86	4.32	1.48	0.88
Munich schenk	3.90	5.7	1.00	1.16
Munich bock	4.60	9.2	1.17	1.90

Adulteration of Beer.—There is a popular impression that beer is extensively and injuriously adulterated; that potato starch, grape-sugar, glycerine, and molasses are added as substitutes for malt; pine bark, quassia, walnut leaf, wormwood, bitter clover, aloes, picric acid, cocculus indicus, and strychnine as substitutes for hops; and various chemicals to neutralize acidity or conceal dilution. A few of the first mentioned would not be objectionable, and it is not probable that many, if any, of the others are ever used.

C. F. CHANDLER.

Beer'sheba (*i. e.* the "well of the oath," or "well of the seven"), an ancient frontier place of Palestine, situated about 50 miles S. S. W. of Jerusalem, and near the border of the desert. Abraham, Isaac, and Jacob often dwelt there. The phrase "from Dan to Beersheba" was used proverbially to express the whole extent of the land of Israel. There are still to be seen seven wells of ancient masonry, from five to twelve and a half feet in diameter; but only two of them now contain water.

Beershe'ba Springs, a post-village of Grundy co., Tenn., on the summit of a spur of Cumberland Mountain, 12 miles N. E. of McMinnville, has valuable tonic, saline, and chalybeate mineral waters, and very beautiful scenery. This is a fashionable watering-place for the people of the South-west.

Bees'wax [Lat. *ce'ra*], a substance manufactured or secreted by the honey bee, is the material of which its cells and combs are constructed, and is an important article of commerce. In order to separate the wax from the honey, the honeycomb is subjected to pressure, which squeezes out nearly all the honey; the residual comb is then heated in water and stirred till the wax melts, when the whole is passed through hair bags. The wax is received in a vessel of cold water, where it is cooled and solidifies as a thick cake on the surface of the water. The natural yellow color is sometimes changed to white by exposure to the joint action of the sun, the ozone of the air, and moisture. Purified beeswax is tasteless, odorless, and colorless. Its specific gravity is about .960. It fuses at 145° F., is insoluble in water, and partly soluble in boiling alcohol. Beeswax is extensively used in the manufacture of candles and tapers, and for other purposes. The candles which are burned in Roman Catholic churches are always made of wax, which is also an ingredient in the cerates of pharmacy. Beeswax consists of—(1) myricin, which is insoluble in boiling alcohol, and is chiefly myricic palmitate, $C_{30}H_{61}.C_{16}H_{31}O_2$; (2) cerotic acid, $C_{27}H_{54}O_2$, which dissolves in boiling alcohol, but crystallizes out on cooling; (3) cerolein, which remains dissolved in the cold alcohol, probably a mixture of several substances.

Beet [Ger. *Beete*], (*Be'ta*), a genus of plants of the order Chenopodiaceæ, extensively cultivated for their esculent roots, which are large and succulent. The species of *Beta*, which are not numerous, are mostly biennial, with smooth, ovate, and petiolate radical leaves. They are natives of the temperate parts of the Eastern hemisphere. The common beet (*Beta vulgaris*) is indigenous on the shores of the Mediterranean, and is extensively cultivated in gardens and fields. The boiled roots are a common article of food in most civilized countries of Europe and North America. Large quantities of sugar are extracted from the roots of the beet in France and Germany. The beet-sugar, when refined, is identical with that of the sugar-cane. The beet prefers a rich, light soil. The variety chiefly cultivated in gardens is the red beet, so called from the color of the root, which is sometimes conical. A coarser variety of beet, called mangold-wurzel, is a valuable food for cattle. (See SUGAR.)

Bee'thoven, van (LUDWIG), a famous musical composer, born at Bonn Dec. 17, 1770. He was the second of four children, of whom the first died an infant. His father, Johann van Beethoven, tenor singer in the chapel of the elector, being poor, mainly in consequence of bad habits, discerned the remarkable musical talents of his son, and prepared early to press them into service by teaching him to play the harpsichord before he was five years old. Having outgrown his father's instruction, the lad was put under the tuition of Pfeiffer, oboist in the chapel, and then under that of Van der Eder, reputed the best organist in Bonn. At the age of eleven he was transferred from Van der Eder to his successor in the chapel, Neefe, who spoke warmly of the boy's proficiency and mastery of the music adapted to the harpsichord. The master himself seems to have given him special instruction in the science of composition, and even had published some of his compositions. At this period the lad dedicated to the elector three pianoforte sonatas, which also were printed. From this time his reputation increased, and his prosperity, under the auspices of eminent patrons, brightened. When but fourteen he was made assistant court-organist, and three years later was sent to Vienna, at the elector's expense, to pursue his studies under the direction of Mozart, then at the height of his fame. In Vienna he finally made his home, after an incidental residence of several years in Rome, where his efforts were required to support his two younger brothers. On his return to Vienna he studied hard with Haydn and Albrechtsberger, the celebrated contrapuntist, making himself perfect master of the science of musical composition. His favorite instrument at this time was the pianoforte, on which he soon rivalled the best performers. His technical education being completed, his powers trained, his method formed, works came from his hand with astonishing rapidity. There is difficulty in fixing the dates of his compositions, but before he was thirty years old he had published as many as twenty sonatas for the pianoforte, nine for piano and instruments, two concertos for piano and orchestra, trios, quartetts, quintetts, septetts, a ballet, "The Men of Prometheus," and two orchestral symphonies. At this period he moved in the best society, was noticed by persons of rank, and recognized by all as a genius of the first order. These were his happy, hopeful days, but they did not last long; they were soon clouded by the one great calamity of his life—a misfortune that to a musician would seem almost fatal to achievement. Already in 1800 he speaks sadly of a defect in his hearing which occasioned serious inconvenience. It increased so rapidly that before long, in the course of two or three years, during which he had a violent sickness, he became totally deaf. This affliction clouded his inner life, made him distrustful, restless, suspicious, melancholy, and unsocial. From this time books, meditation, and solitary walks in the country were his sole recreation. His society was limited to a few select friends, with whom he could forget himself. He lived in his work, and his work went on increasing in volume, gaining in power and deepening in intensity from year to year. The achievements of his genius cannot be described in few words. In less than five years were produced the "Heroic Symphony," "Fidelio," Symphonies Fourth, Fifth, and Sixth, with the grand mass in C. In 1813 came the Seventh Symphony; three years later the Eighth, in 1824 the Ninth or "Choral" Symphony, by many thought the most wonderful of all—by Beethoven himself regarded as the most significant; and in the intervals between these gigantic creations was produced some of his most perfect music. To give here any account of these works is impossible; they cannot so much as be named, for they cover nearly every species of composition, and are so remarkable that nearly every one merits special notice. They are as extraordinary for their wealth of thought and feeling as for their mastery of the laws of composition. They constitute a musical library by themselves. The nine symphonies and the grand sonatas for the pianoforte are monuments of genius which alone would give immortality to their creator.

Beethoven died Mar. 26, 1827, of dropsy, following a violent inflammation of the lungs. His constitution, naturally strong, had been tried by severe shocks of illness. His life was solitary; he was never married. His strongest natural attachment was for a nephew who proved unworthy of his uncle's devotion. Though his deafness made him a recluse, he was not selfish, sordid, or narrow-souled. On the contrary, his human feeling was of the deepest, and, though he could never have been rich, he showed himself capable of generosity. An enthusiastic republican in his belief, and an ardent sympathizer with his countrymen in their struggles for political liberty, Beethoven suffered bitterly for the woes of his Fatherland, and poured out through his music the passion of his proud, agonized heart. There are worlds of sorrow in his compositions. They are, in every sense of the words, modern and living. Though so thoroughly accomplished in musical science, Beethoven was never scholastic; though so deeply charged with emotion, he was never sentimental. His works convey the profound, various, comprehensive feeling which was natural to a sensitive spirit, keenly responsive to all the joy and sorrow of the new age. To this is due their extraordinary hold on people who are quite unable to appreciate their technical excellence.

That Beethoven was a man of vast intellect his compositions testify. But he was something besides a musician. He read much and thought much; he was by no means unfamiliar with the literature of Germany, and even with Italian letters. When interested, his conversation was animated, brilliant, and instructive.

In person Beethoven is said to have been of middle size, stout and apparently strong. His statues, busts, and portraits represent him with a massive head, broad brow, a dignified, sombre expression of countenance, and features of harsh but heroic cast. The bronze statue erected in the public square of his native city in 1845 is of majestic aspect. His latest and most careful biographer, however, Mr. A. W. Thayer, an American, describes him as looking much like a mulatto, short and sallow, with wide nostrils and projecting teeth, heavy lips, and high cheek-bones. A great deal has been written about him. Until the biography of Mr. Thayer the authorities were his contemporary, Moscheles (whose work has been republished in this country), and Schindler. O. B. FROTHINGHAM.

Bee'tle, a common name given to several species of insects of the order Coleoptera. Most writers on natural history extend the meaning of the term, and apply it to all coleopterous insects, the species of which are very numer-

ous. They may be distinguished and recognized by the two hard sheaths or *elytra* which cover the pair of true membranous wings and organs of flight. Many beetles are remarkable for their singular forms and the brilliant colors and ornamental markings of their elytra. Each beetle has two antennæ, two mandibles of a horny consistence, two compound eyes, and six legs. (See COLEOPTERA and SCARABÆUS.)

Bee'tle Stones, a name given by the lapidaries of Edinburgh to hard nodules of clay iron-stone found abundantly at Newhaven, a suburb of that city. They take a fine polish, and are used to make ornamental articles. The name is derived from a fossil which often occurs as a nucleus of the nodule, and was erroneously supposed to be a fossil beetle, but is really a coprolite.

Bee'town, a post-township of Grant co., Wis. P. 1624.

Beet-root Sugar, a kind of sugar made in France and Germany. The beet root contains about 10 per cent. of saccharine matter. The Prussian chemist Achard was the first who succeeded in extracting sugar from beets. (See SUGAR.)

Bee'ville, a post-village, capital of Bee co., Tex., 127 miles S. of Austin City.

Be'gas (KARL), a German painter, born at Heinsburg Sept. 30, 1794. He became about 1818 a resident of Berlin and court-painter to the king of Prussia. He painted "The Finding of Moses" and many other scriptural subjects; also excellent portraits of eminent authors and artists, including Humboldt and Schelling. Died Nov. 24, 1854.

Beg'gar, a person who solicits charitable aid from the public at large. In all ages and countries persons have practised various arts in order to enlist the sympathies of the benevolent. Severe enactments have from time to time been made against them. By a law of Richard II. (1388) able-bodied beggars were punished and compelled to labor, and provision was made for the helpless. By an act of Henry VIII. (1530) licenses were given to impotent persons to beg within fixed limits, but unlicensed beggars were whipped, and all persons giving alms to such forfeited ten times the amount given. In the reign of Elizabeth beggars above the age of fourteen were grievously whipped, burned through the ear with a hot iron, and for the third offence were put to death. This regulation was repealed in 1593.

Begging Friars. See MENDICANT ORDERS.

Beg'hards [Lat. *Beghardi, Begchardi,* and sometimes *Beguini*], a name of uncertain derivation (for which see BEGUINES, below), applied to semi-monastic societies of men, originating in the Netherlands, and dating from the early part of the thirteenth century, or not very long after similar societies of women had been formed. At first the Beghards were distinguished for piety and works of beneficence. Some connected themselves with the Tertiaries of the monastic orders; some became wildly fanatical; and some fell off into heresies. They were severely handled by the Inquisition, but spread into Germany, France, Switzerland, Italy, and even Sicily, and continued down to the Reformation. (See MOSHEIM, "De Beghardis et Beguinabus Commentarius" 1790; and HALLMANN, "Geschichte d. Ursprungs d. belgischen Beghinen," 1843.)

Beghar'mi, or **Bagir'mi,** a country of Central Africa, is bounded on the N. by Lake Tchad, on the E. by the kingdom of Wadaï, and on the W. by the river Shari, which separates it from Bornu. Area, 56,600 square miles. The greatest length is about 250 miles. Capital, Masena. The surface is for the most part nearly level; the soil is the most fertile and the best watered of the Soodan. It was founded by a heathen chief about 300 years ago, but Mohammedanism soon became the ruling religion. It is tributary to both Bornu and Wadaï. The natives are physically well-formed and warlike. Begharmi was visited by Dr. Barth in 1852. Pop. about 1,500,000. (See BARTH, "Travels in Central Africa.")

Bego'nia, a genus of tropical plants, the type of the natural order Begoniaceæ. Some of them are cultivated in hot-houses for the sake of the flowers. The leaves, which are oblique at the base, have a reddish tinge. The succulent stems and leaves of *Begonia tuberosa* and other species are used as potherbs and eaten in the form of tarts. The name *Begonia* was given in honor of Michel Bégon, a patron of science.

Begonia'ceæ (so named from *Bego'nia,* one of the genera), a natural order of exogenous plants, mostly herbaceous, have alternate leaves, oblique at the base, and cymes of unisexual pink flowers, with a colored perianth and numerous stamens. There are also white and deep scarlet varieties. They are nearly all tropical plants, but one species of *Begonia* grows on the Himalayas 11,500 feet above the sea. The order comprises about 160 species. Some of the Mexican species are used as drastic purgatives.

Béguines, bā-geen' [Lat. *Beguinæ, Begutæ,* some say from the old Saxon *beggen,* "to beg" or "to pray;" others from the supposed founder, Lambert le Bègue or Bèghe], the name given to semi-monastic societies of women, originating in Belgium, perhaps at Liege, about 1180 A. D. These societies grew in part out of the numerical inequality between the sexes caused by the Crusades. The women, without assuming monastic vows, lived in houses by themselves, labored for their own support, and took care of the sick. A few of these establishments are still found in Belgium. (For the literature, see BEGHARDS.)

Be'gum [bā'gŭm, the feminine form of the Tartar *beg* or *bey,* a "lord" or "prince"], a title of honor given in the East Indies to princesses and the sultanas of seraglios. Among the charges against Warren Hastings was his cruelty to two rich begums of Oude, the mother and the wife of Sujah Dowlah. In order to extort money from them, Hastings or his agents invaded the privacy of their zenanas, and reduced them to the alternative of delivering their treasures or exposing their faces to the view of strange men. They preferred the former of these two evils.

Be'haim, or **Be'hem** (MARTIN), an eminent cosmographer and navigator, born at Nuremberg about 1459. He became a merchant, and visited foreign countries in that capacity. In 1484 and 1485 he accompanied the navigator Diogo Cam in a voyage of exploration along the W. coast of Africa. He gained distinction as a maker of maps and globes. A large globe which he made in 1492 is still preserved by his descendants in Nuremberg, and is prized as a monument and record of the progress of geography. Died July 29, 1506. (See GHILLANY, "Geschichte des Seefahrers Ritter Martin Behaim," 1853; C. G. VON MURR, "Diplomatische Geschichte des Ritters M. Behaim," 1778.)

Be'ham (BARTHOLOMEW), a German portrait-painter and engraver, born in 1496, was a scholar of Dürer. Died in 1540.—His nephew, HANS SEBALD BEHAM, born in 1500, one of the best of the Nuremberg engravers, chose grotesque, sometimes coarse subjects.

Beheading. See CAPITAL PUNISHMENT.

Be'hemoth, a huge animal described in the book of Job (xl. 15–24). Some critics consider the Hebrew term a plural noun for cattle in general. Others think some extinct species of animal is referred to. Others think the elephant is meant. But most writers say the hippopotamus.

Behes'tian, a township of Ouachita co., Ark. P. 396.

Behistun' [Lat. *Bagista'nus;* Pers. *Baghistan', i. e.* "place of gardens"], an ancient and ruined town of Persia, in Irak-Ajemi, 21 miles E. of Kermanshah. Here is a remarkable limestone mountain (the ancient *Mons Bagistanus,* on the confines of Media), which rises to the height of 1700 feet, and is almost perpendicular on one side. According to Diodorus, the famous Semiramis, on her march from Babylon to Ecbatana, encamped here and prepared a residence, and having cut away the lower part of the rock of Bagistanus, caused her portrait to be carved or sculptured there. The geography of this locality has been carefully investigated by Rawlinson and Masson. A peculiar interest attaches to the rock of Behistun on account of its cuneiform inscriptions, which were made by order of Darius I., king of Persia, about 515 B. C., and have been deciphered by Sir H. Rawlinson. Close to these inscriptions are thirteen human figures, one of which represents Darius. "The labor," says Rawlinson, "bestowed on the whole work must have been enormous. . . . But the real wonder of the work consists in the inscriptions. For extent, for beauty of execution, for uniformity and correctness, they are perhaps unequalled in the world. It is evident that after the engraving of the rock had been accomplished, a coating of silicious varnish had been laid on to give a clearness of outline to each individual letter, and to protect the surface against the action of the elements. This varnish is of infinitely greater hardness than the limestone rock beneath it. It has been washed down in several places by the trickling of water for three-and-twenty centuries, and it lies in flakes upon the foot-ledge like thin layers of lava." (*Journal of the Asiatic Society,* vol. x.) The Persian inscriptions which Rawlinson deciphered are contained in five columns, one of which has ninety-six lines, and the others each nearly as many. There are on the same rock inscriptions in the Median and Babylonian languages. (See RAWLINSON'S "Herodotus," vols. i. and ii.)

Behn (APHRA), a female writer in the reign of Charles II., born in 1640. She wrote seventeen plays, besides novels and poems which were witty, but licentious. She was employed as a spy at Antwerp. Died in 1689.

Behring, or **Beering** (VITUS), a Danish navigator,

born in Jutland in 1680. He entered the Russian navy at an early age, and fought with distinction against the Swedes. In 1725 he was appointed the commander of an expedition sent to explore the Sea of Kamtchatka. During this voyage, which occupied several years, he discovered Behring Strait (1728), and ascertained that Asia was not joined to America. In a subsequent voyage he was wrecked on Behring's Island, where he died Dec. 8, 1741.

Behring Sea, or **Sea of Kamtchatka,** the most northern part of the Pacific Ocean, extending between the peninsulas of Alaska and Kamtchatka. It is connected by Behring Strait with the Arctic Ocean.

Behring Strait, a channel which connects the Pacific with the Arctic Ocean, and separates Asia from America. It was discovered by Vitus Behring in 1728. Its width is about 45 miles at the narrowest part, between East Cape (Asia) and Cape Prince of Wales (America). The depth of this strait near the middle is about 30 fathoms.

Beilan, a town and pass of Northern Syria, on the E. side of the Gulf of Iskanderoon, one of only two passes between Cilicia and Syria. It is thought by some to be the same as the ancient *Amanian Gates.* The town of Beilan is situated on a crest 1500 feet above the sea. Pop. about 5000. It has numerous aqueducts.

Beira, or **Beyra,** bā′rå, a province of Portugal, bounded on the N. by Entre-Douro-e-Minho and Tras-os-Montes, on the E. by Spain, on the S. by Estremadura and Alemtejo, and on the W. by the Atlantic. Area, 9244 square miles. Besides the Douro, which flows along its N. boundary, and the Tagus, which touches it in the S. E. corner, Beira is also drained by the Mondegos. The surface is mountainous; the soil is generally poor. Among the staple productions are wine, grain, and olives. Marble, iron, and coal are found here. Capital, Coimbra. Pop. in 1868, 1,288,994.

Beirout, or **Bairut.** See BEYROOT.

Beis′sel (JOHANN CONRAD), born at Eberbach, in Germany, in 1690, removed in 1720 to Pennsylvania, and became the founder of the religious community at Ephratah, in Lancaster county. He died in 1768, leaving several theological works.

Beit-el-Fa′kih ("house of a saint"), a town of Arabia, in Yemen, on the Red Sea, 90 miles N. of Mocha. The heat here is very great, the thermometer rising to 104° F. in the shade, and 145° in the sun. It has a citadel and a mosque. Pop. about 8000. It is one of the largest marts for coffee in Arabia.

Be′ja (anc. *Pax Ju′lia*), a fortified town of Portugal, in Alemtejo, 57 miles by rail S. of Evora. It has a castle, a cathedral, and manufactures of earthenware and leather. It is the seat of a Roman Catholic bishop. Two annual fairs are held here in the fall. Pop. 7060.

Bejar′, a fortified Spanish town romantically situated on the Cuerpo de Hombre, 48 miles S. of Salamanca. It has manufactures of wool, and is noted for hams. Pop. 10,683.

Bejapoor′ (*i. e.* "the victorious or unconquerable city"), a city of India, in the presidency of Bombay, 140 miles S. E. of Bombay. It was formerly the populous capital of the powerful Hindoo kingdom of the same name, which was founded by Tusnef (died 1510), was conquered by Aurungzeb in 1686, and was afterwards a part of the empire of the Grand Mogul. According to tradition, it contained 100,000 houses, but is at present in ruins. It presents a magnificent external show of domes and minarets, temples and mausoleums, some of which display exquisite workmanship; and lofty walls of hewn stone enclose this scene of splendid desolation. Among the ruins, which are of great extent, is a mausoleum of Mahmood Shah, the dome of which is visible at a distance of fourteen miles. Here are several brass cannon of enormous size.

Bekaa. See BÛKÂ'A.

Beke (CHARLES TILSTONE), PH. D., an English traveller, born in London Oct. 10, 1800. He explored Abyssinia (1841–44), and after his return published, besides other works, an "Essay on the Nile and its Tributaries" (1847), and "On the Sources of the Nile in the Mountains of the Moon" (1848). He has since made other visits to Africa.

Be′kes, a county of Central Hungary, is bounded on the N. by the county of Szabolcs, on the E. by Bihar, on the S. by Csanad, and on the W. by Csongrad. Area, 1321 square miles. The country consists of a plain, and is watered by the Black, White, and Rapid Körös. The climate is unhealthy, but the soil is extremely fertile, yielding large quantities of wheat of the first quality. Pop. in 1869, 209,729. Chief town, Bekes.

Bekes, or **Bekesvár,** bå′kĕsh-var, a town of Hungary, capital of the above county, is at the confluence of the White and Black Körös, 62 miles S. W. of Debreczin. It has considerable trade. Pop. in 1869, 22,547.

Bek′ker (IMMANUEL), a philologist, was born in Berlin in 1785, was a pupil of F. A. Wolf at Halle. He became professor of philology at Berlin in 1810, and published "Anecdota Græca" (3 vols., 1814–21). He produced good editions of many classics, among which are Plato (10 vols., 1814–21), "The Attic Orators" (7 vols., 1823), and Aristotle (7 vols., 1831). Died June 7, 1871.

Belai′a, Bielaja, or **Biela,** a river of Russia, rises in the Ural Mountains, flows through Orenburg, and, after a very tortuous course of about 650 miles, enters the river Kama.

Bel Air, a post-village and county-town of Harford co., Md., 22½ miles N. of Baltimore, and 9 miles from Edgewood Station on the Philadelphia Wilmington and Baltimore R. R., contains a court-house, jail, academy, 3 public schools, 4 churches, 3 hotels, 2 weekly papers, and 1 large carriage manufactory. It is situated in a fine agricultural section. Pop. of village, 633; of township, 5650.

A. H. RUTLEDGE & Co., PUBS. "HARFORD DEMOCRAT."

Be′lia Tser′kof (*i. e.* "White Churches"), a town of Russia, in Kiev, on the river Ross. It has considerable trade. Pop. about 8000.

Belcher (JOSEPH), D. D., a Baptist divine, born in Birmingham, England, April 5, 1794, came to America in 1844, and published nearly 200 works, among which are "The Baptist Pulpit" (1850), "History of Religious Denominations" (1855), etc. Died at Philadelphia July 10, 1859.

Bel and the Dragon, History of, an apocryphal book of the Bible, regarded as a fable by the Jews, by Saint Jerome, and many eminent theologians. It is canonical in the Roman Catholic Church, being part of the fourteenth chapter of Daniel in the Vulgate. By the Anglican Church it is recommended to be read for edification.

Bel′cher (Sir EDWARD), F. R. S., an English vice-admiral, born in 1799. As commander of the Sulphur he sailed on a voyage around the world in 1836, and explored the western coasts of America. During this voyage he served in the naval operations against the Chinese in 1841. He became a post-captain in 1843, and commanded an expedition sent in search of Sir John Franklin in 1852. Returning without any success, and having lost his vessels, he was placed before a court-martial, but acquitted. In 1864 he became rear-admiral of the red. He published, besides other works, a "Narrative of a Voyage round the World in the Sulphur."

Belcher (JONATHAN), a merchant, born in Cambridge, Mass., Jan., 1681, graduated at Harvard in 1699. He was governor of Massachusetts and New Hampshire from 1730 to 1741. Having been removed from office, he went to England to vindicate himself, and was appointed governor of New Jersey in 1747. Died Aug. 11, 1757.

Bel′chertown, a post-village and township of Hampshire co., Mass., on the New London Northern R. R., 10 miles N. N. W. of Palmer. It has important manufactures of carriages, etc. Pop. of township, 2428.

Bel′doc, a township of Barnwell co., S. C. Pop. 1176.

Bel′ed-el-Jereed′ (*i. e.* "the country of dates"), an extensive region of Northern Africa, bordering on the Desert of Sahara, is bounded on the N. by Algeria, and on the W. by Morocco. The soil is mostly arid and sterile, except some oases, which produce the date-palm.

Belem. See PARA.

Belem′nite [Lat. *belemni′tes,* from the Gr. *βέλεμνον,* a "dart" or "arrow"], a genus of fossil Mollusca of the order Cephalopoda, is the type of the family Belemnitidæ. The portion of the animal usually preserved is a cylindrical or conical mass of carbonate of lime, from two inches to a foot in length, one extremity generally acute, the other excavated to form a conical cavity. This organ is called the *guard;* it protruded from the body of a cuttle-fish, and doubtless served as a means of defence. The guard of the belemnite expanded above into a hollow, chambered cone, the "phragmacone;" and from one side of this projected a spatulate lamina of horny or shelly material, the homologue of the "cuttle-bone" of *Sepia* and the "pen" of *Loligo.* In a few instances the body of the belemnite is represented in the fossil state, and such a specimen is in the cabinet of Columbia College. These show that in form the belemnite resembled our common *Loligo*—that it had an ink-bag, and eight arms, which were furnished with many sharp hooks like the living *Onychoteuthis.* The belemnites begin in the St. Cassian beds, as the top of the trias, are very numerous in the Jurassic strata, but are not found in any more recent deposits. They are represented in the chalk by *Belemnitella,* but have no living analogue.

Belemnitel′la [dimin. of *Belemnites*], the name given

to the guard of a cuttle-fish closely allied to the belemnite, but distinguished by a slit which cuts the side of the phragmacone. It is characteristic of the cretaceous strata, and one species (*Belemnitella mucronata*), found on both sides of the Atlantic, is common in the cretaceous strata of New Jersey.

Belemni'tidæ, a family of extinct cephalopods, of which the type is the genus *Belemnites*. It also includes *Xiphoteuthis*, *Belemnoptera*, and *Belemnoteuthis*, of the Jurassic, and *Belemnitella*, etc., of the cretaceous.

Belfast', an important city and seaport of Ireland, in the county of Antrim and province of Ulster, is situated on Belfast Lough (an arm of the sea), at the mouth of the river Lagan, 101 miles by rail N. of Dublin, and 118 miles S. W. of Glasgow; lat. 54° 35′ N., lon. 5° 57′ W. The river is crossed by three bridges, the finest of which is the Queen's Bridge. Railways extend from this point to Dublin, Armagh, and Londonderry. The site of the city is low and level, but is partly enclosed by the ridge of Divis and Cave Hill, the former of which rises to the height of 1567 feet. The houses are mostly of brick and are well built; the streets are regular, spacious, well-lighted, and macadamized. Belfast is the most prosperous commercial town of Ireland, except Dublin. The principal public edifices are Queen's College, a beautiful structure in the Tudor style (opened in 1849); a Presbyterian and a Methodist college; the Royal Academical Institution, affiliated to the London University; the museum, the theatre, Linen Hall, the Corn Exchange, etc. In 1872 it had 80 churches, of which 28 were Presbyterian. Although the seat of the Roman Catholic bishop of Down and Connor, it is almost entirely Protestant, having only five Catholic churches. Fourteen newspapers were published here in 1872. The botanic garden of the Natural History Society occupies about seventeen acres. Belfast is the chief seat of the Irish manufactures of linen and cotton, and is the great dépôt of the linen trade. The linen manufacture was established here in 1637. The other chief branches of industry are weaving of linen and cotton, bleaching, dyeing, calico-printing, and iron-founding. Numerous steamers, engaged in the Channel trade, ply regularly between Belfast and Liverpool, Glasgow, Dublin, London, etc. The chief articles of export are linens, cotton goods, grain, flax, cattle, and provisions. This city has also a large foreign trade. The adjacent country is extremely beautiful. Belfast returns two members to Parliament. It first became an important place about 1604, and was chartered in 1611. Pop. in 1871, 174,394.

Belfast, a seaport, the capital of Waldo co., Me., is on the N. W. shore of Penobscot Bay (sometimes called Belfast Bay), 30 miles from the ocean and 30 miles S. by W. of Bangor. Belfast Bay, 9 miles wide, separates it from Castine. It has a spacious harbor, which is safe and sufficiently deep for large ships. Belfast is extensively engaged in trade, manufactures of paper, shoes, and iron, the fisheries, and in shipbuilding. It is the south-eastern terminus of the Maine Central R. R. (Belfast division). It has a national and savings bank and three weekly newspapers. Pop. 5278.

W. H. Simpson, Ed. "Republican Journal."

Belfast, a post-township of Allegany co., N. Y. It contains a seminary. Pop. 1488.

Belfast, a township of Fulton co., Pa. Pop. 856.

Belfort, an important fortified town of France, at the foot of the Vosges and on the river Savoureuse, 60 miles by rail N. E. of Besançon. Pop. in 1866, 8400. It has a citadel constructed by Vauban, a fine church, and a public library; also manufactures of iron, paper, and calico. It was ceded to France by Austria in 1648. In the winter of 1870–71 it was besieged and taken by the Germans. It was the only town of Alsace which the Germans permitted the French to retain when that province was annexed to Germany in 1871.

Bel'fort, a village of Croghan township, Lewis co., N. Y., has an extensive tannery.

Bel'fry, or **Beffroi,** the name of a military engine used in sieges in the Middle Ages and in ancient times. It was a movable tower about as high as the walls of the town in the siege of which it was employed. It was constructed of wood, with four or more stories or stages, and was moved on wheels. The lowest story was sometimes armed with a battering-ram, and the other stories were occupied with archers, slingers, etc. Near the top of the beffroi was a hinged drawbridge, which, when let down on the parapet of the wall, sometimes enabled the besiegers to storm the town.

Belfry [Fr. *beffroi*], a bell-tower or turret, usually forming part of a church, but sometimes detached from it. Towers built for such purposes in Italy are called campaniles. On the continent of Europe municipal belfries often occur as portions of the town-house (*maison de ville*).

Bel'gæ, the name given by Cæsar to the warlike tribes which in ancient times occupied one of the three great divisions of Gaul (*Gallia*). Their country, which was bounded on the N. W. by the ocean and on the E. by the Rhine, comprised the modern Belgium, part of Holland, and the N. E. part of France. This region was sometimes called *Belgica* or *Gallia Belgica*. It was separated from the territory of the Celtæ by the river *Sequana* (Seine) and its affluent the *Matrona* (Marne). Cæsar represents the Belgæ as distinct from the Celtæ proper and the Aquitani in language, usages, and political institutions. A part of the Belgæ were probably Germans or of German origin, and a part are believed to have been Cymric Celts. Some of the Belgæ had crossed the Channel and settled in the southern maritime parts of Britain, and were found there by Cæsar when he invaded the island. The Belgæ were a brave, warlike people. (See Cæsar, "Commentaries on the Gallic War;" Smith, "Dictionary of Ancient Geography.")

Bel'gard, written also **Bjaligrod,** a town of Prussia, in the province of Pomerania, 90 miles by rail N. E. of Stettin, has a castle, several churches, and manufactures of tobacco and woollen stuffs. Pop. in 1871, 6303.

Belgaum', a town of British India, in the presidency of Bombay, 105 miles S. W. of Bejapoor. It has solid, bastioned walls and ancient ruins, among them two temples. Pop. about 8000.

Bel'gium, a kingdom of Europe, situated on the German Sea between Holland, Prussia, and France, has an area of 11,373 square miles, and (in 1869) a population of 4,961,644 inhabitants. It is the most densely peopled of any European country, having 436 inhabitants to the square mile. The soil is partly fertile, partly (in the E.) sandy and marshy. The only mountains are some offshoots of the Ardennes in the S. The coast has a length of 46 miles, and is of a uniform character. The country is well watered by the Meuse and the Scheldt, and their affluents, the Sambre, Ourthe, Werze, Lys, Dender, and Rupel. There are no lakes of importance, but many canals. The climate in general is temperate. Among the chief products of Belgium belong cattle, fish, corn, fruit, wood; among those of the mineral kingdom, iron and coal. A coal region covering an area of 476 square miles traverses all Belgium, and embraces two large basins, one of which extends into France and the other into Prussia. Celebrated mineral springs are found at Spaa. The people belong, in almost equal proportion, to two different nationalities, the Flemish (German) and the Walloon (French). The Flemish language, which is spoken by about 2,500,000, prevails in the provinces of East Flanders, Antwerp, Limburg, West Flanders, and Brabant, while the Walloon is the predominant language in the provinces of Liege, Hainaut, Namur, and Luxemburg, and is spoken by a population of about 2,000,000. The French, though the language of the minority, has since 1794 been the official language of the state authorities and the court; of late, however, the Flemings have begun an active agitation for the recovery of equal rights for their idiom. The number of periodicals published in the Flemish language was, in 1871, about 40. With the exception of about 10,000 Protestants and 2000 Jews, the entire population belongs to the Roman Catholic Church, which has in Belgium one archbishop at Malines, and five bishops at Namur, Ghent, Bruges, Tournay, and Liege.

There are four universities—at Ghent, Liege, Louvain, and Brussels; the two first named are controlled by the state; the third by the Catholic bishops, and the last named by the Liberal party. Prominent among the other educational institutions of the country are the Academies of Fine Arts at Antwerp and Brussels, the Museum of Painting and Sculpture at Brussels, the Conservatories of Music at Brussels, Liege, and Ghent. The people are chiefly occupied with agriculture, and in this respect excel most nations of Europe. The working of mines also constitutes a most important part of the national industry. First in order are the coal-mines (with three great centres at Mons, Charleroi, and the city of Liege), which produce annually about 10,000,000 tons. The annual produce of the iron-mines, which are especially numerous in the district between the Sambre and the Meuse, amounts to about 7,200,000 hundredweight. Wool is the object of an immense industry, and the Belgian woollen cloths are greatly superior in quality to those produced in France. The linen cloths of Belgium have long been highly valued, and the manufacture of lace, though now less prosperous than formerly, has nothing to fear from foreign competition. The breweries amount to 2671, and beer is the common beverage of all classes. The commerce of the country is also in a

very prosperous condition, being greatly promoted by a dense net of railroads, which in 1871 had an aggregate length of 1936 miles. It is chiefly carried on with France, Holland, England, Prussia, North America, and Russia. The imports in 1869 amounted to 903,000,000 francs, the exports to 691,000,000. The commercial fleet, in 1869, consisted of 67 vessels (12 steamers), with an aggregate of 23,981 tons. The aggregate length of the telegraph lines was, in 1871, 2623 miles. The most important ports are those of Antwerp, Ostende, and Nieuwepoort; the most important centres of the commerce of the interior are Brussels, Ghent, Bruges, Liege, Namur, Courtray.

According to the constitution of Mar. 3, 1831, Belgium is a constitutional monarchy. The crown is hereditary, according to the right of primogeniture, in the male line only. The executive power is vested in the king alone; the legislative he shares with the senate and the house of representatives. The court of cassation at Brussels is the supreme court of the country; besides it there are three courts of appeal (Brussels, Ghent, and Liege). The jury has been introduced since 1831. The Code Napoléon is regarded as the judicial standard. The revenue and expenditures in 1870 amounted to 176,000,000 francs; the public debt to 696,000,000 francs. The army on the peace footing numbered (without officers) 98,770 men, 10,600 horses, and 152 pieces of ordnance; besides, the country has a civil guard consisting of 100,000 men, in 257 legions. The navy is unimportant. The most important fortresses are Antwerp, Mons, Charleroi, Philippeville, Marienbourg, Ath, Tournay, Menai, Ypres, Ghent, Namur. The measures and coins are the same as in France. In point of administration the country is divided into nine provinces: South Brabant, Antwerp, East and West Flanders, Hainaut, Namur, Liege, Limburg, Luxemburg. Brussels is the capital and residence of the king: during the summer months the king resides at Laeken. The national colors are red, yellow, and black, placed perpendicularly beside each other; the escutcheon, the lion of Brabant with the inscription, "L'union fait la force."

In the time of the Romans, the present Belgium, which was then inhabited by Celtic and Germanic tribes, formed, under the name of Gallia Belgica, a part of Gaul. The treaty of Verdun, in 843, united the southern districts with France, the northern with Germany. After the termination of the Carlovingian rule, the French districts were gradually converted into duchies and counties. In 1385 the county of Flanders fell to the House of Burgundy, which in the early part of the fifteenth century gradually obtained possession of all the provinces of the Netherlands. The marriage of Maria of Burgundy, the last scion of her house, with the emperor Maximilian I., incorporated the Netherlands with the extensive dominions of the House of Habsburg, and, under the name of the "Circle of Burgundy" (Burgundischer Kreis), with the German empire. When, after the abdication of Charles V. (1555), his states were divided, Belgium remained united with Spain, and this union continued after the northern provinces had successfully established their independence. Only from 1598 to 1621, Belgium constituted an independent state under the rule of Isabel, daughter of Philip II., and her husband, the archduke Albert. In the course of the seventeenth century Spain had repeatedly to cede portions of Belgian territory to France. The peace of Utrecht in 1713 gave Belgium to Austria.

In the Austrian war of succession the whole country was conquered by the French, but it was restored to Austria in the peace of Aix-la-Chapelle (Oct. 18, 1748). In consequence of the unpopular reforms and innovations which Joseph II. undertook to introduce, an insurrection broke out against Austrian rule in Dec., 1789, and on Jan. 11, 1790, the Belgian provinces (with the exception of Luxemburg) proclaimed their independence under the name of "United Belgium," but in Nov., 1790, the rule of the Austrians was re-established. After the battle of Jemappes (Nov. 7, 1792), Belgium was occupied by the French, and in 1794 the country was ceded by Austria to France. It was now divided into nine departments, and the administration wholly assimilated to that of France. In 1814 the first treaty of Paris united Belgium with Holland into the kingdom of the Netherlands. The union lasted until Aug., 1830, when the whole country rose in revolution against the Dutch government. On Sept. 20 a provisional government was formed, which, on Oct. 4, after the evacuation of the capital by the Dutch, proclaimed the independence of Belgium. On June 4, 1831, the prince Leopold of Saxe-Coburg was elected king. The preliminary treaty of 1833 between England, France, and Holland put an end to the efforts of the Dutch government for the recovery of Belgium, but the definite acceptance of the articles drawn up by the London Conference in 1831 for the regulation of the frontier between Holland and Belgium did not take place until 1838. The subsequent history of Belgium under Leopold I. (died Dec. 10, 1865) and his son Leopold II. has been one of quiet and steady development. The administration has been sometimes in the hands of the Catholic and sometimes in those of the Liberal party, but the peace of the country has never seriously been disturbed, not even by the European revolution of 1848. (See JUSTE, "Histoire de Belgique," 2 vols., 4th ed. 1868.)

A. J. SCHEM.

Belgium, a village of Clay township, Onondaga co., N. Y., on Seneca River. Pop. 166.

Belgium, a post-township of Ozaukee co., Wis., on Lake Michigan. Pop. 1979.

Belgo'rod, a town of Russia, in the government of Koorsk, on the river Donets, 88 miles S. S. E. of Koorsk, and on the railway from Moscow to Kharkof. It is an archbishop's see, and has numerous churches. Pop. in 1867, 15,200.

Belgrade, bĕl-grād' (anc. *Singidu'num;* Turk. *Bilgraad;* Ger. *Belgrad*), an important fortified town of Servia, is on the right bank of the Danube, at the mouth of the river Save, 42 miles S. E. of Peterwardein. The citadel, which is very strong, is situated on a point of land between the rivers, behind which rises the city with antique German edifices, a cathedral, and a palace. Belgrade had formerly an Oriental appearance, but it has been abandoned by many wealthy Turks, and mosques are partly superseded by churches. Here are manufactures of arms, cutlery, silk goods, saddlery, and carpets. It has a good port and an active trade, being the entrepôt of the commerce between Austria and Turkey. It is the seat of the chief authorities of Servia. In consequence of its importance as a strategical point, Belgrade has been the scene of many famous sieges and battles. It was besieged without success by the Turks in 1456, and taken by the sultan Solyman in 1522. In 1688 it was stormed and captured by the elector of Bavaria, but it was recovered by the Turks in 1690. Prince Eugene here defeated 200,000 Turks in 1717, after which it changed owners several times. It is now subject to Turkey. Pop. in 1866, 25,089.

Belgrade, a post-township of Kennebec co., Me., 67 miles N. E. of Portland, on the Maine Central R. R. It has manufactures of lumber, boxes, spools, "excelsior," etc. Pop. 1485.

Belgrade, a township of Nicollet co., Minn. Pop. 414.

Be'lial [Heb. "worthlessness"], a term used in the Bible, frequently occurring in the phrase "a son of Belial," which, by a common Hebrew idiom, signifies merely a worthless or very bad person; but in the New Testament it is generally believed that Belial sometimes is used as a proper name of Satan, though it is not universally admitted. Some commentators think that it is always used in the New Testament in its Old Testament signification.

Bélidor, de (BERNARD FOREST), an eminent French military engineer and writer, born in Catalonia in 1697. He served in the German campaign of 1742, and became a member of the Academy of Sciences. Among his works may be mentioned his "Hydraulic Architecture" (1737), a "New Course of Mathematics for the Use of Artillery" (1757), a "Traité de Fortification," and "La Science des Ingénieurs." Died Sept. 8, 1761.

Belisa'rius [Slavic, the "white tsar or chief"], a celebrated general to whom Justinian was chiefly indebted for the military glory of his reign, was born at Germania, in Illyria, about 505 A. D. Having been appointed general-in-chief of the army of the East, he defeated the Persians at Dara in 530, and suppressed a formidable sedition at Constantinople in 532. He gained two victories over the Vandals in Africa, and took their king, Gelimer, a prisoner, in 534 A. D. In 534 he obtained a triumph, and the office of consul in 535. He also commanded the army of Justinian in a long war against the Ostrogoths, who had made themselves masters of Italy. He occupied Rome in Dec., 536, and gained some other advantages, but was recalled in 540, after which he suffered adverse fortune through the enmity of the empress Theodora. In 544 A. D. he was again sent to Italy to oppose the Gothic king Totila, but his army was so inferior in number that he could not gain a decisive victory. He resigned the command in 548, and passed nearly ten years in inaction. He served with success against the Bulgarians in 559, and was imprisoned in 563 on a charge of treason. Died Mar. 13, 565 A. D. He was distinguished for his loyalty, humanity, and other virtues. (See LORD MAHON, "Life of Belisarius," 1829; GIBBON, "Decline and Fall of the Roman Empire;" C. F. ZELLER, "Belisarius," Tübingen, 1809; C. L. ROTH, "Ueber Belisars Ungnade," 1846.)

Bel'knap, a county in Central New Hampshire, is bounded on the N. E. by Winnepiseogee Lake. Area, 360

square miles. The surface is hilly. Wool, potatoes, grain, and butter are the chief products. The county is intersected by the Concord and Montreal R. R. Capital, Laconia. Pop. 17,681.

Belknap (GEORGE E.), U. S. N., born Jan. 22, 1832, in Newport, N. H., entered the navy as a midshipman Oct. 7, 1847, became a passed midshipman in 1853, a lieutenant in 1855, a lieutenant-commander in 1862, and a commander in 1866. In 1856, while attached to the sloop-of-war Plymouth, he took part in the assault and capture of the "Barrier Forts" at the mouth of the Canton River, China, and was executive officer of the iron-clad New Ironsides from 1862 to 1864 in her numerous engagements with the forts and batteries of Charleston harbor. In his official report to Rear-Admiral Dupont of the part taken by the New Ironsides in the first bombardment of Fort Sumter, April 7, 1863, Commodore Turner writes: "I should fall short of my duty, sir, if I omitted to present to your especial notice the first lieutenant of this ship, Lieutenant-Commander George E. Belknap. It was not in the hour of battle only that great demand was made upon him; there was a constant pressure upon the high qualities that distinguish him as an efficient officer to meet exigencies, which, through a week of toil and labor, he had to provide for. He was equal to his work, gave me a perfect support at all times; and I desire here, and through you, to commend him to the favorable consideration of the government as an officer of the highest merit." Captain (now Vice-Admiral) Rowan, in a report to Rear-Admiral Dahlgren of "the services of the New Ironsides against the defences of Charleston harbor," dated Sept. 10, 1863, says: "I particularly recommend to your notice and that of the department the services of Lieutenant-Commander Belknap, to whose zeal and ability as an executive officer I am so much indebted for his untiring efforts to make the ship efficient in every department, and for his fine judgment and bearing in carrying out my orders as commander of the gundeck during the fourteen times this ship has been under the fire of the enemy's batteries." He commanded the iron-clad Canonicus in both attacks on Fort Fisher. His services on these occasions are thus highly spoken of by Rear-Admiral Porter in his "commendatory letter" of Jan. 28, 1865: "I recommend that Commanders Parrott and Calhoun, and Lieutenant-Commanders Weaver and Belknap, be promoted. These officers have given a world-renowned name to the monitors, and have shown what they were capable of performing when properly placed and managed. They had the hardest part of the work, and there is no end to their energy, bravery and untiring zeal."

FOXHALL A. PARKER, U. S. N.

Belknap (JEREMY), D. D., was born in Boston, Mass., June 4, 1744. He graduated at Harvard College in 1762, was pastor of a church at Dover, N. H., from 1767 to 1786, and was then settled over the Federal Street church, Boston, from 1787 till he died, June 20, 1798. He was the founder of the Massachusetts Historical Society in 1791. He was a careful scholar and a good preacher. He published, besides other works, a "History of New Hampshire" (3 vols., 1784–92), and "American Biography" (2 vols., 1794–98). A memoir of him was published in 1847.

Belknap (WILLIAM G.), an American officer, born at Newburg, N. Y., Sept. 7, 1794, entered the service of the U. S. in 1813 as third lieutenant of infantry, and rose through successive grades to be lieutenant-colonel of the Fifth Infantry in 1847. He served with marked gallantry in the war with Great Britain (1812–15), in the Florida war against hostile Seminoles, and in the war with Mexico. For his services in Florida he was brevetted lieutenant-colonel, and for gallant conduct in Mexico he won the brevets of colonel and brigadier-general; served on frontier duty from 1848 to 1851 in command of his regiment and departments, and while on duty in Upper Texas he contracted a disease from which he died near Fort Washita, Nov. 10, 1851. G. C. SIMMONS, *Clerk Board of Eng'rs.*

Belknap (WILLIAM WORTH), son of the preceding, an American lawyer, and general of volunteers during the recent civil war, born at Newburg, N. Y., Sept. 22, 1829, graduated at Princeton College, N. J., in the class of 1848, studied law with H. Caperton at Georgetown, D. C., removed to Keokuk, Ia., in 1851, and practised his profession successfully. He was elected to the Iowa legislature in 1857 as a Democrat, but being unwilling to countenance the Lecompton constitution, separated from the radical wing of his party, and became what was known as a "Douglas Democrat" up to the breaking out of the civil war, since which time he has been actively identified with the Republican party. He entered the army about Oct., 1861, as major of the Fifth Iowa Infantry, and participated in the battle of Shiloh, where he displayed admirable military qualities; was provost-marshal of the Seventeenth army corps, on Gen. McPherson's staff, and in the campaigns in Tennessee he served under Gens. Sherman and Grant, his services being highly esteemed. At the battle of Atlanta, Ga., July 22, 1864, he so greatly distinguished himself that he was promoted over his superior officers to be brigadier-general of volunteers, Aug. 22, 1864. He bore a prominent part in all the actions during Sherman's famous "march to the sea," and finally to Washington. He was brevetted major-general Mar. 13, 1865, and honorably mustered out of service Aug. 24, 1865. Although tendered more lucrative positions, he declined them to become collector of internal revenue for the first district of Iowa, in which he wrought many reforms. In 1869 he was appointed secretary of war, which portfolio he still retains, administering the responsible duties of his office with great acceptability, both to the Administration and the country, as well as to the officers of the army. As a lawyer, he attained prominence; as a soldier, he distinguished himself for gallantry and ability to command; and as one of the chief executive officers of the government, he is regarded among the most successful of the secretaries of war.

G. C. SIMMONS, *Clerk Board of Eng'rs.*

Bell [from the Ang. Sax. *bellan*, to "make a loud noise"], a hollow metallic instrument employed to give signals by its sounds. It is usually composed of BELL-METAL (which see), but steel bells have been cast with good results. From a remote antiquity hand-bells were used in religious ceremonies. In Egypt the feast of Osiris was announced by the ringing of bells; several bells of bronze have been found in the ruins of Nineveh; Jewish high priests wore golden bells attached to their vestments. In Palestine bells were used in personal adornment, as now in the East. The Hindoo and Burmese priests have long used them in their temples, and in Athens the priests of Cybele used bells in their rites. The Greeks employed bells (κώδωνες) in garrisons and markets; the Romans announced the hour by the *tintinnabulum*. The introduction of bells into churches is usually ascribed to Saint Paulinus, bishop of Nola in Campania (400 A. D.). Their use in churches and monasteries soon spread through Christendom. They were introduced into France about 550, and Benedict, abbot of Wearmouth, brought one from Italy into England about 680. Portable bells had long before been used in the Church. Several specimens, some of them, it is believed, as old as the sixth century, are still preserved in Ireland, Scotland, and Wales. Bells came into use in the East after 865. Church bells were then of a comparatively small size, and were frequently made of wrought instead of cast metal. It was not until the fourteenth century that they reached a large size. The "Jacqueline" of Paris, cast in 1300, weighed 15,000 pounds; another, cast in 1472, weighed 25,000 pounds. The famous bell of Rouen, cast in 1501, weighed 36,364 pounds. One at Toulouse weighs 66,000 pounds. The largest bell in the world is the Great Bell of Moscow, above 19 feet in height, and weighing 448,000 pounds. It was cast in 1734, but fell during a fire in 1737, was injured, and remained till 1837, when it was raised, and now forms the dome of a chapel. Another Moscow bell, cast in 1819, weighs 80 tons. The Great Bell at Pekin, 14 feet high, weighs 53½ tons.

Bells have long been connected with the services of the Christian Church, so that the Mohammedans substitute for them the cry of the muezzin from the tops of the mosques. Associated in various ways with the ritual of the Church, bells acquired a sacred character. They were cast with religious ceremonies, and consecrated by baptism; received names, had sponsors, were sprinkled with water, anointed, and covered with the white chrisom, like infants. This custom is still practised in Roman Catholic countries. Bells were believed to disperse storms and pestilence, drive away enemies, extinguish fires, etc. In the Middle Ages it was common to put some inscription on the bell, like the following:

"Vivos voco, mortuos plango, fulgura frango." *
"Funera plango, fulgura frango, Sabbata pango,
Excito lentos, dissipo ventos, paco cruentos." †
"Laudo Deum verum; plebem voco; congrego clerum;
Defunctos ploro; pestem fugo; festamque honoro." ‡

The notion that bells are efficacious in dispelling storms is by no means extinct.

It was a belief that bells had the power to terrify evil spirits, and the custom of ringing the *passing-bell* grew out of the belief that devils troubled the expiring patient, and

* Literally: "I call the living, I mourn the dead,
I break the lightnings" (or thunderbolts).

† "I mourn the deaths, I break the lightnings,
I mark the Sabbaths, I arouse the slow, I scatter the winds,
I appease the cruel."

‡ "I praise the true God; call the people; assemble the clergy; bewail the dead; put to flight the plague; honor the festivals."

lay in wait to afflict the soul the moment when it escaped from the body. The tolling of the passing-bell was retained at the Reformation, and the people were instructed that its use was to admonish the living and excite them to pray for the dying. The practice of tolling church-bells while funerals are being conducted is still a usage in various nations.

The ringing of the *curfew*, incorrectly supposed to have been introduced into England by William the Conqueror, was a custom of a civil nature, and its object was to warn the public to extinguish their fires and lights at eight o'clock. The eight-o'clock ringing is still continued in many parts of England, Scotland, and the U. S.

The ringing of bells in chimes, and the playing of tunes upon them in church-towers, have been carried to the greatest perfection in the Netherlands; but many fine chimes are found in many other European countries and in the U. S.

REVISED BY R. D. HITCHCOCK.

Bell, a county of Western Tennessee, bordering on Mississippi, established since the census of 1870. It is a good cotton and corn region, and is intersected by the Memphis and Charleston and the Mississippi Central R. Rs. Capital, Grand Junction.

Bell, a county in Central Texas. Area, 1097 square miles. It is intersected by the Leon River, and also drained by Lampasas Creek. Much of the surface is fine prairie. It is healthy, well watered, and well timbered. The soil is adapted to pasturage and cotton and grain crops. Corn, wool, cotton, and cattle are raised. Capital, Belton. Pop. 9771.

Bell, a township of Clearfield co., Pa. Pop. 918.

Bell, a township of Jefferson co., Pa. Pop. 785.

Bell, a township of Westmoreland co., Pa. Pop. 810.

Bell (ANDREW), D.D, a Scottish teacher noted as the founder of the monitorial system (or Madras system) of education, was born at St. Andrew's in 1753. He took orders in the Anglican Church, and became chaplain of Fort St. George at Madras in 1789. Having obtained the direction of a school for male orphans at Madras, he employed the scholars in mutual instruction, and after his return to Britain published a treatise on his new method in 1797. Joseph Lancaster made some successful experiments in this method of education. Bell died Jan. 27, 1832, and left £120,000 sterling to found educational institutions. (See R. and C. C. SOUTHEY, "Life of Andrew Bell.")

Bell (Sir CHARLES), F. R. S. (London), an eminent British anatomist and physiologist, the youngest brother of Andrew Bell, was born in Edinburgh in Nov., 1774. He removed in 1804 to London, where he lectured on anatomy and surgery, and published a "System of Operative Surgery" (1807). In 1814 he was elected one of the surgeons of the Middlesex Hospital. He gained distinction as a surgical operator, and excelled in the treatment of nervous affections. He made the important discovery that the nerve-filaments of sensation are distinct from those of motion. In 1836 he became professor of surgery in the University of Edinburgh. Among his works are an "Exposition of the Natural System of the Nerves of the Human Body" (1824), "Anatomy and Physiology of the Human Body" (3 vols., 1816), and "The Hand, its Mechanism and Vital Endowments as evincing Design" (1834). The last is one of the Bridgewater Treatises. Died April 29, 1842. (See A. SHAW, "Narrative of the Discoveries of Sir Charles Bell in the Nervous System," 1837; "Quarterly Review" for May, 1843; AMÉDÉE PICHOT, "Sur C. Bell," Paris, 1846.)

Bell (CHARLES H.), REAR-ADMIRAL, born in New York Aug. 15, 1798, became a midshipman of the U. S. navy in 1812, and served in the war with Great Britain, became captain in 1854, commodore in 1862, and rear-admiral in 1866.

Bell (HENRY), a Scottish engineer, born in Linlithgowshire April 7, 1767, was the first who obtained success in steam navigation in Europe. He worked in London under Rennie. A small vessel called "The Comet," with an engine constructed by himself, was launched on the Clyde in 1812. Died Nov. 14, 1830.

Bell (HENRY H.), U. S. N., born Nov. 17, 1807, in Orange co., N. C., entered the navy as a midshipman Sept. 1, 1823, became a lieutenant in 1831, a commander in 1854, a captain in 1862, a commodore in 1863, and a rear-admiral in 1866. In 1861 he commanded the steamer Brooklyn, West Gulf blockading squadron. In 1862 he was selected as fleet captain by Rear-Admiral Farragut, and while acting in this capacity led the second division of gunboats at the attack upon Forts St. Philip and Jackson and capture of New Orleans, where his sound judgment and coolness were conspicuously shown and highly commended by the whole fleet. His services during the passage of the Hartford by the Vicksburg batteries, June 28, 1862, are thus referred to by Admiral Farragut: "The captain of the fleet, Commander H. H. Bell, was on the poop by my side, and not being able, as I before stated, to do much in the management of the fleet, owing to the darkness and the smoke, gave his attention to looking up the batteries, and pointing them out to the officers in charge of the guns, and assisting them with his judgment on all occasions." In 1863 he commanded, during the temporary absence of Admiral Farragut, the West Gulf blockading squadron. In 1865, he was appointed to the command of our squadron in the East Indies, where he was drowned, April 12, 1867, in an attempt to pass in his barge over the bar at the mouth of the Osada River, Japan. Rear-Admiral Henry H. Bell was an able and gallant officer, and his death was much lamented.

FOXHALL A. PARKER, U. S. N.

Bell (JAMES), a brother of S. D. Bell, was born at Francestown, N. H., Nov. 13, 1804, and graduated at Bowdoin in 1822. He studied law at Litchfield, Conn., practised at Gilmanton, Exeter, and Guilford, N. H., and was U. S. Senator (1855–57). Died May 26, 1857.

Bell (JOHN), an eminent surgeon, born in Edinburgh May 12, 1763, was an elder brother of Sir Charles Bell. He began in 1786 to lecture on surgery, which he also practised with success in his native city. He published, besides other works, a "System of the Anatomy of the Human Body" (2 vols., 1793–98), to which his brother Charles added two more volumes, and "The Principles of Surgery" (3 vols., 1801–07). He was a good classical scholar, and one of the most skilful operators of his time. He died at Rome April 15, 1820, leaving "Observations on Italy," which was published by his widow in 1825.

Bell (JOHN), an American statesman, born near Nashville, Tenn., Feb. 15, 1797. He graduated at the University of Nashville in 1814. He was elected a member of Congress in 1827, and by successive re-elections continued in that body about fourteen years. He supported Gen. Jackson for the presidency in 1832, but joined the Whig party in 1833, and was chosen Speaker of the House of Representatives in 1834. He was an earnest advocate of a protective tariff. In Mar., 1841, he was appointed secretary of war by President Harrison. He resigned that office in Sept., 1841, because he disapproved the policy of Mr. Tyler. He was elected a Senator of the U. S. for Tennessee in 1847, was re-elected in 1853, and opposed the repeal of the Missouri Compromise in 1854. He was nominated in 1860 for President of the U. S. by the Constitutional Union party, having Lincoln, Douglas, and Breckenridge as his competitors. He received only thirty-nine electoral votes. Died Sept. 10, 1869.

Bell (JOHN), born at Londonderry, N. H., about 1765, was governor of New Hampshire (1829–30). He was a brother of Gov. Samuel Bell, and was long prominent in public affairs. Died at Chester, N. H., Mar. 22, 1836.

Bell (LUTHER V.), M. D., LL.D., a son of Gov. Samuel Bell, was born at Chester, N. H., Dec. 20, 1806, graduated at Bowdoin in 1823, and received his diploma in medicine at Dartmouth. He practised medicine in New York and Chester, N. H., and became an excellent surgeon, and was president of the McLean Insane Asylum, Somerville, Mass. (1837–56). He published able professional writings. In 1845 he visited Europe by invitation of the trustees of the Butler Hospital for the Insane at Providence, R. I., the plans for which he prepared. In Aug., 1861, he was appointed brigade surgeon in the U. S. army, and at the time of his death was medical director of Hooker's division. Died in camp at Budd's Ferry, Md., Feb. 11, 1862.

Bell (ROBERT), a journalist, born at Cork, in Ireland, Jan. 10, 1800, passed his mature life in London. In conjunction with Sir E. Bulwer and Dr. Lardner he founded in 1841 "The Monthly Chronicle," which he edited. Among his numerous works are a "History of Russia" (3 vols., 1836–38), "Lives of the English Poets" (2 vols., 1839), a "Life of George Canning" (1846), and several dramas and tales. He died in London April 12, 1867.

Bell (SAMUEL), LL.D., was born in Londonderry, N. H., Feb. 9, 1770, and graduated at Dartmouth in 1793. He became a lawyer, and held many public offices. He was a judge of the supreme court of New Hampshire (1816–19), governor (1819–23), U. S. Senator (1823–35).—His sons, JAMES, SAMUEL DANA, LUTHER V., and Col. LEWIS BELL (1836–65, mortally wounded at Fort Fisher), all attained distinction.

Bell (SAMUEL DANA), LL.D., son of the above, was born at Francestown, N. H., Oct. 9, 1798, and graduated at Harvard College in 1816. Besides many minor offices, he was justice of the superior court of New Hampshire (1849–55), justice of the supreme court (1855–59), chief-justice

(1859–64), and was one of the most eminent and profound jurists that New England has ever produced. Died July 31, 1868.

Bell (THOMAS), F. R. S., an English naturalist, born in Dorsetshire Oct. 11, 1792. He became a member of the College of Surgeons in London in 1815, and professor of zoology in King's College, London, in 1832. In 1853 he was elected president of the Linnæan Society. Among his works are a "History of British Quadrupeds" (1836) and a "History of British Stalk-eyed Crustacea" (1853).

Bel'la, a town of Italy, in the province of Potenza, 14 miles S. W. of Malfi. Pop. in 1861, 5202.

Belladon'na* (*At'ropa*† *Belladon'na*), an herbaceous perennial plant of the natural order Solanaceæ, is sometimes called **Deadly Nightshade.** It is a native of Europe, has ovate leaves, bell-shaped flowers of a lurid, purple color, and berries which when ripe are black, shining, and sweetish in taste. All parts of the plant are narcotic and very poisonous, and contain an alkaloid called *atropia* or *atropine*, on which its active properties depend. The belladonna is considered a valuable medicine and a powerful remedy for certain nervous diseases, neuralgia, paralysis, etc. It is administered both internally and externally. It is a physiological antidote for opium-poisoning. When applied to the eye it has the remarkable property of greatly dilating the pupil, and it is often used by oculists both in examinations and operations. The medicinal preparation of belladonna commonly used in the U. S. is an extract from the leaves.

Belladonna Lily (*Amaryl'lis Belladon'na*), a beautiful rose-colored flower which grows wild about the Cape of Good Hope, and is cultivated in the gardens of England and France. The drooping flowers are clustered at the top of a leafless stem, which is about eighteen inches high.

Bellair', a township of Appanoose co., Ia. Pop. 655.

Bellaire, a city of Belmont co., O., on the Ohio River, 5 miles S. of Wheeling and 137 miles E. of Columbus. It is at the terminus of the Central Ohio, the Baltimore and Ohio, and the Cleveland and Pittsburg R. Rs. It has water and gas works, 1 national and 1 private bank, 1 manufactory of window-glass and 4 of flint-glass, 1 nail-mill, 1 blast furnace, 1 lantern-factory, and 2 weekly papers. Coal, iron, and limestone are abundant. It is a rapidly growing town. Pop. 4033. JAMES F. ANDERSON, ED. "INDEPENDENT."

Bel'lamy (JACOBUS), an eminent Dutch poet, born at Flushing Nov. 12, 1757. He published a collection of verses in 1782, and on the occasion of the war of 1785 a volume of patriotic poems ("Vaderlandsche Gezangen"). Among his most popular works is "Roosje," a poem. He had good taste and a glowing fancy, and contributed largely to the improvement of the national literature. Died Mar. 11, 1786. (See Q. KNIPERS, "Notice sur Bellamy.")

Bel'lamy (JOSEPH), D. D., born in North Cheshire, Conn., in 1719, graduated at Yale College (1735), and was pastor of the Congregational church at Bethlehem, Conn. (1740–90). He was a powerful preacher and a renowned teacher of theology. Several volumes of his sermons and theological works have been published. Among them are "True Religion Delineated" (1750), "Letters and Dialogues" (1761), and "Complete Works" (3 vols., 1811). Died Mar. 6, 1790.

Bel'larmine (ROBERT), [It. *Roberto Bellarmino*], a celebrated theologian and cardinal, born in Tuscany Oct. 4, 1542. He entered the order of Jesuits in 1560, and became professor of theology at Louvain in 1569. He was a zealous champion of orthodoxy, and was highly distinguished as an able controversial writer against heretics. His principal work is "Disputationes de Controversiis Fidei adversus hujus Temporis Hæreticos" (3 vols., 1581). He became a cardinal in 1598, archbishop of Capua in 1601, and librarian of the Vatican in 1605. Died at Rome Sept. 17, 1621. He was a man of mild and pacific disposition. "The Church of Rome," says Hallam, "brought forward her most renowned and formidable champion, Bellarmin. . . . His abilities are best tested by Protestant theologians, not only in their terms of eulogy, but indirectly in the peculiar zeal with which they chose him as their worthiest adversary." (*Introduction to the Literature of Europe.*) (See G. FULIGATI, "Vita del Cardinal R. Bellarmino," 1624, a work based upon an Autobiography; DANIELLO BARTOLI, "Della Vita di R. Bellarmino," 1678; P. FRIZON, "Vie du Cardinal Bellarmin," 1708.)

*The name *Belladonna*, an Italian phrase signifying "beautiful lady," is said to have been given to this plant from its having been used to improve the complexion, as well as to make the eye appear dark and lustrous.

†From *Atropos*, the name of one of the Fates.

Bella'ry, a town of India, in the province of Madras, 135 miles N. of Seringapatam, is one of the chief military stations in the province, and has a fort on a rock 450 feet high. Pop. about 30,000.

Bell Bird [Sp. *campane'ro*], (*Arapunga alba* or *Casmarynchus carunculata*), found in Guiana and other parts of South America, is nearly as large as a pigeon. It utters a note of metallic sound, resembling the tolling of a bell, which, it is said, can be heard at a distance of three miles. It is distinguished by a broad and depressed bill, which is soft and flexible at the base. The plumage of the male is snowy white. From its forehead grows a curious horn-like and tubular appendage, which when empty is pendulous, but when the bird is excited is filled with air and rises to the height of three inches. The Australian bell bird (*Myzantha melanophrys*), "one of the honey-eaters," produces a peculiar tinkling sound; it is an entirely different species from the above.

Bell, Book, and Candle. The excommunication by bell, book, and candle is a solemnity belonging to the Roman Catholic Church. The priest pronounces the formula of excommunication, consisting of maledictions on the head of the person anathematized, and closes the sentence by shutting the book from which it is read, taking a lighted candle and casting it to the ground, and tolling the bell as for the dead. This mode of excommunication appears to have existed in the Western churches as early as the eighth century. The form of excommunication concluded substantially as follows: "Cursed be they from the crown of the head to the sole of the foot. Out be they taken of the book of life. And as this candle is cast from the sight of men, so be their souls cast from the sight of God into the deepest pit of hell. Amen."

Bell Brook, a post-village of Sugar Creek township, Greene co., O. Pop. 369.

Bell Creek, a post-twp. of Goodhue co., Minn. P. 820.

Bellechasse, a county of Quebec, bordering on the State of Maine, is bounded on the N. W. by the St. Lawrence River. Area, 720 square miles. The staple productions are maple-sugar, hay, flax, and oats. Pop. 17,637.

Belle Creek, a post-twp. of Washington co., Neb. P. 200.

Bellefontaine, a post-village, county-seat of Logan co., O., at the crossing of the Cincinnati and Sandusky and Cleveland and Indianapolis R. Rs. It is the eastern terminus of the Evansville R. R. (building). It is about 110 miles N. of Cincinnati and 55 miles N. W. of Columbus. It has the highest elevation of any town in the State. It has a good trade, 2 banks (1 national), 3 newspapers, 10 churches, 5 schools, a fine court-house, and is noted for its health and beauty. P. 3182. J. Q. A. CAMPBELL, ED. "REPUBLICAN."

Bellefonte, a post-twp. of Jackson co., Ala. Pop. 957.

Bellefonte, a village of Boone co., Ark. It has one weekly newspaper.

Bellefonte, the county-seat of Centre co., Pa., is beautifully situated at the foot of Bald Eagle Mountain, 87 miles N. W. of Harrisburg. The Bald Eagle Valley R. R., connecting with the Philadelphia and Erie R. R. at Lock Haven, and with the Pennsylvania R. R. at Tyrone, passes through the town. Of late it is a place of summer resort. It has a celebrated spring, and the surrounding scenery is very fine. It has two furnaces, three rolling-mills, two foundries, an axe-factory, extensive car-works, glass-works, and a number of smaller manufactories, one monthly and three weekly papers, four printing-offices, three banks, an academy, and a large number of fine private residences. P. of borough, 2655. P. GRAY MEEK, ED. "WATCHMAN."

Bellefonte, a township of Nottoway co., Va. P. 2837.

Belle-Isle-en-Mer, an island belonging to the French department of Morbihan, is in the Atlantic. It is 8 miles from the shore, and has an area of 12 square miles. Pop. 10,076, mostly engaged in the pilchard-fishery. Excellent horses and grain are raised here. Here is a fortified seaport named Le Palais.

Belle Isle, North. (1) An island in the strait of the same name, between Newfoundland and Labrador, is 21 miles in circuit, and has a small harbor; lat. 52° 13′ N., lon. 55° 19.1′ W. (2) BELLE ISLE, SOUTH, an island at the entrance of White Bay, on the N. E. side of Newfoundland; lat. 50° 49′ N., lon. 55° 29′ W. It is a fishing-station. Pop. 53. (3) BELLE ISLE, a fertile island, 9 miles long and 3 broad, in Conception Bay, Newfoundland. It has considerable fishing interests. Pop. 500.

Belle Isle, Strait of, between Labrador and Newfoundland, is 80 miles long, 12 miles wide, and dangerous of navigation.

Bel'lenden (WILLIAM), a Scottish author of whose personal history little is known. He was a professor in the University of Paris, and was distinguished for the elegance

of his Latinity. He published in 1608 at Paris a compilation from the works of Cicero, entitled "Ciceronis Princeps." Among his other works are "De Statu Prisci Orbis" ("On the Condition of the Primitive World," 1615), and "De Tribus Luminibus Romanorum" (1634). Died before 1633. His three principal works were reprinted in 1787, with a Latin preface by Dr. Parr. The preface was noted for its elegant Latinity and its allusions to contemporary politics. The preface attracted much more attention than the reprint.

Belle Plain, a township of Marshall co., Ill. P. 1092.

Belle Plaine, a post-village of Benton co., Ia., 116 miles W. of Clinton, on the Omaha line of the Chicago and North-western Railway, being the first division station on that road from the Mississippi River. It has a round-house and shops of the road, four grain-elevators, a national bank, and one weekly newspaper. Pop. 1488.
D. H. Frost, Ed. "Union."

Belle Plaine, a post-village of Sumner co., Kan., is situated on the Nineseah River, in the midst of a fine agricultural district. It has one weekly newspaper.

Belle Plaine, a post-village of Scott co., Minn., on the Minnesota River and on the St. Paul and Sioux City R. R., 47 miles S. W. of St. Paul. Pop. 497; of Belle Plaine township, 2375.

Belle Plaine, a post-township of Shawanaw co., Wis. Pop. 576.

Belle Prai'rie, a township of Livingston co., Ill. Pop. 630.

Belle Prairie, a post-township of Morrison co., Minn. Pop. 344.

Beller'ophon [Gr. Βελλεροφόντης, "slayer of Bellerus"], originally called **Hippon'ous,** a personage of the Greek mythology, was a son of Glaucus, king of Corinth. Having killed Bellerus by accident, he fled to Prœtus, king of Argos, who was instigated by his wife to send him to Iobates, king of Lycia. He carried a sealed letter requesting Iobates to kill him, but that king imposed on him the dangerous mission of fighting with the Chimæra. He killed this monster and defeated the Amazons. He attempted to soar to Olympus on the winged horse Pegasus, but fell to the earth.

Bellerophon, a genus of fossil univalve gasteropod mollusks. The shell is symmetrically convolute, with few and occasionally sculptured whorls, globular or discoidal, and having a dorsal keel, which terminates in a deep notch. Many species of it have been found in the Silurian, Devonian, and carboniferous rocks in various parts of the world.

Belles-Lettres, a French term often used in English and other languages as synonymous with polite literature or the more refined departments of learning, including poetry, rhetoric, history, and fiction. It is a term of mediæval origin, and is used in a vague manner. Authorities are not agreed in respect to its exact definition and application.

Bellever'non, a post-borough of Fayette co., Penn., on the Monongahela River, 26 miles S. of Pittsburg. Pop. 906.

Belleview', a township of Dallas co., Ala. Pop. 1535.

Belleview, a post-township of Calhoun co., Ill. P. 947.

Belleview, or **Bellevue,** a post-village, capital of Bossier parish, La., is about 20 miles N. E. of Shreveport, and 1 mile S. E. of Lake Bodeau. It has one weekly newspaper.

Belleview, a township of Morrison co., Minn. P. 92.

Belleview, a township of Washington co., Mo. Pop. 1867.

Belleville, a port of entry, the capital of Hastings co., Ontario (Canada), on the Bay of Quinté, and on the Grand Trunk Railway, 113 miles E. N. E. of Toronto. It is a beautiful town, and has fine public buildings, including a court-house, jail, numerous public and private schools, nine churches, and a custom-house. It is the seat of Albert University (Methodist Episcopal), which consists of Albert College for young men and Alexandra College for ladies. One mile W. of the town is the deaf and dumb asylum, a fine building, opened in 1870. The river Moira furnishes water-power, and the lumber trade is very extensive. There are two woollen mills, four sash and blind factories, a large box-shop, furniture-works, four foundries, two locomotive-shops, a sewing-machine factory, a pottery, several large saw-mills, besides breweries, distilleries, chandleries, ship-yards, etc. There are three steamboat lines, a gas company, two banks, a board of trade, and two daily and three weekly papers. Pop. in 1871, 7305.

Belleville, a post-township of Conecuh co., Ala. Pop. 1584.

Belleville, a township of San Bernardino co., Cal. Pop. 56.

Belleville, a city, capital of St. Clair co., Ill., 14 miles S. E. of St. Louis. Four railroads centre here. It contains numerous manufactories of almost every description, and one of the largest rolling-mills in the West; also a fine convent, numerous churches, and splendid school-houses. It is thoroughly gas-lighted. Five papers (two dailies) are published here. It is in a region abounding in coal. Pop. 8146. J. R. O'Neil, Ed. "Advocate."

Belleville, a post-village and capital of Republic co., Kan., is situated in a rich mining district, and has one weekly newspaper.

Belleville, a post-village of Essex co., N. J., on the Passaic River, 3 miles above Newark, and 10 miles W. by N. of New York. It has four or more churches, and several manufactories. Pop. of township, 3644.

Belleville, a post-village of Ellisburg township, Jefferson co., N. Y., on North Sandy Creek, is the seat of an academy.

Belleville, a post-village of Jefferson township, Richland co., O., on the Sandusky Mansfield and Newark R. R., 68 miles S. by E. from Sandusky. It has considerable manufacturing industry and one weekly newspaper. Pop. 720.

Belleville (Bell's Station P. O.), a village of Crockett co., Tenn., on the Memphis and Louisville R. R., 69 miles N. E. of Memphis. It has one weekly newspaper.

Bellevue, a post-village of Jackson co., Ia., pleasantly situated on the Mississippi River, 24 miles below Dubuque and 13 miles S. of Galena. It stands on a high bank, and has a good landing, with a gravelly beach. Produce is shipped here in steamboats and by the C. C. and D. R. R. It is a summer resort and noted for beautiful scenery. The population is largely German. It has an extensive railroad trade in grain, stock, produce, etc. It has one weekly newspaper. Pop. 1353; of Bellevue township, 2402.
Ed. "Jackson Leader."

Bellevue, a post-village and township of Eaton co., Mich., 32 miles S. W. of Lansing, on the Peninsular R. R. It has important manufactures and produces excellent lime. It has one weekly newspaper. Pop. of village, 608; of township, 1985. Edwin S. Hoskins, Pub. "Gazette."

Bellevue, a post-village, capital of Sarpy co., Neb., in a township of the same name, on the Missouri River, 15 miles by water below Omaha, and on the Omaha and South-western R. R., 57 miles N. E. of Lincoln. It has a court-house and several churches. Pop. of township, 961.

Bellevue, a post-village of Huron co., O., on the Lake Shore R. R., 45 miles S. E. of Toledo. It is largely devoted to manufacturing, and is a good grain-market. Water-works are being constructed. It has doubled its number of buildings and inhabitants within five years. It has one weekly newspaper. Pop. 1219. Ed. of "Gazette."

Bellevue, a borough of Allegheny co., Pa. Pop. 384.

Bellevue, a township of Brown co., Wis. Pop. 822.

Bellew' (John Chippendall Montesquieu), a celebrated reader, was born in Lancaster, England, in 1823, of an ancient and noble Irish stock. His name in youth was Higgin, but he assumed his mother's maiden name on coming of age. He was educated at Oxford, and entered the Anglican ministry in 1848, and won great distinction as a preacher. In 1868 he joined the Roman Catholic Church, and has since devoted his time with great success to public readings in Great Britain and the U. S.

Bell Ew'art, a post-village of Innisfil township, Simcoe co., Ontario (Canada), on Lake Simcoe and on the Northern Railway, 10 miles from Barrie. It is visited by regular lines of steamboats. Pop. about 600.

Bell Flower, a township of McLean co., Ill. P. 659.

Bel'lingham, a post-township of Norfolk co., Mass., on the New York and New England R. R. It has three woollen mills and other manufactories. Pop. 1282.

Bellingham (Richard), a lawyer born in England in 1592, emigrated to America in 1634. He was lieutenant-governor of Massachusetts for thirteen years, and governor for ten years. Died Dec. 7, 1672.

Bellingham Bay, in almost the extreme northern part of Washington Territory, in Whatcom co., is 14 miles long, 3 miles wide, with a depth of from 3 to 20 fathoms. Great quantities of lignitic bituminous coal are mined here, the shaft being only one-quarter of a mile from the harbor. It is generally considered the best coal on the Pacific coast of North America. Whatcom is the chief point of this coal-trade.

Bellini (Giovanni), an excellent painter, was born at Venice in 1426. He was the master of Titian, and was

called the founder of the Venetian school. Among his best works, which display great richness of color, are a "Madonna and Child," "The Coronation of the Virgin," and "Christ Talking to the Woman of Samaria." Died Nov. 29, 1516.

Bellini (Vincenzo), a celebrated Italian composer, son and grandson of musicians of moderate ability, was born at Catania, Sicily, Nov. 3, 1802. He was a pupil of Zingarelli. In 1827 he produced "Il Pirata," an opera which was performed at Milan with great success. His fame was widely extended by "La Straniera" (1828), "La Sonnambula" (1831), and "La Norma" (1831). He afterwards went to Paris and London, where he was warmly applauded, and composed "I Puritani" (1834). Died in Paris Sept. 24, 1835. (See Pongin, "Bellini," 1868.)

Bellinzo'na [Ger. *Bellenz*], a town of Switzerland, and one of the capitals of the canton of Ticino, is on the river Ticino, here crossed by a bridge, 16 miles N. of Lugano. It is defended by several old castles, and has an active transit trade. Pop. in 1870, 2501.

Bell Metal, a hard, dense, brittle, and sonorous alloy of copper with tin, zinc, or some other metal. The proportion in English bells is usually 75 per cent. of copper and 25 of tin. The bell metal of commerce usually contains 80 of copper to 20 of tin, or else 78 of copper to 22 of tin.

Bell Mills, a township of Tehama co., Cal. Pop. 79.

Bello'na, the goddess of war in the ancient Roman mythology, was represented as the companion and sister or wife of Mars. She was described by the poets as armed with a scourge and holding a torch in her hand. Her priests were called *Bellonarii*.

Bel'lows [from Anglo-Saxon *bylig*, a "bag;" Ger. *Bälgen*], a very ancient contrivance for producing a blast of air. It consisted, in its rudest form, of a bag which was compressed, allowed to become full, compressed again, and so on. Representations of bellows have been found in some of the earliest Egyptian sculptures, and Sir Gardiner Wilkinson believes he has found a valve as early as the time of Moses. The natives of India and China have employed the bellows from time immemorial. Rude forms of the bellows are found in many of the lowest tribes of Africa. Ordinary bellows, as now used, are practically leather bags which are compressed and then expanded so as to allow air to enter through a valve opening inward, which on compression of the bellows allows no air to escape, except through the nozzle. In modern manufactories, furnaces, etc. the bellows has been partly superseded by machines of different kinds which produce the blast of air with greater efficiency and uniformity than ordinary bellows.

Bel'lows (Henry Whitney), S. T. D., LL.D., an eminent Unitarian minister, born in Walpole, N. H., June 10, 1814, graduated at Harvard in 1832, and became pastor of a church in the city of New York in 1838. He gained distinction as an eloquent public speaker, and lectured on a variety of subjects, especially social, educational, and patriotic enterprises. In 1846 he was one of the founders of the "Christian Inquirer." Among his works are "Lectures on the Treatment of Social Diseases" (1857) and "The Old World in its New Face" (1868). He was the principal promoter and first president of the U. S. Sanitary Commission, established in 1862.

Bellows Falls, a post-village of Windham co., Vt., on the W. bank of the Conn. River, and on the Vt. Central R. R., 53 miles S. E. of Rutland, at the junction of the Rutland division and of the Cheshire R. R. The river here falls 44 feet in half a mile. The village has a medicinal spring, a national bank, and five churches. Railroads extend from it to Boston, New York, Montreal, etc. The water-power is very great, and is being improved. There are six paper-mills, one manufactory of chairs, one of sash and blinds, one newspaper, and two large hotels. It is the seat of St. Agnes' Hall, a seminary for young ladies. Pop. 697. Ed. of "Times."

Bellows Fish, or **Trumpet-Fish,** the *Centriscus scolopax*, a spiny-finned fish of the family Aulostomidæ, feeds upon small animals found at the bottom of the sea, chiefly in the Mediterranean and on the W. coasts of Europe. It is good eating, though small, seldom exceeding five inches in length.

Bellows Fish.

Bell'port, a post-village of Brookhaven township, Suffolk co., N. Y., on Bellport Bay. It is the seat of an academy. Bellport Station, in the same township, is 5 miles N. of Bellport, on the Long Island R. R., 56½ miles from Hunter's Point.

Bells, in nautical language, is a term having a peculiar meaning, and is used as a substitute for those expressions by which people on land indicate the hour. The sailor's day or night is divided into watches or periods, each of four hours' duration, and the bell is struck once at the expiration of each half hour. The number of strokes denotes the number of half hours that have elapsed in that particular watch. If the watch commences at 6 P. M., eight bells would be a signal for the end of the watch at 10 P. M.

Bell's Landing, a post-township of Monroe co., Ala. Pop. 1310.

Bellu'no (anc. *Bellu'num*), a city of Italy, capital of the above province, on the Piave, 49 miles N. of Venice. It is a bishop's see, and has a cathedral designed by Palladio, a rich hospital, a public library, a handsome aqueduct, and a beautiful triumphal arch; also manufactures of silk stuffs, hats, leather, and earthenware. Pop. in 1857, 13,552.

Bell'ville, a township of Howard co., Kan. Pop. 1240.

Bellville, a post-village, the capital of Austin co., Tex., near the Brazos River, 55 miles W. N. W. of Houston.

Bel'mond, a thriving village of Pleasant township, Wright co., Ia., is finely situated on the Iowa River, at the junction of two prospective railroads. It is in a good and well-settled farming region. It has good public schools, churches, etc., and one weekly paper. Pop. 327.

A. M. Allen, Ed. "Belmond Mirror."

Bel'mont, a county of Ohio, bordering on West Virginia. Area, 520 square miles. It is bounded on the E. by the Ohio River, and drained by Wheeling and Captina creeks. The surface is diversified by hills, which are cultivated to the summit; the soil is fertile. Dairy products, grain, wool, fruit, and tobacco are extensively raised. The county is intersected by the Central Ohio R. R., and contains coal. Capital, St. Clairsville. Pop. 39,714.

Belmont, a township of Sumpter co., Ala. Pop. 2916.

Belmont, a township of Iroquois co., Ill. Pop. 833.

Belmont, a township of Warren co., Ia. Pop. 1048.

Belmont, a post-township of Woodson co., Kan. Pop. 622.

Belmont, a post-township of Waldo co., Me. Pop. 628.

Belmont, a post-township of Middlesex co., Mass. It is one of the finest suburbs of Boston. Pop. 1513.

Belmont, a township of Jackson co., Minn. Pop. 625.

Belmont, a post-village of Mississippi co., Mo., on the Mississippi River, opposite Columbus, Ky., 197 miles S. S. E. of St. Louis. In 1861 this place was occupied as a Confederate camp. On Nov. 6, Gen. Grant, in command at Cairo, descended the river with about 4000 troops, remaining over night about 10 miles above Columbus, Ky. On the morning of the 7th this force was debarked on the Missouri shore a short distance above Belmont, and at once moved forward to the capture of the Confederate camp, supposed to contain about 3000 men. After several hours' severe fighting the Federal troops forced their way through the obstructions on either side. An irresistible charge carried the camp, drove the Confederates in all directions, and left the field in possession of the Federals. The Confederate camp, with all its supplies, ammunition, and baggage, was fired and destroyed. The defeated Confederates were, however, strongly reinforced by Maj.-Gen. Polk from Columbus, and in turn drove the Federal troops back to their boats, fighting all the way against a now vastly superior Confederate force, while the batteries on the Kentucky side kept up a damaging fire which could not be returned. By 5 P. M. the troops were all on board their boats without the loss of a gun, while they had with them two guns captured from the Confederates. The Federal loss was 84 killed, 150 wounded, and a similar number missing; the Confederate loss is stated at from 500 to 600, killed and wounded.

Belmont, a township of Otoe co., Neb. Pop. 508.

Belmont, a post-village, capital of Nye co., Nev., in a township of the same name, about 150 miles in a direct line E. S. E. of Carson City. Pop. of township, 244.

Belmont, a post-township of Belknap co., N. H. It has manufactures of hosiery and of lumber. Pop. 1165.

Belmont, a post-village, semi-capital of Allegany co., N. Y., on the Genesee River and on the Erie R. R., 92 miles W. by N. of Elmira, and 94 miles E. S. E. of Dunkirk. It contains a court-house and several barrel-factories. It has one weekly newspaper. Pop. 795.

Belmont, a township of Franklin co., N. Y. P. 1619.

Belmont, a post-twp. of La Fayette co., Wis. P. 1303.

Belmont, a township of Portage co., Wis. Pop. 508.

Belmont, a village of Westchester co., N. Y., now a part of New York City. Pop. 171.

Belmont (August), born at Alzey, in Germany, in 1816, emigrated to America in 1837 as the representative of the Rothschilds, and became an active politician of the Democratic party. He was chairman of the executive committee at the national Democratic convention at Charleston in 1860. He is a prominent man in the financial world of New York.

Beloit', the capital of Mitchell co., Kan., on the S. bank of Solomon River, has a weekly paper, an iron bridge, important mills and manufactures, and an active trade. Pop. of Beloit township, 173. Ed. "Beloit Gazette."

Beloit, a city of Rock co., Wis., is on Rock River and on the Chicago and North-western R. R., 91 miles N. W. of Chicago and 47 miles S. S. E. of Madison. It is also on the Western Union R. R., which connects it with Milwaukee and Rock Island, Ill., and is on the S. boundary of the State. It is partly built on a plain which is about seventy feet higher than the river. It is the seat of Beloit College. It has a national and one other bank, and considerable manufactures of paper, reapers and mowers, ploughs, water-wheels, etc. It has one weekly and one monthly newspaper. Pop. 4396; of the township, 5139.

C. Ingersoll, Ed. "Beloit Free Press."

Beloit College, at Beloit, Wis., originated in the deliberations of ministers and laymen of Congregational and Presbyterian churches in Wisconsin and Northern Illinois. In May, 1845, a convention of sixty-nine members decided unanimously that a college of the highest order for young men ought to be established at Beloit. A self-perpetuating board of trustees then elected was incorporated by charter from the Territorial legislature of Wisconsin in 1846. The corner-stone of the first building was laid in June, 1847, and in the fall of the same year five young men were received to the first college class. Jackson J. Bushnell, A. M., and Joseph Emerson, A. M., both graduates of Yale College in the class of 1841, were the first regularly appointed professors. Rev. Aaron L. Chapin of Milwaukee, also a graduate of Yale, was elected first president in 1849, and continues (1874) still in office. The institution embraces a collegiate department and a preparatory school. The collegiate department offers two parallel courses of four years, called respectively the classical and the philosophical course. In the classical course the branches of study and the standard of scholarship correspond with those of the best colleges of New England. The philosophical course combines, with such an amount of Latin and Greek as is considered essential to the best proficiency in any art or science, a more varied range of study and a more extensive culture of science. In the preparatory school also two parallel courses are defined, called respectively the classical course and the elementary scientific course. These courses occupy three years, and are adapted to meet the requisitions for admission to the two courses of the collegiate department. For such as do not contemplate entering college they offer opportunities for advanced general culture, well balanced and thorough, as far as it goes.

The faculty of the college is now (1874) composed of the president, eight professors, and two instructors of the preparatory school. About 2000 young men have received more or less of culture in the institution, and the graduates of the full course number 210. Its graduates occupy positions of influence in our own country and many foreign lands. For its endowment and support Beloit College depends entirely on private benefactions. It has received generous donations from friends in both the East and the West, but large additions to its resources are much needed. The college is beautifully situated on the banks of Rock River. Its most prominent building is the Memorial Hall, erected in honor of the sons of the college who fell in the late war, and devoted to the collections of the cabinet and library, for the steady increase of which generous provision is made.

Aaron L. Chapin.

Beloochistan', or **Belujistan** (anc. *Gedrosia*), a country of Southern Asia, bounded on the N. by Afghanistan, on the E. by Sinde, on the S. by the Arabian Sea, and on the W. by Persia. Its area is estimated at 107,000 square miles, and the pop. at 2,000,000.

This region, which is almost destitute of rivers or permanent streams, consists of high mountains and barren, sandy plains. The peak of Takkatoo, in the N. part, is said to be 11,000 feet high, and some of the plains or valleys have an elevation of 6000 feet above the sea. The largest river is the Doostee, which has been found only twenty inches deep and twenty yards wide at its mouth. It enters the Arabian Sea. The climate presents great extremes of heat and cold. Most of the fruits known in Europe, as well as plantains and guavas, are common. Melons attain such size that a man cannot lift them. Some of the valleys produce rice, cotton, tobacco, indigo, barley, pulse, etc. Among the mineral resources are copper, antimony, lead, iron, sulphur, and alum. The inhabitants are divided into the Beluches in the N. and W., who are a mixture of Persians, Hindoos, and Semitic tribes, and are indolent, warlike, and cruel; the Brahuis, the remains of the original inhabitants, in the E.; and the Lamri in the S. E. The entire population consists of Sunnite Mohammedans. They subsist mostly by pastoral pursuits, raising sheep, goats, and camels or dromedaries. They are subject to a khan, who rules with despotic power. Kelât was stormed and taken by the British in 1839, and the khan was killed.

Belpas'so, an Italian town, in the province of Catania, at the side of Mount Etna, 7 miles N. W. from Catania. Pop. 7038.

Bel'per, a market-town of England, in Derbyshire, on the Midland Railway, 10 miles by rail N. of Derby. It has several churches, a public library, and a stone bridge over the river Derwent. It has large manufactures of silk and cotton hosiery. Pop. 9509.

Bel'pre, a post-village of Washington co., O., is on the Ohio River, opposite Parkersburg, West Va., and about 12 miles below Marietta. It is the eastern terminus of the Marietta and Cincinnati R. R., connecting here with the Baltimore and Ohio R. R. by a great bridge, which crosses the Ohio and is more than a mile long. Pop. 911; of Belpre township, 2462.

Belshaz'zar [*Bel-shar-uzur;* Fr. *Balthasar*], son of Nabonadius (Labynetus), who was the sixth and last king of the second Babylonian period. His mother was a daughter of Nebuchadnezzar, and probably the widow of Neriglissar, the fourth king of the period. When of sufficient age he was associated with his father on the throne, and in the book of Daniel is therefore called king. At the fall of Babylon in 538 B. C. he was slain, and his father, Nabonadius, then at Borsippa, was taken prisoner.

Belt, a girdle, a band, a zone. This term is applied in surgery to a band or bandage; in astronomy to several dark bands, variable in number, which extend across the disk of the planet Jupiter and are parallel to its equator.

Leather belts or bands are extensively used in machinery to connect a revolving shaft with another shaft or pulley. It is a contrivance for transmitting power with less noise and friction than attend the use of toothed gearing. These belts are generally used between parallel shafts, and when the shafts must turn in opposite directions the belt is crossed. When the shafts are not parallel, and their axes produced intersect each other, they may be connected by using a third shaft. Gutta-percha and India rubber are sometimes used instead of leather. To render leather belts durable, they should be carefully protected against moisture.

Belt Creek, a township of Burt co., Neb. Pop. 287.

Bel'ton, a post-township of Anderson co., S. C. It is on the Greenville and Columbia R. R., 26 miles S. of Greenville, at the junction of the Anderson branch. Pop. 1364.

Belton, a post-village, the capital of Bell co., Tex., is situated on Leon River, 60 miles N. N. E. of Austin City. It has one weekly newspaper. Pop. 281.

Beltra'mi, a large county in the N. W. of Minnesota. A considerable part of the surface is covered with lakes, among which are the Red Lake, Cass, Itasca (the head source of the Mississippi), and a number of smaller ones, all connected together. Area, 3100 square miles. Pop. 80.

Belts, Great and **Little,** are two straits which connect the Baltic with the Cattegat. The former separates the island of Fünen from Seeland, is 36 miles long, and has an average width of about 18 miles. The depth ranges between 6 and 26 fathoms, and the current is so strong that the Belt is seldom frozen over. The navigation of both Belts is dangerous or difficult. The Little Belt, which separates Fünen from Jutland, also forms a communication between the Baltic and the Cattegat. It is 32 miles long. The widest part of it is about 10 miles, and the narrowest about 2500 feet. Its depth ranges from 5 to 14 fathoms. From these Belts (Lat. *baltei*) the Baltic Sea is supposed to take its name.

Belu'ga, a genus of Mammalia, of the order Cetacea and of the family Delphinidæ or dolphins. They are distinguished by a blunt and broad head and the absence of a

dorsal fin. They abound in the Arctic seas, are gregarious, and afford to the Greenlanders an important article of food. The *Beluga globiceps* sometimes attains a length of thirteen feet. *Round-headed cachalot* is one of the synonyms of this animal. The white whale of the St. Lawrence (*Beluga borealis*) is common in northern waters, both salt and fresh. It is caught in the St. Lawrence and the Saguenay, is from ten to twenty feet long, and is prized for its excellent oil and its skin, which makes a very fine leather.

The name Beluga is often applied to a large sturgeon of Southern Russia (*Acipenser huso*), which affords great quantities of isinglass and caviare. (See STURGEON.)

Be'lus [Gr. Βῆλος], in classic mythology, a king of Phœnicia, was said to be a son of Neptune, a brother of Agenor, and the father of Egyptus. He is considered by some persons as identical with BAAL (which see).

Belus [Βηλεύς, now called *Nahr Naaman;* perhaps the *Bealoth* of the Hebrew text of the Bible], a small stream of Palestine, which enters the sea near Acre. On its banks it is said that the art of glass-making was discovered.

Belus, Temple of, a famous temple of enormous size in the city of Babylon, rebuilt by Nebuchadnezzar shortly after 604 B. C. According to some authorities, it was destroyed by Xerxes, king of Persia. Some writers identify its ruins with *Birs-Nimrud* (a huge mound 6 miles S. W. of Hillah), which appears to have been originally about 156 feet high. Others identify its ruins with *Babil* (another mound some 6 miles N. of Hillah), whose height is about 140 feet.

Belvede're (*i. e.* "fair view"), an Italian word applied to a pavilion on the top of a house, or a structure designed to afford a fine prospect of the surrounding country; also an artificial eminence in a garden. In France and other countries of Europe the term is often used as the name of a palace, villa, or summer-house. The famous statue of Apollo Belvedere derived its name from a gallery of the Vatican called Belvedere.

Bel'vedere (*Chenopodium scoparium*, or *Salsola scoparia*), an annual plant of the order Chenopodiaceæ, is a native of Europe and Asia, and is sometimes called summer cypress. It is cultivated in gardens, but not for its flowers, which have no beauty. It has a close, pyramidal, rigid form and narrow leaves, and resembles a miniature cypress.

Belvedere, a town of Southern Italy, province of Cosenza, 26 miles N. N. W. of Cosenza, has a trade in wine and raisins. Pop. 5600.

Bel'videre, the county-seat of Boone co., Ill., on the Kishwaukee River and on the Chicago and North-western Railway (Galena division), 78 miles W. N. W. of Chicago. It is the terminus also of the St. Paul division of the North-western Railway, and is projecting a railroad S. E. It has a national bank, two newspapers, a planing-mill, a number of mills, elegant churches, and fine schools. Pop. 3231, and is rapidly increasing; of Belvidere township, 4410.

R. W. COON, ED. "BELVIDERE NORTH-WESTERN."

Belvidere, a post-township of Monona co., Ia. P. 272.

Belvidere, a township of Montcalm co., Mich. P. 54.

Belvidere, a township of Goodhue co., Minn. P. 626.

Belvidere, a post-village, the capital of Warren co., N. J., on the Delaware River and on the Belvidere Delaware R. R., 13 miles above Easton and 95 miles N. of Philadelphia. The Pequest Creek enters the river here, and affords a valuable water-power. Belvidere has an academy, five churches, one national bank, several mills, and a cotton factory. It has three weekly newspapers. Pop. of the township, 1882.

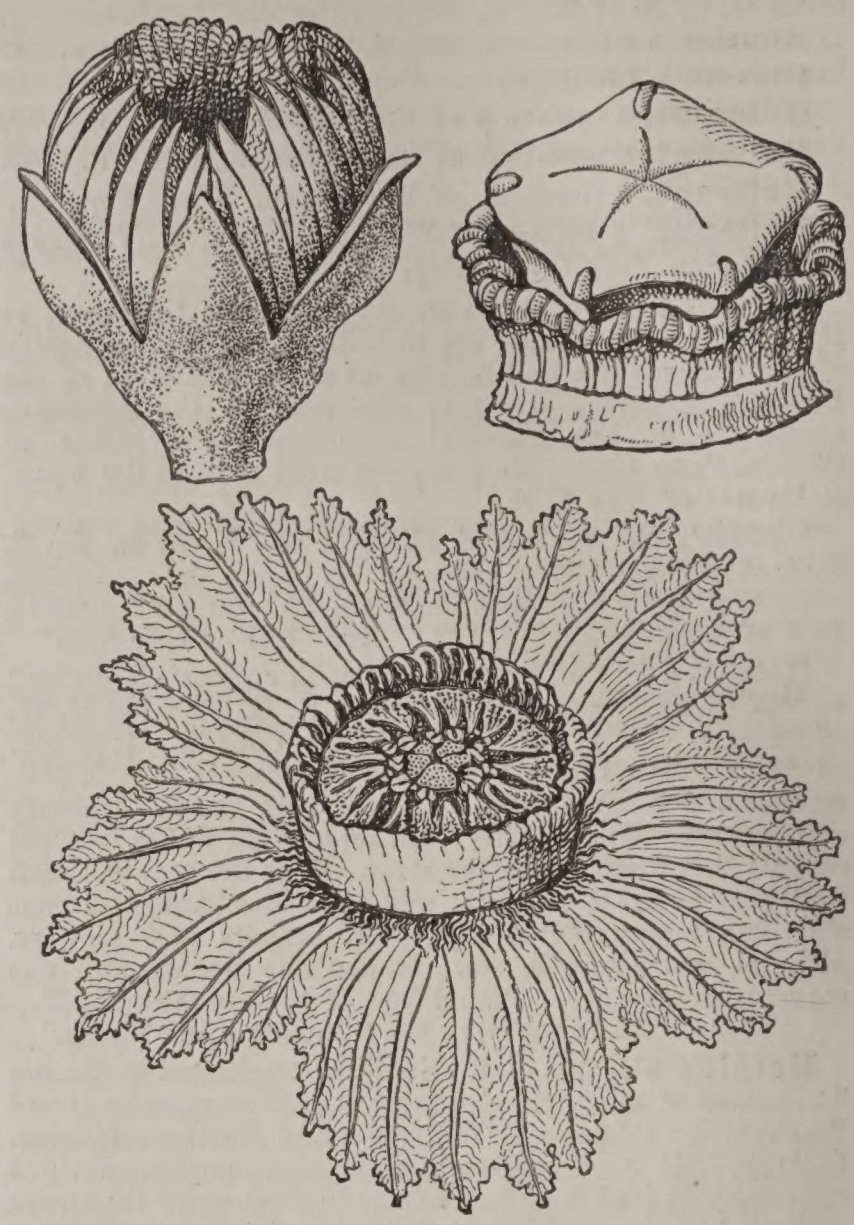
Belvidere, a post-township of Perquimans co., N. C. Pop. 2403.

Belvidere, a township of Lamoille co., Vt. It has manufactures of lumber. Pop. 369.

Belvidere, a township of Buffalo co., Wis. Pop. 632.

Bel'vin, a township of Pitt co., N. C. Pop. 2151.

Belvis'ia (also called **Napoleo'na**), a genus of exogenous plants, the type of the natural order Belvisiaceæ. The few species of this order which are known are natives of tropical Africa, and are large shrubs with simple alternate, coriaceous leaves. The flowers, each of which has twenty stamens, are sessile, beautiful, and have a very singular form. The calyx is a leathery cup, divided into five ovate segments. The corolla consists of three concentric and distinct rings, each of which is monopetalous; the lower or outer one, 5-lobed and furnished with thirty-five stiff ribs, by means of which it is strongly plaited; when fully blown it turns back over the calyx so as to hide it completely; the second, a narrow membrane, is divided into many fine regular segments like a fringe; the third, an erect, cup-shaped membrane, whose edge is cut into many fine segments turned downward. The fruit is a large berry, similar to a pomegranate in size and form, enclosing several reniform seeds, one inch long. One species



Belvisia.

of *Belvisia* bears an edible fruit. According to Lindley, this order belongs to the Myrtal alliance, and is allied to Rhizophoraceæ.

Belzo'ni (GIOVANNI BATTISTA), an Italian traveller, born at Padua Nov. 5, 1778, emigrated to England in 1803, and gained a subsistence by exhibiting himself as an athlete. In 1815 he visited Egypt at the invitation of Mehemet Ali, who desired him to construct a hydraulic machine. He soon directed his attention to the exploration of Egyptian antiquities. He removed to England the colossal bust called "Young Memnon," which is now in the British Museum. He opened the temple of Ipsambool and the pyramid of Cephren (or the second pyramid of Gizeh). He published in 1821 a very interesting "Narrative of the Operations and Recent Discoveries within the Pyramids, Temples, Tombs, etc. in Egypt and Nubia." He undertook a journey to Timbuctu, but died near Benin Dec. 3, 1823.

Bem (JOSEPH), a Polish general, born at Tarnov, in Galicia, in 1795. He served in the Polish army in the revolution of 1830, after which he passed some years in France. In 1848 he joined the Hungarian patriots, and obtained command of the army of Transylvania. He defeated the Austrians in several actions, and took part in the battle of Temesvár (1849), which was disastrous to Hungary. Having fled to Turkey and conformed to Islamism, he was raised to the rank of pasha. Died Dec. 10, 1850. (See PATAKY, "Bem in Siebenbürgen," 1850; N. N. LÁJOS, "Le Général Bem," Paris, 1851.)

Bembeç'idæ [Gr. βεμβήξ, a "top"], a family of hymenopterous insects, the popular name of which is "sand-wasps," are mostly natives of warm climates. They resemble wasps or bees in appearance, and the females make burrows in sandy banks, in which they deposit their eggs. Some of them emit an odor like that of roses. The U. S. have several species.

Bem'bo (PIETRO), a celebrated Italian scholar and cardinal, born at Venice May 20, 1470. He removed to Rome in 1512, and became secretary to Pope Leo X. In 1539 he was raised to the dignity of cardinal. He wrote, besides other works, a Latin "History of Venice" (1551). Died Jan. 18, 1547. He was eminent as a restorer of pure Latinity. His collected works were published at Venice in 4 vols., 1729. (See BECCADELLI, "Vita di P. Pembo;" J. D. LA CASA, "Vita Bembi.")

Bem'bridge Beds, a division of the upper eocene strata found in the Isle of Wight, and containing many fossil shells of the *Paludina*, *Planorbis*, etc. This division comprises, besides several beds of marl and clay, the Bem-

bridge limestone, a cream-colored stone, often compact and sometimes vesicular and concretionary. Here are found remains of the *Anoplotherium*, an extinct animal.

Bement', a post-township of Piatt co., Ill. Pop. 1471.

Be'mis's Heights, a post-village of Stillwater township, Saratoga co., N. Y., on the Champlain Canal and near the Hudson River, was the scene of the first battle of Stillwater, Sept. 19, 1777.

Ben, a Gaelic term prefixed to the names of many mountains of Scotland, as Ben Lomond, Ben Nevis, etc. It signifies "head" or "summit."

Ben, a Hebrew word signifying "son," and equivalent to the Arabic *Ibn*, forms the first syllable of many ancient scriptural names, as Ben-hadad, Benjamin, Benoni, etc. *Beni*, the plural of Ben, occurs in the names of many Arabian tribes.

Ben, Oil of, a fixed oil extracted by pressure from the fruits of *Moringa aptera* and other species, leguminous trees growing in the Levant and the East and West Indies. It is colorless or slightly yellow, is odorless, and does not readily become rancid. It is used to extract the odoriferous principles of fragrant plants.

Bena'res (anc. *Varanashi* and *Kasi*), a famous and populous city of Hindostan, situated on the left bank of the Ganges, about 428 miles by rail N. W. of Calcutta, and 477 miles by rail S. E. of Delhi. It is the holy city of the Brahmans, the chief seat of their science, and may be called the Hindoo capital of India. Flights of stone steps called *ghâts* lead down the steep banks of the Ganges, which is here about half a mile wide. The external appearance of the city, as seen from the river, is rendered very imposing by the minarets of about 300 mosques and the pinnacles of nearly 1000 pagodas. The streets are very narrow, and the houses, which are mostly built of stone, are generally lofty, some of them six stories high. Among the remarkable public edifices are the great mosque of Aurungzeb, 232 feet high, many Hindoo temples, a vast and old astronomical observatory, and the Hindoo Sanscrit college, the chief seat of native learning in India. As the holy city of the Hindoos and the central seat of Brahmanical learning, Benares attracts on the occasion of certain festivals an immense multitude of pilgrims, estimated at 100,000. The permanent population was, in 1866, 200,000. Benares is a wealthy and industrious city, having extensive manufactures of silk, cotton, and woollen stuffs. It is a great emporium for the shawls of the north, the diamonds of the south, and the muslins of Dacca and the eastern provinces. The Hindoo Sanscrit college was founded here in 1791, and an English department was added to it about 1827. The residences of the Europeans are mostly at Secrole, which is three miles from Benares, and contains many fine mansions. It is connected by a railway with Calcutta and Delhi. A mutiny of Sepoys broke out here in June, 1857, but was soon quelled.

Ben'bow (John), a brave English admiral, born in Shropshire in 1650, served first under James II. He became a rear-admiral in the reign of William III., who reposed great confidence in him. In Aug., 1702, he encountered a superior force under the French admiral Ducasse, near Jamaica. He maintained a running fight for four days, was mortally wounded, and died Nov. 29, 1702. (See Campbell, "Lives of the British Admirals.")

Bench, or **Banc** [Law Lat. *bancus*], in law, has several significations: 1. A court or tribunal for the administration of justice. The word originally meant the seat occupied by the judges in court. In England two of the leading courts are termed king's or queen's bench and common bench. The latter tribunal is also called the court of common pleas. 2. The word is also used to designate the judges as contrasted with the practitioners in their court, as in the phrase "the bench and the bar." 3. Another signification is the full number of judges acting as a court of review, as distinguished from a single member of their body, also acting judicially. Thus, decisions rendered by a single judge at a trial are said to take place at *nisi prius*, while those which are made by members of the court sitting together are said to be made in bench or in *banc* or in *banco*.

Bench Warrant, an order issued by or from a bench for the arrest of a person, either in case of contempt or after an indictment has been found, or from a judge to apprehend a person charged with an offence.

Bench'ers, the principal officers of the English inns of court, entrusted with their government and with the power of admitting persons to the bar, and of disbarring practitioners, though the exercise of these powers is subject to the supervision of the judges of the higher courts.

Ben'demann' (Eduard), a German painter of the Düsseldorf school, was born in Berlin Dec. 3, 1811, and was director of the academy at Düsseldorf from 1859 to 1868. He painted the "Captive Jews in Babylon" and "Jeremiah on the Ruins of Jerusalem" (1837).

Bendemeer, or **Bendemir.** See Bundemeer.

Ben'der, or **Ben'dery,** a fortified town of Russia, in Bessarabia, on the right bank of the Dneister, 65 miles N. W. of Odessa. Here is a strong citadel on an eminence. Bender has several paper-mills, forges, and tanneries. Pop. in 1867, 24,443.

Bend'sin, a town of Russian Poland, in the government of Petrokov, 100 miles by rail S. of Petrokov. Pop. in 1867, 6231.

Be'ne, a town of Northern Italy, in the province of Cuneo, on a hill 16 miles N. E. of Coni. It has an old castle. Pop. 6127.

Ben'edek, von (Ludwig), an Austrian general, born at Odenburg, in Hungary, in 1804. He fought with the rank of colonel against the Italians in 1848, and became a major-general in April, 1849, after which he served with distinction against the Hungarian patriots. He directed a corps in the Italian campaign of 1859 and at Solferino. In June, 1866, he took the command of the grand Austrian army, and remained on the defensive in Bohemia. He was defeated by the Prussians at the decisive battle of Sadowa, July 3, 1866.

Benedet'ti (Vincent), Count, a French diplomatist, born in Corsica about 1815. He was sent as ambassador to the kingdom of Italy in 1861. In 1870 he was employed by Napoleon III. in important negotiations with the court of Prussia, and had a personal interview with King William at Ems just before the emperor declared war against Prussia.

Ben'edict [Lat. *Benedic'tus*], Saint, a celebrated Italian religionist, called the founder of monachism in the West, was born at Nursia, in Umbria, in 480 A. D. He renounced the world in early youth, passed some years in solitude, and acquired a wide reputation for sanctity. He founded a famous monastery on Monte Cassino, near Naples, and composed a system of monastic rules which was largely adopted by the Western monks, and was known as the Rule of Saint Benedict. Under this system the monks were employed in manual labor and in the instruction of the young. (See Benedictines.) Died Mar. 21, 543 A. D. (See Juan de Castaniza, "Vida de S. Benito," 1583; J. B. Planchette, "Vie du grand S. Benoît," 1652; Anton Sulger, "Vita divi Benedicti," 1691; J. G. Waitzmann, "Leben und Wirken des heiligen Benedict," 1825.)

Benedict I. became pope of Rome in 574 A. D. Died in 578.—Benedict II., a native of Rome, was elected pope in 683 A. D., and died in 685.—Benedict III. succeeded Pope Leo IV. in 855. He died in 858, leaving a good reputation for piety.—Benedict IV. was elected pope in 900, as the successor of John IX. Died in 903.—Benedict V. was chosen pope in 964, but was banished from Rome by the emperor Otho I. Leo VIII. was pope at the same time with him, and both are recognized by Roman Catholic historians. Died in 965.—Benedict VI. was elected pope in 972, and was killed by the rebellious Romans in 974.—Benedict VII. succeeded Pope Benedict VI. in 975. He is said to have ruled with ability. Died in 984.—Benedict VIII., a son of the count of Tusculum, became pope in 1012. He crowned the emperor Henry II. in 1013, and defeated the Saracens, who had invaded the Papal States. Died in 1024.—Benedict IX. (Theophlactus of Tusculum), sometimes called the "boy-pope," was chosen pope in 1033. He was extremely licentious, and was expelled by the Romans. Sylvester III. became antipope. Benedict was deposed by the emperor Henry III. about 1046.—Benedict X., called the Stupid, was chosen pope in 1058, removed through the influence of Hildebrand in 1059, and died in prison in the same year.—Benedict XI. (Saint), born in 1240, a native of Treviso, succeeded Boniface VIII. in 1303. He was noted for humility. Died in 1304.—Benedict XII. (originally Jacques Fournier), a native of France, was chosen pope in 1334. He was the third pope who reigned at Avignon, and was eminent as a canonist and theologian. He wrote several works. He died in 1342, and was succeeded by Clement VI. Pope Benedict XII. was an excellent man.—Benedict XIII. succeeded Innocent XIII. in 1724. He was distinguished for moderation and other virtues, and promoted the peace of Europe. Died in 1730. (See Clemente da Cruz, "Vida do Benedicto XIII.," 1739.)—Benedict XIII. (anti-pope), (Pedro de Luna), was born in Aragon, and was elected pope by certain cardinals at Avignon in 1394. Another party elected Boniface IX. at Rome, and a schism of the Church ensued. He was deposed by the Council of Constance in 1417. Died in 1424. Benedict XIV. (Pros-

PERO LAMBERTINI), born at Bologna in 1675, was a man of superior talents. He was well versed in history, theology, and classical learning. He succeeded Clement XII. in 1740, and showed himself a liberal patron of literature and science. He was also distinguished for his moderation and enlightened piety, and was the author of several esteemed religious works. Died in 1758. (See FABRONI, "Vita di Benedetto XIV.," 1787.)

Benedict (DAVID), D. D., born at Norwalk, Conn., Oct. 10, 1779, graduated at Brown University in 1806, and was for twenty-five years pastor of the First Baptist church in Pawtucket, R. I. He has written a "History of the Baptists" (2 vols., 1813; 3d vol., 1848), "History of All Religions" (1824), "Fifty Years among the Baptists" (1860), "History of the Donatists," "Compendium of Church History," and other works.

Benedict (ERASTUS CORNELIUS), LL.D., was born at Branford, Conn., Mar. 19, 1800, and graduated in 1821 at Williams College. In 1824 was called to the bar, and has been president of the New York Board of Education and a regent of the university, etc. He published "American Admiralty" (1850), "A Run through Europe" (1860), "The Hymn of Hildebert" (1868), and other works.

Benedict (Sir JULIUS), a musical composer, born at Stuttgart Nov. 27, 1804. He has written "The Gypsy's Warning" (1838), "Brides of Venice," "Lily of Killarney" (1862), all popular operas; "Undine," a cantata, and "St. Peter" (1870), an oratorio.

Benedict (LEWIS), an American lawyer and general of volunteers, born in Albany, N. Y., Sept. 2, 1817, graduated at Williams College, studied law, and was admitted to the bar in 1841. He was actively engaged in politics for many years, and held various important local offices. He entered the army as lieutenant-colonel Seventy-third N. Y. Volunteers, engaged at Yorktown, captured at Williamsburg, exchanged Sept., 1862, appointed colonel One-Hundred-and-Sixty-second N. Y. Volunteers, and was attached to the Army of the Gulf. He was in command of a brigade at the battle of Port Hudson and during the Red River expedition, where he greatly distinguished himself. Killed at battle of Pleasant Hill, La., April 9, 1864, while leading his brigade to a charge. (Brevet brigadier-general U. S. volunteers for gallant conduct.)

G. C. SIMMONS, *Clerk Board of Eng'rs.*

Benedic'ta, a township of Aroostook co., Me. Pop. 415.

Benedic'tine Editions of the Fathers. The following is a complete list of these highly esteemed and now very costly works: 1, Barnabas (Menard), 4to, 1642; 2, Lanfranc (D'Achery), fol., 1648; 3, Bernard (Mabillon), 2 vols. fol., 1667; 4, Anselm (Gerberon), fol., 1675; 5, Augustine (Delfan and others), 11 vols. fol., 1679–1700; 6, Cassiodorus (Garet), 2 vols. fol., 1679; 7, Ambrose (Du Frische and Le Nourri), 2 vols., 1686–90; 8, Hilary (Constant), fol., 1693; 9, Jerome (Martiany and others), 5 vols. fol., 1693–1706; 10, Athanasius (Montfaucon), 3 vols. fol., 1698; 11, Gregory of Tours (Ruinart), fol., 1699; 12, Gregory the Great (De Sainte-Marthe), 4 vols. fol., 1705; 13, Hildebert (Beaugendre), fol., 1708; 14, Irenæus (Massuet), fol., 1710; 15, Lucius Cæcilius (Le Nourri), 8vo, 1710; 16, Chrysostom (Montfaucon), 13 vols. fol., 1718–38; 17, Cyril of Jerusalem (Toultée and Maran), fol., 1720; 18, Basil (Garnier and Maran), 3 vols. fol., 1721–30; 19, Cyprian (Maran), fol., 1726; 20, Justin Martyr (Maran), fol., 1742; 21, Origen (De la Rue), 4 vols. fol., 1733–59; 22, Gregory Nazianzen (Clemencet), 1 vol. fol., 1778; 2d vol., 1842.

Benedic'tines, or **Benedictine Order,** the name of the monks who observe the rule of Saint Benedict. This order was one of the most ancient and learned religious orders of Western Europe. The first Benedictine monastery was that founded by Saint Benedict on Monte Cassino, near Naples, in 528 A. D. The order spread rapidly and widely in several countries of Europe, and it is said had at one period 37,000 monasteries. The Benedictines boasted that their order had produced 24 popes, 200 cardinals, 4000 bishops, and 1500 saints. The rule of Saint Benedict was less severe than that which the Eastern ascetics practised. It required that the monks should live frugally, avoid laughter, hold no private property, and be industrious. To them we are especially indebted for the preservation and transmission of many of the ancient classics through the Dark Ages down to the present time. Among the most celebrated houses or societies of this order was the Congregation of Saint-Maur (dating from 1621), on the river Loire, to which all the Benedictine houses in France were affiliated. Connected with it were many learned men, including Mabillon, Montfaucon, and Sainte-Marthe. They published good editions of the Fathers (see above) and numerous valuable works, among which are "L'Antiquité Expliquée" (15 vols. fol., 1719–24), "Veterum Scriptorum Spicilegium" (13 vols., 1653–77), "Acta Sanctorum S. Benedicti" (9 vols., 1688–1702), and "Histoire Littéraire de la France" (9 vols. 4to, 1733–49). The Cistercians, Carthusians, Camaldules, Clunians, Celestines, and Trappists were branches of the Benedictine order. In 1870 the order numbered 3089 monks, in eight congregations, two of which comprise the monasteries in the U. S. There are also Benedictine nuns, with twelve convents, in the U. S. (See "Annales Ordinis S. Benedicti," 6 vols., 1713–39; TASSIN, "Histoire de la Congregation de St.-Maur," 1770; MONTALEMBERT, "The Monks of the West," 5 vols., 1860.)

Ben'edix (JULIUS RODERICK), a German author, was born Jan. 21, 1811. He has written many successful plays, among them, "Bemoostes Haupt," "Der Steckbrief," "Der Störenfried," "Mathilde," etc., and a novel, "Bilder aus dem Schauspielerleben." Died in 1873.

Ben'efice [Lat. *beneficium*, a "favor"], originally, a bounty in land given to a meritorious Roman soldier. In mediæval history the term denoted an estate in land conferred by a superior by way of recompense for service. As late as the twelfth century the word was used synonymously with *fœdum*. The earlier historians of the Middle Ages adopted the view that benefices were given successively, as revocable, as temporary, as estates for life, and finally as estates in perpetuity. This view has been refuted by Guizot (see "Civilization in France," vol. iii.). In the canon law it designates a right inhering in a clergyman of sharing the income of church property in return for the performance of spiritual duties. The Roman Catholic Church includes all clerical offices, even the papal, among benefices; but the Church of England, which long made the term include all preferments except bishoprics, now excludes also all cathedral preferments, such as deaneries, canonries, arch-deaconries, etc.

Ben'efit of Cler'gy, in English criminal law, the privilege of the clergy, a clerk's privilege. During the Middle Ages benefit of clergy in various European countries extended to a total exemption in favor of clergymen from the process of a secular judge in criminal cases. In England, however, it was not carried beyond an exemption from capital punishment in felony and petit treason. It was never granted in cases of high treason or offences below felonies. Offences were thus divided into those which were clergyable and not clergyable. This exemption, at first allowed only to clergymen, soon was extended to all the officers and clerks of the Church, and then to every one who could read, an ability to read being confined almost wholly to those in the service of the Church. But when learning became more generally diffused, a distinction was made between those in orders and laymen who could read, the latter being allowed the privilege only once, and then (unless they were peers or peeresses) being branded in the left thumb. A woman, unless she was a peeress, could not claim this exemption, though this inequality was rectified by statute.

At first, the criminals who were allowed this privilege were handed over to the ordinary or bishop, to be dealt with according to the canons of the Church; but in the reign of Elizabeth it was enacted that they should be discharged from prison, with the proviso that the court might in its discretion keep the offender in prison for a year; and by subsequent statutes various punishments, such as whipping, fine, and imprisonment, were imposed on criminals entitled to benefit of clergy, who were practically all convicts. Whenever Parliament desired to make an offence strictly capital, the practice was to introduce into the enactment the words "without benefit of clergy." By statute of 7 Geo. IV., c. 28, s. 6, benefit of clergy was abolished. Its retention for so long a time was plainly owing to the fact that it could be used to mitigate the rigor of the English criminal law. (For fuller details as to the history and nature of this exemption, consult 4 BLACKSTONE'S "Commentaries," 365.)

T. W. DWIGHT.

Be'neke (FRIEDRICH EDUARD), a German philosopher, born in Berlin Feb. 17, 1798. He became extraordinary professor of philosophy in the University of Berlin in 1832. Among his works are "Psychological Sketches" (2 vols., 1825–27), a "System of Logic" (2 vols., 1842), and "Pragmatic Psychology" (1850). His system of psychology is called "empirical." He disappeared Mar. 1, 1854, and his body was found in a canal in June, 1855.

Beneven'to, a province of Italy, is bounded on the N. by Campobasso, on the E. by Foggia, on the S. by Avellino, and on the W. by Caserta. Area, 676 square miles. The country is level, and the soil generally fertile. The chief articles of export are cattle, grain, wine, oil, etc. It has changed masters very often, and was annexed by Italy at the same time as Naples. Pop. in 1871, 231,914.

Benevento [Lat. *Beneven'tum*], a walled city of Southern Italy, capital of the above province, is situated on a hill or declivity and on the river Calore, 33 miles N. E. of Naples. Pop. in 1872, 20,133. It has a citadel or castle, a fine old cathedral, several palaces and churches. It is the see of an archbishop, and has several annual fairs. Among the many ancient remains found here is the magnificent Arch of Trajan, erected in 114 A. D., now nearly perfect. *Beneventum* was a place of great antiquity, having become a Roman town as early as 274 B. C., and it was an important city during the Roman empire. It was conquered in the sixth century by the Lombards, under whom it continued to flourish, and became the capital of the powerful duchy of Benevento. The city, with some adjacent territory, was given to the pope in 1053. In 1806 it was erected into a principality by Napoleon, who gave Talleyrand the title of prince of Benevento.

Ben'ezet (Anthony), a French philanthropist, born at Saint-Quentin Jan. 31, 1713. He joined the Society of Friends, and emigrated in 1731 to Philadelphia, where he taught school for many years. He was eminent as an opponent of the slave-trade and slavery, and a benefactor of the negroes. He wrote several tracts on slavery and the slave-trade, etc. Died May 3, 1784. (See Vaux, "Memoir of A. Benezet," 1817.)

Ben'fey (Theodor), born at Noerten, near Göttingen, Jan. 28, 1809, became in 1834 professor of Sanscrit and comparative grammar at Göttingen. He has published, besides other valuable works, a "Lexicon of Greek Roots" (1839–42), "The Cuneiform Inscriptions" (1847), "The Hymns of Sama-Veda" (1848), "The History of Oriental Philosophy in Germany" (1869), and a "Sanscrit-English Dictionary."

Bengal', the largest and most important province of British India, is bounded on the N. by Nepaul and Bootan, on the E. by Burmah, on the S. by the Bay of Bengal, and on the W. by the North-western and the Central Provinces. It has an area of 200,724 square miles. The greater part of Bengal consists of the great alluvial plain or valley of the Ganges and Brahmapootra. The combined delta of these great rivers commences 280 miles from the sea, near which the delta-islands, here called Sunderbunds, are covered with a very dense vegetation, and infested by serpents, crocodiles, and tigers. Farther N. the country is marvellously prolific of rice, cotton, opium, sugar, indigo, and a great variety of tropical fruits. The chief exports are opium, saltpetre, rice, hides, and indigo. The climate of Bengal is subject to great extremes of heat, and is very destructive to the health of both Europeans and natives, but in this respect great improvement is reported in the last few years. Pop. in 1871, 40,352,960.

Among the most important cities of Bengal presidency are Calcutta, the capital, Delhi, Benares, Patna, Agra, and Moorshedâbâd. The people are Hindoos, Mohammedans, Sikhs, and various wild tribes in the hill-country. The native Bengalese are a facile, deceitful, cowardly race. Their morals are much debased. The English first established themselves in Bengal in 1656. From the smallest beginnings their great empire of the East has grown up. The Bengalese language has a basis of Sanscrit, but is modified by words of Arabic, Malay, and Persian origin. Its literature has been much neglected till of late.

Bengal, a post-township of Clinton co., Mich. P. 1086.

Bengal, Bay of (anc. *Ganget'icus Si'nus*), a part of the Indian Ocean extending between Hindostan and Farther India. Its southern boundary is variously placed by geographers, according to some of whom it is a line about 1200 miles long, drawn from Coromandel to the peninsula of Malacca. Others assign as its southern limit a line drawn from the delta of the Godavery to Cape Negrais. Its chief affluents are the Ganges, the Brahmapootra, and the Irrawaddy. There are no good harbors on the western coast, but several safe ports occur on the E. side, at Aracan, Cheduba, Negrais, etc. The tide sometimes rises to the height of seventy feet in this bay. The north-east monsoon prevails here in summer and the south-west monsoon in winter. In this bay are the Andaman and the Nicobar Islands.

Bengal Light, or **Blue Light,** a brilliant signal-light used at sea during shipwreck, and in ordinary pyrotechny for illuminating a tract of country. It is produced by the combustion of a mixture of nitre, sulphur, and tersulphide of antimony. These materials are first reduced to a fine powder, then dried, and mixed in the proportions of 6 pounds of nitre, 2 of sulphur, and 1 of the tersulphide.

Benga'zi, or **Benghasy** (anc. *Bereni'ce*), a seaport-town of Northern Africa and the capital of Barca, on the E. coast of the Gulf of Sidra, 420 miles E. S. E. of Tripoli. The port is shallow, and nearly filled with sand. It has some trade in oxen, sheep, corn, and wool. It is supposed by some to occupy the site of the ancient *Hesperis* and the Gardens of the Hesperides. Pop. estimated at from 6000 to 7000.

Beng'el (Johann Albrecht), D. D., a German Lutheran theologian, was born at Winnenden, in Würtemberg, June 24, 1687. He was probably the first Protestant who treated the exegesis of the New Testament in a thoroughly critical spirit. His edition of the Greek Testament (1734) is highly esteemed. He wrote, besides other works, the celebrated "Gnomon Novi Testamenti" (1742), and an "Exposition of the Revelation of St. John" (1740). Died Nov. 2, 1752. (See a "Memoir of the Life of J. A. Bengel," translated from the German; also J. C. F. Burk, "Dr. J. A. Bengels Leben und Wirken," 1831.)

Bengue'la, a country of Western Africa, the limits of which cannot be accurately defined. It is bounded on the N. by the Coanza River, which separates it from Angola, on the S. by Mossamedes, and on the W. by the Atlantic Ocean. It is watered by numerous rivers which flow westward into the Atlantic; none of which, however, are of great importance. The surface is mountainous. The soil is fertile, and produces a very luxuriant and varied vegetation. The climate is hot, humid, and unhealthy, especially near the coast. The forests are infested by lions and other beasts of prey. Benguela is nominally subject to Portugal. Capital, São Felipe de Benguela.

Ben'ham (A. E. K.), U. S. N., born April 15, 1832, in Pennsylvania, entered the navy as a midshipman Nov. 24, 1847, became a passed midshipman in 1853, a lieutenant in 1855, a lieutenant-commander in 1862, and a commander in 1867. On Nov. 7, 1861, while attached to the steamer Bienville, he took part in the battle of Port Royal. From 1863 to 1865 he commanded the steamer Penobscot, Western Gulf blockading squadron.

Foxhall A. Parker, U. S. N.

Benham (Gen. Henry W.) was born at Cheshire, Conn., graduated at West Point with the highest honors in 1837, entered the engineers, served in Mexico, and was wounded at Buena Vista. He was afterwards employed on the coast survey, and was superintendent of the construction of defensive works around New York City, Boston, etc. In 1861 he was made brigadier-general of volunteers, and in 1865 was brevetted major-general U. S. A. He holds since 1867 the rank of colonel of engineers.

Be'ni, a river of South America, in Bolivia, rises on the E. slope of the Andes, and is formed by the junction of the Chuqueapo and Mapiri. It flows first northward and then north-eastward, and joins the Madeira or Mamore near the N. boundary of Bolivia, after a course of about 650 miles.

Beni, a department of Bolivia, is bounded on the N. and E. by Brazil, on the S. by La Paz, Cochabamba, and Santa Cruz, and on the W. by Peru. It comprises the whole northern part of the republic, and with the exception of a small part in the S. W. corner, and a part of the province of Menos in the E., consists entirely of an unknown region, inhabited only by wild Indians. Chief town, Trinidad. Pop. 53,900, exclusive of the Indians, whose number is estimated at 100,000.

Benicar'lo, a seaport-town of Spain, in the province of Valencia, on the Mediterranean, about 82 miles N. N. E. of Valencia. It is meanly built, and has a ruined castle and a fishing port. A strong wine is made here and exported to Bordeaux, where it is used in "cooking" or adulterating claret. Pop. 6989.

Beniç'ia, a post-village of Solano co., Cal., is on the N. side of the Strait of Carquinez (which connects San Pablo and Suisun bays), about 33 miles by water N. E. of San Francisco. It was formerly the capital of the State. The strait is nearly two miles wide, and is navigable for large vessels. Benicia has a law school, a U. S. arsenal and barracks, a ladies' seminary, a convent, and important manufactures. It is the seat of St. Augustine College (Episcopalian). Here are quarries of limestone, producing good hydraulic cement, and the machine-shops and foundries of the Pacific Mail Steamship Company. Pop. of township, 1656.

Ben'i-Has'san, a village of Central Egypt, on the right bank of the Nile, 23 miles S. S. E. of Minieh. Here are twenty-two grottoes or catacombs excavated in a calcareous bank or hill. They are supposed to have been used as tombs by the people of Hermopolis, which stood on the opposite side of the river. Here are apartments sixty feet long and forty feet wide, in which are pillars of the native rock sixteen feet eight and a half inches in height, and five feet in diameter. The sides of the grottoes are covered with paintings, designed with skill and good taste. These tombs are among the most remarkable in Egypt. The

earliest bears the date of the forty-third year of Ositarsen I., not far from 1800 B. C. Says J. P. Thompson, "I found one tomb, some 200 feet above the level of the river, almost a Doric temple hewn from the solid rock. . . . This chamber was cut from the solid rock with perfect precision; no modern square or line or plummet could make it more true."

Be'ni Khaibir', a tribe in Arabia, supposed by some, but without sufficient reason, to be a remnant of the ancient ascetic Rechabites. They number about 60,000. (See RECHABITES.)

Benin', a kingdom of Western Africa, in Upper Guinea, is bounded on the N. E. and E. by the river Niger, on the S. W. by the Bay of Benin, and on the W. by Dahomey. Its limits in some directions are not well defined or ascertained. The interior is elevated and hilly, and mostly covered with forests. The soil is fertile, and supports a dense population. Sugar, rice, yams, palm oil, and cotton are the staple productions. Many human victims are sacrificed here. The religion of the country is gross fetishism.

Benin, a town of Africa, capital of the above, is on a river of the same name, which is one of the mouths of the Niger. It is about 55 miles from the ocean. The houses are built of clay. Pop. estimated at 15,000. Belzoni died in this town in 1823.

Beni-Sooef', or **Beni-Souef,** a town of Central Egypt, on the Nile, 68 miles S. S. W. of Cairo. It has cotton-mills and quarries of alabaster, and is the entrepôt of the produce of the fertile valley of Fayoom. Pop. 6000.

Ben'jamin, the youngest son of the patriarch Jacob and of Rachel (who called him BENONI). He was his father's favorite child, and the head of one of the twelve tribes of Israel. The territory of this tribe was bounded on the N. by that of Ephraim, on the E. by the Jordan, on the S. by the land of Judah, and on the W. by that of Dan. After the death of Solomon the tribes of Benjamin and Judah remained loyal to his dynasty when the other ten tribes revolted.

Benjamin (JUDAH PETER), an American politician of Jewish extraction, was born in Hayti in 1812. He practised law in New Orleans, was elected a Senator of the U. S. for Louisiana in 1852, and re-elected in 1859. He acted with the Democrats, and became a secessionist. He was secretary of state of the Confederate States from Feb., 1862, until the collapse of that power in 1865. Since the close of the civil war he has practised law in London, England.

Benjamin (PARK), an American poet, born at Demarara, in Guiana, Aug. 14, 1809. He graduated at Trinity College, Hartford, Conn., in 1829, and in 1840 became associated with R. W. Griswold as editor of the "New York World," a literary journal. He wrote, besides many lyrical poems, a "Poem on the Meditation of Nature." Mr. Benjamin, though physically strong, was never able to walk. Died Sept. 12, 1864.

Benjamin of Tudela, a Jewish rabbi and traveller, commenced about 1160 a journey through Palestine, Persia, and Egypt, in which he passed about twelve years. He wrote an account of his travels, which was translated into Latin, English, and French. Died in 1173. (See CARMOLY, "Notice sur B. de Tudéle et ses Voyages," 1837.)

Benkoelen, or **Bencoo'len,** a Dutch seaport-town on the S. W. coast of Sumatra: lat. 3° 48′ S., lon. 102° 19′ E. Pop. estimated at 5000. It was founded by the English in 1685, but was ceded to Holland in 1825, in exchange for Malacca. The climate of the city is exceedingly unhealthy. Pepper is the chief article of export.

Ben'ner, a township of Centre co., Pa. Pop. 1362.

Ben'net Spring, a township of Barnwell co., S. C. Pop. 1742.

Ben'nett (JAMES GORDON), a journalist, born in Banffshire, Scotland, Sept. 1, 1795, and educated for the Roman Catholic priesthood, emigrated to the U. S. in 1819, was connected with several journals published in the city of New York, and was chief editor in 1833 of the "Pennsylvanian," a daily paper of Philadelphia. In 1835 he founded the "New York Herald," which was very successful. He died June 1, 1872.

Bennett (JOHN HUGHES), M. D., an eminent physician and medical writer of Edinburgh, was born in London in 1812, took his degree at Edinburgh in 1837, and in 1848 was made professor of the institutes of medicine in that city. Dr. Bennett is especially distinguished for his studies in histology and therapeutics, and his advocacy of the expectant treatment of disease. Among his works are "Clinical Medicine" (1856), "Practice of Medicine," "Treatment of Pulmonary Consumption," etc.

Bennett (MILO LYMAN), LL.D., was born in Sharon, Conn., in 1790, graduated at Yale in 1811, and studied law at Litchfield. He resided at Burlington, Vt., and was a judge in the Vermont courts (1839–59). He published "Vermont Justice" and other legal works. Died July 7, 1868.

Bennett (Sir WILLIAM STERNDALE), MUS. DR., D. C. L., an English composer and pianist, born at Sheffield April 13, 1816. He visited Germany, and formed a friendship with Mendelssohn. He composed concertos, overtures, and pieces for the piano. He was knighted in 1871.

Bennett's Bayou, a post-township of Fulton co., Ark. Pop. 427.

Ben'nettsville, a post-village, the capital of Marlborough co., S. C., 90 miles E. N. E. of Columbia. It has one weekly newspaper. Pop. of township, 1736.

Ben Ne'vis, a famous mountain of Scotland, and the highest point in Great Britain, is in the county of Inverness, about 5 miles E. of Loch Eil. It has an altitude of 4406 feet, and is very difficult of ascent. On the N. E. side is a tremendous precipice 1500 feet in height. Granite and gneiss form the base of this mountain, the upper part of which is porphyry. In clear weather most of the Western Islands and the mainland as far as Cairngorm and Ben Macdhui can be seen from the summit.

Bennezette, a township of Butler co., Ia. Pop. 206.

Bennezette, a township of Elk co., Pa. Pop. 902.

Ben'nigsen, von (RUDOLF), a prominent German statesman, born at Lüneburg in 1824, became in 1867 a member of the Hanoverian provincial diet and of the Prussian house of delegates, and second vice-president of the North German diet.

Ben'nington, a county which forms the S. W. extremity of Vermont. Area, 700 square miles. It is drained by the Battenkill River, which rises within its limits. The surface is mostly mountainous or hilly, and extensively covered with forests. Quarries of white and gray marble are worked in this county, which is intersected by the Harlem Extension R. R. or Western Vermont R. R. Oats, corn, wool, potatoes, and maple-sugar are important products. Capitals, Bennington and Manchester. P. 21,325.

Bennington, a township of Marshall co., Ill. Pop. 1020.

Bennington, a township of Black Hawk co., Ia. Pop. 654.

Bennington, a post-township of Shiawassee co., Mich. Pop. 1424.

Bennington, a township of Mower co., Minn. P. 257.

Bennington, a post-township of Hillsborough co., N. H. It has manufactures of boots, shoes, paper, cutlery, casks, hoes, etc. Pop. 401.

Bennington, a post-village and township of Wyoming co., N. Y., 26 miles E. S. E. of Buffalo. Pop. of the township, 2385.

Bennington, a township of Licking co., O. Pop. 907.

Bennington, a post-township of Morrow co., O. Pop. 899.

Bennington, the semi-capital of Bennington co., Vt., is on the Harlem extension division of the New York Boston and Montreal R. R., 55 miles S. by W. of Rutland, and 36 miles from the Hudson River at Troy. The town contains three villages—Bennington, North Bennington, and Bennington Centre—each of which has a separate post-office. Gen. Stark, at the head of a column of "Green Mountain Boys," defeated a British detachment in force, commanded by Col. Baum, sent from Gen. Burgoyne's army to capture the public stores at Bennington, Aug. 16, 1777; 600 British prisoners were captured. The town contains nine churches, two extensive graded schools, two national banks, five large manufactories of knit goods, and one of the largest shawl factories in the country. Bennington Village is the largest manufacturing village in the State. It has two weekly newspapers. Pop. 2501; total pop. of township, 5760.

J. HALSEY CUSHMAN, ED. "BANNER."

Beno'na, a post-township of Oceana co., Mich. P. 637.

Bensa'lem, a post-village and township of Bucks co., Pa., on the Philadelphia and Trenton R. R., 16 miles N. E. of Philadelphia. Pop. of township, 2353.

Ben'son, a post-village, capital of Swift co., Minn., is on the Chippewa River and on the St. Paul and Pacific R. R., 134 miles W. of St. Paul. Pop. of township, 628.

Benson, a post-township of Hamilton co., N. Y. P. 320.

Benson, a post-township of Rutland co., Vt. Pop. 1244.

Benson (EGBERT), LL.D., born in New York City June 21, 1746, graduated at Columbia College in 1795, was an eminent lawyer, a member of Congress (1784–88, 1789–93, and 1813–15), a regent of the university (1789–

1802), judge of the supreme court of New York (1794–1801), and of the U. S. circuit court. He published a "Vindication" of the captors of André (1817), and a "Memoir on Dutch Names" (1835). Died Aug. 24, 1833.

Benson (HENRY C.), D. D., an eminent preacher and writer in the Methodist Episcopal Church, was born near Xenia, O., in 1815, joined the Indiana Conference in 1842, was elected professor of Greek in Indiana Asbury University in 1850, went to California in 1852, was editor of the "Pacific Christian Advocate" at Portland, Or., from 1864 to 1868, and elected editor of the "California Advocate" in 1868, in which office he still continues. He is author of "Life among the Choctaws," among whom he labored some time as a missionary.

Benson (JOSEPH), an English Methodist minister, born in Cumberland Jan. 25, 1748, acquired much influence in the Church. He was a popular preacher, and author of numerous works, among which are an "Apology for the Methodists" (1801), a "Life of the Rev. John Fletcher," and a "Commentary on the Holy Scriptures" (5 vols., 1811–18), which is highly esteemed. Died Feb. 16, 1821.

Bent, a county in the S. E. part of Colorado, bordering on Kansas. Area, 5040 square miles. It is intersected by the Arkansas River, and also drained by several creeks. The soil is adapted to grazing and tillage, and grain is successfully cultivated. Capital, Las Animas. Pop. 592.

Bent Grass (*Agros'tis*), a genus of grasses comprising numerous species which are natives of Europe, the U. S., and many other countries. They have 1-flowered spikelets in a loose or open panicle, with glumes which are unequal, awnless, and longer than the paleæ. The upper (inner) palea is often wanting. Stamens mostly three. Some of the species are cultivated for pasture and for hay, on account of their adaptation to certain soils. The *Agrostis vulgaris* forms a principal part of the pasture in the more elevated districts of England, and resists drought better than some other grasses. It is considered suitable for lawns. It is called "herd's grass" or "red top" in Pennsylvania. The *Agrostis alba,* sometimes called "marsh bent grass," is valuable for pasture, and is common in England. It is also naturalized in some of the U. S. The *Agrostis spica venti,* a native of Europe, is a beautiful grass, with very slender branches of its panicle, which, waving in the wind, presents a glossy and silky appearance.

Ben'tham (JEREMY), an English philosopher and reformer, eminent as a writer on ethics and jurisprudence, was born in London Feb. 15, 1748. He graduated at Queen's College, Oxford, in 1766, studied law, and was called to the bar in 1772, but he never practised that profession. He published in 1776 an acute and critical "Fragment on Government," which abounds in sound and original ideas, and in 1787 an exhaustive argument entitled a "Defence of Usury." His next important work was his "Introduction to the Principles of Morals and Legislation" (1789). He adopted the theory that "utility is the test and measure of virtue," and that laws should promote "the greatest happiness of the greatest number." He devoted his time and talents chiefly to the reform of legislation and government, and advocated universal suffrage, the vote by ballot, etc. He inherited from his father an easy fortune. About 1792 he formed a friendship and literary partnership with M. Dumont, who translated into French several of Bentham's works—namely, "Treatise on Civil and Penal Legislation" (3 vols., 1802), and "Theory of Penalties and Rewards" (1811). Among his other works are "Panopticon" (1791), which treats on prison discipline, and "The Rationale of Judicial Evidence" (5 vols., 1827). By habitual temperance, activity, and self-control he prolonged his life to the age of eighty-four. Died June 6, 1832. He has great merits in the English jurisprudence, "which," as Macaulay says, "he found a gibberish and left a science." But on the public in general his influence was small, on account of the unreadableness of his writings. He represents French ideas, especially those of the French Revolution, and he is the real founder of the utilitarian school of philosophy. His works were more admired on the Continent than in England. (See "Memoirs of Jeremy Bentham," prefixed to his works by DR. BOWRING; JOHN HILL BURTON, "Benthamiana;" SIR JAMES MACKINTOSH, "View of the Progress of Ethical Philosophy;" "Edinburgh Review" for Oct., 1843.)

Bentinck (WILLIAM GEORGE FREDERICK CAVENDISH), LORD, commonly called **Lord George Bentinck,** born Feb. 27, 1802, was a third son of the fourth duke of Portland. He became in 1826 private secretary to George Canning, who had married his aunt. He represented Lynn-Regis in Parliament from 1827 until his death, and in 1835 became a conservative and supporter of Sir Robert Peel. He was much addicted to field-sports and horse-races. After Peel adopted the policy of free trade in 1843, Lord George was recognized as the leader of the protectionist party, which opposed the repeal of the corn laws. He died suddenly Sept. 21, 1848. (See B. DISRAELI, "Lord George Bentinck, a Political Biography," 1851.)

Bent'ley, a township of Perry co., Ark. Pop. 345.

Bentley (RICHARD), D. D., a celebrated English critic and classical scholar, born at Oulton, in Yorkshire, on the 27th of Jan., 1662. He entered St. John's College, Cambridge, in 1676, and having taken the degree of bachelor, became, in 1683, tutor to Dr. Stillingfleet's son, with whom he went to Oxford. He was ordained a priest in 1690. In 1692 he was appointed to deliver the Boyle lecture on the evidences of religion, and in 1694 became keeper of the Royal Library. He published in 1699 a celebrated "Dissertation on the Epistles of Phalaris," which procured for him a European reputation. He maintained that these Epistles were spurious, and was involved in a controversy with Atterbury, Charles Boyle, Pope, and other writers, who resorted to sarcasm and personality. Bentley defended himself in another "Dissertation on the Epistles of Phalaris" (1699). He was appointed master of Trinity College, Cambridge, in 1700, and married Joanna Bernard in 1701. In 1711 he published a good edition of Horace. His arrogance provoked a series of quarrels and litigations with the fellows of Trinity College. He was appointed regius professor of divinity in 1717, and was deprived of all his academic degrees and honors by the senate of the University in 1718, but he was reinstated by a mandamus of the court of king's bench in 1724. Among his productions was an edition of Homer, which he left unfinished. He proposed to revise and correct the text of the Greek Testament by comparing it with all the manuscripts. He failed to perform this task, but his principles of criticism have since been adopted, and have triumphed over all opposition. He died July 14, 1742. His daughter was the mother of Richard Cumberland, the dramatist. (See MONK, "Life of R. Bentley," 1830; HARTLEY COLERIDGE, "Lives of Distinguished Northerns;" "Edinburgh Review" for July, 1830.)

Ben'ton, a county which forms the N. W. extremity of Arkansas. Area, 900 square miles. It is drained by the Illinois and White rivers and several creeks, which afford water-power. It has great but undeveloped mineral wealth. Tobacco and corn are the chief crops. The soil is fertile. Capital, Bentonville. Pop. 13,831.

Benton, a county of Indiana, bordering on Illinois. Area, 414 square miles. It is drained by Pine and Sugar creeks. The greater part of the county is an undulating prairie, the soil of which is fertile. Grain and wool are the chief products. Capital, Oxford. Pop. 5615.

Benton, a county in E. Central Iowa. Area, 720 square miles. It is traversed by the Cedar River, and also drained by Prairie Creek. It contains extensive prairies, the land of which is fertile. Cattle, corn, wheat, and wool are largely raised. The Iowa division of the Chicago and North-western R. R. passes through this county. Capital, Vinton. Pop. 22,454.

Benton, a county in Central Minnesota. Area, 400 square miles. It is bounded on the W. by the Mississippi River, and also drained by the Elk River. The surface is undulating; the soil in some parts is fertile. Wheat, corn, and oats are the chief crops. A railroad has been opened from St. Paul to Sauk Rapids, which is the county-seat. Pop. 1558.

Benton, a county of Mississippi, bordering on Tennessee, was organized since the census of 1870. The Tallahatchee River bounds it on the S. W. The soil is fertile. Cotton is extensively raised. The Mississippi Central R. R. traverses the W. part. Capital, Ashland.

Benton, a county in W. Central Missouri. Area, 730 square miles. It is intersected by the Osage River, which flows eastward, and is also drained by the Grand River. The surface is moderately diversified; the soil is productive. Tobacco, grain, and wool are the chief products. Lead is found in this county. Capital, Warsaw. Pop. 11,322.

Benton, a county of Oregon. Area, 1556 square miles. It is bounded on the E. by the Willamette River, and on the W. by the Pacific Ocean. It is drained by the Alseya and Yaquina rivers. The Coast Range of mountains extends through the central part of the county. Wheat, oats, fruit, and wool are important products. Capital, Corvallis. Pop. 4584.

Benton, a county of Tennessee. Area, 400 square miles. It is bounded on the E. by the Tennessee River, navigable for steamboats, and on the N. W. by the Big Sandy River. The soil is productive. Corn, tobacco, and wool are the staple products. The county is intersected by

the Nashville and North-western R. R. Capital, Camden. Pop. 8234.

Benton, a post-village of Lowndes co., Ala., on the Alabama River, and on the railroad connecting Selma and Montgomery, 31 miles W. of Montgomery. Pop. of township, 2627.

Benton, a township of Conway co., Ark. Pop. 583.

Benton, a township of Fulton co., Ark. Pop. 461.

Benton, a post-village, capital of Saline co., Ark., is 25 miles S. W. of Little Rock.

Benton, a post-township of Mono co., Cal. Pop. 94.

Benton, the capital of Franklin co., Ill., 77 miles N. N. E. of Cairo, has 3 churches, 1 high school, 1 law library, 1 printing-office, 1 weekly paper, 1 manufactory of agricultural implements, 1 carriage-shop, 1 saddle and harness manufactory, 2 steam flouring mills, numerous stores, 2 hotels, an exchange bank, a county court-house, and a jail. Pop. 615. J. S. Barr, Pub. "Benton Standard."

Benton, a township of Lake co., Ill. Pop. 640.

Benton, a post-township of Elkhart co., Ind. P. 1188.

Benton, a township of Monroe co., Ind. Pop. 867.

Benton, a township of Benton co., Ia. Pop. 601.

Benton, a township of Des Moines co., Ia. Pop. 1192.

Benton, a township of Fremont co., Ia. Pop. 904.

Benton, a township of Keokuk co., Ia. Pop. 1309.

Benton, a township of Lucas co., Ia. Pop. 696.

Benton, a township of Ringgold co., Ia. Pop. 367.

Benton, a township of Taylor co., Ia. Pop. 1055.

Benton, a township of Wayne co., Ia. Pop. 852.

Benton, a post-village, capital of Marshall co., Ken., on Clark's River, about 270 miles W. S. W. of Frankfort.

Benton, a post-township of Kennebec co., Me. It has manufactures of lumber. Pop. 1180.

Benton, a township of Berrien co., Mich. Pop. 3116.

Benton, a township of Eaton co., Mich. Pop. 1355.

Benton, a post-township of Carver co., Minn. P. 1297.

Benton, a township of Adair co., Mo. Pop. 3369.

Benton, a township of Atchison co., Mo. Pop. 680.

Benton, a township of Cedar co., Mo. Pop. 1130.

Benton, a township of Christian co., Mo. Pop. 527.

Benton, a township of Crawford co., Mo. Pop. 1184.

Benton, a township of Dallas co., Mo. Pop. 2055.

Benton, a township of Daviess co., Mo. Pop. 1199.

Benton, a township of Douglas co., Mo. Pop. 379.

Benton, a township of Holt co., Mo. Pop. 2226.

Benton, a township of Howell co., Mo. Pop. 809.

Benton, a township of Knox co., Mo. Pop. 1602.

Benton, a township of Linn co., Mo. Pop. 696.

Benton, a township of Newton co., Mo. Pop. 968.

Benton, a township of Osage co., Mo. Pop. 2513.

Benton, a township of Polk co., Mo. Pop. 1650.

Benton, a township of Wayne co., Mo. Pop. 1291.

Benton, a township of Webster co., Mo. Pop. 768.

Benton, a township of Nemaha co., Neb. Pop. 456.

Benton, a post-township of Grafton co., N. H. It has manufactures of lumber, etc. Pop. 375.

Benton, a post-township of Yates co., N. Y., includes a part of the village of Penn Yan. Pop. 2422.

Benton, a township of Hocking co., O. Pop. 1448.

Benton, a township of Monroe co., O. Pop. 987.

Benton, a township of Ottawa co., O. Pop. 1152.

Benton, a township of Paulding co., O. Pop. 404.

Benton, a township of Pike co., O. Pop. 1119.

Benton, a post-township of Columbia co., Pa. P. 1053.

Benton, a township of Luzerne co., Pa. Pop. 1055.

Benton, a small post-village, capital of Polk co., Tenn., is about 75 miles S. S. W. of Knoxville. Pop. 250.

Benton, a post-village of Lafayette co., Wis., is 13 miles N. of Galena, and in Benton township. Rich mines of lead are worked here. Pop. of township, 1723.

Benton (James G.), an American officer, born in 1820 in New Hampshire, graduated at West Point in 1842; major of ordnance Sept. 15, 1863. He served at various arsenals and on special duties 1842–57, as member of the ordnance board 1854–56, at Military Academy as instructor of ordnance and gunnery 1857–61. In the civil war he was an assistant in the ordnance bureau at Washington 1861–63, in command of Washington Arsenal till June 14, 1864, and since of Springfield Armory, Mass. Brevet lieutenant-colonel and colonel Mar. 13, 1865, for faithful and meritorious services in the ordnance department. He is author of "A Course of Instruction in Ordnance and Gunnery for the use of the Cadets of the U. S. Military Academy" (1860).

George W. Cullum, U. S. A.

Benton (Thomas Hart), an American Senator and statesman, born near Hillsborough, N. C., Mar. 14, 1782. He removed to Tennessee, studied law, and began to practise at Nashville about 1810. In the war of 1812 he served as colonel under Gen. Jackson. He became a resident of St. Louis, Mo., in 1815, and was elected a Senator of the U. S. for Missouri in 1820. Having been re-elected in 1826, he supported Gen. Jackson, opposed the U. S. Bank, and advocated a gold and silver currency, for which reason he was often called "Old Bullion." For many years he was the most prominent public man of Missouri. He was a member of the national Senate for 30 years, and opposed the extreme State Rights policy of Calhoun. In 1852 he was elected to the House of Representatives, in which he opposed the repeal of the Missouri Compromise. He was opposed by a powerful party of State Rights Democrats in Missouri, who defeated him as a candidate for governor in 1856. He published a "Thirty Years' View, or a History of the Working of the American Government for Thirty Years, 1820–50" (2 vols., 1854–56). Died April 10, 1858.

Ben'ton Har'bor, a post-village of Berrien co., Mich., is on the E. side of St. Joseph's River and the Benton Harbor ship canal, 1½ miles from Lake Michigan, in Benton township, and about 60 miles E. by N. from Chicago. It is on the Chicago and Michigan Lake Shore and Elkhart and Lake Michigan R. Rs. It has one weekly paper, a large trade in grain and lumber, and an immense one in fruit, large manufactories of fruit packages, washboards, and canned fruit, and an undeveloped water-power. Regular lines of steamers and sailing vessels connect it with Chicago and Milwaukee. Pop. 661; of Benton township, 3116.

Alvin Sturtevant,
Ed. of "Benton Harbor Palladium."

Ben'tonsville, a post-village of Johnston co., N. C., in a township of its own name, about 17 miles W. of Goldsboro'. After the battle of Averysboro' (Mar. 16, 1865) the army of Gen. Sherman marched towards Goldsboro', not anticipating any further contest before reaching that destination; but Gen. Johnston, who had been concentrating the Confederate forces from Georgia, South Carolina, and Tennessee at Smithfield, N. C. (now amounting to 40,000), slipped out at night in light marching order, expecting to fall upon the left wing of Sherman's army, under Gen. Slocum, and crush it before support could reach him. Gen. Slocum was at first driven back, but hastily throwing up rifle-pits, assumed the defensive, Kilpatrick with his cavalry supporting his left. Six assaults were made by Johnston, which failed to dislodge the veterans of Slocum from their position, while the artillery fire upon the Confederates was very damaging. Night caused a cessation, Gen. Slocum still holding his ground. By morning of the next day the right wing had arrived to Slocum's aid, and Johnston's army had intrenched itself in a strong position. An attempt was made to cut off the line of the Confederates' retreat, but Johnston hastily retreated during the night of Mar. 21 on Smithfield and Raleigh. The Federal loss was upwards of 1600, killed and wounded; the Confederate loss is not known: 267 dead, however, were left on the field, and 1600 prisoners were taken. Pop. of township, 922.

Ben'tonville, a post-village, the capital of Benton co., Ark., 170 miles N. W. of Little Rock. It has an active trade in tobacco, and has several manufactories.

Bentonville, a post-village of Sprigg township, Adams co., O. Pop. 310.

Bent Timber. Of late years much attention has been paid to the subject of bent timber on account of its strength and economy. This operation is effected either by bending the timber whole or by bending it in planks, which are then put together in pieces of any required thickness; both of them have been used for ship- and for bridge-building. When timber is bent whole, the requisite curvature is given by steaming the beam and weighing down the side intended to receive the curvature; but the objection to this plan is, that steaming is apt to impair the durability of the wood, and the radius of curvature must be always very flat. It was to avoid these objections that the system was introduced of cutting the logs into planks, and bending them to the required curvature, as is often done in railway-bridges and station-roofs. It has been found that the timber so bent remains sufficiently elastic to admit of considerable movement under the weight of a train, and consequently opens at the joints and allows water to act upon the interior. Many bridges where these beams have been

used have decayed; but in sheltered positions they have stood admirably. It is to be observed that bent planks retain a much greater degree of elasticity than the whole timber so managed, and that they are also more likely to retain the original strength of the wood itself. (See EMY, "Sur la Charpenterie.") Bent timber was formerly much used in shipbuilding in the form of natural-grown timber, but its use is becoming more and more rare, on account of the difficulty of obtaining natural-growth wood for that purpose.

Benu'e (*i. e.* "the mother of waters"), a large river of Central Africa, is the principal tributary of the Niger or Quorra. Its source has not been explored. It flows nearly westward through Sokoto, and enters the Niger at Lokoya, which is about 300 miles from the mouth of the Niger. Dr. Barth in 1851 crossed it near lon. 12° 30′ E., and found it there about 800 yards wide. Dr. Baikie in 1850 ascended the Benue to Dulti or Dolti, which is about 400 miles from its mouth. A second expedition to explore this river was undertaken by Dr. Baikie in 1861. In 1867, Gerhard Rohlfs travelled up this river from Dagbo to its entrance into the Niger at Lokoya, a distance of about 150 miles.

Ben Wade, a township of Pope co., Minn. Pop. 240.

Ben'zamide, $C_7H_7NO = N.C_7H_5O.H_2$, a primary amide obtained in beautiful white crystals by several different processes.

Benzene. See BENZOLE.

Ben'zidine, $C_{12}H_{12}N_2 = N_2.(C_{12}H_8)''.H_4$, an organic base, diamine, formed by the reduction of azobenzene or azoxybenzene.

Ben'zie, a county in North-west Michigan. Area, 440 square miles. It is bounded on the N. W. and W. by Lake Michigan, and drained by the Betsie River. Wheat, corn, potatoes, and maple-sugar are the staple crops. Capital, Benzonia. Pop. 2184.

Ben'zinger, a township of Elk co., Pa. Pop. 1630.

Benzine. See BENZOLE.

Benzo'ic Acid, or **Flowers of Benzoin,** a substance which exists in many balsams and is obtained from benzoin. It is artificially made on a large scale from naphthaline and the urine of animals. It occurs in the form of snow-white acicular or feathery crystals, and has a pleasant aromatic odor. It is readily soluble in alcohol and ether, and is one of the ingredients of elixir paregoric (*Tinctura camphoræ composita*). Combined with oxide of zinc, it is a most valuable application in many cases of eczema. It is also used in the arts for various purposes. The chemical formula of this acid is $H.C_7H_5O_2$.

Benzoin', or **Ben'jamin, Gum** [Lat. *benzoi'num*], a fragrant resinous substance, is the concrete juice of a tree called *Styrax benzoin,* which is a native of Sumatra, Siam, and Borneo, and belongs to the natural order STYRACACEÆ (which see). The resin is obtained by making incisions in the bark of trees which are cultivated for that purpose. It is extensively used as incense in Roman Catholic and Greek churches; is also used in perfumery, and in medicine as a stimulant, emetic, and styptic. A tincture of benzoin is sometimes applied to wounds, and is employed in making a cosmetic called virgin's milk.

Benzo'in Odorif'erum, a shrub more correctly called *Lindera Benzoin,* of the natural order Lauraceæ, a native of the U. S., popularly called Benjamin tree, spice bush, etc. Its bark is aromatic, stimulant, and tonic, and has been used as a remedy for intermittent fevers.

Ben'zole, Benzene, Hydride of Phenyl, or **Phene** (symbol C_6H_6), a compound of carbon and hydrogen, is a product obtained by the distillation of coal or coal-tar. It can also be obtained by subjecting oil-gas (carburetted hydrogen) to a pressure of thirty atmospheres, by passing the vapor of benzoic acid through a red-hot iron tube, by the dry distillation of kinic acid, or by distilling benzoic acid with lime. It is usually obtained from the light oil of coal-tar, coal-tar naphtha, by fractional distillation, and purification with nitric and sulphuric acids. Commercial benzole usually contains considerable quantities of the homologous hydrocarbons toluole, C_7H_8, xylol, C_8H_{10}, etc. It is prepared on a large scale for the manufacture of nitrobenzole, aniline, and aniline colors, and for "carbonizing" coal-gas. Benzole may be produced synthetically by heating acetylene, C_2H_2, to a temperature a little below redness. At ordinary temperatures benzole is a thin, limpid, colorless, and volatile liquid, emitting a characteristic ethereal odor. Its specific gravity is 0.85 at 60° F.; its boiling-point is 179.6° F. At 37° F. it becomes solid, or crystallizes into beautiful transparent crystals of fern-like forms. It is not soluble in water, but dissolves readily in alcohol, ether, and turpentine. It is valuable to the chemist as a powerful solvent of caoutchouc, gutta-percha, wax, and fatty substances. It is inflammable, and possesses great illuminating power, which it imparts to gases, and even to atmospheric air, when they are passed through it. With chlorine, bromine, nitric acid, etc., benzole forms interesting substitution products, the most important of which is nitrobenzole or essence of mirbane, $C_6H_5NO_2$. (See TAR.) C. F. CHANDLER.

Benzo'nia, a post-village and capital of Benzie co., Mich., on Betsie River, 5 miles from Frankfort. It is the seat of Grand Traverse College, and has one weekly paper, one church, and a park. Pop. of Benzonia township, 214.
J. A. PETTIT & Co., EDS. "BENZIE COUNTY JOURNAL."

Benzoyl', C_7H_5O, the hypothetical radical which is supposed to exist in benzoic acid and many kindred bodies. Oil of bitter almonds is supposed to be its hydride.

Ben'zyl, Tolyl, or **Toluenyl,** C_7H_7, a hypothetical radical, isomeric with cresyl, which is contained in benzylic alcohol, toluol ($C_7H_8 = C_7H_7.H$), etc.

Benzylamine, $C_7H_9N = N.C_7H_7.H_2$. (See TOLUIDINE.)

Be'owulf', the title of a celebrated Anglo-Saxon poem, written not later than the eighth century, and having for its subject a semi-fabulous hero of Denmark. An English translation of it appeared in London in 1833.

Béranger, de (JEAN PIERRE), an eminent French lyric poet, born in Paris Aug. 19, 1780. He passed about three years as an apprentice to a printer, and never received a very liberal education. He was neglected by his father, and spent many of his early years with an aunt, who imbued his mind with virtuous and republican principles. His first essays in verse, which were written under the pressure of poverty, obtained for him in 1804 the patronage of Lucien Bonaparte. He was employed for nearly twelve years as a clerk or subordinate secretary in the University of Paris. He published in 1815 a volume of songs which became very popular. Some of his verses were political, and contained satirical passages which were offensive to the royalists, then the party in power. Having produced another volume of poems in 1821, he was prosecuted and sentenced to an imprisonment for three months. This increased the popularity of his songs, and failed to restrain the freedom of his satire or abate the ardor of his republicanism. He published in 1828 a fourth volume, for which he was sentenced to pay a fine of 10,000 francs and to be imprisoned for nine months. When his friends obtained power by the revolution of 1830, they offered him lucrative places, which he declined. He never published any poems after 1833, the date of his fifth volume. He rejected all the favors and overtures of Napoleon III. Died July 16, 1857. His character was noble and independent. In his poems gayety and pathos are combined with the happiest effect. "His style," says a French critic, "has a limpidity and purity which defy criticism." (See his autobiographic memoirs, "Ma Biographie," 1857; SAVINIEN LAPOINTE, "Mémoires sur Béranger," 1857; LONGFELLOW, "Poets and Poetry of Europe.")

Berard (CLAUDIUS), an eminent educator, born at Bordeaux, France, Mar. 21, 1786. In 1807 he emigrated to the U. S., and in 1812 was appointed a professor at Dickinson College, Carlisle, Pa. In 1815 he accepted an appointment as teacher in French at the U. S. Military Academy at West Point, which position he held till 1846, when under a law of Congress (1846) he was made professor, continuing in this capacity till his death, May 6, 1848.

Berat', a town of European Turkey, in Albania, on the river Ergent, here crossed by a bridge, 30 miles N. E. of Avlona. It contains a citadel, several Greek churches, and a number of mosques. It is the seat of a Greek archbishop. The population is estimated at 10,000, a majority of whom are Greeks.

Ber'ber, or **El Mesherif,** a town of Nubia, on the Nile. Roads lead from here to Egypt and Khartum. It has considerable trade. Pop., according to Heuglin, 45,000.

Ber'bera, a seaport station of Eastern Africa, in Somauli, is on the Gulf of Aden, 130 miles E. S. E. of Zeyla. Here is held an annual fair, which is attended by 100,000 persons from various foreign countries. They bring coffee, gold-dust, ivory, slaves, cattle, etc. to exchange for cotton, rice, and Indian piece-goods. It appears that Berbera has scarcely any permanent population. The fair begins in November, and continues nearly six months.

Berberida'ceæ, a natural order of exogenous plants, comprises more than 100 known species, one of which is the barberry (*Berberis*). They are natives of the temperate regions of both hemispheres. They have alternate leaves, and hypogynous stamens which are equal in number to the petals, with anthers opening curiously by valves or lids hinged at the top. The pistil is single; the fruit is a berry or a capsule. (See BARBERRY.)

Ber'berine, $C_{20}H_{17}NO_4$, an alkaloid contained in the roots of the barberry (*Berberis vulgaris*), of columbo (*Cocculus palmatus*), and *Menispermum fenestratum*, and in a yellow bark used as a dye in West Africa.

Ber'bers [supposed by some writers to be derived from the word *Barbari*, which the Greeks and Romans applied to all foreigners], a name given to the uncivilized, nomadic tribes of aborigines who inhabit the mountainous regions of Barbary and the northern part of the Desert of Sahara. They are sometimes called Kabyles, but they call themselves Amazeergh, Amazigh, or Amoshagh. They are the descendants of the aboriginal or ancient inhabitants of Northern Africa, who occupied the country before it was conquered by the Arabs, and they are the most numerous part of the present population. The Berbers vary in complexion with situation. Those who inhabit the high valleys of the Atlas have light hair and eyes, while those who occupy the oases of the Sahara are dark, approaching the negroes in complexion, though their features are entirely unlike theirs. Their language is allied to the Semitic in type, and has received from F. W. Newman the name of sub-Semitic. Language, customs, and physical type seem to indicate affiliation with the Semitic races of Asia and Eastern Africa. They are warlike, cruel, and very tenacious of their independence. In religion they are bigoted Mohammedans. They keep cattle and sheep, cultivate fruit trees, and practise agriculture in a rude manner. Many of them live in tents or in clay huts.

Ber'chem, a town of Belgium, in the province of Antwerp. It has factories of linen and tobacco. Pop. 5229.

Berdiansk', written also **Berdjansk,** a seaport-town of Russia, in the government of Taurida, is on the N. shore of the Sea of Azof, 184 miles N. E. of Simferopol. It has a good roadstead and an active trade, and has been remarkable for its rapid growth. It derives its prosperity partly from the coal-mines and salt-lakes of the vicinity. Pop. in 1867, 12,465.

Berditchef', or **Berditschev,** a town of Russia, in the province of Kiev, 194 miles N. W. of Elisabetgrad. It is meanly built, but is an important commercial town, having four annual fairs, held between Aug. 15 and Sept. 15. The value of the goods, cattle, corn, wine, etc. sold here annually is estimated at $3,000,000. Pop. in 1867, 52,786, mostly Jews.

Be'rea, a manufacturing village of Cuyahoga co., O., on the Cleveland Columbus Cincinnati and Indianapolis and Lake Shore and Michigan Southern R. Rs., 12 miles S. W. of Cleveland. It is noted for its inexhaustible quarries of excellent sandstone, and ships 20,000 car-loads of building-stone and grindstones yearly. It has two banks and one newspaper, and is the seat of Baldwin University, a biblical school, etc. Pop. 1628.

P. B. Gardner, Ed. "Grindstone City Advertiser."

Berea College is beautifully situated in the southern part of Madison co., Ky., 40 miles S. of Lexington and 140 from Cincinnati, very near the centre of the State. It originated in the labors of Rev. John G. Fee, a native of Kentucky, in the employment of the American Missionary Association. Mr. Fee was the son of a slaveholder, but earnestly embraced the anti-slavery cause while pursuing theology at Lane Seminary, and, disowned by his father and his Church, devoted his life to the salvation of his native State. The school, like its founder, was always noted for its abolitionism; yet, though its teachers were generally from Oberlin, its pupils were often the sons and daughters of slaveholders. Under the administration of Rev. J. A. R. Rogers the institution became widely known and popular, and its influence began to be feared. The John Brown raid gave occasion for its enemies to rally, and a county meeting sent a committee of sixty-five armed men to remove the school and its officers from the State. At the close of the war it was immediately revived, and for the last three years its annual average of students has been 270. These students represent thirty-eight towns and cities of Kentucky and eleven other States, as the last catalogue reports. Of these 18 are in the four college classes, 7 in the ladies' course, 16 in the normal course, and 43 in the preparatory department. The most are in lower departments. About three-fifths of the students are males, and nearly the same proportion colored. In the four higher departments the white and colored are almost equal—41 and 43. This impartial character of the school causes no collisions among the students, and only disturbs those who have no responsibility in regard to it. They generally acquiesce in silence. The commencement occurs on the first Wednesday of July. Its first senior class of three young men, all Kentuckians and all white, graduates this year (1873). A single lady finishes the ladies' course. The course of study is the same as in other regular colleges, and the grade of scholarship as high as in young colleges generally.

The present president, Rev. E. H. Fairchild, is the first. He commenced his labors in the spring of 1869. Rev. J. A. R. Rogers, professor of Greek; Henry F. Clark, A. M., professor of Latin; Albert A. Wright, A. M., professor of chemistry, etc.; Henry R. Chittenden, A. B., principal of the preparatory department; Mrs. Juliet C. Clark, principal ladies' department. Five other young ladies are employed as teachers, principally in the lower departments. There are fourteen trustees, and a ladies' board of six. The property of the college consists of 400 acres of land, estimated at $20,000; Howard Hall, a very nice dormitory building for young men, constructed of wood with tin roof, $18,000; the new ladies' hall, nearly completed, of brick, with rooms for 110 ladies, $50,000; other temporary buildings, $2500; and endowments to the amount of $23,000. Deduct from this the debts of the college, and the amount necessary to complete the ladies' hall, and the balance is about $95,000. Tuition is very low—$2.50 and $3.50 per quarter. The current expenses of the college, over $8000 per annum, are about half paid by benevolent friends. The American Missionary Association sustains the professor of Greek and three ladies in part. Future prospects are encouraging.

E. H. Fairchild.

Bere'ans, an obscure sect seceding from the Established Church in Scotland, founded by one Barclay in 1773. They take their name from Acts xviii. 11, deny natural theology, make all the Psalms Messianic, and hold assurance to be of the essence of faith. Their numbers are small and diminishing.

Beregh, a county of Hungary, is bounded on the N. E. by Galicia, on the E. by the county of Marmaras, on the S. by the counties of Ugocsa and Szatmar, on the W. by the county of Szabolcs, and on the N. W. by the county of Ungvear. Area, 1440 square miles. The country is mostly mountainous, and produces wine. Pop. in 1869, 159,223. Chief town, Munkacs.

Beregszasz, a town of Hungary, in the county of Beregh, has large vineyards and quarries. Pop. in 1870, 6272.

Beren'gelite, or **Berenge'la Resin,** a bituminous mineral found in a kind of pitch lake in Peru. (*Phil. Mag.* [3] xiii., 329; xiv., 87.)

Bérenger [Lat. *Berenga'rius*] **of Tours,** an eminent French scholastic theologian, born at Tours in 998. He studied under Fulbert of Chartres, and became archdeacon of Angers in 1040. He rejected the dogma of transubstantiation, and was excommunicated in 1050 for heresy by Pope Leo IX. He was compelled to recant or abjure his error, but afterwards relapsed, or continued to oppose the doctrines of the Church. Died in 1088. (See Heinrich Müller, "Berengarii veteris novique Historia," 1674; H. Sudendorf, "Berengarius Turonensis," etc., 1850.)

Bérenger (Alphonse Marie Marcellin Thomas, de la Drôme), a French jurist, born May 31, 1785, exposed the irregularities in the French courts in "De la justice criminelle" (1818). He has written various treatises on the reform of penal law, a "Rapport sur le système penitentiare" (1836), and has labored to that end as magistrate and in the Chamber of Peers.

Berenice, a daughter of Magas, governor of Cyrene, was married to Ptolemy Euergetes, king of Egypt. During his absence on a military expedition she made a vow to sacrifice her hair to Venus for his safe return, which vow she performed. The astronomer Conon reported that Jupiter had transformed this hair into the constellation now called *Coma Berenices* ("Berenice's Hair"). She was put to death by her son, Ptolemy Philopator, in 222 B. C. (See Carl W. Ramler, "Ptolemäus und Berenice," 1765.)

Berenice (called **Bernice** in the New Testament), a daughter of Agrippa I., king of Judea, was born in 28 A. D. She was married to Herod, king of Chalcis, and after his death to Polemon, king of Cilicia. During a visit to Rome she captivated Titus, the son of the emperor Vespasian. She was a sister of King Agrippa, before whom Saint Paul spoke in his own defence. (See Acts xxv.)

Berenice, an ancient city of Egypt, on the Red Sea, 20 miles S. W. of Ras Bernass. It was founded by Ptolemy Philadelphus, who named it after his mother, and was a great emporium of the trade with India. The modern name is *Sakayt-el-Kublee*. Here are the ruins of a temple of Serapis and other interesting antiquities.

Ber'esford (James), an English surgeon, born in Barbados in 1783. He was employed for many years as surgeon in the British army, and settled at Hartford, Conn., about 1833. Died in 1843.

Beresford (William Carr), Viscount, a general, born

in Ireland Oct. 2, 1768, was a natural son of the first marquis of Waterford. He took command of the Portuguese army in Feb., 1809, and fought against the French in the Peninsula. In May, 1811, he defeated Soult at Albuera. He received the title of duke of Elvas in Spain, was created a viscount in 1823, and was master-general of the ordnance in 1828–30. Died Jan. 8, 1854.

Berettyo-Ujfalu, a market-town of Hungary, in the county of Behar, 20 miles S. of Debreczin. Pop. 5760.

Berezi'na, or **Beresi'na,** a river of Russia, rises in the government of Minsk, flows southward, and enters the Dnieper above Rechitza. Its length is about 325 miles. It is navigable, and is connected with the Düna by a canal which opens a communication between the Baltic and Black seas. The French army, retreating from Moscow in Nov., 1812, suffered a great disaster in the passage of this river. The French constructed hastily two bridges over the river, but while they were crossing they were attacked by the Russians, who took about 16,000 prisoners. The French loss, besides the prisoners, amounted to nearly 12,000, many of whom were drowned in the river.

Berez'na, a town of Russia, in the government of Tchernigov, 23 miles E. N. E. of Tchernigov. Pop. 9678.

Ber'ga, a town of Spain, in the province of Barcelona, 53 miles N. W. of Barcelona. Pop. 5590.

Ber'gama (anc. *Pergamum* or *Pergamus*), a ruined city of Asia Minor, in Anatolia, situated in a beautiful valley, on the river Caicus, 46 miles N. N. W. of Smyrna. Pop. about 14,000. The ancient city was the capital of the kingdom of Pergamus, and the seat of one of the seven churches of the Apocalypse. Here are extensive ruins of a palace, temple, amphitheatre, and other edifices.

Berga'mo, a province of Italy, in Lombardy, is bounded on the N. by Sondrino, on the E. by Brescia, on the S. by Cremona, and on the W. by Como and Milan. Area, 1027 square miles. The northern part is mountainous. The soil of the plains and valleys is fertile. Silk is among the products. Capital, Bergamo. Pop. 368,141.

Bergamo (anc. *Bergomum*), a fortified city of Italy, capital of the above province, is situated on several low hills, 52 miles by rail N. E. of Milan. It presents a very picturesque appearance, and is well built. It has a castle, a cathedral, a college, a library, a theatre, many convents and churches; also extensive manufactures of silk, cotton, linen, and woollen fabrics. *Bergomum* was destroyed by Attila in 452 A. D., after which it became an important city of the Lombard kings. Bergamo is connected by railways with Milan, Brescia, etc. Pop. 37,363.

Bergamot, the fruit of a tree which is a species or variety of the genus *Citrus*, is also called **Bergamot Orange,** or **Mellarosa.** According to some botanists, it is a variety of the orange (*Citrus aurantium*). It is cultivated in the south of Europe. The fruit is pear-shaped, of a pale yellow or green color, and has a green, sub-acid, and fragrant pulp. From its rind is obtained by distillation the oil of bergamot, which has a very agreeable odor, is extensively used in perfumery, and is an ingredient in eau-de-cologne and several fragrant essences.

Ber'gen, a fortified city and seaport of Norway, capital of the province of Bergen, is at the head of a deep bay (fiord) of the Atlantic, 184 miles W. N. W. of Christiania; lat. 60° 24′ N., lon. 5° 18′ E. It is picturesquely situated at the foot of a mountain, and enclosed on nearly all sides by water. The harbor is deep and safe, and is defended by several forts. Bergen is well built, has a cathedral, several hospitals, a theatre, a public library, a national museum, and a college. It is the seat of one of the three public treasuries, and is probably the most commercial town of Norway. A large portion of the population is employed in the fisheries, and fish and cod-liver oil form the chief articles of export. It is stated that in the spring 600 fishing-vessels may be seen at once in the harbor. These vessels bring cargoes of fish that were caught in the preceding winter on the northern shores. Bergen was founded in 1070, and was once a Hanse town. Pop. 29,210.

Bergen, a county of New Jersey, bordering on New York. Area, 350 square miles. It is bounded on the E. by the Hudson River, and intersected by the Hackensack and Ramapo. The Passaic River forms part of the S. W. boundary. The surface is partly hilly, and the Palisades of the Hudson extend along its eastern border. Dairy and garden products, corn, and potatoes are the chief crops. It is intersected by the Erie R. R. Magnetic iron ore is found here. It has various important manufactures. Capital, Hackensack. Pop. 30,122.

Bergen, a post-township of McLeod co., Minn. Pop. 588.

Bergen, a former village and township of Hudson co., N. J., on the top of Bergen Ridge, 3 miles W. of New York. It was merged into Jersey City in 1870.

Bergen, a post-township of Genesee co., N. Y. P. 1997.

Bergen, a township of Marathon co., Wis. Pop. 86.

Bergen, a township of Vernon co., Wis. Pop. 795.

Ber'gen-op-Zoom, or **Berg-op-Zoom,** a strongly-fortified town of Holland, in North Brabant, is on the river Zoom, at its junction with the East Scheldt, 27 miles by rail W. S. W. of Breda. It is important as a military position, and has often been besieged. The Spaniards made unsuccessful attempts to take it in 1588, in 1605, and in 1622. In the last-named year General Spinola lost about 10,000 men in the siege. It was taken by the French in 1747, and again in 1794. An English army attacked it without success in Mar., 1814. Pop. 9431.

Bergerac, a town of France, in Dordogne, is situated in a fertile plain on the right bank of the river Dordogne, here crossed by a fine bridge of five arches, 27 miles S. W. of Périgueux, and 51 miles E. of Bordeaux. It has a college, a public library, and manufactures of paper, hosiery, serges, and copper-ware. The Bergerac wine produced in this vicinity is highly esteemed. This town was formerly fortified, and sustained several sieges. Pop. 12,224.

Bergh (Henry), philanthropist, born in the city of New York in 1823, educated at Columbia College, is the author of "Love's Attractions," a drama; "Married Off," a poem; "The Portentous Telegram," "The "Ocean Paragon," "The Streets of New York," tales and sketches. In 1863, Mr. Bergh was made secretary of legation to Russia, and was afterwards a vice-consul there. He is known, not as a writer, diplomatist, or government official, but as the founder and president of the American Society for the Prevention of Cruelty to Animals. On his labors for the dumb creation rests his fame. Alone, in the face of indifference, opposition, and ridicule, he began the reform which is now recognized as one of the beneficent movements of the age. Through his exertions as a speaker and lecturer, but above all as a bold worker, in the street, in the court-room, before the legislature, the cause he adopted gained friends and rapidly increased in influence. The American society was incorporated April 10, 1866, by the legislature of New York, and, according to the seventh annual report (1873), similar societies had been then founded in twenty-five States and Territories and in Canada. The society has nine branches in the State of New York. There are 2 in California, 4 in Massachusetts, 2 in Maine, 4 in New Jersey, 4 in Ohio, 3 in Pennsylvania, 1 each in Virginia, Tennessee, Texas, Rhode Island, Oregon, North Carolina, New Hampshire, Mississippi, Michigan, Minnesota, Maryland, Kentucky, Indiana, Illinois, Georgia, Washington, D. C., Connecticut, and Colorado Territory. The work of the society covers all cases of cruelty to all sorts of animals, from the horse to the tortoise, employs every moral agency, social, legislative, personal, and touches points of vital concern to health as well as to humanity—the transportation of cattle intended for the shambles, the purity of milk, the times and manner of killing for the market. The total number of cases of all kinds prosecuted by the parent society, its branches and agents, since its foundation, is 2094. The membership is large and influential; the cause finds liberal benefactors, Mr. Lewis Bonard, a man who lived and died in extreme indigence and bequeathed a valuable estate to the society, being the greatest. Through this munificence handsome quarters were provided in the city, besides a considerable portion of the annual income of more than $30,000. The work takes on new features every year. Among the latest are an ambulance corps, and an ingenious invention for substituting artificial for live pigeons as marks for shooting.

O. B. Frothingham.

Berg'isch-Glad'bach, a town of Prussia, in the Rhine province, 7 miles by rail E. N. E. of Müllheim. It has considerable manufactures of paper, linen, woollen, and silk goods, potash, percussion caps, etc. Pop. in 1871, 6195.

Berg'mann (Karl), born at Ebersbach, in Germany, April, 1821, removed to America in 1849, and became about 1855 director of the Philharmonic Society in New York. He has composed numerous pieces for orchestras.

Berg'mann (Torbern Olof), Ph. D., a celebrated Swedish chemist, born at Catherinberg, in West Gothland, Mar. 20, 1735. He was educated at the University of Upsal, and devoted himself to natural history, physics, and mathematics. He obtained the chair of chemistry at Upsal in 1767. He discovered sulphuretted hydrogen, and first obtained important results from the use of the blow-pipe. He laid the foundation of the science of crystallography. Among his works are an "Essay on Electric Affinities" (1775), and "Opuscula Physica et Chemica" (6 vols., 1779–90). Died July 8, 1784. (See P. F. Aurivillius,

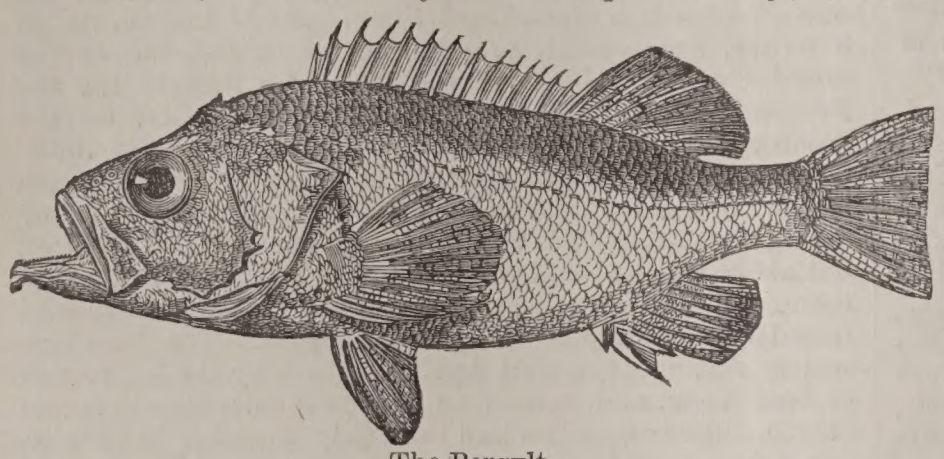
"Aminnelse-Tal öfver T. O. Bergman," 1785; BIOT, article in the "Biographie Universelle;" P. J. HJELM, "Aminnelse-Tal öfver T. O. Bergman," 1786.)

Berg'mehl, a German word signifying "mountain meal," is a name of an extremely fine powder found in geological strata of recent (eocene) formation, and composed of effete and indestructible silicious frustules of Diatomaceæ, which are microscopic plants of the class Algæ. Vast beds of these fossils occur in Virginia, Maryland, Germany, Lapland, and other places. This powder is mixed with flour, and used as food by the people of Sweden and Norway in seasons of scarcity.

Berg'söe (WILHELM), PH. D., a Danish novelist, born Feb. 8, 1835, was in youth a zoologist, attaining distinction in that field. But in consequence of the failure of his eyesight, and of a long and severe illness, he was disqualified for his favorite study, and went to Italy for his health. He became a successful writer of romances. His first venture, "Fra Piazza del Popolo" (1866), had a great success. He has also published "I Sabinerbjergene" ("In the Sabine Hills," 1871), and "Bruden fra Rörvig" ("The Bride of Rörvig," 1872). His fame as a novelist is rapidly increasing.

Bergues, a fortified town of France, in the department of Nord, on the river Colne, 5 miles by rail S. S. E. of Dunkirk. It is connected by a canal with Dunkirk and the sea, and has an active trade, sugar-refineries, and manufactures of soap, tobacco, and earthenware. Pop. 5738.

Ber'gylt (*Sebas'tes Norveg'icus* or *Scorpæna Norvegica*),



The Bergylt.

a fish of the family Sclerogenidæ, resembles a perch in appearance so much that it has been called sea-perch. It is found in all the northern seas, is of a red color, and attains a length of two feet or more. It is used as food. It is found on both sides of the Atlantic.

Ber'hampoor', or **Berhampore,** a town of British India, in the presidency of Bengal, on the Bhagirathi River, 6 miles S. of Moorshedâbâd, and 118 miles by land N. of Calcutta. It is one of the principal British military stations in India, and has an appearance of grandeur and importance. Sanitary improvements have rendered it one of the most healthy places in Bengal.

Ber'i-ber'i, a disease almost peculiar to Ceylon and a part of Hindostan. It is attended by great weakness, often dropsy and paralysis, and is generally fatal in a few days or weeks. It especially attacks the intemperate, who are very numerous in Ceylon, and those who are exposed to the effects of bad air, impure water, and insufficient food.

Ber'ja, a town of Spain, in the province of Almería, on the S. slope of the Sierra de Gador, 22 miles W. S. W. of Almería. It is in the midst of lead-mines, and has manufactures of linen, hats, hardware, etc. Pop. 8000.

Ber'islav, a town of Russia, in the government of Cherson, on the Dnieper, 40 miles E. of Cherson. Pop. in 1867, 6023.

Berkeley, a county of the N. E. of West Virginia. Area, 250 square miles. It is bounded on the N. E. by the Potomac River, and on the S. E. by Opequan Creek. It is the most northern part of the Valley of Virginia. The surface is partly hilly; the soil of the valleys is fertile. Limestone and coal are found here. Wheat, corn, oats, and wool are staple products. It is intersected by the Baltimore and Ohio R. R. Capital, Martinsburg. Pop. 14,900.

Berkeley, a post-village of Alameda co., Cal., the seat of the University of California and the State Agricultural College, is 5 miles N. of Oakland and 9 from San Francisco.

Berkeley, a township of Spottsylvania co., Va. P. 1801.

Berkeley (GEORGE), an eminent philosopher and bishop, was born at Kilcrin, Ireland, on the 12th of Mar., 1684. He studied at Trinity College, Dublin, where he formed a friendship with Dean Swift, and became a fellow of that college in 1707. He published in 1709 his "Essay towards a New Theory of Vision," a work of wide reputation. He propounded his celebrated theory of idealism in a "Treatise concerning the Principles of Human Knowledge" (1710), in which he affirmed that there is no proof of the existence of a material world. The objects of which we are conscious in perception he called "ideas." Their presence he held to be due to the constant agency of the Almighty, who causes them to pass in a real and orderly succession before the mind. His views are the result of the application of rigid logic to the principles which Locke and his school had adopted from Descartes. His method was allied to that of Malebranche, though his conclusions were drawn with a boldness from which the French philosopher recoiled. As distinguished from the egoistic system of Fichte, Berkeley's views have been called theistic idealism. His object was to undermine materialism and counteract skepticism. In 1713 he removed to London, and wrote several essays for the "Guardian." He accompanied Lord Peterborough as chaplain to Italy, and returned to England about 1721. In 1724 he became dean of Derry, with an income of £1100. His abundant charity and zeal induced him to engage in an enterprise for the conversion of the American savages, for which purpose he proposed to found a college in America for the education of missionaries. Having received a promise of pecuniary aid from the government, he married Anna, a daughter of John Forster, in 1728, and sailed to Rhode Island. He preached at Newport two years, but he did not succeed in his enterprise, because the ministers failed to perform their promise. He returned home, and was appointed bishop of Cloyne in 1734. Among his works are "Alciphron, or the Minute Philosopher" (1732), "The Analyst" (1735), and a "Word to the Wise" (1749). He died at Oxford Jan. 23, 1753, leaving an excellent reputation as a model of virtue. "Ancient learning," says Sir J. Mackintosh, "exact science, polished society, modern literature, and the fine arts contributed to adorn and enrich the mind of this accomplished man. All his contemporaries agreed with the satirist [Pope] in ascribing 'to Berkeley every virtue under heaven.'" (*View of the Progress of Ethical Philosophy.*) (See DR. STOCK, "Life of Berkeley," prefixed to his works, 2 vols. 4to, 1784; G. N. WRIGHT, "Life of George Berkeley," prefixed to his works, 1843. Berkeley's works have recently been edited, with a life annexed, by Prof. Fraser, in 4 vols. 8vo, Oxford, 1871.)

Berkeley (Rev. MILES JOSEPH), F. L. S., one of the most eminent of English botanists of the present century, was born in 1803, and educated at Rugby and Christ's College, Cambridge, where he graduated with honors in 1825. He obtained several Church preferments, but his chief distinction has been won in science. As a botanist his attention has been principally directed to the lower Cryptogamia. He is honorary member of many of the scientific societies of Europe. His monographs are very numerous. He is the author of "Gleanings of British Algæ" (1833), the last volume of the "English Flora" (1836), "Handbook of Cryptogamic Botany" (1857), "British Fungology" (1860), "British Mosses" (1863), etc.

Berkeley (Sir WILLIAM) was born near London. He was appointed governor of Virginia in 1641, and held that office for many years. He was a royalist in the civil war, and was removed from power in 1651 by Cromwell, but became governor again in 1660. He rendered himself unpopular by his cruelty in putting to death the adherents of Nathaniel Bacon, and he once said, "I thank God there are no free schools or printing-presses in Virginia." Died in England July 13, 1677.

Berkeley, EARLS OF, and Viscounts Dursley (1679), Barons Berkeley (1416, in England), a prominent family of Great Britain.—THOMAS MORETON FITZ-HARDINGE BERKELEY, the sixth earl, born Oct. 19, 1796, succeeded his father in 1810.

Berkeley Springs, Virginia. See BATH.

Ber'kenhout (JOHN), an English physician of Dutch descent, was born at Leeds in 1730. He was sent to America as an agent of the British government in 1788, and was imprisoned by Congress as a spy. He wrote "Biographia Literaria," "Outlines of the Natural History of Great Britain," and a "Botanical Lexicon." Died in 1791.

Berk'ley, a post-township of Bristol co., Mass. It contains the celebrated Dighton Rock. Pop. 744.

Berks, a county in the S. E. of Pennsylvania. Area, 920 square miles. It is intersected by the Schuylkill River, and also drained by Tulpehocken and other creeks. The Kittatinny or Blue Mountain forms the N. W. boundary of this county, the surface of which is finely diversified. The soil is fertile, especially in the large limestone valley between the Kittatinny and the ridge called South Mountain. Grain, cattle, dairy products, potatoes, and wool are extensively produced. It has rich iron-mines, which are

extensively worked. The county is intersected by the Philadelphia and Reading and the Reading and Columbia R. Rs. It was settled by Germans about 1734. It has important manufactures of many kinds of goods. Capital, Reading. Pop. 106,701.

Berk'shire, an inland county of England, bounded on the N. by Oxford and Bucks, on the E. by Surrey, on the S. by Hampshire, and on the W. by Wiltshire. Area, 705 square miles, or 451,210 acres. The river Thames forms its entire boundary on the N. and N. E. The surface is beautifully diversified by hills and valleys. In the S. E. is Windsor Forest and Park. This forest consists of oak, ash, beech, alder, and hazel trees. The county is drained by the river Kennet and other streams. The soil of the valleys is mostly a fertile loam, with a subsoil of chalk, gravel, or clay. Wheat, oats, horses, and swine are the staple products. The Great Western Railway passes through Berkshire. Capital, Reading. P. in 1871, 196,445.

Berkshire, a county which forms the W. extremity of Massachusetts, bordering on New York and Vermont, has an area of about 1000 square miles. It is drained by the Hoosic, Westfield, and Housatonic rivers, which rise within its limits, and afford abundant water-power. The surface is finely diversified by mountains, hills, and valleys, and presents very picturesque scenery. Saddle Mountain (Greylock), in the N. part, is the highest point in the State. The soil is generally productive, and adapted to grazing. Dairy products, corn, potatoes, wool, and tobacco are the chief products. The manufactures of cotton and woollen goods, paper, and glass are important. Marble, limestone, and iron ore abound here. The county is intersected by the Boston and Albany R. R. and the Housatonic R. R. Capital, Pittsfield. Pop. 64,827.

Berkshire, a post-twp. of Tioga co., N. Y. Pop. 1240.

Berkshire, a post-township of Delaware co., O. Pop. 1336.

Berkshire, a post-township of Franklin co., Vt. Pop. 1609.

Ber'lat, a town in Moldavia, on the Berlat, 63 miles S. of Jassy. It is an entrepôt for grain. Pop. 13,165.

Ber'liching'en, von (Götz or Gottfried), a famous German knight, surnamed of the Iron Hand, was born in 1480 at Berlichingen Castle, in Würtemberg. He lost a hand at the siege of Landshut, and supplied its place by an iron hand. He was a daring and turbulent subject, was involved in several feuds with neighboring barons, and fought for the insurgent peasants against the nobles in the Peasants' War, which closed in 1525. For this offence he was placed under the ban of the empire by Maximilian I. He died in 1562, and left an autobiography (1731). His exploits form the subject of Goethe's drama of "Götz von Berlichingen." (See Carl Lang, "Ritter G. von Berlichingen," 1825; Büsching, "Leben Götz von Berlichingen," 1814.)

Ber'lin, the capital of the Prussian monarchy and the new German empire, residence of the German emperor, seat of the highest authorities of Prussia and Germany, is situated on the Spree; lat. 52° 30′ N., lon. 13° 24′ E. The city is of comparatively modern growth. The two oldest parts, Old Cologne and Old Berlin, are for the first time mentioned in 1237 and 1244. They were in 1307 consolidated into one city, which joined the Hanse, became the head of the confederation of the towns of *Mark*, and at the close of the fifteenth century became the residence of the electors of Brandenburg. Its rapid growth dates from the reign of "the great elector," at whose death it numbered about 20,000 inhabitants. Under Frederick the Great the population rose to 114,000; in 1817 its inhabitants numbered 188,000; in 1844, 311,000; in 1851, 436,000; in 1867, 702,000; and, according to the census of 1871, it had attained the number of 825,389 persons, who, with the exception of 50,000 Roman Catholics and 30,000 Jews, belong to the Protestant Church, and chiefly to the United Evangelical State Church. In 1867 the city had about 34,000 buildings, among which there were about 700 public buildings and sixty churches. Berlin consists of sixteen different parts, of which Old Berlin, on the right bank of the Spree, and Old Cologne, on an island, are the oldest. The others are New Cologne, settled about 1681; Friedrichswerder, 1658; Dorotheenstadt, Neustadt, 1673; Friedrichsstadt, 1694; Luisenstadt, 1669; Stralauer Viertel, 1705; Königsstadt, 1693; Spandauer Revier (Sophienstadt, 1691); and Friedrich-Wilhelmstadt, named since 1828. Inside of the wall, which formerly included the whole of these eleven parts, are situated Wedding (Oranienburger Vorstadt); Moabit (Voigtland, 1752); Æussere Friedrichsstadt (laid out in 1838); Æusseres Spandauer Revier, Schöneberger, and Tempelhofer Revier.

The principal streets are Unter den Linden, with four rows of lime trees and the stately Brandenburg Gate, the Wilhelmsstrasse, and Königsstrasse. Foremost among the public places are the Opera Place, with the equestrian statue of Frederick the Great by Rauch (erected in 1851); the Lustgarten (laid out in 1828), with the museums; the Gensdarmenplatz, with the new theatre; the Wilhelmplatz, with the statues of Schwerin, Winterfeld, Seidlitz, Keith, Ziethen, and Leopold of Dessau; the Belle Alliance Platz, with the Victoria Column (since 1843); the Leipziger Platz, with the monument of the count of Brandenburg; and the Pariser Platz. The most important bridges are the Kurfürstenbrücke, with a statue of "the great elector;" the Friedrichsbrücke, with eight iron arches; the Schlossbrücke, built in 1824, upon two massive arches and with eight allegorical marble groups; the iron Weidendammerbrücke, built in 1826; and the Alsenbrücke, built in 1867. Among the remarkable public buildings are the Königliche Schloss, with the Weisser Saal; the Königliche Palast, with which the palace of Prince Louis is incorporated; the palaces of the crown prince and the princes Charles and Albrecht; the Arsenal; the Artillery School, and the University (formerly palace of Prince Henry); the Singing Academy; the Exchange; the Old Museum, built in 1828 by Schinkel, and containing a celebrated picture-gallery, which is rich in paintings by the early Italian and German masters, and in collections of ancient sculpture and other antiquities. Connected with the Old Museum is the New Museum, begun in 1843, and chiefly formed of the Egyptian antiquities brought home by the expedition under Lepsius.

Berlin has no churches of importance in point of architecture. The university was established in 1810, and is in every respect one of the greatest literary institutions of the world. It had in 1868 about 3000 students, and from its beginning has counted among its professors many of the most celebrated scholars, such as Humboldt, Ritter, Fichte, Hegel, Schelling, Neander, Schleiermacher, and Virchow. The Royal Library numbered in 1870 about 700,000 volumes and more than 15,500 manuscripts. It rapidly increases, as Prussian publishers are bound to deposit in it a copy of every new work. The library of the university has about 100,000 volumes. Other important literary institutions are the Academy of Science, the Polytechnic Institute, the Building Academy, the Navy School, the Mining Academy, the Pharmaceutical School, institutions for the deaf and mute and for the blind, and ten gymnasia. The Charité, the greatest hospital of Berlin, has had as many as 10,000 patients in a year.

The trade and commerce of Berlin are extensive. The castings in iron and the china manufactures of Berlin have a world-wide reputation. The increase of railroad connection has of late given a powerful impulse to the development of industry, and the large numbers of the laboring classes have made Berlin one of the chief centres of the Internationale. The revenue and expenditure of Berlin amount to about five million thalers annually; the debt, to 8,000,000 thalers. The authorities of the city have established a statistical bureau specially devoted to the statistics and history of Berlin; an annual publication by the president of this bureau ("Berlin und seine Entwickelung," established in 1866) is the best source of information for everything relating to this great German city.

A. J. Schem.

Berlin, a town, the capital of Waterloo co., Ontario, Dominion of Canada, on the Grand Trunk Railway, 62 miles W. S. W. of Toronto, at the junction of the Doon branch. It has two weekly papers, fourteen churches, a large button-factory, and other important manufacturing interests. Its trade is extensive. Pop. 2743.

Berlin, a township of Chambers co., Ala. Pop. 2018.

Berlin, a post-village and township of Hartford co., Conn., on the New Haven Hartford and Springfield R. R., 25 miles N. N. E. of New Haven. Pop. of township, 2436.

Berlin, a township of Bureau co., Ill. Pop. 1469.

Berlin, a township of Clinton co., Ia. Pop. 805.

Berlin, a post-township of Worcester co., Mass., is on the Boston Clinton and Fitchburg R. R., 40 miles N. W. of Boston. Pop. 1016.

Berlin, a post-village of Worcester co., Md., at the eastern terminus of the Wicomico and Pocomoke R. R., and north-western terminus of the Worcester R. R., 14 miles from Snow Hill. Pop. 697; of township, 4330.

Berlin, a township of Ionia co., Mich. Pop. 1587.

Berlin, a township of Monroe co., Mich. Pop. 1844.

Berlin, a township of St. Clair co., Mich. Pop. 1231.

Berlin, a post-township of Steele co., Minn. Pop. 409.

Berlin, a township of Coos co., N. H. It has manufactures of lumber, etc. Pop. 529.

Berlin, a post-village and township of Rensselaer co.,

N. Y., on the New York and Harlem Extension R. R., 162 miles N. N. E. of New York City. Pop. of township, 2088.

Berlin, a township of Delaware co., O. Pop. 1330.

Berlin, a township of Erie co., O. Pop. 1741.

Berlin, a post-township of Holmes co., O. Pop. 1007.

Berlin, a township of Knox co., O. Pop. 887.

Berlin, a township of Mahoning co., O. Pop. 963.

Berlin, a post-borough of Somerset co., Pa., 70 miles S. E. of Pittsburg. Pop. 640.

Berlin, a township of Wayne co., Pa. Pop. 1295.

Berlin, a post-township of Washington co., Vt. Pop. 1474. It has manufactures of leather and lumber.

Berlin, a city and township of Green Lake co., Wis., on Fox River, at the termination of a branch of the Milwaukee and St. Paul R. R., 94 miles N. W. of Milwaukee. Steamboats ply between this point and Green Bay, etc. It has one bank, three grist and flouring mills, two saw-mills, one foundry, and manufactures of turbine-wheels, whips, gloves, woollen goods, etc. It has two newspapers, a city park, and a high-school. Pop. of city, 2777; of township, 3800. ED. "BERLIN COURANT."

Berlin, a township of Marathon co., Wis. Pop. 879.

Berlin and Ivor, a post-township of Southampton co., Va. Pop. 2674.

Berlin Blue. See PRUSSIAN BLUE.

Berlin Heights, a post-village of Erie co., O., is the seat of a celebrated community of Spiritualists.

Berlioz (HECTOR LOUIS), a French musical composer, born Dec. 11, 1803, at Côte-Saint-André (Isère). The son of a physician sent to Paris to study medicine, he entered the Conservatory, following a passionate bent for music. He composed "Symphonie Fantastique," overtures to "Waverley" and "King Lear," "Harold" (1833), and "Romeo et Juliette" (1839), symphonies; "Benvenuto Cellini," an opera in two acts, "Symphonie Funèbre et Triumphale" (1840), "Damnation de Faust" (1846), a symphony, "Enfance de Christ," a trilogy (1854), and "Les Trogens," a grand five-act opera, played without success in 1863. M. Berlioz has been considered the chief of the romantic school. His works bespeak an ardent and independent genius, and have elicited diverse criticism. He was also a talented author and critic, and has published "Traité d'instrumentation et d'orchestration moderne" (1844), "Voyage musicale en Allemagne et en Italie," "Études sur Beethoven, Plück, et Weber" (1845), "Soirées de l'orchestre" (1853), "Les Grotesques de la musique" (1859), and "Mémoires" (1870). Died Mar. 9, 1869.

Berme, in fortification, is a ledge or narrow level space, three or more feet wide, at the bottom of the outside of a rampart where it joins the scarp. It serves as a passage-way for the garrison, and to prevent the earth and other materials from falling into the ditch when the rampart is battered by the enemy.

Bermu'da, a township of Chesterfield co., Va. P. 877.

Bermuda Grass, the *Cynodon Dactylon,* a grass which is extensively cultivated in India (where it is called *dhab*), and of late years introduced into the West Indies, Europe, the Southern U. S., and the Sandwich Islands. It is valuable both for pasture-grass and hay, and is especially prized in warm climates, where the grass crop is generally poor; but in light soils, especially northward, its perennial roots cause great trouble to the farmer.

Bermu'da Hun'dred, in Chesterfield co., Va., on the right bank of the James River, just above the mouth of the Appomattox, and 1½ miles above City Point. The tortuous course of the James River here encloses a neck of land which Gen. Butler occupied and fortified in May, 1864, and from which he was to co-operate with Gen. Grant by menacing Richmond and Petersburg. On the morning of the 16th of May, 1864, Gen. Butler, who had moved out of his works, was fiercely attacked by the Confederate force under Beauregard, and after a severe struggle, which lasted till noon, driven back into his intrenchments with severe loss. Beauregard, following slowly, erected a line of works across the peninsula in front of Butler's. Subsequent expeditions were made from these works, and the line finally formed a part of the investment lines of the combined armies against Petersburg.

Bermu'da Islands, or **Bermu'das** [Fr. *Bermudes*], or **Somers's Islands,** a group of small, low islands in the Atlantic Ocean, belonging to Great Britain. They take their name from Juan Bermudez, who discovered them in 1522. They are about 624 miles E. S.E. of Cape Hatteras, which is the nearest land, and are in lat. 32° 20′ N., and lon. 64° 50′ W. The extent of the group is only 19 miles by 6 miles, although the number of islets is nearly 400. Area, 24 square miles. They derive importance from the commanding position which they occupy between the West Indies and the other parts of British America. They are enclosed on several sides by formidable coral-reefs, which are said to be the only coral-reefs occurring in the central expanse of the Atlantic. The climate is so mild and delightful that these islands are covered with perpetual verdure. Between December and March the temperature ranges from 60° to 66° F. The chief articles of export are potatoes, onions, and arrow-root. The largest of these islands are Bermuda, 15 miles long; St. George's, 3½ miles; Somerset, 3 miles; and Ireland, 3 miles. Capital, Hamilton, on the isle of Bermuda. St. George's Isle has a good landlocked harbor, which is defended by strong batteries. These isles are separated by narrow and intricate channels, and have no streams, and but few pools of fresh water. Many of the inhabitants are employed in building cedar vessels, which are durable and swift. Pop. in 1863, 11,796.

Bern, a township of Athens co., O. Pop. 1014.

Bern, a township of Berks co., Pa. Pop. 2124.

Bernadotte, a post-township of Fulton co., Ill. P. 1253.

Bernadotte, a township of Nicollet co., Minn. P. 214.

Bernadotte (Charles XIV.), JOHN, king of Sweden, a French marshal, born at Pau Jan. 26, 1764. His original name was JEAN BAPTISTE JULES BERNADOTTE. He enlisted as a private in the army in 1780, served as general of division under Kleber and Jourdan in Flanders in 1794, and under Bonaparte in 1797. In 1798 he was French minister at Vienna, and married Mademoiselle Clary, a sister of Joseph Bonaparte's wife. He was minister of war for a short time in 1799. Napoleon created him a marshal of France in 1804, and in June, 1806, prince of Pontecorvo. He fought at Austerlitz in 1805, and defeated the Prussians at Halle in Oct., 1806. He quarrelled with Napoleon, who censured his conduct at Wagram (1809), and he resigned his command just after that battle. In Aug., 1810, the Swedish Diet elected Bernadotte as heir to the throne of Sweden, then occupied by Charles XIII., who had no son, and he was immediately associated with the old king in the exercise of royal power. Early in 1812, Bernadotte, who took the name of Charles John, negotiated with Russia a secret treaty of alliance against Napoleon. He openly joined the coalition of the allies in the spring of 1813, and led an army of about 28,000 men into Germany. His army defeated Oudinot at Gross-Beeren in Aug., 1813, but his conduct was considered equivocal and lukewarm by the allies. He forced Prince Christian of Denmark, who had proclaimed himself king of Norway, to resign, and on Nov. 4, 1814, Charles XIII. was proclaimed king, and Bernadotte crown prince. When the allies entered France in 1814, he led his army back to Sweden and conquered Norway. He began to reign alone on the death of Charles XIII., in Feb., 1818, after which a long peace ensued. He died in Mar., 1844, and left the throne to his son, Oscar I. (See ERIK G. GEIJER, "Konung Karls XIV. Johan Historia," 1844; W. G. MEREDITH, "Memorials of Charles (XIV.) John, King of Sweden," 1829.)

Bernal'da, a town of Italy, in the province of Potenza, 46 miles S. E. of Potenza. Pop. 5862.

Bernalil'lo, a large county in the W. part of New Mexico, is intersected by the Rio Grande and Rio Puerco. The surface is partly mountainous; the valley of the Rio Grande is productive. Hides, wool, corn, and wine are produced. Gold, silver, lead, iron, copper, and coal abound. Capital, Albuquerque. Pop. 7591.

Bernard (CLAUDE), an eminent French physiologist, born at Saint Julien, in Rhône, July 12, 1813. He wrote "Researches on the Uses of the Pancreas," which gained the grand prize of the Institute in 1849. He was admitted into the Institute in 1854, and became professor of physiology in the College of France in 1855. Bernard discovered the glycogenic function of the liver. He was created grand officer of the Legion of Honor in 1862. Among his best-known works are "Leçons de Physiologie" (1855), and "Mémoire sur la Chaleur animale" (1856).

Bernard (Sir FRANCIS), an English lawyer, born in 1714, who became governor of New Jersey in 1758, and of Massachusetts in 1760. He was unpopular in Massachusetts because he brought troops into Boston and opposed liberal measures. He was accused of misconduct, but recalled and made a baronet in 1769. Died June 16, 1779.

Bernard, SAINT, abbot of Clairvaux, an eminent mediæval theologian, and a doctor of the Western Church, born at Fontaines, near Dijon, in 1091. He became an inmate of the monastery of Citeaux in 1113, and founded in 1115 a community of the Cistercian order at Clairvaux, in Champagne, of which he was the first abbot. His ascetic life and eloquence rendered him a very influential and powerful person in the Church. He was regarded as an oracle by all Christendom, founded a large number of monasteries,

and was an implacable adversary of Abelard. He zealously promoted the crusade of 1146, which was disastrous to those who joined it. He died Aug. 20, 1153, leaving many religious works, and was canonized in 1174. (See LEMAÎTRE, "Vie de Saint Bernard," 1649; A. NEANDER, "Der heilige Bernard und sein Zeitalter," 1813 (translated into English by Wrench, 1843); C. MONTALEMBERT, "Histoire de S. Bernard;" J. O. ELLENDORF, "Der heilige Bernhard," 1837; EUGENIO DE CORRAL, "Vida de S. Bernardo," 1782.)

Bernard (SIMON), an officer of the French imperial corps du genie, born at Dôle April 28, 1779, was aide-de-camp to Napoleon I., and employed by him in many important and confidential duties incidental to his branch of the service. He was invited to this country by President Madison under a resolution approved April 29, 1816, "authorizing the President of the U. S. to employ a skilful assistant in the corps of engineers," instigated by the notion prevalent at that date, that only in Europe, and especially in France, could the high military science necessary to the organization of a system of sea-coast defence by fortification be found. The chief engineer, Gen. Swift, and subsequently another distinguished officer, Col. McKee, sent in their resignations in consequence. Gen. Swift was succeeded as chief engineer by Col. W. K. Armistead. As "Assistant Engineer" Gen. Bernard was associated with Col. (subsequently General and Chief Engineer) J. G. Totten, constituting a "permanent board," upon which the labor of working out the fundamental principles of the system, and of elaborating the projects of defence for the great seaports, devolved; and mainly upon these two officers, though naval officers of rank and experience were associated with them whenever their examinations included positions for dockyards, naval dépôts, or other objects which concerned the naval service; and the resident engineer officers had a voice in relation to their particular works. He also had a prominent part in the inauguration of some of our earlier works of civil engineering; *e.g.* the Chesapeake and Ohio Canal, the Delaware Breakwater, etc. He resigned in 1831, and returned to France, and became aide-de-camp to Louis Philippe, and subsequently minister of war of France. To high military and scientific acquirements and great experience in his professional duties, Gen. Bernard united the qualities of an amiable and accomplished gentleman, and the tact to adapt himself to his peculiar position without wounding the pride of those with whom he was thus associated. The prestige of his name aided powerfully in sustaining with the administration and with Congress the measures which the board found necessary to recommend, and in establishing firmly, as a part of our national policy, the system of sea-coast defence by fortifications. He died in Paris Nov. 5, 1839. J. G. BARNARD, U. S. A.

Bernard of Cluny, not to be confounded with his more celebrated countryman and contemporary, Bernard of Clairvaux, was born at Morlaix, in Brittany, of English parents, probably not far from the year 1100. He was a monk at Cluny under Peter the Venerable, who was abbot there from 1122 to 1156. He wrote a poem, "De Contemptu Mundi," in about 3000 lines, portions of which were translated by the Rev. John Mason Neale (1818–66) in 1851 and 1862. Dr. Neale pronounces these verses of Bernard "the most lovely, in the same way that the 'Dies Iræ' is the most sublime, and the 'Stabat Mater' the most pathetic, of mediæval poems." Hymns taken from this poem, such as "The world is very evil," "Brief life is here our portion," and "Jerusalem the golden," are among the finest gems in recent English and American collections.

Bernard's', a township of Cherokee co., Ala. P. 135.

Bernard's, a township of Somerset co., N. J. P. 2369.

Ber'nardston, a post-township of Franklin co., Mass., on the Connecticut River R. R. It is the seat of Powers Institute. Pop. 961.

Bernard, the Great St., a famous mountain-pass of the Pennine Alps, upwards of 8000 feet in height, between the Swiss canton of Vaud and the valley of Aosta. Near the summit is the celebrated hospice, said to have been founded in 962 by Saint Bernard of Meuthon in Savoy for the succor of travellers crossing the mountain. In the humane efforts of the monks of this hospice the valuable dogs known as the St. Bernard breed, and noted for their size and sagacity, are valuable assistants. In 1800 Napoleon crossed the Alps here with an army of 30,000 men, with cavalry and artillery.

Ber'nau, a town of Prussia, in Brandenburg, on the Stettin Railway, 14 miles N. E. of Berlin. It has manufactures of silk stuffs, cotton, and woollen goods. Pop. in 1871, 5566.

Bernay, a town of France, in the department of Eure, on the railway from Paris to Caen, 25 miles W. N. W. of Evreux. It has a college, and manufactures of woollen cloths, linens, paper, and leather. A horse-fair, the largest in France, is held here annually. Pop. 7510.

Bern'burg, a town of Germany, formerly capital of the duchy of Anhalt-Bernburg, is on the river Saale, here crossed by a bridge, 24 miles S. S. W. of Magdeburg. It is connected by railway with Berlin and Dresden. It has a gymnasium, a Realschule, a valuable library, a ducal castle, and manufactures of porcelain, paper, and starch. Pop. in 1871, 15,715.

Berne [Fr. *Berne;* Ger. *Bern;* Lat. *Ber'na*], the most populous canton of Switzerland, and the most extensive except the Grisons. It is bounded on the N. by Alsace and Soleure, on the E. by Aargau, Lucerne, Unterwalden, and Uri, on the S. by Valais, and on the N. by Vaud, Fribourg, Neufchâtel, and France. Area, 2660 English square miles. It is traversed by the river Aar, and also drained by the Emmen. The Aar expands into two lakes called Brienz and Thun. The surface is mountainous, and the northern part is occupied by the Jura Mountains. Several high peaks of the Alps—namely, the Finsteraarhorn, 14,032 feet, the Jungfrau, 13,514 feet, Schreckhorn, 13,393 feet—are in Berne. The valleys of the Simmenthal, Lauterbrunnen, and Grindelwald in the Bernese Oberland are celebrated for their beauty. The valleys of the Aar and Emmen are fertile and adapted to pasturage. Among its mineral resources are copper, lead, iron, marble, and granite. The canton has important manufactures of watches, paper, woollen goods, linens, etc. It is intersected by several railroads. Capital, Berne. Pop. in 1870, 506,465, of whom 66,015 were Roman Catholics.

Berne, or **Bern** [said to be derived from the Ger. *Bären,* "bears," figures of which are on the armorial bearings of the city], a city of Switzerland, capital of the canton of Berne, is situated on the river Aar, which encloses it on three sides, 65 miles by rail S. of Bâle and 92 miles by rail N. E. of Geneva. Berne is the seat of the federal government of the republic, and is considered to be the finest city in Switzerland. It is built of freestone, and the houses are massive structures, resting on arcades which form covered promenades on both sides of the streets. Magnificent Alpine scenery is visible from this point. Berne has a Gothic cathedral, a public library, a university, a museum of natural history, a mint, and an arsenal. One of the finest buildings is the new federal palace. The river is here crossed by four large bridges. Several railroads connect it with Geneva, Bâle, and other towns. Berne was founded in 1191, and became a free town of the empire in 1218. It joined the Swiss Confederation in 1352. In 1849 it became the permanent capital of the whole republic. Pop. in 1870, 36,002.

Berne, a post-township of Albany co., N. Y. It contains nine churches, several manufactories, and a number of small caves and mineral springs. Pop. 2562.

Berne, a township of Fairfield co., O. Pop. 3056.

Bern'hard, duke of Saxe-Weimar, a celebrated German general, born Aug. 6, 1604, was a younger son of John III. of Saxe-Weimar. He fought for the Protestant cause in the Thirty Years' war, distinguished himself at Wimpfen in 1622, and became a colonel in the army of Denmark, which he quitted in 1628. In 1631 he joined the standard of Gustavus Adolphus. The victory which the Swedes gained at Lützen in 1632 is attributed to the skill and energy of Bernhard, who in 1633 was appointed to the command of the Swedish army. Having made a personal treaty of alliance with France in 1635, he afterwards commanded a French army and defeated the imperialists. Died July 8, 1639. (See SCHILLER, "History of the Thirty Years' War;" J. A. C. VON HELLFELD, "Geschichte des Bernhard des Grossen," etc., 1797; BERNHARD ROESE, "Herzog Bernhard der Grosse von Sachsen-Weimar," 2 vols., 1828–29.)

Bernice. See BERENICE.

Berni'na, an imposing mountain-group in the Swiss canton of Grisons, rises 13,407 feet above the level of the sea, and has a remarkable glacier. The Pass of Bernina, the altitude of which is 6671 feet, affords a communication between the Upper Engadine and the Valtelline.

Berni'ni (GIOVANNI LORENZO), an Italian architect and sculptor, born at Naples in 1598, lived at Rome. His works, the best among which are the colonnade to St. Peter's church, the Scala Regia of the Vatican, and the Barberini Palace at Venice, possess some excellencies, but show the beginning of the decline of art into the *baroque* or Jesuit style, to which his influence greatly contributed.

Bernoulli, or **Bernouilli** (DANIEL), F. R. S., an eminent mathematician and philosopher, born at Groningen Feb. 9, 1700, was a son of Jean (1667–1748). He became in 1733 professor of anatomy and botany at Bâle, where he

afterwards obtained the chair of physics and speculative philosophy. He gained many prizes of the French Academy of Sciences, and wrote in Latin and French many scientific works. He was one of the three greatest members of this famous family. Died Mar. 17, 1782, at Bâle. (See CONDORCET, "Éloge de Daniel Bernouilli," 1782.)

Bernoulli (JACQUES), a Swiss mathematician, an uncle of the preceding, was born at Bâle Dec. 27, 1654. He became professor of mathematics in that city in 1687. He solved Leibnitz's problem of the isochronous curve, discovered the properties of the logarithmic spiral, and wrote several treatises on mathematics, etc. Died at Bâle Aug. 16, 1705. (See BATTIER, "Vita Jacobi Bernoulli," 1705.)

Bernoulli (JACQUES), a nephew and pupil of Daniel, was born at Bâle Oct. 17, 1759; he became professor of mathematics at St. Petersburg. He was drowned in the Neva July 13, 1789.

Bernoulli (JEAN or JOHN), one of the most eminent mathematicians of the Bernoulli family, was born at Bâle July 27, 1667. He was the father of Daniel and brother of Jacques (1654–1705). He discovered the exponential calculus, and ascertained the curve of swiftest descent. In 1705 he succeeded his brother Jacques as professor of mathematics at Bâle. His works were published in 4 vols., 1742. Died Jan. 1, 1748.

Bernoulli (JEAN), a son of the preceding, was born at Bâle May 18, 1710. He became professor of mathematics at Bâle in 1748, and wrote several treatises. Died July 11, 1790.—BERNOULLI (JEAN), born at Bâle Nov. 4, 1744, was a son of the preceding. He became astronomer-royal at Berlin in 1764, and wrote various works. Died July 13, 1807.—BERNOULLI (JÉROME), a Swiss naturalist, born at Bâle in 1745; died in 1829.—BERNOULLI (NICOLAS), a son of Jean and a brother of Daniel, noticed above, was born at Bâle Jan. 29, 1695. He was professor of mathematics at St. Petersburg, where he died July 26, 1726.—BERNOULLI (NICOLAS), LL.D., F. R. S., a cousin of the preceding, was born at Bâle Oct. 10, 1687. He made several discoveries in mathematics. Died Nov. 29, 1759.

Bern'storff (ALBRECHT), COUNT, a Prussian diplomatist and statesman, born Mar. 22, 1809, became in 1857 Prussian ambassador in London, was minister of foreign affairs from 1861 to 1862, returned to London in 1862, and represented Prussia in the London Conference of 1871. Died Mar. 26, 1873.

Bernstorff, von (JOHANN HARTWIG ERNST), COUNT, an eminent statesman, born at Hanover May 13, 1712. Having entered the civil service of Denmark, he was appointed minister of foreign affairs (prime minister) in 1761. He was a liberal patron of learning and the arts, and he promoted the commerce and manufactures of Denmark. He retained power till 1770. Died Feb. 19, 1772. (See G. H. AHLEMANN, "Ueber das Leben and den Charakter des Grafen von Bernstorff," 1777; G. NAVARRO, "Vie du Comte J. H. E. Bernstorff," 1822.)

Bern'ville, a post-borough of Berks co., Pa., 46 miles E. N. E. of Harrisburg. Pop. 457.

Ber'öe, a genus of Radiata of the class Acalepha, and of a division called Ciliograde (*i. e.* moving by means of cilia). They are phosphorescent marine animals. The genus is the type of a family characterized by an oval or nearly globular body, of a delicate jelly-like substance, with an alimentary canal passing through its axis, which is vertical as the animal floats in the water. The body is strengthened by bands of firmer texture, which are furnished with rows of cilia, the motion of which is very rapid.

Berœ'a, or **Berea,** a large and ancient city of Macedonia, situated at the foot of Mount Bermius, about 30 miles from Pella. It was attacked by the Athenians in the war which began about 430 B. C. Saint Paul visited Berœa, and preached there. (See Acts xvii. 10.) Its site is occupied by the modern town of *Veria,* 35 miles W. of Salonica. (See VERIA.)

Bero'sus [Gr. Βηρωσός], an eminent Chaldee historian, was a priest of Belus at Babylon, and lived about 300 B. C. He wrote in Greek a "History of Babylonia and Chaldæa," which was highly esteemed by the ancient Greeks and Romans, but it is lost except a few fragments. These were edited by Richter in 1825. Pliny states that the Athenians erected a statue to him.

Ber'rien, a county in S. Georgia. Area, 750 square miles. It is bounded on the E. by the Allapaha, and on the W. by Little River, and is drained by the Withlacoochee. The surface is nearly level; the soil is sandy. Rice, corn, cotton, tobacco, and wool are raised. It is intersected by the Brunswick and Albany R. R. Capital, Nashville. Pop. 4518.

Berrien, a county which forms the S. W. extremity of Michigan. Area, 600 square miles. It is bounded on the W. by Lake Michigan, and intersected by the St. Joseph River, navigable for keel-boats. The surface is undulating and mostly covered with forests. The soil is fertile. The county is intersected by the Michigan Central R. R. It sends large quantities of corn, wheat, wool, timber, and fruit to market. Capital, Berrien Springs. Pop. 35,104.

Berrien, a township of Berrien co., Mich. Pop. 1405.

Berrien (JOHN MCPHERSON), LL.D., a distinguished lawyer and politician, born in New Jersey in 1781. He removed to Georgia, and was elected a Senator of the U. S. in 1824. He was attorney-general under President Jackson in 1829–31, and was again chosen Senator in 1840 and 1846. Died Jan. 1, 1856.

Berrien's Island, in the East River, is a part of Newtown township, Queen's co., N. Y. Area, 12 acres.

Berrien Springs, a post-village, capital of Berrien co., Mich., on the St. Joseph River, about 15 miles from Lake Michigan and 160 miles W. S. W. of Lansing. Pop. 662.

Ber'ry [Anglo-Saxon *beria* or *berga;* Lat. *bac'ca;* Fr. *baie*], a botanical term used to designate a fruit which consists of a pulpy pericarp without valves, containing seeds, which have no covering except the pulp or rind, as the grape, gooseberry, currant, barberry, service-berry, and cranberry. Some of them have the calyx adherent to the ovary and the placenta parietal, as the gooseberry. Others have the ovary free and the placenta in the centre, as the grape. The term berry is popularly applied to several small fruits which are not berries in the scientific sense, as the strawberry, which bears seeds (*achenia*) on the external surface of an enlarged and pulpy receptacle. The orange is a berry with a leathery rind, and is also called a *hesperidium.*

Berry, or **Berri,** a former province of France, near its centre, now forms the departments of Cher and Indre. Capital, Bourges. Berry was erected into a duchy about 1360, after which it was held by many princes of the royal family of France. The last duke of Berry was the younger son of Charles X.

Berry, a township of Dane co., Wis. Pop. 1155.

Berry, or **Berri, de** (CHARLES FERDINAND), DUC, born at Versailles Jan. 24, 1778, was the second son of Charles X. He emigrated with his father in 1793, returned to France in 1814, and married in 1816 Caroline Ferdinande Louise, a daughter of the king of Naples. He was assassinated by Louvel Feb. 14, 1820. He was the father of the count de Chambord (Henry V.), who is recognized by the legitimist party as the heir to the French throne. (See CHATEAUBRIAND, "Mémoires touchant la Vie et la Mort du Duc de Berry," 1820.)

Berry (HIRAM G.), a major-general of U. S. volunteers, born at Rockland, Me., Aug. 27, 1824, killed at the battle of Chancellorsville, Va., May 2, 1863. He was member of the Maine legislature several times, mayor of his native city, and president of Lime Rock Bank. At the first call for troops to suppress the Confederate movement he raised three full companies, and himself entered the service as colonel of the Fourth Maine Volunteers. He was made a brigadier-general Mar. 17, 1862, and major-general Nov. 29, 1862. Killed at the head of his division by a shot while leading a bayonet charge on the morning of May 2, 1863.

G. C. SIMMONS, *Clerk Board of Eng'rs.*

Berryer (ANTOINE PIERRE), a celebrated French orator, lawyer, and legitimist, was born in Paris Jan. 4, 1790. He defended General Cambronne about 1815, gained distinction as an advocate of defendants in political trials, and was elected to the Chamber of Deputies in 1830. After Charles X. had been dethroned (July, 1830), he remained in the Chamber as the orator of the legitimist party, although the other members of that party all retired. He made an eloquent speech against the abolition of hereditary nobility in 1831. During the first years of the reign of Louis Philippe he was regarded as the foremost orator in the Chamber. In 1840 he defended Louis Napoleon, who was tried for his attempt to excite a revolution at Boulogne. He was elected to the Constituent Assembly in 1848, and the Legislative Assembly in 1849. In 1850 he went to Wiesbaden to offer homage to the count de Chambord. He opposed the republic, and protested against the *coup-d'état* of Dec., 1851, after which he retired from political life. In 1852 he was elected a member of the French Academy. Died Nov. 29, 1868. (See LOUIS MARIE DE LA HAYE DE CORMENIN, "Biographie parliamentaire de M. Berryer," 1837.)

Ber'ryhill's, a township of Mecklenburg co., N. C. Pop. 1414.

Ber'ryman, a township of Jo Daviess co., Ill. P. 559.

Ber'ry's, a township of Montgomery co., Md. P. 4700.

Berry's Store, a township of Jackson co., Ala. P. 660.

Ber'ryville, a village of Mohawk township, Montgomery co., N. Y., has a cotton factory, paper-mill and grist-mill.

Berryville, the capital of Clarke co., Va., is situated 5 miles W. of the Shenandoah River and 10½ E. of Winchester, and is on the line of the Shenandoah Valley R. R. It contains 6 churches, 1 academy, 1 steam saw and 1 sumac mill, and 1 newspaper. It is often called "Battletown," owing to the many contests of Gen. Morgan of Revolutionary fame. In this vicinity are many scenes of historic interest. Washington, in surveying the lands of this county when it was a part of Frederick, had his head-quarters at a beautiful spring just beyond the town. The small house which he occupied is still standing. Gen. Morgan lived near here. Pop. 580. JOHN O. CROWN, ED. "CLARKE COURIER."

Bersaglie'ri, the Italian name of the riflemen or sharp-shooters who served in the army of Victor Emmanuel when he was king of Sardinia. They took part in the Crimean war, 1854–55, and fought against Austria in 1859. They wear a dark-green uniform.

Ber'serker [from *ber*, "bare," and *serk*, "coat-of-mail"], a hero of Scandinavian mythology, so named because he fought without coat-of-mail. He was the grandson of Starkader, "the eight-handed," and overcame all opponents by his irresistible valor. The name has also been given to a class of warriors who fought naked and performed extraordinary feats under the influence of a kind of demoniac possession.

Berthier, a county of Quebec (Dominion of Canada), has an area estimated at 1200 square miles. It is bounded on the S. E. by the St. Lawrence River. Its capital is Berthier-en-Haut, which is on the St. Lawrence, about 55 miles N. E. of Montreal. Pop. in 1871, 19,804.

Berthier-en-Bas, a post-village of Montgomery co., Ontario, on the right bank of the St. Lawrence, 24 miles S. W. of Quebec.

Berthier-en-Haut, a post-village, capital of Berthier co., Quebec, on the left bank of the St. Lawrence, 55 miles N. E. of Montreal. It has extensive manufactures of leather and a good trade. It has also several saline chalybeate springs, and is in a fertile district. Pop. about 1700.

Berthier (LOUIS ALEXANDRE), prince of Wagram, a French general, born at Versailles Nov. 20, 1753. He served as captain under La Fayette in the U. S. 1778–82. In 1796 he became general of division, and chief of the staff of Bonaparte's army of Italy. He gained the confidence of the general-in-chief, retained for many years the position of chief of the staff, and accompanied Bonaparte to Egypt in 1798. About the end of 1799 he was appointed minister of war. He became a marshal of France in 1804, and rendered important services in the campaign against Austria, 1805. He usually rode in the carriage of Napoleon, whose plans he digested, and whose orders he despatched with remarkable rapidity and precision. He was admirably fitted for the duties of a staff officer by his strong constitution, his methodical habits, and his excellent memory, but he was not so competent to command an army. For his conduct at the battle of Wagram (1809) he received the title of prince of Wagram. He entered the service of Louis XVIII. in 1814, but when Napoleon returned from Elba, Berthier preferred neutrality and retired to Bamberg, where he was killed by a fall from a window Jan. 1, 1815. He left autobiographic "Mémoires d'A. Berthier," 1826.

Berthierite, or **Hardingerite,** a steel-gray, bronzy mineral containing $FeS + Sb_2S_3$.

Berthollet (CLAUDE LOUIS), M. D., COUNT, a French chemist, born in Savoy Nov. 9, 1748. He discovered the composition of ammonia, and invented the process of bleaching by chlorine, that of filtration through charcoal, and several fulminating powders. He published a valuable work, "The Elements of the Art of Dyeing" (1790), and "Essai de statique chimique" (2 vols., 1803). He was associated with Lavoisier in forming a new chemical nomenclature, and was one of the chief originators of modern chemistry. Died Nov. 6, 1822. (See CUVIER, "Éloge de Berthollet," 1824.)

Bertholle'tia, a genus of trees of the order Lecythidaceæ. The *Bertholletia excelsa*, a large South American tree, produces a hard-shelled fruit (about six inches in diameter), enclosing numerous elongated and triangular edible seeds, which are called Brazil nuts. Large quantities of them are exported from Pará.

Ber'tie, a county of North Carolina, having the Chowan River on the E. and the Roanoke on the S. Area, about 900 square miles. It contains extensive pine forests; its soil is quite level and fertile. Cotton and corn are the staple crops. Capital, Windsor. Pop. 12,950.

Bertin (LOUIS FRANÇOIS), called **Bertin l'Ainé,** a French journalist, was born in Paris Dec. 14, 1766. He founded in 1800, together with his brother (LOUIS FRANÇOIS, surnamed DE VEAUX), the daily "Journal des Débats," a literary and political journal, which obtained great influence and success. He was hostile to Napoleon, who banished him. Bertin revived his journal in 1814, and continued to edit it until his death, Sept. 13, 1841.—His son (LOUIS MARIE ARMAND), born Aug. 22, 1801, succeeded him as editor. Died Jan. 12, 1854.

Bertino'ro, a town in Central Italy, province of Forli, on a mountain 7 miles S. E. of Forli. It is the seat of a bishop. Pop. 6014.

Ber'tram, a post-township of Linn co., Ia. Pop. 827.

Ber'trand, a post-township of Berrien co., Mich. Pop. 1522.

Bertrand, de (HENRI GRATIEN), COUNT, a French general, was born at Châteauroux Mar. 28, 1773. He followed Napoleon to St. Helena in 1815. He died Jan. 31, 1844, leaving "Memoirs of the Campaigns of Egypt and Syria, dictated by Napoleon at St. Helena" (2 vols., 1847).

Ber'wick, a post-village of Cornwallis township, Kings co., Nova Scotia, on the Windsor and Annapolis Railway, 47 miles E. N. E. of Annapolis. It has manufactures of boots and shoes.

Berwick, a post-township of Warren co., Ill. P. 1066.

Berwick, a post-township of York co., Me. Pop. 2291. It has manufactures of lumber, shoes, carriages, doors, etc.

Berwick, a post-village in Seneca township, Seneca co., O., on the Cincinnati Sandusky and Cleveland R. R., 43 miles S. W. of Sandusky. Pop. 188.

Berwick, a borough and township of Adams co., Pa., 28 miles S. S. W. of Harrisburg. Pop. of township, 507; of borough, 325.

Berwick, a post-borough of Columbia co., Pa., on the North Branch of the Susquehanna and on the Lackawanna and Bloomsburg R. R., 28 miles S. W. of Wilkesbarre. It has a newspaper, one national bank, a car-shop, foundry, machine-shop, rolling-mill, and an academy. Pop. 923.
D. MORRIS KURTZ, ED. "INDEPENDENT."

Berwick (JAMES FITZ-JAMES), DUKE OF, an able general, a natural son of James II. of England and Arabella Churchill, was born in France Aug. 21, 1670. He had a high command in his father's army in Ireland in 1690, soon after which he entered the French service. He obtained the command of the French army in Spain in 1704, was created a marshal of France in 1706, and gained a decisive victory over the English and their allies at Almanza in 1707. Philip V. rewarded him with the title of duke of Liria and Xerica. He was killed at the siege of Philipsburg June 12, 1734. (See his own "Mémoires," published by his son in 2 vols., Paris, 1778.)

Berwick-on-Tweed, often called simply **Berwick,** a fortified seaport-town of England, in Northumberland, on the left (N.) bank of the Tweed, at its entrance into the North Sea, 58 miles by rail E. S. E. of Edinburgh; lat. 55° 46′ N., lon. 1° 59′ W. The river is here crossed by an old stone bridge of fifteen arches, 924 feet long, and by a magnificent viaduct, over which the trains of the North British Railway pass. It is crossed by the North-eastern, the Midland, and the Great Northern Railways. It has a Gothic church, a theatre, a public library, a town-hall, also large manufactures of steam-engines, mill-machinery, etc. Coal-mines are worked in the vicinity. Pop. in 1871, 13,231. The history of Berwick is full of interest. It was one of the chief seaports of Scotland in the Middle Ages, and in the border wars was often taken and retaken by the English and Scotch, who regarded it as an important military position. It was finally ceded to England in 1502, and became by treaty a free town, independent of both states. These privileges were confirmed on the accession of James I. to the English throne. Down to the time of George II. it was customary in Parliamentary statutes to mention specifically their application to "Berwick-on-the-Tweed."

Ber'wickshire, a county of Scotland, forming its S. E. extremity, is bounded on the N. by Haddington, on the N. E. by the German Ocean, and on the S. E. by the river Tweed, which separates it from England, on the S. by Roxburgh, and on the W. by Edinburgh. Area, 473 square miles. It is drained by the Blackadder, the Whiteadder, and the Eye. The surface is partly hilly in the northern part, occupied by the Lammermuir Hills. The Merse district in the S. part, and near the Tweed, is nearly level, and is one of the most fertile and well-cultivated tracts in the island. Carboniferous limestone, porphyry, and old red sandstone occur here. Capital, Greenlaw. Pop. in 1871, 36,474.

Ber'yl [Gr. βήρυλλος; Lat. *beryl'lus*], a mineral which occurs in the form of six-sided prisms, which are generally blue, yellow, or green, but are sometimes colorless. Those which display clear tints of sky-blue or sea-green are called *aquamarine* by jewellers. The deep green crystals constitute EMERALDS (which see). The sides of the prisms are often longitudinally striated, but the terminating or truncating planes are smooth. The beryl is one of the few minerals that contain *glucina*. It consists of 67 per cent. of silica, 19 of alumina, and 14 of glucina. Gigantic crystals of beryl are found at Acworth and Grafton in New Hampshire. One specimen found at Grafton was four feet long, and weighed more than 2500 pounds. Beryls of fine quality occur in Brazil, Siberia, and several parts of Europe. Emeralds are obtained from Peru, Siberia, and Upper Egypt. (See GEMS, by PROF. H. B. CORNWALL, E. M.)

Be'ryx, a genus of fishes of the family Percidæ, of which few species are living in the present seas, while a large number are found fossil. It begins with the first of the teleosts in the chalk. Three species are found in the chalk of England, and several in the tertiary, especially in the fish-beds of Monte Bolca, near Verona in Italy. This is therefore one of the oldest genera of living fishes.

Berze'lius (JOHAN JACOB), M. D., F. R. S., BARON, a distinguished Swedish chemist, was born in East Gothland, Aug. 20, 1779. He studied medicine and chemistry at the University of Upsal, and published in 1806 a "Treatise on Animal Chemistry" (2 vols.). He acquired great excellence as an analyst, and made important discoveries in chemistry. He was the author of the system of chemical symbols, and he discovered the elements selenium and thorium. His most important work is a "System of Chemistry" ("Lärebok i Kemien," 3 vols., 1808–18), which was translated into every European language. He was professor of medicine and pharmacy at Stockholm 1807–32. He contributed forty-seven articles to the "Memoirs of Physics, Chemistry, and Mineralogy" (6 vols., 1806–18), a work founded by Berzelius and Hisinger. Died Aug. 7, 1848. (See G. FORCHHAMMER, "J. J. Berzelius," 1849.)

Besançon (anc. *Vesontio*), a city of France, capital of the department of Doubs, on the river Doubs, 58 miles by rail E. of Dijon. It is connected with Paris and Lyons by several railways, is well built and strongly fortified, having a citadel which is considered impregnable. It was formerly the capital of Franche-Comté. The most remarkable edifices are a Gothic cathedral, a town-hall, a theatre, the palace of Cardinal Granvelle, and the prefecture. It has also a college, a public library, a museum, an academy of sciences and arts, and extensive manufactures of watches, jewelry, porcelain, carpets, etc. *Vesontio* was an important town in the time of Cæsar, who in 58 B. C. expelled the Sequani from it. Here are many Roman antiquities, and the remains of an amphitheatre and aqueduct. P. 46,961.

Bessara'bia, a province in the S. W. part of Russia, is bounded on the N. by Podolia, on the E. by Podolia, Cherson, and the Black Sea, on the S. by Moldavia, and on the W. by Moldavia and Bukovina. Area, 14,014 square miles. By the treaty of Paris (1856) part of Bessarabia adjacent to the Black Sea was ceded to Turkey. The surface is mostly low and flat; the soil is fertile, producing wheat, barley, maize, tobacco, etc. The chief articles of export are cattle, wool, tallow, and salt. The greater part of the land is in pasturage. The population is composed of Russians, Germans, Bulgarians, Moldavians, Greeks, Jews, Poles, etc. Capital, Kishinef. Pop. in 1867, 1,052,013.

Bessa'rion (JOHN), a learned Greek cardinal, born at Trebizond in 1395, was a disciple of Plato in philosophy. He favored the union of the Latin and Greek churches. He was appointed a cardinal by Pope Eugenius IV., and received in 1463 the title of patriarch of Constantinople. He wrote several works, translated the metaphysics of Aristotle into Latin, and was an efficient promoter of Greek learning. Died Nov. 19, 1472. (See A. BANDINI, "De Vita et Rebus gestis Bessarionis Cardinalis," 1777; AUBÉRY, "Histoire des Cardinaux.")

Bess'borough, EARLS OF (1739), Viscounts Duncannon (1723), barons of Bessborough (1723, in Ireland), Barons Ponsonby (1749, in Great Britain), Barons Duncannon (1834, in the United Kingdom), a prominent family of Great Britain.—JOHN GEORGE BRABAZON PONSONBY, the fifth earl, born Oct. 14, 1809, succeeded his father in 1847. He was member of Parliament for Bletchingley in 1831, for Higham Ferrers in 1831, and for Derby 1834–37.

Bes'sel (FRIEDRICH WILHELM), an ancient German astronomer, born at Minden July 22, 1784. He became assistant to Schröter at Lilienthal in 1806, and was appointed in 1810 director of a new observatory at Königsberg. In 1818 he published "Fundamenta Astronomiæ," an important and capital work, on which he had expended the labor of many years. After three years' observations he determined in 1840 the annual parallax of the star 61 Cygni, and published the result in his "Measure of the Distance of the Star 61 Cygni, etc." (1839). Having made a series of 75,011 observations, he formed a catalogue of stars within the zone from 15° N. to 15° S. declination, containing all stars to the ninth order. Among his works are "Astronomical Observations" (1841–42) and "Popular Lectures on Astronomy" (1848). Died Mar. 14, 1846. (See C. T. ANGER, "Erinnerung au F. W. Bessels Leben und Wirken," 1846.)

Bes'semer (HENRY), an English inventor of Breton descent, was born in Hertfordshire in 1818. He made various improvements in machinery, but is chiefly known as the inventor of the Bessemer process of refining steel—a process now largely employed in Europe and America. This invention has made Mr. Bessemer a very wealthy man.

Bessemer's Process for Refining Iron. See IRON, by A. S. HEWITT.

Bessières (JEAN BAPTISTE), duke of Istria, a French marshal, born near Cahors (Lot) Aug. 5, 1768. He entered the army as a private in 1792, served with distinction in Italy and Egypt, became a general of division in 1802, and marshal of France in 1804. He rendered important services at Austerlitz, Jena, Friedland, and Eylau. Having obtained in 1808 command of an army in Spain, he gained a victory at Medina del Rio Seco. He had the chief command of the cavalry of the grand army in 1813, and was killed on the day before the battle of Lützen, May 1, 1813. (See MIRAMONT, "Vie de J. B. Bessières;" "Victoires et Conquêtes des Français.")

Betan'zos (anc. *Fla'vium Brigan'tium*), a town of Spain, in the province of Corunna, is 12 miles S. E. of Corunna. It is said to be the oldest town in Galicia, and has remains of ancient fortifications. Here are manufactures of linen, leather, and pottery. Pop. 5832.

Be'tel, or **Pawn,** a narcotic stimulant extensively used as a masticatory by Oriental peoples, especially by tribes of the Malay race. It consists of a portion of the nut of the *Areca Catechu* (called betel-nut or *pinang*), rolled up with lime in the leaf of the *Piper Betel* or other species of pepper. The leaf is plucked green, and is smeared with moistened quicklime before the slice of areca-nut is wrapped in it. This mixture is chewed continually by men, women, and children, and the use of it is so general that a Malay presents his betel-box as a European offers his snuff-box. This practice appears to be very ancient, having prevailed before the Christian era. The betel causes giddiness in those who are not accustomed to chew it. The habitual use of it blackens the teeth, and perhaps destroys them. According to Sir James E. Tennent, the betel is beneficial, acting as a tonic, antacid, and carminative.

Beth, a Hebrew noun, meaning "house" or "habitation," employed some fifty times in the Scriptures as a prefix in naming places, such as Bethel, Bethlehem, and Bethany.

Bethab'ara, a place beyond the Jordan where John baptized (John i. 28), though some of the best manuscripts have Bethany.

Betha'nia, a post-township of Forsyth co., N. C. Pop. 1162.

Beth'any [Heb. "house of dates;" Gr. Βηθανία; Arab. *El-Azizeh* or *Lazarieh*], a village of Palestine, on the E. slope of the Mount of Olives, nearly 2 miles (15 stadia) E. of Jerusalem. As the home of Mary, Martha, and Lazarus, it was the scene of interesting events in sacred history. (See Matthew xxi. 17; xxvi. 6; John xi. and xii.; Luke xix. 29.) From some point near the village Christ ascended into heaven. (Luke xxiv. 50.) Here is a cave or excavation in a rock, which, according to a worthless tradition, is the grave of Lazarus. The descent into it is effected by twenty-six steps cut into the solid rock. The modern village contains about twenty families.

Bethany, a post-village of Manvers township, Durham co., Ontario, Canada, on the Midland Railway, 24 miles N. W. by N. of Port Hope. It has three churches and one weekly paper.

Bethany, a post-township of New Haven co., Conn. Pop. 1135.

Bethany, a post-township of Genesee co., N. Y. Pop. 1652.

Bethany, a township of Iredell co., N. C. Pop. 506.

Bethany, a township of Gratiot co., Mich. Pop. 1462.

Bethany, a post-village, capital of Harrison co., Mo., 62 miles N. E. of St. Joseph, 20 miles S. of the Iowa line,

has a good trade, and two weekly newspapers. Pop. of township, 2460. ED. OF "WATCHMAN."

Bethany, a post-village of Dyberry township, Wayne co., Pa. Pop. 202.

Bethany, a post-village of Brooke co., West Va., on Buffalo Creek, 7 miles from the Ohio River and 16 miles N. E. of Wheeling. It is situated in a beautiful and fertile region. It is the seat of Bethany College, established in 1841 by Alexander Campbell, the founder of the sect of "Disciples."

Beth'el [Arab. *Beitîn* or *Beiteen*], an ancient town of Palestine, noted as the scene of the dream of the patriarch Jacob, was 10 or 12 miles N. of Jerusalem. It was near the boundary between Judea and Samaria. Here are ruins of ancient churches and other edifices.

Bethel, a village and township of Wilcox co., Ala., on the Alabama River, 50 miles S. W. of Selma. Pop. of the township, 2456.

Bethel, a borough of Fairfield co., Conn., on the Danbury and Norwalk R. R., 3 miles E. S. E. of Danbury and 25 miles W. N. W. of New Haven. It has manufactures of hats. Pop. of township, 2311.

Bethel, a township of McDonough co., Ill. Pop. 1040.

Bethel, a post-township of Morgan co., Ill. Pop. 1468.

Bethel, a township of Posey co., Ind. Pop. 581.

Bethel, a post-village and township of Oxford co., Me., on the Grand Trunk Railway, 70 miles N. N. W. of Portland. It has an academy, five churches, and manufactures of lumber, carriages, furniture, boxes, woollen goods, starch, etc. The scenery is here very fine. Pop. of the township, 2286.

Bethel, a post-township of Branch co., Mich. P. 1511.

Bethel, a post-township of Anoka co., Minn. Pop. 216.

Bethel, a small post-village of Shelby co., Mo., about 40 miles W. N. W. of Hannibal. It was settled about 1842 by a community of Germans, who built several mills and a glove-factory. Pop. of the township, 1224.

Bethel, a post-village and township of Sullivan co., N. Y., 39 miles N. W. of Goshen. It has manufactures of leather and lumber. Pop. of the township, 2737.

Bethel, a township of Cabarrus co., N. C. It is noted for its fine scenery. Pop. 1095.

Bethel, a township of Perquimans co., N. C. Pop. 1128.

Bethel, a township of Clark co., O. Pop. 3086.

Bethel, a post-village of Tate township, Clermont co., O. Pop. 634.

Bethel, a township of Miami co., O. Pop. 1801.

Bethel, a township of Monroe co., O. Pop. 1284.

Bethel, a post-township of Berks co., Pa. Pop. 2285.

Bethel, a township of Delaware co., Pa. Pop. 554.

Bethel, a township of Fulton co., Pa. Pop. 861.

Bethel, a township of Lebanon co., Pa. Pop. 2272.

Bethel, a township of York co., S. C. Pop. 2330.

Bethel, a township of Windsor co., Vt., has two post-offices, East Bethel and Bethel. It is on the Vermont Central R. R., 25 miles N. W. of White River Junction and 40 miles S. of Montpelier. It has manufactures of shoe-pegs, lumber, leather, etc., a national bank, one weekly newspaper, and seven churches. Pop. 1817.

ED. "WHITE RIVER STANDARD."

Bethel, a township of Pendleton co., West Va. P. 714.

Bethel College, in McKenzie, Tenn. This institution of learning was founded, with a liberal charter, in 1850. Its career of usefulness met the most sanguine expectations of its ardent friends. In an incredibly short time fine libraries of well-selected books were collected, an excellent apparatus was obtained, and praiseworthy efforts made by the board of trustees to secure a liberal endowment. The very moderate charges, as at present, have ever made it eminently the school of the people. The war of the States in 1861–65 closed its doors, and left its denuded walls all scathed and scarred, the endowment lost, libraries scattered, the apparatus destroyed, and its friends wasted and greatly disheartened. But since the dark clouds of despondency have partially passed away the reorganization of the college has been consummated. To secure better accessibility, the college has been moved from McLemoresville to McKenzie, Tenn. Her doors are again open, and she comes forward to resume her position among colleges, that she may bear her part in the education and elevation of the youth of our common country. A liberal patronage has been given since the reorganization. Successful efforts for endowment are being made, the refilling of the cases with valuable libraries has been undertaken with encouragement, and the furnishing of suitable apparatus is progressing. Thus dark hours are yielding to a brighter dawning. The college is under the control of the Synod of West Tennessee of the Cumberland Presbyterian Church. A liberal Christianity and a high standard of moral character are inculcated, yet no peculiar sectarian or political principles are allowed in the literary department. Candidates for the ministry of all denominations receive tuition free of charge. "Church schools differ from the schools of secular learning as differs the cold statue from the living man." Bethel College admits both sexes to her highest honors. The course of study is as thorough as that of any college of the country, and of an eminently practical character. This institution has had her bright as well as her dark hours. Many of the most useful in all the professions found in various parts of the country have obtained their education in this college. There have been many of the most powerful revivals of religion connected with its history. Her presidents have been in the following order: Rev. J. N. Roach, Rev. C. J. Bradley, Rev. A. Freeman, D. D., Rev. Felix Johnson, D. D., Rev. B. W. McDonnald, D. D., LL.D., Rev. J. S. Howard, A. M., Rev. M. Liles, A. M., Rev. W. W. Hendrix. McKenzie is in Carroll county, at the junction of the Nashville and North-western and Memphis Clarksville and Louisville R. Rs.

W. W. HENDRIX.

Bethes'da [Heb. "house of mercy" or "place of the flowing of water"], a pool or tank at Jerusalem where the lame man was miraculously healed (John v. 1–9). Some identify it with Birket Israil, a large reservoir inside the city walls, near St. Stephen's Gate; others with the Fountain of the Virgin (intermittent), about 300 yards S. of the Temple area; and others with the Pool of Siloam, about 300 yards farther S.

Bethesda, a township of York co., S. C. Pop. 2997.

Be'thia, a township of Marion co., S. C. Pop. 767.

Beth'lehem [Heb. *Beth-lehem*, the "house of bread," so called from its fertile soil], a town frequently mentioned in both the Old and New Testaments, and especially distinguished as the birthplace of our Saviour, as well as of his ancestor, King David. Anciently it was called "Bethlehem Judah," to distinguish it from another Bethlehem in the northern part of Palestine (Josh. xix. 15). It is mentioned as existing in the time of Jacob, but was probably never very large or commercially important. It has at present about 3000 inhabitants, all Christians. The principal trade of the place is in crosses, beads, and relics. Here are Greek, Latin, and Armenian convents; and the monks show a cave which they claim to have been the stable where our Lord was born. (See ROBINSON'S "Biblical Researches;" HACKETT'S "Illustrations of Scripture;" RITTER'S "Geography of Palestine.")

Bethlehem, a township of Cass co., Ind. Pop. 993.

Bethlehem, a post-township of Clarke co., Ind. P. 763.

Bethlehem, a post-township of Grafton co., N. H., on the White Mountain R. R., 5 miles from Littleton. It has manufactures of lumber and starch. Pop. 998.

Bethlehem, a post-village and township of Hunterdon co., N. J., on the New Jersey Central R. R., 37 miles N. N. W. of Trenton. Pop. of the township, 2211.

Bethlehem, a post-township of Albany co., N. Y. Pop. 6950.

Bethlehem, a township of Coshocton co., O. P. 850.

Bethlehem, a village and township of Stark co., O., 58 miles S. S. E. of Cleveland. Pop. of township, 2148.

Bethlehem, a township and borough of Northampton co., Pa., on the left bank of the Lehigh River, and on the Lehigh Valley and Lehigh and Susquehanna R. Rs., 51 miles N. of Philadelphia and 5 miles E. of Allentown. It is the northern terminus of the North Pennsylvania R. R., and is pleasantly situated on the slopes of several hills. A bridge across the river connects it with South Bethlehem, the seat of Lehigh University, founded by Asa Packer in 1865, and richly endowed, having a fine stone edifice on a high and commanding position. Bethlehem was founded in 1741 by the Moravians, who have here a large stone church 142 feet long, a theological seminary, an ancient chapel, and several benevolent institutions. There are also a school for boys and a seminary for ladies, three newspapers, two national banks, one savings bank, and another banking-house. There are a large number of manufactories, chiefly in South Bethlehem, including the Lehigh Shovel-Works, several foundries, the Bethlehem Iron Company's rolling-mills, machine-shops, etc.—one of the largest establishments of the kind in the U. S.; Lehigh Zinc Company's rolling-mill, zinc, oxide, and spelter works; Lehigh Brass-Works, gas-works in both boroughs, etc. Pop. of Bethlehem township, 2230; of Bethlehem borough, 4512; of South Bethlehem borough, 3556.

D. J. GODSHALK, ED. "DAILY TIMES."

Beth'lehemites, an order of monks established at Cambridge, England, in 1257; also an order of monks and nuns founded at Guatemala about 1665. They are found in Central and South America and the Canary Islands.

Bethlem, a post-township of Litchfield co., Conn. Pop. 750.

Beth'mann-Holl'weg (Moritz August), a German jurist and statesman, born at Frankfort-on-the-Main April 8, 1795. He was professor of civil law at Berlin, and subsequently at Bonn, and was Prussian minister of public instruction from 1858 to 1862. He published several valuable legal works.

Beth'phage, a locality in Palestine, near Jerusalem, appears to have been on or near the Mount of Olives. The name occurs in Luke xix. 29 and Matthew xxi. 1. Its site has not been exactly ascertained.

Bethsa'ida [Heb. "house of fish"], an ancient town in Palestine, on the W. shore of the Lake of Galilee, the home of Andrew, Peter, and Philip (John i. 44). Dr. Robinson identifies it with Ain-et-Tabigbah, in a little bay or cove between Khan Minyeh (Capernaum?) and Tell Hum (Chorazin?). Another Bethsaida, afterwards called *Julias*, was situated near the head of the lake, on the E. side of the Jordan, about 2 miles from its mouth. It was near this Bethsaida that Christ fed the 5000. (Luke ix. 10–17.)

Beth'shemesh [Heb. "house of the sun"], the name of four places mentioned in the Scriptures, the most important of which was a sacerdotal city of Judah, about 15 miles W. S. W. of Jerusalem, and about 2 miles from the great Philistine plain. It was here the ark rested on its way home from Ekron (7 miles). It was here that Amaziah, king of Judah, was worsted and taken prisoner by Jehoash, king of Israel (2 Kings xiv. 11–13). In the reign of Ahaz it was captured by the Philistines (2 Chron. xxviii. 18), and is not again mentioned in sacred history. It stood on a low ridge. Only ruins now mark the spot, which bears the name of *Ain-Shems* ("fountain of the sun"). The greater part of Samson's exploits were in its immediate neighborhood.

Béthune, a fortified town of France, in the department of Pas de Calais, near the river Lave and the Canal of Aire, 23 miles by rail N. N. W. of Arras. It has a fine castle, a college, and a Gothic church; also manufactures of oil, soap, and woollen goods. It was taken from the Spaniards in 1645, retaken by Prince Eugène in 1710, and restored to France in 1713. Pop. 8178.

Bethune (George Washington), D. D., an American divine and poet, was born in the city of New York in 1805. He graduated at Dickinson College in 1822, and at the Princeton Theological Seminary in 1825. In 1828 he became pastor of a Dutch Reformed church in Rhinebeck, N. Y. He was afterwards settled in Utica, and still later in Philadelphia. In 1849 he removed to Brooklyn, N. Y. In 1861 he went to Europe for the benefit of his health, but died at Florence April 28, 1862. Dr. Bethune was distinguished for his fine taste, his varied culture, and his love of nature. Besides several literary and religious works, he published "A Commentary on the 130th Psalm" (1847), "Lectures on the Heidelberg Catechism" (1864), "Lays of Love and Faith" (1847). (See his life by Dr. Van Nest, New York, 1867.)

Beton. See Brick, Cement, and Stone, Artificial, by Gen. Q. A. Gillmore, U. S. A.

Bet'terton (Thomas), a popular English actor, born in London in Aug., 1635. He performed with great success the parts of Hamlet, Macbeth, and Othello. He was the chief ornament of the English stage for nearly fifty years. His wife was a popular actress. He died April 28, 1710. (See Charles Gildon, "Life of T. Betterton," 1710.)

Bet'ting, or Wa'gering, a vicious practice which prevails more or less in all countries. The English are addicted to betting on horse-races to a ruinous extent. The British Parliament passed an act, 16 and 17 Vict. c. 119, to suppress the haunts of betters, called betting-houses, which it declares to be a common nuisance and contrary to law. But it provides that its enactments shall not extend to stakes or deposits due to the winner of any race or lawful sport. The laws of the U. S. prohibit betting on elections.

Betts (Samuel Rossiter), LL.D., one of the ablest of American jurists, was born at Richmond, Mass., June 8, 1787, and graduated at Williams College in 1806, practised law in Sullivan co., N. Y., served in the war of 1812, became judge advocate, and was a member of Congress (1815–17). He was a judge of the circuit court for the State (1823–26), and U. S. district judge (1826–67). Died Nov. 2, 1868. He published a treatise on "Admiralty Practice" (1838).

Bett's, a township of Sanford co., Ala. Pop. 1048.

Beudant (François Sulpice), an eminent French mineralogist, born in Paris Sept. 5, 1787, became professor of mineralogy in Paris in 1820. Among his writings is an "Elementary Treatise on Mineralogy" (2d ed. 1830). Died Dec. 9, 1850.

Beugnot, de (Arthur Auguste), Comte, a French writer and liberal statesman, was born at Bar-sur-Aube in 1797. He wrote an "Essay on the Institutions of Saint Louis" (Paris, 8vo, 1821), "The Jews of the West" (Paris, 8vo, 1824), and a "History of the Destruction of Paganism in the West" (2 vols., 1835). He became a peer of France in 1841. As a member of the Legislative Assembly of 1849 he promoted freedom in public instruction. Died in 1865.

Beu'lah, a township of Lee co., Ala. Pop. 1299.

Beulah, a post-village, capital of Bolivar co., Miss., on the Mississippi River, 110 miles N. of Vicksburg.

Beulah, a post-township of Johnston co., N. C. Pop. 1105.

Beulé (Charles Ernest), a French archæologist, born June 29, 1826, took part in 1849–53 in the excavations of the Acropolis in Athens, and became in 1854 professor of archæology in the Imperial Library in Paris. He wrote, among other works, "L'Acropole d'Athènes" (2 vols., 1854), "Études sur le Peloponnèse" (1855), and "Fouilles de Carthage" (the results of his excavations in Carthage in 1858).

Beur'mann, von (Karl Moritz), a celebrated German explorer, was born in 1835. In 1860 he attempted to explore the country of the Bogos, but did not succeed in reaching it until Mar., 1861. In Dec., 1861, he was engaged to look for Vogel, who, it was supposed, had been murdered in Wadaï. Beurmann was to start from Tripoli, while at the same time Heuglin should attempt to reach Wadaï from Abyssinia. He reached Kuka in Bornu in Aug., 1862. As it was impossible to reach Wadaï at that time, he made a trip to Jacoba in Bautchi, from which he returned to Kuka Dec. 13. Soon after he attempted the voyage to Wadaï, and having succeeded in reaching Wadaï after several futile attempts, he was murdered in Feb., 1863, in Moa, in the most W. province of Wadaï, by the command of the governor.

Beusa'lem, a township of Moore co., N. C. Pop. 1032.

Beust, von (Friedrich Ferdinand), Baron, an able German statesman, born at Dresden June 13, 1809. He was appointed minister of foreign affairs in Saxony in 1849. In Oct., 1866, he became minister of foreign affairs and prime minister of the Austrian empire. He received the additional title of chancellor of the empire in June, 1867, when Austria was apparently on the verge of ruin. He urged the emperor to adopt a liberal policy, and he effected important reforms which promoted civil and religious liberty. He insisted on the abolition of the concordat with the pope, and induced Francis Joseph to enter into friendly relations with the king of Prussia and emperor of united Germany. Never since the time of Metternich was the foreign policy of Austria so wisely directed as it was by Von Beust. He resigned in Nov., 1871, for reasons (as he announced) not political, but purely personal. He was then sent as ambassador to London.

Beu'then, a town of Prussia, in Silesia, 50 miles E. S. E. of Oppeln, has manufactures of woollen cloth, zinc-ware, and pottery. Pop. in 1871, 17,946.

Bev'el [Fr. *beveau* or *buveau*], an instrument used by masons and carpenters to take or measure angles. It is movable on a point or centre, and may be set to any angle. The term also denotes a slant or inclination of a surface which is not at right angles with the adjacent surface; a sloped or canted surface. It is nearly synonymous with splay.

Bevel Gear, or **Bevelled Gear,** in mechanics, a species of wheelwork in which the axes of two wheels working into each other are neither parallel nor perpendicular, but inclined to each other at a certain angle. Some wheels are also called conical wheels.

Bevereu, a town of Belgium, in the province of East Flanders, 7 miles by rail W. of Antwerp. It has factories of laces, woollen, linen, and cotton goods. Pop. in 1866, 7151.

Bev'eridge (William), an English Orientalist and bishop, born at Barrow, in Leicestershire, in 1638. He was a man of great learning and of profoundly religious character. He published a "Treatise on Chronology" (1669), a work "On the Canons of the Greek Church" (1672), and several devotional treatises. In 1704 he was appointed bishop of St. Asaph. Died in 1708. (See Thomas H.

HORNE, "Memoir of Bishop Beveridge," prefixed to an edition of his works, 9 vols. 8vo, 1824.)

Bev'erland (ADRIAAN), a Dutch classical scholar and heterodox writer, born at Middelburg about 1654, was a friend of Isaac Vossius. He wrote "Peccatum Originale" ("Original Sin," 1678), and other works which were censured for impiety. He was banished from Utrecht, and removed to England, where he died insane in 1712.

Bev'erley, a market-town of England, in Yorkshire, 1 mile W. of the river Hull, and 10 miles N. N. W. of the city of Hull. It is the chief town of the East Riding of Yorkshire, and is handsomely built. The origin of the name is said to be *Beverlac*, a "lake or dam of beavers." It has an ancient and beautiful Gothic minster, called the church of St. John, which exhibits several styles of Gothic architecture, and ranks next to York Minster among the ecclesiastical structures of England. The oldest part of this was erected in the thirteenth century. A priory was founded here about 700 A. D. Beverley has an active trade in corn, coals, and leather, and is on the railway from Hull to York. Pop. in 1871, 10,218.

Bev'erly, a post-township of Adams co., Ill. P. 1173.

Beverly, a thriving post-village of Essex co., Mass., is on a small inlet of the ocean, and on the Eastern R. R., 2 miles N. N. E. of Salem and 18 miles N. N. E. of Boston. A bridge across the inlet connects it with Salem. It derives its prosperity chiefly from commerce and fisheries, and has a national bank and manufactures of shoes, carriages, cotton and woollen goods. It has one weekly newspaper, ten churches, and an insurance company. Pop. of Beverly township, 6507.

Beverly, a city of Burlington co., N. J., on the Delaware River and the Camden and Amboy R. R., 15 miles above Philadelphia. It has five churches, a woollen mill, an oil-cloth factory, a very extensive ropewalk, and one weekly paper. It is a place of summer resort. Pop. 1418; of Beverly township, 2438. GEO. F. CLARKE, PUB. "VISITOR."

Beverly, a post-village, capital of Randolph co., West Va., is on the Tygart's Valley River, about 100 miles S. S. E. of Wheeling. Pop. of Beverly township, 847.

Beverly, a post-village of Washington co., O., on the Muskingum River, 20 miles above Marietta. It has a national bank. Pop. 814.

Beverly Manor, a township of Augusta co., Va. The town of Staunton is in this township. Pop. 8071.

Bevier', a post-village of Macon co., Mo., on the Hannibal and St. Joseph R. R., 5 miles W. of Macon City. Pop. 833; of Bevier township, 1531.

Bewd'ley (formerly **Beaulieu,** *i. e.* "fair place," so called from its situation), a market-town of England, in Worcestershire, on the river Severn, 14 miles N. N. W. of Worcester. It is pleasantly situated and neatly built, and has manufactures of combs, carpets, brass-ware, and leather. Pop. in 1871, 3018.

Bew'ick (THOMAS), a celebrated English engraver, born near Newcastle-on-Tyne Aug. 12, 1753, was a pupil of Beilby. He was the founder of the modern English school of wood-engraving, and none of his numerous pupils have excelled him. He illustrated Gay's "Fables," 1779. Beilby and Bewick published in 1790 a "History of British Quadrupeds," with engravings, which procured for Bewick a high reputation. He was assisted by his brother John in the designs of Goldsmith's "Traveller" and "Deserted Village." Among his best works is a "History of British Birds" (2 vols., 1804). Died Nov. 8, 1828.

Bexar [Sp. pron. bȧ-har'], a county in the S. of Texas. Area, 1456 square miles. It is intersected by the Medina River, and bounded on the N. E. by the Cibolo, and also drained by Salada Creek. The soil is generally fertile, adapted to maize, cotton, wheat, and pasturage. Capital, San Antonio. Pop. 16,043.

Bexar Territory, an extensive portion of Western Texas, having an area of not less than 25,000 square miles. It has few inhabitants except Indians. The N. W. portion is an outlying part of the Llano Estacado, or "Staked Plain," a region having little wood, a few springs and "water-holes," some of them salt, and a very few insignificant streams and lakes. The Rio Pecos extends along the western border. In the E. central portion there are quite a number of streams, chiefly tributaries of the Colorado. The S. central part has an extensive table-land. Much of the region is mountainous and rocky. It has some cedar timber. The chief settlement is at Fort Concho. Its Indians are hostile and intractable. Pop. 1077.

Bey, or **Beg,** a title of the Turkish empire signifying "lord." The ruling officers of Tripoli and Tunis are beys; and the same title is given to some local magistrates, to colonels and generals of the army, and to the sons of pashas. In other cases it is a merely honorary title.

Beyle (MARIE HENRI), a French *littérateur*, who wrote under the assumed name of STENDHAL, was born at Grenoble Jan. 23, 1783. He held several high civil offices under Napoleon. Among his chief works are a "History of Painting in Italy" (2 vols., 1817), "Le Rouge et le Noir," a novel, a "Life of Rossini" (1824), "Memoirs of a Tourist" (1838), "Rome, Naples, and Florence," and a novel called "The Carthusian Nun of Parma" (1839). He passed many years in Italy. Died in Paris in 1842. (See HONORÉ DE BALZAC, "Études sur M. Beyle.")

Bey'root', Beyrout, Beirout, Beirut, or **Bairut** [supposed by some to be identical with the *Berothai* of 2 Sam. viii. 8, and the *Berothah* of Ezek. xlvii. 16; Gr. Βηρυτός; Lat. *Berytus*], a flourishing commercial town and seaport of Syria, is finely situated on the Mediterranean at the foot of Mount Lebanon, 85 miles W. N. W. of Damascus. It is situated on a promontory. The adjacent scenery is very picturesque. The harbor admits only small vessels, but in the bay about 3 miles from the city there is good anchorage for large ships. This is the chief seaport of Damascus and Syria, and has an extensive commerce, which is increasing. French steamers ply weekly between Beyroot and Marseilles, and British steamers ply regularly between this city and Liverpool. The chief articles of export are madder, silk, wool, olive oil, and gums. Here are important manufactures of silk stuffs. Pop. in 1867, about 100,000. *Berytus* was besieged and taken by Baldwin, king of Jerusalem, about 1110, and retaken by the Saracens in 1187.

Be'za [Fr. *De Bèze*], (THEODORE), an eminent Calvinistic theologian, born at Vezelay, in Burgundy, June 24, 1519. In his youth he enjoyed two benefices in the Catholic Church, but in 1548 he went to Geneva with his wife, and avowed himself a Protestant. He became professor of Greek at Lausanne, and an intimate friend of Calvin. In 1554 he published a treatise, "De Hæreticis a Civili Magistratu Puniendis," in which he defended the burning of Servetus. He translated the New Testament into Latin (1556), removed to Geneva in 1559, and became Calvin's ablest coadjutor. He succeeded Calvin as professor of theology in 1564. He afterwards ruled the Genevan Church with energy for forty years. Among his works are a "Life of Calvin" and a "History of the Reformed Churches in France from 1521 to 1563" (3 vols., 1580). Died Oct. 13, 1605. (See BAUM, "Th. Beza," 2 vols., 1843–51; HEPPE, "Th. Beza," 1861.)

Bezant', or **Besant,** a gold coin struck at Byzantium, or a circular piece of gold or silver without any impression, supposed to be a part of the old coinage of Byzantium. Some of these were brought home by the Crusaders, and were current in England. Their value was 10*s.* sterling, but some gold bezants were worth £15 sterling. They occur in heraldic charges, especially Cornish coat-armor, and in the arms of banks or bankers (hence the "three balls" of the pawnbrokers' shops). *Bezant* in heraldry is a globe *or*, or a circle *argent*.

Bez'dau, a town of Hungary, in the county of Bacs. Pop. in 1870, 7573.

Béziers (anc. *Bæter'ræ*), a city of France, in the department of Hérault, on the river Orb and the Canal du Midi, 27 miles by rail E. S. E. of Cette. It is on the railway which connects Montpellier with Toulouse, and has a delightful situation, with a mild climate. Among its antique and interesting edifices are a noble Gothic cathedral and the church of La Madeleine. It has a college, a public library, a theatre; also manufactures of silk, hosiery, gloves, glass, soap, brandy, and leather. Béziers has some Roman remains. It was the scene of a massacre of the Albigenses in 1209. Pop. 27,722.

Be'zoar, a calculous concretion found in the stomachs or intestines of goats, deer, and other ruminant animals, was formerly prized for its supposed medicinal virtues and as an antidote to poisons. That of the antelope was especially prized. The bezoar is sometimes composed of the superphosphate of lime. It is quite worthless as a medicine.

Bhagavat (or **Bhagavad**) **Gîta,** modern Hindoo pron. bhŭg'a vŭt geet—*i. e.* "the divine song" [from the Sanscrit *bhagavat*, "adorable," "divine," and *gita*, a "song"], a famous Hindoo poem usually regarded as an episode of the MAHABHARATA (which see), though it is not found in all the manuscripts of that great epic. The Bhagavat Gîta may be called a poetical treatise on the Hindoo philosophy, ethical and religious. The discourse on these subjects is represented as proceeding from the mouth of the god Krishna (one of the avatars of Vishnu). The poem is regarded with great reverence by the Hindoos, and it has been made the subject of numerous commentaries both in

India and in Europe. (See a translation by WILKINS, who first introduced the poem to the notice of Europe; W. VON HUMBOLDT, "Treatise on the Bhaghavat Gîta," 1827.) The Sanscrit text, with a Latin translation, was edited by A. W. von Schlegel (2d ed., 1846).

Bhamo. See BAMO.

Bhar'tri-Ha'ri, a Hindoo poet celebrated as a writer of apothegms, is supposed to have been a brother of King Vikramâditya, who lived in the first century B. C. His name is attached to a collection of 300 apothegms which were published by Bohlen (Berlin, 1863). Bhartri-Hari was the first Hindoo poet whose works became known in Europe.

Bhawl'poor, a state of Northern India, bounded on the N. W. by the Ghara River and the Indus, and on the S. W. by Sinde. Area, about 22,000 square miles. The soil is mostly desert and sterile, except near the Ghara. Cattle, poultry, sheep, rice, and provisions are plentiful and cheap. The chief articles of export are cotton, sugar, indigo, hides, wool, and drugs. Capital, Bhawlpoor. This state is subject to a khan, and protected by the British. Pop. about 500,000.

Bhawlpoor, a town of India, the capital of the above state, is on a branch of the river Ghara, 210 miles S. W. of Lahore. It is situated in a fertile district, which produces abundance of oranges, apples, and other fruits, and has an extensive trade. Here are manufactures of scarfs, turbans, chintzes, and other cotton stuffs. Pop. about 20,000.

Bhil'sa, a town of Hindostan, 190 miles S. of Gwalior, on the Betwat River, is built on a trap rock, and is fortified. In the neighborhood are extensive ruins. Good tobacco is raised here. Pop. about 30,000.

Bhooj, a fortified town of Hindostan, capital of Cutch, 170 miles S. E. of Hyderâbâd. It has numerous temples or pagodas, mosques, and a beautiful mausoleum of Row Lakka, a former ruler of Cutch. Its manufactures of gold and silver are widely celebrated. Pop. estimated at 25,000.

Bho'pâl', or **Bhapaul,** a state of Hindostan under British protection, is bounded on the S. by the Nerbudda River. Area, estimated at 6764 square miles. It is traversed by the Vindhyan Mountains. Capital, Bhopal. Pop. about 664,000.

Bhurt'poor', or **Bhurtpore,** a "protected" state of British India, is between 26° 30′ and 27° 50′ N. lat., and between 77° and 78° E. lon. Area, estimated at 1978 square miles. Good crops of cotton, sugar, and grain are produced. The heat in summer is extreme. Pop. about 600,000.

Bhurtpoor, or **Bharatpura,** a large town of India, capital of the above state, in a plain 33 miles W. of Agra; lat. 27° 12′ N., lon. 77° 33′ E. Pop. estimated at 100,000. It was formerly fortified by a mud wall, and a ditch which could be filled with water from a lake. Lord Lake, having assaulted this town in 1805, lost 3000 men. It was besieged and taken by the British in 1826.

Bi [from the Lat. *bis*, "twice"], a prefix which occurs in many chemical and other scientific terms, and denotes duality or the number 2, as *bivalve*, "having two valves;" *bicarbonate*, a salt in which two equivalents of carbonic acid are combined with a base; *biceps*, "double-headed."

Biaf'ra, Bight of, a bay of the Atlantic Ocean, on the W. coast of Africa, is the eastern portion of the Gulf of Guinea, and lies between Cape Formosa and Cape Lopez. It encloses the island of Fernando Po and other smaller isles. The largest rivers which flow into the bight are the Niger (or Quorra), the Calabar, and the Cameroon.

Bia'la, an Austrian town, in Galicia, situated on the Biala, 42 miles S. W. of Cracow, has manufactures of cloth and linens. It is connected by rail with Bielitz. Pop. in 1869, 6558.

Biala, a town of Russia, in the government of Siedlce. It has several churches and a monastery. Pop. in 1867, 5662.

Bial'ystok, a fortified town of Russia, in the government of Grodno, on the river Bialy, 52 miles by rail S. W. of Grodno. It is well built and handsome, has several churches, and a palace with a park, which have been called the "Versailles of Poland." Here are a gymnasium and manufactures of woollen goods, hats, leather, and soap. It is on a railway from Warsaw to Grodno. Pop. in 1869, 16,985.

Biancavil'la (*i. e.* "white town"), a town of Sicily, in the province of Catania, on the S. W. declivity of Mount Etna, 13 miles N. W. of Catania. Grain, cotton, and silk are exported from it. Pop. 9083.

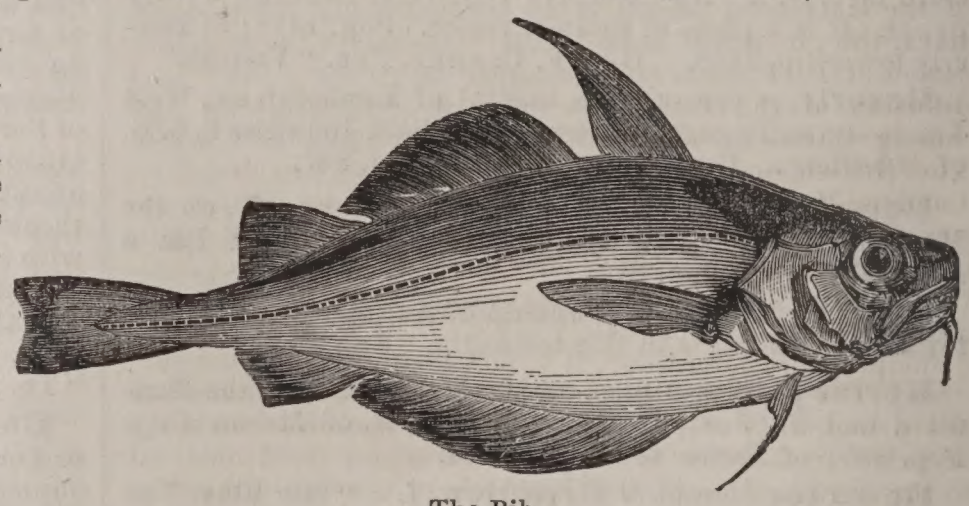
Bianchi'ni (FRANCESCO), an eminent Italian astronomer and antiquary, was born at Verona Dec. 13, 1662. He lived mostly at Rome, and enjoyed a rich benefice, the gift of Pope Alexander VIII. He published, besides other works, a "Universal History, proved by Monuments and illustrated with Symbols of the Antique" (1694). He spent several years in an effort to draw a meridian line from the Adriatic to the Mediterranean, but failed to complete it. He succeeded in drawing a meridian line through the church of Santa Maria degli Angeli. Died at Rome Mar. 2, 1729. (See FONTENELLE, "Eloge de Bianchini," 1757; A. MAZZOLENI, "Vita di F. Bianchini," 1735.)

Biard (AUGUSTE FRANÇOIS), an eminent French painter, born at Lyons June 27, 1800, travelled extensively in the Levant, Egypt, etc., collecting materials for his art. He excelled in several departments of painting, especially in *genre*. Among his works are a "Family of Beggars," "The Strolling Players," "The Wind of the Desert," "A Battle with Polar Bears," "The Slave-Trade," and the "Burning of a Hindoo Widow." (See L. BOIVIN, "Notice sur M. Biard.")

Biarritz, a village and fashionable watering-place of France, on the Bay of Biscay, in the department of Basses-Pyrénées, 5 miles S. W. of Bayonne. Here are several curious grottoes and mineral springs. The situation is pleasant and healthy. This was recently the summer residence of Napoleon III. Pop. 3652.

Bi'as [Βίας], one of the Seven Sages of Greece, was a native of Priene, and a contemporary of Crœsus, king of Lydia. He lived about 570–550 B. C. He was distinguished for eloquence as well as wisdom, and was employed as a legal and political adviser or advocate. According to tradition, he said, "I carry all my goods (or riches) with me."

Bib, called also **Pout** or **Whiting Pout** (*Gadus lusc*us or *Morrhua lusca*), a fish of the same genus as the cod and haddock, is found on many parts of the British coasts and farther N. It is seldom more than one foot long, and is remarkable for the depth of its body, which equals one-fourth of its length. It is esteemed for food.



The Bib.

Bibb, a county near the centre of Alabama. Area, 700 square miles. It is intersected by the Cahawba River. The surface is hilly; the soil in parts fertile. Cotton and corn are the chief crops. Iron ore and coal are found in it. Capital, Centreville. Pop. 7469.

Bibb, a county near the centre of Georgia. Area, 250 square miles. It is traversed by the Ocmulgee River, and also drained by the Tobesofka Creek. The surface is hilly; cotton and corn are the chief crops. The county is intersected by the Central, the Macon and Western, and the Macon and Brunswick R. Rs. Capital, Macon. P. 21,255.

Bibb (GEORGE M.), born in Virginia in 1772, graduated at Princeton in 1792, became a prominent lawyer of Kentucky, and was several times chosen chief-justice of that State, and once chancellor; was U. S. Senator (1811–14 and 1829–35), and secretary of the treasury under Tyler. He published four volumes of Kentucky "Law Reports" (1815–17). Died at Georgetown, D. C., April 14, 1859.

Bibb (WILLIAM WYATT), M. D., born in Virginia Oct. 1, 1780, was member of Congress from Georgia (1806–13), U. S. Senator (1813–14), governor of Alabama Territory (1817–19), and first governor of the State of Alabama (1819–20). Died July 9, 1820.

Bi'ber (GEORGE EDWARD), an English clergyman, born in 1801, was formerly associated with Pestalozzi in educational enterprises, and is author of several pedagogic works. He has taken an active part in recent church controversies in the High Church interest.

Bi'berach', a town of Würtemberg, is in a charming valley and on the river Riss, 23 miles by rail S. S. W. of Ulm. It has a realschule, a beautiful church, built in 1110,

manufactures of paper, linen goods, leather, etc. Pop. in 1871, 7091. The French general Moreau here defeated the Austrians under Latour in Oct., 1796, and the Austrian general Kray in 1800. The poet Wieland was born near Biberach.

Bi'berich, or **Bie'brich,** a village of Prussia, in the province of Hesse-Nassau, on the right bank of the Rhine, 3 miles S. of Wiesbaden. It has a ducal residence which is said to be the finest palace on the Rhine. The river-scenery here visible is almost unrivalled. Pop. including Mosbach, in 1871, 6642.

Bibes'co (GEORGE DEMETRIUS), PRINCE, ex-hospodar of Wallachia, born in 1804 in the banat of Crăiova, studied at Paris, and became under-secretary of state. In 1843 he led the movement which expelled Ghika, and succeeded him as hospodar. He instituted many reforms, but was forced to resign in 1848, on account of alleged Russian predilections. He kept aloof from politics until in 1857 he took part in the deliberations of the *divan* for the reorganization of Moldo-Wallachia. Died at Paris June, 1873.

Bible. See BIBLE, THE.

Bible Christians, called also **Bryanites,** from Rev. William Bryan of Cornwall, England, who left the Wesleyans in 1815. They have in England 368 chapels, 65 preachers, 957 local preachers, and 14,352 members; in Canada, 135 chapels, 46 preachers, and 4986 members; in Australasia, 100 chapels, 34 preachers, 147 local preachers, and 2045 members. In the U. S. the only congregation of "Bible Christians" is in Philadelphia, and they refer their origin to Rev. William Cowherd, who left the Church of England about 1800.

Bible Communists. See ONEIDA COMMUNISTS.

Bible Grove, a post-township of Clay co., Ill. P. 998.

Bible Societies. While the sixteenth century is distinguished for the labor spent upon numerous translations of the Holy Scriptures into the languages of Christian nations, the nineteenth is no less memorable for the multiplication of Bible societies as a means of securing the widest diffusion of the Bible, not only in civilized lands and among Christian communities, but throughout the world. The British and Foreign Bible Society was established in London, Mar. 7, 1804. Previous to that time eight societies in Great Britain had been engaged in publishing or distributing Bibles, though only three, the Naval and Military Bible Society (1780), the Dublin Association (1792), and the French Bible Society (1792), had made this their principal work, and these, it is believed, did not long survive. The great destitution which was found to prevail in the principality of Wales in 1802, and the utter inability of existing societies to supply the demand for Bibles, led to the organization of the British and Foreign Bible Society, with the sole object of encouraging a wider dispersion of the Scriptures, first in the British dominions, and then, according to its ability, in other countries, Christian, Mohammedan, and Pagan. Three hundred persons of different religious denominations united in organizing it, and £700 were at once subscribed. Its entire receipts the first year fell a little short of £5600.

The American Bible Society was founded in the city of New York, May 11, 1816, with the sole object, as announced in its constitution, of encouraging "a wider circulation of the Holy Scriptures without note or comment." This society had, however, been preceded by fifty or sixty others, which had come into being at one point and another in the U. S. after the organization of the British and Foreign Bible Society. The first of these was founded at Philadelphia in 1808; the second at Hartford, Conn., in 1809. Next came the Massachusetts Bible Society at Boston, the New Jersey Bible Society at Princeton, and the New York Bible Society. Such local societies accomplished much good within their own bounds, but having no bond of union, their operations lacked efficiency and economy, and it soon became apparent that a combination of effort was essential for thorough work. Thirty-five local organizations sent delegates to the convention which founded the American Bible Society, and eighty-four became auxiliary to it during the first year of its existence. Among the delegates were representative men of the leading denominations—Baptist, Congregational, Reformed Dutch, Methodist Episcopal, Protestant Episcopal, Presbyterian, and the Society of Friends; but every sectarian jealousy and party prejudice being laid aside, all united with perfect harmony and cordiality in the single object of "disseminating the Scriptures in the received versions where they exist, and in the most faithful where they may be required." The announcement of this organization brought from the British and Foreign Bible Society the expression of their warmest congratulations, and the offer of a gift of £500. At an early date Bible societies were formed on the continent of Europe, as at Bâle (1804) and Berlin and Ratisbon (1805), and nearly fifty others, chiefly in the north of Europe, before 1816. At that time also two had been established in Africa, five in Asia, and others in Nova Scotia, Canada, and the West Indies. About seventy principal societies may be named as having been actually engaged in the manufacture and publication of Bibles. Auxiliary and branch Bible societies and associations have been very extensively formed with a view of enlisting local sympathies, collecting funds from churches and individuals, maintaining depositories, and looking after the circulation of the Scriptures among the needy. The American Bible Society has more than 2000 auxiliary societies, and with them are connected nearly 5000 branches. Such societies are expected to supply the wants of their field from their own resources, if possible, though receiving aid from the national society when necessary, and paying over their surplus funds annually into its treasury. The British and Foreign Bible Society has also not far from 1200 auxiliaries and branches, as well as 3134 Bible associations in the management of which ladies have a principal part. Besides these home institutions, it has many colonial auxiliaries, and also foreign agencies superintending its depositories of Bibles in the chief cities of Europe. Not far from 16,000 smaller organizations are thus connected with the two principal Bible societies of the world; and when it is remembered that many of the continental societies also have adopted the auxiliary system, it is very clear that this multiplication of associations for the distribution of the Scriptures is one of the phenomena of the age.

The American and Foreign Bible Society was founded in New York in 1836 by representatives of the Baptist denomination, owing to the refusal of the American Bible Society to apply its funds to print and circulate versions of the New Testament made by American Baptist missionaries, in which *βαπτίζειν* and its cognate terms were literally translated, not transferred. The American and Foreign Bible Society, thus inaugurated, instructed its translators "to endeavor to ascertain the exact meaning of the original text, to express that meaning as literally as the nature of the languages into which they should translate the Bible would permit, and to transfer no words which were capable of being literally translated." By vote of the representatives of the two societies this society was to have been consolidated with the American Baptist Publication Society, but legal obstacles have been thrown in the way, and the Bible Society still maintains an independent existence. Some of the members of this society were earnest advocates of the publication of a new version of the English Scriptures on the same principle as that which governed its translations into foreign tongues; and on the refusal of the society to authorize such a revision the American Bible Union was formed (1850)—a society which has published a revised version of the New Testament, Psalms, Job, and Genesis in conformity with the principle indicated—translating *βαπτίζειν* by "to immerse," etc. Although some of the most eminent scholars among the Baptists have been employed on the versions of this society, it has never received the support of the great body of American Baptists.

In general, several characteristics of Bible societies are to be noted. They are voluntary associations, being neither close corporations nor under ecclesiastical direction, and the privileges of membership are secured by the payment of money. They are unsectarian, inviting all men to common efforts on the simple basis of the Scriptures of the Old and New Testament without note or comment. They are Protestant organizations, however, because the rules of the Roman Catholic Church are opposed to the free circulation of the Scriptures without admixture of comment. They are strictly benevolent societies, publishing not for profit, but at prices as low as possible, and making large grants, as their receipts may allow, for the supply of the destitute. Their work is exceedingly helpful to Sunday-schools and to various forms of missionary effort at home and abroad; and their influence has been most happy in promoting Christian union, and presenting a form of religious activity in which all denominations might participate without the sacrifice of principle.

The work of Bible societies has constantly encountered difficulties of one sort and another. The circulation of the Bible in all lands creates a demand for new versions, the preparation of which involves many nice points, while the revision of existing versions can hardly fail to occasion complaint. Even the determination of the canon of the Scripture is not universally agreed on. The most violent controversy in the British and Foreign Bible Society turned upon the question whether the Apocrypha should be published and circulated. The controversy continued for years, and when in 1826 it was finally decided to withhold all aid from associations circulating the uncanonical books, fifty auxiliaries on the Continent withdrew from the parent society. The Edinburgh society, which had earnestly op-

posed the circulation of the Apocrypha, also withdrew and stood aloof. The proposal to combine men of different persuasions in Bible effort, and to circulate the Bible without the Book of Common Prayer, encountered some opposition in England at an early date, which after a few years died away. The Russian Bible Society at St. Petersburg (founded 1813) flourished until 1826, when its operations were summarily suspended by the emperor Nicholas, on the ground that it belonged to the Church, rather than to a secular society, to furnish the people with the word of God.

In the American Bible Society differences of opinion concerning the principles which should govern translations into foreign tongues led to the formation of the American and Foreign Bible Society in 1836; and at a later period (1858) its harmony was again imperilled for a time in consequence of dissatisfaction at some attempted modifications (numerous though generally slight) in the English editions of the society—a dissatisfaction which was allayed by abandoning the proposed changes.

The work accomplished by Bible societies in seventy years is vast in extent and of unspeakable usefulness. In 1872 the receipts of the American Bible Society for a year were $689,923, of which $361,274 came from sales. The same year it had issued 1,100,871 volumes, including Bibles, Testaments, and integral portions of Scripture. The British and Foreign Bible Society at the same time reported its receipts for a year to be £184,196, and its issues 2,584,357 volumes. Its total issues since 1804 are 65,884,095, and the total issues of the American Bible Society since 1816, 28,780,969. It is a low estimate to suppose that 113,000,000 volumes of the Bible or separate books of the Bible have been issued by Bible societies since the tears of a little girl in Wales in 1802 led Thomas Charles to ask what could be done to secure Welsh Bibles for his congregation. The aggregate number of volumes issued by no means measures the results of Bible society work. From motives of benevolence the prices of Bibles have been determined by the cost of materials and of manufacture, without regard to profit. The British and Foreign Bible Society has its work done by contract; the American Bible Society manufactures its publications on its own premises, and in so doing gives constant employment to about 400 persons. Besides the books which are sold at unremunerative prices, a large part of the publications each year are given away to destitute families and individuals, to charitable institutions, Sunday-schools, missionary societies, soldiers, seamen, immigrants, travellers, prisoners, and other classes of persons. The American Bible Society and its auxiliaries through the U. S. are engaged for the third time in an effort to reach every destitute family in the land with the offer of a Bible. It has printed the Bible or parts of it in fifty different languages, twenty-seven of these being new translations; 205 new versions have been prepared since 1804. The British and Foreign Bible Society has directly or indirectly promoted the publication and distribution of the Scriptures in at least 200 languages and dialects. (For further information respecting Bible societies reference may be had to the following works: Owen's "History of the British and Foreign Bible Society," 1817; Browne's "History" of same, 1859; Dudley's "Analysis of the System of Bible Societies," 1821; "Jubilee Memorial of British and Foreign Bible Society," 1854; "Jubilee Commemoration at Bombay," 1854; Strickland's "History of American Bible Society," 1856; "Manual of American Bible Society," 1871; "Jubilee Memorial," 1866; Memoirs of S. H. Turner, Gardiner Spring, and John C. Brigham; numerous controversial pamphlets; "Bible Society Record," and "Annual Reports" of each Bible society.) E. W. Gilman.

Bible, The [Lat. *Bib'lia;* Gr. τὰ Βιβλία (*i. e.* "the books"); Fr. *la Bible;* Ger. *die Bibel;* It. *la Biblia*], popularly known also as the **Holy Bible** and **Holy Scriptures,** a collection of ancient writings, divided into two parts, the Old and New Testaments, of which the first is regarded by the Jewish Church, and both are regarded by the Christian Church, as a divine revelation. With respect to the more precise definition and character of the Bible, the views are very diverse in the different churches. The Roman Catholic Church, in consistency with the monarchical theory which it inherited from the Roman civil law, denies any such character to the Bible as would make it a constitutional limitation on the sovereign power. The supreme authority of revelation does not, on this theory, inhere in the codex, but in the personal representative, for the time being, of the Church catholic. The Greek Church lays chief stress on orthodoxy—that is, on inflexible adhesion to the dogmatic symbols in which the faith of Christianity was codified in the early centuries. The Scriptures must therefore be interpreted in accordance with these creeds, but as this elevates the creeds into the position of supreme authority, the labor of interpreting Scripture becomes a superfluous trouble. The Scriptures have in consequence fallen into neglect, and this neglect has become so absolute, under a rigid traditional orthodoxy, that it is impossible to state any positive attitude towards the Scriptures as characteristic of this Church. The Protestants of the sixteenth century, in reviving reverence for the authority of the Scriptures, developed various schools of opinion. Luther and his followers adopted a comparatively free but subjective position. They saw divine revelation in the Bible, but not in all parts of it equally. Calvin's position was different and more scientific. Among his followers in Switzerland, however, there sprang up a great zeal for the doctrine of inspiration. The sacred writers were compared to trumpets or to pens, in order to express their absolute instrumentality in the hands of the Holy Spirit. The Anglican Church at first held a less definite theory of the Scriptures, and there was great diversity of opinion, but it has gradually adopted the general theory of the Swiss Reformers, modified only so far as sober reflection has forced the over-credulous or over-zealous to relinquish the theory of verbal inspiration. Finally, the scientific and critical school of biblical scholars, represented chiefly by modern Germans, regards the Bible as the human record of a divine revelation; not absolutely infallible, since there is no book written in any human language but must partake in a measure of the imperfections of that language. Many of this school, while admitting the Bible to contain the record of a true supernatural revelation, do not consider it to be without positive errors of historical fact, not without false coloring from popular legend and tradition, but nevertheless a record as good as human hands could make of a truly divine revelation. Thus diverse are the conceptions of the book which are held by different parties. Scarcely any of these conceptions rely on an unbiassed examination of the book, to see what it is; many of them are invented to obtain the support of the Bible for some form of Christianity which is first settled, independently of the Scriptures, on the basis of religious or philosophical prepossessions. The Protestant churches, however, are generally united in regarding the Scriptures—1, as of divine authority; 2, as containing all knowledge necessary to salvation; 3, as the appropriate form of a divine revelation (as opposed to tradition or the inner light); 4, as the heritage of all Christians—*i. e.* it is the right of all to read and become acquainted with the teachings of the Bible.

A. *The Old Testament.*—The Old Testament was originally written in Hebrew, but of course the Hebrew manuscripts which we possess are separated by a long interval and many vicissitudes from the original handiwork of the authors.

The History of the Hebrew text is briefly as follows: I. *First Period* (536–180 B. C.)—The Babylonian captivity (from 586, the chief deportation, to 536, the first return) forms an epoch in the history of the Jews. It is a gulf dividing the independent from the subject position of the nation. It was under the former that they had original and productive power and a living revelation, and while they had them they were indifferent to them. After the captivity, when the Jewish nation had been purified by adversity, they turned back to them with new interest. They were able to see that Isaiah and Jeremiah had been the only men of their times who had truly had "the mind of the Spirit." They desired to restore the ancient law, worship, and traditions. To this end the collection and preservation of the ancient writings, which served as the authority for, or bore witness to, the former observances, became an object of great interest and importance. With this movement, however, the nation entered on a new stage. Its work was not original and creative, but preservative and reconstructive. It did not look to the future, to an ideal, but to the past, to a memory. Its spring was not in thought, communion with God, foresight, and purpose, but in tradition, reflection, and application. It had to make the most of its inherited wealth, without adding to it.

In the work which now began Ezra had a prominent part. He collected and arranged the ancient writings, and so laid the foundation of the canon (see below, section on the *Canon*); and from this point the history of the written codex begins. The books were at this time written in the ancient Phœnician characters which appear on some ancient Phœnician inscriptions, on the Moabite Stone, on some coins of the Asmoneans, and in the Samaritan Pentateuch. The letters had no variation of form or shape for capitals and small letters, and neither words, verses, nor chapters were marked off in any way. Some of the books which now appear separately were then united, and a few which are now found in the canon had not yet been written. The work, however, which was now to be done extended beyond the collection, arrangement, and preservation of the ancient Scriptures. The Hebrew language was already a dead language. The popular dialect was the Chaldee, and the Hebrew of Moses, David, and the prophets had become a sort of classical and sacred language, known only to the

oldest and to the learned. It was an object of academical acquisition. It was, therefore, necessary to explain and translate or expound the writings. This task naturally devolved upon such as possessed the requisite knowledge, and they constituted an informal body for this purpose. So much is no doubt true, and it forms the historical basis of the rabbinical tradition about the "Great Synagogue" which was said to have done this work.

When this much is said of the commencement of this period, we have in fact told nearly all which is known about it. We can only infer, from what we know of its beginning and what we find at its close, that the following movements were in progress: 1. The college of interpreters, though not a formally or legally constituted body, and though their business was primarily literary or academical, were gaining in authority and dignity, and acquiring a certain official character from general consent. The "elders" came to have civil and judicial authority from the lack of others to fill these functions. Possibly the Sanhedrim was an outgrowth of this body. 2. The canon (see below) was being formed; the idea of *Holy* Scripture was being elaborated and formulated; the respect for the traditional writings, and the disposition to set them by themselves, were gaining ground; the doctrine of inspiration took its rise. At the close of this period the canon is formed and these doctrines are established dogmas. 3. The form of the letters in use was undergoing a change. At the period referred to, the square letters which are represented in our printed texts had become established in use.

II. *Second Period* (180 B.C. to 500 A. D.).—The "schools" begin with Simon the Just, in 180 B. C. These schools produced the Talmud, an immense work in a dozen folio volumes, containing a commentary on the Mishna, which is itself a "repetition" of the "Law." The schools developed intense zeal for the text of the Scriptures—a zeal which, though frivolous and fanatical in many of its manifestations, has been of immense value to biblical scholarship. The scribes and Talmudists spent unwearying labor in the establishment of the consonant text; they separated the words by spaces (but characteristically ordained just how great the space should be). They probably also introduced the verse-mark (:), and therefore the division into verses. The preservation of the text from corruption in copying was secured by counting the letters or by other devices, and by crabbed, rigid, and minute rules. This work exercised its legitimate influence on the characters of those who did it; it made them punctilious about trifles and negligent of "the weightier matters;" but it preserved the Old Testament text from corruption, and handed it down to us in a comparatively pure and reliable form. In their exegesis the Talmudists were generally guided by arbitrary rules, by dogmatic prepossessions, by a view of the Bible which made it a storehouse of occult wisdom, only to be unlocked by cabalistic and allegorical treatment. It is asserted by some who are well acquainted with the Talmud that it contains valuable geographical, ethnological, historical, and exegetical information for the elucidation of the Bible, but the commentaries of Jews and Christians alike fail to bear witness to the truth of the assertion.

The Targums.—One result of the zeal of the Jews for the original Hebrew was the publication of paraphrases in the Aramaic or popular dialect, which were called *Targumim* (from a root signifying to "interpret"). They present the rabbinical and traditional interpretation of the Scriptures. Their origin is very obscure.

III. *Third Period* (500–1488 A.D.).—The Talmud, having grown by the work of successive generations for three or four centuries, closed about the year 500—*i. e.*, the last of the commentators whose sayings are included in it lived at that time. Then a new work began. The Jewish nation had long been broken up and dispersed. Christianity had grown into a powerful opponent. The latter fact had led the Jews to abandon the Septuagint Greek version of the Old Testament (see below, on the *Versions of the Old Testament*), and the former fact made it necessary to provide still further for the preservation of the Hebrew text. The pronunciation of a language written only with consonants must, of course, be very uncertain; that of the Hebrew had been preserved in the rabbinical schools by tradition. There seemed to be danger that it would now be lost if no means of recording it were devised. The Syriac language had shortly before been provided with points to designate the vowel sounds, and to make the written language a complete representation of the spoken. The chief seats of rabbinical learning at this period were Tiberias in Galilee and Sora in the Euphrates valley, and the scholars are known as the Massoretes. The Massorah was a mass of notes, comments, emendations, and corrections of various kinds, which the Talmudists had adopted, committed to memory, and handed down by tradition, but which they had not ventured to mark in any way upon the pages of the sacred text. The Massoretes now undertook to do this. They marked in the text—1, the vowels, the shades of pronunciation of the consonants, and the diacritical points which distinguish two sounds expressed by one character; 2, the accents, which are partly marks of pronunciation, and partly serve the purpose of musical notes, marking the intonations of the chant; 3, the emendations and corrections which the Talmudists had adopted. These they mark on the margin by a peculiar device, which leaves the consonants as they were, but suggests those which should be read. Here, again, the superstitious reverence of the rabbis for the text served the purpose of a true biblical science, since their proposed amendments are still open to criticism and review. It is difficult to pass a summary judgment on their emendations, but perhaps in a majority of cases modern scholars retain the original reading and reject the Massorah.

The work of the Massoretes did not begin before the sixth century, and it was finished before 1106, the date of the oldest manuscript now known to exist. This manuscript presents the Massoretic text. The work certainly covered a long period, and was done by many different hands. It was not possible, even with the minute and stringent rules which were adopted, to prevent errors in copying, and our manuscripts, all of which belong to the period between 1106 and 1488, offer many variants. The Jews continued to use in the synagogues copies of the Scriptures containing only the consonant text.

IV. *After the art of printing* was invented some books of the Old Testament were printed separately. In 1488 the first edition of the whole Hebrew Bible was printed at Soncino. The second, based on the first, was published at Brescia in 1494. This was the one used by Luther. An independent version appeared in the Complutensian Polyglot, 1517. A collection of variants was made from 615 manuscripts by Kennicott, Oxford, 1780, and a better one by De Rossi, 1788. The Hebrew Bibles in use are scarcely more than reproductions of the two first printed editions. They possess some critical advantages, but generally the excellence of a subsequent edition over the former consists in typographical accuracy and neatness. A satisfactory critical edition, with a full account taken of the variants, is yet to be prepared.

V. *The Old Testament in the Christian Church.*—The Church of the first and second centuries based the authority and truth of its doctrines on the Old Testament, just as it is used in the New Testament. The Church of the third and fourth centuries wavered between acquiescence in the authority ascribed to the Old Testament by our Lord and his apostles, and hatred and suspicion of all things Jewish. No Christians save converted Jews knew Hebrew, and of these very few were of the class which "knew the Law." No man was converted who brought into the infant Church a knowledge of the Hebrew. The Septuagint Greek version (see below) was the form in which the Christians became acquainted with the Old Testament. The first Christian scholar who undertook to learn Hebrew was Origen (254 A. D.). He prepared a Hexapla, containing the Hebrew and five versions, which unfortunately is lost. We possess, however, his commentaries, which show that he had borrowed from the rabbis their allegorical mystical methods of interpretation. He is counted among the Fathers of the Eastern Church, and is the only biblical scholar of whom that Church can boast.

Jerome (430 A. D.) endeavored to learn Hebrew of a Jew, and did learn as much as his teacher could or would teach him. His method of treating the Old Testament shows the influence of his teacher. Through him the rabbinical ideas of inspiration, etc. found their way into the Western Church. His translation of the Scriptures (see *Vulgate*, in the section below on the *Versions*) was regarded as a finality, and all interest in the original text died out. In 1311, Clement V. ordered that Hebrew should be studied at the universities, but no results followed. Nicholas de Lyra (1340) was a converted Jew. His commentaries carried great authority among Christians, and influenced Luther so much that a popular saying arose: "If Lyra had not played the lyre, Luther would not have danced." The Reformers returned with zeal to the study of the Hebrew. That pursuit participated in the general revival of learning, and in the most recent times it has been wonderfully advanced by the development of philological and historical science. It is probably not too much to say that the Hebrew language is more at the command of this generation than of any other since the Babylonian captivity.

It follows from the above—1, That the only text we can hope to establish on manuscript authority is that of the Massoretes. 2, We have no manuscript, even of this text, older than 1106. We shall see below, under *Versions*, what means we have of learning what the text was at an earlier date.

3, The vowel-points, accents, word, verse, and chapter divisions are all many centuries more recent than the original writings. Even the consonant text has been transliterated. The chapter divisions were made in the thirteenth century, and applied to the Vulgate. In the sixteenth century it was asserted that the vowels, etc. were of later origin than the text. This assertion was considered heterodox, as it was inconsistent with the prevailing theory of inspiration. It is only in the most recent times that this fact has been admitted, and it is now undisputed. 4, The crude and superstitious theories of inspiration which have prevailed to some extent in the Christian Church are of rabbinical manufacture. They were introduced into the Christian Church first as attaching to the Old Testament, and then extended over both in their purest and most original form.

VI. *The Canon and the Apocryphal Books.*—As we said above (A, I.), when the period of creation and production was ended, and the period of conservation and reflection and application began, one of the first ideas which was elaborated from the crude into the dogmatic form was that of the Scriptures in their sacred character and divine authority. Hence the terms Holy Scripture, Word of God, etc. When this doctrine was established, the necessity of defining and limiting its application at once made itself felt. What books come under this designation? What is the standard by which they must be tested in order to answer this question? It is certain that these questions never received any authoritative answer. Ezra made a collection of books, but he did not include those books which were not yet written. The Hebrew Bible as we now possess it is divided into three parts: 1, the Torah (*i. e.*, Law—Pentateuch); 2, the Nebiim (Prophets, including Joshua, Judges, First and Second Samuel, and First and Second Kings); 3, the Chetubim ("Writings," including all the other books in the English Version of the Old Testament). Ezra and Nehemiah probably collected a book. The addition of the third part cannot be historically accounted for. The form of the collection, as a whole, bears witness to successive collections and successive gradations of authority. This gradation may be traced still farther. Besides and beyond the Chetubim were a number of books which were on the line, not accepted and not definitely rejected. Still again, beyond these were others which were positively set aside. The translators of the Septuagint included in their collection a number which do not appear in the Hebrew collection (they form the Apocrypha of the English Bible). The Ethiopic version contains others which belong even to the class of the totally rejected. Thus, one who knew only the Septuagint version would find the book of Exodus and the book of Tobit side by side, presented to him as of equal authority. Ethiopian Christianity would give the same authority to the book of Adam as to the book of Genesis. Thus it is certain that when these versions were made, the strict definition of the books to which standard authority belonged was not yet established. Fürst has even shown from the Talmud (*Kanon des Alten Testament*, s. 25) that this idea of the canon was not so definitely established at the time of our Lord but that the rabbis ventured to propose to exclude the book of Ezekiel from the canon, on account of its contradiction to the Pentateuch. Here, then, we have the idea of the canon. It is the limited collection to which, and to which only, authority as the inspired word of God appertains. The works which were in circulation, and to which this authority was denied, were called apocryphal, from a Greek word meaning "to withdraw," because they were withdrawn from use for public instruction. The third class, the pseudepigraphs, were so called because many of them bore names which were forged. In 2 Maccabees ii. 13 we read: "The same things are narrated in the writings and memoirs of Nehemiah, and how he collected the books about the kings and prophets, and those of David, and the letters of the kings in regard to offerings." The Pentateuch had been restored to authority and use by Ezra in 444 B. C. (Nehemiah viii.). Nehemiah added the "Nebiim," which are distinctly described in this passage ("kings and prophets"), and the Psalms, which are the nucleus of the Chetubim. The "letters" are those of the Persian kings, such as we find in the books of Ezra and Daniel. The subsequent omission of these letters from the canon bears witness to the soundness of the standard by which its formation was governed. The Massoretes were finally called upon to decide what books they would recognize as canonical, but in this, as in other things, they no doubt confined themselves to the establishment of the tradition which they had received. In the Christian Church the influence of the Septuagint secured the introduction of the Apocrypha with full canonical authority. Jerome translated all into the Latin Vulgate. They thus remain in authority in the Greek and Roman churches. Luther adopted the Hebrew canon, but translated the apocryphal books, setting them by themselves, and giving them a heading which recommended them for edification, though not for dogmatic definition. The English translators followed the same policy. Of late, however, the Apocrypha has been omitted from the popular editions of the English Bible, because the presence in the volume of works which formed a grade between it and ordinary works seemed to detract from the supreme and isolated position of Holy Scripture.

The Apocrypha and Pseudepigrapha are both quoted in the New Testament. See Jude 9 ("Translation of Moses"); 14 (Book of Enoch); 1 Corinthians ii. 9 (said by Origen to be from a lost apocryphal writing under the name of Elijah). Compare also James iv. 5, John vii. 38, and Luke xi. 40—citations which we cannot identify with passages in any known book.

It appears from the above—1, That the Canon was fixed only after long experience, and by the general consent of successive generations, who bore testimony, by their esteem and veneration for particular books, to their intrinsic authority and profitableness. 2, There is no broad and distinct line of demarcation between the Canon and the Apocrypha. If we allow ourselves to form estimates of the comparative value of various books, we shall find that the first book of Maccabees compares very favorably, as an edifying religious history, with the book of Esther, and that the book of Jesus the son of Sirach compares favorably with Ecclesiastes as a book of religious instruction.

VII. *The Order of the Books of the Old Testament.*—In the arrangement which has been adopted there appears to have been an effort to conform as far as possible to chronology, not only in regard to the historical, but also the legal and prophetic portions. The following are the principal divisions:

1. Law (in Hebrew, תורה, *Torah;* Gr. νόμος) or Pentateuch (Gr. πεντάτευχος), because it consisted of five parts.
2. Prophets (Heb. נביאים; Gr. Προφῆται).
3. Holy Writings or Hagiog′rapha (Gr. ἁγιόγραφα), called in Heb. כתובים, *Chetubim*—*i. e.*, the "writings," *par excellence*).

The Law included—1, Genesis, or "origin;" 2, Exodus, or the "going out;" 3, Leviticus, or the book relating to the Levites; 4, Numbers, so called because Moses was commanded to "take the sum of all the congregation of the children of Israel" (Numbers i. 2); 5, Deuteronomy (from the Gr. δεύτερος, "second," and νόμος, "law"), because it was the second laying down (or the repetition) of the Law.

The Prophets were divided into the Former or Earlier (*Priores*), including Joshua, Judges, First and Second Samuel, First and Second Kings; and Later (*Posteriores*), comprising the greater prophets, viz., Isaiah, Jeremiah, and Ezekiel, and the minor prophets, Hosea, Joel, Amos, etc.

The Holy Writings, or Hagiographa, included the Psalms, Proverbs, Job, The Song of Songs, Ruth, Lamentations, Ecclesiastes, Esther, Daniel, Ezra, Nehemiah, First and Second Chronicles. (For a more particular notice of the different books the reader is referred to their respective heads.)

VIII. *Versions of the Old Testament.*—As we saw above, the oldest manuscript of the Hebrew Scriptures which we possess dates from 1106 A. D., and presents the Massoretic text. If we wish to go back of this to reach something nearer to the original work of the authors, and to eliminate errors which may have crept in, we have one means of doing so—viz., the ancient translations which were made from the text at a remote date.

1. The first and most important of these is the Greek version, called *the Septuagint* (LXX.).—Passing over the fables of the Jews and early Christians in regard to this version (such as that it was made on a set occasion by seventy-two men (six from a tribe) chosen by the high priest, and sent to Egypt for the purpose—that they each separately translated the whole, but that, by virtue of divine inspiration, the seventy-two translations were identical), we state only the best-assured facts in regard to it. The Pentateuch was translated by Alexandrian (not Palestinian) Jews, but by how many is unknown. It was a result of the enlightened interest of the Ptolemies (Lagus and Philadelphus) in all literary and scientific progress. It was made in 285 B. C. The work thus begun was carried on by various persons at various times until all the canonical and apocryphal books were translated. Some originally written in Greek were added. The parts vary in fidelity to the original and in literary excellence. Job and Isaiah are so poorly translated that one must know Hebrew to see the sense of the Greek; Ecclesiastes is faithfully and correctly rendered. At this time Greek was the language of popular intercourse. The Jews of the time of Christ neglected the Hebrew, and generally relied on the Septuagint version. It is the form in which the Old Testament is quoted by Mark, Luke, Peter, and, for the most part, by Paul. Matthew, John, and Paul show acquaintance with the Hebrew, but they also use the Septuagint. Its influence was at this time para-

mount. It passed into the Christian Church as *the* authoritative form of the Old Testament. It soon began to be asserted, however, by the Jews, when the Septuagint was quoted in controversy by the Christians, that it was not a faithful rendering of the original. Hence the Jews abandoned it and returned to the Hebrew, and the most scholarly of the Christians attempted to acquire that language. Nevertheless, the Septuagint remains the authority of the Greek Church to this day. Other Greek versions, which need only be mentioned, are those of Aquila, Theodotion, and Symmachus.

2. *The Peshito* is a Syriac version, whose name signifies "simple" or "faithful," because it is a literal translation, not a paraphrase. It includes the New Testament. Its origin is obscure. It was in use in the time of Ephraim Syrus (378 A. D.).

3. *The Vulgate.*—Augustine says ("De Doctr. Chris." ii. 11), in regard to the early Latin versions, that "in the first days of the faith, if any one obtained a copy of the Greek Scriptures, and gave himself credit for any knowledge of the two languages, he ventured to translate." He recommends only one of the versions existing at the time—viz., the Itala. This is now lost, but seems to have been made from the Septuagint. Jerome (430 A. D.) undertook to learn Hebrew, in order to make a new translation from the original. History repeats itself with regard to all new translations of the Bible. This one was made avowedly in order to meet the wants of the common people, and it was called the "Vulgate" because written in the popular Latin. It was met by the most violent opposition, by all the arguments of tradition and prescription, and by all the considerations of policy and expediency, which suggest themselves in such a case. It was finally adopted, and now it has itself become sacred in the Latin Church. The text of the Vulgate became so corrupt by repeated copyings that, on the invention of printing, the true text seemed lost in a chaos of variants. An attempt to revise it resulted in an arbitrary decree of Sixtus V. (1598), deciding what it should be, and this text is now the "received text" in the Roman Church. A text having critical and scientific authority is still a desideratum.

B. *The New Testament.*—With the advent of our Lord the fountain of divine revelation once more began to flow. Mankind once more received an original and creative revelation, not whimsical traditions or weary reflections on the record of past thought and life. The Greek language, which, as we saw above, was at this time the medium of popular intercourse, became the vehicle of the new revelation. The Gospel of Matthew was probably originally written in Aramaic, but the remainder of the New Testament was certainly Greek from the very hands of the authors.

I. *History of the Greek Text.*—The original handiwork of the writers soon perished. We have no record or tradition of the original manuscripts, and no tradition to bear witness to any care for them. Copies were made from them, and by the middle of the second century the interest in them had become so great as to lead to extensive multiplication of copies. The oldest manuscripts which we possess date from the fourth century. (See article on the Codices of the New Testament.) From that time on, the number of manuscripts which we possess increases as we come down, but as the copies increase in number, so also do the variants. When printing was invented one of the first uses to which it was put was the printing of the Greek Testament. This art gave ground to hope that the text-copies might be multiplied for the future without the errors inseparable from manual copying. The first printed text was contained in the Complutensian Polyglot, prepared under the patronage of Cardinal Ximenes, at Alcalá (the ancient Complutum), in Spain, in 1514. It is not known what manuscript served as copy for this edition. Erasmus prepared a very faulty text, published at Bâle in 1516. These two editions from manuscripts taken at hazard, no doubt fresh ones, served as the basis of succeeding ones (Stephanus, Paris, 1546; Beza, 1565; Elzevir, 1641). The last of these (chiefly on account of its convenience of form and typographical beauty) became the "received text." The doubt between various authorities was settled in this case, as in so many others, not by thoroughly investigating the matter, but by giving arbitrary sanction to one. The Elzevir remained supreme until the time of Griesbach (1812). Here again we come to a department in which the credit for what has been done belongs entirely to German scholars. Griesbach, and after him Lachmann (1851), and at present Tischendorf, have prosecuted the tedious labor of comparing the variants and weighing the authorities. The effort cannot be defined as one to re-establish the text of the apostles, for that may be pronounced hopeless, but to recover the text to which the oldest and best manuscripts bear witness. The three scholars mentioned form a succession in which this aim has been prosecuted with intelligence and zeal and consistency. Some other editions, based on limited authorities and imperfect grasp of the task and its method, have only confused the labor (Bloomfield, Wordsworth, Alford).

The dialect of Greek in which the New Testament is written is what is called the Hellenistic. This was not a good dialect in point of grammatical accuracy, etc., and the influence of the Septuagint makes the New Testament even a sad specimen of it. This assertion was made in the sixteenth century, and it was generally declared that the New Testament was written in "bad Greek." Such an assertion was considered, in some quarters, derogatory to the Bible, and a controversy arose as to whether the New Testament was good Greek or bad. It ended in the general and very sensible conclusion that any dialect is "good" as soon as it contains a literature of any value. Nevertheless, the lack of grammatical accuracy, of precision in the use of words and particles, and of adherence to the rules of style, adds greatly to the difficulty of interpreting the New Testament.

The order of the books in the Greek differs from that in the English Version, in that the catholic Epistles follow the Acts.

II. *Respecting the Separate Books of the New Testament.*—The following account includes such facts as can be relied on, omitting questions which are involved in controversy.

The Gospels.—We possess a fourfold record of the life and teachings of our Lord. It strikes the attention of the reader at once, that the first three contain many passages which are almost identical. On the other hand, each differs from each in a manner equally remarkable. From the earliest times efforts have been made, without much success, to harmonize them into one consistent narrative. Within a century these phenomena have again been examined with great zeal. The question is raised: Do not these resemblances point to an interdependence between the synoptical Gospels? If so, which is the original? If one served as the original, how is it that the authors of the others, in using it, failed to transfer passages of high interest? In fact, the phenomena of identity and difference are so perplexing that these questions seem unsolvable. The prevailing opinion of scholars at the present time appears to be that the Gospel of Mark presents the nearest approach to the original of the synoptical Gospels; that Matthew was originally written in Aramaic, and translated with the assistance of Mark. That Luke is a subsequent compilation of the gospel-material is certain. It was written about the year 70. Before the historic interest in the Gospels arose, and before the movement towards a New Testament canon began, the Gospels no doubt exerted great influence on each other. Passages appear to have been copied from one into another, either inadvertently or at the pleasure or will of the copyist, and hence our science is baffled when it attempts to trace the intricacies of the movement.

The Gospel of John is clearly independent of the others in its material, scope, and purpose. It takes up the life of our Lord not so much pragmatically as philosophically and mystically—in its religious rather than its historical aspect. It has been vigorously attacked by the negative and rationalistic school of critics, and is held by many of them to be falsely attributed to John, but to date from the latter half of the second century. These opinions, however, rest chiefly on philosophical and historical dogmas which are set up as postulates; and one who refuses to admit the necessary *a priori* truth of these postulates, finds that the true critical grounds on which this opinion rests are meagre and insufficient. Conservative scholars of every grade admit the authenticity of the book, and even many who doubt if John were the author, admit its evangelical authority.

III. *The Canon.*—The first century of the Christian era produced a large number of literary works beyond those contained in the New Testament. The idea of the canon therefore came to be applied here once more (see above, *Canon of the Old Testament*). Such of these works as were of genuine apostolic origin, or were faithful representatives of Christian truth, must be separated and recognized apart from all others. Here once more the same phenomenon appeared as in the Old Testament. There was no distinct dividing line to be drawn. The division did not make or suggest itself. The whole body of works might be graded from the Gospel of Matthew down to the most gross and contemptible product of superstition, but the stages were gradual all the way. Different persons differed in their comparative estimate of two (*e. g.*, the Epistle of Barnabas and the Epistle of Jude, the Shepherd of Hermas and the Epistle to the Hebrews), though they agreed in the general range of estimate. Down to the middle of the second century the Christians used the Old Testament for their apologetics and their polemics. Moreover, the tradition was still so fresh that literary authority was not needed. We do not find in any writers earlier than Irenæus (202) references to

the New Testament writings as authoritative, or as inspired in any such sense as the Old Testament was believed to be inspired. From this time on, the chief interest of the Christian Church is rapidly transferred to the New Testament. The books are collected and studied and compared. Their respective authority is determined. The informal verdict of the Church accepted certain books and rejected others, but there were a number which were on the line or in doubt. These were the Epistle of Jude, the Second of Peter, the Second and Third of John, the Epistle to the Hebrews, the Shepherd of Hermas, and the Epistle of Barnabas. In the third century considerable disfavor to the book of Revelation was manifested in the Western Church, though earlier it had been very popular. To go into details of various authorities would lead us too far. Eusebius (340 A. D.) bears witness that the matter stood, in his time, in just about the position above described. Not only the above-mentioned doubtful books, but others also which had become familiar and gained a footing in popular affection, were retained, as the Apocrypha is still sometimes retained in our Bibles. The Synod of Laodicea (360) made the first official list (omitting the Apocalypse), and forbade the public reading of uncanonical books. Pope Innocent I. (405) fixed the canon by decree as it now stands.

IV. *Modern Translations of the Bible.*—1. *German.* In the fifteenth century numerous attempts were made to translate the Bible into German, but it remained for Luther to present the German people with a national version. His safety-imprisonment in the Wartburg gave him an opportunity. He there translated the New Testament (published in 1522). He then undertook, with others, the task of translating the Old Testament, and if he had no other claim to rank among the Fathers of the Christian Church, without regard to time or country, this work would establish it. He had all the enlightened zeal for the popularization of the Bible which animated Jerome (see under *Vulgate*), though he resembled him in nothing else. He had to make his own tools for the work, for he and his age inherited no science and little knowledge from the scholasticism of the Middle Ages. Heine's saying of him and his critics still remains true, that many a dwarf has sneered at the giant for not being able to see as far as himself after climbing upon his shoulders.

2. *French.* A French version by Le Fevre was published first in parts, then as a whole, at Antwerp in 1530. Another by Olivetan, improved by Calvin, was published in Switzerland in 1536. Neither, and no other, has ever won the position of a national version in France.

3. *English.* John Wickliffe (1384) made the first translation into the English language. He translated literally from the Vulgate. His work in this respect, as in others, was a pioneer of the Reformation. William Tyndale is the true father of the English national version, founded on the original languages. He conceived and undertook the work when he risked his life if a proof-sheet of it were found on him, and his work was the basis of all subsequent ones. He published the New Testament (from Erasmus's text—see above, *History of the Greek Text*) at Wittenberg in 1526. He and Coverdale commenced to translate the Old Testament at Antwerp, but they were discovered; Tyndale was captured, and burnt near Brussels in 1536. His merits, obscured by those who afterwards used his work when it was safe and popular to do so, have never met with the recognition they deserved. Coverdale finished the translation of the Old Testament in 1535. "Matthew's Bible" (1537) was approved by royal authority. It contained notes. A new edition (1539)—the "Great Bible"—and another in 1540 with Cranmer's preface—"Cranmer's Bible"—which omitted the notes, supplanted the former. The "Geneva Bible" followed in 1560, with Calvinistic notes. This won great popularity. Archbishop Parker went back to the "Great Bible," and appointed a commission (mostly bishops) to revise it. This produced the "Bishops' Bible" (1568). It also had explanatory notes. It was the "Authorized Version," and was read in the churches. It represented the Church party, while the Geneva Bible retained its place amongst the Puritans, and, in fact, with the popular majority. In 1610 the Roman Catholics also produced a representative version, translated strictly and solely from the Vulgate, and known as the "Douay Bible." In 1604, at the "Hampton Court Conference," it was proposed to supersede the two Protestant versions by a new one satisfactory to both parties. James I. appointed a commission of fifty-four learned men of all parties to do the work, and fixed the rules under which they were to act. The "Bishops' Bible" was to be made the basis, and only altered where necessary. This version was published in 1611, and it gradually displaced the others by virtue of its intrinsic merits. Under the Commonwealth the question of a new version was raised, but the committee of Parliament reported that the English version was "the best in the world." It certainly is one of the very best modern national versions. In 1870 the convocation of Canterbury proposed a revision, which is now in progress. W. G. Sumner.

Bib'lia Pau'perum [a Latin term signifying "the Bible of the poor"]. The work known to bibliographers under this name is one of the earliest "block books" printed before the use of movable type. The printing has been attributed to Laurens Koster of Haarlem, and was probably printed somewhere between 1410 and 1420. The work consists of a series of cuts illustrating the history of our Lord, as set forth in the New Testament and as predicted in the Old. The descriptive text is in the abbreviated Latin of the time. It has different titles, but Heineken gave it the name which he found attached to a copy which he described. It would seem ill adapted to the wants of the ignorant laity of that time, when few among them were equal to the task of deciphering the letter-press, and without this the engravings would have been meaningless. There seems good reason for the opinion of Jackson and Chatto (*History of Wood-engraving*), that the work was prepared to aid the mendicant friars of the time in their preaching—the text forming the topic for their sermons, and the pictures an excitement for their imaginations. (See Jackson and Chatto, and Humphrey's "History of Printing.")

Bib'lical Archæol'ogy, the science which treats of those things which illustrate the public and private life of the people and places mentioned in the Bible. Our knowledge of these subjects is obtained from the ancient literature both of the Jews and Gentiles, and from the monumental and other remains of ancient nations, such as inscriptions, ruins, coins, etc. The principal literary sources of archæological knowledge of this kind are the Bible, Josephus, Philo, the rabbinical and Arabian writers, Herodotus, and a great number of modern works of travel and literary research. The monumental sources of knowledge may not improperly include the interesting literary and other remains of ancient Egypt, the coins of the Phœnicians, of the Maccabees, and of the Syrians, the cuneiform inscriptions of Babylon, Assyria, and Persia, the Moabite Stone, and the remains of the ancient cities of Palestine and the neighboring countries. The archæology of the early Christian Church receives light also from the writings of the Fathers, from the later classical authors, and from the catacombs of Rome.

Among the immense numbers of treatises upon this subject we may mention Jahn's "Biblical Archæology" (1796–1805); Robinson's "Researches" (1856); Rheinwald's "Kirchliche Archaeologie" (1830); Kitto's "Cyclopædia" (1845–50); Michælis's "Mosaisches Recht" (1770; 2d ed. 1775); Saalschütz, "Das Mosaische Recht" (1846–48); Raumer's "Palestina" (1650).

Bibliog'raphy [from the Gr. βιβλίον, a "book," and γράφω, to "write"], that science which has for its object the knowledge and description of the literary productions of all ages and races. It is one of the most important auxiliaries in studying the history of science and art. Distinction is often made between pure and applied bibliography. The former considers the books by themselves, and aims merely to show what has been written, while the latter considers the books according to their character and contents. Bibliography is also useful as facilitating the buying and selling of books, while classified catalogues are often valuable to the student of special subjects. Almost every nation, as well as every science, has its own bibliography, and there are also separate lists of scarce and peculiar books, valuable to bibliomaniacs. The German books published since 1700 are given in the "Allgemeine Bücherlexicon" of Heinsius in alphabetical order (vol. i.–xvi., 1812–69). Ersch gave a list of those published since 1750 in his handbook of German literature (1845–49). In Leipsic a trade catalogue is published semi-annually, as well as Hinrich's "Verzeichniss" and the monthly "Allgemeine Bibliographie" of Brockhaus, comprising the most important works of every nation. The French literature has been catalogued since 1811 in the "Bibliographie de la France;" the Dutch in the "Nederlandsche Bibliographie" since 1854; the Belgian in the "Bibliographie de la Belgique" since 1838; the English in Longman's "History of New Books" since 1844; the Italian in the "Bibliographia italiana" since 1861; the Spanish in the "Boletin bibliografico español" since 1860. Danish, Swedish, Hebrew, Greek, and Polish catalogues are also annually published; while the Russian literature is given in the monthly magazine "Russkaja Bibliografija." The new books published in the U. S. are given in the "Literary Gazette" (Philadelphia). Trübner's "American and Oriental Literary Record" (London, monthly since 1865) gives a list of the most important works published in America, China, and India. (For the earlier literature of all nations see Ebert, "Allgemeines bibliographisches Lexicon," 2 vols., 1821–50.)

The oldest known work with this title is De Bure's "Bibliographie Instructive" (1763–68), but there were older and very valuable bibliographies, such, for example, as Conrad Gesner's "Bibliotheca Universalis" (1545). The works of Robert Watt, Dibdin, Horne, and Lowndes in Great Britain, of Peignot, Brunet, Bourquelot, Louandre, and Quérard in France, of Gamba in Italy, of Foppens in Belgium, of Nyerup and Kraft in Denmark, and of Hain and Panzer in Germany, are all of value to the student of general literature. The American works of Allibone, Duyckinck, Rich, and Bartlett also deserve mention.

REVISED BY C. W. GREENE.

Bib'liomancy [Gr. *βιβλία*, the "Bible," and *μαντεία*, "divination"], a mode of divination used in both ancient and modern times, by opening the Bible and observing the first passage which occurred, or by entering a church and taking note of the first words of the Bible heard after entering. It seems to have originated with the Jews, and to have been adopted from them by the Eastern Christians. The application either depended upon the sound of the words or upon the signification of the passage. Prayer and fasting were used as a preparation for consulting the divine oracles. Bibliomancy was prohibited, under pain of excommunication, by the Council of Vannes, 465 A. D. It continued, however, to prevail for many centuries thereafter. It came into use in the Roman Catholic Church in the choice of bishops, and prevailed in some places for centuries. Many eminent Protestant Christians have made use of this practice in times of perplexity, as Bunyan and John Wesley.

Biblioma'nia [from the Gr. *βιβλίον*, a "book," and *μανία*, "madness"], a taste for collecting books, not for their intrinsic value, but for their age or rarity, or on account of their publisher's, printer's, or binder's fame, or even, in some instances, for the mere caprice of fashion. For example, a few years since the works of some of the Elzevirs brought fabulous prices, while at present they are sold at a comparatively low rate. First editions usually bring high prices. The works of such ancient printers as Caxton must always be sold high on account of their age; so also the books of Aldus Manutius, joining great textual beauty and accuracy to extreme age; while the productions of much later date are often sought for their beauty alone; such, for instance, are the works of Foulis and Baskerville, printers of the last century.

Bibliothe'ca [from the Gr. *βιβλίον*, a "book," and *θήκη*, a "case"], the Latin word signifying library, a collection of books; often used, like our word "library," as a name for publications of various kinds, as "Bibliotheca Hispana," "Bibliotheca Sacra," etc.

Bice [Ger. *Beis*, possibly from a root cognate with the Sanscrit *bisha* or *bisa*, "poison"], the name of two blue and green pigments which are native carbonates of copper, and have been used by painters from very early times. The blue bice is sometimes called mountain blue and ongaro. The synonyms of green bice are Hungarian green, verdetto, malachite green, mountain green, etc.

Bi'ceps [from the Lat. *bis*, "twice" or "two," and *ca'put*, a "head"], ("double headed"), is the large round muscle lying upon the front of the arm. Above, it consists of two portions or heads—whence its name—one being attached to the coracoid process of the scapula, the other to the margin of the shallow socket of the head of the humerus. The former is the short, the latter the long, head of the biceps. They unite to form a fleshy belly, which terminates in a rounded tendon inserted into the tubercle of the radius. The action of the biceps is to bend the fore arm. Another biceps is found on the outer and posterior aspect of the thigh. Its long head arises from the tuberosity of the ischium; its short head, from the *linea aspera* of the thigh-bone. Its tendon is the outer hamstring.

Bicêtre,* the name of an old castle, a hospital, and a fort in the department of Seine, in the southern environs of Paris. The castle, which is very large, has been converted into a hospital for old men and for lunatics. Here the prisoners sentenced to death or to the galleys were formerly kept until the sentence was executed. But in 1837 this prison was transferred to La Roquette. Situated on an eminence, it commands a fine view of Paris and the Seine. Here are accommodations for about 900 male lunatics, who receive gentle treatment.

Bichat (MARIE FRANÇOIS XAVIER), an illustrious French anatomist and physiologist, born at Thoirette, in Jura, Nov. 11, 1771. In 1797 he began to lecture on anatomy, surgery, etc. in Paris. He published "Researches on Life and Death" (1800), and an excellent and profound work entitled "General Anatomy applied to Physiology and Medicine" (4 vols., 1801). He simplified anatomy and physiology by reducing the complex structures of the organs to the simple or elementary tissues, and he was the first who recognized the importance of the distinction between the organic functions and the animal or vital functions. Having impaired his health by close application, he died before the age of thirty-one, July 22, 1802.

*This name is said to be a corruption of *Winchester*. Its castle was founded in 1290 by John, bishop of Winchester.

Bickanir', a native state of India, under British protection, situated between lat. 27° 30′ and 29° 55′ N., and between lon. 72° 30′ and 75° 40′ E. Area, 17,750 square miles. The soil is poor, consisting almost entirely of deserts. The inhabitants are mostly Rajpoots. Pop. 539,520.

Bickanir, a fortified town, capital of the above state, is in an arid and desolate tract 240 miles W. S. W. of Delhi; lat. 28° N., lon. 73° 22′ E. It is surrounded by a battlemented wall three and a half miles in circuit, and has a citadel, several temples, and lofty buildings, but the streets are dirty and most of the houses mean. Pop. estimated at 60,000.

Bick'erstaff (ISAAC), an Irish dramatist, born about 1735, was in his early life an officer of marines. He produced several popular comedies and comic operas, among which are "The Maid of the Mill," "The Padlock," "Love in a Village" (1763), and "The Captive." Died after 1787. Steele's "Tatler" was published under the assumed name of Isaac Bickerstaff, which often occurs in the papers of that work.

Bick'ersteth (EDWARD), an English theologian, born in Westmoreland in 1786. He took orders in the Anglican Church, and was sent by the Missionary Society to Africa in 1816 to reorganize their mission stations. On his return he was chosen secretary to that society. He became rector of Watton, in Hertfordshire, in 1830, and was one of the founders of the Evangelical Alliance. Among his works, which are highly esteemed, are a "Help to the Study of the Scriptures" (1814), "The Christian Student," "A Treatise on Baptism," and "The Promised Glory of the Church of Christ." Died in 1850. His collected works were published in 16 vols., 1853. (See T. R. BIRKS, "Memoir of the Rev. E. Bickersteth," 2 vols., 1851.)

Bickersteth (EDWARD HENRY), a poet and clergyman of the Church of England, son of the above, was born Jan. 25, 1825, and was educated at Cambridge. He has published, besides numerous other works, "Poems" (1849), "The Rock of Ages" (1859), and "Yesterday, To-day, and For Ever" (1866), which has had a great success. His poetry, chiefly upon sacred themes, has many admirers.

Bick'more (ALBERT SMITH), PH. D., naturalist, was born in St. George's, Me., Mar. 1, 1839, and graduated at Dartmouth in 1860. He studied under Agassiz at Cambridge, and in 1865 sailed for the Dutch East Indies for the purpose of collecting shells. He also travelled in China, Japan, Manchooria, Siberia, and Russia. He became in 1870 professor of natural history in Madison University, and has devoted much time to the Museum of Natural History founded by him at the Central Park, N. Y. He has published "Travels in the East Indian Archipelago" (1869).

Bidasso'a, a small river forming part of the boundary between France and Spain. It rises in Spain, and enters the Bay of Biscay at Fuentarabia. On the Isle of Pheasants, in this river, the treaty of the Pyrenees was concluded in 1659. In Aug., 1813, Wellington defeated the French marshal Soult at San Marcial on the Bidassoa.

Bid'deford, a city of York co., Me., situated on the Saco River, 9 miles from its mouth, on the Boston and Maine and the Portsmouth Saco and Portland R. Rs., 15 miles S. W. of Portland. The city limits measure 12 by 4 miles. It was named from the city of Bideford, England. The first settlement was made at the "Pool" (at the mouth of the river) by Richard Vines, in 1616–17. It was settled by a patent to John Oldham and Vines in 1630. York county originally embraced all of the province of Maine, and while settlements were made at a very early date along the seacoast (none earlier than this) to the Piscataqua River, Bideford or Biddeford for a long series of years was the chief settlement and centre. Here are inexhaustible ledges of granite, which ranks among the best in the world, and is largely exported. The business of the place is manufacturing; among the chief corporations are the Pepperell (capital $1,000,000, three extensive mills, 75,000 spindles, average monthly product 1,200,000 yards of cotton cloth, employs 1600 hands); Laconia (capital $1,200,000, four extensive mills, one in process of erection, about 80,000 spindles, cotton cloth, monthly pay over $20,000); Water-Power Machine Company, largest in Maine or New Hampshire (cotton and woollen machinery, capital $300,000, employs 500 men); Harding Machine Company (capital $75,000); Gas Company (capital $71,600); Paper Collar

Company (capital $15,000). A large amount of lumber is also manufactured; valuation, $5,682,402. Assessment, $25 per $1000; annual tax-list, about $83,000; debt, $142,589.76; sinking fund amounts to $20,000. It has two national banks. Biddeford has eight churches and one chapel, and is noted for its church architecture. The average seating capacity, 800; average cost, $20,000. It has one daily and two weekly papers. Pop. in 1850, 6095; in 1860, 9349; in 1870, 10,282.

J. E. Buller, Ed. "Union and Journal."

Bid'dle (Charles John), a son of Nicholas Biddle, was born in Philadelphia in 1819, and graduated at Princeton in 1837. He became a lawyer, served with distinction in the Mexican war, winning a major's brevet, and served also in the late civil war; became editor of the "Age," a leading Democratic journal of Philadelphia, which he conducted with great ability. He published a masterly vindication of Washington's conduct with regard to the execution of André. Died Sept., 1873.

Biddle (Clement), an American officer and merchant, born in Philadelphia May 10, 1740. He fought with the rank of colonel at the battles of Trenton, Princeton, Brandywine, and Monmouth, and quitted the army in 1780. He was a friend and correspondent of Gen. Washington, who appointed him marshal of Pennsylvania. Died July 14, 1814.

Biddle (Clement Cornell), a lawyer, a son of the preceding, was born in Philadelphia in 1784. He served as colonel in the war against the British, 1812–15, and afterwards applied himself to political economy. He produced in 1821 a translation of J. B. Say's "Treatise on Political Economy," with notes. Died in 1855.

Biddle (James), a naval officer, born in Philadelphia Feb. 28, 1783, educated at the University of Pennsylvania, and entered the navy in 1800. He served against Tripoli, where he was a prisoner nineteen months. In the war of 1812 he served with distinction in several engagements, and while commanding the Hornet captured the brig Penguin, receiving a wound in the action (Mar. 23, 1814). For his services he received a gold medal from Congress, besides other honors. He became a captain in 1815. He was afterwards commissioner to Turkey, China, etc., and held other important positions. Died Oct. 1, 1848.

Biddle (John), the founder of English Unitarianism, was born at Wotton-under-Edge, in Gloucestershire, in 1615, and graduated at Oxford. He was prosecuted about 1645 for the expression of heterodox opinions respecting the personality of the Holy Spirit, and after a formal trial by Parliament was condemned to imprisonment for five years. While in prison he published in 1648 a "Confession of Faith concerning the Holy Trinity." He was liberated about 1650, after the death of Charles I., and gathered a congregation of his fellow-believers. He was subsequently persecuted and imprisoned twice during the Commonwealth. It is stated that Cromwell once banished him in order to save his life. He died in prison Sept. 22, 1662. (See J. Toulmin, "Life of John Biddle," 1815; John Farrington, "Vita J. Bidelli," 1682.)

Biddle (Nicholas), a American naval officer, born in Philadelphia Sept. 10, 1750. He entered the royal navy in 1770, and once served in a ship of which the famous Nelson was mate. He obtained the rank of captain in the U. S. navy in 1776, and took several prizes from the British. Early in 1777 he took command of the Randolph, a frigate, which encountered the Yarmouth, a 64-gun ship, Mar. 7, 1778. During the action that ensued the magazine of the Randolph exploded and killed Captain Biddle, with nearly all his crew.

Biddle (Nicholas), LL.D., an American financier, a nephew of the preceding, was born in Philadelphia Jan. 8, 1786. He was a son of Charles Biddle, who was vice-president of Pennsylvania in 1786–87. He graduated at Princeton in 1801, was elected to the legislature of Pennsylvania in 1810, and appointed a director of the U. S. Bank by President Monroe in 1819. In 1823 he became president of that bank, the affairs of which he managed with great ability and success for many years, so that it supplied the country with a sound and uniform currency. The bill to recharter the bank having been vetoed by President Jackson in 1832, the bank was closed in 1836 by the limitation of its charter. He was soon elected president of a new State bank, called "The United States Bank," which was chartered by the legislature of Pennsylvania. This bank became insolvent in the financial crisis of 1841. He was president of the trustees of the fund ($2,000,000) which Stephen Girard left to found a college for orphans. "To his exertions alone," says Judge R. T. Conrad, "the country owes one of the most beautiful structures of modern times, the Girard College. He proposed the present plan, and in the midst of wild political excitement and opposition persisted firmly, and secured a building which every citizen now not only approves, but applauds." Died Feb. 27, 1844. (See a "Memoir of N. Biddle," by R. T. Conrad, in the "National Portrait Gallery," vol. iv., 1839.)

Biddle (Richard), a lawyer and writer, a brother of the preceding, was born in Philadelphia Mar. 25, 1796. He practised law at Pittsburg, was a member of Congress (1837–41), and wrote a "Memoir of Sebastian Cabot, with a Review of the History of Maritime Discovery" (1831). Died July 7, 1847.

Bid'eford, a seaport-town of England, in Devonshire, on the river Torridge, 1½ miles from its entrance into the estuary of the Taw, 30 miles N. W. of Exeter. It has a stone bridge of twenty-four arches, about 680 feet long, a town-hall, a hospital, and manufactures of ropes, sails, earthenware, and leather. Among the articles of export are linen and woollen goods, iron, sails, and naval stores. Vessels of 500 tons can come up to the centre of the town. Pop. in 1871, 6953.

Bidsch'ow, or **Bydcow,** New, a town of Bohemia, is 41 miles E. N. E. of Prague. Pop. in 1869, 5957.

Bid'well, a township of Butte co., Cal. Pop. 337.

Bidwell (Daniel D.), an American general of volunteers, born at Black Rock, now part of Buffalo, N. Y., Aug. 12, 1816. He held various important local offices, and was actively identified with the militia organizations of the city for many years. On the outbreak of the civil war he enlisted as a private soldier, and was promoted to be captain in the Sixty-fifth, and subsequently colonel of the Forty-ninth, New York volunteers. He was engaged in the various actions of the Peninsula campaign, in the battles of South Mountain and Antietam, Fredericksburg, and Chancellorsville, and before Richmond and Petersburg, being most of the time in command of a brigade. In July, 1864, he was commissioned a brigadier-general of volunteers, and assigned to a command under Gen. Sheridan in the Shenandoah Valley, participating in the engagements of that campaign, including the battle of Cedar Creek, Oct. 19, 1864, where he was mortally wounded while gallantly leading his brigade.

G. C. Simmons, *Clerk Board of Eng'rs.*

Biel (Gabriel), "the last of the Schoolmen," was born at Spire, in Germany, after 1442, was professor at Tübingen from the establishment of the university there in 1477, and died in 1495. Although a devout and earnest Catholic, he sided with the Council of Bâle against the pope, and deplored the corruptions and abuses of his time. He is worthy of note as having rejected the doctrine of sensible and intelligible species so widely prevalent among the Schoolmen.

Bie'dermann (Alois Emanuel), a German rationalistic theologian, was born Mar. 2, 1819. He wrote "Die Freie Theologie" (1844), founded the "Kirche der Gegenwart," 1845, and published in 1869 his "Christliche Dogmatik," one of the most important emanations of recent rationalistic theology.

Biedermann (Friedrich Karl), a German journalist and author, born in Leipsic in 1812. He became professor of philosophy and public law at that city, and took part in the political movement of 1848. He has written numerous philosophical and historical works, and conducted various liberal journals.

Bièfve (Édouard de), a Flemish historical painter, born in 1808, studied in Paris with Von Paelink, and lives at Brussels. His chief work is "Compromise of the Burgundian Nobles."

Biela, von (Wilhelm), Baron, a German astronomer, born at Rosla, in Prussia, in 1782, discovered in 1826 the comet noticed below. Died in 1856.

Biela's Comet is a comet remarkable for its short period, of about six and a half years, and for the near approach of its orbit to that of the earth. In 1846 and in 1852 it appeared as if broken into two distinct comets. It has not been observed since 1852, and astronomers are unable to explain its apparent disappearance from the solar system. A shower of shooting stars which occurred Nov. 27, 1872, as the earth was crossing the orbit of this comet, is supposed by astronomers to have been derived from the débris of the lost body.

Bie'lefeld, a walled town of Prussia, in Westphalia, is finely situated on the Minden and Cologne Railway, 20 miles S. W. of Minden. It has a large linen trade, and manufactures of woollen stuffs, leather, soap, and meerschaum pipes. Here is the old castle of Sparrenberg, now used as a prison. Pop. in 1871, 21,803.

Bielef', an old town of Russia, in the government of Toola, and on the river Oka, 70 miles S. W. of Toola. It has a large trade, and manufactures of hardware, leather, and soap. Pop. 8123.

Bielgorai, a town of Russian Poland, in the government of Lublin. Pop. 6168.

Bielgorod, a Russian town, in the government of Koorsk, on the Donitz, 80 miles S. of Koursk. Pop. 8190.

Bie'litz, a town of Austrian Silesia, on the river Biala, 48 miles S. W. of Cracow, with which it is connected by rail. It has an active trade in woollen cloth and cassimeres. Here is a castle of Prince Sulkowsky. A bridge across the river connects Bielitz with Bialia, in Galicia. Pop. in 1869, 10,721.

Biel'la, a town of Italy, in the province of Novara, is on the Cervo, 89 miles by rail N. E. of Turin. It has manufactures of paper, hats, and woollen goods. Pop. 8362.

Bielo'pol, a town of Russia, in the government of Kharkof, on the Vira, 118 miles N. W. of Kharkof. It is on the railway from Orel to Kiev. It has a considerable trade and several distilleries. Pop. 12,178.

Bielzy, a town of Russia, in the province of Bessarabia, 145 miles N. W. of Odessa, has several factories. An annual fair is held here. Pop. in 1867, 6070.

Bienne [Ger. *Biel*], a town of Switzerland, in the canton of Berne, at the N. E. extremity of the Lake of Bienne, 13 miles W. S. W. of Soleure. It is beautifully situated at the foot of the Jura, is enclosed by old walls, and is connected by railways with Berne and Lausanne. Here are manufactures of watches, cotton goods, etc. Many Roman coins have been found at Bienne, which is a place of great antiquity. Pop. in 1870, 8113.

Bienne, Lake of, is in the Swiss canton of Berne. It is 10 miles long, 3 miles wide, and 250 feet deep, is near the base of the Jura Mountains, and has an elevation of 1419 feet above the sea. The Thiele passes through it before joining the Aar. It encloses the island of St. Pierre, which was the residence of J. J. Rousseau in 1765. In digging peat, which is extensively procured from its marshy border, the remains of a pre-historic village of lake-dwellings has been found on the S. E. side of the lake.

Biennial Plants, a term including all plants which live longer than annuals, and not so long as perennials. They grow the first season without flowering, and produce flowers in the second season, at the end of which they die. Such are the turnip, parsnip, beet, and many other plants which are cultivated. Many biennials, if sown early in the spring, will flower in the summer or autumn of that year, and become annuals. In botanical books, biennial plants are often designated by the symbol of the planet Mars, ♂.

Bien'ville, a parish in the N. W. of Louisiana. Area, 680 square miles. It is bounded on the W. by Lake Bistineau (navigable by steamers), and drained by Saline Bayou and other streams. The soil produces cotton and maize. Capital, Sparta. Pop. 10,636.

Bienville, de (Jean Baptiste Lemoine), a French officer and pioneer, born in Montreal Feb. 23, 1680, was a brother of Lemoine d'Iberville. He accompanied the latter in an expedition to the mouth of the Mississippi in 1699, and was three times appointed colonial governor of Louisiana. He founded New Orleans in 1718. Died in France in 1768.

Bier'stadt (Albert), a German painter, born at Düsseldorf in 1829, was brought to the U. S. by his parents in 1831. He studied at Düsseldorf, visited Rome, and returned to the U. S. in 1857. He took part in General Lander's expedition to the Rocky Mountains in 1858. Among his works are a magnificent "View of the Rocky Mountains—Lander's Peak" (1863), "A Storm in the Rocky Mountains," and "The Domes of the Yosemite."

Bi'ga (or **Bi'gæ,** a plural form with the same signification), a term applied by the ancient Romans to a vehicle drawn by two horses abreast; a two-horse chariot used in processions and games. Like the Greek war-chariot, it had two wheels, was low and open behind, and higher and closed in front. Figures of the bigæ are often found upon ancient coins.

Big'amy [Lat. *bigamia*], the offence of contracting a second marriage while a former marriage is still subsisting. The more proper term for this offence is polygamy. It is governed by statute. It is usual to provide that if a husband or wife shall remain absent for a specified number of years (seven) without being heard from or being known to be living, and the other party shall marry again, no crime will be committed, though the absent party be alive. The same rule extends to the case of a party divorced from the bonds of matrimony. In some of the States a person divorced for his or her own adultery cannot marry again during the life of the other party. A violation of this rule is not a case of bigamy, but rather a breach of the prohibitory statute. A sentence to imprisonment for life is in New York a dissolution of a marriage, so that the parties may lawfully marry other persons. The offence consists in the act of marrying; so that if the parties marry in one State and cohabit in another, the crime is committed solely in the place of the marriage, and can only be prosecuted there. In a prosecution for bigamy an *actual* marriage must be established. Evidence of reputation, or even of cohabitation, will not suffice. It does not follow that proof of a ceremonial marriage is necessary. The law of the States differs upon that point, some holding that a case of bigamy may be established by proof of consent before witnesses, without any ceremony. Such is the law in New York.

Big Beaver, a township of Beaver co., Pa. P. 1559.

Big Beaver, a township of Lawrence co., Pa. P. 1406.

Big Bethel, the name given to the action of June 10, 1861. Gen. Butler, who had taken possession of and fortified Newport News a few days previously, found the Confederates under Gen. Magruder in possession of all the commanding points in his front; he accordingly directed a reconnoissance in force to be made, with the object of surprising and capturing the position called Little Bethel; and to make the expedition more certain of success two regiments, Duryea's Zouaves and the Third New York under Col. Townsend, were to start about midnight of the 9th, and gain the rear of the position to prevent retreat, while a battalion of Vermont troops, Col. Phelps, and a New York regiment, Col. Bendix, were to be ready to attack in front by daybreak of the 10th. Though various precautions had been taken against mistake, the commands of Cols. Bendix and Townsend approaching each other near daybreak, Col. Bendix's command opened fire on the Third New York, killing two men and wounding a considerable number, and throwing the whole command into confusion before the mistake was discovered. The Confederates, being thus notified, retreated to Big Bethel, where they hastily threw up breastworks behind a deep creek. Gen. Pierce, who was in command of the Federal expedition, after being reinforced, and finding Little Bethel deserted, advanced towards Big Bethel, a few miles to the N., where he found a Confederate force, estimated at 1800, under the command of Col. J. B. Magruder, a graduate of West Point, protected by the hastily constructed earthworks. Gen. Pierce ordered an attack, which was continued nearly four hours, during which time the Federal troops were exposed to a deadly fire, while the Confederates were almost entirely protected. Later in the day a more general assault was made, led by Major Theodore Winthrop, in which he was instantly killed while encouraging his men to the assault. Gen. Pierce finally ordered a retreat, which was effected in good order, the Confederates following at some distance with cavalry. Lieut. John T. Greble of the Second U. S. Artillery was killed while covering the defeated troops. The Confederates, fearing reinforcements of the Federals from Fortress Monroe, fell back that night to Yorktown. The Federal loss in killed and wounded was about 100 men; the Confederate loss was said to be only 1 killed and 7 wounded.

Big Black, a river of Mississippi, rises in Choctaw co., flows south-westward, and enters the Mississippi at Grand Gulf. Length, about 200 miles. It is navigable for steamboats for 50 miles. General Grant's army, moving to the siege of Vicksburg, defeated the Confederates on the Big Black, nearly 15 miles E. of that town, May 12, 1863. The morning after the battle of Champion Hills, May 17, 1863, found the Confederate forces under Pemberton strongly posted on both banks of the Big Black River. The works were successfully assaulted, and all the troops on the E. bank, with seventeen pieces of artillery, captured, the remainder of Pemberton's army retreating to the fortifications of Vicksburg.

Big Bone Lick, a salt "lick" or spring in Boone co., Ky. It takes its name from the fossil bones found here of the mastodon and other animals, which are thought to have resorted to this place to "lick" the salt earth, and to have perished in the marshy soil.

Big Bottom, a township of Independence co., Ark. Pop. 938.

Big Creek, a township of Limestone co., Ala. P. 1140.

Big Creek, a township of Craighead co., Ark. P. 487.

Big Creek, a township of Fulton co., Ark. Pop. 535.

Big Creek, a township of Hot Springs co., Ark. Pop. 158.

Big Creek, a township of Phillips co., Ark. Pop. 1699.

Big Creek, a township of Sebastian co., Ark. P. 1062.

Big Creek, a township of Sharpe co., Ark. Pop. 414.

Big Creek, a township of White co., Ind. Pop. 584.

Big Creek, a township of Black Hawk co., Ia. Pop. 1394.

Big Creek, a township of Ellis co., Kan. Pop. 6.

Big Creek, a township of Neosho co., Kan. P. 1077.

Big Creek, a township of Cass co., Mo. Pop. 1097.

Big Creek, a township of Henry co., Mo. Pop. 1390.

Big Creek, a township of Taney co., Mo. Pop. 267.

Big Creek, a township of McDowell co., West Va. Pop. 688.

Bigelow (Erastus Brigham), LL.D., an eminent inventor, born in West Boylston, Mass., April, 1814. While a mere boy, he invented a loom for suspender-weaving and other machines, and wrote a book on short-hand writing. He subsequently invented looms for counterpanes (1838–40), another for coach-lace, and in 1839 brought out his well-known carpet loom. He is one of the principal manufacturers of Clinton, Mass. He published "The Tariff Question" (1862) and other works.

Bigelow (George Tyler), LL.D., was born at Watertown, Mass., Oct. 6, 1810, and graduated at Harvard in 1829. He was a State senator of Massachusetts (1847–48), a justice of the State supreme court (1850–61), and chief-justice (1861–68).

Bigelow (Jacob), M. D., LL.D., an eminent American physician and botanist, born in Sudbury, Mass., in 1787, graduated at Harvard in 1806. He became professor of materia medica and clinic medicine at Harvard, and president of the Massachusetts Medical Society. He practised medicine in Boston many years, founded the Mount Auburn Cemetery, and laid out the grounds with much taste. Among his works are "American Medical Botany" (3 vols. 8vo, 1817–21), an able "Discourse on Self-limited Diseases" (1835), "Nature in Disease" (1854), and "History of Mount Auburn" (1860).

Bigelow (John), an author and diplomatist, born in Malden, N. Y., Nov. 25, 1817, graduated at Union College in 1835. He contributed numerous articles to the "Democratic Review," and in 1850 became assistant editor of William C. Bryant's journal, the "New York Evening Post." Having visited Jamaica in that year, he published "Jamaica in 1850, or the Effects of Sixteen Years of Freedom on a Slave Colony." He was appointed American consul at Paris in 1861, and minister plenipotentiary at that court in April, 1865. He resigned this position in 1866. He published in Paris "Les États Unis d'Amérique en 1863," and in 1871 a work on the French monarchy. He has also edited the "Autobiography of Franklin" (1868).

Bigelow (Timothy), born in Worcester, Mass., Aug. 12, 1739, was a blacksmith who became a member of the provincial Congress of 1774–75, entered the Revolutionary army as captain of minute-men in 1775, was captured at Quebec, became a colonel of Massachusetts troops, serving at Stillwater, Valley Forge, etc. Died Mar. 31, 1790.

Bigelow (Timothy), a son of Col. Timothy Bigelow, was born in Worcester, Mass., April 30, 1767, graduated at Harvard in 1786, practised law in Groton and Boston, Mass., where he long stood at the head of his profession, performing an immense amount of legal work. He was also long a prominent Federalist leader. Died May 18, 1821. His daughter became the wife of Abbott Lawrence.

Big Flat, a township of Searcy co., Ark. Pop. 472.

Big Flats, a post-township of Chemung co., N. Y. Pop. 1902.

Big Flats, a post-township of Adams co., Wis. P. 89.

Big Fork, a township of Montgomery co., Ark. P. 206.

Big Fork, a post-township of Polk co., Ark. P. 274.

Big'ger, a township of Jennings co., Ind. Pop. 945.

Big Grove, a township of Kendall co., Ill. Pop. 1726.

Big Grove, a township of Benton co., Ia. Pop. 856.

Big Grove, a township of Johnson co., Ia. Pop. 1358.

Biggs'ville, a post-village of Henderson co., Ill. Pop. 353.

Big Horn, or **Rocky Mountain Sheep** (*Ovis montana,* Cuvier), is regarded by Cuvier as identical with the argali of the Old World. It also resembles the wild sheep (*mouflon*) of the Mediterranean Islands and of the Atlas Mountains. It is very large and extremely wild, and is found in the western and north-western mountains of North America. Its flesh is highly prized, but its hair can hardly be called wool.

Big Horn, a county in the S. E. part of Montana. Area, 25,862 square miles. It is drained by the Yellowstone and its branches. Lignite and other minerals are found here. Pop. 38.

Big Horn, a river of the U. S., is the largest affluent of the Yellowstone. It rises in Wyoming Territory, among the Wind River Mountains, and, flowing in a generally northward direction, crosses the southern boundary of Montana, and enters the Yellowstone at Big Horn City, in Montana. Entire length, estimated at 450 or 500 miles. The upper part or head-stream of it is called Wind River.

Big Island, a township of Marion co., O. Pop. 940.

Big Ivey, a township of Buncombe co., N. C. Pop. 1270.

Big Lake, a township of Mississippi co., Ark. Pop. 211.

Big Lake, a township of Sherburne co., Minn. Pop. 57.

Big'ler (John), born in Cumberland co., Pa., Jan. 8, 1804, was a brother of Gov. William Bigler of Pennsylvania, became a printer, a journalist, and subsequently a lawyer. He removed to Illinois in 1846, and to California in 1849, where he was a prominent Democratic politician, and was known as "Honest John Bigler." He was governor of California (1852–56). Died Nov. 30, 1871.

Bigler (William), governor of Pennsylvania, born Dec., 1813, was of German descent. He received a common-school education, and entered a printing-office. He was connected with the press many years, and afterwards engaged in mercantile pursuits. He was elected by the Democratic party speaker of the State senate 1843, governor 1851 and 1854, and U. S. Senator 1855 and 1858.

Big Level, a township of Greenbrier co., West Va. Pop. 1589.

Big Lick, a post-township of Stanley co., N. C. Pop. 1354.

Big Lick, a township of Hancock co., O. Pop. 1179.

Big Lick, a post-village and township of Roanoke co., Va., on the Virginia and Tennessee R. R., 54 miles W. S. W. of Lynchburg. Pop. of the township, 2592.

Big'low (William), an American teacher and poet, born at Natick, Mass., Sept. 22, 1773. He graduated at Harvard in 1794, and became principal of the Latin School of Boston, for which he prepared several text-books. He contributed to different periodicals, and wrote poems, among which is "The Cheerful Parson." Died Jan. 19, 1844.

Big Mound, a township of Wayne co., Ill. Pop. 1168.

Bignon (Louis Pierre Édouard), a French statesman and historian, born at La Meilleraye Jan. 3, 1771. He was elected to the Chamber of Deputies in 1817, and became a peer of France in 1837. He wrote a "History of France from the 18th Brumaire to the Peace of Tilsit" (7 vols., 1827–38), and other works. Napoleon I. bequeathed him 100,000 francs. Died Jan. 5, 1841.

Bigno'nia [named by Tournefort in honor of the Abbé Bignon, the librarian of Louis XIV.], a genus of plants, the type of the natural order Bignoniaceæ, natives of the tropical and sub-tropical parts of America. Many of them are climbing plants, with compound leaves terminating in a tendril, and handsome trumpet-shaped or bell-shaped flowers, which are 5-lobed, or rather 2-lipped. The *Bignonias* are probably the handsomest twining plants known." The trumpet-creeper or trumpet-flower of the U. S. is the *Bignonia radicans* (or *Tecoma radicans*). It has a large and showy orange and scarlet corolla, funnel-shaped and 5-lobed, with four stamens.

Bignonia'ceæ (so called from *Bignonia,* the principal genus), a natural order of exogenous plants, natives of the U. S. and of tropical climates. They are mostly trees or shrubs, with compound leaves and showy flowers. The corolla is monopetalous, tubular, or campanulate, and irregular; the stamens are five, or four with the rudiment of a fifth; the fruit is a capsule or a drupe. The order comprises about 500 species or more, including those which some botanists have placed in the separate orders of Crescentiaceæ and Pedaliaceæ. Some of them are noble trees which are valuable for timber, as the *Bignonia Leucoxylon* of Jamaica, and the ipe-una of Brazil, which is said to be the hardest timber of that empire. The red coloring-matter called chica is obtained from the leaves of the *Bignonia Chica,* which grows near the Orinoco River. Among the North American species of this order is the *Catalpa Bignonioides,* a well-known ornamental tree of the U. S., which has simple cordate leaves.

Big North Fork, a township of Fulton co., Ark. Pop. 473.

Big Oak Flat, a post-township of Tuolumne co., Cal. Pop. 1249.

Big Piney, a township of Pulaski co., Mo. Pop. 541.

Big Prairie, a post-township of Newaygo co., Mich. Pop. 403.

Big Prairie, a township of New Madrid co., Mo. Pop. 1089.

Big Rapids, a township of Clare co., Mich. Pop. 132.

Big Rapids, a city, capital of Mecosta co., Mich., on

the Muskegon River and Grand Rapids and Indiana R. R., also the terminus of the Big Rapids division of the Chicago and Michigan Lake Shore R. R., 56 miles N. of Grand Rapids and 55 miles N. of Muskegon. It has two banks, one national and one under State law, two newspapers, Holly Waterworks, extensive water-power, the river being dammed in two places, a heavy lumber trade, and large manufacturing interests. Pop. 1237; of the township, 1702.

E. O. Rose, Ed. "Magnet."

Big River, a township of Mendocino co., Cal. Pop. 1911.

Big River, a township of Jefferson co., Mo. Pop. 2033.

Big River, a township of St. Francois co., Mo. Pop. 436.

Big Rock, a township of Pulaski co., Ark. Pop. 3990.

Big Rock, a post-township of Kane co., Ill. Pop. 829.

Big Sandy, a township of Jefferson co., Neb. Pop. 693.

Big Sandy, a township of Kanawha co., West Va. Pop. 876.

Big Sandy River, an affluent of the Ohio, is the boundary between West Virginia and Kentucky. It is navigable for more than 100 miles for steamboats. Its main stream, or Tug Fork, rises in the S. of West Virginia. Its West Fork flows through Eastern Kentucky. Its valley abounds in coal, timber, and mineral wealth.

Big Spring, a township of Fulton co., Ark. Pop. 228.

Big Spring, a post-township of Shelby co., Ill. Pop. 1755.

Big Spring, a post-village of Breckenridge co., Ky., lying partly in Hardin and Meade cos. A large spring rises here which sinks into the ground, and disappears after flowing a few hundred feet. Pop. 134.

Big Spring, a township of Seneca co., O. Pop. 2084.

Big Stone, a county of Minnesota, bordering on Dakota, from which it is partly separated by Big Stone Lake. Area, 325 square miles. It is intersected by the Minnesota River. Pop. 24.

Big Valley, a township of Siskiyou co., Cal. P. 246.

Big Vermilion River. See Vermilion River.

Big Wood River. See Boisée River.

Bihar, a county of Hungary, is bounded on the N. by the county of Szabolcs, on the E. by the county of Middle Szolnok and Transylvania, on the S. by Arad, and on the W. by Bekes. Area, 4279 square miles. The eastern part is mountainous, while the western is a plain, consisting alternately of swamps, sandy plains, and fertile ground, traversed by numerous small rivers. All kinds of grain abound, especially wheat of an excellent quality. Wine and tobacco are also raised in great quantities. Pop. in 1869, 555,337. Chief town, Debreczin.

Biisk, a town of Siberia, in the government of Tomsk, 300 miles S. of Tomsk. Pop. in 1867, 5952.

Bij'anagur', Bijnagur, or **Bijanaghur,** a decayed but once famous city of Southern India, in the presidency of Madras, on the Tumbuddra, about 40 miles N. W. of Bellary. It stands in a plain containing numerous granite rocks, many of which have been rudely sculptured into various forms. It was founded in 1336, and was the capital of a powerful Hindoo kingdom. It was sacked and ruined by the Mohammedans of the Deccan in 1564, but still presents traces of its former grandeur in a number of granite temples and palaces.

Bij'nee, a rajahship of British India, in Bengal, having on the S. the Garrows Mountains, and crossed by the river Bramapootra. It is level and fertile, producing rice, wheat, sugar, and betel. The people are divided between the Bhakat worshippers of Krishna, and the Gorami, who eat meat and drink liquors.

Bilba'o, often written in English **Bilbo'a,** a seaport-town of Spain, capital of the province of Biscay, is situated on the river Nervion, near the Bay of Biscay, and 28 miles N. W. of Vitoria; lat. 43° 15′ N., lon. 2° 54′ W. It is partly enclosed by high mountains, and is well built. Small vessels can ascend the river to this point, which is here crossed by several bridges. Bilbao has a cathedral and a number of convents; also manufactures of hardware, hats, leather, paper, and earthenware. The chief articles of export are wool, iron, oil, and fruits. This town was founded in 1300, and was first called *Belvao*, and about 1500 was the seat of a famous commercial tribunal. Pop. in 1860, 17,969.

Bil'berry, or **Whortleberry,** the fruit of various small shrubs, of the genera *Vaccinium* and *Gaylussacia*, and of the natural order Ericaceæ, natives of North America and Northern Europe. These fruits, under the name of huckleberries and blueberries, are extensively used in the Northern U. S. and Canada.

Bil'derdijk' (Willem), an eminent Dutch poet and philologist, born in Amsterdam Sept. 7. 1756, was a man of great erudition and versed in many languages and sciences. He studied law, and practised as an advocate at The Hague. About 1808, Louis Bonaparte appointed him president of the Institute of Holland. He was the author of many poems, tragedies, and prose works, which had a high reputation, and display a vigorous imagination. Among his important works are "Elius" (1778), "Miscellaneous Poems" (1799), "Rural Life," and an epic poem called "The Destruction of the First World." Died at Haarlem Dec. 18, 1831.

Bildt, a town of Holland, in the province of Friesland. Pop. in 1867, 8362.

Bile [Lat. *bilis*], the secretion of the liver in animals. In all vertebrates it is formed chiefly from the blood of the portal vein, which is mingled, however, to some extent with that of the hepatic artery. It is secreted slowly during the intervals of digestion, attaining its maximum (according to Dalton) about an hour after eating. It is in man a yellowish-green, viscid fluid, with a bitter taste and a peculiar smell. In carnivorous animals it is brownish-yellow; in herbivorous, greenish. From twenty to fifty ounces of it are secreted daily in a man. A portion of bile is commonly detained in the gall-bladder, where it becomes more dense by the loss of water and the addition of mucus.

Bile contains certain resinous, coloring, and saline constituents. The biliary resin, or *bilin*, consists of cholic (glycocholic) and taurocholic acids, combined in man with soda; also with a little cholesterin, a fatty body. These acids are formed in the liver, not being present in the blood, unless from absorption after their elaboration in the liver. Cholesterin and the coloring-matter of the bile are probably present in the blood. Arrest of their removal causes unpleasant, sometimes serious, symptoms, recognized under the term "biliousness."

Entering by the common biliary duct into the duodenum, the bile aids in the digestion of food, especially of fat; and the greater part of it is then reabsorbed from the small intestine. A portion, however, is excreted with the fæcal discharge. Bile stimulates the peristaltic muscular action of the bowels, being the natural laxative. It acts also as an antiseptic to the almost putrescent contents of the large intestine. Solidification of the components of the bile (especially of cholesterin) causes gall-stones, the passage of which through the duct often produces extreme pain.

The gall-bladder is not always present, even in the higher animals. Oxen, sheep, and antelopes have it, but not deer or camels. It is absent in the elephant and horse, but present in the hog. All carnivora have it. Among birds, the ostrich, pigeon, and many parrots are without it. Some species of the same genus have it, and others not. (See Digestion.) It is interesting to observe that the bile of salt-water fishes contains potash in place of soda, although from their being surrounded by much common salt (chloride of sodium) in the sea-water, we should naturally expect to find soda in abundance; and the bile of land and fresh-water animals contains soda, while, considering diet and habitat, potash might more naturally be looked for.

Henry Hartshorne.

Bilin' [Lat. *Belina*], a town of Bohemia, beautifully situated in the valley of the Bila, 17 miles W. of Leitmeritz. It has celebrated mineral springs which are much frequented, and two castles. Near Bilin is a remarkable isolated clinkstone rock called *Biliner Stein*, or Borzenberg. Pop. 3862.

Bilious Fever. See Fever.

Bill, or **Beak** [Lat. *ros'trum*; Fr. *bec*], the hard, horny mouth of birds, consists of two parts called the upper and lower mandibles, which may be regarded as mere extensions of the upper and lower jaws. It is not furnished with teeth, but the bills of the tribe Dentirostres have notches like teeth, and Prof. Marsh has discovered a fossil bird at Fort Harker, Kan., with true teeth. The bill is the principal weapon of offence and defence of many birds, and is an important character on which the distinctions of the orders are founded, the various forms of the bill being intimately connected with the peculiar habits of birds. These forms are especially adapted to the nature of the food on which the bird subsists, and to the operations by which that food must be procured. In birds of prey (Raptores), the upper mandible is hooked and sharp, and the whole bill is adapted for seizing animals and tearing their flesh; birds that feed on seeds have short, strong, and conical bills; while humming-birds have long, straight, and slender bills, fitted to insert into long, tubular corollas. Many aquatic birds have broad, obtuse, and comparatively soft and sensitive bills, with laminæ on the inner margin in order to strain the mud in which they find their food. At the base of the upper mandible is a membrane called the *cere*, which in many birds is naked, in others feathered.

Bill, in law, a formal statement or declaration in writing. It is commonly used in connection with some descriptive word. The principal cases will be considered separately. Bills may be conveniently arranged under the following classes:

1. Contracts and commercial instruments—bill of exchange, bill of lading, bill of credit, bill of sale, single or penal bill.

2. A project of law pending before a legislature, as in the U. S. Constitution, Article I., section 7, "bills for raising revenue." After such a bill becomes a law, it is usually termed an "act."

3. Laws actually passed by the legislature, as a bill of indemnity, a bill of attainder or of pains and penalties.

4. Constitutional instruments or provisions—"bill of rights."

5. In mercantile and ordinary usage—bill of goods, bill of health, bill of mortality, bill of parcels, bills payable and receivable.

6. In pleadings, criminal and civil—original bill, bill of Middlesex, bill of indictment, bill of privilege, bill in equity.

7. In legal practice—bill of costs, bill of exceptions, bill of particulars.

Bill, Brown-bill, or **Gisarme,** an ancient weapon of the English infantry for fighting at close quarters. It differed from the battle-axe in its sickle-shaped blade, to which a drawing stroke was given. The bill was used by the English at the battle of Hastings, and finally went out of use in consequence of the introduction of firearms. Similar weapons were used by mounted troops, as well as infantry, both in England and on the Continent.

Billardie'ra [named in honor of La Billardière, author of a "Flora of New Holland," 1804–06], or **Ap'pleberry,** a genus of twining Australian shrubs of the order Pittosporaceæ, have simple alternate evergreen leaves and pendulous flowers, with a bell-shaped corolla and a calyx of five sepals. The fruit, which is edible, is a soft, spongy pericarp with inflated cells and many seeds, which are loose in the cells. The *Billardiera longiflora* and *ovalis* are cultivated as ornaments in greenhouses.

Bil'lerica, a beautiful post-village of Middlesex co., Mass., on the Boston and Lowell R. R., 18 miles N. by W. of Boston. It has five churches, an academy, and important manufactures. Pop. of Billerica township, 1833.

Bil'leting, a mode of feeding and lodging soldiers when they are not in camp or barrack. It is a compulsory process by which soldiers obtain food and lodging in taverns, inns, or private houses. In 1745 all persons in England were exempt from this burden except certain traders. The persons liable to have soldiers billeted on them in England at present are the keepers of hotels, inns, public-houses, ale-houses, beer-shops, wine-shops, livery-stables, and such-like licensed places. Those who supply food and lodging receive tenpence per day for each soldier.

Bil'liards [Fr. *billard*], a game played with ivory balls upon a rectangular table having resilient sides. The balls are put in motion by means of rods called *cues* held by the players. The place of the origin of this game is variously given as in the East, in France, and in Italy, and the date is entirely uncertain. Shakspeare alludes to this game in "Antony and Cleopatra," but this is undoubtedly an anachronism. The rules of the game vary somewhat in different countries. Various games are played at present in the U. S., the French three-ball game being considered the best. This game requires great skill and quickness of hand and accuracy of sight, and is one of the most popular of games. (See PHELAN, "The Game of Billiards.")

Bill in Eq'uity. This is a statement of the plaintiff's case in a suit in court of equity. A bill is either original or not original. An original bill initiates the suit; a bill not original is used to controvert or suspend or revise a proceeding in the cause, as a decree or order, or for cross-litigation. Particular suits receive special names, with which the word *bill* is connected, such as "bill of peace," "bill of interpleader," "bill of discovery," "cross bill," etc., etc.

Bil'lings (ELKANAH), geologist, was born in Canada May 5, 1820. His father was a native of Massachusetts. In 1845 he was called to the bar, but since 1856 has acted as palæontologist to the Canadian geological survey. He has published valuable scientific memoirs and other important contributions to the geology and natural history of Canada.

Billings (JOSEPH), an English navigator who entered the service of Catherine II. of Russia in 1785. He commanded an exploring expedition sent out by that sovereign in 1787. He explored the coast of Alaska, discovered several islands in the Arctic Ocean, and returned in 1791.

Billings, Josh, the pseudonym of Mr. A. W. Shaw of Poughkeepsie, N. Y., an American humorist, who is known by his "Allminax" and other works.

Billings (LUTHER G.), U. S. N., born in New York in 1840, entered the navy as an acting assistant paymaster Oct. 24, 1862, became an assistant paymaster in 1865, and a paymaster in 1866. He served in the steamer Waterwitch when she was captured by Confederates on the morning of June 3, 1864, and fought gallantly in her defence. Lieutenant-Commander Austin Pendergrast, in his detailed report of Oct. 22, 1864, says: "Notwithstanding the defeat I have sustained, I cannot close this report without recommending to the kind consideration of the department the gallant conduct of those officers and men who so bravely defended their ship. To C. W. Buck, acting master, Acting Ensigns Charles Hill and A. D. Storer, Acting Assistant Paymaster L. G. Billings, Acting Master's Mate C. P. Weston, Coast-pilot R. B. K. Murphy, Henry Williams, captain of the hold, John Williams, captain of the afterguard, John Parker, gunner's mate, and John Y. Hazelton, cockswain, I am indebted for a cordial support in the defence of the ship; and though every one of them was wounded, and many of them threatened with instant death unless they would say that they surrendered, I am proud to say that not one of them disgraced himself by doing so."

FOXHALL A. PARKER, U. S. N.

Billings (WILLIAM), an American musical composer, was born in Boston, Mass., Oct. 7, 1746. He introduced a new style of church-music, which became very popular in New England. Died Sept. 26, 1800.

Bil'lingsgate, a wharf and fish-market of London, below London Bridge, which was made a "free and open market for all sorts of fish" in 1699. It is the only wholesale fish-market in London, and all fish, fresh or cured, if imported in British vessels, are admitted free of duty. All fish are sold here by tale, except salmon and eels, which are sold by weight; oysters are sold by measure. No fish are sold on Sunday except mackerel. The women who vended fish here were formerly notorious for ribaldry and vituperative personalities, so that "Billingsgate" became a synonym of vulgar and foul expressions.

Bill'ion, in the French system of numeration, is a thousand millions, but it is used by the English to denote a million millions—1,000,000,000,000.

Bil'liton, or **Billeton,** a Dutch island in the East Indies, is situated between Borneo and the S. E. end of Sumatra, and is separated from Banca by Clement's (or Gaspar) Strait. It is about 3° S. lat., and 108° E. lon. Area, estimated at 1150 square miles. Iron ore and good timber abound here. Trepang, tin, birds' nests, and tortoise-shells are exported from it.

Bill of Attain'der is a legislative enactment declaring the attainder of one or more persons. (See ATTAINDER.) Formerly, persons were often attained of high treason in England by act of Parliament, and during the war of the Revolution bills of attainder were frequently passed in this country. The Constitution of the U. S. provides that neither a State nor Congress shall pass bills of attainder. Such a bill is usually opposed to sound legislation in four principal respects: It is adopted by the legislature, instead of being a sentence by the judiciary; it departs from judicial rules in establishing the commission of the alleged criminal act, having no regular methods of trial or rules of evidence; it may declare an act to be a crime which was not so when committed; and it admits of the infliction of cruel and unusual punishments. (An instance of such a bill is found in FROUDE'S "History of England," i., 286.)

Bill of Credit, in law. (1), in mercantile law, a letter written by one person to another authorizing or requesting him to give credit to a third or his order, or to bearer. Such a letter is either general or special. It is general when addressed to any one who may see fit to give the proposed credit, and who on giving credit may have recourse to the writer of the letter. On such a letter several persons may successively give credit. The letter is said to be special when addressed to specified persons in such a way that no other persons but those specified can give the credit.

2. Under the U. S. Constitution. That instrument provides that no State shall "emit bills of credit." This expression is construed by the courts to mean instruments issued for the payment of money—issued on the credit of the States as such, payable at a future day, and intended to circulate as money. The clause does not prevent a State from issuing bonds for the payment of its indebtedness, payable at a future day; nor is it supposed to prohibit the creation of banks, which issue currency. The provision aims at the use of the credit of the State in its corporate character.

Bill of Excep'tions, a formal statement in writing

of exceptions taken to the opinion, decision, or direction of a judge during a trial. It sets forth the proceedings at such trial, the decision or ruling made, and the exception thereto, signed and sealed by the judge in testimony of its correctness. The object of a bill of exceptions is to bring the alleged error of the judge before the proper court for review, and it usually contains only such portion of the proceedings and evidence taken at the trial as is necessary for that purpose. (The details of the subject will be found in TIDD and other works on legal practice.)

Bill of Exchange, an open letter of request, whereby one person requests another to pay a third or his order or bearer a sum of money, absolutely and at all events. The person who writes the letter is called the *drawer;* the one to whom it is addressed is termed the *drawee;* and the person who is to receive the money is the *payee.* A bill of exchange is either inland or foreign. Where the parties are in the same State, it is inland; where the drawee resides in a State or country different from that of the drawer, or in any case where the bill is drawn in one State upon a person in another, it is foreign. A bill may be considered under the following heads—1, its nature; 2, endorsement; 3, acceptance; 4, presentment for payment, and steps to be taken to charge drawer and endorsers.

1. A bill of exchange having all the requisites referred to in the definition as above given is *negotiable.* By this word is meant that a transfer of it in good faith before maturity will give the purchaser a right of action in his own name in a court of law, as distinguished from a court of equity; and he accordingly takes a title free from defences that may have existed between the original parties. But if any of the qualities referred to in the definition are wanting, *negotiability* does not exist. The paper becomes assignable, and the defences between the original parties are let in. Negotiability, however, assumes that the instrument has a legal existence as to its outward form, and is accordingly executed by a person competent to contract. A bill of exchange drawn by or upon a married woman or an infant would not create a valid obligation even as to a purchaser in good faith. So if the instrument were declared void by statute, as is sometimes the case when infected with usury or given for a gaming consideration. Under these rules, if an instrument otherwise in the form of a bill of exchange were payable in something other than money, or upon a contingency, or from a special fund, or to a particular person, without the addition of the words "order" or "bearer," it would not be negotiable. The law presumes that a bill is given for a valuable consideration. Evidence may be offered as between the original parties, and as to all who cannot insist upon the protection of negotiability, that there is no consideration. An important distinction thus arises between what may be called business paper and accommodation paper. The former is given for a valuable consideration as between the original parties, such as for money lent or goods sold. In accommodation paper there is no such consideration, but the person who makes it intends to lend his credit to some person. Every party to a bill may hold this relation to it. Thus, there may be an accommodation acceptor, drawer, or endorser. This kind of paper must be distinguished from that which is simply without consideration, in which there is no *intent* to have the credit of the party who makes it used. A single illustration will show the distinction. If a friend should draw a bill in favor of his friend on account of his affection, it would be simply without consideration; if under the same circumstances it was drawn with intent to have it discounted by a bank, it would be "accommodation paper." In the one case, if a purchaser should acquire it with knowledge of all the circumstances, he could not enforce it, while in the other case he could, by reason of the intent. When accommodation paper has been acquired for value, it is substantially equivalent, as far as the holder is concerned, to business paper. Between the original parties it would have no validity, and could not supply the basis of an action. On the contrary, if an accommodation party to the bill is obliged to pay, he has his remedy against the party in whose favor he acted, either on the bill or on an implied contract, as the case may be. Thus, an accommodation acceptor could not bring an action *upon the bill* against the drawer whom he had accommodated, but would be driven to an action on an implied contract on the part of the drawer to repay money which had been paid for the drawer's use and benefit. When one party gives his acceptance to another in return for the other's acceptance, it is not a true case of an accommodation acceptance, though sometimes so called. These "cross" acceptances are based upon a consideration, the one promise being a consideration for the other. They are certainly dangerous contracts, as either party may be called on to pay to a holder not only his own acceptance, but that of the other party. Without further pursuing this distinction, attention should be called to a peculiarity in this branch of the law which shows its close connection with the subject of currency. It is a well-settled general rule of the common law that a person having no title to goods can transfer none, even to a purchaser in good faith. A thief or a finder, for example, can create no better title than he possesses. There is a marked exception to this rule in the case of money. One who has stolen money may give a perfect title to one who takes it in good faith and for value. This exception is demanded by the necessities of commerce. The rule is extended to negotiable paper, payable to bearer, or even to order, when so endorsed as to pass from hand to hand without further endorsement.

It is plain that a bill when drawn imposes no obligation upon the drawee. It is necessary that he should assent to it in some legal form before he becomes liable. This act is termed "acceptance." Before acceptance the only person liable to the payee is the drawer. His liability is a contingent one, and implied by law. There is thus a marked distinction between the liability of a drawer and acceptor—one is implied, and the other is express and created by express contract. The implied obligation of the drawer is created by the custom of merchants, and is conditional. It requires certain acts to be performed as a condition precedent to recovery of the amount of the bill, such as presentment either for acceptance or payment, and due notice to be given of a failure to accept or pay, as the case may be. This distinction between the *implied* liability of the drawer and the *express* contract of an acceptor is of great consequence, and must be carefully attended to. The same remark may be made as to the liability of an endorser. This is also implied and conditional. The nature of a check upon a bank should be referred to. It resembles a bill of exchange, though it is not precisely equivalent to it. The check, according to the better opinion, creates no obligation against the bank in favor of the holder without acceptance. In mercantile phrase, a check when accepted by the act of an officer, such as a teller, is said to be "certified." The bank after such an act is liable to the holder. The drawer of a check having funds on deposit has an action against the bank for damages for a refusal to honor his check, on the ground of an implied obligation to pay checks according to the usual course of business. While checks are usually drawn payable immediately, they may be made payable at a future day, when their resemblance to a bill of exchange is still more close.

2. *Endorsement.*—The payee of a bill may transfer it by writing his name upon the back of it. He is then termed an endorser. When the name is simply written the endorsement is said to be "in blank;" when some person is pointed out to whom payment is to be made, it is said to be "in full." When a bill is endorsed in blank, it will pass from hand to hand, as though payable to bearer; when endorsed in full, an endorsement by the person to whom it is transferred will be necessary to its further transfer. There may be a series of endorsers, called first, second, third, etc. endorsers. Under these rules no holder can claim a title to a bill payable to order except through an endorsement made by the very person to whom it is payable, or some one holding under him, such as his executor, administrator, or assignee in bankruptcy. Accordingly, if it should come into the possession of another person of the same name as the owner, but acting without authority, he could give no title to one acting in good faith. When an owner of a bill endorses it for value, he can impose upon the purchaser no valid restriction preventing its further transfer. The right of sale is an inseparable incident to ownership. On the other hand, if a person endorse a bill to an agent, he may place valid restrictions upon the agent's authority to sell. These, if incorporated in the endorsement, will bind all purchasers. Where a bill is payable to several persons, all must, in general, unite in an endorsement. The regular effect of an endorsement is twofold: one consequence is to transfer the endorser's interest, and the other is to create an implied obligation on his part to pay the bill in case that the drawee does not accept or pay at maturity, and proper steps are taken to charge him. In an accommodation endorsement, as there would be no ownership, the sole effect would be to create an obligation to pay. This obligation closely resembles that of suretyship. Thus, when a bill is accepted the acceptor is primarily liable, and the endorser is, as it were, a surety. The rules governing suretyship may in the main be invoked in his favor. An endorser may avoid this liability by making use of suitable words in his endorsement, such as "without recourse." The endorsement would then simply operate as a transfer of such interest as he might have. Endorsers are commonly liable in the order of time of their endorsements. Thus, if there were three endorsers, if the third

(or last) was compelled to pay, he would be entitled to sue the second or first, and recover in full. A holder need not pursue any prescribed order as between the endorsers. He may select any one, who, if he pays, will be entitled to proceed in the same way as to any one preceding him. If, however, the bill is made payable to several payees, who endorse, they are liable jointly and not successively, and each, as between themselves, would be liable only for their respective shares. Every endorsement is a new contract. One of the consequences of this rule is, that though the original bill may be void, the endorser will still be liable, as if the bill be void for usury or be made by a married woman. Another consequence is, that the rules of private international law may cause a different effect to be given to the respective endorsements. Thus, if A should endorse in one country, and B should endorse the same bill in another, each endorsement would be governed as to its effect by the law of the state where it was made. The mere act of writing one's name is not an endorsement; there must also be a delivery. Accordingly, if one should write his name and die before delivery, an executor could not deliver the bill so as to make a valid "endorsement." The proper course would be for the executor to endorse it in his representative character.

3. *Acceptance.*—The object of acceptance is to show the assent of the drawee of the bill to pay it according to its terms. Without such assent he would not be liable. The regular and formal method of acceptance is to write the name of the drawee upon the front of the bill. But no particular mode of acceptance is necessary. It may be made by writing separate from the bill or orally. It may sometimes be implied, as, for example, by a detention on the part of the drawee beyond a reasonable time. It may be either absolute or conditional. A conditional acceptance may be illustrated by one purporting to be made "on the consignment of goods to the drawee." A holder could not collect in such a case if there was no such consignment. An acceptance should not differ from the terms of the bill. A holder may decline to take such an acceptance, and treat the case as though there was no acceptance. Should he assent to it, he would thereby discharge the drawer and existing endorsers. It is not always necessary that there should be presentment for acceptance as distinct from one for payment, though in some cases it is requisite. Where a bill is payable a fixed number of days "after sight," the word "sight" means acceptance, and it would be necessary to present it once for acceptance, and, if that act took place, again for payment. If, on the other hand, the bill were payable a certain number of days "after date," it would only be necessary to present it once for all for payment, though it would usually be an act of prudence to present it for acceptance, as the holder would in case of acceptance have an additional person to whom he could have recourse, and in case of non-acceptance he could take immediate steps to charge the other parties to the bill. There has been great controversy on the question whether bills payable "at sight" must be presented for acceptance as well as payment. In some of the States the doubt is settled by legislation. The effect of acceptance is to make the drawer the principal debtor. The other parties stand in the relation of sureties, and if they are compelled to pay, they have their remedy over against the acceptors. This is clearly the case in business paper: in the case of an accommodation bill the position of the parties is of course reversed, so that the acceptor, as already explained, has his remedy on an implied contract against the person to whom he lent his credit, though as to the holder of the bill he holds the place of a principal debtor. Under these rules an acceptor is bound to know the handwriting of the drawer, and if that be forged he is still liable to the original holder. If acceptance is refused, the proper course, in the case of foreign bills, is to have a protest made, and prompt notice sent to the drawer and endorsers. In case of inland bills, protest is not essential, though presentment and notice are. Statutes usually allow protest in case of inland bills as a convenient medium of proof that the necessary steps have been taken to charge the parties to the bill. The term "protest" is applied to an official act by an authorized person (notary public), whereby he affirms in a formal or prescribed manner, in writing, that the bill has been regularly presented for acceptance or payment, as the case may be, and that it has been refused. It is used as presumptive evidence at a trial to establish the facts in question. The office of a "notice" is to give immediate information to the drawer or endorsers of failure of acceptance, so that they may take such steps as they deem necessary for their protection. The protest and notice are thus entirely distinct acts for different purposes, and must not be confounded. Assuming that acceptance has been refused and due protest made, mercantile law allows any person to intervene and accept a bill "for the honor" of a drawer or endorser. A holder is not bound to take such an acceptance, though it is valid if assented to. It takes place before a notary public, and is termed an acceptance "*supra protest.*" The person thus intervening states for whose honor he accepts. In case he pays, he becomes the creditor of that party, and may also have recourse to all who precede him on the bill, in opposition to the general rule of law that one cannot become the creditor of another without his consent. When the bill matures it is again presented to the original drawee for payment, who may in the mean time have been placed in funds, and may now be willing to take up the bill. Should he again refuse, it is protested, and presented to the acceptor *supra protest* for payment, which, if he refuses to make another and final protest, will be necessary to charge drawer or endorsers.

4. *Presentment for Payment.*—It is a general rule that as between debtor and creditor no presentment for payment is necessary. It is the duty of the debtor to seek the creditor, and if the day for payment elapses without it, there is an immediate remedy by action. The better opinion in this country is, that this rule applies to an acceptor of a bill of exchange, even where it is made payable at a particular place, such as a specified bank. On this view it would not be necessary for the holder to prove a presentment, but the acceptor might show in his defence any facts that would relieve him or diminish liability, such as that he had left funds with the bank, which had failed. But to charge drawer and endorsers the case is entirely different. These enter into no absolute engagement, but only into an obligation implied by law. It is a part of the implied contract that presentment for payment shall be made, and protest, where that is necessary, and notice given. These acts must be alleged in the pleadings, and proved at the trial as conditions precedent to a right of recovery. The modes of performing these various acts branch out into much detail, and only the leading ones can be brought within the compass of this article. The general rule is, that the bill, when payable without designation of place, must be presented, when it matures, to the acceptor, either at his residence or place of business, and, if at the place of business, within business hours. If a particular place, as a bank, is designated, presentment must be made there within the usual hours devoted to banking business. This duty continues, though the place of business be closed or the acceptor be notoriously insolvent. In the case of an accommodation acceptance no presentment is necessary in behalf of the person to whom the accommodation is given, since he could have no action against such an acceptor. The duty of presentment, as well as of the performance of the succeeding acts, may be waived by a party to the bill by appropriate acts. This waiver may take place either before or after maturity of the bill. An instance would be a writing on the bill, "I hereby waive demand of the within bill," or "I hereby waive notice of demand." The latter expression would be imperfect, since a waiver of notice does not dispense with the necessity of presentment, while a waiver of demand is, from the nature of the case, a waiver of notice.

A bill does not ordinarily actually mature on the day on which it apparently falls due. Three days are allowed, termed "days of grace." These have become so fully a part of the contract that a presentment before the last day of grace is nugatory. Should the last day fall on Sunday or a public holiday, the bill matures on the preceding day. This matter is sometimes regulated by statute. If presentment is made and refused, protest should take place in the case of foreign bills, as already explained in reference to non-acceptance, and notice given to the parties to be charged. The subject of notice requires a more full explanation than has been given in connection with non-acceptance. The object of notice is to give information to the respective parties, to the end that they may protect themselves from loss. The test of its sufficiency is whether it gives the requisite information. No particular form is necessary. It may be either oral or written. It is a common practice to reduce it to writing, and either to give it to a party personally or to send it to him by mail. By the general rule of law the mail can only be used for the purpose of transmission, and accordingly cannot be resorted to where the holder and the person to be notified obtain their letters from the same post-office, though it is in some instances otherwise by statute. The law requires extreme diligence in despatching the notice. It should be sent as early as the next day, and some authorities require by the first convenient mail on the next day. If the notice is properly sent by the mail, it will suffice, though never received. Any endorser receiving notice has a day to send it to one preceding him. After notice the rights of the holder are fixed, and it is not necessary for him to bring his action any earlier than he would be required to do by the statute of

limitations. Delay to collect the bill from the acceptor does not of itself discharge the drawer and endorsers. If, however, a bargain (based upon a consideration) is made between the holder and acceptor, whereby the time of payment is extended, the drawer and endorsers are discharged, unless their consent is obtained. The drawer is not only liable for the face of the bill, but for damages incidental to non-payment. These damages are in some cases fixed by statute. It is sometimes necessary to take into account the difference in exchange between two countries; as, if a bill drawn in New York were payable in London, exchange being in its favor, and the action on the bill were brought in New York, and it cost a certain per cent. to place the funds in London, that amount should be included in the recovery. The article on promissory notes may be referred to. (See PROMISSORY NOTES.) T. W. DWIGHT.

Bill of Lading, the written evidence of a contract for the carriage of goods by water. It is usually signed by the master of the vessel, either in duplicate or triplicate, acknowledges the receipt of the goods from a person (named the consignor), and undertakes to deliver them to a designated person (the consignee) or his assigns at a specified place, for the compensation and on the conditions therein specified. An endorsement of the bill of lading transfers the title to the goods, and, if made in good faith and for a valuable consideration, cuts off the right of stoppage *in transitu*. For most purposes, a bill of lading is assignable, and an assignee takes it subject to any defence existing between the original parties. For the single purpose of shutting out the right of stoppage *in transitu* it is negotiable. (See STOPPAGE IN TRANSITU.) This instrument consists of two parts—a receipt and a contract. That portion of it which is a receipt can be contradicted, as between the original parties, by parol evidence. For example, if it were stated that the goods were in good order, evidence may be adduced to show the contrary. This proposition would not extend to a person who had made advances on the faith of the statement, as he could invoke the doctrine of estoppel. (See ESTOPPEL.) The part of the bill which is a contract cannot be contradicted by parol evidence, even as between the original parties. Although the term was originally applied only to a memorandum of a contract for transportation by water, it is now frequently used to denote the memorandum given by *any* carrier of the terms on which he agrees to carry the goods received by him. T. W. DWIGHT.

Bill of Pains and Penalties, a special act of the legislature declaring a person guilty of some offence, without any conviction in the regular course of judicial proceedings, and inflicting upon him some punishment less than death. It differs from a strict bill of attainder in that the punishment inflicted by the latter is death. Bills of pains and penalties are within the provision of the U. S. Constitution that neither Congress nor a State shall pass a bill of attainder or an *ex post facto* law. Thus, a law of Congress requiring all attorneys of the Supreme Court to take an oath that they had not been engaged in rebellion, or else to be disqualified from practice, was held to be in the nature of "a bill of pains and penalties" as to those who had thus participated, and accordingly void. (*Ex parte Garland,* 4 Wallace R., 333.)

Bill of Rights, an English statute enacted at the time of the accession of William and Mary to the throne. It declared, among other things, the right of the subject to petition the king, freedom of election of members of Parliament, and freedom of speech in Parliament. It affirmed that standing armies without the consent of Parliament are illegal, and that the king had no power of suspending or dispensing with laws. It provided that excessive bail should not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted. The provisions of this act have had great influence in this country, and are deemed of high consequence, as securing liberty to the individual. A number of them are literally inserted among the amendments to the U. S. Constitution, and are also found in State constitutions. The phrase "bill of rights" is frequently employed in this country to designate all those portions of a constitution, State or national, designed to secure liberty to the individual.

Bill of Sale, a writing under seal conveying the title to goods and chattels. The seal by the common law is conclusive evidence of consideration. Accordingly, a bill of sale formally executed passes the title without any consideration or delivery of the property. Where there is no seal, there must be a consideration or delivery. A delivery without consideration would amount to a gift. A bill of sale may pass a title which would be valid as between the parties, and yet not of force as to creditors or purchasers, as if one who was indebted should make a bill of sale without actual consideration, or should sell, even with consideration, and still retain possession of the goods. The transaction might be regarded as infected with fraud, even though there were no fraudulent intent. (See FRAUD and CONSTRUCTIVE FRAUD. As to the general law concerning sales of chattels and the requisites to their validity, see SALES.)

The phrase "bill of sale" is frequently used in a more popular sense to indicate any written instrument, though not under seal, executed as evidence of a sale. In sales of ships the term "grand bill of sale" is sometimes employed. The word "grand" indicates that the sale is made by the builder. All subsequent transfers would be indicated by the ordinary phrase "bill of sale."

Biloxi, a post-village of Harrison co., Miss., on the Mobile New Orleans and Texas R. R., 79 miles E. N. E. of New Orleans, and on Biloxi Bay; lat. 30° 23.8′ N., lon. 88° 53.1′ W. It has an iron lighthouse, with a fixed white light 62 feet above the level of the sea. Biloxi is a place of summer resort. Pop. 954.

Bil'son (THOMAS), an eminent English prelate, born at Winchester in 1536, became bishop of Worcester in 1596, and bishop of Winchester the year following. Bilson was a man of great learning, and a zealous enemy of Puritanism. He assisted in the translation of King James's Bible. He wrote, among other works, "The True Difference between Christian Subjection and Unchristian Rebellion" (1585), and "The Perpetual Government of Christ's Church" (1593), which is considered an able defence of the doctrine of apostolic succession. Died in 1616.

Bils'ton, a market-town of England, in the county of Staffordshire, 2 miles by rail S. E. of Wolverhampton. It forms part of the parliamentary borough of Wolverhampton, and is an important centre of the hardware trade. It is situated between numerous iron and coal mines, and has large manufactures of japanned ware. Pop. in 1871, 24,192.

Bi'mana [from the Lat. *bis,* "twice," "double," and *manus,* a "hand"], a Latin term applied by some zoologists to the first or highest order of Mammalia, of which man is the type and sole genus. Some persons have urged an absurd objection to this classification, because it ignores the spiritual and essential part of man, and does not make a sufficiently wide distinction between men and brutes; while others, again, object to the term on the ground that man in his anatomy is not sufficiently distinct from the higher Quadrumana to require to be placed in a separate order. (See QUADRUMANA, and also MAN.)

Bi'nary Stars. See DOUBLE STARS.

Bi'nary The'ory, in chemistry, is the name given to an hypothesis proposed by Davy, and once supported by Liebig, which assumes that all salts are compounds of a metallic and a non-metallic element. A large class of compounds (like common salt, or sodium-chloride) readily come under this rule. But in order to bring most salts into such a class, it is necessary to suppose all the non-metallic elements in any given salt to be combined into one compound element. But, according to the later theories, it is not considered at all necessary to try to represent the probable arrangement of chemical atoms in compound bodies. (See CHEMISTRY.)

Bin'che, a town of Belgium, province of Hainaut, well built on the river Haine, 6 miles E. S. E. of Mons. It has manufactures of cutlery, glass, pottery, etc.; also a trade in marble, coal, paper, and lace. Pop. 6678.

Bin'drabund', or **Bindraban'** (anc. *Vrindavana*), a town of British India, in the North-western Provinces, on the river Jumna, about 40 miles N. N. W. of Agra. It has several temples of Krishna, one of which is a remarkably massive structure. This town is visited by multitudes of pilgrims from distant parts of India, and their munificence is the chief support of the place. Pop. about 20,000.

Bing'en (anc. *Vin'cum* or *Bin'gium*), a town of Germany, in Hesse, is finely situated on the left bank of the Rhine, at the mouth of the Nahe, 20 miles by rail W. of Mentz. The Nahe is here crossed by an old bridge supposed to have been built by the Romans. Wine of superior quality is produced in the vicinity. Near Bingen the Rhine passes through a narrow channel called *Bingerloch* (*i. e.* the "hole of Bingen"), in which the rocks and rapid current once rendered the navigation dangerous, but in 1834 the obstruction was chiefly removed. Bingen is opposite Rüdesheim, from which it is separated by the Rhine. It has manufactures of flannel, fustian, and leather. Here are interesting ruins of an old castle and convent. Pop. in 1871, 5936.

Bing'ham, a post-township of Somerset co., Me. Pop. 826.

Bingham, a township of Clinton co., Mich. Pop. 2910.

Bingham, a township of Huron co., Mich. Pop. 441.

Bingham, a township of Leelenau co., Mich. Pop. 637.

Bingham, a township of Orange co., N. C. Pop. 1604.

Bingham, a township of Potter co., Pa. Pop. 773.

Bingham (Rev. HIRAM), born in Bennington, Vt., about 1790, graduated at Middlebury College in 1816, at Andover in 1819, and was one of the first Congregational missionaries sent to the Sandwich Islands, where he long exercised a powerful and salutary influence. He returned to the U. S. in 1841. Died at New Haven, Conn., Nov. 11, 1869.

Bingham (JOHN A.), an American legislator, born in Pennsylvania in 1815, removed to Ohio. He was elected a member of Congress by the Republicans of the Western Reserve in 1854, and was often re-elected. He was chairman of the managers who conducted the impeachment of Andrew Johnson in April and May, 1868. He was again elected to Congress in 1870.

Bingham (KINSLEY S.), born at Camillus, Onondaga co., N. Y., Dec. 16, 1808, studied law, went to Michigan in 1833, held many public offices, was a judge of probate, speaker of the house of representatives, member of Congress (1849–51), governor (1855–59), and U. S. Senator (1859–61). Died at Green Oak, Livingston co., Mich., Oct. 5, 1861.

Bingham (WILLIAM), born in Philadelphia in 1751, graduated at Philadelphia College in 1768, was consul at St. Pierre, West Indies, in 1771, and afterwards American agent at Martinique. In 1787–88 he was a delegate to Congress, and was U. S. Senator from Pennsylvania (1795–1801). He was a man of wealth and of strong aristocratic feelings. Died in England Feb. 7, 1804.

Bing'hamton, the county-seat of Broome co., N. Y., was incorporated a city in 1867. It is pleasantly situated at the junction of the Susquehanna and Chenango rivers, 216 miles N. W. of New York and 142 miles S. W. of Albany. The Erie R. R. passes through it, and it is the terminus of the Albany and Susquehanna, the Delaware Lackawanna and Western, the Syracuse Binghamton and New York, and the Utica Chenango and Susquehanna Valley R. Rs. It is also the southern terminus of the Chenango Canal. The State inebriate asylum is situated here, and also a State home for orphan and indigent children of Broome, Tioga, Tompkins, Cortland, Delaware, and Sullivan counties.

The public schools are under a separate management from the State schools, and are controlled by a board of education consisting of ten commissioners, two from each ward. The average annual number of pupils who attend the public schools are 120 in the high school or academic department, and 2200 at the seven ward school-houses. Five teachers are employed in the high school and forty in the ward schools, to whom $27,000 are annually paid in salaries. The school library contains 2587 volumes, valued at $3600, and provision is made for an increase annually of 400 volumes; philosophical apparatus and cabinet worth $2000; total value of public school property, $260,000. Dean College, for females, a school conducted with private capital, employs 13 teachers and is attended by about 150 pupils. Board and tuition, $200 a year; property valued at $50,000. St. Joseph's (Catholic) Female Academy, conducted by Sisters of St. Joseph, has an average of 85 pupils. Tuition and board, $175 a year; library 300 volumes; property valued at $15,000. St. James's (parochial) school for Catholic boys and girls has an average attendance of 350 pupils; salary of principal, $700. Lowell's Commercial College and Telegraphic Institute is a flourishing and important school of its class.

The churches are—3 Presbyterian, 3 Methodist Episcopal, 2 Protestant Episcopal, 1 Baptist, 1 Catholic, and 2 colored Methodist. Together they have a capacity of seating 10,000 persons; value of church property, $700,000; church membership, about 5500.

The city is supplied by Holly Waterworks, owned by the corporation. The gasworks are owned by a private company. Three miles of street railway have been constructed and equipped at a cost of $7500 per mile. A mile and a half of street are paved with wood pavement. The principal business streets are sewered.

Much of the business capital of the city is invested in mercantile establishments, and the wholesale and retail transactions amount to not far from $6,000,000 a year. About $1,800,000 are invested in manufactories, which employ 1400 hands of all grades, to whom about $800,000 are paid annually. The value of manufactured articles is about $3,500,000 annually. The leading articles are boots and shoes, tobacco and cigars, scales, combs, sewing-machines, machinery, and building materials, carriages, furniture, tools, and children's sleighs and carriages. The banking institutions are three national banks, one private banking-house, and two savings banks. There are four weekly, one semi-weekly, and three daily newspapers. The city has an area of 972 acres. The assessors' valuation (on a basis of a quarter of the real value) is $2,180,035 for real estate, and $430,985 for personal property. About $110,000 are raised annually for city and school purposes. The public debt for which the city is bonded, for and in the construction of railroads, and for the construction of the high-school building, waterworks, and bridges, is nearly $400,000. Pop. of city, 12,692; city and township, 14,758.

MALETTE & REID, EDS. "BINGHAMTON REPUBLICAN."

Bing'ley, a town of England, in the West Riding of Yorkshire, is situated on an eminence on the river Aire, 15 miles W. N. W. of Leeds. The Leeds and Liverpool Canal passes by it. Here are manufactures of worsted goods, paper, etc. Pop. 5019.

Bin'ney (AMOS), M. D., an American naturalist, born at Boston Oct. 18, 1803, graduated at Brown University in 1821, was the owner of an ample fortune. He was a liberal patron of artists and men of science, and was president of the Boston Society of Natural History. He wrote "Terrestrial and Air-Breathing Mollusks of the United States" (3 vols., 1851, finely illustrated). Died at Rome Feb. 18, 1847.—His son, W. G. BINNEY, is also a distinguished conchologist.

Binney (HIBBERT), D. D., born in Nova Scotia in 1819, was educated in London and Oxford, graduating at the latter university in 1842. In 1851 he was consecrated lord bishop (Anglican) of Nova Scotia and Prince Edward's Island.

Binney (HORACE), LL.D., an eminent American lawyer, born in Philadelphia Jan. 4, 1780. He graduated at Harvard College in 1797, and divided the first honors with his classmate, the late Judge White of Salem, Mass. Having studied law with Jared Ingersoll in Philadelphia, he was admitted to the bar in 1800, and rose in a few years to the highest rank in his profession. He declined high judicial positions which were offered him, but as a lawyer he took a prominent part in important cases in the higher courts of Pennsylvania, and was several times called to the Supreme Court of the U. S. Elected to Congress in the latter part of Jackson's first administration, he distinguished himself by his eloquence and ability. In 1843 he made his celebrated argument in the Supreme Court of the U. S. in the case of Vidal *versus* the mayor of Philadelphia. This admirable argument is often cited by the bench and bar of the U. S. as authority on questions involving the law of charitable uses, and has been referred to by eminent English jurists in the highest terms of praise. Mr. Binney appeared for the last time before his legal brethren on the occasion of the death of his friend, the Hon. John Sergeant, whose character he delineated in terms of deep feeling and eloquence. Mr. Binney's principal works, besides the argument in the Vidal case, are "An Inquiry into the Formation of Washington's Farewell Address" (1859), eulogiums on Chief-Justice Tilghman (1827) and Chief-Justice Marshall (1836), and "Reports of Cases in the Supreme Court of Pennsylvania" (6 vols.).

Binney (HORACE, JR.), a son of the foregoing, born in Philadelphia Jan. 21, 1809, graduated at Yale in 1828, and was admitted to the bar in 1831. He was eminent for his literary knowledge, and was for a time president of the Union League of Philadelphia. Died Feb. 23, 1870. A memoir of his life by Dr. C. J. Stillé was published in 1870.

Binney (THOMAS), born in 1798, an English dissenting minister, pastor of King's Weigh-house Chapel in London (1829–69). He wrote many controversial papers, "Conscientious Clerical Nonconformity," "Service of Song," and several books for young men, besides several volumes the products of a controversy with the Australian bishop of Adelaide. Died Feb., 1874.

Binoc'ular Tel'escope [from the Lat. *binus*, "double," and *oculus*, an "eye"], a telescope to which both eyes may be applied at once, and by which an object may be observed with both eyes at the same time. There are also binocular microscopes, having two tubes, one for each eye. In some kinds of work they possess superior defining power.

Bino'mial [from the Lat. *bis*, "twice" and *nomen*, a "name"], in algebra, an expression having two terms joined by the sign + or −. The "binomial theorem" has for its object the expression of the law for the formation of any power of a binomial. By means of this theorem any power of $x+a$ can be at once written down without going through the actual multiplication. The older mathematicians were acquainted with this method of finding such powers, but Newton first demonstrated the universality of its application. This is considered one of his greatest discoveries, and the formula was placed upon his tomb. It is usually written thus:

$$(x+a)^m = x^m + max^{m-1} + m\frac{m-1}{2}a^2x^{m-2} + m\frac{(m-1)(m-2)}{2\quad 3}a^3x^{m-3}, \text{ etc.}$$

Binturong' (*Ictides* or *Arctictis*), a genus of quadrupeds nearly allied to raccoons, comprises two species, natives of Java, Sumatra, and Malacca.

The Black Binturong.

Bi'obi'o, the largest river of Chili, rises in the Andes, and enters the sea at Concepcion, after a course of 200 miles.

Biogen'esis, the origin of life from life by parentage or descent; a term recently used in opposition to *abiogenesis*, or the origination of life in matter before not living. (See Spontaneous Generation.)

Biog'raphy [from the Gr. βίος, "life," and γραφή, a "writing"] is the term applied to the literature which treats of the lives of individual persons. Anciently, the leading incidents of a man's life were narrated in their historical sequence, without elaborate attempts to analyze character. Ancient biography was possessed of a stately dignity, colored but sparingly with eulogy or censure. Modern biography, on the other hand, like modern history, is often full of criticism and disquisition. Of strictly biographical works, the most valuable that has come to us from the ancient Greeks is the "Lives" of Plutarch. Roman literature also possesses an admirable "Life of Agricola," by his son-in-law, Tacitus. Besides these may be mentioned the "Lives" ascribed to Cornelius Nepos, the writings of Suetonius, the "Life of Alexander the Great" by Curtius, "Lives of the Sophists" by Philostratus, and a "Life of Plato" by Olympiodorus of Alexandria. Later, we encounter St. Jerome's "Lives of the Fathers," while biographies of saints, martyrs, etc. are scattered profusely through ecclesiastical literature. The monks of the Middle Ages worked at the manufacture of biographies in which the hunger for the marvellous was gratified. Modern biographical literature may be said to date from the seventeenth century. Among the most celebrated works written since the Reformation may be mentioned Vasari's "Lives of the Painters" (Florence, 1550); Tillemont's "Mémoires pour servir à l'Histoire Ecclésiastique des six Premières Siècles de l'Église," in 16 vols. 4to (Paris, 1693); Bayle's "Dictionnaire Historique et Critique" (Rotterdam, 1697); the "Acta Sanctorum" of the Bollandist Fathers; the "Lives of the Saints" by Alban Butler; the "Biographie Universelle" (1810–28); Charles Knight's "English Cyclopædia," Biographical Section, 1856–57. The "Nouvelle Biographie Générale" (42 vols., 1857–63) is of great value. Among individual Lives a high place is given to Boswell's "Life of Johnson" (1793), "The Life of Charles XII." by Voltaire, that of Voltaire by Condorcet, and that of Molière and Corneille by Taschereau. The biographical writings of Carlyle are of the first importance. In American literature we may mention in general biography the works of Sparks, Sprague, Allen, and Drake, and the special biographical writings of Irving and the Abbotts.

Revised by C. W. Greene.

Biol'ogy [from the Gr. βίος, "life," and λόγος, "discourse"] is that branch of the study of nature which treats of organized beings, under their diverse relations, in contradistinction to mineralogy, which relates to the inorganic or mineral substances; its subjects are therefore animals (zoology) and plants (botany or phytology), living and extinct. These agree with each other, and differ from minerals in (1) the physical and chemical characteristics of their primitive constituents or cells, and the concomitant phenomena of life exhibited under certain conditions; (2) the perpetual change during life in the organism by loss of substance proportioned to the demands on the system of exertion or existence, and the renewal of substance by derivation and assimilation of nutriment from without; (3) the segregation and specialization, when the demand for rapid growth has been fulfilled, of certain portions of the organism as reproductive organs, differentiated as receptive and procreative (female), and impregnating and vivifying (male); from the former of which (after the conjunction of the two under certain conditions) an organism originates essentially like that from which it proceeds; and (4) the existence, for a vaguely determinate period, of the organism, and finally a disturbance of the equilibrium or conditions of existence, death and dissolution; (5) originating as above indicated, the offspring repeats the same cycle of phenomena as the parent, and in turn contributes to the perpetuation of the race. Our limits will only allow us to briefly consider, in the order indicated, these characteristic features of the great empire of organic nature.

(1) The animal or vegetable organism is in the main constituted of four elements, three of which are separately known only in a gaseous state—*oxygen*, *hydrogen*, and *nitrogen*—and one —*carbon*—in a simple condition is only known in a solid form. From this predominance of gaseous elements results the degree of molecular mobility of the constituents of the organism, and, according to Herbert Spencer, "that comparative readiness displayed by organic matters to undergo those changes in the arrangement of parts which we call development, and those transformations of motion which we call function." The same author has also insisted on facts that (1) the elements in question (except oxygen) have affinities which are narrow in their range, but low in their intensity; (2) that in all allotropism (or the ability to assume different states) is inherent; and (3) that they all present certain extreme antitheses (as, for example, between oxygen and nitrogen as to chemical affinity, and between carbon and the gases as to molecular mobility); and that these extreme contrasts "fulfil, in the highest degree, a certain further condition to facility of differentiation and integration." The primary form into which these elements enter is a fluid substance called protoplasm, which may or may not be nucleated, but in most organisms assumes the nucleated condition (that is, of cells); of such elements, more or less modified and disguised according to circumstances (*i. e.* specialization and complexity of parts), the entire organism is built up.

(2) By the absorption or ingestion of extraneous substances the organism derives a nutriment which is assimilated and converted into its own substance, and supplies the material (1) for the power for work, (2) the repair of the system, and (3) for direct growth. Every action and exertion is attended with a loss of substance, and hence exists the necessity for a corresponding supply of nutriment. For a certain length of time (according to the species or race), in addition to the preservation of an unstable equilibrium, there is also a demand for supply for increase of bulk, or growth, of the organism. The period and extent to which this is carried is, within certain limits, constant for each species.

(3) When the full stature or phase of development has been more or less nearly attained, the organs of reproduction become functionally developed, and provision for the perpetuation of the race is made. In plants, the female element is termed a seed; in animals, an ovum or egg. The male and female elements may be united in the same individual, as in most plants and many animals, but in the highest animals the sexes are always differentiated in distinct individuals. In mollusks, hermaphroditism is almost of ordinal value, but not more, and in at least one case (Valvatidæ) hermaphroditism occurs in an order of which the other members are diœcious. Among vertebrates, true hermaphroditism is only known (as an exceptional development) in certain fishes (Serranidæ); it is entirely unknown in the higher forms (mammals, etc.), all the reported cases to the contrary being referable to males with the genitalia in an embryonic condition, or females with the clitoris hypertrophied. The homologies of the male and female organs render it impossible that there shall be a union of the sexes in the same individual in the mammals. Actual fecundation of individual germs (seeds or eggs) by the male element is necessary, in most cases, for their development, but in exceptional cases (*e. g.* certain insects, crus-

taceous mollusks), females produce broods of young without having had direct previous intercourse with the male. This peculiar capability has been designated *parthenogenesis:* the unimpregnated eggs (in some forms) produce only females. The question of the determination of sex is still involved in obscurity.

(4) After a certain period, if the individual has escaped all the liabilities to death that occur from enemies, accidents, and disease, there is a decline in the activity of the functions, the system becomes disordered, and death ensues. This period, like those of growth and development of the reproductive power, is also, within certain limits, a constant term, and all reports of extreme longevity—such as the reputed ages of H. Jenkins (169 years), T. Parr (150 years), the countess Desmond (140 years), and others—are either based on very unsatisfactory evidence or demonstrably false.

(5) The offspring, although as a rule very similar to the parent, is never exactly alike, being always distinguishable by some more or less obvious difference or *individuality* of character. Occasionally, however, the offspring differs very markedly in some one character, which may or may not be co-ordinated with other correspondingly important differences. The newly developed peculiarity is apt to be transmitted either to the immediate offspring or to a succeeding generation, and sometimes in an exaggerated degree. But such peculiarities, if the individuals so distinguished pair with those not exhibiting them, generally disappear in their descendants after a longer or shorter course. If, however, the individuals thus characterized are set aside, and their immediate and remote descendants selected in ratio to their possession of some peculiarity, that peculiarity will be indefinitely perpetuated, and a new race distinguished thereby will be thus originated. By means of such *artificial selection,* unintentional or studied, the various races of domesticated animals have been produced. And as, in most cases, there is an obvious fitness of organized beings to the conditions under which they are found, it has been assumed that such relations are the result of the survival of beings possessing characteristics which may have spontaneously arisen, and which have gradually become (relatively) perpetuated in the "struggle for existence;" and hence the hypothesis of *natural selection* has originated. Inasmuch, also, as no offspring is exactly like the parents, it follows that no generation is exactly like the preceding; and although there must be a certain unstable equilibrium, resulting from constant interbreeding, in the incessant surge of variations, the descendants must necessarily depart more and more from their progenitors. While in an historical epoch no very obvious changes may be perceptible, eventually (unless by the interposition of miraculous agency) there must be a contrast between the extremes of a lineage, and the exhibition of such must be merely a question of time, determined to a greater or less degree by the changes of condition. The assumption of this hypothesis, and the inductive evidence furnished by various departments of science, have culminated in the theory of *evolution,* and for an explanation of the *modus operandi* of evolution, natural selection (or Darwinism) has been evoked. The evidence relied upon is chiefly derived from morphology (and the contrast between it and teleology), embryology, the geological succession and the geographical distribution of organisms.

While animals and plants differ from minerals, and agree with each other in all the characters thus specified, there are no such salient differences between themselves. It is, indeed, easy to distinguish the higher animals and plants, and they are, to a certain extent, antetypes and complementary to each other. On the one hand, plants derive their nourishment by absorption from the inorganic world through the external surfaces of their roots and leaves, and (under most conditions) decompose carbonic acid gas, assimilate carbon (and nitrogen), and eliminate oxygen. On the other hand, animals derive their nutriment, immediately or mediately, from plants, and ingest it either through a provisional or specialized alimentary cavity, imbibe oxygen, and exhale carbonic acid gas. The mode of taking nutriment is the most characteristic feature, and specialization especially tends to that end, but supplemented, in the animal, by a specialization of other systems to guide it in the selection and pursuit of its food. Some rather high animals (*e. g.* certain Entozoa) take their nutriment through their external surfaces, but this is rather a teleological modification co-ordinated with atrophy of the intestinal tube, superinduced by peculiar conditions of life. In view of the slight differences between animals and plants, and their contrast with minerals, it is evident that the ternary division of natural objects into animals, plants, and minerals does not express the degree of the relations between them; and hence the animal and plant kingdoms have been combined in an *organic empire* or realm on the one hand, and on the other minerals have been denominated an *inorganic empire.* The impossibility or great difficulty of discriminating the lowest plants and animals has also led some naturalists to separate them from the animal and vegetable kingdoms, and combine them in a peculiar one, which has received, with some varying limits, numerous names; *e. g.* Infusory world (Infusorienwelt), règne de Zoophytes, règnes Psychodaire, règne chaotique, règne Plantanimal, regnum Amphorganicorum, règne organique Primitive, kingdom of Protozoa, regnum Primigenium, kingdom of Primalia, and Protistenreichs. Such propositions, however, do not remove the difficulty, but only shift and complicate the questions, and obscure the recognition of the tendencies of the two antitypically functional divisions of nature. It need only be added that there is also, to some extent, a contrast in respect to individuality in the respective kingdoms, numerous individuals (flowers) being developed from the outgrowth of the contents of a single seed, while in all except some of the lower animals a single individual only originates from one egg. The subject of individuality, however, is a somewhat obscure one, and has provoked much discussion; and the question has been involved by the confusion of potential and actual individuality. (For more detailed information respecting the various subjects of biology, consult Evolution, Hermaphroditism, Individuality, Longevity, Morphology, Palæontology, Parthenogenesis, Taxonomy, Teleology, Zoological Geography, and Zoology and Botany, and their respective subdivisions.)

Theo. Gill, *Smithsonian Inst.*

Bi'on of Smyrna, a Greek pastoral poet, was a friend and contemporary of Moschus, and lived about 250 B. C. His style is graceful and polished. He composed bucolic and erotic poems, fragments of which are extant. Among his extant works is a lament for Adonis.

Biot (Jean Baptiste), an eminent French natural philosopher and astronomer, was born in Paris April 21, 1774. He became in 1800 professor of physics in the College of France. In 1803 he was admitted into the Institute, and in 1805 published "An Elementary Treatise on Physical Astronomy" (2 vols.). An enlarged edition of this appeared in 5 vols., 1841–57. Having been appointed a member of the bureau of longitudes, he was sent to Spain with Arago to measure the arc of the meridian. He contributed many able articles to the "Biographie Universelle" and the "Annales de Chimie et de Physique," and published, besides other works, a "Treatise on Experimental Physics and Mathematics" (4 vols., 1816), which is highly esteemed, and "Researches in Ancient Astronomy" (1829). In 1840 he received the Rumford medal of the Royal Society of London for his researches on the circular polarization of light. He was admitted into the French Academy in 1856. Died Feb. 3, 1862.

Bi'otite, called also **Uniax'ial,** or **Magne'sian Mi'ca,** occurs in six-sided tubular prisms, having a perfect basal cleavage, and generally dark green, brown, or nearly black. It has a vitreous lustre, varies from transparent to opaque, is sectile, flexible, and elastic when reduced to thin laminæ. It consists chiefly of silica, alumina, magnesia, and oxide of iron, with some potassa.

Bi'ped [from the Lat. *bis,* "twice," "double," and *pes, pedis,* a "foot"], an animal which has two feet. Men and birds are almost the only animals to which the term is applicable. The two-footed saurians are thought to furnish a link between reptiles and serpents; certain two-footed batrachians seem to approach the character of fishes; while there are fossil biped reptiles which appear to have resembled birds.

Bi'pont Edi'tions, the name of certain editions of the Latin classics, the publication of which was commenced in 1779 at the German town of Zweibrücken (Deux-Ponts), called in Latin *Bipontium.*

Bir, or **Beer** [anc. *Bir'tha;* Turk. *Bireh-jik*], a town of Asiatic Turkey, on the left (E.) bank of the Euphrates, 74 miles N. E. of Aleppo. It has about 2000 houses, a citadel or castle on a steep rock, and several mosques. Caravans from Aleppo to Diarbekir and Bagdad cross the Euphrates at this point. Pop. about 6000.

Birch (*Bet'ula*), a genus of trees or shrubs of the order Betulaceæ, natives of temperate and cold regions in Asia, Europe, and America (several species are found among the Himalayas). The genus *Betula* is distinguished by ten to twelve stamens and winged seeds (achenia), has alternate, simple leaves, and flowers in scaly catkins. The common birch of Europe and Asia (*Betula alba*) is a handsome tree with triangular or deltoid leaves, which are doubly serrate. The bark is smooth and chalky white, and separable in thin sheets or layers. This bark is very durable, and is used for tanning, dyeing yellow, and other purposes. In some countries hats, shoes, and boots are made of it. The

wood is firm, tough, and valuable, and is much used by coopers, turners, and wheelwrights. The sap is esteemed as a beverage in Scotland, both in a fresh state and fermented. Europe produces a graceful variety called weeping birch (*Betula pendula* of some botanists), which attains a height of sixty feet, and has very slender and pendulous branches. The American white birch, which, according to Gray, is a variety of the above, is a small, graceful tree with tremulous, deltoid, and shining leaves, but is not valuable for timber. Among the other species indigenous in the U. S. are the *Betula lenta* (sweet or black birch), *Betula excelsa* (yellow birch), and *Betula papyracea* (canoe or paper birch). The *Betula lenta* is a rather large tree, the bark of which is aromatic, yielding an essential oil identical with that of *Gaultheria*, and the timber is fine-grained and valuable for cabinet-work. The *Betula papyracea* grows in the Northern States to the height of about seventy feet, has a fine-grained wood, and a very tough, durable white bark, splitting freely into thin layers, which have been used as paper. The Indians make canoes of this bark. The *Betula lutea* (or *excelsa*) sometimes attains a height of nearly eighty feet, and is remarkable for the brilliant yellow tint of its bark or epidermis. The leaves are from three to five inches long. Besides the above and several less important species, the U. S. have the *Betula nigra*, or river birch, which grows on the banks of streams and has remarkably tough wood. Russia leather is tanned with birch bark. "Russian oil" is a tar-like, empyreumatic substance obtained from birch-wood in Russia, and is useful in certain skin diseases.

Birch (Samuel), LL.D., born in London Nov. 3, 1813, one of the best modern Egyptologists, is the author of nearly all the last volume of Bunsen's work on Egypt, and has published a treatise on "Hieroglyphics" (1857), the "Rhind Papyri" (1866), and numerous other treatises on archæology, etc. His studies embrace Chinese literature and all departments of antiquities and ethnology.

Birch (Thomas), D. D., F. R. S., an English biographer and historian, born in London Nov. 23, 1705. He took orders in the Anglican Church, and became rector of a parish in London. Among his numerous works are "The General Dictionary, Historical and Critical" (10 vols., 1734–41), a "Life of Archbishop Tillotson" (1752), "Memoirs of the Reign of Queen Elizabeth" (2 vols., 1754), and a "History of the Royal Society" (4 vols., 1757). Died Jan. 9, 1766.

Birch Coo'ley, a post-township of Renville co., Minn. Pop. 503.

Birch-Pfeif'fer (Charlotte), a German actress and dramatic writer, born at Stuttgart June 2, 1800, was married to Dr. Birch of Copenhagen in 1825. She attained success as a performer and a writer. Among her dramas are "Die Günstlinge," "Hinko," "Dorf and Stadt" (1848), and "Anna of Austria" ("Anna von Oestreich," 1850). Died Aug. 25, 1868.

Birch Point Plantation, a township of Somerset co., Me. Pop. 2.

Birch Run, a post-township of Saginaw co., Mich., 15 miles S. E. of Saginaw. Pop. 925.

Birch Tree, a post-township of Shannon co., Mo. Pop. 312.

Bird. See Birds.

Bird, a township of Jackson co., Ark. Pop. 1313.

Bird (Edward), an English painter of genre and rural scenes, was born at Wolverhampton in 1772. His "Field of Chevy Chase the Day after the Battle" is called his masterpiece. Died in 1819.

Bird (Frederick Mayer), son of Robert Montgomery Bird, noticed below, was born in Philadelphia June 28, 1838, graduated at the University of Pennsylvania in 1857, and at the Union Theological Seminary in New York City in 1860. For several years he was a minister in the Lutheran Church, serving as chaplain in the Union army during the winter of 1862–63. In 1868 he entered the Protestant Episcopal Church, and in 1870 became rector of St. Peter's church in Spottswood, N. J. He owns the largest hymnological library, and is the best-informed hymnologist, in the U. S. He was main editor of the Lutheran Hymn-Book (1865), published "Charles Wesley seen in his Finer and less Familiar Poems" (1867), assisted Bishop Odenheimer in compiling "Hymns of the Spirit" (1872), and has contributed many articles to reviews and newspapers.

Bird (Golding), M. D., an English physician and writer, born in Norfolk in 1815, practised in London, where he also lectured on medical botany. He published a valuable work on the urine. Died in 1854.

Bird (Robert Montgomery), M. D., an American author, born at New Castle, Del., in 1803. He practised medicine in Philadelphia, and wrote, besides other works, "The Gladiator," a tragedy which was successful; "Calavar, a Romance of Mexico" (1834), and the "Infidel," a novel (1835). He became in 1847 one of the chief editors of "The North American and United States Gazette," a daily paper of Philadelphia. Died Jan. 22, 1854.

Bird-Catching Spider (*Mygale aviculariа*), a spider of Cayenne and Surinam. Its body is nearly two inches long, but its legs when stretched out occupy a space almost

Bird-Catching Spider.

a foot in diameter. The hooks of its mandibles are black and very strong. It does not construct a net or web for the capture of its prey, but it obtains it by the chase, and hunts only in the night. This spider and other species of *Mygale* will attack and kill small birds. It is asserted that in some tropical countries there are spiders which feed upon birds caught in their webs.

Bird Cherry, a name given in England to the *Prunus Padus*, which is a small tree growing wild in Europe, and called *hagberry* in Scotland. It bears racemes of small drupes of a sweetish and bitterish taste, which are used in the north of Europe to make spirituous liquors. Nearly allied to this is the wild cherry or choke cherry of the U. S. (See Prunus Virginiana.)

Birde, or **Byrd** (William), a distinguished English composer of church music, born in 1540. In conjunction with Thomas Tallis he became organist to Queen Elizabeth in 1575. He produced, among other works, "Sacred Songs," and a magnificent canon entitled "Non Nobis Domine." Died in 1623.

Bird Lime [Lat. *vis'cus*], a viscous adhesive substance placed on the branches of trees to catch birds which may perch there. It is prepared by boiling the middle bark of the holly (*Ilex*), the mistletoe (*Viscum album*), or other glutinous plants, and concentrating the decoction by evaporation. The gluten of wheat flour is sometimes used as a substitute for bird lime. A tame bird in a cage is sometimes employed to decoy the birds to the tree on which the bird lime is smeared.

Bird of Paradise, the name of several species of birds of the genus *Paradisea* and kindred genera, of the order Insessores, and of the tribe Conirostres, natives of Papua and the neighboring islands, remarkable for the beautiful form and splendor of their plumage. The name was originally applied to the *Paradisea apoda*, which was supposed to be destitute of feet, because the skins, which are exported to Europe, are usually deprived of wings and feet. The older naturalists imagined that they passed all their lives floating in the air and feeding on ethereal food or nectar. For these fabulous and fanciful ideas science substitutes the prosaic truth that they are

nearly allied to the Corvidæ (crow family), and are omnivorous. The value of these birds arises chiefly from the extraordinary development and light and beautiful struc-

Bird of Paradise.

ture of the plumes which grow from the scapular and lateral portions of the body. The plumage of the males is

Red Bird of Paradise.

remarkable not only for brightness of tints, but also for a velvety texture and brilliant metallic reflections. Tufts of feathers growing from the shoulders are so prolonged that they extend even beyond the tail, and they constitute the most beautiful part of the plumes of the bird of paradise, which are a highly prized article of commerce for female ornament. The principal species of this genus are the common bird of paradise (*Paradisea apoda*), the royal bird of paradise (*Paradisea regia*), the red bird of paradise (*Paradisea rubra*), the magnificent bird of paradise (*Paradisea magnifica* or *speciosa*), and the six-threaded (or golden) bird of paradise (*Paradisea sexsetacea*), from the head of which grow six long and threadlike feathers, three on each side. The common bird of paradise is about as large as a jay, and is mostly of a cinnamon color, with a throat of emerald green, whence it is sometimes called "the emerald bird of paradise." The royal bird of paradise has two long feathers or filaments, which extend behind the tail and terminate in disks, like the tail-feathers of a peacock. The red bird of paradise has two very long filaments, extending far beyond its rich and beautiful tail-feathers. They are generally gregarious, and they sometimes fly in flocks from one island to another. It is stated that they can fly more easily against than with the wind. In confinement they are lively and bold, and bestow great care on their plumage. Eighteen species are described by Wallace, whose list does not include all the known species.

A recent writer, referring to what he calls "the supremely glorious members of the feathered tribe which have by common consent been termed BIRDS OF PARADISE," observes that "The plumage of these birds is wonderfully rich and varied, and not even the humming-birds themselves present such an inexhaustible treasury of form and color as is found among the comparatively few species of the birds of paradise." (See WALLACE, "Malay Archipelago.")

REVISED BY J. S. NEWBERRY.

Birds [Lat. *aves;* Fr. *oiseau*, plu. *oiseaux;* Ger. *Vögel*], a class of oviparous vertebrate animals, which in several respects are peculiar, and separated from other animals by a very distinct line of demarcation. They are all bipeds, and are all covered with feathers, which nature has given to no animals of other classes. Nearly all birds have the power of flight, which is enjoyed by few other vertebrate animals. The most conspicuous external characteristic of birds is the plumage, which invests their bodies and wings, serves as clothing, and assists in motion through the air. The feathers entangle among their fibres a considerable quantity of air, and are well adapted to protect the bird from extremes of cold and heat. The internal temperature of birds is from 105° to 112° F., much higher than that of men and beasts. Their buoyancy and muscular energy are increased by numerous air-cells which are connected with the lungs, penetrate the substance of the bones, insinuate themselves between the skin and subjacent muscles, and enter the quills, so that the whole organism is permeated by air. The general form of birds is adapted to aërial navigation, and the body is somewhat boat-shaped. The number of vertebræ in the neck varies from ten to twenty-three, and is always greater than is found in any mammal. Among their peculiar organs is the hard, horny, toothless mouth, called a beak or bill. (See BILL.) The head is so articulated to the neck by a single condyle or pivot that a bird can turn its head round in a manner impossible to Mammalia. The number of toes of each foot is generally four, of which three extend forward and one backward; but the Scansores (climbers) have two before and two behind. The various forms of the toes are the characters which distinguish the five primary orders. (See ORNITHOLOGY.) The sternum or breast-bone is very large and strong, serving for the attachment of the powerful muscles which move the expanded wings. In eagles and other rapacious birds the ridge or keel of the sternum is very prominent. The wing of a bird is the homologue of the arm of a man, and is composed of bones which correspond to those of a human arm or the fore leg of a quadruped. The wing is furnished with feathers called quills, which are larger and stronger than those of the other parts of the bird, and which display an admirable combination of strength and lightness. The names of the several varieties of wing-feathers are *primaries, secondaries, tertiaries,* and *coverts.* The primaries are quill-feathers arising from the first or terminal joint—*i. e.* the part of the wing which corresponds to the hand and fingers of a man. The form of these indicates the bird's capacity of flight, and birds of powerful flight have long and firm primaries. Next to these are the secondaries, which are attached to the middle bone, the homologue of man's fore arm. The tertiaries grow from the part of the wing between the elbow and the shoulder. The leg of a bird is formed of bones which are homologous to those of Mammalia, but are subject to modifications. The thigh-bone is very short, and is so concealed within the body or under the feathers that it is not apparent as a part of the leg on a superficial view. The next division, often mis-

taken for the thigh, is the *tibia* or proper leg-bone, which is always the largest bone of the limb. The feet vary according to the habits of the birds, some of which have strong, hooked, and retractile claws fitted for seizing prey, and others are adapted for swimming by a membrane which unites their toes.

The digestive apparatus is modified in accordance with the nature of their food. A large majority of birds do not masticate their food, which passes from the mouth into the crop or craw, an enlargement of the gullet. The *crop*, or first stomach, is large in birds that feed on grain and seeds, and is wanting in those that eat fish. The second stomach, or *proventriculus*, is largest in those birds in which the crop is small or wanting. The third and principal stomach is the *gizzard*, which is a powerful grinding apparatus, especially in those birds which feed on grain and swallow gravel and pebbles, as the common domestic fowl. Birds sleep generally with the head under their wing, and some prefer to stand on one foot while asleep. Others pass the night on branches of trees, which without effort they clasp with their claws, for the tendons of the muscles which close the claws pass over the joints of the leg in such a manner as to be stretched by the mere pressure when the weight of the bird rests on the legs. The sense of sight in this class is exceedingly keen, and is remarkable for its perfect adaptation to near or distant objects. The swallow, when darting through the air with a swiftness which has become proverbial, is capable of accommodating its sight to the insect which it pursues, even in the short time which is occupied by its swoop at its victim. Some birds of prey have an acute sense of smell, and nocturnal birds, such as owls, have sensitive organs of hearing. Birds are distinguished among all dumb animals for their musical powers, and song-birds are doubtless sensitive to sound and differences of pitch. All the best singing-birds belong to the order Insessores.

Among the most interesting subjects connected with the birds are their migrations and the vastly diversified instincts and ingenuity which they exhibit in building nests. The number of eggs in a state of nature varies from one to twenty, and birds generally breed only once a year, which is in spring. Many species of birds are gregarious, but large rapacious birds are quite solitary in their mode of life. They all moult—*i. e.* change their feathers once a year—and the summer plumage of many birds is very different from the winter dress. The plumage of the males is generally richer and more brilliant than that of the females. Birds perform an important part in the economy of nature. Their flesh and eggs are valuable as food for man, and many species render him great service by checking the increase of insects. "There are few objects," says J. G. Wood, "which will better repay investigation than the young bird in its various stages of development. It is so wonderful to see the manner in which a living creature is gradually evolved from the apparently lifeless substances that are contained within an egg. The being seems to grow under our very gaze, and we arise from the wondrous spectacle with an involuntary feeling that we have been present at a veritable act of creation." (For the classification of birds, see ORNITHOLOGY.)

The earliest traces of the existence of birds on the globe have been supposed to be the so-called birds' tracks in the triassic sandstones of the Connecticut Valley; but it is now generally conceded that most if not all these tracks were made by reptiles and amphibians. Feathers, supposed to have belonged to birds, have been found in the Jurassic rocks of England, and in the lithographic slates of Solenhofen (Jurassic) a nearly complete bird has been recently discovered. This has been described by Prof. Owen, and called *Archæopteryx*. It exhibits some remarkable anatomical features, and is supposed to form a kind of connecting link between birds and reptiles. (See ARCHÆOPTERYX.) The remains of birds have been found in the greensand of England, the eocene of the island of Sheppy, and the Paris basin, as well as in the more recent tertiaries at various European localities. In America fossil birds were unknown until quite recently; they have now been found, however, in the greensand of New Jersey, the cretaceous beds of Kansas, and the tertiary deposits of Wyoming and Idaho. Nearly all these remains have been discovered by Prof. O. C. Marsh, who has made them objects of special search. The most important of Prof. Marsh's discoveries in this branch of palæontology is that of a bird with teeth in the cretaceous beds at Fort Harker, Kan. In the superficial deposits of New Zealand and Madagascar the remains of several kinds of extinct birds have been met with, some of which far exceed in dimensions the largest now living. The great bird of Madagascar is called *Æpiornis maximus*. It is supposed to have been at least twelve feet in height, and very massive. The egg of this bird was over a foot in length. The contents of one of these eggs were equal to those of six ostrichs' eggs or 148 hens' eggs. The largest extinct birds of New Zealand have been described under the name of *Dinornis* by Prof. Owen. They were from six to ten feet in height; and one species, *Dinornis elephantopus*, had legs and feet nearly as massive as those of the elephant. REVISED BY J. S. NEWBERRY.

Bird'sall, a post-township of Allegany co., N. Y. Pop. 755.

Birds'borough, a post-village of Berks co., Pa. It has one weekly newspaper.

Bird's-Eye Limestone, a compact, dove-colored stone, with whitish crystalline points, belonging to the lower division of the Trenton group of the lower Silurian strata of North America, apparently corresponding to the Llandeilo flags. It contains many orthoceratites of enormous size, and fossil brachiopods.

Bird's-Eye View, a term used in the fine arts to denote a picture or view arranged according to the laws of perspective, in which the point of sight or situation of the eye is placed at a considerable height above the object. This is a convenient method of representing battles, or of delineating a large city or a small tract of country. In sketching a locality for military purposes this kind of perspective is used. A common kind of bird's-eye view differs from ordinary perspective only in that the horizontal line is placed considerably above the picture.

Bird's Foot (*Ornith'opus*), a genus of plants of the order Leguminosæ, sub-order Papilionaceæ, derives its name from the resemblance of the curved pods to birds' claws. One species, the *Ornithopus sativus*, an annual plant, a native of Portugal, is cultivated in that country, and affords a nutritious green fodder for cattle. Its Portuguese name is *serradilla*.

Bird's Foot Trefoil (*Lotus*), a genus of plants of the order Leguminosæ, sub-order Papilionaceæ, comprises numerous species, natives of the temperate and cold regions of the Old World. They are so called because a cluster of their pods resembles a bird's foot. The *Lotus corniculatus* is common in the pastures of Great Britain, and is eaten with avidity by cattle. It bears yellow flowers, which have a honey-like smell, and leaves which are trifoliate, like those of clover. A larger species or variety, called *Lotus major*, is also a native of England.

Birds' Nests, Edible, the nest of the sea-swallow (*Hirundo esculenta*) of the Malay Archipelago, a bird of the size of a common martin. It builds its nest of a glutinous substance which it is said to derive from a sea-weed. This weed is swallowed and partly digested, and then disgorged and fashioned into a nest as large as a common coffee-cup. When fresh these nests are of a waxy white color, and are said to be worth twice their weight in silver in the markets of China, where alone they are sold. The poorer sorts bring $5 or more a pound, according to the age of the nests. The taste of dishes prepared from these nests is said to be insipid, but the Chinese prize them, not perhaps so much for their taste as for their supposed tonic and aphrodisiac powers.

Birds of Passage are birds which are migratory, passing instinctively and habitually from one country or latitude to another on account of the change of the season. The migration of birds is generally from north to south, or from south to north, in the temperate zones. They migrate twice in a year, moving northward in the spring, and southward in the autumn, directed by a sagacious instinct to the regions in which their proper food is then most abundant. Migratory birds which breed in the U. S. are called summer birds of passage with reference to those States. They return in autumn to the tropical regions, and are winter birds of passage in the countries where they pass the winter. Wild-geese and other waterfowl that breed in the Arctic regions in summer annually visit the U. S. and Great Britain in autumn, and return northward in the spring. Several other species that are not aquatic, as the woodcock, fieldfare, and snow-bird, pass the winter in the temperate parts of Europe or the U. S., and spend the summer in a more northern latitude. On the approach of cold weather the swallows of Europe pass across the Mediterranean into Africa. "Before the time of migration," says Wood, "they may be seen assembled in great numbers, chattering eagerly and appearing to be holding a great parliament for the settlement of affairs before starting on their long journey. They do not migrate in flocks, but pass in little families of two or three in number across the vast space that separates them from the end of their journey. Although such powerful and swift fliers, they become fatigued in passing the sea, and will flock in great numbers to rest upon the rigging of some ship that may happen to pass their course. It is rather curious that the birds almost invariably fly in a line directly north and south."

Bi′ren, Biron, or **Bu′ren** (Ernest John), duke of Courland, was born in 1687. He gained the favor of Anna (a niece of Peter the Great), who became empress of Russia in 1730, and gave him the title of duke. He was a powerful favorite during her reign, and abused his power by the execution of many innocent persons. On the death of Anna in 1740 he became regent, but he was exiled to Siberia in 1741. When Elizabeth ascended the throne in 1741 she permitted him to return to Russia, and in 1763 the duchy of Courland was restored to him. Died Dec. 28, 1772. (See Ruehl, "Geschichte E. J. von Biron," 2 vols., 1764.)

Birk′enhead, a seaport-town of England, in Cheshire, is on the left bank and near the mouth of the Mersey, opposite Liverpool, and 15 miles N. N. W. of Chester, with which it is connected by railway. It is about 1½ miles S. W. of Liverpool, and is the residence of many merchants who do business in that city. Steamers cross the river between these places once in fifteen minutes, or oftener. Birkenhead was only a small fishing-village as recently as 1824, since which it has increased rapidly in consequence of the construction of extensive docks and important public works. It has wide streets, a fine public park, a college called St. Aidan's (designed for the education of young men for the Anglican ministry), and many handsome villas. One of the docks occupies 120 acres. Pop. in 1871, 65,980.

Bir′mingham, one of the greatest manufacturing cities of England, is situated in the county of Warwick, on the river Rea, 79 miles by rail S. E. of Liverpool, and 130 miles by rail N. W. of London. It is built on the eastern slope of three undulating hills, and has a gravelly foundation. Its suburbs extend into Staffordshire and Worcestershire. It returns three members to Parliament. Birmingham is the chief town of Great Britain for the manufacture of hardware and metallic products made of gold, silver, brass, iron, steel, and mixed metal, including firearms, swords, jewelry, buttons, tools, steel pens, locks, steam-engines, and all sorts of machinery. The value of the goods manufactured here in a year is estimated at more than £4,500,000. Here are also extensive manufactures of glass and papier-maché. Several railways extend from this city to London, Liverpool, Manchester, etc. Birmingham contains about 100 churches; Queen's College, connected with the London University; a free public library; a botanic garden; a Roman Catholic cathedral; and a town-hall, which is a handsome edifice of the classic style, with a very fine organ. A musical festival is held in this hall once in three years. In the vicinity of Birmingham are the famous Soho and Smethwick Works, founded by Watt and Boulton, who there manufactured their first steam-engines. Among the charitable institutions are an asylum for the deaf and dumb, and an asylum for the blind. Pop. in 1871, 343,676.

Birmingham, a new city in Jefferson co., Ala., at the crossing of the South and North Alabama and Alabama and Chattanooga R. Rs. Other railroads are being constructed to the same point. This will doubtless soon be a great railroad centre. It already (1873) claims several thousand inhabitants. Extensive beds of coal and iron ore lie in its vicinity, and contribute essentially to the prosperity of the place. It has one national bank and one weekly newspaper.

Birmingham, a manufacturing borough of New Haven co., Conn., on the Housatonic River, at the mouth of the Naugatuck, 9 miles W. of New Haven. A bridge across the Naugatuck connects it with the village of Old Derby, which is on the Naugatuck R. R. A new railroad, the Derby and New Haven, connects it with New Haven. It has one national bank, several rolling-mills, manufactures of augers, chains, pins, and carriage-axles and springs, and one newspaper. Steamboats ply daily between this place and New York. Here is the first pin-factory established in the U. S. Pop. 2103, or, including Derby Narrows, 3364.

Ed. "Derby Transcript."

Birmingham, a post-twp. of Schuyler co., Ill. P. 1253.

Birmingham, a post-village of Union township, Van Buren co., Ia. It has one weekly newspaper. Pop. 626.

Birmingham, a post-village of Marshall co., Ky. Pop. 322.

Birmingham, a former borough of Alleghany co., Pa., on the left (W.) bank of the Monongahela River, 1 mile S. of Pittsburg, with which it is connected by a bridge 1500 feet long. It derives its prosperity chiefly from manufactures of glass and iron, and has a national bank. The name of its post-office is Buchanan. Pop. 8603. In 1872 it was united to Pittsburg.

Birmingham, a township of Chester co., Pa. Pop. 450.

Birmingham, a township of Delaware co., Pa. P. 765.

Birmingham, a post-borough of Huntingdon co., Pa., 77 miles N. W. of Harrisburg. Pop. 263.

Birmingham Falls, a village of Au Sable township, Clinton co., and Chesterfield township, Essex co., N. Y., at the head of the rapids of the Au Sable River, has a paper-mill, two starch-factories, etc.

Bir′nam, a hill of Scotland, in Perthshire, 12 miles N. W. of Perth, is 1580 feet high, and commands a fine view of the valley of the Tay. It was formerly covered by part of a royal forest, to which Shakspeare has given celebrity in his tragedy of "Macbeth."

Bir′ney (David Bell), an American general, born at Huntsville, Ala., May 29, 1825, practised law in Philadelphia. He became a brigadier-general of Union volunteers in 1861, and as such served at Fredericksburg, Dec., 1862. He was raised to the rank of major-general, and commanded a division at Gettysburg in July, 1863, and in several battles in Virginia in 1864. Died Oct. 18, 1864.

Birney (James G.), a distinguished opponent of slavery, the father of the preceding, was born at Danville, Ky., Feb. 4, 1792, graduated at Princeton in 1812, and became a lawyer. He was the owner of about twenty slaves, whom he liberated, and he founded at Cincinnati an anti-slavery paper called "The Philanthropist." His office was soon attacked by a mob, which threw his press into the river. Having become secretary of the American Anti-Slavery Society, he removed to New York City about 1836. He was nominated in 1840 for the presidency of the U. S. by the Liberty party, which also supported him in the election of 1844. Died Nov. 24, 1857.

Biron, de (Charles de Gontaut), Duke, a French general, born in 1562, was a son of Armand (died 1592). He served with distinction at Ivry, 1590, became a favorite of Henry IV., marshal of France in 1595, and was appointed governor of Burgundy. He was ambitious, and was convicted of forming a treasonable plot with the duke of Savoy, for which he was put to death July 31, 1602. (See De Thou, "Historia sui Temporis;" Martir-Rizo, "Historia de la Vida del Duque de Biron," 1629.)

Bisa′ccia (anc. *Romulea*), a town of Italy, in the province of Avellino, on a hill 32 miles E. N. E. of Avellino. Here is a much-frequented sulphur spring. Pop. 4977.

Bisaqui′no, Busaqui′no, or **Busacchi′no,** a town of Sicily, in Palermo, 30 miles S. S. E. of Palermo, has an extensive trade in grain and oil. Pop. 8585.

Bis′cay, or **Bisca′ya** [Sp. *Vizca′ya*], one of the four Basque provinces of Spain, is bounded on the N. by the Bay of Biscay, on the E. by Guipúzcoa, on the S. by Alava, and on the W. by Santander. Area, 834 square miles. It consists partly of mountains and partly of level plains. The chief products are wine, fruit, walnuts, chestnuts, figs, and grain. Capital, Bilbao. Pop. 778,229.

Biscay, Bay of [Fr. *Golfe de Gascogne;* anc. *Gal′licus Oce′anus,* or *Aquitan′icus Si′nus*], a portion of the Atlantic Ocean bordering on France and Spain, extends from the French island of Ushant to Cape Ortegal. The depth, which is greatest near the coast of Spain, varies from 20 to 200 fathoms. The southern or Spanish coast is bold and rocky, but the E. coast, from the Adour to the mouth of the Gironde, is low and sandy. The largest rivers that flow into this bay are the Loire and the Gironde. The principal ports on it are Nantes, Bordeaux, Bayonne, La Rochelle, and Rochefort in France, and Bilbao and Santander in Spain. Violent currents and winds render the navigation of this bay difficult.

Biscayne, formerly **Miam′i,** a post-village, capital of Dade co., Fla., on Biscayne Bay. It is celebrated for its healthfulness and delightful climate. It has been proposed to establish here a tropical botanic garden. On Key Biscayne there is a lighthouse with a fixed white light 100 feet above the sea; lat. 25° 39′ 51″ N., lon. 80° 09′ 24″ W. It has important sponge-fisheries.

Bisceglia, be-shā′yå, or **Bise′glie,** a fortified seaport-town of Italy, in Bari, and on the Adriatic, 25 miles W. N. W. of Bari. It has a cathedral, a college, and several churches and convents. Excellent currants and olives are raised in the vicinity. It is connected by rail with Foggia and all the points along the coast S. of Barletta to Brindisi. Pop. in 1872, 21,371.

Bisch′of (Karl Gustav), a German chemist, born at Wörd, near Nuremberg, Jan. 18, 1792. He became professor of chemistry at Bonn in 1822. His chief work is a "Manual of Chemical and Physical Geology" (2 vols., 1847–54; 2d ed., Bonn, 1863–66). Died Nov. 30, 1870.

Bischoff (Theodor Ludwig Wilhelm), a German physiologist and anatomist, born at Hanover Oct. 28, 1807. He became professor of anatomy at Heidelberg in 1836, at Giessen in 1843, and obtained a chair at Munich in 1854.

He gained distinction by his researches in embryology, on which he wrote several treatises.

Bisch'weiler, a town of Alsace, on the river Moder, 14 miles by rail E. N. E. of Strasburg. It has manufactures of linens, coarse woollen cloths, gloves, and earthenware. It is the centre of the hop-trade in Lower Alsace. Near it is a rich mine of iron. It was formerly fortified. Pop. in 1871, 9231.

Bis'cuit [Fr. *bis*, "twice," and *cuit*, passive part., from *cuire*, to "cook" or "bake"], a hard kind of unfermented bread formed into small cakes or flat pieces, and sometimes called ship-bread or sea-biscuit. It is composed of wheat flour, water, and salt, and is rendered hard and dry by baking, in order that it may be preserved for a long time. Biscuits are exposed to the heat of an oven for about twelve minutes, and afterwards dried in a warm room for two or three days. "Captain's biscuit" is prepared with butter, in addition to the ingredients mentioned above, and sometimes contains milk. Water or hard biscuits are made of flour, water, with variable quantities of butter, eggs, and sugar. Soft biscuits contain increased proportions of butter and sugar. Several varieties of fermented biscuits are manufactured. Meat biscuit consists of wheat flour, combined with the essential or soluble part of beef, so that the nutritive qualities of the meat may be preserved for a long time. To prepare this biscuit large pieces of beef, with water sufficient to cover them, are subjected to slow ebullition. The fat is skimmed off, the liquor is reduced by evaporation to the consistency of syrup, and is then mixed with wheat flour, rolled out to the thickness of ordinary ship-biscuit, and cut, baked, and dried in the same manner as common biscuits. One pound of meat biscuit contains about one half pound of flour and the soluble part of five pounds of meat. It is used in the form of soup, which is made by boiling the biscuit in twenty times its weight of water for half an hour. (See PEMMICAN.)

BISCUIT, in pottery, is applied to porcelain and earthenware after it has been hardened in the fire, and before it has received the glaze. In this state it is porous and permeable to water. Biscuit in sculpture is a species of porcelain, of which groups and figures in miniature are formed, which are twice passed through the furnace or oven.

Bish'areen', a name given to several nomadic tribes who live in the desert between the Red Sea and the valley of the Nile. Their most valuable possessions are camels, horses, sheep, and goats. They have no firearms, but are armed with bows and arrows, and are addicted to robbery. They profess the Mohammedan religion. One tribe of Bishareen is the largest Arab tribe of Nubia. Like all the Arabs of Upper Egypt, they pay taxes to the khedive.

Bish'op [Gr. ἐπίσκοπος (*i. e.* "overseer"); Lat. *epis'copus;* Fr. *évêque;* Ger. *Bish'of;* Dutch, *bis'cop*], the name applied to an ecclesiastic of the highest rank in the Christian Church—all archbishops, patriarchs, and the pope himself belonging to the order of bishops. In many Protestant denominations the order of bishops is held to be identical with that of presbyters or elders; and in such sects these names are used in preference to that of bishop. Other churches claim for their bishops, by direct succession, an authority derived from the twelve apostles. The principal churches recognizing the superior rank of bishops are the Greek, the Roman Catholic, the Armenian, Coptic, Abyssinian, Nestorian, and Jacobite, the various parts of the Anglican, the Moravian, the Mormon, the Catholic Apostolic (Irvingite), and a part of the Lutheran churches. The Methodist Episcopal churches and some others give their bishops a superiority of office, but not of order. In the Roman Catholic and Anglican churches bishops have the title of "right reverend." In the former, bishops are of six classes: 1st, the pope; 2d, patriarchs; 3d, primates, who are archbishops of the principal sees of some countries; 4th, metropolitans, who are bishops of the large cities, and have a certain authority over smaller sees; 5th, simple bishops; 6th, inferior bishops, as *episcopi vacui*, bishops without cures; bishops *in partibus infidelium*, who are titular bishops, either without office or coadjutors to diocesan bishops. The assistants of metropolitans are called suffragans, but the bishops under a metropolitan are also termed his suffragans. The insignia of bishops in the Greek and Roman Catholic churches are the ring, staff, mitre, gloves, pallium (now worn only by superior bishops), and pectoral. In Great Britain and its dependencies bishops are called lord bishops; and all English bishops, except the bishop of Sodor and Man, and the junior bishop in England proper, have votes in the House of Lords. (See VICAR APOSTOLIC.)

Bishop, a township of Effingham co., Ill. Pop. 564.

Bishop (ANNA), born in London in 1814, was the daughter of Mr. Rivière, an artist. In 1831 she married Sir H. R. Bishop. Her *début* was made in 1837. She has won the highest distinction as a singer, both in classical music and modern opera. Her second husband is Mr. M. Schultz of New York, whom she married in 1858.

Bishop (Sir HENRY ROWLEY), MUS. DR., an eminent English composer of music, born in London in 1780. He produced numerous popular operas, which are commended for their long flowing melodies and animated style. Among them are "Guy Mannering," "Maid Marian," "Native Land," and "The Virgin of the Sun." His glees are very fine. He was knighted in 1842, and was appointed professor of music in the University of Oxford in 1848. Died April 30, 1855. His second wife was Anna Bishop, noticed above.

Bishop Creek, a township of Inyo co., Cal. Pop. 624.

Bish'op's Auck'land, an English market-town, county of Durham, 10 miles S. W. of Durham. It is well built and growing. The fine large castle of the bishop of Durham is here. Pop. 6480.

Bish'op's Stort'ford, a town of England, in Hertfordshire, on the river Stort, 32 miles by rail N. N. E. of London. It is also connected by rail with Cambridge and Colchester. It has a corn and malt trade. In Saxon times it was owned by the bishop of London. Pop. 5280.

Bish'opville, a post-township of Sumter co., S. C. Pop. 1701.

Bis'marck-Schön'hau'sen, von (KARL OTTO), PRINCE, a celebrated Prussian statesman, born at Schönhausen on the 1st of April, 1815. He was educated at the universities of Göttingen and Berlin. After he had studied law, he resided for some years on his paternal estate in Pomerania, and married Johanna von Putkammer in 1847. He was chosen the same year a member of the united Diet or parliament, in which he distinguished himself as a Junker and an advocate of ultra-royalist principles. In 1851 he began his diplomatic career as Prussian secretary of legation at the Federal Diet in Frankfort. Here he manifested his hostility to Austria, and his determination to aggrandize the Prussian monarchy. He was sent to Vienna in 1852. In 1857 he had a conference with Napoleon III. in Paris. He was sent as ambassador to St. Petersburg in 1859. In a letter dated St. Petersburg, May 12, 1859, he says: "I see in our position in the Diet a defect of Prussia which we shall have sooner or later to heal *ferro et igni*" (with iron and fire). He had acquired the confidence of the king, who sent him early in 1862 on a mission to Paris, and in the autumn of that year he was appointed minister of foreign affairs and prime minister. His reactionary policy being resisted with success by the liberals, he closed or dissolved the chamber in Oct., 1862, and announced that he would enforce his measures without the sanction of the deputies. He rendered himself very unpopular, especially with the party of progress and the friends of constitutional government. Austria and Prussia co-operated in the spoliation of Denmark and the conquest of Sleswick and Holstein in 1864.

The rivalry of Austria and Prussia was for a long time a great obstacle to the reunion or reconstruction of Germany as a nation. Bismarck adopted the axiom that Austria must be excluded from the German federation, and that a new union of German states must be formed under the leadership of Prussia. Both of these rivals prepared for war, and as Austria was supported by a majority of the Federal Diet, Prussia seceded from the confederation and appealed to arms in June, 1866. The Prussian armies, assuming the offensive, marched rapidly into Bohemia, and defeated the Austrians at the decisive battle of Sadowa, July 3, 1866. The war was ended by a treaty signed in August of that year, by which Austria was excluded from the German federation. Among the results of this victory was the annexation of Hanover, Electoral Hesse, Holstein, and other states to Prussia, and the formation of the North German Confederation, including all the states N. of the river Maine. Bismarck negotiated in 1866 secret treaties of alliance with Bavaria, Baden, and Würtemberg, which powers agreed that the king of Prussia should command their armies in time of war. The great and sudden increase in the power of Prussia which followed the victory at Sadowa is ascribed chiefly to the energy and diplomatic genius of Bismarck, who was appointed chancellor of the North German Confederation in 1867.

The prestige of Napoleon was much impaired by the great step which had been made in 1866 towards the unity of Germany, and the rise of a new military power so alarming to the French. It is generally admitted that Napoleon III. was not an equal match for Bismarck in the diplomatic intrigues and contests that ensued after the war of 1866. The "Edinburgh Review" (Oct., 1869) has the following estimate of Bismarck: "We cannot consider him a really great statesman, though he has certainly gifts of the high-

est order. He is a first-rate diplomatist and negotiator. No man can captivate more adroitly those he wants to win; nobody knows better to strike at the right moment, or to wait when the tide is running in his favor. His personal courage is great, physically as well as morally; he shrinks from nothing conducive to his end. He is not naturally eloquent, but his speeches are generally impressive and full of terse argument. He is a capital companion in society—witty, genial, sparkling in his conversation. . . . But by the side of these virtues the darker shades are not wanting. He can tell the very reverse of the truth with an amazing coolness; still oftener will he tell the plain truth when he knows he will not be believed."

In July, 1870, Napoleon declared war against Prussia, which was ready for the contest after a few days' notice, and was aided by all the German states except those of Austria. Bismarck accompanied the German army which invaded France, and which gained a series of decisive victories. He was present at the capture of Napoleon at Sedan, and followed King William to the siege of Paris. At an interview with Jules Favre, the French minister of foreign affairs, who made overtures of peace in September, Bismarck demanded the cession of Alsace and part of Lorraine. He spoke contemptuously of the ministers of the new régime as "the gentlemen of the pavement." After the surrender of Paris in Feb., 1871, he negotiated the treaty of peace by which France ceded to the victors Alsace and a part of Lorraine, including the important fortress of Metz, and agreed to pay in money an indemnity of five milliards of francs, equal to $1,000,000,000. The definitive treaty was signed at Frankfort in May. Bismarck received the title of prince and became chancellor of the new empire in 1871. In 1873 he resigned his position as prime minister of Prussia. By his recent course in opposition to the ultramontane and conservative party he has gained great popularity with the liberals. (See "Graf Bismarck, ein Lebensbild," 1867; BAMBERGER, "Herr von Bismarck," 1868, also in French and English; "Fürst Bismarck," in vol. vii., part 1, 1871, of "Unsere Zeit.")

REVISED BY A. J. SCHEM.

Bis'mark, a post-village of St. François co., Mo., on the St. Louis and Iron Mountain R. R., 76 miles S. of St. Louis. A branch railroad extends from this point 11 miles to Pilot Knob and to Piermont, 40 miles beyond.

Bis'muth (symbol Bi; specific gravity about 9.8; equivalent 208), a brittle metal of a crystalline texture and of a yellowish-white color, occurs native in Germany, France, Cornwall, California, Texas, and Sweden. It is also found in combination with oxygen, sulphur, and arsenic. Rich deposits of bismuth ore have recently been found in Utah. It fuses at about 500° F. When strongly heated it burns with a bluish-white flame, and is rapidly oxidized. This metal is not often used in the arts in a pure state, but its alloys are of considerable importance. Some of them are extremely fusible. A compound of eight parts of bismuth, five of lead, and three of tin melts in boiling water, and is called *fusible metal.* Other alloys are even more fusible. Bismuth is an ingredient of some kinds of stereotype metal. The most important of several compounds it forms with oxygen is the tri-oxide (Bi_2O_3), which is employed in the manufacture of porcelain as an agent for fixing the gilding and for increasing the fusibility of fluxes. The sub-nitrate is a tasteless, heavy powder of pure white color, called pearl white, pearl powder, blanc de fard, etc. This is used as a cosmetic. As a medicine it acts as a tonic and antispasmodic. Other medicinal preparations are the sub-carbonate, the sub-oxide, the citrate, the tannate, and the valerianate.

Bis'muthine, a tri-sulphide of bismuth, is composed of 81.6 per cent. of bismuth and 18.4 of sulphur. It occurs in lodes and beds in the older rocks with ores of arsenic, copper, iron, and lead, either crystallized in acicular prisms or massive with a foliated structure. It is a rare mineral.

Bi'son, a genus of animals of the order Ruminantia and family Bovidæ, nearly allied to the ox, natives of Europe and North America. The bisons have short horns, which are curved inward at the point. They are distinguished from the ox by an additional pair of ribs (having fourteen pairs), and by long woolly or shaggy hair, which covers the neck and shoulders of the males. At least three species of fossil bison have been discovered. (For the European bison, see AUROCHS.) The American bison (*Bison Americanus*) is known in the U. S. by the incorrect name of buffalo. This is the only species of the ox family indigenous to America, except the musk ox. It is similar to the European bison, but the fore parts are more shaggy, and it is a powerful and ferocious-looking animal, which no American beast can overcome or resist except the grizzly bear. The color of its hair is mostly brown. Vast herds of bisons roam over the plains and prairies between the Mississippi River and the Rocky Mountains, feeding on grass and brushwood. They are generally inoffensive, and will not attack men, but prefer to run rather than to fight. During their migration they move in enormous herds, which are innumerable and irresistible. Great numbers of them are killed by Indians, who pursue them on horseback and subsist on their flesh. Their hides are also valuable, and under the name of buffalo robes are an important article of commerce. The flesh of the cows is highly esteemed, and is similar to beef, being very juicy and savory. The bisons are swift in running, and have so keen a sense of smell that the hunter cannot easily approach near enough to shoot them. The Indians sometimes circumvent them by setting fire to the prairie grass on several sides, and thus driving them in confusion towards a central position. They also drive them over precipices in large herds, the momentum of which is such that the leaders cannot stop or retreat, being forced forward by the mass behind them. The chase of bisons is attended with some danger, as they sometimes turn upon an assailant, who is liable to be trampled under the feet of the herd. Numerous tribes of aborigines are mainly dependent on the bison for their food and clothing. Their skins, which are covered with soft hair or fur, are much used for blankets, and their flesh and fat are converted into *pemmican,* the favorite food of the fur-hunters and *voyageurs* of North America. The bison differs from the true buffaloes in having a hump upon the back, and in the absence of the dewlap, which is small in the buffaloes. The buffaloes have cavities in their horns communicating with the nasal passages—the bison has not; the horns turn outward in the true buffaloes, and inward in the bisons. (See BUFFALO.)

Bison.

REVISED BY C. W. GREENE.

Bissa'gos, or **Bijoo'ja Islands,** a group of numerous small volcanic islands in the Atlantic, near the W. coast of Africa, between lat. 10° and 12° N., and between lon. 15° and 17° W. They have several good ports. Some of them are densely peopled with a savage negro race who cultivate maize, bananas, etc., and raise cattle. Bissão, an island of the above group, is a settlement of Portuguese, who formerly traded in slaves, and who export hides, wax, and rice; it has about 8000 inhabitants.

Bis'sell (WILLIAM H.), M. D., born in Cooperstown, N. Y., April 1, 1811, removed to Illinois in 1837. He practised law for several years, served as a colonel in the Mexican war (1846–47), and was elected a member of Congress by the Democrats in 1848, and served six years. In 1856 he was chosen governor of Illinois by the Republicans. Died Mar. 18, 1860.

Bissex'tile [Lat. *bissextilis,* from *bis,* "twice," and *sextilis,* "sixth"], called in English **Leap-Year,** a name given to the year which contains 366 days. In the Julian calendar the length of the year was fixed at 365¼ days, about 11 minutes more than the actual length. In order that the year should always begin with the beginning of a day, it was directed that every fourth year should contain 366 days, and the other years 365. The additional day was given to February, and was inserted next after the 24th, which the Romans called *Sexto Kalendas Martii.* This was reckoned twice, and the repeated day was *Bis Sexto Kalendas;* hence the name *bissextile.*

Bistineau, bis'te-nō', a lake in the N. W. part of Louisiana, forms the boundary between Bienville and Bossier parishes. It is about 25 miles long, and has a mean width of nearly 2 miles. Its water is discharged through a short outlet into Red River. It is navigable by steamboats.

Bis'tort (*Polygonum Bistorta*), a perennial herbaceous plant of the order Polygonaceæ, is a native of Europe and Asia. It bears flowers in a dense terminal spike. The whole plant is astringent, containing much tannin. The tortuous root is one of the most powerful vegetable astringents, and is used both internally and externally.

Bis'tre, or **Bis'ter,** a pigment of a warm brown color or reddish brown, used by painters in water-colors. It is prepared from the soot of wood, especially the beech.

Bistric'za, a town of Austria, in Croatia, 14 miles N. E. of Agram. Pop. in 1869, 6117.

Bis'tritz, a fortified town of Transylvania, is situated in a beautiful valley on the Bistritz River, 52 miles N. E. of Klausenburg. It has two monasteries, a gymnasium, and several large cattle-fairs every year. Near it are the

ruins of an ancient castle, the former residence of the family of Huniades. Pop. in 1869, 7212.

Bit, in ships, is a frame composed of two short but strong vertical timbers fixed upon the deck in the fore part of the vessel. Its main purpose is for fastening the cable when the ship rides at anchor, and for "leading" the principal ropes of the rigging. To "bit the cable" is to fasten it round the bit. Various kinds are called "riding-bits," "paul-bits," "jeer-bits," "topsail-sheet-bits," etc. To resist strains, the bits are strongly bolted to the beams that support the deck.

Bitsch [Fr. *Bitche;* Lat. *Bicina*], a small fortified town of Lorraine, in a pass of the Vosges, about 36 miles N. N. W. of Strasburg and 64 miles E. of Metz. Here is a citadel on a steep isolated rock that is nearly impregnable. It was in the French department of Moselle until 1870, when possession was taken of it by the Germans at the general cession of the country; for, in spite of a long siege and bombardment, it was not surrendered. Pop. in 1866, 2740.

Bit'hoor', or **Bittoor,** a town of India, in the Northwestern Provinces, and on the right bank of the Ganges, about 12 miles N. W. of Cawnpore. It has numerous pagodas, and is visited by multitudes of pilgrims. During the mutiny of 1857 it was a stronghold of Nana Sahib, and was taken by Gen. Havelock in Aug., 1857. Pop. about 8000.

Bithyn'ia, an ancient country of Asia Minor, was bounded on the N. by the Pontus Euxinus (Black Sea), on the E. by Paphlagonia, on the S. by Galatia and Phrygia, and on the W. by the Propontis (Sea of Mármora), which separated it from Europe. The chief towns were Nicomedia, Chalcedon, Nicæa, Prusa, and Heraclea. Bithynia was annexed to the Persian empire in 543 B. C., and afterwards became an independent kingdom. Nicomedes I. began to reign over it in 278 B. C., and died in 246. Prusias II. was king of Bithynia in the time of Hannibal, who sought refuge at his court. In 74 B. C., Bithynia became a province of the Roman empire. Nicomedia was for a long time the capital of the kingdom. In 1298 the Turks conquered the country, and in 1328 made Prusa the capital of their whole empire.

Bit'lis, Betlis, or **Bedlis,** a town of Asiatic Turkey, 60 miles W. S. W. of Van. It is built in a wide ravine between limestone ridges or hills which rise about 2000 feet higher than the town. It contains three mosques, several convents, and an ancient castle, and has manufactures of firearms, and cotton cloths of a bright-red dye. Pop. from 10,000 to 12,000, of which about one-third are Armenians. The Persians defeated the army of Solyman the Magnificent near Bitlis in 1554.

Biton'to (anc. *Butuntum* or *Bituntum*), a town of Italy, in the province of Bari, 11 miles W. of Bari. It is well built, and has a fine cathedral and several monasteries. Good wine is made in the vicinity. The Spaniards gained a decisive victory over the Austrians here May 25, 1734. Pop. in 1872, 24,978.

Bitter Almond Oil. See Almonds, Oil of.

Bitter Creek, a station on the Union Pacific R. R., in Sweetwater co., Wy., 785 miles W. of Omaha. The railroad company has repair-shops at this point. Remarkably imposing scenery abounds in the neighborhood. P. 48.

Bit'terfeld, a town of Prussia, in the province of Saxony, on the Mulde River, 20 miles by rail N. of Leipsic. It is on the railway from Berlin to Leipsic, with branches to Halle and other places. It has important manufactures of cloth, iron, machines, etc. Pop. in 1870, 4972.

Bitter King (*Soulaurea amara*), a shrub or small tree of the order Polygalaceæ, derives its name from its intense bitterness. It is a native of the East Indian Islands, has large oval leaves and axillary racemes of regular flowers. It is used as a remedy for fevers and other diseases.

Bit'tern (*Ardea* or *Botaurus*), a bird of the order Grallatores or waders, is regarded by some naturalists as a species of heron (*Ardea*). It has a long, straight, and sharp bill, long legs, and a long neck. The neck is furnished with a loose plumage or fringe of feathers which it can erect at pleasure. This handsome bird frequents marshy fens and reedy shores of rivers and lakes, where it lies hid during the day, and feeds by night on frogs, fish, etc. The *Ardea stellaris* (common bittern of England) is widely diffused in Europe, Asia, and Africa. It utters a peculiar hollow and booming sound, which is noticed in Goldsmith's line, "The hollow-sounding bittern guards its nest." When assailed it defends itself bravely with its sharp bill, which is about four inches long. In the U. S. are found two bitterns similar in habits to the *Ardea stellaris*—viz. *Botaurus minor* ("bittern" or "bog bull") and *Ardea exilis* ("least bittern").

Bittern.

Bittern, the mother-liquid remaining after the removal of common salt from brines which have been partially evaporated. The bitter taste is due to the magnesium salts present. Sea-water and many salt-wells yield a bittern which is valuable in the production of Epsom salts (sulphate of magnesia), and especially of bromine.

Bitter Principle, a term applied to a great variety of bitter substances of vegetable origin, most of which are alkaloids or glucosides. Welter applies this name to carbazotic or picric acid, a crystallizable bitter substance composed of carbon, nitrogen, and oxygen, obtained by the action of nitric acid on indigo, etc.

Bitter Root River of Montana Territory rises in the Rocky Mountains, flows northward, and enters Clark's River in Missoula co. Length, estimated at 110 miles. Gold is found near it.

Bit'ters, the name applied to certain medicines, simple or compound, chiefly of vegetable origin, characterized by a bitter taste, and for the most part having tonic virtues. The simple bitter medicines are *aromatic,* if they have a fragrant odor; *pure,* if bitterness is their principal characteristic to the taste; and *styptic,* if they have an astringent effect upon the tongue. "Bitters," as popularly used, are generally compounds of dilute alcohol with various bitter drugs, as aloes if a cathartic effect be desired; if a tonic effect is sought, the bitters used are calisaya bark, gentian, quassia, columbo, and others. An aromatic is often added.

Bitter Spar, a name given to an easily cleavable variety of Dolomite (which see). It usually occurs in obtuse rhombohedrons, and consists of about 55 per cent. of carbonate of lime and 45 of carbonate of magnesia. Fine transparent crystals of it are found at Gap in France and Traversella in Piedmont.

Bitter-Sweet, or **Woody Nightshade** (*Solanum Dulcamara*), a perennial plant with a shrubby stem, nearly allied to the potato, is a native of Europe and Asia, and is naturalized in the U. S. It has ovate, heart-shaped leaves, the upper ones halberd-shaped or with two ear-like lobes at the base, and purple flowers. The fruit is a poisonous red berry. The stems or twigs gathered in autumn are sometimes used in medicine in chorea and some cutaneous disorders.

The name bitter-sweet is frequently given in this country to a climbing woody vine, the *Celastrus scandens,* of the natural order Celastraceæ, which grows wild in the Northern and Atlantic States. This vine is also called wax-work and staff tree. It has been used in medicine, and is popularly believed to have great virtues as an alterative.

Bitter Wood, a name given to several trees and shrubs of the genus *Xylopia* and the order Anonaceæ, natives of Brazil and the West Indies. They are remarkable for the bitterness of their wood. The fruit of *Xylopia sericea* is aromatic and pungent like pepper. The term is also applied to the *Picræna excelsa* and *Quassia excelsa,* the wood of which is used in medicine as a tonic. (See Quassia.)

Bitu'men [perhaps from the Gr. πίτυς, a "pitch-pine tree"]. This term applies to those mineral substances, both solid and liquid, of an oily or resinous nature, composed principally of hydrogen and carbon, sometimes united with oxygen, for which the general formula is $n(C^xH^y) + m(C^{x'}H^{y'}O^{z'})$. In general terms, therefore, the bitumens are mixtures in sundry proportions of many simple carbonated hydrogens, accompanied in the solid and viscous varieties by many oxygenated carburets of hydrogen.

In general, the whole series of bitumens arrange themselves between two extremes, represented by pit-coal and naphtha as types, as follows:

Pit-coal.		Naphtha.	
Carbon	89.31	Carbon	88.20
Hydrogen	4.92	Hydrogen	11.80
Oxygen and azote	5.77		100.00
	100.00		

Bitumen is employed as the binding substance in a variety of bituminous mastics and cements, which, though principally used as a surface-coating for timber to protect it from decay, and for roofs, arches, walls, area and cellar floors, etc., to render them watertight, is also quite often employed in masonry constructions, both as a matrix for concrete and as a cement between bricks and stone, instead of lime and calcareous cements. It is also used extensively for street and other pavements, and in some of its forms for fuel and for making illuminating gas and varnish.

A knowledge of bitumen dates back to a remote period, but its extensive and varied application in the builder's art is of quite recent origin. It is found in numerous localities and in a variety of forms, principally in the secondary, tertiary, and alluvial formations, seldom in the primitive or older strata. The several varieties pass into each other, from *naphtha*, the most fluid, to *petroleum* and *mineral tar*, which are less so, thence to *maltha*, which is more or less cohesive, to *asphaltum* and *elastic bitumen*, which are solid. They are insoluble in water or alcohol, but combine with the fixed and essential oils. They are most commonly soluble in ether, and generally the more solid varieties are soluble, to a greater or less extent, in those that are more fluid.

Naphtha is a carburet of hydrogen (H_5C_6), is fluid and transparent, exhales a strong odor, burns on the approach of a lighted taper, and will unite with pure ammonia and the fluid caustic alkalies. The principal use of naphtha as an ingredient of cements and mastics is its power of dissolving the more solid bitumens. It also possesses the remarkable property of dissolving india-rubber, which gelatinizes when digested in it with gentle heat, and in this pulpy state is used to render fabrics waterproof. Naphtha is found near Baku, on the western shore of the Caspian Sea, and various parts of Persia; also at Monte Cain, near Piacenza in Italy, and near Amiano in the duchy of Parma. It is also found in Calabria, in Sicily, and in America.

Petroleum is less limpid than naphtha, is unctuous to the touch, blackish or brownish in color, more or less translucid, has a strong odor and a pungent, acrid taste, and is very inflammable, though less so than naphtha. When warm it is as fluid as common tar, but at the freezing-point of water it becomes very viscid. It is much more abundant than naphtha, being found in the secondary rocks, particularly in the coal-strata and in the vicinity of beds of coal. It rises in a spring on the base of Mount Vesuvius, and is found in a stream at Gobian, France. At Beckelbronn in Alsace it is found mixed with about 10 per cent. of sand, from which it is extracted by boiling in water. It is viscous, of a brown color, and is much used as a lubricator for machinery and carriage axles. At Amiano, Italy, it is extracted from a compact, greenish clay, and near Modena it is found on the surface of certain springs. In Transylvania it occurs in most of the salt-mines. The most remarkable and abundant sources of petroleum are found in the U. S., in the vicinity of the coal-beds of Pennsylvania, West Virginia, Ohio, and Kentucky, where it is procured by means of artesian wells, and gives employment to immense capital. The aggregate yield of the oil-wells of Pennsylvania alone has reached as high as 18,000 barrels per day.

Petroleum is a more or less perfect solvent of the more solid bitumens, and when rectified will dissolve india-rubber; and it is in this way that it is useful for cements and mastics. The residuum of refined petroleum will dissolve solid asphaltum.

The viscous bitumens generally, when submitted to distillation, yield a more or less pale-yellow, oily liquid, called by Boussingault *petrolene*, because it is an essential ingredient of petroleum. When pure, this oil, light yellow in color, has a bituminous odor, little taste, boils at 536° F., yielding a vapor of the density of 9.415. It is therefore isomeric with the essential oils of lemon and turpentine. Petroleum at $69\frac{8}{10}$° F. has a specific gravity of .891, and contains 1 equivalent of hydrogen and 1 of carbon, and dissolves sparingly in alcohol. Its composition by analysis is—

Carbon	88.	= 1 equivalent.
Hydrogen	12.	= 1 equivalent.
	100.	

If the petroleum of Beckelbronn and other similar varieties be heated in an oil-bath at a temperature of 482° F., the petrolene is separated and passes off as vapor, and there remains a brilliantly black body, heavier than water, with a conchoidal fracture, and which burns like the resins in general, leaving an abundant coke. As this body possesses the character of asphaltum, and forms an essential part of that bitumen, it is called *asphaltene*. It is oxidized *petroleum*, containing by analysis—

Carbon	75.
Hydrogen	9.9
Oxygen	15.1
	100.00

Mineral tar is regarded as asphaltum containing a larger proportion of bituminous oil than the solid asphaltum. It is more viscid than petroleum, and of a glossy, black color. The principal sources of the mineral tar of commerce are, in France, at Bastenne (Landes) and at Pyrimont-Seyssel (Ain), and in Switzerland at Val-de-Travers in the canton of Neufchâtel, where it is found in the Jurassic limestone formation. At Bastenne, and also at Gaujac, the bitumen flows out from several openings or springs mixed with water, and is also found richly impregnating a quartzy sandstone, from which it is separated by the process of boiling. The Bastenne mines are nearly exhausted. At Seyssel the bitumen is found impregnating both sandstones and limestones. It is procured from the sandstone (called *molasse*) by boiling in water. The tar rises to the surface or adheres to the sides of the vessels in brown lumps, or in a semi-transparent brownish coating. Thus purified it is called *graisse*. A specimen of this sandstone, considerably richer than the average, gave by analysis—

Bituminous oil	8.6	Bitumen	10.60
Carbon	2.		
Quartzy grains			69.00
Calcareous grains			20.40
			100.00

Taken in bulk, the product of the mine is much less rich than this specimen.

The bituminous limestone called asphalt rock is found both at Seyssel and at Val-de-Travers. That from Seyssel contains on an average about 90 per cent. of carbonate of lime and 10 per cent. of bitumen. The Val-de-Travers asphaltic rock is richer, containing about 80 per cent. of carbonate of lime and 20 per cent. of bitumen. The stone is massive, of irregular fracture, and of a liver-brown color. Though easily scratched with the finger nail, it is difficult to break up with a hammer, showing malleable properties under the blows. Its specific gravity is 2.114, water being 1000.

Asphaltum is a dry and solid variety of bitumen, usually very brittle, and at ordinary temperatures too hard to be easily impressed with the finger nail. It is opaque, smooth, slightly translucent at the edges, of black or brownish color, and has little odor unless rubbed or heated. It is very inflammable, melts easily, and if pure burns with little or no residue. It is soluble in alcohol, and not readily so in the fixed and essential oils or ether, but naphtha dissolves one-fifth of its weight of asphaltum at ordinary temperatures, and forms a saturated solution of a deep-black color.

Asphaltum is found floating in the Dead Sea, and in veins with calcareous spar and brown iron ore at Karmsdorf in Saxony. In Cornwall it occurs with sulphurets of lead and copper; near Syrsan on the Wolga in compact limestone; in embedded veins in the secondary limestone in Fifeshire; in clay iron-stone at East Lothian; in veins in Shropshire, England; and in the Hartz Mountains, Germany, along with sparry iron, heavy spar, and brown iron ore. It is also found in the Ural and Caucasus Mountains. It is found in many places in Mexico, and abounds in the islands of Barbadoes and Trinidad. In Trinidad there is a remarkable lake about three miles in circuit, covered almost entirely with a stratum of asphaltum, traversed by fissures and crevices filled with water. The color is ashy or gray, approaching to black, and in portions of the lake quite black. Near the shore it is generally hard, giving a dull conchoidal fracture. Towards the centre it is softer, and at some points fluid petroleum is formed, which gradually indurates on exposure to the air. A gentle heat renders the Trinidad asphaltum ductile, but it is quite brittle at the freezing-point of water. It is employed on the island in making roads and in paving courtyard areas, etc., and for covering roofs, terraces, etc. Within the last few years it has been imported into the U. S. to a considerable extent, where it is used in the fabrication of various road and roof coverings, and for other kindred purposes. The products of its distillation are inflammable gas resembling that obtained from pit-coal, a species of bituminous oil, a tarry substance resembling coal-tar, and a substance resembling coke.

The other forms of solid bitumen (cohesive mineral pitch, elastic bitumen, retinite or retin asphaltum, fossil copal, and hatchetine or mineral adipocere) have little or no useful application in the industrial arts, and require no extended notice. The elastic bitumen, known also as mineral caoutchouc, possesses the property, like india-rubber, of effacing pencil-marks from paper, but is little used for that purpose, as it soils the paper.

The bitumen employed by the ancient Babylonians was a semi-fluid variety, obtained from the fountains of Is (the modern *Hit*), on the right bank of the Euphrates. These thermal fountains still flow copiously, yielding large quantities of petroleum, mixed with intensely saline sulphureous water. It was used to unite the sun-dried bricks with which the Babylonians constructed their public and private buildings, and the state in which the ruins of many colossal structures are still found indicates the imperishable character of the cement used. It was probably applied in the plastic state, and indurated gradually by the evaporation, and absorption of a portion of the bituminous oils.

In the fabrication of bituminous mastics and cements the

forms of bitumen employed are principally petroleum, mineral tar, asphaltum, and, to a limited extent, naphtha. Of petroleum, it is the residuum only (known as "still bottoms"), obtained in the refining process, that is used for this purpose. This is a suitable solvent for solid asphaltum.

Bituminous mastic (sometimes called asphaltic mastic or asphaltic cement) is generally composed of mineral tar and some calcareous, silicious, or earthy substances in powder. Instead of the mineral tar, solid asphaltum, that has been softened by a liquid bitumen or other suitable solvent, may be used. The bituminous mastics of Seyssel and Val-de-Travers are generally made by mixing the bituminous limestones of these localities, previously pulverized, with a suitable proportion of the mineral tar extracted from the bituminous sandstone or *molasse*. Seven to eight per cent. of mineral tar will be required for the Seyssel mastic, while 4½ to 5 per cent. will answer for that of Val-de-Travers. The tar is first heated in cast- or wrought-iron boilers over a brisk fire, until the boiling liquid begins to emit a thin whitish vapor. The heat is then moderated, and maintained at a uniform state, while the powdered stone is added gradually, care being taken to avoid lowering the temperature suddenly by adding too much at once. A yellowish or brownish vapor indicates a degree of heat calculated to scorch and injure the mastic. In such case the material should be stirred rapidly and the fire drawn or reduced. For convenience of transportation the mastic is moulded into blocks about twenty inches long, twelve inches wide, and five or six inches deep. When remelted for use it is necessary to add 2 to 3 per cent. of mineral tar, to compensate for loss of oil by evaporation in reheating.

The bituminous limestone may be reduced to powder by either grinding or roasting. For grinding, the stone is first broken up into pieces not much larger than a hen's egg, and is then passed through some suitable mill. The cast-iron mill, consisting of two horizontal iron plates, one revolving eccentrically upon the face of the other, answers very well. Cold, dry weather is the best season for this operation, which should be conducted under cover. If the weather be too warm the stone is apt to cake. For roasting, the stone is first broken up as for grinding; the fragments are then gently heated in a closed iron vessel. They gradually lose their coherence, and are reduced to powder by stirring with an iron instrument. This process is not only less economical than grinding when large operations are carried on, but there is a loss of tar by evaporation, and there is also danger of injury by too high heat.

Instead of the bituminous limestone, powdered limestone, marl, or chalk has sometimes been used with the mineral tar, giving very good results, the proportion of the tar being of course increased to compensate for its absence in the powdered mineral.

Trinidad Bituminous Mastic.—A good mastic may be made from the Trinidad asphaltum, provided a suitable solvent for it be employed. This asphaltum melts readily at a gentle heat, and is very brittle when cold. When mixed up, without a solvent, with any pulverized material, whether silicious, calcareous, or argillaceous, the mastic produced is not, as it should be, hard, firm, and in some degree malleable through the wide range of temperature peculiar to the U. S. If the proportion of mineral ingredient be so much increased as to give a hard and firm mastic at 100° F., it will be quite brittle at the freezing-point of water; while, on the contrary, if the proportions be adjusted with a view to firmness and tenacity in cold weather, it will be much too soft at a summer heat. The residuum produced in refining crude petroleum is so far a solvent for solid Trinidad asphaltum that when the two are thoroughly mixed together by stirring in an iron boiler over a gentle heat, in the proportion, by weight, of 3 of residuum to 7½ or 8 of asphaltum, a mineral tar is produced much resembling that of Bastennes or Seyssel, and which, like the latter, may be employed for making mastic, in combination with the bituminous limestone or other mineral substance.

The following formulæ give a good mastic for covering pavements, cellars, areas, and arches, and for other similar purposes:

1. Solid Trinidad asphaltum..... 21¾ lbs.
   Residuum of refined petroleum..... 8¼ "
   } = tar 30 lbs.
   Powdered marl or other amorphous limestone..... 70 "
   100 "

2. Solid Trinidad asphaltum..... 17½ lbs.
   Residuum of refined petroleum..... 6½ "
   } = tar 24 lbs.
   Powdered amorphous limestone..... 76 "
   100 "

From the trials that have been made there appears no reason to doubt that the Trinidad asphaltum, suitably softened with some of the liquid bitumens, or with substances derived from them possessing the properties of a solvent, is quite as good as the natural mineral tar in the fabrication of mastics. But it must be conceded that nothing has yet been discovered which can replace, with entire satisfaction, the bituminous limestone of Seyssel and Val-de-Travers. An amorphous carbonate of lime, and even well-slacked quicklime, have both been used with very good results; but in the natural asphaltic rock the calcareous matter is so intimately and impalpably combined with the bitumen, resists so thoroughly the action of air and water, and even muriatic acid, and is so entirely free from moisture—properties due perhaps to the vast pressure and intense heat under which the ingredients have been incorporated by nature—that we are forced to attribute the excellence of this material to the existence of certain natural conditions which the most skilful artificial methods fail to reproduce.

The North American Neufchâtel Rock Paving Company use for their pavement and other coverings in the U. S. the Val-de-Travers asphalt rock, Trinidad bitumen, and "still bottoms" or residuum of petroleum. They manufacture by the following processes:

1. *Mineral tar* is produced by mixing together in an iron boiler, with constant stirring, at a temperature of 470° F.,

   Trinidad asphaltum..... 85 lbs.
   Still bottoms..... 15 "
   100 "

2. *Bituminous mastic* is produced by mixing together, at 400° F.,

   Pulverized Val-de-Travers asphalt rock.....98½ lbs.
   Mineral tar (No. 1, as above)..... 1½ "

3. The *pavement covering* for sidewalks, roadways for light traffic, areas, cellars, warehouses, and for similar purposes, is made by mixing together at 400° F. the following:

   Bituminous mastic (No. 2, as above).....98¾ lbs.
   Mineral tar (No. 1, as above)..... 1¼ "
   Grits or pulverized limestone.....35 "
   } = 100.

This is laid one-half to three-quarters of an inch thick on a concrete foundation four and a half to six inches thick, and then rubbed down smooth with a dry mixture of hydraulic cement and fine sand. The thickness of the foundation should vary to suit the kind and quantity of traffic to which the pavement is to be subjected. This mixture (No. 3) is also suitable for covering roofs, arches, and for watersheds generally. For pavements subjected to traffic with heavy vehicles the covering should be Val-de-Travers asphalt rock alone, and the pavement is laid as follows: 1, prepare a concrete foundation seven to nine inches thick; 2, pulverize the Val-de-Travers rock at a temperature of 260° F.; 3, spread it over the foundation with a rake, and ram it with red-hot rammers in a layer one and a half to two inches thick; 4, smooth it off with a hot smoothing-iron; 5, roll it with a heavy roller, to remove marks of rammer and compress it more solidly.

Q. A. GILLMORE, U. S. A.

Bitu'minous Coal, a variety of coal which is valuable for fuel and burns with a smoky flame. It is softer than anthracite, and ignites more easily, but is less durable in combustion. It is composed of carbon, with a small proportion of hydrogen. Bituminous coal-fields of great extent occur in Western Pennsylvania, Ohio, Indiana, Illinois, Iowa, Kansas, Kentucky, Missouri, etc. This substance is also found in several parts of Europe, especially in Great Britain. It is extensively used in the manufacture of illuminating gas, and is burned as fuel in steamboats, manufactories, etc. (See COAL, COKE, and GAS.)

Bituminous Limestone, carbonate of lime impregnated with bituminous matter, derived from decayed vegetables or from the decomposed remains of those animals the hard parts of which form a large portion of the rock, which is sometimes very extensive. Within a few miles of Chicago, Ill., it has been estimated by Prof. T. S. Hunt that the limestone rocks contain as much petroleum as the oil-wells of Pennsylvania yield in ten years. It is not, however, believed to be separable for use. (For the uses of this stone, see BITUMEN, by GEN. Q. A. GILLMORE, U. S. A.)

Bituminous Shale, an indurated bed of clay, or a tough clayey substance which occurs in many coal-fields, and contains portions of carbon and volatile matter. These shales have a slaty fracture, are often repeated like other beds of clay, and occupy a definite position with regard to coal. Oil, gas, and paraffine are obtained from them by distillation.

Bi'valve [from the Lat. *bis*, "twice," "double," and *valva*, plu. *valvæ*, "folding doors"], a term applied in conchology to a shell which consists of two concave calcareous plates or valves joined together by a hinge and an elastic ligament, as the oyster.

BIVALVE SHELLS, or BIVALVES, are those coverings of mollusks which consist of two concave plates or valves, united by a hinge. (See CONCHOLOGY.) A majority of

recent bivalve shells belong to the acephalous or lamellibranchiate Mollusca. There are also mollusks of the class Brachiopoda which possess bivalve shells. The structure and chemical composition of the shell, however, is different in the two classes. A very large proportion of the bivalve shells of the older fossiliferous rocks belong to the class Brachiopoda. In the Brachiopoda one valve is ventral and the other dorsal; in the Lamellibranchiata both are lateral.

Bivouac, biv′wåk [from the Ger. *bei*, "near," and *Wache*, "watch"], a French word signifying an encampment of soldiers by night in the open air, without tents, or the system by which soldiers on a march, or in expectation of a battle, remain all night in the open air, resting with their arms by their side and ready for action. This practice is said to have been common among the crusaders. The generals of the French republic or the First Empire introduced the plan of dispensing with the use of tents and passing the night *en bivouac*. The same system was adopted by the other great powers on the continent of Europe. In recent times it is common for soldiers on the march to use the *tente d'abri* or shelter-tent.

Bix′in, the coloring principle of annotto, the paste obtained by bruising the seeds of *Bixa Orellana*.

Bizer′ta, or **Benzer′ta** (anc. *Hippo Zarytus*), a fortified seaport of Tunis, and the most northern town of Africa, about 38 miles N. W. of Tunis. The port, which was formerly good, has been filled up, so that it will now admit only small vessels. It is surrounded by walls and defended by two castles, but is commanded by the adjacent heights. This place was fortified by Agathocles about 308 B. C. Pop. about 10,000.

Björne′borg, or **Biornborg,** a seaport of Finland, at the mouth of the Kumo, 115 miles S. of Vasa; lat. 61° 29′ N., lon. 39° 23′ E. It has various manufactures and a considerable trade. Pop. 7270.

Björn′son (Björnstjerne) was born Dec. 8, 1832, in a lonesome and dreary parsonage in North-western Norway, where his father was a minister. He was educated in the Latin school at Molde, from which he went to the University of Christiania in 1851. But already in the next year he broke off his scientific education and commenced a literary life, in which there, as yet, have been no failures and only a few mistakes, while its beneficial consequences will reach far into the future, for with him begins the Norwegian Literature. (See that article.) His first book, published in 1856, was a little novel, "Synnóve Solbakken," descriptive of peasant life in Norway. It made a very deep impression. The plot was simple, but at every movement it touched the deepest laws of life, and nowhere smacked of any narrow tendency. The characters were pure psychological developments, never marred by explanations or remarks from a merely individual moral standpoint. The style was the short, pithy sentence from the Saga, with all its power of signification, all its strength of passion, and all its sweetness of feeling. The effect of this book was truly wonderful, and the impression it made was both deepened and widened by the novels which followed, "Arne," "En glad gut," "Fiskerjenten," etc. In spite of the great variety of characters and situations which they depict, they are all so singularly alike that in the reader's mind they melt together into one book, into one picture of life in Norway; and so touching and charming is this picture that more than one reader exclaimed in delight, "I wish I had been born in Norway!" Alternating with the novels he wrote dramas, and in this field he experienced some opposition. When his first tragedy, "Halte-Hulda," was published in 1858, there were people who felt that a new dramatic genius had arisen, greater perhaps than any since the days of Shakspeare; but the great public was, and will always be, incapable of appreciating a drama by reading it only. Actual representation on the stage is necessary, and the Scandinavian theatres were, at first, singularly unwilling to try the new author. Moreover, the expressions are, in "Halte-Hulda," often forced and obscure. The young poet had not yet learnt to say unimportant things in an unassuming manner, which alone can set off the important in due relief. His next drama, "Kong Sverre," was better in this respect, but it was not until he published his great tragedy, "Sigurd Slembe" (1862), that the public thoroughly felt the eminent greatness of his dramatical powers. "Sigurd Slembe" is a grand conception, masterly executed; and when in 1866 the Royal Theatre in Copenhagen represented his lovely little comedy, "The Newly Married," and next year his tragedy, "Marie Stuart," the impression was irresistible. Meanwhile, he worked alternately as a stage-manager and as an editor, and in practical life he not only experienced hard opposition, but he deserved it. He has ideas, and they are both sound and vigorous, but they are unsupported by that experience or knowledge which alone can make ideas fit for actual life. He has enthusiasm and energy, but he lacks that patience with actual circumstances, and that respect for other people's opinions, which constitute true wisdom. In practical life he is apt to make everything a question of party, and liable to forget that the other party also may comprise honest people; and this circumstance has now and then caused some passing troubles in his life, otherwise so rich and happy and blessed in every respect. Clemens Petersen.

Björn′stjer′na (Magnus Fredrik Ferdinand), Count, a Swedish general and author, born at Dresden Oct. 10, 1779. He fought against the French in 1809–13, and negotiated the treaty by which Sweden and Norway were united. He was ambassador at London for many years (1828–46). Among his works is "The Theogony, Philosophy, and Cosmogony of the Hindoos" (1843). Died Oct., 1847.

Blacas (Pierre Louis Jean Casimir), Duke of, a French statesman, born at Aups, in the department of Var, Jan. 12, 1771, was a faithful adherent of the Bourbons. He negotiated the concordat of 1817, and was employed on various important embassies. He founded the Egyptian Museum in Paris, and became a member of the Institute. Died Nov. 17, 1839.

Black [Lat. *ni′ger*], a term applied to things that absorb all the rays of light. It is considered the privation or negation of color, and a symbol of evil, darkness, and mourning. In blazonry, black (sable) denotes constancy, wisdom, and prudence. Black dyes are produced by logwood, catechu, galls, or other substance containing tannic acid, used with iron; or by various aniline compounds. Black pigments are usually carbonaceous.

Black, a township of Posey co., Ind. Pop. 6291. It contains the town of Mount Vernon.

Black (Jeremiah S.), an American jurist and Democratic politician, born in Somerset co., Pa., Jan. 10, 1810, became a judge of the supreme court of Pennsylvania in 1851, attorney-general in the Cabinet of Buchanan in 1857, and secretary of state in 1860.

Black (Joseph), an eminent chemist of Scottish extraction, was born at Bordeaux in 1728. He graduated as doctor of medicine at Edinburgh in 1754, and became professor of anatomy at Glasgow in 1756. His reputation is founded chiefly on the theory of latent heat, which he propounded between 1759 and 1763. He obtained in 1766 the chair of chemistry in the University of Edinburgh, where he lectured for thirty years, and acquired great popularity. Died Nov. 26, 1799. His "Lectures on Chemistry" were published by Dr. Robison (2 vols. 4to, 1803). He was a friend of James Watt.

Black (William), a Wesleyan divine, born in England in 1760, removed to Nova Scotia in 1775, and founded there the Wesleyan Church. He was subsequently general superintendent of the Wesleyan missions in British America. His purity of life and eminent services to his denomination have made him one of its most memorable characters. He died Sept. 8, 1834.

Black Acts, the acts of the Scottish Parliaments passed between 1425 and 1586—so called because they were printed in the characters known as *black letter*. In English lawbooks the term "black act" is applied to the 9 Geo. I. c. 22 (1722), because it was occasioned by the outrages committed by persons whose faces were blackened. They destroyed the deer in Epping Forest and committed other offences. The act was repealed in 1827.

Black Art. See Magic.

Black′ball. In the elections of clubs and other associations a black ball is deposited in the ballot-box or urn by each person who votes in the negative, or votes against a candidate for admission. Those candidates who are thus rejected are said to be blackballed.

Black Band, a variety of clay iron-stone or compact carbonate of iron, containing 25 or 30 per cent. of carbonaceous matter. It occurs abundantly in the coal-fields of Scotland, and is the ore almost exclusively used for the production of iron in that country. It is not very rich, and does not yield iron ore of the first quality when smelted by itself, but it is easily reduced. Black band also occurs in the coal-measures of Ohio, and is extensively used for the production of iron. Many black bands are so filled with fossil bone and other phosphatic matter that they cannot be profitably wrought.

Black Bass, a highly esteemed game fish of the lakes and rivers of the U. S., of which there are two or more species—*Grystes nigricans* and *Grystes megastoma*. The name is locally applied to various other fishes.

Black′berry, the common name of several species of

Rubus, natives of the U. S. They are shrubby plants called brambles, armed with stout, curved prickles. The fruit (which is not a berry in the botanical sense, but a collection of drupes) is edible and pleasant. The common or high blackberry (the *Rubus villosus*) has compound leaves, with leaflets ovate, pointed, and unequally serrate. Several valuable varieties have been extensively introduced into cultivation. Among these are the sorts known as the Dorchester, the Lawton (or New Rochelle), the Kittatinny, and the Wilson. A leading requisite for success in their management is to keep the bushes "pinched in" during summer, so as to prevent a loose, straggling growth, and to give them a neat, small, compact shape, by which their productiveness is greatly increased. The low blackberry, or dewberry, is *Rubus Canadensis*. Similar fruits are common in Asia and Europe.

Blackberry, a post-township of Kane co., Ill. P. 1173.

Black'bird, or **Merle,** a popular name given in England to the *Turdus merula* or *Merula vulgaris*, a species of thrush which abounds in Europe. In size it is intermediate between the song-thrush or mavis and the missel-thrush. The plumage of the male is all deep black, but that of the female is brown. It has a powerful voice, and its song is more mellow than that of the song-thrush, but inferior in compass and variety. The blackbird is often kept in cages, and is very susceptible of being trained. It feeds on worms, insects, and fruits, and frequents hedges, woods, and thickets. Quite distinct from this bird is the blackbird of the U. S. (*Quiscalus versicolor*), sometimes called "crow blackbird" or purple grakle. The "rusty crow-blackbird" (*Quiscalus ferrugineus*) is a rather less common bird of the U. S. It is a great depredator of corn-fields. The swamps and meadows of the U. S. are frequented by the *Agelaius Phœniceus*, or red-winged blackbird. It is gregarious, and feeds on insects and grain.

The Rusty Crow-Blackbird.

Blackbird, a county in Nebraska, bounded on the E. by the Missouri River, which separates it from Iowa. Area, about 522 square miles. It is largely occupied by the reservation for the Omaha Indians. The surface is undulating; the soil is fertile. Pop. 31.

Black Bluff, a township of Sumter co., Ala. Pop. 640.

Black'brook, a post-village and township of Clinton co., N. Y. It contains extensive beds of iron ore, and has large manufactures of excellent iron. Charcoal and lumber are also manufactured. Pop. of township, 3561.

Black Brook, a post-township of Polk co., Wis. Pop. 323.

Black'burn, a manufacturing town of England, in Lancashire, is situated in a barren district on a small stream called "The Brook," 24 miles by rail N. N. W. of Manchester. It has a beautiful Gothic parish church, a fine new exchange, also in the Gothic style, and numerous chapels of the dissenters, a grammar school founded by Queen Elizabeth, a hospital, a theological academy, and a theatre. The principal business of the town is the manufacture of cotton stuffs, chiefly coarse calicoes and muslins, in which 10,000 persons or more are employed. Coal and lime are abundant in the vicinity. James Hargreaves, who invented the spinning-jenny in 1767, was born here. Railways extend from this point in various directions. Blackburn sends two members to Parliament. It has a public park which is 700 feet above the level of the sea. Pop. in 1871, 76,337.

Blackburn (William Maxwell), D. D., born at Carlisle, Ind., in 1828, graduated at Hanover College, Ind., in 1850, and studied theology at Princeton. He has been professor of biblical and ecclesiastical history in the Presbyterian Theological Seminary at Chicago since 1868, and been for many years an active contributor to religious literature in church history and books for the young. He has also contributed largely to the "Princeton" and "American Presbyterian" Reviews.

Black'burn's, a township of Lauderdale co., Ala. Pop. 672.

Black Buttes, a station of the Union Pacific R. R., in Sweetwater co., Wy., 794 miles from Omaha. Mines of excellent lignitic coal abound in this region, and are extensively wrought. Pop. in 1870, 18.

Black Cap, Black Cap Warbler, or **Fauvette** (*Curruca atracapilla*), a bird of the family Sylviadæ or warblers, is nearly allied to the nightingale. It is regarded as the sweetest song-bird in Great Britain, except the nightingale, to which it is somewhat inferior in size. The back, wings, and tail are of an ash-brown color, the belly is white, and the top of the head is jet black (in the male). Its note is rich in tone, and has a great variety of sweet and gentle modulations. It is a summer bird of passage in England, which it enters in early spring, and from which it migrates in September. It is highly prized as a cage-bird, not only for its song, but for its pleasant manners and temper.

Black Cap is also the name applied to a species of raspberry (the *Rubus occidentalis*), of which several varieties have recently been introduced for cultivation into gardens in the U. S.

Black Chalk, a variety of shale, containing a large proportion of carbon, is found in France, Spain, Scotland, Wales, etc. It is made into artists' crayons and used for drawing, and is ground to powder for paint.

Black Cock, Heath Fowl, or **Black Grouse,**

Black Grouse.

(*Tetrao tetrix*), a bird of the order Rasores, is abundant in Scotland and the north of England. It also occurs in the mountains and marshy parts of the continent of Europe, and abounds in Scandinavia and Russia. Its favorite haunts are moors, bogs, and morasses covered with rank herbage. The male, which weighs nearly four pounds, is of a shining bluish-black color, with a conspicuous white bar on the wings below the ends of the great wing-covers. The outer tail-feathers on each side are elongated and curved outward. The female is of a rust color, and is called the "gray hen." This species of grouse is gregarious, but in winter the males and females form separate flocks. They build nests of very simple construction on the ground, and lay in each six or eight eggs, which are about two inches long. Their food consists of seeds, berries, insects, and the young shoots of the pine, fir, and birch. Their flesh is highly esteemed for food.

Black Creek, a township of Perry co., Miss. Pop. 492.

Black Creek, a township of Shelby co., Mo. Pop. 1418.

Black Creek, a township of Mercer co., O. Pop. 1087.

Black Creek, a township of Lexington co., S. C. Pop. 474.

Black Creek, a post-township of Luzerne co., Pa. Pop. 569.

Black Creek, a township of New Kent co., Va. P. 998.

Black Creek, a township of Outagamie co., Wis. P. 528.

Black Death. See PLAGUE, by STEPHEN SMITH, M. D.

Black Duck (*Anas obscura*), one of the best known and most highly prized of American wild ducks, breeds abundantly throughout the continent from Mexico to Labrador and from the Atlantic to the Pacific. It might be readily domesticated. It is of a generally blackish-brown color, with bright tints about the bill, neck, wings, etc.

Black Earth, a post-township of Dane co., Wis. It has one weekly newspaper. Pop. 966.

Black'feet, a tribe of American Indians who infest the Territory of Montana and Wyoming on the E. side of the Rocky Mountains, and between the Yellowstone and the Missouri Rivers. They are divided into the true Blackfeet, the Bloods, the Piegans, and the Small Robes. They were once a powerful and ferocious tribe, very hostile to the white people, and addicted to robbery. They are distinct from the "Blackfeet Sioux," who belong to the Dakota confederacy. The Blackfeet are also found in British America, and are of Algonquin stock. A small vocabulary of their language was published by George Catlin in the second volume of his "Letters and Notes on the Manners, etc. of the North American Indians" (1841).

Black'fish (*Centrolophus Moris*), a fish of the family Scomberidæ, is nearly allied to the Coryphenes, which are called dolphins. It is found in the Mediterranean, and on

European Blackfish.

the western coasts of Europe, but is not abundant anywhere, at least in shallow water. It sometimes measures thirty inches long and weighs fourteen pounds. Its body is covered with minute scales and a tough skin. The term blackfish or tautog is applied in the U. S. to the *Tautoga Americana*, which is esteemed for the table.

BLACKFISH (*Physeter tursio*) is also the name of a whale closely akin to the spermaceti whale. It is sometimes nearly sixty feet long, but usually much smaller. This huge animal has an eye about the size of that of a common haddock. It yields oil and spermaceti, and is found in the Atlantic. Quite recently the existence of the *Physeter tursio* has been denied. Several other whales are known by this name.

Black Flux, a mixture of carbonate of potash and finely-divided carbon or powdered charcoal. It is prepared by mixing in a crucible one part of nitre with two or three parts of crude cream of tartar, and deflagrating the mixture by ignited charcoal; or by heating in a covered crucible crude cream of tartar or bitartrate of potash, when the tartaric acid is decomposed and charred, forming carbonic acid, which remains in combination with the potash. It is a valuable flux in reducing ores. The metal potassium can be obtained by heating this flux in iron vessels.

Black'ford, a county in the E. N. E. of Indiana. Area, 180 square miles. It is drained by the Salamonie River. The surface is undulating or nearly level; the soil is productive. Corn, wheat, and wool are important products. The county is intersected by the Fort Wayne Muncie and Cincinnati and by the Pittsburg Cincinnati and St. Louis R. Rs. Capital, Hartford. Pop. 6272.

Black Forest [Ger. *Schwarzwald;* anc. *Hyrcinia Sylva*], a mountainous and wooded region in Baden and Würtemberg, with a chain of mountains which extends about 85 miles, and separates the basin of the Rhine from that of the Neckar. It was a part of the ancient Hercynian Forest. This region is remarkable for its extensive forests and its mines of silver, copper, zinc, lead, and iron. The highest point of this chain is the Feldberg, which rises 4903 feet above the level of the sea. The Danube, Neckar, Kinzig, Murg, and Elz rise in the Black Forest. A number of small lakes are found here at elevations of 2500–3500 feet. Granite and gneiss form the foundations of these mountains, and porphyry occurs on their sides, which are also covered with abundance of fir trees. The descent is precipitous on the western side, but the eastern slope is very gentle. A valley called Murgthal, situated in this forest, is famous for its beautiful scenery. In the vicinity of Neustadt is the mountain-pass of Hölle, which was celebrated in connection with Moreau's retreat in 1796. The soil of these highlands is not adapted to tillage. The inhabitants are extensively employed in the manufacture of wooden clocks and toys.

Black Fork, a township of Scott co., Ark. Pop. 160.

Black Fork, a post-township of Tucker co., West Va. Pop. 610.

Black'friars, a term applied, on account of the color of their garments, to the Dominican order of monks, who first came to England about A. D. 1220, and settled at Oxford. Their second house was the Blackfriars in London, and from it the district still bears the name of the order, which had nearly sixty houses in England and Wales at the time of the abolition of monasteries. (See DOMINICAN.)

Black'guard. It is said that when the kings of England made a progress with the court from one royal residence to another, it was customary for the scullions and other menials to follow with loads of kitchen utensils, and even coals; and from their dirty appearance they received the derisive name of *black guard,* which has come to be applied to any person of a vile character, or one who uses vulgar or ruffianly language. (See TRENCH, "English, Past and Present.")

Black Gum, a popular name of the *Nyssa multiflora,* an American tree, sometimes called pepperidge, hornpipe, tupelo, and sour gum. It has oval or obovate leaves, commonly acuminate, which turn bright crimson in autumn. The fruit is a bluish-black drupe, the wood close-grained, tough, and very difficult to split. It is used for cog-wheels, hatters' blocks, and wheel-naves. It belongs to the order Cornaceæ.

Black'hammer, a township of Houston co., Minn. Pop. 709.

Black Hawk, a county in N. E. Central Iowa. Area, 576 miles. It is traversed and nearly bisected by the Cedar River, which flows south-eastward. It is also drained by Black Hawk Creek. Extensive prairies occur in this county, which has a fertile soil. Cattle, corn, wheat, oats, and wool are important products. It is intersected by the Illinois Central R. R. (Iowa division) and the Burlington Cedar Rapids and Minnesota R. R. Capital, Waterloo. Pop. 21,706.

Black Hawk is a mining town of Gilpin co., Col., located about 40 miles W. of Denver, the terminus of the Colorado Central R. R. (narrow gauge through Clear Creek Cañon). It contains, and is adjacent to, rich mines of gold and silver. It has within its limits twenty quartz-mills and the Boston and Colorado Smelting-Works, and is the principal ore-reducing point in Colorado. It has two churches, three hotels, forty stores, one foundry, a fine public school, and a daily and weekly paper. Pop. 1068.

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Black Hawk, a township of Rock Island co., Ill. Pop. 1723.

Black Hawk, a township of Black Hawk co., Ia. Pop. 716.

Black Hawk, a township of Grundy co., Ia. Pop. 396.

Black Hawk, a township of Jefferson co., Ia. Pop. 1019.

Black Hawk, an American Indian, chief of the Sac tribe, born in 1767. He waged war against the U. S. in 1832 for the recovery of lands which certain chiefs of the Sacs and Foxes had ceded to the whites. Died Oct. 3, 1838.

Black'heath, an elevated open common in the county of Kent, England, 5 miles S. E. of London, adjoining Greenwich Park, is a favorite holiday resort for Londoners. It commands an extensive view, and is bordered by numerous handsome villas. The Roman Watling Street crosses this heath, which is the site of Morden College. This heath was the scene of the insurrections of Wat Tyler and Jack Cade, and was formerly infested by highway robbers.

Black Hills, a mountain-range in the S. W. part of Dakota and the eastern part of Wyoming Territory. The highest point of this range, Laramie Peak, in Wyoming, rises about 8000 feet above the sea. It is in about lat. 42° 10′ N., and 60 miles W. of Fort Laramie.

Black Hole, the name of a small dungeon or cell in Calcutta which was the scene of a nefarious crime committed by the nabob Suraja Dowlah in June, 1756. Having captured the English garrison of a fort at Calcutta, he confined the prisoners, 146 in number, in a cell twenty feet square, with only two windows. They suffered great agonies from thirst, heat, and foul air, and 123 died from suffocation in the first night. The twenty-three survivors were taken out the next morning. One of them, John Z. Holwell, published a narrative of their sufferings.

Black'ie (John Stuart), a Scottish classical scholar, born in Glasgow in 1809, studied at Edinburgh and Göttingen. He translated Goethe's "Faust" into English verse, and produced in 1850 an able translation of the works of Æschylus. In 1852 he became professor of Greek in the University of Edinburgh. He contributed articles to the "Encyclopædia Britannica" and the "Imperial Dictionary of Biography." Among his numerous other works are "Lays and Legends of Ancient Greece" (1857), "Lyrical Poems" (1860), and "Homer and the Iliad" (2 vols., 1866).

Black'ing, a compound of bone-black, oil, sulphuric acid, and sugar or molasses, employed in polishing boots, shoes, or leather, on which it produces a black-glazed and shining surface. The ingredients in Day & Martin's blacking are finely powdered bone-black ground with sperm oil, raw sugar or molasses, a little vinegar, and concentrated sulphuric acid, which unites with the lime of the bone-black to form sulphate of lime.

Black Jack, the name given by miners to blende (sulphide of zinc). It is also a popular name of a small species of American oak (*Quercus nigra*), sometimes called barren oak and iron oak. Its wood is very hard and makes a good firewood, but is rather perishable, and is not very valuable for timber. There are several varieties.

Black Jack, a township of Richmond co., N. C. Pop. 799.

Black Lead. See Graphite.

Black Letter, a term applied to the Gothic or Old English types or letters, which were used in the typography of the first books ever printed in England. Books printed before 1500 are generally in this character, which was commonly used in manuscripts by Europeans long before the invention of the art of printing. A form of type similar to this is still used by the Germans.

Blacklick, a township of Cambria co., Pa. Pop. 646.

Black Lick, a township of Indiana co., Pa. P. 1016.

Black Lick, a township of Wythe co., Va. P. 3489.

Black List, the name applied in Great Britain to printed lists connected with insolvency, bankruptcy, and other matters affecting the credit of firms and individuals, and which are circulated for the guidance of the mercantile community. These lists, which serve an important purpose, are well known by commercial men in the United Kingdom. The lists are extracts from public registers, as are the ordinary lists of bankruptcies in the newspapers. Similar information is furnished in America by commercial agencies.

Black Mail was an impost formerly submitted to in parts of Scotland and the north of England as a compromise with robbers. A class of men, often belonging to families in good standing, levied a tax upon their neighbors (generally about 4 per cent. of the rental of their property), on the pretext of protecting them from cattle-thieves. The celebrated Rob Roy was one of these black-mailers. The practice ceased in Scotland after the rebellion of 1745. It had already been long extinct in England. In modern usage, black mail signifies money extorted from a person by threats of accusation or exposure in the public prints. Those who practise this extortion are said to "levy black mail."

Black'man, a township of Jackson co., Mich. Pop. 1470.

Blackman (George Curtis), M. D., one of the first of American surgeons, was born at Newtown, Conn., April 20, 1819, and graduated in medicine at the College of Physicians and Surgeons, N. Y., in 1840. He afterwards studied in the London hospitals, "studying covered with bedclothes to avoid the expense of a fire, and subsisting on two penny rolls a day." His excellent attainments and enthusiasm for his profession won him many eminent friends, and he became a member of the Royal Medical and Chirurgical Society, an honor rarely given to foreigners. He became a resident of Cincinnati in 1854, and was appointed professor of the principles and practice of surgery in the Medical College of Ohio. He served as an army surgeon throughout the late civil war. He was an able writer, a brilliant lecturer, and a bold and skilful operator. He crossed the Atlantic more than thirty-six times on account of his feeble health. He published numerous contributions to professional journals, and several valuable translations. Died July 21, 1871.

Black'more (Sir Richard), a court-physician of William III. and of Queen Anne, a voluminous writer of prose and verse, was born about 1650. He was the object of the satire of Pope and of the ridicule of the wits of his time, but deserves mention as an honest man and a steady friend of virtue at a time when virtue had but few influential friends. His chief works are "Prince Arthur" (1696) and "The Creation" (1712). Died Oct. 8, 1729.

Black Mountain, of North Carolina, is in Yancey co., a few miles W. of the Blue Ridge. This group of mountains derives its name from the forests of dark balsam firs which crown its summits. It has the shape of a horse-shoe. The highest of its peaks rises to 6707 feet, and is called the Black Dome, or Mitchell's High Peak in honor of Dr. Mitchell of the University of North Carolina, who perished while exploring this inhospitable region, and was buried on its top. This is the highest point of the U. S. east of the Rocky Mountains. Arnold Guyot.

Black Oak, a large tree of the U. S., common eastward of the Mississippi, generally considered a distinct species (*Quercus tinctoria*), but regarded by Gray as a variety of *Quercus coccinea*. It is a handsome tree, affording useful timber, but is best known for its thick yellow bark, prized for tanning purposes, and yielding quercitron, a valuable yellow dye. It is also called yellow oak and dyers' oak.

Black Oak, a township of Mahaska co., Ia. P. 936.

Black Quarter, Quarter Evil, or **Black Leg,** a disease which attacks animals, especially thrifty young neat cattle, which are kept on fertile but undrained land. It is characterized by swelling of a joint, leg, or quarter, diarrhœa, extravasation of blood, and formation of abscesses. It is usually fatal. It is probably the same disease which is known in man as malignant pustule. Its causes are not well understood. It is a hard disease to cure, but stimulants, free incision in the affected part, with the application of weak solutions of chloride of zinc and carbolic acid, may prove useful. The best preventive is thorough underdrainage of pastures.

Black River, or **Big Black River,** of Missouri and Arkansas, rises in Iron co., Mo., and flows nearly southward to the N. line of Arkansas. It afterwards runs south-westward, and enters the White River (of which it is the largest affluent) at Jacksonport, Ark. Length, estimated at 350 miles. It is navigable by steamboats about 100 miles from its mouth, except when the water is low.

Black River of New York rises in Herkimer co., flows in a general N. W. direction through Oneida, Lewis, and Jefferson cos., and enters Lake Ontario about 6 miles below Watertown. The whole length is about 125 miles. It falls 63 feet near Turin, in Lewis co.

Black River of Wisconsin rises in Marathon co., flows southward and south-westward through Clarke and Jackson cos., and enters the Mississippi about 15 miles above La Crosse. Its length is about 225 miles. Its Indian name is *Sappah*.

Black River of Vermont [Indian name *Kaskatuac*] rises in ponds in the town of Plymouth, Windsor co., and flows S. by E. through Ludlow, Cavendish, Weathersfield, and Springfield, and empties into the Connecticut River. It furnishes abundant water-power, which is employed in numerous manufactories.

Black River, a township of Greene co., Ark. P. 131.

Black River, a twp. of Independence co., Ark. P. 1358.

Black River, a township of Lawrence co., Ark. P. 1189.

Black River, a township of Butler co., Mo. P. 492.

Black River, a township of Reynolds co., Mo. Pop. 1280.

Black River, a township of Wayne co., Mo. P. 743.

Black River, or **Lockport,** a post-village of Rutland and Le Ray townships, Jefferson co., N. Y., on the Car-

thage Watertown and Sacketts Harbor R. R., 6 miles E. by N. of Watertown. Pop. 181.

Black River, a township of Cumberland co., N. C. Pop. 760.

Black River, a post-village and township of Lorain co., O., the northern terminus of the Lake Shore and Tuscarawas Valley R. R., on the S. shore of Lake Erie, 8 miles N. of Elyria. Pop. 838.

Black River, a township of Georgetown co., S. C. Pop. 960.

Black River Falls, an incorporated village, the county-seat of Jackson co., Wis., on Black River and the West Wisconsin R. R., 50 miles N. of La Crosse. It has numerous saw-mills and flouring-mills, a graded high school with ten departments, iron in unlimited quantities, and one weekly newspaper. Pop. 1101.

COOPER & SON, PUBS. "BADGER STATE BANNER."

Black Rock, a former post-town of Erie co., N. Y., on the Niagara River, at its S. end, about 1 mile N. of Buffalo, of which it is now a part. The river here affords abundant water-power.

Black Rood (OF SCOTLAND), a cross of gold which was alleged to contain a piece of the true cross, was brought into Scotland in 1067 by Margaret, sister of Edgar Atheling, queen of Malcolm III. It was regarded as a national palladium. It was taken twice, at least, by the English, who after 1346 kept it in Durham Cathedral. It disappeared at the Reformation.

Black's Bluff, a township of Wilcox co., Ala. Pop. 1586.

Blacks'burg, a township of Montgomery co., Va. Pop. 3565.

Black Sea, or **Eux'ine** [anc. *Pontus Euxinus;* Turk. *Kara Dengis*], a large inland sea between Europe and Asia. It extends from lat. 40° 45′ to 46° 45′ N., and from lon. 27° 30′ to 41° 50′ E. The extreme length is about 700 miles, and its greatest breadth about 380 miles. Area, estimated at 185,000 square miles. It communicates with the Sea of Mármora by the Bosphorus, and with the Sea of Azof by the Strait of Kertch. The shores of this sea are high and bold on all sides except the N. W., between the Crimea and the mouth of the Danube. In the middle of it no soundings were obtained at 160 fathoms. It encloses no islands except a few small ones at the mouth of the Danube, and the Symplegades, near the Bosphorus. The largest rivers that flow into it are the Danube, Dniester, Bug, Don, Dnieper, Kooban, and Kizil Irmâk. This sea has no tide, but strong currents are produced by the influx of the large rivers, in consequence of which the water is fresher than that of the Mediterranean. The navigation of the Euxine is not dangerous except during violent storms. It is supposed that this sea once extended much farther E. than it does now. In ancient times it was an important highway of commerce. The Turks excluded the ships of all foreign powers from it until 1774, when the Russians obtained the right to navigate its waters. By the treaty of Paris, 1856, this sea was neutralized—that is, the Russians and Turks were not permitted to keep ships of war in it. In 1871 the Russians again were permitted to have men-of-war on this sea.

Black'shear, a post-village, capital of Pierce co., Ga., on Hurricane Creek and on the Atlantic and Gulf R. R., 86 miles S. W. of Savannah. It has one weekly newspaper. Pop. 490.

Black Snake (*Bascanion constrictor*), a species of snake which is common in nearly all parts of the U. S. Its length varies from four to six or seven feet. It is remarkable for agility, climbs trees with ease, and moves along the ground very swiftly. It feeds on frogs, mice, lizards, eggs, birds, etc. Although it is harmless and has no poison-fangs, it will sometimes attack or resist its human enemies. The *Bascanion Alleghaniensis* is another large black snake of the same regions, easily distinguished by the keeled scales on its back.

Black'stock, a post-township of Chester co., S. C. Pop. 479.

Black'stone, a post-village and township of Worcester co., Mass., on the Boston Hartford and Erie R. R., 36 miles S. W. of Boston, and on the Providence and Worcester R. R. It has extensive manufactures, one national bank, seven churches, and a public library. Pop. 5421.

Blackstone River of Massachusetts rises in Worcester co., flows south-eastward into Rhode Island, and enters through Providence River into Narraganset Bay. The name Pawtucket River is given to that part of it which is below the town of Pawtucket. It affords abundant water-power, and flows through several manufacturing villages.

Blackstone (Sir WILLIAM), an English jurist and eminent commentator on law, was born in London July 10, 1723. He was admitted to the bar in 1746, but obtained little practice. In 1758 he became Vinerian professor of law at Oxford, of which he was a graduate, and in 1761 was elected to Parliament. He was appointed solicitor-general in 1763, and a justice of the court of common pleas in 1770. His principal work is "Commentaries on the Laws of England" (4 vols., 1765–69), which acquired a high reputation and is extensively used by students of law. His style is clear, ornate, and graceful, but his method is not scientific, and he was not well qualified to judge of the law from a legislator's point of view. Died Feb. 14, 1780. His "Commentaries" were severely criticised by Bentham. According to Horne Tooke, his work is "a good gentleman's law-book—clear, but not deep." (See CLITHEROE, "Life of Sir W. Blackstone," 1780; Foss, "The Judges of England.")

Blackstone (WILLIAM), a clergyman of the Church of England, and the first white inhabitant of Boston, Mass., who settled at Shawmut, now Boston, in 1623, but left the place in 1633, not liking his Puritan neighbors. He is said to have died in Rhode Island in 1675.

Black Swamp, a township of Winston co., Ala. P. 632.

Black Tin, the name given by miners to tin ore ready for the process of smelting.

Black'ville, a post-village, capital of Barnwell co., S. C., is on the South Carolina R. R., 47 miles E. S. E. of Augusta, Ga., and 90 miles W. N. W. of Charleston. It has one weekly newspaper. Pop. of township, 2327.

Black Vomit, the name of the hæmorrhagic discharge from the stomach peculiar to YELLOW FEVER (which see).

Black Wad, a name sometimes given to the native black oxide of manganese. (See MANGANESE.)

Black Walnut (the *Juglans nigra*), a valuable timber tree of the U. S., belonging to the order Juglandaceæ, and growing from Florida northward, and especially westward, being rare at present in New England. It is a handsome tree, which produces a nut which, though edible, is less so than that of the European walnut, while its timber is even more valuable. The wood is employed for gunstocks, furniture, the finishing and flooring of rooms, and a great variety of purposes.

Black War'rior, a river of Alabama, is formed by the junction of the Locust Fork and Mulberry Fork, which unite near the S. extremity of Walker county. It flows south-westward, and enters the Tombigbee about 2 miles above Demopolis. Its length is estimated at 175 miles. Steamboats ascend this river from its mouth to Tuscaloosa. Bituminous coal is found on this river.

Black'water, a township of Cooper co., Mo. Pop. 548.

Blackwater, a township of Pettis co., Mo. Pop. 1603.

Blackwater, a township of Saline co., Mo. Pop. 1784.

Blackwater, a township of Franklin co., Va. P. 1796.

Blackwater, a township of Prince George co., Va. Pop. 911.

Blackwater, a township of Surry co., Va. Pop. 1235.

Black'well (ANTOINETTE BROWN), an American lady, born in Henrietta, N. Y., May 20, 1825, studied theology at Oberlin College, O., and was ordained pastor of a Congregational church at South Butler, N. Y., in 1853. She has taken an active part in the Woman's Rights movement and other reforms. She was married in 1856 to Samuel C. Blackwell.

Blackwell (ELIZABETH), M. D., born at Bristol, in England, in 1821, was the first woman who ever obtained the degree of M. D. in the U. S. She came to the U. S. with her parents in 1831, and taught school at Cincinnati from 1838 to 1847. Having studied medicine in private, she applied for admission to the medical colleges of Philadelphia, New York, and Boston without success. She was at last admitted by a unanimous vote into the College of Geneva, N. Y., in 1847, and graduated as M. D. with honor in 1849. She afterwards studied midwifery in Paris, and began to practise in New York City in 1851, where she has for the most part since resided. In 1854, with her sister Emily, she opened the New York Infirmary for Women and Children. In 1859 she delivered a course of medical lectures in London.

Black'well's, a township of Polk co., N. C. Pop. 1179.

Blackwell's Island, in the East River, is a part of New York City, and has a lunatic asylum, workhouse, almshouse, penitentiary, smallpox, charity, and fever hospitals, one for incurables, one for epileptics and paralytics, and an asylum for the blind. The island has an area of 120 acres, and was named from a family which long owned it. At its N. end is a stone lighthouse, with a fixed red light 54 feet

above the sea; lat. 42° 46′ 15″ N., lon. 73° 56′ 08″ W. Pop. 5717.

Black Wolf, a township of Winnebago co., Wis. Pop. 847.

Black′wood (WILLIAM), a Scottish publisher, born in Edinburgh in 1776, was the founder of "Blackwood's Magazine." He commenced business as a bookseller in 1804, and issued the first number of his magazine in 1817. It obtained speedy success and a high reputation, to which the writings of Scott, John Wilson, and J. G. Lockhart greatly contributed. Its editors advocated the political creed of the Tories with powerful sarcasm and considerable virulence. Mr. Blackwood was the chief manager of the magazine until his death in 1834, and was succeeded by his sons. Under their direction it has maintained its reputation, and has received contributions from many eminent authors, including Bulwer, W. S. Landor, De Quincey, and W. E. Aytoun.

Blad′der [Lat. *vesica;* Fr. *vessie*], a musculo-membranous sac contained in the anterior part of the pelvis. It is absent in all invertebrate animals. A few cartilaginous fishes possess it; so do Batrachia (frogs, etc.) and Chelonia (turtles). No birds have it, although the ostrich and cassowary have a dilatation of the cloaca somewhat resembling it. It is present in all Mammalia. In man the bladder is nearly triangular when empty, oval when full. The ureters (one on each side) convey the urine to it from the kidneys; and this is voided, by the contraction of the bladder, through the urethra. The entrance to the latter is guarded by a valve, partly muscular, called by some anatomists the *sphincter vesicæ*. Distension of the bladder (retention of urine) from any obstruction of the urethra is a very painful and sometimes dangerous affection. It may be spasmodic, but it is more often the effect of a stricture or contraction of the passage from local disease. In low fevers it is not uncommon for a kind of paralytic distension of the bladder to occur. In either of these cases the removal of the urine by means of a catheter is of great importance. The bladder is also liable to inflammation (*cystitis*) and to chronic irritability; either of which may cause great distress. (For stone in the bladder see CALCULUS.)

Blad′der-Nut (*Staphylea*), a popular name of several plants of the order Sapindaceæ. They are so called because the fruit is a bladdery, membranous, and inflated capsule enclosing hard, bony seeds. They are shrubs or small trees with pinnate leaves, five stamens, and five petals. The *Staphylea pinnata* is a native of Europe, and is planted as an ornamental tree in English shrubberies. Another species, the *Staphylea trifolia*, or American bladder-nut, is a native of the U. S. It is a shrub about ten feet high, having three ovate leaflets. The seed of these species is aperient, and the wood is suitable for turning.

Blad′derwort (*Utricularia*), a genus of aquatic plants of the order Lentibulaceæ, comprises numerous species which abound in tropical and temperate parts of both hemispheres. Their flowers adorn the surface of lakes, ponds, and stagnant or shallow waters. Fourteen species or more of them are found in the Atlantic U. S. They are remarkable for a provision by which the plant, which is ordinarily submerged in water, is raised to the surface, in order that the flowers may expand in the air. The leaves and stems are furnished with little bladders or vesicles, which become filled with air at the time of flowering. The air is afterwards removed, so that the plant sinks again, and ripens its seeds at the bottom. A few species which do not grow in the water have no bladders.

Bla′den, a county in the S. E. of North Carolina. Area, 800 square miles. It is intersected by Cape Fear River, and bounded on the N. E. by South River. The surface is mostly level, and partly occupied by pine forests and many small lakes, which abound in fish. A portion of the soil is sandy, but marl occurs in considerable quantities, and the river-bottoms and swampy tracts are highly fertile. Rice, corn, and some cotton are produced. The county is traversed by the Wilmington Charlotte and Rutherford R. R. It has manufactures of tar and turpentine. Capital, Elizabethtown. Pop. 12,831.

Bla′denboro', a post-twp. of Bladen co., N. C. P. 1005.

Bla′densburg, a post-village of Prince George co., Md., on the Eastern Branch of the Potomac and on the Baltimore and Washington R. R., 6 miles N. E. of Washington. A battle fought here Aug. 24, 1814, between the British and Americans, resulted in the capture of Washington. Pop. 410; of Bladensburg township, 3006.

Bladen Springs, a post-village of Choctaw co., Ala., 3 miles from the Tombigbee River and 85 from Mobile, has six copious saline chalybeate springs, much resorted to for the cure of bowel and kidney complaints and chronic rheumatism and dyspepsia. The country around is hilly, well-timbered, and healthful. It has one weekly newspaper.

Blaeuw, Blaeu, or **Blauw** (WILLEM), an eminent Dutch geographer and publisher, born in 1571. He was a pupil of Tycho Brahe. He produced a terrestrial globe which surpassed all former works of that kind, and a number of maps. Among his publications was an "Atlas of the Seas or Aquatic World." Died Oct. 18, 1638.

Blagoweshtshensk′ (*i. e.* "good news"), the capital of the province of the Amoor, in Siberia, 20 miles N. of the Chinese city Aijun, on the Amoor. It was founded in 1858, and consists mostly of government buildings. Some trade is carried on here between the Chinese and the Russians. Pop. in 1867, 3107.

Blain, a town of France, department of Loire-Inférieure, 22 miles N. N. W. of Nantes. Here are the ruins of a strong castle. Pop. 6865.

Blaine (JAMES GILLESPIE), an American legislator, born in Washington co., Pa., Jan. 31, 1830. He graduated at Washington College in 1847, removed to Maine in early life, and became editor of the "Portland Advertiser." He was elected to Congress by the Republicans of Maine in 1862, and was re-elected five times. He gained distinction as a debater, and was chosen Speaker of the House of Representatives in Mar., 1869, and again in 1871 and 1873.

Blainville, de (HENRI MARIE DUCROTAY), M. D., F. R. S., a distinguished French zoologist and anatomist, born at Arques, near Dieppe, Sept. 12, 1777. He studied comparative anatomy under Cuvier, who employed him as his assistant. In 1808 he received the degree of doctor of medicine. He was appointed professor of anatomy and zoology in the Faculty of Sciences of Paris in 1812, and was admitted into the Institute in 1825. In 1832 he succeeded Cuvier as professor of comparative anatomy in the Museum of Natural History. He acquired a high reputation as a teacher and a writer. Among his most important works are "Lectures on General and Comparative Physiology" (3 vols., 1833), and "Osteography, or a Comparative Iconographic Description of the Skeleton and Dentary System of the Five Classes of Vertebrated Animals" (1839–49, unfinished). Died May 1, 1850.

Blair, a county in S. Central Pennsylvania. Area, 650 square miles. It is intersected by the Frankstown Branch of the Juniata River, and also drained by the Little Juniata. The surface is mountainous. The main range of the Alleghany Mountains extends along the N. W. border of the county, which is traversed by a parallel ridge called Dunning's Mountain. The soil of the limestone valleys is fertile. Grain and wool are important products. Iron is one of the chief articles of export. Bituminous coal is extensively mined. The county is intersected by the Central R. R., and has various manufactures. Capital, Hollidaysburg. Pop. 38,051.

Blair, a township of Clay co., Ill. Pop. 857.

Blair, a township of Grand Traverse co., Mich. P. 383.

Blair, a post-village, capital of Washington co., Neb., in a township of the same name, on the Missouri River and on the Omaha and North-western R. R., 29 miles N. N. W. of Omaha, and on the Sioux City and Pacific R. R. It has a brick court-house, a jail, and is in a fine farming region. It has a school-house costing $20,000, and one weekly paper. Pop. 494; of township, 917.

V. G. LANTRY, ED. "BLAIR TIMES."

Blair, a township of Blair co., Pa. Pop. 1571.

Blair (AUSTIN) was born at Carolina, Tompkins co., N. Y., Feb. 8, 1818, and graduated at Union College in 1839, studied law, removed to Michigan, and has held many public offices; was governor of the State (1861–65), and member of Congress (1867–75).

Blair (FRANCIS PRESTON), an American journalist, born at Abingdon, Va., April 12, 1791. He graduated at Transylvania University, and became in 1830 editor of the "Globe," a Democratic daily paper published at Washington, D. C. He was a personal friend and adviser of Gen. Jackson while the latter was President, and continued to edit the "Globe" until 1845. He supported Van Buren as a candidate for the presidency in 1848, and joined the Republican party in 1855.

Blair (FRANCIS PRESTON, JR.), a lawyer, son of the preceding, was born at Lexington, Ky., Feb. 19, 1821. He graduated at Princeton in 1841, was elected a member of Congress by the Free-Soil party of St. Louis, Mo., in 1856, after which he acted and voted with the Republicans for several years. He joined the Union army in 1861, and obtained the rank of major-general. In 1864 he commanded a corps of Sherman's army in the campaign which resulted in the capture of Atlanta. Having joined the Democratic party, he was selected as a candidate for the vice-presidency

by the convention which nominated Horatio Seymour for the presidency in 1868, but was not elected. He was chosen a U. S. Senator for Missouri in Jan., 1871.

Blair (Hugh), D. D., an eminent Scottish divine, born in Edinburgh April 7, 1718, was licensed as a minister of the Church of Scotland in 1741. In 1758 he became one of the ministers of the High Church of Edinburgh, the highest promotion that a Scottish clergyman can obtain. His sermons were admired for their polished style, but were not remarkable for originality or profoundness. In 1762 he was appointed professor of rhetoric and belles-lettres in the University of Edinburgh. He published five volumes of sermons (1777–1800), which were once very popular, but their reputation has declined. His "Lectures on Rhetoric" were published in 1783, and were used in many schools. Died Dec. 27, 1800. (See James Finlayson, "Life of Hugh Blair," 1801.)

Blair (James), D. D., born in Scotland in 1656, entered the Anglican ministry, came to America in 1685, in 1689 became commissary of the bishop of London for Virginia and Maryland, was the founder and first president of William and Mary College (1693), and rector of Williamsburg, holding all these and other important offices till his death, Aug. 1, 1743. Besides other works, he published a commentary on the "Sermon on the Mount" (5 vols. 8vo, 1722), highly commended by Waterland, Doddridge, and Bickersteth.

Blair (John), an American jurist, born at Williamsburg, Va., in 1732. He graduated at William and Mary College, and studied law in London. Having previously filled several high offices, he was appointed by Washington judge of the Supreme Court of the U. S. (1789). Died Aug. 31, 1800.

Blair (Montgomery), an American officer and politician, born May 10, 1813, in Franklin co., Ky., graduated at West Point in 1835, serving while in artillery in Florida war till he resigned, May 20, 1836; counsellor at law in St. Louis, and U. S. attorney for the district of Missouri 1839–43, mayor of St. Louis 1842, judge of the St. Louis court of common pleas 1843–49, solicitor of the U. S. in the court of claims 1855–58, counsellor at law in Montgomery co., Md., 1853–61, and since 1863, being counsel for plaintiff in the famous Dred Scott case; president of the Republican committee of Maryland 1860, and postmaster-general of the U. S. 1861–64. George W. Cullum, U. S. A.

Blair (Robert), a Scottish poet, born at Edinburgh in 1699, was a relative of Hugh Blair, noticed above. He was ordained minister of Athelstaneford in 1731. He wrote a poem of undoubted merit entitled "The Grave," which was not printed until after his death. Died Feb. 4, 1746.

Blairs'burg, a post-township of Hamilton co., Ia. Pop. 310.

Blairs'town, a post-village of Leroy township, Benton co., Ia. It has one weekly newspaper. Pop. 682.

Blairstown, a post-township of Warren co., N. J. Pop. 1379.

Blairs'ville, a post-village, capital of Union co., Ga., is about 90 miles N. by E. from Atlanta. Gold and marble are found in the vicinity.

Blairsville, a post-borough of Indiana co., Pa., on the Conemaugh River and the Pennsylvania R. R., 56 miles E. of Pittsburgh. A branch railroad extends northward 16 miles to the town of Indiana. Grain, lumber, and coal are shipped here. Blairsville has a national bank. P. 1054.

Blairsville, a post-village of York co., S. C. P. 487.

Blair'ton, a post-village of Belmont township, Peterborough co., Ontario, Canada, has extensive iron-mines and a postal savings bank. Pop. about 350.

Blake, a township of Colleton co., S. C. Pop. 2255.

Blake (Charles F.), U. S. N., born in 1842 in Pennsylvania, graduated at the Naval Academy in 1861, became an ensign in 1863, a lieutenant in 1864, and a lieutenant-commander in 1866. He served on board the steam sloop-of-war Brooklyn at the battle of Mobile Bay Aug. 5, 1864, and is thus referred to in the report of Capt. James Alden, her commanding officer: "The other division officers, Captain Houston of the marines, Lieutenant Charles F. Blake, Ensigns Cassel and Sigsbee, with their assistants, Master's Mates Duncan and Stevens, fought their guns nobly and well." Foxhall A. Parker, U. S. N.

Blake (Francis B.), U. S. N., born Nov. 8, 1837, in Pennsylvania, graduated at the Naval Academy in 1857, became a lieutenant in 1861, and a lieutenant-commander in 1863, resigned June 15, 1870. On the night of Sept. 14, 1861, while serving on board the frigate Colorado, he participated in the very gallant exploit of destroying the privateer Judith, "moored at the S. end of the Pensacola navy-yard, under the protection of a battery and field-piece." He was attached to the steam gunboat Kennebec in her attempted passage of Forts St. Philip and Jackson, April 24, 1862, and at Vicksburg, June 28, 1862.

Foxhall A. Parker, U. S. N.

Blake (George A. H.), colonel of U. S. cavalry and brevet brigadier-general U. S. army, was born in Pennsylvania, and became first lieutenant in the Second Dragoons in 1836. He served honorably in Florida, Mexico, on the frontiers, and in the late civil war. He was wounded at Gaines's Mill in 1862, and received his brevet for his conduct at Gettysburg.

Blake (George Smith), a naval officer, born at Worcester, Mass., in 1803. He served in the Mexican war, and was made superintendent of the U. S. Naval Academy at Annapolis in 1857, and a commodore in 1862.

Blake (Homer C.), U. S. N., born Feb. 1, 1822, in Cleveland, O., entered the navy as a midshipman Mar. 2, 1840, became a passed midshipman in 1846, a lieutenant in 1855, a lieutenant-commander in 1862, a commander in 1866, and a captain in 1871. On the evening of the 11th of Jan., 1863, Blake, in the merchant steamer Hatteras, which had been converted into a government vessel for blockading purposes, encountered the privateer Alabama, built in England with all the latest improvements of a man-of-war, and after a most spirited resistance was forced to surrender, "the Hatteras going down, bow first, ten minutes after the crew left her decks." Capt. Blake, in his official report of the action, dated Jan. 21, 1863, says: "The battery upon the Alabama brought into action against the Hatteras numbered seven guns, consisting of four long 32-pounders, one 100-pounder rifled gun, one 68-pounder, and one 24-pounder rifled gun. The guns used in the action by the Hatteras were two short 32-pounders, one 30-pounder rifled Parrot, and one 20-pounder rifled Dahlgren." Blake was carried in the Alabama to Port Royal, Jamaica, whence, after being paroled, he was permitted to return to the U. S., and so soon as he was regularly exchanged he obtained a command in the North Atlantic blockading squadron, where he remained, doing good service in co-operation with the Army of the James, until the close of the civil war. Foxhall A. Parker, U. S. N.

Blake (John Lauris), D. D., an American biographer and compiler, born in Northwood, N. H., Dec. 21, 1788. He graduated at Brown University in 1812, became rector of an Episcopal church in Boston. He published many school books and a "General Biographical Dictionary" (1 vol. 8vo, 1835). Died in July, 1857.

Blake (Robert), born at Bridgewater, in Somersetshire, in 1599, was elected to Parliament in 1640, and when the civil war began in 1642 raised a troop with which he fought against the royalists. He gained distinction by his defence of Taunton in 1645. In 1649 he was appointed "general of the sea." He destroyed or captured nearly all of Prince Rupert's fleet in the Tagus in 1651. In 1652 he became chief admiral, and in May of that year gained a victory over Van Tromp, who attacked Blake in the ensuing November near Goodwin Sands. Blake was defeated, but in Feb., 1653, he attacked Van Tromp and gained a victory in a running fight of three days. In 1654 he chastised the dey of Tunis. He destroyed the Spanish plate-fleet at Santa Cruz in 1657. He died at Plymouth Aug. 17, 1657.

Blake (William Phipps), A. M., Ph. B., was born in New York City June 1, 1826, and graduated at the Sheffield Scientific School, New Haven, Conn., in 1852. In 1853 he was mineralogist and geologist for the U. S. Pacific R. R. exploring expedition in California, in connection with which he wrote several reports; was editor of the "Mining Magazine" 1859–60; he was 1861–63 mining engineer for the Japanese government; in 1863 engaged in explorations in California and Nevada, became professor of mineralogy, geology, etc. in the College of California, and geologist to the State board of agriculture; in 1867 was commissioner of California to the Paris Exposition, removed in 1867 to New Haven, Conn., was chosen executive commissioner of the Centennial Commission, and in 1873 went as special agent to the Vienna Exhibition. He is vice-president of the American Institute of Mining Engineers, and a prominent officer of the International Patent Congress. Among his numerous professional writings are "Silver Ores and Silver Mines" (1861), a "Report on the Production of the Precious Metals," etc., and various contributions to the U. S. reports on the Paris Exposition, which were edited by him. In 1871 he published "Mining Machinery," etc.

Blake (William Rufus), born in 1805 at Halifax, Nova Scotia, studied medicine, but in 1825 (after playing some time in the theatre at Halifax) he appeared at the Old Chatham Theatre, N. Y. He soon attained the first rank as a comedian, excelling particularly in eccentric characters. Died at Boston April 22, 1863.

Blakely, a post-village, capital of Baldwin co., Ala., is on the Tensaw River, near Mobile Bay, and on the Mobile and Montgomery R. R., 13 miles E. N. E. of Mobile.

Blakely, a post-town, capital of Early co., Ga., is about 88 miles S. of Columbus and 150 miles S. W. from Macon. It has two churches, Baptist and Methodist, and one newspaper. W. W. Fleming, Ed. "Early County News."

Blakely, a township of Luzerne co., Pa. Pop. 767.

Blakely, a post-borough of Luzerne co., Pa. Pop. 659.

Blakely (Johnston), a naval officer, born in Ireland Oct., 1781. He came with his parents to the U. S., graduated at the University of North Carolina in 1800, entered the U. S. navy in 1800, and obtained command of the sloop Wasp in 1813. In June, 1814, he captured the British sloop-of-war Reindeer, and in the ensuing September defeated and sunk the sloop Avon. The Wasp never returned to port, and the fate of Captain Blakely and his crew was never ascertained.

Blakely's, a township of Chambers co., Ala. P. 1162.

Blakesburg, a post-village of Adams township, Wapello co., Ia. Pop. 236.

Blanc (Auguste-Alexandre-Philippe-Charles), a distinguished writer on the fine arts, born at Castres, France, Nov. 15, 1813. He is a brother of Louis Blanc. Besides a long series of valuable contributions on subjects connected with the fine arts to various French journals, he is the author of a "History of French Painters of the Nineteenth Century," of which only the first volume has been published; of a biographical notice of Grandville, and of "The Works of Rembrandt," which first appeared in folio in 1853, and in 1859 was republished with additions in 2 vols. 4to. A new edition, enriched with many additional illustrations, has just been announced (1873). It is the best work on Rembrandt. He was the most important contributor to the "History of the Painters of all the Schools," a very complete and extensive work begun in 1849 by Armengaud, and continued till its completion in 1859, under the editorship of Blanc, with the assistance of able writers, such as Delaborde, Mantz, Silvestre, and P. Chasles. Blanc has been twice Director of Fine Arts in France—once in 1848, when he replaced M. Garraud, and again in 1871. At present he still holds the place, for which he is eminently fitted. Clarence Cook.

Blanc (Jean Joseph Louis), a French historian and radical, born in Madrid Oct. 28, 1813, was educated in France. He founded in Paris in 1839 the "Revue du Progrès," which advocated social and political reform. In 1840 he published an able work on the "Organization of Labor." His next important work was a "History of Ten Years—1830–40," which had a very damaging influence on the popularity of Louis Philippe. He was a member of the provisional government formed in Feb., 1848, and was very popular with the Socialists and workingmen of Paris, who revolted and were defeated in June, 1848. He then went into exile, and resided in England for many years. Early in 1871 he was elected to the National Assembly by the voters of Paris. Among his works is a "History of the French Revolution" (12 vols. 8vo, 1847–62), the style of which is eloquent and dignified.

Blan'cet, a township of Scott co., Ark. Pop. 325.

Blanc, Le, a town of France, in the department of Indre, is finely situated on the river Creuse, 32 miles W. S. W. of Châteauroux. It has manufactures of cloth, linen, pottery, leather, etc. Pop. 5956.

Blanchard, a township of Hancock co., O. P. 1304.

Blanchard, a township of Hardin co., O. Pop. 1250.

Blanchard, a township of Putnam co., O. Pop. 1593.

Blanchard, a post-township of Piscataquis co., Me. Pop. 164.

Blanchard (Albert G.), an American general, born in Massachusetts about 1810, served in the Mexican war, and having entered the Confederate service was made a brigadier-general in 1861.

Blanchard (François), a French aëronaut, born at Andelys in 1753, was noted for his mechanical ingenuity. He constructed a balloon with wings and a rudder, with which he ascended in Mar., 1784. In 1785 he crossed the Channel in this balloon, and landed in England, for which exploit the king of France gave him a pension. He made many other ascents. Died Mar. 7, 1809. His wife, who had been his companion in several aërial voyages, was killed in consequence of the burning of her balloon in 1819.

Blanchard (Laman), an English *littérateur*, born at Great Yarmouth May 15, 1803. He became in 1831 acting editor, under Bulwer, of the "New Monthly Magazine." He contributed many verses and other articles to several periodicals and annuals, and was assistant editor of the "Examiner." His wife became insane, and he committed suicide Feb. 15, 1845. (See Bulwer's "Memoir of L. Blanchard," prefixed to Blanchard's "Essays and Sketches," 1849.)

Blanchard (Thomas), an American mechanic and inventor, born in Sutton, Mass., June 24, 1788. He invented a wonderfully ingenious machine for turning gun-stocks, which is still in use, and he obtained twenty-four patents for his various inventions. Died April 16, 1864.

Blanche of Castile, queen of France, a daughter of Alfonso IX. of Castile, was born in 1187. She was married in 1200 to the dauphin of France, who became King Louis VIII., and she acquired much influence in affairs of state. When Louis died, in 1226, she became regent of the kingdom, which she governed with ability during the minority of her son, Saint Louis. She was eminent for virtue and wisdom. Died Dec. 1, 1252. (See Macheco, "Vie de Blanche Castile," 1820; T. Nisard, "Histoire de la Reine Blanche," 1842.)

Blan'chester, a post-village of Clinton co., O., on the Marietta and Cincinnati R. R., 41 miles E. N. E. of Cincinnati, at the junction of the Hillsboro' branch. Pop. 513.

Blanch'ing [from the Fr. *blanche*, "white"], a process by which gardeners arrest the progress of secretions in the leaves of plants, in order to render them more wholesome and palatable as food. Celery, sea-kale, and other plants are usually blanched by the exclusion of light from them, which deprives them of their natural green color and of certain bitter properties. The blanching is effected in various modes, as heaping up the earth against the growing plants, or covering them with boxes or blanching-pots made of earthenware and perforated with many holes.

Blan'co, a county in Central Texas. Area, 727 square miles. It is intersected by the Pedernales River, and also drained by the Rio Blanco. The soil is mostly prairie, easily cultivated and productive. Stock-raising is the chief pursuit. Cotton and corn are raised. Capital, Blanco. Pop. 1187.

Blanco, a post-village, capital of Blanco co., Tex., is 45 miles W. S. W. of Austin City. It has one weekly newspaper.

Bland, a county in S. W. Virginia. Area, 330 square miles. It is drained by the North Fork of the Holston River and by several creeks. The surface is partly mountainous. Grain, tobacco, and wool are the chief products. Capital, Bland Court-house. Pop. 4000.

Bland, a township of Prince George co., Va. P. 2260.

Bland (Richard), an American writer and patriot, born in Virginia in 1708, was educated at William and Mary College and the University of Edinburgh, and was elected to Congress in 1774. He published "A Letter to the Clergy on the Twopenny Act" (1760) and "An Inquiry into the Rights of the British Colonies" (1766). Died Oct. 27, 1776.

Bland (Col. Theodoric), M. D., born in Prince George co., Va., in 1742, was an uncle of John Randolph of Roanoke. He entered the army in 1777, and gained the confidence of Washington, who employed him in several important affairs. In 1780 he was elected a member of Congress, in which he remained till 1783. Having been again chosen a member of that body in 1789, he died at New York June 1, 1790.

Bland Court-house, a post-village, capital of Bland co., Va.

Bland'ford, a township of Hampden co., Mass. It has a public library and some manufactures. Pop. 1026.

Blan'dinsville, a post-village of McDonough co., Ill., on the Toledo Peoria and Warsaw R. R., 78 miles W. by S. from Peoria. Pop. 1565; of Blandinsville township, 1707.

Bland'ville, a post-village, capital of Ballard co., Ky., about 28 miles W. S. W. of Paducah. Pop. 385.

Blane (Sir Gilbert), F. R. S., a Scottish physician, born at Blanefield, in Ayrshire, Aug. 24, 1749. He became private physician to Lord Rodney, who took command of the fleet in the West Indies in 1780. Dr. Blane served as chief physician to that fleet during the war, and published in 1783 "Observations on the Diseases of Seamen." He was physician to St. Thomas's Hospital, London, from 1785 to 1795, and became first physician to William IV. in 1830. Among his works is "Elements of Medical Logic" (1819). Died June 26, 1834.

Bla'nes, a seaport-town of Spain, in the province of Gerona, on the Mediterranean, 30 miles by rail S. of Gerona. It is on the railway from Barcelona to Gerona. Pop. 5888.

Blank Verse, the name applied to the heroic verse of five feet without rhymes. Blank verse is peculiar to the

Italian, English, and German languages, having been imported into the two latter from the first. In Italian the line is of eleven syllables, and is used invariably in the drama, and frequently in serious poetry, epic or didactic. In England it was first adopted by the earl of Surrey in his translation of the fourth book of the "Æneid" (1547), and first applied to dramatic uses by Lord Buckhurst in his tragedy of "Gorboduc" (1561). It has since been the accepted metre of English dramatic and heroic verse. The Miltonic verse is constructed with closer attention to the melody of the cadence and cæsura than the dramatic; it admits also less frequently of the eleventh syllable, which in English poetry must be regarded as a sort of license; while Shakspeare and other dramatists occasionally double the short syllable at the end, and thus extend the number to twelve.

Blanqui (Jérome Adolphe), a French political economist, born at Nice Nov. 20, 1798. He became in 1833 professor of economy in the Conservatory of Arts and Trades in Paris. He advocated free trade. Among his works are a "Summary of the History of Commerce and Industry" (1826), and a "History of Political Economy in Europe from the Ancients to the Present Time" (2 vols., 1837–38), which is highly esteemed. Died Jan. 28, 1854.

Blanqui (Louis Auguste), a French republican, born in 1805, brother of the preceding, took an active part in the revolutionary movements of 1830, 1839, and 1848, and was a leading spirit in various incendiary secret societies. He went beyond the most advanced in radical ideas. He was condemned to death in 1840, and afterwards repeatedly to long terms of imprisonment, but the penalty was in every case relaxed. He was a leader of the insurgents who attempted to dissolve the National Assembly in May, 1848. He founded the Société Republicaine Centrale, for which he was condemned to four years' imprisonment in 1861. In the Paris Commune, in 1870, he was a central figure, was captured by the Versaillists, who, it was claimed, refused to exchange him for Archbishop Darboy, and was transported in 1872.

Blaps [probably from the Gr. *βλάπτω*, to "injure," so called on account of its supposed dangerous character; see below], a genus of insects of the order Coleoptera, is the type of a family called Blapsidæ. There are numerous species of this genus, all of a dark color and destitute of wings. They feed on decayed vegetable matter, frequent dark and damp places, and have the power of secreting an acrid, irritating fluid of a peculiar and penetrating odor, which they can throw to a distance of six inches. A British species, the *Blaps mortisaga*, is called darkling beetle and churchyard beetle. In some parts of Europe the peasantry have a superstitious dread of this insect. No *Blaps* is found in the U. S.

Blar'ney, a village and castle of Ireland, in Munster, is on a rivulet of its own name, 4 miles N. W. of Cork, and surrounded by beautiful scenery. The castle and groves of Blarney are celebrated in song. The castle, which once belonged to the earls of Clancarty, stands on a steep rock, at the base of which is a deep valley. Among the relics of this ruined castle is the famous "Blarney stone," which, according to the popular opinion, imparts to those who kiss it a peculiar style of eloquence, or great skill in the use of complimentary speech.

Blä'ser (Gustav), an excellent German sculptor, born at Düsseldorf May 9, 1813. Among his numerous works may be mentioned equestrian statues of Frederick William III. and Frederick William IV., the colossal statue of "Borussia" (Prussia) at Berlin, and a bust of Humboldt in the New York Central Park.

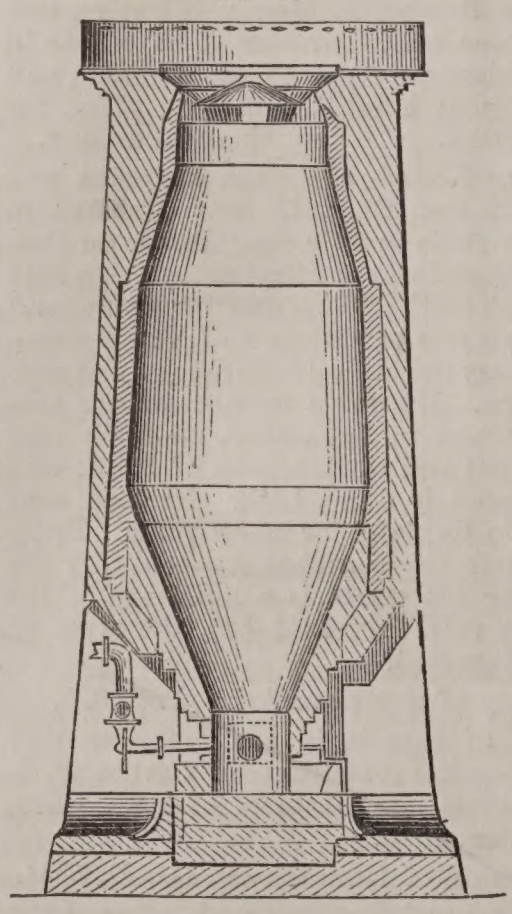
Blas'phemy [Gr. *βλασφημία*], an indignity offered to the Deity or to religion. According to Blackstone, it is denying the being and providence of God, contumelious reproaches of our Saviour Christ, and profane scoffing at the Holy Scripture, or exposing it to contempt and ridicule. It has been otherwise defined to be the act of wantonly uttering or publishing words casting contumelious reproach or profane ridicule upon God, Jesus Christ, the Holy Ghost, the Holy Scriptures, or the Christian religion. If the words were written or printed, there might be a case of blasphemous libel. If oral, the case would be one simply of blasphemy. The law does not brand as a crime serious discussion or the promulgation in a temperate manner of opinions opposed to Christianity. Blasphemy is an offence punishable as a misdemeanor at common law. In many of the States the crime is punishable by statute.

Christianity is declared by the courts to be a part of the common law, which recognizes that the good morals and orderly conduct of the community are closely connected with a respect for religion, and that insults to the Author of Christianity and malicious attacks on his religion tend to the dissolution of civil government. While the law of this country grants the fullest enjoyment of liberty of conscience and religious belief, and free and decent discussion on any religious subject, it will not allow malicious and blasphemous revilings of the Author of the religion professed by the majority of the community, nor of the religion itself, nor of the Scriptures in which it is taught.

Blaste'ma [Gr. *βλάστημα*, a "bud" or "budding"], in botany, the embryo in a seed, or the axis of growth of an embryo; that is, the plumule and the radicle, with the part which connects them. In biology, blastema is the name applied to the rudimental mass or protoplasm from which tissue is developed.

Blast Furnace [Ger. *Hochofen;* Fr. *haut fourneau*]. In its primary signification the term blast furnace implies an elevated shaft lined with a refractory material, designed for the reduction of metals from their ores. The shaft is open at the top, where the ore, fuel, and fluxes are charged, and supplied with a blast of air near the bottom, where openings are provided for removing the metal and cinder. The term has, however, by custom become almost entirely restricted to furnaces for the reduction of iron. In its essential details a blast furnace consists of a stack, in whole or in part of masonry, surrounding a vertical chamber or shaft of circular section. The diameter of the shaft usually increases from the top downward and from the bottom upward. The lower part of the furnace is called the *hearth,* and has the smallest diameter. At its upper part are one or more openings through which the blast of air is introduced, and in the lower part, or *crucible,* the molten iron and cinder collect. The hearth is prolonged towards the front of the furnace, and is closed by the *dam,* and covered in on top by the *tymp-arch.* The dam is formed of firebrick or other refractory material. It slopes inward towards the interior of the furnace, and has its outer vertical face covered with a cast-iron plate, called the *dam-plate.* At the bottom of the dam is a channel communicating with the interior of the furnace, through which the molten iron is tapped off, and on its upper edge is a notch, called the *cinder-notch,* over which the cinder flows. The tymp-arch is covered by the *tymp,* a long, hollow casting, through which water constantly circulates. The blast is supplied through *tuyeres,* from one to eight in number, which are set into the masonry of the furnace. They are hollow truncated cones, supplied with a constant current of water to prevent the iron of which they are composed from melting. Into these *water-tuyeres* are fitted the *nozzles* of blast-pipes, which are connected with the *blast main* which encircles the furnace. The sloping walls connecting the hearth with the widest part of the furnace are called the *boshes.* This term is very generally, though incorrectly, used to express the greatest diameter of the furnace. In many cases there is no sharp line of demarcation between the hearth and the boshes, the former being simply a continuation of the curved walls of the boshes.

Fig. 1.

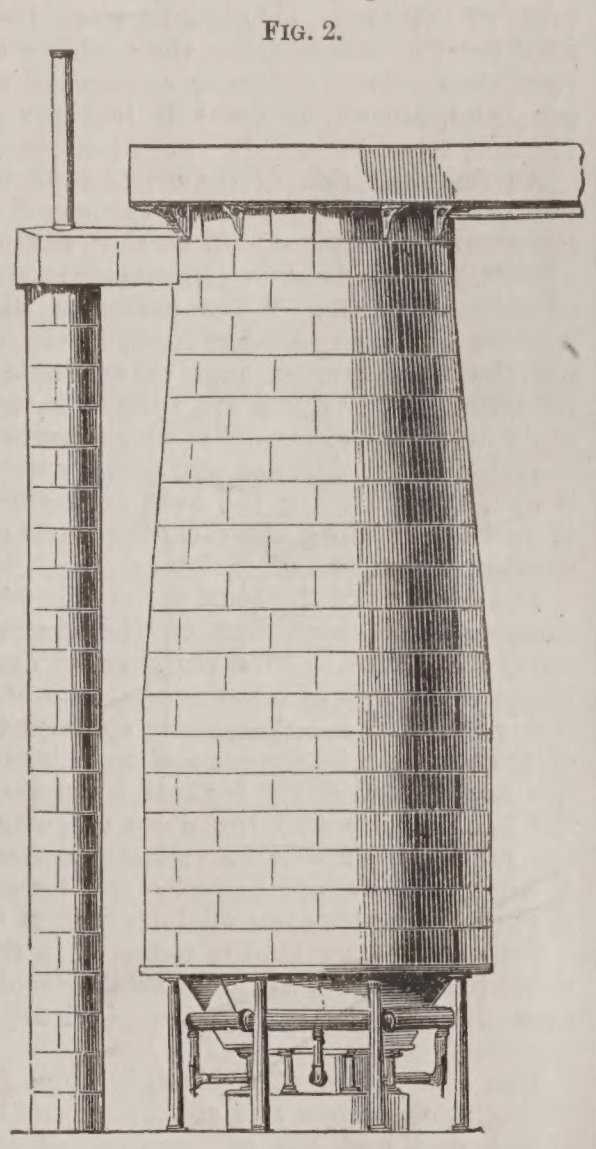


In constructing a blast furnace, the upper portion is built on pillars (of iron or masonry), and is entirely independent of the boshes and hearth, which can be removed and reconstructed without interfering with the body of the stack. The top or *mouth* of the furnace, where the materials are charged, may be either entirely and permanently open, or provided with an arrangement which closes the furnace except during charging, when it is opened by some simple mechanism. The *tunnel head* is a hood or chimney, either of sheet iron or brick, over the mouth of the furnace, provided with suitable openings to allow the charge to be dumped into the furnace. The gases of the furnace, which were formerly allowed to escape and burn at the mouth, are now almost universally utilized. This is effected by making openings in the walls of the furnace—some distance below the top in open-mouth furnaces, but as near the top as possible where the top is closed—and conducting the gases by suitable channels either to the boilers or hot-blast

stoves, or both, where they are burned. With closed-top furnaces the utilization of the gases is complete; with open-top a considerable quantity escapes and burns at the mouth.

The essential accessories of a blast furnace are the blowing-engine, hot-blast stoves, and hoist. There are three varieties of blast-engines in use: the vertical-beam engine, the horizontal, and the upright. The latter have the steam cylinder either directly above or below the blast cylinder. They are rapidly gaining in favor, owing to their compactness and efficiency. The blast, on leaving the blowing cylinder, passes to the hot-blast stoves. These consist of a series of cast-iron pipes, through which the blast passes, heated on the outside by the combustion of the gases of the furnace. The gases are usually burnt in a combustion chamber under the chamber containing the pipes. In this way the heat is more uniformly distributed, and there is less danger of the pipes being injured by the heat. Recently Siemen's system of regenerative heating has been applied to hot-blast stoves with the best results. In this system the gases are burned in a chamber, and the products of combustion pass through a network of firebrick, which becomes intensely heated. The gases are then caused, by means of valves, to pass into a second stove like the first, and burned as before, while the blast is conducted through the first stove. The blast and gases are made to alternate in this way at regular intervals. The temperature of the blast as it enters the furnace varies within wide limits. There are but comparatively few furnaces at the present day driven with cold blast, the temperature employed varying from 300° to 1000° F. With the firebrick stove above mentioned a temperature of from 1500° to 1600° F. has been attained. The blast on leaving the stoves passes through the main to the furnace, and is there distributed to the tuyeres. The pressure employed varies with the kind of fuel used. Charcoal furnaces usually are blown with a half to one and a half pounds, though sometimes as high as four pounds are used. Coke furnaces are blown with three to four pounds, while anthracite furnaces require four to seven pounds.

FIG. 2.



Hoists or lifts serve to raise the ore, fuel, etc. from the ground to the level of the mouth of the furnace, where they are charged. There are many varieties, as the pneumatic, hydraulic, and steam hoist. Occasionally a furnace is favorably situated on a hill-side, and no hoist is needed.

Fig. 1 is a section of a modern blast furnace in the Cleveland district of England. Its height is 75 feet; greatest diameter 24 feet at an elevation of 24 feet; diameter of hearth, 8 feet; height of hearth, 8 feet; diameter of mouth, 15 feet. There are three tuyeres, 4½ inches in diameter. Cubic capacity, 20,000 feet. Yield, 350 tons of iron per week.

Figs. 2 and 3 represent an elevation and vertical section of a modern American furnace at Chicago. Its height is 66 feet; greatest diameter, 17 feet; yield, 350 tons iron per week. The gases are taken off at the top of the furnace, and descend by a vertical flue, then by an underground channel to the boilers and hot-blast stoves. The contrivance for closing the mouth of the furnace, shown in the drawings, is known as the cup and cone, or bell and hopper. This arrangement is one of the simplest, and the one most generally adopted.

The blast furnace of the present day is an outgrowth of the small primitive furnaces still to be met with in Eastern countries for reducing iron ores. It differs from them, however, in three essential particulars. The low furnaces produce an unmelted mass of soft iron, and a cinder rich in oxide of iron, and the process is intermittent. A blast furnace produces a compound of iron and other substances, principally carbon, which is fluid at the temperature of the furnace; the cinder is composed of earthy ingredients, and is almost entirely free from iron, and the process is continuous. Intermediate between the two is the German Blauofen, or Blaseofen, ten to sixteen feet in height, which, according to the manner in which it is worked, can be made to yield either soft or cast iron. These furnaces have no fore-hearth, but are built with closed fronts—a construction which has lately been applied to large blast furnaces successfully, but the system has not been extensively adopted.

The history of the development of blast-furnace construction for the last half century is almost entirely a record of increasing dimensions, both in height and diameter, having for a consequence greater yield, and, within certain limits, greater economy of fuel. The flat boshes of the older furnaces and the rapid narrowing upward towards the mouth have been generally replaced by steeper boshes and wider mouths. There have been, however, no universally accepted principles of blast-furnace construction developed, as far as regards the interior outline. The Cleveland district of England affords a striking instance of the growth of furnaces in height and capacity. Furnaces were built

In 1851,	42	feet	high,	15	feet	diam.,	capacity	4,566	cubic	feet.
" 1861,	62	"	"	20	"	"	"	12,778	"	"
" 1870,	90	"	"	30	"	"	"	41,149	"	"

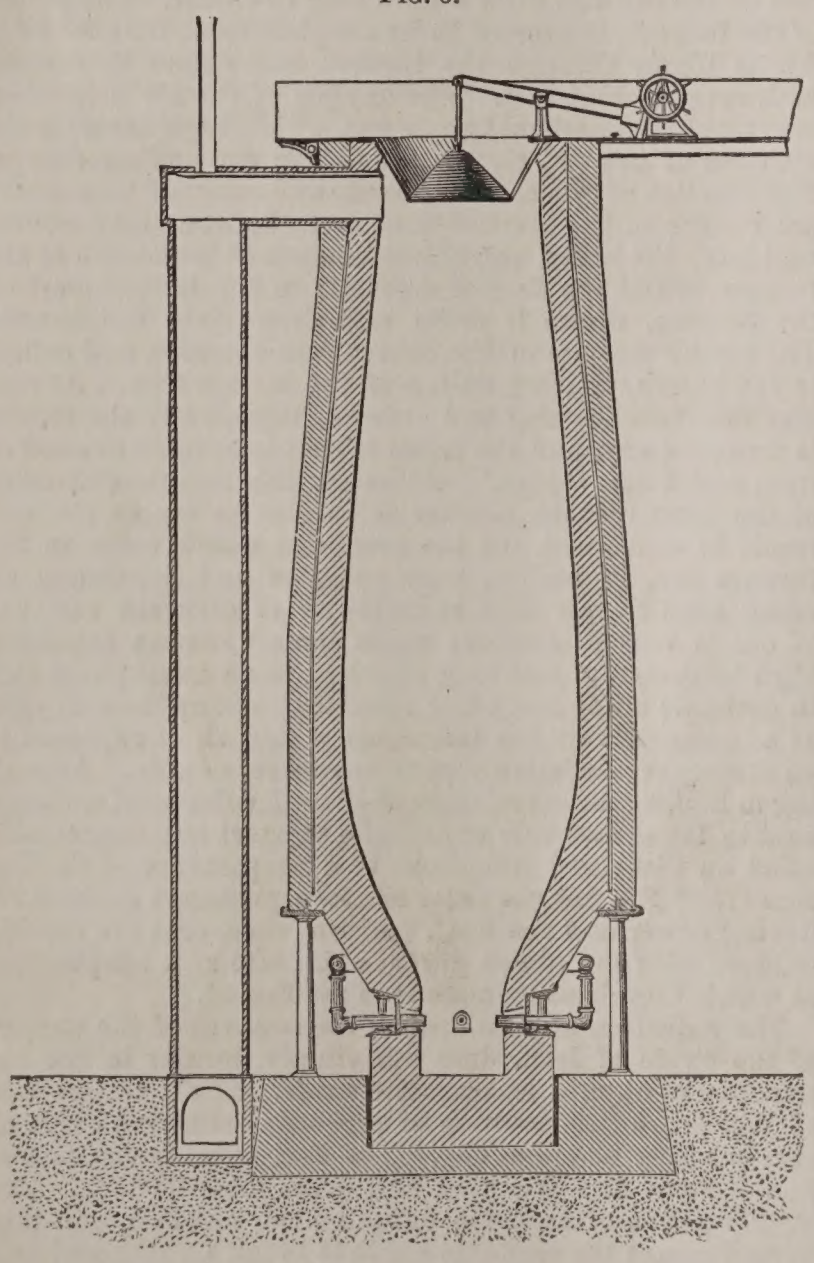
The Blast-furnace Process.—The charge introduced into the mouth of a blast furnace consists of iron ore, which varies greatly in richness and purity in different regions; fuel, either raw coal, coke, or charcoal; and, ordinarily, limestone, the latter serving to unite with the earthy matters of the ore and form a fluid slag or cinder. The action of the furnace, expressed in its simplest form, is as follows: Air is blown through the tuyeres, and comes in contact with incandescent fuel. The oxygen of the air is speedily converted into carbonic oxide gas, which, together with the nitrogen of the air, rises through the descending charge. The reaction of the carbonic oxide and oxide of iron of the ore results in the formation of metallic iron and carbonic acid gas; the latter, ascending, escapes at the mouth of the furnace, while the former descends to the hottest part of the furnace, where it melts and drops into the hearth. The earthy matters of the charge fuse likewise, and collect in the hearth, floating on top of the molten iron. At regular intervals the slag and iron are tapped off: the former is thrown away, and the latter is cast in moulds of sand or iron, and forms "pigs." Although this simple statement of the blast-furnace process is correct as far as the end result is concerned, yet the reactions which occur in the furnace are, in reality, very complex and dependent on many conditions. The reducibility of different varieties of ore is very dissimilar: while some varieties require a high temperature and long exposure to an atmosphere rich in carbonic oxide gas, other varieties yield up their oxygen at a comparatively low temperature and short exposure to an atmosphere relatively poor in carbonic oxide. According to Bell, a gaseous mixture of 40 to 45 volumes of carbonic acid to 100 of carbonic oxide fails to exert any appreciable effect on Cleveland iron-stone at a temperature of melting zinc (782° F.), but the same mixture possesses decided reducing power at a red heat. Again, some ores are rapidly reduced with the above gaseous mixture at a temperature at which Cleveland iron-stone is unaffected.

The reduction of iron ores, or the removal of the oxygen of the oxide of iron, does not simply consist in the abstraction of oxygen by carbonic oxide. The investigations of Bell prove that reaction of carbonic oxide and oxide of iron is a very complex one. The first effect is the formation of some carbonic acid and some metallic iron. The further action of carbonic oxide on the metallic iron thus formed causes the carbonic oxide to break up into carbonic acid and carbon, the latter being deposited in the form of a black powder on the reduced metal. This combined process of reduction and carbon deposition continues until the iron is nearly all in the metallic state; but absolute reduction is never attained by the action of the carbonic oxide alone. As this product, composed of iron and carbon and some oxide of iron, descends into the hotter regions of the furnace, the carbon thus deposited is partially removed by the carbonic acid, but it is not until the point of fusion is reached that the last traces of oxygen are removed. It is probable that the carbon found in the pig iron is a part of the carbon deposited in the ore. The amount and rate of carbon deposition depends on the temperature and the relative amount of carbonic acid present in the gases. It may begin as low as 392° F., but decreases rapidly as soon as a red heat is reached. The most favorable temperature is between 752° F. and 842° F. The temperature of

incipient reduction of sesquioxide of iron by carbonic oxide is variously given by different observers. Bell's determination is the lowest by far—viz. 284° F.—while the oxidation of metallic iron, according to the same observer, does not begin below 752° F.

It is evident that the economical production of iron in the blast furnace is mainly a matter of the amount of fuel used. A saving of the fuel in the process can be effected in two ways: first, by increasing the heat of the descending charge; and second, by increasing the heat of the ascending blast. The first of these conditions is realized by adding to the height or diameter of the furnace; in other words, increasing its capacity, so as more effectually to intercept the heat of the escaping gases; and the second condition is accomplished by direct heating of the air forced into the furnace. It was long considered that there was no limit to the saving that could be effected by increasing the capacity of the furnace and temperature of the blast, but Bell has shown that the profitable limit has probably been attained in both instances, at least in so far as the smelting of Cleveland ore is concerned. The practical limit of capacity in a blast furnace is reached when the gases which are given off at the mouth no longer have the power to abstract oxygen from the ore—a condition dependent on the temperature of the gases, and the relative amount of carbonic oxide they contain. But gases which are inactive on one ore at a given temperature may still have power to reduce another ore at the same temperature; consequently, the height and capacity of a blast furnace is dependent on the kind of ore smelted in it. In the case of Cleveland ore (containing in a calcined state 41 per cent. of iron), of difficult reducibility, Bell finds that the profitable limit is reached in furnaces of from 12,000 to 15,000 cubic feet

FIG. 3.



capacity, with temperature of blast about 900° F. The escaping gases then have a temperature of 600 to 700° F., and contain 6.58 hundredweight of carbon, in the form of carbonic acid, for each ton of pig iron produced, and 40 to 45 volumes of carbonic acid to 100 volumes of carbonic oxide. The consumption of fuel under these circumstances is from 21½ to 22 hundredweight of coke for 1 ton of pig iron produced. Furnaces of 30,000 and 40,000 cubic feet capacity, driven with a blast of 1400 or 1500° F., do not exhibit any further economy of fuel. In smelting richer and more readily reducible ores a small cubic capacity suffices to attain the minimum expenditure of fuel. A notable instance is the Urbna furnace in Austria, working spathic ores. It is 36 feet high, and has a capacity of only 1200 cubic feet, but makes 140 tons of iron per week with 14 hundredweight of charcoal per ton of iron, the temperature of blast being 392° F.

The cause of the great economy of fuel effected by the hot blast—say, on an average, 10 to 11 hundredweight per ton of iron—has long puzzled metallurgists, and the subject cannot be said to be yet entirely removed from the sphere of speculation. The researches of Bell in England and Akerman in Sweden have, however, recently thrown great light on the subject. The following considerations show where the principal sources of economy lie; in other words, why the combustion of a given amount of fuel, outside of the furnace and conveyed through the blast, is more than equivalent to the same amount of fuel burnt in the furnace itself. The fuel burnt before the tuyeres is oxidized merely to carbonic oxide, and gives per unit of carbon only 2400 heat-units; while the fuel in the hot-blast stoves is burnt to carbonic acid, and gives, per unit of carbon, 8000 heat-units, or more than three times the amount in the first instance. Although not more than one-half of this heat is available, owing to loss by the chimney and by radiation, yet there is still a gain from this source. The principal source of saving, however, is to be found in the fact that the heat brought into the furnace by the blast is unaccompanied by any increase in the bulk of the gases in the furnace; whereas the same amount of heat produced by the combustion of the fuel before the tuyeres would have been accompanied by the amount of air necessary for its combustion. This decrease in the bulk of the gases, consequent upon the use of hot blast, acts, first, by diminishing the rapidity of the upward current, thus allowing longer contact of the gases with the ore; and, second, as there is less gas escaping from the furnace, less heat will be carried off in this way.

As the reduction of the ore is dependent upon the temperature and composition of the gases, it is evident that the amount of heat which we may supply by the blast has a limit, for this heat is unaccompanied by the production of carbonic oxide. When, therefore, the fuel used in the furnace has been so far reduced in amount as only to supply the minimum amount of carbonic oxide needed for reduction of any given ore, further increase of the temperature of the blast can be of no advantage, as the heat thus conveyed to the furnace will either escape at the mouth, or it will, by increasing the heat of the furnace, cause a loss of fuel by enabling the escaping carbonic acid to take off another equivalent of carbon.

The product of the blast furnace is *pig* or *cast iron*. Its composition is dependent on the ores and fuel used. It always contains 3 to 4 per cent. of carbon, and in some varieties as high as 5 per cent. The carbon exists in two forms in pig iron—chemically combined, and in the form of graphite. The darker and more highly graphitic varieties are formed at the highest temperatures. The higher the temperature and the more silica the charge contains, the more silicon will be reduced and unite with the iron. A high temperature has also the tendency, in very basic charges, to reduce some of the metals of the alkaline earths.

Sulphur is more readily removed in the cinder at an elevated temperature, while the total phosphorus of the charge goes almost entirely into the pig iron, whatever the temperature may be.

The production of a blast furnace depends on its capacity, the richness and reducibility of its ores, the nature of the fuel, and the temperature of blast. While some small furnaces yield but three tons daily, the production of some of the mammoth furnaces of England is eighty tons daily. The composition and character of the cinder or slag from a blast furnace depends on the nature of the ore and the temperature of the furnace. It consists mainly of a double silicate of lime and alumina.

T. M. DROWN, *Metallurgist.*

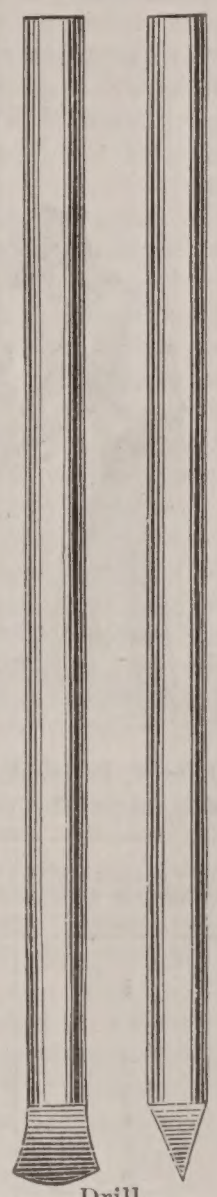
Blast'ing [from the Ang.-Sax. *blæsan*, to "blow"]. The use of gunpowder in quarrying stone probably dates back almost to the invention of that explosive. In ordinary practice the blocks of stone are separated from the mass in the quarry by means of one or more *blasts*, each blast being made by first drilling a hole into the rock by the use of a *drill*, operated either by hand, or—as is now the practice in large works, especially large tunnels or shafts—by machinery driven by steam or compressed air.

In removing very large masses of rock quickly, to make way for a railroad, to furnish stone in sufficient quantities for the rapid construction of an important breakwater, or to prepare the site for a fort, it has become the custom to run galleries into the rock, and to place in chambers prepared for the purpose very large charges of powder of sufficient power to bring down the whole face of a cliff or side of a mountain, as was the case at Dover and Holyhead in England, and at Lime Point, entrance to San Francisco Bay, Cal. Each of these methods for removing rock will be described in turn.

In hand-drilling the operation is performed by means of a *drill* or *jumper*, which is formed from a bar of steel,

or of iron tipped with steel at one end, which is flattened out into a fan shape, with a sharp cutting edge extending on each side a little beyond the body of the drill, as seen in Fig. 1, so that the drill may have free play in working. The drills are of lengths suited to the depths of the holes to be drilled, it being customary to use a short drill in commencing a hole, and longer ones in succession as the hole is deepened. Their diameters also vary, generally with the depths of the hole, but are also much modified by the kind of explosive used, blasting powder requiring much more space for the charge than nitro-glycerine and its compounds.

FIG. 1.



Drill.

In drilling shallow holes of one inch or less diameter, the quarryman holds the drill in one hand (see Fig. 2), turning it a little with each blow, and with the other hand wields a hammer weighing from four to seven pounds. (See Fig. 3.) In this way he can drill in granite an average of eight feet in a day.

In drilling holes ranging from one to three and a half inches in diameter, and two to fifteen feet in depth, three men are usually required (Fig. 4), one to hold and turn the drill, and the other two to wield hammers (Fig. 5) weighing from fourteen to eighteen pounds, striking the drill alternately. The progress thus made in granite has been from two and a half to twelve feet per diem, in holes varying respectively from three and a half to one and a half inches in diameter.

To prevent the cutting edge of the drill becoming heated, and thereby softened, water is frequently poured into the hole, and a wisp of straw, hay, or a rag is laid around the drill at the mouth of the drill-hole to prevent the water spurting out when the drill is struck by the hammer.

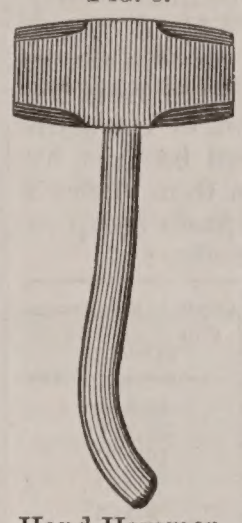
From time to time the fragments and powdered stone have to be taken out of the drill-hole by means of a *spoon* or *scraper*. (Fig. 6.)

Another form of drill, called the *churn-drill* or *churn-jumper*, is frequently used, when the holes are vertical or nearly so. (Fig. 7.) It is usually seven or eight feet long, but may be as much longer as required for deeper holes. It is sharpened at each end into a cutting drill edge, and sometimes has an iron bulb in the middle to give additional weight in falling, and consequently greater effect in drilling. Two men are usually employed to operate it, raising it, turning it about one quarter round, and letting it fall, cutting the rock by the force of gravity. (Fig. 8.) Sometimes a spring rod and line are used to facilitate the operation, enabling one man to operate the drill. (Fig. 9.) The progress made is better than with the drill and hammer, being about sixteen feet per diem, but the cutting edges suffer greater injury, becoming oftener dulled or broken, rendering frequent sharpening necessary.

The next step, after finishing the drilling and removing the chips, powdered stone, etc. from the bottom of the drill-hole, is to determine the *strength of the charge*. In former times an inferior kind of gunpowder, called blasting powder, was generally used, and is still employed in many quarries in preference to the quicker and stronger explosives, apparently for the reason that its slower ignition, by allowing a gradual development of its expansive force, produces a greater, and, for their purposes, a better, effect upon the rock, breaking it into large masses, better suited for "dimension stone." In furtherance of this idea many quarrymen have mixed with the powder certain proportions of other materials, as fine dry sawdust, in the proportions of one-third sawdust for small charges, and one-half for large, and quicklime in the proportion of one-third lime; and have also in some cases managed to have an air-space over or around the charge. The results are stated to have been satisfactory. At Cherbourg, France, in blasting rock for the breakwater, sawdust, obtained from the softer kinds of wood, as elm or beech, was mixed with gunpowder in equal proportions, and the effect, as far as concerns the quantity of rock removed, is reported as having been equal to that of similar blasts in which the charge was wholly gunpowder. The masses were, however, larger, and therefore better suited for use upon the breakwater.

FIG. 2.

FIG. 3.



Hand Hammer.

Of late years the necessity for a more active agent for use in gold and silver mining, and in excavating railroad tunnels, and large cuttings in solid rock, has brought into use more powerful explosives. Nitro-glycerine, first invented and used in Europe, has been introduced to a considerable extent in this country. At the Hoosac Tunnel, where its qualities have been much improved by Prof. Mowbray, it has been manufactured and used exclusively since the summer of 1868. The result has been an improvement in the rate of monthly progress, which, including that resulting from the use of machine drills, has increased from 50 to 150 feet, and the quantity of rock removed in the same time, from $194\frac{7}{12}$ cubic yards to $1147\frac{5}{12}$ cubic yards.

Many combinations of nitro-glycerine are also in use, some of which are claimed to be safer than, and almost if not quite as effective as, nitro-glycerine. Of these *dualin*, invented by Dittmar, and manufactured at Neponset, Mass., is much used. This consists essentially of dried sawdust soaked with as much nitro-glycerine as it will contain. The nitro-glycerine, being thus fixed, is not apparently liable to the changes incident to a liquid state, nor to explosion by shocks. *Giant powder* or *dynamite*, made by soaking nitro-glycerine into a silicious sand, or infusorial earth consisting of millions of microscopic shells, which readily absorb and retain the nitro-glycerine, is claimed to be safe from shocks, and is much used in the mines of California, Nevada, and other Western States and Territories. *Gun-cotton* has been used in England, and the trials of the disks prepared by Prof. Abel have shown marked results of its great explosive power. In the demolition of one of the towers erected in London for the International Exhibition of 1862, some of the charges of gun-cotton were only one-sixteenth, by weight, of the powder used in similar charges in other parts of the same building.

To determine the quantity of powder or other explosive that must be placed in a mine of any kind, we should take

FIG. 4.

into consideration the nature of the soil or rock, its tenacity, weight, and the quantity of the explosive necessary to throw up a cubic yard of it. After ascertaining this by actual experiment, the charge necessary for another mine or blast in the same material may be found by what is called the "miners' rule;" which is, that "the charges of two similar mines are to each other as the cubes of their lines of least resistance," or $c : c' :: l^3 : l'^3$.

The "line of least resistance" is the line along which the exploded charge finds the least resistance to its vent in the open air. Generally, it is the shortest line from the centre of the charge to the surface of the rock or ground. Quarrymen rarely understand the correct use of this line in determining the quantity of powder for a charge, usually confounding it with the depth of the drill-hole. In some cases this is not far from correct, as is seen in Fig. 10, where the line AB is the line of least resistance for the charge BC. But were the hole drilled to the depth G, FG being the position of the charge, the line HE becomes the line of least resistance.

A simple rule, very generally followed, is to "fill the

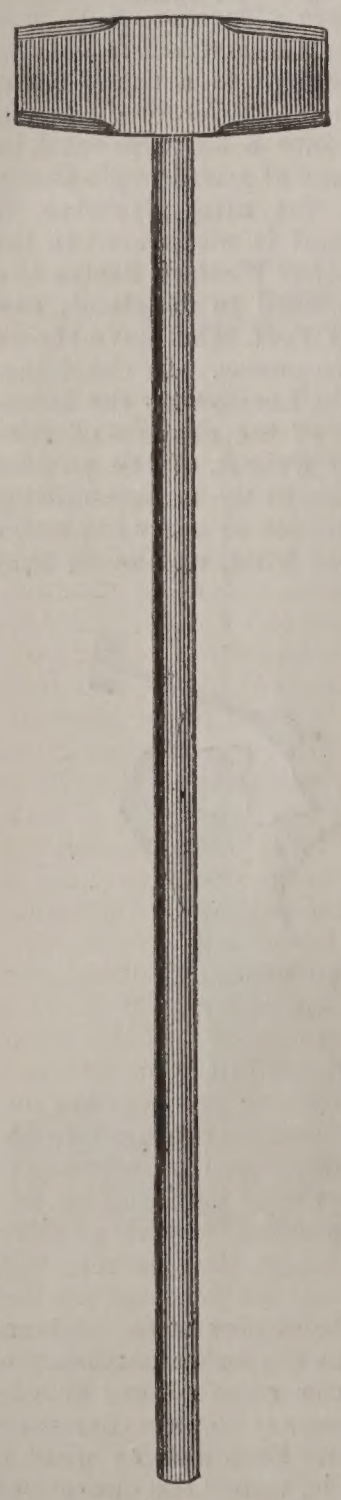
hole one-third full." This for holes of medium diameter may not be far wrong, but where the diameter is larger than usual an excessive charge will be the result of its application. This is readily seen from the fact that one-third of the length of a 2-inch hole will contain nearly *twice* as much powder as the same length of a 1½-inch hole, and a 2½-inch hole will contain nearly *three times* as much.

The true line of least resistance is measured from the *centre of the charge*, and not from the bottom of the drill-hole. This distinction is important, as will be seen by observing in the following table—taken from Gen. Pasley's "Memorandum on Mining"—the different spaces occupied by the same charge in holes of various diameters:

Diameter of the hole.	Powder contained in one inch of hole.		Powder contained in one foot of hole.		Depth of hole to contain one pound of powder.
inches.	lbs.	oz.	lbs.	oz.	inches.
1	0	0.419	0	5.028	38.197
1½	0	0.942	0	11.304	16.976
2	0	1.676	1	4.112	9.549
2½	0	2.618	1	15.416	6.112
3	0	3.77	2	13.24	4.244
3½	0	5.131	3	13.572	3.118
4	0	6.702	5	0.424	2.387
4½	0	8.482	6	5.784	1.886
5	0	10.472	7	13.664	1.528
5½	0	12.671	9	8.052	1.263
6	0	15.08	11	4.96	1.061

Thus, if we have a 1-inch hole, 42 inches deep, charged,

Fig. 5.



Large Hammer.

Fig. 6.

Spoon.

Fig. 7.

Churn Drill.

according to the common rule, with 14 inches of powder, the centre of the charge, being seven inches from the bottom of the hole, will lessen, by that distance, the commonly understood line of least resistance (the depth of the hole), giving 35 inches, which is the true line. As the diameter of the hole increases the two lines approximate more nearly, until with a 6-inch hole they differ only by about half an inch.

Aware of the unequal results from following the common rule, many quarrymen are accustomed to determine the charge by *appearances*, including in that term the nature of the rock, position of planes of stratification, diameter of drill-hole, and a mental comparison with similar mines with which they have had experience. In those quarries and mines, however, which are worked with the best system and economy the charges are almost always determined by the "miners' rule," the charge in pounds being obtained by multiplying the cube of the line of least resistance, expressed in feet, by a certain fractional number, the value of which depends upon the nature of the rock to be blasted.

Fig. 8.

The following table, taken from Lieut.-Gen. Sir John Burgoyne's "Notes on Blasting Rock," gives the charges of "Merchant's blasting powder" used in the granite quarries of Kingstown, near Dublin, Ireland, which were generally found to be sufficient to fracture the rock:

Lines of least resistance, in feet.	Charges of Merchant's blasting powder.		Remarks.
	lbs.	oz.	
1	0	0½	To make sure, ¼ or ½ oz. should be added to so small a charge.
2	0	4	
3	0	13½	
4	2	0	
5	3	14½	
6	6	12	
7	10	11½	
8	16	0	

The above charges, according to the "miners' rule," are all proportional to the cubes of the lines of least resistance in feet.

In the demolition of the walls of the building erected for the International Exhibition of 1862 the charges, when arranged in the wall in three-lined intervals, were equal to ⅝

Fig. 9.

($l.\ l.\ r.$)^3 (five-eighths of the cube of the line of least resistance, in feet); for two-lined intervals the charges were ⅓ ($l.\ l.\ r.$)^3; and for one-lined intervals, from ¼ ($l.\ l.\ r.$)^3 to $\frac{3}{10}$ ($l.\ l.\ r.$)^3.*

In blasting rock, a hard quartzose schist, for the construction of a pier to form the new harbor of Holyhead, England, in 1850–51, the charges of Merchant's blasting powder ranged from ⅔ ($l.\ l.\ r.$)^3 to $\frac{1}{26}$ ($l.\ l.\ r.$)^3, depending upon

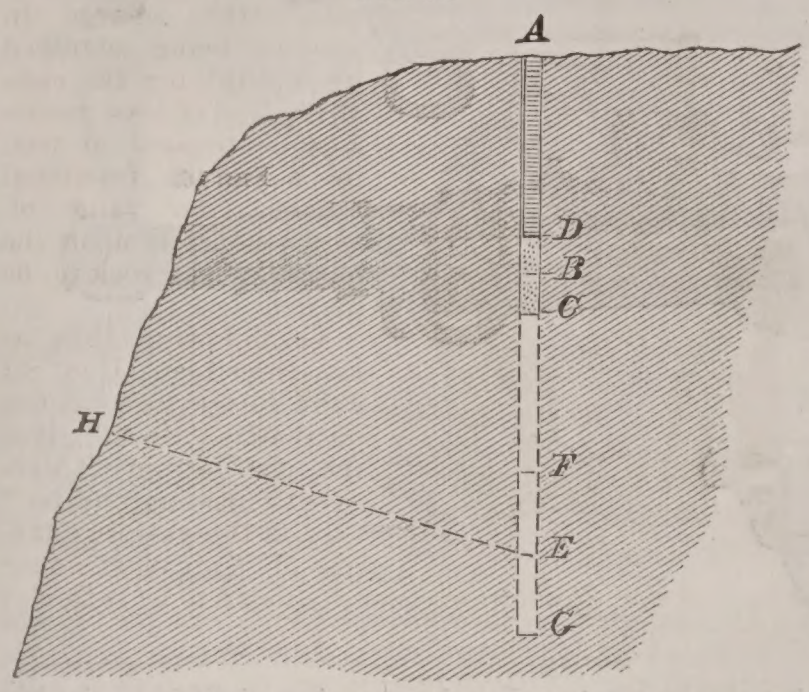
* "Professional Papers of the Corps of Royal Engineers," vol. xiv., p. 148.

the positions of the charges in relation to the planes of stratification.*

In the three large charges used to blast down Round Down Cliff (composed of chalk) near Dover, England, in 1843, their strength was calculated at $\frac{1}{3\,2}$ $(l.\,l.\,r.)^3$. †

At Delhi, India, in blasting hard quartzose rock the charges for lines of least resistances of 1, 2, 3, 4, 5, and 6 feet were, respectively, 4, 8, 14, 20, 26, and 36 ounces. ‡

Fig. 10.



In the large blast in sandstone at Lime Point, entrance to San Francisco Bay, Cal., in 1868, the lines of least resistance being between 45 and 50 feet, the charges were 4000 pounds and 3500 pounds, or about $\frac{1}{2\,8}$ $(l.\,l.\,r.)^3$.

Charging the Drill-hole.—After the strength of the charge has been determined by any of the above rules, and all moisture removed from the bottom of the drill-hole by means of wisps of straw, hay, or bits of rags, the charge is introduced. If the hole be vertical, the powder is poured in by means of an ordinary funnel of tin, or, preferably, copper; but if the hole is inclined, the funnel is lengthened out by attachable sections, so as to reach nearly to the bottom of the hole, in order that the powder may be lodged at the bottom, without allowing any particles to adhere to the sides, as they would do if poured in loosely. The danger of premature explosion from the tamping-bar striking fire against the sides of the hole is thereby avoided. For this purpose, also, the tamping-bar (Fig. 11) should be shod with copper.

Fig. 11.

Tamping Bar.

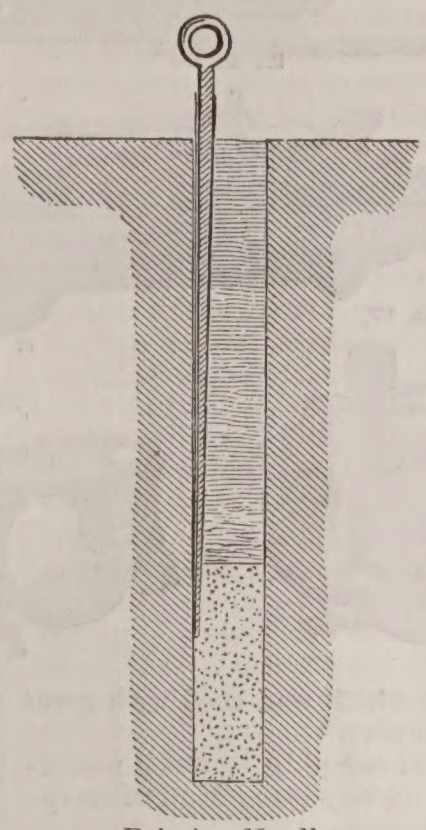
A wooden rod is used to press down the powder and to dislodge any grains that may have attached themselves to the sides of the hole. If the hole be horizontal or nearly so, the charge is placed at the bottom of the hole by using a semi-cylindrical scoop with a long handle. The charge is placed in the scoop, which is then carried to the bottom of the hole, and being turned over is then withdrawn, leaving the powder at the bottom.

If the hole is inclined upward, a cartridge to contain the powder must be used; this is pressed home by the wooden rod, and if the inclination of the hole be great, a wad of straw or hay is pressed up against it to hold it in place until the tamping can be introduced.

Tamping.—The *priming-needle* is next used. This is a long wire tapering towards the point, so as to be easily withdrawn after the tamping is rammed around it, and enlarged at the other end to form an eye for the introduction of an iron bar in withdrawing it. (Fig. 12.) It should be tipped with copper, and would be better if made entirely of that material. The needle is introduced so that its tip shall penetrate well into the charge. It is usually wrapped with paper, so that when withdrawn the paper may remain as a wall to the fuse-hole, preventing any loose particles of tamping from falling into and choking it. The needle being held firmly against one side of the drill-hole (Fig. 12), the tamping is introduced. First, a wadding consisting of some loose elastic material, as a wisp of straw, hay, or piece of dry sod, is inserted over the powder; then an inch or two of broken brick, or dry clay, or soft stone chips without any flinty substances in them, are thrown in and lightly rammed with the tamping-iron and hammer; then a few more inches of brick or stone chips are put in and well rammed, and so on successively to the top of the hole, when the last one or two inches are filled with damp clay and rammed; after which the needle is withdrawn.

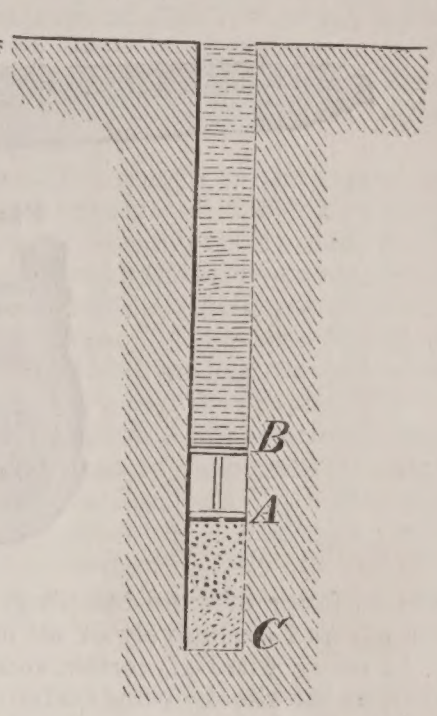
It is stated that if an *air-space* (as AB, Fig. 13) be kept open between the charge and the tamping, leaving the

Fig. 12.



Priming-Needle.

Fig. 13.

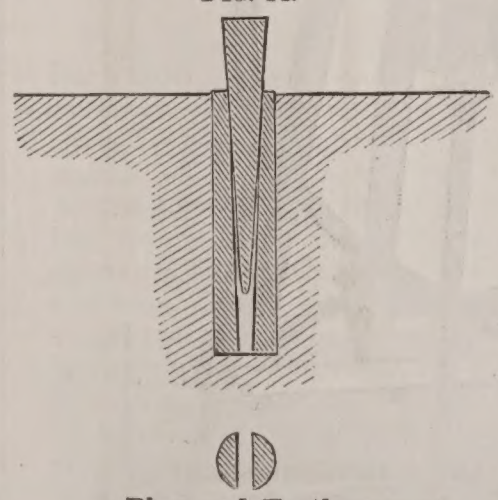


Air-Space.

charge AC to fill one-half or two-thirds of the space BC, the effect will be the same as for a full charge filling the entire space. The expedient, however, is not often used in practice.

Materials for Tamping.—Broken brick slightly moistened, rotten stone, quarry chips not containing any flinty substances liable to strike fire, well-dried clay, and sharp pit-sand, are good tamping materials. Opinions have been much divided in this country and in Europe upon the comparative merits of sand and clay for tamping. Elaborate experiments were made at Fort Adams, under the direction of Colonel (afterwards Brigadier-General) Totten, U. S. Engineers, to determine the value of sand for blasting purposes. Sand was forced upward through brass and iron tubes by means of a piston to which great power was applied. The resistance of the sand to this force was so great as to reduce to powder the sand in contact with the inside of the tube before the mass could be forced out of it. Trials were also made with gunpowder as the expelling force. "A musket barrel of $\frac{3}{4}$-inch bore was charged with two inches of powder and thirteen inches of packed sand. On firing, the barrel was burst, but the sand was not driven out." "A piece of musket barrel taken from near the muzzle, and open at both ends, was charged at one end with five and a half inches of brick-dust, hard rammed, and at the other with five and a half inches of sand, well packed, with one inch of powder between them, a priming-hole being bored to communicate the fire. The explosion of the powder burst the barrel, but neither the sand nor the brick-dust was driven out." In conclusion, the report of Lieut. Brown says: "The experience at Fort Adams proves that the resistance offered by sand is quite sufficient for blasting rocks, and the advantages attending its use are, that it is much less troublesome than the usual mode, and that it is perfectly safe. To ensure success, the space left above the charge should have a length of ten or twelve times as great as the diameter of the hole." ⁂

Fig. 14.



Plug and Feather.

Experiments made at the works carried on at Kingstown, near Dublin, Ireland, to test the relative values of sand and clay for tamping, exhibited in their results a marked superiority in the latter over the former, which was very often blown out without cracking the rock, while the clay tamp-

* "Professional Papers of the Corps of Royal Engineers," vol. ii., p. 1.

† Ibid., vol. vi., p. 188.

‡ Lieut.-Gen. Sir John Burgoyne, "Blasting and Quarrying Stone," p. 76.

⁂ "Journal of the Franklin Institute," July and Aug., 1836.

ing in another hole of the same dimensions held firmly, the rock being cracked. Sand well packed gave better results than when poured loosely into the drill-hole, but not equal to those given by clay. The sand was from the sea-shore, and of course water-worn. Sharp pit-sand would probably have given better results. Of the three varieties, coarse, fine, and medium sand, the medium proved to be the best.

In blasting rock at Cherbourg, France, the experience

FIG. 15.

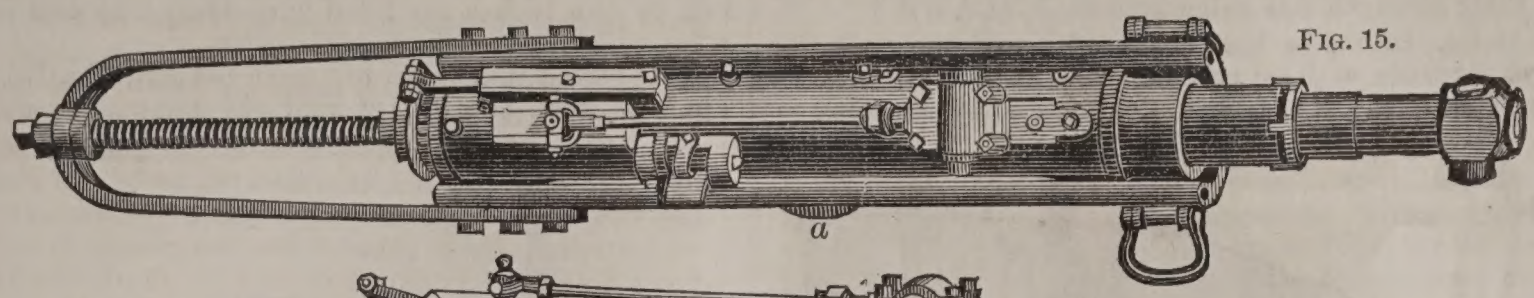


FIG. 16.

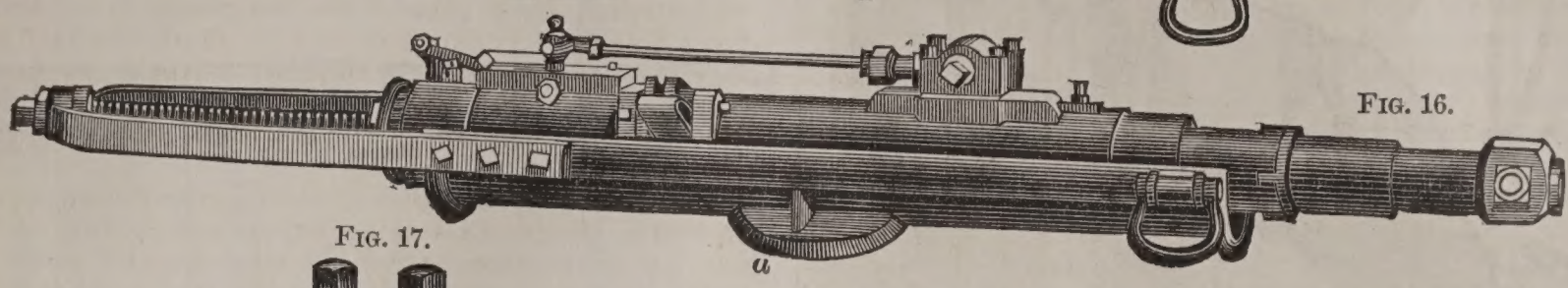


FIG. 17.

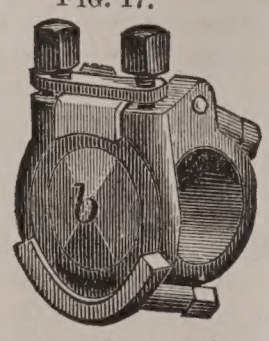
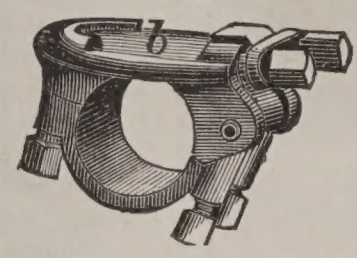


FIG. 18.

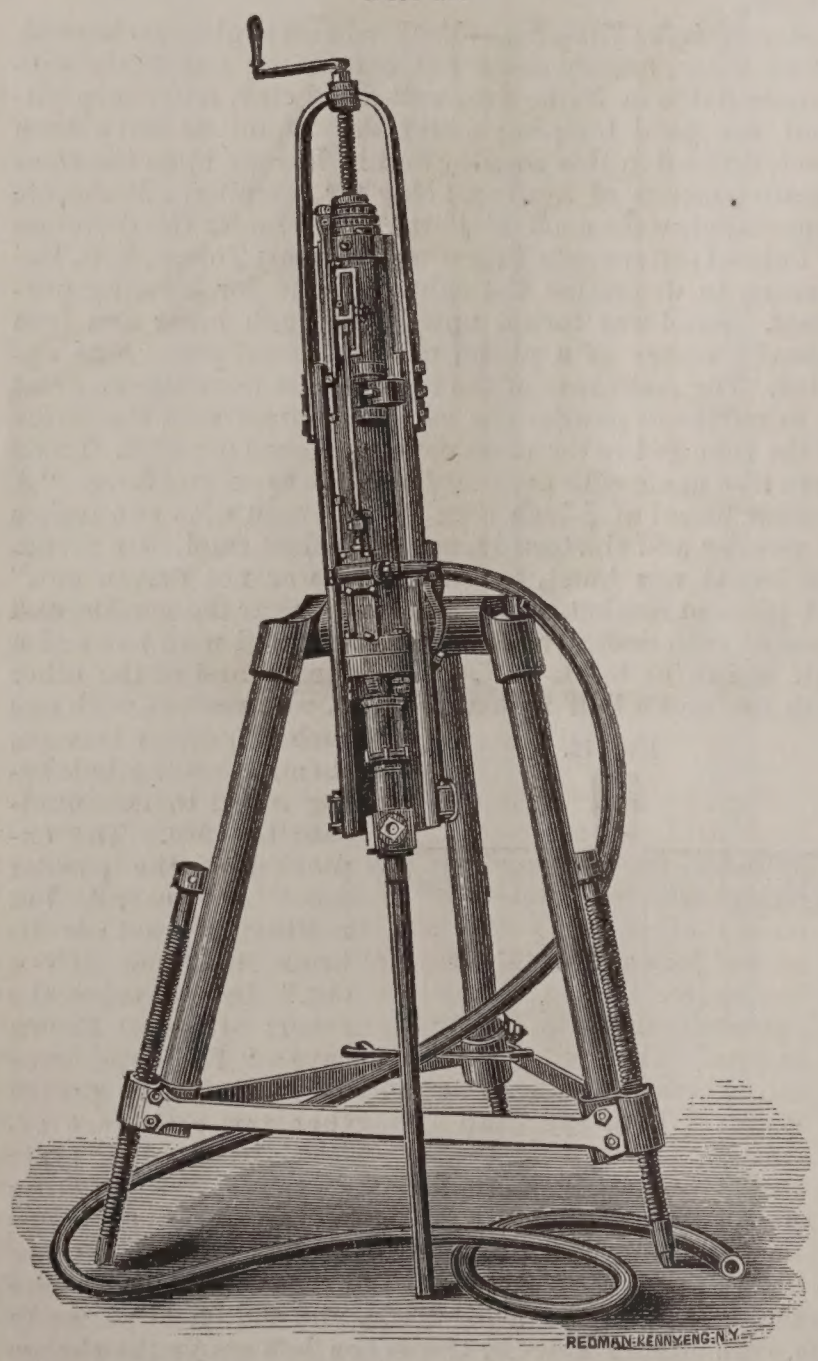


was in favor of sand-tamping, which was used with great success and exclusively of all others.*

In using nitro-glycerine, sand-tamping is much preferable, as the shocks from ramming any other kind of tamping are liable to explode the charge.

Many contrivances, such as cones, plugs, and wedges, have been employed to place over the charge in the drill-hole for the purpose of increasing the resistance of the

FIG. 19.



tamping, but they consume time in their proper placement and confinement in position, and are also expensive. Their use, therefore, is confined to particular blasts, which require unusual time and trouble in their preparation, and from which compensating results are expected.

* "Mémoire sur la digue de Cherbourg," par J. M. F. Cachin, page 51, note.

To obtain greater effect from a given drill-hole, the bottom of the hole has sometimes been enlarged by the use of acids to form a sort of chamber for the reception of the charge. At Marseilles, France, in blasting a calcareous rock, dilute nitric acid was poured to the bottom of the drill-hole through a small leaden tube. The effervescence produced by the decomposition of the rock, escaping to the surface through an outer tube, carried with it the substances of the dissolved rock.

Priming the Charge.—The usual way is to fill the needle-hole with fine powder, then place in connection with the powder at its mouth a slow match, made by soaking coarse paper in saltpetre or a solution of powder. The slow match is made long enough to allow the quarryman, after lighting one end of it, to seek a place of safety before the explosion takes place. Sometimes the priming is contained in straws, joined together end to end so as to make a tube sufficiently long to reach the charge. This is inserted in the needle-hole, and fire is communicated, as above, by a slow match or portfire.

Bickford's safety fuse and others of similar character are frequently used, especially in wet localities. The fuse is cut so that when one end is inserted into the charge the other will project about an inch above the mouth of the hole. The wadding is then put in, and after it the tamping is rammed around it in the same way as around the needle. This fuse possesses great advantages over the common priming when the drill-hole is horizontal or inclined upward, or much water is present. In the latter case the charge should be contained in a waterproof cartridge, and the junction of the fuse with it be made watertight by means of a wrapping of twine covered with wax.

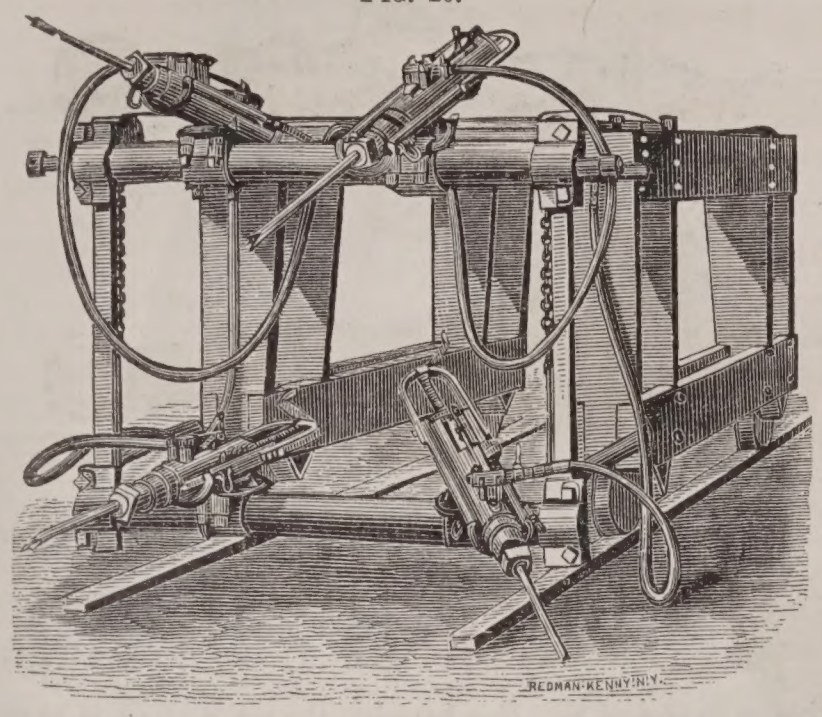
At Cherbourg the use of the needle and the usual tamping was dispensed with. A straw tube, such as has been described, filled with priming composition, was placed in the drill-hole, the lower end being inserted into the charge. Fine and thoroughly dried sand was then poured in until the drill-hole was full. The upper end of the straw was then opened and the composition ignited, the slowness of burning affording time for the miner to seek shelter.

At Delhi, India, a reed filled with powder was used to fire the charge. The reed was inserted into the needle-hole, and the top being split, a piece of rock was laid upon one of the splits to prevent it falling into the hole. The powder being ignited by a piece of touch-paper and a train, the reed flew to the bottom of the needle-hole like a rocket, and ignited the charge.

Of late years the use of electricity in blasting has much increased, especially since the introduction of nitro-glycerine and its compounds, and gun-cotton, which can best be fired by the shock of a minor explosion. If ignited, they burn without any explosive effect. In firing a charge of powder all that is necessary is to make a short interruption of the conducting wires in connection with the charge. In passing the electric current a spark is produced at the point of interruption sufficient to ignite the powder. In firing nitro-glycerine or gun-cotton an "exploder" containing a sensitive priming composition is necessary. Those used at the Hoosac Tunnel are made there by Prof. Mowbray, by first inserting the ends of two insulated wires into a small wooden

cylinder, where they are accurately fixed in position, so as to give a spark upon the passage of the electric current. The wooden cylinder is then filled with the priming composition (composed of sulphide and phosphide of copper and chlorate of potash), and this is then connected with a

FIG. 20.



copper cap containing fulminate of mercury, and the whole enclosed in a wooden cylindrical case made watertight. The resistance of the copper cap adds much to the force of the exploder, and ensures the effective explosion of the nitro-glycerine.

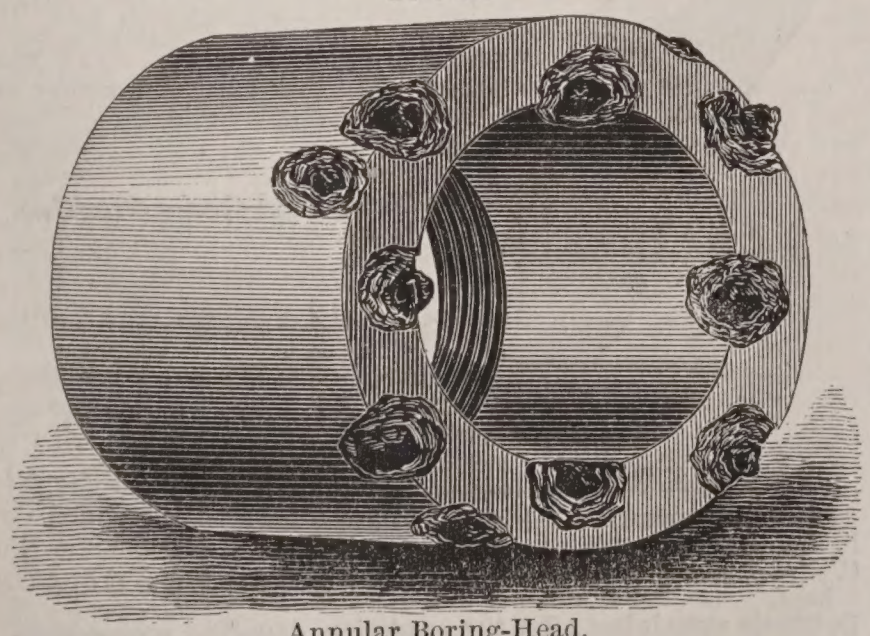
A frictional electric machine made by Mr. H. Julius Smith of Boston is very portable, and has been found useful for firing mines. The ebonite disk for exciting electricity is turned by a small crank between two rubbers covered with sulphuret of tin, and all is enclosed in a compact case of vulcanite. By simply turning the crank backward the connection of the poles of the battery with the conducting wires is made, and the charge is fired.

A magneto-electric machine made by Ritchie & Sons of Boston is used at the Hoosac Tunnel, and possesses the power of firing 150 charges simultaneously. The conducting wires used are of copper encased in a watertight covering of gutta-percha.

Cutting up Large Blocks.—In reducing the masses thrown out by a blast to the sizes of "dimension stone" required for use, lines of small holes are usually cut in the direction required, selecting, if possible, the natural lines of cleavage. These small holes are wedge-shaped, about three inches long, two inches deep, and three inches apart. Into these iron wedges are inserted, and struck with a heavy iron hammer, in succession, from one end of the row to the other.

Splitting with the "plug and feather" is more generally used where it is desired to obtain a uniform split surface to a considerable depth. A row of circular holes, about one inch in diameter, five or six inches in depth, and the same distance apart, are drilled along the line to be split. Two feathers are then placed on opposite sides of each hole. The *feather* (Fig. 14), when in position, is like an inverted iron wedge having a smooth surface to receive the *plug*, and a circular back to fit the sides of the drill-hole. Between these feathers the plug (a long narrow wedge) is in-

FIG. 21.



Annular Boring-Head.

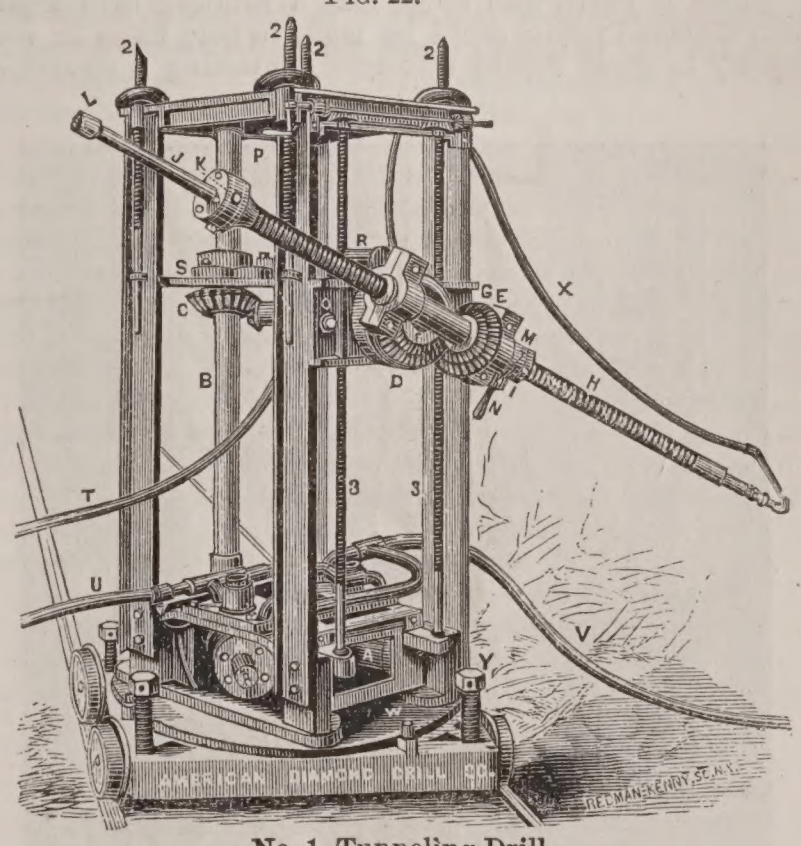
serted, the faces of the plug and feathers being parallel to the desired line of cleavage. The plugs are then driven in succession as above, until the rock splits.

In the large quarries at Aberdeen and Peterhead in the north of Scotland the charges used are merely sufficient to break the rock into large masses. A process called "bulling" is then had recourse to. This consists in filling the vertical cracks and fissures opened by the blast with powder, and firing it. The explosion throws the blocks forward in their beds some inches, if not several yards, into positions convenient for splitting up.

Quarry Shields.—In a populous locality, or one where it is difficult for the quarrymen to reach a place of shelter from the small fragments of rock that are sent by the blast flying through the air, it is usual to cover the rock around the hole with brush or loose plank or timbers weighted with stone. These prevent the fragments from flying so far. Shields of boiler iron and of plank strongly nailed together are used in very confined localities, as in drifts and shafts of mines. The iron shields used in the quarries near Glasgow, Scotland, were two and a half feet square by one-fourth of an inch thick.

Steam Drilling-Machines.—The length of time required, as well as the great labor and expense of drilling by hand, has led to the introduction, in large private and public works, of drilling-machines driven by steam or compressed air. Sommeiller invented a machine which was used with success at the Mount Cenis Tunnel. This was driven by compressed air conveyed into the headings in pipes, the the compressors being situated near the E. and W. entrances to the tunnel. Subsequently the Burleigh drill, similar to the above, was patented in this country, and is now manufactured largely by the Burleigh Drill Manufacturing Company at Fitchburg, Mass. This has been used in the Hoosac Tunnel since the summer of 1866, giving great satisfaction, the progress by its use and that of nitro-glycerine having since increased from 50 to 150 feet per month, notwithstanding the size of the heading had been more than doubled in the mean time. The value of this machine warrants a brief description.

FIG. 22.



No. 1. Tunneling Drill.

Figs. 15 and 16 show a top and side view of the Burleigh drill, as now made. It consists of three parts—the cylinder, the cage, and the piston. "The cage is merely a trough with ways on either side, in which the cylinder, by means of a feed-screw and an automatic feed-lever, is moved forward as the drill cuts away the rock. The piston moves back and forth in the cylinder, propelled and operated substantially like the piston of an ordinary steam-engine. The drill-point is attached to the end of the piston, which is a solid bar of steel. The piston is rotated as it moves back and forth by ingenious and simple mechanism. The forward movement of the cylinder in the trough is regulated by an automatic feed as the rock is cut away, the advance being more or less rapid as by the variation in the nature of the rock the cutting is fast or slow." When the drill is in operation a small jet of water is kept playing into the drill-hole to cool the drill-point and to soften the rock. "When the cylinder has been fed forward the entire length of the feed-screw, it may be run back, and a longer drill-point inserted in the end of the piston." The drilling-machine is attached to the clamp (see Figs. 17 and 18) by means of a circular plate (*aa*, Figs. 15 and 16) with a bevelled edge cast upon the bottom of the cage near its centre. This plate fits a corresponding cavity (*bb*, Figs. 17 and 18) in one side of the clamp, and is held there firmly in any required position by the tightening of a screw. By the

motions upon one plane of the plate in its cavity, and upon another, at a right angle to the first, of the clamp upon the bar, and the sliding endwise of the clamp upon the bar, it will be seen at once that any position and direction of the drill is attainable. It only remains to attach the bar, of any reasonable length, to a convenient carriage or frame."*

These frames are of various forms, made to suit the different circumstances under which the drill is usually used. Of these various forms, the one shown in Fig. 19 is adapted to quarry work, open-cut, surface, or shafting work. The adjustable legs admit of its being placed upon uneven surfaces of the rock. Fig. 20 shows a frame adapted for use in a tunnel. It mounts four drills upon two bars, the lower of which may be raised or lowered by means of chains, pulleys, and a windlass.

In the Hoosac Tunnel the motive-power is compressed air, and this is much better than steam for all tunnel and shaft work. By its escape, upon being worked off, it cools the headings, refreshes the air, and creates a current out of the drift or shaft, which carries off the vitiated air caused by blasting, respiration, and burning candles. The results of its use upon other works have also been very satisfactory. The progress made in deepening the Illinois and Michigan Canal is reported as being from twelve to fifteen holes drilled daily, each hole being from 7 to 8 feet deep and 4½ inches in diameter, or from 90 to 110 feet per diem, equal to the labor of thirty to thirty-five men. At Poughquag, N. Y., in very hard, seamy rock, it drilled 40 holes, 4 inches in diameter, per day, equal to the work of twenty men. At the works of improvement at Hallet's Point, carried on by the government, it was reported for 1868 and 1869 that the drill performed twice the amount of work in the same time as, and at one-third the expense of, hand-labor.

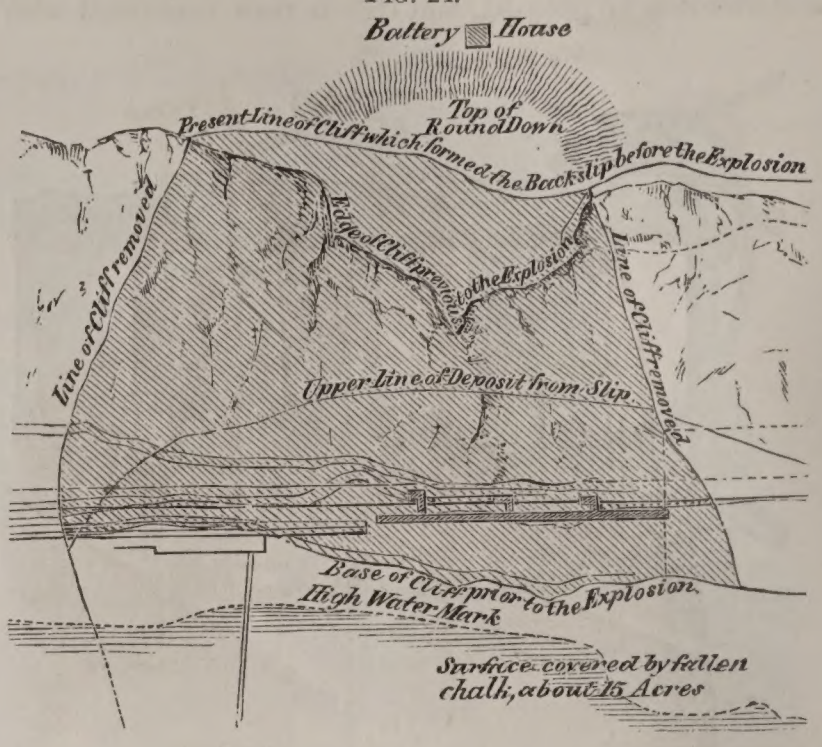
Diamond Drill.—The first application of the diamond to drilling rock was made by Prof. Rodolphe Laschot, a civil engineer of Paris, who found that a rotating drill armed with diamond points could be made to bore holes in rock rapidly to great depths by forcibly injecting a stream of

FIG. 23.

water into the hole through the drill. He also arranged the diamond teeth upon the end of a cylinder or boring-head, so that a hole with an annular cross section could be bored, leaving a cylindrical core in the middle. Fig. 21† shows the arrangement of the black diamonds upon this bit or boring-head, which is a steel cylinder about four inches in length. They are placed in three rows—one on the end, one upon the inner, and one upon the outer edge. The diamonds in the row on the end cut the forward path of the drill, while those in the two other rows enlarge this path to admit the free ingress and egress of water to cool the diamond point and moisten and soften the rock. Fig. 22 exhibits one of the numerous forms of the machine adapted to tunnelling purposes.

The motive-power is furnished by two oscillating engines AA, both attached to the same crank-shaft B. This upright shaft by the gear C communicates its motion, with double velocity, to the bevelled gears D and F, and from

FIG. 24.

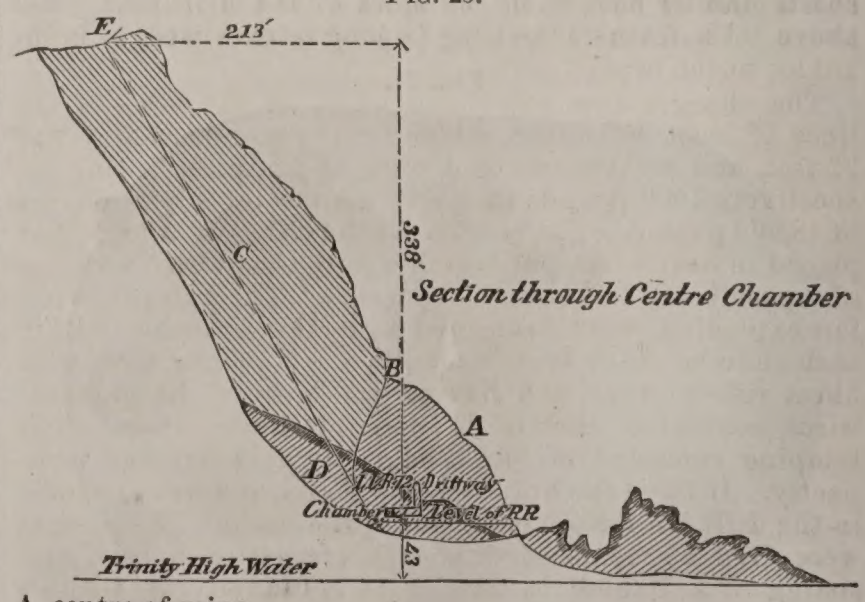


thence to G and E. E is keyed to the screw-shaft H at the clutch M. G has a tubular axis which has a female screw cut inside to receive the male screw on the shaft H, thus forming a long nut in which the shaft revolves. The velocities being different, the effect of the two screws, like that of a differential screw, is to feed forward the drill to its work. By changing the diameters of the bevelled gears G and F any desired feed may be obtained. In extremely hard rock the feed of one inch for 400 revolutions is used, allowing the diamonds to cut only $\frac{1}{400}$ of an inch in each revolution. The drill-rod being rotated at the rate of 600 revolutions per minute, the above feed will give a progress of 1½ inches per minute or 7½ feet per hour. In rock of ordinary hardness the drill is fed forward at the rate of 1 inch to 300 revolutions, boring 2 inches per minute or 10 feet per hour.

By throwing the clutch M out of gear, the revolution of the drill-shaft is suspended, and by the action of the nut-gear G is run rapidly back, thus withdrawing the drill-rod from the hole bored. The drill-rod J consists of a tubular boring shaft made of lapwelded tube, with the bit or boring-head described above screwed on to one end. As the drill cuts an annular channel into the rock, the cylindrical core left by the cutters passes up into the hollow drill-rod, and is drawn out with the drill-rod in sections of from eight to ten feet. The drill-rod may be extended so as to bore any depth required. It may also, by convenient arrangements provided, be turned in any direction, or raised or lowered, as desired. Water is injected into the drill-hole through the hollow drill-rod by means of a double-acting plunger pump situated at R.

Fig. 23 represents a more portable form of the machine, adapted to use in a shaft. It is mounted upon a movable frame, which is fixed in position by jack-screws pressing against the sides of the shaft. The motive-power (steam

FIG. 25.



A, centre of mine.
B, top of crater.
C, superincumbent mass whose fall followed the removal of the base.
D, débris remaining after the explosion, denoting proposed escarpment previous to blast.

or compressed air) is admitted through a pipe leading to the surface above, the quantity being regulated by a stop-cock near the hand of the attendant. The advantages

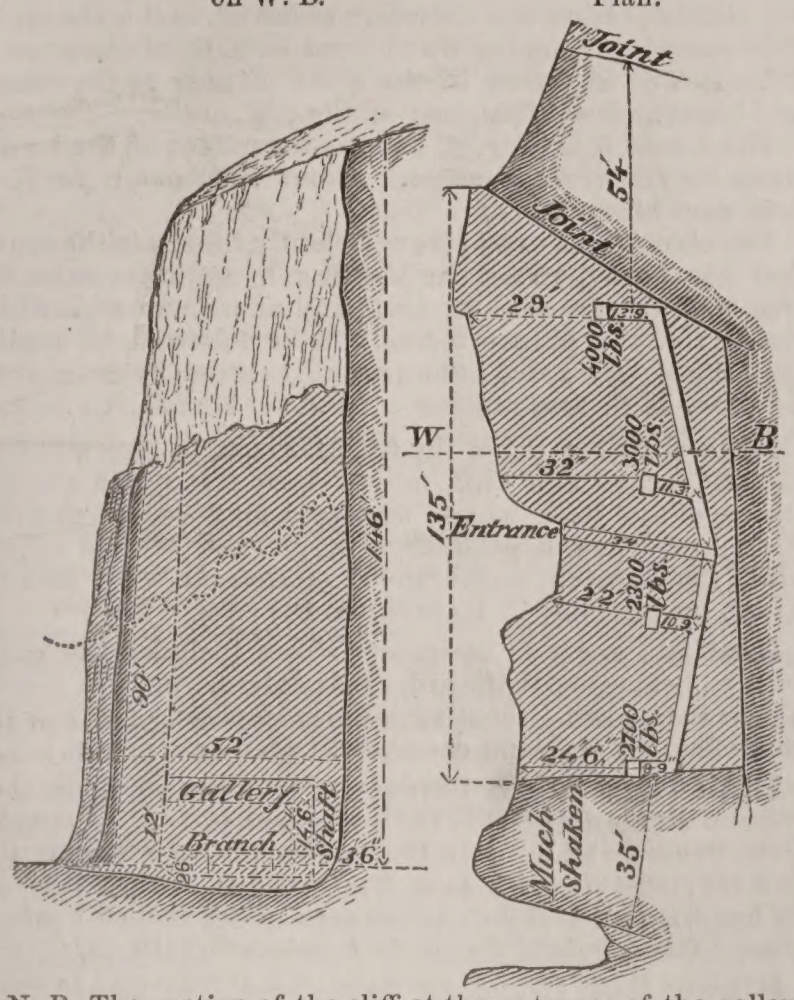
*Circular pamphlet of the Burleigh Rock-Drill Company, Fitchburg, Mass.

† Circular pamphlet of Severance & Holt, manufacturers of diamond-pointed rock-drills, 16 Wall street, N. Y.

claimed for this drill are—that holes may be bored to any required depth, thus permitting the charge to be placed at the point where its effect is desired, and enabling prospect-

FIG. 26.

Section and Elevation on W. B. Plan.



N. B. The section of the cliff at the entrance of the galleries is shown by thick dotted lines, and the outline of the débris is shown by thin dotted lines. The part removed by the explosion is shown by light shading.

ing holes, or drain-holes for water, to be run in galleries or sunk in the bottom of shafts of mines; that the holes are perfectly cylindrical and of uniform diameter, thus permitting the use of cartridges of very nearly the diameter of the holes.

At Hallet's Point, where both drills were used by Gen. Newton, the Burleigh drill gave the best results in tunnel-work, but for prospecting or drilling long holes for other purposes, it is stated that the diamond drill cannot be dispensed with.

Blasting by Galleries.—In cutting the way for the South-eastern Railway it became necessary to blast down a portion of Round Down Cliff, near Dover, England, composed of compact chalk.* It was decided to run a gallery into the cliff, and to place three large charges five feet in rear of the centre line of the railway, and three feet above its level. The gallery, 4′ wide and 5′ 6″ high, was run 20 feet above the level of the railway. (Fig. 24.) Three shafts, made in the form of a truncated cone, 3′ in diameter at top and 5′ at bottom, to offer greater resistance to the tamping being blown out, were then sunk 17 feet. (Fig. 25.) Branches were then run at right angles to the drift-way, made of a wedge-shaped form, 2 feet wide at the shafts and 4½ feet at the chambers, for the reason stated above. Chambers of oblong form were excavated at right angles to the branch drifts.

The charges were calculated at $\frac{1}{3\,2}$ of the cubes of the lines of least resistance, which for the middle charge was 72 feet, and for the two end ones 56 feet each, giving respectively 7500 pounds and 5500 pounds, or a total charge of 18,500 pounds. The powder for the charges, in bags, was placed in deal boxes put together in the chambers, a vacant air-space being left around the boxes. The galvanic wires for exploding were connected with two branches within each chamber, each branch attached to a primer filled with finest rifle powder, and having the ends of the galvanic wires connected therein by fine platinum wires. The tamping consisted of blocks of chalk laid dry and compactly. It filled the branches, the shafts, and was extended in the drift ten feet on each side of the shafts. The charges were fired by means of three separate batteries, each consisting of a Daniell battery of 18 cells, and two Grove's batteries of 20 plates each. These were connected with the charges by three separate sets of wires. The circuit was completed and the mines fired simultaneously by three attendants acting by words of command. The ignition was followed by a deep hollow sound. "The bottom of the cliff yielded very gently to the force of the powder, assuming a curved form beyond the general face; then the upper part began to give way, and finally the whole slid out into the sea, carrying everything before it in the most magnificent manner."† Four hundred thousand cubic yards of the chalk cliff were removed. This blast is remarkable as being the first large one, on land, at which the galvanic wire was used to fire several charges simultaneously.

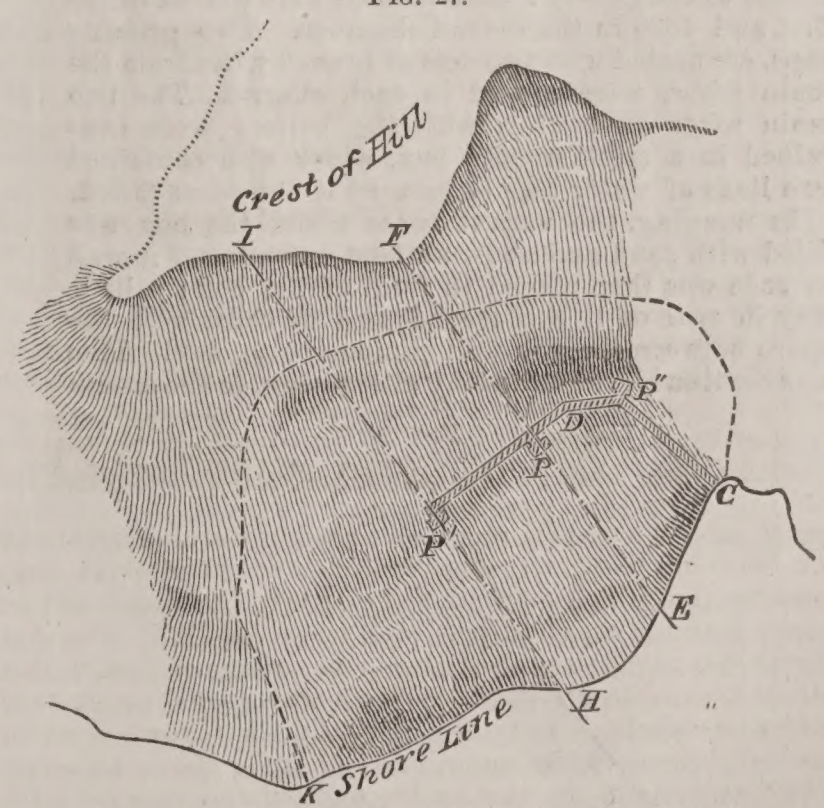
In the construction of the large pier to form the new harbor of Holyhead, England, it was found that the ordinary process of blasting, even on the largest scale, could not supply the quantity of stone required—2500 to 3000 tons per day. It was therefore decided to operate by sinking shafts and running galleries, whichever would soonest reach the seat of the charge, and to use large quantities of powder, properly distributed in several chambers.‡ The rock consisted of an extremely hard quartzose schist.

The first large blast was made on the 1st of Nov., 1850, and by the 2d of Aug., 1851, the number had reached 58, with a total result of 293,890 tons of rock removed by the explosion of 103,092 pounds of Merchant's blasting powder, or an average of $2\frac{85}{100}$ tons to a pound, at a mean cost of $4\frac{3}{4}d.$ per ton. The charges of powder averaged one-fourteenth of the cube of the line of least resistance, in feet. They were so placed that this line should, if possible, be perpendicular to the planes of stratification. The results were so satisfactory that the method was continued.

The galleries were from 3 to 4 feet wide and 5 to 5½ feet high. In excavating them, holes were drilled from 1½ to 2 feet deep, 1½ inches diameter, which were charged with from 4 to 6 ounces of powder, well tamped. Two parties of two men each relieved each other day and night, excavating $1\frac{2}{3}$ feet per day. In the shafts, 6 feet by 4 feet, the progress was not so great. In loading, the powder in sacks was passed from hand to hand to the chamber, where it was usually poured into a deal box prepared to receive it. The tamping was formed of red clay, well rammed, every 6 inches for the first 10 feet, every 12 inches for the next 10 feet, and every 18 inches for the remaining distance. The charges were fired by a Grove's voltaic battery.

Fig. 26 represents the arrangement of galleries and chambers for a large blast of 12,000 pounds of fine-grained powder, which was fired on the 22d of Nov., 1860.‡ A gallery was run in 34 feet from the face of the cliff; then a shaft was sunk 14½ feet, from the bottom of which level galleries were driven right and left, and four returns were made, at the extremities of which the chambers were formed, about 3 feet below the level of the ground-line of the quarry. The powder for the charge, in 50-pound bags, was passed in by hand to the chamber, where the loader emptied them into larger canvas bags coated with tar. These were closely piled in the chamber. The tamping was composed of red clay, and was extended out to the entrance.

FIG. 27.



Sketch of a Drift at Lime Point, Cal., May 20, 1868.

In estimating the quantity of powder for the charges no specific rule founded on the lengths of the lines of least resistance was followed, but the cubical contents of the rock to be removed was divided by the number of cubic

* "Professional Papers of the Corps of Royal Engineers," vols. vi. and viii.

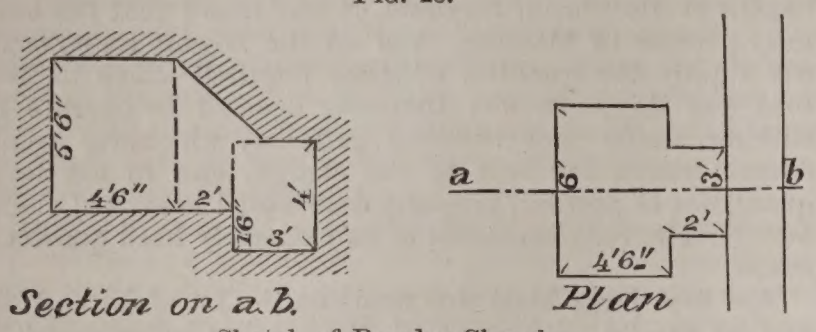
† "Professional Papers of the Corps of Royal Engineers," vol. vi., p. 188.

‡ Ibid., vols. ii. and vii.

‡ Ibid., vol. x.

feet in a ton, and this result divided by the number of tons of rock that had been found, in previous blasting, could be thrown up by one pound of powder. In this case it was 1 pound to 3 tons. The total charge (12,000 pounds) was then divided into four charges, according to their lines of least resistance, the tenacity of the rock near each one, and the proximity of joints. The resulting charges averaged one-fourth of the cubes of the lines of least resistance.

FIG. 28.



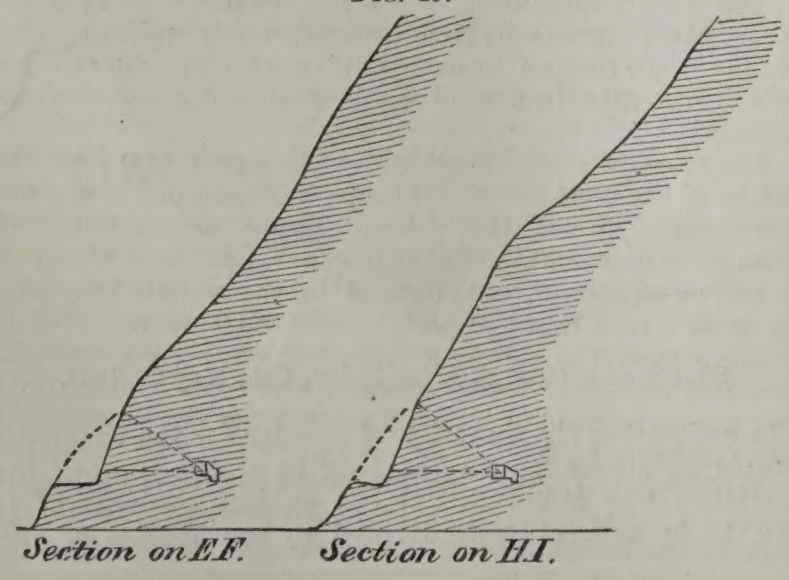
Sketch of Powder-Chamber.

The charges were fired by one of Grove's batteries. The blast threw out 40,000 tons of rock, thus averaging 3⅓ tons to the pound of powder used.

In May, 1868, a large blast was made in the face of the bluff at Lime Point, entrance to San Francisco Bay, Cal., by Major Mendell, Corps of Engineers, to prepare the site for a fort at that point. The rock is described as "a metamorphosed or changed portion of the sandstone formation." Its stratification was very much bent and contorted, "resembling the compressed and crumpled leaves of a book." An entrance gallery was run into the cliff 45 feet (Fig. 27), starting twenty feet above low water, and ascending 1 inch in 10 feet to drain off the water; then the main gallery made two turns to the left to gain a direction parallel to the face of the cliff, extending 80 feet farther with the same grade, at the end of which a chamber was formed for one charge. Another chamber was formed 60 feet from the first. The gallery was commenced with dimensions of 6′ height by 4′ width, giving space enough for two men to work and to swing the striking hammer. It was then decided to use dualin and giant powder. This permitted a reduction of the size of the drill-holes to diameters of ⅞ inch, and depths of 18 inches, and a consequent reduction of the drilling force and size of the drift, one man being able to perform the drilling in a drift 4 feet high by 3 feet wide. The cartridges were 5 to 8 inches long, and were tamped. The priming, consisting of fulminate of mercury contained in a copper cap, was fired by a fuse. The floor of the chambers P and P′ were 1½ feet above the floor of the gallery. (Fig. 27.) Two wooden boxes were put together in them, into which the gunpowder for the charges was emptied as it was brought in in sacks which had been filled from casks opened at the entrance to the gallery: 3500 pounds were placed in the first and 4000 in the second chamber. Two priming caps, connected with two sets of branch wires from the main wires, were placed in each charge. The two main wires connecting with the battery were contained in a small wooden box, which also contained two lines of water fuse to be used if the wires failed.

In tamping, the vacant space about the box was filled with sand and sods, without ramming. A wall of sods was then placed in front of the box; a little way in rear of this a second wall of sods, with the space between the two well rammed with clay. This was continued, sods and clay alternating, to the mouth

FIG. 29.



of the gallery. The face of the cliff in front had been cut away (Fig. 28), to increase the effect of the blast.

The charges were exploded simultaneously by means of Beardsley's magneto-electric machine. "The report was dull, and scarcely noticeable. The base of the hill was upheaved, and moved slowly outward. The rock and earth above, left unsupported, slid in large masses, a considerable portion falling into the sea." The portion of the hill near the entrance gallery was not displaced; the tamping of this portion was therefore removed, and a charge of 2650 pounds of powder was placed in a third chamber at P″. It was exploded in the same manner as the others, and brought down that part of the cliff.

The dotted line (Fig. 27) shows the extent of the breach made by the three charges. About 5500 cubic yards of rock were blown down.

The above three examples sufficiently illustrate the course that has been pursued in blasting by galleries since the first blast of the kind in 1843, and afford an excellent indication of the proper method to be followed in similar operations. (See also SUBMARINE BLASTING, by GEN. JOHN NEWTON, U. S. Eng'rs.) J. G. FOSTER, U. S. A.

Blas'toderm [from the Gr. *βλαστάνω*, to "germinate," and *δέρμα*, the "skin"], a minute thin membrane on that surface of the yelk which, whatever may be the position of an egg, is, by a peculiar arrangement, always uppermost; the germinal membrane or *cicatricula*. (See EMBRYOLOGY, by PROF. J. C. DALTON, M. D.)

Blat'ta, a genus of insects which includes the cockroaches, belonging to the order Orthoptera. Several species of this insect are disgusting household pests, of which the most offensive is *Blatta orientalis*. (See COCKROACH.)

Blau (ERNST OTTO FRIEDRICH HERMANN), a German Orientalist, born April 20, 1821, was sent in 1852 as attaché to the Prussian embassy in Constantinople, and in 1854 and 1855 travelled through Asia Minor and the Greek Islands. He has written, besides various articles for different magazines, "Conmurzielle Zustände Persiens" (1858).

Blauw Boc [Dutch for "blue buck," so named from its blue-black color], the *Antilope leucophæa* an exceedingly swift antelope whose habitat extends from Cape Colony to Senegambia. It is six feet long and three and a half feet high. It fights when at bay, and is then dangerous. Its flesh is poor. The name is also given to the pygmy antelope (*Cephalophus pygmæa*), which is only a foot high. It is found in South Africa. It is of a bluish-slate color.

The Blauw Boc.

Bla'zonry, the art of deciphering coats-of-arms; also that of expressing or describing a coat-of-arms in appropriate language. The word is supposed to be derived from the German *blasen*, to "blow," and to have originated in the ceremonial of tournaments, from which so many other terms and usages in heraldry are derived, it having been customary on these solemn occasions for the herald to blow a trumpet when he called out the arms of a knight on ushering him into the lists. Blazonry requires a knowledge of—1. The points of the shield, which are nine in number; 2. The field—that is, the tincture or tinctures forming the ground of the coat; 3. The charges or devices borne on the field; 4. The ordinaries.

Bleach'ing [from the Ger. *blei'chen*, to "whiten" (from *bleich*, "white" or "pale"); Fr. *blanchir*], a process by

which the natural colors of various substances are discharged, so as to whiten them. Bleaching is extensively applied to the textile fibres; linen, cotton, wool, and silk; and to straw, paper-stock, ivory, wax, animal and vegetable oils, etc. Until the close of the last century the agents employed were air, light, and moisture, aided by weak alkalies and acids. More recently the process has been wonderfully hastened by the use of such powerful agents as chlorine and sulphurous acid. Numerous other agents possessing bleaching properties have been from time to time recommended, but they have not as yet been used to any extent. Such are bromine, ozone, permanganates, chromates, etc. The selection of the bleaching agent depends as much upon the properties of the article to be bleached as upon the coloring-matters to be removed. Cotton, flax, and many other vegetable fibres, being composed of cellulose, one of the most permanent of all organic bodies, are capable of withstanding the action of acids, alkalies, and chlorine, while the animal fibres, silk and wool, being of very different composition, are destroyed by these agents, and must be bleached by the milder sulphurous acid.

Modern bleaching includes much more than the mere application of chlorine or sulphurous acid. The goods are subjected to certain preliminary cleansing processes, such as washing in cold or hot water, boiling with alkaline lyes or soaps, and treatment with acids. By these operations many resinous, fatty, and other impurities, either natural or introduced during the preparation of the yarn, cloth, etc., are removed from the fibre. The more powerful agents are then used for removing the last traces of coloring-matter.

Special Methods.

Bleaching Linen.—This is a very ancient art. We read in the Scriptures of "fine linen, white and clean." The old method, still practised in some localities, consisted in the alternate treatment of the cloth with alkaline and acid liquids, and exposure on the grass to air, light, and moisture. Holland long enjoyed the reputation of possessing the best bleacheries. The brown linen of Scotland was sent over early every spring to be bleached, and on its return in the late autumn was sold under the name of "Hollands," a name still retained in the trade for certain kinds of bleached linen. The word "lawn" is another name of similar origin, having been applied to a finer quality of linen cloth bleached on better grass-plots, or lawns. The Dutch process lasted from March till September, and consisted of the following distinct operations, often repeated: (1) steeping in water four or five days, or in an alkaline lye forty-eight hours. (2) Bucking or bawking, boiling in an alkaline lye. (3) Crofting, or exposing on the grass for several weeks, and sprinkling from time to time with water. (4) Souring with buttermilk. After every dipping the cloth was washed with soap, then with water. The process was necessarily very expensive and laborious. In 1749 the Dutch method was introduced into Scotland, where it was considerably shortened by the employment of dilute solutions of sulphuric acid in place of buttermilk. In 1784, Berthollet investigated chlorine, publishing his results in 1787, and announcing the bleaching properties of this element. Prof. Copeland introduced this agent at Aberdeen. Chlorine was first used in aqueous solution, then in alkaline solution, and finally, in 1798, Charles Tennant of Glasgow introduced chloride of lime, which has been almost exclusively used ever since. Bleaching linen is still a tedious operation, as the fibres are heavily incrusted with impurities; the actual loss during the operations of bleaching being one-third the original weight, while cotton loses only one-twentieth. Steeping, washing, bawking, and crofting are still found necessary, and are several times repeated. Souring is effected with hydrochloric or sulphuric acid. The goods are then chlorinated with hypochlorite of potash, made by mixing chloride of lime with carbonate of potash. Washing, souring, soaping, scalding in soapsuds and weak lye, and crofting, complete the operation. A fortnight is the shortest time in which the bleaching can be effected, and often a much longer time is necessary.

Bleaching Cotton.—Cotton is either bleached in the yarn or in the cloth. The following description of the process employed in American print-works will sufficiently illustrate the methods in common use: The cloth is (1) "singed" by a shearing-machine or by passing over a red-hot roll or over a series of gas flames; (2) it is "limed," boiled for a night with milk of lime; (3) washed; (4) soured with dilute sulphuric acid; (5) washed; (6) bawked, boiled for a night with soda-ash and rosin; (7) washed; (8) bawked with a weak soda-ash lye for seven or eight hours; (9) washed; (10) chemicked with a weak solution of chloride of lime; (11) washed; (12) soured with dilute sulphuric acid; (13) washed—the entire series of operations being completed in three or four days.

Bleaching Wool.—Wool is (1) washed on the sheep, to remove sweat and much of the dirt, including a peculiar substance called suint, which is a neutral salt of potash with a peculiar organic acid. Owing to the high price of potash, this suint has recently attracted considerable attention, and a special industry has been established in the French wool districts for its preservation and utilization. The wool contains from 15 to 33 per cent. of suint, a nine-pound fleece containing twenty ounces of suint, or six to seven ounces of potash. This can be recovered from the water in which the sheep are washed. It is estimated that 3,000,000 pounds of potash can be manufactured annually in the French districts alone. (2) The wool is steeped in soap and water, weak alkaline lye, or putrid urine to remove a peculiar lime-soap which it contains, and other impurities. It is then oiled for spinning, and finally cleansed and bleached, either in the yarn or in the cloth. The operations consist in passing it (3) through a weak warm solution of carbonate of soda and soap; (4) washing with lukewarm water; (5) exposing to sulphurous acid gas. Operations 3, 4, and 5 are sometimes repeated once or twice. The goods may then be blued with carmine of indigo in a weak solution of soap containing a little hydrate of alumina.

Silk Bleaching.—Raw silk contains about 40 per cent. of gummy matter, consisting of albumen, gelatinous substances, wax, fat, resin, and yellow coloring-matter. This is removed by boiling the silk in a solution of soap, and washing with pure water. Bran is sometimes added to the soap to neutralize by the lactic acid it yields any free alkali present. When the silk is to be left white, or dyed or printed with very light colors, it is exposed for a few hours to sulphurous acid gas.

Bleaching Paper-stock.—Cotton and linen rags are bleached in the same manner as cotton yarn and cloth. Old paper is treated with caustic soda to loosen the ink, then with soapsuds, and finally with chloride of lime. Tow and straw are treated with caustic soda and lime, and finally bleached with chloride of lime.

Bleaching Straw.—For the manufacture of hats, bonnets, etc., straw is bleached by (1) exposing it on a meadow to air, sunlight, and dew, with occasional turning; (2) steaming; (3) fumigating with sulphurous acid gas.

Jute is bleached by caustic soda and a chlorine bath made by mixing chloride of lime and sulphate of magnesia in equivalent proportions, and dissolving them in cold water. *Human hair* is said to be bleached on the head to a blonde by the action of aqua regia or of peroxide of hydrogen. *Feathers* are bleached by immersion (1) in a dilute solution of bichromate of potassa containing a little nitric acid, and (2) in a weak solution of sulphurous acid. *Sponges* are bleached by immersion in a warm solution of caustic soda, followed by washing in water and treatment with a hyposulphite of soda solution, to which a little hydrochloric acid has been added. *Ivory* is bleached by rubbing it with pumice-stone and water, and placing it under a glass shade in the sun. It may also be bleached by immersion (1) in a solution of carbonate of soda, (2) in pure water, (3) in a solution of sulphite of soda; (4) to the sulphite of soda is added dilute hydrochloric acid (5) in pure water. *Beeswax* is bleached by exposure to air, sunlight, and moisture in thin ribbons. *Animal and vegetable oils* are often bleached by heating them with a little caustic alkali, by which a small quantity of soap is formed, which settles to the bottom, carrying with it some of the coloring-matter. They are also bleached by exposure in shallow vessels to the sun under glass. *Old engravings* which have turned yellow may be cleansed or bleached by exposure to ozone, generated in a capacious vessel, by a stick of phosphorus partly immersed in water. Immersion for a minute in Javelle water, hypochlorite of soda, is said to answer equally well, though, to prevent injury to the paper, it must be subsequently dipped in water containing hyposulphite of soda.

The Chemistry of Bleaching.—The exact chemical character of the changes which occur in bleaching is not fully established. When the coloring-matter is absolutely destroyed, it is probable that it is generally due to the action of active oxygen, ozone, formed by the agents employed. In some cases, however, sulphurous acid unites with the coloring-matter, forming a colorless compound, the color of which can be restored again. A red rose bleached by this agent returns to its original color when placed in dilute sulphuric acid.

Antichlore.—If free chlorine is allowed to remain in the articles bleached, it is liable to injure their strength and damage the metallic parts of machinery. To prevent this, substances such as hyposulphite or sulphite of soda, protochloride of tin, coal-gas, etc. are employed, but the first mentioned is generally used. These are called Antichlore (which see).

C. F. Chandler.

Bleak (*Leuciscus alburnus*), a small and beautiful fresh-water fish of the family Cyprinidæ, belongs to the same genus as the minnow and dace. It is about six inches long, is found in many European rivers, and is esteemed as a delicate article of food. The inner surface of its scales is lined with a silvery substance which is used for making artificial pearls and white beads to adorn ladies' dresses.

The Bleak.

Bleb, or **Bulla** [Lat. *bulla,* a "bubble"], a blister-like elevation of the cuticle containing a watery fluid. Blebs are characteristic of some skin diseases, such as pemphigus, and are occasionally seen in fevers and disordered conditions of the digestion.

Blech'num [Gr. βλῆχνον], a widespread genus of ferns which has representatives in Europe and North America.

Bleck (Wilhelm Heinrich Immanuel), born in Berlin Mar. 8, 1827, settled in Cape Town in 1856, where he became librarian of Sir George Grey's valuable library. He wrote, among other works, a vocabulary of the Mozambique languages (1856), a "Handbook of African, Australian, and Polynesian Philology" (London, 1858), "Comparative Grammar of the South African Languages" (vol. i., 1862), and "Reynard the Fox in South Africa, or Hottentot Fables and Tales" (1864).

Bled'soe, a county in Tennessee. Area, 330 square miles. It is drained by the Sequatchie River. The surface is hilly or mountainous. Grain, wool, and tobacco are the chief products. Coal is found. Capital, Pikeville. Pop. 4870.

Bledsoe (Albert Taylor), LL.D., an American officer and teacher, born 1809 in Kentucky, graduated at West Point in 1830. He served as lieutenant of infantry at Fort Gibson till he resigned Aug. 31, 1832. He was adjunct professor of mathematics and teacher of French in Kenyon College, O., 1833–34, professor of mathematics in Miami University, O., 1835–36, counsellor-at-law in Springfield, Ill., 1840–48, professor of mathematics in the University of Virginia, 1848–53, and during the civil war assistant secretary of war of the Southern Confederacy. He is author of an "Examination of Edwards on the Will," 1845, and "A Theodicy, or Vindication of the Divine Glory," 1856, and other works; contributor to the principal literary, scientific, and theological reviews of the U. S., and now principal of a female academy at Baltimore, Md., and editor of the "Southern Review" (Methodist).

George W. Cullum, U. S. A.

Bleeck'er, a post-township of Fulton co., N. Y., has manufactures of lumber and leather. Pop. 970.

Bleed'ing, or **Hæm'orrhage** [from the Gr. αἷμα, "blood," and ῥέω, to "flow"], in surgery, denotes the escape of blood from the vessels which normally contain it. When the escape takes place into the tissues it is called "extravasation." Hæmorrhage into an internal cavity is said to be "concealed." A slight cut through the integument is usually followed by loss of blood, chiefly from the capillaries. Capillary bleeding will in many cases cease spontaneously, or it may require compression or the application of medicines, such as persulphate of iron or tannic acid. These medicines are called hæmostatics or styptics. Arterial bleeding is recognized by the fact that the blood escapes in jets and is of a bright-red color. Arterial bleeding tends spontaneously to grow less, both from the feebleness of the heart's action which naturally follows, and from the retraction and contraction of the arterial walls, and the consequent formation of a clot of blood, which plugs the wound; but it may be necessary to resort to ligation or tying, to acupressure or compression of the artery by needles, or to pressure, mechanical or by hand, upon the course of the artery between the heart and the wound. A handkerchief may be tied around and then twisted with a stick. The wounded part should be elevated if possible. Venous bleeding is not generally very formidable. It may be recognized by the steady flow of dark blood. A great source of danger when large veins are cut is that air may enter the circulation; in which case death may immediately follow.

Hæmorrhage from an internal and inaccessible surface may be treated by astringents, as gallic acid, or by ergot, which is especially important in puerperal hæmorrhage.

Some individuals have what is known as the hæmorrhagic diathesis—a disposition to bleed excessively even after a slight injury. A tendency to hæmorrhage from the mucous surfaces is characteristic of some diseases, such as typhoid fever.

Bleeding, or **Blood-letting,** the abstraction of blood from the circulation as a means of curing or preventing disease. This operation is performed either by opening a vein (venesection or phlebotomy), by abstraction from the capillaries by means of leeches or cups, or more rarely by opening an artery (arteriotomy). Bleeding was formerly in extensive use in the treatment of many diseases, generally of an acute or active character; and though it has to a great extent been superseded by other measures, of late years it has been attracting the attention of the medical profession as a valuable therapeutic measure in a certain limited class of diseases. While it is liable to abuse, and while, like many other active measures in the treatment of disease, it may become a source of mischief, it is nevertheless, when used with judgment, a valuable help in the treatment of some disorders.

Blende [from the Ger. *blenden,* to "dazzle"], a name given to the native sulphide of zinc, which British miners call black jack. It abounds in primary and in secondary rocks, and occurs both massive and crystallized in octahedrons and rhomboidal dodecahedrons. Pure blende is composed of 67 per cent. of zinc and 33 of sulphur. It is a valuable ore, but is more difficult to reduce than calamine. This is the chief ore employed in the important zinc industry at Friedensville and Bethlehem, Pa. The term is sometimes applied to sulphides of antimony and of manganese, the former of which is a rare mineral called red antimony.

Blen'don, a post-township of Ottawa co., Mich. P. 718.

Blendon, a township of Franklin co., O. Pop. 1771.

Blendon, a township of Nottaway co., Va. Pop. 3026.

Blenheim, blĕn'im, or **Blind'heim,** the name of a celebrated village of Bavaria, near the Danube, 23 miles N. N. W. of Augsburg. From it the English have named the famous battle which occurred at the neighboring village of Hochstädt, Aug. 13, 1704. Here the allied armies, commanded by the duke of Marlborough and Prince Eugène (who had about 52,000 men), attacked the French and Bavarians (about 56,000 men), who were commanded by Tallard and the elector of Bavaria. The duke of Marlborough and Prince Eugène gained a decisive victory, and took about 13,000 prisoners. The French and Bavarians also lost nearly 10,000 killed and wounded, besides many drowned in the Danube. The French and Germans call this the battle of Hochstädt.

Blenheim, a thriving village of Harwich township, Kent co., Ontario (Canada), 12 miles from Chatham, has several large factories, and a large trade in grain and fruit. Pop. about 850.

Blenheim, a township of Schoharie co., N. Y. Pop. 1437.

Blenheim Dog, or **Marlborough Dog,** a small and beautiful variety of spaniel, much resembling the cocker in form and appearance, but generally of a black color, with flame-colored spots above the eyes and on the breast and feet. The muzzle is also fuller. The Blenheim spaniel is the *Pyrame* of Buffon. It derives its English name from Blenheim Palace, in Oxfordshire, where the breed has been preserved since the beginning of the eighteenth century. These dogs are sometimes sold at an enormous price.

Blenheim House, a magnificent palace in England, near Oxford, was erected at the public expense for the duke of Marlborough as a testimony of gratitude for his services at the battle of Blenheim (which see). The nation at the same time gave him the royal estate of Woodstock, now called Blenheim Park, which is adjacent to Blenheim House. This edifice was designed by Vanbrugh, and cost more than £500,000. It occupies three sides of a square, and the principal front extends 348 feet from wing to wing. The collection of paintings which adorns the interior is one of the largest and most valuable in England.

Blenk'er (Louis), a German patriot and soldier, born at Worms in 1812. After the defeat of the revolutionary movement of 1849, of which he had been one of the leaders, he took refuge in the U. S. In 1861 he became a brigadier-general in the Union army. Died Oct. 31, 1863.

Blen'nerhas'sett (Harman), a rich Englishman, born in Hampshire Oct. 8, 1767, who was ruined by his connection with Aaron Burr. He was educated at Trinity College, Dublin. In 1798 he purchased an island in the Ohio River, 2 miles below Parkersburg, and erected on it an ex-

pensive mansion. He advanced money to aid Burr in his enterprises, and was indicted for treason in 1807 as an accomplice of Burr, but was released without a trial. Died Feb. 1, 1831, in Guernsey.

Blennorrhœ'a [Gr. βλέννα, "mucous," and ῥέω, to "flow"], an abnormally copious discharge from any mucous membrane. In discharges termed blennorrhœal there is a mixture of epithelial scales in large quantities from the mucous membrane, with numerous pus-cells. After inflammation of the urinary mucous membrane a gleety discharge frequently continues for a long period. The treatment consists in establishing health by tonics, fresh air, and careful regimen, with astringent lotions to lessen the secretion, and occasional local stimulants to alter the depraved condition of the mucous membrane.

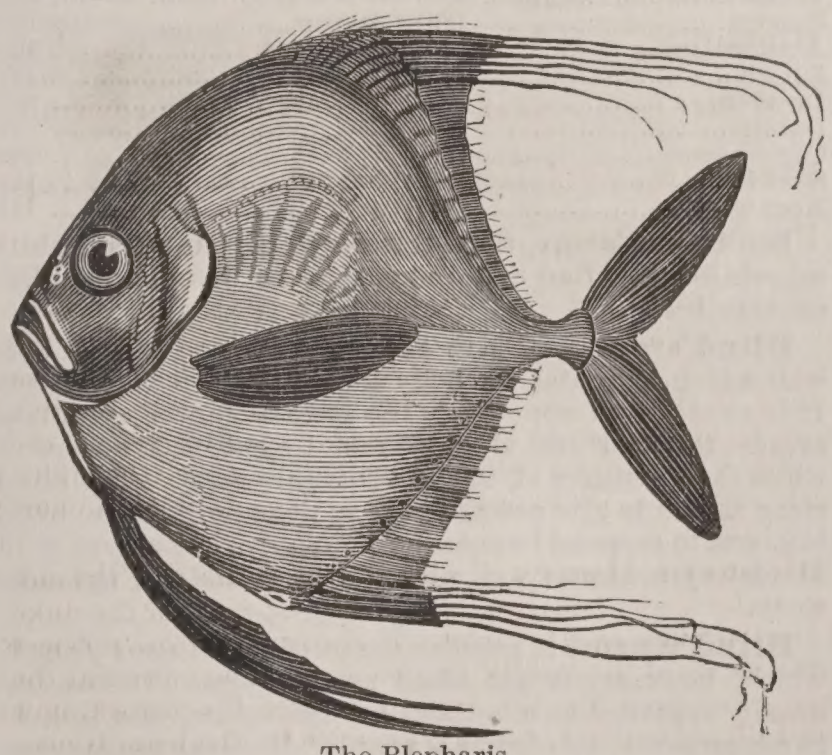
Blen'ny (*Blen'nius*), a genus of fishes of the order Teleostea and family Blenniidæ. To this family the wolf-fish and the gunnel or butter-fish are referred. They are generally remarkable for the abundance of slimy matter with which their skin is covered. Many are destitute of scales. The body is generally of an elongated form. They have only one dorsal fin, which, however, seems in many of them as if composed of two parts. They are found in the seas of many parts of the world. The blennies are small fishes, living in shoals, and often found in pools left dry by the tide. They possess the power of using their ventral fins to aid them in moving about among rocks and sea-weeds. They are seldom used as an article of food, but are in request for the aquarium, on account of their tenacity of life and their activity. They feed chiefly on small crustaceans. The *Blennius ocellaris* (eyed blenny), called also the butterfly-fish, has a large and prominent dorsal fin, in which is a spot resembling an eye. This beautiful fish is common in the Mediterranean, and is sometimes found on the coast of England.

Eyed Blenny.

Many of the blenny family retain their eggs within the oviduct until they are hatched, so that the young are produced alive, and capable of seeking food for themselves. An example of this is found in the viviparous blennies (*Zoarces vivipara*) of the British seas. Several blennies are found on the American coasts.

Blen's Creek, a township of Forsyth co., N. C. Pop. 817.

Bleph'aris [Gr. βλεφαρίς, an "eyelash," referring to the long filaments attached to the fins], a genus of fishes allied to the mackerel and the dory, includes the hair-finned dory, *Blepharis crinitus*, a fish found, though rarely, on the North American Atlantic coast.



The Blepharis.

Bléré [Lat. *Bliriacum*], a town of France, department of Indre-et-Loire, on the river Cher, 16 miles E. S. E. of Tours. It has a bridge built about 1150. Pop. in 1866, 3561. Near it is the château of Chenonceaux, which Henry II. of France gave in 1535 to Diana of Poitiers, who, having sumptuously embellished it, was compelled to transfer it to Catherine de Médicis. In 1733 it was purchased by M. Dupin, the wit and beauty of whose widow caused it to be frequented by Fontenelle, Voltaire, Buffon, Rousseau, and others. The castle is in good preservation.

Bles-Boc (*Damates albifrons*), an antelope of South Africa. Its name is derived from the *blaze* (Dutch, *bles*) of white in its face.

Bles'sed This'tle (*Cnicus benedictus*), a plant of the order Compositæ, a native of Europe, sparingly naturalized in the U. S. It was formerly regarded with great veneration on account of its supposed medicinal virtues, which are celebrated by Burton in his "Anatomy of Melancholy," and by Shakspeare, under the name of *Carduus benedictus*. It is tonic and diaphoretic.

Bles'sington (Margaret Gardiner), Countess of, an accomplished and beautiful Irish lady, born near Clonmel, in Tipperary county, Sept. 1, 1789. Her maiden name was Power. She was married in 1818 to the earl of Blessington, who was her second husband. She travelled with him extensively on the Continent, and after he died in 1829 she lived in Gore House, London, where her soirées were attended by many literati and other eminent persons. She published "Conversations with Lord Byron" (1834), "The Idler in France," and other works. Died in Paris June 4, 1849. (See R. R. Madden, "The Literary Life and Correspondence of Lady Blessington," 3 vols., 1855.)

Bli'dah, or **Blida,** a town of Algeria, in the province of Algeria, about 30 miles S. W. of Algiers. It is pleasantly situated on the border of the Metidjah, is a station on a railway, and is said to be very flourishing. It has been occupied by the French since 1838. Pop. in 1866, 9975.

Bligh (William), an English naval officer, born in 1753. He commanded the ship "Bounty," with which he was sent to Tahiti in Dec., 1787, to procure plants of the bread-fruit tree, in order to plant them in the West Indies. During his voyage for Jamaica with a cargo of these plants a part of his crew mutinied, April 28, 1789, on account of his harsh treatment. The captain and eighteen of his men were sent adrift in the launch, and after much suffering arrived at the island of Timor in June, having traversed 3600 nautical miles in an open boat. The mutineers settled on Pitcairn's Island. Bligh was appointed governor of New South Wales in 1806, but his conduct was so tyrannical that he was expelled in 1808. Died Dec. 7, 1817.

Blight [probably from the Anglo-Saxon *be* and *lihtan*, "to fall upon"], a term in common use for supposed atmospherical injuries received by plants. Before effects were traced to their causes with the same care that they are at present, the sudden discoloration of the leaves of plants, their death, or their being covered with minute insects or small excrescences, was called by the general name of blight; and this blight was attributed to some mysterious influence in the air, to the east wind, or to thunder, because these states of the atmosphere commonly accompanied those phenomena. It is now found that what is called blight is in some cases the effect of insects, to the progress of which a peculiar state of the atmosphere often contributes; while in other cases it is caused by parasitical fungi. These fungi on grain crops are called fireblast, bunt, smut, brand, and rust. The ergot or spurred rye used in medicine is a somewhat similar fungus. Ergot in grain used as food may lead to gangrenous diseases. A fungus upon the grape constitutes *mildew*, a most destructive disease.

The sudden death of plants without apparent cause, and also the withering and drying up of part of their leaves and branches, to which appearance the term blight should perhaps be restricted, are produced by the transpiration of water from the leaves taking place with greater rapidity than it can be supplied by the absorption of the roots, and also by the roots becoming attacked by fungus spawn. In very hot weather in summer branches of fruit trees trained against walls, or of gooseberry bushes on espaliers, are sometimes withered up in a few minutes from this cause. Blight on standard apple or other fruit trees in orchards is often nothing more than the injuries done to the leaves and buds by the caterpillars of certain moths; that on thorn hedges by the caterpillar of the saw-fly or of the ermine, or of some other moths; and that on roses, by the aphides or green-fly.

Blind (Karl), a German liberal politician, born at Mannheim Sept. 4, 1820, had a prominent part in the revolutions of 1848 and 1849, and in 1852 took refuge in London. Having been pardoned by the government of Baden in 1867, he returned to Germany, where he has since distinguished himself as a zealous opponent of the policy of Bismarck.

Blind'age, in fortification, a term applied to a screen made of timber and earth, or any fixture designed to shelter the garrison or conceal their operations from the enemy. The blindage is sometimes formed of fascines, placed on the inner crest of a battery and continued over the top of the embrasures. Other blindages, used to protect the gunners of a battery from a vertical fire, consist of plain and

strong timbers, one end of which is placed on the inner crest of the parapet and the other end on the ground.

Blind-fish. See AMBLYOPSIS.

Blind'ness [Lat. *cæcitas*], the absence of the sense of sight, is caused by disease, defect, or injury of the eye, of the optic nerve, or of that part of the brain connected with it. Blindness may be complete or incomplete; it may exist from birth or may accompany extreme age. It may be transient or permanent. Permanent blindness may follow the various eruptive fevers, especially those of childhood, such as scarlet fever and smallpox. Congenital blindness is generally from deficient development of the nervous apparatus, and is detected by the child being indifferent to light and throwing its head from side to side. Very rarely the power of vision is subsequently developed, except when congenital cataract is removed.

Opacity of the vitreous humor or of the crystalline lens —the latter known as cataract—causes blindness, which comes on gradually. The blindness from cataract is seldom so complete as to prevent the person from distinguishing day from night, or from being aware of opaque bodies passing between him and the light. Opacities of the cornea, if extensive or in the axis of vision, produce some degree of blindness. Advances in knowledge of anatomy have enabled surgeons to restore sight in cases which years ago would have been hopeless.

Night blindness (*hemeralopia*) is a condition in which a person finds, towards evening, that objects are becoming less and less distinct, and at last that he is totally or nearly blind. This affection has attacked bodies of troops exposed to great fatigues and the glare of the sun. If there is no disease within the brain, recovery generally results from protecting the eyes from the light, entire repose, and the use of such remedies as may correct any constitutional defect in the individual attacked.

Day blindness (*nyctalopia*) is characterized by inability to see in a bright light; the subjects of it see more than usually well at night. Captives long immured in dark cells are often affected with it. Among nocturnal animals, as owls, bats, etc., it is the normal condition. It accompanies albinism in some instances.

"The world of the blind," says Prescott, "is circumscribed by the little circle which they can span with their own arms. All beyond this has no real existence." Some subjects of knowledge will always be beyond the blind man's reach. Light, color, and space he cannot fully realize. Cheselden once successfully operated on a boy for blindness. It was two months before he discovered that pictures represented solid bodies; he thought them planes differently colored, and when he began to have some notion of the truth, in touching the canvas of a picture he expected to find something solid upon it. The words sea and sky do not convey the same image to the blind which they convey to us, and there must be a large class of words in the same category. But though the circle of which Prescott speaks is narrow, yet within it the perceptions of the blind are remarkably active and accurate. The fact of their isolation renders their mental operations more concentrated.

As a class, we find the blind to be thoughtful and quiet, with peculiar sensitiveness of mind and feeling; grateful for every kindness; equally tenacious in remembering the least affront, and often self-willed and opinionative. These are but the natural results of scanty information, and a narrow field of observation and acquirement. Not a few blind persons, however, are possessed of peculiar sweetness of disposition, and it is obvious that different conditions may produce great differences of character in such sensitive natures. The loss of the sense of sight, as is well known, is partly compensated for by a wonderfully increased sensitiveness of hearing and touch.

The making of baskets, mats, rugs, list shoes, brushes, knitting, netting, wood-turning, and hair-work are among the trades which the blind practise with success. The study of music is often the blind man's delight. Some blind men have even become famous as musicians—two of them so remarkable that even Handel expressed great delight at their skill. But a pleasing mediocrity is the average attainment of blind players.

Modern civilization is distinguished for its efforts to provide for the mental wants of this unfortunate class. The first school devoted to the instruction of the blind was established in Paris in 1784 by Valentine Haüy, a generous and enthusiastic but impractical man. Asylums, without systematic instruction, had been established at various places in Europe during the Middle Ages, and some of these still exist. The first school for the blind in the U. S. was the New England Asylum (now the Perkins Institution) at Boston, Mass., founded in 1829. Among those who have been distinguished for their zeal and success in this work we may mention Dr. John G. Fisher, the founder of the above school, Dr. S. G. Howe of Boston, Dr. Akerley of New York, Dr. Dunglison and Robert Vaux of Philadelphia. Books for the blind are at present generally printed with raised Roman letters, though various other alphabets, some of them stenographic, have been devised. Some blind persons, however, acquire such a nice sense of touch as to be able to read ordinary printed matter by the fingers alone.

The census of 1870 reports 20,320 blind persons in the U. S., but there is no doubt that many cases of partial and some of total blindness were not reported to the census-takers. The following is a list of institutions for the blind in the U. S.:

Name.	Location.	Year of Found.
Institution for Deaf, Dumb, and Blind	Talladega, Ala.	1858
Institution for the Blind	Little Rock, Ark.	1859
Institution for Deaf, Dumb, and Blind	Oakland, Cal.	1866
Academy for the Blind	Macon, Ga.	1853
Institution for the Blind	Jacksonville, Ill.	1849
Institution for the Blind	Indianapolis, Ind.	1847
Institution for the Blind	Vinton, Ia.	1853
Institution for the Blind	Wyandotte, Kan.	1868
Institution for the Blind	Louisville, Ky.	1842
Louisiana Institution for Instruction of the Blind	Baton Rouge, La.	1870
Institution for the Blind	Baltimore, Md.	1853
Perkins Institute and Massachusetts Asylum for the Blind	Boston, Mass.	1829
Institution for Deaf, Dumb, and Blind	Flint, Mich.	1854
Minnesota Institution for Deaf, Dumb, and Blind	Faribault, Minn.	1863
Institution for the Blind	Jackson, Miss.	1853
Institution for the Blind	St. Louis, Mo.	1851
New York State Institution for the Blind	Batavia, N. Y.	1867
New York Institution for the Blind	New York City, N.Y.	1831
Institution for Deaf, Dumb, and Blind	Raleigh, N. C.	1846
Institution for the Blind	Columbus, O.	1837
Institution for the Blind	Philadelphia, Pa.	1833
Institution for Deaf, Dumb, and Blind	Cedar Springs, S. C.	1869
Institution for the Blind	Nashville, Tenn.	1844
Institution for the Blind	Austin, Tex.	1856
Institution for Deaf, Dumb, and Blind	Staunton, Va.	1839
Institution for Deaf, Dumb, and Blind	Romney, W. Va.	1870
Institution for the Blind	Janesville, Wis.	1850

The following list gives the names of some of the chief schools for the blind in Europe:

	Founded		Founded
Paris	1784	Breslau	1819
Liverpool	1791	Barcelona	1820
Edinburgh	1791	Naples	1822
London	1800	Gmünd	1823
St. Petersburg	1806	Lintz	1824
Berlin	1806	Perth	1825
Vienna	1804	Manchester	1827
Prague	1804	Glasgow	1827
Amsterdam	1808	Freisingen	1828
Zurich	1809	Bruchal	1828
Dresden	1809	Hamburg	1830
Dublin	1810	York	1838
Copenhagen	1811	Cork	1840
Stockholm	1817	Munich	1844
Koenigsberg	1818	Lausanne	1844

Besides the above, there is a very great number of local schools for the blind in Europe, some of them of the highest excellence. REVISED BY CHAS. W. GREENE.

Blind'story, or **Trifo'rium,** the second arcade in the wall which separates the body from the aisles of a church. It is so called as opposed to the clearstory, the uppermost arcade, the apertures of which admit light into the church, while the apertures of the triforium are dark. The blindstory serves to give access to the various parts of the building, and to suspend banners on holidays. The gloom of the blindstory contrasts well with the brightness of the clearstory.

Blind'worm, a popular name of the *Anguis fragilis*, which, however, is not blind nor a worm. It has been usually regarded as a serpent by naturalists, or a link between serpents and saurians (lizards). Mr. Gray has arranged the *Anguis* and several other genera in the order Saurophidia ("lizard serpents"). The blindworm has a cylindrical body, destitute of external limbs, but the bones of the shoulder and pelvis exist in a rudimentary state. It is found in nearly all parts of Europe, is inoffensive and timid, and moves very slowly; hence it is sometimes called slowworm. Its length varies from ten to fifteen inches or more. When alarmed it contracts itself forcibly and becomes very brittle, so that it is easily broken in two by bending it. (See GLASS SNAKE.)

Bliss (WILLIAM W. S.), A. M., an American officer, born Aug., 1815, at Whitehall, N. Y., graduated at West Point in 1833, and assistant adjutant-general (rank of major) July 7, 1846. He served in the Cherokee Nation 1833–34, as assistant professor at the Military Academy 1834–40, in

the Florida war 1840–41, being chief of staff to commanding general, as assistant adjutant-general at head-quarters of Western military departments 1842–45, as chief of staff of Maj.-Gen. Taylor in the military occupation of Texas 1845–46, in the war with Mexico 1846–48, in command of the Western division 1848–49, engineer at Palo Alto, Resaca de la Palma (brevet major), Monterey, and Buena Vista (brevet lieutenant-colonel), as private secretary of President Taylor Mar. 4 to July 9, 1850, and as assistant adjutant-general of the Western division, head-quarters at New Orleans, La., 1850–53. He was presented in 1849, by the State of New York, in "appreciation of him as a soldier and a man," with a gold medal, with suitable devices, for his gallant services in Mexico, and honored with membership of learned associations at home and abroad. He was highly distinguished for his acquirements in science, literature, and languages, was a most graceful and forcible writer, as shown by the celebrated despatches of Gen. Taylor from his pen, and his great wealth of learning and humor made him a most entertaining companion. Died Aug. 5, 1853, at East Pascagoula, Miss., aged thirty-eight.

GEORGE W. CULLUM, U. S. A.

Bliss'field, a post-township of Lenawee co., Mich. Pop. 1766.

Bliss'ville, or **Fredericton Junction,** a post-village of Sunbury co., New Brunswick (Canada), on the Oromocto River, and at the junction of the European and North American R. R. with the Fredericton branch, 41 miles from Fredericton. It has a fine railroad station, several steam-mills, and is a place of growing importance.

Blistered Steel. See STEEL, by A. L. HOLLEY.

Blis'ters are plasters which, when applied to the skin, raise the cuticle into vesicles filled with serous fluid. They have for their object a counter-irritation or diversion of inflammatory action from an internal part to the surface of the body. The common blister is made of cantharides or Spanish fly (*Cantharis* or *Lytta vesicatoria*), mixed with a convenient proportion of lard and wax. If applied too long it produces distressing affections of the urinary bladder. In children and sensitive persons a layer of thin gauze may be placed between the blister and the skin. Under no circumstances should a blister be left long upon children, as it may produce sores which are difficult to heal. When the blister has raised, the vesicles should be pricked and their fluid contents allowed to trickle away, the vesicated surface being then dressed with simple cerate or lard.

Blitt'ersdorf, von (FRIEDRICH LANDOLIN KARL), BARON, minister to the grand duke of Baden, a zealous supporter of the Metternich policy, born Feb. 3, 1792, wrote "Einiges aus der Mappe des Freiherrn von Blittersdorf." Died April 16, 1861.

Bli'tum [Gr. *βλίτον*], a genus of plants belonging to the order Chenipodiaceæ. The common "strawberry blite" (*Blitum capitatum*) of North America is a plant perhaps introduced from the south of Europe, but probably native of both continents. There are several other species likewise common on both sides of the Atlantic.

Block [Fr. *bloc*], a heavy piece of timber; a massy body, solid and heavy; the piece of wood on which criminals are beheaded; the wooden mould on which a hat is formed; any obstacle or obstruction; also a continuous row of buildings. The term is applied in New York and other cities to the space and buildings between each street and the next street.

BLOCK, in architecture, is used to denote large, unworked masses of marble or stone; also a modillion in a cornice, or the small projections left on the stones of some ancient buildings, which are supposed to be indications of the unfinished state of the work, though they are found in elaborately constructed buildings.

BLOCK, in the rigging of a ship, is the part of the apparatus for raising sails and yards, tightening ropes, etc. The uses of blocks are very numerous on shipboard, and to subserve these uses they are distributed about the masts and yards. The block comprises a *shell* or exterior, a *sheave* or pulley on which the rope runs, a *pin* on which the sheave turns, and a *strap* to fasten the block in its place. A single block contains only one sheave; a double block, two; and so on. Besides the designation of blocks according to the number of sheaves they contain (as single, double), they receive other names—such as cheek block, clew-garnet block, clew-line block, etc. Elm is used for blocks, and lignumvitæ for sheaves.

Until 1781 ships' blocks were made by hand. But it required unusual skill and practice to fashion the pieces and put them together so as to possess the requisite strength and facility in working. More than 1400 blocks were required for one of the old seventy-fours, and a proportionate number for other vessels. In 1781 a Mr. Taylor began to make the sheaves and shells of blocks by machinery for the British navy. Sir M. I. Brunel, in 1801, invented machinery for making blocks, which was put into successful operation in 1808. The blocks were made with great rapidity and in a very perfect manner For his invention and superintending the work, Brunel received from the British government £20,000.

Block (MORITZ), a French writer on statistics and political economy, born at Berlin Feb. 18, 1816. Among his works are "Statistics of France" (2 vols., 1860), "Europe, Political and Social" (1869, both in French), "Die Bevölkerung des Französischen Kaiserreichs" (1861), and "Die Bevölkerung Spanien's und Portugals" (1861). Since 1856 he has published the "Annuaire de l' économie politique et de la et statistique."

Blockade, in international law, is the means in time of war of prohibiting neutrals from all intercourse with an enemy's port; and it is carried into effect by an armed force (ships of war or forts), which blocks up and bars export or import to or from the place blockaded. This right is sanctioned by all civilized nations. Blockades may begin in the simple fact of obstructing entrance into a port, or in official notice. According to French doctrine, a vessel may approach the entrance of a port with impunity, and must be warned off by a blockading vessel; but according to English and American practice, due notice given to the public authority of a state makes its vessels liable to penalty for attempting to enter the port. Blockades without notification are chiefly resorted to in an emergency, and are temporary: they require notification at the mouth of the harbor. To constitute a valid blockade, declared intention and actual force are necessary. A blockade ends when a blockading force is withdrawn voluntarily, or is driven off, not by storm, but by a superior hostile force; and to renew it new notification is necessary. The Declaration of Paris in 1856 defines valid blockade to be such as prevents ingress into a harbor. This is somewhat vague, but cuts off all paper blockades, such as those laid by the Orders in Council and the Berlin and Milan Decrees. Only harbors or forts and mouths of rivers can be blockaded, and the latter only so as not to prevent vessels from access to a port of a neutral up the stream. The breach of blockade may be either by coming out of the blockaded port or going in. The breach of blockade subjects the property so employed to confiscation; there is no rule of the law of nations more established than this, and it is universally acknowledged by all civilized governments. The violation of blockade by the master, however, affects the ship, but not the cargo, unless the cargo is the property of the same owner, or unless the owner of the cargo is cognizant of the intended violation.

On the proclamation of peace, or from any political or belligerent cause, the continuance of the investment may cease to be necessary, and the blockade is then said to be *raised*. The blockading force then retires, and the port is open as before to all other nations.

THEO. D. WOOLSEY.

Blockade, in military art, signifies an operation and effort to reduce and capture a fort or town without a bombardment or regular siege, relying solely upon the stoppage of supplies. The attacking party throws up redoubts or other works on the neighboring heights and roads. A part of the investing army sometimes remains in a temporary camp, ready to repel a sortie of the garrison. Forts built on steep and rocky eminences may be reduced more easily by blockade, because the roads or paths by which supplies can be received are few, and can be guarded by a small force.

Block Books. Previous to the invention of printing, besides the calligraphists and illuminators who prepared and adorned the books of scholars and clerics, there existed a separate guild for the fabrication of school-books and books of devotion, as well as calendars and popular medical books for the lay public. These were ornamented with rude paintings. The card-painters were identical with this craft until the beginning of the fifteenth century. As the demand for the products of their art increased, they invented the process of block-printing, cutting into blocks of wood, and sometimes plates of metal, so as to leave the letters and pictures standing out, and applying colors to these and taking impressions. In these xylographic books, sometimes one, sometimes both sides of the sheet were printed.

Block Creek, a township of Wilson co., N. C. P. 1474.

Block'ers, a township of Tuscaloosa co., Ala. P. 950.

Blockers, a township of Edgefield co., S. C. P. 1035.

Block-House, a wooden redoubt or temporary fort, is always covered. It is usually rectangular, is built of logs, and has two stories, one of which is sunk several feet below

the surface of the ground. The upper story projects a few feet beyond the lower on all sides. It is loopholed for the use of muskets. Block-houses have been much employed in the U. S. as a defence against Indians. If exposed to the fire of artillery, they should be formed of double rows of logs three feet apart, with well-rammed earth between them.

Block Island, an island belonging to the State of Rhode Island, situated between Montauk Point, the E. extremity of Long Island, and Point Judith. It constitutes the township of New Shoreham in Newport county. It is 8 miles long and from 2 to 5 miles wide. Block Island light, at the N. extremity, is in lat. 41° 13′ 46″ N., lon. 71° 34′ 17″ W. Pop. 1113.

Block'ley, a former township of Philadelphia co., Pa., on the W. side of the Schuylkill River, is now included in the city of Philadelphia. It is the site of the Blockley Insane Asylum, and of a large almshouse occupied by the paupers of the city.

Block-Printing. See PRINTING.

Block Tin, a name of a variety of tin which is inferior in quality to grain tin. During the process of melting or reduction in a reverberatory furnace the purest tin first fuses, and is withdrawn. The residue, being melted at a higher temperature, is poured into moulds, and is called block tin.

Blod'get (LORIN), an American scientist and writer, born in Chautauqua co., N. Y., May 23, 1823. He received a thorough common-school and academical education. In 1851 he became assistant professor at the Smithsonian Institution at Washington. He sent, in 1852, the results of his researches in climatology to the British Association for the Advancement of Science, and the following year presented a series of papers on the same subject at the meeting of the American Association at Cleveland, which may be said to have laid the foundation of American climatology. In 1853–54, Mr. Blodget had direction of the observations and calculations of the Pacific R. R. survey. Near the close of 1854 he was transferred to the war department, but continued to have charge of the surveys. In 1855 he published a quarto volume of climatological observations, and in 1857, "Climatology in the U. S.," a work extensively circulated and very favorably received in Europe. From 1859 to 1864 he was editor of the "North American," published in Philadelphia, and secretary of the Philadelphia Board of Trade from 1858 to 1864. From 1863 to 1865 he had charge of the commercial bureau of the treasury department at Washington, and published several volumes of official reports. In 1865 he was made U. S. appraiser at large. He contributed articles on finance to the "North American Review" in 1866 and 1867, besides making contributions to various other publications. Mr. Blodget's reputation is perhaps even greater in Europe than in the U. S. Some of his writings on climatology were warmly commended by Alexander von Humboldt.

Blodget (SAMUEL), born at Woburn, Mass., April 1, 1724, became a judge of common pleas in Hillsboro' co., N. H., and served in the Louisburg expedition of 1745. In 1783 he raised a sunken ship with a valuable cargo near Plymouth, and went to Europe to prosecute similar enterprises, but met with small encouragement. He commenced the duck manufacture in New Hampshire in 1781. He afterwards undertook the construction of a canal around Amoskeag Falls. Died at Haverhill, N. H., Sept. 1, 1807.

Bloem'fontein, the capital of the Orange River Free State, in South Africa, on a tributary of the Modder, in about lat. 29° 10′ S., lon. 26° 40′ E. Pop. about 1200.

Blois (anc. *Ble'sæ*), a town of France, capital of the department of Loire-et-Cher, is finely situated on high ground on both sides of the Loire, and on the railway from Orleans to Tours, 36 miles by rail S. W. of Orleans, and 112 miles by rail S. W. of Paris. It has a fine cathedral, a college, a public library, a botanic garden, an episcopal palace, and a hôtel de ville. Here is the celebrated castle of Blois, the scene of many interesting historical events, and once the favorite residence of the kings of France. Francis I., Henry II., and Charles IX. held their courts in this castle, which has been inhabited by many princes. Blois is a place of great antiquity, and was once more important than it is now. It has manufactures of gloves and porcelain, and a trade in brandy, wine, and timber. Here is an aqueduct cut in the rock by the ancient Romans. Pop. 20,068.

Blom'field (CHARLES JAMES), D. D., a learned English prelate, born at Bury St. Edmund's, in Suffolk, May 29, 1786, graduated at Trinity College, Cambridge. He edited several dramas of Æschylus and the works of Callimachus (1824). He became bishop of Chester in 1824, and bishop of London in 1828. He was an efficient promoter of the erection of new churches in London. His principles were "High Church." Died Aug. 5, 1857. (See DR. BIBER, "Bishop Blomfield and his Times," 1857; A. BLOMFIELD, "Life of C. J. Blomfield," 1863.)

Blom'maert (PHILIPPUS), an eminent Belgian author and philologist, born about 1809. He published editions of old Flemish poems, and translated the Niebelungen into Dutch or Flemish iambics. His most important work is a "History of the Belgians" (1849).

Blood [Ger. *Blut*], the principal nutritive fluid of animals, and the most abundant and complex fluid in the animal economy. It consists of a clear, transparent plasma, the "liquor sanguinis," and a great number of floating corpuscles, which are also nearly transparent; while the two together constitute in all the higher animals an opaque red fluid. In most of the invertebrates and in the *Amphioxus,* a fish of a low type, the blood is clear and transparent. In vertebrates only are the corpuscles found. The red color of the blood is brightest in the arteries, while in the veins it assumes a dark, almost blue-black tint. It has a faint odor, often characteristic of the animal from which it is taken. The temperature of human blood in health is probably about 100° F. in the deep-seated vessels. Its specific gravity is about 1060, but is not uniform. The blood-plasma or liquor sanguinis consists of water holding in solution a large proportion of albumen, a much smaller amount of fibrin, a variable amount of the carbonates, phosphates, sulphates, chlorides, and certain organic salts of potash and soda, and of the sulphates and phosphates of lime and magnesia, with a little iron, and certain undetermined organic "extractives." Sugar exists in the venous blood, and so does a fatty emulsion. Urea, the urates, cholesterine, creatine, carbonic acid, and other excrementitious matters are borne along by the blood until excreted by the proper organ. The liquor sanguinis, when its fibrin is removed by coagulation, is called serum—a term which is sometimes applied to the liquid before defibrination. When blood is withdrawn from the circulation, it rapidly separates into a rather firm clot (*coagulum* or *crassamentum*), consisting of fibrin, which when alone is white and clear, but unless washed it is usually colored red by the red corpuscles which it entangles.

If the plasma of blood be defibrinated and then heated, or nitric acid be added, a large white coagulum of albumen will be observed. Albumen is the most abundant, and in nutrition is probably the most important, of the principles of the blood.

The corpuscles already alluded to are of two kinds: (1) the red corpuscles, which constitute nearly half the mass of the blood, to which they give its color. They are flat, biconcave disks, circular in all mammals, except the camels and llamas, in which they are oval, as in the inferior vertebrates. In man they are $\frac{1}{3200}$ of an inch in diameter. (2) The white corpuscles or leucocytes, which are very much less abundant than the others. They are identical with the pus-cells, the colostrum-corpuscles, and with the tissue-cells generally. Their function in the blood is not well known. The white corpuscle is a true cell, while the red corpuscle is not. It is believed by many that the red corpuscles are bearers of oxygen from the lungs to the tissues. The greater part of the iron of the blood is contained in them. Their coloring-matter, hæmoglobine or cruorine, is believed by some theorists to owe its red color to this iron. The composition and physical properties of blood are quite variable, changing with changes of food, of health, or of habits. The circulating fluid of the invertebrates differs widely from true blood, though analogous in origin and uses.

CHAS. W. GREENE.

Blood-bird (*Myzomela sanguinolenta*), a beautiful little species of honeysucker, which receives its name from the rich scarlet color of the head, breast, and back of the male. It inhabits the thickets of New South Wales.

Blood-flower (*Hæmanthus*), a genus of bulbous plants of the natural order Amaryllidaceæ, mostly natives of South Africa, derive their name from the red color of the flowers. They are cultivated in greenhouses for the beauty of their flowers, which grow in heads or clusters. The leaves of some species are linear, and those of others nearly round. The inspissated juice of *Hæmanthus toxicarius* is used by the natives of South America to poison their arrows.

Blood-hound [so called because formerly employed to track wounded game by their blood], a name applied to several varieties of the dog, distinguished for the keenness of their scent and the persistency with which they will follow the track of game. They have been employed in many petty wars to track small forces of partisans, to follow escaped prisoners, etc., as in time of peace they have been trained to hunt felons, poachers, and fugitive slaves. When kept for these purposes they acquire a peculiarly ferocious and bloodthirsty character, but when employed for the chase they are sagacious and trusty. The Cuban

and Russian hounds are celebrated for their ferocity. They differ much from the English hounds, but like them have pendulous ears and lips and a compact and muscular build.

Blood-money, a term anciently applied to money paid by a person guilty of homicide to the next of kin. In England, before the Norman Conquest, the amount of this money was fixed by law, and varied with the rank of the person killed. Similar customs exist now among barbarous races.

Blood-root (*Sanguinaria Canadensis*), a plant of the natural order Papaveraceæ, growing wild in many parts of North America. It is one of our most beautiful early spring flowers. It takes its name from the orange-colored sap of the root, which contains the alkaloid sanguinarina, remarkable for the fine red color of its salts. The root of this plant is a valuable stimulant expectorant, but its use requires caution, for its administration has been followed by the symptoms of acro-narcotic poisoning.

Bloodstone. See HELIOTROPE.

Bloody Run, a post-borough of Bedford co., Pa., 90 miles W. S. W. of Harrisburg, and on the Huntingdon and Broad Top R. R., 43 miles S. W. of Huntingdon. Here are coal and iron mines. Pop. 557.

Bloom [from the Ger. *Blume*, a "flower"], a flower, a blossom, an expanded bud, the opening of flowers in general. A plant is said to be in bloom when its flowers are open. Bloom is also the blue color or powder found on plums, grapes, and other fruits. The term is also applied to a state of development into the prime and vigor of life and beauty.

BLOOM, in fine art, an appearance on paintings resembling the bloom on plums and other fruits. It prevents the transparency and impairs the general effect of a picture. To obviate this defect the picture should be carefully dried before the application of the varnish, which should be heated before it is applied.

Bloom, a post-township of Cook co., Ill. Pop. 1213.

Bloom, a township of Fairfield co., O. Pop. 2071.

Bloom, a township of Morgan co., O. Pop. 987.

Bloom, a township of Scioto co., O. Pop. 2203.

Bloom, a township of Seneca co., O. Pop. 1492.

Bloom, a post-township of Wood co., O. Pop. 1394.

Bloom, a township of Clearfield co., Pa. Pop. 315.

Bloom, a township of Richland co., Wis. Pop. 1171.

Bloom'ary, or **Blo'mary** [from *bloom*, a mass of iron], a furnace for converting pig or cast iron into malleable or "wrought" iron, or for producing malleable iron from iron ore directly. In the latter case it differs from the BLAST FURNACE (which see), in reducing the ore and producing the iron in a mass or "bloom" without melting it, while the blast furnace produces an impure molten iron, which is tapped off and cast into pigs; the blast furnace working continuously, the bloomary (in many cases) interruptedly. The change of cast into malleable iron by the bloomary process is generally superseded by PUDDLING (which see), but the former is used to some extent in the U. S. and Sweden in the production of the better kinds of metal. Bloomaries for the direct production of iron are of various forms. The process is one of the oldest known in metallurgy, and rude forms of it are at present used in many barbarous countries. The two best known modern forms of the bloomary (the Catalan furnace and the German bloomary) are at present used in Spain, Southern France, Sweden, Russia, and parts of the U. S. for the reduction of ores, chiefly by means of charcoal. Only the richest ores can be profitably used, and the loss of iron is much greater than by the blast furnace. In the true Catalan forge the charcoal, with a great part of the charge of iron ore, is heaped on the small square hearth opposite to the tuyere, fine ore and charcoal being thrown in from time to time. A moderate blast is maintained, and the whole is stirred at proper times; and in about six hours the iron (which has settled to the bottom in a mass called a *loup*) is removed, and forged at once into a bloom. In the ordinary or German bloomary the ore is first made fine, and then thrown in small quantities upon a charcoal fire with a hot or cold blast (the former being much the better); the iron and melted slag settling down into the hearth. The slag is tapped off from time to time, and the iron loups are at proper intervals withdrawn and wrought into blooms.

The bloomary process is an excellent one in regions where wood is plentiful and cheap and iron ores of a high grade are abundantly found. It is especially practised in Northern New York, where it produces iron of the very best quality, much sought for in the steel manufacture.

Bloom'er, a township of Pottawatomie co., Ia. P. 611.

Bloomer, a township of Montcalm co., Mich. P. 1422.

Bloomer, a township of Chippewa co., Wis. P. 1559.

Bloomer Costume, a style of dress for women, characterized by skirts and Turkish trousers, which Mrs. Ann Bloomer of New York attempted to introduce in 1849. It had but a temporary success.

Bloom'field, a township of Nevada co., Cal. Pop. 636.

Bloomfield, a post-township of Hartford co., Conn. Pop. 1473.

Bloomfield, a township of La Grange co., Ind. Pop. 2254.

Bloomfield, a township of Clinton co., Ia. Pop. 1231.

Bloomfield, the county-seat of Davis co., Ia., has manufactures of ploughs, wagons, and furniture. It has a high-school building costing $30,000, and is the centre of a rich farming district. It is at the junction of the St. Louis Kansas City and Northern and Burlington and Southwestern R. Rs. It has a public library of 2500 vols., two weekly papers, a national bank, and a large trade. Pop. 1553; of Bloomfield township, 2543.

T. O. WALKER, ED. "DEMOCRAT."

Bloomfield, a township of Polk co., Ia. Pop. 1132.

Bloomfield, a township of Winneshiek co., Ia. Pop. 1183.

Bloomfield, a post-village, capital of Greene co., Ind., on the Wabash and Erie Canal, 80 miles S. W. of Indianapolis. It has 3 wagon and carriage shops, 3 saddlery and harness shops, 1 planing mill and sash and door factory, 1 steam flouring mill, 1 weekly paper, and an active trade. It is 8 miles E. of the Indianapolis and Vincennes R. R. It is in Richland township. Pop. 656.

W. E. STROPES, PUB. "WEEKLY DEMOCRAT."

Bloomfield, a post-village of Nelson co., Ky. P. 435.

Bloomfield, a township of Oakland co., Mich. Pop. 2105.

Bloomfield, a township of Fillmore co., Minn. P. 888.

Bloomfield, a post-village, capital of Stoddart co., Mo., about 125 miles S. of St. Louis. It has one weekly newspaper. Pop. 379.

Bloomfield, a post-village and township of Essex co., N. J., 4 miles N. N. W. of Newark, on the Newark and Bloomfield, the Montclair, and the Watchung R. Rs. It is also connected by horse-railroad with Newark. It has one woollen and two paper mills, an iron foundry, a cabinet-organ factory, a weekly paper, eight churches, and is lighted by gas. Pop. of township, 4580.

STEPHEN M. HULIN, ED. OF "RECORD."

Bloomfield, a township of Jackson co., O. Pop. 1775.

Bloomfield, a township of Logan co., O. Pop. 655.

Bloomfield, a post-township of Crawford co., Pa. Pop. 1262.

Bloomfield, a township of Trumbull co., O. P. 798.

Bloomfield, a borough, capital of Perry co., Pa., 24 miles N. W. of Harrisburg. The name of the post-office is New Bloomfield. Pop. 655.

Bloomfield, a post-township of Essex co., Vt. Pop. 455.

Bloomfield, a post-township of Walworth co., Wis. Pop. 1091.

Bloomfield, a township of Waushara co., Wis. Pop. 1123.

Bloomfield (JOSEPH), born at Woodbridge, N. J., studied law, entered the Revolutionary army in the third regiment of New Jersey troops as captain, serving bravely throughout the war; became attorney-general of New Jersey, governor of New Jersey (1801–12), brigadier-general in the war with Great Britain (1812–15), and an influential Jeffersonian member of Congress (1817–21). Died Oct. 3, 1823.

Bloomfield (ROBERT), an English pastoral poet, born at Honington, in Suffolk, Dec. 3, 1766, was apprenticed to a shoemaker. He worked at that trade in London, and wrote in a garret "The Farmer's Boy" (1798), a rural poem which obtained great popularity, and was translated into French, Latin, and Italian. Among his other works are "Wild Flowers" and "Ballads and Songs." Died Aug. 19, 1823. (See "Pursuit of Knowledge under Difficulties," vol. ii.; "Blackwood's Magazine" for June, 1822.)

Bloom'ing, a township of Hampshire co., W. Va. Pop. 1195.

Bloom'ingburg, a post-village of Paint township, Fayette co., O. Pop. 312.

Bloom'ingdale, a post-township of Du Page co., Ill. Pop. 1141.

Bloomingdale, a post-township of Van Buren co., Mich. Pop. 1496.

Bloomingdale, a post-village of St. Armand township, Essex co., N. Y., has manufactures of lumber and starch.

Blooming Grove, a post-township of Franklin co., Ind. Pop. 801.

Blooming Grove, a post-township of Waseca co., Minn. Pop. 676.

Blooming Grove, a post-township of Orange co., N. Y. Pop. 2502.

Blooming Grove, a township of Richland co., O. Pop. 1199.

Blooming Grove, a township of Pike co., Pa. P. 378.

Blooming Grove, a post-township of Dane co., Wis. Pop. 1011.

Bloom'ington, a city and capital of McLean co., Ill., at the crossing of the Illinois Central, Chicago and Alton, and Indianapolis and Bloomington R. Rs., at the N. terminus of the Jacksonville branch of the Chicago and Alton, and the western terminus of the La Fayette and Bloomington division of the Toledo Wabash and Western R. R., 60 miles N. N. E. of Springfield. It has 12 churches, manufactures of boots, shoes, paper bags, and ploughs, carworks and repair-shops, employing some 1200 hands, a coal-mine, employing 180 hands, 5 banks, 5 furnaces, 3 weekly and 2 daily papers. It is connected by street railroad with Normal, two miles distant, which is the seat of the State Normal University and the Soldiers' Orphans' Home. Bloomington is the seat of Major Female College, the Illinois Wesleyan University, a Roman Catholic college, and a business college. It is one of the most flourishing and beautiful cities in the interior of the State. Pop. 14,590; of township, 16,419. BRAINARD SMITH.

Bloomington, a post-village, capital of Monroe co., Ind., is on the Louisville New Albany and Chicago R. R., 97 miles N. W. of New Albany and 51 miles S. W. of Indianapolis. It is the seat of the State University, organized in 1829, and has a national bank, important limestone quarries, and manufactures of hard wood, of which there is an unlimited quantity in the county. Large tanneries are in successful operation here, the great oak region furnishing unlimited supplies of bark for this purpose. It has one semi-monthly and two weekly newspapers. Pop. 1032; of Bloomington township, 2860. ED. "PROGRESS."

Bloomington, a township of Decatur co., Ia. P. 266.

Bloomington, a township of Muscatine co., Ia. Pop. 1411.

Bloomington, a post-township of Hennepin co., Minn. Pop. 738.

Bloomington, a township of Buchanan co., Mo. Pop. 1487.

Bloomington, a post-township of Macon co., Mo. Pop. 156.

Bloomington, a post-village, capital of Franklin co., Neb. It has one weekly newspaper.

Bloomington, a post-township of Grant co., Wis. Pop. 1245.

Blooms'burg, the capital of Columbia co., Pa., is on Fishing Creek, near the North Branch of the Susquehanna, and on the Lackawanna and Bloomsburg R. R., 56 miles S. W. of Scranton and 25 miles N. E. of Sunbury. Iron and limestone abound in the vicinity. The town has one national bank and one private banking company, is the site of a normal school with buildings capable of accommodating 500 pupils, and has a number of iron furnaces and foundries, and three weekly papers. Pop. 3341.

H. L. DIEFFENBACH, ED. OF "THE COLUMBIAN."

Bloss, a township of Tioga co., Pa. Pop. 4008.

Bloss'burg, a post-village of Tioga co., Pa., on the Tioga River and on the Blossburg and Corning R. R., 41 miles S. of Corning, N. Y. It has one weekly newspaper, and mines of semi-bituminous coal and of iron.

Blount, a county in the N. of Alabama. Area, 950 square miles. It is drained by the head-streams of the Black Warrior River. The surface is diversified by hills or small mountains. Corn, cotton, and tobacco are produced. It is intersected by the South and North Alabama R. R. Capital, Blountsville. Pop. 9945.

Blount, a county of Tennessee, bordering on North Carolina. Area, 900 square miles. It is bounded on the N. W. by the Holston River and on the S. W. by the Little Tennessee. The surface is diversified by fertile valleys and mountains, one of which is called Chilhowee Mountain. Cattle, corn, wheat, oats, and wool are staple products. The county contains extensive beds of marble, limestone, and iron ore. Capital, Marysville. Pop. 14,237.

Blount, a township of Vermilion co., Ill. Pop. 1532.

Blount (WILLIAM), an American Senator, born in North Carolina in 1744, was a member of the Continental Congress, and became governor of Ohio Territory in 1790. In 1796 he was elected a U. S. Senator for Tennessee, and in 1797 was expelled from the Senate on a charge that he was implicated in a plot to surrender a part of Louisiana to the British. Died Mar. 21, 1800.

Blounts'ville, a post-village, capital of Blount co., Ala., about 50 miles S. of Huntsville. Pop. of Blountsville township, 539.

Blountsville, a post-village, capital of Sullivan co., Tenn., about 100 miles E. N. E. of Knoxville. Pop. 180.

Blouse, a French term applied to a loose linen coat or frock which is generally worn in France by operatives, peasants, and the populace. It is similar to the smock-frock often worn by English wagoners and farm-laborers. In Germany the blouse is sometimes made of woollen stuff, and is tightened to the body by a belt. This garment is so characteristic of the workmen and lower classes of France that the French populace are often called "blouses." This name is given to the loose fatigue-jacket worn by soldiers in the U. S. army.

Blow (HENRY T.), born in Southampton co., Va., July 15, 1817, graduated at the University of St. Louis, Mo., whither he had removed in 1830, acquired wealth in manufacturing, mining, and land speculation, was a prominent Unionist and anti-slavery man before the civil war, was U. S. minister to Venezuela (1861–62), member of Congress (1863–67), and minister to Brazil (1869–71).

Blowing-Machines are used instead of bellows in furnaces and manufactories requiring a large and steady supply of air, and also in the ventilation of mines, where, without an artificial supply, the air would become charged with dangerous gases. These machines are of various construction, but in many of them the blast is made by causing fans enclosed in a hollow cylinder to revolve around a central axis. Others have hollow cylinders in which pistons work, as in the air-pump. The blast is sometimes produced by causing a stream of water to fall through a long tube, in such a way that a large quantity of air is carried down with it.

Blow'pipe [Fr. *chalumeau;* Ger. *Löthrohr*], a tube bent at right angles and terminating in a fine nozzle, for directing a current of air from the mouth across the flame of a lamp, candle, or gas-jet. It produces a conical-pointed flame, intensely hot, which can be readily directed upon small objects by the operator. It is constantly used by the jeweller in soldering, but in the hands of the chemist and mineralogist it is the basis of a distinct and comprehensive system of analysis, both qualitative and quantitative. By using a gentle current of air, and not permitting the nozzle to enter the flame, the entire flame is brought into a horizontal position, but its chemical character is not changed; it is still composed of combustible gases rich in carbon; and as these, when directed upon many metallic oxides, reduce or liberate the metals, this flame is called the *reducing* flame. If, on the other hand, a more powerful current of air is blown into the interior of the flame, a sharp-pointed jet of a blue tint is the result. Many metals, placed just beyond the point of this flame, are rapidly oxidized; hence it is called the *oxidizing* flame. The chemist is thus enabled by the aid of the blowpipe to expose small quantities of minerals or other substances either to a reducing or an oxidizing influence. By holding the substance in platinum-pointed forceps its fusibility can be determined, or it may communicate to the flame some characteristic color. By placing it upon charcoal many important facts can be learned with regard to it; *i. e.* it may produce white or colored deposits upon the coal, or evolve a characteristic odor, etc. By subjecting it at the same time to the action of carbonate of soda it may yield metallic globules or powder, with or without a coating. By the aid of a loop of platinum wire the body under examination may be exposed to the action of borax or salt of phosphorus, when glassy beads of characteristic colors may result. Thus with the aid of the blowpipe the analyst subjects the substance to a series of tests, by which its exact character is revealed. By the use of the balance, little clay crucibles, cupels of bone-ash, and a great variety of reagents, the percentages of certain metals can be accurately determined, such as copper, cobalt, nickel, gold, and especially silver. (For detailed information on this subject see ELDESHORST'S "Manual of Blowpipe Analysis," and PLATTNER'S "Manual of Qualitative and Quantitative Analysis with the Blowpipe.") (See OXY-HYDROGEN BLOWPIPE.) C. F. CHANDLER.

Blow'pipe-and-Ar'row, called also **Gravata'na** and **Pocu'na,** a weapon used by some of the Indians of South America, both in war and for killing game. It is a

straight tube, in which a poisoned arrow is placed and forcibly expelled by the breath. The tube, etc. is from two to twelve feet long, the bore not large enough to admit the little finger. It is made of reed or of the stem of a palm. The arrows are from one or two to eighteen inches long, made of the spines of a palm, sharp, notched so as to break off in the wound, and their points covered with curare or other poison. A little down is twisted round each arrow, to fit the tube. In the hand of a practised Indian it is a very deadly weapon. As his weapon makes no noise, the hunter often does wonderful execution.

Blub'ber, the cellular membrane in which the oil or fat of the whale is enclosed; the layer of fat which lies just beneath the skin of the whale. A single whale often contains thirty tons of blubber, from which about twenty tons of oil are extracted. The blubber serves to protect the whale from cold and to diminish his specific gravity. It is an important article of food to the Esquimaux.

Blü'cher, von (Gebhard Leberecht), prince of Wahlstadt, a celebrated Prussian general, born at Rostock Dec. 16, 1742. He entered the service of Prussia in 1760, became a captain in 1771, and a colonel in 1790. In 1794 he distinguished himself as a cavalry officer in the war against the French, and was raised to the rank of major-general. He led the vanguard at the battle of Auerstadt (1806), from which he retreated to Lübeck. He was defeated and taken prisoner near Lübeck in Nov., 1806. When the war between the allies and Napoleon was renewed in Mar., 1813, Blücher was appointed commander-in-chief of the Prussian army, which he led at Lützen and Bautzen. He defeated Macdonald at the Katzbach in August, and took many prisoners. On Oct. 16 he gained a victory over Marshal Marmont at Möckern, and then formed a junction with the allied armies, which, with his co-operation, defeated Napoleon at the battle of Leipsic, Oct. 17–19, 1813. He was raised to the rank of field-marshal in 1813, and led the Prussian army, about 60,000 strong, which invaded France early in 1814. Between Feb. 10 and 15 he was defeated by Napoleon at Champaubert, Montmirail, Veauchamps, etc., and lost about 15,000 men, but he defeated the same enemy at Laon, Mar. 9, entered Paris at the end of that month, and here received from his king the title of prince of Wahlstadt. On the renewal of the war in 1815 he took command of the Prussian army, and was defeated at Ligny, June 16, but he reached Waterloo in time to decide the victory, June 18, 1815. Died Sept. 12, 1819. He was noted for his energy and rapid movements, and was surnamed Marshal Vorwärts ("Forward"). In 1826 a large bronze statue by Rauch was erected to him in Berlin, and another in Breslau in 1827. (See Foerster, "Blücher und sein Umgebung," 1821; Pischon, "Blüchers Leben, Thaten, und Ende," 1842; Varnhagen von Ense, "Blüchers Lebensbeschreibung," 1827; "Life and Campaigns of Blücher," London, 1815; Scherr, "Blücher, seine Zeit und sein Leben," 2 vols., 1862; Bieske, "G. L. Blücher von Wahlstadt," 1862.)

Blue [Lat. *cæru'leus;* Fr. *bleu;* Ger. *blau*], one of the three primary colors, and one of the seven prismatic colors, of which the complementary is orange. The *blue coloring matter of flowers* has been called anthokyan or cyanine; little is known of its chemical constitution. *The blue pigments* are (1) ultramarine, obtained originally from lapis lazuli, now manufactured artificially; (2) Prussian or Berlin blue, the sesquiferrocyanide of iron; (3) smalt, glass colored blue by oxide of cobalt; modifications of this pigment are called azure blue, cerulean blue, indigo blue, deep blue, king's blue, etc.; (4) Thenard's or cobalt blue, a compound of alumina and oxide of cobalt; (5) verditer or Bremen blue, mountain blue, etc., a basic carbonate of copper; (6) blue ochre or iron blue, native Prussian blue, is a phosphate of protoxide of iron found in many localities.

The blue dyes are (1) Indigo. This is applied as Saxon blue, or indigo extract, a solution of indigo in fuming sulphuric acid. Chemic, or chemic blue, is the very acid solution; indigo carmine is the extract neutralized by an alkali, as the indigo vat, indigo reduced to a colorless solution by protoxide of iron or grape-sugar, which becomes blue again in the air. (2) Prussian blue, already mentioned as a pigment. (3) Logwood blue, produced by logwood extract on goods mordanted with alum and cream of tartar. (4) Azuline, or phenol blue, prepared from phenol or carbolic acid. (5) Aniline blues, (*a*) bleu de Lyons, triphenyl-rosaniline; (*b*) Nicholson's, or alkali blue, etc. (6) Toluidine blue. (7) Diphenylamine blue. (8) Chinoline blue, etc. (For details consult the above under their respective names.)

C. F. Chandler.

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Blue, a township of Pottawattomie co., Kan. Pop. 544.

Blue, a township of Jackson co., Mo. Pop. 3603.

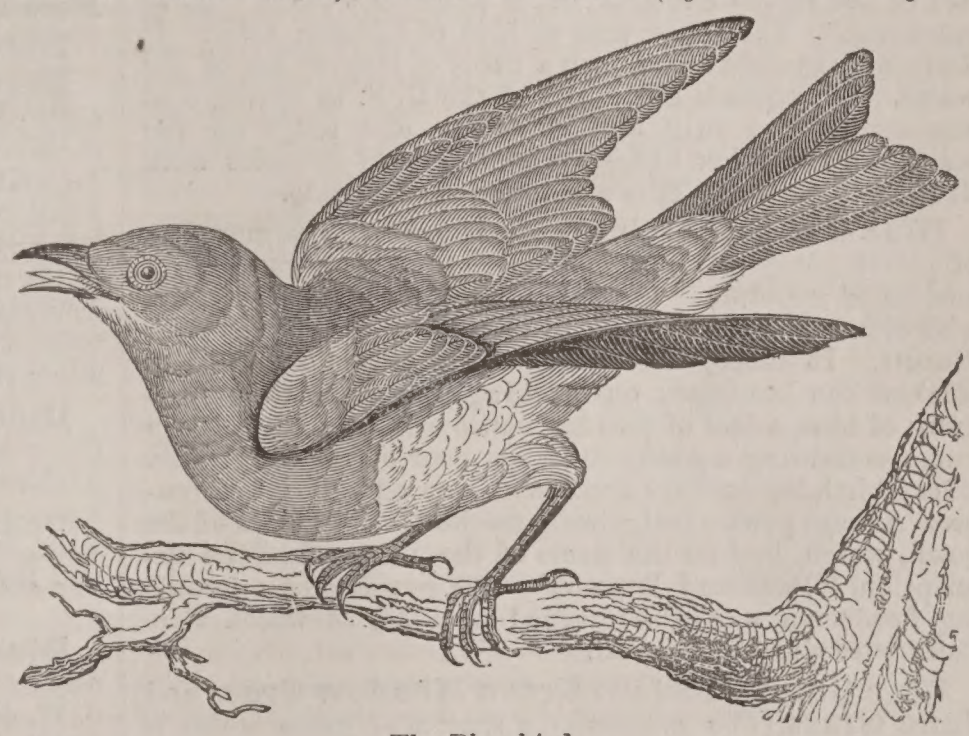
Blue Bayou, a township of Sevier co., Ark. Pop. 840.

Blue'beard [Fr. *Barbe-bleu;* Ger. *Blau'bart*], the central character of a celebrated fiction, according to which the chevalier Raoul, who has a blue beard, tests his wife's curiosity by entrusting her, during his absence, with the key of a chamber which she is forbidden to enter. She cannot resist the temptation to explore the chamber; her fault is discovered, and he puts her to death. Six wives share this fate, but the seventh is rescued by her brothers, and Bluebeard is slain. The tale appears in innumerable forms. Tieck, in his "Phantasus," has worked up this material into a drama, with romantic and satirical additions; Grétry has made use of it in his opera of "Raoul," and Offenbach has written an opéra bouffe called "Barbe Bleu" (1866).

The historic original of Bluebeard is supposed to be Giles de Laval, lord of Raiz, who was made marshal of France in 1429, and fought valiantly against the English; but he is remembered chiefly for crimes which tradition has painted in the blackest colors. He is said to have taken a pleasure in corrupting young persons of both sexes, and in murdering them for their blood, which he used in magical incantations. Out of this fact, itself half mythical, the tale of Bluebeard has probably grown. Laval was burnt alive near Nantes in 1440.

Blue'bell, a name applied in Great Britain to two widely different wild flowers: (1) the *Hyacinthus non-scriptus,* a hyacinth with beautiful blue flowers, and a root which was formerly gathered for the starch it contains; (2) the *Campanula rotundifolia,* the harebell, very common throughout Europe, and having a wide range in Asia and North America. This and other blue-flowered species of *Campanula* are sometimes called "bluebell" in the U. S., where the name is also in some places very incorrectly given to the blue fringed-gentian.

Blue-bird, or **Blue Warbler** (*Sylvia sialis, Erythaca sialis,* or *Sialia sialis*], a bird of the family Sylviadæ, is a general favorite in the U. S., which it visits as a summer bird of passage, and is welcomed as a harbinger of spring. It prefers the vicinity of human habitations, and often builds in orchards and gardens. It is nearly equal to an English robin in size. The upper part of it is a rich sky-blue color; the breast and throat are a reddish chestnut. Its song is a mellow, sweet-toned, and agreeable warble. This bird lays about five pale blue eggs. The male and female both defend their nest and young with remarkable courage when attacked by serpents or other animals.



The Blue-bird.

Blue Books, the name applied to the reports and papers printed by the British Parliament, because they are usually covered with blue paper. The term is also applied to the reports sent annually by the governors of colonies to the colonial secretary. The practice of printing the proceedings of the House of Commons began in 1681, when disputes ran high on the question of excluding the duke of York from the succession. The documents printed by the House of Commons accumulated gradually in bulk and variety, until they reached their present extent. In 1836 the House adopted the practice of selling their papers at a cheap rate. The chief contents of these papers at present are the votes and proceedings of the House; the bills; the estimates for the public services; the accounts of expenditures; any documents which the ministry may voluntarily

or at the demand of the House produce; reports of committees or commissions appointed by the Crown and the government. The blue books of a session often fill fifty or sixty thick folio volumes. Their contents are heterogeneous, and to a great extent cumbersome and valueless. They are not prepared on any uniform system or subjected to general revision or editing. There is an official list of the *personnel* of the U. S. government published annually at Washington, which is entitled "The U. S. Blue Book."

Blue Creek, a township of Adams co., Ind. Pop. 820.

Blue Creek, a township of Paulding co., O. P. 163.

Blue Earth, a county in the S. of Minnesota. Area, 750 square miles. It is partly bounded on the N. by the Minnesota River, traversed by the Mankato or Blue Earth River, and also drained by the Maple River. The surface is undulating, and diversified by fertile prairies, forests, and small lakes. Grain, wool, cattle, and dairy products are the chief staples. It is intersected by the St. Paul and Sioux City R. R. Capital, Mankato. Pop. 17,302.

Blue Earth City, the capital of Faribault co., Minn., is on the Mankato or Blue Earth River, 100 miles in a direct line S. S. W. of St. Paul. It has one weekly paper. It is to be connected with Mankato by railroad. Pop. of township, 1121. ED. OF "POST."

Blue Eye (*Entomiza cyanotis*), sometimes called **Blue-Cheeked Honey-Eater,** a beautiful bird abundant in New South Wales. It is a species of honey-sucker, and feeds on insects and honey, which it obtains chiefly from the blossoms of the *Eucalyptus*. It is gregarious and remarkable for its graceful movements.

Blue Eye, a township of Talladega co. Ala. Pop. 1414.

Blue'fields, or **Blewfields,** a river of Central America, in the Mosquito Territory, flows eastward, and enters the Caribbean Sea at the town of Bluefields, which has a good harbor, and is in lat. 12° N., lon. 83° W.

Blue'fish (*Temnodon saltator*), an acanthopterygian fish of the family Scomberidæ, is sometimes called "horse mackerel." The upper part of it is of a bluish color. It derives its specific name from a habit of leaping out of the water. It frequents the coasts of the U. S. in spring and summer, is very swift and voracious, and preys on the mackerel and other fishes. The weight of it varies from five to ten pounds. It is a fine fish for the table.

Blue Gowns, or **King's Beadsmen,** a former class of privileged mendicants in Scotland. There was long a custom of appointing beadsmen with a small royal bounty, who ultimately degenerated into a class of authorized mendicants. In theory their duty was to pray for the king. Each of the beadsmen on the king's birthday received a gown of blue, a loaf of bread, a bottle of ale, and a leathern purse containing a penny for every year of the king's life. Every birthday another beadsman was added to the number. A large pewter badge was attached to the breast of the gown, which, besides the name of the bearer, had the inscription, "Pass and Repass." The practice of appointing beadsmen was discontinued in 1833, at which time there were sixty on the roll.

Blue Grass, called also **Green Meadow Grass** and **June Grass** (*Poa pratensis*), a species of grass which is a native both of Europe and America, distinguished from other species of its genus by its flat panicles, smooth culms and sheaths, and short, blunt ligules. Though common in many regions, this grass attains its chief value in that part of Central Kentucky which is called the "blue-grass region," where it is considered to afford the most important crop that can be raised by farmers. It is chiefly cultivated for pasturage, though on certain soils it makes excellent hay. To this grass Kentucky owes her great reputation as a stock-raising State.

Blue Grass, a post-township of Scott co., Ia. P. 1420.

Blue Grass, a township of Highland co., Va. Pop. 1418.

Blue Hill, a post-township of Hancock co., Me. It has an academy and some manufactures. Pop. 1707.

Blue Lake, a post-township of Muskegon co., Mich. Pop. 381.

Blue Laws, a name applied to certain enactments said to have been made by the legislature of the colony of New Haven, now a part of Connecticut. These laws are said to have interfered seriously with the private life, religious conduct, and even the dress of citizens; but while it is true that not only in New Haven, but in other parts of New England, there was undue interference in these affairs, it is equally certain that many of the "blue laws" of which certain writers have told us never had an existence in any statute-book.

Blue Lead, a name given by miners to galena.

Blue Lick Springs, a village of Nicholas co., Ky., where there are saline mineral springs, the waters of which are sold for medicinal purposes in various of the U. S. The waters closely resemble those of Harrowgate, in England.

Blue Light. See BENGAL LIGHT.

Blue Monday is said to have been so named from an ancient custom in some parts of Europe of decorating churches with blue on the Monday before Lent, this particular Monday, and afterwards all Mondays, being considered holidays for men whose business obliged them to work on Sundays. This practice led to riotous excesses still traditionally remembered, and it was generally suppressed by legal cenatments; but the blue Monday is still observed to some extent in certain places.

Blue Mound, a township of Macon co., Ill. P. 1089.

Blue Mound, a township of McLean co., Ill. P. 1219.

Blue Mound, a post-township of Linn co., Kan. Pop. 341.

Blue Mound, a post-township of Livingston co., Mo. Pop. 1048.

Blue Mound, a post-township of Dane co., Wis. Pop. 1165.

Blue Mountain, a post-township of Izard co., Ark. Pop. 454.

Blue Mountain (Pennsylvania). See KITTATINNY.

Blue Mountains, a range in the E. part of New South Wales, and N. of the Australian Alps. It is nearly parallel with the sea-coast, from which it is about 100 miles distant. The highest peaks of this range rise over 4000 feet above the level of the sea. The range long formed a barrier between the settlements on the coast and the interior. In 1815 a road was opened through these mountains to the rich pastures of Bathurst Plains; and now a railroad connects Sidney and Bathurst, crossing the Blue Mountains at an elevation of over 3000 feet.

Blue Nile, or **Blue River.** See BAHR-EL-AZREK.

Blue Pill (*Pilula hydrargyri*), or **Blue Mass,** consists of two parts of mercury rubbed with three parts of conserve of roses till globules of mercury can be no longer detected; to this is added powdered liquorice-root, so that a pill of three grains contains one grain of mercury. In cases of recent and mild disorder or torpor of the liver blue pill is much used, either alone or combined with some other drug, such as rhubarb. The dose is from one to three grains twice a day. The doses given by physicians are, however, much smaller now than formerly.

Blue Rapids, a village of Marshall co., Kan., on the Central branch of the Union Pacific R. R., 95 miles W. of Atchison, and on the Big Blue River. It has a developed water-power of 1700 horse-power, large flouring and woollen mills, beds of gypsum and water-lime, a weekly newspaper, and Holly waterworks. Pop. of township, 1247.

C. E. TIBBETS, PUB. OF "BLUE RAPIDS TIMES."

Blue Ridge, the range of the Alleghanies which is nearest to the Atlantic Ocean. It extends in a N. E. and S. W. direction through Pennsylvania, Maryland, Virginia, North Carolina, and Georgia. The part of this ridge in Pennsylvania is called the South Mountain. In Virginia it forms the S. E. boundary of the Great Valley, and is remarkable for beautiful scenery. The Peaks of Otter, which are the highest points of this ridge in Virginia, rise about 4000 feet above the level of the sea. From North Carolina, southward, the name of Blue Ridge is invariably applied to the watershed which divides the waters flowing into the Atlantic from those of the Gulf of Mexico.

Blue Ridge, a township of Piatt co., Ill. Pop. 1120.

Blue Ridge, a post-township of Henderson co., N. C. Pop. 1354.

Blue Ridge, a township of Macon co., N. C. P. 157.

Blue Ridge, a township of Watauga co., N. C. P. 460.

Blue River of Indiana rises in Henry county in the E. part of the State, and flows south-westward. After it has united with several streams it receives the name of Driftwood or East Fork of White River.

Blue River, a township of Hancock co., Ind. P. 1125.

Blue River, a township of Harrison co., Ind. P. 1198.

Blue River, a township of Henry co., Ind. Pop. 862.

Blue River, a township of Johnson co., Ind. P. 2573.

Blue River, a township of York co., Neb. Pop. 258.

Blue River, a post-township of Grant co., Wis. P. 660.

Blue Rock, a post-township of Muskingum co., O. Pop. 1093.

Blue Springs, a post-village and township of Gage co., Neb., on the Big Blue, 12 miles S. of Beatrice. It has a fine tubular iron bridge, an extensive water-power, and a large plough-factory. Pop. of township, 354.

Blue Stocking [Fr. *bas bleu*], a term applied to literary ladies, and generally with the imputation of pedantry. It originated in England in Dr. Johnson's time, when there existed blue-stocking clubs, at which literary ladies met to converse with distinguished literati. According to Boswell, they were so called because Mr. Stillingfleet, one of the prominent members, always wore blue hose.

Blue Stone, a township of Mecklenburg, co. Va. Pop. 1984.

Blue Sulphur, a township of Greenbrier co., West Va. Pop. 2148.

Blue Sulphur Springs is a post-village of Greenbrier co., W. Va., 22 miles W. of the famous White Sulphur Springs. The springs afford a copious supply of valuable saline chalybeate waters, useful in the treatment of many diseases.

Blue Throat, sometimes called **Blue Breast,** or **Blue-Throated Robin** (*Phœnicura Sueçica* or *Sylvia Sueçica*), a beautiful bird of the family Sylviadæ, is common on the continent of Europe as a summer bird of passage, and is supposed to pass the winter in Africa. It resembles a redbreast in form, but is rather larger, and has a brilliant sky-blue plumage on its throat, below which is a black bar. It sings sweetly, and imitates the notes of many other birds. This is one of the birds which the Italians call Beccafico (which see). It is esteemed as a delicacy, and great numbers are caught in Alsace and Lorraine.

Blue Vitriol, the sulphate of copper. (See Copper.)

Blue'wing Duck, or **Bluewing Teal,** a species of duck (*Anas discors*), an abundant game-bird of America. Vast numbers spend the winter in the marshes near the mouths of the Mississippi, to which they congregate both from the North and the East; the summer migrations of the species extend as far N. as the 57th parallel, and it is plentiful on the Saskatchewan in the breeding-season. It breeds also in the marshes of the South, and is common in Jamaica, where it is a permanent resident. No duck is in higher esteem for the table, and it has been suggested that the bluewing is particularly worthy of domestication. In the summer plumage of the male the upper part of the head is black; the other parts of the head are of a deep purplish blue, except a patch of pure white before each eye; the plumage on the upper parts is brown mixed and glossed with green, except that the wings exhibit various shades of blue, the lesser wing-covers being of a rich ultramarine, with an almost metallic lustre; the lower parts are reddish orange spotted with black; the tail feathers are short and pointed. It is a bird of extremely rapid and well-sustained flight.

Bluff, a high bank or cliff presenting a steep or abrupt front towards a river, lake, or sea. The term is often applied to the high banks of the Mississippi and other Western rivers. Between the bluff and the river sometimes occurs a flat tract of considerable width called a bottom. On the Mississippi below Lake Pepin the bluffs of magnesian limestone rise about 350 feet above the river, and present picturesque scenery.

Bluff, a township of Johnson co., Ill. Pop. 1325.

Bluff, a township of Monroe co., Ill. Pop. 925.

Bluff Creek, a township of Monroe co., Ia. Pop. 1015.

Bluff Dale, a post-township of Greene co., Ill. Pop. 1440.

Bluff Port, a township of Sumter co., Ala. Pop. 555.

Bluff'ton, a township of Chambers co., Ala. Pop. 2259.

Bluffton, capital of Wells co., Ind., on the Wabash River and on the Fort Wayne Muncie and Cincinnati R. R. It has fine church and high-school buildings, 3 planing-mills, corn-planter manufactory (steam), 2 barrel manufactories, 2 foundries and machine-shops, 2 stave and heading factories, 3 flouring mills, woollen mills, 2 weekly newspapers, and a large grain, lumber, and stock trade. Pop. 1131.
Ed. "Bluffton Banner."

Bluffton, a post-township of Winneshiek co., Ia. P. 809.

Bluffton, a post-village of Richland township, Allen co., O. It has one weekly newspaper. Pop. 489.

Bluffton, a post-village and township of Beaufort co., S. C., 16 miles S. W. of Beaufort. Pop. 2047.

Bluh'me (Friedrich), a German jurisconsult, born June 29, 1797, professor of jurisprudence at Göttingen, has contributed materially to modern research in the history of the Roman and ancient German law. He assisted Schrader in his edition of Gaius, and Sevigny in the "History of the Roman Law in the Middle Ages," and published, among several learned works, "Die Ordnung der Fragmente in den Pandectentiteln," and an encyclopædia of existing German laws.

Blum (Robert), a German democrat and popular orator, born of poor parents at Cologne Nov. 10, 1807. He founded the "Schiller-Verein" ("Schiller Society") at Leipsic in 1840, and the German Catholic Church at Leipsic in 1845. In 1848 he was the master-spirit of the Saxon liberals or democrats, and a member of the Frankfort parliament, in which he was the leader of the Left or moderate opposition. Having been sent by this party to Vienna, he joined the insurgents of that city, which was soon captured by the Austrian army. Blum was arrested and shot at Vienna Nov. 9, 1848. (See Eduard Duller, "R. Blums Leben und Tod," 1848; E. Franke, "Leben des R. Blum," 1848.)

Blu'menbach' (Johann Friedrich), M. D., an eminent German naturalist, born at Gotha May 11, 1752. He graduated as M. D. at Göttingen in 1775, and wrote for that occasion a remarkable thesis "On the Varieties of the Human Race." In 1778 he became professor of medicine and anatomy in the University of Göttingen, where he lectured for fifty years. He published a "Manual of Natural History" (1780), often reprinted. He may be said to have first placed natural history on the scientific basis of comparative anatomy. Among his works is a "Manual of Comparative Anatomy" (1805), which was translated into many languages. He advocated the doctrine of the unity of the human species, which he divided into five races—the Caucasian, Mongolian, Malay, American, and Ethiopian. Died Jan. 22, 1840. (See C. F. H. Marx, "Zum Andenken an J. F. Blumenbach," 1840.)

Blum'field, a post-township of Saginaw co., Mich. P. 1074.

Blun'derbuss [supposed to be a corruption of the Danish *donderbus*, from *dondre*, "thunder," and *bus*, a "tube;" literally, a "thunder-tube"], a short musket or gun with a large calibre or bore, which has sufficient capacity for several bullets. It has a limited range, but is destructive at close quarters, and was formerly used in the defence of houses against burglars. In the army it has been superseded by the carbine.

Blunt (Edmund), an American hydrographer, born at Newburyport, Mass., Nov. 23, 1799, became in 1833 first assistant in the U. S. Coast Survey. Died Sept. 2, 1866.

Blunt (Edmund March), the father of the preceding, was born at Portsmouth, N. H., June 20, 1770. He published, besides other valuable nautical works, "The American Coast Pilot" (1796). Died Jan. 2, 1862.

Blunt (George William), born in Newburyport, Mass., Mar. 11, 1802, educated in New York City. He is the author of various charts, "Atlantic Memoir," "Sheet Anchor," "Harbor Laws of New York," "Plan to Avoid the Centre of Violent Gales," and compiler of the "American Coast Pilot." He was a commissioner of emigration (1852–54), has been pilot commissioner since 1845, and harbor commissioner since 1867. A man of great public spirit, in the various positions he has held, and still holds, he has been instrumental in correcting many abuses and effecting reforms: and to the interests of New York, as depending upon the preservation of its magnificent harbor and port, he has particularly devoted himself.

Blunt (James G.), M. D., an American general, born at Trenton, Me., July 20, 1826, removed in 1856 to Kansas, and was appointed in 1861 brigadier-general and commander of the department of Kansas. He was made a major-general in 1862. In 1863 he commanded the army of the frontier.

Blunt'schli (Johann Kaspar), professor of political science at Heidelberg, born at Zurich Mar. 7, 1808, and took part in the political movement of 1839 as a conservative. He published a history of Zurich, a history of the Swiss federal laws, extensive treatises on public and private law, and a dictionary of politics.

Blyth (Samuel), a British naval officer, born in 1784, commanded the brig Boxer in an engagement, off Portland, Me., with the U. S. brig Enterprise, Sept. 5, 1813, during which he was killed by a cannon-ball. His remains were interred in Portland with the honors of war by the side of Lieut. Burrows, who commanded the Enterprise, and was also killed. G. C. Simmons, *Clerk Board of Eng'rs.*

Blythe, a township of Marion co., Ark. Pop. 190.

Blythe, a township of Schuylkill co., Pa. Pop. 1924.

Bo'a, the name of a genus of large non-venomous serpents, all natives of the warm parts of America, the similar large serpents of Asia and Africa forming the genus *Python*. The family Boïdæ (containing the *Pythons*, etc. of the Old World, as well as the true *Boas*, anacondas, etc. of the New)

is almost exclusively tropical, and nearly all the species are of great size and strength. It is related by Livy that a serpent 120 feet in length devoured several soldiers and caused alarm to a Roman army in Africa; the skin is said to have been long preserved at Rome. The mouth of the boas, though destitute of poison-fangs, is so furnished with teeth as to make their bite severe. Their teeth are long

Boa Constrictors attacking a Deer.

and directed backward, to prevent the escape of the prey, which is first seized by the mouth, and then the serpent, with a rapidity of motion which the eye of the observer fails to follow, coils itself around it; the muscles of the body afterwards compress it, so that in a few minutes life is extinct. Deglutition then takes place, accompanied with a flow of saliva, not only for lubrication, but to hasten the process of digestion. The food is always swallowed entire, and the process seems to require no small effort. The neck is distended to an enormous degree as the prey passes through. After a repast these serpents spend a considerable time in a state of torpidity—several weeks elapsing before they require a new supply—and in this state they are easily killed.

The lungs consist of two lobes, one much larger than the other, and at the extremity of the larger is a capacious air-bag, supposed to serve for the aëration of the blood during deglutition. The tail has great prehensile power, and its grasp of a tree round which it may be coiled is aided by the opposing action of two claws, one on each side of the anus, which are the representatives of the hinder limbs of the superior vertebrate animals, and which, on dissection, are found to be connected not only with strong muscles, but with bones entirely concealed within the serpent. The head is thick and somewhat elongated; the eyes small; the tail blunt; the scales numerous and rather small; the colors in many species bright and elegantly disposed. The true boas have the plates under the tail single, while in the pythons they are double. They are of four species. The *Boa constrictor* is far from being one of the largest, seldom attaining a length of more than twelve feet. It is common in parts of South America, where its skin is used for making boots and saddles. Uric acid is prepared in Europe from the excrement of the boa. The name boa constrictor is, however, popularly extended to any very large non-venomous serpent. The only known serpent of the boa family in the U. S. is a small species of *Wenona*, found in the Pacific States. REVISED BY C. W. GREENE.

Boadice'a, written also **Voadica,** a warlike British queen, was the wife of Prasutagus, king of the Iceni, who died about 60 A. D. Soon after this date she and her subjects, exasperated by the rapacity and outrages of the Roman soldiers, took arms against them. The Britons took the Roman colonies of Camalodunum and Londinum (London), and killed about 70,000 Romans. She was defeated in 62 A. D. by Suetonius Paulinus, and then killed herself. (See TACITUS, "Annales.")

Boar, the male of the *Sus scrofa,* or swine. When applied to the wild stock of swine found in various countries, the term is used without particular reference to the sex of the animals. The native country of this species is in the Old World, where the wild stock abounds in parts of Europe, in Asia, and in Africa. The wild boars found in the Southern States (especially in Florida) are descended from the domestic swine, but have reverted quite to the wild type in respect to the form of the body, ears, and tusks, the bristly crest on the back, the black or red color, and the striped young. Most writers make all the domestic breeds of swine descendants of the wild stock. Others think the small native pig of the Pacific Islands is of a separate species; but it is asserted by some that no swine were known on these islands till after they were visited by European ships, which certainly left swine and other domestic animals in many parts of Polynesia. A few writers regard the East Indian boar as of a distinct species. Swine with solid hoofs are known in Poland and Hungary. No true swine are native to America or Australia. Boar-hunting has long been regarded as one of the most exciting sports of the chase. It is practised in Europe, India, and Syria—in some places with toils or nets, in others with dogs, which bring the boar to bay, when he is despatched with a spear or long knife. In India he is hunted on horseback and killed with a boar-spear. It is held unsportsmanlike to shoot the boar. When at bay the wild boar is a very dangerous animal.

Board, a form of lumber; a piece of timber sawed thin; if more than one and a half inches thick, it is called a plank; a table; entertainment or food; the deck of a ship or vessel; a table at which a council or court is held; a body of public men constituting a quorum in session. Board is a general term applied to persons in a collective capacity who have the management of some public office or department, bank, etc.; thus the directors of a bank or railroad are called the board of directors; the British lords of the treasury, the board of treasury. In nautical language, board is a space or portion of sea over which a ship passes in tacking.

To "go aboard" or "on board" is to enter a vessel, to embark in it. The mast is said to "go by the board" when it breaks and falls into the water.

To "board," in naval warfare, signifies to enter a ship by force in order to capture it. The assailants sometimes throw on the enemy's deck combustibles, etc., in order to confuse the crew, and then board the ship armed with boarding-pikes, pistols, and cutlasses.

Board'man, a township of Clayton co., Ia. Pop. 1806.

Boardman, a post-township of Mahoning co., O. Pop. 817.

Board'man (GEORGE DANA), an American Baptist missionary, born in Livermore, Me., Feb. 1, 1801, graduated at Waterville College (now Colby University) in 1822, and at Andover Theological Seminary in 1825. He sailed for Burmah July 16, 1825, and distinguished himself by his zeal and devotion to the work among the Karens, being, practically, the founder of the Karen mission. Died near Tavoy Feb. 11, 1831.—His son (Rev. GEORGE D. BOARDMAN, D. D., of Philadelphia) is one of the most brilliant and scholarly clergymen of the Baptist denomination. He was born at Tavoy, in British Burmah, Aug. 18, 1828, and graduated at Brown University in 1852.

Boardman (HENRY AUGUSTUS), D. D., an able and eloquent American divine, was born at Troy, N. Y., Jan. 9, 1808. He graduated at Yale College in 1829, taking the highest honors of his class, and afterwards studied theology at Princeton. Since 1833 he has been pastor of the Tenth Presbyterian church in Philadelphia. Chosen in 1853 by the General Assembly to fill the chair of pastoral theology at Princeton, he declined this position. He has published, among other works, "The Scriptural Doctrine of Original Sin" (1839) and "The Bible in the Counting-house" (1853).

Boardman (RICHARD), one of Wesley's first missionaries to America, born in England in 1738, joined Wesley's conference in 1763, volunteered for America in 1769, preached in New York, and generally through the Middle States, till 1774, when he returned to England, and continued his itinerant ministry till his death at Cork, Ireland, Oct. 4, 1782. He is justly esteemed as one of the chief founders of American Methodism.

Board of Admiralty, a governmental department which has the management of all the affairs of the British navy. (See ADMIRALTY.) It comprises six lords commissioners, who decide collectively on all important questions. Besides this collective action, each has special duties. There are two civil and four naval lords. The first civil lord (always a cabinet minister), besides a general control has the management of naval estimates, finance, appointments, and promotions. The first naval lord manages the distribution of the fleet, discipline, appointment of inferior officers, commissioning ships, sailing orders, and the naval reserve. The second naval lord attends to armaments, manning the navy, the coast-guard, the marines, marine artillery, dockyard brigades, and naval apprentices. The third naval lord attends to naval architecture, machinery, and new inventions. The fourth naval lord has control over the stores, victualling ships, medical affairs, transports, and pensioners. The junior civil lord attends to accounts, mail-packets, Greenwich Hospital, chaplains, and schools. Under these six lords are two secretaries-in-chief, who manage the office-work. The lords all resign when the prime minister resigns.

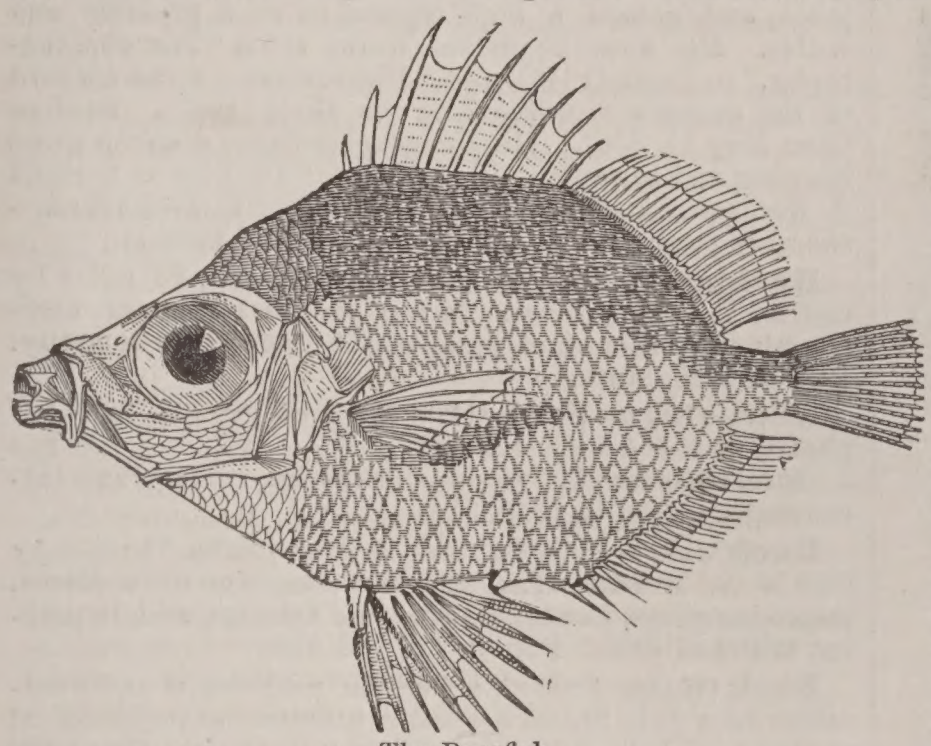
Board of Ordnance. See ORDNANCE, by CAPT. R. P. PARROTT.

Board of Trade, in Great Britain, a permanent com-

mittee of the privy council, comprising many of the high functionaries of the government, who have the supervision of marine affairs, railways, joint-stock companies, etc., and who also collect and publish statistics and information of all kinds which have a bearing upon the commerce, revenues, and economic conditions of the nation, the colonies, and foreign countries. The results are published in monthly and annual reports.

In the U. S. and Canada boards of trade are voluntary associations of business-men, which in most large towns are organized to promote the financial and commercial interests of the place, and to consider such questions with regard to railway and water communication, foreign commerce, banking, insurance, exchange, supply and demand, etc. as may from time to time demand their attention.

Boar'fish (*Capros*), a genus of fishes of the dory family, or Zeïdæ, differing from the genus *Zeus* in the still more protractile mouth (the resemblance of which to the snout of a hog is supposed to have given origin to the name), in the want of spines at the base of the dorsal and anal fins, and of long filaments to the dorsal spines. The body has the usual oval, much-compressed form of the family. The common boarfish (*Capros aper*) is a well-known inhabitant of the Mediterranean, rarely caught on the coasts of England. The flesh is little esteemed.



The Boarfish.

Boat [Anglo-Saxon, *bat;* Fr. *bateau;* Ger. *Boot;* Danish, *baad;* Sw. *bat*], a small open vessel moved by oars, sails, or horse-power. The name is also applied to a decked vessel moved by steam and called a steamboat. Boats differ greatly in form and dimensions according to the purposes they are intended to serve, and receive various names, as barge, cutter, gig, pinnace, skiff, gondola, yawl, jolly-boat, wherry, canal-boat, ferry-boat, scow, etc. The principal boats attached to a ship of war are the long-boat, launch, barge, pinnace, cutter, jolly-boat, yawl, and gig. The long-boat has a mast and sails, and is employed to fetch wood, water, and heavy stores from the shore to the ship. The launch is more flat-bottomed than the long-boat, and is adapted for service in shallow waters or for ascending rivers. Large vessels sometimes have steam launches armed with guns, for fighting in shallow waters. The barge is a long, narrow boat used to carry the principal officers to and from the ship. The name is also applied to quite a number of other kinds of craft, large and small. The pinnace has usually eight oars, and is intended for the inferior officers. The cutter is broader, deeper, and shorter than the pinnace, is rowed with six oars, and is chiefly employed in carrying light stores and the crew. The jolly-boat is similar in form to the cutter, but smaller, and has only four oars. The yawl is a small boat used for nearly the same purposes as the cutter and jolly-boat. The gig is a long narrow boat of six or eight oars, and is used to convey the chief officers of the ship on expeditions requiring great speed. It is only the larger ships of war that carry boats of all these varieties. Life-boats are kept at dangerous points upon the coasts, and are carried on board many ships. They are designed to be so built that they cannot be capsized or sunk. They were first patented in 1785, and have been much improved since.

The coracle, the most ancient form of boat known in the British Islands, still used in Wales, is a large wickerwork basket, covered with skins or some thin waterproof substance, strengthened by a cross-seat. The birch-bark canoe and skin boats of some of the Indian tribes are essentially identical with the coracle. The wherry is stoutly built, and is designed to carry about eight passengers. It is managed by one sculler or two oarsmen, and it is for the conveyance of passengers or pleasure-parties. The boats used for rowing as a sport are of a much lighter and sharper build.

Boat-Bill (*Cancroma cochlearia*), a bird of the order Grallatores and of the heron family. It differs from the heron chiefly in the form of its bill, which is very broad, and somewhat similar in shape to a boat. The mandibles have been compared to the bowls of two spoons placed one upon the other. It is found in the tropical parts of South America, and feeds on fish. In size it is nearly equal to a domestic fowl.

Boat-fly (*Notonecta*), a genus of aquatic insects of the order Hemipetra and sub-order Heteroptera, derives its name from the form of the body, which resembles a boat, and is well adapted to movement in the water. The insects of this genus have a remarkable habit of always swimming on their backs. The *Notonecta glauca*, called water boatman, is common in England, and is about half an inch long. It can fly well, but seldom uses its wings. Many species are found in this country.

Boating. See Regatta.

Boat-Lowering Apparatus is an arrangement of ropes and pulleys for lowering boats from ships quickly and safely. Every passenger-ship is compelled by law to carry a certain number of boats, and every ship of war carries boats for minor services. Many inventors have directed their ingenuity to this subject, with a hope of devising some method of rapidly lowering boats in a storm, without the danger of accident. The apparatus now most approved is Clifford's, in which the lowering and disengaging are effected by one man seated in the boat.

Boat'swain (commonly pronounced by sailors bō'sn), an officer on a ship of war who has charge of the boats, sails, rigging, cables, anchors, and cordage. He must frequently examine the masts, yards, sails, and ropes, and report their condition. It is also his duty to summon the crew to their work, and to assist in the necessary business of the ship and in relieving the watch. In the performance of his duties he is assisted by a boatswain's mate.

Bobadi'lla, de (Francisco), a governor of Hispaniola and knight of Calatrava, sent in 1500 by Ferdinand and Isabella with plenary powers to investigate the affairs of that colony. He immediately put Columbus, who was then governor, in irons, and sent him to Spain. Columbus was, however, well received at court and by the nation, and was sent back on his fourth voyage, arriving there on the day when Bobadilla started to return to Spain, for he had been recalled. Bobadilla's government had been very disorderly and unfortunate, and hardly had he left the port when his ship was lost in a hurricane, and he was drowned June 29, 1502.

Bob'bin, a cylindrical piece of wood, or a wooden roller, flanged at each end, used to hold yarn, which is wound on it, preparatory to warping, in the weaving of cloth. In throstle-spinning bobbins are an essential part of the machinery, as they receive the thread from the rollers. The number of bobbins used in the various branches of business is enormous. In the thread manufacture alone in Great Britain it is stated that 2,000,000 gross are used annually. Thread-bobbins are turned by a self-acting lathe, which turns out one hundred gross in ten hours, a saving of sixteen-fold as compared with hand-turning; the attendant has to feed the machine by dropping blocks into a hopper, from which they pass into the lathe, where they are finished.

Bob'binet (*i. e. bobbin-net*), a sort of lace or net-fabric woven by machinery, and usually made of cotton. It is a fine and elegant textile fabric of a peculiar texture, which consists in the interlacing of a set of long threads, representing the warp in common weaving with a set of cross ones, in such a manner as to form a mesh texture. Bobbinet is made at Nottingham, England, and in France.

Bobcay'geon, a post-village of Verulam township, Victoria co., Ontario, on an island in Sturgeon and Pigeon lakes, 18 miles from Lindsay. The town is divided by a canal which, with its locks, cost $150,000. It has a large trade in lumber, and has daily lines of steamboats, except in winter. It has one weekly newspaper. Pop. about 1000.

Bobolink', Bob'link, Reed-bird, or **Rice-bird** (*Dolichonyx oryzivorus*), a beautiful American migratory bird of the order Insessores, passes the winter in the West Indies or in tropical regions. It comes northward early in spring, and arrives in May in the latitude of New York State, in which latitude it breeds. It builds its nest in meadows among the grass, and renders service to farmers by the destruction of insects and worms. In May and June the

male is very musical, singing in the air with great volubility and hilarity, and rising and falling as if by a series of jerks. "He chants out," says Wilson, "such a jingling

The Bobolink.

medley of short variable notes, uttered with such seeming confusion and rapidity, that it appears as if half a dozen birds of different kinds were singing all together." The summer plumage of the male is mostly black, variegated with white on the scapularies and tail-coverts, and yellow, which it exchanges in July or August for a plumage like that of the female. This is marked with several shades of brown or dull yellow. Its length is seven or eight inches. About the end of June the birds cease to sing, become gregarious, and move in large flocks to the Middle States. They are called reed-birds in Pennsylvania, where many of them are shot for the table in autumn. In the latter part of autumn immense flocks of them attack the rice-crops of South Carolina, where they receive the name of rice-bird, rice bunting, or rice troopial. Many of them are kept in cages for their song, but they do not sing in autumn or winter.

Bobrinez', a town of Russia, in the government of Cherson, 135 miles N. E. of Odessa. Pop. 6553.

Bobruisk', a town of Russia, on the Berezina, in the government of Minsk, and 92 miles S. E. of Minsk, was formerly fortified. It is connected by steamboat with the towns on the river. Pop. 24,681.

Bo'ca Ti'gris (Chinese, *Hu-mên* or *Fumên, i. e.* "mouth of the tiger"), the entrance of the Canton River into the Outer Waters, or Lintin Bay. It is bounded on the E. by the islands of Anunghoi and Chuenpee, and on the W. by the island of Ty-cock-tow. A number of forts and batteries called "Bogue forts," which guard the entrance to the river, were stormed by the British in 1841 and 1857.

Bocca'ccio (Giovanni), or **Boccaccio di Certaldo,** a celebrated Italian novelist and poet, born in Paris or Florence in 1313, was the son of a Florentine merchant and a French woman. He collected many books, and copied rare ancient manuscripts which he was not able to purchase, and was one of the most learned men of that age. At Naples he fell in love, about 1342, with a natural daughter of King Robert of Naples, and to please her he wrote poems entitled "Il Filostrata," "L'Amorosa Visione," and others. He became about 1350 an intimate friend of Petrarch, and returned to Florence, the government of which employed him in several diplomatic missions. His principal work is the "Decamerone, or Hundred Tales" (1353), in prose. These tales have extraordinary literary merit, and are esteemed models of style, but some of them are extremely obscene. From the "Decamerone" Shakspeare derived the subjects of several of his dramas. In 1373, Boccaccio was appointed to lecture at Florence on Dante's "Divina Commedia." He wrote a "Life of Dante." He died Dec. 21, 1375. "There is," says Hazlitt, in Boccaccio's serious pieces, "a truth, a pathos, and an exquisite refinement of sentiment which is hardly to be met with in any other prose-writer whatever." (*Characters of Shakspeare's Plays.*) (See Baldelli, "Vita de Giovanni Boccaccio," 1806; Mazzuchelli, "Scrittori d'Italia;" Longfellow, "Poets and Poetry of Europe.")

Bochart (Samuel), a learned French Protestant Orientalist and theologian, born at Rouen May 30, 1599, studied Arabic, Chaldee, and Syriac under Erpenius at Leyden, and excelled in philology. He became in 1625 pastor of the Protestant church at Caen, where he remained forty-two years, and gained a high reputation as a preacher and writer. His most important works are a "Sacred Geography," in Latin (1646), and "Hierozoicon," or an account of the animals mentioned in the Bible (1663). Died at Caen May 11, 1667. His Geographia Sacra displays great learning and sagacity. (See Morin, "De Vita et Scriptis S. Bocharti," 1692; Edward H. Smith, "S. Bochart: Recherches sur la Vie de cet Auteur illustre," 1833.)

Boch'nia, a town of Austria, in Galicia, 23 miles by rail E. S. E. of Cracow. It has several churches. Here are mines of salt which yield about 15,000 tons annually. Pop. in 1869, 8040.

Boch'old, or **Bocholt,** a town of Prussia, in Westphalia, on the Aa, 42 miles W. S. W. of Münster. It has a castle, and manufactures of silk fabrics, hosiery, and cotton stuffs. Pop. in 1871, 6125.

Boch'um, a Prussian town, in Westphalia, 31 miles by rail N. E. of Düsseldorf, has manufactures of woollens, paper-hangings, hardware, iron, and tobacco, and important mines of coal. Pop. in 1871, 21,193.

Bock (Karl Ernst), a German pathologist and anatomist, born Feb. 21, 1809, became professor of pathological anatomy in Leipsic in 1839. His "Buch vom Gesunden und Kranken Menschen" (9th ed. 1872) has had a wide circulation.

Bock'enheim', a town in Prussia, in the province of Hesse-Nassau, 3 miles N. W. of Frankfort-on-the-Main. It has manufactures of iron-ware, jewelry, and pianos, and a large cattle-market. Pop. in 1871, 8476.

Böckh, or **Boeckh** (August), an eminent German philologist and classical antiquary, born at Carlsruhe Nov. 24, 1785. He was educated at Halle, and obtained in 1810 the chair of eloquence and ancient (or Greek) literature in the University of Berlin, where he taught for forty years or more. His lectures comprised archæology and the history of ancient literature, philosophy, politics, etc. Among his greatest works, which have formed an era in archæology and philology, are "The Political Economy of the Athenians" (2 vols., 1817), which Sir George Cornewall Lewis translated into English, and "Records of the Maritime Affairs of Attica" (1840). He commenced in 1824 the great work called "Corpus Inscriptionum Græcarum" (4th vol., 1867, unfinished). Died Aug. 3, 1867.

Böck'lin (Arnold), a German landscape painter, born in Bâle in 1827, studied under Schirmer at Düsseldorf, and became professor in the art-school of Weimar in 1860. His works are remarkable for brilliancy and harmony of color.

Bode'ga, a post-village and township of Sonoma co., Cal. The village is at the head of Bodega Bay, the entrance to which is in lat. 38° 18′ 20.37″ N., lon. 123° 02′ 28.8″ W. Pop. of township, 1407.

Bo'denstedt' (Friedrich Martin), a German poet and journalist, born at Hanover April 22, 1819. He translated into German the works of several Russian poets, published "The Nations of the Caucasus" (1848; 2d ed., 2 vols., 1855), and became professor of the Slavic languages at Munich about 1854. Among his works is a "Thousand and One Days in the Orient" (2 vols. 1854; 4th ed. 1864).

Bode's Law is the name given by astronomers to an empirical formula which seems to mark the relative distances of the planets. The law, however, was not discovered by Bode, having been put forward before his time by Kepler, and by Titius in 1772.

The law may be thus exhibited: Under the names of the several planets in the order of their distance set the number 4. Then below this row of fours write in order the numbers 0, 3, 6, 12, 24, 48, and so on, the 0 falling under Mercury, the 3 under Venus, and so on. Adding the several columns thus obtained, we have the following result:

Mercury.	Venus.	Earth.	Mars.	Asteroids.	Jupiter.	Saturn.	Uranus.	Neptune.
4	4	4	4	4	4	4	4	4
0	3	6	12	24	48	96	192	384
4	7	10	16	28	52	100	196	388

The numbers thus obtained correspond closely with the relative distances of the planets, except only in the case of Neptune. The real distances, calling the earth's distance 10, are as follows:

Mercury.	Venus.	Earth.	Mars.	Asteroids.	Jupiter.	Saturn.	Uranus.	Neptune.
3.9	7.2	10	15	27.5	52	95	192	300

It will be seen that the distance of Neptune falls far short of that which Bode's law would assign to a trans-Uranian planet. This empirical law has rendered important services to astronomy.

Similar relations have been detected among the distances of the satellites of Jupiter and Saturn. In the case of Jupiter's system, the constant number is 7, the number multiplied is 4, and the constant multiplier 2½. In the case of Saturn's system, the constant number is 4, the number multiplied is 1, and the constant multiplier 2.

It seems difficult to believe that a law so well marked, and fulfilled so closely in so many instances, is not in reality the result of physical relations of some sort, though it is by no means easy to see what those relations may be.

Bodin (Jean), an eminent French political writer, born at Angers in 1530. He published in 1576 a treatise on government entitled "De la République," and in 1586 a Latin version of the same. He advocated a limited monarchy as the best form of government. In the latter part of his life he was an adherent of Henry IV. Died in 1596. His "Heptaplomeres de abditis rerum sublimium arcanis" (published by Noack, Schwerin, 1857) is considered one of the most interesting books of that age.

Bodle'ian Library, the principal library of Oxford University, restored by Sir Thomas Bodley in 1597, the original library having been destroyed before 1556. Bodley's first presentation was a collection of books, purchased on the Continent for £10,000. Through his influence and example the library was enriched by numerous contributions. Among the earliest benefactors of the Bodleian library, which was opened in 1602 with a collection of about 3000 volumes, were the earl of Pembroke, who presented 250 volumes of valuable Greek manuscripts; Sir Kenelm Digby; and Archbishop Laud, who made a gift of 1300 manuscripts in more than twenty different languages. Upwards of 8000 volumes of the library of Selden went to the Bodleian. Gen. Fairfax presented to it many manuscripts, among which was Dodworth's collection of 160 volumes on English history. During the present century important bequests have been the collections of Richard Gough (1812) on British topography and Saxon and Northern literature; of Edmund Malone (1812); also £40,000 by the Rev. Robert Mason, the interest to be expended on books. The library of Francis Douce was added in 1834. In 1870 it contained 500,000 volumes and 30,000 MSS.

Bod'ley (Sir Thomas), an English diplomatist, born at Exeter Mar. 2, 1544, graduated at Oxford in 1566. He was sent by Queen Elizabeth on diplomatic missions to France, Denmark, and Holland. He expended much money in collecting rare and valuable books, and endowed the great public library of Oxford, called the Bodleian Library (which see). Died Jan. 28, 1612. (See T. Hearne's "Reliquiæ Bodleianæ.")

Bod'mer (Johann Jakob), a Swiss critic and poet, born near Zurich July 19, 1688. He founded in 1721 a literary journal called "Discurse der Maler," which promoted a reform in German literature, and waged a literary war against Gottsched. Among his numerous works (which lack originality) is the "Noachide" (1752). He was professor of history at Zurich for fifty years. He translated "Paradise Lost" into German. Died Jan. 2, 1783. (See J. J. Hottinger, "Acroama de J. J. Bodmero," 1783.)

Bod'min, a town in England, one of the capitals of Cornwall, 26 miles W. N. W. of Plymouth, consists chiefly of one long street in a valley between two hills. It was once an important place. It now contains a court-house, a jail, an ancient priory, and a grammar-school founded by Queen Elizabeth. It is now one of the stannary towns of Cornwall. Pop. in 1871, 4672.

Body Color, a term which, in oil-painting, is applied to the opaque coloring produced by certain modes of combining pigments. When, in water-color painting, colors are laid on thickly, and mixed with white to render them opaque, instead of in tints and washes, the work is said to be executed in body color.

Body's Island, the long, low, sandy strip of land between Roanoke and Albemarle Sounds and the Atlantic Ocean, N. of Oregon Inlet. Body's Island lighthouse, 2 miles N. of Oregon Inlet (lat. 35° 48′ 47″ N., lon. 75° 33′ 20″ W.), is a brick tower with a granite foundation and an iron top, 150 feet high, showing a first-order dioptric white fixed light, 156 feet above the sea. The island is here 2 miles wide, and is in Dare co., N. C.

Boece, or **Boyce** (Hector), a Scottish historian, born at Dundee about 1465. He studied and graduated at the University of Paris, where he became in 1497 professor of philosophy. He was a friend of Erasmus. His chief work is a "History of Scotland" (in Latin, 1526), which is highly esteemed. Died about 1536.

Bœhme'ria [from G. R. Böhmer, a German savant], a genus of plants of the order Urticaceæ, was formerly included in the genus *Urtica* (nettle). The fibres of several species of this genus are used to make ropes, twine, nets, and cloth. The beautiful fabric called China grass-cloth is made of the fibres of *Bœhmeria nivea,* a perennial herbaceous plant, with broad ovate leaves, without stings, cultivated by the Chinese, who call it *tchoo-ma.* It can be propagated by seeds, and it thrives best in shade and moisture. It grows naturally in China, Sumatra, Burmah, and other parts of the East Indies. The Malays call it *ramie.* The cultivation of ramie has been tried in some of the Southern U. S., with decided success. Nepaul produces an important species, *Bœhmeria frutescens,* which grows from six to eight feet high, the fibre of which is said to be equal to flax. The natives call it pooee, yenki, or kienki. This fibre also makes excellent paper, and will probably become an important commercial product. (See Ramie.) The U. S. have one native species.

Bœo'tia [Gr. Βοιωτία], a country or state of ancient Greece, was bounded on the N. by Locris, on the N. E. and E. by the Eubœan Channel, on the S. by Attica and Megaris, on the S. W. by the Corinthian Gulf, and on the W. by Phocis. Area, estimated at 1100 square miles. It may be described as a hollow basin, enclosed on the N. by Mount Parnassus and the Opuntian Mountains, on the E. by a continuation of the Opuntian range, on the S. by Mount Cithæron and Mount Parnes, and on the W. by Mount Helicon. The surface is diversified by other mountains and several valleys and plains. It contained a large lake named Copais (now Topolias), which had no outlet except subterranean channels in the limestone mountains. These channels, now called *Katabothra,* were not sufficient to carry off the water of the lake, which sometimes inundated the surrounding plain. To obviate this evil the ancient Bœotians constructed two tunnels through the rock. One of these tunnels was nearly four miles long, with twenty vertical shafts let down into it. These two great works are perhaps the most remarkable monuments of what is called the heroic age. The largest rivers of Bœotia were the Asopus and the Cephissus, the latter of which rises in Phocis and enters Lake Copais. The Asopus flowed eastward through the southern part, and entered the Euripus. Instead of the pure and transparent air of Attica, the air of Bœotia is rendered damp and heavy by vapors rising from lakes and marshes. The winters were very severe, and the snow sometimes lay on the mountains for many days. The soil, which is mostly a rich mould, was very fertile, and produced in ancient times, as well as in the present, abundant crops of grain. The plain of the Copais is especially remarkable for its fertility. Bœotia was famous for meadow and pasture-land, on which were raised the excellent horses of the Bœotian cavalry. The grape and other fruits flourished in this region. Among the other productions was the auletic or flute reed, which grew in the marshes of Lake Copais, and had an important influence on the development of Greek music.

The most remarkable tribes that inhabited Bœotia in the heroic age were the Minyæ, who lived at Orchomenus, and the Cadmeans or Cadmeones, who lived at Thebes. At the commencement of the historical period, the Minyans and other tribes had nearly disappeared, and the country was occupied by the Bœotians, who are supposed to have come from Thessaly. The principal cities formed a confederacy under the presidency of Thebes. Orchomenus was the second city in importance. Among the other towns were Coroneia, Haliartus, Thespiæ, Tanagra, Platæa, and Anthedon. The Bœotians were regarded as a dull, unintellectual people, and less refined and polished than most of the Hellenic tribes. Their natural dulness was ascribed to the dampness and ungenial quality of their climate. According to Cornelius Nepos, they paid more attention to the development of their physical powers than the cultivation

of their minds. Yet this state produced a few great men—Epaminondas, Hesiod, Pindar, and Plutarch. (See FORCHHAMMER, "Hellenika," 1837; LEAKE, "Travels in Northern Greece," 1835; KLUTZ, "De Fœdere Bœotico," 1821; MURE, "Travels in Greece.") WILLIAM JACOBS.

Boer'haave (HERMAN), PH. D., M. D., F. R. S., a Dutch physician of great eminence, was born at Voorhout, near Leyden, Dec. 31, 1668. He studied the ancient languages and history at Leyden, where he took the degree of doctor of philosophy in 1689. He began the study of medicine in 1690, and graduated as M. D. at Harderwick in 1693, after which he practised at Leyden. In 1701 he was appointed lecturer on the theory of medicine in the University of Leyden, and adopted the method of Hippocrates. He afterwards deviated from that method, and substituted mechanical and chemical hypotheses to explain diseases. He published in 1708 an excellent systematic work called "Medical Institutes" ("Institutiones Medicæ in Usus annuæ Exercitationis Domesticos"). He became in 1709 professor of medicine and botany at Leyden, where he acquired great popularity as a teacher. Among his important works are "Aphorisms on the Diagnosis and Cure of Diseases" ("Aphorismi de Cognoscendis et Curandis Morbis," 1709), which is a model for style and other merits, and "Elements of Chemistry" (1724), which some persons consider his capital work. His reputation extended to every part of Christendom, and patients came to consult him from every country of Europe. He received, it is said, a letter from a Chinese mandarin, addressed "To Boerhaave, physician in Europe." He died Sept. 23, 1738, leaving one child, a daughter. He was a sincere Christian and a man of high moral character. (See Dr. S. JOHNSON, "Life of H. Boerhaave," 1834; BURTON, "Life and Writings of H. Boerhaave," 2 vols., 1743.)

Boer'ne, a post-village, the capital of Kendall co., Tex. It is situated on the Upper Cibolo, in a rich and picturesque valley. It was founded by Germans in 1851, and was named in honor of the German writer Louis Börne. Pop. 500, almost all of whom are Germans.

Boers are the farmers in South Africa of Dutch descent. After the annexation of Cape Colony by Great Britain, troubles arose between the government and the boers, and in 1836 many of them left the colony and founded the Orange River Free State and the Transvaal Republic.

Boe'thius (ANIÇIUS MANLIUS SEVERINUS), an eminent Roman philosopher and statesman, was born in 470 A. D. He was liberally educated, became a good Greek scholar, was chosen consul in 510, and gained the confidence of Theodoric, king of the Goths, who reigned at Rome, and appointed Boethius *magister officiorum* in his court. His political influence was exerted for the benefit of the country, but his probity and virtues provoked the enmity of powerful courtiers whose corrupt or oppressive conduct he had opposed. He was accused of treasonable designs, was confined in prison, and finally executed by order of Theodoric in 524 A. D. Whether he was a Christian or not is a matter of uncertainty. He was considered such in the Middle Ages, and the Bollandists gave him the position of a saint. Several theological tracts are attributed to him, and were included in the Leyden edition (1671) of his "Consolation of Philosophy." But there is a predominance of argument in favor of the opinion that he was not, in any proper sense, a Christian, and that the tract on the Trinity was from another hand, probably from a monk of the same name. Boethius holds a place in the history of scholastic philosophy from the fact that a passage from his commentary on the "Isagoge" of Porphyry gave rise to the long-continued discussions between the Realists and the Nominalists. While he was in prison he wrote, partly in verse, "De Consolatione Philosophiæ" ("On the Consolation of Philosophy"), which is his greatest work, and was very popular in the Middle Ages. It was translated into Anglo-Saxon by Alfred the Great. It contains no allusions to Christianity—a fact which can hardly be reconciled with the hypothesis of his being a Christian, considering the circumstances under which it was written. (See BARBERINI, "Exposizione della Vita de Boezio," 1783; DOM GERVAISE, "Histoire de Boëce," 1715; HEYNE, "Censura Ingenii Boethii," 1806; "Life of Boethius," prefixed to Ridpath's translation of the "De Consolatione Philosophiæ," 1785.) M. B. ANDERSON.

Boethius (HECTOR). See BOECE.

Bœuf, a township of Franklin co., Mo. Pop. 3910.

Bœuf, a township of Gasconade co., Mo. Pop. 1277.

Bœuf, Bayou, bī'oo bĕf, a river or creek of Arkansas and Louisiana, is fed by water which it receives from the Mississippi River during inundations. It extends from Chicot co., Ark., south-westward into Louisiana, and unites with the Washita River at the S. extremity of Franklin parish. Steamboats can ascend it 100 miles or more during high water.

Bog [Gaelic, *bog*, "soft," "moist"], a swamp or tract of wet land, covered in many cases with PEAT (which see). Bogs, called mosses in Scotland and swamps in America, often contain the well-preserved trunks of trees, especially of the oak in Ireland and of the cypress in America. In many cases these tracts are higher than the surrounding country, and may thus be easily drained, when they often become very fertile land. (See DRAINAGE.)

Bo'gansville, a township of Union co., S. C. P. 1891.

Bogard', a township of Daviess co., Ind. Pop. 1170.

Bogard, a township of Henry co., Mo. Pop. 1117.

Bogar'dus (EVERARD), second minister of New York (then New Amsterdam), came to America in 1633, and obtained by marriage a farm (the "Dominie's Bouwerie") of 62 acres, now owned by the Trinity church corporation. Having much trouble with the magistrates and people, he resigned in 1647 and sailed for Holland, but was wrecked on the English coast, and with Governor Kieft and many others was drowned Sept. 27, 1647.

Bogardus (JAMES) was born at Cattskill, N. Y., Mar. 14, 1800. In 1814 he was apprenticed to a watchmaker. He made important improvements in cotton-spinning in 1828, invented a gas-meter (1832), a machine for engraving (1836), a pyrometer, and many other mechanical improvements. In 1847 he built in New York the first iron building in the U. S.

Bog Butter, a substance which is found in peaty earth in some of the bogs of Ireland. In composition and qualities it exhibits the general properties of a fat, and melts at 124° F. It is probably fossil butter.

Bo'genhau'sen, a village of Bavaria, on the Iser, 2 miles N. E. of Munich. Here is the royal observatory of Munich, which was erected in 1817, and is one of the best in Europe; lat. 48° 8′ 54″ N., lon. 11° 36′ 22″ E.

Boggs, a township of Centre co., Pa. Pop. 2135.

Boggs, a township of Clearfield co., Pa. Pop. 784.

Boggs (CHARLES STUART), U. S. N., born Jan. 28, 1811, in New Brunswick, N. J., entered the navy as a midshipman Nov. 1, 1826, became a passed midshipman in 1832, a lieutenant in 1837, a commander in 1855, a captain in 1862, a commodore in 1866, a rear-admiral in 1870, and retired from active service in 1873. He commanded the Varuna at the passage of Forts St. Philip and Jackson and capture of New Orleans. Admiral Farragut, in his official report of the affair, says: "We were now fairly past the forts, and the victory was ours, but still, here and there, a gunboat making resistance. Two of them had attacked the Varuna, which vessel, by her greater speed, was much in advance of us: they ran into her and caused her to sink, but not before she had destroyed her adversaries; and their wrecks now lie side by side, a monument to the gallantry of Captain Boggs, his officers, and crew."

FOXHALL A. PARKER, U. S. N.

Bog'head Coal, a highly bituminous variety of the cannel coal of Scotland, from Boghead, in Linlithgowshire. The varieties of cannel pass into shale by insensible gradations, so that it is impossible to draw a line which shall properly limit the use of the term coal. The boghead is one of these substances, more valuable for gas-making, and for the oils and paraffine obtained from it by distillation, than for fuel. Dr. Fife found a picked specimen to yield on analysis 70 per cent. of volatile matter and 30 per cent. of ash.

Bog-iron Ore, a mineral of variable composition, in which the peroxide of iron often amounts to 60 per cent., the water to 20, phosphoric acid from 2 to 11 per cent., while silicic acid, clay, and other substances make up the rest. Bog-iron ore occurs in alluvial soils, in bogs, lakes, etc. It is of a yellowish or blackish-brown color. Some varieties are earthy and friable; some are in masses of an earthy character, and some compact, with conchoidal fracture. It is abundant in the northern countries of Europe generally; also in various parts of the U. S. When smelted it yields rather inferior iron, which, however, in Germany is largely used for wrought iron. From the large percentage of phosphorus present, bog iron is highly prized for fine castings, since it makes an excellent surface with clean lines and edges. The ore is easily and extensively wrought.

It is stated with confidence that bog ore consists chiefly of the frustules of diatomaceous plants, many of which incorporate into their frustules a large percentage of iron. *Gaillonella ferruginea* is one of the most important of these minute iron-making plants. It is well known that in some places bog ore will again fill up the cavities in the earth from which it has been removed.

Bo'gle, a township of Gentry co., Mo. Pop. 991.

Bog'lipoor, or **Bhag'ulpore,** a city of India, in Bengal, is on the right bank of the Ganges, here several miles wide in the rainy season. It is about 265 miles by rail N. W. of Calcutta. It has several mosques, and an English seminary; also manufactures of coarse silk fabrics. Here are two curious round towers, the origin of which is unknown. Pop. estimated at 30,000.

Bogoduchou, a town of Russia, in the government of Kharkov, on the right bank of the Merla, 30 miles N. E. of Kharkov. Pop. 9999.

Bog'omiles [a name said to be derived from their prayer in a Slavic language, "*Bog milui,*" "Lord, have mercy"], a sect of the Eastern Church in the twelfth century. They were founded by Basil, a physician, who is said to have taught an impure Gnosticism, to have rejected all rites, even baptism, and to have proposed to abolish marriage. Basil was burned alive in 1119, but the sect was in existence a century later. (See NEANDER, "Christian History," iv. 552.)

Bo'gos, a negro tribe inhabiting the highlands N. of Abyssinia, which have only recently become known by the explorations of Werner, Munzinger, and Th. Heuglin. The flora and the fauna of the country of the Bogos are exceedingly rich. Mighty sycamores and tamarind trees, and lions, elephants, buffaloes, and antelopes, as well as the rhinoceros and many varieties of beasts of prey, are found here. The total population is estimated by Munzinger at 10,000 persons, of whom only one-third are true Bogos, who speak the Belen language. The rest are tribes subject to them, who speak the Tigre. The Bogos are well formed, and profess Christianity, but have very little religious knowledge. For several years they have paid a small annual tribute to Abyssinia. In recent times the Bogos suffer much from the invasions of the inhabitants of Barla.

Bogota' (formerly SANTA FÉ DE BOGOTÁ), a city of South America, capital of the republic of Colombia, is pleasantly situated on the San Francisco River, which here joins the Rio de Bogotá, and at the foot of two high mountains. It is on an extensive plateau which is about 8800 feet above the level of the sea, and enjoys a mild and genial climate like a perpetual autumn. Lat. 4° 35′ 48″ N., lon. 74° 13′ 45″ W. The adjacent table-land is very fertile, and is enclosed on several sides by high peaks of the Andes. Bogotá is well built, but as it is subject to earthquakes, the houses are generally only two stories high. No vehicles are used in the streets, which are all narrow. It is the seat of an archbishop, and contains a cathedral and numerous churches, a palace of the president, a university, a national academy, a public library, and a theatre. It has several public squares adorned with fountains. Mines of coal, salt, and precious stones occur in the vicinity. A few miles below the city is the great Cataract of Tequendama, where the Bogotá River has a perpendicular fall of 650 feet. Bogotá was founded in 1537. Pop. about 40,000.

Bogue, a post-township of Columbus co., N. C. Pop. 1393.

Bogue (DAVID), D. D., a Scottish preacher, called the founder of the London Missionary Society, was born in Berwickshire Mar. 1, 1750. He preached at Gosport to an Independent church, was the first editor of the "Evangelical Magazine," and wrote an "Essay on the Divine Authority of the New Testament." He was author, in conjunction with James Bennett, of a "History of Dissenters" (3 vols. 8vo, 1689, 1808). He and others founded the London Missionary Society in 1795. Died Oct. 25, 1825.

Bo'gus, an American word signifying "spurious," "fraudulent," was originally applied to counterfeit coin, said by Bartlett to be a corruption of *Borghese,* a noted Western counterfeiter.

Bo'guslaw, a town of Russia, government of Kief, on the river Rossa, 70 miles S. S. E. of Kief. Pop. about 6000.

Bo'gy, a township of Jefferson co., Ark. Pop. 1321.

Bohain, a town of France, in the department of Aisne, 16 miles N. N. E. of St.-Quentin. It manufactures clocks *à carillon,* shawls, and gauzes. Pop. 5322.

Bohe'mia [Lat. *Bohemia;* Ger. *Böhmen* and *Böheim*], a former kingdom of Europe, now a part of the Austro-Hungarian monarchy. It is bounded on the N. by Saxony and Prussian Silesia, on the E. by Moravia and Prussia, on the S. by Lower Austria, and on the W. by Bavaria. It is between lat. 48° 33′ and 51° 3′ N., and between lon. 12° and 16° 46′ E. Its area is 20,064 square miles. It is enclosed on all sides by four chains of mountains, which constitute its natural boundaries—namely, the Erzgebirge ("Ore Mountains"), which separate it from Saxony on the N. and N. W.; the Riesengebirge ("Giant Mountains"), which extend along the N. E. frontier; the Moravian Mountains, which separate it from Moravia on the S. E.; and the Böhmerwald ("Bohemian Forest"), which extends along the S. W. border. The Schneekoppe, which is the highest peak of the Riesengebirge, rises 5275 feet above the level of the sea. The surface of Bohemia is mostly undulating, and belongs to the basin of the Elbe, which rises in the N. E. part. The other principal rivers are the Moldau, which rises in the Böhmerwald, flows northward, and enters the Elbe; and the Eger, which flows through the N. W. part into the Elbe. The Moldau and Elbe are navigable for steamboats. The climate is healthy, and mild in the valleys or lowlands. The mean annual temperature at Prague is 49° F. The soil is generally fertile. The staple productions are rye, oats, barley, flax, and wheat. The grapevine is also extensively cultivated. Nearly one-third of the country is covered with forests. Large numbers of cattle and sheep are raised in some parts of the country. Bohemia is rich in minerals, which are found chiefly in the mountains. Among its mineral resources are copper, tin, iron, lead, cobalt, silver, nickel, zinc, arsenic, sulphur, coal, cinnabar, alum, and precious stones. Here are also quarries of marble, granite, and sandstone. Famous mineral springs occur at Marienbad, Carlsbad, and Töplitz. The manufactures of Bohemia are very important and varied, the principal products being linens, cotton goods, woollens, glass, and paper. The manufacture of damask, cambric, lawn, and other linen goods employs about 400,000 flax-spinners and 50,000 weavers. Over 500,000 spindles are employed in the production of cotton yarn. Beet-sugar is extensively manufactured. The number of paper-mills is over 100. Bohemia has long been celebrated for its glass-works, which employ about 30,000 persons. A considerable quantity of iron is manufactured here. Railways extend from Prague in several directions, connecting it with Dresden, the cities of Bavaria, and those of Moravia. The chief towns are Prague, Pilsen, and Budweis. Bohemia has one university (Prague), twenty-three gymnasia, as well as numerous realschulen and other institutions of learning. A large majority of the inhabitants belong to the Roman Catholic Church, that being the established religion, but other churches are tolerated. The number of Protestants in Bohemia in 1869 was 106,000. Pop. in 1869, 5,140,544, of whom 3,074,000 were Czechs, 1,941,300 Germans, 89,000 Israelites, while the remainder belonged to different nationalities.

Bohemia derives its name from the *Boii,* a Celtic people who settled here before the Christian era, and were expelled by the Marcomanni in the time of the Roman emperor Augustus. It was conquered by the Cechi (or Czechs), a Slavic race, who first established themselves in Bohemia in the second half of the sixth century, and in 630 A. D. made themselves independent. For several centuries the family of the Przemyslides ruled with varying success until in 1310 the kings of the House of Luxemburg ascended the throne, and ruled until 1437. John Huss effected a religious reformation in this country (1400–14), and was burned by the Catholics. The consequence was the sixteen years' war of the Hussites. In 1526, Bohemia was annexed to the dominions of Ferdinand I. of Austria. The majority of the Bohemians in the sixteenth century were Protestants, who, for the assertion of their religious liberty, revolted against the emperor of Austria, and in 1619 elected as their king Frederick, the elector palatine. He was defeated near Prague in 1620 by the Austrians, who then commenced a cruel persecution of the Protestants, and almost exterminated them. The population was reduced in twenty years (1617–37) from 3,000,000 to 780,000. In recent times the country has been agitated by a strong political antagonism between the Czechs and the Germans, the former demanding the re-establishment of a kingdom embracing Bohemia and Moravia, and enjoying the same autonomy in point of administration which has been conceded to Hungary. (See AUSTRO-HUNGARIAN MONARCHY.) A. J. SCHEM.

Bohe'mian Breth'ren, the former name of a sect of Christian reformers, who may be regarded as the remnant of the HUSSITES (which see). After the division of the Bohemian reformers into Calixtines and Taborites, the Council of Bâle (1432) granted the new sects the use of the wine in the communion. This offer drew many of the Calixtines into the Roman Catholic Church, where they were called Utraquists, from the use of both (*utraque*) elements in the Eucharist. But the Taborites, remodelling and still further reforming their creed, which was published in 1504, took the name of Bohemian Brethren. Persecutions raged against them for 150 years, and the vast majority were killed or driven away from Bohemia. In 1567 they recovered freedom of conscience, but numbers of them having removed to Moravia, they took the name of MORAVIAN BRETHREN (which see). The Bohemian Brethren are looked upon by most Protestants as deserving high regard on account of their purity, faithfulness, and the judicious mod-

eration of their doctrines. (See Von Zezschwitz, "Die Katechismen der Waldenser und Böhmischen Brüder," 1863; Peschеck, "Reformation in Bohemia," London, 1846.)

Bohe'mian For'est, or **Böh'merwald,** a chain of mountains in Germany, which forms the boundary between Bohemia and Bavaria, and separates the basin of the Danube from that of the Elbe. It extends in a S. E. and N. W. direction, and is about 130 miles long. The rocks of which it is formed are granite and gneiss. The highest summits of this chain are the Aber, 4848 feet, and the Rachelberg, 4743 feet, above the level of the sea. A large portion of these mountains is covered with dense forests. A railway extending from Bavaria to Prague crosses this range through the valley of the Cham.

Bohe'mian Lan'guage, a name commonly applied to one of the principal dialects of the Slavic family of languages. It is sometimes called the *Cechic* (from *Cechi*,* the native name of the people who speak it); it is regarded not only as the harshest (most abounding in consonants), but also as the richest and most expressive, of all the Slavic dialects. The Cechic vowels, *a, e, i, o, u,* are essentially the same as those of the Italian language; *y* resembles in sound our *i*, but is somewhat more obscure; *ê*, though written with one letter, is a diphthong pronounced *ya*. The consonants, *b, d, f, k, l, m, n, p, t, v,* and *z,* are pronounced as in English; *c* (as in Polish) has the same sound as our *ts*, even before a hard vowel: thus *ca* is pronounced *tsa*; *g* (like the Swedish *g*) has before the soft vowels *e, i,* and *y* the sound of our *y* consonant; *j* is like *i* or our *y* consonant; *w* sounds like our *v*; *s* is always sharp, as in *this*; *r,* as in French and most other European languages, is always trilled. Certain consonants are modified in sound by placing over them this diacritical sign (ˇ): thus *c, d, n, r, s, t,* and *z* are sounded like our *ch* (in *child*), *d* (in *verdure, i. e. dy* uttered in one sound), *ni* (uttered as one sound, as in *minion*), *rzh* (nearly), *sh, ty* (uttered as one sound, or *t* in *nature*), and *zh,* respectively. L, with a stroke through it, *l* (like the Polish), has a sound unknown to our language. *Ch* is pronounced as in German; *sch* nearly as in Dutch. In the variety of its terminations of both nouns and verbs the Cechic may be said to resemble the Latin and Greek. The Bohemians (Czechs) possess no contemptible literature. John Huss himself not only revised the translation of the Bible into the Cechic tongue, but wrote tracts, and poetry in hexameter verse. He appears to have been scarcely inferior to Luther in the impulse which he gave to the mental culture of his countrymen. The golden age of Cechic literature, and of the highest intellectual culture of the Czechs, may be placed between 1450 and 1620 (the opening of the Thirty Years' war), after which both rapidly declined. After a period of depression lasting nearly two hundred years, the literature of Bohemia rose again into active life, and since the commencement of the present century writers have appeared in every department of learning and science. (See Wenzig's "Blicke auf das böhmische Volk, seine Geschichte und Literatur," 1855.) J. Thomas.

Bo'hemond [Lat. *Bohemun'dus*] **I.,** a famous leader of the first Crusade, born about 1056, was a son of Robert Guiscard, duke of Apulia and Calabria. He joined the crusade with a large army in 1095, and took part in the capture of Antioch in 1098. He remained at Antioch while the other crusaders marched to Jerusalem, and he reigned there as prince of Antioch. He waged war with varying success against the Greek emperor Alexis, and married a daughter of Philip I. of France. Died in 1111.

Bohemond II., a son of the preceding, was a minor at his father's death. He became prince of Antioch in 1126, and fought against the Saracens as an ally of Baldwin, king of Jerusalem. He was killed in battle in 1130.

Bohemond III., a prince of Antioch, was a grandson of Bohemond II. He began to reign in 1163. Died in 1201.

Boh'len (Henry), a native of Germany, removed to Philadelphia, where he became a wine-merchant. Appointed a brigadier-general in 1862, he served under Fremont and Sigel, and was killed near the Rappahannock Aug. 22, 1862.

Bohlen, von (Peter), a German Orientalist, born Mar. 13, 1796. He became professor of Oriental languages at Königsberg in 1830, and published, besides other works, an able treatise on Indian antiquities entitled "Das Alte Indien" (2 vols., 1830). Died Feb. 6, 1840. (See his "Autobiography," 1841.)

Böh'ler (Peter), a German theologian and Moravian bishop, born at Frankfort-on-the-Main Dec. 31, 1712. He is recognized, in Methodist history, as having given a decisive impulse to Wesley's opinions and career. He removed to America in 1738, and in 1740 founded the town of Nazareth, Pa. Died in London April 27, 1775.

Böhm (Theobald), a German musician, born in Bavaria in 1802, is noted for an improvement in the construction of the flute. The Böhm flute is more accurate and even in tone, and more easily fingered, than those formerly in use. He has also introduced improvements in other instruments, and has composed musical pieces.

Böhme, or **Böhm** (Jakob), a celebrated German mystic, born near Görlitz, in Upper Lusatia, in 1575. He learned the trade of a shoemaker, worked at his trade at Görlitz, and became a member of the Lutheran Church. He had a very fertile imagination and a remarkable faculty of intuition, and professed to be divinely inspired and illuminated. His first work was entitled "Aurora, or the Morning Redness" (about 1612). This was condemned by the ecclesiastical authorities of Görlitz. He published several other works, which were admired by some eminent men, but they appear visionary and unintelligible to the generality of persons. He died at Görlitz Nov. 24, 1624. His works (10 vols., 1682) were translated into English (2 vols. 4to, 1764) by William Law, who was an admirer of Böhme. He was a religious genius of great depth, and can be understood only by people of strong religious feeling and some religious experience: to them he is as sublime as he is obscure to others. (See La Motte-Fouqué, "Notice sur J. Boehm," 1831; Fechner, "Jakob Böhme, sein Leben und seine Schriften," Görlitz, 1857; Geiss, "Jakob Böhme, der Deutsche Philosoph," Leipsic, 1860.)

Böh'misch-Lei'pa, a town of Bohemia, on the Polzen, 56 miles N. of Prague. It has a gymnasium, and manufactures of woollen and cotton cloths, glass, and hardware. Pop. in 1869, 9244.

Böh'misch-Trü'ban, a village of Austria, in Bohemia, 44 miles by rail N. N. W. of Brünn. P. in 1869, 5141.

Bohn (Henry George), a London bookseller of German extraction, born Jan. 4, 1796, has promoted the popularization of good literature by publishing translations from ancient and modern languages, and has made several useful compilations and written a "Handbook of Pottery."

Bohrahs. See Ismaëliah.

Böht'lingk, or **Boehtlingk** (Otto), an eminent Russian Orientalist, born at St. Petersburg May 30, 1815. He has published, among other works, the text of Kâlidâsa's "Sakuntalâ," with a translation (1842), and, conjointly with Roth, a "Sanscrit-German Lexicon," which is said to be unrivalled in this department of literature.

Bo'hun U'pas [Malay for "poison tree"], the *Antiaris toxicaria*, a tree of the Malay and Philippine archipelagoes, of the order Artocarpaceæ. Many grossly exaggerated reports of its fatal qualities have been published. Its poison appears to be of an acrid, not a narcotic character. The stories of the upas valley in Java, where nothing can grow but the upas tree, probably arose from the now well-ascertained fact that certain close mountain-ravines in that island so abound in poisonous volcanic gases that no plant, not even the upas, can live there. Besides the above, another bohun upas, the *Strychnos Tieute*, is found in that region. It abounds in strychnine, and is even more deadly than the other.

Boiar'do (Matteo Maria), count of Scandiano, an Italian poet, born at Scandiano about 1432. He was patronized by Ercole, duke of Este, and became governor of Módena in 1481. His chief work is the romantic chivalrous poem "Orlando Innamorato," which he left unfinished, and which was published in 1495. He died Dec. 21, 1494. His poem was modified or written over by Berni, whose version of it was so popular that it nearly supplanted the original, the subject of which was also continued by Ariosto in his "Orlando Furioso." According to Hallam, Boiardo was equal to Ariosto in point of novel invention and just keeping of character. (See G. F. Cremona, "Elogio del Conte M. M. Bojardo," 1827.)

Boi'i, an ancient Celtic people who emigrated across the Po and occupied Umbria, where they waged war for several centuries against the Romans. They were defeated by the Romans in 283 B. C., and became allies of Hannibal when he invaded Italy in 218 B. C. Many years later the Romans expelled them from Umbria, and drove them beyond the Alps. A portion of the Boii migrated to the country on the N. side of the Danube, and founded the kingdom of Boiohemum (Bohemia), from which they were expelled by the Marcomanni in the time of Augustus. From them also Bavaria takes its name.

Boil [Lat. *furunculus*], a hard, painful, inflammatory tumor on the surface of the body, which begins as a point of a dusky red color, and is hot, aching, and throbbing.

* Pronounced *cha'kee.*

These symptoms increase in severity for several days, when it is of a conical form, with a broad firm base, and has on the apex a whitish point, which contains a little matter; this opens and after a few days more there is discharged a slough of cellular tissue, and the cavity left heals, leaving a depressed scar. Boils often attack young and plethoric persons, and their appearance is not incompatible with robust health, although they may be so numerous as to greatly reduce the strength. Men in training for athletic exercises, or others who have suddenly changed their habits, are subject to them. Sometimes boils continue to succeed each other for a length of time. The treatment of boils is simple. The intestinal canal should be cleared by laxative medicines, and the digestive powers improved by tonics and antacids. The tincture of perchloride of iron is often a useful remedy. The skin should be kept healthy by frequent washing, while the inflamed point should be poulticed. Wet lint is a sufficient application after the core has been thrown off. Free incision of the boil greatly hastens its course. ✓

Boildieu, or **Boieldieu** (ADRIEN FRANÇOIS), a French composer, born at Rouen Dec. 15, 1775. He went to Russia in 1803, and was there appointed chapel-master to the emperor Alexander, but he returned to Paris in 1811. Among his works are the operas "La Dame Blanche," "Jean de Paris," and "My Aunt Aurora." Died Oct. 8, 1834. (See RÉFUVEILLE, "Boieldieu, sa Vie et ses Œuvres," 1851.)

Boileau, or, more fully, **Boileau-Despréaux** (NICOLAS), an eminent French poet and satirist, born near Paris Nov. 1, 1636. He was liberally educated, and followed no profession but that of an author. He began his literary career by a satire entitled "Adieu of a Poet to the City of Paris" (1660), the style of which was much admired. In 1666 he produced "Seven Satires," which were very successful. He became a friend of Racine and La Fontaine. His "Twelve Epistles," which appeared after 1669, indicate a more mature genius than his satires, and excel in the ease and grace of the versification. He wrote to Racine and other friends numerous letters, which are very interesting as materials for the literary history of his time. Among his best works are the "Lutrin" ("Reading-desk," 1674) and the "Art of Poetry" ("L'Art Poétique," 1674), which is an exquisite performance, and is considered by some French critics as equal to Horace's "Art of Poetry." Boileau was admitted into the French Academy in 1684. He had an immense influence on French literature. His character is represented as pure and generous. He was visited in 1700 by Addison, to whom, as Macaulay remarks, he talked on his favorite theme, literature, long and well; indeed, as his young hearer thought, incomparably well. He died in Paris Mar. 13, 1711. (See D'ALEMBERT, "Éloge de Boileau;" DESMAIZEAUX, "Vie de Boileau," 1712; DAUNOU, "Éloge de Boileau," 1787; L. S. AUGER, "Éloge de Boileau-Despréaux," 1805.)

Boiler. See STEAM-ENGINE, by PROF. W. P. TROWBRIDGE.

Boiling-Point, the temperature at which the elastic force of the vapor of any liquid is equal to the pressure of the atmosphere. When a vessel containing water is heated, the temperature rises and vapor silently passes off from the surface; but at 212° F., or 100° C. (the barometric column standing at 30 inches at the sea-level) steam begins to be formed in bursts at the bottom, and rising through the liquid, throws it into commotion. If the steam is allowed freely to escape, the temperature of the water rises no higher. The water is then said to *boil*, and the temperature at which it remains is its *boiling-point*. Every liquid has a boiling-point of its own.

TABLE OF BOILING-POINTS OF VARIOUS LIQUIDS.

Liquid sulphurous acid.	17.6°	Water	212°
Aldehyde	71.8	Butyric ether	238.8
Ether	96.3	Perchloride of tin	240.2
Carbon bisulphide	118.5	Terchloride of arsenic	273
Acetone	133.3	Bromide of silicon	308
Bromine	145.5	Terebene	322.9
Wood spirit	151.3	Naphthalin	422.2
Ethylic alcohol	173.0	Sulphuric acid	620
Benzole	177.4	Mercury	662

The boiling-point of liquids is altered by various circumstances. Water with common salt in it requires greater heat to make it boil than pure water. In a glass vessel the boiling-point is several degrees higher than in one of metal. But what most affects the boiling-point is variation of pressure. When the barometer stands at thirty inches, showing an atmospheric pressure of fifteen pounds on the square inch, the boiling-point of water is 212°. When part of the pressure is removed, it boils before coming to 212°, and when the pressure is increased the boiling-point rises. Thus in elevated positions, where there is less air above the liquid to press on it, the boiling-point is lower than at the level of the sea. An elevation of 510 feet makes a diminution of one degree F.; at higher levels the difference of elevation corresponding to a degree of temperature in the boiling-point increases; and a method is thus furnished of measuring the heights of mountains. At the city of Mexico, 7471 feet above the sea, water boils at 198.1°; at Quito, 9541 feet, at 194°; in the Himalayas, at the height of 18,000 feet, at 180°. Boiling water is thus not always equally hot, and in elevated places many substances cannot be cooked by boiling. Under the receiver of an air-pump water may be made to boil at the temperature of summer, and ether when colder than ice. This effect of diminished pressure is largely turned to account in sugar-boiling, in preparing extracts, in distilling vegetable oils, and in other processes where the substances are apt to be injured by high temperature. By increasing the pressure water may be heated to any degree without boiling. Papin's digester is formed on this principle. Under a pressure of two atmospheres the boiling-point rises to 249° F.; of ten atmospheres, 356° F.; of fifty atmospheres, 511° F. At a depth of thirty-four feet the pressure of water is equal to an atmosphere, or fifteen pounds on the square inch; and thus at the bottom of a vessel of that depth the water must be heated to 249° F. before it is at its boiling-point.

If a small quantity of water be poured into a silver basin heated above the boiling-point, but below redness, it will begin to boil violently, or perhaps burst into steam at once. But if the basin is heated to redness, the water will gather itself into a globule, and roll about on the hot surface without coming to the boiling-point. It is remarkable that water which has been freed from air by long boiling has its boiling-point much raised. It has been known to reach 275° F. without boiling. REVISED BY F. A. P. BARNARD.

Boiling Spring, a twp. of Lexington co., S. C. P. 354.

Boiling Spring, a twp. of Alleghany co., Va. P. 1388.

Bois Blanc Island, in Lake Huron, 10 miles S. E. of Mackinaw, Mich., is 10 miles long and 3 wide, and has a lighthouse on the E. end; lat. 45° 45′ N., lon. 84° 55′ W.

Bois Brulé, a post-twp. of Perry co., Mo. Pop. 1337.

Bois de Boulogne, a grove or public park in the environs of Paris, on the right bank of the Seine, about 3 miles W. of the city. It is nearly 3 miles long and 1 mile wide. It was the finest promenade in the vicinity of Paris, but many of the trees were cut down and burned when that city was besieged by the Germans in 1870.

Bois d'Arc [Fr. for "bow-wood"], (popularly pronounced bo′dock), a name given to the Osage orange tree (*Maclura aurantiaca*, order Artocarpaceæ) in some parts of the U. S. It is often used for a hedge-plant. As a tree its timber is tough, elastic, and extremely useful. It is a near relative of the fustic tree, and its wood yields a yellow dye. It was used by the Indians for making bows and arrows. (For its use in hedge-fences, see OSAGE-ORANGE.)

Bois d'Arc, a township of Hempstead co., Ark. P. 632.

Bois d'Arc, a township of Montgomery co., Ill. Pop. 1177.

Boisé, a county of Idaho, bordering on Montana, is bounded on the E. by the Rocky Mountains. It is drained by the Salmon River, the East Fork of the Salmon, and by several forks of the Boisé River which rise within its limits. The surface is partly mountainous. The inhabitants are mostly employed in mining gold, which is found in various parts of the county. Grain and wool are raised, and timber abounds. Many of the inhabitants are Chinese. Capital, Idaho City. Pop. 3834.

Boise (JAMES ROBINSON), PH. D., LL.D., born in Blandford, Hampden co., Mass., Jan. 27, 1815, graduated at Brown University in 1840, and was tutor of Latin and Greek in that college from 1840 to 1843, and professor of Greek till 1850. From 1852 till 1868 he was professor of Greek in the University of Michigan. Since then he has filled the same position in the University of Chicago. Prof. Boise has published several classical text-books, among which are editions, with English notes, of Xenophon's "Anabasis" and the first six books of Homer's "Iliad."

Boisé City, the capital of Idaho and of Ada county, is in the southern portion of the Territory, on Boisé River, 50 miles above its confluence with the Snake, in the great Snake River Valley; lat. 43° 34″ N., lon., about 116° W. It is surrounded by a fine agricultural and grazing country, and derives large support from the rich placer and quartz mines in the mountain districts within 50 miles N., S., and E. The principal business-houses are fireproof brick. The city has a national bank, U. S. assay-office, a penitentiary, 3 hotels, 2 churches, 1 high school, 2 grist-mills, a tri-weekly and weekly newspaper, and job printing-office, and various mechanical industries. Two large ditches, bringing the water from Boisé River, give an abundance of water-power, and side ditches for irrigating purposes

carry the water to every lot in the city. Four stages arrive and depart daily, N., E., W., and S. Pop. 995.

MILTON KELLY, ED. "IDAHO STATESMAN."

Bois-le-duc [Dutch *S'Hertogenbosch, i. e.* "Duke's Wood"], a fortified town of Holland, capital of North Brabant, is at the junction of the rivers Aa and Dommel, 30 miles S. S. E. of Utrecht. It is a clean and well-built town, intersected by several canals, and defended by a citadel and two forts. It has a fine cathedral, a college, an academy of art, an arsenal, and a grammar-school in which the celebrated Erasmus studied. Here are manufactures of cutlery, ribbons, woollen goods, linen thread, etc. It was founded in 1184 by the duke of Brabant in a wood while hunting; hence its name. Pop. 24,579.

Boisserée (SULPIZ), an eminent architect and antiquary of French extraction, was born at Cologne Aug. 2, 1783. He devoted himself to the collection of specimens of early German art, in which he was aided by his brother Melchior (1786–1851). They collected about 200 pictures, which were purchased by the king of Bavaria, and are called the "Boisserean Collection." He published "Monuments of Architecture on the Lower Rhine from the Seventh to the Thirteenth Century" (1830–33), and "Views, Plans, and Details of the Cathedral of Cologne, etc." (1823). Died May 2, 1841.

Boissonade (JEAN FRANÇOIS), a distinguished French classical scholar, born in Paris Aug. 12, 1774. He became professor of Greek in the University of Paris in 1812, was admitted into the Academy of Inscriptions in 1813, and became professor of Greek in the College of France in 1828, which position he held until a few days before his death. He edited several Greek classic authors, and published "Sylloge Poetarum Græcorum" (24 vols., 1823–26). He acquired a high reputation as a Hellenist, and gave a powerful impulse to the study of classical literature. Died Sept. 8, 1857.

Boissy d'Anglais, de (FRANÇOIS ANTOINE), COUNT, a French statesman, born at Saint Jean Chambre (Ardèche) Dec. 8, 1756. He became a moderate member of the States-General in 1789, and of the Convention in 1792. He was a member of the Committee of Public Safety in 1794, was chosen president of the Tribunate in 1802, was created a senator and count by Napoleon in 1805, and a peer of France by Louis XVIII. He wrote several political essays and a "Life of Malesherbes" (1819). Died Oct. 20, 1826.

Boivin (MARIE ANNE VICTOIRE GILLAIN), M. D., an eminent French midwife, born April 9, 1773, was educated in a nunnery, and afterwards studied the elements of medicine. She married in 1797, but was soon left a widow with one child. To gain a living she worked in the Maternité Hospital, of which she became superintendent in 1801. The king of Prussia gave her the civil order of merit, and the University of Marburg the degree of M. D. She wrote valuable professional works. Died May 16, 1841.

Bo'ker (GEORGE HENRY), an American poet, born in Philadelphia in 1823, graduated at Princeton, N. J., in 1842. He published "The Lesson of Life and other Poems" (1847); "Calaynos," a tragedy (1848), which was performed with great success in England; "Leonore de Guzman," and "War Lyrics" (about 1862), which were received with favor. In the autumn of 1871 he was appointed minister to Turkey.

Boke's Creek, a township of Logan co., O. P. 1344.

Bokha'ra [Lat. *Bucharia;* anc. *Sogdiana* and *Transoxiana*], or **Uzebekistan',** called also **Great Bucharia,** a state of Central Asia, in Independent Toorkistan, is bounded on the N. and W. by Russian Toorkistan, and on the S. by Afghanistan and Toorkomania. Area, estimated at 76,200 square miles. The high mountain-range of Hindoo-Koosh extends along the southern border of Bokhara, the E. part of which is occupied by offsets from the Bolor Tagh, but the greater part of the country is level. This level tract resembles the dry steppes and sandy wastes of the basin of the Caspian. The largest rivers of Bokhara are the Amoo (Oxus), the Jihoon, and the Samarcand River, or Kohik. Along the banks of these rivers there is arable and fertile land, which is about one-tenth of the whole country. The climate is moderate. Gold is found in the sands of the Oxus, but Bokhara is deficient in metals and timber. Among the products of the soil are cotton, rice, wheat, barley, silk, tobacco, and abundant fruits. The inhabitants raise great numbers of camels, sheep, goats, and horses. They manufacture silk stuffs, firearms, cutlery, shagreen, gold and silver ornaments, sabres, etc. This country derives commercial advantage and importance from its position between Russia and the south of Asia. The population is composed of a mixture of races, who mostly profess the Mohammedan religion. Bokhara partly corresponds to the ancient *Bactria.* It was conquered by Jengis Khan in 1222, and was famed as a seat of learning under Tamerlane. The Uzbecks became masters of it in 1505. In 1864 the Russians moved up the Syr-Darya, captured several important cities, together with the northern half of Bokhara, and formed the government of Toorkistan. Between 1866–68 the Russians conquered the cities of Samarcand and Katty Kurgan, with the territory belonging to them. Since then Bokhara has become more and more dependent upon Russia. In 1870, Russia conquered Badakshan and gave it to Bokhara, and in 1873, owing to the victory of the Russians over Khiva, the Amoo was made the boundary between Khiva and Bokhara. Capital, Bokhara. Pop. estimated at 2,500,000.

Bokhara (*i. e.* "treasury of sciences"), a famous city of Central Asia, the capital of Bokhara, is situated on a plain near the river Sogd or Zerafshan, 138 miles W. S. W. of Samarcand. The streets are very narrow and ill paved, the houses are small, have flat roofs, and are built of sun-dried bricks. Bokhara is probably the most important commercial town of Central Asia, and has numerous extensive bazaars, in which nearly all kinds of goods can be procured. Among the articles exported from it are silks, cotton, wool, coarse chintzes, lapis-lazuli, and dried fruits. This city is said to have 360 mosques, some of which are beautiful structures. It has long been famous as a seat of Mohammedan learning, and is said to contain over 100 colleges, with about 10,000 students. Among the principal edifices is the palace of the khan, which is enclosed by a wall about sixty-five feet high. Bokhara was ruined by Jengis Khan about 1232, and was rebuilt at the end of his reign. The pop. is variously estimated at from 60,000 to 180,000.

Bol (FERDINAND), a Dutch painter and engraver, born at Dort in 1611, was a pupil of Rembrandt. He painted history and portraits with success, and produced some good etchings. Died in 1681.

Bo'lan Pass, a pass in the mountains of Beloochistan, is 50 miles long, and is on the route from Sinde to Kandahar and Kelat. The highest part of the pass is 5793 feet above the level of the sea. The average ascent is ninety feet in a mile. The Bolan River rises here. In 1839 a small British army with heavy artillery marched through this pass from Sinde to Afghanistan.

Bo'las (the "balls"), a Spanish-American name for a missile used by the Indians of the South American plains, and borrowed from them by the Gauchos. It consists of a pair of balls (formerly made of clay by the Indians, but now often of iron) fastened together by a thong of hide. The bolas are hurled with great precision at the ox, horse, guanaco, or ostrich, and, entangling the legs of the animal, detain it till it can be captured or killed. Sixty feet or more is a moderate range for the bolas, which are thrown from the saddle.

Bolbec, a town of France, in the department of Seine-Inférieure, is on a small river of its own name, and 20 miles by rail E. N. E. of Havre, on the railway which connects Paris with the latter place. It is well built, and is adorned with fountains. Here are manufactures of cotton, linen, and woollen fabrics, and chemicals. Pop. 9063.

Bold Spring, a township of Shelby co., Ala. P. 537.

Bole [Lat. *bo'lus;* Gr. βῶλος, a "lump or mass"], an earthy substance resembling clay, and consisting essentially of silica, alumina, and red oxide of iron. It occurs in nests and veins in basalt and other rocks in various countries. It feels greasy between the fingers; is white, yellow, red, brown, or black; has a dull resinous lustre; is friable, and adheres to the tongue. Armenian bole has a red tint, is often used for coloring false anchovies, and is also employed in coloring tooth-powders and in veterinary medicine. Lemnian earth, a bole from the island of Lemnos, was at one time prescribed as a tonic and astringent medicine, and acted beneficially from the large percentage of oxide of iron present. The boles are employed in veterinary practice. When bole is calcined it becomes hard; and when afterwards levigated, a coarse red kind is used as a pigment under the names of English red and Berlin red. French bole is pale-red; Bohemian bole, reddish-yellow; Silesia bole, pale-yellow; and Blois bole is yellow. The boles are absorbent, astringent, and somewhat tonic.

Bole'ro (named from its inventor), a Spanish national dance, generally in the time of a minuet, and with a peculiar rhythm. It is accompanied with the music of the guitar and castanet, and with songs. The dancer seeks to represent by pantomine the successive symptoms and emotions of amorous affection.

Boles, a post-township of Franklin co., Mo. P. 5183.

Bole'tus [Gr. βωλίτης], a genus of fungi of the division Hymenomycetes. It comprises several species, which re-

semble the mushroom (*Agaricus*) in form, but instead of having gills, the under side of the cap (*pileus*) is occupied by a layer (*hymenium*) quite distinct from the body of the pileus in substance, and pierced by pores, so as to be composed of numerous small tubes united together. *Boletus edulis* is used as food in France and Germany, where it grows on the ground in woods and mossy places. In moist, warm summers it is very abundant. The part which is eaten is the flesh of the cap, which is firm, white, and delicate. Several other species are edible.

Bo'leyn, or **Bul'len** (ANNE), queen of England, born in 1507, was a daughter of Sir Thomas Bullen, afterwards earl of Wiltshire. Her mother was a daughter of the duke of Norfolk. She was educated at the French court, and became about 1525 one of the maids-of-honor to the English queen, Catherine. Henry VIII., attracted by her beauty, applied to the pope to obtain a divorce from Catherine, and married Anne privately early in 1533. She became the mother of the princess Elizabeth in September of that year. She showed favor to the cause of the Reformation. Having been supplanted in the favor of the king, she was accused of criminal intercourse with several men, was condemned by a jury of peers, and beheaded May 19, 1536. Some writers think that her crime was not proven. (See FROUDE, "History of England," vol. ii.; MISS BENGER, "Memoirs of Anne Boleyn;" MISS STRICKLAND, "Queens of England.")

Bolgrad', a town of Roumania, on the river Yalpookh, 23 miles N. of Ismail, and on the frontier between Russia and Turkey. In 1856 it was ceded by Russia to Turkey. Pop. 8415.

Bo'li, a town in Asiatic Turkey, in Anatolia, 85 miles N. W. of Angora, inhabited by Turks and Armenians. The manufactures are gold ornaments and leather. Pop. about 10,000.

Bol'igee, a township of Greene co., Ala. Pop. 1770.

Boli'nas, a post-township of Marin co., Cal. Pop. 625.

Bolingbroke (HENRY ST. JOHN), VISCOUNT, a celebrated English author and statesman, born at Battersea Oct. 1, 1678. He was educated at Eton and Oxford, and was extremely dissipated in his youth. Having entered Parliament in 1700, he soon became a prominent orator of the Tory party, and was appointed secretary of war in 1704. He lost this office when the Whigs obtained power in 1708, but he continued to be a favorite counsellor of Queen Anne, who dismissed the Whigs in 1710, and placed Harley at the head of a ministry in which St. John was secretary for foreign affairs. He received in 1712 the title of Viscount Bolingbroke, and in 1713 concluded the treaty of Utrecht, which ended a long war between England and France. He quarrelled with Harley (earl of Oxford), and supplanted him as prime minister in July, 1714. His ambitious hopes were blasted by the death of Queen Anne (Aug., 1714), which also frustrated his designs and schemes to restore the Stuart dynasty. He was attainted in 1715, but he had escaped to France, and entered the service of the Pretender as his prime minister. In 1724 he was permitted to return to England, but not to enter Parliament. He wrote for the "Craftsman" many articles against Walpole, and published, besides other works, a "Dissertation on Parties" (1739) and "Remarks on the History of England" (1743). Died Dec. 15, 1751. He was brilliant and versatile, but not profound. His collected works, which have little merit except style, were published by Mallet in five volumes in 1754. (See GOLDSMITH, "Life of Lord Bolingbroke;" G. W. COOKE, "Memoirs of Lord Bolingbroke," 1835; "Edinburgh Review" for Oct., 1835; F. VON RAUMER, "Lord Bolingbroke und seine Werke," 1841; CHARLES DE RÉMUSAT, "Bolingbroke, sa Vie et son Temps," 1853.)

Bo'ling Green, a township of Pettis co., Mo. P. 2467.

Bol'ivar, a county in the W. of Mississippi. Area, 800 square miles. It is bounded on the W. by the Mississippi River, which separates it from Arkansas. The surface is an alluvial plain, part of which is often inundated by the river. The soil is fertile and produces cotton and corn abundantly. Capital, Beulah. Pop. 9732.

Bolivar, a township of Jefferson co., Ark. Pop. 1732.

Bolivar, a township of Poinsett co., Ark. Pop. 867.

Bolivar, a township of Benton co., Ind. Pop. 776.

Bolivar, a post-village, capital of Polk co., Mo., 110 miles S. W. of Jefferson City. It has a fine high-school building, three churches, two newspapers, a woollen mill, cotton-gin, flouring mill, and other manufactories, three hotels, and a large trade. Pop. 635.

JAS. DUMARS, ED. "FREE PRESS."

Bolivar, a post-township of Allegany co., N. Y. P. 959.

Bolivar, a post-village of Lawrence township, Tuscarawas co., O. Pop. 413.

Bolivar, a post-village of Fairfield township, Westmoreland co., Pa. Pop. 298.

Bolivar, a post-village, capital of Hardeman co., Tenn., 1 mile S. of Hatchee River, on the Mississippi Central R. R., 28 miles S. of Jackson and 68 miles E. of Memphis, in an excellent cotton region, with fine water-power and plenty of timber. It has a foundry, steam saw and grist mill, two male and two female academies, seven churches, and one weekly newspaper. Pop. 889.

M. R. PARRISH, ED. "BOLIVAR BULLETIN."

Bolivar, a township of Jefferson co., W. Va. P. 2892.

Boli'var, one of the nine states of the South American confederation of Colombia, is bounded on the N. by the Caribbean Sea, E. by Magdalena and Santander, S. by Antioquia, and on the W. by Cauca. Area, 26,600 square miles. Besides the Magdalena, which flows along its entire W. boundary, the only river of importance is the Cauca. The surface is mostly level, and covered with forests. The principal towns are Cartagena, the capital, and Mompox. Pop. in 1870, 225,060.

Bol'ivar [Sp. pron. bo-lee'var], (SIMON), or **Boli'var y Pon'te,** surnamed THE LIBERATOR, a South American patriot, born at Caracas July 25, 1783, inherited an ample fortune. He studied law at Madrid, and afterwards joined the patriots who revolted against Spain in 1810. He served as an officer under Miranda in several battles. Having obtained the command of a separate army, he defeated the Spaniards, and entered Caracas in triumph in Aug., 1813, soon after which he was appointed dictator. He was defeated and driven out of Venezuela in 1814, but again rallied to the standard of liberty near the end of 1816, and gained several victories over the Spanish general Morillo in 1817. In Feb., 1819, a congress was opened at Angostura, and Bolivar was chosen president. In Dec., 1819, Venezuela and New Granada were united to form the republic of Colombia, of which Bolivar was elected the first president. He gained a victory at Carabobo in June, 1821, and in 1822 led an army into Peru, which he liberated from the Spaniards. He became dictator of Peru in 1823, and made a tour through that country, in which he was received with triumphal demonstrations. In honor of him the southern part of Peru was named Bolivia, and erected in 1825 into a separate state, of which he became president for life. He was also re-elected president of Colombia in 1826. In 1829, Venezuela seceded from the republic of Colombia, which was much disturbed by faction. Bolivar had many enemies who denounced his ambition. He died Dec. 17, 1830. (See DUCOUDRAY-HOLSTEIN, "Mémoires de S. Bolivar," 1829, and English translation of the same, 2 vols., 1830.)

Bolivar Point is at the N. side of the entrance to Galveston Bay, Tex., in Chambers co., lat. 29° 22′ 02″ N., lon. 94° 45′ 34″ W. It has an iron lighthouse 110 feet high, with a fixed white light 117 feet above the sea.

Boliv'ia, a South American republic, is bounded on the N. and E. by Brazil, on the S. by the Argentine Republic and Chili, and on the W. by Peru and the Pacific Ocean. Area, 535,000 square miles. The population is estimated (Behm and Wagner, "Bevölkerung der Erde," Gotha, 1872) at 2,000,000. The S. W., W., and central parts of the republic contain the highest mountains in the New World, comprising the Cordilleras from lat. 24° S., with the plateau of Potosi, 13,000 feet high, from which two chains branch off, the western, containing many volcanoes, with its highest point, Mount Sajama, 22,760 feet high, and the eastern, with Mount Illampu, probably the highest in America, 24,744 feet, and Mount Illimani, 23,990 feet. The only lake of any importance, Lake Titicaca, on the N. W. boundary, is situated at an elevation of 12,850 feet, and has an area of 5300 square miles. The most important rivers of Bolivia are the Veni or Beni, Mamore, and Guapore, which empty into the Madeira, and the Pilcomayo and Paraguay, which flow to the Parana. Five climatic regions are distinguished: 1, the *Puna brava,* between the elevation of 13,000 feet and the snow-limit; 2, the *Puna,* between 11,000 and 13,000 feet, in which potatoes, oca, quinoa, and barley are cultivated, and fine forests are met with; 3, the *Cabezera de Valle,* between 9000 and 11,000 feet, producing wheat, corn, and European vegetables; 4, the *Valle,* or *Medio Yunga,* between 6000 and 9000 feet, the finest region in Bolivia; besides the products found in the regions above named, many tropical fruits occur here, and the best cinchona is gathered; 5, the *Yunga,* the region of the tropical forests, producing cacao, coca, bananas, and all classes of tropical fruits.

Bolivia is rich in precious metals and useful minerals. Silver is found all through the Bolivian cordillera, while gold is not only found in large quantities, associated with quartz, in the mountains, but is found in the beds of all the numerous rivers that come down from the mountains.

Besides these, copper, tin, mercury, lead, and iron are also found. Salt is also produced in large quantities, while the rich beds of coal have as yet not been touched. Besides the products mentioned above, coffee, cotton, tobacco, indigo, and sugar-cane are extensively cultivated. The inhabitants consist of whites, Indians, and a large number of half-breeds, but very few negroes. The Indians are mostly Chiquitos, Majos, and Chiriquanos. The Roman Catholic religion predominates, and the country contains the archbishopric of La Plata and the bishoprics of La Paz, Santa Cruz, and Cochabamba.

The public education of the nation is on a very low stage as yet. It is under the direction of the presidents of the three universities and the minister of education. The state of the finances is very low indeed. The public debt in 1871 amounted to 10,845,520 pesos, the receipts in 1867 to 4,529,345 pesos, and the expenses in the same year to 5,957,275, leaving a deficit of 1,427,930 pesos. The army consists of 51 generals, 359 superior officers, 654 other officers, and about 2000 privates. The imports are estimated at 6,000,000 pesos, and the exports at 5,000,000. No railroads exist at present. A line has been projected from Tacna to La Paz, and another from Caracoles to the Pacific. The executive power is vested, according to the constitution of 1868, in a president elected for four years, and the legislative in a congress. Bolivia is divided into 11 departments: Chuquisaca, Potosi, Oruro, Tarija, Atacama, La Paz, Mejillones, Santa Cruz, Beni or Veni, Cochabamba, and Melgareja. The capital is Sucre.

History.—The W. part of Bolivia belonged to the old empire of the incas of Cuzco, which existed from about 1018–1524, and which had a high degree of civilization. In 1538 the Spaniards entered the country and conquered it, and in 1557 the inca Sairi Tupac resigned his power to Philip II. But the Spanish dominion was not firmly established until 1780. In this year Bolivia, under the name of Charcas, became a part of the viceroyalty of La Plata or Buenos Ayres. In 1809 the disorders in Spain also caused considerable revolutionary movements in Bolivia. The revolution gradually spread over the whole country, and was carried on with varying successes until 1824. In July, 1825, a congress assembled and declared the country independent, and called the new state Bolivia, in honor of Gen. Bolivar, who had materially aided them. Aug. 25, 1826, a constitution was adopted, and Gen. Sucre was elected president. In 1828 he was forced to leave the country. After a terrible civil war Santa Cruz became president, and succeeded in raising the prosperity of the country considerably. In 1835 he invaded Peru, defeated the rebels, and annexed a part of Southern Peru. A federal republic was formed and Santa Cruz elected protector. But Chili and the Argentine Republic, which had jealously watched his growing success, now took up arms against him, and, although at first victorious, he was in consequence of internal disorders defeated by Chili in 1839, and fled to Guayaquil. After some more revolutions, Gen. Ballivian succeeded in sustaining himself as president in 1840. He conducted the government with vigor, and introduced many reforms. Gamarro, who tried to unite Bolivia with Peru, was repulsed, and the Bolivian troops even entered Peru. Peace was concluded June 7, 1842, and the restoration of the former boundaries was agreed upon. But new troubles arose in the interior, and Gen. Velasco superseded Ballivian, only to be himself superseded in Dec., 1848, by Gen. Belzu. Belzu ruled for over six years, having gained the favor of the lower classes. In 1855 he was compelled to resign by the popular indignation against his arbitrary measures, but had enough influence left to secure the election of his son-in-law, Cordova, who continued the obnoxious policy of Belzu, and in Nov., 1857, was defeated by Dr. Linares, who succeeded him. Linares's attempts to introduce reforms remained futile in consequence of the opposition of his opponents. He was deposed in 1861, and was succeeded by his minister of war, Acha. In 1864, after increasing internal strifes, Belzu made an invasion from Peru. In December of the same year Gen. Melgarejo first defeated Acha, and then defeated and killed Belzu. In 1866, Bolivia joined the alliance of Peru, Ecuador, and Chili against Spain, and in the same year settled amicably the border difficulties with Chili. In 1868 a new congress was elected, which legalized all the acts of Melgarejo. In the same year a contract was made with Col. G. E. Church of New York to open steam-navigation on the Madeira. At the same time citizenship was extended to all Americans who declared their intention to settle permanently in Bolivia. In Feb., 1869, Melgarejo overthrew the constitution of 1868, but in May restored it again. In 1869 a new revolution broke out, Melgarejo was defeated, and Morales declared president. In 1872, Morales was shot by his nephew La Fayé, and was succeeded by Don Adolfo Ballivian.

(See DOLENCE, "Bosquejo Estadistica de Bolivia," 1851; WAPPÄUS, in Stein and Hörschelmann's "Handbuch der Geographie," 7th ed., 1863–70; CORTES, "Ensayo sobre la Historia de Bolivia," 1861; and RECK, "Geographie und Statistik der Republik Bolivia," in Petermann's "Mittheilungen," 1866 and 1867.) A. J. SCHEM.

Bol'khov, a town of Russia, government of Orel, on the Nugra, 30 miles N. of Orel. It is built mostly of wood, and has about twenty churches, also manufactures of gloves, hosiery, hats, and leather. Hemp, hides, oil, and tallow are exported. Pop. 18,491.

Bol'landists, a term applied to certain Jesuits who compiled, and are compiling, a voluminous work called "Acta Sanctorum," or "Lives of the Saints" (53 vols., 1643–1794). They derived their name from John Bollandus. (See BOLLANDUS.) After his death the work was continued by a number of men, among whom were Daniel Papebroek, Conrad Janning, P. van den Bosche, Suyskens, and Hubens. In 1837 a new Bollandist association was formed by the Jesuits in Belgium, who have continued the work of publication. The sixtieth volume, published in 1867, comes down to the saints of October 29. It is stated that 2000 saints remain whose lives are unwritten, and that at least fifty volumes folio will be required to complete the work. As far as they have gone they have by no means exhausted the old calendars. According to Alban Butler, their work, at least in the early part, does not exhibit much scholarship. (See L. P. GACHARD, "Mémoire historique sur les Bollandistes," 1835.)

Bollan'dus, or **Bol'land** (JOHN), a Flemish Jesuit, born at Limburg Aug. 13, 1596. In conjunction with Godfrey Henschen, he published in 1643–58 five volumes of the "Acta Sanctorum." Died Sept. 12, 1665. (See BOLLANDISTS.)

Bollène, a French town, in Vaucluse, on a hillside, 24 miles N. of Avignon. It manufactures silk. Pop. 5412.

Bolles (LUCIUS), D. D., born at Ashford, Conn., Sept. 25, 1779, educated at Brown University, ordained pastor of a Baptist church at Salem, Mass., 1805, and secretary of the Baptist Board of Foreign Missions from 1824. Died Jan. 5, 1844.

Bol'linger, a county in S. E. Missouri. Area, 500 square miles. It is drained by Castor and Crooked Creeks. The surface is hilly or uneven; the soil is fertile. Cattle, grain, tobacco, and wool are produced. Iron ore and kaolin are found here. It is intersected by the St. Louis and Iron Mountain R. R. Capital, Marble Hill. P. 8162.

Bolo'gna, a province of the kingdom of Italy, was previous to 1860 a delegation of the Papal States. It is bounded on the N. by Ferrara, on the E. by Ravenna, on the S. by Florence, and on the W. by Módena. Area, 1392 square miles. The southern part is mountainous; the soil is mostly very fertile. Among the staple products are silk, wine, grain, olive oil, hemp, flax, and rice. Capital, Bologna. Pop. in 1871, 439,166.

Bologna (anc. *Felsina* and *Bononia*), a famous city of Italy, capital of the above province, is situated in a fertile plain near the northern foot of the Apennines, 23 miles by rail S. E. of Módena and 83 miles by rail N. of Florence; lat. 44° 30′ N., lon. 11° 21′ E. Several railways extend from this point to Ferrara, Ancona, Módena, and Florence; that which connects it with Florence crosses the Apennines by numerous tunnels. Bologna is a handsome city with well-paved streets, lined with rich and varied colonnades, which afford shelter from the rain and sun, and it is adorned with many beautiful churches and fine palaces of the nobility, richly furnished with paintings of the old masters. Among the remarkable edifices are the Palazzo del Podestà; the Palazzo Maggiore del Publico; the leaning tower of Asinelli, built about 1110, and 256 feet high; the cathedral, rich in works of art; the church of San Stefano, one of the oldest in Italy, and containing Greek frescoes of the twelfth century; the church of San Petronio, a noble specimen of the Italian Gothic style, adorned with many masterpieces of painters and sculptors; and the church of San Domenico, in which may be seen sculptures by Michael Angelo, and paintings by Guido, L. Caracci, and Colonna. The number of churches in Bologna is about seventy-four.

Bologna is one of the great centres of learning in Italy. Its university, said to have been founded as early as 425, is the oldest in the peninsula. This school attained great celebrity, and was attended by thousands of students from all parts of Europe. The number of its students about the year 1260 is said to have amounted to 10,000. Several female professors have occupied chairs in this institution. The library of the university has about 200,000 volumes and 1000 valuable MSS. Bologna has an academy of fine arts and several theatres. Here are important manufactures of silk goods, velvet, crape, chemicals, paper, musical

instruments, and sausages. This city was the native place of many eminent painters, including Albano, the three Caracci, and Guido; also of Pope Benedict XIV., Galvani, and Malpighi. A town called *Felsina*, founded here by the Etruscans, was perhaps as ancient as the city of Rome. The Romans, who obtained possession of it in 189 B. C., changed its name to *Bononia*. It was taken by Charlemagne in 800 A. D., and was the capital of the most powerful Italian republic from 1118 to 1274. It was annexed to the Papal States in 1514, and to the new kingdom of Italy in 1859. Pop. in 1871, 115,957.

Bologna, da (Giovanni), a Flemish sculptor, born at Douay in 1524, went to Italy when quite young, where he won great and lasting fame. His chief works are the "Rape of the Sabines" in the Loggia di Lanzi at Florence, the "Mercury" of the Uffizi, and the great fountain of Bologna (1564). Died in 1608.

Bologna Stone, a radiated variety of heavy spar (sulphate of baryta) which is found near Bologna, and is sometimes called "Bologna phosphorus." When calcined, pulverized, and made into cakes with gum-water, these cakes, after exposure to the sun, emit a phosphorescent light.

Bo'lor Tagh, or **Belur Tagh,** a high mountain-chain of Central Asia, extends along the W. boundary of the Chinese empire, which it separates from Khoondooz and Kafiristan. Its direction is nearly N. and S. It extends from lat. 35° to 45° N., and is connected with the Hindoo-Koosh on the S. The altitude of its highest peaks is said to be 19,000 feet or more.

Bolse'na (anc. *Volsinii* or *Volsinium*), a town of Italy, on the N. shore of Lake Bolsena, about 20 miles N. N. W. of Viterbo. It is now a small and mean village, but in ancient times it was an important Etruscan city and the capital of the Volsci. It was taken and destroyed in 280 B. C. by the Romans, who built here another city. This was the native place of Sejanus. Pop. 2100. The lake was celebrated in the Middle Ages for its eels. Pope Leo X. visited the island in this lake, on which ruins of beautiful castles, built by the Farnese, are still visible.

Bolt, a dart or pointed shaft, a thunderbolt; also a strong cylindrical pin of iron or other metal. Iron bolts are often used to fasten doors and protect dwelling-houses and warehouses against robbers. Metallic bolts, with a head at one end and a screw-thread and nut at the other, are extensively used in building ships and houses, in order to bind together timber or masonry. Bolts in shipbuilding are usually either iron or copper, and are of various forms and sizes, some being many feet long.

Bol'ton, a post-village of Albion township, Peel co., Ontario (Canada), on the Toronto Grey and Bruce Railway, 25 miles from Toronto, has a large trade in provisions, grain, and flour. It has one weekly newspaper.

Bolton, a post-township of Tolland co., Conn., has quarries of excellent flagging-stone. Pop. 576.

Bolton, a post-township of Worcester co., Mass., on the Boston Clinton and Fitchburg R. R., 43 miles W. N. W. from Boston. It has a public library, and is the seat of the Houghton School. Pop. 1014.

Bolton, a post-village and township of Warren co., N. Y., on Lake George, is noted for fine scenery. P. 1135.

Bolton, a post-township of Chittenden co., Vt., 18 miles N. W. of Montpelier, has manufactures of tubs, measures, boxes, lumber, etc. Pop. 711.

Bolton-le-Moors, an important manufacturing town of England, in Lancashire, on the Croal, 11 miles by rail N. W. of Manchester. Several railways extend from this place to Liverpool, Manchester, and Blackburn. Bolton returns two members to Parliament. It is one of the principal seats of the cotton manufacture, and is the birthplace of the inventors Arkwright and Crompton. The chief products of its manufactories are muslins, fine calicoes, counterpanes, dimities, cotton shawls, and fustians. Here are also paper-mills, foundries, and machine-shops. Numerous coal-mines are worked in the parish of Bolton. The manufacture of cotton and wool was introduced into this place by the Flemings about 1337. Pop. in 1871, 82,854.

Bo'lus [Gr. βῶλος, a "mass"], a dose of medicine given in a mass larger than a pill, yet small enough to be swallowed. The bolus is now seldom used.

Bo'marsund', a fortress of Russia, on the S. E. side of the island of Aland; lat. 60° 12′ 40″ N., lon. 20° 15′ E. This important fortress was taken by the allied English and French fleets in Aug., 1854, and was afterwards blown up by the allies.

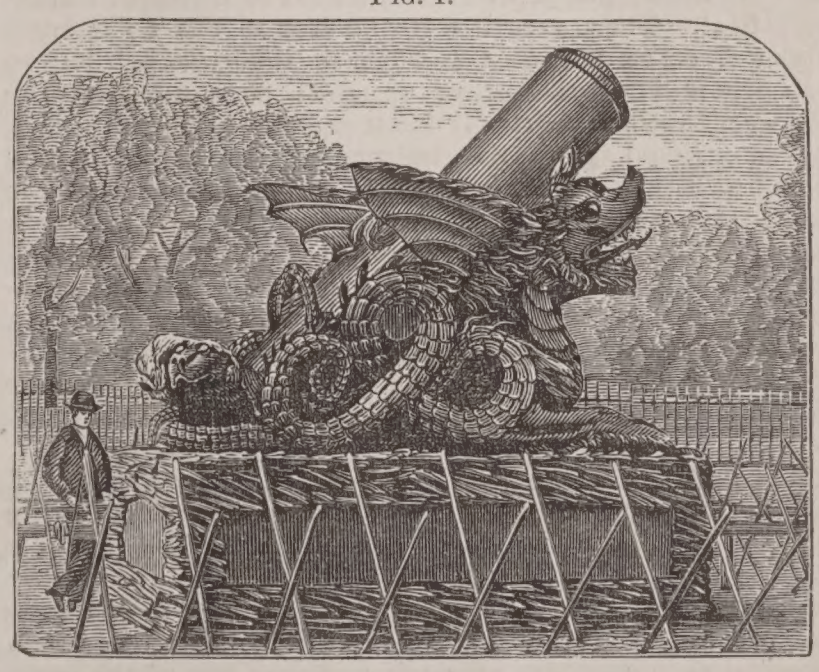
Bomb, bŭm [Fr. *bombe;* Lat. *bom'bus*], or **Bombshell,** a kind of shell; a hollow ball of cast-iron which is filled with powder or other explosive substance, is discharged from a mortar or heavy ordnance, and explodes when it strikes the ground or before it falls. The powder in it is usually exploded by a fuse or hollow tube filled with a slow-burning compound, which is ignited by the discharge of the mortar. The largest bomb in ordinary use is thirteen inches in diameter, weighs about 195 pounds, and is charged with seven or eight pounds of powder. Bombs are thrown at angles varying from twenty to forty-five degrees. (See Mortar.)

Bom'ba, a surname or nickname given to Ferdinand II., king of the Two Sicilies, in consequence of his cruel bombardment of Messina Sept. 2–7, 1848.

Bom'bard, an ancient kind of ordnance, very short, thick, and wide in the bore. It differed from the mortar in shooting forth stones instead of iron shells. Some of the bombards used in the fifteenth century propelled stones weighing from 200 to 500 pounds each.

Bombardment. In the strict meaning of the term, a bombardment is the firing from mortars of *bombs*—(that is, shells or incendiary projectiles) into a fortress or place to compel, or aid in compelling, its surrender. "Bombardments," says Bardin (*Dict. de l'Armée*) "are an impolitic and barbarous means, since it attacks non-combatants, and is rather a warfare against the inhabitants than against the armed defenders, exasperating the people and *nationalizing* the strife." Of the bombardments recorded may be mentioned that of Genoa in 1684; of Tripoli in 1685, 1728, and 1747; Barcelona, 1691. Brussels was bombarded in 1694 by Louis XIV. ("3000 bombs and three times as many red-hot shot" were thrown in); Prague was bombarded in 1759; Breda, Lille, Lyons, Maestricht, Mayence in 1793, and Menin, Valenciennes, Le Quesnoy, Ostende, Nieuwpoort, and Lécluse in 1794. Some resisted—as Lille and Mayence—others succumbed. That of Lille is most noted, this small place being subjected for 140 hours (6 days and nights) to the fire of 12 mortars and 24 cannons. During the siege of Antwerp in 1832 thirty-one thousand six hundred and eighty-nine shells were thrown into the citadel without material effect in accelerating the surrender.* Glogau, Breslau, and Schweidnitz were bombarded by the French in 1806 and 1807. During the long two years' blockade, 1809-10, of Cadiz by the French under Marshal Victor it was found impossible to reach the city from the lines with shells from ordinary mortars: long bronze howitzers of 10 inches calibre were cast at Seville (one of which is now to be seen as a trophy (see Fig. 1) in St. James's Park near the Horse Guards, London) and called *à la Villantroys,* from the French colonel of artillery who had proposed them. These, elevated 45°, threw their projectiles 5000 metres (3 miles) into the heart of the city; but to attain this range it was found necessary to load the shells (already weighing 95 lbs.) with lead, to the exclusion of most of the bursting-charge. In bursting they produced no effect, and it is stated that the inhabitants were "scarcely aware of the bombardment."

Fig. 1.



At the siege of Vera Cruz by Gen. Scott in Mar., 1847, three mortar batteries each containing four (10-in.) mortars and a battery of 8 large (8-in.) howitzers were estab-

* Monster-mortars, like monster-guns, date far back in the history of artillery. One made at Ghent and used in the siege of Oudenarde is yet exhibited in the latter city. At the siege of Antwerp a mortar of sixty centimetres (24 inches) calibre, weighing 7000 kilogrammes and throwing a shell of 500 kil. (1100 lbs.), designed by Col. Paixhans, was used. It threw 15 shells in the last two days of the siege. It was thought that if one fell on a magazine it would destroy it; but the shells actually thrown caused no serious damage. (*Spectateur Mil.*, 1833.) It was fired with 8 kil. of powder, but its full charge was 13 kil. Fired subsequently with this charge it burst.

lished bearing upon the quarter called "La Merced." On the 23d Gen. Scott summoned the place and a conference was had; it proving fruitless, the 12 mortars opened on that day and the howitzer battery the day following. The fire continued throughout the 25th, 26th, and 27th. The La Merced quarter soon became ruinous—200 persons are said to have been injured. The fears of an assault caused Gen. Morales to surrender on the 27th. A shot from the Fort St. Juan entered one of our mortar batteries on the 22d, killing by its "wind" (for though knocking off his cap, the skin was not broken) Capt. Jno. R. Vinton, 3d artillery. During the bombardment our fleet kept up a cannonade on the fort which, though intact, surrendered a few hours after the city.

De Blois (*Capitaine d'Artillerie*) published in 1848 a "*Traite des Bombardements*" to maintain that this means has not, as asserted, fallen into disuse; that bombardments reduce places with much less loss of time, munitions and blood than regular sieges; and, finally, to defend the system "against the unjust reprobation cast upon it in characterizing its employment as an act of barbarity."

The cases cited by him, nearly all of which have been referred to in this, scarcely sustain his thesis; still very recent examples go to prove that it is an agent which will continue, under certain circumstances, to be resorted to. Grivel ["*La Marine dans L'attaque des Fortifications et le Bombardment des villes*," Paris, 1856] maintains that in the use of *curved* fires, combined with direct, naval armaments will in future find the most effective method of attacking fortified places. By the term *curved fires* he includes fire by which projectiles from rifled guns (or even smooth-bores) can, by elevating the piece, be sent, at long ranges, into the interior of a place. The increase of calibre of modern artillery, and more especially the introduction of the rifled principle, has made such fires as effective as that from mortars, and the term "bombardment" is now extended to such.

At Odessa this species of bombardment was first effectively employed in 1854. The results attained there suggested to the allies the advantages to be derived from this application of floating artillery, and the subsequent bombardment of Sweaborg was provided for, in 1855, by adding to the fleet 21 mortar vessels which were towed to within about 2 miles (3400 metres) of the centre of the Russian arsenal, while the gunboats of the squadron, keeping in constant motion, approached to distances of two or three thousand metres. The fire was maintained 45 hours during which 4150 projectiles (2828 of which mortar shells) were thrown into the place, killing and wounding 2000 men and destroying magazines, supplies, and shipping.

At an early period of our civil war the project of capturing New Orleans was mooted. The reduction of the Forts Jackson and St. Philip seemed a necessary preliminary. For this object a fleet of 20 mortar vessels bearing, each, one of the new model 13-inch mortars, weighing 11,500 lbs, were prepared and under command of Commander (now Admiral) David D. Porter, added to Admiral Farragut's fleet. These vessels were moored to the right bank of the river at distances of 3000 to 4000 yards from the forts, their positions being screened from view by the woods. The bombardment commenced on the 18th April, 1862, continued six days and six nights during which time 7500 bombs were fired, of which 1080 exploded in the air and 1113 were afterwards counted as having fallen upon the fort and solid ground of glacis and levees, and 3339 were computed to have fallen in the wet ditches and overflowed lands surrounding the fort [for the levees being broken by the shells the site was overflowed]. At the end of this bombardment Admiral Farragut forced the passage with his fleet, and, destroying the Confederate flotilla of iron-clads and gunboats, the forts surrendered.

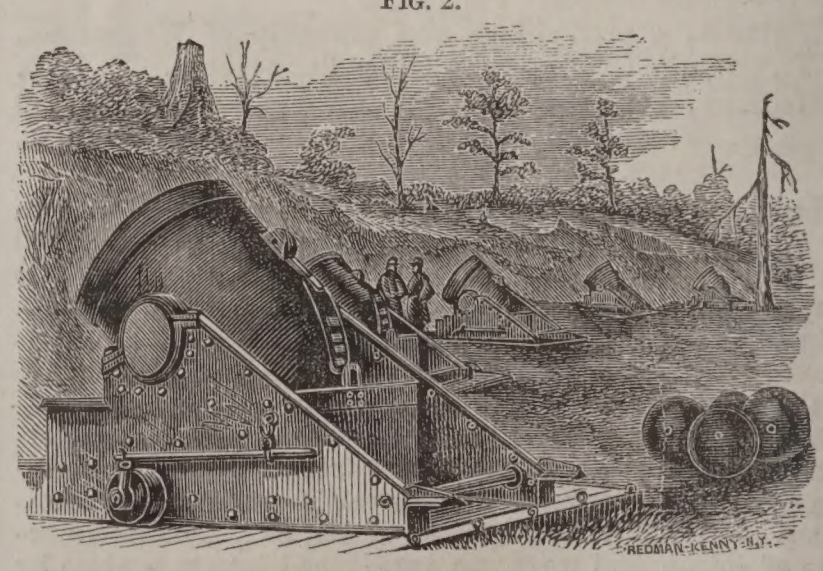
Fort Jackson has a portion of its guns in casemates of the curtains; the arches were of brick of very moderate thickness, roofed with concrete, affording at the crown a thickness of 3 feet of masonry. These were covered by the earthen parapet and terreplein. In the flanks of the bastions were flanking casemates, the brick arches of which were not only destitute of earth covering but of the usual concrete roofing. All the guns of Fort St. Philip were "en barbette." An engineer officer (Gen. Weitzel) examined the work immediately after its capture, and states:

"Fort St. Philip stands with one or two slight exceptions to-day without a scratch. Fort Jackson was subjected to a torrent of 13-inch and 11-inch shells during 144 hours. To an inexperienced eye it seems as if this work were badly cut up. It is as strong to-day as when the first shell was fired at it. The garrison did not bomb-proof the citadel" (*i. e.* had not placed earth over the heavy timber blindage spanning the walls for that purpose) "consequently the roof and furring caught fire. This fire with subsequent shells ruined the walls so much that I am tearing it down and removing the débris to the outside of the work. Three shot furnaces and three cisterns were destroyed. At several points the breast height walls were knocked down. One angle of the magazine on the north side of the postern was knocked off. Several shells went through the flank casemate arches (which were not covered with earth) and a few through the other casemate arches (where two or more struck in the same place). At several points in the casemates the thirteen inch shell would penetrate through the earth over the arches, be stopped by the latter, then explode and loosen a patch of brickwork in the soffit of the arch about 3 feet in diameter and three quarters of a brick deep, at its greatest depth." "To resist an assault, and even regular approaches, it is as strong to-day as it ever was." Gen. Abbot subsequently examined Fort Jackson, and reports that in one case a curtain casemate arch was broken through where there was 3 feet of masonry and 6½ feet of earth (the earth being a very pervious river formation). It does not appear that, otherwise, the forts were much injured or that the efficiency of their fire upon the fleet was seriously impaired. Doubtless, however, the loss of "morale" in the garrison which induced the surrender was due not merely to the successful passage and the destruction of the floating defences, but to the physical exhaustion arising from the six days bombardment and subsequent furious artillery contest with our fleet; and the bombardment is not therefore to be reckoned as without influence in the final result. This conclusion has an important bearing; for the writer, in calling for the use of mortars, in a memoir prepared for the Navy Department, did not maintain that the passage could not be forced; but contended that "to *pass* these works, merely, with a fleet and appear before New Orleans is merely a raid—no capture. New Orleans and the river cannot be held until communications are perfectly established."

Mortar vessels as well as improvised iron-clads were at an early date provided for our fleet in the upper Mississippi. After the fall of Forts Henry and Donelson and the evacuation of Columbus, the agency of bombardment (in conjunction with the fire of the cannon of the fleet) were first brought to bear upon the fortified position of Island No. 10 in the Mississippi, a short distance below New Madrid (Missouri). The bombardment was kept up from Mar. 16 to April 8 (1862), the mortar vessels at one time numbering sixteen. The works and troops being disseminated over an extensive area (the island being over a mile long and 1½ mile wide), neither the bombs nor the cannonade appear to have had much influence in causing the surrender. A similar remark is applicable to Fort Pillow, situated on the Mississippi, about 100 miles above Memphis.

When the course of events decided the establishment of a siege before Yorktown, in April 1862, the Assistant Secretary of the Navy, Mr. Fox, notified Gen. McClellan that ten of the new 13-inch mortars, which had been provided for naval purposes, would be placed at his disposal. As easy water communication made their application practicable, they were accepted and put in battery on the margin of a navigable arm of Wormley Creek, at about 2500 yards distance from the ramparts of the town.

FIG. 2.



Besides the above there were established a battery of ten 10-in. siege mortars at 2000 yards, another of five 10-in. sea-coast mortars at 2500 yards, and another of five 10 and five 8-in. siege mortars at 1600 yards. The place was evacuated before our siege and mortar batteries opened.

Fort Pulaski, situated on Cockspur Island, mouth of Savannah River, Ga., and defending the river approach to Savannah, was captured by bombardment and breaching, April 11th 1862, by the U. S. forces under command of Gen. Gillmore. The fort is pentagonal in form with brick casemates on all sides and brick scarp-wall. It mounted one tier of guns in embrasure and one *en barbette*.

The artillery of the besiegers consisted of thirty-six

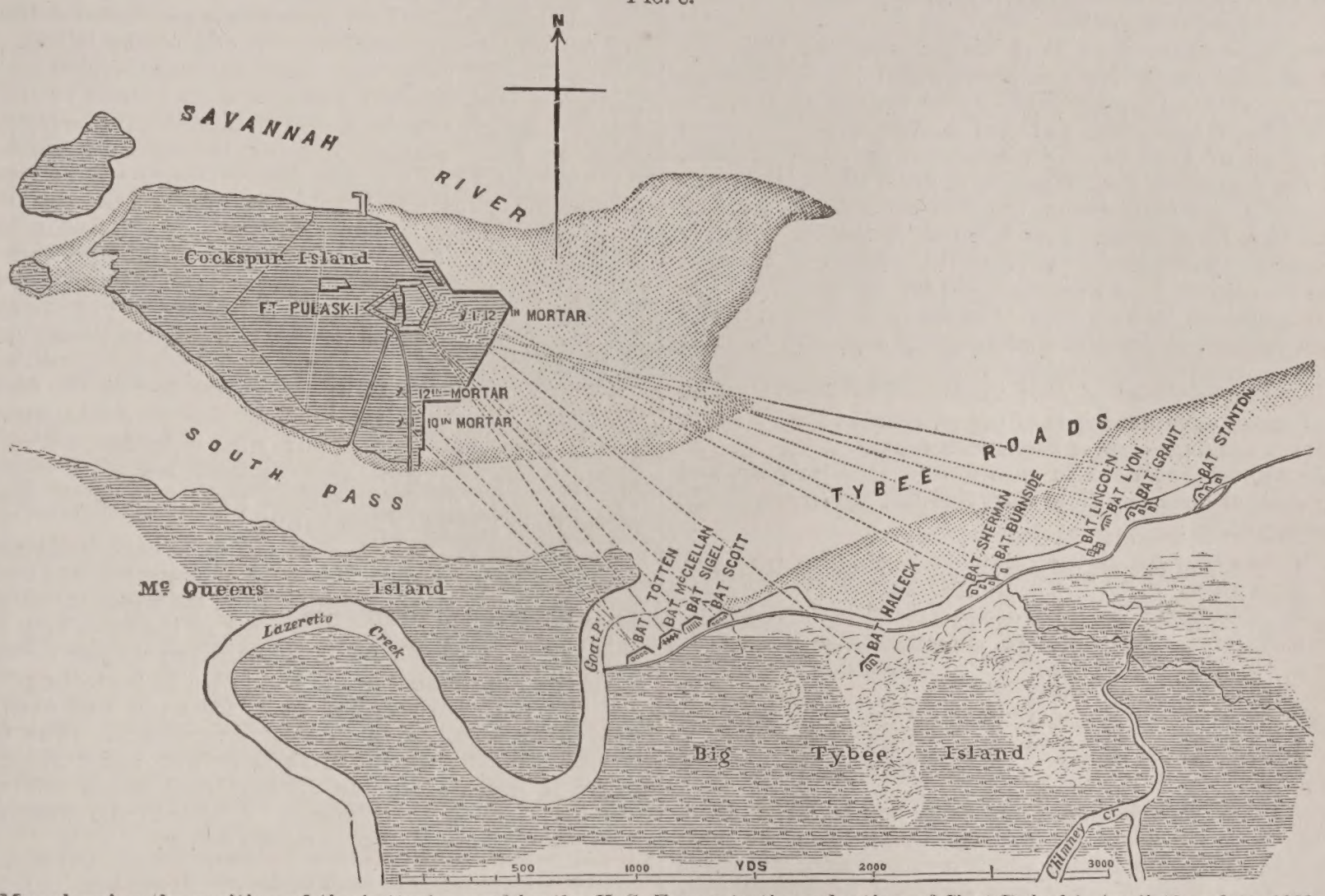
pieces distributed in eleven batteries along the shore of Tybee Island, at various distances from the work as follows (see Fig. 3):

No. 1—3 heavy 13-in. mortars	3,400	yards distant.
" 2—3 " " "	3,200	" "
" 3—3 10-inch columbiads	3,100	" "
" 4—3 8-in. "	3,045	" "
" 5—1 heavy 13-inch mortar	2,790	" "
" 6—3 " " " 's	2,600	" "
" 7—2 " " "	2,400	" "
" 8—3 10-in. columbiads, 1 8 " "	1,740	" "
" 9—5 30-pdr. Parrott rifles, 1 48- " James rifle (old 24 pdr.)	1,670	" "
"10—2 84- " " " (old 42-pdr.), 2 64- " " " (old 32-pdr.)	1,650	" "
"11—4 10-inch siege mortars	1,650	" "

Batteries 8, 9, and 10 were designed to breach the scarp wall of the work, and all the other batteries to keep down its fire and destroy its barbette armament. Some of the 13-inch mortars were served with the view of breaching the casemate arches.

The bombardment began about 8 o'clock on the morning of April 10th 1862. By half past 9 A. M. all the batteries were in active operation, and were so maintained until the dusk of evening, a period of about ten hours. Throughout the night firing was kept up with two 13-inch mortars, one 10-inch mortar, and one 30-pounder Parrott rifle, the object being to prevent the garrisons making any arrangement for their protection by piling sandbags behind that portion of the wall selected for breaching or against the wall of the magazine, which would be exposed to direct fire

FIG. 3.



Map showing the position of the batteries used by the U. S. Forces in the reduction of Fort Pulaski, April 10 and 11, 1862.

as soon as the breach should be effected in the scarp-wall. During the first day's firing the breach was fairly begun in the pan-coupé connecting the South and South-East faces. On the morning of the 11th, a little after sunrise, all the batteries were again opened, the breach was rapidly enlarged, and by 2 o'clock in the afternoon the scarp wall for a length of about forty-five feet had fallen into the ditch. The fire from the breaching batteries passed freely through two of the casemates, endangering the safety of the powder-magazine on the opposite side of the work. At two o'clock the fort raised a white flag and surrendered.

The wall was found to be greatly shattered, much beyond the limits of actual breach, so that one hundred feet of its length had to be replaced by new brick-work. (See Fig. 4.)

FIG. 4.

Fort Pulaski: front view of breach, from opposite side of ditch.

The number of shots fired is shown below:

From—

Mortars: 1,144 13-in. shells and 588 10-in. shells.
10-in. columbiads: 203 shots and 321 shells.
8-" " : 298 " " 428 "
84-pdr. James rifles (old 42-pdr. rifled): 190 shots and 207 shells.
64-" " " (" 32 " "): 380 " " 16 "
48-" " " (" 24 " "): 133 " " 116 "
30-" Parrott " : 150 shots and 1,101 shells.

It was estimated that 110,643 pounds of metal thrown from the breaching batteries struck the breached portion of the wall, equal to 2,458 pounds per lineal foot of wall, the average distance of the breaching gun from the work being 1,687 yards. With small smooth-bore guns at 500 yards distance, used during the Peninsular war in Spain, it was estimated by Sir W. Dennison that 2,544 pounds of metal was expended per lineal foot of wall, in breaching good rubble masonry backed by earth.

The barbette armament of Fort Pulaski was so much injured during the first day as to render it unserviceable. No injury was inflicted upon the arches by mortar shells. Not more than one-tenth of the 13-inch shells fired fell inside the work.

Only twenty pieces of ordnance of the fort bore on the besiegers' batteries on Tybee Island.

The recapture of Fort Sumter and the occupation of Charleston was from the first deemed by the federal government as of urgent importance.

Fort Sumter was a strong casemated brick-work of five faces, designed to mount a total armament of 135 guns, two tiers in embrasure and one *en barbette*, located on a shoal on the south side of the entrance to the inner harbor, at its narrowest point, and three and a half miles from the nearest part of Charleston City. The scarp wall was 7½ feet thick and 32 feet high above the enrockment from which it rose. The embrasures of the second tier had never been finished, and before the siege began had been walled up with brick. The fort never received its full armament. The nearest land is the north end of Morris Island, nearly due south about 1400 yards distant from the fort, and from this point the island—a narrow strip of sand—stretches along the coast in a southerly direction for a little more than three miles and a half. When siege operations began, the Confederates had possession of the whole of Morris Island, and had erected a strong and heavily-armed earthwork—Fort Wagner—1300 yards from the north end of it, and 2700 yards from Fort Sumter, with the object of holding at least the northern half of the island, in order to prevent the establishment of batteries

thereon, within effective breaching distance of Fort Sumter. They also had defences on the south end of the island to prevent its capture. The plan of attack agreed upon comprised:

1. The capture of the south end of Morris Island by assault.
2. The siege and capture of Fort Wagner.
3. The demolition of Fort Sumter by batteries established on the north end of Morris Island; and
4. The entrance of the monitors into the inner harbor, and their passage up to the city of Charleston.

This programme was carried out with the following results:

On the 10th of July, 1863, the south end of Morris Island and the several batteries erected for its defence was captured by a brigade of infantry, which approached in small boats and landed under fire.

Two open assaults of Fort Wagner—on the 11th and 18th of July respectively—demonstrated the impracticability of carrying the position by that method of attack.

The plan of operations was then changed so as to give the demolition of Fort Sumter precedence, in point of time, over the capture of Fort Wagner, in order not to delay unnecessarily the entrance of the fleet and the capture of Charleston, for although Fort Wagner, in the hands of the besieged, was intended to prevent the erection of effective batteries against Fort Sumter, it did not protect the channel of approach by Fort Sumter to the inner harbor, or any of the channel obstructions erroneously supposed to exist there.

First Bombardment of Fort Sumter.—The demolition of Fort Sumter over the heads of the garrison of Fort Wagner was then the next step in the modified plan.

The armament placed in position for this purpose, and their several distances from Fort Sumter, are shown in the following table:

1.	2 8-inch Parrott rifles	3,516	yards	distant.
2.	3 6.4 " " "	3,447	"	"
3.	2 6.4 " " "	3,428	"	"
4.	2 8 " " " and 2 80-pdr. Whitworth rifles	3,938	"	"
5.	1 8-inch Parrott rifle	4,172	"	"
6.	1 8 " " " and 2 6.4 " " "	4,272	"	"
7.	2 6.4 " " "	4,278	"	"
8.	1 10 " " "	4,290	"	"

Firing from these batteries commenced on Aug. 17th, 1863. Its first stage ended Aug. 23. The firing from the most advanced of these batteries, which were less than 900 yards distant from Fort Wagner, was seriously interfered with and at times partially suspended, by the galling fire from that work, to which the cannoniers were almost constantly exposed. The combined fire of mortars and light pieces, aided by the gunboats and iron-clads, failed to subdue it, and it was necessary occasionally to turn the breaching batteries upon it. The result of this seven days' bombardment is thus given in the official report of the chief of artillery of the siege:

The fire from the breaching batteries upon Sumter was incessant, and kept up continuously from daylight till dark, until the evening of the 23d. For five days all the guns were directed upon the gorge wall, and had resulted it bringing it down to such an extent that on the evening of the 21st a practicable breach had been accomplished. On the morning of the 22d the fire from Batteries Nos. 1, 2 and 3 was directed upon the south-easterly face or right flank of the work, with the view of dismounting the guns on the barbette of this face, which commanded the entrance to the harbor, as well as to destroy the guns on the north-easterly face, which this fire would take in reverse. The fire upon the gorge had, by the morning of the 23d, succeeded in destroying every gun upon the parapet of it, and, as far as could be observed, had disabled or dismounted all the guns upon the parapet of the two faces looking towards the city, which it had taken in reverse. The parapet and ramparts of the gorge were, for nearly the entire length of the face, completely demolished, and in places every thing was swept off down to the arches, the débris forming an accessible ramp to the top of the ruins.

There being nothing further to gain by a longer fire upon this face, all the guns were directed this day upon the south-easterly flank, and continued an incessant fire throughout the day. The demolition of the fort at the close of this day's firing was complete, so far as its offensive powers were considered. Every gun upon the parapet was either dismounted or seriously damaged; the terre-pleine for the entire circuit of the place must have been shattered and ploughed up by our projectiles, hundreds of which had been seen to strike upon it. The parapet could be seen in many places, both on the sea and channel fronts, completely torn away down to the terre-pleine. The place, in fine, was a ruin, and effectually disabled for any immediate defence of the harbor of Charleston.

Having accomplished the end proposed, orders were accordingly issued, on the evening of the 23d, for the firing to cease, having been continuously sustained for seven days. There had been thrown five thousand and nine projectiles, of which about one-half had struck the fort. The weight of metal thrown during the seven days ending Aug. 23d was 289,986 pounds, omitting that expended by the four rifles in the naval battery (No. 4), say 20,000 pounds. The enemy remained in possession of the work, having constructed a system of subterranean galleries within the ruined casemates of the fort.

Second Bombardment of Fort Sumter.—Fort Wagner was captured on the morning of Sept. 7, thus giving the besiegers possession of the whole of Morris Island. Heavy guns bearing upon Fort Sumter were at once established in Fort Wagner and on the north end of the island. Up to this time the gorge wall only had been breached. The south-east face, the only one seen from Morris Island except the gorge, remained standing, although badly shattered in many places. Reports having been made by reconnoitering parties that the garrison were attempting to remount guns on this face, it was determined to cut down that face with the rifled guns established in Fort Wagner and on the north end of this island, so that the fire of the besiegers passing over the débris of the gorge and north-east face would take the casemates of the opposite or channel fronts in reverse, and prevent the mounting of guns there.

Fire was opened on the south-east face on the 26th of October. The armament used for this purpose comprised one 10-inch, two 8-inch and nine $6\frac{4}{10}$-inch rifles, one 10-in. columbiad and four 10-inch sea-coast mortars. The distances of these several guns from Fort Sumter varied from 2,500 to 1,300 yards.

In a few days the S. E. face was more completely a ruin than the gorge wall. The débris formed a continuous and practicable ramp, reaching from the water to the summit of the breach. The two faces of the work seen from Morris Island were both in ruins, many of the casemate arches of the channel fronts had fallen in from the reverse fire, and the entire armament of the work had been destroyed or removed to prevent destruction. (For these notices of bombardments of Forts Pulaski and Sumter, the writer is indebted to the distinguished officer who commanded, Gen. Q. A. Gillmore.) A view of the work after the second bombardment is shown below.

FIG. 5.

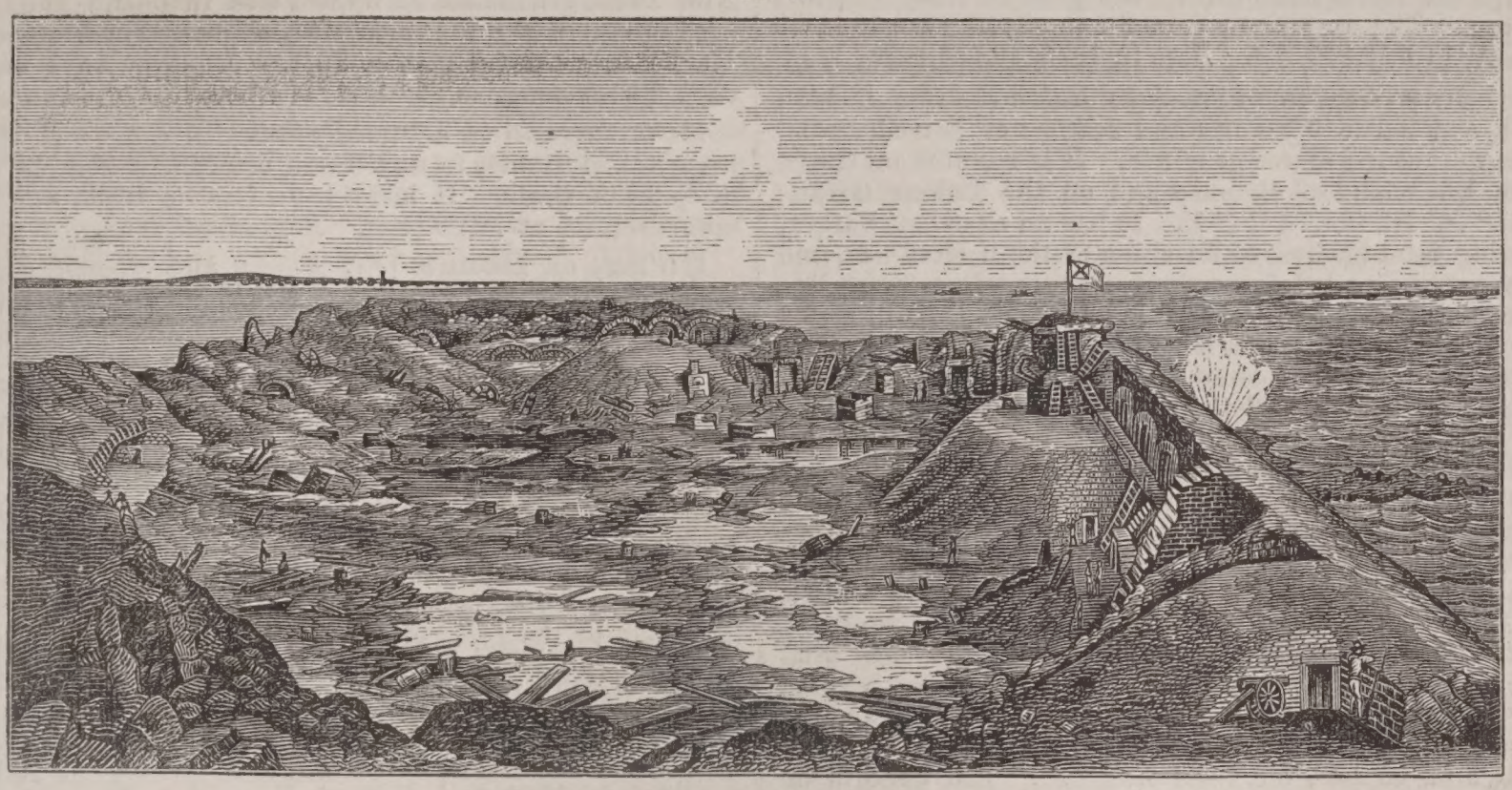
Fort Sumter, Nov. 1, 1863, after the second bombardment.

The recent great European war furnished numerous examples of a resort to bombardment as an auxiliary to siege or blockade, of which the most conspicuous are the sieges of Strasburg and Paris. The former city, fully invested on the 8th of August, was attacked by regular siege approaches and surrendered (Sept. 27) only after, its walls breached, it became exposed (according to Gen. Ulrich) to the "doubtful chances of sustaining an assault." But a bombardment from Krupp guns, howitzers and mortars commenced Aug. 18th and threw shells into the streets of the city with ruinous effect and to the serious injury of the venerable and magnificent cathedral.

Paris was invested soon after the surrender at Sedan; and it was doubtless believed that its surrender would follow. No attempt or regular siege was ever made and it was not until late in December (probably owing to the difficulty of collecting siege artillery, the Strasburg and numerous minor sieges employing all available) that from the heights of Chatillon a cannonade was opened upon the southern forts. Early in January shells commenced to be thrown from the same point into the southern quarters of Paris and this was continued till the 27th. On the 21st January a violent cannonade and bombardment was opened upon the detached forts of St. Denis and also upon the

town, 120 shells falling there in one hour (22d) and many hitting the ancient cathedral. The population took refuge in Paris. At the time (1840–48) the defenses of Paris were constructed the extreme range of projectiles did not exceed two and a half miles; and it was in relation to the artillery service of the day that the forts were located. Hence they did not perfectly protect Paris (as intended) from bombardment, which, however, had no important

FIG. 6.



Fort Sumter, Dec. 9, 1863. Interior view from the south-west angle—from a drawing made by the Confederates. The original bears the autograph approval of the Confederate general commanding the Department of South Carolina, Georgia, and Florida, and may therefore be assumed to be correct. Morris Island and the U. S. fleet are seen on the right, and Sullivan's Island and Fort Moultrie on the left. The right of view shows the gorge face and the top of the adjoining face looking down the harbor. Both were breached by the Morris Island batteries, although oblique to the line of fire. The débris formed an easy ascent from the water to the crest. The left and foreground show the other faces, in ruins from the reverse fire from Morris Island. The interior slopes were subsequently made much steeper by the besieged than shown in the view, and were revetted with gabions. Bomb-proof quarters were also constructed under the ruins for the garrison. These quarters consisted of a continuous gallery all around in the ruins, protected on top and on the side next Morris Island by thick embankments of earth. Throughout the autumn of 1863 the ruins contained no mounted guns. It was simply an infantry outpost. It repulsed a naval assault from small boats Sept. 8, 1863, and was held until February, 1865. On April 14, 1865, the fourth anniversary of its capture by the Confederates, the U. S. flag was again raised over the ruins with imposing ceremonies.

effect. The distance from the Prussian batteries on the heights of Chatillon to the nearest fort (Vanvres) is about one mile—to the nearest part of the "*enceinte*," 2¼ miles; to the populous regions of the southern quarters 3 miles; to the Palace of Luxembourg, Pantheon, Hotel des Invalides, and the "monumental" portions of Southern Paris, 3½ miles. Hence the modern rifle (Krupp's guns of the Prussians) extends its range (with high elevation) to all these regions.

In 13 days from 5th to 18th of January it is computed that about 500 shells a day fell in Paris, hitting and wounding 308 persons, a fourth of whom mortally, *i. e.*, an average of 25 persons each day and 25 shells for each person hit. The shells made little distinction of age or sex though it is asserted that during the latter days more women and children than men were struck. The number of private edifices hit averaged 50 a day, double the number of persons hit. The surface over which the bombardment extended was about 2000 hectares (5000 acres) or one-fourth the total area of Paris. (The batteries being mainly on the heights of Chatillon south of Paris and of the southern forts this area is mostly on the left or south bank of the Seine.) The population of this portion may be estimated at about 500,000. The Pantheon, the Museum, the Hotel des Invalides (with its church and tomb of Napoleon) are among the monumental structures of this portion of the city. All were more or less injured.

It is asserted (L. Simonin, Revue des Deux Mondes, Feb., 1871) that in a military point of view the bombardment by itself was wholly inefficacious.

Nevertheless, though a city so extensive as Paris may endure a protracted bombardment, the destruction of life and property is something serious, and it must especially be so in *small* fortified towns; hence the increased range and accuracy of hollow projectiles have rendered the old system of closely surrounding a town with a continuous rampart or enceinte both useless and dangerous unless supplemented by a system of detached forts sufficiently in advance to keep an enemy's artillery beyond that distance, from which he might destroy the place by his shells: and it is now contemplated to supplement the fortifications of Paris by a second and much further removed cordon of detached forts.

Small forts, by *themselves*, may however very safely defy bombardment, if reasonably provided with casemates or bomb-proofs. Fort Jackson, subjected to vertical fire only, was materially intact after a six days' bombardment, though doubtless the surrender was in *some* degree due to it. Fort Pulaski surrendered because its walls were thrown down and its magazines exposed, by the agency of *direct* fire. Fort Sumter was reduced to a ruin by breaching fire directed against its exposed vertical walls, but it never surrendered: while the little sand work, Fort Wagner, defied both direct and curved fire for two months and was finally evacuated. An attempt to destroy by shells the bomb-proof or timber blindage covered with sand which sheltered its garrison—the exposed end of which could be seen over the parapet—signally failed; the sand running in quite as fast as it could be blown away by shells.

Hence, though the fortification of capitals, great naval or military depots, must, if attempted at all, be undertaken on an immense scale, yet the applicability of modern rifled guns (in place of *mortars*) to the purposes of bombardment, and the increased range of their curved fire, has not destroyed the utility of small forts as elements of the outer cordon of great fortified places, or, used isolatedly, for the special purposes of guarding great military routes, railroads, or water approaches.

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Bom'bax, a genus of large soft-wooded trees of the natural order STERCULIACEÆ (which see), nearly related to the baobab tree. They are natives of tropical climates, especially America. They yield great quantities of cotton, but the fibre is short, does not spin well, and is not durable. Nevertheless, in India cloth is made of it to a small extent. It would probably make good paper.

Bombay', a presidency of British India, is bounded on the W. by the Indian Ocean or Arabian Sea. Area, 87,639 square miles. A large portion of the surface is mountainous. The long range of the Western Ghauts extends parallel to the sea-coast in a direction nearly N. and S. Between this range and the sea is a narrow tract called the North and South Concans, the climate of which is very hot and moist. The annual rainfall in the Concans is more than one hundred inches, in consequence of the vapors of the south-west moonsoon being intercepted by the Ghauts. This province is intersected by the Nerbudda and Taptee rivers, which flow westward into the Gulf of Cambay, and is also drained by the sources of the Godavery and the Kishna, which run in the opposite direction. The soil of the valleys and plains is fertile. Cotton and rice are the staple productions of this region, which contains the richest cotton-fields of India. Sugar and indigo are also raised here. Among the indigenous plants are the cocoa-palm and the teak tree. Bombay has important manufactures of silk stuffs

and of woollen and cotton cloths. In 1867 it had 1159 miles of railway in operation. The administration of this country is vested in a governor and three councillors, subject to the superintendence, direction, and control of the governor-general of India in council. To this province belongs the naval force for all the presidencies. Capital, Bombay. The annual revenue for the fiscal year 1864–65 amounted to £9,393,160. Pop. in 1872, 13,983,998.

Bombay [from the Port. *Bom Bahia* (or *Boa Bahia*), *i. e.* "good harbor"], a city and seaport of British India, the capital of the above province. It is situated on the S. end of the island of Bombay and on the Indian Ocean; lat. 18° 56′ N., lon. 72° 54′ E. It has an excellent harbor, affording good anchorage for ships of the largest size, and is favorably situated for commerce, being in a direct line between Calcutta and Aden. It is the W. terminus of a railway which connects it with Calcutta. The mean temperature is 82° F. At the southern end of the island, which is eight miles long and three miles wide, is the fortified European town, and one mile N. of that is the Black Town, in which the Hindoos and Mohammedans reside. Between these two towns is the esplanade and the barracks. Among the most remarkable buildings are the town-hall, mint, cathedral, the custom-house, the library of the Asiatic Society, the Elphinstone Institution, the missionary houses, the Grant Medical College, the great Hindoo temple of *Momba Dêvî*, and the Jamsetjee Hospital. The chief articles of export are raw cotton, shawls, opium, coffee, pepper, ivory, and gums. Bombay imports raw silk, sugar, and silk stuffs from China, and cotton yarn, cotton cloth, hardware, glass, copper, etc. from England. The exports of Bombay for the year ending Mar., 1870, amounted to £24,690,819; the imports for the same year were £22,232,435. Bombay, excepting Calcutta and Canton, is the greatest commercial emporium of Asia, and is the chief Indian port connected with the establishment of steam navigation between India and England. There is now a regular communication by steamers between Bombay and England through the Red Sea and the Mediterranean. Steamers also ply between this port and Point-de-Galle in Ceylon. Among the races that compose the population of Bombay, the Parsees, descended from the Persian fire-worshippers, are distinguished for their respectability, wealth, and commercial enterprise. The Parsee family of Lowjee is extensively engaged in shipbuilding, which is regarded as the most important interest of the city. Pop. in 1871, 646,636.

Bombay, a post-township of Franklin co., N. Y. Pop. 1488. It contains a part of the reservation of the St. Regis Indians.

Bombay Hook Island, Delaware, is a part of Duck Creek hundred, Kent co., and is separated from the mainland by Duck Creek. Its N. end (lat. 39° 21′ 46″ N., lon. 75° 30′ 19″ W.) has a brick lighthouse 36 feet high, with a fixed white light 46 feet above the water.

Bom′bazine [Lat. *bombyçina*, "made of silk"], a thin fabric, of which the warp is silk and the woof is worsted. It is manufactured extensively at Norwich, England, for ladies' dresses and for mourning apparel.

Bomb-Ketch, an obsolete form of mortar-vessel, which was nearly seventy feet long and drew eight or nine feet of water. It was usually rigged with two masts, and carried two mortars.

Bomb Lance, an explosive missile used in the whale-fishery, consists of a cylindrical shell of iron armed with a sharp and heavy point of a triangular form. It is charged with powder, introduced through an opening at the rear end of the shell, and the opening is afterwards stopped by melted lead. The lance is discharged from the barrel of a musket, and is exploded by a fuse after it has penetrated the body of the whale.

Bomb-Proof, a term applied to a military structure of great thickness and strength which is capable of resisting the explosive force of bombs falling on it. The powder-magazine of a fort is usually protected by a bomb-proof vault built of stone or brick, and covered with three or four feet of earth. (See Casemate.)

Bom′ford (George), an American officer, born in New York in 1780, graduated at West Point in 1805, chief of ordnance, U. S. A., May 30, 1832, with the rank of colonel. He was engaged as an engineer upon the construction of fortifications till 1812, when he was placed on ordnance duty. To the skill and inventive talent of this invaluable officer the country was largely indebted preceding and during the war of 1812–15 with Great Britain, he being almost the only one well informed as to the manufacture of ordnance and ordnance stores; he also introduced the bomb-cannon under the name of "columbiads." Brevetted lieutenant-colonel Dec. 22, 1814, for meritorious services in the ordnance department. After 1842 he was on inspection duty, and made many ingenious and valuable experiments on the best forms for heavy artillery. Died Mar. 25, 1848, at Boston, Mass., aged sixty-eight.

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Bomford (James V.), a son of the preceding, born in New York, graduated at West Point in 1832, served with distinction in the Mexican war, winning several brevets. He became colonel of the Eighth Infantry in 1864, and served with honor in the late civil war.

Bom Jardin (*i. e.* "good garden"), a town of Brazil, province of Bahia, in a rich and beautiful valley, 20 miles S. by E. of Crato. It has a considerable trade and large manufactures of millstones. Pop. about 6000.

Bo′na, or **Bonah** [Fr. *Bone;* anc. *Hippo Regius;* called by the Arabs *Beled-el-Arab*], a fortified seaport-town of Algeria, in the province of Constantine, is on a bay of the Mediterranean, 74 miles N. E. of Constantine; lat. 36° 54′ N., lon. 7° 48′ E. It is finely situated at the foot of a hill near the mouth of the river Seibous or Sebus, and is defended by Fort Cigogne, which is on the top of the hill. Bona was occupied by the French in 1832, since which it has been much improved. It has new markets, bazaars, and reading-rooms; also manufactures of tapestry, saddles, and native clothing. Wool, hides, grain, and coral are exported from it by steamboats. Near Bona are the ruins of the great city of *Hippo Regius*, once the see of Saint Augustine. It was destroyed by the Arabs in 646 A. D. Pop. in 1866, 17,841.

Bona (Giovanni), a cardinal of the Roman Church, was born at Mondovi, in Piedmont, Oct. 10, 1609, was made cardinal in 1669, and died at Rome Oct. 25, 1674. His principal works are "De Divina Psalmodia," 1663, and "Res Liturgicæ," 1671. He was equally distinguished for piety and learning.

Bo′na De′a (the "good goddess"), a Roman divinity, the sister or wife of Faunus, was worshipped only by the Roman women, who concealed her name from the men. According to some authorities, she was identified with Ops. Her annual festival was celebrated on the 1st of May, in the house of the consul, with mysterious rites, from which all males were strictly excluded. Her symbol was a serpent.

Bo′na Fi′de [Lat.], "in good faith," without fraud, innocently; without notice. A *bona fide* purchaser is one who purchases for a valuable consideration, without notice. This subject is of great importance in equity jurisprudence. It is a general rule that a court of equity will grant no relief against a purchaser in good faith. If, on the other hand, the purchaser has notice, actual or constructive, of the equitable rights of others, he will stand in no better position than the person from whom he acquired his title. Thus, if a mortgage of land were cancelled through mistake by a mortgagee, a purchaser in good faith from the mortgagor would hold free from the mortgage. On the other hand, if he had notice of the facts, a court would set up the mortgage against him as well as against the mortgagor. (See Notice.) The same question is presented in the case of bills of exchange, promissory notes, and other commercial paper. If the acceptor or maker has a defence to it as to the payer, it will in general be shut off as to a purchaser in good faith before maturity. But if the purchaser had notice of the defence before the purchase, he would stand in the same position as the payee.

Bonald, de (Louis Gabriel Ambroise), Vicomte, an eminent French publicist and ultra-royalist, born near Milhau Oct. 2, 1754. He emigrated in 1791, and published a "Theory of Political and Religious Power" (3 vols., 1796). Having returned to France about 1806, he was elected to the Chamber of Deputies in 1815, and acquired much influence under the Bonapartes and the Bourbons. He advocated absolutism and the infallibility of the pope. In 1823 he became a peer of France. Among his works is "La Législation Primitive" (3 vols., 1820). Died Nov. 23, 1840. (See Henri de Bonald, "Notice sur le Vicomte de Bonald," 1841.)

Bo′naparte, a town of Van Buren co., Ia., on the Des Moines Valley R. R., 35 miles N. W. of Keokuk. It has one of the largest woollen factories W. of the Mississippi, an extensive furniture and sash, door, and blind establishment, flouring mill, saw-mill, pottery, etc. It possesses fine water-power. It has one weekly paper. Pop. of township, 1341. Ed. "Van Buren Democrat."

Bonaparte (Carlo), a Corsican lawyer, born Mar. 29, 1746, was the father of Napoleon I. He married in 1767 Letitia (Letizia) Ramolino, and had five sons and three daughters. He became counsellor and assessor of Ajaccio in 1773. Died Feb. 24, 1785.

Bonaparte (Caroline Marie Annonciade), queen of Naples, a daughter of the preceding, was born at Ajaccio

in 1782. She was married in 1800 to Joachim Murat, who became king of Naples in 1808. She was the mother of two sons and two daughters. After the death of her husband she took the title of countess of Lipona. Died in 1839.

Bonaparte (Charles Lucien Jules Laurent), prince of Canino, a son of Lucien Bonaparte, was born in Paris May 24, 1803. He was distinguished as an ornithologist, and took little part in political affairs. His wife was a daughter of Joseph Bonaparte. He resided in Philadelphia and Italy, and published "American Ornithology, or a History of the Birds of the U. S." (3 vols., 1825–33), which is highly commended. Died in Paris July 30, 1857.

Bonaparte (Jerôme), king of Westphalia, a brother of Napoleon I., was born at Ajaccio Nov. 15, 1784. He entered the French navy in 1800, and during a visit to the U. S. married, in 1803, Miss Patterson of Baltimore, without the consent of Napoleon. This marriage was annulled by order of Napoleon in 1805. Jerome served as general of brigade against the Prussians in 1806, and was crowned king of Westphalia in 1807. In the same year he married a daughter of the king of Würtemberg. He lost his throne in Oct., 1813, and led a division at Waterloo in June, 1815. After he had passed many years in exile he became a marshal of France in 1850. Died June 24, 1860.

Bonaparte (Jerôme Napoléon), a son of the preceding by his first wife, was born in England in July, 1805, and graduated at Harvard in 1826. He greatly resembled Napoleon I. in appearance. He left two sons, Jerôme and Charles Joseph. Died June 17, 1870.

Bonaparte (Jerôme Napoléon), an American and French officer, grandson of Jerôme Bonaparte, king of Westphalia, and grand-nephew of Napoleon I., born 1830 at Baltimore, Md., graduated at West Point in 1852, and till his resignation of his lieutenancy in the Mounted Riflemen, Aug. 16, 1854, served on frontier duty. He entered the French imperial army Sept. 5, 1854, as second lieutenant of the Seventh Dragoons, became chef d'escadron Third Cuirassiers Aug. 15, 1865, and was transferred Mar. 16, 1857, to the Dragons de l'Imperatrice. He served in the Crimean war against Russia 1854–55, engineer at Balaklava, Inkerman, Tchernaia, and the siege of Sebastopol; for all of which active and distinguished services he was decorated by the sultan of Turkey with the "Medjidie Order," made knight of the Legion of Honor of France, and received the Crimean medal from the queen of England. He was in the Algerian campaign in 1856–57, engaged in several actions with the Kabyles; in Italian campaign against Austria 1859, engaged at Montebello, Solferino, and various outpost affairs, receiving for his gallantry the French "medaille d'Italie" and the decoration of "Military Valor" from the king of Sardinia; in garrison at various posts 1859–67, and in the guard of the empress of France 1867–72. On the fall of the empire he with difficulty escaped from the hands of the Commune in Paris.

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Bonaparte (Joseph), king of Spain, the eldest brother of Napoleon I., was born in Corsica Jan. 7, 1768. He studied law, married Julie Marie Clary, and was elected to the French Council of Five Hundred in 1797. He negotiated the treaty of Lunéville with Austria in 1801, and that of Amiens with England in Mar., 1802. On these and other occasions he showed considerable talents for diplomacy. Urged by the imperious will of Napoleon, he accepted the throne of Naples in 1806, though he does not appear to have been ambitious of such a position. He was transferred in May, 1808, to the throne of Spain against the will of the majority of the Spanish people, who obstinately resisted the domination of the French. During his nominal reign many battles were fought between the French and the allied English and Spanish armies, who expelled him from Spain in June, 1813. In 1815 he emigrated to the U. S., and lived at Bordentown, N. J., under the name of the count de Survilliers. He died at Florence, in Italy, July 28, 1844. (See A. du Casse, "Mémoires et Correspondance du Roi Joseph," 10 vols., 1854; Thiers, "History of the Consulate and the Empire.")

Bonaparte (Letizia Ramolino), the mother of Napoleon I., was born in Corsica Aug. 24, 1750. She was considered a beauty, and had an uncommon intellect. According to her son Napoleon, "she had a great character, with much energy, elevation, and pride." She was married to Carlo Bonaparte in 1767. In 1804 she received the title of Madame Mère. Died Feb. 2, 1836.

Bonaparte (Louis), a brother of Napoleon I., was born at Ajaccio Sept. 2, 1778. He entered the army in youth, and served at Arcola and Rivoli (1797). In compliance with Napoleon's will, he married Hortense de Beauharnais in 1802, and became king of Holland in June, 1808. He and his wife separated about 1807, in consequence of their incompatibility. As nominal king of Holland he was not able to pursue the policy which he preferred, but was compelled by Napoleon to sacrifice the interests of the Dutch to the designs of the emperor, who was offended because Louis was not sufficiently subservient. Louis abdicated the throne in 1810, after which he resided in Italy. He was the putative father of Napoleon III. Died at Florence June 29, 1846. (See Thiers, "History of the Consulate and the Empire;" "Mémoires sur la Cour de Louis Napoléon et sur la Holland," Paris, 1828.)

Bonaparte (Louis Napoleon). See Napoleon III.

Bonaparte (Louis Lucien), a son of Lucien and a nephew of Napoleon I., was born Jan. 4, 1813. He was elected to the French National Assembly in 1849, became a senator in 1852, and grand officer of the Legion of Honor in 1855. He is distinguished for his labors in philology and chemistry.

Bonaparte (Lucien), prince of Canino, a brother of Napoleon I., was born at Ajaccio May 21, 1775. He was an active and energetic republican in the French Revolution. In 1795 he married Christine Boyer, a woman of obscure birth. He was chosen in 1798 a member of the Council of Five Hundred, in which he opposed the Directory. On the 18th Brumaire (Nov., 1799) he displayed great resolution, and efficiently promoted the success of Napoleon. Lucien became minister of the interior in Dec., 1799, ambassador to Spain in 1800, and a tribune in 1802. Having lost his first wife, he married in 1803 a widow named Jouberthon without the consent of Napoleon, who was angry at the match. Lucien went into exile, and refused the throne of Italy, which Napoleon offered him on condition that he should divorce his wife. He was in France during the Hundred Days, 1815, and actively supported Napoleon in that crisis. He passed the latter part of his life in Italy, and died at Viterbo June 29, 1840, leaving five sons and six daughters. With the exception of his brother Napoleon, he was undoubtedly the most eminent and talented member of his family. (See Lucien Bonaparte's "Autobiographic Memoirs," 1836; P. W. Forchhammer, "Denkrede auf den Fürsten von Canino, L. Bonaparte," 1840.)

Bonaparte (Lucien Louis), a son of Charles Lucien, was born at Rome Nov. 15, 1828. He entered the priesthood, and on Mar. 13, 1868, was made a cardinal priest.

Bonaparte (Marie Anne Élise), princess de Piombino, a sister of Napoleon I., was born in Corsica Jan 3, 1777. She was married in 1797 to Felix Bacciochi, a Corsican officer, and received in 1805 the title of princess of Lucca and Piombino. She was for about six years (1809–14) grand duchess of Tuscany, which she ruled with ability. Died Aug. 7, 1820.

Bonaparte, Napoleon. See Napoleon I.

Bonaparte (Napoléon Joseph Charles Paul), Prince, a son of Jerôme, king of Westphalia, was born at Trieste Sept. 9, 1822. His mother was a daughter of the king of Würtemberg. As a professed democrat he was elected to the French Constituent Assembly in 1848. In 1852 he received the title of prince, and was recognized as the heir of his cousin, Napoleon III., in case the latter should die without issue. He married Clotilde, a daughter of King Victor Emmanuel. His features resemble those of his uncle, Napoleon I. He was banished from France in 1873.

Bonaparte (Pauline), Princess Borghese, born at Ajaccio in 1780, was the most beautiful of Napoleon's sisters. In 1801 she became the wife of General Leclerc, who died in 1802. She was married in 1803 to Prince Camille Borghese, an Italian, from whom she soon separated. A statue of Pauline, executed by Canova, is said to resemble the Venus of Praxiteles. Died in 1825.

Bonaparte (Pierre Napoléon), a son of Lucien, was born at Rome Sept. 12, 1815. He passed his youth as an adventurer in America, Italy, and Greece, and committed several homicides. In 1869 he murdered, in his own house near Paris, Victor Noir, for which he was sentenced to pay a fine.

Bona'sa, a genus of gallinaceous birds of the family Tetraonidæ, and one of the genera included in the popular term "grouse." It comprises the hazel-grouse, a European bird, the *Tetrao bonasa* of Linnæus. This bird, which is about as large as the common partridge, is prettily mottled with gray and reddish brown. It prefers the deep solitude of the forests. Its flesh is so highly esteemed that it is consistent with German etiquette to serve it twice in succession on the table of a prince. Another species of this genus is the American ruffed grouse (*Bonasa* (or *Tetrao*) *umbellus*), which is about eighteen inches long, and is called the pheasant in Pennsylvania and the partridge in New

York and New England. The male has on each side a large shoulder tuft or ruff. In the breeding season it struts with erected ruff and tail like a turkey-cock. The loud thumping or "drumming" sound heard in the localities frequented by this bird is produced by the bird beating on its sides with its wings. It is heard most often in the morning and evening. This handsome bird makes its nest on the ground in the forests. Its flesh is a favorite article of food.

Bonaventu'ra (GIOVANNI DI FIDANZA), SAINT, an eminent Italian scholastic theologian, born in Tuscany in 1221, was called THE SERAPHIC DOCTOR. He taught theology in Paris, became general of the order of Franciscans in 1256, and a cardinal in 1273. He had great influence in the Church, and was venerated for his ascetic piety and the miracles ascribed to him. Bonaventura was one of the most eminent of the Schoolmen. "His great mind," says Neander, "grasped the whole compass of learning as it existed in his time." Among his numerous works are "Breviloquium," "Biblia Pauperum" ("Poor Man's Bible"), and "Itinerarium Mentis in Deum" ("Progress of the Mind towards God"). He died July 14, 1274, was canonized in 1482, and was made a doctor of the Church in 1587. (See J. C. BOULE, "Histoire de la Vie de Saint Bonaventure," 1747; IGNAZ A. FESSLER, "Bonaventura's mystiche Nächte, oder Leben und Meinungen desselben," 1807.)

Bonaventure, a county in the E. part of Quebec, is bounded on the S. by the Bay of Chaleurs, and is intersected by the Grand Cascapediac, Matapediac, and several other rivers of considerable size. The Mistouche and Restigouche, forming its S. W. boundary, separate it from New Brunswick. Area, about 3200 square miles. Capital, New Carlisle. Pop. in 1871, 15,923.

Bonavis'ta, a port of entry and capital of Bonavista district, Newfoundland, is one of the oldest towns on the island. It has a rather poor harbor, a jail, and a fine Anglican church. Its people are mostly fishermen, but agriculture is also carried on. Pop. about 2600. The lighthouse on Cape Bonavista (lat. 48° 41′ 56″ N., lon. 53° 5′ 20″ W.) is a catoptric revolving white and red light, 150 feet above the sea.

Bond [from the root of the noun *band*, and the verb *bind*], in law, an instrument in writing, sealed and delivered, whereby a person binds himself to pay a sum of money. It is also called a deed. It is either simple or with a condition. A bond is said to be simple when the engagement to pay is absolute. An instrument in the form of an ordinary promissory note becomes a simple bond if executed under seal. The most common form of bond is one executed under a condition. The instrument in this case consists of two parts—the engagement to pay, and the condition upon which the engagement to pay will become inoperative and void. The condition may be either for the payment of money or the performance of an act, such as the faithful execution of the duties of a public office or of agency or other authority. When for the payment of money, it is usually called a "money bond." In this case it is common to make the engagement to pay, called the penalty, double the amount expressed in the condition of the bond. The penalty will not, however, necessarily limit the amount of the recovery. In other words, in certain cases more may be recovered than the amount named in penalty of the bond; as, for example, the real debt and the interest accruing from delay in payment. At an early day, if the money named in the condition was not paid punctually, the whole penalty could be recovered. Courts of equity, however, regarded this result as in the nature of a forfeiture, and confined the recovery to the debt and the interest. When the bond is given for the performance of an act, the recovery is limited to the damages sustained by non-performance. The person who enters into the bond is called the *obligor;* the person to whom the engagement is made is termed the *obligee.* When it is executed by two or more persons, they may be either "joint" obligors or "joint and several;" that is, they may either bind themselves collectively, or both collectively and separately. An execution of the instrument by two persons simply would be joint. Express words should be used to create a "joint and several" obligation. This is an important distinction where some of the obligors are sureties, as is usual in bonds executed by incumbents of a public office. In the case of a *joint* bond, if one of the sureties should die, his estate would be discharged both in law and equity. This would not be the case had it been both *joint* and *several,* since the individual obligation would remain, though that which is joint would be at an end. A bond is otherwise termed a specialty. It is of a higher grade than an ordinary contract, which is termed a simple contract. Accordingly, if A should owe money to B for goods sold or services rendered, and should give his bond for the amount, the original claim would be merged in the bond, and if the debt were not paid an action could be brought only on the bond. This would not be the case if A had given B his promissory note, or other engagement not under seal, for the amount of the claim. If the note were not paid at maturity, the original cause of action would remain. A bond, as a general rule, is not negotiable, but assignable. A purchaser would take it subject to the equities between the original parties. (See ASSIGNMENT.) The obligor of the bond commonly professes not only to bind himself, but his heirs, executors, administrators, etc. However, if these words were omitted, his obligation would be transferred to these successors in interest to the extent of the assets received from the obligor, it being a general rule in the U. S. that a debtor's property, both real and personal, is liable for his debts in the hands of heirs and other successors in interest. T. W. DWIGHT.

Bond, a county in Central Illinois. Area, 400 square miles. It is traversed by Shoal Creek, an affluent of the Kaskaskia River, which touches the S. E. corner of the county. The surface is diversified by fertile, undulating prairies and tracts of woodland. Cattle, wool, grain, and butter are important products. Coal is found here. It is intersected by the St. Louis Vandalia and Terre Haute R. R. Capital, Greenville. Pop. 13,152.

Bond, a township of Lawrence co., Ill. Pop. 1087.

Bond (GEORGE PHILLIPS), an American astronomer, born at Dorchester, Mass., May 20, 1825, graduated at Harvard in 1845. He aided his father, W. C. Bond, in the observatory at Cambridge, and wrote several works, among which is a "Treatise on the Construction of the Rings of Saturn." Died Feb. 17, 1865.

Bond (HENRY), M. D., born at Watertown, Mass., Mar. 21, 1790, graduated at Dartmouth in 1813, settled in Philadelphia as a physician in 1819, where he gained a high reputation. He published, besides many professional papers, a "History and Genealogies of Watertown" (1855), one of the best works of its class. Died May 4, 1859.

Bond (THOMAS EMERSON), D. D., M. D., a physician and Methodist writer, born at Baltimore, Md., in Feb., 1782. He became a professor in the medical college of Maryland, and afterwards a local Methodist preacher. He edited the "Christian Advocate and Journal," an influential Methodist publication, for twelve years, and wrote important pamphlets in defence of his Church. Died Mar. 19, 1856.

Bond (WILLIAM CRANCH), an American astronomer, born at Portland, Me., Sept. 9, 1789, was a watchmaker. He was appointed director of the observatory of Harvard University. He distinguished himself by his observations on Saturn, and discovered a satellite of Neptune. Died Jan. 29, 1859.

Bon'dager, in Scotland, a laborer who rents a cottage from a farmer under an obligation to work for him at current wages at certain seasons. There are male and female bondagers. When wanted, they are obliged to turn out, though at a sacrifice of wages.

Bonded Warehouse. See WAREHOUSING SYSTEM.

Bon'ders, a name given to the yeomanry of Sweden and Norway. The bonders often claim an aristocratic origin, and display a rude and antiquated hospitality to visitors. They have many virtues as a class, and constitute a large majority of the population.

Bondoo', or **Bondou,** a small kingdom of Western Africa, in Senegambia, is about lat. 14° to 15° N. and lon. 11° to 13° W. It is bounded on the E. by the river Falemé, which separates it from Bambook. The surface is mostly level; the soil is fertile, well watered, and extensively covered with forests. The staple productions are cotton, indigo, maize, tobacco, and millet. Among the forest trees are the baobab and acacia. Iron is abundant here, and wild animals are numerous. The Foolahs are the most numerous of the tribes which inhabit Bondoo. The government is an absolute monarchy. Capital, Bulibani, a mean town on the Falemé. Pop. estimated at 1,500,000.

Bone [Ger. *Bein;* a word found in various forms in all Germanic languages], the substance of which the hard internal skeleton or framework of most vertebrate animals is formed, although some of the lower fishes have no bony skeleton, one of cartilage taking its place, while the surface (exoskeleton) of some of these cartilaginous fishes is covered with bony plates. In animals below the vertebrates there is no true bone, for the hard internal shell ("cuttle-fish bone") of certain cephalopods differs in composition from bone.

Living bone is of a reddish-white tint externally, and is of a much deeper red within. It consists of two parts: (1) an organic substance called ostein (converted by boiling into gelatine), besides a little fat, nerves, and blood-vessels, and some cartilage, amounting in all to about one-third of

the whole, though the percentage is greater in young subjects. If a bone be soaked in dilute hydrochloric acid for a sufficiently long time, the organic matter alone remains, having the form of the original bone, and being flexible, tough, and translucent. If, on the other hand, a bone be burned in a hot fire with a strong blast of air, the animal matter is all burned away, leaving (2) the earthy or inorganic matter, a white, brittle mass, with just the form of the original bone. It consists of calcium phosphate (which constitutes more than half the weight of the whole bone), together with calcium carbonate and fluoride, magnesium phosphate and sodium chloride, with traces of other elements. The proportions vary in different parts of the skeleton, in the same bone at different ages, in various diseases, and in the corresponding bones of different species. Bones are usually covered at their ends and in some other parts by cartilage; but the greater part of the surface is covered by a tough, skinny membrane called periosteum; and hollow bones have a similar membrane within, called endosteum. These membranes are of the utmost importance in the growth, nourishment, and repair of bones. The endosteum also nourishes the marrow, a substance the importance of which in the animal economy has but recently been duly appreciated. It is probable that the marrow, like the closed glands, has, especially in the fœtal state, an important part in the preparation of nutriment for the organism generally.

From the periosteum, arteries and nerves enter the bone, traversing the longitudinal "Haversian canals," which are from $\frac{1}{200}$ to $\frac{1}{2500}$ of an inch in diameter, and lined with a delicate membrane resembling periosteum. Each canal is surrounded by concentric layers of bone, constituting an "Haversian rod" or "system" in which are certain variable vacuities called "Haversian spaces," which appear to be produced by the absorption and disassimilation which is continually going on in all tissues. Bone also contains innumerable "bone-cells," each occupying a cavity called a "lacuna." The lacunæ send out branches called "canaliculi," each $\frac{1}{14000}$ to $\frac{1}{20000}$ of an inch in diameter, which communicate freely with each other, and which are filled with blood-plasma. Bones are said to consist of two kinds of tissue, the compact and the cancellous; but the two differ only in relative density and the relative size of the contained cavities, in the proportion of oily matter, and perhaps in the proportion of earthy ingredients, which appears to be greatest in compact bones.

Osseous tissue is liable to several diseases, such as caries, necrosis, rachitis (rickets), osteomalacia, periostitis, cancer, exostosis, etc., each described under its own name. (For descriptions of the several bones and of their relations to each other, see OSTEOLOGY and the names of particular bones, such as CLAVICLE, HUMERUS, etc.)

CHAS. W. GREENE.

Bone, Chemical Composition of. Bones consist of bone-cartilage, or ossein, and earthy salts, besides a certain quantity of fat, which is easily removed by ether, and is not considered as a constituent of the bone. By burning bones till white, the ossein is destroyed, and the earthy salts remain as brittle bone-ash. By subjecting the bones to the action of dilute hydrochloric acid the earthy salts are dissolved and removed, and the ossein remains as a flexible, translucent substance retaining the forms of the bones. This ossein or bone-cartilage consists of about 50.13 carbon, 7.07 hydrogen, 18.45 nitrogen, and 24.35 oxygen. By long boiling with water it is completely dissolved, being converted into gelatine, which sets to a jelly on cooling. The ratio of ossein to earthy salts is very variable in different animals, and also in the bones of the same animal. Human bones average, perhaps, ossein 34 and earthy salts 66 per cent. The earthy salts contain, in 100, phosphate of lime 83.889, phosphate of magnesia 1.039, carbonate of lime 13.031, fluoride of calcium 0.470, and chloride of calcium 0.286. M. Papillon found that the bones of pigeons and rats which he had fed with food containing phosphate of strontia and phosphate of alumina contained considerable quantities of these compounds. Bones undergo considerable changes in composition in certain diseases.

Uses of Bones.—Bones are extensively used for soup, though it is stated by Liebig and others that the gelatine derived from them is not only valueless as food, but positively objectionable. Others strenuously deny the truth of the statement. In the arts, bones are employed as substitutes for ivory for buttons, handles of knives, brushes, etc., and for combs; they are also used as cattle food in the form of bone-meal; as a fertilizer, either in the form of bone-meal, bone-ash, or after treatment with sulphuric acid. They are used for the manufacture of BONE-BLACK (which see), of gelatine, of phosphorus, of phosphate of soda, superphosphate of lime for raising bread, and bone-ash is used for cupels.

C. F. CHANDLER.

Bone-Ash is the residue left on burning bones; it amounts to about 66 per cent. of the weight of the original bones. It consists of the earthy salts of the bone, the composition of which in 100 parts is given above. Bone-ash is largely exported from South America. It is used as manure, for the manufacture of superphosphates, phosphorus, cupels, and is an important constituent of English china.

C. F. CHANDLER.

Bone-Black, or **Animal Charcoal,** is the residue left on igniting bones in close vessels. The bones are placed either in retorts, like those used in making coal-gas, or in iron pots. On the application of heat destructive distillation takes place. Combustible gases escape, accompanied by vapors which condense to ammoniacal water and offensive oils. Bone or Dippel's oil is thus produced. The residue in the vessels amounts to about 50 per cent. in weight of the original bones. It is passed between rollers, and separated by sieves into different sizes. Bone-black usually contains, after exposure to the air, from 1 to 6 or 7 per cent. of moisture. The average composition of dry bone-black, in 100, is carbon, containing nitrogen, 10, phosphate of lime, including a little phosphate of magnesia, 88, carbonate of lime, 8, sulphate of lime, 0.2, alkaline salts, 0.8, oxide of iron, 0.1, and silica, 0.3.

Animal charcoal possesses to a high degree the property of absorbing gases, and also of absorbing various substances from solutions. Its action is not limited to any one class of substances. It absorbs vegetable bases, bitter principles, astringent bodies, coloring-matters, iodine, metallic oxides, salts, etc. Its chief application in the arts is for the purification of sugar. The raw sugar is dissolved in water, more or less completely freed from suspended impurities by the aid of blood, and filtered through bags of cotton cloth, and then passed through high cylinders of iron containing the bone-black. It is thus almost completely decolorized, and at the same time freed from lime and other salts, and from certain organic substances which interfere with crystallization. On subsequently concentrating the solution in the vacuum-pan it readily yields perfectly white loaf sugar. (See SUGAR.) By washing with warm water, and subjecting to a red heat in suitable retorts, the black is *revivified*, when it may be used again. Sometimes it is also purified by fermentation and treatment with small quantities of dilute acids or alkalies. By repeated reheatings, however, the black becomes greatly condensed, owing to the semi-fusion of the phosphate of lime, and its decolorizing and purifying power is reduced to such a degree that it must be replaced by fresh black. This exhausted black, as well as the fine dust which is not suited for sugar-refining, finds a ready market for the manufacture of superphosphates to be used as fertilizers, for the manufacture of phosphorus, etc. In France, pulverized bone-black in fine powder is often boiled with the raw sugar before it goes to the bag filters.

When bone-black is to be used for decolorizing acid solutions, the phosphate of lime is first removed from it by dilute hydrochloric acid. Bone-black is sometimes employed to remove lime from highly calcareous waters. Many other forms of charcoal possess these properties, but none of them have been found so well adapted for the use of sugar-refiners as bone-black. Under the name of ivory-black animal charcoal is used as a pigment, especially for the preparation of shoe-blacking.

C. F. CHANDLER.

Bone Creek, a township of Butler co., Neb. P. 384.

Bone-Dust, a valuable manure, obtained by grinding bones in stamping-mills, by heavy revolving wheels, or by passing them through toothed iron rollers. The bone is sometimes subjected to the action of hot water and steam in a digester at a temperature of about 275° F., which dissolves out two-thirds of the gelatine and leaves a friable mass. Bone-dust is applied to the soil either in its ordinary insoluble state or as dissolved bones, the fertilizing force of which is expended in the first year.

Bone-Gelatine. See GELATINE.

Boneset, a common name of the *Eupatorium perfoliatum*, an herbaceous plant, a native of the U. S., growing in low or moist places. It is a bitter weed, having hairy leaves, which are united at the base around the stem, and are serrate, very veiny, and wrinkled. An infusion of the leaves is used as a tonic, diaphoretic, etc.

Bon'fire [Fr. *bon*, "good," and Eng. *fire*], a fire kindled as an expression of public joy in the open air, usually on a conspicuous place, as the top of a hill or in the street of a city. The materials consumed are tar-barrels, wood, and other combustibles. The practice of kindling bonfires is very ancient.

Bon'gar (*Bungarus* or *Pseudoboa*), or **Rock Snake,** a genus of venomous serpents, natives of the East Indies. They are allied to the *naja*, and are distinguished by a

much-keeled back, which has a row of hexagonal scales larger than the rest. The *Bungarus annularis* sometimes measures six or seven feet in length.

Bon'ham, a city and capital of Fannin co., Tex., on Bois d'Arc Creek, 270 miles N. N. E. of Austin, and on the line of the Transcontinental R. R., has two fine flouring mills, two newspapers, a saw and planing mill, several benevolent societies, two churches, four schools, and one carriage factory. Pop. 928.

W. S. Gass, Ed. "Texas News."

Bonham (Milledge L.), a statesman and Confederate general, born in South Carolina about 1815, graduated at South Carolina College in 1834, became a lawyer, and served in the Mexican war. He was a member of Congress from 1856 to 1860, and became governor of South Carolina in 1862–64.

Bonha'nis, a township of Wilcox co., Ala. Pop. 1709.

Bonheur (Rosa), an eminent French painter of animals, born at Bordeaux Mar. 22, 1822, was a pupil of her father, Raymond Bonheur. She produced in 1850 "The Nivernais Ploughing," in the Luxembourg gallery, "The Horse Fair" (1853), "Horses in a Meadow," and "Cows and Sheep in a Hollow Road."

Bonhomme, a county of Dakota, bordering on Nebraska. Area, 450 square miles. It is bounded on the S. by the Missouri River. The soil is fertile, and adapted to the production of grain. Capital, Bonhomme. Pop. 608.

Bonhomme, a post-village, capital of Bonhomme co., Dak., on the Missouri River, 36 miles W. of Yankton.

Bonhomme, a post-township of St. Louis co., Mo. Pop. 6162.

Bo'ni, or **Bony,** a state in the S. W. peninsula of the island of Celebes, is about 80 miles long, and is on the W. side of the Gulf of Boni. The surface is partly mountainous. The soil of the N. part is fertile, producing rice, sago, and cassia. The natives manufacture cotton cloth and articles of gold and iron. The British attacked the Bonese in 1814, and killed their king as a punishment for their piracy.

Boni, Gulf of, called also **Bughis Bay,** separates the two southern peninsulas of Celebes. It is nearly 200 miles long, and from 40 to 80 miles wide. It is dangerous to navigation from its numerous reefs.

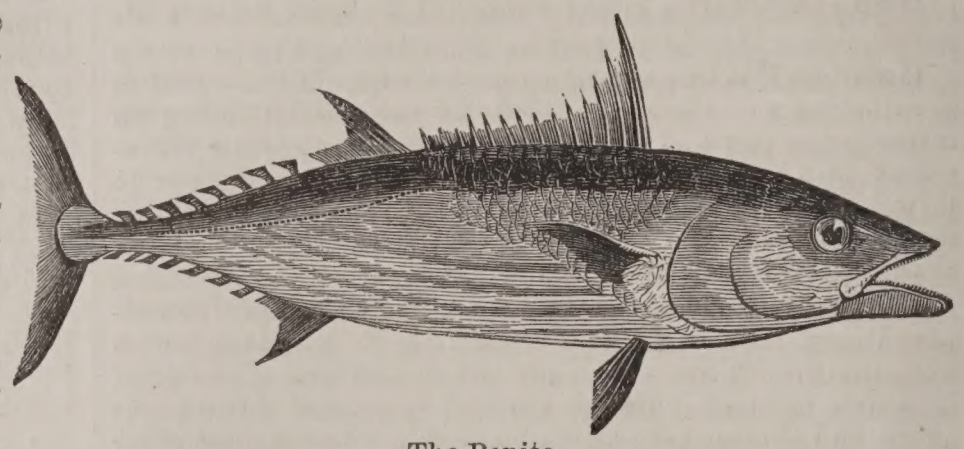
Bon'iface [Lat. *Bonifacius*] **I.,** Saint, Pope, was elected in 418 A. D. Saint Augustine dedicated several works to him. Boniface died in 422.—Boniface II., a Goth, born at Rome, succeeded Pope Felix IV. in 530. Died in 532 A. D.—Boniface III. was chosen pope in 607, and died the same year. He was the first to whom the title of "universal bishop" was given by the Greek emperor (Phocas).—Boniface IV., Pope, born at Valeria, in Italy, succeeded Boniface III. in 608. He converted the pagan Pantheon of Rome into a church. Died in 615.—Boniface V., a native of Naples, became pope in 619. He died in 625, and was succeeded by Honorius I.—Boniface VI., a native of Rome, succeeded Formosus in 896, and died fifteen days after his election. He was an abandoned character.—Boniface VII., considered by some authors an anti-pope, was elected in 974 as a rival of Benedict VI. He was driven out of Rome in 975. He was starved to death in prison in 985.—Boniface VIII., Cardinal (Benedetto Gaetani), was born at Anagni about 1228. He became pope in 1294. He issued a bull forbidding all the clergy to pay any tax on ecclesiastical property, by which he was involved in a contest with Philip the Fair of France. He excommunicated Philip, who accused the pope of heresy and simony, and caused him to be imprisoned at Anagni. Boniface was skilled in both civil and canon law, and published the sixth book of "Papal Decretals." He died Oct. 11, 1303. (See Dante, "Inferno," canto xxvii.; W. Drumann, "Geschichte des Papstes Bonifacius VIII.," 2 vols., 1852; Luigi Tosti, "Storia di Bonifazio VIII.," 1847.)—Boniface IX. (Pietro Tomacelli) succeeded Urban VI. in 1389. He was a despotic ruler, and was accused of selling benefices and indulgences. He died Oct. 1, 1404, and was succeeded by Innocent VII.

Boniface [Lat. *Bonifacius*], (Winfrid), Saint, called the Apostle of Germany, was born in Devonshire, England, about 680. He began in 716 to preach in Germany, where he converted a great number of people and founded schools and monasteries. He was made bishop by Pope Gregory II. in 723, and in 732 Gregory III. made him archbishop and primate of all Germany. In 718, in 723, and again in 738, he visited Rome, and brought the German Church into complete subjection to the papacy. Pepin le Bref, whom he consecrated king of the Franks in 752, appointed him archbishop of Mainz. June 5, 755, he was assassinated by a pagan mob at Dockum in West Friesland, and his remains were finally taken to the famous abbey of Fulda, which was founded by him. (See Willibald, "Life of Saint Boniface;" George W. Cox, "Life of Saint Boniface," 1853.)

Bonifa'cio, Strait of (anc. *Fretum Gallicum*), is between Corsica and Sardinia. The narrowest part of it is 7 miles wide. The navigation is obstructed by rocks, which are favorable to the production of coral, a large quantity of which is obtained here.

Bo'nin, or **Archbishop Islands,** in the Pacific Ocean, extend from lat. 26° 30′ to 27° 44′ N., and are about lon. 142° E. They are divisible into three groups, the most northern of which are called Parry Islands, and the most southern, Baily Islands. Area, about 120 square miles. Peel Island, which is one of the middle group, is occupied by a small number of European and Polynesian colonists, the only inhabitants of the group. Spain claims this group.

Bonito, bo-nee'to, a name given to several fishes of the family Scomberidæ, which are allied to the mackerel. One of these, *Thynnus pelamys*, sometimes called the stripe-bellied tunny, is a native of tropical seas, and is often seen pursuing the flying-fish. It is a beautiful fish, about two and a half feet long, and resembles a mackerel in form. The color of its back and sides is a brilliant steel-blue. Four dark lines extend along each side of the belly from the throat to the tail. Its flesh, though rather dry, is eaten



The Bonito.

and relished by many, but is sometimes poisonous. The term bonito is applied to two species found in the Mediterranean, the *Auxis vulgaris* and the *Pelamys Sarda*. The former is of a uniform blue color, without stripes, and has an average length of about fifteen inches. It is usually eaten salted. The *Pelamys Sarda* is distinguished from the tunny by large and strong teeth. It measures about two feet in length, and is found on our Atlantic coast.

Bo'nitz (Hermann), a German philologist, born July 29, 1814, became professor at Vienna in 1849. He published an edition of the "Metaphysics" of Aristotle (2 vols., 1849), "Platonic Studies," and other works.

Bonn (anc. *Bonna*), a city of Rhenish Prussia, beautifully situated on the left bank of the Rhine, 19 miles by rail S. S. E. of Cologne. It is on the railway which connects Cologne with Coblentz. It has an ancient cathedral, which is a fine specimen of the Romanesque style. Here are manufactures of cotton goods, earthenware, and soap. Bonn is the seat of a celebrated university founded in 1818, which has a library of 200,000 volumes, and is attended by nearly 1000 students. Connected with it are an observatory, a botanic garden, and a museum of natural history. The buildings of this institution are excellent and very extensive. Niebuhr, A. W. Schlegel, Hermes, Simrock, and other eminent men have been professors in this university. Here are several large and elegant hotels for the accommodation of tourists, who are attracted by the picturesque scenery of the vicinity. Bonn is a very ancient town. *Bonna*, which was an important Roman station, is said to have been rebuilt by the emperor Julian in the fourth century. It was conquered by the French in 1802, and annexed to Prussia in 1814. It is the native place of Beethoven. Pop. in 1871, 26,020.

Bonnefemme, a township of Howard co., Mo. P. 1249.

Bon'ner (Edmund), an English prelate notorious as a persecutor, was born about 1495. He gained the favor of Henry VIII., who about 1532 sent him on a mission to the pope, and appointed him bishop of Hereford in 1538 and bishop of London in 1539. Having showed himself hostile to the Protestant cause, he was deprived of his bishopric in 1549, but he was restored on the accession of Queen Mary in 1553. He was the principal instigator of the bloody persecutions which disgraced the reign of Mary. Refusing to take the oath of supremacy on the accession of Elizabeth in 1558, he was imprisoned in the Marshalsea, where he died Sept. 5 1569. (See Froude, "History of England.")

Bonner (Robert), proprietor of the "New York Ledger," was born in the north of Ireland April 28, 1824. He came to America in early youth and learned the trade of a printer. He went to New York in 1844 and purchased the "New York Ledger," which, by energy and business talents, he made extremely successful. He has made munificent gifts of money to the College of New Jersey at Princeton, and is noted for liberality in charitable causes.

Bon'net, in fortification of the old school, is a small defence-work constructed at salient angles of the glacis or larger works. It has only two faces, with a parapet three feet high and ten or twelve broad. A larger kind, with three salient angles, is called a priest's bonnet.

Bonnet (Charles), LL.D., F. R. S., an eminent Swiss naturalist and philosopher, born at Geneva Mar. 13, 1720. He made discoveries in the reproductive and other functions of insects, etc., which he announced in his "Treatise on Insectology" (2 vols., 1745). He published in 1754 a valuable work "On the Use of the Leaves of Plants." Among his other works (all in French) are "Considerations on Organized Bodies" (1762) and "Philosophical Palingenesis" (3 vols., 1769), in which he argued that the Christian revelation is true. Died May 20, 1793. (See H. B. de Saussure, "Éloge historique de C. Bonnet," 1787; J. Trembley, "Mémoire de la Vie de C. Bonnet," 1794; A. Lemoine, "C. Bonnet de Genève, Philosophe et Naturaliste," 1850.)

Bonnet Carré, a post-village in St. John the Baptist parish, La. It has one weekly newspaper.

Bonnet Piece, a gold coin of James V. of Scotland, so called because the king's head is decorated with a bonnet instead of a crown. It weighed seventy-two grains, and was struck in 1539. "In beauty and elegance of workmanship," says De Cardonnel, "it approaches the nearest to the Roman coins, and very much surpasses all the coinage at that period or ever since."

Bonneval, de (Claude Alexandre), Count, a French adventurer, born in Limousin July 14, 1675. He deserted from the French army and entered the service of Austria, in which he distinguished himself by several daring exploits, and obtained the rank of general. Having quarrelled with the governor of the Low Countries, he was condemned to death by a court-martial about 1724, but the penalty was commuted to exile. He entered the Turkish army, took the name of Achmed, and became a pasha of three tails. Died Mar. 27, 1745. (See D. Fassmann, "Leben des Grafen von Bonneval," 1740; "Memoirs of the Bagshaw Count Bonneval," London, 1750.)

Bonneville (Benjamin L. E.), an officer, born in Tennessee, graduated at West Point in 1815. He became a captain in the U. S. army, and served in the Mexican war (1846–47). He published a "Journal of an Expedition to the Rocky Mountains."

Bon'nycastle (Charles), born at Woolwich, England, in 1792, was a son of John, noticed below. He was one of the professors brought over by Mr. Jefferson for the University of Virginia in 1825. He at first occupied the chair of natural philosophy, and afterwards that of mathematics. He published a treatise on "Algebra," one on "Inductive Geometry," and various scientific papers. Died at Charlottesville, Va., Oct., 1840.

Bonnycastle (John), an English mathematician, born in Buckinghamshire. He was professor of mathematics at the Royal Military Academy at Woolwich, and published, besides other works, "Elements of Geometry" (1789) and "Elements of Algebra" (2 vols., 1813), which were highly esteemed. Died May 15, 1821.

Bonnycastle (Sir Richard Henry), a son of the foregoing, born in 1791, served in Flanders and against the U. S. (1812–15), becoming in 1848 lieutenant-colonel of British engineers. Most of his life was passed in British North America. He published "Canada as it Was, Is, and May Be," and other works on Canada, and one on "Spanish America" (1818). Died in 1848.

Bo'no, a post-township of Lawrence co., Ind. Pop. 1005.

Bonpas, a township of Richland co., Ill. Pop. 891.

Bonpland (Aimé), an eminent French botanist, born at La Rochelle Aug. 22, 1773. He studied medicine and botany at Paris, and formed a friendship with Humboldt. In 1799 he accompanied Humboldt in a scientific expedition to South America, where they travelled about five years. After their return to France he published a splendid work entitled "Equinoctial Plants collected in Mexico" (2 vols., Paris, 1808–16, with 140 plates). He had collected 6000 species of plants, of which 3500 were entirely new. He became professor of natural history at Buenos Ayres in 1816, and departed in 1821 on an excursion to the Andes, but as he was passing through Paraguay he was arrested by order of Dr. Francia, who detained him as a prisoner nearly ten years. After his release in 1831, he resided for many years in Uruguay, and died May 11, 1858. Humboldt, Bonpland, and Kunth published a work called "Nova Genera et Species Plantarum" (7 vols., 1815–25, with 700 plates).

Bonpland, Lake, of California, is in Eldorado co. It is about 14 miles long and 6 miles wide.

Bo'nus (a Latin adjective signifying "good") is used in English to denote a premium given for a charter or other privilege; also a special allowance or extra dividend to the shareholders of a company. If the previous dividend has been 4 per cent., and if the profits of the current year are equal to 5 per cent. of the capital, the directors sometimes declare a dividend of 4 per cent., and add a bonus of 1 per cent.

Bonus, a post-township of Boone co., Ill. P. 1164.

Bonyhad, a town of Hungary, in the county of Tolna, 106 miles W. of Szegedin. Pop. in 1869, 5610.

Bony Pike (*Lepidosteus*), a genus of ganoid fishes found in America, especially remarkable as being examples of a type of fishes now almost extinct, but which in the old red sandstone period were extremely numerous. To this genus belong the gar-pike and the alligator-gar of the U. S. The latter is sometimes six feet in length, and resembles the alligator in appearance. It is thought by some naturalists to approach the character of the reptiles.

Bonze, a name given to the priests of Fo (or Booddha) in Japan and China. They profess celibacy, and are addicted to ascetic practices and superstitious notions and rites. They are generally very ignorant. Some of them live in monasteries. They usually wear a yellow dress. (See Gautama.)

Boo'by (*Sula fusca*), a species of aquatic birds of the same genus as the gannet, and of the family Pelicanidæ. It is found on the coasts of tropical and sub-tropical countries. It seldom swims, but is a bird of powerful wing, and feeds on fish, which it catches near the surface of the water by a sudden plunge. It is remarkable for stupidity and slow movement on the land, and will sometimes remain motionless when it is approached by a man, and permit itself to be killed with a club. The boobies are persecuted by the albatross and frigate-bird, which sometimes compel them to give up the fishes they have caught, and even to disgorge those they have devoured.

Bood'dha, or **Buddha,** the title of an Asiatic divinity, or rather of a series of divinities, whose votaries or worshippers are said to constitute more than one-third of the human race. The name is derived from the Sanscrit verb *bud* ("to know"), and signifies, literally, "wisdom," and also the "wise one" or the "sage;" but it has been applied particularly to certain divine sages who are believed to have become possessed of transcendent power as well as wisdom. It is one of the remarkable features of the Hindoo system of belief, Brahmanical as well as Booddhistic, that they hold the doctrine of accumulative merit to an unlimited extent; not only can one in the present life, by persevering prayer, penance, and sacrifice, gradually acquire great merit, but this merit is supposed to be transferred to his account in the next life. It is thus that those beings who become Booddhas are enabled to acquire, in the course of innumerable transmigrations, an amount of merit which for all practical purposes may be termed infinite; and this merit, according to a commonly-received belief, confers infinite wisdom and power. The aspirants to the Booddhaship (called in Sanscrit Bôdhissattvas) are supposed, in the course of their countless transmigrations, to be born sometimes as *dêvas* (inferior deities), and sometimes in the form of various animals, even insects or animalcules; but when they are about to assume the rank of supreme Booddha, they are always born as men, and their human form becomes glorified, when they attain their highest perfection and take their rank as the supreme power of the universe. But they continue only a very brief period in this exalted state; they soon die and pass into nirvâna—a term variously interpreted; according to the majority of Booddhists, including those of Ceylon, it signifies simply non-existence or annihilation, but according to others, the soul, in nirvâna, does not cease to be—it merely ceases its separate existence, having been absorbed into the essence of the supreme, eternal Spirit. The latter view is held by the Aishwarikas of Nepaul, who call the eternal Spirit Ádi-Booddha (*i. e.* "First Booddha"). It is supposed that there have been innumerable Booddhas in the eternity of the past, each being separated from his nearest successor by a space of several thousand years. (For a more particular account of the doctrines of the Booddhists, see Gautama.)

J. Thomas.

Bood'room', Budroum, or **Bodrun,** a seaport-town of Asiatic Turkey, in Anatolia, is finely situated on the N. shore of the Gulf of Cos, about 96 miles S. of Smyrna; lat. 37° 2′ N., lon. 27° 25′ E. It has a safe harbor, defended by a castle which was built by the Knights of St. John in 1402. The streets are narrow and dirty. Pop. estimated at 12,000. It probably occupies the site of the ancient *Halicarnassus,* a great city of Caria, the birthplace of Herodotus. Here are remains of ancient magnificence.

Boofa'rik, or **Boufarik,** a village of Algeria, 18 miles S. S. W. of Algiers, on the road from Algiers to Blidah and Oran, is an important military station. It has a trade in cotton, grain, olives, oranges, etc. Pop. 5627.

Book [Anglo-Saxon, *boc;* Ger. *Buch,* supposed to be from the root of *Buche,* "beech," because thin pieces of this wood were used for writing before paper was invented], the general name of almost every literary composition, but in a more limited sense applied only to such compositions as are large enough to form a volume. Short and fugitive pieces are denominated *pamphlets,* in contradistinction to books, which are of greater length and embrace more general or permanent topics. According to their sizes and forms, books are distinguished as folios, quartos, octavos, duodecimos, etc. The materials of which books have been composed have differed much in different nations and in different stages of civilization. Plates of lead and copper, bricks, stone, and wood were anciently employed for this purpose. At a later period the bark of trees formed the chief material, as is indicated by the meaning of the words which in some languages are employed for the term book (*liber*). Materials for books were afterwards derived from the Egyptian plant papyrus, but as the demand increased more durable materials were sought for, and leather, made chiefly from the skins of goats or sheep, was employed for this purpose. Next followed the use of parchment, on which the ancient manuscripts were chiefly written, but all these systems were swallowed up by the invention of PAPER, which, though long known in China and Japan, was not made in Europe until about the thirteenth century, and facilitated the circulation of knowledge to an incalculable extent. The first books were in the form of blocks and tablets, but when flexible materials came into use it was found more convenient to roll them up in a scroll, called by the Romans *volumen* (from *volvo,* to "roll"). Books were anciently written on one side only of rolls of paper or parchment. When written on both sides they were called *opisthographi.* To save the expense of writing materials, it was sometimes the custom to wash out what were considered unimportant writings, and use the paper or parchment again. These were then called PALIMPSESTS (which see). Leaves of palm-trees are still used in parts of India, etc. for making manuscript books.

REVISED BY C. W. GREENE.

Book'binding, the art of fastening together and enclosing the leaves of a book for preservation and use, has been practised for many centuries. Long before the invention of printing the written leaves of missals and other books were united together, and enclosed in covers of wood, parchment, and other materials. Much labor and expense was bestowed on a single volume, and the covers were frequently decorated with jewels and ornaments of gold and silver. Some of these volumes are still preserved in the monasteries and museums of the Old World, and are objects of interest and study.

Since the invention of printing, and especially from the beginning of this century, the rapid advancement of the mechanical arts, the extension of education, and the general diffusion of knowledge have made books as much a necessity of life as food and clothing, and their preservation is therefore an object of importance.

The modern operations of bookbinding may be grouped in two main divisions—"forwarding" and "finishing," the first comprehending what is necessary for the preservation of books, the latter pertaining to their embellishment. In each of these departments there are various subdivisions, which may be noted. The sheets are generally received from the printer in bundles containing a thousand, more or less, of one kind.

The first operation is to fold the sheet, by means of a thin piece of ivory or bone, about nine inches long, called a "folder." The object of this is to bring the pages together in regular order; and on the care with which the folding is done much of the appearance of the book depends. The next process is "gathering" and "collating." Gathering consists in putting together one each of the various sheets of which the book is made, and collating is the examination of the numbers 1, 2, 3, etc., which are placed at the foot of the outside page of the folded sections, and which are called "signatures."

The next thing required is to make the book solid. This is done by placing it either in a hydraulic press or under some other form of pressure, such as the nature and size of the book may require. After being pressed the book is prepared for sewing by having indentations made in the back of the sheets by passing them over rapidly revolving circular saws. They are now sewed on a frame called a "sewing-bench," each sheet being sewed around twine bands, which are afterwards fastened to the boards. Much of its durability depends on the sewing being well done, and all large work is improved by having the sections at the beginning and end of the book cross or "whip-stitched."

The greater part of the labor has so far been done by women, who by practice acquire great dexterity in the performance of the various processes. Machinery has been used with considerable success in folding, and lately a machine has been introduced for sewing, but all work in the early stages is still in great measure done by hand-labor. In the more advanced stages of binding machinery is used extensively, and our description will be in accordance with the methods pursued where large quantities are constantly being bound, and where machinery is used to facilitate production. The book, after being removed from the sewing-bench, and having about an inch of the twine left on either side to fasten to the pasteboard cover, has the end leaves applied. These are of colored, white, or marble paper, as the nature of the work may require. The book is now "cut" by being fastened tightly in a cutting-machine, and a vibrating knife is brought down on the edge, which is cut off smoothly at the point desired. The edges are either left white, are colored by being sprinkled with color thrown on finely with a brush, or are marbled, which is done by dipping the edge on colors which float on the surface of gum-water. The "comb edge" so much used is made by a comb being drawn through the colors on the surface of the gum-water before the book is dipped. If the book is to have gilt edges, it is placed in a press and a coating of red color applied. The edges are then sized with white of egg, and gold-leaf laid over the size. When the sizing is thoroughly dry, the gold is burnished with agate or bloodstone.

A coating of glue is now applied to the back, and when partially dry by a slight hammering on the back a round is formed in the front and back. The book is then fastened firmly between iron clamps in a backing-machine, lately invented, and a roller is pressed heavily across the back, which turns part of it over either side of the clamps, making a groove to hold the board of which the inside of the cover is made. The piece of silk braid or colored cloth which projects over the leaves of the back inside the cover, and is called the "head-band," is now fastened with glue, and the whole back has a lining of cloth or strong rope paper firmly applied to it with glue and paste. The open or spring back is now made by applying two thicknesses of paper, open in the centre, but fastened at the edges—one thickness of the paper being attached to the back of the book, and the other thickness to the leather or other material of which the outside cover may be made. The book is now ready for the cover, the outside of which may be of muslin, sheepskin, calf, Turkey morocco, or such other materials as may be desired. The cover, or "case," is made by boards being cut larger than the leaves of the book, over which the outside material is fastened by glue or paste, a space being left between the two boards large enough to fit the back of the book in, the boards being required to fit nicely into the grooves made in backing. Much of the material used for boards of common books is straw, but all good work should have a hard, smooth board made of rope. The edge of the board is frequently ground off on a rapidly revolving emery wheel, which makes a bevelled edge, now much used.

After the cover is dry the embellishment is done by stamping in gold, blank, and colors. If in gold, the leather or cloth is sized with albumen, and gold-leaf laid on with oil. The ornamental die or lettering being fastened in an "embossing-press" and heated, it is brought with sufficient pressure on the cover to make the gold-leaf adhere. The surplus gold being brushed off, leaves the impression of the die. The dies are cut in brass or steel, and very elaborate and beautiful designs, which a few years ago would have taken many weeks to execute by hand-labor, are now produced almost instantly by the embossing-press.

The cover having received all intended ornament, the back of the book is glued and fitted into it, the end-papers are pasted to the inside of the cover, and the book is placed in a press to remain till dry. When removed from the press it is ready for the publisher and the public.

"Half binding," much used for library and reference books, is that style of binding where the back and corners are covered with leather, and the sides with cloth or paper.

The old process of "forwarding" by hand, in which each

book is backed by a hammer and cut singly by press and plough, and the book finished by the slow method of former times, is still followed to some extent in small binderies, but requires no minute description, as the system is almost obsolete for books in quantities.

In America, during the last quarter of a century, machinery for the binding of books has been invented, improved, and applied to a greater extent than in any other country; hence books in large editions are produced in a style of great elegance and durability, and at prices so moderate as to be within reach of all classes of the community. The number of persons engaged in bookbinding throughout the various States is very large. In the cities of New York, Philadelphia, and Boston many of the establishments employ from 100 to 300 hands (about one-half of the number being women), and produce from 1000 to 5000 volumes per day. JAMES SOMERVILLE, *Bookbinder, New York.*

Book-Catalogues. See CATALOGUES OF BOOKS.

Books, Censorship of. See CENSORSHIP OF BOOKS.

Book-Club, a society for the purchase of books to be read by its members. It is customary in book-clubs, after the books have been read by all, to sell them at auction. These clubs are quite numerous in Great Britain.

Book-keeping is the art of recording, in a regular and systematic manner, the transactions of merchants or other persons engaged in pursuits connected with money. There are two modes of keeping books of account—the one by what is termed *single,* and the other by *double entry.* Both are in general use. The system of single entry is much the simplest mode of book-keeping, and consists of only a day-book and a ledger. In the day-book the dealer enters his sales and purchases, and in his ledger he carries the former to the debit of his customers, and the latter to the credit of the merchants who supply him with goods. By making at any time a list of the sums due to him by his customers, and of those due by him to wholesale merchants, the dealer may, after adding to the debts due to him the value of his stock on hand, arrive at an approximation to the real state of his debts and assets. This, however, is but an imperfect method of book-keeping, and in the case of wholesale mercantile business, where extensive and multifarious transactions have to be recorded, recourse is had to the system of *double entry.* This system possesses all the advantages of single entry, besides being so complete and comprehensive in its principles, and so certain in its results, as to admit of universal application.

No authentic accounts exist of the origin of book-keeping. The double-entry system appears to have been first practised in the latter part of the fifteenth century in Italy, then the great centre of the mercantile world.

The objects of book-keeping are to exhibit transactions in the most minute detail and in the most condensed form; advancing from the earliest stage to the latest by such clear and lucid steps as to admit of every fact being traced in its progress, so as to be secured at every step against error.

The three principal books required under the system of double entry are a cash-book, journal, and ledger. In the first of these every transaction is recorded where money is one of the elements. The journal forms a most important part of the system. It exhibits a narrative of every transaction of which an actual transfer of money does not form one of the elements, arranging the facts in as simple a form as correctness and intelligibility will admit of; and the results of those entries in the journal are afterwards introduced into the ledger, which thereby becomes a key to the history of every transaction. In like manner cash transactions are often introduced into the journal, and are at stated periods classed and arranged in a condensed form and transferred to the ledger. The journal is advantageously ruled with four columns—two for entries debtor, and two for entries creditor; and all the transactions being connected either with personal and property accounts or nominal accounts, such as charges, profit and loss, and so-forth, they are classed accordingly in the columns on the debtor or creditor side of the journal respectively; and as the debit entries are at all times equal to the credit entries, the aggregate of the two columns on the debtor side must tally with the aggregate of the two on the creditor side of the journal. Experience and practice are occasionally suggesting minor improvements upon the forms of the cash-book, journal, and ledger to suit particular cases; and indeed an intelligent book-keeper may accomplish much by a judicious classification of the facts in auxiliary books; but the fundamental principles of the double-entry system of book-keeping remain perfect and unchanged; and after the length of time during which they have successfully withstood all attempts at innovation or change, it may safely be affirmed that the system is the best hitherto discovered.

Bookselling, or the **Book-Trade,** may be treated of as consisting of two branches: 1st, the wholesale business, usually in the hands of publishers; and 2d, the retail branch, to which more frequently the term bookselling is applied.

Booksellers are mentioned by Horace and other ancient writers, and they are known to have existed as a distinct class in university-towns of Europe during the Middle Ages; but the book-trade was quite unimportant until after the invention of printing, when a great stimulus was given to this branch of industry, more especially at first in Germany. In nearly all European countries the printing and vending of books were subject to a great variety of restrictions, including a more or less strict government censorship, which, in England, ceased in 1695. On the other hand, publishers seem about this time to have had a remarkable disregard of the rights of authors, in whom copyright was first vested by act of Parliament in 1700. Since the beginning of the present century the book-trade of the U. S., from the smallest beginnings, has grown to a position of great importance. The retail book-trade is conducted both by subscription-agents and by regular dealers.

Boo'lâk, Boulac, or **Bulak,** a town of Egypt, on the right bank of the Nile, about a mile from Cairo, and at the origin of the Pelusiac arm of the Nile. It formerly stood on an island. The vessels navigating the Nile discharge their cargoes at Boolâk, which is the port of Cairo, and contains a custom-house. It has manufactures of cotton and silk, a government printing-office, and a very valuable museum of Egyptian antiquities. Pop. about 13,000.

Boolga'rin, Boulgarine, or **Bulgarin** (THADDEUS), an eminent Russian writer, born in Lithuania in 1789. He served as an officer in the army of Napoleon I., after whose fall he settled in St. Petersburg and devoted himself to literature. He published popular novels entitled "Mazeppa" and "Ivan Vuizhegin" (1829), and other works, among which is "Russia in its Historical, Statistical, Geographical, and Literary Aspects." Died Sept. 13, 1859.

Boom [that is, "beam," from the Dutch *boom* and German *Baum,* a "tree" or "beam"], in nautical language, is a general name for long poles or spars employed to extend the bottom of sails. Some of them taper regularly from the middle towards each end. According to their different modes and places of application, they are respectively named jib-boom, flying-jib-boom, studding-sail-boom, main-boom, square-sail-boom, spanker-boom, etc.

BOOM is also the name of a strong iron chain or cable stretched across a river or harbor to obstruct the passage of hostile vessels of war. The chains are moored and are floated by logs. They ought to be defended by a battery. An iron steamer might cut or break the chain unless it is very strong. It is desirable that two or more chains should be stretched across.

Boom, bōm, a town of Belgium, in the province of Antwerp, is on the river Rupel at its junction with the Brussels Canal, 9 miles S. of Antwerp. It has a gymnasium and extensive brick- and tile-works, tanneries, ropewalks, and manufactures of sail-cloth. Pop. 10,064.

Boo'mer (GEORGE B.), an American general, was born at Sutton, Mass., July 26, 1832, and became a citizen of St. Louis in early youth. At the battles of Iuka, Champion Hills, and Vicksburg he behaved with conspicuous gallantry. He was killed in a charge at Vicksburg, May 22, 1863.

Boom'erang, an instrument used in war and the chase by the aborigines of Australia. It is about two feet in length, flat on one side and rounded on the other, and is made of hard wood bent into a curve nearly resembling an obtuse angle. The method of using this remarkable weapon is very peculiar. It is taken by one end with the bulged side downward, and thrown forward as if to hit some object twenty-five yards in advance. Instead of continuing to go directly forward, as might be expected, it slowly ascends in the air, whirling round and round, and describing a curved line, till it reaches a considerable height, when it begins to retrograde, and finally sweeps over the head of the projector and falls behind him. This surprising motion is produced by the reaction of the air upon a missile of this peculiar shape. The Australians are said to be very dexterous in hitting birds and other small animals with this weapon, as, being behind the thrower, they are perhaps not aware that they are objects of attack. It is asserted that a kind of boomerang is employed by some of the hill-tribes of Southern Hindostan.

Boon'dee, a town in East India, capital of a rajahship of the same name, 90 miles S. E. of Ajmeer, has an old and a new town, the former surrounded by a strong wall. It contains a palace, well-built houses, and level streets, and a fine temple of Krishna, other large temples, fountains, etc.

Boone, a county of Arkansas, bordering on Missouri, is drained by the White River. Area, 696 square miles. The surface is a fertile plateau, rich in minerals. Cotton, corn, and tobacco are the principal crops. It was formed in 1869 from parts of Carroll and Marion. Capital, Harrison. Pop. 7032.

Boone, a county of Illinois, bordering on Wisconsin. Area, 280 square miles. It is intersected by the Kishwaukee River, an affluent of Rock River, and also drained by the Piskasaw Creek. The surface is undulating, and diversified by prairies and woodlands; the soil is very fertile. Cattle, grain, wool, and dairy products are raised. The county is traversed by several divisions of the Chicago and North-western R. R. Capital, Belvidere. Pop. 12,942.

Boone, a county in Central Indiana. Area, 408 square miles. It is drained by the Eagle and Sugar creeks. The surface is undulating or nearly level, and was formerly covered with dense forests of the oak, ash, beech, and sugar-maple. The soil is fertile and deep. Grain, wool, cattle, and dairy products are raised. It is intersected by the railroad which connects Lafayette with Indianapolis. Capital, Lebanon. Pop. 22,593.

Boone, a county in Central Iowa. Area, 576 square miles. It is traversed and nearly bisected by the Des Moines River, and also drained by Beaver Creek. The surface is uneven or undulating; the soil is fertile. Cattle, wool, and grain are the chief productions. Coal and timber abound in it. The county is intersected by the Chicago and North-western R. R. Capital, Boonesborough. Pop. 14,584.

Boone, a county in the extreme N. part of Kentucky. Area, 300 square miles. It is bounded on the N. and W. by the Ohio River, and is adjacent to the "Great North Bend" of that stream. The surface is hilly or undulating; the soil is productive, and is based on Trenton limestone. Live-stock, grain, and tobacco are raised. It is intersected by the Louisville Cincinnati and Lexington R. R. Capital, Burlington. Pop. 10,696.

Boone, a county in Central Missouri. Area, 648 square miles. It is bounded on the S. W. by the Missouri River, and on the E. by Cedar Creek, and is traversed by Roche Percée River. The surface is undulating; the soil is very productive. Tobacco, grain, and live-stock are raised. Among the mineral resources are coal and limestone. It is intersected by the St. Louis Kansas City and Northern R. R. Capital, Columbia. Pop. 20,765.

Boone, a county of the E. central part of Nebraska. Area, 912 square miles. The S. part constitutes a portion of the Pawnee reservation. The county is drained by the Pawnee Loup and its branches; the soil is fertile. It was organized since the census of 1870. Capital, Hammond.

Boone, a county of the S. W. part of West Virginia. Area, 525 square miles. It is bounded on the N. E. by Coal River, and also drained by Laurel Creek. The surface is hilly or mountainous, and mostly covered with forests. The soil of the valleys is fertile. Grain, stock, and tobacco are extensively raised. Bituminous coal is found. Capital, Madison. Pop. 4553.

Boone, a township of Columbia co., Ark. Pop. 827.

Boone, a township of Scott co., Ark. Pop. 937.

Boone, a township of Union co., Ark. Pop. 642.

Boone, a township of Boone co., Ill. Pop. 1536.

Boone, a township of Cass co., Ind. Pop. 1262.

Boone, a township of Crawford co., Ind. Pop. 494.

Boone, a township of Harrison co., Ind. Pop. 1870.

Boone, a township of Madison co., Ind. Pop. 1078.

Boone, a township of Porter co., Ind. Pop. 1215.

Boone, a township of Warrick co., Ind. Pop. 4042.

Boone (called **Montana** in the U. S. census of 1870), a city of Boone co., Ia., is the end of a division of the Chicago and North-western R. R., and a round-house and machine-shops of the company are located here. It is a thriving town, and has two weekly newspapers, a national bank, six churches, and is a good manufacturing point, being near both coal and timber. Immense quantities of coal are shipped from here. Pop. 2415.

J. Hornstein, Pub. "Boone County Democrat."

Boone, a township of Dallas co., Ia. Pop. 552.

Boone, a township of Hamilton co., Ia. Pop. 1837.

Boone, a township of Wright co., Ia. Pop. 146.

Boone, a township of Bates co., Mo. Pop. 1257.

Boone, a township of Crawford co., Mo. Pop. 839.

Boone, a township of Douglas co., Mo. Pop. 480.

Boone, a township of Franklin co., Mo. Pop. 1655.

Boone, a township of Greene co., Mo. Pop. 1692.

Boone, a township of Maries co., Mo. Pop. 692.

Boone, a township of Texas co., Mo. Pop. 323.

Boone, a township of Wright co., Mo. Pop. 123.

Boone, a township of Davidson co., N. C. Pop. 1311.

Boone, a post-village, the capital of Watauga co., N. C., in a township of the same name, 177 miles W. by N. of Raleigh. Pop. of township, 737.

Boone (Daniel), a famous American pioneer and hunter, born in Bucks co., Pa., Feb. 11, 1735. He emigrated to North Carolina, where he married. In 1769, with five companions, he penetrated into the forests of Kentucky, which were then uninhabited by white men. He was captured by Indians, but escaped, and continued to hunt in that region for more than a year. Having returned home early in 1771, he moved with his own and five other families to Kentucky in the autumn of 1773. To defend his colony against the savages, he built in 1775 a fort at Boonesborough, on the Kentucky River. The Indians attacked this fort several times in 1777, but were repulsed. Boone was surprised and captured by them in Feb., 1778. They took him to Detroit, and treated him with lenity, but he soon escaped, and returned to his fort, which he defended with success against 450 Indians in Aug., 1778. He removed in 1795 to a place which is nearly forty-five miles W. of St. Louis, Mo., and found there a new field for his favorite pursuits. Died Sept. 20, 1820. (See Sparks, "American Biography," vol. xiii., second series; W. H. Bogart, "Life of Daniel Boone," 1857.)

Boone (Enoch), son of the preceding, and the first white male child born in Kentucky. Died Mar. 8, 1862, aged 84.

Boonesborough, a small village of Madison co., Ky., on the Kentucky River, about 18 miles S. E. of Lexington. Here is the site of a fort built in 1775 by Daniel Boone, the pioneer, which was the first fort erected in the State.

Boonesville, capital of Prentiss co., Miss., a thriving town on the Mobile and Ohio R. R., 20 miles S. of Corinth, at the highest point on that road, is the seat of Paine Male School (Methodist) and Booneville Male Academy. It has four churches, one weekly paper, one cotton-press, and one planing-mill. Pop. 458.

John H. Miller, Pub. "Prentiss Recorder."

Booneville, a post-village, capital of Owsley co., Ky., on the South Fork of the Kentucky River, about 60 miles S. E. of Lexington. Pop. 111.

Booneville, or **Boonville,** a river-port, capital of Cooper co., Mo., is situated on the right (S.) bank of the Missouri River, 227 miles by water and 187 miles by railroad W. by N. of St. Louis. It stands on a bluff about 100 feet above the river, is very healthy, and has an advantageous position for trade. It has a national bank. A railroad 25 miles long extends from Booneville southward to the Missouri Pacific R. R. Lead, coal, marble, hydraulic lime, and iron are abundant here. During the recent civil war a Confederate camp was established at this place. On the 16th of June, 1861, Gen. Lyon reached Rockport, opposite Booneville, and on the following day attacked the forces in camp at Booneville under Col. Marmaduke. The Confederate force amounted to only about 2500 raw troops, poorly armed and utterly deficient in drill; they were easily routed, abandoning two guns and a large quantity of clothing, camp equipage, etc. Booneville has three weekly newspapers. Pop. 3506; of Booneville township, 5319.

Boon Hill, a post-township of Johnston co., N. C. Pop. 1445.

Boon Island, 10 miles E. of the harbor of York, Me., is in lat. 43° 07′ 16″ N., lon. 70° 28′ 16″ W. It has a granite lighthouse 123 feet high, showing a fixed white dioptric light of the second order, 133 feet above the sea.

Boons'boro', the county-seat of Boone co., Ia., 1½ miles E. of Des Moines River, on the Chicago and North-western R. R., 121 miles W. of Cedar Rapids, 40 N. N. W. of Des Moines, in the edge of the best body of timber in the State. Coal is excellent, abundant, and extensively mined. The river affords good water-power, and the scenery in this part of the Des Moines Valley is picturesque. It has six churches, two school edifices, a town-hall, public library, a literary association, a weekly newspaper, two farming implement factories, two furniture, two wagon and carriage, and one stave and barrel factory, one steam grist-mill, and two potteries. Pop. 1518.

Means & Downing, Pubs. "Boone County Republican."

Boonsboro', a post-village and township of Washington co., Md. It has one weekly newspaper. Pop. of village, 835; of township, 2579.

Boons'brook, a township of Franklin co., Va. Pop. 2078.

Boon's Lick, a township of Howard co., Mo. Pop. 1686.

Boon's Station, a township of Alamance co., N. C. Pop. 1100.

Boon'ton, a city of Morris co., N. J., is on the Rockaway River and on the Boonton branch of the Delaware Lackawanna and Western R. R., about 30 miles from New York City and 16 miles from Paterson, N. J. It has iron-works among the largest in the U. S., if not in the world, the rolling-mills, nut-mills, plate-mills, nail-mills, and blast furnaces covering at least 50 acres of land. It has one weekly paper. Pop. of township, 3458.

S. L. GARRISON, ED. "REPUBLICAN."

Boon'ville, the capital of Warrick co., Ind., is 11 miles from the Ohio River and 17 miles from the city of Evansville, at the crossing of the Lake Erie Evansville and South-western and the Vincennes and Owensboro' R. Rs. It has one weekly paper. Pop. 1039.

WM. SWINT, ED. OF "ENQUIRER."

Boonville, a post-village of Oneida co., N. Y., on the Utica and Black River R. R., 35 miles N. of Utica, and on the Black River Canal. It has several churches and mills, one bank and one weekly newspaper. Pop. 1418; of the township, 4106.

Boonville. See BOONEVILLE.

Boonville, a township of Yadkin co., N. C. Pop. 1058.

Boor'hanpoor', or **Burhanpoor** [Hindoo, *Barhanpoora*], a city of Hindostan, the ancient capital of the Candeish, is on the river Taptee, 309 miles by rail N. E. of Bombay. It is on the Great Indian Peninsular R. R. It is one of the largest and best-built cities of the Deccan, and has wide and regular streets and brick houses. Among the remarkable buildings is a mosque built by Aurungzeb, and an old royal palace which is nearly ruined. This city was taken by Akbăr about 1600. It has manufactures of gold and silver thread for brocade. Pop. 20,000.

Boor'los, or **Bourlos,** a shallow lagoon of Lower Egypt, in the delta of the Nile, about 5 miles E. of Rosetta, is 38 miles long. It communicates by a single channel with the Mediterranean, from which it is separated by a narrow tongue of land.

Boo'ro, Buru, or **Bouro,** an island of the Malay Archipelago, is about 60 miles W. N. W. of Amboyna, and lies between lat. 3° and 4° S., and between lon. 126° and 127° E. Area, estimated at 2000 square miles. The surface is mountainous, but the soil is fertile. It contains Mount Dome, which is said to be 10,400 feet high. Cajeli Bay, on the N. side, affords good anchorage.

Boo'roogird', Boorojird, or **Burugird,** a town of Persia, province of Irak-Ajemee, is in a fertile valley about 184 miles N. W. of Ispahan, and 74 miles S. S. E. of Hamadan. It has a castle and several mosques. It has an extensive trade in cotton goods, of which it is said to export over 1,000,000 francs' worth annually. Pop. in 1868, 10,000.

Boos'sa, or **Boussa,** a town of Central Africa, in Soodan, is on an island in the Niger, in about lat. 10° 20′ N., lon. 4° 30′ E. It is enclosed by a wall. Pop. estimated at 14,000. Mungo Park died here.

Boot [Fr. *botte;* Sp. *bota,* a "boot," originally a "leathern bottle," and applied to a boot from its fancied similarity to a bottle], a covering for the foot and lower part of the leg, which seems to have been worn in England as far back as the times of the Anglo-Saxons. Various similar coverings for the foot are known to have been worn in Egypt and other countries in very ancient times, but they all seem to have more closely approached the shape of the modern shoe. Before the time of the wars of the Roses the boot was a part of the regular dress of knights. The names "top-boot," "Wellington boot," "jack-boot," etc. are applied to forms of the boot that have been worn at various times.

BOOT, an instrument for the judicial torture of accused persons and recusant witnesses, once used in Scotland. It was a case made of wood or iron, which enclosed the leg, and wedges were driven between the boot and the leg until the questions asked were satisfactorily answered. In many cases the leg was crushed and still no answer was given. The use of this torture was not abolished until the reign of Queen Anne.

Boo'tan', Boutan, Bhotan, or **Butan,** a state or country of India, is bounded on the N. by the Himalaya Mountains, which separate it from Thibet, on the E. by Thibet, and on the S. and W. by Bengal. It extends from lat. 26° 18′ to 28° N., and from lon. 88° 30′ to 92° 30′ E. Area, estimated at 64,500 square miles. The surface is mountainous. The Peak of Shumalari on the N. border rises about 27,000 feet above the sea. In the central parts are mountains from 8000 to 10,000 feet high, covered with forests of pine, ash, maple, birch, etc. Wheat, barley, rice, and maize are cultivated here. The religion of Bootan is Booddhism. The people practise polyandry and polygamy. The state is ruled by an actual sovereign called Deb-Rajah, and has a nominal head called Dherma-Rajah, who is treated as a god, but has little power. Pop. about 1,500,000.

Boö'tes [Gr. Βοώτης], a name of PHILOMELUS, a son of Ceres and a brother of Plutus. He is said to have invented the plough, and used it in cultivation of the soil. To reward him for this service he was translated into a constellation, under the name of Boötes.

Boötes, a northern constellation, is represented on celestial globes as a man holding in one hand a club, and in the other a leash by which he leads two hunting-dogs. This constellation comprises Arcturus, a star of the first magnitude. Boötes is bounded on the N. by Draco, on the E. by Corona Borealis and Serpens, on the S. by Virgo, and on the W. by Canes Venatici and Coma Berenices.

Booth, a name which seems to have been originally given to tents and other temporary structures for the use of dealers at fairs. These afterwards became permanent, stall-like structures in streets and public places, and were for a long time much employed by respectable merchants, as similar structures are even now in Oriental countries.

Booth (ABRAHAM), born at Blackwell, Derbyshire, England, in May, 1734, from 1769 till his death pastor of the Baptist church in Goodman's Fields, London. He was author of "The Reign of Grace" (1768) and "Pædobaptism Examined," 2 vols. 12mo, 1784. The latter work was republished in 2 vols. 8vo in 1829, and is regarded by the Baptists as an able argument in defence of their opinions. Died in 1806.

Booth. This name, long eminent on the stage, was first made famous by BARTON BOOTH, born in 1681. He first appeared in 1698 at Dublin, Ireland, in Thos. Southern's "Oroonoko." In 1701 he first acted in London, as Maximus in Lord Rochester's "Valentinian." Thenceforward his career was prosperous and distinguished. He left the stage in 1728, and died in 1733. He was deemed excellent in such various parts as Hotspur, Antony, Othello, and Henry VIII. He wrote a masque entitled the "Death of Dido" (1716). He was twice married, but left no children. He was an Englishman of good family, a good classical scholar, a quaint poet, and a notably handsome person. His grave is at Cowley, near Uxbridge, England.—JUNIUS BRUTUS BOOTH, born near London May 1, 1796, first appeared on the stage Dec. 13, 1813, at Deptford, England, as Campillo, in Tobin's "Honeymoon," and within four years became famous in London as Richard III. and Sir Giles Overreach. These and Pescara were his great parts. He first acted in America, July 13, 1821, at Richmond, Va., as Richard III. His career on the American stage was one long triumph—marred, however, by intemperance and incipient insanity. He died on a Mississippi River steamboat, Nov. 3, 1852, and was buried at Baltimore, Md. His wife was a Miss Holmes, of Reading, England. His children were: Junius Brutus, Rosalie Anne, Edwin Thomas, Annie Sydney, and Joseph Addison, who are living (1873), and Henry Byron, Mary, Frederick, Elizabeth, and John Wilkes, who are dead.—EDWIN BOOTH, a son of J. B. Booth, born at Baltimore Nov. 15, 1833, first appeared on the stage, Sept. 10, 1849, at the Boston Museum, as Tressel, in "Richard III." After several years of "strolling" in California and Australia, he returned to New York and other Northern cities, and speedily acquired a high professional rank. He opened Booth's Theatre, N. Y., Feb. 3, 1869—one of the best theatres in the world. His name, as an actor, is identified with Hamlet, Richelieu, Iago, Bertuccio, and Lucius Brutus. His acting is remarkable for intellectual power, refinement, and gleams of passionate fire. WM. WINTER, *of the New York "Tribune."*

Booth (JOHN WILKES), the assassin of Abraham Lincoln, born in Harford co., Md., in 1838, was a brother of Edwin, noticed above. He became an actor, and in the civil war sided with the secessionists. To avenge the "lost cause," he formed a conspiracy with Suratt, Powell, and others. On the 14th of April, 1865, he entered Ford's Theatre, Washington, and shot President Lincoln, who was sitting in a private box. Exclaiming, "*Sic semper tyrannis!*" he leaped down to the stage and broke his leg, but he mounted a horse that was standing ready and escaped to Virginia. He concealed himself in a barn near Bowling Green, where he was discovered by the detectives, and, refusing to surrender, he was shot, April 26, 1865.

Booth (MARY L.) was born at Yaphank, Long Island, April 19, 1831. She was for a time a school-teacher, and has written much for periodical literature. She has pub-

lished many translations from the French, and a "History of the City of New York" (1859).

Booth'bay, a post-township of Lincoln co., Me., on the Atlantic Ocean. Many of the inhabitants are employed in coasting and the fisheries. Pop. 3200.

Boo'thia Fe'lix, a peninsula or island of North America, in the Arctic Ocean, extends from lat. 69° to 75° N. It is bounded on the E. by Boothia Gulf. It was discovered by Sir John Ross, and named in honor of Sir Felix Booth.

Boothia Gulf, a part of the Arctic Ocean, separates Boothia Felix from Cockburn Island, and is a continuation of Prince Regent's Inlet. It is about 300 miles long.

Booth's Creek, a township of Taylor co., West Va. Pop. 1134.

Boo'ty [from the root of the Ger. *beuten*, to "buy," to "capture"], in international law, personal property captured on land by a public enemy in time of war. It differs from prize, which is captured at sea. (See PRIZE.) In the case of prize the ownership of the property does not pass to the captor until condemnation by a prize court. Booty belongs to the captor after an undisturbed possession of twenty-four hours, and the right of *post liminium* is at an end. (See POST LIMINIUM.) In strictness of law, booty belongs to the sovereign, and not to the individual soldier who captures it. It is quite common for the sovereign power to bestow a portion or the whole of it upon its subjects. This matter, however, is not governed by international rules, but by the municipal law of the captor.

Bopp (FRANZ), an eminent German philologist, was born at Mentz Sept. 14, 1791. He studied languages in Paris and Göttingen, and became in 1821 professor of philology at Berlin. He published a "Glossarium Sanscritum" and a "Critical Grammar of the Sanscrit Tongue." He was an efficient promoter of the study of Sanscrit, and is regarded as the founder of the science of comparative philology. His most important work is a "Comparative Grammar of the Sanscrit, Zend, Greek, Latin, Lithuanian, Old Sclavonian, Gothic, and German Languages" (1833), which has been translated into English and published at Oxford (3 vols., 1845–50). Died Oct. 23, 1867. (See Preface to the English translation of Bopp's "Comparative Grammar," 1845.)

Bo'ra, von, or **Boh'ren** (KATHARINA), a German nun who became the wife of Martin Luther, was born in Saxony Jan. 29, 1499. She was converted to the Lutheran doctrines, and escaped from her convent in 1523. She was married to Luther in June, 1525. In his last will he commended her as a good wife. She died Dec. 20, 1552. (See WALCH, "Geschichte der Catharina von Bora," 2 vols., 1752–54; HOFFMANN, "Catharina von Bora," 1845.)

Boraç'ic (or **Bo'ric**) **Aç'id** (B_2O_3), a compound of two equivalents of boron with three of oxygen. It is obtained in white shining scales, which are soluble in water and in alcohol, to the flame of which this acid imparts a beautiful green color. Boracic acid occurs native in certain lagoons of Tuscany, and in a crater in the island of Vulcano (Volcano), north of Sicily. The native boracic acid is of great commercial importance in the manufacture of borax. It also occurs in the form of borax (biborate of soda) in many waters, especially in certain springs and lakes in Thibet and California.

Bor'age (*Borago*), a genus of herbs of the order Boraginaceæ, have five stamens and a wheel-shaped corolla, the mouth of which is closed with five teeth. The common borage (*Borago officinalis*) is a native of Europe, has blue flowers, and rough, hairy leaves and stems. It is mucilaginous and emollient. It was formerly much cultivated, and supposed to possess valuable medicinal virtues and exhilarating qualities.

Boragina'ceæ, a natural order of exogenous plants, natives of temperate climates. It comprises nearly 600 species, mostly rough, hairy herbs, with alternate entire leaves. The corolla is generally regular and imbricated in the bud, with five stamens inserted on the tube of the corolla. It has a single style and a deeply 4-lobed ovary, which forms in fruit four seed-like nutlets or achenia. The whole plant is mucilaginous and emollient. Among the examples of this order are borage, alkanet, and comfrey (*Symphytum*), to which some botanists add the fragrant heliotrope.

Bo'rax, or **Bibo'rate of Soda** (sodium-biborate or sodic-biborate), a compound of boracic acid and soda ($2NaBO_2.B_2O_3.10H_2O$), is found native as a saline incrustation on the shores of lakes in Persia, Thibet, and Italy. The impure borax collected on these shores is called *tincal* or crude borax, which is also found in Peru, India, California, Nevada, and other regions. Borax is also prepared from boracic acid by solution in boiling water, and the addition of a boiling solution of carbonate of soda (Na_2CO_3). It is also prepared from borate of lime, a salt largely procured from Chili, Peru, etc. The common hexagonal crystalline borax contains ten equivalents of water, one of soda, and one of boracic acid. When it crystallizes in octahedrons it contains only five atoms of water. Borax is a white salt of a sweetish taste, soluble in twice its weight of boiling water. It is useful as a flux in promoting the fusion of metallic mixtures, and producing fusible silicates in assaying and in welding iron. As an agent in experimenting with the blowpipe it is valuable for the readiness with which it forms colored glasses with various metallic oxides. It is also used in medicine, and as a detergent in the laundry.

Borax Lake, a small lake in California, N. of San Francisco, the water of which is a strong solution of borax. Crystals of borax are also found in large numbers in the muddy sediment at the bottom. Many hundreds of tons of these have been collected and sent to the San Francisco market.

Borda (JEAN CHARLES), an eminent French mathematician and astronomer, born at Dax May 4, 1733. He served as an engineer in the army, and became a captain in the navy. As a naval officer he fought for the U. S. in 1778–82. He wrote several scientific works, contributed much to the progress of nautical science, and invented or improved the reflecting circle. Aided by Delambre and Méchain, he measured an arc of the meridian from Dunkirk to the Balearic Isles. Died Feb. 20, 1799. (See M. BIOT, "Notice sur Borda" in the "Memoirs of the Academy of Sciences.")

Bord à Plouffe, a post-village of Laval co., Quebec (Canada), on the Isle Jesus and on the river des Prairies, 10 miles N. of Montreal, has a very large trade in lumber and horses. Pop. about 1200.

Bordeaux, a city and seaport of France, capital of the department of Gironde, is finely situated on a plain on the left bank of the river Garonne, 58 miles from its mouth and 364 miles by rail S. S. W. of Paris; lat. 44° 50′ N., lon. 0° 34′ W. It has a capacious harbor, and is accessible by vessels of 600 tons at all stages of the tide. The river, which is here about 650 yards wide, is crossed by a noble bridge of seventeen arches. Bordeaux is an archbishop's see. It is connected by several railways with Paris, Toulouse, Marseilles, and other towns. It is probably the most commercial city of France except Marseilles. The harbor is large enough to admit 1200 vessels of the largest size. Its commerce extends to all parts of the world. The newer portions of the city have wide streets and pleasant promenades lined with trees. Among its remarkable edifices are the Gothic cathedral, built or commenced about 1100; the church of Saint Croix, more than 850 years old; the town-hall; the Hôtel de la Marine; the bridge, which cost about $1,300,000; and the Great Theatre, which is one of the finest in Europe, and was built by Louis XVI. Bordeaux contains a mint, a college, a university or *Académie Universitaire*, a normal school, a school of navigation, and a public library of 120,000 volumes. Here are extensive manufactures of wine, brandy, chemicals, printed calicoes, woollen goods, carpets, hats, paper, etc. The chief articles of export are wine, brandy, vinegar, dried fruits, turpentine, and glass bottles. Wine of superior quality, called Médoc, claret, or Bordeaux wine, is produced in this vicinity. The principal merchants of Bordeaux are engaged in the wine-trade. The Canal du Midi affords a communication with the Mediterranean. Pop. 194,241.

Burdigala was founded before the Christian era, and was the capital of the Bituriges Vivisci. It became the capital of Aquitania Secunda in the reign of Hadrian. In 1152 it was transferred to the crown of the English kings by the marriage of Henry II. with Eleanor of Guienne. The famous Black Prince held his court here. It has belonged to France since 1451. Among the remains of the ancient city is a palace of Gallienus. During the revolution of 1789 this city was the head-quarters of the Girondists, and suffered terribly at the hands of the Terrorists. In consequence of the damage to its commerce by the continental system of Napoleon, Bordeaux was one of the first cities to declare for the Bourbons. On Dec. 10, 1870, the seat of government was transferred to Bordeaux while Paris was besieged by the German armies and several members of the provisional government were shut up in the metropolis. The provinces were then subject to the authority of Gambetta and his colleagues, who, after they had been driven from Tours by the approach of the enemy, removed to Bordeaux. The National Assembly, elected in Feb., 1871, met first in this city, but removed to Versailles in March of that year.

Bordeaux, a township of Abbeville co., S. C. Pop. 2232.

Bordeaux Wines, a general name for several sorts of

French wine produced in the department of Gironde. The red wines of Bordeaux are commonly called claret in the U. S., to which they are largely exported. The average quantity produced annually in the Gironde is about 48,000,000 gallons. Among the best of these wines are the Médoc, which is red, and the Graves, which is white. No French wines except champagne are so largely exported.

Borden (GAIL), the inventor of that industrial product known as "condensed milk," was born in Norwich, N. Y., in 1801. In 1829 he removed to Texas, where he was first a U. S. surveyor, then a journalist, and at last collector of the port of Galveston. In 1853 he succeeded in producing condensed milk, after arduous and persevering efforts; and after securing a patent on his invention he began to introduce it in the market. He died Jan. 11, 1874, at Bordenville, Tex., where he had a large factory for the production of concentrated foods. He lived to see his inventions utilized very extensively.

Borden (SIMEON), a civil engineer and mechanician, born in Fall River, Mass., Jan. 29, 1798. He was appointed in 1834 director of the geodetic survey of Mass., for which he invented valuable apparatus. He was an engineer in the construction of several railroads. Died Oct. 28, 1856.

Bor'dentown, a city of Burlington co., N. J., on the Delaware River and the Camden and Amboy R. R., 30 miles N. E. of Philadelphia and 6 miles S. E. of Trenton. It is the terminus of the Delaware and Raritan Canal. Its site is about 60 feet above the river. It has 9 churches, 2 colleges, 1 bank, 1 weekly paper, a park, water and gas works, an opera-house, 2 public halls, 3 building associations, 3 Masonic bodies, 2 lodges of Odd Fellows, 3 beneficial societies, 2 councils of American Mechanics, and several foundries and manufactories. Here is a mansion built by Joseph Bonaparte, ex-king of Spain. Pop. of Burlington township, 6041. ED. OF "REGISTER."

Bore, called also **Ea'gre** (perhaps from the sea-jotun ŒGIR, which see). In estuaries into which large rivers flow, the struggle between the ascending tidal wave and the opposing current of the stream produces the imposing phenomenon of a huge wave, which, like a moving wall of water, advances with great rapidity and a deep roaring noise up the river, often for hundreds of miles, to the limit of tide-water. This is called the *bore*. In the Hoogly River, one of the main mouths of the Ganges, the bore rushes up the river with great impetuosity. In the Chinese river Teintang it rises to thirty feet in height, and travels at the rate of twenty-five miles an hour, sweeping everything before it. In the Amazon River, at the time of the equinoxes, bores of fifteen feet in height follow each other in quick succession, and within the space of 200 miles five such mighty waves may be seen travelling simultaneously up the river. The Indians, imitating the roaring sound of the bore, call it *pororoca*. ARNOLD GUYOT.

Bore, the internal cavity of any kind of firearm, which is more commonly cylindrical, but often furrowed spirally. (See GUN-MAKING, by CAPT. R. P. PARROTT.)

Borel'li [Lat. *Borellus*], (GIOVANNI ALFONSO), an Italian physician and astronomer, born at Naples Jan. 28, 1608. He is called the founder of the iatro-mathematical school, which proposed to apply mathematics to medicine. He resided for many years in Rome, and was patronized by Queen Christina of Sweden. His most remarkable work is "De Motu Animalium" (1680). Died in Rome Dec. 31, 1679.

Boreman (ARTHUR INGRAHAM), born at Waynesburg, Pa., July 24, 1823, settled in West Virginia, where he practised law. He became the first governor of the new State in 1863, and in 1869 was elected to the U. S. Senate.

Bo'rer, a name applied to the larvæ of many insects which feed upon trees and vegetables, in which they eat holes. Their ravages are very great. The peach tree borer is the larva of *Ægeria exitiosa*, a lepidopterous insect; and species kindred to the last named attack the pear tree, the currant bush, and many other useful plants. The locust tree borer is the larva of a coleopterous insect, the *Clytus pictus*, which, with other larvæ, has seriously diminished the supply of this valuable timber tree. The apple tree is especially attacked by the grub of the *Saperda bivittata*. Borers are most easily destroyed by a wire or gouge while they are in their holes; and though many plans have been devised for preventing their ravages, none as yet are very successful.

Borġet'to, a town on the island of Sicily, in the province of Palermo, 13 miles W. S. W. of Palermo, is finely situated on a cliff. Pop. 5977.

Borghese (CAMILLO), PRINCE, was born at Rome July 19, 1775. He served in the French army in his youth, and married in 1803 Pauline, a sister of Napoleon. He was in 1806 created duke of Guastalla. He sold the Borghese collection of antiquities and artistic treasures to Napoleon for 13,000,000 francs. These had been collected by his father, Marc Antonio. Died April 10, 1832.

Borghe'si (BARTOLOMMEO), COUNT, an Italian antiquary and numismatist, born at Savignano June 11, 1781. He formed a rich collection of medals and coins, and distinguished himself by his successful efforts to illustrate the military, political, and municipal institutions of ancient Rome. His chief work is "Nuovi Frammenti dei Fasti Consolari Capitolini" (2 vols., 1818–20). Died April 10, 1860.

Bor'gia (CESARE), duc de Valentinois, an infamous Italian cardinal and soldier, was a natural son of Pope Alexander VI. He was raised to the rank of cardinal in 1492, and received from Louis XII. of France the title of duc de Valentinois in 1498. He married a daughter of the king of Navarre in 1499. With the connivance of the pope, his father, he waged with success an aggressive war against several princes of the Romagna who were feudatories of the Roman see. He was guilty of many acts of cruelty and treachery, and procured the death of several persons by poison. He made himself master of the duchy of Urbino, but his prosperity was ruined by the death of Pope Alexander VI. in 1503, and the accession of Julius II., who was an enemy of Cesare Borgia. The latter was arrested and imprisoned in 1504, but he escaped in 1506 and joined the army of the king of Navarre. He was killed in battle Mar. 12 1507. (See TOMASI, "Vita del Duca di Valentino," 1655; "Leben des C. Borgia," Berlin, 1782.)

Borgia (LUCREZIA), an Italian woman renowned for beauty, talents, and vices, was a sister of Cesare Borgia, noticed above. She was married in 1493 to Giovanni Sforza, lord of Pesaro, and in 1501 to Alfonso of Este, a son of the duke of Ferrara. She patronized Bembo and other literati, who complimented her in their works. She was accused by contemporaries of incest and poisoning, but several modern writers maintain that the charges against her character are greatly exaggerated. Died in 1520. (See GILBERT, "Lucretia Borgia, Duchess of Ferrara," 2 vols., London, 1869.)

Borgne, a lake or bay in the S. E. part of Louisiana, is 12 miles E. of New Orleans. It is 60 miles long, and 25 miles wide at the broadest part. It communicates with the Gulf of Mexico on the E., and is connected with Lake Pontchartrain by the Rigolets Pass, which is 10 miles long. The lake is surrounded to a great extent by marshes and cane-brakes, separated from it by a narrow ridge of shells. Steamers plying between New Orleans and Mobile traverse this lake.

Bor'go, an Italian word signifying "town" or "castle," occurs as a part of the names of many places in Italy and the Tyrol.

Bor'goo, a kingdom in Central Africa, W. of the Niger, S. of Gourma, E. of the Fellatah country, and N. of the kingdoms Egga and Yarriba. The banks of the Niger are fertile and thickly populated, producing rice, indigo, grain, cotton, yams, lemons, bananas, honey, and game in abundance. The sorghum-fields yield five hundred-fold. The forests are full of elephants of immense size. The population consists of the original inhabitants and Fellatahs and a Mohammedan conquering tribe speaking a language cognate with the Yarriba tongues. The government is an hereditary monarchy.

Bo'rie (ADOLPH E.), born in Philadelphia in 1809, was educated at the University of Pennsylvania and in Paris. He became a successful merchant of Philadelphia, and in 1862 was one of the founders of the Union League, and was a prominent supporter of the national government throughout the late civil war. He was in 1869 for some time secretary of the navy under President Grant.

Boring, for water, see ARTESIAN WELLS, by PROF. E. H. HILGARD, PH. D.; CANNON-BORING, see GUN-MAKING, by CAPT. R. P. PARROTT; CYLINDER-BORING, see MACHINERY.

Borissov', a town of Russia, on the Berezina, in the government of Minsk, 46 miles N. E. of Minsk. Near this place the army of Napoleon suffered a great disaster in its passage of the Berezina in Nov., 1812. Pop. 5233.

Borissoglebsk', a town of Russia, in the government of Tambov, 100 miles E. S. E. of Tambov. Pop. 12,254.

Bor'kum, an island in the North Sea, is at the mouth of the Ems, and 26 miles N. W. of Emden. It belongs to Prussia, is about 6 miles long and 2 miles wide. A lighthouse has been erected on it in lat. 53° 36′ N., lon. 7° 12′ E.

Bor'land (SOLON), a general in the Confederate army, and former U. S. Senator from Arkansas, born in Virginia, studied medicine and settled in Arkansas. In the Mexican war he served as major of volunteers, and was taken prisoner. He was elected to the U. S. Senate 1849, appointed U. S. minister to Central America 1853; and it was during

his term that the inhabitants of Greytown committed the act which he resented, and for which the town was destroyed by Com. Hollins, U. S. N., acting under instructions of his government. In April, 1861, and previous to the secession of Arkansas, he organized a force and captured Fort Smith, was appointed brigadier-general in the Confederate army, and died in Texas Jan. 31, 1864.

Bor'mio [Ger. *Worms*], a town of Italy, in the province of Sondrio, is near the Adda, and 32 miles N. E. of Sondrio. In its vicinity are the celebrated saline baths called Bagni di Bormio, having a temperature of 99° F. Pop. 1630.

Bor'na, a town of Saxony, 15 miles S. S. E. of Leipsic. It has manufactures of woollen cloths and earthenware. Pop. in 1871, 5751.

Bör'ne (Ludwig), a German satirical writer, born of Jewish parents at Frankfort-on-the-Main May 18, 1786, studied at Berlin and Heidelberg, adopted the Protestant faith in 1818, and edited the liberal "Waage" and "Zeitschwingen." After 1830 he lived in Paris, was correspondent of the "Allgemeine Zeitung," and edited "Le Balance." His "Briefe aus Paris" and other writings on political and æsthetical subjects are eloquent and witty, and display a singularly delicate critical sense, but are marked with bitterness of political feeling. ("Sämmtliche Werke," 12 vols., 1862–63.) Died Feb. 13, 1837. (See biographies of Beurmann, 1841, and Gutzow, 1840, and "Heine über Boerne.")

Bor'nemann (Friedrich Wilhelm Ferdinand), a Prussian jurist and statesman, born at Berlin Mar. 28, 1798, became minister of justice in 1848. He died Jan. 28, 1864, leaving several valuable legal works.

Bor'neo, called by the natives **Poolo-Kalamantin,** an island in the Malay Archipelago, extends from lat. 7° 1′ N. to 4° 10′ S., and from lon. 108° 50′ to 119° 2′ E. Its length is 807 miles, and it is about 700 miles wide. The area is about 289,000 square miles. The interior is traversed by chains of mountains, but has not been much explored by Europeans. Near the N. extremity of the island is a peak called Kinibaloo, which rises 13,680 feet above the sea. The maritime parts of the island are mostly marshes or low plains covered with dense forests. It is probable that a large portion of the interior consists of fertile valleys and plains. The outline is nowhere deeply indented by inlets. It is thought by many that the form of Borneo was formerly similar to that of Celebes, but that the bays have been filled up in the course of time, and now form those marshy districts on the coast so unhealthy to the inhabitants. Borneo is watered by numerous navigable rivers—viz., the Brunai, the Sarâwak, the Pontianak, the Kootai, the Pembuan, the Murong, and others. These mostly enter the sea through extensive deltas, and their mouths are so obstructed that large vessels cannot enter them; but they afford facilities for inland navigation. The climate in the low grounds is hot. The rainy season begins about October, and continues till April, during which period heavy rains fall. In the higher lands of the interior the climate is moderate and healthy. The mountains are chiefly formed of granite, syenite, limestone, and quartz. Among the mineral resources are gold, tin, antimony, zinc, diamonds, iron of fine quality, and coal, which latter is very abundant, and is excellent and easily mined. The principal commercial supply of antimony is at present from Borneo. Diamonds are widely disseminated in the soil, at a depth of several feet. One diamond found in Borneo weighed 367 carats. The vegetation of Borneo is exceedingly luxuriant. Among the forest trees are the teak, the ironwood, the gutta-percha tree, the ebony, the cocoa-palm, and various sago trees. The island produces also cinnamon, camphor, betel, pepper, ginger, cotton, rice, and yams. The forests and jungles are infested with tigers, bears, leopards, buffaloes, and orang-outangs. The elephant also is found here. The population is composed chiefly of four races—Malays, Dyaks, Boogis, and Chinese. The Malays, who mostly occupy the maritime parts of the island, are partly Mohammedans and partly pagans. The Dyaks, who live farther inland, are the aboriginal inhabitants, and are the most numerous of all the races in the island. They are divided into many tribes, and subsist mostly by hunting, fishing, and piracy. "They are not all," says Craufurd, "in an equally abject condition; for while some are mere naked hunters, the majority have fixed abodes, and have made some progress in the useful arts. . . . With respect to religion, they have neither priests nor temples, nor do they pray or fast." The population of the Dutch colonies in 1870 amounted to 1,189,353. Borneo is divided into many separate states, governed by native sultans. Among them are Borneo proper, Pontianak, Sambas, Sarâwak, Matan, Simpang, Sooloo, and Banjermassin. Borneo proper is a level tract which extends along the N. W. coast, and is bounded on the S. E. by a chain of mountains. A large portion of the island is subject to the power of the Dutch, whose chief towns and centres of authority are Pontianak on the W. coast, and Banjermassin on the S. coast. Among the other towns are Borneo, Sambas, Sarâwak, and Succadana.

History.—Borneo was discovered in 1518 by the Portuguese, who formed a settlement at Banjermassin in 1690. The Dutch, who first visited the island in 1598, made a treaty of commerce with the sultan of Sambas in 1609. They erected a fort and a factory at Tatis in 1643, and another at Pontianak in 1778. In 1841, Sir James Brooke, an enterprising Englishman, was appointed rajah of Sarâwak by the sultan of Borneo. He took strenuous measures for the suppression of piracy and the promotion of commerce. The prosperity of Sarâwak increased under his rule, and the British influence has become predominant on the western coast of Borneo. The exports of Sarâwak to Singapore amounted in 1858 to £300,000, and in 1864 (according to C. Brooke), £1,155,201. (See Schwaner, "Borneo," 2 vols., 1853–54; Veth, "Borneo's Westerafdeeling," 2 vols., 1854–56; C. Brooke, "Ten Years in Sarâwak," 2 vols., 1866.)

Revised by A. J. Schem.

Borneo, or **Brunai,** a seaport-town on the N. W. coast of Borneo, and on the river Brunai, about 10 miles from its mouth. It is the capital of the sultan of Borneo proper, and has considerable trade. The houses are built on posts, and canals pass through all the streets. Pop. about 25,000.

Born'holm, an island of Denmark, in the Baltic Sea, 90 miles E. of Zealand, and 25 miles from the southern extremity of Sweden. It is 24 miles long by 18 miles wide, and has an area of 225 square miles. Pop. in 1870, 31,894. The surface is mountainous, and the coasts rocky and dangerous to navigators. A lighthouse has been erected on Cape Hammeren, the most northern point of the island, in lat. 55° 18′ N., lon. 14° 47′ E. The soil in some parts is fertile. Valuable porcelain clay and rock-crystals are found here.

Bornoo', Bornu, or **Bornou** [native *Kanowra*], a state of Central Africa, in the Soodan, is bounded on the N. by the Sahara Desert, on the E. by Lake Tchad, on the S. by Mandara (or Fumbina), and on the W. by Houssa. The surface is mostly level; the soil is fertile, producing maize, millet, rice, cotton, indigo, pulse, etc. Cattle, horses, and sheep form a large part of the riches of the Bornooese. The climate is excessively hot, the thermometer often rising to 105° F. in the shade. The rainy season lasts from October to April. The principal rivers of Bornoo are the Shary and Yeou, which flow into Lake Tchad. A large portion of the country is inundated in the rainy season. Lions, panthers, and other beasts infest the forests, which occur only in the vicinity of the rivers. Minerals are said to be rare in Bornoo. The natives manufacture cotton cloth and coats-of-mail, which they use in warfare. The chief exports were until lately slaves and gold-dust. The dominant race, called Shouas, are of Arab descent and are bigoted Mohammedans.

History.—Bornoo was formerly a part of the kingdom of Kanem, which, founded in the ninth century, rose to its highest point of power in the twelfth. At the end of the fifteenth century, King Ali-Dunamánî founded Bornoo. It attained its greatest power under Edrîss Alaoma (1571–1603), who conquered all the surrounding tribes, and even extended his territory to the shores of the Atlantic. Under his peaceful and extravagant successors the power of Bornoo again declined, until in 1808 it could no longer resist the continued attacks of the Fellatah, who took and destroyed the old capital, Birni. The king then established himself at Kuka. An Arab from Fezzan, however, soon defeated the Fellatah at Ngornu. His son Omar removed the old dynasty, and ascended the throne himself in 1835. Although not as strong and determined against his neighbors as his father, his rule has been extremely beneficial for the country, as he has encouraged trade and industry. He also assisted, as much as was in his power, the European travellers who visited his country, among them Denham, Clapperton, Beurmann, and Rohlfs, the latter of whom says in his account, "No European prince could have assisted a traveller more than Omar, the negro prince of Soudan, assisted me, the white Christian." Chief town, Kuka. Pop. about 5,000,000. A. J. Schem.

Bo'ro Bud'dor, or **Bo'ro Bo'do,** an ancient Booddhistic temple of Java, on the river Probo, 25 miles N. W. of Yugyakarta, believed to be the most elaborate specimen of Booddhist architecture now existing, and to have been built in 1350 A. D. It is a square pyramid, with nine terraces or stories (116 feet high, in all), and 400 feet square at the base, each terrace covered with cells or small houses

for monastics, and the whole covered with profuse carvings.

Borodi'no, a village of Russia, in the government of Moscow, and on the Kolocza River, 70 miles W. S. W. of Moscow. It is celebrated as the scene of a great battle between the army of Napoleon (125,000 strong) and the Russian army, of about 130,000 men, commanded by Gen. Kutusof, Sept. 7, 1812. The French remained masters of the field and claimed the victory, but they lost nearly 30,000 men. The loss of the Russians was still greater; some say 50,000 killed and wounded. The French took Moscow a few days after this battle, which they call the battle of the Moskwa; this is the name of a river near the battle-field.

Bo'ron [Lat. *borium*], (symbol B; equivalent 11; specific gravity about 2), a non-metallic element which Sir Humphry Davy discovered about 1808 by exposing boracic acid to the action of a galvanic battery. Combined with oxygen, it forms boracic acid, and it occurs in nature only in combination with oxygen, generally in the form of that acid or of BORAX (which see). Boron is obtained in the form of an olive-brown powder, which is infusible, and has neither taste nor smell. It is not used in the arts in a separate state. It may also be obtained in a graphitoidal form, in six-sided crystals. Crystallized boron is one of the most unalterable and indestructible of all simple substances. Wöhler and Deville have obtained boron by heating in a crucible a mixture of pure dry boracic acid with the metal aluminium, when the latter unites with the oxygen, leaving the boron as minute quadratic octahedral crystals, called boron diamonds. These rival the real diamond in lustre and refractive power, and are scarcely inferior to it in hardness. They scratch glass and the corundum, and resemble diamonds so much that they can scarcely be distinguished by external characters. No acids, pure or mixed, have any effect upon the boron diamond, nor can it be oxidized even when raised to a high temperature.

Borough, bŭr'rŭh, called in Scotland **Burgh** (pron. bŭR'H, almost bŭr'rŭh), in Great Britain and some of the U. S. is a name applied to certain corporate municipalities. Places in England sending burgesses to Parliament are called parliamentary boroughs.

Borough, a township of Beaver co., Pa. Pop. 379.

Borough English is a custom that prevails in some ancient boroughs in England, according to which the youngest son inherits the property within the borough in preference to his elder brothers. A posthumous son is entitled to this privilege, and dispossesses his elder brother.

Borovit'chi, a town of Russia, in the government of Novgorod, on the river Msta, 92 miles E. S. E. of Novgorod. It has an active trade in salt, coal, etc. Pop. 9108.

Borovsk', a town of Russia, in the government of Kalooga, 45 miles S. W. of Moscow. Pop. 8826.

Borrade, a township of Richardson co., Neb. P. 886.

Borrome'an I'slands, a group of four small islands of Northern Italy, in Lago Maggiore. They derive their name from the family of Borromeo. In 1671, Count Borromeo covered them with soil, and converted them from barren rocks into gardens. Their beauty is such that they are sometimes called the "Enchanted Islands." The largest of them is named Isola Madre, and is covered with orange trees and exotic plants. The most celebrated of the group is the Isola Bella, occupied by a beautiful palace of the Borromeo family, and a garden which rises in ten terraces, presenting the form of a truncated pyramid. Many tropical flowers are cultivated here.

Borrome'o [Lat. *Borromæus*], (CARLO), often called **Saint Charles Borromeo,** an illustrious Italian cardinal, born at Arona, on Lago Maggiore, Oct. 2, 1538, was a nephew of Pope Pius IV. He inherited an ample fortune, and was appointed a cardinal and archbishop of Milan in 1560. As legate of the pope he governed Bologna and Ancona with wisdom and moderation. Surrounded as he was with luxury and temptations, he was virtuous, studious, and a patron of literary men. He endeavored to reform the morals of the clergy and monks, and distinguished himself by acts of charity during the prevalence of famine and pestilence (1576). He wrote several religious works (5 vols. fol., Milan, 1747). Died Nov. 3, 1584. He was canonized in 1610. (See POSSEVINO, "Vita di Carlo Borromeo," 1591; GODEAU, "Vie de Saint Charles Borromée," 1748; TOURON, "Vie de Saint Charles Borromée," 3 vols., 1761; ALBAN BUTLER, "Vita di S. C. Borromeo," 1835; ALEXANDRE MARTIN, "Histoire de la Vie de S. C. Borromée," 1847.)

Bor'row (GEORGE), an English author, born at Norwich in Feb., 1803. He became master of several modern languages, for learning which he had remarkable talents. In his youth he associated with the gypsies. As an agent of the British and Foreign Bible Society he travelled through many countries of Europe. He published in 1841 "The Zincali, or an Account of the Gypsies in Spain," and in 1843 "The Bible in Spain, or Journeys, Adventures, and Imprisonment of an Englishman in an attempt to Circulate the Scriptures in the Peninsula," which is a graphic and interesting work. His next work, "Lavengro, the Scholar, the Gypsy, and the Priest" (3 vols., 1851), is regarded as an autobiography. He has also written "Rommany Rye" (1857), "Wild Wales" (1862), and many other works.

Bor'rower, one to whom a chattel is loaned without compensation, which is to be returned in a specified time or on demand. (See BAILMENT.) The word is often used in a popular sense to denote a hirer of money, who pays a compensation for its use. The difference between these two transactions should be carefully noted. In the first signification the borrower agrees to return the specific thing loaned. He is only liable for negligence or the absence of due care. In the second case (loan of money) there is only an agreement to return an equivalent sum. The relation of debtor and creditor is created, and a failure to pay causes the debt to bear interest.

Bor'rowstounness', or **Boness',** a seaport-town of Scotland, in Linlithgowshire, on a low peninsula in the Frith of Forth, 17 miles W. N. W. of Edinburgh. It has a safe harbor, and manufactures of soap, salt, malt, vitriol, and earthenware. Here are coal-mines which extend under the bed of the Forth. Limestone and ironstone are found in the parish, which is traversed by the Roman wall of Antoninus.

Borsa, a town of Hungary, in the county of Marmaros, 50 miles S. E. of Szigeth. Pop. in 1869, 5053.

Borsip'pa [Gr. Βόρσιππα], an ancient city, which according to Strabo was in Babylonia, but there has been much doubt as to its exact situation. Stephanus calls it a city of the Chaldæans. It was probably situated near Babylon. Strabo states that it was sacred to Apollo and Diana. Some modern writers believe that Borsippa is represented by the remarkable mound called Birs-Nimrood, about 5 miles S. W. of Hillah, the site of Babylon proper. (See BABYLON and BABEL.)

Bor'sod, a county of Hungary, is bounded on the N. by the counties of Torna and Gömör, on the E. by Aba-Ujvar and Szabolcs, and on the S. and W. by Heves. Area, 1370 square miles. The county consists chiefly of vineyards and wooded hills, except in the S. E., which is a plain traversed by several small rivers, while the Theiss forms the eastern boundary. The chief products are fruit, hemp, tobacco, and wine, that of Miskolcz being the best in Hungary. Copper, iron, and coal are found in the mountains. Chief town, Miskolcz. Pop. in 1869, 195,037.

Bory de Saint-Vincent (JEAN BAPTISTE GEORGE MARIE), BARON, an eminent French naturalist and traveller, born at Agen in 1780. He explored the island of Mauritius about 1800, and published a "Voyage among the African Islands" (3 vols., 1804). He afterwards served as a captain in the army at Austerlitz and other battles, and became an exile in 1815. With the aid of Van Mons he edited at Brussels the "Annales des Sciences Physiques," 8 vols. He had the chief command of a scientific expedition which the French government sent to Algeria in 1839. Died Dec. 22, 1846. (See HÉRICART DE THURY, "Notice sur le Baron Bory de Saint-Vincent," 1848.)

Bos (gen. *bovis*), the Latin for an "ox" or "cow," is the systematic name for the genus of ruminant animals which comprises the ox, buffalo, etc. (See BOVIDÆ and OX.)

Bos, Bosch, or **Bosco** (HIEROM), a Dutch painter and engraver, born at Bois-le-Duc about 1470. Among his favorite subjects were spectres, demons, and incantations. He also painted some scriptural pieces. His picture of the "Crucifixion" is in the Escurial, in Spain. Died about 1530,

Bo'sa, a seaport-town of the island of Sardinia, is on the W. coast, at the mouth of the Termo, in the province of Cagliari, 30 miles S. of Sassari. Its harbor is safe, but admits only small vessels. It is the seat of a bishop, and has a cathedral, an old castle, and several churches. Wine, oil, and grain are exported. Pop. 6329.

Bosca'wen, a post-township of Merrimack co., N. H., contains the village of Boscawen, which is on the Merrimack and on the Northern R. R., 10 miles N. N. W. of Concord. It has manufactures of furniture, lumber, leather, shoes, and brick. Pop. 1637.

Boscawen (EDWARD), an English admiral, a son of Viscount Falmouth, was born Aug. 19, 1711. He served with distinction under Anson at Cape Finisterre, May, 1747, and commanded an expedition to the East Indies in 1748. He became a vice-admiral of the blue in 1756, was sent

to North America, and gained several victories over the French in 1758. In Aug., 1759, he defeated the French fleet in the Bay of Lagos. He received for this service an annual pension of £3000. Died Jan. 10, 1761. (See CAMPBELL, "Lives of the British Admirals.")

Bosch-boc [Dutch for "bush-buck"], the *Tragelaphus sylvaticus*, a South African antelope, which is almost always found in thick underbrush which is not easily penetrated by man. When surprised in the open country it is easily caught, and is prized for its fine venison. It is about four or five feet long, and has a voice like the barking of a dog. Several other African antelopes have this name.

Bosch-vark [Dutch for "bush-pig"], a wild hog of

Bosch-Vark, or Guinea Hog.

Southern and Western Africa, in size and in habits much resembling the common hog. It has long pointed ears, a long tail, and is of a dull red color, with white marks. It goes in herds, and when at bay the stroke of the boar's tusks is much dreaded.

Bos'cobel, a post-village and township of Grant co., Wis. The village is on the Wisconsin River and on the Milwaukee and St. Paul R. R., 70 miles W. of Madison. It has a national bank and one weekly newspaper. Pop. 1509; of township, 1650.

Bos'covich (RUGGIERO GIUSEPPE), F. R. S., an astronomer and natural philosopher, born at Ragusa, in Dalmatia, May 18, 1701. He entered the order of Jesuits in 1725, and became professor of mathematics and philosophy in the Roman College in 1740. He was one of the first on the Continent who adopted the Newtonian philosophy. His Latin poem "On the Eclipses of the Sun and Moon" (1764) was much admired. He wrote various scientific works, among which we notice "Philosophiæ Naturalis Theoria" (1758) and "Opera Pertinentia ad Opticam et Astronomiam" (5 vols., 1785). The latter is a collection of treatises on optics and astronomy. He died at Milan Feb. 12, 1787. (See FABRONI, "Vitæ Italorum doctrina excellentium;" RICCA, "Elogio storico dell' Abate R. G. Boscovich," 1789.)

Bo'shart, a township of Marshall co., Ala. Pop. 464.

Bo'sio (FRANÇOIS JOSEPH), BARON, an eminent sculptor, born at Monaco Mar. 19, 1767. He worked in Paris, and was patronized by Napoleon I., for whom he executed busts of Josephine and her daughter Hortense; also the bas-reliefs of the column of the Place Vendôme. Among his masterpieces are the "Hyacinth" in the Luxembourg, "Cupid Darting Arrows," and the "Nymph Salmacis." His works are remarkable for grace and harmony. He was a member of the French Institute. Died July 29, 1845.

Bos'na-Serai', or **Sarajevo** (anc. *Tiberiopolis*), a town of European Turkey, capital of the province of Bosnia, is beautifully situated on the Migliazza, 115 miles S. W. of Belgrade. It is an important centre of commerce, and is the dépôt of the caravan trade between Salonica and Yánina. It is adorned with 150 mosques and churches, the domes, minarets, and spires of which give it an Oriental aspect. Here is a palace built by Mahomet II. The town is defended by a citadel, and has manufactures of cutlery, jewelry, woollen goods, and leather. Pop. about 45,000.

Bos'nia, a province forming the N. W. extremity of Turkey in Europe, is bounded on the N. by the river Save, on the E. by the Drin, on the S. by Albania, and on the W. by Austria. Area, 26,874 square miles. The surface is for the most part mountainous, and the Dinaric Alps extend along the western border. Some peaks of this range rise about 7000 feet above the level of the sea. The largest rivers, besides the Save, are the Bosna, the Verbas, the Narenta, and the Drin (or Drina). The mountain-slopes are covered with forests of oak, beech, chestnut, and other trees. The soil of the plains and valleys is fertile, and produces good crops of maize, wheat, hemp, and various fruits. Bosnia is rich in coal, iron, lead, and other metals, but the mines are not worked to a great extent. This province has few manufactures except firearms, sabres, and knives. The population is a mixture of Bosnians, Croats, Morlaks, Turks, Illyrians, Jews, gypsies, etc., the majority being of the Slavic race. The Bosnians, who are the most numerous, are partly Mohammedans and partly members of the Greek and Roman Catholic churches. They are brave, honest, and industrious, but cruel and rapacious. The Morlaks live mostly in the Herzegovina, and are Christians. In ancient times this province was part of Pannonia. It was annexed to the Ottoman empire by conquest in 1522. Capital, Bosna-Serai. Pop. in 1867, 1,100,000.

Bos'phorus, or **Bos'porus** [Gr. Βόσπορος, *i. e.* the "ox-passage," because cattle could swim it], the ancient name of the strait which connects the Black Sea (Pontus Euxinus) with the Sea of Mármora (Propontis), and forms part of the boundary between Europe and Asia. It is about 16 miles long, and varies in width from a half mile to two miles. The Bosphorus is deep, and flows between high shores and cliffs, which present much picturesque scenery, the beauty of which is enhanced by many ancient ruins. Constantinople stands at the S. W. end of the Bosphorus, which is sometimes called the Strait of Constantinople. It was also called the Thracian Bosphorus, to distinguish it from the Cimmerian Bosphorus, the modern name of which is the Strait of Yenikale.

Bos'phorus, Cimme'rian [Gr. Βόσπορος Κιμμέριος], the ancient name of the Strait of Yenikale (or Strait of Kaffa), which connects the Black Sea with the Sea of Azof (Palus Mæotis). The width of the narrowest part is about 3½ miles. On the W. side of it was a Milesian colony and the city of Panticapæum, which was the capital of a kingdom founded by the Archæanactidæ in 480 B. C. This kingdom endured several centuries under various dynasties, whose dominions were on both sides of the strait.

Bosque, a county in N. Central Texas. Area, 905 square miles. It is bounded on the N. E. by the Brazos River, and intersected by the Bosque River. The surface is undulating, and partly covered with forests; the soil is based on limestone, and is fertile. Cotton and corn are the chief crops. Wool is also raised. Capital, Meridian. Pop. 4981.

Bosque River, Texas, rises in Erath co., flows southeastward through Bosque co., and enters the Brazos at or near Waco. Its length is estimated at 100 miles.

Bosquet (PIERRE FRANÇOIS JOSEPH), a French general, born at Pau Nov. 8, 1810. He served in many campaigns in Algeria, became a general of brigade in 1848, and a general of division in 1853. In the Crimean war he commanded a division at Alma, and rendered important services at Inkermann 1854, for which he received the thanks of the British Parliament. He was disabled by a wound at the siege of Sebastopol, Sept., 1855, and became a senator and marshal of France in 1856. Died Feb. 5, 1861.

Boss [Fr. *bosse*], a stud or knob; a protuberant ornament of silver, ivory, or other material used on harness, shields, etc.; a projecting ornament at the intersection of the ribs of ceilings or vaulted roofs.

Boss, in mediæval architecture, was a term applied to a piece of stone, usually carved in a fanciful manner, which covers the intersection of a series of arches. It is commonly finished with a flower or a human masque, and is one of the most characteristic specimens of mediæval decoration.

Bossage, a French word used in architecture, denotes a stone in a building which is left projecting and rough, to be finally wrought into a sculptural decoration; also rustic work, consisting of stones which advance beyond the nave or level of the building.

Bossi (LUIGI), an Italian antiquary and historian, born at Milan Feb. 28, 1785. He was appointed prefect of the archives of the kingdom of Italy by Napoleon. Among his numerous works are a "History of Italy" (19 vols., 1819–23) and an "Introduction to the Study of the Arts of

Design." Died April 10, 1835. (See G. B. CARTA, "Cenni biografici intorno al Cavaliere L. Bossi," 1835.)

Bossier, a parish of Louisiana, bordering on Arkansas. Area, 1000 square miles. It is bounded on the E. by Bayou Dauchite, and on the W. by the Red River. Lake Bistineau forms the S. E. boundary of this parish, which also contains Lake Bodeau. Cotton, corn, and wool are raised. Capital, Bellevue. Pop. 12,675.

Bossuet (JACQUES BÉNIGNE), D. D., a celebrated French pulpit orator and theologian, born at Dijon Sept. 27, 1627. He entered in 1642 the College of Navarre in Paris, where he studied Greek, Latin, philosophy, and theology. In 1652 he was ordained a priest, received the degree of doctor, and became canon of Metz. Having become renowned as a pulpit orator, he was appointed to preach the Advent sermons before the king and court in 1661. In the ensuing years he preached in many churches of Paris, and converted Marshal Turenne to the Catholic communion. He was appointed bishop of Condom in 1669, and preceptor to the dauphin in 1670. He defended his Church against the Protestants in an eloquent work entitled "Exposition of the Doctrine of the Catholic Church on Subjects of Controversy" (1671). In 1671 he was admitted into the French Academy. For the instruction of the dauphin he wrote a "Discourse on Universal History" (1681). He became bishop of Meaux in 1681, and was the author of four articles which were adopted by an assembly of French clergy in 1682, and which secured the liberties of the Gallican Church against papal aggression. His capital polemical work against the Protestants is his "History of the Variations of the Protestant Churches" ("Histoire des Variations des Églises Protestantes," 2 vols., 1688). He was involved in a controversy with Fénelon, whom he censured for his defence of Madame Guyon and her quietism. He was the chief French champion of the Catholic Church in that age. He died April 12, 1704. Among his most admired compositions are funeral orations on the prince of Condé (1687), on the duchess of Orleans (1670), and other eminent persons. A good edition of his complete works was published at Paris in 59 vols., 1825. (See D'ALEMBERT, "Éloge de Bossuet;" M. DE BAUSSET, "Histoire de Bossuet," 4 vols., 1814.)

Bossut (CHARLES), a French geometer, born near Lyons Aug. 11, 1730, was a friend of Fontenelle. He was admitted into the Academy of Sciences in 1768. Among his works are a "Treatise on Mechanics and Dynamics" (1763), a "Complete Course of Mathematics" (7 vols., 1795–1801), and an "Essay on the General History of Mathematics" (2 vols., 1802). He published an edition of Pascal's works. Died Jan. 14, 1814. (See DELAMBRE, "Éloge de Bossut.")

Bostan', Al (*i. e.* the "garden"), a town of Asiatic Turkey, pashalic of Marash, is in a plain and on the river Sihun, near the northern base of Mount Tarsus, 32 miles N. N. E. of Marash. It has several mosques, and a trade in wheat. Pop. about 8000. Here the Egyptian sultan Bibars defeated the united Turks and Mongolians in a great battle on April 16, 1277.

Bos'tick's, a township of Pickens co., Ala. Pop. 479.

Bos'ton, an ancient borough and seaport of England, in Lincolnshire, is on both sides of the river Witham. It is on the Great Northern Railway, 107 miles by rail N. of London. Vessels of 300 tons can ascend the river to this place, which is supposed to be identical with Icanhoe, where Saint Botolph founded an abbey in 654 A. D. About 1200, Boston was one of the chief seaports of England. Here is the parish church of St. Botolph, built in 1309, which is 245 feet long, and has a tower 290 feet high, surmounted by a lantern which is visible nearly forty miles at sea. Boston has manufactures of canvas, iron, brass, ropes, hats, leather, etc. Pop. 15,576.

Boston, an important commercial city, the capital of Massachusetts, and the most populous city of New England, is finely situated on the W. side of Massachusetts Bay, at the mouth of Charles River; lat. 42° 21′ 27.6″ N., lon. 71° 3′ 30″ W. It is 232 miles by railroad N. E. of New York, 200 miles E. by S. of Albany, and 44 miles N. N. E. of Providence. It is the seat of justice of Suffolk county. The site of Boston proper, formerly a small peninsula, the surface of which was uneven, and the highest point about 138 feet above the level of the sea, now in 1874 contains about 19,150 acres, a large portion of the territory having been obtained recently by annexation. The former isthmus, known as The Neck, has recently been greatly changed, large areas having been filled up on both sides, and covered with buildings. The city includes, besides Boston proper, South Boston and East Boston (which latter occupies an island nearly 2 miles long, and is about 600 yards from Boston proper), Roxbury (annexed to Boston in 1868), Dorchester (annexed in 1870), and Charlestown, West Roxbury, and Brighton (annexed in 1874); and is about thirteen miles in length, and eight or more in width. It has about 360 miles of streets, a large part of which are paved or macadamized. Several bridges across Charles River connect the city with large suburbs named Chelsea, Everett, East Cambridge, and Cambridgeport. The Warren and the Charles River bridges, leading northward to Charlestown, are respectively 1390 and 1503 feet long; the bridges to Cambridgeport, East Cambridge, Chelsea, and Everett are much longer. The different railroads which converge to this city have other bridges constructed expressly for their accommodation. Washington and Tremont streets are much frequented thoroughfares. The city has one fine park, called Boston Common, which comprises nearly fifty acres, and adjoining it there is a large Public Garden, in which is a fine equestrian statue of Washington, executed by Ball; also a statue of Everett, by Story, and other works of the fine arts.

Boston has a spacious and excellent harbor, sheltered from the sea by two peninsulas and numerous small islands, and defended by Forts Warren, Winthrop, and Independence. The area of the harbor included between Point Shirley and Point Allerton, which are 4 miles apart, is estimated at 75 square miles, about half of which affords good anchorage-ground for the largest ships. The wharves and docks are constructed on a scale of uncommon magnitude. Long Wharf extends into the harbor about 1800 feet, and is lined with spacious warehouses.

Public Buildings, etc.—The State-house occupies a commanding site on Beacon Hill, fronting Boston Common. The view obtained from its cupola is said to be unsurpassed by anything in the U. S., comprising all parts of the city and the harbor, with a multitude of beautiful islands. Faneuil Hall, called the "Cradle of Liberty," derives interest from its historical associations, and has long been used as a place for public meetings. It was presented to the citizens of Boston by Peter Faneuil in 1742, and is 110 feet long and 80 wide. The custom-house is a granite edifice surmounted by a dome, with a foundation formed by 3000 piles. It cost $1,000,000 or more. A new city-hall, built of granite,

The City Hall.

was completed about 1866. Among the other public edifices are the Merchants' Exchange, which is 250 feet long, and has a front of Quincy granite, with four pilasters, each a single stone forty-five feet high; the Masonic Temple, Massachusetts Horticultural Hall, Quincy Market, City Hospital, Massachusetts General Hospital, the Public Library, Odd Fellows' Hall, court-house, United States court-house, post-office, Old State-house, jail, and those of the reformatory institutions, the State prison at Charlestown, and the Music Hall, one of the finest concert halls in the U. S. This hall is furnished with an organ which has nearly 6000 pipes, and cost $60,000. Among the best hotels of Boston are the Tremont House, the Revere House on Bowdoin Square, the Parker House, the American House, St. James, the Commonwealth, the Waverley House, and Young's Hotel. The Bunker Hill Monument is now within the city limits. The principal railroads that terminate here are the Boston and Albany, the Boston and Maine, the Eastern R. R., the Old Colony and Newport

R. R., the Boston and Providence R. R., the Fitchburg R. R., the Boston Lowell and Nashua R. R., and the Boston Hartford and Erie. The navy-yard is situated in Charlestown district; it was established in 1798, and is one of the most extensive in the U. S. Among the scenes of historic interest in Boston may be mentioned Breed's and Bunker's Hills; Faneuil Hall; Dorchester Heights, an important point in the siege of Boston by the provincial troops during the early part of the Revolution; Fort Independence, on Castle Island, long known as "Castle William," and once the principal seaward defence of the town, though at present Fort Warren, on George's Island, and other defensive works are of much more importance.

The manufactures of Boston are varied and important, including furniture, machinery of all kinds, shipbuilding, oil and sugar refining, leather-dressing, the making of clothing, jewelry, chemicals, boots and shoes, iron and brass castings, etc. It is an important centre of the boot and shoe and leather trade, of the wool business, and of the sale of domestic and foreign dry goods. It does a heavy business in exporting grain, flour, ice, and provisions. Its ancient India and China trade, destroyed by the civil war, has been partly restored.

Churches, Institutions, etc.—This city contains 171 or more churches, of which 29 are Unitarian and 30 Orthodox Congregational, 26 Methodist, 27 Baptist, 20 Episcopal, 4 Jewish, 6 Presbyterian, 22 Roman Catholic, and 6 Universalist. Boston is distinguished among American cities for the number and excellence of its literary and scientific institutions. The Boston Athenæum, on Beacon street, is richly endowed, and occupies a building that cost $136,000, besides the cost of the ground, which was $55,000. It has a library of about 100,000 volumes, with a gallery of paintings and another of sculpture. The American Academy of Arts and Sciences, founded here in 1780, has a good library. The Boston Public Library, founded in 1852, and opened in its present building in 1858, fronts on Boston Common, is free to every citizen, and is one of the

The State Capitol.

largest in the Union. The original cost of it was $363,633. It contains about 275,000 volumes, and has branches in most of the city districts. The Massachusetts Institute of Technology, a school of industrial science, situated near the Public Garden, is a very flourishing institution, and one of the best of its class in the U. S. It has seven courses of study, each of four years—to wit, mechanical engineering, civil and topographical engineering, geology and mining engineering, building and architecture, chemistry, science and literature, and natural history. There is also a free course of instruction in practical design and working draughts for both sexes. The institute is crowded with pupils, and it is proposed to erect additional buildings. Among the other important literary and scientific institutions are the Massachusetts Historical Society, the Massachusetts Horticultural Society, the Medical College, connected with Harvard College, and the Lowell Institute, founded by John Lowell, who bequeathed a legacy of $250,000 to maintain free lectures on chemistry, physics, etc.; the Boston College (Roman Catholic) and the Boston University (Methodist Episcopal), connected with which is a homœopathic medical college.

Boston has a well-organized system of graded public schools, consisting of primary, grammar, and high schools. The head-masters of the high schools receive a salary of $4000 per annum, and the masters of the grammar schools receive $3200. The number of the public schools since the annexation of the neighboring municipalities amounts to about 464. The principal daily papers issued here are the "Daily Advertiser," the "Boston Post," the "Boston Traveller," the "Herald," the "Boston Journal," the "Boston News," the "Boston Transcript," and the "Boston Globe." Among the benevolent institutions are the Massachusetts General Hospital, which is built of granite, and is liberally endowed; the McLean Asylum for the Insane, which is at Somerville, two miles N. W. of Boston; the Perkins Institution and Massachusetts Asylum for the Blind; Home for Aged Men, Home for Aged and Indigent Women, and the City Hospital, completed in 1864 at a cost of about $400,000; a homœopathic hospital, a woman's hospital, a

consumptives' home (homœopathic), a farm school on Thompson's Island, and numerous other charities.

Commerce, Banks, etc.—In foreign commerce Boston is considered as the second city of the U. S. Its enterprise in this department extends to almost every nation on the globe, and its trade is steadily increasing. The value of the foreign imports received here in 1871 was stated to be $62,000,000. The value of exports, which in 1870 was only $12,000,000, amounted in 1871 to $19,000,000. The whole number of arrivals in 1871, including coasting vessels, was about 10,000. Among the chief articles of export are fish and ice. The quantity of ice exported in 1864 was 104,354 tons. Boston has sixty national banks, with a capital of $49,000,000, and nineteen savings banks. It is supplied with good water from Sudbury River and Cochituate Lake, which is nearly 20 miles W. of the city, and Mystic Lake in the towns of Arlington and Winchester. It is divided into twenty-one wards. Steamships of the Cunard line depart from this port to Liverpool once a week or oftener.

History.—Boston was founded in 1630, and the site was originally called Shawmut. The first settlers gave it the name of Tremont (or "Trimountaine," because one of its high hills had three points or summits). Benjamin Franklin was born here in 1706. In Mar., 1770, occurred a conflict between some British soldiers and the populace, several of whom were killed. This was called the "Boston Massacre." Among the memorable events in the history of this place was the battle of Bunker Hill (situated in Charlestown district) June 17, 1775, after which the British army occupied Boston until Mar., 1776. They were then compelled by the American army to evacuate it. Boston was incorporated as a city in 1822. Pop. in 1800, 24,937; in 1820, 43,298; in 1830, 61,391; in 1840, 93,383; in 1850, 136,881; in 1860, 177,840; and in 1870, 250,526; in 1874, about 320,000; besides which the suburbs contain more than 100,000.

On the evening of the 9th of Nov., 1872, a conflagration broke out in a large five-story granite building at the corner of Summer and Kingston streets. This building was surmounted by a mansard roof. The prevalence of the horse-disease caused a delay in bringing fire-engines to the spot. A strong N. W. wind prevailed at the time, and soon blew with great intensity, causing the fire to spread at an uncontrollable rate. The intense heat of the conflagration, together with the height of the buildings, rendered it impossible for the steam fire-engines to render effective service. The spread of the conflagration was promoted by the great number of wooden roofs, covered with slate only. The locality of the fire was occupied to a great extent by wholesale warehouses of the best class, many of them structures of great cost and architectural excellence. Granite walls were disintegrated by the intense heat. Fire-engines soon began to arrive from other cities, but their most persistent and systematic efforts for the time proved unavailing. At two o'clock on the morning of Sunday, Nov. 10, attempts were made to stop the conflagration by the blowing up of buildings by gunpowder. This process was not considered successful in hindering the progress of the flames. The steam fire-engines worked with efficiency, and by two o'clock on Sunday afternoon the progress of the fire had ceased, after having burned over sixty-five acres of ground, and destroying 776 buildings, 709 of which were of brick or stone. These buildings were assessed at a valuation of $13,591,900, probably about half their market value. The number of dwellings destroyed was only sixty. The chief loss fell upon the shoe, leather, and wool interests, and the heavy trade of Boston in these commodities was for a time almost annihilated. The loss of personal property was estimated at $60,000,000, of which a large part was sustained by insurance companies. Only fourteen lives are known to have been lost.

On the 30th of May, 1873, another fire broke out in Bumstead court, in a great furniture warehouse, destroying property worth $1,500,000, including the Globe Theatre, Chickering's piano-forte warerooms, and a large number of stores on both sides of Washington street.

Besides the "Back Bay lands," above alluded to, and other tracts of made land which have been added to the original peninsula of Boston, it is proposed to fill a large tract of the shoal water known as "South Boston Flats," the material for the work being chiefly obtained by dredging the harbor to the minimum depth of twenty-three feet. The newly-made land is to be covered with a deep layer of clean gravel. It is also proposed to construct tidal reservoirs on the Mystic River, N. W. of Boston, so as to preserve the scouring effect of the tides in preserving the depth of the channels leading to the harbor. The harbor itself is one of the best on the coast. Its entrance is marked by four lighthouses, one on Minot's Ledge, lat. 42° 16′ 09″ N., lon. 70° 45′ 14″ W., a granite tower 100 feet high, showing a fixed white light of the second class.

The Boston light, on Little Brewster Island, is a stone tower 80 feet high, showing a flashing white light of the second class, 98 feet above the sea. The Narrows light on the Great Brewster, and the Long Island Head light-house, an iron structure, are of smaller size, though of hardly less importance. The islands to the eastward are of the greatest importance, as they give safety to shipping within the harbor during the prevalence of easterly winds. The destructive action of the sea upon these islands has been very remarkable, but their eastern shores are now protected by heavy sea-walls. These important public works for the preservation and extension of the commerce of Boston are due not alone to the action of the general government, but largely to that of the State and municipal authorities. NATH. B. SHURTLEFF, *Ex-Mayor.*

Boston, a township of Franklin co., Ark. Pop. 289.

Boston, a township of Newton co., Ark. Pop. 109.

Boston, a township of Wayne co., Ind. Pop. 894.

Boston, a township of Ionia co., Mich. Pop. 1947.

Boston, a post-township of Erie co., N. Y. Pop. 1633.

Boston, a township of Summit co., O. Pop. 1142.

Boston, a township of Darlington co., S. C. Pop. 1913.

Boston, a post-village, capital of Bowie co., Tex., 65 miles N. of Marshall. It has a good high school and a female academy. Pop. 273.

Boston (THOMAS), a Scottish Presbyterian minister, born at Dunse, Berwickshire, Mar. 17, 1676, began to preach at Ettrick in 1707, and acquired much popularity as a preacher and a writer. Among his works are a "Body of Divinity," "Human Nature in its Fourfold State" (1720), and "The Crook in the Lot." Died May 20, 1732. His sentiments and peculiar modes of expression are said to have colored the style of Scottish preaching more than those of any other Calvinistic writer. (See his "Autobiography.")

Boston Corners, a post-village, and station of the New York and Harlem R. R., 100 miles from New York. It was formerly a part of Berkshire co., Mass., but being nearly inaccessible from that State on account of an intervening steep mountain-ridge, it became for a time the resort of ruffians, prize-fighters, etc. In 1853 it was ceded to New York, and is now a part of Ancram township, Columbia co., N. Y.

Bos'tra, or **Bots'rah,** sometimes called **Boz'rah,** a great and ancient city of Arabia, in an oasis of the Syrian desert, about 75 miles S. of Damascus, and about 40 miles E. of the Jordan. Some half-dozen families now make their home among the extensive ruins which mark the spot. It was in the southern part of the district of Auranitis, the modern Hauran, of which it was the capital in the Middle Ages. It was beautified by Trajan, who made it the capital of the Roman province of Arabia about 105 A. D. The Roman emperor Philip gave it the title of *Metropolis,* probably because it was his native place. It was described as a great and populous city about 300 A. D. The important ruins of Bostra are described by Burckhardt in his "Travels," and Robinson in his "Biblical Researches," vol. iii. *Bostra,* though sometimes called *Bozrah,* must not be confounded with the Idumean city of that name. (See BOZRAH.)

Bost'wick (Rev. DAVID), born at New Milford, Conn., Jan. 8, 1721, taught in the academy at Newark, N. J., and entered the Presbyterian ministry and became distinguished for eloquence. He was a pastor at Jamaica, L. I., and in New York City. He published several works, of which the best known was a defence of infant baptism. Died Nov. 12, 1763.

Bostwick (Mrs. HELEN LOUISE), born in 1826 at Charlestown, N. H. Her father was Dr. Putnam Barrow. She removed in her youth to Bucyrus, O., became a contributor to periodical literature, and published a volume of poems called "Buds, Blossoms, and Berries."

Bos'well (JAMES) **of Auchinleck,** a famous Scottish biographer, born at Edinburgh Oct. 29, 1740. He studied law, and in 1763 became acquainted with Dr. Johnson, of whom he was a devoted admirer. Having visited Corsica, and espoused with ardor the cause of Paoli, he published an "Account of Corsica" (1768). In 1773 he was chosen a member of the literary club established by Dr. Johnson in London. He diligently noted and recorded the sayings, opinions, and actions of Dr. Johnson, of whom he was an intimate associate. His "Life of Samuel Johnson" (2 vols., 1791) is a remarkable and, in many respects, an admirable biography. Boswell was eccentric, and noted for his vanity. Died May 19, 1795. (See MACAULAY's review of Boswell's "Life of Johnson" in the "Edinburgh Review" for 1831.)

Boswel'lia (named in honor of John Boswell, a physician), a genus of trees of the order Amyridaceæ, natives of India, Persia, and Arabia. The flowers have five petals

and a crenelated granular disk. The fruit is a triangular capsule with three valves, three cells, and one seed in each cell. The number of known species is small. The *Boswellia thurifera* (or *serrata*) is a large tree with pinnate leaves, each of which has about ten pairs of hairy, serrate leaflets and one odd leaflet. It has small pink flowers in axillary racemes. This tree yields the fragrant resin called *olibanum*, which is believed to be identical with the frankincense of the ancients. (See OLIBANUM.)

Bos'worth, a market-town of England, in Leicestershire, on an eminence 10 miles W. of Leicester. On a moor near this town was fought in Aug., 1485, the battle of Bosworth, or Bosworth Field, in which Richard III. was defeated and killed. This battle terminated the civil war of the Roses, and raised Henry VII. to the throne.

Bosworth (JOSEPH), D. D., F. R. S., an English philologist, born in Derbyshire in 1788. He graduated at Leyden, and received the degree of D. D. at Trinity College, Cambridge. In 1817 he became vicar of Horwood Parva, in Buckinghamshire. He devoted much time to the study of Anglo-Saxon, and published, besides other works, a "Dictionary of the Anglo-Saxon Language" (1838), which is indispensable to the thorough student of English. He resided ten years (1830–40) in Holland as British chaplain.

Böszörmeny, a town of Hungary, in the county of Szabolcz, 16 miles N. N. W. of Debreczin. Pop. in 1869, 19,208.

Botanic Gardens are collections of growing plants, made for the purpose of instruction or for scientific observation. Of late, they have also been very serviceable in introducing useful and ornamental plants from foreign countries. The Kew Gardens in England and the Jardin des Plantes in France are among the most celebrated botanical gardens in the world. In the U. S., the garden connected with the Department of Agriculture at Washington promises to become highly useful in bringing new plants into cultivation. There is also a successful botanic garden connected with Harvard College at Cambridge, Mass.

Bot'any [from the Gr. *βοτάνη*, a "plant;" Fr. *botanique;* Ger. *Bota'nik*] is the natural history of the vegetable kingdom—*i. e.*, the science that treats of plants. For the present purpose there is no need to draw out the distinctions between the two kingdoms of organic nature, animal and vegetable, for their ordinary representatives would never be confounded. But the task, when attempted, is by no means a light one; indeed, a complete definition, discriminating the lowest forms of plants from the lowest animals, is still a desideratum, if not an impossibility. (See on this subject the article PLANT.) Probably the best general definition of plants, and that which brings prominently into view their nature and office, is this: they are those beings which derive their sustenance from the mineral kingdom, namely, from the earth and air. They only are capable of converting earth and air into nourishment. Plants create the food upon which animals live. Their office in the economy of nature is to transform lifeless mineral materials into living matter, or into matter capable of supporting or composing the corporeal structure of a living being. Animals take that which plants have prepared for them, transform it more or less, incorporate it into structures which manifest powers and vitality of a higher order; but they originate no organic matter.

The several departments of botany relate to the different kinds of inquiry which may be made respecting plants. They all fall under two primary divisions—namely, *structural* or *biological botany*, and *systematic botany*, with certain subsidiary inquiries.

I. *Structural or Biological Botany* includes all inquiries into the organic structure, life, growth, action, and propagation of plants. The structure and the functions may be regarded separately, although practically they are best treated in connection. As to the first, pure *structural botany* is sometimes denominated *organography—i.e.*, the study of the organs or members of plants. The study of the organs as compared with each other—as, for instance, of the different forms which leaf, stem, etc. may exhibit in the same plant or in different plants—has taken the name of *morphology* (the doctrine of forms or shapes)—a department or mode of treatment of the subject which in modern times has greatly enhanced the interest of botany. The morphological study of abnormal parts or monstrosities takes the name of *teratology*. The organs of plants in the most general sense are their obvious parts or members, such as leaf, stem, and root, flower, fruit, and seed. But each of these is made up of parts, and the parts themselves are complex: the minuter parts or organic elements of plants, which compose the obvious members, are in the stricter sense the plants' organs. Their investigation takes the name of *vegetable anatomy*, or *histology*. The study of the actions of these organs, whether of the obvious members or of their minute components (which, indeed, are the parts that act), is the province of *physiological botany* or *vegetable physiology*. These are the principal departments of structural and biological botany. The leading facts and the leading ideas which the botanist of the present day has to consider under these several divisions, so far as they may be clearly stated in a very brief compass, are as follows:

1. *Structural Botany* proper, including *Morphology*.—The natural history both of the vegetable and animal kingdoms in modern times is studied upon a morphological basis. The minds which have dominated and shaped vegetable morphology are those of Linnæus, Goethe, Robert Brown, and De Candolle, to which several more recent names might be added.

As a proper representative of an animal would be some species of the highest grade, rather than a polyp or an infusory animalcule, so for the plant the higher grade must be taken as a pattern. The following exposition therefore takes into account, in the first instance, ordinary plants only, such as our herbs, shrubs, and trees. These spring from seed; they take root; they develop a stem, on which they display leaves; and they develop flowers, the end of which is the production of seed. The root avoids the light, grows downward, fixes the plant to the soil, and ordinarily ramifies in it. The stem rises into the light, develops leaves at definite points of its surface, is at its summit capable of extending farther and farther, until finally it bears a blossom or a cluster of blossoms, which end it. Stems take root; if they did not do so, our power of multiplying plants would be very much diminished. Some stems will strike root into the ground freely and surely whenever placed in favorable condition for it—namely, when screened from light and supplied with moisture and a fitting temperature. Most stems can be made to do so; hence propagation by laying, by slips or cuttings, etc. A stem consists of a series of what, in a loose way—although as to many plants (reeds, grasses, etc.) a very natural and correct way—of speaking, may be called joints; there is a point or portion from which leaves (one or more) are or may be developed; this is a *node*. Between one node and another above or below it—a space of variable length, according to the amount of growth—no leaves can be produced; this intervening naked portion is an *internode*. A stem is made up of a series of nodes and internodes. The apex of a stem is theoretically supposed to be, and generally actually is, so long as it lives, a *bud;* that is, a growing point, consisting actually and potentially of nodes and internodes. The growth of the stem, as to length, is by the development of the internodes in succession, beginning with the lowest and oldest; this growth separating the nodes more or less according to the amount of lengthening, and so spacing apart the leaves they bear. This growth of the stem, accordingly, consists—1, of the formation of new parts at the apex of the old; 2, of the lengthening of the successive internodes. The length any internode may attain is very variable, but each one when it begins to grow usually acquires the length it may attain rather rapidly, and when its tissues are matured is incapable of any farther extension in length, leaving the stem to be carried up by the development in their turn of the younger internodes above it. Stems usually grow and rest by stages. The bud is the undeveloped apex of a stem, whether in a growing or resting state. Winter-buds, as they are termed, are formed in summer or autumn, remain quiescent through the winter until the coming spring, and then develop. The larger and best-developed ones are provided with scales, which their nodes bear in place of leaves, and they sometimes contain, already formed, all the nodes, internodes, and leaves they are to develop the coming season, already discernible, although rudimentary. From such buds there are all gradations down to those which are hardly or not at all apparent until they begin to grow.

Branching takes place by the production of side-buds, and these, as a rule, are produced only on the nodes; that is, as each joint of the stem, when formed, ends with a bud (the terminal bud) which is to carry on the stem yet higher, so it also produces or may produce side or lateral buds also. There is a definite place on the node for such buds to arise (*i. e.*, in the angle formed by the leaf with the stem, on the upper side): this angle is called the *axil* (arm-pit), and buds springing from thence are said to be axillary. Axillary buds develop into branches. As a rule, there is only one to each leaf.

Arrangement of Leaves (*Phyllotaxy*) *and Branches.*—That of the latter depends upon the former. Leaves are symmetrically disposed upon the stem. A plant, no less than an animal, is symmetrical. Leaves are either single on each node—*i. e.*, they follow one after another (are *alternate*)—or else there is a pair, or more than a pair, upon each node. When a pair only, they stand always upon exactly opposite sides of the stem (are said to be *opposite*); when

three, four, or any other number, they divide the circle equally—that is, they stand as far apart from each other as possible in the circle. A circle of three or more leaves, etc. is called a *whorl* or *verticil;* such leaves are said to be *whorled*. Evidently, opposite leaves present merely the simplest case of whorled leaves, a whorl of two leaves. The pairs or whorls of leaves follow each other in a fixed order; each pair stands over the intervals of the pair next below, and the leaves of the whorl of three or other number correspond to the intervals of those of the whorl above and below. In the alternate arrangement the single leaves succeed one another in a definite order, maintaining a complete symmetry. Each leaf projects from the stem at a fixed angle with that which precedes and that which follows it, which is uniform for the species, but different in different species. In the simplest case the second leaf is on exactly the opposite side of the stem from the first—of course higher up; the third leaf on the opposite side from the second, and therefore vertically over the first; so the leaves are in two vertical ranks; the angular divergence—*i. e.*, the angle which successive leaves make—is one-half the circumference of the stem. Other plants have the angular divergence one-third—*i. e.*, the second leaf is placed one-third round the stem; the third is one-third round from that, completing a cycle of three, and bringing the fourth over the first, the fifth over the second, and so on—that is, disposing the leaves in three vertical ranks. A line traced on the stem through the base or attachment of the successive leaves forms a spiral; each turn, from one leaf round to the one above which is placed directly over it, is termed a *cycle*. Alternate leaves are never in four ranks, but they are very commonly in five. In that case the angular divergence, or portion of the circle between any two successive leaves, is two-fifths of the circumference, and the spiral line ascends through two whole turns round the stem in completing the five vertical ranks of leaves, and bringing the sixth over the first. These several modes of arrangement may be designated by the fractions $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{5}$, which measure the angular divergence of the successive leaves in the spiral. The denominators likewise express the number of vertical ranks, and the numerators the number of turns round the stem in completing a cycle. An obvious relation of these fractions to each other is, that the sum of the numerators of the first two fractions is the numerator of the third, and the sum of the denominators is the denominator of the third fraction. Now, the indication thus suggested is carried out in fact when alternate leaves occur in more than five vertical ranks; for the next higher number of vertical ranks is eight, and their angular divergence is three-eighths of the circumference; and the next is in thirteen vertical ranks, with a divergence of five-thirteenths of the circumference, and so on; that is, the actual arrangements are expressed by the series of fractions, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{5}$, $\frac{3}{8}$, $\frac{5}{13}$, $\frac{8}{21}$, and so on. The subject is capable of very interesting mathematical development. These are all modes of equable distribution of foliage on an axis; and the meaning of them appears in some degree evident when it is understood that the work of vegetation is done by the foliage under the light of the sun; so that there is an advantage in having as large an amount of foliage as possible within a given space, and most fully displayed to the light. The study of the arrangement of leaves is termed *phyllotaxy*, which is the Greek for leaf-arrangement.

Metamorphoses of Leaves and Stems.—The most fertile ideas in morphological botany are those which, indistinctly sketched by Linnæus and afterwards by Wolff, were first well developed by the poet-philosopher Goethe, and since perfected by various minds. These ideas are best expressed in the following propositions: Every plant of the higher grade (high enough to exemplify the plan of vegetation) is built up of a succession of joints of stem and leaves, of which the embryo just developed from the seed, with its primary stemlet and seed-leaves (*cotyledons*, one, two, or rarely more, as the case may be), is the archetype and the parent. All subsequent development consists of repetitions of this. The primary stemlet, at the outset of germination, sends out a root from its lower end, which is often the origin of the whole root of the plant; but any succeeding joint of the stem may equally send out roots, and commonly does so when favorably situated—*i. e.*, when supplied with moisture and excluded from light. The successive joints of stem, with the leaves they bear and any roots they may send downward, build up the plant, as it were, in a series of generations, the greater part of which are capable of independent propagation (as cuttings, layers, etc.), or else they make a part of the common life and structure of the vegetable. A plant, therefore, is to be likened to a coral structure or to other compound polyps which construct a polypidom, rather than to an animal of the higher grade and complete individuality, such as a horse or a man. But the plant constitutes a sort of corporate whole: it may be likened to an organized community, in which "all members have not the same office," but some are turned to one account, some to another. The morphological botanist's view is, that, root excepted, the plant's organs are all constituted of stem and leaf, and all on the plan which is displayed by the plantlet at the beginning of its growth. The cotyledons, which compose the principal bulk of any large embryo, and which develop in germination into the seed-leaves in the convolvulus, gourd, and the like, and do the work of leaves upon being raised above the ground by the lengthening of the stemlet (or first internode) beneath them, are equally discerned in those of the bean, although so much thicker, hardly turning green, and never becoming foliaceous: here the seed-leaves are made a storehouse of nourishment: in a pea and an acorn they are still more gorged, so as to be hemispherical, and never attempt any foliaceous development, but simply feed abundantly the bud between them (*plumule*), so that the succeeding joints of stem and their leaves develop the more rapidly and vigorously. So, again, where winter-buds are formed, their scales represent leaves relegated to the function of protection. Lilac buds in their development show this well, in the gradual and complete transition from the outermost bud-scales, which fall off unchanged, to the ordinary leaves. In the scales of bulbs the botanist sees leaves, or the bases of leaves which are foliaceous above ground, converted into reservoirs of nourishing matter, and when this is exhausted the thinned and dried outermost scales serve for protection. Leaves of barberry develop as spines; those of pea, cobæa, and the like, convert a part of their leaflets into tendrils for climbing, while those of maurandia, lophospermum, etc. make their leaf-stalks, and those of clematis their partial leaf-stalks, serve as tendrils for climbing, the blade of the leaf remaining unchanged as foliage. In other cases (probably in gourds and squashes) a whole leaf becomes tendril.

Equally may stem or branches assume any of these forms and functions. Tendrils of the grapevine and of the passion-flower are stems or branches: so are thorns of hawthorn, pear, honey-locust, etc.; the green rind of the stem of cactuses, or flattened leaflike expansions in many of them and in various other plants, take the function of foliage; tubers (such as potatoes), root-stocks (as of iris, sweet-flag, ginger, etc.), are portions of stem used as reservoirs of nourishment, just as the thickened roots are in radish, turnip, carrot, etc.

Returning to leaves and to the ultimate development in the blossom as the inflorescence is approached, manifest leaves not rarely exchange the green of vegetation for the brighter hues and delicate texture of floral-leaves, as in painted-cup, calla, Poinsettia, etc. And in the leaves of the flower themselves every one recognizes the appropriateness of the term when the outer circle (*calyx*) is green, as is commonly the case, and hardly less so for the inner circle (*corolla*), although its members (*petals*) are of delicate texture and of other hues than green. The evidence of gradual transition from leaves outside of the flower (*bracts*), through those of the calyx to those of the corolla, does not always stop there. In water-lilies and some other flowers the inner petals pass by degrees into stamens, and so supply one of the clews which lead the botanist to his inference that even the interior organs of the flower equally answer to leaves. Cultivated flowers confirm this inference when by becoming "double" (to use the florist's term) they turn, some the stamens only, some both stamens and pistils, into floral-leaves or petals, or, in some monstrosities, turn them all into a rosette of green leaves. Finally, the arrangement of the parts of the flower, of whatever shape or character, conforms to that of leaves on a stem; *i. e.*, they follow the laws of phyllotaxy, already described—are either in circles, and the members of the successive circles alternating with each other (decussating) after the manner of whorls of leaves, or in cycles according to the spiral or alternate arrangement of leaves. And the arrangement of the blossoms themselves upon the stem, or in their clusters, conforms precisely to that of buds: flowers, like leaf-buds, are terminal or axillary. A flower is, as all lines of evidence go to prove, a sort of bud with its leaves developed and the internodes undeveloped or nearly so—with its leaves developed in peculiar forms, not always greatly different from foliage in the outer parts, but very different in form and in office as respects the inner and essential organs. In the language of morphology, leaves, sepals, petals, stamens, etc. are *homologous* organs, just as the fore leg of a dog, the wing of a bat or bird, the flipper of the whale, etc. are homologous with the arm of a man.

The Parts of the Flower need to be briefly specified before its morphology can be completed. Here, again, the botanist places before his mind a pattern flower—one complete in its parts and free from complications or disguises. A complete flower of this sort has two kinds of organs—1, *Envelopes* or leafy parts, "the leaves of the blossom," and

these in two circles; the outer circle is the *calyx*, oftener than otherwise green and leaflike; the leaves or pieces of the calyx are named *sepals;* the inner, of delicate texture, and almost always of other color than green, is the *corolla;* its pieces or leaves are petals. 2, *Essential organs* within the last; these are of two sorts, and at least in two circles; the exterior sort are the *stamens*, the interior, occupying the centre, are *pistils*. These two essential organs conspire to the production of seed. The stamens are the fertilizing organs. Each consists of a *filament*, usually a slender body which may be likened to the stalk of a leaf; it is the stalk of the other and only essential part—namely, the *anther*. The anther is a two-celled sac, commonly opening at maturity by a slit from top to bottom of each cell or compartment of the sac. In an anther the botanist thinks he discovers the blade of the leaf in a peculiar guise; in the two cells or compartments, standing side by side, he sees the right and left half of the blade; in the solid part that usually connects them, the midrib of the blade; and the interior, instead of the green pulp of foliage, contains a powdery matter, commonly of yellow color, composed of minute grains. This powder is named *pollen;* its production is the essential thing; it is discharged by the opening of the anther, and its office is to fertilize the pistil, or rather the important contents of the pistil. A pistil, complete and simple, consists of three parts—1, the *ovary* at the base, the cell or closed cavity of which contains one or more *ovules*, the bodies which after fertilization become seeds; 2, the *style*, a column or narrowed prolongation of the summit of the ovary; 3, the *stigma*, which is sometimes a knob at the apex of the style, sometimes a mere point, or a line running down one side of it; it is always destitute of the epidermis or skin which covers the rest of the plant, and has either a roughened or a glutinous or a moist surface, to which pollen may adhere. The ovary is an essential part, as it contains the ovules or future seeds; the stigma also, for the application of the pollen to it is requisite to the maturation of the ovules into seeds; the style is sometimes wanting, as the stigma may as well be borne upon the apex of the ovary. A simple pistil is conceived by the botanist to answer to a leaf with its edges brought together and united so as to form a closed sac (the ovary), the outer surface of which is the lower surface of the leaf, the lining its upper surface; and the ovules are borne on some part of the line (*suture*) which represents the united edges of the leaf, or on some enlargement of this line (*placenta*). The style is a prolongation of the apex of this ideal leaf, with margins, as we may suppose, rolled in; the stigma answers to some portion of leaf-margin or apex denuded, and sometimes enlarged for the readier lodgment of pollen.

To this idea and type of a flower, which is simply and completely realized in some, and incompletely so in others, the botanist refers all flowers he meets with; and he explains all deviations from it, and all disguises of it, in accordance with the laws that govern the arrangement, combinations, etc. of stem and leaves. For example: when the calyx or corolla occurs as a cup or tube, he sees in it a congenital coalescence, or union by their adjacent edges, of the leaves of a whorl or cycle; when these parts cohere below with the surface of the ovary, he recognizes an adnation of contiguous whorls. When the petals, stamens, or other parts are numerous, this augmentation means that additional whorls or cycles (as the case may be) of metamorphosed leaves of that order have developed. When these organs are fewer than the numerical plan of the flower indicates, the botanist perceives that some of the members of a cycle have failed to be produced—are *suppressed*, as he would say—and he generally may detect either the rudiments or vestiges of the missing organs, or the vacant places which they should occupy—*i. e.*, which the symmetry of the blossom calls for.

There is not only a general plan of flowers, but a particular plan for those of each natural order, and a still more special plan for the flowers of the same genus or kind; and so one flower of a group helps to interpret the others—the more regular and complete ones throw light upon the irregular, incomplete, or unsymmetrical ones, by which the botanist sees through their disguises.

So in the fruit, which is the ovary and its contents matured, the morphological botanist sees either single leaves or whorls of leaves, either separate or combined, either free from other parts or congenitally united with them, either still retaining or resuming somewhat of foliaceous character, as in a legume or pea-pod, or hardened, as in a nut, or thickened and softened throughout, as in a berry, or with an inner stratum hardened to form the stone, and the outer stratum softened to form the sapid pulp or flesh of a peach or cherry. In an apple it is seen that the principal edible portion of the fruit consists of calyx; in a strawberry, of axis or the end of flower-stalk upon which the ovaries were borne; and so on.

The pistils, or the carpels of which a pistil is composed, end the morphological series, and in the seed—or rather in the embryo formed in the seed—the series begins anew. Some would see in the ovule, and consequently in the seed, a bud, developed usually on the margin of the carpellary leaf, and point to bryophyllum and other plants, whose leaves are apt to develop leaf-buds upon their edges. In that view the kernel of the ovule answers to axis, and its coats to leaves. The other, and perhaps the better, view is, that ovules are special appendages or transformed lobes of leaves consecrated to the reproduction of the species.

The lower grades of plants would require to have their structure and morphology separately explained, for which space is lacking; they will be treated under the heads, Ferns, Mosses, Lichens, Fungi, Algæ (Seaweed), etc. Suffice it to say, that the general plan of vegetation, by stem, and leaves symmetrically arranged upon it, prevails in the higher orders of the lower grade of plants, such as ferns and mosses; that stem and leaves begin to be fused into a common foliaceous expansion in liverworts; that all distinction of this sort vanishes in lichens and algæ, and still more in fungi, which in all their multifarious diversity have nothing which in any sense answers to foliage, root, etc.

As to organs of reproduction, the greatest simplification of the flower occurs in coniferous plants (pines, cypress, yew, etc.) and in the allied Cycas family. In these the female flower is reduced to the pistillary leaf or carpel, and that is open; style and stigma are done away with, and the pollen falls directly upon the mouth of the ovules to fertilize them. Sometimes, as in yew, the whole apparatus is reduced to a naked ovule. Such are termed *gymnospermous* plants—*i. e.*, naked-seeded; and in contradistinction those of the ordinary sort with ovules in a closed ovary, and therefore seeds in a pericarp (inside a fruit), are *angiospermous*. But what distinguishes completely the lower grade of plants from the higher is a total change of type as to reproduction. From ferns downward, flowers (and their result, seeds) disappear. Their reproductive organs are analogous to flowers and seeds, but not homologous with them—not of the same type. In common language we say that while ordinary plants are flowering, those of the lower grade are flowerless. Linnæus gave the technical term of *phænogamous* or *phanerogamous* to plants which produce flowers (stamens and pistils), and *cryptogamous* to those (such as ferns, mosses, lichens, algæ, and fungi) which, as the appellation denotes, have no obvious stamens and pistils. His name implied that there were organs answering in function to stamens and pistils, although concealed at least from his view. And the correctness of his surmise is now confirmed. Cryptogamous plants possess organs which act as stamens and pistils, as microscopical researches have shown. The result, however, is not a seed containing an embryo, but a much more simple body, called a spore, which by germination grows into a new plant. The apparatus for producing spores differs so widely in different orders of cryptogamous plants that it must be separately studied in each. To understand them requires a knowledge of

II. *Vegetable Anatomy* or *Histology*.—The space here devoted to morphological botany demands the curtailment of the other departments. The history of vegetable anatomy is that of microscopical research. The leading facts are, that plants are built up of parts or integers, all essentially of one nature, however diverse in form, of which a good general idea may be obtained by likening the integers to the bricks of an edifice, supposing the bricks to be hollow and various in shape. These organic components of plants are called *cells*. They consist of a wall of solid vegetable matter, circumscribing a closed cavity, which, while the cell is alive, contains some living vegetable matter, either solid or liquid. Or, going back to the beginning, a vegetable cell (not very appropriately so named) is or was a mass of plastic vegetable matter, mostly of minute size, which encases itself with a wall or shell, this wall remaining permanent, although the living parts within may have disappeared. A plant, such as an oak tree, began its existence, in an ovule of the parent, as a single cell of this sort. The whole subsequent growth came from this; the capital fact being that the living vegetable cell has the power of multiplication. As it grows it is capable of dividing into two, and these again into two, and so on. There are plants (chiefly aquatic) of the simplest possible structure, which consist of but one cell; for as the cell multiplies by successive divisions into two, these separate and thus become so many individuals. There are plants which consist of a single row of such cells developing in a chain, and remaining adherent at least for a time; or of a plane of cells, dividing as they grow in two directions. But in all the higher plants the cells build up a structure composed mostly of distinct organs (stem, leaves, roots); and the cells themselves develop in various shapes, some round or polygonal, some lengthened into tubes, some with thin and delicate

walls (as in the pith and green bark), some with thicker or even very thick walls (as in wood, in the stone of a cherry, etc.). Woody fibres, bast of bark, ducts, and all the anatomical elements of a tree or herb, consist entirely of cells or of combinations of them, all of the same type and origin, however diverse in form, texture, etc. These are variously combined, arranged, and modified, composing the particular anatomy of roots, stems, and leaves. In the stems of flowering plants the distribution of the woody portion (wood-cells with ducts, etc.) is upon two plans—one, that of common wood, which is in concentric layers around a pith and within a separable bark, and a new layer is every year added outside of that of the year before; this is the *exogenous* stem, or outside-grower: the other, that of palms and the like, has no annual layers, but the wood is in separate bundles, interspersed in the pithy or cellular part, without apparent order, throughout the whole diameter, but more accumulated towards the circumference; as the newer wood or new bundles were thought to be added towards the centre, this stem was named *endogenous—i. e.*, an inside-grower.

In the leaves, the arrangement of the woody portion forming their framework (ribs, veins, nerves, etc.) which supports the green pulp or cellular portion, equally follows two plans. In one, the leaves are *reticulated* or *netted-veined—i. e.*, the finer divisions of the framework branch off from a central rib, or from one or more pairs of lateral ribs also, and their subdivisions, or some of them, unite (anastomose or inosculate) with other divisions to form a network of veins; this occurs in plants with exogenous stems, and only those, with some exceptions. In the other plan, which is characteristic of plants with endogenous stems, but not absolutely so, the leaves are *parallel-veined —i. e.*, the framework is composed of simple and parallel veins (formerly called nerves), proceeding unbranched from the base of the blade to the apex, or else from a midrib to the margins. These differences are turned to much account in descriptive botany.

III. *Physiological Botany*, or *Vegetable Physiology*, which is concerned with the actions or functions of plants considered as organisms, is a wide subject, which may be treated under an independent head. The portion which relates to nutrition connects itself with vegetable chemistry. The action of the roots in absorbing, of the stem in conveying, and of the leaves in digesting or assimilating, the materials upon which vegetables live, the use of assimilated matter in growth, the expenditure of some of it in doing work, are leading topics. The most fundamental idea in all vegetable physiology is, that plants create all organic matter, and consequently provide all the food upon which animals live. The function of vegetation is the assimilation of mineral matter—earth, air, and water, chiefly the two latter—into organic matter, which is alone capable of composing the living structure of vegetables and animals. Animals appropriate this, but produce none. Plants do this all-important work only in their green parts and under the light of the sun. Under the solar radiance they decompose carbonic acid and water, with the liberation of oxygen gas (therefore purifying or renovating the atmosphere for the breathing of animals); and they transform what they retain into permanent plant-structure—that is, into cell-walls, or else into equivalent substance of which cell-walls may be made (such as starch, sugar, and the like). They also convert these same mineral elements, along with some form of combined nitrogen (ammonia, nitrates, etc.), into proteine or protoplasm, which makes up the vitally-active part of living plant-cells, and is the source of, and essentially identical with, the flesh of animals.

And here a most important idea, of recent conception and demonstration, is brought into view—namely, that vegetable matter, produced under the influence of the sun, whether as plant-fabric (wood, etc.) or as prepared material of which fabric may be made (starch, sugar, oil, fibrine, etc.), as also the flesh or other fabric of animals derived from these, is to be regarded as matter in a state of energy; and energy is the power to do work. This, which the animal derives from the food supplied by the vegetable, the vegetable has stored up in the matter which the sun's rays, acting upon the living plant, have brought into this state of energy.

In the function of reproduction, the mode in which the pollen acts in fertilizing the ovules and originating the embryo in the seed; the arrangements through which these minute powdery grains are transferred from the anthers in which they originate to the stigma upon which they are to act, and by a growth from thence to the ovule, or, in some cases, the immediate application of pollen to the ovule; the maturation of fruit and seed; the arrangement for the dispersion of the latter; their germination,—these are some of the leading inquiries. Lastly, the vital manifestations as displayed in the movements or changes of direction which plants (no less really than animals) execute—some of them in connection with vegetation and growth, some subservient to reproductive functions—form extremely interesting subjects of physiological inquiry.

IV. *Systematic Botany* comprises all inquiries relative to plants as consisting of *kinds* variously related to one another—*i. e.*, as manifesting resemblances and differences in various degrees. Plants are thus considered as constituting a systematic whole or *vegetable kingdom*. Commonwealth would have been a truer term, for the vegetable creation does not culminate in a head or actual archetype, as does the animal realm in man. There are high and low plants in grade, but no highest and no lowest. The principal departments of this great branch of botanical science are—1, *Taxonomy*, and 2, *Phytography*, or *Descriptive Botany*.

1. *Taxonomy* is the study of the principles of classification, and of the grounds upon which divisions expressive of the diverse grades of resemblance manifested among plants may be made and defined. The fundamental facts in nature upon which classification in natural history is based are these two: 1st. Plants and animals occur in kinds, and are reproduced true to their essential characteristics, from generation to generation; in other words, progeny is like parent. 2d. The numerous kinds exhibit unequal and very various degrees of resemblance, some being very similar, others widely dissimilar. Upon the first rests the idea of *species;* upon the second, that of genera, orders, classes, etc. Species is the unit in natural history. Individuals occur as links in the chain of generations which have come down from the immemorial past: this "perennial succession of individuals," this *ensemble* of individuals proceeding from a common stock, constitutes a species. Genera, orders, classes, and the like are assemblages of species, of various degrees of likeness, according to the grade. Those species which are most alike are of one genus; for example, red oak, white oak, scarlet oak, live oak, etc. are so many species of the oak genus. Those which concur in a more general resemblance, as being on the same plan of structure in all their important organs, with whatever difference in details, represent an order or family (these terms being synonymous in botany); *e. g.*, the oak genus, with the chestnut, beech, hazel, etc., are of one order. Those which have only a more general resemblance are of one class. Proceeding synthetically, from the species upward, these are *groups*, successively more and more comprehensive. Proceeding analytically from the vegetable kingdom as a whole, distinguishable into parts, they are *divisions*. The sequence of subordination, from general to particular, in all natural history, invariably is—*Class, Order, Genus, Species.*

This sufficed for the earlier naturalists; but in modern times the vast increase in the number of known species, and a more intimate knowledge of their structure, have called for the recognition of more numerous grades. The term *tribe* has been intercalated above genus, and sub-class, sub-order, sub-tribe, sub-genus next under class, order, etc.; the extended scaffolding to be used or not, according as diversities in structure and the numbers of forms to be classified may require.

Although *species* is the recognized unit in natural history classification, no species is represented by absolutely identical individuals. The differences may be slight, apparently casual and evanescent; or they may be more remarkable, inexplicable by any known causes or conditions, and more enduring. Some species are much disposed to vary; some maintain a general uniformity. Even the branches from the same stem may vary, and when variations or "sports" of this character arise, they incline to be perpetuated in the offshoots. Bud variations, however, are not common; the offshoot for the most part strictly reproduces the parent stock. Most varieties originate from seed. Here the result of all observation leads to the conclusion that there are two opposed tendencies in every sexual reproduction: 1. That of the progeny to be like the parent or parents in all respects: this ordinarily obtains such full mastery as to have established the fundamental proposition that the species reproduces itself; which, more strictly analyzed, means that individuals reproduce their like. 2. The second is the tendency to be unlike the parents by varying in some minor particulars, to strike out something new and peculiar. The law of inheritance generally prevails, but the tendency to individualize manifests itself strongly now and then in certain and minor particulars, and sets up a variety. Unimportant as this may be in wild plants, and in any single step, it becomes of the highest practical consequence in horticulture, agriculture, and stock-breeding, in which all depends upon favoring, strengthening, and preserving varieties. Varieties of recent origination are seldom directly perpetuable by seed, although they are so by buds (offshoots, layering, grafting, etc.); the tendency of the offspring to inherit the

peculiarities of the parent being likely to be overborne by the ancestral tendency—*i. e.*, the disposition to take after grandparents, great-grandparents, etc. Also, in uncontrolled nature, the cross-breeding with individuals of the unvaried stock is almost sure to obliterate the incipient variation. The variation is preserved and led on, under man's care, by close-breeding in the first instance, and by selecting for seed only those of the progeny that inherit most of the peculiarity; then again selecting from the best of these, and so on for a few generations. In this way the force of *atavism*, or taking after ancestors, is weakened or evaded; for the new generation is far more likely to take after its immediate parents, grandparents, and great-grandparents when all are similar, than after a remoter ancestry, the parental and the grandparental (or atavic) forces now acting in the same line. In this way varieties, which at first would come true only by bud-propagation, are developed into *races*, or varieties of greater fixity, which come true from seed. Races in plants are naturally most important in annuals and biennials, which are capable of perpetuation only by seed. There are perhaps no annuals or biennials in cultivation which refuse to diverge into races.

Moreover, nearly related species may often, but not in all cases, be cross fertilized, and so their peculiarities mixed in the progeny, which takes after both parents; this gives rise to *hybrids*. These are of transient existence, except when perpetuated from buds—first, because they are commonly sterile *per se;* secondly, because they are liable to be fertilized by the pollen of one or the other parent, and so brought back to that type; thirdly, because even when fertile *per se*, the progeny in a generation or two returns, some to one and some to the other parental type by a disseverance of the mixed characters, one part inheriting only the peculiarities of the male, the other only those of the female, parent of the hybrid.

Races and varieties, of whatever sort or degree of fixity, have been regarded as of economical importance only, but merely perplexing to the systematist. Recently, however, they have assumed a new interest in the eyes of the philosophical naturalist through the investigations and reasonings of Mr. Darwin, which tend to the conclusion that varieties are incipient species, and cognate species only varieties of greater divergence or fixity—offshoots of higher antiquity from a common stock. To many of the leading naturalists of the present day, even those who do not recognize the agency of "natural selection" as the operative cause, the terms relationship, affinity, consanguinity, and the like, by which the resemblance of one species or one genus to another has always been denoted, are no longer regarded as metaphors, but rather as unconscious expressions of the idea that the resemblances are a consequence of community of descent.

The Methods of Classification, by which the principles of taxonomy have been applied to the systematic arrangement of the species of plants, may here be considered only so far as concerns—1. The system which gave the great impulse to botany in the later half of the eighteenth century, and prevailed through the earlier part of the nineteenth; 2. The system which has now taken its place, and under which the science is attaining a truly philosophical development. The first, the artificial sexual system of Linnæus, was entirely the work of this pre-eminent naturalist; to the second, the natural system, he made early and important contributions, and commended the work to his successors. The two great ends of a classification of the vegetable kingdom are—1, to exhibit the relationships which subsist among plants, and bind them into a systematic whole; therefore to arrange them in such order, and under such successive grades, that each species and each group of species shall stand next to those which it most resembles in all or in the most important respects—*i. e.*, in a system which shall express (so far as we can discover and express in terms) the plan of nature, or, more worthily, the plan of the Creator in the vegetable world; 2, to enable a learner readily to ascertain the name, place in the system, and an account of all that is known of any particular species. These two ends should be subserved by one and the same classification. In the last century this was not practicable. So Linnæus contrived the system which bears his name as a temporary but much-needed expedient to subserve the latter purpose. He named it an *artificial system*, because in its classes and orders it did not attempt to express all or the more important relationships of plants, but only those which could most conveniently be used for a practical purpose. He named it the *sexual system*, because he founded it upon the stamens and pistils, of which he had just completed the proof that they were the sexual apparatus; and he saw, with instinctive sagacity, that agreement or similarity in the organs and method of reproduction would furnish the best characters for classification. Linnæus accordingly arranged the vegetable kingdom under twenty-four classes, characterized mainly by the stamens, as follows:

- PLANTS having
  - stamens and pistils manifest,
    - both found in the same flower,
      - the stamens separate from the pistils,
        - unconnected with each other, and
          - of equal length:
            - Stamens 1 ..... 1. MONANDRIA.
            - " 2 ..... 2. DIANDRIA.
            - " 3 ..... 3. TRIANDRIA.
            - " 4 ..... 4. TETRANDRIA.
            - " 5 ..... 5. PENTANDRIA.
            - " 6 ..... 6. HEXANDRIA.
            - " 7 ..... 7. HEPTANDRIA.
            - " 8 ..... 8. OCTANDRIA.
            - " 9 ..... 9. ENNEANDRIA.
            - " 10 ..... 10. DECANDRIA.
            - " 11–19 ..... 11. DODECANDRIA.
            - " 20 or more, adherent to the calyx ..... 12. ICOSANDRIA.
            - " 20 or more, not adherent to the calyx ..... 13. POLYANDRIA.
          - of unequal length:
            - two long and two short stamens ..... 14. DIDYNAMIA.
            - four long and two short stamens ..... 15. TETRADYNAMIA.
        - connected with each other
          - by their filaments in a single set ..... 16. MONADELPHIA.
          - by their filaments in two sets ..... 17. DIADELPHIA.
          - by their filaments in more than two sets ..... 18. POLYADELPHIA.
          - by their anthers ..... 19. SYNGENESIA.
      - the stamens adherent to the pistil ..... 20. GYNANDRIA.
    - in separate flowers
      - in the same individuals ..... 21. MONŒCIA.
      - in different individuals ..... 22. DIŒCIA.
      - some of the flowers perfect, others separated, in the same, or two or three different individuals ..... 23. POLYGAMIA.
  - the stamens and pistils (concealed) represented only by analogues ..... 24. CRYPTOGAMIA.

The orders were founded upon some considerations respecting the pistils, their number, or the number of their styles in compound pistils—*e. g.*, *Monogynia*, with one, *Digynia*, with two, and so on; and upon divers other considerations in the other classes, which there is not space here to specify. The interest of this artificial classification is now only historical, except that it has firmly established many names and terms in the science with which the botanist has to be familiar.

The *natural system*, of which the endeavor is to arrange all plants according to their true relationships, has now been so far perfected that it is, on the whole, as easy for practical as it is indispensable for all thoroughly scientific use. Its first development as a complete system was by the Jussieus, uncle and nephew, in the last century. Towards its perfection many have contributed in the present century: the two names most eminently and intimately associated with it are those of Robert Brown and A. P. De Candolle. It recognizes, first of all, two great series of plants, a higher and a lower grade; the higher comprising the whole twenty-three Linnæan artificial classes (above presented); that is, all plants which are sexually propagated through stamens and pistils (in other words, bear flowers), which result in seeds, of which the essential thing is that they contain an embryo, as stated in another part of this article. These are *phænogamous*, or more popularly *flowering plants*. The

lower series, comprising the Linnæan class *cryptogamia*, has sexual propagation effected through organs which are only analogous in functions to stamens and pistils, resulting (as already explained) in *spores*, instead of seeds: these are *cryptogamous* or *flowerless plants*. The primary divisions or classes of the two series can here be presented only in the following tabular form:

Ser. I. Flowering or Phænogamous Plants, with	Exogenous growth and a dicotyledonous embryo.	Class I. Exogens, or Dicotyledons.	
		Seeds in a pericarp.	Subclass 1. *Angiosperms.*
		Seeds naked.	" 2. *Gymnosperms.*
	Endogenous growth and a monocotyledonous embryo.	" II. Endogens, Monocotyledons.	
Ser. II. Flowerless or Cryptogamous Plants, with	a distinct axis, or stem and foliage, containing woody and vascular tissue.	Class III. Acrogens.	
	a distinct axis, or stem and foliage, containing cellular tissue only.	" IV. Anophytes.	
	no distinction of stem and foliage, but all confounded in a thallus.	" V. Thallophytes.	

Under these come the *natural orders* or *families* (between one and two hundred in number when most comprehensively treated); under these *sub-orders*, *tribes*, etc., whenever such have to be recognized; and finally the *genera* and *species*.

V. *Phytography*, or *Special Descriptive Botany*, is the carrying out of the principles of classification in the actual arrangement and characterization of these great divisions, of the orders under them, of the genera and species, etc.; and the application of names to each according to certain fixed rules. This introduces *Glossology* (a better word than the mongrel one, because half Latin and half Greek, *terminology*), which prescribes the system upon which substantive names are given to the organs and parts of plants, and adjective terms to their modifications and forms, making a technical language through which plants and their several parts may be compared and described with an exactness and brevity not otherwise possible. Also *Nomenclature*, which prescribes the rules for giving names to the plants themselves and to the groups which they compose.

The *binomial system* of nomenclature—which was one of the happiest hits of Linnæus, and of a value which those only can rightly estimate who are aware of the inconveniences suffered by the ante-Linnæan botanists in their endeavors to get on without it—has established for each plant a double name—namely, that of its genus and that of its species. A genus bears a name of one word, a substantive—*e. g.*, *Quercus*, the oak genus, *Lilium*, the lily genus. Genera and generic names, in the modern sense, date back as far as Tournefort (A. D. 1700). The specific name was the invention of Linnæus (say 1750), who first distinguished the phrase or descriptive character of a species from its name, making the latter consist of a single word, preferably an adjective; *e. g.*, *Quercus alba*, for white oak, *Quercus rubra*, for red oak. The generic name answers to our surname, as Brown or Jones: the specific to the baptismal name, as John and James. If a *variety* has to be designated, its name will be appended to that of the species—*e. g.*, *Quercus coccinea* (scarlet oak), variety *tinctoria*, for the quercitron oak. Names of groups higher than genera are in the nominative plural, and are mostly formed by an extension of the name of a principal genus. For instance, *Rosa*, the rose genus, gives its name *Roseæ* to the rose tribe, and of *Rosaceæ* to the rose family. This is a short expression for *Plantæ Rosaceæ*—*i. e.*, rosaceous plants.

Agricultural Botany, *Medical Botany*, and the like, signify so much of systematic botany as applies to agriculture, medicine, etc.

Palæontological or *Fossil Botany* is the systematic and structural botany, as far as it can be made out from fossil remains, of the vegetation of former ages. Its lessons, although fragmentary, are of the highest interest, as showing that a vegetation predominantly of the lower grades alone existed in the earlier geological eras; that gymnospermous plants long preceded angiospermous exogens; that the latter were apparently not introduced until the cretaceous period; and that our existing genera largely originated in tertiary times, and were then represented by species, some of them peculiar, but many much resembling, and some obviously identical with, those of the present day. So that it may be inferred that the actual flora of the United States originated in the cretaceous and tertiary periods, and has come down to the present day with change indeed, but with a continuity of type which argues genetic transmission. (See Fossil Botany.)

Geographical Botany—the study of the relations of plants to the earth, considered in reference to the natural distribution of the species over its surface, and the causes of that distribution—connects the science of botany with physical geography and climatology; also with geology as it proceeds; and it becomes apparent that the present distribution of species is only to be explained, or clearly conceived, by a study of the changes which the earth's surface and its climates have undergone since the types of the actual vegetation came into existence. So that geographical and fossil botany are co-related as modern is to ancient history. Asa Gray.

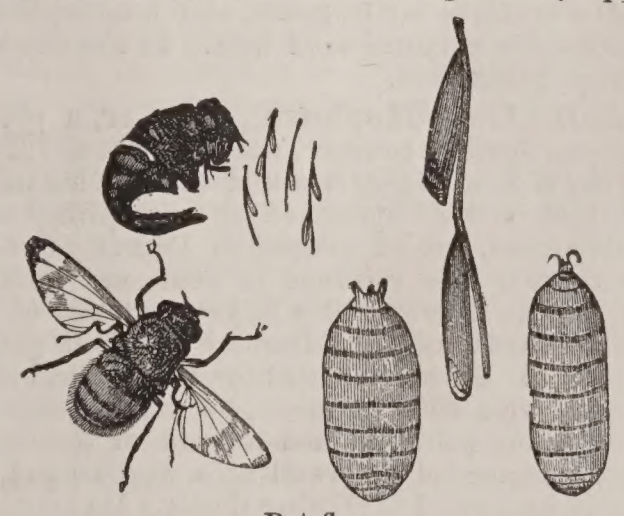
Bot'any Bay, a bay of Australia, in New South Wales, which was discovered by Capt. Cook in 1770, and named by him with reference to the great number of new plants found there. It is 5 miles S. of Sydney, in lat. 34° 2′ S., and lon. 151° 13′ E. A colony of British convicts was planted here in 1787, and was removed to Port Jackson in 1788, but the penal colony long continued to retain the name of Botany Bay.

Bot'etourt, a county of the W. part of Virginia. Area, 550 square miles. It is bounded on the S. E. by the Blue Ridge, and is traversed by several ridges of the Alleghanies, which are separated by fertile valleys. It is intersected by the James River, and also drained by Craig's Creek. The James River Canal connects this county with Richmond. Grain and tobacco are the chief crops. Flour is manufactured. Iron ore abounds. The Peaks of Otter are near its S. E. border. Capital, Fincastle. Pop. 11,329.

Botetourt (Norbonne **Berkeley**), Lord, was born in England about 1734. He was appointed royal governor of Virginia in 1768, and dissolved the assembly of burgesses in 1769 because they passed a remonstrance against some acts of the British Parliament. Died Oct. 15, 1770.

Botetourt Springs, a post-village of Roanoke co., Va., is the seat of Hollins Institute, a flourishing school for ladies, and has a mild and pleasant saline spring known as "Johnson's Spring."

Bot-Fly, a name given to various dipterous insects of the family Œstridæ, but in the U. S. generally applied to



Bot-fly.

the horse bot-fly, *Gastrophilus equi*. The fly lays her eggs upon the hairs of the horse, and after laying her eggs almost immediately dies. The eggs, conveyed to the horse's stomach, are hatched, and the larvæ are provided with mouth-hooks by which they hang on to the coats of the stomach. In about a year's time they are discharged with the excrement, and in one month they are changed into perfect flies. When very numerous there is reason to believe that bots are very injurious to the horse; but there is some dispute among horse-breeders as to the extent of the injury done by them.

Both (Jan), a Flemish painter, was born at Utrecht in 1610. He was a pupil of Bloemaert, and worked in Italy. He excelled in landscapes, and represented the atmospheric effects of Italy with much fidelity. Died in 1651.

Bo'thie [Gaelic *bothag*, a "hut"], the name applied in Scotland to a sort of barrack or large temporary structure for the lodging of farm-laborers, stone-cutters, and others. There are also bothies where women are lodged. The bothie system is considered by the best classes in Scotland as a national disgrace, for the moral results of the plan have been deplorable.

Both'nia [Sw. *Botten*], a name formerly given to a country of Northern Europe, which belonged to Sweden, and was situated on both sides of the Gulf of Bothnia. The eastern portion is now comprised in Finland, and the western forms the Swedish provinces of Piteå and Umeå.

Bothnia, Gulf of, the northern portion of the Baltic Sea, extends from Torneå southward to the island of Aland, and is about 400 miles long. Its width varies from 60 to 130 miles. It is bounded on the E. by Finland and on the W. by Sweden. Its greatest depth is about fifty fathoms. The navigation of it is rendered difficult by many small islands and sand-banks near the shores. The gulf is usually frozen in winter, so that sledges can cross it.

Bothrioceph'alus [from the Gr. *βοθρίον*, a "little pit," and *κεφαλή*, the "head," named from the depressions on each side of its head], a genus of cestoid intestinal worms, once supposed to be identical with the *Tænia*, or common tapeworm. It inhabits the bodies of the salmon, stickleback, and other fishes, as well as human beings. Two species occur in man, *Bothriocephalus latus* and *Bothriocephalus cordatus*. The former is common only in Russia, Sweden, Norway, Lapland, Finland, Poland, and Switzerland. It is from six to twenty feet in length, composed of numerous flat and wide segments, and an elongated, compressed, obtuse head. The mouth is small, with a longitudinal depression extending from it on each side. Like the *Tænia*, it is hermaphrodite, and besides discharging ova multiplies by segmentation, the fragments or *proglottides* being discharged with the fæces of the animal in which it lives. Probably this parasite is introduced into the human body not only from fish eaten as food, but in drinking water from lakes and rivers. Near the Gulf of Bothnia scarcely a family is free from it, but a few leagues from the coast and main water-courses it almost disappears. *Bothriocephalus cordatus* has been found to inhabit the human intestines only in North Greenland. In that country it is quite common in dogs. It is about a foot in length, and receives its name from the cordate or heart-shaped head. (*Cobbold, Proceedings of the Zoological Society*, London, 1862.) The means of destroying or expelling the "broad tapeworm," as this parasite is sometimes called, are the same as in the case of *Tænia*. (See TAPEWORM.)

Both'well, a county in the S. W. part of Ontario (Canada), is intersected by the Great Western Railway, and bounded on the W. by the St. Clair River, and on the S. E. by Lake Erie. Large quantities of petroleum are produced. Area, 547 square miles. Pop. in 1871, 20,701.

Bothwell, a post-town of Zone township, Bothwell co., Ontario (Canada), on the Great Western Railway, 23 miles S. W. of Chatham. It has numerous petroleum-wells, and a trade in cattle, grain, and lumber, the latter being extensively manufactured here. It has one weekly paper. Pop. about 1500.

Bothwell (JAMES **Hepburn**), EARL OF, a profligate and audacious Scottish courtier, was born about 1526. He inherited the title and large estate of the earl his father in 1556. In 1562 he was imprisoned for a conspiracy to seize the queen's person, but he escaped to France, after which he was outlawed. He returned in 1565, and became an enemy of Regent Murray and a favorite adviser of Queen Mary. The murder of Lord Darnley (1567) is generally imputed to him. He was indicted for this crime, but as he came to court with 4000 followers, he was acquitted. In April, 1567, many nobles signed a bond or document in which they commended Bothwell as a fit husband to the queen, whom he carried to Dunbar Castle. He married her in May of the same year. A strong party soon took arms against Bothwell, who fled to Denmark, where he was imprisoned. Died in 1576. (See BURTON, "History of Scotland," vol. iv.; ROBERTSON, "History of Scotland.")

Botocu'does, or **Aymo'res,** a native tribe of Brazil. They live in the forests on the Rio Doce, along the boundary of the provinces of Espirito Santo and Minas Geraes, and are said to resemble the Chinese. They are brave but treacherous, and have caused the government considerable trouble. They number about 4000, and are rapidly dying out. They pierce the lower lip and insert a block of wood in the hole.

Botoshan', or **Bootosha'ni,** a town in Roumania, on the Schiska, 60 miles N. W. of Jassy, carries on a considerable trade with Germany in cattle, wine, wool, tobacco, etc. Pop. in 1860, 27,147.

Bo Tree, or **Pee'pul,** the *Ficus religiosa* or sacred fig tree of Hindostan and Ceylon, a species of tree which is greatly venerated by the followers of Vishnu (who was born under this tree), and especially by the Booddhists. It is a large tree, whose sap abounds in caoutchouc, and which yields a small edible fig, not much valued. Great amounts of lac are gathered from its branches, for it is one of the favorite abodes of the lac insect. The famous bo tree of Anarajapoora in Ceylon is believed, on apparently good grounds, to have been planted in 288 B. C.

Botrych'ium [from the Gr. *βότρυς*, a "bunch of grapes," the name referring to the appearance of the fruitful fronds], a genus of ferns, having the spore-cases distinct, sub-globose, clustered, and on one side of a pinnated rachis, 2-valved, without any elastic ring and opening transversely. The *Botrychium Virginicum* is remarkable for its wide geographical distribution. It abounds in the U. S. and in the Himalaya Mountains, and is found in Norway, Australia, Mexico, and many other countries. It is boiled and eaten in some countries.

Botryoi'dal [from the Gr. *βότρυς*, a "bunch of grapes," and *εἶδος*, a "form"], a term used in mineralogy, and applied to substances the surface of which consists of a group of clustered globular prominences which resemble grapes in form. Examples of such formation are often seen in chalcedony and hæmatite.

Botrytis. See MILDEW.

Bot'ta (ANNE CHARLOTTE LYNCH), an American poetess, born at Bennington, Vt. She was married to Vincenzo Botta in 1855. She published a volume of poems in 1849 and a "Hand-book of Universal Literature" in 1860.

Botta (CARLO GIUSEPPE GUGLIELMO), M. D., an eminent Italian historian, born at San Giorgio, in Piedmont, Nov. 6, 1766. He studied medicine, and served as surgeon in the French army in 1795–96. In 1803 he was elected to the French legislative body. He published in 1809 a "History of the American War of Independence," and in 1825 a "History of the Nations of Italy from Constantine to Napoleon," 3 vols. His most important works are a "History of Italy from 1789 to 1814" ("Storia d'Italia dal 1789 al 1814," 4 vols., 1824), and his "Continuation of Guicciardini's History of Italy to 1789" (10 vols., 1832). He died in Paris Aug. 10, 1837. (See F. BECCHI, "Elogia storico di C. Botta," 1839.)

Botta (PAUL ÉMILE), a distinguished archæologist and traveller, a son of the preceding, was born in 1794. He entered the service of Mehemet Ali of Egypt as a physician about 1830, and became French consul at Alexandria. Having visited Arabia in 1837, he published in French a "Narrative of a Journey to Yemen, etc." (1844). He was next sent as consul to Mosul, and in 1843 began to excavate the mound at Khorsâbâd on the Tigris for monuments of ancient Assyria, and there discovered a palace with statues and cuneiform inscriptions. With the aid of Letronne, Burnouf, and the artist Flandrin, he published a magnificent work entitled "Monuments of Nineveh, discovered and described by M. Botta, with designs by Flandrin" (5 vols. folio, 1847–50).

Botta (VINCENZO), PH. D., born near Turin, Italy, Nov. 11, 1818, became professor of philosophy at Cuneo, and afterwards at Turin; a member of the parliament in 1849; in 1850 inspected the educational system of Germany, and in 1853 that of the U. S., and became professor of Italian literature in the University of the City of New York. Among his works are a "Life of Cavour," "Dante as Philosopher, Patriot, and Poet," and a history of modern philosophy in Italy.

Bött'ger, written **Bött'cher,** or **Böt'tiger** (JOHANN FRIEDRICH), a German alchemist noted as the inventor of Meissen porcelain, was born at Schleiz Feb. 4, 1682. He spent much time and money in the search for the philosopher's stone. Died Mar. 13, 1719.

Botticel'li (SANDRO), an early Italian painter of the Tuscan school (1447–1515), was the most eminent of the scholars of Filippo Lippi. He was the first who treated mythological subjects, and excelled his predecessors in movement and drapery.

Böt'tiger, or **Boettiger** (KARL AUGUST), a German archæologist and *littérateur*, born at Reichenbach, in Saxony, June 8, 1760. He was a friend of Goethe, Schiller, and Herder, with whom he associated at Weimar. He edited several journals, and published many antiquarian treatises. Died Nov. 17, 1835. A collection of his essays, called "Kleine Schriften," appeared in 3 vols., 1838.

Bot'tle [Fr. *bouteille*; Sp. *botilla*, the diminutive of *bota*, a "leather bag for carrying liquids"], a vessel for holding liquids, usually made of glass or earthenware. The bottles mentioned in the Bible were made of the skins of animals, and such vessels are still used for carrying water in Asia and Africa. In Spain, wine-bottles made of goats' skins are used at the present time. The glass used in the manufacture of common bottles is of a coarse quality. The process by which they are formed is briefly as follows: A long iron tube is dipped into the melted glass, a portion of which adheres to the end of the tube. After this material

is partially cooled, the glass-blower puts the end of the tube, with the portion of the glass adhering, into a mould, and blows into the tube, which he holds in a vertical position. It is then passed from the hands of the blower, and is finished by several other workmen.

Bottle Gourd (*Lagenaria*), a genus of plants of the order Cucurbitaceæ, is nearly allied to the genus *Cucurbita*, in which it was formerly included. The *Lagenaria vulgaris*, or common bottle gourd, is a native of India, but is cultivated in many warm climates. It is a climbing annual, having white flowers, and a large bottle-shaped fruit with a hard rind, which is called a *calabash*, and is used for holding or dipping water. This fruit is sometimes several feet long. Some varieties of *Lagenaria* have an edible pulp, which is an important article of food to the poorer Arabs.

Bottle-nose Whale, sometimes called **Bottlehead** (*Hyperaodon bidens*), a cetaceous mammal of the family Physeteridæ. It inhabits the North Atlantic and sometimes ascends rivers. It seldom exceeds twenty feet in length. The name of Bottle-nose Whale is sometimes applied to another mammal, the *Delphinus Tursio*, a dolphin which inhabits the North Sea.

Bottom Heat, a term applied in horticulture to the temperature communicated to certain soils, either by fermenting and decomposing substances placed underneath them, for which purpose leaves, fresh dung, and the refuse bark of the tanyard are often used, or by means of flues or hot-water apparatus. The system is applied to the cultivation of pineapples, grapes, melons, cucumbers, and other plants grown in hot-houses, pits, or frames. It is one of the most important agents in the artificial cultivation of tender plants of whatever kind, whether flower or fruit-bearing.

Bot'tomry [from *bottom*, a part of the ship being put for the whole], the act of lending money on the pledge of a ship or on the bottom of a ship. It may be considered under the following divisions: 1, the nature of the contract; 2, its form; 3, by whom made; 4, the mode of its enforcement.

1. *The Nature of the Contract.*—It is a maritime contract, and in the nature of a wager. The substance of the contract is, that if the ship returns the loan is to be repaid with interest. If it is lost in the course of navigation, the debt is discharged, though the borrower may have abundant means for repayment. The principal of the loan being thus put at risk, the case does not come within the operation of the usury laws. Large interest is sometimes exacted —15 or 20 per cent., or even a larger rate. The proper court, however, has power, in extreme cases of excessive interest, to grant relief. Should the ship deviate from her voyage and be lost, the lender would not take that risk upon himself, but the borrower would still be liable. So if the ship be lost by the wrongful act of the borrower or the master, instead of the perils of the sea. It has been decided that the doctrine of constructive loss which applies in insurance law does not extend to a bottomry loan. This loan is not within the act of Congress, which requires mortgages and conveyances of vessels to be registered for the purpose of giving notice to subsequent grantors or to creditors. Should the ship return, the loan becomes due, and the principal and maritime interest together form a new principal, on which ordinary interest will be calculated until payment. A bottomry loan is strictly on the ship. A corresponding loan on the cargo is termed *respondentia*. It is governed by rules closely resembling those applicable to bottomry. A bottomry loan has this marked peculiarity, applicable, however, to other maritime liens: that where there are two or more in succession, the latest may have the preference, as it may be the price of the safety of the ship. In liens created regularly upon property on land it is a well-known general rule that the earliest has the preference.

2. *The Form of the Transaction.*—There is usually executed a bottomry bond. This is not, however, absolutely essential. The courts do not look so much at the technical forms as at the intent of the parties. Even if there were a sale intended as a security for a loan, evidence to show the true nature of the transaction could be adduced, and it would be enforced accordingly.

3. *By Whom Given.*—A bottomry bond may be executed either by the owner or the master of the ship in the owner's absence. The owner can execute it, in general, whenever he sees fit, so long as the transaction is in its nature maritime. A master of a ship, on the other hand, is governed by special rules. His leading duty is to navigate the ship, not to pledge nor to sell it. These latter powers are conferred upon him in extraordinary emergencies, where the exigencies require it. The lender must be prepared to show that the case is one which justifies the loan, such as stress of weather, necessity of repairs, and the like. Due measures must be taken to communicate with the owner where such communication is feasible. At the present time the telegraph must be resorted to where it is accessible. The power of the master may in like manner in extraordinary cases extend to a pledge, or even a sale, of the cargo. The general test of his authority in all these cases is that he must exercise the diligence of a prudent owner, and that there must be an apparent necessity for the pledge or sale.

4. *Enforcement.*—A bottomry bond is enforceable in a court of admiralty—in this country in the district courts of the U. S. A proceeding is instituted against the ship, or, in technical language, *in rem*. If necessary, the ship may be sold, and the claim paid out of its proceeds. The borrower is also personally responsible. The lien of seamen for subsequent wages is superior to that of the bottomry lender. Should the latter, in order to preserve his own claim, discharge that of the seamen, he could have a lien upon the proceeds of the ship for his reimbursement, as well as a personal claim against the owners; or, in other words, he would be allowed to stand in the place of the seamen.

It may be added that if a ship, having incurred a bottomry loan, does not set out on her intended voyage, the property will not have incurred any maritime risk, and consequently the maritime interest cannot be exacted, but only ordinary interest. T. W. Dwight.

Botts (John Minor), an American statesman, born at Dumfries, Prince William co., Va., Sept. 16, 1802. He was elected to Congress as a Whig in 1839, and re-elected several times. In 1844 he supported Mr. Clay for the presidency. He opposed the repeal of the Missouri Compromise in 1854, was a firm adherent of the Union during the civil war, and afterwards favored the Republican party. He wrote "The Great Rebellion" (1866). Died Jan. 8, 1869.

Bot'zen, or **Bozen** [It. *Bolzano*], a trading town of the Austrian Tyrol, at the junction of the river Talf with the Eisach, 33 miles by rail N. N. E. of Trent. It is situated in a hilly or mountainous district, is well built, and contains a gymnasium, a Gothic cathedral, and a castle; also manufactures of silk, linen, hosiery, etc. It has four annual fairs, and is an entrepôt of the trade between Italy, Germany, and Switzerland. Pop. in 1869, 9357.

Bouchardat (Apollinaire), a French pharmaceutist, born about 1810, commenced young the study of medicine and pharmacy at Paris, and became professor of hygiene in 1852. His most important works are "Recherches sur la Vegetation" (1846), and elementary treatises on applied chemistry, physical science, materia medica, therapeutics, agricultural economy, and several original treatises on wine and wine-culture.

Bou'cher (Jonathan), an English philologist, born in Cumberland in 1738. He removed to Virginia in 1756, became rector of a parish church, and was a royalist in the Revolution. He returned to England in 1775, and compiled a "Glossary of Archaic and Provincial Words." Died April 27, 1804.

Boucher de Perthes (Jacques), a French archæologist and naturalist, born at Rethel Sept. 10, 1788. His principal works are "The Creation" (5 vols., 1839–41) and "Celtic and Antediluvian Antiquities" (1847). He is regarded as the founder of the science of archæo-geology. Died Aug. 9, 1868.

Boucherie (Auguste), a French chemist, born in Sept., 1801, invented a method of preserving wood. He employed sulphate of copper.

Bouches-du-Rhône, a department in the S. E. part of France, was formerly included in Provence. Its area is 1971 square miles. It is bounded on the N. by the Durance, which separates it from Vaucluse, on the E. by Var, on the S. by the Mediterranean, and on the W. by Gard. It is intersected by the Rhone, which enters the sea by several mouths, and forms a delta called the "Ile de la Camargue." The surface in the E. part is hilly, and is elsewhere diversified by plains, heaths, forests, and saline lakes. The grapevine and olive flourish here, and large numbers of silkworms and sheep are raised in this department. Among its public works are several canals, a railway connecting Marseilles with Lyons, and an aqueduct, fifty miles long, from the Durance to Marseilles, which is the capital. It has manufactures of cloth, hats, perfumes, wine, brandy, soap, olive oil, and chemical products. It is divided into 3 arrondissements, 27 cantons, and 107 communes. Pop. in 1872, 554,911.

Bouchette (Joseph) was born in Canada in 1774. In 1790 he entered the surveyor-general's office for British America, and afterwards served in the volunteers and in the navy of the lakes. In 1804 he became surveyor-general. He served against the U. S. in the war of 1812. As surveyor-general he was afterwards employed in establishing the southern boundary of Canada. He published (1816) a

topographical and geographical description of Canada, "The British Dominions in North America" (1831), and a "Topographical Dictionary of Lower Canada" (1832). Died at Montreal April 9, 1841.

Boucicault (Dion) was born in Dublin, Ireland, Dec. 26, 1822, and was educated by his guardian, Dr. Dionysius Lardner, and at the London University. His first successful play was "London Assurance," which he wrote in conjunction with John Brougham, and which was acted in 1841 at Covent Garden, London. He was married to Miss Agnes Robertson, came to America in 1853, and remained till 1860, when he returned to London, and brought out, at the Adelphi Theatre, his first, and still famous, Irish play, "The Colleen Bawn." This is founded on Gerald Griffin's novel of "The Collegians." In 1861 was produced at the same theatre his play of "The Octoroon," which vigorously illustrated, and by implication denounced, the evils of slavery in the Southern U. S. He remained in England till 1872, and during these twelve years he furnished to the London stage the following plays: 1862, "Dot," "The Life of an Actress," "The Phantom," "The Relief of Lucknow;" 1863, "The Trial of Effie Deans;" 1864, "The Streets of London;" 1865, "Arrah-Na-Pogue," "Rip Van Winkle," "The Parish Clerk" (the latter, written for Joseph Jefferson, was not acted in London); 1866, "The Flying Scud," "Hunted Down," "The Long Strike;" 1867, "How She Loves Him!" "Foul Play" (written in collaboration with the novelist Charles Reade); 1868, "After Dark;" 1869, "Lost at Sea," "Formosa," "Presumptive Evidence;" 1870, "The Rapparee," "Jezebel;" 1871, "Elsie," "Kerry;" 1872, "Babil and Bijou." In the autumn of 1872 he appeared at Booth's Theatre, New York, as Shaun in "Arrah-Na-Pogue." In 1873 he produced, at Booth's Theatre, his beautiful Irish play of "Daddy O'Dowd;" at Wallack's Theatre, his "Mora" and his "Mimi;" and at the Union Square Theatre, his "Led Astray." On Dec. 25, 1873, he opened, in conjunction with Mr. William Stuart, the New Park Theatre, on Broadway, near Twenty-second street, New York. Among his earlier works, prior to his first visit to America, were "Old Heads and Young Hearts," "The Irish Heiress," "The Willow Copse," "The Corsican Brothers," "Faust and Marguerite," and "The Vampire." The dramas of Boucicault are seldom, if ever, original in plot, but they are often original, and sometimes superlatively good, in action, treatment of incidents, and brightness of dialogue. His melodramas excel those of the earlier school—which they have superseded—in vitality of subject, lifelike character, human interest, and pointed colloquy. The elevation of this class of stage literature is directly traceable to his influence. He has also been the means of great improvement and elevation to the Irish drama, having replaced the "ranting, roaring Irishman," with stuffed stick and black bottle, by genuine men of the Emerald Isle, such as Diogenes in "How She Loves Him!" Johnny Reilly in "The Long Strike," Myles-na-Coppaleen, Shaun the Post, Kerry, and Daddy O'Dowd. As an actor, Mr. Boucicault's best successes have been won in personating eccentric characters, such as Mantilini, and rustic old Irishmen, such as Daddy O'Dowd. He will be remembered, however, for his Grinaldi and his Vampire. He will also be remembered for having made dramatic authorship a remunerative profession to dramatic authors in England. This he did by asserting, maintaining, and finally establishing the principle that among theatrical attractions the play should be made predominant, and should be suitably recompensed. The change in practice that ensued may be inferred from the fact that whereas, in the earlier part of his career, Mr. Boucicault received but £60 for his "Corsican Brothers," he obtained, in 1866, for his "Flying Scud," £6500. Boucicault was educated as an architect and civil engineer. As a manager he established a theatre in Washington, D. C., in 1858; reconstructed the Metropolitan Theatre, New York, and converted it into the Winter Garden in 1859; and remodelled Astley's Circus and built the Westminster Theatre—both in London—in 1862. He is the author of numerous newspaper essays and letters on dramatic subjects, and of an unpublished work on the stage and kindred themes, called "The Master of the Revels."

William Winter, *of the "N. Y. Tribune."*

Bouck'ville, a post-village of Madison township, Madison co., N. Y., on the New York and Oswego Midland R. R., 15 miles S. W. of Clinton. It has considerable manufactures of lumber, cheese, and vinegar, and a distillery of cider-brandy.

Bou'dinot (Elias), LL.D., an American patriot, born in Philadelphia May 2, 1740. He practised law in New Jersey, and supported the popular cause in the Revolution. He was chosen a delegate to the Continental Congress in 1777, was a member of Congress (1789–95), and was director of the Mint at Philadelphia from 1796 to 1805. In 1816 he became the first president of the American Bible Society. He wrote several works, and gave large sums of money for charitable purposes. His wife was a sister of Richard Stockton. He died Oct. 24, 1821.

Boudoir, a small cabinet or private apartment, usually near the bed-chamber, designed as a place of retirement for the mistress of the house, who sometimes receives there her intimate friends. Boudoirs became fashionable in France in the reign of Louis XIV.

Bouflers, de (Louis François), Duke, a famous French general, born Jan. 10, 1644. He served under Turenne and Catinat, distinguished himself at Steenkerke in 1692, and became a marshal of France in 1693. He commanded at Namur when it was besieged by William III. of England in 1695, and defended Lille with success in 1708 against Prince Eugène. He commanded a wing at Malplaquet (1709), from which he made a masterly retreat. Died Aug. 20, 1711. (See "Vie du Maréchal du Bouflers," Lille, 1852.)

Bougainville, de (Louis Antoine), a famous French navigator, born in Paris Nov. 11, 1729. He was aide-de-camp to Montcalm in America in 1756, and served with distinction in Germany in 1761. He performed a voyage round the world in 1767–69, and discovered several islands in the South Sea, being the first Frenchman who circumnavigated the globe, and he published in 1771 a narrative of that voyage. During the American Revolution he had a high command in several naval battles between the French and English. Died Aug. 31, 1811.

Bought Note, a memorandum given by a broker who effects a sale to the purchaser, in which he is notified that the property therein described has been bought for him of the seller, the price and terms being stated. A similar memorandum given to the seller is called the sold note. According to some authorities, the bought note is given to the seller, and the sold note to the buyer. As a general rule, the notes must correspond, or there will be no contract.

Bough'ton (George H.), a painter of great merit, born in Norfolk, England, in 1836, removed to Albany, N. Y. After a few years' residence in America, he returned to England. His works, chiefly landscapes and genre pictures, are marked by delicacy of execution and tenderness of sentiment.

Bougie, boo'zhee' [a French word signifying a "wax candle," so called because sometimes made of waxed linen], a slender surgical instrument designed to be introduced into the male urethra. It is usually made of gum-elastic or gutta-percha, but may be made of other flexible substances. Bougies are often medicated, but more commonly they are designed to act mechanically upon a contracted passage. Bougies are sometimes made of a larger size for the rectum or for the œsophagus.

Bouguer (Pierre), a French mathematician and natural philosopher, born in Brittany Feb. 16, 1698. He published in 1729 an "Essay on Optics and the Gradation of Light," and was associated in 1736 with La Condamine in an expedition to Peru for the purpose of measuring a degree of the meridian, in which they spent several years. He published the results of this operation in an important work entitled "Theory of the Figure of the Earth" (1749). He wrote other works, and invented the heliometer. Died Aug. 15, 1758.

Bouillon, de (Godefroi). See Godfrey of Bouillon.

Boul'den, a township of Linn co., Ia. Pop. 937.

Boul'der, or **Bowlder,** a large mass or fragment of rock lying on or near the surface of the ground, and found at a distance from the place of its origin and from the formation to which it belongs. Boulders are usually rounded by attrition. In many cases they have been transported hundreds of miles by the action of icebergs or glaciers. Large masses of Scandinavian rocks are scattered over the plains of Denmark and Northern Germany. The pedestal of the statue of Peter the Great at St. Petersburg was hewn out of an erratic granite boulder forty-two feet long, twenty-seven feet broad, and twenty-one feet high. In the Western States occur many granite boulders which probably came from Canada. They abound along the coast of New England, where they are so large as to form a prominent feature in the landscape. The famous Plymouth Rock is a boulder of syenite. (See Drift.)

Boul'der, a county in the N. part of Colorado. Area, 900 square miles. It is drained by Boulder and Saint Vrain's creeks. It is bounded on the W. by a range of the Rocky Mountains which separates it from the Middle Park. The soil is fertile. Grain, hay, and butter are produced. Gold, silver, iron, and coal abound here. Capital, Boulder. Pop. 1939.

Boulder, a post-village, capital of the above county.

on Boulder Creek, near the E. base of the Rocky Mountains, 25 miles N. W. of Denver. The celebrated Caribou silver and the Gold Hill gold-mines are in the immediate vicinity. It is a popular resort for excursionists. It has one weekly newspaper. Pop. 343.

ED. "BOULDER COUNTY NEWS."

Boulder Clay. See GEOLOGY, by PROF. J. W. DAWSON, LL.D., F. R. S.

Bou'le [Gr. *βουλή*, a "council"], the name of the ancient Athenian senate, instituted by Solon as a check on the *ecclesia* (*ἐκκλησία*), which was an assembly of the whole people. The boule was at first composed of 400 members, but Cleisthenes increased the number to 500 when he divided the Athenians into ten tribes. The number was subsequently raised to 600. All freeborn Athenian citizens above thirty years of age were eligible to this council.

Boulevard', a French word corresponding to the English "bulwark" or "rampart," was applied to the fortifications erected around many towns in Europe. In France and Germany these defensive works have been generally levelled and converted into public promenades or avenues lined with trees. The boulevards of Paris are celebrated for their beauty, and are mostly curvilinear. The Inner Boulevards form a magnificent central thoroughfare, lined on each side by a double row of trees, under which is a wide and elevated pathway, and bordered by elegant shops and mansions, the whole presenting a scene of gayety and splendor which no other capital can equal. The Italian Boulevard is a fashionable promenade.

Boulogne, a town of France, department of the Seine, is on the right bank of the river Seine, 5 miles W. of Paris, from which it is separated by the BOIS DE BOULOGNE (which see). A fine stone bridge connects it with the ruined palace of St. Cloud. It is surrounded by beautiful scenery. Pop. 17,343.

Boulogne, or **Boulogne-sur-Mer,** a seaport of France, department of Pas-de-Calais, is on the English Channel, at the mouth of the Lianne, 158 miles by rail N. N. W. of Paris and 27 miles by rail S. W. of Calais; lat. 50° 44′ N., lon. 1° 37′ E. The railway which connects Calais with Amiens passes through it. It is divided into two parts—the upper and lower town, from the former of which the English coast is visible. The upper town has beautiful promenades, an old Gothic cathedral, a hôtel de ville, and an episcopal palace. The lower town is newer, more regular, and more populous. It contains a hospital, a theatre, a museum, a public library, and an exchange. Boulogne derives much of its prosperity from English residents and visitors, who are very numerous. Steamers ply twice a day between this port and Folkestone. The harbor will admit large vessels during high water. Here are manufactures of linen and woollen goods, sailcloth, cordage, bottles, etc. It occupies the site of the ancient *Gesoriacum,* which after the time of Constantine the Great was called *Bononia Oceanensis.* Several centuries later the name was changed to *Bolonia.* At this place Napoleon assembled in 1804 an army of 180,000 men and a flotilla of 2400 transports for the invasion of England. To commemorate this design, which, however, was never executed, a column 164 feet high was erected. Pop. 40,251.

Boulogne (ÉTIENNE ANTOINE), an eloquent French prelate, born Dec. 26, 1747, edited during the Revolution the "Annales religieuses," which was several times suppressed and revived with altered title. Under the empire he, as bishop of Troyes, was imprisoned with two other bishops for declaring that the emperor had no authority to confine a bishop without the approval of the pope. He was made an archbishop in 1822. His works appeared in 1826–28, 8 vols. Died May 13, 1825.

Boul'ton (MATTHEW), an English inventor, born at Birmingham Sept. 3, 1728. He was noted for his energy and enterprise as a manufacturer, and he became a friend and partner of James Watt. He established at Soho, near Birmingham, a manufactory of steam-engines in 1765. Boulton invented an improved apparatus for coining money and a new mode of inlaying steel. He was a man of generous disposition. Died Aug. 17, 1809. (See "Life of M. Boulton," Birmingham, 1809.)

Bou-Maza (SI MOHAMMED BEN ABDALLAH, *surnamed*), an Arab chief, born about 1820, followed for three years the austere life of a dervish, and then, proclaiming that he was an emissary of Heaven, he stirred up the Kabyles, the warlike inhabitants of Dahra in Algiers, preached extermination to Christians, and waged war upon the allies of France, Hadj-Achmed and Sidi-Darribi. He surrendered after a protracted conflict with Gen. Herbillon, Jan. 13, 1847, and was conveyed to Paris. He afterwards entered the service of the Porte, and attained the rank of colonel.

Boul'ware, a township of Gasconade co., Mo. P. 983.

Bound, or **Bound'ary,** a limit; the line which includes the whole of any object or space; also a leap, a spring, a rebound. The term "boundary" is applied to the limit line of demarcation which separates one state or country from another, and which is sometimes an imaginary line, sometimes a river, sea, or other natural barrier. In the mensuration and description of real estate, "bound" is used to denote the utmost limits of land by which the same is known and can be described, being in this sense synonymous with abuttals.

Bound, or **Bownd** (NICOLAS), D. D., a clergyman of the Church of England at Norton, in Suffolk, who died in 1607. He published in 1595 (enlarged edition in 1606) his famous work, "Sabbathum Veteris et Novi Testamenti," in which the Puritan doctrine of the Lord's Day was for the first time broadly and prominently asserted.

Bound Bai'liff, in England, is a sheriff's officer whose duty it is to discover and arrest debtors. He is so called because he is annually bound in an obligation, with sureties, for the due execution of his office. (See BAILIFF.) The name is corrupted into "bum bailiff" by the common people.

Bound Brook, a post-village of Bridgewater township, Somerset co., N. J., on the Central R. R. of New Jersey, 31 miles W. S. W. of New York. It is pleasantly situated on the Raritan River and the Delaware and Raritan Canal. It has five churches and important manufactures. Its trade in lumber is very extensive. Pop. 556.

Boun'ty [from the Fr. *bonté,* "goodness," "kindness"], a premium given by government to foster some branch of industry, or encourage enterprises which are believed to be of national importance and conducive to the public interests. The British government formerly gave bounties to encourage the herring-fisheries and the exportation of grain and Irish linen, and for other purposes. The modern political economists reject this factitious method of fostering commerce, agriculture, etc., and argue that it promotes a misdirection of capital, talent, and industry. The impolicy of giving bounties for such purposes appears to be now generally admitted. They are often given, particularly in new countries, for the destruction of ferocious animals, as wolves, bears, etc. Some of the U. S. give bounties for tree-planting. Subsidies to steamship companies and land-grants to railways are especially common in the U. S.

A bounty in money is also often given to induce men to enlist in the army and navy. The amount of this money varies according to the exigency and the difficulty of obtaining recruits. In 1812 the British government offered a nominal bounty of £23 17*s.* 6*d.,* but this was subject to large deductions and drawbacks. The bounty given in Great Britain at present is about one pound sterling. In the American civil war the recruits of the Union army received in some cases a bounty of $500 or more. Many of these recruits deserted soon after they had received the bounty; these were called "bounty-jumpers."

Bouquetin, or **Ibex of the Alps** (*Capra Ibex*), [Ger. *Steinbock*], a species of wild goat which is found on the Alps, and which ascends to the limit of perpetual snow. It is larger than the common goat, and has large horns which curve backward. The horns of the male are sometimes twenty inches long or more. It has no beard except a few hairs in winter. The color of the hair is mostly brown. This animal feeds on shrubs, lichens, and the scanty herbage which is found on the confines of vegetation. It has an extraordinary power of bounding from crag to crag, and of climbing precipices which are almost perpendicular. The bouquetin can be tamed if it is taken young, and it will breed with the common goat.

Bourbaki (CHARLES DENIS SAUTER), a French general, born April 22, 1816, took part in the wars in the Crimea and in Italy, and in the beginning of the German-French war of 1870 he commanded the imperial guards before Metz. After the deposition of Napoleon he organized the Army of the North, then commanded in the E. of France, and was forced to cross the Swiss frontier with 84,000 men, Feb. 1, 1871.

Bourbon, called also **Ile de la Réunion,** or **Ile Bonaparte,** an island and French Colony in the Indian Ocean, belongs to the Mascarene group, and is about 100 miles S. W. of Mauritius; lat. 20° 51′ 43″ S., lon. 55° 30′ 16″ E. It is 38 miles long, 28 miles wide, and has an area of 956 square miles. Pop. in 1867, 209,688. It is volcanic, and is traversed by a mountain-chain the direction of which is N. and S. This mountain-range, of which one peak rises 10,000 feet above the sea, divides the island into two portions, differing in climate and productions. The Piton de Fournaise, 7200 feet high, is an active volcano, the eruptions of which occur on an average at least twice a year. The soil in some parts is very fertile, and the scenery is gener-

ally extremely beautiful. The climate was formerly healthy, but Europeans now suffer much from typhoid fever and dysentery. The mean annual temperature is about 77° F. It is often visited by terrific hurricanes, which demolish houses and tear up trees by the roots. The chief articles of export are sugar, coffee, and dyewoods. Maize, rice, and tobacco are also cultivated. The island has no good harbors, and the coast is consequently dangerous. In one year (1843–44) eleven large vessels were wrecked here. Capital, St. Denis. This island was discovered in 1545 by the Portuguese, and was occupied by the French in 1649.

Bourbon, a county of Kansas, bordering on Missouri. Area, 625 square miles. It is drained by the Little Osage and Marmaton rivers. The surface is undulating or nearly level; the soil is fertile. Cattle, grain, tobacco, and wool are produced. Excellent coal abounds. A large portion of the county is prairie. It is intersected by the Missouri River Fort Scott and Gulf and the Missouri Kansas and Texas R. Rs. Capital, Fort Scott. Pop. 15,076.

Bourbon, a county of the N. central part of Kentucky. Area, 300 square miles. It is bounded on the N. E. by the South Licking River and drained by several creeks. The surface is undulating; the soil is calcareous and very fertile. This county forms part of the "Blue-grass region," called "the garden of Kentueky." Live-stock, grain, and wool are staple products. This county gives its name to a celebrated brand of whisky. It has several mineral springs, and is intersected by the Kentucky Central R. R. Capital, Paris. Pop. 14,863.

Bourbon, a township of Douglas co., Ill. Pop. 1457.

Bourbon, a post-village of Marshall co., Ind., on the Pittsburg Fort Wayne and Chicago R. R., 53 miles from Fort Wayne, and 95 from Chicago. It contains 2 churches, 1 academy, 1 graded school, 2 saw-mills, 1 large wagon manufactory and several smaller ones, 1 steam furniture manufactory, and 1 on a less extensive scale, a large flouring mill, several extensive boot and shoe manufactories, and various other mechanical enterprises; one literary society with a library. The surrounding country is very fertile, abounding in valuable timber, such as walnut, poplar, oak, maple, beech, etc. It has one weekly newspaper. Pop. 874; of township, 2794.

I. Mattingly, Ed. "Bourbon Mirror."

Bourbon, a township of Boone co., Mo. Pop. 2384.

Bourbon, a township of Callaway co., Mo. Pop. 1590.

Bourbon, the name of a celebrated French royal family which reigned over France from 1589 to 1792, and from 1815 to 1848. A prince of the Bourbon dynasty also obtained the throne of Spain in 1700, and another that of Naples and Sicily in 1735. The Bourbons derive their name from the castle of Bourbon, which was built in the thirteenth century, and was situated in the old province of Bourbonnais, 16 miles W. of Moulins. The heiress of the seignory was married in 1272 to Robert, a younger son of King Louis IX. The seignory was erected into a duchy, and Louis, a son of Robert, became about 1327 the first duke of Bourbon. He died in 1341, and was succeeded by his son Pierre, who was killed at Poitiers in 1356. Louis, a son of Pierre, became the third duke of Bourbon. He was one of the most powerful vassals of the crown of France, and made large additions to the duchy by his marriages. Died in 1410. His son Jean, born in 1381, was the fourth duke. He was taken prisoner by the English at Agincourt, and detained until his death (1434). He was succeeded by his son Charles, born in 1401. He died in 1456, leaving a son Jean, who became the sixth duke of Bourbon and constable of France. (See Bourbon, de, Charles.)

Among the collateral branches of the Bourbon family were those of Vendôme, Condé, Montpensier, Orléans, Conti, and Soissons. Antoine de Bourbon, duke of Vendôme, became by marriage king of Navarre. His son, Henry of Navarre, was the first French king of the house of Bourbon, and began to reign as Henry IV. in 1589. He had two sons, Louis XIII. and Gaston, duke of Orleans; a daughter, Elizabeth, who was married to Philip IV. of Spain, and Henrietta, who became the queen of Charles I. of England. Louis XIII., who died in 1643, left two sons, Louis XIV. and Philip, duke of Orleans, who was the ancestor of King Louis Philippe. The dauphin, the eldest son of Louis XIV., died in 1711, leaving three sons—1, Louis, duke of Burgundy; 2, Philip, duke of Anjou, who became king of Spain as Philip V.; 3, Charles, duke of Berry. Louis of Burgundy, who died in 1712, was the father of Louis XV., who succeeded his great-grandfather, Louis XIV., in 1715. Louis XV. had one son, Louis, who died before his father, leaving three sons, who all reigned successively—namely, Louis XVI., Louis XVIII., and Charles X. Louis XVI. left one son, who by the royalists was recognized as Louis XVII., but perished as a child during the French Revolution. As the circumstances of his death remained unknown, many adventurers claimed to be Louis XVII. Louis XVIII. had no issue. Charles X. had two sons—Louis Antoine, who died without issue in 1844; and Charles Ferdinand, duke of Berry. His only son, Henri, duke of Bordeaux, now styled Count de Chambord, is the heir to the throne, according to the Legitimists, who give him the title of Henry V. (See Chambord.)

The House of Orleans is called the younger branch of the royal family of Bourbon, and is descended from Philip of Orleans, a younger brother of Louis XIV. His son Philip was regent of France during the minority of Louis XV., and left a son, Louis Philippe, duke of Orleans. This last was the grandfather of the duke of Orleans who figured in the Revolution as Citizen Egalité. His eldest son, Louis Philippe, became king of the French in 1830. This king had five sons—the duke of Orleans, the duke of Nemours, the prince de Joinville, the duke of Aumale, and the duke of Montpensier. The count of Paris, the son of the eldest of these five, is regarded as the heir to the throne by the Orleanist party.

Philip, duke of Anjou, who was placed on the throne of Spain in 1700, was the founder of a Spanish dynasty, which reigned in Spain until the dethronement of Queen Isabella in 1868. He was also the ancestor of the Bourbon dynasties of Naples and Parma. Francis II., who was dethroned in Sept., 1860, was the last Bourbon monarch of Naples (or the Two Sicilies). The Bourbons have also ceased to reign in Parma, which was annexed to the kingdom of Italy in 1860. (See Achaintre, "Histoire Chronologique et Généalogique de la Maison Royale de Bourbon," 2 vols., 1825; Coxe, "Memoirs of the Kings of Spain of the House of Bourbon," 3 vols., 1813.)

Revised by A. J. Schem.

Bourbon, de (Charles), Duc, usually styled Constable Bourbon (Connétable de Bourbon), a famous French general, born Feb. 17, 1489, was a son of Gilbert Bourbon, count of Montpensier. He married the heiress of the duke of Bourbon, and became the owner of the vast estates of both branches of the Bourbons. He was appointed constable of France in 1515, and was one of the generals who gained a victory at Marignano in that year. He was very popular with the soldiers. The mother of Francis I. was enamored of him, but her overtures having been rejected, she became his enemy. At her instigation, the estates which he had acquired by marriage were seized by the king. Bourbon deeply resented this injury, renounced his allegiance to the king of France in 1523, and became the ally of the emperor Charles V., for whose service he raised about 6000 Germans. He contributed largely to the victory which the imperial army gained over the French at Pavía in 1525. It appears that he was distrusted by Charles V., who neglected to pay Bourbon's German mercenaries, and these consequently became mutinous. He resolved to quit the service of Charles V., and in order to satisfy his troops with spoils of conquest he conducted a daring enterprise against Rome, in which he displayed great military talents. His army took Rome by assault May 5, 1527, but he was killed as he mounted the wall. (See Robertson, "History of Charles V.;" Brantôme, "Vies des grands Capitaines.")

Bourbonnais, a township of Kankakee co., Ill. Pop. 2068.

Bourbon-Vendée, or **Napoleon Vendée,** a town of France, capital of the department of La Vendée, on the river Yon, 48 miles by rail S. of Nantes. It has a college, a normal school, town-hall, and hospital. Pop. 8710.

Bourdaloue (Louis), an excellent French pulpit orator, born at Bourges Aug. 20, 1632. He entered the order of Jesuits in 1648, and became professor of rhetoric and philosophy. In 1669 he removed to Paris, where he preached for many years, and was often heard by Louis XIV., who expressed a high opinion of his sermons. He was distinguished for the dignity of his manner, the wisdom of his thoughts, and the earnestness of his piety. His style of eloquence was less inflated and more simple than that which then prevailed in France. He was a general favorite with the common people, as well as the learned and higher classes. Died in Paris May 13, 1704. His sermons were published in 16 vols., 1707–34. (See Prigny, "Vie de Bourdaloue," 1705; Villenave, "Notice sur Bourdaloue," 1812; J. Labouderie, "Notice sur Bourdaloue," 1825.)

Bourdoin, a township of Texas co., Mo. Pop. 316.

Bourdon [a French word signifying "staff"], in music, is applied to the humming sound produced by blowing through a long hollow staff. Hence the apparatus in organs, stringed instruments, etc. by which the deep sound is made.

Bourgelat (Claude), a French physician and writer, noted as the founder of veterinary schools in France, was born at Lyons Mar. 17, 1712. He wrote on materia medica, farriery, contagious diseases, etc. In 1762 he founded a veterinary school at Lyons. Died Jan. 3, 1779.

Bourg-en-Bresse, a town of France, capital of the department of Ain, is pleasantly situated on the Reyssouse, 57 miles by rail N. N. E. of Lyons. Several railways connect it with Lyons, Mâcon, and Besançon. It is well built, has a college, a museum, a large hospital, and a public library of about 20,000 volumes. Here are manufactures of linens, cotton stuffs, hosiery, etc. Pop. 13,733.

Bourgeois, a French word signifying a citizen or resident of a city; a commoner, as distinguished from a nobleman; a civilian, as distinguished from a soldier. A citizen of the state or republic is called *citoyen*.

Bourgeois, the name of a type used in printing. It is one size larger than brevier, and one size smaller than long primer.

Bourgeoisie, a French term, which is also much used in English, defined in dictionaries as "citizens," "citizenship," "commonalty." It is applied to the great middle class of French society, composed mostly of merchants, manufacturers, master mechanics, lawyers, etc., who live in towns and cities. They are inferior in rank to the aristocracy, and superior to the peasantry and to the *prolétaires* of the towns.

Bourges (anc. *Avaricum*, afterwards *Bituriges*), a city of France, near its centre, capital of the department of Cher, is situated in a fertile plain at the confluence of the Auron and the Eure, 146 miles by rail S. of Paris. It is connected by railway with Paris, Orleans, Moulins, and other cities. It was enclosed by ramparts, which have been converted into promenades or boulevards bordered with chestnut and walnut trees. The streets are crooked and the houses mostly antique. Bourges has a college, a normal school, a public library of about 25,000 volumes, a fine hôtel de ville, and a magnificent Gothic cathedral, which is considered one of the finest in Europe. It is the see of an archbishop. This town was formerly the seat of a celebrated university. It has manufactures of cutlery, woollen stuffs, etc. *Avaricum*, which occupied this site, was a very ancient town, and was the capital of Celtic Gaul about 500 B. C. It was the chief town of the Bituriges in the time of Julius Cæsar, who besieged and took it in 52 B. C., after which it became the capital of the Roman province of Aquitania. During the Middle Ages seven councils of the Church were held here, and in 1438 the Pragmatic Sanction of the Gallican Church was established here. Pop. 30,819.

Bourgoing, de (Jean François), Baron, an accomplished and amiable French diplomatist, born Nov. 20, 1748, was ambassador at different courts. During a nine years' residence in Spain he wrote a thorough book upon that country, "Nouveau voyage en Espagne, etc." (3 vols., 1789–1808). Died July 20, 1811.

Bourignon (Antoinette), a Flemish visionary religionist, born at Lille Jan. 13, 1616, entered a convent in her youth, and professed that she had received special revelations. Having left the convent and renounced Catholicism, she travelled in foreign countries, wrote several religious works, and gained many converts to her sect, especially in Scotland. She was an eloquent speaker and writer. Died Oct. 30, 1680. (See a "Life of Antoinette Bourignon," prefixed to her works, 21 vols., 1676–84.)

Bourmont, de (Louis Auguste Victor), Comte de Ghaisne, a French general, born in Anjou Sept. 2, 1773, was a royalist in the Revolution. He fought against the republic in 1794–96, and entered the service of Napoleon about 1809. Having served with distinction in Russia, he was raised to the rank of lieutenant-general in 1814. During the Hundred Days, 1815, he deserted Louis XVIII. and Napoleon by turns. He became minister of war in 1829, and commander-in-chief of the army sent against Algiers in 1830. He conquered Algiers, and was rewarded in July, 1830, with the bâton of a marshal of France. Being devoted to Charles X., he was deprived of his command by the revolution of 1830, and went into exile. Died Oct. 27, 1846. (See De Lansac, "Notice sur le Comte de Bourmont," 1847.)

Bourne (Hugh), an English preacher, born in Staffordshire April 3, 1772, was one of the founders of the sect of Primitive Methodists. He was "cut off" from the Wesleyan connection in 1808 for holding camp-meetings, before which he was a zealous layman of that denomination. His new sect was organized in 1810. He visited Ireland and the U. S. Died Oct. 11, 1852.

Bourne (Vincent), an English scholar and elegant Latin poet, was born about 1698. He was an usher of Westminster School. He wrote several short original Latin poems, which are remarkably graceful, and produced Latin versions of English ballads, which are wonderfully felicitous. Cowper translated some of his original Latin poems. Died Dec. 2, 1747.

Bourneville, a post-village of Twin township, Ross co., O. Pop. 208.

Bour'nonite, or **Endellionite,** a triple sulphide of copper, antimony, and lead, is composed of 41.8 per cent. of lead, 26 of antimony, 19.4 of sulphur, and 12.8 of copper. It occurs in crystals and massive.

Bournouse, or **Bornouse,** bor-noos', the Arabic name of a garment worn in Algeria and other parts of Northern Africa. It is a large woollen mantle, worn above the other clothing of the natives, and has a hood which is used to cover the head in rainy weather. It has been adopted by the Spaniards, who call it *albornoz*.

Bourrienne, de (Louis Antoine Fauvelet), a French diplomatist, born at Sens July 9, 1769. He was a fellow-student and friend of Bonaparte at the school of Brienne. They met at Paris in 1792, and renewed their intimacy. In 1796 Bourrienne became private secretary to General Bonaparte, whom he followed to Egypt. In 1804 he was sent as minister to Hamburg, but he was accused of peculation, and was recalled in 1811. Having deserted Napoleon in 1814, he was appointed minister of state by Louis XVIII. in 1815. He published an interesting work entitled "Memoirs of Bourrienne" (10 vols., 1829–31), which is an important contribution to the history of Napoleon. Died Feb. 7, 1834. (See Boulay de la Meurthe, "Bourrienne et ses Erreurs," 2 vols., 1830.)

Bourse. See Exchange.

Boussingault (Jean Baptiste Joseph Dieudonné), a French chemist, born in Paris Feb. 2, 1802, became a member of the Institute in 1839. He was an officer under Bolivar in South America in his youth. He co-operated with Dumas in experiments to determine the composition of the atmosphere. In 1844 he published a valuable work entitled a "Treatise on Rural Economy" (2 vols.). He was a moderate republican member of the National Assembly in 1848.

Boussu-sur-Haine, a town in Belgium, on the Haine, in the province of Hainaut. It has machine-works and breweries. Pop. 6638.

Boustrophe'don [from the Gr. βούς, an "ox," and στρέφω, to "turn"], a word used to describe a mode of writing practised by the ancient Greeks until about 450 B. C. —namely, in alternate lines from right to left and from left to right, as fields are ploughed in furrows, having an alternate direction.

Bou'terwek (Friedrich), a German philosopher and critic, born near Goslar, in Hanover, April 15, 1766. He wrote several poems and a romance called "Count Donamar" (3 vols., 1791). He became extraordinary professor of philosophy at Göttingen in 1797, and ordinary professor in 1802. He published several works on philosophy and a "Treatise on Æsthetics" (1806). His reputation is founded on his excellent "History of Modern Poetry and Eloquence" (12 vols., 1801–19). Died Aug. 9, 1828. (See J. F. Blumenbach, "Memoria F. Bouterwekii," 1832.)

Bout'well (George Sewall), LL.D., an American lawyer and statesman, born in Brookline, Mass., Jan. 28, 1818. His education was partly obtained in the public schools and by a course of thorough private study. He taught school in his youth, was admitted to the bar at the age of twenty-eight, and in 1851 and 1852 was chosen governor of Massachusetts. He was long a member of the Massachusetts board of education, of which he was secretary for five years. He organized the internal revenue department of the U. S. government, and in 1862 became its first commissioner. He was a member of Congress from Massachusetts 1863–69, and secretary of the treasury 1869–73, under President Grant. In 1873 he was chosen U. S. Senator from Massachusetts, in place of Hon. Henry Wilson, Vice-President of the U. S.

Bouvar'dia (named in honor of Bouvard, physician of Louis XIII.), a genus of plants of the natural order Cinchonaceæ, is allied to the trees from which Peruvian bark is obtained. The corolla is tubular, 4-lobed, and has four stamens included in it. The fruit is a capsule, 2-celled. The species of this genus are natives of Mexico. The *Bouvardia triphylla* is cultivated in gardens for its beautiful scarlet flowers.

Bouvet (François Joseph Francisque), a French publicist, born Aug. 15, 1799, has supported by his writings the liberal party. He was editor of the "Revue Independante" and "Reveil de l'Ain," in which he developed

his ideas concerning universal peace. He has written "Du Principe de l'autorité en France, et de la limite des pouvoirs; conciliation des parties" (1839), "Du Pape" (1863), and "Philalethe; le problème européen."

Bouvier' (HANNAH M.), born in Philadelphia in 1811, the only daughter of Judge John Bouvier, published "Familiar Astronomy" (1857), a work which won the praise of Sir John Herschel, Lord Rosse, Hind, Airy, De Morgan, and many other eminent astronomers of Europe and the U. S.

Bouvier (JOHN), a jurist and writer, born in the French department of Gard in 1787. He emigrated to the U. S. in 1802, and practised law in Philadelphia. In 1838 he became a judge of the criminal court in that city. He published a "Law Dictionary" (1839), which has had a great success, and "Institutes of American Law" (4 vols., 1851). Died Nov. 18, 1851.

Bovia'num, an ancient city of Italy, founded by the Samnites on or near the site of the modern Bojano, was surrounded by high mountains. According to Livy, it was a wealthy and powerful city. It was besieged and taken by the Romans in 311 B. C. In the second Punic war it was several times the head-quarters of the Roman army. During the Social war it was the capital of the confederates.

Bov'idæ [from the Lat. *bos*, gen. *bo'vis*, an "ox"], a family of ruminating animals, comprises the ox, bison, buffalo, yak, zebu, etc. The Bovidæ are all large and gregarious animals, and they generally have unbranched horns. This family is usually regarded as equal in extent to the Linnæan genus *Bos*. Indigenous species of Bovidæ are found in Asia, Africa, Europe, and North America. They have eight cutting teeth in the lower jaw, and no cutting teeth in the upper, which is furnished with a fibrous and elastic pad. They also have twelve grinders (molar teeth) on each jaw. The exact number of species of Bovidæ has not been ascertained. They are all valuable to man for their flesh, tallow, hides, horns, etc., and several species besides the ox have been domesticated. (See ARNEE, BISON, BUFFALO, OX, URUS, YAK, and ZEBU.)

Bovi'na, a post-township of Delaware co., N. Y. Pop. 1022.

Bovina, a township of Outagamie co., Wis. Pop. 437.

Bovi'no (anc. *Vibinum*), a fortified town of Italy, in the province of Foggia, 14 miles S. S. W. of Foggia. It has a cathedral and several churches. The imperialists defeated the Spaniards here in 1734. Pop. 6415.

Bow, in nautical language, is the fore part of a ship. In the plural the bows are the two sides of the fore extremity of the vessel, as the starboard and larboard bows. The different shapes of these are distinguished by the terms a narrow or lean bow, and a broad or bluff bow.

Bow, in music, the instrument by which the strings of a violin and some other instruments are set in vibration. It consists of a stick of elastic wood, on which horsehairs are stretched.

Bow [Lat. *arcus*], a weapon used in war and hunting to propel arrows, is made of wood or other elastic substance, and is bent by a string fastened to each end. It is generally used by savages, but among civilized nations its use as a military weapon has been superseded by firearms. Bows have been constructed of various materials; besides different kinds of elastic wood, steel has sometimes, and horn frequently, been employed, particularly in ancient times. (See ARBALEST, ARCHERY, ARROW.)

Bow, a post-township of Merrimack co., N. H. P. 745.

Bow'den, a township of Clay co., Ala. Pop. 274.

Bow'dich (THOMAS EDWARD), an English linguist and traveller, born at Bristol in 1790. Having visited Ashantee in 1816, he published a "Mission to Ashantee" (1819). He undertook an exploring expedition into the interior of Africa in 1822, but he died of fever on the river Gambia near its mouth Jan. 10, 1824.

Bow'ditch (NATHANIEL), LL.D., F. R. S., an eminent American mathematician, born at Salem, Mass., Mar. 26, 1773. He made several long voyages as an officer or supercargo of a merchant-vessel, and learned Greek and Latin without a teacher. He published a valuable work called "The Practical Navigator," and a good translation of Laplace's "Mécanique Céleste," with an ample commentary (4 vols. 4to, 1829–38). This was highly commended by the English "Quarterly Review" for July, 1832. He was a fellow of the Royal Society of London, and a member of a large number of the learned societies of Europe and America. Died Mar. 16, 1838. (See a "Memoir of N. Bowditch," by his son, N. I. BOWDITCH, 1839.)

Bowditch (NATHANIEL INGERSOLL), born at Salem, Mass., Jan. 17, 1805, graduated at Harvard in 1822. He was called to the bar in Boston in 1825, but became a conveyancer, acquiring great reputation for accuracy and industry. He wrote much for periodicals, and published a "Memoir of N. Bowditch" (1840), a "History of the Massachusetts General Hospital" (1851), and "Suffolk Surnames." Died April 16, 1861.

Bow'doin, a post-township of Sagadahoc co., Me. Pop. 1345.

Bowdoin (JAMES), LL.D., an American governor, born at Boston Aug. 8, 1727, graduated at Harvard in 1745. He was president of the convention which in 1778 formed the constitution of Massachusetts, was chosen governor of that State in 1785, and again in 1786. He suppressed Shay's rebellion in 1786. Died Nov. 6, 1790.

Bowdoin (JAMES), a son of the preceding, was born in Boston Sept. 22, 1752. He graduated at Harvard in 1771. He was sent in 1805 on a mission to Spain, to procure the cession of Florida to the U. S., and to obtain indemnity for injuries to American commerce. He was a benefactor of Bowdoin College. Died Oct. 11, 1811.

Bowdoin (bō'den) **College,** the oldest college in Maine, was founded in 1802 at Brunswick, Cumberland co., on the Androscoggin River, about 4 miles from the Atlantic Ocean. It was named in honor of James Bowdoin, governor of Massachusetts, whose son James gave to the college 1000 acres of land, over £1000 sterling, and a valuable library and collection of paintings. The college was also liberally endowed by the State. The college library has about 17,500 volumes, and the other libraries connected with the college have nearly as many more. Connected with this flourishing college is a medical school, founded in 1820. The number of graduates, including those of the medical school, amounted (June, 1872) to 2747. Much attention is paid to physical education; instruction is also given in military science.

Bow'doinham, a post-township and village of Sagadahoc co., Me., on the W. side of the Kennebec River. The village is on the Augusta division of the Maine Central R. R., 38 miles N. E. of Portland. It has been noted for shipbuilding. It has four churches, a national bank, and manufactures of lumber. Pop. 1804.

Bow'don, a post-village of Carroll co., Ga. It is the seat of Bowdon College (not denominational), a flourishing institution with an able faculty. Pop. of village, 350.

Bow'dre, a township of Douglas co., Ill. Pop. 1313.

Bow'en, a township of Madison co., Ark. Pop. 1023.

Bowen, a township of Colleton co., S. C. Pop. 1467.

Bowen (FRANCIS), LL.D., an American writer, born at Charlestown, Mass., Sept. 8, 1811, graduated at Harvard in 1833. He edited the "North American Review" about eleven years (1843–54), and became in 1853 professor of natural religion, moral philosophy, etc. at Harvard University. He has been an ardent defender of the philosophical views of Locke and Berkeley, and a warm opponent of those of Kant, Fichte, and Cousin. Among his works are Lives of Baron Steuben, James Otis, and Benjamin Lincoln in Sparks's "American Biography," and a treatise on Political Economy.

Bowen (Rt. Rev. NATHANIEL), D. D., born in Boston, Mass., June 29, 1779, graduated at Charleston College, S. C., in 1794, held pastorates in Protestant Episcopal churches at Providence, R. I., Charleston, S. C., and New York City. In 1818 he was consecrated bishop of South Carolina. Died Aug. 25, 1839. He wrote "Christian Consolation" (1831), "Private Prayers" (1837), and two volumes of his sermons were published.

Bow'ensburg, a post-village of Hancock co., Ill.

Bow'er, a shady recess; a shelter or arbor in a garden, formed of boughs of trees overarched or intertwined; also a private apartment in ancient castles or mansions, used by ladies as a parlor and a sleeping-chamber.

BOWER, in certain games of cards, is the name of the knave or jack of trumps; this word comes from the Ger. *Bauer*, a "clown" or "peasant."

Bower (ARCHIBALD), a Scottish writer of Roman Catholic parentage, was born at Dundee in 1686, joined the Jesuits, became a Protestant, rejoined the Jesuits, and again became a Protestant. His "History of the Popes," in seven quarto volumes (1748–66), is characterized by great partisan bitterness. He died in 1766.

Bower Bank Plantation, a township of Piscataquis co., Me. (In 1860 the act of incorporation was repealed.) Pop. 83.

Bower-bird, a name given to certain Australian birds of the starling family, remarkable for their making bower-like erections, adorning them with gay feathers, rags, bones, shells, and other brightly-colored objects. These bowers

are not nests. The use made of them by the birds is imperfectly understood; their structure has been carefully examined, and specimens of them deposited in the British Museum. The bowers of the satin bower-bird (*Ptilonorhynchus holosericeus*) are built in trees. The base is an extensive platform of sticks, on the centre of which the bower is built of flexible twigs. It is chiefly at and near the entrance that the shells, feathers, etc. are placed. The bowers of the spotted bower-bird (*Chlamydera maculata*) are longer and more avenue-like than those of the satin bower-bird; they are placed upon the ground, and beautifully lined with grasses.

Bow'ers (Theodore S.), an American officer, born in Pennsylvania about 1832. A printer by trade, he subsequently edited a paper in Illinois, but laying aside his pen he entered the service in Oct., 1861, as a private in the 48th Illinois volunteers, was promoted to be first lieutenant Mar., 1862, made aide-de-camp to Gen. Grant April, 1862, and appointed captain and aide-de-camp Nov., 1862, judge-advocate, with the rank of major, Feb., 1863, and, after the surrender of Vicksburg, assistant adjutant-general of volunteers, with the rank of lieutenant-colonel. On the 29th of July, 1864, he was commissioned a captain and assistant quartermaster in the regular army, and later, Jan., 1865, a major and acting adjutant-general. He served continuously, in the field and afterwards at Washington, on the staff of Gen. Grant, from April, 1862, to Mar. 6, 1866, when he was accidentally killed by being thrown under a train at Garrison's Station, N. Y. Brevet lieutenant-colonel, colonel, and brigadier-general U. S. A. for gallant and meritorious services during the war.

G. C. Simmons, *Clerk Board of Eng'rs.*

Bow'ie, a county which forms the N. E. extremity of Texas, bordering on Arkansas. Area, 862 square miles. It is bounded on the N. by the Red River, and on the S. by the Sulphur Fork of Red River. It is extensively covered with pine forests. The soil is fertile, and adapted to cotton, wheat, and maize. Good iron ore and lignite abound. There are numerous mineral springs. Stock-raising is carried on. Capital, Boston. Pop. 4684.

Bowie, a township of Chicot co., Ark. Pop. 207.

Bowie (A.) was born and educated in South Carolina, but spent the greater part of his life in Talladega, Ala., where for six years he presided on the chancery bench. In 1845 he retired from public life, retaining only his position as a trustee of the State University. He was a distinguished member of the Baptist Church. In politics he was allied with the State Rights Democracy. In society he excelled by his great conversational powers.

Bowie Knife, an American weapon, common in the Southern U. S., invented by Col. Bowie of Texas. It is a sharp-pointed knife having a single edge, and is usually carried in a sheath. The blade is sometimes ten inches long or more. Its use is less frequent than in former times.

Bow'ing, an act of reverence or of worship, common in the Roman Catholic, the Oriental, and the Anglican churches. In the repetition of the creeds it is customary to bow whenever the name of Jesus Christ occurs; and the practice is said by some to be commanded by Phil. ii. 10—"that at the name of Jesus every knee should bow;" an expression regarded by many as figurative. In some ritualistic services it is customary to face the E. during the recital of the creeds; and it is certain that bowing towards the E. was common in ancient churches. In Roman Catholic and in some Anglican parishes it is customary to bow towards the altar when entering and leaving church.

Bow'lan, a township of Shannon co., Mo. Pop. 156.

Bowles (Samuel), an American journalist, born at Springfield, Mass., Feb. 9, 1826. Since 1844 he has been the principal conductor of the "Springfield Republican," one of the most successful journals in the U. S. He has published "Across the Continent" (1865), "The Switzerland of America" (1869), and other works.

Bow-line of a ship is a rope fastened near the middle of the perpendicular edge of the square sails by three or four subordinate ropes called bridles. It serves to tighten the edge of the sail during an unfavorable wind.

Bow'ling, or **Bowls,** a game of skill, played upon a square piece of ground or "bowling green." Each player casts his ball or *bowl* (which is usually not a perfect sphere) at a smaller ball or *jack*, the object being to leave the bowl as near as possible to the jack. There are several forms of this game, which our narrow limits will not allow us to describe particularly.

Bow'ling, a township of Rock Island co., Ill. P. 952.

Bowling Alley, a long, narrow structure made for playing the game of skittles, commonly called in America Ninepins or Tenpins (which see).

Bowling Green, a post-township of Fayette co., Ill. Pop. 1097.

Bowling Green, a post-village, capital of Clay co., Ind., on Eel River, 60 miles W. S. W. of Indianapolis. It has one weekly newspaper. Pop. 606.

Wm. Travis, Pub. "Weekly Archives."

Bowling Green, the capital of Warren co., Ky., is on Barren River and the Louisville and Nashville R. R., 113 miles S. by W. of Louisville and 72 miles from Nashville. It is at the head of navigation, and has an active trade in pork, tobacco, etc. Here are several mills and factories. Small steamboats navigate the river. It has two weekly newspapers. Pop. 4574.

Bowling Green, a township of Chariton co., Mo. Pop. 1496.

Bowling Green, a post-village, capital of Pike co., Mo., is on the Missouri division of the Chicago and Alton R. R., 12 miles S. W. of Louisiana, where that railroad meets the Mississippi River. It has one weekly newspaper. Pop. 599.

Bowling Green, a township of Licking co., O. Pop. 1042.

Bowling Green, a township of Marion co., O. P. 903.

Bowling Green, a post-village of Centre and Plain townships, capital of Wood co., O. It has one weekly newspaper. Pop. 906.

Bowling Green, a post-village, capital of Caroline co., Va., 45 miles N. of Richmond. Pop. of Bowling Green township, 4765.

Bow'man, a township of Sullivan co., Mo. Pop. 581.

Bowman (Alexander H.), an American officer, born May 15, 1803, at Wilkesbarre, Pa., graduated at West Point in 1825, lieutenant-colonel of engineers Mar. 3, 1863. He served as assistant professor at the Military Academy 1825–26, in building defences and improving rivers and harbors on the Gulf of Mexico 1826–34, in constructing Memphis and St. Francis military road 1834–39, improvement of Cumberland and Tennessee rivers 1834–38, defences of Charleston harbor, S. C., 1838–53, as instructor of practical military engineering at the Military Academy 1851–52, in charge of improvement of Charleston harbor 1852–53, chief engineer U. S. treasury department and treasury building extension 1853–61, member of lighthouse board 1857–59, superintendent of Military Academy 1861–64, and member of engineer boards 1847–65. Died Nov. 11, 1865, at Wilkesbarre, Pa., aged sixty-two.

George W. Cullum, U. S. A.

Bowman (Thomas), D. D., born in Berwick, Pa., in 1819, graduated at Dickinson College in 1837. He became, in 1859, president of the Indiana Asbury University, which position he still held when he was elected a bishop of the Methodist Episcopal Church in 1872.

Bowman (Samuel), D. D., born at Wilkesbarre, Pa., May 21, 1800, studied law, but became a deacon of the Protestant Episcopal Church in 1823, and a priest in 1824. He was long settled in Lancaster, Pa. In 1847 he was chosen bishop of Indiana, but declined, and afterwards refused the nomination for provisional bishop of New York. In 1858 he was chosen assistant bishop of Pennsylvania. He was greatly beloved by his people, and was very active in his parochial and episcopal duties. Died Aug. 3, 1861.

Bow'manville, a port of entry of Durham co., Ontario (Canada), in Darlington township, has an excellent harbor on Lake Ontario, and is on the Grand Trunk Railway, 43 miles N. E. of Toronto. It has good water-power, and manufactures of lumber, hoop skirts, furniture, and castings. It is visited by daily steamers during the season of navigation, and has a bank and three weekly papers. Pop. about 3000.

Bowne, a post-township of Kent co., Mich. Pop. 1275.

Bow'ring (Sir John), an English author and linguist, was born at Exeter Oct. 17, 1792. He was an intimate friend of Jeremy Bentham, and was well versed in modern languages, especially the Slavonic. In 1825 he became editor of the "Westminster Review." He collected and translated into verse the ancient and popular poems of almost all the countries of Europe. In 1835 he was elected to Parliament, in 1854 became governor of Hong-Kong, China, and received the honor of knighthood. In 1859 he retired on a pension. Among his works is "The Kingdom and People of Siam" (2 vols., 1857). He wrote a description of his visit to the Philippine Islands (1860). He also wrote some excellent hymns. Died Nov. 22, 1872.

Bow'sprit, a large boom or spar which projects over the stem or bow of a ship. It serves to support the fore-

mast, which is fastened to it by large stays or ropes; also to carry sail forward, as a means of counteracting the effect of the after sails and keeping the ship well balanced. In many cases the bowsprit rises at an angle of about 45°. It supports the jib and flying-jibbooms.

Bow'string Hemp, the fibre of the *Sanseviera Zeylanica,* a plant of the order Liliaceæ and tribe Hemerocalleæ, a native of the East Indies. The Hindoo name is *moorva.* This fibre, which is white, silky, and elastic, is used to make bowstrings. A similar fibre is obtained from the leaves of *Sanseviera Roxburghiana,* a perennial Indian plant which has leaves about three feet long, and from other Asiatic and African species.

Bowtown Plantation, a township of Somerset co., Me. Pop. 14.

Box (*Buxus*), a genus of evergreen shrubs or small trees of the natural order Euphorbiaceæ, with opposite leaves entire at the margins. It has male and female flowers growing on the same plant. The male flower is a perianth with four stamens, and the female flower is a perianth with an ovary surmounted by three styles. The most important species is the *Buxus sempervirens* (common box), which is a native of Europe and Asia, has oval, shining, and deep-green leaves, and is remarkable for its compact habit of growth. In Southern Europe it grows twenty feet high or more. A variety called dwarf box, which is only two or three feet high, is extensively cultivated in gardens, and is used to form edgings of flower-beds and gravel-walks, being reduced by clipping to the height of a few inches. The wood of the box, which is very hard, heavy, compact, and fine-grained, is the best of all materials for wood-engraving, and is highly prized by turners. It is also commonly used to make flutes and other wind instruments. It is of a pale yellow color, admits of a beautiful polish, and is not liable to be worm-eaten. Large quantities of boxwood are exported from Spain and Turkey.

Box, a township of Cedar co., Mo. Pop. 1307.

Box'borough, a post-township of Middlesex co., Mass. Pop. 338.

Box Elder, or **Ash-leaved Maple,** a small tree of the order Sapindaceæ, the *Negundo aceroides,* which grows from Florida to Pennsylvania and westward, especially along the banks of streams. It is very beautiful, and is one of the characteristic trees of the far West. In Minnesota, Nebraska, etc. it is tapped, like the sugar-maple, for its sap, which affords sugar of good quality.

Box Elder, a county which forms the N. W. extremity of Utah, bordering on Idaho and Nevada. It is intersected by Bear River, and bounded on the E. by the Wasatch Mountains. The northern half of Great Salt Lake is included in this county. Grain and wool are raised. The Central Pacific R. R. passes through the county. Capital, Brigham City. Pop. 4855.

Box'ford, a post-township of Essex co., Mass., on the Newburyport and Danvers R. R. Pop. 847.

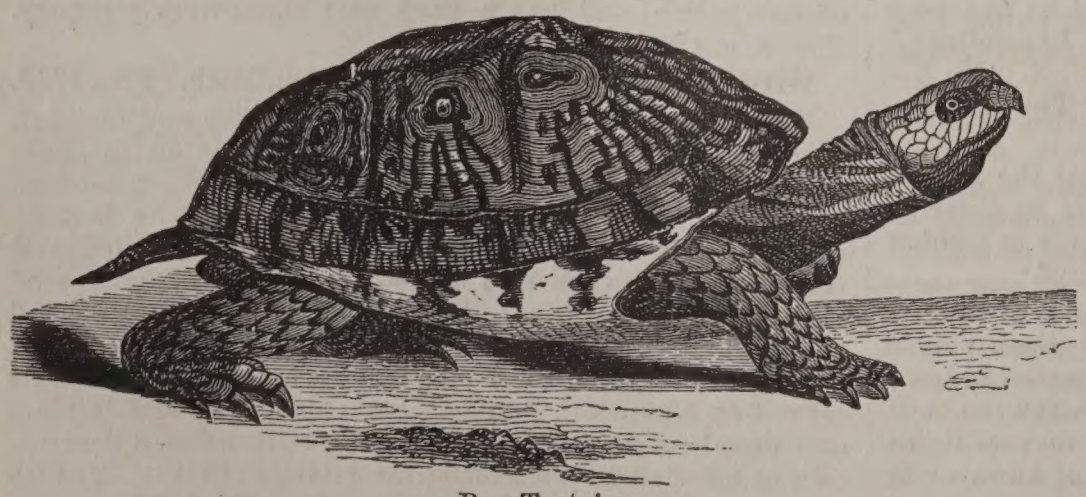
Box'hauling is a mode of turning a ship when the swell of the sea renders tacking impossible, or when the ship is so near the shore that there is not room for veering. The operation is effected by a peculiar management of the helm and the sails.

Boxing. See Pugilism.

Boxing the Compass, a nautical phrase, means a recital or enumeration of the several points, half points, and quarter points of the mariner's compass in their proper order.

Box'tel, a village of Holland, in North Brabant, on the river Dommel, 6 miles S. of Bois-le-Duc. The river flows through the streets and affords passage for boats. Fine diaper is manufactured here. Pop. 4221.

Box-tortoise, or **Lock-tortoise,** popular names of



Box-Tortoise.

the *Cistuda Virginica* and *Cistuda Blandingii,* tortoises of the U. S., characterized by the division of the plastron into two parts by a crosswise division, united, however, by a ligament which serves as a hinge on which the parts of the plastron turn, thus enabling the animal to shut himself entirely up in his shell. These tortoises are very timid and of gentle disposition. Their legs are longer and their speed greater than is usual among tortoises.

Boya'ca, one of the U. S. of Colombia, is bounded on the N. E. and E. by Venezuela, on the S. and S. W. by Cundinamarca, and on the N. W. by Santander. Area, 32,800 square miles. While in the W. the state is exceedingly mountainous, the E. consists of a hot, dry plain. Copper and precious stones are found in the mountains. Capital, Tunja. Pop. in 1870, 482,874.

Boyaca, a village of Colombia, in the department of its own name, is 5 miles S. W. of Tunja. Here Bolivar gained over the Spaniards, Aug. 7, 1819, a victory which secured the independence of Colombia.

Boy'ar [from a word signifying "battle"], a title given in ancient Russia to those who distinguished themselves in war. This afterwards came to be the title of the nobility, who under the grand duke of Moscow formed an aristocracy whose powers differed according to the character of the monarch, but which were so considerable that even Ivan the Terrible in his ukases added to the words "The czar has commanded," also "The boyars have approved." The last boyar died in 1750.

Boyau (a French word signifying "bowel" or "gut"), in military engineering, is a winding or serpentine trench, dug to form a path or communication between the different armed trenches of a siege-work, and to prevent them from being enfiladed.

Boy Bishop. During the Middle Ages the custom grew up of allowing the choristers of cathedrals to choose yearly one of their number to act the part of a bishop. The practice was permitted probably from the same motives which suffered the mummeries of the Abbot of Unreason (a graphic account of which may be found in Sir W. Scott's romance of "The Monastery"). If the boy bishop died within his short period of office, he was buried in his episcopal robes. A tomb with the effigy of a boy so clothed may be seen in Salisbury Cathedral.

Boyce (James Petigru), D. D., LL.D., born Jan. 11, 1827, at Charleston, S. C., graduated at Brown University in 1847, studied theology at Princeton, N. J., pastor of a Baptist church at Greenville, S. C., 1851–55, professor of theology in Furman University, Greenville, S. C., 1855–58, professor of theology in the Southern Baptist Theological Seminary (formerly Greenville, S. C., now Louisville, Ky.) 1858 to the present time (1873). He has published several sermons, addresses, and articles, which have largely contributed to mould the opinions of the Southern Baptists, and holds, as president of the Southern Baptist Convention, a position of commanding influence.

Boyd, a county of Kentucky, bordering on West Virginia. Area, 225 square miles. It is bounded on the N. E. by the Ohio River, and on the E. by the Big Sandy. The surface is hilly. Grain, tobacco, and wool are raised. Iron ore, coal, pig iron, and lumber are largely exported. Capital, Catlettsburg. Pop. 8573.

Boyd, a township of Transylvania co., N. C. Pop. 448.

Boyd (Andrew Kennedy Hutchison), D. D., born in Nov., 1825, the son of the incumbent of Auchinleck, Ayr, was educated at King's College, London, and at Glasgow. He became rector of St. Andrew's. Under the name of "Country Parson" he has published contemplative essays and sermons.

Boyd (John Parker), an American general, born in Newburyport, Mass., Dec. 21, 1764, entered the U. S. army as ensign in 1786. A spirit of adventure led him to India in 1789, where he obtained a command in the Mahratta service, and rose to the rank of commander. He returned to the U. S. in 1808, and was commissioned colonel of the Fourth U. S. Infantry. In the war with Great Britain he was a brigadier-general, distinguished himself at Tippecanoe, at the capture of Fort George, Canada, and Chrysler's Field; disbanded in 1815. In 1830, President Jackson appointed him naval officer of the port of Boston, Mass. Died Oct. 4, 1830.

Boyd (Linn), an American statesman, born at Nashville, Tenn., Nov. 22, 1800, was a member of Congress from Kentucky for twenty years, being first elected in 1835. During his last term he served as Speaker of the House of Representatives. Died Dec. 18, 1859.

Boy'dell (John), an English engraver and patron of art, born Jan. 19, 1719, became a printseller in London, and

amassed a large fortune. He promoted the improvement of British art by his liberal patronage of native engravers and painters. He employed Opie, Reynolds, Northcote, West, and other painters to illustrate Shakspeare's works. The result was the "Shakspeare Gallery," from which was engraved a volume of admirable plates (1803). He was lord mayor in 1790. Died Dec. 11, 1804.

Boy'den (SETH), born at Foxboro', Mass., Nov. 17, 1788, went into the leather manufacture in Newark, N. J., in 1813, began the making of patent leather in 1819, invented a process for making spelter and a machine for leather splitting. In 1826 he made the first malleable cast iron. He also discovered a process for making Russia sheet iron, invented an excellent doming-machine for hat bodies, and built the first successful locomotive with cylinders outside. It is also claimed that he produced the first daguerreotype in the U. S., but the claim is also made for others. Died Mar. 31, 1870.

Boyd'ton, a town of Mecklenburg co., Va., and one of the most flourishing towns of its size in the State. It contains the residences of the county officers, a bank, newspaper-office, two tobacco warehouses, tobacco factory, furniture factory, saw and grist mills, an excellent hotel, and numerous stores, workshops, fine schools and churches, etc. The lands around are of superior quality. Boydton has a daily mail and a passenger service in connection with the Richmond and Danville R. R., *viâ* Barnesville. A railroad is now constructing which will pass within a few miles. Pop. 261; of township, 4708.

ED. "SOUTHSIDE VIRGINIAN."

Boy'er, a township of Crawford co., Ia. Pop. 135.

Boyer, a township of Harrison co., Ia. Pop. 589.

Boyer (ALEXIS), a French surgeon, born Mar. 1, 1757, was the son of a tailor, and acquired his profession under great drawbacks. He was surgeon to Napoleon I. and chirurgical professor of the university. His main works are "Traité complet d'anatomie" (4 vols., 1797–99) and "Traité des maladies chirurgicales et des operations qui leur conviennent" (8 vols., 1814–22). Died Nov. 25, 1833.

Boyer (JEAN PIERRE), a president of Hayti, was born at Port-au-Prince Feb. 28, 1776, and was a mulatto. He entered the French army in his youth, and as an officer in the army of Pétion fought against Christophe. On the death of Pétion he was elected president of the republic in 1818. By partiality to the mulattoes and arbitrary measures he offended the negroes, who revolted in 1842 and expelled him from the island. He died in Paris July 9, 1850.

Boy'ertown, a post-village of Colebrookdale township, Berks co., Pa., about 18 miles E. of Reading. It has one weekly newspaper. Pop. 690.

Boy'kins, a village of Southampton co., Va., in a township of the same name, on the Seaboard and Roanoke R. R., 26 miles from Portsmouth. Pop. of township, 2292.

Boyle, a county in Central Kentucky, in the "blue-grass region." Area, 180 square miles. It is bounded on the N. E. by Dick's River, and also drained by the sources of Salt River. The soil is based on limestone, and is deep and very fertile. Grain, tobacco, wool, and live-stock are extensively raised. The county is intersected by a branch of the Louisville and Nashville R. R. Capital, Danville. Pop. 9515.

Boyle (JOHN ALEXANDER), a Methodist Episcopal preacher, born at Baltimore, Md., May 13, 1816, removed to Philadelphia in youth, entered the ministry in 1839, but was twice compelled by ill-health to relinquish his chosen profession. He became a lawyer, and afterwards an editor in Elk co., Pa. In 1861 he became a captain and afterwards a major of Pennsylvania volunteers, served with great honor in Virginia and Tennessee, and was killed at the battle of Chattanooga, Oct. 29, 1863.

Boyle (ROBERT), a celebrated experimental philosopher, born at Lismore, in Ireland, Jan. 25, 1626, was the seventh son of Richard, the first earl of Cork. He was educated at Eton and Geneva. He took no part in political contests, but devoted himself to the cultivation of science, especially chemistry and natural philosophy. He became a resident of Oxford in 1654, and was one of the founders of the Royal Society. To qualify himself to defend the Christian religion, he learned the Hebrew and Greek languages. He improved the air-pump, and made important discoveries in pneumatics. Among his works are a "Disquisition on Final Causes," a "Discourse of Things above Reason," "Excellency of Theology," and "Hydrostatical Paradoxes." He declined a peerage which was offered to him repeatedly. He was remarkable for his benevolence and charity. By his last will he endowed the BOYLE LECTURES (which see). He died in London Dec. 30, 1691. His complete works were published by Dr. Birch in 5 vols. fol., 1744.

Boyle Lectures were so called from Robert Boyle, who bequeathed an annual salary to be paid to some clergyman for preaching eight sermons in a year in order "to prove the truth of the Christian religion against Atheists, Deists, Pagans, Jews, and Mohammedans, not descending to any controversies among Christians themselves." The first person selected to preach the "Boyle Lectures" was the celebrated Richard Bentley (1691), who directed his arguments against Atheism. In 1739 three volumes of the lectures were published, and nearly 60 volumes since then. The "Boyle Lectures" are still maintained.

Boyle's Law is a statement of the fact that "the volume of a gas is inversely as the pressure;" that is to say, if we double the pressure upon a gas we reduce its volume to one-half; if we make the pressure three times what it was at first, the bulk of the gas is reduced to one-third. More commonly called MARRIOTTE'S LAW (which see).

Boyl'ston, a post-twp. of Worcester co., Mass. P. 800.

Boylston, a township of Oswego co., N. Y. Pop. 1053.

Boylston (ZABDIEL), F. R. S., an American physician, born at Brookline, Mass., in 1680, was the first who practised inoculation for the smallpox in America. Died Mar. 1, 1766.

Boyne, the most important river in the E. of Ireland, rises in the Bog of Allen, flows north-eastward through Kildare, King's county, Meath, and Louth, and enters the Irish Sea after a course of 65 miles. Many ruins of monasteries and castles occur on its banks. An obelisk 150 feet high, nearly 3 miles from Drogheda, commemorates the great battle of the Boyne, in which William III. defeated James II., July 1, 1690.

Boyn'ton, a post-township of Tazewell co., Ill. P. 820.

Boynton (EDWARD C.), born in Vermont, graduated at West Point in 1846. He entered the artillery, was severely wounded at Churubusco, and was brevetted captain; was assistant professor of chemistry, etc. at West Point (1848–55), professor of chemistry, etc. in the University of Mississippi (1856–61), and was brevetted major in 1865. He published a "History of West Point" (1863) and a "History of the U. S. Navy."

Bozeman, a post-village, capital of Gallatin co., Montana, on an affluent of the Gallatin Fork of Missouri River, 100 miles S. S. E. of Helena, and 70 miles S. W. of the National Park on the survey of the Northern Pacific R. R. It has a national bank, one weekly paper, and immense deposits of coal. Pop. 168; of township, 574.

JOSEPH WRIGHT, ED. "AVANT COURIER."

Boz'rah, an ancient city of Idumæa (Edom), often mentioned in the Bible. (See Genesis xxxvi.; Isaiah xxxiv. and liii.) It was situated to the S. W. of the Dead Sea, about halfway between the latter and Petra. Its site is probably occupied by the modern *Buseireh,* a poor village consisting of about fifty wretched huts. No ancient ruins are visible.

Bozrah, a post-village and township of New London co., Conn., on the Yantic River, about 35 miles E. S. E. of Hartford. Total pop. 984.

Boz'zaris, or **Bot'zaris** (MARCO), a famous Greek patriot, born at Suli, in Albania, about 1790. He enlisted in the French army about 1808, and served several campaigns. When the Greeks took arms against the Turks in 1820, Bozzaris became the leader of a band of Suliotes, and gained several victories. He defended Missolonghi against the Turks in 1822. Aug. 20, 1823, he attacked and defeated a superior force at Carpenisi, near the ground where the battle of Platæa was fought, but he was killed in the action.

Bra, a town of Italy, province of Cuneo, on the river Stura, 38 miles S. S. E. of Turin. It has manufactures of silk and metal-foundries; also a trade in grain, cattle, and wine. Pop. 9125.

Brabançons, a class of mercenary soldiers chiefly from Brabant, whence they took their name. They served principally in the armies of England and France from the eleventh to the thirteenth centuries. They had little discipline, and were not much better than robbers.

Brabant', a former duchy of the Low Countries. In the sixth century it was conquered by the Franks. During the Middle Ages it changed masters very often, until in the fifteenth century it came to the House of Habsburg. Charles V. left it to his son, Philip II., under whom the province revolted, but only the northern part succeeded in gaining its independence, and joined the Netherlands in 1648, while South Brabant remained with the Spanish-Austrian line until 1714, when it passed into the possession of the imperial line of Austria. It was conquered by the French in 1794, and divided into two provinces, and in

1810 Napoleon also conquered the Dutch part of Brabant. In the treaty of Paris of 1814 Brabant became a part of the Netherlands, and was divided into the provinces of North Brabant, Antwerp, and South Brabant. In consequence of the Belgian revolution of 1830, Antwerp and South Brabant came to Belgium, while North Brabant remained with Holland. The inhabitants in the N. are Dutch, in the centre, Flemish, and in the S., Walloons. The boundary-line between the Germanic and French idioms runs S. of Brussels, past the villages of Braine l'Alleud, Waterloo, Wavre, and Sodoigne.

Brabant, North, a province of Holland, is bounded on the N. by the river Meuse (or Maas), Holland, and Gelderland, on the E. by Limburg, on the S. by Belgium, and on the W. by Zeeland. Area, 1980 square miles. Capital, Bois-le-Duc. It is drained by the Dommel, the Aa, and the Lintel. The surface is flat; the soil is generally fertile. The province is deficient in minerals and timber. Many cattle and sheep are raised here. It has manufactures of cotton, linen, and woollen goods. Pop. in 1870, 440,302.

Brabant, South, a province of Belgium, is bounded on the N. by Antwerp, on the E. by Limburg and Liege, on the S. by Namur and Hainaut, and on the W. by East Flanders. The area is 1268 square miles. Capital, Brussels. The principal rivers are the Dyle, Demer, and Senne. The surface is partly hilly and partly level; the soil is generally fertile and highly cultivated. This province contains extensive forests, mines of iron, and quarries of stone. It is intersected by several railways and canals. It has important manufactures of cotton and woollen fabrics, fine lace, hats, leather, jewelry, fine linens, ribbons, paper, machinery, etc. This is one of the most densely peopled districts in Europe. Pop. in 1870, 879,814.

Brace (Charles Loring), an American clergyman and writer, born at Litchfield, Conn., in 1826, graduated at Yale in 1846. Having travelled in Europe, he published "Home-Life in Germany" (1853), "Races of the Old World" (1863), and other works. He was the principal founder of the Children's Aid Society of New York.

Brace (Julia), a blind deaf-mute, was born near Hartford, Conn., in 1806. When she was four years old she lost by sickness both sight and hearing, and not long after forgot all the words she had previously learned. (See an interesting notice of her in Dunglison's "Physiology," vol. ii. p. 160.)

Bracebridge, a post-village of Victoria co., Ontario (Canada), in the Muskoka region and in Macaulay township, on the Muskoka River, 195 miles from Lindsay, the county-town. It is visited by steamboats, except in winter, and has one weekly paper. Pop. about 200.

Bracelet [from *bras* (Lat. *brachium*), an "arm"], an ornament worn around the arm at or near the wrist. These ornaments have been worn by every nation, savage or civilized, from the earliest ages. They are mentioned in Genesis as worn by both women and men. The Medes and Persians were remarkable for their love of gold ornaments and jewelry. They wore bracelets, armlets, earrings, and pearl necklaces. The ancient Greek ladies wore bracelets and armlets of various materials and forms. They generally passed round the arm several times.

Braceville, a post-village of Grundy co., Ill., in a township of the same name, on the Chicago and Alton R. R., 61 miles S. S. W. of Chicago. Pop. 1188.

Braceville, a post-township of Trumbull co., O. P. 954.

Bra'chial [from the Lat. *brachium*, the "arm"] **Ar'tery,** the main artery of the arm; a continuation of the axillary, as the latter is of the subclavian trunk. The brachial vessel lies upon the inside of the *humerus* or arm-bone, just back of the biceps muscle; near the elbow it passes forward and divides into the radial and ulnar arteries. Before this, it gives off four smaller branches. The position of the brachial artery makes it quite practicable to compress it firmly against the bone in case of serious bleeding from a wound of the arm, fore arm, or hand.

Brachiop'oda (plu.), [from the Gr. *βραχίων*, the "arm," and *πούς, ποδός*, the "foot," alluding to their two long fringed and coiled arms], or **Palliobranchia'ta,** a class of marine bivalve, molluscoid organisms which have symmetrical dorsal and ventral valves; the former of which (according to the general opinion of observers) is usually much the smaller, being free and imperforate, but according to E. S. Morse the so-called dorsal valve is really ventral. The valves articulate by two curved teeth developed from the border of the larger valve. Brachiopods are among the most ancient of fossil organisms, the genus *Lingula* being found from the Cambrian to the existing fauna. Brachiopods have also the greatest range of climate and depth.

Brachis'tochrone [from the Gr. *βράχιστος*, "shortest," and *χρόνος*, "time"], the plane curve down which a material particle must fall in order to pass in the shortest possible time from the upper to the lower of two given points not in the same vertical line. It is the common cycloid. The problem of the brachistochrone is celebrated in the history of mathematics. It was first proposed by John Bernoulli in 1696, and was solved by Sir Isaac Newton and James Bernoulli. It is often called "the curve of quickest descent."

Brach'vogel (Emil Albert), a German novelist and dramatist, born at Breslau April 29, 1824. Among his principal works are the novels entitled "A New Falstaff" (1862), "Beaumarchais" (1864), "The German Michael" (1868), and "Narcissus," a drama.

Brachycephalic. See Dolichocephalic.

Brachyp'teræ, or **Brachypteres** [from the Gr. *βραχύς*, "short," and *πτερόν*, a "wing"], that section of the web-footed birds in which the wings are so short and the feet so far back as to compel the birds to assume an erect posture when on land. They are aquatic, and excel in diving, so that the name divers is sometimes used as equivalent to Brachypteræ; but that name is also frequently applied to other birds, especially to the genus *Colymbus*. The auks, puffins, penguins, grebes, and guillemots are among the Brachypteræ.

Brachyu'ra [from the Gr. *βραχύς*, "short," and *οὐρά*, a "tail"], a tribe of decapodous crustaceans which takes its name from the post-abdominal segment, which is short and folded beneath the trunk. (See Crab.)

Brack'en, a county of Kentucky, separated from Ohio by the Ohio River. Area, 200 square miles. It is drained by the North Fork of Licking River. The surface is hilly. The soil is calcareous and productive. Tobacco, grain, and wool are the chief products. Capital, Brookville. Pop. 11,409.

Brack'enridge (Henry M.), a judge and writer, born at Pittsburg, Pa., May 11, 1786. He held judgeships in Louisiana and Florida, and was U. S. commissioner to the South American republics (1817–19). Among his numerous writings are a "Voyage to South America" (1820) and "Recollections of Persons and Places in the West" (second edition, 1869). He was elected to Congress from Pennsylvania in 1840. Died Jan. 18, 1871.

Brackenridge (Hugh Henry), the father of the preceding, was born in Scotland in 1748. He emigrated to the U. S. in childhood, graduated at Princeton in 1771, and became a judge of the supreme court of Pennsylvania in 1799. He wrote a satirical work called "Modern Chivalry, or Adventures of Captain Farrago" (1792). Died June 25, 1816.

Brack'et, an ornamental projection in the shape of a console standing isolated on the face of a wall, and used to support a statue, bust, or other work of art. Brackets may be either of wood or stone, and they are sometimes elaborately carved. The term bracket is applied to a piece of wood or metal employed to support a shelf or gallery. Also one of two marks [ ] used in printing to enclose a word, remark, explanation, etc. When a word in a classical work is included in brackets it implies that the word so enclosed does not properly belong to the original text, but has been either introduced by a mistake of the copyist, or has been inserted by the editor to supply some omission.

Brack'ett (Albert Gallatin), an American officer, born in Cherry Valley, N. Y., Feb. 14, 1829. He served during the Mexican war as first lieutenant Fourth Indiana Volunteers, appointed captain Second U. S. Cavalry Mar., 1855, engaged principally on frontier duty and against hostile Indians in Texas prior to 1861, when, on Twiggs's surrender, he effected his escape, and was in command of cavalry at Blackburn's Ford, Va., July 18, 1861, commissioned colonel Ninth Illinois Volunteer Cavalry Aug., 1861, and served during the civil war in the Western and Southwestern armies. He was promoted to be major First Cavalry U. S. A. July 17, 1862, and lieutenant-colonel Second Cavalry June 9, 1868. Since the close of the war he has been in command of various departments, and actively engaged in operating against hostile Indians. He is author of "Lane's Brigade in Mexico" and "History of the U. S. Cavalry." G. C. Simmons, *Clerk Board of Eng'rs.*

Brackett (Edwin E.), an American sculptor, born at Vassalborough, Me., Oct. 1, 1819. His works are principally portrait-busts.

Brackett (Walter M.), a brother of the preceding, born at Unity, Me., June 14, 1823. He has won a high reputation as a painter. His specialty is the painting of fish.

Brack'lesham Beds, a group of fossiliferous strata,

in the middle eocene formation, overlying the London clay series, in England. On the coast of Hampshire they are 500 feet thick.

Bract [from the Lat. *bractea*, a "thin plate"], a floral leaf or an altered leaf, placed at the base of a flower on the outside of the calyx. It is a leaf from the axil of which a flower or floral axis is produced, instead of an ordinary leaf-bud or branch, and is regarded as the first attempt made by the leaves to change into floral organs. The bract is sometimes large and brightly colored. In several species of *Arum* it constitutes the large enveloping-leaf called a spathe. An involucre is a collection of bracts arranged in a whorl.

Brac'ton, de (HENRY), a distinguished English jurist and writer on law, lived during the reign of Henry III. His principal work, entitled "De Consuetudinibus et Legibus Angliæ," is a complete treatise on jurisprudence and legislation. He was an arch-deacon (1263–64), and a judge in eyre in 1265. Died probably in 1267.

Brad'burn (SAMUEL), the son of a soldier, was born at Gibraltar Oct. 5, 1751. He became a local Wesleyan preacher at Chester, England, in 1773, and an itinerant in 1784. He was very eloquent, and was throughout his life extremely popular and influential. Died July 24, 1816.

Brad'bury (WILLIAM B.), composer of sacred music, born at York, Me., in 1816, and residing from 1836 till his death (Jan. 7, 1868) in or near New York. He published (sometimes in conjunction with other authors) numerous books for the use of choirs and Sunday-schools, the most celebrated of which are "The Shawm," "The Jubilee," "The Temple Choir," "The Cantata of Esther," "The Golden Chain," and "Fresh Laurels." The sale of the last two books (designed for Sunday-schools) was immense.

Bradbury Isle, a township of Hancock co., Me. Pop. 6.

Brad'dock, a borough of Alleghany co., Pa. Pop. 1290.

Braddock (EDWARD), an English general, born about 1715. He commanded in a war against the French and Indians in North America. As he was marching to attack Fort Duquesne he was surprised by the Indians near Pittsburg, and was defeated and mortally wounded. Died July 13, 1755.

Brad'don (MARY ELIZABETH), a popular English novelist, born in London in 1837. Among her works are "Lady Audley's Secret" (1862), "Aurora Floyd," "Eleanor's Victory," "Henry Dunbar," and "Rupert Godwin."

Brad'ford, an important manufacturing town of England, in the West Riding of Yorkshire, is on a small branch of the Aire and on the Leeds Railway, 9 miles by rail W. of Leeds. It is situated at the meeting of three vales, and is built of stone. It returns two members to Parliament. Among the principal buildings are a handsome exchange, an elegant public hall, the parish church, erected in the reign of Henry VI., and a cloth-hall. The Saltaire alpaca and mohair mills, which are three miles from Bradford, are said to be the most splendid manufactories in England. Bradford is the chief seat in England of the manufacture of worsted fabrics, alpaca, mohair, etc. Broadcloths and cotton goods are also made here. Mines of coal and iron are worked in this vicinity. The value of the goods exported from this town to the U. S. in 1868 amounted to about $12,000,000. Baptist, Independent, and Wesleyan colleges are near this city. Pop. in 1871, 145,827.

Bradford, a county in the N. E. of Florida. Area, 940 square miles. The surface is but little elevated above the sea. It is intersected by the Florida R. R. Grain and live-stock, with some rice and cotton, are raised. Capital, Lake Butler. Pop. 3671.

Bradford, a county of Pennsylvania, bordering on New York. Area, 1170 square miles. It is intersected by the North Branch of the Susquehanna River, and also drained by the Tioga River and several creeks. The surface is hilly, and extensively covered with forests of pine, sugar-maple, and other trees. Sandstone underlies the greater part of the county, which also contains beds of bituminous coal, which, with lumber, is among the chief articles of export. Cattle, grain, hay, and dairy products are largely raised. It is intersected by the Williamsport and Elmira R. R., and by another railroad, connecting Wilkesbarre with Waverley. Capital, Towanda. Pop. 53,204.

Bradford, a post-village of Simcoe co., Ontario (Canada), on the Northern Railway, 41 miles N. of Toronto. It has a weekly paper. Pop. in 1871, 1130.

Bradford, a township of Lee co., Ill. Pop. 1086.

Bradford, a post-village and township of Chickasaw co., Ia., about 30 miles N. of Cedar Falls. Pop. 2076.

Bradford, a post-village of Stark co., Ill. Pop. 280.

Bradford, a post-township of Penobscot co., Me. Pop. 1487.

Bradford, a post-village and township of Essex co., Mass. The village is on the S. bank of the Merrimack River, and on the Boston and Maine R. R., 32 miles N. of Boston, at the junction of the Newburyport R. R. A bridge across the river connects it with Haverhill. It is the seat of Bradford Female Academy, and has manufactures of shoes, etc. Pop. 2014.

Bradford, a post-township of Merrimack co., N. H. It has manufactures of lumber and leather. Pop. 1081.

Bradford, a post-township of Steuben co., N. Y. Pop. 1080.

Bradford, a post-village of Newberry township, Miami co., O. Pop. 166.

Bradford, a village of Adams township, Darke co., O. Pop. 243.

Bradford, a township of Clearfield co., Pa. Pop. 1172.

Bradford, a post-township of McKean co., Pa. Pop. 1446.

Bradford, a post-village in Bradford township, Orange co., Vt., on the Connecticut River and on the Connecticut and Passumpsic Rivers R. R., 29 miles S. E. of Montpelier. It has an academy, a savings bank, and manufactures of paper, casks, sash and blinds, machinery, woollen goods, etc. It has two weekly newspapers. Total pop. 1492.

Bradford, a township of Rock co., Wis. Pop. 1006.

Bradford (Rev. ALDEN), LL.D., was born in Duxbury, Mass., Nov. 19, 1765, and graduated at Harvard in 1786, and was a tutor there 1791–93; was successively a Congregational minister in Wiscasset (now in Maine), a clerk of the Massachusetts supreme court, a bookseller, secretary of state for Massachusetts (1812–24), and a journalist. He published numerous historical, biographical, and antiquarian books and papers. Died Oct. 26, 1843.

Bradford (ALEXANDER WARFIELD), LL.D., born in Albany, N. Y., in 1815, graduated at Union College, became a prominent lawyer of New York, being especially well versed in the civil law. He was surrogate of New York 1848–51, and for a time was one of the editors of the "Protestant Churchman." He published several volumes, mostly of legal reports. Died Nov. 5, 1867.

Bradford, EARLS OF, and Viscounts Newport (1815, in the United Kingdom), Barons Bradford (1794, in Great Britain), and baronets (1660), a prominent family of Great Britain.—ORLANDO GEORGE CHARLES BRIDGEMAN, the third earl, was born April 24, 1819, and succeeded his father in 1865. He was member of Parliament for South Shropshire 1842–65.

Bradford (JOHN), an English Protestant martyr and a popular preacher, was born at Manchester about 1500. He became a chaplain to Edward VI., and after the accession of Mary was burned at the stake July 1, 1555. (See WILLIAM STEVENS, "Life of John Bradford," 1832.)

Bradford (JOSEPH M.), U. S. N., born Nov. 4, 1824, in Sumner co., Tenn., entered the navy as a midshipman Jan. 10, 1840, became a passed midshipman in 1846, a lieutenant in 1855, a lieutenant-commander in 1862, a commander in 1866, and a captain in 1871. From Nov., 1863, to June, 1865, he served as fleet-captain of the South Atlantic blockading squadron, during which period he was frequently in battle. Rear-Admiral Dahlgren, in his "general order" of June 16, 1865, speaking of the services of the officers of his staff, says: "First is Fleet-Captain Joseph M. Bradford. Perhaps no one but a commander-in-chief can rightly understand the many and never-ceasing cares imposed by the proper discharge of the duties of this office, especially in war and in a command so large as this has been, to say nothing of the abnegation of all opportunity of personal distinction which such a position demands. I shall never think but with great pleasure and satisfaction of the excellent service which this gentleman has rendered, and the never-failing energy and ability with which he has discharged his many onerous duties." Died at Norfolk, Va., April 14, 1872. FOXHALL A. PARKER, U. S. N.

Bradford (WILLIAM), one of the Pilgrim Fathers, was born in Yorkshire, England, in Mar., 1588. He emigrated to New England in the Mayflower in 1620, and was elected governor of Plymouth Colony in 1621. Having been re-elected annually, he held the office till his death except five years, when he declined the election. A patent or charter for the colony was granted in 1630 to William Bradford, his heirs and associates. Died May 9, 1657. He left a "History of Plymouth Colony," which was printed in 1856.

Bradford (WILLIAM), an American lawyer, born in Philadelphia Sept. 14, 1755, graduated at Princeton in 1772, served as an officer in the war of the Revolution. He was appointed attorney-general of the U. S. by Washington in 1794. Died Aug. 23, 1795.

Bradford (William), a distinguished American painter, born in 1827 at New Bedford, Mass. His best pictures are scenes from the Northern Atlantic coast. He was formerly a merchant of Fairhaven, Mass. He is of Quaker stock, and is now (1874) a resident of New York City.

Bradford (William H.), a Presbyterian minister and journalist, was born in Aug., 1814, at Cooperstown, N. Y., studied law, and afterwards theology. After serving two years as pastor of a church at Berkshire, N. Y., he became assistant editor of the "New York Evangelist," acting a part of the time as its sole editor. Here he remained seventeen years. He was an accomplished writer and scholar. Died April 1, 1861.

Bradford Clay, the middle member of the upper division of the lower oolite, occurring at Bradford, near Bath, England. It extends only a few miles, and is never more than fifty or sixty feet thick. It is remarkable for the abundance of a peculiar fossil, the *Apiocrinites Parkinsonii.* The surface of the calcareous rock on which the clay rests is encrusted with a pavement formed by the bases of this crinoid.

Bradford, Great, a market-town of England, in the county of Wilts, on the river Avon, and on the Kennet and Avon Canal, 10 miles by rail E. S. E. of Bath. It has a fine old church, and manufactures of broadcloth, kerseymeres, and india-rubber goods. Pop. in 1871, 8032.

Bradford Springs, a post-township of Sumter co., S. C. Pop. 1142.

Brad'ish (Luther), LL.D., was born in Cummington, Mass., Sept. 15, 1783, and graduated at Williams in 1804. He studied law, and was employed as a government agent in affairs relating to Levantine commerce. He settled in Franklin co., N. Y., became prominent in State politics, was lieutenant-governor (1829–43), and under Fillmore was assistant U. S. treasurer at New York. He was prominent in religious, educational, and other charitable and benevolent enterprises. Died Aug. 30, 1863.

Brad'laugh (Charles), an eminent English atheist and republican, was born in Hoxton, London, Sept. 26, 1833. Owing to the extreme poverty of his parents, he ceased attending school before he was eleven years old. He developed an early taste for politics, for at the age of fifteen he appeared as an orator before street audiences during the political turmoils of 1847–48. The origin of his atheistical opinions dates from the same period. Studying to fit himself for a Sunday-school exhibition before the bishop of London, he became skeptical, and declared his inability to reconcile the Thirty-nine Articles with the Four Gospels. His father, influenced by the clergy, gave him three days in which to alter his opinions, on penalty of losing his situation. He accepted the penalty, and quitted the situation and his home for ever. For a year he earned an inadequate support by selling coals on commission, and then, becoming slightly involved in debt, he enlisted in the service of the East India Company, where he remained until a small legacy enabled him to purchase his discharge. He now secured a clerkship in a solicitor's office in London, and entered at once upon his life-career of a political and atheistical writer and speaker. In 1858–59 he gained considerable notoriety by editing a journal called the "Investigator," which was soon suspended for want of capital. He was now well known under the appropriate name of "Iconoclast," which he signed to all of his writings, and was met with the fiercest opposition on all sides. A year later the journal which he now edits, the "National Reformer," was established, and in the conduct of this his reputation for ability was greatly increased. By persistently attacking every opponent he could reach with his voice or pen, his fame as a debater and popular orator steadily grew until he reached the high position of political power which he now occupies. Systematic attempts were made to suppress his journal, but their only effect was to increase its circulation. His sympathies for the oppressed were not confined to his own country. When Italy was fighting for freedom he raised by his own exertions one hundred guineas and sent them to Garibaldi. He visited Ireland, conferred with the advocates of "home rule," and raised his voice in their justification. In 1868 he was a candidate for Parliament in Northampton, and after a canvass of extraordinary excitement with five opponents he succeeded in polling 1086 votes in a constituency of over 9300. In the following year an attempt was made by the Gladstone ministry to suppress his journal because he refused to have it licensed. He argued his own case, and won a brilliant victory. Since then he has pursued his course unmolested. The "Reformer" claims a circulation of 7000. Like himself, in politics it is republican, in religion atheistic, in social economy Malthusian, after the standard of the late John Stuart Mill. Mr. Bradlaugh's republicanism is simply an advanced type of that to which thousands of his countrymen are irresistibly advancing. It assumes that the "right to deal with the throne is inalienably vested in the English people, to be exercised by them through their representatives in Parliament;" argues that the House of Brunswick occupies it only from the acts of Settlement and Union, and seeks the repeal of those acts after the abdication or demise of the present monarch. It aspires to a commonwealth after the American model, to be attained as peaceably as possible. Mr. Bradlaugh's personal popularity is very great. Sir Charles Dilke said of him in 1873 that he had the largest personal following of any man in England. In the autumn of 1873, Mr. Bradlaugh visited the U. S., and delivered lectures in most of the prominent cities. His reception in all cases was hearty and cordial—notably so in New York and Boston. At his lecture in the latter city Wendell Phillips presided, and introduced him to an immense audience, and Charles Sumner and William Lloyd Garrison sat upon the platform. His subjects were "Republicanism in England," "The Irish Question," and "English Workingmen." While lacking the polish of the perfect orator, Mr. Bradlaugh's manner has much of that personal magnetism which enables a man to be a leader of his fellows. The want of modulation in his strong, vibrating voice, and the absence of grace in his tall, powerful figure, are fully compensated for in the compact and skilful arrangement of his thoughts, and the unmistakable earnestness and sincerity of his manner.

J. B. Bishop, *of the "N. Y. Tribune."*

Brad'lee (Caleb Davis), a Unitarian minister and author, born at Boston, Mass., Feb. 24, 1831, graduated at Harvard in 1852, was pastor of the Allen street church, Cambridge, Mass., 1854–57, and since 1864 has been pastor of the church of the Good Samaritan in Boston. He has published occasional sermons and many contributions to periodical literature, and is a member of various literary and historical associations.

Brad'ley, a county in the S. S. E. of Arkansas. Area, 958 square miles. It is traversed by the Saline River, and bounded on the W. by Moro River. The soil is adapted to cotton and maize. Tobacco and wool are also raised. Timber, marl, gypsum, and lignite abound. The county is traversed by the Mississippi Ouachita and Red River R. R. Capital, Warren. Pop. 8646.

Bradley, a county of East Tennessee, bordering on Georgia. Area, 400 square miles. It is bounded on the N. E. by the Hiawassee River. The surface is partly mountainous; the soil is mostly fertile, and well supplied with timber. It is a part of the beautiful valley of East Tennessee. Grain, tobacco, and wool are raised. It is intersected by the East Tennessee Virginia and Georgia R. R. Capital, Cleveland. Pop. 11,652.

Bradley, a post-village of Jackson co., Ill., in a township of the same name, 15 miles from Murfreesboro'. Pop. 1297.

Bradley, a township of Penobscot co., Me. It has manufactures of lumber and shingles. Pop. 866.

Bradley (Edward), better known as "Cuthbert Bede," an Englist novelist and humorist, born in 1827, was educated at Durham University, entered the Anglican ministry, and received a number of church preferments. He is the author of many volumes of prose and verse, chiefly novels, of which his first venture, "Verdant Green," is the best known. He has contributed largely to periodical literature.

Bradley (James), D.D., F. R. S., an eminent English astronomer, born at Sherborne, in Gloucestershire, in 1692, excelled as an observer and as a theorist. He graduated at Oxford, was ordained as a priest, and obtained several livings, but resigned them when he became Savilian professor of astronomy at Oxford in 1721. In 1727 he announced the important discovery of the aberration of light, which serves to demonstrate the earth's motion around the sun. In 1741 he was appointed astronomer-royal, and began to make observations at Greenwich. His next discovery was that the inclination of the earth's axis to the ecliptic is not constant, a fact which explained the precession of the equinoxes and the nutation of the earth's axis. This discovery forms an important epoch in astronomy. He died July 13, 1762, leaving in manuscript thirteen volumes of observations, which were published in 1798–1805. (See "Biographia Britannica.")

Bradley (Joseph P.), LL.D., associate justice of the U. S. Supreme Court, was born at Berne, Albany co., N. Y., Mar. 14, 1813, graduated at Rutgers College, New Brunswick, N. J., with honors, in 1836, was admitted to the bar in 1839 at Newark, N. J., where he has since resided. He married in 1844 a daughter of Chief-Justice Hornblower. Besides his labors in every branch of his profession, he has devoted much attention to mathematics and the study of

law as a science, extending his researches to the civil law —researches which have been of great service in his judicial duties in Louisiana and Texas. Engaged in many important causes in the State and U. S. courts, he has never taken a very active part in politics. He was formerly a Whig, warmly sustained the national cause in the civil war, headed the electoral ticket for Grant in 1868, and has ranked as a moderate Republican. He was appointed to the bench of the U. S. Supreme Court Mar. 21, 1870. He received the degree of LL.D. from Lafayette College in 1859.

Bradley (Joshua), a Baptist minister and educator, was born July 5, 1773, at Randolph, Mass., and graduated at Brown University in 1799. He was ordained at Newport, R. I., in 1801. Mr. Bradley became a kind of traveling missionary, chiefly in the Western States, residing for short times at many places, and establishing great numbers of churches, schools, and colleges. He died at St. Paul, Minn., in 1855.

Bradley (Stephen Row), LL.D., born at Wallingford, Conn., Oct. 20, 1754, graduated at Yale in 1775, and served as an officer of the Revolutionary war for some time. In 1779 he removed to Vermont, where he was an able and active public officer, representing that State in the U. S. Senate (1791–95, 1801–13). He possessed marked ability, but was eccentric in his manners. He was a friend of Ethan Allen. Died at Walpole, N. H., Dec. 16, 1830.

Bradley (William Czar), LL.D., a son of S. R. Bradley (an able lawyer of Vermont), was born at Westminster, Vt., Mar. 23, 1782, and graduated at Yale. He was elected to Congress in 1813, 1817, 1823, and 1825, and held several other important offices. Died Mar. 3, 1867.

Brad'shaw, a township of Greene co., Ark. Pop. 535.

Bradshaw (John), the most prominent of the famous English regicides. He was born in Cheshire, probably in 1602, became in 1627 a barrister, chief-justice of Chester in 1647, a commissioner of the great seal in 1646, sergeant-at-law in 1648, and was in 1649 president of the High Court which condemned Charles I. He conducted that cause with unfeeling sternness and severity, but with dignity, and probably with a conscientious desire to do justice to the king and the country. He afterwards opposed Cromwell's ambitious designs, and was removed from his chief-justiceship, but still later held various important positions. He died in 1659. At the Restoration his body was exhumed from Westminster Abbey, gibbeted, and then beheaded.

Brad'street (Anne), wife of Gov. Simon Bradstreet, and daughter of Gov. Thomas Dudley, was born in England in 1612. She published a volume of poems, which won her the titles of "the tenth muse" and "the morning star of American poetry." These poems and her other writings have been several times reprinted (the last and best edition in 1867), and some of them are not without merit. Died Sept. 16, 1672.

Bradstreet (Simon), colonial governor of Massachusetts, was born at Horbling, Lincolnshire, England, in 1603. He studied at Cambridge, and was for a time the steward of the countess of Warwick. He came to Salem, Mass., in 1630, as an assistant judge, was one of the founders of Cambridge and Andover, and resided also at Ipswich and Boston. Besides holding other important positions, he was governor (1679–86 and 1689–92). Died Mar. 27, 1697.

Brad'wardine (Thomas), a distinguished English prelate and scholastic theologian, called the Profound Doctor, was born in 1290. He became confessor to Edward III., and afterwards archbishop of Canterbury. His principal work, "De causa Dei adversus Pelagium," is a masterly argument for the doctrine of Augustine. He was an able mathematician of Oxford University. Died Aug. 26, 1349, of the plague.

Bra'dy, a post-village of Kalamazoo co., Mich., on the Peninsular Railway where it is crossed by the Grand Rapids and Indiana R. R., 68 miles S. W. of Lansing. Pop. of Brady township, 1382.

Brady, a township of Saginaw co., Mich. Pop. 471.

Brady, a township of Williams co., O. Pop. 1681.

Brady, a township of Butler co., Pa. Pop. 600.

Brady, a township of Clarion co., Pa. Pop. 263.

Brady, a township of Clearfield co., Pa. Pop. 2009.

Brady, a township of Huntingdon co., Pa. Pop. 904.

Brady, a township of Lycoming co., Pa. Pop. 394.

Brady (Hugh), an American general, born in Northumberland co., Pa., in 1768. He served under Wayne in 1792, and won distinction by his bravery at the battle of Chippewa, 1812. He was a relative of Capt. Samuel Brady, a famous Indian fighter. Died April 15, 1851.

Brady (James Topham), an American lawyer and politician, born in New York City April 9, 1815, was a prominent leader of the "War Democrats" during the civil war. He held a very high position as a lawyer, and was greatly beloved in private life. His literary tastes were fine and well cultivated. Died Feb. 9, 1869.

Brady (Nicholas), D. D., born at Bandon, Ireland, Oct. 28, 1659, was educated at Oxford and Dublin, sided with King William against James II., and in consequence was made chaplain to the king. He received several English church preferments, but is best known for his share in the metrical version of the Psalms, which he made in conjunction with Nahum Tate (1652–1715), the poet-laureate. Tate and Brady's Psalms, though justly ridiculed for their clumsiness, quaintness, and bombast, have some noble passages. Brady also published a "Translation of the Æneid" (4 vols., 8vo, 1726). He died May 20, 1726.

Brady (William Maziere), D. D., was born in Dublin, Ireland, in 1825, of a prominent family, and graduated at Trinity College with honor. Entering the Irish State Church, he received lucrative appointments, which he hazarded, and in part lost, by his many bold and able attacks upon the Church establishment to which he himself belonged. He was one of the foremost leaders of the movement which resulted in the disestablishment of the Irish Church. He is the author of several works, chiefly upon the ecclesiastical history and antiquities of Ireland and Great Britain.

Brady's Bend, a post-village of Armstrong co., Pa., on the Alleghany River and the Alleghany Valley R. R., 68 miles N. N. E. of Pittsburg. Pop. of township, 3619.

Bra'ga (anc. *Bracara Augusta*), a town of Portugal, capital of the province of Minho, is on an eminence near the river Cavado, 39 miles N. N. E. of Oporto. It is the seat of an archbishop. It has a fine Gothic cathedral and a college. Braga is enclosed by old walls and defended by a castle. Here are manufactures of linen, cutlery, firearms, jewelry, etc. It is a very ancient town, and has ruins of a Roman temple and amphitheatre. It was the capital of Lusitania after the latter had been conquered by the Suevi. Its archbishop is titular primate of Portugal. Church councils were held at Braga in 563, 572, and 672 A. D. Pop. in 1863, 19,514.

Bragan'za, a fortified town of Portugal, province of Tras-os-Montes, situated on a small stream 35 miles N. W. of Mirandi. It has a citadel, a college, and a castle partly ruined, which was the seat of the dukes of Braganza. It is the seat of a Catholic bishop. The name of the reigning family of Portugal and Brazil, the House of Braganza, is derived from this town. It has manufactures of velvet and other silk fabrics. Pop. 5111.

Braganza, or **Caite',** a seaport-town of Brazil, province of Pará, on the river Caite, near its mouth, 106 miles E. N. E. of Pará. It has a trade in sugar.

Bragan'za, or **Bragança,** the name of the royal family of Portugal and the imperial family of Brazil, which is descended from Affonso, duke of Braganza, a natural son of John I., king of Portugal. He died in 1461. The first member of this family that became king of Portugal was the eighth duke, who began to reign as John IV. in 1640. The first emperor of Brazil was Dom Pedro I., the eldest son of King John VI.

Brag'don (C. P.), a distinguished Methodist Episcopal preacher, was born at Acton, Me., Sept. 9, 1808, entered the ministry in 1834, and labored with great zeal and success in Maine, New York State, and Illinois. He was distinguished for the power and effectiveness of his preaching. Died at Evanston, Ill., Jan. 8, 1861.

Bragdon (Edmund Erastus Eastman), D. D., an eminent Methodist Episcopal divine and educator, was born at Acton, Me., Dec. 8, 1812, and graduated at the Wesleyan University, Middletown, Conn., in 1841. With the exception of three years in the pastorate, one year of which was in New York City, his life was devoted to the cause of education. He held professorships of ancient languages in the Ohio University, Athens, O., in the Indiana Asbury University at Greencastle, and in Genesee College, Lima, N. Y. He was a faithful and successful instructor, and a man of devout life. Died Mar. 20, 1862.

Bragg (Braxton), an American officer, born in 1817 in Warren co., N. C., graduated at West Point in 1837, and became captain June 18, 1846, in the Third Artillery. Served at seaboard posts 1837–45, in Florida war 1837–38 and 1838–42, in removing Cherokees to the West 1838, in military occupation of Texas 1845–46, in war with Mexico 1846–48, engaged at Fort Brown (brevet captain), Monterey (brevet major), and Buena Vista (brevet lieutenant-colonel), and on frontier duty 1849–55. On his resignation, Jan. 3, 1856, he became sugar-planter at Thibodeaux, La., 1856–61, and commissioner of public works for Louisiana

1859–61. In the civil war he was in command of the forces of the Southern army at Pensacola operating against Fort Pickens 1861, of Second Corps at Shiloh 1862, being promoted to general on the death of Gen. A. S. Johnston; movement against Buell to Kentucky 1862, from which he was compelled to retire after defeat at Perrysville; after a brief arrest opposed Rosecrans at Chickamauga 1863, relieved from command Dec. 2, 1863, for loss of Mission Ridge, and led a small force from North Carolina to Georgia in 1864. Resumed planting in Louisiana, and is now chief engineer of Alabama of improvements in Mobile harbor. GEORGE W. CULLUM, U. S. A.

Bragg (JOHN) was a brother of Braxton and Thomas Bragg. In 1836 he settled in Mobile, Ala. In 1842 he was appointed judge of the tenth circuit, and in 1851 he was elected to Congress. He served but one term, then retiring from public employments to take care of his large planting interests.

Bragg (THOMAS), a brother of Braxton Bragg, born at Warrenton, N. C., Nov. 9, 1810, was admitted to the bar in 1831, was governor of North Carolina 1854–58, U. S. Senator 1859–61, and attorney-general in Jefferson Davis's cabinet 1861–63. Died Jan. 21, 1872.

Braggado'cio, a township of Pemiscot co., Mo. P. 90.

Bragg's Store, a post-twp. of Lowndes co., Ala. P. 1035.

Bra'gi, written also **Braga** and **Brage** [from the Icelandic *bragga*, to adorn"], in Norse mythology a son of Odin, was the god of eloquence and poetry. He is represented as an old man with a long beard. His wife Iduna keeps the apples of immortality, which bestow immortal youth on those that partake of them. This myth probably has allusion to the power of poetry to confer immortality.

Bra'he (TYCHO), the celebrated Danish astronomer, was born in 1546 at Knudstrup, in Skaane, which at that time was a province of Denmark. The king, Frederic II., gave him the island of Huena, where he built the finest observatory (Uranienborg) which ever had been erected in Europe. He enriched the science of astronomy very much, partly by his very numerous observations, partly by inventing new instruments. He formed a catalogue of 777 stars, increased by his pupil, Kepler, to 1000 from the records which he left behind, and his recorded observations of the planet Mars furnished to the same distinguished successor the material from which he deduced his famous "Laws." He entered the University of Copenhagen in 1559, and was destined for the law, but his attention was diverted to astronomy by the eclipse of the sun in Aug., 1560. In 1562 he was sent to Leipsic to pursue his studies. An uncle who died in 1565 left him an estate. Having passed several years in Augsburg, he returned to his native country in 1570. He rejected the Copernican system, which in his time was not supported by the conclusive evidence we now have in its favor. In fact, Tycho's theory, which made the sun move round the earth, and all the other planets round the sun, explained all the phenomena then known equally well with that of Copernicus. After the death of his royal patron in 1588, he was first neglected, and then so persecuted by the court that he emigrated to Germany in 1597, and was induced by the emperor Rudolph to settle at Prague, where he died Oct. 13, 1601. He published, besides other works, "Astronomiæ Instauratæ Progymnasmata" (1587–89). "As a practical astronomer," says Sir David Brewster, "Tycho has not been surpassed by any observer of ancient or modern times. The splendor and number of his instruments, the ingenuity which he exhibited in inventing new ones, and his skill and assiduity as an observer, have given a character to his labors and a value to his observations which will be appreciated to the latest posterity."

Brahilof', or **Braïloff'** [Turk. *Ibraïla*], a fortified town of Wallachia, on the left bank of the Danube, about 100 miles from its mouth and 102 miles N. E. of Bucharest. Large quantities of grain and other produce are shipped at this place, which is the chief port of Wallachia. Pop. 15,767.

Brăhm, written also **Brahme** (but pronounced in one syllable), in the Hindoo mythology, the name of the eternal, self-existent Spirit, whom Manu describes as follows: "He whom the mind alone can perceive, whose essence eludes the external organs, who has no visible parts, who exists from eternity—even He, the soul of all beings, whom no being can comprehend." His image is the external universe. His attributes or powers took a personal form in BRAHMA, VISHNU, and SIVA (which see). "Of that infinite, incomprehensible, self-existent Spirit no representation is made, to his direct and immediate honor no temples rise; nor dare a Hindoo address to him the effusions of his soul, otherwise than by the mediation of a personified attribute, or through the intervention of a priest." (MOOR's "Hindu Pantheon.") The Hindoos make no images of Brahm, but the devout Brahmans meditate with silent and unspeakable awe on his mysterious attributes.

Brăh'mâ, a Sanscrit term which literally signifies "worship" or "prayer," but now used as the name of one of the great Hindoo deities, called the "Creator," but who is in fact the personification of the creative power of BRAHM (which see). Brahma, though regarded as the first of the gods, is much less worshipped by the Hindoos than either Vishnu or Siva. The votaries of the last-named gods are stimulated by hope and fear. (See VISHNU and SIVA.) But the votaries of Brahma may be said to be actuated only by the feeble principle of gratitude. Accordingly, there are no temples and no rites exclusively dedicated to Brahma, though his images are occasionally found in the temples of the other gods. The all-producing earth being the most remarkable of the external types of creation, earth is taken as the symbol of Brahma, as water is the symbol of Vishnu, and fire that of Siva. The pictures of Brahma are commonly of a reddish hue, this being the usual color of the earth. Viewed in another relation, Brahma represents matter, while Vishnu represents spirit, and Siva time. (See MOOR, "Hindu Pantheon.")

Brah'manism, the name given to the religious system founded by the Brahmans of India. Scarcely any trace of Brahmanism is discoverable in the Vêdas, the oldest writings of the Hindoos. We first find it developed in a work of somewhat uncertain date entitled the "Institutes of Manu" (or Menu), which was probably composed between 600 and 900 years before the Christian era. The deities of the Vêdas are such as would naturally have been suggested by the phenomena or objects of external nature, such, for example, as the heavens, called Varuna (Uranus), Mitra, the Sun, Fire (Agni, Ignis), and so on. The greatest and most powerful of the Vêdic divinities is Indra (perhaps allied to the Latin *imber*), the god of the atmosphere, of clouds, and of storms, and hence the Thunderer, corresponding in this respect to the Jupiter of the classic, and to Thor of the Northern, mythology. But in the Brahmanical system all these deities of nature retire into the background, and are replaced by the great gods (the *Dii majores*), such as Brahma, Vishnu, and Siva, with their consorts (*saktis*), their various avatars, etc.

In the primitive ages the head of each family among the Aryas (see ARYA) appears to have acted as priest, sacrificing to the gods in his own name; but as the people receded from their primitive simplicity, they employed professional priests, who were believed to understand the wishes of the gods, and to know how their favor could best be propitiated. Having thus become a necessary element in the community, the priestly class soon established themselves as the dominant power in the state; and in order to secure the position which they had thus acquired, they founded the distinctions of CASTE (which see).

The doctrine of "emanation," as it is called—with its associated doctrine of transmigration—may be said to form the philosophical basis of the Brahmanical system. According to this doctrine, BRAHM (which see) is the centre and source of all the various beings of the universe, these being nothing more than emanations from him; and as He is the source whence all things have been evolved, so all things will ultimately return to him, and be absorbed into the essence of the Self-existent. This final absorption is regarded by the Hindoo as his salvation. His aversion to activity or excitement makes the notion of complete repose necessary to his ideal of perfect felicity. Hence the final aim of all the efforts of the devout Hindoo is to bring his transmigrations to an end, that his individual existence may cease, and his soul be completely swallowed up in Brahm. The same general doctrine, with some modifications, forms also the basis of Booddhism.

One of the most remarkable features of the Brahmanical system is the great importance which it attaches to the performance of penance and prayer. According to the Christian and Hebrew Scriptures, prayer and sacrifice are of no avail if they are not acceptable to God. But the Brahmans teach that persevering prayer, if made in due form, though prompted by the most unworthy motives, can, especially when it is combined with penance and sacrifice, compel the gods to accede to the wishes of the suppliant. (See MOOR, "Hindu Pantheon;" Prof. H. H. WILSON, "Essays on the Religion of the Hindus;" "Institutes of Menu," translated by Sir W. JONES.) J. THOMAS.

Brahmapoo'tra, written also **Burrampooter** (anc. *Dyardanes* or *Œdanes*), a great river of Asia, rises in Thibet, on the N. side of the Himalaya Mountains. It flows nearly eastward to the E. extremity of Bootan, thence turns southward, and breaks through the Himalayas into Assam. Its general direction is nearly W. S. W. until it passes through Assam and enters Bengal. It flows southward through Bengal, and enters the Bay of Bengal close

to the mouth of the Ganges. It is connected with the Ganges not only by a common delta, but by a large branch or channel called the Jena, which leaves the Brahmapootra about lat. 25° N. Its entire course is estimated at 1700 miles. It inundates the level tracts of Bengal from April to September, and is said to discharge into the sea more water than the Ganges. The violence of its current and its tidal bore render navigation difficult.

Brahmapootra Fowl. See POULTRY.

Brah'mo So'maj (*i. e.* "worshipping assembly") is the name of a society of Theists in India. Founded in 1830 by Rammohun Roy, it increased in numbers and activity after 1842, under the leadership of Debendro Nath Tagore, who succeeded in emancipating it from Vedantism. In 1859 a new impulse was given to it by the ability and enthusiasm of Keshub Chunder Sen, who effected the separation of those who were willing to abolish caste in their communion, as the "Brahmo Somaj of India." The more conservative members remained in the Somaj or Church of Calcutta. The whole number of Brahmos is probably not more than 1000. Many of them are young Hindoos educated at the English colleges. The first building for public worship of the progressive Brahmos was opened at Calcutta in 1869. In 1873 there were only 143 Brahmos registered in Calcutta, and only 40 in Bombay.

Keshub Chunder Sen, in his sermons and published tracts, avows a belief in the unity of God, in immediate revelation, in the necessity of a new birth, in the immortality of the soul, and in the efficacy of prayer. His morality is pure, and he inculcates reverence for the character of Jesus Christ, but repudiates the doctrines of his divinity, mediation, and atonement as taught in the New Testament. This "Unitarian Theism" is said to resemble the theological rationalism of Theodore Parker. (See "Six Months in India," by MISS CARPENTER; "Hours of Work and Play," by MISS F. P. COBBE; an article in the "Contemporary Review" on "Indian Theism," etc., 1869; Dr. JARDIN'S paper in "Proceedings of the Allahâbâd Conference," 1872.)

Braid'wood, a post-village of Reed township, Will co., Ill., on the Chicago and Alton R. R., 58 miles from Chicago. It has two weekly newspapers and a national bank.

Brain [Gr. ἐγκέφαλος; Lat. *cerebrum;* Fr. *cerveau* or *cervelle;* Ger. *Gehirn*], the *encephalon* or contents of the head; the material instrument of thought, impulse, and perception in man and the higher animals. Only vertebrates have a true brain; in others ganglia or nerve-centres exist; but, in the view of anatomists, the "cephalic ganglia" of insects and other invertebrate animals are not strictly homologous with the brain.

The *amphioxus* is the only brainless vertebrate; it is a small oceanic fish, exceptional in many respects of structure. There is an ascent in the endowment of brain from the fishes, batrachians, reptiles, birds and lower mammals, until the culmination is reached in man. The proportion, by weight, of the encephalon to the whole body is in fishes on the average (according to Leuret) about as 1 to 5668; in reptiles, 1 to 1321; birds, 1 to 212; mammals, 1 to 186; in man, 1 to 36. The elephant has the largest brain, in actual weight, of all animals, sometimes reaching nine or ten pounds; next is that of the whale, about five pounds. The heaviest human brains have never weighed so much as this. Yet the proportion of weight of the brain to the whole body in the elephant is as 1 to 500. In some small animals and birds the proportion is relatively larger; as in the marmoset, 1 to 22; field-mouse, 1 to 31; linnet and canary-bird, 1 to 20; and blue-headed tit, 1 to 12. But it must be remembered that the *kind* of brain varies also; and the sensori-motor portions at the base of the brain are of much greater relative size in the lower animals than in man. There is an obvious connection between the degree of cerebral development in the different groups of animals and their intelligence; and the human brain is greatly superior to any other in its endowment. As Huxley has pointed out, the difference in the *structure* of the brains of men and of the higher apes is not very marked, and the disparity in *size* is less than between the highest and the lowest of the quadrumana. But the gap is evidently a very wide one; as Professor Huxley admits that an average European child of four years old has a brain twice as large as an adult gorilla, whose weight is perhaps four times as great. *Cephalization* is a term applied by Professor Dana to the predominance of the head and its prehensile appendages, by which the higher are distinguished from the lower animals; and of which the erect position and large, evenly-balanced head of man furnish the only perfect exemplification.

The typical *encephalon* of vertebrate animals may be regarded as constituted mainly of the following parts, in varying proportions: olfactory ganglia, cerebral hemispheres, optic lobes, and cerebellum, besides the *medulla oblongata*, which, as its name implies, is the continuation of the spinal axis within the skull. In fishes, those parts which (in a rudimentary manner) represent the cerebral hemispheres are generally no larger than the optic lobes; a condition to which, at a certain stage of development, the brain of the human embryo presents a near though not exact resemblance. In reptiles and batrachia, there is not much advancement, but the cerebral hemispheres are larger and the cerebellum smaller. Birds have a considerable increase in the size of the hemispheres, which, in them, cover the olfactory ganglia in front and the optic lobes behind; the cerebellum in them is large. To each of these the embryonic human brain has, at certain stages, a general resemblance.

Mammals present great diversity, from the smooth-brained (Lissencephala of Owen) Monotremata, Marsupialia, and Rodentia, up through the other groups to the highly-convoluted (Gyrencephala) and otherwise complex brains of the anthropoid apes, as the gorilla and chimpanzee. In mammals only do we find the large transverse commissure (connecting band) called the *corpus callosum*, between the hemispheres; and in the lowest of them, as the duck-billed platypus of Australia, it is wanting. In the higher apes, as well as in man, the cerebral hemispheres roof over and conceal, when looked at from above, the cerebellum behind, as well as the olfactory bulbs in front; but in the lowest Quadrumana (as the lemurs) the cerebellum is uncovered, and the surface of the cerebrum is almost devoid of convolutions.

Of the different lobes into which the cerebral hemispheres are imperfectly divided, the last to appear in the ascent from lower to higher groups of vertebrates, and the last to be developed in the growth of the human embryo, is the posterior lobe. This is among the facts which suggest a different hypothesis concerning the relative functions of the anterior, middle, and posterior lobes from that which is generally entertained.

An adult man's brain weighs, on the average, 48 ounces; a woman's, 44 ounces; yet, as Tiedemann (Philadelphia translation, 1836) observes, since the female body is lighter than the male, there is no inferiority in the *relative* size of the brain.

In capacity, the largest human brain of 900 measured (R. Wagner) was that of a woman, 115 cubic inches; the smallest adult male's, 62 cubic inches. Morton, however ("Crania Americana," p. 132), mentions a skull of the Inca Peruvian race, 60 cubic inches. The Hindoos probably have the smallest skulls of all known races. The following table is from Morton:

RACES.	No. of skulls.	Mean capacity.	Largest.	Smallest.
Caucasian, . .	52	87	109	75
Mongolian, . .	10	83	93	69
Malay, ...	18	81	89	64
American, . .	147	82	100	60
Ethiopian, . .	29	78	94	65

The human brain is enveloped, within the skull, by three membranes—the outer, fibrous, *dura mater;* the middle,

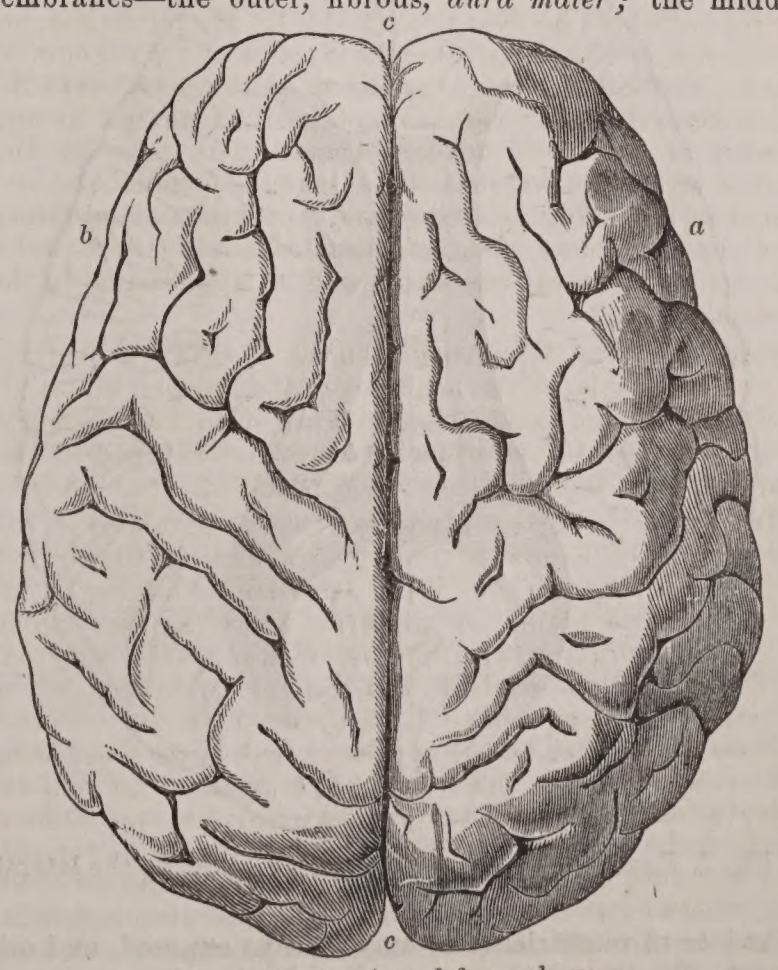


Fig. 1. Brain viewed from above.

serous, *arachnoid;* the inner, *pia mater*, consisting of small blood-vessels, with connective tissue between them. As usually described, the parts of the encephalon are, the *cerebrum, cerebellum, medulla oblongata*, and *pons varolii*.

The cerebrum is composed of the right (Fig. 1, *a*) and left (*b*) hemispheres, partially separated by the longitudinal fissure (*c c*). The convolutions on the two sides do not correspond (unless in a few principal forms) with each other; nor are they the same in different subjects. The fissure of Sylvius (Fig. 2, *a a*), on each side, separates (partly) the anterior from the middle lobe. On the surface of the hemispheres, gray (cineritious) vesicular nerve-substance predominates, although thin alternating layers of white substance exist in the convolutions. The central mass of the cerebrum is mainly composed of white, fibrous nerve-substance.

Laying the brain over so as to examine its base, the *cerebellum* (Fig. 2, *b b*), *pons varolii* (*c*), and *medulla oblongata* (*d*) are seen posteriorly. The relative positions of these parts

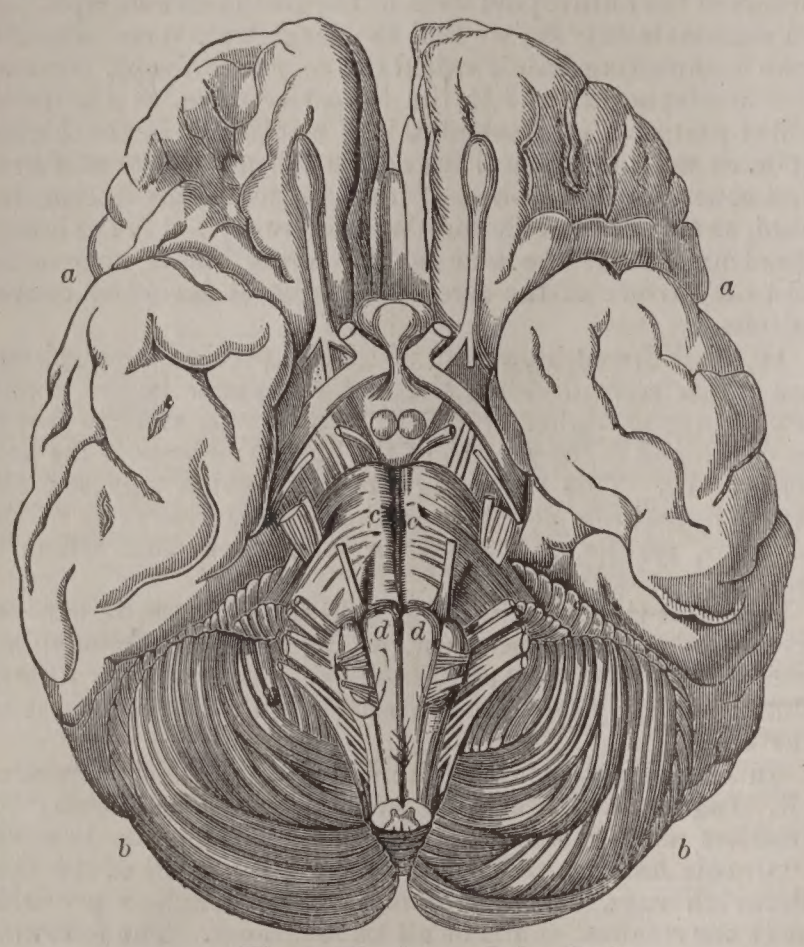


Fig. 2. The base of the Brain.

can be understood by the aid of the figure. In front of these the cranial nerves. They are commonly enumerated in the order of their emergence from the brain, as the 1st (most anterior), olfactory nerve; 2d, optic; 3d, motor oculi, etc.

To inspect the interior of the brain, it should be placed upon its base and sliced away above the *corpus callosum*, (Fig. 3, *a*) which bridges transversely the two hemispheres.

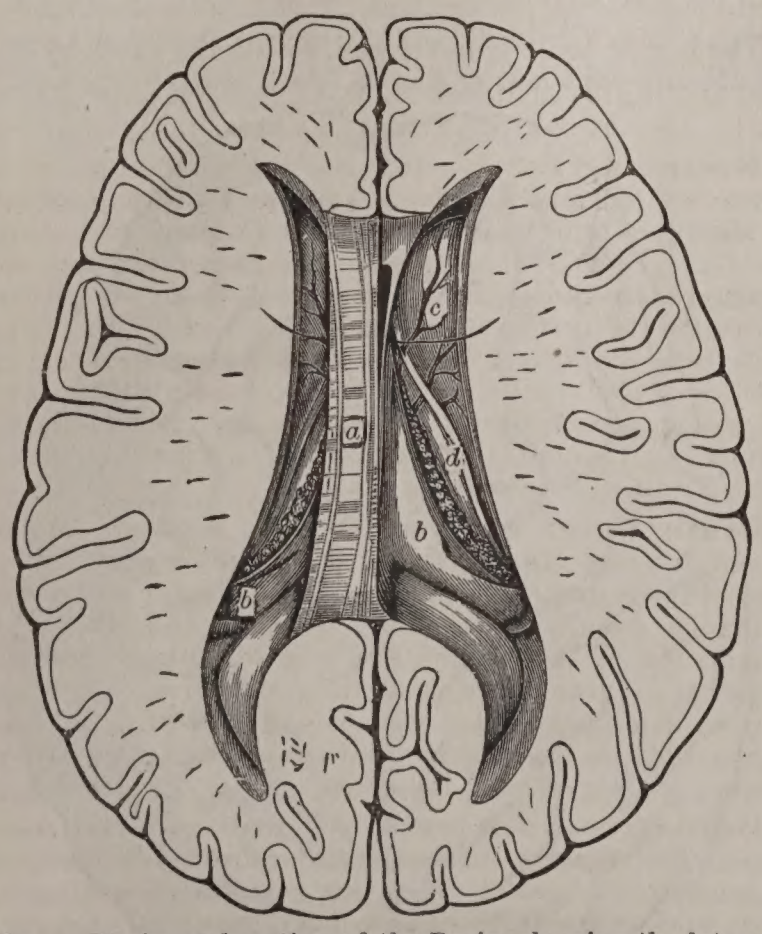


Fig. 3. Horizontal section of the Brain, showing the lateral ventricles.

The lateral ventricles (*b b*) may be thus exposed, and other parts, the technical names of which would cumber the memory of the general reader, especially as the particular uses of all of them have not yet been clearly determined. The figure will suffice to locate some of them.

The most important parts of the floor of the ventricles are the *corpora striata* (*c*) and the *thalami* (*d* and Fig. 4, *a a*). The former (one on each side) are anterior, the latter posterior. Both are rounded masses, partly of gray and partly of white nerve substance.

Connected with the thalami on each side by commissural filaments, and lying between the cerebrum and cerebellum,

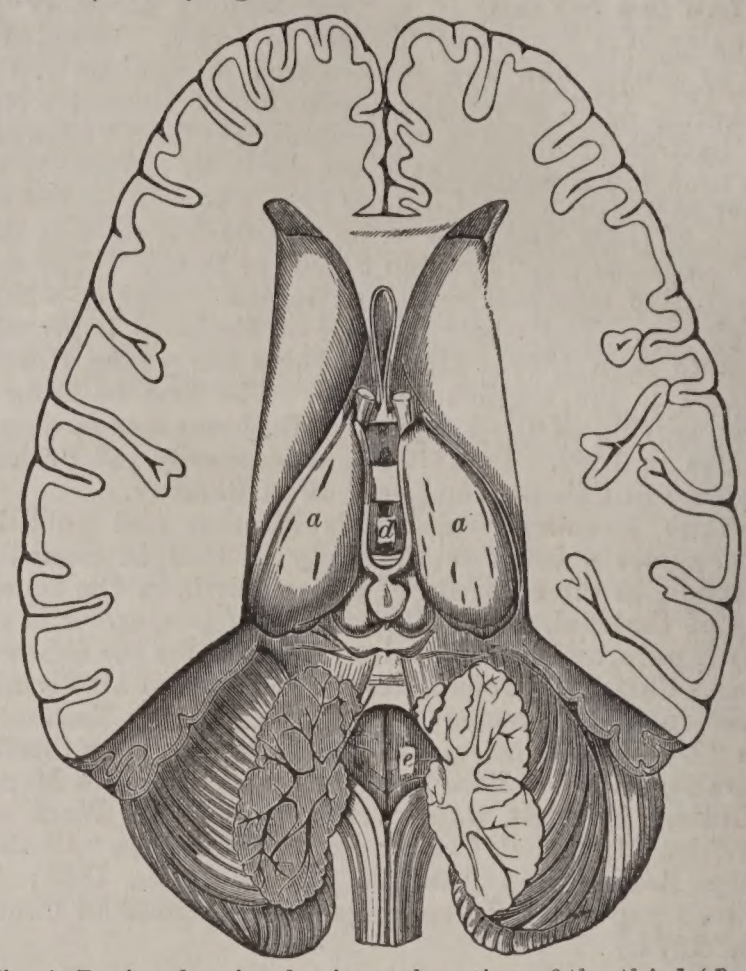


Fig. 4. Brain, showing horizontal section of the third (*d*) and fourth (*e*) ventricles.

are the (four) *tubercula quadrigemina*, which correspond nearly with the optic lobes of birds, reptiles, and fishes. The optic nerves principally terminate in them.

The *cerebellum* (*c*) is much smaller than the *cerebrum*, and lies behind and below it; they are separated by the membranous *tentorium*. The cerebellum consists of a right and a left hemisphere, with a fissure between them, interrupted by commissural connections. The outer portions of these hemispheres are arranged in nearly parallel delicate *lamellæ* or layers of gray nerve-matter. When a vertical section is made, we see an arborescent internal structure of white nerve-substance enclosed in the gray; this is called the *arbor vitæ* by anatomists. The *pons varolii* is principally composed of bands of transverse filaments, connecting the hemispheres of the cerebellum. The *crura cerebri* are bundles of white substance diverging from the pons varolii into the hemispheres of the cerebrum, widening as they pass forward.

The *medulla oblongata* (*f*) is a pyramidal mass of nerve-substance, continuous with the spinal marrow, as well as connected with the cerebrum and cerebellum. It is divisible on each side into four portions. The anterior of these, *corpora pyramidalia*, are composed of bundles of white nerve-fibres, which *decussate—i. e.*, cross each other, a little below the *pons*. They are connected with the antero-lateral columns of the spinal cord, and their crossing explains some facts in connection with one-sided motor palsy. The *posterior pyramids* are continuous with the posterior tracts of the spinal cord. The other portions of the *medulla oblongata* are called *corpora olivaria* and *corpora restiformia*. (For a more detailed description, the reader is referred to works on special anatomy.)

The *functions* of the brain, except as regards the general fact of its serving as the instrument of mental action, including perception, thought, emotion, and will, constitute a difficult subject of study, whose investigation has not yet been completed. We can give here only those views upon which physiologists are most nearly agreed. (For the consideration of some others, see PHRENOLOGY.)

The *medulla oblongata*, besides fibres of a commissural nature, is believed by most inquirers (Brown-Séquard excepted) to contain the ganglionic centre, under the control of which, through reflex action, are performed the movements connected with breathing and swallowing. A serious injury to it is always fatal, by interruption of respiration.

The *cerebellum* (believed by Gall to be the seat of the organ of amativeness or sexual propensity) has, since the inquiries and experiments of Flourens, been generally thought to have the office of harmonizing or co-ordinating

voluntary movements. Animals which climb, as the ape and the bear, have a larger cerebellum than those of simple locomotion, as the dog and the hog. Among birds, those of rapid and varied flight, as the swallow and many birds of prey, have it larger than the heavily-flying pheasant family, of which the barn-fowl is an example. Possibly the cerebellum may be the seat of the "muscular sense" of some physiologists. It is an unexplained fact that it has often been found considerably altered in persons who have died insane. Some recent investigations of Doctor S. Weir Mitchell of Philadelphia appear to throw doubt in the way of the acceptance of the *co-ordinative* theory concerning the cerebellum. He found that in animals which survived the entire removal of the cerebellum, although the order and balance of locomotor actions was lost for a considerable time, it was finally restored. Doctor Mitchell suggests, therefore, that the cerebellum cannot be the *exclusive* centre of muscular co-ordination, however it may share this office with other parts of the cerebro-spinal axis, but that it may be a great reservoir for accumulation of motor force.

The *corpora striata* are probably connected with the direct emanation of the motor impulses, upon which voluntary actions depend.

The *thalami* (formerly called *nervorum opticorum*) appear to be the ultimate *termini* of the nervous filaments which bring from the spinal cord impressions of common sensation or touch. These, with the *corpora striata*, the *tubercular quadrigemina*, and other central masses at the base of the brain, constitute the group of *sensori-motor ganglia*, believed by Carpenter and others to be the immediate seat of consciousness and will. Sensori-motor actions are those in which motion is guided by sensation, through the medium of this ganglionic apparatus. The importance of such guidance is easily illustrated by many familiar actions. We walk by sight; if one closes his eyes, his steps become uncertain. So, every one speaks or sings by aid of his hearing; the phrase "a good ear for music" is justifiable. One born deaf is also mute, from lack of this guidance. A blind person learns to substitute the use of the senses of touch and hearing for sight, but some guidance by sensation must always be had. All confused or unusual impressions make action difficult or irregular, as when one endeavors, without practice, to walk a narrow plank at a great height from the ground.

The cerebral hemispheres are, by universal consent, regarded as the material organs of intellect and of the emotions. Commonly it is believed that the anterior portion of the brain (the "gray matter" of its convolutions) is the seat of intellectual activity; the emotions, if separately located at all—which Carpenter disputes—being connected with the middle and posterior lobes. Yet the order of development, compared with the successive periods of maturing of the impulses and the reasoning powers, would point rather to the posterior lobes as being the organs of intellect.

The nature of the relation between mind and brain is a topic of endless controversy. (See MATERIALISM and MENTAL PHILOSOPHY.) Certain propositions may be here advanced, as open to very little question at the present time: 1. The two hemispheres of the brain, under normal conditions, act as one. We are not conscious of anything but unity in our mental activity. 2. Yet the brain is probably, in relation to our faculties, a multiple organ. This is shown by the partial consciousness of dreaming and somnambulism; partial insanity or monomania; limited disturbance of mental or moral powers after certain injuries; and the special gifts of mind so different in different individuals, recognized under the name of genius. 3. Reflex action, as pointed out first by Dr. Laycock, affects the brain, as well as the lower nervous centres. Emotional actions, excited by the presence of particular objects or impressions, exemplify this. 4. Mental action, intellectual as well as emotional, is often truly automatic or involuntary. The will (as all psychologists recognize) controls thought and feeling only by the directing and selective power of attention, by which one, rather than another, kind of impression or ratiocination acquires momentum and continuance. Great mental capacity is, indeed, often combined with deficiency of will, as in such striking examples as Mozart and S. T. Coleridge. 5. There is reason to believe, as Doctor Carpenter has shown, that mental activity may sometimes be unconscious—the "unconscious cerebration" of authors. During sound sleep, for instance, most persons are able to awake at a determined time. When we have forgotten a once-familiar name or number, our attention being withdrawn from the search, it frequently comes back unsought. Many other facts may receive the same kind of explanation. (See "Human Physiology," by W. B. CARPENTER, M. D., chapters on the "Nervous System.")

HENRY HARTSHORNE.

Brain'ard (JOHN GARDINER CALKINS), an American poet of merit, born at New London, Conn., Oct. 21, 1796. He graduated at Yale in 1814. He published a volume of poems in 1825, and was for six years editor of the "Connecticut Mirror." Died Sept. 26, 1828. (See "Memoir of Brainard," prefixed to his works, by J. G. WHITTIER, 1832.)

Brainard (LAWRENCE L.), a prominent citizen and business-man of St. Albans, Vt., born about 1794, was several times candidate for governor, and was U. S. Senator from Vermont 1854–55. Died May 9, 1870.

Brain Coral, a name of various corals of the order Madreporaria and family Mæandrinidæ, especially applied to the *Mæandrina cerebriformis*, which grows in warm seas, and takes its name from the fact that its surface has convolutions shaped somewhat like those of the human brain.

Braine (DANIEL L.), U. S. N., born May 18, 1829, in the city of New York, entered the navy as a midshipman May 30, 1846, became a passed midshipman in 1852, a lieutenant in 1858, a lieutenant-commander in 1862, and a commander in 1866. In 1861–62 he commanded the steamer Monticello, taking part in the engagement with the battery at Sewell's Point, near Norfolk, Va., May 19, 1861, and in the capture of Forts Hatteras and Clark, N. C., Oct. 5 of the same year. He was frequently under the fire of Forts Fisher and Caswell while blockading the port of Wilmington, and participated in both the Fort Fisher fights, and in the capture of Fort Anderson on the 19th of Feb., 1865. For the "cool performance" of his duty in these battles Braine was recommended for promotion by Rear-Admiral Porter in his "commendatory despatch" of Jan. 28, 1865. FOXHALL A. PARKER, U. S. N.

Braine-l'Alleud, a town of Belgium, in Brabant. It has cotton-factories. Pop. 5578.

Braine-le-Comte, a town of Belgium, in the province of Hainault, on the railway from Brussels to Valenciennes, 20 miles by rail N. N. E. of Mons. It has a church built about the year 1300, also cotton-mills and dyeworks. Fine flax is raised in the vicinity. Pop. 6464.

Brain'erd, a post-village of Crow Wing co., Minn., on the Northern Pacific R. R. where it crosses the Mississippi River, 115 miles W. S. W. of Duluth. It has one weekly newspaper.

Brainerd (DAVID), an American missionary, born at Haddam, Conn., April 20, 1718. He entered Yale College in 1739, but was expelled in 1742 for a very trivial offence. In 1743 he began his famous labors among the Indians in a village about halfway between Stockbridge, Mass., and Albany, N. Y. The year following he went among the Delawares in Pennsylvania, and afterwards to Crosweeksung in New Jersey, where he had his most signal success. In the summer of 1747 he returned to Massachusetts in broken health, and died at Northampton Oct. 9, 1747. Jonathan Edwards, to whose daughter he was engaged to be married, and at whose house he died, published a memoir of him in 1749. A new (and now the standard) edition of this, with his journals, was published by Rev. Sereno E. Dwight in 1822.

Brainerd (JOHN), a younger brother of the preceding, was born at Haddam, Conn., Feb. 28, 1720, graduated at Yale College in 1746, and was for a time missionary among the Indians in New Jersey. In 1757 he was settled at Newark, and in 1777 at Deerfield, N. J., where he died Mar. 17, 1781. (See his "Life," by Rev. THOMAS BRAINERD, 1865.)

Brainerd (THOMAS), D.D., of the same stock as the above, was born at Weston, N. Y., June 17, 1804, graduated at Hamilton College and at Andover Theological Seminary in 1831. From 1831 to 1833 he was pastor of the Fourth Presbyterian church in Cincinnati, O., from 1833 to 1836 edited the "Cincinnati Journal" and "Youth's Magazine," and from 1837 till his death at Scranton, Pa., Aug. 21, 1866, was pastor of the Pine Street church, Philadelphia. He was an accomplished and able writer. Besides various sermons and pamphlets, he published in 1865 the "Life of John Brainerd," referred to above.

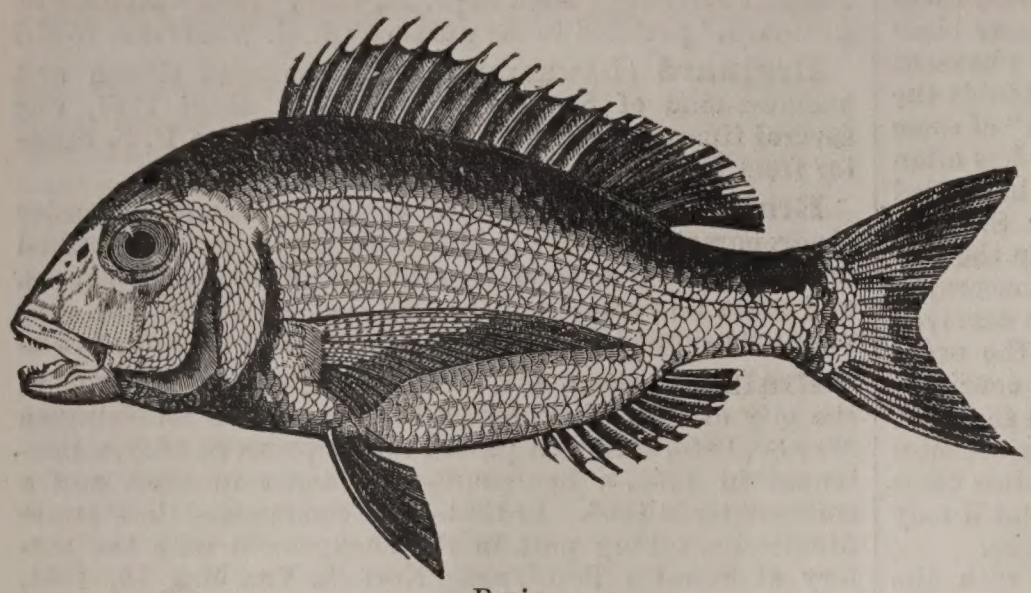
Brain Fever is a popular name for acute cephalic meningitis (see MENINGITIS), a dangerous disease, characterized in its earlier stages by very high fever and intense headache, usually followed by delirium and death. Inflammation of the brain itself (encephalitis) is less common, but is even more fatal than the former. It is not easy to discriminate between the two during life. Cold applications to the head and mild but persistent derivative treatment are generally indicated.

Brain'tree, a post-township and village of Norfolk co., Mass. The village is on the Old Colony and Newport R. R., 10 miles S. of Boston. Here are manufactures of machinery, woollen goods, boots and shoes, paper, tacks, cordage, etc. Pop. of township, 3948.

Braintree, a post-township of Orange co., Vt., 25 miles S. of Montpelier. It has three churches, and manufactures of lumber. Pop. 1066.

Brain'trim, a township of Wyoming co., Pa. P. 620.

Braize, or **Becker** (*Pagrus vulgaris*), a sea-fish of



Braize.

Europe, represented in American Atlantic waters by the big porgy or scup (*Pagrus argyrops*), which is prized both for the table and for its oil.

Brake, a term with various significations; it sometimes denotes a thicket, a place overgrown with shrubs, brambles, or ferns. In the U. S. a thicket of canes is called a "canebrake."

Brake is a name applied, especially in America, to plants of the order Filices. The more correct name is Fern (which see, by Prof. D. C. Eaton, LL.B.).

Brake, an instrument used to break flax or hemp; the hand or lever by which a pump is worked; a large harrow used in agriculture; a sharp bit or snaffle (of a bridle).

Brake, a machine attached to the wheels of heavy carriages and railroad cars, which, when pressed against the wheels, retards or stops their motion by friction. Patents have been obtained in the U. S. for numerous machines or inventions for this purpose. Among these are "steam car-brakes," in the use of which the friction is produced by steam-power, and the engineer of a locomotive applies the brakes by the turning of a cock; and the "Westinghouse air-brake," now extensively used.

Bra'ma, a genus of fishes of the family Chætodontidæ, having the body very deep and compressed, a single elongated dorsal fin, and a forked tail, the points of which are widely divergent. The *Brama raii*, sometimes called *bream*, is common in the Mediterranean, and is highly esteemed for food.

Bra'mah (Joseph), an English machinist and inventor, born in Yorkshire April 13, 1749. He carried on business in London, and gained distinction by numerous and valuable inventions, among which are a safety lock, a hydrostatic press, and improvements in fire-engines and steam-engines. Died Dec. 9, 1814.

Bramah's Press. See Hydrostatic Press.

Braman'te (Donato Lazzari), a celebrated Italian architect and painter, born near Urbino in 1444, was a relative of Raphael. He studied and worked at Milan from 1476 to 1499, and afterwards removed to Rome, where he was patronized by Pope Julius II. He designed the vast galleries which connect the Vatican with the palace of Belvedere. He was the first architect of St. Peter's church, which he began to build in 1506. Only a small portion of his design had been realized when he died in 1514, and the succeeding architects deviated from the original plan. (See Vasari, "Lives of the Painters;" Pungileoni, "Memoria intorno alla Vita di Donato Bramante," 1837.)

Bram'bling, Bram'blefinch, or **Mountain Finch** (*Fringilla montifringilla*), a small bird nearly allied to the chaffinch, than which it is rather larger. The predominant colors of the upper parts are black and brown, with white bands on the wings. The belly is white, and some of the wing-coverts are yellow. It breeds in the northern parts of Sweden and Norway, and visits England, Italy, and other countries as a winter bird of passage.

Bramp'ton, a post-village, capital of Peel co., Ontario, on the Grand Trunk Railway, 21 miles W. of Toronto, has manufactures of flour, farming implements, pumps, etc., and a large trade. It has two weekly papers. Pop. in 1871, 2090.

Bran, the husk or outer covering of wheat, which in the process of flouring is separated from the fine flour. In 100 parts of bran there are of water, 13.1; albumen, 19.3; oil, 4.7; husk (with a little starch), 55.6; ash or saline matter, 7.3. Calico-printers use bran and warm water to remove coloring-matter from those parts of their goods which are not mordanted. Bran and the flour united—*i. e.* unbolted wheat flour—make a good bread, which is considered more digestible than that made of fine white flour.

Branch [Fr. *branche;* Lat. *ramus*], a limb of a tree or plant; a bough, or division of the stem or trunk; a ramification; any member or part of a body or system; a distinct article or section, as a branch of science or education. In geography several streams which unite to form a river are called its branches. The term "branch" is also applied to an individual of a family descending in a collateral line; any descendant of a common parent. In botany each branch originates in a leaf-bud, which is produced at a node of the stem or of an already existing branch. The arrangement of the branches as alternate or opposite corresponds to the relative position of the leaves.

Branch, a county of Michigan, bordering on Indiana. Area, 528 square miles. It is traversed by the St. Joseph River and is drained by several creeks. The surface is diversified by forests, oak-openings, and small lakes; the soil is a fertile sandy loam. Cattle, grain, and wool are staple products. Iron ore is found. It is intersected by the Michigan Southern R. R. Capital, Coldwater. Pop. 26,226.

Branch, a township of Stanislaus co., Cal. Pop. 787.

Branch, a township of Schuylkill co., Pa. Pop. 1200.

Branch (John), born at Halifax, N. C., Nov. 4, 1782, graduated at the University of North Carolina in 1801, became a lawyer, was made a judge of the superior court, governor of North Carolina (1817–20), U. S. Senator (1823–29), secretary of the navy (1829–31), member of Congress (1831–33), governor of Florida Territory (1844–45), besides holding other important offices. Died at Edgefield, N. C., Jan. 4, 1863.

Branch (Lawrence O'Brien), son of the preceding, born in Halifax co., N. C., in 1820, graduated at Princeton in 1838, was a Democratic Representative in Congress from 1855 to 1861. He was made a brigadier-general in the Confederate army in 1861, and was killed at Antietam in 1862.

Branch'burg, a twp. of Somerset co., N. J. Pop. 1251.

Branchiop'oda [from the Gr. βράγχια, the "gills," and πούς, ποδός, a "foot"], an order of entomostracous crustaceans, deriving their name from the peculiarity of having the gills, which are numerous, attached to the feet. They are small, many of them almost microscopic, and abound in stagnant fresh waters. A few are found in salt water. Some are known by the name of water-fleas; the genera *Cyclops* and *Cypris* may be mentioned, the former on account of its frequency in stagnant waters, the latter because its fossil shells are abundant. Western North America abounds in species; Eastern North America has none.

Branch'port, a station on the Raritan and Delaware Bay R. R., in Ocean township, Monmouth co., N. J., 1 mile N. of Long Branch. It has a fine bay, a coasting-trade in lumber and oysters, and has many summer residences.

Branchport, a post-village of Jerusalem township, Yates co., N. Y., at the head of the W. arm of Keuka Lake. It has five churches.

Branch'ville, a township of St. Clair co., Ala. Pop. 1419.

Branchville, a post-village of Orangeburg co., S. C., in a township of the same name, on the South Carolina R. R., 75 miles E. S. E. of Augusta. Pop. 1339.

Brand, a burning piece of wood, or a stick of wood partly burned; a sword (this use of the word is obsolete except in poetry); a thunderbolt; a mark made by burning with a hot iron on a criminal or on a cask, etc.; a stigma. (See Branding.) The term brand is applied in England to some diseases of plants, especially of cereal grains, which are also called blight, bunt, mildew, rust, or smut. These diseases are caused by minute parasitic vegetation. Perhaps the most common application of this term is to a peculiar spotted and burnt appearance of leaves and bark, the cause of which is probably not known.

Brande (William Thomas), F. R. S., an English chemist, born in London in 1788. He lectured with success on chemistry at the Royal Institution, and filled for many years an important office in the Mint. Among his works are a valuable "Dictionary of Science, Literature, and Art" (1842) and a "Manual of Chemistry." Died in 1866.

Brand'enburg, the most important province of Prussia, and that which formed the nucleus of the Prussian kingdom. It corresponds nearly to the old Mark of Bran-

denburg, and has an area of 15,402 square miles. It is mostly a level plain which has but little elevation above the sea. It contains numerous lakes, is intersected by the Oder, and also drained by the Warthe, the Spree, the Havel, and the Elbe, which latter forms part of its W. boundary. The soil is sandy and moderately fertile. The province is traversed by several canals and railways. It has extensive manufactures of cotton, wool, linen, silk, paper, leather, sugar, etc. The chief towns are Berlin, Potsdam, Königsberg, and Frankfort-on-the-Oder. The inhabitants are mostly Protestants. It is divided into two regencies (Regierungsbegirke) and thirty-three circles. This country was conquered by Charlemagne in 789 A. D. The first margrave of Brandenburg was Albert the Bear, who is called the founder of the House of Brandenburg. He began to reign in 1134. Early in the fifteenth century the margrave became an elector of the German empire, and took the title of elector of Brandenburg. Frederick William, who became elector in 1640, added the duchy of Prussia and part of Pomerania to his dominions, and his son took the title of king of Prussia in 1701. Pop. in 1871, 2,863,461.

Brandenburg (anc. *Brennaborch* or *Brennabor*), a town of Prussia, in the above province, is situated on both sides of the river Havel, and on the Berlin and Magdeburg Railway, 38 miles by rail W. S. W. of Berlin. It is enclosed by walls, and divided by the river into the old and new town, between which, on an island, is a quarter called "Venice," containing a castle and a mediæval cathedral. The town has a ritter akademie, a gymnasium, a realschule, and a public library; also manufactures of woollen and linen goods, hosiery, paper, leather, etc. Pop. in 1871, 25,828.

Brandenburg, a post-village, capital of Meade co., Ky., is on the Ohio River and on a high bluff, 40 miles below Louisville. Pop. 427.

Brandenburg, New, a walled town of Mecklenburg-Strelitz, is situated near the N. end of Tollensee, 18 miles N. N. E. of Strelitz and 53 miles W. N. W. of Stettin. It has wide and regular streets, and is said to be the most beautiful town in Mecklenburg-Strelitz. It has a grand-ducal palace, and manufactures of cotton and woollen goods, damasks, paper, and chemical products. Pop. in 1871, 7245.

Brand'ing, a mode of punishment formerly practised in England, by burning the face or hand of an offender with a hot iron. This penalty was inflicted in the case of all clergiable offences (see Benefit of Clergy), but it was abolished by an act of Parliament in 1822. Branding is now obsolete except in the case of deserters from the army, who are marked with the letter D, not by a hot iron, but by ink or gunpowder. By the Mutiny act of 1858 it is enacted that the court-martial, in addition to any other punishment, may order the offender to be marked on the left side, two inches below the armpit, with the letter D, such letter to be not less than one inch long.

Bran'dis (Christian August), professor at Bonn University, born at Hildesheim, in Hanover, Feb. 15, 1790, was the son of Joachim Dietrich Brandis, a celebrated physician. He edited, with Emmanuel Bekker, a critical edition of Aristotle. He was the secretary of King Otho in Greece. His main work was a history of the Greek and Roman philosophies (2 vols., 1835–44; the third volume appeared in 1860–66) and a "History of the Development of Greek Philosophy" (2 vols., 1862–64). Died July 24, 1867.

Bran'don, a township of Jackson co., Ia. Pop. 1103.

Brandon, a post-township of Oakland co., Mich. Pop. 1284.

Brandon, the capital of Rankin co., Miss., on the Vicksburg and Meridian R. R., 13 miles E. of Jackson, contains twenty-one stores, a large hotel, a bank, a large female college, five churches, and one newspaper. It is surrounded by numerous mineral wells, limestone and marl-beds. Pop. 756.

A. J. Frantz, Ed. of "Brandon Republican."

Brandon, a township of Franklin co., N. Y. P. 692.

Brandon, a post-village of Rutland co., Vt., is in Brandon township, near Otter Creek, on the Vermont Central R. R. (Rutland division), 16 miles N. N. W. of Rutland. It has a newspaper, a graded academy, two parks, two national banks, five churches, twenty-five stores, two hotels, and manufactures of Howe scales, iron castings, carriages, flour, lime, lumber, paint, marble, pill-boxes, spools, and tassel-moulds. The township contains also the village of Forestdale. Pop. of the township, 3571.

A. N. Merchant, Pub. of "Union."

Brandon, a post-township of Prince George co., Va. Pop. 1600.

Brandon, a post-village of Fond du Lac co., Wis. It has one weekly newspaper.

Brandt, a post-village of Bethel township, Miami co., O. Pop. 240.

Bran'dy [Ger. *Branntwein* (*i. e.* "burnt wine"); Fr. *eau de vie*] is the liquid obtained by distilling the fermented juice of the grape. It is generally manufactured from white and pale-red wines. White wine yields a richer brandy than red wine, as it contains more of the essential oil of grapes, to which the flavor of the brandy is due. The peculiarities of the wine pass to a certain extent to the brandy. Wines which taste of the soil communicate the same taste, the *goût de terre*, to the brandy distilled from them. Wines of Selleul in Dauphiny yield a brandy having the odor and taste of Florentine iris; those in St. Pierre in Vivarais give a spirit which smells of violet. The stronger the wine the greater the yield. The wines of the S. of Europe, being richest in alcohol, yield the most brandy. The usual yield is from 100 to 150 gallons from 1000 gallons of wine. The best brandy, that distilled in the department of Charente, known as *cognac* and *armagnac* (names of towns), is made from very choice wines. Inferior brandies are distilled from dark-red wines of France, Spain, and Portugal, also from the fermented *marc* or refuse of the grape, and from the lees of wine and the scrapings of the casks. The catawba brandy, made from the lees of catawba wine in Ohio, is a very good brandy, though it has the peculiar flavor of this wine. The brandy distilled from catawba marc has an unpleasant taste, and contains much fusel oil. The wines of California yield brandy abundantly and of good quality. Various other liquors are known as brandies, such as "cider brandy" or "apple jack," distilled from cider or from the "pomace" or refuse ground apples from the cider-press. This, when new, is a harsh, fiery liquor, but is much improved by age. "Peach brandy" is extensively made from the pulp of ripe peaches in some of the Southern States.

Fresh brandy is colorless, and remains so in glass vessels. The sherry-wine color which brandy generally exhibits is either derived from the cask or from burnt sugar purposely added. Brandy is almost pure alcohol and water, the percentage of alcohol varying from 48 to 56 per cent. It has an agreeable vinous, aromatic odor, and a peculiar well-known taste. Its specific gravity is from 0.902 to 0.941. Besides alcohol and water it contains the volatile oil of the wine, a little acetic acid, acetic ether, aldehyde, etc., together with the coloring-matter and tannic acid derived from the cask.

Brandy for medical use should be free from disagreeable odor and taste, and should be at least four years old. The advantage of keeping brandy a few years in the cask is due to the oxidation and removal of the ranker fusel oils, and to the precipitation of possible traces of copper or lead derived from the still by the tannic acid of the cask.

The greater part of the brandy and cognac of commerce is made from alcohol derived from Indian corn,—rectified and deodorized whisky. This is diluted to proof, 50 per cent., and flavored with acetic ether, œnanthic ether, oil of grapes, argol, and tannin, and colored with burnt sugar. It is improved by the addition of a little real brandy, and by keeping it a few years in the cask. The following recipe for cognac brandy is taken from the circular of a New York firm, whose business is to supply the necessary materials to the manufacturers of wines and liquors: "To 40 gallons of cologne spirit, double distilled and free from odor, and reduced to proof with distilled water, add $\frac{1}{8}$ ounce of our best cognac oil, distilled from grapes, $1\frac{1}{2}$ pints burnt-sugar coloring, and $\frac{1}{4}$ ounce of tannin." At the prices charged for the materials this choice brandy would cost the compounder $1.25 per gallon, and would sell at from $10 to $25.

Brandy is an esteemed cordial and stomachic. It is frequently given in the sinking stages of low fevers and to convalescents, and to check diarrhœa.

C. F. Chandler.

Brandy Station, a post-village of Culpeper co., Va., on the Orange Alexandria and Manassas R. R., 56 miles S. W. of Alexandria, the scene of conflicts between the Federal and Confederate forces on the 9th of June and 11th of Oct., 1863.

Bran'dywine, a hundred of New Castle co., Del. Pop. 3180.

Brandywine, a township of Hancock co., Ind. Pop. 1061.

Brandywine, a township of Shelby co., Ind. Pop. 1224.

Brandywine Creek is formed by the East and West branches, which unite in Chester co., Pa. It flows southeastward into the State of Delaware, and enters the Dela-

ware River near Wilmington. It furnishes water-power for numerous mills. On its banks, in Chester county, the British general Howe defeated Washington Sept. 11, 1777.

Bran'ford, a borough of New Haven co., Conn., in Branford township, on Long Island Sound and on the New Haven and New London R. R., 8 miles E. S. E. of New Haven. It has three churches, a foundry, etc. The harbor will admit vessels of 300 tons. It is a place of summer resort. It has various manufactures, and is the seat of an academy. Pop. of township, 2488.

Branks, an instrument formerly used in England and Scotland for the punishment of scolding women. It was of various forms, but consisted essentially of a bridle of iron or leather, to which was attached a piece of iron which held the tongue firmly. It is asserted that in some obscure places in England its use came down to quite recent times.

Bran'nan (John Milton), an American officer, born in 1819 in the District of Columbia, graduated at West Point in 1841, major First Artillery Aug. 1, 1863, and Sept. 28, 1861, brigadier-general U. S. volunteers. He served at seaboard posts 1841–73, in suppressing Canada border disturbances 1841–42, in the war with Mexico 1846–48, engaged at Vera Cruz, Cerro Gordo, La Hoya, Contreras, and Churubusco (brevet captain), and the city of Mexico (severely wounded at Belen Gate), as adjutant First Artillery 1847–54, in Florida hostilities 1856–58. In the civil war he served in command of the department of Key West, Fla., 1862, in the department of the South 1862–63, engaged on expedition to St. John's River, Fla. (brevet lieutenant-colonel), at Pocotaligo, S. C., and several minor actions, in Tennessee campaign 1863, engaged at Hoover's Gap, Tullahoma, Elk River, and Chickamauga (brevet colonel), as chief of artillery department of the Cumberland 1863–65, engaged at Missionary Ridge, in the various operations of the Atlanta campaign 1864 (brevet brigadier-general), in command of the district of Savannah, and temporarily of department of Georgia 1865–66. Brevet major-general Mar. 13, 1865, for meritorious services in the field.

George W. Cullum, U. S. A.

Brant, a county in the S. part of Ontario (Canada). Area, 416 square miles. It is intersected by Grand River and the Grand Trunk R. R. The staple productions are lumber, wool, potatoes, maple-sugar, butter, and cheese. Capital, Brantford. Pop. 32,259.

Brant, a township of Saginaw co., Mich. Pop. 331.

Brant, a post-township of Erie co., N. Y., on Lake Erie. Pop. 1359.

Brant. See Barnacle Goose.

Brant (Joseph Thayendanega), an Indian Mohawk chief, born in 1742, fought in the British army against the Americans in the war of the Revolution. He published the Gospel of Mark in Mohawk. Died Nov. 24, 1807. (See W. L. Stone, "Life of Brant," 1838.)

Brant (Sebastian), a German poet, born at Strasburg in 1458. He was appointed an imperial councillor by the emperor Maximilian. He wrote a satirical poem entitled "Das Narrenschiff" ("The Ship of Fools," 1494). Died May 10, 1520.

Brant'ford, a town of Ontario (Dominion of Canada), the capital of Brant county, is on Grand River and the Grand Trunk Railway, 24 miles W. S. W. of Hamilton and 84 miles S. E. of Goderich. The river, an affluent of Lake Erie, is navigable to Brantford, which has an active trade. Here are large machine-shops and engine-houses of the railway company, and manufactures of brass and iron castings, farming-implements, etc. The county buildings are substantial. There is an orphans' home for girls and a widows' home supported by the charitable. Brantford has two weekly newspapers. Pop. in 1871, 8107.

Brant'ley (William Theophilus), D. D., born May 1, 1816, at Beaufort, S. C., educated at Brown University, pastor of the First Baptist church at Augusta, Ga., 1840–48, professor of belles-lettres and evidences of Christianity in the University of Georgia 1848–56, pastor in Philadelphia 1856–61, Atlanta, Ga., 1861–71, and of the Seventh Baptist church of Baltimore since 1871.

Brantôme (Pierre de Bourdeilles), a French historian, born of a noble family at Périgord about 1540. He served in the army in several campaigns, and gained the favor of Charles IX., at whose court he passed some years. He wrote "Les Vies des Hommes Illustres et grands Capitaines, etc.," a work of high reputation. His style is commended as charming, vivacious, *naïf*, abounding in ingenious turns of expression, and sometimes rising to eloquence. Died July 15, 1614.

Bra'shear City, a town and port of entry of St. Mary's parish, La., on the Atchafalaya River, 80 miles from New Orleans, is the southern terminus of Morgan's Louisiana and Texas R. R., and is connected with Galveston and other Texas ports by Morgan's line of iron steamships; it is connected with Havana and Mexican ports by a line of iron steamers. Its port may be entered by vessels drawing 15 feet. It is connected with the Tèche country by a daily line of steamboats, and has one of the best harbors in the State. It has a resident collector of customs, and is destined to be one of the largest commercial towns in the State outside of New Orleans. It was captured from the Union forces by Gen. Dick Taylor in 1863, with a large quantity of military stores. It has one weekly newspaper. Pop. 776.

W. B. Merchant, Ed. "News."

Brash'er, a township of St. Lawrence co., N. Y., contains the post-village of Brasher Falls (pop. 450), which is on the St. Regis River, 36 miles by rail E. of Ogdensburg. It has important manufactures of lumber, pumps, and agricultural tools. Brasher Iron-works, a post-village, has a furnace and other shops. Pop. 250. Bog-iron ore is obtained in this township. Pop. of township, 3342.

Bras'idas [Gr. Βρασίδας], an eminent Spartan general in the Peloponnesian war, which began in 431 B. C. He relieved Megara in 424, and gained several victories over the Athenians. He was killed in 422 B. C. at Amphipolis, where he was opposed to the Athenian general Cleon. His memory was long honored by annual sacrifices. Plato compared him to Achilles.

Brass [Lat. *æs*, gen. *æris;* Fr. *airain*], an important alloy of copper and zinc extensively used for a great variety of purposes in the arts, on account of the ease of working and its acceptable color. It is made (1) by fusing copper and zinc in crucibles, placing the latter below; considerable of the zinc is lost during the operation, owing to its volatility; (2) by heating copper in grains or sheets with oxide of zinc and charcoal; (3) the ancient method, by heating copper with calamine, a native ore of zinc, and charcoal. Different varieties of brass, adapted to special uses, are obtained by varying the proportions of the component metals. Common brass for ordinary purposes, which is cast in moulds and finished by turning and filing, contains about 70 parts of copper and 30 of zinc. *Munz* or *yellow metal,* which is rolled into sheets and used for sheathing ships, contains from 50 to 63 parts of copper and 37 to 50 of zinc. *Tombac, pinchbeck, prince's metal, Mannheim gold, mosaic gold, similar,* etc., contain 80 parts or more of copper to 20 or less of zinc. A little lead diminishes the ductility, while tin increases the hardness of brass. Articles of brass are cleaned by immersion in aqua fortis (nitric acid), and lacquered with shell-lac in alcohol. Brass is harder than copper, is malleable and ductile, and can be readily cast, rolled, stamped, and turned in the lathe. Next to iron in its different forms, it is the most important metal used in the arts.

C. F. Chandler.

Bras'sarts, or **Bras'sards,** jointed plates of steel which in plate-armor protected the upper part of the arms, and united the shoulder and elbowpieces. The ancient name of them was *brachiale.* When the front of the arm only was shielded the pieces were called demi-brassarts.

Brasses, Monumental, are either plates or inlaid figures of brass or latten, which occur in old churches of Europe, generally designed to represent the figure and the heraldic honors of the dead. Monumental brasses were often wrought with fine artistic taste. This ancient practice, which had become nearly obsolete, has been lately revived.

Brasseur de Bourbourg (Charles Étienne), a French priest, born Sept. 8, 1814, travelled extensively in North and Central America, and published, as the result of his travels, "Histoire de Canada" (2 vols., 1851), "Histoire des nations civilisées du Mexique et de l'Amérique Centrale" (4 vols., 1857–59), "Gramatica de la lengua Quiche" (1862), and other works.

Brass'field's, a township of Granville co., N. C. Pop. 3015.

Bras'sica, a genus of herbaceous plants of the order Cruciferæ, distinguished by a round and tapering 2-valved pod (*silique*), globose seeds in one row in each valve, and conduplicate cotyledons. The species of this genus, which comprises the cabbage, cauliflower, broccoli, turnip, rape, etc., are natives of the temperate and cold regions of Europe and Asia. The species just named are extensively cultivated in gardens and fields. (See Cabbage and Turnip.)

Brass'town, a township of Clay co., N. C. Pop. 395.

Brat'tice, in mining engineering, is a term applied to a partition of iron plate and other fit material which divides the great general shaft into two chambers, which serve as up-cast and down-cast shafts for ventilation.

Brat'tleboro', a post-village of Windham co., Vt., on the Connecticut River and the Vermont Central R. R., 24

miles S. of Bellows Falls and 127 miles by rail S. of Montpelier. It has seven churches, an asylum for the insane, three newspaper-offices, two national banks, a paper-mill, and important manufactures of machinery, musical instruments, furniture, and many other articles. West Brattleboro' has two seminaries for young ladies. Pop. of Brattleboro' township, 4933. Valuation of taxable property in 1873, $2,272,371; number of polls, 1330.

ED. OF "VERMONT PHŒNIX."

Brat'ton, a township of Mifflin co., Pa. Pop. 852.

Brauns'berg, a walled town of Prussia, in the province of Prussia, on the river Passarge, about 35 miles S. W. of Königsberg. It has manufactures of woollen and linen goods, and an active trade in grain, timber, etc. Pop. in 1871, 10,471.

Bra'vo (NICOLAS), a Mexican general, born about 1792, fought against the Spaniards in several campaigns. He was elected vice-president of Mexico in 1824, revolted against Vittoria in 1827, and was defeated. He officiated as the executive chief and substitute of Santa Anna in the absence of the latter, from Oct., 1842, to Mar., 1843. Died April 22, 1854.

Bra'vo-Muri'llo (JUAN), a Spanish statesman, born in June, 1803, became in 1847 minister of justice, then of public instruction and of the finances. In 1851 he became the head of a new cabinet, in which position he followed a reactionary policy. In April, 1868, he again became president of the cabinet. On the expulsion of the queen he followed her to Bayonne. Died in Jan., 1873.

Braw'ley, a township of Scott co., Ark. Pop. 183.

Brawn, the flesh of a boar, or the animal itself; the fleshy, protuberant muscular part of a man or animal; bulk, muscular strength; sometimes the arm; also a preparation of meat made of the head and belly of a young pig, with the addition of ox feet to render it gelatinous. The whole is rolled up tight in sheet tin and boiled for four or five hours. The moisture is then pressed out, and after it has stood about ten hours, the meat is put into cold salted water and is ready for use.

Brax'ton, a county of West Virginia. Area, 646 square miles. It is intersected by the Elk and Little Kanawha rivers. The surface is hilly, and extensively covered with forests; the soil is mostly fertile. Grain and wool are the staple products. Coal, iron, and salt are found. Capital, Braxton Court-house. Pop. 6480.

Braxton, a township of Colleton co., S. C. Pop. 1971.

Braxton (CARTER), an American planter, born in Newington, Va., Sept. 10, 1736. He graduated at William and Mary College in 1756. He was elected to the Continental Congress in 1775, and signed the Declaration of Independence. Died Oct. 10, 1797.

Braxton Court House, or **Sutton,** a post-village, capital of Braxton co., W. Va., on Elk River.

Brazeau, a township of Perry co., Mo. Pop. 2281.

Brazen Sea, a great bowl of cast metal, probably of copper or bronze, which stood in the priests' court in Solomon's temple. (1 Kings vii. 23–26; Josephus's "Antiquities," viii. 3, 5.) Its purpose was to hold water for the ablutions of the priests. The brazen sea stood upon twelve oxen, the latter facing outward. The exact shape and size of the brazen sea are not known, but the best commentators think its contents exceeded 11,000 wine gallons.

Brazen Serpent, the name of a copper or bronze figure of a serpent erected by Moses during the journey of the Israelites from Egypt to the land of promise, for the miraculous cure of those who had been bitten by venomous serpents. This brazen serpent became an object of superstitious worship among the Israelites, and was consequently destroyed by Hezekiah. In accordance with John iii. 14, the brazen serpent is regarded as a type of Christ.

Brazil', an empire, and the only monarchy on the continent of America, occupying almost one-half of South America, extends from Cape Orange, in lat. 4° 23′ N., to the S. point of the peninsula of Mirim, in lat. 33° 44′ S., and from the most eastern point on the coast near Olinda, in lat. 34° 40′ W., to the most western part of the course of the river Javari, in 73° 15′ W. It is bounded on the N. by Colombia, Venezuela, British, Dutch, and French Guiana, on the N. E. and E. by the Atlantic, on the S. and W. by Uruguay, Paraguay, the Argentine Republic, Bolivia, Peru, and Ecuador. Area, estimated at 3,252,900 square miles.

Face of the Country, Mountains, etc.—Brazil may be divided into three different regions—the low coast, a tableland with an elevation of from 2000 to 2500 feet, and a large plain, watered by the Amazon and its tributaries, and having very little declination. Beginning in the S. of the empire, the first mountain-range we meet with is the Serra do Mar, extending along the coast to lat. 26° 30′ S., here separates into two branches, which enclose the valley of the Uruguay. The Serra de Mantiqueira, extending from lat. 20½° to 23° S., may be regarded as the central chain of the empire. This chain, mostly in the provinces of Minas Geraes and Goyaz, contains the highest elevations in Brazil. The northern continuation, under the name of Serra do Espinhaço, runs parallel to the coast in an almost N. direction. Parallel to this chain, and enclosing with it the valley of the Rio San Francisco, the Serra da Tabatinga runs from lat. 20° to 11° 20′ S. Among its branches, the Serra Piauhy and the Serra Ibiapaba in the E. almost extend to the ocean, while its western branch terminates on the Tocantins River. In about lat. 16⅔° S. the Pyreneos Mountains connect the Serra da Tabatinga with the Cordillera Grande, running parallel to it. The low chains along the southern branches of the Amazon (the Araguay, Xingu, Topayos, and Madeira) are all connected with each other at their southern extremity. The theory formerly held, that these chains running parallel to the Andes belonged to their system, has been shown to be erroneous, as the Brazilian highlands decline towards, and, as in the provinces of Matto Grosso, are separated by, extensive plains from the Andes.

Rivers and Lakes.—Among the rivers, the Amazon is the most important, and at first, like all its tributaries, flows northward. Upon its entrance into Brazil it flows eastward, and keeps this direction throughout its entire course. Its first important tributary on the right bank is the Rio Madeira, and then the Topayos and the Xingu. On the left bank we find the Rio Negro, coming from Colombia. Near the Amazon, the Tocantins or Para, formed by the junction of the Araguay and the true Tocantins, empties into the Atlantic. We next find the Maranhão, which flows through the province of the same name, and empties into the Bay of San Luis after a course of 650 miles. On the E. coast the Rio San Francisco, forming the boundary between the provinces of Sergipe and Pernambuco, empties into the ocean after a course of 1480 miles. Numerous smaller rivers rise on the mountains running parallel to the coast, and empty into the Atlantic. Among these the most important are the Rio Grande de Belmonte, the Rio Doce, the San João de Parahiba, and the Rio Grande do Sul, which connects Lakes Patos and Mirim. Among the rivers rising in Brazil, but having the larger part of their course in other states, are the Rio Paraná, the Paraguay, and the Uruguay. There are numerous small lakes in the plains, but none of any great extent. The Laguna dos Patos and Lake Mirim, both in the province of Rio Grande do Sul, in the extreme S. of the empire, are the most important. Steam navigation has been successfully established on the Brazilian rivers.

Geology and Mineralogy.—Nearly all the geological formations are represented in Brazil. In the highlands of the interior is a large area of granitic and other metamorphic rocks, with extensive basins of Devonian and carboniferous strata. These reach down the Tocantins and Xingu to near their mouths, and form the southern margin of the valley of the Amazon. The valley itself is occupied by tertiary rocks. At Rio and along much of the coast granitic rocks prevail, but near Pernambuco are extensive areas of cretaceous deposits, with many of the chalk fossils of Europe. In the caves of Brazil are found the bones of many large animals now extinct (*Megatherium, Machairodus,* etc.). The mineral wealth of Brazil includes gold, silver, iron, and diamonds and other precious stones. To these may be added the euclase, beautiful crystals of iron-glance, crystallized talc, rock-crystals with adhering topazes, as well as topaz-crystals with included rock-crystals, and kyanite. Beautiful red-lead spar or chromate of lead occurs, and beds of iron-glance over 1000 feet thick are found in some places. Among the gold-mines first discovered in Brazil were those of Jaraguá. The whole amount of gold produced is less than a fourth of what it was a hundred years ago. Coal is found on the Amazon.

Brazil is perhaps richer in diamonds than any other country in the world. The most noted mines are those of the Serra do Frio. The diamonds were first found in this district about 1730 by a colony of miners from Villa do Principe, 60 miles to the S. E. of Tejuco. While employed at this place in search of gold they frequently met with little shining stones, which at first they threw away. But one of the overseers, suspecting that they might be of value, transmitted specimens to the governor, who sent them to Lisbon, and they were pronounced genuine diamonds. The diamonds have hitherto been found in the beds of rivers, and are washed from the sand in a manner similar to that practised in washing gold. A diamond was found in the Rio Abaste in 1791 which weighs 138½ carats; another, worth £45,000, was found in 1847. In 1852 rich mines were discovered in the province of Minas Geraes. Not-

withstanding the immense wealth of Brazil in these two minerals, neither of them has proved so profitable as her agricultural productions. In one year and a half the exports of sugar and coffee amounted to more than the value of all the diamonds found in eighty years. (See C. F. HARTT, "Geology and Physical Geography of Brazil.")

Climate.—In such an extensive region as Brazil both the climate and soil must, of course, vary greatly according to the locality. But these variations are by no means so large as under corresponding latitudes of the northern hemisphere. In the northern provinces of Ceará, Pernambuco, and their neighborhood, sometimes no rain falls at all for two or three years at a time. A famine ensues, cattle and other animals die of thirst, and numbers of the inhabitants of starvation. This, however, is a rare exception, as most of the northern provinces are subject to heavy rains, while in the S. the climate is healthy and settled. Over all Brazil, December, January, and February are the hottest months—June, July, and August the coolest. A great advantage of Brazil over the rest of the tropics is, that a foreigner may without fear enjoy the gifts of nature. Most of the European diseases are unknown here, while the yellow fever, with very few exceptions, is not known in Brazil.

Vegetable Productions.—Brazil is probably not surpassed by any other country in the world in natural fertility; comparatively little attention, however, is given to agriculture, and the growth of vegetation is so rank in some places as seriously to impede agricultural labor. It is estimated that less than one-hundredth part of the soil is under cultivation, and this portion is almost entirely limited to the vicinity of the coast, and to the N. E. part of the empire, where the soil seems peculiarly well adapted to the production of coffee, sugar, and maize. The pastures are of immense extent, and are covered with herds of horned cattle. The most useful plants are the sugar-cane, coffee, cotton, cacao, rice, tobacco, maize, manioc, beans, bananas, ipecacuanha, ginger, yams, lemons, oranges, figs, etc. Sugar and coffee are the staple products. Manioc (the plant which produces the tapioca) is native of Brazil, and its farina is used as meal by almost every household. It is said to produce six times as much nutriment to the acre as wheat. No part of the world can excel Brazil in the extent and luxuriance of her forests. Many of the largest trees bear brilliant blossoms, others are clothed with a drapery of epiphytes and climbing plants. Many trees of the largest size stand so close together that it is impossible to clear a passage between them. The cocoanut-palm grows near the sea-shore, and the *Bertholletia* is met with in many localities. The kernels of this tree are exported in great quantities, and are called Brazil nuts. Another productive tree of Brazil found in the Amazonian forests is the caoutchouc (*Siphonia elastica*), which grows to the height of forty or fifty feet without branches. A peculiar characteristic of Brazilian vegetation is the large number of species of myrtaceous trees which fill the air with perfume; other trees are the purga das Paulistas (*Anda Gomezii*), the seeds of which yield a tasteless oil, more powerfully cathartic than castor oil; the Brazil-wood, the rosewood, fustic, mahogany, and others well adapted to shipbuilding. The inhabitants of Brazil distinguish the different kinds of forests and woods by particular names. There are the Matos Virgens, or the virgin forests, such as those along the whole maritime cordillera; the Catingas, consisting for the most part of low deciduous trees; the Carascos, close-growing shrubs; and the Capiveira, being such wooded tracts as are formed by small trees and shrubs springing up where virgin forests have been cleared away.

The flowers of Brazil are no less extraordinary than its other vegetable products, there being the greatest abundance of them, representing every variety of color. Some of the crops come to maturity in Brazil very quickly. The common garden pea has, it is said, been sown and gathered in the neighborhood of Rio within twenty-one days.

Animals.—The chief domestic animals of Brazil are horned cattle and horses; the numbers of both are immense. The greater part of them live in a wild state; those in the countries S. of the parallel of 25° S. lat. have multiplied to such an extent that large numbers of them are slaughtered chiefly for their hides, thousands of which are exported annually to Europe and the U. S. The immense number of cattle would afford extensive trade in provisions were not salt so dear on account of the inland carriage in a region wholly destitute of roads. Swine and goats are abundant. Many rapacious animals, such as the puma, the jaguar, and several native Canidæ, as well as sloths and porcupines, are numerous. The peccary is common, also the capybara, a rodent animal. Monkeys and vampire-bats abound. Among the feathered tribes are the humming-bird (found in immense numbers and in great variety); vultures, ducks and geese, toucans, and a great number of large and brilliant species which are peculiar to the country. Among the reptiles are the anaconda, the boa constrictor, the corral snake, the surucucú, and the jararaca; the three last named are venomous and much dreaded by the inhabitants. The insects of Brazil are brilliant, presenting many different shapes and colors; of all, the butterflies are the most beautiful; 700 species have been seen in the environs of the town of Pará alone, while the whole number known in Europe is 390. Some scorpions attain a length of six inches. The bees of this country are mostly stingless. Large numbers of fish, which form a principal part of the subsistence of the inhabitants, are caught in the Amazon and other rivers. Professor Agassiz found in the Amazon alone 1163 new species of fish, which is more than the Mediterranean Sea produces.

Commerce.—Brazil chiefly imports breadstuffs, furniture, paper, linen, liquors, etc., and exports cotton, coffee, sugar, hides, horse-hair, caoutchouc, drugs, gums, diamonds, dyewoods, etc. The total amount of coffee produced in Brazil in 1820 was estimated at 5,312,000 pounds; in 1851 the amount produced was 303,556,960 pounds. In 1869 the imports amounted to 166,000,000 and the exports to 202,000,000 milreis (1 milreis = 54 cents).

Population, Races, etc.—The population of the several provinces of Brazil in 1867, according to Packenham, was as follows:

Provinces.	Population.
Rio de Janeiro	1,370,000
São Paulo	835,000
Santa Catharina	140,000
Paraná	90,000
Rio Grande do Sul	420,000
Espirito Santo	65,000
Bahia	1,400,000
Parahiba do Norte	280,000
Pernambuco	1,250,000
Alagoas	300,000
Sergipe	275,000
Rio Grande do Norte	230,000
Ceará	550,000
Piauhy	232,000
Maranhão	385,000
Pará	320,000
Minas Geraes	1,450,000
Goyaz	151,000
Matto Grosso	46,000
Alto Amazonas	70,000
Total	9,858,000

Of this number, 1,674,000 were slaves. The number of uncivilized Indians is about 200,000. The whites have gradually forced the natives back from the coast into the interior. The latter are mostly peaceable, and civilized to a certain degree. In the N. and in the extreme W. the Indians are still in a savage state, and oppose the advance of the whites. The number of tribes is very large, but it is not improbable that they originally belonged to one family and spoke one language. The most prominent are the Tupi, the Puris, the Guarycurnes in Matto Grosso, the Tapinambas in Bahia, the Taperivas in the N., and the Botocudoes. While the Indians predominate in the N., the negroes are in a majority in the S. But throughout Brazil the different races have mixed considerably. The descendants of whites and Indians are called Mamelucoes, of Indians and negroes, Cafuzoes, and the settled Indians, Caboclos. The white inhabitants consist almost entirely of the descendants of the Portuguese settlers. While the inhabitants of Minas Geraes are farthest advanced in intellectual culture, manufacturing industry is most advanced in Bahia. The inhabitants of Pernambuco are of the true type of a slaveholding aristocracy, while those of Rio Grande do Sul are an independent race of shepherds.

Religion, Government, etc.—The Roman Catholic is the established religion of Brazil, though other religions are tolerated since 1811. The number of Protestants is estimated at 20,000 to 25,000, mostly Germans. English are also found in all the commercial cities. A Presbyterian missionary association has several missionaries here, and publishes a paper. The Catholic Church has 986 parishes and 11 dioceses, which are subordinate to the archbishop of Bahia, the metropolitan and primate of Brazil. The government of the country is an hereditary constitutional monarchy. The legislative power is vested in the general assembly, which consists of two chambers, the senate and the chamber of deputies; the former elected for life, and the latter for four years. The head of the government is the emperor, who belongs to the house of Braganza.

The standing army in time of peace was fixed by the assembly in 1869 at 20,000 men. In 1870 the imperial navy consisted of 89 men-of-war, of which 52 were steamers.

Literature, Education, etc.—Through the enlightened policy of the present emperor, schools have been established in many of the largest towns, where the first rudiments of education are taught. Considerable attention has been paid to the study of the French system. A handsome mu-

seum has been established at Rio Janeiro. There is a school for engineers, a naval college, and several fine libraries. Brazil has two law schools—one in São Paulo, the other in Pernambuco, and two medical schools—at Bahia and Rio Janeiro. In Rio there are also a military academy, a naval academy, etc. Printing-presses are common throughout the empire. The press is free, and over 300 newspapers are published. The official language of the empire, and the language of the inhabitants of European descent, is Portuguese.

History.—Brazil was first discovered on May 3, 1500, by Vincente Yanez Pinçon, who was one of the companions of Columbus. It was subsequently taken possession of by Pedro Alvarez Cabral. Soon after the first discovery of Brazil the Portuguese made numerous settlements in that country, which continued gradually to extend, notwithstanding the jealousies and opposition of the English, Dutch, and Spaniards, who repeatedly attacked and even destroyed some of their settlements. In 1755 a decree was passed by the Portuguese government, declaring all Indians exempt from slavery, which curse in future should rest only on the African race. When Portugal was invaded by the French in 1808, the sovereign of that kingdom, John VI., sailed for Brazil, accompanied by his court. Soon after his arrival he placed the administration on a better footing, threw open the ports to all nations, and improved the condition of the country generally. On the fall of Bonaparte the king raised Brazil to the rank of a kingdom, and assumed the title of king of Portugal, Algarve, and Brazil. A revolution in 1820 forced the king to return to Portugal, and he left Pedro, his eldest son, as regent. In 1822, Dom Pedro, forced by a desire on the part of the Brazilians for complete independence, and not wishing the control of Brazil to go outside of his family, declared Brazil a free and independent state, and assumed the title of emperor, and was recognized by the king of Portugal in 1825. A series of disturbances and general dissatisfaction throughout the empire ended in the abdication of Dom Pedro, who left Brazil April 7, 1831, leaving a son, who was under age, as his successor. The rights of the latter were recognized and protected, and a regency of three persons appointed by the chamber of deputies to conduct the government during his minority. In 1840 the young emperor was declared of age, being then in his fifteenth year, and was crowned July 18, 1841. The early part of his reign was disturbed by a servile insurrection and a war with Buenos Ayres. In 1826, Dom Pedro I. had made a treaty with England for the abolition of the slave-trade. Dom Pedro II. emancipated the slaves of the government in 1866, and in 1871 the legislature provided for the gradual abolition of slavery throughout the entire empire. Brazil, with some aid from the Argentine Republic, carried on a war with Paraguay from 1865 to 1870, This war terminated in complete victory for Brazil. In 1866 an imperial decree opened all the important rivers to the commerce of foreign nations. Ten large steamships navigated the Amazon in 1869, while smaller steamers carried on a trade with Peru and Ecuador. The construction of railways is also rapidly progressing. The first one was made between Rio de Janeiro and Petropolis, and was opened for commerce in 1854. The railway of Dom Pedro II. extends from Rio Janeiro to São Francisco. The Bahia Railway is to unite Bahia to São Francisco. The Pernambuco Railway traverses the province diagonally from Recife, and is to extend to São Francisco. The São Paulo Railway is to connect Santos with Campinas. The aggregate length of Brazilian railroads in 1871 was 503 miles; the aggregate length of telegraph lines, 920 miles, but it has since been doubled.

The public debt of Brazil in 1870 was 581,323,430 milreis, of which sum less than one-fifth was due in foreign countries. The receipts of the revenue for 1869–70 were 77,611,950 milreis, about one-half of which came from import duties. There are also duties on certain exports, and there is a system of internal taxation. The expenses of the government in the years 1869–70 were nearly 71,000,000 milreis, of which 15,000,000 were paid towards the reduction of the public debt. The government pays subsidies to steamboat companies, railroads, and many schools, and owns one railway, that of Dom Pedro II. (See SOUTHEY, "History of Brazil," 3 vols., 1810–19; HANDELMANN, "Geschichte von Brazilien," 1860; WAPPÄUS, in the 7th ed. of Stein and Herschelmann's "Handbuch der Geographie und Statistik," 1871; FLETCHER and KIDDER, "Brazil and the Brazilians," 8th ed., Boston, 1868.)

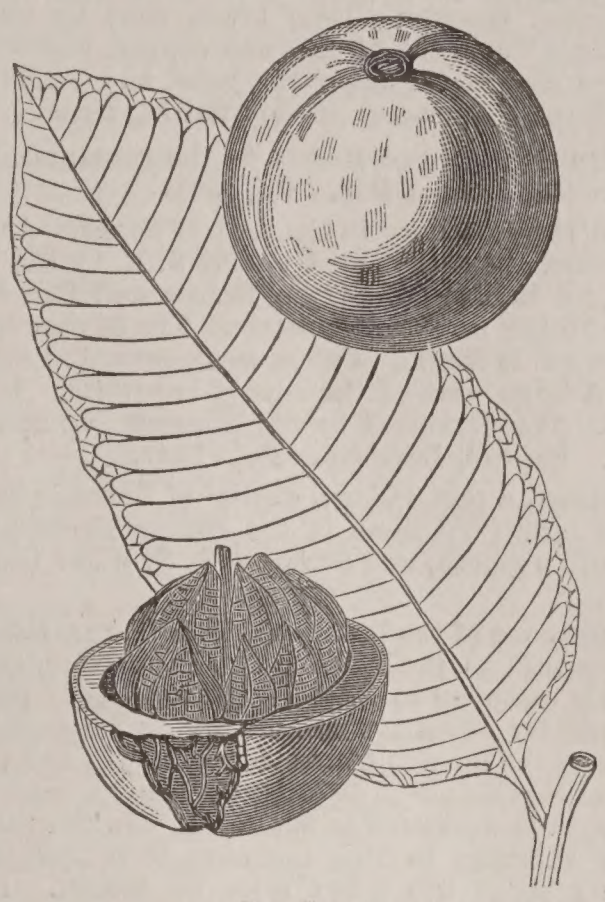
A. J. SCHEM.

Brazil, a city of Clay co., Ind., on the Terre Haute and Indianapolis R. R., 16 miles E. N. E. of Terre Haute. It is an important centre of the block coal and iron business. It has one weekly paper. There are several blast furnaces and collieries in the vicinity. Pop. 2186; of Brazil township, 2772. ED. OF "MANUFACTURER AND MINER."

Brazil Cabbage, the *Caladium sagittifolium,* a plant of the natural order Araceæ, having arrow-shaped, pointed leaves. It is supposed to be a native of tropical America, but is now in cultivation throughout the tropics; not only the root being used for food, but also the leaves, boiled as greens. Both root and leaves are almost entirely destitute of the acridity so generally characteristic of the order.

Brazil'ian Grass, a popular name of a substance used in the manufacture of hats, sometimes called chip hats. It is not grass, but the leaves of a species of palm (*Chamærops argentea*) which are imported from Cuba.

Brazil-nuts, the seeds of the *Bertholletia excelsa,* a



Brazil-nut.

beautiful tree of the natural order Lecythidaceæ. This tree, which attains a height of 100 feet or more, abounds on the banks of the Orinoco and in the northern parts of Brazil, and bears a round woody pericarp nearly as large as a man's head. This pericarp contains about twenty-four seeds or nuts, which have the form of a triangular prism, and a hard shell enclosing a white kernel, which is very agreeable when fresh, but soon becomes rancid. They yield a large quantity of oil, which is valuable for burning in lamps. Many Brazil nuts are exported from Pará to Europe and the U. S.

Brazil-wood, an important dyewood from the *Cæsalpina crispa,* a tree of the order Leguminosæ. There are

Brazil-wood.

several varieties, known as Pernambuco, Lima, Santa Martha, Sapan or Japan, etc. The wood contains a colorless

principle, *brazilin* ($C_{18}H_{14}.O_6$), which changes by oxidation to *brazilein* ($C_{18}H_{14}O_7$), which is the red coloring-matter which gives the wood its value. Pernambuco and Lima wood contain as high as 2.7 per cent. of brazilein, Sapan 1.5, and Santa Martha (also called Peach or Nicaragua) still less. Brazil-wood is very heavy and hard, is pale when freshly cut, but becomes red by exposure to the air. The coloring-matter is soluble in water, but more so in alcohol or ammonia. It is used in dyeing to produce reds with alumina, purples with tin, etc., for coloring wall-paper and for red ink. C. F. CHANDLER.

Bra'zing, the joining of two or more pieces of metal (iron, copper, German silver, brass, etc.) by means of "hard solder," an alloy of zinc and copper, which is fused and fluxed with borax upon the joint, and forms a hard alloy with the other metals, firmly uniting them.

Braz'law, a town of Russia, in the government of Podolia, 60 miles S. E. of Bar. Pop. 5211.

Brazo'ria, a county in the S. E. of Texas. Area, 1260 square miles. It is bounded on the S. E. by the Gulf of Mexico, and intersected by the Brazos and San Bernard rivers and other navigable streams. The surface is nearly level; the soil is fertile. Cattle, wool, corn, and cotton are raised. A large part of the county is prairie. It is well timbered. It is traversed by the Houston Tap and Brazoria R. R. Capital, Brazoria. Pop. 7527.

Brazoria, a post-village, capital of Brazoria co., Tex., is on the right (W.) bank of the Brazos River, about 30 miles from its mouth, and 60 miles W. S. W. of Galveston. Pop. 725.

Bra'zos, one of the largest rivers of Texas, rises in the high table-land in the N. W. part of the State, and flows first nearly eastward to Baylor. It afterwards pursues a S. E. course for about 200 miles. In the subsequent part of its course the general direction is S. S. E., and it enters the Gulf of Mexico about 40 miles S. W. of Galveston. Its whole length is estimated at 900 miles. In the rainy season, from February to May inclusive, it is navigable for steamboats about 300 miles from its mouth. It flows through forests of live-oak and red cedar.

Brazos, a county in Central Texas. Area, 578 square miles. It is bounded on the E. by the Navasota River, and on the S. W. by the Brazos. The former river unites with the Brazos at the S. E. extremity of the county. The soil is fertile; the surface in part undulating and well timbered. Cattle, corn, cotton, and wool are raised. The county is intersected by the Houston and Texas Central R. R. Capital, Bryan. Pop. 9205.

Bra'zos Santia'go, an inlet and seaport of Texas, in Cameron co., between the N. end of Brazos Island and the S. extremity of Padre Island. It has some trade, but it has a bad and shifting bar. The settlement is on Brazos Island, in lat. 26° 04′ N., lon. 97° 12′ W. A railroad has been constructed to White Ranche, on the Rio Grande. Point Isabel lighthouse on the mainland is a brick tower, with a white flashing light; lat. 26° 04′ 52″ N., lon. 97° 11′ 04″ W. Brazos Island extends southward 10 miles to "Boca Chica," a small outlet of the Rio Grande. The island is a waste of sand.

Breach, as a military term, signifies a gap or opening made by the besiegers in a wall or defensive work of a city or fortress. The operation by which the gap is produced is called *breaching,* and the guns used for this purpose are *breaching batteries.* (See ASSAULT and BOMBARDMENT, by GEN. J. G. BARNARD, U. S. A.)

Breach of the Peace, the offence of disturbing the public peace, either by actively or constructively breaking it. Unlawful assemblies, riots, affrays, challenges to fight, and libels are breaches of the peace, and by the common law the offender is indictable. The phrase is sometimes used to distinguish civil from criminal cases, as in the clause of the U. S. Constitution which grants to members of either house of Congress freedom from arrest except in cases of treason, felony, and "breach of the peace." In this connection it seems to include all indictable offences, not only those which are in fact attended with force and violence, but also those which are constructive breaches of the peace of the government, as tending to violate good order.

Bread [Gr. ἄρτος; Lat. *panis;* Fr. *pain;* It. *pane;* Ger. *Brod;* etymology uncertain], the most common kind of prepared food. It is made from the flour or meal of some grain, which is moistened with water, and mixed or kneaded till uniform. It may or may not be *raised* by the development in the mass of carbonic acid or other gas; it is then formed into loaves or cakes, and finally baked before a fire or in an oven.

I. *Bread which is not raised* is often called *unleavened* bread. This may be made from the whole grain by soaking it in water, forming it in the hands, and either drying it in the sun or baking it before a fire. This is the simplest process of bread-making, and is still practised to some extent among savages. Generally, unleavened bread is made from grain which has been pounded or brayed in a mortar or between flat stones, reduced to meal in a mill, or even further reduced to flour. Coarse oat, barley, and pease meals are in Scotland made into bread by simply kneading with water, flavored with salt, and baking before a fire. Wheat bread is made in a similar manner in many localities. The *passover cakes* of the Israelites were thus prepared. In the U. S., especially among the poorer classes in the South, Indian corn meal is thus made into corn bread. From wheat flour sea biscuit and the various kinds of crackers are prepared.

II. *Raised bread* is bread which is made porous and spongy by the aid of some gas, produced either before or during the baking. This gas may be carbonic acid, either generated by fermentation, produced by the decomposition in the bread of an alkaline bicarbonate, or mingled with the flour in solution in water under pressure. It may be air which is incorporated with the dough during the kneading and expanded during the baking, as in pastry, sponge cake, etc., or it may be carbonate of ammonia, which is vaporized during the baking.

The best bread is made of wheat flour, although the flour of rye, oats, and other grains is used. (See FLOUR.) Wheat flour owes its superiority to the large percentage of gluten which it contains. This body, when moistened with water, becomes adhesive, elastic, and tenacious, and holds the bubbles of gas formed during the process of raising the loaf, although it be distended to a spongy mass several times the original volume of the dough. The other cereals contain scarcely any gluten; hence it is difficult to make light-raised bread from them. (See GLUTEN.) The bread from wheat flour is whiter than that of other grains. The composition of the most important kinds of flour and meal is, according to Von Bibra, as follows:

	Wheat Flour.	Rye Meal.	Barley Meal.	Oat Meal.
Water	15.54	14.60	14.00	11.70
Albumen	1.34	1.56	1.20	1.24
Vegetable glue	1.76	2.92	3.60	3.25
Casein	0.37	0.90	1.34	0.15
Fibrin	5.19	7.36	8.24	14.84
Gluten	3.50			
Sugar	2.33	3.46	3.04	2.19
Gum	6.25	4.10	6.33	2.81
Fat	1.07	1.80	2.23	5.67
Starch	63.64	64.28	53.15	58.13
Sand	.....	.....	6.85	

Besides the above constituents the flour and meal contain small but important quantities of potash, soda, lime, magnesia, oxide of iron, chlorine, sulphuric and phosphoric acids, silica, etc., although the larger part of these substances remain in the bran, which is separated by bolting or sifting during the milling of the grain.

1. *Fermented bread* is prepared either with leaven or yeast. Leaven is dough—*i. e.* flour and water—in a state of incipient putrefaction. When flour is moistened with water and placed in a warm situation, spontaneous chemical action begins in the nitrogenous constituents, casein, fibrin, gluten, etc. This change extends later to the sugar, gum, and starch. At one stage of the decomposition the products of vinous fermentation may be detected, alcohol and carbonic acid; at a later stage an acid fermentation supervenes, producing lactic acid. The alcohol, carbonic acid, and lactic acid are formed from sugar, either the small quantity originally contained in the flour, or an additional quantity formed during the decomposition from the gum and starch. (See FERMENTATION.) The change of sugar in the vinous and lactic acid fermentations is shown in the following formulæ:

$$\underset{\text{Sugar.}}{C_6H_{12}O_6} = \underset{\text{Carbonic acid.}}{2CO_2} + \underset{\text{Alcohol.}}{2C_2H_6O}.$$

$$\underset{\text{Sugar.}}{C_6H_{12}O_6} = \underset{\text{Lactic acid.}}{2C_3H_6O_3}.$$

It is here seen that the transformation from sugar to alcohol and carbonic acid, or to lactic acid, is very simple. Where leaven is used for raising bread, a portion of the dough is set aside at each baking to serve as leaven for the next. The process of making the bread is very simple. The proper quantity of flour is mixed with tepid water, the leaven, and a little salt, the whole being well incorporated by kneading. The mixture is placed in a warm situation and left over night to ferment. If the leaven is in the proper stage of decomposition, it will induce vinous fermentation, producing alcohol and carbonic acid gas; the latter, held by the elastic and tenacious gluten, will expand the mass into a light, porous sponge, which becomes in the oven a palatable loaf. If, however, the leaven be in a more advanced state of decomposition, or if some other

necessary condition fail, instead of alcohol and carbonic acid, lactic acid will be formed, and the dough will not be *raised* by gas, but will be heavy and sour. To avoid this latter result, sal aëratus, bicarbonate of potassa or soda, is added to the dough. This neutralizes the lactic acid as fast as it is formed, and by liberating carbonic acid gas at the same time inflates the sponge and makes it light and porous. Were there any certainty as to the quantity of lactic acid that would be generated, it might be possible to add the proper amount of sal aëratus to neutralize it, but in practice there is generally an excess or a deficiency. In the former case the bread is alkaline, yellow, and disagreeable; in the latter case, sour. Leaven is also liable to communicate a disagreeable taste and odor.

Notwithstanding the difficulty of making good bread with leaven, and the frequent failures in private families, in Paris, where bread-making has reached a high degree of perfection, the bread is raised chiefly by leaven, a little yeast only being added to facilitate the fermentation. According to Prof. Horsford, the following is the common method practised in Paris: At eight o'clock in the evening a mass of paste (leaven or sour dough) is taken, composed of 8 kilogrammes of flour and 4 kilogrammes of water. This is left until six o'clock in the morning, and constitutes the main leaven; 8 kilogrammes more of flour and 4 kilogrammes of water are then added: this forms the first quality of leaven. At two o'clock in the afternoon 16 kilogrammes of flour and 8 of water are added: this is the second quality of leaven. At five o'clock the complete leaven is prepared by adding 100 pounds of flour and 52 kilogrammes of water, mixed with from 200–300 grammes of yeast. At seven o'clock 132 kilogrammes of flour and 68 kilogrammes of water, holding in solution 2 kilogrammes of salt, and mixed with from 300–600 grammes of yeast, are added to the leaven, and made into well-kneaded dough.

With this quantity of paste five or six batches of bread are made in the following manner: 1*st Batch.*—This is composed of half the dough prepared as above, which is moulded and left to rise, and then set in the oven. The bread of this first baking is sour, rather brown, and not particularly light. 2*d Batch.*—The dough remaining of the first batch is mixed with 132 kilogrammes more of flour and 68 kilogrammes of water, mixed with the same proportion of salt and yeast as the preceding batch. Half of this dough forms the second baking, the bread of which is whiter and better than the first. 3*d Batch.*—The same quantity of flour, water, and salt, with 300 grammes of yeast, is again added to the dough, of which half is baked as usual. 4*th Batch.*—Same proceeding as for the third. 5*th Batch.*—This is prepared like the foregoing, and produces what is called fancy bread, the finest quality of any.

The use of leaven is of great antiquity. The usual agent for raising bread in the public bakeries in the U. S. and in many families is yeast, either obtained from some brewery or specially prepared for the purpose. (See YEAST.) The following is a recipe in common use in New England: "Take eight good-sized potatoes, boil, mash fine, pass through a sieve, and work in a cup of flour. Thin to a cream with hot water, and add a tea-spoonful of salt and a table-spoonful of sugar. When cooled to lukewarm, add a cupful of old yeast, and set aside in a warm place. In six hours the yeast will be ready to use. Bottled it will keep for a week. Use a cupful for two loaves of bread." (*My Mother.*)

A very essential element of success in bread-making is thorough kneading. When the bread has risen sufficiently it is baked. There is a loss of about 25 per cent. in baking, chiefly water. In bread raised by fermentation some alcohol is evolved. Liebig estimated that 150,000 gallons of alcohol are thus lost annually in London alone, and 12,000,000 gallons in Germany. Efforts have been made to save it by condensation, but thus far without success.

The carbonic acid which gives lightness to fermented bread is derived chiefly from the small amount of sugar contained in the flour. If wheat is exposed to dampness after harvesting, or if the flour has been exposed to heat and moisture, the albumen which it contains is transformed into diastase (see BEER), which possesses the property of changing starch to dextrine (gum) and sugar. Bread made from such flour is sweet, sticky, heavy, and dark-colored. Several substances have been used to prevent these results. Alum is said to have been extensively used in London; its use being now forbidden by law, lime-water was recommended by Liebig, and is largely used by the Glasgow bakers. Sulphate of copper is a poisonous salt, said to be used in Belgium, $\frac{1}{80000}$ to $\frac{1}{15000}$ being sufficient for the purpose. Mege-Mouriès announced some years since (*Compt. Rend.*, xxxvii., 775; xxxviii., 351, 505; xlii., 1122; xliv., 40, 449; xlvi., 126; xlviii., 431; l., 467) the discovery of a body, "cerealine," found almost wholly in the bran, which possesses properties similar to those of diastase. He devised means for getting rid of this agent, or at least of its effects, and the following method of bread-making bears his name: It is assumed that 100 kilogrammes of wheaten meal have given

72 kil.	750 grammes		finest white flour,
15 "	750	"	dark groats,
11 "	500	"	bran.

1. At six o'clock in the afternoon take 40 litres* of water at 18° R. (72½° F.), add 70 grammes of pure yeast, or 700 grammes common grocer's yeast, and 100 grammes of starch-sugar. (Instead of the yeast and sugar, take, if necessary, 26 grammes of tartaric acid.) The place where the mixture is set aside must be maintained nearly at the temperature of 18° R. 2. The next morning, at six o'clock, the fluid will be saturated with carbonic acid. Stir in the 15 kilogrammes 750 grammes of groats. Fermentation will commence immediately. 3. At two o'clock in the afternoon add 30 litres of water, and pass the whole through a very fine silk or silver-wire sieve, to separate the fine bran. 4. The 70 litres with which the groats have been treated, after passing through the sieve, will be reduced to about 55 litres, with which the 72 kilogrammes 750 grammes of white flour and 700 grammes of salt are to be kneaded into a dough. (The bran is again extracted with 30 litres of water, and the extract employed in the next batch.) 5. The dough is then placed in baking-pans to ferment. 6. When raised, it is placed in the oven.

The baking of bread can be effected at 212° F., but no crust will be formed; to secure the best result a temperature of 350° to 570° F. should be employed. A high heat should be avoided at first, lest a hard crust be formed while the interior of the loaf remains unbaked. 100 pounds of flour yield from 125 to 135 pounds of bread, the increase being due to the water added. The most common faults of wheat bread are due to its being (1) *sour,* from the flour having been partly spoiled, the yeast or leaven having been too old, or the dough having been allowed to stand too long before baking; (2) *bitter,* from excess of yeast or bad yeast; (3) *heavy,* from insufficient kneading, raising, or bad leaven; (4) *mouldy,* from the flour having been kept too long in a damp place.

Graham bread is made from the unbolted meal of wheat, a mixture of bran and flour; it is used by dyspeptics. *Rye bread* is largely used in Northern Europe, and to some extent in the U. S. It is dark-colored, is harder than wheat bread, and has a peculiar taste.

2. *Substitutes for Fermentation.*—Carbonic acid may be developed in the dough by the decomposition of bicarbonate of potassa (sal aëratus) or of bicarbonate of soda by some acid. Sour milk, hydrochloric acid, tartaric acid, bitartrate of potassa (cream of tartar), and the acid phosphate of lime have been used for this purpose. They give rise respectively to lactate, chloride, tartrate, double potassic tartrate (Rochelle salt) of potassium or sodium, or to (in the case of the last mentioned) a mixture of phosphate of lime and soda or potassa. As neither of these agents causes fermentation, none of the elements of the flour are lost, and a greater yield of bread is claimed. This saving is, however, very trifling, as the loss in fermentation is small. The use of the acid phosphate of lime, suggested by Prof. Horsford, is claimed to restore to the flour the phosphates of the wheat which were removed in the bran. The process has been commended by Liebig. One strong recommendation for these "baking-powders" is the fact that bread may be mixed and baked at once, without the delay of several hours which is necessary where fermentation is resorted to. As cream of tartar and acid phosphate of lime do not act on bicarbonate of soda in the absence of water, either of these acid salts may be mixed with the flour, together with the bicarbonate, thus producing what is now extensively sold in the U. S. under the name of "self-raising flour," which is already salted, and merely requires to be mixed with water and baked to produce a palatable loaf. Carbonate of ammonia (sal volatile) is sometimes used alone to raise bread; being very volatile, it is converted into vapor during the baking and raises the loaf to a light sponge. Mr. Danglish introduced *aërated bread,* which is prepared by kneading flour in a closed vessel with water supersaturated under pressure with carbonic acid gas. On bringing the dough into the air, the carbonic acid gas set free by the removal of the pressure expands it into a sponge. "Sponge cake" is raised by means of air which is incorporated with the flour by first beating eggs to a froth, stirring in the flour, and quickly baking. "Pastry" is made flaky, but not really spongy like bread, by mixing flour and water to a dough, rolling it out into sheets, applying butter liber-

* A litre of water weighs 1000 grammes = 1 kilogramme = 2.2 pounds avoirdupois.

ally, doubling over the sheet, rolling it out again, and again applying butter. These operations are repeated till the dough becomes a sheet of innumerable layers of dough alternating with a thin coating of butter. On exposing this to the heat of the oven, the different layers of dough separate, either from the expansion of the imprisoned air or from steam, and the mass becomes light and flaky.

C. F. CHANDLER.

Breadal'bane, EARLS OF, earls of Holland, viscounts of Tay and Paintland, Lords Glenorchy, Benederaloch, Ormelie, and Wreik (1677, in Scotland), and baronets (1625, in Scotland), a prominent family of Scotland.—GAVIN CAMPBELL, the seventh earl, was born in 1851, and succeeded his father in 1871.

Bread-fruit Tree (*Artocarpus incisa*), an important tree of the order Artocarpaceæ, a native of Southern Asia,

Bread Fruit.

of the islands of the South Pacific and of the Indian Archipelago, now naturalized in some of the West Indies. This tree grows to the height of forty or fifty feet, and has large, glossy, dark-green leaves, which are pinnatifid or deeply divided into pointed lobes. The leaves are sometimes eighteen inches long. The fruit, which is a *sorosis*, is nearly spherical, and is covered with a rough rind, which is marked with small irregularly hexagonal divisions, having each a small prominence in the middle. The fruit sometimes weighs four pounds or more, contains a large portion of starch or fecula, and is a principal part of the food of the natives of the South Sea Islands. The pulp is juicy and yellow when it is fully ripe, but it is in a better condition for eating before it arrives at that stage of maturity. When it is gathered before ripeness and baked, the pulp is white and mealy, very nutritious, and resembles wheat bread. The usual practice is to cut the fruit into three or four slices, and bake them in an oven. Sometimes the people of a village join to make a huge oven—a pit twenty or thirty feet in circumference—in which several hundred bread-fruits are baked at once on heated stones. Baked in this mode, the bread will keep good for several weeks. The tree produces two or three crops in a year. It has been introduced into the West Indies with some success. The timber, which is light and of a rich yellow color, is used in building houses and for other purposes, but if exposed to the weather is not very durable. A sort of cloth is made of the fibrous inner bark. The tree abounds in a glutinous milky juice, which, when boiled with cocoanut oil, is used as a cement and as bird-lime.

Bread-Nut, the fruit of the *Brosimum Alicastrum*, a tree of the order Artocarpaceæ, is a native of Jamaica. It is allied to the bread-fruit. The genus *Brosimum* has male and female flowers on separate trees in globose catkins. Its fruit is a 1-seeded drupe, which is edible, and is used instead of bread after it has been boiled or roasted. The tree has ovate, lanceolate, evergreen leaves, and abounds in a gummy milk.

Break'water. An artificial barrier designed to *break* the force of waves in sea-ports and harbors and thus to protect shipping from damage; but more commonly to *create* a harbor or a secure anchorage where none existed before. Among ancient works the piers of the ancient Piræus and of Rhodes may be denominated Breakwaters, as also similar modern structures projected from the shore and called *piers* or *moles;* but the term *Breakwater* has of late years been considered as more peculiarly appropriate to large insulated aggregations of stone, whether of regular masonry or sunk promiscuously in rough masses, so placed as to form an artificial island across the mouth of an open roadstead, and thereby, in obstructing and breaking the waves of the sea, to convert a dangerous anchorage into a safe and commodious harbor for the reception of ships of war or merchantmen. In this sense of the term the Breakwater of Cherbourg (Fr. "Digue de Cherbourg") was the first work entitled to the name,* and it remains still the *greatest.* It had long formed a favorite project of the French government to establish a great maritime port in this quarter of the kingdom, in order to counterbalance in some measure the great naval station of Portsmouth, situated on the opposite side of the Channel, and the whole coast had been frequently surveyed and examined by the most celebrated engineers for that purpose, but nothing definite was done until the year 1712, when a plan was proposed to the Minister of Marine to construct a detached mole or breakwater, in order to protect the roadstead of Cherbourg. The subject was dropped till 1777 when M. de la Bretonniere, a distinguished naval officer, proposed a plan to construct a detached breakwater, 2000 toises or 12,792 English feet long, having three openings, viz. one in the centre and one at each end: these breakwaters or moles he proposed to make by sinking the hulls of vessels filled with stone, in order to form a nucleus or base for the work in the first instance (similar to the plan which had been adopted at Rochelle by Cardinal Richelieu in the year 1629), and then to cover the hulls of the vessels with loose angular blocks of rubble stone or *pierre perdue,* so as to form one continued breakwater. He proposed this plan of commencing the work because he was fearful that the undercurrents and waves during storms were so strong that it would be impossible for the rubble to lie without some nucleus of the kind to bind it together in the first instance. The objections made to the plan of M. de Bretonniere were, First, that it would require a number of vessels which France could not furnish in ten years. Secondly, that there would be great difficulty in getting a sufficient number of workmen. Thirdly, that although the plan had succeeded very well at Rochelle, yet there was no similarity between the two cases; for whilst at Rochelle there were only from 5 to 6 feet at low water, at Cherbourg there were generally 40 feet, and in some places more, and as the moles at Rochelle were attached to the shore, the difficulties were comparatively trifling to what they would be at Cherbourg, where they would be isolated. Fourthly, that the upper part of the breakwater would be so much exposed that it would not withstand the shock of the waves. Fifthly, that it was not high enough to give sufficient protection to the shipping within.

In 1781 the matter was referred by the Minister of Marine to M. de Cessart, an engineer of reputation for hydraulic constructions of this character. M. de Cessart entertained great doubts of the probability of making a continuous mole of such gigantic dimensions, composed only of loose rubble stone, sufficiently strong to be able to withstand the effects of the waves and currents, the more so as the only similar work at Rochelle had failed just after its completion in 1628; he therefore conceived the idea of breaking and destroying the effects of the waves in the first instance by a series of 90 detached cones, made of wood and filled with stone, sunk in the line of the proposed breakwater, touching each other, or at such distance only from each other as would be sufficient to break and disperse the waves without allowing them to pass bodily through between the cones, by which he considered that sufficient tranquillity would be produced within, so as to form a safe and secure roadstead. The plan of M. de Cessart was approved and adopted and himself appointed the Chief Engineer of the work. The cones were proposed to be 142 feet diameter at the base 113 feet diameter at the top, the sides inclining at an angle of 60°, and 65 feet high: the total weight of each was 2,000,885 lbs., and would displace 27,418 cubic feet of water; and in order to give as little resistance as possible, and to render it more buoyant, he proposed to attach to it 68 great casks, 12 feet long and 7 feet diameter: it was calculated that in calm weather it would require 250 men in boats to tow out one of the cones;

*Mr. George Rennie in his letter of Dec. 31, 1835, concerning the proposed Madras Breakwater (Engineering Oct. 18, 1872) enumerates many other ancient and modern works as "breakwaters." It is evident enough, from the tentative process by which the Cherbourg advanced, that no previous work furnished adequate information as to the principles of such constructions and hence that none was entitled to be named with these hereafter described. The numerous "moles" he mentions differ from such breakwaters in many respects besides their connection with the land.

this operation would occupy five or six hours, and the sinking 36 minutes; the depth of water where they were to be sunk was from 6 to 7 fathoms, and the rise of tide at ordinary springs 18 feet, so that the upper part of the cone would be from 8 to 10 feet above high water. Immediately after the caisson was sunk, it was to be filled with stone, viz. rubble to the level of low water and masonry above. Eighteen of these 90 cones were put in place at an expense of about £14,000 each. Their expense and the repeated damage occasioned to them by storms induced the Committee of Direction to abandon the plan of M. de Cessart, notwithstanding his dissent and strong remonstrances against it. No more than eighteen cones were deposited, the last being placed on the 19th of June, 1788, and they subsequently adopted the plan of throwing down nothing but rubble, wholly against the advice of M. de Cessart, who said that the rubble alone would never be able to resist the force of the sea, and that it would be utterly impossible to construct the mole or digue in that manner. Fortunately, however, the advice of M. de Cessart was not taken, and the contrary opinion prevailed.

The foregoing is interesting as showing that the fundamental knowledge of the force and action of waves upon such structures being unknown at that day, how feeble and groping were the efforts to design an efficient breakwater. Says Sir John Rennie,—("Theory and Construction of British and Foreign Harbours") "The well-known principle, that all materials take their angle of repose more or less according to the density, tenacity, and gravity of their component parts, combined with the external forces acting upon them, does not appear to have inspired M. de Cessart with sufficient confidence to trust to the rubble alone; and the moles at Rochelle, which he seems to have studied with great care, did not inspire him with greater confidence, although the small rubble of which they were composed, the steep slope at which the rubble was laid, and the heavy sea to which they were exposed might readily have suggested to him the cause of their failure. It is still more extraordinary (if he doubted the efficiency of the small stones which he employed, weighing only from 30 to 100 lbs. each), that he did not employ blocks of much larger size, as he was doubtless aware that they would be moved with much greater difficulty by the sea; in fact, by the mere inspection of the sea-shore he would have found that within the range of the waves it invariably takes the angle or inclination according to the materials composing its surface; for example, sand lies at an angle of 1° 30′, or 40 to 1; beach, or loose pebbles, at angles of 11° or 8°, or 5 and 7 to 1; and heavier materials at a steeper angle, or almost perpendicular; but, abandoning the simple laws of nature, he went out of his way to invent the expensive unwieldy cones, which were no sooner fixed in their places, than nature, as it were, deriding his feeble efforts, at once destroyed and overturned them."

The cones having been abandoned small rubble continued to be thrown in until 1790 with an inside slope of forty-five degrees, and, outside, one upon three. In 1792 a commission of the French government reported that the digue had hitherto been constructed with small stones only one-fifth of a foot cube each, and that these had undergone considerable alteration as to the form of the mass, to the depth of 16 feet (English) below low water of the lowest tides, so that it was impossible to construct a permanent mole with such small materials; but they found in a small portion, 50 toises long, where blocks of 20 cubic feet had been employed, that they maintained their position tolerably well, and preserved the small blocks within them, although where there were only smaller blocks, they were sensibly damaged and removed, and displaced, *particularly near the cones*, which, although cut down to low water, materially increased the shock or recoil of the waves, while they acted with greater force upon the small loose rubble near them. They therefore came to the unanimous conclusion, that as blocks of from 15 to 20 cubic feet would withstand the effects of the waves, still greater durability would be obtained by employing larger blocks. The question as to the height to which the mole should be carried, in order to ensure the necessary tranquillity within the roadstead, was much more difficult to determine: it was found that the action of the waves was most severe two hours before and two hours after high water, or when the tide had risen about 16 feet; and at such times, during gales of wind, vessels riding within the breakwater suffered great inconvenience, so that it was necessary to raise the breakwater or digue at least to that height; but even this would not ensure sufficient tranquillity to enable boats to communicate from the shore with vessels in the roadstead at all times; and considering that this great advantage would only be obtained by raising it to the height of 9 feet above the level of the highest tides, so as to place it beyond the general reach of the waves, they finally resolved to recommend that it should be carried to that height.

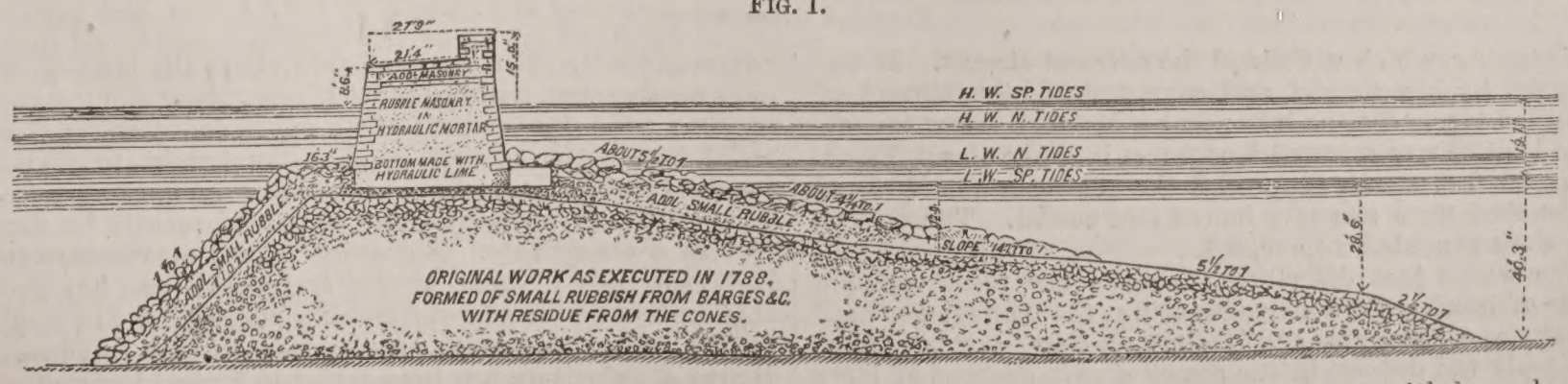
In the year 1802 the work which had at different times been raised nearly its whole length to the level of low water of spring tides, had been lowered by the violence of storms to a depth of from 12 to 15 feet below low water: the inner slope was 1 to 1, or 45°; the exterior 1½ to 1, or 33°, from the bottom to 18 feet above it; and from thence to within 6 feet of low water of spring-tides it had assumed the slope of nearly 8 or 10 to 1, or an angle of 7° and 5°, at which it seemed to be permanent. Such being the state of the work, notwithstanding the employment of larger blocks of stone, great difficulties were anticipated in constructing a battery upon it, which the Government nevertheless determined to do.

For the next six years operations appear to have been confined to the enlargement and raising of the central part of the dike and construction of the battery. Several severe storms occurred in this period doing great damage. The most severe was Feb. 12, 1802, when the sea covered the whole platform of the battery, and the barracks with 60 men were swept away. The mass, properly speaking, of the battery suffered but little, although the pavement was torn up and the blocks were wedged into fresh slopes with great regularity, as if they had been cemented together by the hand of man. The real effect of the storm was generally to consolidate the mass of the work more firmly together. New wooden barracks were erected, and after this repair the battery remained in a good condition throughout the war.

Thereafter until 1830 little was done except to preserve the central battery and to raise the remainder by means of rubble to low water level; but finding it extremely difficult to maintain it in that position, and feeling that, in order to secure the desired tranquillity within the roadstead, it was necessary to raise the superstructure at least from 9 to 10 feet above high water of spring-tides, it was finally resolved, at the recommendation of several engineers, to construct a wall of solid masonry, with almost vertical sides, from low water upwards, upon the top of the rubble base: this upright wall extends from thence up to the full height of 6 feet above the level of high water of spring tides; it is composed of rubble masonry faced with granite ashlar or dressed stone, in horizontal courses from 18 inches to 2 ft. thick, and 3 to 4 ft. wide, set in mortar. This part of the work is 36 feet 3 inches wide at the base, and 29 feet 3 inches wide at the top, the outer slope being $\frac{1}{6}$ to 1, and the inner slope nearly the same: on the outside of this superstructure there is a solid parapet 8 feet 3 inches thick, 6 feet high, and eight feet six inches wide at the top. The exterior base of this wall is founded on a bed of beton or concrete, set in wooden boxes or cases 10 feet long, 6 feet 6 inches wide, and 3 feet 3 inches deep dove-tailed together, and well bedded in and covered with large blocks of rubble stone.

No sooner was this vertical wall raised above the level of high water than it presented such a sudden resistance to the waves, rolling upwards along the rubble slope, that they broke against the face of the vertical wall with the greatest violence, and rising perpendicularly against it,

FIG. 1.



fell down upon the rubble, undermining the base of the vertical wall and threatening to overwhelm it entirely. To obviate this, it became necessary to raise the rubble slope still higher, and to case the surface with large heavy blocks, well wedged together: still this only partially remedied the evil, for, notwithstanding this casing, during

heavy N. W. and N. E. gales at high water the waves beat with such violence against it, that heavy masses of water wash over the top, so as to render it both difficult and dangerous to walk along it, although nearly 10 feet above high water of the highest tides; and it has been proposed (1850) to carry the rubble slope still higher in front of it, also to raise the wall 8 feet higher.

Sir John Rennie from whose great work on Harbours the foregoing is taken draws the following "conclusions":

First. The plan of making the digue or breakwater isolated or detached from the shore is the best, and, if carried into effect with greater judgment, would have been more advantageous to the harbor.

Secondly. The cone system, although ingenious, was inapplicable and failed.

Thirdly. The rubble system for the mass of the work is correct, and if blocks of greater size had been employed, the result would have been more advantageous in economy of time, labor, and materials.

Fourthly. The vertical wall system is inferior to the flat slope.

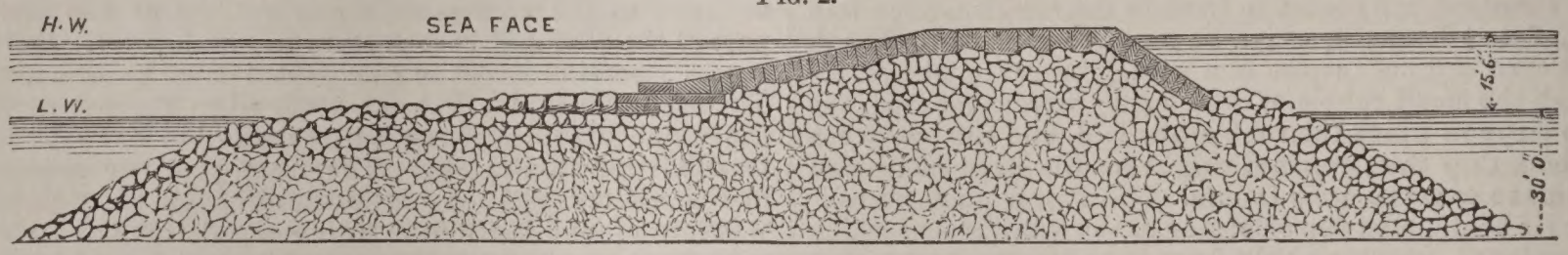
The history of the Cherbourg Breakwater has been thus given in some detail, since, being the first work of the kind, the experience derived has furnished *data* for subsequent works.

The next great breakwater in order of time and importance is the "Plymouth," intended to render Plymouth Sound a safe roadstead for ships of war. It was recommended by Messrs. Rennie and Whidby as the most practicable and best mode of constructing this great work, to heap together promiscuously large blocks of stone, which were to be sunk in the line of the intended breakwater, leaving them to find their own base,* and take their own position; and it was conceived that stones of the weight of from one and a half to two tons each would be sufficiently large to keep their places, without being rolled about by the tremendous swell which, in stormy weather, is thrown into Plymouth Sound; and thus avoid the inconvenience as well as loss of time and labour which the French had experienced at Cherbourg by throwing down small rubble stones. It was thought, that, in those places where the water was five fathoms or thirty feet deep, the base of the breakwater should not be less than seventy yards broad, and the summit ten yards, at the height of ten feet above the low water of an ordinary spring-tide; in other words, that the dimensions of the breakwater in these places should be forty feet high, thirty feet across the top, and 210 feet wide at the foundation. There are in this work about 900,000 tons of stone of which in blocks

	Tons.
Of one ton each stone, and under	423,904
Of one to three tons each	309,706
Of three to five tons each	150,593
Of five tons and upwards	12,760

The cost of the work was £364,000; a little over eight shillings per ton of stone. More recently the surface above low water has been covered (or "paved") with blocks of stone of great size, of regular dimensions, and closely and smoothly laid. The work has completely answered the expectations of its advocates.

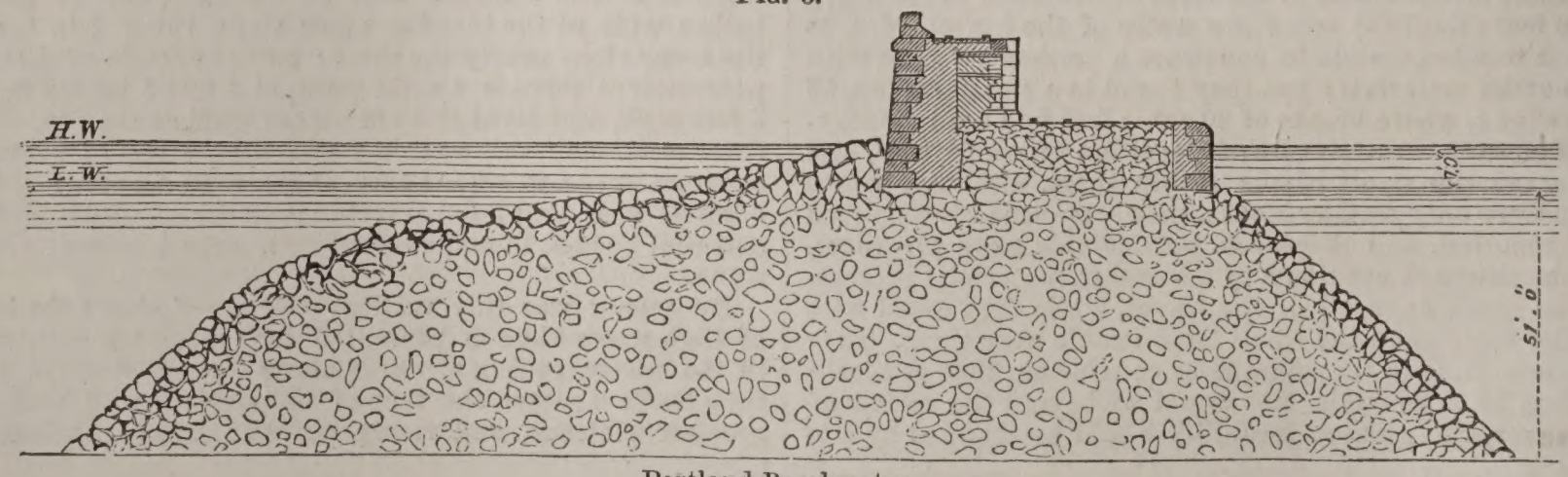
FIG. 2.



The PORTLAND Breakwater, designed to create a harbor of refuge, commenced in 1849, has recently been finished. It commences with a pier projecting from the shore, of 1900 feet in length. Then follows a gap or opening of 400 feet to admit vessels of the largest class, coming from the Southward. Beyond this gap the breakwater proper commences, and extends seaward 6000 feet. The pier is formed by a rubble mound, composed of stone of all sizes, from 6 and 8 tons down to small chippings; and this mound is carried up to a few feet above the level of high water of spring tides. When it has been washed by heavy seas, a trench is excavated within the body of the mound to the level of low water of spring tides, and a wall of masonry erected. The face course is formed by large ashlar blocks, the body of the wall being of heavy rubble work set in mortar made of blue lias lime and pozzuolana. The ashlar face courses up to about 6 feet above high water are of granite, all the remainder of the stone employed being from the quarries in Portland. The sea wall is strengthened by counterforts placed 20 feet apart, and an arch being turned between each, a platform is obtained 15 feet wide, exclusive of footway and parapet. Instead of throwing overboard from vessels, the deposit of stone and other operations were carried on from a timber staging, the rubble stone being conveyed in waggons drawn by locomotive engines, a mode introduced by the late Mr. Rendel, C. E., which proved entirely successful. Guided by results obtained elsewhere, it was decided when the work was commenced to keep all the horizontal timbers of the staging at least 12 feet above high water of the highest tides; and experience proved that this was necessary to ensure safety. The breakwater proper is simply a rubble bank, the material of which it is formed being for the most part the "cap-stone" which covers the valuable Portland stone, but which of itself is valueless, except for this purpose. The rubble, as in the pier, includes stones of all sizes, from large masses down to chips, which latter the action of the water has driven in between the larger blocks until (as is said) they have become united into a compact and almost solid mass.

During the construction the 400 feet opening was bridged

FIG. 3.



Portland Breakwater.

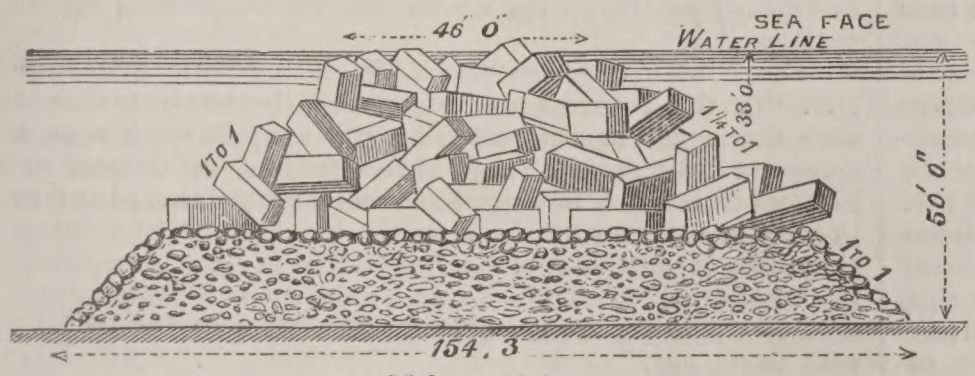
by a staging, which withstood the severest storms. It was designed by Mr. Rendel and consisted of piles formed of creosoted logs. To the lower end a Mitchell screw was attached which was screwed 6 or 8 feet into the clay. These, about 80 feet apart, supported the platform to which of course they were strongly bolted and bound. The cost of this work exceeded £1,000,000.

The works just described illustrate the most common mode of breakwater construction, *i. e.* the "*pierre perdue*," "long slope," or (as we call it) the "rip-rap" system. This is simply the deposit in the sea of a vast amount of loose rubble stone, rising to about the level of high water, allowing it to take its own level and to be acted upon by the sea, until its section assumes the permanent form which this action gives it. The seaward side obeys the laws of ordinary sea-beaches, and forms itself into a long sloping shore, involving the employment of an enormous amount of material before the mound reaches the height to give the required protection. Such a system is only applicable where stone is abundant, and can consequently be deposited at a cheap rate. But stone is not everywhere to be had, especially in large blocks, and experience has shown that unless blocks of considerable magnitude are applied to the upper portions, permanence cannot be ensured. Hence a substitute has been found in large blocks of con-

* It is stated by Mr. Rennie (see latter hereafter) that the original section was triangular with outer slope of 18°.

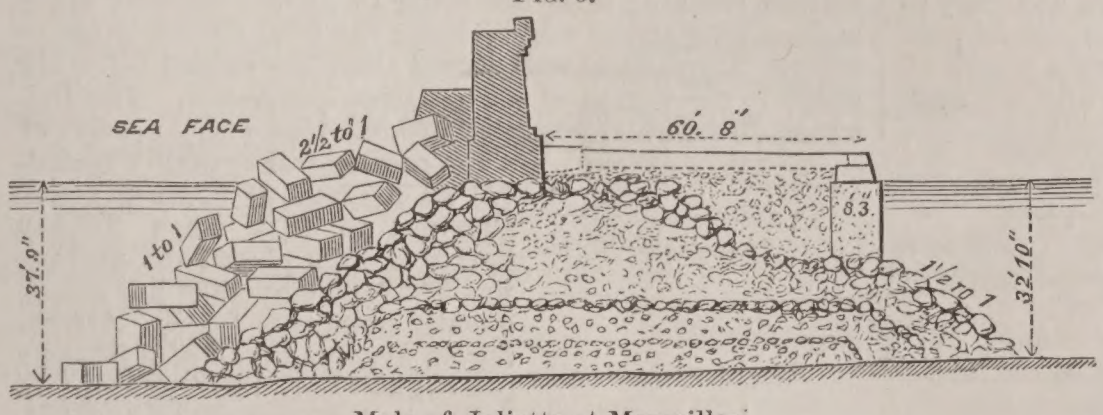
crete (Fr. *béton*). M. Poirel (see his "*Mémoire sur les Travaux à la Mèr*") was the first to introduce this system in the construction of a mole at Algiers, which he constructed at first wholly of blocks of béton of 10 cubic metres, or about 22 tons each, launched into the sea as *pierre perdue*. M. Poirel states that although the profiles "differed somewhat from each other, yet they gave generally for the slopes at which the artificial blocks arranged themselves, a rate of 1 base to 1 perpendicular (45°) for the exterior, and of ½ base to 1 perpendicular (57°) for the interior side." He adds "that it appears, on a comparison of the cubic contents of the mole as given by these profiles, with the account kept of the quantities contained in the blocks immersed, that the interstices are very nearly one-third of the solids; or, which is the same thing, that the voids are equal to one-fourth of the whole mass." In prolonging the mole, since 1847, the French had adopted a cheaper system, by forming the mass from the bottom with blocks of natural stone, which were brought up till the uniform depth of 33 feet under water was attained at slopes of 1 to 1. This method was subsequently employed in forming the new port of La Joliette, at Marseilles; and, more recently, for the jetees forming the artificial harbor of Port Saïd at the entrance to the Suez Canal.

FIG. 4.



Mole at Algiers.

FIG. 5.

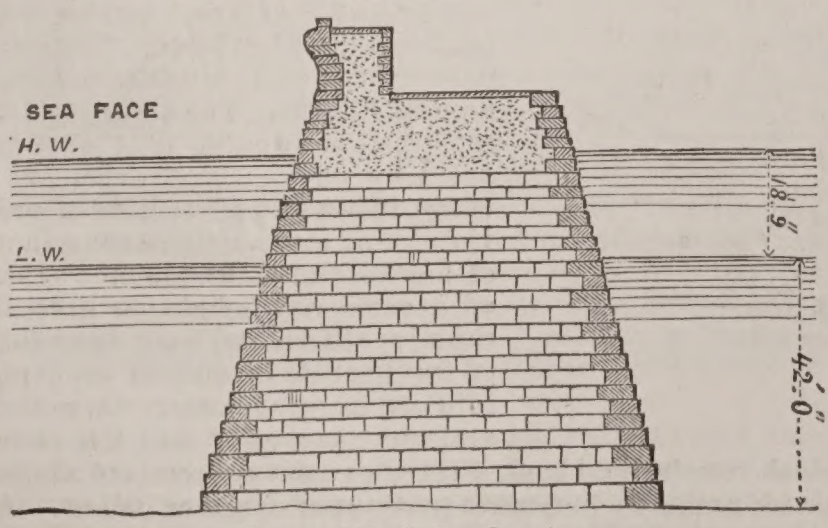


Mole of Joliette at Marseilles.

In other situations destitute of suitable stone, another form, the vertical-wall system, is adopted. In this mode the walls are built upright from the bottom, and as all the material below low-water is put in place by diving apparatus, and is of an expensive nature, the cost of a work executed in this way is very great. The Dover breakwater is the most prominent example. It is built up solid from the bottom of the sea, the exterior facing being of ashlar granite blocks, and the hearting of rectangular blocks of concrete, built in the same way as ashlar masonry up to the level of high-water, above which it is filled in with concrete.

Concrete blocks are a costly substitute at best for rough quarry stone (when that is at hand), and with a system of construction which requires each block to be "laid" (under water), the expense must be very great. The Dover Breakwater has cost over £400 per lineal foot.

FIG. 6.



Dover (West) Breakwater.

It has been a subject of discussion whether the "long slope" or the "vertical wall" system were preferable: waves in deep water are chiefly oscillatory in their character, the fluid having little progressive motion in itself, and consequently exerting but little force on objects opposed to it; but when deep sea waves approaching the shore, feel the influence of gradually shoaling depth, they assume an entirely different character, acquire progressive motion, and become waves of *translation*, in which the fluid is carried bodily forward in a horizontal direction, and in consequence it strikes any body opposed to it with great percussive force. Vertical walls, therefore, which rise from the deep water, being only subject to the oscillatory movement of the waves, are least exposed to the destructive effect of storms. The evidence taken before the Royal Commission in 1859 seemed to be conclusive on this point, and the opinions of the Commissioners, as developed in their report, may be considered to have set this subject at rest. But whatever difference of opinion there may still be upon this matter, there can be no question as to the vast saving of material by vertical walls, and of the great economy which would result, provided a simple and easy mode of construction could be adopted. The vertical system has, besides, the great advantage of being applicable in many cases as quays for vessels lying alongside to load and discharge, which may be turned to valuable account both for commercial purposes, and in times of war, for the rapid shipment or debarkation of troops, stores, and other materials. (See Paper by D. Miller, "C. E. and Arch. Journal," 1865.) But it is implied that the wall *springs from deep water; i. e.* fifteen feet at least, the experience at Cherbourg, Alderney, Portland, and Holyhead having shown that the sea did not disturb rubble at a depth of 15 feet below low water; and, hence, there may be a combination of the vertical wall and slope, which is nearly equal to a vertical wall;—as when a nearly perpendicular wall is built upon a rubble mound, as near to the edge of the slope as was consistent with the safety of the foundation; the surface of the mound being 15 feet below low water, and the slope being the natural one of about 1 to 1.

It is to be observed that the vertical construction on the Cherbourg breakwater, instead of springing from great depth, commences at *low-water* mark—an arrangement which we believe is now generally condemned. (The Civil Engineer and Architects' Journal of 1865 furnishes graphic sections of the different works alluded to and of others, as of Cette, La Ciotat, Cassis, Vendres, with interesting discussions as to the form and cost of breakwaters.)

In the construction of a sub-aqueous mass on the "riprap" system, whether for a breakwater or a foundation, a question arises as to the size of the material to be used. The Cherbourg work was first constructed wholly of very small stones; it was subsequently found necessary to cover its more exposed surfaces with large blocks. In the Plymouth, the system at first was to use the largest stones obtainable from the quarries. At Portland and at Holyhead the large and small stones were used promiscuously, even the quarry rubbish being deposited for the purpose of filling up the interstices. The French engineers, on the contrary, considered the best system of employing rubble was not to mix the small with the large blocks. In one of their best constructed moles, that of La Joliette, at Marseilles, this method has been strictly adhered to. The large blocks being only used where required, were not unnecessarily wasted in the heart of the work. Small pieces of stone mixed with large rubble, far from consolidating the work, very often had the effect of allowing the larger masses to be more readily displaced. Stones weighing 5 tons and even 7 tons are thrown out of place by the waves, in consequence of the small stones getting in between them, and keeping them in motion during every storm. If, however, heavy blocks only are employed, so as to remain stationary under the greatest action of the waves, nothing would be gained by the interstices being filled up.

M. Cachin deduces from the experience of Cherbourg, as developed by observations after exposure to the severest tempests, the following facts concerning the natural slopes assumed by the exposed face of the breakwater. Above the highest storm tides the talus assumes a slope of 1 upon 1.8; between extreme high and low water 1 upon 5½; between the level of lowest storm-tides and a plane 5 metres (16½ feet) below this level, 1 upon 3; thence to the bottom 1 upon 1¼. Hence it is generally assumed that at three fathoms below low water the force of the waves is insignificant. Hence the nucleus of a breakwater may be constructed to that height of small stones, say of blocks of ½ ton down to quarry rubbish. Larger stone is required

above this, say from 2 to 5 tons; but if the surface is to be finished with loose blocks, alone, those of the outer coating must be of large dimensions. The French engineers, in the construction of the new mole at Algiers found by experience that blocks of 10 metres cube, or about 22 tons, were requisite to withstand the shock of the waves. At Marseilles and at Cette the beton blocks weighed 25½ tons; but at Cassis, in a more exposed situation, with very deep water outside, and a long stretch of sea, the outer face of the mole required blocks of 20 metres cube; for on trial, blocks of 10 and even of 15 metres cube were found insufficient.

The experience at Cherbourg gives about the same results; a block of beton of 4 metres × 2.25 × 1.40, or 12.60 cubic metres volume and 28,980 kilogrammes weight, lying loosely and exposed, resisted the most violent tempests. M. Cachin estimates the force required to move this stone at 3900 kil. per sq. metre (or 800 lbs. per square foot) of *exposed surface.* At Skerryvore stones of 5 tons were swept over the top of the rock and Mr. Stevenson's Dynamometer measured pressures of 6000 *lbs. per sq. foot;* and this extreme pressure has been confirmed in a few instances elsewhere (see a remarkable instance in the Journal Des Ponts et Chausées April, 1859).

It remains to allude to our own great work, the Delaware Breakwater. This, unlike those of Plymouth and Cherbourg, mainly undertaken in reference to naval aggrandizement of the respective nations, was designed solely for the benefit of trade and commerce and the preservation of life. The need of a *harbor of refuge* near the mouth of the Delaware Bay was early recognized. Commissioners appointed by Congress in 1828 selected Cape Henlopen as the site. They said "the objects to be gained by an artificial harbor in this roadstead are to shelter vessels from the action of the waves caused by the winds blowing from east to northwest round by the north, and also to protect them against injuries arising from floating ice descending from the north-west." Having these objects in view, the commissioners proposed two works—the breakwater proper, to secure the first object; and the ice-breaker, an auxiliary to the breakwater but chiefly to accomplish the second purpose. The first mentioned was designed with a length of 1200 yards. The ice-breaker was designed with a length of 500 yards.

FIG. 7.

As now constructed the length of the breakwater proper is 2589 feet and the ice-breaker nearly 1500 feet long. In designing the work the Commissioners had the two great examples which we have described before them,—Cherbourg and Plymouth—both, originally, on the "rip-rap" system. Adopting that system they copied the slopes from the first but fixed a width on top 8 feet less than that of Plymouth. The great mass of the breakwater consists of blocks ranging from ¼ ton to 3 tons; the seaward slopes being coated with stones of from 1½ to 7½ tons. The *exposure* is by no means so severe, owing to the shoals off the mouth of the bay, as at others we have noticed. Blocks of 6000 lbs. weight have been moved several feet, as in the gale of March, 1843; but the injuries inflicted by the waves have been but slight.

In an official report of the writer when (1853) in charge of this work, occurs the following passage: "I consider the profile and the principles upon which it is based radically vicious. They are to trust to the isolated mass of each block of stone, exposed on the surface, to retain its position, while at the same time an accumulated mass is heaped up twice as great as necessary to resist the total effort of the waves. Though little attention has been paid to the recommendation of the Commissioners as to the arrangement and mass of stone above low water, the breakwater has resisted every storm which has yet spent itself upon it; and if occasionally a block of considerable dimensions has been moved from its place, it has been utterly disconnected from the mass of the work, and generally on unfinished portions over which the sea swept with all its violence."

* * * * * * * *

. . . "in the future arrangement of the work I should urge that, from the extreme low water line, the work should consist of dimension stone carefully laid in courses of headers to the sea, having dimensions of at least nine feet in length, and two by three on the head, and that the top should be capped with stone twelve feet in length, covering the whole with such blocks as would, even if isolated, be able to maintain their stability when thus placed lengthwise to the sea."

The method of construction above recommended in 1853 has been sanctioned by the practice at all the more recent works at Holyhead, Portland, Alderney, etc., which have vertical walls starting *from low water.* But not only is wave action developed with all its violence by a sloping surface reaching from low water to 2½ or 3 fathoms but it is these long slopes which render the total rip-rap mass so great. The vertical wall should therefore extend *below* low water to the region of comparative quiescence. The Delaware Breakwater contains 900,000 tons (very nearly) of stone costing (all expenses included) an average of $2.35 per ton. Previous to 1839 when 835,000 tons had been placed the average was $2.27—the average has subsequently been over $4.00. Assuming an average depth of 5 fathoms (30 ft.) and that the "rip-rap" is only raised 15 feet above the bottom, with 30 feet width at top, an inner slope of 1 upon 1 and an outer as gentle as experience might prove to be necessary, the total length, 4000 feet (about), of breakwater and ice-breaker would not, with large allowance for sinking into the sand, consume more than 300,000 tons which, at the earlier rates, would have cost $675,000. A wall with 20 feet base and rising 25 feet with 15 feet width at top built of quarried dimension stone in large blocks may be laid (without mortar), even at present more than doubled prices, at $10 per ton. For a length of 4000 feet there would be needed say 120,000 tons costing $1,200,000, and making the total cost say $1,875,000. The actual cost is officially reported to have been $2,123,505. The vertical-wall construction would, of the two, probably be the least expensive, while, instead of presenting to the violence of wave-action a collection of loose isolated blocks it would, with regularity of shape, possess the strength derived from the union of its elements in mutual support, into an integral mass. It would also serve as a quay wall alongside which vessels could haul, if through damages received at sea, it were necessary to remove portions of cargo or ballast. A recent work, the MANORA BREAKWATER (Scinde, see "Engineering" May 3, 1872), more properly speaking, a "Jetee," is referred to in illustration of the *principle* of construction just sketched and which was contemplated in the report of 1853.

The general principle of that breakwater is that of a bank of rubble stone laid upon the natural bottom and brought up to a level of 15 ft. below low water, but near the shore, where the original depth is less than this, to 10 ft. below low water. Upon this bank of rubble stone a superstructure is raised, consisting of blocks of concrete each 12 ft. × 8 ft. × 4½ ft., and weighing 27 tons, set upon the narrowest side, so that the whole superstructure consists of two blocks in width and three in height, forming a solid wall, with vertical sides 24 ft. wide and 24 ft. high. The blocks are set in place by means of an overhanging crane. (See Fig. 9.)

The peculiar form of structure adopted for the Manora Breakwater has the advantage, under these circumstances, that it does not depend for its strength on bonding or lateral connection of the several blocks as in ordinary masonry. Any security that this bonding may afford while the foundation holds good is at once lost when the foundation yields and the superstructure sinks unequally. In the present case, if the foundation under one block fails, that block and those immediately over it must drop, but those on either side are in no way affected.

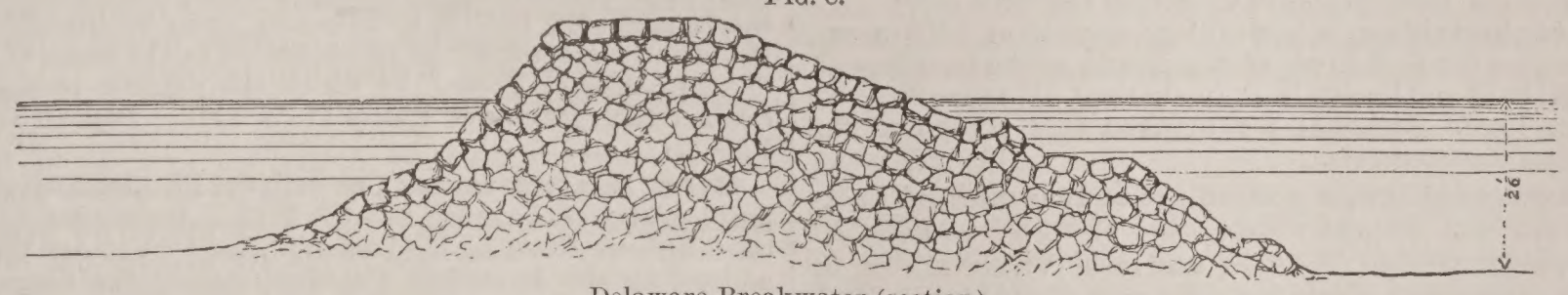
"It has been determined, on data based on experience, that the most favorable depth for the foundations of the superstructure is 15 ft. below low water, and for the future the rubble base will be in the first instance kept down to that level so that little or no dredging or excavation by the divers will be required; and if, under these more favorable circumstances, the foundations can be prepared—as it is expected they may be—there is no reason why 300 ft. of breakwater should not be built in each month of the working season."

The "Monsoons" blow with great violence at Manora, and the wave action is described as only somewhat less than at Alderney, but none of the blocks on the sea-side have ever been forced out.

Mr. Rennie in the letter already referred to, after stating that the Plymouth work was "originally designed to be on the triangular system with interior slope of 45° and exterior of 18° or 1 upon 3½ (by which in 20 ft. depth the base would be 250 ft.) was changed (see section) in consequence of the top having been swept away by the storm of 1829, "thus pointing out the necessity of a further augmentation of the base and a change in the slopes;" so that the base became (in that depth) 350 ft. "The above form has been found to answer most effectually, and to remain undisturbed during the greatest storms. A casing of cut granite has been put over a considerable part of the surface, and the previous filling the interstices between the large stones with quarry rubbish has tended to consolidate the whole into one great mass." Doubtless with "a casing of granite" the "long slope" system may be made stable; but *that* casing, in the case before us, consumes more large dimension stones than the hypothetical wall I have mentioned in connection with the Delaware Breakwater.

A *mean* section (for it is very irregular) of the Delaware Breakwater is given below. In the language of an official report already referred to the "harbor of refuge" which it creates, is in no sense a work "of mere local interest. It was constructed for, and is resorted to by, the floating commerce of the *nation*, and in this light only should it be regarded. It has been the means of saving millions of property and countless lives from destruction; property whose owners or underwriters are as widely distributed as are the merchants and ship-owners of the nation, and lives whose preservation is a duty which a nation owes to humanity." Its utility is best exhibited by the statement that since 1833, 246,011 vessels have taken refuge from storm under its protection, of which 17,307 in the year 1871 alone. "Let a threatening sky foretell the approaching storm, and a few hours will suffice to fill a previously vacant harbor. Let a north-easterly storm continue a day or two, with severity, and the harbor becomes crowded entirely beyond its capacity. The fleet of vessels which now fill it, are seen to come in, in rapid succession, from the seaward; and there is no single fact more capable of impressing on the mind the magnitude of our coasting trade than the great number of vessels which a few hours' time will, under the

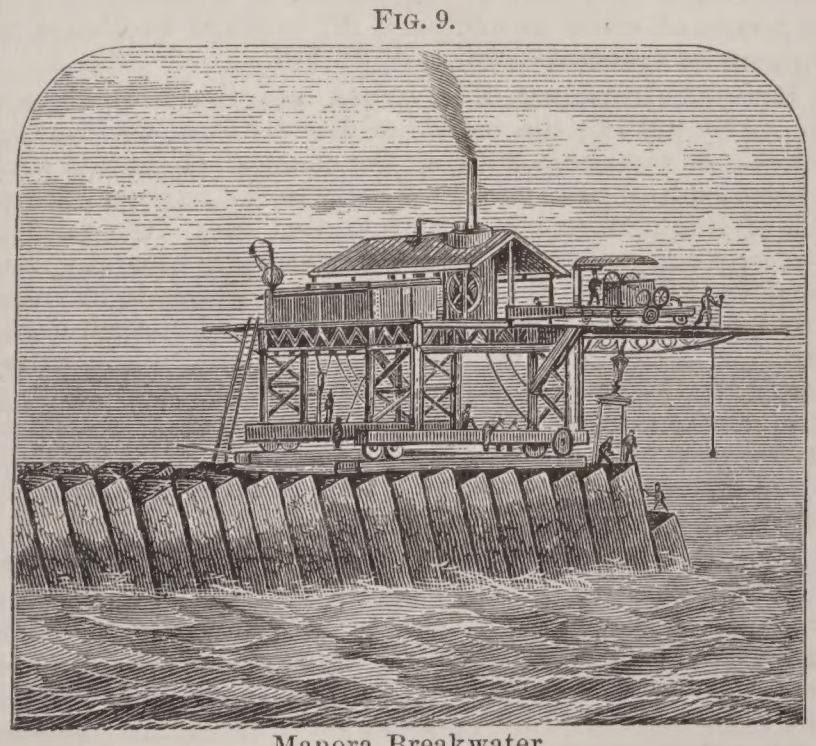
FIG. 8.



Delaware Breakwater (section).

above circumstances, congregate at this point." *Jetees*, such as the interesting works at Port Saïd; at the sea termination of the North Sea Canal of Holland; and those recently constructed to form a new mouth to the river channel to Rotterdam and also at the Sulina mouth of the Danube have much in common with breakwaters, but in general their direction, normal to the shore, saves them from the severe exposure of breakwaters. They will be mentioned in the article HARBOR; and reference is made to a Report

FIG. 9.



Manora Breakwater.

on the North Sea Canal of Holland, Prof. Papers, Corps of Engineers, No. 22. (Works to be consulted: "Theory and Construction of British and Foreign Harbours," by Sir John Rennie; "La Digue de Cherbourg" (Cachin); "Cours de Construction des Ouvrages Hydrauliques des Ports de Mer" (Minard); "Mémoire sur les Travaux à la Mer" (Poirel); "Civil Engineer and Architects' Journal;" "Annales des Ponts et Chaussées;" "The Engineer;" "Engineering," etc. etc.) J. G. BARNARD, U. S. A.

Bream [Fr. *brème*], a name given to several species of fishes. One is a fresh-water fish of the family Cyprinidæ, the *Abramis brama*. It is found in many rivers and lakes of Europe. Several true breams occur in North America. The name sea-bream is given to various European fishes of the genera *Pagellus, Cantharus, Brama*, etc. Among these are the black bream (*Cantharus griseus*) and the *Pagellus centrodontes*. Bream is also a synonym of the *Pomotis vulgaris*, or sunfish, a fresh-water fish of the U. S., which is remarkable for its beautiful colors, and is esteemed for food. It constructs a curious nest, and is abundant throughout a great part of the U. S.

Breast. See MAMMARY GLANDS.

Breast Wheel, in hydraulics, the name given to a water-wheel so placed as to be struck by the stream of water nearly on a level with the axle, the lower quadrant of the circumference on the side opposed to the stream being placed in a race or channel concentric with the wheel, through which the water is conducted in its descent from the higher to the lower level.

Breast'work, in fortification, is a hastily-constructed earthwork, generally without a banquette. It is sufficiently high to afford shelter to the soldiers standing on the level of the ground and firing over the crest. It is usually a pile of earth, but may be formed of gabions, bags of sand, or bales of cotton. It is intermediate in size and importance between a parapet and an *épaulement*.

Breath. See RESPIRATION.

Breath'itt, a county in the E. of Kentucky. Area, 600 square miles. It is intersected by the North and Middle Forks of Kentucky River. The surface is hilly and extensively covered with forests; the soil of the valleys is fertile. Corn and tobacco are the staple crops. Coal and iron ore are found here. Capital, Jackson. Pop. 5672.

Breathitt (JOHN), born near New London, Va., Sept. 9, 1786, removed in youth to Kentucky, where he was a surveyor and teacher, and was admitted to the bar in 1810,

He was a zealous Jacksonian Democrat, and was lieutenant-governor of Kentucky (1828–32) and governor (1832–34). Died at Frankfort, Ky., Feb. 21, 1834.

Bre'ccia, an Italian word applied by geologists to a collection of angular fragments of any hard rock cemented into a compact mass either by carbonate of lime or other natural cement. Rounded fragments under similar circumstances form conglomerate or pudding-stone. The Potomac marble, of which some columns of the Capitol at Washington are made, is a breccia composed of marble, sandstone, etc.

Bre'chin, a town of Scotland, in Forfarshire, on the left bank of the South Esk, 38 miles by rail S. S. W. of Aberdeen. It stands on an abrupt declivity, and some of the streets are very steep. It has a cathedral, part of which was built in the thirteenth century, now used as a parish church. Adjacent to this church is a remarkable round tower eighty-five feet high, and surmounted by a spire of twenty-five feet. Here are manufactures of linens and sail-cloth, bleaching-works, etc. It is the seat of an Anglican bishop. Pop. of Parliamentary borough in 1871, 7933.

Breck (Daniel), LL.D., born at Topsfield, Mass., Feb. 12, 1788, graduated at Dartmouth in 1812, and became a lawyer of Richmond, Ky., in 1814. Besides holding other offices of responsibility, he was for a time judge of the county court, and afterwards of the supreme court of Kentucky. He was a member of Congress (1849–51).

Breck'enridge, a county of Kentucky, bordering on Indiana. Area, 450 square miles. It is bounded on the N. W. by the Ohio River, and on the S. by Rough Creek. The surface is rolling; the soil is based on limestone, and is fertile. Cattle, grain, wool, and tobacco are staple products. Bituminous coal abounds. Sinking Creek in this county passes for five or six miles under the ground, and returns to the surface. Capital, Hardinsburg. Pop. 13,440.

Breckenridge, a township of Jackson co., Ark. Pop. 694.

Breckenridge, a post-village, capital of Summit co., Col., is near the base of the Rocky Mountains, 70 miles W. S. W. of Denver. Rich gold-mines abound here.

Breckenridge, a post-village, capital of Wilkin co., Minn., on the Red River of the North, at the terminus of the St. Paul and Pacific R. R. (main line), 217 miles W. N. W. of St. Paul. Steamers ply between this point and the Manitoba settlements.

Breckenridge, a post-village and township of Caldwell co., Mo. Pop. of village, 515; of township, 1336.

Breckenridge (John), a native of Virginia, born in 1760, removed to Kentucky. He was elected to the U. S. Senate in 1801, and was appointed attorney-general by President Jefferson in 1805. Died Dec. 17, 1806.

Breckenridge (John), D. D., born at Cabell's Dale, Ky., July 4, 1797, graduated at Princeton in 1818, was an eminent Presbyterian preacher, an able polemic writer, and an influential and useful citizen. He was professor of theology at Princeton (1836–38). Died Aug. 4, 1841, near Lexington, Ky.

Breckenridge, or **Breckinridge** (John Cabell), a statesman and general, a grandson of John, first noticed above, was born near Lexington, Ky., Jan. 21, 1821. He studied law, which he practised at Lexington, and was elected to Congress by the Democrats in 1851. He was chosen Vice-President of the U. S. in 1856, when James Buchanan was elected President. In 1860 he was nominated for the presidency by the Anti-Douglas Democrats who seceded from the convention that met at Charleston. His competitors were Abraham Lincoln, John Bell, and Stephen Douglas. Breckenridge received seventy-two electoral votes, being supported by all the Southern States except Virginia, Kentucky, Tennessee, and Missouri. Having been elected to the U. S. Senate, he took his seat in Mar., 1861, but he joined the Confederate army in the autumn of that year. He served as major-general at the battle of Stone River, which ended Jan. 2, 1863, and at Chickamauga, Sept. 19 and 20 of that year. In May, 1864, he defeated Gen. Sigel at Newmarket, in Virginia. He became secretary of war at Richmond in Jan., 1865, visited Europe about five months later, and returned to the U. S. in 1868.

Breckenridge (Robert Jefferson), D. D., LL.D., an eminent Presbyterian minister, born at Cabell's Dale, Ky., Mar. 8, 1800, was an uncle of the preceding. He graduated at Union College in 1819, and practised law in Kentucky eight years (1823–31). Having preached for some years in Baltimore, he removed to Lexington, Ky., in 1847, and became professor of theology at Danville in 1853. He published "Travels in Europe" (1839) and several works on theology. His principal work is in two volumes, "The Knowledge of God, objectively considered" (1857), and "The Knowledge of God, subjectively considered" (1859). He was a loyal friend of the Union in the civil war. Died at Danville, Ky., Dec. 27, 1871.

Breck'inridge (Gen. James), born in Botetourt co., Va., Mar. 7, 1763, was a soldier of the Revolution, graduated at William and Mary College in 1785, and became an eminent Federalist lawyer and a public-spirited citizen of Virginia. He was a member of Congress (1809–17), and co-operated with Jefferson in establishing the University of Virginia. Died in Aug., 1846.

Breck'nock, a township of Berks co., Pa. Pop. 813.

Brecknock, a township of Lancaster co., Pa. P. 1600.

Brecks'ville, a township of Cuyahoga co., O. P. 1007.

Brec'on, or **Breck'nockshire,** an inland county of South Wales, has an area of 719 square miles. It is bounded on the N. by Radnor, on the E. by England, on the S. by Glamorgan, and on the W. by Caermarthen. The surface is occupied by several mountain-ranges and deep, beautiful, and fertile valleys. The highest point of this county is Brecknock Beacon, which has an altitude of 2862 feet. Old red sandstone underlies the southern and middle parts of the county, and Silurian rocks are found in the N. The chief rivers are the Wye (which forms the N. E. boundary), the Usk, Elan, and Tawe. The staple products are oats, barley, wheat, and cattle. It has extensive iron-works. Capital, Brecon. Pop. in 1871, 59,904.

Brecon, Brecknock, or **Aber-Honddu,** a town of Wales, the capital of the above county, is finely situated in a valley on the river Usk, at the mouth of the Honddu, 38 miles by rail W. S. W. of Hereford. It has beautiful promenades, an old castle, a collegiate church founded by Henry VIII., and a college; also considerable manufactures. Pop. in 1871, 5845.

Breda', a fortified town of Holland, in North Brabant, is situated at the confluence of the navigable rivers Aa and Merk, 16 miles S. S. E. of Dordrecht. It is connected by railway with Antwerp and The Hague. It has a castle built in 1350, a Gothic cathedral, the spire of which is 362 feet high, and a magnetic observatory; also manufactures of linens, carpets, hats, soap, leather, etc. This town can be protected against an invading army by inundating the country around it. It is celebrated as the scene of the "Compromise of Breda," by which the patriots protested against the tyranny of Philip II. in 1566. Pop. in 1868, 15,265.

Bree (Mathieu Ignace), an eminent Flemish historical painter, born at Antwerp Feb. 22, 1773. Among his works are "Rubens dictating his Last Will," and "Van der Werff addressing the Famished Populace during the Siege of Leyden, 1574." Died Dec. 15, 1839.

Breech, the end of a gun which is farthest from the muzzle; the solid part behind the bore. The breech of a cannon is made very massive, to enable it to resist the shock caused by the explosion of the powder.

Breech'ing of a naval gun or carronade is a strong rope by which the recoil of the gun is checked at such a point that the muzzle is brought wholly within the porthole, where the seamen can sponge and reload it. Breeching or breech-band is a part of the harness of a carriage-horse, by means of which he can push the carriage backward or support its pressure in going down hill.

Breech-loading Firearms are those which are loaded by putting the cartridge directly in at the breech, instead of ramming it in at the muzzle. It is said that breech-loading guns were used early in the reign of Henry VI. of England, and it is certain that they were used in Scotland about that time. There are several ancient specimens in the Tower of London. Many attempts to improve this kind of arms have been made, and of late with much success. Among the most celebrated weapons of this character are the Armstrong and Whitworth guns, the Krupp steel guns, the *mitrailleuse*, and among small-arms the needle-gun and the Chassepot, Sharp, Snyder, Spencer, Ward-Burton, and Remington rifles. These will each be described under its own name.

Breed, a variety produced in any animal species in consequence of domestication by changes somewhat analogous to those which occur in cultivated plants. The changes originated by breeding (artificial selection) are in some species, as in the dog and pigeon, very marked, producing external, and even structural, differences, which, if they were permanent and originated by natural and unexplained causes, would confessedly be regarded as sufficient to establish difference of species. But the fact that thoroughbred animals, when neglected or allowed to go wild, tend to revert to the original type, and the not less important fact that animals of the most widely different varieties of the same species will (with a few possible exceptions) breed freely with each other, producing fertile young (which is rarely the case

with those of different species), are by many held to show a radical difference between varieties or breeds and species. The study of the variations produced by domestication seems to have suggested to Mr. Darwin his doctrine of the origin of species by natural selection. (See DARWINISM, by Profs. E. L. YOUMANS and J. H. SEELYE.)

Some of the results of artificial selection on animals are truly marvellous. The numerous varieties of the dog and the pigeon have been, to a great extent, produced by design; animals being bred to develop certain desired peculiarities, the principle being that "like produces like," or that certain qualities possessed by the parent may be perpetuated and increased in the offspring. The milk-producing qualities of the Ayrshire cow, the butter-making excellence of the Jersey breed, the long-wooled Cottswold sheep, and the new breeds of easily fattened swine afford illustrations of the industrial importance of this remarkable plasticity or adaptability of the various domestic animals—an adaptability which has only of late been scientifically studied, and the limitations of which are as yet not well known. (See DARWIN, "Domesticated Animals and Cultivated Plants," 1867.) CHAS. W. GREENE.

Breed (WILLIAM P.), D. D., born in 1816, at Greenbush, N. Y., removed in childhood to New York City, graduated in 1843 at the University of New York, and has held Presbyterian pastorates in Steubenville, O. (1847–56), and in Philadelphia. He is the author of numerous religious works, chiefly for the young.

Breeds'ville, a post-village of Columbia township, Van Buren co., Mich. Pop. 255.

Breese (KIDDER RANDOLPH), U. S. N., born April 14, 1831, in Philadelphia, entered the navy as a midshipman Nov. 6, 1846, became a passed midshipman in 1852, a lieutenant-commander in 1862, and a commander in 1866. At the close of 1861 he was placed in command of the third division of Porter's mortar flotilla, and took part in the bombardment of Forts Jackson and St. Philip prior to and during the passage of Farragut's fleet by the forts on its way to the capture of New Orleans, and participated in the attacks on Vicksburg during June and July, 1862. In Oct., 1862, he was appointed to the command of Admiral Porter's flag-ship, the Black Hawk, and in her took part in nearly all the severe engagements on the Mississippi and its tributaries during 1863 and 1864. In Sept., 1864, when Admiral Porter assumed command of the North Atlantic blockading squadron, he selected Breese as his fleet-captain, in which capacity Breese took part in the Fort Fisher fights, and in the fight with Fort Anderson; and in the naval assault on Fort Fisher of Jan. 15, 1865, he commanded the storming party. His services throughout the civil war are thus honorably mentioned by Admiral Porter in his "commendatory despatch" of Jan. 28, 1865: "Lieutenant-Commander K. R. Breese, my fleet-captain, has been with me nearly all the time since the rebellion broke out. In command of a division of the mortar flotilla which opened the way to New Orleans, he made his first record there. In the Mississippi with me for two years, engaged in harassing and dangerous duties, he always acquitted himself to my satisfaction. In charge of the mortars at the siege of Vicksburg, he helped to hasten the surrender of that stronghold. At Fort Fisher he led the boarders in the assault, and though we were not successful in getting into the fort in the face of equal numbers, yet that assault gained the day, as is generally admitted on every side. Our troops obtained a footing without much resistance, and then nobly maintained what they had won. Lieutenant-Commander Breese did all he could to rally his men, and made two or three unsuccessful attempts to regain the parapet; but the marines having failed in their duty to support the gallant officers and sailors who took the lead, he had to retire to a place of safety. He did not, however, leave the ground, but remained under the parapet in a rifle-pit, using a musket until night favored his escape. He is a clever, gallant officer, and I strongly recommend his immediate promotion to a commander."

FOXHALL A. PARKER, U. S. N.

Breese (SAMUEL L.), REAR-ADMIRAL, was born in New York in 1794, entered the navy in 1810, served against Great Britain and Mexico, became captain in 1841, and rear-admiral in 1862. Died Dec. 17, 1870, at Mount Airy, Pa.

Breese (SIDNEY), born at Whitesboro', Oneida co., N. Y., July 15, 1800, graduated at Union College in 1818. In 1821 he was called to the Illinois bar, and attained great distinction, was an officer in the Black Hawk war, U. S. Senator from Illinois (1843–49), and was speaker of the Illinois legislature in 1850. He was made circuit judge in 1835, and again in 1855, becoming chief judge of that bench. He was one of the originators of the Illinois Central R. R.

Brees'port, a post-village of Horseheads township, Chemung co., N. Y. Pop. 292.

Breeze, a soft wind, a gentle gale. *Land and Sea Breezes.*—In a fair day, near the sea-shore, an hour or two after sunrise, a gentle wind begins to blow from the sea towards the land, gradually increasing in force during the day. With the declining sun the sea-breeze loses its power, and dies out before sunset. A lull then ensues, after which a land-breeze sets in from the land towards the sea, and continues all night until before sunrise, when another calm occurs. The cause of these alternate winds is to be found in the fact that the land is more readily heated by the rays of the sun, and more quickly cooled in their absence, than the sea. In an island, for instance, in proportion as the sun rises above the horizon the land becomes warmer than the neighboring sea. Their respective atmospheres participate in these unequal temperatures; the fresh air of the sea rushes from all directions in the form of a *sea-breeze,* which makes itself felt along the whole coast, and the warmer and lighter air of the island will ascend into the atmosphere. During the night it is the reverse. The island loses heat by radiation, and cools quicker than the sea. Its atmosphere having become heavier, flows into that of the sea in the form of a *land-breeze;* and this interchange lasts until the temperature, and consequently the density, of the two atmospheres have again become the same. This is the phenomenon observed almost daily on nearly all the sea-boards.

Mountain-Breezes.—Similar alternate breezes are observed to play between the great mountain-chains and the neighboring plains, as in the Alps. On a fair day strong breezes rush up the valley towards the overheated mountain-slopes, and descend with equal force during the night; for during the day the mountains absorb more heat than the neighboring free atmosphere, and radiate more during the night. (See WINDS, CIRCULATION OF.) ARNOLD GUYOT.

Breitmann, Hans. See LELAND (CHARLES GODFREY).

Brem'en, a free city of Germany, situated on both sides of the river Weser, about 45 miles from the sea and 60 miles S. W. of Hamburg; lat. 53° 4′ 36″ N., lon. 8° 48′ 54″ E. It is divided into the old and the new town, the former of which is on the right bank of the river, and has narrow, crooked streets. The new town, which is connected with the old by two bridges, is more regular. The old ramparts have been levelled and converted into beautiful promenades and pleasure-grounds. The most remarkable edifices are the cathedral, built about 1100; the fine old Gothic town-hall, with a famous wine-cellar; the exchange, the museum, and the observatory of Olbers. Bremen has a large public library, a normal school, a theatre, and a hospital, also manufactures of woollen and cotton goods, paper, starch, and cigars. As a commercial city this is one of the most important of Germany, having an extensive foreign trade, especially with the U. S. It is connected by railway with Hanover, Bremerhafen, and other towns. Vessels drawing seven feet of water can ascend to this point, and large ships stop at Bremerhafen. The trade of Bremen has increased rapidly in the last fifteen years. The chief articles of export are woollen goods, linens, glass, hemp, hides, rags, wooden toys, and wool. The imports consist of cotton, coffee, sugar, rice, tobacco, wines, dyewoods, oil, tea, etc. Shipbuilding is carried on here extensively. The imports in 1858 amounted to £8,232,000, and the exports to about £8,000,000. In 1863 the imports had increased to about £11,190,000, and the value of the exports was nearly £10,000,000. In 1868 the imports amounted to 98,130,000 thalers (about $68,690,000), and the exports to 89,970,000 thalers. The number of emigrants that embarked here was 73,971 in 1867, and 66,433 in 1868. In 1871, 8,513,882 gallons of petroleum were exported from Philadelphia to Bremen. The total produce imported here from the U. S. in 1868 was valued at $23,285,000. Pop. in 1871, 82,950.

Bremen was founded before 788 A. D., and was made a bishopric by Charlemagne. It was one of the chief towns of the Hanseatic League. In 1815 it was admitted into the Germanic confederation by the Congress of Vienna. The government of this city and the territory attached to it (with an area of 74 square miles) is a nominal republic, the total pop. of which in 1871 was 122,565. It is governed by four burgomasters and twenty-four senators, who are elected for life. Bremen is the native place of Heeren and Olbers. A. J. SCHEM.

Bremen, a township of Cook co., Ill. Pop. 1501.

Bremen, a township of Lincoln co., Me. Pop. 797.

Bremen, a post-village of Rush Creek township, Fairfield co., O. Pop. 265.

Bre'mer, a county in N. E. Central Iowa. Area, 430 square miles. It is intersected by the Cedar and Wapsipinicon rivers, and also drained by several creeks. The soil is generally fertile. Grain, cattle, and wool are raised. It

is traversed by a branch of the Illinois Central R. R. Capital, Waverley. Pop. 12,528.

Bremer, a township of Delaware co., Ia. Pop. 821.

Bremer (Fredrika), a popular Swedish novelist, born at Abo, in Finland, Aug. 17, 1801. She was educated at Stockholm, and became in early youth familiar with German literature. Among her first works was "The Neighbors," a novel (1842), which Mrs. Howitt translated into English. She afterwards produced "The Home" (1843), "The President's Daughters," "Nina," "Brothers and Sisters," and "Hertha" (1856), which were translated into English, French, and German. She visited the U. S. in 1850, and after her return published "The Homes of the New World" (1853). Died Dec. 31, 1866. (See "Life, Letters, and Posthumous Works of Fredrika Bremer," edited by her sister Charlotte, New York, 1868.)

Bre`merha'fen, a town and port of Germany, on the right bank of the Weser, near its mouth, about 35 miles N. N. W. of Bremen. It is a part of the republic of Bremen, and was built by the citizens of Bremen (1827–30) for the accommodation of large ships which cannot ascend the river. It has an outer and inner harbor. Pop. in 1871, 10,594.

Bre'mond, a post-village of Robertson co., Tex., at the junction of the Houston and Texas Central and the Waco and North-western R. Rs. It is in a beautiful and fertile region, abounding in coal and iron. It has a cotton-seed oil mill.

Bren'ham, a post-village, capital of Washington co., Tex., on a branch of the Houston and Texas Central R. R., 95 miles E. of Austin City. It is in a fertile region adapted to the growth of cotton. It has a seminary for ladies, several manufactories and two weekly newspapers. Pop. 2221.

Bren'ner Pass, the lowest pass in the main chain of the Alps, is on the route between Innspruck and Botzen, and is 4775 feet above the level of the sea. The mountains on each side rise about 7500 feet above the pass, which is open at all seasons of the year. In 1867 a railway was opened through this pass from Innspruck to Botzen, at which point it connects with the railways of Germany and Italy. At the summit of the pass is the small village of Brenner.

Bren'nus [Celtic *bran*, a "chief." *Bran*, as a proper name, is well known both in Cymric and Erse tradition], a famous chief of the Senones, a tribe of ancient Gauls who crossed the Apennines in 390 B. C., invaded the Roman state, and defeated its army. Brennus then captured Rome, except the Capitol, which he besieged for about six months. During this siege he attempted to surprise the garrison by night, but he was repulsed by Manlius, who was awakened by the cackling of some geese. The Romans purchased peace by the payment of one thousand pounds of gold. To increase the price, Brennus is said to have thrown his sword on the scale. (See, on this subject, Arnold's "History of Rome.")

Brennus, a Gallic chief who invaded Greece with a large army about 280 B. C., and ravaged Macedonia and Thessaly. He was defeated at Delphi by the Greeks, who were said to have been aided by an earthquake.

Brenta'no (Clemens), a German novelist and dramatist, born at Frankfort-on-the-Main Sept. 9, 1778. He was a brother of Goethe's friend, Bettina von Arnim. He produced dramas entitled "Ponce de Leon" (1804) and "The Foundation of Prague" (1816). Among his admired novels is "The History of Caspar the Brave and the Fair Annerl." In conjunction with Arnim he published the collection of ballads called "Des Knaben Wunderhorn" (1806–08; 2d ed. 1815). Died July 28, 1842.

Brentano (Lorenz), a German jurist, born at Mannheim in 1812. He was actively engaged in the Baden revolution of 1848, and afterwards removed to America, and became in 1860 editor of the "Illinois Staatszeitung" at Chicago. He sold his interest in the "Illinois Staatszeitung" in 1867, and returned to Germany soon after. In 1868 he was elected a presidential elector on the Grant ticket.

Brent'ford, a market-town of England, the capital of Middlesex, is on the Thames, at the mouth of the Brent, 7 miles W. S. W. of London. It is connected with Kew by a bridge across the Thames, has large gin-distilleries, and the works of the West London Water Company. It consists mostly of one long street. Pop. 9521.

Bren'ton, a township of Ford co., Ill. Pop. 1073.

Brenton (Samuel), born in 1810 in Gallatin co., Ky., became a Methodist Episcopal preacher in 1830, and subsequently a lawyer. In 1841 he returned to the ministry, but having become disabled by paralysis, he again left the profession. He was a member of Congress from Indiana 1852–57, and at the same time president of Fort Wayne College. Died Mar. 25, 1857.

Brenton (William) emigrated to Boston from Hammersmith, England, held important offices in Massachusetts and Rhode Island, where he was several times lieutenant-governor. He was president of Rhode Island (1660–61), and governor (1666–69). Died at Newport in 1674.

Brents'ville, a small village, capital of Prince William co., Va., on the Occoquan Creek, 104 miles N. of Richmond. Pop. of Brentsville township, 937.

Brent'wood, a post-township of Rockingham co., N. H. It has manufactures of paper, leather, lumber, etc. Pop. 895.

Brentwood, a post-village of Williamson co., Tenn., on the railroad between Nashville and Franklin, about 9 miles from each place.

Brenz (Johann), [Lat. *Brentius*], a German Reformer, born at Weil, in Swabia, June 24, 1499, was educated at Heidelberg, and became a Protestant under Luther's influence. He was a popular preacher at Halle, but in 1530 had to flee to Stuttgard, to the protection of Duke Ulrich of Würtemberg against Charles V. There he died Sept. 11, 1570. He was a man of great ability, and wrote much, chiefly expository lectures on the Bible. These writings are still highly prized. He taught that the Lord's body is everywhere present, hence his followers are called Ubiquitarians, but in the main his doctrines are those of Luther.

Bres'cia, a province of Italy, is bounded on the N. by the Tyrol, on the E. by Lago di Garda and Verona, on the S. by Cremona, and on the W. by Bergamo. Area, 1784 square miles. The soil is fertile. Silk and wool are among the staple productions. It has manufactures of woollen goods, firearms, and cutlery of superior quality. Capital, Brescia. Pop. in 1871, 450,750.

Brescia (anc. *Brixia*), a handsome city of Italy, in Lombardy, capital of the above province, is pleasantly situated on a wide plain and on the river Garza, 62 miles by rail E. N. E. of Milan. It is on the railway which connects Milan with Venice. It has an old cathedral, a mediæval structure, and a new marble cathedral (Duomo Nuovo) commenced in 1604; also many churches richly adorned with works of art by celebrated masters, an episcopal palace, a college, a good public library, a museum of antiquities, a botanic garden, and a theatre. Here are manufactures of cutlery, silk, linen, and woollen fabrics, paper, and wine. The streets and public squares are adorned with numerous fountains. Brixia was a very ancient town, and was the capital of the Cenomanni, a Gallic tribe. It was plundered by Attila, but soon recovered from this injury. The emperor Otho I. declared it a free city about 936. It was bombarded and taken by the Austrian general Haynau in 1859. Pop. in 1872, 38,906.

Bres'lau, or **Breslaw** [Lat. *Bratislavia;* Polish, *Wraclaw*], a large city of Prussia, the capital of Silesia, is situated on the river Oder, at the mouth of the Ohlau, and on the railway from Berlin to Vienna, 221 miles by rail S. E. of Berlin; lat. (of observatory) 51° 6′ 56.5″ N., lon. 17° 2′ 18″ E. It is, next to Berlin, the most populous city of Prussia. It is divided by the Oder into the old and new towns, which are connected by numerous bridges. The new town has wide and regular streets. It is the seat of a Roman Catholic bishop. The most remarkable edifices are a cathedral founded in the twelfth century, St. Elizabeth's church, the theatre, the Rathhaus, exchange, mint, and university buildings. The university has a library of 350,000 volumes. Breslau contains other public libraries, an observatory, a botanic and zoological garden, four gymnasia, and numerous other schools of different kinds. It has an extensive trade, and is the greatest market for wool in Germany. It has manufactures of woollen, linen, cotton, and silk fabrics, broadcloths, lace, jewelry, soap, earthenware, starch, and ardent spirits. The number of distilleries in it is about 100. Railways extend to Dresden, Posen, Warsaw, and Vienna. Pop. in 1871, 208,025.

Breslau, a thriving post-village of Babylon township, Suffolk co., N. Y., on the South Side R. R. of Long Island, 33 miles E. by S. of Brooklyn. Its inhabitants are mostly Germans.

Brest [Lat. *Brestum*], an important fortified city and seaport of France, department of Finistère, 314 miles W. of Paris, is said to be the strongest military port in France. It is on the N. shore of the Road of Brest, in lat. 48° 23′ N., lon. 4° 29′ W. Its outer harbor is one of the best and most capacious in the world, having ample room for 500 ships of the line. The harbor or road communicates with the ocean by a single channel called the Goulet, which is 1750 yards wide. In the middle of this channel are the Mignan Rocks, which render the entrance of hostile ships very difficult and dangerous. The outer harbor or roadstead is

about 6 miles long, and is defended by powerful batteries. The inner harbor is also secure and spacious. From its natural advantages and the strength of its defensive works, Brest is considered one of the first naval stations of Europe. Here are five large basins, extensive quays, an arsenal, vast magazines, large barracks, and a prison, the Bagne, which can accommodate 4000 convicts. Brest is the western terminus of a railway which extends to Paris *viâ* Rennes and Le Mans. The city is built on the slopes of several hills, and is divided into two parts, which can communicate only by boats. Is is encircled by ramparts, which, being planted with trees, form pleasant promenades. It has a naval school, a medical school, a communal college, besides numerous other schools, a public library, a botanic garden, an observatory, etc. This port has little trade except for the supply of the naval department, and its industry is confined to the equipment of the navy. This place was not of much importance until Cardinal Richelieu commenced in 1631 the fortifications, which were completed by Vauban. A submarine telegraph cable connects this harbor with Duxbury, Mass. Pop. 79,847.

Brest Litowsk′, a town of Russia, in the government of Grodno, 92 miles S. of Grodno. It has several factories, and is the seat of a United Armenian bishop. Pop. 22,493.

Bretagne [Lat. *Britannia Minor*], usually called **Brit′tany** by the English, or **Little Brittany,** a former province of France, is an extensive peninsula, bounded on the N. by the English Channel, and on the W. and S. W. by the Atlantic Ocean. It is now comprised in the departments of Finistère, Côtes-du-Nord, Morbihan, Ile-et-Vilaine, and Loire-Inférieure. It was divided into Haute-Bretagne (Upper Brittany), capital, Rennes, and Basse-Bretagne (Lower Brittany), capital, Vannes. Among the other towns are Brest, Quimper, and St. Malo. The surface is partly mountainous, and the scenery wild and beautiful. This province, which in ancient times was called *Armorica,* was settled by the Cymri, a Celtic race to which the ancestors of the Welsh belonged. It contains large tracts of heath nearly uncultivated, and extensive forests. The outline is indented with numerous bays and inlets, which afford facilities for navigation and commerce. Brittany abounds in ancient monuments and cromlechs, which are ascribed to the Druids. The modern Bretons are tenacious of their ancient customs and peculiarities, and are generally Catholics. They are more loyal and devout than the majority of the French. Their language (the Armorican) is peculiar, and closely resembles the Welsh. This region and its people have a special interest for antiquarians. It became subject to the Franks in the time of Charlemagne. In 848 A. D., Nominoé, an Armorican chief, assumed the title of king of Bretagne, and defeated the army of King Charles the Bald. The Normans conquered it in the tenth century.

Geoffroi, count of Rennes, became in 992 the first duke of Bretagne, which continued to be an almost independent feudal duchy until it was annexed to France in 1531. Pop. in 1872, 2,947,348. (See Daru, "Histoire de Bretagne," 1826; Courson, "Histoire des Peuples Bretons, etc.," 1847.)

Brethren. See Plymouth Brethren; also Dunkers and United Brethren.

Brethren and Sisters of the Free Spirit, a sect of extremely pantheistic and immoral semi-monastic enthusiasts, who probably originated in the sect of Almericians, followers of Amalric of Bena, who died in 1209. They suffered much from the severity of the authorities, but became very numerous in Germany, France, and Italy. The sect lasted till about 1450. They were otherwise known as *Homines Intelligentiæ* ("men of understanding"), also as Adamites, Turlupins, Schwestriones, Picards, etc.; and it is believed that the immoral "Adamites" now existing in Bohemia are their descendants.

Brethren of the Christian Schools, an order in the Roman Catholic Church founded in 1679, at Rheims, by the Abbé La Salle, and confirmed in 1725 by Benedict XIII. Its members are not allowed to enter the priesthood. They devote themselves to teaching, and especially to the instruction of the poor, mostly in rudimentary branches, but sometimes in more advanced studies. They are numerous in France, Ireland, Italy, the U. S., and most other countries. They are a branch of the Jesuits.

Brethren of the Common Life [Lat. *Fratres Vitæ Communis*], an association of pious clergymen founded in Holland by Gerhard Groot in 1384. They soon were joined by many laymen, who were associated closely with the priests, but had separate habitations. A semi-monastic discipline was maintained, generally according with the rule of Saint Augustine, without lifelong vows. The order spread to Germany, and "Sisters of the Common Life" afterwards appeared. The Brethren became partly identified with the Canons Regular. Thomas à Kempis, Wessel, and Erasmus were educated by them. Luther and Melanchthon esteemed the brotherhood highly, and many of them became Protestants, others Jesuits, etc., and before 1650 the fraternity was extinct.

Breton, a township of Washington co., Mo. Pop. 2396.

Breton (Jules-Adolphe), a French artist, distinguished for his serious and sympathetic treatment of subjects connected with the rural life of France. He was born at Courrières (Pas-de-Calais). His most important pictures are "Blessing the Wheatfield," 1857, "The Calling Home of the Reapers," 1859, both in the Luxembourg Gallery; "A Girl Guarding Turkeys," 1864; "Young Girls Guarding Cows," 1872. Clarence Cook.

Brett (Philip Milledoler), D. D., born in New York City July 13, 1817, graduated at Rutgers College, New Brunswick, N. J., was ordained to the Dutch Reformed ministry in 1838, held pastorates at Nyack, N. Y., St. Thomas, W. I., and at Mount Pleasant and Tompkinsville, N. Y. He was very influential, and greatly beloved by his denomination. Died of cancer Jan. 14, 1860. A volume of his sermons has been published.

Breu′ghel (Jan), a famous Flemish painter, born at Brussels in 1568, was called Velvet Breughel, in reference to the material of his clothing. He painted landscapes, animals, flowers, and small figures, which are finely finished. Among his chief works are "Adam and Eve in Paradise" and "The Four Elements." The figures of these were painted by Rubens. Died in 1625.

Breughel (Pieter), a Flemish painter, the father of the preceding, was born at Breughel, near Breda. He painted with success village festivals, comic subjects, and the amusements of rustic life. Died in 1569.

Brevard′, formerly **St. Lucie,** a county in the S. E. of Florida, is bounded on the E. by the Atlantic Ocean. Area, 5600 square miles. Stock-raising is the chief pursuit. The climate is pleasant and healthful. Corn and rice are raised. It is intersected by the Kissimee River, and includes the greater part of Lake Okechobee, which is about 30 miles in diameter. The surface is generally low and flat. Capital, St. Lucie. Pop. 1216.

Brevard, a post-village, capital of Transylvania co., N. C., in a township of the same name, about 240 miles W. S. W. of Raleigh. Pop. of Brevard township, 784.

Breve, in music, a note formed thus , or , or , and equivalent to two semibreves. The note for a whole bar in modern notation is called a semibreve. The breve is now only used in *à la capella* movements, psalm-tunes, and fugues, or at the close of a composition.

Breve, in printing, is a curve marked over a vowel to indicate that it is short, as *ĕ*.

Brevet′, a French word signifying a patent, a warrant, a license, a commission, a royal act in writing conferring some privilege or distinction.

Brevet is also a military term used in England and the U. S. In the British army it is a promotion of officers which takes place on such special occasions as a coronation or the termination of a great war. By this promotion the officers obtain an increase of pay, even if they have never served in a campaign. On these occasions lieutenant-generals, major-generals, colonels, lieutenant-colonels, majors, and captains receive a promotion of one grade. Each colonel, for instance, becomes a major-general. Officers below the rank of captain are excluded from the benefit of this brevet, which applies to the navy as well as the army, so that commanders become captains, captains become rear-admirals, etc. Besides this general promotion by brevet, there is (in England) brevet rank conferred on individual officers for special services. This does not entitle them to an increase of pay, but only to hold a rank next above that which their commission specifies. This kind of brevet is not used in the navy, and it does not apply in the army to other officers than captains, majors, and lieutenant-colonels. In the army of the U. S. a brevet is a commission giving an officer a nominal rank higher than that for which he receives pay. A brevet major, for instance, only receives the pay of a captain or of a lieutenant. These honorary titles are given for meritorious services.

Bre′viary [Lat. *breviarium* (from *brevis,* "short"); Fr. *bréviaire*], an abridgment or epitome; also a book containing the daily service of the Church of Rome or of the Greek Church. It is so called, probably, because it was abridged from another service-book, called *Plenarium officium,* the "full service." The Roman Catholic Church has several breviaries, some being used in particular dioceses or in special monastic orders, but the *Breviarium Romanum* ("Roman Breviary") is the most generally used, and is

rapidly taking the place of the others throughout the Latin rite, and it has been translated into some of the Eastern rites. It is in four parts: the Psaltery, or psalms for canonical hours, recited daily by all the beneficiary clergy; the *Proprium de Tempore*, for festivals in honor of Christ; the *Proprium de Sanctis*, for festivals of special saints; and the *Commune Sanctorum*, for other days. The Greek Breviary (ὡρολόγιον) or "dial" is used in the Greek Church and the Roman Catholic churches of the Greek rite. (See CANONICAL HOURS and LITURGY.)

Brevier, bre-veer′, in typography, a name of a type which is larger than minion and one size less than bourgeois.

Brevipen′nes [from the Lat. *brevis*, "short," and *penna*, a "wing"], or **Brevipennates** (*i. e.* "short-winged"], a term applied in the system of Cuvier to that tribe of the order Grallatores which comprises the ostrich, cassowary, emeu, rhea, apteryx, and perhaps the extinct dodo. They have wings so short that they are not fit for flight, but they serve to accelerate the speed with which the birds run on the ground. Some ornithologists give them the name of Struthionidæ, and some rank them among the gallinaceous birds. Their sternum (breast-bone) has no keel or ridge. The gigantic *Dinornis* and some other fossil birds exhibit the characters of the brevipennes. Birds of this tribe flourish only in solitudes and deserts, and are perhaps destined to extinction, as the progress of population is hostile to their increase or existence. (See CURSORES.)

Brew′er, a township of Pike co., Ark. Pop. 597.

Brewer, a post-township and village of Penobscot co., Me., on the Penobscot River, opposite Bangor, with which it is connected by a bridge. It has a savings bank, and important manufactures of lumber, bricks, leather, boots, shoes, harness, carriages, sails, boats, etc. Total pop. 3214.

Brewer (WILLIAM HENRY), born at Poughkeepsie, N. Y., Sept. 14, 1828, was educated at the scientific school of Yale College and at the universities of Heidelberg and Munich, was professor of chemistry and geology in Washington College, Pa. (1858–60), first assistant in the geological survey of California (1860–64), professor of chemistry in the College of California, and professor of agriculture in the Sheffield Scientific School, New Haven, Conn., since 1864. He has prepared a work on the "Botany of California," and various scientific papers.

Brew′erton, a post-village of Cicero township, Onondaga co., and of Hastings township, Oswego co., N. Y., on both sides of the Oneida River, at the foot of Oneida Lake, and on the Syracuse Northern R. R., 15 miles N. of Syracuse. The old British Fort Brewerton stood on the Oswego side. Pop. in Onondaga co., 322; in Oswego co., 196.

Brewerton (HENRY), LL.D., an American officer, born 1801 at Newburg, N. Y., graduated at West Point 1819, colonel Corps of Engineers April 22, 1864, served as assistant professor at the Military Academy 1819–21, in construction of fortifications 1821–32, Cumberland road 1832–36, improvement of Hudson River 1836–42, building Fort Montgomery, N. Y., 1841–45, superintendent of the Military Academy 1845–52, constructing defences of Baltimore harbor 1852–64, of the Delaware 1862–64, of Point Lookout, Md., 1864–65, and of Hampton Roads 1864–70, improvement of harbors in Maryland 1852–64, and member of engineer and other boards 1839–67. Brevet brigadier-general Mar. 13, 1865, for long, faithful, and meritorious services, and retired from active service Mar. 7, 1867.

GEORGE W. CULLUM, U. S. A.

Brew′erville, a township of Sumter co., Ala. P. 1520.

Brew′ington, a township of Clarendon co., S. C. P. 199.

Brew′ster, a post-township of Barnstable co., Mass., on the Cape Cod R. R., 89 miles from Boston. Pop. 1259.

Brewster (Sir DAVID), LL.D., D. C. L., F. R. S., an eminent British natural philosopher and writer, born at Jedburgh, Scotland, Dec. 11, 1781. He was educated at the University of Edinburgh, and became in 1808 editor of the "Edinburgh Encyclopædia," for which he wrote many articles. He received in 1815 the Copley medal of the Royal Society for an "Essay on the Polarization of Light by Reflection." He invented the kaleidoscope in 1816. In conjunction with Professor Jameson he founded the "Edinburgh Philosophical Journal" in 1819. About this date the Royal Society awarded to him the Rumford gold and silver medals for his discoveries in optics. He was knighted in 1832, and elected in 1849 one of the eight foreign associates of the French Institute, the highest scientific distinction in Europe. Among his works are a "Treatise on Optics" (1831), "More Worlds than One" (1854), and "Memoirs of the Life and Writings of Sir Isaac Newton" (2 vols., 1855). In 1859 he was chosen principal of the University of Edinburgh. His wife was a daughter of Macpherson, the author of Ossian's poems. Died Feb. 10, 1868.

Brewster (JAMES), born about 1785, was a prominent merchant and philanthropist of New Haven, Conn. He founded in that city Brewster Hall, the Franklin Institute, and the Orphan Asylum, and was the active promoter of many benevolent and business enterprises. Died Nov. 22, 1866.

Brewster (WILLIAM), one of the Pilgrims of Plymouth, born at Scrooby, England, in 1566, was educated at Cambridge, entered the public service, became a non-conformist, and in 1607 was imprisoned at Boston, Lincolnshire. He was liberated with great expense and difficulty, and went to Leyden, where he taught English. In 1620 he came to America on the Mayflower's first voyage. He was an elder of the Church, preaching frequently, but never administering the sacraments. Died at Plymouth, greatly venerated, April 16, 1644.

Brewster's Station, a post-village of South-east township, Putnam co., N. Y., on the Harlem R. R., 53 miles from New York. It has two fine mines of magnetic iron ore, one national bank, and one weekly newspaper. Great quantities of milk are sent to market from this point.

Brew′ton, a post-twp. of Escambia co., Ala. P. 1312.

Brezo′wa, a town of Hungary, in the county of Neutra, 19 miles N. W. of Leopoldstadt. It has several tanneries and distilleries. Pop. in 1869, 5886.

Brialmont (ALEXIS HENRI), a distinguished Belgian officer, engineer, and military writer, born May 25, 1821, at Venloo, Province of Limburg, Pays-Bas; entered the military school of Brussels in 1839 from which he graduated as *sous-Lieutenant du Genie* (Engineers) in 1843. Entered the Belgian staff corps (*d'Etat major*) as Captain in 1855 and passing through successive grades became Colonel in 1868, Chevalier of the Order of Leopold in 1846—officer, in 1859, and "Commander" in 1870. Member of the Belgian Academy of Sciences of Stockholm in 1865. As an officer of Engineers has participated in the fortification of Antwerp and Diest, and when the present magnificent system of fortifications was decided upon he had the distinguished honor of planning works "unrivalled in Europe in the intelligent application of true principles of art to a great practical example." Colonel Brialmont is now an acknowledged authority on the *modern* art of fortification—his military publications are numerous; among the most important may be named, "*Précis d'Art Militaire*," 1850, 4 vols., 12mo, *Considerations Politiques et Militaires sur la Belgiques*," 1851–52, 3 vols., 8vo, "*Histoire du Duc de Wellington*," 1856–57, 3 vols., 8vo, "*Etudes sur la Defense des Etats et sur la Fortification*," 1863, 3 vols., 8vo, with atlas, "*Etudes sur l'organization des Armées*," 1867, 1 vol., 8vo, "*Traité de Fortification Polygonale*," 1869, 3 vols., 8vo, with atlas, "*La Fortification à Fossés Secs*," 1872, 3 vols., 8vo, with atlas; "*Études sur la Fortification des villes Capitales*" (1873), besides minor works and a great number of pamphlets upon current military or political topics; and he is author of the article on FORTIFICATION in the present work.

J. G. BARNARD, U. S. A.

Brianchon's Theorem, in conic sections, is the reciprocal of Pascal's theorem, and was first discovered by Brianchon. It is thus enunciated: "The three diagonals of every hexagon circumscribed to a conic meet in a point."

Briançon (anc. *Brigantium*), a town of France, in the department of Hautes-Alpes, on the river Durance, 56 miles S. E. of Grenoble, and near the Italian frontier. It is strongly fortified, is the principal French arsenal among the Alps, and is considered almost impregnable. Pop. 3579.

Briansk′, a town of Russia, in the government of Orel, on the river Desna, 74 miles W. N. W. of Orel. It has several churches, a cannon-foundry, an imperial building-yard, and a manufactory of small-arms. Pop. 13,881.

Briar Creek, a township of Columbia co., Pa. P. 1077.

Bri′bery [from the Fr. *bribe*, a "piece of bread," or a gift to a beggar], in criminal law, the offence of taking or offering any gift or reward to influence one's behavior in a public office, whether executive or judicial. It is an offence at common law. It also includes the case of influence or attempting to influence, by money, voters at an election to Parliament. The crime may be committed though it turn out that the person whose vote is thus solicited has no right to vote. It is an offence in any case to offer the bribe, though it is not received. The U. S. Constitution brands it as a crime of magnitude by declaring that the President and other civil officers are liable to impeachment for "treason, bribery, and other high crimes and misdemeanors." It is usual to pass statutes in the States extending the cases to which bribery as an offence may be applied, and fixing the punishment.

Brick, a species of artificial stone made by moulding plastic clay into blocks, and burning them. A very inferior quality of bricks is made by simply drying the blocks in the sun. The earths most employed in brickmaking are (1) the plastic clays, composed principally of silica and alumina in varying proportions; (2) the loams or sandy clays; and (3) the marls, which are either sandy, clayey, or calcareous, according as silica in the form of sand, alumina, or carbonate of lime preponderates in the mixture. These brick-clays almost always contain a small percentage of oxide of iron, carbonate of lime, soda, and carbonate of magnesia. The purer clays contain about 1 part of alumina to 2 of silica, with a percentage of water varying greatly among the different clays. They all mix up freely with water in either large or small proportions, and are characterized by a tenacious plasticity. If moulded and baked, they shrink and warp greatly out of shape, and crack. Hence, these rich clays all have to be tempered with sand, ashes, or cinders before they can be used for bricks. Some clays contain too much sand, and are weak and brittle after burning; these must be mixed with the richer clays. From the greatly varying character of the raw material, it results that the methods pursued in brickmaking must vary among different localities. Some clays require but very little change in the natural proportion of their ingredients, and but very little labor to prepare them for moulding into bricks, it being merely necessary to add the requisite quantity of water to render the clay plastic; while others, such as the fire-clays and some of the marls, have to be pulverized by machinery before they can be reduced to a sufficiently plastic condition. The red color of burnt bricks is caused by the presence of a small percentage of oxide of iron, generally the protoxide. When there is more than 10 per cent. of iron oxide present the clay burns to a blue and almost a black color. A large percentage of iron, if lime also or an excess of silica be present, renders the clay fusible. Some clays contain lime and very little or no iron. These burn white, and require a less intense heat than any other clays to produce hard brick, the lime being a flux on the silica. When carbonate of lime, whether as chalk, marl, nodules of calcareous petrifactions, or in any other form, is present in the clay, it is converted into quicklime in burning, and only such portions of it will combine with the silica and alumina as come into actual contact with them. The balance remains quicklime, which will slake when the bricks become wet, and destroy them. Hence clay containing too much carbonate of lime is unfit for bricks. Other clays contain iron and lime with an excess of the latter, in which case the bricks burn to a light dun or a whitish color. Magnesia generally produces a brown color.

The presence of iron pyrites is objectionable, for the burning expels the sulphur, leaving oxide of iron or a basic sulphate, which occupies less volume than the original pyrites, and makes the bricks porous and weak. Vegetable remains, such as roots, grass, etc., should be excluded for a similar reason.

It is impossible to ascertain, by chemical analysis alone, whether or not a given clay or any mixture of two or more clays will make good bricks. The best chemical tests will furnish only a close approximation. The composition of four clays—two suitable for common bricks and two for fire-brick—are given below. Nos. 3 (from Stourbridge, England) and 4 are the fire-brick clays:

	No. 1.	No. 2.	No. 3.	No. 4.
Silica	50.40	49.44	51.80	58.40
Alumina	24.00	34.26	30.40	35.78
Oxide of iron		7.74	4.14	3.02
Carbonate of lime	2.70	1.48	—	
" of magnesia	1.30	5.14	.30	2.72
Water, etc	21.60	1.94	13.11	
	100.	100.	99.95	99.92

Some of the fire-clays contain as high as 65½ to 66 per cent. of silica, 27½ to 26½ per cent. of alumina, and 5½ to 6 per cent. of oxide of iron, the balance being the alkalies and water.

Fire-bricks are used for lining furnaces, kilns, ovens, etc. subjected to an intense heat that would destroy common bricks or stone. The Stourbridge fire-bricks are noted for their excellence. The clay is dug up and exposed from three to eighteen months, according to the weather, in "spoil heaps," spread over as large an area as practicable, until thoroughly disintegrated by weather and frost; in winter three months will suffice. The clay weighs six tons to seven cubic yards, and some of the spoil heaps contain 10,000 tons. After weathering, the clay is ground in a circular pan under two cylindrical stone rollers, each weighing two and a half to three and a quarter tons, and faced with iron. After grinding, the clay is carried on an endless band to a "riddle" of 4 or 6 meshes to the inch for fire-bricks, 6 to 10 meshes for fine cement clay, and 12 to 14 meshes for glass-house or pot clay. After passing the riddle the clay is tempered with water to a suitable degree of plasticity, and is then passed through a cylindrical cast-iron pug-mill, where it is cut and stirred by revolving helicoidal blades, which force it out through an opening at the bottom in the form of a bar, which is received and carried by an endless band to the moulding shed. The fire-bricks are moulded by hand in the usual manner, dried in artificially heated sheds at a temperature of 60° to 70° F., or by the sun in clear weather. They are burned in circular domed kilns or cupolas called ovens, where they remain from eight to fourteen days, being subject to the intensity of flame or white heat for about four days and three nights. In burning, the heat is slowly increased and gradually lowered, and the burnt contents require seven days to cool. Most of the kilns contain 12,000 bricks—some, exceptionally, 30,000 to 35,000. The chimney-stack is on the outside, and the flame burns with a down draught, descending through holes in the floor. Coal is used for fuel.

Excellent fire-bricks are made in New Jersey at Perth Amboy, Woodbridge, South Amboy, Trenton, and other places in the vicinity. The process of manufacturing is essentially the same as for common bricks. The fire-clays

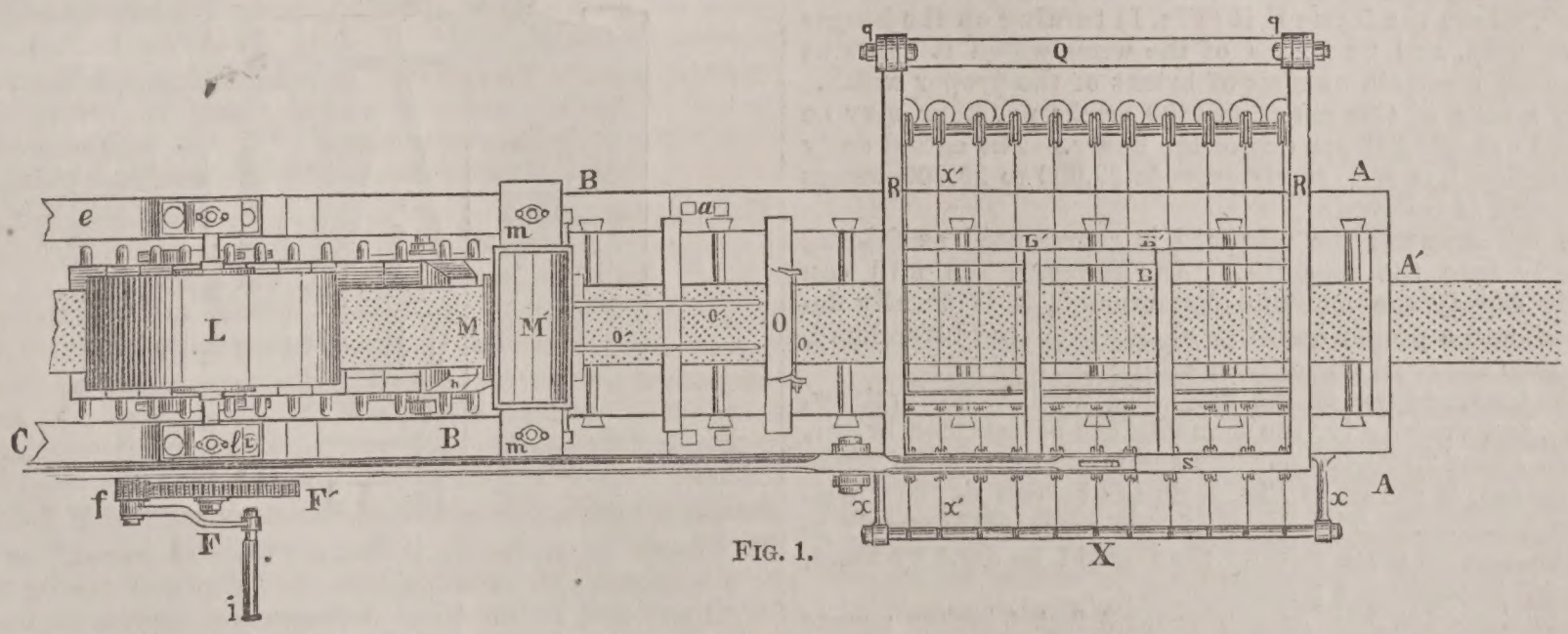


FIG. 1.

of these localities contain generally more alumina and less silica than those of Stourbridge, England, and are therefore richer, the alumina reaching in some cases as high as $37\frac{1}{10}$ to $39\frac{7}{10}$ per cent., with only $43\frac{2}{10}$ to $45\frac{3}{10}$ per cent. of silica. The composition of the bricks consists of about ⅝ raw clay, ⅛ cement, ⅛ kaolin, and ⅛ fine sand. The cement is fire-clay that has been burnt; the kaolin is a clay consisting of very fine sand, mica, and fire-clay, found in the vicinity, and the fine sand is clean coarse, angular-grained quartz, found remarkably pure near by.

Many machines have been employed for making bricks, of which two that have proved to be successful will be described. In the French machine, invented by M. Terrason-Fougères, the frame is composed of two side-pieces A B (Figs. 1 and 3) from sixteen to twenty feet long, framed together as shown in the figures, and mounted on wheels to permit of its being easily moved from place to place. The clay, being previously moistened, is fed to the pug-mill Y (Fig. 3) by means of an endless chain Z, the chain and mill being both operated by a sweep worked by from two to four horses. The clay, on feeding out of the pug-mill, is received upon a plank *k* (Figs. 2 and 3) supported on rods, and sanded to prevent adhesion. The width of the plank is equal, or nearly equal, to the length of the bricks to be made.

Three pairs of rollers D, E, G (Fig. 3) fastened under-

neath the frame give movement and direction to two endless belts H (Fig. 3) by means of a crank and pinion on the shaft E. On each belt is riveted or screwed a series of wooden blocks *h* (Fig. 3) exactly equal in size. Each block has a hole bored in it near the belt, through which the rods pass from side to side. The distance between the two belts can be regulated by sliding the rollers on their shafts, so that the space between the blocks *h* may be adjusted to the length of brick required. In the intervals between D, E, G the belts are supported on friction-rollers *i* (Fig. 3). Motion is given to the belt by means of the teeth *e* (Fig. 2), which take hold of the projecting ends of the rods *h'*.

The endless belts being put in motion, the plank *k*, loaded with clay, is drawn forward under the cylinder L (Figs. 1, 2, 3), which just grazes the top of the blocks *h*. The clay is thus pressed between the plank *k* and the cylinder L, and is prevented from spreading laterally by the blocks *h*. When one plank has advanced sufficiently, another is added, and so on.

The prism of clay, constantly advancing, comes next under the cylinder M (Figs. 1 and 3), which compresses it down to the thickness required, while two wires *n* (Fig. 3), one on each side, cut it to the desired width.

Passing through the die O (Figs. 1 and 3), the prism is brought to its accurate calibre. When working a prism

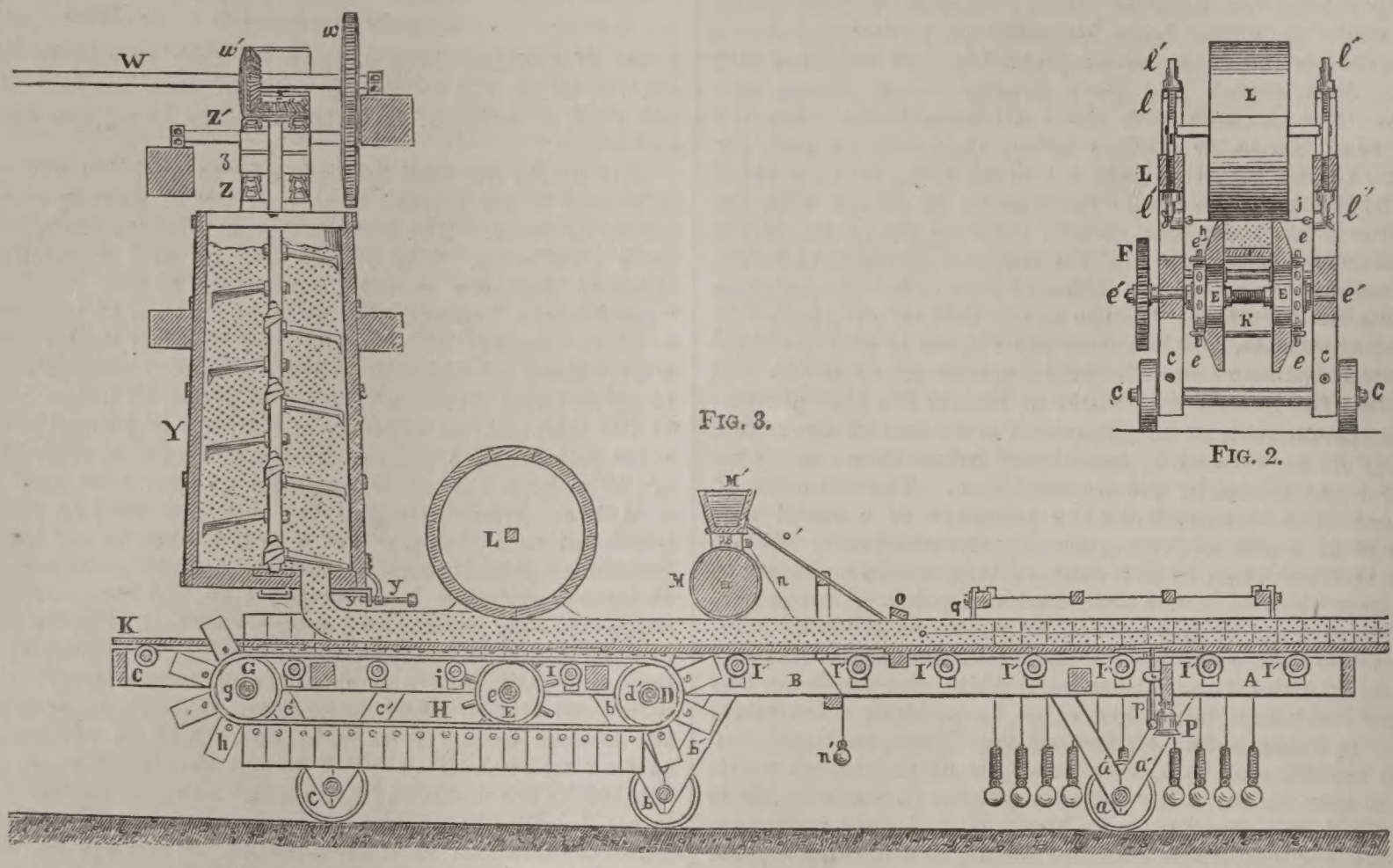


Fig. 3.

Fig. 2.

two bricks thick the die contains a wire *o* (Fig. 3) which cuts the mass horizontally.

The cylinder L is of wood; a wire *j* (Fig. 2) stretched between its lower surface and the top of the blocks H prevents the clay from adhering to it. The cylinder M is also of wood, but is surfaced with felt, kept constantly moistened. The die O is also supplied with a small stream of water from the same source, at its upper corners, through the tube *o'* (Fig. 3).

When the prism, after passing through the die, has advanced sufficiently far, a small chock upon the plank *k* rings a bell P, upon which the man who is turning the crank stops, and by means of a lever, not shown in the figure, allows the frame R R (Fig. 1) turning on the hinges *q q* to drop, and by means of the wires which it contains to cut off a certain number of bricks of the proper width.

By means of this machine 4800 bricks per hour may be turned out—48,000 per day of ten hours. The actual daily production, however, rarely exceeds 20,000 to 25,000, unless the crank is relieved.

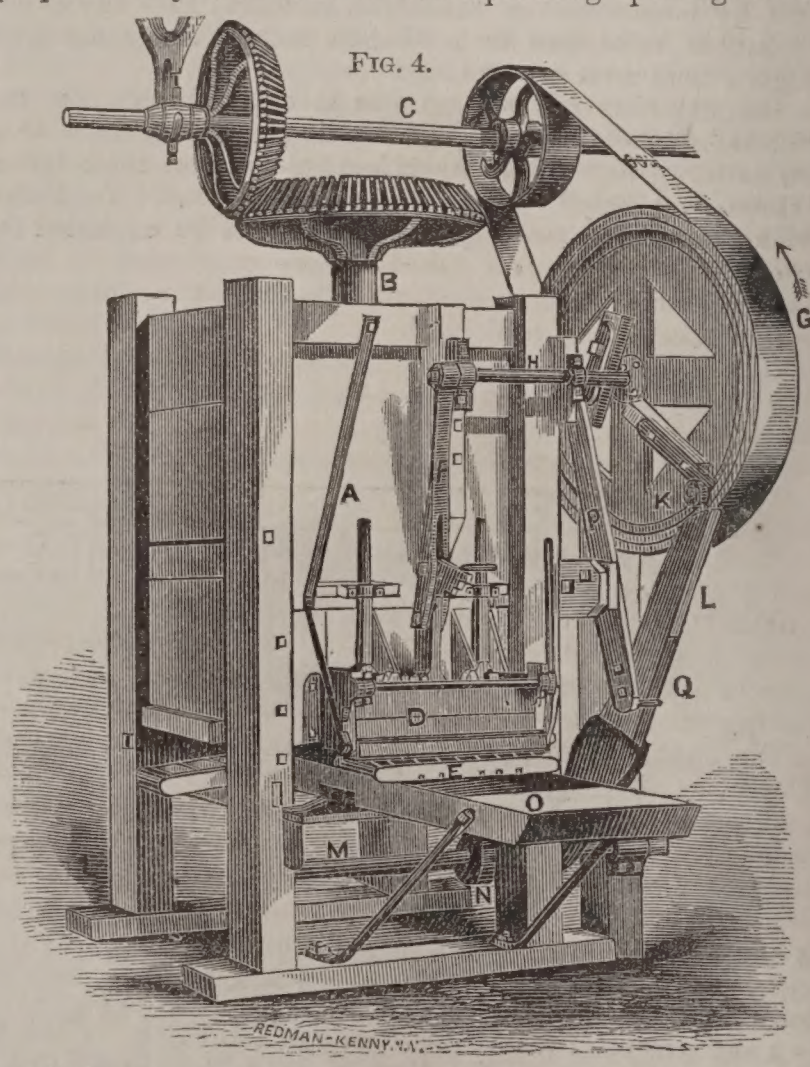
In the drawing the pug-mill is represented as feeding directly into the machine. As, however, the mill can rarely supply the machine fast enough, it is usually detached, and a proper quantity of clay prepared beforehand, and then shoveled on to the machine as required.

The leading type of the machines used at Haverstraw, N. Y., and vicinity for the manufacture of common bricks, where about 2,000,000 per day are made during the working season, is shown in Fig. 4, and is known as the "Vervalen machine." The object of this machine is merely to fill the moulds more rapidly than could be done by hand, and not to produce a pressed brick.

A is a wooden box or tub about 3 feet 4 inches square inside, and from 4 feet 6 inches to 5 feet high, into which the clay to be moulded is cast. B is a vertical iron shaft about 5 inches in diameter, geared with the engine shaft C, which imparts to it a horizontal rotary motion. The lower end of B is provided with a heavy casting, shaped like the letter S, called the *wiper*, which sweeps the clay through a lateral opening in the front side of A into the cast-iron box D.

The shaft B is provided with a number of projecting arms, from fourteen to twenty-two, which clear the sides of the tub by about one inch, and serve to mix the ingredients before they are expelled by the wiper. When, however, the clay is previously mixed by a tempering wheel, these arms are removed, leaving only the wiper, and the tub then serves merely as a hopper. The bottom of the cast-iron box D is provided with six openings, through which the prepared clay is forced into corresponding openings in the

Fig. 4.



mould E. A sort of rectangular piston works up and down in the box D by means of a connecting rod F run by a drum G. A crank at the end of the drum-shaft H communicates a stroke of about seven inches to the piston, which stroke, however, can be diminished at pleasure by shifting the position of a pin at the lower extremity of F. The bottom of the piston does not come nearer than about six inches to the bottom of the box D.

The action of the machine will now be readily under-

stood. The prepared clay is swept by the wiper out of A into D, whence it is expelled by a down stroke of the piston into a mould placed under it. While this mould is being filled an empty one is inserted behind it through the aperture I. The drum G continuing its revolution in the direction of the arrow, a cam K strikes the lever L, throwing it forward, as shown in the figure. It carries with it the shaft M, which by means of a horizontal rod attached to two cranks (one of which is shown partially in the figure at N) and passing behind the empty mould, forces it forward, thrusting out the full one upon the table O, and placing the empty mould in position to be filled. The drum G continuing its revolution, another cam, placed so as to clear the top of the lever L, strikes the upper arm of the lever P, causing it, by means of the projection Q, to return L to its primitive position. A chock prevents L from falling too far back. And so on.

Whenever the nature of the materials used admits, the mixture of the ingredients is made by the pug-mill working in the tub. In this case a rectangular pit is prepared directly behind the machine, capable of containing the amount of clay required for a day's work. The clay is placed over night in this pit, and is wet down with a certain amount of water, varying according to the nature of the clay used. In the morning the other ingredients, consisting of sand and anthracite coal-dust, are carted to the pit and roughly mixed by two spaders, who afterwards throw it up into the tub, where the pug-mill completes the mixing.

The proportion of sand used varies according to the quality of the clay and the relative proportions in which the two are found in the bank. It may be taken, on an average, at one-third sand to two-thirds clay. The Haverstraw sand is of excellent quality, and, more than the clay, gives the bricks of this locality their peculiar character. Coal-dust is used in the average proportion of 3 pecks to the 1000 bricks. For burning properly in the kilns, a certain number of what are called *double-coal* bricks is required, in which the proportion is about 5 bushels of dust per 1000 bricks. When mixed in a circular pit by means of a "tempering wheel," the clay and coal-dust are disposed in alternate layers and cut up by the wheel. The sand is then added, and incorporated by the wheel. This operation consumes the entire day.

When the moulds, which are made mostly of cherry or locust wood, and contain six bricks each, are thrust from under the press upon the table, they are placed on trucks and wheeled under the drying shed. The bricks are thrown out upon the flat. When sufficiently dry they are "edged up" by means of an instrument called an *edger*, then "spatted," or tapped with a flat board called a "spatter," to give them a clean edge, and then "hacked up," or placed in long and narrow rows on edge. When dry enough—that is, in one to three days, according to weather—they are built up in "arches," set on edge in the order called "three over one." The arches contain 28,000 to 35,000 bricks each, and are 6 bricks or 4 feet wide, about 44 bricks or 30 feet deep, and from 45 to 55 courses high. Each arch has an opening at the bottom—hence the name—in the centre of its width, in which the wood used in baking is placed. On the outside are placed the "double-coal" bricks, to the number of about 3000 per arch. Bricks containing only the usual proportion of coal would not burn properly at this distance from the fire.

A number of arches, five, ten, or more, are built up contiguously, so as to form a solid mass. The whole is then covered with a dry wall of baked bricks, the lower courses being one brick thick, and the rest half a brick. At the bottom they leave a vacancy between the wall and the face of the arch, which gives a batter to the covering wall, and affords a better draught. Arch-irons or cast-iron frames having an opening of about one square foot are inserted in the openings, and the whole is smeared over with clay. The heap so prepared is called a kiln. This system of burning is pursued rather than that with permanent kilns, on account of the greater number of bricks which may be burned in a given space. At Haverstraw, yards controlling only 200 feet frontage can thus make from 5,000,000 to 6,000,000 bricks per season of 150 working days.

About four cords of wood are used per arch, and the burning requires six days, fires being lit on Monday morning and drawn on Saturday evening. Moulding is usually carried on during the forenoon of each day—about five to six hours—the rest of the day being spent in "hacking up," etc.

The machines above mentioned turn out, in ordinary working, ten moulds or sixty bricks per minute, or 18,000 to 20,000 per forenoon. They require the following plant and help per machine: 25 moulds, 4 trucks, and 8 men. If operated by steam, a machine turning out 18,000 per day requires eight horse-power nominal, high pressure.

The standard of full work in this section is to turn out 1000 bricks per day for every soul employed, from the time the clay is dug till the bricks are loaded in the vessels. Thus, an establishment employing forty hands, all told, should turn out 40,000 bricks per day.

There are many other machines made besides those described; those which most merit attention are "Adams' Power Moulding Machine" and "Adams' Hand Machine."

In the first of these, the clay, having been previously tempered and mixed in a separate machine, is placed in a hopper, out of which it is forced into the moulds by the intermittent action of a helical screw turning with a vertical shaft in the hopper, and gearing only every alternate half revolution. This machine, as it admits of a more rapid feed of moulds, turns out nearly double the number of bricks that the Vervalen machine does, but it requires a large number (fourteen) of men to operate it, and from the nature of the mechanism cannot be run at a slower rate with less help.

Adams' hand machine is used for making the Croton or other face bricks. It is said to be the only machine in use which admits of using the very fine moulding sand which these bricks require. It works by the alternate up-and-down stroke of two rods, to which is attached a pair of iron plates hinged in the middle, like the cover of a book, so as to close when the rods are raised and open when they come down. Therefore, at the upward stroke they fall together and pass freely through the clay with which the hopper is charged, and on the down stroke open and press the clay into the mould. They are worked by hand. The moulds contain four bricks each. These machines require 9 moulds, 3 trucks, 4 men.

Q. A. GILLMORE, U. S. A.

Brick, Archæology of. This material has in recent times attracted much archæological interest. The Bible mentions brick as the material of which the tower of Babel was made: "Go to, let us make brick and burn them thoroughly" (Gen. xi. 5); and it is precisely in this region, the valleys of the Euphrates and Tigris, that the most interesting archæological remains of this character are found. The Babylonian bricks were usually burned in a kiln, while those of Nineveh were more frequently sun-dried. We learn also from the Bible that sun-dried bricks were extensively employed in Egypt; and that it was one of the principal employments of the enslaved Israelites to make such bricks, in which straw was mingled with the clay so as to increase the durability of the mass. But Egyptian buildings made of unburnt brick, even without straw, are still standing in good preservation. Some of these buildings are with confidence referred to the remotest periods of history. Similar though scarcely parallel examples of the durability and excellence of unburnt bricks are afforded by the *adobe* buildings of Mexico, New Mexico, and Arizona, many of which were erected by the natives long before the advent of the white race. Adobe buildings erected for public uses in Santa Fé, New Mexico, by the Spanish authorities long before the foundation of the English colonies of North America, are still in use, having stood for more than three centuries with but the most insignificant repairs. This durability, however, both in Egypt and Spanish America, is largely due to the dry weather which prevails in both regions, and is not observed in brick made from inferior clays. The ancient Peruvians made bricks of the greatest excellence, as well as sun-dried bricks of good quality. The Chinese have for ages made excellent bricks, to some of which they give a glazed surface, like that of porcelain. The people of India make bricks—those of some regions finely ornamented, and superior in quality to the bricks of Europe and America. The old ruins of Farther India and Java attest the antiquity of the art of brickmaking in those regions.

But the great discovery of the secret of the cuneiform writing (see CUNEIFORM INSCRIPTIONS, by the REV. W. H. WARD) has of late attracted renewed attention to the bricks of Babylon, each of which bears at least the name of some king (notably that of Nebuchadnezzar), the writing having been in most cases made upon the soft clay by a stylus of iron. This practice of marking bricks with some name, as that of the ruler or the manufacturer, has prevailed in other countries, notably in ancient Rome. The Romans made many public and private buildings of brick, often of excellent character; but in some of their subterranean water-courses, recently cleared out, the brick lining has disappeared, leaving a honeycomb of projecting mortar. It has been assumed that Roman brickmaking was derived from that of Greece, in the latter country a very important and extensive industry in ancient times; and the Greeks, it is stated, learned the art of brickmaking from the Egyptians. But if it were necessary to find any such origin for so universal an art in such countries, the Greeks might perhaps be imagined to have acquired it from the Assyrians in Cyprus, for there the two civilizations had a point of contact.

CHARLES W. GREENE.

Brick, a township of Ocean co., N. J. Pop. 2724.

Brick Creek, a township of Halifax co., Va. Pop. 5563.

Brick Meeting-House, a post-township of Cecil co., Md. Pop. 1564.

Bricks'burg, a post-village of Brick township, Ocean co., N. J., on the Raritan and Delaware Bay R. R., 44 miles S. by W. of New York. It is a new and thriving settlement, and has manufactures of lumber, sash and blinds, brick, etc. Considerable capital is invested in raising small fruits for market. It has one weekly paper, a ladies' seminary, and a fine public school building.

Bridesburg, a former township of Philadelphia co., Pa., now included within the limits of Philadelphia. It is about 7 miles N. by E. of the State-house. It contains a U. S. arsenal.

Bridewell, a name sometimes given to a house of correction for offenders. This name was originally applied to a well which was dedicated to Saint Bride in London, and a hospital founded on that site by Edward VI. Henry VIII. also built here about 1522 a palace called Bridewell, which Edward VI. gave to the city of London to be used as a workhouse and house of correction "for the strumpet and idle person, for the rioter that consumeth all, and the vagabond that will abide in no place."

Bridge. (*The etymology of the word is obscure; but, according to Richardson, its derivation is believed to imply that which reaches, stretches, or extends;* i. e. *from bank to bank, across a river, from side to side, point to point—anything built, raised, and stretched or extended across.*) If, as defined by Rankine (see ENGINEERING) the engineer "is he who by art and science makes the mechanical properties of matter serve the ends of man," it may further be said that the form of matter which earliest presented the problem of its reduction to subservience to his purposes was the *surface of the earth.* To a social being—a member of communities in which civilization has made any advances—paths of communication from place to place are among the earliest felt necessities; and in connection with them the surmounting, by bridges, of the barriers presented by ravines, rivulets, and rivers. In a rude state of society the most obvious and simple bridge is a tree thrown across the stream (if but a rivulet), and hence, says Rankine, "the first man who bridged a torrent with a fallen tree had in him something of the engineer;" putting bridge building among the very first exhibitions of the engineering art. Nor should it be overlooked that from the engineer's art, as exhibited in bridge-building, was derived the title of the Roman high priest; a title transmitted to the Roman *Bishop* and now symbolizing to the faithful of the Roman Church, the successor of St. Peter, the infallible head of the Church of Christ, otherwise styled THE POPE. The word "Pontiff," says Webster, is "said to be derived from *pons,* a bridge, and *facere,* to make, because the first bridge over the Tiber was constructed and consecrated by the high priest."

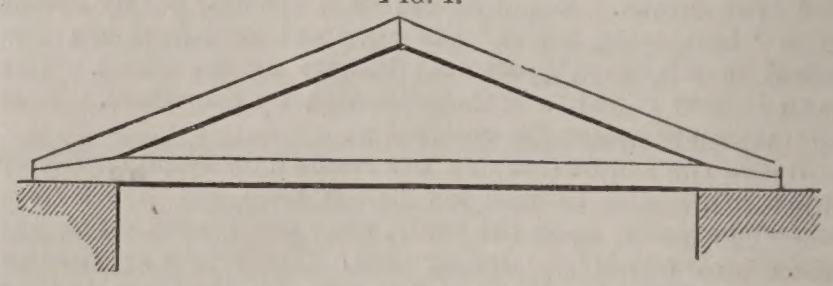
We have indicated the fallen tree as the rudest and, most probably, the earliest bridge. Singularly the next step in bridge-building seems to have been one which, in its full development, involves the refinements of the constructive art and of the mathematical science. "Another step in advance (Tomlinson's Encya. of the Useful Arts) is to stretch across a river a number of ropes, made of rushes or leathern thongs, secured on the opposite banks between trees and posts, and connected and covered, so as to form a slight bridge. This method is practised in some of the mountainous districts of South America. The ropes are formed of thongs of ox-hide, consisting of several strands, about six or eight inches in thickness, and across these, in a transverse direction, sticks are laid, and these are covered with a flooring of branches of trees. In other cases, an ox-hide rope is extended from one side of the river to the other, and is secured to each bank by means of strong posts. On one side is a kind of wheel, or winch, to straighten or slacken the rope, from which hangs, by a clue at each end, a kind of leathern hammock, capable of holding a man. A rope fastened to either clue, and extended to each side of the river, is used for drawing the hammock to the side intended. A push at its first setting off sends it quickly to the other side. Mules are carried over in this way."

To use these cables in pairs and to suspend from them a flooring is all that is needed to make a suspension bridge. "Such bridges are very numerous in various parts of the world. In China, where the germ of nearly everything connected with the Useful Arts is found, suspension bridges are formed of five parallel chains with links one foot in diameter, on which a loose bamboo flooring is laid. Another form is described as consisting of two parallel chains four feet apart, suspended over stone piers about eight feet high on each bank. The ends of the chains pass back from thence, turn obliquely, and are bedded in the rock, each being fastened round a large stone, which is kept down by a mass of smaller stones laid upon it. A plank about eight inches wide, extending across the river, is suspended from the chains by bands made of roots, of such length that the path is four feet below the chains in the middle of the length of the bridge. The suspending bands are renewed every year, and the planks are loose, so that any part can be prepared separately. The length of one of these bridges is described as being 59 feet. It is only used for foot-passengers; but it is a proper suspension bridge, with a horizontal platform suspended from the main chains."

But to return to the "fallen tree." Instead of "felling" a tree in place, the transition to stretching the trunk of a tree, a "log" or "beam," over a ravine with suitable, however rude, artificial bearing-points, or "abutments," is natural and obvious. As the art of "Carpentry" developed itself, and as a more scientific knowledge of the "Strength of Materials" was acquired—particularly in its applications to the resistance to flexure and stress of beams, the "Timber Bridge" becomes the natural development of the fallen tree. It would soon be discovered that the simple "beam" stretched between two bearing points would receive its *maximum* bending strain at its middle point; that thence, towards each abutment the strain would rapidly diminish. Hence, to get the greatest strength, with the least weight (for *its own weight* is the preponderating cause of strain) the obvious expedient of making the beam thicker in the middle.

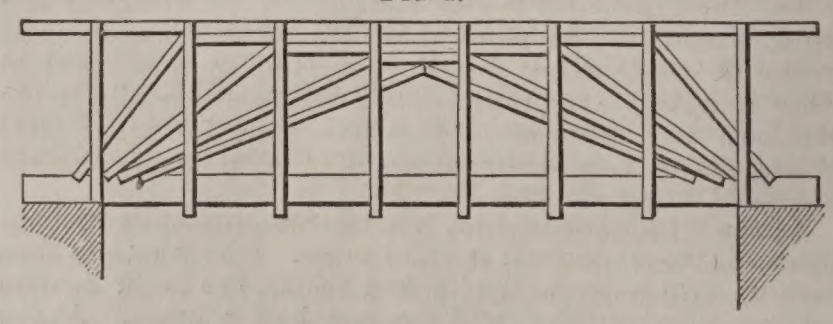
Again, the discovery would soon be made that the upper or top fibres of a beam are compressed and those at the bottom extended, while the middle ones are comparatively without strain; and the transition to the truss or framed girder in which the lower or tie-beams, alone, suffer extension—the upper, or brace timbers, are compressed.

FIG. 1.



In applying the above to long spans it becomes necessary that the lower or tie-beam (which may indeed be made up of more than one piece "fished" together) should have points of support intermediate between the two abutments; also that the upper (or *thrust*-bearing pieces) should be stiffened by the application of intermediate bearing points. To meet these requirements the truss assumes more complicated forms, thus:

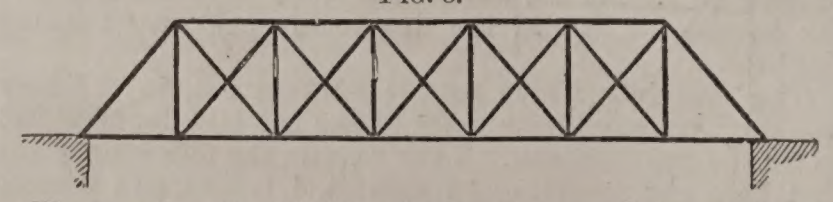
FIG. 2.



The latter figure exhibits nearly the principles of construction of the celebrated bridge over the Rhine at Schaffhausen.

Since, in a bent beam it is found that the top fibres are compressed, the bottom ones extended, while the middle ones, neither compressed nor extended (*longitudinally*) serve to bind the other parts together, an artificial beam on a large scale may be made by uniting the top and bottom longitudinal pieces by a web of diagonals which shall serve the purpose of the middle fibres of the pure beam. This is accomplished in the various kinds of "trusses" in which the upper and lower members are connected by different systems of diagonal bracing combined with vertical ties: as in Fig. 3.

FIG. 3.

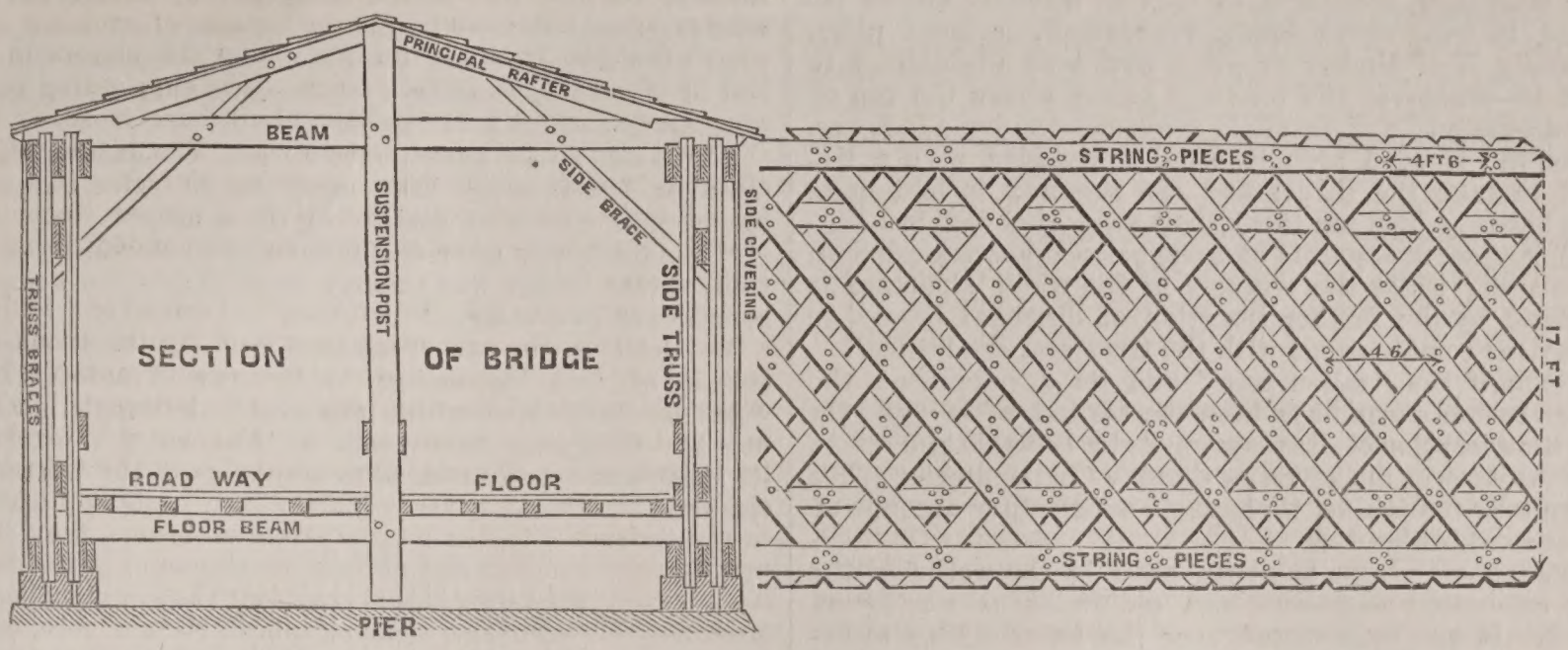


Hence, also, the "lattice bridge" so much in use for ordinary road bridges in this country, of which the sketches below exhibit the "Town" lattice.

The following is the inventor's statement of its merits.

1. There is no pressure against abutments or piers, as arched bridges have, and, consequently, perpendicular supports only are necessary. This saving in wide arches is very great; sometimes equal to *two-thirds* of the whole expense of the superstructure.

FIG. 4.



2. The shrinking of timber has little or no effect, as the strain upon each plank of the trusses, both of the braces and string-pieces, is an end-grain strain, or lengthwise of the wood, that is, a tension or thrust strain.

3. Suitable timber can be easily procured and sawed at common mills, as it requires no large or long timber. Defects in timber may be discovered, and wet and dry rot prevented much more easily than could be in large timber.

4. There is no iron-work required, which at best is not safe, especially in frosty weather. This fact has, of late, been abundantly and most satisfactorily proved.

* * * * * * *

8. Draws for shipping to pass through, may with perfect safety be introduced in any part of the bridge, without weakening it, as in arched bridges, where the strength and safety of the arches depend so much on their pressure against each other and the abutments, that a draw, by destroying the connection, weakens the whole superstructure; this advantage is of the greatest importance.

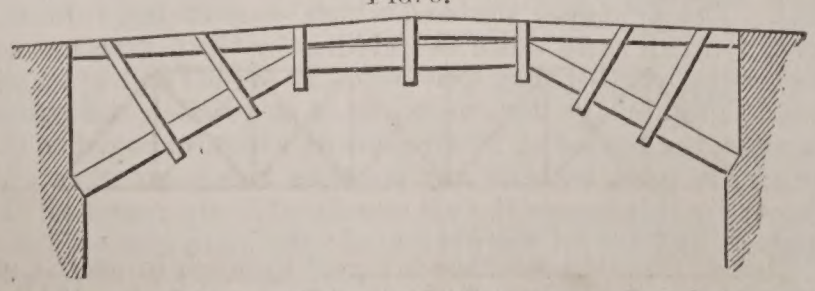
9. The great number of nearly equal parts or intersections, into which the strain occasioned by a great weight upon the bridge, is divided, is a very important advantage over any other mode; as by dividing the strain or stress into so many parts, that what falls upon any one part or joint is easily sustained by it, without either the mode of securing the joints, or the strength of the material, being insufficient. Such is the advantage of this mode in this one respect alone, that no substitute in other modes, that can possibly be introduced, will ever equal it; this is equal to mathematical truth, and cannot be erroneous.

10. The expense of the superstructure of a bridge of this kind, would not be more than two-thirds that of other modes of constructing one over the same span or opening. This is a very important consideration, especially in the southern and western states, where there are many wide rivers, and a very scattered population to defray the expenses of bridges.

In the "Dictionnaire des Arts et Manufactures," of Laboulaye (Paris, 1867), is the following: "the bridges thrown over American rivers attain dimensions of which we find no examples in France." * * * "Almost universally they present the characters of boldness and economy which American constructors know so well how to stamp upon their works. We shall here examine only the ingenious arrangement of 'lattice' bridges of Mr. Ithiel Town, which, under the name of *'ponts Americains'* is the only American bridge generally known in France. This quite new combination of *bois de charpente* offers in many cases incontestable advantages."

Familiarity with the principles by which weight-bearing power is obtained in the simple truss (Fig. 1) would soon suggest the fact that the top or *thrust* bearing timbers would sustain weight even though the bottom, or *tie-beam*,

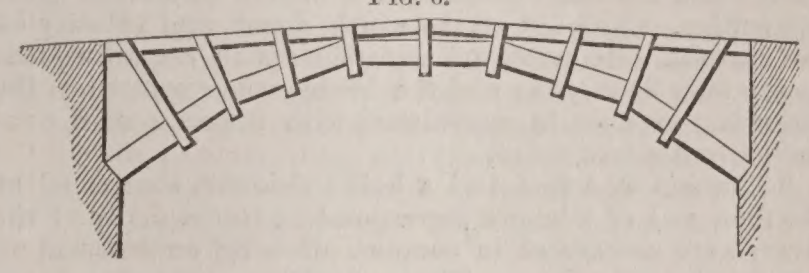
FIG. 5.



were removed, *provided a substitute were found in fixed abutments.* From this idea proceed various forms which are analogous to the *arch* in masonry. One of the most simple is shown in Fig. 5.

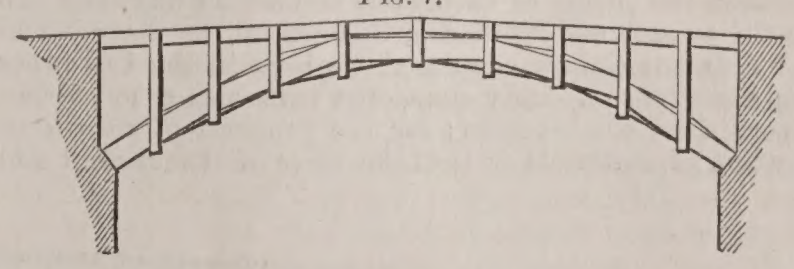
By dividing the span into shorter lengths than is here shown, little or no advantage is gained, because the angles of junction become more obtuse or open, and the strain in the direction of the pieces is much increased. Although such a bridge might bear a constant load, a load moving over it would soon derange it, because the strength of such a system to resist a variable load must depend wholly on the strength of the joinings, which cannot be made very strong. (Fig. 6.)

FIG. 6.



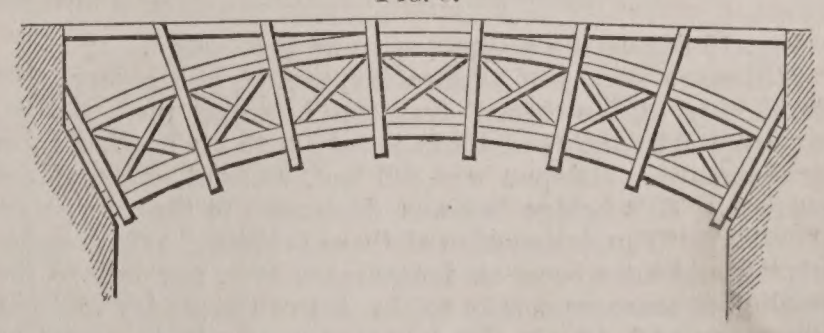
Combinations of this kind naturally lead to the continued curved rib which possesses advantages not found in a series of beams merely abutting end to end; for when the rib is built of short lengths with the joints crossed and the different thicknesses firmly bolted together it becomes as one solid beam. (Fig. 7.)

FIG. 7.



As a bridge with a curved rib and of considerable span yields at the centre, by depression, and at points midway between the centre and abutments, by elevation, when the load is applied at the middle, the strength must be increased by increasing the depth of the rib. This leads to the construction of a framed rib, Fig. 8. But in such case the two curved ribs must be continuous, and put together so as to resist either extension or compression.

FIG. 8.



The analogy of such structures to the arch proper has been already suggested; it is only an analogy however—that is, they have *some* of the properties of the masonry arch. But the essential characteristic of the arch proper is that it is composed of isolated members (voussoirs) whereas in timber, *continuity* is one of the elements of strength and, says Tredgold, "it is losing one of the greatest advantages of the material to interrupt the connection of the parts; besides, many joints should be avoided, on account of the difficulty of making them fit so as to

bring every part alike into action, and also of the difficulty of preventing decay at the joinings."

Inasmuch as the thrust of such structures against the abutments, when heavily loaded, must be great, while their weight is, compared to that of masonry arches intended to bear equal loads, very small, isolated piers, especially if of timber or piles, would be ill-adapted to resist it—moreover the roadway passes above the top of such arches while it is often convenient to have it lower. Hence, the wooden arch is usually provided with a tie-beam to take the thrust and the roadway is laid upon these beams, which are themselves supported (against sagging) at numerous points by suspension braces running up to the arch; while the stiffness of the whole structure is increased by the further insertion of diagonal braces, or by various combinations with the truss and the lattice.

Although the "fallen tree" and its development, the timber bridge, must have been the earliest of bridges yet with the exception of drawings made by Palladio and others from the description given in Cæsar's Commentaries of his bridge over the Rhine, we have no satisfactory account of any ancient bridge.*

This famous bridge has been cited in the works of the most celebrated engineers and architects as worthy of record. It was constructed over the lower Rhine somewhere between Emerich and the Wesel, perhaps (and quite probably when the situation of Cæsar's camp at that time is considered) at the very place where the city first named is now built. Its length must have been somewhere between 550 and 650 yards. Cæsar (according to Rondelet) describes his own work as follows:

"Urged by these powerful motives Cæsar resolved to cross the Rhine with his army. The use of boats offered no sufficient security for such an operation, and, moreover, a resort to this means seemed to him unworthy of his glory and of the honor of the Roman name. On the other hand the establishment of a bridge presented great difficulties on account of the width, depth, and velocity of the current. He persisted nevertheless in regarding this as the only fit means; and the bridge was executed in the following manner in accordance with the idea of it conceived in his own mind.

"Timbers of a foot and a half thickness, sharpened at the foot, and of a length corresponding to the depth of the river, were assembled in couples, allowing an interval of two feet between them. Thus united by means of suitable apparatus, they were let down into the water, not vertically like ordinary piles, but inclined in the direction of the current, and thus driven. Another couple with opposite inclination was then fixed (or driven) 40 feet below the first. These double pieces, thus disposed, received at their extremity a beam of 2 feet thickness which filled the interval between the pieces of each pair, and which was thus supported at each end by double ties.

"This frame-work composed of pieces inclined in opposing directions, strongly connected with each other, formed a very solid combination; for the property of such a disposition of materials is that the force of the current adds to its stability by exerting a strong pressure on the assemblage.

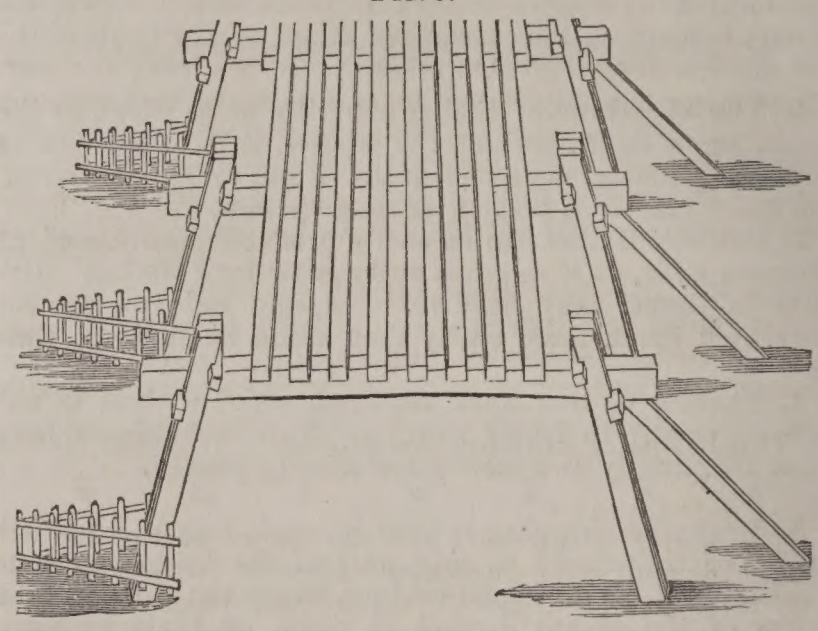
"After making a number of similar structures, placed at equal distances and extending from shore to shore, a continuous flooring was added composed of beams covered with fascines. Besides these arrangements inclined (brace) piles were driven on the lower side and connected with the rest of the work, forming a *whole* capable of resisting the greatest impetuosity of the current.

"The same was done above to protect against floating trees or boats which the enemy might send down the stream with a view of destroying the structure.

"The tenth day after the cutting and assembling of the timbers, the bridge was entirely finished and the army accomplished its passage."

Rondelet gives two "restorations" (as they may be called) of this interesting bridge (see Plate XCVIII. "Art de Batir"), of which the sketch herewith is one;* but the foregoing description is, like all the works of its great author, so lucid as to scarce need pictorial illustration.

FIG. 9.



Among the earlier wooden bridges of which we have record the boldest and most ingeniously constructed was that at Schaffhausen on the Rhine.

A stone bridge that had spanned the Rhine here having fallen, and the project of rebuilding it being found impracticable, Ulric Grubenmann, a common carpenter of Tueffen, produced a model for a wooden bridge, supported only by the abutments on the banks of the river. After some hesitation on the part of the committee of Schaffhausen, his proposal was adopted, and he completed this truly extraordinary work in the year 1758. The total length of the bridge was 364 feet, and its breadth 18 feet. It was eight feet out of a straight line, the angle pointing down the river; and 171 feet from the town abutment. This magnificent and ingenious bridge was destroyed by the French in April 1799.

FIG. 10.

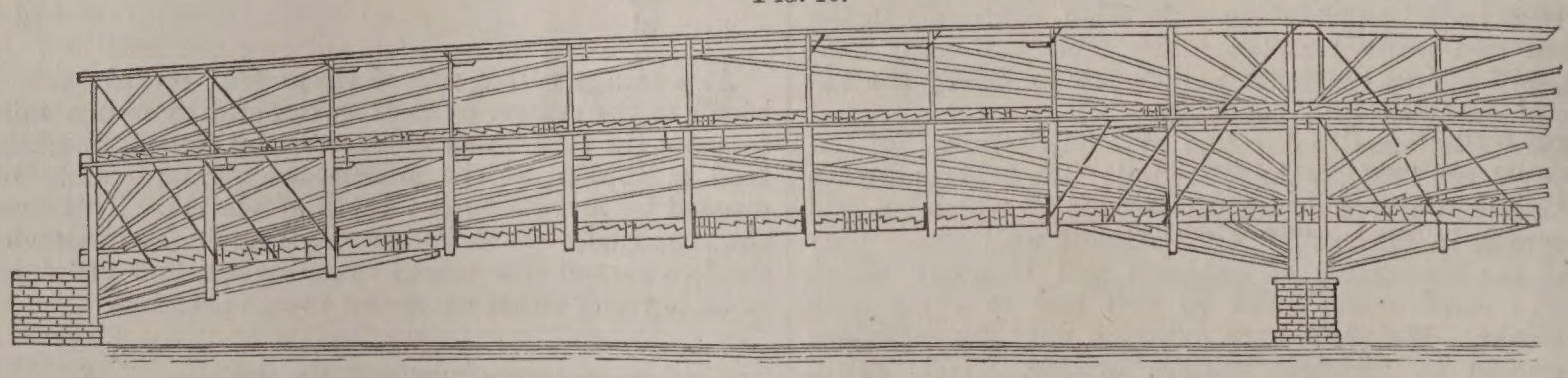


Fig. 10 represents a single span of the bridge.

Still more worthy of admiration, though less known, was the bridge of Wettingen over the Limmat, near Baden, constructed by the same Ulric jointly with his brother John Grubenmann. Its span was 366 feet, without intermediate support. This bridge too was destroyed in the campaign of 1799. "The destruction of these bridges," says Rondelet, "would have been an irreparable loss, not only to the public but more especially to the Art of Carpentry had not the plans and details, the knowledge of which cannot be too widely disseminated, been carefully preserved."

Fig. 11 represents a half span.

In our own country, until the comparatively recent introduction of iron, timber has been *almost* exclusively employed in Bridge-building, the early history of which describes many noteworthy structures. The most remarkable of these was that over the Schuylkill at Philadelphia, styled by its builder, Lewis Wernwag, "The Colossus of Fairmount." It is thus described by Cresy.

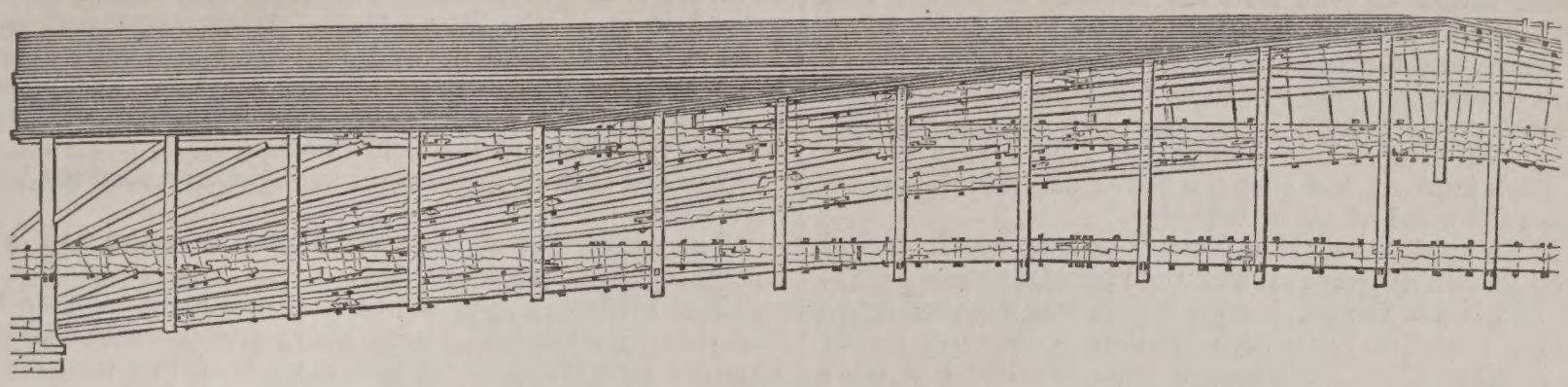
"It was a beautiful piece of carpentry, composed of a single arch, the span of which was 340 feet, and it had no other support than that of the two abutments; the versed sine was 38 feet, and the breadth of the carriage way 30 feet. The principal timbers, which were of large dimension, were all sawn down the middle, for the purpose of ascertaining whether they were perfectly sound; and when applied to the bridge they were placed at a sufficient distance to allow the tenons of 29 king-posts, which radiated to the centre, to pass, without any mortises being cut to receive them; by this means the air circulated freely round all the timbers, and dry rot was prevented: the main ribs consisted

* The oldest wooden bridge on record is the bridge of Sublicius which existed at Rome 500 years B.C. It is celebrated for the combat of Horatius Cocles, a Roman knight, who saved the city by his noble defence of this bridge. It is stated to have been put together without iron or nails. (Tomlinson.)

* There is also one in the book of Thomas Pope, cited hereafter.

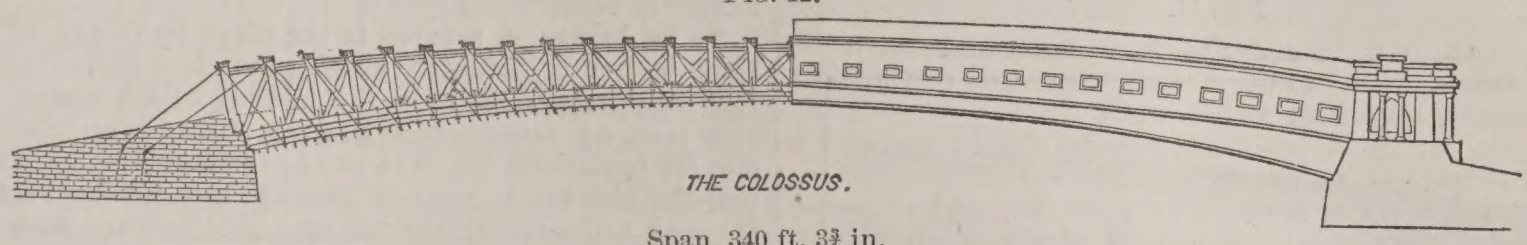
of three double rows of timber, laid three deep, or one above the other, the whole bound together strongly with wrought iron. Between the tops of the king-posts straining beams were introduced, which kept the heads from approaching each other, and in addition two other timbers, placed diagonally like St. Andrew's cross, were inserted in each of the

FIG. 11.



divisions, strutting the king-posts more firmly and preventing the arch from springing. The abutments, against which the timber arch pressed, were of solid masonry, and carried up considerably higher than the top of the arch. The floor of the bridge was upon girders, laid upon shoulders formed in the sides of the king-posts, to which they were firmly bolted: on the tops of the kings, and in the direction of the transverse girders, were the tie-beams of the roof; these latter not only served to maintain the roof securely, but also the heads of the kings in their perpendicular and proper position. The roof was lightly formed, and the sides of the bridge were close boarded, so that the timbers, or the principles of their construction, could not be seen." Fig. 12 exhibits the arrangement described; its great simplicity compared with the two just before described is striking. The builder asserts that he can build to 500 feet span "by making the ribs of more pieces in depth and thickness and all the parts in proportion."

FIG. 12.



Span, 340 ft. 3¾ in.

This beautiful structure was compared by Fanny Kemble in her "Journal," to "a scarf rounded by the wind and flung over the river."

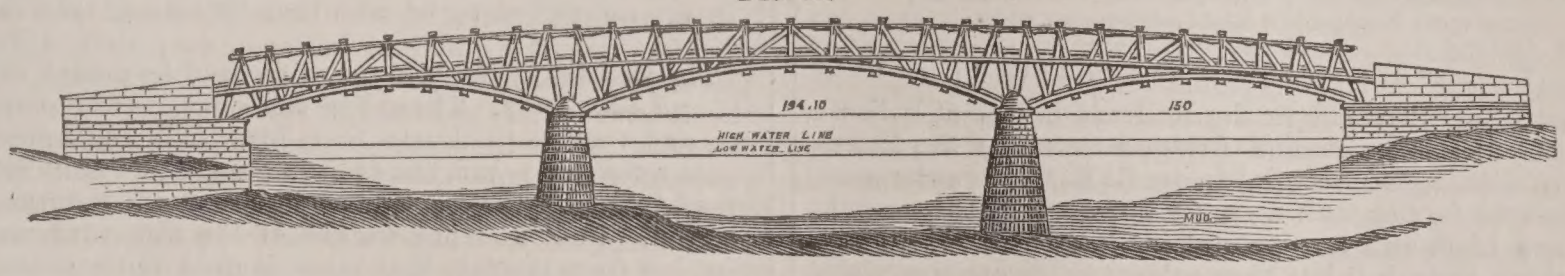
The writer is informed that the upper part of the west abutment had yielded (receded) three or four inches under the thrust of the arch but, apparently, without detriment to stability. On one occasion an unusual load (a heavy stone) was allowed to pass over this single stretch of 340 feet 3¾ inches (the accurate lineal span) which had been refused passage over the Market street triple span bridge. (See Fig. 13.)

Like its famous predecessors of Schaffhausen and Wettingen, this beautiful structure has ceased to exist; not like them a victim of "man's ravage," but of the arch enemy to all wooden monuments—accidental combustion (1838).

Another notable bridge was thrown over the Schuylkill at a much earlier period of which a sketch is given herewith.

It is described by Thomas Pope * as follows:

FIG. 13.



"It is composed of three arcs of wood, supported by two stone piers, with two abutments and wing-walls. The western pier is sunk in an astonishing depth of water, perhaps greater than ever any bridge pier was before sunk, in any part of the world; the surface of the rock on which it is placed being forty-one feet nine inches below common high tides. The piers were built with coffer-dams. The dam for the western pier was curiously constructed, from a design furnished by Mr. William Weston, a celebrated hydraulic engineer of Gainsborough, in England. We may have some conception of its magnitude when we are told that eight hundred thousand feet of timber were employed in it."

* * * * * * *

"The eastern abutment and wing-walls are founded on a rock. Those on the western side are built on piles. There are upwards of seven thousand five hundred tons of masonry in the western pier. Many of the stones composing both piers weigh from three to twelve tons. A number of massive chains are stretched in various positions across the piers. These are worked in with the masonry, the exterior of which is clamped, and finished in the most substantial and workmanlike style.

"The frame of the superstructure was designed and erected by Timothy Palmer of Newburyport, Massachusetts. It is a masterly piece of workmanship, combining in its principles that of king-posts and braces with that of a stone arc. Half of each post, with the brace between them, will form the voussoir of an arc, and lines through the middle of each post would describe the radii or joints."

Another notable bridge is described by the same author as follows:

"PISCATAQUA BRIDGE. In the year one thousand seven hundred and ninety-four, a bridge was built over the River Piscataqua, seven miles above Portsmouth. Its length is twenty-six hundred feet; of which twenty-two hundred feet are planked. The greater part of this Bridge is built of piles driven into the bed of the river in the common way. But that part which engages the attention of travellers, is an arc nearly in the centre of the river, uniting two islands, over water forty-six feet deep. This stupendous arc of two hundred and forty-four feet on the chord, is allowed to be a masterly piece of Architecture, planned and built by the ingenious Mr. Timothy Palmer of Newburyport. This bridge cost the proprietors sixty-eight thousand dollars."

This bridge is alluded to in the Edinburgh Encyclopædia as one over the "Portsmouth River;" and by Col. Douglass in his work on military bridges, who says: "It was put together with wooden keys, on Price's method of construction, applied to a larger span, except that there is some difference in the form of the keys." The writer observes that the arch is extremely flexible, and that diagonal braces would be an improvement in it. Also that if the three ribs had been placed close above one another, and firmly connected together, the bridge would have been much better adapted to resist any unequal load, because, in such case, they would have formed a solid beam, equal in depth to the sum of their depths.

And even Tredgold treats of it, saying "it would have been still better to have made the same quantity of timber into two ribs, with cross ties and diagonal braces between them; that the method of connecting the parts by means of dove-tail keys is objectionable, as the timber must be greatly weakened by such large mortices, and a very slight degree of shrinkage renders them useless; that it is still more objectionable as applied to the radial pieces, which would have been much better notched on in pairs, and bolted through."

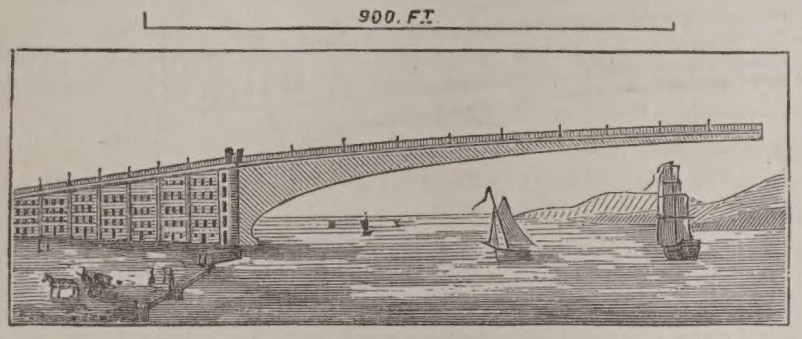
* "A Treatise on Bridge Architecture," New York, 1811. A very curious, and, as a history of bridge-building up to that date, valuable book. The Society and Mercantile Libraries possess copies.

The special object of the work of Thomas Pope was to promulgate the project of a "Patent Bridge" of his own. "A model was built to illustrate a Bridge suitable to span the East River at New York, with a single arc, the chord of which would be 1800 feet, the altitude or versed sine 223 feet, the abutments were built in the form of so many warehouses, and the whole was erected by a scale of ⅜ of an inch to one foot; the length of model of half bridge, in real measure, is nearly fifty feet. The weight that the unsupported arm of this diminutive Model bore at one time, since finished, has been ten tons; and which has astonished the mind of every beholder."

"The Shipwrights of New York" (among which we find the well-known names of HENRY ECKFORD, Christian Bergh, Adam and Noah Brown, Joseph Webb, &c., &c.) certify to the effect that "we have no hesitation in asserting as our joint opinion, that the strength thus furnished is more than equal to all that can be needed."

The plan is not without merits; but the time when "Rivers North and East may have a Bridge," waited for a Roebling. The inventor gives his plan of construction in great detail, together with a view twice repeated of the entire bridge spanning "the spacious Hudson." But inasmuch as it was to be projected out from its abutments without aid of centreing or "false works," he has given a view (Fig. 14) of the *half* bridge thus projected, with the motto:

FIG. 14.



"Like half a rainbow rising on yon shore
While its twin partner spans the semi o'er
And makes a perfect whole that need not part
Till time has furnished us a nobler art."

But the frontispiece exhibits the "perfect whole" striding the "Broad Hudson," with the more ambitious motto:

"Let the Broad Arch the spacious Hudson stride,
And span Columbia's Rivers far more wide,
Convince the world America begins,
To foster Arts the ancient work of Kings."

Of recent wooden bridges, the Railroad bridge at Bellows Falls, and the Susquehanna Bridge erected by the Philadelphia, Wilmington, and Baltimore R. R. Co., are the most notable—the former with spans of 250 feet has been standing since 1850, and has proved as efficient as any of less dimensions, though it has been subject to uncommon trials. The centre deflection, when this bridge was tested by three heavy locomotives, drawing a freight train at a speed of 25 miles to the hour, was nine-tenths of an inch, the permanent set remaining being about one-sixteenth of an inch. This bridge was designed and built by Parker, and was the first timber bridge for a railroad of so long a span, erected in this or any other country.

The Susquehanna Bridge, also designed by Mr. Parker, is thus described by him:

"The structure between the shores of the river is about three thousand five hundred feet in length. It has thirteen supporting piers and two guard piers at the draw, and two abutments. The piers are built in water varying from ten to forty-five feet in depth. The spans are two hundred and fifty feet in length between bearings. The draw span is one hundred and seventy-six feet long. Height of superstructure twenty-five feet. The superstructure is an improved form of the Howe truss. When completed each truss is to be encased entirely in iron, thus making it fireproof and free from exposure to the weather. The peculiarity of the hydraulic engineering connected with this work is the disuse of the Coffer dam.

"Instead thereof water-tight wrought-iron caissons have been used.

"The whole cost of the magnificent structure has been something less than $2,000,000.

"The bridge is approached from the main road on the east side by a track laid over heavy trestle work, fourteen hundred feet long. This trestle work is but temporary, and, as soon as practicable, will be replaced by an earth embankment, supported by retaining walls of appropriate masonry. At the end of this is a firm abutment of strong masonry, handsomely constructed of granite from the quarries in the vicinity of Port Deposit, only six miles from the structure. This granite is of a dark color, of elegant appearance when worked, and is said to be the hardest and heaviest in the world—heavier by three pounds to the cubic foot than that of the famous Egyptian Pyramids. There is one of these abutments in each end, similarly constructed.

"The bridge is secured to the piers by means of bolts, three inches in diameter, which pass through holes drilled for that purpose to near the surface of the water, where they are, by means of a ring at the end, attached to a similar horizontal bar that passes through the sides of the pier." The upper ends of these perpendicular bars pass through a heavy oak bolster, and are fastened with a nut at the top, by means of the screw, upon which they can be tightened if occasion should require.

"The timber of this structure has been very carefully selected. It has also gone through the process of Burnettizing, by which its durability is not only increased at least two-fold, but by which it is rendered indestructible by fire. This treatment was applied by Mr. Charles P. Bent, who has an establishment for the purpose at Perryville, and several others upon railroads in different States."

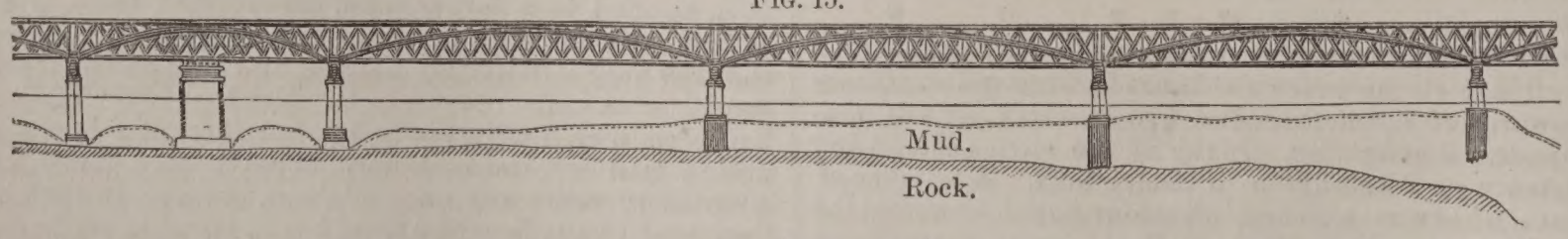
"This process is familiar to our readers, and consists in removing air, etc., from the fibres of the wood, by placing it in an exhausted vessel and then injecting chloride of zinc."

"The timbers of the bridge are secured by means of iron bars and butt seats. These bars are about twenty-five feet long, and vary in thickness from one to three inches, the largest weighing seven hundred pounds. In the construction of the bridge nearly seventeen hundred of these bars are used. The immense weight of the structure may be estimated from the fact that there is used upon each span about two hundred tons of wood and iron. Iron is much more extensively used than is common in timber structures. As an instance, the bottom chords, where most exposed to a tensile strain, are entirely sheathed on the sides with plate iron three-eighths of an inch thick."

"For five years from five hundred to one thousand men have been employed upon this great work. Upon its construction nearly five million feet of timber, twenty thousand cubic yards of masonry, three million pounds of wrought and cast iron have been used."

Fig. 15 exhibits an elevation of four spans, including the draw, of the bridge just described.

FIG. 15.



To convey an adequate idea of the relative merits of the different kinds of "truss" for wooden bridges (known as Burr's, Long's, Howe's, "McCallum's inflexible arch," etc.) would require more space than can be devoted to it in a work not professedly technical. The clearest description and analysis of merits will be found in Spon's Dictionary of Engineering, or Cresy's Encyclopædia.

Although, as we have seen, suspension bridges of a simple character are among the primitive structures of mankind, yet their development into important structures capable of meeting the needs of civilized intercourse, demanded an advance in the scientific knowledge of materials and the principles of construction, which has only been made within the last two or three centuries. Bridges of rope or cordage are described in works on Military Engineering early in the 17th century; and in 1741 the first European Chain Bridge was built in England across the Tees. It was a rude work attracting no attention at the time; and not until 1814 did English engineers apply themselves to their construction. In our own country, in reality, was the Suspension or (as it was called) the "Chain Bridge" first introduced. Thomas Pope states that a "Patent Chain Bridge" was patented by James Finlay in 1808 and that there existed eight of these bridges. In the "Portfolio" of June, 1810, is the following descriptive notice of four of the eight:

First bridge erected on this plan in 1801 was on Jacob's Creek, 70 feet span, 12½ feet wide, and warranted for 50 years (all but flooring), cost $6,000. Exclusive right secured by patent 1808. Largest at Falls of Schuylkill, 306

feet span, aided by intermediate pier; passage 18 feet wide, supported by 2 chains of 1½ inch square bar.

One at Cumberland, Md., supported by two chains of 1¼ inch bar; span 130 feet, 15 feet wide.

Another over the *Potomack* above the Federal city of nearly the same dimensions as at Cumberland. (Fig. 16.)

The "Portfolio" mentions besides the foregoing (making up the eight of Thomas Pope):

Fig. 16.

One over the Brandywine at Wilmington, 145 feet span, no pier, thirty feet wide, supported by four chains of inch and three-eighths bar. Two carriage-ways and one foot path.

One at Brownsville, Fayette County, one hundred and twenty feet long, eighteen feet wide, one inch and a quarter bar.

One near the same place, one hundred and twelve feet long, fifteen feet wide, one inch and a quarter bar.

Finlay says that he entered into an agreement with John Templeman* of Georgetown, Md., concerning the disposition of his patent right, and hence we presume the attributing of the *Powtowmack* bridge to the latter in some publications, as he was probably its *builder*.

This latter bridge has a history: it was standing in the beginning of 1839 when the writer, in company with the present Quarter Master General of the U. S. Army, who has kindly furnished these items of information, crossed it. Not long after it was carried away by a freshet, replaced by a truss bridge (Long's probably), and that by two spans of iron (by Geo. Thom) which fell before completion; when Randolph Coyle built a wooden bridge over the *whole* Potomac bed, doing away with the *causeway* which, in restricting the flood-water area, had caused the destruction of the original "Chain Bridge." This last is thus alluded to in the "Report on the Defenses of Washington." (Prof. Papers, Corps of Eng'rs., No. 20.)

"The Chain Bridge (for the *name* still holds) owed its name to a former suspension structure, long since carried away by floods. It had been replaced by a fine timber trussed bridge of over four hundred yards in length, resting on masonry abutments and seven masonry piers. At ordinary stages the river, rapid and unfordable, flowed beneath the single span next the Virginia shore; the rest of the bed being dry and strewn with fragments of rocks of large size. At high stages the whole width spanned was swept over by a furious flood. This was the sole existing bridge between Washington and Harper's Ferry at the breaking out of the war, the one formerly existing at Berlin having been destroyed by fire. It connected Washington with the Leesburg Turnpike and neighboring parts of Virginia. Its ordinary uses ceased with the outbreak of the war, but it immediately acquired a high military importance. Though not strictly necessary to a mere passive defence of Washington, it had, nevertheless, a high incidental utility as a means of maintaining communication with the Virginia theatre of war, and of throwing forces on the flank of an enemy menacing the lines of Arlington."

The existing timber trusses have decayed, and are soon to be replaced by others of iron.

Thomas Pope, in commenting upon the accounts of the ancient bridge of Bootan, East Indies, says, "the mode of construction is so exactly similar to those we see erected lately in the United States that we are ready to conclude the ancients lived yesterday."

"Were the Chain Bridges erected of late in the U. S. a new invention, the notorious defects contained in the system would remain the same.

"It is an axiom that when a structure of any kind depends wholly on two parts, if one of these parts fail and the other is not competent to support the whole a downfall must ensue; hence we infer there can be no security in a bridge wholly dependent on two chains, &c., &c." Knowing only *chain* bridges he almost anticipates Roebling when the latter says "there is not one good suspension bridge in Great Britain, nor will they ever succeed as long as they remain attached to these *chains*, and present mode of superstructure."

In 1814 Telford undertook a course of experiments upon the tenacity of malleable iron prompted by the necessity of such knowledge to the testing of the feasibility of such bridges with large spans and thus epitomizes his results:

"From these experiments I had reason to be satisfied that English iron made with wood charcoal, had sufficient tenacity to bear itself, and a portion to spare equal to the purposes of a bridge across an opening of 1000 feet, and therefore considered myself justified in proceeding to form designs."

The Menai Bridge, commenced in 1819, and finished in 1826, was the culmination of Telford's labor in this connection; but several smaller suspension bridges had been previously erected in England, among others that across the Tweed at Dryburgh Abbey on the system of "inclined wires." In 1818, six months after the completion of the bridge, a violent gale of wind caused so great a vibration of the chains that the longest chains broke, the platform was carried away and the whole bridge destroyed. The vertical motion of the roadway was said to be, just before breaking, as great as the horizontal motion, and sufficiently violent to have thrown a person off the bridge.

The Menai Bridge has a clear span between the summits of the main pyramids of 579 feet 10½ inches.

The deflection of the chains in the middle.....	43 ft. 0 in.
The clear height of the roadway above high water...	102 ft. 0 in.
Breadth of the platform.....	28 ft. 0 in.

The main chains are on Capt. Brown's plan of straight bars, united by coupling bolts. The main chains are 16 in number, each containing a series of links composed of 5 wrought-iron bars, 9 feet 1¼ inch long, 3¼ inches broad, and 1 inch thick. They are disposed, four chains one under the other, on each side of the central footpath, and four at each outside of the platform. So that there are in all 80 bars in the main chains, and their united section is $80 \times 3\frac{1}{4} = 260$ square inches of iron. The bars are united by coupling plates 16 inches long, 7½ inches broad, by 1 inch thick, and screw-bolts 3 inches diameter, each bolt weighing 56 lbs.

This bridge was seriously injured by a violent gale and has been strengthened.

The Conway Bridge completed at the same time differs but little in construction from the Menai. Its span is but 327 feet.

The Brighton Chain-Pier on the same plan consisted of four spans each of 225 feet running out into the sea 1014 feet from its origin in the esplanade wall and was built in

* John Templeman subsequently constructed the Chain Bridge over the Merrimac three miles above Newburyport. This was a much superior work to those just described. The span was two hundred and forty-four feet, and width thirty feet, with two roadways of fifteen feet each. The abutments were of masonry forty-seven feet long and thirty-seven feet high, upon which supporting towers were erected. Ten chains, three at each outer edge of the bridge, and four in the centre, were made to bear, with perfect safety, five hundred tons.

1822–23. "It withstood the shock of many a violent tempest; but at length, in November, 1836, it yielded to a gale of wind. The roadway of the pier gave way half an hour after midday of the 29th, about which time Osler's anemometer recorded the pressure caused by the wind's force at Birmingham as equal to 11½ pounds on the square foot.* The barometer at Greenwich had sunk to 29.24; the wind's force there also being denoted by 11½ lbs. There was a double motion in the pier, for both chains and roadway oscillated laterally, and undulated longitudinally; but the latter movement increased greatly, whilst the former diminished, just before the fracture took place. It was probably owing to this double motion that half the upper part of the roadway, and half the under part, were visible to the spectators at the same instant. As soon as the side rails gave way the undulations greatly increased, and almost immediately afterwards the roadway broke. It was remarked at the time that, had the side-railing been a trussed rail, the pier would probably have withstood the force of the storm."

The Suspension Bridge over the Esk at Montrose, completed in 1829, had a span of 432 feet and a deflection of 42 feet. The iron work built by Capt. Brown was mainly the same as in the two bridges just described. There were no joints to the suspending rods, and the main-chains rested upon detached cast-iron saddles, built into the masonry of the towers, and their ends were secured by cast-iron plates let into the masonry 10 feet under ground. The roadway of this bridge, which weighed 203 tons 9 cwt., was destroyed on the 11th of October, 1838, when the platform fell in one mass, in consequence of the failure of the suspension rods, which having no joints were twisted off close to the floor by the undulatory motion. It was afterwards repaired, when suspension rods of 1⅝ inch diameter were introduced, with flexible joints at the level of the platform.

We need mention but one other European Bridge—a harbinger of our own more magnificent construction in that form of the suspending material which is declared by Roebling the only fit one for such structures—the bridge of Freyburg, in Switzerland, completed in 1834. This bridge has a span, from pier to pier, of 870 feet, and is suspended at the height of 167 feet above the river which flows under it. It is thus 319 feet longer than the Menai Bridge, and 65 feet higher. It is supported on 4 cables of iron wire each containing 1,056 wires, the united strength of which is capable of supporting three times the weight which the bridge will ever be likely to bear, or three times the weight of two rows of wagons extending entirely across it.

It was completed at an expense of about $125,000, and, in 1834, was subjected to various severe trials, to prove its strength. First, 15 pieces of artillery, drawn by 50 horses, and accompanied by 300 people, passed over it at one time, and were collected in as close a body as possible, first on the centre and then at the two extremities, to try the effect of their concentrated weight. A depression of 39⅓ inches was thus produced in the part most weighed upon; but no sensible oscillation was occasioned. A few days after, the bridge was opened by the bishop and the authorities of the town, accompanied by about 2000 persons, who passed over it twice in procession, preceded by a military band, and keeping step. On this occasion a slight horizontal vibration was produced; but it is very improbable that the bridge, in its ordinary service, will ever receive such a multitude at once.

"The first wire bridge," (says Stuart) "*an American invention*, was over the Schuylkill," and was constructed by Charles Ellet, whose name should be associated with that of Roebling as a pioneer of the wire suspension principle. It succeeded the famous wooden "Colossus" of Lewis Wernwag which we have described. This bridge, the span of which is 408 feet, still remains in good condition after a service of thirty years of constant use.

In 1846, continues the same writer, in his sketches of the "Civil and Military Engineers of America," the attention of Mr. Roebling † was invited by him (Stuart) to the erection of a railroad bridge across the Niagara River, who, in response, states: "Although the question of applying the principle of suspension to railroad bridges has been disposed of in the negative by Mr. Robert Stephenson, when discussing the plan of the Britannia Bridge over the Menai, on the Chester and Holyhead Railway, I am bold enough to say that this celebrated Engineer has not at all succeeded in the solution of this problem. That a suspension bridge can be built to answer for a railroad, is proven by the Monongahela Bridge, which is only intended for common travel, but with some additional expense could be made stiff enough (it is strong enough) for railroad trains at a moderate rate of speed. Castings of ten tons weight, suspended to two pairs of large timber wheels, have lately been hauled over this bridge; the six-horse coal trains which pass over it hourly weigh seven tons."

"It cannot be questioned that wire cables, when well made, offer the safest and most economical means for the support of heavy weights. Any span within fifteen hundred feet, with the usual deflection, can be made perfectly safe for the support of railroad trains as well as common travel."

* * * * * * * *

"I maintain that wire cable bridges, properly constructed, will be found hereafter the most durable and cheapest railroad bridges for spans over one hundred feet."

To Mr. Roebling, we think, must be conceded the claim of *practically establishing* the sufficiency of the suspension principle for railroad bridges and of developing the manner of their construction. His first great work—the Niagara Bridge—is so well known as to need little description in this place. The span is 821 feet 4 inches from centre to centre of the towers; it forms a slightly curved hollow beam or box of a depth of 18 feet, width at bottom of 24 feet, and at the top of 25 feet, the lower floor of which is used for common traffic, whilst the upper is devoted to the railway. The two floors are connected by two trusses of simple construction, so arranged that their resisting action operates both ways, up as well as down. The suspenders are 5 feet apart. The beams of the upper and lower floor are connected by posts arranged in pairs, leaving a space between for the admission of truss rods. The ends of the posts are secured between the beams, in a manner that no part is weakened, and that any amount of strain can be thrown upon them without injuring or loosening their connections. There are no joints to work loose; and if the timber should shrink, the truss rods simply require tightening. The depressing action of any loads is by these posts transmitted from one floor to the other.

From the end of each pair of posts a truss rod extends each way to the fourth pair of posts, at an angle of 45 degrees. The rods therefore cross each other, and form a diamond figure; they are 1 inch in diameter, with screw ends of an inch and an eighth; by these rods the pressure upon any pair of posts is spread 40 feet apart. All the nuts work on cast-iron plates placed above or below the posts.

Without adding much to the weight of the structure, a considerable degree of stiffness has been obtained by this simple construction. The pressure of an engine and whole train of cars is so much distributed that the depression caused by a light freight or ordinary passenger train is scarcely perceptible. A freight train of twelve loaded cars, with a 25 ton engine, covers about half the length of the floor; and its effect is more noticeable than either a smaller or larger train. When in the centre, the camber is a little flattened; but when near the towers, where the grade forms nearly a straight line, the depression is from 3 to 4 inches. A longer train, of greater weight in proportion, disturbs the equilibrium less, as it covers a greater extent. Passenger trains of fifteen long cars, which frequently cross the bridge, make so little impression that the eye can scarcely detect it.

The height of the railway track above the middle stage of the river, is 245 feet.

The Cincinnati and Covington Bridge over the Ohio, completed in 1867, was erected by the same Engineer. From his report, as quoted by Stuart, the following particulars are extracted:

"The floor of the bridge is formed of a strong wrought-iron frame, overlaid with several thicknesses of plank, and suspended to the two wire cables by means of suspenders attached every five feet, arranged between roadway and footpaths; the latter seven feet wide, and are protected by iron railings towards the river. The roadway is twenty feet wide, forming two tracks of four lines of iron trams, on which the wheels run, each tram being fourteen inches wide, to accommodate all kinds of gauges. The whole width of the floor between the outside railings is thirty-six feet. No stays or other obstructions are put up below the floor, such as may be seen under the Niagara Bridge. No such means to prevent the floor from rising was used in this work; its security and stability are provided for by other appliances. The rock under the Niagara Bridge afforded a very cheap mode of anchorage; it would have been a great oversight on my part not to avail myself of under-floor stays in such a favorable locality. But in the Ohio River no such appendages were admissible.

* This pressure corresponds to a wind velocity of about forty-eight miles per hour; a *violent* gale. Vessels cannot "carry sail" with pressure *beyond* 6 lbs., corresponding to a wind velocity of 35 miles.

† Mr. Roebling had previously constructed four *Suspension Aqueducts* on the Delaware and Hudson Canal of 115, 144, 145, 170 feet span, and one for the Pennsylvania Canal over the Alleghany River of seven spans of 162 feet each; also the wire suspension bridge over the Monongahela at Pittsburg, of eight spans of 188 feet each.

"Great doubts are yet entertained by many engineers, particularly in Europe, in regard to the fitness and safety of suspension bridges for railway purposes. By an additional expenditure of fifty thousand dollars, and a railroad track laid down in the centre of the floor, the Ohio bridge could have been made serviceable for the passage of locomotives and trains at the highest speed. Let any person who doubts this, observe the very slight tremor which is produced on this bridge by a long line of heavily loaded teams, frequently ten in a row, and he will readily understand that but a small addition of rigidity is wanted in order to pass railroad trains."

The principal dimensions are given by Mr. Stuart as follows: "Main span, from centre to centre of towers, one thousand and fifty-seven feet. Side spans, from abutment to centre of tower, two hundred and eighty-one feet. Total length between abutments, one thousand six hundred and nineteen feet. Elevation of floor above low water at tower, ninety-one feet. Elevation of floor above low water at centre, one hundred and three feet. Length of Cincinnati approach from Front street to abutment, three hundred and forty-one feet. Total length, including approaches, two thousand two hundred and fifty-two feet. Number of cables, two, each twelve and one-third inches in diameter. Number nine wires, in each cable, five thousand two hundred. Ultimate strength of one cable, four thousand two hundred and twelve tons. Weight of main span between towers, one thousand five hundred tons. Number of stays in main span, seventy-six—strength of each, ninety tons. Weight of main span between towers, as far as supported by cables, one thousand three hundred tons. Deflection of cables in main span, eighty-nine feet. Permanent tension to strength, one-eighth. Ordinary working tension to strength, one-seventh. Maximum tension to strength, one-sixth. Section of each anchor chain in square inches, one hundred and ninety. Area of each foundation in square feet, eight thousand two hundred and fifty. Cubic contents of masonry of each tower, four hundred thousand feet.

Although not vieing in importance with the bridges just named yet from its, as yet, unrivalled span, and the peculiarity of its site, the Clifton Bridge, Niagara Falls, deserves a notice.*

The end of the bridge resting on the right bank is situated in Porter's Grove, at the foot of Niagara street, 300 yards below the American Fall. The end resting on the left bank, lands upon the main road running along the bank of the river, and is 100 yards below the Clifton House, and about three quarters of a mile below the great Horse-Shoe Fall on the Canada side.

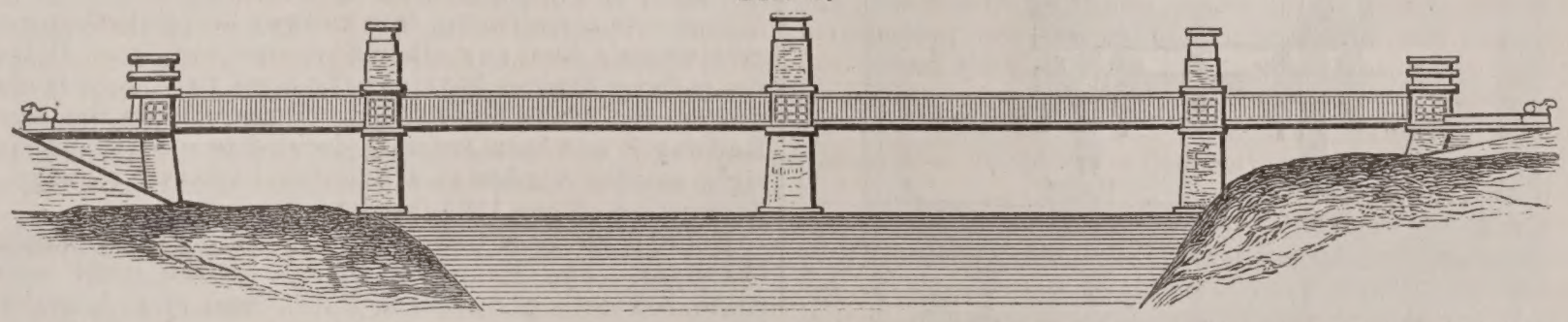
A section of the river on the line of the bridge gives a distance of 1190 ft. from rock to rock at the top cliff, and 850 ft. at the water's surface. The rock on the left bank is 175 ft. above the water, and on the right bank 180 feet. The American Fall is 164 feet. On the Canada side the rock is covered with 2 ft. of earth. It falls off perpendicularly 54 ft. to the débris which covers the fort and slopes away to the water's edge. On the American side it is covered with 20 ft. of drift (clay, sand, and gravel), which, when removed to make room for the towers, exposed a water-worn surface. Here the rock overhangs some 10 ft., and the plumb line strikes the débris at a distance of 80 ft. from the surface.

The span between the points of suspension, or centres of towers, is 1268 ft. 4 in. The deflection of the cables at centre, or greatest depression below the horizontal line, varies from 89 ft. in winter to 92 ft. in summer. The difference of 3 ft. is owing to the effect produced upon them by the changes of temperature, ranging through 100° Fahr. The road way is suspended at an elevation of 183 ft. above the water on the Canada side, and 188 ft. on the American side, while the centre, according to the season, varies from 190 to 193 ft., there being a rise of 4 ft. in the curvature of the bridge in summer, and 7 ft. in winter. The tops of the towers being in the same horizontal plane, are therefore 105 ft. high on the left bank, and 100 ft. high on the right bank. The length of the cables at medium temperature is 1286 ft. between centres of towers; 1828 feet between the anchor pins, where they are connected with the anchor chains, and 1888 ft. in all, between the anchors embedded in masonry on either side. The prolongation of the cables under ground is effected by anchor chains of Lowmoor iron 30 ft. in length, made in links of 10 feet each, firmly built in hydraulic masonry.

But the crowning example of the suspension bridge—the last great work of John A. Roebling—is found in the East River Bridge, connecting the cities of New York and Brooklyn—the stupendous piers of which (themselves wonderful monuments of the engineering skill of the age) are, under the direction of Col. W. A. Roebling, the son of the deceased projector, far advanced toward completion. The superstructure is described under a special heading EAST RIVER BRIDGE. Under the heading FOUNDATIONS, will be found a further account of this work up to date.

A transition from the suspension to the iron *tubular* railway bridge is proper here, owing to controversies which have prevailed among engineers as to the relative merits of the two constructions. The suspension principle was condemned by Mr. Stephenson in discussing the project of a bridge over the Menai Straits; and to this engineer is due the merit of the original *conception* of the tubular bridge, though it was owing to "the determined perseverance" of Mr. Fairbairn (to use his own expression) "that Mr. Stephenson's original conception has been carried into execution." The first work of the kind was the bridge at Conway on the line of railway from Chester to Holyhead. But *the* great typical work of this character is the Bridge over the Menai Straits on the same great railway route (from London to Dublin), eighteen miles distant from Conway. It owed its creation to the necessity imposed by the Lords Commission of the Admiralty of preserving a clear height of water-way of 105 feet from pier to pier. There are two spans over the straits each of 460 feet; and two shorter (230 feet) for the land connections. (Fig. 17.)

FIG. 17.



The history of the experimental development and actual construction of this celebrated bridge has been so fully and so often given that we content ourselves with simply giving a cross section of one of the tubes. (Fig. 18.)

But the most stupendous structure (considering merely *magnitude*)—probably the *last* of the kind—is the Victoria Bridge, over the St. Lawrence at Montreal, on the line of the Grand Trunk Railway to Portland, Maine. It contains twenty-five openings of two hundred and forty-two feet, with the exception of the extra span, which is three hundred and thirty feet, hence the length of tube is six thousand six hundred feet, approached by embankments, the Montreal end being one thousand two hundred feet, the southern shore of eight hundred feet, which, including the abutments, makes a total of nine thousand and eighty-four feet, or one and three-quarter miles nearly. The abutments are, at the base, each two hundred and seventy-eight feet long, divided into cells of twenty-four feet, with intervening tie-walls of five feet, but at the top they correspond exactly with the length of a tube two hundred and forty-two feet in length, and indeed are carried up to the same height, the cells being filled with gravel. To resist the thrust of the ice, both the abutments and piers are furnished with a cutwater, which meets the pier proper thirty feet above summer water, the whole height of the abutment being thirty-six feet above summer water, the centre pier being sixty feet; hence the bridge rises in a grade of one inch in one hundred and thirty-two, or forty feet to the mile, the centre again being a pure level. The centre pier is twenty-four feet in width, the remaining piers are but sixteen feet. These dimensions are directly under the girder, for at the foundation the piers are twenty-two feet in width, and at summer water sixteen feet. Transversely the piers are thirty-three feet under the girder. Thus the dimensions at the junction with cutwater, sixteen by thirty-three feet, extending outwards to the foundation up stream,

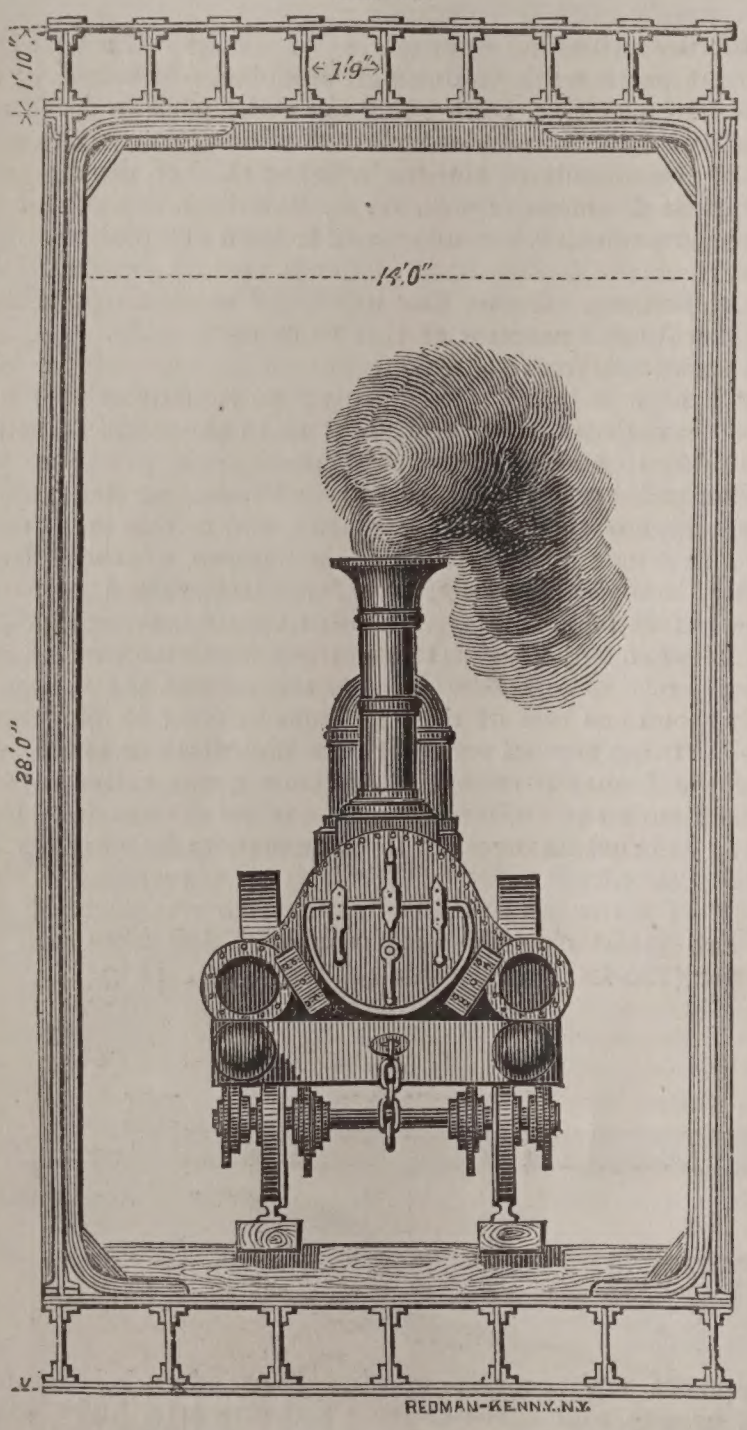
* There is over the Avon, near Bath, England, another important suspension bridge of this name; and like this over a chasm of great depth, at the bottom of which flows the river. The central span is 702¾ ft., and height above the river 257 ft. Although a modern work, it is, owing to the proprietors becoming possessed of the chains of the Hungerford Bridge, built by Telford, a *chain* bridge. It was built under the direction of those eminent engineers, John Hawkshaw and W. H. Barlow.

make the area of the course whence the cutwater is commenced sixteen by ninety feet.

There are three millions of cubic feet of masonry in the Victoria Bridge. That is to say if turned into lineal measure it would reach five hundred and ten miles, or as a solid would form a pyramid two hundred and fifteen feet high, having a base of two hundred and fifteen feet square. These figures will give some idea of the solidity of the structure, and the warrant that exists for its endurance for all time. The stone itself was mostly quarried from Point Claire, and forms the first in the series of the Lower Silurian, and is known by the geological term of Chazy, resting immediately on the calciferous sand-rock and the Potsdam sandstone. At the quarry the stones were taken out in as large masses as in any quarry in the world. We shall be borne out in this statement of this fact in the dimensions of the piers. The courses being three feet ten inches and three feet to two feet six inches above water level, and thence verging into a course eighteen inches under the plates, being in length from seven feet to twelve feet.

This bridge cost $7,000,000. The peculiarity of the erection of these tubes is that they were built *in place,* on false works erected in the rapids. The *ice* which holds the surface of the rapids bound during many months of the winter, was made a useful auxiliary in the construction.

FIG. 18.



Mr. Peter W. Barlow, an eminent English engineer visited America in the summer of 1860 (a fellow-passenger across the Atlantic with the writer) *expressly* to examine the Niagara Suspension Bridge. His conclusions were given in a pamphlet published by Weale. The Civil Engineer and Architects' Journal, 1861, comments upon it as follows: "Are tubular bridges costly blunders? This is in effect the question raised by Mr. Barlow's pamphlet," and, referring to two papers in same Journal, (1860) says "from these two papers it is at least obvious, that in comparing suspended and unsuspended girders the former have greatly the advantage in point of economy. And this conclusion is supported by a very high authority on this subject, Prof. Macquorn Rankine, in two letters in our numbers of December and January last. In the latter of these letters Prof. Rankine arrives at the conclusion that a suspended girder need have only about *one-seventh* of the strength of an unsuspended girder of the same span and required to sustain the same travelling load."

"It is notorious that tubular bridges, of which that over Menai Straits and the Victoria Bridge in Canada are the most conspicuous examples, are enormously expensive. It is notorious that the cost of those two bridges has been ruinous to the companies which constructed them. There is not much difficulty in arriving at the reasons of this result. In the first place, tubular bridges are extremely complicated structures, consisting of a vast number of parts which have to be fitted together with extreme accuracy. In order to prevent the top of the tube from bulging or 'buckling' from the compression to which it is subject, the expedient of a cellular structure of that part of the tube is adopted, and it consists of numerous cells formed of iron plates, with an immense number of joints and rivets. Now all this difficulty of counteracting the tendency to distortion is avoided in suspension bridges, for in them the strains, being tensile instead of compressive, tend to counteract instead of tending to cause distortion. Again, in suspension chains the material is so disposed as to more directly sustain the travelling load than is the case in girders or tubular bridges. In the latter the source of strength is rigidity;—that is, the moment of the elastic forces of tension and compression; and this moment of forces is limited by the depth of the structure; so that, to speak in popular language, the elastic forces can never have a greater leverage than the distance between the top and bottom of the tube. But in suspension bridges the similar leverage is far greater. For the equilibrium of the half-span, the moment of the weight upon it about the abutment is equal to the moment about the same axis of the tension, which acts at the summit of the chain."

It is further observed that the Niagara Bridge "notwithstanding certain defects in its construction has proved in a great degree successful," while instead of the 3000 tons of iron in the 460 feet span of the Britannia (Menai) Bridge, there is in the former, in 821 feet span, but 400 tons of iron, combined with 600 tons of wood.

The extension of railways over the immense territorial areas of Europe and America, and the quite recent application of this powerful agent to the development of new countries, or to the spanning of uninhabited regions in order to connect populous ones, has given a vehement impulse to bridge construction as well as to the inventive faculties of its engineers. Few more instructive and suggestive studies can be made than that of the comparative characteristics of the *recent* railway bridges of India—of Russia—of Holland—of England—and of our own country. These countries are named as exhibiting *typical* constructions which reflect the peculiar civilized *status* of the peoples, and the peculiar *engineering* problems offered by different regions, modified as they are by the different nature of the *building materials* which those regions afford. We cannot enter into this subject, nor can we go at length into modern science and practice of iron bridge construction.

In our own country the problem is presented in almost every possible variety of aspect—rivers of unrivalled magnitude to be spanned by erections to rest upon foundations of the most difficult character, while necessity has rigidly limited outlay. Hence arises a special fertility of invention and a special class of work.

Russia is commencing iron railway bridge-building on a greater scale than any other European country. Hitherto her railway bridges have, for the most part, been made of timber, and are to be replaced. Especially on the Nicolai Railway it has been recently decided to reconstruct sixty-eight wooden viaducts—a decision hastened through the destruction of one 1200 feet long by fire.

Holland has been building great bridges of a remarkable character. The Moerdyck Bridge on the great railway route connecting Antwerp, Rotterdam, and Amsterdam, consists of fourteen spans of 328 feet each. The framed iron girders for this bridge, built on shore, were floated to their destination and, by aid of the tidal rise, elevated to their final positions. The railway bridges in construction, or just completed, over the Maas and Lek at Bommel and Crévecœur are works of the same character; the former has eight spans of 187 feet and three of 394 feet and has cost over 270,000 pounds, or $1,350,000. In England the great bridge over the Tay (noticed on another page) is styled "the most important civil engineering work now being carried out in Great Britain."

We can allude to but few of the remarkable constructions of our own country.* The Quincy Bridge is the longest bridge spanning the Mississippi, the river at the point of crossing being 3250 feet in width, the navigation channel, however, being only 800 or 900 feet broad. The

* The longest truss *span* in the U. S. is in the Newport and Cincinnati R. R. bridge; the span is 420 feet (400 feet clear opening). In Europe the bridges over the Leck at Kuilenberg (Holland) and Moldau at Prague have 515 feet span. In each of these latter are used over 2000 tons of iron and steel. The longest pivot *draw* is in the just finished railroad bridge over the Mississippi at Louisiana, Mo.—200 feet.

bridge is divided into seventeen spans, two of 250 feet, three of 200 feet, eleven of 137 feet, and one large draw span 360 feet long, the girder of the latter being 36 feet in depth. The piers of the fixed spans are all of masonry, that of the swing is formed of four wrought-iron cylinders 14 feet in diameter, sunk through 50 feet from the water level; upon the top of these a turn-table, 30 feet diameter, rests, and carries the span. This bridge, designed and constructed under Mr. Thomas C. Clarke, cost over a million of dollars.

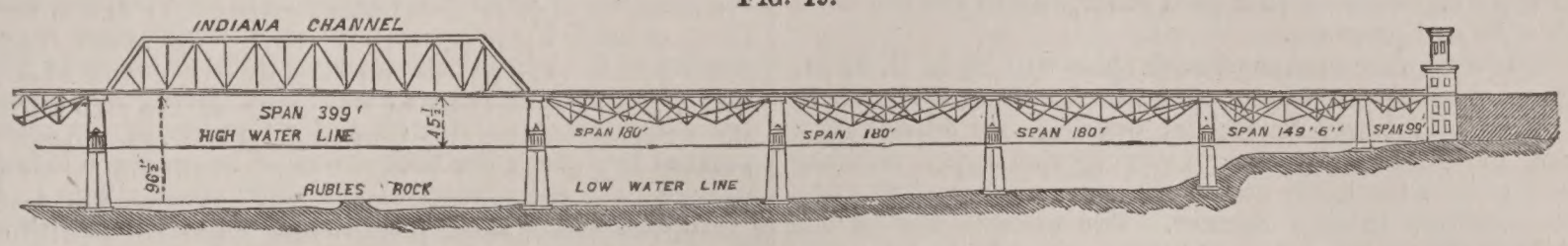
The bridge at Omaha, over the Missouri, designed by Gen. Dodge, engineer of the Union Pacific Railroad, is 2800 feet in length, divided into eleven spans of 250 feet each, resting upon concrete filled cast-iron cylinders 8 feet 8 inches in diameter. Some of them require to be sunk to a depth of 70 feet below low water, making the total length of column 139 feet. The superstructure of this bridge is formed of ordinary wrought-trussed girders, with cast-iron top member. In addition to the bridge itself, approaches three miles in length are also required, principally formed of trestle work.

The railway bridges over the Mississippi at Dubuque, Iowa; at Hannibal, Missouri; and the great work over the Missouri at Kansas City are noteworthy constructions—as also that over the same river at St. Joseph. The superstructure of this latter bridge is of iron throughout (with floors for both railway and highway traffic) resting on stone piers and abutments sunk to the bed rock. Its total length is divided into three fixed spans of 300 feet each, one of 80 feet, and one pivot draw-span of 365 feet. The character of the river bed renders the sinking of the pier foundations (difficult in all the works just cited) especially interesting.

Fig. 19 represents the part of the bridge over the Ohio at Louisville from the Indiana shore to the nearest (Indiana) channel.

This bridge is the longest iron bridge yet erected in the

Fig. 19.



United States, and it includes amongst its openings two of the largest spanned by trussed girders as yet constructed in America. It carries across the Ohio a line connecting the Louisville and Nashville with the Jeffersonville and Indianapolis Railroad, the line forming a connecting link between two immense railway systems, the northern and the southern. The bridge consists in all of twenty-seven spans, twenty-four over the river, one over the New Albany and Jeffersonville Railroad, and two on the Louisville side; and these spans, with the abutments, make up a length of 5280 feet, or just one mile.

The bridge includes two spans of the lengths of 370 and 399 feet, and a pivot bridge 264 feet in length, this bridge giving two clear openings of 114 feet 6 inches, one on each side of the pivot-pier.

The lowest point of the superstructure over the middle chute is 90½ feet above low water, and over the Indiana "chute" 96½ feet—the low water in the Indiana chute being 6½ feet lower than in the middle chute. The extreme rise of the river at Louisville, above low water, is, we may mention, 40½ feet.

As will be seen by these figures the rails are, except in the case of the two long spans, carried at the level of the tops of the girders, these being of the class known as the Fink truss. In this bridge a pair of diagonal tension bars connects the foot of the principal strut, or "king post," in each truss, with the ends of the top chord. This pair of diagonal bars supports one-half of the whole weight of the truss and its load. Each half span is subdivided by a strut, and two diagonal tension bars extend, one to the nearest end of the top chord, and the other to the top of the centre post. Each quarter span is again subdivided into eighths, and these again, for spans greater than 100 feet, into sixteenths.

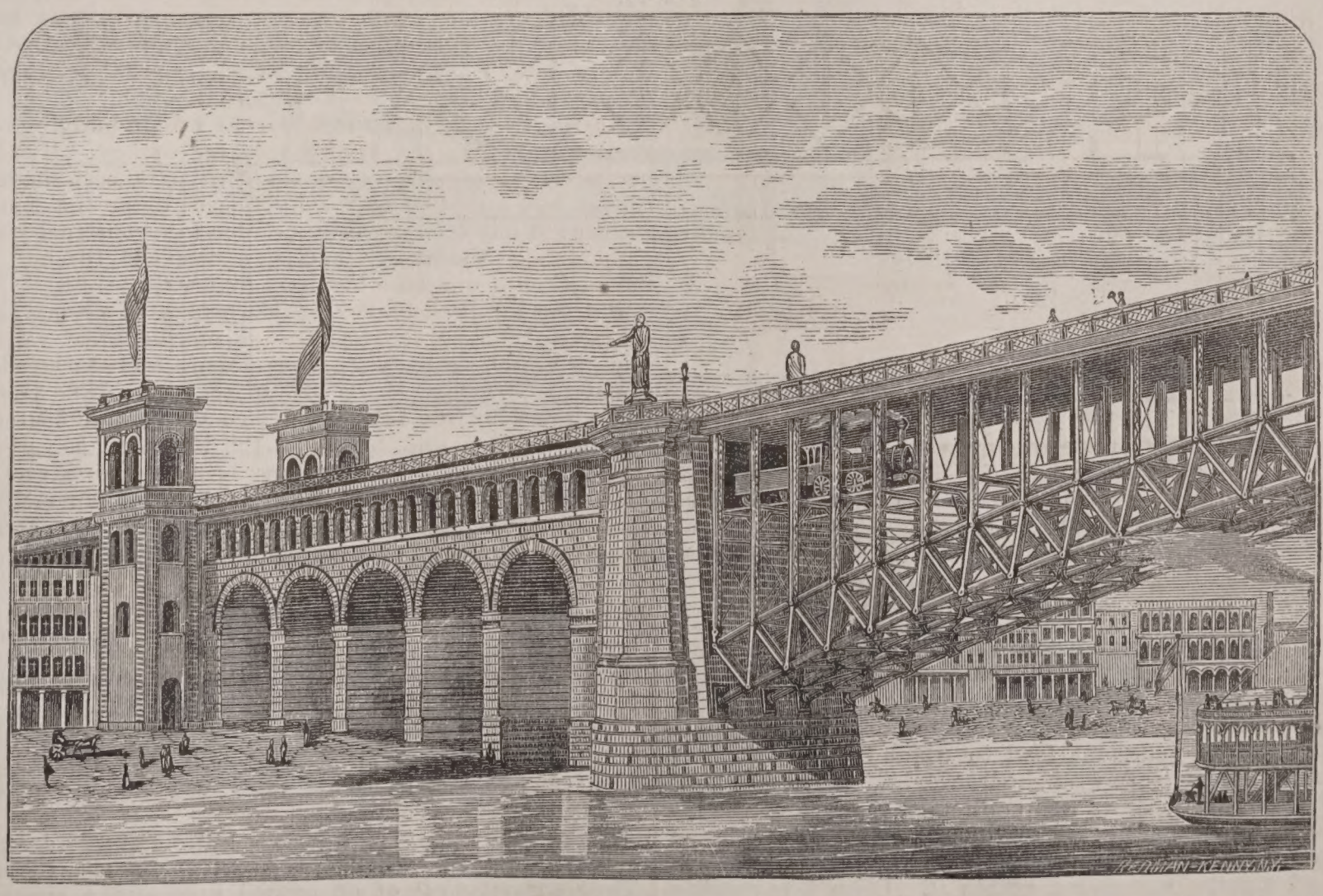
The bridge over the Hudson River at Albany connects the New York Central with the Hudson River, Harlem, and Boston and Albany roads.

It consists altogether of fifteen spans (four of 185 feet, and a swing bridge 274 feet long) and has a total length of 1740 feet, or nearly a third of a mile.

The superstructure is entirely of wrought iron, except necessary bearing and joint blocks, which may be of cast iron, and to carry, at the bottom thereof, a double track railway, and also two sidewalks, each sidewalk being 6 feet wide. The bridge to be with two lines of main girders, 26 feet apart in the clear on the straight portion of the bridge, and 27½ feet apart in the clear on the curved part.

But the most remarkable structure is the Illinois and St. Louis Bridge now in progress over the Mississippi River at St. Louis; equally remarkable whether considered in connection with the establishment of its piers (for account of which see Foundations) or its superstructure. (Fig. 20.)

Fig. 20.



From the report of its eminent engineer, Jas. B. Eads, the following account of the superstructure is taken:

"The bridge will have three spans, each formed with four ribbed arches made of cast steel. The centre span will be

515 feet and the side ones 497 feet each, in the clear. The rise of the centre one will be one-tenth of the span; that of the side ones 47 feet 10 inches each.

"The four arches forming each of these spans will each consist of an upper and lower curved member or rib, extending from pier to pier. Each of these members will consist of two parallel steel tubes, 9 inches in exterior diameter, placed side by side. The upper and lower members will be 12 feet apart, measured from the centre of the upper to the centre of the lower tubes. At regular intervals of about 9 feet, these members will be braced from each other by a vertical system of cast-steel bracing on each side of them. These braces will be secured at each end to cast-steel plates, formed something like the voussoirs of a stone arch, and against which the tubes will be abutted and secured every 9 feet throughout the arches. A horizontal system of bracing will extend from pier to pier between the four upper curved members, and a similar system between the four lower ones, for the purpose of securing the four arches in their relative distances from each other, and to sustain them against lateral pressure.

"The two centre arches of each span will be 13 ft. 9½ in. apart from centre to centre, and will have, in addition to the upper and lower horizontal bracing just described, a system of diagonal bracing, securing the upper member of one arch to the lower one of the other arch, and the two other members in like manner. The outside arches are each 15 ft. 1¾ in. from the middle ones, and are joined to the latter by three systems of bracing similar to those described as between the two centre arches. These systems, however, on the outside of the middle arches, extend only from the piers to the under side of the railways, the latter being carried between the two outer and the two inner arches near their crowns. The outside arches being supported in this interval against lateral movement, by rigid connections from both the upper and lower roadways.

"The roadways are formed by transverse iron beams, 12 in. in depth, supported by iron struts of cruciform section resting on the arches at the points where the vertical bracing of the latter is secured. That portion of the railways which passes below the crown of the arches is suspended from them. Between the iron beams forming the roadways, four parallel systems of longitudinal wooden members are introduced, extending from pier to pier, and serving to maintain the iron beams in position. These wooden members are each about 9 ft. long, and their ends rest upon the flanges of the beams, and are there secured from moving. On these the wooden beams for the carriage-way rest in one roadway, and the cross-ties for the railways in the other. From the opposite ends of the iron beams a double system of diagonal horizontal iron bracing serves to bind the whole together, and gives additional support against wind pressure.

"The upper roadway is 34 ft. wide between the footwalks. The latter are each 8 ft. wide, making the bridge 50 feet wide between the railings.

"The railway passages below the carriage-way will each be 13 ft. 6 in. in the clear and 18 ft. high, and will extend through arched openings of equal size in the abutments and piers."

This superstructure is estimated to cost over two millions of dollars.

In 1870 the French Minister of Public Works, at the instance of the "Conseil de l'École des Ponts et Chaussées," despatched one of its engineers, M. Malezieux, to the United States to inspect the public works, who thus comments on American Bridge Engineering.

"A distinctive feature in American Bridge engineering is undoubtedly the almost entire abandonment of plate or lattice girders, and the adoption almost universally (if we except the cases of unusually large spans where the suspension system is resorted to) of one or the other arrangements of trussed structures." M. Malezieux considers that the practice of American engineers in this respect, and also their extended application of the suspension system is worthy of the special attention of their brethren in Europe, and especially in France; and after giving a summary of the general dimensions, etc., of a number of the more important bridges in the United States, he proceeds to describe in detail the principal systems of trussed bridges in use.

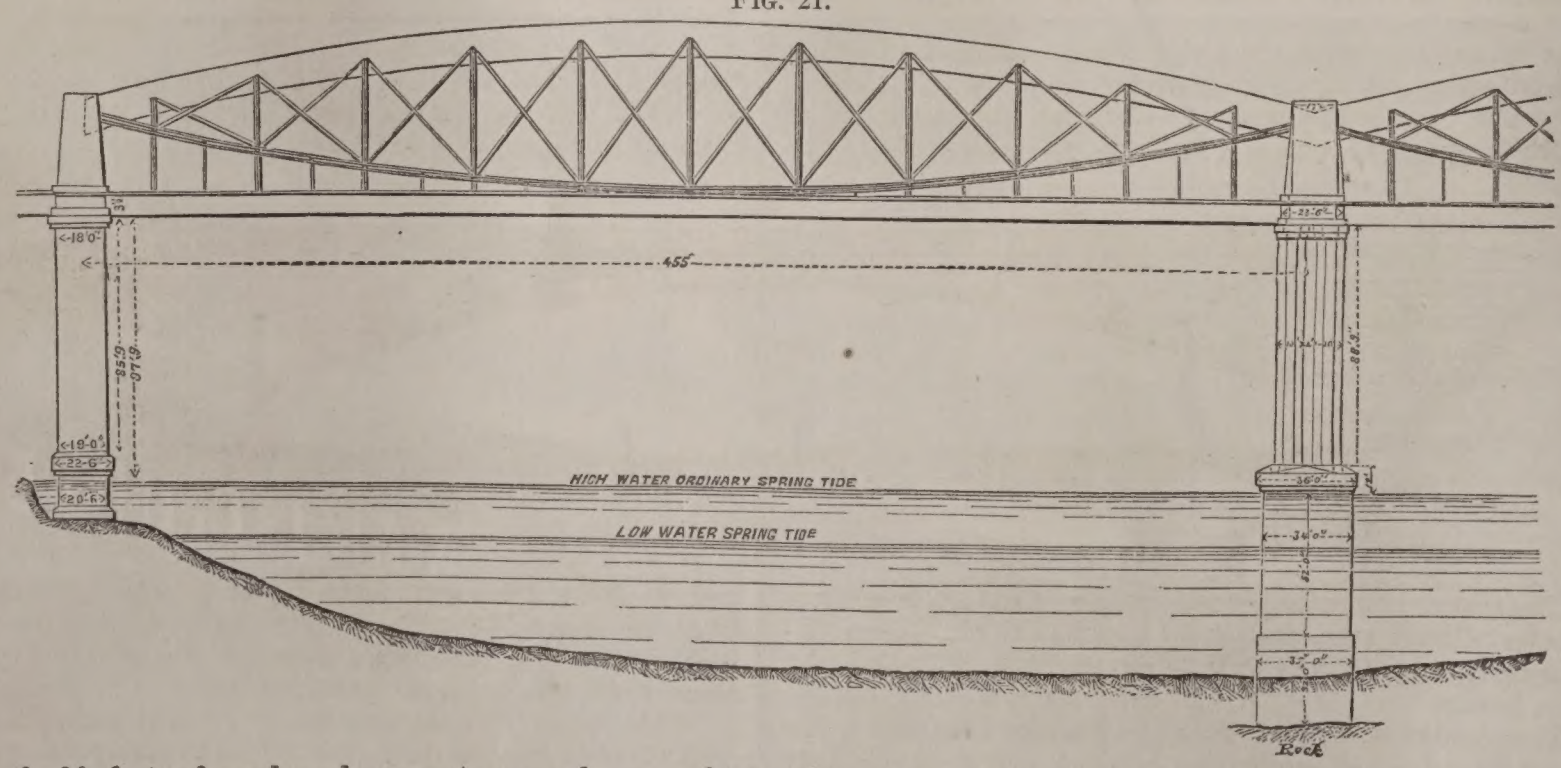
An exhaustive analytical discussion of the merits of the "principal systems" of trussing, will be found in the work "Iron Truss Bridges for Railroads," by Col. W. E. Merrill, U. S. Engineers.

The subject of iron railway bridges cannot be dropped without allusion to one of the most remarkable of those structures: the "Royal Albert Bridge," designed to carry the Cornwall railway across the Tamar at Saltash, a few miles above Plymouth, England.

The whole structure consists of nineteen openings, two of which have a clear span of 455 feet; the remaining seventeen are each 69 feet 6 inches in length. The River Tamar is crossed by the two large spans, the smaller ones bringing the railway from the hills on either side of the valley down to the banks of the river, the total length of the entire structure being 2240 feet.

The main stone piers are at the water's edge, and support the ends of the great spans crossing the river. These are of course of the most solid construction, and more resemble the massive columns of Egypt than the works of modern engineers. Each is of granite 29 feet wide by 17 feet thick, and 190 feet in height from the foundation to the summit. The strength required in each of these piers was far surpassed by the resistance which that in the centre of the river must offer, and for this a column was required of such proportions that nothing short of the solid rock would suffice for its foundation. But to reach the rock was a matter of no ordinary difficulty, inasmuch as it lay

FIG. 21.



beneath 20 feet of mud and concrete gravel, over which flowed 70 feet of salt water. To erect a stone pier in the ordinary manner would be here entirely out of the question, but by an ingenious contrivance the granite column requisite to sustain the enormous load to which it is subject was reared. An immense wrought-iron cylinder, 100 feet high and 37 feet in diameter was sunk upon the site of the intended pier, and proper means being taken to exclude the water from the interior of this cylinder, the above-mentioned column was raised within it. Upon this column four octagonal cast-iron pillars, each 10 feet wide and 88 feet 9 inches high, were erected 10 feet apart, and strongly braced together, forming a square of about 30 feet. The weight of each column is 150 tons, each being in pieces 6 feet long, 2 inches thick, and strengthened inside by stout ribs and brackets. As fast as these pieces were cast, planed down, and accurately fitted, they were sent to the centre pier ready for erection. Upon these columns the top framing of the pier is fixed.

Upon this centre pier, and the two side piers, rest the massive ribs by which the great spans are sustained. They consist each of an arched tube and a suspension chain strongly braced together, to which the small side-girders are attached. The arched tubes are in section of

an elliptical form, the major axis of the ellipse being placed in a horizontal position; they are made of stout wrought-iron plates strongly riveted together, and rendered more rigid by stiffeners and diaphragms. The width of each tube is 16 feet 9 inches, and its depth is 12 feet 3 inches, the diaphragms being placed about 20 feet apart.

The rib complete presents the appearance of a double bow, and it may be regarded as such, the tensile action of the chain upon the bed-plates being counteracted by the thrust exerted upon the same by the arched tube. The depth of the rib from the centre of the main tube to that of the main chain is 56 feet 3 inches, or about $\frac{1}{8}$ of the clear span. The alteration of length of the rib, by contraction and expansion under variations of temperature, is provided for to the amount of six inches (although the greatest difference yet observed amounts only to three inches in the entire length of both spans) by placing the frames, which carry those ends of the main tubes which are supported by the side piers, upon 48 wrought-iron rollers, each 3 feet 3 inches long and $3\frac{1}{2}$ inches diameter, in a double cast-iron frame or bed-plate.

The total quantity of wrought-iron used in this structure is 2700 tons; of cast, 1300 tons; masonry and brickwork, 17,000 cubic yards, and about 14,000 cubic feet of timber.

Each of the main ribs was constructed entire, adjacent to the site of the intended structure, and after being tested was floated out on pontoons and raised by hydraulic presses of immense power. The foundations intended to support the bridge were used to sustain these presses. As the spans were raised, by the means described, the iron columns were built up under them. The pressure upon the foundation of the centre pier will amount to more than 8 tons per square foot of bearing area, or double the pressure upon the foundations of the Victoria Tower. (Fig. 21.)

One more example of modern bridge-building for railway purposes must be introduced here. The Tay Bridge is styled ("The Engineer," Apl. 4, 1873), "the most important civil engineering work now being carried out in Great Britain. Indeed, the magnitude of the bridge, and the novelty and ingenuity of the means employed in its erection, entitle it to take rank with the most interesting civil engineering works ever carried to completion." The Tay Bridge will be, when finished, the largest iron bridge in the world. It will cross the river about one and a quarter miles west of Dundee. The total length from shore to shore is 10,320 ft. Commencing from the south, or Fife side, there will be three spans of 60 ft., two of 80 ft., twenty-two of 120 ft., fourteen of 200 ft., sixteen of 120 ft., twenty-five of 66 ft., one of 160 ft., and six of 27 ft. The first three spans (60 ft.), south side, are on a descending gradient of 1 in 100, the two 80 ft. spans are level; the bridge then rises with a gradient of 1 in 353 to the centre of the 200 ft. spans. It again descends with a gradient of 1 in 73.56 to the north shore, passing at a height of about 18 ft. over Magdalen Point and the Esplanade now being constructed.

The bridge thus comprises eighty-nine spans, and at the commencement on the south side the rails are 78 ft. above high water, running over the tops of the girders as far as the 200 ft. spans which cross the navigable channel of the river. Over these fourteen spans the rails run on the bottom of the girders, giving a clear headway of 88 ft. above high water. On reaching the 120 ft. spans on the north side, the rails are again on the top of the girders, which is continued, with the exception of the 160 ft. bowstring span, to the north shore. From the south side the first five spans are on a curve of twenty chains radius. The bridge then runs straight across the river as far as the end of the sixteen 120 ft. spans on the north side; thence the whole of the 66 ft. spans, 160 ft. bowstring, and the 27 ft. spans are on a curve also of 20 chains radius, forming nearly a quadrant of a circle, the length being about 2000 feet. This long curve is necessary to bring the bridge—which runs nearly due north—at right angles across the river into the town, alongside the Caledonian Railway. (See Foundations.)

In the foregoing we have felt constrained for want of space to confine our notices of iron bridges to those which, owing to the amount and character of the moving weight they carry, develop more fully the art of the engineer—railway bridges; but there is another class of bridges, in which, indeed, iron construction for bridge purposes first developed itself, *i. e.* cast-iron arched bridges, which should at least be mentioned.

The first cast-iron bridge erected in England was over the Severn at Colebrook Dale, in the year 1777; it has five arch ribs, with a clear span of 100 feet 6 inches, and a rise of 45 feet, a width of 26 feet, and a sectional area in each rib of $56\frac{1}{4}$ square inches.

In 1796 a more notable bridge, the Sunderland Bridge over the Wear, was completed, having six arch ribs, with a span of 236 feet, and rise of 34 feet, and a width of 32 feet, the sectional area of rib being 46.5 square inches.

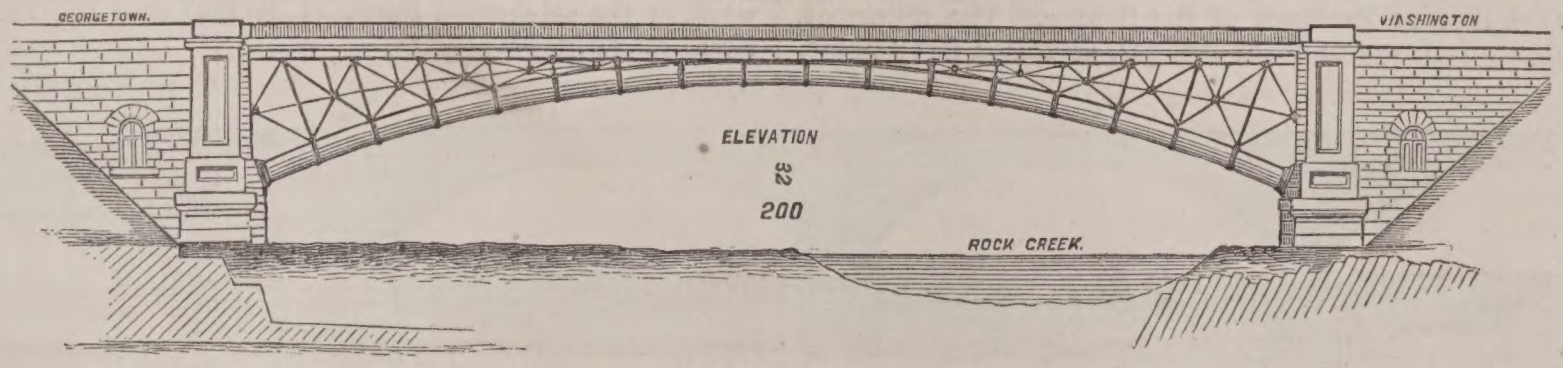
In 1806 the Bristol and in 1812 the Bonar bridges were built, the latter having a span of 150 feet, four ribs and 20 feet rise. (These two bridges are described and delineated in the Ency. Ed.)

The Southwark Bridge was built in 1818 with 8 ribs, 240 feet span, and 24 feet rise. The Cauxhall, Tewkesbury, and Plymouth bridges have spans of 78, 170, and 100 feet. The Westminster (renewed in 1859, as mentioned on a later page) has arches partly of wrought and partly of cast iron of 120 feet span, and 20 feet rise.

The foregoing (English) bridges are all still in use. The "Pont de Caroussel" at Paris, built in 1836, has spans of 187 feet, five ribs with $15\frac{1}{2}$ feet rise. The bridge across the Neva at St. Petersburg (built by Joseph Harrison, Jr., of Philadelphia) though subjected to the most severe changes in temperature stands a monument to American professional skill. It has seven spans, with 157 feet as the largest.

In our own country the first example of an iron bridge construction, and, in the beautiful simplicity of conception by which purposes foreign to each other are subserved by the same material agents, the most remarkable one, is the Aqueduct Bridge, over Rock Creek, at Washington City; built by Captain (now Bvt. Maj.-Gen. and Quarter Master General, U. S. A.) Meigs. The engraving (Fig. 22) is an elevation, and its distinguished engineer has kindly furnished the following description.

Fig. 22.



"The ribs are circular pipes forty-eight inches in interior diameter of cast-iron, and are $1\frac{1}{2}$ inches thick. No additional thickness is given to them on account of the loading by the bridge.

"The thickness, $1\frac{1}{2}$ inches, is the standard thickness for water pipes of 48 in. under the head of water which these bear, and all the strains caused by their being loaded with a bridge platform and its traffic are at right angles to those caused by the pressure of the water. These two sets of strains therefore do not affect each other plus or minus.

"The joints are flange joints turned plain and smooth and held together by pressure and by screw bolts as in the ordinary method of joining steam pipes. Originally the iron pipes were lined with wooden staves as a non-conductor under an apprehension of danger of injury by freezing. The temperature of the air sometimes, though rarely, here touches 0 or even falls below 0.

"But the wood acted too well as a non-conductor. The iron took its temperature from the air and sunshine, not from the water, hence a diurnal motion from expansion and contraction, which in some of the joints produced never a stream, but a dropping of water.

"This inconvenience led me to an investigation of the conditions of temperature, the quantity and rate of transmission of heat from the water as it passed through the pipes to the air, which satisfied me that it would be safe to withdraw the non-conducting lining. I took it out and the bridge has now stood some 12 years and no trouble from ice in the pipes has ever been noted.

"This bridge is, or was when first erected, unique of its kind."*

The only cast-iron arched bridge since erected (we believe) is the Chestnut Street Bridge, over the Schuylkill, at

* Another arch of cast-iron, of 30 inches diameter, of 120 feet span, carries the water across "College Branch."

Philadelphia, commenced in 1861 and opened for travel July 4, 1866; designed and built under direction of Mr. Strickland Kneass, C. E. It has two main spans (over the waterway) each of 185 feet, each span is composed of six segmental arches with versed sines of 20 ft. placed at distances of 8 feet 8⅝ inches, and 7 feet 10¾ inches from centre to centre. They are four feet in depth, and 2½ inches thick, with upper and lower webs of same thickness, and 8 inches wide; thus giving a compressive area of 147.5 square inches to each arch rib. These arches were cast in lengths of 12 feet 10 inches, with end flanches 12 inches wide, having three side-stays from body of segment, and were secured to each other by four screw-bolts 1¼ inches in diameter. The outside arches or ribs are slightly reduced in section, and are cast with ornamental face.

As regards strength of this structure, and treating the arches as built with a succession of voussoirs, and performing functions the same as if built of stone, we find that the horizontal pressure at the crown of each road-way rib is, with 100 lbs. per square foot of transient load, 512,585 lbs., equal to 3,475 lbs. per square inch of section, and at skewback, 529,542 lbs., or 3,590 lbs. per square inch of section. Taking the crushing power of best iron at 107,000 lbs. per square inch, the maximum load that would probably be placed upon it, would give a pressure at crown of but $\frac{1}{31}$ its ultimate strength.

The cost of this bridge was about $500,000.

We have progressed thus far without even mentioning that class of structures to which has seemed pre-eminently to attach the title of Bridge and which furnishes the principal theme of most writers, viz., the masonry arched bridge. The arch seems to have been known to the Chinese (see Tomlinson and Ency. Ed.) for many ages. The gateways of the great wall are arched and Kirchee speaks of stone bridges three or four miles long and of an arch of the incredible span of *six hundred feet.* But it is to the Romans that the world is really indebted for the practical application of the arch to bridges. Eight of these bridges over the Tiber are described in history.

But perhaps the most magnificent of all the Roman bridges, and one of the noblest monuments of antiquity, is the bridge of Alcantara upon the Tagus, at the town of that name. The town has probably taken its name from that structure, as the word *alcantara,* in the Arabic, signifies "the bridge." It consists of six arches; its whole length is 670 Spanish feet, and from the bottom of the river to the roadway the height is 205 feet.

Whatever constructive energy was exerted during the Middle Ages was devoted either to religious purposes (witness the Convents, Churches, and Cathedrals), or to the agencies of War, or of self-preservation, as exhibited in the numberless castles and walled towns. The destructive tendencies of war have always seemed to be peculiarly directed against bridges. It could hardly be expected, therefore, that an age in which every man's hand was against his neighbor should *produce* these adjuncts to the occupations of peace. In days of general insecurity there was no safety for travellers particularly in passing rivers, where violent exactions were made by banditti.

To put a stop to these disorders, sundry persons formed themselves into fraternities, which became a religious order, under the title of Brothers of the Bridge. The object of this institution was to build bridges, establish ferry boats, and receive travellers in their hospitals on the shores of the rivers. It is stated "that Saint Benezet (the patron saint of Avignon) who proposed and directed the building of the bridge of Avignon, was a shepherd, and that he was not twelve years of age when repeated revelations from heaven commanded him to quit his flock and undertake this enterprise."

This bridge, which was composed of 18 arches, was begun in 1176, and completed in 1188. In 1385, during the contentions of the popes, some of its arches were destroyed; three others fell in 1602, from the neglect of repairing a fallen arch. In 1670, the frost was so great that the Rhone for several weeks bore the heaviest carriages; when the thaw followed, the ice destroyed the piers; but the third pier, with the chapel of St. Nicholas, has stood notwithstanding all these accidents (*ibid*).

It is worthy of remark, that the bridge of Avignon was begun under the direction of Saint Benezet in 1176, and that of London begun to be built of stone under the direction of Peter of Colchester, a priest, in the same year (1176). The French "Brothers of the Bridge" accomplished their magnificent and useful work in 12 years, the labours of the English priest occupied 33 years; but this may be accounted for, by considering the interruptions which must be experienced in a river where the tide rises twice every day from 13 to 18 feet.

In London bridge there were 19 arches, and it was 45 feet in breadth. For many ages there were houses along each side of it; but these were removed, the middle pier was taken away, and the space including the two adjacent arches, converted into one arch of 72 feet span, in 1758. The remaining old arches are very narrow, and the piers enormously large, being from 15 to 25 feet in thickness above the sterlings.

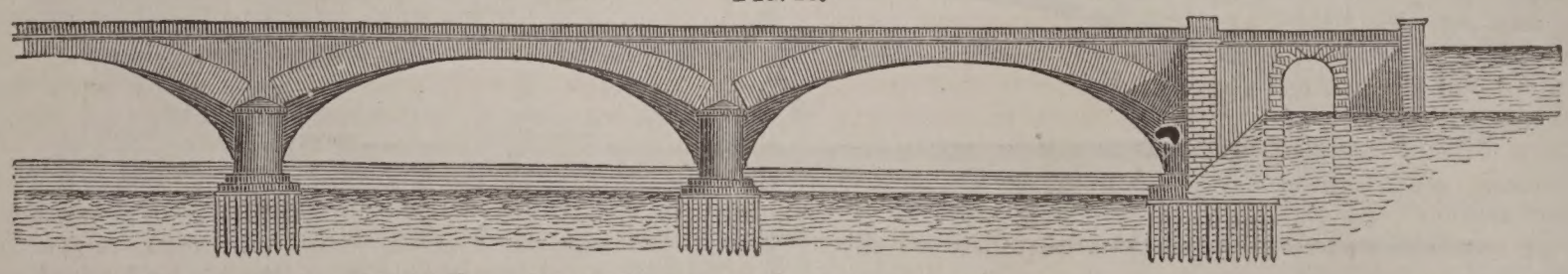
Some of the old piers of the Old London Bridge were larger than the original openings of the arches; they consisted of small rubble stones laid in lime-mortar, surrounded by a thin casing of squared stones. The Roman bridges were probably constructed in the same manner. In modern bridges, the piers consist wholly of squared stones, each course being of equal height quite through the body of the pier. The thickness ought to be regulated by the span and rise of the arches, combined with the height of the piers. At the bridge of Neuilly the thickness is only one-ninth part of the span from the springing of the arches. The height is regulated according to circumstances, attention being given to the highest point to which the waters have ever been known to have risen (*ibid*).

The next (in order of time) important bridge was that at Westminster, built in the years 1739–50, consisting of 13 large and two small arches, semi-circular, the middle one having a span of 76 feet. This bridge, of which a Mr. Labalye was the engineer, was not only, for the time, the greatest work of that kind in England, but it formed, in what regards laying foundations in deep water and constructing centres for large arches upon navigable rivers, a new school for bridge-building (Ed. Encyc.).

Like the Old London Bridge it has since been superseded by another structure—in this case with iron arches of from 104 to 120 feet span.

The finest of the earlier French bridges and the greatest work of the celebrated Perronet, is that over the Seine at Neuilly. (Fig. 23.)

Fig. 23.



It consists of five arches, each 120 French, or 128.2 English feet span, and 30 French or 32 English feet rise; the breadth, including the parapets, is 45 French, or 48 English feet. It was begun in April 1768, and opened in October 1773; the masonry was completed in 1774; the roads, and other operations connected with this bridge, were finished in 1780. A great peculiarity in this bridge, well deserving the attention of engineers employed in similar works, is that the soffits of the arches are shaped to suit the contracted vein of water, as formed in the entrance and exit of pipes. This is accomplished, by making the general form of the body of the arch elliptical, with a rise of 30 French, or 32 English feet, or ⅛ of the span; but making the headers follow the segment of a circle, the versed sine of which is only 13½ French or 14.5 English feet, or about 1-9 of the span. This, besides affording facility for the passage of flood waters, gives a great appearance of lightness to the fabric (Ed. Encyc.).

The construction of a magnificent stone bridge, says the Edinburgh Encyc., "is justly looked upon as one of the greatest performances of the masonic art; for if we compare the enormous weight of a great arch, with the strength which the cohesion of the firmest cement can give, we readily admit that it is only by the nicest adjustment and balancing of its parts, that they are hindered from instantly falling to pieces."

And in consonance with the above dictum, the theory of the arch has always formed one of the prominent components of works on theoretic civil engineering, while the main features of treatises on bridge-building have usually been the art of constructing arches, piers, centering and coffer-dams. But this class of works has now become almost purely *monumental.* The "enormous weight of a great arch" is rivalled by its enormous expense, and it imposes the necessity of proportionate care and expense in giving to its piers sure foundations; and these costly piles are

multiplied, to the great detriment of the water-way of the river, by the limitation of span which masonry arches can compass; or, at least, by the enormous ratio by which *cost* increases with increase of span. In our country there are, naturally, few examples of masonry arched bridges, properly so called; but it would be an unpardonable omission in an account of *American* Engineering, and would be doing an injustice to its distinguished engineer (now Quarter Master General, U. S. A.) to omit to notice the superb, and unrivaled in span, bridge and aqueduct combined, over the Cabin John Valley*, Potomac Aqueduct. The main road, macadamized by Act of Congress, leading up the Potomac Valley passes over the Cabin John Creek by the "Union" Arch. It is noteworthy as exhibiting the longest (220 feet) stone span in the world. The arch (circular) has a rise of 53½ feet, and is 101 feet high above the bed of the stream. It is of cut granite, 4 feet thick at crown, 6 feet thick at spring; but re-inforced by the spandrils (of coursed rubble and Seneca sand-stone) being laid in course normal to the main arch.

When the centre was struck there was no perceptible motion of the arch which could be detected when watched by two cross-wire telescopes. This fact is worthy of mention as Engineers are all taught to read the descriptions of the first long arches built over the Seine, at Paris, some of which, on striking the centre, moved 18 inches. In fact the arch of Cabin John in warm weather in a great measure. if not entirely, relieved itself from the centre, owing to expansion, before the centre was removed. Its key was laid in a cool season.

The bridge is 20 feet wide. The spandrils are hollow, having the two outer walls and one wall in the middle line or axis of the bridge. Upon these rests a platform of masonry upon which the conduit of brick, 9 feet clear diameter, is built. Made water-tight by asphalte between the brick rings. (For view of this structure see Fig. 6, article AQUEDUCT, by GEN. M. C. MEIGS, U. S. A.)

The magnificent arched structure carrying the Croton Aqueduct over the Harlem River, is purely an aqueduct. In both these cases the resort to the masonry arch was natural and proper. Save these, the fine viaducts of the Baltimore and Ohio Railway, built in the early days of American Engineering, are the only considerable works of the kind which we recall; and it is safe to say that the future of engineering construction in our country (or in any other, unless for monumental purposes or for exceptional reasons, we might say) will never exhibit a specimen of a great masonry-arched bridge.

The subject of Bridge would not be complete without a few words concerning MILITARY BRIDGES.

Wherever warfare has been so far reduced to a system and a science, as to call into the field, for protracted campaigns, large and organized armies, the very necessities of the case call for some systematic method of passing streams, and, as belonging to it, special organizations of men (*personnel*) for making bridges, and a portable bridge *apparatus*.

The bridge of boats of Xerxes for passing the Hellespont—the timber pile bridge of Cæsar (of which an account has been given) for passing the Rhine, were not ordinary, but *extra*-ordinary constructions necessitated by the magnitude of the obstacles; and they owe their record probably to that peculiarity. It is quite likely, however, that during ages when roads for wheeled vehicles scarcely existed, and, on the other hand, forest timber was abundant, the felled tree (elaborated into a rude bridge), or some such improvised expedient, could generally be resorted to, and that a regular "bridge-equipage," in the modern sense of the term did not exist. The Romans are known to have had a species of "ponton" (as we now call it) to carry with their armies. In fact the wooden boat has naturally offered the readiest means of support to portable bridges; but these, generally large and heavy, are with difficulty transported. Hence, various expedients for creating a vessel of considerable flotation power, yet lighter and more portable than ordinary boats (such as frame-work, covered by skins, canvas, etc.) have been resorted to. The French, the systematizers of the modern "Art of War," were naturally the first to provide a regular organization and established type of construction for the military bridge, and to organize a "*personnel*" by which it should be operated.

Their first *ponton* was of copper. Their system has undergone successive modifications and improvements, and instead of metal, wood is used in their ponton. As fixed in 1853 the French ponton, as described by Gen. Cullum in his work on Military Bridges, is a flat-bottomed wooden boat, 31 feet long: the middle part or body of which, for a length of 16 feet has a trapezoidal section of 5′ 7″ width at top, and 4′ 4″ at bottom, and 2′ 7″ deep; the fore part 8′ 9″ long, diminishes to 2′ 6″ in width at the bow, and has a sheer of 5½″; and the aft part, 6′ 3″ long, diminishes to 4′ 7″ in width at the stern, and has a sheer of 3″. Each bateau weighs 1,455 lbs., is borne on the shoulders of 16 to 20 men, has a flotation of 18,700 lbs., carries 25 infantry soldiers, is convenient for disembarking troops, and can be easily navigated in a rapid current by five men.

The material for the French bateau bridge consists of 8 abutments, 8 trestles, 32 bateaux, 4 mooring-boats, 339 balks (84 abutment, 24 claw, and 231 bateau), 784 chesses, 32 anchors, and all the accessories for forming a bridge of 41 bays, 262 yards long, and 12′ 9½″ wide.

The Russians have a somewhat lighter equipage; the ponton (of canvas) is a flat-bottomed bateau, having, except at the ends, a rectangular section. The length at top is 21 feet, and at bottom 18′ 4″; the width 5′ 4″; and the depth 2′ 4″. The skeleton consists of two side-frames, connected by movable transoms—all of four inch scantling. The canvas cover is 10′ 8″ wide, 30 feet long in the middle, and 23′ 3″ along the edges: both sides being tarred or painted black with a composition, applied hot, composed of hempseed oil, strong loam, india-rubber, soap, wax, and soot. The cover is brought over the ends of the frame, and lashed to the top-transoms; it is secured, along the sides, to the top string-pieces of the side-frames by small nails passing through eyelet-holes along the edges of the cloth. A plank is laid on the bottom for the pontoniers to stand upon. The canvas ponton, frame and cover complete, weighs 718 lbs.; and has a flotation of 13,428 lbs.

The complete bridge is composed of 32 canvas pontons, with bridge-flooring and accessories for 33 bays; and a section of the Birago equipage consisting of 8 trestles and 15 wooden pontons (8 bow and 7 body pieces), with a bridge-flooring for eight bays.

The Austrians, after satisfactory trials in the passage of the broad, deep, and rapid current of the Danube, adopted, in 1841, a system named from its inventer, Col. Birago, of the Austrian Imperial Engineers.

This equipage has fixed and floating bridge-supports, the former consisting of abutments and trestles, and the latter of pontons of one to six pieces assembled together according to the requirements of the bridge for the passage of infantry, cavalry, or artillery, and whether designed for one, two, or three distinct roadways.

The pontons are flat-bottomed, wooden bateaux, of one piece, or from two to six assembled together, end to end, by suitable bolts and fixtures. The *cap* is *adjustable;* being partly supported at the proper height by *suspension*-chains, at one end of which are large rings passed over the tops of the legs, the free ends being run through suspension-rings on the upper side of the cap. After the chains are made taut, and the cap is at its proper height, the latter is held in place by the *toggles* inserted in the last link which has passed through the suspension-rings.

The Birago trestle is composed of a *cap* and two *legs*, to the lower ends of which *shoes* are attached, to increase their bearing surface, and give greater stability to the trestle.

Nothing like a "bridge-equipage" had belonged to our military service until 1846. The Engineer Department had long foreseen the necessity of a corps of well-drilled pontoniers and a bridge-equipage for our army, and year after year had urged their great importance upon the attention of Congress, but not until the 15th of May, 1846, was its sanction given to the project of the department, and when too late to influence the passage of the Rio Grande.

With the sanction of Congress finally obtained, a company of sappers, miners, and pontoniers was organized as part of the Corps of Engineers, and an india-rubber ponton bridge of 46 pontons was prepared by direction of the Chief of Engineers, but under the superintendence of Captain (now Bvt. Major General) G. W. Cullum. Another of 36 pontons was subsequently despatched with the army under General Scott. Owing to the lightness of these pontons only *thirty-five six-horse carriages* are necessary to transport, over the worst roads, a complete train for the formation of a bridge of two hundred yards. For the French bateau bridge of nearly two hundred and forty metres, *seventy-seven six-horse carriages* are used.

The rubber pontons in use for drill purposes at West Point having become unserviceable, and it having become evident that rubber was not adapted to their construction, experiments were undertaken by the then Instructor of Practical Engineering, Captain J. C. Duane. (Vid. "Organization of the Bridge Equipage of the United States Army," Official.)

The immense trains with which our armies are unavoidably encumbered, the long marches to be made, and the

*Previous to the construction of this Aqueduct, the bridge over the Dee, at Chester, England, built in 1833, exhibited the greatest span of any masonry arch in the world. This arch is circular with a chord (span) of 200 feet and a rise of 42 feet. The material is sand-stone.

numerous wide and rapid rivers to be crossed, demand an equipage of the most substantial character. On the other hand, the extended expeditions of light columns, which necessarily attend our military operations, require a train light enough to keep pace with the most rapid cavalry movements.

Hence we require both a reserve and advance-guard train.

The experiments included the trial of the bridge equipages used by those European armies most experienced in the art of military bridge-building.

Pontons were constructed after the models of the French bateau, the Austrian sectional ponton, and the Russian canvas boat. Corrugated-iron boats were procured, corresponding as nearly in form and dimensions to the French and Austrian boats as the nature of the material would permit. A number of Birago trestles were also constructed. All of the above material, with the exception of the iron boats, was prepared by the enlisted men of the Engineer Company ("A") then stationed at West Point.

The bridges formed of this material were exposed as much as possible to the action of heavy loads, storms, the tide, and floating ice. The material was also packed on carriages of various patterns in order to ascertain the best form, both of bridge material and of carriage, for transportation.

The selection of the French, Russian, and Austrian trains for these experiments, was made after a careful study of the various equipages used at present by the armies of Europe. These three nations alone appeared to have definitely settled on their systems, and this after much experience and thorough research.

After experimenting for two years, the conclusion was arrived at that the French ponton should be adopted. Experiments followed to determine *the material* of which the ponton should be made. Life-boats having been successfully made of corrugated-iron, it was presumed it might be, with equal advantage, applied to pontons. It was not only found that to get adequate strength, the weight must be increased beyond that of the wooden ponton, but that iron failed in other respects. In fact, it would not bear land transportation; as, in travelling over a rough road, the joints open by the yielding of either the rivets or sheet iron. When in the bridge, if the boat grounds on an uneven or rocky bottom, a hole is frequently punched through it, and such injuries cannot be repaired in the field. The wooden ponton is not only much less liable to such accidents, but can be readily repaired when they do occur.

Previous to the battle of Gettysburg, a ponton bridge over the Potomac at Harper's Ferry was destroyed, the pontons being scuttled and set adrift above the rapids. About three weeks after, the water having fallen, the boats were recovered, repaired with pieces of hard-bread boxes obtained from the commissary, and used in constructing a bridge at Berlin, over which the entire army passed into Virginia.

With regard to the canvas boat it soon became apparent that it was precisely what we required for our advance-guard train. It is light, simple, strong, easily repaired, and when packed can safely be transported with the superstructure of the bridge as rapidly as any column of troops can move. A strong argument in favor of its adoption was that it had been used successfully by the Russians for more than a hundred years, under every variety of circumstances likely to occur in this country.

The French ponton wagon not being adapted to our rough roads, further experiments ensued to fix upon the selection of a proper carriage for transporting our bridge-equipage.

Through the information gained by these experiments resulted the system of bridge-equipage adopted at the commencement of the late Civil War.

"During the winter of 1861–62, five trains were constructed, each composed of thirty-four pontons and eight trestles—the pontons being nearly of the same form and dimensions of the French bateau. The frame was somewhat different, the ribs being entire and strongly ironed, and the ironing stronger throughout. The stern was provided with a locker. There were also other alterations in the details of construction. The balks were stronger, and the Birago trestle was modified by substituting built beams, instead of solid timber, for the trestle caps and balks.

"At the same time several canvas trains were organized. In constructing the ponton frame, the dimensions and form of the Russian boat were exactly retained. The scantling for the frame was considerably lighter, but, being strongly braced and ironed, the strength was about the same. One train was composed of canvas boats and trestles; being, in truth, a trestle train, with auxiliary pontons to be used only where the depth of water, or muddy bottom, prevented the use of trestles.

"In the month of February, 1862, a ponton bridge composed of about sixty boats of the reserve train, was thrown across the Potomac at Harper's Ferry. The river was then a perfect torrent, the water being fifteen feet above the summer level, and filled with drift-wood and floating ice. The greatest difficulty was experienced in pulling the pontons into position, and it was necessary to make use of ship anchors and chain cables to hold them in place. Notwithstanding these unfavorable circumstances, the bridge was completed in about eight hours, and the corps commanded by General Banks, with all its trains and artillery, passed over it without accident or delay.

"Several of these trains accompanied the army in the Peninsular campaign. The pontons were used in discharging quartermaster and commissary stores at Ship Point; in disembarking General Franklin's command at West Point (York River); and in constructing bridges over Hampton Creek, the streams in front of Yorktown, and the Upper Chickahominy. Finally, a bridge was built over the Lower Chickahominy, about two thousand feet long, over which nearly the whole army of the Potomac, with its immense trains, artillery, and cavalry, passed with promptness and safety.

"After the army had passed the bridge was dismantled and the balks, chess, etc., packed into the pontons, which were formed into rafts and towed by steamers to Washington. The bridge trains were next transported to Harper's Ferry, where a bridge was constructed a second time, but under entirely different circumstances from that built during the previous winter. The water was now not deep enough; and, as it continued to subside shortly after the bridge was laid, many of the pontons grounded on a very uneven and rocky bottom. Some of them were completely out of water, yet the heavy trains continued to move over the bridge without seriously injuring them; and when the water rose, most of them floated as well as ever.

"Discovering in this way that the boats were much stronger than we had supposed, we were enabled to improve the method of bridging tidal streams.

"It had formerly been considered necessary to build out to low-water mark with trestles, so that the ponton should always be afloat. The bridge is now commenced at high-water mark, building with pontons alone. As the water subsides, the pontons nearest shore ground successively, forming a gentle ramp from the abutment to the floating portion of the bridge, instead of making the descent in twenty feet as formerly. This method, of course, applies only to wooden pontons, and to cases where the bottom is favorable.

"During the Fredericksburg campaign, it became necessary to force the passage of the Rappahannock. The enemy having entrenched themselves on the bank, prevented for some time the construction of the bridge; until, at length, troops were embarked in the pontons and ferried across, where they stormed the rifle-pits, and held them until the bridge was completed.

"During the year 1863, the ponton trains accompanied the army in all its marches backward and forward through Virginia, frequently bridging the Potomac, Rapidan, and Rappahannock. In the latter stream, the bridges remained in position all winter; and, notwithstanding the frequent floods and the quantity of ice formed, but few interruptions occurred on these thoroughfares.

"During the campaign of 1864, trains, composed of fourteen pontons and two trestles, accompanied each of the three army corps of the army of the Potomac. These trains attended their corps in the long march from Culpeper to the James River; and, although the roads were frequently very bad, in no instance did they delay the march of the troops, or arrive late when a bridge was to be laid.

"The headquarters train was followed by a canvas train; which, when a crossing was to be made by surprise, was sent forward with the cavalry, who covered the construction of the bridge and held the position till the main body arrived.

"On reaching the James River, a bridge was laid, opposite Charles City Court-House (at a point selected by the writer of this article) about two thousand feet in length. The water was so deep and rapid that the pontons could not be held by their own anchors, and it was found necessary to attach their cables to schooners anchored above and below the bridge." "For the next 40 hours a continuous stream of wagons passed over the bridge, from 4000 to 6000 wagons, some said, 50 miles of wagons, and nearly all the artillery of this army, and by far the larger portion of the infantry and all its cavalry present, and even to its heads of 3000 or more of beef cattle—the most injurious of all—without an accident to man or beast." (*Report of Gen. Benham.*) The length of the bridge was made up of 200 ft. in trestle work and 2000 ft. in pontons (101 in all); depth of the river 85 ft.

"Thus the wooden ponton train through four years of

war during which the bridges constructed were without parallel in number and magnitude, amply fulfilled all the requisites of a good bridge equipage. The frequent crossing of the Potomac, Chickahominy, and James Rivers proved that, even under the most unfavorable circumstances, it could furnish a bridge capable of passing a large army, with its heaviest trains over wide and rapid streams, with safety and despatch.

"Its capabilities in ferrying troops were shown at Ship Point, West Point, and Fredericksburg; and of the mobility of the equipage there was abundant proof in the long marches during the last two years of the war.

"The canvas equipage, also, was perfectly successful as an advance-guard train. In the cavalry raids, it was always able to keep pace with the columns; and, although they frequently marched hundreds of miles, it was invariably ready to furnish a prompt and secure means of crossing all the streams on their route. It also often furnished bridges for the heavy trains of the army over streams of moderate width and rapidity.

"The only part of the bridge equipage which did not realize all our expectations was the Birago trestle.

"As already stated, a train was organized early in the war on the Austrian principle, in which the trestle is the main dependence, the ponton being merely auxiliary. It was supposed that many streams would be encountered which would be bridged best with trestles alone, but none such were met with. In fact, when a stream is more than two feet deep, a ponton bridge may be laid; when less than that depth, if the bottom is hard, it may be forded, and no bridge is required; should the bottom be soft, the trestle legs will usually settle so as to render the bridge unsafe. As it was not deemed advisable to transport with the army a train which could only be used in exceptional cases, this description of equipage was abandoned. The trestle was, however, very useful as an auxiliary, especially with the canvas train; for, as these boats when in the bridge should never be allowed to touch the bottom, it is frequently necessary to build out several bays from the shore before sufficient depth of water can be obtained to float the ponton—and for this purpose nothing could be better than the Birago trestle, which is also equally useful for a similar purpose with the reserve train, when the river bottom is rough near the shore.

"The canvas train was extensively used by the western army, and with such success that it was proposed to employ it exclusively. Experience, however, in the East has clearly proved that this train cannot fulfil all that is required of the bridge equipage of a large army. The bridges of the Potomac and James rivers could not have been built with canvas boats, which will not resist ice and drift-wood; neither are they suited to the disembarkation of troops or the passage of a river by force.

"Experience would therefore lead us to concur with General Barnard in his remarks on this subject, viz.:

"'The numerous proposers of "flying" bridges forget that if a military bridge is intended to be *carried with* an army, it is also intended to *carry* an army, its columns of men, its cavalry, its countless heavy wagons, and its ponderous artillery. It must carry all these, and it must do it with certainty and safety, even though a demoralized corps should rush upon it in throngs. No make-shift expedient, no "ingenious" invention not tested by severe experiment, no light affair of which the chief merit alleged is that it is light, will be likely to do what is required, and what the French ponton has so often done.'"

The experienced engineer officers, from whose Introductory History we quote, constituted a Board which, in 1870, established the present authorized organization. It was based upon the experience we have described in their language.

As now fixed the United States bridge-equipage is composed of reserve and of advance-guard trains. The former are intended to accompany large bodies of troops in the field, and are provided with the material necessary for the construction of bridges of sufficient capacity to pass large armies with their heaviest trains over rivers of any size and rapidity.

The advance-guard equipage is intended for the use of light troops, such as advance guards, cavalry expeditions, etc. It is organized, both as regards material and carriages, with a view to rapidity of movement. At the same time it is capable of furnishing a bridge which will fulfil all the requirements of troops engaged on such service.

The basal elements of these distinct equipages—the French wooden bateau and the Russian canvas ponton—are of dimensions very nearly corresponding to those (already given) of their original prototypes; but with modifications in details of construction derived from our own experience.

The Reserve Equipage is divided into trains, each of which is composed of four ponton divisions and one supply division. Each division is accompanied by a tool wagon and travelling forge.

Each ponton division is complete in itself, containing all the material necessary for constructing a bridge of eleven bays, or 225 feet in length.

Each of these divisions is subdivided into four sections, two of which are ponton and two abutment sections; the former contains three ponton wagons and one chess wagon; the latter, one ponton, one chess, and one trestle wagon each.

The ponton section contains the material for three bays, and should never be subdivided. The division may be increased or diminished at pleasure, by changing the number of its ponton sections.

The supply division is provided with articles necessary to replace material lost or worn out, such as balk, chess, spare parts of carriages, a few complete carriages, etc.

The carriages of this division consist of ponton, chess, and tool wagons, and of forges. Their number and proportion will be determined by the nature of the country in which the army is operating, and by the proximity of the main depot.

The trains of the Advance Guard Equipage are composed of 4 ponton divisions, each of which consists of 8 ponton, 2 chess, and two trestle wagons.

The ponton wagon carries all the material necessary for constructing a complete bay. The division may, therefore, be increased or diminished by one or more ponton wagons without disorganizing it. When a forced march is to be made, and it is desirable to lighten the loads, the chess may be removed from the ponton wagons, the rope from the trestle wagons, and the load of the chess wagons be reduced to 40 chess. The number of the latter wagons in this case must be increased to 5.

The ponton wagons of reserve train are drawn by 8 mules or 6 horses, those of the advance-guard train by 6 mules or 4 horses; the "loads" being about 3000 and 2000 lbs. respectively. It would be out of place to enter more fully into this subject in this work; but these historical details concerning the development of our military bridge system—a matter in which we had no experience whatever—during the war cannot fail to be interesting.

Another interesting branch of the subject—the remarkable constructions applied to the improvisation of railroad bridges, in place of destroyed ones, and the noteworthy system of repair and construction introduced into our military railway service, can only be alluded to. The military railroad construction and repair corps were a part of the Quartermaster's Department, which organized, hired, and paid all their members, and bought and paid for all the material, and possessed and operated the railroads at an expense which at one time amounted to about $2,000,000 per month. Under the Chief of that Department, and especially charged with this duty, the principal organizer and conductor of military railroad transportation and repairs was Brig.-Gen. D. C. McCallum (who has since made a valuable report on this subject), well known as an able civil Engineer and inventor of the "Inflexible Arch Truss;" but the credit of the military railroad operation, and repair and success belong to no individual altogether, but to the Quartermaster's Department, and to the body of Railroad Engineers, superintendents, and operatives who came into its service to aid the country during the war.

In the occupation, for protracted periods, of the same ground (as in investments, sieges, etc.) military bridges assume frequently a semi-permanent character.

Thus, while the Army of the Potomac occupied a position near Richmond (May and June 1862) its wings were separated by the formidable barrier of the Chickahominy rivulet and swamp. One of the bridges is thus described in the report of the Chief of Engineers of the Army of the Potomac:

"The bridge was built over the stream upon frame trestles; through the swamp it was supported by cribs. The *approaches* to the bridge over the low bottom-lands were either raised corduroy or (on the north side) simply earth raised two or three feet (the soil being here sandy), with a layer of brush one foot below the upper surface; deep lateral ditches being made. The whole structure of the bridge and approaches was about fourteen hundred yards long. The trestle-work and crib-work bridge was mostly done by troops of the Engineer brigade under General Woodbury; the approaches on the north, by the 9th and 22d Massachusetts regiments (Colonels Cass and Gove, both of whom were killed in the battles following), and those on the south side by the 3d Vermont. The bridge was ready for the passage of teams on the 14th, covered with earth, and the approaches entirely completed on the 17th. The bridge proper was 1,080 feet long; roadway, 11 feet wide; number of cribs, 40; of framed trestles, 6." (Fig. 24.)

The combined armies under General Grant occupied positions before Petersburg and Richmond from June 1864 to April 1865. The James River separated the Army of the James (in its final position) from the centre and left. An

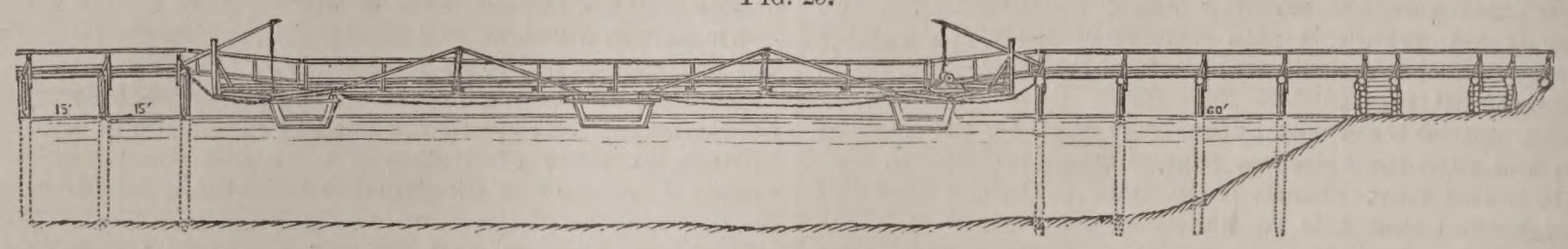
FIG. 24.

Woodbury and Alexander's Bridge.

assured communication was indispensable, and at the same time one which would not impede the navigation to our own vessels, whether transports or armed.

Col. P. S. Michie, Chief of Engineers Army of the James, designed and submitted for approval a timber pile bridge with a floating draw (the floats being our ordinary pontons) of which an elevation of a portion, including the "draw," of pontons is here given. (Fig. 25.)

FIG. 25.



The piles of trestles were guarded against ice (which in the winter forms freely in the upper James) by highly inclined guard pieces, the feet of which were secured to piles in the bed of the river. Each trestle was made up of a cap piece and six piles (in pairs) driven into the bed of the river. This bridge constructed late in 1864 was in use up to the close of the war. During the period above indicated the gap in our lines made by the Rappahannock was occupied by one or more ordinary ponton bridges.

Limiting the scope of the word *bridge*, by the radical meaning (as given in our definition) we have omitted in the foregoing nearly all reference to a very essential portion of the art of *bridge-building*, viz.: the establishment of pier and abutment *foundations*. For this subject see "FOUNDATIONS." Consult "Dictionary of Engineering" (Byrne). "Theory of Strains on girders and similar structures" (Stoney). "The Strains upon Bridge Girders" (Cargill). "Woodbury on the Arch." "Roebling on the Niagara Suspension Bridge." "Boudsot, Ponts Suspendus." "The Pesth Suspension Bridge." "Iron Truss Bridges" (Col. W. E. Merrill). "The Theory of Strains" (Diedrichs). "Theorie élémentaire des Poutres Droites" (Collignon, an excellent little French work); also Humber's great work on Bridges and "Modern Examples" and the published accounts of the Quincy and Kansas City Bridges. (See also FLEXURE OF BEAMS, by COL. W. E. MERRILL.)

J. G. BARNARD, U. S. A.

Bridge Creek, a twp. of Ouachita co., Ark. Pop. 375.

Bridge Creek, a township of Eau Claire co., Wis. Pop. 1538.

Bridgehamp'ton, a township of Sanilac co., Mich. Pop. 936.

Bridgehampton, a post-village of Southampton township, Suffolk co., N. Y. Pop. 1334.

Bridge-Head. See TÊTE-DE-PONT.

Bridge, Natural. See NATURAL BRIDGE.

Bridgenorth (anc. *Bruges* or *Brugia*), a town of England, in Shropshire, on both sides of the Severn, 19 miles S. E. of Shrewsbury, and 123 miles N. W. of London. The upper part of the town is picturesquely built on a rock sixty feet higher than the river. It has an old castle, almshouses, a public library, a blue-coat or charity school, a handsome bridge, and manufactures of carpets, nails, tobacco-pipes, boats, and worsted stuffs. It has a heavy commerce upon the river. It is supposed to have been founded by a daughter of Alfred the Great. Pop. in 1871, 5871.

Bridgeport, a post-village of Waterloo township and co., Ontario (Canada), 2 miles from Berlin, has extensive water-power and some manufactures. Pop. about 700.

Bridgeport, a post-village of Cape Breton Island, in Sydney township, Cape Breton co., 13 miles from Sydney, with which it is connected by railway, has important coal-mines. Pop. about 300.

Bridgeport, a post-township of Jackson co., Ala. Pop. 1002.

Bridgeport, a post-village, capital of Mono co., Cal., about 160 miles E. of San Francisco. It is near the Sierra Nevada. Pop. of Bridgeport township, 174.

Bridgeport, a township of Nevada co., Cal. Gold is found here. Pop. 1829.

Bridgeport, a village of Green Valley township, Solano co., Cal., on the California Pacific R. R., 39 miles N. E. of San Francisco. Pop. 80.

Bridgeport, a city and seaport of Fairfield co., Conn., is situated on an inlet of Long Island Sound, at the mouth of Pequonnock River and on the New York and New Haven R. R., 58 miles E. of New York and 18 miles W. S. W. of New Haven; lat. 41° 10′ 30″ N., lon. 73° 11′ 46″ W. It is the southern terminus of the Housatonic R. R., which extends to Pittsfield, Mass., and of the Naugatuck R. R., which connects it with Waterbury. It is mostly built on a small plain, behind which rises an eminence called Gold Hill, which is about 60 feet above high-water mark, and is occupied by elegant mansions. Bridgeport contains 25 churches, 5 national and 3 savings banks, a public library, and an orphan asylum. It has two daily newspapers, one semi-weekly, and two weekly. It is the third city in size and importance in Connecticut. Since the census of 1870 three square miles of the adjacent town of Fairfield have been added to Bridgeport, and the population has

been largely increased. It derives its prosperity chiefly from its manufactures of carriages, sewing-machines, miscellaneous hardware, machinery, brass and iron castings, leather, cartridges, hats, shirts, saddles, springs and axles, etc. Here are the large manufactories of Wheeler & Wilson's, Elias Howe's, and the Secor sewing-machines, with the Union Metallic Cartridge Co., Wood Brothers' carriage-factory, The New York Tap and Die Co., Glover Sanford and Sons' hat manufactory, and many others. There are 53 corporate companies doing business within the city limits, on an aggregate capital of over $6,000,000. The city has a paid fire department and an electric fire-alarm telegraph. It has two fine parks, and a horse-railroad connecting its eastern, southern, and western extremes. Pop. (in 1870, before the annexation of a part of Fairfield), 18,969; of the township, 19,835.

G. C. WALDO, ED. OF "DAILY STANDARD."

Bridgeport, a post-village of Christy township, Lawrence co., Ill. Pop. 435.

Bridgeport, a post-township of Saginaw co., Mich. Pop. 1171.

Bridgeport, a post-township of Warren co., Mo. Pop. 822.

Bridgeport, a post-village of Sullivan township, Madison co., N. Y. Pop. 217.

Bridgeport, a post-village of Belmont co., O., on the Ohio River, opposite Wheeling, with which it is connected by a bridge. It is on a branch of the Cleveland and Pittsburg R. R., and has a national bank and an active trade. Pop. 1178.

Bridgeport, a post-borough of Fayette co., Pa., on the Monongahela, adjoining Brownsville, 35 miles S. of Pittsburg. Pop. 1199.

Bridgeport, a post-borough of Montgomery co., Pa., on the Schuylkill, opposite Norristown. Pop. 1578.

Bridg'er's Pass, a defile in the Rocky Mountains, in the S. part of Wyoming Territory, about lat. 41° 39′ N., lon. 107° 30′ W. The overland mail route passed through it before the Pacific R. R. was opened. It is described by Fitz Hugh Ludlow as "a narrow gallery, walled by noble precipices of red granite and metamorphic sandstone, rising directly from the traveller's side to the almost perpendicular height of from 1000 to 2500 feet. In some places this gallery appears scarcely more than a crevice of dislocation, a mere crack between stupendous naked rocks, which would match joints exactly if slid back to their old position. Though the passage is in reality ample for an army, the vast height of its lateral walls makes it seem proportionally narrow. This American Simplon is Bridger's Pass. It is several miles in length." (*The Heart of the Continent.*)

Brid'ges, a township of Ozark co., Mo. Pop. 532.

Bridg'et, SAINT, or **Saint Bride,** one of the three patron saints of Ireland, lived about 500–520 A. D. St. Bridget's Day is Feb. 1st.

Bridget, Brigit'ta, or **Bir'get,** SAINT, a daughter of Birger, prince of Sweden, was born in 1304. She was the mother of Saint Catharine of Sweden, and author of a work entitled "Revelations." (See BRIGITTINES.) Died in 1373. (See ÉTIENNE BINET, "Vie de Sainte Brigitte," 1634.)

Bridgeton, a post-village and township of Cumberland co., Me., 38 miles from Portland. It has three woollen mills at the Centre Village, a printing-office, a weekly paper, sash and blind factories, etc., and is accessible by steamboat from the foot of Sebago Lake. Pop. 2685.

ED. OF "BRIDGETON NEWS."

Bridgeton, a post-township of Newaygo co., Mich. Pop. 397.

Bridgeton, a city, port of entry, and the capital of Cumberland co., N. J. (a rich agricultural county), is situated on both sides of Cohansey River, a fine tide-water stream, 20 miles from Delaware Bay, 37 miles S. of Philadelphia, and 127 miles S. of New York. Its area is 15.39 square miles, or 9849 acres. Its population was in 1800 about 400; 1829, 1736; 1838, 2315; 1850, 3480; 1860, 5104; 1870, 6830; and now (1873) is 8000. As a port of entry it is second in the State, having a tonnage, Jan. 1, 1873, of 16,067.33 tons. Three steamers and a large number of sailing-vessels, barges, etc. are employed in the direct trade of the city, transporting annually over 150,000 tons, while an equal amount is carried by the different railroads. The receipts of leading articles are, coal, 21,000 tons; pig iron and iron ore, 10,200 tons; lumber, 4,000,000 feet; lime and shells, 175,000 bushels; fertilizers, 1500 tons; and manufactured goods, 30,000 tons. The principal shipments are 110,000 kegs of nails, 2,200,000 feet of gas and water-pipe, 70,000 cases of canned fruits, 290,000 yards of woollen goods, 20,000 boxes window-glass, $200,000 worth of hollow-ware, and 25,000 bushels of grain, potatoes, etc. It is the leading city of Southern New Jersey in the variety and value of its manufactured products, which consist in part of nails, water and gas-pipe, castings, machinery, woollen goods, glass, canned fruits, lumber, brick, shipbuilding, etc. Companies and firms to the number of 143 are engaged in 60 different branches of manufacture, with a capital of $1,231,350, employing 1210 males, 637 females, and 143 children, to whom $632,821 are annually paid as wages, using raw material worth $2,236,339, and producing articles to the value of $3,413,769. The assessed valuation of the city for 1873, about two-thirds of the actual value, was $3,541,000, on which the assessment was $1.35 on $100. The expenses were, State tax, $5,056.47; county, $13,847.29; schools, $17,741.96; city government, $13,301. The city is out of debt. Educational facilities are fine. The South Jersey Institute, for both sexes, opened in 1870, has a handsome and well-appointed building, which cost over $65,000, on a commanding site, with 8 teachers and 100 scholars during the last school year. The West Jersey Academy occupies a fine building on a beautiful location, and has 5 teachers and 50 scholars. Ivy Hall, a select boarding-school for young ladies, has a high reputation, and has 10 teachers and 54 scholars. There are 6 public schools of a high order, with 22 teachers (to whom are paid salaries amounting to $9,469.19) and 1238 scholars. A handsome building for a new school is now being erected at a cost of about $16,000. A good public library has over 1300 volumes. The newspapers comprise 1 daily, circulation 400; 3 weekly, circulation 4200; 2 monthly, circulation 7500 copies. The churches number 13, owning 13 church buildings, 6 chapels, and 8 parsonages, valued at $288,500, with sittings for 6750 persons, and having a membership of 2833. There are national and savings banks, a flourishing board of trade, two building and loan associations, a large number of benevolent societies, and a children's home for the care of destitute children. Three bridges span the river, and the streets are well laid out, graded, and lighted with gas. Water-works are about being erected. It is a railroad centre; the New Jersey Southern, from New York to Baltimore, passes through the city; the West Jersey connects it with Philadelphia; the Bridgeton and Port Norris, 22 miles long, connects it with the celebrated Maurice River oyster-grounds. Several others are projected.

As the head of navigation and a fording-place on the Cohansey, a settlement early grew up. Before the Revolution there were not over 200 inhabitants, but they were staunch patriots. Dr. Jonathan Elmer, a Bridgetonian, was a member of the Revolutionary Congress. A company from Bridgeton served under Gen. Schuyler, and a privateer schooner built here made one successful voyage, but was captured when returning from the second. During the present century the place has had a steady growth, and was incorporated in 1865. The climate is mild and healthy, the city and its surroundings most beautiful, and its inhabitants intelligent and social. CHARLES E. SHEPPARD, *Att'y,*
Member of Board of Trade.

Bridgeton, a borough of Bucks co., Pa. Pop. 944.

Bridgetown, the capital of the island of Barbados, is on its W. coast, and extends along the N. side of Carlisle Bay, which forms its roadstead; lat. 13° 4′ N., lon. 59° 38′ W. It is the residence of the bishop of Barbados and the governor of the Windward Islands, and has an arsenal and barrack in the vicinity. Pop. about 25,000.

Bridgetown, a post-village of Granville township, Annapolis co., Nova Scotia, on the Windsor and Annapolis R. R., 14 miles from Annapolis, at the head of navigation of Annapolis River, has a fine water-power and one weekly paper. The surrounding country is very fertile. Pop. about 800.

Bridgeville, a post-twp. of Pickens co., Ala. P. 1265.

Bridgeville, a post-village of North-west Fork hundred, Sussex co., Del. Pop. 300.

Bridgewater, a town and river-port of England, in Somersetshire, on both sides of the river Parret, 33 miles by rail S. W. of Bristol. It is neatly built, and the houses are mostly of brick. Vessels of 200 tons can ascend the river to this town. Here is St. Mary's Church, which has a remarkable and lofty spire. This is the native place of Admiral Blake. Bridgewater became a free borough in 1200. Pop. in 1871, 12,101.

Bridgewater, a post-village of New Dublin township, Lunenburg co., 12 miles from Lunenburg, Nova Scotia, has manufactures of lumber, etc., an active trade, and one weekly newspaper. Pop. about 1000.

Bridgewater, a post-village of Elzevir township, Hastings co., Ontario, has mines of iron, copper, and other minerals, and quite extensive water-power and manufactures. White marble is found here. Pop. 450.

Bridgewater, a post-township of Litchfield co., Conn. Pop. 877.

Bridgewater, a post-township of Aroostook co., Me. It has manufactures of lumber, leather, etc. Pop. 605.

Bridgewater, a post-village and township of Plymouth co., Mass., is on the Old Colony and Newport R. R., 27 miles S. of Boston. It contains a State normal school, academy, State almshouse, extensive iron-works, cotton-gin, and other manufacturing establishments, and is the seat of the county agricultural fair. It has a weekly paper and a savings bank. Pop. 3660.

PRATT & Co., PUBS. "BANNER."

Bridgewater, a post-township of Washtenaw co., Mich. Pop. 1379.

Bridgewater, a township of Rice co., Minn. Pop. 957.

Bridgewater, a post-twp. of Grafton co., N. H. P. 453.

Bridgewater, a township of Somerset co., N. J., contains Somerville, the county-seat. Pop. 5883.

Bridgewater, a post-township of Oneida co., N. Y. The village is on the Utica branch of the Delaware Lackawanna and Western R. R., 15 miles S. of Utica. Pop. 1258.

Bridgewater, a post-township of Williams co., O. Pop. 1207.

Bridgewater, a borough of Beaver co., Pa. Pop. 1119.

Bridgewater, a township of Susquehanna co., Pa., contains Montrose, the county-seat. Pop., exclusive of Montrose, 1459.

Bridgewater, a post-township of Windsor co., Vt. It has manufactures of woollen goods, etc. Pop. 1141.

Bridgewater (FRANCIS HENRY EGERTON), EARL OF, born Nov. 11, 1758, was a son of John Egerton, bishop of Durham. He inherited the earldom in 1823, and died without issue in 1829. By his last will he left £8000 to be paid to the author of the best treatise "On the Power, Wisdom, and Goodness of God as manifested in the Creation." He was an Anglican priest. (See BRIDGEWATER TREATISES.)

Bridgewater Treatises, a celebrated series of works named in honor of the earl of Bridgewater. (See preceding article.) The trustees who had the control of his bequest of £8000 pounds placed it at the disposal of Gilbert Davies, president of the Royal Society, who appointed eight gentlemen to write separate treatises illustrative of the power, wisdom, and goodness of God. They are—1. "The Adaptation of External Nature to the Moral and Intellectual Constitution of Man," by Thomas Chalmers, D. D. (1833); 2. "Chemistry, Meteorology, and the Function of Digestion considered with Reference to Natural Theology," by William Prout, M. D. (1834); 3. "On the History, Habits, and Instincts of Animals," by the Rev. William Kirby (1835); 4. "On Geology and Mineralogy," by the Rev. Dr. Buckland (1837); 5. "The Hand, its Mechanism and Vital Endowments, as Evincing Design," by Sir Charles Bell (1837); 6. "The Adaptation of External Nature to the Physical Condition of Man," by John Kidd, M. D. (1837); 7. "Astronomy and General Physics considered with Reference to Natural Theology," by the Rev. William Whewell (1839); 8. "Animal and Vegetable Physiology considered with Reference to Natural Theology," by Peter Mark Roget (1840).

Bridg'man (LAURA), a blind deaf-mute, affording a remarkable instance of the development of intellectual and moral powers under the most adverse circumstances. She was born at Hanover, N. H., Dec. 21, 1829. When two years old, through a severe illness, she lost her sight, hearing, and smell; her sense of taste being at the same time greatly impaired. At the age of eight she was placed under the instruction of Dr. Howe of Boston, principal of the Perkins Institution. She soon learned to read and spell with a manual alphabet; and she afterwards learned to write and to sew, and to play very well on the piano.

Bridgman (WILLIAM R.), U. S. N., born Nov. 28, 1844, in Iowa, graduated at the Naval Academy in 1861, became an ensign in 1862, a lieutenant in 1864, and a lieutenant-commander in 1866. He served in various vessels of the West Gulf and Mississippi River squadrons during 1862 and 1863, participating in the action with Forts Jackson and St. Philip and capture of New Orleans, and in many of the most important fights on the Mississippi.

FOXHALL A. PARKER, U. S. N.

Brid'lington, or **Bur'lington,** a market-town of England, in the East Riding of Yorkshire, and on the North Sea, 54 miles by rail E. by N. of York. Here are remains of a rich priory founded by a grand-nephew of William the Conqueror. Numerous ancient tumuli or barrows occur in this vicinity. Bridlington Quay, a seaport and bathing-place, is on the sea 1 mile S. E. of the town. It has a chalybeate spring and several hotels; also an active trade in corn, which is exported from it. This place is noted for chalk-flint fossils. Pop. of Bridlington and Quay, 5775.

Brid'port, a seaport-town of England, in Dorsetshire, on the Brit or Bride River, 16 miles N. W. of Dorchester. It is surrounded by hills, and consists chiefly of three spacious streets. It has a Gothic church, an almshouse, a town-hall; also manufactures of cordage, sail-cloth, shoe-thread, and fish-nets. The vicinity is celebrated for its butter and cheese. Pop. in 1871, 7666.

Bridport, a post-township of Addison co., Vt. P. 1171.

Briec, a village of France, department of Finistère, 9 miles N. N. E. of Quimper. Pop. 5726.

Brief [Lat. *breve*], **Papal,** a letter addressed by the pope to temporal princes or communities on subjects of discipline or public affairs. It differs from the papal bull in several respects, giving decisions on matters of inferior importance, which do not require the deliberations and assent of a conclave of cardinals. It is not signed by the pope, but by the segretario de' brevi, an officer of the papal chancery. It is written on parchment, and sealed in red wax with the pope's private seal, called the "Fishermen's Ring" (Annulus Piscatoris).

Brief [from the Lat. *brevis*, "short"], in law, an abridged statement of the plaintiff's or defendant's case, prepared by his attorney for the use of counsel. It should contain a summary of the pleadings, a concise statement of the facts involved, the names of the witnesses, the substance of their testimony, and usually observations by the attorney in the nature of suggestions to counsel.

The word "brief" is also employed in this country to indicate the sketch of the argument of counsel, which is either used by him or submitted to the court under its rules. "Brief" is also sometimes employed in the sense of *breve*, to denote one of the writs by which all suits in the higher courts were originally begun.

Brieg, a town of Prussia, in Silesia, on the Oder, and on the railway from Breslau to Oppeln, 29 miles by rail N. of Neisse. It is well built, and has a gymnasium, a good library, and manufactures of hosiery, ribbons, linens, and woollens. Pop. in 1871, 15,367.

Briel, or **The Brill,** a fortified seaport-town of Holland, in the province of South Holland, and near the mouth of the river Meuse, 13 miles S. S. W. of The Hague; lat. of lighthouse, 51° 54′ 11″ N., lon. 4° 9′ 51″ E. It has a good harbor, is intersected by several canals, and contains several magazines. The capture of this town by William de la Marck in 1572 was the first important event in the long contest between the Dutch and Philip II. of Spain. Admirals van Tromp and de Witt were born here. Pop. 4168.

Brienne, or **Brienne-le-Château,** called also **Brienne-Napoléon,** a small town of France, in the department of Aube, on the river Aube, 23 miles E. N. E. of Troyes. Here was a military school in which Napoleon I. was educated. The place derived its name from a château built by the last count de Brienne. In Jan., 1814, a battle was fought here between Napoleon and the allies, commanded by Blücher and Schwarzenberg, in which the latter were victorious. Pop. in 1866, 2078.

Brienz, Lake of [Ger. *Brienzer-See*], in Switzerland, is formed by the river Aar, at the foot of the Hasli Valley. It is 8 miles long, 2 miles wide, and from 500 to 2100 feet deep. The surface is 1847 feet above the level of the sea. It is surrounded by high mountains, one of which, called the Rothorn, commands a grand view of the Alps. The surplus water of this lake flows through the Aar into Lake Thun. A small steamer plies on the lake daily.

Brier Creek of Georgia rises in Warren county, flows south-eastward, and after a course of about 100 miles enters the Savannah near Jacksonborough. Mar. 4, 1779, the British, under Prevost, defeated a force of Americans, under Gen. Ashe, on this creek.

Brier Hill, a post-village of Morristown township, St. Lawrence co., N. Y., on the Black River and Morristown R. R., is an active business-place.

Brierre de Boismont (ALEXANDRE JACQUES FRANÇOIS), a French physician, born Oct. 18, 1797, has published numerous treatises on medico-psychological subjects; among others, "De l'Ennui," "Sur le Suicide et la folie-suicide" (rev. ed. 1865), and "Des Maladies Mentales" (1866).

Bries [Hun. *Breznobanya*], a royal free city of Hungary, in the county of Sohl, 20 miles N. E. of New Sohl. Pop. in 1869, 11,766.

Brig, a square-rigged vessel with two masts. It has a boom mainsail, and is otherwise square-rigged—*i. e.* having the sails brought to yards hung horizontally by the middle. The hermaphrodite brig is the same with the BRIGANTINE (which see).

Brigade [It. *brigata*, a "company"], a group of regiments or battalions combined into one body. In the British army it denotes a body formed by the union of two or more regiments or battalions under one commander, called a brigadier. It is a temporary grouping which can be broken up whenever the commander of the army thinks proper. In the U. S. army two or more regiments of infantry or cavalry may constitute a brigade; two or more brigades under one command constitute a division, and two or more divisions an army corps.

Brigade-Major, an officer of the British army whose duties in a brigade are analogous to those of the adjutant in a regiment. When regiments or battalions are formed into a brigade, a brigade-major is detailed, usually from among the captains. He conveys orders, keeps the roster, inspects guards and pickets, directs exercises, etc.

Brigadier', or **Brigadier-General,** the commander of a brigade; an officer who is one degree higher than a colonel, and one lower than a major-general. In the British army a brigadier is an officer (usually a colonel) who for a limited time and for a special service is appointed to the command of a brigade. When this is broken up he either falls back to his colonelcy, or is raised to the rank of major-general.

Brigandine, a part of the defensive armor of the Middle Ages, was an assemblage of small plates of iron sewed upon quilted leather or linen. It formed a sort of coat or tunic, and derived its name from the irregular, light-armed troops called brigans or brigands, who were addicted to marauding and plundering.

Brigan'tes, a powerful nation of ancient Britain, inhabiting what is now the north of England, including the counties of Cumberland, Westmoreland, Durham, York, and Lancaster.

Brigantine, or **Hermaph'rodite Brig,** a two-masted vessel, with the mainmast of a schooner and the foremast like that of a brig. The mainsail of a brigantine is a fore-and-aft sail, like that of a schooner.

Briggs (Charles Frederick), an American writer, born at Nantucket, Mass. He became an editor of the "New York Times," and published, besides other works, "The Adventures of Harry Franco, a tale of the Great Panic" (1839), "The Haunted Merchant" (1844), and "The Trippings of Tom Pepper" (1847).

Briggs (George Nixon), LL.D., an American lawyer and judge, born in Adams, Mass., April 13, 1796. He was a member of Congress for two years, and governor of Massachusetts from 1844 to 1851, and afterwards judge of the court of common pleas. He was a distinguished philanthropist, and for many years president of the Baptist Missionary Union. Died Sept. 12, 1861.

Briggs (Henry), an English mathematician, born near Halifax, Yorkshire, in 1556, was educated at Cambridge. He became in 1619 Savilian professor of geometry at Oxford. He made important contributions to the theory of logarithms, and published in 1624 a great work entitled "Arithmetica Logarithmica," giving the logarithms of natural numbers from 1 to 20,000, and from 90,000 to 100,000, calculated to fourteen places. Died in 1631.

Brig'ham (Amariah), M. D., an American physician, born near New Marlborough, Mass., Dec. 26, 1798. He became superintendent of the lunatic asylum at Utica, N. Y., in 1842. Among his works is "The Anatomy, Physiology, and Pathology of the Brain" (1840). Died Sept. 8, 1849.

Brigham (Rev. Charles H.), born in Boston, Mass., July 27, 1820, graduated at Harvard, was from 1844 to 1866 pastor of the First Congregational church in Taunton, Mass., and since 1865 has been pastor of the Unitarian church at Ann Arbor, Mich. Since 1866 he has been professor of biblical archæology and ecclesiastical history in the Meadville (Pa.) Theological School. He is a prominent member of the American Oriental Society, of the Philological Society, and of the American Association for the Advancement of Science, and is the author of a very great number of contributions to periodical literature.

Brigham City, a post-village, capital of Box Elder co., Utah, near Bear River, and near the Central Pacific R. R., about 50 miles N. of Salt Lake City. It has manufactures of leather, woollen goods, etc. Pop. 1315.

Bright, a post-village of Oxford co., Ontario (Canada), on the Buffalo and Goderich branch of the Grand Trunk Railway, has some manufactures and a postal savings bank. Pop. about 500.

Bright (Jesse D.), born at Norwich, Chenango co., N. Y., Dec. 18, 1812, became a lawyer of Indiana, circuit judge in the State courts, lieutenant-governor, etc., and U. S. Senator from Indiana (1845–62).

Bright (John), an eminent English orator and statesman, born near Rochdale on the 16th of Nov., 1811. He is a member of the Society of Friends. About 1840 he became a personal and political friend of Richard Cobden, and gained distinction as an orator of the Anti-Corn Law League, in advocacy of which he addressed many public meetings. He was elected a member of Parliament for the city of Durham in 1843, and was returned for Manchester in the general election of 1847. Cobden and Bright became the principal leaders of the Manchester school or party, which was not identified with either of the great political parties, but advocated a pacific foreign policy and electoral reform. He was defeated in the election of 1857, because he had opposed the Crimean war against Russia and the Chinese war, but he was elected in the same year by the Liberal voters of Birmingham, which he continued to represent for many years. During the great civil war in the U. S. he expressed his sympathy with the Union cause in several eloquent speeches. After the Reform bill of Russell and Gladstone had been rejected by the House of Commons in 1866, Mr. Bright advocated the cause of electoral reform by vehement speeches at immense public meetings in London, Manchester, Birmingham, and other places. Referring to these speeches, the "European Times" of Dec. 8, 1866, remarked: "In all Mr. Bright's previous career he has never put forth such extraordinary power, such floods of the very highest order of eloquence, on the great question of the day, as during the last four months." In 1867 the friends of reform triumphed, and procured the passage of a bill granting the right of suffrage to every householder in a borough. He entered the cabinet formed by Mr. Gladstone in Dec., 1868, as president of the board of trade, and resigned office on account of ill health about Mar., 1871. As an orator he is distinguished for racy humor, passionate declamation, and nervous diction.

Bright'on, formerly **Brighthelmstone,** a town and fashionable watering-place of England, in Sussex, and on the English Channel, 50 miles S. of London. It is the southern terminus of the London and Brighton Railway. Lat. of lighthouse, 50° 50′ N., lon. 0° 8′ W. It extends 3 miles along the coast, and is sheltered on the N. and N. E. by the South Downs. To resist the inroads of the sea, which formerly undermined the chalk-cliffs at Brighton, a sea-wall of great strength has been constructed. It is 60 feet high, and forms an admirable promenade. In the middle of the town, in an open space called the Steyne, is the Pavilion or Marine Palace, a fantastic structure of Oriental style built by the prince of Wales (George IV.). It was finished in 1827, and is now owned by the corporation of Brighton. The town is well built, and consists mostly of new and elegant streets and terraces. It is a favorite resort for the aristocracy and the opulent classes, has numerous magnificent hotels, two theatres, assembly-rooms, and many boarding-schools. Among its institutions are Brighton College, founded in 1847 for the education of the sons of noblemen, a hospital, and the Sussex Literary and Scientific Institution. Brighton returns two members to Parliament. Steamers ply between this place and Dieppe. A fine terrace, called the Marine Parade, extends about a mile between the Steyne and Kempton, an eastern suburb of Brighton. It has little or no maritime trade, and owes its rapid increase to the salubrity of the air and its attractions to persons in pursuit of health and pleasure. It entertains, on an average, about 20,000 visitors. Pop. in 1871, 90,013.

Brighton, a port of entry of Northumberland co., Ontario, Dominion of Canada, on Lake Ontario and on the Grand Trunk Railway, 69 miles W. S. W. of Kingston. Pop. in 1871, 1357.

Brighton, a post-township of Sacramento co., Cal., on the Central Pacific R. R., 5 miles E. of Sacramento. Pop. 909.

Brighton, a township of Cass co., Ia. Pop. 337.

Brighton, a post-village of Washington co., Ia., is in Brighton township, 50 miles by railroad W. S. W. of Muscatine. It has a national bank and one weekly newspaper. Pop. 785; of the township, 1384.

Brighton, a post-village of Macoupin co., Ill. It has one weekly newspaper.

Brighton, a post-twp. of Somerset co., Me. Pop. 627.

Brighton, a former post-township and village of Middlesex co., Mass. The village is on the Boston and Albany R. R., 5 miles W. of Boston, and has a public library, two national and one savings bank, and one weekly newspaper. Brighton has a celebrated cattle-market and abattoir. Total pop. 4967. The town of Brighton, and also the city of Charlestown and town of West Roxbury, were annexed to Boston Oct. 13, 1873, to become a part of that municipality Jan. 5, 1874.

Brighton, a post-village and township of Livingston co., Mich., 43 miles S. E. of Lansing, on the Detroit Lansing and Lake Michigan R. R. The village is rapidly growing, has good water-power, a manufactory of pumps and cradles, a planing-mill, a foundry, a weekly newspaper, a graded school, and a public library. Pop. 454; of township, 1440. G. W. AXTELL, ED. "CITIZEN."

Brighton, a township of Franklin co., N. Y. Pop. 204.

Brighton, a post-village of Monroe co., N. Y., is in Brighton township, on the Erie Canal and the Central R. R., about 4 miles E. S. E. of Rochester. Pop. of township, 4304.

Brighton, a post-township of Lorain co., O. Pop. 508.

Brighton, a township of Beaver co., Pa. The village of Brighton is on the W. bank of Beaver River, nearly opposite NEW BRIGHTON (which see). Pop. 844.

Brighton, a post-township of Essex co., Vt. Pop. 1535. It has manufactures of flour and lumber.

Brighton, a post-village and township of Kenosha co., Wis., about 16 miles W. S. W. of Racine. Pop. 1185.

Bright's Disease (or **Ne'phria**), so called after the English physician, Dr. Bright, who first investigated its character, consists essentially of a degeneration of epithelium of the kidneys. This impairs the excreting powers of the organ, so that the urea is not properly removed from the blood. The disease is characterized by albuminuria. When we apply heat and nitric acid to the urine from a kidney so affected, albumen is coagulated; under the microscope we observe moulds of the tubules of the diseased organ. Headache and sickness of stomach are common symptoms, and dropsy usually attends the disease. The retina is usually attacked by a degenerative inflammatory disease, which impairs the sight, and is detected by the ophthalmoscope.

The causes are, indulgence in strong drinks, exposure to wet and cold, gout, and syphilis. The indications for treatment are, to remove any of those causes which may be present, relieve congestion of the kidneys, at the same time endeavoring to increase strength by iron and other tonics. When considerable dropsy occurs, cathartics may be called for. Bright's disease may be either acute or chronic. The prospect of recovery is small, but patients sometimes attain a comfortable, but generally a precarious, degree of health. REVISED BY WILLARD PARKER.

Brights'ville, a township of Marlboro' co., S. C. P. 857.

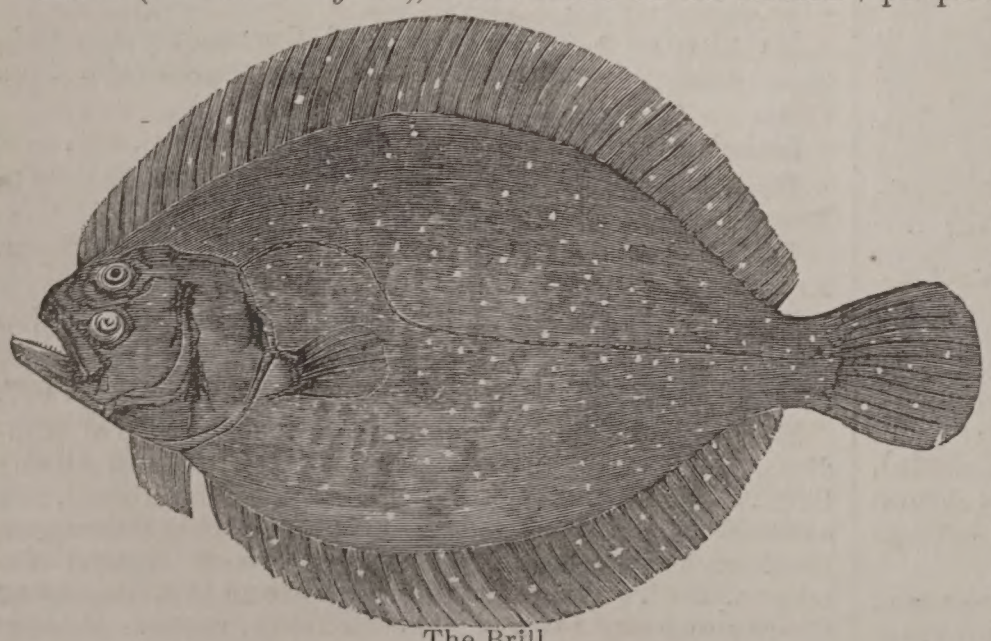
Brigittines, or **Order of the Saviour,** a monastic order affiliated with the Augustinians, founded by Saint Bridget of Sweden in 1344. It originally included monks and nuns, who lived in the same house, but were forbidden to see each other. There are at present few if any Brigittine monks, and not many nuns. Sion House was the only English convent. Œcolampadius, the Reformer, was once a Brigittine monk.

Brignoles, a town in the S. E. of France, department of Var, is beautifully situated in a valley on the small river Calami, 23 miles S. W. of Draguignan. It has a normal school, a public library, and manufactures of broadcloth, silk twist, pottery, soap, and leather. Pop. 5945.

Bri'gus, a port of entry and post-town, capital of Brigus district, Newfoundland. It has a small but good harbor, having over 820 cod-fishing boats and 30 trading vessels, and is visited by steamers from St. John's. It has a convent of Sisters of Mercy and a jail. It has considerable agriculture. Pop. about 2000.

Bril (PAUL), an eminent landscape-painter, was born at Antwerp in 1556. He was a pupil of his brother Mattheus, and worked for many years in Rome, where he died in 1626.

Brill (*Rhombus vulgaris*), a fish found on the British coasts, and esteemed as food, though inferior to the turbot, from which it may be distinguished by its want of tubercles on the upper surface, and by the color, which is a reddish sandy brown on the upper side, varied with darker brown, and sprinkled with white pearly spots. It seldom weighs more than eight pounds.



The Brill.

Bril'liant [Fr. *brillant*], a diamond of fine quality formed into a number of facets, so as to refract and reflect the light, by which it is rendered more brilliant. It has a face or flat table in the middle on the top. (See DIAMOND.)

Bril'lion, a post-township of Calumet co., Wis. P. 672.

Brim'field, a post-village and township of Peoria co., Ill., about 20 miles W. N. W. of Peoria. Pop. 1547.

Brimfield, a post-township of Hampden co., Mass. Pop. 1288.

Brimfield, a post-township of Portage co., O. Pop. 913.

Brim'stone, a commercial and common name for SULPHUR (which see), by PROF. C. F. CHANDLER.

Brin'disi, a fortified seaport of Italy, province of Lecce, situated at the head of a bay of the Adriatic, 38 miles by rail N. N. W. of Lecce; lat. of fort, 40° 39′ N., lon. 18° 1′ E. The ancient *Brundisium* was taken from the Sallentines by the Romans in 267 B. C., and was afterwards the principal naval station of the Romans on the Adriatic. It had an excellent landlocked harbor, and was long one of the most important maritime cities of Italy. It was the port from which the Romans embarked on the voyage to Greece. Virgil died here in 19 B. C. The crusaders used it as their chief port of embarkation to the Holy Land. The harbor having become choked with sand, its importance greatly declined. Here is a mediæval cathedral and an ancient castle. The large steamers of the Peninsular and Oriental Company now enter this port, which has recently been improved. Since 1860 the government has dredged the harbor, so that a depth of nearly six fathoms has been obtained, and has constructed two breakwaters and about 3000 feet of quay. The position of Brindisi has been rendered very advantageous for commerce by the opening of the Suez Canal. A railway extends from this town along the coast to Ancona, Milan, etc. Pop. 8403.

Brind'ley (JAMES), an eminent English mechanic and engineer, born at Thornset, in Derbyshire, in 1716. He made improvements in the machinery of mills, and was the engineer of a canal projected by the duke of Bridgewater from Worsley to Manchester, and completed in 1761. This was the first navigable canal made in England. He was employed as engineer of other canals. Died Sept. 27, 1772.

Brine Shrimp, an active, translucent crustacean, the *Artemia salina*, a branchiopod one inch long, found especially in the half-evaporated sea-water of the salt-works of Lymington, England. The workmen believe that these animals clarify the brines, and they therefore are careful to put them into such brines as appear to be without them. They breed rapidly and become very numerous. *Artemia fertilis* is extremely abundant in the Great Salt Lake.

Brink'ley's, a twp. of Somerset co., Md. Pop. 2536.

Brinvilliers (MARIE MARGUERITE D'AUBRAY), MARCHIONESS OF, a French woman notorious as a poisoner, was married in 1651 to the marquis de Brinvilliers. She poisoned her father, her sisters, and two of her brothers. For these crimes she was tried and put to death July 16, 1676.

Brion (GUSTAVE), a French artist of considerable reputation, was born at Rothau (Vosges) in 1824. His principal pictures are the "Potato Harvest during the Inundation," 1853; "A Funeral in the Vosges," 1855; "A Marriage in Alsace;" "Jesus and Peter on the Water," 1863; "The Dance of the Cock" (Alsace), 1872. A picture by M. Brion, "The Sixth Day of Creation," exhibited in the Salon in 1867, was brought to New York in 1872, where it attracted much attention. Brion is an earnest painter, most at home in scenes in which the half-German, half French peasantry of Alsace take part. C. C.

Bris'bane, a seaport and the capital of Queensland, Australia, on Brisbane River, about 20 miles from its entrance into Moreton Bay, and about 600 miles N. by E. of Sidney. Wool and other produce are exported from this place. It is connected by rail with Ipswich and Dalby, and is in direct steamship communication with London and Liverpool. It is the seat of an Anglican and a Roman Catholic bishop. Pop. in 1871, 19,413.

Brissot de Warville (JEAN PIERRE), an eminent French Girondist and political writer, born near Chartres Jan. 14, 1754. He published in 1780 a "Theory

of Criminal Laws." In 1785 he was unjustly imprisoned in the Bastile for about four months. With the aid of his friends he founded about 1788 the "Society of the Friends of the Negroes," and visited the U. S. to promote the abolition of the slave-trade. After his return to France he founded and edited the "Patriote Français," an able republican journal. In 1791 he was elected to the National Assembly by the voters of Paris. He was so prominent a leader of the Girondists that they were often called Brissotins. Having been elected to the Convention, he opposed the execution of the king. He was guillotined in Paris Oct. 31, 1793. (See BRISSOT'S "Mémoires pour servir à l'Histoire de la Révolution," published by his son, 4 vols., 1830.)

Bris'ted (CHARLES ASTOR), son of the following, born in New York Oct. 6, 1820, educated at Yale College, New Haven, and Trinity College, Cambridge, author of an edition of Catullus (1849), "Five Years in an English University" (1851, revised 1872), "The Upper Ten Thousand" (1852), "Pieces of a Broken-down Critic" (1858), "The Interference Theory of Government" (1867), "Anacreontics" (1872), and a frequent contributor to leading periodicals. Died at Washington, D. C., Jan. 14, 1874.

Bristed (JOHN), an Episcopal clergyman, born in 1779 in Dorsetshire, England, educated at Winchester School, removed to America in 1806, and practised law in New York, studied divinity and was ordained in the Episcopal Church. He was author of "Resources of the British Empire," "Resources of the U. S.," and "Anglo-American Churches." Died at Bristol, R. I., in 1854.

Bris'tle [Lat. *seta*], the name of the stiff strong hairs which grow on the backs of swine, and are used extensively in the manufacture of brushes; also by shoemakers and saddlers as substitutes for needles. Bristles are an important article of commerce. There is a great variety in their color and quality. The white are considered the most valuable. The best bristles are obtained from the hogs of cold climates, as from Russia.

Bris'tol, an important maritime city of England, situated on the Avon at its confluence with the Frome, 8 miles from the sea, 11½ miles by rail N. W. of Bath, and 118 miles by rail W. of London; lat. 51° 27′ N., lon. 2° 35′ W. It is chiefly in the county of Gloucester, and partly in Somersetshire, and it occupies several hills and valleys. It is the terminus of the Great Western, the Bristol and Exeter, and the Midland Railways. Bristol returns two members to Parliament. Among its remarkable buildings are the cathedral, which was founded about 1150; the fine church of St. Mary Redcliffe, which was completed in 1376; the Temple church, which has a leaning tower; the guildhall; the exchange, used as a corn-market; and the new general hospital. The modern portions of Bristol, including Clifton and other suburbs, consist of handsome residences in squares, terraces, crescents, and detached villas. This city has a public library, a bishop's college, a medical school, an infirmary, an asylum for the blind, an asylum for deaf-mutes, and other benevolent institutions. The Avon here, though narrow, is deep enough for large vessels. About £650,000 have been expended in turning this river into a new course, and its old channel now forms a harbor furnished with locks and quays 6000 feet long. Bristol was the first British port between which and the U. S. a regular communication by steam was established. It has an extensive trade with Canada, the U. S., the West Indies, France, Russia, the shores of the Mediterranean, etc. The chief articles of export are copper, iron, brass, coal, salt, and manufactured goods. The manufactures of this city are chiefly cotton goods, refined sugar, glass, woollen goods, chemical products, machinery, and earthenware. Here are extensive shipyards, which turn out excellent vessels. This place was called *Caer-oder* by the Britons, and *Bricstowe* or *Briestow* by the Anglo-Saxons. A fortified town existed here as early as 500 A. D. It was formerly the second commercial city in England. During the civil war it was taken alternately by Royalists and Roundheads. Among the distinguished natives of Bristol were Sebastian Cabot and the poets Chatterton and Southey. Pop. in 1871, 182,524.

Bris'tol, a county in the S. E. of Massachusetts. Area, 517 square miles. It is bounded on the S. by Buzzard's Bay, and is drained by the Taunton River and other streams, which afford water-power. It has many good harbors on the sea-coast. The surface is nearly level; the soil is partly fertile. Garden products, wool, and grain are raised. The manufactures of iron, cotton and woollen goods, etc. are very important. It is intersected by several railroads. Capitals, Taunton and New Bedford. Pop. 102,886.

Bristol, a county in the E. of Rhode Island. Area, 25 square miles. It is washed on several sides by Narragansett Bay and Mount Hope Bay, and has great facilities for navigation and the fisheries. The soil is fertile, and the surface is finely diversified. Hay, grain, garden products, and wool are raised. It is intersected by the Providence Warren and Bristol R. R. Capital, Bristol. Pop. 9421.

Bristol, a post-village of Hartford co., Conn., in Bristol township, on the Hartford Providence and Fishkill R.R., 18 miles W. S. W. of Hartford. It has one weekly paper, a large manufacture of clocks, several foundries, machine-shops, stocking-mills, and a printing-office. Pop. of township, 3788. ED. OF "BRISTOL PRESS."

Bristol, a post-village, capital of Liberty co., Fla., 59 miles S. W. of Tallahassee.

Bristol, a post-village and township of Kendall co., Ill., on Fox River and the Chicago Burlington and Quincy R. R., 49 miles W. S. W. of Chicago. Pop. 1352.

Bristol, a post-village and township of Worth co., Ia., is about 20 miles S. of Albert Lea, Minn. Pop. 503.

Bristol, a post-village of Washington township, Elkhart co., Ind. Pop. 681.

Bristol, a post-township of Lincoln co., Me., on the Atlantic Ocean. It has important manufactures of lumber, fish oil, barrels, etc. It is on the site of the old city and port of Pemaquid, and was first settled in 1625, unless, as is believed by some, the Dutch settled here still earlier. Pop. 2916.

Bristol, a township of Fillmore co., Minn. Pop. 993.

Bristol, a post-township of Grafton co., N. H., on the Bristol branch of the Northern R. R. This town has a deposit of good graphite, and a mineral spring. It has manufactures of leather, lumber, gloves, paper, hosiery, flannels, etc. It has a high school and a savings bank. Pop. 1416.

Bristol, a post-township of Ontario co., N. Y. P. 1551.

Bristol, a post-township of Morgan co., O. Pop. 1469.

Bristol, a township of Trumbull co., O. Pop. 983.

Bristol, a post-borough of Bucks co., Pa., on the Delaware River, 19 miles above Philadelphia, and nearly opposite Burlington, N. J. It is on the Philadelphia and Trenton R. R., and has almost hourly communication with Philadelphia by steamboats. Here is a national bank, a valuable mineral spring, and one quarterly and one weekly newspaper. Pop. 3269; of township, 2040.

Bristol, a port of entry and capital of Bristol co., R. I., is on Narragansett Bay, 16 miles S. S. E. of Providence and 7 miles S. W. of Fall River. It has a good harbor, which is easy of access and will admit large vessels. It is on the Providence Warren and Bristol R. R. A beautiful eminence called Mount Hope rises about 300 feet high in Bristol township, which has an area of 12 square miles. It has two national banks, and manufactures of cotton goods and other articles. It has one weekly newspaper. Pop. of Bristol township, 5302.

Bristol, a city of Sullivan co., Tenn., is situated partly in Washington co., Va., on the East Tennessee Virginia and Georgia R. R., 130 miles E. N. E. of Knoxville. It is a thriving place, and the seat of King College. It has one weekly and one monthly newspaper in Tennessee, and one weekly newspaper in Virginia.

Bristol, a post-township and village of Addison co., Vt., about 25 miles S. of Burlington. It has an academy, and manufactures of lumber, furniture, barrel staves, boxes, sash and blinds, agricultural tools, etc. Pop. 1365.

Bristol, a township of Dane co., Wis. Pop. 1274.

Bristol, a post-village in Bristol township, Kenosha co., Wis., is on a railroad, 12 miles W. by S. of Kenosha. Pop. of the township, 1140.

Bristol, MARQUESSES OF (1826, in the United Kingdom), earls of Bristol (1714, in Great Britain), Earls Jermyn (1826, in the United Kingdom), and Barons Hervey (1703, in England), a noble family of Great Britain.—FREDERICK WILLIAM JOHN HERVEY, the third marquess, born June 28, 1834, succeeded his father in 1864. He was member of Parliament for West Suffolk 1859–64.

Bristol Bay, an inlet of the Pacific Ocean, in North America, between Cape Newnham and the peninsula of Alaska.

Bristol Brick, or **Bath Brick,** a variety of brick used for scouring steel table-cutlery and other polished steel surfaces. It is made at various places in England and the U. S., a peculiar fine sand being used in the manufacture.

Bristol Channel, an inlet of the Atlantic Ocean, in the S. W. part of England, is bounded on the N. by Wales and on the S. by Somerset and Devonshire. At the E. end it communicates with the estuary of the Severn. It is the largest inlet of Great Britain, and has a coast-line of 220 miles. The tides rise here to an extraordinary height—at

Bristol about forty, and at Chepstow sometimes seventy, feet. The principal bays and harbors of this channel are Swansea Bay, Caermarthen Bay, Cardiff Road, the Severn Estuary, and Barnstable Bay.

Bris'tow Sta'tion, a post-village of Prince William co., Va., on the Orange and Alexandria R. R., 4 miles W. S. W. of Manassas Junction. A severe engagement took place here the afternoon of Aug. 27, 1862, between the U. S. forces under Gen. Hooker and the Confederates under Gen. Ewell, darkness closing the conflict, with severe loss on both sides. On Oct. 14, 1863, the Confederate general A. P. Hill attacked the force under command of Gen. G. K. Warren, U. S. A., at this place; the attack was handsomely repulsed by Warren, who captured several pieces of artillery and many prisoners.

Brit, the *Clupea minima*, a very small species of herring found on the coasts of New England and the British provinces of North America. It occurs in immense shoals, but is only from one to four inches long, and is chiefly important as furnishing food to larger fishes.

Britan'nia, the ancient name of the island of Great Britain. It was inhabited by rude, uncivilized tribes of Britons (Lat. *Britanni*), who were perhaps, but not probably, the aborigines, when Julius Cæsar invaded the island in 55 B. C. Their religion was a sanguinary Druidism. Many of the Britons were Cymric Celts, while those of the northern part were probably largely Gaelic. (See Briton.) They obstinately resisted the Roman invaders, but without success, and the southern half of the island was conquered by the armies of Vespasian. In the reign of Domitian, Agricola extended Roman power to Scotland, and erected a chain of forts between the friths of Clyde and Forth about 84 A. D. The northern part of the island was inhabited by the Caledonians and Picts, whom the Romans failed to subdue. These warlike barbarians made frequent inroads into the southern province, to obviate which the Romans built the wall of Antoninus about 140 A. D. Another rampart, called the Wall of Hadrian, extending from Solway Frith to the mouth of the Tyne, was completed by Severus about 210 A. D. The part of the island S. of this wall was for several centuries under the dominion of the Romans, who founded many towns (*municipia*), and diffused Roman culture, arts, and civilization in the country. They made numerous roads from London to the provinces, the remains of which are still visible. Many parts of England abound in Roman antiquities, including remains of camps, baths, mosaic pavements, weapons, ornaments, utensils, pottery, sculptures, and coins. It appears that the Romans intended to keep Britain as a permanent conquest, but in consequence of the internal disorders and external dangers that menaced the stability of the Roman empire, the legions were withdrawn from the island about 420 A. D., soon after which it was invaded and conquered by the Saxons. It is said that Cæsar was the first who gave the name *Britannia* to this island, which before his time was called *Albion*. The term *Britannicæ Insulæ*, however, was applied to the British Islands collectively before Cæsar invaded *Albion*. Britannia is usually personified in the fine arts as a woman seated on an insulated rock, leaning on a shield and holding in her hand a spear or trident. (See Camden, "Britannia;" Horseley, "Britannia Romana.")

Britan'nia Met'al, an alloy of tin with a little antimony, zinc, and copper, is largely used in the manufacture of coffee-pots, tea-pots, and other vessels. It is harder than pewter, and not so easily indented or bent. The proportions of the metals combined to make this alloy are various. The average composition in 100 parts is—tin, 85½; antimony, 10½; zinc, 3; and copper, 1. The present composition of the alloy used at Birmingham, England, is stated to be 90 of tin, 8 of antimony, 2 of copper.

Brit'ish Amer'ica is usually applied to that portion of North America which lies N. of the parallel 49° N., except Alaska. It also extends several degrees farther S., where the great lakes form the boundary between it and the U. S. It is bounded on the N. by the Arctic Ocean, on the E. by the Atlantic and Davis Strait, on the S. by the U. S., and on the W. by the Pacific Ocean and Alaska. The Rocky Mountain chain extends through the western part. The principal rivers are the St. Lawrence, the Mackenzie, the Saskatchewan, and the Churchill. It contains several large lakes—namely, Winnipeg, Athabasca, and Great Slave Lake, and includes a large inland sea, named Hudson's Bay. This vast region was formerly divided into numerous territories or provinces, but in 1873 the whole of it had been admitted into the Dominion of Canada, with the exception of Newfoundland and Labrador.

British America, in a more extended sense, comprises all the British possessions in America, including British Guiana, the British West Indies, etc.

British Burmah. See Burmah, British.

British Colum'bia, a province of the Dominion of Canada, is bounded on the S. by the U. S. (Washington, Idaho, and Montana), on the E. by the Rocky Mountains, and on the W. by the Pacific Ocean. It includes the important islands of Queen Charlotte and Vancouver (which last was formerly by itself a British colony). British Columbia was united to Canada in 1871. The soil of portions of the province near the sea is good, and the climate mild, though rainy; but in the interior the surface is extremely rugged and the climate is severe. The coast-line is characterized by remarkable fiords, called "canals," which are often walled in by mountains. Furs are largely exported. There is much valuable timber, and the fisheries promise to become important. Cod, haddock, herring, halibut, trout, sturgeon, anchovies, and especially salmon, abound. There is much fine grazing-land. Large amounts of gold have been obtained here, and silver, copper, zinc, mercury, coal, and marble are found. Estimated area, 240,000 square miles. Capital, Victoria. Pop. in 1871, exclusive of Indians, 14,043. Total pop. estimated at 50,000. The best harbor is at Esquimault. British Columbia has an Anglican bishop, whose seat is at New Westminster.

Certain islands in the Strait of San Juan de Fuca, having been claimed by both the U. S. and Great Britain, were held under joint military occupation until Oct., 1872, when by a decision of the emperor William I. of Germany, to whom the dispute was referred, they became U. S. territory. These islands, of which San Juan is the most important, are ten in number. Their entire population in 1870, exclusive of the garrisons, was 554.

British Empire. See Great Britain and Ireland.

British Guiana. See Guiana.

British Gum. See Dextrine, by Prof. C. F. Chandler, Ph. D., LL.D.

British India. See India.

Brit'ish Muse'um, The, in London, was established in 1753 by act of Parliament in pursuance of a bequest of Sir Hans Sloane to the nation of his cabinets of natural history and library, numbering 50,000 volumes, in return for a sum of £20,000 to be paid to his heirs. The palace of the duke of Montague on Russel street was purchased for the reception of the collection. In 1801 the Elgin Marbles, in 1823 the library of George III., containing 80,000 volumes, were added to the museum, and it has been subsequently enriched by the Granville library, the Sir William Temple coin cabinets, the Layard and Loftus collection of Assyrian, and the Lady Webster collection of Mexican, antiquities, and other extensive accessions. The building was in 1823–47 enlarged and renovated at a cost of £150,000. The library numbers at present 750,000 volumes, besides 41,180 MSS. and 33,000 documents and state papers. The collections of antiquities are altogether the completest in Europe. The museum contains also the finest collection of vases, among them the famous Portland Vase, and the largest collections of Greek and Roman sculpture in the world, and the cabinets of natural objects embrace every province of science.

Brit'on, a native or citizen of ancient Britain or Britannia (which see); a name given to the aboriginal or ancient inhabitants of that island. When Cæsar invaded Albion about 54 B. C., he found in it two different peoples. The interior was occupied by the primitive or indigenous Celtic inhabitants, who had been driven back from the coasts by a people of probable Gothic descent. The latter had colonized the S. E. part of the island, and were less numerous than the Celtic Britons. The language of the Southern Celtic Britons was very similar to the present Welsh. "The Gaels and Britons," says R. G. Latham, "are the fundamental populations of the British Isles. The Picts were either aboriginal or intrusive. If aboriginal, they were like the Gaels and Britons, Keltic." (See Picts.) When Cæsar invaded the island, the Britons were divided into a number of petty kingdoms or states. Some of these were called *Silures*, *Brigantes*, *Ordovices*, *Trinobantes*, and *Cantii*. Their religion was Druidism. (See Druids.) The primitive Britons were brave and warlike, but, in consequence of their divisions, they were conquered by the Romans without much difficulty. They were rude barbarians, who painted their bodies blue. The term Briton is often applied to a modern inhabitant of Great Britain.

Brittany. See Bretagne.

Brit'ton's Neck, a post-township of Marion co., S. C. Pop. 884.

Britt's, a township of Robeson co., N. C. Pop. 1159.

Brive, or **Brives-la-Gaillarde,** a town of France, department of Corrèze, is situated in a rich plain on the river Corrèze, 44 miles by rail E. of Périgueux. It has

manufactures of muslins, woollen stuffs, silk handkerchiefs, etc.; also a college and public library. Pop. 10,389.

Broadal'bin, a post-township of Fulton co., N. Y. It contains several mills and factories. Pop. 2492.

Broad Arrow, the British government mark placed upon all solid materials used in ships or dockyards, to prevent embezzlement of royal stores. The origin of the mark is obscure. Before 1698 the authorities prosecuted a dealer in marine-stores for having in his possession certain stores bearing the broad arrow of his majesty. The defendant, when asked what he had to say, replied that it was very curious that the king and he should both have the same private mark on their property. The man was acquitted, and this led to the passing of a law that persons in possession of stores or goods of any kind marked with the broad arrow shall forfeit all such goods, with £200 and costs.

Broad Bay, a township of Forsyth co., N. C. Pop. 993.

Broad'cast, in agriculture, is a method of sowing seeds by casting or scattering them abroad, so as to distribute them evenly over the entire surface of the soil, instead of planting them in drills or rows. The operation of sowing broadcast is generally performed by the hand of a man, who carries the seeds in a bag or basket. Clover and timothy seeds are usually sown in this method. In the U. S., wheat, barley, and oats are often sown broadcast.

Broad'cloth, a woollen fabric about four and a half feet wide, extensively used for coats. The best quality of this article is manufactured in France, Germany, and England.

Broad Creek, a hundred of Sussex co., Del. Pop. 3480.

Broad'dus (Rev. Andrew), D. D., born in Caroline co., Va., Nov. 4, 1770, died Dec. 1, 1848. The "Dover Selection" of hymns and the "Virginia Collection," compiled by him, were long popular in several States; and he "was commonly regarded as the most eloquent preacher ever known in Virginia." A rare timidity led him to decline the pastorate of leading Baptist churches in Boston, New York, Philadelphia, and various Southern cities, and he lived and died a country pastor. Some of his sermons, with a memoir by J. B. Jeter, D. D., were published in New York in 1852.

Broad'hagen, a post-village of Logan township, Perth co., Ontario (Canada), 60 miles N. of London. It has a weekly paper. Pop. about 200.

Broad'kiln, a hundred of Sussex co., Del. Pop. 2419.

Broad Mountain, a high ridge in the anthracite coal-region of Pennsylvania, in Carbon and Schuylkill cos. It has an altitude of about 2000 feet above the sea, and is nearly 50 miles long. Its direction is nearly N. E. and S. W. The Mine Hill R. R. crosses this mountain.

Broad River of the U. S. rises at the foot of the Blue Ridge, in the W. part of North Carolina. Having entered South Carolina, it flows in a S. S. E. direction through fertile uplands, and unites with the Saluda at Columbia to form the Congaree. Total length, estimated at 150 miles.

Broad River, a township of McDowell co., N. C. Pop. 399.

Broad River, a township of Lexington co., S. C. Pop. 1116.

Broad River, a township of York co., S. C. Pop. 1455.

Broad Run, a township of Loudon co., Va. Pop. 2582.

Broad'side, in naval warfare, is the simultaneous discharge of all the guns on one side of a ship of war. The fighting power of a ship is sometimes estimated by the weight of her broadside. That of some British war-steamers amounts to 2400 pounds. In printing, a broadside is a sheet of paper containing one large page or printed on one side only.

Broad'sword, a sword with a broad blade, adapted for cutting, but not for stabbing. It is not sharp-pointed. The broadsword was especially used in Scotland.

Broad Top, a township of Bedford co., Pa. Pop. 1626.

Broad Top, a post-village of Carbon township, Huntingdon co., Pa., near the E. terminus of the Broad Top City branch of the Huntingdon and Broad Top R. R. Pop. 327.

Broad Top Mountain, Pennsylvania, is in the N. E. part of Bedford co. and the S. part of Huntingdon. It rises about 2500 feet above the level of the sea. Here are extensive beds of bituminous coal, for the transportation of which a railroad has been opened from this mountain to Huntingdon.

Broad'us (John Albert), D. D., LL. D., born Jan. 24, 1827, in Culpeper co., Va., graduated at the University of Virginia in 1850, was assistant professor in that university in 1851–53, its chaplain in 1855–57, and pastor of the Baptist church in Charlottesville, Va. (the seat of the university), from 1851 to 1859, since which time he has been professor of the interpretation of the New Testament and of homiletics in the Southern Baptist Theological Seminary, Greenville, S. C. In 1870 he published an excellent "Treatise on the Preparation and Delivery of Sermons," which has passed through several editions, and was republished in London.

Broad'way, a township of Anderson co., S. C. Pop. 1378.

Broad'well, a post-township of Logan co., Ill. Pop. 920.

Brocade [It. *broccata*], a silk fabric variegated with gold and silver threads, or a silk fabric on which figures of flowers, foliage, or other objects are formed by the threads of the warp and woof being raised by the Jacquard loom or other means. Brocade bears nearly the same relation to silk textures as damask to linen fabrics.

Broc'chi (Giovanni Battista), an Italian naturalist, born at Bassano Feb. 18, 1772. He published, besides other works, "Sub-Apennine Fossil Conchology, with Geological Observations on the Apennines, etc." (2 vols., 1814). During a journey to Sennaar he died at Khartoom, on the Nile, Sept. 28, 1826.

Broc'coli, a highly-esteemed garden vegetable, a variety of the cabbage (*Brassica oleracea*). It has considerable resemblance to cauliflower, from which it differs by the purple or green color of its heads, and its greater hardness. It is propagated by sowing the seeds in the spring or in autumn, and transplanting the young plants once or twice. The leaves are often tinged with purple. There are several kinds of broccoli, some of which are preferred for sowing in early spring. Others are sown in autumn, and are ready for use in the ensuing spring.

Brock (Sir Isaac), a British general, born Oct. 6, 1769, who in 1812 captured General Hull and his army at Detroit. He was killed at the battle of Queenstown Oct. 13, 1812.

Brock'en, The, or **Blocks'berg** (anc. *Mons Bructerus*), a mountain of Prussia, in the province of Saxony, 20 miles W. S. W. of Halberstadt, is the highest summit of the Hartz Mountains, and is 3740 feet above the level of the sea. It is cultivated nearly to the top, which commands a fine view in clear weather. The Brocken is the cradle of many popular superstitions. It is, according to an ancient

The Spectre of the Brocken.

belief, the scene of the annual dance of the witches on Walpurgis Night (May 1st). This superstition, in all probability, owes its origin to the phenomenon known as "The Spectre of the Brocken," seen here and elsewhere, which is

simply the reflection of the forms of men and other objects against the sky, the vapors of the atmosphere acting as a vast concave mirror; hence the objects reflected are seen greatly magnified.

Brock'ett (Linus Pierpont), A. M., M. D., born Oct. 16, 1820, at Canton, Hartford co., Conn., educated at Suffield Literary Institution and Brown University, entering the latter in 1837. He studied medicine in New Haven, Conn., Washington, D. C., and New York City, and graduated as M. D. from Yale Medical College in 1843. After practising his profession for some years, he devoted himself to literary pursuits at Hartford, Conn., and from 1847 to 1857 was partner in a publishing-house in that city. Resuming literary labor in 1856, he has been since connected with several religious newspapers, was a large contributor to the "New American Cyclopædia," and has had charge of several departments in the "American Annual Cyclopædia" from its beginning in 1862 to the present time. In 1857, Amherst College conferred on him the honorary degree of A. M. He has published many works, among which the following are best known: "Geographical History of New York," 1847 (with J. H. Mather); "History of Education," 1859; "The National Almanac for 1863;" "History of the Civil War" (with S. M. Schmucker), 3 vols., and 1 vol. 8vo, 1866; "Our Great Captains," 1865; "Philanthropic Results of the Civil War," 1864; "Woman's Work in the Civil War," 1867; "Men of Our Day," 1868 (revised and mostly written anew, 1872); "Woman, her Rights, Wrongs, Privileges, and Responsibilities," 1869; "The Year of Battles, a History of the Franco-German War of 1870–71," 1871; and "Epidemic and Contagious Diseases: their History, Symptoms, and Treatment," 1873. He has also edited and largely rewritten "A Hundred Years' Progress of the U. S.," 1871–73; the American biographies of "Men of the Time," 8th ed., London, 1872; "Una and her Paupers," 1872; "The Thorough Business-Man: Life of Walter Powell," 1873; and has been a frequent contributor to magazine and review literature, etc.

Brockett's Bridge, a post-village of Manheim township, Herkimer co., and Oppenheim township, Fulton co., N. Y., on East Canada Creek, has a cheese-factory, box-shop, tannery, and two churches.

Brock'haus (Friedrich Arnold), an eminent German publisher, born at Dortmund May 4, 1772. He was the founder of the firm of Brockhaus in Leipsic, and published six editions of the "Conversations-Lexikon." He was distinguished for his literary culture, enterprise, and patriotism. He became a citizen of Leipsic in 1817. Died Aug. 20, 1823.—Heinrich, a son of the preceding, was born at Amsterdam Feb. 4, 1804. He succeeded his father as proprietor of the publishing-house, and published new editions of the "Conversations-Lexikon."—Herman, a brother of the preceding, was born at Amsterdam Jan. 28, 1806. He became professor of Sanscrit at Leipsic in 1848. Since 1856 he has been editor-in-chief of Ersch and Gruber's "Allgemeine Encyklopädie."

Brock'port, a post-village of Monroe co., N. Y., on the Erie Canal and the New York Central R. R., 17 miles W. of Rochester. It is in the heart of a wealthy and populous farming country. It has two well-sustained newspapers, eight churches, and two banks. It has an extensive trade in beans. A State normal school, accommodating from 400 to 500 students, is located here; also the Johnston harvester works (200 men employed) and Seymour & Morgan mower and reaper works (150 men employed), Ithaca wheel-rake works, and other manufactories. Pop. 2817. Johnson Brigham, Ed. "Brockport Democrat."

Brock's, a township of Etowah co., Ala. Pop. 490.

Brock's, a township of Henry co., Ala. Pop. 663.

Brock's Gap, a township of Rockingham co., Va. Pop. 1366.

Brock'ville, a port of entry of Ontario, Canada, capital of the county of Leeds, on the St. Lawrence River and the Grand Trunk Railway, 125 miles by railway S. W. of Montreal and 75 miles by railway S. of Ottawa. Hardware, chemicals, white lead, gloves, farming tools, steam-engines, and machinery are manufactured here. It is the southern terminus of the Brockville and Ottawa Railway. It is connected by ferry with Morristown, N. Y., and has three weekly papers. Pop. in 1871, 5102.

Brock'way, a post-township of St. Clair co., Mich. Pop. 1330.

Brock'wayville, a post-village of Jefferson co., Pa. It has one weekly newspaper.

Broc'ton, a post-village of Portland township, Chatauqua co., N. Y., at the junction of the Lake Shore and Buffalo Corry and Pittsburg R. Rs. It is the seat of a religious community established here in 1847 by T. L. Harris. P. 329.

Bro'derick (David Colbreth), an American Senator, born at Washington, D. C., in 1818. Having removed to California in 1849, he was elected a Senator of the U. S. by the Democrats in 1856. He opposed the extension of slavery, and in 1858 ceased to act with the Democratic party. He was killed in a duel by Judge Terry, a political opponent, near San Francisco, Sept. 21, 1859.

Brod'head, an incorporated village of Decatur township, Green co., Wis., beautifully situated on Sugar River and on the Milwaukee and St. Paul R. R., 90 miles W. of Milwaukee, has a large graded school, five churches, a printing-office, a national bank, a foundry, machine-shops, wagon and carriage factories, large flouring mill, etc., one weekly paper, and an extensive trade. The country surrounding is exceedingly fertile. Pop. 1548.

E. O. Kimberley, Pub. "Brodhead Independent."

Brod'head (John Romeyn), LL.D., an American historian, son of Rev. Dr. Jacob Brodhead, was born in Philadelphia Jan. 2, 1814, graduated at Rutgers College in 1831, and was admitted to the bar in New York City in 1835. After two years he began to devote himself to the study of American history. In 1839 he went to Holland as secretary of the U. S. legation at The Hague. In 1841 he was appointed by Governor Seward to search out and copy documents relating to the early history of New York. When he returned in 1844 he brought with him more than 5000 separate documents, which led Mr. Bancroft to say that "the ship in which he returned was more richly freighted with new materials for American history than any that had ever crossed the Atlantic." These documents were afterwards published in eleven quarto volumes. From 1846 to 1849 he was secretary of legation under Mr. Bancroft in London. From 1853 to 1857 he was naval officer of the port of New York, and in 1855 declined the appointment of consul-general to Japan. Years of patient labor were bestowed upon his "History of the State of New York," the first volume of which appeared in 1853, and the second in 1871. After two or three years of declining health, he died in New York City May 6, 1873. He was a high-toned Christian scholar and gentleman. As an historian he was scrupulously exact and fair.

Bro'die (Sir Benjamin Collins), D. C. L., F. R. S., an English surgeon, born in Wiltshire June 9, 1783, became in 1832 surgeon to William IV., and was created a baronet in 1834. Among his works are "Lectures on Local Nervous Affections" (1837) and "Psychological Inquiries as to the Mental Faculties" (1854). He received the Copley medal of the Royal Society in 1811 for his contributions to physiology. Died Oct. 21, 1862. (See his "Autobiography," 1865.)—His son, Sir Benjamin Collins Brodie, Bart., F. R. S., born Feb. 5, 1817, is professor of chemistry at Oxford.

Bro'dy, formerly called **Lubicz,** a trading town of Austria, in Galicia, is near the Russian frontier, 50 miles E. N. E. of Lemberg. It has an imperial chamber, a theatre, and a castle; also manufactures of linen and leather. The majority of its inhabitants are Jews. It has an extensive trade with Russia, Poland, and Turkey. Pop. 18,733.

Broffe'rio (Angelo), a celebrated Italian poet, dramatist, and radical politician, born Dec. 6, 1802. Among his works are a "History of Piedmont," the dramas of "Salvator Rosa" and "The Return of the Exile," and a number of lyrics; among them, "L'Inno di Guerra," called the Italian Marseillaise. Died May 25, 1866.

Brog'den, a township of Wayne co., N. C. Pop. 2560.

Broglie, de (Achille Léonce Victor Charles), Duc, a French statesman, was born in Paris Nov. 28, 1785. He married in 1816 the daughter of Madame de Staël. He was a friend of Guizot, and co-operated with him as a leader of the party called Doctrinaires. He was minister of foreign affairs from Oct., 1832, to April, 1834. In 1849 he was a conservative member of the Legislative Assembly. He was elected to the Academy in 1856. Died Jan. 26, 1870.

Broglie, de (Albert), Prince, a writer and diplomatist, a son of the preceding, was born June 15, 1821. He wrote, besides other works, "The Church and the Roman Empire in the Fourth Century" (2 vols., 1856), "La Souveraineté pontificale et la Liberté" (1861), and "La Liberté divine et la Liberté humaine" (1865). He was appointed minister to London by M. Thiers in Feb., 1871, and became minister of foreign affairs in the MacMahon administration in 1873, and favored the royalist cause.

Broil'ing is a simple and expeditious mode of cooking pieces of meat, by laying them on a gridiron over a bright fire or on the coals themselves. Broiling is a quicker sort of roasting. The albumen of the outside being sealed up at once, the meat is rendered extremely nutritious. But to broil meat so as to preserve its odor, juice, and fat requires care and skill.

Broken Arrow, a post-township of St. Clair co., Ala. Pop. 760.

Broken Straw, a township of Warren co., Pa. Pop. 1048.

Broken Wind, a disease of the horse, the nature of which is not well understood, though it is characterized by difficulty in the act of expiration, the horse making a spasmodic effort to expel the air from the lungs. The symptoms are best observed when the horse is exercised, the breathing becoming labored, the nostrils dilated, the eyes bloodshot, showing imperfect purification of blood in the lungs. A broken-winded horse has a bad hollow cough. When the animal is oppressed by work, the pulse is excessively rapid and the heart beats energetically. From this circumstance it is regarded by some as a disease of the heart. Low-bred horses are especially liable to broken wind if fed on innutritious and bulky food, and at the same time kept at hard work. The treatment is unsatisfactory, and we can only hope for palliation by keeping the alimentary canal in order, administering occasional purgatives, and feeding on a proper quantity of the best oats, which should always be bruised; also allowing the best hay in spare quantities—ten to twelve pounds daily. The hay should be cut and wet. Fresh grass in its season is the proper food. Dusty hay and dry meal as food should especially be avoided.

Broker [Norman Fr. *broggour*], in general, a species of agent employed to act as a middleman or negotiator between distinct parties, such as buyer or seller, though this statement would not include a pawnbroker. He differs from a factor, since he does not have possession of the property with which he deals. He is in a certain sense the agent for both parties, though primarily of the party by whom he is employed. Accordingly, until he closes the negotiation he is the agent of the party who employs him. If he were employed to buy, he could not sell his own goods, but must buy of a third person, even though his engagement be gratuitous. Regularly, a broker discloses his agency on the face of the transaction; should he fail to do so, he would, by the general principles of the law of agency, make himself personally liable. When he has closed the negotiation, he usually gives to either party a memorandum of the transaction, and in the case of the sale of goods gives a "bought-and-sold note." For the purpose of complying with the rule of law requiring in certain sales a written memorandum, he is the agent of both parties. A broker is to be distinguished from an auctioneer; a broker may both sell and buy—an auctioneer only sells. A broker buys and sells at private sale—an auctioneer only sells at public sale. His compensation is usually derived from commissions upon the transaction, termed "brokerage." The commission is earned when the negotiation is completed. The real inquiry in such a case is, Did the broker's services result in bringing the buyer and seller together? If that be the case, he will be entitled to his commissions, though the contract, from subsequent causes, was not in fact carried out. On the other hand, if the negotiation failed at the time, and the parties were subsequently brought together by other means, his commissions would not be payable.

In the large cities brokers form a distinct class of persons, devoting themselves to special departments of agency, such as insurance-brokers, stock-brokers, real-estate brokers, produce-brokers, and the like. A person, however, may act as a broker in a single transaction without following the business, and be governed in the main by the rules already stated. (See AGENT for the more general principles governing this subject.) T. W. DWIGHT.

Bro'mal, $C_2HBr_3O = C_2Br_3O.H$, a compound analogous to chloral, produced by the action of bromine on alcohol.

Brom'berg [Polish *Bydgoszcz*], a town of Prussia, in the province of Posen, on the river Brahe, about 6 miles from its junction with the Vistula, and 65 miles N. E. of Posen. It is on the railway from Berlin to Dantzic, and on the Bromberg Canal, which connects the Vistula with the Oder. It has a normal school and a gymnasium; also manufactures of linen and woollen fabrics, tobacco, Prussian blue, etc. Here are several distilleries, potteries, and breweries. Pop. in 1871, 27,734.

Brome, a county in the S. part of Quebec (Canada), is bounded on the E. by Memphremagog Lake. The soil is fertile. Copper ore is found. Capital, Knowlton. Area, 470 square miles. Pop. in 1871, 13,757.

Brome Grass (*Bromus*), a genus of plants of the order Graminaceæ, with flowers in panicles, spikelets many-flowered, glumes unequal, membranaceous, the outer palet bifid at the extremity and awned beneath. It comprises numerous species, natives of both continents. The *Bromus mollis* grows well on poor soils, and is readily eaten by cattle, but is not much esteemed by farmers. The tall brome grass (*Bromus giganteus*), a native of Europe, grows nearly five feet high, and affords a large bulk of foliage, not much relished by cattle. The *Bromus secalinus*, commonly called chess or cheat, is a troublesome weed which infests grain-fields both in Europe and the U. S. In the latter it is a naturalized or *adventive* exotic. It resembles rye (*secale*) when it is young, hence the specific name *secalinus*. The seeds retain their power of germinating for years. This weed is so common in wheat-fields that many farmers believe that wheat will turn into chess.

Brome'lia, a genus of plants of the order Bromeliaceæ, named after the Swedish botanist Bromel, are natives of tropical America, though many have naturalized themselves in Asia and Africa. The fruit is succulent, and the leaves have spiny serratures on the margins. The genus comprises a number of species, the fibres of which are used for cordage, ropes, nets, etc. Among them are *Bromelia pigna*, which abounds in the Philippine Islands, and is cultivated for its fibre by the Chinese; and the *Bromelia pinguis* of the West Indies, from the fruit of which a vinous liquor is prepared.

Bromelia'ceæ, a natural order of endogenous plants, natives of tropical climates. (See BROMELIA.) They have six stamens and a single style, with a 3-celled ovary. The leaves are hard, rigid, channeled, and often spiny. Some of the species have beautiful flowers. The order comprises more than 150 species, among which are the pineapple (*Ananas sativus*) and the *Tillandsia usneoides*, which is called Spanish moss or old man's beard. It grows in the Southern U. S. on forest trees, from the branches of which it hangs down in long gray threads. The fibre of this is used to stuff mattresses. Many of the species are epiphytic, growing on trees, and are capable of vegetating for a long time without contact with the earth, and will flower if suspended in the air after being severed from their roots. The leaves of some are so formed as to retain near their base a quantity of water, and thus supply travellers with refreshment. Many plants of this order afford valuable fibres, which are used in the fabrication of cordage, cloth, etc. The fibre of the leaves of *Ananas sativus* has been made into a fabric resembling white muslin.

Bro'mide, a chemical term applied to a salt formed by the combination of bromine with a metal. Several bromides, especially bromide of potassium, are used in medicine; others are used in photography.

Bro'mine, or **Bro'mium** [from Gr. βρῶμος, a "strong and fetid odor"], symbol Br, a chemical element discovered in 1826 by Balard. It resembles chlorine in chemical habitudes, and exists in minute quantity in sea-water and the ashes of marine plants. It is also found in many mineral springs, especially those of Kissingen, Kreuznach, and Arnstadt (13.6 grains per imperial gallon), in Germany, Tenbury in Worcestershire (12½ grains), Saratoga and Ballston, N. Y., and in many brines, especially those of Pennsylvania and West Virginia, and in the waters of the Dead Sea (121 grains). Bromine also occurs as a bromide of silver in the mines of Chili and other countries. It is usually extracted from the mother-liquors or bitterns of brines, or from the purification of rock salt and chloride of potassium by the agency of chlorine or of binoxide of manganese and sulphuric acid. Formerly, most of the bromine was obtained at Schœnbich, Prussia; since the discovery of the Stassfurth deposits larger quantities (21,000 pounds per annum) have been made there. In the U. S. much bromine is made at Tarentum, Sligo, and Natrona, Pa., at Pomeroy, O., and Kanawha, West Va. The total product of these localities is estimated at 125,000 pounds for 1870. To obviate the danger attending the transportation of bromine, much of the bromine of Stassfurth is shipped as bromide of ethyl, from which it is easily set free.

Bromine is a dark reddish-brown liquid, having a powerful suffocating odor and emitting heavy red fumes. Its specific gravity is 2.976; it boils at 145.4° F., and freezes at 19.4°. It is very poisonous; is soluble in alcohol and ether, slightly so in water. Its equivalent is 80. It combines readily with metals; forms hydrobromic acid (HBr) with hydrogen, and with oxygen bromic acid ($HBrO_3$) and hypobromous acid (HBrO), all of which are analogous in their properties to the corresponding compounds of chlorine. Bromine possesses bleaching and disinfecting properties. It is used to a limited extent as a disinfectant, but its most important application is for the manufacture of bromide of potassium (KBr), which is used in medicine and in photography. Bromide of ammonium, cadmium, etc. are also prepared for the latter purpose. The high price of bromine is the chief obstacle to its more extensive use.

C. F. CHANDLER.

Bro'moform, the ter-bromide of formyl ($CHBr_3$), a compound analogous to chloroform and iodoform. It is a heavy, volatile liquid.

Bromp'ton Falls, a post-village of Brompton township, Richmond co., Quebec (Canada), on the Grand Trunk Railway, 94 miles E. of Montreal, has extensive manufactures of lumber. Pop. about 500.

Broms'grove, a market-town of England, in Worcestershire, 16 miles by rail S. W. of Birmingham, is in a richly-wooded valley on the Birmingham and Bristol Railway. It has a fine old church, and a grammar-school founded by Edward VI.; also manufactures of buttons and nails. Pop. 5262.

Bron'chi [plural of the Lat. *bronchus;* Gr. βρόγχος, the "windpipe"], sometimes called **Bron'chia** [Gr. τὰ βρόγχια], are the subdivisions of the trachea or windpipe. Opposite the third dorsal vertebra the latter divides into two branches or bronchi of similar structure to itself. (See TRACHEA.) Of these bronchi, one goes to each lung, the right being little more than an inch, the left, about two inches, in length. A foreign body entering the windpipe is more likely to fall into the right than into the left bronchus. On entering the lung, the bronchi divide into smaller branches, which again subdivide, until they terminate in small cells, which seem to cluster round their extremities and open into them. These are the air-vesicles. (See LUNGS.)

Bronchi'tis [from *bronchus*, and *-itis*, a suffix denoting inflammation], a diseased condition characterized by inflammation or hyperæmia (congestion) of the mucous membrane lining the air-passages, and usually accompanied by a more or less excessive secretion of mucus from that membrane. Young children, old people, and those who are feeble or ill-nourished are especially liable to it. More or less bronchitis is usually associated with pulmonary consumption, with obstructive heart disease, and with asthma. It is often seen in patients with intermittent fever, typhoid, measles, and smallpox. Perhaps the most fruitful cause is exposure to sudden and extreme changes of the weather, leading primarily to that form of acute bronchitis which is known as a "cold on the lungs." Influenza is an epidemic bronchitis caused by some unknown influence probably existing in the air.

The symptoms of bronchitis are of various character, varying according as the disease is seated in the larger or the smaller bronchi; the disease is also much more formidable in young children and in aged persons than in others. There is especial danger in the case of infants that collapse of small portions of the lung may ensue. Bronchitis may be either chronic or acute. Uncomplicated chronic bronchitis may require the use of sedatives or tonics, with systematic exercise and careful attention to the other hygienic conditions, but the treatment of individual cases will vary with the circumstances and special condition of the patient. The inhalation of medicated vapors and atomized liquids is especially recommended in some cases. Acute bronchitis is in general to be treated by expectorants or emetics, to remove the secretion, and by diaphoretics and counter-irritants, such as mustard, on the extremities and the chest, to relieve the congested blood-vessels of the bronchi. When the case is extreme and suffocation threatened, an infant may be often relieved by a warm bath. There are other special remedial measures which may be resorted to under the advice of the physician.

The diagnosis of bronchitis may be somewhat obscure, but to the practitioner the stethoscope reveals the extent and character of the disease by signs which to the untrained observer might appear insignificant. It may be observed that, except in children and old persons, the great proportion of cases of acute bronchitis recover spontaneously.

REVISED BY WILLARD PARKER.

Bronchocele. See GOITRE.

Brongniart (ALEXANDRE), an eminent French savant, born in Paris Feb. 5, 1770. He became in 1800 director of the porcelain manufactory at Sèvres. In 1815 he was admitted into the Institute. He wrote, besides other works, an "Elementary Treatise on Mineralogy" (1807) and a "Treatise on the Art of Pottery" (1845). He classified reptiles, to the divisions of which he gave the names of Saurians, Batrachians, Chelonians, and Ophidians. Died Oct. 14, 1847.

Bron'son, a township of Branch co., Mich. Pop. 2100.

Bronson, a post-township of Huron co., O. Pop. 980.

Bron'te, a town of Italy, in Sicily, in the province of Catania, near the W. base of Mount Etna, 28 miles N. N. W. of Catania. It has manufactures of paper and woollen goods. Pop. 11,760.

Bronte, a port and post-village of Trafalgar township, Halton co., Ontario (Canada), on Lake Ontario, at the mouth of Twelve Mile Creek and on the Great Western Railway, 26 miles S. W. of Toronto. It has a good harbor for vessels of 300 tons, and has one weekly paper. Pop. about 550.

Bron'té (CHARLOTTE), "Currer Bell," an English novelist, born at Thornton, in Yorkshire, April 21, 1816. Her eccentric father, Patrick Brontë, originally *Prunty,* became curate of Haworth (Yorkshire) in 1820. She lost her mother in 1821, and was sent to a boarding-school, where her health was impaired by impure air and unwholesome food, and then taught until in 1842 she and her sister Emily went to Brussels to learn French. In 1846, Charlotte and her sisters Emily and Anne published a volume entitled "Poems by Currer, Ellis, and Acton Bell." Her first successful work was "Jane Eyre, an Autobiography, edited by Currer Bell" (1847), which was very popular. Her other chief works are "Shirley" (1849) and "Villette" (1852). She was married in 1854 to the Rev. A. B. Nichols, her father's curate, and died Mar. 31, 1855. (See E. C. GASKELL, "Life of Charlotte Brontë," 2 vols., 1857.)

Bronx'dale, a village of Westchester and West Farms townships, Westchester co., N. Y., has manufactures of importance.

Bronx'ville, a post-village of East Chester township, Westchester co., N. Y., on the Harlem R. R., 16 miles from the Grand Central dépôt in New York. It has a large cutlery establishment, good hotels, etc.

Bronze, an alloy of copper and tin in variable proportions, is harder and more fusible than copper, but less malleable. Bell-metal is a variety of bronze, and the cannon commonly called brass are made of this alloy. Bronze was used by the ancients for weapons and utensils before the art of working iron had been invented. The metal which the Romans called *æs* was probably bronze. The brass mentioned in the Bible is supposed to have been either pure copper or an alloy of copper and tin. Bronze is extensively used in the form of statues, machinery, and ordnance. Its hardness and durability render it well adapted for the speculums of telescopes. Bronze when well prepared is the most durable of metallic materials, except gold, platinum, and some rare metals. The French and English have recently issued bronze coins for currency. Tempering produces on bronze an effect directly opposite to that on steel; and in order to render bronze malleable it must be heated to redness and quenched in water. A mixture of 90 parts of copper with 10 of aluminium produces a valuable alloy which is used as a substitute for bronze. The varieties of bronze are composed of the following proportions: Bronze cannon, copper 9, tin 1; Chinese gongs, copper 5, tin 1; musical bells, copper 6, tin 1; house bells, copper 4, tin 1; large bells, copper 3, tin 1; bronze for toothed wheels, copper 10, tin 1; telescope or speculum metal, copper 2, tin 1; bronze for mathematical instruments, copper 12, tin 1.

Bronze, Age of. It is held by some archæologists that when primeval man first began to become civilized, the first weapons of war and utensils for industry were made of stone; that in the next stage of progress (in most nations before the beginning of history) there succeeded a time when copper and its alloys were used in the place of stone for many purposes, as is known to have been true among the Peruvians, and also among some of the ancient races of North America; and that in the third stage men learned how to smelt and work iron. Hence these three hypothetical stages are respectively termed the Age of Stone, the Age of Bronze, and the Age of Iron. These terms are convenient, though it is certain that the so-called ages interpenetrated and overlapped each other. In Denmark and Scandinavia especially there have been interesting and extensive collections made of the relics of the "Age of Bronze," and it appears certain that a large part of these curious weapons and tools (which are in many cases finely wrought) were made in pre-historic times; nevertheless there are many able men who deny that the facts, so far as known, sustain the above-mentioned theory of the origin of civilization.

Bronze Wing, or **Bronze Pigeon,** the name of several species of pigeons, natives of Australia, mostly belonging to the genus *Peristera* of Swainson. They have wings marked with lustrous bronze-colored plumage. The common bronze-wing (*Peristera chalcoptera*) is distributed over all the Australian colonies. It weighs about one pound, and is esteemed as food.

Bron'zing is the covering of articles made of clay, metal, wood, or other material with a substance which gives them the appearance of being made of bronze. Sometimes bronze or some other alloy of copper is actually spread upon the articles to be bronzed; which may be done by the electrotype process, or by applying the powdered alloy by means of *gold size,* which is a mixture of linseed oil and gum animé. There are also certain chemical re-

agents which when applied to various metals will give them a bronzed appearance.

Bronzite, a name which has been given to varieties of Eustatite and PYROXENE (which see).

Brook'dale, a post-village, capital of Rice co., Kan.

Brooke, a county of West Virginia, bordering on Pennsylvania. Area, 75 square miles. It is part of the "Pan Handle," and is bounded on the W. by the Ohio River. The surface is hilly; the soil is fertile. Wool, grain, and dairy products are extensively raised, and the manufacturing interests are important. Coal and iron ore are found in it. Capital, Wellsburg. Pop. 5464.

Brooke (FRANCIS J.) was born at Smithfield, Va., Aug. 27, 1763, served as an officer in the Revolutionary war, became a lawyer in 1788, held various offices, was elected to the Virginia senate in 1800, and became its Speaker, and was for many years a judge of the court of appeals, of which he was for some time president. Died Mar. 3, 1851.—His son, FRANCIS J. BROOKE, an officer of the U. S. army, was killed at the battle of Okeechobee, Fla., Dec. 25, 1827.

Brooke (GUSTAVUS VAUGHAN), born in Dublin, Ireland, about 1818, was educated for the law, but went upon the stage in 1833, and attained eminence as a tragedian, playing with success in the principal cities of Great Britain and the U. S. He was lost on the steamer London while on a voyage to Australia, Jan. 11, 1866.

Brooke (HENRY), a dramatist and novelist, born in the county of Cavan, Ireland, in 1706, was a friend of Pope. He wrote, besides other works, "Universal Beauty," a poem, a novel called "The Fool of Quality" (1767), and tragedies entitled the "Earl of Essex" and "Gustavus Vasa." Died Oct. 10, 1783.

Brooke (Sir JAMES), rajah of Sarâwak, was born of English parents in Bengal April 29, 1803. He served in the British army in India, and having formed a project to suppress piracy in the Malay Archipelago, went to Borneo in 1838. He rendered some service to the sultan of Borneo, who in 1841 appointed him governor of Sarâwak. He framed a code of laws for the natives of Sarâwak, and displayed great energy in the extirpation of pirates. He and his coadjutors received £20,000 as "head-money" for the pirates whom they killed. In 1847 he was created a knight by Queen Victoria. Died in England June 11, 1868.

Brook'field, a post-township of Fairfield co., Conn. Pop. 1193.

Brookfield, a township of La Salle co., Ill. Pop. 1230.

Brookfield, a post-township of Clinton co., Ia. Pop. 1040.

Brookfield, a township of Worth co., Ia. Pop. 274.

Brookfield, a post-township of Worcester co., Mass. It is on the Boston and Albany R. R., 67 miles W. by S. of Boston. It has extensive manufactures of boots and shoes, cottons, leather, brick, iron-wares, etc. Pop. 2527.

Brookfield, a post-township of Eaton co., Mich. Pop. 1057.

Brookfield, a township of Huron co., Mich. Pop. 116.

Brookfield, a post-village of Linn co., Mo., on the Hannibal and St. Joseph R. R., is the central station and division head-quarters of the road. Several of its offices, its round-house, and extensive shops are located here. It has a weekly paper, fine schools and churches. There is a coal-mine near the town. Pop. of village, 402; of Brookfield township, 2321. W. D. CRANDALL, ED. "GAZETTE."

Brookfield, a post-township of Carroll co., N. H. Pop. 416.

Brookfield, a post-township of Madison co., N. Y., about 18 miles S. of Utica. It contains the villages of North and South Brookfield, Leonardsville, Clarksville, etc., and has an academy and several manufactories. Pop. 3565.

Brookfield, a township of Noble co., O. Pop. 978.

Brookfield, a post-village and township of Trumbull co., O., near the Erie and Pittsburg R. R., and 180 miles N. E. of Columbus. Pop. 2657.

Brookfield, a post-township of Tioga co., Pa. Pop. 895.

Brookfield, a post-township of Orange co., Vt., 16 miles S. of Montpelier. It has five churches and manufactures of axes, forks, hoes, rakes, etc., and two cheese-factories. Pop. 1269.

Brookfield, a post-township of Waukesha co., Wis. Pop., containing the village of Brookfield Centre, 2281.

Brookhaven, a city, capital of Lincoln co., Miss., on the New Orleans Jackson and Great Northern R. R., 54 miles S. by W. of Jackson. It is an important point in the lumber trade and manufacture. It has a weekly paper, a foundry and machine-shops, and a flourishing female college. Pop. 1614. J. S. MAGEE, ED. OF "CITIZEN."

Brook'haven, a township of Suffolk co., N. Y. This township extends across Long Island, and has thirty-three churches, a large number of small villages, and considerable manufactures. Pop. 10,159.

Brook'ings, a county of Dakota, bordering on Minnesota. It is drained by the Big Sioux River, which rises within its limits, and it contains several small lakes. Area, 750 square miles. Pop. 163.

Brook'ite, a mineral named in honor of Brooke the crystallographer, is pure native titanic anhydride. It occurs in reddish, yellowish, or hair-brown crystals, which are more or less translucent and have a brilliant lustre, inclining to metallic. It is found in Perthshire, Scotland, at Tavistock, in Savoy, and other places. A variety found in the Ozark Mountains, Ark., is called *arkansite*.

Brook'land, a township of Henrico co., Va. P. 3612.

Brook'lime (*Veronica Beccabunga*), a perennial plant, a native of Europe, grows in ditches and wet places. It has a procumbent stem and elliptical serrate leaves, which are succulent, and are used in England as an ingredient in spring salads. They are sometimes sold with water-cresses. In the U. S. is found a similar plant, the *Veronica Americana*, or American brooklime.

Brook'lin, a post-village of Whitby township, county and province of Ontario (Canada), 7 miles from Whitby. It has large manufactures of furniture. Pop. about 650.

Brook'line, a post-village and township of Norfolk co., Mass., on the Charles River, which separates it from Boston and Cambridge, and on the Boston and Albany and Boston Hartford and Erie R. Rs. It is a place of residence for people doing business in Boston, and has many fine villas and country-seats. A small part of this township has been annexed to Boston since the census of 1870. Brookline has a public library building costing $50,000, and a granite town-house costing $150,000. It is connected with Boston by a horse railroad, and has one weekly newspaper. Pop. 6650. B. KINGMAN, ED. "TRANSCRIPT."

Brookline, a post-township of Hillsborough co., N. H. Pop. 741.

Brookline, a township of Windham co., Vt. P. 203.

Brook'lyn, a post-township of Conecuh co., Ala. Pop. 937.

Brooklyn, a post-village in Brooklyn township, Alameda co., Cal., is on the E. side of the Bay of San Francisco and 10 miles E. of the city of San Francisco. It is on the Central Pacific R. R. It has a good harbor, a cotton-factory, a pottery, and a large shoe-factory. Pop. 1603; of the township, 2816.

Brook'lyn, a post-village, capital of Windham co., Conn., is about 40 miles E. of Hartford and 2 miles W. of the Quinebaug River, which is the E. boundary of Brooklyn township. It has a national bank. Pop. of the township, 2354.

Brooklyn, a township of Lee co., Ill. Pop. 1235.

Brooklyn, a post-township and small village of Schuyler co., Ill., about 40 miles N. E. of Quincy. Pop. 1071.

Brooklyn, the commercial centre of Poweshiek co., Ia., close to the centre of the county, is the end of the railroad division of the Chicago Rock Island and Pacific R. R., 104 miles W. of Davenport. It has a large brick round-house, 7 church buildings, 2 graded schools, 4 grain-elevators, 1 foundry, 1 flour-mill, 4 hotels, and 2 weekly papers. Pop. 971. HENRY MARTIN, PUB. "JOURNAL."

Brooklyn, a post-township of Hancock co., Me. Pop. 966.

Brooklyn, a post-village of Jackson co., Mich., on the Raisin River and on the Detroit and Hillsdale R. R., 15 miles S. E. of Jackson. Pop. 544; of township, 1691.

Brooklyn, a township of Hennepin co., Minn. Pop. 1024.

Brooklyn, a city, seaport, and capital of Kings co., N. Y., situated at the W. end of Long Island, on New York Bay and the East River, an arm of the sea or estuary which divides it from New York City and connects Long Island Sound with the Atlantic Ocean. Brooklyn is the third city of the Union in population, and is distant from Albany 147 miles, and from Washington 226 miles. Its latitude (at the navy-yard) is 40° 51′ 30″ N., longitude 73° 59′ 30″ W. from Greenwich. Its area as at present constituted is about 16,000 acres or 25 square miles, but it is expected that in 1874 the other towns of the county will be annexed, and its area will then include the whole of Kings county, which is 72 square miles.

Population.—In 1698, Breuckelen had 509 inhabitants;

in 1800, 3298; in 1810, 4402; in 1820, 7545; in 1825, 8800; in 1830, 15,292; in 1835, 24,310; in 1840, 36,233; in 1845, 59,574; in 1850, 96,850; in 1855, 205,250; in 1860, 266,661; in 1865, 296,112; in 1870, 396,350. In 1873 its population is estimated, on the basis of school censuses and directory returns, at 520,000.

Commerce.—Brooklyn is a commercial port of great and constantly increasing importance. The city of New York, naturally desirous of concentrating on its own shores and at its own docks, slips, and piers its vast commerce so long as it could find room for it, discouraged all efforts for the erection of wharves, piers, docks, or warehouses on the Brooklyn side for many years. There had been a government navy-yard in the city limits since 1801, and it had ranked as first class since 1824, but the commerce of the city had no existence beyond a moderate coasting-trade prior to about 1844. In that year the Atlantic Docks Company, incorporated in 1840, completed their first warehouse. This company, after passing through many discouragements, has now 3 miles of wharf accommodation, 40 acres of water-area, warehouses covering 20 acres, 9 steam-elevators, and every facility for shipping and storing cargoes. There have been in this dock at one time 130 sea-going vessels. The Erie Basin, S. of this, has a water-area of 60 acres, and the Brooklyn Basin, still farther S., a surface of 40 acres. Both are surrounded with warehouses, and are thoroughly equipped for accommodating shipping of the largest class. Since 1844 there has been invested in docks and warehouses a private capital of more than $125,000,000 on the shore-line of Brooklyn, which extends 8½ miles, and has 25 miles of dockage, with vast warehouses, piers, slips, docks, and basins along the whole distance. The following statistics, gathered by careful examination in 1872, will give some idea of the extent of this commerce:

In the warehouses of the Atlantic Dock Company, and others S. therefrom to Red Hook Point, there is stored—grain, $20,000,000; sugar and molasses, $15,000,000; provisions, $2,200,000; flour, $1,000,000; lumber and stone, $1,200,000; cotton, $1,500,000; guano, $1,500,000; rags, $500,000; saltpetre and brimstone, $100,000; salt, $500,000; iron, $2,000,000; miscellaneous, including resin, turpentine, etc., $4,000,000; total, $50,000,000; in the section N. from Atlantic Docks to South Ferry, $60,000,000. That which diverges to the Gowanus Canal, comprising coal, building, and other material, valued at $4,000,000; from South to Fulton Ferry, $126,000,000; from Fulton Ferry to Main street, $25,000,000; making an aggregate to this point of $261,000,000 annually stored. These figures seem enormous, but are borne out by facts. The warehouses from Red Hook to Main street are full of merchandise, and literally overflowing. A number of other large warehouses are now (Sept., 1873) in process of erection. From Main street, N. E. to the bridge over Newtown Creek, a distance of 4 miles, there is an extensive commerce. Many shipyards, gas-works, lumber-yards, coal-yards, sugar-refineries, and most of the vast petroleum-refineries and shipping-houses, are on this part of the coast-line. The annual commerce from this section, aside from the navy-yard, is somewhat more than $40,000,000. All through the year, with more or less activity, the business of loading and unloading vessels is going on. It is estimated that 2500 vessels are unloaded every year between Red Hook and Main street. In the business of warehousing alone some 5000 men are engaged along the shore-line.

Brooklyn is already the largest grain dépôt in the world. Immense steam-elevators are employed to lift and deliver the grain. The stores of E. C. Lockwood & Co. have storage for 3,000,000 bushels at a time, employ 1000 hands, and pay to the city a tax of $50,000. The flour-mills of F. E. Smith & Co. deliver 1200 barrels per day. During the receiving season, from October to December, canal-boats arrive by the hundred to be discharged. On the closing of navigation as many as 600 canal-boats loaded with grain lie up for the winter in the basins, in many cases with the captains and their families on board until the cargoes can be sold. The value of the boats engaged in the grain-carrying trade is estimated at $18,000,000. The bulk of grain afloat seeking port frequently amounts to 5,000,000 bushels at one time.

Continuing the shore-line from Main street to the navy-yard, and beyond to the north-eastern boundary, including the large interior dockage made by the Wallabout improvements, on Newtown Creek and at Gowanus Creek and Canal, it is apparent that the capacities of the city for extensive commerce can hardly be over-estimated. These are likely to be greatly aided by the removal of the obstacles at Hell Gate, at the confluence of the East River with the Sound. Five lines of steamships now ply between Brooklyn and their respective ports: The State line, to and from Glasgow; the North American line, to and from London, New-Castle, Christiania, and Bergen; the South American line, with U. S. mail, to and from Rio and other ports; the White Cross line, to and from Antwerp; the Netherlands and Rotterdam line, to and from Rotterdam. The "Brooklyn Eagle" now gives daily reports of arrivals and departures to and from this port.

Manufactures.—Brooklyn is a great manufacturing city. A very large proportion of the goods and wares professedly manufactured in New York City are really produced in Brooklyn, and sent from thence to the New York warehouses. In some classes of goods and wares, such as pianos, cabinet organs, hats, caps, men's and children's clothing, oil-cloths, iron castings and ware, carpets, lace, etc., from one-fourth to one-half of all that is credited to New York City is actually produced in Brooklyn. Considerable quantities of all these wares are also produced and sold direct by Brooklyn dealers and manufacturers. According to the census of 1870, Kings county had 1043 manufacturing establishments, employing 286 steam-engines. The internal revenue office reported for the year ending July 1, 1873, 1440 stationary steam-engines; the same census reported 18,545 persons employed in manufactories; capital employed, $25,287,981; wages paid, $9,273,994; raw material used, $39,899,971; and annual product, $60,848,673. That these statistics very imperfectly represent the manufacturing industry of Brooklyn will appear from an analysis of a few items of this aggregate. The census reports the production of stoves, heaters, etc., at $120,000; at the industrial exposition of Kings county in Sept., 1873, one manufacturer in Brooklyn reports a production of these wares of over $2,000,000 the previous year; tobacco, snuff, and cigar manufacturers reported in the census as producing $4,414,000, paid in the year ending July 1, 1873, a tax of $2,042,016.17, and their entire production was over $8,000,000. The census reported seven establishments for refining sugar and molasses, producing an annual amount of $16,706,851, while at the industrial exposition of Sept., 1873, one of these sugar-refiners reported a production from July, 1872, to July, 1873, of $12,300,000, and another of over $5,000,000; and the production of the whole seven was somewhat more than $24,000,000. Ropes, cordage, and twine, reported by the census as producing $688,641, reported to the internal revenue office for the year ending July, 1873, a production of over $3,000,000; carpets, not specified in the census report, were produced in 1873 to the value of over $1,000,000; hats and caps, put down in the census at $1,074,948, were produced in 1872–73 to the value of $4,100,000; lace, guipure, thread, Nottingham, etc., not mentioned in the census, are produced to the extent of about $1,200,000; artificial stone, not mentioned in the census, is produced to the extent of over $3,000,000; distilled and malt liquors, reported by the census at $2,220,929, paid revenue-tax in 1872–73 on a production of $7,500,000; camphene, not specified in the census, is produced to the extent of over $2,000,000; steel is produced to the extent of $1,500,000; flouring-mill products, in which there are now six large houses engaged, produce annually over $7,000,000, instead of $2,692,000, as reported by the census. The rectification and packing of coal oil, petroleum, and petroleum products in Brooklyn make use of a capital of over $4,000,000, and produce annually of these various articles to the value of over $8,000,000; gas is produced to the extent of about $3,500,000; oil-cloths, about $1,500,000; paper-hangings, $1,300,000; the book, job, and newspaper printing establishments turn out work annually to the value of over $2,300,000; woollen goods are manufactured to the extent of $1,800,000; linseed oil is produced of the value of nearly $2,000,000; drugs and chemicals, including the production of sulphuric acid (of which there are several factories), produce goods to the value of more than $5,000,000. Other large manufactures are of men's, women's, and children's clothing, machinery, shipbuilding, lumber, sawed and planed, sash, doors, and blinds, hardware, marble and stone work, gas and lamp fixtures, tin, copper, and sheet-iron ware, and soap and candles. As the result of careful and thorough examination, continued for several months, the annual production of the Brooklyn manufacturing establishments, aside from those owned in and run from New York City, is stated as between $125,000,000 and $130,000,000.

Finances.—

Tax levy in 1872 for 1873:

For State purposes	$1,086,530.78
" county "	1,336,177.94
" city "	5,550,981.18
	$8,023,739.90
Assessed value of real estate and personal property	$216,073,170

The census gives, as the true valuation of Kings county in 1870, $700,000,000. The valuation of the other towns of the county in 1873 was $11,626,043. The assessed valuation of 1872 was $207,952,332. The budget of expenditure for the city government in 1873 was—

Principal of city debt		$2,002,540.72
" of certificates		31,000.00
Interest on city bonds		1,021,290.00
" on certificates		11,377.57
One-fifth of one-third of assessments		110,353.91
General purposes		891,500.00
Salaries city officers		295,000.00
Wells and pumps		8,700.00
Health department		50,000.00
Department city works		325,000.00
Fire department		661,650.00
Police department		661,650.00
Board of education		929,666.46
Park commissioners		45,000.00
		$4,900,878.68
Less revenue fund	$471,981.27	
Less surplus and tax arrears	341,134.56	813,115.83
		$4,087,762.85

The debt of the city, funded and unfunded, is about $32,000,000.

Courts.—The principal court of Brooklyn is "the city court," with three judges at salaries of $10,000 each per annum, with civil jurisdiction equal to that of the supreme court, and also criminal jurisdiction. It holds both general and special terms. Number of arraignments and convictions from Jan. 1, 1872, to Jan. 1, 1873, 289; years sentenced, 353; from Jan. 23d to May 23d, 1873, 148 arraignments. In 1872 judgments entered, 1561; motions, 2183; naturalizations, 693. The city has also six district justices' courts and one police court. Terms are also held, in the city, of U. S. circuit and district courts, the supreme court, and county court. The city jail is on Raymond street; the penitentiary, at the corner of Nostrand and Flatbush avenues; the almshouse, hospital, and lunatic asylum are at Flatbush; the city hospital, on Raymond street; the Long Island College Hospital, on Henry street, near Atlantic.

Education.—The public school system of Brooklyn is managed by a board of education of forty-five members. It has under its charge 52 distinct organizations, 46 schoolhouses, 4 colored schools, and 11 evening schools. Number of children in 1870 within the legal school age, resident in the city, between the ages of five and fourteen, 86,842; between the ages of fourteen and twenty-one, 38,355; total, 136,769. This number is now (1873) 175,000. Total school registration to Jan. 1, 1873, 104,628. Daily attendance, including evening schools, 50,500; number of sittings, 48,622; number of teachers, exclusive of evening schools, 915; evening schools, 109; teachers' wages, $563,940.67; value of school property, $1,986,114; average cost of tuition, $10.18; total expenses for all purposes, $812,969.20. This year (1873) upwards of $900,000 will be required. The Catholic schools have a separate organization, attended by religious as well as secular instruction, which comprises 2 colleges, 3 academies, 1 select school, 1 asylum school, 2 industrial schools, 20 parish schools, 2 night schools—30 in all, with a registry of 16,144 scholars. The grades of study are primary, intermediate, and collegiate. Of private schools there are 200. Of schools for female education none stand higher than the Packer Collegiate Institute, organized in 1845, and largely endowed by Mrs. Harriet S. Packer and others. This institute has 38 teachers, 5 males and 33 females; 793 pupils, of whom 153 are in the preparatory department; 53 free scholarships; and had graduated 628 alumnæ in 1872. Its preparatory course occupies five years, and the collegiate course four years. The building and grounds are admirably adapted to their purpose, and have a fine chapel for public worship. The library contains 4000 volumes. The Brooklyn Heights Female Seminary, the Athenæum Seminary, and many others have a high reputation for the instruction of young ladies, and the Adelphi Academy, a more recent institution, on "the Hill," receives pupils of both sexes, and has already attained a high reputation. Its pupils numbered in 1872–73 a little more than 600. For boys and young men, the Brooklyn Collegiate and Polytechnic Institute has a deservedly high character. In 1872 it had 27 teachers, of whom 25 were males and 2 females; 562 pupils, of whom 400 were in the preparatory department, and 162 in the collegiate. Each course (preparatory and collegiate) is for four years. The institute has fine buildings, and a library of 3000 volumes. The Juvenile High School is in some sense a tender for the Polytechnic, being intended for boys under twelve. Mr. Lockwood's academy in Adelphi street and many other of the private schools are of high character. There are two business and commercial colleges in the city—Clarke, Bryant, and Stratton's and Brown's. The Polytechnic has also a commercial and business department. A college or university has been chartered by the Catholics, and buildings are now erecting for it, but it has not yet been organized. There is a medical college, the Long Island College Hospital, founded in 1859, which has 8 professors and 5 other instructors.

Libraries.—The principal libraries of the city are the Mercantile Library, with 45,959 volumes, and rapidly growing; the Long Island Historical Society's Library, with 24,000 volumes; the library of the Brooklyn E. D. Library Association, with 20,000 volumes; the Youths' Free Library at the Brooklyn Institute, 11,000 volumes; the Young Men's Christian Association Library, 6000 volumes; the Law Library, 8000 volumes; Consolidated Public School Library of the Eastern District, 8000 volumes; and the thirty public school libraries of the Western District, numbering together over 37,000 volumes.

Newspapers.—Brooklyn has four daily papers, nine weeklies, and several monthlies, mostly advertising journals. There are, however, two monthly magazines, not of very large circulation. The morning papers of New York City circulate almost as largely in Brooklyn as in New York, but the Brooklyn evening papers have a very large circulation.

Churches.—The first denomination which planted a church in Brooklyn (or, as it was then called, Breuckelen) was the Reformed (late Dutch) Church. Their first church in Kings county was built at Flatbush, then called Midwout, in 1654, but though their dominie, Rev. Theodorus Polhemus, ministered to the few settlers scattered over the present limits of Brooklyn, there was no church edifice in the present city till 1666, when one was built in Fulton street, near the present Hoyt street. A hundred years later (in 1766) this gave place to a second on the same site; in 1807 the third church edifice was erected on Joralemon street, and this was replaced by the present tasteful edifice of that church on the same site in 1835. In 1787 the first Episcopal church was consecrated. It stood on Fulton street, on the present site of St. Ann's building. In 1795 it was reorganized and incorporated as St. Ann's church. The first Methodist Episcopal church was erected in Sands street, and dedicated June 1, 1795. The Protestant Methodists had a church here in 1833, and the Primitive Methodists in 1839. The Roman Catholics erected their first church (St. James's) on the corner of Jay and Chapel streets in 1823. The first Presbyterian church on the present site of Plymouth church was erected in 1822–23. The first Baptist church was organized in 1823, but their church edifice, on Pearl street between Nassau and Concord, was not erected till 1826. The first Unitarian church (Church of the Saviour) was organized in 1833, and purchased the Second Presbyterian church in Adams street in 1835. An effort was made to establish an Independent or Congregational church in this city in 1785, but it failed, and the first Congregationalist church (the Church of the Pilgrims) was organized in Dec., 1844, but the church on the corner of Remsen and Henry streets was not completed till May, 1846. The first Universalist society was organized in 1842, and their church on the corner of Fulton and Pineapple streets was completed in 1843. The first Lutheran church was incorporated and its edifice erected in 1847, in Graham avenue, corner Wyckoff street, E. D., and the first Evangelical Lutheran in Brooklyn on Henry street in 1856. The first Jewish synagogue was built in 1862. The Swedenborgian society was organized in 1859, but did not obtain their present place of worship till 1869. The Moravian church in Jay street is older, but their present church edifice was built in 1869. There are now in the city 250 churches—viz., Methodist Episcopal, 40; Methodist, not Episcopal, 4; Episcopal, 38; Baptist, 33; Roman Catholic, 34; Jewish synagogues, 6; Universalist, 4; Congregationalist, 18; Lutheran, 12; Presbyterian of various connections, 32; Reformed (Dutch), 15: Unitarian, 3; miscellaneous, 11. Many of these church edifices are remarkable for their architectural beauty. The new Roman Catholic cathedral, on Lafayette avenue between Vanderbilt and Clermont avenues, will, when completed, be one of the stateliest ecclesiastical structures in the U. S.; the church of St. Charles Borromeo in Sidney place, St. Peter's, corner of Hicks and Warren, and St. Vincent de Paul, on N. Sixth street, are all very fine edifices. The church of the Holy Trinity (Protestant Episcopal), St. Ann's-on-the-Heights, St. Paul's, Clinton corner Carroll street, St. Peter's, on State street, and Christ church, E. D.; the Lafayette avenue Presbyterian church, Westminster Presbyterian church, and the Ross street Presbyterian church; the Church-on-the-Heights, First Reformed (Dutch), on Joralemon street, the Bedford avenue Reformed church, E. D., and the East Reformed church, also on Bedford avenue, corner Madison street; the Church of the Pilgrims, the South Congregational church, the Central Congregational church on Hancock street, and the Church of the Puritans; the Simpson Memorial M. E. church, the Pacific street M. E. church, First place M. E. church, and Summerfield M. E. church; and the Strong place and the Washington avenue Baptist churches,—are all church edifices noteworthy for architectural taste and beauty.

Benevolent and Charitable Institutions.—The city has

eight hospitals—viz., The Brooklyn City Hospital, on Fort Greene; the Long Island College Hospital, corner of Pacific and Henry streets; the King's County Almshouse and Hospital at Flatbush; St. Mary's Female Hospital and St. Peter's Hospital, both under the care of the Roman Catholic Sisters; the U. S. Naval Hospital; the Brooklyn Eye and Ear Hospital, 190 Washington street; and the Homœopathic Maternity Hospital. There are thirteen infirmaries and dispensaries; three nurseries or crèches; seven orphan asylums, of which four are Roman Catholic, one general, one Episcopal, and one colored. The Children's Aid Society of Brooklyn sustains also a newsboys' home, a home for friendless and unprotected girls, and a nursery. There are also the House of the Good Shepherd, the Home for Poor Boys, the Helping Hand, the "Home" in Concord street, the Association for Improving the Condition of the Poor, the Truant Home, the Industrial School Home, and the Temporary Home for Friendless Women—all benevolent institutions. For the aged and infirm there are the Graham Home for Respectable Aged Indigent Females, the Church Charity Foundation, the "Home" of the Little Sisters of the Poor, and the Baptist "Home," now erecting in the eastern part of the city. The Kings County Inebriates' Home is also one of the city charities. There are also numerous local relief and benefit societies, among them 44 Masonic lodges, 26 Odd Fellows' lodges, 28 United American lodges, and a large number of Good Templars, Sons of Temperance, Father Matthew Total Abstinence Benevolent societies, Hibernian Benevolent, Sons of Erin, German Mutual Benefit, Trades Unions, etc. There is also a society for the prevention of cruelty to animals, three Young Men's Christian associations, an association for Christian work, numerous local, literary, and Christian associations.

Principal Buildings.—The Brooklyn City Hall; the Kings County court-house, costing $550,000, and the adjacent grounds about $650,000 more; the Williamsburg Savings Bank, $450,000; Kings County Savings Bank, $195,000; the Mercantile Library buildings, $219,932; Academy of Music, $200,000; Long Island Safe Deposit building, $150,000; the Academy of Design, in Montague street; the Packer Collegiate Institute, in Joralemon street; the Adelphi Academy; the Church Charity Foundation; the new Brooklyn Orphans' Asylum; the College of St. John the Baptist, Lewis and Willoughby avenues, are all fine buildings.

Public Parks and Cemeteries.—Since the consolidation of 1855 the city has increased the magnitude of its enterprises, public and private, in every direction. Of its parks the principal is Prospect Park, which consists of 522 acres, and is laid out and improved upon a plan of beauty, convenience, and magnificence which will compare with any other in the Union. It has lakes, drives, and boulevards, one of the latter, 202 feet in width, and six miles in length, is adorned with trees, and is intended to reach the ocean; and another extends to East New York. Cost of land taken $2,268,909.70, and expenditure for improvements $1,169,604.70; entire cost to Jan., 1868, $3,438,514.40. A fine parade-ground of 40 acres for the exercise of troops has been added. Washington Park, taken in 1837 (comprising 30 acres), is the remaining height and grounds of old Fort Green or Putnam of the Revolution and of the line of works of 1812. It has been surrounded by an elegant and substantial wall, neatly buttressed and coped, the height itself terraced and laid out in convenient walks and avenues, properly shaded with appropriate shrubbery. The object of these grounds, which will enlist an interest as wide as the Union, is the preservation of the tombs of the martyrs of the prison-ships of the Revolution, of whom 11,000 were buried on the shores surrounding the Brooklyn navy-yard. In the excavation for this work many were unburied and enclosed in large coffins. In 1808 these coffins were borne through the streets on catafalques, orations were made, after which they were deposited in a temporary vault on Jackson street (now Hudson avenue), adjoining the navy-yard wall. Here they rested till June 17, 1873, when they were privately taken up by the park commissioners and placed in their present permanent tomb fronting on Myrtle avenue. There are also five other small parks in the city.

Of the cemeteries, Greenwood is well known as peerless in extent, having 413 acres enclosed, as well as in the beauty of its grounds, the number of burials, and the magnificence of its monuments. The Evergreens, 207 acres, and others, make Brooklyn as eminent in this regard as in her churches.

Railroads and Rapid Transit.—No city is better provided with local railroads traversing it in every direction. Steam does not come within the limits, except in a few cases by dummy-engines. To provide rapid transit by means of tunnelling, a company has been formed, to which $502,000 have been subscribed. While two of the Long Island railroads discharge their passengers at Hunter's Point, the South Side R. R. passes through Williamsburg by a dummy, and has its dépôt in Brooklyn at the foot of S. Seventh street. From all these roads the travel reaches the City Hall and ferries by cross-town cars. There are 26 city railroad companies in the city (one of them, the Brooklyn City, having thirteen routes), and their aggregate length is about 135 miles. There are five ferry companies with twelve ferries; over these ferries nearly 80,000,000 of persons are carried annually. The New York Bridge Company is erecting a suspension bridge over the East River, to connect Brooklyn and New York City. Its estimated cost is about $10,000,000. The trial boring began in 1867, and the last of four anchor-plates was fixed in place July 29, 1873. Two lofty towers stand on either side of the river, the Brooklyn tower now being 184 feet above high water. The New York terminus is opposite the City Hall in Chatham street, the Brooklyn terminus in the square bounded by Brooklyn, Sands, Washington, and Prospect streets. Total length, 5989 feet. The central span will cross the river from pier-line to pier-line, without impeding navigation, in one single span of 1595 feet 6 inches from centre to centre of towers. There has been received up to Sept. 1, 1873, about $4,000,000, and expended about $3,800,000. All the stock, except $500,000 subscribed by citizens, is held by the cities of New York and Brooklyn.

Waterworks.—These are now managed by a board of commissioners of city works. The water is derived from a number of ponds and streams on the S. side of Long Island, and is raised to its reservoirs by powerful steam-engines. Time has vindicated the completeness of the system and the fine quality of the water for all purposes. Cost $7,000,000. From Jan. 1, 1871, to Jan. 1, 1872—

Total gallons	8,288,509,360	Miles of sewerage	232
Daily supply	22,708,245	Amount expended to Jan. 1, 1872	$239,533.21
Amount of receipts	$971,414.98	Streets paved, miles	298
Expenses of management	$297,225.23	Unpaved, "	210
Number of miles of streets	546	Intersections, "	38

The New City Charter.—This was passed at the recent session of the legislature, June 28, 1873. It increases the salary of the mayor to $10,000, and divides the city into twenty-five wards with thirty-six aldermen till the new census of 1875, after which the representation will be 12,000 to each alderman. This charter has gone into operation.

Annexation Commission.—A legislative commission which sat in Aug. and Sept., 1873, in Brooklyn, composed of six commissioners from Brooklyn and five from the county towns, with power to agree upon terms of annexing the other five towns, Flatbush, Flatlands, New Utrecht, New Lots, and Gravesend to Brooklyn as one city, reported a plan of consolidation which is to be voted upon early in 1874, and will doubtless result in the extension of the city limits over the entire county.

Banks and Associations.—The city has 12 banks of discount, 17 savings banks, 1 trust company, 3 safe-deposit companies, 6 gaslight companies, 2 art associations, 7 clubs, 1 philharmonic society, 1 academy of music, 3 musical conservatories, 2 theatres, 2 minstrel operas, 33 religious and benevolent societies, 1 industrial exposition, 1 gymnasium, 7 libraries and literary societies, 6 public parks, 8 cemeteries, a paid fire department, 8 regiments of the national guard, etc.

History.—Brooklyn was named from Breuckelen ("marshy land"), in the province of Utrecht in Holland, 6 miles from the city of Utrecht, from which some of its earliest settlers came. The first step towards its settlement was the purchase from the Indians in 1636, by Willem Arianse Bennet and Jaques Bentyn, of a tract of 630 acres, lying at Gowanus, between Twenty-seventh street and the New Utrecht line; the second step, the purchase by Joris (George) Jansen de Rapalje of 325 acres at the Wallabout Bay, June 16, 1637.

At the time of the discovery of the Long Island shores in 1609 by Hendrik Hudson, several tribes or settlements occupied Long Island, one of which was at Canarsie, and another, the Mareckawick tribe, at Brooklyn, which, from the spot where they were located (sandy place or shore) at the Wallabout, gave the name *Mareckawick* to that locality. Brooklyn Heights, overlooking the East River, was called in the Indian dialect *Ihpetonga* (highlands). Families of these Indians were at New Utrecht and Gowanus in 1680, on the visit of the Labadists to those places in that year. The first ferry was established by license in 1642, running from Peck Slip to a point near the present Fulton ferry, from this period named "The Ferry." There were at that time five hamlets—"The Ferry;" "Breuckelyn,"

near present Hoyt on Fulton street, where stood the church; "Gowanus," around Gowanus Bay; "Bedford," inland; and "the Wallabout," around Wallabout Bay. The first house known to have been built in Brooklyn was that of Willem Arianse Bennet, located on his purchase, with Jaques Bentyn, from the Indians, prior to 1643, as in that year it was burnt by the Indians in the Indian wars, and replaced by the Schermerhorn House, on or near the same site; and the second probably that yet standing, and known as the De Hart or Bergen house, which was existing and visited by the Labadists in 1680, being then occupied by Simon Aertsen de Hart, grantee of Bennet. George Jansen de Rapalje did not come over from New Amsterdam to occupy his farm till about 1654. Later history has entirely exploded the story that his daughter, Sarah Rapalje, was the first Christian born child in New Netherlands, and also that her birthplace was Brooklyn at the Wallabout. The Labadist manuscript, published by the Long Island Historical Society, shows that this distinction of first birth in the colony probably belongs to a male person, Jean Vignè, who was born in New Amsterdam in 1614, eleven years before the birth of Sarah, who was born in 1625. Besides, it is clear that Sarah, instead of being born at the Wallabout, as often asserted by early historians, was born in Albany (Fort Orange) in 1625, removed with her parents to New Amsterdam in 1626, lived there till after her marriage, between the age of fourteen and fifteen, was a church member in New York, and united with the Brooklyn church by certificate in 1661; was twice married in the Wallabout, gave birth to fourteen children, and died in 1685, aged about sixty. There is no proof that any white person lived upon Long Island prior to 1636.

Immediately upon the establishment of the ferry in 1642, grants of building lots at that point began, and that locality, as well as the other hamlets, increased. The union of all the hamlets into one incorporated jurisdiction named Breuckelen took place in 1646, under Director-General Kieft. The Labadists, who crossed this ferry in Sept., 1679, speak of it as "a considerable thoroughfare," and say, "a considerable number of Indians live upon Long Island, who gain their subsistence by hunting and fishing; and they as well as others must carry their articles to market over this ferry, or boat themselves over, as it is free to every one to use his own boat if he have one, or to hire one for the purpose. The fare over the ferry is three stuivers in German (less than half a cent English) for each person."

In 1665, Breuckelen had attained the leading position among the towns in point of population and wealth, and was granted the privilege yearly of "a fayre and market near the ferry for all graine, cattle, or other produce of the country." Whatever the increase of population, it must have been very gradual, as (to skip a long period) the canvasser for the "New York and Brooklyn Directory" in 1796, passing up "the old road" (Fulton street), and down "New Ferry" (Main street), and through the intervening streets, gives but 125 names. The statistics of population, and the picture painted by Francis Guy of its condition up to 1820, also show that, up to this time, it held but the rank of an inconsiderable village, without institutions, commerce, or manufactures.

Over the spaces now occupied by Prospect Park, Washington Park, Greenwood Cemetery, Evergreen and Cypress Hills Cemeteries, was fought on the 27th of Aug., 1776, the important battle which has been properly designated "the battle of Brooklyn," the first great battle of the Revolution after the Declaration of Independence. The British army was under the command of Lord Howe, the Hessians under Gen. von Heister. Gen. Greene being ill, Gen. Putnam was in command of the American forces. The result is well known. An important pass was left unguarded in Howard's Hills, just beyond Bedford, by which the English troops gained the rear of the American army, and defeated it with heavy loss. Those who escaped within the lines were rescued by the masterly retreat effected by Gen. Washington on the 28th to New York by means of boats and under cover of a heavy fog, by which their movements were concealed. A memorable incident of this battle was the death of Gen. Nathaniel Woodhull of Suffolk co., L. I., while engaged on the 28th, the day after the battle, in driving the cattle eastward. He had entered the "Increase Carpenter house," two miles E. of Jamaica. While there a body of horsemen rode up, commanded by Captain Oliver de Lancey, who struck the general several times with his sword, and wounded him so severely that he died a few days after at New Utrecht, where he had been conveyed as a prisoner.

The Brooklyn navy-yard was begun with the purchase by the U. S. government of 40 acres in 1801, which were converted into a navy-yard, and which was designated in 1824 by the secretary of the navy as one of the first-class navy-yards of the nation. It has since added largely to its domain by other valuable purchases, upon which are placed the U. S. hospital, a dry-dock, and costly buildings for the repair and construction of the largest vessels.

The War of 1812.—On Aug. 9, 1814, the patriotic citizens of Brooklyn and the surrounding country flocked to Fort Greene, and aided in rehabilitating that old fortification and following out the line of earthworks across the island, conformably to the plans of Gen. Joseph G. Swift, after whom one of the forts which cornered on Atlantic street (the "Cobble Hill Fort" of 1776) was named "Fort Swift." Every preparation was made to meet the dangers to which New York was liable from her exposed situation by sea and land. By these precautions or otherwise Brooklyn did not, as in the Revolution, bear the brunt of the first systematic strategic conflict.

The Civil War of 1861–65.—In this emergency the city of Brooklyn was not exceeded by any other city in raising regiments and supplying material aid. Her Sanitary Fair of Feb. 22, 1864, was extraordinary as an effort of local unity and successful effort, the pecuniary realization reaching the magnificent sum of $402,943.74. This was aptly characterized as the first great act of self-assertion ever made by the city of Brooklyn, and did much to bring her citizens together for other efforts.

The village charter of Brooklyn is dated April 12, 1816; the first city charter was passed April 8, 1834; the consolidation act uniting Williamsburg and Greenpoint with it passed April 17, 1854, and took effect Jan. 1, 1855. The new charter was passed in 1873, and went into effect the same year. The institutions which have had the greatest influence upon the social organization and material progress of the city have been the Apprentices' Library and Graham Institute (founded July 4, 1825), the Academy of Music (opened Jan. 15, 1861), the Mercantile Library Association, the Atlantic Docks, and the Long Island Historical Society.

ALDEN J. SPOONER,
LATE ED. OF "THE LONG ISLAND STAR."

Brooklyn, a post-village and township of Cuyahoga co., O. The village is about 3 miles S. of Cleveland. Pop. 648; of township, 3712.

Brooklyn, a post-township of Susquehanna co., Pa. Pop. 1128.

Brooklyn, a post-twp. of Green co., Wis. Pop. 1111.

Brooklyn, a twp. of Green Lake co., Wis. Pop. 1339.

Brooks, a county of Georgia, bordering on Florida. Area, 550 square miles. It is intersected by the Ocopilco River. The surface is level and the soil sandy. Corn, oats, rice, cotton, and wool are raised. It is traversed by the Atlantic and Gulf R. R. Capital, Quitman. Pop. 8342.

Brooks, a township of Buena Vista co., Ia. Pop. 71.

Brooks, a post-township of Waldo co., Me., on the Belfast branch of the Maine Central R. R., 13 miles N. by W. of Belfast. It has manufactures of lumber, spools, carriage-wheels, etc. Pop. 868.

Brooks, a township of Newaygo co., Mich. Pop. 974.

Brooks, a township of Cedar co., Neb. Pop. 40.

Brooks (CHARLES SHIRLEY), an English journalist, lecturer, dramatist, and novelist, born in Oxfordshire in 1815. He produced dramas entitled "The Creole," "Our New Governess," etc. Among his novels are "Aspen Court" (1857), "The Silver Cord," and "Sooner or Later." He was for several years editor of "Punch." His style was delightfully genial and witty, and he was personally greatly beloved. Died Feb., 1874.

Brooks (CHARLES TIMOTHY), a Unitarian minister and poet, born at Salem, Mass., June 20, 1813. He graduated at Harvard in 1832, and became in 1837 pastor at Newport, R. I. He is eminent as a translator of "Faust," "Hesperus," "Titan," and many small poems from the German.

Brooks (ELBRIDGE GERRY), D. D., born at Dover, N. H., July 29, 1816, studied law (1833–35) with Chief-Justice Tenney of Maine, began preaching in 1836, was ordained over a Universalist church in West Amesbury, Mass., 1837, has been pastor in East Cambridge, Lowell, and Lynn, Mass., in Bath, Me., in New York City, and since 1868 in Philadelphia, Pa. He was general secretary of the Universalist General Convention (1867–68).

Brooks (ERASTUS), an American journalist, born at Portland, Me., Jan. 31, 1815. He graduated at Brown University, and became editor of the "N. Y. Express" in 1836.

Brooks (HORACE), U. S. A., born in Boston, Mass., was a son of Maria G. Brooks, the poet. He graduated at West Point in 1835, and was assistant professor of mathematics there 1836–39; served with distinction in Florida, Mexico, and the civil war, becoming in 1863 colonel of the Fourth Artillery, and in 1865 brevet brigadier-general.

Brooks (JAMES) was born in Portland, Me., Nov. 10,

1810, and graduated at Waterville in 1831. He was educated by his own industry and self-denying efforts. He studied law with John Neal the novelist, taught school, and at the same time engaged in political journalism. When twenty-one years of age he was elected to the State legislature, and in the following year became a newspaper correspondent at Washington. He afterwards travelled in the South and in Europe. In 1836 he established the "New York Express." He was a member of Congress 1849–53, 1864–67, his seat being at last successfully contested by Hon. W. E. Dodge, and 1868–73. He died April 30, 1873.

Brooks (John), M. D., LL.D., born in Medford, Mass., May 31, 1752, practised medicine at Reading, fought with the greatest honor as an officer at Lexington, White Plains, Saratoga, Monmouth, etc., becoming a colonel and adjutant-general. He practised medicine at Medford, Mass., after the war, and held many important offices. He was governor of Massachusetts (1816–23), and president of the Massachusetts Medical Society (1817–25). Died Mar. 1, 1825.

Brooks (Kendall), D. D., born at Roxbury, Mass., Sept. 3, 1821, graduated at Brown University 1841, Newton Theological Institute 1845, tutor in Columbian College 1841–43, pastor of the Baptist church at Eastport, Me., 1845–52, professor of mathematics and natural philosophy in Waterville College 1852–55, pastor at Fitchburg, Mass., 1855–65, editor of the "National Baptist," Philadelphia, 1865–68, and since 1868 president of Kalamazoo College, Mich.

Brooks (Maria Gowen), a poetess, born at Medford, Mass., about 1795. She was married young to a Mr. Brooks, a merchant of Boston. Her chief work is "Zophiel, or the Bride of Seven" (1825), which was praised by the poet Southey, who called her Maria del Occidente ("Maria of the West"). She died at Matanzas Nov. 11, 1845.

Brooks (Peter Chardon), born in North Yarmouth, Me., Jan. 6, 1767. He engaged in marine insurance in Boston, and attained great wealth. He held many public offices of trust. Edward Everett, Charles Francis Adams, and N. L. Frothingham, D. D., were sons-in-law of Mr. Brooks. Died Jan. 1, 1849.

Brooks (Rev. Phillips), an eloquent American divine, born in Boston Dec. 13, 1835, and graduated at Harvard in 1855. He studied in the Episcopal Theological Seminary at Alexandria, Va., was ordained in 1859, became the same year pastor of the Church of the Advent in Philadelphia, and in 1862 of the Church of the Holy Trinity, where he remained until 1870, when he accepted the pastoral charge of Trinity church in Boston.

Brooks (Nathan Covington), LL.D., an American scholar, born in Cecil co., Md., Aug. 12, 1809, became president of the Baltimore Female College in 1848. He has published a number of poems and a popular "History of the Mexican War," besides numerous school-books of merit.

Brooks (Preston S.), a politician, born in Edgefield co., S. C., Aug. 4, 1819, graduated at South Carolina College in 1839. He was elected a member of Congress in 1853 and 1855. He violently assaulted Senator Sumner (for words spoken in debate) in the Senate chamber in May, 1856. He was censured by the majority of the Representatives, and resigned his seat, but was re-elected. Died Jan. 27, 1857.

Brooks (William T. H.), an American officer, born in Ohio in 1821, graduated at West Point in 1841, major Eighteenth Infantry Mar. 12, 1862, and Sept. 28, 1861, brigadier-general U. S. volunteers. He served in the Florida war 1841–42, on frontier duty 1843–45, in the military occupation of Texas 1845–46, in the war with Mexico 1846–48, was engaged at Palo Alto, Resaca de la Palma, Monterey (brevet captain), Vera Cruz, Cerro Gordo, Contreras, Churubusco (brevet major), and the city of Mexico, as aide-de-camp to Brevet Major-general Twiggs 1848–51, in active operations in New Mexico in 1838, and engaged in several skirmishes against Navajos. In the civil war he served in the Virginia Peninsula campaign 1862, engaged at Yorktown, Golden's Farm, Savage Station (wounded), and Glendale, in the Maryland campaign 1862, engaged at Crampton Pass and Antietam (wounded), and commanding division in the Rappahannock campaign 1862–63, in command of the department of the Monongahela 1863–64, when Pittsburg was threatened by a raid, in command of the Tenth Corps before Richmond 1864, engaged at Swift's Creek, Drury's Bluff, Bermuda Hundred, Cold Harbor, and the siege of Petersburg. Failing health from exposure and wounds caused him to resign from the army July 14, 1864, and in 1866 he retired to a farm in Huntsville, Ala., where he reposed upon his well-earned laurels till his death, July 19, 1870, aged forty-nine. George W. Cullum, U. S. A.

Brooks'ton, a post-village of Prairie township, White co., Ind. Pop. 406.

Brooks'ville, a post-township of Hancock co., Me. Pop. 1275. It has four churches and manufactures of lumber, etc.

Brook'ville, a post-township of Blount co., Ala. Pop. 510.

Brookville, a township of Coosa co., Ala. Pop. 689.

Brookville, a post-village, capital of Hernando co., Fla.

Brookville, a post-township of Ogle co., Ill. Pop. 746.

Brookville, a post-village, capital of Franklin co., Ind., is at the confluence of the forks of the White Water River, and on the White Water Valley R. R., 42 miles N. W. of Cincinnati. It has water-power in abundance, a national bank, two paper-mills, two flouring mills, two weekly papers, and one grain distillery. Pop. of Brookville township, 4207. Wm. A. Beasley & Co.,
Eds. and Pubs. "Brookville American."

Brookville, a post-village of Spring Creek township, Saline co., Kan. Pop. 201.

Brookville, a post-village, capital of Bracken co., Ky. Pop. 348.

Brookville, a village of Oyster Bay township, Queen's co., N. Y., is the seat of "Jones Institute" for the support of the poor of Oyster Bay and North Hempstead.

Brookville, a post-village, capital of Jefferson co., Pa., on Red Bank Creek, 170 miles W. N. W. of Harrisburg. It has a national bank and two weekly newspapers. Coal, timber, and iron abound. Pop. 1942.

Brookville, a township of Campbell co., Va. P. 4960.

Broom, a name given to several shrubs of the order Leguminosæ. They belong to the allied genera of *Spartium, Genista,* and *Cytisus.* The common broom of Europe (*Cytisus Scoparius*) grows on dry and sandy soils and heaths, and bears handsome yellow flowers. The branches, which are very tough and angular, are used for making brooms. The young tops and seeds, being strongly diuretic, are used in medicine, and are beneficial in dropsy. All kinds of broom have long, slender branches. The Spanish broom (*Spartium junceum*) grows wild in the south of Europe, and possesses medical properties like the common broom. The fibre of its branchlets is used in Italy and Spain for making cloths and ropes. The *Cytisus albus,* or white broom, also a native of Europe, is cultivated in England as an ornamental shrub, and bears white flowers which are much admired. It sometimes attains a height of fifteen feet or more. The broom (Fr. *genêt*) gave name to the royal family of Plantagenet, one of its ancestors having the broom for his crest.

Broom Corn (*Sorghum vulgare*), a plant of the order Graminaceæ, is a native of the East Indies, and is cultivated in the U. S. It has a jointed stem, which grows to the height of eight or ten feet, and bears spikelets, two and three together, on the ramifications of an open panicle. Only the middle or terminal one of these is fertile; stamens three. The panicle is extensively used in the manufacture of brooms, and the seeds are valuable as food for domestic animals. It is stated that this plant was first introduced into the U. S. by Dr. Franklin, who, finding a seed on a whisk that had been imported, planted it and propagated it. It succeeds best in alluvial soils, but will generally produce a fair crop on any land that is adapted to maize. Broom corn is largely cultivated by the Shakers, who make brooms of a good quality. It is planted in rows about three feet apart, and in hills about eighteen inches apart. The weeds are removed from the growing crop by the cultivator or the hoe. The average produce of an acre is about 500 pounds of the brush or material for brooms. The usual practice in harvesting is to bend the stalks about three feet from the ground, leave them for a few days to dry, and then cut them six or eight inches below the brush or panicle.

Broome, a county of New York, bordering on Pennsylvania. Area, 706 square miles. It is intersected by the Susquehanna River, and also drained by the Chenango and Otselic rivers. The surface is hilly or undulating; the soil in some parts is fertile. Cattle, grain, tobacco, wool, hay, fruit, and dairy products are extensively raised. It has manufactures of leather, lumber, flour, wagons, etc. It is traversed by the Erie R. R., and other railroads extend from this county to Albany and Syracuse. Capital, Binghamton. Pop. 44,103.

Broome, a township of Schoharie co., N. Y. Pop. 1834.

Broome (John L.), U. S. M. C., born Mar. 8, 1824, in the State of New York, was appointed a second lieutenant in the marine corps Jan. 12, 1848, became a first lieutenant in 1857, a captain in 1861, and a major in 1864. He served with the marine battalion in Mexico during the Mexican war. While in command of the marine guard of the Hart-

ford during 1862 and 1863 he participated in the attack on Forts St. Philip and Jackson and capture of New Orleans, and in all the many actions of that famous vessel in the waters of the Mississippi. In his official report of the action of June 28, 1862, with the Vicksburg batteries, Commander Richard Wainwright writes: "The marine guard, under the command of Captain J. L. Broome, had charge of two broadside guns, and fought them well, thus sustaining the reputation of that distinguished corps." At the close of the war, Captain Broome, who had been twice wounded, received the brevets of major and lieutenant-colonel "for gallant and meritorious conduct."

FOXHALL A. PARKER, U. S. N.

Broom'field, a post-township of Isabella co., Mich. Pop. 118.

Bro'ra Beds, a series of strata at Brora, a village in the county of Sutherland, Scotland. Here is a seam of good coal three and a half feet thick, and the thickest bed of true coal hitherto discovered in any secondary strata of Great Britain. The fossils indicate that it belongs to the lower oolitic series.

Broth'ers, Lay, an inferior class of Roman Catholic monks, not in holy orders, but bound by monastic rules, and employed as servants in monasteries.

Broth'ers' Val'ley, a township of Somerset co., Pa. Pop. 1597.

Broth'ertown, a post-township of Calumet co., Wis. Pop. 1605.

Brough (JOHN), born in Marietta, O., Sept. 17, 1811, was a printer in his youth, and studied at Ohio University. He edited several political journals, became a powerful Democratic orator, and held important public offices. In 1846 he became a lawyer. In 1848 he left political life for a time and became a railroad president. In 1864 he became governor of Ohio, receiving the joint vote of all parties who were in favor of prosecuting the war against the insurgent States. Died at Cleveland Aug. 29, 1865.

Brough'am (HENRY), LORD, an eminent and learned British orator, lawyer, and writer, was born in Edinburgh Sept. 19, 1779. His mother was a niece of Dr. Robertson, the historian. He graduated in the University of Edinburgh, studied law, and was admitted to the Scottish bar in 1800. He was intimate with Francis Jeffrey and Sydney Smith, whom he aided in founding the "Edinburgh Review" in 1802, and he continued to contribute to that review for many years. In 1808 he removed to London, was called to the English bar, and chose the common-law courts as the scene of his practice. He became a Whig member of Parliament in 1810, and soon acquired a high reputation as a debater as well as a forensic pleader. He was considered at that period the most powerful speaker in the House of Commons except Canning, who was his political opponent. As a parliamentary orator he was distinguished for vehemence and energy, and the rather free use of sarcasm and invective. He represented Winchelsea from 1816 to 1830. Among his famous performances as an advocate was his defence of Queen Caroline (1821), by which he gained great popularity. In 1819 he married Miss Eden, a daughter of Thomas Eden and niece of Lord Auckland. He distinguished himself as a promoter of popular education, as a reformer of laws, and a friend of political reform and progress. In 1825 he published "Practical Observations on the Education of the People." He took a prominent part in founding the Society for the Diffusion of Useful Knowledge, of which he became in 1827 the first chairman. In a great speech which he delivered in 1827 he enumerated the defects in nearly every branch of English law, and made proposals for dealing with law reform on a proper scale. He made a powerful speech against slavery in 1830, soon after which he was returned to Parliament by the great popular constituency of Yorkshire. In the same year he was appointed lord chancellor in the new Whig ministry, and was raised to the peerage as Baron Brougham and Vaux. He retired from office with his colleagues in Nov., 1834, after which he ceased to act with the Whigs, without joining any other party, but pursued an independent political course.

Having cultivated various sciences with success, and written many and various works, he was chosen a foreign associate of the French Institute in 1833. Among his writings are a "Treatise on the Objects, Advantages, and Pleasures of Science;" "Sketches of Statesmen of the Time of George III." (3 vols., 1839–43); "Political Philosophy" (3 vols., 1840–44); and "Contributions to the 'Edinburgh Review,' Political, Historical, and Miscellaneous" (3 vols., 1857). He had only two children, who died before their father. He died at Cannes, in France, May 9, 1868. He had published an edition of his collected works in 10 vols., 1857. (See LORD CAMPBELL, "Life of Lord Brougham," 1869; "Quarterly Review" for April, 1859; "Edinburgh Review" for April, 1858.)

WILLIAM JACOBS.

Brougham (JOHN), actor and author. Brilliance of mind, warmth of heart, and genial courtliness of manners have seldom been united to form so fascinating a public character as this comedian. John Brougham was born at Dublin, Ireland, in 1810, and there he passed his childhood and went to school. He was educated well, and was trained to be a surgeon. He walked the Peter Street Hospital, in Dublin, for eight months. Reverses of fortune, affecting his family, led, however, to a change of plan, and threw him upon his own resources, whereupon he drifted into the dramatic profession, making his entrance upon the stage at the Tottenham Theatre, London, in 1830. His first effort was characteristic of his prodigious mental force and vivacity, since he undertook twelve or fourteen parts in the play of "Tom and Jerry," then new and a popular favorite. After this he was engaged by Madame Vestris to act in her stock company at the London Olympic Theatre. Here he rose rapidly, both in talent and favor. His first dramatic composition was a burlesque, written for Mr. William E. Burton, then an actor at the Pavilion Theatre, London, afterwards famous in the U. S. It succeeded, and he wrote many similar pieces of a light description. Madame Vestris, having been wedded by Mr. Charles Mathews, removed from the Olympic to Covent Garden, and Brougham acted for a while at that theatre. It was at this period that he wrote, in conjunction with Mr. Dion Boucicault, the comedy of "London Assurance," the authorship of which is commonly ascribed to Mr. Boucicault alone. A little later he undertook the management of the London Lyceum during several seasons, and for this stage he wrote "Life in the Clouds," "Love's Livery," "Enthusiasm," "Tom Thumb the Second," and—in association with Mr. Mark Lemon—"The Demon Gift."

In 1842 Brougham came to America, accompanied by his first wife, an English actress, known to the London stage as Miss Emma Williams. They acted at the Park Theatre Oct. 4 in that year—one as O'Callaghan in "His Last Legs," and the other as Lady Teazle. Afterwards they made a professional tour of the theatrical cities of America. Brougham then settled down as a member of the stock company of Burton's Theatre, New York. Here he wrote "Bunsby's Wedding," "The Confidence Man," "Don Cæsar de Bassoon," "Vanity Fair," "The Irish Yankee," "Benjamin Franklin," "All's Fair in Love," "The Irish Emigrant," and a dramatization of "Dombey and Son." He then undertook the management of Niblo's Garden, and wrote a fairy play called "Home," and a piece for Mademoiselle Blazy called "Ambrose Germain." On Dec. 23, 1850, he opened Brougham's Lyceum. This building stood on the W. side of Broadway, and was the second structure S. of the corner of Broome street. It afterwards became Wallack's Theatre, and so remained till 1860. Brougham did not keep it long, but while there he wrote "The World's Fair," "Faustus," "The Spirit of Air," "Row at the Lyceum," a dramatization of "David Copperfield," and, for Charlotte Cushman, a new version of "The Actress of Padua." His next venture was made at the Old Bowery Theatre (1856–57), where he brought out "King John," with a cast of parts that included Mr. and Mrs. Edward L. Davenport, Mr. William Wheatley, Mr. J. B. Howe, and Miss Kate Reignolds. Afterwards he wrote, and produced at the Bowery, "The Pirates of the Mississippi," "The Red Mask," "Tom and Jerry in America," "The Miller of New Jersey," and other dramas of a common sort, but profitable. Then he accepted an engagement at Wallack's Theatre, and while there he wrote "The Game of Love," a version of "Bleak House," "My Cousin German," "A Decided Case," "The Game of Life," "Pocahontas," "Neptune's Defeat," "Love and Murder," "Romance and Reality," "The Ruling Passion," and "Playing with Fire." A little later he left Wallack's and rejoined Burton at the Metropolitan Theatre—first known as Tripler Hall, and last as the Winter Garden, burned in 1866—and here he produced his burlesque of "Columbus."

In 1861–62, Brougham went to London, where he remained upwards of four years. During this time he wrote "The Duke's Motto" and "Bel Demonio"—based on French originals—for Mr. Charles Fechter; dramatic versions of two novels by Miss M. E. Braddon called "Lady Audley's Secret" and "Only a Clod," for Miss Herbert; "While There's Life There's Hope," played at the Strand Theatre; "The Might of Right," played at Astley's Theatre; and "The Golden Dream," played at Manchester. He also wrote the words of three operas—"Blanche de Nevers," "The Demon Lovers," and "The Brides of Venice." Shortly after his return to America, in 1866–67, he appeared in one of the finest of his compositions, an Irish drama, entitled "O'Donnell's Mission." On the 25th of Jan., 1869, he opened Brougham's Theatre, on the S. side

of Twenty-fourth street, N. Y., adjacent to the Fifth Avenue Hotel. This afterwards became Daly's Fifth Avenue Theatre, and was destroyed by fire Jan. 1, 1873. Brougham kept it ten weeks, when he was dispossessed of his lease by the owner, the notorious adventurer James Fisk, Jr. At this place he brought out, among other pieces, his burlesque called "Much Ado about a Merchant of Venice." Among his later works are "The Lottery of Life," "Little Nell and the Marchioness"—dramatized from Charles Dickens's novel of "The Old Curiosity Shop"—"The Lily of France," a play on the story of Joan of Arc, and a melodrama called "Atherley Court."

Brougham started in New York a comic paper called "The Lantern," and he is the author of two volumes of miscellaneous writings, entitled "A Basket of Chips" and "The Bunsby Papers." He was separated from his first wife in 1845. The lady died near New York in 1865, under the name of Mrs. Robertson. His second wife, Miss Nelson, whom he wedded in 1847, was known as an actress and celebrated as a person of extraordinary beauty. This lady died in Twenty-fourth street, N. Y., in 1870. Brougham has latterly acted at Wallack's Theatre, at Daly's Grand Opera-House, and miscellaneously at provincial theatres. In Oct., 1873, he appeared for the first time in the lyceum, giving, at Boston, Mass., a reading from his own works. In earlier times he was noted for his personal beauty, and he won many successes in light-comedy characters, to which his immense animal spirits, grace of motion, polish of manners, and drollery of temperament made him admirably suitable. In maturer years he was excellent as a delineator of Irish character, and possessed in this a very wide range of power and skill, being equally at home in Dennis Bulgruddery, Sir Lucius O'Trigger, Maurice Fitz Maurice, and Tim O'Brien, which it seems fair to denote as representative parts. His engaging personal qualities and mental attributes, however, account, better than his artistic powers, for his great popularity. Magnanimity, charity, scholarship, wit, a charming ease in conversation, the spontaneous habit of sympathy with weakness, sorrow, worth of character, and worth of effort, and the frank, off-hand demeanor of rugged yet gentle manliness, shown in a long career of steady usefulness to the stage and to society, have won affection and respect, as well as reputation and competent fortune, for John Brougham.

WILLIAM WINTER, *of the "N. Y. Tribune."*

Brough'ton, a twp. of Livingston co., Ill. Pop. 823.

Broussa. See BRUSA.

Broussais (FRANÇOIS JOSEPH VICTOR), M. D., an eminent French medical writer, born at Saint-Malo Dec. 17, 1772, is called the founder of the so-called physiological school of medicine. He became in 1832 professor of pathology in the faculty of Paris, and was a member of the Institute. His chief works are a "History of Chronic Inflammations" (1808), and an "Examination of the Medical Doctrine generally adopted" (1816). Died Nov. 17, 1838. (See J. B. PRIOU, "Notice historique sur F. J. V. Broussais," 1841.)

Broussone'tia, a genus of trees allied to the mulberry, comprises the paper mulberry (*Broussonetia papyrifera*), the fibrous bark of which is used by the Chinese and Japanese in the manufacture of paper. It is a small tree with deciduous leaves of variable shape. It is planted as a shade tree in some American cities.

Brow'ers, a township of Randolph co., N. C. P. 781.

Brown [Fr. *brun*], in painting, a dark dusky color, inclined to red, of various degrees of depth. It belongs to the tertiary colors known as russets and olives, in which the hue is modified by an admixture of black or a dark pigment. Among the brown pigments are bistre, umber, raw and burnt sienna, and brown madder.

Brown, a county in the W. part of Illinois. Area, 320 square miles. It is bounded on the E. by the Illinois River, and on the N. E. by the La Moin or Crooked River. The surface is undulating or level; the soil is fertile. Coal is found in some parts. Cattle, grain, tobacco, wool, and hay are raised extensively. Stone and earthen ware is manufactured at various points. It is intersected by the Toledo Wabash and Western R. R. Capital, Mount Sterling. Pop. 12,205.

Brown, a county in the S. part of Indiana. Area, 325 square miles. It is drained by Bean Blossom and Salt creeks. The surface is diversified with hills of moderate height; the soil is mostly fertile. Grain, tobacco, and wool are the staple products. Capital, Nashville. Pop. 8681.

Brown, a county of Kansas, bordering on Nebraska. Area, 576 square miles. It is drained by the Sauterelle, Wolf, and Webster creeks. The surface is somewhat diversified: the soil is productive. It is intersected by the St. Joseph and Denver City R. R. Grain, wool, and tobacco are the staple products. Capital, Hiawatha. Pop. 6823.

Brown, a county in the S. part of Minnesota. Area, 450 square miles. It is bounded on the N. E. by the Minnesota River, and intersected by the Big Cottonwood River. The county contains several small lakes. The soil is fertile. Grain and wool are the staple products. Capital, New Ulm. Pop. 6396.

Brown, a county of Ohio, bordering on Kentucky. Area, 500 square miles. It is bounded on the S. by the Ohio River, and drained by the Eagle and White Oak creeks. The surface is mostly undulating; the soil is based on limestone, and is very fertile. Cattle, grain, tobacco, and wool are largely raised. Lumber, saddlery, etc. are manufactured extensively. Capital, Georgetown. Pop. 30,802.

Brown, a county in the central part of Texas. Area, 1050 square miles. It is nearly all prairie. Stock-raising is the principal pursuit. It is bounded on the S. W. by the Colorado River, and drained by Pecan and Jim Ned creeks. Capital, Brownwood. Pop. 544.

Brown, a county in the E. part of Wisconsin. Area, 525 square miles. It is partly bounded on the N. by Green Bay, and intersected by Fox or Neenah River, which is navigable for steamboats. This county was originally covered with dense forests. The soil is fertile. Grain and wool are largely raised. It is intersected by the Chicago and North-western R. R. Capital, Green Bay. P. 25,168.

Brown, a township of Sanford co., Ala. Pop. 459.

Brown, a township of Columbia co., Ark. Pop. 1090.

Brown, a township of Champaign co., Ill. Pop. 486.

Brown, a township of Hancock co., Ind. Pop. 1329.

Brown, a township of Hendricks co., Ind. Pop. 1233.

Brown, a township of Martin co., Ind. Pop. 1048.

Brown, a township of Montgomery co., Ind. Pop. 2126.

Brown, a township of Morgan co., Ind. Pop. 1673.

Brown, a township of Ripley co., Ind. Pop. 2234.

Brown, a township of Washington co., Ind. Pop. 1521.

Brown, a township of Linn co., Ia. Pop. 1581.

Brown, a township of Manistee co., Mich. Pop. 459.

Brown, a township of Carroll co., O. Pop. 2022.

Brown, a township of Darke co., O. Pop. 1239.

Brown, a township of Delaware co., O. Pop. 1108.

Brown, a township of Franklin co., O. Pop. 819.

Brown, a township of Knox co., O. Pop. 1242.

Brown, a township of Miami co., O. Pop. 1639.

Brown, a township of Paulding co., O. Pop. 1140.

Brown, a township of Vinton co., O. Pop. 1297.

Brown, a township of Lycoming co., Pa. Pop. 347.

Brown, a township of Mifflin co., Pa. Pop. 1192.

Brown, a township of Darlington co., S. C. P. 1598.

Brown (AARON V.), an American statesman, born in Brunswick co., Va., Aug. 15, 1795, graduated at Chapel Hill in 1814, removed to Tennessee in 1815, was a member of Congress 1839–45, and was elected governor of the State in 1845. He became postmaster-general of the U. S. in 1857. Died in 1859.

Brown (ALBERT G.), born in Chester district, S. C., May 31, 1813, was chosen governor of Mississippi in 1843, and elected to the U. S. Senate in 1853. He was re-elected in 1858 for six years, but withdrew from the Senate in 1861.

Brown (BENJAMIN GRATZ), born in Lexington, Ky., May 28, 1826, graduated at Yale in 1847. He commenced the practice of law at St. Louis, Mo., was a member of the State legislature (1852–58), and edited the Missouri "Democrat" (1854–59). On the breaking out of the war in 1861, he raised a regiment and fought on the side of the Union. He afterwards commanded a brigade of militia. He was among the most active and influential in procuring the adoption of the ordinance of freedom in 1864 by the State of Missouri. He was U. S. Senator in 1863–67, and was made governor of Missouri in 1871. He was nominated at the Cincinnati Convention, May, 1872, for the office of Vice-President of the U. S., the Hon. Horace Greeley being the nominee for President.

Brown (CHAD) went from Massachusetts to Rhode Island in 1636, on account of his religious opinions, and in 1642 became one of the elders of the Baptist church at Providence. He was the ancestor of many distinguished citizens. Died in 1665.

Brown (CHARLES BROCKDEN), an American novelist, born at Philadelphia Jan. 17, 1771. He published "Wieland" (1798), "Ormond, or the Secret Witness" (1799),

and "Arthur Mervyn" (1800). He founded in 1803 "The Literary Magazine and American Register," which he edited for nearly five years. His mind was remarkable for ingenuity and imagination. Among his other works are "Clara Howard" (1801) and "Jane Talbot" (1804). He married a Miss Linn in 1804, and died Feb. 22, 1810. "His peculiar merits," says Prescott, "appeal to a higher order of criticism than is to be found in ordinary and superficial readers." (See PRESCOTT, "Life of C. B. Brown," in Sparks's "American Biography," vol. i.; W. DUNLAP'S "Life of Charles B. Brown," prefixed to an edition of his works, 1827.)

Brown (DAVID PAUL), a distinguished American lawyer, born in Philadelphia in 1795. He published in 1856 "The Forum, or Forty Years' Full Practice at the Philadelphia Bar," besides several dramatic and other works. Died July 11, 1872.

Brown (FRANCIS), D. D., was born at Chester, N. H., Jan. 11, 1784, graduated at Dartmouth College in 1805, was tutor from 1806 to 1809, was settled over the Congregational church in North Yarmouth, Me., in 1810, and was chosen president of his alma mater in 1815. It was during his presidency that the famous Dartmouth College case was carried up to the U. S. Supreme Court. Jeremiah Mason and Daniel Webster admired the ability with which he served them in their management of the case. Rufus Choate, one of his pupils, speaks in the highest terms of his genius, character, and culture. He published only pamphlets and sermons. Died July 27, 1820.

Brown (Sir GEORGE), a British general, born near Elgin, Scotland, in 1790, served in the Peninsular war. In the Crimean war he commanded a division, and was severely wounded at Inkerman in Nov., 1854. He directed a storming-party which attacked the Redan of Sebastopol in 1855. Died Aug. 27, 1865.

Brown (GEORGE), U. S. N., born June 19, 1835, in Indiana, entered the navy as a midshipman Feb. 5, 1849, became a passed midshipman in 1855, a lieutenant in 1856, and a commander in 1866. He was in command of Admiral Porter's flag-ship, the Octorora, at the attack on Vicksburg, June 28, 1862, and is thus commended by the admiral in his official report of that battle: "The officers and crew of the Octorora behaved like veterans; and I am much indebted to that excellent officer, Lieutenant George Brown, for the drill of the crew and the perfect arrangements made for going into action." On the night of Feb. 24, 1863, Brown, in the steamer Indianola, defended his vessel for an hour and twenty-seven minutes against the rams Queen of the West and William H. Webb, and two large "cotton-clads," surrendering the Indianola only when she was "fast filling with water." He commanded the steamer Itasca at the battle of Mobile Bay Aug. 5, 1864, and during the subsequent operations against the defences of Mobile. FOXHALL A. PARKER, U. S. N.

Brown (GEORGE L.), an eminent American landscape-painter, born in Boston in 1814. Among his masterpieces are a view in the White Mountains entitled "The Crown of New England," and "New York Harbor" (both in possession of the prince of Wales).

Brown (GOOLD), an American grammarian and teacher, born in Providence, R. I., Mar. 7, 1791. He published "Institutes of English Grammar" (1823), which was very successful, and "Grammar of English Grammars" (1850). Died Mar. 31, 1857.

Brown (HARVEY), an American officer, born in 1795 at Rahway, N. J., graduated at West Point in 1818, colonel Fifth Artillery May 5, 1861. He served chiefly at seaboard posts 1818–61, as aide-de-camp to Maj.-Gen. Brown 1824–25, on quartermaster duty 1826–29, in the Black Hawk expedition 1832, in the Florida war 1836–38; engaged at Wahoo Swamp, suppressing Canada border disturbances 1839–41, in the war with Mexico 1846–48; engaged at Monterey, Vera Cruz, Cerro Gordo, Contreras (brevet lieutenant-colonel), Molino del Rey, and the City of Mexico (brevet colonel), on recruiting service 1848–52, being superintendent 1851–52, in Florida hostilities 1852–53, in command of the artillery school for practice 1857–58, and inspector of artillery 1859–60. In the civil war he was engaged in the defence of Fort Pickens, Fla., 1861–62 (brevet brigadier-general), and as military commander of the city of New York Jan. 15–July 16, 1863, suppressed the draft riots (brevet major-general). Retired from active service Aug. 1, 1863.

GEORGE W. CULLUM, U. S. A.

Brown (HENRY KIRKE), an American sculptor and painter, born at Leyden, Mass., in 1814. Among his best works are the equestrian statue of Washington in Union Square, New York, a colossal statue of Governor Clinton at Greenwood Cemetery, the "Angel of the Resurrection," also at Greenwood, and a colossal equestrian statue of Gen. Winfield Scott. His statue of Gov. Clinton at Washington is perhaps the finest. He is also a painter of no mean ability. His versatility is remarkable.

Brown (JACOB), born in Bucks co., Pa., May 9, 1775, removed to New York in 1798. He joined the army in 1812, and defended Sackett's Harbor in 1813. Having been raised to the rank of major-general, he invaded Canada in the spring of 1814, and commanded with success at Chippewa and Niagara Falls in July of that year. He became commander-in-chief of the U. S. army in 1821. Died Feb. 24, 1828.

Brown (JAMES), born near Staunton, Va., Sept. 11, 1766, graduated at William and Mary College, became an eminent lawyer of Kentucky and Louisiana, representing the latter State in the U. S. Senate (1812–17 and 1819–24), and was minister to France 1824–29. Died April 7, 1835. He was one of the compilers of the Louisiana code.

Brown (JOHN), a Scottish religious writer, was born in Perthshire in 1722. He preached at Haddington, and had a high reputation for piety and learning. It is stated that he knew nine languages. Among his works are a "Dictionary of the Bible" (1769), and a "Self-Interpreting Bible" (1778). Died June 19, 1787.

Brown (JOHN), M. D., a Scottish physician, the author of the Brunonian system of medicine, was born at Dunse in 1735. He published in 1780 "Elementa Medicinæ," in which he propounded his new system. This was received with favor by many physicians. His favorite medicines were alcohol and opium. Died in London in 1788.

Brown (JOHN), born in Providence, R. I., Jan. 27, 1736, became a partner with his three brothers in a mercantile firm. He was leader of the men who on the night of June 17, 1772, destroyed the "Gaspe" sloop-of-war, for which he was arrested and put in irons, but escaped. He supplied the troops around Boston with powder during the siege. He was a man of wealth, a liberal patron of Brown University, and a member of Congress from Rhode Island (1799–1801). Died Sept. 20, 1803.

Brown (JOHN), a patriot, born in Sandisfield, Mass., Oct. 19, 1744, graduated at Yale in 1761. He became king's attorney in the New York colony, and afterwards practised law at Pittsfield, Mass. In 1774 and 1775 he operated for the cause of freedom in Canada, aided in the capture of Ticonderoga, took Fort Chambly, fought at Quebec, became a lieutenant-colonel, and in 1777 surprised the outposts at Ticonderoga, and made important captures. He left the service for a time from hostility to Arnold the traitor. He was killed by the Indians in the Mohawk Valley campaign Oct. 19, 1780.

Brown (JOHN), a brother of Senator James Brown, was born at Staunton, Va., Sept. 12, 1757, served in the Revolutionary war, studied at Princeton and at William and Mary College, removed to Kentucky in 1782, was a member of Congress from Virginia (1787–88 and 1789–93), and U. S. Senator from Kentucky (1793–1805). Died Aug. 29, 1837.

Brown (JOHN), M. D., a son of Rev. Dr. John Brown (1784–1858), a celebrated preacher, was born in Scotland Sept., 1810. He practised in Edinburgh, and published a work entitled "Horæ Subsecivæ" (1858), containing the well-known "Our Dogs" and "Rab and his Friends."

Brown (JOHN) **of Ossawatomie,** a zealous opponent of slavery, was born at Torrington, Conn., May 9, 1800. He removed to Ohio in early youth, and married and worked at the trade of a tanner. In 1855 he emigrated to Kansas, where he fought against the pro-slavery party, and lived at Ossawatomie. He was the master-spirit of the convention which met at Chatham, Canada, in May, 1859, and organized an invasion of Virginia in order to liberate the slaves. In July of that year he rented a farmhouse about six miles from Harper's Ferry. On the 16th of October, aided by about twenty friends, he surprised Harper's Ferry, and captured the arsenal and armory. He was wounded and taken prisoner by the Virginia militia on the next day, and was hung at Charlestown Dec. 2, 1859. (See REDPATH, "Life of Captain John Brown," 1860; WEBB, "Life and Letters of John Brown.")

Brown (JOHN A.) was a son of Alexander Brown, a banker of Baltimore. He was born in Ballymena, Ireland, May 21, 1788, came in youth to the U. S., and became manager of the Philadelphia branch of the great banking firm of Brown Brothers. He was eminent for upright dealing and benevolence. Among numerous other gifts, he presented $300,000 to the Presbyterian Hospital of Philadelphia. Died Dec. 21, 1872.

Brown (JOHN G.), a painter, born in the north of England, settled at Brooklyn, N. Y., in 1856. His portraits of children are greatly admired.

Brown (John Newton), D. D., a Baptist divine, born at New London, Conn., June 29, 1803, published in 1831 an "Encyclopedia of Religious Knowledge," and in 1834 "Memorials of Baptist Martyrs." Died May 15, 1868.

Brown (Joseph E.), a distinguished citizen of Georgia, was born in Pickens co., S. C., April 15, 1821. During his youth his father moved to Georgia. He was elected governor of that State for two years, and was re-elected four times. While he was in the executive chair he took a leading part in the secession movement in 1861. When the war was over he took a prominent part in support of the reconstruction measures of Congress. Under the new State constitution he became chief-justice of the supreme court in 1868, and supported Gen. Grant for President of the U. S. that year. He resigned his position in 1871 to assume the presidency of the Western and Atlantic R. R. Company. He supported Mr. Greeley for President in 1872.

Brown (Mason), LL.D., father of B. Gratz Brown, was born in Philadelphia Nov. 10, 1799, graduated at Yale in 1820, was a judge of a Kentucky circuit court for many years, and secretary of state of Kentucky (1855–59). He was one of the authors of "Morehead and Brown's Digest." Died at Frankfort, Ky., Jan. 27, 1867.

Brown (Milton), born in Ohio, became a resident of Tennessee, and was a member of Congress from that State (1841–47). He was in 1845 the author of the resolution for incorporating Texas into the Union.

Brown (Nicholas), a benevolent merchant, born at Providence, R. I., April 4, 1769, graduated at Rhode Island College in 1786. He gave to that college about $100,000 at various times, and in 1804 it took the name of Brown University in his honor. He gave largely to other institutions. Died Sept. 27, 1841.

Brown, or **Browne** (Robert), an English theologian, the founder of the sect of Brownists, was born in 1549. His doctrines differed little from those of the Anglican Church, but he maintained that the congregation has a right to elect its own minister. Died after 1630.

Brown (Robert), F. R. S., D. C. L., an eminent botanist, was born at Montrose, Scotland, Dec. 21, 1773. He studied medicine in the University of Edinburgh, but did not practise it long, preferring to devote himself to botany. He was employed as naturalist of the expedition which Captain Flinders conducted to Australia in 1801. In 1805 he returned with a collection of 4000 species of Australian plants, and in 1810 he published a Flora of that region, "Prodromus Floræ Novæ Hollandiæ." He also wrote "General Remarks, Geographical and Systematical, on the Botany of Terra Australis" (1814). He adopted the natural system of Jussieu, and made important discoveries in vegetable physiology. In 1827 he became keeper of the botanical department of the British Museum, and in 1833 was chosen one of the eight foreign associates of the French Academy of Sciences. Humboldt styled him "Botanicorum facile princeps." Died in London June 10, 1858.

Brown (Samuel Gilman), D. D., LL.D., son of President Francis Brown, noticed above, was born at North Yarmouth, Me., Jan. 4, 1813, graduated at Dartmouth College in 1831, and at Andover Theological Seminary in 1837, travelled in Europe from 1838 to 1840, was professor in Dartmouth College, first of oratory from 1840 to 1863, and then of intellectual philosophy from 1863 to 1867, when he was chosen president of Hamilton College. Besides numerous addresses and articles in reviews, he has published a "Biography of Self-Taught Men," 1847, and "The Life of Hon. Rufus Choate," 1862. He has also lectured with marked success on "British Orators."

Brown (Thomas), M. D., an eminent Scottish metaphysician, born near Dumfries Jan. 9, 1778. He was a pupil of Dugald Stewart in Edinburgh. In 1798 he published an able refutation of Darwin's "Zoonomia." Having studied medicine, he graduated in 1803, and practised medicine about seven years. In 1810 he was appointed colleague of Dugald Stewart as professor of moral philosophy in the University of Edinburgh. He was very popular as a lecturer, and published "Lectures on the Philosophy of the Human Mind" (4 vols., 1820). His other chief work is "Observations on the Relation of Cause and Effect" (1804; 3d ed., enlarged, 1818). His chief contribution to psychology is an explication of the sixth or *muscular* sense. Died April, 1820. (See Dr. Welsh, "Account of the Life and Writings of Thomas Brown," 1825; Mackintosh, "View of the Progress of Ethical Philosophy.")

Brown (Thompson S.), an American officer and engineer, born 1807 in New York, graduated at West Point in 1825. He served, while lieutenant of engineers, as assistant professor at the Military Academy, 1825, in the construction of Fort Adams, R. I., 1825–26, and 1828–33 as aide-de-camp to his uncle, Maj.-Gen. Brown, 1826–28, in the improvement of Arkansas River, 1833, in charge of Cumberland road in Illinois, 1833–34, in the construction and repair of defences of Charleston harbor, S. C., 1834–35, and the improvement of Lake Erie harbors and lighthouses, 1835–36. He resigned Oct. 31, 1836, and till his death was an eminent civil engineer. He was chief engineer of Buffalo, N. Y., and Erie, Pa. (Lake Shore), R. R., 1836–38, of Lake Erie harbor improvements, 1836–38, of western division of the New York and Erie R. R., 1838–42, and of the entire road, 1842–49. Upon the invitation of the czar of Russia he became consulting engineer of the St. Petersburg and Moscow Railway. Died Jan. 30, 1855, at Naples, Italy, aged forty-eight. George W. Cullum, U. S. A.

Brown (W. M.), a popular American painter, born at Troy, N. Y., in 1827. His works are chiefly landscapes and fruit-pieces.

Brown Coal. See Lignite.

Browne (Charles Farrar), known as **Artemus Ward,** a humorous writer, born at Waterford, Me., April 26, 1834. He learned the business of a printer, and gained distinction by writing for the public journals a series of "Letters from Artemus Ward, Showman." He became a popular lecturer, visited California in 1863, and London in 1866. Died at Southampton, England, Mar. 6, 1867. He had published "Artemus Ward his Book," and other works.

Browne (John Ross), an American writer, born in Ireland in 1817. Among his works is "Yusef, or the Journey of a Frangi: a Crusade in the East." He was minister to China in 1868–70. He is a citizen of Oakland, Cal.

Browne (Samuel J.), born in England Mar. 19, 1788, became in 1798 a resident of Cincinnati, O. He was long a minister of the United Brethren, and afterwards of the Presbyterians. Died Sept. 10, 1872, leaving a large amount of money to found a church, a university, and a free school.

Browne (Sir Thomas), M. D., an English philosopher and writer, born in London Nov. 19, 1605. He practised medicine at Norwich for many years. He published, besides other works, "Religio Medici" (1642), which is highly esteemed, and "Inquiries into Vulgar and Common Errors" (1646). He was knighted by Charles II. in 1671. Died Nov. 19, 1682.

Brownell (Henry Howard), born in Providence, R. I., Feb. 6, 1820, graduated at Washington College, Hartford, Conn., in 1841, was admitted to the bar, but became the author of numerous works, such as "The Old World," "The New World," and several other historical works, a volume of "Poems" (1847), "Lyrics of a Day" (1864), "War Lyrics" (1866). His poetry has more than ordinary merit. In the civil war he was a volunteer naval officer, serving on Farragut's staff. Died Oct. 31, 1872.

Brownell (Rt. Rev. Thomas Church), D. D., LL.D., was born at Westford, Mass., Oct. 19, 1779, and graduated at Union College in 1804. He held various professorships, etc. in the college until 1816, when he took orders in the Protestant Episcopal Church. In 1819 he was consecrated bishop of Connecticut, and was the first president of Trinity College, Hartford (1824–31). He published an "Expositor" of the New Testament, a "Commentary on the Book of Common Prayer," "Religion of the Heart and Life" (5 vols., 1839–40), and other works. Died Jan. 13, 1865.

Brown'field, a post-township of Oxford co., Me., on the Portland and Ogdensburg R. R., 43 miles N. W. of Portland, has manufactures of leather, tubs, etc. P. 1323.

Brown'helm, a post-twp of Lorain co., O. Pop. 1461.

Brown'hill, a township of Franklin co., Va. P. 1692.

Brownian Movements are those seen with the microscope among minute particles (not living) in a limpid liquid. Robert Brown the botanist first described them in 1827. These molecular movements have often been mistaken for *vital* motions. When the minute organisms called *Bacteria* are exposed to a heat of 200° F. they are killed, but molecular motion still goes on in a manner obviously different from their living movements. The same phenomenon can be exhibited by rubbing fine powder of gamboge in water, and placing it under a microscope. Beale considers of the same nature the motions of very minute bubbles ($\frac{1}{20000}$ of an inch in diameter) within certain crystals. These movements have not been satisfactorily explained. Beale suggests their possible connection with heat.

Brown'ie, a spirit of the fairy order in the old superstitions of Scotland. The tradition is that he was a good-humored goblin, who attached himself to farmhouses, and occupied himself when the family were in bed in performing any work, such as churning, threshing, etc.—a spirit not seen or spoken to, and only known by the performance of voluntary labors. In Cornwall a goblin known as Browny is called to assist at the swarming of bees.

Brown'ing, a post-township of Schuyler co., Ill. Pop. 2139.

Browning (Elizabeth Barrett), an eminent English poetess, born in Herts in 1809. She was liberally educated, and studied the Greek and Latin languages with success. She published in 1826 a volume entitled an "Essay on Mind, and other Poems," and in 1833 translated from the Greek of Æschylus "Prometheus Bound." Her next production was "The Seraphim, and other Poems" (1838). Her health having been impaired by the rupture of a blood-vessel, she passed several years in seclusion. In 1846 she was married to the poet Robert Browning, and went with him to reside in Italy. She published in 1850 her collected works, including "The Drama of Exile," and a new poem called "Lady Geraldine's Courtship." Among her other poems are "Casa Guidi Windows" (1851), "Aurora Leigh" (1856), and "Poems before Congress" (1860). She died at Florence June 29, 1861, with the reputation of being the greatest poetess England had ever produced.

Browning (Orville H.), a statesman, was born in Harrison co., Ky., was educated at Augusta College, studied law, was called to the bar in 1831, and removed to Quincy, Ill. He served in the Black Hawk war, became a prominent State politician, was U. S. Senator (1861–63), secretary of the interior (1866–68), and acting attorney-general of the U. S. (1868–69).

Browning (Robert), an eminent English poet, born at Camberwell, a suburb of London, in 1812, was educated in the University of London. He published in 1835 the drama of "Paracelsus," a poem remarkable for subtlety of thought. His tragedy of "Strafford" (1837) was performed without success. He married Miss Barrett in 1846, after which he resided in Italy until 1861. In 1855 he produced two volumes entitled "Men and Women," which are much admired. According to an anonymous critic, "they are unsurpassed in the English language for depth and subtlety of conception and profound analysis of the human mind." Among his other works are "Pippa Passes," "The Ring and the Book" (1869), "Fifine at the Fair, and other Poems" (1872), and the "Red Cotton Night-cap Country" (1873). His poetry is too obscure to please the general public.

Brown'ington, a post-township of Orleans co., Vt., 2 miles from Barton Landing. It has three churches, an academy, and manufactures of lumber, starch, and carriages. Pop. 901.

Brown'low (William Gannoway), an American Methodist divine and politician, born in Wythe co., Va., Aug. 29, 1805, removed to Tennessee, where he edited the "Knoxville Whig." After the breaking out of the war of 1861 he was a firm adherent of the Union party, and in 1865 was elected governor of Tennessee by the Republicans, and re-elected in 1867. He became a member of the U. S. Senate in 1869.

Brownlow, Earls, and Viscounts Alford (1815, in the United Kingdom), Barons Brownlow (1776, in Great Britain), and Baronets (1677), a prominent family of Great Britain. — Adelbert Wellington Brownlow, the third earl, born Aug. 19, 1844, succeeded his brother in 1867. He was member of Parliament for North Shropshire 1866–67.

Brown'marsh, a post-township of Bladen co., N. C. Pop. 800.

Browns'burg, a post-village of Lincoln township, Hendricks co., Ind. Pop. 551.

Brown-Séquard (C. Edouard), M. D., a distinguished physiologist, was born in the island of Mauritius in 1818. He was the son of Edward Brown, a Philadelphian, and a French lady named Séquard. He studied in Paris, where he graduated as M. D. in 1840. He gained distinction by experiments on blood, animal heat, and the spinal cord. These highly important researches are believed to have thrown as much light as those of any other observer upon the physiology and diseases of the nervous system. In 1869 he was appointed professor in the School of Medicine in Paris. He has published valuable professional works, and resides chiefly in the U. S.

Brown'son (Nathan), a physician and statesman of Georgia, graduated at Yale in 1761, was a member of the provincial Congress (1775), a surgeon of the Revolutionary army, member of the Continental Congress (1776 and 1778), was chosen governor of Georgia in 1781, and was afterwards a prominent official of the State. Died in Liberty co., Ga., in 1796.

Brownson (Orestes Augustus), LL.D., an American journalist and theologian, born at Stockbridge, Vt., Sept. 16, 1803. He founded in 1838 "The Boston Quarterly Review," of which he was editor for five years, and was a frequent contributor to the "Democratic Review." He joined the Catholic communion in 1844, having previously been a member of the Presbyterian, Universalist, and Unitarian churches. He has published "Charles Elwood, or the Infidel Converted," a novel, and other works.

Brown Spar, a name given to a variety of dolomite or magnesian limestone, which is tinged with oxide of iron and manganese, and is sometimes called pearl spar.

Brown's Store, a township of Lunenburg co., Va. Pop. 2147.

Browns'town, a post-village, capital of Jackson co., Ind., on the Ohio and Mississippi R. R., 98 miles W. of Cincinnati and 70 miles S. of Indianapolis. Iron ore and timber abound here. It has one weekly newspaper. Pop. 572; of Brownstown township, 2580.

Brownstown, a post-township of Wayne co., Mich. Pop. 2037.

Brownstown, a township of Davidson co., N. C. P. 987.

Browns'ville, a township of Lee co., Ala. Pop. 1425.

Brownsville, a post-village of Prairie co., Ark., 27 miles E. of Little Rock, on the road to Memphis, Tenn. Here an engagement took place, Aug. 25, 1863, between a division of U. S. cavalry under Gen. J. W. Davidson and the Confederate force under Gens. Marmaduke and Walker. The Confederates were driven from the town after a brief struggle.

Brownsville, a post-township of Union co., Ind. Pop. 900.

Brownsville, a post-village, capital of Edmondson co., Ky., on Green River, 130 miles S. W. of Frankfort and 10 miles W. of the Mammoth Cave.

Brownsville, a post-village of Saline co., Mo. It has one weekly newspaper.

Brownsville, a post-village and township of Houston co., Minn. The village is on the Mississippi River, about 11 miles below La Crosse. Pop. 615; total pop. 1589. Grain is shipped here in steamboats.

Brownsville, a post-borough of Fayette co., Pa., on the Monongahela, 35 miles S. of Pittsburg, has four banks, nine churches, large glass-factories, coal-mines, iron-foundries, machine-shops, distilleries, planing-mills, and numerous other industries. It has one weekly newspaper, and is connected with Pittsburg by steamboat navigation. It is in a very wealthy agricultural and mineral region. It has a fine bridge across the river. Pop. 1749.

Seth T. Hurd, Ed. "Clipper."

Brownsville, a post-township of Marlborough co., S. C. Pop. 1597.

Brownsville, a post-village, capital of Haywood co., Tenn., is on the Memphis and Louisville R. R., 57 miles N. E. of Memphis. It is in a rich cotton-growing district, 5 miles N. of the navigable river Hatchie. It ships 23,000 bales of cotton yearly, and has a $500,000 cotton factory, 4 colleges (3 female, 1 male), 2 weekly newspapers, and gas-works. Pop. 2457. Ed. "Bee."

Brownsville, a river-port, capital of Cameron co., Tex., is on the left bank of the Rio Grande, opposite Matamoras (Mexico), and about 40 miles from the mouth of the river. It is about 280 miles S. W. of Galveston. It has the advantage of steam-navigation on the Rio Grande, and has an extensive trade with the Mexicans. Here is a custom-house and a Roman Catholic college. Brownsville was taken from the Confederates by General Banks in Nov., 1863. It has one daily, one semi-weekly, and two weekly newspapers. Pop. 4905.

Brown University, an institution of learning founded in 1764 at Warren, R. I., and removed to Providence, its present seat, in 1770. Its first name was Rhode Island College, but in 1804 it received its present name, in honor of Nicholas Brown, one of its chief benefactors. James Manning, D. D., was its first president (1765–90); Jonathan Maxcy, D. D., was president 1792–1802, and Asa Messer, D. D., 1802–27. From 1827 to 1855, the Rev. Francis Wayland, D. D., was president of this university, and contributed greatly to its reputation. He was succeeded by the Rev. Dr. Barnas Sears, who resigned in 1867 to accept the presidency of the Peabody Educational Fund. His immediate successor was Dr. Caswell, who had maintained almost a lifelong connection with the university. He gave place, in 1872, to the Rev. E. G. Robinson, D. D., for many years president of Rochester Theological Seminary. Brown University is distinguished by its unsectarian character, though the Baptists are its chief patrons, and a majority of the board of trustees must be of that denomination. One of the chief attractions of this seat of learning is its choice library of 38,000 volumes, one of the very best in America for educational purposes. Its statistics for 1873 are as follows: instructors, 13; undergraduates, 204; alumni,

2554; invested funds, $602,653; property (at least), $1,200,000.

Brownville, a township of Clay co., Ala. Pop. 795.

Brownville, a township of Piscataquis co., Me. P. 860.

Brownville, a city, capital of Nemaha co., Neb., on the W. side of the Missouri River, 95 miles by water S. E. of Omaha, or 65 by rail, and at the same distance N. W. of St. Joseph, Mo. It has Presbyterian, Methodist, Baptist, Episcopal, and Roman Catholic churches, and a congregation of Christians, 3 benevolent societies, 1 national and 1 private bank, graded schools, 2 weekly papers, 3 manufactories of tobacco and cigars, 2 of wagons, 1 brewery, 1 soap-factory, and 1 flouring mill, besides other less important industries. Five railroads are projected to this point. Pop. 1305; of Brownville precinct, 2386.

R. O. WHITEHEAD, ED. "DEMOCRAT."

Brownville, a post-village of Jefferson co., N. Y., on the right bank of Black River, and on the Rome and Watertown R. R., 4 miles N. W. of Watertown, and about 5 miles from Lake Ontario. It has several manufactories and mills. Pop. of Brownville township, 3219.

Brown'wood, a post-village, capital of Brown co., Tex., about 125 miles N. W. of Austin City.

Bruce, a county in the W. part of Ontario (Canada). It is bounded on the N. W. by Lake Huron, and intersected by the Saugeen River. Area, 922 square miles. Pop. 48,515. Capital, Walkerton.

Bruce, a township of La Salle co., Ill. Pop. 1921.

Bruce, a township of Benton co., Ia. Pop. 567.

Bruce, a township of Macomb co., Mich. Pop. 2145.

Bruce, a township of Guilford co., N. C. Pop. 1034.

Bruce, the name of a noble family of Scotland, descended from Robert de Bruis (or de Brus), a Norman knight who followed William the Conqueror to England in 1066. He derived his lineage from Brusi, a Northman, a son of the famous Sigurd. His younger son, Adam, who acquired a large estate in Yorkshire, left a son, Robert, who received from David I. of Scotland a grant of the lordship of Annandale, held by the tenure of military service. He died in 1141, and left a son, Robert, who was the second lord of Annandale. This second lord had a grandson, Robert, who was the fourth lord of Annandale. He married Isabel, a daughter of David, earl of Huntingdon, younger brother of King William the Lion, and thus laid the foundation of the royal house of Bruce. He died in 1245. Robert de Bruce, a son of the preceding, and the fifth lord of Annandale, was born in 1210. When the Scottish throne became vacant by the death of Queen Margaret in 1290, this Robert de Bruce and Baliol claimed the throne. The dispute was referred to Edward I. of England, who decided in favor of Baliol. Robert died in 1295, leaving a son, Robert, who by his marriage with the countess of Carrick obtained the title of earl of Carrick (1271). He fought in the English army against Baliol at the battle of Dunbar. He died in 1304, and left a son, Robert, who became king of Scotland.

Bruce (ARCHIBALD), M. D., born in New York in 1777, was the son of a British army surgeon. He graduated at Columbia College in 1795, and studied medicine and mineralogy five years in Europe. He was (1807–11) professor of materia medica and mineralogy in the College of Physicians and Surgeons, N. Y., became a member of many learned societies, and in 1810 edited the "Journal of American Mineralogy." Died Feb. 22, 1818.

Bruce (Sir FREDERICK WILLIAM ADOLPHUS), a British diplomatist, born at Elgin Castle in 1814, was a brother of Lord Elgin. He was consul-general in Egypt in 1849, and in 1865 succeeded Lord Lyons as ambassador at Washington. Died in Boston in 1867.

Bruce (GEORGE), born in Edinburgh, Scotland, June 26, 1781, came in 1795 to the U. S., and became a printer in Philadelphia. In 1803 he became publisher and printer of the New York "Daily Advertiser;" in 1806, with his brother David, he began printing books; in 1812 they introduced stereotyping into the U. S., and soon after established an extensive type and stereotype founding business, in which they acquired great reputation. George, with his nephew David, invented a successful type-casting machine. Died July 6, 1866.

Bruce (JAMES), a Scottish traveller, born in the county of Stirling Dec. 14, 1730. He was appointed consul-general at Algiers in 1763, after which he studied several Oriental languages, and explored the antiquities of Barbary. In 1768 he departed from Cairo on a journey to Abyssinia, in order to discover the source of the Nile. Passing through Syene, Cosseir, and Jidda, he reached Gondar in Feb., 1770. He discovered the source of the Blue Nile in November of that year, and remained about two years in Abyssinia, the king of which treated him kindly. He passed through great dangers and hardships in his return, and arrived in England in 1774. In 1790 he published "Travels to Discover the Source of the Nile" (5 vols.). His veracity was at first doubted by many, but his statements have been confirmed by Salt, Belzoni, and others. Died April 27, 1794. (See A. MURRAY, "Life of Bruce.")

Bruce (MICHAEL), a Scottish poet, whose productions (mostly hymns) are characterized by singular pathos and beauty, was born at Kinneswood, in the county of Kinross, Mar. 27, 1746. He died of consumption July 5, 1767. In 1770 his "friend," the Rev. John Logan (1748–88), published what purported to be his literary remains. In 1781 this same Logan published another volume of poems, which he called his own. The best of these, it is now almost absolutely certain, came from the pen of Michael Bruce. A baser act of literary piracy was never perpetrated. (See "The Works of Michael Bruce," edited by REV. ALEXANDER B. GROSART, 1865.)

Bruce (ROBERT), a heroic and famous king of Scotland, born Mar. 21, 1274, was a son of Robert de Bruce, earl of Carrick. In 1296, as earl of Carrick, he swore fealty to Edward I. of England, but he soon joined the Scottish leaders who were fighting for the independence of Scotland. Having made peace with Edward I., he became in 1299 one of the four regents who ruled the kingdom. In 1305 he was involved in a quarrel with the Red Comyn, who was a nephew of Baliol and was a claimant of the throne. Bruce killed Comyn, and then assembled his vassals and was crowned at Scone in the spring of 1306. His small army was soon defeated by the English, and he was compelled to take refuge in the island of Rathlin, on the coast of Ireland, where he remained all winter. Renewing the contest in the spring, he defeated the English at Loudon Hill in May, 1307. In less than two years he made himself master of nearly all Scotland, and in 1309 he drove back an invading army of Edward II. The latter invaded Scotland again in 1314 with an army of about 100,000 men. Bruce, who had less than half as many, gained a complete victory at Bannockburn, June 24, 1314. In 1318 the Scots invaded England, and after several other campaigns the war was suspended in 1323 by a truce. By a treaty of peace concluded in 1328 the English king recognized the independence of Scotland. Bruce died in June, 1329, and was succeeded by his son David.

Bru'cea, a genus of shrubs which has been referred to the order Rutaceæ. A species called *Brucea antidysenterica* is a native of Abyssinia. Its leaves are said to be tonic, astringent, and efficacious in dysentery. The leaves of *Brucea Sumatrana*, a native of Sumatra and China, have similar medicinal virtues, and are very bitter.

Bruce Mines, a port of entry of the Algoma district, Ontario (Canada), near the N. end of Lake Huron, 35 miles below Sault Ste. Marie. It has very productive mines of copper, and exports considerable quantities of fish. Pop. about 1250.

Bruceville, a post-township of Bullock co., Ala. P. 862.

Bruch'sal, a town of Germany, in Baden, on the river Salzbach, and on the railway from Heidelberg to Carlsruhe, 14 miles by rail N. E. of the latter. It is the northwestern terminus of a railway which extends to Friedrichshafen, on Lake Constance. It has an old castle, a fine palace, a gymnasium, and a paper-mill. Pop. in 1871, 9786.

Bru'cia, or **Brucine,** a very bitter and poisonous vegetable alkaloid found in *Strychnos nux vomica*. It is characterized by giving a blood-red color with concentrated nitric acid. It was discovered in bark incorrectly supposed to be that of *Brucea antidysenterica*, whence its name. Its toxicological effects are like those of strychnia, but it is far less active.

Bru'cite, the native magnesic hydrate, MgH_2O_2. It is found in serpentine at Hoboken, N. J. The finest specimens occur in the chrome-mines of Texas, Pa.

Brück'e (ERNST WILHELM), a German physiologist, born at Berlin June 6, 1819, became in 1846 teacher of anatomy at the Berlin Art Academy, and in 1849 professor of physiology in Vienna. He is the author of "Anatomische Beschreibung des Augenapfels" (1847), and "Grundzüge der Physiologie und Systematik der Sprachlaute" (1856).

Bruck'er (JOHANN JAKOB), a German historian and Protestant minister, born at Augsburg Jan. 22, 1696. Among his works is a "Critical History of Philosophy" (in Latin, 5 vols., 1741–44), which has a high reputation. It contains valuable biographical materials, but is deficient in critical analysis. Died Nov. 26, 1770.

Bruel'lett's, a township of Edgar co., Ill. Pop. 1086.

Bru'ges [Dutch *Brugge*, or *Bruggen* (*i. e.* "bridges"); Lat. *Brugæ*], a fortified city of Belgium, capital of the province of West Flanders, is situated on a fertile plain about 8 miles from the ocean, and 64 miles by rail N. W. of Brussels; lat. 51° 12′ N., lon. 3° 14′ E. The railway from Ostend to Brussels passes through Bruges, which is connected with the ocean by several canals. It derives its name from the numerous bridges (about fifty-four) which here cross the canals. It contains many fine Gothic edifices, some of which were built in the fourteenth century, and are richly adorned with works of art. Among these are the church of Notre Dame, which has a spire 450 feet high, and contains a splendid monument of Charles the Bold; the town-hall, with a lofty tower and a celebrated chime of forty-eight bells; and the cathedral of St. Sauveur, furnished with paintings of eminent artists. Bruges has an academy of painting, a public library, a museum, an episcopal college, a hospital, a school of surgery, and an institution for the blind. Here are manufactures of cotton, linen, and woollen fabrics, lace, leather, cordage, tobacco, and soap. Several thousand females are employed in the manufacture of lace of fine quality. Bruges was an important commercial town before the Norman conquest (1066), after which it continued to increase in riches and population. In the thirteenth century it was the great central mart of the Hanseatic League. Its manufactures were also very extensive. The tapestry and cloths of Bruges were celebrated for their excellence. The population once exceeded 200,000. Its prosperity was injured by a popular revolt in 1488, and by the persecutions and vexations which it suffered under Philip II. of Spain, in consequence of which many traders and manufacturers emigrated to England. Pop. in 1866, 47,621.

Brugsch (Heinrich Karl), Ph. D., a German archæologist, born at Berlin Feb. 18, 1827. He was Prussian consul to Cairo in 1864, and in 1868 was charged by the viceroy of Egypt with the organization of the first Egyptian university in Cairo, where he now (1873) resides. He has published a "Grammaire Démotique," "Monuments of Egypt," a "Hieroglyphic Demotic Dictionary" (4 vols., 1867–68), and other similar works.

Brühl, von (Heinrich), Count, a German courtier, born in Saxony Aug. 13, 1700. He became in 1747 prime minister of Augustus III., elector of Saxony and king of Poland. He was very extravagant in his style of living, and impoverished the country in order to enrich himself and gratify the passions of the dissolute king. His library of 62,000 volumes forms a part of the royal library of Dresden. Died Oct. 28, 1763.

Brumaire, the second month in the calendar of the French Republic, is perhaps derived from *brume*, a "mist," a "fog." It comprised the time from Oct. 23 to Nov. 21. The 18th Brumaire (Nov. 9), 1799, was a famous epoch in French history. Then occurred the *coup-d'état* which subverted the power of the Directory and raised Bonaparte to supreme power as first consul. The Directory was not popular, and was weakened by dissensions among the directors themselves, two of whom, Sieyès and Ducos, promoted the design of Bonaparte by resigning on the eve of the crisis. The Council of Elders and Council of Five Hundred were dispersed or overawed by the soldiery, and the new régime was established with little fighting and loss of life.

Bru'math, a town of Germany, in Alsace-Lorraine, 10 miles by rail N. N. W. of Strasburg. Pop. in 1871, 5601.

Brum'mel (George Bryan), "Beau Brummel," a famous fop, born in London in 1778, was educated at Oxford. He had an elegant taste in dress, became an intimate associate of the prince of Wales, and lived in a sumptuous style. He was recognized as the leader of the *haut ton*, and as an oracle in questions of etiquette and dress. Having squandered a fortune, he went into exile in 1815, and lived in France. Died at Caen Mar. 29, 1840.

Brum'met's Creek, a township of Mitchell co., N. C. Pop. 217.

Brunai, or **Borneo,** a state and seaport of the island of Borneo (which see).

Brunck (Richard François Philippe), an eminent classical scholar, born at Strasburg, in Alsace, Dec. 30, 1729. He was liberally educated in Paris, and became an ingenious critic and bold emendator of the classics. He edited Anacreon, Aristophanes, Sophocles, and Terence, and published "Analecta Veterum Poetarum Græcorum" (1772–76). His editions are highly esteemed. In the French revolution he warmly supported the popular cause. Died June 12, 1803.

Brundisium. See Brindisi.

Brunehaut, or **Brunehilde,** a famous queen, was a daughter of Athanagildus, king of the Visigoths. She was married in 568 A. D. to Sigebert, king of Austrasia. She was beautiful, ambitious, and high-spirited. Her husband was assassinated in 575 by the order of Fredegonda, queen of Neustria. She afterwards governed the kingdom with ability, and obtained an ascendency over her son Childebert, who was the nominal king. Having been defeated in battle and captured by Clotaire II., she was murdered in 613 A. D.

Brunel' (Isambard Kingdom), D. C. L., F. R. S., a British engineer, born at Portsmouth April 9, 1806. He was employed under his father as assistant engineer of the Thames Tunnel, in the construction of which he displayed great energy and ability. In 1833 he was appointed chief engineer of the Great Western Railway. He was the designer and engineer of the Great Western steamship and of the Great Eastern, said to be the largest vessel ever built in the world, and of the Royal Albert Bridge, Saltash. (See Bridge, by Gen. J. G. Barnard, U. S. A.) Died Sept. 14, 1859.

Brunel (Sir Mark Isambard), F. R. S., a celebrated engineer, born near Rouen, in France, April 25, 1769, was the father of the preceding. Driven from France by the Reign of Terror, he removed to New York in 1793, and designed the Bowery Theatre of that city. In 1799 he went to England, and married a Miss Kingdom. He was distinguished for his mechanical ingenuity, and invented several useful machines. His most important work is the Thames Tunnel, which was commenced in 1825 and opened in 1843. Died Dec. 12, 1849. (See R. Beamish, "Life of M. I. Brunel.")

Brunelles'chi (Filippo), an eminent Italian architect and sculptor, born at Florence in 1377. He improved the theory of perspective, and efficiently promoted the restoration of the ancient style of architecture as a substitute for the Gothic, which in his youth prevailed in Italy. About 1418 he was appointed architect of the cathedral of Florence (Santa Maria del Fiore), which had been commenced about 1296, and was unfinished. He raised over it a grand and beautiful dome, which is one of the largest in the world. Among his other works is the Pitti Palace of Florence. Died in 1444. (See Baldinucci, "Vita di F. di Ser Brunellesco," 1812.)

Bru'ni (Leonardo), a learned Italian writer, a native of Arezzo, and hence called Leonardo Aretino, was born in 1369. He obtained a high office at Florence, promoted the study of Greek literature, and translated into Latin some works of Aristotle and other classics. Among his original writings is a "History of Florence," in Latin. Died Mar. 9, 1444.

Brünn [Slavic, *Brno*, the "ford"], a fortified city of Austria, and the capital of Moravia, is beautifully situated at the confluence of the Schwarza and the Zwittawa, 94 miles by rail N. N. E. of Vienna and 159 miles by rail S. E. of Prague; lat. 49° 11′ 39″ N., lon. 16° 36′ 39″ E. Here is the castle of Spielberg, used as a state prison. Among the remarkable public buildings are the cathedral, the Gothic church of St. James, the *Landhaus*, formerly a rich Augustine convent, several palaces of the nobility, and a theatre. Brünn also contains a museum, a public library, and a botanic garden. It has important manufactures of woollen, cotton, and silk fabrics, ribbons, glass, soap, and tobacco. It is the seat of the highest civil and military authorities of Moravia and Austrian Silesia and of a Roman Catholic bishop. Its manufactures of woollens are said to be the most extensive in the Austrian empire. Over 15,000 persons are employed in the factories, according to the census of 1869. Napoleon used Brünn as his head-quarters before the battle of Austerlitz. Pop. in 1869, 73,464.

Brun'now, von (Philipp), a diplomatist, was born at Dresden Aug. 31, 1797. He entered the Russian civil service in his youth, and was employed in several important offices and missions. He was sent as ambassador to London in 1840, was transferred to Frankfort in 1854, and attended the Conference of Paris in 1856. In 1858 he resumed his former position in London, and took part in the Conference of London in 1862.

Bru'no [Lat. *Brunus*], (Giordano), an eminent Italian philosopher, born at Nola, in the kingdom of Naples, in 1548. He was a man of independent and speculative spirit, and rejected the orthodox doctrines of the Church. On account of his opinions he was obliged to flee to Geneva in 1580, a few years after which he removed to Paris, and passed some time in England. His principal works are "Spaccio della Bestia trionfante" (1584), "Della Causa Principio e Uno," and "Del Infinito Universo e Mondi." About 1592 he returned to Italy and became a resident of Pavía. Having been accused of heresy, he was imprisoned at Rome for nearly two years, and was burned as a heretic

Feb. 17, 1600. His system is called Pantheism, and has had much influence in modern philosophy. (See C. G. von Murr, "Leben und Schriften des G. Bruno," 1805; N. Moeller, "G. Bruno, sa Vie et ses Doctrines," 1840; Berti, "Vita di Giordano Bruno," 1868.)

Bruno, Saint, founder of the Carthusians, was born at Cologne about 1040. In 1086 he retired from the world, and with a few friends began to live in solitude near Grenoble. He founded there the order of Carthusians, who adopted the rule of Saint Benedict. The monastery of the Grande Chartreuse was afterwards built at the same place. He died Oct. 6, 1101.

Bruno the Great, archbishop of Cologne, born 925 A. D., was a younger brother of the emperor Otho I. He was a man of great talents, virtue, and learning, and had a powerful influence in the Church and State. He became lord high chancellor of the empire. Died in 965.

Bruno City, a township of Elko co., Nev. Pop. 122.

Brunol'ic Acid, a substance which occurs in oil of coal-tar, associated with carbolic, cresylic, and rosolic acids.

Bruns'wick, a duchy of the German empire, consists of three larger parts and several enclaves. Area, 1425 square miles. The larger part, containing the capital, is entirely surrounded by Prussia. The chief mountain-range is a part of the Hartz Mountains in the S., the highest point of which in the duchy is the Wormberg, 3245 feet high. It is traversed by the Ocker in the N., and the Leine, Aller, and Bode. The chief products are grain, flax, and hops. Among the mineral products are silver, lead, iron, lignite, salt, etc. It has extensive manufactures of linen, wooden wares, glass, sugar, tobacco, paper, cloths, etc., also large beer-breweries. It has five gymnasia, one polytechnic school, a theological seminary, two normal, and numerous other schools. The government is a constitutional monarchy, and the supreme power is vested in a duke and a legislative body of forty-six members. The receipts and expenses for the three years 1870–72 were each estimated at 7,196,400 thalers. The public debt in 1871 amounted to 23,765,768 thalers. Brunswick is represented by two members in the Bundesrath of the empire, and three deputies in the imperial Reichstag. Its contingent to the German army forms part of the tenth army corps. Pop. in 1871, 311,819.

History.—Brunswick formed originally a part of the duchy of Saxony, and was given in 1194 to Henry the Lion. His grandson Otto became first duke of Brunswick in 1235. After having been divided and reunited by the descendants of Otto, they were again united under Ernest the Confessor (died 1546). His two sons, Henry and William, again divided the country, and formed the two branches Brunswick-Oels and Brunswick-Lüneburg, the latter of which reigned as electors of Hanover, and in the person of George I. ascended the British throne. Brunswick was annexed to the kingdom of Westphalia in consequence of the treaty of Tilsit, but in 1813 it again became an independent state under Frederick William, who was killed in the battle of Quatrebras in 1815. He was succeeded by his son Karl, who was expelled from the country in 1830, and was succeeded by his brother Wilhelm, who is the present duke. Brunswick joined the German customs-union in 1844, assisted Prussia in the war of 1866, joined the North German Confederation in the same year, and became a member of the German empire upon its revival in 1870. With the death of Duke Wilhelm the ducal line of Brunswick will become extinct, Duke Charles having died in Aug., 1873, without issue. While the duke desires the ex-king of Hanover or his son for his successor, it is believed that Prussia would favor the succession of one of the sons of Queen Victoria. A. J. Schem.

Brunswick [Ger. *Braunschweig;* anc. *Brunonis Vicus*], a city of Germany, capital of the duchy of the same name, is on the river Oker and in a level district, 47 miles by rail E. S. E. of Hanover; lat. 52° 16′ 11″ N., lon. 10° 32′ 09″ E. The old fortifications have been demolished and converted into pleasant promenades. It contains a magnificent ducal palace, an ancient cathedral, the church of St. Andrew, with a steeple 316 feet high, a mint, an opera-house, a town-hall, and a museum which contains paintings by Albert Dürer, Rembrandt, Holbein, and other great masters. Railways extend from this town to Hanover, Magdeburg, and other places. Here are manufactures of linen and woollen goods, lacquered wares, *papier-maché,* tobacco, hardware, etc. A great annual fair is held here. Among its institutions are a college, a gymnasium, a real-schule, and an asylum for deaf-mutes. This is a very old town. It was enlarged and beautified by Henry the Lion in the twelfth century. It formerly belonged to the Hanse League. Pop. in 1871, 57,883.

Brunswick, a county of North Carolina, bordering on South Carolina. Area, 950 square miles. It is bounded on the S. by the Atlantic Ocean, on the E. by the Cape Fear River, and on the W. by the Waccamaw. The surface is level, and partly occupied by swamps. Corn, rice, cotton, and wool are produced. It is intersected by the Carolina Central and the Wilmington Columbia and Augusta R. Rs. Capital, Smithville. Pop. 7754.

Brunswick, a county of Virginia, bordering on North Carolina. Area, 600 square miles. It is intersected by the Meherrin River, and bounded on the N. by the Nottoway. The surface is undulating; the soil is productive. Grain, tobacco, and wool are raised. Capital, Lawrenceville. Pop. 13,427.

Brunswick, a port of entry, capital of Glynn co., Ga., on St. Simon's Sound, 8 miles from the Atlantic Ocean and 80 miles S. S. W. of Savannah. It is the S. E. terminus of the Macon and Brunswick R. R., and the E. terminus of the Brunswick and Albany R. R. It has a safe and spacious harbor, and is chiefly engaged in the manufacture and export of yellow-pine lumber. It has one weekly paper. At the S. end of St. Simon's Island, and on the N. side of the entrance to the sound, is St. Simon's light-house; lat. 31° 08′ 03″ N., lon. 81° 23′ 26″ W. It is of brick, 108 feet high, and shows a fixed light varied by red and white flashes. Pop. 2348.

T. F. Smith, Ed. "Seaport Appeal."

Brunswick, a post-village of Cumberland co., Me., on the right bank of the Androscoggin River, and on the Maine Central R. R., 30 miles N. E. of Portland and about 8 miles W. of Bath; lat. 43° 54′ 5″ N., lon. 69° 57′ 4″ W. It is the S. terminus of the Androscoggin R. R., and is the site of Bowdoin College (which see). The river here falls nearly 50 feet in the distance of half a mile, affording abundant water-power. Brunswick has six churches, three national banks, a cotton-mill, and other manufactories. It has a weekly paper. Many ships are built and owned here. Pop. 1449; of Brunswick township, 4687.

Brunswick, a post-village, capital of Kanabec co., Minn., on Snake River, 64 miles N. of St. Anthony. P. 93.

Brunswick, a post-village of Chariton co., Mo., on the N. bank of the Missouri River, 292 miles by water from St. Louis, and on the St. Louis Kansas City and Northern R. R., 90 miles E. by N. from Kansas City. A branch railroad extends from this place north-westward to Chillicothe. It is situated on a level, fertile prairie. It has one weekly newspaper. Pop. 1645; of Brunswick township, 4576.

Brunswick, a township of Rensselaer co., N. Y., contains a part of the suburbs of Troy. Pop. 3128.

Brunswick, a post-township of Medina co., O. Pop. 980.

Brunswick, a post-township of Essex co., Vt. It contains a mineral spring of some note. Pop. 221.

Brunswick, a township of Eau Claire co., Wis. Pop. 575.

Brunswick-Bevern (August Wilhelm), Duke of, a Prussian general, born Oct. 15, 1715, took part in the wars of Frederick the Great against Austria. He distinguished himself in the battles of Lowasitz, Reichenberg, Prague, and Kollin. He was defeated and taken prisoner at Breslau in 1757, and was released in 1758. Died Aug. 1, 1781. He was the tallest soldier of his time in the Prussian army.

Brunswick Black is a varnish employed to coat over coarsely-finished iron grates, fenders, etc. It is composed mainly of lampblack and turpentine. It is applied with a brush, dries quickly, and leaves a shining, jet black surface.

Brunswick Green, a pigment used in the arts, consisting of the hydrated chloride and the oxide of copper. It is obtained by exposing metallic copper to the action of muriate of ammonia, or by mixing sulphate of copper and common salt into a paste with water. It is also generated by the action of sea-water on copper, and occurs native in Atacama in the form of green sand, hence called atacamite.

Bruns'wick-Lü'neburg (Karl Wilhelm Ferdinand), Duke of, a German general, born Oct. 9, 1735, was a nephew of Frederick the Great, and the eldest son of Duke Karl. He fought for his uncle in the Seven Years' war, and succeeded to the dukedom in 1780. He became in 1792 commander-in-chief of the allied armies of Austria and Prussia, which invaded France and were repulsed by Dumouriez. In 1793 he resigned the command. He took command of the Prussian army in 1806, and was defeated by the French at Jena in October of that year. In this battle he was mortally wounded. Died Nov. 10, 1806.

Bru'sa, or **Bur'sa** (anc. *Prusa ad Olympum*), a city of Asia Minor, in Anatolia, is pleasantly situated at the N. base of Mount Olympus, about 60 miles S. by E. from Constantinople. It is on a beautiful and fertile plain, and presents a magnificent external appearance, having more than 200 mosques and minarets, some of which are very hand-

some. The streets are narrow, but are kept clean by running water. Here are many colleges and schools, several Armenian churches, and large bazaars supplied with European goods. Brusa is one of the most commercial cities in Asiatic Turkey, and raw silk is the chief article of export. It has manufactures of silk, satin, gauze, cotton cloths, and tapestry. The silks of Brusa are highly esteemed in the European markets. Here are warm mineral springs which were celebrated in ancient times. *Prusa* was the capital of ancient Bithynia. It was taken by the Turkish sultan Orkhân in 1326, after which it was the capital of the Turkish empire until 1453. Feb. 28, 1855, the town was nearly destroyed by an earthquake. Pop. about 70,000.

Brusanti'ni (Vincenzo), Count, an Italian poet of the sixteenth century. He went in youth to Rome to seek his fortune, but forgot his purpose, and was put into prison on account of certain indiscreet acts. In prison he suffered much. He afterwards made a long tour throughout Italy, and his talents won him the patronage of many princes. His indiscretion, however, lost him whatever favors he had gained, and in 1570 he died at Ferrara, his native town. He is known by his "Angelica Inamorata" and "Cento Novelle," imitations, the one of the "Orlando Furioso" of Ariosto, and the other of the "Decameron" of Boccaccio. Both are clumsy, cold, and untasteful performances.

Brusasor'ci (properly Domenico **Ri'ccio**), a painter, born at Verona, Italy, in 1494. His title of "the Titian of Verona" was conferred upon him on account of his imitation of the style of that master. His works, which have been greatly overpraised, are chiefly at Verona. Many of them are in fresco. Died in 1567.—His son, Felice Riccio, called the Younger Brusasorci (1540–1605), was a skilful painter on marble and alabaster.

Brus'chius, or **Brusch** (Gaspard), a German historian, born Aug. 19, 1518, at Schlakenwald in Bohemia, was in 1552 made a count palatine and poet laureate by Ferdinand, king of the Romans. He favored Luther and Melanchthon, and in 1559 was murdered in a forest by some gentlemen who thought themselves satirized by him. His chief historical works are "De Germaniæ episcopatibus epitome" (1549) and "Monasteriorum Germaniæ præcipuorum Chronologia" (1551).

Brush, an instrument for removing dirt from various surfaces by friction, for adjusting the hair, or for polishing, or applying paints, whitewashes, and the like. Hogs' bristles furnish a large part of the material for the friction surface of the best brushes, but for delicate work camel's, badger's, sable's, and rabbit's hair is used. Wire brushes are used in various departments of manufacturing industry. Split whalebone is sometimes employed as a substitute for bristles. Broom-corn and twigs of trees are often employed for stiff brushes, and the coarse instruments used in cleaning streets are partly made from piassaba and other imported palm fibres. Most brushes are made by joining some of the above materials to a stock of wood, leather, bone, or metal, by various methods—a business which gives employment to many thousands in Europe and the U. S. Ingenious machines have been invented for the performance of various parts of the work of making brushes; and these machines have greatly reduced the labor and expense of making some kinds of brushes. Other kinds are still made by hand.

Brush (George Jarvis), born at Brooklyn, N. Y., Dec. 15, 1831, was educated at Yale College, at the University of Munich, the Mining Academy of Freiberg, Saxony, and the School of Mines in London. He became in 1855 professor of metallurgy in Yale, to which the professorship of mineralogy was added in 1864. He is executive officer of the Sheffield Scientific School, and has published numerous papers in the "American Journal of Science," and is author of parts of the fifth edition of Dana's "Mineralogy."

Brush Creek, a twp. of Washington co., Ark. P. 740.

Brush Creek, a township of Faribault co., Minn. Pop. 422.

Brush Creek, a township of Yancy co., N. C. P. 495.

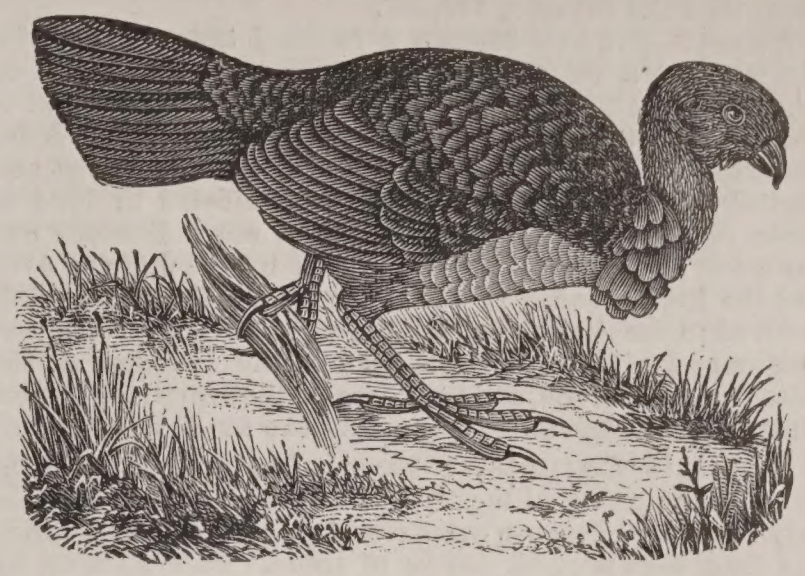
Brush Creek, a township of Jefferson co., O. P. 697.

Brush Creek, a post-township of Muskingum co., O. Pop. 1292.

Brush Creek, a township of Scioto co., O. P. 1410.

Brush Creek, a township of Fulton co., Pa. P. 876.

Brush Turkey (*Tallegalla Lathami*), sometimes called **Wattled Tallegalla** and **New Holland Vulture,** a bird of Australia remarkable for the peculiar manner in which its eggs are hatched. Several pairs of these birds having united to build a nest, collect leaves, grass, etc. into a heap, sometimes to the amount of several cart-loads. In this mass the several females deposit their eggs, where they remain till hatched by the artificial heat of the mound. The bird is about the size of our common turkey, and has wattles on its head and neck. When pursued, it endeavors



Brush Turkey.

to make its escape by running through the tangled brush or by flying into the low branches of a neighboring tree.

Besides the above, there are several other species and genera, all Australian, and nearly all closely resembling the above bird in its peculiar habits. These now constitute the family Megapodidæ, which is now regarded as gallinaceous. The birds are edible, and are much sought as game.

Brush Valley, a post-township of Indiana co., Pa. Pop. 1606.

Brushy Creek, a post-township of Anderson co., S. C. Pop. 1752.

Brushy Lake, a township of Cross co., Ark. Pop. 313.

Brushy Mountain, a township of Wilkes co., N. C. Pop. 434.

Bruso'ni (Girolamo), an Italian historian and poet, born at Legnano Dec. 10, 1610. He wrote many Latin and Italian poems, and was for a time confined in prison at Venice for assuming improperly the dress of a Carthusian monk. He wrote many historical and other works, of which the most celebrated is "Istoria d'Italia" (1656–80). Died after 1679.

Brus'sels, a post-township of Door co., Wis. P. 406.

Brus'sels [Dutch, *Brussel;* Fr. *Bruxelles*], the capital of Belgium, is situated in the province of Brabant, on the river Senne, 27 miles by rail S. of Antwerp, and 227 miles by rail N. N. E. of Paris; lat. 50° 51′ 10″ N., lon. 4° 22′ 13″ E. It is built partly on the slope of a hill which rises 220 feet above the level of the sea, and partly on a fertile plain. The upper town on the hill is the most modern and fashionable, and contains the royal palace, public offices, and the finest hotels. Brussels is the most important and populous city of Belgium, is remarkable for the number and richness of its antique buildings, and ranks among the finest cities of Europe. The walls which formerly surrounded this city have been converted into boulevards, broad promenades lined with double rows of shade trees. The Allée Verte is a fashionable promenade along the Scheldt Canal, and extends to the royal palace of Laeken, about 3 miles N. of the city. The principal public squares are the Place Royale, the Grande Place, in which stands the hôtel de ville, and the Place de la Monnaie, which contains the mint, the theatre, and the exchange. Among its remarkable edifices are the hôtel de ville, a fine Gothic structure, with a spire 364 feet high, in the grand hall of which the emperor Charles V. abdicated in 1555; the Gothic cathedral of St. Gudule, which was built about 1270, and is celebrated for its painted windows, numerous statues, and carved pulpit; the church of Notre Dame de la Chapelle, commenced in 1134; the royal palace; the modern church of Notre Dame de Bon Secours; the former palace of the prince of Orange; and the Palace of the Fine Arts, which contains a large collection of paintings of the Flemish school. Brussels has a public library of about 200,000 volumes; a botanic garden; an astronomical observatory, one of the finest in Europe; a magnetic observatory; a free university, founded in 1834, with four faculties—viz. law, medicine, mathematical and physical sciences, and belles-lettres; a normal school, a polytechnic school, and institutions for the blind and for deaf-mutes. The only mint of the kingdom is situated here. Brussels is one of the great centres of Belgian industry, and is celebrated for the manufacture of lace which is considered the finest in the world. The other chief products of its manufactories are fine linens, damasks, ribbons, gold and silver embroidery, glass mirrors, jewelry, paper, porcelain, hats, mathematical and musical instruments, carriages, and chemical products. Its trade is facilitated by a canal which connects it with Antwerp, and by railways which radiate in many

directions. About one-third of the people of this city speak French, and the others Flemish or Dutch. Pop. in 1869, with the suburbs, 314,077.

History.—Brussels became a fortified town about 1044, but was not a very important place until the House of Austria began to reign over Flanders. In 1507 the seat of government of the Low Countries was fixed here. Under the emperor Charles V. it was a residence of the court and capital of a viceroyalty. Here he abdicated in 1555 in favor of his son, Philip II., in whose reign Brussels was the scene of the atrocities committed by the duke of Alva and the Inquisition. It was taken by the French in 1747, restored to the Austrians in 1748, and annexed by conquest to France in 1792. It was a part of the kingdom of the Netherlands 1815–30, and then became the capital of the new kingdom of Belgium. REVISED BY A. J. SCHEM.

Brussels Carpets, a name of carpets of excellent quality manufactured mostly at Tournay. They were probably so named because extensively sold at Brussels, which has long been a great centre of trade. (See CARPET, by WILLIAM BERRI, JR., editor of "The Carpet.")

Bru'ton, a township of York co., Va. Pop. 1839.

Bru'tus, a township of Cayuga co., N. Y. It contains the village of Weedsport. Pop. 2621.

Brutus (LUCIUS JUNIUS), a famous Roman patriot, was a son of Tarquinia and a nephew of Tarquin the Proud. According to tradition, that tyrant was about to put him to death, but he saved his life by feigning idiocy, which was the origin of his surname *Brutus*—*i. e.* "stupid or brutish." Aruns and Titus, the sons of Tarquin, for their amusement took him with them to consult the oracle of Delphi. In answer to the question which of those three should be king of Rome, the oracle replied, "He who shall first kiss his mother." On landing in Italy, Brutus, pretending to stumble, kissed the earth. When the tragic fate of Lucretia had prepared the people to revolt, Brutus became their leader, expelled the Tarquins, and founded a republic (509 B. C.). He was then elected one of the consuls. He ordered the execution of his own sons, Titus and Tiberius, who were convicted of treason. About 507 he was killed in a battle against the Tarquins. (See CHOMPRÉ, "Vie de Brutus, Premier Consul de Rome," 1730; ARNOLD'S "History of Rome.")

Brutus (MARCUS JUNIUS), a Roman republican, a descendant of the preceding, was born in 85 B. C. He married Porcia, the daughter of Cato Uticensis, who was his maternal uncle. In the civil war he fought under Pompey against Cæsar, but after the battle of Pharsalia he was kindly treated by the dictator, with whom he entered into friendly relations; he was appointed governor of Cisalpine Gaul. His zeal for republican liberty and the influence of his friend Cassius induced him to join the conspiracy against Cæsar. After the death of the latter (44 B. C.), Brutus and Cassius were the most prominent leaders of the republican party. They raised a large army in Macedonia, and encountered that of Antony and Octavius at Philippi (42 B. C.). Brutus, who commanded the right wing, gained the advantage over Octavius, whom he imprudently pursued. In the mean time, Antony defeated Cassius so completely that Brutus killed himself on the field. (See PLUTARCH'S "Lives.")

Brüx, or **Brix,** a town of Bohemia, on the river Bila, 14 miles N. of Saaz. It has a gymnasium, a realschule, numerous churches, coal-mines, and manufactures of salts from the famous mineral spring of Seidlitz. P. in 1869, 6308.

Bry'an, a county of Georgia, bordering on the Atlantic. Area, 472 square miles. It is bounded on the N. E. by the Ogeechee River, and intersected by the Cannouchee. The surface is nearly level; the soil is sandy. Rice, corn, oats, cotton, and wool are raised. The Atlantic and Gulf R. R. passes through it. Capital, Eden. Pop. 5252.

Bryan, a post-village of Sweetwater co., Wy. It is on the Union Pacific R. R., 858 miles W. of Omaha, Neb., and has machine-shops of the railroad.

Bryan, a township of Surry co., N. C. Pop. 1032.

Bryan, capital of Williams co., O., on the Air-Line R. R., 54 miles W. of Toledo. It has two banks, an academy, and important manufactures, and is noted for its artesian wells. Two newspapers are issued here. Pop. 2284. P. C. HEYES, PUB. "PRESS."

Bryan, a city, capital of Brazos co., Tex., on the Texas Central R. R., 100 miles N. W. of Houston and 8 E. of Brazos River, has a cotton-gin and mill-factory, a manufactory of tobacco, one of carriages, one of soap, and one of cotton-seed oil. It has a college, a newspaper, two academies, three benevolent societies, eight churches, and is the seat of the State Agricultural and Mechanical College. GOODWIN & SMITH, EDS. "BRYAN APPEAL."

Bryanites. See BIBLE CHRISTIANS.

Bry'ant (WILLIAM CULLEN), LL.D., an American poet, was born in Cummington, Mass., Nov. 3, 1794. He published at the age of thirteen "The Embargo," a political satire in verse. He was educated at Williams College, studied law, and was admitted to the bar in 1815. In 1816 he produced "Thanatopsis," a poem which is greatly admired. He practised law nearly ten years, and removed to New York City in 1825. In 1826 he began to edit the "New York Evening Post," which he conducted with great ability. This paper has advocated free trade and opposed the extension of slavery. A complete edition of his poems was published in 1832. He visited Europe in 1834 and at several subsequent periods, and published "Letters of a Traveller in Europe, etc." During the civil war he supported vigorously the cause of the Union. He produced in 1869 a translation of the "Iliad," and later, 1871, a translation of the "Odyssey," which are regarded by competent critics as the best metrical translations of Homer.

Bry'antown, a post-twp. of Charles co., Md. P. 3629.

Bryd'ges (Sir SAMUEL EGERTON), an English writer and bibliographer, born in Kent Nov. 30, 1762, published, besides many novels, letters, poems, etc., "Censura Literaria, containing Titles and Opinions of Old English Books" (10 vols., 1805–09), "The British Bibliographer" (4 vols. 8vo, 1810–14), and "Res Literariæ" (3 vols., 1821). He claimed that he was the lawful heir to the barony of Chandos, but his title was not recognized. Many of his works were privately printed. His works on bibliography are highly prized. Died at Geneva Sept. 8, 1837. (See his "Autobiography," 2 vols., 1834.)

Bryen'nius (NICEPHORUS), a Byzantine historian and general, was a minister of Alexis Comnenus, whose daughter, Anna Comnena, he married. Died about 1137. His "History of Constantinople" was edited by MEINEKE (1836).

Bryn'hild, or **Brynhil'da,** a beautiful maiden, celebrated in the Norse mythology. Though called a valkyria, she is evidently the same person as the Princess Brunhild of the "Nibelungen Lied." (See THORP'S "Northern Mythology," vol. i.; see also NIBELUNGEN LIED, in this work.)

Bry'ony (*Bryonia*), a genus of plants of the order Cucurbitaceæ, having triadelphous stamens, with distinct anthers, and stems which climb by means of lateral tendrils. The flowers are campanulate, 5-partite, and unisexual. The common bryony (*Bryonia dioica*) is a native of England, has palmate or 5-lobed leaves, and bears red berries about as large as a pea. It abounds in a fetid and acrid juice. The large perennial root is a purgative and emetic, and is employed in medicine, especially in homœopathic practice. The root of *Bryonia alba* possesses similar properties, and contains a bitter poisonous principle called *bryonine*. The *Bryonia Boykinii* grows in the Southern U. S.

Bryony, Black (*Tamus communis*), a plant of the order Dioscoreaceæ, is a native of many parts of Europe. It has long twining stems, cordate, undivided leaves, and red berries which are succulent but unwholesome. The whole plant is acrid, but the young suckers, in which the acrid principle is not fully developed, are eaten in Greece like asparagus.

Bryozo'a [Gr. βρύον, "moss," and ζῶον, "an animal"], an order of animals which appear to occupy an intermediate place between mollusks and articulates. Most writers have called them mollusks; others class them with the "molluscoids;" while some refer them to the Articulata. They are very small, and moss-like or polyp-like in appearance, mostly marine, but some species live in fresh water.

Bry'son, a village of Pontiac co., Quebec (Canada), has one weekly newspaper.

Bryson (ANDREW J.), U. S. N., born July 25, 1823, in the city of New York, entered the navy as a midshipman Dec. 21, 1837, became a passed midshipman in 1843, a lieutenant in 1851, a commander in 1862, and a captain in 1866. He commanded the iron-clad Lehigh in 1863 and 1864 at the reduction of Fort Macon, and was in all the important fights with the defences of Charleston harbor. On the 17th of Nov., 1863, the Lehigh, having grounded, was exposed for an hour to the fire of nine batteries on Sullivan's Island. Rear-Admiral Dahlgren, in his official report of this affair, says: "Commander Bryson and Lieutenant-Commander Cornwell, with their officers, did their duty handsomely on the occasion." FOXHALL A. PARKER, U. S. N.

Bu'aze, an African plant, of which the botanical relations are not yet known, but which is likely to prove of importance on account of its fibre. Dr. Livingstone found it growing in large quantities north of the Zambesi, and thinks its fibre stronger and finer than that of flax.

Bu'balus, Bubalis, or **Bubalé** [Gr. βούβαλος, a term

anciently applied to a species of antelope], a genus of Bovidæ which is formed by the buffaloes of India and Africa, the anoa, and perhaps the musk-ox of North America (*Bubalus* or *Ovibos moschatus*). It includes those species which have the bony core of the horn excavated, with large cells or sinuses communicating with the cavity of the nose. The horns are flattened, and bend laterally with a backward direction. The *Antilope Bubalus*, a native of Barbary, is about the size of a large stag, and has a head and muzzle like an ox. Its horns are furnished with a number of thickened rings, and are curved so that the points are directed backward. It is gregarious. The figure of this animal is found on the monuments of ancient Egypt.

Bubas'tis (the *Pi-beseth* of Scripture and modern *Tel-basta*), a ruined city of Lower Egypt, in the Delta of the Nile, about 75 miles a little E. of N. from Cairo; lat. 30° 36′ N., lon. 31° 33′ E. The site is now occupied by extensive mounds containing the remains of brick houses and broken pottery.

Bubastis, a goddess of ancient Egypt, a deification of the moon corresponding to the Greek Artemis, said to signify literally "she who multiplies her aspects;" so called in allusion to the changes of the moon. According to other authorities, Bubastis was the deification of the cat, which animal, as is well known, was an object of worship in ancient Egypt. Her name, according to modern Egyptologists, was *Pecht* or *Pasht*.

Bub'ble [Lat. *bulla;* Fr. *bulle*], a globular film or vesicle of water or other liquid inflated with air, vapor, or gas. The air usually expands until the film is burst by the distension. Bubbles formed with a mixture of water and soap will float in the air and exhibit interesting optical phenomena. "The colors," says Sir J. Herschel, "which glitter on a soap-bubble are the immediate consequence of a principle the most important from the variety of phenomena it explains, and the most beautiful from its simplicity and compendious neatness, in the whole science of optics." (See THIN PLATES, COLORS OF.) The formation of bubbles of steam (ebullition) always occurs when water is heated to the boiling-point.

Buccaneer' [Fr. *boucanier*], a name applied to the famous adventurers or filibusters who in the sixteenth and seventeenth centuries infested the West Indies and the Spanish colonies of South America. They were mostly English and French, and were united by a common hostility to the Spaniards, to plunder whom was their principal object and business. For mutual protection against the cruelty of the Spaniards, they organized themselves into an association or community bound by a simple code of laws. The island of Tortuga was at one time occupied by them, and was their chief base of operations. They took immense booty from the Spanish galleons which conveyed precious metals to Spain, and often attacked towns on the coasts. Among the famous and able leaders of the buccaneers were the French Montbar, surnamed THE EXTERMINATOR, and Henry Morgan, a Welshman, who was born about 1637. He organized fleets and armaments, took strong fortresses, and displayed remarkable military talents. He was knighted by Charles II. The navigator Dampier also took part with the buccaneers in some expeditions against the Spaniards. (See JAMES BURNEY, "History of the Buccaneers.")

Buccina'tor [Lat. *buccino*, "to swell the cheeks," as in blowing a trumpet, from *bucca*, the "cheek"], the name of a muscle situated in the substance of the cheeks; so called because, when the cheeks are distended with air, the contraction of the buccinator muscle forces it out. Its principal use is to compress the food during mastication.

Bucci'no, a town of Italy, in the province of Salerno, is on the river Botta, here crossed by an old Roman bridge, 23 miles W. of Potenza. Here are quarries of fine marble. Pop. in 1861, 5493.

Buc'cinum [a Latin word signifying a "trumpet"], a genus of gasteropod mollusks, characterized by a shell with a smooth nonplicated columella, and with a fissure or short respiratory canal inflected towards the left. The shape of some species of this genus resembles that of a trumpet. *Buccinum undatum* is the systematic name of the shell called whelk. Most of the living species are found in the cold zones; many are fossil.

Buc'cleugh, DUKES OF (1663), dukes of Queensberry, marquesses of Dumfriess-shire, earls of Drumlanrigand Sanquhar (1684), earls of Buccleugh (1619), earls of Dalkeith (1663), viscounts of Nith, Torthorwold, and Ross, and Barons Douglass (1684), Barons Scott of Buccleugh (1606), Barons Scott of Eskdale (1619), Lords Scott of Winchester (1663, in Scotland), earls of Doncaster, and Barons Tynedale (1662, in England), a noble family of Scotland, descended from Sir Walter Scott of Branxholm and Buccleugh, a brave and powerful chieftain who lived in the reign of James V. He fought at the battle of Pinkie in 1547, and died in 1552. Some incidents of his life formed the subject of Scott's poem, the "Lay of the Last Minstrel." His great-grandson, also named Sir Walter, was raised to the peerage as Lord Scott of Buccleugh in 1606. The first duke was beheaded in 1685, but the duchess retained the title and estates. Henry, the third duke, born in 1746, was a pupil and friend of Adam Smith. He distinguished himself by his efforts to improve his extensive estates by planting trees, enriching the soil, making roads, and improving the breed of sheep. Died in 1812.—His grandson, WALTER FRANCIS, born Nov. 25, 1806, the fifth duke of Buccleugh and the seventh of Queensberry, is said to have spent £320,000 in improving the harbor of Granton, about two miles from Edinburgh, the greatest public work ever executed in Scotland by an individual at his own expense. He succeeded his father in 1819, was lord of the privy seal 1842–46, and president of the council in 1846.

Bucen'taur [It. *Bucentoro*], the name of a celebrated Venetian galley which was gilded and sumptuously furnished, and was used only once a year in a splendid aquatic procession when the doge performed the ceremony of espousing the Adriatic on Ascension Day by dropping a ring into the water. It was about 100 feet long, and was propelled by oars. In the annual procession the Bucentaur, which conveyed the doge and other high functionaries, was followed by many gondolas and feluccas. It was burned in 1797, having been kept for this service since 1177.

Buceph'alus [Macedonian Gr. Βουκεφάλας, for Βουκέφαλος, *i. e.* "ox-head" or "big-head"], the favorite horse of Alexander the Great, who rode on him in all his campaigns. He was purchased in Thessaly by King Philip, and cost, according to Pliny, sixteen talents, equal to $20,000, nearly, of our money. The royal grooms were unable to manage him, but Alexander, then very young, tried and succeeded; and Bucephalus would never permit any one but Alexander to ride him. Bucephalus died in India from the effect of wounds received in battle about 326 B. C., and Alexander built in his honor the city *Bucephala* on the Hydaspes.

Bu'cer [from the Gr. βοῦς, a "cow," and κέρας, a "horn," being a literal translation of his German name, *Kuhhorn*], (MARTIN), a German Reformer, was born near Strasburg in 1491, and was for a time a Dominican friar. He became a Protestant in 1521. He was a friend of Luther, and studied Greek and Hebrew at Heidelberg. He introduced the Reformed doctrines at Strasburg 1523, and was for many years professor of theology at that city. When dissensions arose between Luther and Zwingle, Bucer acted the part of mediator. His opinions in relation to the sacrament accorded more nearly with those of Zwingle than those of Luther. He attended the Diet of Augsburg in 1548, and there conducted himself with moderation, but he refused to subscribe to the "Interim." At the invitation of Archbishop Cranmer he went to England in 1549, and became professor of theology at Cambridge. He wrote in Latin and German numerous religious works and commentaries on Scripture. Died Feb. 27, 1551.

Bu'ceros [from βοῦς, an "ox," and κέρας, a "horn"], a genus of birds of the order Insessores, remarkable for the excessive size of the mandibles, of which the upper in some species supports a large horn-like protuberance. These birds are called horn-bills. They are natives of the Old World.

Buch, von (LEOPOLD), a celebrated Prussian geologist, born at Stolpe-on-the-Oder April 25, 1774. He studied mineralogy under Werner at Freiberg. He explored the geology of many countries of Europe, generally travelling on foot. In 1805 he witnessed an eruption of Mount Vesuvius, which converted him to the Plutonic theory. Among his principal works are "Geognostic Observations during Travels in Germany and Italy" (2 vols., 1802–09), "Travels in Norway and Lapland" (1810), and "On the Mountain-Systems of Russia" (1840). He published an excellent geological map of Germany (1824). He was the author of the doctrine of the slow upheaval of continents. Died in Berlin Mar. 4, 1853. (See the English translation of FLOURENS' "Eulogy on L. von Buch," in the Smithsonian Report for 1862, p. 358.)

Buch'an, a district of Scotland, in the north-eastern part of Aberdeenshire, consisting of about one-fourth of the county lying between the Doveran and the Ytham.

Buchan, EARLS OF, and Lords Auchterhouse (1469), Barons Cardross (1606, in Scotland), a noble family of Scotland.—DAVID STUART ERSKINE, the thirteenth earl, was born in Nov., 1815, and succeeded his father in 1857.

Buchan'an, a county in N. E. Central Iowa. Area, 576 square miles. It is intersected by the Wapsipinicon

River, and also drained by Buffalo Creek. The soil is fertile. Cattle, grain, and wool are raised. The Dubuque and Sioux City R. R. passes through this county. Capital, Independence. Pop. 17,034.

Buchanan, a county of Missouri, bordering on Kansas. Area, 400 square miles. It is bounded on the W. by the Missouri River, and intersected by the Platte or Little Platte. The soil is very productive. Cattle, grain, tobacco, and wool are raised. This county is traversed by the Hannibal and St. Joseph R. R., the Kansas City St. Joseph and Council Bluffs, and the St. Joseph branch of the St. Louis Kansas City and Northern R. Rs. Capital, St. Joseph. Pop. 35,109.

Buchanan, a county of Virginia, bordering on Kentucky. Area, 500 square miles. It is drained by the Louisa Fork and Russell Fork of Sandy River. The Cumberland or Big Black Mountain extends along the N. W. border of this county, the surface of which is mountainous. Grain, tobacco, and wool are raised. Capital, Grundy. Pop. 3777.

Buchanan, a post-village, capital of Haralson co., Ga., about 50 miles W. of Atlanta. Pop. 768.

Buchanan, a township of Jefferson co., Ia. P. 1499.

Buchanan, a township of Page co., Ia. Pop. 771.

Buchanan, a flourishing village of Berrien co., Mich., on the St. Joseph River and on the Michigan Central R. R., 87 miles E. of Chicago and 197 miles W. of Detroit. It is situated in the midst of a rich agricultural and fruit region, has a large trade, and contains a national bank, two large bedstead and furniture factories, a zinc collar-pad factory, a large wagon factory, several flouring and saw mills, one sash and blind factory, one foundry and machine-shop, a large washing-machine and clothes-wringer factory, and a weekly newspaper and steam printing establishment. Pop. 1702; of township, 2857. WAGNER & KINGERY,
PUBS. "BERRIEN COUNTY RECORD."

Buchanan, a township of Atchison co., Mo. Pop. 905.

Buchanan, a township of Douglas co., Mo. Pop. 430.

Buchanan, a township of Sullivan co., Mo. Pop. 1104.

Buchanan, Alleghany co., Pa. See BIRMINGHAM.

Buchanan, a post-village and township of Botetourt co., Va. The village is on the S. bank of James River, 135 miles W. of Richmond. Pop. of township, 4000.

Buchanan, a township of Outagamie co., Wis. P. 823.

Buchanan (CLAUDIUS), D. D., a Scottish preacher, born near Glasgow Mar. 12, 1766. He was professor in the College of Fort William in Bengal. He wrote "Christian Researches in Asia" (1811), and promoted the spread of the gospel in India. Died Feb. 9, 1815.

Buchanan (FRANKLIN), born at Baltimore, Md., became a midshipman of the U. S. navy in 1815, and passed through the various grades of the service, becoming a captain in 1855. In 1861 he resigned, intending to enter the Confederate service, but subsequently he asked to be restored. His request was refused, and he then joined the Southern navy. He fitted up the Merrimack frigate as an iron-clad, and with her sunk the Cumberland and Congress, but was severely wounded in the fight with the Monitor. When the national troops occupied Norfolk he blew up his ship. He became a rear-admiral. He was defeated and made prisoner by Farragut in the battle of Mobile Bay, Aug. 5, 1864, when he fought on board the Tennessee iron-clad, and lost a leg.

Buchanan (GEORGE), an eminent Scottish poet and historian, born at Killearn, in the county of Sterling, in Feb., 1506. He was well educated in Paris, and became a professor in a college of that city. Having adopted the Reformed doctrines, he returned to Scotland in 1537, and wrote "Somnium," a satire against the monks, for which he was persecuted. He took refuge in England, and passed over to France about 1540. He was employed as a teacher in Bordeaux and Paris for several years, during which he wrote some Latin tragedies. After several changes of residence and adventures, he returned to Scotland in 1560. In 1562 he was appointed classical tutor to Mary queen of Scots. His religious and political principles rendered him a supporter of Regent Murray in the civil war that ensued. He became preceptor to the young king, James VI., in 1570, and keeper of the privy seal in the same year. Died Sept. 28, 1582. As a scholar he was almost unrivalled by any of his contemporaries. He wrote Latin verse with great purity, and was humorous, sarcastic, and profound. His chief works are a "History of Scotland" ("Rerum Scoticarum Historia," 1582), a metrical Latin version of the Psalms (1570), and "Franciscanus," a poetical satire. (See his "Autobiography," 1608; DAVID IRVING, "Memoirs of the Life of George Buchanan," 1807.)

Buchanan (ISAAC), a Canadian politician, born in 1810, became a leading merchant and president of the board of trade of Hamilton, Ontario. He was active in putting down the rebellion of 1837, and has for many years been prominently engaged in public affairs. He has published "The Relations of the Industry of Canada with the Mother-country and the U. S."

Buchanan (JAMES), fifteenth President of the U. S., born in Franklin co., Pa., April 23, 1791, graduated at Dickinson College, Carlisle, in 1809, and was admitted to the bar in 1812. He was a Federalist in his youth, but voted for General Jackson in 1828, and was then elected to Congress. In 1831 he was sent as minister to Russia, and in 1833 was elected to the Senate of the U. S. He remained in the Senate until 1845, and was then appointed secretary of state. After he had passed four years in private life, he was sent as minister to England in 1853. He was nominated by the Democrats and elected President of the U. S. in 1856. The other candidates in this election were John C. Fremont, Republican, and Millard Fillmore, "American." Mr. Buchanan received 174 electoral votes. His policy was hostile to those who opposed the extension of slavery. In his message of Dec., 1860, he blamed the Northern people for the disruption of the Union, and affirmed that the Executive had no power or right to prevent the secession of a State. Died June 1, 1868.

Buchanan (ROBERT C.), an American officer, born in 1811 in Maryland, graduated at West Point in 1830, and Feb. 8, 1864, colonel Tenth Infantry. He served at frontier posts 1830–70, in Black Hawk war 1832, engaged in command of gunboats in the battle of Bad Axe River, as adjutant Fourth Infantry 1835–38, in Florida war 1836–38—1841–42, engaged at Camp Izard, Oloklikaha, and Okeecho-bee, emigrating Cherokees to the West 1838, in the military occupation of Texas 1845–46, in the war with Mexico 1846–48, engaged at Palo Alto, Resaca de la Palma (brevet major), Monterey, San Antonio, Churubusco, Molino del Rey (brevet lieutenant-colonel), Chapultepec, and the city of Mexico; in command of district of Oregon and Northern California 1856, engaged against Rogue River Indians, and as superintendent of Western recruiting 1857–59. In the civil war he served in the Virginia Peninsula 1862, engaged at Yorktown, Gaines' Mill (brevet colonel), Glendale, and Malvern Hill (brevet brigadier-general), in Northern Virginia campaign 1862, engaged at Manassas, in the Maryland campaign 1862, engaged at Antietam and Potomac Run, in the Rappahannock campaign 1862–63, engaged at Fredericksburg (brevet major-general), as assistant provost marshal, etc. for New York 1864, and member of commissions 1865–68. Retired from active service Dec. 31, 1870. GEORGE W. CULLUM, U. S. A.

Buchanan (THOMAS MCKEAN), U. S. N., born Sept. 10, 1837, at Bellefonte, Pa., graduated at the Naval Academy in 1855, and became a lieutenant in 1860, and a lieutenant-commander in 1862. He was in many engagements with the enemy on the lower Mississippi in co-operation with our army, and on the 15th of Jan. fell, with a bullet through his head, while "encouraging in his own person his officers and men to fight courageously" in the sharp action at Bayou Tèche. In his report to the navy department of this battle Rear-Admiral Farragut writes: "Lieutenant-Commander Buchanan was one of our most gallant and persevering young officers. He informed me two days ago that he thought the enemy was about to make an attack on him, and that he would anticipate them. In reply to my letter, in which I enjoined him to do his whole duty on this occasion, he assured me that I need give myself no uneasiness upon that score, as they had all determined to go down rather than surrender."
FOXHALL A. PARKER, U. S. N.

Buch'anites, a Scotch fanatical sect, now extinct, which derived its existence (in 1783) and its name from a Mrs. Buchan, whose maiden name was Elspeth Simpson. She was born in 1738, and claimed to be the woman mentioned in Rev. xii. The last of the sect died in 1846.

Bu'charest, the capital of Wallachia, is situated in a fertile plain on the river Dimbovetza, about 140 miles N. W. of Varna; lat. 44° 25′ 30″ N., lon. 26° 5′ 24″ E. The houses are mostly mean, and the streets dirty and not well paved. It is said to contain ninety-five churches, one college, a public library, several hospitals, and an excessive number of gaming-houses. This city has the reputation of being the most dissolute capital in Europe. It is the entrepôt for the trade between Austria and Turkey, the chief articles of which are grain, wool, salt, building timber, cattle, and wax. The treaty of peace by which the sultan ceded Bessarabia and part of Moldavia to Russia was concluded here in May, 1812. Pop., according to the "Almanach de Gotha" for 1872, 141,754.

Buchez (PHILIPPE JOSEPH BENJAMIN), an able French

philosophical writer and republican, was born in Ardennes in 1796. He studied medicine, and took part in several plots against the Bourbons. He wrote, besides other works, "The Science of the Development of Humanity" (1833), and a "Complete Treatise on Philosophy from the Catholic and Progressive Point of View" (3 vols., 1840). Buchez and Roux published "The Parliamentary History of the French Revolution" (40 vols., 1833–38). He was president of the National Assembly in May, 1848. Died in 1865.

Buch'holz, a town of Germany, in Saxony, 46 miles S. W. of Dresden. Pop. in 1871, 5247.

Büch'ner (Friedrich Karl Christian Ludwig), born at Darmstadt, in Germany, Mar. 29, 1824, is a leading writer of the present time in advocacy of "humanitarian," materialistic, and atheistic opinions. His best-known work is entitled "Kraft und Stoff" ("Force and Matter," 1854). He has written also two volumes with the title "Physiological Pictures" (1861); one on "Natural Philosophy," "Six Lectures on Darwin" (1868), and a work on "Man in the Past, Present, and Future" (1869–70). The latter has been translated (1872) into English by W. S. Dallas, F. L. S. With considerable acquaintance with recent science, an easy style, and some ingenuity of argument, the principal attraction of Büchner's works to most readers is, probably, his audacity. In 1872–73 Büchner made a lecturing-tour in the U. S., under the auspices of the German Turnverein, but without marked results in the propagation of his opinions.

Bu'chu [a South African word], the leaves of *Barosma crenata, crenatula,* and *serratifolia,* and of other strong-smelling South African plants used in medicine for their diuretic properties. They belong to the order Rutaceæ, and are used by the Hottentots for many diseases. The natives also prize them for their fragrance, and use them in perfuming their bodies. In commerce the various kinds of buchu are known as "round" and "long" buchu, etc. They all contain a volatile oil.

Buck, a name given to the male of the fallow deer and other species of deer; also to the male of sheep, goats, and antelopes. The term is not properly applied to the male of red deer or American deer, which is called a stag. The term doe is applied to the females of those species of deer the males of which are called bucks.

Buck, a township of Edgar co., Ill. Pop. 794.

Buck, a township of Hardin co., O. Pop. 1259.

Buck, a township of Luzerne co., Pa. Pop. 574.

Bucka'ria, a township of Halifax co., N. C. Pop. 1782.

Buck'au, a town of Prussia, in the province of Saxony, forms a suburb of Magdeburg. Pop. in 1871, 9696.

Buck Bean, or **Marsh Trefoil** (*Menyanthes trifoliata*), a plant of the order Gentianaceæ, the only known species of its genus. It is indigenous in Europe and the U. S., and is widely distributed in the colder parts of the northern hemisphere. It grows in bogs and marshes. The leaves are ternate, the corolla funnel-shaped and 5-parted, and the fruit is a pod or 2-valved capsule. A bitter extract obtained from the leaves is a valuable remedy for dyspepsia and disorders of the bowels. The whole plant is tonic, and is used in Germany as a substitute for hops.

Buck Creek, a township of Hancock co., Ind. P. 1227.

Buck'eye, the popular name of certain American exogenous trees and shrubs of the genus *Æsculus* and the order Sapindaceæ. The Ohio buckeye (*Æsculus glabra*), growing in the Valley of the Mississippi, is a large tree with a strong-smelling bark, small, obscure flowers, and prickly fruit containing the seed, which is a large nut resembling that of the horse-chestnut tree, which is a near relative of this buckeye. The sweet buckeye (*Æsculus flava*), a tree, sometimes a shrub, of a range rather more to the S. than that of the preceding, has yellow or sometimes dull purple flowers. The red buckeye (*Æsculus Pavia*) has a still more southern habitat, ranging southward from the Ohio River to Florida. It is generally small, and has bright-red flowers. The white buckeye (*Æsculus parviflora*) is a shrub of the mountains of the Southern States, with panicles of white flowers. There are various other species in Asia.

Buckeye, a post-township of Yolo co., Cal. Pop. 860.

Buckeye, a township of Stephenson co., Ill. Pop. 1761.

Buckeye, a township of Hardin co., Ia. Pop. 159.

Buckeye, a post-township of Frederick co., Md. Pop. 2414.

Buck'field, a post-village of Oxford co., Me., on the Portland and Oxford Central R. R., 48 miles N. of Portland. It has considerable manufactures. Pop. of Buckfield township, 1494.

Buckhan'non, a post-village, the county-seat of Upshur co., West Va., on Buckhannon River, 28 miles S. of the line of the Baltimore and Ohio R. R., and near the centre of the State. It has one weekly paper. Pop. 475; of Buckhannon township, 1674.

C. G. Rapp, for Ed. "Delta."

Buck'hart, a post-township of Christian co., Ill. Pop. 2028.

Buckhart, a township of Fulton co., Ill. Pop. 1577.

Buck'horn, a township of Talladega co., Ala. P. 1614.

Buckhorn, a post-township of Brown co., Ill. P. 1050.

Buckhorn, a township of Harnett co., N. C. P. 1438.

Buckhorn, a township of Wake co., N. C. Pop. 1694.

Buck'ingham, a post-village and township of Ottawa co., Quebec (Canada), on the river du Lièvre. It has an academy of the Sisters of Charity, and manufactures and trade in lumber and leather. Pop. of village about 1200.

Buckingham, a county in the central part of Virginia. Area, 680 square miles. It is bounded on the N. and N. W. by the James River, and on the S. by the Appomattox, and also drained by Slate River. The surface is partly hilly; the soil near the rivers is fertile. Tobacco, grain, and wool are raised. Valuable gold-mines and slate-quarries have been opened in this county. Capital, Maysville, or Buckingham Court-house. Pop. 13,371.

Buckingham, a post-township of Tama co., Ia. P. 634.

Buckingham, a post-township of Bucks co., Pa., about 27 miles N. by E. of Philadelphia. Pop. 2910.

Buckingham, a township of Wayne co., Pa. Pop. 1127.

Buckingham (George Villiers), Duke of, the favorite of James I. of England, was born in Leicestershire Aug. 20, 1592. He became in 1617 a gentleman of the bed-chamber, and obtained in the space of two years the titles of baron, viscount, and earl. In 1616 he was appointed lord admiral of England. He accompanied Charles, prince of Wales, when he went to Madrid in 1623 to obtain in marriage the infanta of Spain. The failure of this suit was ascribed to the arrogance of Villiers, who in his absence was created duke of Buckingham. After the death of James I. he became the favorite and prime minister of Charles I., but he made himself odious to the nation. He was assassinated by John Felton Aug. 23, 1628.

Buckingham (George Villiers), Duke of, a son of the preceding, was born in Westminster Jan. 30, 1627. He was an adroit courtier, but profligate and unprincipled. On the defeat of the royalist party in 1651 he went into exile. At the Restoration (1660) he became a member of the privy council and an enemy of Lord Clarendon, after whose fall (1667) he was a confidential minister of Charles II. He was the president of the ministry called the "Cabal." He wrote the "Rehearsal," a comedy, and other plays. Died April 16, 1688.

Buckingham (Joseph Tinker), an American writer, born at Windham, Conn., Dec. 21, 1779, published "Specimens of Newspaper Literature, etc.," and became successively editor of the "New England Galaxy," the "Boston Courier," and the "New England Magazine." Died April 11, 1861.

Buckingham (William Alfred), LL.D., born at Lebanon, Conn., May 28, 1804, was governor of the State (1858–66), and in 1869 was elected to the U. S. Senate by the Republicans.

Buckinghamshire (England). See Bucks.

Buckingham and Chandos, Dukes of, marquesses of Chandos and Earls Temple of Stowe (1822, in the United Kingdom), marquesses of Buckingham (1784), Earls Temple (1749), Viscounts and Barons Cobham (1718, in Great Britain), Earls Nugent (1776, in Ireland), Barons Kinloss (1601, in Scotland), a noble family of Great Britain.—Richard Plantagenet Campbell Temple Nugent-Brydges Chandos Grenville, the third duke of this family, born in 1823, succeeded his father in 1861. He was lord president of the council 1866–67, secretary of state for the colonies 1867–68, and is at present lord lieutenant of Bucks.

Buckingham Court-house, or **Maysville,** a post-village, capital of Buckingham co., Va.

Buck'inghamshire, Earls of (1746, in England), Barons Hobart (1728, in Great Britain), and baronets (1611, in England), a noble family of Great Britain.—Augustus Edward Hobart, the sixth earl, born Nov. 1, 1793, succeeded his brother in 1849.

Buck'land, a post-township of Franklin co., Mass. The village of Shelburne Falls is partly in this town. Pop. 1946.

Buckland (CYRUS), an American inventor and machinist, born at Manchester, Conn., Aug. 10, 1799, invented machines for working gunstocks, and a machine to cut the grooves in the barrel of a rifle.

Buckland (WILLIAM), D. D., F. R. S., an English geologist, born at Axminster in 1785, was educated at Oxford. His principal work is the Bridgewater Treatise entitled "Geology and Mineralogy, considered with reference to Natural Theology" (2 vols., 1836). In 1825 he became a canon of Christ Church, Oxford. Died Aug. 14, 1856.

Bucklan'dia, a large and beautiful evergreen tree of the order Hamamelaceæ, a native of the Himalaya Mountains. The trunk is sometimes seven feet in diameter at five feet from the ground, and grows to the height of forty feet before it branches. The foliage is thick and glossy, but the timber is not very valuable.

Buck'le (HENRY THOMAS), a popular English author, born at Lee, in Kent, Nov. 24, 1822. His father was a merchant, at whose death he came into the possession of an ample fortune, and was enabled to gratify his fondness for books, forming, it is said, one of the finest private libraries to be found in all Europe. He published in 1857 the first volume of the "History of Civilization in England," a work displaying great boldness as well as affluence of thought, and characterized by an easy and vigorous style. It is, however, wanting in that accuracy of knowledge and closeness of reasoning which are so important in the treatment of those profound and recondite inquiries which form the subject of his work. The second volume of Mr. Buckle's "History" appeared in 1861, but having been written under the great disadvantage of declining health, it attracted less attention than the first had done. To recruit his failing health, Mr. Buckle set out on an Eastern tour in 1861. He died at Damascus May 29, 1862.

Buck'ley, a post-village of Iroquois co., Ill.

Buck'lin, a post-village of Linn co., Mo.

Buck'minster (JOSEPH), D. D., an orthodox divine, was born at Rutland, Mass., Oct. 14, 1751, graduated at Yale in 1770, became pastor of a church at Portsmouth, N. H., in 1779, and an eloquent and popular preacher. Died June 10, 1812.

Buckminster (JOSEPH STEVENS), D. D., a Unitarian minister, a son of the preceding, born at Portsmouth, N. H., May 26, 1784. He graduated at Harvard in 1800, and became minister of the Brattle Street church, Boston, in 1804. He sailed to Europe for his health in 1806. Died June 9, 1812.

Buck'ner (SIMON BOLIVAR), born 1823 in Kentucky, graduated at West Point in 1844, in infantry 1844–52, and subsequently as commissary of subsistence, rank of captain. He served at frontier posts 1844–52, as assistant professor at the Military Academy 1846, in the war with Mexico 1846–48, engaged on the march through Coahuila, at Vera Cruz, Cerro Gordo, Amazoque, San Antonio, Churubusco (wounded and brevet first lieutenant), Molino del Rey (brevet captain), Chapultepec, and the city of Mexico, and quartermaster Sixth Infantry, as assistant instructor at the Military Academy 1848–50, and on commissary duty at New York City 1852–55. Resigned Mar. 26, 1855. He was superintendent of construction of Chicago custom-house 1855, adjutant-general, rank of colonel, of Illinois 1857, colonel of Illinois volunteers for Utah expedition (not mustered into service), inspector-general commanding Kentucky home guards 1860–61, and farmer near Louisville 1860–61. He joined the Southern army in the civil war, and was in command of Bowling Green, which he evacuated on the capture of Fort Henry, falling back to Fort Donelson (surrendered Feb. 16, 1862, to Gen. Grant, with 16,000 troops and vast stores); prisoner of war at Fort Warren till Aug., 1862, in command of a division of Hardee's corps in Bragg's army in Tennessee, as major-general assigned to the third grand division, engaged at Murfreesboro' and Chickamauga, and included, May 26, 1865, in Kirby Smith's surrender to Gen. Canby.

GEORGE W. CULLUM, U. S. A.

Buck Prairie, a township of Lawrence co., Mo. Pop. 1514.

Bucks, or **Buck'inghamshire,** an inland county of England, is bounded on the N. by Northampton, on the E. by Bedford and Hertford, on the S. by Berks, and on the W. by Berks and Oxford. It has an area of 730 square miles. The surface is diversified by valleys and hills of moderate height. The Chiltern range of chalk-hills, about 900 feet high, extends across the county in a N. E. and S. W. direction. Near the middle of the county is the fertile Vale of Aylesbury, which is farther N. than the Chiltern Hills; the soil is generally fertile, and contains a large portion of clay. It is drained by the Ouse, the Thame, and other small rivers. The staple products are wheat, beans, butter, cattle, and mutton. The sheep of the Vale of Aylesbury are noted for their fine and heavy fleeces. Bucks county is intersected by the Great Western and North-western Railways. The chief towns are Aylesbury, Buckingham, and Marlow. Pop. in 1871, 175,870.

Bucks, a county of Pennsylvania, bordering on New Jersey. Area, 600 square miles. It is bounded on the N. E. and S. E. by the Delaware River, and is drained by the Neshaminy and Perkiomen creeks. The surface is mostly undulating or hilly; the soil is productive and well cultivated. Cattle, grain, tobacco, wool, and hay are staple products. Quarries of limestone and sandstone, valuable for building, have been opened in this county, and iron, titanium, and zircon are found in it. The manufacturing interests include lumber, leather, cigars, wagons, clothing, and many other commodities. It is intersected by the North Pennsylvania R. R. and the Philadelphia and Trenton R. R. Capital, Doylestown. Pop. 64,336.

Bucks, a township of Tuscarawas co., O. Pop. 1127.

Buck's, a township of Horry co., S. C. Pop. 1481.

Buck'shoal, a township of Yadkin co., N. C. Pop. 1390.

Bucks'port, a township and village of Humboldt co., Cal. The village is on Humboldt Bay; lat. 40° 46′ 37.09″ N., lon. 124° 10′ 43.8″ W. Pop. 388.

Bucksport, a post-village of Hancock co., Me., in Bucksport township, and on the left (E.) bank of the Penobscot River, 18 miles S. of Bangor. It derives its support from shipbuilding, fisheries, and commerce. It has a national bank, manufactures of various kinds, and is the seat of the East Maine Conference Seminary. Pop. of the township, 3433.

Buck'skin, a township of Ross co., O. Pop. 2229.

Buck'stone (JOHN B.), an English dramatist and comic actor, born in 1802. He performed with success in London, and wrote a great number of popular dramas, among which are "The Green Bushes," "The Rough Diamond," "The Wreck Ashore," and "Good for Nothing."

Bucks'wort, a township of Marshall co., Ala. P. 390.

Buck'thorn, a township of Mecklenburg co., Va. Pop. 2046.

Buckthorn (*Rhamnus*), a genus of shrubs or small trees of the order Rhamnaceæ, distinguished by a bell-shaped calyx which is four or five cleft, and petals which are small and sometimes wanting. The fruit is a berry-like drupe, containing two to four separate seed-like nutlets. The species are numerous, and natives of many temperate and tropical regions. The common buckthorn (*Rhamnus catharticus*) is a deciduous shrub, a native of Europe, and naturalized in the U. S. It has spiny branches, ovate leaves, and small black berries (or drupes) which are nauseous and purgative, and which yield the pigment called sap-green (or bladder-green). This shrub is planted for hedges in the U. S. The Atlantic U. S. have two native species. The alder buckthorn (*Rhamnus Frangula*) is a European shrub which is not armed with spines, and has ovate, entire leaves. The berries are violently cathartic. The bark has been employed in medicine, and is used for dyeing yellow. The unripe fruit of dyers' buckthorn (*Rhamnus infectorius*), a shrub which grows in Southern Europe, yields a bright yellow dye. The so-called French berries or Avignon berries used by dyers are the fruit of the last and other species.

Buck'town, a township of Dorchester co., Md. P. 885.

Buck'wheat* (*Fagopyrum esculentum* or *Polygonum Fagopyrum*), an annual plant of the order Polygonaceæ, is said to be a native of Central Asia and the basin of the Volga. It is cultivated for food in Europe and the U. S., thrives on poor soils, and grows to the height of two feet or more. It has triangular, heart-shaped or halberd-shaped leaves. The seeds are triangular and resemble a beech-nut in form. Cakes of buckwheat eaten warm are a favorite article of food, which is very nutritious. Buckwheat meal contains about 10 per cent. of gluten and 50 per cent. of starch. Bees are partial to the flowers of this plant, which secrete a large portion of honey, which, however, is not of the first quality. Buckwheat comes to maturity in a shorter time than most other grains, and may be sown late. In the U. S. the seeds are usually sown broadcast. The quantity of seed required for one acre is a bushel or one bushel and a half. It requires little manure, and does not exhaust the soil. A good crop of this grain yields about forty bushels on an acre, and a bushel of it weighs from forty-five to forty-eight pounds.

* Originally "beech-wheat," because its seeds are shaped like beech-nuts; in German it is *Buchweizen*, which is literally "beech-wheat."

Another species, called Tartarian buckwheat (*Fagopyrum Tartaricum*), is a hardy native of Siberia, and is adapted to cold climates. It is distinguished from the common buckwheat by the toothed edges of its seeds, and is inferior in quality.

Buckwheat Tree, a small tree or shrub of Georgia and the Gulf States (the *Cliftonia ligustrina*), a smooth, elegant evergreen of the order Cyrillaceæ. It has clusters of white, fragrant blossoms in March, April, and May. It grows around swamps, ponds, and streams, and is often called *titi*. Its pendulous winged fruit is sometimes shaped like a kernel of buckwheat; whence the name.

Bucol'ic [Gr. βουκολικός (from βουκόλος, an "ox-herd," derived from βοῦς, an "ox," and κολέω, to "care for," a word which only occurs in compounds, but whose root is seen in the Lat. *colo*); Lat. *bucolicus*], pastoral or pertaining to herdsmen. This term is applied to a kind of pastoral poetry written in hexameter verse. The poems of Theocritus and the "Eclogues" of Virgil are the most perfect models of bucolic poetry.

Buctouche, a port of Wellington township, Kent co., New Brunswick, on Buctouche River, has considerable shipbuilding, and a trade in oysters and lumber. Pop. about 500.

Bucy'rus, the county-seat of Crawford co., O., on Sandusky River, on the Pittsburg Fort Wayne and Chicago R. R., 62 miles N. of Columbus. It is the seat of a large farming and manufacturing community, has the largest union school-house in the State, and is well supplied with churches. There are mineral springs in the town and neighborhood. The skeleton of a mastodon was found in the vicinity in 1838. It has one national bank and two weekly and one semi-weekly paper. Pop. 3066; of township, 4184.

J. R. Clymer, Ed. "Crawford County Forum."

Buczacz, a town of Austria, in Eastern Galicia, often mentioned in the wars between Poland, Hungary, and Turkey. Pop. 8523.

Bu'da [Ger. *Ofen;* Slavonic, *Budin;* Lat. *Buda*], a free city of the Austrian empire, capital of Hungary, is on the right bank of the Danube, opposite Pesth, with which it is connected by a magnificent suspension bridge. It is 130 miles S. E. of Vienna, and in lat. 47° 29′ N., lon. 19° 3′ E. It is built in the form of an amphitheatre around a hill which rises 485 feet above the level of the sea, and presents a picturesque appearance. This hill is crowned by a citadel and a royal palace. The other remarkable edifices are the cathedral, the palaces of the nobility, and the observatory, which is on the top of a hill called Blocksberg. Here are hot sulphur springs, from which Buda derives its German name of *Ofen—i. e.* "oven." It has manufactures of silks, velvets, cotton and woollen goods, leather, and gunpowder. Large quantities of excellent wine, called *Ofner*, are produced in this vicinity. Buda was formerly considered the key of Christendom. It was taken by Solyman the Magnificent in 1541, and occupied by the Turks until 1686. Pop. in 1869, 53,998.

Buda, Old [Ger. *Alt Ofen;* Hun. *O'Buda*], a municipal town of Hungary, in the county of Pesth, on the Danube, almost adjoining the suburbs of Buda. It is supposed to be the ancient *Sicambria*. Pop. in 1869, 16,002.

Buddæ'us (John Francis), a distinguished Lutheran theologian and philosopher, born at Anclam June 25, 1667. At the age of twenty he was master of arts and adjunct professor in the philosophical faculty at Wittenberg, and in 1689 at Jena. He was elected in 1692 professor of the Greek language at Coburg, and in 1693 he was invited to take the chair of moral philosophy at Halle. In 1705 he became professor of theology at Jena. His position was one which harmonized orthodoxy and pietism. His erudition was enormous (he was the most universal scholar among the theologians of his time), yet accurate, and his judgment was of the most solid kind. He wrote more than a hundred books, most of which are still sought by scholars, and several of which are acknowledged standards. His practical skill as an instructor was of a high order, and many of his pupils rose to great eminence. His writings which are most read in our day are "Institutiones Philosoph. eclecticæ," "Theologia Moralis," "Historia Ecclesiæ Veteris Testamenti," "Theologia Dogmatica," "Isagoge ad Theologiam Universam," "Ecclesia Apostolica." In philosophy he was an eclectic. His writings are marked by tact, clearness, logical arrangement, and ease of style. His Latin is above the common standard. He was distinguished for his eminent purity of character, his fidelity to the faith of the Church, and his firmness and moderation towards those who dissented from it. Died at Jena Nov. 19, 1729.

C. P. Krauth.

Buddha, or **Buddhism.** See Booddha.

Bud'ding, or **Inocula'tion,** is a mode of propagating improved and choice varieties of fruit which cannot be reproduced by seeds. It is the best mode of propagating peaches, and is convenient in the case of plums, cherries, apples, pears, roses, etc. The best time for budding is the last half of summer. The operation is performed by opening the bark of the stock with a vertical and transverse cut, nearly like a letter T, and inserting into it a leaf-bud of another variety. The length of the bark and wood cut off with the bud is about one inch. These buds are taken from a branch formed in the present or preceding year. They should be cut squarely at the top, so as to fit the transverse section of the bark of the stock. The leaf growing close to the bud should be cut off. The process is finished by tying the bud with bass matting, soft cotton twine, or woollen yarn. The operation just described is called "shield-budding," and is more rapidly performed than grafting.

Bud'dlea, a genus of shrubs of the natural order Scrophulariaceæ, comprises many species, which are natives of warm climates. Some of them are prized for the beauty of their flowers. *Buddlea globosa,* a native of Chili, is cultivated in gardens, and is hardy enough to bear the climate of England. It has globose heads of orange-colored flowers. *Buddlea Neemda,* a native of India, has beautiful flowers.

Bude Light, a name originally applied to a brilliant light invented by a Mr. Gurney of Bude, in Cornwall, England. He introduced a stream of oxygen into a flaming jet of oil or gas. The expense of this system has prevented its general use. The same name is sometimes inappropriately given in England to other similar inventions.

Budg'ell (Eustace), an English essayist, born at Exeter in 1685, was a friend of Addison. He contributed to the "Spectator" a number of essays signed "X." Having lost about £20,000 by the South Sea Bubble, he committed suicide May 4, 1737.

Bud'get [Fr. *bougette*], originally a bag, a small sack with its contents; hence a stock, a store, or collection of things. In England the term is applied to a condensed statement of the revenue and expenditure of the nation; an annual financial statement which the chancellor of the exchequer presents in a speech to the House of Commons. It comprises an exposition of the relative amounts of money received and expended during the past year, an estimate of the probable expenditures of the ensuing year, and sometimes a scheme to meet by a loan or new taxes the actual or anticipated deficit. Budget is also used in France to denote the annual financial statement.

Bud'ington (William Ives), D. D., a Congregational clergyman, born April 21, 1815, at New Haven, Conn., graduated at Yale College in 1834, studied theology at the Yale Divinity School and at Andover, leaving the latter institution in 1839. He was ordained pastor of the First church, Charlestown, Mass., April 22, 1840, where he remained fourteen years. In 1855 (April 22) he took charge of the Clinton avenue Congregational church, Brooklyn, N. Y. In 1845 he published "History of the First Church, Charlestown, Mass.," and has also published occasional sermons. He is an eloquent and acknowledged leader in the denomination to which he belongs.

Bud'ukhshan, or **Fy'zâbâd,** a town of Independent Tartary, is on the river Budukhshan, 180 miles N. N. E. of Cabool. It was once an important place, having valuable mines of rubies in the vicinity.

Bud'weis, or **Bud'witz,** a town of Bohemia, on the Moldau, 77 miles S. of Prague. It is well built, has a cathedral, a gymnasium, and an academy; also manufactures of woollen cloths, muslins, damasks, etc. A railway extends from this town to Linz. Pop. in 1869, 17,413.

Bu'el, a post-township of Sanilac co., Mich. Pop. 216.

Buel (Jesse), a journalist, born at Coventry, Conn., Jan. 4, 1778. He founded the "Albany Argus," a Democratic journal, in 1813, and in 1834 became the first editor of the "Albany Cultivator," an agricultural paper. He also published the "Farmer's Companion." Died Oct. 6, 1839.

Bu'ell (Don Carlos), an American officer, born Mar. 23, 1818, near Marietta, O., graduated at West Point in 1841, and after serving in the infantry till 1848, became, July 17, 1862, assistant adjutant-general U. S. A., rank of colonel, and Mar. 21, 1862, major-general U. S. volunteers. He served in the Florida war 1841–42, on frontier duty 1843–45, in the military occupation of Texas 1845–46, in the war with Mexico 1846–48, engaged at Palo Alto, Resaca de la Palma, Monterey (brevet captain), Vera Cruz, Cerro Gordo, and Churubusco (severely wounded and brevet major), and as adjutant of the Third Infantry 1847–48, as assistant adjutant-general at Washington, D. C., 1848–49, and at head-quarters of various departments 1849–61. In the civil war he was in command of the department of the Ohio 1861–62, in command of the army of the Ohio 1862, engaged

at the battle of Shiloh, siege of Corinth, operations in Northern Alabama, and the retreat to Louisville to cut off the army of Bragg, which he drove from Kentucky, and before a commission to investigate his operations 1862–63. He resigned from the army June 1, 1864, and since 1865 has been president of the Green River (Ky.) Iron-works.

GEORGE W. CULLUM, U. S. A.

Bu'el's Gore, a township of Chittenden co., Vt. P. 29.

Bue'na Vis'ta, a county in the N. W. of Iowa. Area, 600 square miles. It is drained by the Little Sioux and Raccoon rivers. The surface is undulating; the soil is fertile. Cattle, grain, and wool are raised. It is intersected by the Dubuque and Sioux City R. R. Capital, Sioux Rapids. Pop. 1585.

Buena Vista, a township of Columbia co., Ark. P. 538.

Buena Vista, a township of Stanislaus co., Cal. Pop. 357.

Buena Vista, a post-village, capital of Marion co., Ga., 33 miles S. E. of Columbus. Pop. 525.

Buena Vista, a township of Schuyler co., Ill. Pop. 1152.

Buena Vista, a township of Clayton co., Ia. P. 308.

Buena Vista, a township of Jasper co., Ia. P. 1073.

Buena Vista, a post-township of Saginaw co., Mich. Pop. 1005.

Buena Vista, a township of Humboldt co., Nev. Pop. 520.

Buena Vista, a township of Atlantic co., N. J. Pop. 948.

Buena Vista, a township of King and Queen co., Va. Pop. 2985.

Buena Vista, a post-township of Portage co., Wis. Pop. 624.

Buena Vista, a township of Richland co., Wis. Pop. 1044.

Buena Vista, a hamlet in Mexico, situated about 90 miles S. W. of Monterey and 7 miles S. of Saltillo, famous for the battle fought in its vicinity between the American forces under Gen. Zachary Taylor and the Mexican army under Santa Anna, Feb. 22–23, 1847. Gen. Taylor, having become assured, from reconnoissances on Feb. 20, that the enemy was in heavy force at Encarnacion, 30 miles in front of Agua Nueva, with the evident intention of attacking his position, withdrew his army on the 21st from the camp at Agua Nueva, which could be turned on either flank, and took up a strong line a little in front of Buena Vista, 7 miles south of Saltillo. A cavalry force left at Agua Nueva for the purpose of covering the removal of supplies was driven in during the night, and on the morning of the 22d the Mexican army appeared immediately in front of Buena Vista, and at 11 A. M. (Feb. 23) a flag was sent from Santa Anna with a summons of unconditional surrender, to which Gen. Taylor laconically replied that he "declined to accede to the request."

The line occupied by the American troops was one of remarkable strength. The road at this point becomes a narrow defile, the valley on its right being rendered impracticable for artillery by a system of deep and impassable gullies, while on the left a succession of rugged ridges and precipitous ravines extends back towards the mountain which bounds the valley. The features of the ground were such as nearly to paralyze the artillery and cavalry of the enemy, while his infantry could not derive all the advantage of his numerical superiority. The action was commenced about 3 o'clock in the afternoon of the 22d, between the light troops on the left, and skirmishing continued till dark, but no serious attack was made until the morning of the 23d. During the night of the 22d the Mexicans had occupied the mountain-side by light troops, with the intention of forcing the left flank of the American army, and it was here that the action commenced on the 23d, and an obstinate and sanguinary conflict was maintained, with short intervals and varying success, throughout the day, resulting in the repulse of the enemy from our lines, which, however, had been much contracted since morning. An attack of cavalry upon Buena Vista and a demonstration upon Saltillo were also repelled, and during the night Santa Anna abandoned his position and fell back upon Agua Nueva. A reconnoissance made on the 26th disclosed the fact that the retreat had been continued in the direction of San Luis Potosi, and Gen. Taylor resumed his former camp at Agua Nueva on the 27th.

The American force engaged was about 5200, while the Mexican army was stated by Santa Anna in his summons to be 20,000 strong. The American loss was 746, of which 267 were killed; the Mexican loss in killed and wounded was about 2000. Much of the credit of final success in this unequal contest is due to the uniform bravery and efficiency of the regular artillery; the volunteers, though at times displaying the greatest courage, were wanting in discipline and experience, and but for the steady behavior of the regular troops the result must at least have been less decisive and complete.

Buen Ayre, one of the Dutch West India Islands, is near the coast of Venezuela, 30 miles E. of Curaçoa. Length, 20 miles; average width, 4 miles. It has a tolerable harbor, and produces cattle and salt. Pop. in 1870, 3870.

Bue'nos Ay'res, a province of the Argentine Republic, is bounded on the N. E. by the Rio de la Plata, on the E. and S. E. by the Atlantic Ocean, and on the S. W. by the Rio Negro, which separates it from Patagonia. The area is estimated at 72,400 square miles. The surface is an alluvial plain, in which timber and stones are scarce; the soil is mostly fertile. Here are vast treeless, grassy plains, called *Pampas*, which afford pasture to immense herds of cattle and horses. These constitute the principal riches of the inhabitants. This province is not liberally supplied with rivers or running streams, but contains a great number of salt lakes. The principal river besides the Paraná (La Plata) is the Rio Colorado, which traverses the S. W. part of the province. The climate in the N. part is mild, and has a mean summer temperature of 90° F. It became independent of Spain in 1810, seceded from the Argentine Republic in 1853, and was reunited to it in June, 1860. A large number of Europeans have recently emigrated to this province. Capital, Buenos Ayres. Pop. in 1869, 495,107.

Buenos Ayres, a seaport of South America, and the largest city of the Argentine Republic, is situated on the right bank of the La Plata, and 150 miles from the ocean; lat. 34° 36′ S., lon. 58° 22′ W. It is the capital of the state or province of Buenos Ayres, and is nearly opposite to Montevideo, which is 100 miles distant. The streets cross each other at right angles, are paved with granite, and bordered by low brick houses, which usually have each a garden adjoining. The principal public buildings are a large cathedral, numerous churches, the house of representatives, and a college, with which are connected a large library, an observatory, and a normal school. The adjacent country is alluvial, and nearly destitute of timber. The climate is dry and healthy, but variable. Among the disadvantages of this city is a scarcity of fresh water, which can be obtained only from the river, and is conveyed about the streets in carts. The trade and prosperity of Buenos Ayres are impeded by the want of a safe and commodious harbor. Vessels drawing more than twelve feet of water cannot come within five miles of the city, and smaller vessels usually anchor one mile from the shore. During a S. E. wind vessels are here exposed to a violent surf. The chief articles of export are precious metals, hides, beef, wool, tallow, horns, and skins. In 1866 the exports amounted to $22,312,400, and the imports to $31,218,000. Several English and French newspapers are published here. This city was founded by the Spaniards in 1580, and became the capital of the viceroyalty in 1776. Its growth has been retarded by civil wars and political commotions. Pop. in 1868, 180,000.

Buf'falo, a name given to two species of ruminant animals of the family Bovidæ, the *Bubalus Buffelus* and *Bubalus Caffer*. The former is a native of India, where it has been long domesticated, and is an important and useful animal. It is generally used as a beast of burden in India and also in Italy, where it was introduced about 600 A. D. It is larger and more powerful than an ox, and has a larger head in proportion to the size of the body; the dorsal line rises into a considerable elevation above the shoulders. It has large crooked horns, which are curved first outward and downward, and next backward and upward. The buffalo is partial to marshy places, and is addicted to wallowing in the mud and shallow water. Its flesh is inferior to that of the ox, but the milk of the female is said to be excellent in quality. The tame buffaloes of India are easily managed and guided by a mere rope, and the driver often rides on their backs. The jungles of India are also infested by wild buffaloes of the same species, sometimes called arna or arnee, a fierce and dangerous animal, which is more than a match for a tiger. The Cape buffalo (*Bubalus Caffer*) is a native of South Africa, and has not been domesticated. It has large horns, the bases of which are close together. The horns spread or diverge laterally, are next bent downward, and

Cape Buffalo.

have the point curved upward and inward. The animal measures about eight feet from the base of its horns to its tail, and is about five and a half feet in height. It is a dangerous animal, which will attack men without provocation, but it is sometimes mastered by the lion. Its hide is so thick and tough that the Caffers make of it shields impenetrable to a musket-ball. Vast herds are found in S. Africa. (For the American buffalo see BISON.)

Buffalo, a county of Central Dakota, bounded on the W. by the Missouri River. Area, 750 square miles. Iron ore is found. Pop. 246.

Buffalo, a county of Central Nebraska. Area, 850 square miles. It is bounded on the S. by the Platte River, and also drained by Wood River and a stream called South Branch. The soil is fertile. The county is intersected by the Union Pacific R. R. Capital, Gibbon. Pop. 193.

Buffalo, a county of Wisconsin, bordering on Minnesota. Area, 650 square miles. It is bounded on the S. W. by the Mississippi River, on the W. by the Chippewa. The surface is diversified; the soil is fertile. Grain and wool are staple products. Capital, Alma. Pop. 11,123.

Buffalo, a township of Craighead co., Ark. Pop. 221.

Buffalo, a township of Marion co., Ark. Pop. 268.

Buffalo, a township of Searcy co., Ark. Pop. 195.

Buffalo, a township of Ogle co., Ill. Pop. 3524.

Buffalo, a township of Buchanan co., Ia. Pop. 598.

Buffalo, a township of Linn co., Ia. Pop. 508.

Buffalo, a post-township of Scott co., Ia. Pop. 1435.

Buffalo, a township of Cloud co., Kan. Pop. 303.

Buffalo, a post-village, capital of Wright co., Minn., in a township of its own name, on a small lake about 45 miles W. N. W. of St. Paul. Pop. of the township, 508.

Buffalo, the capital of Dallas co., Mo., 4 miles W. of Niaugua River and 33 miles N. E. of Springfield, has fine iron and lead ore, several mines in operation, and also has coal. It is on the line of the Laclede and Fort Scott R. R., and has a fine court-house and two weekly papers. P. 278. A. G. HOLLENBECK, ED. "REFLEX."

Buffalo, a township of Morgan co., Mo. Pop. 543.

Buffalo, a township of Newton co., Mo. Pop. 785.

Buffalo, a township of Pike co., Mo. Pop. 2880.

Buffalo, a township of Caldwell co., N. C. Pop. 792.

Buffalo, a city, port of entry, and shire-town of Erie co., N. Y., in lat. 42° 53′ N., lon. 78° 55′ W., at the foot of Lake Erie, and at the head of Niagara River. It is also the western terminus of the Erie Canal. In population and wealth it is the third city in the State. The city is delightfully situated, having a water-front of about five miles, with numerous substantial and extensive piers, breakwaters, basins, and canals, constructed at an expense of several millions of dollars, partly by the Federal government and partly by the State and municipal authorities. The city extends down the Niagara River five miles, and at right angles with it about the same distance, but the northerly and easterly portions are sparsely settled.

On the 31st of Dec., 1813, Buffalo, then containing about 200 inhabitants, was burned by the British. After the war it speedily began to increase, and in 1828 contained about 7000 inhabitants, the completion of the Erie Canal in 1825 giving a strong impetus to its growth. It became a city in 1832, and then had 15,000 inhabitants; in 1835 it contained 15,700; in 1840, 18,200; in 1845, 30,200; in 1850, 42,300; in 1855, 74,200; in 1860, 81,130; in 1865, 94,210; and in 1870, 117,714. A private enumeration in 1873 indicated that the population had reached 161,782. The report of the State assessors for 1873 puts the valuation, for the purpose of taxation, at $38,000,000. The "true valuation," according to the census of 1870, was $110,100,000.

Buffalo is noted for its wide and beautiful streets, and the profusion of trees and shrubbery with which they are decorated. It claims to be the best paved, best lighted, and best sewered city in the U. S. It has long been a most important commercial entrepôt, especially in the receipt, handling, and shipment of grain. In 1872 there were received by lake over 62,000,000 bushels of grain (including flour estimated as wheat), and at least 30,000,000 bushels by rail, making 92,000,000 bushels in a single year. In addition there were receipts of lumber, live-stock, and other property, estimated to equal the grain receipts in value. In addition to the water-communication by lake and canal, which is practically unlimited, Buffalo has railroad trunk-lines in almost every direction—viz. the New York Central, the Erie, the Lake Shore, the Buffalo New York and Philadelphia, the Grand Trunk and the Great Western, the Canada Southern, and the Buffalo and Jamestown R. Rs. The New York and Oswego Midland, the Lake Ontario Shore, and the Northern Pacific R. Rs. will be important auxiliaries to Buffalo's growth and commerce. The Niagara is here crossed by a fine iron truss railroad bridge.

In the public works essential to a large city Buffalo is either already well supplied or is rapidly becoming so. It has extensive waterworks, the property of the city; three gas companies; a magnificent park, and boulevards almost surrounding the city; a State normal school, a central grammar school, and thirty-six first-class district schools. A city and county hall will be completed in 1875. It is to be of granite, and the estimated cost is $1,250,000. The State is erecting an insane asylum, to accommodate 1000 patients, and to cost over a million dollars. The city contains a penitentiary and a county almshouse. There are four large markets; thirty grain-elevators; a stone post-office belonging to the U. S. government; a State arsenal; a commodious hall and library building belonging to the Young Men's Association; and over seventy church edifices. Of the latter, two (one Roman Catholic and the other Episcopalian) are imposing cathedrals. With literary, benevolent, and educational institutions Buffalo is well supplied. Among them may be named the Young Men's Association, with a library of 20,000 volumes, and real estate and buildings worth $250,000; the Society of Natural Science, with an extensive collection and a large museum of casts of fossil remains; a well-endowed art-gallery; an historical society, law library, mechanics' institute, Young Men's Christian Union, Grosvenor Library (free), a general hospital, orphan asylums, special hospitals, a medical college, a female seminary, and several Catholic colleges. There are ten lodges of Free Masons, four chapters of Royal Arch Masons, two councils, two commanderies, and a Masonic brotherhood of 2000. The Odd Fellows have ten lodges and two encampments. There are a number of singing societies and three clubs. Buffalo has twenty newspapers and periodicals, seven of them dailies. Their aggregate circulation, aside from advertising sheets, is about 75,000. There are eleven banks of discount, with an aggregate capital of $3,150,000; four savings banks, with deposits amounting to about $15,000,000; one fire insurance company, with $200,000 capital and $352,857 assets in July, 1873.

Buffalo is divided into thirteen wards, and its city government is composed of a mayor and twenty-six aldermen. It has a paid fire department, with twelve steam fire-engines, seven hose companies, three hook-and-ladder companies, one ladder-and-bucket company, and one tarpaulin-protection company.

At present the most important interest of the city is its commerce. The registered marine of the port on the 1st of Jan., 1873, was 726 vessels, of 145,116 tons, representing an investment of $54,000,000, and doing a business of $250,000,000 per annum. The lake tonnage was valued at but $24,000,000 in 1862, showing the remarkable growth of thirty millions in a single decade. The manufactures are rapidly increasing, especially those of iron. There are upwards of thirty large establishments, employing at least 5000 men, to say nothing of the smaller enterprises. The city has four blast furnaces, two large rolling-mills, several machine-shops, stove-foundries, iron shipyards, forges, etc. etc. It has large manufactories of agricultural implements, car-shops, tanneries, flouring-mills, etc. The opening of the Buffalo New York and Philadelphia Railway to the bituminous coal-fields of Pennsylvania has given a largely added impetus to manufactures. The census of 1870 gives the statistics of manufactures only by counties. We have therefore only the estimated manufactures of Erie county, and not those of Buffalo by itself; yet as most of the manufacturing of the county is conducted within its limits, we should not exceed the truth if we regarded the statistics of Erie county in 1870 as representing those of Buffalo in 1873. The growth of some manufactures within three years is undoubtedly greater than the total amount of manufacturing out of Buffalo in Erie county in 1870, when there were 1429 establishments, employing 13,274 persons and a capital of $13,043,790, paying wages to the amount of $4,946,414, using raw material to the value of $15,274,440, and producing annually $27,446,683. Iron and iron wares were produced to the value of $5,471,000; flour, etc., $1,981,932; clothing, $1,481,485; malt and distilled liquors, $2,240,330; lumber, planed and sawed, $1,786,441, besides $225,950 in sash, doors, and blinds; machinery, $1,252,445; leather, tanned and dressed, $1,701,044; metallic wares, $502,244; boots and shoes, $696,010; agricultural implements, $499,305; furniture, $590,719; tobacco, snuff, and cigars, $400,711; gas, $427,481; carriages and wagons, $363,257; malt, $600,821; boats, $311,820; cooperage, $286,800; vinegar, $271,000; bricks, $278,800; soap and candles, $341,599.

S. M. CHAMBERLAIN,
OF THE "COURIER AND REPUBLIC."

Buffalo, a township of Noble co., O. Pop. 780.

Buffalo, a township of Butler co., Pa. Pop. 1495.

Buffalo, a township of Perry co., Pa. Pop. 779.

Buffalo, a township of Union co., Pa. Pop. 1521.

Buffalo, a post-township of Washington co., Pa. Pop. 1189.

Buffalo, a township of Kershaw co., S. C. Pop. 1764.

Buffalo, a township of Prince Edward co., Va. Pop. 3415.

Buffalo, a township of Rockbridge co., Va. P. 2445.

Buffalo, a township of Brooke co., West Va. Pop. 2191.

Buffalo, a township of Clay co., West Va. Pop. 790.

Buffalo, a post-township of Putnam co., West Va. Pop. 1448.

Buffalo, a post-township of Buffalo co., Wis. P. 1594.

Buffalo, a township of Marquette co., Wis. Pop. 712.

Buffalo Bayou (or **River**) of Texas flows eastward through Harris co., passes by Houston, and enters Galveston Bay. Steamboats can ascend from its mouth to Houston, which is about 40 miles from the bay.

Buffalo Heart, a township of Sangamon co., Ill. Pop. 538.

Buffalo Lick, a township of Chariton co., Mo. Pop. 1267.

Buffalo Prairie, a post-township of Rock Island co., Ill. Pop. 1291.

Buffalo Springs, mineral springs of Mecklenburg co., Va., 7 miles W. of Clarksville. The waters of the springs are remarkably stimulant, and belong to the saline chalybeate class. They are especially recommended for various diseases of the mucous membranes.

Buffalo Station, a township of Wallace co., Kan. Pop. 10.

Buf'fer, an elastic cushion attached to a railway car or carriage, in order to break or moderate the shock when one car is pushed against another. It is usually formed of horse-hair covered with leather, of vulcanized caoutchouc, or of strong iron springs.

Buf'fington, a township of Indiana co., Pa. Pop. 877.

Buffon, de (Georges Louis Leclerc), Comte, a celebrated French naturalist and philosopher, born at Montbar, in Burgundy, Sept. 7, 1707. He was liberally educated, and travelled in his youth in Italy and England. In 1739 he was elected to the Academy of Sciences, and appointed intendant of the royal garden in Paris. He published in 1749 the first three volumes of his "Natural History" ("Histoire naturelle, générale et particulière"), in which he was assisted by Daubenton. Twelve other volumes of it appeared between 1749 and 1767. This work, which made an epoch in the study of the natural sciences, displays a brilliant imagination and presents many ingenious ideas. His writings obtained great celebrity, due partly to the fascination of his style. "Like all great poets," says Condorcet, "he knows how to render interesting the delineations of natural objects, by blending with them moral ideas which affect the soul at the same time that the imagination is amused or astonished." He was admitted into the French Academy in 1753, and married a lady named Saint-Belin in 1762. Among his most admired works is the "Epochs of Nature" ("Epoques de la Nature"), which appeared in a supplement to his "Natural History." He received from the king the title of Count de Buffon in 1776. Died in Paris April 16, 1788. (See Condorcet, "Éloge de Buffon;" Cuvier, "Éloge de Buffon," prefixed to an edition of the "Natural History," 36 vols., 1826; Flourens, "Buffon: Histoire de sa Vie, etc.," 1844.)

Bu'ford, a township of Union co., N. C. Pop. 1158.

Buford (John), an American officer, born in 1826 in Kentucky, graduated at West Point in 1848, captain Second Dragoons Mar. 9, 1859, and Dec. 16, 1863, major-general U. S. volunteers. He served on frontier duty 1848–61, as quartermaster of the Second Dragoons 1855–58, in the Sioux expedition 1855, engaged at Blue Water, in quelling the Kansas disturbances 1856–57, on the Utah expedition 1857–58. In the civil war he served as assistant inspector-general (major), making inspections 1861–62, in command of cavalry brigade in Northern Virginia campaign 1862, engaged at Madison Court-house, Kelley's Ford, Thoroughfare Gap, and Manassas (wounded), as chief of cavalry of the Army of the Potomac in Maryland campaign, engaged at South Mountain and Antietam, in Rappahannock campaign, commanding cavalry brigade, 1862–63, engaged at Fredericksburg, Stoneman's raid, and Beverly Ford, in command of a division of cavalry in the Pennsylvania campaign 1863, engaged at Gettysburg and numerous skirmishes, in Central Virginia 1863, engaged at Culpeper, Bristow Station, and numerous movements and skirmishes. He was an admirable cavalry officer, and from the effects of exposure and wounds died Dec. 16, 1863, at Washington, D. C.

George W. Cullum, U. S. A.

Buford (Napoleon B.), an American officer and engineer, born Jan. 13, 1807, in Woodford co., Ky., graduated at West Point in 1827, and April 15, 1862, brigadier-general U. S. volunteers. He served, while lieutenant of artillery, on garrison and topographical duty, and as assistant professor at the Military Academy till Dec. 31, 1835, when he resigned. He was civil engineer on the Licking River improvement 1835–42, iron-founder at Rock Island, Ill., 1843–61, president of the Rock Island and Peoria R. R. 1857–61, and president of the bank of the Federal Union, Rock Island, 1858–61. In the civil war he was colonel of the Twenty-seventh Illinois Volunteers till promoted brigadier-general, engaged in the battle of Belmont, demonstration on Columbus, Ky., attack of Island No. 10, capture of Union City, Ky., expedition to Fort Pillow, siege and battle of Corinth, Miss., siege of Vicksburg, and in command of Helena, Ark. Brevet major-general U. S. volunteers Mar. 13, 1865, for gallant and meritorious services, and Aug. 24, 1865, mustered out of volunteer service. He was superintendent of a mining company in Colorado, special U. S. Indian commissioner 1867–68, and Union Pacific Railway commissioner 1868–69.

George W. Cullum, U. S. A.

Buford Bridge, a post-township of Barnwell co., S. C. Pop. 1385.

Bug, or **Bog,** a river of Russian Poland, rises in Galicia, flows nearly northward and north-westward, and after a course of about 400 miles enters the Vistula at the fortress of Modlin, about 18 miles N. W. of Warsaw.

Bug, or **Bog** (anc. *Hypanis*), a river of Russia, rises in Podolia, flows nearly south-eastward, and enters the estuary of the Dnieper 30 miles W. of Kherson. Its whole length is estimated at 400 miles. It is navigable for small vessels from its mouth to Vosnesensk, upwards of 100 miles.

Bug'bie's Mill, a township of Baker co., Ala. Pop. 1436.

Bugeaud (Thomas Robert), duc d'Isly, a French general, born Oct. 15, 1784. Soon after the revolution of 1830 he was created a marshal of France. Having won several victories in Algeria, he was appointed governor-general of the same in 1840. He defeated the army of the emperor of Morocco at Isly in 1844. During the revolution of Feb., 1848, he commanded the army at Paris. Died of cholera in Paris June 10, 1849.

Bu'genhagen (Johann), surnamed Pomeranus, a learned German Protestant Reformer, born at Wollin, in Pomerania, June 24, 1485. He was converted to the doctrines of Luther in 1520, and became professor of theology at Wittenberg in 1522. He was a devoted friend of Luther, whom he assisted in the translation of the Bible, and he wrote several religious works. He organized churches in Hamburg, Brunswick, and Denmark. Died April 20, 1558.

Bug'hall, a township of Bullock co., Ala. Pop. 1823.

Bug'hill, a township of Columbus co., N. C. Pop. 513.

Bu'gis, a people of the Malay Archipelago, chiefly inhabiting Celebes and Macassar. They are noted for their commercial enterprise, and own many vessels employed in the navigation of the East Indian seas. They are muscular, middle-sized, and of a light-brown color, and have made considerable progress in civilization. They manufacture cotton cloth, build durable sailing-vessels, and are said to be skilful workers in copper and iron.

Bu'gle, a brass musical wind instrument, which has been improved by keys so as to be capable of all the inflections of the scale.

Bugle (*Ajuga*), a genus of plants of the natural order Labiatæ, has an irregular corolla with a very short upper lip and trifid lower lip. The species are mostly natives of the colder parts of Europe or Asia. The *Ajuga reptans* is common in British pastures and woods. The Alpine bugle (*Ajuga Alpina*) has beautiful flowers.

Bu'gloss [Gr. βούγλωσσος, *i. e.* "ox tongue," perhaps from the shape and roughness of its leaves], a common name given to several species of plants of the order Boraginaceæ and of the genera *Anchusa* and *Lycopsis*. The *Lycopsis arvensis* is a common weed in the grain-fields of Great Britain. The *Lycopsis* has a funnel-shaped corolla with a curiously curved tube. The *Echium vulgare*, called viper's bugloss, is a native of Europe and naturalized in the U. S.

Bugul'ma, a town of Russia, in the government of Samara, 170 miles S. E. of Kasan. Pop. 5455.

Buguruss'lau, a town of Russia, in the government of Samara, 65 miles S. of Bugulma. Pop. 7440.

Buhl-Work, or **Boule-Work,** a kind of marquetry or inlaid work in wood, gilt metal, or tortoise-shell, the name of which is derived from its inventor, Boule, a French cabinetmaker (1642–1732). He employed veneers of dark-colored tortoise-shell, inlaid with brass, and was patronized by several sovereigns. A German named Reisner made cabinets which were highly prized, in which he used woods of contrasted colors.

Bujalan'ce, a town of Spain, in the province of Córdova, about 18 miles E. of Córdova. It is surrounded by a wall flanked with old towers, and has an old Arabian castle and a college. Here are manufactures of woollen goods, glass, and pottery. Pop. 8312.

Bukâ' a, the modern Arabic name of the ancient Cœle-Syria (which see).

Bukovi'na, a province of Austria, is bounded on the N. by Galicia, on the E. and S. by Roumania, and on the W. by Hungary, Transylvania, and Galicia. Area, 4035 square miles. With the exception of both banks of the Pruth, its chief river, the country is mountainous throughout. The climate is severe, but healthy. It has very little commerce and industry. The chief occupations of the inhabitants are agriculture and cattle-raising. Iron, copper, and rock-salt are mined in large quantities. Bukovina was originally a part of Transylvania, with which country it passed under Turkish rule in 1529, was ceded to Austria in 1777, united with Galicia in 1786, and organized as a separate crown-land in 1849. Pop. in 1869, 513,404.

Bula'ma Boil, a painful affection of the skin somewhat resembling an ordinary boil in appearance. It prevails in Bulama and the neighboring islands, known as the Bissagos (which see). It is said to be caused by the larva of some insect, and that the only cure for it is to remove the larva, which burrows beneath the skin.

Bulb [Gr. *βολβός*; Lat. *bulbus*], in botany, a short stem or bud (usually subterraneous), covered with imbricated scales, having at their base a disk, from which the roots grow downward, while from the middle of the scales an annual herbaceous stem grows upward. The scales are regarded as modified leaves, and are sometimes all fleshy; sometimes the outer scales are membranous, as in the onion. The corm of the crocus is often called a solid bulb. Plants which are produced from bulbs are usually called bulbous-rooted. The bulb is generally subterranean, but sometimes grows above ground in the axils of the leaves, as in the tiger lily. When the scales are broad and enwrap all that is within, so as to form a succession of coats one over another, the bulb is said to be tunicated. The onion, tulip, and hyacinth are familiar examples of such bulbs. Most bulbs, if removed from the ground when vegetation is most dormant, may be kept in a dry place without injury. The flora of the Cape of Good Hope is remarkable for the abundance of bulbous-rooted plants, many of which bear beautiful flowers.

The term "bulb" is also applied to the round cavity at the lower end of the tube of a thermometer.

Bul'bul, the Persian name of the nightingale, is sometimes used by English poets. The same name is given by the people of India to a different species of bird, the *Pycnonotus hæmorrhous,* of the tribe Dentirostres. It is a small bird of brilliant plumage, and remarkable for its pugnacity and its sweet song.

Bulga'ria (anc. *Mœsia Inferior*), a province of European Turkey, is bounded on the N. by the Danube, on the E. by the Black Sea, and on the S. by the Balkan Mountain range, which separates it from Rumili, and on the W. by Servia. Area, 28,700 square miles. The surface is level in the N., and mountainous in the S., and is generally well wooded. The soil in some parts is fertile. It is drained by numerous small tributaries of the Danube. The chief articles of export are horned cattle, grain, wine, iron, wood, hides, wax, and attar of roses. The principal towns are Varna, Widin, Silistria, Sophia, and Schoomla. The Bulgarians belong to the Greek Church, but have for many years been endeavoring to become independent of the patriarchate of Constantinople, and to have all the Bulgarian dioceses of Turkey united under one Bulgarian exarch. The demand was granted by the Turkish government in 1872. They are of the Slavic race, as is shown by their language. This province was conquered by the Turks in 1392. Pop. about 2,250,000.

Bulk'heads, in a ship, are the partitions between the several portions of the interior, whether to separate it into rooms or as a safeguard in case of wreck. In ships of war, the bulkheads or partitions between the several cabins or storerooms are chiefly of wood, and most or many of these are removed when preparing for action, in order to obtain clear space for working the guns. In emigrant ships the bulkheads between the cabins are frequently mere lattice-work.

Watertight bulkheads are among the improvements in modern shipbuilding; they are iron walls running athwart the hold, as a means of dividing it into several portions; the interior is thus cut off into cells, each watertight in reference to its neighbors. When such a ship is leaking in any one of the compartments, there is thus a chance that the others may be kept dry until the damage is repaired. Most of the large passenger-steamers are to some extent provided with these bulkheads.

Bulk'ley (Eliphalet Adams), born at Colchester, Conn., June 29, 1803, graduated at Yale in 1824, became a lawyer of Hartford, Conn., was for many years the president of life insurance companies, and accumulated a large fortune. Died Feb. 13, 1872.

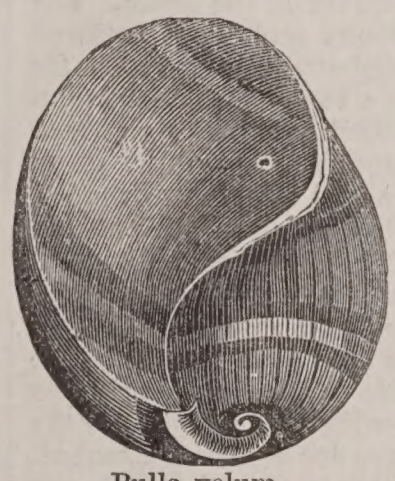
Bull [Lat. *taurus;* Fr. *taureau*], the male of animals belonging to the family Bovidæ and genus *Bos.* (See Bovidæ and Ox.) Also the name of one of the twelve signs of the Zodiac, and of a constellation which does not coincide with the sign. (See Taurus.)

Bull [Lat. *bulla,* a "seal;" so called from the seal mentioned below], or **Papal Bull,** an ordinance or decree of the pope, equivalent to the edicts, proclamations, or letters-patent of secular sovereigns, some of which are, however, called bulls. (See Bull, Golden.) All bulls are written in Latin, except those addressed to the United Greek churches. They are generally designated by the first words of the text; thus the bull issued in 1536 against heretics was called the bull "In Cœna Domini," and that directed against the Jansenists in 1713 was the bull "Unigenitus." The publication of a bull is termed fulmination (from the Lat. *fulmino, fulminatum,* to "hurl a thunderbolt," *fulmen*). Bulls are written on parchment, and the leaden seal of the Church is appended to every bull by means of a silken cord if the bull be a gracious one, but if it be severe the cord is of hemp. A collection of papal bulls is called a "bullarium."

Bull (Ole Bornemann), a famous Norwegian violinist, born at Bergen Feb. 5, 1810. He visited Paris in his youth, and afterwards performed in Italy and England with great applause. In 1845 he came to the U. S., purchased a large tract of land in Pennsylvania, and founded the colony of Oleona. This proved to be a failure, and he returned to Europe. He has since resided in the U. S. several times.

Bul'la, a Latin word signifying a "bubble," also a stud or boss with which the ancient Romans ornamented their dress or military equipments; an amulet or ornament, in the shape of a heart, worn round the neck by noble Roman children until they were seventeen years old, when the bulla was consecrated to the Lares.

Bulla, a genus of gasteropodous mollusks, having the male and female organs of sex in the same individual. They have a convoluted and generally thin shell, which serves as a protection for the gills, and which in some species is large enough for the entire animal; in others it is itself enveloped in the mantle. The mouth of the shell is large, extending the whole length, widening towards one end, the lip being acute. The gizzard is very muscular, and among its thick coats, in some species, are found calcareous plates, which, being moved against each other by muscles, serve to grind the food. All the species are marine, and some are found on the American coasts. Some, from their form and fragility, are called bubble-shells. The *Bulla velum* of the Indian and European seas is one of the most elegant.



Bulla velum.

Bull-baiting, a sport once very common in England, and in which all classes delighted, but now rare even among the lowest. It consists in causing a bull to be attacked by dogs; and that the bull may be made as furious as possible, his nose is sometimes blown full of pepper. Another form of this sport is to fasten the bull by a rope, and to send bull-dogs against him, one at a time, to seize him by the nose; this is called *pinning* the bull. No small enjoyment is derived from the success with which the attacks of the dogs are met by the bull lowering his head and receiving them on his horns, often tossing them to a great distance.

Bull-dog [so-called from the now obsolete practice of causing this animal to fight with the bull], a variety of the dog especially bred in England, and more remarkable for

courage, persistency, and strength than for docility or intelligence. It is now much less frequently bred than in past times. The size of the neck and fore quarters of this dog is quite in excess of the development of the other parts. The bull-dog is one of the most fierce, and even dangerous, of his species. Its chief value at present is for crossing with other breeds. The greyhound, the terrier, and the pointer, each have their courage and persistency much improved by this cross, if judiciously made.

Bull'et [Fr. *balle;* Ger. *Kugel*], a projectile of lead to be discharged from various kinds of small-arms. For smooth-bore arms bullets are usually spherical, but for rifled musketry various forms of the elongated bullet are used. Most of these bullets have an expansive base, either hollow or plugged with wood; the design being to force the soft lead outward, so as to cause it to fit the grooves of the rifle, and thus give the bullet a rotation around its long axis during the motion forward. This rotation, as is well known, increases the range and precision. Bullets were formerly always cast, but now they are more frequently stamped in steel dies. Copper bullets are used by the Circassians.

Bull'etin [Fr.], in diplomatics, a term equivalent to schedule, and variously applied to different public acts. In recent times the word is often used to denote an official report, a despatch of a military commander, and in a wider sense any public notice or announcement, especially of recent events. In France the ticket or slip of paper which each elector uses in voting at elections is called a bulletin. In the U. S. official bulletins of the weather are issued daily by the war department.

Bull-fight [Sp. *corrida de toros* or *fiesta de toros*], a combat of men with bulls for public entertainment. They were common in Thessaly and in Rome under the emperors, where they were introduced by Julius Cæsar B. C. 45, though in later times they were forbidden. They were introduced into Spain by the Moors before 800 A. D. They are still a favorite pastime in Spain, Spanish America, etc. In Spain they were abolished by Charles IV., but Joseph Bonaparte re-established them, the mass of the population being passionately fond of the sport. Bull-fights were at one time instituted by the monarchs themselves; at present they are held either as private speculations or for the benefit of public institutions. In Madrid the proceeds go to the hospital. The fights take place in the Plaza de Toros, round which the seats rise like the steps of a stair, with a tier of boxes over them. This plaza at Madrid is capable of containing 10,000 people, who pay a high price for admission. The men employed in the fight have generally been bred to it, but amateurs may take part. The bull-fight is divided into three acts. The performers in the first are the *picadores;* in the second, the *chulos;* the last act devolves on the *matador*. The picadores are mounted, dressed like knights of the olden time, and armed with a lance; they take position in the middle of the arena. The chulos, on foot, are gay with ribbons and bright-colored cloaks. The matador, or chief combatant, is on foot. He is handsomely dressed, and holds a sword and a *muleta,* a stick with a piece of scarlet silk attached. On a sign given by the magistrate a bull is let out; the picadores stand waiting his charge. With a brave bull they act on the defensive; with a cowardly one, on the offensive; and should their stabs be ineffectual in rousing the animal, the beast is hooted by the crowd, and stabbed ingloriously. The bull frequently kills several horses, and sometimes one or more men. When the bull begins to tire the picadores are succeeded by the chulos with *banderillas*—darts about two feet long, ornamented with flags—which they stick into the animal. Sometimes these darts have fire-crackers attached. The matador now enters alone. As soon as the bull sees the muleta, he generally rushes at it, and the matador dexterously plunges the sword in before the left shoulder, and the animal falls. The matador is greeted with acclamations, and not less so the bull should he wound or kill the matador, in which case another matador steps into the arena. Ten and sometimes even twenty bulls are despatched in a day, twenty minutes being about the time taken for one.

Bull-Finch (*Pyrrhula vulgaris*), a European bird of the family of Fringillidæ, is a little larger than the common linnet, now naturalized to some extent in the U. S., and often kept as a cage-bird, especially by the Germans. It is easily trained. The genus is characterized by its short, thick, rounded bill, of which the sides are inflated and bulging, and the tip of the upper mandible overhangs that of the lower. The plumage is bluish-gray above, the breast is of a bright tile red, and the crown of the head and the greater wing-coverts are black. It builds on bushes or trees near the ground, and feeds chiefly on seeds, berries, and buds. Its song is not naturally very agreeable, but it can be improved by education, and trained bull-finches are sold for high prices. The pine bull-finch (*Orythus enucleator*), is a beautiful northern bird of both hemispheres. The male is of a splendid red, the female an orange-green.

Bull-Finch.

Bull-frog (*Rana pipiens*), a frog found in the U. S., is of an olive-green color, and is generally eight to twelve inches long, though in some cases it attains the length of nineteen to twenty-one inches. It derives its name from the remarkable loudness of its voice, which is bass and resembles the bellowing of a bull. It is almost wholly aquatic. The hind legs of this frog are often used as food.

Bull, Golden, a term applied to a decree or enactment of Charles IV., emperor of Germany, published in 1356, in two diets held in succession at Nuremberg and Metz, in order to fix the laws in the election of emperor and to regulate the number and privileges of electors. It is preserved at Frankfort-on-the-Main. Another "golden bull," of Andrew II. of Hungary in 1222, fixed the privileges of the nobles, and was regarded as a national constitution.

Bull'head, the popular name of small fishes of the genus *Cottus*, of which there are several species in Europe and America. Another name commonly given them is "miller's thumb." The common catfish and several others are locally known as bullheads.

Bullion, uncoined gold and silver in bars or other masses. In political economy the term is also used to denote gold and silver coin. The word was originally applied to the mint, or place where the precious metals were alloyed and converted into stamped money. In 1810 a celebrated bullion report was made to the British Parliament by Francis Horner and Sir Robert Peel, who promoted the resumption of specie payments, which had long been suspended.

Bul'lion, a post-village, capital of Piute co., Ut. P. 82.

Bul'lions (Peter), D. D., a learned divine and educational writer, born in Perthshire, Scotland, in 1791, removed to America in 1817, and became in 1824 professor of Latin and Greek in the Albany academy. He published a "Latin Reader," a "Greek Reader," a "Latin-English Lexicon," etc., which are highly esteemed. Died Feb. 12, 1864.

Bull'itt, a county of Kentucky, near the Ohio River. Area, 300 square miles. It is bounded on the S. W. by Salt River, and is intersected by the East Fork of that river. The surface is moderately hilly; the soil is productive. Grain and wool are the chief products. It is traversed by the Louisville and Nashville R. R. Capital, Shepherdsville. Pop. 7781.

Bullitt (Alexander Scott), born in Prince William co., Va., in 1761, emigrated to Kentucky in 1784, became a prominent politician, was president of the State senate for several years, and lieutenant-governor (1800–04). Died in Jefferson co., Ky., April 13, 1816.

Bull'ock, a county in S. E. Alabama. Area, 600 square miles. It is drained by the sources of Pea River. The soil is mostly fertile. Corn, oats, and cotton are raised. It is intersected by the Mobile and Girard R. R. and the Montgomery and Eufaula R. R. Capital, Union Springs. Pop. 24,474.

Bullock, a county in the E. of Georgia. Area, 900 square miles. It is bounded on the N. E. by the Ogeechee, and on the S. W. by the Cannouchee River. The surface is level; the soil is sandy, and partly covered with forests

of pine. Corn, oats, rice, cotton, and wool are raised. Capital, Statesborough. Pop. 5610.

Bullock (Alexander Hamilton), LL.D., was born in Royalston, Mass., Mar. 2, 1816, and graduated at Amherst in 1836. He was called to the bar in 1841, became a resident of Worcester, Mass., and held many important public offices. He was governor of Massachusetts (1866–69).

Bullock (Archibald), a native of Charleston, S. C., was a delegate to the Philadelphia Congress from Georgia in 1775, and in the following year president of the executive council of Georgia, the highest office in the State. Died in 1777.—His son, William B. Bullock (died Mar. 6, 1852), was in 1813 U. S. Senator from Georgia.

Bullock (Rufus B.), the first governor of Georgia under the new constitution adopted in pursuance of the reconstruction measures of Congress. He was a native of New York, but had resided some years before and during the war in the city of Augusta, Ga. He was a member of the constitutional convention which was called in 1867, and took an active part in its proceedings. On the adoption of the constitution formed by it, he was declared to be duly chosen at the same election in 1868 governor of the State under it for the term of four years. This office he held until the fall of 1871, when he resigned it and abandoned the State.

Bullock's Creek, a post-township of York co., S. C. Pop. 3068.

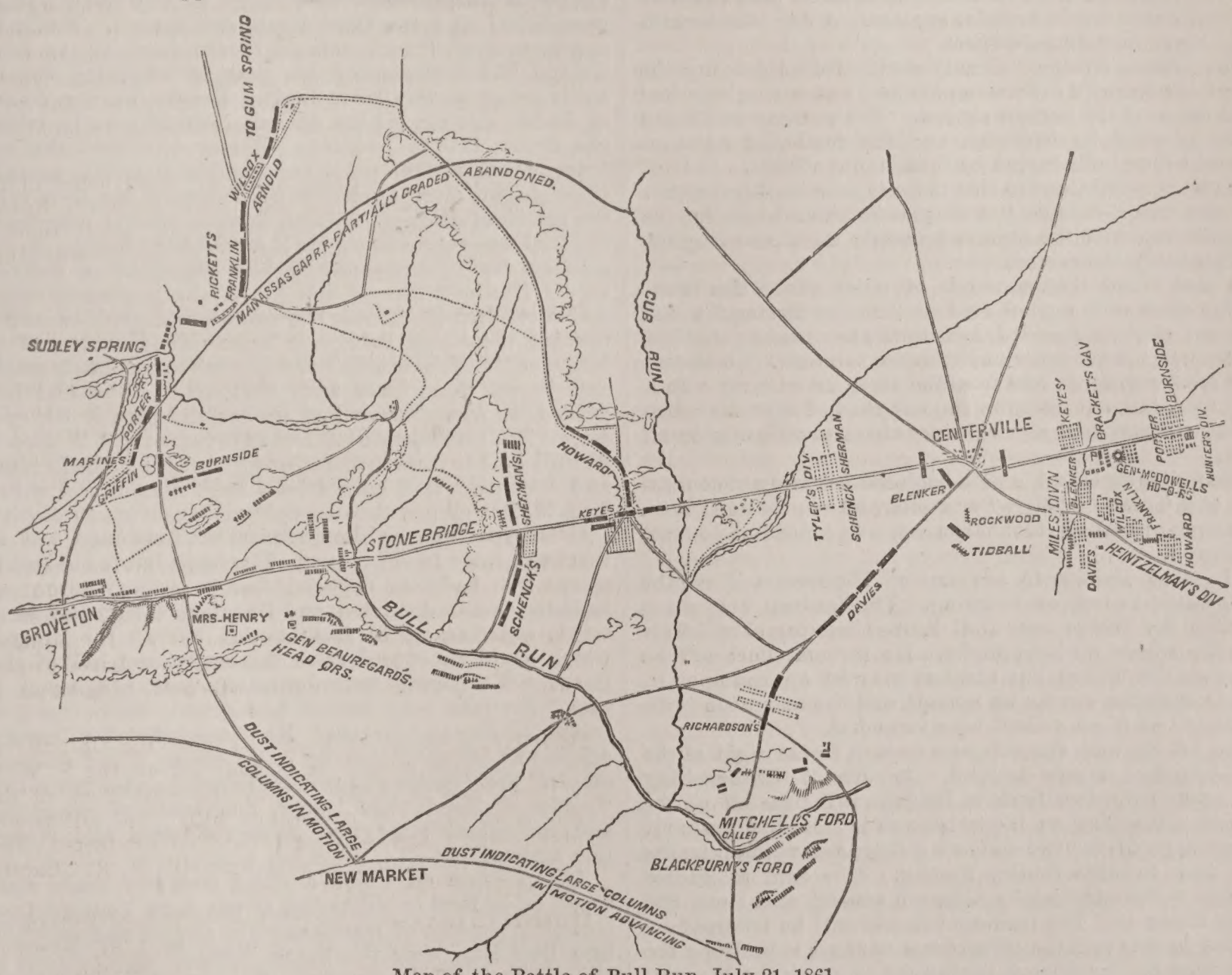
Bull Pond, a township of Barnwell co., S. C. Pop. 2400.

Bull Run, a township of Elko co., Nev. Pop. 43.

Bull Run, Battle of. The battle of Bull Run has, with propriety, been classed as one of the "Decisive battles of the War." As the *first* pitched battle—the first trial of strength between the North and South—its inception and issue were pregnant with grave consequences to the future of a struggle in which the two combatants were yet hesitating to engage. In its purely *military* results it has been well said that "the cannon of Bull Run echoed henceforth on every battle-field of the war." The bombardment of Fort Sumter found the government completely destitute of an organized force—the army scattered on distant frontiers (a large portion indeed captured through the agency of its commander), and the navy dispersed to remote quarters of the earth. For no inconsiderable period the possession of the national capital seemed to be due rather to hesitation or irresolution of the Confederates than to its capability of vigorous defence. But the President's call for 75,000 volunteers for "three months" (his power to call out the militia to "suppress insurrection" being thus legally limited) had assembled in Washington and elsewhere a large militia force which, strengthened by such portions of the regular force as could be made available, had been diligently trained under direction of army officers.

Simultaneously with our occupation of the Virginia shore of the Potomac, the Confederates had established themselves at "Manassas Junction," a point on the railroad twenty-five miles west from Alexandria, and the junction of the great southern railroad route (connecting Washington with Richmond and the South) and the Manassas Gap Railroad, leading to the valley of the Shenandoah, where another Confederate force under Johnston confronted Patterson, who had recently crossed the Potomac at Harper's Ferry.

The occupation of Manassas was recommended to the Confederates by the fact that it controlled the railroad routes, and was itself a strong position. An elevated plateau, in the crotch, formed by the Occoquan and its principal tributary from the north, Bull Run, of which the beds are canal-like cuts in horizontal strata of red sandstone, it was of difficult approach to an attacking army, while the general character of the country, broken, wooded, with few roads fit for the movement of an army, was favorable to the defence.



Map of the Battle of Bull Run, July 21, 1861.

Leading almost directly west from Alexandria, diverging slightly to the north from the railroad, a macadamized road led to Centreville, twenty-two miles distant.

From Centreville, a little west of south and six or seven miles distant, lay Manassas Junction. About midway between these two points flowed the rivulet of Bull Run (the real defensive line of the enemy) in a general direction from north-west to south-east.

A road led from Centreville almost directly to the "Junction," crossing Bull Run three miles from Centreville at "Blackburn's Ford" (sometimes called by the Confederates "Mitchell's Ford"). The turnpike before mentioned continued its westerly course towards Warrenton, in a nearly straight line beyond Centreville, crossing Bull Run at the "Stone Bridge," four miles distant. Somewhat eastwardly of south, a country road from Centreville crossed Bull Run and the railroad at "Union Mills."

The Confederate force was distributed along Bull Run from Union Mills to the Stone Bridge (nearly eight miles), with reserves and a fortified position at or near the Junction.

The line was a strong one, for the stream, though containing but little water at that season, was, owing to the character of the bed and to the abrupt and wooded slopes of its right bank, a formidable obstacle.

The army of General McDowell, which marched to the attack of this position, numbered about 30,000 men. Save perhaps 700 or 800 regular troops (fragments of regiments) of the old army, it was composed wholly of raw volunteers, none of whom had been in a soldier's garb more than two or three months, and at least half of whom were enlisted only for a term of three months, then just about expiring. Such an army as this was certainly not the best suited for an offensive campaign. Troops *utterly* raw; brigades and divisions, the component parts of which had never been brought in contact before, commanded by officers who, though generally of ability, were for the first time exercising these extensive commands, and who had hardly seen the troops they commanded.

Such was the army which marched from the banks of the Potomac on the afternoon of July 16th. It moved in four columns, one by the turnpike, one by the lateral country roads on the right, one on the left of the railroad, and another between the turnpike and railroad, following what is known as the "Braddock" road, from its having been made by that general on his memorable march to Fort Duquesne in 1754, which terminated in his disastrous defeat and death.

The "plan" of the campaign organized by General McDowell had been carefully studied by him in conjunction with his staff officers for a week or two before the movement commenced. It was a feature of it, after reaching Fairfax Court-house, to make a sudden movement to the left, crossing the Occoquan just below the junction of that stream with Bull Run, aiming at the enemy's railroad communications. His personal reconnaissances in that direction, made on the 18th, led him to consider the country impracticable for the operations of his army.

However imperative it was (for many reasons) to lose no time (a regiment the term of which expired on the eve of the battle, actually marched "to the rear," as Gen. McDowell expressed it, "to the sound of the enemy's cannon") it was out of the question to attack until some plan could be devised which would promise success. A day was accordingly spent in reconnaissances.

The "Stone Bridge," already mentioned as forming the left of the enemy's defensive position, was a single arched structure over the narrow stream. The passage was found to be guarded by batteries, and the road and adjacent ground beyond obstructed by formidable abattis. Several roads were ascertained to lead to fords between Blackburn's and the Stone Bridge, but they were mere by-paths, the opposite banks of the stream generally steep and tangled, and probably obstructed.

It was found that a couple of miles above the Stone Bridge there was a good ford at "Sudley Spring," which was but slightly guarded, and that above that point the stream was, almost everywhere, easily passable. No continuous road communicated from the turnpike with the "Sudley" ford, but our reconnaissances showed that the intervening country was almost everywhere practicable to all arms.

The writer finds in his note book the following memorandum of a "plan of battle" or attack, which, founded upon the above results of reconnaissance, was submitted to Gen. McDowell.

1st.—One division to advance on Warrenton Turnpike at 3 o'clock to-morrow morning. The leading brigade to threaten the bridge over Bull Run—throwing skirmishers into the woods on both flanks. No serious effort will be made on the bridge but artillery may be opened upon it, as if to open the way for an assault, and the operation to be conducted *as if* an assault were intended.

The 2d, 3d, and 4th Brigades to turn to the right at the road ½ to ¾ of a mile beyond "Cub Run." On reaching the forks to the two fords a Brigade will turn off on the *left* fork advancing on it *just enough* to clear the route for the passage of the two following Brigades which take the *right* fork towards Sudley Spring. The ford at Sudley Springs will be turned by a march around and some 200 yards above it. The leading brigade will be followed by the one in rear and the whole force advance rapidly by the road from Sudley Spring southward to reach the Warrenton 'Pike by the shortest route. The brigade left on the road to the lower ford will then pass over. Detachments from the advanced brigades should be sent to take in rear the defenders of the lower ford and Warrenton 'pike bridge. The brigade left at the Stone Bridge will cross over and join the other two.

2d.—Another division should follow to take position behind Bull Run to be ready to pass over if necessary—but unless ordered from Hd. Qrs. to remain on the E. side.

3d.—Another division should simultaneously with the commencement of the first operation commence the semblance of an attack on Blackburn's Ford. Every appearance of a formidable assault should be made, but *no attempt to force the passage*, unless the enemy shows unmistakable signs of retiring.

4th.—Another division should remain in reserve at Centreville.

This plan was adopted by the General, modifying the composition only of the different columns thus,

One division under Colonel Miles to remain in reserve at Centreville, and to make, with one of its brigades, a false attack on Blackburn's Ford; another division (Tyler's) to move by the turnpike up to the Stone Bridge and threaten that point, and, at the proper time, to carry it and unite with the principal column, which, consisting of the two divisions (of Hunter and Heintzelman) of about 12,000 men, was to diverge from the turnpike, and, by a flank movement, reach the Sudley Ford, and descending the right bank of the stream, take the defences of the Stone Bridge in the rear. The united force would then give battle, strike at the enemy's railroad communication, or act otherwise, as circumstances might dictate.

This plan was carried out in its main features, but it failed in one important particular. It was calculated that the marching column should diverge from the turnpike by early daylight (the route being so wooded that a night march was deemed imprudent) and reach Sudley Ford by six or seven A. M. The Stone Bridge division did not clear the road over which both, for a certain distance, had to pass, so that the column could take up its march until near six o'clock. The route through fields and woods to Sudley proved to be far longer and more difficult than was believed. The column did not reach the Sudley Ford till near half-past nine, three or four hours "behind time." When it reached the ford the heads of the enemy's columns were visible, on the march to meet the attack.

This loss of time caused the loss of the battle. It might have been unwarrantable to have *counted* on punctuality with an army so utterly inexperienced in tactical manœuvres and in marching; nevertheless the immediate end aimed at was gained—the passage of Bull Run was accomplished and the Confederate left turned. While the appearance of Tyler's column in the front of the Stone Bridge had disconcerted his plan of attacking *our* left by crossing at the lower fords. Hunter, having crossed at Sudley Spring, led his column down to take in reverse the Stone Bridge position. Evans who held the confederate left at that point had had his attention occupied through the morning hours by Tyler in his front; but the march of Hunter's column became evident long before the ford was reached and ere it reached the bridge, Evans, sending for re-inforcements, had formed "*en potence*" across Hunter's line of march. A sharp combat ensued which resulted in forcing the confederate position and in opening the Stone Bridge to Tyler's division, two of the brigades (W. T. Sherman's and Keyes') immediately passed and joined their force with Hunter's. Thus had been gained the *immediate* end of the tactical plan of the operation. The Confederate left had been turned, the Warrenton turnpike taken from them (opening to us the Stone Bridge); and their line had been driven back a mile and a half. Gen. McDowell had thus brought nearly all his three divisions into position on the enemies left flank and was advancing nearly 18,000 strong. The Confederate left (all his troops that had been engaged) had been thrown into confusion. Gen'ls Johnston and Beauregard hastened to the scene, ordering up to their routed left all the brigades which could be spared from the centre and left of their line. "We came," says Johnston, "not a moment too soon," for "the long contest had greatly discouraged the troops of Bee and Evans." He found "that the aspect of affairs was critical;" but by great efforts, "and some example," the "battle was re-established," and, after a time, "many of the broken troops, fragments of companies, and individual stragglers, were re-formed and brought into action."

The position on which a stand was now made was a broad table land in which the slopes from Young's Creek (crossing our line of march at right angles and emptying into Bull Run near the Stone Bridge) terminate in the general level of the country. To carry the position, McDowell advanced the brigades of Wilcox and Howard on the right, supported by part of Porter's brigade, and the cavalry under Palmer; the brigades of Franklin and Sherman in the centre and up the road, and Keyes' brigade on the left. Schenck's brigade (of Tyler's division) was still at Centreville; but the positions of these troops, coupled with the demonstrations made, still detained several Confederate brigades confronting them.

A severe contest ensued for this position with varying success; the result of which was at 3 P. M., the possession of the hill; the fighting having commenced at 10.30 A. M. of a July day. The men who had been up since two o'clock in the morning were exhausted by fatigue, want of food

and water, and somewhat demoralized by the vigorous resistance they had encountered.

"It was at this time," says Gen. McDowell, "that our adversary's reinforcements came to his aid from the railroad train, understood to have just arrived from the valley with the residue of Johnston's army. They threw themselves in the woods on our right, and toward the rear of our right, and opened a fire of musketry on our men, which caused them to break and retire down the hill-side. This soon degenerated into disorder, for which there was no remedy. Every effort was made to rally them, even beyond the reach of the enemy's fire, but in vain. The battalion of regular infantry alone moved up the hill opposite to one with a house on it, and there maintained itself until our men could get down to and across the Warrenton turnpike, on the way back to the position we occupied in the morning. The plain was covered with the retreating troops, and they seemed to infect those with whom they came in contact. The retreat soon became a rout, and this soon degenerated still further in a panic."

Enough has been written to show how grossly misrepresented in the popular mind has been this battle. It was one (and the first) of the few pitched battles of the whole war deliberately *planned,* before hand, *executed* in full accordance with its plan (save the loss of *time* already alluded to); and *successful* up to a point when an element, excluded by the preliminary conditions under which the campaign was undertaken, (the arrival of Johnston's troops) was thrown in which turned victory into defeat. The confederate President—himself a soldier, who at Buena Vista had learned the meaning of such words—pronounced the battle "a hard fought field." Gen. Johnston the confederate commander, reports the demoralization of his own troops in words already quoted, and, further, he says, "We were almost as much disorganized by victory as the Federals by defeat," and hence "pursuit was out of the question;" but the disorganization, so candidly acknowledged and so artfully explained, was due rather to the gloomy hours of actual defeat, and the severe handling with which it was accompanied, than to the elation of victory. "It is right to say," says a distinguished English officer in his review of Cooke's Life of Lee, "that the surprise of the Confederates on their flank was a real one, and their defeat at one time very near, being only averted by the superiority in steadiness of Jackson's troops to their comrades." "Although completely defeated in his attack, McDowell yet left his enemy so *shattered as to be not only quite incapable of an advance upon the capital of the Union, but according to the confession of the best Southern officers, unfit for some time later for any serious operations.*"

And concerning the "panic" which, although *military* writers have generally been free from this injustice, has been so commonly held up as *the* picture of the battle the instances even with armies of veteran troops like Napoleon's (Albuhera and Vittoria, &c.) are so numerous that the exceptional case of Bull Run, when the army was almost wholly made of three months' men, should excite no surprise: moreover, it was not such as to prevent a stand at Centreville, "the apparent firmness" of which, says Gen. Johnston, "checked our pursuit." The disorder and mob-like appearance was rather, as described by Major (now Brevet Major-General) H. J. Hunt, the result of "sheer fatigue." They were, says he "footsore, hungry, and tired; but had we been attacked I have little doubt that a stout resistance would have been made."

Let us rather admire the courage and fortitude with which men just from their farms and firesides, for whom the battle-field and the cannon's roar had been divested of none of their horrors, unsustained by the confidence in each other which association and discipline engender, vindicated, in this the first great battle of the long and saddening series, the American claim to those qualities, and to the patriotism which could call forth their exhibition.

J. G. Barnard, U. S. A.

Bull Run, Second Battle of. A junction, upon the Rappahannock, of the forces under Gens. McClellan and Pope having been determined upon, orders were sent to McClellan Aug. 3, 1862, to withdraw his army from Harrison's Landing, on the James river, and transfer it to Acquia creek; Burnside was ordered (Aug. 1) to embark his troops at Newport News, transfer them to Acquia Creek, and take position opposite Fredericksburg. Burnside moved promptly, reaching Acquia Creek Aug. 3; but the evacuation of Harrison's Landing was not commenced until Aug. 14, though McClellan had been repeatedly notified of the necessity of promptly uniting his forces with those of Gen. Pope, as reliable information had been received of the preparation of the enemy, with a large force, to drive back Gen. Pope and attack either Washington or Baltimore. Owing to this delay the main forces of Gen. Cox were ordered to Pope's aid from Western Virginia.

To gain time and facilitate the withdrawal of the Army of the Potomac, Pope crossed the Rappahannock, occupied Culpeper and threatened Gordonsville. Jackson's and Ewell's forces were hurried back to the Rapidan where on the 9th of August they encountered Bank's corps at Cedar Mountain, a severe contest ensuing resulting in the defeat of the latter, Jackson holding his position on the mountain for two days when he withdrew across the Rapidan. As information received showed that Lee was moving the main body of his army by forced marches, to attack Pope before a junction could be formed between him and the Army of the Potomac, Pope was advised by the Gen.-in-Chief to take up his position in rear of the Rappahannock, which he accordingly did Aug. 17–18, prepared to hold its passes as long as possible; he had been reinforced by King's division, and a part of Burnside's corps under Gen. Reno. Burnside occupied Barnett's and Richard's fords between him and Pope, and though repeated attempts were made by the Confederates to cross at different points on the Rappahannock they were all repulsed and the line of this river was held for eight days, during which time it was hoped sufficient forces from the Army of the Potomac would reach Acquia Creek, and prevent any further advance of Lee and eventually with the combined armies to drive him back upon Richmond; but the expected aid not arriving Pope telegraphed to Washington that he was overmatched and unless reinforced must retreat. He was directed on the 21st to maintain his position two days longer when he would be reinforced; but though he held his ground for four days he received during that time but about 7000 men. On the 21st a portion of Confederate cavalry under Gen. Stuart crossed the river at Waterloo Bridge and on the night of the 22d, during a furious storm, surprised Pope's headquarters at Catlett's station capturing his despatch books, and much of his personal baggage, numerous horses and wagons; the latter were burned. Pope's actual Headquarters at this time were at Rappahannock Station.

On the 24th by a flank movement Lee crossed a portion of his forces under Jackson above Waterloo bridge; but being repulsed here moved further up the river and entered the valley which lies between the Blue Ridge and Bull Run mountains; the object of this movement being to gain Pope's rear and cut off his supplies, at the same time gaining a position by which Washington could be attacked or Maryland invaded. Jackson passed through Thoroughfare Gap and reached Bristow Station Aug. 26, from whence he sent Stuart with a detachment of cavalry to capture Manassas Junction which was accomplished that night, immense quantities of commissary and quartermaster's stores, besides 8 pieces of artillery, 10 locomotives, and large trains falling into their hands: the main body of the Confederate army in the meantime engaging Pope at Sulphur Springs and Waterloo Bridge. The Confederate army at this time numbered probably 80,000, while Pope had barely 40,000; but, relying, with reason, on being reinforced by as many more veterans from the peninsula, he indicated the positions to be taken up by them on arrival and laid his plans for the impending struggle with the firm belief that it was to be fought by the combined armies.

Discovering the movement on his right flank, and failing to receive any adequate reinforcements, Pope fell back in three columns from Warrenton and Warrenton Junction, and was at this time joined by Heintzelman's corps of 10,000 (but without artillery, wagons, or horses for officers) and Porter's corps, foot-sore and fatigued by long marching night and day. Under these circumstances Pope could not maintain his front, after detaching a sufficient force to meet Jackson operating on his flank.

Gen. Pope's disposition of his troops at this juncture (27th) was as follows: the corps of McDowell and Sigel and the Pennsylvania Reserves under Reynolds were advanced to Gainesville, Reno and Kearny were directed upon Greenwich, while Hooker's division was sent against Ewell along the railroad; the movement however was too late, as a large part of Lee's army was already east of Thoroughfare Gap.

Hooker encountered the Confederates near Kettle Run (27th) and a sharp engagement ensued, resulting in driving Ewell from the field.

As McDowell, Sigel and Reynolds had reached their positions there was every prospect that Jackson could be overwhelmed before reinforcements could reach him. On the evening of the 27th Gen. Pope ordered Gen. Porter to be at Bristow Station by daylight on the morning of the 28th, with Morell, and also directed him to communicate to Banks the order to move forward to Warrenton Junction. All trains were ordered this side of Cedar Run and to be protected by a regiment of infantry and section of artillery. For some reasons Porter did not comply with this order and his corps was not in the battles of the 28th and 29th. (Porter was afterward tried and cashiered.)

Heintzelman's corps pressed forward to Manassas on the morning of the 28th and forced Jackson to retreat across Bull Run by the Centreville turnpike. McDowell had succeeded in checking Lee at Thoroughfare Gap, but the latter took the road from Hopeville to Newmarket and hastened to the relief of Jackson who was already in rapid retreat. A portion of McDowell's corps encountered the retreating column on the afternoon of the 28th near the Warrenton turnpike and a severe but successful contest ensued. Jackson was again attacked on the 29th near the old battle ground of July, 1861. Knowing that Longstreet was not distant he made a most desperate stand; the fight continued nearly all day, and was terminated only by darkness. It was renewed in the morning (30th), and a desperate battle continued all through the day, but Pope could not hold out against the combined strength of Lee's army, now united, and after a hard day's fighting was forced to fall back behind Bull Run. Pope's loss during this campaign was nearly 30,000 men; the Confederate loss about 15,000.

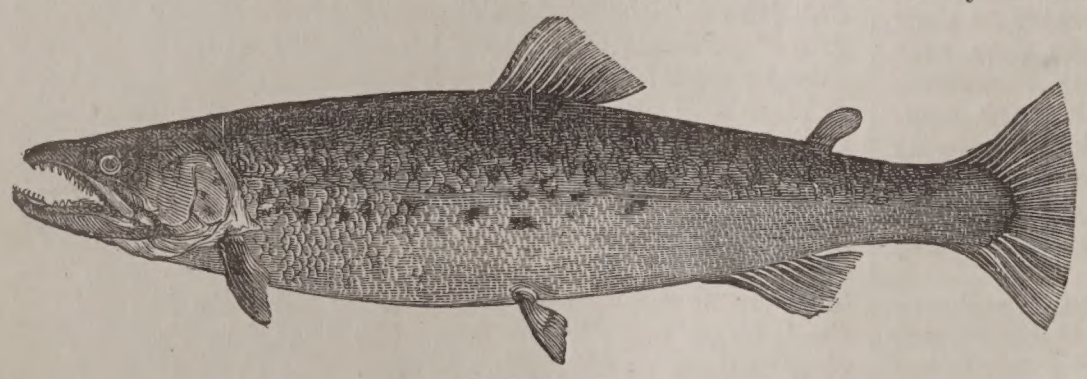
Bull's Eye, in architecture, the technical name given to a glass lens used for the purpose of concentrating the light of a given centre upon an object. It is also applied to a circular window of plain glass. On shipboard the bull's eye is a small pulley in the form of a ring, with a rope spliced round the outer edge, and another sliding through a hole in the centre. In rifle practice the small black centre in the circle on the target is called the bull's eye. In astronomy, the bull's eye is Aldebaran, a bright star in Taurus.

Bull'skin, a township of Fayette co., Pa. Pop. 1657.

Bull Swamp, a township of Lexington co., S. C. P. 933.

Bull-terrier, a dog bred by a cross, more or less remote, between the bull-dog and some one of the terriers, and frequently uniting in a remarkable degree the courage and strength of the bull-dog with the docility, activity, quick scent, and intelligence of the terrier. This little animal is especially famous for its zeal and success in killing rats.

Bull Trout, Gray Trout, Whitling, or **Sewen,**



Bull Trout.

the *Salmo Eriox,* a fish of Europe closely resembling the salmon in size, appearance, and habits, but much inferior as food. It is common in England and Wales. It affords good sport to anglers.

Bulsar', or **Bulsaur,** a seaport of India, on the Gulf of Cambay, and in the presidency of Bombay, 44 miles S. of Surat. It has manufactures of ginghams, and an active trade in grain, salt, and sugar. Pop. about 8000.

Bul'ti, Iskar'do, or **Little Thibet,** the upper end of the Indus Valley, subject to Cashmere, having Chinese Tartary on the N., Afghanistan on the W., and Cashmere on the S., between lat. 34° 30′ and 36° N. and lon. 74° 40′ and 76° 30′ E. The inhabitants are Mohammedans of Thibetan origin. The climate has greater extremes than that of Cashmere; the soil produces grains and fruits in abundance. This region is also called Baltistan.

Bul'wark [Fr. *boulevard*], in fortification, a rampart or bastion; an outwork for defence; that which secures against an enemy; a shelter or means of protection. On shipboard a bulwark is the parapet raised round the deck for the purpose of protecting men and goods from slipping overboard, and of excluding the waves from the deck. In ships of war the bulwark is sufficiently high and solid to afford the crew some protection against the shot of the enemy.

Bulwer (Edward George Earle Lytton), Baron Lytton, a celebrated English novelist, born in Norfolk in May, 1805, was the youngest of the three sons of William Earle Bulwer and Elizabeth Lytton. Both parents were descended from ancient families. His early education was superintended by his mother, a woman of intellectual tastes and culture. Having entered Cambridge, he gained the chancellor's prize for English verse by his poem on "Sculpture" (1825), and in 1826 graduated at Trinity Hall. He soon after visited France, and published after his return his novel of "Falkland" (1827), which was followed by "Pelham, or the Adventures of a Gentleman" (1828), "The Disowned" (1828), "Devereux" (1829), "Paul Clifford" (1830), "The Siamese Twins," a poem (1831), and "Eugene Aram" (1832). In 1831 he was returned to Parliament for St. Ives, and from 1832 to 1841 he represented the city of Lincoln. He published in 1833 "England and the English," and the same year visited Germany and Italy. He produced in rapid succession "The Pilgrims of the Rhine," "The Last Days of Pompeii," "Rienzi, the Last of the Tribunes" (1835), and "The Student," a series of contributions to the "New Monthly Magazine," of which he was for some time editor. His drama entitled "The Duchess of La Vallière" (1836) was not well received. In 1837 he brought out "Athens, its Rise and Fall," and "Ernest Maltravers," a novel, which was continued under the title of "Alice, or the Mysteries." His dramas entitled "The Lady of Lyons" (1838) and "Richelieu" were very successful, as well as the comedy of "Money," which came out soon after. His "Night and Morning," a novel, published in 1841, was followed by "Zanoni" (1842), "The Last of the Barons" (1843), "Lucretia, or the Children of the Night" (1846), and "Harold, the Last of the Saxon Kings" (1848). His novels entitled "The Caxtons" (1850), "My Novel" (1851), and "What will he Do with It?" (1858) first appeared in "Blackwood's Magazine," to which Bulwer has been a frequent contributor. "A Strange Story" came out in "All the Year Round" in 1861. Although his reputation rests chiefly on his novels, he has distinguished himself in various departments of literature. His translations of Schiller's poems (1844) were received with favor, and he has published original poems—"O'Niel, or the Rebel" (1827), "The New Timon" (1846), and "King Arthur" (1848). His novels have great popularity in England, America, and on the Continent, and have been translated into several languages. Bulwer was made a baronet in 1838, and in 1844, on the death of his mother, came into possession of the Knebworth estates and assumed the name of Bulwer-Lytton. He had published in 1835 a liberal political pamphlet entitled "The Crisis," which caused a great sensation. He was elected lord rector of the University of Glasgow in 1856, and in 1858 he held for a time the office of secretary of state for the colonies. He was made a peer in 1866 with the title of Baron Lytton. In 1827 he married Miss Rosina Wheeler of Limerick, who wrote "Bianca Capello," "The Budget of the Bubble Family," and other books. The union was unhappy, and the parties were divorced. Died Jan. 18, 1873.—His son, Edward Robert Bulwer Lytton, born Nov. 8, 1831, published "Lucile" and other poems under the pseudonym of "Owen Meredith," besides other works. J. Thomas.

Bul'wer (Henry Lytton Earle), Baron Dalling and Bulwer, an English diplomatist and author, a brother of the preceding, was born in 1804. He was elected to Parliament in 1830, and was sent as ambassador to Madrid in 1843. In 1849 he was transferred to Washington, and in 1851 was created a knight grand cross of the Bath. He became minister plenipotentiary at Constantinople in 1858. He was afterwards ennobled. Among his works are "France, Social and Literary," and a "Life of Lord Byron." Died May 27, 1872.

Bummalo'ti (*Saurus ophiodon*), a fish of the family Scopelidæ, which is regarded as a subdivision of the family Salmonidæ. It is a native of the seas of India, from which it is exported in large quantities, salted and dried, being highly esteemed for its flavor. In commerce it is known by the appellation of "Bombay duck." It is long, with a very large mouth, the gape of which extends behind the eyes, and which is furnished with a great number of long, slender, barbed teeth.

Bum'mingtown, a township of Macon co., N. C. Pop. 320.

Bum'stead (Freeman Josiah), M. D., born at Boston, Mass., April 21, 1826, graduated at Williams College in 1847, studied medicine in Paris, and became a practitioner in New York, where he was appointed professor of venereal diseases in the College of Physicians and Surgeons, also surgeon to the Eye and Ear Hospital and the Charity Hospital. He has published "Pathology and Treatment of Venereal Diseases" (1861), and valuable translations from Ricord and Cullerier.

Bunce (Francis M.), U. S. N., born Dec. 25, 1836, in Hartford, Conn., graduated at the Naval Academy in 1857, became a lieutenant in 1861, a lieutenant commander in 1863, a commander in 1871. Had charge of the naval howitzers in the combined army and navy expedition of July 10, 1863, which resulted in the capture of a part of Morris Island. Participated in all the important attacks

on the defences of Charleston harbor during the summer and fall of 1863, and was in the disastrous assault upon Fort Sumter of Sept. 18, 1863, where, for his "gallant support and zealous co-operation," he received the thanks of his commanding officer, Captain Thomas H. Stevens.

FOXHALL A. PARKER, U. S. N.

Bun'combe, a county in the W. of North Carolina. Area, 450 square miles. It is intersected by the French Broad River, and bounded on the E. by the Blue Ridge. The surface is partly mountainous; the soil of the valleys is fertile. Cattle, grain, tobacco, and wool are raised. Capital, Asheville. Pop. 15,412. The phrase "talking for Buncombe," often heard among politicians, was first used by a member of Congress from this district. During a long speech which he made, several members, who had not patience to listen, retired from the hall. He then told the remaining members that they also might go, for he "was only talking for *Buncombe*."

Buncombe, a post-township of Johnson co., Ill. Pop. 1385.

Bun'delcund', or **Bundlecund,** a territory of Hindostan, is bounded on the N. E. by the river Jumna. It extends from lat. 24° to 26° 26′ N., and from lon. 78° to 81° 36′ E. Area, about 18,000 square miles, of which about 8700 square miles are subject to the British, while the rest of the country is governed by numerous native princes, who are tributary to the British. It is situated in the North-western Provinces. The surface is diversified by many hills or isolated precipitous rocks. The soil is fertile, but requires irrigation. It is said to contain diamonds and rich beds of iron ore. The chief towns are Calpe, Banda, Jhansi, and Callinger. Pop. 2,592,800.

Bundemeer' (anc. *Araxes*), a river of Persia. It flows through a richly wooded valley, emptying into the Bakhtegan Lake after a course of 150 miles.

Bun'galow [from the Hindostanee *băngla*, a "summer-house"], the name of a kind of rural dwelling very common among the Europeans in India. Bungalows usually have but one story, and are always surrounded with a verandah, the covering of which affords shelter from the sun. Besides private bungalows, there are military bungalows for the use of soldiers in cantonments, and for the accommodation of travellers there are public bungalows belonging to the government on all the principal roads in India. Travellers sometimes carry their provisions, servants, etc. with them, paying a rupee (a half dollar of our money) per day for the use of the bungalow. But on the most frequented roads one can nearly always find native cooks, or rather "stewards" (*khânsâmân*), as they are called, who furnish food for travellers, and cook it.

Bun'ion, or **Bunyon** [said to be from the Gr. *βούνιον*, the "earth-nut," from its fancied resemblance in shape], is a painful inflammation of the *bursa mucosa*, or membranous sac of the joint which connects the great toe with its metatarsal bone. The pressure of a boot causes this bursa to inflame and swell, and this may go on to suppuration. Rest and poulticing are generally sufficient to subdue the attack, and wearing a shoe so constructed as to save the bunion from pressure will generally prevent a recurrence.

Bunka'ra, or **Blue River,** of Colorado, rises in the Middle Park, among the Rocky Mountains, flows nearly south-westward, and unites with the Gunnison River to form the Grand River. Total length, estimated at 200 miles.

Bun'ker Hill, a post-village of Macoupin co., Ill. It has one weekly newspaper.

Bunker Hill, a post-township of Ingham co., Mich. Pop. 957.

Bunker Hill, the county-seat of Russell co., Kan., on the Kansas Pacific R. R., 176 miles W. of Topeka, has one weekly paper. J. B. CARBOLT, ED. "NEW REPUBLIC."

Bunker Hill, a rounded eminence in Charlestown, now a part of Boston, Mass. It is about 110 feet high and connected by a ridge with another small eminence 700 yards distant called Breed's Hill. These two elevations are famous for the battle fought here between the British and American forces June 17, 1775. The American redoubt was on Breed's Hill, but by common usage the event is known as the battle of Bunker Hill.

After the stirring events of the spring of that year the troops organized in New England had taken up a line extending from Roxbury to Cambridge under command of Gen. Artemas Ward; Putnam, Starke, Prescott, Gridley, and Pomeroy were there, and by the middle of June not less than 20,000 men had assembled.

Gen. Gage was in chief command of the British at Boston, and had been recently largely reinforced by Gen'ls Howe, Burgoyne and Clinton.

It having been ascertained by the provincial army that Gage meditated seizing and fortifying Bunker Hill and the heights of Dorchester on the night of the 18th, it was determined by the Americans to forestall this design, and, on the night of the 16th, a detachment of 1000 men under command of Col. Wm. Prescott, was despatched from Cambridge to Charlestown for the purpose of fortifying Bunker Hill. They were joined at Charlestown Neck by Gen. Putnam and Major Brooks and at a council it was decided to fortify Breed's Hill not as high as Bunker Hill but nearer Boston. By daylight a formidable work had been thrown up on the spot now marked by the Bunker Hill Monument. This being discovered by daylight the "Lively" opened fire upon it which soon extended to all the shipping and the battery on Copp's Hill in Boston; the British troops were called to arms and preparations for an attack were made; Prescott meanwhile continued to strengthen his position and sent to Cambridge for reinforcements; the entire American force engaged, however, did not probably exceed, at any time, 1500.

A force of British under Gen'ls Howe and Pigot, covered by the guns of their shipping, had embarked in boats and landed at Morton's Point east of the foot of Breed's Hill. This movement produced the greatest excitement in Cambridge and reinforcements were hastened to Charlestown, Gen'ls Warren and Pomeroy arriving at 2 P. M. at the moment Howe, whose force by this time had been increased to about 4000, began his advance around the eastern slopes of Breed's Hill and along the Mystic river with the intention of gaining the rear of the American lines; but this movement having been anticipated Knowlton had taken up a position near Bunker Hill and thrown up a breastwork nearly two hundred and fifty yards in length, and another line had been built in front of a stone and rail fence between which was placed new mown hay, and between the breast work and the rail fence the artillery was placed. The Conn. and N. H. troops were west of the redoubt and a force was posted at the foot of the S. W. side of Breed's Hill, near Charlestown, and a work had been commenced on Bunker Hill. Gen. Warren, who was with Prescott in the redoubt, having refused to take command from either Prescott or Putnam, saying he came to fight as a volunteer. Howe was foiled in his flank movement and compelled to make a direct attack and having ordered the guns of the shipping and the battery at Copp's Hill to open fire on the redoubt moved forward under its cover up the slopes of Breed's Hill in two wings, the right under his own command the left under Pigot: Gen. Howe with his command to carry the position at the rail fence while Pigot attacked the redoubt. Prescott's orders to his men were to reserve their fire on the advancing columns till the whites of the men's eyes could be seen. The British opened fire when within gunshot but no reply was heard from the breastworks till they were within close range when volley after volley was poured into their ranks causing them to fly in disorder toward their boats. Howe succeeded, however, in quickly rallying his troops and being reinforced by some 400 marines and provided with artillery, of which latter they were deficient in the first attack, a second advance was made over the same ground.

In the meantime reinforcements had been sent to Prescott but those sent from Cambridge were prevented from crossing Charlestown Neck by the severe fire of the batteries and shipping of the British, and but few additional troops reached the redoubt before the second attack.

As before the Americans reserved their fire till the British line was at short range when it was delivered with the same deadly effect.

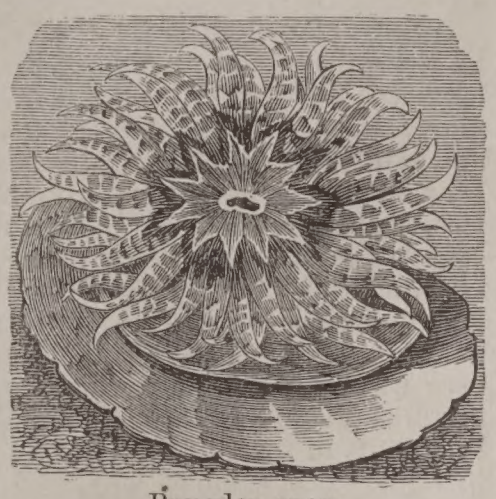
Hot shot from Copp's hill having meanwhile set fire to some houses in Charlestown the whole town was soon in flames and Gen. Howe hoped to storm the redoubt under cover of the smoke; but a light wind which had just sprung up cleared away the smoke and disclosed the advancing columns which were again broken and driven in confusion by the fatal fire from the patriots within the redoubt. Howe was now reinforced by Clinton and a third attack was made upon this little band whose ammunition was now nearly exhausted and Howe, having discovered the weakness of this part of the line, attacked the position between the rail fence on the east of the redoubt and the breastwork, sweeping it with his artillery and forcing its defenders within the redoubt. The ammunition of the Americans was now completely exhausted and the British advancing scaled the work but were met by the Americans with muskets clubbed and a hand to hand conflict ensued. But the superiority of the British in numbers was too great and Prescott was compelled to order a retreat, himself and Warren being the last to leave the works. Stark and Knowlton maintained their position at the rail fence until the retreat had been effected, when they retired slowly and in good order. Warren had hardly left the redoubt when he fell shot through the head; Prescott escaped uninjured. Falling back across

Bunker Hill, Putnam here made an ineffectual attempt to rally the retreating army within the partially finished works. The retreat continued across Charlestown Neck where many were killed by a severe fire from the shipping and batteries; but the British did not continue their pursuit beyond this point.

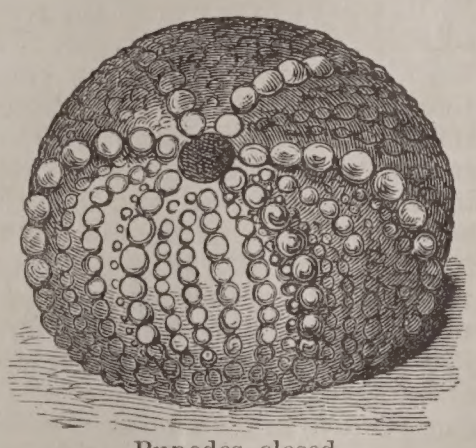
The British loss in killed and wounded was about 1050; the American loss was not over 450.

A granite obelisk 221 feet in height now marks the scene of this important struggle on Breed's Hill, and is known as Bunker Hill Monument. Gen. Lafayette laid the corner stone June 17, 1825, and Daniel Webster delivered one of his most memorable orations on the occasion. The monument was completed in 1842 and was dedicated June 17, 1843 in the presence of the President of the U. S. and his Cabinet, Daniel Webster being, as before, the orator of the occasion.

Buno'des Gemma'cea, called in English *gem pimplet*, a zoophyte of the order Actinoida (sea anemones; see ANEMONE, SEA). When open it bears a striking resemblance to a flower, but when closed it assumes a spherical form, having the appearance of an echinus stripped of its spines. The generic name is from the Greek βουνώδης, signifying "resembling an eminence or a woman's breast" (referring to its form when closed); the specific name is from the Latin *gemma*, a "bud," or small protuberance, and has allusion to the wart-like protuberances on the exterior surface.



Bunodes, open.



Bunodes, closed.

Bun'sen (ROBERT WILHELM), a very distinguished German chemist, born at Göttingen Mar. 31, 1811, became in 1851 professor of chemistry at Breslau, and in 1852 at Heidelberg. He is the author of several works, the most important perhaps being on gas analysis. His investigations on organic compounds of arsenic, kakodyl, etc., in 1841, attracted much attention. He has invented several most important pieces of apparatus, several of which bear his name, as the Bunsen battery, gas-burner, photometer, filter pump, etc. His most brilliant discovery was probably that of spectrum analysis and the SPECTROSCOPE (which see), made in connection with Kirchoff. This instrument established a new era in astronomy, and has already led to most valuable discoveries in chemistry. By its aid Bunsen himself discovered two new alkaline metals, *cæsium* and *rubidium*, and Lamy and Crookes discovered *thallium* and Rich and Richter *indium*. He also devised a new system of analysis by flame reactions. His laboratory is still a favorite resort for Americans studying chemistry in Europe.

C. F. CHANDLER.

Bunsen, von (CHRISTIAN KARL JOSIAS), PH. D., D. C. L., CHEVALIER, an eminent German writer and diplomatist, born at Korbach, in Westphalia, Aug. 25, 1791. He studied the Oriental languages in his youth. He was appointed secretary to the Prussian embassy at Rome in 1818, where he remained many years and devoted much time to philology and historical research. In 1827 he succeeded Niebuhr as Prussian minister at Rome. He was sent as ambassador to London in 1841, and acquired a greater influence and a higher position in English society than any German diplomatist had ever enjoyed. His principal works are "Die Verfassung der Kirche der Zukunft" (1845), "Egyptens Stelle in der Weltgeschichte" (5 vols., 1845–57), "Christianity and Mankind" (7 vols., 1854), and "Gott in der Geschichte" (2 vols., 1868). He had a high reputation as an Egyptologist, and was liberal in religion and politics. He was recalled from the court of St. James in 1854, and was raised to the peerage as Freiherr (baron) in 1858. Died at Bonn Nov. 29, 1860. (See "Memoirs of Baron Bunsen," by his wife, 2 vols., 1868.)

Bunt. See MILDEW.

Bun'ter Sand'stein ("variegated sandstone"), a German term imported into English geology, and applied to the "new red sandstone," the lowest portion of the triassic series, called *grès bigarré* by French geologists. As the trias is more perfectly developed in Germany than in Great Britain, the German beds are considered the typical group of the triassic period. Large quantities of bunter sandstein flank the Vosges Mountains. It is there generally a fine-grained, solid sandstone, useful as a material for building, and is often of a blue, red, or greenish tint. The most remarkable fossils of this formation are the remains of huge batrachians, including the *Labyrinthodon*.

Bun'ting [cognate with the Ger. *bunt*, "variegated," a term appropriate to many of the species], a name properly

The Cirl Bunting (*Emberiza cirlus*).

given to numerous small birds of the genera *Emberiza*, *Euspiza*, and *Plectrophanes*. These birds are mostly European, but some are found in America. One of their number is the ortolan of Europe, so highly prized for the table. The bobolink is sometimes called rice-bunting, and several other birds are often improperly called buntings.

Bunting (JABEZ), D. D., an English Wesleyan minister, born at Manchester May 13, 1779. He gained distinction as an eloquent preacher, and had much influence in the Church. Died June 16, 1858. (See his Life by T. P. BUNTING, 1859.)

Bunt of a Sail is that portion nearest the central perpendicular line. If a sail be divided into four equal portions from side to side, the bunt would comprise the two middle strips.

Buntz'lau, or **Bunzlau,** a town of Prussia, in Silesia, is on the Bober, 28 miles by rail W. N. W. of Liegnitz. It has a normal school, and manufactures of woollen goods, hosiery, linens, etc. Pop. in 1871, 8817.

Buntzlau, or **Bunzlau, Jung** (*i. e.* "Young Buntzlau"), a town of Bohemia, on the river Iser, 37 miles N. E. of Prague. It has an old castle, a gymnasium, and manufactures of cotton and woollen fabrics, leather, and soap. Pop. in 1869, 8695.

Bun'yan (JOHN), author of "Pilgrim's Progress," was born near Bedford, England, in 1628, and learned the trade of a tinker. He was dissipated in his youth, and enlisted in the army of the Parliament about 1645. He married about the age of twenty, soon quitted the army, and joined the Baptists. After passing through severe spiritual conflicts he became a preacher in 1655. He preached at Bedford until 1660, and was then committed to Bedford jail, in which he was confined twelve years. In this jail he wrote "Pilgrim's Progress" (1678), and other religious works, amounting in all to sixty volumes, large and small. After his liberation he resumed his ministerial labors at Bedford. Died Aug. 31, 1688. "We are not afraid to say," says Macaulay, "that though there were many clever men in England during the latter half of the seventeenth century, there were only two great creative minds. One of these produced the 'Paradise Lost,' and the other the

'Pilgrim's Progress.'" (See MACAULAY, "Essay on Southey's edition of 'Pilgrim's Progress;'" IVIMEY, "Life of John Bunyan," 1809.)

Bu'ol-Schau'enstein, von (KARL FERDINAND), COUNT, an Austrian diplomatist, born in Switzerland May 17, 1797. He was sent as ambassador to St. Petersburg in 1848, and was transferred to the court of St. James in 1851. He was minister of foreign affairs from 1852 to May, 1859. Died Oct. 28, 1865.

Buoy (pron. bwoy or boy), a floating body usually intended as a mark for the guidance of mariners. It is made either of wood or metal, and is often hollow. Buoys are generally moored by chains to the bed of the channel. They are of various shapes, sizes, and colors, partly to render them conspicuous, and partly to distinguish them one from another. Sometimes buoys point out the best channel; sometimes they warn the mariner away from shoals; sometimes they form a continuous double line between which ships can with safety pass. A hollow conical buoy is called a "can-buoy," a double conical buoy is called a "nun-buoy," a floating wooden spar is a "spar-buoy." The bell-buoy is a contrivance for rendering a buoy audible, whether it is visible or not; so long as any stream of water, caused by a tide or current, passes through the lower part of the buoy, it moves an undershot wheel, which rings a bell. In laying submarine telegraphs buoys are used when cables are thrown overboard in stormy weather. Such weather might severely strain the telegraphic cable, but it may be cut, buoyed, and abandoned during the rough weather, and afterwards picked up and repaired, and the work of laying the cable can go on as before the storm.

A buoy-rope, on shipboard, is the rope which connects the anchor with a buoy floating above it. It is simply intended to point out the locality of the anchor, but if it be strong it is useful in assisting to raise the anchor at times when the proper cable is cut or injured.

Buphaga. See BEEFEATER.

Bupres'tis [from the Gr. *βούπρηστις*, the name of an insect whose bite is said to have caused cattle to swell up; derived from *βοῦς*, an "ox," and *πρήθω*, to "puff up" by blowing], a genus of coleopterous insects of the family Buprestidæ, which includes more than 1000 species. They are remarkable for the splendor and richness of their colors. They are found in Europe, but are more abundant in tropical countries. The *Buprestis gigas*, of Cayenne, is about two inches long, and is larger than any of the European species.

The Giant Buprestis.

Bur, a rough, prickly covering (involucre) of the seeds of some plants, as the chestnut. The term is also applied to the flower-head or involucre of the *Arctium lappa* (burdock), the prickles of which are hooked at the point. In engraving on steel or copper, bur is a slight ridge raised on the edges of a line by the graver or the dry-point.

Bura'no, an island and town of Italy, in the Adriatic, 5 miles N. E. of Venice. The inhabitants are employed in fishing and cultivating vegetables for the market of Venice. Pop. 5693.

Bur'bage (RICHARD), an English actor, one of Shakspeare's associates. Died in 1619.

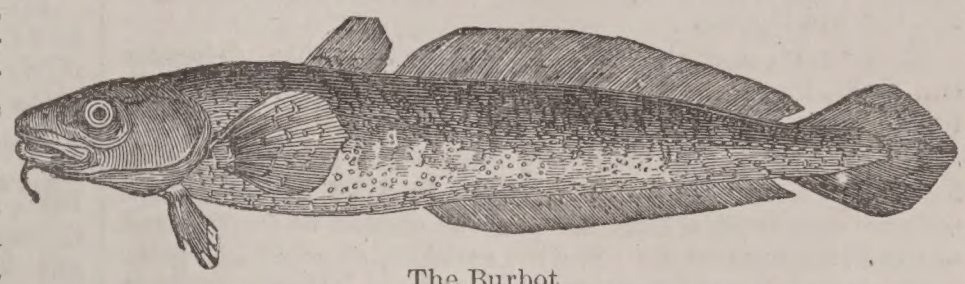
Bur'bank, a post-township of Monongalia co., Minn. Pop. 523.

Burbank, a post-village of Canaan township, Wayne co., O. Pop. 258.

Bur'beck (HENRY), an American officer, born in Boston June 8, 1754. He was a soldier in the Revolution, and was appointed captain under the Confederation May 1, 1787. In 1789 he was commissioned a captain of artillery, major in 1791, lieutenant-colonel in 1798, and colonel in 1802. He served with distinction in the Revolutionary war, that of 1812 with Great Britain, and on frontier service. He was brevetted brigadier-general 1813, and retired from the army June, 1815. Died at New London, Conn., Oct. 2, 1848.

Bur'bois, a post-township of Gasconade co., Mo. Pop. 800.

Bur'bot (*Lota vulgaris*), a fish of the same genus as the ling, is found in certain rivers of England, and is the only British fresh-water species of the family Gadidæ. It



The Burbot.

is also found in the northern parts of the continent of Europe, and in Asia. The larger specimens weigh eight or ten pounds. It has two dorsal fins, the second of which is very long, and a very long anal fin. Its flesh is white, firm, and is esteemed as food. It is capable of living a long time out of water. Several burbots are found in the U. S.

Bur'bridge (STEPHEN GANO), an American general of volunteers, born in Scott co., Ky., Aug. 19, 1831; educated at Georgetown College and at Kentucky Military Institute, Frankfort; studied law in the office of the late Senator Garrett Davis at Paris, Ky. In 1849 he returned to Georgetown, and engaged in mercantile business till 1853, when he turned his attention to farming, and at the outbreak of the recent civil war was conducting a large farm in Logan county. He at once ardently espoused the cause of the U. S., and by his voice and influence raised the famous Twenty-sixth Kentucky, which he led in the field until the battle of Shiloh, where, for distinguished gallantry, he was promoted to be a brigadier-general of U. S. volunteers. Upon Bragg's invasion of Kentucky in 1862 he was ordered there, remaining till Bragg was driven from the State, when he was ordered to join the expedition against Vicksburg. He led the charge at Arkansas Post and at Port Gibson, being among the first to enter each place. In the various actions about, and at the siege of, Vicksburg he was conspicuous. He subsequently commanded the military district of Kentucky, and it was during this time that he defeated John Morgan in his raids, and drove him into Tennessee. For this service he received the thanks of President Lincoln, and was brevetted major-general. He resigned from the army in 1865. G. C. SIMMONS, *Clerk Board of Eng'rs.*

Burch'dale, a township of Todd co., Minn. Pop. 124.

Burch'ville, a township of Lawrence co., Ala. P. 656.

Burchville, a township of St. Clair co., Mich. Pop. 726.

Burck'hardt (JOHANN LUDWIG), an enterprising Swiss traveller, born at Lausanne Nov. 24, 1784. He went to London in 1806, and entered the service of the African Association, which in 1809 sent him to explore the interior of Africa. He spent about two years in Syria, and prepared himself by the study of Arabic and medicine. He travelled through Cairo and Nubia to Mecca, where he arrived in 1814. Disguised as a Moslem hâjî, he made a pilgrimage to Mount Ararat and to Medina. He died at Cairo Oct. 15, 1817. He was eminently qualified for the

part of a traveller and explorer. His "Travels in Nubia" (in English, 1819), "Travels in Syria and Palestine" (1822), "Travels in Arabia" (1829), "Notes on the Bedouins and Wahabis" (1830), and "Manners and Customs of the Modern Egyptians" (1830), are highly esteemed.

Bur'den (HENRY), born at Dumblane, Scotland, April 20, 1791, was educated at Edinburgh, and in 1819 came to the U. S., where he finally became a large iron manufacturer at Troy, N. Y. He made the first cultivator used in America, and invented several useful machines. His horse-shoe machine he brought out in 1835, and the hook-headed spike used on railroad tracks in 1843. Died Jan. 19, 1871.

Burden of Proof, the obligation or necessity of proving the fact in dispute in an issue joined in a court of justice. The general rule is, that the burden of proof is with the party who asserts the affirmative of the issue. The same rule is applied if he grounds his case on negative statements or allegations. The rules concerning the burden of proof are of great importance in criminal prosecutions. The burden of proof is on the government throughout the whole case.

Burdett', a post-village of Hector township, Schuyler co., N. Y., has a tannery, foundry, a factory of agricultural tools, a woollen mill, and three churches.

Burdett (Sir FRANCIS), a popular and liberal English legislator, was born Jan. 25, 1770. In 1793 he married a rich heiress, Sophia Coutts. He was elected to Parliament about 1795, became an effective speaker, opposed the ministry, and advocated parliamentary reform. He represented Westminster for many years (1807–36), and was the idol of the London populace. Died Jan. 23, 1844.

Burdett-Coutts (ANGELA GEORGIANA), BARONESS, a daughter of Sir Francis Burdett, born April 25, 1814. She gained distinction by the liberal use of her vast fortune. She is now a baroness in her own right.

Bur'dock (*Lappa officinalis*), a plant of the order Compositæ, has a globular involucre with imbricated coriaceous scales, each tipped with an abrupt and spreading, awl-shaped, hook-pointed appendage. This involucre, which is called a *bur*, catches hold of the clothes of persons who come into contact with it. It is a native of Europe and naturalized in the U. S., growing as a weed in waste places, fence-corners, and near dwellings. It is used in medicine as a diuretic and diaphoretic.

Burd'wan, a town of India, in Bengal, is on the Dummodah, and on the Grand Trunk Road, 68 miles by rail N. W. of Calcutta. It has manufactures of silk and cotton fabrics, and a large palace, but the houses are generally rather mean. Pop. estimated at 50,000.

Bu'reau, a French word, much used also in various other languages. In France it signifies a writing-table, a desk, an office in which public business is transacted. It is also applied to each one of the numerous committees of the French National Assembly. The treasury office is called *bureau des finances*. The parliamentary phrase *déposer sur le bureau* signifies "to lay upon the table." In the U. S. the term bureau is commonly applied to a chest of drawers, a piece of furniture for a bed-chamber. Soon after the end of the civil war in the U. S., a department called the Freedmen's Bureau was organized, in order to protect, feed, and clothe the liberated slaves. The term is also applied to the minor divisions of the executive departments at Washington.

Bureau, a county of Illinois. Area, 800 square miles. It is bounded on the S. E. by the Illinois River, and intersected by Green River and Bureau Creek. The surface is undulating or nearly level; the soil is fertile. The greater portion of the county is prairie-land. It has important mines of coal. Cotton, grain, dairy products, wool, and hay are raised extensively. The chief manufactures are carriages, wagons, saddlery, etc. It is traversed by the Chicago Burlington and Quincy and Chicago Rock Island and Pacific R. Rs. Capital, Princeton. Pop. 32,415.

Bureau, a township of Bureau co., Ill. Pop. 1145.

Burg, a German word signifying a "castle," a "fortress," occurs as the termination of the names of many towns of Europe.

Burg, a town of Prussian Saxony, is on the river Ihle, 17 miles by rail N. E. of Magdeburg, and on the railway which connects Magdeburg with Berlin. It was settled by French and Walloon colonists, and in one of the churches the service is in French. It has been for many centuries celebrated for its manufactures of woollen cloth, which are still flourishing. The annual value of the cloth made here is about 7,500,000 thalers. Here are also manufactures of linen, machinery, pottery, etc. Pop. in 1871, 15,184.

Burg'dorf [Fr. *Berthoud*], a town of Switzerland, in the canton of Berne, on the river Emmen, 13¾ miles by rail N. E. of Berne. It has a castle and manufactures of ribbons and silk. Pestalozzi opened a school here in 1798. The Sommerhaus baths are in the vicinity. Pop. in 1870, 5078.

Bür'ger (GOTTFRIED AUGUST), a popular German poet, born near Halberstadt Dec. 31, 1747. He studied at Göttingen, and his literary career was greatly influenced by reading Shakspeare. His works consist chiefly of ballads and songs, which, though very popular, did not relieve him from poverty. Among his best productions are "Lenore" (1772) and the "Wild Huntsman." Died June 8, 1794.

Bur'ges (TRISTAM), LL.D., an American statesman and orator, born at Rochester, Mass., Feb. 26, 1770, and graduated at Brown University in 1796. He studied law, which he practised with success at Providence, R. I., and became a leader of the Federal party. He was for a time chief-justice of Rhode Island, and afterwards a professor in Brown University. In 1825 he was elected a member of Congress, in which he continued ten years, and gained a high reputation. He was eminently logical and terribly sarcastic. Died Oct. 13, 1853.

Bur'gess, a citizen or freeman of a borough; a representative or magistrate of a borough. This title was formerly given to members of the lower branch of the Virginia legislature.

Burgess (Rt. Rev. GEORGE), D. D., born at Providence, R. I., Oct. 31, 1809, graduated at Brown University in 1826, and was a tutor there for a time. He studied in Germany two years, was rector of Christ church (Protestant Episcopal), Hartford, Conn. (1834–47), and was in 1847 consecrated bishop of Maine, acting also as rector of Christ church, Gardiner. He went to Hayti to found a mission, and died there of apoplexy April 3, 1866. He published "Pages from the Ecclesiastical History of New England," "The Last Enemy Conquering and Conquered," a volume of sermons, and other works. (See his Life, by ALEXANDER BURGESS, his brother.)

Burgk'mair (HANS), a noted German painter and engraver on wood, was born in Augsburg in 1472. He was a friend of Albert Dürer. Died in 1531.

Bur'glary [from *burg*, a "town," and the Old Fr. *laire* (Lat. *latro*), a "thief"], in criminal law, the act of breaking and entering into a dwelling-house of another or a church in the night-time, with intent to commit a felony therein. There are four circumstances necessary to constitute the offence, referring to place, time, the acts done, and the intent. The place is a dwelling-house or a church. It is not necessary, in order to constitute a "dwelling-house," that there should be any person residing in the house at the time. It is enough if it be habitually used as a dwelling, though it may at the time be closed, as in the case of a person having two or more residences. Difficult questions sometimes arise as to buildings connected with the house and within the curtilage, and as to the case of lodgers having separate rooms and entering by a common door. In the last instance the inquiry would be whether each lodger has a distinct dwelling-house. (Consult BISHOP or WHARTON on "Criminal Law.")

As to time, the rule is that the offence must be committed by night. The better opinion is, that both the breaking and entering must be by night, though the two acts, so far as they are distinct in their nature, may be committed on separate nights. It is held to be night when a person cannot by the light of the sun clearly discern the face of another. This is quite indefinite, and as burglary is a heinous offence, some fixed though arbitrary rule seems desirable. In some of the States the time is fixed by statute. The fact that the face can be seen by moonlight does not affect the question.

The acts to be done are breaking and an entry. The word "breaking" is not to be construed so as to require any great degree of force or violence. Unlatching a door or raising a window is sufficient. If a door or window be left open, an entry through them would not be a breaking, though the act of coming down a chimney would be. Any entry will suffice, such as thrusting the hand or an instrument through a broken pane of glass. The act of discharging a loaded pistol or gun through a door or the glass of a window would be both a breaking and an entry. It is doubtful whether the act of *breaking out* of a house will be sufficient, though the other ingredients of the offence, except breaking in, be present.

Finally, there must be an intent to commit a felony. If a felony be actually committed, the intent may be inferred. It will be immaterial whether the felony exists at common law or is created by statute. An intent to commit a trespass will not suffice.

The common-law ingredients of this crime have been modified in this country by statute. Burglary is sometimes divided into degrees; some of these degrees would include breaking and entry in the daytime, or into build-

ings other than dwelling-houses and churches, or breaking out of a building, as well as into it. In some of the States, statute law makes the intent to commit any crime sufficient.

T. W. DWIGHT.

Bur'gos, a province of Spain, in Old Castile, is bounded on the N. by Santander, on the E. by Biscay, Alava, and Logroño, on the S. E. by Soria, on the S. by Segovia, and on the W. by Valladolid and Valencia. Area, 5651 square miles. It is drained by the Douro and the Ebro, which rises within its limits. The surface is partly mountainous. Gold, silver, copper, iron, and lead are found in it. Pop. in 1867, 357,846.

Burgos [Lat. *Burgi*], a city of Spain, capital of the above province, is situated on the river Arlanzon, at the foot of the Sierra de Oca, 140 miles by rail N. of Madrid; lat. 42° 20′ N., lon. 3° 45′ W. It was formerly the capital of Old Castile, and was far more populous than it is now. It was founded in 844 A. D., and has many antique buildings. The court was removed from Burgos to Madrid in the sixteenth century, after which the importance of the former declined. The most remarkable edifice here is the cathedral of white marble, which is one of the noblest specimens of Gothic architecture in Europe. This was commenced in 1221. Burgos is the seat of an archbishop, and has a college and some manufactures of woollen and linen fabrics. The railway which connects Bayonne with Valladolid passes through this town. Pop. 25,721.

Burgoyne (JOHN), a British general and dramatist, born in 1730. He commanded a force which captured Alcántara, in Spain, in 1762. In the summer of 1777 he took command in Canada of an army of about 8000 men, which was ordered to enter New York State and operate against the revolted colonists. He was repulsed at Stillwater in September, and was captured with his whole army at Saratoga in Oct., 1777, by Gen. Gates. He wrote successful dramas called "The Maid of the Oaks" (1780), "Bon Ton," and "The Heiress" (1786). Died June 4, 1792.

Burgoyne (Field-Marshal Sir JOHN FOX), son of the general above named, and godson of Charles James Fox, was born in London July 24, 1782, entered the Royal Engineers as second lieutenant in 1798. "During a period of 73 years' service, he slowly but steadily ascended, until at an age far beyond the scriptural limit of the life of man, he reached that summit of his professional career, which, in a published letter, dated Wilhelmshohe, Oct. 29, 1870, earned for him from the French Emperor, Napoleon III., the designation of

"LE MOLTKE DE L'ANGLETERRE."

He served as Commanding Engineer under General Frazer at the assault of Alexandria and siege of Rosetta (Egypt) in 1807; and under Sir John Moore in his Portuguese campaign and retreat, in 1808. Through the Peninsular war, as an engineer officer he took a prominent part in its greater sieges and battles, *e. g.* the siege of Ciudad Rodrigo, the two sieges of Badajoz, as Commanding Engineer at the desperate siege of Burgos and of that of Sebastian (shot through the neck in the assault) and the battles of Busaco, Salamanca, Bidassoa, Nivelle, &c. He came out of the Peninsular war, aged 32, the senior officer of Engineers who had been engaged in the sieges of Spain. As commanding engineer under Gen. Pakenham he was present at the assault of Gen. Jackson's lines below New Orleans, January 8, 1815, as also at the capture of Fort Bowyer (Mobile Point) February 11. He was called again to the field (aged 72) for the Crimean war, rendering distinguished services both in the debarkation, the battle of the Alma and subsequent march, and in the siege. Against the opinion of the French engineers he pointed out at the beginning the Malakoff as the proper and decisive object of the siege operations. On his recall he resumed his position at the War office as Inspector General of Fortifications, to which place he had been appointed in 1845. His services in this capacity and his home services during the long interval between the Peninsular and Crimean wars are numerous and important and his various reports and official writings have been deemed of such importance as to justify the publication of a work entitled "Military Opinions" of Sir John Burgoyne. After 70 years' service he retired in 1868 with promotion to the rank of Field Marshal, and the appointment of Constable of the Tower of London. Though then aged 86 his physical powers were good and his mind unimpaired. "Seventy years of work have left in me," he writes, "a train of thought that I now continue to indulge in." A past history and experience of 70 years had had no effect in blunting his mind to the *present* and its progress. His interest in all that concerned our own great war was unflagging and his mind keenly open to every "improvement" he could discern. Our reports on military bridges, military railway transportation, sieges, torpedoes, submarine blasting, &c., he sought for and appreciated. How much longer a noble life and a grand career might have been protracted it is useless to speculate, for a blow fell in September, 1870, in the loss of his only son, Capt. Hugh Burgoyne, V. C., Commander of the ill-fated "Captain," from the effects of which he never rallied. He died Oct. 7, 1871. For one who "has done more under fire than any soldier in Europe," even though, to use his own modest explanation, he "had been a long time about it," whose life is a shining illustration of the motto of the Royal Engineers, "*Quo fas et gloria ducunt Ubique*," this tribute from one who was honored with his friendship and who reverently followed his remains to their last resting place, in the historic Tower of London, is due.

J. G. BARNARD, U. S. A.

Bur'gundy [Fr. *Bourgogne;* Lat. *Burgundia*], one of the most important of the former provinces of France, now forming the departments of Côte d'Or, Saône-et-Loire, Yonne, part of Ain, and part of Aube. The whole population of the departments of Ain, Saône-et-Loire, Côte d'Or, Yonne, Aube, Haute-Marne, and Haute-Saône amounts to 2,460,730. The name was derived from an ancient German tribe called in Latin *Burgundi* or *Burgundiones*, who settled in this part of Gaul about 408 A. D. Gondemar, king of Burgundy, was defeated and killed in 534 by the Franks, who then obtained possession of Burgundy. The kingdom of Burgundy re-established in 561 was much more extensive than the province of that name, and its extent varied in different periods. It included the provinces of Burgundy, Franche-Comté, Dauphiné, a part of Switzerland, Lyonnais, and nearly all the basin of the Rhone. In 879 A. D., Burgundy renounced its allegiance to the weak Carlovingian king, and became an independent state ruled by King Boso. It afterwards in part belonged to the kingdom of Arles (933–1032). Upper Burgundy was a kingdom from 888 to 933. In these ages there were often several lines of princes claiming the title of king of Burgundy, and ruling over parts of the country. King Rudolf III., dying without male issue in 1032, bequeathed his kingdom to the emperor Conrad II. Conrad's son, Henry, erected it into a duchy, feudal to Germany, sometimes called Little Burgundy. Meanwhile the north-western portion of old Burgundy remained a fee of the French crown, governed by a line of dukes. This line became extinct in 1361, but John II. of France made his son, Philip the Bold, duke in 1364. After this Burgundy became an important state, which was much of the time virtually independent. Several of the dukes who reigned over it were powerful and famous princes. On the death of Charles the Bold, in 1477, the ducal line became extinct, and the duchy was annexed to France. From 915 to 1384 Franche-Comté was under a line of counts of Burgundy, but Philip the Bold made it a part of his dominions in 1384. (See DE BARANTE, "History of the Dukes of Burgundy," 13 vols., 1826.)

Burgundy, DUKES OF. See CHARLES THE BOLD, PHILIP THE BOLD, PHILIP THE GOOD.

Burgundy (LOUIS), DUKE OF, dauphin of France, born in 1682, was a grandson of Louis XIV. and the father of Louis XV. He was a youth of violent passions and extremely haughty, but his character was, it is said, reformed by Fénelon, who was his preceptor. He married Adelaide of Savoy about 1698. On the death of his father he became dauphin and heir-apparent to the throne. Died in 1712.

Burgundy Pitch (*Pix Burgundica*), a resinous substance, is a concrete exudation from the *Abies excelsa* or Norway fir. It is prepared by melting it in hot water, by which process part of the volatile oil which it contains is separated from it. By straining it through a coarse cloth some impurities are removed. It is of a yellowish-white color, is hard and brittle when cold, but is softened by a moderate degree of heat. It has a pleasant resinous odor and a slightly bitter taste. It is used in medicine as an external application in the form of a plaster. The Burgundy pitch of commerce comes chiefly from the neighborhood of Neufchâtel, Switzerland.

Burgundy Wines, the name of excellent French wines produced in the former province of Burgundy, chiefly on the range of hills called Côte d'Or, between Dijon and Châlons. These hills are about 800 to 1000 feet high. The wines are celebrated for richness of flavor and perfume. The best red wines of Burgundy are called Clos-Vougeot, Chambertin, Romané-Conti, Volnay, Pomard, and Richebourg. The white wines of Burgundy are said to be the finest in France, but the quantity produced is less than that of the red. The total annual product of Burgundy wines is from 2,500,000 to 3,500,000 hectolitres.

Bu'ri, a name of a species of palm, a native of the Philippine Islands. Its trunk is employed in the construction of houses; sugar and spirituous liquors are made of the

sap; the pith yields a valuable article of food (sago); and mats and sails are made from its fibre. This palm is the *Saguerus saccharifer*.

Bu'ri, or **Bure** [from a root cognate with the Anglo-Saxon *bora*, "one who bears" or produces, because, being the first of the gods, he was the progenitor of all the others], the first of the gods of the Norse mythology (Æsir). It is related that when the mythic cow Audhumla (whose name, from *audr*, "desert," and *hum*, "darkness," may be said to symbolize the original chaotic darkness) began to lick the frost-covered rocks of the primeval chaos, there came forth a beautiful and mighty being in human form called Buri, whose son Bör (that is "born," and hence, like the Latin *natus*, signifying a "son") was the father of Odin.

Buridan (JEAN), a French scholastic philosopher, born at Béthune, in Artois, flourished about 1350. He was a pupil of Occam, lectured at Paris, and belonged to the Nominalist school. He wrote commentaries on Aristotle's "Metaphysica," and other works, and was the reputed author of a celebrated sophism called "Buridan's Ass." The subject of this was an ass placed between two equidistant and equal bundles of hay, and starving on account of the equal balance of the two motives.

Bu'rin, a post-town and port of entry of Newfoundland, capital of Burin district, has a fine harbor on the W. side of Placentia Bay, and has a jail. Pop. 1850.

Burke, a county of Georgia, bordering on South Carolina. Area, 1640 square miles. It is bounded on the N. E. by the Savannah River, and on the S. by the Ogeechee, and is intersected by Brier Creek. The surface is undulating or nearly level; the soil is fertile. Corn and cotton are staple crops. Limestone abounds here. Burke county is intersected by the Central R. R. Capital, Waynesborough. Pop. 17,679.

Burke, a county in the W. of North Carolina. Area, 450 square miles. It is intersected by the Catawba River, and also drained by Linville River. The Blue Ridge extends along the N. W. border of this county, which presents beautiful mountain-scenery. Grain, tobacco, and wool are raised. It contains gold, native antimony, and small quantities of silver and platinum. True diamonds have been found here. The soil of the valley is fertile. It is traversed by the Western R. R. Capital, Morganton. Pop. 9777.

Burke, a post-township of Franklin co., N. Y. P. 2141.

Burke, a post-township of Caledonia co., Vt. It has five churches, and manufactures of lumber, shingles, and starch. Pop. 1162.

Burke, a township of Dane co., Wis. Pop. 1127.

Burke (EDMUND), LL.D., an eminent statesman, orator, and writer, born in Dublin Jan. 1, 1728, or, according to some writers, in 1730. He was the son of Richard Burke, a distinguished attorney, and Miss Nagle, a lady of a Roman Catholic family. He was one of four children, the only survivors of a numerous family, and at an early age became the pupil of Abraham Shackleton, a Quaker of superior attainments and excellent character, who taught a school at Ballitore. Having entered Trinity College, Dublin, he devoted himself to history, philosophy, the classics, etc., not neglecting poetry and other works of imagination. He afterwards studied law at the Middle Temple, but returned to Ireland in 1751, and took the degree of A. M. His "Vindication of Natural Society," an ironical criticism of Lord Bolingbroke's attacks on Christianity, came out anonymously in 1756. "The imitation of Bolingbroke's style and manner was so perfect," says Prior, "as to constitute identity, rather than resemblance." This was followed by a "Philosophical Inquiry into the Origin of our Ideas of the Sublime and Beautiful," which was highly commended by Dr. Johnson. Burke married, in 1757, Mary Jane, daughter of Dr. Nugent of Bath, and the union appears to have been a very happy one. Soon after this he formed an intimacy with Dr. Johnson and Garrick; the former, from his first acquaintance with Burke, felt the warmest admiration for his talents, and was accustomed to say that "no man of sense could meet Mr. Burke, by accident under a gateway, to avoid a shower, without being convinced that he was the first man in England." In 1759 he became private secretary to William Gerard Hamilton, through whose influence chiefly he received a pension from the government of £300 per annum; but finding that his political independence would be compromised by its acceptance, he threw it up at the end of the year. He was returned to Parliament for Wendover, in Buckinghamshire, about 1765, and re-elected in 1768. Having soon after purchased an estate, he wrote to his friend Shackleton, "I have made a push with all I could collect of my own, and the aid of my friends, to cast a little root into this country. I have purchased a house with 600 acres of land in Buckinghamshire, 24 miles from London." The "Letters of Junius," which appeared about this time, were almost universally ascribed to Burke, but his repeated denials were not generally believed until the publication of the "Grenville Papers." His "Thoughts on the Cause of the Present Discontent" came out in 1770, and in 1771 he was appointed agent to the colony of New York. In 1772, Sir Charles Colebrook, in the name of the directors of the East India Company, offered to Burke, who had already considerable knowledge of Indian affairs, "the first position in a supervisorship of three, empowered to trace out in detail the whole administrative system of India, and to remedy all they could find amiss." This offer he declined, feeling perhaps unwilling to leave Parliament at a time when American affairs were becoming more complicated, and the condition of France filled him with anxious forebodings. Soon after his return from a short residence in Paris he said in a speech in Parliament, "I see propagated principles which will not leave to religion even a toleration, and make Virtue herself less than a name." In April, 1774, he made a speech on American taxation, and he appears to have been the only member of Parliament who fully comprehended the dangers which threatened the American colonies. An intelligent American gentleman, who was present on this occasion, is said to have exclaimed, "You have got a most wonderful man here; he understands more of America than all the rest of your House put together." In Nov., 1774, Burke represented the city of Bristol in Parliament, and in Mar., 1775, made an admirable speech in favor of conciliatory measures towards the American colonies. Fox said of this oration, "Let gentlemen read this speech by day and meditate upon it by night; they would there learn that representation was the sovereign remedy for every evil." In 1780 he delivered his speech "On the Economical Reform," and in 1782 became a privy-councillor and paymaster-general of the forces under the Rockingham ministry. His speech on the "East India Bill" in Dec., 1783, is esteemed one of his best. The bill was lost in the House of Lords, although it passed that of the Commons. Burke retired from office soon after the accession of Pitt as prime minister, and held no position afterwards under the government. In Feb., 1785, he made a speech on the debts of the nabob of Arcot, which, says Prior, "was one of those outpourings of a fertile and vigorous intellect which on an unpromising theme seemed to combine all that could instruct, dazzle, and even overpower the reader." His prosecution of Hastings, the most arduous enterprise of his life, was commenced in Jan., 1786. The articles containing the different charges were so numerous and extensive as to require the attention of the House for a considerable part of two sessions. After Sheridan's speech on the Begum case in Jan., 1787, a committee of impeachment was formed, and on the 10th of May, Burke, as chairman of the committee, accused Hastings at the bar of the House of Lords in the name of the Commons of England. On the 15th of Feb., 1788, Burke made his memorable speech in Westminster Hall, in the presence of an immense assembly. Although a verdict of acquittal was passed in 1795, the noble efforts of Burke led the way to great reforms in the government of India. "Never," says Lord John Russell, "has the great object of punishment, the prevention of crime, been attained more completely than by this trial—Hastings was acquitted, but tyranny, deceit, and injustice were condemned." In 1790 Burke published his "Reflections on the Revolution in France," of which more than 30,000 copies are said to have been sold within a few months. It was translated into French, and received with enthusiasm in all parts of Europe. Soon after this he published "An Appeal from the New to the Old Whigs," in which he refutes the charge brought against him by Fox of having abandoned the principles of his party. About 1795, Burke received considerable pensions granted at the desire of the king, and without solicitation on his part or that of his friends. His acceptance of these well-merited rewards exposed him to severe attacks upon his character, in reply to which he wrote his "Letter to a Noble Lord," which was received with great favor. Burke's only son, Richard, a young man of great promise, had died in 1794, and this severe affliction probably hastened the father's death, which took place July 9, 1797. "If we are to praise a man in proportion to his usefulness," says Schlegel, "I am persuaded that no task can be more difficult than to do justice to the statesman and orator Burke. This man has been to his own country, and to all Europe, a new light of political wisdom and moral experience. He corrected his age when it was at its height of revolutionary frenzy; and without maintaining any system of philosophy, he seems to have seen farther into the true nature of society, and to have more clearly comprehended the effect of religion in connecting individual security with national welfare, than any philosopher

of any preceding age." A writer in the "London Quarterly Review" observes of Burke's speeches on the Stamp Act, "This was the appropriate start of a man who, whether as a statesman, a thinker, or an orator, was without an equal. Pitt and Fox were great, but Burke belongs to another order of beings, and ranks with the Shakspeares, the Bacons, and the Newtons. . . . By the incessant practice of composition he learned to embody his conclusions in a style more grandly beautiful than has ever been reached by any other Englishman with either the tongue or the pen" (*London Quarterly Review for January and April*, 1858). (See PRIOR, "Life of Burke;" DR. GEO. CROLY, "Political Life of Edmund Burke;" LORD JEFFREY, "Miscellanies.") J. THOMAS.

Burke (Sir JOHN), a genealogist, born in Ireland in 1786. He published, besides other works, a "Dictionary of the Peerage and Baronetage of the British Empire" (1826), often reprinted. He was for some time Ulster King of Arms. Died in 1848.—His second son, Sir JOHN BERNARD BURKE, LL.D., born in 1815, is (1873) Ulster King of Arms, an office which he has held since 1853. He has written a large number of works on heraldry and kindred subjects.

Burke's Fork, a township of Floyd co., Va. P. 671.

Burkesville, a post-village, capital of Cumberland co., Ky., on the Cumberland River, about 125 miles S. by W. of Frankfort. It has one weekly newspaper.

Burkesville, a post-village of Nottoway co., Va. It is situated at the crossing of the Richmond and Danville and the South Side R. Rs. It has one weekly newspaper.

Bur'kittsville, a post-village of Petersville township, Frederick co., Md. Pop. 293.

Bur'leigh (WILLIAM **Cecil**), LORD, an able English statesman, born at Bourne, in Lincolnshire, in 1520. He graduated at Cambridge, studied law, and married Mildred, a daughter of Sir Anthony Cook. In 1548 he was appointed secretary of state. As he was a Protestant, he resigned office on the accession of Queen Mary in 1553. He was one of the few eminent Protestants who escaped from persecution in that reign. He was again appointed secretary of state by Queen Elizabeth in Nov., 1558, and he was virtually prime minister for forty years from that date. In 1571 he received the title of Baron Burleigh, and in 1572 became lord treasurer. According to Hume, "he was the most vigilant, active, and prudent minister ever known in England." He died in 1598, and left no less than 300 landed estates. "Lord Burleigh," says Macaulay, "can hardly be called a great man. He was not one of those whose genius and energy change the fate of empires. Nothing that is recorded either of his words or actions indicates intellectual or moral elevation. But his talents, though not brilliant, were of an eminently useful kind. He had a cool temper, a sound judgment, great powers of application, and a constant eye to the main chance." (See ARTHUR COLLINS, "Life of William Cecil," 1732; MOTLEY, "History of the United Netherlands," chaps. vi., viii., and xviii.; FROUDE, "History of England," vol. v.)

Burleigh (WILLIAM HENRY), an American poet, born at Woodstock, Conn., Feb. 2, 1812. He was an opponent of slavery and editor of several journals. In 1848 he produced a volume of poems. Died Mar. 18, 1871.

Bur'leson, a county of the S. central part of Texas. Area, 976 square miles. It is bounded on the N. E. by the Brazos River, and on the S. by Yegua Creek. The soil is fertile. Great numbers of cattle are raised. Wool, cotton, and corn are staple products. Capital, Caldwell. P. 8072.

Burleson, a post-township of Franklin co., Ala. Pop. 1050.

Burlesque [It. *burlesco*, from *burla*, a "jest," "mockery"], a species of ludicrous composition. The Italian "poesia burlesca" signifies comic or sportive poetry. The term in French and English is commonly restricted to compositions of which the humor consists in a ludicrous mixture of things high and low, as high thoughts clothed in low expressions, or, *vice versâ*, ordinary or mean topics invested with the artificial dignity of poetic diction. Scarron's works and Butler's "Hudibras" are remarkable examples of the burlesque.

Burlet'ta, an Italian word, signifies a comic operetta or musical farce.

Bur'lingame, the county-seat of Osage co., Kan., on the Atchison Topeka and Santa Fé R. R., 24 miles S. S. W. of Topeka. Coal is found in abundance here, also a fine quality of fire-clay. It has four churches and a fine brick school-house. The surrounding country is unsurpassed in productiveness. The climate is healthy. It has one newspaper. Pop. 655; of Burlingame township, 1549.
ED. OF OSAGE COUNTY "CHRONICLE."

Burlingame (ANSON), LL.D., an American diplomatist, born at New Berlin in Chenango co., N. Y., Nov. 14, 1822, and graduated at Harvard in 1846. He became a lawyer and a resident of Boston, and represented the fifth district of Massachusetts in Congress from 1854 to 1860. He acted with the Republicans, and gained distinction as an orator. In 1861 he was sent as commissioner to China, and in 1867 was appointed ambassador from China to the U. S. and the great powers of Europe. Died Feb. 23, 1870.

Bur'lington, a county of New Jersey. Area, 600 square miles. It extends entirely across the State. It is bounded on the N. W. by the Delaware River, and on the S. E. by the Atlantic Ocean. It is drained by Little Egg Harbor River and Rancocus Creek. The surface is mostly level; the soil is fertile in the N. W. part, and sandy in the other portions. Grain, cattle, hay, and dairy and garden products are the chief staples. It has manufactures of lumber, clothing, boots, shoes, etc. It is intersected by the Camden and Amboy R. R. and the New Jersey Southern R. R. Capital, Mount Holly. Pop. 53,639.

Burlington, a post-village of Boulder co., Col., on the St. Vrain River, 42 miles N. W. of Denver.

Burlington, a post-township of Hartford co., Conn. Pop. 1319.

Burlington, a post-township of Kane co., Ill. P. 919.

Burlington, a post-township of Carroll co., Ind. Pop. 1198.

Burlington, a city and river-port of Iowa, capital of Des Moines co., is situated on the Mississippi River, 45 miles above Keokuk, 207 miles W. S. W. of Chicago, 250 miles by water above St. Louis, and 296 miles by railroad E. of Omaha. The river is here a broad, deep, and beautiful stream. The plan of the city is regular, and the houses are mostly of brick or stone. Many of the private residences are built on high bluffs which afford extensive views of river-scenery. This place is the seat of Burlington University. It contains about fourteen churches, three national banks, and several manufactories. It is the eastern terminus of the Burlington and Missouri River R. R., and is connected with Chicago by the Chicago Burlington and Quincy R. R. The Burlington Cedar Rapids and Minnesota R. R. connects it with Cedar Rapids and St. Paul. Here occurs a valuable variety of carboniferous limestone. (See BURLINGTON LIMESTONE.) Burlington is sometimes called the "Orchard City." It has two daily, one tri-weekly, one semi-weekly, and three weekly newspapers. Pop. in 1860, 6706; in 1870, 14,930.

Burlington, a post-village, capital of Coffee co., Kan., on the right bank of the Neosho River, and on the Missouri Kansas and Texas R. R., 28 miles S. E. of Emporia and 65 miles S. of Topeka. It has an abundant water-power, a national bank, a weekly paper, a public school-house costing $30,000, and first-class mills. Pop. 960; of Burlington township, 1600. A. D. BROWN, PUB. of "PATRIOT."

Burlington, a post-village, capital of Boone co., Ky., is 16 miles S. W. of Cincinnati. It has four churches. Pop. 277.

Burlington, a post-township of Penobscot co., Me. Pop. 553.

Burlington, a post-township of Middlesex co., Mass., has a public library and woollen print-works. Pop. 626.

Burlington, a post-township of Calhoun co., Mich. Pop. 1485.

Burlington, a township of Lapeer co., Mich. P. 880.

Burlington, a city of Burlington co., N. J., is on the Delaware River, nearly opposite Bristol, 20 miles above Philadelphia and 12 miles S. W. of Trenton. It is on the Camden and Amboy R. R. The river is here nearly 1 mile wide, and encloses an island of 300 acres. The city is the seat of Burlington College (Episcopalian), founded in 1846, and contains ten churches, a public library, a national bank, and two weekly newspapers. Pop. 5817; of Burlington township, 1025.

Burlington, a post-township of Otsego co., N. Y. Pop. 1476.

Burlington, a township of Licking co., O. Pop. 1061.

Burlington, a post-village in Burlington township, Bradford co., Pa., 8 miles W. of Towanda. Pop. of township, 1375.

Burlington, a city and capital of Chittenden co., Vt., is situated on Burlington Bay of Lake Champlain, 40 miles W. from Montpelier, the capital of the State. It was incorporated as a city in 1865, and is the largest place in the State. Pop. in 1840, 4271; in 1850, 7585; in 1860, 7713; in 1870, 14,387; in 1873, estimated from registered vote, 17,000. Area of original township, 6 square miles; about two-fifths were included in the municipal limits, the rest

forming a new town called South Burlington. Estimated value of property in the city (April 1, 1873), $9,307,500; city and State taxes for 1873, $95,391; city debt, Feb. 1, 1873, bonded and floating, $214,000; expenses of city government, 1872, $78,000.

The heaviest trade in the city is in lumber. There are five planing-mills, one of which alone dresses 50,000,000 feet a year, and the whole amount dressed is 8,000,000 or 10,000,000 feet per month. The capital invested is over $1,000,000, and, including the sales made by firms here of lumber which goes elsewhere, Burlington is the third market in the U. S. for size. There are large quarries of building-stone, of limestone, and fine marble within or near the city limits; lime-kilns and brick-yards are in active operation, and steam marble-mills, machine-shops, foundries, sash-factories, chair and furniture factories, paper-mills, and many smaller manufacturing trades, are thriving. On the N. E. limit of the city the abundant water-power of the Winooski is utilized for woollen and cotton mills, flour-mills, machine-shops, chair-factories, etc. A line of passenger steamers and a large fleet of tugs and barges ply between Burlington and every port on the lake.

The University of Vermont and State Agricultural College is situated here; it was chartered in 1791, has 8 professors and an average attendance of 100 students, besides a flourishing medical department, and ranks as one of the best institutions in the country. Since 1872 young women have been admitted to the classical and scientific departments on the same terms as young men. The college buildings stand on the crown of the hill on whose side the city is built, overlooking the lake in a most beautiful and commanding position. The library and museum are in a fireproof building, and the third story of the edifice contains an art-gallery. A park of 7 acres lies in front of the college buildings, and lands of the university in the rear. The city schools are 14 in number, having 37 teachers and 800 pupils, divided in three grades, besides the high school, and are under control of a board of commissioners elected by the people. The high-school building, erected in 1871 at a cost of $20,000, is one of the best in the State. The cost of maintaining schools in 1872 was $22,726. There are also two large Roman Catholic schools and an Episcopal institute for boys within the city limits, and several private schools. The churches are—two Congregational, one each Baptist, Methodist, Episcopal, and Unitarian, and two Roman Catholic, besides several mission chapels. The edifices are all good, and most of them new, all but one of stone or brick; and St. Mary's (Roman Catholic) cathedral is one of the finest church edifices in this part of the country. There are two orphan asylums—one Roman Catholic, accommodating 60 children, and one Protestant, with 35 inmates. The chief public buildings are the city hall, the county court-house (a handsome stone building, erected in 1872), the county jail, and the U. S. post-office and custom-house (a large fireproof brick building, erected in 1858). The banks are the Merchants' National and Howard National, united capital $1,100,000, the Burlington Savings Bank, deposits $214,000, and the Farmers' and Mechanics' Trust Company, capital $100,000. The libraries are the University Library, 15,000 volumes; Young Men's Association, 2000 volumes; Young Men's Christian Association, 1000 volumes, and the Fletcher Free Library, to be under control of the city, and not yet opened, fund $20,000. There are three newspapers, one daily and weekly, and two weekly. The Vermont Life and Champlain Mutual Fire Insurance Companies have their head offices in this city.

The city is supplied with water from the lake, raised by steam-pumps to a reservoir on the hill, which gives a head of 280 feet; the water-works are under the control of the city, but the gas-works are the property of a corporation. Some of the streets are sewered and paved, and $20,000 was appropriated by the city council for the street department for 1873. Lakeview Cemetery, opened by the city in 1868, on the bluff overlooking the lake, is already a beautiful spot, and Green Mount Cemetery, on the eastern side of the city, overlooking the valley of the Winooski, a magnificent location, contains the monument to Ethan Allen, who was one of the early settlers and buried here—a shaft of granite surmounted by a heroic statue of Allen in marble, which was unveiled with imposing ceremonies July 4, 1873.

Burlington was first settled in 1773, but no permanent residences were made till the close of the Revolutionary war, and in 1800 the population was 600. The principal streets are four rods wide, laid out at right angles, many of them well shaded with elm and maple trees. The location of the city is unequalled in this part of the country, and the beauty of its scenery unsurpassed anywhere. The geographical position of the city, midway of the eastern shore of Lake Champlain, and the facilities for transportation by rail and water, make the whole valley of the lake tributary to it in the way of business. Railroads run direct to Boston, Albany, and New York, Montreal, Ogdensburg, and the West, while other lines are under construction to centre here or connect with roads already built. When the proposed Caughnawaga Ship Canal is completed Lake Champlain must become a portion of the great highway between West and East, and Burlington a chief place of transshipment of goods for the Eastern cities and Europe.

B. L. BENEDICT,
OF THE CITY DIRECTORY AND "FREE PRESS."

Burlington, a post-village of Racine co., Wis., on the Pishtaka or Fox River, and on the Western Union R. R., 27 miles W. by S. of Racine. It has several factories and mills, one national and one State bank, and one weekly paper. Pop. 1589; of Burlington township, 2762.

ED. "BURLINGTON STANDARD."

Burlington Limestone, a variety of sub-carboniferous magnesian limestone, which derives its name from Burlington, Ia., the typical locality where it was first studied. It also occurs as a surface-rock in Missouri and Illinois, adjacent to the Mississippi River. It is a valuable building-stone, and is peculiarly interesting to naturalists. The upper bed is of a light gray color, and is nearly pure carbonate of lime. The lower bed contains more magnesia. "It is," says A. H. Worthen, "exceedingly rich in fossils, especially Crinoidea, and has afforded a greater number both of species and individuals than all the other palæozoic rocks of this continent combined."

Bur'mah, Birmah, or **Birma,** sometimes called the **Burmese Empire** or **Kingdom of Ava** [native *Myamma* or *Bramma;* Chinese *Meen-teen*], a country of Farther India, mostly included between lat. 19° and 27° N. It is bounded on the N. W. by Assam, on the N. by Thibet, on the E. by China and the river Salwen, on the S. by the British province of Pegu, and on the W. by Munnipoor and Aracan. Area, estimated at 190,500 English square miles. It is enclosed on several sides by mountain-ranges. The surface is diversified by high ridges, rolling uplands, and alluvial basins. The soil is generally fertile, and the climate in most parts is healthy. The rainy season in the southern part lasts from May to October, and is followed by several months of cool, dry, and pleasant weather. It is intersected by the river Irrawaddy, which divides it into two nearly equal parts. Burmah is rich in minerals, including gold, silver, copper, antimony, lead, tin, iron, marble, coal, and sulphur. It has valuable mines of rubies and sapphires, and wells of petroleum. The annual value of the gems found in Burmah is estimated at about £14,000. The staple productions of the cultivated soil are rice, maize, millet, pulse, cotton, indigo, tobacco, yams, and bananas. Among the indigenous plants are the bamboo, the cocoanut palm, the palmyra palm, the betel, the oak, and the teak tree, of which last Burmah has inexhaustible forests. The principal wild animals found here are the elephant, rhinoceros, tiger, leopard, and buffalo. The elephant and buffalo are tamed and employed as domestic animals. The Burmese belong to that branch of the Mongolian race which is characterized by a monosyllabic language. Their figure is short, squat, and robust; their hair is black, coarse, and lank; and their complexion is light-brown or yellowish. They have eyes obliquely placed and lozenge-shaped faces. A large majority of them profess the religion of Booddha, to which a great number of pagodas and temples are dedicated in Burmah. Connected with this religion is a monastic system and a multitude of monks bound by vows of poverty and celibacy. Besides the Burmese proper there are a great variety of other peoples, among which are the SHANS and KARENS (which see). The government is an hereditary despotism. The Burmese excel in boatbuilding, and are skilful workers in metals. They weave cotton fabrics and manufacture lacquered wares. They export teak-timber, petroleum, gold-leaf, silver, copper, indigo, tobacco, cotton, horns, and gums. Capitals, Mandelay and Ava. The total population is estimated at 4,000,000.

History.—This empire was formerly much more extensive than it is now. In this region the rival kingdoms of Ava and Pegu long contended for mastery. The seat of government was fixed about 1364 at Ava, which continued to be the capital for 369 years. The most celebrated martial king in Burmese history was Alompra, the founder of the present dynasty of Burmah, who conquered Pegu about 1756 and died in 1760. The empire attained its greatest extension about 1822, soon after which date the Burmese were involved in war with the British, who reduced the limits of the empire by the conquest of Aracan, Martaban, Pegu, and the Tenasserim provinces. In 1873 the Chinese troops invaded Northern Burmah and burned some towns. (See WINTER, "Six Months in Burmah," 1858; MALCOM, "Travels in the Burman Empire;" J. W. PALMER, "The Golden Dagon," 1853.)

REVISED BY A. J. SCHEM.

Burmah, British, a collective term applied to several provinces of the Anglo-Indian empire conquered from the kings of Burmah. These are Aracan, Martaban, Pegu, and the Tenasserim provinces of Maulmain (or Amherst), Tavoy, and Mergui. Aracan and the Tenasserim provinces were ceded to the British by a treaty signed in Feb., 1826, at the end of the first war with Burmah. Pegu and Martaban were retained as compensation after the war of 1852. The American Baptist missionaries have in British Burmah one of the most successful missions of modern times. The area of British Burmah is 93,879 square miles. Pop. in 1869, 2,392,312. (See ARACAN and PEGU.)

Bur'mann (PETER), an eminent philologist, was born at Utrecht July 6, 1668. He became professor of history, eloquence, and the Greek language at Leyden in 1715. He edited Horace, Ovid, Virgil, Quintilian, Lucan, and other classics, and wrote several works, among which is a treatise "On the Revenues of Rome" ("De Vectigalibus Populi Romani," 1694). His writings are esteemed for their accurate erudition. Died Mar. 31, 1741.

Bur'meister (HERMANN), a German naturalist, born at Stralsund Jan. 15, 1807, became professor of zoology at Halle in 1842, and in 1860 director of a museum of natural history in Buenos Ayres. Among his works are a "Manual of Entomology" (4 vols., 1832–44) and "The Animals of Brazil" (2 vols., 1854–56).

Bur'nap (GEORGE W.), D. D., born at Merrimack, N. H., Nov. 20, 1802, graduated at Harvard in 1824, became in 1828 pastor of a church in Baltimore, and was the author of numerous works, principally for the defence and exposition of the school of Unitarianism to which he belonged. Died at Philadelphia Sept. 8, 1859.

Burnes (Sir ALEXANDER), a noted traveller and Orientalist, born at Montrose, Scotland, May 16, 1805. He entered the army of India in his youth, and by his knowledge of Oriental languages gained a rapid promotion. In 1832 he started from Lahore on an exploring expedition in Central Asia, and visited Balkh, Bokhara, Astrâbâd, Teheran, etc. Having returned to England in 1833, he published "Travels into Bokhara." In 1838 he was sent on a mission to Cabool, where he passed some years as political resident. He was murdered there Nov. 2, 1842, by the Afghan insurgents.

Bur'net, the popular name of two genera of plants, the *Sanguisorba* and *Poterium*, generally referred to the natural order Rosaceæ. The great burnet (*Sanguisorba officinalis*) is cultivated in Germany as a forage-plant, and yields a good crop on poor soils. A similar species grows wild in North America. The common burnet (*Poterium Sanguisorba*) furnishes valuable pasturage for sheep on the English downs. It is sometimes seen in American gardens, and is used in salads.

Burnet, a county in Central Texas. Area, 995 square miles. It is bounded on the W. by the Colorado River, by which the southern part of the county is intersected. The surface is partly hilly; the soil is productive. Good iron ore, petroleum, and marble abound. The water-power is great. Cedar timber is plentiful. Cattle, corn, cotton, and wool are largely produced. Capital, Burnet. Pop. 3688.

Burnet, a village, capital of the above county, is 45 miles N. W. of Austin, and 10 miles E. of the Colorado River. Pop. 280.

Burnet (GILBERT), F. R. S., an eminent British historian and prelate, born in Edinburgh Sept. 18, 1643. He became professor of divinity in the University of Glasgow in 1668, resigned that chair in 1675, and removed to London. In 1679 he published the first volume of his "History of the Reformation in England" (3 vols., 1679–1715). He refused a bishopric which was offered to him by Charles II. He was a courageous and able asserter of civil liberty in the important crisis which preceded the revolution of 1688, and gained the favor of William III., who appointed him his chaplain, and in 1689 bishop of Salisbury. Among his works are a "Life of Sir Matthew Hale" (1682) and a "History of his Own Times" (2 vols., 1724–34). Died Mar. 17, 1715. "The utmost malevolence of faction," says Macaulay, "could not deny that he served his flock with a zeal, diligence, and disinterestedness worthy of the purest ages of the Church." (*History of England.*)

Burnet (JACOB), LL.D., an American jurist, born at Newark, N. J., Feb. 22, 1770. He graduated at Princeton in 1791. He was one of the founders of Cincinnati, whither he removed in 1796. He became a judge of the supreme court of Ohio in 1821, and was elected to the Senate of the U. S. in 1828. He wrote "Notes on the Early Settlement of the North-west Territory." Died April 27, 1853.

Bur'nett, a county of Wisconsin, bordering on Minnesota. Area, 1100 square miles. It is bounded on the N. W. by the St. Croix River, and is drained by the Namekagon and Shell rivers. The surface is uneven, and partly covered with forests of pine. Capital, Grantsburg. Pop. 706.

Burnett, a township of Santa Clara co., Cal. Pop. 802.

Burnett, a post-township of Dodge co., Wis. Pop. 981.

Burnett (WALDO IRVING), M. D., a naturalist and microscopist, born at Southborough, Mass., July 12, 1828. He wrote, besides other works, "The Cell; its Physiology, Pathology," etc. Died July 1, 1854.

Burnett Prizes, The, are two premiums founded by Mr. Burnett, a merchant in Aberdeen, who for many years spent £300 annually on the poor. On his death in 1784 he bequeathed his fortune to found the above prizes, as well as to relieve poor persons and to support a jail-chaplain in Aberdeen. He directed the prize-fund to be accumulated for forty years at a time, and the prizes (not less than £1200 and £400) to be awarded to the authors of the two best treatises on the evidence that there is a Being all-powerful, wise, and good, by whom everything exists; "and particularly to obviate difficulties regarding the wisdom and goodness of the Deity, and this independent of written revelation and of the revelation of the Lord Jesus; and from the whole to point out the inferences most necessary and useful to mankind." The competition is open to the whole world, and the prizes are adjudicated by three persons appointed by the trustees, with the ministers of the Established Church of Aberdeen, and the principals and professors of King's and Marischal Colleges. On the first competition in 1815 the judges awarded the first prize, £1200, to Dr. Wm. L. Brown of Aberdeen for an essay entitled "The Existence of a Supreme Creator;" and the second prize, £400, to the Rev. J. B. Sumner, afterwards archbishop of Canterbury, for an essay entitled "Records of Creation." In 1855 the judges awarded the first prize, £1800, to the Rev. R. A. Thompson, for an essay entitled "Christian Theism;" and the second prize, £600, to the Rev. Dr. John Tulloch of St. Mary's College, St. Andrew's, for an essay on "Theism." The above four essays have been published.

Burnett's Disinfecting Fluid is a strong solution of chloride of zinc, with a small amount of iron, and when used it is mixed with water in the proportion of one pint to five gallons of water. The liquid acts only as a deodorizer and antiseptic, and does not exhibit the properties of a true disinfectant. It is of service in preserving dead animal tissues, as in the dissecting-room and in jars containing anatomical specimens. It has little action on steel instruments. When added to sewage water, the chloride of zinc mainly acts by decomposing the sulphide of ammonium, forming the sulphide of zinc and chloride of ammonium, both of which are odorless. It has been applied to the preservation of timber by a process called *burnettizing*. Crewe's disinfectant liquid is the same.

Bur'nettsville, a village of Jackson township, White co., Ind. Pop. 270.

Bur'ney (CHARLES), F. R. S., MUS. DR., an English composer, born at Shrewsbury in 1726, was a friend of Dr. Johnson and Edmund Burke. He wrote, besides other works, a "General History of Music from the Earliest Ages" (4 vols., 1776–89), which is highly esteemed, and a "Life of Handel." He was the father of Madame d'Arblay. Died in 1815.

Burney (FRANCES). See D'ARBLAY, MADAME.

Burn'ham, a village township of Waldo co., Me., at the junction of the Maine Central and Belfast and Moosehead Lake R. Rs., 30 miles N. W. of Belfast. It has manufactures of leather and lumber. Pop. 788.

Burnham (HIRAM), an American general of volunteers, entered the army as colonel Sixth Maine Volunteers, leading his regiment with daring and ability through the Peninsula campaign, at Antietam, Fredericksburg, and Gettysburg. Appointed brigadier-general of volunteers 1864, and in the memorable "Wilderness" campaign of that year he took a prominent part. His entire military career was conspicuous for gallantry and coolness; at the battle of Chapin's Farm, Sept. 29, 1864, he fell in the noble performance of his duty.

G. C. SIMMONS, *Clerk Board of Eng'rs.*

Burning Glasses and **Burning Mirrors,** the names given to glasses or mirrors so formed as to collect the sun's rays which fall on them into a point or *focus*, and thereby produce intense heat. The rays of light or heat may be concentrated either by refraction or reflection; in the former case they must pass through a transparent refracting substance, as glass formed into a proper shape; in the latter they fall on a concave polished surface of silvered glass or bright metal.

The method of exciting heat or producing fire by the concentration of the sun's rays was known from remote antiquity, but the most famous recorded achievement of this kind is that of Archimedes, who is reported to have burned by means of mirrors the Roman fleet in the harbor of Syracuse. The celebrated Buffon, with 168 mirrors, each about six inches square, set fire to planks of beech 150 feet distant, and this with the faint rays of the sun at Paris in the month of March.

In preparing a burning glass, the first thing to be considered is the figure necessary to collect all the rays into the smallest possible space. Descartes, in his "Optics," showed that a disk of glass convex on the one side and concave on the other, the convex side being a portion of an elliptic surface, and the concave a portion of a sphere, would cause parallel rays falling on its convex side to converge in a single point. But as the practical difficulties of forming a glass accurately into this shape are insuperable, both sides are ground into portions of a sphere. In a lens the focal length depends on the curvature, or the radius of the sphere, and on the refractive power of the substance of which the lens is formed.

The proper form for a burning mirror is the parabola, but as a parabolic curve is exceedingly difficult to obtain either upon metal or glass, opticians frequently rest content with a spherical curvature of long focus. Recently, burning mirrors have been constructed of glass, upon the curved surface of which pure silver is precipitated by chemical means. By this plan the curved surface is produced upon glass, and thus becomes permanent, whilst the reflection is effected by the polished surface of the silver, which can be easily renewed from time to time. The focus of a burning mirror is one-half of the radius of curvature.

Among those who have experimented, in modern times, upon the effects of burning glasses or mirrors, are reckoned Baron Napier, the illustrious inventor of the logarithms, Kircher, Dr. James Gregory, Sir Isaac Newton, and many others. The most powerful solid lens ever constructed was the work of Mr. Parker, an ingenious London artist. It was made of flint glass, was three feet in diameter, $3\frac{1}{4}$ inches thick at the centre, its focal distance 6 feet 8 inches, the diameter of the burning focus 1 inch, and its weight 212 pounds. The rays refracted by this lens were received on a second, the diameter of which in the frame was 13 inches, and its focal length 29 inches. The diameter of the focus of the combined lenses was half an inch, consequently, by the addition of the second lens, the burning power was increased four times. With this lens some of the most refractory substances were fused in a very short space of time: for example, 10 grains of common slate in 2 seconds; 10 grains of cast iron in 3 seconds; 10 grains of lava in 7 seconds; 10 grains of jasper in 25 seconds, etc. One account says, "the most infusible metals were instantly melted and dissipated in vapor." The difference in the statements may be reconciled by supposing the circumstances attending the use of the glass to be different, as there is a very great difference in the power of the sun's rays at different times, and especially in different countries. This glass was afterwards carried to China by one of the officers who accompanied Lord Macartney, and left at Pekin. A remarkable lens, formed by bending or moulding two plates of glass over a parabolic mould, and filling the cavity between with ninety quarts of spirits, was constructed by Rossini of Gratz, in Styria. The diameter of the plates was three feet three inches, and they were united by a strong ring of metal. The whole was mounted on a heliostat. In its focus a diamond was instantly kindled and dissipated, and a piece of platinum twenty-nine grains in weight was melted and thrown into violent ebullition. This lens now belongs to the French government. (For detailed information on this subject the reader may consult the article "Burning Glasses" in the "Encyclopædia Britannica," 8th edition.)

REVISED BY J. THOMAS.

Burning Springs, a post-township of Wirt co., West Va. Pop. 1368.

Burn'ley, a market-town of England, in Lancashire, on the Brun, near its entrance into the North Calder and 20 miles N. of Manchester. It is connected by railway with Blackburn, Liverpool, and other cities. It has manufactures of cotton and woollen fabrics, calico-printing works, brass and iron foundries, machine-shops, tanneries, and rope-walks. Its prosperity is partly derived from the collieries in the vicinity. Pop. in 1871, 31,608.

Burnouf (EUGÈNE), DR. LIT., an eminent French Orientalist, born in Paris Aug. 12, 1801. He studied the languages of Persia and India, was admitted into the Academy of Inscriptions, and became in 1832 professor of Sanscrit in the College of France. Among his works are a "Commentary on the Yaçna, one of the Liturgic Books of Persia" (1834), and an "Introduction to the History of Booddhism" (1845), which is highly commended. Died May 28, 1852. (See CHARLES LENORMANT, "Eugène Burnouf," 1852.)

Burns, a post-township of Henry co., Ill. Pop. 1144.

Burns, a post-township of Shiawassee co., Mich. Pop. 1557.

Burns, a township of Anoka co., Minn. Pop. 340.

Burns, a post-township of Allegany co., N. Y., on the Buffalo division of the Erie R. R. It contains Canaseraga Academy and several mills. Pop. 1340.

Burns, a post-township of La Crosse co., Wis. P. 743.

Burns (FRANCIS), D. D., a colored bishop of the Methodist Episcopal Church, was born in Albany, N. Y., Dec. 5, 1809, was sent as missionary to Liberia, Africa, in 1834, taught in a school at Cape Palmas, joined the Liberia Conference in 1838, founded the Monrovia Academy in 1851, was ordained bishop of his denomination, in Liberia, in 1858, and, after nearly five years of eminent episcopal service, died in 1863.

Burns (ROBERT), a gifted Scottish poet, was born near the town of Ayr on the 25th of Jan., 1759. His father was the son of a farmer, and "was thrown by early misfortunes," says the poet, "on the world at large, where, after many years' wanderings and sojournings, he picked up a pretty large quantity of observation and experience, to which I am indebted for most of my little pretensions to wisdom." Although his life seems to have been one long struggle with misfortune, Burns's father was at great pains to give his children a good education. When he was able he sent them to school; and not unfrequently when the day's work was ended he taught his children himself. "I owed much," says Burns, "to an old woman who resided in the family. . . . She had, I suppose, the largest collection in the country of tales and songs concerning devils, ghosts, fairies, brownies, witches, warlocks, enchanted towers, and other trumpery. This cultivated the latent seeds of poetry." Burns was early familiarized with those trials and hardships to which the poor are so often exposed, and to which he sometimes alludes with such power and pathos in his poetry. "My father," says the poet, "was advanced in life when he married; I was the oldest of seven children, and he, worn-out with early hardships, was unfit for labor. . . . We lived very poorly. I was a dexterous ploughman for my age." The poet had a robust frame and active body, as well as a strong intellect and acute sensibilities. He is said to have done at the age of fifteen the work of a man. In a touching account which his brother Gilbert wrote of the troubles of their early years, he says: "I doubt not but the hard labor and sorrow of this period of his life were in a great measure the cause of that depression of spirits with which Robert was so often afflicted through his whole life afterwards."

In the case of Burns, as in that of Sappho, it was love that taught him song. A little before he reached his sixteenth year he "first committed the sin of rhyme." A "bonnie sweet sonsie lass" had been associated with him in the labors of the harvest-field. Her singing "made his heart-strings thrill like an Æolian harp," and first inspired him with the idea of writing songs. An irresistible attraction towards what he calls the "adorable half of the human species" was perhaps his most remarkable characteristic; and hence it was as an amatory poet that he was especially distinguished. Unhappily, this remarkable susceptibility to the tender passion degenerated, under the influence of evil company, from its first purity, and led him into illicit amours, which were the cause of his principal misfortunes. In proportion as he cast off the restraints of morality, he seems to have lost his reverence for religion. He was one day seen, says Lockhart, "at the door of a public-house holding forth on religious topics to a whole crowd of country-people, who presently became so shocked with his levities that they fairly hissed him from the ground." With his other faults and vices, intemperance went hand in hand. But he had too much sense of right, and too much feeling, to be able to drown altogether the reproving voice of conscience. He sometimes alluded to his faults in a manner full of pathos and self-reproach; and he had at least the merit of not seeking to defend his errors.

He had formed in 1785 a *liaison* (which was, according to the usage of Scotland, virtually a marriage) with Jean Armour, a person somewhat above his own position in life. She bore him twins, and although he had previously given her a written acknowledgment of marriage, her father was greatly incensed against the poet, so that he determined to leave Scotland and seek his fortune in the New World. But before quitting his native country for ever, he resolved (1786) to publish his poems. The success of the experiment induced him to change his plans. He was encouraged

to visit Edinburgh, where he made the acquaintance of many men at that time distinguished in literature, including Dugald Stewart and Dr. Blair, besides many others. It was during Burns's visit to the capital that Scott, then a very young man, had an opportunity of beholding and listening to the gifted stranger. He has left a very interesting account of Burns's appearance. He seems to have been most struck with the eye of the rustic poet. "I never saw," says Scott, "such another eye in a human head, though I have seen the most distinguished men of my time. It was large and of a dark cast," and "literally *glowed* when he spoke with feeling or interest." "His conversation expressed perfect self-confidence, without the slightest presumption."

Among men of rank who interested themselves in the poet, Lord Glencairn was especially prominent. Burns always remembered his kindness with the most heartfelt gratitude, and afterwards dedicated to his memory the beautiful and touching lines entitled the "Lament for James, earl of Glencairn." Soon after his visit to Edinburgh he published (1787) a new edition of his poems. In 1788 he openly declared his marriage with Jean Armour, and about this time was appointed an officer of the excise, with a salary of fifty pounds a year; it was subsequently increased to seventy-five pounds. His intemperate habits, which had been aggravated by the excitement and irregularities of his recent life in Edinburgh, and his subsequent pecuniary distresses, gradually gained a great ascendency over him, but rarely if ever to the extent of rendering him incapable of performing the duties of his office. He removed in 1791 to Dumfries, where he passed the remainder of his life. He died July 21, 1796. Nearly twenty years after his death a splendid mausoleum was erected to his memory in the churchyard at Dumfries, whither his remains were removed on the 5th of June, 1815. (See LOCKHART's "Life of Burns," 1828; CURRIE's "Life of Burns," prefixed to the "Correspondence" of the poet; A. CUNNINGHAM, "Life and Land of Robert Burns," 1840; CARLYLE, "Miscellanies;" also F. G. HALLECK's and THOMAS CAMPBELL'S beautiful lines to Burns's memory.)

J. THOMAS.

Burns (WILLIAM W.), GENERAL, was born in Ohio, and graduated at West Point in 1847. He became a brigadier-general of volunteers in 1861, major-general volunteers in 1862, and brevet brigadier-general U. S. A. in 1865. He served in the Army of the Potomac until 1863.

Burns and Scalds of the body differ in the mode of application of the excessive heat which is the cause of injury—burns arising from the application of a hot solid body or flame, and scalds from hot water or steam. Severe burns are often fatal, especially to children; quite as much, perhaps, from the shock which attends them as from any appreciable injury. Burns which are not fatal frequently leave extensive scars, which often have a tendency to contract in such a way as to lead to frightful disfiguration. When the clothes take fire, the flames should be extinguished if possible by wrapping in a blanket or rug, that being usually the most available means at hand. In all cases the clothes should be removed with great care, so as not to remove the cuticle with them. If cold water be agreeable to the patient, it may be cautiously applied. Pain and shock may often be relieved by opiates or stimulants. The injured surfaces are to be dressed with carron oil (a mixture of olive oil and lime-water), with collodion, with oiled cotton, or they may simply have flour dredged over them. When the surface takes on an unhealthy action and granulations are excessive, a weak solution of nitrate of silver or other local stimulant may produce good results.

REVISED BY WILLARD PARKER.

Burn'side, a post-township of Lapeer co., Mich. Pop. 1173.

Burnside, a township of Goodhue co., Minn. Pop. 396.

Burnside, a township of Centre co., Pa. Pop. 386.

Burnside, a post-township of Clearfield co., Pa. Pop. 1624.

Burnside, a township of Trempealeau co., Wis. P. 542.

Burnside (AMBROSE EVERETT), an American officer and governor, born May 23, 1824, at Liberty, Ind., graduated at West Point 1847, and as lieutenant of artillery served in war with Mexico 1847–48; at various posts 1848–53; on frontier duty in New Mexico 1849–50, engaged with Jacarillo Apaches (wounded); and with Mexican boundary commission 1851–52. Resigned Oct. 2, 1853. Manufacturer at Bristol, R. I., 1853–58, of breech-loading rifles, which he had invented; cashier of land department Illinois Central R. R. Company 1858–59; and treasurer Illinois Central R. R. Company 1860–61. In the civil war, as colonel Rhode Island three-months' volunteers, served in Maj.-Gen. Patterson's operations about Cumberland, Md., and in the Manassas campaign 1861, engaged at Bull Run. Appointed brigadier-general U. S. volunteers Aug. 6, 1861, and promoted to major-general May 18, 1862, serving in organizing the coast division and in command of department of North Carolina 1862, engaged at Roanoke Island, Newbern, Camden, and Fort Macon; in command of forces (Ninth army corps) at Newport News and Fredericksburg 1862; in Maryland campaign, engaged at South Mountain and Antietam, in command of left wing; in general charge of Harper's Ferry 1862; in command of Army of Potomac Nov. 7, 1862, to Jan. 28, 1863, defeated at Fredericksburg; in command of department of Ohio 1863, engaged against Morgan's raiders, capture of Cumberland Gap, occupation of East Tennessee, in several actions and siege of Knoxville; in command of Ninth corps in Richmond campaign 1864, engaged at Wilderness, Spottsylvania, North Anna, Tolopotomy, Bethesda Church, and Petersburg, including Mine assault. Resigned April 15, 1865, from volunteer service. Civil engineer 1865–66; president of Cincinnati and Martinsville R. R. Company since 1865; of Rhode Island Locomotive Works since 1866, and of Indianapolis and Vincennes R. R. Company since 1867; and governor of the State of Rhode Island 1866–71.

GEORGE W. CULLUM, U. S. A.

Burns'ville, a post-township of Dallas co., Ala. Pop. 1497.

Burnsville, a township of Dakota co., Minn. Pop. 361.

Burnsville, a township of Anson co., N. C. Pop. 1038.

Burnsville, a post-village, the capital of Yancey co., N. C., 120 miles W. of Lexington.

Burnt Corn, a post-township of Monroe co., Ala. Pop. 959.

Burnt Offerings. See SACRIFICE.

Burnt Prairie, a post-township of White co., Ill. Pop. 2186.

Burnt Sien'na, a fine orange-red pigment, transparent and permanent, obtained by burning the ferruginous ochreous earth called terra di Sienna. It is used both in oil-painting and painting with water-colors. Mixed with Prussian blue, it produces a beautiful green.

Burnt Swamp, a township of Robeson co., N. C. Pop. 1511.

Burnt Um'ber, a pigment of a russet-brown color, is semi-transparent, mixes well with other pigments, and dries quickly. It is prepared by burning umber, an ochreous earth first discovered in Umbria, Italy.

Bur Oak (the *Quercus macrocarpa*), a species of oak of medium size found in the U. S., principally E. of the Mississippi. It is also called over-cup oak and mossy-cup oak. Its timber is valuable.

Burr (AARON), father of the Vice-President, was born at Fairfield, Conn., Jan. 4, 1716, graduated at Yale in 1735, licensed to preach in 1736, settled over the Presbyterian church in Newark, N. J., in 1738, chosen president of the College of New Jersey in 1748, and died Sept. 24, 1757. In 1752 he married Esther, daughter of the elder President Edwards. She died April 7, 1758, in the 27th year of her age. They left two children—a daughter, who married Hon. Tapping Reeve, chief-justice of the supreme court of Connecticut, and a son, Aaron, noticed below. He was both a scholarly and an eloquent man. He published a Latin Grammar, 1752, known as "The Newark Grammar," a pamphlet on "The Supreme Divinity of our Lord Jesus Christ," reprinted in 1791, and several discourses.

Burr (AARON), born at Newark, N. J., Feb. 6, 1756, was a son of the preceding and a grandson of Jonathan Edwards. He graduated at Princeton in 1772, joined the Provincial army at Cambridge, Mass., in 1775, served as a private soldier, and afterwards as aide to Montgomery on the Quebec expedition, served on the staffs of Arnold, Washington (whom he disliked), and Putnam, becoming a lieutenant-colonel, and commanding a brigade at Monmouth. He resigned from the army by reason of ill-health in 1789. He practised law at Albany in 1782 and in New York City in 1783, and became attorney-general of New York in 1789. He was a Republican U. S. Senator 1791–97. In 1800 he and Jefferson each had 73 electoral votes for the office of President of the U. S. The choice was thus left to Congress, which, on the thirty-sixth ballot, chose Jefferson for President and Burr for Vice-President. In 1804 he mortally wounded in a duel his rival Alexander Hamilton, and in consequence lost greatly in political and social influence, and soon after embarked in a wild attempt upon Mexico and, as was asserted, upon the South-western territories of the U. S., thereby involving in ruin his friend Blennerhassett. He was in 1807 tried at Richmond, Va., on a charge of treason, but was acquitted. To escape his creditors he retired to Europe for a time, but returned to New York in

1812, and again practised law. Died Sept. 14, 1836. Burr was a man of much ability and very brilliant and popular talents, but his influence was destroyed by his unscrupulous political acts and his grossly immoral conduct in private life. (See his "Life," by M. L. DAVIS, 1836–37; by JAMES PARTON, 1857.)

Burr (ENOCH FITCH), D. D., a kinsman of President Burr of the College of New Jersey, was born at Greens Farms, Fairfield, Conn., Oct. 21, 1818, graduated at Yale in 1839, spent several years in New Haven in scientific and other studies, became greatly broken in health, obtained partial relief by a year of foreign travel, and was settled over the Congregational church in Lyme, Conn., in 1850. After nearly twenty years of secluded and patient study, his reputation was suddenly made by several works of marked ability. He has published "A Treatise on the Application of the Calculus to the Theory of Neptune," 1848, "Ecce Cœlum," 1867, "Pater Mundi," 1870, "Ad Fidem," 1871, "Doctrine of Evolution," 1873, "A Song of the Sea" (an illustrated poem), 1873, and "Pasce Agnos, or What I have to Say to the Children," 1873.

Burrampooter. See BRAHMAPOOTRA.

Bur'rell, a township of Decatur co., Ia. Pop. 852.

Burrell, a township of Armstrong co., Pa. Pop. 964.

Burrell, a township of Indiana co., Pa. Pop. 1374.

Burrell, a post-township of Westmoreland co., Pa. Pop. 1819.

Burria'na, a town of Spain, in the province of Castellon de la Plana, on the Rio Seco, near the Mediterranean, 8 miles S. of Castellon de la Plana. It exports wine, oil, and fruit. Pop. about 6200.

Bur'rill (ALEXANDER M.), born about 1807, graduated at Columbia College with the highest honors in 1824, studied law with Chancellor Kent, and published a number of legal works, including a "Law Dictionary." Died at Kearney, N. J., Feb. 7, 1869.

Burrill (JAMES), LL.D., born in Providence, R. I., April 25, 1772, graduated at Brown University in 1788, was called to the bar in 1791, and attained eminence. He was attorney-general of Rhode Island (1797–1813), chief-justice of the State supreme court (1816), U. S. Senator (1817–20), besides holding other important offices. Died Dec. 25, 1820.

Bur'rillville, a post-township of Providence co., R. I. It has numerous manufactures, and a national bank at Pascoag village. Pop. 4674.

Bur'ritt, a post-township of Winnebago co., Ill. P. 991.

Bur'ritt (ELIHU), a reformer and linguist, called THE LEARNED BLACKSMITH, was born in New Britain, Conn., Dec. 8, 1811. He worked for many years at the trade of a blacksmith, and became a self-taught master of many ancient and modern languages. As a public lecturer he advocated temperance and peace in the U. S. and in England. Among his works are "Sparks from the Anvil" (1848) and "Thoughts on Things at Home and Abroad" (1854).

Burr Oak. See BUR OAK.

Burr Oak, a township of Mitchell co., Ia. Pop. 425.

Burr Oak, a post-township of Winneshiek co., Ia. Pop. 960.

Burr Oak, a township of Doniphan co., Kan. Pop. 1015.

Burr Oak, a post-village and township of St. Joseph co., Mich. Pop. of village, 724; of township, 1911.

Bur'roughs (GEORGE), a victim of the witchcraft delusion, graduated at Harvard College in 1670, and was a preacher in Salem, Mass., in 1681. He soon after went to Falmouth (now Portland), Me., where he remained until the Indians sacked the town in 1690; returning to Salem, he was accused in 1692 of witchcraft, placed on trial, and, owing to the infatuation then prevailing, was declared guilty of exercising diabolical powers, and executed Aug. 19, 1692. At the scene of execution he declared his innocence, his appeal moving the spectators to tears; and though he repeated the Lord's Prayer, which no witch was supposed to be able to do without mistake, he was doomed to suffer.

Burroughs (STEPHEN), a famous adventurer, the son of a Congregational minister of Hanover, N. H., was born in 1765, and early became noted for mischievous conduct. When fourteen years old he enlisted in the Revolutionary army, deserted, and entered Dartmouth College, which he soon left to serve on a privateer. He became a ship's surgeon and schoolmaster, and under an assumed name was for a time minister of the church at Pelham, Mass. He was soon convicted of passing counterfeit money, and was confined at Northampton, Mass., in irons, but set fire to the jail, and was removed to Castle William (now Fort Independence) in Boston harbor, whence he escaped, but was retaken. After his sentence was served out he again became a counterfeiter in Canada, but reformed, and was for several years an exemplary Roman Catholic instructor of youth. He appears to have always possessed engaging and popular qualities. He published a remarkable autobiography in two volumes. Died at Three Rivers, Canada, Jan. 28, 1840.

Bur'rowing Owl (*Strix cunicularia* or *Athene cunicularia*), called also the **Coquimbo Owl,** is a remarkable bird, which, "disdaining all the traditions of its family," hunts for its prey (consisting chiefly of beetles and other insects) in broad daylight, facing the glare of the noonday sun without any inconvenience. It is a small,

Burrowing Owls.

lively bird, and is found in many parts of America, being especially abundant beyond the Mississippi, and inhabiting the same localities as the marmot (or prairie dog), whose dwelling it often shares, the rattlesnake sometimes making the third member of this singular family. On the Pacific slope a green snake (*Bascanion*) makes a fourth member of this group. Although the Coquimbo owl prefers to dwell in the holes already excavated by the marmot, it will, if obliged to do so, dig burrows for itself; but these are not so deep nor so neatly made as those of its friends and neighbors the prairie dogs.

Bur'rows (WILLIAM), an American naval officer, born near Philadelphia Oct. 6, 1785. He entered the navy at the age of fourteen and served on the Barbary coast; on the outbreak of war with Great Britain (1812), while on his way to the U. S., he was taken prisoner. He reached home in June, 1813, and immediately resumed his duty. He commanded the brig Enterprise in an engagement with the British brig Boxer off Portland, Me., Sept. 5, 1813, during which he was mortally wounded. He lived, however, long enough to receive the surrender of the British vessel. His remains were interred in Portland by the side of the commander of the Boxer, who was also killed in the same action.

Burr'stone, or **Buhrstone,** a silicious rock containing small cells, which give it a roughness of surface adapting it for millstones. It is a sedimentary rock, and its cavities are often produced by the removal, through solution, of its calcareous fossil shells. Burrstone occurs in several geological formations. That which comes from Paris is eocene. The Alabama burrstone is of the same age. That of Ohio, West Virginia, etc. is of the carboniferous age. There are different varieties; those in which the cells are small and regularly distributed are most esteemed. Good burrstone is found in Wales, Scotland, Germany, and Italy, also in Ohio, Pennsylvania, South Carolina, and Alabama, but the finest stones are obtained from La Ferte-sous-Jouarre, near Paris. It is not unusual to form millstones of pieces of burrstone, bound together by iron hoops. The stone is found in beds or detached masses. It is cut out into the form of a cylinder; around this grooves are cut at the intended thickness of the millstones; into these grooves wooden wedges are driven, and water is thrown upon the wedges, which, causing the wood to swell, splits the cylinder into the slices required. Millstones are not always made of burrstone, but sometimes of silicious gritstones, of sandstone, and even of granite. Burr-millstones are extremely durable.

Burs'lem, a market-town of England, in Staffordshire, 2½ miles N. W. of Newcastle-under-Line, on an eminence near the Trent Canal. The occupation of the inhabitants is earthenware manufacture, and it is the principal place in the district called the Potteries. Pop. 17,821.

Bur'sons, a township of Randolph co., Ala. Pop. 1214.

Burt, a county of Nebraska, bordering on Iowa. Area, 500 square miles. It is bounded on the E. by the Missouri River, and intersected by Logan's Creek. The surface is undulating; the soil is fertile. Grain and wool are raised. Capital, Tekama. Pop. 2847.

Burt, a township of Cheboygan co., Mich. Pop. 72.

Burt (William A.), born in Worcester, Mass., June 13, 1792, became a surveyor of Erie co., N. Y., and in 1824 removed to Michigan, surveyed Northern Michigan (1840–47), introducing important improvements in surveying. At the World's Fair in London, 1851, he obtained a medal for his solar compass. He was for a time a judge in one of the Michigan State courts, and one of the originators of the canal at Sault Ste. Marie. Died Aug. 18, 1858.

Bur'ton, a post-township of Adams co., Ill. Pop. 1423.

Burton, a township of McHenry co., Ill. Pop. 218.

Burton, a township of Genesee co., Mich. Pop. 1667.

Burton, a post-village, capital of Sunbury co., New Brunswick, is on the St. John's River, about 45 miles by land N. N. W. of St. John's.

Burton, a post-township of Geauga co., O. Pop. 1004.

Burton (Asa), D. D., was born at Stonington, Conn., Aug. 25, 1752, graduated at Dartmouth College in 1777, and on Jan. 19, 1779, was settled over the Congregational church in Thetford, Vt., where he died May 1, 1836. He was the champion of the so-called "Taste scheme," in opposition to the "Exercise scheme" of Dr. Emmons, and conducted the controversy with great ability. Besides occasional sermons, he published, in 1824, a volume of "Essays on Some of the First Principles of Metaphysics, Ethics, and Theology."

Burton (John Hill), LL.D., F. R. S. E., a Scottish historian and advocate, born at Aberdeen Aug. 22, 1809. He published, besides other works, "The Life and Correspondence of David Hume" (2 vols., 1846), "Political and Social Economy" (1849), and "The History of Scotland from Agricola's Invasion to the Revolution of 1688" (1867), which is highly esteemed.

Burton (Richard Francis), an eminent English traveller, born in Norfolk in 1821. Having served many years in the Indian army, he published in 1851 "Sindh, and the Races that inhabit the Valley of the Indus." Disguised as a Mussulman, he performed a perilous exploration of Arabia in 1853, and published a "Personal Narrative of a Pilgrimage to El Medinah and Meccah" (3 vols., 1856). Among his other works are "The Lake Regions of Central Africa" (1860) and "The Highlands of Brazil" (2 vols., 1869).

Burton (Robert), an English clergyman, born at Lindley, in Leicestershire, Feb. 8, 1576, was educated at Oxford. He became rector of Segrave in 1628. He was author of a quaint and popular work entitled "The Anatomy of Melancholy; what it is, with all the Kinds, Causes, Symptoms, Prognostics, and several Cures of it: Philosophically, Medicinally, Historically opened and cut up, by Democritus Junior" (1621). It is an amusing medley of quotations and reflections. Died Jan., 1640.

Burton (William Evans), a comedian and writer, born in London in Sept., 1802. He acted with distinguished success both in England and America. While in England he wrote a drama, "Ellen Wareham," which for a time enjoyed a great popularity. He compiled the "Cyclopædia of Wit and Humor." He was also very successful as a manager. He built the National Theatre in Philadelphia, and in New York purchased Palmo's Opera-house, and afterwards the Metropolitan Theatre on Broadway. Died in New York Feb. 10, 1860.

Burton-on-Trent, a town of England, in Staffordshire, on the river Trent, 11 miles by rail S. W. of Derby. The Trent is here crossed by a stone bridge of thirty-six arches, which was built before the Norman conquest, and is 1545 feet long. Burton has large breweries of celebrated ale; also iron-works and manufactures of cotton goods. It is on the Grand Trunk Canal. Pop. 13,671.

Bur'tonville, a post-village of Charleston township, Montgomery co., N. Y., on Schoharie Creek. Pop. 160.

Burt'scheid, or **Borcette,** a town of Rhenish Prussia, about half a mile from Aix-la-Chapelle, of which it is properly a suburb. Here are warm sulphur springs and manufactures of woollen cloths and cassimeres. Pop. in 1871, 10,079.

Bu'ry, a manufacturing town of England, in Lancashire, on the river Irwell, 10 miles by rail N. W. of Manchester. It is on a railway which connects it with Bolton and Liverpool. It contains more than twenty churches and dissenting chapels, several public libraries and literary institutions. Here are important manufactures of cotton and woollen goods, machinery, and paper, also calico-printing works and dye-works. Mines of coal and quarries of good freestone have been opened in the vicinity. Bury returns one member to Parliament. The eminent statesman Sir Robert Peel was born near Bury. Pop. of the parliamentary borough in 1871, 41,517.

Burying Beetles are certain insects of the order Coleoptera and family Sylphidæ, famous for their valuable habits of interring the bodies of dead animals. When the carcass of a mouse or other small animal is found, several of them collect around it, and by digging the earth from beneath gradually sink it several inches below the surface. In it the female deposits her eggs, and when the larvæ are hatched, they find themselves in the midst of suitable food.

Bury St. Edmunds, or **St. Edmundsbury,** an ancient borough of England, in the county of Suffolk, is finely situated on the river Larke, 26 miles by rail N. W. of Ipswich and 95 miles by rail N. E. of London. It is well built and remarkably clean. It has a botanic garden, a guildhall, a fine Gothic church (St. Mary's), a celebrated grammar-school founded in 1550, and some remains of a large Benedictine abbey (505 feet by 212), which was founded by Canute, and became the richest (except one) in England. Here is an old belfry or quadrangular tower about eighty-five feet high, which is one of the finest remains of Saxon architecture extant in Britain. Parliaments were held here in 1272, 1296, and 1446. Bury has a large trade in wool, butter, grain, and cheese. Sir Nicholas Bacon was born here. Pop. in 1871, 14,928.

Bus'becq, or **Bousbecq** (Augier Ghislen), [Lat. *Busbequius*], an eminent Flemish scholar and traveller, born at Commines in 1522. He was employed on several important diplomatic missions, and was sent as ambassador from the emperor Ferdinand to Solyman II. of Turkey. He wrote a valuable account of this embassy, entitled "Legationis Turcicæ Epistolæ Quatuor" (1589). Died Oct. 28, 1592.

Bus'by (Dr. Richard), a famous English schoolmaster, born at Lutton, Northamptonshire, Sept. 22, 1606. He was head-master of Westminster School for about fifty-five years (1640–95), was a very successful teacher, and a strict disciplinarian. He is said to have educated a larger number of eminent men than any other teacher who ever lived. Died April 6, 1695.

Büsch'ing (Anton Friedrich), an eminent German geographer, born in Schaumburg-Lippe Sept. 27, 1724. He became in 1761 minister of a Protestant congregation in St. Petersburg, and in 1766 removed to Berlin, where he was employed as director of a gymnasium. He published a "Description of the Earth" (1754), which was the most complete work on geography that had then appeared; also a "Magazine for History and Geography" (25 vols., 1767–93). Died May 28, 1793.

Busen'to [Gr. Πυξοῦς; Lat. *Buxentum*], a river of Italy, in the province of Salerno, empties into the Gulf of Busento at the city of Policastro. Upon the death of Alaric, the Visigoth king, his followers turned the course of the river, and after having buried him, again led the river into its old course, thus covering all trace of Alaric's grave from the eyes of his enemies.

Bush (George), a theologian and biblical scholar, was born at Norwich, Vt., June 12, 1796, graduated at Dartmouth College in 1818, at Princeton Theological Seminary in 1821, in the same class with Albert Barnes, and from 1824 to 1829 was pastor of a Presbyterian church in Indianapolis, Ind. He became in 1831 professor of Hebrew and Oriental literature in the University of New York, and was converted to the doctrines of Swedenborg in 1847. Among his works are a "Life of Mohammed" (1832), a "Hebrew Grammar" (1835), and "Bible Commentaries" (8 vols., 1840 *et seq.*). Died Sept. 19, 1859.

Bush Creek, a township of Wayne co., Ill. P. 1470.

Bush Creek, a twp. of Gasconade co., Mo. Pop. 566.

Bush Creek, a township of Highland co., O. P. 1601.

Bush'el [Fr. *boisseau*], an English measure of capacity, containing eight gallons or four pecks. Each gallon holds ten pounds avoirdupois of distilled water, and measures 277.274 cubic inches; consequently the imperial bushel contains eighty pounds of distilled water, and is equal to 2218.192 cubic inches. The old Winchester bushel contains 2150.42 cubic inches. The State of New York, by statute of 1829, adopted the imperial bushel, but in the revised statutes of 1851 this was abolished, and the Winchester bushel substituted.

Bushire, or **Aboo-shehr,** a seaport of Persia, on the Persian Gulf, about 120 miles W. S. W. of Sheeraz; lat. 29° N., lon. 50° 50′ E. It is at the N. extremity of a sandy

peninsula, and is the principal commercial emporium on the coast of Persia. The anchorage, which is the best on the coast, consists of an outer harbor, exposed to the N. W. winds, and a safe inner harbor. It has a large trade with British India, from which it imports rice, indigo, sugar, and English cotton goods. The chief articles of export are raw silk, shawls, horses, carpets, silk goods, grain, Sheeraz wine, pearls, dried fruits, etc. Pop. about 18,000.

Bush'kill, a township of Northampton co., Pa. P. 1901.

Bush'men, or **Bosjesmans,** a name given to some roaming tribes of savages who live in Southern Africa, along the Orange River. They are similar to the Hottentots, are very diminutive in stature, and of a dark-brown complexion. They build no houses and have no tents. They are said to be malicious and intractable.

Bush'nell, a city of McDonough co., Ill., at the junction of the Chicago Burlington and Quincy, the Toledo Peoria and Warsaw, and the Rockford Rock Island and St. Louis R. Rs., 60 miles W. of Peoria, 70 miles N. E. of Quincy, and 194 S. W. of Chicago. It has one national bank, four hotels, good schools, a publishing-house, several manufactories, and a good supply of timber, coal, and excellent water. It is in a fine, high, and healthy prairie region, and has two weekly papers. Pop. 2003; of Bushnell township, exclusive of the city, 578. Ed. of "Bushnell Record."

Bushnell, a post-township of Montcalm co., Mich. Pop. 1266.

Bushnell (Horace), D. D., a Congregational clergyman, was born at Litchfield, Conn., April 14, 1802, graduated at Yale College in 1827, was tutor from 1829 to 1831, and was settled over the North church in Hartford, Conn., from 1833 to 1859, when the failure of his health compelled him to resign his pastorate, though he was still able to do literary work and preach occasionally. He is distinguished for the originality and boldness of his thinking, and for the brilliancy and vigor of his style. Among his published works are a Phi Beta Kappa oration in 1837 on "The Principles of National Greatness," "Christian Nurture" (1847), "God in Christ" (1849), "Nature and the Supernatural" (1858), "The Vicarious Sacrifice" (1865; revised in 1873).

Bush'whackers (in the language of our late civil war) were those men who rarely or never wore a uniform, and claimed to be peaceful farmers or herdsmen when in presence of a superior hostile force, but had firearms concealed at a convenient distance, and did not scruple to use them on any opportunity to pick off a soldier from an ambush while he was moving in fancied security. Bushwhackers were especially murderous in Missouri, and were often treated, when captured, with unrelenting severity.

Bush'y, a township of Saline co., Ill. Pop. 1040.

Bushy Fork, a post-township of Person co., N. C. Pop. 1425.

Busi'ris [Gr. Βούσιρις], in Greek mythology, a fabulous personage, supposed to have been a son of Neptune, and a king of Egypt, who sacrificed all the foreigners who entered his dominions, and was killed by Hercules.

Bus'kin [Lat. *cothurnus*], a covering for the leg or for the ankle and foot; a shoe reaching up to the middle of the calf and tightly laced. The word buskin is used by English writers as a translation of cothurnus, which was a high shoe worn by ancient tragic actors, and had thick cork soles. The term is also used to denote the tragic drama or tragic style, having been used in contradistinction to *soccus*, a sock or flat-soled shoe worn by comedians.

Bus'seron, a post-township of Knox co., Ind. Pop. 1283.

Bus'sey (Benjamin), born at Canton, Mass., Mar. 1, 1757, served in the Revolutionary army at Burgoyne's capture. He was a silversmith of Dedham, Mass., and afterwards a very successful merchant of Boston. Died Jan. 13, 1842, leaving $350,000 to Harvard University, half to found the Bussey School of Agriculture, and half to sustain the Law and Divinity Schools.

Bus'su Palm (*Manicaria saccifera*), a palm growing in the tidal swamps of the Amazon, the only known species of its genus. The stem is ten to fifteen feet high, curved and deeply ringed. The leaves are undivided, and are the largest of the kind produced by any known palm, being often thirty feet long and four or five feet wide. The leaves make excellent and durable thatch, being split down the midrib, and laid obliquely on the rafters, so that the furrows formed by the veins lie in a vertical direction, and serve as gutters to carry off the water. The spathe is used by the Indians as a bag, and the larger ones to make caps.

Bust [It. *busto;* Fr. *buste*], a sculptured representation of the head and upper part of the human body. The earliest busts formed by the Greeks were probably heads of Mercury, which, when elevated on quadrangular blocks of stone, received the name of Hermæ. These blocks were afterwards frequently surmounted by representations of other divinities; and they gradually assume more of the human form, but they still were called Hermæ even after Alexander's time, when busts began to be used for portraiture in Greece. During the learned period of Greece, which commenced with Aristotle, portrait-busts formed an important department of art. The artists of this period exhibited remarkable ability in expressing the character. We have well-authenticated busts of Socrates, Plato, and other philosophers; of Isocrates and Demosthenes; of Athenian statesmen and distinguished women. In Rome, representations of the kings and persons of distinction belonging to the earlier period were probably made from the images of his ancestors which every patrician preserved, and which were commonly made of wax. These were often fanciful representations. The earliest well-authenticated Roman bust which we possess is probably that of Scipio Africanus the Elder, but we possess many examples of later date. In recent times portrait busts constitute an important department of plastic art.

Bustaman'te (often incorrectly written **Bustamente**), (Anastasius), M. D., a patriotic Mexican general, born in 1782. He was a physician by occupation. He obtained power as president of Mexico in 1830, was banished by Santa Anna about 1833, and was elected president in 1837. He was again banished in 1841. Died in 1851.

Bus'tard (*Otis*), a genus of birds which belongs to the order Cursores. They have three toes, which are all directed forward, long naked legs, and bills of moderate length. They are mostly inhabitants of open plains, to

Little European Bustard.

which all their habits are adapted. Although they are capable of flying, they often endeavor to escape from danger by running. The great bustard (*Otis tarda*) is the largest of European land-birds, and sometimes weighs thirty pounds. It is found in the eastern and southern parts of Europe, and abounds in the open plains or steppes of Tartary. The plumage is of a pale chestnut color on the upper parts, finely variegated with black. The wings are diversified with black and white, and the tail is tipped with white. The male has on each side of the chin or neck a tuft of feathers nearly nine inches long, under which is a spot of naked skin, and in the throat a sac or pouch capable of holding three or four pints of water. Their flesh is highly esteemed as food. The little bustard (*Otis tetrax*) is common in Southern Europe and Northern Africa, and is not half so large as the *Otis tarda*. South Africa produces a species called *Otis Kori*, or Kori bustard, which is five feet high or more, and is a noble-looking bird. Its flesh is good. Macqueen's bustard is a fine Asiatic bird. Several other bustards are known, all Old World species, except one, which is Australian.

Bus'ti, a post-township of Chautauqua co., N. Y. P. 1844.

Bus'to Arsiz'io, a town of Italy, in the province of Milan, 23 miles by rail N. W. of Milan, is situated on a fertile plain. It has several churches, one of which is adorned with fine old frescoes by Ferrari. Here are manufactures of cotton thread. Pop. 9978.

Busuluk', a town of Russia, in the government of Samara, 60 miles S. of Bugurusslau. Pop. 9932.

Butcher's Broom (*Ruscus aculeatus*), a biennial evergreen plant of the natural order Liliaceæ, has a stem from one to three feet high, and ovate, alternate, sharp-pointed leaves. The fruit is a red berry nearly as large as a wild cherry. It is indigenous in the south of Europe, and is cultivated for ornamental purposes. The root is aperient and diuretic.

Bute, an island of Scotland, in the Frith of Clyde, separated from the mainland by a narrow strait called the Kyles of Bute, which is about 1 mile wide. The island is about 16 miles long, and has an area of nearly 60 square miles. The mildness of the climate renders it a favorite resort for invalids. The chief town is Rothesay. Here are Rothesay Castle and Dungyle, a vitrified fort on the S. W. coast.

Bute, or **Buteshire,** a county in the S. W. part of Scotland, comprises the islands of Bute, Arran, the Cumbrays, Holy Isle, Pladda, and Inchmarnock. Area, 171 square miles, or 109,375 acres, of which 60,000 are cultivated. Chief town, Rothesay. Pop. in 1871, 16,977.

Bute, Marquesses of, earls of Windsor and Viscounts Mountjoy (1796), Barons Mountstuart (1761), Barons Cardiff (1766, in Great Britain), earls of Dumfries (1633), earls of Bute (1703), viscounts of Ayr (1622), Viscounts Kingairth, Lords Mountstuart, Cumbræ, and Inchmarnock (1703), Lords Crichton and Cumnock (1633), Barons Crichton of Sanquhar (1488, in Scotland), and baronets (1627, in Scotland).—John Patrick Crichton Stuart, the third marquess, born Sept. 12, 1847, succeeded his father in 1848. He is said to be the richest man in England.

Bute (John Stuart), Earl of, a minister of state, born in Scotland in 1713. He became groom of the stole to the prince of Wales, who was afterwards George III., over whom he acquired a great influence. In Mar., 1761, he was appointed one of the principal secretaries of state. He was prime minister from May, 1762, to April 8, 1763, and became very unpopular. His policy tended to exalt the royal prerogative. He was a liberal patron of literature and art. Died in 1792.

Bu'tea [named in honor of the earl of Bute], a genus of trees and shrubs of the natural order Leguminosæ, remarkable for the length of the standard of the flower, and having a compressed, 1-seeded pod. The *Butea frondosa*, called dhak tree, and *Butea superba*, are natives of India, and bear racemes of large and beautiful scarlet flowers, which present a gorgeous spectacle. The twigs yield a resinous exudation in the form of lurid red tears, which is one variety of lac. The sap of the trunk also yields gum-kino. A beautiful dye is obtained from the flowers, and the bark has a useful fibre.

But'ler [Old English *boteler* (*i. e.* "bottle-er"), a man who has charge of the bottles], a servant or household officer who has care of the wines, plate, etc. The "chief butler" of Pharaoh, mentioned in the Bible, an officer of high rank, was more properly a cup-bearer to the king.

Butler, a county in the S. of Alabama. Area, 850 square miles. It is drained by the Sepulga and Pigeon rivers. The soil is moderately fertile, and adapted to cotton. Oats, corn, and wool are also raised. Forests of pine timber abound. It is intersected by the Mobile and Montgomery R. R. Capital, Greenville. Pop. 14,981.

Butler, a county in Central Iowa. Area, 576 square miles. It is intersected by Shell Rock River and the West Fork of Cedar River. It contains extensive prairies. The soil is productive. Grain and wool are staple products. It is traversed by the Burlington Cedar Rapids and Minnesota and the Dubuque and Sioux City R. R. Capital, Butler Centre. Pop. 9951.

Butler, a county in the S. of Kansas. Area, 720 square miles. It is drained by the Walnut and Whitewater creeks. The surface is undulating; the soil is fertile. Cattle and grain are raised. Capital, Eldorado. Pop. 3035.

Butler, a county in S. W. Kentucky. Area, 500 square miles. It is intersected by Green River, which is here navigable for steamboats. The surface is hilly; the soil moderately fertile. Tobacco, grain, and wool are staple products. Coal is mined in this county. Capital, Morgantown. Pop. 9404.

Butler, a county of Missouri, bordering on Arkansas. Area, 560 square miles. It is bounded on the E. by the St. Francis, and intersected by the Big Black River. The surface is nearly level. Grain, tobacco, and wool are staple products. Capital, Poplar Bluff. Pop. 4298.

Butler, a county in the E. of Nebraska. Area, 576 square miles. It is bounded on the N. by the Platte River, and drained by the Big Blue River. The soil is productive. Grain and wool are the staple products. The county contains a large proportion of prairie. Capital, Savannah. Pop. 1290.

Butler, a county of Ohio, bordering on Indiana. Area, 455 square miles. It is intersected by the Great Miami River and the Miami Canal. The surface is nearly level; the soil is very productive. Cattle, grain, tobacco, wool, hay, and butter are largely raised. Trenton limestone, valuable for building, is abundant here. The manufactures are varied, including flour, metallic wares, carriages, clothing, saddlery, etc. The county is traversed by the Cincinnati Hamilton and Dayton, the Cincinnati Richmond and Chicago, and the Cincinnati and Indianapolis R. Rs. Capital, Hamilton. Pop. 39,912.

Butler, a county in the W. of Pennsylvania. Area, 800 square miles. It touches the Alleghany River on the N. E. and the S. E., and is drained by the Conequenessing Creek. The surface is undulating; the soil is fertile. Cattle, grain, dairy products, wool, and hay are largely raised. Bituminous coal, iron, and limestone are found here. The manufactures include lumber, furniture, leather, carriages, brick, saddlery, etc. Capital, Butler. Pop. 36,510.

Butler, a post-village, capital of Choctaw co., Ala., about 110 miles N. of Mobile.

Butler, a post-village, capital of Taylor co., Ga., on the South-western R. R., 50 miles W. S. W. of Macon.

Butler, a post-village of Montgomery co., Ill., on the Indianapolis and St. Louis R. R., 63 miles N. E. of St. Louis, and 3 miles N. W. of Hillsborough. Pop. 1648; of the township, 2107.

Butler, a township of Vermilion co., Ill. Pop. 925.

Butler, a post-township of De Kalb co., Ind. P. 1209.

Butler, a township of Franklin co., Ind. Pop. 1488.

Butler, a township of Miami co., Ind. Pop. 1535.

Butler, a township of Butler co., Ia. Pop. 1329.

Butler, a township of Jackson co., Ia. Pop. 857.

Butler, a township of Scott co., Ia. Pop. 889.

Butler, a post-village of Pendleton co., Ky. Pop. 144.

Butler, a post-township of Branch co., Mich. P. 1430.

Butler, a post-village, capital of Bates co., Mo., is in a fertile prairie, about 75 miles S. by E. from Kansas City. It has a national bank and two weekly papers. Pop. 1064.

Butler, a township of Harrison co., Mo. Pop. 748.

Butler, a township of Pemiscot co., Mo. Pop. 298.

Butler, a township of St. Clair co., Mo. Pop. 646.

Butler, a township of Platte co., Neb. Pop. 328.

Butler, a township of Wayne co., N. Y. Pop. 2023.

Butler, a township of Columbiana co., O. Pop. 1558.

Butler, a township of Darke co., O. Pop. 1524.

Butler, a township of Knox co., O. Pop. 701.

Butler, a township of Mercer co., O. Pop. 1301.

Butler, a township of Montgomery co., O. Pop. 2153.

Butler, a post-township of Richland co., O. P. 768.

Butler, a township of Adams co., Pa. Pop. 1333.

Butler, capital of Butler co., Pa., on the Conequenessing Creek, 31 miles N. of Pittsburg. A branch railroad

extends from the Alleghany River to the town. It has four banks, an educational institute, and a fine school building. It is situated in the "oil region," and two lines of pipe bring petroleum ten miles to the railroad. There are several machine-shops, two planing mills, two steam-grist-mills, and three weekly papers. Pop. of borough, 1935; of Butler township, 984. J. ZIEGLER,
ED. OF "DEMOCRATIC HERALD."

Butler, a township of Luzerne co., Pa. Pop. 1423.

Butler, a township of Schuylkill co., Pa. Pop. 5905.

Butler, a township of Darlington co., S. C. Pop. 1099.

Butler, a township of Edgefield co., S. C. Pop. 2080.

Butler, a township of Greenville co., S. C. Pop. 1646.

Butler, a township of Hancock co., W. Va. Pop. 979.

Butler, a township of Wayne co., W. Va. Pop. 1992.

Butler (ALBAN), a learned Roman Catholic divine, born at Northampton, England, in 1710; died May 15, 1773. He wrote "Lives of the Saints" (5 vols., 1745) and other works.

Butler (ANDREW PICKENS), born in Edgefield district, S. C., Nov. 18, 1796, graduated at South Carolina College in 1817, was admitted to the bar in 1818, became a judge in 1833, and was U. S. Senator from South Carolina (1846–57). —His father, WILLIAM BUTLER (1759–1821), was a brave soldier of the Revolution. A. P. Butler died May 25, 1857.

Butler (BENJAMIN FRANKLIN), lawyer and statesman, born at Deerfield, N. H., Nov. 5, 1818, son of Captain John Butler, who commanded a company of dragoons during the war of 1812, and served under Jackson at New Orleans. Reared by an excellent mother, B. F. Butler graduated at Waterville College, Me., and in 1840 was admitted to the bar at Lowell, Mass., where he rapidly advanced to an extensive and lucrative practice, in which he acquired a considerable fortune. He served in the State militia through all grades from private to brigadier-general. A Democrat by inheritance and conviction, he took an active part in politics, and in 1853 represented Lowell in the legislature, where he lent powerful aid to the bill for reducing the hours of labor in the factories of the State from thirteen to eleven. In 1853 he was a member of the constitutional convention, and in 1859 a member of the senate of Massachusetts. On April 15, 1861, upon a call for troops to hasten to the defence of Fortress Monroe and Washington, Brigadier-general Butler, who at 5 P. M. was in court in Boston trying a cause, issued the requisite orders for mustering the regiments of his brigade. April 16, the Sixth regiment left Boston, and on the 18th General Butler, at the head of the Eighth, took his departure, having been ordered to proceed to Washington by way of Baltimore. Two regiments of his brigade had, in the mean time, sailed for Fortress Monroe, which they garrisoned, and saved from falling into the hands of the enemy. Prevented from reaching Washington by way of Baltimore in consequence of the burning of bridges, he seized Annapolis, repaired the railroad between that city and Washington, and thus the Eighth Massachusetts and Seventh New York reached the capital in time to prevent all attempts on the part of hostile forces to seize it. May 13, 1861, at the head of 900 men, he marched upon Baltimore, and encamped on Federal Hill, in the midst of the city, without opposition—a service immediately (May 16) rewarded by President Lincoln with the commission of major-general in the service of the U. S., and by assigning him to the command of Fortress Monroe, where he arrived May 22. He here refused to send back the runaway slaves to their masters, on the ground, originated by him, that the slaves were "property contraband of war." Feb. 23, 1862, he was assigned to the command of the troops, 18,000 in number, forming part of the expedition against New Orleans, Captain Farragut commanding the naval force. After the heroic passing of the forts defending the Mississippi by Captain Farragut, General Butler (May 1, 1862) landed and took possession of the city, where he remained until Dec. 16 following, when he was relieved by Major-general N. P. Banks. During his administration of the department of the Gulf he taxed the wealthy Confederate citizens to support the thousands of inhabitants reduced to destitution by the war, and governed the city with an ability and justice never surpassed. Nov., 1863, he was appointed commander of the department of Virginia and North Carolina. In the winter he conceived the project of attacking Richmond from City Point and Bermuda Hundred. On May 5, 1864, he occupied City Point and Bermuda Hundred, and intrenched himself upon that peninsula, holding it with supplies, aiding the movement of General Grant upon Petersburg, after the repulse of the Wilderness and Cold Harbor. He went with a detachment of his forces in Nov., 1864, to New York during the presidential election, a rising being expected in New York City by which the election was to be carried by the Democracy. With a small force he held the city in peace and quiet, and compelled an orderly election. He was sent against Fort Fisher in Dec., 1864, but the navy not having reduced the fort by bombardment, a storm arising so that he could not land his troops, he took the responsibility of disobeying orders and returning; the enemy withdrew their troops, deeming all further attack upon that point to be given up; so that when another command was sent down against Fort Fisher, the enemy were found unprepared. Before the second expedition Gen. Butler was relieved of his command. In 1866 he was elected to Congress from the Essex district in Massachusetts, in which he had become a resident for that purpose, and has remained in Congress ever since.
JAMES PARTON.

Butler (BENJAMIN F.), an American lawyer and resident of Albany, N. Y., born Dec. 15, 1795, was attorney-general of the U. S. under President Jackson from Dec., 1831, to June, 1834. Died Nov. 8, 1858. (See his "Life" by W. L. MACKENZIE.)

Butler (CHARLES), a learned English jurist and writer, born in London in 1750, was a Roman Catholic. He wrote, besides other works, "Horæ Biblicæ" (1797), "Historical Memoirs of the English, Irish, and Scottish Catholics," and a continuation of his uncle's (Alban Butler's) "Lives of the Saints." Died in 1832.

Butler (CLEMENT M.), D. D., an American divine and scholar, was born in Troy, N. Y., Oct. 16, 1810. He was ordained a minister of the Protestant Episcopal Church in 1836, was rector of St. John's Church at Georgetown, D. C., from 1841 to 1844, rector of Grace Church, Boston, from 1844 to 1847, and rector of Trinity Church at Washington from 1847 to 1854. He officiated as chaplain of the Senate of the U. S. from 1849 to 1853. He was subsequently rector of Grace Church at Rome (in Italy) from 1862 to 1864; in the last-named year he was appointed professor of ecclesiastical history in the Divinity School of the Protestant Episcopal Church in West Philadelphia. Besides numerous sermons and lectures, Dr. Butler has published "The Book of Common Prayer Interpreted by its History" (1849), "Old Truths and New Errors" (1850), "The Flock Fed," etc. (1859), "St. Paul in Rome" (1865), "Inner Rome" (1866), "Manual of Ecclesiastical History from the First to the Thirteenth Century" (1868); also a "Continuation of the same from the Thirteenth to the Eighteenth Century," and various other works.

Butler (EZRA), born about 1762, was in the early years of Vermont history a prominent Jeffersonian of Weathersfield and Waterbury. He held justiceships and chief-justiceships of the courts of Chittenden and Jefferson counties, Vt., 1803–26, was a member of Congress (1813–15), and governor 1826–28. Died July 19, 1838.

Butler (GEORGE), U. S. M. C., born Jan. 20, 1839, in the District of Columbia, appointed a second lieutenant in the Marine Corps Feb. 11, 1859, became a first lieutenant in 1861, and a captain in 1862. Led the marines of the Minnesota in the assault upon Fort Fisher Jan. 15, 1865, and is thus honorably referred to by Lieut.-Commander James Parker, in his official report of the assault: "Captain George Butler of the marines also deserves mention for coolness and bravery. He reached and remained near the 'palisades,' a short distance inside of them." At the close of the rebellion Captain Butler was brevetted major "for gallant and meritorious conduct."
FOXHALL A. PARKER, U. S. N.

Butler (JOHN J.), D. D., a Free-will Baptist minister, born at Berwick, Me., in 1814, graduated at Bowdoin College in 1837, studied theology at Andover, Mass., was professor of sacred literature in Whitestown Theological Seminary (1844–54), of systematic theology at the Theological School of New Hampton, N. H. (1854–70), when he was appointed professor of sacred rhetoric and homiletics in Bates College Theological Seminary, Lewiston, Me. For many years he has been connected with the "Morning Star," a religious paper of Dover, N. H. He has published several commentaries on parts of the Bible, and a work on natural and revealed theology.

Butler (JOSEPH), an English bishop and eminent writer, was born at Wantage, in Berkshire, in 1692. About 1714 he wrote an able refutation of Dr. Samuel Clarke's celebrated *a priori* argument. He entered Oriel College, Oxford, in 1714, was appointed preacher at the Rolls Chapel in 1718, and obtained the rich benefice of Stanhope in 1725. He became chaplain to Lord Chancellor Talbot in 1733, and bishop of Bristol in 1738. In 1750 he was translated to the see of Durham. His chief work is "The Analogy of Religion, Natural and Revealed, to the Constitution and Course of Nature" (1736). He died unmarried June 16, 1752. (See

T. BARTLETT, "Memoirs of the Life of Joseph Butler, Bishop of Durham.")

Butler (PIERCE), born in Ireland in 1744, was a relative of the Ormond family and an officer of the British army. While stationed at Boston, Mass., he resigned his major's commission, removed to South Carolina, was a member of Congress (1787), a member of the convention which drew up the Federal Constitution (1788), and U. S. Senator from South Carolina (1789–96 and 1802–04). Died Feb. 15, 1822.

Butler (PIERCE M.), COLONEL, and former governor of South Carolina, born in Edgefield district, S. C., April 11, 1798. He entered the army in 1819 as second lieutenant of infantry, was promoted to first lieutenant 1822, captain 1825, resigned from the army in 1829, and was president of a bank at Columbia until 1836, when he accepted the appointment of lieutenant-colonel in Goodwin's regiment of South Carolina volunteers, and served against the Seminole Indians in Florida. On his return was elected (1838) governor of South Carolina; at the end of his term became Indian agent, and was acting as such at the outbreak of the Mexican war, when he was elected colonel of the "Palmetto regiment" of South Carolina volunteers, which regiment he gallantly led to the seat of war, distinguishing himself at Cerro Gordo and subsequent battles; at the battle of Churubusco Aug. 20, 1847, he continued to lead his men after being wounded, when he was shot a second time, through the head, and killed.

Butler (SAMUEL), a witty English poet, born in Worcestershire in 1612. He was liberally educated, and became in early youth clerk to a justice of the peace, and afterwards entered the service of Sir Samuel Luke, who is supposed to be the prototype of Hudibras. About 1661 he married a widow named Herbert, who had an easy fortune, but it was lost by investment in unsound securities. He published in 1663 the first part of "Hudibras," a witty and satirical poem which obtained great popularity. The second part appeared in 1664, and the third in 1678. He died poor Sept. 25, 1680. He was hostile to the Puritans, whom he satirized in his famous poem. "The sense of Butler," says Hallam, "is masculine, his wit inexhaustible, and it is supplied from every source of reading and observation. But these sources are often so little known to the reader that his wit loses its effect through the obscurity of the allusions." (See A. RAMSAY, "Butler and his Hudibras.")

Butler (WILLIAM ALLEN), an American lawyer and poet, born at Albany, N. Y., 1825, graduated at the University of New York in 1843. He wrote, besides other works, an admirable poem, "Nothing to Wear, an Episode of City Life" (1857).

Butler (WILLIAM ARCHER), a philosopher, born near Clonmel, Ireland, in 1814, was a writer of high promise. He became professor of moral philosophy in Trinity College, Dublin, in 1837. Among his works are "Lectures on the History of Ancient Philosophy" (2 vols., 1846). Died July 5, 1848.

Butler (WILLIAM ORLANDO), an American general, born in Kentucky in 1793. He served in the war of 1812 and the Mexican war, and became a major-general in 1846. He was the Democratic candidate for the office of Vice-President in 1848, but was not elected.

But'lerage, an ancient duty belonging to the Crown of England, otherwise called the *prisage* of wines. This duty is mentioned in the Great Roll of Exchequer, 8 Richard I. The Crown could take two tuns of wine from every ship (English or foreign) importing into England twenty tuns or more, one before and one behind the mast; by charter of Edward I., it was changed into a duty of two shillings for every tun imported by strangers.

Butler Centre, a post-village, capital of Butler co., Ia., near the West Fork of Cedar River, about 95 miles N. N. E. of Des Moines. Pop. 152.

Butler's Isle, a township of Hancock co., Me. P. 12.

Butler's Landing, a post-village of Clay co., Tenn.

Butoma'ceæ, a natural order of endogenous aquatic plants, nearly related to the Alismaceæ. It derives its name from the *Butomus umbellatus* (Gr. βοῦς, an "ox," and τέμνω, to "cut," because the edges of its leaves cut the mouths of cattle), an aquatic plant which grows in ditches and ponds in many parts of Europe and Asia, commonly called flowering rush. The leaves are all radical, linear, triangular, and about two feet long. The scape terminates in a large umbel of beautiful rose-colored flowers, each of which has nine stamens. This plant was formerly used in medicine. Its root is eaten in Asia. None of these plants are found in North America.

Butte, a French word signifying a "small hill," a "knoll," a "rising ground." In parts of the U. S. the term is applied to mountains, as the Downieville Buttes, 8840 feet high.

Butte, a county in the N. part of California. Area, 1200 square miles. It is bounded on the W. by the Sacramento River, and is intersected by Feather River and its forks. The surface is hilly or mountainous, and the scenery picturesque. The name of the county is derived from the Butte Mountains on the Sacramento River. Gold is found imbedded here in quartz rock. Cattle, wool, hay, grain, and dairy products are raised, and lumber is sawed. It is intersected by the Oregon division of the Central Pacific R. R. Capital, Oroville. Pop. 11,403.

Butte, a township of Colusa co., Cal. Pop. 604.

Butte, a township of Sierra co., Cal. Pop. 1182.

Butte, a township of Siskiyou co., Cal. Pop. 410.

Butte, a township of Sutter co., Cal. Pop. 1359.

Butte City, a post-village of Deer Lodge co., Mon.

But'ter [Ger. *Butter;* Fr. *beurre;* Lat. *butyrum;* Gr. βούτυρον, supposed to be from βοῦς, a "cow," and τυρός "cheese"] is the fatty substance extracted from milk. In ancient times the Hebrews made use of butter as food, but the Greeks and the Romans used it only as an ointment in their baths; and it is probable that the Greeks obtained their knowledge of the substance from the Scythians, Thracians, and Phrygians, whilst the Romans obtained it from Germany. In Southern Europe, at the present time, butter is very sparingly used, olive oil often taking its place; and in Italy, Spain, Portugal, and Southern France it is sold by apothecaries as a medicinal agent for external application. In the East Indies the natives use *ghee,* which is butter clarified by boiling. Butter is usually made from cow's milk, which has the following average composition:

Fat (butter)	3.83
Caseine	3.88
Sugar (lactose)	4.08
Salts (alkaline and earthy)	0.76
Water	87.45
	100.00

The composition varies, however, with the breed, age, and food of the cow, the age of the calf, the time and frequency of milking, etc. The last milk drawn at a milking is richer in butter than the first. (See MILK.) The caseine, sugar, and most of the salts are in solution, while the fat is in suspension in the form of minute globules, which are readily seen by the aid of the microscope. They vary in size from $\frac{1}{800}$ to $\frac{1}{300}$ of an inch in diameter. They are quite transparent, refract light strongly, and give the milk its white color. It was formerly supposed that each globule was covered with a thin membrane or envelope, but this has been disproved by Von Baumhauer and F. Knapp.

Cream.—When milk is allowed to stand, the fat globules rise to the surface and form a layer of cream, while below remains a blue transparent fluid, serum, containing the other constituents of the milk. The separation of fat and serum is never complete; each retains a certain quantity of the other. Dr. Voelcker gives the composition of cream as follows:

Fat (butter)	33.43	25.40
Caseine	2.62 }	7.61
Sugar	1.56 }	
Salts	0.72	2.19
Water	61.67	64.80
	100.00	100.00

To allow the cream to rise for the manufacture of butter, the milk is placed in a cool cellar, at a temperature of 55° to 59° F. If much cooler than this, the cream rises too slowly; if warmer, the milk sours rapidly. The pans for holding the milk should be perfectly clean and dry. Two inches is considered the best depth for the milk. In from twenty-four to thirty-six hours the separation of the cream will be complete, when it is skimmed off and put into a stone pot, or, if a sufficient quantity is at hand, it may be churned at once. Owing to a kind of fermentation (see FERMENTATION) that takes place in milk on standing, it becomes somewhat sour before all the fat globules have separated, and as it thickens or partially coagulates the further separation of cream is prevented. In zinc pans it remains sweet four or five hours longer than in wooden or earthen vessels, and consequently yields a somewhat larger proportion of cream; but the poisonous character of zinc salts makes the use of such pans dangerous. Glass vessels are really the best, but tin (tinned iron) is the material usually employed. When the cream is to be kept for a few days before churning, it is poured into a clean stoneware vessel; and some butter-makers add a little saltpetre, which prevents moulding and keeps the cream free from a cheesy taste.

Churning.—The butter is obtained from the cream by the process of *churning*—violent agitation in a wooden vessel,

a churn. The fat-globules are thus caused to unite in larger masses, and finally to separate entirely from the watery liquid, called buttermilk. The temperature of the cream when it enters the churn should be between 53° and 55° F. During the churning it rises several degrees. If the cream is too cold, the fat is hard and will not coalesce; if it be too warm, the fat is semi-liquid and will not unite. The time at which the butter separates, as well as its quantity and the quality, depends largely upon the temperature. From forty-five minutes to one hour should be occupied in churning; if the butter comes much sooner, it is generally soft and frothy; if a much longer churning is required, it is badly flavored. The butter is separated from the liquid, thoroughly washed with cold water, and kneaded or *worked* to expel the buttermilk as completely as possible. It is then fashioned into rolls or moulded into forms for immediate use, or it is packed in stone jars or wooden firkins for winter use. A little salt is generally added to improve the flavor—about a quarter of an ounce to a pound if the butter is intended for immediate use, but when it is to be packed for winter use as much as an ounce to the pound is used. Great care is necessary in selecting the salt for this purpose, as even minute quantities of the chlorides of calcium and magnesium, which are common impurities of salt, give the butter a bitter, disagreeable taste. The English *Ashton* and the Syracuse *factory-filled dairy* salt are specially adapted for dairy use. The buttermilk is never completely expelled from the butter, and although it gives an agreeable taste to the butter, it also causes it to rapidly become rancid unless some means are adopted to prevent this result. The caseine of the buttermilk acts as a ferment both upon the sugar and the butter. The former is changed to lactic acid; a little of the latter to free fatty acids and glycerine. The pure fat of butter may be kept for months without becoming rancid. To protect the butter from rancidity it is generally salted as above mentioned, or, in addition to salt, white sugar and saltpetre are added. Two tablespoonfuls of a mixture of 3 pounds of salt, 1 pound of sugar, and 1 pound of saltpetre to a pound of butter is sufficient to keep it sweet and good for a year. Butter may be completely purified, though with a serious loss of flavor, by melting it at as low a temperature as possible and allowing the buttermilk to settle out.

The average yield of butter is about one pound from twenty-four pounds or twelve quarts of milk, or about a pound of butter from two quarts of cream. It is computed that a cow will give 1800 quarts of milk per annum, producing 140 pounds of butter. In the same time she will eat 8000 pounds of hay, which contain, as shown by analysis, 168 pounds of fat. Butter is made in many localities from the whole milk, which is allowed to stand till it becomes sour. The churning is more laborious, owing to the large quantity of material and the longer time required to bring the butter. The yield is greater, however, than when cream is used, and the butter is very good. Great success has attended the establishment of butter and cheese factories in some parts of the U. S., which receive the milk daily from the farmers and manufacture butter or cheese, or both, on a large scale in the most approved manner. It is claimed that owing to the possibility of regulating temperatures with more certainty on a large scale, to the advantage of steam for cleansing vessels, and to the ability of large establishments to employ more skilful labor, the products are obtained of better quality and at less cost than when each farmer handles the milk of his own farm. At the factory of the "Wallkill Milk Association," in Orange co., N. Y., the milk is set in tin pails twenty-two inches deep and eight inches in diameter. These pails are placed in running spring-water at 48° to 56° F., where they remain over night. The cream is then skimmed with a conical cup having an upright handle. The cream is put immediately into the churns, and the skimmed milk is made into cheese. Each churn receives fifty quarts of cream and one pail of cold spring-water. The temperature is always between 56 and 64° F. The churning is effected by horse-power, and is continued forty-five to sixty minutes. The butter is then taken out, washed with spring-water, salted with 18 ounces of salt to 22 pounds of butter, and well worked. It stands till evening, when it is worked again, then packed in sixty-pound pails and sent to New York. For winter butter a small teaspoonful of pulverized saltpetre and a large tablespoonful of white sugar is added to every twenty-two pounds. The butter is worked on an inclined slab with a wooden lever. The yield was—

		Milk, qts.	Butter, lbs.	Cheese, lbs.
May 18,	from	3512	213	560
May 26,	"	3300	210	550
Sept. 12,	"	3128	200	546
Oct. 14,	"	2027	120	407

The "Orange County Milk Association" find that it requires an average of 14 quarts (wine) or 28 pounds of milk to make 1 pound of butter and 2 pounds of cheese.

When newly prepared, butter is of a yellow color, which is deeper as the pasture on which the cow is fed is richer. Hence the poorer kinds of butter are often colored with annatto, turmeric, infusion of calendula flowers, or the juice of carrots.

Butter differs very much in composition according to the care taken in working it. The pure fat varies from 77 to 95 per cent., the buttermilk from 5 to 23 per cent. The fat is a mixture of several neutral fats or glycerides, chiefly the liquid, oily fat oleine and the solid fats palmitine and stearine, with smaller quantities of myristine, butyrine, caproine, capryline, and caprine. To these latter bodies the peculiar odor and flavor which distinguish butter from other fats are due. Prof. E. N. Horsford has detected phosphorus in butter. Butter melts at from 85° to 90° F. It is generally harder and less fusible in winter than in summer, owing to the relative increase in summer of the oily constituent, oleine.

The *adulterations* most frequently found in butter are excess of water and salt. They may be detected and estimated by melting a weighed quantity of the butter and allowing them to settle out. Lard is said to be added to butter. Lactate of zinc, derived from the zinc pails and pans used in the dairy, has been reported; when present in sensible quantities, it produces violent vomiting.

Butter powders for largely increasing the yield of butter are advertised to some extent in the U. S. One of these, the "Star Butter Powder," is a mixture of equal parts of alum and sugar. The directions for its use are: "To one quart of milk, twelve hours old, add one pound of butter; warm by setting the churn in blood-warm water. Add one teaspoonful of the powder, and churn as usual. You will have two and a half pounds of delicious fresh butter." The effect of this and similar powders is to coagulate the milk and enable the operator to mix it with the butter, forming a frothy mixture (emulsion) of butter and sour milk, which is anything but *fresh and delicious.*

Artificial Butter.—Mége-Mouriéz, investigating the production of milk, noticed that cows deprived of food continued to give milk in some quantity, and that the milk continued to contain butter. This led him to infer that the fat of the animal was changed to butter, and, acting upon this hint, he succeeded in extracting from beef tallow (suet) a fat having the consistence of butter, which he converted into an excellent substitute for genuine butter. As already mentioned, butter consists chiefly of oleine, palmitine, and stearine. The same is true of suet, but the oily oleine is not present in so large a proportion as in butter. Mouriéz, therefore, removes such a proportion of the palmitine and stearine as to leave a mixed fat having the consistence of butter. His process is as follows: Fresh suet is cut very fine, placed in a vessel containing water, a little carbonate of potash, and fresh sheeps' stomachs cut in pieces are added. The whole is warmed to 112° F. Under the influence of the heat and the pepsin of the stomachs the fat separates from the cellular tissue. This fat is allowed to cool till it solidifies, when it is subjected to pressure in a hydraulic press, when it separates into two portions—a hard white stearine and palmitine, suitable for the manufacture of candles, and a liquid oil, which on cooling further solidifies into a white fat having the consistence of butter. Mouriéz calls this *oleo-margarine*, from the old idea, now disproved, that a fat margarine existed in butter and suet.

To produce butter, the oleo-margarine is poured into a churn while still liquid with about half its volume of fresh milk and nearly as much water. A little annatto is added for color, and a little water in which pieces of cows' udder and milk glands have been soaked. The mixture is then churned, yielding a sweet, palatable butter which may be salted as usual. As nothing unwholesome is used in the manufacture of this butter, its use in place of real butter is a mere matter of taste. As it can be made for from one-fifth to one-third the cost of real butter, and does not readily become rancid, it bids fair to become an important article of manufacture. It is certainly a good substitute for the olive oil so freely used in Southern Europe, or the lard which is used on bread in place of butter in many families in Germany. Mr. Alfred Paraf has simplified the process, and erected a large factory for making this butter in New York, under the name of the "Oleo-margarine Company."

Vegetable Butters.—The name "butter" is applied to several vegetable fats, such as palm, cacao, cocoanut, nutmeg, and shea butter. The latter is made from a nut like the olive, and is used in Africa as a substitute for butter.

Metallic Butters.—In chemistry the name butter was formerly applied to certain oily compounds which resembled melted butter; as the butter of antimony, bismuth, zinc, and tin, which were the chlorides of the respective metals. *Bog butter* is a fossil butter found occasionally in the Irish

peat-bogs. It is believed to have been made by man. *Rock butter* is an iron alum which appears as a pasty exudation on alum slates. C. F. CHANDLER.

Buttercup. See RANUNCULUS.

But'terfield (DANIEL), born in Oneida co., N. Y., in 1831, was educated at Union College. Soon after the breaking out of the civil war he was made brigadier-general of volunteers, and took part in many actions under Generals McClellan, Pope, and Burnside, and was chief of General Hooker's staff at Lookout Mountain, and afterwards. He was brevetted major-general for gallant and meritorious conduct.

Butterfield (JOHN), born at Helderberg, N. Y., about 1783, became an extensive proprietor of passenger stages, and after the construction of railroads and telegraphs was largely interested in the railroad, express, and telegraph business. He removed to Utica, N. Y., in 1822, and died there Nov. 15, 1869. He was one of the founders of the American Express Company.

But'terfly, the name of the Papilionidæ, diurnal lepidopterous insects, forming many genera in the recent entomological systems. Butterflies exhibit a great similarity in most respects to other lepidopterous insects. They are distinguished in most cases without difficulty by their knobbed antennæ, and by brilliancy of coloring, which in butterflies belongs to both sides of the wings, whilst the beauty of moths appears chiefly on the upper side. The abdomen is shorter and smaller than in other families. Butterflies, at rest, hold their wings erect, the under side being thus chiefly exhibited; while the other lepidopterous insects hold their wings in a horizontal or inclined position, and some have them wrapped round the body. Butterflies are the only insects of their order which have no sockets, spines, bristles, or hooks by which the second wing on each side can be attached to the first, but both when flying and at rest have all their wings quite separate. Their caterpillars have always sixteen feet, ten of which are abdominal. The pupa or chrysalis is angular, especially on the thorax, is seldom enveloped in a cocoon, is generally suspended by the tail by means of a silky substance, but is sometimes supported by bands around the middle, and generally exhibits more or less of that golden color from which both the names *aurelia* (from the Lat. *aurum*, "gold") and *chrysalis* (from the Gr. χρυσός, "gold") are derived.

Some species of butterflies possess no small power of flight. Short-lived as they are generally believed to be, some of the tropical species perform wonderful migrations. The number of species is very great; not less than 5000 species being known, and the number will doubtless be increased. There are probably 1000 species in North America. Their arrangement is difficult, on account of the similarity which prevails among them.

Some butterflies measure almost a foot across the expanded wings. The largest species are tropical. Some species are widely distributed: *Cynthia cardui* is found throughout nearly all the world. The geographical limits of other species are restricted. Caterpillars of some species are furnished with spines, those of others have fleshy prominences, horny at the tip, perhaps intended as means of defence. The hinder wings of many butterflies are prolonged into tail-like appendages, one or more on each wing, which vary in form.

These insects are objects of admiration, associated with the most lovely scenes, but they are also a cause of annoyance and vexation by the ravages of their caterpillars. There is, however, one species, the bugong (*Euplœa hamata*), which affords food to the aborigines of Australia. Butterflies of this species congregate in such vast numbers in rocky crevices that they are collected by simply making fires under the rocks, in the smoke of which they are suffocated. Bushels of them are thus procured, and baked by placing them on the heated ground, the down and wings removed, and the bodies made into cakes which resemble lumps of fat. It is probable that the oil of this species may become commercially important. As an article of food it is irritant and nauseating, even to the natives. REVISED BY C. W. GREENE.

But'terfly-Weed, a common name of the *Asclepias tuberosa*, an herbaceous plant which is indigenous in many parts of the U. S., and is sometimes called **Pleurisy Root.** It has nearly sessile leaves, varying from linear to oblong-lanceolate, and has showy orange-colored flowers. The root is diaphoretic and expectorant, and has been used in medicine. (See ASCLEPIAS.)

But'termilk, the part of milk that remains after the butter has been separated from it. It contains casein, sugar, water, and all the original ingredients of milk, except the oily matter. It is a nutritious beverage, and is extensively used in many places as food.

Buttermilk Falls, a cataract in Le Roy township, Genesee co., N. Y. The Oatka Creek falls 90 feet over a cliff of limestone. Also a series of cascades on Bog Meadow Creek in Cornwall township, Orange co., N. Y., below West Point, and near the Hudson River.

But'ternut, or **White Walnut,** a name given to the *Juglans cinerea*, and its fruit, which is indigenous in the U. S. The tree grows to the height of from thirty to fifty feet, and has oblong-lanceolate leaflets, which are serrate, pointed, and rounded at the base. The fruit is oblong and clammy, and contains an oily, edible kernel. The wood is valuable in the arts.

But'ternuts, a post-township of Otsego co., N. Y. It contains four churches and several manufacturing establishments. Pop. 2174.

Butternut Valley, a post-township of Blue Earth co., Minn. Pop. 590.

Butter Tree, a name given to several tropical trees, the fruits of which yield concrete fixed oils which are similar to butter and used as food. The butter trees of India and Africa belong to the genus *Bassia* and the order Sapotaceæ. Those of Brazil and Guiana belong to the genus *Caryocar*.

But'terwort (*Pinguicula*), a genus of herbaceous plants of the natural order Lentibulariaceæ, distinguished by a 2-lipped calyx, the upper lip trifid, the lower bifid; and a spurred corolla, 2-lipped and gaping, the upper lip arched. The *Pinguicula vulgaris* is a small stemless perennial, growing in marshes and on wet rocks in Europe and the U. S. It has the power of coagulating milk, and is used for that purpose by the Laplanders.

But'terworth (JOHN), well known as the author of a concordance and dictionary of the Scriptures, born in Lancashire Dec. 13, 1727. He was pastor of the Baptist church at Coventry for fifty-two years. Died in 1803.

Butt Hinge, a hinge of iron or brass, the flaps of which close like a book. It is usually let in flush with the bead of a joint left for the purpose of concealing it. Such hinges are commonly used for doors.

Butt'mann (PHILIPP KARL), an eminent and profound German philologist, born at Frankfort-on-the-Main in Dec., 1764. He was appointed secretary of the Royal Library of Berlin in 1796, and chief librarian of the same in 1811. He was a friend of Niebuhr, and an excellent Greek scholar. He edited several Greek classics, and published, besides other works, a "Greek Grammar for Schools" (1792), a large "Greek Grammar" ("Ausführliche Griechische Sprachlehre," unfinished), and "Lexilogus, or Explanation of the Greek Words" (1818). Died June 21, 1829.

But'ton [Fr. *bouton*, a "button;" originally, a "bud"], a well-known appendage to dress used for fastening or for ornament. Buttons are of various kinds and materials. Military buttons are for the most part of brass. Circular disks, called "blanks," are cut from sheet brass by machines, which cut a row of eight or ten blanks at once, the machine itself pushing the metal forward. The edges are trimmed, and the blank planished by stamping with a die. The shanks are made by a machine which is fed with wire, which it pushes in short lengths to a pair of shears. The pieces of wire are forced into a vice which bends them to the required shape, the ends are made flat with a hammer, the shanks soldered to the blanks, and the buttons finished in the lathe and lacquered or gilded. "Shell" buttons are made of two blanks, that forming the face being larger than the back to which the shank is attached. These blanks are pressed into the required shape by dies, and then, by another die, the edge of the larger blank is lapped over the smaller, and thus attached without soldering. Common metal buttons are cast in moulds in which the shanks are previously placed, and are thereby attached without soldering. When the body of the button is of pearl-shell, bone, or wood, the blanks are cut by means of a tubular saw. The shanks are fixed by cutting a hole half through the blank; this is enlarged as it deepens, and after inserting the shank a blow spreads it out, so as to fill up the inner and larger part of the cavity. Buttons with holes, when of shell, wood, bone, or ivory, are cut with the tubular saw, and drilled. Covered buttons are often made by sewing cloth upon "moulds"—*i. e.* flat bone or wooden disks with a hole in the middle. These have been to a great extent superseded by various patented buttons. Many of these are made of combinations of metal and cloth.

Many buttons are now made of plastic materials, like vulcanized rubber, papier maché, etc. which are pressed in moulds to the shape required. Horn buttons are made by pressure, the horn having been softened by heat. A very cheap substitute for pearl buttons is made by forcibly com-

pressing clay into moulds. There are several compositions of this kind used. Buttons of horn, vegetable ivory, bone, mother of pearl, the coquilla nut, hard wood, glass, etc. are largely manufactured.

REVISED BY C. W. GREENE.

Button, a township of Ford co., Ill. Pop. 610.

Button (Sir THOMAS), an English sailor who in 1614 sailed to discover the N. W. passage, wintered in Hudson's Bay, which he called "Carey's Swan's Nest," and named many places on its shores. For these services he was knighted.

Button-bush (*Cephalanthus occidentalis*), a common American shrub of the Cinchona family, has a white flower in globose heads, whence its name. When in flower it is much frequented by bees.

But'tonwood, a common name of the *Platanus occidentalis*, a tree which is a native of the U. S., and is also called PLANE TREE (which see).

But'tress [Fr. *arc-boutant*], in architecture, a projection for the purpose of giving additional support or strength to a wall; a mass of masonry or brickwork built to resist the horizontal thrust of another mass. In the classical style no buttresses were used, their place being to some extent supplied by pilasters, antæ, etc.; but in Gothic architecture they are much used to counteract the outward thrust of the arches or of the vaulting which covers the naves and aisles of cathedrals. The different stages of Gothic architecture are marked by the form of the buttresses employed almost as distinctly as by the form of the arch. The Norman buttress was broad, often semicircular, never projecting from the wall to any great extent. Early English buttresses project more boldly, and are narrower than the Norman. They are frequently broken into stages, which diminish in size as they ascend. Buttresses of which the upper portion or the whole upright part is detached from the wall (with which they are connected by an arch) are called flying buttresses or arch-buttresses.

Butts, a county in Central Georgia. Area, 180 square miles. It is bounded on the E. and N. E. by the Ocmulgee River, and drained by Tussahaw and Sandy creeks. The surface is nearly level; the soil is fertile. Corn, cotton, and wool are produced. Capital, Jackson. Pop. 6941.

Butts Road, a township of Norfolk co., Va. P. 2039.

Butyl. See TRITYL.

Butyr'ic [from the Lat. *butyrum*, "butter"] **Acid,** $HC_4H_7O_2$, may be obtained by saponifying butter with potash, adding dilute sulphuric acid, and distilling about one half of the mixture, adding water, and continuing the distillation till the residue is not acid. Butyric acid may also be obtained by allowing a small quantity of milk-curd to act upon a solution of sugar at a temperature of 77° to 86°. Chalk is added to take up the butyric acid when produced. The butyrate of lime is left in the vessel, and on acting upon that by dilute hydrochloric or sulphuric acid, and distilling, the free butyric acid passes over, and is condensed. Butyric acid is a transparent, thin, oily liquid, with a most persistent rancid odor. It is miscible in all proportions in water, alcohol, ether, and sulphuric acid; has a specific gravity of .973, boils at 314°.

Butyr'ic E'ther, or **Ethyl'ic Bu'tyrate,** $C_2H_5.C_4H_7O_2$, an exceedingly fragrant liquid obtained by distilling butyric acid (or the butyrate of lime), alcohol, and sulphuric acid. Butyric ether is mixed with alcohol, and sold as artificial pineapple oil. There is little doubt that pineapples owe their flavor to the presence of natural butyric ether. A small quantity is also found in rum. The artificial variety is used for flavoring various articles and for sophisticating bad rum. Butyric ether alone cannot be used in perfumery, as, when inhaled in even a small quantity, it tends to cause irritation of the lungs and intense headache, but it is employed in the manufacture of compound perfumes. Other butyric ethers are the methylic, butylic, propylic, amylic butyrates, etc.

Buxbaum'ia [named in honor of J. C. Buxbaum, a German botanist], a genus of mosses, of which only one species is known, *Buxbaumia aphylla*, a rare European and American plant, apparently destitute of leaves. The part of it visible above the ground is merely a little conical bulb, with minute scales, which are its leaves.

Bux'ton, a town and watering-place of England, in Derbyshire, is situated in a deep valley near the source of the Wye, 32 miles N. W. of Derby, and 160 miles N. N. W. of London. Here are calcareous and chalybeate springs, which are annually visited by about 14,000 persons. Buxton is surrounded by beautiful scenery, has several good hotels, and baths which are regarded as among the finest in Europe. One of the dukes of Devonshire expended £120,000 here in the erection of a pile of stone buildings called the Crescent. Buxton was once the residence of Mary queen of Scots, then a captive. Near this town is Diamond Hill, famous for its crystals. Pop. 1877.

Buxton, a post-township of York co., Me., on the Portland and Rochester R. R., 17 miles W. of Portland. It has a savings' bank, and manufactures of lumber, furniture, woollen goods, etc. Pop. 2546.

Buxton (Rev. JARVIS BARRY), born at Newbern, N. C., Jan. 17, 1792, was ordained pastor of a Protestant Episcopal church at Elizabeth City, N. C., in 1827, and removed in 1831 to Fayetteville, N. C., where he was distinguished for his devotion to his work as a minister. Died May 30, 1851. A volume of his "Discourses," with a memoir of his life, was published by his son in 1853.

Buxton (JEDIDIAH), an Englishman, born near Chester in 1705. Though below mediocrity in respect of intellect, he possessed such marvellous powers of arithmetical calculation that he was regarded as one of the wonders of his time. His insight into the relations of numbers was so far intuitive that he never could explain the processes by which he arrived at his conclusions, which were almost always correct. Died about 1774.

Buxton (Sir THOMAS FOWELL), an English philanthropist, born in Essex April 1, 1786, was the son of opulent parents. He married in 1807 Hannah Gurney, a sister of Joseph John Gurney and of Mrs. Fry, and was elected a member of Parliament in 1818 by the voters of Weymouth, which he represented nineteen years. He was an eminent advocate of the abolition of slavery and other humanitarian measures, and had much influence in public affairs. Died Feb. 19, 1845. (See "Life of T. F. Buxton," by his son, SIR CHARLES.)

Bux'torf [Lat. *Buxtorfius*], (JOHANN), an eminent German scholar, born at Kamen, in Westphalia, Dec. 25, 1564. He was well versed in the Hebrew language and rabbinical literature. In 1591 he became professor of Hebrew at Bâle. His chief works are a "Lexicon Hebraicum et Chaldaicum" (1607) and "Biblia Hebraica Rabbinica" (1618). Died Sept. 13, 1629.

Buxtorf (JOHANN, JR.), a son of the foregoing and father of the following, was born Aug. 13, 1599, became in 1630 professor of Hebrew at Bâle, where he later held other professorships. Died Aug. 16, 1664. He published various learned works, among which are a treatise on the Hebrew vowel-points and a Chaldee and Syriac lexicon.

Buxtorf (JOHANN JAKOB) was born Sept. 4, 1645, and died April 1, 1704. He also was a good Hebraist, but published nothing except a preface to his grandfather's "Tiberias" (1665), and a revised edition of his "Synagoga Judaica" (1680). He was professor at Bâle from 1669.

Buxtorf (JOHANN, TERTIUS), nephew of the preceding, was born Jan. 8, 1663, became professor at Bâle in 1704, and died June 19, 1732. His principal work is the "Catalecta Philologico-theologica," etc.

Buxus. See BOX.

Buyck'ville, a township of Elmore co., Ala. Pop. 806.

Buzançais, a town of France, department of Indre, on the river Indre, 46 miles S. E. of Tours. Here are extensive iron-works. Pop. in 1866, 5145.

Buz'zard (*Buteo*), a genus of birds of the order Raptores and family Falconidæ, having a small bill, which bends from the base and is not notched. They resemble the eagle and falcon in form, but are inferior in size and courage. The common buzzard (*Buteo vulgaris*), a native of Europe and North America, measures nearly four feet from tip to tip of the wings. It is sluggish and inactive compared with other birds of prey. The prevailing color of its plumage on the upper parts is brown, with a mixture of black. The rough-legged buzzard (*Buteo lagopus*) is similar to the *Buteo vulgaris*, but it may be distinguished by its having the tarsi feathered to the toes. It is widely distributed in Europe and Africa, and is found in North America. Among the other species of this genus is the red-tailed hawk of the U. S. (*Buteo borealis*), which often kills poultry. The American bird called turkey-buzzard belongs to the genus CATHARTES (which see).

Buzzard's Bay, in the S. part of Massachusetts, is 30 miles long, has an average width of 7 miles, and contains the harbors of New Bedford, Fairhaven, and Wareham. It is sheltered from the ocean by the Elizabeth Islands.

By-bidding, bidding at an auction sale by a person on behalf of the owner of the property sold, and with no intent of purchasing it. It may be for either one of two purposes—either to prevent the property from being sold below its value, or to raise its price beyond its value. The former act is supposed to be lawful; the latter is illegal, and the buyer may make use of it to avoid the sale. By-bidders are sometimes called "puffers." (See AUCTION.)

Byb'los, or **Byblus** [Gr. Βύβλος], an ancient city of Phœnicia, on the Mediterranean, about 22 miles N. N. E. of Berytus, was called *Giblah* by the Hebrew writers. It was near the base of Mount Lebanon, and was said to be the native place of Adonis or Thammuz. This site is occupied by the modern town of Jubeïl, and ruins of a Roman theatre.

Byblos [Gr. Βύβλος], an ancient town in the delta of Egypt, was celebrated for its manufacture of papyrus, the chief writing-material of the civilized world. It stood in a marshy tract which produced in abundance the byblus or papyrus plant (*Cyperus antiquorum*).

By'ford (William Heath), M. D., was born at Eaton, Preble co., O., Mar. 20, 1817, was self-educated, became an active practitioner in Chicago, president of faculty and professor of clinical surgery in the Woman's Hospital Medical College, was twice president of the American Medical Association, author of "Philosophy of Domestic Life," "Chronic Inflammation of the Unimpregnated Uterus," "Practice of Medicine and Surgery applied to Diseases and Accidents peculiar to Women," "Theory and Practice of Obstetrics," etc.

By-laws, regulations made by a corporation for its own government or that of its members. It is a general rule that the power to make by-laws is incidental to the existence of a corporation. It is sometimes conferred expressly in the charter upon the corporation, or vested in a select body of persons, such as directors. Where the charter is silent, the power appertains to the corporation itself. By-laws must be reasonable and consistent with law. If a penalty for breach of a by-law be imposed, it may be collected by action. The by-laws of municipal corporations are usually termed "ordinances." A city in making such an ordinance usually acts in a *quasi* legislative character. It would not, for example, be responsible if the ordinance should be broken by one of the citizens and a person should suffer damage by the breach. Thus, if there were an ordinance that no owner of swine should allow them to run at large, yet if an owner did so permit them to run to the injury of his neighbor, an action would not lie against the city, but only against the wrong-doer.

Byles (Mather), D. D., born in Boston, Mass., Mar. 26, 1706. His father was a native of England; on his mother's side he descended from the Rev. Richard Mather and the Rev. John Cotton. He graduated at Harvard College in 1725, and was ordained first pastor of Hollis street church, Boston, 1733. He soon attained eminence in his profession, and also attracted considerable attention by his poetical talents. He continued happily with his parish till the excitement preceding the Revolution created a distrust against him, and he was accused of being a Tory, and separated from his parish. Charges were afterwards made against him that he prayed for the king and received visits from British officers, and in May, 1777, he was publicly denounced in town-meeting. On the 2d of June following he was placed on trial, pronounced guilty and ordered to be confined on a guardship, and in forty days to be sent to England with his family; this sentence, however, was not executed, but he was confined to his own house, where a guard was placed over it, which was afterwards removed, but again replaced and again dismissed, causing him to say that he was "guarded, reguarded, and disregarded." His literary talent was recognized by many men of genius in England, and among his correspondents were Pope, Swift, Lansdowne, and Watts. He continued to reside in Boston, but was not again connected with any parish, till his death, which occurred July 5, 1788.

Bynæ'us (Anthony), a Dutch Orientalist, born at Utrecht Aug. 6, 1654, became a Protestant minister and a proficient in Hebrew and Syriac literature, and published a treatise on Hebrew vowel-points and several sermons and commentaries. Died at Deventer Nov. 8, 1698.

Byng (John), an admiral, a son of Lord Torrington, was born in 1704. He gained the rank of admiral of the red in 1748. In 1756 he commanded an expedition sent to relieve Minorca, then blockaded by the French. He failed, and was accused of cowardice by the ministers, who sought to divert attention from their own inefficient measures by sacrificing him to the public indignation. He was tried by a court-martial and shot Mar. 14, 1757.

Byng Inlet, a port of entry of the province of Ontario (Canada), on the N. side of Georgian Bay, Lake Huron, has very extensive saw-mills, whence 20,000,000 feet of lumber are yearly sent to the U. S. It is visited in winter by dog-sledges, and in summer by regular steamers. Pop. about 200.

By'ram, a township of Sussex co., N. J. Pop. 1332.

Byrd, a township of Cape Girardeau co., Mo. P. 2112.

Byrd, a township of Brown co., O. Pop. 1251.

Byrd, a township of Goochland co., Va. Pop. 3216.

Byrd (William), F. R. S., born at Westover, Va., Mar. 28, 1674, studied law in London, and long held important offices in Virginia. He was a patron of literature, and laid out in 1733 the towns of Petersburg and Richmond. He wrote many valuable sketches of his travels in Virginia. Some of his writings were published by Edmund Ruffin as "The Westover Manuscripts" (1841). Died Aug. 26, 1744.

By'rom (John), F. R. S., an English writer, born near Manchester in 1691, was educated at Cambridge. He wrote prose and verse, contributed to Addison's "Spectator," and invented a system of shorthand. Died Sept. 28, 1763.

By'ron, a post-village of Shiawassee co., Mich.

Byron, a post-township of Ogle co., Ill. Pop. 1093.

Byron, a township of Buchanan co., Ia. Pop. 1195.

Byron, a post-township of Oxford co., Me. It has manufactures of lumber. Pop. 242.

Byron, a township of Kent co., Mich. Pop. 1326.

Byron, a township of Wauseca co., Minn. Pop. 253.

Byron, a post-township of Genesee co., N. Y., contains several mineral springs. Pop. 1734.

Byron, a post-township of Fond du Lac co., Wis. Pop. 1441.

Byron (George Gordon Noel), Lord, an eminent English poet, was born in London the 22d of Jan., 1788. He belonged to an ancient Norman family whose name was variously written Burun, Biron, and Byron. John Byron, the poet's grandfather, was a noted English admiral. Captain Byron, the son of the admiral, married Catherine Gordon, a Scottish heiress, who had only one son, the subject of this notice. Captain Byron was distinguished for nothing but his vices. Having squandered a large portion of his wife's property, he deserted her, after which she retired to Scotland, and resided for some time at Aberdeen, where young Byron received the first rudiments of his education. Before he was seven years old, with his mother he visited the Highlands, the picturesque beauty of which, even at that age, made, it is said, a powerful impression on his mind. When he was ten years old he succeeded to the estate and title of his grand-uncle, William, fifth Lord Byron, who had resided at Newstead Abbey, where he died in 1798. The poet had a congenital deformity of his feet, which rendered him lame, and which was during his whole life a bitter mortification to him. When he was about twelve years old he was sent to school at Harrow. While here he became acquainted with Miss Chaworth, for whom he conceived a romantic and passionate love. She was the heiress of Annesley, which was adjacent to Newstead, the estate to which Byron had succeeded. This appears to have been one of the truest and deepest attachments of his life, and he seems to have fully persuaded himself that if he had married Miss Chaworth he would have been a far better as well as a happier man. He went in 1805 to Cambridge, which he left two years afterwards without taking a degree. While at the university he published (1807) a volume of poems, "Hours of Idleness," which was criticised in the "Edinburgh Review." This critique was written by Mr. (afterwards Lord) Brougham, but Byron always supposed that Jeffrey was the author. In retaliation he wrote "English Bards and Scotch Reviewers," which may be said to have laid the foundation of his fame. This satire, though evincing great talent in its way, is in many parts egregiously unjust, as, for example, where the satirist speaks of Scott. It is but just to add that Byron himself afterwards deeply regretted the publication of the poem, and did everything in his power to suppress it.

In 1809, in company with his friend Mr. Hobhouse, Byron commenced his travels through different parts of Europe, Spain, Portugal, European Turkey, and Greece. After an absence of about two years, he returned to England and published the first two cantos of "Childe Harold's Pilgrimage," which were received with extraordinary favor, so that, as he himself informs us, he "awoke one morning and found himself famous." He soon after took his seat in the British House of Peers. At one time it would appear that he thought seriously of giving himself up to politics, but he soon changed his purpose and turned his attention again to poetry. Within the next two or three years he produced several minor poems of exquisite beauty—namely, "The Giaour," "The Bride of Abydos," "The Corsair," "Lara," "The Siege of Corinth," "Parisina," and "The Prisoner of Chillon." On the 2d of Jan., 1815, he was married to Miss Isabella Millbanke, only daughter of Sir Ralph Millbanke, afterwards Noel. She was regarded as a great heiress. But, if Byron may be believed, his fortune was but little improved by this marriage. He says, "All

I have ever received or am likely to receive (and that has been twice paid back, too) was £10,000." The union was a very unhappy one, as well on account of Lord Byron's licentious habits as the incompatibility of temper of the two parties.

Lady Byron gave birth to a daughter, Ada, who became afterwards the countess of Lovelace. She was Lord Byron's only legitimate child; he addresses her in "Childe Harold" as "sole daughter of my house and heart."

Not long after the birth of Ada, his wife left him, and, taking the child with her, went to her father's. He left England early in 1816, resolved never again to return to his native land. Passing through Belgium, he visited the field of Waterloo; he subsequently went to Switzerland, and resided near Geneva. Here he wrote the third canto of "Childe Harold." He afterwards abode some time in Venice. He next visited Ravenna, where he formed a *liaison* with the countess of Guiccioli, whose sprightly and imaginative character, no less than her personal beauty, powerfully attracted him. While at Pisa in 1822 he experienced a great sorrow in the tragic death of his friend, the poet Shelley. Early in 1822, Byron, Shelley, and Leigh Hunt were associated in the publication of a journal styled "The Liberal," but Byron and Hunt quarrelled soon after the death of Shelley, and "The Liberal" was discontinued.

While in Italy, Byron wrote several of his most admired poems, including the fourth canto of "Childe Harold," "Mazeppa," "Manfred," "Cain, a Mystery," "Marino Faliero," "The Two Foscari," "Sardanapalus," "Werner," and "Don Juan." He espoused with enthusiasm the cause of Greek independence, and in 1823 passed over from Italy to Cephalonia, where he spent several months. In the early part of 1824 he arrived at Missolonghi. He took, April 9, a severe cold, which caused his death on the 19th of April, 1824.

Byron's poetic genius was of a very high order, but he was more distinguished for the clearness and intensity of his intellect (if we may use this expression) than for its breadth or versatility. It has been said that Brougham's galling article in the "Edinburgh Review" "stung Byron into a poet," but this expression of course implies that he previously possessed the potentiality of genius. But whether the above remark be true or not, it is certain that Byron's intellect partook in a remarkable degree of the character of his emotional nature. It was only under the influence of intense feeling or passion that he could put forth his poetical powers with any success. And hence it is that everything he has written is so strongly colored with his own personal feelings. He was perhaps the most intensely subjective of all the great poets that ever lived. This explains why he had no genius for dramatic composition. He could only represent successfully those characters which resembled his own. His soul was not capacious nor calm enough to reflect without distortion the infinitely varied pictures presented by the comedy and tragedy of human life. But in his own department he has probably never been equalled—certainly never surpassed—by any poet either in ancient or modern times. His two most remarkable characteristics are, first, his power of expressing intense passion, particularly of the darker and fiercer kinds. "Never," says Macaulay, "had any writer so vast a command of the whole eloquence of scorn, misanthropy, and despair." Again, no poet ever displayed a more exquisite taste in the choice of his expressions, or a more admirable art in his manner of presenting to the imagination of his readers any subject, whether of the delightful or of the opposite kind. (See Moore's "Life of Byron;" "Recollections of the Last Days of Shelley and Byron," by E. J. Trelawney, 1858.)

J. Thomas.

Byron (Henry James), an English writer of burlesque dramas, is a lawyer by profession, and has contributed much to "London Fun," of which he was for a time the editor. His principal works are travesties of various popular and standard dramas and operas, but he has produced several comedies, pantomimes, and novels. He has also acquired distinction as an actor in London.

Byron (John), Vice-Admiral, grandfather of the poet and son of the fourth Lord Byron, born at Newstead Nov. 8, 1723, entered the navy, served in Anson's expedition of 1740, served against Louisburg in 1760, circumnavigated the globe (1764–66), and fought D'Estaing off Granada July 6, 1779, in the American war. Died April 10, 1786. He was familiarly known as "Foulweather Jack," and was a popular hero.

Bys'sus [Gr. *βύσσος*], a Greek word which occurs in the New Testament, and is translated "fine linen." (See Luke xvi. 19; Rev. xviii. 12.) Some suppose it was cotton or silk.

Byssus, a name given to a bundle of silky or shining, semi-transparent, horny filaments by which many bivalve mollusks attach themselves to rocks or other fixed substances. These filaments are secreted by a gland at the base of the foot of the animal. They are guided to their place by the foot, and expand into a sort of disk at the point of attachment. An example of the byssus may be seen in common mussels. The *Pinna* of the Mediterranean produces long and strong filaments of a silky lustre, which can be woven into cloth. This cloth is highly prized, but the *Pinna* has become so rare that it cannot be produced in large quantities.

By'ström (Johan Nils), a Swedish sculptor, born at Philippstad Dec. 18, 1783, studied at Rome. He became a resident of Stockholm in 1816. Among his works are "Pandora Combing her Hair," a statue of Linnæus, and a colossal statue of Gustavus Adolphus. Died at Rome Mar. 13, 1848.

Byttneria'ceæ [from *Byttneria*, one of the genera], a natural order of exogenous plants, closely allied to the Malvaceæ, consists of trees and shrubs, mostly tropical or sub-tropical, with simple leaves and monadelphous stamens, the anthers of which are turned inward. The order comprises nearly 400 species, many of which have beautiful flowers. Florida has a few unimportant species. The *Guazuma ulmifolia*, a native of Brazil, bears an edible fruit. The fibrous bark of this and other species is used in the manufacture of cordage. The *Abroma augustum*, an East Indian tree, is commended as worthy of cultivation for its fibre, which is beautiful, fine, and strong, and is produced in abundance. This tree bears beautiful purple flowers. Among the other species of the order is *Theobroma Cacao*, from the seeds of which chocolate and cacao are obtained. Several others are useful, as yielding fibres, fruits, or medicines.

Byz'antine, or **Bezant** [from Byzantium, the old name of Constantinople], in numismatics, is a term applied to a coin of the Byzantine empire. These coins were of gold, silver, and bronze, bore impressions distinct from the earlier Roman coins, and were copied in several countries. They were current in the north of Europe, and even in India. The silver bezant was worth about 10*s.* sterling. The gold bezant was worth at one time fifteen pounds sterling.

Byzantine Art, in ornament and architecture, is that symbolic system which originated at Byzantium (or Constantinople), and was developed by the Greek artists out of the Christian symbolism. During the Dark Ages, after Rome had been conquered by the Goths and Huns, and the fine arts had been nearly extinguished by the influx of barbarism, many Western artists retired to Constantinople, and founded a school by which the traditions of antique and classical art were cherished, and modified by whatever was new and peculiar in the Christian system. The great features of this style are the circle and dome, the round arch, and all the various details of form which are derived from the lily, the cross, the nimbus, and other symbols. Among the finest specimens of this style of architecture are the mosque of St. Sophia at Constantinople and the church of St. Mark at Venice.

At the Renaissance, Italian and other artists in every department derived from living Greek or Byzantine artists the technical rudiments of their respective arts, which could scarcely have been learned by a mere examination of ancient works. The school of Byzantine art, as modified by Christian ideas and symbols, commenced in the time of Justinian, and continued to flourish until 1200 or later. After it had been banished from Constantinople by the Turks, who captured that city in 1453, it was cherished by the Greek Church to form the basis of artistic life in Russia.

Byzantine Empire, also called the **Eastern** or **Greek Empire,** is the name of a former empire of Europe which came into existence in 395 A. D., upon the death of the Roman emperor Theodosius the Great, who divided his empire between his two sons, Arcadius and Honorius. While the latter received the western half as his portion, Arcadius became ruler of the Eastern empire, then comprising Syria, Asia Minor, Pontus, Egypt, Thrace, Mœsia, Macedonia, Crete, and Greece, with the capital, Constantinople. The history of the Byzantine empire extends from 395 A. D. to 1453. During the reign of Arcadius ambitious politicians wielded an unlimited power, and oppressed the people to satisfy their rapacity. Arcadius was followed by his seven-year-old son, Theodosius II. (408–450), for whom a prefect ruled with wisdom and strength. In 415 he took his sister Pulcheria as co-regent, who from that time took charge of the entire administration. Peace and prosperity reigned during Theodosius's rule, and were only interrupted by a short war with Persia in 422, which led to the acquisition of a part of Armenia. But peace with Attila, king of the Huns, could only be purchased by large tracts of land on the Danube and large sums of money. Upon the death

of Theodosius he was succeeded by his sister Pulcheria. She married the senator Marcianus, who reigned until 457. Under Justinian (527–565), who became famous by his legislation and the victories of his generals, Belisarius and Narses, the Byzantine empire gained great influence and power among the other nations, while in the interior the dissensions of the parties were quelled effectually. Under the nephew and successor of Justinian (Justinus II., 565–578) the empire suffered from invasions of the Lombards and Persians. In 718, Leo III. ascended the throne, and continued to sustain himself in spite of the contest concerning the worship of images, which continued for over a century, and the attacks of the Arabs. He died in 741. He conquered Phrygia from the Arabs, but lost the last remnant of territory in Italy. Basilius I. Macedo, the founder of the Macedonian dynasty, ascended the throne in 867. He introduced reforms in all branches of the administration, and revised the laws of Justinian. He was succeeded by his son, Leo VI., who called upon the Turks to aid him against the Saracens, and thus opened the way for the Turks. After the extinction of the Macedonian dynasty, in 1057, Isaac Comnenus was raised to the throne by the unanimous vote of the army. He introduced many reforms, and entered a monastery in 1059. Among his successors, Alexius I., who began to rule in 1081, was the most important. He increased the area of the empire considerably. The dynasty of the Comnenian emperors continued to rule until 1204. In 1204, Constantinople was taken by the French and Venetians (called the Latins), who then became masters of the whole empire. They divided it into four parts, giving the first, with the capital, to Baldwin, count of Flanders, who was made emperor, and whom the other participants in the expedition recognized as their sovereign. The Venetians received as their share the countries bordering on the Adriatic and Ægean Seas, a part of the Morea, together with several islands; Bonifacius, count of Montferrat, Macedonia and part of Greece; dukedoms, countships, principalities, etc. were established at various places; while a number of Greek princes maintained their independence. Under Theodorus Lascaris, who had been elected emperor at Constantinople, an empire was formed at Nicæa (Nice), and in Trebizond Alexius Comnenus ruled with absolute power. One of his successors, John Comnenus, became emperor of Trebizond. Neither Baldwin nor his successors could do anything to avert the impending ruin. Baldwin was taken prisoner by the Bulgarians, and died in 1206. His brother Henry ruled bravely and wisely till 1216, when the empire became a prey to utter anarchy.

The dynasty of the Palæologi began with Michael VIII. Palæologus, who, by the help of the Genoese, captured Constantinople in 1261. Michael, the first of the Palæologi, was an able prince, but offended both clergy and people by an attempt to unite the Greek and Latin churches. Andronicus III., a great-grandson of Michael, became emperor in 1328. During his reign the Turks took Nicæa and Nicomedia and devastated the European coasts. In the reign of his son, Johannes V., the Turks began to gain ground in Europe, and in 1362 Sultan Amurath had made Adrianople his capital. Under the following rulers the empire rapidly declined, giving way more and more to the advancing forces of Turks, until on May 28, 1453, with the capture of Constantinople by Mohammed II. and the death of Constantine XI., the Byzantine empire came to an end, and the Turkish rule was, after centuries of fierce warfare, firmly established in Europe. A. J. Schem.

Byzantine Historians are those Greek writers who have treated of the history of the Byzantine empire. They are divided into three classes: 1. Those whose works refer exclusively to Byzantine history; 2. Those who professedly occupy themselves with universal history, but at the same time treat Byzantine history at disproportionate length; 3. Those who write on Byzantine customs, antiquities, architecture, etc. The most interesting and instructive among them are those who confine their attention to a limited number of years, and to the events which transpired under their own observation or in which they took part. The Byzantine historians flourished from about 300 A. D. to 1453, the date of the capture of their city by the Turks. Among the most eminent of these very numerous writers we may reckon Procopius (about 500–565 A. D.), an excellent historian; Acropolita (1220–83), whose chronicle is but short; Cinnamus (twelfth century), an able but strongly prejudiced writer; Georgius Pachymeres (1242–1310), one of the best of the later Byzantines; Anna Comnena (1083–1148), a romantic and untrustworthy writer; Nicephorus Bryennius (died 1137), the husband of the last named, and one of the most accomplished historians of his age; the emperor John (V.) Cantacuzenus (about 1300–55), a very partial historian; Nicephorus the patriarch (758–828), one of the best of all; Nicetas (twelfth and thirteenth centuries), whose writings are highly valued; and Nicholas Chalcocondyles (who was alive late in the fifteenth century), one of the latest, treating of the history both of his own people and of the Turks. Of some of these, and of others, there are many writings yet unpublished, so that this field of historical research contains much fresh, if perhaps unproductive, soil. As a class, the Byzantine writers are turgid and bombastic, full of prejudice and conceit, and the proper estimation of their value requires much labor and discrimination. The principal Byzantine histories were collected and published at Paris in 36 vols., with Latin translations, under the editorship of P. Philippe Labbé, a Jesuit, and his successors (1648–1711). This magnificent collection was reprinted, with additions, at Venice (1727–33). In 1828, Niebuhr, assisted by Bekker, the two Dindorfs, Schopen, Meinecke, and Lachmann, began a new "Corpus Scriptorum Historiæ Byzantinæ," the forty-eighth volume of which appeared in 1855.

Byzantine Rescension is a Greek text of the New Testament, which was used in Constantinople after it became a metropolitan see in the Eastern Church. It is cited by several Greek Fathers, and was used as the basis of the old Slavic version. It corresponded quite nearly with the present "received text" and with many existing MSS.

Byzan'tium [Gr. Βυζάντιον], an ancient Greek city, situated on the Thracian Bosporus and on the site of the modern Constantinople. It is said to have been founded by a colony of Megarians in 667 B. C. It increased rapidly, and soon became an important commercial city. Few cities could boast so magnificent a position. Commanding, as it did, the two shores of both Europe and Asia, at the same time secure and advantageously situated for commerce, it had at its command the choicest gifts of nature and the most charming scenery. Byzantium was very anciently the site of extensive tunny-fisheries, the fishes visiting the port periodically in immense numbers, as they do at the present day. The fish were salted and exported. The name "Golden Horn," still applied to a part of the channel of Constantinople, was probably derived from the great revenue flowing from this fishery. The Byzantines also levied a considerable toll on vessels passing from sea to sea. The levying of these tolls once involved them in war with the Rhodians. They also derived much profit from their rich corn-fields, not far from the city. On the S. it was bathed by the Propontis (Sea of Mármora), and on the N. by the waters of the Golden Horn. Having been captured by a general of Darius Hystaspis, it was liberated by Pausanias about 478 B. C. A few years later Byzantium became an ally or tributary of Athens, against which it revolted in 440 B. C. It was besieged and taken by Alcibiades in 408. Philip of Macedon besieged it in 340 B. C., but Demosthenes persuaded the Athenians to send a fleet which compelled him to raise the siege. This repulse of Philip was one of the proudest feats of the great orator, who often recurs to it in his speech "On the Crown." Byzantium was for ages especially exposed to the attacks of barbarians, but the long wars did not beget much valor in the people. From their great commercial prosperity they early became corrupted, and they were proverbially indolent, cowardly, and luxurious. Byzantium was probably either a kingdom or the seat of a tyrannus; afterwards it became an aristocracy, and later a crude democracy.

The Byzantians suffered much from the predatory incursions of the Gauls, and being unable to resist them in battle, agreed about 279 B. C. to pay them an annual tribute. This city supported Pescennius Niger in the civil war against Septimius Severus, who captured it in 196 A. D., after a brave resistance of three years' duration. He then reduced it almost to ruin, but afterwards relented and partially restored it. The name of *Augusta Antonina* was given to it in his time. The Greek Christians ascribe the foundation of the Byzantine Church to the labors of Saint Andrew the apostle, but this statement is unsupported by trustworthy evidence. It is, however, certain that soon after 200 A. D. there were numerous Christians in the city. In 330 A. D. Constantine the Great selected this place as the capital of his empire, and founded a new city, to which he gave the name of New Rome. This city of Constantine was much more extensive than Byzantium, which occupied in all probability only the most eastern of the seven hills on which the modern capital is built. (See Constantinople.)

Revised by C. W. Greene.

Bzo'vius, or **Bzowski** (Abraham), a Roman Catholic historian, born at Proczovic, Poland, in 1597. He was a zealous Dominican prior, and was called to Rome by Pius V., where he wrote nine volumes of a continuation of the "Annals of Baronius," an "Ecclesiastical History" (3 vols. folio, 1817), and other historical works, besides numerous sermons and biographies of several popes. Died Jan. 31, 1637.

C.

C, the third letter of most European alphabets, is in English either a palatal mute, with the sound of *k*, a sound which it has before *a*, *o*, *u*, and the consonants (except *h*), unless marked with the cedilla, thus, *ç*, as in *façade* and other words, mostly from the French and Portuguese. When marked with the cedilla, or when occurring before *e*, *i*, or *y*, it has the sibilant sound of *s*. *Ch* has (1) the Spanish sound, as in the word *church*; (2) the French sound (equivalent to *sh*, the German *sch*), as in *chaise;* and (3) the hard sound, equivalent to *k*, as in *chord*. The German guttural *ch* is never used in English. C in music is the first note of the natural diatonic scale. C in Latin stood for 100, and also for the prænomen Caius. In chemistry it is the symbol of carbon; and *c. c.* is an abbreviation for "cubic centimètre."

Caa'ing Whale [Scottish for "driving whale"], the *Globiocephalus deductor*, a large porpoise which abounds in large herds on the coasts of Great Britain, North America, Iceland, etc. It takes its name from the fact that when one of the herd is stranded, the rest all follow it, sometimes as many as 100 at once rushing to their own destruction in this manner. They are the source of rich booty to fishermen. Other species of the genus inhabit the Mediterranean, the Pacific, etc. It is one of the "bottle-head" whales of North America, and is most frequently caught in Scotland.

Cabal', a secret council formed under the reign of Charles II. (1667), consisted of the following members: Sir Thomas, afterwards Lord Clifford, Lord Arlington, the duke of Buckingham, Lord Ashley, afterwards earl of Shaftesbury, and the earl of Lauderdale. The Cabal was dissolved in 1674. The prevailing opinion, that the word was formed from the initials of the names of its members, is perhaps erroneous, as it had been used before to denote a secret cabinet, and is said to be derived from the Hebrew (see CABBALA), but this accidental association of the initial letters may have suggested this particular application of the name.

Cabanel (ALEXANDRE), a French historical painter, born at Montpellier Sept. 28, 1823, obtained a first medal at the Paris exhibition of 1855. Among his masterpieces we may name "The Florentine Poet" and "The Lost Paradise."

Cabanis (PIERRE JEAN GEORGE), an eminent French philosopher and physician, born near Saintes (Corrèze) June 5, 1757. He was a friend and political partisan of Mirabeau, whom he attended in his last illness. He was admitted into the Institute in 1796, and became professor of medicine in Paris in 1797. In the early part of his life he was an atheist. His principal work is the "Relations between the Physical System and Mental Faculties of Man" ("Rapports du Physique et du Moral de l'Homme," 1802), in which he maintained that "the brain secretes thought as the liver secretes bile." But he afterwards changed his opinions in this respect, and adopted theistic views. Died May 5, 1808.

Cabar'rus, a county in S. W. Central North Carolina. Area, 350 square miles. It is drained by branches of Rocky River. The surface is hilly; the soil in some parts is fertile. Gold and copper are found. Cattle, grain, cotton, and wool are the chief products. It is intersected by the North Carolina R. R. Capital, Concord. Pop. 11,954.

Cab'bage [Fr. *chou;* Ger. *Kohl*], a variety of the *Brassica oleracea*, a plant of the order Cruciferæ. Other varieties of this species are the broccoli, cauliflower, and kale. Cabbages are of many sorts, which are divided into common and Savoy cabbages, the latter being characterized by wrinkled leaves. They are also divided into early and late cabbages, which differ remarkably in their periods of growth. The cabbage requires a good soil and clean culture, and furnishes not only a cheap, palatable food for mankind, but is very useful as a forage plant. It may be remarked that although boiled cabbage occasionally acts as a poison on certain peculiar constitutions, uncooked cabbage in the form of a salad is generally very wholesome.

Cab'bage But'terfly, a name common to several species of butterfly, the larvæ of which devour the leaves of plants of the cabbage tribe, and are popularly known as cabbage worms. They belong mostly to the genus *Pieris*, are natives of Europe, but have been introduced into America. The excessive multiplication of these insects is generally prevented by small birds, which devour them and their caterpillars, and by insects of the ichneumon tribe, which lay their eggs in the caterpillars, that their own larvæ may feed on them.

Cabbage-Fly (*Anthomyia brassicæ*), a fly of the same family with the house-fly, flesh-fly, etc., of which the maggots often do injury to the roots of cabbages. It is of the same genus with the turnip-fly, onion-fly, etc. They are found in both continents, and are very destructive.

Cabbage-Palm, or **Cabbage Tree,** a name given to several species of palm, the great terminal bud of which is eaten like cabbage. The cabbage-palm of the West Indies is the *Areca oleracea*, which grows to the height of 130 feet or more. (See ARECA.) The palmetto (*Chamærops palmetto*) is sometimes called cabbage-palm.

Cab'bala [Heb., קבלה, "that which is received" (by tradition), from קבל (*kibbel*), to "receive"], an ancient Jewish system of religious philosophy or theosophy. Those who have studied the subject with the greatest care are not fully agreed among themselves as to its origin and character. The Cabbala attempted to explain the nature of God and of the universe. Some of the late writers of this school taught that God has neither will, intention, desire, nor action, but that ten *Sephiroth*, or intelligences, emanated from God. The first *Sephirah* is called the *Inscrutable Height* (from which the second was derived, as the third from the second, and so on). The names of the other intelligences in order are wisdom, intellect, grace, power, beauty, firmness, splendor, foundation, and authority. As God became active in these *Sephiroth*, so these become externally manifested in the universe.

The psychology of the Cabbala teaches the doctrine of the transmigration of souls, but as the literature of the system is immense, and its teachings recondite and often puerile, it is difficult and unnecessary to state exactly what this philosophy taught. It probably influenced and was influenced by the Greek philosophy known as Neo-Platonism. According to Hallam, the Cabbala originated with the Alexandrian Jews near the beginning of the Christian era.

Cab'balists, the name given to those Jews who believe in the Cabbala, or traditional interpretation of the Pentateuch, said to have been received by Moses from God on Mount Sinai. (See preceding article.)

Cab'ell, a county in the W. part of West Virginia. Area, 448 square miles. It is bounded on the N. W. by the Ohio River, and intersected by the Guyandotte. The surface is hilly or uneven; the soil is partly fertile. Tobacco and grain are the chief products. Capital, Cabell Court-house. It is intersected by the Chesapeake and Ohio R. R. Pop. 6429.

Cabell Court-house. See BARBOURSVILLE.

Cabet (ÉTIENNE), a French socialist, born at Dijon Jan. 2, 1788. He was a radical democrat in politics and a leader of the Carbonari. In 1842 he published a romantic work called "Travels in Icaria," which was very popular among the workingmen of Paris. He planted in 1840 a colony on the communist system in Texas, from which he and his followers removed in 1849 to Nauvoo, Ill., after that town had been deserted by the Mormons. Died Nov. 9, 1856. His colony was broken up in 1857.

Cabe'za del Buey, a town of Spain, in the province of Badajos, on the northern slope of the Sierra Pedregoso, 112 miles by rail E. S. E. of Badajos. It has manufactures of linen and woollen goods. Pop. 6294.

Cab'in [Fr. *cabane*], a small room or enclosure; a cottage, small house, or rudely-built temporary residence. Also an apartment in a ship or steamboat for the use of the officers and passengers. These apartments in steamboats are often called saloons. In ships of war the rooms of the admirals and captains are called state cabins, and are fitted up with much elegance, with a gallery or balcony projecting at the stern. All the cabins of a ship of war are enclosed by light panelling, so that the partitions are readily removed when it is necessary to clear the decks for action.

Cabin Creek, a township of Kanawha co., West Va. Pop. 2437.

Cab'inet, a closet; a small room or retired apartment, a private room in which consultations are held; a piece of furniture, consisting of a chest or box with drawers and

doors; a small room used as a repository for works of art, antiquities, medals, specimens of natural history, etc. The term cabinet is also applied to a collection of such objects. A cabinet picture is a painting suitable for a cabinet or small room. These are generally of small dimensions and finely finished.

Cabinet, in politics, a select council of an executive chief; a committee of ministers or the governing council of a country, so called from the cabinet or apartment in which the ruler assembles his privy council. In the U. S. the cabinet is composed of seven heads of departments—namely, secretary of state, secretary of the treasury, secretary of war, secretary of the navy, secretary of the interior, postmaster-general, and attorney-general. In England a variable number of ministers (usually about fifteen) are by official usage members of the cabinet, and are called cabinet ministers, but they have no recognized legal character. The names of the members who compose the cabinet are never officially announced; no record is kept of its resolutions or meetings, nor has its existence been recognized by any act of Parliament. The British cabinet always includes the first lord of the treasury (who is prime minister), the lord chancellor, the chancellor of the exchequer, the president of the council, and five secretaries of state.

Cabin Run, a township of Mineral co., West Va. Pop. 822.

Cabi'ri, or **Cabeiri** [Gr. Κάβειροι], ancient divinities worshipped in Samothrace, Phœnicia, Greece, and other countries. The myth of the Cabiri is obscure, and not well explained by ancient writers. Their worship was performed with much solemnity and mystery.

Ca'ble, a rope or a chain, employed on shipboard to suspend and retain the anchors, and for other purposes. The name is often applied to wire ropes, especially such as are used in suspension bridges, to submarine telegraph lines, etc. Rope cables are made of the best hemp, of manilla, or of coir. The circumference varies from about three inches to twenty-six. A number of yarns are twisted to form a *lissum;* three lissums, twisted in an opposite direction, form a *plain-laid* or *strand;* and three or four strands twisted in the direction of the yarns in a lissum form a *cable.* The strength of a cable eighteen inches in circumference is about sixty tons; the strength varies according to the cube of the diameter. On shipboard, cables receive the names of *chief* cables, *bower* cables, etc., according to the anchor to which they are attached. Hempen cables are now generally spun by the wonderfully ingenious machinery invented by the late Prof. Treadwell of Harvard College.

Chain cables consist of links, the length of each of which is about six diameters of the iron of which it is made, and the breadth about three and a half diameters. The stay-pins, to strengthen the links, are of cast-iron. The sizes of chain cables are denoted by the thickness of the rod-iron for the links.

The defects in chain cables as compared with those of hemp are the greater weight, the less elasticity, and the greater care required in management; but the advantages more than counterbalance these defects, and have led to the very extensive adoption of chain cables. Wire cables are sometimes used for the standing rigging of ships.

Cable City, a post-township of Deer Lodge co., Mon. Pop. 280.

Cabochiens, a number of journeymen butchers who took their name from their leader, Jean Caboche. They were partisans of John, duke of Burgundy, whose cause they maintained against the Armagnacs. Their outrages in Paris caused the citizens to rise against them in 1418.

Ca'bo Fri'o (*i. e.* "cool cape"), a city and seaport of Brazil, is on the Atlantic, near a cape of its own name, 75 miles N. E. of Rio Janeiro. It is at the S. E. extremity of Lake Araruama.

Cabomba'ceæ [from *Cabomba*, one of the genera], a small natural order of exogenous aquatic plants, allied to the Nympheaceæ. They are indigenous in North and South America and Australia, and are distinguished by their distinct carpels, abundant albumen in the seeds, and the absence of a torus. They are included in the order Nymphaceæ by some botanists.

Cabool', or **Cabul,** a fortified city of Afghanistan, on the Cabool River, here crossed by three bridges, is 80 miles N. N. E. of Ghuznee, and is elevated about 6400 feet above the level of the sea; lat. 34° 30′ N., lon. 69° 6′ E. The climate in winter is very severe. The citadel, called Bala Hissar, includes the palace of the khan, the government offices, royal gardens, and numerous dwellings. The streets are narrow; the houses are two or three stories high, and have flat roofs. The public buildings are not remarkable. Cabool is widely celebrated for the variety and excellent quality of its fruits, apples, pears, pomegranates, grapes, etc. It has an extensive trade as an entrepôt between India and Toorkistan. The people of Cabool are Mohammedans and a mixture of several races. Under the emperor Bâber, Cabool was the capital of the Mogul empire. It was taken by Tamerlane about 1400, and by Nâdir Shah in 1738. The British captured it in 1839, but in Jan., 1842, the Afghans revolted and massacred the British army. Pop. estimated at 60,000.

Caboose, or **Camboose** [Ger. *Kabuse*], a name of the kitchen or cook-room in a merchant-ship. In coasting-vessels the term is applied to a portable cast-iron cooking-stove on the deck.

Cab'ot, a post-township of Washington co., Vt. It has manufactures of lumber, woollens, etc. Pop. 1279.

Cabot (George), a statesman and Federalist, born at Salem, Mass., Dec. 3, 1752. He was elected to the Senate of the U. S. in 1790, and was president of the Hartford Convention in 1814. He was distinguished for sound judgment, and was well versed in political economy. Died April 18, 1823.

Cabot (John), a foreign merchant of Bristol who after the discovery of America by Columbus was placed in command of a fleet of five vessels, which sailed in the spring of 1497. They reached the coast of Newfoundland June 24, and were in England again in August.

Cabot (Sebastian), an eminent navigator, a son of the preceding, was born in Bristol about 1477. He commanded a ship in his father's voyage, and in 1499 conducted another expedition, and visited the Gulf of Mexico. Having entered the service of Ferdinand, king of Spain, in 1512, he commanded an expedition which examined the coasts of Brazil and La Plata in 1526. He returned to England in 1548, after which a pension was granted to him by Edward VI. Died about 1557. (See Richard Biddle, "Memoir of Sebastian Cabot," 1831.)

Ca'bra (anc. *Ægabrum*), a town of Spain, in the province of Córdova, 30 miles S. S. E. of the city of Córdova. It has a college, a cathedral, a convent, and manufactures of linens, hats, soap, bricks, etc. The neighboring region is volcanic, and produces excellent wine. Pop. 11,500.

Cabral' (Pedro Alvarez), a Portuguese navigator noted as the discoverer of Brazil, was born about 1460. He commanded a fleet which Emmanuel of Portugal sent to the East Indies in 1500. Having been carried out of his course by a westward ocean current, he discovered Brazil in April, 1500. He afterwards pursued his voyage to Calicut, and made conquests in India, where he founded the first Portuguese factory. He returned to Lisbon, where he arrived in June, 1501. Died about 1526.

Cabre'ra (Ramon), a Spanish general and Carlist, noted for his cruelty, was born at Tortosa Aug. 31, 1810. In the civil war which began about 1834 he fought for Don Carlos against the Christinos, and became a leader of guerillas. He gained a victory at Buñol in Feb., 1837, and took Valencia, but he was driven out of Spain by Espartero in 1840, and retired to France. He returned in 1848 and renewed the contest, but he was defeated and went into exile in Jan., 1849.

Caca'o, the fruit of the *Theobroma Cacao,* a tree of tropical America, of the order Byttneriaceæ. Chocolate is made of the roasted oily kernels of the cacao nut, which also yields cacao butter. This tree should not be confounded with the cocoanut tree nor with the coca of Peru.

Cacao Butter, a fixed oil, hard and solid at ordinary temperatures, which is yielded in large quantities by the fruit of *Theobroma Cacao.* It is extracted by heat and pressure. It contains a very large proportion of stearin, with some olein and palmitin. It is largely used in the preparation of cosmetics, and is especially useful in pharmacy in the preparation of suppositories. The mafurra tallow which is brought from Madagascar closely resembles the above in chemical and physical properties. Cacao butter is not to be confounded with cocoa butter, which is a kind of palm oil, used in the manufacture of soap.

Cac'apon, or **Great Cacapon,** a river of West Virginia, rises near the S. extremity of Hardy county, flows nearly north-eastward through Hampshire and Morgan counties, and enters the Potomac. Length, about 140 miles.

Cacapon, a township of Morgan co., West Va. P. 958.

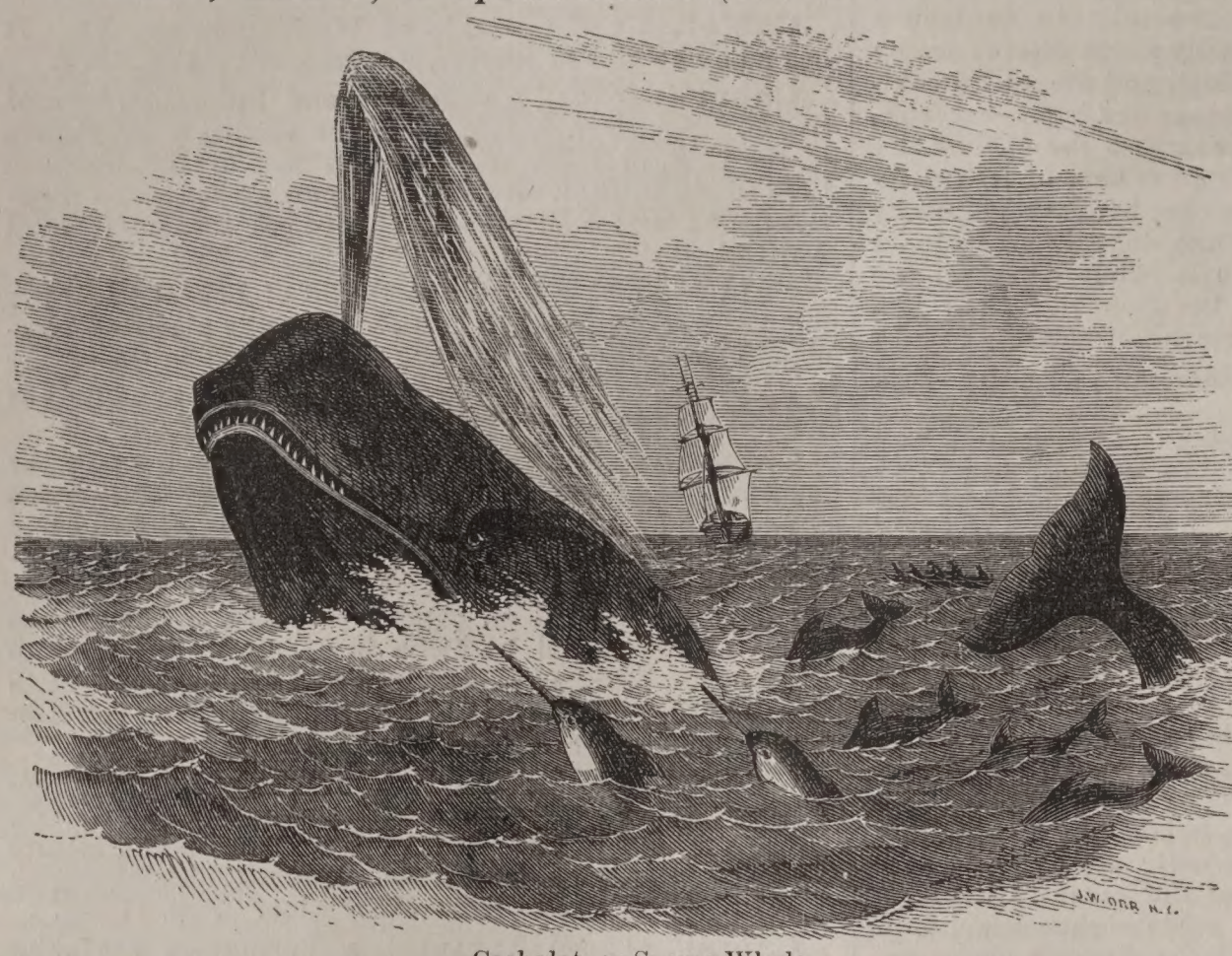
Cacca'mo, a town of Sicily, in the province of Palermo, about 18 miles W. of the city of Palermo. P. 7233.

Cáceres, a province of Spain, bounded on the N. by Salamanca, on the E. by Avila, Toledo, and Ciudad Real, on the S. by Badajoz, and on the W. by Portugal. Area, 8014 square miles. It is intersected by the river Tagus. The surface is diversified by several ranges of mountains. Capital, Cáceres. Pop. 303,700.

Cáceres (anc. *Castra Cæcilia*), a town of Spain, capital of the above province, is situated on high ground 25 miles W. by N. from Trujillo. It contains an old castle, an episcopal palace, several convents and hospitals, a theatre, a Jesuits' college, and a bull-ring which is one of the largest in Spain. It has manufactures of linens, woollen goods, hats, soap, wine, etc. Interesting Roman and Moorish antiquities are found here. Pop. 13,466.

Cá'ceres, Nue'va (*i. e.* "New Cáceres"), a town of the Philippine Islands, in Luzon, on its S. E. coast, 184 miles S. or S. E. of Manila, a seat of a bishop. Pop. including suburbs, about 12,000.

Cachalot, kasha-lot, or **Sperm Whale** (*Catodon*



Cachalot, or Sperm Whale.

macrocephalus), one of the largest of all the Cetacea, is much sought after, not only on account of the oil, but also for the spermaceti and ambergris which it yields. Unlike the right-whale family, it affords no whalebone. The cachalot belongs to the family of Cetacea called Physeteridæ, of which there are three or four existing genera. The common cachalot has a very wide geographical range. It may be said to inhabit all seas, except those near the poles, although most abundant in the southern hemisphere. The cachalot sometimes attains the length of seventy or eighty feet. The head is enormous, forming about one-half of the entire bulk of the animal, and more than one-third of the length. The body tapers from the head to the tail. The color is dark gray, nearly black on the upper parts, but lighter beneath. Old males, or bull-whales, have a large gray spot on the front of the head. The muzzle is obtuse, as if suddenly cut off in front. In a protuberance on the front surface of the head is the blow-hole, which is single, and situated a little on the left side. The mouth is very large; and the throat, unlike that of the Greenland whale, is sufficiently wide to admit the body of a man. The upper jaw projects beyond the lower, and is destitute of teeth and whalebone, though rudimentary teeth exist within the gums; the lower jaw has from twenty to twenty-five teeth on each side, according to the age of the animal. The teeth are conical, projecting about two inches from the gum. The lower jaw is very narrow, the two branches being in contact throughout the greater part of its length. The cervical vertebræ, except the first, are consolidated into one. The dorsal fin is represented by a protuberance halfway between the neck and the tail; and these parts are seen above water in the ordinary swimming of the animal. The pectoral fins are small, and seem scarcely to aid in progression, which is accomplished by the large and powerful tail-fin, which is very broad, and is divided into two lobes, called flukes.

The head is in part occupied by a cartilaginous cavity in front of and above the skull, called by whalers *the case*, which is the chief receptacle for spermaceti. This substance being light, the animal in swimming raises its head above the surface of the water, which it also does even when at rest. The case frequently holds as much as ten large barrels of spermaceti. It is divided into compartments communicating with each other. The substance which it contains is a semi-fluid, but hardens on cooling; it consists of spermaceti and oil; the oil is separated by draining and squeezing. What purpose the spermaceti serves is not well known, except that of giving buoyancy to the fore part of the body; it is distinct from the brain, which is small. Cavities filled with spermaceti are distributed over the body and through the external fat or blubber. The blubber of the cachalot is not nearly equal in thickness to that of the Greenland whale, being only from eight to fourteen inches thick. It is removed from the body in great strips, and is heated in large pots, the skin of the whale serving for fuel. The *junk*, a thick elastic mass which lies immediately under the case, yields also considerable oil.

Squids and cuttle-fishes appear to be its chief food. Its herds are called *schools* or *pods* by whalers. Five hundred or more have been seen in a single herd. Large herds generally consist of females, with a few males; herds of young males also occur; solitary individuals are almost always old males. Terrible conflicts take place among the males, and it is not unusual to find the lower jaw dislocated or broken in consequence of these fights.

REVISED BY C. W. GREENE.

Cache, kåsh, a French word signifying a "hiding-place," is a name given in the Western U. S. to subterranean holes in which travellers and trappers hide provisions and other property, to preserve them from the depredations of the Indians and wild animals. They are carefully covered with sods, and the surface is made closely to resemble the surrounding earth, care being taken to leave no trace of the work.

Cache, a county of Utah, bordering on Idaho. Area, about 2000 square miles. It is intersected by Bear River, and bounded on the W. by the Wasatch range of mountains. The soil is partly productive. Some wool is raised. Capital, Logan. Pop. 8229.

Cache, a township of Green co. Ark. Pop. 766.

Cache, a township of Jackson co., Ark. Pop. 377.

Cache, a township of Lawrence co., Ark. Pop. 128.

Cache, a township of Monroe co., Ark. Pop. 1452.

Cache Creek, a post-township of Yolo co., Cal. Pop. 3067.

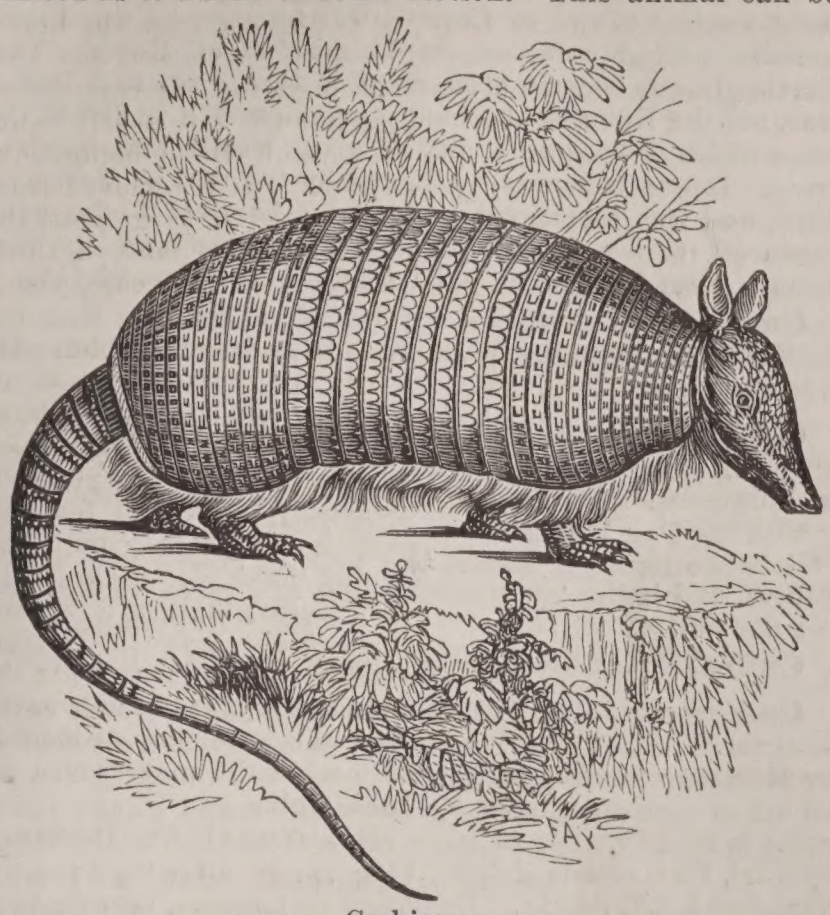
Cache River of Arkansas rises near the N. E. extremity of the State. It flows in a S. S. W. direction, and enters the White River near Clarendon. Length, about 150 miles.

Cachet, Lettres de, lêtr dẹh kå'shå', was a term applied in France under the old régime to letters or orders signed with the private seal of the king and used as instruments of despotic power. Before the seventeenth century they were not often employed, but in the reign of Louis XIV. they became very common. Many persons were arrested by such warrants and imprisoned without trial in the eighteenth century. It is stated that in the reign of Louis XV. lettres de cachet were sold by one of the mistresses of the king to any one who would pay money for them. About twenty-two of these warrants were issued against the famous Mirabeau. They were abolished in Jan., 1790.

Cachex'ia [from the Gr. καχεξία, a "bad habit" of body], in medical practice, a diseased or abnormal condition of the body. Cullen having given extensive circulation to the word as indicating a large group of chronic diseases, cachexia has come to be chiefly employed with reference to conditions in which the general nutrition of the body is at fault. Thus, cancerous cachexia indicates the state of ill-health associated with the growth of cancer in various parts of the body; gouty cachexia, the state of the general system in gout, as opposed to the mere local attack. All cachexias are associated with constitutional diseases, and most of them tend to become hereditary. The term is nearly synonymous with dyscrasia.

Cachica'ma, called also **Tatou-pe'ba,** the "nine-banded armadillo" (*Dasypus novem-cinctus*), an edentate mammal found from Texas to Paraguay. It is sixteen inches long, and has a long tail. Both body and tail are covered with plates, those of the tail in horny rings, and

those of the body (in part) disposed in nine bands, so united as to admit of some motion. This animal can be



Cachicama.

readily tamed. Its food is principally ants, but it also is fond of vegetables and of carrion.

Cach'olong, a beautiful mineral, sometimes called **Pearl Opal,** is a milk-white variety of opal, nearly allied to hydrophane. It is opaque and pearly, has a conchoidal fracture, and sometimes has a reddish tinge. The name is derived from the river Cach, in Bucharia, where it was first discovered.

Cac'odyle, or **Arsendimethyl,** is an extremely poisonous organic substance containing carbon, hydrogen, and arsenic (C_4H_6As). It has been proposed to employ the oxide of cacodyle as a deadly agent in war. This compound, known as *Cadet's fuming liquor,* has the property of taking fire spontaneously when exposed to the air, evolving abundant deadly fumes. Thus, a shell filled with it would, on bursting, cover the deck of a man-of-war with a liquid which would take fire of its own accord, and would likewise spread death by its fumes. The term *cacodyle* is from the Greek κακός, "bad," ὄζω, to "smell," and ὕλη, "matter" or "stuff."

Cacou'na, a post-village and parish of Temiscouata co., province of Quebec (Canada), on the S. E. bank of the St. Lawrence, is the terminus of the Rivière du Loup division of the Grand Trunk Railway, and is a place of summer resort for salt-water bathing and for fishing and hunting. Pop. of village in 1871, 641; of parish, 1335.

Cacta'ceæ (named from *Cactus,* one of the genera), a natural order of exogenous plants remarkable for their gay and large flowers, and for the grotesque forms of some of the species, which are nearly all succulent. It comprises about 500 species, all natives of America, growing in hot climates and arid situations, to which they are well adapted by their thick skins, almost impervious to moisture. The so-called cactuses of the Old World are often Euphorbiaceæ; or, if they are really cactaceous, they are naturalized plants. The Cactaceæ for the most part are easily naturalized, and hence some species abound in Southern Europe and Asia. Most of them are leafless, and instead of leaves have clusters of hairs or prickles. Among their characteristic features are the numerous undistinguishable sepals and petals, the scattered stamens, the confluent styles, and the exalbuminous seeds. Their curious and vastly diversified forms constitute a remarkable feature in the vegetation of the warm regions of America. In some species, as the melon cactus or melon thistle, the stem swells into a globe. Other species have long creeping or trailing stems. This order comprises the night-blooming cereus, the *Opuntia* or prickly pear, which bears an edible fruit, and the nopal, on which the cochineal insect feeds. The stems of the Cactaceæ abound in a juice which affords a wholesome and valuable beverage to men and animals in the long dry season which prevails where they grow. Many species occur as epiphytes on forest trees. The Cactaceæ are extensively cultivated in greenhouses and hothouses in England and the U. S. Most of them are easily propagated by branches, which are allowed to dry a little before they are planted. Numerous species are natives of the U. S., especially in the extreme S. W.

Cactus. See CACTACEÆ.

Ca'cus, in classic mythology, an Italian robber and giant, said to be a son of Vulcan. He stole some oxen of Hercules, and dragged them by their tails into the cave which he usually inhabited, so that they could not be discovered by their tracks. Hercules, however, heard them bellow, and killed Cacus.*

Cadam'ba, or **Kudum'ba,** the wood of several species of *Nauclea,* a genus of East Indian trees of the order Cinchonaceæ. The *Nauclea Cadamba* is a noble tree which bears orange-colored fragrant flowers, and is highly prized for its shade. The wood, which is yellow, soft, and fine-grained, is useful for several purposes. The wood of *Nauclea cordifolia,* a large tree which grows in the mountains of Hindostan, is used for flooring-planks.

Ca'da Mos'to, da (LUIGI), a navigator, born at Venice in 1432. Having entered the service of Prince Henry of Portugal, he explored in 1455–56 the W. coast of Africa as far as the mouth of the Gambia. He wrote a narrative of his voyage (1507). Died in 1464.

Cadas'tral Sur'vey [Fr. *cadastre*], a term recently adopted by the English and other European nations, is used to denote a survey on a large scale. A cadastral as opposed to a topographical map may be defined as one on which the objects represented agree as to their relative positions and dimensions with the objects on the face of the country, while a topographical map, usually drawn on a small scale, exaggerates the dimensions of houses and the width of roads and streams, for the sake of distinctness. The usual scale of cadastral maps is nearly twenty-five inches to a mile.

Caddett's Pass, a township of Lewis and Clarke co., Mon. Pop. 71.

Cad'dice-fly, or **Caddis-fly** (*Phryganeidæ*), a family of insects of the order Neuroptera, considered by Mr. Kirby a distinct order, Trichoptera. The caddice-flies differ in important particulars from the other neuropterous insects, and exhibit points of intimate resemblance to the Lepidoptera. These insects are most interesting, however, on account of their larvæ, of which the larger kinds are the caddice-worms or cad-bait of British anglers. The species of caddice-fly are numerous in the U. S., and they are more so in the north than in the south of Europe. The angler looks for cad-bait about the edges of streams and under stones, or on the stalks of aquatic plants. As a bait, the caddice is almost as deadly as the May-fly, and more so, in running streams, than the ordinary worm.

Cad'do, a parish which forms the N. W. extremity of Louisiana, has an area of 1200 square miles. It is bounded on the E. by the Red River and the Great Raft, and is partly occupied by Caddo and Soda lakes, which are navigable and communicate with Red River. Cotton and corn are the chief crops. It is intersected by the Texas and Pacific R. R. Capital, Shreveport. Pop. 21,714.

Caddo, a township of Clarke co., Ark. Pop. 2717.

Caddo, a township of Montgomery co., Ark. Pop. 234.

Cade (JACK), an Irishman who called himself MORTIMER, the leader of an insurrection which broke out in Kent in June, 1450. He marched with about 16,000 insurgents towards London, and encamped on Blackheath. Among their motives for rebellion was oppressive taxation. Having defeated a royal army which was sent against him, he entered London, in which he maintained strict order, but he caused Lord Say, a royal favorite, to be put to death. Many of his followers were induced to disperse by a promise of pardon. Cade fled, but was pursued and killed July 11, 1450.

Cade, Oil of [Fr. *huile de cade*], a thin tar distilled from the wood of *Juniperus oxycedrus,* is used in the medical treatment of diseases of the skin.

Ca'dence [from the Lat. *cado,* to "fall"], a fall, a decline, a state of sinking; a fall of the voice at the end of a sentence; a sound or tone. In horsemanship, an equal measure or proportion observed by a horse in all his motions.

CADENCE, in music, the conclusion of a song or of some parts in certain places of the piece, dividing it into so many numbers or periods. The cadence takes place when the parts fall on a note or chord naturally expected by the ear, just as a period completes the sense in a discourse. A cadence is either perfect or imperfect—the former, when it consists of two notes sung after each other, or by degrees conjoined in each of the two parts, the harmony of the fifth preceding that of the key-note; and it is called perfect, because it satisfies the ear. It is imperfect when the key-note with its harmony precedes that of the fifth without its

* It has been suggested that this name is from the Greek κακός, "bad," having been given in contradistinction to Evander (Εὔανδρος), *i. e.* "good man." (See VIRGIL, "Æneid," book viii.)

added seventh. A cadence is said to be broken or interrupted when the bass rises a major or minor second, instead of falling a fifth.

Ca'dency [from the Lat. *cado*, to "fall" or "descend"], in heraldry, the marks by which the shields of the younger members of families are distinguished from those of the elder and from each other. No distinction is usually made between marks of cadency, differences, distinctions, or brisures, though the last term is used to include not only differences in general, but also the so-called abatements. There is convenience in the practice followed in Scotland, of appropriating the marks of cadency to distinguishing the sons from the father, and from each other during the father's lifetime, and of adopting other distinctions after the death of their father. Another mode of differencing the shields of brothers in early times was by changing the tinctures, but this is now regarded as too extensive a change.

The differences used by the British royal family are found in some peerages. The label of the prince of Wales is plain, whilst those of the other princes and princesses are charged with crosses, fleurs-de-lis, hearts, or other figures for the sake of distinction. Labels, crescents, mullets, martlets, etc. are the usual marks of cadency, and the rules governing their use are complicated and fanciful.

Caden'za, in music, an ornamental succession of notes introduced at pleasure by the performer at the end of a phrase.

Cadet' (fem. *cadette*), [a French word signifying "younger," "junior"]. Cadet as a noun means younger son, younger brother: a military officer who is junior to another is a cadet in respect to him. The term is also applied in France and other countries to a student of the art of war and military science. The students of the Military Academy at West Point, N. Y., are called cadets, as are those of the Naval Academy at Annapolis. There are also medical cadets, recognized as of a distinct rank in the U. S. "Army Regulations."

Cadet, Naval, is the lowest grade of officer in the British navy. Cadets enter the naval service at twelve to fourteen years of age. Every captain on being appointed to a ship has a right to nominate a cadet, and every flag-officer can nominate two on receiving his flag. The others are nominated by the first lord of the admiralty, subject to the regulations for competitive examination. They first pass three months on a training-ship in port to learn the rudiments of seamanship, and are thence transferred to sea-going ships. After the cadet has served fifteen months in a sea-going ship he is eligible for promotion to the rank of midshipman.

Ca'di, an Arabic word signifying judge or jurist, is the title of an inferior judge among the Turks and other Mohammedan nations. They must be chosen from the ranks of the priesthood, as the precepts of the Koran constitute their code of laws.

Ca'dion, a township of Van Buren co., Ark. Pop. 587.

Cā'diz, a province which forms the S. W. extremity of Spain, is bounded on the N. by Seville, on the E. by Málaga, on the S. by the Strait of Gibraltar, and on the W. by the Atlantic and Huelva. Area, 2809 square miles. The soil is fertile, and the province contains large forests. Capital, Cadiz. Pop. 417,346.

Cadiz (anc. *Gades*), an important city and seaport of Spain, capital of the above province, is situated on the Atlantic Ocean and on the N. W. extremity of the isle of Leon, about 94 miles by rail S. by W. of Seville; lat. 36° 32′ N., lon. 6° 18′ W. Its site is a long narrow isthmus or tongue of land surrounded by water on three sides, having on the N. and N. E. an inlet called the Bay of Cadiz, which forms a good and capacious harbor. It is accessible from the mainland only by a tongue of land, which in some places is only 200 yards wide, and is strongly defended by several forts. The houses, built of white freestone, present a bright appearance from the sea. The streets are narrow, but well paved and regular. Among the principal edifices are two cathedrals, an old and a new, the lighthouse of San Sebastian, 172 feet high, and a hospital called Casa de Misericordia. The convent of the Capuchins possesses two excellent pictures by Murillo. The city contains two theatres, a medical school, a botanic garden, and an academy of fine arts. Cadiz is one of the first commercial cities of Spain, but is probably inferior to Barcelona in the value of its imports. The chief articles of export are sherry wine, olive oil, salt, metals, and fruits. Among the imports are tobacco, sugar, coffee, hides, indigo, cotton, dyewoods, fish, and coal. The commerce of this port is much less extensive than it was formerly. Cadiz is the southern terminus of a railway which connects it with Seville. The isle of Leon is separated from the mainland by a narrow channel, which is crossed by a bridge. Here are manufactures of mantillas, fans, glass, soap, cotton and silk stuffs, hats, etc. Cadiz, which is one of the most ancient towns of Europe, was founded by the Phœnicians, probably before the foundation of Rome. The Carthaginians became masters of it during the first Punic war, but the Romans obtained possession of it in 206 B. C., after which it became a city of great wealth and importance. It was taken and pillaged by the earl of Essex in 1596, and was blockaded in 1656 by Admiral Blake, who captured two rich galleons. It was besieged by the French from Feb., 1810, until Aug., 1812. Pop. 61,750.

Cadiz, a post-village, capital of Trigg co., Ky., on Little River, 230 miles W. S. W. of Frankfort. It has one weekly paper. Pop. 680.

Cadiz, a post-village, capital of Harrison co., O., is about 22 miles N. W. of Wheeling, and 120 miles E. N. E. of Columbus. A branch railroad, six miles long, connects it with the Pan Handle route from Pittsburg to Cincinnati. It has two national banks, two private banks, two newspapers, and is the commercial centre of a great wool-growing district. Pop. 1639. Ed. "Republican."

Cadiz, a post-township of Green co., Wis. Pop. 1401.

Cad'mium, a white metal having a slight bluish cast, discovered in 1817 by Stromeyer, and also independently by Hermann, named from *cadmia fossilis*, a name given to an ore of zinc mentioned by Dioscorides and Pliny. The name is said by some to have come from that of Cadmus. Symbol, Cd; atomic weight, 112; sp. gr. after fusion, 8.6; hammered, 8.7, nearly. Cadmium is lustrous, takes a fine polish, and possesses a fibrous fracture. It tarnishes very slightly in the air, and only burns at a high heat. It is more tenacious than tin, though, like that metal, a bar of it gives a "cry" when bent. It melts below 260°, and volatilizes at about 360° C. It occurs in nature as the sulphide "greenockite" at Bishopstown, Renfrewshire, Scotland, and incidentally as a constituent of various zinc ores, as the carbonate, silicate, etc., as well as the sulphide in several localities. The zinc flowers in the flues of zinc-reducing furnaces contain even as much as 11 per cent. of cadmium. Commercial English zinc often contains cadmium. The metal is readily soluble in nitric acid, and but slightly so in other acids, except at a boiling temperature. It forms two oxides, CdO and Cd_2O, of which the former (the monoxide) is the basis of a series of salts. The suboxide is greenish. The monoxide varies in color from brownish to blackish yellow, according to the mode of preparation. It is infusible and not volatile. Its salts are mostly colorless, and when taken into the stomach act as emetics; their taste is disagreeably metallic. The cadmium chloride forms double salts with hydrochlorates of many of the alkaloids. Cadmium is prepared by collecting the first products of distillation from the zinc ores containing it, and subjecting them, when mixed with charcoal, to two successive distillations in iron retorts at a low red heat. Instead of the last distillation, solution in acid and purification in the wet way is resorted to. The demand for cadmium is, however, so small that the working up of the furnace products containing considerable amounts of that metal has been discontinued in some places in Silesia. It is necessary, however, to remove it from the zinc, as it renders that metal brittle when 3 per cent. or more is present. Cadmium finds its chief application in the arts in the form of the sulphide, which has an intense yellow color, and is used for coloring soaps, and in paints, etc. It is known as cadmium yellow and jaune brillant. The iodide and bromide of cadmium are used in photography. The metal is used for forming a fusible with lead, tin, and bismuth for filling teeth. This element is recognized in the laboratory by being the only one which affords a yellow sulphide, insoluble in ammonium sulphide.

C. F. Chandler.

Cad'mus [Gr. Κάδμος], in classical mythology, was a son of Agenor, king of Sidon, and a brother of Europa. After Europa had been carried off by Jupiter, Cadmus was tent in quest of her. According to tradition, he founded she city of Thebes, in Bœotia, and invented sixteen letters of the Greek alphabet, or introduced them from Phœnicia into Greece.

Cad'ron, a post-township of Conway co., Ark. P. 502.

Cadu'ceus, in classic mythology, the symbol and winged staff of Mercury (Hermes), to whom it was presented by Apollo. From this staff Mercury derived the surname of *Caducifer*. The term caduceus was also applied by the ancients to a staff or rod of laurel or olive which was carried by ambassadors and heralds as a symbol of peace. It had the figures of two serpents twisted around it. Among the moderns the caduceus is used as an emblem of commerce, over which Mercury was supposed to preside. Still more frequently it is the emblem of health and of the healing art.

Cadwal'ader (Gen. George), a native of Philadelphia, where he practised law, served as a brigadier-general in the Mexican war, and was brevetted major-general for services at Chapultepec. He was major-general of Pennsylvania troops 1861–62, and in 1862 became major-general of U. S. volunteers.

Cadwalader, or **Cadwallader** (John), an American general, born in Philadelphia in 1743. He served as a brigadier-general at the battles of Princeton, Brandywine, and Monmouth (1778). Died Feb. 10, 1786.

Ca'dy (Albemarle), an American officer, born in 1807 in New Hampshire, graduated at West Point 1829, and Oct. 20, 1863, colonel Eighth U. S. Infantry. He served chiefly at frontier posts 1829–61; on engineer duty 1834–37; in Florida war 1838–42; in war with Mexico 1846–48, engaged at Vera Cruz, Cerro Gordo, Amazoque, San Antonio, Churubusco, and Molino del Rey (wounded and brevet major); on Sioux expedition 1855, engaged at Blue Waters, Dak.; and superintendent of general recruiting 1857–59. In the civil war was in command of the district of Oregon 1861–62; acting inspector-general of the department of the Pacific 1863, and in command of draft rendezvous at New Haven, Conn., 1864–65. Brevet brigadier-general U. S. A. Mar. 13, 1865, for long and faithful services; and retired from active service May 18, 1864.

George W. Cullum, U. S. A.

Cæcil'ia [from the Lat. *cæcus*, "blind"], a genus of batrachians formerly placed among serpents on account of their form, although breathing by gills when young and undergoing a metamorphosis. The body is almost cylindrical, the head small, the eyes very small, and in some species imperfect or wanting; on which account the name was given. The skin is viscous and annularly wrinkled, appearing naked, although minute scales are found between its wrinkles. The vertebræ are articulated as in fishes and not as in serpents, and the skull is united to the first vertebra by two condyles. The ribs are short. The original genus has been subdivided, now forming a family, Cæciliadæ. The species are inhabitants of marshy or moist places, chiefly in Africa and South America.

Cæcil'ius Sta'tius, a Roman comic poet of high reputation, was a native of Milan and a friend of Ennius. He wrote nearly forty comedies, of which only small fragments are extant. Died in 168 B. C. He was regarded by ancient critics as a comic poet of the first rank.

Cæci'na Alie'nus (Aulus), or **A. Licinius Cæcina,** a Roman general who entered the service of Vitellius in 68 A. D., and obtained command of an army. In the year 69, Cæcina and Valens defeated the army of Otho at Bedriacum. He soon deserted Vitellius, and became an officer of Vespasian, but he formed a conspiracy against the latter, and was put to death in 79 A. D.

Cæ'cum [the neuter gender of the Lat. adjective *cæ'cus*, "blind"], literally, the "blind intestine," applied to a sac or branch of an intestine having only one opening. In man there is only one cæcum, not very large, at the extremity of the small intestine, where it terminates in the colon. In the herbivorous Mammalia it is comparatively large, and secretes an acid fluid, perhaps supplementing the gastric juice in completing digestion. The cæcum is wanting in bats and in the bear and weasel families. Birds have two cæca, generally long and capacious in those that are omnivorous or granivorous. Reptiles seldom have a cæcum. Fishes have the cæca attached to the intestine at its uppermost part. The number of these is extremely various; sometimes there are only two, and sometimes more than a hundred. The number is different even in nearly allied species. In some fishes, as the cod, the cæca divide into smaller branches. The intestinal canal of some of the infusoria is furnished throughout its length with cæca.

Cæd'mon, an ancient Anglo-Saxon poet, was originally a cowherd attached to the monastery of Whitby, in England. He afterwards became a monk, and composed, professedly under divine inspiration, poems on religious subjects, which are thought to have suggested to Milton his "Paradise Lost." Some of these are the oldest extant specimens of Anglo-Saxon metrical composition. Died about 680 A. D.

Cæ'lius Aurelia'nus, an eminent medical writer who belonged to the sect of Methodici, was born at Sicca, in Africa. He is supposed to have lived between 100 and 300 A. D. He wrote two Latin works, "De Morbis Chronicis" ("On Chronic Diseases"), and "De Morbis Acutis" ("On Acute Diseases"), which are extant and are highly prized.

Caen [Lat. *Cadomus* or *Cadomum*], a city of France, capital of the department of Calvados, is situated on the river Orne, 10 miles from the sea, and 148 miles by rail W. N. W. from Paris; lat. 49° 11′ 12″ N., lon. 0° 21′ W. It was formerly the capital of Lower Normandy. It has wide, regular, and clean streets, several fine public squares, and many noble specimens of ancient Norman architecture. The houses are generally built of an excellent cream-colored freestone which is quarried in the vicinity, and is called Caen Stone (which see). Caen is connected with Paris by a railway, and with the sea by a navigable canal. Among its remarkable edifices are the cathedral of St. Etienne, founded by William the Conqueror; the church of La Trinité, or Abbaye-aux-Dames, founded by Queen Matilda in the eleventh century; and the church of St. Pierre, the tower or spire of which is much admired. The castle, commenced by William the Conqueror and finished by his son, Henry I., was partially destroyed in 1793. This city contains a large public library, a museum, a botanic garden, a custom-house, the hôtel of the prefecture, an academy of arts and sciences, a medical school, a normal school, and an asylum for deaf-mutes. It has manufactures of lace, crape, linens, cotton fabrics, porcelain, cutlery, flannel, hats, and gloves. Caen has long been celebrated for its manufacture of Angora and woollen gloves. This was an important place as early as 912, when it became subject to the Normans. It was the residence of William, duke of Normandy, before he conquered England. In 1346 it was taken and pillaged by Edward III. of England. The poet Malherbe and Auber the composer were born here. Pop. 41,564.

Caen Stone, a fine cream-colored or light yellow building-stone which is exported from Caen to England and the U. S. It is an oolite or sandstone, and is easily worked. It was extensively used in England in the fifteenth and sixteenth centuries. The cathedrals of Winchester and Canterbury are built of this stone.

Caerle'on (anc. *Isca Silurum*), an old town of England, in Monmouthshire, on the river Usk, here crossed by a bridge, 2 miles N. E. of Newport. It is supposed to have been the capital of the Roman province *Britannia Secunda* (modern Wales), and, according to tradition, was a residence of King Arthur. Many Roman antiquities and relics have been found here, as baths, altars, statues, coins, inscriptions, and aqueducts. Here is also a ruined amphitheatre 222 feet in length. Pop. 1281.

Caernarvon, a township of Berks co., Pa. Pop. 927.

Caernarvon, a township of Lancaster co., Pa. Pop. 1566.

Cæsalpin'ia, a genus of trees of the order Leguminosæ, the type of the sub-order Cæsalpinieæ. This sub-order is characterized by irregular flowers which are not papilionaceous, and comprises numerous species, some of which have purgative properties, as senna (*Cassia*). Others bear edible fruits, as the tamarind and the carob. Among the products of the sub-order are Copaiba, Log-wood, and Camwood (which see). They are mostly natives of warm climates. The genus *Cesalpinia* has pinnate or bi-pinnate leaves, and ten stamens in each flower. The red dyewood called sappan-wood is obtained from the *Cæsalpinia Sappan*. Other species yield the Brazil-wood of commerce. Among the species of the above sub-order that grow wild in the U. S. are the *Cercis Canadensis*, the *Gleditschia triancanthos* and *monosperma* (honey locust).

Cæ'sar, the cognomen of a patrician Roman family of the Julia gens, which was one of the most ancient in the state, and claimed a descent from Iulus, a son of Æneas. The first member of the family mentioned in history is Sextus Julius Cæsar, who was prætor in 208 B. C. After the family had become extinct (at the death of Nero), the succeeding emperors of Rome assumed the name of Cæsar as a title. It subsequently became the title of the heir-presumptive to the throne.

Cæ'sar (Julius), or, more fully, **Caius Julius Cæsar,** one of the most remarkable men that ever lived, was born on the 12th of July, 100 B. C. He belonged to the Julian tribe (gens Julia), which boasted its descent from Iulus (or Julus), the son of Æneas. In 83 Cæsar divorced Cossutia and married Cornelia, the daughter of Cinna. This act offended Sulla (then in the height of his power), who commanded Cæsar to divorce the latter. On his refusal to obey he was proscribed. He was under the necessity of concealing himself for a time, but on the intercession of mutual and influential friends the dictator reluctantly pardoned him. Sulla is reported to have said to some of his friends who interceded for him, that Cæsar would some day be the ruin of the aristocracy, adding, "In that young man there are many Mariuses." (Marius had proved himself the most formidable enemy that the aristocratic party had ever encountered.) Soon after, Cæsar went to Asia Minor, and served with distinction in the Roman army. Afterwards, while on his journey to Rhodes with a view to study oratory under Apollonius Molo, he

was taken by pirates. While detained by them he often threatened (in jest, as they supposed) that he would put them to death when he got his liberty. The required ransom having at last been paid, he manned some vessels, pursued and took the pirates, and crucified them all.

Having returned to Rome, he became a candidate for popular honors. He was elected quæstor in 68 B. C. This same year his wife Cornelia died, and the next he married Pompeia, a relative of Pompey the Great and a granddaughter of Sulla. This was done to ingratiate himself with Pompey, who, since the death of Sulla, was all-powerful at Rome. He was made an ædile in 65 B. C., and sought to render himself popular by the exhibition of public games which are said to have surpassed in magnificence everything of the kind ever before seen at Rome. He was elected pontifex maximus in 63 B. C. In 63 occurred the conspiracy of Catiline, and many suspected Cæsar of being accessory to it. When Cicero asked the opinion of the senate respecting the punishment which ought to be inflicted on the conspirators, all the senators gave judgment in favor of their death, until it came to Cæsar's turn to speak. He maintained that it was contrary to justice and highly inexpedient to put men of their rank to death without a full trial. His argument had great weight with the senators. But Cato followed in a powerful speech, accusing Cæsar of complicity with the conspirators, and carried a large majority of the senate with him. The conspirators were condemned to death; Cæsar himself narrowly escaped.

In 62 B. C. he was made prætor, and was sent the next year as proprætor to Spain, where he greatly distinguished himself both as a magistrate and general, and was saluted as *imperator* by the army. In 60 he was elected consul, L. Calpurnius Bibulus being his colleague. One of his leading measures was to propose an agrarian law, by which a considerable tract of the public land was to be divided among the poorer citizens, particularly those who had a number of children. This measure was carried, in spite of the opposition of Bibulus. With a view to strengthen his interest with Pompey, Cæsar gave him in marriage his daughter Julia, though she had already been affianced to S. Cæpio. He formed in 60 B. C., with Pompey and Crassus, a secret alliance known in history as the first triumvirate. Supported by such powerful influence, Cæsar was enabled to carry through the senate whatever laws or measures he pleased. The government of Cisalpine and Transalpine Gaul having been decreed to him for five years, he left Rome in the spring (of 58 B. C.), and before the ensuing winter he had ended successfully two important wars in Transalpine Gaul—one with the Helvetii, a nation inhabiting what is now Switzerland; the other with Ariovistus, the king of a powerful German nation who had a few years before crossed the Rhine and established themselves in Gaul. In the next seven years he not only subdued the greater part of Gaul, but crossed over (55 B. C.) into Britain, defeated Cassivelaunus, one of the kings of that country, took hostages, and fixed the tribute the Britons were to pay to Rome.

Cæsar's daughter Julia, whom he had given in marriage to Pompey, had died in 54 B. C. The triumvir Crassus had been killed in the war with the Parthians. A coolness gradually arose between Cæsar and Pompey. The latter appears to have become jealous of the new favorite of fortune, since all his own exploits, splendid and unparalleled as they were at the time they were performed, had been eclipsed by the more recent and more glorious achievements of his great rival. Pompey had succeeded to the position of Sulla as the leader of the aristocracy, while Cæsar's policy had been from the first to cultivate the favor of the common people. The two parties became more and more hostile to each other. Some of the more violent of the patricians were determined to crush Cæsar at all hazards. It was at length proposed in the senate, in 50 B. C., by Marcellus, that Cæsar, the Gallic war having been brought to an end, should lay down his command and disband his army; but Curio, a tribune whom Cæsar had gained over to his interests, vetoed the decision of the senate; Cæsar, however, was deprived of two of his legions. But desirous, by the moderation of his conduct, to fasten upon his opponents the responsibility and odium of beginning the quarrel, he sent a proposition to the senate that he would agree to dismiss his army if Pompey would do the same. But the senate even refused to consider the proposal. It was afterwards decreed that Cæsar should disband his army by a certain day or be considered a public enemy. This was virtually a declaration of war, for no one could believe that Cæsar would thus tamely abandon the contest. On learning the decision of the senate, Cæsar assembled his army, and in an eloquent harangue inspired them with his own indignant spirit. Accompanied by only 5000 infantry and 300 cavalry (for his other troops were beyond the Alps), he advanced to the river Rubicon, which then marked the limit between Italy and Cisalpine Gaul. After revolving in his mind for some time his perilous enterprise, he at length exclaimed, "The die is cast!" He instantly crossed the river, and proceeded with rapid strides through Ariminum, Arretium, and Ancona towards Rome. Every town seemed ready to open its gates as he approached. In the general consternation, Pompey, with the two consuls and many of the senators, fled from the city towards Brundisium, closely pursued by Cæsar. He passed over into Greece, whither Cæsar, for want of ships, was unable to follow him. Cæsar soon after set out for Spain, where Afranius and Petreius, Pompey's lieutenants, had a formidable army under their command. Having compelled them to sue for and accept peace on his own terms, and captured Massilia (Marseilles), he returned to Rome, whence he proceeded to Brundisium. After some delay he evaded the vigilance of Pompey's fleet, and succeeded in transporting his army into Greece. In his first engagement with Pompey, near Dyrrhachium, Cæsar was worsted, and was obliged to retreat. He withdrew, pursued by Pompey, to Thessaly. At length the two armies met on the plains of Pharsalia. Cæsar had only 22,000 foot-soldiers and 1000 horse, while the army of Pompey amounted to 45,000 infantry and 7000 horse. The latter sustained a disastrous defeat; 15,000 men fell in battle, and upwards of 24,000 were taken prisoners. Pompey escaped to Egypt, where he was basely assassinated. (See POMPEY.) The power of his enemies having been utterly broken in Greece, Cæsar followed Pompey to Egypt, where he was detained for a time, captivated by the charms of Cleopatra, whose pretensions to the throne of Egypt he supported against those of her brother Ptolemy. He next marched against Pharnaces, a son of Mithridates the Great, king of Pontus. Having defeated and destroyed the army of Pharnaces, he wrote to the senate his celebrated letter of three words only—*Veni, vidi, vici.* He next turned his arms against the Pompeians in Africa, who were under the command of Cato and Scipio, whose forces were defeated and almost exterminated at Thapsus, not far from Carthage (46 B. C.). Cæsar returned to Italy the undisputed master of the Roman world. But he had scarcely time to celebrate his recent triumphs when word was brought that the sons of Pompey, Cneius and Sextus, had collected a formidable army in Spain. Cæsar advanced to meet them with his usual celerity. After a severe and bloody battle he gained a complete victory. He said afterwards to his friends that he had often fought for victory, but then only for his life.

Having thus risen to power on the ruins of the republic, Cæsar appears sincerely to have sought to promote the true interests of his country. He procured the enactment of several salutary laws. One of the subjects which claimed his earnest attention was the regulation of the calendar. His improvements have been adopted, with some modifications, by all the European nations. (See CALENDAR.) He is said to have contemplated the preparation of a complete digest of the Roman laws, the draining of the Pontine Marshes, and other important public works, when death put an end to all his schemes. The senate had conferred upon him the title imperator (whence our "emperor"), for life; he was also made dictator and præfectus morum ("chief or ruler of manners or customs"), and pontifex maximus. To these dignities he wished to add that of king, that he might transmit his power to his successor. Having no legitimate children of his own, he had adopted his grand-nephew, Octavius, the son of Attia, who was a daughter of Cæsar's sister Julia. On a certain public festival, the Lupercalia (sometimes called in English the Lupercal), Antony, a zealous adherent of Cæsar, publicly offered him a regal crown, but he, perceiving that it displeased the people, refused it, but very reluctantly, according to some accounts. From the time of Tarquin the Proud the name of king had always been particularly odious to Romans of every class. Cæsar's evident desire to be a king stimulated the hostility of his enemies, who were encouraged to hope that the taking of his life would be approved even by many of the people. A conspiracy in which sixty persons were implicated was formed. Cæsar had many warnings, it is said, of his approaching fate, but as he scorned to live in constant terror of death, he disregarded all the admonitions of his friends, saying it was better to die at once than to suffer the anguish of death many times by constantly fearing it. It had been planned that when Cæsar came into the senate on the ides of March, Cimber, one of the conspirators, should present a petition to him, and that while the paper was being read the others should crowd around, as if very anxious that Cimber should obtain his request, and make an attack upon their victim all at once. At first Cæsar resisted with great spirit, but when he perceived the number of his enemies he resigned himself to his fate, and, wrapping his toga about him, fell at

the foot of Pompey's statue, the base of which was bathed in Cæsar's blood. One account states that he resolutely defended himself until he saw the dagger of M. Brutus among those of the other conspirators, when, exclaiming "Thou too, Brutus!" he yielded without any further struggle. He was assassinated 44 B. C., in the fifty-sixth year of his age. In person, Cæsar was tall and of a commanding presence. His constitution was naturally delicate, but by exercise and exposure he became so hardy that none of his soldiers could better bear the fatigues and privations incident to a military life. He was sometimes, though rarely, subject to attacks of epilepsy.

As a general, Cæsar was probably superior in genius to every other commander of whom history makes mention, excepting, perhaps, Hannibal alone. (See HANNIBAL.) In the fertility of his resources, indeed, he appears to have surpassed all other generals that ever lived. It has been said that Napoleon taught his enemies how to conquer him, but Cæsar's enemies never learned how to conquer him, because he had not a mere system of tactics, but a new stratagem for every new emergency. But he was not only a great general, but a pre-eminent statesman, and the greatest orator of his age except Cicero. Cæsar was also distinguished as a historian; he wrote the first seven books of the commentaries treating of the Gallic war, and three books relating to the civil war. His style is remarkable for ease, clearness, and simplicity.

Referring to those remarkable men in history who have compelled "nations unaccustomed to control" to bow obedient to their will, Macaulay observes: "In this class three men stand pre-eminent—Cæsar, Cromwell, and Bonaparte; the highest place in this remarkable triumvirate belongs undoubtedly to Cæsar. He united the talents of Bonaparte to those of Cromwell, and he possessed also what neither Cromwell nor Bonaparte possessed—learning, taste, wit, eloquence, the sentiments and manners of an accomplished gentleman." WILLIAM JACOBS.

Cæsare'a [Gr. Καισαρεία; anciently called *Turris Stratonis*], an ancient city and seaport of Palestine, now in ruins, was situated on the Mediterranean, about 37 miles N. of Jaffa, and 55 miles N. N. W. of Jerusalem. It was founded by Herod the Great (22 B. C.), who erected here several magnificent edifices, and protected its port by a semicircular mole, which is said to have been one of the most wonderful works of antiquity. Cæsarea was the scene of several events recorded in the book of Acts. (See Acts, chaps. x., xxiii., xxv.) It was taken by the crusaders in 1101. The site is now covered with shapeless ruins.

Cæsarean Operation. See HYSTEROTOMY.

Cæsare'a Philip'pi, or **Pa'neas,** an ancient town of Palestine, situated about 20 miles N. of the Sea of Galilee and 45 miles W. S. W. of Damascus. It is mentioned in Matthew xvi. 13. This site is now occupied by the village of Banias, in which some ancient ruins are visible.

Cæsar's Creek, a township of Greene co., O. Pop. 1114.

Cæ'sium (symbol Cs; atomic weight, 133), an alkali metal discovered with the spectroscope by Bunsen and Kirchoff in 1860 in the water of some saline springs in Germany. The salt spring of Dürkheim contains 0.17 parts of the chloride in 1,000,000. The hot spring of Wheal Clifford was found to contain 0.12 grains of the chloride in a gallon. Cæsium is widely diffused in nature, though in exceedingly small quantities; it has been found with rubidium in lepidolite, petalite, and some felspars. The mineral *pollux* of Elba is reported to contain 34 per cent. of cæsium. In its chemical relations cæsium is closely analogous to potassium, though it is more electro-positive, being, indeed, the most electro-positive element known. A fused mass of cæsium chloride may be decomposed by the electric current, but the cæsium rises to the surface and burns with a reddish flame. Bunsen obtained it as an amalgam with mercury, but even in amalgam or alloy it absorbs oxygen with great rapidity. The platin-chloride is more insoluble than that of potassium, and this fact has formed the basis of its separation from that element. The spectrum of cæsium is characterized by two blue lines.
C. F. CHANDLER.

Caffraria. See KAFFRARIA.

Caf'feine, an alkaloid existing in coffee, tea, Paraguay tea (*Ilex Paraguayensis*), and guarana (*Guarana officinalis*, or *Paullinia sorbilis*), called also **Theine** and **Guaranine.** Chemical formula, $C_8H_{10}N_4O_2$. It was discovered by Runge in 1820, and almost simultaneously by Pelletier, Caventou, and Robiquet. Oudry in 1827 extracted an alkaloid from tea which he supposed to be a distinct compound, and called it theine, but in 1838 Jobst proved caffeine and theine to be identical. Stenhouse extracted caffeine or theine from the leaves and twigs of Paraguay tea, while Martius extracted it from the dry pulp of the *Paullinia sorbilis* or guarana, and called it guaranine, but afterwards proved the alkaloid to be identical with caffeine. Van Corput first showed that the leaves of the coffee-plant, as well as the berries, contained caffeine. It probably also exists in other plants.

Caffeine occurs in the raw and also in the roasted coffee, the amount varying with the variety of coffee, the ripeness of the sample, the season of the harvest, etc. The mean amount of caffeine, as determined by Stenhouse in samples of various coffees, was 0.8 to 1 per cent. Domingo coffee contains the least and Martinique coffee the most caffeine. Tea contains somewhat more caffeine than coffee, 2.5 to 3.4 per cent. having been found in hyson tea, 2.2 to 4.1 in gunpowder tea, and 0.9 to 2.1 per cent. in various black teas. (*Stenhouse.*) Mean, about 2 per cent. The Paraguay tea used in several South American countries to prepare the drink known by the natives as "maté" contains 1.1 to 1.2 per cent. of caffeine. The guarana, which is a sort of chocolate, the seeds of the plant being roasted and ground to a paste with water, contains about 5 per cent. of caffeine. Guarana is used by the Brazilians to counteract dysentery, retention of urine, etc. Caffeine is supposed to exist in coffee-berries and tea-leaves, combined with tannic acid and potassa—*i. e.* as potassium caffeo-tannate.

Several methods of extraction have been practised, as precipitating the infusion of tea or coffee with basic lead acetate, freeing from excess of lead salt by hydrosulphuric acid, and then crystallizing out from the solution, precipitating by milk of lime, and extracting the caffeine from the precipitate by water or alcohol. Another process is based on the volatility of the alkaloid.

When pure, caffeine appears in white silky needles having no odor, containing 8.4 per cent. of water of crystallization, which it parts with at 150° C.; sparingly soluble in cold water, and much more so in hot, less soluble in alcohol, and still less so in ether. It acts as a weak base, dissolving in acids, from which it may be crystallized by evaporation. Boiled with fixed caustic alkalies, it decomposes, giving methylamine. Heating with basic hydrate alters it to a stronger base—caffeidine. Boiled with an excess of nitric acid and then evaporated at a gentle heat, it gives a red color, resembling that obtained from murexide, on the addition of ammonia, which is quite characteristic.
C. F. CHANDLER.

Ca'gliari, one of the two provinces into which the island of Sardinia is divided, is bounded on the N. by the province of Sassari, and on the E., S., and W. by the Mediterranean Sea. Area, 5224 square miles. The ground is marshy and the climate unhealthy. The chief articles of export are grain, oil, almonds, sugar, molasses, and wine. Chief town, Cagliari. Pop. in 1871, 392,958.

Cagliari (anc. *Calaris* or *Caralis*), a city of Sardinia, the capital of the above province, is situated on a spacious bay on the S. coast; lat. 39° 13′ N., lon. 9° 7′ E. It has a large and secure harbor, which is defended by several forts, and is the emporium through which nearly all the foreign trade of the island passes. It contains a cathedral, about thirty churches, numerous convents, a public library, several hospitals, an arsenal, a mint, and a college. Here are manufactures of cotton fabrics, soap, gunpowder, leather, and furniture. Among the articles of export are grain, wine, oil, salt, saffron, and rags. Pop. in 1871, 32,834.

Cagliari (PAOLI), an eminent Italian painter of the Venetian school, often called PAUL VERONESE, was born at Verona 1530. He was a pupil of his uncle, Antonio Badile, and he worked successively in Venice, Rome, and other cities of Italy. He was an excellent colorist, and was distinguished by the richness and fertility of his imagination. Among his masterpieces are "The Marriage at Cana" (which is now in the Louvre), "The Calling of Saint Andrew to the Apostleship," "The Rape of Europa," and "The Presentation of the Family of Darius to Alexander." He was a contemporary of Titian. Died April 19, 1588.

Caglios'tro (ALEXANDER), COUNT, a famous Italian charlatan and impostor, whose proper name was GIUSEPPE BALSAMO, was born at Palermo June 2, 1743. He learned a little chemistry and medicine in a monastery, where he was assistant apothecary. Having assumed the title of count and become a Freemason, he travelled through many countries, professing to be a physician and alchemist, and raising money by quackery and other forms of imposture. In some of his adventures he was attended by his wife, and travelled in his own coach in an ostentatious style. About 1780 he visited Paris, where he made many dupes among the higher classes, and revived an old Egyptian Masonic order, of which he became grand kophta. He was patronized by Cardinal de Rohan, with whom he was implicated in the affair of the "diamond necklace," and was impris-

oned in the Bastile in 1785. Having been liberated in 1786, he visited England, where he obtained little success. He afterwards went to Rome, where he was arrested in 1789 as a Freemason, and condemned to imprisonment for life. Died in 1795. (See CARLYLE, "Miscellanies," vol. iv.)

Cagno'la (LUIGI), MARQUIS, an eminent Italian architect, born in Milan June 9, 1762. He became president of the Institute of Milan. His greatest works are two triumphal arches of Milan—viz. the Porto del Ticino (once called Porta di Marengo) and the Arco della Pace or Porta del Sempione, commenced in 1807 and finished about 1837. The latter is built of white marble, and is seventy-eight feet high. Died Aug. 12, 1833.

Cagots [Fr.], a despised race of social outcasts (resembling in some respects the gypsies) who have wandered over parts of France for centuries, and were considered descendants of the Visigoths, whom Clovis nearly annihilated in battle in the fifth century. Before the great French Revolution they were bound by law to wear a peculiar dress, to live apart, to labor in none but menial occupations, and only to enter churches by a special door in each. The Revolution relieved them from all legal disabilities, but could not release them at once from social outlawry and general detestation. Vulgar prejudice still regarded them with abhorrence as foul and depraved, and they were still objects of aversion and loathing. Of late, however, they would seem to have sunk out of sight, being either absorbed into the lower class of the peasants or dwindled to a handful. (See MICHEL, "History of Outcast Races in France and Spain," 1847.)

Cahaw'ba, a river of Alabama, rises in the N. central part of the State, flows in a general S. S. W. direction, and enters the Alabama at Cahawba, in Dallas co. Length, estimated at 150 miles.

Cahawba, a post-village, capital of Dallas co., Ala., is on the Alabama River just below the mouth of the Cahawba, about 8 miles S. W. of Selma. Cotton is shipped here in steamboats. Pop. of Cahawba township, 1859.

Cahier, kȧ'yȧ', a French word signifying primarily a copy-book; a bundle of writing-paper or manuscript; a number of sheets of paper loosely tied together. The term is also applied to the memorial or report of a public assembly or body, and the official instructions of the electors to the deputies who were sent to the States-General in 1789.

Caho'ka, a post-village of Clark co., Mo. It has one weekly newspaper.

Caho'kia, a post-village of St. Clair co., Ill., on the Mississippi River, 10 miles N. W. of Belleville. It was settled by the French about 1683, and its present inhabitants are of French descent, and preserve many of their old ancestral customs. Coal is found in the neighborhood. The name is derived from a tribe of Indians long extinct.

Cahors (anc. *Divona*), a town of France, the capital of the department of Lot, is on the river Lot, 57 miles N. of Toulouse. The site is a rocky eminence enclosed on several sides by the river. It contains a large cathedral, a college, a theatre, a public library, and a normal school; and has manufactures of glass, paper, woollen goods, cotton yarn, etc. Here are remains of a magnificent Roman aqueduct. Pop. 13,846.

Cailliaud (FRÉDÉRIC), a French traveller, born at Nantes Mar. 17, 1787. He discovered in Mount Zabarah, in Egypt, the emerald-mines which were worked in ancient times. He published a "Journey to the Oasis of Thebes" (1821), and "Researches into the Arts and Trades and the Civil and Domestic Customs of the Ancient Egyptians, Nubians, and Ethiopians" (1831). Died May 1, 1869.

Caillié, or **Caillé** (RENÉ), a French traveller, born in Deux-Sèvres Sept. 19, 1799. He gained a prize of 10,000 francs which the Geographical Society of Paris offered to the first traveller who should visit Timbuctoo. He performed the journey from Sierra Leone to Timbuctoo in 1827–28, and published a narrative of his adventures (1830). Died May 25, 1838.

Cain, a township of Fountain co., Ind. Pop. 1802.

Cain'ites, or **Cain'ians,** a Gnostic sect of the second century, who maintained that Cain was superior to Abel, since the latter was easily overcome by him. They also professed reverence for Judas and all the worst characters mentioned in the Bible.

Cainozo'ic, Kainozo'ic, or **Cænozo'ic** [from the Gr. *καινός*, "new," and *ζωός*, "living"], a geological term synonymous with tertiary, and applied by some writers to rocks which were formed after the mesozoic.

Cain's, a township of Marion co., S. C. Pop. 1007.

Caique, a small boat for conveying passengers, used principally on the Bosphorus near Constantinople.

Caird (JOHN), an eloquent Scottish pulpit-orator and Presbyterian, was born at Greenock in 1823. He was ordained a minister in 1845, and became pastor at Errol, Perthshire, in 1849. He gained a wide reputation by a sermon on "Religion in Every Day Life," preached before Queen Victoria in 1855. He removed to Glasgow in 1858.

Cairn, a Celtic word signifying a "heap or pile," is applied to artificial and conical heaps of unhewn stones which are frequently found in Europe on tops of hills. Many cairns are found near the circles of unhewn stone pillars which are sometimes called Druidical. In some cases the heaps of stones are girdled round by large unhewn stones set upright in the ground. It appears that the majority of them were raised as sepulchres and monuments for the dead. Human bones are often found buried under them, together with stone hammers, flint arrow-heads, flint axes, bronze weapons, etc. In Scotland and Ireland occur large cairns called "chambered cairns." The most remarkable of these is at New Grange, on the river Boyne, near Drogheda. It is 400 paces in circumference, about eighty feet high, and is supposed to contain about 180,000 tons of stones. It presents the appearance of a grassy hill partially wooded, but on examination the coating of earth is found to be superficial. An opening accidentally discovered is the external entrance of a gallery leading to a large cruciform chamber containing three granite basins or urns. The sides or walls of the chamber are formed of immense blocks of stone, some of which are covered with carved figures, supposed to be symbolical. In countries where stones are scarce the place of the cairn is supplied by the barrow or earthen mound, which differs from a cairn only in the material of which it is made.

Cairngorm Stones, a name given by jewellers to brown or yellow quartz or rock-crystal found at Cairngorm, in Aberdeenshire, Scotland. The color is produced by a little oxide of iron or manganese. They are used as ornamental stones, and the yellow variety is often called topaz, but it is inferior to the true topaz in hardness and brilliancy.

Cairns (HUGH **McCalmont**), LORD, a distinguished orator and lawyer, born near Belfast, Ireland, in 1819. He was returned to Parliament for Belfast in 1852, and was appointed attorney-general by Lord Derby in 1866. He was lord chancellor of England from Feb., 1868, until December of that year, and was leader of the Conservative party in the House of Lords in 1869.

Caï'ro [called by the Arabs *Al Masr* or *Musr;* also *Al Kahireh* (or *Qahera*), *i. e.* "the victorious"], a famous city, the capital of modern Egypt, is situated in a sandy plain on the right (E.) bank of the Nile, 5 miles S. of the commencement of the Delta; lat. 30° 3′ N., lon. 31° 18′ E. Elevation, forty feet above the level of the sea. The climate is warm, dry, and healthy, with a mean annual temperature of about 72° F. The mean temperature of summer is 85°, and that of winter, 58°. Cairo is bounded on the E. by the ridge of Mokattam, and is surrounded by stone walls with antique battlements. The streets are narrow, crooked, and ill-paved. The houses, which are mostly built of brick, are substantial, have flat roofs, and two or three stories. The city is divided into quarters, which are appropriated to the several religious sects, and occupied respectively by the Mussulmans, the Jews, the Christians, etc. These quarters are separated by gates that are closed at night. Cairo is connected with Alexandria by a railway.

The most remarkable edifices of Cairo, which comprise many of the finest remains of Arabian architecture, are the mosques and minarets; the latter, which are very lofty, and built of alternate layers of red and white stone, are considered the most beautiful in the Levant. The city contains about 350 mosques, one of which, the great mosque of Sultan Tooloon, was built 879 A. D. It exhibits the oldest specimens of the pointed arch. The magnificent mosque of Sultan Hassan has two very high and graceful minarets. The majestic "Tombs of the Caliphs," which are in the environs without the walls, are beautiful specimens of Saracenic architecture. Here are handsome public gardens with groves of orange, citron, and palm trees. Among the remarkable objects in the vicinity of Cairo are the palace of the viceroy, the obelisk of Heliopolis, and the old and celebrated Nilometer, on the island of Rodah, which is a graduated column indicating the height of the inundations of the Nile. The Great Pyramid is about 10 miles S. W. of this city. Cairo has long been celebrated as a seat of Oriental learning and Mohammedan theology. It has a university or college which is attended by nearly 2000 students. Here are numerous iron-foundries, calico-printing works, and extensive manufactures of cotton and silk fabrics. The Arabs are the most numerous of the races which compose the population. Cairo, which is supposed to occupy the site of the ancient *Latopolis*, was founded by the

Arabs about 970 A. D., and was ruled by the Fatimite caliphs until 1171, when Saladin became master of Egypt. It was the capital of the sultans of Egypt until it was captured by the Turks in 1518. Pop. in 1871, 353,851.

Cairo, kā′ro, a river-port of Illinois, capital of Alexander county, situated at the southern extremity of the State, upon the point formed by the junction of the Ohio and Mississippi rivers, 175 miles below St. Louis. It is the terminus of the Illinois Central, Cairo and St. Louis, Mississippi Central, and Cairo Arkansas and Texas R. Rs., and a market for the supply of a large portion of Southern Illinois, South-east Missouri, and Western Kentucky. It is an important dépôt for the products of Northern Illinois, Iowa, and Wisconsin seeking southern markets. Over 4000 steamboats land at its wharf annually. It has a considerable manufacturing industry, costly public-school buildings, and a fine custom-house. It has two national banks and three daily and three weekly papers. The low site of the city necessitated the construction of a levee to protect it from inundations. Pop. in 1870, 6267; local census of 1873, 8315.

M. B. Harrell, Ed. "Gazette."

Cairo, a township of Renville co., Minn. Pop. 326.

Cairo, a post-village and township of Greene co., N. Y., has four churches and some manufactures, and contains the county poorhouse. Pop. of township, 2283.

Caisse, a French word, the primary meaning of which is a "chest," "box," "case," or "coffer." It has important applications in commerce, finance, etc. In mercantile business it signifies "cash" or "cash-box." In anatomy, caisse is the drum of the ear. In financial affairs the term is applied to a fund; also to the pay-office. "Caisse d'Épargne" signifies a savings fund or savings bank.

Caisson, a French word which in architecture signifies a coffer, a sunken panel in a flat or vaulted ceiling or in the soffit of a cornice. In civil engineering the term is applied to an enclosure or large vessel in which the foundations of the piers of a bridge are built and gradually lowered to the bottom of a stream. Caisson is also a name given to a tumbril or ammunition-cart used in the artillery service. In maritime affairs it is applied to an apparatus for lifting a vessel out of the water for repairs or inspection. It is usually a hollow structure which contains an air-chamber, and is sunk by letting water into it. After it has been placed under the vessel the water is pumped out, and the caisson rises with the vessel. (See Foundations.)

Caith′ness, the northernmost county of Scotland, is bounded on the W. by the county of Sutherland and by the ocean on the other three sides. Area, 712 square miles. The sea-coast is bold and rocky, with many inlets or bays. The surface is nearly level, except a mountain-range formed of granite and gneiss, which extends along the western border, and rises to the height of 2300 feet. A large part of the county is moorland, destitute of trees. The staple products of the soil are oats, potatoes, and turnips. Many of the inhabitants are employed in the herring, cod, and salmon fisheries, and over 150,000 barrels of cured fish are annually exported from this county. Chief towns, Wick and Thurso. In the Middle Ages the kings of Norway ruled over this part of Scotland. Pop. in 1871, 39,989.

Caithness, Earls of, and Barons Berriedale (1455, in Scotland), Barons Barrogill (1866, in the United Kingdom), and baronets (1629, in Scotland).—James Sinclair, the fourteenth earl, was born Dec. 16, 1821, and succeeded his father in 1855.

Caithness Flagstones are dark-colored bituminous schists, slightly micaceous and calcareous, found in Caithness, Scotland. Their great toughness and durability render them valuable for pavements, cisterns and other purposes. They belong to the old red sandstone formation.

Ca′ius [the Latinized form of *Kaye, Key,* or *Cay*], (John), M. D., a learned English physician, born at Norwich Oct. 6, 1510. He practised medicine at Cambridge and in London, and was appointed physician successively to Edward VI., Queen Mary, and Elizabeth. In 1557 he founded Caius College, Cambridge. He wrote, besides other works, a "Treatise on the Sweating Sickness" (1552). Died July 29, 1572.

Caiva′no, a town of Italy, in the province of Naples, 8 miles N. of Naples, was fortified in the Middle Ages. It has remains of its old walls and towers. Pop. 9441.

Caj′etan [It. *Cajetano* or *Caietano;* Lat. *Caëtanus*], the surname of Thomas de Vio, an Italian prelate, born at Gaeta (Caieta) Feb. 20, 1470. He became the general of the Dominican order in 1508, and a cardinal in 1517, soon after which Leo X. sent him as legate to Germany in order to induce Luther to recant. In 1519 he became bishop of Gaeta. He was one of the first who maintained without reserve the infallibility of the pope. Died Aug. 9, 1534.

Caj′uput, or **Cajeput** (*Melaleuca Cajeputi*), a tree of the order Myrtaceæ, sub-order Leptospermeæ, from the leaves of which the pungent, aromatic volatile oil of cajuput is obtained by distillation. The cajuput is common on the Moluccas and in the southern part of Borneo. It is rather a small tree, with a crooked trunk, thick spongy bark, white wood (whence the name cajuput, properly *kayuputi,* signifying white wood), and terminal spikes of white flowers. The greater number of the species of this genus are natives of Australia, some of them very beautiful ornaments of hothouses. Much of the oil of cajuput of commerce is prepared in the island of Banda, and at Amboyna and Bouro. Several other species yield this oil. Two sackfuls of leaves yield scarcely three drachms of the oil, which is green, transparent, limpid, with a strong odor, agreeable only when much diffused. It is sometimes used as a stimulating aromatic in medicine, and is considered very efficacious in rheumatism.

Cal′abar Bean, the seed of the *Physostigma venenosum,* a twining, half-shrubby leguminous plant, a native of Western Africa. It belongs to the sub-order Papilionaceæ, and is nearly allied to the kidney bean. The bean is used as an ordeal among the Africans. It is very poisonous; fifteen of the beans have produced death in an hour. It is used by surgeons, in small amounts, to cause contraction of the pupil of the eye, the opposite of the effect of belladonna. It is also sometimes given in tetanus and some other diseases. It is a powerful depressant to the nervous action.

Cal′abash Tree (*Crescentia Cujete*), a tree of the order Bignoniaceæ, is a native of the tropical parts of America. It bears a large fruit, sometimes one foot in diameter, the hard shell of which is used as a substitute for bottles and other vessels. These shells are so hard that water may be boiled in them. They are sometimes polished, carved with figures, and converted into ornamental vessels. The wood of this tree is tough and flexible, and a suitable material for coaches. The term calabash is also applied to the fruit of the gourd, which is used for holding water.

Calabo′zo, a town of Venezuela, in the province of Guarico, on the Guarico River, 106 miles S. S. W. of Caracas. It has considerable trade with the interior. The valley in which it is situated is subject to great inundations. The city is the residence of many wealthy cattle-graziers (*hatos*), and has a fine church. Pop. 10,000.

Cala′bria, the ancient name of the south-eastern part of Italy, coinciding nearly with the modern province of Lecce. It was bounded on the N. E. by the Adriatic, on the S. W. by the Sinus Tarentinus (Gulf of Taranto), and on the N. W. by Apulia. Among its chief towns were Brundisium and Tarentum.

Calabria (anc. *Bruttium*), a region of Southern Italy, forming the southern part of the former kingdom of Naples, is a long peninsula enclosed by the sea on all sides except the N., and separated from Sicily by the Strait of Messina. Area, 6663 square miles. It is divided into three provinces, Cosenza, Reggio Calabria, and Catanzaro. It is traversed by the Apennines through its whole extent. These mountains, which are here nearly 4000 feet high, are partly covered with forests of pine, oak, and beech trees. Between the Apennines and the sea are fertile and beautiful valleys, which produce wheat, cotton, rice, sugar, oranges, figs, grapes, and olives. This region is subject to earthquakes. Chief towns, Cosenza, Reggio, and Catanzaro. Pop. in 1871, 1,209,315.

Cal′ahaln, a post-township of Davie co., N. C. Pop. 1232.

Calahor′ra (anc. *Calagurris*), a town of Spain, in the province of Logroño, on the river Ebro, 19 miles E. S. E. of Logroño. It has an old cathedral and some ancient remains. It is the seat of a bishop. Quintilian was born here. *Calagurris* was taken by Pompey or Afranius about 78 B. C., after a long and famous siege. The sufferings of the inhabitants were extreme: hence the Romans gave the name "Calagurritan famine" to any severe famine. Pop. 7104.

Calais [Lat. *Caletum,* from the ancient tribe *Caleti*], a fortified seaport-town of France, department of Pas-de-Calais, on the Strait of Dover, 122 miles by rail N. N. E. of Amiens, 19 miles N. E. of Boulogne, and 26 miles E. S. E. of Dover; lat. of the lighthouse, 50° 57′ 45″ N., lon. 1° 51′ 18″ E. The town and harbor are defended by a castle and several forts, and can be rendered inaccessible by land by flooding the adjacent ground, which is low and marshy. The harbor, which is formed by two moles, is nearly dry at ebb-tide. The town is regularly built, mostly of brick, and has wide, well-paved streets. It has a Gothic cathedral, a public library, and a theatre. A large portion of the English tourists who visit the Continent pass through

Calais, which has daily communication with Dover by steamboats. The number of persons who arrived here from England in 1865 is said to have been 133,562. Calais is the terminus of a railway which connects it with Amiens and Paris. Here are flourishing manufactures of bobbinet, hosiery, soap, leather, etc. In 1347 this town was taken after a long siege by Edward III. of England, who was then persuaded by his queen, Philippa, to spare the lives of six devoted citizens of Calais. It remained in the power of the English until 1558, when it was taken by the duke of Guise. Pop. in 1866, 12,934.

Calais, kāl′is, a city and port of Washington co., Me., is on the St. Croix River, at the head of navigation, 28 miles N. by W. from Eastport, and 264 miles N. E. of Portland. It is the S. E. terminus of the St. Croix and Penobscot R. R. Bridges across the river connect it with St. Stephen's, in New Brunswick. Calais derives its prosperity from the lumber-trade and shipbuilding. It has one national bank, nine churches, a savings bank, a public library, thirteen school-houses, one academy, an opera-house, a dry dock, two marine railways, a planing-mill, a sash-and-blind factory, three machine-shops, two foundries, ten shipyards, and two weekly papers. The river, which affords water-power, is part of the eastern boundary of the U. S. Pop. 5944. ED. "ADVERTISER."

Calais, a post-township of Washington co., Vt. Pop. 1309. It has some manufactures.

Calaman′der Wood, a valuable cabinet-wood which resembles rosewood, but is far more beautiful and durable. It is produced by the *Diospyrus hirsuta*, a tree of the order Ebenaceæ, a native of Ceylon and Southern Hindostan, which belongs to the same genus as the ebony and persimmon tree. This wood is very dense, takes an exquisite polish, and exhibits great richness and variety of colors, among which is chocolate or fawn-color. It is said to be so hard that it cannot be worked with edge tools. The tree has become rare in consequence of the wasteful operations of the Dutch and English. Several similar species are found in the Indian Archipelago.

Calamary. See SQUID.

Calamat′ta (LUIGI), a French engraver of Italian birth and of great merit, born at Cività Vecchia in 1802. Died in 1869.

Calambu′co, a valuable timber tree which grows in the northern part of the island of Luzon. It is an excellent material for shipbuilding, and resembles the teak in appearance. It is very durable, and is never eaten by the white ant, which is so destructive in the Malay Archipelago. Calambuco-wood is also used in the manufacture of farming-implements and other articles. It is also a name of aloes-wood.

Calamia′nes, a group of islands in the Malay Archipelago, about midway between Mindoro and Palawan; lat. 12° N., lon. 120° E. Calamianes, the largest of the group, is about 35 miles long and 15 miles wide. It is fertile, and has a Spanish settlement.

Calamich′thys [Gr. *κάλαμος*, a "rush," and *ἰχθύς*, "fish"], a ganoid fish found in the rivers of Western Africa. It takes its name from its slender, cylindrical form. It is closely allied to the *Polypterus* of the Nile.

Cal′amine (*Lapis calaminaris*), an important and abundant ore of zinc, a native carbonate, containing, when pure, 52 per cent. of zinc. Crystals of this mineral are rare. It is opaque or translucent, has a vitreous lustre, and occurs in kidney-shaped, botryoidal, cellular, and other imitative forms. It is found in veins, beds, and large deposits termed *pockets* in metamorphic limestone and in the Devonian and carboniferous formations. Large quantities of it are exported from Spain. This ore is called Smithsonite by Dana and other mineralogists, who apply the term calamine to the silicate of zinc, the primary form of which is a rhomboid.

Cal′amint (*Calamintha*), a genus of plants of the order Labiatæ. The common calamint (*Calamintha officinalis*) is indigenous in England. It has serrated leaves, with an agreeable aromatic odor, and is used in domestic practice as a pectoral medicine. The U. S. have several species.

Cal′amis [Κάλαμις], an eminent Greek sculptor and embosser who worked at Athens about 450 B. C. He reproduced the forms of horses with success, and executed a bronze statue of Apollo, which Lucullus transported to Rome. Among his works was a marble statue of Apollo, which some persons identify with the Apollo Belvedere.

Cal′amite, an extinct genus (*Calamites*) of great plants, perhaps of the order Equisetaceæ, approaching in character (in the opinion of some observers) the dicotyledonous plants and the conifers. The remains of nearly sixty species have been observed, chiefly in carboniferous strata (none later than the Jurassic) in both continents. These plants must have contributed largely to the production of coal.

Cal′amus [Gr. *κάλαμος*], a Latin word signifying a "reed," a "stalk" (of a plant), was used by the ancient Romans to denote an arrow, a musical pipe, and a pen which was made of a reed. This reed is supposed to have been the *Arundo donax*. Calamus also denotes the golden tube through which, in some church services, the eucharistic wine is taken.

Calamus, a name of the sweet flag. (See ACORUS.)

Calamus, a genus of Palmaceæ, yields a great part of the canes and rattans of commerce, which are used in Europe and the U. S. for the seats of chairs and other purposes. Among the species of this genus are *Calamus Rotang* and *Calamus viminalis*, which are natives of the warm or tropical parts of Asia. The *Calamus rudentum* has been found 500 feet long (Humboldt). *Calamus Draco* yields the best dragon's blood. Several species are climbers.

Calamus, a township of Dodge co., Wis. Pop. 1140.

Cal′amy (EDMUND), an English divine, born in London in Feb., 1600. He became an eloquent Presbyterian minister, and preached for many years in London. In the civil war he sympathized with the royalist party. He was one of the authors of a famous treatise against episcopacy called "Smectymnuus" (1641). Died Oct. 29, 1666.

Cal′and (PIETER), an engineer of Holland, born in Zierikzee in 1826. His father, A. Caland, was an engineer-in-chief of the "Waterstaat" of Holland, and author of a work on dyke-construction, embracing the methods of Dutch engineering as exhibited in the works of protection against the encroachments of the ocean and the inundations of rivers, etc. The son above named was educated at the Royal Military Academy at Breda, was appointed a sub-engineer of the "waterstaat" in 1845, and passing through successive grades became engineer-in-chief of the second class in 1867, then in 1873 promoted over the intermediate grade to be inspector (the highest grade, of which there are but two) of the "waterstaat."

He is author of a work (in French), "Étude sur l'Effet des Marées dans la partie maritime des fleuves;" also (in Dutch) of a work on the protection of the coast against the encroachments of the sea, and of numerous reports. Knight of the order of the Netherlands Lion, and vice-chairman of the Royal Institution of Engineers of Holland. As a member of a commission upon the "improvement of the water-communication from Rotterdam to the sea," and as the executive engineer of the work by which an existing mouth of the combined Rhine and Meuse has been closed and another made, and a channel navigable for ships of the greatest draught (600 passing per month) created where before naught but light-draught vessels (10 to 12 feet) could under favorable circumstances of wind and tide venture, M. Caland's highest claim to fame as an engineer will be founded on the great seaport of Rotterdam, through the works with which he is thus identified in giving an easy and direct water-communication with the sea, in place of the tedious and circuitous ones (see "Prof. Papers Corps of Engineers," No. 22) before available. For this important work M. Caland received from the Vienna Exposition the first prize—a certificate of honor.

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Calan′do, an Italian musical term, signifies diminishing gradually from forte to piano. It differs from *decrescendo* and *diminuendo*, as the tempo at the same time is slightly retarded, but not so much as in *ritardando*.

Cala′nus [Gr. Κάλανος], an ancient Hindoo philosopher, was one of those whom the Greeks called Gymnosophists. According to Plutarch, his proper name was SPHINES. He passed some time in the camp of Alexander the Great in India. Having become sick at Pasargadæ, he was at his own request burned alive.

Calas (JEAN), a French Protestant and victim of fanaticism, born in Languedoc in 1698, lived at Toulouse. He was condemned and executed Mar. 9, 1765, by eight judges of Toulouse on a false charge that he had murdered his own son. Voltaire exposed the iniquity of this outrage, and induced the king to give 30,000 livres to the family of Calas. (See COQUEREL, "Jean Calas et sa famille," Paris, 1869.)

Calascibet′ta, a town of Sicily, in Caltanisetta, about 60 miles S. E. of Palermo, is on an isolated hill which rises nearly 2500 feet above the sea. It is said to have been founded in 1080. Pop. 5255.

Cala′tabello′ta, a town of Sicily, province of Girgenti, 25 miles N. W. of the city of Girgenti. It is very near the site of the ancient *Tricala*, and is on the ancient river *Crimisus*. Here is a fine mediæval church. Pop. 5572.

Calatafi′mi, a town of Sicily, province of Trápani, is

in a fertile valley 5 miles S. W. of Alcamo. Here in 1860 Garibaldi defeated the royalist troops. Pop. 8731.

Calatanazor′, a small town of Spain, in Old Castile, 10 miles S. W. of Soria. Here Al-Mansoor gained a great victory over the Christians in 1101.

Calatayud′, a town of Spain, province of Saragossa, on the river Jalon, 45 miles S. W. of Saragossa. It has an episcopal palace, a noble old castle, and several churches, convents, and hospitals; also manufactures of linen and woollen fabrics, paper, leather, etc. About 2 miles E. of this place is the site of the ancient *Bilbilis*. Pop. in 1860, 9823.

Calatra′va (José Maria), a Spanish statesman and eloquent lawyer, born at Mérida Feb. 26, 1781. He was a leader of the liberal party and a member of the Cortes. He passed many years in exile between 1814 and 1830. Died Jan. 24, 1846.

Calatra′va, the Order of, was founded in 1158 by Sancho III. of Castile, and confirmed by Pope Alexander III. in 1164. After the death of Sancho the knights elected as grand-master Don Garcías de Redon. For a long period the war against the Moors was carried on almost entirely by the Knights of Calatrava. The influence exercised by the grand-master on public affairs at length excited the jealousy of the king, and in 1487 the grand-mastership was united to the crown.

Calave′ras, a small river of California, rises in Calaveras county, flows nearly south-westward, and enters the San Joaquin River about 15 miles below Stockton.

Calaveras, a county in N. Central California. Area, 1100 square miles. It is bounded on the N. W. by the Mokelumne River, and on the S. E. by the Stanislaus. It is also drained by the Calaveras River. The Sierra Nevada extends along the eastern border. The surface is finely diversified with mountains and valleys. Cattle, barley, and wool are the chief products. It has rich copper-mines. Gold is found here imbedded in quartz rock. In the eastern part is the famous grove of mammoth trees, in which was found a *Sequoia gigantea* about thirty feet in diameter and 300 feet high. Capital, Mokelumne Hill. Pop. 8895.

Calbur′ga, or **Kulbur′ga,** a town of India, in the Nizâm's dominions, on an affluent of the Beemah, 110 miles W. of Hyderâbâd. It is now unimportant, but was formerly the capital of several Hindoo and Mohammedan sovereigns.

Calca′reous [Fr. *calcaire*, from Lat. *calx*, gen. *calcis*, "lime"], containing much lime. The term "calcareous" is applied to rocks which are chiefly composed of lime—*i. e.* to limestone, marble, and chalk, which are carbonates of lime. They are sedimentary and stratified rocks, and consist chiefly of shells of marine animals, corals, and encrinites. The presence of lime in rocks can easily be detected by the application of nitric or hydrochloric acid, which produces an effervescence in any of the various forms of carbonate of lime. Calcareous soils are derived from the disintegration of limestone, chalk, etc., but they often contain a portion of clay, which increases their fertility. The term calcareous is applied to springs and to water which hold in solution carbonate or sulphate of lime. Such water is commonly called *hard*, and is not so good for washing as soft water.

Calcareous Spar, or **Calc Spar,** a common name of crystallized carbonate of lime, composed, when pure, of 44 per cent. of carbonic acid and 56 of lime. It is one of the most abundant of all minerals, and is found in all geological formations and in every part of the world. The primary form of its crystals is a rhomb or rhombohedron. Its secondary forms are more numerous than those of any other mineral, and are said to amount to 700 or more. In a pure state this mineral is colorless and transparent, but it often contains impurities which render it red, green, brown, yellow, etc. The purest and most limpid variety of this crystal is called Iceland spar, which is found in Iceland, and exhibits double refraction in a remarkable degree.

Calcasieu, kal′ka-shu, a river of Louisiana, rises in the western part of the State, flows in a general S. S. W. direction through Calcasieu parish, and enters the Gulf of Mexico. At its mouth stands an iron lighthouse 53 feet high; lat. 29° 45′ N., lon. 93° 17′ E. Length, estimated at 200 miles, including Calcasieu Lake, which is an expansion of the river. The lake is about 18 miles long and 5 wide, and the foot of it is nearly 5 miles from the Gulf of Mexico.

Calcasieu, a parish in the W. of Louisiana. Area, 1500 square miles. It is bounded on the W. by the Sabine River, and is intersected by the Calcasieu River. The surface is nearly level, and occupied by extensive savannas or grassy plains. Corn and rice are the chief products. Capital, Lake Charles. Pop. 6733.

Calceola′ria [from Lat. *calceolus*, a "little shoe," a "slipper"], a genus of plants of the order Scrophulariaceæ, comprises numerous species, natives of South America. They mostly grow on that part of the Andes which is more than 9500 feet above the level of the sea, and are herbaceous plants or shrubs with beautiful flowers. The corolla is 2-lipped, and the lower lip is inflated, so as to form a bag which has some resemblance to a slipper. They are so abundant in some parts of Chili and Peru as to give a peculiar aspect to the scenery. They are cultivated by florists in Europe and the U. S.

Cal′chas [Κάλχας], a celebrated Greek soothsayer who was present at the siege of Troy. He was consulted by the Grecian chiefs in the most important affairs during that siege.

Cal′cite [from *calx*, "lime"], a general term under which are comprised all the varieties of carbonate of lime.

Cal′cium (symbol Ca), the metal present in lime, discovered in 1808 by Sir Humphry Davy. Its atomic weight or equivalent is 20. Combined with oxygen it forms lime or oxide of calcium, which consists of 20 parts of calcium + 8 of oxygen. It is a yellowish-white malleable metal, having a specific gravity of 1.578. It does not occur naturally in a separate state, but may be obtained by passing a powerful current of voltaic electricity through fused chloride of calcium, when the metal separates in minute globules. When brought into contact with water, it rapidly decomposes the water and is converted into lime. At a red heat it melts and burns with a dazzling white light and with scintillations.

Cal′culating Machine, a machine for performing arithmetical operations, or for computing logarithmic or other mathematical tables in which the successive results are to be obtained by substituting, in an invariable formula, the consecutive numbers of a simple series, uniformly increasing. The two kinds of work here mentioned are essentially different, and require different machinery. For simple arithmetic the most successful machine yet constructed is that of M. Thomas of Colmar in France. For tabular numbers, the computations are made by the "method of differences;" and the machines are called "difference-engines." Such are those of Babbage (which was never finished) and of the Messrs. Scheutz of Stockholm, of which there is an example at the Dudley Observatory, Albany, and another in the office of the registrar-general, London. (See Mechanical Calculation, by F. A. P. Barnard.)

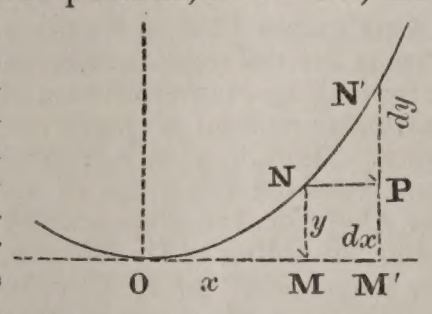
Cal′culus [Lat. a "little stone" or "pebble"]. The term is derived from the ancient use of pebbles as *counters* or for making computations, and it, in general, denotes some particular method of performing mathematical investigations. Those, *e. g.*, of arithmetic, algebra, logarithms, etc., have received the name of *calculus*, as the *Arithmetical*, the *Algebraic*, the *Exponential*, the *Trignometrical* (which latter, according to De Morgan, "contains that of *undulating magnitude;*" or of *Circular Functions*); but the term applies, in modern usage, more appropriately to mathematical methods of peculiar power involving unusual refinements of reasoning, or reference to relations of magnitude, which may be styled "transcendental." Among such are the "Antecedental Calculus" of Mr. Glenie,* the "Calculus of Derivations" of M. Arbogast, the "Calculus of Probabilities" (see this head), and the more modern creation of Sir Wm. Rowan Hamilton, "Quaternions." But, pre-eminently, by the word calculus is denoted the Differential Calculus, including under this head the complementary branches of "Differential and Integral," of the Leibnitz system of symbolization, or the "Fluxions" and "Inverse Method of Fluxions" of the Newtonian. The calculi of Leibnitz and Newton are essentially the same, though the logical basis on which Newton places his method is generally considered more satisfactory than that of Leibnitz. The method of Leibnitz was first to make its appearance before the public in 1684; but Newton's method of drawing tangents (wherein the method of fluxions was sufficiently explained) was communicated in a letter to a Mr. Collins in 1682. Upon the allegation that Leibnitz had seen this letter was based the charge (sustained by the Royal Society of London) that Leibnitz had plagiarized therefrom. This charge is now considered unfounded, and the glory is conceded to him of having been a contemporaneous discoverer of a calculus that has been styled "one of the greatest, most subtle, and sublime dis-

* Jas. Glenie, F. R. S. of London and Edinburgh, invented this calculus in 1774; it was published in 1794. According to the writer in Ree's Encyclopædia, "both the differential and fluxional calculi may be derived from the doctrine of proportions (therein expounded) in a manner altogether unexceptionable."

coveries of this or, perhaps, of any age: opening a new world to us, and extending our knowledge, as it were, to infinity; and carrying us beyond the bounds that seemed to have been prescribed to the human mind; at least infinitely beyond those to which ancient geometry was confined."

The Continental mathematicians usually defined the calculus as the arithmetic or analysis of *infinitely*, or rather indefinitely *small* quantities. ("*Analyse des Infiniment Petits.*") Sir Isaac Newton and the English authors styled these infinitely small quantities *moments*—*i. e.* the *momentary* increments of variable quantities; *e. g.* of a line considered as generated by the movement (*flux*) of a point, or of a surface by the "flux" of a line. Although it may have been impracticable to expound the rationale of the calculus, or of fluxions, without allusion to "infinitely small" or "indefinitely small" or "vanishing" quantities; nevertheless, all the mystification attending these subjects and nearly all the contests about the logical basis have had their *raison d' être* in the use of these words. There can be nothing "small," nothing "great," except *relatively*. "The expression *infinitely little magnitude*," says Mr. Glenie, author of the "Antecedental Calculus," "implies a contradiction, since what *has* magnitude cannot be infinitely little." And furthermore, it may be said that the relations of *magnitude* (which form the subjects of all mathematical reasonings) can be of but *one kind:* we must either discard the infinitely little, or treat it quantitatively (if we assign it magnitude), as we treat other quantities. No elaborate discussion of the differential method can be attempted here, but most briefly I think it can be defined as the method by which, from the *law of growth*, the "full stature," that is, the complete expression for the value of a function, is obtained; or *vice versâ*. A quantity or magnitude is said, in mathematics, to be a *function* of another quantity when it depends for its value upon the value of that other quantity. Thus, the particular ordinate, y, of a parabola, at any point of which the abscissa is x, depends for its actual value or magnitude, upon the arbitrary value we may give to x, and (referred to its axis of ordinates and vertex) the expression for y in terms of x is $py = x^2$, or $y = \frac{1}{p}x^2$. The ordinate, y, is here a *function* of the arbitrarily assumed magnitude x (hence called, as well as y, which varies with it, a *variable*) and of the parameter, p, which, remaining the same for the same parabola, is called a *constant*. As distinguished from y (the *function*), x is an *independent* variable.

If ONN′ be a branch of the parabola, let $x = \text{OM}$, then y is represented by MN. If we add the magnitude MM′, which we will call dx (alluding thereby to the *difference* between the original and the new abscissa), to OM (or x), the ordinate corresponding, M′N′, will *differ* from MN by the magnitude PN′, which we will call dy.



Thus, to an arbitrary increment dx of x, corresponds an increment dy of y; and the value of this last increment depends—1st, upon the nature of the function, or the algebraic relation between y and x; and 2d, upon the arbitrary value of dx.

In the equation $y = \frac{1}{p}x^2$ we substitute $y + dy$ for y and $x + dx$ for x, develop and subtract y and its value from the two members respectively, then divide by dx, we have $\frac{dy}{dx} = \frac{1}{p}(2x + dx)$; which gives the *ratio* of the increment dy of the function y to that of the variable x; and this ratio depends upon the value we may assign to dx, which, so far, may have been any lineal magnitude whatever. In fact, from the curvature of the line ONN′ to which the ordinates are drawn, it is clear that the ratio of dy to dx must vary with the greater or less distance of M′ from M. Let us suppose that the point M′ is moved towards M until MM′ or dx becomes *indefinitely small* (compared with OM or with our unit of linear dimension or with some dimension to which we attribute ordinary magnitude, such as that of the *parameter*), "smaller than any assignable quantity," "infinitely small," or *zero;* that is, "vanishes." So must also dy; but the value of the *ratio*, $\frac{dy}{dx}$, *does not vanish*, but becomes (as its algebraic expression shows) $= 2\frac{1}{p}x$; that is, it has a finite determinable value which depends upon the *form of the function alone.* Had y been given as a multiple of some other power, say $= px^n$, we should have found the limiting value of $\frac{dy}{dx}$ to be npx^{n-1}, etc. etc. By this it is seen that the *ratio* of two mutually dependent variable quantities does not necessarily vanish, nor even *necessarily* become *small*, as the quantities themselves diminish; but that it approaches more and more nearly a determinate limit, just as in algebra and geometry the expression $\frac{0}{0}$ takes (generally) a finite and determinable value. Although it is, in general, with this *limit*, called the *differential coefficient*, that we have to deal, yet the symbols dy, dx, etc. (styled *differential* of y, etc.) are often met with separately and treated as *real*, though indefinitely small, quantities.* It is also to be remarked that in the exemplar expressions $\frac{dy}{dx} = 2\frac{1}{p}x$, $\frac{dy}{dx} = nx^{n-1}$ etc., $\frac{dy}{dx}$ is *itself* a function of the variable x, and would yield (by the repetition of the same process) $2\frac{1}{p}$ and $n(n-1)x^{n-2}$, as *their* differential coefficients; styled *second* differential coefficients of the original function, and expressed, by reference to its symbol y, as $\frac{d^2y}{dx^2}$, implying a *second* differentiation of y, as a function of x. The process may be continued (to a third and fourth, etc.) so long as the resulting expression continues to be a function of the variable.

Geometrically, the idea of *limit* may be illustrated by supposing, in the figure, a secant to be drawn through the given point N of the curve, cutting it again in some other point N′. The nearer this second point is made to approach the first, the more nearly will the secant approach to coincidence with the tangent drawn at N. Thus, "the tangent to a curve is the right line which limits the position of all the secants which can be drawn through the point of contact, though, strictly speaking, it be no secant; so, also, a *ratio* may limit the variable ratio of increments, though it cannot be said to be the ratio of any real increments." In fact, the limit of the ratio $\frac{dy}{dx}$ is the trigonometrical tangent of the angle which the tangent line at N makes with the axis of abscissas. Newton's "method of drawing tangents" of 1682, in which the method of fluxions is said to be "sufficiently explained," is founded on this relation of tangents to this limit-ratio of increments. This ratio, now known as the "Differential Coefficient," is really the expression for what I have styled the *law of growth* of the function as depending upon the growth or increase (or decrease) of the variable. To determine the differential coefficients, knowing the integral expression for the function, and to deduce by aid of them unknown properties of the functions themselves, is the object of the "Differential Calculus." On the other hand, given this law of growth, the integral expression for the function is determined by the methods of the "Integral Calculus." The peculiar power of the calculus as an instrument of mathematical investigation depends upon this, that the more difficult problems of pure Mathematics, and far the greater proportion of those of Mechanics or Physico-Mathematics (in which the action of *forces* is concerned), can only be stated in terms involving not merely relations between integral quantities known and sought, but between their simultaneous and mutually dependent *increments*—*i. e.* the data involve *besides*, perhaps, the quantities themselves, their *law of growth*, in the form of their differential coefficients; and, *hence*, can only be solved by the processes of the Calculus.

Thus, in mechanics, the velocity generated by a constant or uniformly accelerating force is proportional to the time it acts, whether finite or indefinitely small, or $v = gt$ or $\frac{dv}{dt} = g$ (if the force be gravity). Also the distance traversed is proportional to the velocity; and this, though the velocity constantly increases, is the *law of growth*, as a function of the time; hence, $\frac{dy}{dt} = v = gt$, and hence (by integration) y (the distance fallen in the time t) $= \frac{1}{2}gt^2$, the well-known expression for the height of fall in terms of the time. The expression can be arrived at without the use or even the knowledge of the formal methods of the calculus, but it will be found that its fundamental principles are involved in such solutions.

These fundamental principles are in much more common

* In the modern improved system these illogical symbols are wholly discarded (*e. g.* Prof. Peirce's "Analytic Mechanics"), and the real element of the calculus—the differential coefficient—is symbolized by the letter D, with the independent variable sub-fixed; followed by the symbol of the function; *e. g.* $D_x y$, instead of $\frac{dy}{dx}$.

use than is supposed. When we assign, for example, a specified velocity to a cannon-ball at a given instant of time or at a certain point of its trajectory, we speak of a thing which has no permanent—indeed, I might almost say no *real*—existence; for there is no portion of that trajectory, *however minute*, which the ball really traverses at the supposed rate. It *would* travel, *e. g.*, 1000 feet per second, if at the given instant its variable velocity were made invariable; and *this* is what we mean. The resulting direction would be the *tangent* to the actual trajectory; the invariable velocity, the *differential coefficient* of the space traversed as a function of the time. The practical measurement of the velocity involves the same conceptions. We place two screens along the path of the ball, and by skilfully-devised instrumental agencies, measure the minute *time* of transit. The quotient of the distance apart of the screens, divided by the time, gives us the required velocity. If this distance were "infinitely small," the quotient would be the true "differential coefficient." The *nearer* we place the screens (and we place them as near as the practical difficulties of measuring the time will permit), the more nearly do we approximate to that coefficient. Even with a very measurable (*finite*) distance, we obtain results of error less than we can assign any expression for.

If, instead of placing screens very close together, they were many hundred feet apart, the distance divided by the time of transit would still give us the *mean* velocity between the screens, but evidently not (accurately) the velocity at any one point; for the variation or differential of velocity from one screen to the other is considerable, compared with its *total* value. Hence, by diminishing *indefinitely* the distance, this variation becomes less and less appreciable, and the ratio of the indefinitely diminished *space* and *time* becomes the *ultimate* ratio—the *differential coefficient*—which (in this particular case) is the velocity sought. We have then, in this practical operation, an illustration of peculiar notions and fundamental principles of the calculus: *indefinitely small—vanishing*, or *infinitesimal*, quantities; *ultimate ratios*, *limits*, or (what is equivalent) *differential coefficients*.

Besides the direct solution of problems, the calculus has been the most effective and indispensable of agents in widening the sphere of mathematical investigation, and in enhancing the power of its instruments. Scarce one of the modern methods of analysis but depend on it for their development. The CALCULUS OF VARIATIONS, originating with Lagrange, is but an extension of the methods of the calculus to the discovering of functions, in cases in which, instead of the law of growth, some condition (such as that of producing a maximum or minimum under certain conditions) which the function when found must fulfil, is given. The CALCULUS OF OPERATIONS is but an extension of algebra to the *symbols of operation* of the calculus: algebra itself being really a calculus of operations, since it deals only with symbols with a view to reduce the operations they indicate to their simplest expression. The modern method of DETERMINANTS is but an extension of algebraic "operations." (See these heads.)

The mathematical method (another development of the Differential Calculus), commonly referred to by English writers as that of LAPLACE'S COEFFICIENTS, is, generalized and enlarged, now termed "Spherical Harmonic Analysis," and is a *calculus* of great power for a large class of physical problems involving arbitrary data over a spherical surface. Hence its applicability to the calculation of the "tides" and other problems connected with the "figure" and "attraction" of the earth; also to certain problems relating to the distribution of electricity and magnetism, etc.

Sir William Rowan Hamilton's "Calculus of Quaternions," by many believed to be an invention of importance vieing with that of the calculus itself, has indeed a rationale, or logical basis, radically distinct from and independent of the calculus; yet for its full development it has recourse to the methods and principles of the CALCULUS.

Mr. Cauchy has shown that for the explanation of certain properties of functions, even for *real* values of the independent variable, it is indispensable to generalize the investigation by including the case of *imaginary* values for that variable (*i. e.* values involving the well-known expression of *impossibilty*, $\sqrt{-1}$). All geometricians are aware of the service which the consideration of imaginary quantities has rendered to Algebra. The theory of equations is dependent upon it, and it seems destined to render yet greater service to the theory of "functions." It would be impossible to attempt any explanation of the method or *Calculus* of Imaginaries, an outline of which may be found in Book I. of "Théorie des Fonctions Doublement Périodiques," Briot and Bouquet, Paris, 1859. Resulting from it is the *Residuary Calculus*, or Residuation by which (see the "Integral Calculus," of PROF. B. PEIRCE) developments are obtained for functions where Taylor's theorem fails in consequence of its first term becoming infinite.

In an antecedent paragraph we found the expression for the algebraic relation between the finite increments (or "differences") of the co-ordinates of the parabola when one of these is "any lineal magnitude whatever." The "Calculus of FINITE DIFFERENCES," invaluable in the practical application of analytic formulæ to numerical calculations, for the summation of infinite series, and for INTERPOLATION, results from such relations between finite increments or "differences," and is defined by Lacroix to have for its object "the determination of the values of increments, by deducing them not merely from the analytic expression of the functions, but also from their numerical (or particular) values, when that expression fails or is too complicated." Except a general similarity in notation and terms employed, it has little in common with the Differential Calculus; the fundamental element of which latter—the Differential Coefficient—having no place in it.

J. G. BARNARD, U. S. A.

Calculus, or **Stone,** in medicine, a concretion formed within the body from the deposition of matters which normally remain in solution. The most important calculi are those formed in the kidneys or bladder (urinary calculus), and those formed in the gall-bladder or biliary ducts (biliary calculus, or gall-stone). Both of these give rise to intense pain, and may even threaten life. Calculi of less importance may form in the salivary ducts and elsewhere.

Biliary calculus may generally be assumed to exist when excessive pain suddenly arises in the right side beneath the ribs, and when in a few hours jaundice comes on. But absolute proof that these symptoms depend on calculus is often wanting. The pain is more severe while it lasts than almost any other form of suffering. It may be relieved by large doses of opium or by the inhalation of ether, but such a remedy requires to be cautiously given. Gall-stones impacted in the ducts sometimes have proved fatal, but much more frequently they find their way, sooner or later, into the intestines. They are, in the human subject, almost invariably composed of cholesterine, with coloring-matter and mucus arranged in layers. The Oriental bezoar-stone is a biliary calculus from an antelope. It consists chiefly of crystalline lithofellic acid.

Urinary calculus is a disease most common in advanced life and in the male sex. It is frequent in gouty persons, or among those who pursue sedentary occupations and live freely. Among sailors it is rare. Certain local conditions promote it, especially an excess of mineral matter in drinking-water. It is common in England, Ireland, Russia, France, Northern Italy, and Egypt. In the U. S. it is most frequent in Kentucky, Tennessee, West Virginia, Ohio, and Indiana. In its early stages the disease not unfrequently presents itself in the form of gravel, shown by the passage of numerous small gritty concretions, observed in the urine as a deposit like sand. When such deposits are present at the time of passing the urine, and not merely after it has cooled, there is reason to apprehend the formation of calculus. If in these circumstances there are pains of a dull character in the loins, with occasional twinges, no time should be lost in seeking medical advice. Calculus in the bladder is at first attended with little pain, as compared with that caused by the stone in its passage downward from the kidney; but unless removed the calculus is sure to enlarge, and it then becomes the cause of most intense distress. Perhaps the most trustworthy evidence of stone in the bladder, apart from the use of the sound, is smarting and burning pain experienced after the bladder has been emptied, with occasional temporary stoppages of the urine.

The chief varieties of urinary calculus are—1. Uric acid, urates of ammonia, soda, lime, etc. (brick-dust sediment, red sand); 2. Phosphates of ammonia and magnesia, lime, etc. (the lime phosphate, mixed with ammonio-magnesian phosphate, constitutes the "fusible calculus," one of the commonest kinds); 3. Oxalate of lime (mulberry calculus); 4. Carbonate of lime (chiefly in domestic animals); 5. Cystine; 6. Xanthic oxide (very rare); 7. Very rarely indeed do leucine, tyrosine, and other disease-products form calculous concretions. 8. Calculi of fibrine, etc. are also reported. 9. Calculi are frequently composed of numerous layers, having perfectly distinct chemical composition. When calculus has once formed in the urinary organs no cure exists except the removal of it from the body (see LITHOTOMY and LITHOTRITY), but in the earlier stages much may be done to check the malady by careful regulation of the diet and mode of living, with the use of solvents adapted to the particular form of deposit found.

Urinary calculi have been often observed in horses, cattle, and pigs, and are very frequent in the common rat.

REVISED BY WILLARD PARKER.

Calcut'ta [Sanscrit, *Kalikâta*, "dwelling of Kali," an Indian deity], the capital of British India, situated in the province of Bengal, on the E. bank of the Hoogly, an arm of the Ganges, about 75 miles from the sea; lat. 22° 34′ N., lon. 88° 20′ E. The city extends along the river about 6 miles, and has an average breadth of 1½ miles. The river, here a mile wide, is constantly full of shipping. In the southern part of the city, called Chowringhee, are the residences of the Europeans, which in a great part are finely built in Grecian style, and many of them surrounded by groves of fruit trees. A quarter of a mile to the S. W. is Fort William, built at a cost of £2,000,000, the largest fortress in the British dominions, octagonal in form, requiring a garrison of 10,000 men and mounting 619 guns. Its usual garrison consists of one English and two native regiments. Between the fort and the city is the Maidân or glacis, a handsome park, and the Esplanade, on which is the Government House, a magnificent building surmounted by a dome, and in a line with it a row of handsome dwellings. Beyond Chowringhee is the native or "Black Town," consisting mostly of mud or bamboo cabins and narrow dirty streets. Here and there an idol of painted wood or plaster is set up in the street. The principal buildings of Calcutta are the Government House, the mint, the town-hall, the cathedral, the Hindoo college, and the hospital. On the other side of the river, opposite the citadel, is the botanic garden. Calcutta is the residence of an English bishop. The Asiatic Society have a valuable museum and library of Oriental MSS. There are several educational institutes, supported by the government—the Hindoo, the Madriassa or Mohammedan, the Sanscrit, and the Fort William Colleges. Calcutta has the largest commerce of any city in Asia, and commands the entire inland trade of Bengal. Ships of 1400 tons can anchor in the river. It has railway connection with Bombay, 1420 miles distant by rail, and with Delhi, and through the Punjâb with the Indus. The chief articles of export are opium, indigo, sugar, saltpetre, rice, raw cotton, raw silk, piece goods, hides, lac, etc. The exports in 1868–69 were estimated at £20,728,159, and the imports for the same year at £16,934,771. European society at Calcutta is very convivial and fond of amusement. Calcutta was founded by Job Charnock, agent of the East India Company, about 1690. In 1756 it was captured by Surajah Dowlah, who confined 123 prisoners in the horrible "Black Hole." Lord Clive retook it in 1757, and built the fortress. Pop. 616,249; of these 238,325 are in the suburbs. Of the 377,924 inhabitants in the inner city, 239,190 are Hindoos and 113,059 Mohammedans.

Calda'ni (Leopoldo Marco Antonio), an eminent Italian anatomist, born at Bologna Nov. 21, 1725. He succeeded Morgagni as professor of anatomy at Padua in 1771. He published several works on anatomy and physiology, and a series of accurate plates entitled "Icones Anatomicæ" (4 vols., 1801–14). Died Dec. 20, 1813.

Calda'ra (Polidoro), an Italian painter, born in the Milanese about 1495, was often called Caravaggio, from the name of his native place. He went to Rome, and was employed by Raphael to paint the friezes in the Vatican. He was a skilful painter of landscapes and historical pieces. He was murdered by his servants in 1543.

Cal'das, or **Calde'tas,** a Spanish term applied to warm springs, and forming part of the name of many places in Spain. Among these the most noted is Caldas de Mombuy, 18 miles N. of Barcelona. Here are thermal baths and some antiquities.

Calderon' de la Bar'ca (Pedro), the most eminent Spanish dramatic author, born in Madrid Jan. 17, 1600, was educated at the University of Salamanca. He began to write dramas about the age of thirteen, and having entered the army in 1625, served several campaigns in Italy and Flanders. After he had gained distinction as an author, he was patronized by Philip IV., who invited him to his court in 1636, and created him a knight of Santiago. He was a very prolific author, and produced about 500 dramas. In 1651 he entered the Church, and became chaplain in the royal chapel at Madrid 1663. Among his greatest works are a tragedy entitled "The Constant Prince" ("El Príncipe Constante"), "Love is no Joke," "Life is a Dream," and "The Physician of his Own Honor." In the latter part of his life he wrote many religious poems called "Autos Sacramentales." His imagination was brilliant, and not restrained by conventional rules. He is ranked among the greatest Spanish poets by native critics, and his dramas are popular in Germany. His works display great fertility of invention, and abound in beautiful passages, but are deficient in fidelity to nature. Died May 25, 1681. (See Richard C. Trench, "The Life and Genius of Calderon," 1836; Ticknor, "History of Spanish Literature.")

Cal'derwood (David), a Scottish Presbyterian minister and historian, born in 1575. He was banished for his opposition to episcopacy in 1619, and then retired to Holland, where he published a controversial work called "The Altar of Damascus" (1623). He returned to Scotland in 1636, and wrote a "History of the Kirk of Scotland." Died in 1651.

Cal'dicot (Thomas Ford), D. D., born at Buckby, England, in 1803, removed to Canada in 1824, held Baptist pastorates in Hamilton, Lockport, and Brooklyn, N. Y., Boston, Mass., and Toronto, Canada, where he died July 9, 1869. As a scholar, writer, and orator he was alike distinguished.

Caldie'ro (anc. *Caldarium*), a town of Northern Italy, where Napoleon I. was defeated by the Austrians under Alvinzi, Nov. 11, 1796. It is 12 miles by rail E. of Verona, and is noted for its thermal springs. Massena was repulsed here by the archduke Charles in 1805.

Cald'well, a county in the W. of Kentucky. Area, 275 square miles. It is bounded on the N. E. by the Tradewater Creek. The surface is nearly level; the soil is fertile. Grain, tobacco, cattle, and wool are raised. It is intersected by the Elizabethtown and Paducah R. R. Capital, Princeton. Pop. 10,826.

Caldwell, a parish in N. Central Louisiana. Area, 528 square miles. It is intersected by the Washita River, navigable for steamboats, and bounded on the E. by Bœuf Bayou. Wool and cotton are the chief products. Capital, Columbia. Pop. 4820.

Caldwell, a county in the N. W. of Missouri. Area, 435 square miles. It is intersected by Shoal Creek. The surface is nearly level; the soil is fertile. Grain, wool, and cattle are raised. The county is traversed by the Hannibal and St. Joseph R. R. Capital, Kingston. Pop. 11,390.

Caldwell, a county in the N. W. of North Carolina. Area, 450 square miles. It is bounded on the S. by the Catawba River, and drained by the Yadkin, which rises within its limits. The Blue Ridge extends along its N. W. border. The soil is mostly fertile. Corn, wheat, tobacco, and wool are raised. Excellent iron ore is found. Capital, Lenoir. Pop. 8476.

Caldwell, a county of the S. central part of Texas. Area, 535 square miles. It is bounded on the S. W. by the San Marcos River, and drained by several creeks. The surface is undulating; the soil is fertile. It is an excellent region both for farming and grazing. Corn and tobacco are the chief crops. Capital, Lockhart. Pop. 6572.

Caldwell, a township of White co., Ark. Pop. 451.

Caldwell, a post-township of Appanoose co., Ia. Pop. 1201.

Caldwell, a post-village in Caldwell township, Essex co., N. J., is about 10 miles N. W. of Newark. Pop. of the township, 2727.

Caldwell, the capital of Warren co., N. Y., is situated near the head of Lake George, 62 miles from Albany. It has two churches and four hotels, and is a place of summer resort. Steamers ply upon the lake. Fort William Henry and Fort George were situated within the limits of this township. Pop. of township, 2329.

Caldwell, capital of Noble co., O., on the Marietta and Pittsburg R. R., 35 miles N. of Marietta, is situated in the centre of the Duck Creek oil-region. The vicinity yields coal and iron. It has one national bank and two weekly newspapers. P. 318. Ed. "Noble County Republican."

Caldwell, a township of Newberry co., S. C. P. 1791.

Caldwell, a post-village, capital of Burleson co., Tex., about 85 miles E. by N. from Austin. It has a male and female academy.

Caldwell (Charles), M. D., an American physician, born in Caswell co., N. C., May 14, 1772. He was for many years professor of medicine in Transylvania University in Kentucky. He wrote, besides other works, a "Life of General Greene" (1819). Died July 9, 1853.

Caldwell (Charles H. B.), U. S. N., born June 11, 1828, in Massachusetts, entered the navy as a midshipman Feb. 27, 1838, became a passed midshipman in 1844, a lieutenant in 1852, a commander in 1862, and a captain in 1867. In 1858, while attached to the sloop-of-war Vandalia, Caldwell had charge of an expedition against a tribe of cannibals inhabiting Wega, one of the Fejee Islands, which he conducted with ability, defeating the Wegans in a pitched battle and burning their town. While commanding the steamer Itasca he took part in the bombardment of Forts Jackson and St. Philip April 24, 1862, but was unable to pass the forts with the rest of the fleet, "owing to a 42-pound shot entering the boiler, the steam from which filled the fire and engine-room, driving every one up from below,

and almost suffocating those on the quarter-deck." He participated in the action with the Grand Gulf batteries, Mississippi River, June 9, 1862, and in command of the iron-clad Essex took part in all the operations at Port Hudson during the spring and summer of 1863.

FOXHALL A. PARKER, U. S. N.

Caldwell (JAMES), a patriot, born in Charlotte co., Va., in April, 1734. He graduated at Princeton in 1759, became pastor of a Presbyterian church at Elizabethtown, N. J., and efficiently promoted the popular cause during the Revolution. He served in the army as chaplain and also as a soldier. He was murdered by a sentinel June 6, 1780.

Caldwell (JOSEPH), D. D., born in Leamington, N. J., April 21, 1773, graduated at Princeton in 1791, became in 1796 principal professor in the University of North Carolina, and its first president in 1804. Died Jan. 24, 1835.

Caldwell (MERRITT), A. M., a distinguished author and educator in the Methodist Episcopal Church, was born at Hebron, Me., Nov. 29, 1806, graduated at Bowdoin College in 1828, became principal of the Maine Wesleyan Academy at Readfield in 1828, was elected professor of mathematics and vice-president of Dickinson College, Pa., in 1834, professor of metaphysics and English literature at Dickinson in 1837, visited England, and assisted in founding the Evangelical Alliance at the "World's Convention," London, 1846. Died June 6, 1848. He was a distinguished and able advocate of total abstinence, a gifted and industrious writer, and was author of a "Manual of Elocution" (1846), "Philosophy of Christian Perfection" (1847), "Christianity Tested by Eminent Men" (1852), "The Doctrine of the English Verb" (1857), and numerous reviews. He was a man of great talents and excellence of character.—His brother, ZENAS CALDWELL (born Mar. 31, 1800; died Dec. 26, 1826), was a brilliant and able instructor, whose early death was widely lamented. A volume of his writings has been published.

Cald'well's, a township of Catawba co., N. C. P. 1101.

Cal'edon, EARLS OF (1800), Viscount Alexander (1797), Baron Caledon (1789), all of the Irish peerage.—JAMES ALEXANDER, fourth earl, was born July 11, 1846, and succeeded his father in 1855.

Caledo'nia, the ancient name of Scotland, probably first given to that country by the Romans. It was inhabited by a rude and warlike people called Caledonii, who are supposed to have been a Gaelic race. The first Roman general who invaded Caledonia was Agricola, who defeated a chief named Galgacus in 84 A. D. Pliny is the first author who mentions Caledonia. Tacitus describes the natives as having red or sandy hair, as living in tents without cities, as addicted to predatory warfare, and fighting in chariots. The Romans made several unsuccessful efforts to subdue these barbarians, who not only repulsed the invaders, but harassed the Roman colonies in Britain by frequent inroads. To defend themselves against these inroads, the Romans built about 140 A. D. the Wall of Antonine from the Frith of Forth to that of the Clyde.

Caledonia, a village of Cape Breton co. and island, Nova Scotia, 10 miles from Sidney, has mines of coal. Pop. about 250.

Caledonia, a county in the E. N. E. of Vermont. Area, 650 square miles. It is bounded on the S. E. by the Connecticut River, and drained by the Passumpsic, Lamoille, and Wells rivers. The surface in the W. part is mountainous; the soil is fertile. Oats, wool, maple-sugar, and hay are the chief products. Lumber, carriages, saddlery, and a great variety of articles are manufactured. It is intersected by the Connecticut and Passumpsic Rivers and Portland and Ogdensburg R. Rs. Capital, St. Johnsbury. Pop. 22,235.

Caledonia, a village of Ontario, Canada, in Haldimand co., on Grand River and the Grand Trunk Railway, 59 miles W. N. W. of Buffalo, N. Y., and about 16 miles S. S. W. of Hamilton. Pop. in 1871, 1247.

Caledonia, a village and township of Boone co., Ill. The village is on a branch of the Chicago and North-western R. R., where it is crossed by the Kenosha and Rockford R. R., 13 miles S. E. of Beloit. Pop. of township, 1345.

Caledonia, a post-village, capital of Pulaski co., Ill., on the Ohio River and on the Cairo and Vincennes R. R., 14 miles above Cairo. Pop. 222.

Caledonia, a post-twp. of Kent co., Mich. Pop. 1599.

Caledonia, a township of Shiawassee co., Mich. P. 891.

Caledonia, a post-village, capital of Houston co., Minn., is 14 miles W. of the Mississippi River and 20 miles S. W. of La Crosse. It has four churches, one academy, two public schools, and one plough and two wagon manufactories. It has one weekly newspaper. Pop. of township, 1628. J. L. CHRISTIE, ED. AND PROP. "JOURNAL."

Caledonia, a post-village and township of Livingston co., N. Y., on the Attica branch of the Erie Railway, 17 miles E. by S. of Batavia. The township yields excellent lime and limestone for building purposes. Caledonia Spring, two acres in area, affords good water-power. Pop. 597; of township, 1813.

Caledonia, a township of Halifax co., N. C. P. 2118.

Caledonia, a post-village of Marion co., O., on the Whetstone River, and on the Atlantic and Great Western R. R., 94 miles N. E. of Dayton. Pop. 419.

Caledonia, a township of Columbia co., Wis. P. 1180.

Caledonia, a township of Racine co., Wis. P. 2800.

Caledonia, a twp. of Trempealeau co., Wis. P. 507.

Caledonia, a township of Waupacca co., Wis. P. 661.

Caledo'nian Canal', The, in Scotland, connecting the Atlantic Ocean with the North Sea near Inverness, was built by Telford, and opened in 1823. It is 61½ miles in length, and is formed by cuts 120 feet broad at the surface, 50 feet at the bottom, and 17 feet deep, connecting the Lochs Ness, Oich, Lochy, and Eil. The combined length of the artificial portions is 23 miles. This canal saves vessels the stormy passage by the Hebrides, which takes nine or ten days longer. Ships of 600 tons can pass through. The highest part is Loch Oich, 94 feet above the sea-level.

Caledo'nia Springs, in Caledonia township, Prescott co., province of Ontario (Canada), are 40 miles from Montreal and 9 miles S. W. of L'Orignal. They are resorted to especially for the cure of cutaneous, scrofulous, and rheumatic diseases. There are four principal springs, all strongly alkaline, one with considerable iodine and bromine in its waters.

Cal'endar [Lat. *calendarium*, the "money-lender's account-book," because interest was payable on the calends; hence, a register of times and seasons—an almanac], a term applied to any systematic and comprehensive method of dividing, distributing, and reckoning time, or to a book or table exhibiting such a method. There are two natural divisions of time, or regularly recurring periods, which all calendars must recognize—the day and the year. The month seems to have been suggested by the period of the moon's revolution (29½ days nearly), to which in some calendars (as the Jewish and the Greek) it has been made closely conformable. The week is, approximately, one quarter of a lunation. It is found in the Oriental and Egyptian calendars, and in that of the Israelites, from whom we have received it, but it was not known to the Greeks or the Romans. The Greeks instead employed *decades* of ten days each, and the Romans periods of *eight* days, the last of which was called *nundinæ* (*novem*, "nine;" *dies*, "day"), or ninth day; the count including both the nundine at the beginning and that at the end of the period. In the ancient calendars the nundine periods were distinguished by setting opposite the successive days the first eight letters of the alphabet (A to H inclusive), repeating these letters throughout the year. From this usage was derived that of the Christian calendar of marking the days by the first seven letters (A to G), similarly repeated. The manner of denoting days of the month was peculiar. The first day was always called *kalendæ*, "calends;" the fifth or seventh, *nonæ*, "nones;" and the thirteenth or fifteenth, *idus*, "ides." The nones were the seventh, and the ides the fifteenth in March, May, July, and October, the first, third, fifth, and eighth months of the Roman year (easily remembered by associating them with the notes of the common chord in music); in the remaining months they fell on the fifth and thirteenth. Any other day was denoted by its distance counted backward from one of these points of reference, the reference-day itself counting one. Thus, the 31st day of March is *Pridie* Kal Apr., or II. Kal Apr.; the 30th day of March is III. Kal Apr.; the 6th of July is Pridie Non. Jul.; the 5th, III. Non. Jul., etc. It is difficult to understand how so cumbrous a system as this could have maintained itself for centuries among a cultivated people.

In the regulation of the year we find the calendars of different peoples materially differing. The Egyptian year had 12 months of 30 days each, and counted five unallotted days at the end. It was too short by nearly a quarter of a day; and hence the beginning of the year went backward through the seasons once in 1460 natural years or 1461 Egyptian years. This was known as the SOTHIAC PERIOD (which see). Because of this incessant movement the Egyptian year is called *vague* or wandering. The Greek year consisted of 12 lunar months of 30 and 29 days alternately. This made the length of the year 354 days alternately. This made the length of the year 354 days, or 11¼ days too small. To compensate for the deficiency, an intercalary month of 30 or 29 days was introduced every alternate year, which made the average length seven days too great; for which reason the intercalary

month was omitted once in about eight years. The earliest Roman year, attributed to Romulus, had only ten months, of which the first, third, fifth, and eighth (those in which, as above mentioned, the nones fell on the ninth and the ides on the fifteenth) had 31 days, and the rest 30 each. This year of only 304 days was shorter than the natural year by about one-sixth. Each Romulian year therefore began two months earlier in the season than the last, and the sixth came to an end at the same time with the fifth natural year. This circumstance, according to Niebuhr, determined the period of the lustrum. (See LUSTRUM.)

The months of the original Roman year were named Martius, Aprilis, Maius, Junius, Quintilis, Sextilis, September, October, November, December. Numa Pompilius, second king of Rome, added, according to Solinus, Januarius to the beginning and Februarius to the end of the year. This year was a lunar year of 354 days, but it was made a day longer, or 355, because there was supposed to be luck in odd numbers. To prevent displacement, an intercalary month of 22 and 23 days, alternately, was introduced every second year. This made the year to consist in effect of 366¼ days. About the year 450 B. C. the decemviri regulated the calendar once more, and placed February between January and March, both at the end of the year. The months were now—whether so settled by Numa or the decemvirs is uncertain—Martius, 31 days; Aprilis, 29; Maius, 31; Junius, 29; Quintilis, 31; Sextilis, 29; September, 29; October, 31; November, 29; December, 29; Januarius, 29; Februarius, 28. The intercalary month was inserted between the 23d and 24th days (as we count them) of February, or, in the Roman manner of speaking, before the sixth calends of March. The reason for so placing it was, that the seventh calends of March, or the 23d day of February, was the last day of a round year of 360 days, and was celebrated as the festival of Terminus, the god of limits, under the name Terminalia. The Romans, like the Egyptians, seem to have regarded the remaining five days as hardly belonging to the year, but as being a sort of interval between two years. The odd day added to the 354 for luck was not, however, intercalated in this place, but was introduced wherever it might be necessary to prevent the *nundinæ* from falling on the calends of January or the nones of any month—such a coincidence being deemed inauspicious. The year on this system being, as we have seen, a day too long, added twenty-four days too much in twenty-four years. It was provided, therefore, that during the last eight years of this period these twenty-four days should be deducted in making the intercalations. The pontiffs, however, who had the control of the intercalation, used their power capriciously for personal ends—sometimes to lengthen or shorten the term of a magistrate, sometimes to benefit or injure the farmer of the public revenues. As a natural consequence, the calendar fell into extreme confusion; so that in the time of Julius Cæsar the civil differed from the astronomical equinox by nearly three months. This powerful ruler resolved on a thorough reform. Under the advice of the astronomer Sosigenes he abolished the lunar year. He readjusted the months to their proper seasons by making the year 708 A. U. C. 445 days long, extending from October 13, inclusive (according to our present count), to the 31st day of the second ensuing December. This year is known in chronology as the year of confusion. He reconstructed the months, giving 31 days each to the first, third, fifth, seventh, ninth, and eleventh, and 30 days each to the rest, except February, which had 29 only, but every fourth year received an intercalary day, making 30. The intercalation took place, for a reason already given above, immediately after the feast of Terminalia, and was made by repeating the *sexto Kalendas Martius;* whence the year in which it occurred came to be called bissextile. Finally, the beginning of the year was transferred from the first of March to the first of January. To flatter the vanity of Octavius after he had secured the supreme power and had received the title of Augustus, a day was taken from February by a sycophantic senate and given to August, which had been named from him, for the frivolous purpose of giving to his month no less dignity in point of numbers than July, which had received its name from the first Cæsar. The lengths of the later months were then altered to prevent three long months from occurring consecutively.

The Julian year consisted of 365¼ days, and consequently differed in excess by 11 minutes 13.95 seconds from the true solar year, which consists of 365 days 5 hours 48 minutes 46.05 seconds. In consequence of this difference the equinox, in the course of a few centuries, fell back sensibly towards the beginning of the year. In the time of Julius Cæsar it corresponded to the 25th of March; in the sixteenth century it had retrograded to the 11th. The correction of this error was one of the purposes sought by the reformation of the calendar effected by Pope Gregory XIII. in 1582. By suppressing ten days in the calendar, Gregory restored the equinox to the 21st of March, the day on which it fell at the time of the Council of Nice in 325. This council determined that the Eastern churches should celebrate Easter at the same time as the Western—*i. e.* on the Sunday following the Paschal full moon, and not on the fourteenth day of the Paschal moon. The Gregorian rule of intercalation may be expressed as follows: Every year of which the number is divisible by 4 without a remainder is a leap year, excepting the centesimal years, which are only leap years when divisible by 4 after suppressing the two zeros. Thus, 1600 was a leap year; 1700 and 1800 were common years; 1900 will be a common year, 2000 a leap year, and so on. The length of the mean year thus fixed is 365.2425 days, or 365 days 5 hours 49 minutes 12 seconds, which exceeds the true solar year by 25.95 seconds, an error which amounts only to one day in 3325 years. The intercalations might be so made as to make the calendar year correspond even more closely than it does now with the solar year, but no other method could be as convenient as the Gregorian.

The new calendar was received immediately or shortly after its promulgation by all Roman Catholic countries. The Protestant states of Germany and the kingdom of Denmark adhered to the Julian calendar till 1700; and in England the alteration was successfully opposed by popular prejudices till 1752. In that year the Julian calendar, or *old style*, as it was called, was abolished by act of Parliament, and the date used in all public transactions rendered coincident with that followed in other European countries, by enacting that the day following the 2d of Sept., 1752, should be called the 14th of that month. When the alteration was made by Gregory it was only necessary to drop ten days; the year 1700 having intervened, which was a common year in the Gregorian, but a leap year in the Julian calendar, it was now necessary to drop eleven days. The old style is still adhered to in Russia and the countries following the communion of the Greek Church; the difference of date in the present century amounts to twelve days. For fuller information on this subject, see DELAMBRE, "Astronomie Théorique et Pratique," tom. iii., chap. xxxviii.; IDELER, "Lehrbuch der Chronologie;" and ANTHON, "Greek and Roman Antiquities."

Ecclesiastical Calendar.—The adaptation of the civil to the solar year is attended with no difficulty, but the church calendar for regulating the movable feasts imposes conditions less easily satisfied. The festival of Easter commemorates the resurrection of our Lord, which momentous event having occurred near the time of the Jewish Passover, was naturally associated in the minds of the early disciples with that anniversary, and its annual returns were made dependent upon the same calendar regulations. The Passover was observed on the fourteenth day of the moon—that is, near the full moon. The question what day is most proper for the observance of Easter became early a subject of warm controversy. In order to put an end to an unseemly contention, the Council of Nice ordered that Easter should be celebrated on the Sunday which immediately follows the full moon that happens upon or next after the vernal equinox. In order to determine Easter according to this rule for any year, it is necessary to reconcile three periods—namely, the week, the lunar month, and the solar year. To find the day of the week on which any given day of the year falls, it is necessary to know on what day of the week the year began. In the Julian calendar this was easily found by means of a short period or cycle of twenty-eight years, after which the year begins with the same day of the week. In the Gregorian calendar this order is interrupted by the omission of the intercalation three times out of four in the last year of the century. But to render calculation unnecessary, a table is given in the prayer-books, showing the correspondence of the days of the year and the week for the current century. The connection of the lunar month with the solar year is an ancient problem, for the resolution of which the Greeks invented cycles or periods, which remained in use with some modifications till the time of the Gregorian reformation. See, on this subject, DELAMBRE, "Histoire de l'Astronomie Moderne," tom. i., liv. i.; also DE MORGAN, "Companion to the British Almanac," 1845; also, BARNARD, "How to Find the Church Festivals," New York, 1872.

A new reform of the calendar was introduced in France during the period of the Revolution. The commencement of the year was fixed at the autumnal equinox, which nearly coincided with the epoch of the foundation of the republic. The names of the ancient months were abolished, and others substituted having reference to agricultural labors or the state of nature in different seasons of the year. But the alteration was found to be inconvenient and impracticable, and after a few years was formally abandoned.

F. A. P. BARNARD.

Cal'endering [a corruption of the word *cylindering*].

the process of finishing by pressure the surface of linen, cotton goods, or paper, by passing the material between cylinders pressed together with force; the domestic processes of starching and ironing afford simple illustrations of the object and result of calendering. The mangle effects the same object as the flat-iron, and is a near approach in construction to the calendering-engine. The calenders were originally of wood. Hollow iron and copper cylinders are used where heat as well as pressure is required, the cylinders being heated by steam passed through the interior or by red-hot heaters; but it is desirable that one of the cylinders shall be of material combining considerable hardness with a degree of elasticity; for this purpose solid paper cylinders are used.

Before the final calendering the fabric is flatly smoothed by passing over warm cylinders. Cotton goods are starched with flour, thickened with plaster of Paris, porcelain clay, etc., to give an appearance of stoutness, which of course vanishes when the article is washed. The fabric is then simply passed between plain cylinders, which produces the desired effect by flattening the threads. When, by means of a cylinder with a pattern raised upon it, the amount of this flattening is unequal on different parts of the cloth, the effect known as *watering* is the result. *Glazing* is produced by the rollers being made to move with different velocities, so that one side of the fabric is rubbed as well as pressed by the roller whose surface moves with the greater rapidity. A copper roller is used for glazing, so hot that if the machine stops it burns the goods. For glazing on a small scale a polished flint is rubbed over the fabric, which is laid upon a smooth wooden table.

Cal'ends [Lat. *calendæ*, from *calo* (Gr. καλέω), "I call"], the first day of each Roman month, because, according to Macrobius, before Cn. Flavius the scribe, against the will of the patricians, made the *fasti* (propitious days—days when courts were open) known to all the people (about 300 years B. C.), it was the duty of one of the minor priests, on the first appearance of each new moon, to summon the plebeians to a place in the Capitol near the Curia Calabria, and there to announce the number of days before the nones (always five or seven, *including the day of calling and the day of the nones itself*), by so many times repeating the word *calo*. If the part of this statement which makes the beginning of each month dependent on direct observation of the moon is correct, it is impossible that the months of the early Roman calendar should have had the fixed and rather arbitrary lengths usually assigned to them. As to this question historians differ, some asserting that the Roman months were strictly lunar down to A. U. C. 448; others, as Censorinus, that their lengths were fixed by Numa, the second king. (See CALENDAR, by PRES. F. A. P. BARNARD, S. T. D., LL.D., L. H. D.)

Cal'enture [Sp. *calentura*, a "fever," a "heat"], a species of temporary delirium occurring on board ship in hot climates, and probably due to the effect of exposure to the direct rays of the sun. The descriptions of the disease seem rather fanciful and contradictory, and the term is nearly obsolete. It is said that persons having a calenture fancied the sea was a green field, and leaped overboard.

Cale'ra, a post-village of Shelby co., Ala., at the crossing of the Selma Rome and Dalton and South and North Alabama R. Rs., 10 miles W. by S. of Columbiana.

Calf Creek, a post-township of Searcy co., Ark. Pop. 511.

Calhoun', a county in the E. N. E. of Alabama. Area, 700 square miles. It is bounded on the W. by the Coosa River. The surface is diversified by hills and fertile valleys. Cotton, corn, and wool are the staple products. It is intersected by the Selma Rome and Dalton R. R. Capital, Jacksonville. Pop. 13,980.

Calhoun, a county in the S. of Arkansas. Area, 650 square miles. It is bounded on the E. by Moro River, and on the S. W. by the Washita. The surface is undulating and well timbered; the soil is fertile. Chief products, corn and wool. Capital, Hampton. Pop. 3853.

Calhoun, a county of Florida. Area, 464 square miles. It is bounded on the E. by the Appalachicola River, and on the S. W. by St. Joseph's Bay, a part of the Gulf of Mexico. The surface is low and nearly level. Tobacco, rice, and corn are the chief crops. Capital, Ocheesee. P. 998.

Calhoun, a county in the S. W. of Georgia. Area, 300 square miles. It is intersected by the Ichawaynochaway Creek. The surface is level; the soil is productive. Chief crops, cotton and corn. Capital, Morgan. Pop. 5503.

Calhoun, a county of Illinois, bordering on Missouri. Area, 260 square miles. It is a narrow peninsula, bounded on all sides except the N. by the Mississippi and Illinois rivers, which unite at the S. E. extremity of the county. The surface is uneven. Grain, wool, live-stock, and potatoes are largely raised. Capital, Hardin. Pop. 6562.

Calhoun, a county in N. W. Central Iowa. Area, 570 square miles. Grain and stock are raised. Capital, Lake City. Pop. 1602.

Calhoun, a county in S. W. Central Michigan. Area, 720 square miles. It is intersected by the Kalamazoo and St. Joseph rivers, and is also drained by Battle Creek. The surface is undulating; the soil is a rich sandy loam. It is intersected by the Michigan Central R. R. Quarries of sandstone occur here. Grain, dairy crops, wool, fruit, and potatoes are very extensively raised. Carriages and wagons, lumber sawed, flouring-mill products, clothing, cooperage, saddlery, and harness are chief manufactures. Capital, Marshall. Pop. 36,569.

Calhoun, a county in N. Central Mississippi. Area, 560 square miles. It is intersected by the Yallobusha River and Loosascoona Creek. The surface is undulating or nearly level; the soil is fertile. Corn, cotton, cattle, wool, and grain are the chief products. Flouring-mill produce is extensively manufactured. Capital, Pittsboro'. Pop. 10,561.

Calhoun, a county of Texas, bordering on the Gulf of Mexico. Area, 684 square miles. It is bounded on the N. E. by Lavacca Bay, and on the S. W. by Espiritu Santo Bay and the Guadalupe River. The surface is nearly level. Cattle and wool are largely raised. The county is traversed by the San Antonio and Mexican Gulf R. R. Capital, Indianola. Pop. 3443.

Calhoun, a county in Central West Virginia. Area, 300 square miles. It is intersected by the Little Kanawha River. The surface is hilly. Grain and wool are the chief products. Capital, Grantsville. Pop. 2939.

Calhoun, a post-village and township of Lowndes co., Ala., about 30 miles S. S. W. of Montgomery. Pop. 2781.

Calhoun, a post-village of Columbia co., Ark. P. 806.

Calhoun, a post-village, capital of Gordon co., Ga., on the Western and Atlantic R. R., 78 miles N. W. of Atlanta. It has one weekly newspaper. Pop. 427.

Calhoun, a township of Calhoun co., Ia. Pop. 263.

Calhoun, a post-township of Harrison co., Ia. P. 371.

Calhoun, a post-village, capital of McLean co., Ky., is on Green River, about 40 miles S. S. E. of Evansville, Ind.

Calhoun (JAMES M.), a nephew of J. C. Calhoun, was born in South Carolina, but removed to Alabama, where in 1831 he was elected a member of the House. He served for several years, then retired for fifteen years, but served once more in the Senate from 1857 to 1861.

Calhoun (JOHN CALDWELL), LL.D., an eminent American statesman, born in Abbeville district, S. C., Mar. 18, 1782. He graduated at Yale College in 1804, studied law, and was sent to Congress in 1811. He began his political career as a Democrat and a leader of the war-party. He supported the tariff of 1816 and the U. S. Bank. In Oct., 1817, he became secretary of war in the cabinet of President Monroe. He approved the Missouri Compromise of 1820, and was elected Vice-President of the U. S. in 1824, in which canvass he was supported by the friends of Jackson and those of Adams. Having joined the Jackson party, he was again elected Vice-President in 1828, when General Jackson was chosen President. About this time he became an advocate of free trade and of the doctrine of the sovereignty of the States. He was the author of the "South Carolina Exposition," which affirmed that any State can nullify unconstitutional laws of Congress. Calhoun and Van Buren having become aspirants for the office of President of the U. S., Gen. Jackson, by promoting the nomination of the latter, incurred the enmity of Calhoun. He resigned the office of Vice-President in 1832, and was then elected a Senator of the U. S. for South Carolina. A convention held in South Carolina near the end of 1832 adopted what was known as the Nullification ordinance. Its object was to test the constitutionality of the protective tariff policy through the instrumentality of the State instead of the Federal courts, and to prevent the collection of duties on imposts in that State under the act of Congress of 1832, levied, as was alleged, with a direct view rather to the protection of American manufactures than the collection of revenue, until the protective principle, so-called, should be so tested and decided by the State courts. This was in pursuance of Mr. Calhoun's peculiar doctrines, known as nullification. He held that under the Federal system the judiciary of each State had the reserved sovereign right to decide in the last resort upon the extent of the powers delegated under the Constitution by the States respectively. This ordinance was to go into effect on the 12th of Feb., 1833. The determined attitude of Gen. Jackson against these nullification doctrines caused

general and serious alarm lest a conflict of forces should ensue between the Federal and State authorities. It was in this condition of affairs that Mr. Clay, as a mediator, came forward with his famous "tariff compromise" of 1833, which was founded upon the avowed principle of an abandonment of the protective policy after 1843. To this measure Mr. Calhoun gave his cordial support, and in this way the anticipated perils of the crisis were averted.

As a debater, Mr. Calhoun occupied the foremost rank among the American Senators, and was scarcely equalled by any of his contemporaries, except Mr. Clay and Mr. Webster. These three were known as "the Great Trio." The debate between Mr. Calhoun and Mr. Webster on the nature of the Federal government and the doctrine of nullification, so-called, in Feb., 1833, was one of the most noted for ability and eloquence in the annals of this country. Mr. Calhoun retired from the Senate in Mar., 1843, and was appointed secretary of state by Mr. Tyler in Mar., 1844. It was under his auspices that the "Tyler treaty," as it was called, for the annexation of Texas, was negotiated in the same year. He was re-elected to the Senate in 1845, and opposed the Mexican war in 1846. He continued in the Senate until his death, which occurred 31st of Mar., 1850. His mind was eminently metaphysical, and his private character was without reproach. Among his writings are two posthumous works—one, a "Disquisition on Government," and the other, "A Discourse on the Constitution and Government of the U. S." These are both held in high estimation by his admirers and men of his school of politics. ALEX. H. STEPHENS.

Calhoun (WILLIAM BARRON), LL.D., born at Boston, Mass., Dec. 29, 1795, graduated at Yale in 1814, became a prominent lawyer of Springfield, Mass., was speaker of the Massachusetts house of representatives (1834–35), member of Congress (1835–43), president of the Massachusetts senate (1846–47), and State secretary 1848–51, besides holding other important offices. Died Nov. 8, 1865.

Calhoun Mills, a post-village and township of Abbeville co., S. C., about 87 miles W. of Columbia. Pop. 2208.

Ca'li, a town of the United States of Colombia, 70 miles N. by E. of Popayan, is on a western declivity of the Andes. It has two fine churches and an active trade. Pop. about 5000.

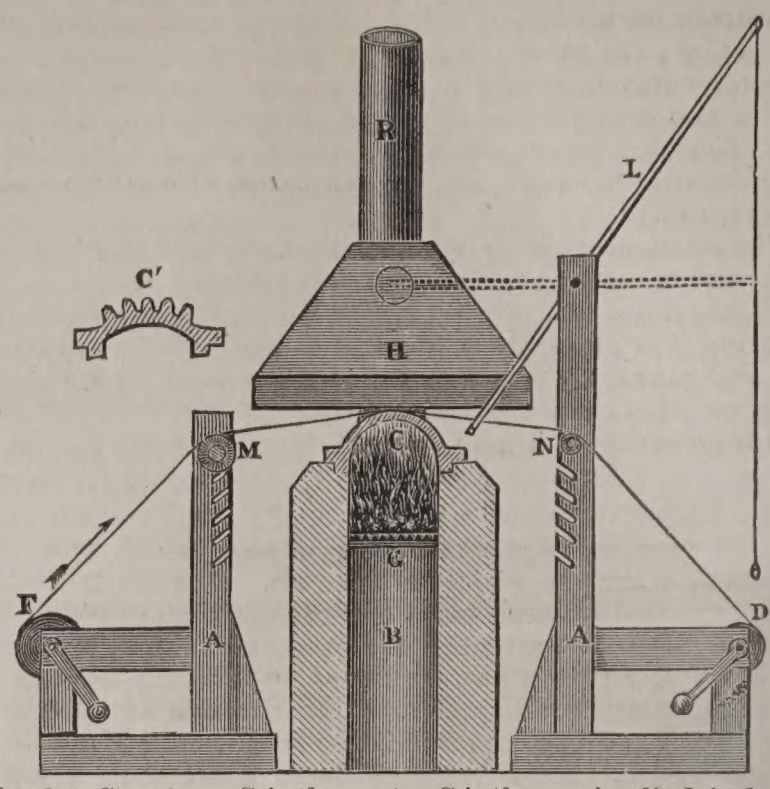
Cal'ibre, or **Caliber,** a French word which is also much used in English, signifies the diameter of the bore of a gun or any firearm. It is usually measured and decribed in inches or parts of inches. The cannon in which solid shot is used are often denoted by the weight of each shot, as a twenty-four pounder, but mortars which throw shells or hollow shot are usually designated by such terms as a thirteen-inch mortar, etc.

Cal'ico, a kind of cotton cloth, said to be so named from Calicut, a city of India, where it was first manufactured. It was imported into England by the East India Company in 1631.

Calico-Printing is the art of producing patterns on cotton cloth, either by printing in colors, or in mordants which become colors when subsequently dyed. Cloth made from cotton and wool, when similarly printed, is known as mousseline de laine. Calico-printing originated in India in very ancient times. Pliny describes the art as practised by the Egyptians. For a long time chintz counterpanes were imported into England from India. The art spread westward to Asia Minor and the Levant. It was imported into Holland by the Dutch East India Company, and spread into Germany. At the close of the seventeenth century Augsburg in Bavaria was noted for its printed linens and cottons. Calico-printing was introduced into England during the seventeenth century, but the development of the art was for a long time seriously retarded by the opposition of the silk and woollen weavers. At their instigation the importation of chintz from Calicut was prohibited, and a heavy revenue tax was placed upon English calicoes. Finally, in 1720 a law was enacted prohibiting the wearing of any printed calicoes whatever, either of foreign or domestic origin. This law was repealed in 1736, but a duty of 6*d.* per yard was still levied. In 1831 all duties were repealed. England is now the largest producer of calicoes; the U. S. stand second. The finest calicoes are made in Alsace, at Mühlhausen. Calico-printing involves a variety of operations, some of which are peculiar to certain styles, while others are common to all.

Singeing.—The first operation is the removal from the surface of the cloth of the fibrous nap or down, which, if not removed, would seriously interfere with the uniform application of the colors. The removal of the nap is effected either by passing the cloth rapidly over a red-hot plate (Fig. 1) or between lines of gas-jets. A shearing-machine is also in use for this purpose.

FIG. 1.



Hot-plate Singeing.—G is the grate; C is the semi-cylindrical red-hot plate of iron or copper; F and D are rolls on which the cloth is wound; M and N are brushes for raising the nap; L is a lever for raising the cloth from the plate, slots being made in the hood H to permit its being raised to the position indicated by the dotted line. C′ is a ridged plate used in some establishments.

Bleaching is then effected by boiling the cloth with lime, souring with sulphuric acid, boiling with soda-ash and rosin, boiling with soda-ash alone, treating with bleaching-powder, souring again, and finally washing thoroughly with water. (See BLEACHING.)

Calendering is resorted to in order to make the cloth smooth and even. It is effected by passing it between very heavy rolls.

Fixing the colors upon the cloth is effected (1) by the aid of mordants, substances which have an affinity for both fibre and color, as madder, logwood, Brazil-wood, etc., fixed by alumina or oxide of iron; Persian berries, fixed by chloride of tin; aniline colors, fixed by gluten, etc. Sumach and cutch, which produce drabs and blacks with oxide of iron by the action of the tannic acid they contain, belong to this class. It is impossible to make a distinction between the action of true mordants and of agents which simply produce insoluble colors in the tissue of the cloth, as the two classes pass into each other by insensible gradations. These insoluble colors are produced by double or simple decomposition, by the successive treatment of the cloth with the necessary reagents. Thus, Prussian blue is fixed on the cloth either by first applying an iron salt and then treating it with ferrocyanide of potassium, or it is produced by the decomposition of ferrocyanide of potassium alone, under the influence of certain acids. Chrome yellow is produced by the successive application of a lead salt and bichromate of potassa. Indigo is fixed by applying it in solution as colorless reduced indigo, and developing it as insoluble blue pigment by oxidation in the air. Brown oxide of manganese is formed by applying sulphate of manganese, withdrawing the sulphuric acid by an alkali, and oxidizing to a brown oxide by hypochlorite of lime. Aniline black is produced by the oxidation of an aniline salt in the cloth. (2) Colors are fixed by agents which, being first mixed with the color, are applied to the cloth and then rendered insoluble, when they hold the color upon the fibres mechanically, as ultramarine blue, Guignet green, chrome yellow, madder lake, and aniline colors, fixed by albumen coagulated by heat.

Patterns are produced (1) by printing the mordant in figures, and subsequently producing the colors in the dye-liquors: *madder styles.* (2) By printing one component of the color, and then passing the cloth through a solution of the other component, or of the agent necessary to develop the color: *padding, bronzing, indigo, pencil blue,* and *China blue styles.* (3) By printing the color together with the mordant or fixing agent, and rendering it insoluble or developing it by air or steam. This is called topical or surface printing: *steam colors, spirit colors, aniline black, aniline colors by albumen, pigment printing, metallic printing.* (4) By printing resist or reserve pastes, which protect certain portions of the cloth, and prevent the fixing of the color in the subsequent dyeing operations: *resist styles.* (5) By discharging the color from portions of the cloth previously dyed: *discharge styles.*

The *colors* most frequently employed in calico-printing are (1) the dyestuffs proper—madder in the various forms of powdered root, garancine, extract, alizarine, etc.; log-

wood, Brazil-wood, sandal, cam, and bar wood, and fustic; quercitron bark, indigo, Persian berries, cochineal and aniline colors; (2) the astringents which contain tannic acid, catechu, sumach, nutgalls, etc.; (3) the pigments chrome yellow and orange, Prussian blue, Guignet green, ultramarine, Scheele's green, oxide of iron, oxide of manganese. (For details see each under its own name, also DYEING and DYESTUFFS.)

The *mordants* most frequently used are salts of alumina, iron, and tin, caseine, albumen, and gluten.

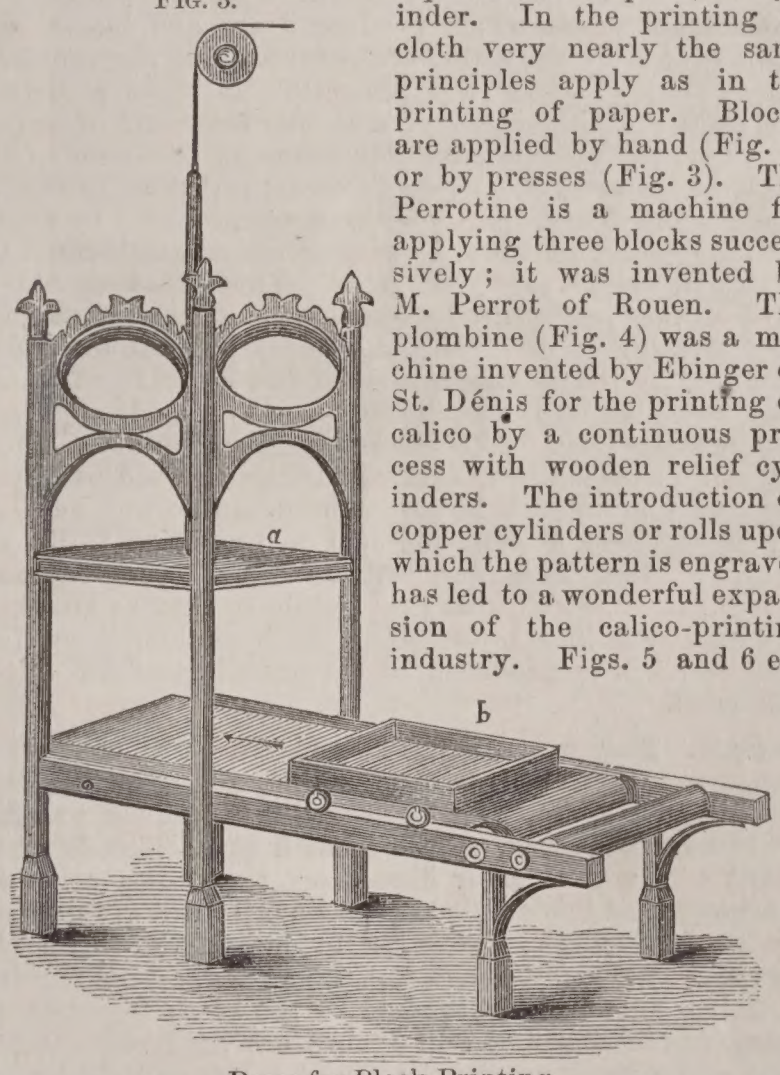
Thickenings.—In preparing the colors and mordants for printing it is necessary to thicken them to prevent spreading and running. The agents generally used for this purpose are wheat flour, starch, dextrine, gum-arabic, senegal, and tragacanth, and glue.

FIG. 2.

Block-printing by hand.

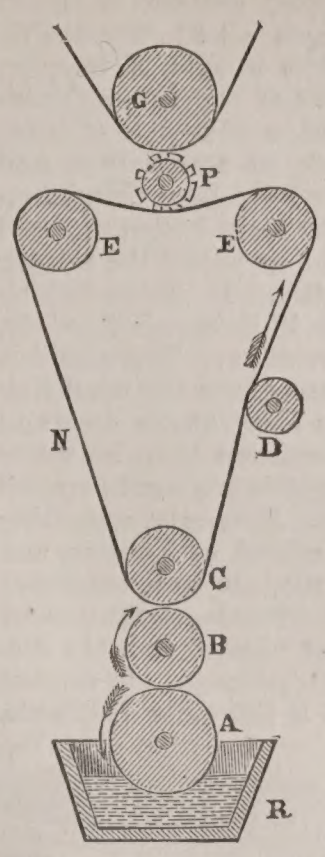
Printing Apparatus.—The mordants and colors are applied to the cloth either by wooden blocks or cylinders with raised patterns, or by copper plates or cylinders with sunken patterns; the copper cylinders being most generally used for common calicoes. Each color or tint requires a separate block, plate, or cylinder. In the printing of cloth very nearly the same principles apply as in the printing of paper. Blocks are applied by hand (Fig. 2) or by presses (Fig. 3). The Perrotine is a machine for applying three blocks successively; it was invented by M. Perrot of Rouen. The plombine (Fig. 4) was a machine invented by Ebinger of St. Dénis for the printing of calico by a continuous process with wooden relief cylinders. The introduction of copper cylinders or rolls upon which the pattern is engraved has led to a wonderful expansion of the calico-printing industry. Figs. 5 and 6 exhibit the disposition of the more essential parts in printing with engraved cylinders. The cloth F passes over a huge drum B, against which the rolls A are pressed. Each roll is supplied with thickened mordant or color by a wooden cylinder C, which dips into a vessel E containing it. A blunt knife D, called the *color doctor*, scrapes off the superfluous mordant or color from the unengraved portion of the roll; another knife, called the *lint doctor*, cleanses the roll as it leaves the cloth. By enlarging the drum the capacity of the machine may be increased from one to twenty colors by adding to the number of rolls. Fig. 7 exhibits a ten-color machine; Fig. 8 an eighteen-color

FIG. 3.



Press for Block Printing.

FIG. 4.

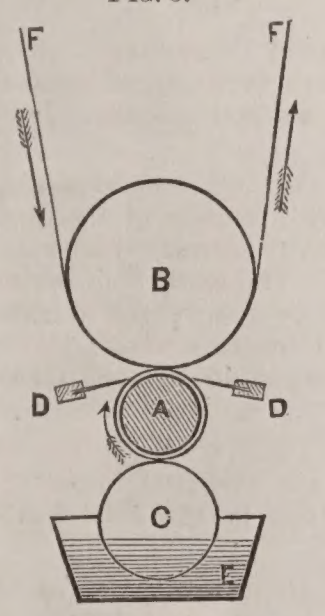


Plombine Printing.—R is the color-trough. The roll A applies the color to the roll B, which transfers it to the endless web N, by which it is applied to the relief cylinder P, which prints it upon the cloth as it passes over the drum G.

machine. The pieces of cloth, measuring each about forty yards, are stitched together, and the process becomes continuous, miles of calico being printed without stopping the machine. A similar machine is now employed in printing wall-paper. As each roll prints only a portion of the pattern, it is of course very important to regulate the tension of the cloth to secure the proper location of the parts of the figure. It is found that the cloth stretches in length, and consequently diminishes in width, in the machine; so each roll must be made to print a slightly narrower pattern than those which precede it. To prevent the running of the mordants or colors, the cloth passes directly from the machine to a heated drying-room.

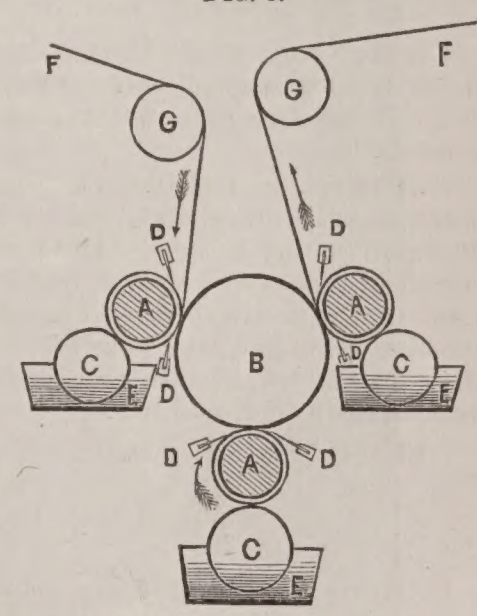
Madder Style.—This is the most important and extensively practised style of calico-printing, applicable not only to the coloring-matter from which it derives its name, but to nearly all organic coloring-matters which are soluble in water and capable of forming insoluble compounds with mordants. The thickened mordants are printed on the cloth, and the colors are produced by passing the cloth through the dye-beck, which contains the dyestuffs and water. For pinks the mordant employed is acetate of alumina;

FIG. 5.



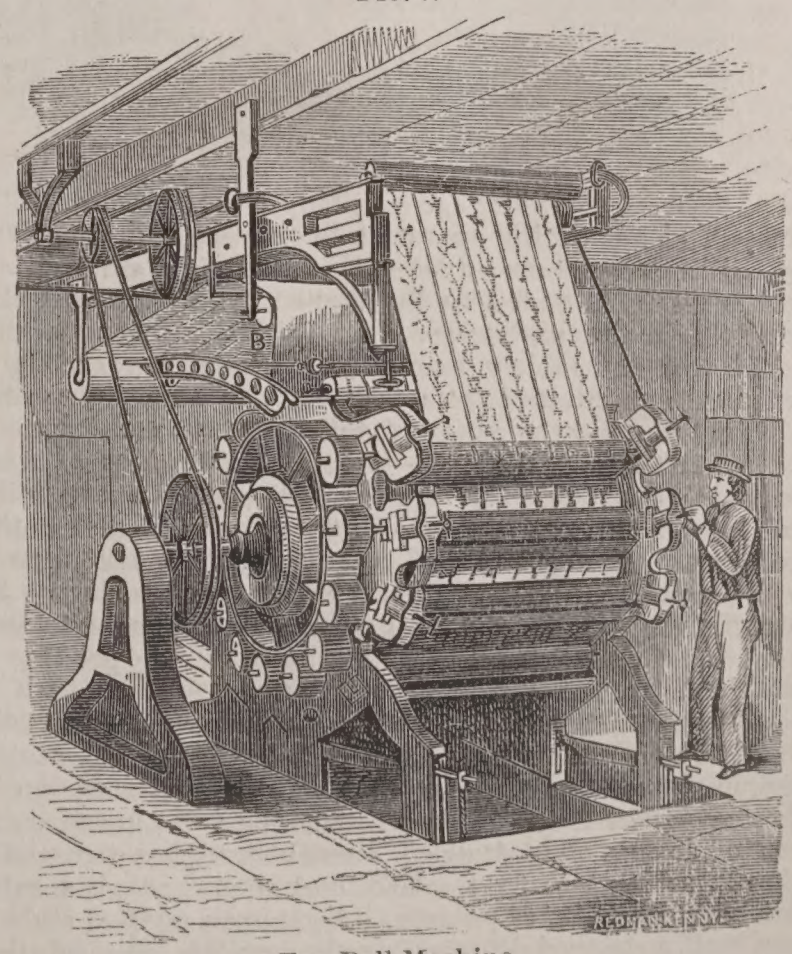
Single Roll.

FIG. 6.



Three Rolls.

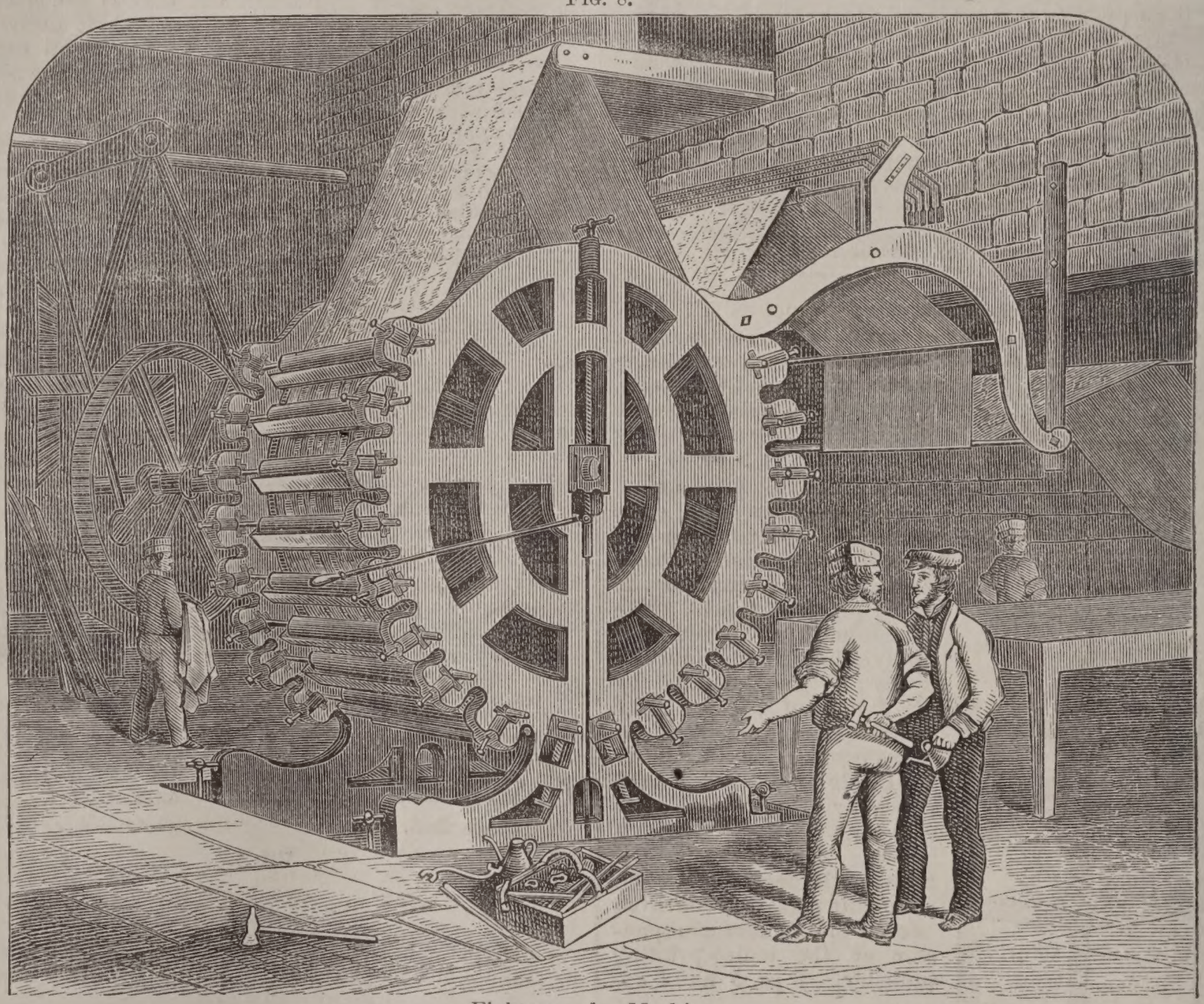
FIG. 7.



Ten-Roll Machine.

for reds, the same, more concentrated, with an addition of chloride of tin; for purple, acetate of iron; for chocolate, acetate of alumina, with a little acetate of iron; for brown, catechu, with a little nitrate of copper; for drab, catechu, with a little nitrate of copper and chloride of iron; for black, a strong solution of acetate of iron; for orange, acetate of lead, chloride of ammonium, and chloride of tin. After the mordants have been printed on the cloth, it is run into the drying-room, and then exposed to the process of *ageing*. This has for its object the setting or rendering insoluble of the mordants. It is effected by hanging the cloth in a room where it is exposed to air, warmth, and a certain degree of moisture. The alumina loses most of its acetic acid, and passes into the condition of an insoluble basic salt; the iron loses acetic acid and takes up oxygen, passing into the condition of an insoluble basic salt of the sesquioxide. The goods are next exposed to a cleansing process called *dunging*. Formerly, cow-dung was used for this purpose; it was mixed with water, and the goods were passed through the mixture and subjected to a kind of scouring. Phosphate of soda, arseniate of soda, and silicate of soda have now almost entirely displaced the dung. The effect of the treatment is to remove the excess of mordant, render what is left quite insoluble, and clear the unmordanted portions of the cloth. The next step is the dyeing, which is effected in the dye-beck. Water and the proper coloring-matters are introduced, and by means of steam the whole is heated to the proper temperature. The dyestuffs employed depend somewhat upon the tints to be produced. Madder alone is used for pinks; for reds, purples, chocolates, etc., a portion of the madder is replaced by Brazil-wood. For orange Persian berries are added, with quercitron and fustic; for blacks, logwood. In order to brighten the colors, to render them more permanent, and to clear the whites, the cloth is next subjected to the *clearing* process. This consists in exposing it to a bath containing bran and soap, and then to a very weak solution of bleaching-powder, hypochlorite of lime. If the colors employed include Persian-berry orange, the cloth is passed through a very weak bath of chloride of tin. The cloth is then washed, starched, and calendered, when it is ready for market. Calico dyed in madder styles is the most durable, resisting the action of light and soap better than any other style. *Garancine styles* are mordanted in the same manner, but are dyed with garancine—madder which has been treated with sulphuric acid. (See MADDER.) This is a more economical way of using madder. It is preferred for dark, heavy colors where the cloth is much

FIG. 8.



Eighteen-color Machine.

covered. The soaping operation is omitted, and the colors are not as fast as those dyed with madder. Carbonate of lime, whiting, is added to the dye-beck, to neutralize the free acid in the garancine. Artificial alizarine madder red is now extensively manufactured from anthracene, a hydro-carbon obtained from coal-tar. It is employed as a substitute for the various preparations of the madder root, both in the dye-beck and in topical printing. (See ALIZARINE.) *Padded styles* are specially adapted to mineral colors. Sometimes padding is resorted to for the production of a ground of a uniform tint, the figures to be subsequently applied by topical printing. In this case the cloth is first passed through a mordant, then dried, and passed through the dye. To produce a pale blue ground the cloth is first passed through a weak iron solution, then dried, passed through chalk suspended in water to fix the iron, then through ferrocyanide of iron to produce Prussian blue. To produce a design in chrome yellow the cloth is printed with a thickened solution of acetate of lead, dried, passed through a carbonate-of-soda solution to fix the lead, and then through a solution of bichromate of potassa. A common padded style is iron buff, produced by passing through an iron solution and fixing by an alkaline bath. *Bronzes* were once a favorite style. They were prepared by padding with chloride of manganese, then through caustic soda, and finally through hypochlorite of lime. A uniform brown ground was thus produced. By printing figures with protochloride of tin mixed with pigments or decoctions, the brown color was discharged, and colored patterns on a brown ground were produced. *Topical printing* has displaced to a considerable degree the old madder styles. The colors and the mordant or fixing agent being applied to the cloth together, the operations of dunging and dyeing are rendered unnecessary, and a much greater variety of colors and shades can be employed; and as the colors do not come in contact with the whites, there is a great economy of materials. Woollen fabrics and de laines are always printed in this manner, as they are not well adapted for mordanting and dyeing in the madder style, owing to the affinity which wool possesses for most coloring-matters. *Steam colors* are produced by printing upon the cloth the madder and dyewood extracts, mixed with the mordants, to fix them and to produce the desired tints, and properly thickened. On exposing the dried and aged cloth to steam, an intimate union of the color, mordant, and fibre is effected. Such goods are very brilliant and permanent to light, but do not withstand hot soap solution, which alters the shades. For steam reds, prepara-

tions of madder, cochineal, and various dyewood extracts, especially Brazil-wood, are employed. Madder extract, nearly pure alizarine, prepared from madder root by various processes, is extensively used, not only for pinks and reds, but also for purples and chocolates. Artificial alizarine is now largely used in place of madder extract. For reds and pinks it is mixed, in the form of paste, with solutions of acetate of alumina and acetate of lime, and a thickening composed of wheat starch, acetic acid, gum tragacanth, and olive oil boiled to a paste with water. For purples, pyrolignate of iron is used in place of acetate of alumina. Cochineal is prepared for steam-printing by boiling the cochineal liquor with starch, and adding oxalic acid and protochloride of tin.

For steam yellows, either decoction of quercitron bark mixed with alum and gum senegal, or a decoction of Persian berries with alum, protochloride of tin, and gum senegal, is employed. Prussian blue is ground with chloride of tin and thickened for topical printing. To convert it into green the cloth, after rinsing, is passed through a solution of bichromate of potash. *Spirit colors* are extremely brilliant topical tints, obtained by the use of larger proportions of the spirits or metallic mordants. As they are applied very strong and acid, they cannot be steamed, but are simply dried in the air, aged, and rinsed with water. For a spirit purple a mixture of logwood liquor, thickened with starch, to which some perchloride of tin is added as a mordant, is employed. For chocolate, extract of Brazil-wood and extract of logwood, with the chlorides of tin and copper, properly thickened, is used. For red, peach-wood liquor, with starch, nitrate of copper, perchloride of tin, chloride of tin and ammonium, and oil. *Aniline black* is a topical style recently introduced, which has almost entirely displaced logwood and other blacks for certain kinds of patterns. It is produced by printing a thickened mixture of an aniline salt with a powerful oxidizing agent, such as chlorate of potassa, with chloride of ammonium, sulphate of copper, etc. The color is developed by steaming, and the goods are finally passed through a weak solution of carbonate of soda. When applied to large surfaces this black injures the strength of the fabric; its use is consequently restricted to light patterns showing a large proportion of white. It is also specially adapted for use with other topical styles. It is practically indelible. By substituting naphthylamine for the aniline salt the beautiful naphthylamine violet is produced.

Aniline Styles.—While the different aniline colors are more especially adapted to wool and silk dyeing and printing, they are nevertheless employed to some extent in calico-printing, either in the dye-beck or by topical application as steam colors. In the former case the cloth is printed with (1) albumen, caseine, gluten, or chloride of tin, followed by a nutgall decoction to produce insoluble tannates, and then passed through an acid solution of the aniline color; or the cloth is mordanted with either of the above-mentioned substances, the nutgall decoction printed on, and then passed through the acidulated color. Single tints are thus produced. For use as topical colors, to be fixed by steam, the aniline colors are mixed with albumen, gluten (either putrid or dissolved in soda-lye, weak acid or saccharate of lime), caseine in lye or weak acid, glue, tannate of glue, tannic acid, oleo-sulphuric acid, shell-lac in borax, arsenious acid in glycerine (method of Alfred Paraf), or with a solution of arsenite of alumina in acetate of alumina. The last process, devised by Perkin and Schultz, is more extensively employed than any other, except perhaps that with albumen. Of course in topical printing any desired number of aniline colors may be used at the same time. *Pigment printing* involves the application of the pigments used in painting to the surface of the cloth by means of some cementing agent. Caoutchouc dissolved in naphtha was first employed with excellent results, but the danger of fire attending the use of naphtha has caused the substitution of albumen, caseine, or gluten for the caoutchouc. The pigments generally used are ultramarine, chrome yellow and orange, Guignet green, and lampblack for drabs. *Metallic precipitates*, as tin precipitated by zinc, are sometimes printed on cloth.

Indigo Styles.—Indigo is in some respects a very peculiar dye; it is insoluble in its ordinary blue form, $C_{16}H_{10}N_2O_2$, but is changed by reducing agents, such as grape-sugar in soda-lye, or protoxide of iron, produced by the action of lime on copperas, to colorless, soluble, hydrogenized indigo, $C_{16}H_{12}N_2O_2$. By passing the cloth through such a solution, and exposing it to the air, the indigo is oxidized and becomes blue again, being fixed as an insoluble pigment in the fabric. By repeating the treatment any desired shade is obtained. By the use of reserve pastes or discharges, with topical printing, white or colored figures on a blue ground are produced. *Pencil blue* is a name given to a style of calicoes which were prepared by printing on by hand, with a piece of wood called a pencil, the colorless reduced indigo. On oxidizing it produced figures in fast blue. *The China blue or pottery style* (so called from its resemblance to old china) was once very popular, but, owing to its cost and the ease of imitating it with Prussian blue, is now almost obsolete. The blue indigo was printed on the cloth, forming blue figures on a white ground. To render the color fast, the indigo was worked into the cloth by treating it alternately with lime and copperas. *Resist styles* involve the use of a resist or reserve which protects the cloth in mordanting, dyeing, padding or covering, so that the mordant or color does not adhere. Some resists act mechanically, as clay, fat, oil, resin, wax, and sulphate of lead. Others act chemically, as citric, tartaric, or oxalic acid, or bisulphate of potassa, which are printed on cloth mordanted with alumina or iron to remove them and prevent the fixing of the color. Sulphate of zinc, sulphate and acetate of copper, and chloride of mercury are special resists used in indigo styles. *White resist,* for cylinder printing, consists of a mixture of acetate or sulphate of copper thickened with gum or dextrine. It is printed on the white cloth and allowed to dry. When the cloth is handled in the indigo vat containing the soluble colorless indigo, it is dyed a uniform blue, the insoluble indigo being precipitated as insoluble blue pigment in the fibres, except where the resist has been applied. Here the copper salt having been changed to oxide of copper by the alkali of the vat, the colorless indigo is oxidized by the oxide of copper (which becomes suboxide), and deposited on the surface. On subsequently passing the dyed goods through dilute sulphuric acid, the suboxide of copper is dissolved and the indigo detached, leaving white figures on a blue ground. Often the resist is mixed so as to contain a mordant for some other color; thus, the resist applied to cloth to be dyed in the indigo vat may contain an iron or alumina mordant; so that after the ground with the white figures is produced, the white becomes colored red, purple, or black in the dye-beck with madder, woods, or bark. This style is sometimes called *lapis,* from a remote resemblance to *lapis lazuli.*

Discharge Style.—After cloth has been uniformly dyed of one color, agents called discharges are sometimes employed to remove the color and produce a white pattern; or by adding to the discharge certain agents the original color is not only removed, but another color takes its place. By printing a mixture of tartaric acid with pipeclay and gum on a piece of cloth dyed red or purple with madder or wood, or blue with indigo, and passing it through weak hypochlorite of lime, the color will be discharged, leaving a white pattern. Were a salt of lead added to the mixture, it would be fixed by the hypochlorite of lime, and on subsequently passing the cloth through bichromate of potassa, would develop chrome yellow in place of the whites. A modification of this style is the well-known bandanna style for handkerchiefs. Several folds of cloth dyed Turkey red with madder are placed between perforated lead plates, and firmly squeezed together in a hydraulic press. A solution of chlorine is forced through the perforations, destroying the color. This is followed by water, and on removing the cloth from the press it is found to present white figures on a red ground. Indigo is oxidized to soluble isatine ($C_{16}H_{10}N_2O_4.H_{20}$), which is removed by washing, by the action of chromic acid (applied in the form of bichromate of potash), or by a mixture of potash and ferricyanide of potassium. Reducing agents are also employed as dischargers, especially the protochloride of tin, or *tin salt.* When this compound comes in contact with oxide of iron, a soluble protochloride of iron is formed, which is readily removed by washing, while at the same time the sesquioxide of tin (SuO,SuO_2) is fixed upon the cloth, and is ready to fix red or yellow dyes on the spots treated.

Combination Styles.—By combining two or more of the above styles the greatest variety of result may be obtained. Some of the finest French and English *cretonnes* exhibit the most elaborate designs and most pure and brilliant colors, and are really works of art. (For further details see URE'S "Dictionary;" MUSPRATT'S "Dictionary," especially the last German edition, from which the cuts used to illustrate this article were obtained; SCHÜTZENBERGER'S "Traité des Matières Colorantes," especially the German edition; O'NEILL'S "Dictionary of Dyeing and Calico-Printing," and KRIEG'S "Theorie und Practische Anwendung von Anilin in der Färberei und Druckerei;" the annual volumes of WAGNER'S "Jahresbericht ueber die Fortschritte der Chemischen Technologie." The following periodicals are especially devoted to dyeing and calico-printing: "Moniteur de la Teinture;" "Bulletin de la Société Industrielle de Mulhouse;" REIMANN'S "Färberzeitung;" "Die Musterzeitung für Färberei, Druckerei," etc. See also MOUSSELINE DE LAINE, SILK-PRINTING, and WOOL-PRINTING.)

C. F CHANDLER.

Cal′icut, or **Kalikat,** a seaport-town of British India, presidency of Madras, on the Indian Ocean, 102 miles S. W. of Seringapatam, and about 570 miles S. S. E. of Bombay; lat. 11° 15′ N., lon. 75° 46′ E. It was the first place in India visited by Vasco da Gama, who arrived here in May, 1498. It was then a populous and important city, and it continued to be for nearly two centuries a flourishing emporium. Its prosperity afterwards declined, partly because its harbor became filled with sand. Pop. about 24,000.

Califor′nia, one of the Pacific States of the American Union, lying between the parallels of 32° 28′ and 42° N.

California Seal.

lat., and between the meridians of 114° 30′ and 124° 45′ W. lon., from Greenwich. It formed a part of the cession and purchase from Mexico after the Mexican war, and is bounded on the N. by Oregon, E. by Nevada and Arizona, the Colorado River being the dividing-line between it and Arizona, S. by Lower California, and W. by the Pacific Ocean, which along the whole California coast trends from N. W. to S. E. Its area is 188,981 square miles, or 120,947,840 acres, or somewhat more than the combined area of New England, New York, and Pennsylvania. Its length is 700 statute miles, and its average breadth more than 200 miles.

Face of the Country.—The mountain-system of California, vast in extent, diversified in character, abounding in mineral wealth, and unsurpassed in beauty and grandeur of scenery, deserves our first attention. It may be classed under two grand divisions: the Sierra Nevada, extending along the eastern border, and the Coast Range, along the western—near the sea, as its name implies. These ranges, uniting on the S. near Fort Tejon, in latitude 35° N., and again in latitude 40° 35′, form the extensive and fertile valleys of the San Joaquin and Sacramento. These divisions embrace many separate groups of mountain-chains differing in geological formation and mineral character. The Sierras, or Snowy Mountains, comprise a series of ranges 70 miles in width, while the several chains of the Coast Range aggregate 40 miles in width, and extend from the northern to the southern limits of California. The Sierras may be traced in regular order for a great distance in two lines of culminating crests, but there is no apparent order in the position and direction of the peaks of the Coast Range, and many of the high mountains in close proximity to each other are remarkably different in their mineral composition. The peaks of this range rise to a height of 1500 to 8000 feet above the level of the sea. The peaks of the Sierra Nevada—Mount Shasta, Lassens Butte, Spanish Peak, Pyramid Peak, Mounts Dana, Lyell, Brewer, Tyndall, Whitney, and a number of others—reach from 10,000 to 15,000 feet above the sea. E. of the culminating crest of the Sierras is situated a series of lakes—of which Klamath, Pyramid, Mono, and Owens lakes, wholly E. of the mountains, and Lake Tahoe—occupying an elevated valley at a point where the range separates into two summits. The southern limit of the depression in which these lakes are located is at the confluence of the Colorado and Gila rivers. A similar depression exists on the western slope of these mountains, about 50 miles in width, also containing a series of lakes.

The section of country lying E. of the range of culminating peaks of the Sierras is termed the Eastern Slope. The depression between the foot-hills of the Sierras and the Coast Range is called the California Valley, while the Coast Range forms still another section. A further geographical division is made by drawing an E. and W. line across the State in the latitude of Fort Tejon, that part lying S. of this line being termed Southern California. The country between this line and one extending E. and W. through Trinity, Humboldt, Tehama, and Plumas counties, is called Central California; all N. of this is considered as Northern California. Central California contains nearly seven-eighths of the known wealth and population of the State.

The most thoroughly explored division of the Coast Mountains is the Mount Diablo Range, about 150 miles in length by 50 in width. The peak from which this range takes its name was selected as one of the three initial points governing the public surveys in the State, its isolated position rendering it a marked feature of the landscape, whether viewed by land or sea, while from its summit may be had a more extended view than from almost any other point in the State. On the N., E., and S. may be seen a large portion of the magnificent valleys of the Sacramento and San Joaquin, with the numerous flourishing towns and villages, surrounded by highly cultivated farms. Stretching away in the distance are the verdant plains and hill-sides, dotted with ranches and teeming with countless flocks and herds. Bordering this extensive vista on the E., and stretching along the horizon for more than 300 miles, rise the Sierras, range above range, their rugged peaks extending upward to the regions of perpetual snow. On the W. are the beautiful valleys of the Coast Range; the busy city of San Francisco, with its broad bay, in which the ships of every commercial nation ride at anchor, and in the distance the blue waters of the Pacific, flecked with the white sails of numerous vessels plying to and fro on the peaceful errands of commerce.

The most interesting and picturesque feature of California mountain-scenery is the Yosemite Valley, six or eight miles in length, with an average width of not more than half a mile, enclosed by perpendicular walls of granite rising from 3000 to 5000 feet. Over these walls pour streams of water from the narrow valleys above, some of them passing into mist long before they reach the bottom of the valley; others leaping by a series of falls from 400 to 600 feet each; the Yosemite Fall is 2600 feet in height, or fifteen times that of Niagara. Through the centre of the valley, among verdant meadows, groves of majestic oaks and pines, and thickets of willow, birch, and bay trees, winds the Merced River, which enters the valley by a descent of 2000 feet in two miles. This valley has been ceded by Congress to the State of California, to be held as a place of public resort.

On the whole coast of California but one navigable river, the Salinas, connects directly with the ocean; but a number, navigable for steamers, flow into San Francisco, San Pablo, and Suisun bays, and are hence equally important for the purposes of trade and commerce as if they emptied directly into the ocean. Of these the principal are the Sacramento and San Joaquin, the former navigable for steamers and sailing vessels as far as Sacramento City at all seasons of the year, and by small steamers far beyond, into the interior of the country. The San Joaquin, which traverses one of the most beautiful and fertile regions in all California, is navigable for moderate-sized steamers within a few miles of Fort Miller, near the foot of the Sierras. N. of the Golden Gate are a number of rivers of considerable magnitude, but their rapid descent from the interior precludes their use for the purpose of navigation.

Of the harbors of California, that of San Francisco ranks first—indeed it is the most commodious on the Pacific coast—being 50 miles in length and 9 in width, securely landlocked, protected by surrounding hills from the violent winds of every quarter, and approached by the Golden Gate, 5 miles in length, with a width of 1 mile, in which, notwithstanding the rapid outward current at ebb tide, there is never less than 30 feet of water. Next in importance is San Diego, 456 miles S. of San Francisco, and near the southern boundary of the State. It is protected on all sides from violent winds, easily approached through a channel half a mile in width, and of sufficient depth to float the largest vessels at all times. It has not, however, the advantages of San Francisco for inland traffic, though, if connected with the East by a continental railway, it might prove a formidable rival. The harbor of San Pedro, 370 miles S. of the Golden Gate, is formed by a spur from Point St. Vincent and Deadman's Island. This harbor is sheltered from all but southerly winds, yet the water for several miles from the mainland is very shallow, vessels being compelled to anchor two miles from the shore, and to receive and discharge their cargoes by means of lighters. The other harbors are San Luis Obispo, 200 miles, Monterey Bay, 92 miles, Santa Cruz Harbor, 80 miles, and Half Moon Bay, 46 miles, S. of San Francisco; and Drake's, Tomales, Bodega, and Trinidad bays, and Crescent City Harbor, N. of the Golden Gate. These are all more or less exposed to gales from certain points of the compass, and

in order to render them perfectly secure breakwaters and other improvements are needed.

There are a number of islands off the coast of California, varying in size from a few acres to 150 square miles, the smaller ones being extremely rugged, and inhabited only by seals, sea-lions, and aquatic birds, while several of the larger are adapted to grazing; and on Santa Catalina Island several of the small valleys are under cultivation.

The arable lands of the State, including those which only need irrigation to make them largely productive, and the reclaimed *tulé* or swamp-lands, which when reclaimed and protected from overflow yield the largest crops in the world, comprise nearly 60,000,000 acres, or almost one-half the area of the State; while those adapted to grazing and viniculture are estimated at nearly 40,000,000 more. The remainder of the surface is covered by lakes, rivers, bays, salt lakes, etc., and by mountain-ranges, which, too steep for cultivation, are often covered with heavy timber. Still, the State has but a very small proportion (only 477,880 in farms, and but 9,604,607 acres in all; only about one-thirteenth of her territory) in woodland, and this is rapidly diminishing.

Geology.—The Coast Range and its foot-hills belong in general to the tertiary formation, but at San Pedro Bay the cretaceous rocks come to the coast, and these in turn, from the mouth of the Margarita River southward, are replaced by the recent alluvial formation, which extends S. E. to the head of the Gulf of California. At two points of the Coast Range there crop out beds of tertiary coal or lignite—viz. at the Monte Diablo coal-mines, in Contra Costa co., in the vicinity of the San Joaquin River, though about 800 or 900 feet above it; these are the only coal-mines as yet worked to any extent in the State, and yield about 120,000 tons annually; and a second and more recently discovered outcrop of similar character in Mendocino co., not yet exploited. The valley, or rather succession of valleys, already described as lying between the Coast Range and the Sierras are mostly of the cretaceous formation, though in the extreme S. they rise into the alluvial sands. But a small portion of these valleys contain gold, except in placers washed down from the mountains; but occasionally there have been found considerable quantities of gold and silver in metamorphic rocks belonging as high up in the series as the cretaceous. Still, the greater portion of the auriferous and argentiferous rocks of the State belong to the triassic and Jurassic strata, which form the surface-rocks of the Sierra Nevada, and extend from the Columbia River nearly to the head of the Gulf of California. It is in the rocks of these strata that the greater part of the gold and silver deposits of the region, from the foot-hills of the Rocky Mountains to the Pacific, occur. W. of the Sierras, in the vicinity of the upper waters of Kern River and its tributaries, is a volcanic region, where basaltic and porphyritic rocks, sulphur and chalybeate springs, deposits of sulphur, and extensive tracts of lava and lava-ashes are found. A somewhat similar region exists in Sonoma co., in what are known as the Geysers. Much of the region E. of the Sierras is of recent formation, and is sterile and forbidding to the last degree. The lakes or sinks, often very deep, are always salt and bitter, and often without water most of the year, but the beds of the lakes are covered with alkaline deposits. The famous Death Valley, the Dry Lakes, Dry Salt Lake, Owen's Lake, and other sinks of this region give striking evidence of its former volcanic character, and of the great changes which have taken place, some of them within modern times, in this part of the State. The earthquakes of 1871 were most violent in this section.

Mineralogy.—Gold is found pure in scales, nuggets, crystals, and in combination with cinnabar, bitumen, tellurium, iridosmine, etc. The yield of the California gold-mines has been immense. Silver is found native, though rarely, but largely in combination with copper, as copper glance, with galena, as proustite, or red silver ore, kuargyrite, etc. Copper exists native at various localities, as malachite, copper glance, eubescite, azurite, chalcopyrite, and chrysocolla, and in combination with sulphur, etc. Mercury in the cinnabar ore is very abundant throughout the Coast Range, as coccinite in Santa Barbara, and native in the "Pioneer Claim" and elsewhere. Lead is abundant as galena ore all over the State, and the molybdate of lead (wulfenite) is found at one or two localities. Tin, in the form of cassiterite or binoxide of tin, is found in the Temescal Range, about 60 miles from Los Angeles. Arsenic occurs pure in Monterey co., and as arsenilite in one or two localities; iron as chromic iron, as hematite; tellurium, native, and in combination. Diamonds are found in several localities; graphite in Tuolumne co. and elsewhere; borax and boracic acid, salt as rock-salt, sulphur, carbonate of soda, gypsum, barytes, antimony, ochre, alabaster, fluor spar, corundum and cobalt, in the form of erythrine, abound in various parts of the State. Magnesite, iridosmine, magnetite, limonite, tourmaline, pyrolusite (binoxide of manganese), zircon, garnets, chrysolite, and haysine are the other principal minerals. Coal, as has been already mentioned, occurs in two or more localities. Petroleum and bitumen are found all along the coast counties.

Vegetation.—There are 48 genera and 105 species of forest trees in California, the greater part not only indigenous, but peculiar to the Pacific slope. Of these, 40 species are evergreens, found mostly on the mountains of the Coast Range and the Sierras. Most remarkable of these are the two species of *Sequoia* (the *Sequoia gigantea* or mammoth tree), of which there are seven or eight groves known in the State. Some of these trees have attained a height of 450 feet, with a circumference near the ground of 120 feet or more. The largest now standing is said to be 376 feet in height and about 106 feet in circumference. This tree seems to belong to the cedar family; its wood is soft, elastic, straight-grained, light when dry, and red in color. The *Sequoia sempervirens*, or California redwood, is a very stately tree, attaining a height of 300 feet and from 75 to 80 feet in circumference. This is the most valuable timber-tree of California, though confined to the upper portion of the Coast Range, not appearing below San Luis de Obispo, and but sparingly below San Francisco. When felled, it is replaced by other trees. The sugar-pine (*Pinus Lambertiana*) is the peer of the redwood in size and commercial value. Its wood is white, straight-grained, clear, and free-splitting. Its height is sometimes 300 feet and its circumference 45. It has cones eighteen inches long and four thick; a sweetish resinous gum exudes from the harder portion of the wood, tasting much like manna and having cathartic properties. There are fifteen other species of pine, of which the *Pinus ponderosa*, or yellow pine, 225 feet high, the *Sabiniana*, or Sabine's pine, 140 feet, and the *insignis*, or Monterey pine, 100 feet, are the most remarkable. The yellow and Monterey pine are similar to our yellow or pitch-pines at the East, and are in demand for flooring purposes. Sabine's pine is the nut-pine, having an edible cone or nut, much valued by the Indians. The other species rise from 30 to 100 feet in height, but are not so much prized as those we have named. There are six species of true fir, one of them (*Abies Douglasii*, Douglas's spruce) 300 feet in height, and three of the others stately trees 100 feet or more in height; the Western balsam fir (*Picea grandis*) grows to the height of 150 feet. The California white cedar (*Libocedrus decurrens*) is a very stately tree, 140 to 150 feet in height. There are also four species of cypress, three of juniper, two of arborvitæ, and one of yew (*Taxus brevifolia*), which attains to the height of 75 feet. The wild nutmeg (*Torreya Californica*), the California laurel (*Oreodaphne Californica*), the *Arbutus Menziesii*, or madrona, and the *Arctostaphylos glauca*, or manzanita, are all beautiful and remarkable evergreens. There are twelve species of oak, two of them live-oaks or evergreens, the rest deciduous. The burr-oak is the largest and stateliest, but its wood, like most of the others, is principally valuable for fuel. The *Quercus Garryana*, sometimes called white oak, though not a large tree, has a dense, fine-grained wood, used for making agricultural implements. There is one member of the chestnut family, the Western chinquapin, which is a fine tree, sometimes attaining a height of 125 feet. There are four acacias, none of them remarkable; three poplars or cottonwoods, one of them a fine shade-tree; two alders; the Mexican sycamore; one species of walnut (*Juglans rupestris*), a fine tree; three species of cornel or dogwood, all differing from the Eastern cornels; four of the wild lilac; two of the wild cherry, both shrubs rather than trees; two maples, *Acer macrophyllum*, here called white maple, a stately and beautiful tree, and *Acer circinatum*, or vine maple, a smaller tree, found only in the mountains. There are three yuccas, two species of willow, a box elder, an Oregon ash, and the flowering ash, which is not a true ash; a species of buckeye, one of ironwood, a Parkinsonia or greenwood, small but elegant; two species of cactus, a persimmon, the pistachio-nut, and many species of semi-tropical trees which are unknown elsewhere. The shrubs and small fruits are numerous. There is but one species of native grape, which is found in Southern California, but most of the European and Eastern vines flourish well in the foot-hills, and the culture of the vine is becoming one of the great industries of California. The edible berries and fruits of California are very abundant, though in the wild state most of them are inferior in size and flavor to those of the Atlantic coast. Medicinal plants and shrubs abound, and many of them possess very valuable qualities. Grasses are very numerous, and many of them highly nutritious, but except in the foggy regions along the coast there are hardly any native grasses which will make a sod or which are adapted for hay. The wild oat (*Avena fatua*) is the principal dependence of the farmer (except cereals sown expressly for that purpose) for fodder. There are twenty-six known species

of these indigenous grasses and grains, but not more than four or five of them are of much value for pasturage. Alfalfa, a species of lucerne clover from Chili, has been largely introduced, and is regarded as the best plant for pasture and fodder found in the State. The native clovers are good, but do not grow very freely or abundantly. Wild flowers abound in California, most of them remarkable for their beauty of form and color, and a few of them exceedingly fragrant. The lily and syringa families, many of them shrubs and even trees, are conspicuous both for beauty and fragrancy, filling the air for long distances with their perfume. Of cryptogamous plants the quantity and variety is simply boundless. More than 100 species of mosses have been described, while the mushrooms, sea-weeds, lichens, and fungi are still more abundant.

Zoology.—There are 115 species of mammals in California, of which twenty-seven are carnivorous, including the grizzly, black, and brown or Mexican bear, the raccoon, badger, two species of skunk, the wolverine fisher, American sable or marten, mink, and yellow-cheeked weasel, California otter and sea-otter, the cougar, jaguar, wild-cat or red lynx and banded lynx, raccoon fox or mountain cat, gray wolf, coyote or barking wolf, five species of fox, three or four species of sea-lion, two species of seal, and the sea-elephant. Of the insect-eaters there are two species of mole and two of shrew; of the bats, sixteen species. Of the rodents there are the beaver, the sewellel or mammoth mole, five species of ground-squirrels, and five of tree-squirrels. Of the mouse family there are eighteen species, including three naturalized ones; the muskrat, jumping mouse, four species of kangaroo mice, and five of gophers; the yellow-haired porcupine; six species of hares and rabbits, and a coney or rat-rabbit. Of ruminants there are the elk, the white-tailed, black-tailed, and mule deer, the American antelope, and the mountain-sheep or bighorn. Of the Cetacea, there are the right and California gray whale, the humpback and finback, two of the beaked whales, the sperm whale, the black-fish, and three species of porpoise. Of birds there are 350 species recognized as native to California. There are twenty species of climbers, fifteen of them woodpeckers; of birds of prey there are thirty-seven species, including five of the eagle family, ten species of buzzard-hawks, four hawks, and four falcons; twelve species of owls; the king of the vultures, and the turkey-buzzard or turkey-vulture. Of the perchers there are eleven species in the first group, including the crows, ravens, magpies, jays, and kingfishers; in the second and third groups, the insectivorous and granivorous perchers, there are 148 species, including the flycatchers, humming-birds, swallows, waxwings, shrikes, tanagers, robins and thrushes, wrens, chickadees, grosbeaks, finches, linnets, larks, orioles, and sparrows. The pigeon tribe has but three species in the State—the band-tailed pigeon and the turtle and ground doves. The grouse family are more numerous—blue grouse, sage-fowl, prairie-hen, and ruffed grouse, and three species of quail, all distinct from the quails of the Atlantic coast. Of the waders there is a great variety, fifty-one species having been described. These include cranes, herons, bitterns, ibises, plover, kill-deer, avocets, snipes, sandpipers, curlews, rails, and coots. The swimmers are still more numerous, ninety species having been described, including a great variety of geese, brants, teal, ducks, scooters, coots, sheldrakes, mergansers, pelicans, cormorants, albatrosses, fulmars, petrels, gulls, terns, loons, dippers, auks, sea-pigeons, and murres. Of the reptiles there are great numbers, though there are no true saurians (alligators or crocodiles) in the State, and the rattlesnake is the only poisonous serpent. There are three tortoises, thirty-one lizards, five rattlesnakes, twenty-five species of harmless snakes, twenty-three frogs, toads, salamanders, etc. One hundred and ninety-four species of fish had been discovered in the lakes, bays, rivers, and on the sea-coast of California in 1868, and since that time the number has been greatly increased. About 180 species are edible. These include nine species of the salmon family, four of the cod family, a dozen eels, seven species of mackerel, numerous species of the perch family, and its congeners; two tautogs—viz. the redfish and kelp-fish; thirteen flatfish and flounders; seven species of shad, herring, and anchovies; twenty-two carps, and thirty-two species of cartilaginous fishes, sturgeons, sharks, rays, sunfish, etc. etc. There are fifty-five species of mollusks, including a great variety of clams, oysters, mussels, scollops, whelks, limpets, sea-snails, cuttle-fish, squids, nautiluses, etc. Of crustaceans there are seven species, including crabs, lobsters, shrimps, and crawfish.

Climate.—Extending over almost ten degrees of latitude, the climate of California is too varied to be regarded as a whole. It may be divided, in the first place, into the land climate and the sea climate. W. of the Coast Range, and extending to the sea-shore, the climate is governed by the temperature of the ocean. The cold current of water which flows out from Behring Strait, and hugs the W. coast of the American continent inside of the Kuro-sievo or Pacific Gulf Stream, has a temperature of from 52° to 54° the year round. From April to October, inclusive, N. or N. W. winds prevail, and almost daily during this period a deluge of cold damp air, of nearly the same temperature as the ocean over which it has passed, is poured upon the land. It is mostly laden with mist in dense clouds, which it deposits at the foot-hills and on the slopes of the highlands, or carries a short distance into the interior wherever there is a break in the mountain-wall which shuts off these mists from the sunny valleys of Middle California. The land climate is as nearly as possible the opposite of this in every respect. It is modified by the configuration of its surface. In summer and autumn it is hot and dry. Even the mountains, which retain the snow till a late period in the season, have a high temperature in the middle of the day, and the presence of snow on their summits in June is due rather to the great mass which has accumulated on them than to the lowness of the temperature at this season. The great interior valleys, as of the Sacramento and San Joaquin, have a most torrid temperature in summer. The thermometer in June, July, and August marks at 2 or 3 P. M. from 104° to 117° F., sometimes for several successive days. Yet this intense heat is not as prostrating as a considerably lower temperature on the Atlantic coast, for two reasons: 1st, the heat is dry, and accompanied by a considerable breeze: during those three months the aggregate rainfall is seldom more than $\frac{25}{100}$ of an inch; and 2d, the nights and mornings are always cool, the average of the nights never rising above 70°, and in June not above 65° F. In South-eastern California, in the valley of the Colorado and its vicinity, there is still more intense heat, the mean for the month of July for twelve years being upwards of 100° at noon, and 91.5° at 9 P. M. The maximum temperature of these twelve years was 130° in the shade at 12 M. to 3 P. M.—a heat unsurpassed, we believe, in any part of the torrid zone. In San Francisco, on the contrary, and in most of the towns on the coast N. of that port, the summer temperature is almost too cool for comfort, from the cause we have already assigned. A table of the temperature and rainfall in that city for each day of July, 1872, from the signal service bureau, gives the monthly average temperature as only 58°, and the highest mean daily thermometer, that of July 13, was only 63.2°, while on several days of the month it was as low as 54°. The entire rainfall for the month was only one one-hundredth of an inch. It should be said, however, that the range of the thermometer in San Francisco during the year is very small. The mean temperature of the year is 56.6°; the mean temperature of the year at sunrise is 49.5°; and the mean at noon 63.7°. The minimum temperature of the year is seldom below 32°, and in some years not below 40°; in the average of seventeen years the mercury rose to 90° only six times, and but two of these were in the summer months. Usually, the maximum is not above 82° or 83°, and the entire range of the thermometer for the year seldom exceeds 50°. This small range and uniform mean of the thermometer characterizes the climate of the whole coast-region lying W. of the Coast Range. In the nine degrees of latitude between the mouth of the Columbia River and Monterey the mean temperature of the year varies not more than three or four degrees at most, but the summers are hotter and the winters cooler in the northern part than in the S. In Yreka, in the extreme northern portion of the State, an elevated district, the winters are very severe; in Jan., 1868, the mercury stood below zero for several days in succession, and sometimes twelve to fifteen degrees below. Between the coast and the interior valleys there is a large district under the joint influence of the two climates, and consequently enjoying the most delightful climate in the world. This is composed chiefly of valleys surrounding the Bay of San Francisco and penetrating into the interior in every direction. The sea-breeze, with its clouds and abundant moisture, prevents these valleys from being parched with drought, tempers the fierceness of the heat, and moderates the cold of winter. Except in the northern counties there is nothing which can legitimately be called winter, the year being divided into the rainy and the dry seasons. The rainy season commences in November and lasts through April, and the dry season, beginning with May, continues to the end of October. These terms, however, are not used in any absolute sense. During the rainy season, even in San Francisco and on the coast generally, no more rain falls than in the Atlantic States during the summer. The mean rainfall of each of the rainy months for seventeen years (1850–67) in San Francisco was November, 2.74 inches; December, 5.37 inches; January, 4.51 inches; February, 3.08 inches; March, 2.76 inches; April, 1.74 inches. The dry season for the same term of years showed the following mean: May, 0.82 inch; June, .05

inch; July, .02 inch; August, .01 inch; September, .09 inch; October, 0.57 inch; or for June, July, August, and September, $\frac{17}{100}$ of an inch, and for the whole six months 1.56 inches. The mean rainfall of the year was 20.79 inches. In many of the interior towns the yearly average is less than this. At Sacramento the yearly mean was 18.23 inches; at Benicia, 22.86 inches; at Monterey, 12.20; at San Diego, 10.43; at Fort Yuma, 3.24. On the other hand, among the foot-hills of the Sierras the precipitation was very great. At Red Dog, Nevada co., the average mean of three years was 64 inches; at South Yuba the rainfall of 1866–67 (not an exceptional year) was 81.56. Klamath co., in the N. of California, seems to partake of the characteristics of the Oregon climate. In 1861–62, which was a year of remarkable rains all over the Pacific coast, the rainfall in Hoopa Valley, Klamath co., was 129.15 inches, or almost thirteen feet. The following table gives the average temperature and rainfall for each quarter and the whole year in several widely separated towns of the State for a period of from twelve to seventeen years:

Places.	Spring.	Sum'r.	Aut'n.	Winter.	Year.	Rainfall.
San Francisco....	56.5°	60.0°	59.0°	51.0°	56.6°	20.79 in.
Sacramento	56.0°	69.05	61.0°	46.5°	58.0°	18.23 "
Benicia	56.5°	67.0°	60.5°	49.0°	58.0°	22.86 "
Monterey	54.0°	59.0°	57.0°	51.0°	55.5°	12.20 "
San Diego	60.0°	71.0°	64.5°	52.5°	62.0°	10.43 "
Fort Yuma.....	72.0°	90.0°	75.5°	57.0°	73.5°	3.24 "
Humboldt Bay...	52.0°	57.5°	53.0°	43.5°	51.5°	57.24 "

Agricultural Products.—The assessors of the counties of the State reported to the surveyor-general the following as the agricultural products of the State in the year 1872:

Turnips	2,324 tons.	Oats, 88,056 ac.	2,152,047 bushels
Pumpkins and squashes.....	24,535 "	Rye, 2899 ac....	35,955 "
Silk cocoons ...	106,168 pounds.	Corn, 39,996 ac.	1,356,372 "
Broom corn....	917 acres.	Buckwheat, 464 acres	7,598 "
Butter.....	7,734,469 pounds.	Peas, 2258 ac...	91,164 "
Cheese.....	2,741,198 "	Beets.....	9,647 tons.
Wool.....24,255,468 "		Onions, 1645¾ acres	143,966 bushels
Honey	400,922 "	Hay, 352,867 ac	411,420 tons.
Apple trees.....	1,370,971 number	Flax, 4287 ac. (seed)	2,052,200 pounds.
Peach	882,338 "	Hops, 534 ac...	445,036 "
Pear.....	297,841 "	Tobacco, 151¼ acres	53,050 "
Plum	249,464 "	Peanuts, 442 ac	435,648 "
Cherry	144,120 "	Beans, 7275 ac.	137,438 bushels
Nectarine	43,776 "	Castor beans, 765 acres.....	642,800 pounds.
Quince.....	36,940 "	Potatoes, 31,035½ acres	1,067,256 tons.
Apricot	92,326 "	Sweet potatoes 897½ acres ...	5,267½ tons.
Fig	52,550 "	Brandy.....	147,135 gallons.
Lemon	8,973 "	Wine	4,542,879 "
Orange	5,156 "	Breweries, 137	3,770,464 "
Olive.....	13,282 "	To which are to be added,	
Prunes	15,325 "	Wheat.....13,360,302 bushels	
Mulberry.....	553,032 "	Barley.....	528,494 "
Almond	484,868 "	Cotton.....	360,000 pounds.
Walnut	127,615 "		
Gooseberry bushes.....	21,187 "		
Raspberry bushes.....	79,084 "		
Strawberry vines	7,524,688 "		
Grape vines....30,889,366 "			

The arrivals of wheat at San Francisco from July to Dec., 1872, were 7,069,600 centals = 11,782,666 bushels; which indicates what is probably true, that these returns of the assessors are considerably below the actual production. Four counties made no return of agricultural products.

The assessors' report of live-stock for the year 1872 was as follows:

	No.		No.
Horses	237,280	Total neat cattle.....	816,897
Mules	24,176	Sheep	3,158,193
Asses.....	1,356	Cashmere and Angora goats	18,073
Cows	260,145	Hogs	219,057
Calves.....	200,726	Hives of bees.....	23,118
Beef cattle.....	218,454		
Oxen	7,529		

The estimates of some kinds of live-stock by the agricultural department at Washington for Jan., 1873, were: horses, 250,000, valued at $11,037,500; mules, 25,000, valued at $1,776,500; oxen and other cattle, 442,200, valued at $10,042,362; milch cows, 270,000, valued at $11,728,800; sheep, 4,002,800, valued at $11,888,316; and 427,300 hogs, valued at $2,610,803.

The agricultural products of the State, as was to be expected from its varied climate and its very rich and deep soil, are many of them very different from those of other portions of the country. In some sections there are extensive vineyards, and the best of European grapes have been planted here and yield bountifully; in the valleys of the interior there are vast crops of the cereals; and the culture of the mulberry and rearing of silkworms have become a prominent industry. The culture of cotton is also becoming very popular. In Southern California the best-paying crops are oranges, lemons, olives, almonds, English walnuts, figs, prunes, nectarines, apricots, and pomegranates. The culture of the sugar-beet is also becoming an important industry, and a successful beginning has been made in the cultivation of tea and in the raising of coffee. In the northern counties butter, cheese, and the hardier fruits are produced, and large flocks of sheep are kept, over 24,000,000 pounds of wool being grown in 1872. In short, in one part of the State or another, all the trees, fruits, vegetables, and shrubs of the tropical, sub-tropical, and temperate regions can be cultivated with success.

Manufactures and Mining Industry.—The assessors' returns on these topics are very incomplete, and we are under the necessity of taking those of the census of 1870, except on a few points, though these are known to be imperfect and under-estimated. The manufacturing statistics of California, according to the census, are: manufacturing establishments, 3984; steam-engines, 604, of 18,493 horse-power; water-wheels, 271, of 6877 horse-power; operatives employed, 25,392, of whom 24,040 were men, 873 women, 479 children; capital employed, estimated at $39,728,202; wages paid, $13,136,722; raw material used, $35,351,193; annual product, $66,594,556. More than four-sevenths of the entire manufactures ($21,170,956 capital, $7,238,528 wages, $20,046,321 raw material, and $37,410,829 annual product) belonged to San Francisco. The heaviest item was flouring and grist-mill products, $9,036,386 of annual product; the next largest were those of lumber, sawed and planed, and sash doors and blinds, yielding a product of $7,066,924. The quartz-mills were either understated or have greatly increased since 1870. The census reports 114, the assessors 311; the census reports the annual product at $3,405,708, while the assessors report 572,913 tons crushed, which, at the very low rate of $25 per ton (which is below probability), would yield $14,322,800. Refined sugar was produced, according to the census, in three refineries, to the annual amount of $3,904,645. Of liquors, distilled, malt, and vinous, there were produced $3,342,934 worth in 1870. The production of wines and brandy from wines has greatly increased each year since, and in 1872 these two items alone amounted to $3,944,287. Boots and shoes were reported as manufactured to the value of $2,214,807 in 1870; tobacco and cigars of the value of $1,967,717 were reported in 1870, doubtless an underestimate, as the import of unmanufactured tobacco in 1872 was valued at over $2,000,000, aside from that grown in the State, and the expense of manufacture. Printing and publishing yielded an annual product in 1870 of $2,279,339; machinery of various kinds was produced to the value of $3,814,817; iron and iron castings and wares to the value of $1,715,141; carriages and wagons, $1,309,443; carpenter work and building, $1,391,163; gas, $1,356,753; brick, $1,185,820; blacksmithing, $1,161,790; clothing, $1,828,609; woollen goods, $1,102,754—an evident under-estimate, as in 1872 the seven mills reported by the assessors used 4,191,000 pounds of wool, which, at the ruling price, 32 cents, made the cost of raw material $1,341,120, and the annual product nearly double that sum; and yet this did not include all the woollen mills of the State. The only other considerable manufactures of the State were cordage and twine, $850,000; gunpowder, $526,487; drugs and chemicals, $617,870; and bags other than paper, $501,310.

The census of 1870 reports the mining industry of California as employing 7589 persons and a capital of $20,079,975, producing $8,281,623. Of this amount, $817,700 is said to be yielded by cinnabar and other quicksilver ores, gold in placer, hydraulic, and quartz mining, $7,365,833, and silver, $98,100. How far below the truth these statistics are will appear from the production of these metals in 1872. Gold and silver were produced in California in that year to the known value of $19,049,098; the export of quicksilver that year was $861,795, which was less than one-half the yield; copper ores were exported to the value of $120,261. There is also a very considerable amount of lignitic coal obtained from the mines already mentioned. The greater part of the coal-supply of the State is from the lignitic mines of Oregon, British Columbia, Washington Territory, and Wyoming. It is of very fair quality, but is generally quite inferior to true coal of the carboniferous period. The amount raised is unknown.

Railroads.—On the 1st of Jan., 1873, there were 1102 miles of completed railroad in the State in actual operation, nearly all of it controlled, either by lease or purchase, by the Central Pacific R. R. Company. The following summary shows the length of each line and its present termini. Of the 882 miles of the Central Pacific R. R. proper, 276 are comprised between the State line of Nevada and San Francisco. The other lines under its control are:

San Francisco to Holister	94 m.
Gilroy to Salinas	37 "
Niles to San José	18 "
Lathrop to Tipton	167 "
Stockton to Milton	30 "
Peters to Oakdale	19 "
Sacramento to Vallejo	60 "
Davisville to Yuba City	50 "
Vaca to Vacaville	7 "
Napa Junction to Calistoga	34 "
Roseville Junction to Redding	153 m.
Donahue to Cloverdale	56 "
San Quentin to San Rafael	4 "
Wilmington to Los Angeles	22 "
Sacramento to Folsom	23 "
Folsom to Shingle Springs	26 "
Marysville to Oroville	26 "
Total	1102 "

These roads do a fair though not a large passenger traffic—the through passengers arriving in California from the East over the Central Pacific and Western Pacific in 1872 being 34,040, and those returning to the East numbering 21,645—but their principal business is a freight traffic. The through freight sent eastward over the Central Pacific in 1872 was 60,120,497 pounds; the westward-bound through freight weighed 160,370,044 pounds; while the local freight amounted to 1,676,436,753 pounds, making a grand aggregate of 948,463.65 tons moved over these roads. This is wholly independent of the express freight, a large proportion of it bullion and ores, sent over these lines by Wells, Fargo & Company's express.

Ocean Steamers and Sailing Vessels.—The number of passengers arriving in California by ocean routes (Panama and China lines) in 1872 was 17,651; the number leaving the State by ocean steamers was 11,305. The freight landed at San Francisco in 1872 by the two lines was—from Panama, 27,071 tons; from the China line, 26,850 tons. Notwithstanding the existence of the Pacific R. R. and the Panama steamers, there is still considerable freight business done by sailing-vessels from New York by way of Cape Horn. The freight money received for cargoes of all inward-bound vessels, sail and steam, for the year, was $5,331,762.

Finances.—The funded indebtedness of the State Jan. 1, 1873, was $3,372,500, bearing 7 per cent. interest, payable semi-annually, a reduction of $750,000 since 1871. In 1870 the total assessed valuation of personal and real estate in California was $269,644,068; the estimated true valuation by the U. S. marshal was $638,767,017. In Jan., 1873, the assessed valuation of real and personal estate liable to taxation for the year 1872 was $636,907,181. Including property not subject to taxes, and the low valuation, the real amount of real and personal property in the State must be more than double this amount. The funded debt of the counties at the close of 1872 was $5,701,000, and the floating debt $1,448,000. The taxes of all classes for 1872 were in round numbers, $9,500,000.

Commerce and Navigation.—We have no returns of entries or departures of vessels from the smaller ports of California, but as these must have been mostly coasting-vessels, and as the district of San Francisco covers the entire California coast, the following statement may be relied upon as accurate so far as *arrivals* in 1872 were concerned. The clearances of coasting-vessels sailing under a coasting license are not reported at the custom-house.

	Arrived.		Cleared.	
	Vessels.	Tons.	Vessels.	Tons.
Domestic Atlantic ports	84	96,739	8	6,845
Domestic Pacific ports	3,018	634,872	243	143,577
Great Britain	74	71,623	204	197,726
France	8	4,771		
Germany	8	3,522		
China	67	109,531	9	7,783
Japan	12	4,795	22	77,822
Peru	32	21,063	56	32,905
Chili	7	4,572	10	6,772
Other South American ports	4	1,646	5	1,284
Hawaiian Islands	36	25,160	36	26,078
Society Islands	29	4,454	28	3,642
Philippine Islands	11	8,472	12	11,021
East Indies	16	8,520	5	4,985
Australia	78	87,848	38	40,415
Central America	18	5,078	13	2,973
Mexico	34	13,858	42	16,580
British Columbia	51	40,267	72	48,480
Russian Possessions	10	1,372	8	1,423
Panama	28	77,243	30	81,139
New Zealand	...	.....	1	1,042
Other foreign ports	9	1,870	9	5,798
Whaling voyages	28	9,078	19	5,947
Codfishing voyages	7	793	6	744
Salmon-fishing voyages	1	110		
Totals	3,670	1,237,257	876	729,981

The freights on inward cargoes were thus distributed, as between American and foreign vessels:

American vessels from American ports were paid for freight	$1,938,383
American vessels from foreign ports were paid for freight	1,616,973
Foreign vessels from foreign ports were paid for freight	1,776,406
Total paid for freights	$5,331,762

The total domestic exports by sea, except coin and bullion, were as follows, showing the great variety of the productions of the State:

Articles.	Quantity.	Value.
Albalones, sks.	1,573	$16,123
Asphaltum, pkgs.	72	227
Barley, 100 lb. sks.	176,085	222,949
Beans, sks.	5,311	14,477
Bones, pkgs.	727	1,300
Borax, cs.	3,297	94,563
Bran, etc., pkgs.	15,808	22,942
Brandy, gallons	58,155	122,670
Brandy, cases	94	
Bread, pkgs.	10,902	34,974
Brick, M.	51	577
Brooms, doz.	9,516	24,070
Broom corn, centals.	103	615
Coal, pkgs.	247	802
Corn, sks.	690	1,302
Fish, salmon, p.	30,717	206,675
Flour, bbls.	246,843	1,336,985
Fruit, bxs.	5,360	10,423
Glue, pkgs.	16	257
Hay, bales.	3,603	9,358
Hides, No.	86,683	380,783
Horns, No.	82,494	2,475
Laths, M.	4	66
Leather, pkgs.	4,402	258,778
Lime, bbls.	2,112	4,029
Live-stock, No.	337	30,587
Lumber, M. ft.	16,517	$309,325
Macaroni, bxs.	3,653	7,836
Mustard seed, 100 lb. sks.	5,143	21,041
Oats, 100 lb. sks.	10,170	18,086
Onions, pkgs.	1,575	3,790
Ores, Copper, ts.	2,106	120,261
" Silver, ts.	751	206,412
" Various, ts	6,410	1,714,249
Pickets, No.	58,856	1,104
Posts, No.	4,300	537
Potatoes, pkgs.	33,969	54,723
Quicksilver, flks	13,098	861,795
Rosin, pkgs.	73	726
Salt, pkgs.	428	924
Seeds, pkgs.	120	4,574
Shingles, M.	4,243	11,252
Skins, etc. pkgs.	473	110,170
Spars, No.	73	1,392
Spirits turpentine, pkgs.	136	1,316
Tallow, pkgs.	253	5,322
Vegetables, pks	720	1,872
Wheat, 100 lb. s.	6,071,383	10,671,180
Wine, gallons	532,241	415,802
Wine, cases	9,147	
Wool, lbs.	3,607,717	1,124,799
Total		$18,466,495

The following statements show the articles and amount of through and local freight shipped by railroad from California in 1872, but not its value:

Number of pounds through freight moved west-bound over the Central Pacific Railroads during the twelve months ending Dec. 31, 1872:

Agric'l implements	4,810,145	Lumber	1,947,522
Bullion	1,903.898	Mowers	77,607
Butter	1,127,662	Machinery	1,445,138
Cheese	858,898	Meats	12,968,313
Coal	6,868,135	Merchandise	100,799.291
Crude metal	903,606	Oil	3,369,184
Cartridges	24,436	Oysters	658,266
Corn meal	414,546	Ore	6,349,132
Car (street)	21.818	Paper	757.135
Eggs	287.291	Staves	987,272
Engines	220,364	Spokes	21,818
Furniture	702,545	Shovels	161,673
Fish	1,342,974	Sheep	109,090
Game	21,818	Spirits	1,091,684
Hogs	2,315,476	Stock	785,455
Hides	376,740	Tobacco	2,430,185
Ice	283,637	Whisky	390,993
Iron, bar	332,411	Wagons	2,694,927
Iron, sheet	87,611	Wool	76,256
Lard	823,374	Yeast powders	21,818
Aggregate			160,370,044

The tonnage for the month of December is estimated.

Number of pounds local freight forwarded over the Central Pacific Railroads during the twelve months ending Dec. 31, 1872:

Bark	21,818	Ore	12,121,295
Brick	70,909	Posts	6,627,897
Base metal	14,560,949	Powder	458,181
Broom corn	30,448	Pig iron	3,490,590
Coke	216,000	Railroad iron	57,271,646
Charcoal	2,487,273	Scrap iron	21,818
Coal	18,882,202	Sand	271,691
Fruit	1,081,985	Salt	4,311,385
Flour	519,107	Stone	16,117,304
Grain	311,039,069	Shingles	5,955,774
Hay	6,882,459	Shakes	2,926,067
Ice	14,613,341	Stave bolts	6,024,677
Lime	6,282,356	Stock	63,980,000
Lumber	201,887,950	Telegraph poles	329,090
Laths	1,492,367	Ties	37,392,916
Mill-stuff	1,153,964	Wine	110,480
Machinery	145,611	Wool	7,321,305
Merchandise	807,263,935	Wood	62,692,694
Total			1,676,436,753

The number of pounds for December estimated.

The shipments of coin, bullion, gold-dust and ores of the precious metals from California in 1872, by express and other conveyances, except that sent by mail, was $19,049,048. The custom-house duties in 1872 were $8,184,481.

Banks, Savings Banks, Insurance Companies, etc.—There were in the State in Nov., 1872, three national gold banks and nine State banks; the national banks had an aggregate capital of $2,800,000; nine State banks, one, the Bank of California, having a capital of $5,000,000, and the other eight an aggregate of $3,100,000. There were 20 savings banks, ten of them in San Francisco, and the other ten in the interior towns. The ten savings banks of San Francisco had on the 1st of Jan., 1873, 46,060 depositors; the amount of the deposits was $42,474,935, their gross earnings were $2,091,113, the reserve fund $1,852,771, the amount of their dividends $1,818,406, and the average rate of dividend between 9 and 10 per cent. The ten interior savings banks had 18,441 depositors; the amount of deposits was $8,956,391, the gross earnings were $642,991, the reserve fund was $1,870,212, the amount of dividend $469,898, and the rate of dividend an average of a little more than 11 per cent. There are about sixty private banking-houses and agencies of banking companies in the

State. There are seven fire and marine insurance companies in the State, with an aggregate capital of $2,304,725 capital and about $3,968,000 of assets. There is one mutual life insurance company, the Pacific Mutual Life, at Sacramento, with $100,000 capital and $1,064,320 assets. There are numerous mining and other incorporated companies, of which a part pay regular dividends.

Education.—Much attention is paid to education in California. The following table gives a summary of the latest report of the superintendent of public instruction, so far as public and private schools are concerned, in 1871 and 1872. The State has a State superintendent, and county superintendents of schools for each county:

School Children.	1871.	1872.	Increase.
White boys between 5 and 15	65,359	68,840	3,481
White girls between 5 and 15	62,549	66,368	3,819
Total whites between 5 and 15	127,908	135,208	7,300
Negro boys between 5 and 15	480	489	9
Negro girls between 5 and 15	421	385	dec.....36
Total negroes between 5 and 15	901	874	dec.....27
Indian boys between 5 and 15	765	708	dec.....57
Indian girls between 5 and 15	542	571	29
Total Indians between 5 and 15	1,307	1,279	dec.....28*
Total children between 5 and 15	130,116	137,361	7,245
Whites under 5 years	65,799	69,222	3,423
Negroes under 5 years	249	254	5
Indians under 5 years	254	247	dec.....7
Total children under 5 years	66,302	69,723	3,421
Whites between 5 and 15 at public school	83,039	92,265	9,226
Negroes between 5 and 15 at public school	449	385	dec.....64
Indians between 5 and 15 at public school	140	144	3
Total bet. 5 and 15 at pub. school	83,628	92,794	9,166
Number of children in Chinese schools	1,800	1,850	50
Whites between 5 and 15 at private school	15,452	13,677	dec ...1,775
Negroes between 5 and 15 at private school	58	90	32
Indians between 5 and 15 at private school	14	20	6
Total bet. 5 and 15 at pri. school	15,524	13,787	dec ...1,737
Whites between 5 and 15 at no school	28,587	29,266	679
Negroes between 5 and 15 at no school	270	399	129
Indians between 5 and 15 at no school	602	1,115	513
Total bet. 5 and 15 at no school	29,459	30,780	1,321
Total number enrolled	91,332	94,720	3,388
Average number belonging	72,031	72,972	941
Average daily attendance	64,286	65,700	1,414
Percentage of attendance on average number belonging	89	90	1
Total number of schools	1,550	1,612	62
Total male teachers	820	881	61
Total female teachers	1,232	1,420	188
Total number of teachers	2,052	2,301	249
New school-houses erected	125	124	dec.....1
Number of school-houses	1,326	1,450	124
Number of schools maintained nine months and over	388	421	33
Number of volumes in teachers' libraries	10,570	11,380	810

Receipts.	1871.	1872.	Increase.
State apportionment *	$423,550 89	$424,021 85	$470 96
County taxes	889,622 86	988,636-21	99,013 35
Miscellaneous	571,413 09	719,125 52	147,712 43
Total receipts	$1,884,586 84	$2,131,783 58	$247,196 74
Expenditures.			
Teachers' salaries	$1,103,125 14	$1,282,799 15	$179,674 01
Sites, etc	390,158 40	290,119 01	†100,039 39
Libraries	26,766 30	25,793 54	†972 76
Apparatus	3,689 46	4,720 13	1,030 67
Rent, fuel, etc	204,094 19	277,900 99	73,806 80
Total expenditures	$1,727,833 49	$1,881,332 82	$153,499 33
Value of property	$3,362,580 18	$3,822,663 15	$460,082 97

The number of inhabitants of all races 10 years old and over, unable to write, in 1870, was 31,716, including 2853 Chinese and 1789 Indians. Of these, 22,196 were of foreign birth. Of 1941 white illiterates from ten to fifteen years of age, 1092 were males and 849 females; of 2018 white illiterates between the ages of fifteen and twenty-one, 1179 were males and 839 females; and of 22,199 white illiterates twenty-one years old and over, 12,362 were males and 9837 females; making 26,158 white illiterates in all. Of the colored illiterates, 24 males and 21 females were under fifteen, 30 males and 34 females between fifteen and twenty-one, and 468 males and 339 females over twenty-one; making 916 colored illiterates in all.

California is very well supplied with universities, colleges, academies, and seminaries for superior and secondary instruction. The State Normal School at San José is in reality a teachers' college, and is liberally sustained by the State government. It has 6 teachers and 181 students, and has graduated 270 teachers. There are about twenty institutions bearing the name of college or university in the State, some of them as yet unorganized, except in the preparatory departments, but others institutions of a high grade. The University of California, formerly at Oakland, but now permanently established at Berkeley, is already an institution of great merit, and with some claims to the high title of a university. Its president, D. C. Gilman, LL.D., is an able and distinguished scientist, and its corps of eighteen professors contains many eminent names. It had in 1872, 355 students. It is liberally endowed by the State, and has also a grant of 150,000 acres of land from the U. S. government. The Agricultural College, also situated at Berkeley, is to be a department of the university, which has a well-endowed professorship of the languages of Eastern Asia—a professorship eminently appropriate for a California university, since through its Golden Gate the nations of Eastern Asia are probably to enter the Western World. The California Military Academy at Oakland, under the charge of President David McClure, has 10 professors and 125 students. The other colleges of the State are the Missionary College of St. Augustine at Benicia (Protestant Episcopal), with 8 instructors and 94 students; St. Vincent's College, Los Angeles (Roman Catholic), with 4 instructors and 45 students; St. Ignatius College at San Francisco (Roman Catholic), with 19 professors and 450 students; St. Mary's College at San Francisco (Roman Catholic), with 12 professors and 218 students; University College (Presbyterian), also at San Francisco, with 28 instructors and 180 students; Franciscan College (Roman Catholic), at Santa Barbara, with 9 professors and 40 students, all in the preparatory departments; Santa Clara College (Roman Catholic), at Santa Clara, with 16 professors and 80 students, all in the preparatory department; University of the Pacific (Methodist Episcopal), at San José, for both sexes, with 7 instructors; Pacific Methodist College (M. E. Church South), at Santa Rosa, with 9 professors and 160 students of both sexes; College of Our Lady of Guadalupe (Roman Catholic), at Santa Inez, with 5 instructors and 20 students, all in the preparatory department; California College (Baptist), at Vacaville, with 4 professors and 68 students; Hesperian College (Disciples), at Woodland (female), with 6 professors and 193 students; College of Notre Dame at San José (Roman Catholic, female), with 25 professors and 486 students; Female College of the Pacific at Oakland, now, we believe, merged in the State university; Washington College at Washington, for both sexes, with 80 students. Of Petaluma College at Petaluma, Union College at San Francisco, San Rafael College at San Rafael, and Sonoma College at Sonoma, we have no recent information. In addition to the agricultural and scientific departments of the University of California, which receives the Congressional land-grant, there is a scientific department to St. Mary's College, San Francisco, which has 5 instructors and 32 students. There are two theological seminaries in California—the Pacific Theological Seminary at Oakland (Congregational), with 3 professors and 5 students, and an endowment of $75,000; and the San Francisco Theological Seminary (Presbyterian), with 4 professors and 6 students, and 7000 volumes in its library. Some of the Roman Catholic colleges have also seminaries of theology connected with them. There are two medical colleges in the State, both at San Francisco—Toland Medical College, with 10 professors and many students, and the Medical College of the Pacific, connected with University College, with 10 professors and 28 students. The California Institution for the Deaf, Dumb, and Blind, at Oakland, has 23 instructors and employés, 37 blind and 59 deaf-mute pupils. Its property is valued at $250,000, and its annual receipts from the State $30,000, and from other sources $1000. There are four or five orphan asylums in the State, all in a prosperous condition. There is an industrial school or reformatory for boys at San Francisco, with 243 inmates. The Mechanics' Institute at San Francisco is a very efficient institution, having a library of 19,000 volumes, a cabinet, a reading-room, and scientific apparatus, and holds biennial

* 10 cents on every hundred dollars of taxable property.
† Decrease.

exhibitions, which have always been successful. Its property is estimated at $150,000.

Libraries.—The colleges, schools of higher instruction, professional and scientific schools have libraries amounting to about 32,000 volumes; and beside these there are the following public and society libraries, not including school or Sunday-school libraries:

Location.	No.	Vols.	Location.	No.	Vols.
Sacramento	1	42,000	Stockton	5	8,500
Oakland	4	8,000	Redwood City	3	800
Jackson	1	1,200	Woodside	1	600
Pacheco	1	300	San José	2	2,800
Oroville	1	1,500	Santa Clara	2	13,300
Crescent City	1	300	Santa Cruz	2	850
Placerville	1	1,800	Watsonville	1	500
Arcata	1	300	Shasta	1	500
Eureka	1	200	Oro Fino	1	600
Sawyer's Bar	1	350	Scott River	1	700
Los Angeles	3	800	Yreka	1	300
San Quentin	1	560	Benicia	4	2,200
Monterey	1	1,000	Vallejo	3	3,200
Napa City	1	400	Petaluma	1	1,000
Grass Valley	1	500	Knight's Ferry	1	1,000
Nevada	2	3,300	Yuba City	1	450
Auburn	1	300	Red Bluff	1	200
Spanish Ranch	1	500	Weaverville	1	240
Meadow Valley	1	400	Woodland	1	200
San Diego	2	600	Marysville	4	6,500
San Francisco	18	94,000	Totals	88	202,450

Newspapers and Periodicals.—The census of 1870 states the entire number of newspapers and periodicals in California at that time as 201, having an aggregate circulation of 491,903, and issuing annually 47,472,756 copies. Of these, 33 were dailies, having 94,100 circulation; 4 were tri-weeklies, having 9500 circulation; 4 semi-weeklies, with 2700 circulation; 140 weeklies, having an aggregate circulation of 298,603; 1 semi-monthly, with 300 circulation; 17 monthlies, with 82,200 circulation; 2 quarterlies, with 4500 circulation. Four of these papers (1 weekly and 3 monthlies) were advertising sheets, having an aggregate circulation of 26,000, and issuing 432,000 copies annually; two (1 weekly and 1 monthly) were agricultural and horticultural, with a circulation of 3800, and issuing 165,600 copies annually; four (3 weeklies and 1 monthly) were the organs of benevolent or secret societies, and had a circulation of 18,000, and issued 536,000 copies annually; fifteen (2 dailies, 2 tri-weeklies, 8 weeklies, 2 monthlies, and 1 quarterly) were commercial and financial, with an aggregate circulation of 31,600, and issuing 2,906,600 copies annually; six (4 weeklies and 2 monthlies) were illustrated literary or miscellaneous periodicals, having a circulation of 47,000, and a total annual issue of 2,084,000 copies; seven (2 dailies, 1 tri-weekly, 2 semi-weeklies, and 2 weeklies) were devoted to the different nationalities represented in California; these had a total circulation of 13,950, and an annual issue of 2,697,800 copies. One hundred and forty-one (viz. 28 dailies, 1 tri-weekly, 2 semi-weeklies, 108 weeklies, and 2 monthlies, the whole having a circulation of 239,253, and an annual issue of 33,849,556) were political and the organs of the great parties. Fourteen (11 weeklies, 1 semi-monthly, and 2 monthlies) were religious; these had a circulation of 93,400, and a total annual issue of 3,968,400 copies. There was one weekly sporting paper with a circulation of 4000, and an annual issue of 208,000 copies; there were seven technical and professional journals (1 daily, 1 weekly, 4 monthly, and 1 quarterly), with a circulation of 14,900, and a total annual issue of 624,800.

Churches.—The census of 1870 reports 643 churches of all denominations in the State, 532 church edifices, 195,558 sittings, and $7,404,235 of church property. Of these, there are reported 60 Baptist churches, 44 church edifices, 16,775 sittings, and $271,600 church property. The Baptist "Year Book" for 1873 reports, in 1872, 5 associations, 82 Baptist churches, 74 ordained ministers, and 3628 members; 62 Sabbath schools, 1240 teachers, 3200 scholars; $34,318 of benevolent contributions. The census reports 30 "Christian" churches, 22 church edifices, 6380 sittings, $34,160 of church property. It also reports 40 Congregational churches, 36 church edifices, 11,915 sittings, $282,400 church property; the "Congregational Quarterly" for Jan., 1873, reports, in 1872, 55 churches, 55 ordained ministers, 2577 members, 5274 children in Sabbath schools; church property, $378,270; benevolent contributions, $44,616. The census reports 45 Episcopal churches, 38 church edifices, 13,095 sittings, $398,200 of church property. The "Episcopal Almanac" for 1873 reports, in 1872, 41 parishes and missions, 53 clergymen, 2741 communicants, 357 S. S. teachers, 3398 S. S. scholars, $50,460 of benevolent contributions. There was in 1870 one church and one church edifice of the Evangelical Association, with 200 sittings and $5000 property. There were the same year 2 societies and 2 meeting-houses of Friends, with 500 sittings and $16,000 property. There were also 7 Jewish congregations and 7 synagogues, with 3610 sittings and $314,600 of church property. There were 6 Lutheran churches, with 6 church edifices, 5350 sittings, and $54,000 church property. The census reported 184 Methodist churches, 155 church edifices, 43,035 sittings, $677,625 of church property. In 1872 the Methodist Episcopal Church North reported 147 churches, 134 travelling and 109 local preachers, 6242 members, $679,950 of church property, 133 Sunday-schools, 1417 teachers, 9730 scholars, and about $7200 in benevolent contributions. The Methodist Episcopal Church South the same year reported 60 travelling and 69 local preachers, 63 churches, 3749 members, and $2340 collections for benevolent objects. The census reports 7 Chinese congregations, with 5 temples, sittings 2600, property $22,500; two congregations of the Greek Church, 2 church edifices, $6000 of property; 4 Mormon societies, 3 edifices, 550 sittings, $3100 property; 1 New Jerusalem (Swedenborgian) congregation, 1 church edifice, 400 sittings, $12,000 property; 79 Presbyterian (regular) churches, 59 church edifices, 21,798 sittings, $453,050 of church property. In 1872 the "Presbyterian Almanac" gave in the Synod of the Pacific (General Assembly of the Church North), which embraces somewhat more than the limits of California, 89 ministers, 83 churches, 5292 communicants, 7157 S. S. scholars, and $140,400 benevolent contributions and church support. The census reported, in 1870, 160 Roman Catholic churches, 144 church edifices, 66,640 sittings, $4,692,200 of church property. The "Catholic Almanac" for 1873 gives, in 1872, 181 churches, chapels, and stations, 161 church edifices, 173 priests, and over 100,000 estimated adherent Catholic population. The census also reports 3 Second Advent churches, 3 church edifices, 300 sittings, $4000 of church property; 6 Spiritualist organizations, with 2 edifices, 750 sittings, and $3300 of property; two Unitarian societies, with 2 church edifices, 1400 sittings, $151,000 church property; 3 churches of United Brethren in Christ (German Methodists), with 1 church edifice, 100 sittings, $500 of church property; 1 Universalist society, with 1 church edifice, 160 sittings, $3000 of property.

Population.—The true population of California in 1870, including nomadic Indians and Indians sustaining tribal relations, was 582,031. The Indians in the State number 29,025, of whom 21,784 sustain tribal relations, and are not usually reckoned among the population of the State. As the State came into the Union in 1848, the census of 1850 was the first in which it appeared; its population was then 92,597, of whom 91,635 were whites, 962 colored, and no enumeration was made of the Indians. In 1860 the population was 379,994, of whom 323,177 were whites, 4086 colored, 34,933 Chinese, 17,798 Indians. In 1870 there were, excluding tribal Indians, 560,247 inhabitants, of whom 499,424 were whites, 4272 colored, 49,310 Chinese and Japanese, and 7241 civilized Indians. The density of the population to the square mile in 1850 was .049; in 1860, 2.01; in 1870, 2.29. Of the 560,247 inhabitants in 1870, 349,479 were males and 210,768 females; 350,416 (199,421 males and 150,995 females) were native born; 209,831 (150,058 males and 59,773 females) were of foreign birth. Of the 499,424 whites, 297,648 were males and 201,776 females. Of the 4272 colored, 2514 were males and 1758 females. Of the 49,310 Chinese and Japanese, 45,429 were males and 3881 females; 487 of these (290 males and 197 females) were born in California. Of the 7241 civilized Indians, 3888 were males and 3353 females; of these, 6895 were natives and 346 of foreign birth. Of the entire population, 71,086 males and 66,043 females were between five and eighteen years of age; of these, 64,203 males and 62,083 females were native born, and 6883 males and 3960 females of foreign birth; 66,446 males and 64,340 females were white; 484 males and 464 females colored; 3123 males and 449 females Chinese; and 1033 males and 790 females Indians. There were 194,935 males of all races between eighteen and forty-five years of age; of these, 77,828 were natives, 117,107 foreigners, 154,200 whites, 1264 colored, 37,800 Chinese, 1671 Indians. There were 227,256 males of all classes of twenty-one years old and upward; of these, 145,802 were citizens, 1812 Indians, 36,890 Chinese, and the remainder foreigners not naturalized.

Constitution, Courts, etc.—The constitution of the State was adopted in 1850, and, though it has been modified and amended in a few particulars, is still the organic law of the State. By its provisions all legal distinctions between individuals on religious grounds are prohibited; the utmost freedom of assembling, of speech, and of the press is allowed, subject only to restraint for abuse; in trials for libel the jury are required to judge upon the law and the fact, and proof of the truth of the charges and of the good intentions of the writer is made a bar to damages; foreigners who are actual residents have the same rights in regard to property as citizens; there is to be no imprisonment for debt, except where fraud can be proved; slavery and in-

voluntary servitude, except for crime, were prohibited; wives were secured in their separate rights of property beyond their husbands' control; the exemption of a part of the homestead and of other property of heads of families from forced sale was recognized; no public debt was to be created exceeding at any time the sum of $300,000, except upon a specific vote of the people, and then only within certain specified limits (this provision was subsequently modified by vote of the people); no divorce could be granted by the legislature; lotteries and the sale of lottery-tickets were prohibited; corporations and joint-stock companies were to be organized only under general laws, and the stockholders were to be individually liable for corporate debts; no charters for banking purposes were ever to be granted (this was subsequently modified), and the circulation of paper money in any form was prohibited (this, too, has been modified, though the circulating medium of the State has always been gold and silver); the credit of the State was not to be loaned to any individual or corporation, nor was the State ever to become a stockholder in any corporation. On the qualifications of electors the constitution provides that every white male citizen of the U. S., and every white male citizen of Mexico who shall have elected to become a citizen of the U. S. under the treaty of peace exchanged and ratified at Queretaro May 30, 1848, of the age of twenty-one years, who shall have been a resident of the State six months next preceding the election, and of the county or district in which he claims his vote thirty days, shall be entitled to vote at all elections which are now or hereafter may be authorized by law. The ratification of the fourteenth and fifteenth amendments to the Constitution of the U. S. led to such a modification of this provision as permitted the negroes to vote, but the elective franchise has not yet been permitted to the Chinese. Convicts and idiotic persons are excluded from the franchise. The legislative department of the State government consists of a senate of 40 persons, elected for four years, one-half being elected every second year; and a House of Representatives, 80 in number, elected for two years. All citizens who have resided for one year in the State, and for six months in the district, are eligible for membership. The executive department consists of a governor, lieutenant-governor, comptroller, treasurer, attorney-general, surveyor-general, and superintendent of public instruction, all of whom are chosen for the term of four years, commencing with the first Monday in December after the election. The judiciary consists—1st, of a supreme court, with a chief-justice and four associate justices, having appellate jurisdiction in all cases in equity, in all cases at law involving the title or possession of real estate, or the legality of any tax, toll, fine, etc., or in which the matter in controversy exceeds $300; also in all cases arising in the probate courts, and in all criminal cases amounting to felony on questions of law alone. It has power to issue writs of mandamus, certiorari, prohibition, and habeas corpus, and all writs necessary and proper to the exercise of its appellate jurisdiction. 2d, of district courts, of which there are now fourteen, one to each judicial district. These courts have original and co-ordinate jurisdiction in all cases in equity and law in which the supreme court has appellate jurisdiction. They have criminal jurisdiction in criminal cases not otherwise provided for. 3d, of county courts, having original jurisdiction of actions of forcible entry and detainer, insolvency, nuisance, and of all such special cases as are not otherwise provided for. A justice of the supreme court may issue writs of habeas corpus in and to any part of the State; a district judge in and to any part of his district; and a county judge in and to any part of his county. The justices of the supreme court are elected by the qualified electors of the State at special elections for judicial officers, and no others, except the superintendent of public instruction, for a term of ten years; judges of district courts by the qualified electors of their district, at similar elections, for six years; and judges of county courts by the qualified electors of their county, at similar elections, for four years. California has four representatives in Congress under the new apportionment law.

Objects of Interest.—California has numerous natural wonders, so remarkable that they attract visitors from all parts of the world. We have already alluded to the Valley of the Yosemite. This valley, one of the wonders of the world, is elsewhere more fully described. (See YOSEMITE.) It is sufficient to say here that it is a deep valley 8 miles long by 2 wide, with walls averaging nearly 4000 feet in height; that there are seventeen sentinel peaks keeping guard over the valley, and ranging from 1800 to 6034 feet in height, while the outlying summit-mountains, Lyell, Dana, and Cathedral, rise to the height of over 13,000 feet; and eleven waterfalls, the lowest 350 feet in height, and the highest 3000 feet; and in the various scenery of mountain-peak and valley, of the gentle flowing river and the endless variety of cataract, rapid, spray, and mist, of the precipitous mountain-spires and gentle grassy slopes, nature seems to have exhausted all forms of the beautiful. Near this wondrous valley are two of the groves of the sequoias or monster trees—the Calaveras and the Mariposa groves. These are visited by many tourists. The Geysers or hot springs of Calistoga, at the head of Napa Valley, are in a narrow valley or cañon which is filled with flowing (not spouting) hot springs, and the whole soil is covered with a crust of sulphur, iron-rust, and other mineral deposits, and filled with steam from the boiling water. The surface of the ground is so hot as to render walking over it uncomfortable. There has recently been discovered another of these deep valleys with its surrounding peaks and waterfalls, N. W. of Yosemite, which has a larger volume of water and falls equally lofty, and bids fair to rival the Yosemite Valley. The natural bridges and the Chyote caves in Calaveras co., with their bell-sounding rocks, the beautiful Lake Tahoe, and the smaller but romantic Donner Lake, on the boundary-line of Nevada, Mono (salt) Lake, near Yosemite; the wild volcanic region with its horrors in Mono, Fresno, and Kern counties, and the terrible Death Valley in the last-named county; Tulare Lake and the tulé swamps and lakes of the southern counties, some of them covered with bitumen; and the wild and waterless region bordering on the Colorado River in S. E. California,—all have their attractions for those who desire to witness Nature in her unknown haunts and in her strangest attire.

Counties.—There are now 51 counties in the State, the last, Ventura, having been organized from the southern part of Santa Barbara in Jan., 1873. The table appended gives the population in 1860 of each county then organized, the population of each race, and the entire population of each county in 1870, and the population as estimated by the assessors and surveyor-general at the close of 1872:

COUNTIES.	Population in 1860.	White, 1870.	Colored, 1870.	Indian, 1870.	Asiatic, 1870.	Totals, 1870.	Estimated total population 1872.
Alameda	8,927	22,106	86	111	1,934	24,237	35,000
Alpine	.....	676	1	.....	8	685	800
Amador	10,930	7,870	81	.....	1,631	9,582	11,360
Butte	12.107	9,185	84	40	2,094	11.403	12.500
Calaveras	16,299	7,400	45	18	1,432	8,895	9,986
Colusa	2,274	5,389	81	424	271	6,165	8,000
Contra Costa	5,328	8.271	21	9	160	8,461	10,000
Del Norte	1,993	1,009	22	774	217	2.022	2,500
El Dorado	20,562	8.589	133	6	1,581	10,309	9,600
Fresno	4,605	3,259	15	2,635	427	6,336	4,250
Humboldt	2,694	6,025	.....	76	39	6,140	11,500
Inyo	.....	1,608	87	232	29	1,956	2,100
Kern	.....	2,193	4	585	143	2,925	4,000
Klamath	1,803	1,069	2	61	542	1,674	3,300
Lake	.....	2,825	8	17	119	2,969	2,969
Lassen	.....	1,309	.....	1	17	1,327	1,500
Los Angeles	11,333	14,720	134	219	236	15,309	17,400
Marin	3,334	6,394	22	126	361	6,903	
Mariposa	6,243	3,344	116	8	1,104	4,572	4,560
Mendocino	3,967	6,865	9	542	129	7,545	11,000
Merced	11,141	2,548	37	36	186	2,807	3,500
Mono	.....	386	.....	2	42	430	550
Monterey	4,739	9,428	15	203	230	9,876	10,887
Napa	5,521	6,725	112	66	260	7,163	11,200
Nevada	16,446	16,334	162	9	2,629	19,134	19,134
Placer	13,270	8,850	99	1	2,407	11,357	14,000
Plumas	4,363	3,571	2	5	911	4,489	7,000
Sacramento	24,142	22,725	479	28	3,598	26,830	35,000
S. Bernardino	5,551	3,964	8	.....	16	3,989	7.000
San Diego	4,324	4,838	15	28	70	4,951	7,359
San Francisco	56,802	136,059	1 341	55	12,018	149,473	175,000
San Joaquin	9,435	19,192	230	.....	1,628	21,050	25,000
S. Luis Obispo	1,782	4,567	9	137	59	4,772	6,000
San Mateo	3,214	6,099	10	7	519	6,635	7,370
Santa Barbara	3,543	7,483	109	163	29	7,784	8,400
Santa Clara	11,912	24,537	179	12	1,518	26,246	27.000
Santa Cruz	4,944	8,532	53	2	156	8,743	9,000
Shasta	4,360	3,529	44	26	574	4,173	6.000
Sierra	11.387	4,781	29	.....	809	5,619	5,800
Siskiyou	7,629	5,312	32	47	1,457	6,848	8,000
Solano	7,169	15,871	78	3	919	16,871	16,571
Sonoma	11,867	19 184	80	82	473	19.819	25,000
Stanislaus	2,245	6,189	4	.....	306	6,499	6,500
Sutter	3.390	4,791	31	.....	208	5,030	6,550
Tehama	4,044	3,166	146	.....	275	3,587	6,500
Trinity	5,125	1,950	29	139	1,095	3,213	3,775
Tulare	4,638	4,379	39	4	99	4,521	7,400
Tuolumne	16,229	6,540	68	3	1,539	8,150	8,000
Ventura*							
Yolo	4,716	9,321	69	117	392	9,899	11,000
Yuba	13.668	8.367	151	.....	2,333	10,851	11,500
Total	379,994	499,324	4,611	7,059	49,229	560,223	657,821

Principal Towns.—San Francisco, the principal seaport and commercial metropolis of our Pacific coast, has a pop-

* New county, organized from Santa Barbara in 1873.

ulation of 149,473; Sacramento, the capital of the State, in the Sacramento Valley, has 16,283 inhabitants; Oakland, across the bay from San Francisco, 10,500; and Stockton, in the San Joaquin Valley, 10,066, are the only other towns of the State which had over 10,000 inhabitants in 1870. San José, 9089; Los Angeles, 5728; Marysville, 4738; Santa Cruz, 2561; and San Diego, 2300, were the only other towns having more than 2000 inhabitants.

History.—By the treaty of Feb. 2, 1848, with Mexico, the territory comprising the present States of California and Nevada and the Territories of Utah, Arizona, and New Mexico (except the strip S. of the Gila River), part of Colorado and part of Texas, were ceded to the U. S. Of all this region California was best known, and, though its mineral wealth was as yet undiscovered, it had long been celebrated as the El Dorado of the Pacific. Originally, the name California embraced the long peninsula now called Lower or Old California (which still belongs to Mexico) and an indefinite extent of territory northward along the coast, to which the name of Upper or New California was given. The Spaniards claimed to the Arctic Circle, but their settlements never extended N. of San Francisco. The origin of the name is involved in doubt. It is first found in an old Spanish romance published at Seville in 1510, entitled the "Sugas of Esplandian, the son of Amadis of Gaul." It is twice named in the book, as follows: "Know that on the right hand of the Indies there is an island called California, very near to the Terrestrial Paradise, which was peopled by black women, without any men among them, because they were accustomed to live after the manner of the Amazons. They were of strong and hardened bodies, of ardent courage, and of great forces. The island was the strongest in the world, from its steep rocks and great cliffs. Their arms were all of gold, and so were the caparisons of the wild beasts they rode." Another passage reads: "In the island called California are many griffins, on account of the great savageness of the country, and the immense quantity of wild game to be found there."* The present State of California (not the peninsula—that was discovered considerably earlier) was first discovered and partially described by Juan Rodriguez Cabrillo in the year 1542. Cabrillo was a Portuguese by birth, but was a navigator in the Spanish service. The highest latitude reached by him was 40° 30′, where he encountered the great western headland which he called Cape Mendoza, now known as Cape Mendocino. He also discovered and named the Farallones Islands, from his pilot Farallo. In 1578, Sir Francis Drake passed along this coast, landed at what is now known as Drake's Bay, N. lat. 37° 59′ 5″, and, ignorant of any previous discovery, took possession of it in the name of Queen Elizabeth, calling it New Albion. In 1602, General Sebastian Viscayno, under orders from Philip III. of Spain, explored the coast from San Diego northward as far as the Bay of Monterey and the islands which form the Santa Barbara channel. There is no record of any successful attempt to plant a colony on this territory for 167 years after this exploration of Viscayno. There had been numerous unsuccessful expeditions prompted by the thirst for gold, for there was a strong though vague impression that there were gold, silver, and precious stones among its mountains, but in every case they had failed miserably.

In 1767 the Jesuit missionaries were expelled from Lower California (the peninsula) by order of Charles III. of Spain, and their missions and property granted the Fathers of the order of St. Francis. These zealous propagandists began the next year to take measures for extending their missions into Upper or New California, and in the winter and spring of 1769 organized expeditions, both by sea and land, to found colonies and missions in that hitherto unknown region. After great suffering and heavy loss by scurvy and starvation, two of the three vessels reached San Diego—one April 11th, the other May 1st. The land expedition was in two divisions, the first of which reached San Diego May 15, and the second on the 1st of July. From San Diego a new party was organized, which proceeded northward along the coast to find Monterey. Missing this, they continued northward and discovered the Bay of San Francisco (which till then had been unknown to white men) on the 25th of Oct., 1769. They gave it its present name after their patron saint, but presently returned to San Diego, which they reached Jan. 24, 1770. It was not until Oct. 9, 1776, that these Fathers founded a mission at San Francisco—the Mission Dolores, as it is now called. It was the sixth they had founded within the present limits of the State. Within about fifty years they had founded twenty-one of these missions, the farthest N. being that of San Francisco de Solano de Sonoma, in lat. 38° 30′ N. These missions, at first instituted for the conversion and civilization of the Indians, soon became the means of reducing these hapless aborigines to a condition of slavery for the benefit of the Franciscan Fathers and their dependents. Within fifty-five years from the time of the planting of the first mission at San Diego the Fathers had accumulated enormous wealth. They owned all the land along the coast, the landed estate of one mission joining another, though they were twenty-five to thirty miles apart; according to the report of Rev. Calvin Colton, who made very thorough investigation of their condition in 1825, they had more than 1,200,000 head of cattle, over 100,000 horses and mares, from 12,000 to 15,000 mules, more than 1,000,000 sheep, many thousand hogs, and not less than $1,000,000 in specie and bullion, besides the rich gold and silver ornaments, statues, crucifixes, etc. in their churches. They carried on a thriving trade in hides and tallow, wool and wine, with the Russians and other traders who came to Yerba Buena (now San Francisco), Monterey, and San Diego in ships, for their produce. Nearly 20,000 Indians were domesticated at the missions, whipped and tortured if they did not perform the work allotted to them, and in the most abject condition of fear and degradation. Only a very few of these were taught to read, or even instructed in the elements of Christianity. They were merely farm-slaves. They were to defend the missions, which were strong, walled villages, and to prevent any free settlers from coming into the territory. The Indians of the interior, at that time numbering 100,000 or more, were left to their ignorance and heathenism, and no efforts were made to civilize or convert them.

With the downfall of the Spanish power in Mexico in 1822, the missions began to wane, and after years of decay they were at last formally abolished and their property confiscated in 1845. For fifteen or twenty years previous to this time a large and constantly increasing number of settlers had been pouring into California—Mexicans, attracted by the fine climate and fertile soil; trappers and hunters, who had emerged from the deserts E. of the Sierras, and who found game abundant, the lands fertile, and the Indians less warlike and ferocious than those they had before encountered; Russians from Russian America; sailors and adventurers of all nations, who had escaped from merchant-ships or had been left here at their own request; and now and then citizens of the Eastern States, who had come in search of health. Between 1840 and 1845 more than 5000 persons crossed the Plains and scaled the mountains to make their homes in California, some of the parties, like that of Captain Donner in 1846, perishing by the way from encountering terrific snow-storms, or, as in other instances, from drought and starvation in S. E. California. Great numbers, too, came by sea. In Oct., 1842, Commodore Jones, U. S. N., under the impression that there was actual war between Mexico and the U. S., entered the harbor of Monterey, captured the fort, hoisted the Stars and Stripes, and declared California a territory of the U. S., greatly to the satisfaction of most of the inhabitants; but finding himself in error, he next day hauled down his colors and apologized to the Mexican authorities for his conduct. The expeditions of Lieut. (since Major-Gen.) John C. Fremont to the Pacific aroused great interest in this region, and, in spite of the hardships to be endured, led thousands of emigrants to undertake the perilous journey. Before the close of 1846 there were 2000 American citizens in California, about 3000 foreigners who were friendly to them, and about 3000 more who were neutral or hostile. In Mar., 1847, Col. Stevenson's picked regiment of California volunteers, nearly 1000 strong, was added to this number, and other U. S. troops came in soon after. On the 7th of July, 1846 (war having already commenced between the U. S. and Mexico), Commodore John D. Sloat took possession of Monterey, and issued a proclamation as governor of the territory. Two days later, the U. S. troops took possession of San Francisco, July 10th of Sonoma, and July 12th of Sutter's Fort. Commodore Sloat acted as governor until Aug. 17, 1846, when Commodore Robert F. Stockton was proclaimed his successor. Commodore Stockton gave his immediate attention to fighting the Mexican forces under Flores, who had recaptured Los Angeles and Santa Barbara, and whom he defeated in two battles—at Rio San Gabriel and on the plains of Mesa, Jan. 8 and 9, 1847—and drove out of the country. In Jan., 1847, Commodore Stockton appointed Col. John C. Fremont governor. This was a blunder, as Gen. Stephen W. Kearney, as commander of the forces, was rightfully governor, and assumed command Mar. 1, 1847. Fremont was afterwards tried by court-martial for this offence, but was cleared, it being proved that he had acted in good faith and without a knowledge of Gen. Kearney's rights in the matter. Col. Richard B. Mason was appointed governor May 31, 1847, and held office till April 13, 1849; Capt. (afterward Maj.-Gen.) Henry W.

* Cronise's "Natural Wealth of California," page 2.

Halleck was secretary of the territory under Col. Mason, and rendered great services to the country then and subsequently. On the 13th of April, 1849, Gen. Bennet Riley was appointed military governor, and on the 3d of June following called a convention to meet at Monterey on the 1st of Sept. to frame a State constitution. This convention, consisting of forty-eight members, assembled at the time appointed, and after six weeks of deliberation reported, adopted, and signed a constitution (Oct. 13, 1849), which was submitted to the people for ratification on the 13th of Nov., 1849, when 12,064 votes were polled in favor of its adoption, 811 against it, and 1200 were set aside for informality. In Dec., 1849, Peter H. Burnett was elected governor under this constitution, and application was made in due form for the admission of the State into the Union. After a long and acrimonious struggle in Congress between the advocates of slavery and free soil, which lasted from Dec. 22, 1849, to Sept. 7, 1850, California was admitted into the Union as a State Sept. 9, 1850.

In Feb., 1848, gold was discovered on the estate of Gen. Sutter in Coloma co., and as the news of its discovery spread the gold-hunters flocked in from all parts of the world, and in a very short time (in 1852) California had a population of over 250,000, a large proportion of them energetic, daring, reckless men, capable of almost any crime, and mad in their pursuit of gold. Gambling and its concomitant vices bore almost universal sway. Whole squares were devoted to gambling-houses in San Francisco, and theft and murder were rife in its streets. It was found that the courts protected instead of punishing rogues and ruffians, and in 1851 a "vigilance committee" of some of the best citizens was formed, which seized, tried, and hanged in the streets some of the worst villains. This alarmed the dangerous classes for a time, but the courts and civil authorities were all thoroughly corrupt, and some of the worst men in the community were occupying high offices, upon which they had seized by the most open and unblushing frauds. The vigilance committee was revived in May, 1855, and for eight months held sway in San Francisco, arresting, trying, hanging, and banishing those whose crimes had rendered them obnoxious to the community. It was a desperate remedy, and one fitted only to a desperate condition of affairs; but it is the universal testimony of the best citizens that the committee used their absolute powers wisely and well, and disbanded as soon as the occasion for which they were called into action had passed. They executed four, one of their prisoners committed suicide while they were deliberating on his case, and nearly twenty were banished from the State. One of their prisoners, who was at the time one of the justices of the supreme court of the State, was released by them after trial, but his subsequent course verified their judgment of his ruffianly character. The State has passed through many vicissitudes, the succession of excitements in regard to new gold-fields depopulating some districts and causing a rapid growth of others. Of late years, however, it has been developing its other resources—the culture of grain and the production of wine, of silk, and semi-tropical fruits, and of some descriptions of manufactures; and though the yield of gold in the State has partially fallen off, it has been much more than made up in the increase of the crops and manufactured goods, and these afford a better and more certain return to the producer than mining products. During the late war California contributed her full share both in men and money towards achieving the success of the Union arms; her magnificent gifts to the Sanitary Commission and to all organizations for the welfare of the soldiers will never be forgotten. By the completion of the Union and Central Pacific R. Rs. the State was brought into closer connection with the Eastern States, and all danger of the creation of a separate Pacific empire, if such danger ever existed, was for ever removed from the thoughts of its people.

Gold Product of California.—Mr. T. F. Cronise, in his "Natural Wealth of California," gives the following table of the gold product of California, which we have brought down to the beginning of 1873. It is in round numbers, but is the closest approximation to the truth:

Year.	Amount.	Year.	Amount.
1848	$10,000,000	1861	$40,000,000
1849	40,000,000	1862	34,700,000
1850	50,000,000	1863	30,000,000
1851	55,000,000	1864	26,600,000
1852	60,000,000	1865	28,500,000
1853	65,000,000	1866	26,500,000
1854	60,000,000	1867	25,000,000
1855	55,000,000	1868	28,000,000
1856	55,000,000	1869	27,800,000
1857	55,000,000	1870	28,500,000
1858	50,000,000	1871	25,000,000
1859	50,000,000	1872	20,000,000
1860	45,000,000		
Total for 25 years			$990,600,000

Governors of the State, Territory, and Province.—California has been within the past 106 years under the government of four different powers—viz. 1st, the Spanish rule from 1767 to 1823 (previous to 1767 it was parceled off among numerous tribes of Indians, some of them Pueblos or dwellers in towns and villages, and others nomadic); 2d, the Mexican rule; 3d, the American territorial and military government; 4th, the State government.

Spanish Rule.

Gaspar de Portala	1767–71	José J. de Arrillaga	1792–94
Felipe de Barri	1771–74	Diego de Borica	1794–1800
Felipe de Neve	1774–82	José J. de Arrillaga	1800–14
Pedro Fajés	1782–90	José Arguello	1814–15
José Antonio Romen	1790–92	Pablo Vicente de Sola	1815–22

Mexican Rule.

Pablo Vicente de Sola	1822–23
Luis Arguello	1823–25
José Maria de Echeaudia	June, 1825–Jan., 1831
Manuel Victoria	Jan., 1831–Jan., 1832
Pio Pico	Jan., 1832–Jan., 1833
José Figueroa	Jan., 1833–Aug., 1835
José Castro	Aug., 1835–Jan., 1836
Nicolas Gutierrez	Jan., 1836–April, 1836
Mariano Chico	April, 1836–Aug., 1836
Nicolas Gutierrez	Aug., 1836–Nov., 1836
Juan B. Alvarado	Nov., 1836–Dec., 1842
Manuel Micheltorena	Dec., 1842–Feb., 1845
Pio Pico	Feb., 1845–July, 1846

American Military and Territorial Rule.

Com. John D. Sloat	July 7, 1846–Aug. 17, 1846
Com. Robert F. Stockton	Aug. 7, 1846–Jan., 1847
Col. John C. Fremont	Jan., 1847–Mar. 1, 1847
Gen. Stephen W. Kearney	Mar. 1, 1847–May 31, 1847
Col. Richard B. Mason	May 31, 1847–April 13, 1849
Gen. Bennet Riley	April 13, 1849–Dec., 1849

State Government.

Peter H. Burnett	Dec., 1849–51	John G. Downey	1860–62
John McDougall (acting)	1851–52	Leland Stanford	1862–63
John Bigler	1852–56	Frederick F. Low	1863–68
J. Neely Johnson	1856–58	Henry H. Haight	1868–72
John B. Weller	1858–60	Newton Booth	1872–75
Milton S. Latham	1860–60		

Electoral Vote for President and Vice-President.—The first presidential election in which California participated was that of 1852, and her electoral votes have been cast from that time as follows:

Year.	Candidates.	Electoral vote.
1852	Pierce and King	4
1856	Buchanan and Breckenridge	4
1860	Lincoln and Hamlin	4
1864	Lincoln and Johnson	5
1868	Grant and Colfax	5
1872	Grant and Wilson	6

Popular Vote for President and Vice-President.

Elec. year.	Candidates.	Popular vote.	Candidates.	Popular vote.	Candidates.	Popular vote.	Candidates.	Pop. vote.
1852	Scott and Graham	35,407	Pierce and King	40,626	Hale and Julian	100		
1856	Fremont and Dayton	20,691	Buchanan and Breckenridge	53,365	Fillmore and Donelson	36,165		
1860	Lincoln and Hamlin	39,173	Douglas and Johnson	38,516	Breckenridge and Lane	34,334	Bell and Everett	6817
1864	McClellan and Pendleton	43,841	Lincoln and Johnson	62,134				
1868	Seymour and Blair	54,077	Grant and Colfax	54,583				
1872	Greeley and Brown	40,718	Grant and Wilson	54,020				

(For the recent statistics of this article we are indebted to the Hon. Drury Melone, secretary of state of California.)

L. P. Brockett.

California, a township of Madison co., Ark. Pop. 313.

California, a township of Starke co., Ind. Pop. 251.

California, a township of Coffey co., Kan. Pop. 645.

California, a post-township of Branch co., Mich. Pop. 803.

California, a city, capital of Moniteau co., Mo., on the Missouri Pacific R. R., 150 miles W. of St. Louis. It is the geographical centre of the State, and has fine county buildings, seven churches, four hotels, graded schools, bank, public library, and two weekly papers, and is surrounded by a rich agricultural district, abounding in lead and other minerals. R. E. Huntington, Ed. "Moniteau Journal."

California, a township of Pitt co., N. C. Pop. 3626.

California, a post-borough of Washington co., Pa. Pop. 659.

California, Gulf of, or **Sea of Cortes** [Sp. *Mar Bermejo*], an arm of the Pacific Ocean, separates the peninsula of Lower California from the Mexican provinces of Sinaloa and Sonora. It is about 700 miles long, and varies in width from 40 to 100 miles. It encloses many islands. The river Colorado enters it at the N. extremity. This gulf was once famous for its pearl-fisheries, and mother-of-pearl is still obtained here.

California, Lower or **Old,** a long, narrow peninsula, a territory of Mexico, is bounded on the N. E. by the Gulf of California, and on the S. W. by the Pacific Ocean. It is about 750 miles long, and varies in width from 30 to 150 miles. Its most southern point, Cape Lucas, is in lat. 22° 52′ N., from which it extends in a N. N. W. direction to lat. 32° 30′ N. It is a mountainous, arid region of volcanic formation, having a sparse population. Capital, La Paz. This peninsula was discovered by Grijalva in 1534. Pop. in 1868, 21,645.

California, University of, was established by an act of the State legislature, approved Mar. 23, 1868. It was an outgrowth of the College of California, which was chartered in 1855, and maintained on a non-sectarian basis. Prof. Henry Durant opened its preparatory school at Oakland, and thus became one of the earliest pioneers of education in the State. In 1860 the college admitted its first class, and it graduated classes yearly from 1864 to 1869. It had no president. From 1863 to 1869, Rev. S. H. Willey was vice-president. Finding the college fettered by its want of endowments, and wishing to see a larger and stronger institution, the trustees in 1867 offered all their property to the State. This included a new, unoccupied site of 160 acres at Berkeley, 5 miles N. of Oakland, and 9 miles from San Francisco. The State had accèpted the Congressional provision for an agricultural college. It was now proposed to unite all interests in a university adequate to the wants and worthy of the name of the State. The proposition was agreed to. The first board of regents, appointed in 1868, kept the college in existence another year. In 1869 the university was organized for instruction, and received its first class. That class graduated in the summer of 1873. The classes have steadily increased, and the university now numbers 180 students. The university has already two large buildings at Berkeley.

The first president of the university, elected in 1870, was Henry Durant, LL.D., formerly of the College of California. The present president is Daniel C. Gilman, late of Yale College. DANIEL C. GILMAN.

Calig'ula (CAIUS CÆSAR), a Roman emperor, born at Antium in 12 A. D., was a son of Germanicus. His mother was Agrippina, a granddaughter of the emperor Augustus. He succeeded to the throne 37 A. D., at the death of Tiberius, against whose cruel jealousy he had guarded himself by habitual dissimulation. His reign was at first mild and popular, with an ostentation of generosity, but he soon showed himself a monster of cruelty, and indulged his vicious propensities without restraint. He expressed a wish that all the Roman people had but one head, that he might decapitate them at one blow. He ordered that sacrifices should be offered to himself as a god. In 41 A. D. he was assassinated by conspirators, and was succeeded by his uncle Claudius.

Ca'liph [Arab. *khalifah*, a "successor"], the "commander of the faithful," the spiritual and temporal head of orthodox Mohammedanism—so called as being the "successor" of Mohammed. The caliphs are usually classed as follows: (1) The four "Arabian caliphs" of Medina, A. D. 632–661; (2) the fourteen "Ommyiades" of Damascus, 661–750; (3) the twenty-seven "Abbasides" of Bagdad, 750–1258; besides these there were rival caliphates; (4) in Egypt the "Fatimites," fourteen in number, 909–1171; and (5) in Cordova, 756–1031, there were twenty-seven successive caliphs (Abbasides) who had authority in Spain and N. W. Africa. The later Moorish dynasties, such as the "Almoravides" (1050–1145) and the "Almohades" (1129–1269), are not usually reckoned as caliphs, that term being, in strict language, only applicable to sultans of the family of Mohammed. Nevertheless, the Turkish sultans have long claimed the caliphate, and the claim is generally admitted by orthodox Mohammedans. The Shiite Mohammedans recognize of the above only Ali, the fourth Arabian caliph, as the lawful heir of the prophet, and from him the present royal house of Persia claims a lineal descent.

Calisthenics. See CALLISTHENICS.

Calisto'ga, a beautiful post-village of Napa co., Cal., the N. terminus of the Napa Valley R. R., 42 miles from Vallejo, is celebrated for its warm springs and its picturesque scenery. The town is supplied with water from the adjacent mountains, and is a place of considerable business. Five miles to the S. E. is a famous petrified forest.

Cali'tri, a town of Italy, in Principato Ulteriore, near the Ofanto, 23 miles S. E. of Ariano. Pop. 6208.

Calix'tines, the name given to a party of the Hussites, because they insisted on giving the cup (calyx) in the Eucharist to all who were not guilty of mortal sins. They defeated the Taborites (the other branch of the Hussites) in a battle at Lippau (1434). The Calixtines had been reconciled to the pope in 1433. The term Calixtines has also been applied to the adherents of G. Calixtus, a Lutheran professor of theology at Helmstedt. (See CALIXTUS.)

Calix'tus, originally **Callisen** (GEORGE), an eminent Protestant theologian, born at Medelbye, in Sleswick, Dec. 14, 1586. He became professor of theology at Helmstedt in 1614, and wrote several treatises against the doctrines of the Roman Catholics. He was distinguished for his learning and tolerance as well as his talents. Among his works are an "Epitome of Moral Theology" (1634) and "De Tolerantia Reformatorum" ("On the Tolerance of Reformers," 1658). He was accused of heresy and cryptopapism by some Lutherans, but his doctrines were accepted by many followers, who were called Calixtines. Died Mar. 19, 1656. (See W. C. DOWDING, "Life of Calixtus," 1864.)

Calixtus I. (POPE), SAINT, succeeded Zephyrinus 219 A. D. Died 223.—CALIXTUS II. succeeded Gelasius II. in 1119. He concluded the concordat of Worms with the emperor Henry V., which ended the difficulty with respect to investitures. Died Dec. 12, 1124.—CALIXTUS III. (ALONZO BORGIA), born in 1379 in Valencia, succeeded Nicholas V. in 1455. He attempted to institute a crusade, without success. Died Aug. 6, 1458.

Cal'ken, a village of Belgium, in East Flanders, on the Scheldt, 8 miles E. of Ghent. Pop. 5227.

Calk'ing, or **Caulking,** the process of filling with tarred oakum the seams between the planks of ships, in order to render the joints impervious to water. The oakum is driven into the seams by a wedge-shaped tool called a calking-iron. The seams are finally payed over or coated with melted pitch or resin. The quantity of oakum used in a ship of the largest size is about thirty tons.

Call, a military musical term, signifies a signal given by a trumpet, bugle, or drum.

CALL, a metallic whistle used on shipboard by the boatswain and his mate. Various kinds of sounds denote signals or orders for hoisting, lowering, veering, etc.

CALL TO THE BAR is the formal expression by which the admission of students of law to the rights and privileges of the degree of barrister in England and Ireland is publicly announced. In Scotland the corresponding expression is "passing advocate."

Cal'la, a genus of plants of the natural order Araceæ. The genus is characterized by a flat spathe, within which is a cylindrical spadix covered with naked flowers, appearing as a mere mixture of stamens and pistils, and a 1-celled ovary. The *Calla palustris* is a native of Europe and the U. S., growing in swamps and bogs. It has cordate leaves, a white spathe, and very acrid rhizomes, which are cooked for food by the Laplanders. The *Calla Æthiopica* or *Richardia Æthiopica* is prized for the beauty of its flowers.

Cal'lahan, a county in the N. of Texas. Area, 900 square miles. It is drained by several affluents of the Colorado and Brazos rivers. The surface is hilly or mountainous. Here are two peaks, called the East Caddo and West Caddo. Timber is scarce. Stock-raising is the only pursuit. Returned as having no population by U. S. census of 1870.

Cal'land's, a post-village and township of Pittsylvania co., Va., 45 miles S. W. of Lynchburg. Pop. 2848.

Calla'o, a fortified town of Northern Peru, on the Pacific Ocean, 6 miles W. of Lima, of which it is the port; lat. 12° 4′ S., lon. 77° 13′ W. It is connected with Lima by a railway, and has a commodious quay and a fine fortress. The harbor or roadstead, which is sheltered by the island of San Lorenzo, is the best on the coast of Peru. The chief exports are specie, copper, cotton, hides, and bark. The town was destroyed by an earthquake in 1746. Pop. about 10,000.

Cal'lao, a post-village of Macon co., Mo., on the Hannibal and St. Joseph R. R., 9 miles W. of Macon City. Pop. of Callao township, 1643.

Cal'laway, a county of Kentucky, bordering on Tennessee. Area, 450 square miles. It is bounded on the E. by the Tennessee River, and is drained by Clark's River. The surface is hilly, except the extensive river-bottoms;

the soil is fertile. Tobacco, corn, wheat, and wool are staple products. Capital, Murray. Pop. 9410.

Callaway, a county in E. Central Missouri. Area, 743 square miles. It is bounded on the S. by the Missouri River, and on the W. by Cedar Creek. The surface is undulating; the soil is very fertile. About one-third of it is prairie-land. Bituminous coal, iron, fictile clay, and fine limestone are abundant here. Tobacco, grain, wool, and cattle are extensively raised. Capital, Fulton. Pop. 19,202.

Callaway, a township of St. Charles co., Mo. P. 1745.

Call'cott (Sir Augustus Wall), an English landscape painter, born at Kensington (London) Feb. 20, 1779. He was chosen a member of the Royal Academy in 1810, was knighted in 1837, and became conservator of royal pictures in 1844. Among his works are "Morning," "Evening," and "Harvest in the Highlands." Died Nov. 25, 1844.

Callcott (John Wall), Mus. Dr., an eminent English composer, a brother of the preceding, was born at Kensington in 1766. He composed many anthems, glees, and other pieces of music. He published a "Musical Grammar" (1805). In the latter part of his life he was insane. Died in May, 1821.

Calle'ja (Don Felix del Rey), a Spanish general, born in 1750. He commanded the royal army in Mexico against the insurgents who revolted in 1810, and he became viceroy of Mexico in 1813. Died in 1820.

Cal'lender (John), born in Boston, Mass., in 1706, graduated at Harvard in 1723, became pastor of the Baptist church of Swansey, Mass., in 1728, and in 1731 of the church at Newport, R. I. His best-known work is a centennial historical discourse, delivered in 1738, which is of great value in the early history of Rhode Island. Died Jan. 26, 1748.

Cal'lensburg, a post-village of Licking township, Clarion co., Pa. Pop. 255.

Cal'licoon, a post-township of Sullivan co., N. Y., has manufactures of lumber and leather. The soil is good. Sand for glass-making has been procured here. Jeffersonville, which is partly in this township, has a weekly paper. Pop. of township, 2763.

Callic'rates [Gr. Καλλικράτης], an eminent Greek architect who flourished about 440 B. C. Among his works was the Parthenon of Athens, in which he was assisted by Ictinus. It was adorned with sculptures by Phidias, and was surrounded by forty-six Doric columns.

Callicrat'idas [Gr. Καλλικρατίδας], a Spartan general who obtained command of the fleet in 406 B. C. He defeated the Athenian general Conon, and blockaded him at Mitylene. The Athenians soon sent to the relief of Conon another fleet, which defeated the Spartans at Arginusæ in 406 B. C. Callicratidas was killed in this action.

Callig'onum, a genus of plants of the order Polygonaceæ, having a quadrangular fruit (*achenium*) winged at the angles. The *Calligonum Pallasia*, a succulent shrub, is found in the sandy steppes near the Caspian Sea. Its acid fruit and shoots serve to allay the thirst of travellers. From its root exudes a nutritious gum which is similar to tragacanth, and is used as food by the Calmucks.

Callig'raphy [Gr. καλλιγραφία, from κάλλος, "beauty," and γραφή, "writing"], the art of beautiful writing. The scribes who copied manuscripts before the invention of printing have been termed calligraphers or calligraphists. Their art consisted not merely in writing, but also in embellishing their work with ornamental devices. (See Illumination.) Some extant manuscripts, written in the early part of the Middle Ages, exhibit admirable specimens of the art, with letters of gold, vermilion, etc.

Callim'achus, a Greek sculptor and architect who is supposed to have lived about 450–400 B. C. His statues were finely finished. The invention of the Corinthian capital is ascribed to him.

Callimachus [Gr. Καλλίμαχος], a celebrated Greek poet and grammarian, was born at Cyrene, and flourished about 260–240 B. C. He was patronized by Ptolemy Philadelphus, and was appointed chief librarian of the great Alexandrian library. He was a prolific writer and an eminent teacher; among his pupils was Eratosthenes. He wrote an epic poem entitled "Galatea," several important prose works, and tragedies, elegies, comedies, etc. His works are nearly all lost, except his epigrams and hymns. Quintilian regarded him as the best of the Greek elegiac poets.

Calli'nus [Καλλῖνος] **of Ephesus,** the earliest of the Greek elegiac poets, is supposed to have lived about 600 or 650 B. C. Only small fragments of his poems are extant.

Calli'ope [Gr. Καλλιόπη], one of the Nine Muses, presided over epic poetry, and was said to be the mother of Orpheus and Linus. She was represented as holding a tablet or closely-rolled parchment in her hand.

Calliope, a post-village, capital of Sioux co., Ia., is on the left bank of the Sioux River (which is here the western boundary of the State), about 38 miles N. of Sioux City. Pop. 40.

Callip'pic Period, a correction of the Metonic cycle, proposed by Callippus. The Metonic cycle was a period of nineteen solar years, at the end of which the new moons return again on the same days of the year. The period contained exactly 6940 days. Now, 6940 days exceed 235 lunations by only seven hours and a half. At the end of four cycles, or seventy-six years, the accumulated excess of seven and a half hours amounts to one day and six hours. Callippus proposed to quadruple the period of Meton, and to deduct a day at the end of it.

Callip'pus, or **Calippus** [Gr. Κάλλιππος or Κάλιππος], an ancient Greek astronomer, born at Cyzicus, lived about 330 B. C. at Athens. He associated with Aristotle. He invented a new cycle of seventy-six years, which was adopted by astronomers, and was called the "Callippic Period." It began 331 B. C.

Callis'thenes [Gr. Καλλισθένης], an historian, born at Olynthus, in Thrace, about 365 B. C., was a relative and pupil of Aristotle. He accompanied Alexander the Great in his expedition against Persia in 334 B. C., and gained the favor of that prince, but afterwards offended him by his boldness of speech, and was put to death on a charge of treason in 328 B. C. He left a history of Alexander's expedition against Persia, which is not extant.

Callisthen'ics, or **Calisthenics** [from the Gr. κάλλος, "beauty," and σθένος, "strength"], a system of exercises designed to promote beauty and strength; in other words, to impart grace of movement and physical strength at the same time. These exercises are better adapted to girls than ordinary gymnastics, as they do not subject the muscles to so violent a tension. The apparatus used in these exercises consists of a light wooden staff about four feet long, a pair of light dumb-bells, parallel bars, two square weights, and a short roller fixed in sockets near the top of an open doorway. Good substitutes for this apparatus may be found in the game of battledoor, in swimming, riding on horseback, etc.

Callis'tratus [Gr. Καλλίστρατος], an eloquent Athenian orator who lived about 380–360 B. C. His eloquence and the applause which he received excited the emulation of Demosthenes, and induced him to cultivate the art of oratory. Callistratus was banished from Athens in 361 B. C. Having returned without permission, he was put to death.

Cal'litris, a genus of trees of the order Coniferæ. The cones consist of four to six woody scales, which separate one from another, each scale having from three to six winged seeds. *Callitris quadrivalvis*, a large tree of Barbary, called arar, yields a very hard, almost indestructible, fragrant wood, and the aromatic gum-resin called sandarach. The timber is highly prized, and is used for the floors of mosques.

Callot (Jacques), a French engraver, born at Nancy in 1592. His plates are most of them small, and deal with familiar and grotesque subjects. Among his works are notable the series of etchings "Les Misères de la Guerre." Died Mar. 24, 1635.

Calluna. See Heath.

Cal'lus [Lat.], the exuded material by which fractured bones are consolidated together. If the broken ends are accurately adjusted, there is merely a slight deposition of callus between the two surfaces; if, however, the adjustment is not accurate, it is effused in such quantity as often to form a considerable hard swelling round the seat of the fracture; any excess is, however, usually absorbed during the last stage of the repair of a fracture. The term callus is also applied to the thick skin formed on hands or feet which are exposed to much rubbing and pressure.

Calmar, or **Kalmar,** a town of Sweden, is situated on an island in the Calmar Sound, 198 miles S. S. W. of Stockholm. It is regularly built, and was formerly strongly fortified. It has a good harbor, considerable trade, large factories, and a beautiful cathedral. It is the seat of a Lutheran bishop. Pop. in 1864, 8813.

Cal'mar, a post-village of Winneshiek co., Ia., on the Milwaukee and St. Paul R. R., 43 miles W. by N. from Prairie du Chien. It is the eastern terminus of a branch of the same railroad. Pop. of Calmar township, 1864.

Calmet (Augustine), a learned French Benedictine and commentator on Scripture, was born near Commercy, in Lorraine, Feb. 26, 1672. He became in 1728 abbot of Senones, where he resided for many years. He published,

besides other works, a "Commentary on the Bible" (23 vols., 1707–16), and a "Historical and Critical Dictionary of the Bible" (2 vols. folio, 1720), which was translated into several languages. Died Oct. 20, 1757.

Calms. *Equatorial Calms.*—A belt of calms, variable winds, sudden squalls, and tornadoes, and almost daily thunder-showers, situated about and somewhat N. of the equator, 4° to 6° of latitude in breadth, and separating the two bodies of N. E. and S. E. trade-winds. This is the region where the heated air at the equator ascends to return from the height of the atmosphere towards the poles. (See WINDS, GENERAL CIRCULATION OF.)

Calms of the Tropics of Cancer and Capricorn.—Two belts of calms and light winds, almost rainless, situated in the neighborhood of, but outside, the tropics. They are found at the polar limit of the trade-winds, which they separate from the region of variable winds of the temperate zones. Each belt occupies but a few degrees in latitude, but the position and limits of both are less defined than those of the equatorial belt. The region of the calms of Cancer, in the Atlantic, is called by American mariners the *horse latitudes*. It is said that in colonial times the numerous vessels freighted with horses from New England for the West Indies were often long detained in these dreaded calms, under the burning rays of the sun of these latitudes, causing a great mortality among their living freight. Hence the name. (See WINDS, GENERAL CIRCULATION OF.) ARNOLD GUYOT.

Cal'mucks, called by the Tartars *Khalimick* ("renegades"), the largest of the Mongolian peoples, inhabiting large regions of the Chinese and also Russian dominions. They are divided into four tribes: the Choshots, ruled by descendants of Gengis Khan; the Soongars, in the seventeenth and eighteenth centuries the masters of the other races; oppressed by the Chinese, they migrated in great numbers in 1758 to Russia, but, finding the new yoke still more grievous, returned in 1770 to Soongaria; the Derbets, who dwell in the valleys of the Don and Ili; the Torgots, formerly united with the Soongars. The former in 1616 removed to the plains of the Volga, but a large part sought their native regions again. The Calmucks are a nomadic race. Their wealth consists in herds of horses, camels, sheep, and cattle. In Russia there are at present about 120,000, the greater part of whom are found in Astrakhan. The European Calmucks are mostly Booddhists, but some are Mohammedans and some are Christians.

Caln, a post-township of Chester co., Pa. Pop. 984.

Calomar'de (FRANCISCO TADEO), COUNT, a Spanish minister of state, born at Villel in 1775. He studied law, joined the absolutist party, and became in 1823 minister of grace and justice. He persecuted the liberals, favored the Jesuits, and abused his power with cruelty. In 1833 he was disgraced and exiled in consequence of his abortive intrigues to raise Don Carlos to the throne. Died in 1842.

Cal'omel [from the Gr. καλός, "beautiful," "good," and μέλας, "black," perhaps so named because it was supposed to be good for black bile] is one of the compounds of mercury (Hg) and chlorine (Cl), known to chemists as the subchloride of mercury, or, according to the new nomenclature, mercurous chloride (Hg_2Cl_2). It is prepared by taking two equal portions of mercury, dissolving one portion in hot sulphuric acid, which forms sulphate of mercury, then adding the second part, and triturating the whole in a mortar till the metal becomes incorporated with the sulphate. This mixture is added to one-half its weight of common salt, and heated in a retort, when calomel condenses in the cool part of the receiver as a white powder. It is also sometimes prepared by precipitation. A minute quantity of corrosive sublimate which accompanies it is removed by washing. Calomel is very heavy. It is not soluble in water, and sparingly so in acids. It turns black on the addition of lime-water, potash, soda, or ammonia. When heated it sublimes unaltered, and readily condenses again on any cool surface held near it. Its medicinal properties are of a decided character, and though capable of being misused, and thus doing great harm, it is still of great value in the treatment of certain diseases. REVISED BY WILLARD PARKER.

Calonne, de (CHARLES ALEXANDRE), a French courtier, born at Douay in 1734. He was appointed controller-general of finances in 1783, at a time when the public revenue was not equal to the expenses of the state. He was profuse in the expenditure of the public money, and supplied the deficit by loans, extraordinary taxes, and other temporizing expedients, in which he showed himself fertile. In 1786 he advised the king to convoke an assembly of the Notables, in order to devise some remedy for the financial crisis. He was removed from office in 1787. Died Oct. 30, 1802.

Calophyl'lum [from the Gr. καλός, "beautiful," and φύλλον, a "leaf"], a genus of trees of the order Guttiferæ, natives of warm climates. Some of the species produce edible fruits and valuable timber. The resin called East Indian tacamahac exudes from the trunk of *Calophyllum Inophyllum*, a beautiful tree, which has large shining leaves and fragrant white flowers. This is one of the most valuable timber trees of the South Sea Islands. The timber is very durable, and resembles mahogany, but is of a lighter color. It is used for building and for the masts of vessels. The fruit of this and the other species is a drupe.

Caloric. See HEAT, by PROF. W. GIBBS, M. D., LL.D.

Caloric Engine. See HOT-AIR ENGINE, by PRES. F. A. P. BARNARD, S. T. D., LL.D., L. H. D.

Calorimo'tor [from *calor*, "heat," and *moveo, motum*, "to move,"], a name given to a peculiar form of the voltaic apparatus, invented by Dr. Hare, composed of one pair of plates, which have great extent of surface, the electricity of which, when transmitted through good conductors, produces intense heat.

Calottistes (*Le Régiment de la Calotte*), an association of wits and satirists under the reign of Louis XIV. They were so called from their custom of sending to a public character who had made himself ridiculous a "patent," authorizing him to wear the *calotte*, a small cap, to protect the weak part of his head. The society was dissolved under the ministry of Cardinal Fleury.

Caloy'ers (*i. e.* "good old men"), [from the Gr. καλός, "good," and γέρων, an "old man"], a name applied to the monks of the Greek Church. They mostly follow the rule of Saint Basil, but those at Mount Sinai and Mount Lebanon follow the rule of Saint Anthony; from the caloyers the bishops and patriarchs are chosen. Among their numerous monasteries those of Mount Sinai in Asia and Mount Athos in Europe are the most celebrated.

Cal'pee, or **Kalpee,** a city of India, in Bundelcund, is on the right bank of the Jumna, in lat. 26° 7′ N., lon. 97° 28′ E. It is 46 miles S. W. of Cawnpore. Paper and refined sugar of superior quality are made here. Calpee was conquered by the British in 1803. In May, 1858, it was captured by Gen. Rose from the mutinous Sepoys, of whom Calpee was one of the head-quarters. Pop. 21,812.

Calpel'la, a township of Mendocino co., Cal. P. 807.

Calpur'nia, the fourth wife of Julius Cæsar, was married to him in 59 B. C. She was a daughter of L. Calpurnius Piso, who was consul in 58 B. C. She urged her husband not to leave home on the day of his assassination, the ides of March, 44 B. C.

Calpur'nius (TITUS JULIUS), a Latin poet, surnamed SICULUS, is supposed to have lived about 280–300 A. D. The events of his life are unknown. Several of his eclogues are extant, and have some merit.

Caltagiro'ne (anc. *Calata Hieronis?*) a city of Sicily, in the province of Catania, on the slope of a hill about 32 miles S. W. of Catania. It is the see of a bishop, and has a college, a hospital, and several convents; also manufactures of cotton fabrics and pottery. The inhabitants are esteemed the best workmen in Sicily in the useful arts. Pop. in 1872, 25,978.

Caltaniset'ta, an Italian province, bounded on the N. by Palermo, on the E. by Catania and Siracusa, on the S. by the Mediterranean, and on the W. by Girgenti, in the central part of Sicily. Area, 1455 square miles. Pop. in 1872, 226,156.

Caltanisetta, a fortified town of Sicily, capital of the above province, in a fertile plain near the Salso, 23 miles N. E. of Girgenti. Here are mineral springs and extensive sulphur-works. This place is supposed to be the site of the ancient *Nissæ*. Pop. in 1872, 26,156.

Caltavutu'ro, a town of Sicily, province of Palermo, 30 miles S. E. of the city of Palermo, is of Saracenic origin. Jasper is found in this vicinity. Pop. 5119.

Cal'tha, the Latin name of the marigold. *Caltha palustris* is the systematic name of the marsh marigold, often called in America "cowslip," a plant of the natural order Ranunculaceæ, which grows in swamps and wet meadows in Asia, Europe, the U. S., and even in Alaska. It is boiled and eaten in the spring as a potherb, the poisonous properties which it is said to possess being destroyed by cooking.

Cal'trop, or **Calthrop,** a thistle of the genus *Tribulus*, growing in the S. of Europe; its burs are armed with strong spines, which inflict wounds upon the feet of men and beasts if trodden upon. This name is also applied to a four-pointed piece of steel, so shaped that one prong always points upward. It is used in military operations to annoy an advancing enemy.

Caluire-et-Cuire, a village of France, in the department of Rhone, a suburb of Lyons, on the Saône, 3 miles N. N. E. of that city. Pop. 9182.

Cal'umet [said to be of French origin], the pipe of peace used by the North American Indians in the ratification of treaties. It is a tobacco-pipe, having a long stem made of hollow reed and ornamented with feathers. Some tribes of the aborigines appear to think that a treaty is not valid or complete until both parties have smoked the calumet together.

Calumet, a county in the E. of Wisconsin. Area, 300 square miles. It is bounded on the W. by Winnebago Lake, and is drained by the sources of Manitoowoc River. The rocks which underlie this county are limestone and sandstone. Grain, wool, and dairy products are largely raised. Capital, Chilton. Pop. 12,335.

Calumet, a post-township of Cook co., Ill. Pop. 1253.

Calumet, a post-township of Houghton co., Mich. Pop. 3182.

Calumet, a township of Pike co., Mo. Pop. 5185.

Calumet, a township of Fond du Lac co., Wis. Pop. 1460.

Calvados, a maritime department of France, formed of part of the old province of Normandy, is bounded on the N. by the English Channel, on the E. by Eure, on the S. by Orne, and on the W. by Manche. Area, 2181 square miles. The southern part is hilly, but extensive plains occur in other portions. The soil is fertile. The chief rivers are the Orne, Dromme, and Vire. Among the mineral productions are iron, coal, marble, and slate. Many horses, cattle, and sheep are raised here. Capital, Caen. Pop. in 1866, 474,909.

Cal'vary, Mount, the scene of our Saviour's crucifixion, is commonly thought to be an eminence which lay at the north-west, and just on the outside, of the ancient city of Jerusalem, but the locality is by no means certainly known. Calvary, or Calvaria, is a translation into Latin of the Hebrew word Golgotha, signifying a "skull," either because the mount was a place of public execution, or because it was shaped like a human skull. The word occurs but once in our authorized version of the New Testament (Luke xxiii. 33); the term in the Greek being Κρανίον. It was not improbably so named from its shape.

Calvary, a township of Clarendon co., S. C. P. 1152.

Calvel'lo, a town of Italy, in the province of Basilicata, 12 miles S. of Potenza. It has two convents. P. 5172.

Cal'vert, a county in the S. of Maryland. Area, 250 square miles. It is bounded on the E. by Chesapeake Bay, and on the W. by the Patuxent River, which enters that bay at the S. extremity of the county. The soil is fertile. Tobacco, corn, wheat, and wool are the chief products. Capital, Prince Fredericktown. Pop. 9865.

Calvert, a township of Grant co., Ark. Pop. 476.

Calvert, a city, the capital of Robertson co., Tex., on the Houston and Texas Central R. R., 130 miles N. N. W. of Houston. It has a weekly newspaper.

Calvert (George and Cecil). See Baltimore, Lord, by Hon. Henry Stockbridge.

Calvert (George Henry), born at Baltimore, Md., Jan. 2, 1803, is a descendant of Lord Baltimore and of the painter Rubens. He graduated at Harvard in 1823, studied at Göttingen, and became a journalist of Baltimore. Besides many dramas, translations, and poems, he has published "Scenes and Thoughts in Europe" (1846–52), "An Introduction to Social Science (1856), "The Gentleman" (1861), and other works. Since 1843 he has been a citizen of Newport, R. I.

Calvert (Leonard), younger brother of Cecil, second Lord Baltimore. He was the first governor of Maryland, whither he led the first colony in 1634. He was a Roman Catholic, and appears to have been a man of liberal views, but existing details of his life are few. Died June 9, 1647.

Cal'vi, a seaport and fortified town of Corsica, on a peninsula of its N. W. coast, 38 miles W. S. W. of Bastía. It has a good harbor and a strong citadel. Calvi was besieged and taken by the English in 1794. Pop. 2069.

Calvi (anc. *Cales*), a decayed town of Italy, 7½ miles N. N. W. of Capua, is a bishop's see. It was formerly important, and was celebrated for its baths.

Calvin, a post-township of Cass co., Mich. Pop. 1788.

Cal'vin, written also **Cauvin,** and **Chauvin** (John), the great Protestant Reformer, was born at Noyon, in Picardy, July 10, 1509. When Calvin was about sixteen years old he was made curé of Marteville, and subsequently of Pont l'Évêque. He began early to preach openly the doctrines of the Reformed religion. In 1532 he published a commentary on Seneca's treatise "De Clementia." Having incurred the displeasure of the Sorbonne, he withdrew from Paris to Angoulême. For a brief period he was protected by Margaret of Navarre, a sister of Francis I., but was soon obliged to fly to Bâle, where he published in 1536 his most important work, "Christianæ Religionis Institutio," the object of which is to explain and vindicate the doctrines of the Reformers. The same year, with a view to promote the cause of the Reformation, he visited Ferrara, where he was kindly received by the duchess Renata, a daughter of Louis XII. of France, and consort of Ercole d'Este. But she was unable to protect him against the power of the Inquisition, and he again sought safety in flight. Having sold his patrimonial estate, with his sister, his brother, and some devoted friends, he escaped to Switzerland in Aug., 1536, expecting to proceed to Germany. But Farel prevailed on him to remain at Geneva. In conjunction with Farel, he composed a confession of faith and a system of ecclesiastical discipline. But Calvin and Farel were in 1538 banished from the city. Calvin retired to Strasburg, and founded there a church which was regarded as a pattern for all Protestant churches. After the banishment of Calvin, Cardinal Sadolet made great efforts to bring Geneva back to his Church. A letter of Calvin's, designed as a refutation of an epistle by Sadolet, made a powerful impression on the Genevese, and in 1540 he received from the senate of Geneva a pressing invitation to return. Although reluctant to leave Strasburg, he appears always to have regarded the church of Geneva as especially his care. In Sept., 1541, he returned to Geneva, and was received by all classes with every demonstration of affection. The rest of Calvin's life was spent in efforts to establish the church and civil government of Geneva. The effects of his exertions in promoting learning and morality (not to speak of religion) are visible in Geneva after a lapse of more than three hundred years.

At Strasburg he had married (in 1539) a widow named Idelette de Bures, a woman of rare virtues. Their only child, a son, died in infancy. Calvin died in 1564.

Nothing perhaps in the history of this great man is more admirable than the self-denying simplicity of his life. He received what was barely sufficient to support him with the utmost parsimony, and yet he would never accept a present except for the poor. Once in his sickness the council sent him twenty-five thalers as a gift, but he insisted on repaying it.

The central doctrine in Calvin's system of theology was unconditional election and reprobation. (See Calvinism.) As a writer on theology he is distinguished for his clearness, method, scientific precision, and logical acuteness. Scaliger regarded him as the greatest of all theologians, using this forcible language: "Solus inter theologos Calvinus."

Calvin has been much censured, and not without cause, for the part he took in the condemnation and death of Servetus. Calvin regarded Servetus as a dangerous man, not merely on account of his heresies, but also of his arrogant and reckless spirit, joined as these were with abilities of no common order; he exerted his utmost influence to prevent his being burned; for, though he deemed Servetus worthy of the punishment of death, he wished to save him from a death so dreadful as that by fire. (See Henry, "Life of Calvin;" Théodore de Bèze, "Histoire de la Vie et la Mort de Calvin." J. Thomas.

Cal'vinism. Calvinism, as also Pelagianism and Lutheranism, is a term used to designate, not the opinions of an individual, but a mode of religious thought or a system of religious doctrines, of which the person whose name it bears was an eminent expounder. There have from the beginning coexisted in the Christian Church three, and only three, generically distinct systems of doctrine, or modes of conceiving and adjusting the facts and principles understood to be revealed in the Scriptures. One of these is the Pelagian, which denies the guilt, pollution, and moral impotence of man, and makes him independent of the supernatural assistance of God. At the other pole is the Calvinistic system, which emphasizes the guilt and impotence of man, exalts the absolute justice and sovereignty of God, and refers salvation absolutely to the undeserved favor and the new creative energy of God. Between these comes the manifold and elastic system of compromise once known as Semi-Pelagianism, and in modern times as Arminianism, which admits man's original pollution, but denies his guilt, regards redemption as a compensation for innate and consequently irresponsible disabilities, and refers the moral restoration of the individual to the co-operation of the human with the Divine energy, the determining factor being the human will. The system to which this article is devoted was known originally, and is now designated more generally and indefinitely, by the title *Augustinianism*, from its earliest champion, the illustrious Augustine, bishop of Hippo Regius in Northern Africa (395–430 A. D.); while the more modern and specific title is Calvinism, from the fact that it was developed into a perfect form, and infused into the creeds

of all Protestant churches, and into the life of modern nations, through the instrumentality of John Calvin, the Reformer of Geneva (1509–1564). The authentic statement of its constituent doctrines is not to be drawn exclusively from the writings of either of the great men mentioned, but from the public confessions of those churches which have professed this form of doctrine, and from the classical writings of their representative theologians.

It is proposed in this article to present, in necessarily meagre outline, a statement (1) of the fundamental characteristics of the system; (2) of the history of its development and prevalence both before and after Calvin; and (3) of its practical moral influence upon individuals and upon communities.

A. *Statement of Principles.*—Calvinism, as a system of doctrines, derives its character from the following fundamental positions or foci of organization:

I. *The Relation of the Creator to the Creation.*—There are three generically distinct views as to the relation of the Creator to the creation, each, of course, embracing many specific varieties under it.

1st. The Deistical view, which admits a creation *ex nihilo*, and an original endowment of the elements with their active powers, and the subjection of the whole system of things to certain general laws, adapted to the evolution of certain fixed plans. The general plan and order of the creation is attributed to the Creator, and all events are referred to Him in a general sense as the indefinitely remote First Cause, who inaugurated the ever-onflowing line of second causes. This view, however, denies the continued immanence of the Creator in the creation, and the momentary dependence of the creature on the Creator for the continuance of its substance, the possession of its properties, and the exercise of its powers.

2d. The opposite extreme is the Pantheistic mode of thought, which identifies God and the universe as His existence-form, or at least so confines Him to it as to deny His transcendence beyond the universe as an extra-mundane Spirit and conscious Person whose actions are rationally-determined volitions.

3d. Between these extremes stands Christian Theism. It emphasizes at once the transience of God beyond, and the immanence of God within, the world. He remains ever a conscious personal Spirit, without and above the world, able, in the exercise of His free volitions, sovereignly to exercise a supernatural influence (*potestas libera*) upon any part of that system of nature which He has established, ordinarily working through second causes, "yet free to work without, above, and against them at His pleasure." At the same time He continues to interpenetrate the inmost being of every element of every creature with the infinite energies of His free intelligent will, and His creatures momentarily continue absolutely dependent upon the energy of that will for substance and for the possession of the powers communicated to them as second causes in all their exercises.

All Christians, of course, are Theists in the sense thus defined, but the different schools of Christian theology take their points of departure here, as, on the one hand, they press the essential dependence of the creature upon the Creator in substance, properties, and actions, or as, on the other hand, they press the self-active power of second causes, and by consequence their self-sufficiency and independence. Here we have the ultimate antithetical grounds of Pelagianism and Augustinianism. Pelagius, who was characterized by a rationalistic habit of thought and a superficial religious experience, believing that power to the contrary is an inalienable attribute of every act of free-will, necessary to render it responsible and therefore moral, maintained, in the supposed interests of morals, that every free agent is so adequately endowed by God as to be self-sufficient for action, each in a manner appropriate to his kind. Augustine, on the contrary, held that every creature exists and acts only as its substance is momentarily sustained, and its action conditioned, by the omnipresent and omnipotent energy of God. While admitting the free self-determining power of the human soul, he referred the moral character of the volition to the disposition which prompted it, and the moral nature of man to the influences of the Spirit of God. Anterior to apostasy, therefore, the spirit of man depended for spiritual life and moral integrity upon the *concursus* of the Spirit of God, the withdrawal of which is the immediate cause of spiritual death and moral impotence. This Divine influence, in one degree and in one mode or another, is common to all creatures and all their actions, and it is called "grace" when, as an undeserved favor, it is in a supernatural manner restored to the souls of sinful men with the design of affecting their moral character and action. This view of Augustine was subsequently elaborated by his disciples into the theory of the "previous," "simultaneous," and "determining" *concursus* of the Thomists and Reformed theologians. (*Summa of Tho. Aquinas*, 2. 1. 10; and *Turretin*, 6. 6. 6 and 7.)

II. *The End or Design of God in Creation.*—Every intelligent Theist must regard the universe as one system, and must therefore believe that the Creator had from the beginning one general end, for the accomplishment of which the whole and all its parts were intended. This general end must have determined the Creator in every step He has taken in the evolution of the universe, and hence our conception of it will give shape to any speculations we may form with respect to the relations of God and His works. It is evident that no solution of this transcendent question can be reached by reasoning from *a priori* principles, or by generalizations drawn from the comparatively few facts at present accessible to our observation, and that it can be rationally sought for only in a direct revelation. For the most part, this general end has been referred to the essential benevolence of God, prompting Him to confer the greatest possible amount of blessedness, in the highest forms of excellence, upon innumerable objects of His love. Leibnitz, in his "Théodicée" (1710), which has exerted a wide influence on all modern speculation, lowered this view by emphasizing the "happiness" of the creatures as the great end of the creative goodness.

The Scriptures, on the contrary, emphatically declare that the manifestation of His own glorious perfections is the actual and most worthy possible end of the great Designer in all His works of creation, providence, and redemption, and hence likewise the final end of all His intelligent creatures in all moral action. The recognition of this great principle, and its application to the interpretation of all God's dealings with man, and of all man's duties to God, has always been an essential characteristic of Calvinism. Pelagians and Semi-pelagians, with more or less decision, place the general end of the system of things in the well-being of the creature: Calvinists place it absolutely in the glory of the Creator, which carries with it, not as a *co-ordinate* design, but as a *subordinate* yet certain effect, the blessedness of all loyal creatures.

III. *The Relation which the Eternal Plan of God sustains to the Actual Evolution of Events in Time.*—Every Theist believes that the eternal and absolutely perfect intelligence of the Creator must have formed from the beginning a plan comprehending the entire system of creation and providence in reference to the great end for which they were designed. Pelagius himself admitted that the absolute foreknowledge of God embraced the future volitions of free agents, as well as all other classes of events, while he denied their foreordination. The Socinians, who have developed Pelagianism into a complete system, more consistently deny foreknowledge, as well as foreordination, since, if it is essential that a volition should be purely contingent in order that it should be responsible, it must be indeterminate before the event, and while indeterminate it cannot be certainly foreknown. The Arminians admit foreknowledge, but deny foreordination. The Calvinists maintain the following positions: 1. This eternal and immutable plan of God has constituted man a free agent, and consequently can never interfere with the exercise of that freedom of which it is itself the foundation. 2. However, according to the principles above stated, this created free-will is not independent, but ever continues to have its ground in the conserving energies of the omnipresent Creator. 3. In the case of an infinitely wise, powerful, and free Creator of all things *ex nihilo*, it is obvious that the certain foreknowledge of all events from the absolute beginning virtually involves the predetermination of each event, without exception; for all the causes and consequences, direct and contingent, which are foreseen in creation, are, of course, determined by creation. As Sir William Hamilton asserts (*Discussions*, Appendix 1, A.), "the two great articles of foreknowledge and predestination are both embarassed by the selfsame difficulties." 4. Since all events constitute a single system, the Creator must embrace the system as a whole, and every infinitesimal element of it, in one all-comprehensive intention. Ends more or less general must be determined as ends, and means and conditions in all their several relations to the ends which are made dependent upon them. Hence, while every event remains dependent upon its causes and contingent upon its conditions, none of God's purposes can possibly be contingent, because in turn every cause and condition is determined in that purpose, as well as the ends which are suspended upon them. All the decrees of God are hence called absolute, because they are ultimately determined always by "the counsel of His own will," and never by anything exterior to Him which has not in turn been previously determined by Him. 5. This determination, however, instead of interfering with, maintains the true causality of the creature, and the free self-determination of men and angels. Since the holiness of the created moral agent is conditioned upon the indwelling of Divine

grace, and its turning from grace is the cause of sin, it follows that all the good in the volitions of free agents is to be referred to God as its positive source, but all the evil (which *originates* in defect, privation) is to be referred simply to His permission. In this view, all events, without exception, are embraced in God's eternal purpose; even the primal apostasies of Satan and of Adam, as well as all those consequences which have flowed from them.

It is in view of these principles that Calvinism has been so often confounded with fatalism, and held up as distinguished from the majority of human opinions by its pre-eminent offensiveness. It should be remembered, however, that the philosophy which has underlain the religions and the speculations of the immeasurable preponderance of the most intelligent nations in the past (Augustinian Christianity excepted), as well as of the advanced thinkers of the present, has been fatalistic. Witness the fatalism of the ancient Stoics and the modern Mohammedans and Deists —the eternal and necessary conflicts of the dualism of Zoroaster, perpetuated among the Gnostics and Manichæans —the ceaseless modifications of the one eternal essence in the pantheism of the Booddhists, the Brahmanists, the ancient Greeks, and the modern disciples of Spinoza—the eternal interplay of unconscious and immutable natural laws as held by Positivists, Humists, and all modern scientific materialists, after the manner of the ancient Epicureans. How infinitely superior to all this is the Calvinistic conception of the all-penetrating and all-energizing will of the personal Jehovah, who, being at once perfect Love and perfect Light, constitutes and conserves our free agency, and through its free spontaneity works continually the ever-blessed counsel of His own will, weaving even rebellious volitions into the instrumentalities of His purpose, and making every consenting soul a conscious co-worker with Himself.

As to the bearing of this principle upon the question of the design of God in the application of redemption (predestination), see below.

IV. *The Manner in which the Divine Attributes of Benevolence, Justice, and Grace are illustrated in the Scheme of Redemption.*—Arminians have generally held, with Leibnitz, that "justice is benevolence acting according to wisdom"—*i. e.*, inflicting a lesser pain in order to effect a greater or more general happiness. The necessity for punishment therefore lies not in the essential and inexorable demands of righteousness, but in its being the best means to secure the moral reformation of the sinner, and the best motive to restrain the community from disobedience. Grotius maintained that the moral law is a product of the Divine will, and therefore capable of being relaxed by that will. In the gospel scheme, therefore, God, in the exercise of His sovereign prerogative, relaxes His law by forgiving sinners upon repentance and reformation, while as an administrative precaution He makes an exhibition of severe suffering in the person of His Son, in order that all other subjects of His moral government may be deterred from making the impunity of repentant men an encouragement to disobedience. The atonement, therefore, was an exhibition solely of the Divine benevolence, but not of justice in the ordinary sense of that word.

Calvinists, on the contrary, hold that justice as well as benevolence is an essential and ultimate property of the Divine nature, and hence lies back of, and determines the character of, the Divine volitions. By the perfection of God's nature He is always benevolent to the innocent, and just as certainly is He determined to punish the guilty. In the gospel, God has sovereignly separated the sin from the sinner in certain cases; in the vicarious penal sufferings of His Son punishing sin in strict rigor of justice, and then treating the believing sinner as a righteous person—that is, as a person with regard to whom all the demands of justice are fully satisfied. Hence He has exercised both justice and benevolence—justice to the sin and to the law, benevolence to the sinner; which benevolence to the undeserving is sovereign grace. While Arminians in their view of the gospel emphasize benevolence, Calvinists in their view emphasize justice and grace.

V. *The Degree of Guilt and Moral Damage entailed through the Apostasy of Adam upon his Posterity.*—The answers respectively given to this question impose form and character upon all the various systems of theology.

1. Pelagius held that free-will (*liberum arbitrium*), in the sense of an absolutely unconditioned power of choice between good and evil, is essential to responsible moral agency, and hence inalienable from human nature. Since, then, all men continue after the apostasy to be responsible moral agents, their nature in this essential respect must remain in the same condition in which it was created. The moral agency of a man at any one moment cannot determine the character of his moral agency at any other moment, and he possesses throughout his entire existence ability to will and to do all that God has any right to require of him. Hence Pelagians deny—(1.) All original sin or corruption of nature, because sinfulness can be predicated only of free acts, and man in order to be responsible must always possess plenary ability to will aright. (2.) All original *guilt* or desert of punishment common to the race, and prior to actual transgression, since it would be a violation of justice to hold one moral agent responsible for the wrong volitions of another. (3.) Hence men need redemption through Christ only to deliver them from the guilt of actual and personal transgression, and only those need it who have thus sinned. Those dying in infancy can be benefited by Christ only by being raised to a higher plane of blessedness—the *regnum cœlorum* as distinguished from the *vita æterna*.

2. Augustinians and Calvinists, on the contrary, maintain—(1.) That the entire soul, with all its constitutional faculties and acquired habits, is the organ of volition, the agent willing. (2.) That this soul possesses the inalienable property of self-determination, the moral character of which determination always depends upon the moral condition of the soul acting. (3.) That the holy moral condition of the soul, and hence its spontaneous disposition to will that which is right, depends upon the indwelling of the Divine Spirit. The free agency of God is an absolute self-existent and self-sufficient perfection, self-determined to good and incapable of evil. The freedom of saints and angels is dependent upon Divine assistance, but, like that of God himself, it is the very opposite to the "liberty of indifference" or "power to the contrary," being a *non posse peccare*, a *felix necessitas boni*. Adam was created in fellowship with God, and hence with a holy tendency of heart, with full power not to sin (*posse non peccare*), but also, during a limited period of probation, with power to sin (*posse peccare*). He did sin. As a punishment, the Holy Spirit is withdrawn from the race, and he and his descendants lost the *posse non peccare*, and retained only the *posse peccare*, which thus became the fatal *non posse non peccare*.

This *theological* doctrine of total moral inability has nothing whatever to do with the *psychological* theory of "philosophical necessity" as an attribute of voluntary action, which, since the time of President Edwards, has been too frequently regarded essential to the defence of Calvinism. It has been conclusively shown by Principal Cunningham (*Theology of the Reformers*, Essay IX.) that this metaphysical doctrine is not essential to Calvinism; while Sir William Hamilton (*Discussions*, Appendix, 1, A.) and Sir James MacIntosh (*Dissertations on the Progress of Ethical Philosophy*, Note O) propose to prove that it is absolutely inconsistent with Calvinism as historically taught. The phrases "bondage of the will," etc., so frequently used by all classes of Augustinian theologians, and above all by Luther in his treatise "De Servo Arbitrio," are intended to apply only to the corrupt spontaneous tendency of fallen man to evil, which can be reversed only by a new creating energy from above. At the same time, every Calvinist holds devoutly to the free self-determination of the soul in every moral action, and is at liberty to give whatever psychological explanation of that fact may seem to him most reasonable. (See *Confession of Faith*, ch. 9, and *Calvin's De Servitute et Liberatione Humani Arbitrii*.)

Hence Calvinists hold—First. As to original guilt. (1.) Human sin, having originated in the free apostatizing act of Adam, deserves God's wrath and curse, and immutable justice demands their infliction. (2.) Such, moreover, was the relation subsisting between Adam and his descendants that God righteously regards and treats each one as he comes into being as worthy of the punishment of that sin, and consequently withdraws his life-giving fellowship from him. Some refer this responsibility of Adam's descendants for his apostatizing act to a purely sovereign "divine constitution" (New England view); others hold that we all were in our generic essence guilty coagents with him in that act (Realistic view); while the common opinion is that God, as the guardian of our interests, gave to us all the most favorable probation possible for beings so constituted in Adam as our covenant representative (Federal view). The whole race, therefore, and each individual it embraces, is under the just condemnation of God, and hence the gift of Christ, and the entire scheme of redemption, in its conception, execution, and application, are throughout and in every sense a product of sovereign grace. God was free to provide it for few or many, for all or none, just as he pleased. And in every case of its application the motives determining God cannot be found in the object, but only in the good pleasure of the will of the Divine Agent.

Calvinists also hold—Secondly. As to original sin. (1.) Since every man thus comes into the world in a condition of antenatal forfeiture because of Adam's apostasy, he is judicially excluded from the morally quickening energy of the Holy Ghost, and hence begins to think, feel, and act

without a spontaneous bias to moral good. (2.) But since moral obligation is positive, and the soul is essentially active, it instantly develops in action a spiritual blindness and deadness to divine things, and a positive inclination to evil. This involves the corruption of the whole nature, and absolute impotency of the will to good, is, humanly speaking, without remedy, and necessarily tends to the indefinite increase both of depravity and of guilt. It is therefore said to be total. Some Calvinists hold original guilt to be conditioned upon original depravity (*e. g.*, the advocates of mediate imputation and the *ex traduce* origin of souls). Others, as the writer of this article, hold original depravity to be the penal consequence of Adam's apostatizing act, and therefore to be conditioned upon original guilt (hence immediate imputation and creationism).

3. The advocates of the middle scheme have, of course, varied very much from the almost Pelagian extreme occupied by many of the Jesuits and the later Remonstrants, to the almost Augustinian position of the Lutherans and of the great Wesleyan Richard Watson. The Semi-pelagians admitted that the nature of man was so far injured by the fall that he could do nothing in his own strength morally good in God's sight. But they held that man is able to incline himself unto good, though he is not able to effect it; so that in every case of spiritual reformation the *first* movement towards good is from the soul itself, while the performance of it is the result of the co-operation of Divine grace with the human will. They consequently denied the *gratia præveniens*, but admitted the *gratia co-operans*.

The modern Protestant Arminians (Limborch, Episcopius, etc.) admit original *sin*, while they deny original *guilt*, and regard innate corruption rather as a vice or fault of nature than as a sin in the full sense of that term. Dr. D. D. Whedon ("Bibliotheca Sacra," April, 1862) admits—1. That Adam and Eve by their apostasy morally corrupted their own nature and that of all their descendants; 2. That every child of Adam is born with an inherent tendency to sin which he cannot remove by his own power; 3. That Adam and Eve were fully responsible for their apostasy, because they sinned in spite of possessing power to the contrary, and therefore might justly have been damned; 4. Nevertheless, their descendants, although corrupt and prone to sin from birth, are neither responsible nor punishable until there has first been bestowed upon them redemptively a gracious ability to the right; 5. After Adam sinned, therefore, only one alternative was open to Divine justice—either that Adam should be punished at once without issue, or that he should be allowed to generate seed in his own moral likeness, when equity required that an adequate redemption should be provided for all; 6. Hence Christ died for all men, and sufficient grace (including *gratia præveniens* and *gratia co-operans*) is given to all men, which is essential to render them responsible, and they become guilty only when they abuse (by failing to co-operate with) that gracious power to the contrary (*posse non pecare*) which has been conferred on them in the gospel.

Quoting the dictum of Pres. Edwards (*Will*, pt. 4, § 1), "The essence of the virtue or vice of dispositions of the heart and actions of the will lies not in their cause, but in their nature," Whedon says: "To this we oppose the counter-maxim, that in order to responsibility for a given act or state, power in the agent for a contrary act or state is requisite. In other words, power underlies responsibility." The only limit he allows to this principle is in the case of that moral inability which results from the previous abuse of freedom by the agent himself. This he declares is the fundamental ground upon which all the issues between Arminianism and Calvinism depend. Thus, while Calvinism exalts the redemption of Christ in its execution and in each moment of its application as an adorable act of transcendent grace to the ill-deserving, Arminianism, in its last analysis, makes it a compensation brought in by the equitable Governor of the world to balance the disabilities brought upon them without their fault by the apostasy of Adam. This difference is the practical reason that Calvinism has such a strong hold upon the religious experience of Christians, and that it finds such frequent irrepressible expression in the hymns and prayers of evangelical Arminians.

VI. *The Nature and Necessity of that Divine Grace which is exercised in the Moral Recovery of Human Nature.*—Grace is free sovereign favor to the ill-deserving. It is the motive to redemption in the mind of God. It is exercised in the sacrifice of His Son, in the free justification of the believing sinner on the ground of His vicarious obedience and sufferings, and in the total change wrought in that sinner's moral character and actions by the energy of the Holy Ghost. While the word *grace* applies equally to the objective change of relations and the subjective change of character, it is used in this connection to designate that energy of the Holy Ghost whereby the moral nature of the human soul is renewed, and the soul, thus renewed, is enabled to act in compliance with the will of God.

Pelagius found in his system neither need nor room for this Divine energy, except in the way of objective revelations and educational and providential influences.

Semi-pelagians admitted its necessity to help man to complete that which he had himself commenced, and that it is actually given to all those who had thus prepared themselves for it and made themselves worthy of it.

Arminians admit that it is necessary in order that the corrupt will shall be even predisposed to good, but they regard it as a compensation for the irresponsible defects of an inherited nature, which restores the native power for either good or evil, and which depends for its effects wholly upon the use made of it by the soul in which it acts. This is styled the theory of co-operation as held by the Arminians, and of "synergism" as held by the followers of Melanchthon in Germany. Regeneration is the result of the co-working of two energies, but the determining factor is the human will. Hence grace is *sufficiens* in every case, and *efficax ab eventu vel congruitate*.

Augustinians and Calvinists, on the other hand, hold—1. That, for Christ's sake, and in spite of all human demerit, a gracious influence is excited on the minds of all men of various intensities. This is "common grace," and is a moral and suasory influence on the soul, tending to good, restraining evil passions, and adorning the soul with the natural virtues; which may be resisted, and is always prevailingly resisted, by the unregenerate. 2. But at His pleasure, in certain cases, God exerts a new creative energy, which in a single act changes the moral character of the will of the subject, and implants a prevailing tendency to co-operate with future grace in all forms of holy obedience. This is *gratia efficax*, "effectual calling," which is always effectual because it consists in effecting a regenerative change in the moral nature of the will itself. The change which this grace effects is the "new heart" of Scripture, the *conversio habitualis seu passiva*, of which God is the agent and man the subject, which as a new habit of soul lays the foundation for all holy activities. Augustine has been followed by many in styling this grace "irresistible," because it cannot be resisted. But this is as incongruous as it would be to call the creation of the world or the generation of a child irresistible. Effectual calling consists in a new creative energy within the soul, making it willing, upon which it spontaneously embraces Christ and turns to God (the *conversio actualis seu activa*). It merges itself into the very spontaneity of the will, and enfranchises it from the corruption which had hitherto held it in bondage, and restores it to its normal equilibrium, in harmony with reason and conscience and the indwelling Spirit of God. 3. Afterwards this same Divine energy continues to support the soul, and prepare it for, and to concur with it in, every good work. This grace is now prevailingly co-operated with by the regenerated soul, and at times resisted, until the status of grace is succeeded by the status of glory.

Calvinists hold that this "grace" in all its stages is purely undeserved favor, and therefore sovereignly exercised by God upon whom and at what times He pleases; hence it is called *gratia gratuita et gratis data*, otherwise grace would be no more grace. It also works in its various stages progressively, except in the single regenerative act. It is at first the *gratia præveniens*, then the *gratia operans*, then the *gratia co-operans*, and finally the *gratia perficiens*, including the *donum perseverantiæ*, infallibly securing perseverance in faith, and obedience unto the complete redemption of soul and body in glory.

VII. *The Relation which the Eternal Plan of God bears to the Application of Redemption to Individuals.*—Predestination, or the purpose of God to secure the salvation of some men and not of all, has been popularly regarded as the distinguishing feature of Calvinism, and one most revolting to the moral sense. Some Calvinists, reasoning downward from the nature of God as absolute, and developing this doctrine in a strictly speculative manner, have made it the foundation of their whole system. These have necessarily conceived of it in the high and logically coherent Supralapsarian sense, which, in a speculative point of view, is impregnable. The vast majority of Calvinists, however, are brought to this point by practical rather than speculative considerations, such as the explicit authority of Scripture and the personal sense of absolute unworthiness and moral impotency, and therefore of absolute dependence upon grace. These are all willing to stop in the Infralapsarian view of the decree of redemption, which, if less logically complete, is nevertheless exactly conformed to all the facts open to our inspection or embraced in our experience, and to all the representations of Scripture. The Scriptures never speak of God as creating men in order either to save or damn them, nor of electing certain individuals considered merely as creatable, and then allowing them to fall in

order that they might be redeemed; but they uniformly represent God as electing His people out of the mass of guilty sinners, and then as providing redemption for them in order to carry out the purpose of election. Arminians maintain that this decree of election is conditioned on God's foresight of faith and repentance; but Calvinists insist that if faith and repentance are the gifts of God and the fruits of His Spirit, they cannot be the conditions upon which election is suspended, but rather its predetermined and graciously effected results. Augustine held the Infralapsarian scheme. The position of Calvin has been disputed. Beza, his successor in Geneva; Gomarus and Voetius, the great opponents of the Remonstrants of Holland; Twiss, the prolocutor of the Westminster Assembly, have been the most conspicuous advocates of Supralapsarianism. On the other hand, the canons of the Synod of Dort (1619), the Confession and Catechisms of the Westminster Assembly (1648), the Formula Consensus Helvetica (1675), and the vast majority of Calvinists, ancient and modern, are decided Infralapsarians.

Gottschalk (848–868) insisted much upon a *predestinatio duplex* of the elect to salvation and of the reprobate to damnation, and this view has often been offensively insisted upon as essential to Calvinism by its enemies. It is, however, a gratuitous assumption and without scriptural warrant, and not taught in the recognized standards of Calvinism. God positively decrees grace, and thus produces all that is good. He only determines the permission of sin, and punishes it because he forbids and in every way morally discountenances it. He elects of free grace all those he purposes to save, and actually saves them, while those whom he does not elect are simply left under the operation of the law of exact justice, whatever that may be. Archbishop Whately, himself an Arminian, in his "Essays on Some of the Difficulties in the Writings of the Apostle Paul," honorably admits that the apparent harshness of Calvinism lies in the *facts* of the case as admitted by all Christians. All infants, idiots, and all believers in Christ are saved by grace—all others are left to the operation of pure justice. It is obvious that all who are born, sin and die, that all do not believe, and that all are not saved. Calvinistic "particularism" admits the actual results of salvation in their widest scope, and refers all to the gracious purpose and power of God, but does not restrict it one iota within the limits determined by the facts themselves.

B. *The History of Calvinism.*—Pantheism, which is the only philosophical basis of polytheism (in the forms of Booddhism, Brahmanism, and underlying all forms of Greek philosophy), and the Dualism of Zoroaster (which was revived in the second and third centuries in a Christianized form in the various systems of the Gnostics and Manichæans), together constituted the substratum of all ancient philosophies and religions. All such systems were consequently essentially fatalistic, and made sin either an essential attribute of an eternal self-existent Principle, or a necessary condition of the eternal evolution of the infinite and absolute into the finite and contingent. In necessary antagonism to these fundamental heresies, the early Fathers, especially Origen and all his colleagues and followers of the Alexandrian school from the reaction of Neo Platonism (200–350 A. D.), were led in a very unqualified manner to insist upon the independent, self-determining power of the human will, and to maintain that sin is the product of that freedom abused. They universally held that human nature was morally ruined by Adam's sin, and that it was redeemed by the blood and restored by the Spirit of Christ; but they conceived of these great principles in a crude and indefinite manner, without determining their relations to each other. All the ancient Fathers were induced to render special attention to the defence of human self-determining power as the basis of responsibility. As a general fact, the Greeks were specially distinguished for emphasizing the autocracy of the will, without denying the need of grace, while the Latins especially emphasized inherited depravity, without denying the freedom of the will. And the anthropology of the Greek Church has continued to preserve the same characteristics to the present day (*Athanasius, Expos. in Psalmos*, Ps. l. 7; *Orthodox Confession of Peter Mogilas*, 1642). On the other hand, there was during the third century a marked tendency in the Latin Church to more profound views as to the moral and spiritual nature and relations of man. This characteristic was developed most obviously in Tertullian of Carthage (220 A. D.), who taught the propagation (*ex traduce*) of a corrupt nature from Adam to each of his descendants; in Hillary of Poictiers (368); and in Ambrose of Milan (397), the most explicit defender in that age of the sovereignty of God and the moral impotence of man, and the immediate teacher of Augustine. But the "history" of all systematic theology properly commences with the great controversy of Augustine and Pelagius in the first quarter of the fifth century. On the one hand we have Augustine (354–430), a native of Tagaste, in Numidia, the son of a heathen father and of the sainted Monica, in turn a prodigal, unbeliever, Manichæan, Platonist, disciple of Ambrose, Christian of profound experience, preacher and teacher of transcendent genius, bishop of Hippo Regius from 395 to 430, and the greatest theologian of all time. On the other hand we have Pelagius (Morgan), a British monk, student of the Greek Fathers, a man of pure life, clear, practical intellect, and earnest zeal for the moral interests of human life. He was the moral author of the system which bears his name, while its intellectual constructor was Cœlestius, a youthful Roman advocate; and its most effective advocate was Julian, the deposed bishop of Eclanum, in Campania. The opinions of Pelagius were universally condemned by the whole Church, Eastern and Western, at the councils held at Carthage, 407 and 416 A. D., at the council at Mileve, 416 A. D., by the popes Innocent and Zosimus, and by the œcumenical council held at Ephesus, 431 A. D. This rapid and universal condemnation of Pelagianism, after making all due allowance for extraneous influences, proves that, however indefinite the views of the ancient Greek Fathers may have been, nevertheless the system taught by Augustine was in all essentials the common and original faith of the Church. In the history of the entire Church to the present moment, Pelagianism has been never adopted into the public creed of any ecclesiastical body except that of the Socinians (*Racovian Catechism*, 1605), and it has prevailed practically only among Rationalists, whose Christianity was disentegrating into Deism.

In the mean time, John Cassian, a disciple of Chrysostom, abbot of the monastery at Marseilles, brought into prominence the middle system of compromise, whose advocates were at first styled Massilians; during the Middle Ages and at present in the Romish Church, Semi-pelagians; among Lutherans, Synergists; and among the Reformed, Arminians. His most influential supporters and followers were Vincentius of Lerinum (434), Faustus, bishop of Rhegium (475), Gennadius, and Arnobius; and his opinions prevailed in France for a long time, and were confirmed by the provincial synods of Arles (472) and of Lyons (475). Against this party Augustine wrote his great works "De Prædestinatione Sanctorum," and "De Dono Perseverantiæ," and he was ably represented by Prosper and Hilarius, and the unknown author of the great work "De Vocatione Omnium Gentium," ascribed to Pope Leo I. (461); by Avitus, archbishop of Vienne (490–523), Cæsarius, archbishop of Arles (502–542), and by Fulgentius of Ruspe (1533). Semi-pelagianism was condemned by the decree of Pope Gelasius (496), and finally in the synods of Orange and Valence (529), which were confirmed by the edict of Pope Boniface (530); from which time a moderate form of Augustinianism became the recognized orthodoxy of the entire Western Church. It was taught by Gregory the Great, and held by the emperor Charlemagne, the two persons who exerted the greatest influence in the reconstruction of Europe at the commencement of the Middle Ages. It was held throughout those ages by all the greatest Church teachers and ornaments, as the Venerable Bede (673–735), Alcuin (804), and Claudius of Turin (839). The history of the persecution and condemnation of Gottschalk, under the influence of Rabanus Maurus and Hinckmar, with which Scotus Erigena was involved (about 850), prove beyond question that the entire Church of that age, and even the part most opposed to Gottschalk, was agreed in adopting the Augustinian system (as they understood it), and all the consequences that flowed from it. (*Neander.*) All the most illustrious teachers of the scholastic age, making allowance for the extravagance of many of their speculations, were disciples of Augustine; as, for example, Anselm, archbishop of Canterbury (910); St. Bernard, bishop of Clairvaux (1140); Peter Lombard, "Magister Sententiarum;" Hugo de St. Victor; and, above all, Thomas Aquinas, "Doctor Angelicus" (1247), and Thomas Bradwardine, archbishop of Canterbury (1348). The Dominicans as a class followed Aquinas, while the Franciscans followed their champion, Duns Scotus (1265), "Doctor Subtilis," and in that age the ablest advocate of Semi-pelagianism. The controversies then revived have continued to agitate the Romish Church up to the present time, when they have been annihilated by the capitulation of the whole body to the Jesuits in the Council of the Vatican (1870). The Council of Trent (1546) attempted to satisfy both parties by indefinite decrees, and accordingly both Augustinians and Semi-pelagians, Thomists and Scotists, have claimed that their respective views were sanctioned. The truth is, that while the general statements of doctrines which are to be found among the canons are Augustinian in form, the more detailed explanations which follow are uniformly Semi-pelagian in sense. The Jesuit society, whose doctrines and casuistry have been signally ventilated in the "Provincial Letters" of the immortal Pascal, has

always advocated Semi-pelagianism. The illustrious gentlemen of Port Royal, Paris, called Jansenists from Jansenius, bishop of Ypres (Tillemont, Arnauld, Nicole, Pascal, Quesnel, etc.), were at the same time devout Catholics, and in the matters of grace and predestination earnest Calvinists. They were persecuted by the Jesuits, and finally outlawed by the bulls of Popes Innocent X. and Alexander VII. (1653 and 1656 A. D.), and of Clement XI. (1713). By the suicidal action of the Œcumenical Council of the Vatican (1870) all Scripture, traditions, canons of councils, and classical theology have been superseded by the plenary inspiration of a pope who in turn is a creature of the Society of Jesus. Thus at last Popery has become definitely Semi-pelagian.

All the great evangelical teachers and forerunners of the Reformers in the century immediately preceding the Reformation were decided Augustinians (*Neander's Hist. Doc.*, vol. ii., p. 609). This is most conspicuously true of Wickliffe (1384), Jerome of Prague, John Huss (1415), John of Goch (1475), John of Wesalia, Jerome Savonarola, a Dominican (1498), John Wessel (1499), "the Light of the World," and his disciple, the great Grecian, John Reuchlin, in his turn the teacher of Melanchthon, and Staupitz, vicar-general of the Augustines and the spiritual teacher of Luther.

All of the great national Reformers, Zwingle of Switzerland, Luther of Germany, Calvin of France, Cranmer of England, and Knox of Scotland, although each movement was self-originated and different from the others in many permanent characteristics, were alike strictly Calvinistic. The complete agreement of Zwingle with what was afterwards called Calvinism on the point of absolute predestination, although denied by Mosheim and Milner, is beyond question. (See his work "De Providentia Dei," written when Calvin was twenty years old; also Scott's "Continuation of Milner," vol. iii., p. 142–231; Neander's "Christ. Doc.," vol ii., p. 668; and Cunningham's "Theology of the Reformers," Essay V.) That Luther agreed with Calvin on all points considered characteristic of his system, with the exception of the sacraments, is demonstrated by his great work, "De Servo Arbitrio" (1525), written against the "De Libero Arbitrio" of Erasmus, the sentiments of which were never retracted, and are obviously in harmony with all his religious opinions in their entirety. Melanchthon, in the earliest editions of his "Loci Communes" (1521), took extreme ground as to the moral impotence of the human will and absolute predestination, which, however, he gradually and radically modified in subsequent editions, until he finally assumed Synergistic or Arminian ground. The personal followers of Melanchthon excited the strong opposition of the stricter Lutherans, and the struggle came to an explosion in the Weimar Confutation (1558). The result was the triumph of the stricter party, who left to posterity that grandest monument of Lutheran symbolism, the "Formula Concordæ" (1580). The system here presented agrees in all its deepest positions with Calvinism as presented in this paper. It differs from it (*a*) by making the sacrament of baptism the efficient means by which ordinarily regeneration is effected; (*b*) by making the difference between the saved and the lost to be ultimately determined by the "non-resistance" to grace of the former in contrast with the resistance of the latter. In all other respects, as to the guilt, pollution, and helplessness of the condition into which all children are born, as to justification, and the necessity and the efficacy of regenerating and sanctifying grace, it is one with Calvinism.

By far the greatest of the Reformers, viewed either as a theologian, an interpreter of Scripture, as a social organizer, and founder of churches and republics, was John Calvin. His "Institutes" (1530), written when he was twenty-seven years old, the first and grandest work of systematic divinity the world has seen, has recast Augustinianism in its final Protestant form, and handed it over to the modern world stamped with its great author's name. His "Commentaries" are acknowledged by the most advanced modern scholars of every school to be upon the whole the ablest and most complete work of the kind ever achieved by a single hand. His "Tractatus" consists of various controversial treatises in defence of the truth, and his "Epistolæ" consist of his voluminous correspondence with princes, nobles and commoners, statesmen and churchmen in every part of the Protestant world, concerning the important movements then revolutionizing Europe, both in Church and State. By him Calvinism and its correlates, Presbyterianism in the Church and republicanism in the State, were not invented, but advocated and disseminated with transcendent ability and success. His doctrines have been most consistently developed and illustrated in the writings of such men as Bullinger, Martin Bucer, Theodore Beza, Diodati, Heidegger, Turretin, Cocceius, Witsius, Vitringa, Markius, De Moor, Pictet, John Owen, and Jonathan Edwards; in the deliverance of the international Synod of Dort (1618–19), of the national Assembly of Westminster (1648), of the French synods of Charenton and Alez, and in the following creeds and confessions of the Church: The Creed of the Waldensian pastors at Angrogne (1532), the two Helvetic, the Gallic, Belgic, and Scotch Confessions, the Thirty-nine Articles of the Church of England, the Lambeth Articles (1595), the Articles of Religion of the Dublin Convocation (1615), the Heidelberg Catechism, the Savoy Confession of the English (1658), and the Boston Confession (1680) of the American Independents. Calvinism is professed by all those Protestants of Germany who embrace the Heidelberg Catechism, the national (Protestant) churches of France, Switzerland, Holland, England, and Scotland, the Independents and Baptists of England and America, and the various branches of the the Presbyterian Church in England, Ireland, and America,—in all about thirty-six millions of adherents, if the Episcopal churches are included. From the time of Archbishop Laud (1644) a large proportion of the clergy and influential writers of the Episcopal churches have been Arminian, and it has even been disputed whether the Church of England was originally Calvinistic or not. The fact that the founders and leading ministers of that Church were thorough Calvinists during the first hundred years of its history, and that its creed remains such to this day, is as certain and as conspicuous as any other fact in the history of mankind. The seventeenth article, "On Predestination," corresponds in spirit, design, and expression with all the other Calvinistic creeds in the world. Tyndal, Frith, Barnes, who suffered under Henry VIII.; Hooper, Latimer, Ridley, who suffered under Bloody Mary; Cranmer, the real author, and Jewel, who gave the finishing touch to the Thirty-nine Articles, were all Calvinists. Jewel wrote to Peter Martyr of Zurich, "We do not differ from your doctrine by a hair's breadth." Cranmer put Martin Bucer and Peter Martyr into the divinity chairs of Oxford and Cambridge. "The same is proved by the whole history of the proceedings connected with the Lambeth Articles, the cases of Baro and Barret (1595), the Irish Articles (1615), and the Synod of Dort (1619)." (*Cunningham.*) The sources of information, and the arguments on both sides of this controversy, may be found in the "Works of the Parker Society," Richmond's "Fathers of the English Church," the "Zurich Letters," the works of Heylin, Winchester, Daubeny, Tomline, and Lawrence on the Arminian side, and the works of Prynne, Hickman, Toplady, Overton, Goode, and Principal Cunningham on the Calvinistic side.

Over this vast area of time, and under all these various conditions of national and ecclesiastical life, Calvinism preserves its essential identity as a system of theological principles. It has, of course, undergone within these limits very various modifications as to details of structure and modes of statement. In Germany it has been rendered less thorough and definite through the influence of the compromising school of Melanchthon. In Holland, England, and Scotland it has been modified in form by the "Federal Scheme" introduced by Cocceius and the Westminster divines (1650). In France it was temporarily modified by the "Universalismus Hypotheticus," or the universal impetration and limited application of redemption (1642), as held by Amyraldus, Daillé, and Placeus on the Continent, and by Baxter, Davenant, and in modern times by Wardlaw and others, in England. In America it has been coerced through more radical and more transient transformations in the speculations of Hopkins, the younger Edwards, Emmons, N. W. Taylor, and others of the New England school.

C. *The Practical Effects of Calvinism on Personal Moral Character, and upon the Social and Political Interests of Men.*—From the time of Cœlestius and Julian, in the fifth century, to that of Heylin (1659) and Tomline (1811), the *a priori* objection has always been brought against Calvinism that its principles are necessarily immoral, and must lead either to licentious liberty or to abject subserviency, to discouragement in the use of means, and to undue disparagement and neglect of human reason. It is argued that the doctrine of the absolute moral impotence of man's will must destroy all sense of accountability, and that the doctrine of absolute decrees must cause the use of means to appear either unnecessary or ineffectual, and to lead to despair upon the one hand, or to licentiousness upon the other.

The advocates of Calvinism have triumphantly vindicated the moral character of their system in two ways: 1st, on the ground of reason. The recognition of the true (*i. e.*, actual) condition of man's nature and relations to God, as this is revealed in Scripture and experience, must be more moral in its effect than the most skillful misrepresentation possible of that actual condition can be. The historian Froude, himself held by no trammels of sect or party, says in his late address at St. Andrew's (1871): "If Arminianism most commends itself to our feelings, Calvinism is nearer to the facts, however harsh or forbidding those facts may

seem." Archbishop Whately, himself an Arminian (in his essay on "Some of the Difficulties in the Writings of St. Paul"), acknowledges that the ordinary objections against the moral attributes of Calvinism are in effect objections to the open *facts* of the case. That standard of morals which places the ground of obligation in the supreme will of the All-perfect, instead of a tendency to promote happiness, and which utterly condemns fallen man, is obviously higher, and therefore more moral, than a more self-pleasing one which either justifies or excuses him. The system which teaches the total depravity and guiltiness of human nature from birth, its absolute dependence upon Divine grace, together with the universal sweep of God's absolute decrees, at once maintaining the free agency of man and the infallibility of the Divine purpose, must of course empty man of self, make all men equal before the law, and exalt the all-wise and all-powerful Father to the control of all events; such a system must make the highest attainments the condition and the fruit of God's favor, and must raise even the weakest believer to the position of an invincible champion for God and the right, "a co-worker together with God."

2d, In the second place, Calvinists claim that on the ground of an illustrious and unparalleled historical record they can show that their system has been eminently distinguished by the effects produced by it upon all the communities which have embraced it in its purer forms, as to the following particulars: (*a*) the general standard of moral character practically realized in personal and social life; (*b*) the amount of rationally regulated liberty realized both in Church and State; (*c*) the standard of popular intelligence and education actually attained; (*d*) the testimony yielded to the power of the truth by the number and illustrious character of its martyrs; and (*e*) the zeal and devotion expressed in sustained missionary efforts for the extension of the kingdom of Christ.

1st. As to the influence of Calvinism on the moral character of individuals, it is only necessary here to quote the ex-rector Froude's citation of the names of "William the Silent, Luther, Calvin, Knox, Andrew Melville, the regent Murray, Coligny, Cromwell, Milton, John Bunyan—men possessed of all the qualities which give nobility and grandeur to human nature." As to its effect upon the general moral character of communities, it will be sufficient to cite the Waldensians; the little radiant state of Geneva, whose Protestant reconstruction began with the establishment of a Court of Morals; the Huguenots, as compared with their Catholic fellow-citizens; the Jansenists, as compared with the Jesuits; the Dutch Protestants prior to the latter half of the seventeenth century; the Scotch Covenanters; the English Puritans, whose very name signalizes their eminent moral character, in contrast with the unparalleled corruption brought in at the Restoration in association with the ecclesiastical revolution effected by the despot Laud (see Macaulay's "Essays on Milton" and Hallam's "Constitutional History"); and finally, all those sections of America settled by English Puritan New Englanders, by the Scbtch and Scotch-Irish, and by Presbyterians from France and Holland.

Mr. Froude (*Address*, p. 7) says: "The first symptom of its operation, wherever it established itself, was to obliterate the distinction between sins and crimes, and to make the moral law the rule for states as well as persons." Pascal, the sublime avenger of the persecuted religionists of Port Royal, shows in the first nine of his "Provincial Letters" the connection between the infamous morality of the Jesuits and their Semi-pelagian views as to sin and grace. Sir James MacIntosh, in vol. xxxvi. of the "Edinburgh Review," vindicates at length the morality of the theological doctrine of predestination by a general review of the history of its most conspicuous professors.

2d. It appears superfluous to prove the tendency of Calvinism to promote freedom and popular government, both in Church and State. Its principles strip the ministry of all sacerdotal powers; they make all men and all Christians equal before God; they make God absolute and supreme over all, and the immediate controller and disposer of human affairs. Hence all churches accepting Calvinism, unless prevented by external conditions, have immediately adopted popular constitutions, either Presbyterian or Independent. This is true of all the churches of Switzerland, France, Holland, the Palatinate, Scotland, America, and the free churches of England and Ireland. The apparent exception is the English Establishment. The history of its political relations explains its prelatical character. Cranmer and the other Calvinistic founders of that Church held, as did Archbishop Usher, a very moderate theory of the espiscopate, and submitted to the constitution actually established only for state reasons. Afterwards, as Calvinism became more thoroughly incorporated in the public faith, Presbyterianism was established by the Long Parliament, and Independency by the Puritan army and Protector. It is a conspicuous fact of English history that high views as to the prerogatives of the ministry have always antagonized Calvinistic doctrine.

The political influence of Calvinism was at an early period discerned by kings as well as by the people. The Waldenses were the freemen of the ante-Reformation period. The republic was established at the same time with Presbytery at Geneva. The Hollanders, grouped around the sublime figure of William the Silent (*Calvus et Calvinista*), performed deeds of heroism against odds of tyranny unparalleled utterly in all foregoing and subsequent history. This battle was fought by Calvinistic Holland, and the victory won (1590) completely before the Arminian controversies had commenced. Add to these the French Huguenots, the Scotch Covenanters, the English Puritans in the Old and in the New World, and we make good our claim that Calvinists have been successful champions of regulated freedom among men.

Bancroft, the historian of our republic, attributes over and over again the modern impulse to republican liberty to the little republic of Geneva and to its Calvinistic theology (vol. i., 266; ii., 461–464). He credits the moulding of American institutions chiefly to New England Independents, and to Dutch, French, and Scotch-Irish Presbyterians. "The Mecklenburg Declaration, signed on the 20th of May, 1775, more than a year before that of July 4, 1776, signed in Philadelphia, was the first voice publicly raised for American independence. And the convention by which it was adopted and signed consisted of twenty-seven delegates, nine of whom, including the president and secretary, were ruling elders, and one, Rev. H. J. Balch, was a Presbyterian minister." Tucker, in his life of Jefferson, says: "Every one must be persuaded that one of these papers must have been borrowed from the other;" and Bancroft has made it certain that the Declaration of Jefferson was written a year after that of Mecklenburg. The correspondence between the representative system and the gradations of sessions, presbyteries, provincial synods, and national general assemblies, developed in the Westminster Confession, to the federal system of State and national governments in the Constitution of the United States, is too remarkable to have been accidental.

3d. The relation of Calvinism to education is no less conspicuous and illustrious. The little republic of Geneva became the sun of the European world. The Calvinists of France, in spite of all their embarrassments, immediately founded and sustained three illustrious theological schools at Montauban, Saumur, and Sedan. The Huguenots so far surpassed their fellow-countrymen in intelligence and skill that their banishment on the occasion of the Revocation of the Edict of Nantes (1685) quickened the manufactures and trades of Germany, England, and America, and for a time almost paralyzed the skilled industries of France. (See Weiss's "History French Protestant Refugees.") The fragment of marshy sea-coast constituting Holland became the commercial focus of the world, one of the most powerful communities in the society of nations, and the mother of flourishing colonies in both hemispheres. The peasantry of Scotland has been raised far above that of any other European nation by the universal education afforded by her parish schools. The common-school system of Puritan New England is opening up a new era of human history. In this country, for the first two hundred years of its history, "almost every college and seminary of learning, and almost every academy and common school even, which existed, had been built up and sustained by Calvinists." (See "New Englander," October, 1845.)

4th. The martyrology of Calvinism is pre-eminent in the history even of the entire Church. We call to witness John Huss and Jerome of Prague, who perished for their adherence to this faith one hundred years before Luther. The Waldenses, of whom were the "slaughtered saints whose bones lie scattered on the Alpine mountains cold," the victims of the reign of "Bloody Mary," John Rodgers and Bishops Hooper, Ferrar, Ridley, Latimer, and Cranmer, and their fellow-martyrs, were all Calvinists, as well as Hamilton and Wishart, the victims of Claverhouse and the "Killing Time" of 1684 in Scotland, and the victims of the High Commission and of the "Bloody Assizes" of England (1685). Under Charles V. and Philip of Spain, Holland had been made a spectacle to all nations by her sufferings, and had surpassed all other Christian communities with the number and steadfastness of her martyrs. When the duke of Alva left the Netherlands, December, 1573, he boasted that within five years he had delivered eighteen thousand six hundred heretics to the executioner. (Motley's "Rise of the Dutch Republic," vol. ii., p. 497.) Moreover, Calvinists claim the victims of the Inquisition in Spain and Italy; the history of the Huguenots of France, from the martyr-doom of Leclerc (1523) to the promulgation of the Edict of Nantes, 1598; the victims of the unparalleled atrocity of the mas-

sacre of St. Bartholomew, August 22, 1572, when some fifty thousand princes, noblemen, and commoners perished at one time by the hand of assassins; and all the hundreds of thousands of the very flower of France who fell victims either to the wars which raged with comparatively short exceptions from the Reformation to 1685, or to the dragoonings, the galleys, and the expatriation which preceded and followed that dreadful time.

5th. Calvinism has been proved an eminent incentive to all missionary enterprises, domestic and foreign. It is, of course, acknowledged that several Christian bodies not characterized by what are generally regarded as the peculiarities of Calvinism have been in the highest degree distinguished by missionary zeal and efficiency. The most remarkable instances of this kind have been the Nestorians in Western and Central Asia from the fifth to the ninth century, the Moravians from 1732, and the Wesleyan Methodists from about 1769 to the present time. These bodies (except the Nestorian) may be said to be eminently evangelical and Augustinian in the general usage of that term, nearly agreeing with the Calvinism set forth in this article in its most essential principles of total depravity, moral inability, and dependence upon divine grace. And it is obvious that these evangelical principles, common to these great missionary churches, with others whose Augustinianism is more pronounced, must supply the strongest incentives and encouragements possible to urge all Christians to the rescue of their perishing fellow-men.

In the early Church, St. Patrick, the missionary of Ireland, fifth century; Augustine, the missionary of Gregory the Great to England; and Columba and his missionary college at Iona in the Hebrides, and his disciples the Culdees, in the sixth century, as well as the Lollards, the followers of Wickliffe, in the fourteenth century, were all of the general school of St. Augustine. In 1555, through Admiral Coligny, Calvin sent two ministers to the heathen in Brazil. Cromwell in the next century proposed to appoint a council to promote the Protestant religion in opposition to the congregation *De Propaganda Fide* in Rome. One of the principal objects of the promoters of the Plymouth and Massachusetts colonies was the conversion of savages and the extension of the Church. The charter of the "Society for the Propagation of the Gospel in Foreign Parts" was granted by the Calvinistic prince William III. As to the number of missionaries to the heathen employed by the different branches of the Protestant Church at present, the following may be regarded as a fair statement as to the proportion of the several confessions in England and America and on the Continent: Congregational, including the Baptists (all Calvinists), about 400; Episcopal, a majority of those supporting missions being of the Evangelical school, and many of these being Calvinists, about 310; Presbyterians, about 430; Moravians, about 160; Methodists, about 300.

D. *Literature.*—This is so immeasurable that only a few books of the greatest interest from the stand-point of this article will be mentioned: "S. Aurelii Augustini Hipponensis episcopi Opera," of different editions, especially his Anti-pelagian writings collected in the the tenth tome of Ed. Bened, Par. 1690; "The Works of John Calvin," especially his "Institutes," his "Consensus Genevensis," and his "Letters," by Bonnet; "The Treatise on Predestination," by Moses Amyraldus, Saumur, 1634, and his "Answer to Hoard's "Doctrinæ J. Calvin Defensio;" "The Works of John Owen," Edinburgh, 1850; "The Institutes of Theology" of Francis Turretin, Geneva, 1682; "Collectio Confessionum in Ecclesiis Reformatis Publicatarum," Niemeyer, and "Libri Symbolici Ecclesiæ Evangelicæ sive Concordia," Hase; Wigger's "Historical Presentations of Augustinianism and Pelagianism," translated by Ralph Emerson; "The Works of the Parker Society," 1841–55; Mozley's "Treatise on the Augustinian Doctrine of Predestination;" Goode's "Vindication of the Defence of the Thirty-nine Articles," and his "Effects of Infant Baptism;" "The Works of Jonathan Edwards;" "The Reformers and the Theology of the Reformation," and "Historical Theology," by William Cunningham, D. D.; "Calvinism," an address by James Anthony Froude, M. A., delivered at St. Andrew's, March 17, 1871; "History of the Christian Religion and Church," by Augustus Neander, translated by Torrey; Neander's "History of Christian Dogmas," translated by Ryland; "History of the Christian Church," by Philip Schaff, D. D.; Pascal's "Provincial Letters," translated by Thomas McCrie, D. D.; Motley's "History of the Rise of the Dutch Republic;" Neal's "History of the Puritans;" Macaulay's "History of England" and "Miscellanies;" "Dissertation on the Progress of Ethical Philosophy," note O, included in the miscellaneous works of Sir James MacIntosh;" "Our Theology and its Developments," by Dr. E. P. Humphrey, Presbyterian Board of Publication; "Comparative Influence of Calvinism and Arminianism on Civil Liberty;" "The New Englander," Oct., 1845; Bancroft's "History of the U. S." (See also the article ARMINIUS, ARMINIANISM, by D. D. WHEDON, D. D., LL.D.)

A. A. HODGE.

Calvinistic Methodists, in Great Britain, are in three divisions: (1) "Whitefield's Connection," dating from 1741; (2) "Lady Huntingdon's Connection," dating from 1748; (3) "Welsh Methodists," from about 1750.

Cal'vy, a post-village and township of Franklin co., Mo., about 55 miles E. S. E. of Jefferson City. Pop. 2100.

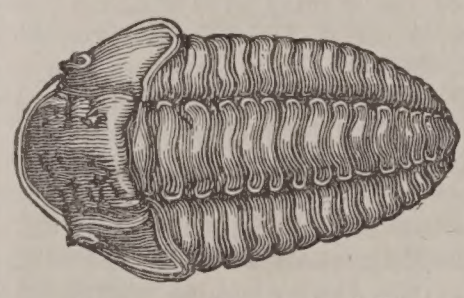
Calx (gen. *calcis*), the Latin name of quicklime, was applied by the alchemists to many products of combustion or oxidation, especially to those obtained from metals and other minerals, which were supposed to be converted into earths.

Calycan'thus [from the Gr. κάλυξ, a "cup," and ἄνθος, a "flower;" the bottom of the flower being cup-shaped], a genus of plants of the order Calycanthaceæ, allied to Rosaceæ. It comprises only a few known species, which are natives of the U. S. and Japan, and are shrubs with square stems. The flowers, bark, and leaves are fragrant and aromatic. The *Calycanthus floridus*, a native of Carolina, called Carolina allspice and sweet-scented shrub, is cultivated in many gardens of the U. S. Its flowers are of a lurid purple or rich-brown color.

Cal'ydon [Gr. Καλυδών], an ancient and celebrated city of Ætolia, on the river Evenus, a few miles from its entrance into the sea. It is often mentioned by Homer, and continued to be an important city in the historical period.

Calydo'nian Hunt, The, in classic mythology, was a celebrated enterprise against a wild boar which ravaged the dominions of Œneus, king of Calydon. Among the heroes who took part in this hunt were Meleager, Theseus, Jason, and Nestor.

Calym'ene, a genus of fossil trilobites, which is distinguished from the other genera of that order by the faculty which the animal had of rolling itself up into a ball, in which form they are often found. This genus is characteristic of the Silurian formation. The *Calymene Blumenbachii*, sometimes called "Dudley locust," is remarkable as a long-surviving species which is found in beds of several successive periods in England and the U. S.



Calymene Blumenbachii.

Calyp'so [Gr. Καλυψώ], a beautiful nymph and demi-goddess of classic mythology, who was, according to Homer, a daughter of Atlas. She reigned over the island of Ogygia, on which Ulysses landed after he had been shipwrecked. She treated him kindly, and tempted him to marry her with the promise of immortality, which he declined for the sake of Penelope.

Calyp'so Borea'lis, a rare and beautiful plant of the natural order Orchidaceæ, growing in cold bogs and wet woods of the Northern U. S. and Canada. The flower is variegated with purple, pink, and yellow. It has a single, nearly heart-shaped leaf.

Calyp'tra, the hood which covers the urnlike sporecase of certain mosses.

Calyptræ'a [Gr. καλύπτρα, a "head-dress or veil"], a genus of gasteropod mollusks, the type of a family, Calyptræidæ, formerly included in the genus *Patella*, or limpet, and still known as chambered limpets, bonnet limpets, and slipper limpets. The shell is limpet-shaped, but the apex is spiral, and has a calcareous process from its inner surface for the attachment of a muscle. The Calyptræidæ differ in shape, some being very flat, and others very conical; some are elongated and slipper-like. The species are generally natives of the shores of warm climates. Calyptræidæ are common in the older fossiliferous rocks. Fifty living species are known.

Ca'lyx, plu. **Cal'yces** [Gr. κάλυξ, a "cup;" Fr. *calice*], a botanical term applied to the flower-cup, which is the outermost of the proper floral envelopes, or of the circles of modified leaves which surround the organs of reproduction, and along with them constitute the flower. The leaves or separate parts of the calyx are called *sepals*. They are generally green, but in some cases are richly colored and *petaloid*, as in the *Mirabilis*, *Salvia splendens*, and *Fuchsia*. The calyx serves to protect the interior organs of the flower. If it falls off before the corolla, it is called *caducous*, and if it remains until the fruit is ripe it is called *persistent*. When the calyx is adherent to the sides of the ovary, it is *superior*, and when quite free from the sides of the ovary, it is *inferior*.

Cam, or **Granta,** a river of England, rises in Essex, flows north-eastward through Cambridgeshire, and enters the Ouse 3½ miles above Ely. Length, about 40 miles. It is navigable from its mouth to Cambridge, which derives its name from it. The Cam is considered as a classic stream, on account of its associations with Cambridge University.

Cam, or **Camb,** in machinery, is a contrivance for converting a uniform rotatory motion into a varied rectilinear motion. The end of a rod which is free to move only in the direction of its length is held in contact, by the action of a spring or weight, with the edge of an irregularly-shaped mass which revolves uniformly upon an axis. A varied motion is thus communicated to the rod, which carries with it the machinery by which the motion is to be applied.

Cam (Diogo), a Portuguese navigator who in 1484 explored the W. coast of Africa S. of the equator.

Camaïeu. See Camayeu.

Camaldulen'sians, or **Camal'dolites,** an order of monks founded about 1018 by Saint Romuald at Camaldoli, in the Apennines, about 30 miles from Florence. They are divided into two classes—Cœnobites and Eremites—and follow the rule of Saint Benedict. There are also a few houses of Camaldolite nuns.

Caman'che, a post-village of Clinton co., Ia., on the Mississippi River, about 35 miles above Davenport. It is on a railroad which extends from Clinton to the Missouri River, and is 5 miles S. W. of Clinton. Pop. 840; of Camanche township, 1453.

Camanche Indians. See Comanche Indians.

Camar'go, a post-township of Douglas co., Ill. P. 1808.

Camargue, La, a populous island of France, department of Bouches-du-Rhône, is at the mouth of the Rhone, and enclosed on two sides by the arms of that river. It is an alluvial fertile delta, partly occupied by marshes. Area, about 240 square miles. Large quantities of salt are obtained here.

Camari'lla, a Spanish word, the diminutive of *camara,* a "chamber," signifies, literally, a "little chamber." It is applied to the private chamber or cabinet of the king of Spain, or to his courtiers and confidential advisers, who usually had great power in the government and exerted a pernicious influence. The term is also used in other European countries and languages to denote the influence of courtiers and secret counsellors, counteracting the opinions and policy of the legitimate ministers.

Camari'na, a celebrated Greek city of Sicily, on the southern coast, about 20 miles E. of Gela. It was founded by a colony of Syracusans in 599 B. C. It is said that no trace of it now exists.

Camas'sia [from its Nootka Indian name, *camass* or *quamash*], a genus of plants of the natural order Liliaceæ, consists of a single species, the *Camassia esculenta,* the quamash of the Nootka Indians. It grows in swampy places in the U. S. west of the Rocky Mountains, and resembles the *Scilla,* having bulbs which the savages use as food.

Camayeu (or **Camaïeu**) and **Mon'ochrome** are French terms used to denote a painting in a single color. Pictures of several tints, which do not represent the natural colors of objects, are said to be *en camayeu.* The same term may be properly applied to drawings in India ink and red chalk, as well as engravings.

Camb. See Cam.

Cambacérès (Jean Jacques Régis), duke of Parma, an able French statesman and lawyer, born at Montpellier Oct. 18, 1753. He was elected in 1792 a member of the National Convention, in which he acted a cautious and moderate part. After the death of Robespierre (9th Thermidor, 1794) he was president of the Committee of Public Safety, and opposed the continuance of the Reign of Terror. He became a member of the Institute about 1796. About the end of 1799 he was appointed second consul by Bonaparte, of whom he became a faithful adherent. He took a prominent part in the rédaction of the civil code. Under the empire he was arch-chancellor and president of the council of state. During the Hundred Days he was Napoleon's minister of justice. He held no office after the Restoration of 1816. Died Mar. 5, 1824.

Cambay', a seaport-town of Hindostan, is at the head of the Gulf of Cambay, and on the right bank of the Myhee, 82 miles N. N. W. of Surat. It has a fine mosque, several Hindoo temples, and a curious subterranean Booddhist temple. Ruined palaces and mosques attest the former magnificence and extent of this town, which was once much more populous than it is now. One cause of its decline was the increasing shallowness of the gulf. It still exports cotton, grain, ivory, etc. Pop. about 10,000.

Cambay, Gulf of, is an inlet of the Arabian Sea, in the W. part of Hindostan. It is about 75 miles long, and extends in a nearly N. and S. direction. The width of the entrance, which is the widest part, is 32 miles or more. It receives the rivers Nerbudda, Taptee, Myhee, and Subbermuttee. The tide here is very rapid, and rises about thirty feet.

Cam'ber [Fr. *cambre*], a term applied by builders to the slight degree of arching which is usually given to beams or other parts of a frame in order to compensate the settlement of the various parts or the subsidence of the joints. Camber in shipbuilding signifies a curvature upward, or a convexity. A deck is said to be "cambered" when it is higher amidships than at the bow or stern.

Cambis'ta, an Italian word signifying "a banker," "a money-changer." It is also used as the title of a book in which the moneys, weights, and measures of various nations are given in the equivalents of some particular nation.

Cam'bium, in botany, a mucilaginous, viscid substance which is secreted between the liber and alburnum of exogenous trees and other plants in early spring. It is supposed by some physiologists to be the matter out of which new wood and bark are formed; by others, to be a preparation of organizable matter out of which the horizontal growth of the cellular system and the vertical growth of the woody system may be nourished during their respective developments. Delicate cells (cambium cells) are formed in it, which certainly fulfil important functions in the production of new wood.

Cambo'dia is known under three different names: first, *Kampootcha,* which is given to it in the sacred books; *Youdra Skan,* the appellation by which it is best known to foreigners; and *Khamain,* the common name used among the natives themselves. This vast kingdom lies between Laos on the N. and Cochin China on the E., the China Sea and the Gulf of Siam on the S., and the kingdom of Siam proper on the W. The country between Cambodia and Siam is an inclined plane falling off to the sea, beginning from the Khoa Dong Rèke, or the highlands of Korat, which constitutes the first platform of the terraces that gradually ascend to the mountain-chain of Laos. Khoa Dong Rèke, the Cambodian Atlas, includes in its domain a magnificent and extensive fôrest, Dong P'hya Fai, or "the forest of the Lord of Fire," whence issue many beautiful streams to flow into the Pachim River. Its area is about 250,900 square kilomètres. Its population is estimated at a little over 1,000,000. The religion is Booddhism, with a small but rapidly growing proportion of converts to Roman Catholicism. It is subdivided into Northern and Southern Cambodia, and the great province of Cancao on the S. E., and it teems with every species of mineral and vegetable wealth. Near the coast the country is covered with woods; a little farther inland, especially along the banks of the rivers and lakes, the land is well cultivated. But in the interior it abounds with impenetrable jungles, where elephants, lions, tigers, and wild buffaloes find shelter and afford excellent sport to the natives, who hunt them in large parties for their ivory and skins. Deer, hogs, goats, and a great many species of wild fowl abound in the forests, as well as in the more cultivated districts. The country abounds in iron, tin, precious stones, teak, sandal, and other wood, gamboge and numerous other dyestuffs. The finest gamboge is produced by the tree *Garcinia gambogoides;* and Bantabang is noted for its gold-mines. Saigon annually exports quantities of pepper, rice, cardamoms, cotton, hides, horns, and cocoanut oil.

The climate is warm but wholesome, the scenery varied and beautiful; the navigation of the Gulf of Siam and the China Sea, along with such splendid rivers as the Meikong and the Saikong, magnificent forests of fine woods, endless crops of rice, Indian corn, sugar-cane, and tea, and vast plantations of mulberry trees for the rearing of silkworms, producing the finest article of silk, are some of the prospective advantages of the superb region to which Saigon is the key. The export of rice alone for the month of Aug., 1870, amounted to 130,000 piculs, sent to Europe, Mauritius, Singapore, Malacca, China, and Japan. The arrivals for that month at the port of Saigon alone were thirty-two vessels, of from 200 to 2000 tons, and there were twenty vessels loading under the British, French, and German flags, aggregating 9000 tons; and indigo and silk are now cultivated with splendid prospects of success.

The kingdom of Cambodia was in its day not only independent, but powerful. As to its antiquity, two opinions prevail; one ascribing to it a duration of 1300 years, the other 2400. The native historians reckon 2400 years from the building of the wonderful temples found in the neighborhood of Angkor, near the great lake Talasap. Angkor has even at this day sufficient proof, in its memorable ruins,

that it was at some remote period the centre of a wealthy, powerful, and highly civilized state. Its decline probably dates from the dispersion of the Indian Booddhists, which took place from seven to five centuries before Christ. The ruins of Angkor Tom or wall are still in a tolerable state of preservation, and are composed of a central tower surrounded by four turrets and flanked by two other towers, all connected together by extensive galleries. At the top of the central tower are four immense heads in the Egyptian style, and every available space on these buildings is filled with exquisite sculptures in bas-relief. The scenes are drawn from the ancient mythological books of the Cambodians. There are here, also, several gigantic stone bridges of almost superhuman magnitude and solidity.

During the reign of His Siamese Majesty Phra-Chow-Maha-Chakraphat, who reigned in Ayodhia, the ancient capital of Siam, in the Siamese civil era 900 (corresponding to 1540 of our Christian era), the Cambodians fitted out an immense army and attacked Siam, marched their forces as far as Bangnah and Phrakanong, ancient seaport-towns of Siam, which they pillaged and destroyed. The Siamese thereupon set out with a powerful army and took possession of Inthapataburee, the ancient capital of Cambodia, and remained masters of the citadel until the emperor of Cambodia acknowledged himself penitent and willing to become tributary to Siam. About a hundred years ago dissensions among the reigning family led to weakness, and Cambodia fell under the control of the Annamites, who exacted heavy tribute, and at last, in 1809, unblushingly divided its provinces between themselves and the Siamese.

The name Cochin China was applied to it by the Portuguese, who thought they saw a likeness in it to Cochin on the coast of Malabar. In 1471 it was reunited to the great province of Tonkin. In the sixteenth century it broke away, and in 1774, after a long and terrific war, Tonkin was reduced to submission and incorporated that fine country with the kingdom of Annam. It was about this time that European influence first began to be felt in this region. The emperor of Cambodia, Chow Ngayen, felt the need of some support, and offered, through a Christian missionary who was a bishop in the country, to place himself under the protection of France. On this many French officers went to the new kingdom in the East, disciplined its armies, and took a share in the government. In 1820 the old-school Booddhists, in order to revenge the indiscriminate pillage of the French officers on the property of the simple inhabitants, instituted a ferocious persecution of the Christians. Since then, French fleets have been sent out to demand indemnities and protect the Catholic missionaries. Thus, France and other European nations have made their way into Annam, until now France holds the best part of Southern Cochin China and the whole of the fine province of Cambodia.

MRS. ANNA H. LEONOWENS.

Cambon (JOSEPH), a French statesman and financier, born at Montpellier June 17, 1756. He was elected to the National Convention in 1792, voted for the death of the king, and became a member of the Committee of Public Safety in 1793. He promoted the fall of Robespierre in 1794. As a member of the committee on finance he made several able reports, and is said to have laid the foundation of the modern financial system of France. He procured the adoption of the great book or register of the public debt. He held no office under the empire, was exiled in 1816, and died Feb. 15, 1820.

Cam'borne, a town of England, in Cornwall, 11 miles N. W. of Falmouth. Here is a church which has a stone inscription of the tenth century. Productive mines of copper, tin, and lead are worked in this vicinity. Pop. 7500.

Cambray [Lat. *Camaracum*], a fortified city of France, in the department of Nord, on the Schelde, 45 miles by rail N. N. E. of St.-Quentin, the seat of an archbishop, celebrated for its fine linens, called *cambrics*. Cambray is an ancient city, with gabled houses, handsome streets, and is surrounded by a wall with ancient towers and gates. It has manufactures of laces, tulles, leather, soap, etc. Pop. 22,207.

Cam'bria, the ancient and Latin name of Wales, which the Romans called Britannia Secunda. Cambria is derived from *Cymry,* by which name the Welsh people have always called themselves.

Cambria, a county in S. W. Central Pennsylvania. Area, 670 square miles. It is drained by the West Branch of the Susquehanna and Conemaugh Creek, both of which rise within its limits. The surface is elevated and uneven, and traversed by precipitous ravines. Grain, wool, potatoes, and dairy products are extensively raised. Bituminous coal and iron are abundant here, and lumber is the chief article of export. It is intersected by the Central R. R. Capital, Ebensburg. Pop. 36,569.

Cambria, a township of Hillsdale co., Mich. P. 1683.

Cambria, a township of Blue Earth co., Minn. P. 339.

Cambria, a post-township of Niagara co., N. Y. Within its limits there are pre-historic remains of a fortification, etc. covering six acres. Pop. 2145.

Cambria, a post-borough of Cambria co., Pa. P. 1744.

Cambria, a township of Cambria co., Pa. Pop. 1086.

Cambria, a post-village of Courtland and Randolph townships, Columbia co., Wis. Pop. 502.

Cam'brian Rocks (or **System**), a name given by Prof. Sedgwick to the oldest known fossiliferous rocks, on account of their extensive development in North Wales (*Cambria*). They are in part the equivalents of rocks described by Murchison as lower Silurian. The Cambrian is therefore regarded by some geologists as a subordinate member of the Silurian group. The government geological surveyors confined the term to a series of sandstones, slates, and gritstones which underlie the Silurian lingula beds.

Cām'bric, the name generally given to the lightest and finest of linen and cotton fabrics, originally made at Cambrai, in France, whence the name is derived. In 1563 Dutch emigrants introduced the manufacture into England.

Cam'bridge [anc. *Granta;* Lat. *Cantabrigia*], a town of England, capital of Cambridgeshire, is situated on both sides of the river Cam, and on the Eastern Counties Railway, 48 miles N. N. E. of London. The site is level, and the town is embosomed among lofty trees. It is the seat of one of the great universities of England, and contains many noble edifices belonging to that institution. Among the remarkable buildings of the town are Trinity church and the church of the Holy Sepulchre, which was built in the reign of Henry I., and has a round tower. It is said that Cambridge was destroyed by the Danes in 871 A. D. The Doomsday Book mentions it as an important place under the name of *Grentebrige*. It obtained a charter from King John in 1200. Jeremy Taylor was born here. Cambridge returns two members to Parliament, besides those who represent the university. Pop. in 1871, 30,074.

Cambridge, a post-village of Union township, Storey co., Ia. Pop. 200.

Cambridge, a post-village, capital of Henry co., Ill., 140 miles N. by W. from Springfield, is the chief intermediate station and grain-market on the Peoria and Rock Island Railway. It has two weekly papers. Pop. 1200.

GEO. C. SMITH, ED. "HENRY COUNTY CHRONICLE."

Cambridge, a post-township of Somerset co., Me. Pop. 472.

Cambridge, a post-village, capital of Dorchester co., Md., is on the S. side of the Choptank River, 50 miles S. E. of Annapolis. The river is here about 2 miles wide. Cambridge is the western terminus of the Dorchester and Delaware R. R., which extends 33 miles to Seaford. It has academies for both sexes, four hotels, five churches—four M. E. and one Episcopal—a flouring mill, a tobacco and a stave factory, and four canning establishments. It has three weekly papers. Pop. 1692.

JOSEPH P. JOHNSON, ED. "NEWS."

Cambridge, a city of Massachusetts, and one of the shire-towns of Middlesex co., is on the N. W. bank of the Charles River, which is here about 1 mile wide, and separates Cambridge from Boston. Cambridge, though incorporated as one city, was formerly divided into several villages, the local names of which still survive; these are Old Cambridge, Cambridgeport, East Cambridge, and North Cambridge. Harvard University is in Old Cambridge. Cambridgeport and East Cambridge contain many mercantile houses and manufactories, mostly of glass, furniture, organs, steam-engines, and boilers. East Cambridge is connected with Boston and Charlestown by bridges. West Boston Bridge connects Cambridgeport with Boston. In the whole city there are thirty churches, six national banks, and four savings banks. Extensive printing establishments exist here, and the first printing-office in America was located in Cambridge. There are two weekly newspapers. Near Harvard University is a fine soldiers' monument, erected in 1869–70 at a cost of $35,000. The city hall is in Cambridgeport. Cambridge is beautifully situated on a plain, contains some handsome public buildings, and a great number of elegant private residences, with spacious grounds ornamented with shrubbery and flowering plants. The city is furnished with water from Fresh Pond, the consumption being about 2,000,000 gallons daily. Pop. in 1850, 15,215; in 1870, 39,634; in 1873 (estimated), 50,000. Valuation of real and personal property in 1873, $62,421,215. The town is one of the oldest in New England, having been settled in 1630. (See HARVARD UNIVERSITY.)

H. R. HARDING, ED. "CAMBRIDGE PRESS."

Cambridge, a post-township of Lenawee co., Mich. Pop. 1110.

Cambridge, a post-village, capital of Isanti co., Minn., on Rum River, about 44 miles N. of Minneapolis. Pop. of Cambridge township, 374.

Cambridge, a post-village of Blackwater township, Saline co., Mo. Pop. 375.

Cambridge, a township of Coos co., N. H. Pop. 28.

Cambridge, a post-village of Washington co., N. Y., on the Rensselaer and Saratoga R. R., 35 miles N. E. of Albany. It has a national bank, a fine academy, a foundry and machine-shop, two tanneries, a cigar-factory, seven churches, four hotels, and one weekly newspaper. It has also a fine driving park. Pop. 1530, of which 967 are in White Creek township; pop. of Cambridge township, 2589.

ED. "WASHINGTON COUNTY POST."

Cambridge, a post-village, capital of Guernsey co., O., situated on Will's Creek and the Baltimore and Ohio (Central Ohio division) and Marietta and Pittsburg R. Rs., in a good agricultural and mineral region, 85 miles E. of Columbus and 65 miles N. of Marietta. It has five churches, two monthly and three weekly newspapers, a national bank, and several mills. P. 2193; of Cambridge township, 3624.

LENFESTY & GOODERL, PUBS. "GUERNSEY TIMES."

Cambridge, a post-borough and township of Crawford co., Pa., on French Creek and on the Atlantic and Great Western R. R., 14 miles N. N. E. of Meadville. It has one weekly paper. Total pop. 1199.

Cambridge, a post-township of Lamoille co., Vt., situated at the foot of Mount Mansfield on the Lamoille River and the Lamoille Valley R. R. It contains two villages, Cambridge Borough and Jeffersonville. Surrounded by fine scenery, it is extensively visited by pleasure-seekers in summer. It has one newspaper. Pop. 1651.

A. N. MERCHANT, PUB. "VALLEY SENTINEL."

Cambridge (ADOLPHUS FREDERICK), DUKE OF, the seventh son of George III. of England, was born Feb. 25, 1774. He entered the army about 1790, was appointed governor of Hanover in 1816, and viceroy of that kingdom in 1831. Died July 8, 1850.

Cambridge (GEORGE WILLIAM FREDERICK CHARLES), DUKE OF, a British general, a son of the preceding, was born Mar. 26, 1819. He became a major-general in 1845, served in the Crimean war in 1854, and was appointed acting commander-in-chief of the British army in 1856, and field-marshal in 1862.

Cambridge City, a post-village of Wayne co., Ind., on the Whitewater River, 15 miles W. of Richmond, and at the junction of the Pan-Handle R. R. with the White Water Valley, the Fort Wayne Muncie and Cincinnati and the Jeffersonville branch roads. It has a national bank with a capital stock of $350,000, the car-shops of the Indiana Car Company, employing 300 hands and manufacturing six cars a day, and other manufactures. There is one newspaper. P. 2162. ED. "CAMBRIDGE CITY TRIBUNE."

Cambridge Platform, a system of church government drawn up by a synod at Cambridge, in the colony of Massachusetts Bay, in 1648. The Congregational churches of New England at that time differed somewhat in regard to discipline, some being inclined to Presbyterianism and others to Independency, while the majority avoided both extremes. The synod reaffirmed the doctrines taught in the Westminster Confession, but recommended a form of church discipline substantially the same as that which now prevails in the Congregational churches.

Cam'bridgeshire, a county of England, is bounded on the N. by the river Nen, on the E. by Norfolk and Suffolk, on the S. by Essex and Hertford, and on the W. by Bedford and Huntingdon. Area, 820 square miles. Pop. in 1871, 186,363. The surface is mostly flat, and about one-fourth of the county is occupied by fens or marshes. The northern portion is part of the BEDFORD LEVEL (which see). The soil is fertile, and the inhabitants are mostly engaged in agriculture. Among the staple products are wheat, beans, hay, oats, butter, and cheese. It is intersected by the river Ouse, and also drained by the Cam. In the N. part is a tract called the Isle of Ely. The chief towns are Cambridge, Ely, and Newmarket.

Cambridge, University of, one of the two ancient universities of England. In 1110, Joffrid, abbot of Croyland, sent to his manor of Cottenham, near Cambridge, Gislebert, a professor in divinity, with three other learned monks. They in a short time drew together so great a number of scholars that in the second year no single building was able to contain them. When Alfred of Beverly was there, in 1129 A. D., there were no public halls, but each one lived in his own lodgings. About the year 1257 students began to live together in hostels, under a principal, at their own charges. The hostels were named after saints or the churches which they adjoined, or the persons who built them. Trinity hostel survived to 1540. The hostels were the beginning of the college system, which distinguishes the universities of Oxford and Cambridge. A hostel for medical students was opened in 1859, and another has been opened in connection with Trinity College.

Before the close of the sixteenth century nearly all the foundations were endowed which now constitute the university. The predominance of the religious element in the discipline is to be attributed to the usage of the times in which the colleges were founded. There had been, from very early times, "religious houses," which were in many cases united with collegiate foundations, as, for example, the Dominicans, whose house is now Emmanuel College. The friars who lived in these convents kept their "acts" or exercises for degrees like other university-men. To the same cause is traced the condition of celibacy, upon which, with scarcely an exception, the fellowships are tenable. With some exceptions, the fellows are obliged to take holy orders within a limited period or to vacate their fellowships.

The present statutes were confirmed July 31, 1858. The governing body is a senate of eight members. All university laws are approved by the council, consisting of a chancellor and vice-chancellor, before they are submitted to the senate. The executive powers are a chancellor, high steward, vice-chancellor, commissary, and assessor. There are three terms—Michaelmas, Lent, and Easter. Dissenters are not excluded from taking degrees, except in divinity.

There are four classes, or orders, of students—viz. fellow-commoners and noblemen, pensioners, sizars, and scholars on the foundation of their college. The first are so called from their dining at the fellows' table; they wear silk or embroidered gowns and pay heavier fees. The pensioners are the students not on the foundation, who pay for their own commons and for their chambers. The sizars are the poorer students, who are admitted at lower charges than the pensioners, but wear the same dress, and no longer perform menial offices, as they once did. St. John's and Trinity have very liberal endowments for sizars, and pecuniary assistance is given. All students coming to the university are entered in one of the above classes. The scholars are elected, by examination, from the pensioners and sizars; they have rooms and commons free, and other emoluments. The fellows are generally elected from the scholars. The fellowships are given to members of the college, and are not, as at Oxford, open to the whole university. Before a student can be admitted he must be sufficiently instructed in Latin, Greek, and mathematics.

When the undergraduate comes in he is called a "freshman;" in his second year, a "junior soph;" in his third year, a "senior soph." The degree of bachelor of arts requires usually nine terms, or three years, of residence. The master's degree is conferred three years later. The candidates for degrees are called questionists.

The mathematical examination embraces the whole range of mathematics. The successful candidates are arranged in a tripos—*i. e.* in three classes, called respectively wranglers, senior optimes, and junior optimes; the first mathematician is called the senior wrangler. In the examination for classical honors the candidates are arranged in a tripos, and distinguished as first, second, and third class. The examinations for degrees are called the "great go." The previous examination, which comes in the second year of residence, is called the "little go." There is also a tripos for the natural sciences. The pecuniary value of the first place in either the classical or the mathematical tripos has been estimated at £10,000, for it secures to its possessor high social position, as well as lucrative employment. The next prizes are the fellowships, of which there are 430 tenable for life. The office of tutor is one of great honor and emolument. In 1870 the members of the university amounted to 9241. The undergraduates for the same year numbered 2019.

The following is a list of the colleges and halls:

Name.	Founded
St. Peter's College	1257
Clare College	1326
Pembroke College	1347
Gonville Hall and Caius College	1348
Trinity Hall	1350
Corpus Christi College	1351
King's College	1441
Queen's College	1448
St. Catherine's College	1473
Jesus College	1496
Christ's College	1505
St. John's College	1511
Magdalene College	1519
Trinity College	1546
Emmanuel College	1584
Sidney Sussex College	1598
Downing College	1800

The Fitzwilliam Museum is the finest modern addition to the university. Viscount Fitzwilliam bequeathed, in 1816, £100,000, the interest of which was to build and support a museum. He bequeathed also a valuable collection of books, paintings, etc. The University Library is a fine mass of buildings of different periods, and contains at present more than 230,000 volumes, without reckoning those in the college libraries, some of which are very important. The Geological Museum contains the collection of Dr. Woodward, with recent numerous and interesting acquisitions. Besides this, there are other valuable scientific museums. (For full information about the university see the "Cambridge Calendar.") REVISED BY T. D. WOOLSEY.

Camby'ses [Gr. Καμβύσης; Old Persian cuneiform inscriptions, *Kabujiya*], king of the Medes and Persians, and a son of Cyrus the Great, whom he succeeded about 530 B. C. He invaded Egypt in 525, defeated Psammenitus, its king, in battle, and captured Memphis, the capital of Egypt. Having completed the conquest of that country, he led an army to Ethiopia, but was compelled by famine to retire before he had conquered it. He afterwards indulged in violent and capricious acts of tyranny and cruelty in Egypt, so that many believed him to be insane. Cambyses was an epileptic, but a man of strong though very cruel character. By his Egyptian subjects he was utterly detested. Died in 522 B. C.

Cam'den, a county which forms the S. E. extremity of Georgia. Area, 600 square miles. It is bounded on the E. by the Atlantic Ocean, and on the S. by the St. Mary's River, and is intersected by the Santilla (or Satilla) River. The surface is level; the soil is sandy. Rice and corn are the chief crops. It embraces some of the Sea Islands. Capital, St. Mary's. Pop. 4615.

Camden, a county in S. Central Missouri. Area, 600 square miles. It is intersected by the Osage River, and also drained by the Niangua. The surface is diversified by hills and valleys; the soil is moderately fertile. Lead is found in this county. Grain, tobacco, and wool are the chief products. Capital, Linn Creek. Pop. 6108.

Camden, a county in the S. W. of New Jersey. Area, 235 square miles. It is bounded on the N. W. by the Delaware River, which separates it from Philadelphia, and is drained by Big Timber and Cooper's creeks, and other streams. The surface is nearly level; the soil is mostly sandy, and in the W. part is a fertile loam. Marl is abundant in this county, which is intersected by the Camden and Atlantic R. R. Corn, wheat, fruit, and garden and dairy products are extensively raised. It has manufactures of flour, machinery, and a great variety of goods. Capital, Camden. Pop. 46,193.

Camden, a county of North Carolina, bordering on Virginia and Albemarle Sound. Area, 280 square miles. It is bounded on the S. W. by the Pasquotank River. The surface is level, and partly covered with forests of cedar and cypress. Indian corn is the chief crop. The northern portion of the county is part of the Dismal Swamp. Capital, Camden Court-house. Pop. 5361.

Camden, a post-village, capital of Wilcox co., Ala., is about 4 miles S. of the Alabama River and 80 miles S. W. of Montgomery. It has a weekly paper. Pop. of Camden township, 3060.

Camden, a post-village, capital of Ouachita co., Ark., is on the right bank of the Washita River, 110 miles S. by W. from Little Rock. Steamboats ascend the river to this point, which is connected by navigable water with New Orleans, and for two-thirds of the year steamers ascend the river to Arkadelphia. There are two weekly papers. Camden is an important commercial centre. It was once called *Écore à Fabre,* and was a great hunting rendezvous. Pop. 1612.

Camden, a post-village of North Murderkill hundred, Kent co., Del., near Wyoming Station, on the Delaware R. R., 3 miles S. of Dover. Pop. 657.

Camden, a post-township of Schuyler co., Ill. P. 1173.

Camden, a post-village of Jackson township, Carroll co., Ind., on the Logansport Crawfordsville and Southwestern R. R., 14 miles S. W. of Logansport. Pop. 476.

Camden, a post-village of Knox co., Me., on the W. side of Penobscot Bay, about 8 miles N. N. E. of Rockland. It derives its support from the burning of lime, shipbuilding, commerce, and manufacture of cars, car-wheels, railroad spikes, and ship's furniture of various kinds. It has a weekly paper. Pop. including Camden township, 4512.

DUNTON BROS., PUBS. CAMDEN "HERALD."

Camden, a post-township of Hillsdale co., Mich. The township is on the Ohio and Indiana State line, and on the Fort Wayne Jackson and Saginaw R. R. Pop. 1883.

Camden, a township of Carver co., Minn. Pop. 414.

Camden, a township of De Kalb co., Mo. Pop. 1359.

Camden, a post-village and township of Ray co., Mo., on the St. Louis Kansas City and Northern R. R., 5 miles S. W. of Richmond, and on the N. bank of the Missouri River. Pop. of village, 357; of township, 3347.

Camden, a post-township of Seward co., Neb. P. 309.

Camden, a city and river-port of New Jersey, and the capital of Camden co., is situated in a plain on the Delaware River opposite Philadelphia, and 32 miles by railroad S. W. of Trenton. It is the terminus of the Camden and Amboy R. R. and the Camden and Atlantic R. R., and of the West Jersey R. R., which extends to Cape May, Millville, etc. The plan of the city is regular. It contains a court-house, near thirty churches, and two national banks; also several iron-foundries and manufactures of machinery, chemicals, and other goods. There is a large manufactory of steel pens. Numerous steam ferry-boats cross the river at various points, and connect Camden with Philadelphia. It has three weekly papers. Pop. 20,045.

Camden, a post-village of Oneida co., N. Y., on the Rome Watertown and Ogdensburg R. R., 18 miles N. W. of Rome. It has three churches, one weekly paper, and manufactures of lumber, leather, pumps, and sash and blinds, etc. Pop. 1703; of township, 3687.

Camden, a township of Lorain co., O. Pop. 858.

Camden, a post-village of Somers township, Preble co., O., on the Cincinnati Richmond and Chicago R. R., 44 miles N. of Cincinnati. Pop. 648.

Camden, a post-village, capital of Kershaw co., S. C., is on the E. bank of the navigable Wateree River, 33 miles N. E. of Columbia. Camden is the terminus of a railroad which extends southward and connects it with Charleston. It contains seven churches and four academies, and has good water-power. Gen. Gates was defeated here Aug. 16, 1780, by Lord Cornwallis, and April 25, 1781, Gen. Greene was defeated by Lord Rawdon at Hobkirk's Hill, near Camden. During the recent civil war this place was captured, Feb. 24, 1865, by the Federal forces under Gen. Sherman after a lively skirmish; 2000 bales of cotton and a large quantity of tobacco were destroyed by burning. Camden has two weekly papers. There are ancient mounds near this town. Pop. 1007.

J. B. KERSHAW, ED. OF CAMDEN "JOURNAL."

Camden, a post-village, capital of Benton co., Tenn., on the Nashville and North-western R. R., 82 miles W. of Nashville. Pop. 148.

Camden, MARQUESSES OF, earls of Brecknock (United Kingdom, 1812), Earls Camden (1786), Viscounts Bayham (1836), Barons Camden (1765, Great Britain).—JOHN CHARLES PRATT, born June 30, 1840, was member of Parliament for Brecon in 1866, and succeeded to the marquisate in the same year.

Camden (CHARLES **Pratt**), FIRST EARL OF, an eminent English statesman and lawyer, born in 1713, was a son of Chief-Justice Sir John Pratt. He was called to the bar in 1738, became attorney-general about 1758, and chief-justice of the court of common pleas in 1762. His decision against the legality of general warrants, which he gave in the trial of John Wilkes, rendered him very popular. He received the title of Baron Camden in 1765, and was appointed lord chancellor, but he resigned that office in Jan., 1770. He afterwards distinguished himself as a champion of constitutional liberty, and acted with Lord Chatham in opposition to the American policy of Lord North. In 1783 he became president of the council. He was created Earl Camden in 1786. Died April 18, 1794. "Among the names that adorn the legal profession," says Lord Brougham, "there are few which stand so high as that of Camden." On account of his liberal policy during the Revolutionary war his name became very popular in the U. S., and was given to several counties and many towns and villages.

Camden (WILLIAM), an eminent English antiquary, born in London May 2, 1551, graduated at Oxford. He was appointed second master of Westminster School in 1575. His most important work is a description of Great Britain in Latin, entitled "Britannia sive Regnorum Angliæ, Scotiæ, et Hiberniæ, ex intima Antiquitate Chorographica Descriptio" (1586). He published several new editions of it, enlarged and improved. Among his works is "Annals of the Reign of Elizabeth" (in Latin), highly commended by Hume. He became head-master of Westminster School in 1593, and Clarenceux king of arms in 1597. His promotion to this position over the heads of all the College of Heralds led to many heart-burnings and recriminations, and embittered many years of the life of this worthy man, who has been called "the judicious Camden" and "the British Pausanias." He was buried in Westminster Abbey. Died Nov. 9, 1623.

Camden Court-house, a post-village, capital of

Camden co., N. C. It is a port of entry, and is on the navigable Pasquotank River.

Camden Society, an association organized in 1838 in London for the purpose of publishing the MSS. of old British authors, historical documents of importance, old records, visitations, both heraldic and ecclesiastical, and other matter of antiquarian, literary, or historical interest relating to England. Some of their materials are not very ancient, but are published for their general interest. The results of their work are contained in a large number of volumes, which are, as a whole, of very great value. The rooms of the society are in Parliament street, London. The name was given in honor of William Camden, the historian.

Cam'el [Lat. *camelus;* Ger. *Kameel;* Gr. κάμηλος; Arabic, *gammel*], a genus of ruminant quadrupeds of which

Dromedary, or Arabian Camel.

only two species now exist. This genus is the type of the family Camelidæ, which includes the genus *Auchenia,* the llama, alpaca, etc. The Camelidæ exhibit a wonderful adaptation to their native regions both in the Old World and the New. The dentition differs from that of all other ruminating animals in the presence of incisor teeth in the upper jaws, camels having canine teeth in both jaws, and the Auchenia in the lower jaw; the feet have not the cloven hoof of the rest of the order, but two elongated toes, each tipped with a nail-like hoof, the feet resting not upon the hoofs, but upon elastic cushions. In the camels the toes are united by a common sole, instead of having each a separate one, as in the genus *Auchenia;* the broad foot enabling the animals of the one genus easily to traverse the sand of the desert, while the separation of the toes in the other is suited to rocky heights. Camels have a hump or humps upon the back, of which the others exhibit no trace. With similarity of form the Camelidæ of the Andes exhibit a gracefulness which strongly contrasts with the gaunt angularity of those of the East. The Arabian camel (*Camelus dromedarius*) has only one hump on the back, while the Bactrian camel (*Camelus Bactrianus*) has two. The first-named species is found chiefly in Arabia, Syria, and Northern Africa. The other is a native of Central Asia, where it is still found wild. The Arabian camel is bred to some extent in Italy; the Bactrian in the Crimea. The two are sometimes crossed. The Bactrian is the larger, being often ten feet high. It is much hardier than the other. Confusion has arisen from the employment of the name dromedary as a designation of the former species, it being properly limited to a slender, graceful, and fleet variety of that species. The hump on the camel's back is chiefly a store of fat, from which the animal draws as the wants of its system require; and the Arab is careful to see that the hump is in good condition before a long journey. Another interesting adaptation is the thick sole which protects the foot of the camel from the burning sand. The nostrils may be closed by valves against blasts of sand. Most interesting is the provision for drought made by providing the second stomach and a portion of the first with great cells, in which water is long retained. This store of water is known to the Arabs, who sometimes avail themselves of it by killing some of the camels of the caravan. Sight and smell are extremely acute in the camel.

The Arabian camel carries about 500 pounds. The Bactrian camel is sometimes loaded with 1000 or even 1600 pounds weight, but can carry the latter weight but a short distance. The East India Company had at one time a corps of camels, each mounted by two armed men. The Persians mount light swivel guns upon the saddle of the camel. The pace of the loaded camel is steady and uniform: it proceeds from day to day at a rate of about two and a half miles per hour. Some of the dromedaries, however, can carry a rider more than 100 miles in a day. The motion of the camel is peculiar, jolting the rider in a manner extremely disagreeable to those who are unaccustomed to it. The camel produces a single young one at a time, or rarely two. It lives thirty or forty years. The patience of the camel has been celebrated by authors. But with all its general submissiveness, it is resentful of injury, and, according to some observers, is always ill-humored and morose, and during the rutting season is particularly vicious. The flesh and milk of the camel are valued by the Arabs as food. Its dung is a very useful fuel in the desert. The hair is used for the manufacture of cloth, some kinds of which are coarse, and others soft and fine. Camel's hair is also imported for the manufacture of pencils or small brushes used by painters. A fossil camel (*Camelus Sivalensis*), larger than either existing species, has been discovered in miocene deposits in Hindostan. Numerous remains of fossil Camelidæ occur in the tertiary of Dakota and Nebraska. These are of many species and several genera. The U. S. government in 1857 introduced a number of camels for service in the arid regions along the South-western frontier. These were owned and employed by the government, and performed good service; but, owing to the civil war and the unsettled condition of that region, the attempt to naturalize them for general use has not been successful. Revised by J. S. Newberry.

Camel, a contrivance by which ships are floated over sandbars and shoals. A long caisson, or "camel," nearly filled with water, is fastened to each side of the ship: when the water is pumped out the caissons rise and lift the ship with them. The principle is more fully explained in the article Dock (which see, by Samuel H. Shreve, C. E.), for it is essentially the principle of all floating docks. Camels were formerly used at Nantucket and New Bedford, Mass. A similar machine is employed in raising sunken ships.

Camel'lia [named in honor of G. J. Kamel or Camelli, D. D., a botanist, natural historian, and a German Jesuit missionary to Luzon in the last century], a genus of evergreen plants of the order Camelliaceæ, natives of China, India, and Japan, and extensively cultivated in greenhouses in Europe and the U. S. for the beauty of their flowers. The most admired species is the *Camellia Japonica,* a shrub which has ovate-elliptical, serrate, and shining leaves, and large, polypetalous flowers, which resemble a rose. Many others belong to *Camellia reticulata* and to hybrid varieties. In the wild state it bears red and single flowers, but the flowers of the cultivated varieties are generally double. Among their various colors are red, white, and yellow. Many of the varieties originated in China or Japan, and others have been raised by European and American florists. New varieties of them are annually produced. The value of the camellia is increased by the fact that it flowers in autumn and winter. The single camellia is propagated by seed, and the cultivated or double varieties by grafting, cuttings, or layers. The proper soil for these is a loose, black mould. They should be protected from frost, and liberally supplied with water, but are liable to be injured with an excess of moisture. It is important that they should receive a free access of fresh air and light. The *Camellia oleifera* and *Camellia Sasanqua* are cultivated in China for their seeds, which yield an oil similar to olive oil. Some writers refer the tea-plant to this genus, to which it is very nearly allied.

Camellia'ceæ, a natural order of exogenous trees and shrubs, mostly natives of Southern and Eastern Asia and South America. North America has four species (loblolly bays and Stuartias), while Africa has also a few. They generally have beautiful flowers. The *Camellia* and the tea-plant are the most important.

Camelopard. See Giraffe.

Cameloparda'lis, a constellation of the northern hemisphere of the celestial globe called the Giraffe. It contains only sparsely scattered stars. It is situated between Cassiopeia, Perseus, Ursa Major, etc. It was added by Hevelius to the list of constellations.

Camel's Hair is used by the Arabs and Persians, who weave it into stuff for tents and clothing. A fine quality of camel's hair is imported from Persia, and is used to make pencils for artists. Camel's hair was extensively worn by monastics in the Middle Ages for the mortification of the body. It was harsh and rough. Camel's hair is woven to some extent in Europe, but most of the goods now so called are of wool.

Camel's Rump, or **Camel's Back Mountain,** in Vermont, is one of the highest peaks of the Green Mountains, and is 17 miles W. of Montpelier. Its height is 4188 feet.

Camel's Thorn [Dutch, *kameel-doorn*], (*Alhagi*), a genus of plants of the order Leguminosæ, comprises nu-

merous herbaceous and shrubby species, mostly natives of the deserts of Asia and Africa. They have simple leaves and jointed pods, with one seed in each joint. These plants grow where other vegetation is scarce, and afford valuable food for camels, which are fond of them. The *Alhagi camelorum* yields a kind of manna, which appears in the form of drops on the leaves. In South Africa fences of the camel's thorn are used to protect camps by night from wild beasts.

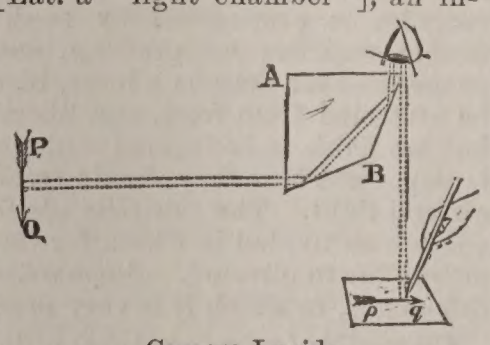
Came'næ, the general name of four prophetic nymphs of Roman mythology—viz. Antevorta, Postvorta, Carmenta, and Egeria. The Nine Muses were also called Camenæ by the Latin poets.

Ca'menz, or **Kamenz,** a town of the kingdom of Saxony, on the Black Elster, 20 miles N. E. of Dresden. It has manufactures of earthenware, tobacco, starch, etc. Lessing was born here in 1729. Pop. in 1871, 6406.

Cam'eo [Fr. *camaïeu*], a term applied to gems of various colors carved in relief, especially to diminutive pieces of sculpture, which are formed of precious stones having two strata or layers of different colors, the uppermost of which is partly removed so as to expose the lower stratum, which forms the background of the figure. The art of cutting cameos is of great antiquity, having been practised by the ancient Egyptians and Babylonians. It was brought to great perfection by the Greeks, and practised with success in ancient Rome. The cameos of the ancients were formed mostly of the onyx, agate, and sard, and were sometimes executed on a factitious stone called *vitrum obsidianum*. The famous Barberini or Portland Vase is a beautiful specimen of cameo in glass. The ancients used cameos as personal ornaments, and as cups, vases, and other articles. Many of the antique cameos now extant are marvellously beautiful in design and perfect in execution. Among the finest antique specimens are the Gonzaga cameo, which represents the head of a king and his queen, and is now at St. Petersburg; "The Judgment of Paris," in the cabinet of Prince Piombino at Rome; and the onyx called the "Apotheosis of Augustus," which is now in Paris. The last is twelve inches high and ten inches wide. The art revived in Italy in the fifteenth century, and was patronized by the Medici. Some specimens of this period are perhaps as perfect as the antique. The fabrication of cameos, both in *pietra dura* and in shell, has become in Italy an important branch of art.

Shell Cameos are made from such shells as have layers of differently-colored material, such as the conch-shells of the Bahamas. The art—a modern one—of cutting these shells has been carried to a high degree of perfection. These cameos began to be cut at Rome about 1805, and the best work is done there now; but many shells are cut at Paris, especially for exportation to England and America.

Cam'era Lu'cida [Lat. a "light chamber"], an instrument invented by Wollaston, and intended to facilitate the delineation of objects, consists of a quadrilateral prism of glass (A B) in a frame attached to an upright rod, having at its lower end a clamp to fix it to the edge of a table. The prism has its upper face horizontal, and two of its faces are at a right angle at A. Rays from an object (P Q) falling nearly perpendicularly on the first surface enter the prism and undergo reflection at the contiguous surface; they then fall at the same angle on the next surface, and are reflected again; finally they emerge nearly perpendicularly to the remaining surface. The eye receives the emergent light in such a way that an image of the object is seen projected upon a sheet of paper upon the table. The pencil and image being seen together upon the paper, a sketch of the latter can be taken. But the image and the pencil are at different distances from the eye, and cannot be seen together distinctly at the same time. To obviate this, a plate of metal with a small eyehole is placed under the eye, so that the rays through the prism and those from the drawing-pencil, which both pass through the eyehole, form only very small beams of light. By this the difficulty is diminished. It is, however, difficult to use the instrument satisfactorily, though many acquire readiness in its use. Besides this form of the camera lucida, which is the most common, there are others. Its simplest form is a piece of smooth glass fixed at an angle of 45° to the horizon. An image from a horizontal object falling on this glass will be perfectly reflected, so that the eye looking vertically down will see the image, and the artist will be able to trace it upon paper. The name has been applied to other optical instruments.



Camera Lucida.

Cam'era Obscu'ra [Lat. a "dark chamber"], an instrument whose invention is ascribed to Baptista Porta in the sixteenth century, but Roger Bacon described it 300 years before. It is known in a simple form as a box furnished at one end with a lens whose focal length is equal to the length and depth of the box, at the opposite end of which a plane reflector is placed at an angle of 45°, which throws the image of any objects to which the lens may be directed upon an opaque surface which is viewed through a slit in the box.

The camera obscura, being indispensable in photography, has received improvements which make it rank as a scientific instrument. The principle involved in all forms may be made intelligible by the following experiment: Let a hole be bored in a window-shutter and the room darkened. If the light entering the room by this hole be intercepted by a sheet of white paper at a small distance from the hole, an inverted image of objects without will be seen upon the paper. By placing a convex lens in the hole this image is rendered much more distinct. At a certain distance from the hole the image attains a maximum degree of sharpness, and if the paper be removed to a position either nearer to the hole or farther from it, the image becomes indistinct.

Camera'rius (Joachim), an eminent German scholar, born at Bamberg April 12, 1500. His proper name was Liebhard. His ancestors were chamberlains to the bishops of Bamberg; hence he took the Latin name Camerarius, which signifies a "chamberlain." He was a friend of Melanchthon, and became president or principal of the University of Tübingen in 1535. He was rector of the University of Leipsic for many years after 1541. Among his works are numerous translations of Greek authors, a "Life of Melanchthon" (1566), "Elements of Rhetoric," and Latin "Commentaries on the Greek and Latin Languages" (1551). Died April 17, 1574.

Cam'eron, a new parish in the S. W. part of Louisiana, made from parts of Calcasieu and Vermilion parishes. Cotton, corn, and stock are raised. Capital, Grand Chenière. Pop. 1591.

Cameron, a county in N. W. Central Pennsylvania. Area, 400 square miles. It is drained by Sinnemahoning Creek. The surface is hilly, and mostly covered by forests. Grain, timber, potatoes, and butter are the chief products. Coal, iron, and salt are found. It is intersected by the Philadelphia and Erie R. R. Capital, Emporium. Pop. 4273.

Cameron, a county which forms the S. extremity of Texas, bordering on Mexico. Area, 3000 square miles. It is bounded on the E. by the Gulf of Mexico, and on the S. by the Rio Grande. The surface is nearly level; the soil is partly productive. Cattle, corn, and wool are raised. Several saline lakes occur in this county. Capital, Brownsville. Pop. 10,999.

Cameron, a post-village of Clinton co., Mo., on the Hannibal and St. Joseph R. R., where it is crossed by the Chicago and South-western R. R., 35 miles E. of St. Joseph. It has a weekly paper. Pop. 1428.

Cameron, a post-village and township of Steuben co., N. Y., on the Erie R. R., 22 miles N. W. by W. of Corning. Pop. 161; of township, 1334.

Cameron, a thriving post-village of Lumber township, Cameron co., Pa., on the Philadelphia and Erie R. R., 6 miles S. E. by S. of Emporium. Here are valuable mines of gas-coal and beds of iron ore. Lumber is manufactured here.

Cameron, a township of Northumberland co., Pa. Pop. 603.

Cameron, a post-village, capital of Milam co., Tex., on Leon River, 63 miles N. E. of Austin, has a weekly paper.

Cameron, a post-township of Marshall co., West Va. Pop. 1627.

Cameron (Donald) **of Lochiel,** a Highland Scottish chief who fought for the Pretender in 1745. He was wounded at the battle of Culloden, and escaped to France in 1746. Died in 1748. He was the subject of Campbell's poem entitled "Lochiel's Warning."

Cameron (James), brother of Simon Cameron, born at Maytown, Pa., Mar. 1, 1801, learned the trade of a printer, subsequently became an editor, and studied law. He entered the army at the beginning of the civil war as colonel of the Seventy-ninth New York Highlanders. In the battle of Bull Run, July, 1861, he was killed while gallantly leading his men in a charge.

G. C. Simmons, *Clerk Board of Engineers.*

Cameron (Richard), a Scottish minister, born at Falkland, was the founder of the sect of Cameronians or "Cov-

enanters." He strenuously opposed the measures by which the government endeavored to establish the Episcopal Church in Scotland. He persisted in preaching in fields, which was prohibited by law. In June, 1680, he, with about twenty armed adherents, entered the town of Sanquhar and formally renounced their allegiance to Charles II. He was killed in a fight with the royal troops July 20, 1680. (See CAMERONIANS.)

Cameron (SIMON), an American Senator, born in Lancaster co., Pa., in 1799. He was elected Senator of the U. S. by the Democrats in 1845, and having joined the Republican party, he was re-elected a Senator in 1856. He was secretary of war from Mar., 1861, to Jan., 1862, and was then sent as minister to Russia, from which he returned in 1863. In 1866 he was again elected to the Senate of the U. S. He was elected to the national Senate for another term (1873–79).

Camero'nians, the followers of Richard Cameron, who in 1680 made a public declaration that Charles II., by his suppression of civil and religious liberty, had forfeited all right to the crown. They were also called Covenanters, from their having demanded the strict observance of the Solemn League and Covenant received by the Parliament in 1643. The Cameronians still exist as a sect, both in Great Britain and America, under the name of REFORMED PRESBYTERIANS (which see).

Cam'eronites were the adherents of John Cameron, a native of Scotland, who went to France in 1600, and became professor of theology at Saumur. "He devised a method," says Mosheim, "of uniting the doctrines of the Genevans, as expounded at Dort, with the views of those who hold that the love of God embraces the whole human race." They have sometimes been called Hypothetical Universalists.

Cameroons', or **Camerones,** a river of Africa, in Upper Guinea, enters the Bight of Biafra about lat. 4° N. and lon. 9° 40′ E. by an estuary 20 miles wide. Its length is not known. It has a cataract 90 miles from its mouth.

Cameroons Mountains, of Western Africa, culminate in a peak which is near 13,000 feet high, and about lat. 4° 13′ N. and lon. 9° 10′ E.

Camil'la, a fabulous Italian virgin, celebrated for swiftness of foot, was said to be a daughter of the Volscian king Metabus, and aided Turnus against Æneas.

Camilla, the capital of Mitchel co., Ga., is on the Atlantic and Gulf R. R., 28 miles S. of Albany. It has two churches, an academy, and a newspaper. From 6000 to 8000 bales of cotton are shipped from here annually. Pop. 289. T. M. MASON, ED. CAMILLA "ENTERPRISE."

Camil'lus, a post-village of Onondaga co., N. Y., on the New York Central R. R., 8 miles W. of Syracuse, has three churches. Camillus township contains valuable limestone and gypsum, and several sulphur springs. Pop. of village, 598; of township, 2423.

Camillus (MARCUS FURIUS), a celebrated Roman dictator and patrician, who became a tribune in 403 B. C. He was chosen dictator in 396, and soon captured Veii. About 390 he was exiled, and retired to Ardea. After Brennus and the Gauls had captured Rome in 390 B. C., Camillus was recalled and appointed dictator. According to the popular tradition, which is perhaps mixed with fable, he defeated the Gauls, and afterwards gained victories over the Volsci and other enemies. In 367 he was chosen dictator for the fifth time. Died in 364 B. C. (See PLUTARCH'S "Life of Camillus;" ARNOLD'S "History of Rome.")

Camisards, French Protestants who lived in the Cevennes early in the eighteenth century, so named from the *camise* or loose outer garment which they wore. They strove to obtain the religious liberty which had been sacrificed by the Revocation of the Edict of Nantes, but although they gained several victories over the royal troops, they were subdued by the duke of Berwick in 1705. (See SCHULTZ, "Geschichte der Camisarden," Weimar, 1790.)

Cam'let, a fabric originally made of camel's hair, but in more recent times of the hair of the Angora goat. It is also made of wool, or a mixture of wool with other materials. Camlets are mentioned in Marco Polo's narrative as among the articles manufactured in Thibet.

Camo'ëns (LUIS or LUIZ), a celebrated Portuguese epic poet, was born of a noble family, probably at Lisbon, in 1524. He was educated at Coimbra, and soon after he left college fell in love with a lady of honor at court. He was consequently banished to Santarem. Having joined the army, he served with valor in several battles against the Moors. Before this time he had written some verses, which, like his military services, had been treated with neglect. He therefore resolved to emigrate, and embarked for India in 1553, exclaiming with Scipio, "Ingrata patria, non possidebis ossa mea." He wrote a political satire called "Follies in India," for which he was banished in 1556 from Goa to Macao, where he composed his great epic poem "The Lusiad" ("Os Lusiadas"), which celebrates the martial exploits of the Portuguese warriors and heroes, and is pervaded by patriotic sentiments. It was first printed in 1572. He was recalled from exile in 1561, and returned in 1569 to Lisbon, where he passed his later years in great poverty, and died June 10, 1580. Among his works are elegies, sonnets, odes, satires, and epigrams. The versification of "The Lusiad" is remarkably stately. (See JOHN ADAMSON, "Memoirs of the Life and Writings of Luis de Camoens," 1820; SOUZA BOTELHO, "Vida de L. Camoens," 1817.)

Camor'ra, the name of a secret society of outlaws and robbers called *Camorristi* who infested the former kingdom of Naples. This society had a rendezvous in every large town. Under the Bourbon dynasty its members openly presented themselves at markets and public spectacles, where they extorted a portion of the money that passed from hand to hand. They were also addicted to violent crimes, and could be hired to commit murder. The society was thoroughly organized and subject to a strict discipline. Candidates for membership were not admitted until they had passed through a probation for a year, and given proofs of courage and obedience. They are said to have been tolerated by King Ferdinand II.

Camp [from the Latin *campus*, a "plain;" Fr. *camp;* Ger. *Lager*], in a general sense the ground (constructions included) upon which tents, huts, etc. are erected for the shelter of any collection of human beings; in a military sense, that occupied by an army under tents or temporary shelter in the field. It is usually distinguished from *bivouac* by the use of shelter (such as tents), as distinguished from passing the night in the open air (*à la belle étoile*). More exclusively yet, the ground and shelter of an army in *tents;* but in our "Army Regulations" a camp is the place where troops are established in tents, in huts, or in bivouac. The Roman camp (Lat. *castra*, a word which in the form of the termination *cester* or *chester* indicates the origin of numerous English towns, as arising from a Roman camp, and to which also are due the words *château* and *castle*), described with great detail in most cyclopædias, was in reality an *intrenched camp* (see BARDIN, "Dictionnaire de l'Armée de Terre"). Such were constructed in the heart of invaded countries to secure for the troops a place of retreat, to control the district, to provide secure dépôts for provisions of all kinds, and to protect the communications with the frontier. A Roman army might occupy its camp several winters. In the mean time it sallied forth to resume its operations. Most commonly, when the legions had thus vacated them to undertake long marches, *veterans* remained behind to guard the ramparts, and thus became a kind of permanent garrison, which, by intermarriage, became the origin of a town or colony; *e. g.* the English "Chesters" and the German Cologne or Köln (*Colonia*).

The Romans necessarily had, besides these, temporary camps, sometimes of huts, but more generally tents of skins of animals. The details of these Roman camps are of little interest (unless to antiquarians); neither indeed, except to soldiers, those of the modern military camp. Its arrangements (as practised with us) are set forth in our "Army Regulations." Strictly speaking, the arrangements of a camp for a regiment of infantry or cavalry are governed purely by considerations of discipline and administration. The encampment of an army must indeed be sedulously governed by tactical considerations, such as the defence of the position and the formation of line of battle, the character of the issues, the approaches, etc. But these arrangements belong to "Tactics." An INTRENCHED CAMP is a fortified position of greater or less extent, usually of field-works to be occupied during a campaign or the duration of a war. In this sense the subject belongs to FIELD FORTIFICATION (which see). J. G. BARNARD, U. S. A.

Camp, a township of Polk co., Ia. Pop. 1558.

Camp, a township of Renville co., Minn. Pop. 418.

Camp-and-Garrison Equipage is a general name for the tents, furniture, utensils, etc. used in an army which serve to supply the wants of the soldiers, rather than to aid their military operations.

Camp-Followers, the sutlers and dealers who follow an army, and carry a variety of articles which they sell to the soldiers. In India the camp-followers of British armies are very numerous, comprising sutlers, servants, hostlers, water-carriers, snake-charmers, conjurers, and women. An army of 15,000 men which invaded Afghanistan in 1839 is said to have been accompanied with 85,000 camp-followers.

Campa'gna, a town of Italy, in Principato Citra, is

situated amidst high mountains, 18 miles E. of Salerno. It is a bishop's see, has a fine cathedral, a college, and several convents. Pop. 8776.

Campa'gna di Ro'ma, an extensive undulating, desolate plain of Central Italy, nearly coinciding in limits with the ancient *Latium*, was formerly a province of the Pontifical States. It is bounded on the S. W. by the Mediterranean, extends along the coast from Cività Vecchia to Astura and the Pontine Marshes, and surrounds the city of Rome, which is near its centre. Its length is estimated at 75 miles, and its width varies from 27 to 40 miles. The highest parts of it rise about 200 feet above the level of the sea. The soil is of volcanic formation, and the climate is rendered unhealthy by pestilential malaria or miasmatic effluvia. This region, once rich and populous, is now almost deserted and uncultivated. In autumn the inhabitants of the Apennines descend into the Campagna with their flocks and herds, for which some parts of it afford good pasture. Numerous ancient monuments, aqueducts, and other ruins are scattered over this plain. It contains several lakes, which occupy craters of extinct volcanoes.

Campaign' [Fr. *campagne*], a connected series of military operations forming a distinct stage in a war; the time that an army keeps the field, either in fighting or marching, without entering into winter quarters. The term had a more definite meaning formerly, when armies kept the field only in the summer and autumn, than it has now, when the operations of armies are not interrupted by winter or any ordinary degree of cold.

Campan (Jeanne Louis Genest), born Oct. 6, 1752, was reader to the daughters of Louis XV. and a companion and friend of Marie Antoinette. After the Revolution she was an instructress of high reputation. Died May 16, 1822. She wrote, among other works, "Memoirs of the Private Life of Marie Antoinette."

Campa'na, La, a town of Spain, in the province of Sevilla, on the river Madre Viega, 30 miles E. N. E. of Seville. It has a trade in grain, wine, and fruit. Pop. about 5500.

Campana'rio, a town of Spain, in Estremadura, 72 miles E. of Badajos. It has manufactures of linen fabrics, wine, oil, and ropes. Pop. 6145.

Campanel'la (Tommaso), an eminent Italian philosopher and Dominican monk, born in Calabria Sept. 5, 1568. He published in 1591 "Philosophy Demonstrated by the Senses," which opposed the scholastic philosophy and gave offence to the partisans of Aristotle. On a charge of heresy and conspiracy against the Spanish government, he was in 1599 committed to prison in Naples, where he was confined about twenty-seven years, during which he wrote several works. Pope Urban VIII. procured his release in 1626. Campanella, after passing several years in Rome, retired to France in 1634, in order to avoid the renewed persecution of the Spaniards. He was kindly treated by Cardinal Richelieu. Among his important works are "Civitas Solis," etc. ("The City of the Sun, or the Idea of a Philosophic Republic," 1623), "The Five Parts of Rational Philosophy" (1638), and a "Discourse on the Spanish Monarchy" (in Latin, 1640). Died in Paris Mar. 21, 1639. (See Baldacchini, "Vita e Filosofia di T. Campanella," 1840; Dareste, "Thomas Morus et Campanella," 1843.)

Campa'nha, a town of Brazil, in the province of Minas Geraes, about 156 miles N. W. of Rio de Janeiro. It has several churches, a hospital, and a theatre. Gold is found in the vicinity. Pop. about 6000.

Campa'nia, a province of ancient Italy, was bounded on the N. E. by Samnium, on the E. and S. by Lucania, on the S. W. by the Mediterranean, and on the N. W. by Latium. The Apennines extended along the N. E. border. Between these mountains and the sea was an extensive and very fertile plain, which produced abundance of corn, wine, and oil. Ancient writers concur in extolling the fertile soil, the genial climate, and the beautiful landscapes of Campania, which was the *Regio felix* of the Romans. It was traversed by the Appian Way (*Via Appia*), the greatest thoroughfare of ancient Italy. Its principal cities were Capua, Pompeii, Neapolis (Naples), Cumæ, Salernum, and Herculaneum. Among its physical features was Mount Vesuvius. During the Roman empire, Campania was the favorite resort of wealthy Romans, who adorned its shores with villas and palaces. It is supposed that the original population of this region was an Oscan or Ausonian race. The earliest fact which can be affirmed as historical in relation to Campania is the foundation of the Greek colony of Cumæ, which is said to have been the most ancient of the Greek colonies in Italy. The Campanians were conquered by the Samnites about 430 B. C., but they continued to speak the Oscan language after that event. The Romans gained a decisive victory over the allied Latins and Campanians in 340 B. C., when Campania became subject to Rome. It embraces the modern provinces of Benevento, Naples, Principato Citeriore, Principato Ulteriore, and Terra di Lavoro, with an area of 6937 square miles and 2,625,830 inhabitants.

Campani'le, a structure standing by the side of the main church in many Italian cities, is a lofty belfry tower, often of elaborate, but of a lighter, profaner architecture than the sacred edifice. The finest of the campaniles are—that at Florence, designed by Giotto, the Leaning Tower of Pisa, and in Spain the beautiful Giralda of Seville, built by Guever the Moor.

Campan'ula, a Latin word signifying a "little bell," from *campana*, a "bell," is the name of a genus of hardy herbaceous plants, the type of the natural order Campanulaceæ (which see). The genus is characterized by a bell-shaped, 5-lobed corolla, five stamens, the filaments of which are dilated at the base, and a top-shaped capsule, with two to five cells opening by lateral clefts. It comprises numerous species, with beautiful blue or white flowers, to many of which the common name of bell-flower is given. Among the remarkable species are the *Campanula medium* or Canterbury bell, a native of Europe, and the *Campanula rotundifolia*, or harebell, which is indigenous both in England and the U. S.

Campanula'ceæ [from *Campanula*, one of the genera], a natural order of exogenous plants, herbaceous or suffruticose, with a milky juice, alternate leaves, and a calyx adherent to the ovary. The corolla is regular, monopetalous, bell-shaped, and valvate in the bud. The stamens, five in number, are free from the corolla, which is generally blue and showy. This order comprises nearly 500 known species, mostly natives of the temperate and cool climates of the northern hemisphere. Two genera are indigenous in the U. S.—viz. *Campanula* and *Specularia*.

Campbell, kam'el, a county in N. W. Central Georgia. Area, 360 square miles. It is intersected by the Chattahoochee River. The surface is hilly or undulating; the soil is fertile. Corn, cotton, and wool are staple products. Gold has been found in the county. Capital, Campbellton. Pop. 9176.

Campbell, a county in Northern Kentucky, borders on the Ohio, and is bounded on the W. by the Licking River. Area, 120 square miles. Grain, wool, and tobacco are the chief products. The soil is based on Trenton limestone, and is fertile. Capital, Newport. Pop. 27,406.

Campbell, a county in N. N. E. Tennessee, bordering on Kentucky. Area, 450 square miles. It is drained by New River and other streams. Coal is found. Wool, grain, and tobacco are the chief products. The surface is hilly or mountainous. Capital, Jacksboro'. Pop. 7445.

Campbell, a county in the S. of Virginia. Area, 576 square miles. It is bounded on the N. by James River, and on the S. by Staunton River. The surface is hilly; the soil is mostly productive. Grain, wool, and tobacco are the chief products. Granite is found here. The Atlantic Mississippi and Ohio R. R. passes through the N. part of the county. Capital, Campbell Court-house. Pop. 28,384.

Campbell, a township of Lawrence co., Ark. P. 576.

Campbell, a post-township of Pulaski co., Ark. Pop. 1304.

Campbell, a township of Searcy co., Ark. Pop. 359.

Campbell, a township of Jennings co., Ind. P. 1563.

Campbell, a township of Warrick co., Ind. P. 1437.

Campbell, a post-township of Ionia co., Mich. P. 1120.

Campbell, a township of Douglas co., Mo. Pop. 413.

Campbell, a township of Greene co., Mo., contains the town of Springfield. Pop. 8694.

Campbell, a post-village and township of Steuben co., N. Y., on the Rochester division of the Erie R. R., 9 miles N. W. of Corning. Pop. of the township, 1989.

Campbell, a township of La Crosse co., Wis., 5 miles N. of La Crosse. Pop. 2084.

Campbell (Alexander), D. D., a theologian, born in the county of Antrim, Ireland, in June, 1788, emigrated to the U. S. in 1809, after studying at the University of Glasgow. He founded a sect called Disciples of Christ, who accept the Bible as their only creed. In 1841 he founded Bethany College, West Va., of which he was long president. Died Mar. 4, 1866. (See Disciples of Christ.)

Campbell (Archibald), an American officer and engineer, born 1813 in New York, graduated at West Point 1835, serving while in infantry at frontier posts till he resigned, Sept. 30, 1836. Civil engineer 1837–44, chief clerk U. S. war department 1846–49 and 1853–57, and commissioner to establish the North-western boundary of the U. S. between Washington Territory and British America 1857–

69, and to run the 49th parallel from the Lake of the Woods to the Rocky Mountains, since 1872.

GEORGE W. CULLUM, U. S. A.

Campbell (Sir COLIN), LORD CLYDE, a British general, born in Glasgow Oct. 20, 1792. He entered the army in 1808, and served in the Peninsular war (1809–14). In 1842 he obtained the rank of colonel. Having served with distinction in India, he was appointed in 1854 to the command of the Highland brigade, which he led at the battles of Alma and Balaklava in the Crimea. In 1855 he was raised to the rank of major-general, and created a knight grand cross of the Bath. He was appointed in July, 1857, commander of the army in India, then fighting against the mutinous Sepoys. He relieved Lucknow in Nov., 1857, defeated the Sepoys at Cawnpore, and quelled the mutiny in 1858. He was raised to the peerage as Baron Clyde in the same year. Died Aug. 14, 1863.

Campbell (DUNCAN R.), D. D., born in Scotland about 1797, received a university education, came while young to the U. S., was ordained to the Baptist ministry, and was president of Georgetown College, Ky. (1849–65). Died Aug. 11, 1865.

Campbell (GEORGE WASHINGTON), born in Tennessee in 1768, graduated at Princeton in 1794, was a member of Congress 1803–09, U. S. Senator (1811–14 and 1815–18), became secretary of the treasury in 1815, and minister to Russia in 1818. Died Feb. 17, 1848.

Campbell (JAMES), an American jurist and statesman, born in Philadelphia in 1813, was a judge of the court of common pleas (1841–50), and became attorney-general of the State in 1852, and postmaster-general under President Pierce in 1853.

Campbell (JOHN), LORD, an eminent British lawyer, was born in Fifeshire, Scotland, Sept. 15, 1779. He was called to the English bar in 1806, and soon obtained an extensive practice. In 1830 he became a Whig member of Parliament, and in 1834 attorney-general. He was made chancellor of Ireland and a peer of the United Kingdom in 1841. He was appointed chief-justice of the court of queen's bench in 1850, and lord chancellor of England in 1859. He published "Lives of the Lord Chancellors and Keepers of the Great Seal of England" (7 vols., 1846), which obtained much popularity, and "Lives of the Chief-Justices of England" (3 vols., 1849–57). Died June 23, 1861.

Campbell (JOHN A.), an eminent jurist, born in Washington, Ga., June 24, 1811, was the son of Duncan G. Campbell, a distinguished lawyer of that State. He was educated in the Georgia University, where he graduated with distinction in 1826, and was admitted to the bar by special act of the legislature in 1829, some time before his majority. He moved to Alabama, where he soon took high rank in his profession, and was appointed associate justice of the U. S. Supreme Court by President Pierce in 1853. This position he resigned in 1861, after the outbreak of the conflict between the two sections. While he had opposed the policy of secession, he yet believed in its rightfulness. He was afterwards appointed assistant secretary of war of the Confederate States. He was one of the commissioners appointed by Mr. Davis to meet Mr. Lincoln and Mr. Seward at the Fortress Monroe conference in Feb., 1865. After the fall of Richmond and the surrender of the Southern arms, he was arrested and imprisoned for some time at Fort Pulaski, but was finally discharged on parol. Since then he has been engaged in the practice of the law in New Orleans.

Campbell (THOMAS), a popular British poet, born in Glasgow July 27, 1777. He was educated at the university of his native city, and became a good classical scholar. He produced in 1799 his admirable poem, "The Pleasures of Hope," which was considered by Lord Bryon as "one of the most beautiful didactic poems in the English language." During a visit to the Continent he witnessed the battle of Hohenlinden, Dec., 1800, on which he composed a lyrical poem of great beauty and celebrity. He soon afterwards published short poems entitled "The Exile of Erin" and "Ye Mariners of England." Having married his cousin, Miss Sinclair, he removed to London in 1803, and adopted literature as a profession. In 1809 he produced "Gertrude of Wyoming," which is generally and greatly admired. He became editor of the "New Monthly Magazine" in 1820, and was elected lord rector of the University of Glasgow in 1827. He published, besides other works in prose, "The Life and Times of Petrarch" and a "Life of Frederick the Great." Among his finest poems is a spirited ode called "The Battle of the Baltic." He died June 15, 1844, and was buried in Westminster Abbey. "No poet at such an age," says Moir, referring to the "Pleasures of Hope," "ever produced such an exquisite specimen of poetic mastery—that is, of fine conception and high art combined." (See "The Life and Letters of Thomas Campbell," by WILLIAM BEATTIE, 3 vols., 1850.)

Campbell Court-house, a post-village, capital of Campbell co., Va.

Camp'bellford, a post-village of Seymour township, Northumberland co., Ontario (Canada), on the river Trent, has great water-power and considerable manufactures. Pop. about 1000.

Campbellites. See DISCIPLES OF CHRIST.

Camp'bell's, a township of Clarke co., Ala. Pop. 401.

Campbell's Station, a post-village of Knox co., Tenn. Here Gen. Burnside's army was attacked Nov. 16, 1863, by the Confederates under command of Gen. Longstreet. The engagement lasted from noon till dark, the Confederates being repulsed. Pop. in 1870, 1807.

Camp'bellsville, a post-village, capital of Taylor co., Ky., 75 miles S. S. W. of Frankfort. Pop. 512.

Camp'bellton, a post-village, capital of Campbell co., Ga., on the Chattahoochee River, about 20 miles S. W. of Atlanta. Pop. 119.

Campbelton, a royal borough and seaport of Scotland, in the county of Argyle, and near the S. end of the peninsula of Cantire, 65 miles W. S. W. of Glasgow. It has a good harbor on the E. coast of Cantire, is the chief town in Argyleshire, and is a favorite resort in summer. Here are more than twenty distilleries of whisky. Pop. in 1871, 6628.

Camp Branch, a township of Shelby co., Ala. P. 637.

Camp Branch, a township of Cass co., Mo. P. 1258.

Camp Branch, a township of Warren co., Mo. P. 901.

Camp Colora'do, a post-village, capital of Coleman co., Tex.

Camp Creek, a township of Rutherford co., N. C. Pop. 1007.

Camp Creek, a township of Pike co., O. Pop. 743.

Cam'pe (JOACHIM HEINRICH), a German philanthropist and writer on education, was born in Brunswick in 1746. He was appointed superintendent of schools in the duchy of Brunswick in 1787, after which he was the proprietor of a publishing-house. He wrote several popular books for the instruction of youth, among which is "Robinson the Younger." Died Oct. 22, 1818.

Campeach'y, a state of Mexico, is bounded on the N. by Yucatan, on the E. by the Caribbean Sea, on the S. by Belize and Guatemala, and on the W. by the Gulf of Campeachy. Area, 23,958 square miles. Many ruins of ancient cities have been found in this province, the most extensive of which are the ruins of Tekel. Chief town, Campeachy. Pop. in 1868, 80,366.

Campeachy, a city of Central America and the principal seaport of Yucatan, is situated on the Gulf of Mexico and the W. coast of that peninsula, 90 miles S. S. W. of Mérida; lat. 19° 50′ N., lon. 90° 33′ W. It contains many good stone houses, a college, about six churches, several convents, and a theatre. The harbor is capacious, but shallow. Logwood, wax, and cotton are exported from this port. Pop. about 18,000.

Campeachy Wood, a name of LOGWOOD (which see).

Cam'per (PIETER), M. D., PH. D., born at Leyden May 11, 1722. He became professor of medicine at Amsterdam in 1755, and at Groningen in 1765. He wrote a number of works on anatomy and physiology, and gained distinction as a lecturer as well as a writer. Among his works is "Anatomico-Pathological Demonstrations" (1760–61). He discovered the presence of air in the bones of birds. In 1785 he was chosen a foreign associate of the Academy of Sciences in Paris. Died April 7, 1789.

Cam'perdown, a village of Holland, 27 miles N. W. of Amsterdam, famous for the victory gained off its coast by the English, under Admiral Duncan, over the Dutch, commanded by Admiral de Winter, Oct. 11, 1797.

Camp Halleck, a post-township of Elko co., Nev. Pop. 160.

Camp'hausen (LUDOLF), a Prussian statesman, born at Hünshoven in 1803. He became president of the council of ministers in Berlin in Mar., 1848, resigned in June of that year, and was soon appointed ambassador to the Diet at Frankfort. In 1851 he retired from political life.

Camphausen (OTTO), a Prussian statesman, born Oct. 12, 1812, was appointed minister of finance in 1869. Through him the corn-tax and other burdensome taxes have been removed and replaced.

Camphene, or **Camphine,** a term applied to purified oil of turpentine, obtained by rectifying it over dry

chloride of lime. It consists of 10 atoms of carbon combined with 8 of hydrogen, and is represented by the equivalent number 68. Camphene has been burned in lamps for the purpose of illumination, but many fatal accidents having resulted from its use, it has been superseded by coal oil or rectified petroleum. Ordinary camphor is a protoxide of camphene, which is sometimes called camphogen. Borneo camphor is by some chemists considered to be a binoxide of camphene.

Cam′philene, or **Artificial Camphor,** is obtained from the oil of turpentine, by acting on it with dry vapor of hydrochloric acid, and keeping the whole at a low temperature by immersing the vessel in a freezing mixture. A solid substance is produced in the form of white crystals, with the taste and aromatic smell of natural camphor. It is regarded as a hydrochlorate of camphene.

Camp Hill, a post-township of Tallapoosa co., Ala. Pop. 373.

Camphine. See CAMPHENE.

Cam′phogen [from *camphor*, and the Gr. γεννάω, to "produce," because from it is obtained artificial camphor], a synonym of CAMPHENE (which see).

Cam′phor [Lat. *camphora*; Sp. *alcanfor* or *canfor*; Arabic *al kâfoor*, not improbably derived from the Sanscrit *khapur*, a name applied to several fragrant plants] is a concrete substance found in many plants, particularly those of the order Lauraceæ. The greater part of the camphor of commerce is the produce of the camphor laurel or camphor tree (*Camphora officinarum*, formerly known as *Laurus camphora*), a native of China, Japan, Formosa, and Cochin-China, and which has been introduced into Java and the West Indies. The camphor laurel is a tree of considerable height, with evergreen leaves and yellowish-white flowers in panicles. The fruit is not unlike a black currant. Every part of the tree smells strongly of camphor. The wood is much valued for carpenter's work. In the extraction of camphor the wood is chopped up and then steeped and boiled in water, when the steam carries off the camphor in vapor. The camphor is deposited around the straw (with which the head of the still is filled) in minute grains. The crude camphor is heated in a vessel, from which the steam is allowed to escape at a small aperture. The camphor sublimes as a semi-transparent cake. Camphor was unknown to the Greeks and Romans, and was first brought to Europe by the Arabs. It is a white, tough solid, slightly lighter than water. It is sparingly soluble in water, but freely soluble in alcohol, ether, acetic acid and the essential oils. It fuses at 347°, and boils at 399°, is very inflammable, and burns with a white smoky flame. When set fire to upon water it floats with a curious rotary motion. It has a peculiar aromatic taste and a characteristic odor.

Camphor is used in medicine, internally and externally, as a stimulant. In small doses it is an anodyne and antispasmodic; in very large doses a narcotic poison. Its alcoholic solution (spirits of camphor) and liniments in which it is an ingredient are much used in sprains and bruises, chilblains, and chronic rheumatism. Paregoric is a camphorated tincture of opium. The effluvium of camphor is very noxious to insects, and it is therefore much used for preserving specimens in natural history, as well as clothing.

The Borneo camphor, sometimes called hard camphor, is the produce of *Dryobalanops aromatica*, a large tree of the order Dipteraceæ. The camphor is obtained by cutting down the tree and splitting it into small pieces, being found in crystalline masses in natural cavities of the wood. To this substance the Chinese ascribe extraordinary medicinal virtues, so that it is taken in exchange by them for more than fifty times its weight of common camphor. It is seldom brought to Europe as an article of commerce. The tree yields also a pale-yellowish limpid fluid, which gushes out when deep incisions are made in the tree with an axe, and which is called liquid camphor, camphor oil, or borneole. When this oil is distilled it yields a light fragrant liquid called borneene, which is used in perfumery. It is sometimes imported into Europe. It has a smell somewhat resembling that of camphor, but more like oil of cajuput. It is supposed that from this fluid the hard camphor is deposited.

REVISED BY C. W. GREENE.

Campido′glio, Pala′zzo del, the name of a palace or pile of buildings erected by Michael Angelo on the Capitoline Hill in Rome, on the site of the ancient Capitol. Campidoglio appears to be a corruption of *Capitolium*.

Campi′nas, or **São Carlos,** a city of Brazil, about 65 miles N. of São Paulo. Much sugar is produced here. Pop. about 6000.

Cam′pion, or **Campian** (EDMUND), a learned Catholic priest, born in London in 1540. He visited Rome in 1573, and having joined the Jesuits returned to England on a mission. He challenged the clergy of the Anglican Church to dispute with him. In 1581 he was convicted on a charge of treason, and put to death Dec. 1. He was author of a "History of Ireland" and other works.

Cam′po Bas′so (formerly called **Molise**), a province of Central Italy, is bounded on the N. by Chieti, on the N. E. by the Adriatic Sea, on the S. E. by Foggia, on the S. by Benevento, and on the W. by Caserta. Area, 1778 square miles. The country is mountainous and sterile, and there is very little industry. Chief town, Campo Basso. Pop. in 1871, 363,943.

Campo Basso, a fortified city of Italy, capital of the province of Campo Basso (formerly Molise), is on the declivity of a mountain, about 55 miles N. N. E. of Naples. It has a fine cathedral, a ruined castle, a college, several convents and palaces of the nobility; also celebrated manufactures of cutlery and arms. Pop. 13,354.

Campobel′lo, a town of Sicily, in the province of Trapani, 50 miles S. W. of Palermo. Pop. 5141.

Campobello, an island in Passamaquoddy Bay, 2 miles E. of Eastport, Me. It is a part of Charlotte co., New Brunswick. It is 8 miles long, its N. point being in lat. 44° 57′ N., lon. 66° 55′ W. Copper and lead ores exist in the island. The inhabitants are chiefly engaged in the herring, cod, and mackerel fisheries. Pop. in 1871, 1073.

Campo Bello, a post-township of Spartanburg co., S. C. Pop. 2951.

Campobel′lo di Lica′ta, a town of Sicily, in the province of Girgenti, 15 miles N. W. of Licata. Here are mines of sulphur. Pop. 5764.

Cam′po de Cripta′na, a town of Spain, in the province of Ciudad Real, about 50 miles N. E. of Ciudad Real. It has manufactures of coarse cloths, and a trade in grain and fruit. Pop. about 5500.

Cam′po For′mio, Campio Formio, or **Campo Formido,** a village of Northern Italy, in Friuli, about 66 miles N. E. of Venice and 7 miles S. W. of Udine. An important treaty of peace was concluded here between Austria and the French republic, Oct. 17, 1797. Alarmed by the recent victories gained by Bonaparte in Italy, Austria was inclined to peace, and negotiated with the French general this treaty, by which she ceded the Netherlands and recognized the independence of the Cisalpine republic, including Milan, Mantua, and other parts of Austrian Italy. In return for these concessions the French gave up Venice, Istria, and Dalmatia to Austria.

Camp of Seventh Cavalry on Saline, a township of Ellis co., Kan. Pop. 80.

Campoma′nes (PEDRO RODRIGUEZ), COUNT, an eminent Spanish author and minister of state, was born in the Asturias July 1, 1723. He gained a high reputation by his writings on political economy, and was distinguished for his probity and enlightened policy. He became president of the royal council of Castile in 1788, and afterwards a minister of state. Among his works are a "Discourse on the Promotion of Popular Industry" (1774) and a "Discourse on the Popular Education of Mechanics" (1775). Died Feb. 3, 1802.

Cam′po Mayor′, a fortified town of Portugal, in Alemtejo, about 16 miles N. W. of Badajos. Pop. 5277.

Camp Point, a village and township of Adams co., Ill. It has two mills, a manufactory of agricultural implements, and one weekly newspaper. There is a fine public-school building. Pop. 2130.

GEO. W. CYRUS, ED. CAMP POINT "JOURNAL."

Camp Stur′gis, a township of Ellis co., Kan. P. 320.

Camp′ton, a township of Kane co., Ill. Pop. 957.

Campton, a post-village, capital of Wolfe co., Ky., about 65 miles E. S. E. of Lexington. Pop. 67.

Campton, a post-township of Grafton co., N. H. It has four churches and manufactures of woollens, lumber, etc. Pop. 1226.

Camp′tonville, a post-village of Yuba co., Cal.

Cam′pus, a Latin word signifying a "plain," "an open field," any level surface, as of the sea. It was sometimes used to denote a field of battle, and was applied figuratively to a subject of discourse, a field of debate or speculation. The grounds about college buildings in some places are called the campus.

Cam′pus Mar′tius (*i. e.* the "field of Mars"), a celebrated plain and open field of ancient Rome, was on the left bank of the Tiber, outside of the walls of the city. It was the place in which the Roman youth performed military exercises and evolutions, and in which the *comitia* assembled for the purpose of enacting laws and electing magistrates. It was subsequently used as a public park or pleasure-ground.

Campveer', Kampveer, or **Veer,** a decayed maritime town of the Netherlands, province of Zeeland, on the N. E. coast of the island of Walcheren, 4 miles N. N. E. of Middelburg. It has a beautiful cathedral, and a town-house with an elegant tower. The Scotch Staple was transferred from Bruges to Campveer in 1444, after which this town had peculiar trading relations with Scotland for several centuries.

Camus (Charles Étienne Louis), a French mathematician, born at Crécy-en-Brie Aug. 25, 1679. He was a member of the Academy of Sciences, which in 1727 sent him, with Maupertuis, to Lapland, to determine the figure of the earth. He wrote scientific works. Died Feb. 2, 1768.

Cam'wood, or **Bar'wood,** a dyewood which yields a brilliant but not permanent red color, and is used along with sulphate of iron as a dyestuff. It is the wood of the *Baphia nitida,* a tree of the order Leguminosæ, a native of Angola.

Ca'na, a village of Galilee, was the scene of Christ's first miracle. (John ii.) Its site is supposed to be indicated by some ruins 6 miles N. of Nazareth. The natives call this place *Cana-el-Jelîl.*

Ca'naan, an ancient patriarch, was a son of Ham and the ancestor of the Canaanites, who lived in Palestine before the Israelites conquered it. Palestine was called the land of Canaan by the Hebrew writers. It was bounded on the E. by the Jordan and on the W. by the Mediterranean Sea. (See Palestine, by Howard Crosby, D. D., LL.D.)

Canaan, a post-township of Litchfield co., Conn., at the crossing of the Connecticut Western and Housatonic R. Rs. The scenery here is very fine. It has a national bank at Falls Village. Pop. 1257.

Canaan, a township of Henry co., Ia. Pop. 784.

Canaan, a post-village of Somerset co., Me., about 35 miles N. by E. from Augusta. It has manufactures of lumber and cloth. Pop. of Canaan township, 1472.

Canaan, a post-township of Gasconade co., Mo. Pop. 1107.

Canaan, a post-township of Grafton co., N. H. It has manufactures of straw-board and boots and shoes, and has one newspaper. Pop. 1877.

Canaan, a post-township of Columbia co., N. Y., on the Boston and Albany R. R., 34 miles S. E. of Albany, contains several villages, has valuable water-power, several paper-mills and other manufactories, four churches, and a slate quarry. The township has two communities of Shakers, who have a farm of 1400 acres, where they raise garden-seeds and manufacture brooms, etc. Pop. 1877.

Canaan, a township of Athens co., O. Pop. 1543.

Canaan, a township of Madison co., O. Pop. 729.

Canaan, a township of Morrow co., O. Pop. 1109.

Canaan, a post-township of Wayne co., O. Pop. 1997.

Canaan, a post-township of Wayne co., Pa. Pop. 680.

Canaan, a post-township of Essex co., Vt. It has manufactures of starch and lumber. Pop. 419.

Can'ada, Dominion of, a country of North America which is to embrace all of the American possessions of Great Britain lying N. of the U. S. Founded in 1867 by the union of the provinces of Canada West, Canada East, New Brunswick, and Nova Scotia, it embraced in 1872, besides these four provinces named, also the provinces of Manitoba and British Columbia and the North-west Territory. The only portion of British North America which in 1873 had not yet joined the Dominion of Canada was the province of Newfoundland, Prince Edward Island having joined the Dominion in June of that year. It is bounded on the S. by the U. S., on the E. by the Atlantic, on the N. by the Arctic Ocean, and on the W. by the Pacific. It comprises the whole country N. of the U. S., with the only exception of the Territory of Alaska and of Greenland. A part of the southern frontier is formed by the lakes Superior, Huron, Erie, and Ontario. The frontier-line which separates it from the State of Maine was fixed in 1843 by the Ashburton Treaty. The long-pending dispute between Great Britain and the U. S. as to the island of San Juan in the Pacific was in 1872 decided by the arbitration of the emperor of Germany. The principal rivers on the Atlantic side are the St. Lawrence, the Ottawa, the St. Maurice, and the Saguenay, which enter the St. Lawrence from the left. On the Pacific side the most important rivers are the Columbia and the Frazer. The Saskatchewan, rising in the Rocky Mountains, traverses fifteen degrees of longitude, or a distance of at least 900 miles, and falls into the great Lake Winnipeg in 53° N. lat. This lake is connected with Hudson's Bay, the most remarkable indentation of the American coast, by the Nelson or Port Nelson, about 500 miles in length. Lake Athabasca, situated about lat. 58° N. and lon. 110° W., receives, among others, the Peace River and the Athabasca, a large stream rising in the Rocky Mountains near the source of the Columbia. The Mackenzie, entering the Arctic Ocean, is one of the largest rivers on the globe.

Climate and Soil.—The climate of the Atlantic provinces is similar to that of Sweden and Norway. The heat of summer and the cold of winter are greater here than in the corresponding latitudes in Europe. At Montreal the mercury in winter often sinks to 24° or 30° below zero, and rises in summer to 96° or 100°. The climate of Ontario (Canada West) is milder than that of Quebec (Canada East), because it is farther S., and is modified by the vicinity of the great lakes. Peaches flourish and ripen on the N. shore of Lake Erie, and near Toronto on Lake Ontario. The transition from winter to summer is sudden, especially in the north-eastern parts of Canada. The most fertile portion of this part of the Dominion is Ontario, especially the peninsula formed by Lakes Huron, Erie, and Ontario. The climate of British Columbia, like that of the Pacific coast in general, is more uniform and moderate than that of the Atlantic provinces. The soil of the peninsula formed by Lakes Huron, Erie, and Ontario produces good crops of wheat and other grains. The greater part of Canada is covered with forests of good timber, from which large quantities of pine lumber are exported. The province of Quebec abounds in romantic and picturesque scenery. Seven miles below Quebec is the cataract of the Montmorenci, with a perpendicular descent of 240 feet. Among other remarkable objects is the sublime scenery of the Saguenay, which flows between high and precipitous rocks. The northern portion of the Dominion will undoubtedly be doomed to everlasting sterility on account of the severity of the climate. The country on the lower Saskatchewan and on the Red River, it is believed, will be long among the most fertile regions of the Dominion.

Area and Population.—The area of the Dominion in 1872 was estimated at 3,389,442 square miles, being almost equal to the extent of the U. S. The population of the four old provinces of the Dominion (Ontario, Quebec, New Brunswick, and Nova Scotia), according to the census of 1871, was 3,484,924, against 3,089,659 in 1861—an increase in ten years of 12.79 per cent. The population of Manitoba, according to the census of 1870, was 11,953. The population of British Columbia was in 1871 estimated at 50,000, and that of the North-west Territory at 28,700; total for the whole Dominion in 1871, 3,575,577. The number of immigrants entering the St. Lawrence in 1870 was 44,475; the number who entered from the U. S. was estimated at 24,544; making a total immigration during the year of 69,019—a figure considerably exceeding the immigration of any previous year. During the period from 1851 to 1870 the aggregate number of arrivals by the St. Lawrence was 560,996, and of arrivals from the U. S. 399,461. The number of those who settled in Canada was calculated to be 418,910, while the remainder went on to the U. S. The large majority of the population of Quebec (847,615 out of 1,111,566) are of French origin; in all the other provinces the descendants of the British largely predominate. The city of Ottawa has been made the capital and seat of legislation. The largest cities are Montreal, Quebec, Toronto, St. John, Halifax, and Hamilton. The Indian population in Canada proper is estimated at 25,673; of the former Hudson's Bay Territory, 42,870; of British Columbia, 18,000; total, 86,543.

Church and Education.—There is no state Church in the Dominion and in the whole of British North America. According to the census returns of 1861, there were in the four original provinces of the Dominion, 1,372,913 Roman Catholics, 471,946 Presbyterians, 465,572 Anglicans, 431,927 Wesleyans and Methodists, 189,080 Baptists, 29,651 Lutherans, 17,757 Congregationalists, 76,176 of miscellaneous creeds, 18,860 of "no religion," and 16,682 "no creed stated." Roman Catholics were most numerous in the province of Quebec, and they also constituted a plurality in New Brunswick; the leading religious denomination of Ontario is the Wesleyans, and the leading denomination of Nova Scotia the Presbyterians. The provinces of Quebec and Ontario have separate school laws adapted to the religious elements prevailing in either. The common schools are supported partly by government and partly by local self-imposed taxation, and occasionally by the payment of a small fee for each scholar. All common-school teachers must pass an examination before a county board of education or receive a license from the provincial normal school. Similar arrangements exist in the other provinces, nearly all the public schools of which possess endowments of land and personal property.

Commerce, etc.—Canada enjoys great advantages for commerce by the navigation of the great lakes and the river St. Lawrence, which give the Canadians ready access to the

markets of the U. S. The greater portion of the Canadian exports go to the U. S., while the greater part of the imports are from Great Britain. The trade is also facilitated by several canals and railways. The Rideau Canal, 135 miles long, extends from Kingston, on Lake Ontario, to the Ottawa River, and the Welland Canal connects Lake Erie with Lake Ontario. The principal railways of Canada are the Grand Trunk Railway (1377 miles), which connects Montreal with Detroit (Mich.) on one hand, and with Portland (Me.) on the other; the Great Western (351 miles), which with several branches traverses the south-western part of Ontario; the European and North American Railway (108 miles), which extends from Bangor (Me.), *viâ* St. John, to Point du Chêne, in New Brunswick; the Nova Scotia Railway (145 miles), which extends from Halifax to Pictou, on the Gulf of St. Lawrence, with a branch line (32 miles) from Halifax to Windsor, on the Bay of Minas; the New Brunswick and Canada Railway (116 miles), which extends from St. Andrew's on the sea-coast to Richmond, with branch lines to St. Stephen, Woodstock, and Houlton. At the beginning of the year 1872 over 3000 miles were in operation, besides which 1100 more were in the process of construction, and charters had been obtained for more than 800 miles in addition, apart from the Canadian Pacific Railway, which is to be 2500 miles long, will connect Lake Nipissing with some port in British Columbia, and is to be completed in ten years. The longest among the railways in the course of construction is the Intercolonial Railway, which will extend from the Grand Trunk at Rivière du Loup to Truro, Nova Scotia, a distance of 499 miles. The receipts and expenditures for the financial year ending June 20, 1870, amounted to $22,895,077.87, each. The monthly publications of the revenue and expenditure for the fiscal year ending June 30, 1871, showed a very large surplus of revenue over expenditure. The debt of the Dominion on July 1, 1870, amounted to $115,993,706; total assets, $37,783,964; net debt, $78,209,742. The fisheries of British North America are the finest in the world, and inexhaustible. The value of fish exported in 1871 exceeded $7,000,000, and the minister of marine and fisheries states the aggregate annual value of the fish-product of the provincial fisheries at nearly $17,000,000. The total exports of Canada in 1870 were valued at $73,573,540, of which $28,772,312 were exported to the U. S. The imports for that year amounted to $71,239,187, of which $24,724,071 were imported from the U. S. The merchant-navy of the Dominion consisted in 1868 of 5822 vessels, of a total burden of 776,343 tons.

Government.—The constitution of the Dominion, which was adopted in 1867, is formed after the model of the mother-country. The Parliament consists of the queen of Great Britain, an upper house, styled the senate, and a house of commons. The queen is represented by a governor-general, who is appointed by the Crown, and exercises his authority with the aid and advice of a council appointed by himself. The senate consists of not more than seventy-two members, who are chosen by the governor-general, and hold the appointment for life. The house of commons consists of about 180 members, elected by the people. Each of the provinces has also its local or provincial legislature and administration, with a lieutenant-governor at the head of the executive. The troops maintained by the imperial government have been reduced to 5000 men. The militia, which was organized in 1868 by a statute of the first federal Parliament, consists of all male British subjects between eighteen and sixty, divided into an active and a reserve force. In 1870 the number of men on the rolls was 675,000. The naval forces of Canada in 1871 consisted of eight armed screw steamers, maintained on the great lakes and the river St. Lawrence, and two coast-steamers, which are available as gunboats.

History.—The first settlement made by Europeans in Canada was made in 1541 at St. Croix's Harbor by Jacques Cartier, a French navigator, who sailed up the St. Lawrence. The French founded Quebec in 1608, after which numerous French colonists settled in Lower Canada, near the St. Lawrence River. The English general Wolfe captured Quebec in 1759, and the conquest of Canada was completed in 1760. Upper Canada was settled mostly by English emigrants. In 1791 Canada was divided into two provinces, called Upper and Lower Canada (afterwards called Canada West and Canada East). Both of these provinces were disturbed by an insurrection in 1837, and were reunited in 1840. By an act of the British Parliament, which was passed Mar. 29, 1867, and came into force June 1 of that year, the Canadian provinces, Ontario and Quebec, and New Brunswick and Nova Scotia, were federally united into one Dominion of Canada. The legislature of Newfoundland declared in favor of joining the Dominion, but the people, in Nov., 1869, by a large majority, declared against it. From the Hudson's Bay Company the government of the Dominion purchased in the same year its vast territory. An insurrection of colonists and natives, who protested against having their land treated as a dependent territory, induced the government to organize in 1870 that part of the newly-purchased territory which is situated between lon. 96° and 99′ W., and the U. S. boundary-line and lat. 50° 38′ N., as an independent province of the Dominion, under the name of Manitoba. The immense unorganized territory beyond the limits of Manitoba is called the North-western Territory. On Mar. 31, 1871, British Columbia was received into the Dominion. Invasions of Canada by armed Fenians from the U. S. were attempted in 1866 and 1870, but were repelled without difficulty. The long-pending controversies with the U. S. were mostly settled by the Washington treaty of 1871. In 1873 Prince Edward Island joined the Dominion.

A. J. Schem.

Canada, a township of Labette co., Kan. Pop. 480.

Canada Balsam [Lat. *Balsamum Canadense*] is a turpentine or oleoresin obtained from the *Abies balsamea*, a species of fir which grows in Canada and the U. S., and is sometimes called balsam fir. It is a pale yellow, transparent liquid, having a peculiar and agreeable odor. When it exudes from the bark it has the consistence of honey, but by age and exposure to air it becomes solid. It is used in medicine, in photography, in mounting objects for the microscope, and is an ingredient in varnishes. It is also valuable to opticians, who use it as a cement.

Canada Goose, or **Wild Goose** (*Anser Canadensis*), an inhabitant of the entire continent of North America, belonging to the order Natatores, family Anatidæ, is thirty-five inches long, brownish above, lighter beneath, with the head, neck, bill, and feet black. "It spends the winter in the warmer regions, chiefly in the South-western States and in the everglades of Florida, but in spring moves northward in large flocks." While on the wing the birds generally arrange themselves in a <-shaped figure (though sometimes they fly in a straight line), led by an experienced gander, who frequently gives utterance to his familiar *honk*. "Their spring migrations usually take place from the 20th of March to the last of April, but are wholly dependent upon the state of the season. They breed at the north, and linger there till the hard frosts warn them that the lakes and streams will soon be frozen over." While performing their long journeys they usually fly at a great height, probably a quarter of a mile or more.

Canada Goose, or Wild Goose.

Canadian, a township of Mississippi co., Ark. Pop. 330.

Canadian River rises in the N. E. part of New Mexico, and flows through the N. part of Texas into the Indian Territory. Its general direction is nearly eastward. After a course of about 900 miles it enters the Arkansas River about 50 miles W. of Fort Smith. The North Fork of the Canadian is sometimes called Rio Nutria. It rises in the N. E. part of New Mexico, flows in an E. S. E. direction, and enters the Canadian about 50 miles from its mouth. Length, estimated at 600 miles.

Can'adice, a post-township of Ontario co., N. Y. Pop. 905.

Canajohar'ie, a post-village and township of Montgomery co., N. Y., on the S. bank of the Mohawk River and on the Erie Canal, and opposite Palatine Bridge on the New York Central R. R., 55 miles W. N. W. of Albany. The village has five churches, an academy, a school district library of 800 volumes, a weekly paper, two national banks, a planing mill, two malt-houses and an extensive paper-bag factory. The township has another academy, six other churches, six cheese-factories, and a woollen mill. Pop. of village, 1822; of township, 4256.

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Canal', a post-township of Venango co., Pa. P. 1205.

Canal. See INLAND NAVIGATION, by WM. J. MCALPINE.

Canal', or **Canalet'to** (ANTONIO), an Italian painter, was born at Venice Oct. 18, 1697. He worked in his native city, and acquired a high reputation. He painted many views of Venetian palaces, canals, etc., which are highly commended by some critics, but others charge him with mannerism. He is said to have been the first who used the camera obscura for artistic purposes. Died Aug. 20, 1768.

Canalet'to, a surname of BERNARDO BELOTTO, a Venetian painter, born in 1724. He was a nephew and pupil of the preceding. He worked in Rome, London, Dresden, and other places, and excelled in perspective. He painted many buildings and the environs of cities. Died at Warsaw in 1780.

Canal' Do'ver, a post-village of Dover township, Tuscarawas co., O., on the Tuscarawas River, the Ohio Canal, the Lake Shore and Tuscarawas Valley R. R., and the Tuscarawas branch of the Cleveland and Pittsburg R. R. It has several mills and iron-furnaces, and one weekly paper. Pop. 1593.

Canal' Ful'ton, a post-village of Stark co., O., on the Ohio Canal and on the Lake Shore and Tuscarawas Valley R. R., and on the Tuscarawas branch of the Cleveland and Pittsburg R. R., 56 miles S. of Cleveland. Pop. 1048.

Canals' of Can'ada, The, may be classed under the following heads:

1st, The St. Lawrence and lake navigation, including the Lachine Canal, the Beauharnois, Cornwall, Farran's Point, Rapide Plat, and Galops canals, commonly designated the St. Lawrence canals, in the river St. Lawrence, surmounting its rapids between Montreal and Kingston; and the Welland Canal, between Lake Ontario and Lake Erie, surmounting the falls and rapids of Niagara; to which may be added the Burlington Bay Canal, through a sandbar at the mouth of that bay, at the head of Lake Ontario.

2d, The Ottawa and Rideau navigation, including St. Anne's Lock, the Carillon, Chute à Blondeau, and Grenville canals, surmounting the rapids of the Ottawa between Montreal and the city of Ottawa; and the Rideau Canal, connecting the river Ottawa with the St. Lawrence at Kingston, through the rivers Rideau and Cataraqui.

3d, The Richelieu and Champlain navigation, being the St. Ours Lock and Chambly Canal, surmounting obstacles on the river Richelieu from the St. Lawrence to Lake Champlain.

4th, The river Trent navigation, consisting of locks and dams on the river Trent, a large tributary of Lake Ontario, extending into the interior of the Newcastle district, originally proposed as a line of communication with Lake Huron.

5th, The St. Peter's Canal, connecting the Bras d'Or, a bay of the sea in the interior of the island of Cape Breton, with St. Peter's Bay, on the S. coast of the island.

Along with the foregoing may be noticed the following projected canals: the Caughnawaga Canal, to connect Lake Champlain with the river St. Lawrence above the Lachine Rapids; the Ottawa and Huron Canal, to form a direct and short route between Montreal and Lake Huron by the Ottawa and French River; a canal at Sault Ste. Marie; the Huron and Ontario, or Georgian Bay Canal; the Bay Vert Canal, from the Gulf of St. Lawrence to the Bay of Fundy; and the Shebandowan and Lake of the Woods navigation, forming 311 miles of the route from Lake Superior to Red River.

The canals of Canada derive an extraordinary importance from the vast extent and importance of that great system of inland navigation, the river St. Lawrence and its lakes, the obstructions in which they are almost exclusively designed to overcome.

When we consider the great extent of fertile lands of the States and provinces adjoining it, and the still vaster territories behind them of fertile prairies and wooded lands in the U. S. and Canada, for the traffic of which this great water-system must be the highway; and also that as the western extremity of Lake Superior reaches the middle of the continent, a considerable trade with the Pacific will naturally be directed to it to gain the advantage of cheaper transport by water,—it will be seen how enormous must be the amount of future traffic passing through the canals constructed to avoid or surmount the obstacles in its course.

With the extent and character of the great North-western States and Territories of the Union the public are already familiar. The States of Wisconsin, Iowa, Minnesota, Michigan, Illinois, Indiana, and Ohio, for whose surplus produce the St. Lawrence and its great lakes are more or less the natural highway to the ocean and European markets, embrace a grain-growing region unequalled on this continent, or perhaps in the world. It may be sufficient to remind the reader that it is but little more than thirty years since settlement and cultivation had advanced sufficiently in the territories on the Western lakes to have any considerable amount of surplus produce to export, but that their progress since has been so great that in 1871 the grain or its equivalent in flour brought to the five principal ports on these lakes for shipment amounted to upwards of 140,000,000 bushels, though the productive capacity of the region that yielded it is still far from being fully developed, and the territories in rear of it as yet comparatively unoccupied.

The country on the Canadian side of the boundary, being hitherto much less known, may require a little more notice. The valley of the Saskatchewan or Nelson River and its tributaries resembles very much in formation, soil, and climate, as well as extent, that of the Volga of Russia, the greatest river in Europe. The region N. W. of it, drained by the Athabasca and the Peace River, the main arms of the river Mackenzie, each about a thousand miles in length, is fully as suitable for settlement; the Peace River country especially being superior in soil, both richly wooded and interspersed with rich, well-watered prairies, with a climate better than that of Red River Settlement or Northern Minnesota.

The extent of country within the valleys of these three rivers, and within the limits of successful cultivation of wheat, estimated on carefully selected evidence confirmed by recent explorations, is equal to ten times the area of the State of New York. It is remarkable for the great extent of very fertile and arable prairie and wooded land it contains, its vast coal-fields, and its abundance of petroleum. Iron ore is found in it, and gold that promises to afford profitable diggings has recently been definitely ascertained to exist on Peace River, besides what was already found on the Saskatchewan.

The cost of transport will no doubt check the exportation of heavy produce from the remote parts of these territories especially; but there are farm products, such as flax, wool, cured meats, etc., that can be carried with profit much farther than grain, which has hitherto been the chief export of the West; and every improvement in our means of transport, by canals or otherwise, that reduces the cost of it, will extend the distance from which grain can be exported. The gold of the mountain countries westward, alike in the U. S. and Canada, will encourage settlement and stimulate commerce, compensating as a remittance, in payment for imports, for the reduced value, as such, of heavier products. The outward and inward traffic, from all sources, by the Northern Pacific and Canadian Pacific R. Rs. will, from the greater economy of transport by water, to the utmost possible extent, consistent with the destination of the freight, use the route by the great lakes, the St. Lawrence, and its canals.

Reverting to the North-west territories of Canada, it may be worth noticing here, as connected though remotely with the route by the great lakes and the St. Lawrence as a commercial highway, that it has been ascertained, by a recent exploration for the Canadian government by Mr. Horetzki, C. E., of Ottawa, that the valley of the Peace River offers a site for the Canadian Pacific Railway presenting several important advantages over any other route known or surveyed. Its summit-level in passing through the Rocky Mountains is less than 1700 feet in elevation over the sea (the Peace River being there large and navigable); that is, less than half the summit-elevation of the Yellow Head Pass, which previously was justly considered the most favorable known. The Peace River route, by passing farther N., avoids the exceedingly rugged, almost insurmountable, region between the Yellow Head Pass and the Frazer River, the *caput mortuum* on that route, and which would entail great crookedness and extraordinary cost. It also avoids the necessity for bridging that river and the chasm in which it flows. It has the advantage also of being free from the heavy falls of snow which the other passes at higher levels are subject to; and, as was

previously known as to the general character of the country, traverses to a greater extent the best lands for settlement.

From Fort Simpson, on the Mackenzie, about 400 miles N. of this route, that great river is navigable uninterruptedly downward for about 800 miles,* with a depth sufficient for the largest sea-going ships, to the Arctic Sea at its mouth, where there are whales in great abundance. The country between the Peace River and Fort Simpson is generally very fertile, arable land, and two-thirds of it is within the limits of successful wheat cultivation. Whale-fishing, as now carried on, has ceased to be profitable, owing to the competition of mineral and other oils, the increasing scarcity of whales, and their having to be sought farther into the Arctic, the dangers of the voyage, and the great distance the oil has to be carried—from the Arctic within Behring Strait to the Sandwich Islands, and thence home, in all about 24,000 miles. Were the Mackenzie connected by rail with the Canada Pacific Railway, the richest whale-fishing in the world could be rendered available, and 800 miles of transport on the Mackenzie, where coal and wood abound for steamers that might be used with great advantage in the fishing, and 1800 miles by rail, would bring the products of the fishing to Duluth on Lake Superior. Though the prospect of such communication be remote, it may be noticed in considering the area for which the St. Lawrence may be the commercial outlet.

The acquisition by Canada of the great territories formerly held by the Hudson's Bay Co., including so much valuable country, has greatly changed the position of Canada in relation to the improvement of the navigation of the St. Lawrence. Previously, it might be argued that it was absurd for the Canadian people to task their resources for the construction of a gigantic system of canals on the St. Lawrence to render it the great highway of the West, as the benefit of it would chiefly be to reduce the cost of transport and increase the value of the produce of the great Western grain-growing regions of the U. S.; but now that Canada has acquired an equal share of the vast fertile regions of the West, she has a common interest with the U. S. in the improvement of that great inland route of navigation, which must more or less be their common outlet. Though there may be antagonism between rival shipping-ports and routes of transport on the one side of the international boundary and the other, and large though such interests may be, they cannot be considered otherwise than secondary to that of the millions of producers, present and future, having a common interest in every work of improvement that tends to reduce the cost of transport, and thereby enhance the value of the products of the great regions of the West. With this view, the canals of Canada may be considered of important interest to the American people, especially now, since the right of using them for commercial purposes has been secured by the treaty of Washington.

Before describing the canals of Canada it may be suitable to take a brief view of the general character of the river St. Lawrence, and of the obstructions in its course which they are chiefly intended to overcome.

Notwithstanding these obstructions, it has certain specialities as a water-system which otherwise render it peculiarly suitable as a commercial highway for trade of the greatest magnitude. Its course is so free from minor sinuosities that though scarcely 2000 miles in length from its mouth at Anticosti to the W. end of Lake Superior, it extends as far into the continent as the Mississippi does with its course of 3160 miles; the upper part of which, even where navigable, is of insignificant capacity for transport compared with the great lakes of the St. Lawrence. Directness (which means shortness of route) and great capacity are most important advantages. The great proportion of it that consists of lakes and wide water—that is, three-quarters of its whole length—affording sea-room admitting of free navigation by sailing-vessels, is another important advantage. So also is the uniform height of its waters; from their being held in reserve in the great lakes, it never falls one-twentieth below its mean volume; and its navigation is free from all the disadvantages arising from low water that other rivers are liable to.

Its enormous volume also is attended with an important commercial advantage in the depth of water it affords on its rapids, which is such as to admit of large passenger steamers and lake vessels of 500 or 600 tons, if lightly loaded, passing as freely down through its vast swaying surges as the lightest bark canoe of the Indian descends the rapids of an ordinary river, and with an increased speed, instead of the delay necessarily attending the passage through the canals and locks which are so essential for vessels going upward.

The St. Lawrence drains an area of 565,000 superficial statute miles. The mean volume passing Niagara is given in the New York State reports as 389,000 cubic feet per second. But this is the drainage of only 237,300 square miles of the basin of the St. Lawrence. Before reaching the Galops Rapid it is augmented by that of the basin of Lake Ontario and all its tributaries, and has an average width of about a mile. Before reaching the Lachine Rapids it receives nearly half of the waters of the Ottawa; the remainder passes N. of the island of Montreal. The Ottawa, according to the careful measurements taken in the canal survey of it, has a mean discharge of 83,000 cubic feet per second.†

Between the seaports of Montreal and Quebec the St. Lawrence has an average width of a mile and three-quarters. Midway it receives the St. Maurice (which discharges as much water as the Ottawa) and other large tributaries. From Quebec it increases rapidly in width; below the island of Orleans, where still fresh water, it is eleven miles wide. At 100 miles lower it receives the Saguenay, nearly equal to the Ottawa in volume of discharge, besides other large rivers below it. Taking the 327,700 square miles of the basin of the St. Lawrence as yielding as much water in proportion to its area as the 273,000 above it, the total discharge of the St. Lawrence past Anticosti must at least be 926,035 cubic feet per second. But it is known by all observers that the tributaries of the lower St. Lawrence, coming from mountainous wooded regions, where the snow falls from four to eight feet in depth, deliver more water comparatively than its upper tributaries. With the smallest addition admissible for that difference, the total discharge of the St. Lawrence must be upwards of 1,000,000 cubic feet per second. Darby, the great American hydrographer, who surveyed the Mississippi, computed the mean discharge of the St. Lawrence as fully one-half greater than the Mississippi, but afterwards thought he had under-estimated the former.

Other rivers after their floods shrink to comparative littleness, but the St. Lawrence flows on at all seasons with unabated grandeur; and it remains to be determined by scientific observation how far any other river in the world exceeds the mass it pours to the Gulf, where the stern Laurentides and the lofty mountains of Notre Dame faintly skirt its remote horizon on the one side and the other.

As the treaty of Washington, besides securing the right of using the canals of Canada, provides that the river St. Lawrence, to and from the sea, "shall for ever remain free and open for the purposes of commerce to the citizens of the U. S.," the lower course of that river, with which the treaty secures unbroken communication, may now be considered as a subject of greater interest to Americans than heretofore. The right of in-shore fishing in the St. Lawrence and the Gulf, and of having fishing establishments along their coasts, will doubtless lead to great extension of the fisheries there and business connected with them. As the provisions necessary for their use can be supplied with much greater advantage from lake ports by the way of the St. Lawrence than otherwise, a considerable trade in that way will no doubt arise. This new interest in the lower St. Lawrence may justify its being noticed here in connection with its canals.

To ascend the St. Lawrence from the Atlantic we traverse the Gulf for 426 miles from the entrance of the Straits of Belle-Isle to the mouth of the river St. Lawrence, which is at an imaginary line from Cape Gaspe to the head of the island of Anticosti, and thence to the N. shore.

To Quebec, 400 miles, the river is navigable for the largest ships that float, including the Great Eastern. Thence to Montreal the distance is 160 miles; midway is Lake St. Peter. Extensive shoals in the upper part of it had originally a depth of only 11½ feet at low water. A channel has been dredged through them to the depth of nearly if not quite 20 feet at low water. It is 11½ miles in length and 300 feet wide at bottom. It was begun in 1844, and completed in 1865, and cost $1,347,018. Many large vessels, drawing from 18 to 23 feet laden, now ascend to Montreal harbor. The parliamentary commission recommend deepening this channel to 22, and ultimately to 24 feet.

The seaport of Montreal, 586 miles from the mouth of the St. Lawrence, is situated at the foot of the Lachine Rapids, which are surmounted by the Lachine Canal, 8½ miles in length, the first of the series of St. Lawrence canals. From the head of it, at Lachine, it is 15¼ miles through Lake St. Louis to the "Cascades," which, together

* With the exception of the Stony Rapid above Fort Simpson, the Mackenzie is navigable throughout its course of 1000 miles into Slave Lake.

† This seems an under-calculation, being only two-thirds of the rate of discharge to its area in proportion to the St. Lawrence, which, being exposed to much evaporation, should be less for its area than the Ottawa.

with the "Cedars" and "Coteau" Rapids, are overcome by the Beauharnois Canal, 11¼ miles in length. Thence through Lake St. Francis it is 32¾ miles to the foot of the "Longue Sault" Rapids, which are surmounted by the Cornwall Canal, 11½ miles in length. At 5 miles farther, ascending the river, is "Farran's Point Rapid" and canal, ¾ of a mile in length. At 10½ miles farther by the river is the "Rapide Plat" and its canal, 4 miles in length. At 4½ miles is Galops Canal, 7⅝ miles in length, surmounting the "Pointe aux Iroquois," "Pointe Cardinal," and "Galops" Rapids. These, from Farran's to the "Galops" inclusively, are called the Williamsburg canals, terminating 7⅜ miles below Prescott. The descent from the head of the "Galops" to Montreal harbor, 111¼ miles, is 234 feet; Kingston, 178 miles from Montreal, is 59 miles above Prescott. From Kingston, where we enter Lake Ontario, to Port Dalhousie, at the foot of the Welland Canal, 27 miles from the head of that lake, the distance is 170 miles.

By the Welland Canal it is 27 miles to Lake Erie at Port Colborne, from which to the head of the lake, at the mouth of the Detroit River, as the entrance of the St. Lawrence is there called, is 232 miles. The Detroit River, 18 miles, Lake St. Claire, 25, and St. Claire River, 33 miles, reach to Lake Huron.

Lake Huron to its head at river St. Mary is 270 miles in length, river St. Mary up to the Sault, 47 miles; in all 625 miles of unbroken navigation from the head of the Welland Canal to the Sault Ste. Marie Canal, which is 1 mile in length; thence it is 7 miles to Lake Superior, which is 390 miles long to Fond du Lac, at the head of it; making in all the total distance of 2384 miles from the Atlantic at the entrance of the Straits of Belle-Isle, of which 71¾ miles are artificial navigation, and 2312¼ open navigation.

Reverting to the rapids between Montreal and Kingston, the navigation of them by steamboats was not attempted till 1842. Daily passenger steamers have run these rapids from Kingston to Montreal during open navigation for many years past. These steamers in returning ascend the Lachine, Beauharnois, and Cornwall canals, but ascend the Iroquois Rapid, Rapide Plat, and the Galops without entering the canals. It is not usual for freight vessels to run the lower rapids; but as the saving of time is very great in descending the rapids, compared with passing through the canals at much lower speed, besides detention in lockage, the improvement of the channel there necessary, so as to admit of the largest freight vessels fully laden descending the rapids at lowest water with perfect safety, has long been advocated, and is one of the works recommended to be prosecuted by the canal commission of the Canadian Parliament in 1871. In the "Galops Rapid" there is a short shoal, having not more than 9 or 10 feet water over it when lowest. In the "Longue Sault" the water is often over 50 feet in depth, but there is one shoal in it with only 12 feet of water over it. On the "Coteau Rapid" the depth is often over 20 feet, but there are two shoals with only from 7½ to 10 feet depth at lowest water. The "Cedars" are generally 12 to 25 feet in depth, but one or two shoals have been found with only 9½ to 10 feet depth at lowest water. In the "Cascades" there is a shoal having 6 or 7 feet in depth in dry weather; this is the shallowest spot in all the rapids of the St. Lawrence. In the lower part of the Lachine Rapids there are two shoals having not more than 8 feet over them at lowest water. The cost of completing a 12 to 13 feet channel from Lake Ontario level to Lachine by blasting has been estimated at $720,000, which probably might be much reduced by adopting a system of side-dams to gorge the channel as far as practicable.

Taking the works constructed to surmount the obstacles in the navigation of the St. Lawrence in the order in which they have been mentioned, the first is the Lachine Canal.

The Lachine Canal is 8½ miles in length, extending from the harbor of Montreal to the village of Lachine on Lake St. Louis. It surmounts the St. Louis or Lachine Rapids. Its construction was urged as a necessity as early as 1791; a grant by the legislature of £25,000 was obtained in aid of the project in 1815, on the recommendation of the governor-general, Sir George Prevost, who considered it important in a military point of view. In 1819 the grant of 1815 was repealed, and an act passed incorporating a joint-stock company for carrying out the design; but it proved abortive. In May, 1821, a bill was passed repealing its incorporation, and authorizing the construction of it by government in the month of July following. In 1825 the canal was opened for the passage of vessels. Its dimensions as then constructed were 28 feet in width at bottom and 48 feet at the water-line, with 4½ feet depth of water. It had seven locks, 100 feet long and 20 wide, built substantially of stone. The cost of that canal up to Mar., 1826, was $438,404.15, of which the British government contributed $50,000 and the province the remainder. This canal being found insufficient, a little before the union of the provinces of Lower and Upper Canada, Lieut.-Col. Phillpotts, R. E., at the instance of Earl Durham, made a report and estimate for the construction of a new line of canal, with locks 200 feet by 45, and 9 feet depth of water. After careful consideration of what were then considered to be the requirements of the trade of the great lakes, and with a view of satisfying the wants of Upper Canada, it was decided that the canal should be continued in the same site, and that it should be enlarged to its present dimensions (with the exception of the lowest two locks), which are as follows:

Breadth of the canal at bottom		80 feet.
" " " at water-surface		120 "
Dimensions of locks	200 by 45	"
Depth of water on sills, 2 locks		16 "
" " " 3 "		9 "
No. of locks	5	
Total rise of lockage		44¾ feet.
Length of canal		8½ miles.

The two locks of 16 feet depth of water on sills were so made to allow the largest vessels then trading to Montreal to enter the first basin of the canal. During the enlargement navigation was not discontinued, the new locks being built by the side of the old ones. The total cost of this work, up to 1st July, 1867, is given, in the report of the department of works of Canada, for that year, as being $2,587,532.85; cost since for works and repairs to 1st July, 1870, $42,640.30. It was not till early in 1862 that the excavation of the enlargement was completed to its full width.

But, though this enlargement has been but so recently completed, the increase of trade by the St. Lawrence in the products of the West has been such as again to call for further enlargement and increased accommodation. It having been shown in evidence before the Canadian canal commission of 1871 that the Montreal entrance to this canal was quite insufficient, especially in view of the enlargement of the Welland Canal, and even now causing much delay, and that an additional entrance was necessary, so as to admit of one being used for vessels ascending and the other for those descending the canal, contracts have been entered into for the construction of a new entrance to the canal, with two locks, and of two new basins, and for the enlargement of present basin No. 2. One of the new basins is to be 1250 feet in length and 225 feet in breadth; the other is to be 540 feet in length by 260 in breadth. Both are to be 19 feet in depth. The locks are to be 270 feet long and 45 feet wide, with a depth of 18 feet of water on the mitre sills; the locks, and also the walls of the basins, to be of the most substantial structure and best quality of masonry, laid in hydraulic cement mortar, as usual. This is mentioned as indicating the common character of work of the Canadian canals. But though the length of 270 and breadth of 45 feet has been adopted for these locks, in accordance with the scale recommended by the Canadian canal commission for the St. Lawrence canals throughout, as well as the Welland Canal, the depth of 18 feet is exceptional, 12 feet being the standard depth recommended by the commissioners, together with the improvement of the channel of the St. Lawrence above Montreal, so as to give 14 feet of water throughout. The Canadian government will no doubt be governed by the practicability of obtaining that depth throughout without unreasonable outlay. But the depth of water in the locks should not be limited to the capacity of lowest water, but be made to correspond with the greater depth of channel that may be obtained in future.

It is to be observed that the scale of 200 feet by 45, with 12 feet of water on the sills, recommended by the commissioners, will admit vessels of about 1300 tons, instead of 700, which is the limit of the capacity of the lesser locks on this canal and others on the St. Lawrence, excepting the Cornwall Canal.

The navigation of the Lachine Canal is open in general for 210 to 220 days during the year, and may be safely counted upon from the last week in April to the last week in November. In some years its period of navigation is considerably longer. In 1839 it opened on the 11th of April; in 1852 it was open till December 16th; in 1849 it was open 234 days. The freight that passes through the Lachine Canal is much greater than that passing by the canals between Lake St. Louis and Lake Ontario, as the trade of the Ottawa and the Rideau Canal joins that of the St. Lawrence in Lake St. Louis, and the export of sawn lumber from the Ottawa is very great.

The next in succession of the St. Lawrence canals is the Beauharnois Canal, 11¼ miles in length, connecting Lake St. Louis with Lake St. Francis, and surmounting the "Cascades," "Cedars," and "Coteau" rapids. Previous to the construction of the Beauharnois Canal four short canals had been made which admitted of boats carrying thirty

barrels of flour, descending from Lake St. Francis to Lake St. Louis. Several small improvements were subsequently made on this part of the navigation of the St. Lawrence. In 1833 the increasing importance of the subject led the government of Lower Canada to appoint commissioners for the improvement of the navigation from Lake St. Louis to Lake St. Francis. Their engineer, Mr. Mills, made a survey with that view, and his reports and plans, which were for the construction of three short canals at the rapids, were approved of by a committee of the house of assembly, who recommended a grant of $960,000 for that purpose. The report, however, fell to the ground, and in 1839 Col. Phillpotts, before mentioned, recommended a canal on the N. side of the river for military reasons. After other projects had been entertained and abandoned, the present site, on the S. side, after much discussion, was adopted as the most favorable, on the recommendation of the chief engineer of the department of public works of Canada, and in 1842 contracts were entered into for the construction of it. The canal was opened at the close of the season of 1845, but it was found that its upper entrance was imperfect, its channel crooked, too shallow in dry seasons, and impeded by cross currents. On account of these and other difficulties, in the course of years up to a recent date considerable sums have been expended in constructing dams, regulating weirs, and dykes to give the required facilities for the trade passing through it, and the original difference of opinion as to which side is the best canal route exists up to this day. The work, however, was constructed in the same substantial manner and superior quality of masonry and workmanship as the Lachine Canal.

The present dimensions of the Beauharnois Canal are as follows:

Breadth at bottom	80 feet.
" " surface	120 "
Length of canal	11¼ miles.
Total rise of lockage	82½ feet.
Dimensions of locks	200 by 45 "

No. of locks 9; depth of water on sills 9 feet.

Total cost to 1st July, 1867, $1,611,424.11; works and repairs since to 1st July, 1870, $26,120.03.

The navigation of this canal is open on an average for 221 days of the year, opening about the 20th of April and closing about the 28th of November. Earliest opening on record, 12th of April; latest, 5th of May. Earliest closing, 24th of November; latest, 13th of December.

The Cornwall Canal is the next in ascending the St. Lawrence. It is on the N. side of the river, and extends from the town of Cornwall. It is 11½ miles in length, and surmounts the Longue Sault Rapids. This is the first of the St. Lawrence canals that was constructed on the present scale. In 1817 the governor of Upper Canada called the attention of the legislature of that province to the importance of improving the navigation of the river below Prescott, which is situated a few miles above the head of the rapids of the St. Lawrence. In 1818 a joint commission was appointed by the governments of Upper and Lower Canada, and reported favorably on the subject, recommending the construction of small canals of 4 feet depth of water. In this report the cost of transport from Montreal to Prescott, a distance of 119 miles, is stated as being then $16 a ton, and thence to Niagara $8. Nothing further was done till 1826, when, at the instance of the legislature of Upper Canada, a report was laid before it with estimates for such canals, and also others of larger dimensions, 8 feet in depth. In 1832 an appropriation was made for a scale of canals 9 feet in depth. In 1834 the work was put under contract, but its progress was retarded by the insurrection and financial difficulties, and it was not completed till 1843. This canal is similar in construction to the others already described, excepting that instead of striking back for a direct route, it winds along the shore of the river, having necessarily heavy embankments towards it, in which breaks have taken place that have been repaired at considerable cost.

Its present dimensions are:

Breadth at bottom	100 feet.
" at water-surface	150 "
Length	11½ miles.
Locks, 7 in number	200 by 55 feet.
Depth of water on sills	9 "
Total lockage	48 "

Cost to 1st July, 1867, $1,933,152.69; cost since for works and repairs to 1st July, 1870, $46,962.79.

On an average this canal is open for 230 days of the year, opening about four days sooner and closing as much later than the Cornwall Canal. It has been known to open as early as the 7th of April, and the latest closing was on the 18th of December.

The next in the order of succession are the Farran's Point, "Rapide Plat," and "Galops" canals, known collectively as the Williamsburg canals.

Farran's Point Canal commences 5 miles above the head of the Cornwall Canal. It surmounts the Farran's Point Rapid, and is only three-quarters of a mile in length. Its dimensions are:

Breadth at bottom	50 feet.
" at water-surface	90 "
1 lock	200 by 45 "
Total rise of lockage	4 "
Depth of water on sills	9 "

Less breadth was considered necessary for this canal than the others below it, as it is used principally by vessels ascending. Descending vessels run down the rapids with ease and safety. Though proposed and surveys made of a site for it, this canal was not commenced till four years after the union of Upper and Lower Canada. It was completed for traffic in Oct., 1847.

The "Rapide Plat" Canal commences 10½ miles above the head of Farran's Point Canal. It surmounts the rapids after which it is named. Its other dimensions are the same as the preceding; it is narrow in width for the same reason. It has two locks, and a total lockage of 11½ feet.

The "Galops" Canal commences 4½ miles above the "Rapide Plat" Canal. It surmounts the rapids at "Pointe aux Iroquois" and the "Galops." It originally was in two parts, that were opened in Sept., 1847. The connecting portion was completed in 1856. It is 7⅝ miles in length. Its other dimensions are the same as the two preceding, for the same reason. It has three locks, and a total lockage of 15¾ feet.

These three canals are on an average open for navigation 233 days in the year; the dates of opening and closing closely resemble those given for the Cornwall Canal. The total cost of these three canals to 1st July, 1867, was $1,320,655.54; cost since for repairs to 1st July, 1870, $20,975.60.

For the year to 30th June, 1872, on the St. Lawrence canals, including the Lachine Canal:

The total of tolls accrued was	$84,675.09
Of tonnage of vessels passed	1,134,446 in Canadian vessels.
	52,320 in U. S. "
Of goods transported, tons	940,645

The Welland Canal is the next that occurs in ascending the St. Lawrence navigation. The distance to it from the last is 226 miles. It is the most important of Canadian canals. It leaves Lake Ontario at Port Dalhousie, 12 miles westward of the mouth of the Niagara River, and at Port Colborne, 17 miles westward of the head of that river, it enters Lake Erie, surmounting the falls and rapids of Niagara. Its length, apart from that of its branches, is 27 miles.

In 1816 the project of connecting these lakes by a canal was first taken into consideration, and reported upon by a committee of both houses of the Upper Canada Parliament. In 1821 a commission appointed to consider the subject of inland navigation reported favorably upon it, and suggested the formation of a commission to carry out the work. This led to the incorporation of a company, on the petition of W. H. Merritt and others, in 1824, who proposed constructing a combined canal and railway, the canal to admit of passing boats of 40 tons. In 1825 this scheme was abandoned, and another adopted of connecting the Welland River with Lake Ontario by a canal, with wooden locks 110 feet by 22, and 8 feet of water on the sills, to admit of the passage of sloops and schooners. The company went into operation in 1825 with limited capital and partial assistance from the imperial and provincial governments, encountering many difficulties, financial and physical; among others, a land-slide caused them to abandon the river Welland as a feeder and adopt the Grand River instead of it. In 1829 water was let into the canal, and two schooners ascended by it to the river Welland. Subsequently, the company obtained an extension of capital, and adopted the design of carrying the canal over the Welland River to Port Colborne, nearly on its present site, which was completed accordingly in 1833, but with small wooden locks. In 1839 an act was passed authorizing government to purchase all the private stock, which was not done till 1841, when the canal was placed under the board of works of Canada, and the enlargement of it decided upon. It was determined to rebuild all the locks in stone, 120 feet by 24, with 8½ feet water; the aqueduct to be rebuilt in stone; the Grand River feeder to be converted into a navigable canal; the harbors of Port Colborne and Port Dalhousie, one lock at the former and two at the latter, to be 200 feet by 45, with 9 feet of water; the Port Maitland branch to be constructed with a similar lock at its Lake Erie entrance. This led to the works being carried out in their present dimensions, which are as follows, the main line from Lake Ontario to Lake Erie:

Length of canal	27 miles 1099 feet.
3 pairs of guard gates.	
2 lift-locks	200 by 45 feet.
24 "	150 by 26⅝ "
1 "	230 by 45 "

Total rise of lockage to Lake Erie	330 feet.
8 feet by 2 feet Grand River level	16 "
Total lockage up and down	346 feet.
Depth of water on sills	10¼ "

For 14 miles the summit-level is 8 feet above Lake Erie, making 16 feet of lockage up and down, in addition to the difference in level of 330 feet between the lakes. The summit-level receives the branch from Grand River, which is the feeder of the main canal, besides being a navigable arm of it. But as the supply from it is found inadequate to meet the requirements of the steadily increasing traffic, the lowering of this summit-reach to the level of Lake Erie, which is to be the feeder of the canal, has been for some years in progress.

The breadth of the main canal varies in different parts of it from 26 feet at bottom and 66 at surface to 70 feet at bottom and 110 at surface. The enlargement of this canal to a uniform scale of dimension of 100 feet breadth at bottom and 12 to 13 feet depth of water, with locks of 270 feet in length between the gate-quoins, and 45 feet in breadth, with 12 feet depth of water on the sills, has been decided upon in accordance with the recommendation of such dimensions by the Canada canal commission of 1871, as a general scale to be adopted throughout all the Canadian canals on the St. Lawrence navigation. In pursuance of this decision, the Canadian government has advertised for tenders to be received on Oct. 18, 1873, for the enlargement and deepening to the above dimensions of a great part of this canal (including the Deep Cut, which is 1¾ miles in length and 60 feet deep in parts), together with the construction of new portions of canal between Thorold and Port Dalhousie, and of fourteen new locks of the above size and depth, and their weirs; and also for the deepening and enlargement of Port Colborne. When enlarged to this the Welland Canal will admit of vessels of 1300 tons burden passing through it.

The existing twenty-seven lift-locks and their weirs, and three guard-locks, are all substantially constructed of durable stone masonry, excepting a guard-lock at Port Robinson, which is of wood and masonry. There is on it a substantial stone aqueduct, which carries this canal over the river Welland. A lock into the Welland above the aqueduct, and the connection by another below Port Robinson, enable vessels to pass down that river without serious obstruction from the aqueduct.

The Welland Canal has two branches—the Welland River or Chippewa branch, and the Grand River feeder; the latter has a short branch connecting it near its termination with Port Maitland on Lake Erie. The Welland River or Chippewa branch descends from the main line into the Welland River by means of a lock at Port Robinson. The river Welland is then descended 8¾ miles, with a short cut to the Niagara River at Chippewa. The canalling on this branch consists of—

The cut from Port Robinson to Welland River	2622 feet.
Length of lock above aqueduct	300 "
" " Chippewa Cut to Niagara River	1020 "
2 locks, each	150 by 26½ "
Depth of water on sills	9 feet 10 inches.

The Grand River feeder is 26 feet wide at bottom and 60 to 70 at the surface, and 8 feet deep. It taps the Grand River at Dunnville, where a dam 564 feet long raises the water of the river, making it navigable for 16 miles up to Cayuga.

Length of Grand River feeder	21 miles.
Locks { 1 of	150 by 26½ feet.
Locks { 1 of	200 by 45 "
Depth of water on sills	10½ "
Total rise of lockage	7 to 8 "

Its branch to Port Maitland is 1¼ miles long, with one lock of 185 by 45 feet, and 11 feet depth of water on sills, with a total lift of 8½ feet.

For the year ending June 30, 1872, on the Welland Canal—

The total of tolls accrued was..	$254,781.92
Of tonnage of vessels passed.....	565,207 in Canadian vessels.
	812,608 in U. S. vessels.
Of goods transported, tons.....	1,319,996

The total cost of the Welland Canal and its branches to July 1, 1867, was $7,638,239.83; cost since to July 1, 1870, for works and repairs, $224,375.07.

It is on an average open for 241 days in the year. Its earliest opening on record was 25th of March; the latest, 5th of May. Its earliest closing, 15th of November; its latest, 19th of December.

The Burlington Bay Canal is generally classed in the St. Lawrence navigation. It is merely a cutting of half a mile in length through a piece of low land which separates Lake Ontario from a large sheet of deep water, called Burlington Bay, at the W. end of it. It enables vessels to reach the city of Hamilton and the Desjardin Canal (a deepened channel), the property of a private company, leading up 5 miles to the town of Dundas. The canal is navigable for vessels drawing 12 feet of water; its width is from 108 to 138 feet between the piers on each side of it, that are of cribwork filled with stone. The outer end of the S. pier extends 300 feet into Lake Ontario. This work was begun in 1843; the upper part of the piers has been rebuilt since 1855. The total cost of this canal to July 1, 1867, was $432,684.40; cost since to July 1, 1870, for repairs, $682.53.

This completes the list of existing Canadian canals on the St. Lawrence and its lakes.

The second part of the canals of Canada that presents itself for consideration is the Ottawa and Rideau navigation, which includes the St. Anne's, Carillon, Chute à Blondeau, and Grenville canals on the Ottawa, surmounting the rapids on that river between Montreal and the city of Ottawa, and the Rideau Canal, connecting the Ottawa with the St. Lawrence, at Kingston, by the rivers Rideau and Cataraqui.

The Lachine Canal already described forms the first link in this line of navigation, as it serves alike the traffic of the Ottawa and the St. Lawrence between Lake St. Louis, where these rivers meet, and the harbor of Montreal. From the head of the Lachine Canal, 8½ miles from Montreal, there is a channel of fifteen feet and upwards in depth, but crooked in parts, through Lake St. Louis for fifteen miles, nearly to the St. Anne's lock. The formation of a new and direct channel of 120 feet in width and of ample depth, flanked with a guide-pier of cribwork, through the shoal below the entrance, has been contracted for and is in progress.

St. Anne's Canal is situated on the N. side of a channel of the Ottawa between Ile Perrot and the head of the island of Montreal. It overcomes a short rapid with a fall of 3 feet, the difference of level between Lake St. Louis and the Lake of the Two Mountains above it. The canal is half a mile in length, and the lock is 190 feet by 45, and has a depth of from 6 to 7 feet of water on the sill. It is built of substantial masonry. The lock was contracted for in 1840, and opened for use in 1843. The total cost of these works to July 1, 1867, was $134,456.51; cost since to July 1, 1870, for repairs, $3528.44.

For the year to June 30, 1872, on St. Anne's lock—

The total of tolls accrued was..	$2,991.98
Of tonnage of vessels passed.....	3,460 in U. S. vessels.
	91,425 in Canadian vessels.
Tons of goods transported.....	100,865

It is generally open from the last week in April to the last week in November.

From St. Anne's lock, with the exception of the imperfect upper entrance to it, and a shoal with 13 feet of water a little above it, the Lake of the Two Mountains is 20 to 30 feet deep; the distance through it and a short part of the Ottawa above it to the foot of the Carillon Canal is 27 miles.

The "Carillon," "Chute à Blondeau," and "Grenville" canals were constructed by the imperial government of Great Britain. They were projected in 1819, but it was not till April, 1834, that the Grenville Canal, the latest of them in being completed, was opened for navigation. In 1856 they were transferred to the province of Canada. It would be difficult to ascertain the cost of the original construction of these works under the direction of the royal staff corps. The expenditure upon them by the provincial government up to 30th June, 1867, was $63,053.64.

The Carillon Canal, as it at present exists, is of the following dimensions:

Breadth at bottom	30 feet.
" " surface	50 "
Length of canal	2⅛ miles.
3 locks, two rising; in all	21¾ feet.
one falling	13 "
Total rise	8¾ "
Dimensions of locks from 126½ to 128 by	32½ "
Depth of water on sills	6 "

All built of substantial masonry.

The inadequacy of this canal for the requirements of the increasing trade of the Ottawa, the lockage up and down of 34¾ feet to overcome a rise of 8¾ feet, and the insufficiency of the supply by the summit-feeder were reasons for abandoning the present canal; especially as, in accordance with the recommendation of the canal commission of 1871, the Canadian government decided on adopting an increased scale of dimensions for the Ottawa canals, with locks of 200 feet by 45, and 9 feet depth of water on the sills, and as the designed improvement could be better effected by damming the rivers.

Acting accordingly, the Canadian government has (in 1873) contracted for the construction of a wooden dam across the Ottawa on the Carillon Rapids of sufficient height to flood them out, and also the Chute à Blondeau Rapids, with three-quarters of a mile of canal, with two

locks descending from it, on the N. side, and a raft-slide 220 feet in width and 550 long on the S. side. The locks are to be built of the above dimensions and of the most substantial masonry. The canal is to be made by embankment in the river-bed, faced with substantial masonry, and all to be completed by the 1st of Nov., 1875. This dam will afford an enormously great and very available water-power in a commanding position on a great line of navigation. But the chief advantage of it is that by flooding out both of these rapids it will supersede the "Carillon" and "Chute à Blondeau" canals, and the necessity of enlarging them; and by substituting its lockage of 12½ feet and the broad river for the narrow canals and their 38½ feet of lockage, it will much reduce the time of vessels passing.

The "Chute à Blondeau" Canal commences 4 miles above the head of the present Carillon Canal. It surmounts the rapid of that name, and is half a mile long, cut through solid rock, on the N. side of the river. It is 30 feet in breadth at top and bottom, has one lock, 130⅚ feet by 32⅚ at the upper and 36⅓ at the lower end, and 6 feet depth of water on the sills. The total rise of lockage is 3¾ feet.

The Grenville Canal commences 1⅜ miles above the preceding. It is 5¾ miles long, and surmounts the "Longue Sault" Rapid. As originally constructed, its breadth at bottom was from 20 to 30 feet and at surface 30 to 60 feet, but much of it has been very recently enlarged. It has seven locks. The first and second are combined, and also the third and fourth. They vary from 128 to 130 feet by 31⅚ to 32⅓, with 6½ feet of water on sills. The remaining three locks originally were about 107 feet by 19, with 6 feet of water on sills, but two of them have been already rebuilt on the enlarged scale of 200 feet by 45, with 9 feet of water on sills, recommended for the Ottawa, and the third is now being so enlarged. The total rise of lockage is 45¾ feet.

The cost of these three canals since their transfer to Canada, to 1st July, 1867, was $63,053.64; for repairs and work to 1st July, 1870, $47,034.56.

The navigation of the Ottawa and the works upon it are noticed so fully here because they form part of the proposed Ottawa and Huron navigation, which, when the Caughnawaga Canal is constructed between Lake Champlain and Lake St. Louis, will offer by far the shortest and apparently the most advantageous line of navigation between New York and Chicago. These Ottawa canals are generally open from the 25th of April to the 30th of November.

From the head of the Grenville Canal to the entrance of the Rideau Canal, at the city of Ottawa, is, by the course of the river, 56 miles, making a total distance of 120 miles from the city of Montreal. The ordinary breadth of the river between Grenville and Ottawa is about half a mile, and its depth of channel 30 feet, excepting one short shoal of 8 feet at low water.

The Rideau Canal is 126¾ miles in length. From Ottawa to Kingston it is a system of continuous slack-water navigation, obtained by damming the rivers Rideau and Cataraqui between the river Ottawa and Lake Ontario. It was constructed by the British government, chiefly with a view to the defence of the province, by securing, in connection with the Ottawa, an interior route of water-communication between Montreal and Lake Ontario, avoiding alike the rapids of the St. Lawrence and the danger in time of war of transporting stores along that river where it formed the international boundary. Though fortunately never required for use under such circumstances, it was of great use commercially to the provinces from 1834, when the Ottawa canals were first opened to the public, till the opening of the St. Lawrence canals. Steamers with long lines of barges with up-freights ascended to Kingston by the Ottawa and Rideau, and the barges returned down through the St. Lawrence laden to Montreal. Since the opening of the St. Lawrence canals that traffic has been altogether discontinued, and the Rideau Canal has become of comparatively little importance. With respect to the Ottawa canals the case is otherwise in a very great degree, owing to the growth of the city of Ottawa, the progress of settlement, and the great development of the lumber-trade of the Ottawa, especially the manufacture of sawn lumber. During the year ending on 30th June, 1872, the traffic through the Ottawa and Rideau canals amounted to upwards of 500,000 tons, three-fourths of which was sawn lumber.

For the year to 30th June, 1872, on the Ottawa and Rideau Canals—

The total of tolls accrued was....$38,017.14
Of tonnage of vessels passed..... { 25,245 in U. S. vessels. / 360,909 in Canadian vessels.
Of goods transported, tons.....519,040

The construction of the Rideau Canal was first taken into consideration in 1814, after various reports and projects respecting it had been submitted. The construction of it was decided on by the British government in 1825. In Sept., 1826, Colonel By was sent out to superintend the work, and on the 21st of the same month the excavation for ten locks was begun. It was completed and opened to the public in the spring of 1832. The works are all of the most substantial description, no expense being spared in their construction.

The length of the Rideau Canal from Ottawa to Kingston is 126¼ miles, but the total length of actual canals connecting the slack-water reaches is only 8½ miles. It has forty-seven locks, of which thirty-three ascend 282¼ feet from the Ottawa level to Rideau Lake, the summit, from which fourteen locks descend 164 feet to the Lake Ontario level at Kingston. The locks are all of the most substantial masonry, 134 feet by 33, with 5 feet of water on the sills. The breadth of the canal cuttings is at bottom 60 feet in earth and 54 in rock; at surface of water it is 80 feet in earth and 54 in rock. The line throughout admits of vessels passing of 4½ feet draft. Between Ottawa and the summit there are seven stone dams, from 200 to 548 feet in length and from 5 to 29 feet in height, and 11 of wood or earth, from 108 to 1616 feet long and 6 to 45 in height. Between the summit and Kingston there are four stone dams, 130 to 300 feet long and from 16 to 60 feet high. The extent of flooded lands caused by the dams and the broad lakes upon the line of the Rideau Canal made it impracticable to have a towpath along it.

The total cost of it to 1st July, 1867, was $4,064,764.47, of which the original outlay by the imperial government was £758,966 12*s.* 11¾*d.* sterling, apart from land damages. This canal was transferred to the Canadian government in 1856, and the cost for works and repairs from 1st July, 1867, to 1st July, 1870, was $58,666.51.

The distance from Montreal to Kingston is 68¼ miles longer by the Ottawa and the Rideau Canal than by the St. Lawrence. The Rideau Canal is generally opened in the last week of April, and closed at the end of November.

3. The Richelieu and Champlain navigation is the next to be considered.

The river Richelieu enters the St. Lawrence 46 miles below Montreal. It is rendered navigable from the St. Lawrence to Lake Champlain by a dam and lock at St. Ours, 14 miles above its mouth, and a canal of 12 miles in length 32 miles farther up the river, known as the Chambly Canal.

The St. Ours Locks and Dams.—At St. Ours the river divides into two deep channels. In the eastern channel a lock in cut stone, with a dam 300 feet long of earthwork, has been constructed, and in the western channel a dam 600 feet long, of cribwork filled with stone, has been made. The length of canal is one-eighth of a mile. The lock is 200 feet by 45, with 7 feet water on the sills at lowest; its total lift is 5 feet. These works raise the river from 4 to 7 feet above its natural level, and give a depth of not less than 7 feet up to the entrance of the Chambly Canal. They were commenced in 1844, and finally completed in 1851.

The Chambly Canal is 12 miles in length. It has nine locks of cut stone, varying from 118 to 125 feet in length and about 23½ feet in width, with 7 feet of water on their sills. The total rise is 74 feet. The canal is 36 feet wide at bottom and 60 at the surface of the water.

The construction of this canal commenced in Oct., 1831. After much delay in the progress of the work the charge of it was assumed by the department of public works of the united provinces, and in 1843 it was opened for use. The lock walls having proved weak, and the excavation of the canal being imperfect, an expenditure of $69,758 was found necessary for completing and repairing the work.

The account of cost of the St. Ours and Chambly canals is undivided in the public accounts. The total expenditure before and since the union of the provinces, up to 1st July, 1867, is given by the department of public works report as $756,249.41, of which $634,711.76 is stated to be for the Chambly Canal and $121,537.65 for the St. Ours works. The further cost for repairs to 1st July, 1870, for the St. Ours locks is $3159.24, and for the Chambly Canal, $43,179.38.

For the year to 30th June, 1872, on these works—

The total of tolls accrued was....$30,610.38
Of tonnage of vessels passed..... { 327,911 in Canadian vessels. / 81,998 in U. S. "
Of tons of goods transported.....346,148

The St. Ours lock generally opens about the middle of April and closes in the beginning of December. The Chambly Canal closes about the same time, but opens a little later.

The trade of the Richelieu Canal is steadily increasing, being swollen by sawn lumber from the Ottawa passing through to Lake Champlain for markets in the U. S. It is now taxed to nearly its utmost capacity of transport; during the year to 30th June, 1872, the freight that passed

through it amounted to 346,128 tons. This large trade will continue till the Caughnawaga Canal from the St. Lawrence to Lake Champlain is constructed. Then the Ottawa lumber will go by it instead of the Richelieu; the latter, however, will still have the transport of lumber from the St. Maurice and other tributaries of the St. Lawrence below Montreal, which will steadily increase, as the exhaustion of the pine forests will bring the spruce lumber of Lower Canada more into demand.

The Canadian canal commission have recommended the enlargement of the Chambly Canal locks to the Ottawa standard of 200 feet by 45, which doubtless will be done before long in the required rebuilding of them.

4. The river Trent navigation is the next subject in succession. It has to be noticed separately, not from its importance, but because it does not properly come under any other head.

The river Trent discharges into the Bay Quinté, Lake Ontario, about 67 miles above Kingston. It was originally proposed to form a line of slack-water navigation by it and the lakes of the New Castle district of Upper Canada through to Lake Huron, as a means of shortening the distance by water from Kingston to the far West. But that idea had to be abandoned, as the summit-level was found to have an elevation at Balsam Lake of 589½ feet, and the route is so crooked as to be more than double the direct one of 112 miles from Kingston to Lake Huron. In Feb., 1833, however, the legislature of Upper Canada appointed commissioners and authorized the raising of a loan for the improvement of this route, as a line of inland communication and for the descent of timber, as far as Lake Scugog, a distance of 190 miles, including the length of that lake. Work was commenced in 1833, and a short piece of canal and a wooden lock (since rebuilt in stone) were completed in 1855 at the rapid below Sturgeon Lake, 140 miles up the route, which permitted vessels navigating Chemong, Buckhorn, and Pigeon lakes to pass through Sturgeon Lake up to the town of Lindsay.

Afterwards several grants of money were obtained, and dams and other works constructed. After the union of the provinces various unfinished works were completed and others made, including four stone locks, 133 feet by 33, with 6 feet of water on the sills, and one of wood; also nine dams, one of which is of stone, and some short pieces of canal.

The total expenditure on these works, apart from timber-slides, roads, and bridges, up to 1st July, 1867, amounts to $319,371.31. There is no account of tolls and tonnage in the public accounts for the Trent navigation.

Steamers navigate the upper lakes above mentioned, chiefly for the towing of rafts and other purposes of the lumber-trade. Of the whole distance of 190 miles to the head of Scugog Lake, 152¼ miles are navigable, and 37¼ not practicable, even for boats. The Peterboro' and Port Hope Railway has diverted traffic from part of this route, and for some years the works were neglected. The opening and closing of this navigation may be taken to be nearly the same as of the Rideau Canal.

5th. The St. Peter's Canal is the only existing Canadian canal remaining to be noticed. It is the only canal in actual operation in the maritime provinces of Canada. It connects the Bras d'Or Lake of Cape Breton with the Atlantic at St. Peter's Bay on the S. coast of that island. The Bras d'Or is a large landlocked arm of the sea in the interior of the island. It is 60 miles long from its entrance on the N. E. coast to its southern extremity, and 15 miles in greatest breadth. It has several bays or arms that reach far inland in different directions. Its southern extremity reaches within half a mile of St. Peter's Bay, and it is across this narrow isthmus that the St. Peter's Canal is cut.

The project of constructing this canal was adopted by the legislature as designed by Captain Barry, and the work commenced in Sept., 1854. It was suspended for a time, and resumed at the instance of the Cape Breton representatives in 1864. It was handed over to the Dominion in 1867. It is 2400 feet in length and 26 feet wide at bottom. It has one tidal lock 122 feet by 26, with 13 feet depth of water on the sills at lowest tide. The lock has four pairs of gates. The extreme rise and fall of the tide in St. Peter's Bay is 9 feet. The total cost of it up to 30th June, 1870, was $302,037.53, including $138,433.09 since confederation for further work.

The Bras d'Or and its arms abound in fish, and the surrounding country is rich in mineral and agricultural resources. The traffic on this canal during the year ending 30th June, 1871, consisted of 656 vessels, freighted with coal, limestone, marble, fish, and flour, making an aggregate of 26,757 tons; besides 262 open boats. The canal opens about the 20th of April, and closes about the last of December.

The projected canals of Canada claim consideration, not only for the unusual magnitude of most of them as engineering works, and the importance of the objects to be attained by them, but especially because they are all calculated more or less to benefit the people of the U. S. by giving them improved outlets for the products of the great West, and otherwise facilitating their commerce and fisheries—some of them, indeed, to a greater degree than they can benefit the Canadian people. This is decidedly the case as to the Caughnawaga Canal. It was first brought prominently before the public by Messrs. John Young, L. H. Holton, and other merchants of Montreal in 1848. Mr. J. B. Mills, by direction of the governor-general, made a survey and reported in favor of a line from the Indian village of Caughnawaga, on the St. Lawrence opposite the head of the Lachine Canal, to St. John on the Richelieu, at the head of the Lake Champlain navigation. It was recommended by the commissioner of the public works in 1852, but no action was taken about it by government, excepting the obtaining of further surveys and reports by Mr. Jarvis and others of various routes. In 1870, at the instance of Mr. Young and others, a bill was passed incorporating a company to build the Caughnawaga Ship Canal from Lake St. Louis on the St. Lawrence to Lake Champlain, the locks not to be less than those of the Beauharnois Canal—that is, 200 feet by 45—and 9 feet of water on the sills; the canal to be completed in five years, otherwise the charter to expire.

Lake Champlain is only 29 feet above the St. Lawrence at Caughnawaga in Lake St. Louis. One of the proposed routes would be about 34½ miles long, with Lake Champlain as its summit-level and feeder; another of 25½ miles in length would have its summit 37½ feet above Lake Champlain, with a feeder from the St. Lawrence; and a third route, 37½ miles long, would connect Lake Champlain with the lower part of the Beauharnois Canal, of which it would, in a manner, form a branch. The opening of this canal would have very important results. It would very greatly benefit and expand the lumber-trade of the Ottawa. Its sawn lumber in barges, on reaching the mouth of the Ottawa in Lake St. Louis, instead of descending the Lachine Canal and St. Lawrence, 55 miles, and ascending the Richelieu and its canals, 58 miles, to St. John's, would pass from Lake St. Louis to St. John's, 28 miles, or thereby, by this canal, saving about 85 miles in distance and 86 feet of lockage. During the year ending June 30, 1869, 220,000,000 feet of sawn lumber passed down through the Ottawa canals, besides what descended through the rapids; 150,000,000 of this probably passed by the Richelieu to Lake Champlain. Had the Caughnawaga Canal been in operation, the saving by it on the freight on that quantity would have been, at reasonable rates, $100,000, besides a corresponding reduction in the cost of transport of return cargoes of coal and other merchandise. When it is made and in operation, much inferior timber, and of various kinds, that would not now pay its freight, will be manufactured and taken to market with profit.

When the New York Champlain Canal is enlarged and this canal opened, they, with the enlarged Welland Canal, will no doubt form a more eligible route for the transport of the grain of the West to New York than the Erie Canal ever can, even if it were enlarged to the utmost capacity its summit-supply of water will permit. It is true that the distance from Lake Erie to New York will be about 217 miles longer by this route than by the Erie Canal, but as the Welland and the St. Lawrence canals, when enlarged on the scale begun, will pass vessels of 1300 tons (the latter already can pass vessels of 700 tons, and one passed in 1872 of 760), the much quicker trips, far less lockage, and the great economy of the very much larger cargoes, either by propellers or barges going through to New York without transshipment at Albany, must obviously give the route by the Caughnawaga Canal a most decided advantage. In short, the opening of such a route would render every improvement on the St. Lawrence by the people of Canada for the purpose of drawing the trade of the West to Montreal necessarily equally effective in favor of New York, and draw to it much trade which Montreal, in virtue of the advantages of the St. Lawrence route, is now rapidly appropriating. That would be so far advantageous to Montreal; but it is alike the interest of the U. S. and Canada that the producers of both countries on the great lakes and in the Western territories should have the cheapest transport of their produce to market, irrespective of the interest of either city; and that the rivalry on equal terms would certainly ensure.

A glance at a map will show that the entrance of this Caughnawaga route is directly opposite the mouth of the river Ottawa, the entrance to the proposed line of the Ottawa and Huron navigation, the next projected work to be noticed.

The projected Ottawa and Huron Canal, as it is called,

offers, according to the report of that eminent engineer, Mr. Walter Shanly, a route to Chicago 368 miles shorter than that by the St. Lawrence. It is true that the recent correction of the reputed distance by the lakes to Chicago by U. S. engineers will reduce this difference, but will no doubt more or less affect the lake portion of both routes; and the difference to Lake Superior and Duluth will in any case be 40 miles more in favor of the Ottawa and Huron route. The lockage by this route would be 157 miles more than by the St. Lawrence; nevertheless, by Mr. Shanly's calculations, based upon McAlpine's well-known rates for comparison, the movement of freight would cost fully one-ninth part less from Montreal to Chicago than by the St. Lawrence and Welland canals, or by the St. Lawrence and the Georgian Bay canals. The saving of time he estimates at 44 hours as compared with the St. Lawrence and Welland route, and 22 hours as compared with the route by the Georgian Bay Canal.

The Ottawa and the French River, which the route follows to Lake Huron, offer great facilities for canalization in the lakes and long trench-like reaches of deep navigable water which characterize their courses, and both are remarkable for their great volume of water, well sustained in dry weather. Lake Nippiseongue, the proposed summit-feeder of this route, presents an enormously redundant supply. The navigable reaches of the Ottawa vary from 10 or 15 to 50 or 60 miles in length. They are navigable now by steamers for upwards of 300 miles above its mouth. One of the upper boats draws 9½ feet, plying on a reach of 40 miles.

Mr. Clarke, who completed the canal survey of the Ottawa for government, estimated that canalling, where required, the whole route through to Lake Huron, 431 miles, with locks 250 feet by 45, with 12 feet of water on the sills, would cost $12,057,680, to be effected chiefly by damming; 21 miles of actual canalling only being required. Locks of 200 feet by 45, with 9 feet of water on the sills, is the scale adopted on the recommendation of the Canada canal commission for the progressive improvement of the Ottawa.

No doubt this route would be very advantageous, especially as a barge route, as the dangers of the lakes would be avoided between St. Joseph Island and Montreal, while the great size of the river navigation would give room for the utmost speed. But as the Canadians have constructed great works for the perfecting of the St. Lawrence route, and are enlarging and completing them, it would seem unwise for them to undertake the task of opening another rival route before the trade of the country needed it. The requirement of the lumber-trade, and the increasing settlement and prosperity of the Ottawa country, will lead gradually to the construction, successively, of the requisite works for surmounting the obstacles on this route, till little be needed to complete it as a highway to the West. It will then afford, in conjunction with the Caughnawaga Canal, a most direct and favorable route from Duluth and Chicago to New York. Two locks are being built by government now, 200 feet by 45, at L'Islet's Rapids, 213 miles up the Ottawa, that by connecting two reaches will give 70 miles of uninterrupted navigation.

It is argued that as the dams to be built to flood out the rapids, together with the falls on the Ottawa and French rivers, will, from the great volume of the rivers, afford unlimited water-power at numerous points on the route, they will become the sites of important manufactories, as on the Erie Canal, but with incomparably greater available water-power; and that the grain of the West may, with great advantage, be manufactured there into flour while on its way to market.

This route is deservedly advocated by the inhabitants of the Ottawa valley; but they are a minority, and it was not to be expected that the inhabitants of the far more populous districts of Canada upon the St. Lawrence, and their parliamentary representatives, who would chiefly have to bear the burden of the cost, should readily consent to the Ottawa, far from them, which they cannot use, being, at great outlay, made the commercial highway of the West, instead of their own route, the St. Lawrence, in the improvement of which they are so deeply interested.

Apart from its claims as a highway to the West, the improvement of the Ottawa route is of great importance to the provinces of Ontario and Quebec in opening up their interior country, as the Ottawa is the boundary between them for 400 miles of its course. In that respect the Georgian Bay Canal, the next projected work to be noticed, is very different. Connecting Lake Ontario at Toronto with the S. extremity of the Georgian Bay of Lake Huron, it would be almost, perhaps quite, equal to the Ottawa and Huron route in shortening the distance for the trade of the West. It would feed the Erie Canal eastward of Oswego, but it would be of no use to the country around Lake Erie, and passing through an already occupied country, that has a railway connecting the same points as the canal, would, in its 100 miles of course, develop nothing new of importance. The chief objection to it is its impracticability except at enormous cost.

The canal commission of Canada in 1871 state in their report "that the public should be reminded of the facts that the proposed canal is of equal length with the Suez Canal, that has cost $80,000,000 and occupied fifteen years in construction. But it is encompassed with difficulties infinitely greater. While the Suez, being on a dead level from sea to sea, is unencumbered by a single lock, the Huron and Ontario has an intermediate summit of 470 feet above Ontario to surmount, which requires forty-two locks and 600 feet of lockage. It has also no less than three deep cuts, the least of which is larger than the celebrated deep cut on the Welland, and the largest of which exceeds it in volume of material eighty-fold."

The commission concludes with the opinion that, "admitting it to be physically possible, the cost of carrying out such a project would render it commercially worthless."

A canal at Sault Ste. Marie is the next Canadian project to be noticed. It is stated that a canal on the Canadian side of the river St. Mary would be much more commodious and secure, especially at the upper entrance, than the existing canal on the U. S. side of the river; that it would have deeper approaches and be one-third shorter; in short, that it would have every advantage over the latter. There was strong testimony in favor of it given before the Canadian canal commission, already mentioned, and the commission recommended it as a work of the first class in importance. This arose, no doubt, chiefly from the passage of vessels with troops for Red River Settlement through the Sault Ste. Marie Canal having been refused at the time of the disturbances there. Possibly, the better understanding and agreement as to the use of canals in common through the treaty of Washington may abate the urgency for this work. But it is not unlikely that the necessity of having a passage through Canadian ground for the transmission of troops in case of disturbances between Indians and settlers, or other necessity, will ultimately lead to the construction of the proposed canal.

The next project proposed to be noticed is the Bay Verte Canal, which also has been included as of first-class importance by the canal commission. The object of this canal is to connect the waters of the Gulf of St. Lawrence at Bay Verte with those of the Bay of Fundy at Cumberland Basin, by cutting across the isthmus of Chignecto, which unites Nova Scotia with New Brunswick, so as to admit of vessels engaged in the coal-trade of Pictou and the fisheries of the Gulf, and the coasting-trade of the St. Lawrence, the Gulf, and the Bay of Fundy, passing directly between these waters, which are only 15¼ miles apart, instead of having to make a circuit of 600 miles out through the Gut of Canso to the Atlantic, and round the peninsula of Nova Scotia. In addition to former surveys, one has just been made by order of the government of the Dominion of Canada for a site for this canal. It will present serious and unusual difficulties in its construction, owing to the great difference in the height to which the tide rises on each side of the isthmus. Spring tides rise 45¼ feet in the Bay of Fundy, and but 10½ in Bay Verte. The canal commission recommended a canal with locks of 270 feet length of chamber, by 40 feet in width, having 15 feet in depth of water on the sills. The estimated cost is $3,250,000.

The last route of communication proposed to be noticed in this article is the Shebandowan and Lake of the Woods navigation, which forms about 311⅓ miles of the line of communication established by the Canadian government between Thunder Bay of Lake Superior and Fort Garry in Manitoba, known as the Dawson route, which is 451⅓ miles in length. This is the route by which the military expedition under Col. Wolsey passed through to Red River Settlement in 1870. Since then the route has been much improved by the Canadian government, and emigrants and their luggage are conveyed over it at moderate rates. The 311⅓ miles of water-conveyance on this route, though not, strictly speaking, a canal, are admirably adapted for canalization. The connection of its principal reaches has been proposed, and will no doubt before long be carried into effect to a considerable extent. It consists of ten navigable reaches, varying from 8 to 120 miles in length. The last and greatest is formed by Rainy River and the Lake of the Woods, separated only by the falls at Fort Francis from Rainy Lake, which is navigated for 44 miles. On the Lake of the Woods and Rainy River a steamer of 120 feet keel and 20 feet beam plies from the falls to the N. W. angle of the Lake of the Woods; on Rainy Lake one of 100 feet keel and 19 feet beam. On the eight other reaches the transport is effected by barges towed by small steam-launches. The smallness of the crafts is not caused by want of depth of water. On the contrary, the slack

water consists of deep trench-like lakes generally, with the exception of Rainy River, which is large and deep. The ten portages amount together to nearly 7¾ miles.

The total fall to be overcome by lockage in the distance of 311⅓ miles from the summit-level at the commencement, to be obtained by damming, to the N. W. angle of the Lake of the Woods, is 425 feet, or an average of $1\frac{37}{100}$ feet per mile. This is more favorable than the Erie Canal, which has an average of $1\frac{91}{100}$; the Rideau Canal has $3\frac{51}{100}$. There is much valuable pine and other timber on the tributaries of Rainy Lake. As the supply of water is abundant and permanent, with prevailing deepness, it could be made a line of water-communication of great capacity. For the W. half of its extent it is the boundary of the U. S. Its eastern extremity reaches within 45 miles of Lake Superior. An important lumber-trade for the supply of the prairie country beyond will necessarily arise in this wooded region. From the Lake of the Woods westward the Canadian Pacific Railway and its connections will give the means of distributing the manufactured lumber.

The following table of tonnage and tolls levied on freight and passengers on all Canadian canals from 1850 to 1870, shows the progress of traffic upon them during that period; it also shows the extent to which they were used by American commerce:

Tonnage and Tolls levied on Freight and Passengers passed through all the Canadian Canals from 1850 *to* 1870, *inclusive, distinguishing whether from or to Canadian or U. S. Ports.* (*Abridged from the "Report of the Canada Canal Commission" of* 1871.)

Remarks.	Year.	From Canadian to Canadian ports.	From Canadian to American ports.	From American to Canadian ports.	From American to American ports.	Total Freight.	Tolls Collected on Freight and Vessels.		Net Revenue on Freight and Vessels after deductions and refunds.	
		Tons.	Tons.	Tons.	Tons.	Tons.	$	cts.	$	cts.
Ottawa canals, not included under control of imperial government.	1850	538,477	224,835	52,183	221,895	1,037,390	258,123	58	258,123	58
	1851	830,212	217,500	103,962	265,120	1,416,794	304,864	90	304,864	90
	1852	896,030	153,006	38,858	409,720	1,497,614	343,306	96	338,409	32
	1853	1,015,202	241,801	85,211	463,495	1,805,709	390,487	02	382,915	50
	1854	1,006,006	149,636	118,663	412,999	1,687,304	333,101	85	332,081	57
	1855	849,007	203,923	181,851	437,623	1,714,642	335,690	21	324,691	42
	1856	922,626	258,761	220,343	542,842	2,007,263	398,259	58	381,582	08
	1857	856,093	264,141	215,566	423,825	1,837,007	355,691	28	330,107	33
Season of navigation.	1858	1,424,313	259,537	162,936	471,432	2,335,480	314,447	51	302,410	59
	1859	1,563,599	338,437	126,707	380,601	2,447,766	228,962	41	223,427	38
	1860	1,351,186	473,365	169,671	589,479	2,583,701	333,262	56	205,921	93
	1861	1,522,029	246,742	299,798	546,323	2,614,892	419,385	02	185,521	75
	1862	1.545,219	552,606	371,510	644,393	3,113,728	497,305	96	213,487	41
	1863	1,664,908	491,112	274,897	621,358	3,052,275	385,220	21	385,220	21
	1864*	498,449	127,756	69,112	158,764	812,496	106,611	80	102,078	75
Fiscal years.....	1865	1,390,930	433,575	346,463	257,846	2,537,897	299,905	47	282,757	17
	1866	1,538,111	671,042	194,404	465,715	2,955,386	318,597	74	304,312	24
	1867	1,690,316	736,057	234,223	461,074	3,235,754	325,283	42	318,439	54
	1868	1,752,425	810,939	278,706	644,946	3,599,043	381,129	18	365,776	32
	1869	1,716,529	743,946	305,221	690,881	3,605,039	369,982	10	367,556	82
	1870	2,368,871	858,870	330,794	685,350	4,276,820	444,932	25	407,463	22

A. J. Russell.

Canal' Win'chester, or **Winchester,** a post-village of Madison township, Franklin co., O. It has one weekly paper. Pop. 633.

Canandai'gua, capital of Ontario co., N. Y., on the Auburn branch of the New York Central R. R., the E. terminus of the Niagara Falls Branch R. R., and the N. terminus of the Northern Central R. R. It is 28 miles S. E. of Rochester, at the N. extremity of Canandaigua Lake, which is navigated by daily lines of steamers. It is picturesquely situated on high ground which commands an extensive view of the lake. The beautiful scenery of the lake and the fishing and boating accommodations make Canandaigua a popular pleasure resort. Canandaigua (or, as originally, *Canandarqua*, signifying in the Indian tongue the "chosen spot") is a beautiful village with wide shaded streets, fine public buildings, and handsome residences. There are two weekly newspapers, seven churches, an academy, a female seminary, a library association and museum, four banks, various manufactures, two orphan asylums (one public and one private), a private lunatic asylum, a jail, and a fine court-house built jointly by the county and the U. S. government. Pop. 4862; of township, 7274.

N. J. Milliken, Ed. "Times."

Canandaigua Lake of Western New York is mostly included within Ontario co. It is 15 miles long, and varies in width from three-fourths of a mile to 1½ miles. It is surrounded by high banks which present beautiful and diversified scenery. The water is discharged at the northern extremity of the lake by an outlet which communicates with Clyde River, an affluent of the Seneca River. The surface of this lake is 437 feet higher than that of Lake Ontario, and 668 above the sea. The lake is navigable by steamers.

Cana'ries, or **Cana'ry Islands** (anc. *Fortunatæ Insulæ*), a group of islands in the Atlantic Ocean, belonging to Spain, are about 60 miles W. from the coast of Africa. They are between lat. 27° 49′ and 29° 26′ 30″ N., and between lon. 13° 25′ and 18° 16′ W. The names of the seven largest islands are Lanzarote, Fuerteventura, Gran Canaria, Teneriffe, Gomera, Palma, and Ferro (or Hierro); besides which there are several small islets. Their total area is 2806 square miles. The Canaries are of volcanic formation, and have high rocky coasts. The surface is mountainous, and the highest point, the Pico de Teyde, in Teneriffe, rises 12,182 feet above the level of the sea. The climate is mild and equable, the heat being moderated by the sea-breezes. The vegetation is arranged in zones, according to the height above the sea. The first or lowest zone produces the date-palm, sugar-cane, etc.; in the second flourish the grapevine, olive, and maize. The highest summits are barren and naked rocks. The largest island of the group is Teneriffe, which is nearly 60 miles long, and has an area of about 900 square miles. The Canaries have belonged to Spain since 1493, and the population is Spanish. The aboriginal race, called Guanches, was conquered in the latter year. The meridian of the island of Ferro (17° 39′ 51″ W. of Greenwich) is usually taken as the dividing-line between the eastern and western hemispheres. Pop. 267,036.

* Half year.

Cana'rium, a genus of trees of the order Amyridaceæ, natives of the East Indies, having compound leaves and diœcious flowers. The fruit is a drupe. The *Canarium commune* is cultivated in Java and the Moluccas for the sake of its fruit, which is edible and yields a lamp oil. This tree grows about fifty feet high, and is supposed to be one of the trees which produce elemi.

Cana'ry Bird, a small singing-bird of the family Fringillidæ, is nearly related to the finches, and is a native of the Canary Islands. The species of canary bird which is commonly kept in cages is called *Carduelis Canaria* by some naturalists, but others place it in the genus *Linota* or *Fringilla*. In its wild state it builds on shrubs or trees, and produces five broods in a year. In confinement it seems to be contented, and breeds readily several times in a year. The color of its plumage is mostly a rich and delicate yellow. Its favorite articles of food are canary seed, hempseed, sugar, and bland green leaves, such as those of chickweed or lettuce. It has great imitative powers, and can be trained to sing various notes. Some of the wild canary birds are said to surpass the best trained singers in loudness and clearness of note.

Canary Grass (*Phalaris Canariensis*), a grass the seed of which is used as food for cage-birds. It is a native of the Canary Islands, and is cultivated for its seed in England and continental Europe. This plant is sparingly naturalized in the U. S., and is also somewhat cultivated for its seed. A fine flour is prepared from canary seed, which is employed as dressing in fine cotton-weaving and for the finishing of silks. The groats and flour of this seed are also used in the Canary Islands, in Barbary, and in Italy as food, the flour being made into bread which is very nutritious and palatable. The reed canary grass (*Phalaris arundinacea*) is very common on the banks of lakes and rivers and in other places in Europe and America. It yields a great bulk of coarse grass, very nutritious when cut early, but it is stated that its seeds are so infested

with ergot as to render it sometimes poisonous to cattle. A variety with curiously striped leaves is well known in gardens as *ribbon grass*.

Canary Seed, the product of CANARY GRASS (which see).

Canary Wine, or **Teneriffe Wine,** is produced in the Canaries, and so much resembles Madeira wine that it is often sold for that article. It is improved by a long voyage. The term Canary is properly applied to the Bidogue wine, which is the juice of grapes gathered before they are ripe, and is not good until it is rendered mellow by age.

Canasera'ga, a post-village of Burns township, Allegany co., N. Y., on the Buffalo division of the Erie R. R., has an academy and several manufactories.

Canasto'ta, an incorporated village of Madison co., N. Y., on the Erie Canal and the Central R. R., 20 miles E. of Syracuse. It has one national bank, four churches, a high school, and an academy. Salt brine in paying quantities has been found by boring. There are sulphur and sulphur-and-iron springs within the village. It has a weekly paper. Pop. 1402.

A. R. BARLOW, PUB. "HERALD."

Can'by (EDWARD RICHARD SPRIGG), LL.D., born in 1817 in Kentucky, graduated at West Point 1839, major-general U. S. volunteers May 7, 1864, and July 28, 1866, brigadier-general U. S. A.; being in infantry till June 18, 1846, assistant adjutant-general to Mar. 3, 1855, and in infantry till July 28, 1866. He served in Florida 1839–42 on quartermaster duty; in emigrating Indians, garrison duty, etc., 1842–46; as adjutant Second Infantry 1846–47; in war with Mexico 1846–48, engaged at Vera Cruz, Cerro Gordo, Contreras, Churubusco (brevet major), and city of Mexico (brevet lieutenant-colonel); as assistant adjutant-general of Pacific division 1849–51; in adjutant-general's office, Washington, D. C., 1851–55; on Utah expedition 1857–60; and in command of Navajo expedition 1860–61. In the civil war he served in command of the department of New Mexico 1861–62, where, after the defection of his seniors, he displayed great energy and skill in defending the country at Fort Craig, Valverde (brevet brigadier-general), and Peralta against a formidable inroad from the South; on special duty in war department at Washington and suppressing New York draft riots 1863–64; in command of division of West Mississippi 1864–65 (wounded on White River); in command of the expedition which captured Mobile and its defences (brevet major-general), Montgomery, Ala., and received the surrender of the armies of Gen. R. Taylor and E. K. Smith; in command of various Gulf departments 1865–66, and of department of Washington 1866–67. After the war he was placed on various important special duties, and when fatigued by a long and laborious career in 1869 he voluntarily consented to take command of the department of the Columbia, which he held till treacherously shot dead April 11, 1873, by the chief "Jack" while he was endeavoring to mediate for the removal of the Modocs from their rocky fastness on the northern border of California.

GEORGE W. CULLUM, U. S. A.

Cancale, a seaport-town of France, in the department of Ile-et-Vilaine, is situated on the English Channel, 9 miles E. N. E. of St. Malo. It has good anchorage. Large quantities of good oysters are procured from a chain of rocks, called Rochers de Cancale, which partly enclose the port. Pop. 6400.

Cancan, a French word, the primary signification of which is noise, pother. It is also the name of an irregular French dance which is not restrained by conventional proprieties.

Cancella'ria, a genus of univalve mollusks of the class Gasteropoda and order Prosobranchiata. The shell is oval or turreted, the spire is prominent, the last whorl is ventricose, the surface reticulated, and the columella plicated. All the recent species are natives of tropical or sub-tropical seas. Numerous fossil species are found in the strata above the chalk.

Can'cer [from the Lat. *cancer*, a "crab," the swollen veins around it being likened to crabs' claws], the popular name for carcinoma, a disease characterized by tumors or slow ulcerations in various parts, occurring either simultaneously or in succession, and having a malignant character; that is, a tendency to spread to other parts, and to grow worse, resisting medication, and usually ending in the death of the patient.

Among the tumors admitted by general consent into the order of cancers there are widely different degrees of malignancy; some having the tendency to spread rapidly and infect the system at an early period, while others remain local for a considerable time, and may be removed with good hope of a permanent recovery.

The practical distinction or *diagnosis* of these tumors is founded upon a careful comparison of the characters of malignant and non-malignant tumors, and also upon a thorough knowledge of the anatomy and relations of the textures in which they arise. The attempts to distinguish these from other growths call for the highest qualities of the surgeon, including a knowledge of minute structure as obtained by the use of the microscope. What the characteristic microscopical element of cancer is it is, however, not easy to define. But Billroth confidently asserts that it always springs from true epithelium, and that the modified epithelial cell is the constant characteristic element of cancer.

The most common seats of cancer are, among external parts, the female breast, the eye, the tongue, the lip, the male genital organs; among internal organs, the liver, stomach, uterus, rectum, gullet, peritoneum, and lymphatic glands. Scirrhus or hard cancer, observed most frequently in the breast, uterus, and stomach, is more frequently solitary than encephaloid (brain-like), otherwise called medullary or soft cancer; the rare colloid cancer is of a glue-like consistency; melanosis, or melanic cancer, a variety charged with brown or black pigment, is almost always multiple in its occurrence; while epithelial cancer, or epithelioma, of which examples are frequently found in the lip, scrotum, or tongue, is so generally solitary as to have led some pathologists to place it in a class altogether apart from the truly cancerous growths. Again, there are varieties of fibrous and of cartilaginous tumor, as well as certain tumors of bone and bone-like tumors in soft parts (osteoid), which occupy a doubtful position between the malignant and non-malignant growths, the so-called "cauliflower excrescence" being one of the number.

A tumor falls under the suspicion of being cancer when it infiltrates the texture in which it arises and passes into the surrounding textures; when it invades the lymphatic glands; when it is attended by stinging or darting pains, or by obstinate and slowly extending ulceration; when it occurs in a person having impaired health or past middle life, and is not traceable to any known cause of inflammatory disease or local irritation, nor to any other known constitutional disease, such as syphilis or scrofula. But the elements of diagnosis here referred to ought to be early submitted to the scrutiny and judgment of a well-educated medical adviser.

The removal of cancerous tumors is resorted to by surgeons, and when performed early in well-selected cases it has been followed by long-continued exemption. Operations are rarely performed after the lymphatic glands are involved, or when there is evidence of a deteriorated constitution or of internal disease; but sometimes great pain or profuse and exhausting discharge from an external tumor may justify its removal, as a palliative measure, even under these unfavorable circumstances.

REVISED BY WILLARD PARKER.

Cancer, the Latin name of a crab. In astronomy, it is the fourth sign of the Zodiac, and is denoted by the figure ♋. The sun enters this sign about the 21st of June. The first point of Cancer is 90° distant from the first point of Aries, and is called the summer solstice. Cancer is also the name of a constellation of the Zodiac, which does not coincide with the sign just described. (See PRECESSION OF THE EQUINOXES, by GEN. J. G. BARNARD, U. S. A.)

Cancer Root, or **Beech Drops,** a name given to the *Epiphegus Virginiana*, a parasitic plant of the natural order Orobanchaceæ. It is a native of the U. S., and grows on the roots of beech. The plant is astringent, and the root has been reputed a remedy for cancer, but it has no favorable effect upon that disease.

Cancer, Tropic of, in geography, one of the lesser circles of the earth, a parallel about 23° 27′ N. of the equator. At the summer solstice (June 21st) the sun is vertical over this line. There is a corresponding circle on the astronomical globe. This circle touches the ecliptic in the first point of the sign Cancer. Hence the name.

Cancrin' (GEORG), COUNT, a German financier, born at Hanau Dec. 8, 1774. He entered the service of Russia in 1796, became a councillor of state in 1811, and lieutenant-general in 1815. He was Russian minister of finance for twenty-one years (1823–44), and performed the duties of that office with ability and success. Died Sept. 22, 1845.

Can'crinite, a silicate of alumina and soda with carbonate of lime, is found in Norway and at Litchfield, Me. It is remarkable as an instance of a silicate containing carbonic acid.

Can'crum O'ris (synonyms, *noma, aqueous cancer*), a mortification of the cheek, mostly in children who have

long suffered from poverty, moist or close air, or fever. The proximate cause is generally found in an imprudent administration of mercury, or in the inanition and dissolution of the blood from measles, typhoid fever, hooping-cough, or dysentery. It is almost always fatal. Usually but one cheek is affected. A small vesicle shows itself half an inch or an inch from the angle (mostly the left) of the mouth; it soon bursts and gives way to a yellow hardening surface. The surrounding parts swell and exhibit a waxy color. A day or two after a hard spot is felt in the cheek which extends rapidly. The skin become black and fetid, and the whole cheek is perforated. The destruction spreads rapidly over the cheek, nose, upper lip to the median line, eyelids, neck, and jaw-bones. The teeth fall out, the stench is intolerable. Hæmorrhages are rare. While in this manner half of the face is being destroyed, the patient may be without fever, inclined to play and to eat. After about a week has elapsed fever will set in, depression will take the place of indifference; pneumonia or diarrhœa, with swelling of the feet, will make its appearance and accelerate the fatal termination. Recoveries have been observed, but are rare. Amongst the best preventives early attendance in cases of the common forms of ulcerous inflammations of the mouth, restriction in the use of mercurial medicines, and the improvement in the condition of the poor, take prominent places. When the malady is developed the diseased portion must be disinfected by hypermanganate of potassa or carbolic acid, or destroyed by concentrated mineral acids, chloride of zinc, arsenic paste, or the red-hot iron. The general condition of the patient requires a generous diet, and the administration of stimulants and iron, or quinia, or both combined. ABRAHAM JACOBI.

Candahar′, or **Kandahar,** called by the Afghans **Ahmed Shahee,** the capital of Central Afghanistan, is situated in a fertile plain, 220 miles S. W. of Cabool. It is well supplied with water by two canals. The houses are mostly mean and built of wood. Candahar has an extensive trade and some manufactures. About 2 miles N. of this town is a precipitous rock which is crowned by a strong fortress or citadel. Candahar is supposed to have been founded by Alexander the Great. It was captured by Tamerlane in 1384, and by Shah Abbâs of Persia in 1620. The British army occupied it in 1839–42. Pop. estimated at from 50,000 to 80,000.

Candela′brum [Lat., plu. *candelabra*], a "candlestick," a support for lamps. There were perhaps few articles in which the ancients so combined the beautiful with the useful as in their candlesticks and lamps. Candelabra usually were of wood, but marble and metals were used for their construction, and sometimes they were adorned with gems. The candelabra found at Herculaneum and Pompeii are mostly of bronze; they were also frequently of marble. The base in many instances consists of three feet of a lion, goat, or other animal, real or imaginary. In addition to the various kinds of candelabra which seem to have stood on the floor, the ancients had others intended to be placed on a table. These consisted either of a pillar or of a tree, and from the capital in the former case, or from the branches in the latter, lamps were suspended.

Can′dia, or **Meg′alo-Cas′tro,** a fortified seaport and capital of the island of Crete, is on the N. coast; lat. 35° 21′ N., lon. 25° 8′ E. It contains several mosques, a cathedral, a pasha's palace, and an arsenal. Its massive fortifications and its cathedral were erected by the Venetians, who owned the island until it was captured by the Turks in 1669. Pop. 15,000.

Candia, a post-township of Rockingham co., N. H. Pop. 1456.

Candia. See CRETE.

Can′didate [Lat. *candidatus*], the name given by the Romans to a person soliciting the office of quæstor, consul, etc., from his appearing in public dressed in a white (*candida*) toga. Among the early Christians converts newly baptized were called candidates, on account of the white robes worn by them eight days after baptism. In Germany, at the present time, a theological student who has been approved before the highest authorities in the Church is called a candidate, and the term is generally given to any applicant for office, religious or secular.

Can′dle [Lat. *candela* (from *candeo*, to "shine"); Fr. *chandelle*], a cylinder of wax or fat with a central wick, intended for giving light, and used in various religious ceremonies. Candles are made of tallow, of stearine, bleached wax, spermaceti, and paraffine. They are either dipped, moulded, or rolled. "Dips" are made by hanging wicks upon a frame, at a distance from each other equal to about double the intended thickness of the candle; these are then dipped in melted tallow, and hung upon a rack until cooled, then dipped again and again, until the required thickness is obtained. Mould candles are cast by pouring the tallow down a tube, along the axis of which the wick has been previously adjusted. These tubes are smooth inside, and several are fitted in a frame, the upper part of which forms a trough into which the moulds all open; and by pouring into the trough all the moulds are filled at once. Wax candles are not moulded, on account of the contraction which wax undergoes in cooling, and the difficulty of drawing it from the moulds. The wicks are warmed, and melted wax is poured over them until they acquire the proper thickness; they are then rolled between flat pieces of wet hard wood.

Certain fatty acids are also used in making the best candles. Lime is used to separate the glycerine from the fatty acid of tallow, palm oil, etc. The lime forms an insoluble soap by combining with the fatty acid, and the glycerine remains in solution with the water. This lime-soap is then reduced to powder, and the fatty acid separated by means of sulphuric acid, which combines with the lime. The whole being heated, the fatty acid is skimmed off, and the candles moulded from it. These are called star or composite candles; they give a purer light than ordinary tallow. Stearic acid, the principal fatty acid of tallow, is a hard crystalline substance, perfectly dry and free from any greasiness, with a somewhat pearly lustre. Its crystalline structure presents a difficulty in the manufacture of candles, for when cast in moulds it contracts on cooling and leaves small spaces between the crystals. This is obviated by mixing the "stearine" with a little wax.

Various ingenious arrangements have been introduced to obviate the necessity of snuffing candles; in nearly all of them the object is effected by causing the wick to bend over and its end to fall outside of the flame, and thus, by coming in contact with the oxygen of the air, to be completely burned, for such combustion cannot take place within the flame. This bending over is variously brought about. One method is by braiding the wick with one strand shorter than the rest. Another process loads the wick with metallic bismuth, which fuses to a bead in the flame, and the weight of the bead bends the wick.

REVISED BY C. W. GREENE.

Can′dlemas, a festival to commemorate the purification of the Virgin Mary, is observed by the Roman Catholics on the 2d of February, when they form a procession with many lighted candles. On this day all the church candles for the year are blessed.

Candle-Nut (*Aleurites triloba*), a tree of the order Euphorbiaceæ, a native of Java, the Moluccas, and the Pacific islands. It bears a nut as large as a walnut, having a hard shell and a kernel which is edible when roasted. It yields an excellent bland oil, which is used for food and is burned in lamps. The natives of the Society Islands arrange the perforated kernels on a string or rush and use them as torches.

Cand′lish (ROBERT SMITH), D. D., a Scottish preacher, born in Glasgow Mar. 23, 1807. He was licensed as a minister in 1831, and began to preach in Edinburgh in 1834. He was one of the prominent leaders of the popular party, and co-operated with Dr. Chalmers in organizing the Free Church after the disruption which occurred in 1843. He acquired much distinction as a pulpit-orator and a debater in religious assemblies. He published several religious works. Died Oct. 19, 1873.

Can′dor, a post-village of Tioga co., N. Y., on the Cayuga and Susquehanna R. R., has four churches, a weekly paper, a bank, and some manufactures. Pop. of Candor township, 4250.

Candy, a town of Ceylon. See KANDY.

Can′dytuft (*Iberis*), a genus of plants of the natural order Cruciferæ, are indigenous in the countries bordering on the Mediterranean. The flowers have unequal petals and grow in dense corymbs. Some of the species are cultivated in gardens for the beauty of their flowers.

Cane [Lat. *canna*], a name given to several species of plants, and to the stems of the smaller palms and the larger grasses. The canes or rattans of commerce, which are used in making cane-seats of chairs, etc., are the product of the palmaceous plants *Calamus Rotang* and *Calamus viminalis*. The term cane is also applied to the *Arundinaria macrosperma*, an arborescent grass which grows in the Southern U. S. on the alluvial banks of rivers, and forms thickets called canebrakes which are almost impenetrable. This plant often grows to the height of fifteen or twenty feet. (See RATTAN and SUGAR-CANE.)

Cane′a, or **Can′na,** called **Khani′a** by the modern Greeks, a seaport-town of Candia or Crete, is on the N. coast, about 70 miles W. of Candia. It occupies the site of the ancient *Cydonia*. It is the most commercial town

in the island, and has a safe but shallow harbor, which will admit vessels of 300 tons. It has a lighthouse, an arsenal, and a fort. Oil, soap, wax, etc. are the chief articles of export. Pop. about 7000.

Canea'dea, a post-village and township of Allegany co., N. Y., contains valuable stone-quarries. Pop. of village, 236; of township, 1869.

Cane Creek, a township of Clarke co., Ala. Pop. 480.

Cane Creek, a post-township of Butler co., Mo. P. 323.

Cane Creek, a township of Lancaster co., S. C. Pop. 1759.

Cane Hill, a township of Washington co., Ark. Pop. 1611. It is the seat of Cane Hill College.

Canel'la Al'ba, a large tree which grows in Florida and the West Indies, and is called wild cinnamon. It has fragrant flowers and an aromatic bark, which is exported in quilled pieces of a pale buff color and a pungent taste. This is sometimes used in medicine as a stimulant tonic. The genus *Canella* belongs to the order Clusiaceæ.

Ca'nes Venat'ici (*i. e.* the "Hunting Dogs"), the Latin name of a constellation of the northern hemisphere. It is represented on the celestial globe by the figures of two dogs named Asterion and Chara, which are held in leash by Boötes, and appear as if pursuing Ursa Major.

Ca'ney, a township of Independence co., Ark. Pop. 177.

Caney, a post-township of Ouachita co., Ark. Pop. 845.

Caney Fork, a township of Pike co., Ark. Pop. 199.

Caney Fork, a township of Jackson co., N. C. Pop. 951.

Caney River, a township of Yancy co., N. C. Pop. 1202.

Can'field, a post-village, capital of Mahoning co., O., on the Niles and New Lisbon R. R., 69 miles S. E. of Cleveland. It has one large leather-belt factory, a good machine-shop, and one weekly paper. The exhibition grounds of the Mahoning Agricultural Society are located here. Pop. 640; of Canfield township, 1513.

WM. R. BROWNLEE, ED. "MAHONING COUNTY NEWS."

Can'gas de Tine'o, a town of Spain, in the province of Oviedo, 37 miles S. W. of Oviedo, on the Narcea. Pop. 21,337.

Canicat'ti, a town of Sicily, in the province of Girgenti, on the river Naro, 15 miles E. N. E. of Girgenti. It is well built, and has sulphur-mines in the vicinity. Pop. in 1871, 20,908.

Canic'ula, a name formerly given to Sirius, the dog-star, a star in the constellation Canis Major. This name signifies in Latin "little dog."

Canic'ular Year, the ancient year of the Egyptians, so called because its commencement was determined by the heliacal rising of Sirius (or Canicula). Their reason for computing time from the rising of that star was perhaps because it occurred about the same date as the annual inundation of the Nile. The common year of the Egyptians consisted of 365 days, and every fourth year of 366.

Can'idæ [from the Lat. *canis*, a "dog"], a family of the digitigrade carnivorous Mammalia, to which belong the dog, fox, wolf, etc. The hyænas are sometimes referred to this family, and sometimes to the Viverridæ (civets, ichneumons, etc.). These families are closely connected, and hyænas may be said to form a connecting link between them. The Canidæ have two flat tuberculous molar teeth on each side behind the great cheek tooth of the upper jaw, a dentition resembling that of the bear family, or Ursidæ, to which they exhibit a further resemblance in their power of adapting themselves to the use of vegetable food. They have generally three incisors or cutting teeth, with one large canine tooth, and four præmolars on each side in each jaw, two true molars on each side in the upper jaw, and three in the lower.

Cani'na (LUIGI), CAVALIERE, an Italian architect and antiquary, born at Casal Oct. 23, 1795. He was professor of architecture at Turin, and published, besides other works, "Ancient Architecture Described and Illustrated by Monuments" (9 vols., 1844). Died Oct. 17, 1856.

Ca'nines, or **Canine Teeth** [Lat. *dentes canini*, from *canis*, a "dog"], a name given to four teeth which are pointed and are placed between the incisors and bicuspidate teeth. Each jaw has two of these, which are sometimes called eye-teeth or stomach-teeth. In the Carnivora they are very large and adapted to tearing flesh.

Canis'ius (PETRUS), SAINT, a Dutch Jesuit, born at Nimeguen May 8, 1521. His proper name was PIETER DE HONDT. He became in 1549 professor and rector of the University of Ingolstadt, and was also a prominent member of the Council of Trent in 1545. He wrote, besides other works, "Summa Doctrinæ Christianæ." Died Dec. 21, 1597. He was canonized by Pope Pius IX. in 1864.

Ca'nis Ma'jor (*i. e.* the "Greater Dog"), a constellation which appears in the celestial globe under the feet of Orion. It comprises Sirius, the dog-star, which surpasses all the stars of the firmament in splendor and apparent magnitude.

Ca'nis Mi'nor (the "Lesser Dog"), a constellation adjacent to Canis Major and to Gemini. It comprises Procyon, a star of the first magnitude, which is nearly in a direct line between Sirius and Pollux.

Caniste'o, a post-village of Steuben co., N. Y., on the Canisteo River and the Erie R. R., 55 miles W. N. W. of Elmira. It has some manufactures and a weekly paper. Pop. of Canisteo township, 2435.

ED. CANISTEO "REPORTER."

Canister, a township of Dodge co., Minn. Pop. 880.

Canister Shot. See CASE SHOT.

Cank'er [from the same root as *cancer*]. Canker in plants is especially injurious to fruit trees. It is a kind of gangrene, usually beginning in the young branches and gradually descending to the trunk. Wet subsoils appear to cause canker in some cases. Varieties of fruit trees which have been long propagated by grafting and budding are most liable to this disease. (For the diseases of the human mouth known as canker, see STOMATITIS and APHTHÆ.)

Canker-Worm (*Anisopteryx*), a genus of destructive insects, of the order Lepidoptera and family Phalænidæ or Geometridæ. The common American species (*Anisopteryx vernata*) is rather smaller than the European, and with darker wings. The female is wingless. The male has four thin, silky wings, which have an extent of about an inch and a quarter when expanded. The moths come out of the ground principally in the spring, sometimes also in the autumn. The female lays from sixty to one hundred eggs, glued in clusters to branches of trees; they hatch in the early part of May. The larvæ then feed upon the leaves, especially of apple and elm trees, which they pierce with multitudes of holes. When fully grown the larva is nearly or quite an inch in length. After about four weeks of feeding, the larvæ descend, by crawling or hanging down by their threads, to the ground, burrowing generally to the depth of a few inches. Within twenty-four hours afterwards they are changed to light-brown chrysalids. From these the moths emerge after a variable time. As the female canker-worms are wingless, trees may be protected from them by leaden troughs containing tar or fish oil being placed around their trunks. It is also desirable, however, to destroy as many of the caterpillars as possible. Shaking the trees will often dislodge them. (See HARRIS, "On Insects Destructive to Vegetation," Boston, 1862.)

Can'na [a Latin word signifying a "cane" or "reed"], the name of a genus of plants of the order Marantaceæ. The fruit is a capsule containing hard black seeds, which are called Indian shot. The flower has one fertile petal-like stamen, and a petaloid style. One or more species are extensively cultivated as ornamental plants. The starch of *Canna coccinea* is used sometimes instead of arrow-root, under the name *tous-les-mois*. The *Canna flaccida* is a native of the Southern U. S., near the coast.

Cannabina'ceæ [from *Cannabis*, "hemp"], a small natural order of exogenous plants which most botanists include in the order Urticaceæ. They are distinguished by solitary suspended ovules and a hooked or spiral embryo. This order comprises only two genera of plants, the hemp (*Cannabis*) and the hop (*Humulus*).

Can'nabis [Gr. κάνναβις], the typical genus of plants of the order Cannabinaceæ. The only known species of it is *Cannabis sativa*, or hemp, a tall diœcious annual with elegant palmate leaves, which grows wild in India, and is cultivated for its fibre, etc. (See HEMP, by PROF. GEO. C. SCHAEFFER, M. D.)

The intoxicating drug called *hasheesh* by the Arabs and *bhang* by the Hindoos is procured from a variety called *Cannabis Indica*. Under the name of *gunjah* the dried female flowering hemp-plants are sold in bundles for smoking. The resinous extract called *churrus* is swallowed for intoxicating effect. Several native African tribes use it. There appears to be more of the active resinoid (*cannabin*) in the Indian than in the European variety, owing probably to the difference of climate. It has been proved by the experiments of Dr. H. C. Wood, Jr., of Philadelphia, that the extract of American hemp has the same kind of influence on the brain and nervous system as that from India. Transportation must induce some change in the latter, as the medicinal dose found to be safe by physicians in England

is about ten times as large as that used by Dr. O'Shaughnessy and others in Bengal. The effects of Indian hemp vary considerably with different persons. Mostly, they are agreeably exciting, the plant being known in India as the "increaser of pleasure," the "cementer of friendship," and the "laughter-mover." Some persons become violent under its use. The word *assassin* is said to be derived from the Arabic *hashishin*, one who drinks or smokes hasheesh. With many there is an exaggeration of ordinary impressions, so that slight sounds are taken for thunder, one's head seems as large as a house, etc. Others have their sensibility diminished or suspended by it. The pupil of the eye is dilated under its internal use. It does not, like opium, affect the secretions, and seldom produces nausea. As with other stimulants, the habit of taking it becomes a pernicious slavery.

The ancients possessed some knowledge of the narcotic powers of hemp. Dioscorides and Galen mention its juice as a remedy for earache. The Scythians made a vapor-bath of its fumes by throwing the seeds on red-hot stones. Dr. Royle suggests that it may have been the nepenthes (*φάρμακον νηπενθές*) which, according to Homer, Helen received from an Egyptian woman and gave to Telemachus in the house of Menelaus.

Extract of hemp (*Extractum cannabis Indicæ*) is now used as a medicine for neuralgia and some other nervous affections. The variability of its effects, however, has hitherto interfered with its extensive employment. (See PEREIRA, "Materia Medica and Therapeutics," Philada. ed., 1866.) REVISED BY WILLARD PARKER.

Can'næ, an ancient Roman town in Apulia, on the river Aufidus (Ofanto), near its entrance into the Adriatic Sea. Here, on Aug. 2, 216 B. C., Hannibal gained a decisive victory over the Roman army commanded by C. Terentius Varro. According to Livy, the Romans on this day lost about 45,000 infantry and 3000 cavalry. The site of Cannæ is occupied by a village called *Canne*, about 10 miles W. S. W. of Barletta.

Can'nel Coal [originally *candle* coal; because its bright flame was a substitute for candle-light], a variety of bituminous coal which is very dense and compact, and breaks with an uneven or largely conchoidal fracture. It sometimes exhibits a brilliant waxy lustre, and is generally of a brown or black color. It burns with a bright flame, and during the process of combustion splits and crackles without melting. This coal, which is found in England and the U. S., is used for fuel and is valuable for making gas. (See COAL, by PROF. J. S. NEWBERRY, M. D., LL.D.)

Can'nelton, a post-village, capital and principal town of Perry co., Ind., is on the Ohio River, about 68 miles above Evansville. It has a large cotton factory, built of sandstone, about 300 feet long and five stories high, which employs over 400 operatives; also manufactories of draining-tiles, pottery, chairs, flour, etc. Bituminous coal abounds in the adjacent hills, and is supplied in large quantities to steamboats. It has two weekly newspapers. Pop. 2481.
C. H. MASON, ED. "REPORTER."

Cannes, a seaport-town of France, in the department of Alpes-Maritimes, on the Mediterranean Sea, 25 miles S. E. of Draguignan. It has an old Gothic castle and a good quay. The mildness and salubrity of the climate render this a favorite winter resort for English families. Napoleon landed at Fréjus, near Cannes, after his escape from Elba on Mar. 1, 1815, and Lord Brougham died here in 1868. Pop. 9618.

Can'nibal [etymology doubtful], a person who feeds on human flesh. The practice appears to have prevailed in ancient as well as in modern times. Facts show that the people addicted to the eating of human flesh are not always the most degraded of the human race. For instance, in Australia, where the large animals are scarce, there are tribes of an extremely degraded type, who have only been known in exceptional conditions to feed on human flesh. The New Zealanders, on the other hand, who are one of the most highly developed aboriginal races with which civilization has had to compete, were, down to a late period, habitual cannibals. Cannibalism is chiefly found in the islands of the Pacific and in Africa. Among certain tribes of aborigines of America cannibalism is said to have formerly prevailed. It is also believed by some archæologists that the inhabitants of Europe in the prehistoric stone-period were to some extent cannibals.

Can'ning (CHARLES JOHN), EARL, an English statesman, a son of George Canning, noticed below, was born Dec. 14, 1812. He succeeded to the peerage on the death of his mother in 1837, and began his public life as a conservative. In 1852 he became postmaster-general in the ministry of Lord Aberdeen. He was appointed governor-general of India in 1855. During his administration occurred the great Sepoy mutiny (1857–58). Died in England June 17, 1862.

Canning (GEORGE), an eminent English statesman and orator, born in London April 11, 1770. He was educated at Christ's Church College, Oxford, where he distinguished himself as a classical scholar. In 1793 he entered Parliament as a supporter of Pitt, who was then prime minister, and he became an under secretary of state in 1796. About 1797, Canning, Ellis, and others began to publish the witty and famous political satires called "The Anti-Jacobin." He married a daughter of General John Scott. After the resignation of Mr. Pitt, in 1801, Canning joined the opposition against the ministry of Addington. In April, 1807, he became minister of foreign affairs in the Tory cabinet formed by the duke of Portland. He fought a duel in 1809 with Lord Castlereagh, who was the favorite leader of the Tories. Soon after this duel he ceased to be a cabinet minister. He advocated Catholic emancipation in 1812, was returned to Parliament for Liverpool in that year, and was appointed president of the board of control in 1816. In the latter part of his life Canning and Lord Brougham were considered the most eloquent and powerful orators in the House of Commons. On the death of Lord Castlereagh, in 1822, Canning succeeded him as secretary of foreign affairs in the cabinet of Lord Liverpool. He infused a more liberal spirit into the cabinet, and rendered an important service to his country by pursuing a foreign policy that was not subservient to the interests and designs of the Holy Alliance. In April, 1827, he became first lord of the treasury as the successor of Lord Liverpool, who was disabled by paralysis. He formed a cabinet partly of Tories and partly of Whigs. Died Aug. 8, 1827. (See ROBERT BELL, "Life of George Canning," 1846; A. G. STAPLETON, "The Political Life of G. Canning," 1859; RUEDER, "G. Canning, seine Leben, etc.," 1827.)

Canning (STRATFORD). See STRATFORD DE REDCLIFFE.

Can'nington, a post-village of Brock township, Ontario co. and province (Canada), on the Toronto and Nipissing Railway, 59 miles N. of Toronto. It has a weekly paper and some manufactures. Pop. about 800.

Cannon. See ARTILLERY, by GEN. WILLIAM F. BARRY, U. S. A.

Can'non, a county of Middle Tennessee. Area, 220 square miles. It is drained by Stone River and other small streams. The surface is undulating or hilly; the soil is mostly fertile. Grain, wool, and tobacco are the chief products. Capital, Woodbury. Pop. 10,502.

Cannon, a township of Kent co., Mich. Pop. 1206.

Cannon (NEWTON), born in Guilford co., N. C., about 1781, served in the Tennessee mounted riflemen as colonel at Tallahatchie (Nov. 3, 1813), was a member of Congress from Tennessee (1814–17 and 1819–23), and was governor (1835–39). Died Sept. 29, 1841.

Cannon (WILLIAM), born at Bridgeville, Del., in 1809, was governor of Delaware in 1864–65. Died Mar. 1, 1865.

Cannonade, in general, is the discharge of balls or shells from cannon or great guns; the act of firing artillery in a battle or a siege. As a technical term it is sometimes used to denote an action between two armies in which the artillery is employed almost exclusively.

Cannon-ball Tree (*Couroupita Guianensis*), a large tree of the order Lecythidaceæ, a native of Guiana. It bears racemes of white and rose-colored flowers, and a fruit which has a hard woody shell and is nearly round. This fruit is about the size of a thirty-six pound cannon-ball.

Cannon City, a post-township of Rice co., Minn. Pop. 510.

Cannon Falls, a township of Goodhue co., Minn. Pop. 957.

Can'non's, a township of Newberry co., S. C. P. 1224.

Cannonsburg, Pa. See CANONSBURG.

Can'nonsville, a post-village of Tompkins township, Delaware co., N. Y., on the Delaware River, 8 miles above Deposit, has three churches, and manufactures of leather, flour, etc. Pop. 319.

Cann'stadt, a town of Würtemberg, is situated in a beautiful and fertile valley, on the river Neckar, 2¼ miles by rail N. E. of Stuttgart. It is connected by railways with Carlsruhe, Heilbronn, and other cities. It has manufactures of cotton and woollen fabrics and an active trade, for which the navigable Neckar affords facilities. Here are many mineral springs, which are much frequented in the summer. Pop. in 1871, 11,904.

Ca'no, a township of Iowa co., Ia. Pop. 235.

Cano (ALONZO), a celebrated Spanish painter, sculptor, and architect, was born at Granada Mar. 19, 1601. He

studied painting under Pacheco and Juan de Castillo, and became the founder of the school of Granada. In 1638 he was appointed court-painter by Philip IV. Among his chief works is a "Conception of the Virgin." Died Oct. 5, 1665.

Canoe [etymology uncertain], a rude boat made of the trunk of a single tree hollowed out. Canoes are generally open boats, propelled by paddles and steered by oars. The length and other dimensions vary greatly. On sea-coasts canoes are sometimes made of light wooden frames covered with seal skins, which are drawn across as a deck, with only a hole large enough for one man to sit in. The name is also applied to boats made of birch bark, and to other rude craft, and of late to a pleasure-boat designed for long excursions by a single person.

Canoe, a township of Escambia co., Ala. Pop. 479.

Canoe, a post-township of Winneshiek co., Ia. P. 864.

Canoe, a township of Indiana co., Pa. Pop. 998.

Canoe Creek, a township of Rock Island co., Ill. P. 413.

Cano'ga, a post-village of Fayette township, Seneca co., N. Y., has an extensive water-power furnished by an immense spring, which discharges also nitrogen gas. The village is on the W. shore of Cayuga Lake. Pop. 197.

Can'on [Gr. *κανών*, a "rule"], a term of various significations in theology, science, and art, means, in general, a law, rule, or standard. In ecclesiastical language it is applied to a law or rule of doctrine or discipline, or the decree of a general council; also to the genuine books of the Holy Scripture, called the *Sacred Canon*. The Roman Catholic Church recognizes as parts of the canon of Scripture the apocryphal books, which Protestants reject. In the canon of the New Testament the agreement of the Christian churches may be said to be unanimous. (See BIBLE, THE, by PROF. W. G. SUMNER.)

Can'on [Lat. *canonicus*], the name of a dignitary of the Roman Catholic and Anglican churches. In each cathedral and collegiate church there are canons, who perform some parts of the services and receive a portion of the revenue of the church. In a collective capacity the canons are called a chapter, and form the council of the bishop. Canons (in England) must reside at the cathedral for three months in each year. Canons were originally monks or priests who lived in a community or monastery. They are historically known as Canons Regular, and followed the rule of Saint Augustine, Saint Benedict, Saint Anthony, etc. They were once the most numerous of the religious orders. They are still found in some parts of Europe.

Can'on, in music, a perpetual fugue; a kind of fugue in which not merely a certain period or phrase is to be imitated or answered, but the whole of the first part with which the canon begins is imitated throughout by all the other parts. The canon is composed for two, three, four, or more voices.

Canon (SACRED). See BIBLE, THE, by PROF. W. G. SUMNER.

Cañon, a Spanish word, pronounced cányon, meaning a tube, and applied by the American Spaniards to long and narrow mountain-gorges, or deep ravines with precipitous slopes assuming almost a tubular form. The Rocky Mountains, the Sierra Nevada, and the great Western plateaus of North America furnish numerous and striking examples. The Great Cañon of the Colorado, in the middle course of the river, above its last great bend, between 111° and 115° W. lon., is the most remarkable of its kind, and may serve as a type. It is hollowed out below the general surface of a vast plateau to the depth of 3000 to 5000 feet, opening to view, in its perpendicular walls, all the series of geological strata down to their granite foundation. At the bottom of this vertiginous chasm, occupying its whole width, roll the waters of the stream, now foaming through wild rapids, now flowing peacefully in its deep and narrow channel. Its tributaries, Grand River, the Little Colorado, and others, are hardly less remarkable.

The Snake River, or Lewis branch of the Columbia, runs through a deep valley full a thousand feet below the surface of the surrounding country. The nature of these chasms, their winding course, the disposition of their affluents, seem to force us to ascribe their origin to the erosive action of the flowing waters, and these wonderful structures prove the enormous power of the agent which was capable of scooping out such channels. In the far West the name of cañon has been extended to almost every narrow mountain-gorge, whatever be its origin and character.

ARNOLD GUYOT.

Cañon City, capital of Fremont co., Col., situated on the Arkansas River where it emerges from the Rocky Mountains, on a branch of the Denver and Rio Grande R. It is a resort for invalids, having both cold and warm mineral springs and a healthful climate. In this vicinity is fine scenery. It has unlimited water-power, and in the neighborhood are coal, iron, oil-wells, marble and limestone quarries, and rich copper and silver mines. It contains a planing mill, a grist-mill, three churches, a public school and seminary, and contains the Colorado penitentiary. It has one weekly newspaper. The city is 5280 feet above the sea-level. Pop. 229.

HENRY RIPLEY, ED. CAÑON CITY "TIMES."

Cañon City, a post-village, capital of Grant co., Or., about 150 miles S. E. of Dalles City. It contains several fine fireproof buildings. Gold-mines have been opened in the adjacent hills.

Cañon Creek, a post-township of Lewis and Clark co., Mon. Pop. 39.

Can'oness [Lat. *canonissa*]. The canonesses were members of certain religious orders of the Roman Catholic Church, who often took no monastic vows, though they lived in common and usually observed the rule of Saint Augustine. Many noblemen sought well-endowed canonical livings for their daughters, who were at liberty to marry when they chose. The custom prevailed in Germany even after the Reformation, and there were many houses (*Stifter*) of Protestant canonesses, especially in Westphalia and Mecklenburg.

Canon'ical, according to the canon or rule. The canonical books of Scripture are those which are admitted to be genuine and of divine origin. (See BIBLE, THE.)

Canonical Hours, in the Roman Catholic Church, are certain fixed times in the day for devotions. These hours are called nocturnes, matins, lauds, tierce, nones, vespers, and complines. The breviary has seven canonical hours, because the Psalter says "Seven times in the day will I praise Thee." In England the hours between 8 A. M. and 12 M. are canonical, and no marriage can take place in any church except in canonical time.

Canonical Virgins, in the early ages of the Church, were young women who, remaining in their homes, took upon themselves vows of perpetual virginity. They were enrolled in a list or canon, whence their name.

Canon'icus, an American Indian, chief of the Narragansetts, who, though at first hostile to the Pilgrims who landed at Plymouth in 1620, subsequently became friendly to the whites, and especially to the inhabitants of the colony of Roger Williams. Died June 4, 1647.

Canon'icut, or **Conanicut,** a beautiful island in Narragansett Bay, nearly 8 miles long and 1 mile wide. The island constitutes the township of Jamestown, in Newport co., R. I. Pop. 378.

Canoniza'tion, the act of declaring a person a saint; a ceremony in the Roman Catholic and Greek churches by which deceased beatified persons are enrolled in the catalogue or canon of saints. In the Roman Catholic Church the pope has exclusive authority to canonize since the year 1170, but before that date other bishops had the same right or power. When it is proposed to canonize a person, a formal process is instituted by which his merits and character are investigated. After it has been proved that he died in the odor of sanctity, the ceremony is performed in St. Peter's church, Rome. The day of his death is annually celebrated by the Church.

Canon Law, a system of rules for the discipline of the Church. The name is especially applied to the rules of the Roman Catholic Church, which are also in force to some extent in the churches of England, Scotland, and Germany. This system of laws is based largely upon decisions of ancient councils, and also shows marks of the influence of the Bible and of the Roman jurisprudence. It received frequent additions and other modifications from the decretals, bulls, and extravagants of the popes. In England, the kings and parliaments were always jealous of the introduction of foreign canons, but permitted to some extent their introduction in cases where they did not interfere with the statutes of the land. In this way the common law came to receive the influence of the papal decretals; which are sometimes cited as of authority in matters of marriage, divorce, inheritance, etc., since these affairs were under the control of the ecclesiastical courts. In Scottish jurisprudence the influence of canon law is very great, it having been originally received as of equal force with the statutes of the realm. (See LAW, by PROF. T. W. DWIGHT, LL.D.)

Can'onsburg, a post-borough of Washington co., Pa., on the Chartiers Valley R. W., 22 miles S. W. of Pittsburg. It is the seat of Jefferson College. It has one newspaper, a planing mill, and a woollen factory. The Pennsylvania Reform School is near by. Pop. 641.

T. M. POTTS & CO., PUBS. CANONSBURG "HERALD."

Cano'pus, or **Cano'bus** [Gr. Κάνωπος], a very bril-

liant star of the first magnitude in Argo, a constellation of the southern hemisphere. It is never visible in the Northern or Middle U. S., being only 37½° from the South Pole.

Canopus, or **Canobus,** an ancient city of Lower Egypt, was situated on the Mediterranean, near the western mouth of the Nile, 15 miles E. of Alexandria. Before the foundation of Alexandria it was the principal seaport of the Delta. Here was a famous shrine and oracle of Serapis. Canopus was notorious for the dissolute morals of its people and the number of its religious festivals. Its ruins are still visible about three miles from Aboukir.

Can'opy [Gr. κωνωπεῖον, from κωνωψ, a "gnat," because canopies were used to keep off gnats, like our mosquito-curtains; Lat. *canopeum*], an ornamental covering over a throne or bed; also a covering which is carried over the heads of kings on journeys, and over the holy sacrament in Roman Catholic processions. The latter is called BALDACHIN (which see). In architecture and sculpture, canopy is a magnificent decoration which covers an altar, throne, pulpit, or tribunal. In Gothic architecture, the term is applied to the rich coverings which are often seen over niches and tombs.

Cano'sa (anc. *Canusium*), a town of Italy, in the province of Bari, is situated on the declivity of a steep hill 14 miles S. W. of Barletta. It has an ancient cathedral. Here are interesting ruins of the ancient *Canusium*, an important city of Apulia. In the subterranean tombs of this place were found painted vases and magnificent funereal furniture, with precious stones and jewels. Pop. 12,769.

Cano'va (ANTONIO), a celebrated Italian sculptor, born at Possagno, in Venetia, Nov. 1, 1757. He studied art in Venice and Rome, and aspired to restore the pure and classic style of the antique. Among his early works were a statue of Apollo and a group of "Dædalus and Icarus." He settled in Rome in 1782, and acquired celebrity by his "Theseus and the Minotaur." He did not adhere strictly to the severe simplicity of the antique, but modified it by a peculiar grace, which is apparent in his "Cupid and Psyche" and his "Venus and Adonis." Having been invited by Napoleon, he went to Paris in 1802, and executed an admirable statue of that emperor. Among his other works are a "Venus Victorious," a monument to Clement XIII., erected in St. Peter's church, a statue of Washington, and a "Perseus with the Head of Medusa." In 1816 he received the title of marquis of Ischia. He was the founder of a new school of sculpture, and was reputed the greatest sculptor of his age. Sentiment appears to be the most characteristic quality of his works. Died at Venice Oct. 13, 1822. (See CICOGNARA, "Vita di Canova," 1823; J. S. MEMES, "Memoirs of Antonio Canova," 1825; MISSIRINI, "Vita di Canova," 1827.)

Canrobert (FRANÇOIS CERTAIN), a French general, born at St. Ceré, Lot, June 27, 1809. Having served many campaigns in Algeria, he became a general of brigade in 1850, and a general of division in 1853. He commanded a division in the Crimea in 1854, and was wounded at Alma. In Sept., 1854, he succeeded Marshal St.-Arnaud as commander-in-chief of the French army, and he began the siege of Sebastopol. He resigned the command to General Pelissier in May, 1855, and was made a marshal of France in 1856. In June, 1859, he commanded a corps at Solferino. He was taken prisoner by the Germans at Metz in Oct., 1870.

Can'so, Gut of, a strait which separates Nova Scotia from the island of Cape Breton, and connects the Atlantic with the Gulf of St. Lawrence. It is 17 miles long, and has an average width of 2½ miles.

Cant, a term used in architecture to express the sides of a polygon turned from the spectator, or an angular deflection of a straight line which is neither in the same direction to the horizontal nor to the perpendicular line of the base.

CANT, on shipboard, is a term applied to timbers which lie obliquely to the line of the keel, and are near the bow or stern. It is also applied to anything sloping or inclined.

CANT also signifies an impulse with a sudden jerk; obliquity of position; a whining or affected tone;* a whining pretension to goodness; the peculiar words and phrases of professional men; any barbarous jargon in speech.

Canta'bri, a rude race of ancient mountaineers who lived in Cantabria, the northern part of Spain, near the Bay of Biscay. Their chief towns were Juliobrigas, Concana, and Vellica. They made a brave resistance to the Romans in the Cantabrian war (25–19 B. C.). They are said to have been of Iberian origin.

Canta'brian Moun'tains, a general name of several ranges in the N. part of Spain. They are connected with the Pyrenees, from which they extend westward to Cape Finisterre. The highest summits are estimated at 10,000 feet high. Several portions of these mountains receive the local names of Salvada, Ordunte, Peña, Anaña, Mellara, etc.

Cantacuze'nus, Anglicised as **Cantacuzene** [Gr. Καντακουξηνός], (JOHN), a Byzantine emperor and historian. He was prime minister under Andronicus III. (who died in 1341), and he became emperor in 1342. He was involved in a civil war with Anna, the wife of Andronicus III., and abdicated in 1355. He wrote a work on Byzantine history from 1320 to 1357. Died Nov. 20, 1411.

Cantal, a central department of France, formed of the S. part of the old province of Auvergne. It is bounded on the N. by Puy de Dôme, on the E. by Haute-Loire, on the S. E. by Lozère, on the S. by Aveyron, and on the W. by Lot and Corrèze. Area, 2217 square miles. It is drained by the sources of the Dordogne. The surface is mountainous, and mostly occupied by the *débris* of extinct volcanoes. The soil is mostly sterile. Among the staple products are cattle, butter, cheese, and chestnuts. Capital, Aurillac. It is divided into 4 arrondissements, 23 cantons, and 200 communes. Pop. in 1872, 231,867.

Can'taloupe (commonly pronounced kan'ta-lōp) **Melon,** or **Musk-melon,** named from Cantalupo, in Italy, the *Cucumis melo* of botanists, is of the same genus with the cucumber, family Cucurbitaceæ. It has round, heart-shaped leaves, a creeping stem, yellowish flowers, and fleshy fruit, which is much esteemed. It is largely cultivated in New Jersey.

Canta'ta [Fr. *cantate*], an Italian musical term, derived from *cantare*, "to sing." It is the name of a local composition, not easily defined, which consists of choruses, arias, and recitatives with instrumental accompaniment. Later forms of it are much simpler.

Canteen' [Fr. *cantine*], a military term used in several senses: 1, a small tin or wooden vessel, which each soldier carries and uses for holding water; 2, a small wooden or leathern chest or coffer containing the table equipage and utensils of an officer when he is in active service; 3, a public-house licensed in British garrisons and barracks for the sale of malt liquor, ardent spirits, and groceries, in order that the soldiers may obtain such articles without going beyond the precincts of the barracks.

Cantemir' (DEMETRIUS), an historian, was born in 1673. He was appointed vaivode of Moldavia by the sultan of Turkey in 1710. Having become an ally of Peter the Great, he was expelled from Moldavia by the Turks in 1711. He wrote in Latin a "History of the Origin and Decay of the Ottoman Empire." Died in 1723.

Can'terbury, a city and county of England, in Kent, on the river Stour, 56 miles E. S. E. of London, with which it is connected by railway. It is the metropolitan see of England, being the seat of the archbishop of Canterbury, who is primate of all England and the first peer of the realm. It stands in a vale or level space between hills of moderate height. It contains fourteen old churches, mostly built of flint; also remains of St. Augustine's Benedictine abbey, and the ruins of a Norman castle. Among its institutions are several hospitals, a museum, and a theatre. Canterbury returns two members to Parliament. It has manufactures of linen damask, and is noted for its brawn. St. Augustine became the first archbishop of Canterbury in 597 A. D. About this time the town was the capital of the kingdom of Kent, and was called *Caer Cant* (*i. e.* "city of Kent"). Archbishop Cuthbert built here, about 740 A. D., a church which received numerous additions in succeeding ages. The choir having been destroyed by fire in 1174, it was soon rebuilt by William of Sens. This restored choir is probably one of the oldest parts of the cathedral, which presents a magnificent union of almost every style of Christian architecture. The central tower is 234 feet high, and the total exterior length of the cathedral is 545 feet. Immense numbers of pilgrims came here to worship at the shrine of Thomas à Becket, who was killed here in 1170. Pop. in 1871, 20,961.

Canterbury, a post-village of Windham co., Conn., on the Quinebaug River and on the Hartford Providence and Fishkill R. R., 40 miles W. S. W. of Providence. Pop. of Canterbury township, 1543.

Canterbury, a post-township of Merrimack co., N. H., on the Boston Concord and Montreal R. R., 8 miles N. of Concord. It has a community of Shakers and some manufactures. Pop. 1169.

Canterbury, a village of Cornwall township, Orange co., N. Y., has six churches, and manufactures of cord, fish-lines, and woollen yarn.

Canterbury, a settlement of about 2400 square miles on the E. coast of the N. island of the New Zealand group.

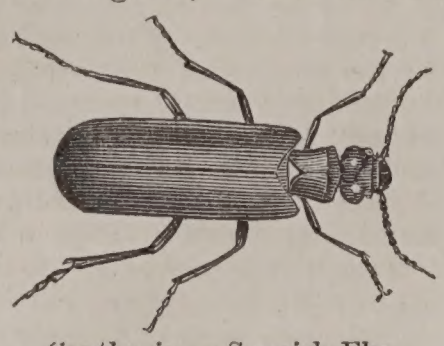
* *Cant* in this sense is probably derived from the Latin *canto*, to "sing," in allusion to the singing tone made use of.

Capital, Christchurch; Lyttleton is its chief port. The products are potatoes, oil, whalebone, gold-dust, and hides.

Canterbury, Viscounts (United Kingdom, 1835).—John Henry Thomas Manners-Sutton, third viscount, K. C. B., governer of Victoria colony, born May 27, 1814, was member of Parliament for Cambridge borough 1841–47, under-secretary for the home department 1841–46, has been lieutenant-governor of New Brunswick and governor of Trinidad, and succeeded his brother Nov. 13, 1869.

Canterbury Bell. See Campanula.

Can'tharis [Gr. *κανθαρίς*], plu. **Canthar'ides,** a genus of insects of the order Coleoptera and family Meloidæ. The Spanish fly, or blister beetle (*Cantharis* or *Lytta vesicatoria*), the most important of the genus, is about an inch long; has a large head and long antennæ, and soft wing-covers concealing the abdomen. It is of a bright green. Its brilliancy is of use in detecting cases of poisoning by cantharides, golden-green particles being always seen in powders made of these insects, and these particles remaining long unchanged. The common blister fly is found in the south of Europe and in Asia. It is rare in England. They are imported from Spain, France, Italy, Russia, and the Levant. The perfect insect is taken by beating the branches of trees in the morning or evening, when it is comparatively lethargic, a cloth being spread below to receive the insects as they fall. Those who collect them wear gloves and veils. Unpleasant effects have been experienced from even sitting under trees on the leaves of which cantharides were numerous. They are killed with the vapor of vinegar, sulphurous acid, or oil of turpentine. Unless kept with great care, they lose their active properties. They are liable to be injured by mites. Some of the species of the genera *Meloe* and *Mylabris* are occasionally used as vesicants. The American *Lytta vittata* (potato-fly) and other native species have very similar properties.



Cantharis, or Spanish Fly.

The active principle of the flies is cantharidin, of which $\frac{1}{100}$ of a grain placed on the lip rapidly causes the rise of blisters. Internally, the flies cause heat in the throat, stomach, kidneys, etc., and in large doses they give rise to inflammation of a serious nature. There are various preparations of blistering flies, such as tincture of cantharides, cantharidal collodion, etc., but that most commonly employed is blistering plaster, made by mixing powdered flies, yellow wax, resin, and lard.

Can'ticles [in the Vulgate, *Canticum Canticorum*, the "Song of Songs"], called in the common English version of the Bible **Solomon's Song,** the Hebrew שִׁיר הַשִּׁירִים (*i. e.* "Song of the Songs"), is a collection of poems, perhaps with a dramatic arrangement, whose subject is chaste love. The rabbis first began to interpret it allegorically of God and His people, and this interpretation was so established before the time of the Massoretes that they did not hesitate to recognize the book as canonical. The same method of interpretation passed into the Christian Church, only that the allegory was there accepted as referring to Christ and the Church. The more crass forms of this method of interpretation have been abandoned, but the effort is still made by types or symbols or other devices to give to the book another significance than that which it bears on its face. Not a syllable appears in the book to suggest any such hidden significance, and this interpretation rests on the assumption that, since the book is in the canon, it *must* be something more than it appears to be. Niebuhr is said to have replied to a young man, who regretted its place in the canon, that he would not consider the Bible complete as "the book of humanity," if it contained no representation of pure and faithful love. The book probably belongs to the time of Solomon, though there are no satisfactory data for deciding as to its date and author.

Cantire, kan-tīr′, or **Kintyre,** a long narrow peninsula of Scotland, forms the S. end of the county of Argyle. It is bounded on the E. by the Frith of Clyde or Kilbrannan Sound, and on the W. by the Atlantic Ocean. Its length is 40 miles, and its average width 6½ miles. It contains a large portion of arable land. A lighthouse stands at the S. W. extremity, which is called the Mull of Cantire.

Can'to Fer'mo, in music, the subject-song or theme. Every part that is the subject of counterpoint, whether plain or figured, is called canto fermo by the Italians. In church music this term means plain song or choral song in unison, and in notes all of equal length.

Can'ton [from the It. *canto,* a "corner"], a small piece of territory; the name of each of the states or independent provinces which united form the federal republic of Switzerland, each retaining its autonomy in matters of internal administration.

Canton, in heraldry, occupies a corner of the shield, either dexter or sinister, and in size is the third of the chief. It is one of the nine honorable ordinaries.

Canton′ [a corruption of *Quang-Tong,* the name of the province; Chinese *Sang-Ching*], a populous city, the greatest commercial emporium of China, and the capital of the province of Quang-Tong, is on the left (N.) bank of the Canton or Pearl River, about 70 miles from its entrance into the China Sea; lat. 23° 7′ N., lon. 113° 14′ E. The mean annual temperature is 69° F. The city is enclosed by a brick wall about seven miles in extent, and is entered by twelve gates. It is also defended by four strong forts, erected on the hills which rise on its northern side. Several islands in the river below Canton are also fortified. The city is divided into the old and new town, the former of which is occupied by Tartars, and the latter by the Chinese. The European merchants occupy one of the suburbs called *hongs,* which face the river and are separated from it by a quay 100 feet wide. The streets of Canton are crooked and narrow, having an average width of about eight feet. The houses are built of brick, stone, or wood, and are seldom more than two stories high. Many thousands of people called Tankia, having no homes on the land, live on boats and rafts, and gain a subsistence by fishing and rearing poultry. Canton contains several many-storied pagodas, a Mohammedan mosque, and about 120 joss-houses or Booddhist temples. The most remarkable of these is on the island of Honam, which is opposite the city. This temple covers about seven acres. Canton has extensive manufactures of silk, cotton, brass, iron, and wood.

The city has an advantageous position for foreign and internal trade, and has access to the rich provinces of Quang-See and Quang-Tong by its large navigable river. The chief articles of export are tea and silk goods, of the former of which 24,477,411 pounds were exported in 1863. Sugar, porcelain, and precious metals are also exported. All the legitimate foreign trade of China was confined to Canton before 1843, when the more northern ports of Amoy, Foochoo, Ningpo, and Shanghai were opened to foreigners, since when the importance of Canton has declined. The exports from this city to Europe and America in 1844 were valued at $26,755,626, and in 1871 they were valued at about $13,840,000. The quantity of tea exported in 1847 is said to have been more than 72,000,000 pounds. Large quantities of opium, produced in Hindostan, are imported into Canton contrary to law.

Canton is supposed to be the oldest city of China. Its population is notorious for profligacy, turbulence, dishonesty, and other vices. The European factories have been more than once attacked by mobs of Cantonese, actuated by a violent hostility to foreigners. The police is rendered inefficient or worse by the venality and rapacity of its officers, who share in the profits of robberies, and are often bribed to liberate offenders. In May, 1841, the British forces captured the defences of Canton, but before they entered the city they were induced to retire by the payment of £6,000,000. The city was occupied by the British and French armies in Dec., 1857. Pop. about 800,000.

A. J. Schem.

Canton, a township of Wilcox co., Ala. Pop. 1528.

Canton, a post-village and township of Hartford co., Conn., 15 miles N. W. of Hartford. Pop. 2639.

Canton, a post-village, capital of Lincoln co., Dak., on the Sioux River, in a good farming region. It has good water-power, and one weekly newspaper.

R. H. Miller, Ed. Sioux Valley "News."

Canton, a small post-village, capital of Cherokee co., Ga., on the Etowah River, about 37 miles N. of Atlanta. Gold is found in this county. Pop. 214.

Canton, an incorporated city in Fulton co., Ill., 28 miles W. S. W. of Peoria, 12 miles W. of Illinois River, at the crossing of the Toledo Peoria and Warsaw R. R., and the Rushville and Buda branch of the Chicago Burlington and Quincy R. R., is situated in a coal-region with mines within the city. It has 7 churches, 1 national and 2 private banks, 3 iron-foundries, large agricultural implement and wagon manufactories, 4 cigar manufactories, and a large packing-house, putting up meat for the English market. There is a good library, four ward and one high school, erected at a cost of $10,500 each, a good fire department, etc. It has two weekly newspapers. Pop. 3308; of township, 4472. W. P. Tanquary, Ed. "Register."

Canton, a township of Benton co., Ia. Pop. 1509.

Canton, a post-township of Oxford co., Me., on the Androscoggin River, at the N. terminus of the Portland

and Oxford Central R. R., 50 miles from Portland. It has manufactures of furniture and carriages. Pop. 984.

Canton, a post-village of Norfolk co., Mass., on the Boston and Providence R. R., 14 miles S. of Boston. Canton township has one national bank, and manufactures of cotton and woollen goods, sewing silk, machinery, etc. Pop. 3879.

Canton, a post-twp. of Wayne co., Mich. Pop. 1392.

Canton, a township of Fillmore co., Minn. Pop. 1012.

Canton, a post-village, capital of Madison co., Miss., is the southern terminus of the Mississippi Central R. R., which here connects with the New Orleans Jackson and Great Northern R. R. It is 23 miles N. N. E. of Jackson. It has two weekly newspapers. Pop. 1963.

Canton, a post-village of Lewis co., Mo., on the Mississippi River, about 185 miles above St. Louis. The Mississippi Valley and Western R. R. connects it with Quincy, Ill., 17 miles distant, Keokuk, and St. Louis. It is one of the chief shipping-points of the county, and contains Canton University, an institution of the "Christian" connection. There are two public schools, two banks, two wagon and plough factories, and various other manufactures. It has one weekly and one monthly newspaper. Pop. 2363; of Canton township, 3434. ED. "PRESS."

Canton, a village of Van Buren township, Onondaga co., N. Y. Pop. 223.

Canton, a post-village, and capital of St. Lawrence co., N. Y., on the Rome Watertown and Ogdensburg R. R., 60 miles N. E. of Watertown, and on Grass River, which affords valuable water-power, used in manufacturing lumber, flour, machinery, leather, castings, etc. Canton contains a court-house, jail, almshouse, good graded schools, and nine churches, and is the seat of St. Lawrence University (Universalist), having law and theological schools connected with it. The university buildings are very elegant. It has one weekly newspaper. P. 1681; of Canton township, 6014.

Canton, the capital of Stark co., O., is a handsome city at the confluence of the East and West branches of Nimishillen Creek, and on the Pittsburg Fort Wayne and Chicago R. R., 102 miles W. N. W. of Pittsburg and 54 miles S. S. E. of Cleveland. It is on the line of the Valley R. R., now in course of construction, from Cleveland, O., to Wheeling, W. Va. It contains 14 churches, 6 banks, 1 academy, St. Vincent's College (Roman Catholic), 4 weekly newspapers (1 German), 3 manufactories of mowers and reapers, 1 printing-press works, 1 manufactory of safes, 1 saw and spring manufactory, 2 woollen and 5 flouring mills, 2 plough manufactories, and a variety of smaller manufactures. The city is supplied with water from a lake three miles N. W. of the town by means of a Holly engine. Coal is abundant in the vicinity, and the city derives its prosperity chiefly from its manufactures, though the surrounding country is a very rich agricultural one. Canton is rapidly increasing in population and business. Pop. 8660; including Canton township, 10,612. ED. "REPOSITORY AND REPUBLICAN."

Canton, a township and post-borough of Bradford co., Pa. It has one weekly newspaper. Pop. of township, 1840; of borough, 710.

Canton, a township of Washington co., Pa. Pop. 592.

Canton, a post-village, capital of Van Zandt co., Tex., about 200 miles N. N. E. of Austin City. It has two weekly newspapers. Pop. 183.

Canton, a township of Buffalo co., Wis. Pop. 648.

Canton (JOHN), F. R. S., an English natural philosopher, born at Stroud in 1718. He made some discoveries in electricity, and received from the Royal Society a gold medal in 1765 for his demonstration that water is compressible. Died in 1772.

Can'tonment* [Fr. *cantonnement*], a military term applied to temporary resting-places of European armies. When troops are detached and quartered in several adjacent towns or villages they are said to be in cantonments. In India the term is applied to permanent military stations of the British army, or to regular military towns at a considerable distance from any city. A cantonment on a large scale comprises, besides barracks for European soldiers and huts for native troops, magazines, public offices, and bungalows for the officers.

Cantù (CESARE), a popular Italian historian and poet, born near Milan Sept. 5, 1805. He wrote "Storia Universale" (20 vols., 1837–42), which has been translated into English and French, and "Della Indipendenza Italiana" (1872). He supported the liberal cause in 1848.

Canu'sium [Gr. Κανύσιον], an important and very ancient city of Apulia, in Italy, on the river Aufidus (Ofanto), about 15 miles from its mouth. It was probably founded by the Greeks. The inhabitants were called *bilingues* by Horace, because they spoke Greek and Latin. It was captured by the Romans in 318 B. C. Its site is occupied by the modern CANOSA (which see). Here were found, about 1803, remarkable remains of ancient art, among which were painted vases, marble statues, and jewels of exquisite workmanship.

Canute, Knut, or **Knud,** king of Denmark and the conqueror of England, was the son and successor of Sweyn, king of Denmark, who died in 1014. After the death of Edmund Ironsides, in 1016, Canute reigned as sole monarch of all England, having completed by arms the subjugation of the Anglo-Saxons. He confirmed his power by mildness and prudent policy, and became the most powerful European monarch of his time. He founded monasteries, patronized minstrels, and wrote verses or ballads himself. He died in 1036, leaving three sons, Sweyn, Harold, and Hardicanute.

Can'vas [from the Lat. *cannabis*, "hemp"], a coarse hempen or linen cloth which is extensively used in the form of tents and the sails of ships. It is also the principal material on which artists paint oil-pictures. The word is sometimes employed as synonymous with sail. In Old English it meant also a straining-cloth or sieve.

Can'vas-back (*Fuligula valisneria*), a species of North American duck, the flesh of which is highly prized. It is considered by some persons as the most delicious of all waterfowl. It is not found in Europe. It frequents the bays of the sea and the estuaries of rivers. The plumage is diversified with black, white, chestnut-brown, and slate-color. The length is about twenty inches. These birds, after breeding in the northern parts of the continent, migrate southward about November. During the winter many of them are shot on Chesapeake and Delaware bays. Those found on the Chesapeake are considered better than any others.

Canzo'ne, a form of Italian lyrical poem adopted, with some alteration, from the poetry of the Troubadours. The canzone is divided, like the Greek strophic ode, into stanzas, in which the number and place of rhymes and metre of verses respectively correspond. The last stanza, commonly shorter than the others, is called *congedo* or *ripressa*. This form of poetry was adapted by Petrarch to the expression of different veins of thought—elevated and heroic.

Caoutchouc, Gum Elastic, or **India-Rubber,** a valuable substance used in the arts for a great variety of purposes, is the inspissated juice or sap of several species of plants of the natural orders Euphorbiaceæ, Moraceæ, Artocarpaceæ, and Apocynaceæ. It is produced chiefly in tropical and sub-tropical countries, especially in the East Indies and South America. The milky juice of the tree is obtained by incisions in the bark, and is dried on clay moulds over smoky fires, which gives it its usual black color. Pure caoutchouc is a hydrocarbon, C_8H_{14}. It is extremely valuable in the arts on account of its elastic and waterproof properties. By combining it with less than 25 per cent. of sulphur, and exposing it to a temperature of about 270° F., it is converted into soft vulcanized rubber, a substance much more valuable than the original caoutchouc. By adding 50 per cent. or more of sulphur, and heating to 300° F., it forms hard vulcanized rubber or ebonite. (See elaborate article on the manufacture of caoutchouc products by PROF. C. F. CHANDLER, under INDIA-RUBBER.)

Cap, in shipbuilding, is a strong, thick block of wood fixed near the top of each mast. It has a hole to receive the upper end of the lower mast, and another to receive the lower end of the topmast, with eyebolts to aid in hoisting the topmast. When made of iron the cap is called a *crance*.

Ca'pac, a post-village of St. Clair co., Mich.

Capac'ity [from the Lat. *capax*, "capable"], in law, ability or power to do a particular thing, such as to take or to hold land, to sue and to be sued, and the like. Capacity may sometimes exist to do one of these acts, and not to do another. Thus, one may be able to take and hold land, and not have capacity to dispose of it, as in the case of an infant; or one may be able to take, and not have the power to hold against another, as in the case of an alien, who may at common law take land as between himself and his grantor, but cannot hold it as against the state. Capacity may be conveniently considered under two general heads—capacity to have rights, and capacity to act. Some rules as to incapacity depend upon natural disabilities; others rest upon arbitrary grounds. This subject is closely connected with the doctrine of *status*, as treated by writers on public law. This has been shown by Mr. Maine in his work on "Ancient Law" to have had its principal origin in the early idea of the family. The arbitrary rules of archaic law have been, to a considerable extent, gradually

* Frequently pronounced kan-too'ment in the British army.

supplanted by the modern idea of fixing one's relations to another by contract, so that the movement of modern progressive society has been from *status* to contract. This doctrine is well illustrated in the case of master and servant. In ancient law the position of the servant was fixed by an arbitrary rule, so that he was a slave. In modern times the relation depends on contract. Still, there always will be a class of cases where legal capacity is denied, as where persons have not the mental power to enter into a contract, including infants, insane persons, and habitual drunkards, or where a supposed rule of public policy may intervene, as in the case of aliens. These are still in some of the American States denied the power to hold land by purchase, or even to take it at all by descent. In fact, capacity to have rights largely depends on the general convictions of the people of a state, while the capacity to act is commonly determined by a desire to protect one who has rights from an improvident surrender of them. (See as to the relations of this subject to private international law, WESTLAKE'S or SAVIGNY'S treatises on that topic, and PHILLIMORE or WHEATON on international law.) T. W. DWIGHT.

Capanno'ri, a city of Italy, in the province of Lucca, and 5 miles E. of Lucca. It is situated in a fertile plain on the railway from Florence to Pisa, and has considerable trade. Pop. in 1871, 48,313.

Cape Ann, the eastern point of Essex co., Mass., is 31 miles N. E. of Boston. Here is a rocky headland, in which, at Rockport, valuable quarries of syenite are worked. Lat. 42° 38′ 3″ N., lon. 70° 34′ 2″ W. Two stone lighthouses stand on Thatcher's Island, ¾ of a mile distant, each 112½ feet high, showing fixed white dioptric lights of the first class, 165½ feet above the sea.

Cape Ar'ago, or **Greg'ory,** is a point at the S. side of the entrance to Coos Bay, in Coos co., Or. Its lighthouse stands on a small island, lat. 43° 20′ 38″ N., lon. 124° 22′ 11″ W., and shows a flashing light 75 feet above the sea.

Cape Bab-el-Man'deb, on the Arabian side of the strait of that name, lat. 12° 40′ N., lon. 43° 31′ E., is a rock of basalt 865 feet high.

Cape Béarn, a promontory of France, in the Mediterranean; lat. 42° 31′ N., lon. 3° 7′ 30″ E. Here is a lighthouse of the first class, 751 feet above the sea.

Cape Bianco, lat. 37° 20′ N., lon. 9° 48′ E. This is the most northern point of Africa.

Cape Blan'co (*i. e.* "White Cape"), on the Atlantic, is, next to Cape Verde, the westernmost point of Africa; lat. 20° 47′ N., lon. 17° 4′ W.

Cape Blanco, or **Orford,** on the Pacific, is the most western point of Oregon; lat. 42° 50′ N., lon. 124° 32′ 29″ W. Its lighthouse shows a fixed white dioptric light of the first order, 256 feet above the sea.

Cape Boe'o (anc. *Lilybæum Promontorium*) is the most western point of Sicily. It was in ancient times an important naval station, near which the Romans gained a great naval victory in the First Punic war. Lat. 37° 48′ N., lon. 12° 25′ E.

Cape Boj'ador', a bold headland of Western Africa, is the termination of a range of Mount Atlas, in lat. 26° 7′ N., lon. 14° 29′ W.

Cape Bon, or **Ras Adder,** on the N. coast of Africa, 58 miles N. E. of Tunis; lat. 37° 6′ N., lon. 11° 3′ E.

Cape Breton (brit'tn), an island of North America, belonging to Great Britain, and forming a part of the province of Nova Scotia, is in the Atlantic Ocean, and is separated from the north-eastern extremity of Nova Scotia by a narrow strait called the Gut of Canso. It is a rocky island of very irregular shape, and has an area of 3120 square miles. The chief articles of export are fish, coal, and lumber. It is noted for its fisheries of cod and mackerel. It is divided into four counties, Cape Breton, Inverness, Richmond, and Victoria. The climate is severe. Pop. in 1871, 75,483.

Cape Breton, a county of Nova Scotia, Dominion of Canada, is a part of the island of Cape Breton, and borders on the Atlantic Ocean. Bituminous coal is the chief product. Capital, Sidney. Pop. in 1871, 26,454.

Cape Canav'eral, on the E. coast of Florida, in Volusia co., lat. 28° 27′ N., lon. 80° 33′ W., is nearly surrounded by dangerous shoals, and has on its N. E. pitch a revolving light of the first order, 139 feet above the sea.

Cape Canso, the most easterly point of Nova Scotia, has a lighthouse on Cranberry Island; lat. 45° 19.5′ N., lon. 60° 55′ 3″ W. It is also a port of entry in Wilmot township, Guysborough co., having active trade and fishing interests. It has a U. S. consul. Gold has been found here. Pop. about 1000.

Cape Cato'che, the north-eastern extremity of Yucatan, is on the Gulf of Mexico. This was the part of the American continent on which the Spaniards first landed; lat. 21° 34′ N., lon. 86° 57′ 51″ W.

Cape Charles, Va., is the southern point of the "Eastern Shore," a peninsula which separates Chesapeake Bay from the Atlantic Ocean. A lighthouse stands on Smith's Island near this cape with a flashing light of the first order; lat. 37° 07′ 08″ N., lon. 75° 53′ 12″ W.

Cape Clear, the most southern point of Ireland, is in the county of Cork. Here is a lighthouse on a cliff 455 feet above the sea; lat. 51° 26′ N., lon. 9° 29′ W.

Cape Coast Castle, a British settlement and town on the W. coast of Africa, in Upper Guinea; lat. 5° 6′ N., lon. 1° 15′ W. This is the capital of the British colonies on the coast of Guinea. It is defended by several forts. The climate is unhealthy. The chief articles of export are palm oil, gold-dust, and tortoise-shell. Pop. about 10,000.

Cape Cod, Mass., is a long and narrow sandy peninsula, which nearly coincides with Barnstable county. It is about 65 miles long, and from 1 to 20 miles wide. The form of it is similar to a man's arm bent at the elbow. On the northern extremity, which is called Race Point, is a revolving light 47 feet above the sea; lat. 42° 03.7′ N., lon. 70° 14.3′ W.

Cape Colon'na (anc. *Sunium Promontorium*), the most southern point of Attica, on the Mediterranean; lat. 37° 39′ N., lon. 24° 2′ E. Its summit is crowned by the ruins of a marble temple 269 feet above the sea.

Cape Col'ony, or **Cape of Good Hope,** a British territory which forms the southern extremity of Africa, is bounded on the N. by the Orange River, on the E. and S. by the Indian Ocean, and on the W. by the Atlantic. Area, 221,311 square miles. The interior of this region is described as a succession of plateaus and mountain-ranges, which increase in elevation as they recede from the coast. The highest mountains are estimated at nearly 10,000 feet above the level of the sea. The sea-coast presents several comparatively safe and commodious harbors, among which the most frequented are Table Bay and Algoa Bay. Cape Colony has no rivers that are of much value for navigation. The climate is healthy, but the extremes of temperature have a wide range. But little rain falls in the interior. The vegetation of this region is peculiar, and rich in beautiful flowers, among which are the ixia, gladiolus, tritonia, strelitzia, pelargonium or Cape geranium, and xeranthemum. The characteristic vegetation of the vicinity of Cape Town consists of Ericaceæ (heaths), Stapeliæ or carrion flowers, and Proteaceæ. Here are about 400 species of Ericaceæ. Among the indigenous animals of Cape Colony are the elephant, giraffe, rhinoceros, lion, buffalo, panther, wild-boar, hyæna, antelope, quagga, springbok, and ostrich. Many cattle and sheep are raised here. The soil in some parts is fertile, but a large portion of it is arid and barren without irrigation. Wheat and other cereals are cultivated extensively. The chief articles of export are wool, wine, copper, hides, horses, flour, aloes, fish, fruits, and maize. The value of the exports in 1870 amounted to £2,603,000, and that of the imports to £2,502,000. In 1870, 28,813,583 pounds of wool were exported, valued at £1,835,390.

The colony is divided into two provinces—the eastern and western, the respective capitals of which are Graham's Town and Cape Town. The pop. in 1865 was 496,381, of which 81,598 were Hottentots, 100,536 were Kaffers, and 181,592 were Europeans.

History.—The Dutch were the first Europeans who colonized this region. They founded Cape Town in 1652. The colony was captured in 1806 by the British, to whom it was formally ceded in 1814. The European colonists have been often disturbed by the hostility of the Kaffers, a warlike race of negroes. In 1836 the BOERS (which see) left the country in great numbers, and founded the independent Transvaal Republic and Orange Free State. In 1866, British Kaffraria, and in 1868 a part of the Basuto country, were annexed to the colony. A. J. SCHEM.

Cape Com'orin, in the Indian Ocean, is the southern extremity of Hindostan; lat. 8° 5′ N., lon. 77° 30′ E.

Cape Di'amond, in Canada, is at the confluence of the St. Charles River with the St. Lawrence. It is 333 feet above the river, to which it presents a precipitous bluff. On this point stands the citadel of Quebec.

Cape Disappointment, or **Cape Hancock,** the S. W. point of Washington Territory and of Pacific co., at the mouth of the Columbia; lat. 46° 16′ 33″ N., lon. 124° 02′ 13″ W., has a lighthouse 40 feet high, showing a fixed white light of the first order 232 feet above the sea.

Cape Duca'to, or the **Leuca'dian Prom'ontory,** sometimes called **The Lover'sLeap,** is the S. point of the Greek island of Leucadia or Santa Maura; lat. 38° 34′ N., lon. 20° 32′ 45″ E. It is a perpendicular white cliff over

2000 feet high, whence Sappho is said to have cast herself for love of Phaon. From this precipice the ancients once a year cast a criminal, first tying a great number of birds to him. If the flight of the birds was strong enough, so that the man was alive when he reached the sea, he was taken up in a boat and set at liberty. Mariners have always regarded this cape with dread.

Cape Eliz'abeth, a township of Cumberland co., Me., 1 mile from Portland, contains seven churches, and has a rolling-mill, oil-refinery, a dry-dock, and important manufactures. Cape Elizabeth is a suburb of Portland, and a place of summer resort. The township takes its name from the cape; in lat. 43° 33′ 56″ N., lon. 70° 11′ 41″ W. It has two stone lighthouses, one with a fixed and one with a flashing light. Pop. 5106.

Cape Farewell', the southern extremity of Greenland, is in lat. 59° 49′ N., lon. 43° 54′ W.

Cape Fear, on the Atlantic, is the southern extremity of Smith's Island, N. C., and is the most southern point of the State; lat. 33° 52.3′ N., lon. 77° 59.8′ W.

Cape Fear, a township of Chatham co., N. C. Pop. 2285.

Cape Fear, a township of New Hanover co., N. C. Pop. 996.

Cape Fear River is formed by the Haw and Deep rivers, which unite at Haywood in Chatham co., N. C. It flows south-eastward, passes Fayetteville and Wilmington, and enters the Atlantic near Cape Fear. The length, excluding the branches above named, is estimated at 200 miles. Steamboats can ascend it to Fayetteville, 120 miles.

Capefigue (Baptiste Honoré Raymond), a French historian, born at Marseilles in 1802. He became a royalist and editor of several journals of Paris. Among his numerous works on French history are "Europe during the Consulate and the Empire" (1839–41), a "History of the Restoration" (1842), and (his best work) a "History of Philippe Auguste" (1831–34, 4 vols.).

Cape Flat'tery, the N. W. point of Washington Territory and of Clallam co. On Tatoosh Island, half a mile distant, is a small lighthouse, in lat. 48° 23′ 20″ N., lon. 124° 43′ 48″ W. This is the most western point of the U. S., exclusive of Alaska.

Cape Flor'ida, the S. point of Key Biscayne, off the S. E. point of Florida, has a lighthouse standing in a grove of cocoanut trees; lat. 25° 39′ 56″ N., lon. 80° 09′ 24″ W., with a fixed white light.

Cape Foulweath'er, or **Yaqui'na Head,** the westernmost point of Tullamook co., Or., has a brick lighthouse 81 feet high, showing a fixed white light of the first order 150 feet above the sea; lat. 44° 16′ 33″ N., lon. 124° 05′ W.

Cape Gas'pe, the point of land at the N. side of the entrance to Gaspe Bay, Quebec (Canada). It is in lat. 48° 45′ N., lon. 64° 12′ W.

Cape Girardeau, a county in E. S. E. Missouri. Area, 875 square miles. It is bounded on the E. by the Mississippi River, and drained by the Whitewater. The surface is nearly level; the soil is fertile. Grain, wool, tobacco, cattle, and timber are among the chief products. Lumber, cooperage, saddlery, harness, etc. are the principal manufactures. Capital, Jackson. Pop. 17,558.

Cape Girardeau, a city in Cape Girardeau co., Mo., on the W. bank of the Mississippi, 150 miles S. of St. Louis, is the seat of St. Vincent's College, and contains also a female academy and a public school. There are four newspapers, one of them German. Its exports are cotton, ploughs, lime, mineral paints, etc. There are seven churches in the city, two of them Catholic. Pop. 3585; outside township, 1651. A. M. Casebolt, Pub. "Marble City News."

Cape Guar'dafui, or **Gardafui,** the easternmost point of Africa, is in lat. 11° 50′ N., lon. 51° 21′ E.

Cape Hat'teras, the eastern extremity of North Carolina, is a point of a low sandy island, separated from the mainland by Pamlico Sound. The navigation is dangerous in this vicinity, on account of shoals which extend far out into the sea; lat. 35° 15.2′ N., lon. 75° 30.9′ W. Two miles N. of the extremity stands the lighthouse, 190 feet in height, showing a flashing dioptric light of the first order.

Cape Hay'tien, formerly **Cape Français,** a seaport of Hayti, 90 miles N. of Port-au-Prince. It has a safe harbor and some handsome squares. It has some trade with the U. S. and England. Lat. 19° 46.4′ N., lon. 72° 11′ W. Pop. estimated at 10,000.

Cape Henlo'pen, Del., is at the entrance of Delaware Bay, 13 miles S. S. W. of Cape May; lat. 38° 46.6′ N., lon. 75° 04.7′ W. It has a stone lighthouse, showing a fixed white dioptric light of the first order, 128 feet above the sea.

Cape Henry, Va., is at the entrance of Chesapeake Bay, 12 miles S. of Cape Charles. Here is a fixed light 129 feet above the level of the sea; lat. 36° 55.5′ N., lon. 76° 0.2′ W.

Cape Horn, the southernmost point of America, is an island of the archipelago of Terra del Fuego; lat. 55° 59′ S., lon. 67° 16′ W. It is a high, steep, naked rock. Vessels which pass from the Atlantic to the Pacific, or the reverse, usually double this cape, rather than pass through the Strait of Magellan.

Cape la Hague, a headland of France, in Normandy, on the English Channel, is the N. W. extremity of the peninsula of Cotentin, and about 16 miles N. N. W. of Cherbourg. On the E. side of Cotentin is Cape la Hogue, near which the English and Dutch fleets defeated the French in 1692. Lat. 49° 44′ N., lon. 1° 56′ W.

Ca'pelin, or **Caplin,** a little marine fish of the salmon family (the *Mallotus Grœnlandicus*), which visits the coasts of Labrador and Newfoundland in vast shoals, furnishing bait for the cod-fishermen. Capelins are also taken and dried for the European market, and are very good eating. They are about the size of the smelt.

Cap'ell (Edward), an English Shakspearian critic, born at Troston in 1713. He published the works of Shakspeare in 10 vols. 8vo, 1767, "Notes and Various Readings of Shakspeare" (1775), and the "School of Shakspeare," 3 vols. 4to (1783). Died Feb. 24, 1781.

Capel'la (*i. e.* the "Kid"), a bright star of the first magnitude in the constellation of Auriga, is also called *α Aurigæ*. It is a double star.

Cape Lookout', the S. E. extremity of the islands off Carteret co., N. C., has a lighthouse 150 feet high near its extremity, in lat. 34° 37′ 16″ N., lon. 76° 31′ 07″ W., with a fixed white light of the first order.

Cape May, the southernmost county of New Jersey. Area, 250 square miles. It is bounded on the E. by the Atlantic Ocean and on the W. by Delaware Bay. The surface is level; the soil is alluvial, and partly sandy. The chief crops are grain, potatoes, and dairy products. The county is intersected by the West Jersey R. R. It contains a deposit of cedar-wood which is still sound, although it has probably been buried many centuries. Capital, Cape May Court-house. Pop. 8349.

Cape May, or **Cape Island,** a celebrated watering-place of Cape May co., N. J., is on a small island in the Atlantic Ocean, 81 miles by railroad S. of Philadelphia. The distance from that city by water is nearly 100 miles. This place is the southern terminus of the West Jersey R. R., and has daily communication with Philadelphia by steamboats in summer. It has two weekly newspapers. It is one of the most fashionable summer-resorts in the U. S., and contains numerous hotels.

Cape May, the southern extremity of New Jersey, is at the entrance of Delaware Bay. Here is a revolving light elevated 152 feet above the sea, in lat. 38° 55.8′ N., lon. 74° 57.3′ W.

Cape May Court-house, capital of the above county, is on the West Jersey R. R., 68 miles S. of Camden. Pop. 1248.

Cape Mendoci'no, a lofty headland of Humboldt co., Cal., is the westernmost point of that State. It has a wrought-iron lighthouse, with a flashing white light of the first order, 428 feet above the sea; lat. 40° 26′ 24″ N., lon. 124° 23′ 27″ W.

Cape North, a promontory in the Arctic Ocean, is the northernmost point of Europe. It is the N. extremity of the island of Magerö, separated by a narrow channel from the mainland of Norway; lat. 71° 10′ 12″ N., lon. 25° 46′ E.

Cape of Good Hope, a promontory near the southern extremity of Africa, is the termination of Table Mountain, rising about 1000 feet above the level of the sea; lat. 34° 22′ S., lon. 18° 30′ E. It is about 30 miles S. of Cape Town. This cape was discovered by Bartholomew Diaz in 1486, and was first doubled by Vasco da Gama in 1497.

Cape Pal'mas, the S. extremity of Liberia, lat. 4° 22′ N., lon. 7° 44′ W., is a high point with a lighthouse. It is also the popular name of that part of the country. It is included in the Liberian state of Maryland. Cape Palmas is the diocese of a bishop of the Protestant Episcopal Church.

Cape Pine, Newfoundland, lat. 46° 37′ 4″ N.. lon. 53° 31′ 45″ W., has an iron lighthouse with a fixed catoptric white light of the first order, 314 feet above the sea.

Cape Poge, the N. E. point of Chappequiddick Island, in Edgartown, Dukes co., Mass., lat. 41° 25′ 14″ N., lon. 70° 26′ 44″ W., has a wooden lighthouse 36 feet high, with a fixed white light of the fourth order.

Cape Prince of Wales, the westernmost point of the

American continent, on the E. side of Behring Strait; lat. 65° 45′ N., lon. 168° 17′ W. It is a lofty headland, with dangerous shoals in the vicinity.

Ca′per, the common name of the pickled flower-buds of the *Capparis spinosa*, of Southern Europe and Barbary. Several other species yield buds which are similarly used. It is a trailing shrub of the order Capparidaceæ, growing on rocks and walls, and extensively cultivated in Sicily and the south of France. The flowers are large and beautiful. Capers have an agreeable pungency of taste, and are used as a condiment and ingredient of sauces. They have medicinal properties, being anti-scorbutic, stimulant, and laxative. The buds are gathered every morning, and immediately put into vinegar. They are sorted, and the best are sent to market in jars. Florida has two native species of the caper tree, which are erect and not trailing. The plant called "caper" in England is the caper spurge, a *Euphorbia*.

Cape Race, near the S. E. extremity of Newfoundland, lat. 46° 39′ 30″ N., lon. 53° 4′ 30″ W., is a point very dangerous to ships sailing in foggy weather between the U. S. and Europe. It has a revolving light 180 feet above the sea. It was established by the British government, and (with Cape Pine light) is sustained by a tax upon all ships sailing from or to Great Britain to or from Canada and the North-eastern U. S.

Capercail′zie, Capercail′lie, Wood Grouse, or **Cock of the Woods** (*Tetrao urogallus*), a large gallinaceous bird, a native of Europe, is a species of grouse. The male sometimes weighs fifteen pounds or more. The plumage of the male is variegated with black, brown, and white, and the chest is dark green. Above the eye is a scarlet patch of naked skin. The legs and feet are feathered to the toes. This bird is found in the pine-covered mountains of several countries of Europe and Northern Asia, and feeds on berries, seeds, insects, and young shoots of the fir and pine. It builds on the ground. The flesh is highly esteemed for food.

The Capercailzie.

Caper′naum, an ancient city of Palestine, situated on the N. W. coast of the Sea of Galilee. Some authorities identify it with the modern Tel-Hûm.

Cape Romain′, on Raccoon Key, Charleston co., S. C., has a brick lighthouse 150 feet high, with a flashing light of the first order; lat. 33° 01′ 08″ N., lon. 79° 22′ 12″ W.

Ca′pers (William), D. D., an eloquent preacher and bishop of the Methodist Episcopal Church South, born in St. Thomas parish, S. C., Jan. 26, 1790, educated at South Carolina College, studied law, entered the Methodist ministry in 1809, was sent as delegate from his denomination to the Wesleyan Conference, in England, in 1828, professor of evidences of Christianity in Columbia College 1835, editor of the "Southern Christian Advocate" 1836–40, missionary secretary of the M. E. Church 1840–44, and superintendent of colored missions in the Southern States 1844. He took an active part in the proceedings of the Methodist General Conference of 1844, which resulted in the division of the Church, and was elected bishop by the Southern division in 1844. Died in Anderson, S. C., Jan. 29, 1855. He was author of an "Autobiography" (in Wightman's "Life of Capers"), "Catechisms for the Negro Missions," and "Short Sermons and True Tales for Children." He was an able and highly venerated man.

Cape Sa′ble, the S. E. point of Nova Scotia, is in lat. 43° 26′ N., lon. 65° 38′ W. It has a lighthouse, and is on Cape Sable Island, in Barrington township, Shelburne co. The island has some 600 inhabitants, mostly fishermen, descended from loyalists who left the U. S. during the Revolution. A ferry connects it with the mainland. The name Cape Sable Island is also given to Sable Island (which see).

Cape Sable is the most southern point of the peninsula of Florida; lat. 25° 06′ N., lon. 81° 09′ W. It is sandy and low, and is the site of Fort Poinsett.

Cape San Blas, the S. extremity of Calhoun co., Fla., has a brick lighthouse 96 feet high, with a flashing white light of the third order 102 feet above the sea, in lat. 29° 39′ 46″ N., lon. 85° 21′ 38″ W.

Cape San Lucas, the southernmost point of the peninsula of Old California; lat. 22° 44′ N., lon. 109° 54′ W.

Cape Spear, Newfoundland, lat. 47° 31′ 11″ N., lon. 52° 36′ 59″ W., has a colonial lighthouse, showing a revolving catoptric light of the first order, 264 feet above the sea.

Cape St. George, the S. point of St. George's Island, Franklin co., Fla.; lat 29° 35′ 15″ N., lon. 85° 02′ 40″ W., has a brick lighthouse 68 feet high, with a fixed white light of the third order 73 feet above the sea.

Cape St. Mary's, Newfoundland, lat. 46° 49′ 30″ N., lon. 54° 11′ 34″ W., has a brick (colonial) lighthouse, with a flashing red and white catodioptric light of the first order, 300 feet above the sea.

Cape St. Roque, a promontory on the coast of Brazil; lat. 5° 28′ S., lon. 35° 16′ W.

Cape St. Vin′cent (anc. *Promontorium Sacrum*), the S. W. extremity of Portugal; lat. 37° 3′ N., lon. 9° W. Near this cape the British admiral Jervis defeated the Spanish fleet on Feb. 14, 1797.

Capet (Hugh), king of France, was the founder of the Capetian dynasty. He was a son of Hugh the Great, count of Paris, and was born about 940 A. D. The throne having become vacant by the death of Louis V., the last Carlovingian king, in 987, Hugh assumed the royal power with the consent of many of the barons. He ruled with moderation, and selected Paris as the capital of France. He died in 996, and was succeeded by his son Robert.

Cape′tian Dy′nasty, the third dynasty of French kings, was founded by Hugh Capet, who ascended the throne in 987 A. D. (see Capet), and is said to have been the ancestor of thirty-two kings of France. According to some authorities, the last of the direct line of Capetian kings was Charles IV., who died in 1328, without male issue. He was succeeded by his cousin Philippe, who founded the house of Valois. The Bourbon line, from Henry IV. onward, were descendants of the youngest son of Saint Louis, or Louis IX., and so of Capet.

Cape Tit′mouse (*Parus Capensis*), a small bird belonging to the order Insessores, family Paridæ, found at the Cape of Good Hope. It is remarkable for the ingenuity it displays in constructing its nest, which is made chiefly of cotton, and is shaped like a bottle, as shown in the accompanying illustration. Whilst the female is hatching inside, the male, a most watchful sentinel, remains outside, resting in a pouch made for the purpose fixed to one side of the

neck of the nest. But when his mate moves off, and he wishes to follow her, he beats the opening of the nest vio-

Cape Titmouse.

lently with his wing, and succeeds in closing it, in order to protect his young from enemies.

Cape Town, a seaport of South Africa, the capital of Cape Colony, is on the S. W. shore of Table Bay, and between that bay and Table Mountain; lat. of observatory 33° 56′ 3.2″ S., lon. 18° 28′ 45″ E. It is intersected by several canals, is built on a regular plan, and lighted with gas. Close behind rise the perpendicular rocks of Table Mountain. The town contains an exchange, a college, an observatory, a public library, and a botanic garden. It is the see of a bishop of the Church of England. This port is visited by a large number of vessels, and is a convenient place for mariners to stop for rest and provisions in the voyage between Europe and India. The Constantia wine is produced in this vicinity. Cape Town was founded by the Dutch in 1652, and ceded to Great Britain in 1815. Pop. 28,457.

Cape Trafalgar′, a headland of Spain, on the Atlantic Ocean, between Cadiz and Gibraltar; lat. 36° 10′ N., lon. 6° E. Near this cape, on Oct. 21, 1805, the English fleet gained a great victory over the French, and Lord Nelson, who commanded the former, was killed.

Cape Verd, or **Verde** ("Green Cape"), the most western point of Africa, projects into the Atlantic Ocean between the rivers Senegal and Gambia; lat. 14° 44′ N., lon. 17° 33′ W.

Cape Verd, or **Verde** (called also **Cape de Verd**) **Islands** [Port. *Ilhas Verdes*], a group belonging to Portugal, in the Atlantic, 320 miles W. of Cape Verd. They are between lat. 14° 47′ and 17° 12′ N., and between lon. 22° 45′ and 25° 25′ W. Area, 1650 square miles. The group consists of fourteen islands, nine of which are inhabited—namely, Sal, Boavista, Mayo, Fogo, Brava, São Nicolão, São Thiago, São Antão, and São Vicente. They are all mountainous and of volcanic formation, and the highest point is the peak of Fogo, which rises 9157 feet, and is an active volcano. The climate is hot. They have mostly a fertile soil, and are covered with luxuriant vegetation. Sugar, cotton, coffee, maize, indigo, salt, and tobacco are the staples. The majority of the inhabitants are negroes. Pop. in 1867, 67,347.

Capeville, a post-village and township of Northampton co., Va. The village is 3 miles from Chesapeake Bay. Pop. of township, 2381.

Cape Vin′cent, a port of entry of Jefferson co., N. Y., on the St. Lawrence River and the Rome Watertown and Ogdensburg R. R., 25 miles W. N. W. of Watertown. Extensive shingle manufactories and flouring mills are located here. It has one weekly paper. In the vicinity is good fishing, and it is a favorite resort for summer tourists. Pop. 1450; of township, 3390.

W. W. Ames, Prop. "Cape Vincent Eagle."

Cape Wrath, the north-western extremity of Scotland, projects from Sutherland into the Atlantic Ocean. It is a pyramid of gneiss about 600 feet high, and is remarkable for the wildness and grandeur of its scenery. Here is a lighthouse 400 feet above the sea, in lat. 58° 37′ N., lon. 4° 58′ W.

Ca′pias [Lat. "you may take"], in law, a writ to take a person into custody. It assumes a number of forms, still designated by the leading words in the old writs, which were framed in Latin, such as (1) *Capias ad audiendum,* or (2) *ad respondendum,* (3) *ad satisfaciendum,* (4) *in withernam,* (5) *utlagatum.* The first of these writs is issued to bring up for judgment a defendant who has been found guilty of a misdemeanor or minor crime; the second is resorted to as a mode of commencing an action. This was originally the most important of all these writs, and is frequently called a "capias," without additional words. It has been much modified in England, and altogether abolished in some of the American States. The third writ designates an execution against the person, and commands the sheriff to take the person named, and to have his body before the court on a specified day to *satisfy* the claim of the party resorting to it. The result is that the party is retained in custody until discharged by due course of law. The writ is frequently called, by way of abbreviation, *ca. sa.* The fourth writ (*in withernam*) is used in an action of replevin where the goods in question cannot be found by the sheriff. By means of it he seizes other goods belonging to the party who has removed them, and detains them until restitution is made. These goods cannot be replevied until those which are the subject of the action are restored. The writ *utlagatum* is used to arrest an outlaw.

Capillaire, a name given to simple syrup flavored with orange flowers or orange-flower water; also to a medicinal syrup which is used as a pectoral in chronic catarrhs, and is prepared by adding sugar and orange-flower water to an infusion of the European fern called maiden-hair (*Adiantum capillus-veneris*), the French name of which fern is capillaire. This species also grows in the Southern U. S. Its virtues are said to be shared by the common maiden-hair (*Adiantum pedatum*), and by several European species.

Cap′illaries [from the Lat. *capillus,* a "hair"], the minute blood-vessels intermediate between arteries and veins. They have but a single coat, which is elastic, but not muscular. In size they vary considerably, most of them being too small to admit the passage of more than one or two blood-corpuscles at a time. Their arrangement differs very much in the different tissues and organs. They can be examined only by the aid of the microscope after their injection with colored fluid; hence their existence was not known to the ancients. During life the capillary movement of the blood may be seen in the web of the frog, the tail of the tadpole, or the wing of a bat. The use of the capillaries is to subdivide and distribute the blood among all the organs and tissues of the body. Their importance in nutrition and in the performance of all the organic functions is very great. (See Circulation of the Blood, by Prof. Henry Hartshorne.)

Cap′illary Ac′tion in its primary signification denotes the elevation or depression of liquids in fine hair-like tubes, as compared with the level of liquids in equilibrium in vessels or in wide tubes. If a clean wide open tube be plunged into water, nice observation will show an elevation of the fluid both within and without the tube; but if the tube be very fine the water within rises very considerably above its level outside, and the finer the bore the higher the rise. Careful examination will show that the upper surface of the water in the capillary tube is concave. The concavity, or "meniscus," is greatest in the finest tubes. If two glass plates are united at one edge, the opposite edges being slightly separated, and the plates are placed in water with the united edges vertical, the water will rise between the plates, forming a curve which assumes the form of a right-angled hyperbola, of which the asymptotes are the common vertical edge and a line at right angles to this edge so drawn as to be equidistant from the two panes of glass. If mercury be substituted for water, the capillary action is reversed; the mercury not rising in the tube or between the plates, but being depressed. The meniscus, too, is convex in this case, and the hyperbola is likewise reversed. In the barometer and eudiometer it is necessary to make corrections for this capillarity.

The cause of capillarity is well understood, and its results can be mathematically explained. It depends on the adhesion (or repulsion) which exists between the fluid and the material of the tube; while the degree of cohesion between the particles of the fluid itself must affect the result. As the size of tubes increases, the column within increases with the square of the diameter, while the attracting surface

increases only with the diameter. Attraction is therefore relatively much greater in fine tubes.

The following table exhibits the relative capillary elevation of certain fluids in glass tubes one millimètre in diameter at zero C., according to Frankenheim:

Liquid.	Height of cap. column in millimetres.
Water	15.336
Acetic acid	8.510
Sulphuric acid	8.40
Oil of lemons	7.23
" " turpentine	6.76
Alcohol	6.05
Ether	5.40
Carbon disulphide	5.10

The temperature of the tubes and the liquid exercises an important influence upon capillarity. Heat diminishes the cohesion of the particles of the liquid among themselves, and hence greatly favors capillary action.

Capillarity is, however, not confined to tubes, but is seen in pounded glass, sand, sponge, bread, and other porous substances. The principle in these cases is obviously the same as in the case of fine tubes. It has been proved that the principle of attractive and repulsive capillarity exercises a most important influence upon the circulation of nutritive fluids in both plants and animals.

Cap'ita [Lat. "heads"], in law, is principally used to denote the mode of taking either real or personal property from an intestate in case of several claimants. Personal property is taken under the provisions of statute law, based on a well-known English act termed the "statute of distributions," the provisions of which were derived from the civil or Roman law. Primogeniture having disappeared in the main in the U. S. as to the inheritance of land, the laws of descent also recognize division *per capita*. These words are contrasted with "*per stirpes*." Persons are said to take in the former manner (*per capita*) when, standing in an equal degree of relationship to the intestate, they receive equal shares, as if he had left four children. They take in the latter manner, or *per stirpes*, when the claimants, not being in equal relationship to the intestate, some of them represent one who if he had lived would have stood on an equality with others of nearer relationship to the intestate than themselves. Thus, if the claimants were A, a son, and C, D, E, and F, children of B, a deceased son of the intestate, these children representing B would take his share and no more.

Cap'ital [Lat. *capitalis* (from *caput*, "head"); Fr. *capitale*], pertaining to the head or life; important, principal, chief; affecting life, as capital punishment; large, as capital letters. Capital crimes are those which are punishable with death.

CAPITAL, in geography, the chief city or town of a state, empire, province, or county; the seat of government or residence of the court.

CAPITAL [Lat. *capitulum;* Fr. *chapiteau*], in architecture, is a term applied to the head or uppermost part of a column or pilaster. Each of the orders of ancient classic architecture—viz., Doric, Ionic, Corinthian, Tuscan, and Composite—had a peculiar form of capital. The capitals were the prominent characteristic features of the Corinthian and Ionic orders. They became more ornate in proportion to the development of art, the Doric, the most ancient, being very plain and simple compared with the Corinthian capital. (See CORINTHIAN, DORIC, IONIC, etc., respectively.)

CAPITAL, in political economy, denotes whatever, apart from human skill or labor, is used (active capital) or can be used in production. In commerce and manufactures, it signifies the sum of money or the value of the property which a merchant, banker, or manufacturer owns and employs in his business. Some writers define it as "stock," or accumulated and productive riches, whether in the form of money, land, or personal property. In the widest sense the term may even include the skill of an artist or the education of a physician. But generally the word denotes, more narrowly, all that from which profit or interest can be derived, and thus land drawing rent is excluded. The growing antagonism between capital and labor—the great agents or prime moving forces of prosperity and civilization—is one of the most important and exciting problems of political economy and social science. This antagonism has been manifested in the formation of trades unions and in the frequent strikes of mechanics and operatives. Among its more formidable manifestations were the rebellion of the Commune of Paris in 1871, and the projects of the International Society.

Capital Account, a term used especially in connection with railroad or other stock companies, as distinguished from the revenue account. It includes the money obtained for shares of stock and that borrowed upon mortgages (debentures) or the property of the company, and begins with the first preparatory operations of the company; whereas the revenue account commences with the returns from actual traffic or other productive business.

Cap'italist, a person who owns or possesses capital, usually applied to a rich man or one who has a large capital employed in trade or manufactures.

Cap'ital Pun'ishment, the punishment of death (so called from the Latin *caput*, "head," also "life"). As the penalty for murder it has prevailed from the earliest times in all parts of the world. In most nations treason or rebellion against lawful government has also been thus punished; and in England and elsewhere, down to a very recent period, the same has been true of counterfeiting, forgery, mail-robbery, and several other crimes. The manner of execution varies greatly. Military criminals, in modern times, are usually shot. In civil administration the modes most prevalent have been decapitation upon the "block," used for political criminals of rank in Great Britain; the GUILLOTINE (which see) in France; in Spanish countries the GARROTE (which see); and hanging. In Japan, for some offences, the criminal is condemned to take his own life in the presence of officials. (See HARA-KIRI.)

In Christendom the tendency has been in the present century to limit capital punishment to the greatest crimes only, and many intelligent persons believe that it should be abolished altogether. The grounds upon which the question is argued are chiefly—1, common right; 2, Scripture; 3, expediency. The marquis of Beccaría ("Essay on Crimes and Punishments," 1775) denies the right of governments to take human life, under any circumstances, in punishment of crime. It appears to be evident, however, on any theory of society, that such a right exists in all cases in which the safety of the community requires it. As to Scripture, the Old Testament, in accordance with the words, "Whoso sheddeth man's blood, by man shall his blood be shed" (Gen. ix. 6), affords very numerous examples of its enforcement under Divine authority; and the New Testament contains no prohibition of it. It is urged, nevertheless, that the benevolence of Christianity and its high regard for human life oppose the continuance of the death-penalty. In William Penn's code of laws for Pennsylvania it was prescribed for two crimes only—murder and treason. The chief reason for its retention in Christendom is, perhaps, its biblical injunction, especially as this injunction (as above) was given to Noah when he represented the whole human race, and is not therefore merely a Mosaic or Jewish statute, which might be supposed to be superseded, like the Mosaic system generally, by Christianity. It has been plausibly replied, however, that the Noachic law may reasonably be supposed to be subject to modification by the progress of the race, like the Mosaic; and that Christendom has practically recognized this fact by abolishing the capital punishment of *brutes*, which was enjoined in the same Noachic law that enjoins it for man, and without any discriminative qualification whatever. In the early training of the race such means of teaching the value of human life, it is argued, might be necessary; but as one part of the law is now deemed unnecessary, and its execution would be esteemed preposterous, it is inferable that the other is equally subject to change. Beccaría and many others deny the expediency of capital punishment, asserting that it does not lessen the amount of crime. It is well known that in the crowds often assembled in England to witness a public execution, manslaughter has been several times committed. There is no doubt reasonable objection to publicity on such occasions, but this is not necessary. Other objections to capital punishment are the occasional uncertainty of evidence, and the frequent unwillingness of juries to convict in cases where it will follow. On the whole, while the death-penalty would seem to be needful, at least in all imperfectly-settled countries not provided with secure prisons, it may be regarded as an open question whether imprisonment for life might not, with advantage, be substituted for it in the great centres of advanced civilization. This experiment has been tried for a number of years in one or two European countries and in some of the U. S., but the time has not yet been sufficient to afford decisive results. (See BASIL MONTAGU, "On the Punishment of Death," 1809–13; "Memoirs of Sir S. Romilly," 1840; JEREMY BENTHAM, "Rationale of Punishment," 1830; E. G. WAKEFIELD, "Facts Relating to the Punishment of Death in the Metropolis," 1831; F. HILL, "Crime: its Amount, Causes, and Remedies," 1853; BOVEE, "Reasons against Capital Punishment.") (See PUNISHMENT, by PROF. T. W. DWIGHT, LL.D.) ABEL STEVENS.

Cap'itals, or **Capital Letters** [Lat. *majuscula*], a term applied in typography and chirography to letters which are larger than the others, and also different in form, except in a few cases, as O, S, V, and W. Every sentence and every proper name should begin with a capital, which is a modern invention. No distinction of capitals and

small letters was made by the writers and scribes of the Middle Ages or by the ancients, but distinction existed between uncial and cursive writing. In German books every substantive (or noun) begins with a capital.

Cap'itol [Lat. *Capitolium*], a term originally applied to the magnificent temple of Jupiter Capitolinus, and the citadel or fortress which occupied the Capitoline Hill (*Mons Capitolinus*), in ancient Rome. These edifices were founded by the Tarquins about 600 B. C., and dedicated in 507 B. C. The temple was burned in the time of Sulla, in 83 B. C., but was soon rebuilt. Here was also the *Tabularium*, containing the public archives. The site of the Capitol is now occupied by the palace called Palazzo del Campidoglio, built by Michael Angelo. The term Capitol is also applied to the magnificent edifice in which the Congress of the U. S. holds its sessions at Washington, and to the State-houses which are erected at the capitals of the several States.

Cap'itoline Hill (*Mons Capitolinus* or *Mons Tarpeius*), one of the seven hills of ancient Rome, was very near the left bank of the Tiber, and adjacent to the Campus Martius. It was occupied by the great temple of Jupiter and the citadel, or Capitol, with some other public buildings. The steepness of its sides rendered it a natural fortress. On one side of it was the Tarpeian Rock, from which traitors and state criminals were thrown. This hill is now occupied by the church Ara Cœli and the Palazzo del Campidoglio. (See CAPITOL.)

Capitoli'nus (JULIUS), a Latin biographer, one of the authors of the "Historia Augusta," lived about 300 A. D. The biographies of the emperors Antoninus Pius, Marcus Aurelius, Pertinax, Opilius Macrinus, the two Maximins, and others, are ascribed to him.

Capit'ularies [Lat. *capitularia*], a name applied to the laws enacted by the Frankish kings from the time of Childebert. These laws were general for all the states of the kingdom, while those called *leges* were issued for the several states. The most celebrated capitularies were those of Charlemagne and St. Louis. After Charles the Simple, in 922, they were no longer issued. The best collections of them are those of Baluze (Paris, 1677 and 1780), and of Pertz, in the "Monumenta Germaniæ."

Capitula'tion [from the Lat. *capitula*, "heads or chapters"], the act of capitulating or surrendering to an enemy upon stipulated terms; a treaty of surrender to an enemy, which is concluded when the garrison or besieged force does not surrender at discretion or unconditionally. The treaty often consists of several specified conditions or articles, and those who surrender are sometimes permitted to retain their arms and to march out with the honors of war.

Ca'po d'Is'tria (anc. *Ægida*), a fortified seaport-town of Austria, in Trieste, is situated on a rocky island in the Gulf of Trieste, 8 miles S. W. of Trieste. It was formerly the capital of Istria. It is connected with the mainland by a bridge about half a mile long. It is the seat of a bishop, has a cathedral and other churches; also manufactures of soap and leather. Pop. 9186.

Capo d'Istria (JOHN ANTHONY), COUNT, the first president of Greece, was born at Corfù in 1776. He entered the diplomatic service of Russia in 1808, and represented that power at the Congress of Vienna in 1814–15. In 1816 he became secretary of foreign affairs in Russia. Though he had little or no sympathy with republican principles, he was elected president of the new republic of Greece in 1827 for five years. His policy was arbitrary, and gave offence to the liberal party. He was assassinated Oct. 9, 1831, by George and Constantine Mauromichali.

Ca'pon [Gr. *καπών*; Lat. *capo*], a domestic cock castrated when young to improve his size and the flavor of his flesh. Capons' flesh is regarded as much superior to that of ordinary fowls, but is inferior to that of the *poularde* or spayed pullet.

Capon, a township in Hampshire co., West Va. Pop. 1160.

Capon, a township of Hardy co., West Va. P. 1541.

Caponiere, kap-o-neer' [Fr. *caponnière*], in fortification, is a parapet eight or ten feet in height, with a superior slope extending to the ground like a glacis. It is placed in the ditch of a fortified place, to screen its defenders while passing from one part of the works to another. If there is a passage between two such parapets, it is a *full* caponiere—if on one side only, a *half* caponiere. Another kind, the *casemated* caponiere, constitutes one of the most essential features in the modern German (or polygonal) system of fortification. It is a large casemated structure in the main ditch, and usually opposite the middle of the curtain, by which the entire *front* is defended by flanking artillery fires.

Capon Springs, Hampshire co., West Va., 17 miles E. of Romney and 22 N. W. of Winchester, has celebrated and very valuable warm springs, alterative, and useful in a very wide range of diseases. The scenery is fine and the trout-fishing excellent. The hotels and bathing-houses are extensive.

Cappado'cia [Gr. *Καππαδοκία*], an ancient province of Asia Minor, was bounded on the N. by Pontus and Galatia, on the E. by Armenia, on the S. by Mount Taurus (which separated it from Syria and Cilicia), and on the W. by Lycaonia. It was traversed by the river Halys. Among its chief towns were Comana, Ariarathia, and Tyana. It was conquered by Cyrus the Great of Persia, and was ruled by independent kings from the time of Alexander the Great until 17 A. D., when Tiberius reduced it to a Roman province. The greater part of it is included in the modern Karamania.

Capparida'ceæ [from *Capparis*, the typical genus], a natural order of exogenous plants akin to the Cruciferæ, mostly of tropical and sub-tropical countries, and having four-parted flowers, which are generally very beautiful. The leaves are mostly alternate, and undivided or palmate. The order comprises about 350 species, herbaceous plants, shrubs, and trees. They have a strong pungent or acrid taste, and some species are poisonous. They have long silken stamens, which are in some cases gayly colored, as in the CAPER (which see). Among the interesting species of this order is the *Capparis sodata*, or siwák, a bush or small tree which is a characteristic feature of the vegetation of Africa. It bears pungent berries, which are used as a condiment by the natives. Several species of the caper-bush grow in Florida and the West Indies, and a number of herbaceous plants of the order are found in the U. S.

Capre'ra (literally, "Goat Island"), one of the Buccinarian Islands, in the Mediterranean, 4 or 5 miles from the N. E. coast of Sardinia, belongs to Italy. It is nearly 6 miles long, and abounds in goats and rabbits. The patriot Garibaldi since reaching middle life has often resided here. He built a house here about 1854.

Ca'pri (anc. *Capreæ*), a charming island of Italy, in the Mediterranean, at the entrance of the Bay of Naples and 20 miles S. of the city of Naples. It is about 4½ miles long and 3 miles wide. The shores of the island are steep and inaccessible. The town of Capri is the seat of a bishop. Upon this island is a remarkable cavern called the "Grotto of the Nymphs" or the "Blue Grotto." The emperor Tiberius passed the last ten years of his life here, and built twelve villas or palaces, of which the ruins are still visible. Pop. 3911.

Capri'ccio, an Italian word signifying "caprice," "whim," or "fancy," is a musical term applied to a species of free composition which is not subject to rule as to form or measure.

CAPRICCIO, in art, is a picture or other work which intentionally violates the ordinary rules of composition.

Cap'ricorn [Lat. *Capricornus*], the "Goat," the name of the tenth sign of the Zodiac, which the sun enters at the winter solstice, about the 21st of December. It is denoted by this figure, ♑. Capricorn is also the name of a constellation.

Capricorn, Tropic of, in geography, one of the lesser circles of the earth, a parallel nearly 23° 27′ S. of the equator. At the winter solstice (Dec. 21st) the sun is vertical over this line. There is a corresponding circle on the astronomical sphere. This circle touches the ecliptic in the first point of the sign Capricorn, which therefore gives name to this tropic.

Cap'ridæ [from *capra*, a "goat"], a family of ruminant quadrupeds which, according to some naturalists, consists of the two genera *Ovis* (sheep) and *Capra* (goat). Other naturalists extend the term so as to include the antelope.

Caprifolia'ceæ (see CAPRIFOLIUM), a natural order of exogenous plants which have opposite leaves without stipules, epipetalous stamens, and monopetalous flowers. The fruit is generally a berry, sometimes dry, but not splitting open when ripe. This order is nearly allied to Rubiaceæ, and comprises more than 200 species, mostly natives of temperate and cold climates. Among those that are indigenous in the U. S. are the *Sambucus* (elder), several species of *Viburnum*, and many species of *Lonicera*, called woodbine, honeysuckle, etc.

Caprifo'lium [from *capra*, a "goat;" also a "branch with tendrils" (from the fancied resemblance of the tendrils to a goat's horns), and *folium*, a "leaf"], a genus of plants (twining shrubs) which are natives of Europe and other parts of the northern hemisphere. They mostly have fragrant tubular flowers. The honeysuckle is an example.

Caprimul'gidæ [named from the *Caprimulgus*, or

"goatsucker"], a family of insectivorous birds of the order Insessores and tribe Fissirostres. They have long wings, short legs, and toes united at the base by a membrane. The base of the bill is furnished with long stiff bristles. This family includes the goatsucker (*Caprimulgus*) and the American whippoorwill, as well as the night-hawk, the chuck-will's-widow, the poor-will of the Western States, and other native species.

Capri'no, a town of Italy, in the province of Verona, 15 miles N. W. of Verona. It has a beautiful church and many fine country-seats. Pop. 5111.

Cap Rouge, a post-village of Quebec and Portneuf cos., province of Quebec (Canada), has extensive manufactures of pottery. Pop. about 800.

Caps and **Hats,** the name applied to the political parties in Sweden in 1738. The former favored the alliance with Russia, while the latter opposed it. They were both suppressed by Gustavus III. in 1772.

Cap Sante, a post-village, capital of Portneuf co., Quebec (Canada), 30 miles above Quebec, on the N. shore of the St. Lawrence. Pop. about 400.

Cap'sicin, an exceedingly acrid, soft, resinous alkaloid of a reddish color, obtained from the seed-pods of the *Capsicum annuum* or Cayenne pepper, of which it is the active principle.

Cap'sicum, a genus of plants of the order Solanaceæ, natives of the warm parts of America, Africa, and Asia. They are mostly annual or biennial plants, with more or less woody stems, and have a wheel-shaped corolla, with five convergent protruding anthers. The fruits of *Capsicum annuum, frutescens, fastigiatum, baccatum, grossum,* and *cerasiforme,* with perhaps those of other species, form, when pulverized, the Cayenne pepper which is extensively used as a condiment. It is extremely pungent, and is often employed with excellent results in medicine as a derivative and stimulant. The *Capsicum annuum* is a hardy plant, cultivated in the U. S., where pickles are made of its unripe fruit. It is stated that the fruit of *Capsicum toxicarium* of tropical America is a narcotic poison. The *Capsicum frutescens* grows wild in Florida, as well as in most warm countries. It is the true Cayenne pepper.

Cap'stan [Fr. *cabestan*], a strong, massive column of timber, shaped somewhat like a truncated cone, and having its upper part pierced to receive bars or levers for the purpose of winding a rope round it, to raise heavy weights or otherwise exert great power. It is chiefly used in vessels for drawing in cables in order to raise anchors, etc. There are several improved forms in use on ships.

Cap'sule [Lat. *capsula,* dimin. of *capsa,* "a box or case"], in botany, a dry, syncarpous, dehiscent fruit or seed-vessel. The term is applied to all dry fruits which are dehiscent, whether simple or compound, one-celled or many-celled, and whether they open by valves or by pores. The capsule or pod is a general name of dry seed-vessels which split or burst open at maturity. The capsule is the pod of a compound pistil. The poppy, lobelia, iris, and snapdragon afford examples of it.

Cap'tain [Low Lat. *capitaneus* or *capitanus,* a "headman" (from *caput,* the "head"); Fr. *capitaine*], a military term which in a general sense signifies a commander, a man skilled in war or the military art. In some countries the commander-in-chief is called captain-general. In a more limited and technical sense, captain is the title of an officer who commands a troop of cavalry, a company of infantry, or a battery of artillery. He is the next in rank below a major. In the U. S. army a captain is responsible for the camp-and-garrison equipage, the arms, ammunition, and clothing of his company. A captain of the U. S. marines is of a rank corresponding with that of a captain in the army, and that of a lieutenant in the navy.

CAPTAIN (of the navy) is an officer of higher rank and holds a more responsible position than a captain of the land forces. He has the command of a ship, and is responsible for everything on board—all that relates to the *personnel* or the *matériel* of the vessel. The commanders of all British vessels, from first-rates down to ship-rigged sloops, are captains. A captain in the royal navy is the next in rank above a commander. A captain in the U. S. navy takes rank with a colonel in the army, and next below a flag-officer. He rises by regular succession to the rank of rear-admiral, but he cannot attain that rank unless he has first served for six years in a sea-going vessel with the rank of captain. Before the civil war (1861–65) there was no definite rank in the U. S. navy higher than that of captain. (See COMMODORE.) The term captain is also applied to the master of a merchant-vessel.

Cap'tion [Lat. *captio,* a "taking"], in law, is that part of a legal document, such as an indictment or commission, which shows the time and place where, and the authority by which, it was made or executed. It is of considerable consequence in the case of indictments. While a caption is not strictly a part of an indictment, its absence or imperfection may be of serious import. Its office in this case is to state the style of the court, and the time and the place of its meeting, and the time and place where the indictment was found, and the number of the jurors who found it, though their names need not be mentioned. Care that it be properly drawn is particularly requisite where the indictment is removed into a higher court (see CERTIORARI), in which case it is said that there must be enough in the caption to show that the inferior court has jurisdiction in the case. (The details of the subject will be found in WHARTON'S "Criminal Law" and in ARCHBOLD'S "Criminal Pleading and Practice," where useful forms of captions are given.)

Capture. See INTERNATIONAL LAW, by PRES. THEO. D. WOOLSEY, S. T. D., LL.D.

Cap'ua [Gr. Καπύη], an important city of ancient Italy, the capital of Campania, was situated on a plain about 2 miles from the river Vulturnus, and about 18 miles N. of Naples. It is supposed to have been founded by the Etruscans, who called it *Vulturnum.* It was probably nearly as ancient as Rome itself. Capua was the greatest and most opulent city of Italy about 350 B. C. It was conquered by the Romans in 340 B. C., but it continued to prosper under the Roman power, and in the time of the second Punic war was scarcely inferior to the great cities of Rome and Carthage. Capua was noted for its luxury and refinement. After Hannibal had defeated the Roman army at Cannæ in 216 B. C., the popular party of Capua, in hopes of rendering their city independent of Rome, opened their gates to the Carthaginians, who spent the winter in Capua and became enervated by its luxury. The Romans, having besieged the city and captured it in 211, punished its revolt with severity, nullified its political importance, and reduced it to the condition of a provincial town of the most degraded class. It continued, however, to be a popular city for several centuries, but it was taken and ruined in 456 A. D. by Genseric the Vandal. The site is now partly occupied by a large village called Santa Maria di Capua, with 9733 inhabitants. Here are visible the remains of a grand amphitheatre.

Capua (anc. *Casilinum*), a fortified city of Italy, in the province of Caserta, is beautifully situated on the river Volturno, 27 miles by rail N. of Naples. It is on the railway which connects Naples with Rome, and is a military station of the first class. It was considered one of the keys of the former kingdom of Naples. Capua contains a remarkable old cathedral, a college, and several convents. It was founded on the site of *Casilinum,* 2 or 3 miles E. of the ancient Capua, in 856 A. D. Pop. 12,548.

Capuchin' [Fr. *Cappucin;* It. *Cappuccino*] **Friars,** a branch of the order of Franciscan monks which originated in Italy in 1525. They derived their name from a hood or head-dress (in Italian *cappuccio*). They are a branch of the Minorites of the strictest observance. In 1859 they numbered about 11,300. They are found in most countries of Christendom, and are said to be increasing in numbers. They have a few convents in the U. S. The Capuchins are remarkable for their austere discipline. They have never cultivated learning, and have produced few eminent men. One of the best known of its recent members was the late Father Matthew, the distinguished advocate of total abstinence. There is also an order of Capuchin nuns who are also Franciscans of the strictest observance.

Capuchin Monkey, a species of South American monkeys, *Cebus capucinus,* which receives its specific name from the cowl-like appearance of the hairy covering of its head. Other species of the genus receive the same name.

Capudan' Pasha (*i. e.* "captain-pasha," *capudan* being a corruption of the It. *capitano*), the high admiral or commander-in-chief of the Turkish navy. He has the control of all naval affairs, appoints all the officers of the navy, and is governor of the Turkish islands in the Archipelago.

Ca'put Mor'tuum [Lat.], *i. e.* literally, "dead head," the inert residue of distillation and sublimation. When sulphate of iron is distilled at a red heat, it leaves a residue of red oxide of iron, which the alchemists called *caput mortuum vitrioli.* Its symbol was a death's head and cross-bones; hence *caput mortuum* signified also a "bugbear," a source of groundless terror.

Capyba'ra, or **Capiba'ra** (*Hydrochœrus Capybara*), is the largest known quadruped of the order Rodentia, and belongs to the family Cavidæ. It is an aquatic animal, a native of South America, and feeds on vegetable food exclusively. Its dentition resembles that of the cavy, except that the grinding teeth are formed of many transverse

plates, the number of plates increasing as the animal advances in age. It is inoffensive and easily tamed. The flesh is esteemed good food. It is somewhat smaller than the common hog.

Capybara.

Car. See RAILROAD EQUIPMENT.

Carab'idæ, a family of coleopterous or beetle-like insects, equivalent to the Linnæan genus *Carabus*. Its species are very numerous and of various habits. Most of them are voracious devourers of other insects and of worms; the larvæ have similar propensities. Some of them are more than an inch in length, and with rather long legs, used in pursuing their prey. A few species have only rudimentary wings. Several have considerable beauty of color and lustre.

Carabo'bo, a province of Venezuela, is bounded on the N. by the Caribbean Sea, on the E. by Caracas, Aragua, and Guarico, on the S. by Portugueza, and on the W. by Barinas, Barquisimeto, and Coro. The province of Cojedes has lately been detached from this province, but nothing definite being known of the boundaries of Cojedes, we treat of the two as one. Area, 7300 square miles. The northern part of the province is mountainous, while it is level in the S. The country around Lake Valencia is one of the most fertile districts of the republic. The climate is very warm, but is only unhealthy on the seashore. The chief products are coffee, cacao, and sugar. Chief town, Valencia. Pop. 230,509.

Car'acal (*Felis Caracal*), a species of lynx found in the warm parts of Asia and in Africa, supposed to be the same animal as that which the ancients called lynx. It is larger than a fox, and is powerful enough to kill a hound with ease. The fur of the upper part is of a deep brown or wine-red, its ears being tufted with long black hair. It is naturally fierce, but is capable of being tamed, and has been employed in hunting.

Caracal.

Caracal'la (MARCUS AURELIUS ANTONINUS BASSIANUS), a Roman emperor, a son of Septimius Severus, was born at Lyons in 188 A. D. On the death of his father, in 211 A. D., he ascended the throne, and caused his brother Geta to be murdered. He also massacred several thousand friends of Geta, including Papinian, the great jurist. His reign was disgraced by many acts of cruelty and infamy. He was assassinated near Edessa in 217 A. D., at the instigation of Macrinus, who became his successor. The Baths of Caracalla are among the most striking ruins of Rome.

Caraca'ra, or **Caracara Eagle** (*Polyborus*), a genus of rapacious birds peculiar to America, and regarded as a connecting link between the eagle and the vulture. They feed on carrion, like the vulture. The *Polyborus Braziliensis*, which is found in Brazil and other parts of America, has fine plumage, and measures about four feet from tip to tip of the wings. Other species are known.

Carac'as, a state of Venezuela, South America, is bounded on the N. by the Caribbean Sea, on the E. by Barcelona, on the S. by Guarico, and on the W. by Aragua and Carabobo. Area, 6038 square miles. The surface is mostly mountainous, with fertile valleys in the interior. This state contains the best cultivated districts of the republic. Capital, Caracas. Pop. 173,042.

Caracas, a city, the capital of the above province and of the republic of Venezuela, is situated 12 miles S. of La Guayra, and nearly 3000 feet above the level of the sea; lat. 10° 30′ 50″ N., lon. 67° 5′ W. It is separated from La Guayra, its seaport, by a high mountain-ridge. It is liberally supplied with water by several streams which run through or near the city. The streets are narrow, straight, and well paved. Among the principal edifices are the cathedral and the church of Alta Gracia. Caracas is the seat of a Roman Catholic archbishop, and contains a college and several hospitals. The climate is healthy, but the place is subject to earthquakes, one of which in 1812 destroyed about 12,000 people. The chief articles of export are cacao, cotton, indigo, coffee, hides, etc. Pop. in 1869, 47,597.

Cara'cci, or **Carracci** (ANNIBAL or ANNIBALE), an excellent painter, was born in Bologna in 1560. He was a pupil of his uncle, Ludovico Caracci, with whom he was associated as a founder of the Bolognese school of painting. The pictures which he painted in the Farnese Gallery in Rome, on which he expended eight years, are considered his best works. He is generally regarded as the greatest painter of the Caracci family. Died at Rome in 1609. (See KUGLER'S "Schools of Painting in Italy.")

Caracci, or **Carracci** (LUDOVICO), the founder of the Bolognese school of painting, the son of a butcher of Bo-

logna, was born in 1555. He was noted for his fidelity to nature. Among his works are a "Transfiguration" and "The Preaching of John the Baptist." He had several eminent pupils, including Domenichino and Guido Reni. Died in 1619.

Caraccio'li (Francesco), Prince, an Italian admiral, born at Naples about 1748. He entered the service of the Parthenopian Republic formed at Naples in 1798, and obtained the command of a small fleet. He repulsed the Anglo-Sicilian fleet in 1799. After Naples had surrendered to the royalists he was arrested and hung by the order of Lord Nelson in 1799.

Car'acole [Sp. *caracol*], a French term used in horsemanship or the manège to denote a semi-round or half-turn. When cavalry advance to charge in battle they sometimes perform caracoles in order to perplex the enemy, and excite a doubt whether they will attack the flank or the front.

Carac'tacus, or **Cara'doc,** a brave king of the Silures, a tribe of ancient Britons who lived in Wales. He resisted the Roman invading armies for nine years, but was at length defeated, and was carried a captive to Rome in 51 A. D. His deportment in the presence of the emperor Claudius was admired by the Romans, who treated him with clemency.

Cara'doc Sand'stone, a deposit originally described by Murchison as one of the principal members of his lower Silurian series. It is found at Caer Caradoc, in Shropshire, and is remarkably rich in trilobites. Among the other fossils of this deposit are Brachiopoda and Graptolites. The thickness of the beds in some places reaches 9000 feet.

Cara'fa de Colobra'no (Michele), an Italian musician and composer, born at Naples Nov. 28, 1785. He became a resident of Paris about 1821. Among his works are operas entitled "Il Sonnambulo" and "Massaniello." Died July 28, 1872.

Ca'raites, or **Ka'raites** [from *cara*, "to read"], the modern Jewish Sadducees, founded by Anan ben David, and dating from about 760 A. D., though they are disposed to claim for themselves a much higher antiquity. Like the old Sadducees, they cling to the letter of Scripture and reject Talmudical traditions. They are found chiefly in South-western Russia, also in Asia Minor and Persia, and number less than 10,000.

Car'alis, or **Cal'aris,** the capital or chief town of ancient Sardinia, is said to have been founded by the Carthaginians before the Second Punic war. It had a good port, and was for many centuries an important place. The site of it is now occupied by Cagliari.

Carambo'la, an East India fruit produced by the *Averrhoa Carambola*, a small evergreen tree of the natural order Oxalidaceæ. The fruit is about as large as a duck's egg, and has five longitudinal ribs, with a thin, smooth, yellow rind. The pulp has an agreeable flavor (sweet or acid), and is used in making sherbets, tarts, etc. It is one of the most generally-cultivated fruits in India, and is sometimes called Coromandel gooseberry. The tree has irritable or sensitive leaves, and exhibits in a remarkable degree the phenomenon called sleep of plants. The acid fruit called *bilimbi* grows on another species of *Averrhoa*.

Car'amel [said to be from Lat. *canna*, "cane," and *mel*, "honey" or "sugar," *i. e.* "cane-sugar"], a name given to the dark-brown substance produced by burning sugar or exposing it to a great heat. It is also formed in the process of roasting coffee and malt. It is used to color wine and to adulterate coffee. Caramel is also a sort of confectionery.

Cara'na Resin, or **Gum-Cara'na,** the product of an unknown South American tree. It is soluble in alcohol, and melts at a low temperature.

Cara'pa, a genus of plants of the order Meliaceæ, natives of warm climates. *Carapa Guianensis* is a large tree called anderaba, which grows in Guiana, and has large pinnate leaves. Its bark is reputed a valuable febrifuge, and is used in tanning. Masts of ships are made of the trunks. Lamp oil is obtained from the seeds of this tree and from those of the *Carapa Guineensis*, which is a native of Guinea. Its oil is used to protect the bodies of the natives from the bites of insects.

Car'apace, the upper shell or dorsal shield of chelonian reptiles (turtles and tortoises) and of the Crustacea Malacostraca (crabs and lobsters). In the Chelonia it is chiefly an expansion of the ribs covered by a thick layer of horny substance. The latter is most peculiar in the hawk's-bill turtle, furnishing the tortoise-shell of commerce.

Caraquette, Lower, a port of entry in Gloucester co., New Brunswick, has a good harbor and extensive fisheries. Pop. about 1500.—The settlement of Upper Caraquette, in the same parish, has about 600 inhabitants.

Car'at [from the Gr. κεράτιον, a "little horn;" a "pod" of the locust tree; also a minute weight], a term used by jewellers in weighing gold and precious stones. For diamonds a carat is three and one-sixth troy grains, a "carat grain" being one-fourth of this. In assaying gold, either the pound, ounce, or any other weight is divided into twenty-four parts, in order to designate the proportion of pure gold in an alloy with another metal or metals. That which contains $\frac{22}{24}$ of gold is said to be "twenty-two carats fine." There is here no absolute designation of weight.

Carau'sius, one of the three Augusti who shared the rule of the Roman world between the years A. D. 286 and 294, and emperor of Britain, was one of the most remarkable men of whom so little is known, except results, that scarcely any history does justice to the extraordinary ability which first discovered and developed the real bent of Saxon and Dutch genius for the naval service. He was a Menapian, that is, a member of a confederation (Meenaft) which inhabited the debatable or sea-land at the mouth of the Rhine, Maas, and Schelde, a coast which has given birth to the greatest admiral of the world, Ruyter, and to Tromp, in Holland, and in France, to John Bart and Duquesne. Whether he was of noble and conspicuous or of humble parentage is not certain, neither his real name, for Carausius is most probably a Latin corruption of one whose base was Karl. Nothing is stated of his birth, youth, and education, nor of the steps by which he rose to high rank, extensive influence, and vast power, except a brief notice of his co-operation in putting down the rebellion of the Bagaudæ, A. D. 285, in Gaul. His name, indeed, in general history, is first mentioned in connection with the exalted position of "count of the Saxon shore" "and admiral of the northern seas"—a maritime jurisdiction which would have satisfied even the towering ambition of a Wallenstein. His services were so brilliant in this connection that the Britons, suffering from the depredations of the Saxon and Frank pirates, whom he had first beaten into submission and then converted through admiration into devoted allies, besought him to assume the sovereignty of their island. Having organized a marine victorious against the pirates, which before his advent had filled the "narrow seas," and once in possession of Britain, he established a navy which overthrew so triumphantly all that Rome could marshal against him that the two Augusti, Diocletian and Maximian, acknowledged him as the Third, as contemporary coins attest. Space being denied to do more than flash a telegraphic indication of the magnitude and brilliancy of Carausius, the curious reader is referred to three books which contain all that is known of this wonderful man: Dr. William Stukeley's "Medallic History of Marcus Aurelius Valerius Carausius, emperor in Britain," 1757; Guenebrier's less extensive but even more satisfactory treatise, both in the De Peyster alcove N. Y. Historical Society; and "Carausius," 1858, and "Ancient, Mediæval, and Modern Netherlands," 1859, by the author of this article, the two last the result of the labors of years, without regard to expense in the collection of authorities. Carausius maintained himself as independent monarch of Britain and of a Frank confederation at the mouth of the Rhine for about seven years, during which time he destroyed two Roman fleets or navies; carried his arms into the Highlands of Scotland; chastised the Picts and Scots, leaving a name whose mention in their songs and traditions testified the respect he inspired. Ossian in his poems gives him the most appropriate title of "King of Ships." He rebuilt the wall of Severus, constructed a trophy or triumphal memorial which excited the curiosity of the learned, until it was wantonly destroyed within a century, on the banks of the Carron, a stream which takes its name from him. His munificence attracted the finest artists of the day to his island empire, of whose ability numerous specimens exist in coins exquisite for the period, some of which bear the effigies of Carausius and his empress, Queen Oriuna. He established a fair at Sturbich or Stourbridge, near Cambridge, that continues to exist until this day, and a water-communication between the Humber and the Peterborough rivers by means of a canal known as the Car-dic or dyke, which served for the threefold purpose of obviating the dangerous navigation of the Cimbric Ocean, for military communication, and for drainage, especially of the Lincolnshire fens. Of this vestiges still exist. In the midst of his developing military power, administrative sagacity, general munificence, and prescient organization, he was assassinated at York, the vicarian or Roman capital of Britain, A. D. 293–294, by his prime minister and confidential friend, Allectus—a name by some considered rather as a title indicative of office than a proper appellation. The military and naval preparation of Carausius enabled the traitor to maintain his usurped dominion

for three years, when the Roman power, under the cæsar Constantius Chlorus and his lieutenant-general Asclepiodatus, made a triple invasion up the Bristol Channel from the W., across the Channel from the S., and up the Thames from the E., and put an end to the independent sovereignty of Britain, and reunited it to the empire by a series of conflicts, the last in the streets of London. In the most important, in the W., Allectus was slain. Of all the series of monarchs, two decidedly among the greatest or ablest who have honored the British crown by the wearing of it were the Hollanders Carausius of Menapia and William III. of Orange. J. WATTS DE PEYSTER.

Carava'ca, a town of Spain, in the province of Murcia, is on the slope of a hill 40 miles N. W. of Murcia. It has an old castle, a college, and a fine church. Excellent wine is produced in the neighborhood. Pop. 6839.

Carava'ggio, a walled town of Italy, in the province of Bergamo, 38 miles by rail E. of Milan. Here are two handsome churches. The melons of this place are noted throughout Italy. Pop. 5535.

Caravaggio, da (MICHAEL ANGELO), an Italian painter, born at Caravaggio in 1569. His proper name was MICHAEL ANGELO AMERIGHI (or MORIGI). He imitated no model except nature, and formed an original style. He excelled in chiaroscuro and coloring. His wild and gloomy character is reflected in his works. Among his masterpieces are a "Supper at Emmaus" and "The Fraudulent Gamblers." His temper was quarrelsome. Died in 1609.

Car'avan [Arabic and Persian *karawân*], a company of merchants or pilgrims who associate together in order to traverse with greater security the deserts of Africa and Asia. The commercial intercourse of those regions has been from the remotest ages carried on chiefly by caravans of camels. In Mohammedan countries large caravans of pilgrims are annually assembled to perform the journey to Mecca. The most important regular caravans are those which annually travel to Mecca from the three following points—Damascus, Cairo, and Babylon. The caravan of Damascus is said to consist of more than 30,000 pilgrims and merchants, many of whom are Europeans. Each caravan is under the command of a chief.

Caravan'serai', or **Caravan'sary** [Arabic *karawân*, a "caravan," and *serâï*, a "palace" or "inn"], also called **Khan,** an Oriental public-house or unfurnished inn for the shelter and lodging of travellers in Asia and Africa. The travellers in those regions usually carry their own food with them. Each of these inns is commonly a square building of four wings built round a courtyard, in which the beasts of burden are confined. There is always a well or spring of water in it. The wings are divided into small lodging-rooms, in which the traveller finds no bed or furniture but that which he carries with him. In many caravanserais the hospitality is gratuitous. It was in the stable of one of them (called *inns* in the Bible) that our Saviour was born.

Car'away (*Carum Carui*), a plant of the order Umbelliferæ, grows wild in Southern Europe and in some parts of Asia. It is cultivated in Europe and America for its aromatic seeds (carpels), which are used in medicine as a carminative and tonic. They are also used as a condiment by confectioners, pastry-cooks, and perfumers. Their aromatic principles depend on a volatile oil called oil of caraway, which is obtained by distilling the crushed seeds with water. It is administered by physicians to correct the nauseating and griping tendencies of some cathartic medicines.

Carbazo'tic Ac'id, or **Pi'cric Acid** ($C_6H_3(NO_2)O_3$), a bitter crystallizable acid, composed of carbon, nitrogen (azote), and oxygen, and obtained by the action of nitric acid on indigo, on carbolic acid, and on many other orgapic substances. It occurs in the form of yellow crystals, which are soluble in alcohol, and dissolve in eighty or ninety times their weight of cold water. It is an important dyestuff. When silk which has been treated with a mordant of alum is immersed in a solution of this acid, it is dyed of a beautiful permanent yellow color. The picrate (carbazotate) of potassium, when heated, explodes with tremendous violence, and was used in the Franco-Prussian war in blowing up bridges, etc. As this salt is nearly insoluble in water, the acid has been proposed as a test for potash. It is sometimes called nitro-phenisic acid.

Car'bides, formerly called **Carburets,** are chemical compounds of carbon with a metal. None of them occur in a natural state.

Car'bine, or **Car'abine** [It. *carabino,* probably from *carabin,* a light-horseman among the Arabs], a light musket, a firearm used by cavalry and artillery, is shorter in the barrel than the infantry musket or rifle. The best carbines are now rifled. The American breech-loading carbine has usually a barrel about twenty-two inches long, is simple in construction, has a long range, and may be fired with rapidity.

Car'bo (CNEIUS PAPIRIUS), a Roman general who was elected consul in 86 B. C., and was a partisan of Marius in the civil war that ensued. He commanded in a battle against Sulla at Clusium, and soon after that event was defeated by Metellus at Faventia. Having fled to Africa, he was taken prisoner and put to death in 82 B. C.

Carbohy'drogens, or **Hydrocar'bons,** in organic chemistry, a series of compounds, composed of carbon and hydrogen in such proportions that the members of the group differ from each other in definite and regular numbers of atoms. The best-marked group of carbohydrogens commences with methylene (CH_2), which may be regarded as the first step in the series, and by the successive addition of two atoms of carbon and hydrogen we obtain ethylene or olefiant gas (C_2H_4), propylene or propene (C_4H_6), etc.

Carbol'ic Acid, also called **Phen'ic Acid, Phe'nol,** and **Car'bol,** a substance discovered by Runge in 1834, is obtained by repeated distillation of coal-tar at a moderately elevated temperature. Its formula (new notation) is C_6H_5,OH. When pure it crystallizes in colorless needles, which liquefy on the addition of a small amount of water. It dissolves in twenty parts of water by weight, and also in alcohol, ether, and the oils. Specific gravity, 1.066. It melts at 95° F., and boils at 356°, and is inflammable. In odor, taste, and caustic property it resembles wood-creasote, for which, indeed, it is often sold. It is not, chemically, an acid, being more allied to the aromatic alcohols. When applied to the skin it causes at first a sense of burning, with the appearance of a white spot, and then the loss of sensibility in the part. This anæsthetic action has been recently applied in medicine and surgery.

The most important property of carbolic acid is its influence upon organic matter and living organisms as an antiseptic and disinfectant. It coagulates albumen (when warm) by abstracting its water. This enables it to preserve animal tissues from putrefaction for some time, but not so effectually as alcohol. It is destructive to minute forms of life, and has hence been generally supposed to be one of the most useful of disinfectants. Lister of Glasgow has especially advocated its use in connection with the "germ-theory" of disease. Doubts have been recently cast upon its value by the observations of Dr. Parkes in England, Dr. Bill in the U. S., and others. It is certainly a feeble deodorizer as compared with chlorine. Internally, it has been used in the treatment of many diseases with benefit, especially in cancer. Locally applied, in solution with water or oil, it lessens considerably the tendency to suppuration. (See ANGUS SMITH, M. D., "On Disinfection," Edinburgh, 1869; A. E. SANSOM, M. D., "The Antiseptic System," London, 1871; and I. H. BILL, M. D., "American Journal of Medical Sciences," July, 1872.) (See also the article PHENOL, by PROF. C. F. CHANDLER, PH. D., LL.D.)
HENRY HARTSHORNE.

Car'bon [Lat. *carbo,* "a coal"], symbol C, an important chemical element or simple substance which is abundant in the mineral, vegetable, and animal kingdoms. It occurs in a great variety of forms and combinations, being the combustible base of charcoal and fossil coal. It also occurs uncombined in the diamond, which is pure crystallized carbon, and in graphite or plumbago. Its atomic weight is 6, or, according to the new notation, 12. It is remarkable for its allotropic character, and is extremely infusible and unalterable at ordinary temperatures. It is the only element that is always present in animal and vegetable substances. In its ordinary forms it is a good conductor of electricity, but the diamond is a non-conductor. United with oxygen, it forms carbonic acid (CO_2), which occurs in the atmosphere, in limestone, marble, dolomite, etc. (See CARBONIC ACID.) With nitrogen it forms an important compound called cyanogen. In plants and animals it occurs as one of the principal constituents of wood, gum, starch, sugar, oil, gelatin, fibrin, etc., in which it is combined with hydrogen and oxygen. The various forms of carbon are combustible, but they are not affected by any degree of heat except in the presence of air or oxygen. Carbon resists the action of many reagents which alter other simple substances. It is insoluble in all known liquids. In the classification of the elements it is arranged with sulphur, phosphorus, and boron, which are called tetratomic metaloids, or non-metallic substances. A compound of carbon with a metal is called a carbide or carburet. Coke and lampblack are more or less impure artificial forms of carbon.

Carbon, a county in Eastern Pennsylvania. Area, 400

square miles. It is intersected by the Lehigh River, and also drained by the Mahoning and other creeks. It is bounded on the S. E. by the Kittatinny or Blue Mountain, and traversed by several other high ridges. This county derives its name and its prosperity from its rich mines of good anthracite coal. The stratum or bed of coal near the top of Mauch Chunk Mountain is about fifty feet thick. Wheat, corn, rye, buckwheat, and potatoes are the chief crops raised. Lumber is manufactured quite extensively. Carbon county is intersected by the Lehigh Valley R. R. Capital, Mauch Chunk. Pop. 28,144.

Carbon, a county of Wyoming Territory, bordering on Colorado. It is intersected by the North Fork of the Platte River, and also drained by the Medicine Bow River. The surface is diversified and mountainous, and partly occupied by elevated plains. The southern part is traversed by the Medicine Bow Mountains. Iron and good lignitic coal abound here. The Union Pacific R. R. passes through this county. Capital, Rawlings Springs. Pop. 1368.

Carbon, a township of Huntingdon co., Pa. Pop. 2233.

Carbon, a post-village of Carbon co., Wy., on the Union Pacific R. R., 83 miles N. W. of Laramie, has coal-mines which give employment to a large number of men. It is 7008 feet above the sea.

Carbona'ri is the name of a secret political society, founded during the French rule in Naples in the beginning of the present century. After the restoration of the Bourbons in Naples the society rapidly increased. In 1820 they organized branches in France, and after the defeat of the revolutionary party in Naples and Piedmont, Paris became their head-quarters. After the revolution of 1830 the society disappeared, although as late as 1841 a society of Carbonari was found to exist in Southern France. In the revolution of 1848 they took no part.

Car'bonated (or **Acid'ulous**) **Wa'ters** are those which contain a large proportion of carbonic acid gas. The term is applied to mineral springs, as those of Seltzer, Pyrmont, Salzbrunn, and Reinerz. Such waters sparkle much when poured from one vessel to another. They are refreshing and exhilarating, and are useful in some disordered states of the stomach. At St. Nectaire, in France (Puy-de-Dôme), the proportion of gas condensed in the water is said to be as four volumes to one; in most waters it is much less.

Car'bonates, salts containing carbonic acid. They may be easily identified by the effervescence which results when they are brought into contact with dilute hydrochloric or nitric acid. Of this numerous class of salts the most important are carbonate of lime, which occurs in the form of limestone, marble, etc., carbonate of potash, and carbonate of soda. (See POTASH and SODA, by PROF. C. F. CHANDLER.) Crystallized carbonate of lime is called CALCAREOUS SPAR (which see).

Carbon Bisulphide is a heavy, clear liquid compound of carbon and sulphur, very volatile and very inflammable. It is composed of one atom of carbon and two of sulphur, and is obtained by passing the vapor of sulphur over red-hot charcoal. Its symbol is CS_2. It has great solvent power, and is largely used in chemistry and the arts as a solvent of caoutchouc and other organic matters. This compound is a sulphur acid, and when combined with sulphur bases it produces compounds of the class known as sulpho-carbonates.

Car'bondale, a city of Jackson co., Ill., at the junction of the Illinois Central, Grand Tower and Carbondale, and Carbondale and Shawneetown R. Rs., 27 miles E. of the Mississippi, is the seat of the Southern Illinois Normal University. It has an active trade in cotton, tobacco, fruit, lumber, building-stone, and farm produce, and has one weekly newspaper. Pop. 2400; of township, 3370.

ANDREW LUCE, ED. "OBSERVER."

Carbondale, a post-village of Osage co., Kan., at the junction of the Atchison Topeka and Santa Fé and the Lawrence and South-eastern R. Rs., 68 miles from Atchison. It has extensive mines of coal.

Carbondale, a city of Luzerne co., Pa., is on the Lackawanna River, and at the head or north-eastern end of the Lackawanna Valley. It is on the Delaware and Hudson R. R., about 17 miles N. E. of Scranton, and is the southern terminus of a branch railroad which connects with the Erie R. R. at Susquehanna. It contains about nine churches, one national bank, one savings bank, and two newspaper-offices. Large quantities of anthracite coal are mined in this vicinity. Pop. 6393, or, including Carbondale township, 7114. ED. CARBONDALE "ADVANCE."

Carbonear', a port of entry of Newfoundland, on the N. side of Conception Bay, 31 miles from St. John's. It has an extensive trade in fish, a commercial and a grammar school. Pop. about 2000.

Carbon'ic Acid is the popular and former scientific name of a compound of carbon and oxygen, in the proportion of one atom of carbon to two of oxygen. It is called in the new chemical nomenclature CARBONIC OXIDE, CARBON DIOXIDE, or CARBONIC ANHYDRIDE. It is easily prepared by putting marble-dust or chalk into dilute sulphuric or hydrochloric acid. The latter acid, combining with the lime, sets free the carbonic acid as a colorless, slightly pungent gas of the specific gravity 1.524. When this gas is submitted to a pressure of thirty-six atmospheres at 32° F., it becomes a light limpid liquid, without acid properties, readily miscible with alcohol and ether, but not with water or fixed oils. When this liquid is allowed to evaporate in the open air, it produces cold so intense that the unevaporated residue of the liquid solidifies into a snow-like substance, below 100° F. in temperature. By evaporating this substance in a vacuum the spirit-thermometer can be made to fall to —166° F. Carbonic acid gas is regarded by many authorities as poisonous, while others assert that it destroys life by exclusion of oxygen, like water in drowning. These last authorities state that the narcotic effects attributed to this gas are really due to the presence of carbonous oxide (CO), which is an undoubted poison. (See article next below.) The choke-damp of coal-mines contains both these gases. Carbonic acid is a constant result of ordinary combustion and fermentation, and of the respiration of animals. It furnishes to plants, through their leaves, a very important part of their nourishment.

Carbon'ic Ox'ide, called in the new nomenclature **Carbonous Oxide** or **Carbon Monoxide** (symbol CO), a compound of one atom of carbon with one atom of oxygen, has the atomic weight of 14 or (new) 28. It is fatally deleterious to animals if they inhale it, and extinguishes flame, but it burns with a blue flame in contact with air, and thus forms carbonic acid. It is a colorless and insipid gas, which has never been liquefied nor solidified. Specific gravity, .967. It does not occur naturally, but may be obtained by the action of sulphuric acid on oxalic acid, by passing carbonic acid over red-hot charcoal, or by heating to redness chalk or pounded marble with iron-filings or zinc. Even when largely diluted with air, it acts as a narcotic poison to those who inhale it. This gas does not perform any active part in natural phenomena, but in the reduction of ores, as in the blast furnace, it is of the greatest importance.

CARBONIC OXIDE, in the new nomenclature, is a name for CARBONIC ACID (which see).

Carbonif'erous [from the Lat. *carbo,* "coal," and *fero,* to "bear"], producing or containing carbon or coal, a geological term applied to the strata of rocks which are connected with the coal-beds and are interstratified with them. The period which followed the Devonian age is called by some geologists the carboniferous age. It was the third and last age of the palæozoic era.

Carboniferous Formation, the series of rocks (sandstones, shales, limestones, etc.) which occur in connection and alternation with the coal-beds, and were deposited during the carboniferous age. (See COAL and ANTHRACITE, by PROF. J. S. NEWBERRY, M. D. LL.D.)

Carboniferous Limestone, sometimes called **Sub-Carboniferous** or **Mountain Limestone,** is one of the lower and older rocks of the carboniferous system. It mostly contains magnesia, is of coralline formation, and is rich in organic remains, among which are many encrinites or Crinoidea and marine shells. This limestone is largely developed in Yorkshire and Derbyshire in England, in Russia, Germany, Illinois, Missouri, and other parts of the U. S. Some varieties of it are valuable for building-stone.

Carboniferous System, the name given to the strata which were deposited during the carboniferous age of geology, and which are interposed between the Devonian system and the Permian strata. Most of the great coal-fields of the world belong to this system of formation, which is largely developed in Pennsylvania, Ohio, Illinois, and other States of the Union.

The chief characteristic of the lower and older member of the carboniferous system in England and Western Europe generally, as well as in North America, is a vast deposit of coralline limestone, crystalline for the most part, and abounding in shells, encrinites, and corals. It has long been known as the mountain limestone, from its large development in the mountain districts of Yorkshire, Derbyshire, and Lancashire, where it is the source of much picturesque beauty. (See CARBONIFEROUS LIMESTONE.) Among the limestones are many bands of coal, some thick enough and good enough to pay for working. In other parts of England, and in Russia, very poor and imperfect coal-

measures represent the carboniferous limestone. In Ireland there is a peculiar sandy deposit of the same age.

Over the carboniferous limestone lies the millstone grit, a rock occasionally represented by bituminous shales and covered by pebbly grits. Here come in some of those valuable deposits of iron more common among the coal-measures, but helping to give value to the middle part of the carboniferous system. Here also are valuable building-stones.

The natural divisions between the beds of limestone and its numerous crevices and caverns are often filled, more or less completely, with ores of lead and zinc. Rich masses of galena occupy the fissures, large deposits of calamine fill the interspaces between the beds, and where none of these valuable minerals exist, large bodies of water accumulate, and occasionally make their way out in springs or are available when tapped by accident or intention.

Much of the carboniferous limestone is of organic origin, and appears to have been deposited in a coral sea, not far from islands covered with luxuriant vegetation. The almost perfect identity of species observable when fossils obtained from the quarries in Central Europe are compared with others from high northern districts either in Europe or North America renders it highly probable that a remarkable uniformity of climate prevailed at that time over the whole northern hemisphere. The nature of the prevailing fossils—goniatites, orthoceratites, etc. among the univalves, and the numerous species of terebratula and spirifer among the bivalves—points to conditions different from any that have since affected the same districts.

Over the millstone grit come the sandstones and shales that contain the coal-measures, the lower part of which in England is most prolific in coal. At least a quarter of a million of square miles of the earth's surface in the various tracts of land now above the water are covered with sandstones and shales of the carboniferous period, among which coal is buried; and this coal is for the most part accessible. As in each square mile of country there are upwards of three millions of square yards of surface, and a cubic yard of coal weighs nearly a ton, while in many coal-fields there is an average of workable coal from ten to twenty yards thick, the reader may obtain for himself a rough but sufficient estimate of the possible extent of supply of this mineral. (See COAL, by PROF. J. S. NEWBERRY.)

The coal-measures abound in the remains of plants of extinct species, which mostly grow in marshes or low places. The principal fossil plants found in this system are Coniferæ, Equisetaceæ, the Lepidodendrons, the Sigillaria, Calamites, and ferns of colossal size.

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Car'boy, a large globular bottle of green glass protected by basket-work or enclosed in a wooden box. Carboys are used to contain acids and other corrosive liquids. A carboy of sulphuric acid (oil of vitriol) usually contains about 160 pounds of that acid.

Car'buncle [Lat. *carbunculus*], a name given by lapidaries to a beautiful mineral which mineralogists call pyrope. The carbuncle of the ancients appears to have been either pyrope or a deep-red variety of precious garnet which is very similar to pyrope.

Carbuncle [Lat. *carbunculus*, a "small coal"], the *anthrax* of surgical writers, is a violent and painful inflammation, larger than a boil, on any part of the skin, most frequently on the back. The part swells and hardens, and, as the disease advances, assumes a livid redness. The cuticle often rises in blisters, and a number of small openings may occur, through which matter escapes. The origin of carbuncle seems to be constitutional, and it is usually attended by great suffering and considerable prostration. It is sometimes fatal, especially to old people. In its treatment, besides supporting the patient's strength and softening the skin by warm poultices, it is usual to divide the skin early and freely with a knife, or to destroy its surface with caustic.

Car'buret [Fr. *carbure*], the generic term formerly applied to compounds of carbon with the simple elements. (See CARBIDES.)

Car'buretted Hy'drogen, a chemical term applied to two gaseous compounds of carbon and hydrogen. The light carburetted hydrogen or methane is known by the popular names of marsh-gas and fire-damp. It is a nearly odorless gas, evolved abundantly in some coal-mines, where it has caused tremendous and fatal explosions. When pure it is not poisonous. Its symbol is CH_4. A mixture of one volume of this with three volumes of oxygen explodes with great violence when inflamed. It is one of the principal constituents of the coal-gas which is used for illuminating houses and streets. The bicarburetted hydrogen or ethene (C_2H_4) is the same as OLEFIANT GAS (which see).

Carcajen'te, a town of Spain, in the province of Valencia, 22 miles by rail S. S. W. of Valencia. It is on a fertile plain near the river Juncar, and is well built. Here are manufactures of linen and woollen fabrics. Pop. 8842.

Carcassonne (anc. *Carcaso*), a city in the S. of France, capital of the department of Aude, is on the river Aude and the Canal du Midi, 56 miles by rail E. S. E. of Toulouse. The river is here crossed by a bridge of ten arches, and separates the old from the new town. The old town, which stands on high ground, is enclosed by walls of great solidity, has an ancient castle, and retains in a remarkable degree the aspect of a fortress of the Middle Ages. Carcassonne is the seat of a bishop, and has a cathedral, a town-hall, a theatre, a public library with about 22,000 volumes, and a college. Here are extensive manufactures of fine woollen cloth which have long been celebrated. This city suffered much in the crusades against the Albigenses. Pop. 22,173.

Car'cel Lamp, one in which oil is pumped up by internal machinery, so as to be constantly overflowing the wick. The invention originated in France.

Carcinoma. See CANCER.

Car'damom [Lat. *Cardamomum*], a name of the capsule and seed of several species of plants of the genera *Amomum* and *Elettaria* and natural order Zingiberaceæ. The capsules are three-celled, and contain numerous seeds, which are aromatic and pungent, with a peculiar and agreeable taste. They are used as a condiment in Asia and Germany. Having mild cordial and stimulant properties, they are used in medicine and in combination with cathartics. The officinal cardamom of the U. S. and British Pharmacopœias is the seed of the *Elettaria Cardamomum*, a native of India. The cardamoms of commerce are produced in India, Ceylon, Madagascar, and the Malayan Archipelago.

Car'dan [It. *Cardano*], (JEROME), a celebrated Italian philosopher, author, and physician, was born at Pavía Sept. 24, 1501, graduated as M. D. at Padua in 1525, and became professor of mathematics at Milan. He also practised medicine, and acquired a wide reputation as a physician. In 1552 he visited Scotland and cured the primate of that country of asthma. He afterwards resided successively at Pavía, Bologna, and Rome. He was an astrologer, and professed to be an adept in magical arts. In 1545 he published in his "Ars Magna" a formula for the solution of cubic equations, which is called "Cardan's Formula." He wrote numerous works on physics, astrology, medicine, astronomy, etc. Among them are "De Rerum Subtilitate" ("On the Subtilty of Things") and "De Rerum Varietate" ("On the Variety of Things"). He died at Rome Sept. 20, 1576. (See his autobiography, entitled "De Vita Propria," 1643; H. MORLEY, "Life of Cardan," 1854.)

Card'board is made by pasting and pressing together a number of layers of paper, making either three-, four-, six-, or eight-sheet boards. Bristol board, used by artists, is entirely of white paper; common card-board is white on the outside only. Mill-board, employed in bookbinding, is composed of coarse brown paper, glued and pressed between iron rollers. The enamelling of cardboard is effected by brushing over it a mixture of white lead (China or Kremnitz white) with size. After drying, the surface is lightly rubbed with flannel which has been dipped in powdered talc; it is then polished with a hard, fine brush.

Car'denas, a seaport-town of Cuba, on the N. coast of the island, 120 miles E. by S. from Havana, with which it is connected by railroad. It has a good harbor. P. 7225.

Car'diac [Lat. *cardiacus*], belonging to the heart or connected with the heart. Stomachic and stimulating remedies or cordials are called cardiac medicines; the cardiac orifice is the superior opening of the stomach.

Cardi'adæ, a numerous family of lamellibranchiate bivalve mollusks, includes those species in which the mantle is open anteriorly for the foot, and has two orifices, one for respiration and the other for excretion, as the cockle (*Cardium edule*).

Cardial'gia, or **Car'dialgy** [from καρδία, the "heart," and ἄλγος, "pain"], literally, "pain in the heart." The term is commonly applied, however, to the uneasiness (heartburn) connected with indigestion, the seat of which is really in the stomach.

Car'diff, a seaport-town of South Wales, the capital of Glamorganshire, is on the river Taff, 171 miles by rail W. of London. It contains a town-hall, a fine old castle owned by the marquis of Bute, a theatre, and about thirty churches and chapels. Railways extend from this town to the mining districts of South Wales, the products of which are exported from Cardiff. It has a good harbor, improved by the construction of a magnificent basin and

docks. Coal and iron are the chief articles of export. The population has increased rapidly since 1840. Cardiff Castle, built in the eleventh century, is partly in ruins. Robert, duke of Normandy, was confined in it about twenty-seven years by Henry I. Cromwell obtained possession of it in 1648 by stratagem, after bombarding it for three days. Pop. in 1871, 39,675.

Cardiff, a post-village of Lafayette township, Onondaga co., N. Y., on Onondaga Creek, is the place of the pretended discovery of the "Cardiff giant," a statue of a man ten and a half feet long, which was cut from a block of gypsum quarried at Fort Dodge, Ia., sculptured at Chicago, buried for some months at Cardiff, and "accidentally" discovered Oct. 16, 1869. It was exhibited for many months with great success as a petrified giant, but the fraud was finally confessed by its perpetrators. Pop. 147.

Car'digan, a seaport of South Wales, the capital of Cardiganshire, is on the river Teify, 240 miles by rail W. by N. from London. It has an old and stately church, and the ruins of a castle which is supposed to have been founded in 1160. Romantic scenery occurs in the vicinity of Cardigan. Pop. in 1871, 3535.

Cardigan (James Thomas **Brudenell**), Earl of, an English general, born Oct. 16, 1797, was obliged to leave the service when a lieutenant-colonel on account of bullying conduct towards a brother officer, but was restored to his rank, became known as a daring dragoon officer, and rose in India to be a major-general. At the battle of Balaklava Lord Cardigan led the famous charge of the "six hundred." Died Mar. 27, 1868.

Car'diganshire, a maritime county of South Wales, is bounded on the N. by Merioneth, on the N. E. by Montgomery, on the E. by Radnor and Brecknock, on the S. by Carmarthen and Pembroke, and on the W. by Cardigan Bay. Area, 693 square miles. The surface is diversified with rugged hills, fertile valleys, and small lakes. The rocks which underlie this county are lower Silurian slates and shales, in which rich veins of copper, lead, and zinc occur. The chief articles of export are cattle, sheep, oats, barley, butter, slates, and pigs. Capital, Cardigan. Pop. in 1871, 72,245.

Car'dinal [Lat. *cardinalis,* from *cardo, cardinis,* a "hinge"], an epithet implying importance, and applied to the principal virtues, the four points of the compass, and other objects. The numbers 1, 2, 3, etc. are called "cardinal" numbers, to distinguish them from 1st, 2d, 3d, etc., which are called "ordinal" numbers.

Cardinal [It. *cardinale;* for etymology see above], the tile of an ecclesiastic in the Roman Catholic Church. The cardinals are the highest dignitaries of the Church, except the pope, of whom they are the electors and the counsellors. They are distinguished by a scarlet hat and a short purple mantle worn over the rochet. Pope Urban VIII., in 1630, gave them the title of Eminence, which is still used. They are appointed by the pope, who often employs them as ambassadors, and a cardinal so employed is called a legate *a latere.* The body of cardinals is called the Sacred College. The total number of these prelates has been for several centuries limited to seventy, of whom six are bishops of certain Italian dioceses; fifty, styled cardinal-priests, hold their titles from parishes in Rome (many of them being at the same time bishops of foreign dioceses); and fourteen are cardinal-deacons. The actual number of cardinals is often less than seventy. When the pope dies, a successor is chosen by the cardinals, who are assembled in conclave at Rome, and who must elect one of their own number to the vacant pontificate. During the election, which is sometimes protracted several months by their inability to agree, they are confined in a certain building, usually the Quirinal Palace, and debarred from intercourse with the public. (See Conclave.)

Cardinal, a post-village of Boulder co., Col., 2 miles from Caribou. It has rich silver-mines.

Cardinal Bird (*Cardinal* or *Cardinalis Virginianus*), called also **Red Bird, Cardinal Grosbeak, Cardinal Finch,** and **Virginia Nightingale,** a native of the U. S., is one of the finest of American song-birds, and is remarkable for the beauty of its form and plumage. The bill is thick and broad, but not long. It belongs to the family Fringillidæ. The back of the male is a dusky red, and the rest of the plumage is a bright, vivid scarlet. It has on the crown long feathers erected into a conical or pointed crest, which it is said to raise and lower at pleasure. The total length is about eight inches. It visits the Northern States as a summer bird of passage, and passes the winter in the Southern States, where some of them remain all the year. Many of them are taken to England and kept in cages.

Cardinal Flower [so called from its bright red flowers, in color like a cardinal's hat], the name of the *Lobelia cardinalis,* a perennial herbaceous plant of the order Lobeliaceæ, common in most parts of the U. S. in wet places. It usually has a very rich red corolla, but the Mexican cardinal (*Lobelia fulgens*) and other foreign species are still richer. All the above are prized in cultivation.

Cardinal Virtues, those regarded as of primary importance to character. Among the ancients they were justice, prudence, temperance, and fortitude.

Car'dington, a post-village of Morrow co., O., on the E. branch of the Olentangy River, and on the railroad which connects Cleveland with Columbus, 41 miles N. by E. from Columbus. It has a national bank. Pop. 918; of Cardington township, 2199.

Cardin'ia, a genus of fossil Conchiferæ, comprising about eighty-five species, which extend from the Silurian formation to the lower oolite. They have an oval or oblong shell, attenuated posteriorly, and marked with lines of growth and an external ligament.

Cardi'tis, inflammation of the heart. (See Endocarditis and Pericarditis.)

Cardoon' (*Cynara cardunculus*), a perennial plant of the same genus as the artichoke, is a native of Southern Europe. It is cultivated for the sake of the leaf-stalks and midribs of the leaves, which are blanched and used as a salad or as a boiled vegetable.

Cardo'zo (Isaac N.), born at Savannah, Ga., June 17, 1786, became in 1816 editor, and some years later proprietor, of the "Southern Patriot," a free-trade journal of his native town. In 1820 he published "Notes on Political Economy." He established the "Evening News" in 1845. He was active in commercial affairs, and, though opposed to the tariff of 1828, was not of the extreme nullification party. He was drowned in Virginia Aug. 26, 1850.

Cards. See Playing Cards.

Cards, a device for preparing the fibres of wool, cotton, or other textile material for the spinning process. The operation was formerly performed by hand-cards, but at present machines of surprising ingenuity are employed. The manufacture of cards is itself accomplished by wonderfully perfect mechanism. The subject is more fully discussed under Spinning (which see). Other forms of cards are employed for currying or cleaning the hair of domestic animals.

Carduus Benedictus. See Blessed Thistle.

Card'well, a county in the Dominion of Canada, in the central part of Ontario, was formed out of parts of Simcoe and Peel counties. Pop. in 1871, 16,500.

Cardwell (Edward), an English statesman, born in Liverpool in 1813. He was elected to Parliament in 1842, joined the party called Peelites, and was president of the board of trade from 1852 to 1855. In the latter year he was returned to Parliament for Oxford. He became secretary for Ireland in 1859, and secretary of state for the colonies in April, 1864. Having resigned with his colleagues in June, 1866, he entered the cabinet of Gladstone as secretary of state for war in Dec., 1868.

Career' [Fr. *carrière,* literally, a "track or course for carriages or cars"], the ground on which a race is run; a course; a race; the entire course of one's public life. The term was often applied to the course which was run in a tournament or tilt by two mounted knights from the starting-place to the place where they encountered in the middle of the lists.

Ca'ret [from Lat. *careo*] signifies "it is lacking." It is the name of a character formed thus ∧, and denotes that some word or letter has been omitted.

Carew' (Thomas), an English poet and courtier, born in 1589. He was patronized by Charles I., in whose court he served as gentleman of the chamber. He wrote sonnets and short lyrical poems which are remarkable for elegance and ease. Died in 1639. (The name Carew is by some English families of the name pronounced like Carey.)

Ca'rex (gen. *caricis*), [a classical Latin word signifying "sedge"], is the botanical name of a vast genus of coarse grass-like plants of the order Cyperaceæ. They abound in temperate and cold climates, and are perennial herbs, often growing in dense tufts in swamps and wet places. The genus is characterized by male and female flowers, separated (mostly monœcious), with an ovary enclosed in an inflated sac called a *perigynium.* Stamens three, rarely two. More than 450 species of *Carex* are known, and 150 species are described in Gray's "Manual of Botany" as natives of the Northern U. S. The *Carex arenaria* is planted in Holland on the dikes for the purpose of binding the sandy shores with its spreading roots (rhizomes) and resisting the encroachments of the sea. Few of the species are good for pasture, but they tend to convert swamps

gradually into fertile soil. In the U. S. they are harvested in large quantities from wet lands, but produce a poor quality of hay.

Ca′rey, a post-village of Crawford township, Wyandot co., O., at the junction of the Findlay branch with the Cincinnati Sandusky and Cleveland R. R., 50 miles S. by W. of Sandusky. Pop. 692.

Carey (Henry Charles), a political economist and writer of distinction, was born in Philadelphia Dec. 15, 1793. He became in 1821 the head of the firm of Carey & Lea, publishers. He has advocated a protective tariff, and has written, besides other works, "The Principles of Political Economy" (3 vols., 1837–40), "The Past, the Present, and the Future" (1848), and "The Principles of Social Science" (3 vols., 1858–59). He is the founder of a school of political economy whose principles are considered more progressive and liberal than those of Malthus and Ricardo. He has been distinguished especially for the zeal with which he has urged the principle of protection as opposed to that of free trade.

Carey (Matthew), a writer, born in Dublin, Ireland, Jan. 28, 1760, was the father of the preceding. He emigrated to Philadelphia in 1784, and became a bookseller. He published "The American Museum" (1787–93), wrote several political pamphlets and "Essays on Political Economy," and had much influence in public affairs. Died Sept. 16, 1839.

Carey (William), D. D., born in Northamptonshire, England, in Aug., 1761, was a shoemaker in early life, but becoming impressed with the duty of giving the gospel to the heathen, he went to India in 1794 and founded the Baptist mission at Serampore; became (1800) professor of Sanscrit, Bengalee, and Mahratta at the College of Fort William; published a Sanscrit grammar, a Bengalee-English dictionary, and other works, besides assuming the principal labor in the translation of the Scriptures into several Oriental languages. Died in 1834. He takes rank among the most distinguished of modern missionaries for his fidelity, success, and learning. (See "Life," by J. C. Marshman, also by F. Carey.)

Car′go [Sp. *cargo, i. e.* "load"], a general name for all the merchandise carried by a merchant-vessel. It is nearly synonymous with freight. The master of every British coasting-vessel is required to keep a cargo-book, in which are recorded the name of the vessel, the name of the owner, the port of departure, the port of destination, the goods which constitute the cargo, etc.

Ca′ria [Gr. Καρία], an ancient province in the extreme S. W. part of Asia Minor, was bounded on the N. by Lydia, on the E. by Phrygia, on the S. by the Mediterranean, and on the W. by the Ægean Sea. The surface is mountainous. It was drained by the river Meander. The chief towns were Miletus, Halicarnassus, and Cnidus, which were founded by the Greeks, and were important places. The natives of Caria were called *Cares*.

Caria′ma, a wading bird of South America, akin to the cranes, is thirty inches high, brown above and whitish beneath. It is easily domesticated, and associates peaceably with other fowls. It is the *Microdactylus cristatus*.

Caribbe′an Sea, a grand inlet of the Atlantic Ocean, is between North and South America, and is separated from the Pacific by the Isthmus of Darien (or Panamá) and by Central America. It separates the West India Islands from South America, and communicates with the Gulf of Mexico by a passage about 120 miles wide, which divides Cuba from Yucatan, and is called the Channel of Yucatan. The water accumulated in the Caribbean Sea by an oceanic current flows continually into the Gulf of Mexico, from which it can only escape by the narrow passage between Florida and the Bahamas, thus forming the great Gulf Stream. The depth of this sea is generally more than 500 fathoms. Its navigation is not obstructed by reefs, rocks, or islands.

Car′ibbee Bark, or **Piton Bark,** is obtained from the *Exostemma Caribbæum*, a small tree of Mexico, Florida, and the West Indies. It belongs to the cinchona tribe, and, although possessing none of the active principles of cinchona, it resembles it so much as to be sometimes substituted for it. The flower differs from that of the cinchona in having its stamens exserted, instead of their being included in the corolla.

Caribou′, or **Cariboo** (*Rangifer caribou*), the American reindeer, inhabits Maine, New Brunswick, and other cold regions of North America. The caribou is remarkable for the great development of the brow-antlers or branches, which extend in both sexes forward over the forehead. The color of its hair in summer is a rich reddish-brown. The average weight of this animal is about 250 or 300 pounds. Its flesh is much esteemed as food, and its skin is of value. The "barren ground caribou" (*Rangifer grœnlandicus*) is found farther N.

Caribou, a post-village of Boulder co., Col., in the "Grand Island District," has valuable placer gold-mines and one weekly newspaper.

Caribou, a post-village of Lyndon township, Aroostook co., Me. It has one weekly newspaper.

Ca′ribs, the former Indian inhabitants of the Caribbee Islands. Remnants of the Caribs exist at the present time in the West Indies, Guiana, Honduras, and near Panama.

Ca′ries, a Latin term signifying "rottenness," applied to a disease of the bones analogous to the ulceration of the soft tissues; a term used to designate both open ulcer of bone and chronic ostitis or inflammation of the connective tissue of bone, with solution of the earthy part. It begins as an inflammation, accompanied by periostitis, followed by exudation of new materials and softening. Sometimes the bone-cells are filled with a reddish fluid, and there are masses of tubercle. After caries has existed for some time the abscess bursts; its aperture remains open, discharging a fluid which contains particles of bone. If a probe be passed through this opening, it will be felt to sink into a soft, gritty substance; this is carious bone. Pathologists give different names to the somewhat various forms of the disease. Thus we have "osteoplastic," "tuberculous," and "suppurative" caries, etc. It is molecular death of bone, while necrosis is death of a large mass of bone.

Caries usually selects the vertebræ, the bones of the wrist and foot, and the soft ends of long bones forming joints. Carious vertebræ yield under the weight of the trunk, and the spine curves forward or to one side. In joints the part enlarges, the cartilages become affected, matter forms, and amputation of the limb or excision of the joint is frequently necessary. The causes of caries

Cariama.

are constitutional, such as bad nutrition, syphilis, old age, and other depressing conditions. It may be accidentally determined by any irritation, such as a blow or exposure to atmospheric changes. The treatment consists in supporting the patient by judicious change of air, by the use of tonics, such as cod-liver oil, which in scrofula appears to combat the constitutional predisposition. In

those parts where the diseased bone can be reached it may be carefully removed, so as to leave a healthy surface.

Caries of the teeth is a very common disease. It is believed to be caused by dyspepsia and the use of too hot food and drink, but especially by neglect to clean the teeth after eating. (For its treatment see DENTISTRY, by Dr. C. N. PIERCE.) REVISED BY WILLARD PARKER.

Carillon, a post-village of Argenteuil co., Quebec (Canada), on the Ottawa River, has an academy, and is connected with Grenville by canal and railway. Pop. about 500.

Carima'ta, a group of small islands in the passage between Borneo and Billiton.

Carimo'na, a post-township of Fillmore co., Minn. Pop. 788.

Cari'na, a Latin word signifying the keel of a ship or boat; also a botanical term applied to the sharp thin ridge or keel of any organ, and to the two anterior petals of a papilionaceous flower, which adhere by their lower edges and form a body somewhat like a boat.

Carina'ria [from the Lat. *carina*, a "keel"], a genus of gasteropodous mollusks, characterized by having the heart, liver, generative organs, etc. protruded from the body, and encased in an extremely fragile and beautiful shell, which is sub-transparent, symmetrical, and compressed. The convexity of the shell is terminated by a single keel.

Cari'ni, a town of Sicily, in the province of Palermo, beautifully situated 10 miles W. N. W. of Palermo. It has a Gothic castle. Near it are the ruins of the ancient *Hyccara*. Pop. 12,539.

Carin'thia [Ger. *Kärnthen*], a division of the Austrian empire, is bounded on the N. by Salzburg and Styria, on the E. by Styria, on the S. by Carniola and Italy, and on the W. by the Tyrol. Area, 4006 square miles. It is intersected by the river Drave, the valley of which separates the Noric from the Carinthian Alps. The Noric Alps extend along the N. border of Carinthia, which is mostly mountainous. It was comprised in the ancient *Noricum*. Its inhabitants were anciently called Carni. Chief town, Klagenfurt. Pop. in 1869, 337,058.

Cari'nus (MARCUS AURELIUS), a Roman emperor, was the son of the emperor Carus. On the death of Carus, in 284 A. D., Carinus and Diocletian became competitors for the throne. The former gained an advantage in Mœsia over Diocletian in 285, but was killed by his own soldiers, whom he had offended by his cruelty.

Caris'sa, a genus of plants of the family Apocynaceæ. *Carissa Carendas* is a thorny shrub much used for fences in India, and its fruit is eaten.

Carl, a post-township of Adams co., Ia. Pop. 301.

Carlén' (EMILIE FLYGARE), a popular Swedish novelist, born at Stockholm Aug. 8, 1807. She published in 1838 her first novel, "Waldemar Klein." She was married a second time in 1841 to a lawyer named Carlén. Translated into English, among her works, are "Home in the Valley," "The Lover's Stratagem," "The Professor," and "Woman's Life."

Carleton, a county of New Brunswick (Dominion of Canada), bordering on Maine. Area, about 900 square miles. It is intersected by the river St. John and the New Brunswick and Canada Railway. The soil is fertile. Lumber is produced, and excellent iron ore is mined and smelted. Manganese is also found. Capital, Woodstock. Pop. 19,938.

Carleton, a thriving suburb of St. John, New Brunswick, and within the city limits, but separated from the main city by the St. John River. It is the S. E. terminus of the European and North American Railway, and has seven churches, a large foundry, and several steam sawmills. A steam ferry here crosses the river. Carleton has extensive fisheries.

Carleton, a county in the E. part of Ontario (Canada). Area, 647 square miles. It is bounded on the N. by the Ottawa River, and drained by the Rideau. It is intersected by the St. Lawrence and Ottawa Railway. The county-town is Ottawa, which is also the capital of the Dominion of Canada. Pop. 21,739.

Carleton, a small post-village and township of Bonaventure co., Quebec (Canada), on the Bay of Chaleurs. It is a port of refuge, has fine mountain-scenery, extensive herring-fisheries, a convent of Sisters of Charity, and is a place for holding the circuit courts.

Carleton (Sir GUY), LORD DORCHESTER, a British general, born at Strabane, in Ireland, Sept. 3, 1724. He became governor of Quebec in 1772, which he defended against the American army in Dec., 1775. He invaded New York in 1776, and fought a battle against Arnold on Lake Champlain. In 1777 he was relieved of the command, but he succeeded Sir Henry Clinton as commander-in-chief in North America in 1781. Died Nov. 10, 1808.

Carleton (WILLIAM), an Irish novelist, born in Tyrone county in 1798. His first work was "Traits and Stories of the Irish Peasantry" (1830), which was received with favor. In 1839 he published "Fardorougha the Miser," which was very successful. He described Irish life and manners with much vigor and accuracy in other works, among which are "Rody the Rover" (1846) and "Willie Reilly" (3 vols., 1855). Died Jan. 30, 1869.

Carleton Place, a post-village of Beckwith township, Lanark co., Ontario (Canada), at the junction of the Brockville and Ottawa and the Canada Central Railways, 28 miles from Ottawa, on a navigable stream called the Mississippi River. It has manufactures of woollen cloth and iron castings, and very extensive lumber-mills. It has one weekly paper. Pop. about 1500.

Car'li, or **Car'li Rub'bi** (GIOVANNI RINALDO), COUNT, an Italian political economist, born at Capo d'Istria April 11, 1720. He acquired a high reputation by an important work entitled "Delle Monete e delle Instituzione delle Zecche d'Italia" ("On Italian Coins and the Institution of Mints in Italy," 4 vols., 1754–60). He was appointed president of the council of commerce and public economy at Milan. Among his other works is a treatise "On Italian Antiquities" (1788). Died Feb. 22, 1795.

Car'lin, a township of Calhoun co., Ill. Pop. 534.

Carlin, a post-village of Elko co., Nev., is on the Humboldt River and the Central Pacific R. R., 583 miles N. E. of San Francisco. Pop. of township, 295.

Car'linville, a post-village, capital of Macoupin co., Ill., on the Chicago and Alton R. R., 57 miles N. N. E. of St. Louis and 38 miles S. W. of Springfield. It has one national bank, six churches, and is the seat of Blackburn University, connected with which is a theological seminary. Its court-house cost $1,800,000, and is said to be the finest in the U. S. Coal is mined here. It has one semi-weekly and two weekly newspapers. P. of Carlinville township, 5808.

Carlisle, kar-līl' (anc. *Luguvallio* or *Luguvallum*), an ancient episcopal city of England, the capital of Cumberland county, is situated on an eminence at the confluence of the Eden and Caldew rivers, by which it is nearly surrounded. It is 301 miles by rail N. N. W. of London, 98¾ miles by rail S. of Edinburgh, and 12 miles E. of Solway Frith. Several railways converge to this point, which also has communication by steamboats with Liverpool and Belfast. It has a cathedral founded by William Rufus, dedicated in 1101, greatly damaged by fire in 1292, and restored about 1854. The choir, which is 138 feet long and 72 feet high, is one of the finest in England. Here is a castle founded in 1092. Carlisle sends two members to Parliament. It has manufactures of ginghams and cotton checks, print-works, iron-foundries, etc. It was the residence of the ancient kings of Cumbria, and was destroyed by the Danes in 900. During the wars between the English and Scotch it was an important fortified border-town, and was often besieged. Pop. in 1871, 31,074.

Carlisle, capital of Cumberland co., Pa., is situated in the fertile limestone valley between the Kittatinny and South Mountains, and on the Cumberland Valley R. R., 18 miles W. by S. from Harrisburg and 125 miles W. of Philadelphia. It is well built, and has wide streets and a public square. It contains about twelve churches, one national bank, one other bank, two weekly newspapers, one car-factory, and two machine-shops. Carlisle is the seat of Dickinson College, founded in 1783. This town was shelled by the Confederates July 1, 1863. It contains also Carlisle (U. S. A.) Barracks. Pop. 6650.

Carlisle, a post-village of Haddon township, Sullivan co., Ind. Pop. 499.

Carlisle, a post-village of Warren co., Ia. Pop. 200.

Carlisle, a post-village, capital of Nicholas co., Ky., about 35 miles N. E. of Lexington. It has one weekly newspaper. Pop. 606.

Carlisle, a post-township of Middlesex co., Mass. Pop. 569.

Carlisle, a post-township of Schoharie co., N. Y. Pop. 1730.

Carlisle, a township of Lorain co., O. Pop. 1219.

Carlisle, EARLS OF, Viscounts Howard of Morpeth and Barons Dacre of Gillesland (England, 1661).—WILLIAM GEORGE HOWARD, eighth earl, rector of Londesborough, born Feb. 23, 1808, succeeded his brother in 1864.

Carlisle Springs, a post-village of Cumberland co., Pa. It has good hotels and mild sulphurous waters.

Car'lists, a political party of Spain, consisting of the followers of Carlos of Bourbon and his descendants. (See CARLOS OF BOURBON.)

Car'loman, or **Karloman,** a French prince, was a son of Charles Martel, at whose death, in 741 A. D., he became king of Austrasia, Suabia, and Thuringia. He abdicated in favor of his brother, Pepin le Bref, in 747, and became a monk. Died in 755 A. D.

Carloman, a son of Pepin le Bref and a brother of Charlemagne, was born in 751 A. D. On the death of his father in 768 he began to rule over Neustria and Burgundy. He died in 771, and Charlemagne then obtained possession of Carloman's dominions.

Car'los, a township of Douglas co., Minn. Pop. 116.

Carlos, DON, infante of Spain, the son and heir-apparent of Philip II., was born July 8, 1545. He was a youth of violent temper and sickly constitution, and appears to have been deficient in intellect. He attacked or menaced the duke of Alva with a poniard in 1567. The king regarded him with suspicion, and ordered him to be tried by the Inquisition, which pronounced him guilty. He died in 1568, but the cause and manner of his death are involved in mystery. He is the subject of Schiller's tragedy of "Don Carlos." (See PRESCOTT, "History of Philip II.")

Carlos of Bourbon, DON, count de Molina, born Mar. 29, 1788, was the second son of King Charles IV. of Spain. He was the heir-presumptive to the throne until the birth of Isabella in 1830. On the death of his brother, Ferdinand VII., in 1833, Don Carlos claimed the throne, and was supported by a party called Carlists, between whom and the partisans of Isabella a civil war ensued. The priests and absolutists mostly preferred Don Carlos, but his claim was rejected by the Cortes in 1836. The Carlist army was defeated in 1839, and Don Carlos fled to France. He abdicated in favor of his son, Don Carlos, count de Montemolin, in 1845. Died Mar. 10, 1855.

CARLOS, DON, count de Montemolin, a son of the preceding, was born Jan. 31, 1818. After the death of his father he was a pretender to the throne of Spain, and was recognized as Charles VI. by the Carlists, who revolted in 1860 without success. Died in 1861.

CARLOS, DON, duke of Madrid, a nephew of the preceding, son of Don Juan of Bourbon and grandson of Don Carlos, count of Molina, was born in 1848. His father, Don Juan, abdicated in his favor on Oct. 3, 1868, and from that time he was recognized by the Carlists as Charles VII. He made in 1869, 1870, and again in 1872, unsuccessful efforts to overthrow the government of King Amadeus, and in 1873 waged war against the republican government. His eldest son, Jayme, prince of Asturias, was born June 27, 1870.

Carlovin'gian [Fr. *Carlovingien*], the name of the second dynasty of French or Frankish kings. The origin of the family is traced to Arnulph, bishop of Metz, who died in 631. The dynasty derived its name from Charles Martel or his grandson Charlemagne. Charles Martel became in 714 A. D. mayor of the palace and king in reality, but he permitted Childeric to retain the name and form of royalty. The Merovingian dynasty ended in Childeric, a *roi fainéant*, who after a merely nominal reign was deposed in 752 by Pepin le Bref, a son of Charles Martel. Pepin usurped the throne, and was the first Carlovingian who took the title of king. He was succeeded by his son Charlemagne, who began to reign in 771, extended his dominions by conquest, was the most powerful European monarch of his time, and the founder of the Germanic empire. He was crowned as emperor of the West by Pope Leo III. in 800 A. D., and died in 814. Under his descendants the empire continually declined in power. His son and successor, Louis le Débonnaire, divided his dominion among his three sons, Lothaire, Pepin, and Louis. Louis le Débonnaire, who died in 840, had another son, Charles the Bald, who became king of France. He died in 877, and was followed by a succession of feeble princes. The last of the Carlovingian dynasty was Louis V., who died in 987. Hugh Capet then assumed the royal power. This house included a number of German and Italian monarchs.

Car'low, a county of Ireland, in Leinster, is bounded on the N. by Kildare and Wicklow, on the E. by Wicklow, on the S. E. by Wexford, on the W. by Queens county and Kilkenny. Area, 353 square miles. The surface is mostly level or undulating; the soil is fertile. The rocks found near the surface are granite and limestone. It contains many dairies, and exports grain, flour, and butter. Coal is mined near the western border of this county. Chief town, Carlow. Pop. in 1871, 51,472.

Carlow, a town of Ireland, capital of the above county, is on the navigable river Barrow, at the mouth of the Burren, 57 miles by rail S. S. W. of Dublin. It is well built, has two bridges, a Roman Catholic cathedral, a college for students of divinity, a lunatic asylum, and a handsome court-house; also extensive flour-mills. Here are the picturesque ruins of a large Anglo-Norman castle founded in 1180. This castle was taken and dismantled by the army of Gen. Ireton in 1650. Pop. in 1871, 7773.

Car'lowitz, a town of Austria, on the right bank of the Danube, 8 miles S. E. of Peterwardein. It contains a Greek cathedral, and is the seat of the Greek archbishop of the Serbian nationality. It is noted for its excellent wine, the product of which sometimes amounts to 1,750,000 gallons in a year. An important treaty was concluded here in 1699, between Turkey on one side and Austria, Russia, and Venice on the other. Pop. in 1869, 4419.

Car'lowville, a post-township of Dallas co., Ala. Pop. 800.

Carls'bad, or **Karlsbad** (*i. e.* "Charles's Bath"), a town in Bohemia famous for its hot springs, is on the right bank of the river Eger, about 76 miles W. N. W. of Prague. It belongs to the emperor of Austria, and is said to be the most aristocratic watering-place in Europe. It is in a narrow valley between steep granite mountains, and is surrounded by very beautiful scenery. It contains a theatre, several reading-rooms, and good hotels. The temperature of the waters varies from 117° to 165° F. They contain sulphate of soda and other salts, and about 2,000,000 gallons are discharged daily. The number of annual visitors here is from 12,000 to 15,000. Carlsbad was a favorite resort of Goethe. A congress of German powers was held here in 1819. Pop. in 1869, 7291.

Carls'burg, or **Karlsburg,** a fortified town of Austria, in Transylvania, on the right bank of the Maros, 46 miles S. S. E. of Klausenburg. Saltpetre is manufactured here. It is the seat of a Roman Catholic bishop, and has a gymnasium, a theological seminary, a normal school, and several convents. Pop. in 1869, 7955.

Carlscro'na, or **Karlskro'na** (*i. e.* "Charles's Crown"), sometimes called in English **Carlscroon',** a seaport in the S. of Sweden, is situated on several small islands, which are connected by bridges with each other and with the mainland, 258 miles S. S. W. of Stockholm; lat. 56° 10′ N., lon. 15° 36′ E. It has an excellent and safe harbor, with sufficient depth of water to float the largest ships, and is the principal station of the Swedish navy. The entrance to the harbor is defended by two strong forts. Here are dry-docks blasted out of the granite rock, and a naval arsenal. It has manufactures of linen cloths, naval equipments, etc. Pop. 17,564.

Carls'hamn, a seaport of Sweden, on the Baltic, 27 miles W. of Carlscrona. It has a small but secure harbor, and an active trade in iron, timber, etc.; also manufactures of sailcloth, hats, soap, and tobacco. Pop. in 1868, 5578.

Carls'ruhe, or **Karlsruhe** (*i. e.* "Charles's Rest"), a city of Germany, capital of the grand duchy of Baden, 46 miles by rail S. of Mannheim. It is connected by railways with all parts of Germany. The streets are arranged like the radii of a semicircle, converging towards a central point, which is occupied by the palace of the grand duke. Connected with this palace is a museum and a library of 80,000 volumes. The town also contains a large public library, a botanic garden, a mint, a theatre, an arsenal, and several hospitals. Here are manufactures of carpets, jewelry, chemical products, carriages, etc. Carlsruhe was founded in 1715 by Charles William, margrave of Baden. Pop. in 1871, 36,622.

Carl'stad, a town of Sweden, on the island of Tingvalla, in Lake Wener, about 141 miles W. of Stockholm. It is connected with the mainland by a large and handsome bridge. It has a cathedral, a college with an observatory, and a cabinet of natural history. Copper, iron, timber, and grain are exported from this town through Lake Wener and the Gotha Canal. Pop. 5433.

Carl'stadt, a fortified town of Croatia, in the county of Agram, 33 miles S. W. of Agram, has a large garrison and an active transit trade. Pop. in 1870, 5175.

Carlstadt, a post-village of Bergen co., N. J. It has two weekly newspapers.

Carl'ton, a county of Minnesota, bordering on Wisconsin. Area, 860 square miles. It is drained by the St. Louis and Nemadji Rivers. The surface is moderately diversified, and partly covered with forests of pine and other trees. It is intersected by the Northern Pacific R. R. Capital, Thomson. Pop. 286.

Carlton, a township of Tama co., Ia. Pop. 812.

Carlton, a township of Barry co., Mich. Pop. 1125.

Carlton, a township of Freeborn co., Minn. Pop. 378.

Carlton, a post-village and township of Orleans co.,

N. Y., 33 miles N. W. of Rochester and 1 mile from Lake Ontario. Pop. 2327.

Carlton, a post-township of Kewaunee co., Wis. P. 1185.

Carlton (THOMAS), D.D., a clergyman of the Methodist Episcopal Church, was born at Derry, N. H., in 1809. He began his ministry in the Genesee (now Western New York) Conference in 1829, and occupied important pulpits in Rochester, Buffalo, and other places during some years. His superior administrative and financial abilities led to his appointment as agent, for three years, of the Genesee Wesleyan Seminary, as presiding elder of important districts for seven years, and at last as principal agent or publisher of the "Methodist Book Concern" in New York, and treasurer of the Methodist Missionary Society, in which functions he has served his Church for twenty years.

Carludovi'ca Palma'ta, a tree or shrub of the order Pandanaceæ, grows in the tropical parts of South America. It produces the leaves of which Panama hats are made. Those of the best quality are plaited from a single leaf without any joints. As this process requires several months, the price of such a hat is very high.

Carlyle, kar-līl', a post-village, capital of Clinton co., Ill., on the Kaskaskia River and the Ohio and Mississippi R. R., 47 miles E. of St. Louis, has fine churches and school-houses, two newspapers, and considerable iron manufactures. The public library contains 5000 volumes. It has a new female seminary. Pop. 1364.

HARDIN CASE, ED. CARLYLE "CONSTITUTION AND BANNER."

Carlyle, a post-village of Allen co., Kan., on the Leavenworth Lawrence and Galveston R. R., 73 miles S. of Lawrence.

Carlyle (THOMAS), the famous English historian and philosopher, was born in 1795 at Ecclefechan in Scotland. He was educated in the University of Edinburgh, which he entered at the age of fourteen, and very early he embraced literature as a profession. In 1824 he wrote a "Life of Schiller." Soon after he translated Goethe's romance "Wilhelm Meister;" and these books, as well as his biographical essays on Fichte and Jean Paul, contributed very much to call the attention of the English public to the German literature, of whose ideas he himself is the English representative. In 1834 he moved from Craigenputtock, near Dumfries, where he had led a very secluded and almost solitary life, to London, and his literary activity soon widened and became more varied. In 1837 he wrote the "History of the French Revolution" (3 vols.). In 1840 he delivered his celebrated course of lectures on "Heroes and Hero-Worship." In 1845 he published "Oliver Cromwell's Letters and Speeches, with Elucidations and a Connecting Narrative" (5 vols.). In 1851 he wrote "The Life of John Sterling," and from 1858 to 1864 published the "Life of Frederick the Great" (6 vols.), besides producing a great number of essays, reviews, and pamphlets of a miscellaneous character. Carlyle's stand-point as a historian and philosopher is not one of conviction, but of temperament. He can only write when in the attitude of an opponent. What all the world hates he will defend, admire, and love. What all people strive after he will mock and scorn and deride. But he can keep the attitude through six volumes without vacillating, and he is as eloquent and brilliant when he defends as he is grotesque and sardonic when he attacks. Taken as a whole, his writings are one maze of glaring confusion. In 1837 he represented history as an evolution of natural forces according to necessary laws, against which all efforts of individual passion or shrewdness are ridiculous. In 1840 he represented history as the work of the great men, of the heroes, in whose track the mass of the people have to follow like sheep. In all his writings he tells us that human greatness is truth, and truth alone. A man is great in proportion to the amount of truth there is in him. But his heroes happen to be among the greatest liars history knows of—as, for instance, Frederick the Great and Mirabeau. With Carlyle his ideas contradict his ideals. His ideas are those of the German philosophy as it culminated with Hegel—lofty, but without power of progress, radiant like the stars, but like them indifferent to what they shine upon. His ideals are those of the English middle class: what has power must be revered; what is successful, must be admired. To bring these ideas into harmony with these ideals is impossible, and the undercurrent of sadness and sourness which flows through all Carlyle's writings, and which now and then bursts forth to the surface with weird chants, is the natural result of such an attempt. But the almost violent mental vigor which is Carlyle's nature, and the perfect veracity which is his character, have produced a combination of these inconsistent elements which, in the details, is always stirring and exciting, even when it makes us sick at heart, and which in our days of harmony of mediocrity is exceedingly refreshing. Carlyle is never mediocre. Even when he plays the part of a clown, he is unsurpassed. Indeed, there is only one thing in history which he cannot master—the fact. He likes to mock the German historians, and addresses them generally as Mr. Dryasdust; but whenever he himself tries to state a fact and keep it intact, he at once becomes a Mr. Drierthandust. CLEMENS PETERSEN.

Carmagnole, the name of a political song which was sung by the popular party of Jacobins in the French Revolution. The term was also applied to a popular dance of that period, and to a jacket which was worn by the revolutionists as a symbol of patriotism.

Carmar'then, or **Caermarthen** (anc. *Maridunum*), [Welsh, *Caer Fyrddyn*], a seaport-town of South Wales, the capital of Carmarthenshire, is on the river Towy, 8 miles from its entrance into the Bristol Channel. It has a picturesque situation, but the streets are steep and narrow. The Towy, which is here crossed by a bridge, is navigable for vessels of 200 tons from its mouth to this point. Tin plates, cast iron, timber, slates, lead ore, marble, and grain are exported from it. The famous prophet Merlin is said to have been born here. Pop. in 1871, 10,499.

Carmar'thenshire, or **Caermarthenshire,** a county of South Wales, is bounded on the N. by Cardigan, on the E. by Brecon, on the S. E. by Glamorgan, on the S. by the Bristol Channel (here called Carmarthen Bay), and on the W. by Pembroke. Area, 974 square miles. The surface in the northern and eastern parts is mountainous; the soil of the valley is fertile. It is bounded on the N. by the river Teify, and intersected by the Towy, which flows through the celebrated Vale of Towy, 30 miles long. Among its mineral resources are copper, coal, iron, lead, slate, and marble. Capital, Carmarthen. Pop. in 1871, 116,944.

Car'mel, a post-village of Penobscot co., Me., on the Maine Central R. R., 15 miles W. of Bangor. Pop. of Carmel township, 1348.

Carmel, a township of Eaton co., Mich. Pop. 2504.

Carmel, a post-village, capital of Putnam co., N. Y., is in Carmel township, about 50 miles N. by E. from New York City and 15 miles E. of the Hudson River, on the New York Boston and Montreal R. R. It has one national bank, three churches, two newspapers, and a young ladies' seminary. Pop. 590; of township, 2796.

J. D. LITTLE, ED. "PUTNAM COUNTY COURIER."

Car'melites, or the **Order of St. Mary of Mount Carmel,** a celebrated monastic order of the Roman Catholic Church. It was probably founded on Mount Carmel in the twelfth century, but the Carmelites claim to have been instituted by the prophet Elijah. They were compelled by the Saracens to wear a striped dress, whence they were formerly called in England Barred Friars. They were at first under the rule of Saint Basil, but afterwards a part of them came under the mitigated rule of Innocent IV.; hence these were called Mitigated Carmelites. In the tenth century a part of the Carmelites sought and obtained a severer rule. These are called Barefooted Carmelites (*Discalceati*). They are entirely independent of the former. Their manner of life is very austere. The Carmelite monks and nuns (who were first admitted to the order in 1452) are found, both Mitigated and Discalceate, in almost every country, though in numbers they are much reduced. The best known member of the order in modern times is the French pulpit orator, Father Hyacinthe.

Car'mel, Mount, a mountain-ridge of Palestine, extends from the plain of Esdraelon to the Mediterranean, and terminates in a steep promontory in that sea, about 9 miles S. W. of Acre; lat. 32° 51′ 10″ N., lon. 34° 57′ 42″ E. It is formed of limestone, and has an altitude of nearly 1400 feet above the sea. Oaks, pines, olives, and laurels grow on its summit and sides. Carmel is mentioned in Scripture as the place where the prophet Elijah slew the priests of Baal. The meaning of the word in Hebrew is a *park* or *garden*. Near the top of this mountain is a monastery, the inmates of which are called CARMELITES (which see). The ORDER OF MOUNT CARMEL was a body of one hundred knights, all of noble descent, instituted by Henry IV. of France.

Carmen'ta, a prophetic divinity of ancient Italy, was one of the Camenæ, and was worshipped by the Roman matrons at a festival called Carmentalia.

Car'mi, a city, capital of White co., Ill., at the junction of the St. Louis and South-eastern and the Cairo and Vincennes R. Rs., is at the head of navigation on the Little Wabash River, 150 miles S. E. of Springfield. It has iron and woollen manufactures and several flour-mills. It has two weekly newspapers. Pop. 1369; of township, 3669.

W. F. PALMER, ED. "CARMI COURIER."

Car'michael, a township of Marion co., S. C. P. 910.

Car'michael's, a post-borough of Greene co., Pa. P. 491.

Carmin'atives [from Lat. *carmen*, a "charm"], medicines to relieve flatulence and pain in the bowels, such as cardamoms, peppermint, ginger, and other stimulating aromatics.

Car'mine [Fr. *carmin*, from the Arabic KERMES (which see)], a beautiful red pigment composed chiefly of cochineal, mixed with alumina and a little oxide of tin. It is employed by artists and silk-dyers, and is an ingredient in the best red inks. It is considered the most beautiful of all red pigments, and has been in use since the middle of the seventeenth century. Under the name of *rouge* it is used by ladies to paint their cheeks. One of the processes by which it is prepared is as follows: Digest one pound of cochineal in three gallons of water for fifteen minutes; add one ounce of cream of tartar, heat gently for ten minutes, add half an ounce of alum, and boil it for several minutes. After the impurities have settled, the clear liquid is placed in clean glass pans or shallow glazed dishes, in which it is allowed to stand while the carmine is slowly deposited. Imitations of carmine are made of red sandal-wood, Brazil-wood, and other substances, and are often sold as *rouge*.

Carmo'na (anc. *Carmo*), a town of Spain, in the province of Seville, is picturesquely situated on a hill or high ridge 21 miles N. E. of Seville. It is near the railway which connects Seville with Córdova. It contains a fine old Gothic church, a ruined castle, and a university. Here are manufactures of woollen fabrics, hats, soap, leather, etc. It has a large annual cattle fair. Pop. 20,074.

Carnac, a village of France, department of Morbihan, 19 miles S. E. of Lorient. On a wide plain adjacent to Carnac, and near the sea, is a remarkable monument, consisting of about 1100 to 1200 (formerly over 4000) rude obelisks of granite, standing with their smaller ends on the ground, arranged in eleven parallel rows and from six to twenty-one feet high. Most writers have called these remains Druidical or Celtic, but late authorities ascribe them to a pre-historic race. Pop. 2864.

Car'nahan (JAMES), D. D., LL.D., a Presbyterian divine, born near Carlisle, Pa., Nov. 15, 1775, graduated at Princeton in 1800, and was a tutor there 1801–04. After holding several pastorates, he became in 1823 president of Princeton College, performing his duties with fidelity and wisdom till his resignation in 1854. Died Mar. 2, 1859.

Carnahu'ba Palm, or **Caranai'ba Palm** (*Copernicia cerifera*), a beautiful palm which abounds in the N.

Carnahuba Palm.

part of Brazil. It seldom attains a height of more than forty feet. The fruit is edible, and the timber is valuable for several purposes. The leaves of this tree are covered beneath with wax, which is collected, and, like the wax of certain other species of palm, is an article of commerce. Its timber is exported to England, where it is used for veneering.

Car'nallite, a hydrated chloride of potassium and magnesium, which occurs in coarse granular masses, mixed with rock-salt, near Magdeburg, in Prussia. It is used as a fertilizer of the soil.

Carnar'von, or **Caernarvon** (anc. *Segontium*), a seaport-town of North Wales, capital of Carnarvonshire, is on the E. side and near the S. W. end of the Menai Strait, which separates it from the island of Anglesey. It is 7 miles S. W. of the Menai Bridge, and about 60 miles W. S. W. of Liverpool. The harbor will admit vessels of 400 tons, and steamboats ply between this port and Liverpool. Carnarvon is a much-frequented watering-place, and has beautiful scenery in the vicinity. Here is a castle founded by Edward I. in 1282, which now forms one of the most imposing ruins in the kingdom. It has thirteen embattled towers surmounted by turrets. Carnarvon is about half a mile from the site of *Segontium*, an ancient Roman town or station. Pop. in 1871, 9370.

Carnarvon (HENRY HOWARD MOLYNEUX HERBERT), EARL OF, an English conservative statesman, born in London June 24, 1831. He was appointed secretary of state for the colonies in June, 1866, and he framed a plan for the confederation of the British North American colonies, which was approved by Parliament. He resigned in Mar., 1867, because he was opposed to the Reform bill which Disraeli introduced.

Carnar'vonshire, or **Carnarvon,** a county of North Wales, bordering on the Irish Sea, has an area of 544 square miles. It is bounded on the N. W. by Menai Strait and Carnarvon Bay, on the N. by the Irish Sea, on the E. by Denbigh, and on the S. by Merioneth and Cardigan Bay. The surface is very mountainous, and the scenery is remarkably grand. Here is Snowdon, which is the highest mountain in Wales, and rises 3571 feet above the level of the sea. Among the minerals of this county are copper, lead, zinc, coal, and roofing-slate. The chief branch of rural industry is the rearing of black cattle for the dairy. Carnarvonshire is traversed by the Chester and Holyhead Railway, which crosses the Menai Strait. Capital, Carnarvon. Pop. in 1871, 106,122.

Carnat'ic, The, a former division or region of India, on the coast of Coromandel, was bounded on the E. by the Indian Ocean or Bay of Bengal, and extended from Cape Comorin to about 16° N. lat. Its other dimensions were not well defined. It contains numerous large temples, and other monuments which attest its former splendor.

Carna'tion [Lat. *carnatio*, from *caro*, gen. *carnis*, "flesh"], "flesh-color." This term is used in painting, and is applied to the flesh-tints or natural color of flesh, also to the parts of a picture which represent the nude human figure. The art of producing a good carnation appears to be difficult, and not well understood by most modern painters.

Carnation, a beautiful and fragrant double-flowering variety of the *Dianthus Caryophyllus*, or clove pink. It is a universal favorite of florists, and exists only in a state of cultivation. Scarlet, purple, and pink are the prevailing colors of the flowers, which are often three inches in diameter. Florists prefer those in which the colors are perfectly distinct. The numerous varieties which have been produced by the florist's art are arranged in three classes—*flakes*, *bizarres*, and *picotées*. The flakes have only two colors, disposed in broad stripes; the bizarres have three colors, in irregular spots and stripes, and the picotées have an edging of scarlet, red, or purple on a white or yellow ground. Carnations prefer a rich soil, and should have free access to the fresh air. They are propagated either by layers or *pipings*—*i. e.* short cuttings.

Carne'ades [Gr. Καρνεάδης], a Greek philosopher and orator, born at Cyrene, in Africa, in 213 B. C. He opposed the doctrines of the Stoics, was the founder of a school called the New Academy, and maintained that man has no criterion of truth. He was distinguished for his subtle dialectic and powerful and specious eloquence. In 155 B. C. he was sent as ambassador from Athens to Rome, where he gained much applause by his orations. One day he eulogized justice, and the next day refuted himself by a sophistical argument tending to confound the distinction between justice and injustice. This offended Cato, who caused him to be expelled from Rome. Died at Athens about 129 B. C.

Carne'lian, or **Corne'lian** [Fr. *cornaline*], a name given to a fine variety of chalcedony which is composed chiefly of quartz. The color is red or flesh-color, and rarely milky white. It has a conchoidal fracture. Fine specimens of it are found in Hindostan, where they are highly prized, and are manufactured into various ornamental articles. Carnelians are also found in Europe and the U. S. The bright, clear red are most valued.

Carnesville, a post-village, capital of Franklin co., Ga., about 90 miles N. E. of Atlanta. Pop. 266.

Car'nifex Ferry, over the Gauley River, Nicholas co., Va., about 8 miles below Summerville, gives its name to the severe action on the N. bank of the river near this ferry, Sept. 10, 1861. The Confederates under Gen. Floyd, numbering about 5000, had strongly intrenched themselves in this position, where they were attacked by the forces under Gen. Rosecrans on the afternoon of the 10th Sept. Darkness terminated the battle of the day, and during the night Gen. Floyd, being largely outnumbered, escaped with his command across the Gauley River, destroying his bridge behind him, which prevented pursuit. All the camp equipage and munitions of war fell into the hands of the Federal forces.

Carnio'la [Ger. *Krain*], a division or crown-land of the Austrian empire, is bounded on the N. by Carinthia, on the N. E. by Styria, on the S. E. and S. by Croatia, and on the S. W. by the Adriatic Sea and the Littoral province. It was formerly a part of the kingdom of Illyria. Area, 3857 square miles. The surface is mountainous, and partly occupied by the Carinthian Alps. Among its remarkable physical features is Lake Zirknitz, and the rock-bridge of St. Kanzian, which is 130 feet high. The chief river is the Save. Carniola contains the quicksilver-mine of Idria, which is one of the richest in the world. Iron, coal, and marble also occur here. Among the products are flax, silk, honey, and wine. The chief town is Laybach. Pop. in 1870, 466,334.

Car'nival [from the Lat. *caro*, gen. *carnis*, "flesh," and *vale*, "farewell"], a festival in the Roman Catholic countries of Europe just preceding Lent. It was formerly most brilliantly celebrated at Venice; later, especially in Rome. Like many other usages in modern Europe, the customs connected with the Carnival probably originated in the heathen spring-time festivals, as the Lupercalia and Bacchanalia of the Romans, and the Yule-feasts of the Germans. During the Middle Ages costly banquets with the rich, and drinking-bouts amongst others, marked the time. Recently, the Carnival at Rome has lasted eight days, during which the whole city is given up to revelry, the centre of which is the street called the *Corso*. In this all the houses are hung with crimson drapery, and each afternoon a constant line of carriages and promenaders is passing through it. Most of those who appear in the street are masked, and an incessant interchange of bouquets, *confetti*, and other harmless missiles makes a scene of extreme liveliness. At six o'clock, after the firing of cannon and the clearing of the Corso by troopers, a number of horses are let loose at one end of the street, and are urged by the shouts of the people to full speed. The last event of the Carnival week is the celebration of the *Moccoletti*. For this, after dark, all the revellers, on foot, in carriages, and at the windows of the Corso, provide themselves with a number of small lighted tapers, which each endeavors to preserve, while he puts out as many as possible of those of his neighbors. The political disturbances of Italy threw, for a time at least, somewhat of a cloud over these festivities from 1859 to 1870.

Carniv'ora [Fr. *carnivores*, from Lat. *caro*, gen. *carnis*, "flesh," and *voro*, to "devour"], devouring flesh, feeding on flesh; applied to animals which prefer flesh and eat little or no vegetable food. They belong to the class Mammalia, and are synonymous with the old order Feræ. It is characteristic of them to have sharp cutting teeth, simple stomachs, very muscular bodies, and active habits. This order includes, among other animals, all those quadrupeds which are properly called beasts of prey, excepting a few of the marsupials of Australasia, which are carnivorous in their habits, and resemble in their external characters certain animals of this order, which they may be said to represent in the native fauna of that region. Interesting fossil remains of Carnivora are referred to the eras just preceding and just following the glacial period. The order is divided into several families, as Felidæ, Mustelidæ, Ursidæ, Canidæ, Phocidæ, etc. (which see).

Car'nochan (John Murray), M. D., born in Savannah, Ga., in 1817, received a university education at Edinburgh, and studied surgery with Dr. Valentine Mott, and afterwards in Europe. He began practice in New York in 1847, and soon gained distinction for his bold and successful surgical operations. In 1851 he became professor of surgery at the New York Medical College and surgeon-in-chief to the State Immigrant Hospital. He has published many valuable professional monographs and lectures, a treatise on "Congenital Dislocations" (1850), a translation of Rokitansky's "Pathological Anatomy," and other translations and original works.

Carnot (Lazare Hippolyte), a French radical republican, son of the following, born at Saint-Omer April 6, 1801. He was a member of the Chamber of Deputies from 1840 to 1848, and was minister of public instruction from February to July of that year. From 1864 to 1868 he was again a member of the legislative assembly. In 1871 he was again elected to the Assembly, where he voted with the extreme left. He wrote an able work on Saint-Simonism, and published the memoirs of his father (2 vols., 1860–64).

Carnot (Lazare Nicolas Marguerite), Count, a celebrated French statesman and geometer, born at Nolay, in Burgundy, on the 13th of May, 1753. He was educated at the military school of Mézières, and published in 1783 an "Essay on Machines," in which he gave a new and important theorem on the loss of force. As an earnest friend of the popular cause he was elected to the National Convention in 1792. He voted for the execution of Louis XVI., and was chosen a member of the Committee of Public Safety in Aug., 1793; but he took no part in the contest between the Girondists and Jacobins, nor in the cruel excesses of the Reign of Terror. He rendered important services to the republic as war minister by the formation of plans of the campaigns, the selection of generals, and the organization of the army. In this arduous labor he displayed administrative abilities of the highest order. In 1795 he was elected a member of the Institute, and also one of the five members of the Directory. He was proscribed by Barras and the majority of the Directors, and condemned in 1797 to deportation, but escaped to Germany. He was Bonaparte's minister of war in 1800, but he soon resigned, being too independent and too earnestly republican to serve under that chief. After the emperor had suffered reverses, he returned to his aid, and defended Antwerp heroically in 1814. During the Hundred Days (1815) he was Napoleon's minister of the interior. He went into exile on the restoration of 1815, and died at Magdeburg Aug. 3, 1823. He published, besides other able works, "Geometry of Position" (1803), which contains several new theorems. (See D. F. Arago, "Biographie de Carnot," 1850; P. F. Tissot, "Mémoires historiques sur Carnot," 1824.) As a military engineer he is referred to by all subsequent writers upon the art of fortification. His own "system," and his great work, "Sur la défense des places fortes" (the latter written to stimulate a more protracted defence of fortresses during the decline of Napoleon's power), though open to criticism, have exerted no small influence upon the progress of the art.

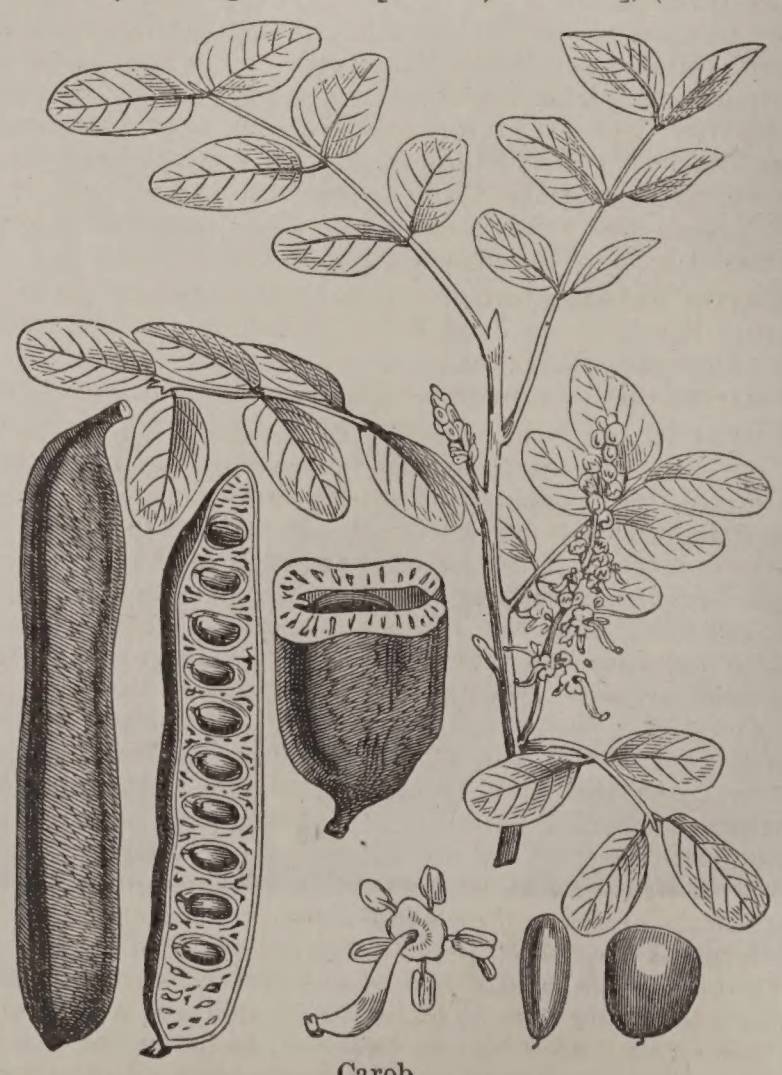
Revised by J. G. Barnard, U. S. A.

Carn'wath, Earls of (1639), Barons Dalzell (Scotland, 1628), and baronets (1666).—Henry Arthur Hew Dalzell, twelfth earl, born in 1858, succeeded his father in 1867.

Car'ny, a township of Montgomery co., Kan. Pop. 361.

Ca'ro, a post-village, capital of Tuscola co., Mich., on Cass River, about 80 miles N. E. of Lansing. It has two weekly newspapers.

Car'ob, Algaro'ba [Arabic, *kharoob*], (*Ceratonia Siliqua*), a tree of the natural order Leguminosæ, is a native of the countries around the Mediterranean. It has



Carob.

pinnate, evergreen leaves, with two or three pairs of large oval leaflets. The fruit is a brown pod, four to eight inches long, having a fleshy or mealy pulp of an agreeable taste, which is extensively used as food by the Arabs, Moors, and Italians. This fruit or pod is supposed to be the same as the article translated "husks" in the parable of the Prodigal Son; and it is thought by some that the locusts eaten by John the Baptist were these pods. They are imported into England and the U. S. under the name of locust beans; also called "St. John's bread." The wood of the carob is hard and valuable.

Caro'ga, a township of Fulton co., N. Y., contains numerous lakes and forests, and has manufactures of lumber and leather. Pop. 828.

Caroli'na Mari'a, queen of Naples, born Aug. 13, 1752, was a daughter of Francis I. and Maria Theresa of Austria. She was married in 1768 to Ferdinand, king of the Two Sicilies, over whom she obtained great influence. She persuaded him to join the coalition against Bonaparte, who expelled King Ferdinand from his kingdom in 1806. She died in Vienna Sept. 8, 1814.

Carolina, North. See NORTH CAROLINA.

Carolina, South. See SOUTH CAROLINA.

Car'oline, a county of Maryland, bordering on Delaware. Area, 330 square miles. It is intersected by the Choptank River, and partly bounded on the W. by the Tuckahoe. The surface is level; the soil is mostly sandy. Wheat, corn, and fruit are the chief crops. It is intersected by the Maryland and Delaware R. R. Capital, Denton. Pop. 12,101.

Caroline, a county in the E. of Virginia. Area, 480 square miles. It is bounded on the N. by the Rappahannock, and on the S. W. by the North Anna River, and is intersected by the Mattapony. The surface is undulating. Corn, tobacco, and wheat are raised. The county is traversed by the Richmond and Fredericksburg R. R. Capital, Bowling Green. Pop. 15,128.

Caroline, a township of Pulaski co., Ark. Pop. 2802.

Caroline, a post-township of Tompkins co., N. Y., has several villages, ten churches, and is on the Delaware Lackawanna and Western R. R. It has beds of iron ore. P. 2175.

Car'oline Ame'lia Eliz'abeth, queen of England, born May 17, 1768, was a daughter of the duke of Brunswick and a niece of George III. of England. She was married in 1795 to the prince of Wales, afterwards George IV., who regarded her with aversion, and separated from her soon after the birth of their daughter, the princess Charlotte. On the accession of George IV. in 1820, she was prosecuted on a charge of adultery, was defended by Mr. Brougham, and was not convicted. Died Aug. 7, 1821.

Car'oline Islands, or **New Phil'ippines,** an archipelago of Oceanica, is situated between the Philippines, the Ladrones, the Marshall Islands, and New Guinea, and extends from lat. 3° 5′ to 12° N. Area, 872 square miles. They number about 500 islands. The greater portion of the inhabitants are of the Malay race. They are ruled by numerous petty chiefs, and are noted for their commercial enterprise. The islands were discovered in 1543, and named after Charles V. The Spaniards have always claimed them as forming part of the Philippines. On July 9, 1868, this archipelago was taken possession of by England. Pop. estimated by Dr. Gulick in 1872 at 25,000–30,000.

Caron'delet, a former village of Missouri, on the Mississippi River, about 5 miles S. of St. Louis. In 1860 it was annexed to St. Louis.

Carondelet, a township of St. Louis co., Mo. Pop. 5387.

Carot'id [perhaps from the Gr. *καρά*, the "head," and *οὖς*, gen. *ὠτός*, the "ear," because it passes to the head under the ear] **Ar'tery,** the great anterior artery which on each side distributes blood to the head. In man, each primitive or common carotid at the upper margin of the larynx or organ of voice separates into two of nearly equal size—the external and the internal carotid. The external carotid supplies the larynx, tongue, face, and scalp; its principal branches are the superior thyroid, the lingual, the facial, the occipital, the posterior aural, the internal maxillary, and the temporal. The internal carotid enters the cavity of the skull through a tortuous canal in the temporal bone, and separates into the anterior and middle cerebral arteries, which are the principal arteries of the brain; in its course through the dura mater it gives off the ophthalmic artery, which subdivides into small branches which afford the eye its principal supply of blood.

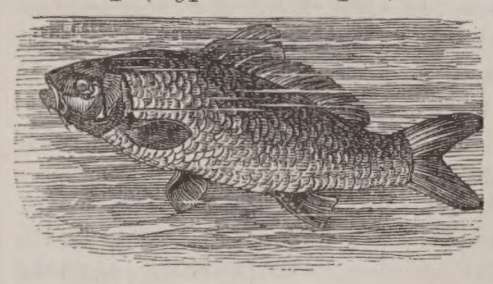
Wounds of the carotids are generally from stabs or cuts. Those attempting suicide often try to cut them, but rarely cut sufficiently deep by the side of the windpipe. But should either vessel be wounded, death results almost immediately. Punctured wounds may not be immediately fatal; they may heal, or a false aneurism may result.

Sir Astley Cooper was the first to tie the common carotid for aneurism, in Nov., 1805; Abernethy had tied it for a wound in 1798, and others probably had tied it before him, and the operation has been successfully performed in a number of cases. Owing to the interchange of branches between the two sides, cutting off the blood through one carotid is seldom followed by affections of the brain. Dr. Mussey tied both carotids within twelve days of each other without any such result. REVISED BY WILLARD PARKER.

Carouge, a town of Switzerland, in the canton of Geneva, on the river Arve, 1½ miles S. of Geneva, is beautifully situated, and surrounded by elegant villas and orchards. It has manufactures of watches, leather, pottery, and thread. Pop. in 1870, 5873.

Carouse, a township of Ouachita co., Ark. Pop. 528.

Carp (*Cyprinus Carpio*), a fresh-water fish of the family Cyprinidæ, is a native of Europe and Asia, and has been long naturalized in countries in which it is not indigenous. It is found in lakes and rivers, prefers still waters, and feeds on aquatic plants, worms, insects, etc. Its length in some cases is two feet or more, but it is generally less than a foot long. It is very tenacious of life, and is said to attain the age of 200 years. The flesh of the carp is highly esteemed as food, but it is not a very valuable fish to the angler, because it does not bite freely. It is remarkable for its fecundity, and 700,000 eggs have been found in a carp of moderate size. The gold-fish is a species of carp.



Carp.

Carpa'thian (or **Karpathian**) **Mountains** [Ger. *Karpathen;* anc. *Carpates*], a long curvilinear range of mountains, chiefly in the Austrian empire. It separates Hungary from Galicia, and Transylvania from Moldavia and Wallachia, and is nearly in the form of a semicircle, one end of which meets the Danube at Presburg, and the other touches the same river at New Orsova. This chain, which is about 800 miles long, is divisible into two portions, called the Eastern and the Western Carpathians, the latter of which extend along the N. border of Hungary. The highest points of the Eastern Carpathians, which are of primitive formation, are Negui, 8573 feet, and the Kuhhorn, 7303 feet. Among the Western Carpathians the Eisthalerspitze rises 8875 feet above the sea. Many of the Hungarian mountains are formed of limestone. The sides of the Carpathians are mostly covered with forests of pine, beech, and other trees. They are rich in minerals, including gold, silver, copper, iron, and quicksilver.

Carpeaux (JEAN BAPTISTE), a French sculptor, born in Valenciennes in 1827. He established his reputation in 1863 by the group "Ugolino and his Children." His most celebrated works are a group representing "The French Empire spreading Light over the World, and protecting Agriculture and Science," made for one of the pediments of the Flora Pavilion of the Tuileries in 1865, and another representing "La Danse," made in 1869 for the New Opera. He is one of the most prominent representatives of the naturalistic school.

Car'pel [from the Gr. *καρπός*, "fruit"], a botanical term applied to a transformed leaf which becomes a simple pistil or one of the elements of a compound pistil. The upper surface of the leaf forms the inner surface of the carpel. The number of ovaries and stigmas of a pistil depends on the number of carpels of which it is composed, but several are often united so as to appear as one.

Carpenta'ria, Gulf of, is a broad and deep indentation of the N. coast of Australia, and is a portion of the South Pacific Ocean. It extends from Cape Arnhem to Cape York, and is about 500 miles long from N. to S. and 350 miles wide. It is mostly included between lat. 10° 40′ and 17° 30′ S., and between lon. 138° and 142° E. Its shores are generally low. It encloses numerous islands. It is visited by vessels for the *bêche de mer*, which is found in its waters. It was named in honor of Peter Carpenter, who from 1623 to 1627 was governor-general of the Dutch possessions in the East Indies. It has been explored by Cook (1770), Flinders (1802), Stoke (1841), Leichardt (1845), Gregory (1856), Landsborough (1861–62), and McKinlay (1862).

Car'penter, a township of Jackson co., Ala. Pop. 903.

Carpenter, a township of Jasper co., Ind. Pop. 1081.

Carpenter (CHARLES C.), U. S. N., born Feb. 27, 1834, in Greenfield, Mass., entered the navy as a midshipman Oct. 1, 1850, became a passed midshipman in 1856, a lieutenant in 1858, a lieutenant-commander in 1862, and a commander in 1869. While attached to the iron-clad Cats-

kill as executive officer he participated in the attacks upon the forts of Charleston harbor of April 7 and July 10, 1863, and is honorably mentioned in the reports of his commanding officer, Commander George W. Rodgers. He was in the severe engagement with Fort Wagner on the 17th of Aug., 1863, when the Catskill was struck thirteen times and Commander Rodgers killed, and bore himself bravely and well. FOXHALL A. PARKER, U. S. N.

Carpenter (FRANCIS B.), an American artist, born at Homer, Cortland co., N. Y., Aug. 6, 1830. His portrait of President Lincoln and his "Emancipation Proclamation" are esteemed his best works. He published an interesting narrative entitled "Six Months at the White House."

Carpenter (GEORGE W.), born at Germantown, Pa., July 31, 1802, became a successful merchant of Philadelphia, and was from 1823 till his death treasurer of the Academy of Natural Sciences in that city. He took a great interest in science, particularly in geology, mineralogy, and the medical sciences. He was a member of many learned societies. Died June 7, 1860.

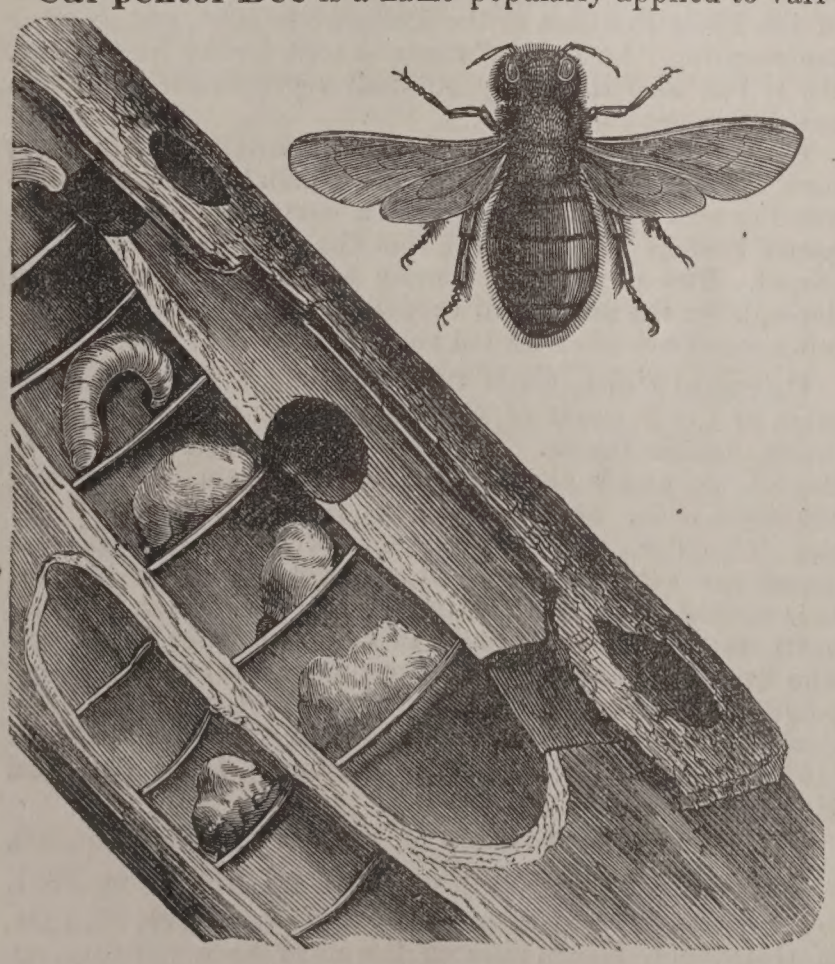
Carpenter (LANT), LL.D., an English theologian, born at Kidderminster April 5, 1780. He published an "Introduction to the Geography of the New Testament" and "Unitarianism the Doctrine of the Gospel." In 1817 he became minister of a Unitarian church at Bristol. He was drowned in 1840 in the passage from Naples to Leghorn.

Carpenter (MATTHEW H.), an American lawyer, born at Moretown, Vt., in 1824, was at the U. S. Military Academy two years, studied law with Rufus Choate, and was admitted to the bar in 1845. In 1848 he removed to Wisconsin, where he resumed his profession; elected to the U. S. Senate Mar. 4, 1869.

Carpenter (WILLIAM BENJAMIN), M. D., LL.D., F. R. S., an eminent English physiologist, a son of Dr. Lant Carpenter, born in 1813, studied medicine and graduated as M. D. in Edinburgh in 1839. In the same year he published an important work entitled "Principles of General and Comparative Physiology." His reputation was widely extended by an excellent work called "Principles of Human Physiology" (1846). This has gone through several editions, and is considered by many to be the best work extant on that subject. He became professor of medical jurisprudence in University College, London, and for many years edited the "British and Foreign Medico-Chirurgical Review." Among his works are "Zoology, and the Instinct of Animals" (2 vols., 1838), and "The Microscope: its Revelation and Uses" (1856). He has few living equals in acquaintance with natural science, capacity for original inquiry, and skill as a scientific writer. Some of his latest investigations have been in regard to oceanic currents. He was president of the British Association for the Advancement of Science in 1872.

MARY CARPENTER, sister of the above, born in 1807, a distinguished philanthropist, has been especially known in connection with "ragged schools," and other agencies for juvenile reform. She visited the U. S. in 1873.

Car'penter Bee is a name popularly applied to various hymenopterous insects of the bee family, distinguished from other bees by their skill in working wood. They mostly inhabit warm countries. Perhaps the most celebrated of the tribe is the *Xylocopa purpurea* of Southern Europe, a beautiful insect of a rich blue color, about the size of a large humble bee. It attacks dry wood, especially when partly decayed, cutting a longitudinal canal about a foot deep and more than a third of an inch wide. After finishing one of these canals, it lays an egg at one extremity of the hole, and places near it a mass of pollen and honey as food for the future larva. The egg and its accompanying store of food are then hermetically sealed up by a thin wall composed of powdered wood, formed into a very hard compound by being mixed with a substance secreted by the insect. In this manner the mother-bee divides her house into many little chambers with one egg in each. In due time the eggs hatch, each of the larvæ devours the food prepared for it, and then passes into the chrysalis state. At last, when the perfect insects are developed, they destroy the partitions made by the parent bee, and escape into the air; the one produced from the egg first laid escaping first, through an opening made for it by the mother, and the others following in order.



Carpenter Bee.

Carpenter, Ship's, is a warrant officer whose duty it is to repair the hull, masts, and spars of a ship of war. During a battle he watches for shot-holes, and is prepared to stop them with plugs. He attends constantly to the state of the pumps.

Car'pentersville, a post-village of Kane co., Ill.

Carpentras (anc. *Carpentoracte*), a town of France, department of Vaucluse, is on the river Auzon, 15 miles by rail N. E. of Avignon, and near the base of Mont Ventoux. It is surrounded by walls which were built about 1365, and are flanked by towers, and is mostly well built. It has a Gothic cathedral, part of which was erected in the tenth century, and a public library of 22,000 volumes, containing also a large collection of medals and antiquities; also manufactures of cotton and woollen fabrics, brandy, etc. Here are remains of a Roman triumphal arch. Pope Clement V. removed the papal court to this town in 1313. Pop. 10,848.

Car'pentry implies the art of building structures in wood, and signifies more especially that branch of industry which is applied to the construction of wooden buildings, wooden bridges, and the framings of heavy machines. The labors of the carpenter are necessarily directed by some knowledge of the forces which may be brought to act upon the structure when completed; that is, by some knowledge of the principles of engineering.

The lesser and lighter works of wood, such as furnish the interiors of dwellings, are the products of another branch of labor, termed *joinery*. The work of the joiner is guided more or less directly by the artist, and bears less reference to strength, rigidity, and the forces concerned than to external proportion and æsthetic fitness to surroundings.

The skill of the carpenter is directed towards giving two distinct qualities to the structures he builds—viz. *strength* and *rigidity*. The first is secured mainly by *dimensions* assigned to the different parts, and the skill with which these parts are united; and the latter depends largely upon the *arrangement* of the several members.

We will treat these two topics more fully.

Strength.—Timbers designed for structures are subjected to one or more of the following varieties of strain: transverse, tensile, compressive. A transverse strain is a force applied to a beam in a direction more or less perpendicular to its length; the timbers of a floor afford examples. A tensile strain is one that tends to elongate, and a compressive strain one that, acting in the direction of the length of the member, tends to shorten or crush it.

When the entire structure is of such dimensions that each member of it may be formed of a single stick of timber, the work of the artisan is comparatively simple, and is guided by plain and brief rules. But when by reason of the size of the entire work single parts are required of greater dimensions than can be supplied by single pieces of timber, then skilful joining of smaller parts must be relied upon to meet the emergency. Now, to so combine separate pieces of timber as to form a single member, and thereby employ the available strength of the component parts, at the same time to form such a connection with adjacent portions of the structure as to transmit properly the force assigned to the position, is to apply in the fullest sense the science of carpentry.

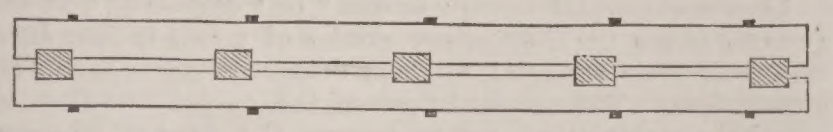
It may be remarked here that even in our most important bridges no special effort is made to secure solid timbers for the larger members, because the quality of thorough soundness can be more easily secured by a judicious selection of smaller parts, and then a proper combination can be made to ensure the requisite strength.

When a beam is subjected to transverse strain the fibres

upon the side that tends to become convex under the action of the strain are subjected to a tensile or pulling force, while upon the opposite side they are at the same time compressed. The simple experiment of bending a twig that has bark upon it will illustrate this fact. The bark on the convex side is torn asunder and on the other side compressed into wrinkles. It becomes evident upon slight reflection—1st, that the extreme upper and lower fibres are most severely strained; and 2d, that the central portion of the stick is acted upon by forces comparatively slight. The obvious conclusion is, that the original force is best sustained by portions of the stick at some distance from the middle of its depth, and consequently that beams acted upon by transverse forces should present considerable width in the direction of the bearing force. It is easily demonstrated that the strength of a beam of given length and breadth, to bear a weight between two supports, varies as the square of the depth of the beam. Floor-beams are accordingly made narrow and deep.

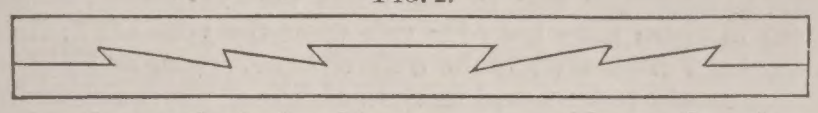
To secure depth of beam without employing material which is comparatively of little use the method has been employed of joining two sticks by blocks and bolts, as shown in Fig. 1.

FIG. 1.



It will readily be seen that the condition of providing material where the strains are greatest has been secured, provided the combination when under strain acts as a single stick. The plan fails when through want of secure bolting there is any motion among the component parts. The chances of failure increase very rapidly as the halves of the compound beam are separated by larger space, as the point is soon reached where each half acts like a simple beam; and whereas in the perfect system the upper half is urged by compressive and the lower by tensile strains only, when by insecure joining there is a slipping among the parts, each of these halves is acted upon by both kinds of force, and has near its centre material of but little use.

FIG. 2.



Another method of making a compound beam, though not often employed, is represented in Fig. 2. In either of the cases above represented some advantage is gained by employing different kinds of timber for the upper and lower members.

The most common way of reinforcing the strength of a simple beam is by the addition of iron rods, as shown by

FIG. 3.

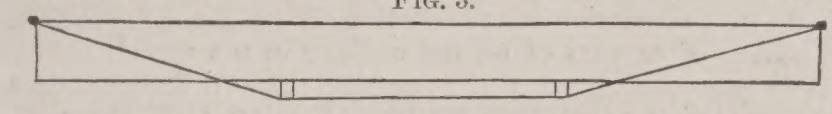
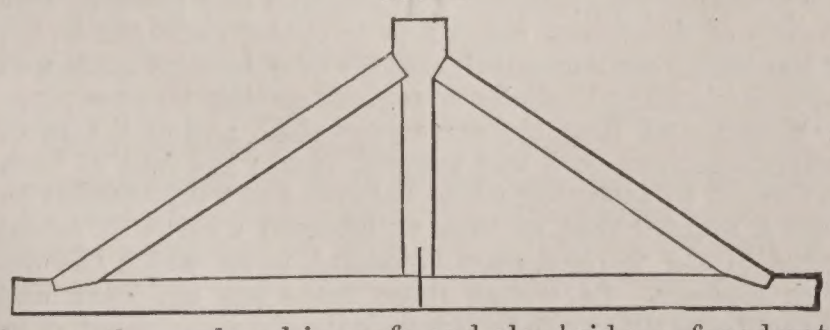


Fig. 3. The consideration of such a combination belongs to the subject of *trusses*.

When a stick of timber is employed so as to resist a tensile force, the manner of connecting it with the portions of the structure through which or to which the force is to be transmitted becomes a matter of great importance. In the case of an iron rod, which can be furnished with a head, an eye, or a nut, the problem of attaching it so as to resist a tensile force is easily solved; but when the conditions require a wooden *tie-beam*, the problem of uniting the various parts so that the strength of the stick shall not be too largely sacrificed requires consideration, because to join timbers implies more or less cutting of their substance, and this in turn sacrifices material.

In the common king-post truss, as the combination represented in Fig. 4 is termed, the methods of uniting parts that fulfil different functions are employed. This truss is

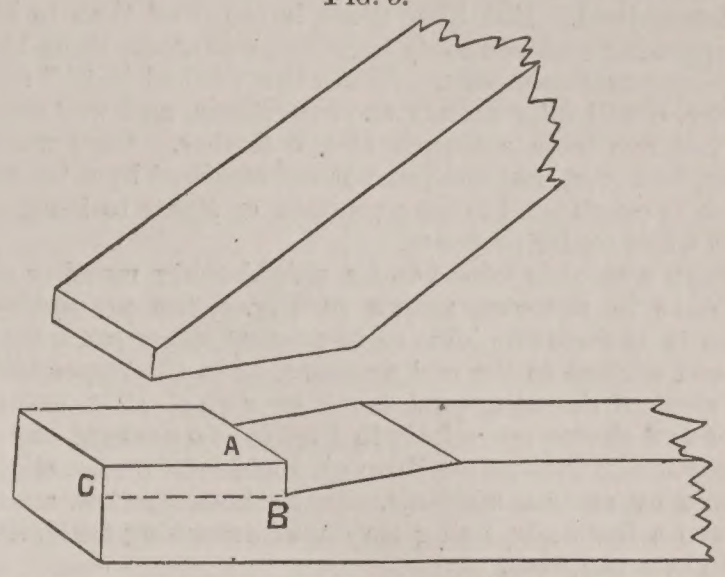
FIG. 4.



frequently employed in roofs, and also bridges of moderate span. In the latter case the flooring is sustained by the horizontal member or tie-beam; a large portion of the weight sustained is transmitted through the upright, and is received by the inclined pieces or *struts* and conveyed to the extremities of the tie-beam. The tie-beam and post are thus subjected to tensile, and the struts to compressive, strain.

In order that the tie-beam shall properly receive the thrust of the struts, the former must be notched to receive the ends of the latter. Fig. 4 shows the method usually employed; an enlarged view of the ends of the strut and tie-beam are given in Fig. 5. In constructing this truss it

FIG. 5.

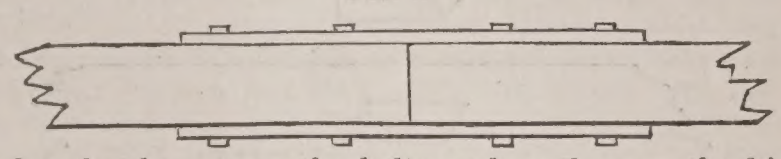


is necessary to regard the tendency which the strut exerts to split off the portion ABC. It is considered sufficiently secure in most kinds of timber if the length BC is ten times the depth AB, as, when this proportion is observed, the cohesion which resists splitting off is equal to that which resists the crushing of the fibres exposed to the direct pressure on the lesser surface.

When the length of the tie-beam is such as to require the uniting of two or more pieces, the skill of the carpenter is again called in requisition to produce such a joint as shall safely resist the forces to be met.

The simplest of all is the so-called *fish-joint* (Fig. 6), the strength of which depends partly upon the few fibres of the

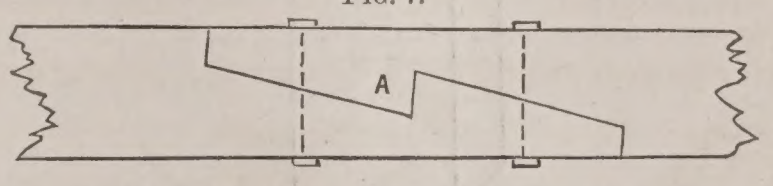
FIG. 6.



timber that bear upon the bolts, and partly upon the friction arising from the pressure of the fish-plates. These latter are sometimes made of iron, and furnished with projections that are let or forced into the timber when bolted on. But the expedient is regarded as a clumsy one, and is only tolerated where, as in some roofs, the subsequent additions to the structure hide it from view.

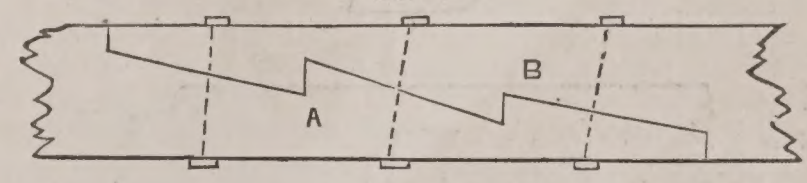
Another and a common form is the *single-lock joint* or *scarf*, shown in Fig. 7, in which the resistance to direct tensile strain depends upon the surfaces opposed to each other at *a*, and which may be one-third the sectional area of the beam. A modification of this method of scarfing is exhib-

FIG. 7.



ited in Fig. 8, in which one-half of the beam is made available in resisting tensile strain, as the joints A and B are each

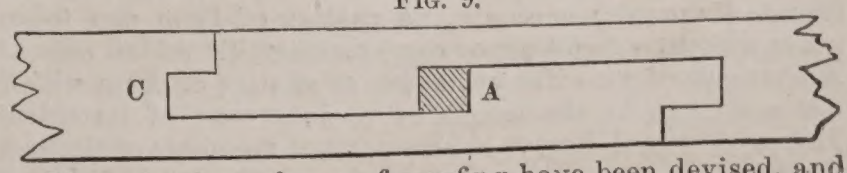
FIG. 8.



one-fourth of the depth of the beam. The method of Fig. 8 has the advantage over Fig. 7 of greater strength, but it is also far more difficult of construction, as there are two bearing surfaces that must act together; the fitting of the joint therefore requires especial care. This difficulty is sometimes met by leaving spaces at A and B, into which wedges or keys are driven as the scarf is bolted together.

Fig. 9 represents a form of scarf in which no bolts are used, the method of locking at C being employed instead: the *key* at A is made of hard wood, and forced in so as to bring the surfaces of the scarf to a firm bearing. Of course this method of locking the scarf can be equally well applied to the methods shown in Figs. 7 and 8.

FIG. 9.



Many intricate forms of scarfing have been devised, and

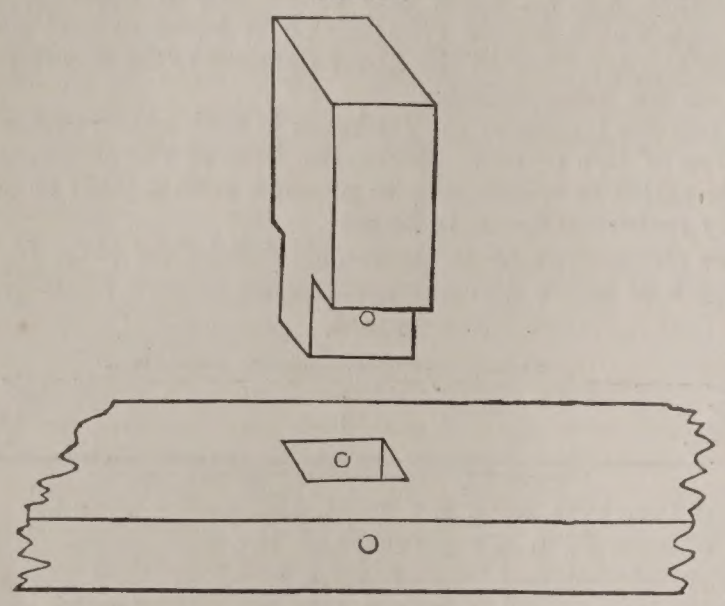
are exhibited in treatises on carpentry. They belong mostly to the time when but little iron was employed as an adjunct to timber construction; and even then most of the elaborate forms were rather fanciful than useful.

When timbers are united to resist thrust or compressive strain only, less skill is required than in the constructions just described. But little more is required than to bring the opposing surfaces fairly together, and secure them by the simplest possible means. Hence the "fished joint" shown in Fig. 6 will fully satisfy the conditions, and will employ the full available strength of the timber. Care must be taken, however, that the joint is not strained by a tendency which is manifested in long columns or struts to bend sideways when under pressure.

When a strut is joined to its neighboring member at an angle, as in the case shown in Fig. 4, the precaution is taken to so form the joint as to present either the whole of the end surface to the end pressure, as in the upper end of the strut of the king-post truss, or a part of it, as in the lower end shown more fully in Fig. 5. To prevent any displacement in such joints through accidental forces, they are secured by various methods, either a bolt, a notch, a tenon, or even a few nails, being employed according to the liability to lateral forces.

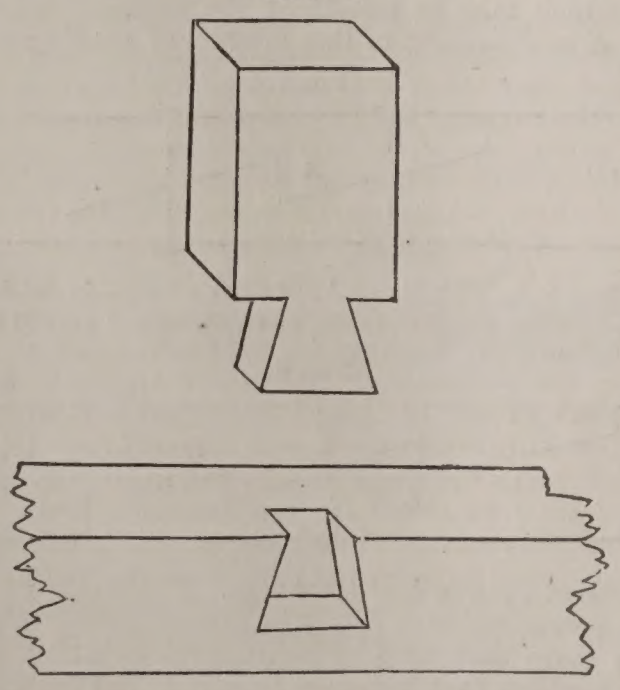
The *tenon* employed is exhibited in Fig. 10; the cut which receives it is called the *mortise*.

FIG. 10.



If the joint is liable to be urged by a force tending to pull it asunder, some security is obtained by the use of a stout pin through the tenon. A dove-tail joint is also employed for the same purpose (see Fig. 11). This form is common in joinery, but should not be relied upon in carpentry.

FIG. 11.



Rigidity, a quality which was referred to as somewhat distinct from *strength* in structures, is secured by such a disposition of material that no change of form of the entire system can occur without bringing into action the tensile or compressive resistances of certain members of it. A plain square frame, fastened however securely at the corners, may be lengthened and shortened cornerwise without calling into action the strength of the materials of the framing, except such as is concerned in fastening the corners. If, however, a stick be firmly secured to the frame, diagonally across it, no change of form can take place without extending or compressing this added *brace*. A triangular frame will not admit of change of form without a change in the length of at least one of its sides Hence diagonal braces are important members of timber framings, inasmuch as they ensure stiffness or rigidity The braces themselves are secured by mortising, by iron straps, or more rudely by outside pieces fastened after the manner of the joint shown in Fig. 6.

(For extended treatises on carpentry see TREDGOLD'S "Carpentry," by Hurst; also EMY'S "Traité de la Charpentérie.")

GEO. W. PLYMPTON.

Car'pet-Bag'ger (in recent American politics) is a Republican born and reared in the North or West, who went South with or after the Federal armies, planted himself in one of the States lately reconstructed, and aided in organizing and drilling the negroes to vote the Republican ticket. Of course the term originated with those of adverse politics, who applied it as a stigma, and with considerable looseness, any one not a native of the South being denounced as a "carpet-bagger" if an active Republican; if "native there and to the manor born," he was termed a "scalawag."

HORACE GREELEY.

Car'pets. The word "carpet," denoting floor-covering, is of unknown origin; it is supposed, by some, to be derived from "Cairo," probably because Egypt is the country credited with first using floor-coverings as articles of luxury in her ancient days of splendor.

As a commercial term, "carpet" or "carpeting" is the generic name for the various grades of goods in that line, whatever their material, mode of construction, or technical appellation. The original form of the carpet was that of a large rug, which was spread upon the floor when occasion required; and the Eastern carpets, the manner of whose manufacture has undergone but little change for many centuries, are invariably made so to this day. The modern way of weaving carpeting in long, narrow strips, to be sewn together, doubtless had its origin in the greater convenience and cheapness which that form admits of through its adaptation to the ordinary loom.

Before the invention of the Jacquard loom, however, carpets were either of very simple pattern, or, if elaborate in their designs, necessarily very expensive. The ancient royal manufactory of the Gobelins in Paris has always occupied the first place in regard to artistic perfection. Some of the carpets produced there cost from 100,000 to 200,000 francs, requiring five to ten years for their completion. None of them have been for sale since the year 1791; they have been presented to the different sovereigns of Europe, and are only to be found in the palaces of courts. The invention of Jacquard, so peculiarly adapted to the weaving of various grades of carpets, together with the still more recent improvements in looms, has greatly facilitated the production of carpeting at once beautiful and durable, and at the same time cheap enough for persons of moderate means or economical tastes; so that the use of carpets has probably increased more during the last fifty years than that of any other commodity of equally ancient origin. At present, the U. S., in proportion to population, is by far the greatest consumer of carpets of all the nations in the world.

The principal grades of carpeting known to commerce (leaving out the Gobelins, Turkish, Persian, and others of similar rug-like make) are Aubusson, Moquette, Axminster, Wilton, velvet, Brussels, tapestry Brussels, ingrain (two or three ply), and Venetian, taking rank, as to value and general desirability, in the order named.

Aubusson, Moquette, and Axminster are very similar in appearance and construction, and are made with a high, tufted pile, thick, durable, and expensive. They are constructed with a firm groundwork of linen or cotton, upon which the pile, containing the design, is fastened in tufts of soft-woollen yarn. As these tufts are supplied from a series of rollers corresponding in number to the picks or wefts completing one pattern, and in length to the width of the carpet, and in their action entirely independent of the warp and woof composing the body of the fabric, the employment of an almost unlimited number of colors is admissible, and the designs in those grades are therefore generally of the most perfect and elegant description. They are principally manufactured in England and France. One factory of Axminster carpets is in operation in the U. S.; it has been very successful, and its productions rank well with the imported articles as regards quality and beauty.

Wilton and Brussels are woven alike and of the same materials (linen back and worsted face); the face of both is formed by inserting wires between the warp threads in such a manner that on their withdrawal a series of raised loops of the worsted warp is formed, upon which the design appears. In Wilton these loops are cut open and sheared smooth, while in Brussels they remain uncut. The worsted portion of the carpet being exclusively in the warp, the threads of which are of continuous color throughout the piece, each particular color requires a special set of threads, worked in an independent manner by what is technically called "frame." This arrangement secures great perfection and clearness of design, for each color being

brought to the surface entirely by itself, while the others are carried under or through the linen back until brought up in their turn, the work has the appearance of embroidery on canvas. But as the colors in the direction of the warp are limited to five (no larger number of frames being convenient), the designs in these goods are of necessity simple, and no patterns requiring elaborate shading can be attempted in them. From the number of colors thus employed, the different qualities of these carpets receive the names of two, three, four, and five frame respectively.

Velvets and tapestry Brussels are also manufactured alike in a manner corresponding to Wilton and Brussels, with the difference that only one set of worsted warp threads is used, upon which all the colors are printed by means of color-rollers before the fabric is woven, and upon the correct proportioning of spaces of the various colors the perfection of the goods is in a great measure dependent. In designing patterns for these goods the artist is allowed free scope as to the number and arrangement of colors, and profuseness in that respect does not add very greatly to the cost; hence we find these goods usually much more elaborate of design and more lavishly colored and shaded off than Wilton and Brussels. The manufacture of tapestry (both velvet and Brussels) was commenced in England in 1842. It was soon after introduced in this country, but for twenty years, by reason of patent restrictions, two establishments monopolized the business here. Since the expiration of the patents new concerns are rapidly organizing, and the indications are that in a few years this will be the most important branch of carpet manufacture in the country. Tapestry carpets are now used to an extent greater than that of all other grades combined, with the exception of ingrains. The largest concern in the world manufacturing these goods (in connection with the other principal grades) is that of John Crossley & Sons', Halifax, England, a stock company. They employ nearly 6000 hands.

The ingrain carpet (also called Kidderminster, after the city which formerly manufactured it largely) is the only kind of carpet made exclusively of all wool, and it may be worn on either side, though usually one side is more desirable in coloring than the other. The names "ingrain" and "three-ply" are derived from the modes of their construction. The former is composed of two distinct thicknesses, interwoven or "ingrained" wherever the colors change or mingle; the latter of three layers, also interlacing each other. The design is very similar on both sides, but the colors are reversed. The American consumption of these goods is supplied by home manufacture. Philadelphia has upwards of 5000 looms employed on them, and very large establishments in Connecticut, Massachusetts, and New York State turn out the better qualities. Venetian is the name given to a fabric composed of woollen warp and coarse hemp filling, usually striped in color, and made in widths suitable for stair coverings. Philadelphia furnishes in that grade nearly all the cheap stair carpets used throughout the country.

The carpet manufacturing business of the U. S. has been rapidly growing since the close of the civil war, and is now a very important industry. The capital invested is upwards of $15,000,000; the last census sums up the principal products per annum:

Ingrains (two and three ply), yards		16,924,711
Tapestry Brussels,	"	1,711,000
Venetian,	"	1,350,017
Brussels,	"	806,505
Felt,	"	586,000
Velvet,	"	107,000

WILLIAM BERRI, JR., EDITOR OF "THE CARPET."

Car'pi, a fortified town of Northern Italy, province of Módena, is on the canal of Carpi, 12 miles N. N. W. of Módena. It is the seat of a bishop, and has a citadel, a fine cathedral, a seminary for priests, and manufactures of silk. Pop. 5076.

Carpi'no, a town of Italy, in the province of Foggia, and on Mont Gargano, 30 miles N. E. of Foggia. P. 6264.

Carp Lake, a township of Ontonagon co., Mich. P. 25.

Carpoc'rates, or **Car'pocras,** a heretic who lived at Alexandria in the reign of the emperor Hadrian, and founded a Gnostic sect about 130 A. D. He believed in the transmigration of souls, and maintained that the world was created by angels. He is accused of teaching principles that tend to subvert morality. His followers existed as late as the sixth century.

Car'polite [from the Gr. καρπός, "fruit," and λίθος, a "stone"], a name applied to fossil fruits. Many such have been described, mostly belonging to the carboniferous formation.

Car'pus, a Latin term signifying the wrist, in anatomy denotes the series of bones between the fore arm and hand. In man there are eight small bones in two rows; the upper row consists of the scaphoides, lunare, cuneiforme, and pisiforme; the lower, of the trapezium, trapezoides, magnum, and unciforme. The upper row is articulated with the radius of the fore arm; the lower with the metacarpal bones of the HAND (which see). The number and form of the bones of the carpus vary much in different animals, but rudiments of them, at least, appear in all mammals. They are quite distinct in the flipper or paddle of the whale, as well as in the fore leg of the ox and the horse.

Carp'zov, a Saxon family of the seventeenth century celebrated for learning, of which the most distinguished members were BENEDICT, professor of Wittenberg, author of "Definitiones forensis," "Practica nova rerum criminalum," "Jurisprudentia consistorialis," and "Processus juris"—works which had an extended influence on German laws; died Aug. 30, 1666; JOHANN BENEDICT, professor of theology at Leipsic, brother of the above, who wrote "Systema theologicum," born in 1607; died in 1657; JOHANN GOTTLOB, born Sept. 20, 1679, grandson of the above, professor of Oriental languages at Leipsic, who wrote "Introductio in libros canonicos" and "Critica sacra Veteris Testamenti." Died April 7, 1667.

Carqui'nez (written also **Karquenas**), a strait of California which connects the Bay of San Pablo with Suisun Bay; lat. 38° 04′ 16″ N., lon. 122° 15′ 19″ W. It is from 1 to 2 miles wide and 7 miles long, and is navigable for steamboats. Large ships can ascend it to Benicia. It has sixteen feet of water at low tide. It forms the boundary between Solano and Contra Costa counties.

Carr, a township of Clarke co., Ind. Pop. 692.

Carr, a township of Jackson co., Ind. Pop. 1665.

Carr (EUGENE A.), an American officer, born Mar. 20, 1830, in Erie co., N. Y., graduated at West Point 1853, and July 17, 1862, major Fifth Cavalry. He served on frontier duty 1850–61; scouting against Lipan Indians 1854 (severely wounded in skirmish near Diablo Mountain); on Sioux expedition 1855, Utah 1858, and Kiowa and Camanche expedition 1860, engaged in several skirmishes. In the civil war became colonel Third Illinois Volunteer Cavalry Aug. 15, 1861, and was promoted brigadier-general U. S. volunteers Mar. 7, 1862, serving in operations in Missouri 1861–62, engaged at Wilson's Creek; in command of division in pursuit of Price into Arkansas 1862, engaged at Pea Ridge (thrice wounded); in command of the army of S. W. Missouri 1862, and of district of St. Louis 1862–63; in command of division in Vicksburg campaign, engaged in operations against the place; at Port Gibson, Champion Hill, Edward's Station, Black River Bridge (brevet colonel), and capture of Vicksburg; in the department of Arkansas, commanding cavalry division on Camden expedition 1864, engaged at crossing of Little Missouri; in command of the district of Little Rock 1864 (brevet brigadier-general), engaged at Clarendon and Camden; in command of a division of the Sixteenth corps in operations against Mobile 1865, engaged at Spanish Fort; and in various districts and post commands since 1865. Brevet major-general U. S. A. Mar. 13, 1865, for gallant and meritorious services in the field. GEORGE W. CULLUM, U. S. A.

Carr (JOSEPH B.), an American general of volunteers, born in Albany, N. Y., Aug. 16, 1828, educated at Troy, N. Y. On the outbreak of the recent civil war he was commissioned (April 14, 1861) lieutenant-colonel of the Second New York Volunteers, and colonel May 10, 1861. The second regiment was the first volunteer regiment to leave the State. In 1862 Carr was commissioned a brigadier-general of volunteers; he was at the battle of Big Bethel, and bore a conspicuous part in all the battles of the Army of the Potomac up to the final surrender of Lee's army, April, 1865. He was brevetted major-general Mar., 1865, and mustered out of service Sept., 1865. He holds at present the commission of major-general third division National Guard State of New York, head-quarters at Troy, where he is engaged in the manufacture of chain cable.

Carr (Sir ROBERT), a British gentleman who was appointed by Charles II. in 1664 one of the royal commissioners to New England. He assisted in the capture of New Amsterdam from the Dutch, and changed its name to New York in honor of the duke of York, afterwards James II. Died June 1, 1667.

Car'rageen', or **Irish Moss,** is a name given to several species of sea-weed which are not mosses, but algæ. The species which yields the greater part of the carrageen of commerce is the *Chondrus crispus*. It is used as medicine and as an article of food, and is esteemed for its emollient and demulcent properties. It grows on the rocky coasts of several countries of Europe and on the eastern shores of North America. It is from two to twelve

inches long, branched, cartilaginous, flexible, and reddish-brown in color. It is considered easy of digestion. Jelly and blanc-mange are made by boiling the carrageen in water or milk, with an addition of sugar and spices. The Iceland moss (*Cetraria Islandica*) is a wholly different plant, though used in a similar way. It is not a true moss, but a lichen.

Carra'ra (anc. *Cararia*), a town of Italy, in the province of Massa-Carrara, is on the Avenza, near the Mediterranean, 133 miles by rail N. W. of Pisa. It has an old collegiate church, a ducal palace, and an academy of fine arts. Here are celebrated quarries of white statuary marble, which have been worked for two thousand years or more. Many foreign artists come here to work, in order to save the expense of transporting the marble. The quarries, of which there are more than thirty in the vicinity, are in high hills or mountains formed chiefly or entirely of marble. Pop. 6797.

Carrara Marble is a white, fine-grained, saccharine marble obtained at Carrara, Italy, and well adapted for statuary. It is a metamorphic limestone of the oolitic formation. Besides this fine white marble, several inferior varieties are obtained in the quarries of Carrara. Some of these are veined and blue.

Carratra'ca Springs, a post-village of Plantagenet township, Prescott co., Ontario (Canada), has large hotel accommodations, and a copious mineral spring whose waters are very highly esteemed for their alterative effects.

Carratunk Plantation, a township of Somerset co., Me. Pop. 214.

Carrel (Nicolas Armand), an eminent French writer and leader of the republican party, was born at Rouen May 8, 1800. He served in the army in his youth. He gained distinction by an able "History of the Counter-Revolution in England." Carrel, Mignet, and Thiers became in 1830 chief editors of the "National," a liberal daily paper of Paris. In 1830 Thiers and Mignet retired from the editorship, and Carrel obtained the control of the "National," which he edited with great ability. He was an eloquent and popular writer, and was qualified by sound judgment and moderation to be the leader of a party. He was mortally wounded in a duel by Émile de Girardin, and died two days after, July 24, 1836.

Car'rell (Rt. Rev. George Aloysius). D. D., born at Philadelphia, Pa., June 13, 1803, studied at Mount St. Mary's College, became in 1829 a Roman Catholic priest, was stationed in Philadelphia, Pa., Wilmington, Del., and St. Louis, Mo., where he was a professor and afterwards rector in the university; in 1849–53 was president of the Purcell Mansion College at Cincinnati, O.; in 1853 he was consecrated bishop of Covington, Ky. Died Sept. 25, 1868.

Carre'ra (Rafael), a general of mixed Indian and negro extraction, was born in Guatemala in 1814. He fought against the federal party in the civil war (1837–39), and became the general-in-chief of the insurgents. He was chosen president of Guatemala in 1847, and re-elected in 1851 president for life. He was an absolute monarch while in power. Died April 14, 1865.

Carriacou, kăr'e-ą-koo', the largest of the Grenadine Islands, in the British West Indies, 20 miles N. E. of Grenada. It is 7 miles in length and about 3 miles in breadth. Chief crop, cotton. Hillsboro' is on its western side.

Carriages, Coaches, Chariots, Wagons, and **Carts.** We have chosen to place all these vehicles under one head, since they are so closely connected that it is almost impossible to make any other satisfactory classification. It is probable that the idea of a vehicle with wheels, to be drawn by animals, must have occurred to man soon after the domestication of the horse and the ox. The first attempts in this direction must have been very rude, much like the bullock-carts of India and South Central Africa of the present day—the wheels solid pieces of wood, thin slices of the trunk of a tree, and the axle a solid beam, with the ends rounded and thrust through the rude wheels, which creaked horribly as they revolved. From this cumbrous axle a pole or shafts extended forward, while attached directly to it was the body of the cart or wagon, no springs or intervening elastic substance mitigating its inevitable jolting. The cart was undoubtedly of earlier origin than the chariot; but though progress in those days was slow, yet within 600 years after the Flood the Egyptians, and probably the Assyrians also (for the two nations kept pace with each other in mechanical inventions), were constructing both chariots and carts or wagons, which indicated a great advance in mechanical knowledge. They were at first, and indeed for several centuries, two-wheeled vehicles, but the wheels were no longer solid pieces of wood, but had a hub in which the axle was inserted, and at first four, then six, then eight, and finally (though not till near the close of the Assyrian or Medo-Persian monarchy) twelve spokes, the diverging ends of which were inserted in a rim of wood, which was bound with a tire of bronze. Whether this rim was originally whole or composed of several pieces or felloes is uncertain, but at the period of the Assyrian monarchy felloes were in use. The chariot was box-shaped, but open in the rear, the front being about four feet in height. It was probably three or four hundred years later that those intended as state carriages were provided with a back, and a seat in which the nobles or royal personages sat or reclined, while a charioteer stood in front and drove the horses.

The chariots were used for two purposes: first, as an evidence of the great dignity and exalted station of the king or prince who occupied them, as when Pharaoh made Joseph "ride in the second chariot which he had" (Gen. xli. 43), and as when the funeral procession for Jacob went up out of the land of Egypt, and "there went up with Joseph both chariots and horsemen," in token of the high rank of the deceased (Gen. l. 10). It is noteworthy that during the time which elapsed between these two incidents we find Joseph sending wagons (probably carts, or simple two-wheeled vehicles, drawn by oxen) from Egypt to Canaan for his brethren to bring their wives and children to Egypt (Gen. xlv. 19). A second use of these chariots was for war-purposes. It is hardly probable that they were used in this way so soon as for regal pomp and display. There is a tradition that Erichthonius of Athens built the first war-chariot about 1586 B. C. At the time of the Exodus (B. C. 1491) Pharaoh had 600 war-chariots, and it is implied (Ex. xiv. 7) that besides these there were other chariots in Egypt which were employed for the same purpose. These war-chariots had on their sides cases for the bow and sheaf of arrows, and also for the spears or lances, and usually an archer or a spearman stood on either side of the charioteer, and shot his arrows or hurled his spears at the enemy as the charioteer drove furiously to the conflict. The Canaanitish kings and the kings of

Fig. 1.

Assyrian War-Chariot.

Moab in the next 150 years after the Exodus are often spoken of as having numerous chariots of iron; by which is generally understood, not chariots constructed of iron, but having iron or bronze scythes attached to the axles of their chariots. These, driven at great speed against a force of footmen or cavalry, proved terribly destructive. The Israelites under the theocracy were prohibited the use of chariots, but in the time of David, and still more in that of Solomon, they began to accumulate them, and Solomon maintained a force of 1400 chariots; these and the horses which drew them were mostly imported from Egypt at a cost of about 1050 shekels for each chariot—about $650, or, reckoning the difference in the value of money then and now, equivalent to at least $3000 of our money; so that his force of chariots must have been worth at least $4,200,000. But another item in the cost of these establishments were the richly embroidered housings and trappings for the horses and the cloths for the chariots, manufactured for a long period in Tyre or in some of its tributary states (Ezek. xxvii. 20).

Until near the close of the Assyrian monarchy the chariot was generally drawn by three horses. At that time the third horse was withdrawn, but the Persians a little later drove four horses, attached, like our stage horses, to the chariot in pairs. The chariot continued to be a two-wheeled vehicle until near the Christian era, when its use for war-purposes was discontinued, and among the Romans, Greeks, and the Sybaritic nations of the Orient it became the synonym of luxury and effeminacy. It was mounted on four wheels, and drawn by four or six horses elegantly caparisoned, and the chariot itself was trimmed and cushioned with the most luxurious embroidered cloths of the East. Usually but two persons besides the driver occupied it, though there was often room for six. There were chariot-races in the Olympian and Isthmian games, and the nobles of Greece and Rome drove at full speed along the magnificent Roman roads and highways. It was prob-

ably in one of the more modest of these vehicles that the Ethiopian treasurer of Candace, queen of Ethiopia, was returning to his country from his visit at Jerusalem when he met Philip (Acts viii. 27, 28). During the period of the later Roman empire and the decline of its power these richly decorated carriages multiplied, with the other indications of the luxury and effeminacy of the people. There was not, however, even in the most costly of these vehicles, anything answering to the springs of our modern coaches and carriages. Leather and steel of the best quality were both abundant, but the idea of using either for rendering the motion of these carriages easier did not occur to the carriage-builders of those days.

During the Dark Ages the roads were so rough and poor that carriages were almost entirely abandoned as a means for the conveyance of persons, the only method of land-travel being on horseback, and even the broad-wheeled heavy wagons or wains, used to some extent for the transportation of goods, moved over the highways with the greatest difficulty. On the Continent, asses, mules, and the large but slow and sure-footed Norman horses were used for the packing of goods from one country to another, the huge panniers on either side of the animal almost concealing him from sight. In 1280, according to Beckman, Charles of Anjou and his queen entered Naples in a *caretta*, a small but highly decorated chariot. Fourteen years later, in 1294, Philip the Fair issued an ordinance forbidding the wives of citizens to use carriages, or perhaps more accurately *cars*, probably open two or four-wheeled vehicles, which seem to have come into use about that time. For the next 200 years their use was very infrequent, and seems to have been confined to royal personages. Yet in this time there had been introduced one change which was perhaps an improvement. The canopy (probably borrowed from the Oriental umbrella held over the monarch in his chariot), which had hitherto been sustained by four pillars, and had been open at the sides, now gave place to a close drapery, which concealed the occupant from view except when looped up. The emperor Frederic III. attended the council or diet at Frankfort in 1474 and 1475 in close or covered carriages, that of the latter year being magnificently decorated. Soon after this time the German princes seem to have entered upon a rivalry to outshine each other in the splendor of their equipages. In 1509, at a tournament in Rappin, the electress of Brandenburg's carriage was completely covered with gold, and those of the other duchesses were ornamented with crimson and purple curtains and draperies of the richest satin. From this time the use of coaches by the nobility, and especially by the feudal lords, spread gradually over continental Europe; but, though the coaches were low and broad-wheeled, the condition of the roads was a serious obstacle to their use. In 1550 there were only three coaches in Paris. In 1610, Henry IV. was assassinated in his coach. Rude carriages

FIG. 2.

Henry IV.'s Coach.

called whirlicotes, two-wheeled vehicles without straps or springs, and having the horses attached to them by ropes, had been occasionally seen in England as early as the time of Richard II. (1377–99), and it is recorded that his mother was conveyed in one at the time of the rebellion of 1399. But the state coach was first introduced in the time of Queen Elizabeth, in the year 1555, it is said, by Walter Rippon, a Dutchman, who built one in that year for the earl of Rutland, and in 1564 another for the queen, who made him her coachman. Of this coach, and a later one built by the same man for her when attended by her maids of honor or her ministers, we give an illustration copied

FIG. 3.

Queen Elizabeth's State Carriage.

from Höfnagel's print of Nonsuch Palace. These coaches were without springs of any kind, though that of Henry IV., figured above, appears to have been suspended on heavy bands of leather or steel.

The English nobility soon set up their carriages, and, as Buckingham quaintly expresses it, "within twentie years there became a great trade of coachmaking." Some of the nobles increased the number of horses attached to these coaches to six, or even eight. The use of private carriages was confined to the aristocracy for the next hundred years,

FIG. 4.

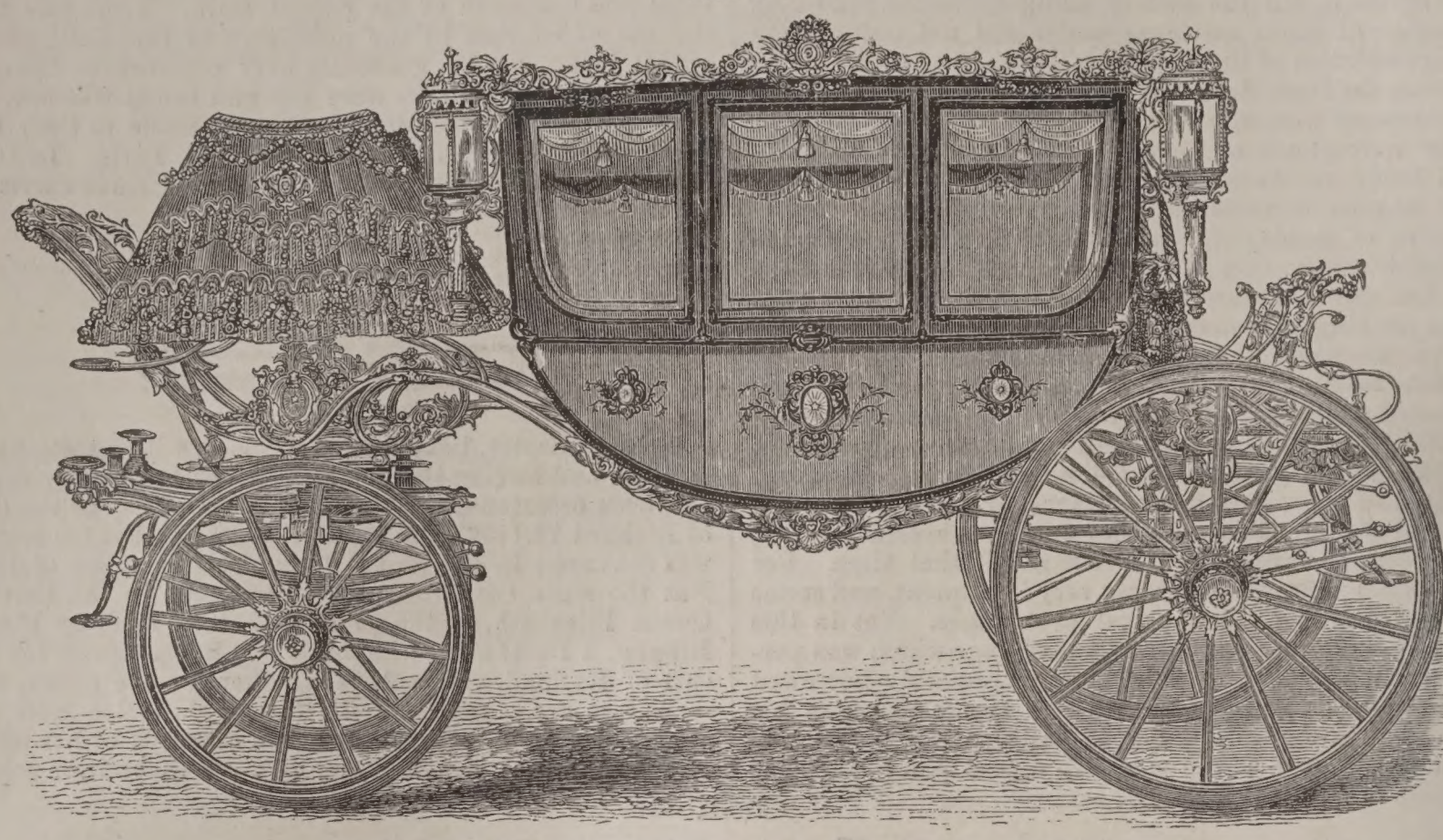
Private Carriage of the Seventeenth Century.

but a few hackney-coaches (so called from the French *coche-à-haquenée*, a vehicle with a hired horse) were kept for hire after 1625. Fifty years later there were twenty of these in Edinburgh, but such was the condition of the roads and streets that there was not much demand for them, and a hundred years later the number had dwindled to nine. During nearly the whole of the eighteenth century these hackney-coaches, the heavy and slow-going stage-coaches, and the post-chaises, were the only vehicles in England for the accommodation of those travellers who did not own horses or coaches. There was, indeed, one other mode of travelling, very slow and inconvenient, which was resorted to by the common people, and sometimes by the middle classes. The huge broad-wheeled covered wagons used for the transportation of goods, and drawn by six, eight, or twelve of the great Normandy horses, had a space partitioned off at the hinder end and strewn with straw, in which they could carry six or eight passengers, all of whom had to sit on the straw on the floor of the wagon. This was called "riding in the tail of the wagon." But even this limited accommodation was only to be found on the great thoroughfares, as away from these goods were carried on pack-horses. Even as late as in 1750 the journey from London to Birmingham by stage-coach, a distance of 116 miles, occupied nearly the whole of three days and nights. In 1754 the first line of stage-coaches was established between London and Edinburgh, and the advertisement stated that "a two-end glass coach machine, hung on steel springs, exceeding light and easy, would go through in ten days in summer and twelve in winter, the passengers lying over during the Sabbath at one of the villages on the route." The distance between the two cities is about 400 miles, and it is now run by the ordinary fast trains of the Great Northern Railway in ten or eleven hours. The introduction of steel springs for coaches dates from about 1750, but these were not at that time the elliptic or the C spring, but a bow of steel, the two ends of which were secured to the axle, and the centre reinforced by shorter strips of steel, much like the heavy springs we see on some of the passenger cars on the railways. The leather thorough-braces, whether attached to a crossbar, as they were at first, or to the C spring, as was done later, did not come into use till near the close of the eighteenth century.

The great improvement in the public highways in Great Britain, which was the result of the labors of Macadam, Telford, and other civil engineers at the close of the last and

the commencement of the present century, and the reorganization of the postal arrangements, led to the establishment of those lines of stage-coaches on all the principal thoroughfares which De Quincey has so eloquently described as "the glory of England" and "the poetry of motion." These coaches were well built, strong, and so well provided with springs that their motion was easy, and did not weary the traveller even on long journeys. They were run by time-tables, and made their ten miles an hour regularly. From about 1795 to 1835 these vehicles were the favorites of travellers, and carried hundreds of thousands of passengers annually; but when the railway lines were constructed between the large towns the stage-coaches began to fall into disuse, and they are now only employed on short and subordinate routes, and their number is decreasing every year. But with their decrease there has been a vast increase in the number of private carriages of all descriptions, till now these are numbered by hundreds of thou-

Fig. 5.

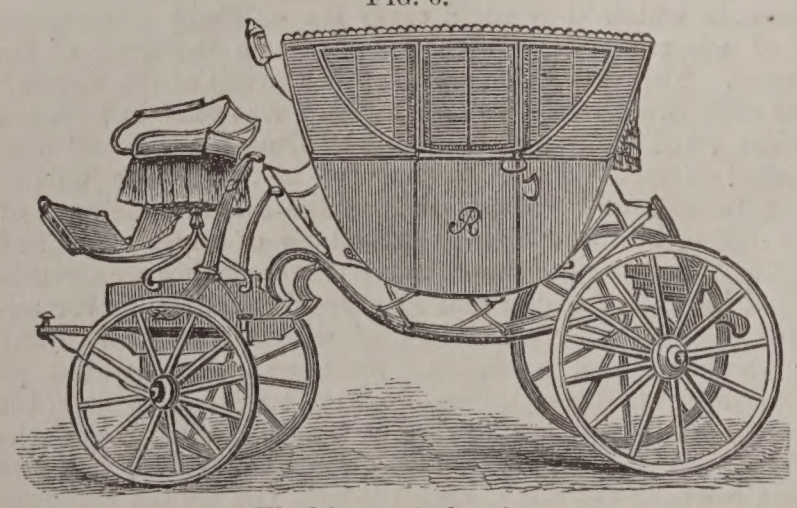


The Viceroy of Egypt's Carriage, built in Paris in 1867; cost $15,000.

sands. They are of a great variety of designs, and are intended for one, two, four, or even six horses, and vary in their capacity from the skeleton or sulky for a single passenger, who is his own driver, to the family coach, phaeton, or carryall, into which from eight to a dozen can be stowed. The hackney-coaches have very generally given place to cabriolets or *cabs*, as they are generally called, vehicles drawn by a single horse and carrying two or four passengers besides the driver, which were introduced about 1820. There are now nearly 60,000 of these vehicles in use in London. Omnibuses, introduced about 1831 from France, have been used to some extent.

In this country the prevalent mode of travelling for the first two centuries was on horseback, the roads preventing any very extensive use of wheeled vehicles. There were, however, even at the time of the Revolution and for some decades before, a few family coaches, maintained by the wealthy and aristocratic families of the larger towns. These were heavy, lumbering affairs, drawn by six large horses, and seldom moved faster than a very slow trot. In New

Fig. 6.



Washington's Carriage.

York, Pennsylvania, and New Jersey the great Conestoga wagon, broad-wheeled, and with its huge canvas-covered body elevated both in front and rear, drawn sometimes by the Normandy horses, sometimes by four or six yokes of oxen, crept at a slow pace over the rough roads to carry goods from the seaports into the rural districts. These same wagons in our times have been used in the Mississippi Valley and on the Western plains, as well as in Western Pennsylvania, West Virginia, the mountain districts of North and South Carolina, Georgia, and East Tennessee, to transport both goods and emigrants, and have received the name of "prairie schooners." At the time of the Revolution the stage-coach was unknown on this continent. In 1791 there were but 1905 miles of post-roads in the U. S., and over the greater part of these the mails were carried in heavy wagons, occupying three or four days in the trip from Philadelphia to New York, or making the round trip in a week, while they took ten days for the journey from New York to Boston. The improvements in the roads led to improvements in the vehicles, and on the great thoroughfares from 1810 to 1845 the stage-coaches were, of their kind, admirable vehicles. Accommodating nine inside, and usually six, including the driver, on the outside, with a good supply of baggage covered with a heavy leather boot in the rear, and drawn by four or six spirited horses, these vehicles, though not making quite as good time as the English stage-coaches, were the admiration of all beholders. Troy, N. Y., became celebrated for its coaches, as it has since for its horse-cars, and the stage-proprietor who could assure his customers that he used only the best Troy coaches was sure of ample patronage. For the travel in newer regions and over somewhat rougher roads what were called the Concord wagons or coaches, originally made in Concord, N. H., but now manufactured also in Chicago and in other Western cities and towns, were preferred. The coaches of the Overland Mail, and indeed most of those in use in the Pacific States, are of this description. They are furnished with strong brakes to check their too rapid descent of the mountain declivities. We give an illustration of one of the Overland coaches.

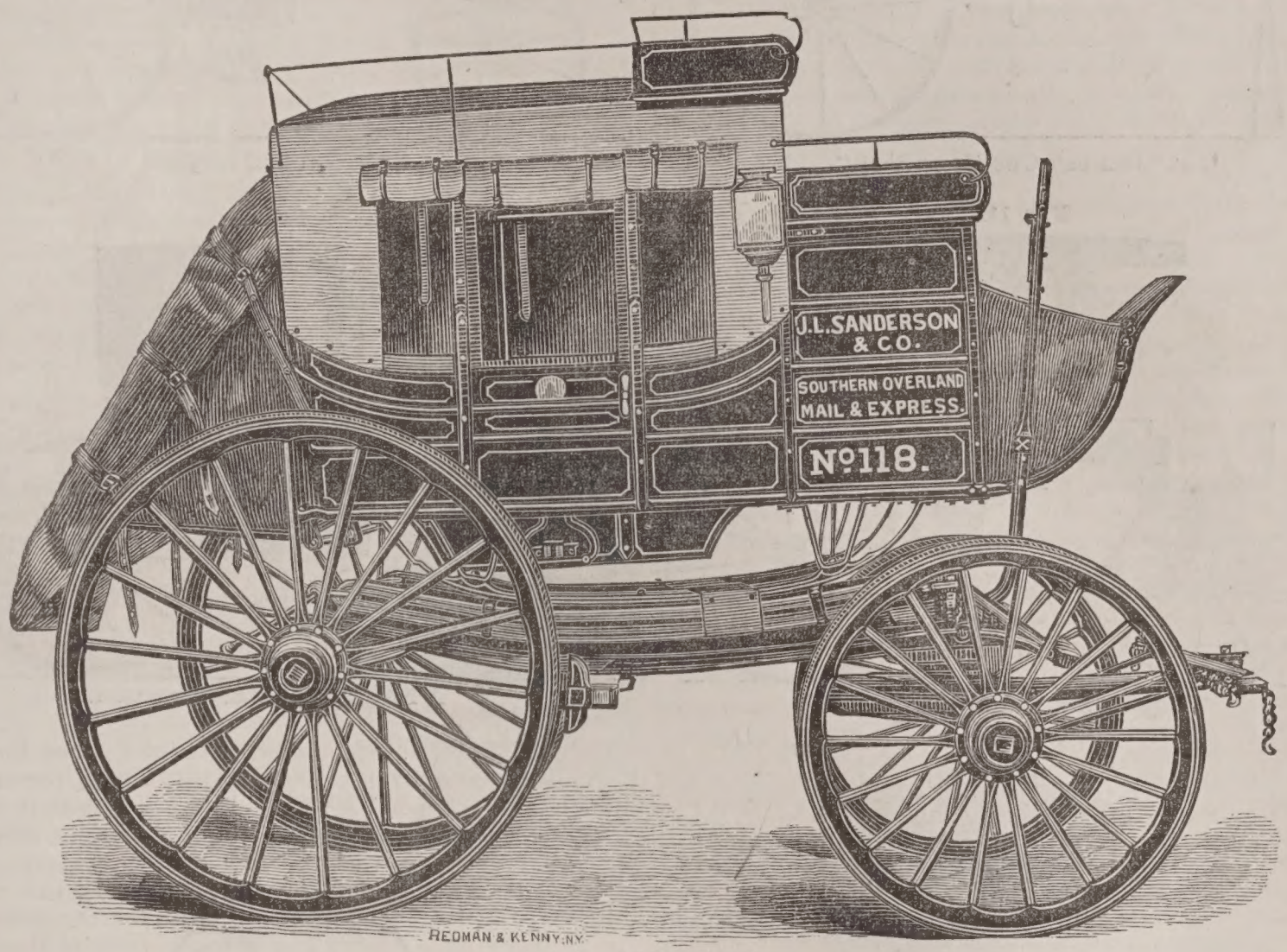
The omnibus has not been used to any great extent except in cities and large towns, but in these, until the street-cars of the horse-railroads began to take its place, it was the favorite vehicle for public travel. At one time, about 1857 or 1858, there were nearly 500 plying on the streets of New York City. The present number is not more than 120. The omnibus is too well known to need description or illustration. It is a French invention, introduced into Paris about 1827, and into New York in 1830.

The other public carriages for hire have been hackney-coaches, or hacks, as they are generally called, four-wheeled close carriages, drawn by two horses, and of which there are now several styles, such as the close coach, the caleche, the quarter coach, the C-spring coach, the double caleche, the barouche, the six-seat rockaway, and the clarence, the last having a glass front and sides. Cabriolets or cabs, either two or four-wheel vehicles drawn by one horse, are also used to some extent, but have never been as popular here as in London. The hansom cab, with a caleche top and the driver's seat at the back, the reins extending over the top, has been very little used here. A style called crystal cabs,

having a glass front like the clarence, but on a very much smaller scale, was for a time much liked.

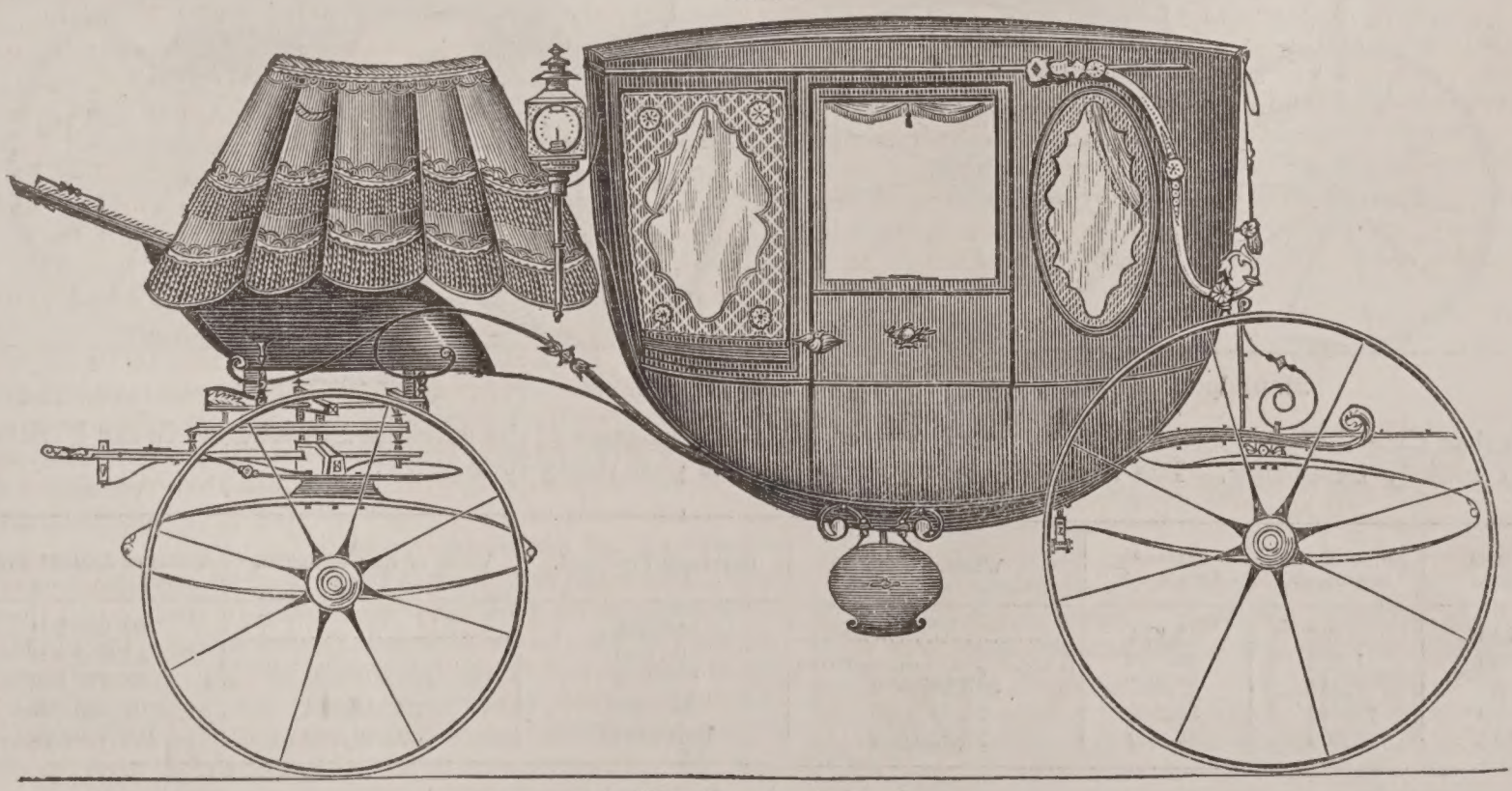
As the country has increased in wealth, and the highways, drives, boulevards, and city and town streets have improved, the demand for private carriages has grown, until now this constitutes by far the largest department of the trade. It is stated by the organ of the trade that there are now about 1,000,000 carriages and wagons of all descriptions sold annually, and the annual product is valued at nearly or quite $100,000,000. The variety as well as the quality of these vehicles is almost infinite. A single manufacturing house had in their catalogue in 1862 more than 300 styles, and now number about 500, yet there are hundreds of styles which they never attempt to manufacture. The great seats of carriage manufacture are—for strong and heavy top-wagons, Concord, N. H.; for buggies, open wagons, and light cheap wagons, which are yet very serviceable, Amesbury and Belchertown, Mass.; for private coaches and carriages of all styles, New Haven and Bridgeport, Conn. (there are in the former of these cities thirty-six manufacturing establishments); Troy, now mostly restricted to stage-coaches, street-railroad cars, and omnibuses, but doing a moderate share of other work; New York City, which has a high reputation for the excellence of the work of some of its

FIG. 7.



Overland Mail Coach.

FIG. 8.



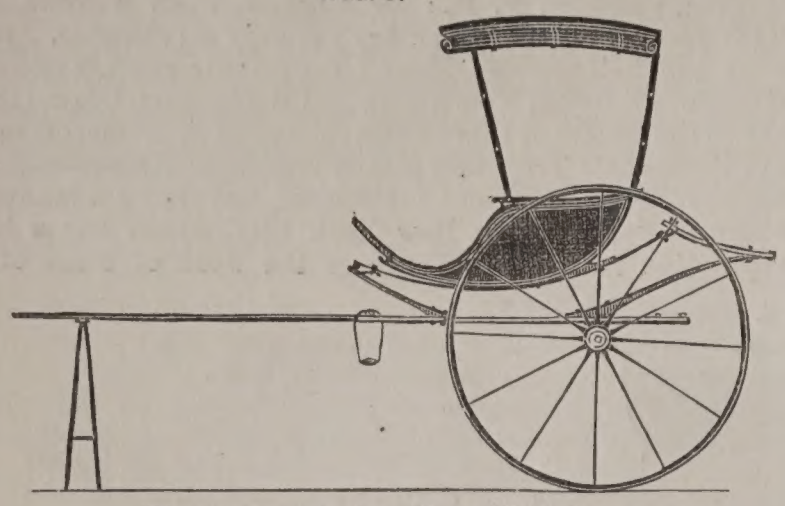
A Glass-Quartered Coach.

manufactories; Newark, N. J., where are manufactured many of the lighter class of carriages; Philadelphia, which has long maintained a reputation for good work in some styles; Wilmington, Del.; Pittsburg and Chicago, both largely engaged in the manufacture of various styles, both heavy and light. But there are very few cities or large towns in the U. S. in which there is not a considerable number of carriages and wagons produced.

It would occupy too much of our space to enumerate a tenth of the styles of carriages which are now or have recently been most popular. For family use, to be drawn by two horses, the preference seems to be for some form of the clarence, the phaeton, the brett, the coupé, the landau, or of late the landaulette, or the higher grades of four or six-seat rockaways. Some of the latter are very light and graceful. For a single horse there are rockaways with four or five sittings, light octagon-front coupés, broughams, stanhope-phaetons, victorias, chariotees, English, French, and American styles, top buggies, with or without jump seats, tilburies, doctors' gigs and carriages; and among the open wagons the French, English, and American dog-carts, the dos-à-dos, the two-wheeled dog-carts and stanhopes, the turn-out seat and drop-front buggies, the road sulky, etc. etc. The illustrations show a few of these styles.

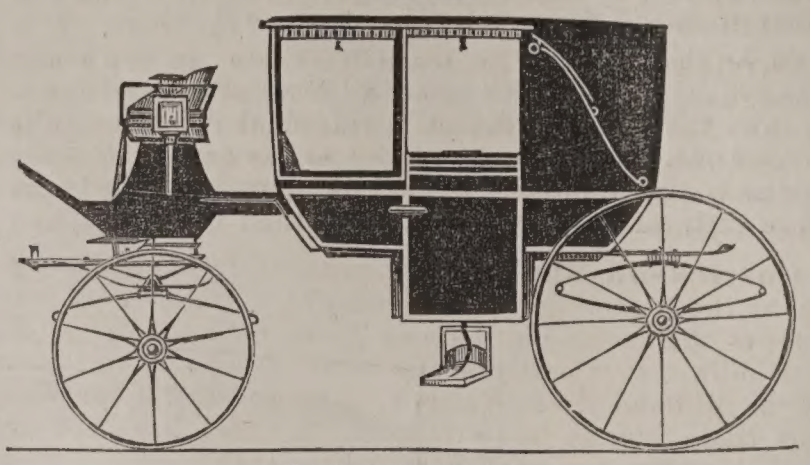
The manufacture of children's carriages on any considerable scale has been only attempted within the past twenty-five years, and has only become an extensive industry within the last fifteen years. There has been added to it within that time the production of dolls' carriages, which is also rapidly extending. The following table exhibits the progress of the carriage manufacture in the U. S. within the past thirty-four years:

FIG. 9.



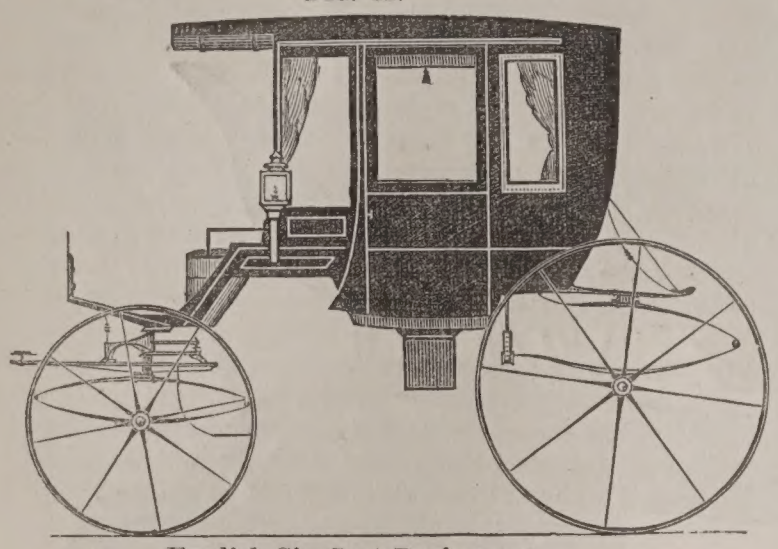
The "Deacon's One-Horse Shay."

FIG. 10.



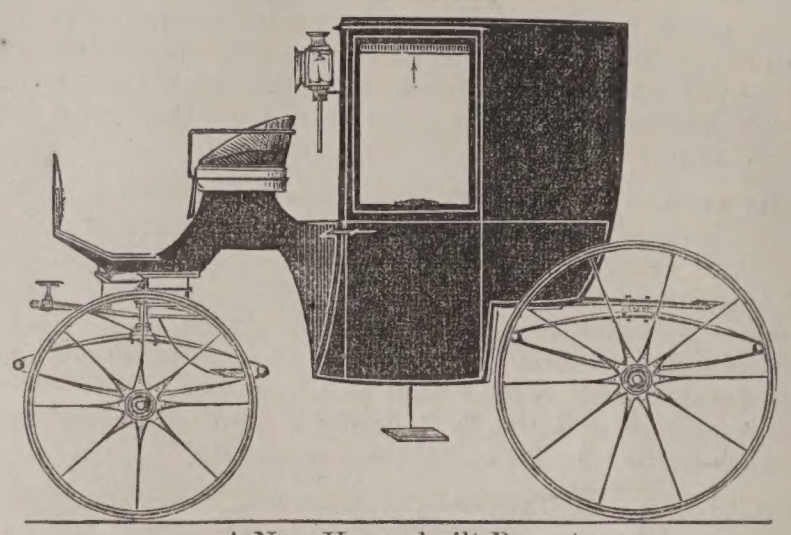
English Box Landau.

FIG. 11.



English Six-Seat Rockaway.

FIG. 12.

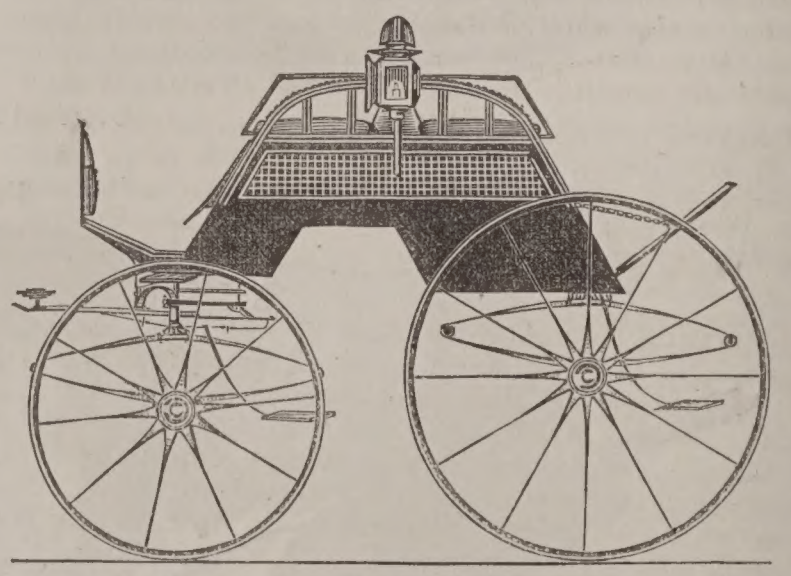


A New Haven built Brougham.

FIG. 13.

Stanhope-Phaeton.

FIG. 14.



The Dos-à-Dos.

Census Year.	No. of Establishments.	Persons Employed.	Wages Paid.	Carriages Produced.	Value of Raw Material.	Value of Annual Product.
1840	92	2,274	.....	13,331	.....	$1,708,741
1850	1,822	14,000	.....	95,000	.....	12,000,000
1860	7,234	37,457	$13,547,356	270,000	$12,008,675	35,927,192
1870	11,944	56,294	21,749,625	800,000	23,385,683	67,003,730
1873	*12,500	75,000	29,500,000	1,000,000	30,000,000	100,000,000

For many of the facts and estimates in this article, as well as for a considerable number of the illustrations, we are indebted to the courtesy of Messrs. William H. Bradley & Co. of New Haven, successors to Brewster & Lawrence.

L. P. BROCKETT.

Carrical', or **Karrical,** a French town and seaport of Hindostan, on the Bay of Bengal, 152 miles S. of Madras. It was formerly fortified, and was captured by the British, who restored it to the French in 1814, on condition that it should not be fortified or garrisoned.

Car'rick, EARLS OF (1748), Viscounts Ikerrin (1829), and Barons Butler (Ireland, 1607).—SOMERSET ARTHUR BUTLER, fifth earl, born Jan. 30, 1835, succeeded his brother in 1846.

Carrickfer'gus, a seaport-town and borough of Ireland, on Belfast Lough, 10 miles by rail N. N. E. of Belfast, is situated in the county of Antrim, but forms a county by itself, called "the county of the town of Carrickfergus." It has a fine old parish church, said to have been founded in 1164; also several spinning-mills and manufactures of linen and starch. Here is a remarkable and picturesque castle, supposed to be 700 years old, standing on a high rock and on the sea. It is used as an arsenal, barracks, and a fort for the defence of the harbor. Carrickfergus has important fisheries, and is celebrated for its oysters, lobsters, and scollops. It has considerable trade with

* Estimated by editors of the "Hub." This is exclusive of the manufacture of sleighs, which is of itself a vast industry.

Liverpool, though its harbor is shallow and poor; it might, however, be easily improved. The people are mostly Protestants of Scotch descent. A part of the ancient wall is still standing. The town is connected with Larne by railway. It returns one member to Parliament. There are mines of salt in the vicinity. Pop. in 1871, 9452.

Carrickmacross′, a town of Ireland, in the county Monaghan, Ulster, is 46 miles N. W. of Dublin. One of its churches serves as the cathedral for the Roman Catholic archbishop of Clogher. It has a savings bank and a well-endowed grammar school, and has a fair held five times a year. Pop. 2063.

Carrick-on-Shannon, a town of Ireland, the capital of the county Leitrim, Connaught, is situated on both sides of the navigable Shannon River, 85 miles W. N. W. of Dublin. It is partly in the county Roscommon, and is on the Midland Great Western Railway. It has considerable trade, chiefly in provisions. A canal has been cut from this place to Lough Erne. Pop. 1587.

Car′rick-on-Suir, a town of Ireland, in the county of Tipperary, is on the river Suir, 13 miles by rail E. of Clonmel. It has an old bridge, a parish church of high antiquity, a hospital, a convent, and a picturesque ruined castle built about 1310. Grain and other products of the soil are exported from this place by the navigation of the river. Pop. in 1871, 4986.

Car′rick's Ford, a point on the Cheat River near St. George, Tucker co., West Va. The Confederate forces under Gen. R. B. Garnett, in retreat from Laurel Hill, where they had abandoned most of their artillery and stores, were here attacked by three regiments of U. S. troops under Gen. T. A. Morris. A brisk engagement ensued, in which the Confederates were routed and Gen. Garnett killed. The Unionists captured the Confederate wagon-train and one piece of artillery. This affair occurred July 13, 1861.

Carrier (Jean Baptiste), a French Jacobin notorious for his cruelty, was born near Aurillac in 1756. He was elected to the National Convention in 1792, and was sent in 1793 to Nantes, where he found many Vendean prisoners. He murdered multitudes of men, women, and children by various modes. Many of these victims were crowded into boats which were scuttled and sunk in the Loire. This was called *republican baptism.* The cruelties and obscenities related of this worst of Jacobin leaders are almost incredible. More than 15,000 persons were put to death by him in a single month. He was guillotined Dec. 16, 1794.

Carrier (Joseph Auguste), a French painter of portraits, miniatures, and forest scenery, was born in 1800 at Paris, and studied under Gros, Prud'hon, and the chevalier Saint. He first exhibited in 1824, has won several medals, and in 1866 was decorated with the cross of the Legion of Honor.

Carrier (Thomas), died May 16, 1735, at Colchester, Conn., aged 109. He was a native of the west of England, settled in Andover, Mass., and married Martha Allen in 1664. His wife was hung at Salem in 1692 on a charge of witchcraft, she having, it was alleged, appeared to her daughter in the form of a black cat. About 1715, Carrier removed to Colchester. He retained his strength and faculties in a surprising degree till his death.

Carrière (Joseph), a French *abbé* and theologian, born at Aveyron Feb. 19, 1795, was especially noted for a Latin work treating upon marriage, upon justice and law, and upon contracts. This work is highly esteemed. Died April 23, 1864.

Carrière (Moritz), a German *littérateur,* born at Griedel, in Hesse, Mar. 5, 1817, studied philosophy at Giessen, Göttingen, Berlin, and in Italy. In 1849 he became professor of philosophy at Giessen, and after 1853 held that position at Munich. He has published "Der Kölner Dom als frie deutsche Kirche" (Stuttgart, 1843), "Abelard und Heloise" (Giessen, 1844), "Die Religion in ihrem Begriff," etc. (1841), "Die philosophische Weltanschauung der Reformationzeit" (1847), "Die letzte Nacht der Girondisten" (a poem, 1849), "Religiöse Reden und Etractungen für das deutsche Volk" (1850), "Das Characterbild Cromwells" (1851), "Das Wesen und die Form der Poesie" (1853), "Deutsche Geiteshelden im Elsass" (1871), "Die Kunst im Zusammenhange der Culturentwickelung und die Ideale der Menschheit" (1863–71), and other works. He defends Christianity, opposes Ultramontanism, and is of the liberal school. As an art-critic he takes a high rank.

Car′rier Pig′eon, a variety of the domestic pigeon (*Columba livia*), is remarkable for the sagacity with which it returns to its home after it has been conveyed to a distant place. It is trained to carry messages in various countries. The letter sent by this mode is sometimes enclosed in a quill and tied to the bird's leg, neck, or wing. Pigeons are trained by a progressive system, the young birds being at first taken to a small distance from their home and set loose. The distance to which they are taken is gradually increased to thirty miles or more. When they are liberated and thrown up for a journey, they first rise spirally to a great height in the air. Before the invention of the electric telegraph they were often employed to carry news of the changes in the prices of stocks. The balloons which the Parisians sent up during the siege of Paris in the winter of 1870–71 carried each a number of these birds, which were employed as bearers of despatches in the public service. Some of them, after being taken more than 100 miles, returned to Paris, notwithstanding the inclemency of the season. They have been known to fly 1000 miles or more, and at times to fly more than 100 miles an hour. They have been sent home from great distances at sea, with no possible guide as to direction—a seeming demonstration of the theory that these birds are prompted as to the direction in which to fly by some instinct at present altogether inexplicable. Some birds, however, are puzzled by foggy weather or by a coating of snow upon the ground. Many pigeons fly well only in a general N. and S. direction, others E. and W. There are several breeds of the carrier pigeon, the Belgian stock being generally regarded as affording the best messenger birds. There are, however, various forms of the Belgian breed, but most of the birds have considerable family likeness. They should be over fourteen inches long, and in weight should exceed one pound. A wattle of larger or smaller size generally extends across the bill. Most Belgian birds have a short head, long neck, and very broad, muscular shoulders. Many have a wide circle, without feathers, around the eye. The Turks are regarded as training this bird most successfully. The Asiatics, it is stated, have employed the carrier pigeon from the earliest times. Anacreon mentions it as a carrier of letters; Pliny mentions its use at the siege of Modena. The Turks employed it during the Crusades, but the crusaders kept falcons which were flown at the pigeons with some success. The English merchants in Aleppo, in the palmy days of the Turkey Company, had regular communication with Scanderoon, 80 miles distant, by means of this bird. It is related that in the East regular relays of pigeons were formerly flown from towers thirty or forty miles apart, the birds being trained to carry messages both ways. The message was transferred from bird to bird, and thus great distances were traversed in a short time. Before the electric telegraph was invented there were lines of birds flown from Halifax, N. S., to Boston, Mass., and from Sandy Hook to New York, with the European news. In the Franco-German war very long documents were micro-photographed, and sent in packages of only a few grains weight with complete success.

Revised by Charles W. Greene.

Carrières, de (Louis), a Roman Catholic theologian, was born in 1662 at Cluvilé, near Angers, France. He became a soldier, and in 1689 joined the Congregation of the Oratory. He became distinguished as a theologian, and published, at the request of Bossuet, a "Commentaire Littéral" (24 vols. 12mo, 1701–16). This work is very popular in France even at the present day. Most of the comments are made in the translated words of the Bible itself. It has been often reprinted. Died at Paris June 11, 1717.

Car′riers, Com′mon, those who undertake for hire to transport from one place to another the goods or persons of such as choose to employ them. They are distinguished from *private* carriers by this readiness to afford accommodation to the public generally, and are subjected in law to a different responsibility. They may be either carriers by land or carriers by water. Familiar examples of the former kind are stage-coach proprietors, railway companies, express companies, wagoners, and teamsters, etc.; of the latter, the owners and masters of steamships, ferry-boats, and vessels of all kinds engaged in a general transportation business. The principles of law exhibiting the rights and duties of common carriers form a subordinate department under the general subject of Bailment, and, as in other varieties of the same legal relation, the degree of care necessary in the custody and treatment of whatever is received by the bailee is not dependent in all respects for its determination upon the contract of the parties, but arises by force of established legal rules. The difference in these requirements, depending upon the circumstance whether there be a carriage of goods or a carriage of passengers, demands that these two branches of the subject be examined separately.

Common carriers of goods are placed under a responsibility of excessive stringency. They are held liable for all loss or damage which occurs during transportation except

that occasioned by "the act of God or the public enemy." They are made virtually insurers of the goods against all perils except those arising from these two sources, and the infrequency of exemption must be so great as to afford relief but very rarely. The reasons for imposing a duty so severe grow out of considerations of public policy. The facility with which the carrier or those who may collude with him can purloin or injure goods entrusted to his oversight and disposal, and the difficulty of ascertaining the true cause of the loss, are thought to place the members of the community so entirely at his mercy that their interests demand the most ample protection. Moreover, the fact that the application of this rule has not proved detrimental to the growth and prosperity of transportation companies indicates that its apparent undue severity, while conducing greatly to the advantage of the public, has worked no practical injustice even to the carriers themselves. The phrase "act of God" is held to extend only to such inevitable accidents as occur without the intervention of human agency. Thus, losses directly occasioned by winds, floods, lightning, and earthquakes would be properly included under this designation, and the carrier would be relieved from liability. But robbery, even if committed unexpectedly and by an irresistible force, or fire occasioned by some incendiary, wholly without the carrier's negligence or connivance, would be causes of loss containing that element of human agency which makes the exemption inapplicable. Damage resulting from natural causes, such as frost, fermentation, evaporation, the natural decay of perishable articles, or the inherent viciousness of animals, are placed upon the same footing as losses caused by the "act of God." By the phrase "public enemies" is meant those with whom the nation is at war or pirates on the high seas. Thieves, robbers, and mobs would not be included under this term.

It is a carrier's duty to receive for transportation all goods offered of the kind which it is his usual custom to carry. He may, however, demand the payment of freight in advance, and may refuse all articles of a dangerous quality. All persons who engage his services must be charged for the same service equably. Suitable vehicles for transportation must be provided, in charge of competent servants; the goods must be carried safely to the proper place of destination by the usual route and with all reasonable despatch, and there delivered, or held ready for delivery, to the owner or consignee. Reasonable instructions given by the owner or his agent relative to the mode of carriage of the goods must be followed, unless compliance is impracticable. The carrier is also held accountable for all acts of his employés within the scope of their employment, even though they violate his instructions as to the mode of performance. He cannot escape from his obligations as to the carriage of the goods by attributing default to his own agents.

The responsibility of common carriers begins upon the delivery of the goods for transportation. A delivery at the usual place of receiving freight or to the employés in the usual course of business is sufficient. But where goods are transferred to carriers with instructions not to transport them until further notice, the extraordinary liability already considered does not attach in the mean time, and it is only necessary that the ordinary care which is obligatory upon warehousemen be exercised until carriage really commences. The responsibility terminates when the goods have reached their destination and been actually delivered. But if, upon the lapse of a reasonable time after arrival, they are not claimed and removed, the carrier's liability is not entirely ended, but only modified in degree. It is then his duty to store the property in a safe and secure warehouse to await the owner's demand, and he is only accountable thereafter for ordinary care. Important distinctions are drawn between various classes of carriers in reference to the proper mode of delivery. These are rendered necessary by the different kinds of transportation adopted in the several cases. Thus, express companies employ conveyances which can be readily sent from dwelling to dwelling, and they are consequently held bound to make actual personal delivery at the owner's place of business or residence. Carriers by water, on the other hand, can proceed no farther than the wharf. Hence, according to a well-settled usage clearly applicable to sea-going ships, no other delivery is demanded than can be made there; but the convenience of the consignee is still regarded, as far as practicable, by imposing upon the carrier the obligation, rendered necessary by the uncertain time of arrival, that notice be given when the vessel has reached her place of discharge of the cargo. In railway transportation, again, the circumstances are still different. The cars are confined to a given line, have a regular terminus, and trains are run uniformly in accordance with published time-tables. Hence, according to some authorities, personal delivery is so completely excused that not even notice of arrival is necessary. The better opinion seems to be that notice is required, and that the consignee has a reasonable time within which to take the goods before the strict liability of the carrier is modified into that of the warehouseman.

The purpose of these various regulations manifestly is, that the interests of both carrier and owner be promoted. The "reasonable time" after arrival during which the carrier's heavy responsibility as insurer is to continue will be most speedily terminated when the owner has immediate knowledge that the goods lie at his disposal.

There are instances, however, in which delivery is sufficient to discharge the carrier, though not made to the owner himself. This occurs when several parties are engaged successively in the transportation of the same articles. The liability of each, in the absence of special circumstances, terminates when the next undertakes the duty of carriage. At least, such is the doctrine upheld generally by the decisions of the American courts. In England, on the contrary, the rule is maintained that the first carrier who receives the goods, if he accepts them for a destination beyond his own route, continues liable until the entire journey is completed, and the subsequent parties, though the injury or loss may occur on their own lines of travel, are exempted from liability on the contract. This proceeds upon the notion that the contract for transportation is tacitly made with the first carrier. According to the prevailing opinion in the U. S., the cases in which these views should be followed are those in which the first carrier engages by special contract for the entire route. It should be added that there may be such a business connection between various parties concerned in continuous transportation as to make them all liable as partners for the entire transportation.

Questions of much importance arise as to how far a carrier's duty and responsibility may be modified by usage or custom, or by specific contract entered into with the owner, or by notice given him. It is well established that common usage, if uniform and reasonable, may be pleaded in justification of peculiar regulations adopted. Thus, the nature of the goods which will be received or the route which will be generally pursued may be determined in this manner.

But these common modes of reducing responsibility are comparatively insignificant in view of those qualifications established by contract or notice. The policy of allowing the carrier to so limit his liability has been much questioned, but the validity of such agreements is now generally recognized. Bills of lading and instruments of an analogous character, given by the carrier on accepting goods for transportation, contain almost invariably stipulations in regard to exemptions from loss by fire and other enumerated perils, and are regarded as constituting a contract between the carrier and shipper. In like manner, notice brought home to the knowledge of the owner of the goods and assented to by him will have in general the same effect. At this point there is a great practical difficulty. The question is, What will be sufficient evidence of assent on the owner's part to a notice? It is plain, at least, that the notice must be so given by the carrier as naturally to attract the attention of the shipper, and must be so precise and clear that he can readily acquaint himself with its contents. Assuming this to be so, *can the carrier shake off his extraordinary responsibility by notice?* It is now quite clear that he cannot. He may make in this manner reasonable regulations in the nature of by-laws, pointing out the articles that he will carry, or requiring a statement of their value, so as to know what care will be properly demanded of him, and what reasonable charge he should make. But when all this is done he cannot shake off his character of insurer by notice. To do this there must be a contract—some evidence of assent; and notice by the carrier is no evidence of assent by the shipper. He, by his silence, should fairly be assumed to insist on the carrier's common-law responsibility. The English courts held otherwise at one time, but the salutary doctrine here maintained is now substantially established in England by statute. Under its legislation the carrier may relieve himself to a considerable extent by notice, but cannot escape entirely the consequences of his own neglect or misconduct. The notice must not only be really or presumptively known to the owner of the goods, but must also be reasonable in its character.

Common Carriers of Passengers.—These are not held to as stringent a liability as carriers of goods. They are not made insurers of the passengers' safety, but are nevertheless required to use the utmost care, and are responsible for even the slightest negligence. The reason for this difference is, that they can have no such complete control over persons as over goods. Passengers must largely retain freedom of movement and self-direction. It is no more than just, therefore, that the carrier's duty should be

correspondingly modified. Extreme vigilance may be demanded, but not the duty of preventing injuries to which the passenger's own heedlessness may expose him. In accordance with this principle, injuries occurring from any defect in the construction of machinery or vehicles which proper care could have guarded against, or from their unskilful management, subject the carrier to responsibility. He is answerable for the acts of his agents, whether negligent or wilful, done within the scope of their employment. It is his duty to exclude lawless and disorderly persons from his conveyances, or, failing to do so, he may, according to some authorities, be held responsible for any violence they may perpetrate on the passengers.

When, however, the passenger's own negligence is the proximate cause of the injury, the carrier is not liable. Thus, if an attempt should be made to get upon a train while the cars were in motion, or a passenger's head or arm should be thrust from a window, and accidents occur in consequence, his own imprudence would be fatal to any claim for damages. This proposition leads to an important branch of the law termed "contributory negligence," which may be defined to be that negligence without which the injury would not have happened, while at the same time, on the part of the carrier, on being made aware of the passenger's negligence, there must be reasonable care used to avert its effects.

The common duties of passenger carriers are, to receive all who offer to take passage as long as their vehicles suffice, to carry them the entire route, to treat all with civility and propriety, and bring them to their destination within the stipulated time. They are not, however, compelled to receive persons of offensive or disorderly conduct, or any who by reason of disease or disgusting habits are unfit associates for the other passengers. Reasonable regulations may be adopted concerning the control of passengers, such as that fares must be paid in advance, tickets must be exhibited when called for, and the like. Expulsions of persons in a suitable manner and without unnecessary force from their vehicles for refusing to comply with such rules are considered justifiable.

The liability of passenger carriers for baggage committed to their charge is in general the same as that of common carriers of goods. In other words, they are held bound as insurers. If, however, the passenger prefers to retain exclusive control of his own property, as a coat, an umbrella, or a satchel, the carrier's responsibility is modified. The liability continues until delivery is made, either to the owner at the final destination or to another carrier in a continuous line of transit, and the duty of storing and preserving goods is the same that has been already detailed in the ordinary case of carriage of goods. The effect of contract or notice is also similar. The obligation to convey baggage arises independently of any special agreement in relation thereto, being considered as incidentally connected with the undertaking to carry the passenger himself, and no additional payment is necessary. But some measure of relief is granted to the carrier on account of this lack of remuneration by defining his accountability more narrowly. He is only liable for articles properly denominated baggage, and not for everything which the passenger may choose to consider such. Articles of necessity or personal convenience are reasonably included within the meaning of the term, but not merchandise or large sums of money or silver plate, and the like. For instance, jewelry used for personal ornament, a reasonable amount of money for travelling expenses, the instruments of a surgeon required in practice in the course of his journey, have all been considered "baggage," and the carrier made accountable for the loss. But the samples of a traveller acting for a commercial house would not be baggage, but merchandise, unless the carrier was made aware of their nature, and then without objection received them as baggage. The principle governing this matter is that concealment of the true nature of the package presented as baggage is a fraud on the carrier. All inference of fraud is dispelled if the contents be disclosed, and there is no objection to the carrier accepting merchandise in trunks if he see fit.

Appropriate remedies exist in favor of carriers. They may detain goods for the freight. They have an action against strangers who interfere with their possession, and may even recover the full value of the goods, holding the surplus above their charges in trust for the owner.

In this brief summary of the rights and duties of common carriers attempt has only been made to exhibit common-law provisions and principles. Statutory enactments exist in England and in various States relating to the subject, the details of which must be sought by reference to the acts themselves. In particular, the so-called English "Carriers' Act" may be referred to. (The subject is treated in much detail in such works as REDFIELD "On Railways," and ANGELL "On Common Carriers." The rules of damages will be found in SEDGWICK or MAYNE "On Damages.") T. W. DWIGHT.

Car'rion Flowers, a name given to the flowers of several species of *Stapelia,* the smell of which resembles that of carrion. They are natives of the Cape of Good Hope. The genus *Stapelia* belongs to the order Asclepiadaceæ, and is remarkable for an excessive development of the cellular tissue of the stem at the expense of the leaves.

Car'roll, a county of Arkansas, bordering on Missouri. Area, 700 square miles. It is drained by King's River and other small affluents of White River, which touches its N. E. extremity. The soil is fertile, producing excellent crops of grain. Tobacco and wool are also staple products. The timber and pasturage are unsurpassed. Fine variegated marble, iron, and lead ore are found here. Capital, Carrollton. Pop. 5780.

Carroll, a county of Georgia, bordering on Alabama. Area, 572 square miles. It is bounded on the S. E. by the Chattahoochee River. The surface is partly hilly. Grain, wool, and cotton are staple crops. Among the minerals found here are gold and granite. Capital, Carrollton. Pop. 11,782.

Carroll, a county of Illinois, bordering on Iowa. Area, 425 square miles. It is bounded on the W. by the Mississippi River. The surface is undulating; the soil is fertile. Lead is found here. A large portion of the county is prairie. Grain, cattle, and wool are largely produced. The most numerous manufactories are those of saddlery and harnesses. It is intersected by the Western Union R. R. Capital, Mount Carroll. Pop. 16,705.

Carroll, a county in N. W. Central Indiana. Area, 378 square miles. It is intersected by the Wabash River, and also drained by the Tippecanoe. The surface is nearly level; the soil is productive. Wheat, corn, wool, and dairy products are staple exports. Lumber and flour are manufactured. The Toledo Wabash and Western R. R. passes through it. Capital, Delphi. Pop. 16,152.

Carroll, a county in W. Central Iowa. Area, 576 square miles. It is drained by the Raccoon River and the Middle Coon. The soil is fertile. Grain and cattle are raised extensively. It is intersected by the railroad which extends from Cedar Rapids to the Missouri River. Capital, Carrollton. Pop. 2451.

Carroll, a county in the N. of Kentucky. Area, 200 square miles. It is bounded on the N. by the Ohio River, and intersected by the Kentucky River. The surface is mostly undulating; the soil is fertile. Wheat, corn, wool, and tobacco are the chief products. Limestone occurs here as a surface-rock. It is intersected by the Louisville Cincinnati and Lexington R. R. Capital, Carrollton. P. 6189.

Carroll, a parish which forms the N. E. extremity of Louisiana. Area, 1000 square miles. It is bounded on the E. by the Mississippi River and on the N. W. by Bœuf Bayou. The surface is nearly level; the soil produces cotton and maize. Capital, Lake Providence. Pop. 10,110.

Carroll, a county of Maryland, bordering on Pennsylvania. Area, 453 square miles. It is drained by the sources of the Patapsco and Gunpowder rivers. The surface is hilly; the soil is good. Tobacco, grain, and butter are extensively produced. It has manufactures of leather, metallic wares, flour, clothing, carriages, saddlery, etc. Soapstone quarries and iron and copper mines have been opened. It is intersected by the Western Maryland R. R. Capital, Westminster. Pop. 28,619.

Carroll, a county in N. W. Central Mississippi. Area, 900 square miles. It is bounded on the W. by the Tallahatchie and Yazoo rivers, and also drained by the Yallobusha. The soil is fertile. Corn and cotton are the chief crops. Cattle and wool are largely raised. It is intersected by the Mississippi Central R. R. Capital, Carrollton. P. 21,047.

Carroll, a county in N. W. Central Missouri. Area, 670 square miles. It is bounded on the E. by Grand River, and on the S. by the Missouri. The surface is partly undulating; the soil is fertile. Corn, tobacco, and dairy products are the staple crops. It contains prairies, with groves of oak, hickory, and other trees. Limestone abounds here. A branch of the St. Louis Kansas City and Northern R. R. passes through it. Capital, Carrollton. Pop. 17,446.

Carroll, a county in E. Central New Hampshire. Area, 500 square miles. It is partly bounded on the S. W. by Lake Winnipiseogee, and drained by the Ossipee and Saco rivers. The surface is hilly; the soil is productive. Grain, wool, and butter are the chief products. The manufacturing interests are varied. It is intersected by the Portland and Ogdensburg R. R. Capital, Ossipee. Pop. 17,332.

Carroll, a county in the E. of Ohio. Area, 360 square miles. It is drained by Conotten and Sandy creeks. The

surface is diversified by hills of moderate height; the soil is fertile. Wool, grain, and dairy products are extensively produced. Coal and iron ore abound in this county, which is traversed by a branch of the Cleveland and Pittsburg R. R. Capital, Carrollton. Pop. 14,491.

Carroll, a county of West Tennessee. Area, 625 square miles. It is intersected by the Big Sandy River, and also drained by the South Fork of the Obion. The surface is nearly level; the soil is very fertile. Cotton, corn, tobacco, and wool are staple products. It is traversed by the Nashville and North-western and Memphis and Louisville R. Rs. Capital, Huntingdon. Pop. 19,447.

Carroll, a county in the S. W. of Virginia. Area, 440 square miles. It is drained by the New River or Kanawha, and bounded on the S. E. by the Blue Ridge. The surface is hilly. Grain and wool are the chief products. Copper, lead, and iron are found here. Capital, Hillsville. Pop. 9147.

Carroll, a township of Ouachita co., Ark. Pop. 713.

Carroll, a township of Vermilion co., Ill. Pop. 2032.

Carroll, a post-village and township of Carroll co., Ia. It has one weekly newspaper. Pop. 384; of township, 578.

Carroll, a township of Tama co., Ia. Pop. 382.

Carroll, a post-township of Penobscot co., Me. P. 632.

Carroll, a township of Platte co., Mo. Pop. 2691.

Carroll, a township of Reynolds co., Mo. Pop. 605.

Carroll, a township of Texas co., Mo. Pop. 519.

Carroll, a post-township of Coos co., N. H. It has manufactures of lumber and starch, and is one of the principal places of resort in the White Mountain region. P. 378.

Carroll, a township of Chautauqua co., N. Y. It has manufactures of lumber. Pop. 1548.

Carroll, a post-village of Greenfield township, Fairfield co., O. Pop. 187.

Carroll, a township of Ottawa co., O. Pop. 1036.

Carroll, a township of Cambria co., Pa. Pop. 1780.

Carroll, a township of Perry co., Pa. Pop. 1425.

Carroll, a township of Washington co., Pa. Pop. 3178.

Carroll, a township of York co., Pa. Pop. 898.

Carroll, a township of Lincoln co., West Va. P. 1123.

Car'roll (Charles) **of Carrollton,** an American patriot, born at Annapolis, Md., Sept. 20, 1737. He inherited a large estate in land, and was regarded as the richest man in Maryland. He was chosen a delegate to the Continental Congress in 1776, and signed the Declaration of Independence. To distinguish himself from another man of the same name, he signed himself "Charles Carroll of Carrollton." He was elected to the Senate of the U. S. in 1788. He was of the Roman Catholic faith, and was a man of great dignity and worth. He was a lawyer by profession, educated in France and England, and was especially honored as the last survivor of the signers of the Declaration of Independence. Died Nov. 4, 1832.

Carroll (John), D. D., LL.D., first Roman Catholic bishop of the U. S., and cousin of the preceding, born Jan. 8, 1735, at Upper Marlborough, Md., became in 1773 professor at Bruges, in Belgium. In 1786 he was, at the instance of Franklin, appointed vicar-general, and in 1790 he was consecrated as bishop of Baltimore. In 1791 he founded St. Mary's College. A few years before his death he was raised to the archiepiscopacy. Died Dec. 3, 1815.

Car'rollton, a post-village, capital of Pickens co., Ala., on Lubbub Creek, 172 miles W. N. W. of Montgomery. It has one weekly newspaper. Pop. of Carrollton township, 1841.

Carrollton, a township of Boone co., Ark. Pop. 577.

Carrollton, a post-village in a township of the same name, capital of Carroll co., Ark., on Long Creek, 125 miles N. N. W. of Little Rock. Pop. of township, 808.

Carrollton, a post-village, capital of Carroll co., Ga., is on the Little Tallapoosa River, about 50 miles W. S. W. of Atlanta, at the intersection of three railroads, one recently completed. It has two schools and one weekly newspaper.

Edwin R. Sharpe,
Ed. "Carroll County Times."

Carrollton, a city, capital of Greene co., Ill., on the Chicago and Alton R. R., 34 miles N. N. W. of Alton. It has a fine public-school building, an academy, seven churches, two newspapers, a library association, and various manufacturing industries. It has two weekly newspapers. Pop. of township, 2760.

G. B. Price's Sons, Pubs. "Carrollton Gazette."

Carrollton, a township of Carroll co., Ind. Pop. 1046.

Carrollton, a post-village, capital of Carroll co., Ia., is on the Middle Coon (or Raccoon) River, about 70 miles W. N. W. of Des Moines. Pop. 384.

Carrollton, a post-village, capital of Carroll co., Ky., on the Ohio River, at the mouth of the Kentucky River, 62 miles above Louisville, manufactures cloth, flour, etc. It has five churches and a newspaper. Pop. 1098.

Ed. Carrollton "Democrat."

Carrollton, a city in Jefferson parish, La., on the left bank of the Mississippi River, above and adjoining New Orleans. It contains the court-house and public buildings of Jefferson parish, and is connected with the centre of New Orleans by street-cars, which start every three minutes. Here are public gardens which attract many visitors. It has one weekly newspaper. Pop. of ward, 6495.

Amos S. Collins, Ed. "Louisiana State Register."

Carrollton, a post-township of Saginaw co., Mich. Pop. 1564.

Carrollton, a post-township of Fillmore co., Minn. Pop. 1646.

Carrollton, a post-village, capital of Carroll co., Miss., will be soon connected with the Mississippi by a railroad. It has one weekly newspaper. Pop. 377.

P. W. Robertson, Ed. "Mississippi Conservative."

Carrollton, a post-village, capital of Carroll co., Mo., on the St. Louis Kansas City and Northern R. R., 207 miles N. W. of St. Louis and 66 miles E. N. E. of Kansas City. It contains nine churches, a school-house built at a cost of $40,000, two banks, two flour-mills, a woollen factory, and two weekly newspapers. Pop. 1832.

Jos. H. Turner, Ed. "Wakanda Record."

Carrollton, a township of Cattaraugus co., N. Y., has manufactures of leather and lumber and an oil-well. Pop. 1142.

Carrollton, a post-village, capital of Carroll co., O., is about 125 miles E. N. E. of Columbus. A branch railroad, twelve and a half miles long, extends from this place to Oneida, which is on a branch of the Cleveland and Pittsburg R. R., and the Ohio and Toledo R. R. is being built through it. It has two weekly newspapers. Pop. 813.

J. V. Lawler, Pub. Carroll County "Chronicle."

Car'rolltown, a post-borough of Cambria co., Pa. Pop. 416.

Carronade, a short iron cannon for naval service, invented by Mr. Gascoigne, and named after the Carron Iron-works in Scotland, where it was first made. It is lighter than the ordinary guns, and has a chamber for powder like a mortar. Carronades are now little used, and are nearly obsolete. In the war of 1812 the carronades of the American navy did excellent service. They have a short range, and are only suitable for fighting at close quarters.

Car'ron Brook, a post-village of Hibbert township, Perth co., Ontario (Canada), on the Buffalo and Goderich branch of the Grand Trunk Railway. It has various manufactures, of which the most important is that of salt from salt-wells. There is one weekly paper. Pop. about 1000.

Carron Oil, a mixture of lime-water and oil, useful as an application to burns. It was named from the Carron Iron-works, where it has been much used.

Car'rot (*Daucus*), a genus of plants of the order Umbelliferæ. The common carrot (*Daucus carota*) is a biennial plant, a native of the East, but naturalized both in Europe and America. Its leaves are pinnately compound; the flowers creamy white. The root of the cultivated plant is much thicker and more agreeable to the taste than the wild. It is largely given to cattle, for which, as well as for men, it is a wholesome and moderately nutritious article of food. The plant has some beauty, its leaves having been, during the reign of Charles I., worn in England by ladies instead of feathers. The root is sometimes used for poultices.

Carrou'sel, a knightly exercise, in imitation of the tournament, common in Europe until the beginning of the eighteenth century. It consisted in contests of skill, in horsemanship, and in the use of the sword, lance, or other weapon. The Place du Carrousel in Paris was named from a fête of this kind held in honor of Mademoiselle de la Vallière in 1662. The Eglinton tournament, so called, at Eglinton Castle, in Scotland, in 1839, was really a carrousel.

Car'ryall, a post-township of Paulding co., O. Pop. 1087.

Carse, a term applied in Scotland to low alluvial land adjacent to rivers. In Perthshire it is extended to the whole of the slightly undulating land on the north of the Tay, which is called the Carse of Gowrie. Carse soils usually consist of argillaceous deposits, which produce crops of great luxuriance, but in some cases they are rather sterile.

Car'son (Alexander), LL.D., of Tubbermore, descend-

ed from the Covenanters who sought the same kind of an asylum in North Ireland as the Puritans found in North America. Probably the world has had no grander type of men than those produced by colonizing Scots in Ireland; and perhaps of all the men that grew from this rugged grafting, no one was a more characteristic scion than Alexander Carson. He was born in 1776, in county Tyrone, Ireland. His father and mother were Presbyterians, and in his youth they set him apart for the ministry, and gave him his education at the University of Glasgow. Here he was *facile princeps*. He paid especial attention to Greek, and drove his studies in all departments so hard that his firm constitution seemed ready to sink. His tremendous power of concentration was fully shown in his college life, and was of the highest service in all his life's work. He became pastor of the Presbyterian church in Tubbermore when he was in his twenty-second year. In the same year he was married to the companion of his life, Margaret Ledlie. The Unitarian controversy which shook the Presbyterian churches in North Ireland during the early part of this century was to him a cause of great mental anguish. The prevailing worldliness and evil practices of many members of the synod of Ulster constrained him at last to say that all the wealth of the Indies could not induce him to celebrate another communion service when he must share in the responsibility of such doctrines and practices. About the year 1805 he drew up his "Reasons for Separating from the Synod of Ulster." In this he argues for the independence of each church from all others. Thus he became a Congregationalist, or an Independent, as the term is used in Great Britain. In doing this he resigned all the earthly support he had. The majority of his congregation clave to him, and the law decided that the church property should be theirs, but as they could not retain it without strife, he gave it up, and "preached for many years in cold, incommodious barns, and often in the open fields." Afterwards a rude stone building was raised in the village of Tubbermore. Its interior was neither painted nor plastered, and the seats were hard benches. Here he preached for thirty years. Not long after his views on church government were changed, one of the Baptist missionaries supported by the Haldanes of Scotland came over to the north of Ireland, and Carson's congregation were much troubled in mind by the new-comer. The pastor attempted to confute the Baptists, but after a month spent in prayer, reading the New Testament, and ransacking the Greek language, he burned his manuscripts and proclaimed himself a Baptist. He devoted all his scholarship and much of his time to enforcing the views of the Baptists.

His preaching was entirely expository. During his long ministry in Tubbermore he expounded the entire Scriptures, and was well on his way through them a second time when death silenced him. His custom was to take a chapter in course, in the Old Testament, for his morning discourse, and a verse or two of the New Testament, in course, for the afternoon. He was scrupulous to observe whatever was ordained by Christ and the apostles and practised in the Church, including the ceremony of the kiss of holiness and love. The singing of his great congregation was of the most artless kind. A few of the old minor tunes and the Scotch metrical Psalms, with Watts' and some other hymns, was the whole apparatus from year to year. He taught that the ordinance of the Lord's Supper should be observed every Lord's Day, and the church, in common with nearly all the Baptist churches in Ireland, so practised. It is said that the salary he received from the church did not average more than thirty pounds a year. He sustained his large family chiefly by farming, teaching, and whatever he realized from time to time by the sale of his books. He was a wonder to many, in that he was able to educate his sons and provide for his daughters. He had thirteen children. Many of his congregation came many miles every Lord's Day to hear him. Old women there were who walked, on going and returning, distances varying from five to twenty miles. In the doctrines of the gospel Dr. Carson held the very highest ground. He maintained the federal headship of Christ, the actual imputation of his righteousness to the redeemed, and the actual imputation of their sins to the atoning Saviour. He believed and maintained the verbal inspiration of the Scriptures; that the atonement of Christ was made for his Church only; that man is entirely powerless to do good, yet entirely responsible for sin; that the gospel is to be preached to all; and that the sinner's guilt is increased by rejecting it. There were five great subjects which chiefly occupied his pen: the mode and subjects of baptism, the Godhead of Jesus Christ, the Romish controversy, the inspiration of the Scriptures, the harmony of God's attributes in the gospel, and the wonders of God's providence towards his Church. He was most diligent in the use of his time, and testified of himself that he had scarcely ever lost an hour. He had such a power of abstraction that he wrote some of his profoundest treatises while his children were climbing over his chair. His style of writing is remarkable. His sentences are short, and of the simplest possible construction. He was a reasoner who would as soon be guilty of a larceny as of an intentional fallacy. He very rarely attempted anything like fine writing, but sometimes a few words are so used as to produce a sublime effect. He preached always entirely without notes. His eloquence has been described as "volcanic." He threw such light upon the most recondite parts even of the Old Testament that there grew up under his ministry a multitude of people unlearned in everything else, but mighty in the Scriptures. So rapt was his auditory in his discourses that many times they half rose from their seats. The common people thronged to hear a man who hardly ever spoke a word they could not understand, and yet who dealt with the deepest things that can busy the mind of man. In unfolding the glory of the gospel his face absolutely shone; he seemed to be caught up to heaven, and to be ministering between a living God and a dying world.

In person, Dr. Carson was well fitted for his laborious life. He was of middle height, broad-shouldered, deep-chested, stout-limbed. His eye was clear and piercing, his features of a noble Roman cast, and when he died, nearly seventy years old, he had scarcely a gray hair. His voice was very powerful, and so tireless that four hours of almost continuous exercise did not weary it, week after week. His delivery was lively and natural. Those who only knew him from his controversial writings, thought of him as a fiery and unrelenting polemic, and indeed he treated any thing like a weak argument without mercy; yet in private life he was gentle and kindly, without a tincture of pride or vanity. His Christian character was remarkable. He prayed like a little child. His spirit may be judged from the words with which he closed his essay on the "Doctrine of the Trinity:" "Lord Jesus, I own thee before men—deny me not before thy Father and the holy angels!" He resolved at one time to come to America, but after his preparations were well advanced his congregation were so apparently broken-hearted at the thought of his leaving them that, to use one of the beautiful, homely idioms of the north of Ireland, "he could not find it in his heart to leave them."

He died in Belfast in 1844; his death was the result of a fall into the water from a steamer's plank. He was making way for a lady to go aboard, and lost his balance; he was rescued, but somewhat injured, and a fever ensued, which in a few days ended his life. He was a man of rare and saintly self-denial, of zeal that was bounded only by strength, of learning vast and varied, of logic keen to divide between truth and error, and of singleness of purpose to know nothing but Christ crucified. And this man lived for thirty years the pastor of a humble village church in Ireland, and desired no title among men but that of "minister of the gospel!"

THOMAS ARMITAGE.

Carson (CHRISTOPHER), an American trapper, commonly called KIT CARSON, was born in Kentucky Dec. 24, 1809. He served as a guide to Fremont in his Rocky Mountain explorations. He was an officer in the U. S. service in both the Mexican war and the great civil war. In the latter he received a brevet of brigadier-general. Died May 23, 1868.

Carson City, the capital of the State of Nevada and county-seat of Ormsby co., is situated near the E. base of the Sierra Nevada, about 3 miles W. of Carson River and 15 miles S. S. W. of Virginia City. It is surrounded by grand and picturesque scenery, and is about 10 miles E. of Lake Tahoe. Here are rich silver-mines, which in 1864 yielded $1,994,884. It has one daily paper. Pop. of the township, 3042.

Carson Lake, a township of Mississippi co., Ark. Pop. 74.

Carson River, Nevada, rises in the Sierra Nevada, flows nearly north-eastward, passes through Ormsby and Lyon counties, and enters Carson Lake in Churchill county. Length, estimated at 150 miles. Carson Lake has no outlet, and is about 15 miles long.

Car'stairs, or **Carstares** (WILLIAM), a Scottish negotiator distinguished for learning and sagacity, was born near Glasgow Feb. 11, 1649. He became chaplain to William, prince of Orange, who trusted him as a confidential adviser in affairs relating to Great Britain. Having been sent to England in 1682 as the secret agent of William of Orange, he was arrested as an accomplice in the Rye-House plot, and was put to the torture, which could not extort from him any confession, although he was the depository of important secrets. After the accession of William to the throne, Carstairs had great influence in Scottish affairs, and was five times chosen moderator of the General Assembly. He became minister of Gray Friars' Church, Edinburgh, in 1704. Died Dec. 28, 1715. His virtues and abilities are

highly extolled by Macaulay. (See McCormick, "Life of W. Carstairs," 1774.)

Car'stens (Asmus Jakob), a German painter, born May 10, 1754, at St. Jürgen, Sleswick, the son of a poor miller, travelled on foot to Rome to study art. His great drawing, "The Fall of the Angels," procured him a professorship at the Berlin Academy of Arts. He took the lead in reforming taste in Germany, but painted few pictures. His drawings have been engraved by Müller, 43 plates, 1869. Died May 25, 1798.

Cart. See Carriages, etc., by L. P. Brockett, M. D.

Cartage'na, a city and fortified seaport of Spain, is in the province of Murcia and on a bay of the Mediterranean, 27 miles S. S. E. of Murcia; lat. 37° 36′ N., lon. 1° 1′ W. It occupies the declivity of a hill, and a small plain which is between the hill and the sea. The harbor, which is one of the best in the Mediterranean, is capacious enough to hold the largest fleets, and is protected from winds by highlands which enclose it on several sides. The entrance to the harbor is defended by a fortified island. Cartagena was formerly the chief naval arsenal of Spain, and had a population of 60,000, but its importance has declined. It has a Moorish cathedral, numerous churches and convents, a theatre, and an observatory; also manufactures of sailcloth and glass. Red marble is abundant here, and is used for building. Mines of silver and lead have been opened in the vicinity. Pop. 54,315. The ancient *Carthago Nova* was founded by Hasdrubal in 242 B. C. (See Carthago Nova.)

Cartage'na, written also **Carthagena,** a fortified city and seaport of the United States of Colombia, in South America, the capital of the state of Bolivar, is on the Caribbean Sea, about 275 miles E. N. E. of Panamá; lat. 10° 25′ 36″ N., lon. 75° 38′ W. It was founded in 1532, and was formerly the chief mart of New Granada and Central America, with over 25,000 inhabitants. It stands on a sandy peninsula, is well built, and has well-paved streets. The houses are mostly stone, and two stories high. It contains numerous churches, some of which are said to be splendid, several convents, a theatre, and a college. The climate is very hot, damp, and unhealthy. Cartagena has a good landlocked harbor. Sugar, coffee, tobacco, hides, and bullion are exported from this place. Pop. estimated at 9000.

Carta'go, a town of Central America, the former capital of Costa Rica, one of the oldest cities in Central America, having in 1823 over 37,000 inhabitants, is about 20 miles E. of San José. It once contained eight churches and about 3000 houses, but it was ruined by an earthquake in Sept., 1841, which is said to have destroyed seven churches and 2900 houses. Present pop. estimated at from 3000 to 5000. Near this place is Mount Cartago, 11,480 feet high.

Cartago, a town of the United States of Colombia, in the state of Cauca, and on the river Cauca, about 135 miles W. of Bogotá. It has a cathedral, and a trade in coffee, cacao, dried beef, tobacco, etc. Pop. 7000.

Carte, a French word, signifies a "card," a "ticket," a "map," a "chart." *Carte blanche* (literally, "white card") is a blank paper signed by a person and given to another, that he may prescribe or insert such conditions as he pleases.

Carte (Thomas), an English historian, born at Clifton in April, 1686. He became a priest and Jacobite. During the rebellion of 1715 a large reward was offered for his arrest, but he escaped to France. His chief work is a "History of England" (4 vols., 1747–55), which is prized for its facts, but is not well written. Many volumes of his manuscripts are preserved in the Bodleian Library at Oxford. Died April 2, 1754.

Car'tel, an Anglicised French word which in France signifies a "challenge." As a military term it is used to denote an agreement between two belligerents for the exchange of prisoners. A vessel used in exchanging prisoners or carrying proposals to an enemy is called a cartel-ship.

Car'ter, a county in the N. E. of Kentucky. Area, 550 square miles. It is intersected by the Little Sandy River. The surface is hilly. Iron ore and coal are found here. Indian corn is the chief agricultural product. Capital, Grayson. Pop. 7509.

Carter, a county in the S. E. of Missouri. Area, 500 square miles. It is intersected by the Current River. The surface is diversified by hills and valleys. It contains mines of copper and quarries of limestone. Corn, wool, and tobacco are the chief products. Capital, Van Buren. Pop. 1455.

Carter, a county of Tennessee, bordering on North Carolina. Area, 350 square miles. It is intersected by Watauga River, and bounded on the S. E. by the Iron Mountain. The surface is mountainous. Corn, wool, oats, and wheat are raised. Iron abounds here. Capital, Elizabethtown. Pop. 7909.

Carter, a township of Ashley co., Ark. Pop. 960.

Carter, a township of Spencer co., Ind. Pop. 1420.

Carter, a township of Carter co., Mo. Pop. 760.

Carter, an important military and commercial point on the Union Pacific R. R., in Uintah co., Wy. Ter., 53 miles N. E. of Evanston, has a large warehouse for the Montana trade.

Carter (Elizabeth), a learned English authoress, born at Deal, in Kent, Dec. 16, 1717, was a friend of Dr. Johnson. She was a good classical scholar, and gained a wide reputation by a translation of Epictetus from the Greek (1758), which, according to Warton, is better than the original. She wrote two numbers of Johnson's "Rambler" (Nos. 44 and 100) and a number of poems, among which is an "Ode to Wisdom" (1746). Died Feb. 19, 1806.

Carter (James Gordon), an American educator, born at Leominster, Mass., Sept. 7, 1795, and graduated at Harvard in 1820. He was chairman of the committee on education in the legislature of Massachusetts, and drafted the bill which appointed the Massachusetts board of education. He became chairman of that board. Died July 22, 1849.

Carter (Nathaniel Hazeltine), an American author, born at Concord, N. H., Sept. 17, 1787, and graduated at Dartmouth in 1811. In 1820 he became editor of the "New York Statesman." He afterwards published "Letters from Europe," in two volumes. Died at Marseilles Jan. 2, 1830.

Carter (S. P.), U. S. N., born Aug. 6, 1819, in Carter co., Tenn., entered the navy as a midshipman Feb. 14, 1840, became a passed midshipman in 1846, a lieutenant in 1855, a lieutenant-commander in 1862, a commander in 1865, and a captain in 1870. He served on the E. coast of Mexico during the Mexican war. While attached to the steamer San Jacinto in 1856 he participated in the attack on the Barrier Forts at the mouth of the Canton River, China, which resulted in their capture. In July, 1861, Carter was ordered to report to the secretary of war for duty, and proceeded at once to East Tennessee, where he organized the Tennessee brigade. He was now appointed a brigadier-general of volunteers, and continued on active duty with the army during the entire war, doing most important and gallant service in Tennessee, Kentucky, Virginia, and North Carolina, and receiving the brevet of major-general "for gallant and distinguished services."

Foxhall A. Parker, U. S. N.

Car'teret, a county in the S. E. of North Carolina. Area, 450 square miles. It is bounded on the E. and S. by the Atlantic Ocean. The surface is level, and partly covered with pine forests. Indian corn is the principal crop. It is intersected by the Atlantic and North Carolina R. R. Capital, Beaufort. Pop. 9010.

Carteret (Philip), an English navigator who took part in the expedition to the South Sea commanded by Wallis, in 1766. He discovered a number of small islands, one of which he called by his own name.

Carter's Crossing, a township of Sumter co., S. C. Pop. 947.

Car'tersville, a post-village, capital of Bartow co., Ga., is on the Western and Atlantic R. R., 48 miles N. N. W. of Atlanta. Gold, copper, and other minerals are found in this vicinity. It has one weekly newspaper. Pop. 2232.

Carte'sian Philos'ophy, the name of the system of philosophy brought forward by Réné Descartes (1596–1650), one of the most original thinkers of France or of any country. The scholastic philosophy which had prevailed in the Middle Ages, though based upon the teachings of Aristotle, had so far departed from the spirit of its great master as to have become almost vain and fruitless. What Descartes and his contemporary, Bacon, did, was, each in his own way, to help arouse a spirit of independent research in philosophy and in science. It must not be forgotten, however, that the independence of Bacon and Descartes was a result as well as a cause of this new spirit. The new current had begun to flow before their day, but they each contributed largely to swell that current.

Descartes proposed as a basis for his system, and as a ground for all knowledge, the act of conscious thought, as necessarily involving the idea of existence. His celebrated dictum, "*Ego cogito, ergo sum*"—*i. e.* "I think, therefore I exist"—is the starting-point of his philosophy. And although the dictum itself has been severely criticised, it may be fairly questioned whether the fault be not in the expression rather than in the thought intended to be expressed, and whether the appeal to our consciousness be not indeed the ultimate ground of philosophy. Those writers who deny the validity of the testimony of consciousness are nevertheless continually appealing to the same testimony when it serves their purpose. Descartes was a firm believer in the

existence of a personal God, and attributed all the phenomena of nature to the continual and actual presence of an all-pervading Deity.

The ultimate conclusions reached by Descartes need not be stated here. Founded to some extent upon unwarranted hypotheses, many of his opinions are now known to have been fallacious. But the great value of his philosophy has been in the grand stimulus of thought which it has given to others. Spinoza, Malebranche, and even the modern German philosophers, are confessedly much indebted to him.

Carte'sians [from *Cartesius*, the Latin name of DESCARTES], the name given to the disciples of Descartes, or to those who adopted his system of philosophy. In the seventeenth century nearly all the philosophers of France were ranged under two parties, Cartesians and Gassendists.

Car'thage [Gr. ἡ Καρχηδών; Lat. *Carthago*], an ancient and celebrated commercial city of Africa, and the capital of the republic of Carthage, was a Phœnician colony founded by emigrants from Tyre about 850 B. C. It was situated on a bay of the Mediterranean about 20 miles S. of Utica, and near the site of the modern town of Tunis. Lat. about 36° 47′ N., lon. 10° 6′ E. The Punic or native name of Carthage is said to have been *Carthada* or *Karth Hadtha*. According to a tradition which has been immortalized by the genius of Virgil, it was founded by Dido, a sister of Pygmalion, king of Tyre, and she purchased of the natives the site of the new city. Ancient authorities concur in affirming that it was founded many years later than Utica, which was also a Phœnician colony. No record of the early history of Carthage has been preserved. "This great city," says P. Smith, "furnishes the most striking example in the annals of the world of a mighty power which, having long ruled over subject peoples, taught them the arts of commerce and civilization, and created for itself an imperishable name, has left little more than that name behind it, and even that in the keeping of the very enemies to whom she at last succumbed. Vast as is the space which her fame fills in ancient history, the details of her origin, her rise, her constitution, commerce, arts, and religion, are all but unknown. Of her native literature we have barely the scantiest fragments left. The treasures of her libraries were disdained by the blind hatred of the Roman aristocracy, who made them a present to the princes of Numidia, reserving only the thirty-two books of Mago on agriculture for translation, as all that could be useful to the republic." Our information respecting the Carthaginians is derived mostly from Roman historians, who were deficient in impartiality, and from Polybius, who has preserved some genuine Punic documents.

Carthage seems to have been almost from its foundation independent of Tyre, but friendly relations were maintained between the colony and the metropolis, and the religious supremacy of the latter was recognized by an annual offering to the temple of Hercules at Tyre of a tithe of all the revenues of Carthage. The Carthaginians gradually acquired a dominion over the other Phœnician colonies of Northern Africa, and also over the Libyans and Numidians or nomadic tribes who occupied this region before the foundation of Carthage. This city became one of the greatest commercial emporiums of the world before the first Punic war. During the period of her greatest prosperity, Carthage was probably the greatest maritime power in the world. The population of the city amounted to about 700,000 in 150 B. C. The Carthaginian (or Punic) language resembled the Hebrew, and belonged to the Semitic or Aramaic family. The government was a republic or an oligarchy, in relation to which our information is very scanty.

A condensed summary of all that is known on this subject is given by Grote, from which we extract the chief points: "Respecting the political constitution of Carthage, the facts known are too few and too indistinct to enable us to comprehend its real working. The magistrates most conspicuous in rank and precedence were two kings or *suffetes*, who presided over the senate. They seem to have been renewed annually, though how far the same persons were re-eligible we do not know; but they were always selected out of some few principal families or *gentes*. There is reason for believing that the genuine Carthaginian citizens were distributed into three tribes, thirty curiæ, and 300 gentes. From these gentes emanated a senate of 300, out of which, again, was formed a smaller council or committee of thirty *principes*, representing the *curiæ*. . . . The purposes of government were determined, its powers wielded, and the great offices held—suffetes, senators, generals, or judges—by the members of a small number of wealthy families. In the main, the government was conducted with skill and steadiness, as well for internal tranquillity as for systematic foreign and commercial aggrandizement. Within the knowledge of Aristotle, Carthage had never suffered either the successful usurpation of a despot or any violent intestine commotion."

At a period little later than her first distinct appearance on the stage of recorded history, Carthage possessed an imperial authority, in a greater or less degree, over the northern coast of Africa from the Pillars of Hercules to the Great Syrtis, a distance of about 16,000 stadia (2000 miles). But the only part of this extensive territory that was entirely subject to the dominion of Carthage was the country which extended S. of the city about ninety miles, and the boundaries of which were nearly the same as those of Zeugitana, and the strip of coast along which lay Byzacium and Emporia. Like other great commercial states, Carthage found that her maritime enterprise led her on almost inevitably to engage in foreign conquests and to contend for the dominion of the sea. The first foreign province that she acquired appears to have been the island of Sardinia, which belonged to Carthage at the time of her first treaty with Rome, 509 B. C. This island was the principal emporium of her trade with Western Europe, and always ranked as the chief among her foreign possessions. Among the earliest objects of the military enterprise of the Carthaginians was Sicily, then occupied by several Greek colonies. For the conquest of this island they sent a fleet of 3000 ships, with an army of 300,000 men, commanded by Hamilcar. He was defeated by Gelon, tyrant of Syracuse, at Himera, in 480 B. C., and was killed in this action, which was one of "the decisive battles of the world," and was important in a degree which no contemporary could estimate. The Carthaginians in 410 B. C. renewed the war against the Greeks of Sicily, and obtained possession of part of that island, where they were involved in a long contest with Dionysius of Syracuse. They planted colonies in Hispania (Spain), and derived much riches from the gold and silver mines of that peninsnla, but their relations with the natives were peaceful, and they did not attempt to subjugate Spain before the Punic wars. Polybius states that all the islands of the Western Mediterranean belonged to Carthage at the commencement of the Punic wars, 264 B. C. In 509 B. C. a commercial treaty was concluded between Carthage and Rome. This celebrated document has been preserved by Polybius. The second treaty between these two powers was made in 348 B. C. It appears that the Carthaginians never came into hostile contact with the Athenian republic, although the latter was a great maritime power while Carthage was near the zenith of her prosperity.

The army of Carthage was composed chiefly of Libyan conscripts and slaves and foreign mercenaries. This defect in her military system was probably one of the chief causes of her ruin. This system could not afford the republic internal security, for the soldiers had little devotion to the cause for which they fought, and the enemies of Carthage found it their best policy to "carry the war into Africa." It would be an error to regard the Carthaginians as a merely commercial people. Agriculture was a favorite pursuit of the nobles, citizens, and colonists, and the soil of her African territory was extremely fertile. Her prosperity was also promoted by manufactures and mechanical arts. Gold and silver were the standard of value at Carthage, but we have no evidence that the republic coined money, as no Punic coins are now extant which were struck before the Romans conquered that state. Her merchantships passed beyond the Pillars of Hercules and made voyages to the British Islands. The Carthaginians also carried on an extensive inland trade by caravans, which traversed the deserts to the valleys of the Nile and Niger.

Carthage and Rome were the two greatest powers of the world when their competition for the rich island of Sicily involved them in the first Punic war, 264 B. C. The Romans, who had no navy when the war began, suffered several defeats at sea, and one of their generals, Marcus Regulus, who invaded Africa, was taken prisoner. They gained a great naval victory near Lilybœum in 241 B. C., which ended the war. The Carthaginians obtained peace by ceding Sicily and Sardinia to the victors. Carthage was so impoverished by this long war that she could not pay her armies. The mercenaries revolted in 240 B. C., and were joined by most of the subject Libyans in a civil war which brought Carthage to the brink of ruin. After the suppression of this revolt the peace and stability of the state were menaced by a feud between Hanno and Hamilcar Barca, who became respectively the leaders of the aristocratic and democratic parties. The great abilities and sagacity of Hamilcar restored the prosperity of the republic by the conquest of Spain, which, says Heeren, "was then the richest country of the known world." He invaded Spain in 237 B. C., and gained several victories, but he subdued the Spaniards by kindness rather than force. Before he had conquered all the Peninsula he died in 229, leaving the completion of the enterprise to his son-

in-law, Hasdrubal, and his own son, the famous Hannibal. The latter succeeded to the chief command of the army in Spain in 221 B. C. His conquests provoked the hostility of the Romans, and he began the second Punic war by marching across the Alps and invading Italy in 218 B. C. After he had defeated the Romans at several places in Northern Italy, he gained a most signal and complete victory at the great battle of Cannæ in the summer of 216 B. C. The second Punic war seems to have been conducted by Hannibal rather than the state, from which he received little aid or co-operation. By his military genius and personal resources he maintained himself in Italy for about fifteen years. (For the details of this war, which was ended by the victory of the Roman general Scipio at Zama in 202 B. C., the reader is referred to the article HANNIBAL.) The treaty which the victors dictated in 201 B. C. deprived Carthage of all her dominions outside of Africa. Hannibal, who soon obtained the ascendency in Carthage, made important reforms, which reduced the power of the aristocracy and the judges, but he was driven into exile by a hostile faction in 195 B. C. The Romans, who resolved to destroy Carthage, found a pretext to commence the third Punic war in 150 B. C. The Carthaginians made an heroic and desperate resistance, but their capital was taken and utterly ruined in 146 B. C. On the commanding site of the Punic Carthage the emperor Augustus founded a Roman town, which was also called Carthage, and became a very rich and populous city. Herodian states that in his time it was next to Rome in population and wealth. In 439 A. D. it was taken by Genseric, who made it the capital of the Vandal kingdom in Africa. It was captured and finally destroyed by the Arabs in 647 A. D. Few vestiges of its ancient grandeur remain to indicate its site, except some broken arches of a great aqueduct which was fifty miles long. (See ARNOLD, "History of Rome," vol. ii.; HEEREN, "Historical Researches into the Politics, Commerce, etc. of the Ancient Nations of Africa," 1824; BÖTTIGER, "Geschichte der Carthager," 1827; MÜNTER, "Religion der Karthager," 1821.) WILLIAM JACOBS.

Car'thage, a post-township of Hale co., Ala. P. 960.

Carthage, a post-village, capital of Hancock co., Ill., is at the crossing of the Keokuk branch of the Toledo Wabash and Western R. R. and the Burlington and Quincy R. R., 13 miles E. of Keokuk. It has one national bank, seven churches, one academy, and two newspapers. Pop. 1448; of Carthage township, 2448.

THOS. C. SHARPE, ED. CARTHAGE "GAZETTE."

Carthage, a post-village of Ripley township, Rush co., Ind. Pop. 481.

Carthage, a township of Franklin co., Me. Pop. 486.

Carthage, a small town, capital of Leake co., Miss., is about 60 miles N. E. of Jackson, and is on the line of the Natchez Jackson and Columbus R. R., which is now in course of construction. It has one weekly newspaper.

L. M. GARRETT, ED. OF "THE CARTHAGINIAN."

Carthage, a city, capital of Jasper co., Mo., on Spring River and on the line of the Memphis Carthage and Northwest R. R., situated in the centre of the rich lead-regions of South-west Missouri, with numerous manufactories, an academy, two public schools, two parks, a public library, and one national bank. Four newspapers are published in this place. On the morning of July 5, 1861, a force of Confederates under Gov. Jackson and Gen. Price, numbering about 3500 men, while retreating from the army of Gen. Lyon, were confronted about 7 miles E. of this town by a body of Federal troops under Gen. Sigel, numbering about 1500. Gen. Sigel was superior in artillery, while the Confederates, largely outnumbering him, had the advantage also of a body of cavalry. Gen. Sigel, availing himself of his superior strength, opened fire with his artillery, which he continued, to the severe loss of the Confederates, for several hours, when, to avoid being outflanked by the Confederate cavalry, and to protect his baggage-train, he was obliged to fall back, which he accomplished in good order, continuing his retreat to Carthage and to Sarcoxie, 15 miles eastward. The Federal loss was less than 50 killed and wounded, while the Confederate loss was reported to be 50 killed and about 150 wounded.

J. A. BODENHAMER, ED. "PEOPLE'S PRESS."

Carthage, a post-village of Wilna and (West Carthage) of Champion townships, Jefferson co., N. Y., on the Utica and Black River R. R., and on Black River and its canal, 23 miles by rail E. of Watertown. It has extensive water-power, lumber-mills, forges, foundries, and manufactories of nails, machinery, leather, furniture, wooden-ware, etc., and has also a bank, a weekly newspaper, and seven churches.

Carthage, a post-village, capital of Moore co., N. C., about 60 miles S. W. of Raleigh. Pop. of Carthage township, 1786.

Carthage, a township of Athens co., O. Pop. 1272.

Carthage, a post-village, capital of Smith co., Tenn., is on the Cumberland River, 50 miles by land E. N. E. of Nashville. Pop. 477.

Carthage, a post-village, capital of Panola co., Tex., about 45 miles S. of Jefferson.

Cartha'go No'va [the Lat. for "New Carthage"], an ancient and celebrated city of Hispania (Spain), on the Mediterranean, was founded by Hasdrubal in 242 B. C. It had an excellent harbor, and became a great commercial city of the Carthaginians. It also derived much prosperity from its rich silver-mines, in which 40,000 men are said to have been employed, In 210 B. C. it was captured by Scipio Africanus. Strabo informs us that it was in his time a great emporium of exports and imports. It was destroyed by the Goths before 550 A. D. The site is occupied by CARTAGENA (which see).

Car'thamine, a dyestuff obtained from the *Carthamus tinctorius,* a plant which is a native of India and Egypt, and is sometimes called saffron or safflower. This is the plant used in domestic medicine and known as saffron, but it is very different from the true saffron, or *Crocus sativus.* It is used to dye cotton and silk, to which it imparts a beautiful red color which is not very permanent.

Carthu'sians [Lat. *Carthusiani;* Fr. *Chartreux* (fem. sing. *Chartreuse*)], a monastic order founded in France by Saint Bruno in 1086. It was sanctioned by the pope in 1170, and was propagated in England and Italy. The monasteries of these monks in England were called Charter-houses, a corruption of the French *Chartreuse.* Their rules require them to perform manual labor, to abstain from eating flesh, and to observe ascetic practices, among which is a vow of continual silence. They built near Grenoble a magnificent convent called La Grande Chartreuse. Their houses are few at present. The Carthusian nuns were dispersed during the French Revolution. They have been restored, but are very few in number.

Cartier (Sir GEORGE ETIENNE), BART., an eminent Canadian statesman, a descendant of the following, was born Sept. 6, 1814. He became distinguished as the leader of the French Canadian conservatives, and was the author of many legal and political reforms. Died May 20, 1873.

Cartier (JACQUES), a French navigator, born at St. Malo Dec. 31, 1494. He discovered the river St. Lawrence in 1534, and ascended it as far as the site of Montreal. He returned to France in 1536. Died about 1554.

Cart'ilage [Lat. *cartilago*] is a firm, opaque, highly elastic substance of a pearly white or bluish-white color (rarely yellow), presenting to the eye a homogeneous appearance, but in reality composed of cells (corpuscles) variously combined with a fibrous, granular, or structureless intercellular substance. Cartilages may be classified as the temporary, the permanent, and the accidental. The temporary cartilages are substitutes for bone in the earlier periods of life, and after a time become ossified. At birth the extremities and larger eminences of the long bones and the margins of the flat bones are still cartilaginous, and this cartilage does not altogether disappear till puberty. Permanent cartilages are articular or non-articular. Articular cartilages are attached to the extremities of bones and enter into the formation of joints. Non-articular cartilages are usually more flexible than the articular. They are sometimes attached to bones to lengthen them out, as, for instance, in the nose and some of the ribs. In other cases they form the basis of distinct organs, as the larnyx, the Eustachian tubes, the external ear, the trachea, and the eyelids. Accidental cartilages are cartilaginous concretions which are occasionally found in situations where they do not normally occur, and are of little general interest, except as the basis of chondromata or cartilage-tumors. There is also a substance called fibro-cartilage, composed of cartilage mixed with white fibrous tissue. There is another substance known as spongy cartilage found in a few organs. Osseine (ostein) is frequently but incorrectly called bone-cartilage.

Cartilag'inous Fishes, those whose skeletons are destitute of true bone. (See FISHES.)

Cartoogacha'yo, a township of Macon co., N. C. Pop. 480.

Cartoon' [Fr. *carton;* It. *cartone,* from the Lat. *charta,* "paper"*], a term applied in the fine arts to a design drawn on paper for a fresco, oil picture, or a tapestry. The cartoon is of the same size as the subsequent work, and is sometimes primed or washed with ground-color. The artist draws the cartoon in order that he may adjust the

* The French *carton* and the Italian *cartone* are properly augmentatives from *carta,* "paper," and signified originally large, coarse, strong paper.

drawing and composition of his subject in circumstances in which alterations can be made with facility. The drawing is made either in chalk or in distemper. The cartoon when finished is transferred to the canvas or plaster, either by tracing with a hard point or by pricking with pins, charcoal in both cases being used.

The use of cartoons is particularly important in fresco paintings, of which only a small portion can be executed at a time, because the plaster must be moist when the pigment is applied to it, and it would be impossible to sketch the whole design on the plaster in the first instance. Therefore the cartoon must be traced in compartments so small that the artist can finish one before the plaster becomes dry. The most famous works of this kind are seven cartoons of Raphael which are preserved at Hampton Court in England. These are a part of a set of twenty-five in number which were sent to Flanders to be copied in tapestry for Pope Leo X. After the fabrication of the tapestry, which is said to be extant in Rome, the cartoons lay neglected at Brussels, and many of them were destroyed. The seven which were purchased by Rubens for Charles I. of England represent the following subjects: 1, Saint Paul preaching at Athens; 2, the death of Ananias; 3, Elymas the sorcerer struck with blindness; 4, Christ delivering the keys to Saint Peter; 5, the sacrifice at Lystra; 6, the apostles healing the sick in the temple; 7, the miraculous draught of fishes. These have been engraved by Dorigny and Audran. When the collection of Charles I. was sold these cartoons were purchased for the nation by Cromwell's special command.

Car'tridge, a case containing the proper quantity of powder or ammunition required to charge a gun or firearm. Cartridges for muskets are usually paper tubes, each containing a small amount of powder and a leaden ball. These are called ball cartridges. The paper used for this purpose is strong, and is made into a tube by means of a mandrel. Thinner paper is applied to certain parts of the tube, so that the powder has two or three thicknesses of paper around it, but the ball has only one. Besides this form there are several patent cartridges. A cartridge which contains powder only is called a blank cartridge. Cartridges for cannon or large guns are chiefly made of serge or flannel sewed up in the form of a bag, which, filled with a given weight of powder, is tied around the neck and strengthened by iron hoops. Cartridges for pistols are usually copper cylinders, having at the base the proper amount of fulminating powder, which inflames the charge of gunpowder upon being struck by the hammer, and these cartridges are used in most breech-loading firearms.

Cart'wright, a twp. of Sangamon co., Ill. Pop. 1851.

Cartwright (Edmund), an English clergyman, noted as the inventor of the power-loom, was born at Marnham April 24, 1743. He wrote "Arminia and Elvira" and other poems. In 1785 he exhibited his first power-loom, the introduction of which was violently opposed by the operatives, who burned a mill containing 500 of his looms. In 1809 he received a gift of £10,000 for his invention. Died Oct. 30, 1823.

Cartwright (John), Major, a brother of the preceding, was born at Marnham Sept. 28, 1740. He became an officer in the navy, but he refused to fight against the U. S. He gained distinction as an advocate of parliamentary reform and as a friend of liberty. Died Sept. 23, 1824.

Cartwright (Peter), D. D., a Methodist preacher, born in Amherst co., Va., Sept. 1, 1785. He labored with great success for upwards of sixty years, and is said to have preached 18,000 sermons. His labors were chiefly in the Mississippi Valley. Died Sept. 25, 1872.

Cartwright (Samuel A.), M. D., one of the most distinguished physicians of the South-west, and who was chief surgeon during Andrew Jackson's campaigns. He was born in Virginia in 1793, studied medicine under the celebrated Dr. Rush, and graduated at the University of Pennsylvania. He commenced the practice of his profession in Huntsville, Ala., but soon moved to Natchez, Miss., which became his field of labor for a quarter of a century. His numerous contributions to medical science may be found scattered through the journals of his day; he received valuable medals and prizes on medical topics—for he was a vigorous writer—especially for his labors on yellow fever, cholera infantum, etc., and a golden testimonial from the planters of his own county for his successful treatment of the Asiatic cholera. In 1836 he visited Europe, and in 1848 he removed to New Orleans. During 1862 he was consulted by Mr. Davis how to improve the sanitary condition of the Southern troops stationed near Port Hudson and Vicksburg. It was while in the discharge of this duty that he contracted the disease of which he died. Cartwright's treatment of hæmorrhoids by the sulphate of iron was generally adopted in the army; and that for prevention of the constitutional symptoms of syphilis was confirmed in the New York Hospital. Of him it has been said, "Full of charity and good-will towards all men, he fulfilled faithfully his station in all the relations of life." His last days, as all his life had been, were passed in doing good. Paul F. Eve.

Carus (Karl Gustav), a celebrated German physiologist, was born at Leipsic in 1789. His lectures on comparative anatomy, delivered in his native town in 1812, attracted great attention, and still more his book on the circulation of the blood in insects. It is, however, his writings on subjects belonging partly to science, partly to art—as, for instance, "Psyche"—which have gathered a brilliant circle of the greatest scientists and artists to his house in Dresden, where he lives as court-physician.

Car'ver, a county in S. E. Central Minnesota. Area, 375 square miles. It is bounded on the S. E. by the Minnesota River, and is also drained by the South Fork of the Crow River. The surface is undulating and the soil is fertile. Wheat, corn, wool, and oats are extensively raised. It contains several small lakes. Cap., Chaska. P. 11,586.

Carver, a post-township of Plymouth co., Mass. Iron ore is here obtained, and castings extensively manufactured. Pop. 1092.

Carver, a post-township of Carver co., Minn., on the N. Pacific and the Hastings and Dakota R. Rs., and on the Minnesota River, 25 miles S. W. of Minneapolis. P. 521.

Carver (John), a native of England, came in the Mayflower to America in 1620, and was elected first governor of the Plymouth Colony. Died in 1621.

Carver (Jonathan), an American traveller, born in Connecticut in 1732. He made an exploring expedition across North America to the Pacific Ocean in 1766–68, and published "Travels through the Interior Parts of North America." Died in London in 1780.

Carver's Creek, a twp. of Bladen co., N. C. P. 996.

Carver's Creek, a twp. of Cumberland co., N. C. P. 1391.

Carvin-Épinoy, a town of France, in the department of Pas-de-Calais, is on a railway 11 miles S. S. W. of Lille. It has manufactures of beet-root sugar, starch, and earthenware. Pop. 6546.

Car'ving, a branch of sculpture, performed on metals, bone, stone, wood, and ivory. It is a branch of sculpture, but the latter term more especially denotes the construction of independent figures of men and animals, while carving represents designs of all kinds on the surface of various objects, such as furniture, doors, walls, goblets, crucifixes, etc. Ivory was the favorite material in the East from an early period. During the palmy days of Grecian art ivory was largely employed. The earliest statues of the gods were generally of wood, different kinds of wood being appropriated to different divinities. Carvings in ivory form an important branch of early Christian sculpture. During the seventeenth and eighteenth centuries we find ivory again extensively employed. Ornamental carving is now executed on a large scale by various machines. (See Wood Carving, by Pres. A. D. White, LL.D.)

Ca'ry (Alice), a talented poet and prose-writer, born April 26, 1820, 8 miles from Cincinnati, O., was the daughter of one of the first settlers of Cincinnati. Her family was of New England origin, and her parents were persons of cultivation and in good circumstances, but, as they lived in a newly-settled country, the daughters had but imperfect school advantages. When eighteen years of age she commenced writing for the press, both in prose and verse. Her sketches, signed "Patty Lee," in the "National Era," attracted much attention. In 1850, with her sister Phœbe, noticed below, she published a successful volume of poems. In 1851 the first series of her "Clovernook Papers" appeared. In 1852 the two sisters removed to New York and devoted themselves to literature. In this they were successful, for, without becoming wealthy, they were able to maintain a pleasant and comfortable home, made not less pleasant by the genial hospitality and good taste which distinguished its owners—a hospitality which was highly prized by all who had the good fortune to share it. Among her earliest and most constant friends was the late Hon. Horace Greeley. A place at the tea-table of the Cary sisters was always reserved for him, and he was one of their most frequent and welcome guests. Their Sunday evening receptions were for years the resort of members of the guild of letters, both authors and publishers making it a place of pleasant social intercourse. Besides several volumes of poetry and a great number of contributions to periodical literature, she published two additional series of "Clovernook" (1853–54), "Hagar, a Story of To-day" (1852), "Married not Mated" (1856), "Pictures of Country Life" (1857), "The Lover's Diary" (1867), "Snowberries" (1869), and several

other works. Her poetical style is graceful and of a high order of merit. Her prose is perhaps even better than her verse. She delighted in the description of simple domestic scenes, which she presented with much felicity. She was an untiring worker, though many years of her life were passed in great suffering, which she endured with remarkable patience. She died at New York Feb. 12, 1871.

Cary (Col. ARCHIBALD), an American patriot, born in Virginia about 1730, took an active part in the convention of 1776 which framed the constitution of Virginia, and was afterwards a member of the Senate. Died in Sept., 1786.

Cary (Rev. HENRY FRANCIS), an English poet, born at Birmingham in 1772, was educated at Oxford. He became in 1797 vicar of Bromley Abbots. His reputation is founded on an admirable translation of Dante's "Divina Commedia" (1814), which is very accurate and expressive, and is generally considered the best translation of that celebrated poem. He was for some years assistant librarian of the British Museum. Died Aug. 14, 1844.

Cary (PHŒBE), a younger sister of Alice Cary, noticed above, was born near Cincinnati, O., Sept. 4, 1824. One of her earliest productions, written at the age of seventeen, was the well-known poem commencing "One sweetly solemn thought comes to me o'er and o'er." Of the first volume of poems published by the two sisters, her share was much the smaller in bulk, though in the opinion of many critics her poetry was in no way inferior to that of her sister, being characterized by more variety, spirit, and humor than that of Alice. She published "Poems and Parodies" (1854), "Poems of Faith, Hope, and Love" (1868), besides numerous hymns and occasional contributions to periodicals. Phœbe Cary was remarkable for genial and ready wit in conversation. She did not long survive the death of Alice. Worn out by anxiety during her sister's long illness, and overwhelmed by grief after her death, her system was unable to throw off an attack of malarial fever, of which she died at Newport, R. I., July 31, 1871. The sisters were buried in Greenwood Cemetery, where a beautiful monument has been erected to their memory at a cost of about $1000, Mr. Greeley heading the subscription for the purpose. (See "Alice and Phœbe Cary," by MARY CLEMMER AMES, 1873.)

Caryat'ides [Gr. Καρυάτιδες], the Latin plu. of *Caryatis*,

Caryatides, from the Erechtheum at Athens.

i. e. a woman of Caryæ (a city of Laconia), or a virgin dedicated to the service of the Caryan Diana. The term is applied in Greek architecture to female figures which were used instead of columns to support a roof or entablature. They were usually dressed in long robes. The corresponding male figures are called Atlantes and Telamones.

Cary'ocar, a genus of large trees of the order Rhizobolaceæ, which comprises but few other genera. They are natives of Brazil and Guiana, and are sometimes called pekea trees and butter trees. The fruit is a drupe or nut which has a soft, edible, and delicious kernel, and is known by the names of butter-nut and souari-nut. The drupe contains, besides the kernel, a pulp which is like butter, and is used in cookery as a substitute for it. Oil of good quality is obtained from the kernels. The timber of the caryocar is good for shipbuilding. The *Caryocar nucifera* is cultivated in the island of St. Vincent.

Caryophylla'ceæ [from the specific name of the carnation (*Dianthus Caryophyllus*)], a natural order of exogenous plants, mostly herbaceous and natives of temperate and cold countries. They have opposite, entire leaves, often united at the base, regular flowers, and stems usually swollen at the articulations. The fruit is a 1-celled capsule or pod. The order comprises nearly 1000 species, some of which have beautiful flowers, as the pink (*Dianthus*). Among the other genera are the *Silene, Lychnis, Arenaria, Stellaria* (chickweed), and *Saponaria* (soapwort), which is said to be a substitute for soap.

Caryop'sis [from the Gr. κάρυον, a "nut," and ὄψις, "appearance"], in botany, a fruit in which the seed and pericarp are so closely united as to be inseparable and undistinguishable. The fruit or grain of wheat, barley, maize, and other graminaceous plants is a caryopsis. It is a 1-celled, 1-seeded, and indehiscent pericarp.

Caryo'ta, a genus of palm, sometimes called the jaggery-palm or sugar-palm, growing in India and Ceylon. *Caryota urens,* a lofty, spreading tree, yields a large amount of fermentable juice (toddy) when its spathes are incised; this is boiled down to produce sugar. Its farinaceous pith resembles sago, and its fibres are used for making ropes.

The quantity of sugar produced in India from this and a few other palm trees is very great, but the quality is inferior. The cultivation of the jaggery-palm is entirely in the hands of a caste, or sub-caste, of Soodras, who devote their whole labor to this crop. The genus *Caryota* is botanically very distinct from all other known palms.

Ca'rysfort Reef, a dangerous coral-reef at the edge of the Gulf Stream, near the S. point of Florida, lat. 25° 13′ 15″ N., lon. 80° 12′ 45″ W., has an iron-pile lighthouse 112 feet high, with a flashing light of the first order 106 feet above the sea.

Ca'ryville, a village of Oakfield township, Genesee co., N. Y., is the seat of Cary Collegiate Institute (Episcopalian).

Ca'sa, an Italian and Spanish word signifying a "house," a "home," a "family," and forming a part of many Italian and Spanish names.

Casacalen'da, a town of Italy, in the province of Campobasso, is about 18 miles N. E. of Campobasso. It has three churches and a convent. Silk and wine of good quality are produced in this vicinity. Pop. 6000.

Casa'le, a fortified town of Italy, in the province of Alessandria, is on the river Po, 37 miles E. of Turin. It has an iron bridge across the river, an old castle, and a cathedral founded in 1474; also several convents, a college, a public library, a theatre, and two hospitals. Here are manufactures of silk twist. Casale is the seat of a bishopric, and was formerly the capital of the duchy of Montferrat. Many Roman remains are found here. Pop. in 1871, 27,514.

Casal' Pusterlen'go, a town of Italy, in the province of Milano, on the Brembolo, 29 miles S. E. of Milan. It has manufactures of silk and linen and earthenware, and a trade in Parmesan cheese, which is made here. Pop. 5437.

Casamas'sima, a town of Italy, in the province of Bari, 12 miles S. E. of Bari. It has a convent and two abbeys. Pop. 5941.

Casano'va de Seingalt' (GIOVANNI GIACOMO), a celebrated Italian adventurer, born at Venice April 2, 1725. He travelled extensively, passed his life successively in many European capitals, and mixed with aristocratic society. He fought several duels, and was confined in the dungeons of Venice for nearly two years. About 1790 he became librarian to Count Waldstein in Bohemia. He is said to have been witty, dissipated, and greatly addicted to intrigues. Died June 4, 1798. He left entertaining autobiographic memoirs, which were published in 1822.

Cas'areep', Cassareep, or **Casaripe,** a sauce or

condiment made of the juice of the bitter cassava or manioc root. It is highly esteemed in Guiana, where it is employed to flavor nearly every dish. It is the basis of the West Indian *pepper-pot*, and is imported into Great Britain. It is a powerful antiseptic, by means of which meat can be kept fresh for a long time. The fresh juice is poisonous, but its noxious properties are removed by cooking.

Ca'sas, de las (Bartolomé), a benevolent Spanish Dominican missionary, born at Seville in 1474. He accompanied Nicolas d'Ovando, governor of San Domingo, to America in 1502, and preached the gospel in Hispaniola. His sympathies were excited by the cruelty with which he found that the Indians were treated, and he directed untiring efforts to the improvement of their condition, interceding with the governor, Velasquez, and the emperor Charles V. The statement that he suggested the introduction of African slaves is not now accepted. After he had officiated as bishop of Chiapa in Mexico, he returned to Spain in 1551. Died July, 1566. (See Arthur Helps, "Life of Las Casas," 1868.)

Casaubon (Isaac), an eminent Protestant scholar and critic, born of French parents at Geneva Feb. 18, 1559. He was appointed professor of Greek at Geneva in 1582, and married, about the year 1585, Florence, a daughter of the well-known Henri Étienne (or Stephanus). He displayed great critical sagacity and learning in editions of classical authors, including Athenæus, Polybius, and Aristotle. In 1599 he removed to Paris, where he taught Greek, and was made royal librarian by Henry IV. Among his works is a treatise on religious liberty, "De Libertate Ecclesiastica" (1607). Having emigrated to England in 1610, he was appointed prebendary of Canterbury by James I. Died July 1, 1614. (See C. Nisard, "Le Triumvirate littéraire, Juste Lipse, Scaliger, et Casaubon," 1851.)

Cascade, a post-township of Dubuque co., Ia. Pop. 1289.

Cascade, a post-township of Kent co., Mich. Pop. 1157.

Cascade, a post-township of Olmsted co., Minn. Pop. 812.

Cascade, a township of Lycoming co., Pa. Pop. 595.

Cascade Range, a chain of mountains in Oregon and Washington Territory, is nearly parallel with the coast of the Pacific Ocean, and is a continuation of the Sierra Nevada of California. The direction of the range is nearly N. and S. Its distance from the sea-coast is in Oregon about 120 miles. The Columbia River breaks through this range, forming the cascades from which the name is derived. Among the highest summits of this range are Mount Hood, which rises about 14,000 feet above the sea, and Mount Jefferson, both in Oregon. Some of the peaks are volcanic, as Mount St. Helen, about 12,000 feet high.

Cascades, a post-village, capital of Skamania co., Washington Territory, on the N. bank of the Columbia River, about 50 miles W. of Dalles City.

Cascaril'la [diminutive of *cáscara*, the Spanish word for "bark"], a name given in South America to different kinds of bitter medicinal barks, including Peruvian bark. European and American physicians and apothecaries apply the term to the bark of the *Croton Eleutheria*, a small West Indian tree. This bark is imported into Europe and the U. S., and is used in medicine as a stimulant tonic.

Cas'co, a post-township of Cumberland co., Me. It has manufactures of canned goods, leather, lumber, starch, etc. Pop. 998.

Casco, a township of Allegan co., Mich. Pop. 1264.

Casco, a post-township of St. Clair co., Mich. Pop. 1991.

Casco, a post-township of Kewaunee co., Wis. Pop. 794.

Cas'co Bay, in Maine, washes the shore of Cumberland county, and is about 20 miles long. The city of Portland is at the western extremity of this bay, which encloses about 300 islands.

Case [Fr. *cas;* Lat. *casus*, a "fall," an "accident," a "casualty," from *cado, casum*, to "fall"], a term used in various senses, signifies an event; a condition in which a person is placed; the state of the body with respect to health or disease; a predicament; a situation or contingency; in grammar, the inflection of nouns or a change of termination; in law, a cause or a suit in a court. A wooden box in which dry goods and hardware are packed is called a case. *To be in good case* signifies "to be fat." Case, in printing, is a receptacle for types; this is divided into compartments, each of which contains the types of but one letter. Commonly there is an upper and a lower case; the upper holding the capitals, small capitals, and *sorts* little used; the lower, the small letters, points, figures, etc.

Case, in law, is used in a number of significations. (1) It indicates a form of action, called "an action on the case." This action did not exist in the early English law, but was introduced by a statute of the reign of Edward I. (Westminster 2d). It is founded on the peculiar circumstances of the case, and supplies a remedy for such wrongs as cannot be included under the term "trespass," and which are in their nature indirect and consequential. It applies to such wrongs either committed against one's person or property, whether real or personal. The action is sometimes called "trespass on the case," and at other times simply "case." Out of this action grew the modern action of "assumpsit," which is really instituted to recover damages for breach of contract. (2) It sometimes means a suit or action in court. Thus, in the U. S. Constitution it is said that the judicial power of the Federal courts shall extend to all *cases* in law and equity. The meaning of the word has been settled by adjudication, as shown in approved treatises on the Constitution. (3) Another sense is a written or printed statement of facts for the opinion of counsel or for the decision of a court without regular trial. The question then to be decided is a question of law, and the facts are sometimes presented by agreement, and at other times through the formal intervention of a jury. This is frequently called a "case stated." (4) In legal practice the word is used to denote the mode of presenting the facts which occurred at a trial to an appellate court for review. If the respective parties fail to agree on a statement of facts, the court before which the trial occurred passes definitively upon them in a prescribed manner, and is thereupon said to "settle" the case.

Case (Augustus Ludlow), U. S. N., born Feb. 3, 1831, in Newburg, N. Y., entered the navy as a midshipman April 1, 1828, became a passed midshipman in 1834, a lieutenant in 1838, a commander in 1855, a captain in 1863, a commodore in 1867, and a rear-admiral in 1872. He served on the E. coast of Mexico during the Mexican war, participating in the capture of Vera Cruz and Tobasco. Early in 1861, Commander Case was appointed fleet-captain of the North Atlantic blockading squadron, in which capacity he took part in the capture of Forts Hatteras and Clarke, Aug. 29, 1861, and in the operations in the sounds of North Carolina in the winter of 1862. In 1863, in command of the Iroquois, and assisted by the steamers James Adger and Mount Vernon, he cut out the blockade-runner Kate, under the fire of the forts and batteries at New Inlet, N. C. Referring to the capture of Forts Hatteras and Clarke, Flag-officer Stringham, in his official report of Sept. 2, 1861, writes: "I here take the opportunity of mentioning with great pleasure the name of Commander A. Ludlow Case, my fleet-captain, for very prompt and efficient services during all the time we have been occupied in the expedition so successfully terminated." And Flag-officer Goldsborough, in a letter to the navy department dated Feb. 18, 1862, says: "It is really difficult for me to state, in adequate terms, how largely I feel myself indebted to Commanders Rowan and Case for their constant and signal services. They, hand in hand, with their marked ability and sound sense, and in the absence of all ordinary facilities, brought about, at Hampton Roads, the arming, manning, and equipment of the many vessels sent to us, from necessity, in an unprepared condition; and subsequently they both labored, most conspicuously and faithfully, in their respective spheres of action, to vanquish difficulties . . . at Roanoke. In short, their assistance has been invaluable to me." He was chief of the bureau of ordnance from Aug., 1869, to May, 1873; in June, 1873, he was appointed to the command of the European squadron.

Foxhall A. Parker, U. S. N.

Case-hardening is forming a covering of steel on the surfaces of gun-locks, tools, the upper surface of railroad iron, grates, fenders, etc. The articles are first heated to redness, sprinkled with yellow prussiate of potash, and heated again. The heat decomposes the prussiate of potash, and the liberated carbon combines with the iron, forming a coating of steel on the surface. Another mode is to surround the articles with a layer of animal matter, such as powder from charred hoofs or waste leather, with a little common salt, and heat them in an iron case to redness, retaining them at that temperature for half an hour or more; the articles are then taken out and cooled in cold water or in oil. The coating of steel is very thin, seldom exceeding one-sixteenth of an inch. The steel covering makes the articles more durable, and admits of a better polish.

Ca'seine [from the Lat. *caseus*, "cheese"], a nitrogenous organic substance allied to albumen, found in milk, and most abundantly in that of flesh-eating animals. It is said to be occasionally found in the fluid of cysts. It is

also found (as legumine, and probably as amandine, both being regarded as identical with it) in peas, beans, almonds, and other seeds. Vegetable and animal caseines behave exactly alike with chemical tests, and when pure cannot be distinguished by the taste. The proportion in cow's milk is about 4 per cent.; in dried peas, 25 per cent. Caseine is coagulated (curdled) by acids or by rennet, and is the chief constituent of CHEESE (which see). It also forms insoluble precipitates with corrosive sublimate, with nitrate of silver, and with acetate of lead. Hence, copious draughts of milk afford a ready antidote in cases of poisoning with either of the above salts. Caseine is also used in calico-printing. The probable proportions of the constituent elements of caseine in 100 parts have been given as follows: carbon, 53.83 parts; oxygen, 22.52; nitrogen, 15.65; hydrogen, 7.15; sulphur, 0.85, with perhaps a little phosphorus; but its composition is not exactly known.

CHARLES W. GREENE.

Casemate [from the Sp. *casa*, "house," and *matar*, "to kill"] was originally a loopholed gallery excavated in a bastion, from which the garrison could fire on an enemy who had obtained possession of the ditch. The term was afterwards applied to a bomb-proof vault in a fortress, which is designed for the protection of the garrison, and is sometimes used as a barrack or hospital. A casemated battery consists of such a vault or vaults, with openings for the guns, called "embrasures" or ports. The term casemate is also applied to the part of an iron-clad vessel armored to protect broadside guns.

Casement, a portion of a window-sash made to open or turn on hinges; a frame with hinges enclosing part of the glazing of a window. Such windows are very common on the continent of Europe. The term is also applied to a deep, hollow circular moulding, similar to the *scotia* of classical and the *cavetto* of Italian architecture.

Caseno'via, a township of Muskegon co., Mich. Pop. 1094.

Caserta. See TERRA DI LAVORO.

Caser'ta, a town of Italy, capital of Terra di Lavoro, is situated on a plain about 21 miles by rail N. E. of Naples. It has, besides numerous churches and a military school, a magnificent royal palace, which was built by Vanvitelli about 1755, and is one of the largest in Europe. Connected with the palace is a fine park and an aqueduct. Here is a royal silk-factory, in which about 700 persons are employed. Pop. in 1871, 29,142.

Case-Shot [Fr. *mitraille;* Ger. *Kartätschenschuss* (*i. e.* "cartridge-shot")] is the name of a projectile, consisting of several balls or bullets of lead or iron packed in a case. When the case is a cylinder of tin with a wooden bottom, the whole is called cylindrical-case or canister. The number of shot in each canister varies from 40 to 126. Some armies use canister with an explosive charge in the centre, but more commonly it has no such charge. When the balls are affixed to a central spindle without a case, or enclosed in a canvas bag, they are called grape-shot. This is especially used in garrison-artillery. Against advancing lines the effect of grape and canister at close range is often terrible, but solid shot and shell are preferred against columns. Spherical-case or shrapnel (so named from its inventor) is a thin cast-iron shell, containing a chamber with a light or bursting charge of gunpowder, around which are packed bullets of lead or iron. It should burst at least forty yards in advance of the enemy. This missile is effective at three times the range of canister, but at long distances its effect is often lost from lack of precision in the aim or in the cutting of the fuse.

Caseville, a post-township of Huron co., Mich. P. 382.

Ca'sey, a county in S. Central Kentucky. Area, 350 square miles. It is intersected by Green River. The surface is uneven or hilly. Wheat, tobacco, and corn are the chief crops; cattle and wool are also raised. Capital, Liberty. Pop. 8884.

Casey, a post-village of Cumberland township, Clark co., Ill., on the St. Louis Vandalia Terre Haute and Indianapolis R. R., 18 miles W. S. W. of Marshall. It has one weekly newspaper.

Casey, a post-village of Thompson township, Guthrie co., Ia., on the Chicago Rock Island and Pacific R. R., 82 miles E. by N. of Council Bluffs. It has one weekly newspaper.

Casey (SILAS), an American officer, born July 12, 1807, at East Greenwich, R. I., graduated at West Point 1826, and Oct. 9, 1861, became colonel Fourth Infantry, and May 31, 1862, major-general U. S. volunteers. He served on western and northern frontiers 1826–36, in Florida war 1837–41, engaged at Pilaklikaka, on northern frontier 1842–47, in war with Mexico 1847–48, engaged at Contreras and Churubusco (brevet major), Molino del Rey, and Chapultepec (wounded in leading assault, and brevet lieutenant-colonel), on the Pacific frontier 1848–54, on tactical and arms boards 1854–55, and at Puget Sound post 1856–61, engaged in several Indian skirmishes. During the civil war he served in preparing volunteers for the field at Washington, D. C., 1861–62, in the Virginia peninsula 1862, engaged at Fair Oaks (brevet brigadier-general), as president of board for examination of officers of colored troops 1863–65, in command at Detroit, Mich., 1865–67, and commissioner to examine war-claims of Ohio. Brevet major-general U. S. A. Mar. 31, 1866, for gallant and meritorious services. Compiled and edited a system of "Infantry Tactics" for the U. S. service 1862, and "Infantry Tactics for Colored Troops," 1863, and was retired from active service July 8, 1868.

GEORGE W. CULLUM, U. S. A.

Casey (SILAS, JR.), U. S. N., born Sept. 11, 1841, in Rhode Island, graduated at the Naval Academy in 1860, became a master in 1861, a lieutenant in 1862, a lieutenant-commander in 1866. In 1861 he was attached to the steamer Wissahickon, South Atlantic blockading squadron, and participated in the first attack on Fort Sumter, and in various engagements with the forts and batteries in Charleston harbor.

FOXHALL A. PARKER, U. S. N.

Ca'seyville, a post-village of St. Clair co., Ill., on the Ohio and Mississippi R. R., 9 miles E. of St. Louis. Coal is here extensively mined.

Caseyville, a post-village of Union co., Ky., on the Ohio River, 13 miles below Shawneetown. Pop. 560.

Cash [Fr. *caisse;* Ger. *Kasse*], money; coin or current bank-notes; ready money. It is often used to denote immediate payment, and goods are said to be sold for cash when they are not sold on credit.

Cash-book, a book in which merchants, bankers, and others keep an exact and methodical account of each sum of money received or paid by them. It is a book of original entry.

Cash'el, a town of Ireland, in the county of Tipperary, is 105 miles by railway S. W. of Dublin and 49 miles N. N. E. of Cork. It is built on the slopes of an isolated limestone hill rising abruptly from a rich plain. Cashel was the residence of the kings of Munster, and is now a bishop's see. The top of the hill called the "Rock of Cashel" is occupied by the most interesting ruins in Ireland. These consist of a round tower ninety feet high, the palace of the kings of Munster, a chapel of Saxon and Norman architecture, and a cathedral which was founded in 1169, and is said to have been the largest in the country. It was built of limestone. Pop. in 1871, 3976.

Cash'er's Val'ley, a post-township of Jackson co., N. C. Pop. 509.

Cashew'-nut (*Anacardium occidentale*), a tree of the order Anacardiaceæ, is a native of the tropical parts of America, and perhaps of Asia. It abounds in a clammy, milky, and acrid juice which turns black on exposure to the air, and is used in India as a varnish. The fruit is a kidney-shaped nut attached to the larger end of a pear-shaped, fleshy stem, from which the botanical character of the genus is derived. The shell, which is double, encloses an oily kernel which is very agreeable and wholesome, and is a common article of food in tropical countries. The fleshy stem, sometimes called the cashew-apple, is also edible and refreshing, having an acid taste. In size it is nearly equal to an orange. A pleasant vinous beverage is prepared from its fermented juice. The oil is used as a remedy for leprosy. Cashew is a corruption of the French *acajou*.

Cash'gar, the former capital of Chinese Toorkistan, on the side of a mountain and on a stream 140 miles N. W. of Yarkund. It is encircled by an earthen wall, and is divided into the Chinese and Mohammedan cities, the latter much the larger. There is considerable luxury among the people, as well as an industrious and skilful artisan class, workers in gold and jasper, weavers of silk and carpets, and dyers of calico. It has a trade with Bokhara, exchanging tea, porcelain, silk, etc. for European merchandise. The Chinese acquired dominion over this place about eighty years ago, and have here a garrison of 8000 men. Pop. 40,000 to 50,000.

Cashier' [Fr. *caissier*], a cash-keeper, a person who has charge of the cash in a bank, counting-house, or other place of business. The president and the cashier are the highest officers of a bank, and they write their signatures on each bank-note. The cashier superintends the books and transactions of the bank, under the order of the directors.

Cashmere, kash-meer', written also **Kaschmir** and **Kachemir** (anc. *Caspira*), a country and valley of Northern Hindostan, bordering on Thibet, belongs to the domin-

ion of Gholab Sing, which comprises Baltistan, Cashmere, and Loday, the whole of which is sometimes called the empire of Cashmere, and has an area of 60,100 square miles, and a population of 3,000,000. The valley of Cashmere is surrounded on all sides by lofty mountains (the Himalayas). It is mostly included between 33° 30′ and 34° 35′ N., and between 74° 20′ and 75° 40′ E. Area, estimated at 5100 square miles. Pop. about 400,000. The bottom of the valley is about 5500 feet above the level of the sea. Among the highest peaks on the frontier of Cashmere is the Pir Panjal, which rises about 15,000 feet above the level of the sea. The mountains are partly of basaltic formation, and limestone is abundant in the valley. The mountain-barrier is indented by several passes, none of which are practicable for wheel-carriages. The chief river is the Jhylum, which rises in the S. E. part, traverses the middle of the valley, and flows out through the Baramoola Pass. Cashmere may be said to equal or surpass almost every other portion of the earth in the beauty of its scenery. Cashmere contains several lakes, and is admirably supplied with the means of irrigation. The soil is mostly alluvial and exceedingly fertile. The staple production is rice, besides which wheat, maize, and barley are cultivated here. This valley is renowned for the abundance and fine quality of its fruits—apples, pears, apricots, cherries, etc. Among the forest trees is the deodar (*Cedrus Deodara*), the pine, and the walnut. The inhabitants are mostly Mohammedans. In physical qualities they excel the natives of the other parts of Hindostan. They manufacture shawls which are widely celebrated and bring high prices. The material of these is the wool of the CASHMERE GOAT (which see). The Cashmerians are excellent lapidaries, and are noted for the fabrication of firearms. Chief town, Serinagur or Cashmere.

Cashmere was conquered by the emperor Akbăr in 1586, and annexed to the Mogul empire. The Afghans became masters of it in 1752, and held it until 1819, when it was subjugated by the Sikhs. In 1849 it was ceded to the British, who transferred it to Gholab Sing.

REVISED BY A. J. SCHEM.

Cashmere Goat, a variety of the goat remarkable for its long, fine, and silky hair, from which Cashmere shawls are made. This goat is found in Thibet, from which the finest hair is imported into Cashmere, to be there manufactured. The hair is longer than that of the Angora goat, and not, like it, curled, but straight, and about eighteen inches long. A single goat does not yield more than three ounces, and the fleeces of ten goats are requisite for a shawl a yard and a half square. The hair is spun by women, and dyed after it is spun. Some 16,000 looms are in constant employment in Cashmere, producing annually about 30,000 shawls. Woven in rude looms, a pair of shawls sometimes occupy three or four men a year in weaving. Plain shawls are simply woven, but those with varied patterns are worked with wooden needles. These shawls are in the highest request, but the hair of other breeds of goats is employed for the manufacture of shawls called by the same name. Imitations are manufactured in France, some from the Thibet wool, and others of a mixture of this with silk and cotton.

Attempts have been made to introduce the Cashmere goat into Europe and America. In Northern South Carolina and the neighboring regions it thrives well, as also in California. A mixed race, produced by crossing the Cashmere and the Angora goat, possesses valuable qualities, the hair being long, fine, and more abundant than in the parent breeds.

Cas′imir III., surnamed THE GREAT, king of Poland, born in 1309, was a son of Ladislaus, king of Poland, whom he succeeded in 1333. He enlarged his dominions by the conquest of Red Russia about 1366, and repelled the aggressions of the Tartars. He promoted education and founded colleges and hospitals. He died Nov. 8, 1370, and was succeeded by his nephew, Louis of Hungary.

Casimir IV., son of the prince Jagello of Lithuania, born Nov. 29, 1427, was in 1444 elected king of Poland. He carried on, for nearly twenty years, a war with the Teutonic Order, which in the peace of Thorn (1466) had to cede West Prussia to Poland; and by convoking in 1468 the nobility became founder of the Polish constitution. Died June 7, 1492.

Casi′no [diminutive of Italian *casa*, a "house"] signifies a place for social reunions. Italian nobles have long had casinos detached from their palaces, and public casinos were the result of an attempt made by the middle classes to imitate them. A casino is generally a place where musical or dancing soirées are held, containing a conversation-room and rooms for amusement, as well as apartments where refreshments may be had. They are numerous in Italy and Germany, and have been introduced into England. In general, they are not believed to exert a good moral influence.

Casi′no, or Mon′te Casi′no, a mountain of Italy, in Terra di Lavoro, about 55 miles N. N. W. of Naples. It is close to the town of San Germano, and is the site of a celebrated Benedictine abbey founded in 529 A. D. by Saint Benedict. This abbey is remarkable for its architecture, its wealth, its library, and the learning of its monks. Several valuable works have been issued from the press of Monte Casino.

Cask's, a township of Talladega co., Ala. Pop. 737.

Caso′ria, a town of Italy, in the province of Napoli, 6 miles N. N. E. of Naples. It has four fine churches. Silk is produced in this vicinity. Pop. 6934.

Cas′pe, a town of Spain, in Aragon, province of Saragossa, is situated near the river Ebro, 53 miles S. E. of Saragossa. It has three churches, a town-hall, and manufactures of oil and soap. Pop. 9402.

Cas′per, a township of Union co., Ill. Pop. 2718.

Cas′pian Sea [Lat. *Mare Caspium*, or *Mare Hyrcanium*; Gr. Κασπία Θάλασσα], a large inland sea forming part of the boundary between Europe and Asia. It has on the N. European Russia, on the E. the Khirgeez steppe, or Toorkomania, on the S. Persia, and on the W. Persia and Georgia. It is about 690 miles long from N. to S., and has an average width of near 200 miles. The area is estimated by Berghaus at 156,800 square miles. The depth of water towards the S. is said to be 3000 feet, but towards the N. it is generally shallow, seldom being more than 3 feet deep at a distance of 100 yards from the shore. According to some authorities, the greatest depth is only 600 feet. The depression of the surface of the Caspian below that of the Black Sea is about eighty-four feet. The Caspian receives several large rivers—viz. the Volga, the Ural, and the Koor. It has no outlet, and its superfluous water can only escape by evaporation. Between the Caspian and the Sea of Aral is a low flat tract forming part of the steppes of Western Asia. This tract, which is said to be lower than the surface of the Atlantic Ocean, was probably once covered by the Caspian Sea. This region is considered one of the most interesting subjects in the physical geography of the globe. That the Caspian and the Sea of Aral were once connected is rendered evident by the nature of the rocks in the vast plains which extend from them in several directions. Great numbers of sturgeons and salmon are caught in this sea, in which various other kinds of fish are also abundant. A communication has been opened between the Caspian Sea and the Baltic by a canal which connects the Volga with the rivers Tvertza and Schlina. Steam-packets navigate the Caspian, the commerce of which is mostly in the hands of the Russians. The chief ports on its coasts are Astrakhan and Derbend.

Cass, a county in W. Central Illinois. Area, 350 square miles. It is bounded on the N. W. by the Illinois River and on the N. by the Sangamon. The surface is nearly level; the soil is very fertile. Corn, oats, wool, and live-stock are largely raised. It is intersected by the Peoria Pekin and Jacksonville and the Rockford Rock Island and St. Louis R. Rs. Capital, Beardstown. Pop. 11,580.

Cass, a county in N. Central Indiana. Area, 420 square miles. It is intersected by the Wabash River, and also drained by the Eel River. The surface is nearly level; the soil is fertile. Grain, wool, and dairy products are extensively raised. Iron ore and good building-stone are found here. The most numerous manufactories are of cooperage. The county is traversed by the Toledo Wabash and Western R. R., and by a railroad which connects Chicago with Cincinnati. Capital, Logansport. Pop. 24,193.

Cass, a county in S. W. Iowa. Area, 576 square miles. It is intersected by the East Nishnabatona River, and also drained by Turkey and other creeks. The surface is undulating; the soil is fertile. Grain and dairy products are staple crops. It is traversed by the railroad which connects Des Moines with Council Bluffs. Capital, Lewis. Pop. 5464.

Cass, a county of Michigan, bordering on Indiana. Area, 528 square miles. It is drained by the Dowagiac River, and contains several small lakes. The surface is nearly level; the soil is very fertile. Grain, cattle, and wool are largely produced. The county has extensive prairies and "oak openings." Lumber, wagons, etc. are manufactured. It is intersected by the Central and Peninsular R. Rs. Capital, Cassopolis. Pop. 21,094.

Cass, a large county in N. Central Minnesota. A large part of its boundary is formed by the Mississippi River, which rises on its north-western border. It contains numerous lakes, among which are Leech and Itasca Lakes. The surface is partly covered with forests. Pop. 380.

Cass, a county of Missouri, bordering on Kansas.

Area, 700 square miles. It is drained by the two main branches of Grand River. The surface is undulating, and diversified with groves and extensive prairies; the soil is fertile. Corn, oats, tobacco, wool, and live-stock are extensively raised. Limestone is abundant here. The county is intersected by the Osage division of the Missouri Kansas and Texas R. R. Capital, Harrisonville. Pop. 19,296.

Cass, a county in the E. of Nebraska. Area, 570 square miles. It is bounded on the E. by the Missouri River, and on the N. by the Platte River. The greater part of it is undulating prairie, the soil of which is calcareous and fertile. Grain and wool are staple products. Limestone occurs here as a surface-rock. The county is traversed by the Burlington and Missouri River R. R. Capital, Plattsmouth. Pop. 8151.

Cass, a township of Fulton co., Ill. Pop. 1283.

Cass, a township of Clay co., Ind. Pop. 470.

Cass, a township of Greene co., Ind. Pop. 819.

Cass, a township of La Porte co., Ind. Pop. 1214.

Cass, a township of Ohio co., Ind. Pop. 772.

Cass, a township of Pulaski co., Ind. Pop. 460.

Cass, a township of Sullivan co., Ind. Pop. 1488.

Cass, a township of White co., Ind. Pop. 451.

Cass, a township of Boone co., Ia. Pop. 895.

Cass, a township of Cass co., Ia. Pop. 1200.

Cass, a township of Cedar co., Ia. Pop. 591.

Cass, a township of Clayton co., Ia. Pop. 1272.

Cass, a township of Guthrie co., Ia. Pop. 1754.

Cass, a township of Hamilton co., Ia. Pop. 433.

Cass, a township of Harrison co., Ia. Pop. 217.

Cass, a township of Jones co., Ia. Pop. 913.

Cass, a township of Shelby co., Ia. Pop. 120.

Cass, a township of Wapello co., Ia. Pop. 859.

Cass, a township of Douglas co., Mo. Pop. 410.

Cass, a township of Greene co., Mo. Pop. 1531.

Cass, a township of Stone co., Mo. Pop. 592.

Cass, a township of Texas co., Mo. Pop. 779.

Cass, a township of Hancock co., O. Pop. 759.

Cass, a township of Muskingum co., O. Pop. 851.

Cass, a township of Richland co., O. Pop. 1274.

Cass, a township of Huntingdon co., Pa. Pop. 599.

Cass, a township of Schuylkill co., Pa. Pop. 4621.

Cass, a township of Monongalia co., West Va. Pop. 1449.

Cass (George W.), an American officer and engineer, born in 1810 in Ohio, graduated at West Point in 1832. He served while lieutenant of infantry on topographical and engineer duty till he resigned Oct. 26, 1836. Civil engineer 1836–41; merchant at Brownsville, Pa., 1842–52; president of Adams' Express Co. 1854–57; of Ohio and Pennsylvania R. R. 1856; of Pittsburg Fort Wayne and Chicago R. R. 1856–58 and since 1859, and of Northern Pacific R. R. since 1873.

George W. Cullum, U. S. A.

Cass (Lewis), LL.D., an American statesman, born at Exeter, N. H., Oct. 9, 1782. He studied law, which he began to practise at Zanesville, O., in 1802. Having entered the army as a colonel in 1812, he served in Canada under Gen. Hull, and was taken prisoner. He was raised to the rank of brigadier-general in 1813, and appointed governor of Michigan Territory in 1814. After he had held that office sixteen years, and negotiated many treaties with the Indians, he was appointed secretary of war by President Jackson in 1831. He was sent as minister to France in 1836, returned home in 1842, and was elected a Senator of the U. S. for Michigan in 1844. Having opposed the Wilmot Proviso, he was nominated as Democratic candidate for the presidency of the U. S. in 1848, but he was defeated by Gen. Taylor, the Whig candidate, who received 163 electoral votes; Gen. Cass received 137 electoral votes. In the winter of 1850–51 he was re-elected to the Senate of the U. S. He supported Douglas's Kansas-Nebraska bill in 1854, and became secretary of state in Mar., 1857. He resigned in Dec., 1860. Died June 17, 1866.

Gen. Cass's history well illustrates the great possibilities which have justly served as an encouragement to young men of this country born in humble circumstances. Without fortune or friends, and with an imperfect education, he went to Ohio on foot when seventeen years old. Elected to the legislature, his zeal against the suspected treason of Burr brought him to the favorable notice of President Jefferson and the people. His services in the war with Great Britain were useful to the nation, and greatly increased his popularity. During his long governorship of Michigan his success in managing the disaffected Indians, and in developing the resources of the Territory, demonstrated his great abilities. To his power of making strong personal friends much of his success was due. He was democratic in his tastes and habits, as well as in his political opinions. He attained a large fortune and much political influence. Throughout the civil war he was in favor of the maintenance of the Federal union. Gen. Cass was a man of literary tastes. His published writings are not numerous, but are well written and display much ability. (See H. R. Schoolcraft, "Life of General Cass," 1848; W. L. G. Smith, "Life of Lewis Cass," 1856.)

Cassada'ga, a post-village of Stockton township, Chautauqua co., N. Y., on Cassadaga Lake. Pop. 225.

Cassan'der [Gr. Κάσσανδρος], a Macedonian prince, was a son of Antipater, regent of Macedonia. When Antipater died, in 318 B. C., Cassander and Polysperchon became competitors for the regency, and appealed to arms. Cassander was victorious, and having taken Athens, restored the aristocracy under Demetrius Phalereus in 316 B. C. He married Thessalonice, a sister of Alexander the Great, and obtained possession of Alexander's infant son, whom he put to death in 309, and usurped the throne. He joined Seleucus and Ptolemy in a coalition against Antigonus, whom these allies defeated at the battle of Ipsus in 301 B. C. He died in 297, and was succeeded by his son Philip.

Cassan'dra [Κασσάνδρα], an ancient Trojan princess, a daughter of Priam, was celebrated for her prophetic inspiration. According to the poetical legend, Apollo was enamored of her, and taught her the secrets of fate, but he ordained that her prophecies should not be credited. During the siege of Troy she predicted the ruin of that city, but she was regarded as a lunatic by the Trojans. She was carried away as a captive by Agamemnon.

Cassandra, Gulf of (anc. *Toronaicus Sinus*), is a part of the Ægean Sea, in European Turkey, and extends between two peninsulas, the extremities of which are called Cape Drepano and Cape Pailluri. It is nearly 25 miles long.

Cassa'no, a town of Italy, in the province of Calabria Citeriore, 30 miles N. of Cosenza. It stands in the concave recess of a steep mountain, in the midst of beautiful scenery. It has a cathedral, several convents, and an old castle; also manufactures of silk, linen, cotton, and leather. Pop. 7456.

Cassation. See Courts, by George Chase, LL.B.

Cassa'va, a West Indian name of the plant called manioc or manihot, and of the starch or fecula prepared from its root. It is known in the U. S. by the name of Tapioca (which see).

Cassay', Munnipoor', or **Munepoor,** a country of Farther India, is bounded on the N. W. by Assam, and E. and S. by the Burmese dominions and the country of the independent Kookies. It is mostly included between lat. 24° and 26° N., and between lon. 93° and 95° E. The area is said to be 7584 square miles. The surface is diversified by valleys and high mountains which are covered with forests. The staple productions are tea, rice, cotton, indigo, sugar, opium, and tobacco. The finest pineapples in the world are produced here. The Cassay ponies are celebrated throughout the East, and much sought in Burmah for cavalry horses. Capital, Munipoor. Cassay became independent in 1826, before which it was part of the Burmese empire. It is governed by a native rajah.

Cass co., Tex. See Davis co., Tex.

Cassel (anc. *Castellum*), a town of France, department of Nord, is on an isolated hill 550 feet in height, 27 miles N. W. of Lille, with which it is connected by a railway. It was formerly fortified, and was the scene of several military events. Here are manufactures of lace, hosiery, and linen thread. It commands a very extensive view of the level surrounding country. Pop. 4242.

Cas'sel (anc. *Castellum Cattorum*), a walled city of Prussia, the capital of the province of Hesse-Cassel, is pleasantly situated on both sides of the river Fulda, about 132 miles W. of Leipsic and 28 miles S. W. of Göttingen. It is connected by railways with Leipsic, Frankfort, and other towns. It has several public squares, in the largest of which, called Friedrichsplatz, stands the palace of the electors of Hesse. Near this palace is a handsome museum with a library of about 100,000 volumes. Cassel contains an observatory, a valuable picture-gallery, a theatre, several hospitals, a normal school, and academies of painting and sculpture. It has manufactures of cotton, silk, and woollen fabrics, lace, gloves, carpets, hardware, etc. In the environs of Cassel is the royal palace of Wilhelmshöhe,

with beautiful gardens and fountains. This palace was occupied by the emperor Napoleon III. while he was a captive in the autumn of 1870 and the ensuing winter. Pop. in 1871, 46,375.

Cas'sel (Douglas R.), U. S. N., born Oct. 9, 1845, in Ohio, graduated at the Naval Academy as ensign in 1863, became a lieutenant in 1866, and a lieutenant-commander in 1868. While attached to the steam-sloop Brooklyn was slightly wounded at the battle of Mobile Bay, but remained at his quarters until the close of the action. He is thus honorably noticed by his commanding officer, Capt. James Alden, in his report of Aug. 6, 1864: "The other division officers—Capt. Houston of the marines, Lieut. Charles F. Blake, Ensigns Cassel and Sigsbee, with their assistants, Master's Mates Duncan and Stevens—fought their guns nobly and well." He served in the Brooklyn during both the Fort Fisher fights, and led the seamen of the Brooklyn in the assault on the fort of Jan. 15, 1865.

Foxhall A. Parker, U. S. N.

Cas'serly (Eugene), born in Ireland in 1822. In 1824 he emigrated to America with his parents, became a lawyer and journalist of New York, and removed to California in 1850, where he became a Democratic politician and editor in San Francisco. In 1869 he was chosen U. S. Senator from that State, but resigned in 1873.

Cas'sia, a fragrant bark mentioned in the Bible, and supposed to be the cassia-bark of the shops, a coarse variety of cinnamon from China, Anam, and other eastern countries. It is generally sold as cinnamon, which it much resembles, though cheaper and generally inferior in quality. It yields the oil of cinnamon. "Cassia buds" are the dried flower-buds which are brought from China and used in confectionery.

Cassia is the name of a genus of leguminous herbs, shrubs, and trees, natives of both continents. Several African and Asiatic species are valuable for their leaves, which when dried constitute the drug *senna*. The U. S. have numerous species, one of which (*Cassia Marilandica*) yields leaves which have the cathartic properties of senna in a milder degree. "Cassia pulp" or "purging cassia" comes from the pods of *Cathartocarpus Fistula* or *Cassia Fistula*, a tree of India and Egypt, now naturalized in most tropical countries. It contains a large percentage of sugar, and is used in making laxative conserves for medicinal use.

Cas'sian [Lat. *Cassianus*], (John), a monk noted as a promoter of monachism and as an opponent of Saint Augustine, was born about 350 A. D. He founded a large monastery at Marseilles (about the year 415), which was a model for many others in Gaul and Spain. He differed from Saint Augustine respecting grace, and taught doctrines which were called semi-Pelagian. Among his works is a "Treatise on Monastic Institutions." Died about 433 A. D.

Cas'sican, a name applied to the baritas of Australasia and other birds, but appropriately belonging to the genus *Cassicus*, resembling the orioles. The best known species is the *Cassicus cristatus* of South America, a bird twenty inches long, which makes a large nest exhibiting great skill in construction. The nests are often three feet long, and are hung upon the branches of trees. They are gregarious birds, and often build several of their huge nests upon the same tree.

Cas'simere [formerly *kerseymere*, not improbably derived from *Cashmere;* Fr. *casimir;* Ger. *Kasimir*], a twilled woollen or cotton and woollen fabric, either plain or figured, much used for men's clothing. Cassimeres are largely woven in England and the U. S., but especially on the continent of Europe.

Cas'sin (John), an American naturalist, born in Delaware co., Pa., Sept. 6, 1813. He published, besides other works, "American Ornithology: a General Synopsis of North American Ornithology, containing Descriptions and Figures of all North American Birds not given by former American Authors" (1856). Died Jan. 10, 1869.

Cassi'ni (Giovanni Domenico), an eminent astronomer, born near Nice, June 8, 1625. He discovered in 1665 that Jupiter performs a rotation in nine hours and fifty-six minutes, and published in 1668 his ephemerides of the satellites of Jupiter. Invited by Colbert, he removed to Paris in 1669, and became director of the observatory of that city. In 1684 he discovered four satellites of Saturn. His descendants for several generations were able astronomers. Died Sept. 14, 1712. (See his "Autobiography;" also Fontenelle, "Éloge de J. D. Cassini.")

Cassi'no, a town of Italy, in the province of Caserta, 49 miles by rail N. W. of Caserta. Large ruins of Roman theatres and palaces are in the neighborhood. Just above the city, on a high mountain, is the celebrated monastery Monte Cassino, connected with which is a seminary, a gymnasium, and a large library containing many valuable manuscripts. Pop. 5641.

Cassiodo'rus (Magnus Aurelius), a Latin historian and minister of state, was born at Scylacium (Squillace), in Italy, about 468 A. D. He entered the service of Theodoric, king of the Ostrogoths, about 494, and became his chief minister. He had a high reputation for ability and learning, and continued in power for many years. He wrote, besides works on grammar and rhetoric, a "History of the Goths," and a valuable collection of state papers entitled "Variarum Epistolarum Libri XII.," which was printed in 1533.

Cassiope'a, or -pia, Cassiepe'a, or **Cassi'ope** [Gr. Κασσιόπεια, Κασσιέπεια, Κασσιόπη], in classic mythology, the wife of Cepheus and the mother of Andromeda. She was said to have been transformed into a constellation.

Cassiope'ia, or "Lady in the Chair," a constellation in the northern hemisphere, has several stars of the third magnitude. It is represented on the celestial globe as a lady sitting in a chair. Five of its most conspicuous stars are arranged in a figure like a W. In 1572 a new and brilliant star suddenly appeared in Cassiopeia. It was observed by Tycho Brahe in November, and is said to have surpassed all the fixed stars in splendor. It disappeared in Mar., 1574, after a gradual diminution of lustre.

Cassiquia're, or **Cassiquia'ri,** a river of South America, in Venezuela, is a deep and rapid stream, forming the S. bifurcation of the Orinoco. It issues from the Orinoco about lat. 3° 10′ N. and lon. 66° 20′ W., and flowing south-westward about 130 miles, enters the Rio Negro near San Carlos. This remarkable river opens a navigable communication between the Orinoco and the Rio Negro. It is 600 yards wide at its entrance into the latter.

Cassis, the French name of the black currant bush and its fruit. A liqueur called *liqueur de cassis* is made from the fruit, and is used in Europe very extensively.

Cassiter'ides [from the Gr. κασσίτερος, "tin"], the ancient name of certain islands (supposed to be the Scilly Isles) from which the Phœnicians procured tin.

Cas'siterite [from the Gr. κασσίτερος, "tin," and λίθος, a "stone"], native peroxide of tin, composed, when pure, of 21.62 per cent. of oxygen and 78.38 of tin. It is the common ore of tin, and the only one from which the metal is obtained. It occurs massive (as tin-stone), disseminated and fibrous (as wood tin), in rolled pieces, and in grains as sand (stream tin); also crystallized in quadrangular prisms, terminated by four-sided pyramids. Its lustre is splendent. It is obtained chiefly in Cornwall, Banca, Sweden, France, Spain, Chili, and California.

Cas'sius Longi'nus (Caius), a famous Roman conspirator and general, was a friend of Marcus Brutus, whose sister he married. He served as quæstor under M. Crassus, and distinguished himself in the expedition against the Parthians in 53 B. C. After the death of Crassus he defeated the Parthians. In the civil war that ensued he fought for Pompey against Cæsar. He was one of the conspirators who killed Cæsar in 44 B. C., soon after which event he commanded with success in Syria. His army was subsequently united with that of Brutus. Brutus and Cassius, who were the principal leaders of the republican party, were defeated by Antony and Octavius at Philippi in 42 B. C., and then killed themselves. (See Plutarch, "Life of Brutus.")

Cas'sius Parmen'sis, or **Ca'ius Cas'sius Seve'rus,** a Latin poet who wrote epigrams and elegies. He was one of the conspirators who killed the dictator Cæsar, 44 B. C. Having entered the service of Mark Antony, he fought against Augustus, by whose order he was put to death about 30 B. C. Only small fragments of his works are extant.

Cassivelau'nus, or **Cassibelau'nus,** sometimes Anglicised as **Cassib'elan,** a chief of the ancient Britons who ruled over the country N. of the Thames. He fought bravely against Cæsar when the latter invaded Britain in 54 B. C., but Cæsar took his capital and compelled him to pay tribute.

Cas'sock, a long loose garment like a frock-coat, worn under the surplice by the clergymen of the Anglican and Roman Catholic churches. It has a single upright collar. The Catholic priests wear cassocks of various colors, but those of the Anglican clergy are always black, except the purple cassocks which are sometimes used by bishops.

Cassop'olis, a post-village of Cass co., Mich., at the junction of the Chicago and Lake Huron and the Michigan Central R. Rs., 98 miles S. W. of Lansing. It has a national bank, three churches, and two newspapers. P. 728.

Prop. "Vigilant."

Cas'sowary (*Casuarius*), a genus of birds nearly allied to the ostrich (see BREVIPENNES and OSTRICH), but distinctively characterized by still greater shortness of wing, by a laterally compressed bill, by a bony crest, by pendent wattles on the naked neck, and by three toes on each foot, all furnished with claws, the inner toe short, and armed with a very long and sharp claw. Only one species is known, *Casuarius galeatus*, sometimes called emu by the older naturalists before that name was appropriated to the Australian bird, which now alone receives it. The cassowary is a native of the Moluccas, New Guinea, and other Asiatic islands, chiefly inhabiting deep forests. In appearance it is not unlike the ostrich, but has a much shorter neck. It is the largest known bird except the ostrich, and its height is about five feet. It feeds on fruit, eggs, and succulent herbage. When attacked, it defends itself by kicking obliquely backward with its feet, and by striking with its short wings, the rigid barbless shafts of which are otherwise useless, even to aid it in running.

Cass'town, a post-village of Lost Creek township, Miami co., O. Pop. 241.

Cass'ville, a township of Neosho co., Kan. P. 1070.

Cassville, a post-village and capital of Barry co., Mo., 200 miles S. W. of Jefferson City. It has one weekly newspaper. P. 287. JOHN RAY, ED. CASSVILLE "DEMOCRAT."

Cassville, a post-village of Paris township, Oneida co., N. Y. Pop. 152.

Cassville, a post-borough of Huntingdon co., Pa. Pop. 416.

Cassville, a post-village of Grant co., Wis., on the Mississippi River, about 32 miles above Dubuque. Lead is shipped here in steamboats. Pop. 551, or, including Cassville township, 1318.

Casta'lia, or **Cas'taly** [Gr. Κασταλία], a fountain which issued at the base of Mount Parnassus, near Delphi, and was sacred to Apollo and the Muses. The ancient poets imagined that it filled the minds of those who drank of it with poetic inspiration. All persons who visited the temple of Delphi for any religious object were obliged to purify themselves by bathing their bodies or their hair in this sacred fountain. It is now called the fountain of St. John.

Casta'lia, a post-village of Erie co., O., on the Cincinnati Sandusky and Cleveland R. R., 5 miles S. W. of Sandusky. Here is a spring which petrifies vegetable substances.

Casta'nea, the classical Latin name of the chestnut; also the botanical name of a genus of trees of the order Cupuliferæ. Three species of this genus are indigenous in the U. S.—viz. *Castanea vesca* (chestnut tree), the *Castanea pumila* (chinquapin), and the golden chinquapin, or chestnut of the Pacific coast. (See CHESTNUT.)

Cas'tanets, a musical instrument consisting of two hollow shells of ivory or wood, which are bound together on the thumb, and struck by the fingers to produce a trilling sound in keeping with the rhythm of dances. Castanets were introduced into Spain by the Moors. They take their name from the Lat. *castanea*, a "chestnut," from their being made of chestnut wood. The castanets are used in the ballet and in the opera.

Casta'ños, de (FRANCISCO XAVIER), duke of Baylen, a Spanish general, born April 22, 1756. He obtained the command of a corps in 1808, and defeated the French general Dupont at Baylen in July of that year. Dupont then surrendered his army, amounting to 18,000 men. Castaños distinguished himself at the battle of Vitoria, June, 1813. He was appointed captain-general in 1823. Died Sept. 24, 1852.

Caste [from the Port. *casta*, a "race"], a term originally applied to the distinct classes of society established under the Brahmanical régime in India. When the Portuguese first visited that country, at the close of the fifteenth century, they found their intercourse with the natives seriously interfered with by arbitrary social laws; certain pursuits were invariably followed by persons of a certain class, and any attempt to induce a man to perform offices which did not, according to the prevailing notions of the country, belong to his class, was obstinately resisted. The difference in appearance between some of these classes—as, for example, between the Soodras and persons of the priestly or military class—was so striking as to suggest the idea of an original difference of race; and hence the Portuguese employed the word *casta* ("race") as a general term to designate the distinctions above referred to.

According to the "Institutes of Manu" (considered by the Hindoos to be a work of divine authority, and regarded by them, indeed, in much the same light as the Law of Moses was regarded by the Israelites), there are four pure castes or classes: 1st, the priestly class, fabled by the Brahmans to have proceeded from the mouth of Brahmâ, the Creator; 2dly, the military class (called Kshatriyas, or Chuttrees), supposed to have sprung from his arm; 3dly, the mercantile class (Vaisyas), said to have been produced from his thigh; and lastly, the servile class (Soodras or Sudras), fabled to have sprung from his foot. There is reason to believe that the three higher classes were composed of persons of the original Aryan race (see ARYA), but that the Soodras came from the tribes which the Aryas had conquered. Besides the four pure classes, there are various mixed or impure classes, some of which (the Chandâlas, for example) are so vile that their very shadow is pollution, and a Brahman is forbidden to take shelter under the same tree with one of these miserable outcasts. The term *pariah* (a word said to be derived from the Tamul, and to signify "inhabitant of the mountains;" see PARIAH) is used in the south of India in a more general sense to denote any of the impure or degraded classes.

The Brahmans or priestly caste having (as they claim) proceeded from the mouth of Brahmâ, became his spokesmen or the interpreters of his will. The appropriate occupation of a Brahman is to teach the Vêda. It is proper to observe that the Brahmans are not all priests, but from their class alone priests are to be chosen. Many of them at the present day follow the profession of arms.

The military class is composed of warriors, chieftains, and kings. To the members of this class (Kshatriyas) only is the *executive* power of the state properly to be entrusted, though in some rare instances Brahmans have performed the part of princes, and, as already intimated, they share, at the present time, the profession of arms with the Kshatriyas.

The Vaisyas are supposed to compose the mercantile class, and also to include agriculturists, herdsmen, etc.; but in point of fact members of the two upper classes also not unfrequently engage in mercantile pursuits. Manu expressly states that in case a Brahman is unable to support himself by the offices appropriate to his calling—viz. "assisting to sacrifice, teaching the Vêdas, and receiving gifts from a pure-handed giver"—he may follow the profession of a soldier or engage in mercantile pursuits.

It is the duty of Soodras to serve the superior classes, and especially the Brahmans. It is their place to perform various menial duties, but the lowest offices in the community (that of scavenger, for example) are invariably performed by persons of the impure or mixed classes.

With respect to the first origin of caste, there can be no reasonable doubt that the institution was the invention of the Brahmans. This is shown by the manner in which the Brahmans are spoken of in the "Institutes," more particularly in those parts which treat of the duties of the other classes. "From his high birth alone a Brahman is an object of veneration even to the gods" (chap. xi. 85). "Though Brahmans occupy themselves with all sorts of mean occupations, they must invariably be honored, for they are something transcendentally divine" (ix. 319). "Let not a king, although in the greatest distress for money, provoke Brahmans to anger by taking their property; for they, once enraged, could immediately, by sacrifices and imprecations, destroy him, with his troops, elephants, horses, and cars" (ix. 313). "No greater crime is known on earth than slaying a Brahman" (viii. 381). "A Brahman is born above the world, the chief of all creatures. . . . Whatever exists in the universe is all, in effect, though not in form, the wealth of the Brahman" (i. 100). In order to guard the sanctity of the priestly caste against all encroachments, a man of any of the lower castes is strictly prohibited from marrying a Brahmanî (a Brahman woman), and the children of such marriages are irredeemably base. The offspring of a Brahmanî and Soodra (called a Chandâla) is accounted the vilest of mortals. By thus affixing an indelible mark of abhorrence upon the children, they inspire perhaps a stronger fear of such marriages than they could do by the most terrible punishments inflicted upon the parents themselves.

Whether the regulations respecting caste, as they are laid down in the "Institutes of Manu," were ever strictly enforced, has been doubted by many. Respecting this interesting question, in the entire absence of all historical testimony,* we can only reason from probabilities. The great reverence with which the "Institutes of Manu" seem to have been always regarded among the Hindoos who accept the Brahmanical religion renders it not improbable that at one time those regulations may have been as strictly observed as the ritual of the Levitical law was observed by the ancient Israelites. It would certainly be unreasonable to infer that because such an observance has not obtained

* It is scarcely necessary to inform the intelligent reader that nothing deserving the name of history can be found in any of the ancient Hindoo writings, if we except those relating to the little state of Cashmere.

in modern times, when the entire Hindoo nation has been subjugated first to one foreign despotism and then to another, it may not have prevailed in a remote antiquity, when (as there is every reason to believe) a large part of India was under the rule of sovereigns professing the Brahmanical religion. Nor can we safely argue against such an observance from the state of society represented in Hindoo dramas written near the time of the Christian era, for that was after the rise of Booddhism had broken the Brahmanical yoke, and though the new religion was subsequently displaced, the influence of the freedom which it had introduced was not wholly lost upon the people of India; in the same manner as the influence of the Revolution was felt in France even after the restoration of the Bourbons.

The doctrine of the transmigration of souls (which appears to have been almost universally accepted in India among all classes and in all ages of which we have any definite knowledge) became the principal and a most terrible engine in the hands of the Brahmans for curbing and breaking the spirit of the other classes. It may well be doubted whether the comparatively vague fear of eternal punishment taught among the nations of the West was calculated to exert anything like so powerful an influence on the mind as the definite, though infinitely varied, terrors which the priests of India presented to the imagination of the laity. Thus, one who steals the gold of a priest (unless he makes expiation in this life by some voluntary and cruel penance) will be born a thousand times in the form of a spider or some disgusting reptile; he who kills a Brahman, after having passed a long period in terrible torture will be born as a boar or some other low animal, or as a Chandâla. The poet Lucretius expressed his anxiety lest his friend Memmius, through fear of "eternal punishment after death," should be prevented from a candid and dispassionate examination into the false religious views then prevailing, because in the face of such awful terrors the mind has no means or power of standing firm. But the terrors to which the Hindoos were exposed were still more difficult to be resisted, because they appeared naturally, if not inseparably, connected with a belief (that of transmigration) which seemed indigenous, so to speak, in the Hindoo mind. There is great reason to believe that it was the intolerable tyranny of caste under the Brahmans which prepared the people of India for the rise and rapid spread of Booddhism. (See GAUTAMA.) At all events, there can scarcely, we think, be a reasonable doubt that the rise of Booddhism, which absolutely rejected all the distinctions of caste, has essentially contributed to mitigate the extreme rigor of the system as it originally prevailed.

J. THOMAS.

Castel'-a-Ma're (*i. e.* "fortress on the sea"), or **Castellama're di Stabia,** a fortified city and seaport of Italy, in the province of Naples, is finely situated on the Gulf of Naples, 17 miles by rail S. E. of Naples. It has a royal palace, a cathedral, several convents, a military hospital, and a royal dockyard; also manufactures of cotton, linen, silk, and sailcloth. The castle from which the town takes its name was built in the thirteenth century by the emperor Frederic II. It is near the site of the ancient *Stabiæ*, where Pliny was killed by an eruption of Vesuvius in 79 A. D. Pop. in 1872, 26,381.

Castel-a-Mare del Golfo, a seaport-town of Sicily, in the province of Trápani, is on a gulf of its own name, 20 miles E. of Trápani, near the site of the ancient *Segesta*. It exports cotton, wine, fruit, and manna. Pop. 8986.

Castelar' (EMILIO), an eminent Spanish orator and republican, was born in 1832. He founded in 1864 a journal called "La Democracia," in which he developed his social and political principles. He was condemned to death in 1866, but he escaped to France. In 1868 he returned to Spain, and became a member of the Cortes and a leader of the republican party. He is considered the most eloquent political orator in Spain. He has contributed articles to the "Fortnightly Review," published in London. He became minister of foreign affairs Feb. 12, 1873, and president of the Spanish republic Sept., 1873 to Jan. 3, 1874.

Castel'-Buo'no (*i. e.* "good castle"), a town of Sicily, in the province of Palermo, is in the Madonian Mountains, 4 miles S. S. E. of Cefalú. It has mineral springs, and a trade in manna. Pop. 7948.

Castel'-Gandol'fo, a village of Italy, picturesquely situated on the N. W. side of Mont Albano, about 13 miles S. E. of Rome. Here are numerous villas and the pope's summer residence.

Castella'na, a town of Italy, in the province of Bari, 24 miles S. E. of Bari. Pop. 9061.

Castellane'ta, a town of Italy, in the province of Lecce, 21 miles N. W. of Taranto. It has a cathedral and several convents. Pop. 6363.

Castel'lo Bran'co (*i. e.* "white castle"), a town of Portugal, in the province of Beira, 55 miles S. E. of Coimbra. It is a bishop's seat, and has a ruined castle. Pop. 6585.

Castel'lo de Vi'de, a walled town of Portugal, in Alemtejo, about 124 miles E. N. E. of Lisbon. It has a castle, and manufactures of woollen cloth. Pop. 5285.

Castellon', a province of Spain, bounded on the N. by Tarragona, on the E. by the Mediterranean, on the S. by Valencia, and on the W. by Teruel. It is a wild mountainous region, and contains many mines and mineral springs. Area, 2447 square miles. Capital, Castellon de la Plana. Pop. 288,981.

Castellon' de la Pla'na, a town of Spain, capital of the province of the same name, is in an extensive and fertile plain about 2 miles from the Mediterranean, and 40 miles N. N. E. of Valencia, with which it is connected by a railway. It is well built, with wide and straight streets, and is supplied with water by a magnificent aqueduct. It has a handsome episcopal palace, a theatre, a hospital, and several convents; also manufactures of linen, woollen, and hempen fabrics, sailcloth, paper, firearms, glass, soap, etc. Francisco Ribalta, the famous painter, was a native of this town. Pop. 20,123.

Castelnaudary (anc. *Sostomagus*), a town of France, department of Aude, is on an eminence near the Canal du Midi, 22 miles W. N. W. of Carcassonne. It has manufactures of silk and woollen fabrics and earthenware. The canal here expands into a commodious basin 1300 yards in circumference. This town was founded on the site of *Sostomagus* by the Visigoths, who called it *Castrum Novum Arianorum*. It was taken by the English Black Prince in 1355. Pop. 9075.

Castelnuo'vo, a city in Austria, province of Dalmatia, on the canal of Cattaro and the Bay of Topla, has ancient walls and towers. Pop. 7423.

Castelnuovo, a market-town of Northern Italy, in the province of Alessandria, 14 miles N. W. of Asti. It has a mineral spring. Pop. 5011.

Castel-Sarrasin, a town of France, department of Tarn-et-Garonne, is near the river Garonne, 14 miles W. of Montauban. It was formerly fortified. It has manufactures of serge and worsted stockings. Pop. 6838.

Castel Ter'mini, a town of Sicily, in the province of Girgenti, 16 miles N. of the city of Girgenti. It has mines of rock-salt and sulphur. Pop. 7346.

Castel'-Vetra'no, a town of Sicily, province of Trápani, 23 miles S. E. of Trápani. It has several convents and an old castle and cathedral. Articles of coral and alabaster are made here. Pop. in 1872, 20,420.

Castiglio'ni (CARLO OTTAVIO), COUNT, an Italian philologist, known as the editor of Ulfila's Gothic Bible (1819), was born in 1784. He also wrote a memoir upon the history of the Arab cities of Africa (1826). Died April 10, 1849.

Castile, kas-teel' [Sp. *Castilla*, the "land of castles"], a former kingdom of Spain, occupied the central table-land of the peninsula, and was the nucleus and central seat of the Spanish monarchy. The kingdom of Castile was founded about 1035 by Ferdinand I., who conquered Leon and annexed it to Castile. By the marriage of Ferdinand the Catholic with Isabella of Castile in 1469, Castile and Aragon were united into one kingdom. The Castilians have been long distinguished for their pride or haughtiness. The Castilian dialect is considered purer than the dialects spoken in other parts of Spain. Pop. 3,270,516. Castile was divided into two portions, OLD and NEW CASTILE (see below).

Castile, a post-village and township of Wyoming co., N. Y., on the Erie R. R., 75 miles N. W. of Corning. Pop. of village 712; of township, 2186.

Castile, New [Sp. *Castilla la Nueva*], an old province of Spain, the S. portion of the kingdom of Castile, has an area of 21,081 square miles. Former capital, Madrid. It is a table-land, bounded on the N. by the Sierra Guadarrama and on the S. by the Sierra Morena. This range of mountains is rich in minerals. The soil of this region is partly sterile and not well watered. The plains receive little rain, and are nearly destitute of trees. Large flocks of sheep are raised here. New Castile is divided into four provinces—viz. Madrid, Toledo, Cuenca, and Guadalajara. Pop. 1,289,145.

Castile, Old [Sp. *Castilla la Vieja*], an old province of Spain, is bounded on the N. by the Cantabrian Mountains, on the E. by Aragon, on the S. by New Castile, and on the W. by Leon. Area, 25,412 square miles. The surface is diversified by several ranges of mountains and high table-lands, which are arid and nearly destitute of forests.

The soil in many parts is rendered sterile by deficiency of water. The chief rivers of this region are the Douro and the Ebro. Sheep and cattle constitute the principal riches of the inhabitants. Old Castile is divided into the provinces of Burgos, Valladolid, Palencia, Avila, Logroño, Segovia, Santander, and Soria. Pop. 1,716,193.

Casti'lla (Don Ramon), a general in the Peruvian war of independence, born Jan. 31, 1797, after the annexation of Peru to Bolivia in 1835 fled the country. He returned upon the restoration of independence in 1839, and became finance minister. In the second war with Bolivia he was taken prisoner and exiled; he returned in 1844, deposed the dictator Vivanco, and became president of Peru 1845–51, to which dignity he was re-elected in 1855, and again in 1858. Died May 30, 1867.

Castille (Charles Hippolyte), a French author, born Nov. 8, 1820. He wrote a number of romances in which the interest is of a dreadful character, and later biographical parallels, a history of the Second Republic (1854), and political portraits (1856–60).

Castine, kas-teen', a port of entry of Hancock co., Me., is on the E. side of Penobscot Bay, at the mouth of the Penobscot River, 34 miles S. of Bangor. It is 9 miles E. of Belfast, which is on the opposite side of the bay. It has a good harbor, a custom-house, and manufactures of boats, ships and ship furniture, cordage, brick, etc. It has a State normal school. Pop. including Castine township, 1303.

Cast'ing Vote, the vote of the president or chairman of a public assembly, or the Speaker of a legislative body. This vote decides the question whenever there is a tie—*i. e.* when the votes of the assembly are equally divided. The Vice-President of the U. S. never votes except in case the Senators are equally divided. The Speaker of the British House of Commons never votes except in a similar contingency. It is usual for the Speaker to give a casting vote in such a way that the House will have an opportunity of reconsidering its decision.

Cast Iron. See Iron, by A. S. Hewitt, A. M.

Castle (kas'l), [Sax. *castel;* Lat. *castellum,* dimin. from *castrum,* a "camp"], a name given to a building constructed as a dwelling, as well as for the purpose of repelling attack. The name is especially given to buildings of this kind constructed in Europe in the Middle Ages. The *castella* of the Romans were constructed on the model of their stationary encampments, and may have suggested the castles of the Middle Ages, though designed for military purposes only. Traces are found in various parts of Great Britain of castles which are ascribed to its aboriginal or early inhabitants. Traces of Saxon, and even Norman, workmanship are found in structures originally Roman. But of castles for residence as well as defence few are of higher antiquity than the Conquest. The absence of strongholds was one reason why William the Conqueror so easily became master of England; as a protection against the resentment which the conquest occasioned most of the great Norman castles were built. As these castles grew in strength they afforded their possessors not only security from their fellow-subjects and their subordinates, but independence as regarded the monarch. Similar conditions in other countries led to similar results. No small portion of the history of Europe during the feudal period consists of an account of the attempts which were made by the monarchs to extirpate these dens of thieves.

The castle was generally surrounded by a moat, foss, or ditch; and that the ditch might be readily filled with water, the site was usually the bank of a river or a lake. Inside the ditch mounds were constructed, with walls and towers, both supplied with battlements and bastions. The gates were protected by towers usually of great strength. The bridge across the moat was made to draw up and down, and the entrance, in addition to thick doors, was protected by a portcullis, dropped down through grooves at the sides. The gate was further defended by a barbican and by machicolations. Passing the external wall, one entered the bailey, or ballium, which consisted of several courts, and contained the barracks, magazine, well, and chapel. Within the ballium was the donjon, keep, or citadel, a species of internal castle, placed in the most advantageous position to afford a last chance to the garrison when driven from the external works. The protection which the castle afforded to the retainers of a baron led to the construction of houses around the moat, and to this custom a very large number of the towns in Europe owe their origin.

Cas'tlebar, a town of Ireland, capital of the county of Mayo, is on the Castlebar River, about 160 miles W. N. W. of Dublin. It has an old castle, once a stronghold of the De Burgh family; also manufactures of coarse linen. The earl of Lucan has a country-seat near this town. Castlebar was taken by the French general Humbert in 1798. Pop. 2960.

Castle Grove, a post-township of Jones co., Ia. Pop. 839.

Castle Hill Plantation, a township of Aroostook co., Me. Pop. 237.

Cas'tlemaine, a city in Australia, province of Victoria, in the neighborhood of rich gold-mines, connected by rail with Melbourne, 70 miles distant. Pop. 9683.

Cas'tle Peak, California, is a peak of the Sierra Nevada, about lat. 38° 10′ N. Its height is estimated at 13,000 feet.

Cas'tlereagh (Robert Stewart), Viscount, marquis of Londonderry, an able British Tory statesman, born in the county of Down, Ireland, June 18, 1769. He was the eldest son of the first marquis of Londonderry. He entered the House of Commons in 1794, and efficiently promoted the union of Ireland with England in 1800. In 1802 he was appointed president of the board of control by Mr. Pitt. He became secretary of state for the department of war and the colonies in 1805, and fought a duel with George Canning in 1809. About this time he was the favorite leader of the Tory party, and a political rival of Canning. He entered the ministry of Lord Liverpool as secretary for foreign affairs in Feb., 1812, and as such was a powerful director of the coalition against Napoleon. He represented Great Britain at the Congress of Vienna, 1814, and the Congress of Paris, 1815. On the death of his father, in 1821, he inherited the title of marquis of Londonderry. He committed suicide Aug. 12, 1822, and left no issue. (See his "Memoirs and Correspondence," 8 vols., 1848.)

Castle Rock, a post-township of Dakota co., Minn. Pop. 703.

Castlestu'art, Earls of (1800), Viscounts Stuart (1793), Barons Castlestuart (1619, Ireland), and baronets (Scotland, 1637).—Charles Andrew Knox, fourth earl, born 23d April, 1810, succeeded his brother Feb. 20, 1857.

Cas'tleton, a township of Barry co., Mich. Pop. 1738.

Castleton, a township of Richmond co., N. Y., on the N. side of Staten Island. The township contains the villages of New Brighton and Tompkinsville, and a "Sailor's Snug Harbor," an asylum for the children of seamen, several extensive dyeing and color-printing establishments, and other manufacturing interests. It has many elegant residences of New York merchants and manufacturers. Pop. 9504.

Castleton, a post-village of Schodack township, Rensselaer co., N. Y., on the Hudson River and the Hudson River R. R., 9 miles S. E. of Albany. It has a national bank. Pop. 580.

Castleton, a post-village of Rutland co., Vt., on Castleton River and on the Rensselaer and Saratoga R. R., 11 miles W. of Rutland. It is the seat of Castleton Seminary and a State normal school, and has five churches, a national bank, and manufactures of agricultural implements, marbleized slate, etc. Pop. of Castleton township, 3243.

Cas'tletown, an English town, capital of the Isle of Man. It has a Danish fortress, Castle Rushen.

Cas'tlewood's, a township of Russell co., Va. Pop. 1886.

Castor. See Beaver.

Cas'tor, a remarkable binary or double star of the second magnitude in the constellation Gemini, is called also α Geminorum. The two stars rotate around their common centre of gravity, and according to Sir John Herschel perform a rotation in 253 years.

Castor, a township of Madison co., Mo. Pop. 1000.

Castor, a township of Stoddard co., Mo. Pop. 2785.

Castor and **Pol'lux** [Gr. Κάστωρ and Πολυδεύκης], heroes of classic mythology, called also **Dioscu'ri** ("sons of Jove"), were twin brothers. They were supposed to be sons of Jupiter and Leda, or, as some say, of Tyndareus and Leda. They took part in the Argonautic expedition and the Calydonian hunt. Castor excelled in horsemanship, and Pollux in pugilistic contests. According to tradition, Pollux was immortal, and when Castor was killed offered to share his fate, and they were permitted to enjoy life by turns. They were translated into or identified with the constellation Gemini, "The Twins."

Castor and Pollux, the name given to an electrical meteor which sometimes appears at sea, attached to the extremities of the masts of ships, under the form of two balls of fire. Sailors consider this phenomenon a sign of fair weather, but a single ball, which is called Helena, is supposed to portend a storm.

Castor (Antonius), an ancient physician of high reputation who lived at Rome in the Augustan age, and died about 80 A. D. Pliny states that he had a botanic garden, the first mentioned in history.

Casto'reum, or **Cas'tor,** a substance secreted in glandular sacs closely connected with the reproductive organs of the beaver (*Castor fiber*). Each beaver produces two of these sacs or pouches. This substance is used by perfumers, and was formerly esteemed a valuable remedy for hysteria, catalepsy, and other diseases. It is an antispasmodic.

Casto'ria, a township of San Joaquin co., Cal. Pop. 1184.

Castor'idæ, a family of Mammalia of the order Rodentia, comprises the beaver (*Castor*), which is the typical genus, the coypu (*Myopotamus*), and the musquash.

Cas'tor Oil (*Oleum Riçini*), a fixed oil from the seeds of the castor-oil plant. The best variety is obtained by pressure in the cold, and is known as *cold-pressed* castor oil. But the warm-pressed Italian oils are the pleasantest as a medicine. In the Indies great quantities are prepared by boiling the seeds, but the oil is irritating, dark in color, and not fit to use as a medicine. Exposure to the sun's light bleaches the oil. When pure, castor-oil is of a light-yellow color, but when of inferior quality, it has a greenish, and occasionally a brownish, tinge. It is sometimes thick and viscid. Its specific gravity is about 960 (water being taken as 1000). It has a nauseous smell and a disagreeable taste. The principal acid present in it is ricinolic, allied to oleic acid.

The best castor oil is one of the mildest of purgatives. In doses of one or two tea-spoonfuls it forms a gentle laxative, while a dose of a table-spoonful will almost always open the bowels freely. The only objection to the use of castor oil is its disagreeable flavor; some attempt to get over this difficulty by floating the oil on hot coffee, or mixing it with twice its bulk of spiced syrup of rhubarb. It is also much used in the arts as a lubricant for machinery, carriage-wheels, and leather. In Hindostan it is extensively employed as a lamp oil.

The Castor-oil Plant (*Riçinus communis*) is a native of the south of Asia and of Northern Africa, naturalized in the south of Europe and in other warm regions. It belongs to the order Euphorbiaceæ, and has panicled flowers; the fruit a three-celled capsule, with one seed in each cell. The castor-oil plant is often cultivated in gardens in Europe and the U. S., where except in Southern Florida it is only an annual, attaining a height of three to ten feet, highly ornamental by its stately growth, its large, broad, palmate peltate leaves and its purplish hue. In warmer climates it is perennial, and becomes arborescent, attaining even thirty feet in height. From the resemblance of its seeds to an insect called ricinus, it received that name from the Romans. The seeds are oval, and about four lines long. They are chiefly valued for the oil which they yield, on account of which the plant is cultivated in the Levant, Spain, Provence, the Indies, Brazil, and the U. S. Illinois and Missouri are the chief seats of its culture, and St. Louis of the oil manufacture in the U. S.

Castres, an ancient town in the S. of France, department of Tarn, on the river Agout, 34 miles by rail N. E. of Castelnaudary. It is the most populous town in the department, and is the seat of a Protestant consistory, having been one of the strongholds of the early Huguenots. Castres has important manufactures of cassimeres, military clothing, cotton goods, paper, soap, and copperware. Pop. 21,357.

Cas'tro (anc. *Mitylene*), a seaport-town of Asiatic Turkey, capital of the island of Mitylene, is on its E. coast, 55 miles N. W. of Smyrna. It has a large castle and several churches and mosques. Some remains of the ancient *Mitylene* are visible here. Pop. 6000.

Cas'tro del Ri'o, a town of Spain, in Córdova, on the river Guadajoz, 21 miles S. E. of Córdova. The streets are mostly wide and regular, and lined with well-built houses. It has a spacious church with a high tower, two colleges, two hospitals, and several convents; also manufactures of linen and woollen fabrics, brandy, wine, etc. Pop. 8852.

Cas'tro Giovan'ni (anc. *Enna*), a town of Sicily, in the province of Caltanisetta, is on a fertile plateau 4000 feet above the level of the sea, 14 miles N. E. of Caltanisetta. Here is a feudal fortress of Saracenic origin. The ancient *Enna* was the site of the most famous temple of Ceres, and was supposed to be a favorite resort of that goddess. Pop. 14,084.

Castrovilla'ri, a fortified town of Italy, in the province of Cosenza, 32 miles N. of Cosenza. It has an old castle, and a trade in silk, manna, and wine. Pop. 7931.

Cas'troville, a post-township of Monterey co., Cal., near the mouth of the Salinas River. It is connected with San Francisco by steamboat. Pop. 1302.

Castroville, a post-village, capital of Medina co., Tex., on the Medina River, 25 miles W. S. W. of San Antonio. It has one weekly newspaper. Pop. 515.

Cast Steel. See Steel, by A. L. Holley, C. E.

Castue'ra, a town of Spain, in the province of Badajoz, 75 miles E. S. E. of Badajoz, near the river Guadiana. It has manufactures of earthenware and a trade in fruit and wine. Pop. 6221.

Casuari'na, "the cassowary tree," a genus of trees of the order Amentaceæ, sub-order Casuarineæ, mostly natives of Australia. Some of them are large trees, producing hard and heavy timber of excellent quality, which is called beef-wood, from its resemblance to the color of raw beef. One species, the *Casuarina equisetifolia*, grows wild in the South Sea Islands, the peninsula of Malacca, and other places. It is a lofty tree, which is valued in India for its timber, which is very durable and hard. All the trees of this genus have a peculiar appearance, having long, slender creeping or drooping branches, which are jointed, and bear scales instead of leaves. The flowers have neither calyx nor corolla, and the stamens and pistils are in separate flowers.

Cas'uistry [from the Lat. *casus*, a "situation"] is that branch of ethics which deals with delicate or perplexing moral questions, and which supplies rules for resolving the same, partly from natural equity, and partly from the authority of Scripture, the councils, Fathers, etc. Casuistry has been studied chiefly by ancient Jewish, and later by Roman Catholic writers, who generally call it "moral theology." Traces of it are, however, found in the philosophers of ancient Greece, but the healthy reason of antiquity could not enter into the refinement of morals found in certain Jewish and Christian writers. The Schoolmen elaborated it into a science, and the Jesuits Molina, Escobar, Sanchez, etc. became notorious for their ingenuity in the construction of moral puzzles, and for the immorality of their solutions. Certain Protestant writers, as Baxter, Jeremy Taylor, and others, have written much on these subjects with a different animus. The University of Cambridge has a professorship of this science, which is now generally regarded as practically obsolete, for most modern authorities are of the opinion that an educated moral sense is the best practical guide in cases of conscience.

Ca'sus Bel'li (a "case of war," or, in other words, a "case justifying war"), a Latin phrase used to denote an act or event which involves war or justifies a declaration of war. It is the reason alleged by one power for waging or declaring war against another.

Cas'well, a county of North Carolina, bordering on Virginia. Area, 400 square miles. It is drained by the Dan and Hycootee rivers. The surface is undulating; the soil is fertile. Iron ore is found. Grain, tobacco, and wool are important products. The Richmond and Danville R. R. crosses the N. W. part of the county. Capital, Yanceyville. Pop. 16,081.

Caswell, a township of Calhoun co., Ark. Pop. 220.

Caswell, a township of New Hanover co., N. C. Pop. 1087.

Caswell (Alexis), D. D., LL.D., an American educator, born about 1805, was a professor of mathematics in Brown University from 1828 to 1864. He was president of that institution from 1868 to 1871.

Caswell (Richard), an American patriot and statesman, born in Maryland Aug. 3, 1729, removed to North Carolina, where he served with distinction against the British, and subsequently became governor of the State. He assisted in framing the Federal Constitution in 1787. Died Nov. 9, 1789.

Cat [a word found in various forms in many Indo-European and in some other languages], a name sometimes extended to the whole family Felidæ, including the lion, tiger, lynx, etc., sometimes limited to the smaller species of that family, and sometimes to the genus *Felis* proper, which is distinguished from the rest of the family by having a longer tail and four molar teeth on each side of the upper jaw, while the others have but three. This genus includes the lion, tiger, and all the larger Felidæ, as well as the domestic cat and the wild-cat of Europe, but not the wild-cat of America, which is a lynx.

It is not easy to say what was the original abode of the domestic cat (*Felis domestica*). It not unfrequently escapes to a wild state, but no properly wild species exactly resembles it. It is asserted that the domestic cat of ancient Egypt was the *Felis maniculata*, a species differing considerably from ours. The cat is scarcely mentioned in the

authors of ancient Greece, Rome, and Judæa, and it is known that in the earlier mediæval period of Europe cats were comparatively rare and costly animals. They seem to have been long known in China, which affords a fine variety with a soft and beautiful fur and pendulous ears. It is, however, regarded as probable that the wild-cat of

European Wild Cat.

Europe and Asia, though somewhat different anatomically, may be the progenitor of the domestic cat. Among the more remarkable varieties are the Manx or Cornish cat, with a merely rudimentary tail; the Angora cat, with long hair; the Maltese and Chartreuse cats, with a bluish-slate color, etc.

Catacaus'tics [from the Gr. *κατά*, "down" or "back," and *καίω*, "to burn"] are the caustic curves formed by the reflection of the rays of light, and are so called to distinguish them from the diacaustic, which are formed by refracted rays. (See CAUSTIC.)

Cat'acombs [probably from the Gr. *κατά*, "down," and *κύμβη*, a "hollow"], a pit or excavation under ground, employed usually as a receptacle for the dead. The name is applied especially to those at Rome, but also to those of Egypt, Naples, Syracuse, Malta, and other places. Even the quarries under Paris, now used as charnel-houses, are often called by this name. The earliest catacombs of Rome are believed by many to date from the persecution of Nero, and they were probably all finished before the fifth century. It has been held that the catacombs of Rome were originally quarries, but most writers now admit that they were executed principally to serve the purpose of burial-places for the dead, tombs or *loculi* being cut on either side of the long galleries and transverse corridors, which run to great distances through the tufa. Some writers assign them a Jewish origin. They were also places of refuge in times of persecution, and Christian worship was no doubt often held there. Still, the traditions of the "Church in the catacombs," of Pope Stephen's subterranean court, and his final martyrdom there, are thought by many to be greatly exaggerated. The catacombs abound in symbols and inscriptions, mostly of Christian origin and commemorative of the dead. They have been of late explored with much care, and the results are very important in the study of Christian archæology. (See BOSIO, "Roma Sotterranea," 1532; PERRET, "Les Catacombes de Rome," 1852–53; ROSSI, "Roma Sotterranea Christiana," 1864 *seq.*; KIP, "The Catacombs of Rome," 1854.)

Catahou'la, a parish of Louisiana. Area, 1200 square miles. It is bounded on the E. and S. E. by the navigable Tensas and Washita Rivers, and also drained by other streams. The soil in some parts is fertile. Cotton, corn, and live-stock are raised. This parish contains Catahoula Lake, which is nearly twenty miles long. Capital Harrisonburg. Pop. 8475.

Catala'ni (ANGELICA), a celebrated Italian singer, born at Sinigaglia in 1784. She had a voice of immense volume, range, and flexibility. Having made her *début* in Italy at an early age, she afterwards performed with great applause in Paris and London, and amassed large sums of money. She was married to a Frenchman named Valabrègue, with whom she resided for some years in Paris. In 1830 she retired from the stage. Died June 13, 1849.

Catalau'nian Plain [Lat. *Campi Catalaunici*], the ancient name of the wide plain surrounding Châlons-sur-Marne, in France. On this plain the Roman general Aetius and his ally, Theodoric the Visigoth, gained a great victory over Attila in 451 A. D.

Cat'alepsy [from the Gr. *κατά*, intensive, and *λαμβάνω*, to "take"], a condition in which a person becomes more or less completely unconscious, but does not fall. If standing at the commencement, he remains so during the attack, the countenance retaining the expression the patient wore at the outset. If the limbs of the patient be placed in a new position by attendants, the position is retained. This disease is a rare one, and indeed is probably not so much a peculiar disease as a symptom of other diseases. It has been observed in both sexes, and may occur in insane persons or in those suffering with chorea and other nervous affections. It has been described as sometimes epidemic. The immediate attack is seldom fatal, and is usually short, but may be indefinitely prolonged. Treatment must be addressed to the general condition. Catalepsy is so rare that its character is not well understood.

REVISED BY WILLARD PARKER.

Catali'na, a port of entry of Newfoundland, on the N. side of Trinity Bay, has an excellent harbor, though difficult to approach. It has a lighthouse and a fine Anglican church. Pop. 1300.

Cat'alogue [Gr. *κατάλογος*; Lat. *catalogus*], a list; an enumeration of the names of books, stars, or other things. The term is used to denote a list of the books contained in a library, or of the works kept for sale by a bookseller.

CATALOGUE RAISONNÉ (rà-zon-ā'), a French term used in statistics, natural science, bibliography, etc., signifies a catalogue of objects arranged in appropriate classes. For example, books are arranged under their several subjects, with a general abstract of the contents of the works where the title does not sufficiently indicate it, thus serving to direct the reader to the sources of information on any topic. The want of alphabetical arrangement is supplied by an index at the end.

CATALOGUES OF BOOKS.—There is nothing connected with the management of any large public library which can compare in importance with the character of its catalogues of books. However large and select its stores, however able its administration, however accessible its contents to the student, its usefulness will be much diminished if its catalogues be not well arranged, frequently revised, and thoroughly at the command of those who use them. "A library," says Carlyle, "is not worth anything without a catalogue; it is a Polyphemus without any eye in his head; and you must front the difficulties, whatever they may be, of making proper catalogues."

And these difficulties are neither few nor small. "There is," says the late Mr. C. C. Jewett (a most competent authority), "no species of literary labor so arduous and perplexing." Indeed, many of the largest libraries of this country and Europe have entirely abandoned the issue of catalogues; and the trustees of the New York State Library in 1872 contented themselves with issuing a catalogue of the authors whose works are in their library, the names of the authors being arranged under the various subjects treated of. Even this meagre subject-catalogue is a large volume. Not one of the first-class libraries of Europe, it is said, has a complete catalogue; and many of those which are most complete are, from their defective arrangement, of little value to the student.

Catalogues may be arranged in an alphabetical table of the names of books and of their authors. But the same author may have issued books under two names, as White and Albius. It is the librarian's duty to be so well informed in bibliography as to be able to bring the works of such an author under one head, and make all necessary references. Again, the number of anonymous, pseudonymous, apocryphal, and supposititious works is very great. Even Voltaire saw fit to publish works under the names of other famous men. All such matters it is the part of the catalogue to explain. Others, again, prefer to have books catalogued under the heads of the various subjects of which they treat. This plan is of very great use to editors and compilers, and indeed to all literary men. Much discussion has prevailed, especially in France, as to the relative merits of the two plans just referred to; and among the numerous class who prefer the arrangement by subjects there is great difference of opinion as to how the subjects themselves shall be arranged. For example, under the head of theological books, there must be many minor heads to enable the reader conveniently to find in a large library the book he may desire.

The plan of combining into one both the above systems of cataloguing was perfected by Mr. Lloyd P. Smith, the accomplished librarian of the Philadelphia Library. His catalogues are arranged according to subjects, and at the

end of the volume is a full alphabetical index, as well of authors as of all the important words of each title. Good judges pronounce his catalogues the best yet published.

In rapidly-growing libraries there is much difficulty and expense in keeping the catalogues up with the times. Various plans have been proposed to overcome the difficulty. The British Museum has catalogues interleaved with blank pages, on which the names of new books are written—a clumsy and unsatisfactory arrangement. Mr. Jewett in 1850 brought forward the plan of having the name of each book stereotyped on a separate block, so that it is easy to insert the names of new books in their proper places in a new catalogue without the great expense of setting up type anew for the whole volume.

The present approved plan of keeping up a manuscript catalogue is to write the title of each book on a card, and to keep the cards so prepared, together with those containing the necessary cross references, arranged alphabetically in drawers. (For the subject of general catalogues of books, see BIBLIOGRAPHY.) CHAS. W. GREENE.

Catalo′nia [Sp. *Cataluña*], an old province of Spain, is bounded on the N. by France, on the E. by the Mediterranean, on the S. by Valencia, and on the W. by Aragon. Area, 12,514 square miles. Pop. in 1867, 1,744,052. Capital, Barcelona. The Pyrenees extend along the northern border of this region, which is extremely mountainous. The highest summits are covered with perpetual snow. The soil of the valleys is fertile, and this is said to be the best cultivated part of Spain. The orange, the olive, the grape, and cereal grains flourish here. The principal rivers are the Ebro and Llobregat. Among its minerals are copper, cobalt, lead, zinc, coal, sulphur, and marble. Catalonia surpasses every other province of Spain in the importance of its manufactures, the chief products of which are cotton, silk, and woollen fabrics, paper, firearms, cordage, and leather. Catalonia is divided into the provinces of Barcelona, Tarragona, Lerida, and Gerona. The Catalans speak a peculiar language, different from the Castilian, and nearly related to the Provençal. They surpass the other Spaniards in energy and industry. This region was in ancient times a Roman province called *Hispania Tarraconensis*. The Goths and Moors successively became masters of it. In 1137 it was united with Aragon by a marriage of the sovereigns.

Cataloo′cha, a township of Haywood co., N. C. P. 198.

Catal′pa, a genus of trees of the order Bignoniaceæ. The *Catalpa bignonioides* is indigenous in the Southern U. S., and is planted as an ornamental tree in the Northern States and in Europe. It has large cordate and pointed leaves, and showy flowers in open compound panicles. The fruit is a pod which is often one foot long, and usually remains on the tree all winter.

Catalpa, a township of Culpeper co., Va. Pop. 3388.

Catal′ysis [from the Gr. κατά, intensive, and λύω, to "dissolve"] is a term applied in chemical physics to a force exerted by one substance upon a second, whereby the latter is subjected to change or decomposition, whilst the former, or acting substance, remains comparatively unaltered, and does not combine with it. The force, indeed, has been ascribed to the mere "action of contact." No satisfactory theory has been brought forward to account for these changes, or to define what the force of catalysis is.

Catamaran′ [said to mean "floating trees" in Singhalese], a sort of raft used by the Hindoos of the Coromandel coast, is formed of three planks or pieces of wood lashed together. The middle piece is longer than the others. The catamaran, which is propelled by a paddle, is used by the people of Madras to maintain communication between the shore and ships where the surf is so violent that ordinary boats are unsafe. The catamaran is also used on the coast of Brazil.

Catamar′ca, a province or department of the Argentine Republic, is bounded on the W. by the Andes. The soil is mostly fertile, producing grain and cotton. Area, 35,760 square miles. Capital, Catamarca. Pop. 110,000.

Catamarca, San Fernando de, the capital of the above province, is about 650 miles N. W. of Buenos Ayres. Pop. 5150.

Catame′nia (plu.), [Gr. from κατα, "according to," and μήν, "month"], the monthly sanguineous uterine discharges. They commence in hot climates usually from the age of ten or eleven, and considerably later in colder regions. Each period in a state of health commonly lasts from three to six days. The final cessation occurs, with some exceptions, at the age of forty-five or fifty.

Catamount. See PUMA.

Cata′nia, a province of Italy, in Sicily, is bounded on the E. by the Mediterranean, on the N. by Messina, on the W. by Caltanisetta, and on the S. by Noto. Area, 1948 square miles. The surface is partly mountainous. Among its prominent features is Mount Etna. Capital, Catania. Pop. in 1871, 479,850.

Catania (anc. *Catana*), a city of Sicily, capital of the above province, is beautifully situated on the E. coast, at the foot of Mount Etna, 31 miles N. N. W. of Syracuse; lat. 37° 28′ N., lon. 15° 5′ E. It presents a noble appearance from the sea, and is internally handsome, being well built, with wide and straight streets, which are paved with lava. Some of the public buildings are also constructed of lava. It has been several times nearly ruined by earthquakes and eruptions of Mount Etna, but it has risen again with greater beauty and splendor, and is now perhaps the finest city of Sicily. The most remarkable edifices are the cathedral, rebuilt after the great earthquake of 1693; the town-hall; the university, founded in 1445; and the grand Benedictine convent and church of San Niccolò. Catania has about fifty churches, several hospitals, and a college of arts. In a fine square adjacent to the cathedral is a statue of an elephant formed of lava. The harbor, which was formerly good, has been partly choked by lava from Mount Etna. This city has manufactures of silk and linen fabrics, and of articles and wares formed of amber and lava. The chief articles of export are grain, wine, silk, olives, manna, figs, soda, and snow from Mount Etna. The ancient *Catana* was founded by the Phœnicians or Greeks, and was nearly as old as Rome. It was taken by the Athenian general Nicias about 413 B. C., and was an important city under the Romans, who adorned it with magnificent edifices. The remains of an aqueduct, a temple of Ceres, and a large amphitheatre are still visible here. Catania was severely injured by earthquakes in 1693, 1783, and 1818. Pop. in 1872, 84,397.

Catanza′ro (formerly called **Calabria Ulteriore II.**), a province of Southern Italy, is bounded on the N. by the province of Cosenza, on the E. by the Gulf of Taranto, on the S. by the province of Reggio, and on the W. by the Mediterranean Sea. Area, 2158 square miles. The soil is fertile and the climate healthy. The chief products are wool, cotton, linen, cheese, butter, hemp, oil, silk, wine, and lumber. Chief town, Catanzaro. Pop. in 1871, 412,226.

Catanza′ro, a city of Italy, in the province of the same name, is finely situated on a mountain near the Gulf of Squillace, 33 miles S. S. E. of Cosenza. It has an old castle of the Norman period, a cathedral, a large college, and a royal academy of sciences. Many of its public buildings were destroyed by the earthquake of 1783. Here are manufactures of velvet and of silk and woollen fabrics. Pop. in 1872, 24,901.

Cataplasm. See POULTICE.

Cat′apult [Lat. *catapulta*, from the Gr. κατά, intensive, and πάλλω, to "hurl"], an engine of war used by the ancients for discharging arrows. We are not able, from any descriptions the ancients have left us, to form any exact idea of either the catapult or the ballista. It appears that in the catapult a rope, suddenly freed from great tension, gave impulse to an arrow placed in a groove. There were great catapults, fixed upon a scaffold with wheels, which were used in sieges, and small ones, carried in the hand, which were employed in the field. Originally, ballistæ were employed to throw stones, and catapults to shoot darts; but the terms were often confounded by the later Roman writers.

Cat′aract [Gr. καταῤῥάκτης, from κατά, "down," and ῥήγνυμι, to "break," so named because the ancients believed that a kind of veil fell down within the eye, obscuring vision], an opaque state of the crystalline lens of the eye, of its capsule, or both. Cataracts are thus lenticular, capsular, or lenticulo-capsular. Various other kinds are enumerated, such as the soft cataract, in which the lens is soft, and sometimes even liquid; the hard cataract, when the lens may be as hard as bone, with many of intermediate consistency. Lamellar cataract affects a limited part of one or more of the lamellæ, or layers of the lens. "Gold-leaf cataract" is of a shining yellow, and contains cholesterine and crystalline degeneration products. Cataract is generally white, but sometimes is brown, black, bluish, silvery, etc. It sometimes has a pearly lustre.

Cataract begins in a gradual impairment of vision, some months generally elapsing before sight is lost. The pupil is sensitive to light and atropia, vision being clearest when the pupil is large. There is no pain or intolerance of light. The patient sees as in a mist, but almost always can perceive at least the presence of light. The pupil on examination is seen to be opaque, but the eye is neither hardened nor softened and the expression of the face is quite natural. One or both eyes may have cataract. It is most frequent in elderly persons, but may occur at any age; children are sometimes born with it. Medical treatment for cataract is

useless, but the skilful surgeon can treat the disease often with the happiest results. The operation is either (1) extraction of the lens and its capsule, (2) depression or couching of the same, or (3) laceration with appropriate instruments, with a view of inducing absorption of the diseased part. This last operation is the most common, and often is the only one admissible. Great care should be taken for a long time to prevent inflammatory action. The place of the lens is supplied by a kind of spectacles called cataract glasses. By these means the sight is often to a great degree restored.

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Cataracts and Rapids. The regular slope of the river-bed is sometimes interrupted by more inclined and rocky planes, over which the stream, flowing with increased velocity, forms *rapids*, or by abrupt and nearly perpendicular walls, from which the foaming water descends from rock to rock, or in a single leap, in imposing *cataracts* or picturesque *waterfalls*. Usage, however, often confounds these names. The famous cataracts of the Nile are merely rapids, which impede, but do not entirely prevent, navigation. The Falls of St. Anthony, in the Upper Mississippi, the great falls of the Upper Missouri, and, the grandest of all, the rapids of the St. Lawrence at Long Sault and Lachine, above Montreal, are among the noblest examples in our American rivers.

The highest waterfalls are found in mountainous regions in the upper course of rivers; the largest in their middle course. Among the first, that of the Yosemite, in California, is perhaps the most remarkable. It falls from an almost perpendicular ledge of rock over 2500 feet high to the bottom of the valley of the same name, forming three cataracts, the first descending by a single leap of 1500 feet on a shelf of rock, from which it makes a series of cascades and a final plunge of 450 feet to the base of the precipice. The Keelfoss, in Norway, near the Sognefiord, the highest fall in Europe, has an uninterrupted descent of 2000 feet, and the Cascade of Gavarnie, in the Central Pyrenees, falls from a height of over 1300 feet; the Staubbach, in the Swiss Alps, from a 900-feet wall, and is reduced to spray before reaching the ground. In the Falls of Tequendama, in the Andes of New Granada, the river Bogota, compressed in a chasm thirty feet wide, precipitates itself 560 feet into a deep recess amidst the most gorgeous tropical vegetation.

Among the great cataracts of the middle course of rivers Niagara takes the first rank by the volume of its waters, presenting the grand spectacle of a river over half a mile wide pouring itself in two magnificent sheets from a height of 160 feet into the whirlpool below. The Shoshonee Falls in the Snake River branch of the Columbia in Idaho, the Victoria Falls of the Zambese in the heart of South Africa, the Falls of the Cavery in Southern India, which fall 500 feet in seven magnificent cascades, the newly discovered and splendid Cataract of Kaieteur, in British Guiana, formed by a large affluent of the Essequibo, which jumps in a single foaming sheet of water into a vast basin 740 feet below, the Falls of the Rhine, though but 60 feet high, all are said to equal in picturesque beauty, though not in grandeur, the Falls of Niagara. ARNOLD GUYOT.

Catarrh' [from the Gr. κατά, "down," and ῥέω, to "flow"], in medical language is a condition characterized by hyperæmia (or congestion) of the blood-vessels of any mucous surface, with great increase of the proper secretion of the part. Thus, there may be catarrh of the nose, the throat, the air-passages, the bowels, the vagina, the bladder, or the urethra; but in popular language "catarrh" designates either a "cold" in general, a "cold in the head," or a chronic catarrh of the posterior nares (nostrils) and throat. Catarrhs in general arise from exposure to cold and wet and to sudden atmospheric changes. They are most common in persons who are ill-fed, and who are not accustomed to out-of-door exercise. The variety of catarrh known as a "cold" is by no means always easy of cure. The popular belief that "a cold must have its run" has some foundation. Hot foot-baths, laxatives, sedatives, demulcents, mild stimulants, or diaphoretics may, however, prove useful in many cases. Judicious exercise, bathing, and life in the open air tend to overcome the morbid inclination to take cold from which some patients suffer. Chronic catarrh of the posterior nostrils is an obstinate disease, best treated by systematic exercise and attention to other hygienic conditions, and by the use of water as a nasal douche. REVISED BY WILLARD PARKER.

Catasau'qua, a post-borough of Lehigh co., Pa., on the Lehigh River and the Lehigh Valley R. R., 3 miles N. of Allentown; it is also on the Lehigh and Susquehanna R. R., and is the E. terminus of the Catasauqua and Fogelsville R. Rs. It contains about seven churches, one national bank, two machine-shops, two rolling-mills, and five blast furnaces. It has two weekly newspapers. P. 2853.

Catas'trophe [Gr. καταστροφή, from καταστρέφω, "to overturn"], the final event of a drama or romance, to which the other events are subsidiary; a disastrous revolution or event; a calamity; an unfortunate conclusion. The term is used by geologists to denote a violent convulsion or physical revolution, causing the elevation or subsidence of portions of the globe, and the destruction of large tribes or multitudes of animals.

Cataw'ba, the name of an excellent wine of a rich muscadine flavor which is produced in various parts of the U. S. It is made of the Catawba grape, which originated probably near the Catawba River in North Carolina. This grape, which is highly esteemed for dessert, is red or copper-colored. The first person who cultivated it extensively for wine was Nicholas Longworth of Cincinnati, whose vineyards covered the southern slopes of the hills in the environs of that city. The Catawba grape flourishes in the Middle, Southern, and Western States. A large quantity of this wine is produced in the Ohio Valley, the climate and soil of which are especially adapted to the culture of the grape. The best sparkling Catawba is considered nearly equal to champagne.

Catawba, or **Great Catawba,** a river of the U. S., rises in McDowell co., N. C., and flows nearly eastward to Iredell co. It afterwards runs southward into South Carolina, and forms the E. boundary of York and Chester counties. Below Rocky Mount it is called the Wateree. Its length from its source to Rocky Mount is 250 miles.

Catawba, a county in the W. of North Carolina. Area, 250 square miles. It is bounded on the N. and E. by the Catawba River, and is also drained by the Little Catawba. The surface is diversified; the soil is fertile. Corn, wheat, and wool are important products. Iron ore and marble are found. It is intersected by the Western R. R. Capital, Newton. Pop. 10,984.

Catawba, a township of York co., S. C. Pop. 2893.

Catawba, a post-twp. of Roanoke co., Va. Pop. 845.

Catawba Indians, a once warlike tribe in the Carolinas, now represented by a few half-breeds on a reservation near the Catawba River. They were always friendly to the whites and hostile to their Indian enemies. Their language was akin to that of the Creeks.

Catawba Island, a post-twp. of Ottawa co., O. P. 515.

Catawba Springs, a twp. of Lincoln co., N. C. P. 2097.

Catawis'sa, a post-village of Columbia co., Pa., on the North Branch of the Susquehanna, and on the Danville Hazelton and Wilkesbarre and the Catawissa R. Rs., 52 miles S. E. of Williamsport. Here are several iron-works. The scenery is very fine. Pop., including township, 1614.

Cat-Bird (*Turdus felivox*), a bird common in the U. S., is related to the mocking-bird, which it resembles in its vocal powers. It derives its common name from a note or cry which it utters. It occurs in the Middle States as a summer bird of passage, and breeds in gardens or in the vicinity of dwelling-houses. The color of its upper plumage is dark gray or slate-color. It is serviceable to man in devouring insects and worms. It sometimes imitates the song of other birds, and is remarkable for its boldness and vivacity.

Catch, a kind of music for men's voices; a sort of round or fugue intended for convivial parties. This kind of music is chiefly English, and was especially popular in Charles II.'s time. The effect of the best catches is very fine.

Catch-drains, open drains across a declivity to intercept the surface-water. The term is sometimes applied to under-drains across a declivity.

Cateau, Le, or **Cateau-Cambresis,** a town of France, department of Nord, on the river Selle, 14 miles E. S. E. of Cambrai. It is well built, and was formerly fortified. It has manufactures of shawls, merinoes, and calicoes. The important treaty of Cateau-Cambresis was concluded here between Henry II. of France and Philip II. of Spain, in 1559. Pop. 9974.

Catechet'ical Schools, a name given to the ancient Christian schools of theology, of which the principal were those of Alexandria (160–400 A. D.) and Antioch (from 290 A. D. through the fifth century). The most noted teachers in the great school of Alexandria were Clement and Origen.

Cat'echism [from the Gr. κατηχέω, to "sound into" one's ears, to "instruct orally"], an arrangement of questions and answers, generally designed to teach religious doctrine to the young. Catechetic instruction has long prevailed among the Jews, and in the early Christian Church the *catechumens* (or persons receiving instruction preparatory to baptism) constituted, according to several of the Fathers, a separate order in the membership of the Church. This order comprised both the children of be-

lievers and adults from heathen society who desired admission into the Church. What would now be called catechisms were used to some extent in those remote times. Catechisms were used in the Middle Ages by the Waldenses, and later by the Bohemian Brethren. It has been said that the catechisms of Luther (1518–29) were the first which received this name, but this point is not quite certain. The Roman Catholic Church had long used catechisms, though called by other names. Kero of St. Gall in the eighth century prepared one of the earliest in the German language. The principal catechisms of later times have been those of Luther (the Exposition of 1518, the Catechism of 1520, the Smaller and Larger Catechism of 1529), still extensively used in the Lutheran Church; Calvin's catechisms, the Smaller and Larger (1536–39); the Heidelberg Catechism (1562), (Reformed); that of Œcolampadius (1545), of Erasmus (1547), of Leo Judæ (1553); the Tridentine Catechism (1566), a standard in the Roman Catholic Church; the Anglican catechisms—the Larger (Latin, 1570), the Shorter or Middle Catechism, and the Smaller, which, with a few changes, is published in the Book of Common Prayer; the British Presbyterian catechisms—the Shorter (1647) and Larger (1648), which, with the Westminster Confession (1646), are standard books with most Presbyterian churches in the U. S. and Great Britain. The Russian Church has a "Primer for Children" (1720) and a "Shorter" and "Longer Catechism" (1839). Besides these may be mentioned the three Wesleyan catechisms prepared by Richard Watson, and the three Methodist Episcopal Church catechisms (New York, 1852). The number of symbolical or authorized standard catechisms of the various churches is quite large, besides an immense number of private or unauthorized works of the kind.

REVISED BY R. D. HITCHCOCK.

Cat'echu [etymology uncertain], a material employed in tanning leather, as a coloring-matter, and medicinally as an astringent. The catechu of commerce is derived from East Indian trees, such as the catechu tree (*Acacia Catechu*); also from the areca-palm and various other trees. It is known in India by the name *kutt* (our cutch). The heart-wood of the former (now naturalized in Jamaica) yields catechu by cutting it into chips and boiling in water, straining the liquid from time to time, and adding fresh chips, till the extract is of sufficient consistence to be poured into moulds of a square or circular shape; or when of the thickness of tar it is allowed to harden, and is formed into balls about the size of oranges. The catechu manufacturers in India move to different parts of the country at different seasons, and erect huts in the jungles, where they carry on their operations. The catechu tree abounds in Bombay and Bengal and in Burmah and Siam, and is a small thorny tree, with a roundish head. Its sapwood is yellow, the heart dark red. Catechu is brittle, soluble in water, and possesses an astringent taste, but no odor. It affords permanent colors, and is employed in the dyeing of blacks, browns, fawns, drabs, and greens. It contains much tannin, which is of a peculiar kind, called mimo-tannic acid, also catechuic acid, which can be isolated in white silky crystals. This latter acid is often called catechine, and is of important use when catechu is employed as a dyestuff. It is sometimes adulterated with earthy substances, but its solubility in water and alcohol at once show their presence. The catechu of the betel-nut is obtained by boiling first the nuts, and then the extract. A first boiling of the nuts yields a black catechu, called kassu; and a second boiling, after the nuts are dried, a yellowish kind, called coury, which is the best. The former appears in commerce under the name of Ceylon catechu, in circular flat cakes. Gambir may be regarded as a kind of catechu, and is frequently called "pale catechu." Kino is sometimes confounded with catechu, which it much resembles.

Catechu'men [Gr. κατηχούμενος], a person who is learning the elements of any science, but especially one who is receiving instruction preparatory to admission into the Christian Church. Catechumens were anciently divided into three, or, as some writers say, four classes. The probation commonly lasted from two to three years, although it was frequently reduced to a much smaller compass. It was assumed that the children of Christian parents required less instruction than Jewish converts, and Jewish converts less than the heathen.

Cat'egory [from the Gr. κατηγορέω, to "accuse," and hence to "affirm strongly;" Lat. *prædicamentum*]. In philosophical terminology the categories are the ultimate classes in which all objects of knowledge can be systematically arranged. Philosophy and science, acknowledging the impossibility of knowing all things individually, reduce objects to classes; and when we gain knowledge of the class, we have a formal or general knowledge of its constituent objects. This attempt to render knowledge in some sense universal has been made in the philosophy of all ages, and has given rise to various systems of categories—literally, things that may be affirmed. Aristotle seems to have been the first of the Greeks to make anything like a complete classification of them. He makes them ten in number—viz. substance, quantity, quality, relation, place, time, position, possession, action, passivity. This system was unquestioningly received for a long time, but modern criticism has shown that there may be many predicates which could not be contained in any of these categories. Accordingly, Kant and others have attempted to make better classes. Kant makes twelve categories, in four classes of three species each—viz., singularity, plurality, and universality; reality, unreality, and indefiniteness; substance, dependence, and reaction; possibility, existence, and necessity. Various other arrangements have been proposed, but criticism has shown that thus far, perhaps, none are perfect. It is remarkable that the categories of the Hindoo philosopher Kanâda are almost identical with those of Aristotle. Kanâda probably lived before the time of Aristotle. (See MAX MÜLLER'S paper on "Indian Logic," appended to ARCHBISHOP THOMSON'S "Laws of Thought.")

Cate'na [Lat. *catena*, a "chain"], in biblical literature, is a commentary made up of selections from various writers. The number of catenæ is very considerable, and some are of great antiquity. Perhaps the most celebrated is the "Catena Aurea" (*i. e.* "Golden Chain") of Thomas Aquinas.

Cat'enary [from the Lat. *catena*, a "chain"], the curve formed by a cord or flexible chain of uniform density and size when suspended or allowed to hang freely from two fixed points. This curve was first noticed by Galileo, but he imagined it to be the same as the parabola. Its true nature was first demonstrated by James Bernoulli. It has several remarkable properties, one of which is that its centre of gravity is lower than that of any curve of equal perimeter and with the same fixed points for its extremities. It is interesting on account of the light it throws on the theory of arches, and by reason of its application to the construction of suspension bridges.

Cat'erpillar. See ENTOMOLOGY, by PROF. SANBORN TENNEY, A. M.

Catesby (MARK), F. R. S., an English naturalist and artist, born in 1679. He visited America in 1710, and after his return to England published a "Natural History of Carolina, Florida, etc.," with colored figures drawn and etched by himself. Died Dec. 24, 1749.

Cat-fish (*Pimelodus*), a well-known genus of fresh-water fishes, of the family Siluridæ, comprising, it is said, thirty or more species in the U. S., divided by some of the later authors into several genera, as *Amiurus, Ichthælurus, Hopladelus*, etc. They are also called bull-heads and pouts. Some of them are armed with sharp spines. It is said that cat-fish have been taken in the Mississippi weighing more than two hundred pounds. As a rule, they are not very savory as food. The sea cat-fish (*Galeicthys marinus*) is kindred to the above genus, and is a fine fish for the table.

Cat'gut, a material employed for the strings of violins and other musical instruments, for the cords used by clock-makers, bow-strings, fishing-lines, and for belt-stitching in mills, etc. It is generally prepared from the intestines of sheep, and sometimes from those of the horse and ass. It is prepared by an elaborate process, and preserved from putrefaction by treating it with a dilute solution of alkali. The best violin-strings are manufactured in Italy, and are called Roman strings.

Ca'tha, a genus of plants of the natural order Celastraceæ. The *Catha edulis*, which the Arabs call *khât*, is a shrub, a native of Arabia, having narcotic and stimulating leaves, which are eaten by the Arabs. They also make a decoction of the leaves, which is used as a beverage.

Cath'ari [Gr. Καθαροί, the "pure"], a name applied at different times to various sects of Christians, such as the Novatians of the third century, and to the Albigenses, Patarenes, Waldenses, and others in the twelfth century. The name is analogous to "Puritans," and was apparently in some cases assumed, and in others ironically conferred in consequence of their professed aim at greater purity of life than was ordinarily attained. The Cathari proper were Dualists, and were perhaps of Slavonic, possibly of remote Gnostic, origin. They appeared in Italy in the eleventh century, and attained their greatest prosperity in Southern France, where they were confounded with the Albigenses, and were exterminated with them in the thirteenth century. The strict Cathari held no property, abstained from marriage, war, and the killing of animals, and rejected water-baptism.

Cath'arine, a post-township of Schuyler co., N. Y. Pop. 1629.

Catharine, a township of Blair co., Pa. Pop. 907.

Catharine de Medici [Fr. *Catherine de Médicis*], queen of France, was born at Florence in 1519. She was a daughter of the duke of Urbino, who was a nephew of Pope Leo X. She was married in 1533 to a son of Francis I. of France, who ascended the throne as Henry II. in 1547. On the death of her son, Francis II., in 1560, she became regent of France during the minority of Charles IX., who was her son. She was ambitious, crafty, and perfidious, and made bad use of her power. Her intrigues promoted the civil or religious war by which France was for many years afflicted. She also appears to have been one of the instigators of the massacre of St. Bartholomew (Aug., 1572). Died Jan. 5, 1589. (See Eugenio Alberi, "Vita de Caterina de' Medici," 1834.)

Catharine Howard. See Henry VIII.

Cath'arine [Russ. *Ekaterina*] **I.,** empress of Russia, was born of poor parents at Ringen, near Dorpat, in Livonia, April 15, 1684. Her first husband was a subaltern Swedish officer. She was taken a captive by the Russians in 1702, and was married to Peter the Great in 1711. Peter, having invaded Turkey in 1711, was reduced by want of provisions to a critical position, from which he was extricated by Catherine, who bribed the Turkish vizier. She was crowned as empress in 1724, and died May 17, 1727. Her daughter Elizabeth became empress.

Catharine II., empress of Russia, born at Stettin May 2, 1729, was a daughter of the prince of Anhalt-Zerbst. She was married in 1745 to Peter, a nephew and heir of Elizabeth, empress of Russia. They soon quarrelled and became estranged from each other. On the death of Elizabeth, in 1761, he ascended the throne as Peter III. In July, 1762, he was assassinated by conspirators, of whom Catherine was probably an accomplice, and she assumed sovereign power, for which she was qualified by superior talents; but she was a woman of very dissolute character. She administered the government with energy and success, and increased both the extent and power of the empire. She co-operated with Austria and Prussia in the partition of Poland in 1772, and in the second partition of 1793. The Russians were victorious in a war against the Turks, which was ended by the treaty of Kainardji in 1774. She was a liberal patron of scientific men. She died Nov. 17, 1796, and was succeeded by her son, Paul I. "Her capacity," says Lord Brougham, "was of an exalted order. Her judgment was clear and sure. The history of princes affords few examples of such force of character on a throne perverted to the working of so much mischief." (*Statesmen of the Time of George III.*) (See Tooke, "History of Catherine II.," 1803; Castera, "Vie de Catherine II.," 1796; Tannenberg, "Leben Catherinens II.," 1797.)

Catharine of Aragon, queen of England, a daughter of Ferdinand and Isabella of Castile, was born in 1486. In 1501 she was married to Arthur, who was the eldest son of Henry VII. of England, and who died in 1502. She was married in 1509 to Arthur's brother, Henry VIII., who was six years younger than herself. She gave birth in 1516 to a daughter, Mary, who became queen. The king, who had conceived a passion for Anne Boleyn about 1527, expressed doubts of the legality of his marriage with Catharine, and applied to the pope for a divorce. The disagreement between the pope and Henry VIII. on this subject was one of the causes of the prevalence of Protestantism in England. Cranmer declared the marriage void in 1533. She died in 1536.

Catharine of Braganza, the queen of Charles II. of England, born in 1638, was a daughter of John IV., king of Portugal, and brought in dower Tangiers and Bombay. She had been religiously bred, and the licentious customs of the English court she found strange. After the death of Charles (1685) she returned to Portugal in 1693, and was made regent by her brother Pedro in 1704. Died Dec. 31, 1705.

Catharine of Valois, queen of Henry V. of England and daughter of Charles VI. of France, was born Oct. 27, 1401. Her hand, together with the right of succession to the French throne, was given to Henry by the treaty of Troyes. After the death of the king, Catharine became the wife of Owen Tudor, a Welsh gentleman. She died Jan. 3, 1437.

Catharine Parr, the sixth wife of Henry VIII. of England, was born in 1513. She was married to Lord Latimer, and after his death became, in 1543, the queen of Henry VIII. She was a woman of considerable learning and no little tact. After the death of the king she was married to Sir Thomas Seymour. Died Sept. 30, 1548.

Cathar'tes Au'ra, the turkey-buzzard, a vulture which is so called from its close resemblance to the common turkey. It mostly inhabits North America, but is sometimes found in Jamaica, where it is called the John crow. The adult bird measures about two feet and a half in length, and is

Cathartes Aura.

six feet between the tips of the wings. The general color of the plumage is black mingled with brown. Turkey-buzzards as scavengers are of much service to man, devouring all refuse substances that are injurious to health. When gorged they perch themselves on some neighboring tree, where they sit with their wings half open, apparently too lazy to hold them in their proper position. They do not construct much of a nest, but generally deposit their eggs in some hollow tree or log. Another species, *Cathartes atratus,* commonly known as the carrion crow or black vulture, is smaller than the above, and is found in the Southern States. In the Southern towns, especially Charleston and Savannah, large numbers may be seen sauntering about the market-places, or, if the weather be cool, perched on the chimney-tops, the heat from which they greatly enjoy. Both species are protected by law, and are in an almost perfect state of domestication.

Cathar'tics [from the Gr. καθαίρω, to "purify"], a name at first given to medicines supposed to purify the body from the matter of disease, assumed by the ancients to exist in cases of acute disorder, and to require to be thrown off by the excretions. Ultimately, the term cathartics became limited to remedies acting on the bowels, which are popularly called purgatives. Among the principal cathartics are aloes, colocynth, rhubarb, scammony, jalap, senna, Epsom and Rochelle salts, and castor oil. Sulphur and cream of tartar form a useful mild laxative; magnesia is also administered in cases of indigestion with acidity. The resin of podophyllum (may-apple) is now sometimes used. The most agreeable of all cathartic medicines is the effervescent solution of citrate of magnesia. Croton oil and elaterium belong to a dangerous class of cathartics, as also does the favorite remedy of the ancients, the black hellebore. The number of cathartic medicines is very great.

Cathar'tin is the supposed active principle in senna. It can be isolated as a yellowish-red uncrystallizable substance, which is deliquescent, and has a very bitter taste, a characteristic odor, and purging powers, causing nausea and griping. Three grains of cathartin are a full dose. It is not much used, and is perhaps not a definite compound. The same name is given to a purgative principle obtained from buckthorn berries.

Cath'cart, Earls of (1814), Viscounts Cathcart and Barons Greenock (United Kingdom, 1807), Barons Cathcart (Scotland, 1447).—Alan Frederick Cathcart, third earl, born Nov. 15, 1828, succeeded his father July 16, 1859.

Cathcart (William Shaw), Earl of, a British general and diplomatist, born Sept. 17, 1755. He became a major-general in 1794, and was sent on a mission to the court of Russia in 1805. He commanded the land forces which, with aid of the fleet, captured Copenhagen in 1807. In 1813 he was sent as ambassador to St. Petersburg. He was raised to the rank of earl in 1814. His eldest son, Charles

Murray, born in 1783, became a general, and inherited the title of earl. Died June 17, 1843.

Cathe'dral [from Gr. καθέδρα, a "chair," a "seat"], the principal church of a diocese, in which is the *cathedra* or throne of the bishop. It is the parish church of the whole diocese. The difference between a cathedral and a collegiate church consists chiefly in the fact that the former is the see of a bishop. The governing body of a cathedral is called the dean and chapter—*i. e.* the dean and canons. In the Anglican Church all the members of the cathedrals, except the dean, are styled canons, and their seat in the cathedral is called their *stall*. Among the remarkable cathedrals of the world are the Duomo at Florence, the cathedral of Milan, that of Notre Dame in Paris, the Strasburg cathedral, and St. Paul's in London. The church of St. John Lateran in Rome is the cathedral or episcopal church of the pope.

Catherine, Saint, of Alexandria in Egypt, suffered martyrdom about 307 A. D. She is supposed to have been a patroness of learning and philosophy.

Cath'eter [Gr. καθετήρ, from καθιήμι, to "send down" or "thrust into"], in surgery, the name of various instruments used for passing along mucous canals. It is, however, generally applied to tubes through which fluids may pass, and which may give exit to the accumulated contents of such organs as the urinary bladder. The ancients made catheters of copper. In the ninth century silver was substituted by the Arabian surgeons, and still generally used. The urinary catheter for the male varies in length from ten to twelve inches; the female catheter need not be more than four or five inches, and is nearly straight. For the male urethra most surgeons prefer an instrument straight to within the last few inches of its length; the latter should be curved into the segment of a small circle. Others, however, use a double curve. A vertebrated catheter, consisting of short, hollow joints of silver, united into a continuous flexible tube, is often extremely useful. Flexible catheters of gum elastic are used either alone or supported on a wire. Great tact and care are required in introducing catheters into the urinary bladder. It must not be done by force, but by gentle management. Violence in the operation may cause serious injury. Revised by Willard Parker.

Cath'ey's Creek, a township of Transylvania co., N. C. Pop. 515.

Cathlam'et, a post-village, capital of Wahkiakum co., Wash. Ter.

Cathode. See Electricity, by Pres. Henry Morton, Ph. D.

Catholic or **United Copts,** that portion of the Coptic Church in Egypt which acknowledges the supremacy of the pope. They number about 13,000. (See Copts.)

Cath'olic Apostol'ic Church, The, is the name of a body of Christians popularly known as the **Irvingites,** being followers of the Rev. Edward Irving, who died in 1834. They are distinguished by their claim to the exercise of apostolic gifts, such as prophecy, the use of unknown tongues, and the miraculous healing of disease. They receive only the Apostles', the Nicene, and the Athanasian creeds; their officers are called apostles, prophets, evangelists, angels, pastors, deacons, under-deacons, and deaconesses; they are ritualists, imitating closely the service of the Roman Catholic Church, professing to select all that is desirable from all Christian churches. This sect originated in London, but it is found in small numbers in most Protestant countries. (See Irving, Edward.)

Cath'olic [Gr. καθολικός, "universal," from κατά, "throughout," and ὅλος, "all"] **Church.** The phrase Catholic Church is equivalent to "universal church," and cannot properly be limited to any particular sect or body. It was once employed to distinguish the Christian Church from the Jewish, the latter being restricted to a single nation, while the former was intended for the world. Afterwards, it served to mark the difference between the so-called orthodox Church and the sects which sprang from it, such as the Arians, Gnostics, etc. The name has been especially claimed by the Church of Rome. Protestant divines have been careful to deny its applicability, yet the term Catholic is still popularly used as synonymous with Roman Catholic. (See Roman Catholics.)

Cath'olic Emancipa'tion, in British history, the measure enacted April 13, 1829, by which the political disabilities previously resting upon Roman Catholics were chiefly removed. These disabilities weighed most heavily upon the Roman Catholics of Ireland, and the history of the oppressions of Irish Catholics is almost identical with the history of English rule in Ireland, for these oppressions had their origin quite as much in political and social as in religious prejudice.

After the subjugation of Ireland in 1691 by the forces of William III., the whole people were disarmed; priests were banished the country; no Roman Catholic could act as guardian for any child; after 1704 a son turning Protestant could dispossess his father and take his estate; a Catholic heir to landed property was to be set aside in favor of the next Protestant heir; no office, military or civil, could be held by a Roman Catholic; he could not vote or marry a Protestant wife; his son might force him to settle an allowance upon him (the son) at the discretion of a court of chancery; no Roman Catholic could practise law or teach school; no Protestant lawyer could marry a Catholic wife; a priest marrying a Catholic and Protestant was to be hanged. Many of these measures became obsolete in practice, and more were repealed by the Irish Parliament of 1790; and at the union (1800) Mr. Pitt pledged himself to secure an act of emancipation, but through the opposition of George III. he failed. Subsequently, in consequence of the agitation of O'Connell and the Catholic Association, the subject was again taken up, was brought forward in Parliament by Mr. Peel Mar. 5, 1829, and was carried by large majorities in both houses. The only disabilities left upon Catholics were their exclusion from the regency, the chancellorship of England or Ireland, the viceroyship of Ireland, and from the offices and patronage of the Anglican Church, the universities and the Church schools; the prohibition of episcopal titles, the public use of clerical insignia, the extension of monasticism, and the increase of the number of Jesuits. These latter prohibitions are, however, practically overlooked.

Cath'olic Epis'tles, the name given to certain epistles of the New Testament addressed not to particular churches or individuals, but to the Church universal or to a large and indefinite circle of readers. Originally the Catholic Epistles comprised only the first Epistle of John and the first of Peter, but as early as the fourth century the term was applied also to the Epistle of James, of Jude, the second of Peter, and the second and third of John. These seven thus constitute the Catholic Epistles.

Cathol'icos, the title of the patriarchs or chief ecclesiastics in the hierarchy of the Armenian Church, and also of the prelates of the Christians of Georgia and Mingrelia.

Cat'iline [Lat. *Catilina*], (Lucius Sergius), a famous Roman demagogue and conspirator, born about 108 B. C. In his youth he was a partisan of Sulla in the civil war. He was elected prætor in 68 B. C., and afterwards aspired to the office of consul. He was notorious for his crimes, and was ruined in fortune, but his talents and his audacity combined to render him a popular favorite of a large party, many of which were insolvent debtors and desperate adventurers. Having been defeated in the election for consul, he formed a conspiracy against the state. It appears that he and his numerous accomplices proposed to massacre the senators and the friends of order, and to involve Rome in a general conflagration. The leaders of this plot met on the 6th of Nov., 63 B. C., and made arrangements for its speedy execution; but the secret was revealed by Fulvia, the mistress of one of the conspirators, who were baffled by the vigilance and energy of Cicero. On the 8th of November, Cicero uttered in the senate his first oration against Catiline, who was present and attempted to reply, but his voice was drowned by cries of "Traitor!" and "Parricide!" Catiline left Rome in the next night, and went to the camp of Manlius, who was his accomplice and was at the head of an army in Etruria. Lentulus and other conspirators who remained in Rome were put to death in Dec., 63 B. C. The army of the senate encountered that of Catiline near Pistoria (now Pistoia) in 62 B. C. He stimulated the courage of his soldiers with an eloquent harangue, and a desperate battle ensued, in which Catiline was defeated and killed, with about 3000 of his partisans. (See Sallust, "Bellum Catilinarium;" Rose, "History of Catiline's Conspiracy," 1813; Cicero, "Orationes in Catilinam.")

Cat'kin, or **A'ment** (*amentum*), in botany, a term applied to a form of inflorescence of which the willow, poplar, birch, and alder afford examples. It is a close spike of numerous small, unisexual flowers, destitute of calyx and corolla, and furnished with scale-like bracts. The trees which bear catkins form the natural order Amentaceæ (which see).

Cat'lettsburg, a post-village, capital of Boyd co., Ky., on the Ohio River, at the mouth of the Big Sandy, about 150 miles E. N. E. of Frankfort. It has a trade in lumber and various manufactures. It has one weekly newspaper. Pop. 1019. Ed. "Central Methodist."

Cat'lin, a post-township of Vermilion co., Ill. P. 1826.

Catlin, a township of Chemung co., N. Y. Pop. 1342.

Catlin (George), an American traveller and artist, born in Wilkesbarre, Pa., in 1796. He passed many years

among the North American Indians, and published "Illustrations of the Manners, Customs, and Condition of the North American Indians," with engravings (2 vols., 1841). He exhibited in Europe his Indian gallery and collection. Died in Jersey City Dec. 23, 1872, aged seventy-eight.

Cat'mint, or **Cat'nip** (*Nepeta Cataria*), an herbaceous plant of the natural order Labiatæ, is a native of Europe, and is a common weed in the U. S., but not indigenous here. It has cordate and crenate leaves, which are whitish, downy underneath, and emit a peculiar odor. Cats are extremely fond of this plant, which they eat with avidity and signs of excitement.

Ca'to, a post-township of Montcalm co., Mich. P. 523.

Cato, a post-township of Cayuga co., N. Y. P. 2091.

Cato, a post-township of Manitowoc co., Wis. P. 1675.

Cato (Dionysius), a Latin moralist of the third century, of whom nothing is known, is the reputed author of a small volume of moral precepts, entitled "Disticha de Moribus ad Filium," which was a popular book in the Middle Ages. Each precept is expressed in two hexameter verses. Great difference of opinion exists respecting the merit of this work.

Cato (Marcus Porcius), often called Cato Censorius (*i. e.* "Cato the Censor"), a celebrated Roman statesman and patriot, born of a plebeian family at Tusculum in 234 B. C. He was surnamed the Elder, to distinguish him from Cato Uticensis. He fought against Hannibal in the second Punic war, after the end of which he cultivated a small Sabine farm, adopted a simple and frugal mode of life, and became a model of austere and pristine Roman virtue. Having removed to Rome, he gained distinction as an advocate in the courts of justice, and was elected prætor in 198 B. C. He was chosen consul in 195, and commanded an army in Spain, where he displayed superior military talents, and was so successful that he received a triumph on his return to Rome. In the year 184 he was elected censor, in which capacity he acted with uncommon rigor. He was a zealous asserter of old-fashioned principles, and opposed the growing tendency to luxury, and all innovations, good or bad. He was an implacable enemy of Carthage, and often repeated in the senate the phrase *Delenda est Carthago* ("Carthage must be destroyed"). He wrote, besides other works, a treatise on agriculture ("De Re Rustica"), which is extant. Died in 149 B. C. (See Plutarch, "Life of Cato;" Cornelius Nepos, "Cato;" Livy, "History of Rome;" Weber, "Programma de M. P. Catonis Vita et Moribus.")

Cato (Marcus Porcius), surnamed the Younger and Uticensis (*i. e.* "of Utica"), an eminent Roman patriot and statesman, born in 95 B. C., was a great-grandson of the preceding. He studied and adopted the doctrines and discipline of the Stoic philosophers. In 72 B. C. he served in the campaign against Spartacus. Having been elected quæstor (treasurer), he effected some reforms in the treasury department. He became tribune of the people in 63 B. C., and heartily co-operated with Cicero, who was then consul, in his efforts to defeat the treason of Catiline and his accomplices. He opposed the triumvirs, Cæsar, Pompey, and Crassus, after they had formed a coalition. In 54 B. C. he was chosen prætor, and used his power to prevent bribery in elections. He was an uncompromising opponent of corruption, and inflexible in his adherence to what he considered the right and the patriotic policy. As a candidate for the consulship he was defeated, because he declined to gain votes by bribery and other means which were customary, but not strictly right. In the civil war which began about 49 B. C. he adhered to the side of the senate and Pompey. He was not present at the battle of Pharsalia, soon after which he was appointed commander of the army in Africa, but he resigned the command to Scipio. The republican cause having been ruined by the defeat of that army at Thapsus in 46 B. C., Cato killed himself at Utica in the same year. He was regarded as a model of pure and disinterested virtue. (See Drumann, "Geschichte Roms;" Plutarch, "Life of Cato the Younger.")

Catoc'tin, a township of Frederick co., Md. P. 1326.

Ca'ton, a post-township of Steuben co., N. Y. P. 1544.

Catoo'sa, a county of Georgia, bordering on Tennessee. Area, 175 square miles. It is drained by Chickamauga Creek. The surface is hilly. Wool and grain are important products. It is intersected by the Western and Atlantic R. R. Capital, Ringgold. Pop. 4409.

Catoosa Springs, a saline chalybeate spring of Catoosa co., Ga. There are accommodations for several hundred visitors, and the springs are extensively patronized in the summer.

Catoptrics. See Reflection of Light.

Cats [Lat. *Catsius*], (Jakob), an eminent Dutch poet, born at Brouwershaven, in Zealand, in 1577. He studied law, which he practised. He also filled several high civil offices. He was grand-pensionary of Holland from 1636 to 1648, when he became keeper of the grand seal. His poems were very popular. He wrote "Moral Emblems," fables, songs, allegories, etc., which are distinguished by simplicity of style and good moral tendency. Died in 1660. (See Alsche, "Commentatio de J. Catsio," 1828.)

Cat's Eye, a beautiful variety of chalcedonic quartz of various shades of greenish-gray or brownish-red. It displays, when polished, a peculiar pearly opalescence (chatoyance) or floating internal light, much resembling the mutable reflections exhibited by the contracted pupil of the eye of a cat. This results from the parallel arrangement of the minute fibres of the mineral or of the fibres of amianthus or asbestos which it contains. It is obtained chiefly in Ceylon, and is found in Scotland. It is used in jewelry, and is cut *en cabochon.*

Cats'kill, a post-village, capital of Greene co., N. Y., on the W. bank of the Hudson River, at the mouth of Catskill Creek, 34 miles below Albany, and 109 miles by rail N. of New York. It contains a court-house, seven churches, two national banks, and two newspaper-offices. Pop. 3791; of Catskill township, 7677. The Hudson River R. R. passes on the other side of the river.

Catskill Group, the uppermost division of the Devonian system in America. It was named from the Catskill Mountains, which were supposed to be formed of these rocks, but are now known to be mainly composed of strata of the Chemung group. The Catskill rocks are best seen in the northern counties of Pennsylvania—Tioga, Bradford, Potter, etc. They are mainly red sandstones and shales, and contain as characteristic fossils the scales and bones of large ganoid fishes.

Catskill Mountains, of New York, a group of the great Appalachian system, included mostly in Greene county. The highest summit, Hunter Mountain, has an altitude of 4050 feet. On the border of the eastern terraces are the Overlook House, placed at an elevation of 2977 feet, and the Catskill Mountain House, at 2235 feet above the Hudson. The last, which has long been a favorite summer resort, is about 12 miles W. of the village of Catskill. The summits of the mountains command extensive and beautiful prospects. The view at sunrise from these mountain-houses is magnificent and beautiful in the highest degree. The scenery of this group is diversified by cascades, rocky precipices, small lakes, and deep ravines.

Cat's-Tail Grass, a name of the *Phleum pratense.* (See Timothy.)

Cat Tail, or **Cat's Tail** (*Typha latifolia*), an aquatic herbaceous plant of the order Typhaceæ, is indigenous in the U. S. and Europe. It bears flowers in a long and very dense cylindrical spike terminating the stem. Its leaves are of late employed with success in France as a material for paper-making.

Cattarau'gus, a county of Western New York, bordering on Pennsylvania. Area, 1334 square miles. It is intersected by the Alleghany River, and bounded partly on the N. by Cattaraugus Creek. The surface is uneven or hilly; the soil is fertile. Dairy products, grain, and potatoes are largely produced. Leather, lumber, cooperage, metallic wares, flour, cheese, saddlery, etc. are among the manufactures. It is traversed by the Erie, the Atlantic and Great Western, and the Buffalo New York and Philadelphia R. Rs. Capital, Little Valley. Pop. 43,909.

Cattaraugus, a post-village of New Albion township, Cattaraugus co., N. Y., on the Erie R. R., 22 miles E. of Dunkirk.

Cat'taro, a seaport-town of Austria, in Dalmatia, on the Gulf of Cattaro, about 37 miles S. E. of Ragusa. It is situated at the base of a steep limestone hill, is strongly fortified, and is surrounded with walls. It has a castle on a precipitous rock, a cathedral, and several churches. It was formerly the capital of a small republic of the same name. Pop. 3589.

Cat'taro, Boc'ca di (*i. e.* "Gulf of"), a tortuous inlet of the Adriatic, at the S. extremity of the coast of Dalmatia, is 30 miles long. It is protected from winds by high mountains on several sides, and forms the best harbor in the Adriatic. The entrance from the sea into this gulf is about 1½ miles wide.

Cat'tegat, or **Kattegat** (anc. *Codanus Sinus*), a part of the ocean which separates Denmark from Sweden and washes the eastern side of Jutland. It communicates with the Baltic by three channels—the Great Belt, the Little Belt, and the Sound. On the other side the Skager-Rack connects it with the German Ocean. It is about 150 miles long and 85 miles wide. Dangerous sand-banks occur in it.

Cattell' (Alexander G.), born in Salem, N. J., Feb. 12, 1816. He became a successful merchant of Philadelphia in 1846, becoming president of the Corn Exchange and of the Corn Exchange Bank. In 1855 he removed to Merchantville, N. J., and was U. S. Senator from N. J. 1866–71.

Cattell (William Cassiday), D. D., a brother of the preceding, was born at Salem, N. J., Aug. 30, 1827, graduated at Princeton College in 1848, at Princeton Theological Seminary in 1852, became professor of ancient languages at Lafayette College in 1855, pastor of a Presbyterian church at Harrisburg, Pa., in 1860, and president of Lafayette College in 1864. His administration of the affairs of the college has been marked by energy and success.

Cat'tle [Old Eng. *catel*, "chattels," "goods," because in ancient times a man's cattle were his principal goods], a collective term which in its widest sense includes all domestic animals, and in the usage of some writers includes also deer and other wild grazing animals. In America, however, its application is limited very generally to beasts of the species *Bos taurus*, the domestic ox, the "neat cattle" or "black cattle" of British writers. There are many varieties or "breeds" of cattle, some of which, in Southern Asia, are distinguished by a large hump or mass of fat upon the shoulders. The original wild stock from which cattle are descended is not well known. The principal breeds in the U. S. are of British origin. The old "native" stock is of extremely mixed descent, but of late years much attention has been paid, with the best results, to the rearing of pure-blooded and "grade" stock. The best are the "short-horn" or "Durham" breed, which produce excellent beef-cattle, and are extensively reared in the U. S., chiefly for fattening purposes; the "Herefords," for working oxen and beef; the beautiful "Devons;" the "Ayrshires," prized for milking qualities; the "Jerseys" or "Alderneys," which yield extremely rich and excellent milk. The continent of Europe has many fine breeds which are little known in the U. S., though the "Dutch" and "Holstein" cattle have been introduced. The Texas cattle are descended chiefly from Spanish stock. (See Solon Robinson, "Facts for Farmers.")

Cattol'ica, a town of Sicily, in the province of Girgenti, 14 miles N. W. of the city of Girgenti. It has productive sulphur-mines. Pop. 5749.

Catul'lus (Valerius), a Roman lyric poet of high reputation, was born at or near Verona about 87 B. C. He became in early life a resident of Rome, and enjoyed the society of Cicero and Cæsar. He was the first Roman who excelled in lyric poetry. He wrote, besides numerous odes and epigrams, a heroic or narrative poem entitled "The Nuptials of Peleus and Thetis," which is his longest work, and a poem called "Atys," which is highly commended. The date of his death is unknown. One hundred and sixteen of his poems are extant. They are admired for the exquisite grace and beauty of their style, but are grossly licentious. Died about 47 B. C.

Cat'ulus (Quintus Lutatius), a Roman general and writer. He was chosen consul and a colleague of Caius Marius in 102 B. C. Catulus and Marius commanded two armies, which united and defeated the Cimbri near Vercelli in 101 B. C. He was a partisan of Sulla in the civil war. Having been condemned to death by the Marian party, he killed himself in 87 B. C. His works are lost except two epigrams.

Catulus (Quintus Lutatius), a son of the preceding, was a conservative and meritorious statesman. He became consul in 78 B. C., and censor in the year 65. Cicero applied to him the epithet "*clarissimus*" ("illustrious"). Died in 60 B. C.

Cau'ca, a river of South America, rises in the Andes and flows nearly northward through Popayan, Cauca, and Antioquía. After a course of 600 miles it enters the Magdalena in lat. 9° 25′ N. The valley of the Cauca is one of the most fertile and populous districts of South America.

Cauca, a state of the republic of Colombia. The surface is partly mountainous. Area, 68,300 English square miles. It is traversed by the river Cauca. Capital, Popayan. Pop. in 1870, 435,708.

Cauca'sian (*i. e.* "pertaining to Caucasus"), a term somewhat loosely employed to designate the principal white races of mankind. The Circassians and Georgians dwelling at the foot of Mount Caucasus have been taken as the type of the Caucasian race, and suggested the name. According to Blumenbach, the Caucasian race is the principal of the five divisions of the human family, and the original stock from which the other races have sprung. It also forms one of the three varieties of Cuvier. It comprises the most enlightened and powerful nations of the earth, including, besides the Aryan races (see Arya), the Hebrews, Phœnicians, and Arabs. But the inhabitants of the Caucasus, so long held to be types of the European variety, are now by some excluded from it altogether, and classed with the Mongols. The question of their relationship is a very obscure one. The basis upon which the theory of the Caucasian type was formed is thus stated by Latham: "Blumenbach had a solitary Georgian skull, and that skull was the finest in his collection, that of a Greek being the next. Hence it was taken as the type of the skull of the more organized divisions of our species. More than this, it gave its name to the type, and introduced the term *Caucasian*. Never has a single head done more harm to science than was done in the way of posthumous mischief by this well-shaped head of a female from Georgia." As commonly used, the term Caucasian is objectionable, as confounding under one name nations (as, for example, the Arabs and Germans) who have at best a very remote relationship; while it has often led to a still greater error—that of separating, on trivial and superficial grounds, nations who are unquestionably closely related, such as the dark-complexioned Hindoos and the light-complexioned Teutons and Celts. It is as if a botanist, instead of classifying fruits according to their internal structure and essential nature, should divide them into classes according to their color, putting the yellow fruits into one division, the red into another, and so on.

Cauca'sian Prov'inces, or **Cauca'sia,** a portion of the Russian empire, situated on both sides of the central chain of the Caucasus. It is bounded on the E. by the Caspian Sea, and on the W. by the Black Sea, being partly in Europe and partly in Asia. The European portion, called Cis-Caucasia, comprises Circassia, Caucasus, and Daghestan. The Asiatic part, called Trans-Caucasia, comprises Georgia, Mingrelia, and Russian Armenia, and has an area of 169,632 square miles. The chief towns are Tiflis, Stavropol, Derbend, and Erivan. (For the physical geography of this region, see Caucasus.) Pop. 4,661,824.

Cau'casus [Gr. ὁ Καύκασος or ὁ Καύκασις], an important and lofty mountain-range which extends between the Black Sea and the Caspian, and forms part of the boundary between Europe and Asia. It is 690 miles long, and extends from the Peninsula of Taman on the Black Sea, in an E. S. E. direction, to the peninsula of Apsheron on the Caspian. Connected with this central chain are several branches or transverse ridges on both sides. The culminating point of the Caucasus is Mount Elboorz, which is near the middle of the central chain, and has an altitude of about 18,570 feet. Its base is 7660 above the sea-level. The next highest is Mount Kasbek, 16,552 feet, east of which is the Dariel Pass. This is said to be the only pass by which carriages can cross the Caucasus. The highest summits of this chain are formed of trachyte or porphyry, below which occur granite, syenite, etc. Limestone, slate, and other stratified rocks appear at the base and on the sides of these mountains. The limit of perpetual snow is here about 11,000 feet above the level of the sea. Some parts of the Caucasus are destitute of trees, but the secondary ranges near the Black Sea are covered with magnificent forests of oak, beech, ash, maple, and walnut. The cereal grains flourish 7000 feet above the level of the sea, and the lower valleys produce rice, cotton, indigo, and the grape. The principal rivers that rise among these mountains are the Kooban, Koor, and Terek. The scenery of this region is said to be very beautiful and picturesque. Among its minerals are copper, iron, and lead. The inhabitants of the Caucasus comprise a variety of tribes, who speak different languages and are subject to Russia. Among these tribes are the Circassians, Georgians, and Lesghians. They are noted for their love of freedom; and to maintain their independence they waged a long war against the Russian invaders, which was terminated by the capture of their leader, Schamyl, in 1859. The Caucasus Mountains have been celebrated from a remote antiquity. From them the finest physical type of man derives its name, the Caucasian race. (See Caucasian.)

Caucasus, Indian. See Hindoo-Koosh.

Cauchy (Augustin Louis), a French mathematician, born in Paris in 1789. He gained a prize of the Institute in 1815 for his "Memoir on the Theory of Waves." He became a member of the Academy of Sciences and professor of mechanics in the Polytechnic School in 1816. He published, besides other works, "Lectures on the Differential Calculus" (1826), and succeeded Biot as professor of astronomy in 1848. Died in 1857.

Cau'cus, a meeting of legislators or citizens for the selection of candidates to be supported at a pending election, or to shape and direct political movements of whatever kind. The word is of American coinage, and Boston gave it being about a century ago, during the popular discontent and agitation which culminated in our fathers' Revolutionary struggle—Boston, the cradle and focus of

this agitation, being then a straggling maritime village, mainly supported by commerce and the seaboard fisheries, which gave importance to the arts subsidiary to navigation. The *calkers* of vessels were thus relatively numerous; they were robust, active citizens in the prime of life, and they were enlisted, heart and soul, in the patriot cause. Their work was done at the North End, where but few houses had yet been built, and their dwellings were mainly in that neighborhood. If they had a place of meeting as a craft, it would naturally be chosen for their political gatherings as well; and the Tories or loyalists, seeing these convened at the calkers' head-quarters, would call them *calkers'* meetings, implying that none but low-bred mechanics and their like were hostile to the royal cause. *Caucus*—at first a corruption of *calkers*—thus became the received designation of a political meeting, especially if held with closed doors. The word first appears in the diary of John Adams, under date of Feb., 1753, as follows: "This day found that the *Caucus Club* meets at certain times in the garret of Tom Dawes, adjutant of the Boston (militia) regiment." Adams adds that the town-officers and representatives were first chosen in this club before they were elected in town meeting. Gordon's "History of the Revolution" asserts that the caucus dates back at least to 1725, and that Samuel Adams's father and some twenty others devised and employed it to concentrate the power of the town in their own hands. He adds that Samuel Adams was first made representative of Boston through the instrumentality of the caucus, which thenceforth formed an important part of the machinery whereby the Revolution was incited and maintained.

That the majority of a legislative body should hold a caucus for the selection of the officers of that body cannot be reasonably gainsaid, the minority being at perfect liberty to do likewise; while any member of the majority, dissatisfied with its choice, may claim and exercise, if he will, the right to bolt. But when, about 1804, a caucus of the Republican (Jeffersonian) members of Congress was held expressly to recommend persons to be supported at the polls by Republicans living in districts represented by Federalists, thus giving to the people of those districts no voice in the selection of their candidates, the legitimacy of the assumption involved in such nominations was gravely questioned. Yet the candidates of the caucus continued to be chosen—with docility, if not with alacrity—until 1824, when the system broke down ignominiously upon William H. Crawford of Georgia being nominated for President, with Albert Gallatin of Pennsylvania for Vice-President. This ticket was badly defeated, the friends of John Quincy Adams, General Andrew Jackson, and Henry Clay, forming two-thirds of those elected to either House, uniting in a public recommendation that the fiat of the caucus be disregarded—in fact, defied. Mr. Crawford received less than a fourth of the electoral votes; the vote standing Jackson 99, Adams 84, Crawford 41, Clay 37. This sent the election to the House of Representatives, which elected Adams by a coalition of the supporters of Adams and Clay; the vote standing—for Adams, 13 States; Jackson, 7; Crawford, 4. This was the last caucus of members of Congress which assumed to nominate candidates for the people, and legislative caucuses with like purposes have also been discarded by all parties, though caucuses continue to be held for the choice of candidates to be supported by the body whose members make the nomination.

The first nominating national convention was held in 1832 by the Anti-Masons, who presented William Wirt of Maryland for President, with Nathaniel Ellmaker of Pennsylvania for Vice-President. In 1836 the Democrats held a like convention, which nominated Martin Van Buren of New York for President, with Richard M. Johnson of Kentucky for Vice-President. The Whigs held their first national convention at Harrisburg in Dec., 1839, and presented General William Henry Harrison of Ohio for President, with John Tyler of Virginia for Vice-President. These were elected over Van Buren and Richard M. Johnson, the Democratic incumbents, who had triumphed four years previously. Each and every national party has since selected its candidates mainly by a delegated convention.

But this in time develops abuses, especially in the case of a party whose nomination all but ensures an election; and the latest fashion is that called "the Crawford county (Pennsylvania) system," whereby all the members of a party residing in a designated district are invited to attend a poll in their respective precincts and cast a ballot directly for sheriff, clerk, etc., he who polls the largest vote for any office being the whole party's candidate for that post. But such preliminary elections, being unsanctioned by law, are often corrupted by systematic frauds; and it is manifest that, while a caucus may serve for the choice of Speaker, clerk, etc., of a legislative body, or even of U. S. Senators by a legislature, a perfect mode of selecting candidates for the popular suffrage has not yet been devised.

HORACE GREELEY.

Caudebec, a handsome seaport town of France, on the right bank of the Seine, 26 miles E. of Havre, was formerly fortified. It has a remarkable Gothic church built in the fifteenth century, and manufactures of cotton stuffs. Pop. 2181.

Caudebec-les-Elbeuf, a town of France, department of Seine-Inférieure, on the river Oison, 12 miles S. of Rouen. It has manufactures of cloth. Pop. 9184.

Caude'te, a town of Spain, in Murcia, 50 miles E. S. E. of Albacete, was formerly fortified. Here are some Roman remains. Pop. 6413.

Cau'dex, a Latin word signifying a "trunk of a tree," was also a botanical term applied by Linnæus to the axis of vegetation, or the woody centre around which the leafy organs are arranged. He called the stem *caudex ascendens*, and the root *caudex descendens*.

Cau'dine Forks [Lat. *Furculæ Caudinæ*], two narrow mountain-gorges or defiles near the town of Caudium, in ancient Samnium. They are celebrated in connection with a humiliating disaster which the Roman army suffered in 321 B. C. A large army commanded by the consuls Titus Veturius and Spurius Postumius were marching against the Samnites. According to Livy, this army, supposing the Samnites to be far distant, marched through one gorge or pass into a small valley enclosed by high mountains, and soon found that both of the passes were blocked up with trees and stones. The Romans were compelled by famine to surrender unconditionally to Caius Pontius, the Samnite general, who required them to pass under the yoke, and then permitted them to return to Rome. Caudium was on the Appian Way, 21 Roman miles E. of Capua. Niebuhr expresses an opinion that the Romans must have been defeated in battle before they were shut up between the two passes, and Cicero twice alludes to the battle and defeat of the Romans at Caudium. In one place he says, "Cum male pugnatum ad Caudium esset." (*De Officiis*, iii., 30.)

Caugh'denoy, a post-village of Hastings township, Oswego co., N. Y. Pop. 220.

Caughnawa'ga, a village of Laprairie co., province of Quebec (Canada), at the foot of Lachine Rapids and on the S. side of the St. Lawrence, 9 miles from Montreal. It is on the Montreal Lachine and Province Line Railway, and is entirely inhabited by Iroquois Indians, who number about 500. It is to be the terminus of the great Caughnawaga Ship Canal. (See CANALS OF CANADA, by A. J. RUSSELL, C. E., Crown Inspector of Timber Agencies.)

Caul. See OMENTUM.

Caulaincourt, de (ARMAND AUGUSTIN LOUIS), duke of Vicenza, a French diplomatist, born in Picardy in 1773, entered the army about 1789, and obtained the rank of general. In 1807 or 1808 he was sent as ambassador to Russia, from which he returned in 1811. He afterwards served in the army, and was the travelling companion of Napoleon in his hurried journey from Russia to Paris in 1812. He was appointed minister of foreign affairs in 1813. Died in 1827.

Cau'liflower [Sp. *coliflor;* Ger. *Blumenkohl, i. e.* "flowering cole"], a highly-prized variety of the cabbage (*Brassica oleracea*). The cauliflower differs from the other varieties of its species, its leaves being not fit for use. The parts eaten are the flower-buds and the stalks of the plant transformed by cultivation, and forming a compact mass, generally of a white color. There are many sub-varieties which are more tender than the ordinary forms, and require protection during winter. The seed is sown in hot-beds, that the plants may be ready for planting out in spring. Later sowings are made in the open ground. The cauliflower requires a moist, rich, loamy soil, with abundance of manure, and careful cultivation.

Cau'line [from Lat. *caulis*, a "stem"], a botanical term applied to any parts or organs which grow on the stem of a plant. Leaves which arise directly from the stems are called *cauline*, to distinguish them from radical leaves.

Caulo'nia, an ancient Greek city and seaport of Italy, in Bruttium, between Locri and the Gulf of Scyllacium. It was an important city about 500 B. C. According to Porphyry, Pythagoras sought refuge in Caulonia after his expulsion from Crotona. The people of Caulonia formed a league with those of Crotona and Sybaris. In 389 B. C. Dionysius the Elder invaded Magna Græcia with a large army, and besieged Caulonia, which he took. He then removed the inhabitants to Syracuse.

Caulop'teris, a generic name for the stems of fossil tree-ferns found in the carboniferous and triassic measures. They are hollow, and covered with markings similar to the leaf-scars on recent tree-ferns. Twelve species have been described.

Caus, de (SALOMON), a French engineer, born in Normandy, is considered by his countrymen as one of the inventors of the steam-engine. He published in 1615 a work on motive-powers entitled "Les Raisons des Forces mouvantes," etc., which gives a theorem on the expansion and condensation of steam. He is supposed to have died about 1630.

Cau'sa, a Latin word extensively used by the ancient Romans as a legal and political term. Its meanings and applications were nearly the same as those of the word *cause* in English. It signified in law a "lawsuit," a "judicial process;" in politics, the measures or principles adopted by one party and opposed by another; in general, a subject, affair, reason, etc.; efficient cause, or that which produces any effect.

Cause, in law, an action at law or suit in equity or in a court of probate. It is found in such connections as the following: "matrimonial cause," "testamentary cause," "calendar of causes," "title of a cause," etc. etc.

Cause, in ONTOLOGY (which see), means in general any PRINCIPLE (which see) which in any way whatever embraces the GROUND (which see) or REASON (which see) why anything diverse from itself exists. The principle correspondent with *this* principle is called EFFECT (which see), and the relation which exists between cause and effect is *casuality*.

Causes have been divided into five classes (four by Aristotle): I. The *efficient* or operative cause. Its activity may be intransitive—that is, *immanent*—or transitive or transient—that is, *emanent*. The *efficient* cause is by pre-eminence *the* cause, and is usually meant if the word *cause* is not qualified. There may be *requisites* or *conditions*, even to the degree of *sine qua non*, and there may be *occasion*, but these ideas are not to be confounded, as they often are, with that of cause. Efficient causes are subdivided into primary and secondary; universal or general, and particular; principal and instrumental; univocal and equivocal; causes *per se* and *per accidens;* adequate and inadequate; free and necessary; physical and moral; proximate, remote, and ultimate; relative and absolute. There is in the train of causes a *subordination*, and this is MATERIAL or FORMAL (which see).

The ONTOLOGICAL principles deduced are: There is no effect without a cause; out of nothing nothing comes; nothing can be the efficient cause of itself; two things cannot be the reciprocal cause of each other; the effect and the cause are *always* proportioned to each other; whatever is in the effect must in some sense be in the cause; the cause of the cause is also the cause of the effect; the same causes always produce the same effects; the cause must be present, either immediately or mediately, with that which it effects.

II. The Material; III. The Formal; IV. The Exemplary (Plato); and V. The Final Cause.

The names most distinguished in connection with the philosophical theories of cause are—Heraclitus and Portagoras (denial of the notion), Plato (idea, matter, operative principle; immediately evident, free and physical; conditional and absolute), Aristotle (fourfold division; first cause of motion), Bruno (principle, internal; cause, external; first cause, final), Hobbes (potency and act), Descartes (assistance), De la Forge, Malebranche (occasional causes), Spinoza (adequate cause; cause of divine acts identical with cause of divine existence), Locke (appearance of changes), Leibnitz (pre-established harmony), Hume, Brown (observation of sequence, habit, not by, but *after*, natural instinct, apart from reason, blind belief), Kant (a fundamental, synthetical, *a priori* judgment, a postulate of pure reason, category of relation), Reid, Stewart (intuition), De Biran, Cousin (self-consciousness, personal causation), Fichte (positings of the Ego, self-originated subjective modification), Schelling, Hegel (spontaneity, all *being* has in it the internal impulse and power to *become*), Hamilton (the conditioned; mental impotence), Schopenhauer (the occasion for the phenomenon of Will). Among later points made, the most important is that each sphere of nature is controlled by a specific modification of the law of causality. All the views are reducible to two: the conception of cause is either *a priori* or *a posteriori*, and each of these is either original or derivative. In the application of the idea of cause arise the terms causal principle, causal judgment, causal nexus, causal connection, causal union, causal relation.

One of the most specious and widely accepted fallacies is that *cause precedes* effect. Cause and effect are absolute correlates, so that in point of *time* cause cannot be *before* effect, but the two sides of the relation come into simultaneous being. Nor can cause, as such, exist without effect. As a term of relation, cause is as dependent on effect as effect on cause. The order of priority is therefore purely logical and mental. Nor is it true that a thing must be (*in time*) *before* it becomes a cause. It is only necessary that it shall be *when* it becomes a cause. Hence the thoughts of an eternal mind, the acts of an eternal being, may be eternal. In the world about us all that *becomes* cause *exists in deed* before it *becomes cause*, but the reason of this is that every source of cause, in our sphere, is also an effect, and must *be* as an effect before it can *act* as a cause. Nevertheless, it becomes cause strictly *simultaneously with* the effect, not *before* it. The true conception of cause therefore is demonstrably not that of sequence in time, as Hume contends, but the one we have given—to wit, that cause is that which contains the reason of the effect, and hence that the relation is a necessary one, and is as certain where we cannot observe its result as where we can. Innumerable instances can be given of the invariable sequence, *in time*, of one thing.

That in virtue of which a causal agent can become cause, we call power. Some of the postulates which hold good as to cause and effect in the *inorganic* world are not demonstrably valid in the organic, and seem to fail entirely in the sphere of freedom and of intellect.

So complete is the mind's recognition of the nature of cause that on a statement of any number of purely *hypothetical cases* it will at once decide which of the two terms is cause, which is effect, if the statement is such as to help the mind to see which of the terms must contain the reason of the other. C. P. KRAUTH.

Caus'tic [from the Gr. *καίω*, to "burn"], a term applied to substances which exert a disintegrating or destructive effect upon animal tissues. They usually produce a sensation as of burning, whence the name. "Lunar caustic" is the silver-nitrate, so called because *luna* (the "moon") is the old alchemical name for silver. Caustic lime, potash, soda, and magnesia are these substances when pure, so called to distinguish them from their less active carbonates. Many other chemical reagents are used in surgery as caustics, notably the nitric, chromic, and arsenious acids.

CAUSTIC, in optics, is a term applied to curved lines and surfaces formed by a series of points where (from the intersection of reflected or refracted rays) the heat and light are most intense. Reflected rays produce catacaustics —refracted rays, diacaustics. The study of caustic surfaces and curves is of the greatest importance in the construction of lenses and mirrors. For example, it has been found that the caustic by reflection from a paraboloid of revolution is reduced to a point when the incident rays are parallel to the axis of the paraboloid. For this reason parabolic reflectors have been introduced with great success into many optical instruments.

Cau'tery [Gr. *καυτήριον*, a "branding-iron"], in surgery, the application of a white-hot iron or of a moxa. It is otherwise called "actual cautery," to distinguish it from "potential cautery," or the application of a chemical reagent as a caustic. "Cautery" is also the small iron instrument which is heated and applied in this operation. The actual cautery is useful in destroying certain morbid and gangrenous tissues, in staying hæmorrhages, and in relieving severe local pain. It has a valuable derivative effect in many cases, and when properly applied produces comparatively little pain. It is sometimes used to produce a slight, and sometimes a profound local effect.

Cau'tion [from the Lat. *caveo, cautum*, to "be on one's guard"], a legal term derived from the Roman law, and employed in the admiralty courts. It is substantially equivalent in meaning to security or bail. When security is given under oath, it is called "juratory caution." The word *caution* is employed in the same general sense in Scotch law.

Cavaignac (GODEFROY), a French republican journalist, son of Jean Baptiste Cavaignac (1762–1829), who figured in the Revolution, born in Paris in 1801. He was driven into exile in 1835, returned in 1841, and became one of the editors of "La Réforme." He was one of the most popular leaders of the liberal party. Died May 5, 1845.

Cavaignac (LOUIS EUGÉNE), an eminent French general and statesman, brother of the preceding, was born in Paris Oct. 15, 1802. He served with distinction in Algeria, to which he was sent in 1832, became a colonel in 1841, and governor of the province of Oran in 1847. In Mar., 1848, he was appointed governor-general of Algeria, and in the next month was invited by Lamartine to come to Paris and defend the government against the mob. He reached that capital on the 17th of May, and was then appointed minister of war. He displayed much energy, skill, and presence of mind in his operations against the Socialists and Com-

munists, who began a great insurrection in Paris June 23, and were defeated in a battle which lasted three days. About the 28th of June he was chosen *chef du pouvoir exécutif*, or president of the republic, by the National Assembly. He was a moderate republican, and used his power with clemency. In the autumn of 1848 he was a candidate for the office of president, and received 1,448,302 votes, but was defeated by Louis Napoleon. He retired from power on the 20th of Dec., and took his seat in the National Assembly. He was excluded from political life by the *coup-d'état* of Dec., 1851, and by his refusal to take the oath of allegiance to Napoleon III. Died Oct. 28, 1857. (See HENRI MONTFORT, "Biographie du Général Cavaignac," 1848.)

Cavaillon (anc. *Cabellio*), a town of France, department of Vaucluse, on the river Durance, 16 miles S. E. of Avignon. It has an old cathedral and remains of a Roman triumphal arch. Here are manufactures of silk twist and vermicelli. Pop. 8034. *Cabellio* was a city of the ancient Cavares, and Pliny calls it an *oppidum Latinum*.

Cavalier' [Sp. *caballero;* It. *cavaliere*, from the Lat. *caballus*, a "horse"], an Anglicized French word, signifies a horseman, a knight, an armed horseman, a gentleman (attendant on a lady), a gallant, a soldier who fights on horseback. In English history it is applied to the royalist party which fought for Charles I. against the Roundheads. *Cavalier* is the French for the knight in the game of chess.

CAVALIER, in fortification of the old school, is a defence-work constructed on the *terre-plein* or level ground of a bastion. It rises to a height varying from eight to twelve feet above the rampart, and has a parapet about six feet high. Its uses are to command any rising ground held by the enemy within cannon shot, and to guard the curtain, or plain wall between two bastions, from being enfiladed.

Cavalier (JOHN), (1679–81 (Morel says 1685) 1740), often styled the "Baker's boy of Anduze," because at one time appenticed to that trade, was the son of a Protestant peasant of the Cevennes, of the village of Ribaute near Anduze (Gard), and in his early youth served as a shepherd lad or herdsman. When the Cevenol uprising in defence of the Protestant religious rights broke out in Languedoc in 1702, Cavalier, who had fled in 1701 for safety to Geneva, returned to share the lot of his persecuted brethren, and was soon after recognized as their military commander-in-chief. Such was his instinctive military genius that although he knew nothing more of tactics than what he had picked up by watching the drill of the militia of his district in the streets of his native town, he soon had his rude volunteers under a rigid system of discipline, such as Martinet would have envied, and made them a match for triple (if not quintuple) their number of the very best regulars opposed to them. His grand tactics were unexceptionable, and his handling of troops on the field of battle perfection itself. He could make them perform with resultive effect the most complicated evolutions under the severest fire, demonstrating that he was one of the rarest of mortal phenomena, uniting a power of control, instruction, and influence such as scarcely any general on record has proved equal to. Very shortly after he first exercised any command he undoubtedly became by election or unanimous choice commander-in-chief (commandant-général) of all the Camisard or Cevenol insurgents in arms. Michelet and others question this fact, and attribute the chieftainship to the charming or exquisite Roland, but the facts as set forth by Morel (i., vii., viii.), and the language used by Roland himself, who addresses Cavalier as "commandant les troupes religionaires, ou il se trouvera, en Languedoc," would set the question at rest, were it not further established by his possession of absolute power of life and death in all cases upon his own personal judgment, without calling a council of war. That he never abused this enormous prerogative, at the same time that he did exercise it, testifies to a remarkable self-control in a young man of twenty. In the organization of the Cevenol forces Cavalier was called upon to draw upon the almost obsolete resources of the past as to weapons, as well as to improvise them until his men were armed with the best firearms of the day, captured from his adversaries. He even improvised cannon, but never had time to bring them into the field.

To enter closely into all the details of the career of this Cromwell in miniature, or of a mountain-warfare which under his supreme command did not last over two years, is impossible within the space accorded. His greatest and most glorious engagement was that of Nages (16th April, 1704), which was deemed of sufficient importance by the celebrated engineer and map-maker, Cassini, for a special indication upon his map of the district in which it occurred. Upon this field, surprised through the physical prostration of his men, and no fault of his own, and surrounded by six or seven to his one, Cavalier extricated himself, and in so far defeated the finest soldiery in France that he foiled all the plans of their best commanders. His tactics were not only astonishing in their precision, but sufficiently admirable in their originality to extort the praise of his adversaries; and, if such a thing were possible, the military capacity of this comparative youth exceeded the heroic courage and unsurpassable devotion of the troops he had made and commanded. Although he enjoyed the triumph of treating with Villars, the superb representative of the magnificent Louis XIV., Cavalier certainly betrayed his trust in that he capitulated under stipulations for his own personal benefit, without insisting upon reliable guarantees to ensure the maintenance of the treaty he extorted in behalf of his religious brethren. There is no question but that Villars and Louis both deceived the Cevenol leader, more loyal to his pledges than either marshal or king. Moreover, Louis wounded his pride in a personal interview, and alarmed him for his personal safety. Like Prince Eugène, he quitted the French service for that of his enemies, and with that prince and the duke of Savoy took part in the invasion of France in 1707; and it is questionable if either imperial prince or royal duke inspired more apprehension to the government authorities than the former Cevenol-peasant-generalissimo. From the Dutch he passed into the British service, and remained in it until his death in 1740. He distinguished himself at Almanza (25th April, 1707), where his regiment, composed of Cevenol refugees, was opposed to a French organization in which the Huguenots recognized a portion of their former persecutors. Thereupon this mutual recognition led to such a fearful conflict with the bayonet, that only three hundred of the combatants survived. This is according to the statement of the impassible bigot the duke of Berwick, who never could recall the circumstance without horror. Morel (i., 389) says, "This (Cavalier's) terrible Camisard regiment rushed with the bayonet on the Franco-Spanish army, and made the balance of victory tremble."

The distinguished Malesherbes, after a full consideration of the character of Cavalier, pronounces him "one of the rarest characters which history presents for our contemplation." Villars, no better judge, concedes his vast military capacity. His treating with Cavalier as equal with equal would attest the latter's influence, had we not the marshal's very words to establish the fact. The same is admitted in more or less eloquent language by all the historians of this struggle for religious freedom. Whether Cavalier needed only a wider stage to demonstrate his worthiness to rank with the most distinguished commanders of olden or modern times, or whether his lights were not strong enough to illuminate a vaster space, he had no opportunity to determine. That he did not rise higher and more quickly than he did in the English army is easily explained. William of Orange preferred purely professional soldiers, and his very sense of religious inspiration doubtless marred his prospects, even under the succeeding monarch, Anne. That he was deemed worthy of confidence is shown by his elevation to the rank of major-general in the British service, and his appointment as governor of Jersey, one of the Channel Islands, an outpost of her dominions and nearest their most dangerous enemy. In this position he died in 1740.

Without *one* man—an obscure citizen of Nijni-Novgorod—Kosma Minin, a butcher, "distinguished by nothing but a sound head (strong common sense) and a brave, honest, unselfish heart," Russia, in 1611–12, would have become a Swedish or a Polish possession; and without another one, an equally obscure man, this John Cavalier, a peasant, imbued with instinctive capacity for war and the government of men, France, in 1704, would have acquired such authority in Europe, and resultively in America, that the preponderance of the Latin race would not have been a question for Napoleon III. to attempt to solve, and fail in solving, as in Mexico. Indeed, Cavalier's career exemplifies the rule of great events depending on "small things." The Cevenol uprising and his successes in Languedoc attracted to the south, into Languedoc, 10,000 to 20,000 veteran infantry, besides dragoons, and a large body of artillery, the latter of no use in the mountains of the Cevennes, but sorely needed, to the east, on the Rhone, and to the north, in Flanders. A cabal of women aggravated the evil as regarded the Roman Catholic cause by sending the favored Villeroy where men and a man were most needed, and a man, Villars, into Languedoc. This alone made Blenheim a possibility. Had no Cavalier arisen, Villars would have been in Flanders to prevent Marlborough's flank march into Germany, or to remedy Marson's and Tallard's blunders, there, in 1704. It is admitted that the effect of the Cevenol-Huguenot insurrection, in which Cavalier was the prominent figure, had a momentous effect on the fortunes of the war elsewhere, on the prospects of Louis XIV., and on the future of France.

J. WATTS DE PEYSTER.

Cavalry. See MOUNTED TROOPS, by GEN. J. WATTS DE PEYSTER.

Cav'an, a county of Ireland, in Ulster, has an area of 746 square miles, with Fermanagh and Monaghan counties on the N. E., and Leitrim, Longford, Westmeath, and Meath on the W. and S. The surface is partly hilly and partly occupied by bogs. It is drained by the rivers Erne and Woodford. About three-fourths of the land is arable, but the soil is mostly poor, except near the rivers. Among the rocks found here are clay-slate, graywacke, and carboniferous strata. It contains coal, iron, copper, and lead. There are many mineral springs, and numerous highly picturesque lakes. There are some linen manufactures. Capital, Cavan. Pop. in 1871, 140,555.

Cavan, a town of Ireland, capital of the above county, is situated in a fertile vale on the railway from Dublin to Enniskillen, 65 miles N. W. of Dublin. It is mostly ill-built, but has a fine public garden. Pop. 3107.

Cava'nas, or **Cabanas,** a port of Cuba, on the N. W. coast, 38 miles S. W. of Havana. Here is a deep bay which affords anchorage for several hundred ships.

Cavani'lles y Cen'ti (Don ANTONIO), a prominent Spanish historian, born at Coruña, in Galicia, in 1805, became in 1841 a member of the Royal Academy of History, and soon after also a member of the Academy of Moral and Political Sciences. His "History of Spain" (5 vols., 1860–64, not finished) is among the best historical works of Spanish literature. Died in 1864.

Cavarze're, a town of Italy, in the province of Venetia, on the river Adige, 25 miles S. W. of Venice. It has an active trade in silk, cattle, and firewood. Pop. with suburbs, 11,903.

Cavati'na [It.], a short operatic air, differing from the aria in consisting only of one part, and that more in the form of a song. Many composers, however, disregard this difference.

Cave, or **Cav'ern** [Lat. *caverna*, from *cavus*, "hollow;" Fr. *caverne*], a hollow place beneath the surface of the earth. Natural caves have been produced by the upheaval of the strata, by water, or by both combined. The eroding power of water has formed caverns in the courses of rivers and on the coast-line of the sea.

By far the greater number of caves are found in limestone, and they are here formed by the solution of the limestone by atmospheric water, which always contains carbonic acid. The most extensive caves known are subterranean water-courses which have been excavated in limestone by the dissolving power of the stream or streams which flow or have flowed through them. They especially abound in the oolitic limestone, which on this account is sometimes called by geologists "cavernous limestone." The caves of Franconia, of Kentucky, and many others occur in this formation. Next to limestone, caves are mostly found in the strata containing rock-salt, a substance easily removed by water. They are also sometimes met with in igneous rocks; the cave of Fingal, in Staffa, is formed in basalt, and in some places recent lava contains large caverns. Many caves have a calcareous lining, giving them a gorgeous appearance. Sometimes this deposit is pure white, and has, when the cave is lighted up, a wonderful richness and transparency. It is, however, generally colored. To incrustations descending from the roof like icicles the name stalactite is given; those rising from the floor are stalagmites. Sometimes the stalactite meets the ascending stalagmite and forms a column, as if to support the roof. The material of the stalactites and stalagmites originates as follows: The superficial soil, acted upon by moisture and air, evolves carbonic acid, which is dissolved by rain-water, which, permeating the calcareous strata, has the power of taking up lime, until from evaporation the excess of carbonic acid and water is parted with, when the lime returns to its solid state and forms a crust. Caves are inhabited by peculiar species of fishes (such as the blind fish of the Mammoth Cave), by remarkable reptiles (such as the *Proteus*), and by various characteristic insects and crustaceans. They also have an interest from the occurrence, in many, of fossil remains under the incrustations of the floor, frequently concreted into a firm breccia. They belong to the pleistocene period, when Europe was inhabited by hyænas, bears, and lions. Portions of other animals were dragged into their dens as food. In this way the bones of herbivorous animals are mixed with those of the beasts of prey; they have a gnawed appearance, similar to what is produced on bones by the hyæna. Remains of thirty-three species of mammals and five of birds have been discovered in the caves of the British Islands, of which about one-half still survive in Europe, Asia, Africa, and perhaps in America, for the cave-bear has been pronounced to be identical with the living grizzly bear. Among the mammals are species of ox, deer, horse, wolf, dog, fox, bat, hippopotamus, rhinoceros, hyæna, bear, and lion. It is confidently asserted by some geologists that the bones of men are also found in these caves, in circumstances showing that man was coeval with the cave-bear and the mammoth, and lived before the glacial period. The most famous ossiferous cavern in Great Britain is at Kirkdale, 25 miles from York. Ossiferous caves occur in many parts of the globe. The fossils of those in Australia show that the fauna of the pleistocene period in that country had a remarkable resemblance to that of the present day. The remains are chiefly those of kangaroos and other marsupials. The caves of Brazil have yielded many interesting remains.

REVISED BY J. S. NEWBERRY.

Cave (EDWARD), an English printer, born at Newton in 1691, was the founder of the "Gentleman's Magazine," first issued in 1731. He was a friend and patron of Dr. Johnson. Died in 1754.

Cave (WILLIAM), an English scholar and writer, born in Leicestershire in Dec., 1637. He became canon of Windsor in 1684, and vicar of Isleworth in 1690. He published "Primitive Christianity" (1672), a "History of Christ and the Apostles" (1675), and "Lives of the Fathers of the Church in the Fourth Century" (1682), which were highly esteemed. Died Aug. 4, 1713.

Ca'veat [Lat. "let him beware"]. This word is used in law in two senses. (1) A notice given to a court or judge to stay the performance of certain acts, judicial or ministerial. It is used to prevent the enrolment of a decree in chancery, or the issuing of a commission of lunacy, or the grant of letters testamentary to an executor. (2) In patent law it has a statutory effect. It is filed in the office of the commissioner of patents. An inventor makes use of it to obtain time to perfect his invention. It should set forth the design, and pray protection of the inventor's right until the invention is matured. The caveat is filed in the confidential archives of the patent office, and preserved in secresy. It is operative for one year after its filing. When, however, an application is made within the year by another person for a patent interfering with the caveat, it is treated as confidential, and notice given by mail to the caveator, who must thereupon file his specifications prepared for a patent within three months from the time of mailing the notice, added to the time usually required for the transmission of mail-matter from Washington to the caveator. Resident aliens, under certain regulations, may avail themselves of the privilege of a caveat. (See section 40 of chap. 230 of "Laws of Congress," 1870.)

Ca'veat Emp'tor ("let the purchaser beware"). This is an important rule in the law of sales of personal property. Its general meaning is, that a purchaser must judge for himself of the quality of goods purchased. He will accordingly have no remedy against the seller if the goods turn out to be of an inferior character and of much less value than the price paid. The common law of England differs widely from the civil or Roman law, where the rule prevailed that a "sound price warrants a sound article." The rule (*caveat emptor*) must be confined to the *quality* of the goods. In the case of failure of the *title* to chattels sold by a person in possession, there is, according to the American decisions, an action against the seller, on the theory of an implied warranty. To the general doctrine of "caveat emptor" there are important qualifications. (1) The rule does not extend to cases of fraud. Where there is positive or active fraud, this is extremely clear. There is more doubt in the case where there is only concealment on the part of the seller. A distinction has here been taken between intrinsic and extrinsic defects. The latter would refer to cases where external circumstances affect the value of a chattel, as the outbreak of war or the conclusion of peace. The rule in such cases is that concealment is not a legal fraud, unless there is an active attempt to mislead. In the case of intrinsic defects there is great diversity of opinion. Some authors of repute hold that "the seller may allow the buyer to cheat himself *ad libitum*, but that he must use no effort to mislead." It is to be regretted that a view of the law should be taken so widely at variance with the dictates of common morality, and an effort should be made to find some satisfactory ground upon which they can be reconciled. It is believed that the seller is bound, *in law*, to disclose any facts within his knowledge of the nature referred to which cannot be discerned by the exercise of ordinary observation and good judgment on the part of the buyer, and which materially affect the value of the chattel in ordinary estimation. To use a familiar illustration, if a seller knew that a horse which he exposed for sale in the ordinary manner had a secret defect not discernible by a careful purchaser, it would be a fraud on his part not to disclose it. Of course, this conclusion would not be arrived at if he expressly stated that the sale was "with all faults," etc.

(2) When a sale is made by a manufacturer for a special purpose, the better opinion is that the rule in question has no application. In other words, there is an implied warranty that the chattel is reasonably fit for the purpose for which it is bought. Some authorities of weight maintain that there is an implied warranty in all sales by manufacturers that there is no defect in the *process of manufacturing*, though they would not extend the doctrine to the materials used. (3) Wherever the reason on which the rule is founded fails, the rule itself gives way. The only rational ground of the doctrine of *caveat emptor* is, that when a purchaser has an opportunity to examine goods he should act in the way in which a prudent man usually manages his affairs, and should notice such defects as he may be able to discover. Where there is no such opportunity for inspection, or where the seller takes the burden of selection upon himself, there is no room for the application of the rule. Accordingly, it does not apply to a true sale by sample; that is, where the bulk of the commodity is not present. In this case, the seller impliedly warrants that the bulk of the commodity is equal to the sample. The purchaser must examine the sample for himself. If, however, that course is not open to him, the bulk of the commodity must be equal to the *apparent* qualities of the sample. Thus, if an article like madder were sold by a sample contained in a sealed bottle, the bulk must equal the sample as it appears to the eye. The same general rule would apply to so called executory contracts of sale, as where goods are sold at sea "to arrive" at a prescribed time. In the special case where the selection is made by the seller, the rule also fails. The distinction is put by one of the English judges in an apt form. He says: If the buyer says to the seller, "Sell me *a* gray horse to ride," there must be a horse supplied which the purchaser can ride. If, however, he had said, "Sell me *that* gray horse to ride," pointing to a particular animal, there would be no remedy, in the absence of fraud, if the horse were unfit to ride. In these cases another view might be taken. There is really no contract if the stipulated article is not supplied, the minds of the parties not having met. It seems very clear that if A proposes to sell B wheat by sample, and he furnishes on delivery wheat that does not correspond with the sample, there has been no agreement to buy the thing furnished, and it may accordingly be returned to A when its true character is discovered. (4) There is an exception to the rule in American law resting upon peculiar grounds, and it may be maintained though there be no fraud or other special circumstances. This is the sale of provisions for *domestic use*. There is an implied warranty that the goods are wholesome. The exception is not extended to sales by one dealer to another. It may be added that there is a corresponding rule (*caveat venditor*) applicable to the seller, who is bound in like manner to be on his guard in dealing with the purchaser, though this would also give way in cases of fraud. An instance is where the buyer, having learned that a war has ended, takes advantage of his superior knowledge to make purchases. Such a purchase would be legally valid, though if he misled the seller the fraud would vitiate the transaction. (See also, on this subject, SALES.) T. W. DWIGHT.

Cave City, a post-village of Barren co., Ky., on the Louisville and Nashville R. R., 85 miles S. of Louisville and about 6 miles S. E. of the Mammoth Cave. Pop. 387.

Cave in Rock, a post-township of Hardin co., Ill., on the Ohio River, 51 miles above Paducah, Ky., was once the haunt of a band of river-pirates under one Mason, an outlaw. Pop. 869.

Cav'endish, a post-township of Windsor co., Vt., on the Rutland and Burlington division of the Vermont Central R. R., 23 miles N. by W. of Bellows Falls. It has manufactures of woollen cloth, leather, lumber, furniture, etc. It includes the village of Proctorsville, which has a national bank and important manufactures. Pop. 1823.

Cavendish (HENRY), an eminent English chemist and philosopher, born at Nice Oct. 10, 1731, was a son of Lord Charles Cavendish and a grandson of the duke of Devonshire. He was a man of eccentric and unsocial habits, who devoted himself exclusively to science. From an uncle who died about 1773 he inherited a very large fortune. As a chemical philosopher he occupies the first rank. He was one of the founders of pneumatic chemistry, ascertained the proportions of oxygen and nitrogen in common air in 1783, and discovered the composition of water in 1784 by burning oxygen and hydrogen in a glass vessel. He was profoundly versed in geometry and mathematics. In 1803 he was chosen an associate of the French Institute. He died in London without issue Feb. 24, 1810, and left a fortune of one million pounds sterling. (See G. WILSON, "Life of H. Cavendish.")

Cavendish Experiment, an experiment for determining the mean density of the earth. (See DENSITY OF THE EARTH.)

Caver'na, a post-village of Hart co., Ky. Pop. 479.

Cave Rock, a township of Douglas co., Nev. P. 120.

Cave Spring, a township of Jackson co., Ala. P. 378.

Cave Spring, a post-village of Floyd co., Ga., is the seat of the State asylum for deaf-mutes, and has an extensive cavern and a medicinal spring. It is also the seat of Harn School for young men.

Cave Spring, a post-township of Roanoke co., Va. Pop. 2261.

Cavetown, a post-twp. of Washington co., Md. P. 1899.

Ca'very, or **Cauv'ery** (anc. *Chaberis*), a river of India, in the Deccan, rises near lat. 13° N. and lon. 76° E. It flows south-eastward through Mysore, and after a course of about 470 miles enters the sea by many mouths. Its delta is mostly in the district of Tanjore. It is eminently available for irrigation and useful in agriculture.

Caviare, kav'iar or kaveer', the prepared and salted roe of the sturgeon, made chiefly in Russia, the Caspian fishery alone sometimes yielding several hundred tons annually. There are six or seven species of sturgeon caught for their yield of caviare—species chiefly living in the Caspian and Black seas and their tributary streams. The roe of the sterlet (*Acipenser ruthenus*) is the best, and its caviare is reserved for the imperial court. Caviare is proverbially disagreeable to the uneducated palate, though highly esteemed by the initiated. It is now manufactured quite extensively in the U. S.

Cavi'te, a fortified seaport-town of Luzon, one of the Philippine Islands, is on the Bay of Manila, 3 miles S. W. of the city of Manila. It has an arsenal, and is the chief naval dépôt of the Spanish possessions in the East. Here is a manufactory of cigars. Pop. about 6500.

Cavour', di (CAMILLO BENSO), COUNT, an illustrious Italian statesman, born Aug. 1, 1810, of an aristocratic Piedmontese family, the son of the marchese Michele di Cavour and his wife Adelaide Syllon d'Allamar, an accomplished Swiss lady. Camillo, a younger son, was destined for the army. In the military academy at Turin he showed such proficiency in mathematical studies that he was made an engineer officer at the age of sixteen and given responsible commands. Military life was repugnant to his tastes, and he entertained radical opinions which he did not hesitate to utter, and thereby displeased the king, Charles Albert. He therefore left the army in 1831, and turned his attention to agriculture, taking part also in the reform agitations of the time. He pursued a zealous inquiry into social and industrial questions, visiting England and France for that purpose. He was one of the founders of the "Associazione Agraria," an energetic reform society, and started the liberal journal "Il Risorgimento" in 1847. When in 1848 the liberal party came into power and a constitutional frame of government was accorded to Sardinia, Cavour stood at the head of the moderate republican press, and, elected to the Chamber, he took an important part in the debates, supporting the moderate ministry of D'Azeglio and opposing the violent demands of the Left, whereby he lost in great measure his popularity. In 1850 he was appointed minister of commerce, in 1851 of finance, and in 1852 became premier, accomplishing a fusion of the Right Centre with the Left Centre under Ratazzi. From that time forth he conducted the policy of Italy, bringing about finally its political consolidation amid stormy internal commotions and foreign complications. He promoted free trade and religious toleration, opposed the encroachments of the papal power, and formed an alliance with England and France in the war against Russia, 1854–55. The grand aim of his diplomacy was to promote the union of the Italian peoples and the liberation of Italy from foreign domination. He thus provoked the hostility of Austria, which invaded Italy in April, 1859. The Austrians were defeated, and obtained peace by ceding Lombardy, which was annexed to the Sardinian states. Cavour resigned office in July, 1859, because he disapproved the treaty of Villafranca, but he resumed the position of prime minister in Jan., 1860. In consequence of the victories of Garibaldi and the general uprising of Italian patriots in 1859 and 1860, nearly all Italy was liberated and united. Cavour was prime minister of the new kingdom of Italy when he died on the 6th of June, 1861. He was never married. He left the reputation of being one of the greatest statesmen of modern times. (See "Reminiscences of the Life of Cavour," translated from the French by EDWARD ROMILLY; also EDWARD DICEY, "Cavour, a Memoir.")

Ca'vy, the name of various South American tailless rodent mammals, closely related to the porcupine family, and by most naturalists referred to the Hystricidæ, but

by others to the family Cavidæ, differing from the hare family in the want of clavicles, and in having the incisors situated not in the manner characteristic of the hares. There are four molar teeth in each jaw, and in the genus *Cavia* these are compound; there are four toes on each of the fore feet, and three on the hind feet, the feet not being webbed. The females have only two teats. One species, *Cavia Cobaya*, has long been domesticated as a pet and plaything of children. It is called the "restless cavy," or more frequently the "Guinea pig," although it is neither a pig nor a native of Guinea. The Guinea pig multiplies with rapidity, producing young ones when only two months old, and afterwards at intervals of two months, from four to twelve in a litter. This fecundity serves for the preservation of the race in a wild state, the little animal being very defenceless. The other species are very numerous in parts of South America.

Caw Caw, a township of Orangeburg co., S. C. Pop. 934.

Cawker City, a post-village and township of Mitchel co., Kan. It is the seat of the U. S. land-office for the north-western district of Kansas, and is favorably situated at the junction of the two branches of the Solomon River. It has one weekly newspaper, a high school, three churches, and a large wholesale and retail trade. Pop. of township, 38.

FLAVIUS MACMILLAN,
ED. AND PUB. OF "SENTINEL."

Cawn'poor, or **Cawnpore,** a town of Hindostan, on the right bank of the Ganges, which is here nearly a mile wide, about 96 miles S. W. of Lucknow; lat. 26° 29′ N., lon. 80° 25′ E. It is an important British military station, having cantonments which accommodate about 7000 men. It is not well built, and contains few remarkable public edifices. Connected with the cantonments are several hundred bungalows for the officers, which are fitted up luxuriously and have large gardens. During the mutiny of the Sepoys in 1857, Nana Sahib massacred here a number of English captives, including women and children. Pop. 108,796.

Caxamarca, or **Cajamarca,** kå-hå-mär'kå (*i. e.* a "place of frost"), a department of Peru, is bounded on the N. by Ecuador, on the E. by Amazonas, on the S. by Libertad, and on the W. by Libertad and Piura. The department, with the exception of the extreme N., is crossed by mountain-ranges, in consequence of which the climate is cool and pleasant. It is irrigated by the Marañon, which flows along its eastern boundary. All products of the tropics and the temperate zones are raised here, as wheat, barley, potatoes, tobacco, etc. Chief town, Caxamarca. Pop. about 120,000.

Caxamar'ca, or **Cajamarca,** a town of Peru, capital of a province of its own name, is near the eastern foot of the Andes, about 83 miles N. N. E. of Trujillo. It has several churches, and manufactures of cutlery and woollen cloth. Silver-mines have been opened in the vicinity. Caxamarca is celebrated in the history of the Spanish conquest. The ruined palace in which Pizarro confined the inca Atahualpa is still to be seen. Pop. 18,330.

Caxatam'bo, or **Cajatambo,** a town of Peru, capital of a province of its own name, is on the W. slope of the Andes, 140 miles N. of Lima. Pop. about 6500.

Cax'ton (WILLIAM), an English merchant, born in Kent about 1412, was the first to introduce printing into England. In 1464 he was employed to negotiate a treaty of commerce between Edward IV. of England and the duke of Burgundy. He translated from the French a "History of Troy," which he printed probably in 1471, but perhaps earlier. This is said to be the first book ever printed in the English language. After he had resided for some time at the court of the duchess of Burgundy, he returned to England and established a printing-office in Westminster in 1476, where he printed several other books. Died about 1492.

Cayam'be, or **Cayambe-Urcu',** a mountain in Ecuador, a peak of the Colombian Andes, is directly under the equator, and about 45 miles N. E. of Quito. It has a beautiful conical form, and an altitude of 19,541 feet. It is covered with perpetual snow, and forms one of the most remarkable landmarks on the globe.

Cayenne, a seaport-town of South America, capital of French Guiana, is on the Atlantic, and on an island of its own name at the mouth of the Cayenne River; lat. 4° 56′ N., lon. 52° 13′ W. It has a shallow harbor, and is defended by a fort and batteries. Considerable quantities of coffee, sugar, cotton, indigo, and cacao are exported from this place. Pop. about 6000. Cayenne Island is about 30 miles in circumference, and is separated by a narrow channel from the mainland. Cayenne is a penal colony to which political offenders are transported.

Cayenne Pepper. See CAPSICUM.

Cayes, a seaport-town of Hayti, on its southern coast, 92 miles W. S. W. of Port-au-Prince. Pop. 3000.

Cayman' [said to be an African word, introduced by slaves], a name used either as the distinctive appellation of some, or as a common name for all the Crocodilidæ of South America and the West Indies. The genus *Alligator* is by some naturalists divided into three genera, to one of which the name *Caiman* is given. The eye-browed cayman

Cayman.

(*Alligator palpebrosus*), to which the name cayman is applied in Guiana, is not the largest of its tribe. The three bony plates which form each eyebrow, projecting as large knobs, and the scarcely webbed feet, constitute the characters of the genus or sub-genus *Caiman*, to which belong also *Alligator trigonatus* and *Alligator gibbiceps*.

Caymans, The, three small islands in the Caribbean Sea, belonging to Great Britain, 130 miles N. W. of Jamaica. They have few inhabitants, and chiefly produce turtles.

Cayu'ga, a county in W. Central New York. Area, 756 square miles. It is bounded on the N. by Lake Ontario, and partly on the W. by Cayuga Lake. It also contains Owasco Lake, and is traversed by Seneca River. The surface is undulating; the soil is very fertile. Wool, cattle, butter, cheese, fruit, grain, and tobacco are extensively raised. Among the minerals found here are gypsum and corniferous limestone. The rocks of this county are of the Silurian and Devonian formations. The county has various manufactures, including metallic wares, castings, lumber, flour, carriages, agricultural tools, etc. It is intersected by the Central, the Southern Central, and the Cayuga Lake R. Rs. Capital, Auburn. Pop. 59,550.

Cayuga, a post-town of Ontario (Canada), capital of Haldimand co., is on Grand River, which is navigable, 14 miles from its entrance into Lake Erie and 25 miles S. of Hamilton. It has two newspapers and a heavy trade in grain and plaster.

Cayuga, or **Cayuga Bridge,** a post-village of Aurelius township, Cayuga co., New York, on Cayuga Lake near its outlet, and on the New York Central R. R., 11 miles W. of Auburn at its junction with the Cayuga Lake R. R. It has four churches. The railroad here crosses the lake by a bridge nearly a mile long. Pop. 435.

Cayuga Lake, a beautiful lake of New York, forms the boundary between Cayuga and Seneca counties, and is

about 38 miles long. Its width varies from one to three miles, and its greatest depth is supposed to be above 500 feet. The surface is 387 feet above the level of the sea. Its banks are formed of Silurian and Devonian rocks. Whitefish and many other species of fish are caught in it. Steamboats ply daily between Cayuga Bridge and Ithaca, which is at the head of the lake. The outlet of this lake flows into Seneca River, which separates Central from Western New York.

Cayugas. See SIX NATIONS.

Cayu'ta, a post-township of Schuyler co., N. Y. P. 641.

Caza'lla de la Sier'ra, a town of Spain, province of Seville, 39 miles N. N. E. of the city of Seville. It is on a declivity of the Sierra Morena, and in a district which abounds in silver, copper, iron, and marble. It has manufactures of linen, machinery, etc. Here are several ruined villas and Roman and Arabic antiquities. Pop. 6852.

Cazem'be, or **Kazembe,** the name of a country in the S. E. of Africa. It is between Lake Tanganyika and the river Zambesi, but its limits are not definitely known. Its fortified capital, Lucenda, is between lat. 8° and 9° S., and between lon. 28° and 29° E. The soil is well watered and fertile. Among the chief productions are maize, manioc or cassava, sugar, palm wine, ivory, copper, and sesamum.

Cazeno'via, a post-township of Woodford co., Ill. Pop. 990.

Cazenovia, a post-village of Madison co., N. Y., is on a small lake 18 miles S. E. of Syracuse. The Cazenovia and Canastota R. R., 15 miles long, connects it with the Central R. R. The Syracuse and Chenango Valley R. R. connects it with Syracuse on the N., and with the New York and Oswego Midland R. R., at Earlville on the S. It is the seat of Central New York Conference Seminary. It has a woollen-mill, a pasteboard-factory, a paper-mill, a lock-factory, and a machine-shop, one national bank, and one newspaper-office. Pop. 1718; of Cazenovia township, 4265. IRVING C. FOOTE, PUB. CAZENOVIA "REPUBLICAN."

Ceano'thus America'nus, New Jersey Tea, or **Red Root,** a shrubby plant of the order Celastraceæ, is a native of the U. S. It is about two feet high, and has ovate, serrate leaves, which were used as a substitute for tea during the Revolutionary war. It has small white flowers in clusters, which are crowded in dense panicles. The beautiful native shrubs called in California wild lilac belong to this genus.

Ceará, or **Ciará,** a maritime province in the N. E. of Brazil, has a coast-line of nearly 350 miles. Area, 36,887 square miles. Pop. in 1867, 550,000. Gold, copper, and iron are found here. Ceará is covered by fine forests, and produces balsams and resins. Capital, Fortaleza.

Ce'bes [Gr. Κέβης], sometimes written **Kebes,** a Greek philosopher, born at Thebes, was a disciple and friend of Socrates. One of his works, entitled "Pinax" (the "Tablet or Picture"), is extant. It is a dialogue on human life, which is highly commended, and has been translated into many languages.

Ce'bus [Gr. κῆβος, a "monkey"], a genus of American monkeys characterized by a round head, long thumbs, and a long prehensile tail covered with hair. The species are numerous, remarkably intelligent and active, and live in trees. They feed chiefly on fruits, but also on eggs, insects, worms, and mollusks. They are included under the designation sapajou in its wider sense, and among them are the monkeys to which this name is more strictly applied. The names capuchin, sajou, weeper, and sai are also given to them. The name Cebidæ is given to the American monkeys as a family by those who recognize the limits of this family as being the same as those of the tribe Platyrrhinæ.

Cebus, or Sajou Monkey.

Cecidomyi'a [from the Gr. κηκίδιον, a "gall-nut," and μυῖα, a "fly"], a genus of two-winged insects of the gnat and mosquito family, having downy wings, which are horizontal when at rest; antennæ as long as the body, with joints, and whorls of hairs at the joints; long legs, and the first joint of the tarsi very short. The species are numerous, of small size, but some of them are very important on account of the ravages which their maggots effect in grain crops. *Cecidomyia cerealis,* called the barley midge, a brownish-red fly with silvery wings, of which the maggot is vermilion-colored, is very destructive to barley and spelt. The maggots live in families between the stalk and the sheath of the leaf, abstracting the juice of the plant. The wheat-fly and the Hessian-fly belong to this genus. Some of the species of *Cecidomyia* deposit their eggs on the young buds of trees, which the larvæ transform into galls.

Ce'cil, a county which forms the N. E. extremity of Maryland, is at the head of Chesapeake Bay. Area, 409 square miles. It is partly bounded on the W. by the Susquehanna River, and is intersected by the Elk River. The soil is productive. Wheat, corn, oats, fruit, and wool are extensively raised. The county contains large quarries of granite and valuable mines of chromium, iron, and fire-clay. The manufactures include flour, iron, paper, etc. It is traversed by the Philadelphia Wilmington and Baltimore and the Philadelphia and Baltimore Central R. Rs. Capital, Elkton. Pop. 25,874.

Cecil, a township of Washington co., Pa. Pop. 1102.

Cecil (Rev. RICHARD), an eminent evangelical clergyman of the Church of England, born in London in 1748, died in 1810. He was a devout, fervent Christian, and an impassioned pulpit orator. His works were published (London, 1811) in 4 vols. 8vo. The fourth volume, containing his "Remains," is considered the most valuable. There is also an American edition (New York, 1845) in 3 vols. 8vo.

Cecil, Lord ROBERT. See SALISBURY, MARQUIS OF.

Cecil. See BURLEIGH.

Cecil'ia, SAINT, a Roman virgin who is supposed to have suffered martyrdom in the second or third century. She is regarded as the patroness of musicians and the inventor of the organ. Raphael, Domenichino, and other great artists painted pictures of her, and Dryden wrote a celebrated "Ode for St. Cecilia's Day," which is the 22d of November.

Cecil'ian Col'lege, a Catholic male boarding school at Cecilian, Hardin co., Ky., on the Elizabethtown and Paducah R. R. It was founded in 1860, and chartered in 1867. Its proprietors and professors are laymen. Its average number of matriculants for thirteen years is 150. No uniform is required. The discipline is firm and strict, the students being at all times in the care of the officers of the school. Degrees are conferred by this college both in the classical and business departments. The school term is of forty weeks, at a charge of $5 per week, covering all expenses.

H. A., S. G., and A. D. CECIL,
PROPRIETORS.

Cecilius. See CÆCILIUS.

Ce'cilton, a post-village and township of Cecil co., Md. Pop. 462; of township, 3337.

Cecro'pia, a genus of trees of the order Artocarpaceæ. The *Cecropia peltata,* a very common tree of the West Indies and South America, called trumpet-wood and snake-wood, is remarkable for its hollow stem and branches, with membranous partitions at the joints. The small branches are made into wind instruments. The wood is very light, readily takes fire by friction against hard wood, and is much used by the Indians for procuring fire. The fruit is agreeable, and resembles a mulberry.

The trunk and branches yield a large quantity of saline matter, employed by planters in the purification of sugar. The bark is strong and fibrous, and is used for cordage. It is also astringent, and is employed in diarrhœa and gonorrhœa. The juice yields caoutchouc.

Cecro'pia Moth, a lepidopterous insect of the family Bombycidæ, and nearly related to the silkworm. The systematic arrangement of this family is unsettled, but of the numerous names proposed for this insect perhaps *Platysamia cecropia* is the best. This is the largest North American moth yet known. When expanded it often measures six inches and a half across. It is of a dusky-gray color, variegated with white, black, and various neutral tints. It appears in the U. S. in June, and is a most striking and beautiful object. Its larva is over three inches long, of a light-green color, with red and yellow warts armed with bristles. The cocoon is of a very strong silk, which is abundant in quantity, but it cannot be reeled. It has, however, been carded and spun into an excellent thread, and but for the delicate character of the larvæ, which are hard to raise, it would become an important article of commerce. The *Telea polyphemus,* an American relative of this moth, has attracted much attention from the excellence of its silk and the hardiness of its young. The ailanthus silkworm of China also closely resembles the larva of the cecropia moth. From the fact that the common silkworm has become subject to several destructive diseases, the scientific world is much interested in the effort to find another silkworm which shall be hardy and productive of useful cocoons.

Ce'crops, or **Kekrops** [Gr. Κέκρωψ], a semi-fabulous hero of the Pelasgian race, was called the first king and legislator of Attica. According to tradition, he instituted marriage and instructed the Athenians in agriculture, navigation, religion, etc. The people of Attica were sometimes called Cecropidæ.

Ce'dar [Gr. κέδρος; Lat. *cedrus;* Fr. *cèdre*], the common name of several species of evergreen trees of the order Coniferæ. They afford durable and valuable timber. The name red cedar is given to the *Juniperus Virginiana,* a native of the U. S., which is prized for its durable, compact, and odorous wood, and is used by cabinet-makers. It grows mostly in dry and sterile soils. In the Western States it attains the height of seventy feet or more, but in the Eastern States it is a small tree. The American white cedar (*Cupressus thyoïdes*), an evergreen tree, abounds in the swamps of the U. S., and grows from thirty to seventy feet high. The timber of this tree will remain for a long time under water without decaying, and is an excellent material for posts of fences and for shingles. Various other coniferous trees are called cedars in the U. S. The name white cedar is given in America to the wood of *Cupressus thyoïdes* and *Thuya occidentalis*—the latter throughout the Northern States.

The cedar of Lebanon, perhaps the most celebrated of the cedars, is now assigned to the genus *Cedrus,* which differs from *Larix,* the larch, in having evergreen leaves and in other less conspicuous characters. This famous tree is not confined to Lebanon, but grows in the Atlas Mountains, and is half naturalized in parks and landscape gardens in Europe and America, thriving well even in the north of Scotland. According to Dr. Hooker, it is highly probable that the deodar of the Himalaya Mountains is specifically identical with the cedar of Lebanon, though the trees differ considerably in growth, aspect, and size of cones. The deodar is much larger. It is prized for its timber and its resin, tar, and pitch; which were also once produced by the cedar of Lebanon. Its timber is much better than that of the latter. Of the celebrated cedars on Mount Lebanon, eleven groves still remain, two of them numbering thousands of trees. The famous B'Sherreh grove is three-quarters of a mile in circumference, containing some 400 trees, young and old. Twelve of these are of an extreme age, estimated by some at 2000 years. The largest is 63 feet in girth and 50 feet high, one-third the maximum height of the deodar.

The so-called "cedar" of the West Indies and South America, much used for cigar-boxes, and sometimes for lead-pencils, is the fragrant red wood of the *Cedrela odorata* of the order Cedrelaceæ.

Cedar, a county in the E. of Iowa. Area, 576 square miles. It is intersected by the Cedar and Wapsipinicon rivers. The surface is diversified by woodlands and undulating prairies, the soil of which is very fertile. Grain, wool and beef-cattle are very largely raised. It is traversed by a branch of the Chicago and North-western R. R., and contains quarries of good Devonian limestone. Capital, Tipton. Pop. 19,731.

Cedar, a county in the W. S. W. of Missouri. Area, 435 square miles. It is intersected by Sac River, and also drained by Horse Creek. The surface is uneven; the soil is fertile. Corn, tobacco, and wool are staple products. Capital, Stockton. Pop. 9474.

Cedar, a county of Nebraska, bordering on Dakota, has an area estimated at 700 square miles. It is bounded on the N. by the Missouri River, and also drained by Big Bow Creek. The soil is productive. Wool, wheat, and corn are the chief products. Capital, St. James. Pop. 1032.

Cedar, a township of Clarke co., Ark. Pop. 897.

Cedar, a township of Knox co., Ill. Pop. 2153.

Cedar, a township of Benton co., Ia. Pop. 1041.

Cedar, a township of Black Hawk co., Ia. Pop. 731.

Cedar, a township of Cherokee co., Ia. Pop. 250.

Cedar, a township of Floyd co., Ia. Pop. 415.

Cedar, a township of Greene co., Ia. Pop. 306.

Cedar, a township of Jefferson co., Ia. Pop. 816.

Cedar, a township of Johnson co., Ia. Pop. 1094.

Cedar, a township of Lee co., Ia. Pop. 1196.

Cedar, a township of Lucas co., Ia. Pop. 764.

Cedar, a township of Mahaska co., Ia. Pop. 1265.

Cedar, a township of Mitchell co., Ia. Pop. 733.

Cedar, a township of Monroe co., Ia. Pop. 831.

Cedar, a township of Muscatine co., Ia. Pop. 421.

Cedar, a township of Van Buren co., Ia. Pop. 1090.

Cedar, a township of Washington co., Ia. Pop. 957.

Cedar, a township of Wilson co., Kan. Pop. 539.

Cedar, a township of Boone co., Mo. Pop. 5020.

Cedar, a township of Callaway co., Mo. Pop. 2453.

Cedar, a township of Cedar co., Mo. Pop. 788.

Ce'darburg, a post-village of Ozaukee co., Wis., on Cedar Creek and on the Milwaukee and Northern R. R., 20 miles N. of Milwaukee. It has a national bank. Pop. of Cedarburg township, 2557.

Cedar Creek, in the N. part of Virginia, rises in Shenandoah co., and enters the North Fork of the Shenandoah about 4 miles below Strasburg. On this creek the army of Gen. Sheridan was encamped when, Oct. 19, 1864, during Sheridan's absence, it was surprised at daylight, at Alacken, by the Confederate army under Gen. Early, its left flank turned and driven in confusion, the remainder of the army retiring, yet in good order. Gen. Wright, in command at the time, after having succeeded in restoring something like order among the surprised troops, seeing that the position they had fallen back to was an exposed one, ordered a general retreat, to enable him to restore communications. The retreat was conducted in good order, and Gen. Wright had halted and restored his line when, at 10 A. M., Gen. Sheridan, who had heard of the disaster at Winchester, arrived on the field. He was informed by Gen. Wright of the dispositions made by him, to which Sheridan gave his approval. The pursuit by the Confederate army had ceased, the men being occupied plundering the camps of the Eighth and Nineteenth corps. Gen. Sheridan arrived, then, to find that his army had been surprised and routed; but he found that the worst was over, the line reformed, and the army not demoralized. His presence lent an inspiring effect, so that, after making his line as compact as possible, an attack made upon it at 1 P. M. was successfully repulsed. At 3 P. M., after making some charges with his cavalry, he attacked the Confederates with great vigor, driving and routing them, and capturing over fifty pieces of artillery, including twenty of his own lost in the morning, about 2000 prisoners, and releasing many of our men captured in the morning. The cavalry drove them still farther next day, the 20th, and during that night Early retreated, and the military operations in the Shenandoah Valley were at an end.

Cedar Creek, a township of Carroll co., Ark. Pop. 511.

Cedar Creek, a township of Crawford co., Ark. Pop. 952.

Cedar Creek, a township of Sevier co., Ark. P. 117.

Cedar Creek, a village and hundred of Sussex co., Del. The village is about 30 miles S. S. E. of Dover, and near the Delaware R. R. Pop. 3544.

Cedar Creek, a township of Allen co., Ind. P. 1713.

Cedar Creek, a township of Lake co., Ind. P. 1326.

Cedar Creek, a township of Cowley co., Kan. P. 79.

Cedar Creek, a township of Marion co., Kan. P. 105.

Cedar Creek, a township of Muskegon co., Mich. Pop. 660.

Cedar Creek, a township of Wayne co., Mo. P. 379.

Cedar Creek, a post-township of Cumberland co., N. C. Pop. 2358.

Cedar Creek, a twp. of Lancaster co., S. C. Pop. 1505.

Cedar Creek, a township of Bath co., Va. Pop. 903.

Cedar Creek Mines, a township of Missoula co., Mon. Pop. 1486.

Cedar Dale, a village of Whitby township, Ontario co., province of Ontario (Canada), on the Grand Trunk Railway, 33 miles from Toronto.

Cedar Falls, a city and township of Black Hawk co., Ia., on the Cedar River and the Illinois Central and the Burlington Cedar Rapids and Minnesota R. Rs. It has eight churches, two newspapers, and several mills, and other manufactories. P. 3070; including township, 4381.
C. W. & E. A. Snyder, Eds. Cedar Falls "Gazette."

Cedar Fork, a township of Wake co., N. C. P. 1533.

Cedar Grove, a post-twp. of Orange co., N. C. P. 2047.

Cedar Island, in the township of East Hampton, Suffolk co., N. Y., at the entrance to Sag Harbor, Long Island; lat. 41° 02′ 26″ N., lon. 72° 15′ 19″ W., has a granite lighthouse, with a fixed white light 34 feet above the sea.

Cedar Keys, a seaport of Levy co., Fla., on the Gulf of Mexico, at the S. W. terminus of the Florida R. R., on Way Key, a small island, 154 miles from Fernandina. Its harbor is formed by a group of keys, or small islands, which give name to the town. It has a lighthouse on Seahorse Key; lat. 29° 05′ 49″ N., lon. 83° 04′ 46″ W. It shows a revolving light 75 feet above the sea. The lumber-trade is the chief industry. Pop. 440.

Cedar Lake, a post-twp. of Scott co., Minn. P. 756.

Cedar Mills, a post-twp. of Renville co., Minn. P. 205.

Cedar Mountain, a twp. of Culpeper co., Va. P. 1708.

Cedar Mountain, Va., about 2 miles W. of Mitchell's Station, Culpeper co., on the Orange Alexandria and Manassas R. R., was the scene of a desperate and sanguinary conflict on the 9th of Aug., 1862, between the forces of Gens. Pope and Jackson, in which the Federal forces under the immediate command of Gen. Banks were outnumbered and defeated with a loss of nearly 2000 in killed, wounded, and missing, and a large quantity of war-material; the Confederate loss was about 1300.

Cedar Mountains, of South Africa, are in Cape Colony. This range extends nearly parallel with the Atlantic, and is near the meridian of 19° E. The highest summits of it rise about 6590 feet above the level of the sea. They are partly covered with forests of cedar.

Cedar Rapids, a city of Linn co., Ia., on Cedar River, 219 miles W. of Chicago and 265 miles S. of St. Paul, on the Chicago and North-western, the Burlington Cedar Rapids and Minnesota (also the Milwaukee and Pacific divisions of that road), and the Dubuque and South-western R. Rs. It is the head-quarters of the Iowa R. R. Land Company, of the Sioux City and Pacific R. R., of a coal company, and of the Burlington Cedar Rapids and Minnesota R. R., whose shops are here. It has a valuable water-power, two national and one savings bank, two weekly, one monthly, and one daily newspaper, flouring-mills, steam bakery, foundries, planing-mills, manufactories of furniture, confectionery, paper, oil and lint, beer, oatmeal, woollens, knit goods, agricultural tools, wagons, carriages, door-latches, etc. Pork-packing is extensively carried on. The wholesale trade is important. The city is lighted with gas, has excellent schools and churches, and is increasing in population and prosperity. Pop. 5940. F. McClelland, Ed. "Times."

Cedar (or **Red Cedar**) **River,** of Iowa, rises in the S. part of Minnesota. It flows nearly south-eastward through Mitchel, Floyd, Bremer, Black Hawk, Benton, Linn, and Cedar counties of Iowa. Then turning to the S. W., it enters the Iowa River about 15 miles above Wapello. Total length, estimated at 350 miles. Devonian and magnesian limestones are abundant along its banks.

Cedar Rock, a post-twp. of Franklin co., N. C. P. 1112.

Cedar Run, a township of Fauquier co., Va. P. 2145.

Cedar Springs, a post-village of Kent co., Mich. It has one weekly newspaper.

Cedar Springs, a twp. of Abbeville co., S. C. P. 1503.

Cedar Springs, a post-village in Spartanburg co., S. C., on the Spartanburg and Union R. R. It contains the State institution for the deaf, dumb, and blind, founded in 1849.

Ce′dartown, a post-village, capital of Polk co., Ga., about 60 miles W. N. W. of Atlanta. Pop. 323.

Ce′darville, a township of Hale co., Ala. Pop. 1920.

Cedarville, a post-village of Smith co., Kan. It has one weekly newspaper.

Cedarville, a twp. of Menominee co., Mich. P. 194.

Cedarville, a post-village of Greene co., O., in a township of the same name, on the Columbus and Xenia R. R., 47 miles S. W. of Columbus. Pop. 753; of township, 2361.

Cedarville, a township of Warren co., Va. Pop. 1734.

Cedrela′ceæ [from *Cedrela*, one of the genera], a natural order of exogenous trees and shrubs, very nearly allied to Meliaceæ, and chiefly distinguished by the winged seeds, numerous in each cell of the fruit, which is a capsule. The known species are few, all tropical or sub-tropical, most of them trees valuable for their timber. To this order belong mahogany, satin-wood, toon, Barbadoes cedar, the yellow-wood of New South Wales, etc.

Cefalù (anc. *Cephalœdium*), a town of Sicily, in the province of Palermo, situated on the Mediterranean, 40 miles E. S. E. of Palermo. Here is a fine cathedral of Norman architecture. The town is situated at the foot of a mountain or high rock, on which are the ruins of an ancient Phœnician structure and of a Saracenic castle. It has marble-quarries and sardine-fisheries. Pop. in 1872, 11,799.

Ceglie, chà′lyà, a town of Italy, province of Lecce, 23 miles W. of Brindisi. It has several churches, one of which is collegiate, and two annual fairs. Pop. 11,261.

Cehegin, thà-à-heen′, a town of Spain, in the province of Murcia, 35 miles W. N. W. of the city of Murcia. It has manufactures of cloth, paper, soap, and pottery, and a trade in wine and fruits. It is partly built of marble quarried in the vicinity. Pop. 6186.

Ceil′ing [perhaps from the Fr. *ciel*, "heaven," referring to its vaulted shape, and possibly to the blue color and stars of gold common in mediæval ceilings], the covering or upper surface of a room. Ceilings among the ancients were usually flat, but crossed at right angles by beams, forming square *lacunæ* or panels, often ornamented with rich designs. Similar ceilings were common in Middle-Age structures, but the arched ceiling, barrel-vaulted, made of "cants" or a succession of flat surfaces, plastered, wainscoted, ribbed, plain, gilt, embossed, or otherwise ornamented, was a much more common form than in ancient Rome, where, however, arched ceilings were not unknown.

Cel′andine (*Chelidonium*), a genus of herbs of the order Papaveraceæ. The common celandine (*Chelidonium majus*) is a perennial, with yellow flowers in simple umbels, frequent in waste places in most parts of Europe and in the U. S. The root, stem, and leaves have a disagreeable smell, and are full of a yellow juice which is very acrid. Celandine in medicine is a drastic purgative, and in large doses an active poison; in small doses it is said to be useful in scrofulous diseases, disease of the glands, etc. The fresh juice, applied to warts, sometimes removes them.

Celano Lake. See Fucino.

Celastra′ceæ, a natural order of exogenous shrubs, having simple leaves and seeds furnished with arils. They have acrid properties, sometimes stimulant. Two genera of this order, *Celastrus* and *Euonymus* (spindle tree), are natives of the U. S. (See Euonymus.) The *Celastrus scandens*, called bittersweet or waxwork, has five stamens and alternate serrate leaves. The orange-colored pod and seeds, enclosed in a scarlet aril, are ornamental in autumn.

Cel′ebes [native, *Negree-Orang-Boogis*], a large island of the Malay Archipelago, is about 75 miles E. of Borneo, from which it is separated by Macassar Strait. It extends from lat. 1° 50′ N. to 5° 30′ S., and is mostly included between lon. 119° and 125° E. It has a very irregular form, being divided by deep bays into four peninsulas, one of which (called Menado) is about 400 miles long and very narrow. These peninsulas are formed by chains of mountains radiating from the central part of the island. The highest summit rises about 7000 feet above the level of the sea. Though the area of Celebes is only 72,647 square miles, it has a coast-line of nearly 2500 miles. The peninsula of Menado is bounded on the N. by the Sea of Celebes, and on the S. by the Bay of Tomini. The two southern peninsulas are separated by the large bay of Boni. The vegetation is luxuriant, and the island is partly covered with forests of oak, teak, palm, cedar, and upas trees, and partly by vast grassy champaigns which are used in common by the natives. The nutmeg, the clove, and the bamboo also flourish here. Among the minerals are gold, copper, tin, and iron. Coffee, rice, sugar, indigo, and manioc are cultivated. Chief town, Macassar. Celebes is partly occupied by a race called Boogis, who are strong and well built, revengeful in character, and fond of the chase. The tribe of Wadjus are an intelligent race who pursue commerce; the Arafuras inhabit the central regions, and are the aborigines of this archipelago. This island was visited by the Portuguese in 1512. The Dutch expelled the Portuguese in 1660, and planted there colonies, which they still possess. Pop. of the residency of Celebes in 1869, 341,000; and of the residency of Menado, 508,000.

Cel'ery, a plant of the order Umbelliferæ. The common celery (*Apium graveolens*) is found wild in most parts of Europe, in wet saline soils. The wild plant, called smallage, has a stem about two feet high, a slender root, a penetrating odor, and a bitterish acrid taste. By cultivation its taste becomes agreeably sweetish and aromatic, and either the leaf-stalks increase in thickness or the root-stalk assumes a form resembling that of the turnip. The latter variety is called *celeriac*. The stalks of the former variety, blanched, are used as a salad or to impart flavor to soups, etc. They contain sugar, mucilage, starch, and a substance resembling manna-sugar, which sometimes acts as a stimulant on the urino-genital organs. The blanching of the stalks is accomplished by drawing up earth to the plants, which are transplanted from the seed-bed into richly-manured trenches, and as they grow the trenches are filled, and the earth finally raised into ridges. Another species (*Apium australe*) grows abundantly in wet places about Cape Horn and in Staten Land. It is a large and luxuriant plant, and is described as wholesome, and nearly equal in its wild state to garden celery.

Céleste (Madame), a danseuse, born in Paris Aug. 6, 1814, became in childhood a pupil at the Royal Academy of Music. When fifteen years old she came to the U. S., and soon after married a Mr. Elliot. After her husband's death she went to England, where she met with great professional success. She subsequently passed several years in the U. S. (1834–37 and 1865–68), where she was received with the greatest enthusiasm. The greater part of her life has been passed in England, where she was successful as an actress and a theatrical manager.

Cel'estine [from the Lat. *cœlum*, the "sky," in allusion to its color], a mineral which is essentially sulphate of strontia, with occasional mixture of sulphate of baryta and carbonate of lime in small proportions. Its color is often a beautiful indigo-blue. It resembles heavy spar, but is not quite equal to it in specific gravity. Fine specimens of crystallized celestine are found in Sicily. It is useful as a source of strontia. The finest crystals of celestine are found on Strontian Island, Lake Erie.

Cel'estine (or **Cœlesti'nus**) **I.,** Saint, a native of Rome, became pope in 422 A. D. He promoted the meeting of a council which deposed Nestorius. He died in 432, and was succeeded by Sixtus III.—Celestine II., Pope, originally Guido di Castello, was born in Tuscany. He succeeded Innocent II. in 1143, and died in 1144.—Celestine III. (Giacinto Orsini) was elected pope in 1191 as the successor of Clement III. He promoted the first Crusade, and excommunicated Leopold, duke of Austria, for detaining Richard Cœur de Lion in prison. He died in 1198, aged about ninety-two years.—Celestine IV. (Goffredo Castiglione) succeeded Pope Gregory IX. in Sept., 1241, but he died in October of the same year.—Celestine V., Saint (Pietro da Murrone or Morone), Pope, was born at Apulia in 1215. He was elected in 1294 as the successor of Nicholas IV. Before that event he had founded an order of hermits called Celestines (which see). He abdicated the office before the end of 1294, and was succeeded by Boniface VIII. Died in 1296.

Cel'estines, an order of hermits or monks founded in 1264 by Pietro da Murrone, who became Pope Celestine V. This order spread rapidly in France, Italy, and Germany between 1264 and 1400, but it is now nearly extinct. These monks followed the rule of Saint Benedict, and preferred a contemplative life.

Cel'ibacy [from the Lat. *cœlebs*, an "unmarried man"], the condition of a person never married; applied often to the voluntary life of abstinence from marriage assumed by religious devotees and the clergy of some churches, such as the Roman Catholic. Practised in ancient Rome in the case of the vestal virgins, in Judæa by the Essenes, and in the East by the priests of Booddhism, it is probable that it took its origin in the belief that the material body is the source of evil and the prison of the soul; while the passages of Saint Paul recommending the celibate condition as desirable during the stormy years which preceded the destruction of Jerusalem were used among early Christians as authority for advocating religious celibacy. Accordingly, virginity was held in peculiar honor in the early Church. But it is certain from the inscriptions found in the catacombs, from passages in the canon law, and from the positive testimony of history that celibacy was not enforced, even among the higher clergy. For centuries this matter was a subject of discussion in the councils. The Council of Tours (566) suspended from their functions for one year all secular priests and deacons with wives; but in 692 the Council of Constantinople allowed priests and deacons to marry once only; and in parts of the Greek Church their marriage is compulsory, though bishops and patriarchs are celibates. In the West, decretals were from time to time issued against the marriage of the clergy, leading to many struggles within the Church. These struggles culminated in the eleventh century, and the point was finally settled by the vigor and determination of Gregory VII. in 1074, positively forbidding the marriage of the clergy. The Council of Trent (1593) finally set at rest the controversy by imposing the same prohibition. There is, however, an exception made in favor of priests and deacons of the Eastern rites, who are allowed to retain their wives if married before ordination.

Celi'na, a post-village, capital of Mercer co., O., is on the N. W. bank of the Great Reservoir, near the source of the Wabash River, 115 miles W. N. W. of Columbus. It has seven manufactories, four churches, and two newspapers. Pop. 859.

C. Bidlack, Ed. Celina "Journal and Standard."

Celina, a post-village, capital of Jackson co., Tenn., on the Cumberland River, at the mouth of the Obey.

Cell [Lat. *cella*], a term applied in anatomy primarily to lacunæ in tissues of any kind, such as the air-vesicles in the lungs, the minute sacs in which fats are contained, and the hollows in cancellated bone. But of late the term especially designates the simplest of the histological elements of which animals and plants are built up, some of the lowest plants and animals (*Protococcus*, *Gregarina*) consisting of single cells and their contents, and many others consisting of a mere aggregation of cells. The animal or vegetable character of these low forms can only be determined by careful observation of their functions (see Animal), but it is observed that animal structures have more generally an interstitial substance lying between the constituent cells; while plants often have their cells packed together with no intermediate substance, or with only air between. This intermediate substance, when fluid, plastic, and nutritive, is called a *blastema;* when solid, it is a *matrix*.

Cells are propagated (1) by division of the parent cell; (2) by free formation within the parent cell, the contents assuming the cell-form, and ultimately escaping from the original cell—a process observed especially in the lower plants; and (3) by free formation in a fluid plasma, as observed chiefly in animal life.

The primary form of the cell is spherical or nearly so, but by mutual pressure and by other conditions (some of them unexplained by science) their shape is often modified, especially in the solid tissues; cells which are stellate, spindle-shaped, flat, conical, etc. being well known to every observer. The cell consists usually of a membranous "cell-wall" enclosing "cell-contents," which are fluid, granular, or solid. The diameter of animal cells varies (without noticing exceptional cases) between $\frac{1}{1000}$th and $\frac{1}{2000}$th of an inch. Vegetable cells are sometimes much smaller and often much larger than animal cells (from $\frac{1}{30}$th to $\frac{1}{5000}$th of an inch). The vegetable cell-wall is of cellulose, a non-nitrogenous substance; the animal cell is of some nitrogenized protein compound. The vegetable cell-wall is lined by a peculiar layer called the primordial utricle.

The "cell-contents" usually contain a "nucleus," which is regarded by many theorists as the essential part of the cell. Thus, Schultze says: "The cell is only the protoplasm surrounding a nucleus;" but on the other hand it has been demonstrated that the nucleus is not always present in the cell, and it is believed by some that it is not an essential element. Sometimes there are several nuclei in a cell. Each nucleus is a hollow spheroid, often containing one or more round "nucleoli," but the nucleolus is by no means a constant element. Animal cells may contain water, salts, pigments, various secretion or excretion compounds, oils, fats, and granules of various kinds, etc. Vegetable cells may contain salts, water, oils, resin, starch, sugar; and all these substances (except excretive matters, water, and the salts) are produced, it is believed, in great part, through the agency of cells. It is known that a great part of the functional activity of organized bodies is carried on by means of cells, such as excretion, secretion, absorption, etc. The ovum, the spermatozoon, the pollen grain, is but a cell. Many animal cells are ciliated, or provided with a vibratile tail or cilium, which assists by its motion in some most important functions. Cells are also in many cases so transformed and metamorphosed that it is difficult to recognize them at all as cells; for example, the muscle-fibres, the tubules of dentine in the teeth, wood-fibre, flax and other vegetable fibre, hollow tubes and vessels, etc., are held to be transformed cells; and in some such cases the nucleus is yet visible. It is generally believed that the cell is the ultimate structural element of all organized tissues, though this is denied by some recent biologists. The red blood-corpuscle is at present not generally regarded as a true cell, but the white corpuscle is undoubtedly so. It is regarded as identical with the tissue-cell, the pus-cell, the mucus-cell, and the colostrum

corpuscle; and the whole group have been named "leucocytes." (See KÖLLIKER, "Human Histology;" LEYDIG, "Lehrbuch der Histologie;" VIRCHOW, "Cellular Pathology;" TYSON, "Cell Doctrine;" BURNETT, "The Cell;" and the works of VON MOHL, BRÜCKE, UNGER, REMAK, and HAECKEL.)

CHAS. W. GREENE.

Cel'le, or **Zelle,** a town of Germany, in Hanover, is on a sandy plain on the river Aller at the head of navigation, and on the Hanover and Brunswick Railway, 22 miles N. E. of Hanover. Here is a noted government breeding stud. It has an old castle, a gymnasium, and a library of 60,000 volumes; also manufactures of wax candles, printers' ink, thread and yarn, pianofortes, tobacco, matches, etc. Pop. in 1871, 16,147.

Celli'ni (BENVENUTO), a celebrated Italian artist, born at Florence in 1500. He was a skilful engraver, goldworker, and sculptor. He was in Rome in 1527 when it was attacked by the army of Constable Bourbon, and according to his own statement he killed that commander on that occasion. He was a man of passionate and quarrelsome temper, and much inclined to egotism. Among his patrons were Pope Clement VII., Francis I. of France, and Cosimo de' Medici. He worked in Rome, Paris, and Florence, produced, besides other works, a bronze of "Perseus with the head of Medusa." His interesting autobiography is translated into German by Goethe and into English by Roscoe (1822). The first complete edition was issued by Tassi, Florence, in 1829. Died Feb. 25, 1571.

Cel'lular Tis'sue, more properly **Are'olar Tis'sue,** in animals, is the soft, elastic, filamentous substance which underlies the skin and the serous and mucous membranes, and which fills the spaces between muscles and between their fibres, and indeed surrounds almost all important organs, such as nerves, glands, blood-vessels, etc., throughout the body. It normally contains a small quantity of serous fluid, which in certain diseased conditions becomes increased, constituting anasarca, a form of dropsy.—Cellular tissue in botany is simply non-vascular substance composed entirely of untransformed cells. It forms the soft substance of plants, and is called parenchyma.

Cel'lulose ($C_{18}H_{30}O_{15}$) is the term applied to the substance which forms the mass of the cell-membranes of plants. Cellulose forms the framework or skeleton of all plants; next to water it is the most abundant substance in the vegetable kingdom. During the early stages of the development of the plant the cell-walls consist entirely of cellulose, but as the plant grows the walls become incrusted with resins, coloring-matters, etc. Some tissues consist almost entirely of cellulose, as the pith of the Chinese rice-paper plant (the *Æschynomene paludosa*, or perhaps the *Aralia papyrifera*) and the vegetable ivory. Cotton, linen, hemp, and unsized paper consist of almost pure cellulose.

The following percentages of cellulose are found in some of the most common vegetable matters in the air-dry state:

	Per cent.		Per cent.
Potato tubers	1.1	Red clover hay	34.
Wheat kernels	3.0	Timothy hay	23.
Maize kernels	5.5	Oat straw	40.
Oat kernels	10.3	Wheat straw	48.
Buckwheat kernels	15.0	Rye straw	54.

Cellulose is said to exist in the animal kingdom in the mantle of Mollusca (Tunicata) and the integuments of insects and Crustacea. It is more probable, however, that these tissues consist of the nitrogenized body CHITIN (which see). Virchow (*Compt. Rend.*, xxxvi., 492, 860) found cellulose in degenerated human spleen and in the brain. De Luca (*Compt. Rend.*, lii., 102, lvii., 43) found cellulose in the skin of the silkworm and of the serpent.

Preparation.—Owing to the insolubility of cellulose in water, alcohol, ether, dilute alkalies, and dilute acids, it is generally prepared by subjecting vegetable tissues to the successive action of these agents, by which all foreign substances—sugar, starch, gum, resins, oils, fats, etc.—are removed. It may then be bleached by the action of chlorine water. Thus prepared, it retains more or less perfectly the structure from which it was obtained. Skeleton leaves, which are made up into the beautiful "phantom bouquets," consist of nearly pure cellulose. They are prepared either (1) by boiling the leaves in a dilute solution of caustic soda till the epidermis and parenchyma separate readily, removing them to a vessel of cold water, and carefully rubbing them with the fingers, and then bleaching by immersion in a solution of hypochlorite of lime, to which a little acid has been added; or (2) by adding to a pint of nitric acid, of a specific gravity of 1.1, an ounce of chlorate of potassa in fine powder, and suspending the leaves in the mixture for ten to twenty days. They are then thoroughly washed, and dried between sheets of blotting-paper. In the conversion of rags, straw, wood, etc. into paper the cellulose is rendered nearly pure by treatment with caustic soda, hypochlorite of lime, and sulphuric acid. Swedish filter-paper is almost chemically pure cellulose. Common paper receives an addition of a considerable proportion of kaolin (china clay), and is sized on the surface. (See PAPER.) In bleaching the textile fibres cotton, flax, and hemp the process has for its object the purification of the fibrous cellulose by the removal of resinous and coloring matters. (See BLEACHING.)

Composition.—Cellulose usually contains about 10 per cent. of moisture, which may be removed by drying. It then contains, in 100 parts, carbon 44.44, hydrogen 6.17, oxygen 49.39. Its composition is represented by the formula $C_{18}H_{30}O_{15}$. This is also the composition of starch, a body possessing totally different properties. Sugar and gum are nearly allied to cellulose in composition. All these bodies are called *carbohydrates*, because they consist of carbon in combination with hydrogen and oxygen in the proportions in which they exist in water, H_2O.

Properties.—When pure, cellulose is fibrous or spongy, white, and translucent, and often silky. Under the microscope the fibrous varieties appear like spun glass. It is tough and elastic. Its specific gravity is 1.5. When pure it is unalterable in the air, but when associated with albuminous and other easily alterable bodies, it gradually decomposes (decays) in moist air, undergoing a slow combustion, and changing to a yellow or brown friable substance called touchwood, and finally to humus. (See DECAY, PUTREFACTION, PRESERVATION OF TIMBER.) Cellulose is insoluble in water, alcohol, ether, and oils—both volatile and fixed. It is not sensibly affected by boiling in water, unless it has been derived from a very soft or imperfectly developed portion of a plant, when it becomes pulpy; and in the case of cellulose from Iceland moss, which is easily disintegrated and finally converted into soluble dextrine. Mulder observed that on boiling Swedish filter-paper with water under pressure at 400° F. a little glucose was produced.

Solution of Cellulose.—An ammoniacal solution of oxide of copper was discovered by Schweitzer to dissolve cellulose without changing its character. The solvent is prepared by dissolving hydrated oxide of copper in ammonia, or partially immersing copper turnings in ammonia. The cellulose is precipitated from the solution in amorphous flakes by boiling, diluting, or the addition of acids in excess. By dipping paper or cotton or linen fabrics in the copper ammonia solution, and then passing them between rolls, they are rendered waterproof. Several layers of such sheets or cloths pressed together form an artificial wood of great strength. A plastic mass can be prepared of this material suitable for the manufacture of water-pipes, gas-pipes, hats, clothing, boats, etc.

Action of Acids, etc.—Cold dilute acids and alkalies have little action on cellulose. Long boiling with dilute hydrochloric or sulphuric acid converts cellulose into glucose. In concentrated hydrochloric and sulphuric acids it dissolves, exhibiting different products according to the temperature and the duration of the treatment: (1) disaggregated, dissolved cellulose, precipitated by dilution; (2) an amyloid body; (3) dextrine, which differs from starch dextrine in having little action on polarized light. Strong boiling hydrochloric acid converts it into a fine powder, without change of composition. Boiled for a short time with dilute sulphuric acid, it is converted into a pulpy mass, still exhibiting the composition of cellulose, and not sensibly soluble in water. By dipping unsized paper for a few seconds into a mixture of 2 volumes of sulphuric acid and 1 volume of water, and then thoroughly washing with water and dilute ammonia, it is converted into "parchment-paper," a substance of the appearance and properties of animal parchment. Neumann proposes to make cotton and linen fabrics stronger, more compact, and waterproof by subjecting them to the above treatment and pressing between rolls. Parchment-paper is an excellent material for the septa used in dialysis. (See ENDOSMOSIS.) If cellulose is ground with concentrated sulphuric acid, without allowing the mixture to become heated, it forms a pasty mass, which when largely diluted deposits an amorphous body which is blued by iodine, and is hence called *amyloid*. Longer digestion with sulphuric acid converts cellulose into dextrine, and, on diluting with water and boiling, into glucose. Strong nitric acid, or a mixture of nitric and sulphuric acids, or of nitre and sulphuric acid, converts cellulose into nitro-substitution products, such as GUN COTTON (which see). Moist chlorine gas and warm solutions of hypochlorites rapidly cause the oxidation of cellulose. For this reason care must be observed in bleaching paper-stock and fabrics by chlorine. (See BLEACHING and ANTICHLORE.)

Cellulose in its more compact forms is not rendered blue by iodine until it has been disintegrated by sulphuric acid or caustic alkalies. Some lichens and algæ—Iceland moss,

for example—give the blue color after being boiled with water. Caustic alkalies disintegrate cellulose very slowly, except when heated under pressure to about 400° F., when hydrogen is evolved, and methylic alcohol (wood-naphtha), formate, acetate, propionate, and carbonate of potassa are formed. No carbon is set free. By heating cellulose with a mixture of potassic and sodic hydrates, at a temperature of 400° to 500° F., for several hours, it is converted into OXALIC ACID (which see). Cellulose is immediately blackened by fluoride of boron, being carbonized. Heated in close vessels, cellulose, in all its forms, undergoes destructive distillation, yielding charcoal, which remains behind, and combustible gases, tar, and a mixture of water, acetic acid, and methylic alcohol, all of which distil over. (See ACETIC ACID, CHARCOAL, and TAR.)

Digestibility of Cellulose.—Although wood and straw are not easily digestible by most animals, the cellulose of young and succulent stems, leaves, and fruits is digested to a large extent; and therefore cellulose, which forms a large proportion of the food of herbivorous animals, contributes directly to their nutrition. *Fungin* from fungi, and *medullin* from the pith of various trees, are mere modifications of cellulose. *Hordein* from barley is a mixture of cellulose with starch and a nitrogenized body.

C. F. CHANDLER.

Cel'sius (ANDERS), a Swedish mathematician, born Nov. 27, 1701, was the nephew of Olof Celsius, professor of theology at Upsala and author of "Hierobotanicon." His father was professor of mathematics at Upsala, and at the same university Anders became professor of astronomy in 1730—a position which he left in 1732 in order to pursue the study of astronomy where he could have the advantages of an observatory and instruments. He remained some time at Nuremberg with Doppelmayer, in which city he published "Observationes luminis borealis." He then visited Rome, determining with greater exactitude the meridian drawn by Bianchini and Maraldi. Here he made observations upon the intensity of light, and established the true size of the ancient Roman lineal measures. In 1734 he went to Paris, and with Maupertuis went to Lapland to determine the measure of a degree of latitude. He afterwards returned to Upsala, wrote "De observationibus pro figura telluris determinanda in Gallia" (1738), and worked out a theory regarding Jupiter's satellites. At his instance the observatory at Upsala was constructed. The centigrade division of the thermometer, called sometimes the Celsius scale, which divides the difference of temperature between freezing and boiling water into one hundred equal parts, was first proposed by Celsius. Died April 25, 1744.

Cel'sus, a celebrated writer who lived about 150–170 A. D., and is supposed by some to have been an Epicurean philosopher, mentioned by Lucian as his friend. He may, however, not improbably have been another person of the same name. He was the reputed author of a work against Christianity and Judaism entitled Λόγος ἀληθής, a "True Discourse," which is not extant, but some fragments of it have been preserved by Origen, who to confute it wrote a book, "Contra Celsum." These fragments indicate ingenuity and a talent for sophistry. But his objections are not generally regarded by Christian students as very formidable, though he has brought forward some acknowledged difficulties. The effect of his argument is marred by his sophistries, and especially by his calumnious spirit.

Celsus (AURELIUS CORNELIUS), an eminent Latin medical writer who is supposed to have lived at Rome in the reign of Augustus. The events of his life are mostly unknown, except that he wrote works on various subjects, including philosophy and rhetoric. These are all lost except his excellent work on medicine, "De Medicina," in eight books, the style of which is remarkably elegant and pure. He adopted most of the medical doctrines of Hippocrates. (See F. VALORI, "Dissertatio de A. C. Celso," 1835.)

Celt [Lat. *celtis*, a "chisel"], the name given by archæologists of Europe to certain instruments of stone or bronze which were used by pre-historic peoples. Similar stone tools are found in the U. S., but are not often called "celts." They are generally of a kind of chisel shape, but vary greatly in this respect, some being extremely rude and simple; others, especially the bronze ones, are sometimes ornamented with some taste with cut lines. In length they vary from two inches to two feet. They often had handles, and seem to have served for axes and domestic utensils, as well as for weapons of war and the chase.

Celtibe'ri, or **Celtibe'rians,** an ancient and powerful people who inhabited the northern or north-eastern part of Spain. They were supposed to have been a mixture of indigenous Iberians with Celtic people who came from Gaul. Their country was called *Celtiberia* (Gr. Κελτιβηρία). They were a warlike nation, and were subdued by Hannibal with great difficulty. In the second Punic war they fought for the Carthaginians. They made a brave and long resistance to the Romans, who conquered them about 143–133 B. C., and they renewed the war under Sertorius. Among their chief towns were Segobriga and Numantia. Celtiberia proper comprised the south-western part of Aragon, Cuenca, Soria, and the greater part of Burgos, but the name was sometimes applied by the Romans to a more extensive region.

Celts, or **Kelts** [Lat. *Celtæ;* Gr. Κέλται], one of the great divisions of the Indo-European family of mankind, itself divided into at least two groups—the Western, Erse, or Gaelic Celts (now marked by the use of the Irish, Gaelic, and Manx languages), and the Cymric or Kymric Celts, to whom belong the Welsh and Armorican (extant) and the Cornish (extinct) languages. But the Celtic blood is much more widely diffused than those relics of their language would seem to indicate. Certain critics hold that the Cimbri and Cimmerii were Cymric Celts. Almost all France (Gallia) was inhabited by Celts. The Belgæ are thought to have been partially Cymric, as the ancient Britons undoubtedly were. The name *Celtiberi* indicates that in Spain the Celtic was probably long ago mixed with the Basque or Iberian blood. Northern Italy was long so entirely Celtic as to be called Cisalpine Gaul. The Celts under Brennus invaded Greece. In Asia Minor they settled and gave name to Galatia. In Germany the Boii gave name to Bohemia and Bavaria. In Great Britain the Cymri long had sway in Cornwall, Cumberland, and Strathclyde. It is probable that the present Cymric element of North-western France, though generally traced to a supposed Welsh immigration, is largely of direct Gaulish descent. Many of the Latin and Germanic races have a strong infusion of Celtic blood. The relationship between the two branches of the Celtic race seems never to have been intimate, and is not very clearly determined. The two groups of languages are distinct, having some common roots, with but little else in common. The languages of each group are, however, possessed of strong family likeness to the others of their own group.

The ancient Celtic religion was a rude polytheism, the mythology and doctrines of which are now for the most part unknown. The priestly caste of Druids were lawgivers, poets, and prophets as well. Human sacrifices were common. The common people were grossly superstitious and ignorant. Weakened by the workings of their rude social system of clans and septs, oppressed by the exactions of their priesthood, and harassed by the constant inroads of Rome and the Germanic tribes, the Celts, after the dawn of history, are almost constantly seen to be the losing race. But they yielded nothing except to force, and among all the races of mankind none were ever more distinguished for valor. Among their other characteristics may be mentioned profound religious feeling and acute sensibilities.

The Celtic literature is of very ancient origin, all the old Celts having a literary class called "bards," sometimes of noble and sometimes of sacerdotal rank. The ancient Irish wrote in a rude alphabet called the Ogham. The people of Gaul have left comparatively few inscriptions, and these are often much Latinized. Some have apparently Gaelic roots, but Cymric roots appear in the names of places. The chief existing Celtic literature consists of the hymns, martyrologies, annals, and laws of Ireland (see GAELIC LANGUAGE and IRELAND); the Welsh poems and laws, and many historical and theological works, mostly of a somewhat later date than the Irish; with the Mabinogion, a collection of tales. There are also a few extant Cornish religious dramas. The Manx literature is not extensive, and is quite recent. The number of people speaking the Irish, Manx, and Gaelic languages is rapidly diminishing, while the number of persons of Celtic blood seems to be increasing. The English language is fast displacing the others in Ireland, Scotland, and the Isle of Man. In Wales, however, the use of the Cymric language is probably much more extensive now than for many centuries past. Intense national feeling and systematic, persistent, and widely sustained effort have caused the old language to maintain its ground and make head against the English.

Cem'bra Pine, called also **Swiss Stone Pine,** the *Pinus Cembra,* a noble and stately forest tree of Asia and Europe, cultivated to some extent in parks and arboretums in the U. S. It is prized for its seeds, which, though hard to extract from the cone, are very agreeable, and are used for dessert, and with those of *Pinus Pinea* (the stone pine of Southern Europe and Barbary) are sold under the name of pine-nuts. The Cembra pine yields also a thin fragrant turpentine, called Riga balsam, Carpathian balsam, or balsam of Lebanon. It is caught in bottles as it flows from the wounded twigs, and is used in medicine.

Cem'ents [from the Lat. *cæmentum*, literally, a "cutting" or "chip;" a name applied both to building-stone and to the fragments of marble used in making mortar], a term applied to fluid, semi-fluid, or plastic substances which are capable of uniting solid bodies together when interposed between the surfaces, and afterwards solidifying. There are many kinds of cements, either animal, vegetable, or mineral substances, used separately or in combination with each other.

Glue is an animal cement in common use. It is a hard, brittle, brownish gelatine, obtained by boiling to a soft jelly the skins, hoofs, etc. of animals. When heated gently with water it becomes viscid, and is employed for uniting solid bodies, mostly wood. In drying it becomes very tough and hard, but is easily softened again by water. Marine glue is formed by dissolving 1 pound of india-rubber in 5 gallons of coal-naphtha, and adding to this solution an equal weight of shellac. The mixture is then placed over a gentle fire, and thoroughly incorporated by stirring. This glue is insoluble in water, and is very tenacious and adhesive. A cement for iron pipe, etc. is made as follows: mix together in a mortar 2 ounces of muriate of ammonia in powder, 1 ounce of flowers of sulphur, and 16 ounces of cast-iron filings, and keep the mixture dry for use. When the cement is to be used, take 1 part of this mixture, 20 parts of clear iron borings or filings, pound them together in a mortar, mix them with water to a proper consistency, and apply the compound between the joints. A good cement for resisting moisture is made by mixing 8 parts of melted glue, of the consistency used by joiners, with 4 parts of linseed oil, boiled into varnish with litharge. This cement hardens in forty-five to fifty hours, and renders the joints of wooden cisterns and casks air and water tight. A good cement for coating the outside of buildings consists of linseed oil, rendered dry by boiling with litharge, and mixed with porcelain clay or well-dried pipeclay in fine powder, to give the consistency of stiff mortar. Oil of turpentine added in small quantity to thin the cement aids its cohesion to stone, brick, or wood. A cement designed to improve the composition of artificial stone, stucco, etc. is made by dissolving 1 pound of gum shellac in 3 to 4 ounces of concentrated alkali in aqueous solution. This mixture is then diluted with water, and used for mixing up the materials—hydraulic cement, lime, and sand—of which the artificial stone or stucco is made. The water required to mix one cubic foot of the materials should contain 1 to 2 ounces of gum shellac. Shellac dissolved in a concentrated solution of borax gives a good cement for uniting broken stone. Singer's cement for joints between brass and glass is made by melting together 5 pounds of rosin, 1 pound of beeswax, 1 pound of red ochre, and 2 table-spoonfuls of gypsum. Ure recommends for cementing voltaic plates into wooden troughs, and for similar uses, a cement made of 6 pounds of rosin, 1 pound of red ochre, half a pound of gypsum, and a quarter of a pound of linseed oil; the ochre and gypsum to be calcined beforehand, and added to the other ingredients while in fusion. French plumbers employ for the joints of glazed pottery pipes, used for distributing water, a cold cement made of quicklime, cheese, milk, and the white of eggs, or a hot cement made by melting rosin, beeswax, and lime together. There are a great variety of cements composed of vegetable, mineral, and animal substances mixed, which it is not deemed necessary to mention.

There is a class of cements of which plaster of Paris or gypsum is the basis, the hardening of which is due to the union of the plaster with water, and not to the formation of silicates, as in the hydraulic cements hereinafter described. Plaster of Paris, however, never attains sufficient hardness and tenacity to be used with water alone. It may be advantageously combined with alum. Keene's cement is made by mixing powdered gypsum with an aqueous solution of alum, then heating the mixture until the water of combination is driven off. It is then finely ground in a suitable mill, and slaked with a solution of 1 part of alum to 12 or 13 parts of water, by weight. Martin's cement differs from Keene's in adding to the original mixture a portion of carbonate of soda or of potassa. It is burnt with a higher degree of heat. In Parian cement borax is used instead of the carbonate of soda or of potassa.

Cement—Common Lime, Hydraulic Lime, and Hydraulic Cement.—Considered as materials for use in the builder's art, the products derived from the calcination of pure and impure limestones are classified into common or fat lime, hydraulic lime, and hydraulic cement. Common lime is sometimes called air lime, because a paste or mortar made from it requires exposure to the air to enable it to "set" or harden. The hydraulic limes and cements are also called water limes and water cements, from their property of hardening under water.

Common Lime.—The limestones which furnish the common lime of commerce are seldom if ever pure, but usually contain, besides the carbonate of lime, from 3 per cent. to 10 per cent. of impurities, such as silica, alumina, magnesia, oxide of iron, oxide of manganese, and traces of the alkalies. Lime, common lime, quicklime, or caustic lime (synonymous terms) is a protoxide of calcium, and is produced when marble or any other variety of pure or nearly pure carbonate of lime is calcined with a heat of sufficient intensity and duration to expel the carbonic acid. It has a specific gravity of 2.3, is amorphous, highly caustic, has a great avidity for water, and when brought into contact with it will rapidly absorb nearly a quarter of its weight of that substance, accompanied and followed by a great elevation of temperature, the evolution of hot and slightly caustic vapor, the bursting of the lime into pieces, and finally its reduction to a powder, of which the volume is from two and a half to three and a half times that of the original lime. In this condition the lime is said to be slaked, and is ready for use in making mortar. The purer the limestone the larger is its *growth* or increase of volume in slaking. The paste of common lime is unctuous and impalpable to the sight and touch; hence these limes are sometimes called *fat* or *rich* limes, as distinguished from others known as *poor* or *meagre* limes. These latter usually contain more or less silica in the form of sand, and a greater proportion of other impurities than the fat limes, and in slaking exhibit a more moderate elevation of temperature, evolve less hot vapor, are seldom reduced to an impalpable, homogeneous powder, yield thin paste, and are characterized by less *growth* of volume. They are less valuable for mortar than the fat limes, but have an extensive application as a fertilizer. When used for building purposes they should, if practicable, be reduced to powder by grinding, in order to remove all danger of subsequent slaking.

Water dissolves, according to Sir H. Davy, about $\frac{1}{400}$ of its weight of lime, or, according to Thomson, $\frac{1}{758}$, while Dalton states it to be, at 60° F., $\frac{1}{778}$, and at 212°, $\frac{1}{1270}$. The solutions commonly called lime-water are valuable reagents and antacids. Lime being more soluble in cold than in hot water, its solution becomes turbid when boiled. A similar result is produced by breathing into a solution through a tube, owing to the carbonate of lime formed by respiration; which, however, is dissolved by an excess of carbonic acid gas. A paste of the slaked lime is therefore a mixture of the hydrate of lime and lime-water.

Lime may be distinguished by its dilute solution giving a white precipitate of oxalate of lime when a solution of oxalic acid is added to it, which is not redissolved by an excess of oxalic acid, and by not yielding a precipitate with sulphuric acid and sulphate of soda.

The purest minerals of the calcareous class are the rhombohedral prisms of calcareous spar, the transparent double refracting Iceland spar, and white or statuary marble. They are entirely dissolved in dilute hydrochloric acid, with a brisk effervescence, due to the escape of carbonic acid, and contain, according to an analysis of a specimen of white marble by Gen. Treussart, about 33 per cent. of carbonic acid, 64 per cent. of lime, and 3 per cent. of water.

Common lime, when mixed into a paste with water, or when slaked with sufficient water to produce a paste, may be kept for an indefinite time in that condition without deterioration, if protected from contact with the air so that it will not dry up. It is customary to keep the lime-paste in casks, or in wide, shallow boxes in which it was slaked, or heaped up on the ground, covered over with the sand to be subsequently incorporated with it in making mortar. It is convenient, for some purposes, to keep the slaked lime on hand in a state of powder, which may be done in casks under cover, or in bulk, in a room set apart for that purpose. Most common limes contain impurities which prevent a thorough, uniform, and prompt slaking of the entire mass, and hence the necessity of slaking some days before the lime is to be used, to avoid all danger to the masonry by subsequent enlargement of volume and change of condition.

A paste or mortar of common lime will not harden under water, or in continuously damp places excluded from contact with the air. It will slowly harden in the air, from the surface towards the interior, by desiccation and the gradual absorption of carbonic acid gas, by which a subcarbonate with an excess of hydrated base is formed, or $CaO.CO_2 + CaO.HO$.

The pastes of fat lime shrink, in hardening, to such a degree that they cannot be employed as mortar without a large dose of sand, and are unsuitable for masonry constructions under water, or in soils that are constantly wet. In other situations they have a very extensive application, possessing, as they do, a great advantage in economy over the hydraulic limes and cements, on account of the large augmentation of their volume in slaking, their extensive distribution over the surface of the globe, and the simplicity

attending their manufacture. For masonry constructions of importance, and particularly upon our public works, a mortar or a concrete containing common lime only as the cementing medium is seldom used at the present day. Hydraulic lime or hydraulic cement is usually added, to a greater or less extent, in order to hasten the induration and secure greater ultimate strength and hardness.

The Hydraulic Property.—A lime is said to possess *hydraulic* properties when, after being calcined, reduced to powder, and made into a paste with water, it will harden or set under water, or in damp places excluded from contact with the atmospheric air. If the calcined stone can be slaked to powder in the presence of water, it is customary to call it *hydraulic lime*. The *cements* possess the hydraulic property to a greater degree than the hydraulic limes, and are reduced to powder by grinding. In both initial and ultimate strength and hardness, the hydraulic mixtures are greatly superior to those of common lime, even when the latter are employed under the most advantageous circumstances, but their maximum strength is not reached under a period of several years. The best cements, when mixed to a paste without sand, attain during the first month, or month and a half, fully one-half their greatest ultimate strength and hardness. After the first two years, the increase in strength and hardness proceeds very slowly, and at the end of three years the monthly increment requires the use of delicate instruments for its measurement. This principle, of slow and gradually diminishing induration, is characteristic of all hydraulic mortars, whether derived from the cements or the hydraulic limes, either natural or artificial. The most *active* hydraulic limes or cements, or those which set the most quickly, are not necessarily those which attain the greatest ultimate strength and hardness. The latter are characterized as possessing the greatest hydraulic *energy*.

The *argillaceous hydraulic limes* of commerce are generally derived from limestones containing from 10 to 20 per cent. of clay, homogeneously mixed with carbonate of lime as the principal ingredient. Traces of the alkalies, and a small percentage of the oxides of iron and carbonate of magnesia, are also present in most cases. The clay ingredient usually contains from $1\frac{1}{2}$ to 2 of silica to 1 of alumina. During the burning, which is conducted at a heat just sufficient to expel the carbonic acid, all the silica and alumina is neutralized by entering into combination with a portion of the lime, forming both the silicate of lime and the aluminate of lime, leaving in the burnt product an excess of quick or caustic lime, which induces slaking, and becomes hydrate of lime when brought into contact with water. As this lime is burnt at a low heat, the double silicate of lime and alumina, which is formed only at a high heat, is not produced. The silicate of lime is first formed, and the alumina, reacting upon the quicklime as an acid, produces aluminate of lime. When slaked by sprinkling, the quicklime alone is hydrated.

Argillaceous hydraulic lime is therefore composed of—

Anhydrous silicate of lime.....$SiO_3.3CaO$, or { Silica.... 23 / Lime..... 43

Anhydrous aluminate of lime..$Al_2O_3.3CaO$, or { Alumina 17 / Lime..... 28

And hydrate of lime.....$CaO.HO$, or { Lime..... 34 / Water... 11

When argillaceous hydraulic lime is mixed into a paste with water or made into mortar, the anhydrous silicate and aluminate of lime form hydro-silicates and hydro-aluminates of lime by combining with six equivalents of water, and subsequently undergo a species of crystallization technically called *setting*. This setting will ensue under water, and constitutes the hydraulic property.

If, in the general case, more than 20 per cent. of clay be present in a homogeneous limestone, a larger proportion of the lime will combine with silica or alumina during the burning, leaving insufficient quicklime present to induce slaking; and such stone may be expected to furnish a hydraulic cement. Some heterogeneous limestones, however, containing as high as 30 to 35 per cent. of clay, will slake more or less thoroughly after burning, for the reason that the ingredients are not in sufficiently close contact to combine in the kiln in the formation of the hydraulic elements. In such cases the burnt product contains an excess of lime, of silica, and of alumina, and, after slaking as much as possible, there still remains a lumpy residue.

Limes containing 10 per cent. of clay are *moderately hydraulic*. If made into a paste and immersed in water in small cakes, they will harden so as to resist crushing between the thumb and finger in from twelve to fifteen days. The *eminently hydraulic limes*, derived from homogeneous stones containing from 18 to 20 per cent. of clay, will harden under water in from twelve to twenty hours. If the stone contains more clay than this, and still yields hydraulic lime by slaking, the excess of clay does not combine with lime, and therefore confers no additional hydraulic energy. On the contrary, it impairs the strength and value of the lime for building purposes.

In consequence of their peculiar properties, the hydraulic limes cannot be kept on hand in a state of paste, like common lime. They are preserved in casks or sacks in the condition of powder, and in using them for mortar or concrete, especially those that are eminently hydraulic, it is not well to mix more than one day's supply in advance. The lime and the sand may be mixed together dry, and kept on hand a long time in that condition if protected from the weather, but the water should not be added until a few hours before the material is to be used, whether for mortar or concrete.

The method usually pursued in manufacturing hydraulic limes is as follows: The stone, after being quarried and broken up into pieces not exceeding generally twelve or fifteen pounds in weight, is burnt in any suitable kiln at a heat just sufficient to expel the carbonic acid, and then, after being drawn from the kiln and while still warm, is sprinkled with from 15 to 20 per cent. of its own weight of water. The slaking soon begins, and the stone falls to pieces, some of it in fine powder, and the rest in unslaked lumps of various sizes. The mass is then thrown together in large heaps, where it remains undisturbed for six or eight days, in order that the slaking may be completed by the steam evolved. It is then screened through fine wire-cloth to get rid of the unslaked lumps, packed in sacks or barrels, and sent to market.

With some varieties of argillaceous limestones, the lumpy, unslaked residue, which does not pass through the screen, is natural hydraulic cement, in which case it is reduced to powder by grinding, and is either incorporated with the lime in order to improve its quality, or is marketed separately as hydraulic cement. The lumpy portion either contains too much clay, or has been burnt at too high or too low a heat, to be susceptible of thorough slaking by exposure to the air or sprinkling with water; and its quantity will be great in proportion to the amount of clay in the stone, or the extent to which the heat in burning has been improperly regulated. In some localities the residue is thrown away as dangerous or worthless, while in others it is customary to grind it up separately and mix it with the powder obtained by slaking.

When the burning has taken place at a heat suitable for common lime, the residue owes its origin to the presence of too much clay, and may be, for all useful purposes, inert, or it may be a light, quick-setting cement like the Roman. If the former, it should be rejected; if the latter, its incorporation with the lime-powder will augment its hydraulic activity and energy. When the residue is due to insufficient burning, it may cause damage by subsequent slaking in the masonry, and should be rejected. When the burning has been conducted at a high heat, the residue may be slow-setting Portland cement, or it may be clinker, partially or wholly vitrified, and inert. For these reasons the utilization of the unslaked lumps, arising, from whatever cause, in manufacturing hydraulic limes, requires watchful care, in order that the introduction of ingredients that are either worthless or dangerous may be avoided.

It is not known that any deposits of argillaceous limestones capable of furnishing good hydraulic lime exist in the U. S. It is manufactured in several localities in France, notably at Seilley, about 70 miles from Paris. The Seilley lime has recently been brought to the U. S. in small quantities for use in making artificial stone. When fresh it weighs about fifty pounds to the struck U. S. bushel, loosely measured. If made into a stiff paste, it will set in the air in ten or twelve hours, and will resist crushing between the thumb and finger in from twenty to twenty-four hours. It is not active enough for laying masonry under water, but will harden under water after the initial set has taken place in the open air.

The *silicious hydraulic limes* are generally derived from silicious limestones containing from 12 to 18 per cent. of silica, less than 90 per cent. of carbonate of lime, with a small proportion of alumina and oxide of iron. The process followed in their manufacture is similar, in all essential respects, to that described for producing argillaceous hydraulic lime. They owe their hydraulic property, when mixed to a paste with water, to the crystallizing energy of the anhydrous silicate of lime, formed during the calcination: $SiO_3.3CaO = \{$ Silica, 23. / Lime, 43. The best type of silicious hydraulic lime is derived from the quarries at Teil on the river Rhone, department of Ardèche, France. It is known as hydraulic lime of Teil. The raw stone contains from 11 to 15 per cent. of silica, from 1 to 2 per cent. of alumina, from 80 to 84 per cent. of carbonate of lime, and a trace of oxide of iron. When newly made this lime weighs about fifty-six pounds to the struck U. S. bushel,

loosely measured, but if exposed to the air it absorbs moisture so that its weight is considerably augmented. In initial hydraulic energy, the Teil lime does not materially differ from the lime of Seilley, but in ultimate strength and hardness it is believed to be superior to it. Analyses of the Teil hydraulic lime after burning, by Professor Rivot, gave the following composition:

Lime	78.29		73.60	
Silica	18.20		17.20	
Alumina	1.80	21.70	1.70	20.50
Quartz sand	1.70		1.60	
Oxide of iron	traces		traces.	
Water and carbonic acid	—		5.00	
	99.60		99.10	

The elements of hydraulic energy in this lime may be stated to be 60 per cent. of the whole immediately after calcination, as indicated below, neglecting a small quantity of alumina and oxide of iron:

Silicate of lime	66	Silica	23	$SiO_3.3CaO$.
		Combined lime	43	
Free lime	34		34	CaO.
	100		100	

Artificial hydraulic lime can be manufactured by mixing together, in suitable proportions, thoroughly slaked common lime and unburnt clay, tempering the mixture with water, and then burning it in the form of bricks or rounded balls in an ordinary lime-kiln. The burnt material can be slaked in the ordinary way. For the common lime, powdered limestone, preferably chalk, may be substituted. It is better, however, when it becomes necessary to resort to artificial mixtures to produce the hydraulic ingredient of mortar, to make hydraulic cement at once, on account of its superior hydraulic energy.

Heavy, Slow-setting, Argillaceous Cement (*Portland Cement*).—When a homogeneous, argillaceous limestone contains so large a proportion of clay, usually exceeding 20 per cent., that it will not slake after calcination, it may be expected to furnish some grade of hydraulic cement. The stone from which the celebrated Portland cement is derived contains from 20 to 22 per cent. of clay and 78 to 80 per cent. of carbonate of lime. The clay itself is composed of 1½ to 2 parts of silica to 1 of alumina. When calcined at a high, long-continued heat, all or nearly all the silica and alumina of the clay combines with a portion of the lime, producing both silicate of lime, represented by the formula $SiO_3.3CaO$ { Silica, 23, Lime, 43, and double silicate of lime and alumina, as expressed by the formula

$$SiO_3(Al_2O_3 + CaO)_3 \begin{cases} \text{Silica,} & 15, \\ \text{Alumina,} & 51, \\ \text{Lime,} & 28. \end{cases}$$

The burnt product does not contain any uncombined, and therefore inert, silica and alumina to adulterate the cement and impair its hydraulic properties; while the quantity of uncombined lime is not sufficient to cause the mass to slake to powder in the presence of water. After calcination the cement is therefore reduced to powder by grinding between ordinary mill-stones.

Good Portland cement, when made into paste and formed into small cakes, will set under water in from two to four hours, so as to resist crushing between the thumb and finger. When stone suitable for Portland cement is calcined at a low heat, barely sufficient to expel the carbonic acid, the silicate of lime (as above) and the aluminate of lime ($Al_2O_3.3CaO$) are formed, and a light, quick-setting cement is usually the result, greatly inferior to Portland cement in weight as well as in ultimate strength and hardness.

The superior quality of Portland cement appears to depend in a great measure upon the presence of the double silicate of lime and alumina, which is formed only at a high heat. The weight of Portland cement, as well as its hydraulic energy and its ultimate strength and hardness, is increased by augmenting the intensity and duration of the heat employed in burning, within the limit of vitrification. The initial hydraulic activity, however, is diminished by high burning, so that the best Portland cements are slowest in setting. A cement weighing 100 pounds to the struck U. S. bushel may be burnt to weigh 125 pounds to the bushel, and its strength will be nearly doubled thereby.

It is not known that any deposit of argillaceous limestone suitable for making the best quality of Portland cement exists in the U. S., and there is only one such in Europe now worked. It is found at Seilley, in France, intermixed with the layers from which the argillaceous hydraulic lime is derived. Near Boulogne-sur-Mer, in France, there is a deposit of calcareous clay, from which very excellent Portland cement is manufactured. In its manufacture the wet process, described below, is followed.

Artificial Portland Cement.—Fully nineteen-twentieths of all the Portland cement used at the present day is artificial. It is made by thoroughly mixing together, in suitable proportions, clay and finely pulverized carbonate of lime (either chalk, marl, or compact limestone), burning the mixture in kilns at a high heat, and then grinding the burnt product to fine powder between ordinary mill-stones. There are two methods of manufacture, both well adapted to the character of the materials employed, and known respectively as the "wet process" and as the "dry process."

Portland Cement by the Wet Process.—The works in the vicinity of London, England, employ the wet process. The carbonate of lime is furnished by both the white and gray chalks of the neighborhood. The clay procured from the shores of the Medway and Thames, and from the adjoining marshes and inlets, contains about 2 parts of silica to 1 of all the other ingredients, comprising alumina, oxide of iron, soda, carbonate of lime, etc.

First. The clay and chalk are mixed together with a large quantity of water, in a circular wash-mill or basin, provided with heavy harrows attached to the horizontal arms of a revolving vertical shaft. By this means the chalk is thoroughly pulverized and incorporated with the clay in a semi-fluid state. The proportions are about 1 of clay to 3 of chalk, by weight. *Second.* When a thorough mixture of the ingredients is thus effected, the liquid mass, resembling whitewash in appearance, is conducted into large reservoirs called *backs*, where it is left to settle. When the heavier material, or raw cement, has settled to the bottom, and the surplus water has become clear on top, the latter is drained off. By subsequent evaporation the drying process is continued, until the raw cement has attained the requisite stiffness. During the time the mixture remains in the backs samples of it are taken from time to time and made into cement by burning in sample kilns, in order to test the accuracy of the proportions. If any error in this respect is discovered, it is corrected by conveying from the wash-mills additional material containing an excess of either clay or chalk, as the case may require. Sometimes the needed correction is secured by mixing together the contents of two or more backs. *Third.* When, by evaporation, the raw cement mixture has attained the consistency of butter, or rather of stiff clay, it is taken out of the backs by shovelfuls, and in that form and condition is removed to rooms artificially heated, or spread out around the tops of the kilns, and further dried. *Fourth.* After being dried, although it is not necessary to expel all the moisture, the cement is burnt in suitable kilns with nearly a white heat, just below the point of incipient vitrification. The kilns may be intermittent or perpetual, the latter being most economical in current expenses, though somewhat more costly in original outlay for construction. When properly burnt, the pieces of cement, called *clinker*, are of a greenish-brown color, contorted and much shrunken from the effect of the heat. *Fifth.* The cement clinker is then finely ground between ordinary mill-stones, packed in barrels, each containing 400 pounds net, and sent to market.

Portland Cement by the Dry Process.—By the dry process any of the compact limestones, as well as the chalks and marls, may be used in making Portland cement. *First.* The raw materials—the carbonate of lime and the clay—are kiln-dried at 212° F., in order to expel the moisture and prevent caking in the kiln, and otherwise facilitate grinding and sifting. *Second.* After drying, the clay and the carbonate of lime are mixed together in suitable proportions, and reduced to a fine powder. In most localities the proportion will vary from 20 to 23 per cent. of clay and 80 to 77 per cent. of the carbonate. One kind of machine will not suffice for grinding the raw material economically. In Germany, whence most of the artificial Portland cement made by the dry process is derived, three machines are used—viz. (1) A stone-breaking machine of the kind usually employed in breaking stone for roadways or for concrete. Through this the dried and mixed materials are passed, issuing therefrom in pieces varying from the size of a pea to that of a hen's egg. (2) A further reduction is effected by a vertical mill or edge-runner. (3) The material is then finely ground between horizontal mill-stones. *Third.* The powdered material is then tempered to a rather stiff paste in a brick-making machine, and made into bricks of a suitable size for burning. During this mixing the material is kept warm by coils of steam-pipe or otherwise, and the water used for tempering is rendered strongly alkaline by adding 3 to 6 per cent. of calcined soda, and an equal amount of newly burnt slaked lime. *Fourth.* The bricks are dried by artificial means, and are then burnt at a high heat and ground to a fine powder, as in the wet process. The same number of mills is necessary for grinding the cement as for pulverizing the raw materials. The clinker is first put through a stone-breaking machine, then into a vertical mill or edge-runner,

and lastly is ground to an impalpable powder in a horizontal mill. The dry process is followed in manufacturing Portland cement in Germany.

Tests for Portland Cement.—Portland cement should be ground so fine that at least 90 per cent. of it will pass a No. 30 wire sieve of 36 wires to the lineal inch, both ways, and should weigh not less than 106 pounds to the struck bushel, loosely measured. When made into a stiff paste without sand, it should sustain without rupture a tensile strain of 400 pounds on a sectional area $1\frac{1}{2}$ inches square, or $2\frac{1}{4}$ square inches (equal to 178 pounds to the sectional square inch), seven days after being moulded, the sample having been in water six of these days. The composition of 1000 parts of the natural Boulogne Portland cement, after burning, is as follows:

Lime	651
Magnesia	6
Silica	204
Alumina, and small quantity of oxide of iron	139
Sulphate of lime	a trace
	1000

When burnt at the high heat essential in manufacturing Portland cement, the double silicate of lime and alumina is first formed by 139 of alumina combining with 40 of silica, and this compound, with 75 of lime, thus producing 254 of the double silicate of lime and alumina. The balance of the silica (164 parts) then takes up 304 of lime, producing 468 of silicate of lime, leaving 272 of uncombined lime.

The composition of Boulogne Portland cement, just after calcination, with reference to its hydraulic properties, is therefore as follows:

254 parts of double silicate of lime and alumina, $SiO_3(Al_2O_3 + CaO)_3$,
468 parts silicate of lime, $SiO_3.3CaO$,
272 parts free hydrate of lime, $CaO.HO$,
A fraction of compounds of magnesia.

The artificial Portland cement of London contains—

Lime	681
Silica	206
Alumina	104
Oxide of iron	9
	1000

The elements are combined as follows:

238 parts double silicate of lime and alumina,
506 " silicate of lime,
295 " free hydrate of lime and oxide of iron.
1039

Light, Quick-setting, Argillaceous Cements.—When an argillaceous limestone, containing more than 23 per cent. of clay homogeneously mixed through the mass, is burnt with the great intensity and duration of heat necessary to produce Portland cement, it generally fuses into a species of slag or glass, in consequence of the large amount of silica present, and becomes nearly destitute of hydraulic energy. But if the calcination be kept below the point of vitrification, it may be expected to yield a quick-setting hydraulic cement, weighing about seventy pounds to the struck bushel, loosely measured. In the burning, a portion, and in some cases all, of the lime enters into combination with a portion of the silica and alumina of the clay, producing silicate and aluminate of lime, leaving generally an excess of uncombined clay, but more especially of silica, which, being inert, adulterates the cement, injuring its hydraulic energy, and consequently impairing its strength. Cements of this class, if mixed into a paste and immersed in water, will set so as to lose their plastic condition in ten or fifteen minutes, but are far inferor in ultimate strength and hardness to Portland cement of average quality. Some of these contain as high as 10 or 15 per cent. of the oxides of iron, the proportion of clay in such cases being generally below 23 per cent.

The cement of Vassy, Grenoble, Camp Rond, and Corbigny, in France, and the English and French Roman cements made from nodules of septaria, belong to this class. No deposits of this type of argillaceous limestones have been discovered in the U. S.

This grade of cement may also be produced artificially, by burning at a low heat a mixture of lime and clay, and was manufactured largely in England and France by this method, before the superior and peculiar qualities of the Portland cement were discovered.

Argillo-Magnesian Cements.—All the natural hydraulic cements of the U. S. are made from argillo-magnesian limestones—that is, limestones of which the principal ingredients are carbonate of lime, carbonate of magnesia ($MgO.CO_2$), and clay. The Rosendale cements, from the valley of Rondout Creek, in Ulster co., N. Y., and those found at Shepherdstown, Va., Cumberland, Md., Louisville, Ky., and at different points on the line of the Erie Canal, and at Sandusky, O., Utica, Ill., and other localities in the West, belong to this class. The process followed in their manufacture is essentially the same for all. The stone is quarried, and then broken up into pieces of irregular size, seldom exceeding twelve or fifteen pounds in weight, and burnt in an ordinary kiln (either intermittent or perpetual), with either wood or coal as fuel. Where coal is used the perpetual method of burning is usually followed, the kiln being filled, in starting, with alternate layers of coal and stone, and then fired with wood at the bottom. As the burning proceeds, the charge settles down, the burnt stone is drawn at the bottom of the kiln, and alternate layers of coal and stone added at the top. The burnt cement is then crushed up into small fragments by suitable machinery, ground between ordinary mill-stones, packed in barrels of 300 pounds each, and sent to market.

In burning the argillo-magnesian cement both the lime and the magnesia combine with the silica and alumina of the clay. The result is the formation of the silicate and aluminate of lime and magnesia—compounds which become hydrates when water is added, and are capable of undergoing the species of crystallization or hardening under water called *setting*. The argillo-magnesian cements cannot be burnt with that intensity and duration of heat necessary in making Portland cement without fusing into slag, destitute of hydraulic energy. Those manufactured in the U. S. are all quick-setting, and their weight does not ordinarily exceed seventy pounds to the struck bushel, loosely measured. The Rosendale cement is regarded as the most valuable of them all, but even this will never attain, under the most favorable circumstances, more than one-third the ultimate strength and hardness of the best Portland cement.

Test for Rosendale Cement.—This cement should be ground so that 90 per cent. of it can pass a No. 30 wire sieve of thirty-six wires to the lineal inch, should weigh not less than sixty-eight pounds to the struck bushel, loosely measured, and when made into a stiff paste, without sand, should sustain, without rupture, a tensile strain of 135 pounds on a sectional area of $1\frac{1}{2}$ inches square, or $2\frac{1}{4}$ square inches (equal to 60 pounds to the sectional square inch), when seven days old, the sample having been six days in water.

The elements of hydraulic energy in limes and cements are composed as follows, the proportions being given by weight:

Silicate of lime, $SiO_3.3CaO$		Silica..... 23 Lime..... 43
Aluminate of lime, $Al_2O_3.3CaO$		Alumina... 17 Lime..... 28
Silicate of alumina, $2SiO_3.Al_2O_3$		Silica..... 30 Alumina... 17
Double silicate of lime and alumina	$SiO_3.(Al_2O_3+CaO)_3$	Silica..... 15 Alumina... 51 Lime..... 28
Silicate of magnesia, $SiO_3.3MgO$		Silica..... 23 Magnesia.. 30

Magnesian Cement.—Pure carbonate of magnesia, called magnesite, when burnt at a heat of moderate intensity, about cherry-red, ground to a fine powder, and made into a paste with water, possesses considerable hydraulic energy. This calcined magnesite has been patented under the name of Union cement. Its characteristic property, however, upon which it depends for its peculiar value, is not developed when mixed with water alone, for in that case the induration or setting is due to the crystallization of the hydrated magnesia or oxide of magnesium. But if the burnt and pulverized magnesite, or Union cement, be mixed up with the chloride of magnesium—for which the bittern water of seaside salt-works has been found to be a cheap and suitable substitute—a chemical combination takes place between the oxide and the chloride of magnesium, and oxychloride of magnesium is formed. This is a very remarkable hydraulic cement, being greatly superior to any other known cement in strength and hardness, not excepting even Portland cement.

Dolomite, or the double carbonate of lime and magnesia, when burnt at a low heat, reduced to powder, and made into mortar, also exhibits hydraulic properties. But if the heat be carried sufficiently high—say about 400° C.—to reduce the carbonate of lime also, thus forming caustic or quicklime, the addition of water causes slaking, and the hydraulic energy is destroyed or impaired by the presence of the hydrate of lime.

Any magnesian limestone containing as high as 60 per cent. of carbonate of magnesia may be presumed to be capable of yielding hydraulic cement of greater or less value, if properly underburnt, no matter whether clay be present or not. If clay exists as one of the principal ingredients, there are formed in the kiln silicate and aluminate of magnesia, as well as silicate and aluminate of

lime. All of these compounds become hydrated when brought in contact with water, and are then in condition to undergo that species of crystallization called setting.

Mortar.—Mortar is a mixture of the paste of lime or cement with sand. The paste may be made before adding the sand, or the materials may be incorporated dry, and afterwards tempered to a plastic condition with water. In common mortar the cementing substance is common lime. Hydraulic mortar may be made by mixing a paste of hydraulic lime or cement with sand, or by adding hydraulic materials to common mortar.

Common Mortar.—As a paste of common lime hardens or *sets* very slowly, even in the open air, unless it be subdivided into small particles or thin films, it is important that the volume of lime-paste in common mortar should be but slightly in excess of what is sufficient to coat all the grains of sand and fill the voids between them. If this limit be exceeded the strength of the mortar will be impaired. With most sands the proper proportion will be from $2\frac{5}{10}$ to 3 volumes of sand to 1 volume of lime-paste. Generally, if either less or more sand than is herein indicated be used, the mortar will be injured; in the former case from excess of lime-paste, and in the latter from porosity.

Hydraulic-Lime Mortar.—With mortars of hydraulic lime the volume of sand should not be less that $1\frac{8}{10}$ times that of the lime-paste, in order to secure the best results regardless of cost. The usual proportions are, however, for ordinary work, the same as in common mortars, care being taken to incorporate sufficient paste to coat all the grains of sand and to fill up the voids between them.

Hydraulic-Cement Mortar.—A paste of good hydraulic cement hardens simultaneously and uniformly throughout the mass, and its strength is impaired by any addition of sand. For ordinary use, however, it is customary to add as much sand as possible without making the mortar porous: 1 barrel of cement, as packed for market, to 3 barrels of sand, is the proportion usually followed. The usual practice is to mix the cement and sand together dry, and afterwards temper to a plastic condition with water.

Tensile or Cohesive Strength of Mortar per square inch, in pounds.

Composition of the Mortar.	One Month Old.	Two Years Old.
Portland cement mixed to a paste without sand	300 to 400	500 to 600
Good Portland cement. 1 vol. Sand 3 "	50 to 80	200 to 230
Rosendale cement mixed to a paste without sand	80 to 100	180 to 220
Rosendale cement 1 vol. Sand 3 "	15 to 20	75 to 85
Portland cement paste. $\frac{1}{2}$ vol. Fat lime paste $\frac{1}{2}$ " Sand 3 "	.....	95 to 110
Rosendale cement paste. $\frac{1}{2}$ vol. Fat lime paste $\frac{1}{2}$ " Sand 3 "	.....	45 to 60
Tiel hydraulic lime dry 3 vol. Sand 5 "	25 to 35	120 to 160
Good common mortar Common lime-paste 1 vol. Sand 3 "	.....	40 to 60

Crushing Strength of Mortars and Concretes, from Trials upon Cubes and Parallelopipedons of various sizes, in pounds per square inch of top surface.

Composition of the Mortar.	Six Months Old.	Two Years Old.
Portland cement without sand	4500 to 5300	5000 to 6000
Dry Portland cement... 1 vol. Sand 3 " Mixed to a stiff mortar	1500 to 2200	2000 to 2600
Dry Portland cement... 1 vol. Sand 5 " Mixed as above	1200 to 1600	1600 to 2000
Rosendale cement without sand	1500 to 1800	1800 to 2000
Dry Rosendale cement, 1 vol. Sand 3 " Mixed to a stiff mortar	450 to 600	550 to 700
Good hydraulic lime, like Tiel 3 vol. Sand 5 "	450 to 590	550 to 600
Common lime-paste 1 vol. Sand 3 "	.....	400 to 500
Poor common lime-mortar	.....	200 to 250
Composition of Concrete.		
Mortar { 1 Portland cement, 3 Sand } 1 vol. Broken stone 3 "	.....	2000 to 2500
Mortar { 1 Rosendale cement, 3 Sand } 1 vol. Broken stone 3 "	.....	700 to 800

Cement and Lime Mortar.—When it is desirable, from any cause, to lessen the cost of cement mortar, the best way is to add a portion of common lime to the cement, rather than to increase the quantity of sand, as this last method produces a porous mortar. The volume of the cementing paste, whether of pure cement or a mixture of cement and lime, should be slightly in excess of what is theoretically necessary to coat all the grains of sand and completely fill the voids. A mortar of cement and sand loses about four-tenths of its strength if one-half of the cement paste is replaced by an equal volume of common lime-paste, but is then quite suitable for ordinary work.

Concrete or *Béton.*—These terms in modern practice are synonymous, and apply to any mixture of mortar (generally hydraulic) with coarse materials, such as fragments of brick or stone, gravel, pebbles, or shells. The volume of mortar should be slightly in excess of the volume of voids in the coarse materials. Among American engineers it is customary, in making concrete by hand, to (1) mix the cement and sand, or cement, lime, and sand, together, dry; (2) then add water, and mix to a stiff mortar; and (3) then spread the mortar evenly over the platform; (4) the coarse fragments are then spread out upon the mortar, and the whole mixed together thoroughly with shovels. The coarse materials should be kept damp, or sprinkled with water before they are incorporated with the cement and sand. After mixing, the concrete is conveyed away in wheelbarrows, and compacted in position by ramming in layers six inches to eight inches thick. Concrete should not be mixed with too much water, but when ready for use should be quite coherent, and capable of standing at a steep slope without the water running from it; otherwise it will be impossible to compact it by ramming. It should not be plastic and jelly-like under the rammer.

In carrying on large operations it is advantageous, on many accounts, to make the concrete in a mill, of which there are several kinds. Any box or cylinder to receive the ingredients, revolving slowly about either a diagonal or concentric axis, will answer the purpose. A cubical box, measuring four feet in length on each edge, was used by the writer upon the fortifications on Staten Island with entire success. The box was rigidly mounted upon an iron axle passing through opposite diagonal corners, and was provided with a trap-door, about two feet square, close to one of the angles farthest from the axis, through which the materials were introduced. Eight revolutions of the box, made in less than one minute, were found to be quite sufficient to secure a thorough incorporation of the mortar with the coarse material (broken stone and pebbles). In using a mill of this description, it is not necessary that the mortar should be first prepared by a distinct and separate process, but all the ingredients of the concrete—the cement, lime (if lime be used), sand, water, and coarse materials—may be introduced promiscuously into the box. The mill may be charged by wheelbarrows from a platform arranged at the proper height, or preferably by a large tub manœuvred by a derrick. The proper charge for the box, in order to ensure thorough mixing, should not exceed one-half to five-eighths of its total capacity. One tubful (thirty-six to forty cubic feet) should charge the box.

The standard formula for making Rosendale cement concrete upon government works is:

Concrete No. 1.

1 barrel of cement, 3 " " sand } = 3.27 barrels of concrete mortar;
5 " " broken stone, or brick, gravel, oyster-shells, or a mixture of two or more of them.

This batch will make 21.75 cubic feet of concrete rammed in place. The mortar of this concrete, tested by itself, possesses a crushing strength of 130 pounds per square inch when two months old, the test being applied to 5-inch or 6-inch cubes. For unimportant works, six to six and a half barrels of broken stone, instead of five, may be incorporated, and the concrete may be cheapened still further by replacing a portion of the cement by common lime, as in No. 2.

Concrete No. 2.—In foundations above water the concrete mortar may be composed as follows:

1 barrel of Rosendale cement = 3.70 cubic feet of paste,
$\frac{1}{3}$ " " common lime = 2.50 " "
$3\frac{1}{2}$ to 4 " sand, loosely measured.

The concrete should contain 1 volume of this mortar to about $2\frac{1}{2}$ volumes of ballast.

Concrete No. 3.—Portland cement concrete possessing a little more strength than the No. 1 above may be made as follows:

1 barrel of Portland cement, 1 " " slaked lime-powder, 10 " " sand } = 10.37 barrels of concrete mortar;
16 " " broken stone or other good ballast.

This batch will produce $69\frac{1}{2}$ cubic feet of concrete rammed

in position. The mortar of this concrete will sustain a crushing weight of 154 pounds to the square inch when two months old.

Omitting the common lime, the following formula will give a good concrete:

Concrete No. 4.

1 barrel of	Portland cement	} = 5.4 barrels of concrete mortar.		
5½ "	" sand			
6 "	" gravel and pebbles	} = 12½ barrels mixed and shaken down, containing 26½ per cent. of voids.		
9 "	" broken stone			

This batch of concrete produces 50 cubic feet rammed in position, and is suitable for the best quality of concrete work.

It is desirable, in all cases, that the mortar for concrete should be hydraulic, in order to secure simultaneous induration throughout the entire mass after it has been compacted in position. Having established the quality of the mortar, whether of cement and sand, or cement, lime, and sand, the proportion of mortar to the coarse materials should be adjusted, so that the volume of the former should be somewhat in excess of the volume of voids in the latter.

The *natural pozzuolanas* comprise pozzuolanas proper, tras or terras, the arènes, some of the ochreous earths, and the sands of certain graywackes, granites, basalts, etc. Their principal ingredients are silica and alumina, the former largely preponderating, and most of them contain small quantities of soda and potash, and the oxides of iron and manganese. They possess the peculiar property that when finely pulverized, even without previous roasting, and combined with a paste of common lime, a hydraulic mixture is produced which will compare favorably with the mortars of hydraulic lime and sand. Pozzuolana itself was first discovered near the village of Pozzuola, near the base of Mount Vesuvius, and its properties were known to both Vitruvius and Pliny. It was extensively used by the Romans before their day. Vitruvius gives a formula for its use in monolithic or *pisé* masonry, which, with slight variations, has been followed in Italy ever since. It is as follows:

12 parts of pozzuolana, well pulverized,
6 " " quartzose sand, well washed,
9 " " rich lime, recently slaked.

This constitutes the mortar. To this is added 6 parts of broken stone, porous and angular, when it is intended for a pisé or filling in.

Tras closely resembles pozzuolana, and is employed substantially in the same way. It is found on the Rhine between Mayence and Cologne, and in various localities in Holland. The arènes are a species of ochreous sand, containing so large a proportion of clay that they can be mixed into a paste with water without the addition of lime, and used in that state for pisé work, as well as for common mortar. Mixed with rich lime, they yield hydraulic mortars of considerable energy. Many of the natural pozzuolanas are improved by a slight roasting, and an artificial pozzuolana may be produced by subjecting clay to a slight calcination. Brick-dust mixed with common lime gives a feebly hydraulic mortar. Forge scales from the smith's anvil, the slags from iron-foundries, and the ashes from lime-kilns, containing cinders, coal, and lime, are artificial pozzuolanas. (For bituminous cements, mastics, etc., see BITUMEN.) Q. A. GILLMORE, U. S. A.

Cementa'tion of Steel is the process followed in the production of blistered steel or steel of cementation. The term cementation is also applied to other cases of incorporation together of two solids, under the influence of high heat without fusion. (See STEEL, by A. L. HOLLEY, C. E.)

Cem'etery [Lat. *cœmeterium;* Gr. κοιμητήριον, from κοιμάομαι, to "sleep," to "repose;" Fr. *cimetière*]. In all ages the disposition of the human body after death has engaged the thoughts of mankind.

The earliest records of our race indicate an interest in the interment of the deceased. "Bury me not, I pray thee," said the patriarch Jacob—"bury me not in Egypt, but I will lie with my fathers. And thou shalt carry me out of Egypt, and bury me in their burying-place. . . . There they buried Abraham, and Sarah his wife; there they buried Isaac, and Rebekah his wife, and there I buried Leah." Such are the natural expressions of human feeling; it is a matter of instinct, a spiritual impulse, which supersedes belief and disdains question. Even the American Indians have been known to burden themselves with the bones of their ancestors when removing to new reservations. These feelings are common to all ages—to the barbarian and the civilized, to the bond and free, to the heathen, to the Christian. They are manifested by the barrows, cairns, and mounds of olden times; and everywhere spots seem to have been so selected that the magnificence of nature might administer comfort to human sorrow and incite to human sympathy.

The aboriginal Germans interred their dead in groves consecrated by their priests. The Egyptians soothed their grief by embalming the dead and interring them in vast catacombs or enclosing them in stupendous pyramids. The Hebrews watched with religious care over their places of burial. They usually selected for this purpose ornamental gardens, deep forests, fertile valleys, or rocky mountains; and they still designate them, with a sad emphasis, as the "house of the living." The ancient Asiatics lined the approaches to their cities with sculptured sarcophagi and mausoleums embosomed in shrubbery. The Greeks exhausted the resources of their exquisite art in adorning the habitations of the dead. They discouraged interments within the limits of their cities, and consigned their relics to shaded groves in the neighborhood of streams and fountains, and called them "places of repose" (κοιμητήρια). The Romans erected the monuments of the dead in the suburbs of the city, on the sides of their spacious roads, in the midst of trees and ornamental walks. The Appian Way was crowded with columns and obelisks in memory of their heroes, and at every turn the short and touching inscription met the eye—*Siste, viator* ("Pause, traveller"), inviting at once to sympathy and thoughtfulness. These suggestions must have given formerly, as they may do still, to the language of the senseless stone a voice enforced by the benignity of that nature with which it is in unison. The Moslems placed their burial-grounds in rural retreats and embellished them as a religious duty.

The Greek term *cemetery*, signifying a place of rest or repose, was applied to the usual places of interment of the early Christians, who followed the customs of the Romans; but the desire to lie under the religious sanction of the Church afterwards transferred their burial-places to the vicinity of religious buildings or within towns; and still in some countries the Church derives revenue from interments. The practice is now happily changed, and few comparatively attach importance to the protection which churches were supposed to afford; indeed, the protection has proved fallacious, religious sects having almost ceased to provide for the dead. When their ground becomes valuable or the site of the church is to be changed, disinterment too often takes place, without a symptom of the tenderness with which the remains were deposited. The extension of cities has been too often attended by the painful spectacle of burial-grounds torn up and the occupants removed. In the rural cemetery this cannot occur, for each lot-holder possesses a deed in fee for burial purposes, and he is as positively the owner of his lot as he is of his dwelling-house, and he cannot by law be dispossessed. The desire so long cherished to be interred under the shadow of the church has nearly passed away, and there can be no doubt as to the advantages of the new rural mode. The refining influences of a well-kept cemetery are too obvious to need to be dwelt upon.

Chadwick, in 1843, had demonstrated the unhealthfulness of church and city interments, and the world woke up to the necessity of a change. America led the way. Boston instituted Mount Auburn, on which occasion Judge Story delivered a beautiful and appropriate dedicatory address; Laurel Hill, Philadelphia, immediately followed; Greenwood, New York, came next, and others succeeded, till now nearly every city (as well as many villages) has its rural burial-place. It was a fortunate thing that the first examples were governed by cultivated men; they inaugurated a taste for fine planting that culminated in a general demand for ornamental grounds. Boston, Philadelphia, and New York were fortunate, also, in the location of their cemeteries, having chosen grounds capable of high embellishment, and now these cities are establishing still more desirable places of sepulture in Forest Hills, West Laurel Hill, and Woodlawn, where the improvements suggested by experience are introduced, such as receiving-tombs carefully constructed, and the selection of trees and shrubs adapted for permanence, or such as when fully grown will not interfere with the monuments. Much depends on the first planting of a cemetery.

The great body of English poetry is more rich on the subject of sepulture than the poetry of any other nation, and abounds with references to the practice of ornamenting graves with flowers, shrubs, and trees. A rich vegetation exercises a powerful influence in preventing the escape of deleterious miasmata, though this is not to be feared where graves are single and of a depth of seven or eight feet, as they always should be. Trees should be chiefly of fastigiate growth, which neither cover a large space with their branches nor give so much shade as to prevent the growth of grasses. Of these, are all the arborvitæ family, the junipers, the yews, hollies, and a few species of oaks, magnolias, and in general the trees of middle size

suitable to each particular climate. The attempt made at Laurel Hill to introduce as many varieties as possible has been attended with partial success; its specimens of the cedar of Lebanon and other historical and rare trees are justly admired.

How to lay out a cemetery is an important topic. It should conform to the character of the ground and be made as cheerful as possible. The so-called landscape plan, lately introduced at Cincinnati, has no enclosures, the lots only marked by a sunken post at each corner, with but one monument in the centre, and the interments surrounding this on all sides; the advantages claimed are a park-like appearance and more open space, with more facility for neat keeping, etc. To this it is replied that where there is no impediment the footprints of visitors and habitués will soon create paths in various directions; short cuts will inevitably follow, and paths be made over the graves. The correct way will be found to devote a portion of each cemetery to the new plan, and let individual wishes be consulted; this has been done at Woodlawn and West Laurel Hill with advantage.

The rules to be observed in cemeteries in common use in America indicate a general desire to promote good order, and are in the main judicious. Bricked vaults under ground of greater or less size are not uncommon, and a more general desire for those above the surface is observable. These latter should never be allowed unless provision is made to effectually seal the crypts in which bodies are deposited; otherwise the vicinity is liable to be infected with unhealthy odors which the wonderful purifying power of sufficient earth entirely prevents. Iron railings, which prevailed in the early period of our rural burying, are happily disappearing, and should no longer be permitted, as indeed all perishable materials should be discarded. A hedge, however, is allowable, provided it be of an enduring kind, such as the slow-growing holly. Permanency should be aimed at, and this cannot be commanded by even iron, which perishes by rust, and all unions of iron and stone become disfigured. Granite is much used as a curbing; this suffices for the enclosure, and marks the possession of each family, and is the most enduring; the best burnt bricks for underground structures are also lasting; marble or other veneering must soon give out by the introduction of water in the interstices, which in freezing it opens with great force.

The best material for monuments is granite, either the expensive Aberdeen or the American. Italian marbles are not adapted to a cold climate; they inevitably split and crumble, while the American will do the same if not laid in the position of its natural bed.

JOHN JAY SMITH, *Supt. Laurel Hill Cemetery.*

Cen'ci (BEATRICE), a beautiful Roman lady whose father was very depraved and treated his children with great cruelty. Her father having been found dead under suspicious circumstances, Beatrice, her brother, and her stepmother were accused of his murder, and for that crime were executed at Rome Sept. 11, 1599. Her story is the subject of one of Shelley's tragedies and of a novel by Guerazzi. The portrait of her by Guido Reni is well known.

Cenis, Mont. See MONT CENIS.

Cenon-la-Bastide, a town of France, province of Gironde, in which are carried on shipbuilding and plaster manufacture. Pop. 6817.

Cenozoic. See CAINOZOIC.

Cen'ser [Fr. *encensoir*, from the Lat. *incendo, incensum*, "to burn;" Lat. *acerra*], a vase or other vessel used for burning perfumes and incense in temples and churches. Censers were used by the ancient Hebrews and Greeks, and are now employed in the Roman Catholic Church at mass, vespers, and other services. The censer is suspended by chains which are held in the hand, and is tossed or swung in the air. It is frequently called the THURIBLE (which see).

Cen'sor [Fr. *censeur;* from Lat. *censeo*, to "judge or estimate"], the title of two magistrates of high rank in ancient Rome, who were appointed to take the census—*i. e.* to make an enumeration of the citizens and a valuation of their property—also to inspect and regulate their manners and moral conduct. In the early ages of the republic these duties were performed by the consuls, and no special magistrates were elected for the purpose until 443 B. C. The censors were originally chosen for a term of five years (which was soon reduced to eighteen months), and only patricians were eligible to the office. About 340 B. C. a law was enacted that one of the censors must be a plebeian. The censorship (in Lat. *censura*) was regarded as the highest dignity in the republic except the office of dictator. The power of the censors was in a great measure undefined and irresponsible, especially in the regulation of morals (*regimen morum*). They had power to expel a senator from the senate for a misdemeanor, and to punish with marks of ignominy those whose conduct did not accord with their own ideas of rectitude. They could degrade persons from a higher to a lower rank, and fill vacancies in the senate. Among their duties was the administration of the finances of the state and the erection of new public buildings. As a general rule, the only persons eligible to the office were those who had previously been consuls. No person could be elected censor for a second term.

Cen'sorship of Books, the term applied to interference by a government with the freedom of the press, exercised formerly over books alone, but since the rise of journalism extended to periodicals also. The censorship of books did not come into operation until the invention of printing (except that heretical books were prohibited by the Church). It soon became common to all European countries, Great Britain included. The censorship of books was established by act of Parliament in 1662, and renewed from time to time: but its renewal was refused in 1693. In 1766 it was abolished in Sweden; in 1770, in Denmark; in 1791 in France, where it was restored in 1805, again abolished in 1814, and after having again been in turn restored and abolished, was finally suppressed in 1827, but has since been from time to time, to some extent, revived. In Germany and Austria freedom of the press was promised in article 18 of the Federal act (1815), but not established until 1848. In 1872, Russia was the only country of Europe in which it formally existed, but in several others the police authorities have a supervision of books and periodicals. In the republics of North and South America a censorship of books has never been known.

The Church of Rome has long claimed the right of censorship over books. Some of the early provincial councils prohibited the reading of suspicious or heretical works, but the first catalogue of the kind now known was issued in 494 A. D., in the time of Pope Gelasius.

The INDEX LIBRORUM PROHIBITORUM, a list of fully prohibited books, was first authoritatively issued by Pope Pius IV. (1557–59), though previously lists more or less complete were published in various parts of Europe. The work was vigorously pushed on by the Council of Trent, and has been kept up by the subsequent popes. The best-known edition of the Index is that of 1819, published at Rome. Frequent additions to the Index are made by decree.

The INDEX EXPURGATORIUS is a list published, like the above catalogue, by the "Congregation of the Index" at Rome, and contains the names of books which cannot be read until certain specified passages are expunged. Bishops have power to give the learned the privilege of reading prohibited books. The ecclesiastical censorship of books does not command much respect, even in countries bound by concordat to accept and enforce it. The Russian Greek Church has also a catalogue of prohibited books, and the influence of the system is greater and worse in the Eastern than in the Roman Catholic Church.

Cen'sus [a Latin word, from *censeo, censum*, to "weigh, estimate, tax, assess;" a registering and rating of Roman citizens; the censors' lists; the registered property of Roman citizens; Fr. *recensement*, a "statement, return, verification;" *cens*, "census," or amount of direct tax qualifying one to be an elector; Eng. *cense* (obsolete), a "public rate," "rank," "condition;" also *cess* (obsolete), to "rate," to "assess"], an official enumeration of the inhabitants of a state or municipality. The various forms and significations of the word, as given above, indicate the chief objects for which the census has been used in the different periods of history, though in many cases other objects have been associated with these. (For a discussion of the origin and progress of statistical inquiry, in its more general bearings, see STATISTICS. The census proper is a branch of this more general subject.)

I. THE CENSUS OF ANCIENT NATIONS.—An inquiry into the censuses of ancient nations is valuable only in so far as it exhibits the objects had in view and the methods employed. It is alleged that China ordained a census more than twenty centuries before Christ; also, that a census was taken in Japan a century before the Christian era; also, that statistical information was taken by officials in Peru under the reign of the Incas. But these and similar notices of ancient censuses are too vague and uncertain to possess much value. This article will be directed chiefly to those nations of which history speaks with definiteness and reasonable certainty.

1. *The Jewish Census.*—It was ordered in the Jewish law that the first-born of man and beast, as well as the first fruits of agricultural produce, should be set apart for religious purposes; the first-born of man to be redeemed—the first-born of the beasts, excepting the ass, and the first fruits of the earth, to be offered unto the Lord (Ex. xiii. 11–13; xxii. 29). According to Archbishop Ussher's chronology, this enactment must be referred to the year 1491 B. C. The law further provided that when the sum of the

children of Israel was taken they should give every man a ransom for his soul, amounting to a half shekel of silver (Ex. xxx. 12–16). So far as appears, this is the original institution of the Jewish census. It is clear that it was primarily for religious purposes. The Hebrew word answering to census or enumeration means a "numbering combined with lustration," from a verb signifying to "survey, in order to purge." The four most notable enumerations recorded in the Old Testament were—1st. In the third or fourth month after the exodus the males of the Hebrews, twenty years of age and upwards, were enumerated by Divine command, chiefly for the purpose of raising money for the tabernacle (Ex. xxxviii. 26). The enumeration amounted to 603,555. The number of men at the time of leaving Egypt is stated (Ex. xii. 37), but it is hardly probable that a formal enumeration was made at that time. Probably the result, 600,000, was retrospectively inferred from the first numbering at Sinai. 2d. A second enumeration was made at Sinai in the second month of the second year after the exodus (Num. i. 2, 3). Here a new idea appears, as this numbering was to ascertain—1, the number of fighting men between the ages of twenty and fifty; and 2, the amount of the redemption-offering. Exclusive of the Levites, the result was the same as the first. 3d. The next enumeration was made just before the tribes entered Canaan, thirty-eight years after the one just mentioned (Num. xxvi. 63–65). The number of men had slightly fallen off. 4th. The most notable of the Jewish censuses was that taken in the reign of King David. Its history can be gathered from 2 Sam. xxiv. 1–9; 1 Chron. xxi. 1–7, 14; xxvii. 23, 24. This enumeration was followed by a three days' pestilence, which destroyed 70,000 men. The pestilence is credited to David's presumption. It is not altogether clear in what his offence consisted. According to Josephus (*Ant.* vii. 13, § 1), the king's transgression was in not collecting the redemption-offering required by the law. This account is more generally followed by biblical scholars, but some attribute the pestilence to David's presumption and pride, of which the enumeration is regarded as an indication. It appears from Ex. xxx. 12, either that the customary ransom was to avert a plague among the people, or that such plague was to be the penalty for neglecting to require the offering. The pestilence made a lasting impression on the minds of men; for to this day, in both Mohammedan and Christian countries, especially in the former, there are superstitious fears attending enumerations of the people. David's enumeration of the people was not recorded.

All the objects comprehended in the Jewish census are stated above. It does not appear that the law made any provision as to the time or manner of making the enumerations. The censuses referred to in the New Testament were taken under Roman authority, and were in no proper sense Jewish.

2. *The Greek Census.*—History gives us no definite knowledge of a census in any portion of Greece except at Athens, where the census was established by Solon, who held the office of Archon from 558 to 549 B. C. He made a radical change in the constitution of Attica. Before his time the honors and duties of the citizen were based on birth; he introduced what was called the *timocracy*, or government based on wealth. He distributed all free citizens, without regard to birth or rank, into four classes, according to the amount of property they owned. The classes were—1st. Those whose annual income was equal to or exceeded 500 medimni of corn (about 700 English bushels). 2d. Those whose income was less than 500 and more than 300 medimni. 3d. Those whose income was less than 300 and more than 200 medimni. 4th. All whose property yielded an income less than 200 medimni. The medimnus of corn was valued in the time of Solon at about one drachma, or 9¾*d.*

The first class (Πεντακοσιομέδιμνοι) alone were eligible to the principal public offices. The second class (Ἱππεῖς) were knights, or those having sufficient income to keep horses and perform cavalry service. The third class (Ζευγῖται, so named from their being able to keep a yoke of oxen) formed the heavy-armed infantry. The fourth class (Θῆτες), which comprised the great body of the people, were ineligible to any office, paid but little if any tax, and in case of war served only as light-armed infantry, with weapons furnished by the state.

The census was instituted for the double purpose of making this classification of citizens, and of laying the foundation of the Athenian system of taxation. The idea of assessment was as much a part of the census as that of enumeration. The Greek word for assessment (τελεῖν) has also the general meaning of rank or class; and the phrase τελεῖν το τέλος, which signifies "to comply with the requisition assessed," signifies also to belong to a class. The census was taken, at first, by the Naucrari, and afterwards by the Demarchi. A record was kept, showing the class to which each citizen belonged, and the list of his taxable property. The census was taken sometimes once a year, and sometimes once in four years, according as property fluctuated in value. The classification of Solon lasted, with some modification, to the close of the Peloponnesian war (404 B. C.), and was in part preserved after the renovation of the democracy in the following year. The classification of citizens and the mode of assessment were changed during the archonship of Nausinicus (in 378 B. C.), in order to levy increased taxes for carrying on the war against Sparta.

(For the latest and fullest discussion of the Greek census see Bœckh's "Political Economy of the Athenians" (English trans., Boston, 1857), book iv., chap. 5; Grote's "History of Greece," vol. iii., chap. 11, and vol. x., chap. 87; Plutarch's "Solon," i., p. 168; and Smith's "Dictionary of Greek and Roman Antiquities," words *Censor* and *Census.*)

3. *The Roman Census.*—The institution of the census at Rome was intimately connected with the great reform in the Roman constitution consummated by Servius Tullius. Before his time all the political and military authority was wielded by a few powerful Roman families, and clans or groups of families, called *gentes.* The word *populus* applied to these families alone. Around the members of this ruling class were gathered, under the name of *clients,* a large number of foreigners (*metoeci*) residing at Rome, subjugated people, and freedmen, who possessed no political rights, paid no regular taxes, and were neither compelled nor permitted to serve in the army. Most of them were farmers, and many were wealthy. As the city grew this plebeian class rapidly increased. In order to equalize the burdens of the state, but particularly to strengthen the army and make it more national, Servius Tullius so changed the constitution as to place the burdens of taxation and the duties and honors of military service, not upon the patricians as such, but upon freeholders between the ages of seventeen and sixty, without regard to family or rank. All these were distributed into five classes, according to the amount of land owned by each. It has been held by most writers that the classification was based upon the amount of wealth, in any form, possessed by the citizen; but Mommsen and other late authorities insist that the basis was land.

The first class comprised those who owned an entire *hide* of land—a full Roman farm—not less than twenty jugera (about fourteen acres). The second, third, fourth, and fifth classes consisted of those who owned respectively three-fourths, one-half, one-fourth, and one-eighth of a *hide* of land. The non-freeholders (*proletarii*), counted by some authorities as the sixth class, were called *capite censi* (*i. e.*, "counted by the head"). They could not vote, paid no taxes, and were not liable to perform military service. The rights and duties of all Romans were determined by the class to which they were thus assigned.

In order to effect these changes in his government, Servius Tullius instituted the census (555 B. C.). Every citizen was compelled to declare his name, age, and tribe, the name of his father, the number of his children, the value of his estate, and the number of his slaves. The record thus made was both a land-register and a roster or rank-roll of the Roman people. When the enumeration and registration were completed the people were assembled in the Campus Martius, where the religious solemnities of the lustration were performed. The sacrifices attending it were called *suovetaurilia,* because a pig, a sheep, and an ox, after being led three times around the campus, were sacrificed for the purification of the people. This was called the closing of the lustrum. As the census was taken quinquennially, the word *lustrum* came to signify a period of five years.

At first, the census was taken by the kings in person. After the expulsion of the kings it was taken by the consuls; but the duties accompanying the census became so important that in 443 B. C. two magistrates, called *censors,* were chosen from the patricians, to whom this duty was entrusted. The office of the censors ranked next to that of dictator. Their powers and duties were threefold: 1st. They took the census and made and kept the official record. In performing this duty they were the sole judges of the qualifications required by law for the rank or class to which a citizen should be assigned. 2d. They were conservators of public and private morals. This branch of their power was called *regimen morum.* If in their judgment a citizen was guilty of immoral or unworthy conduct, they placed him in a lower class. They could even degrade a senator by omitting his name from the senatorial list. Ulpian says in his "Digest" (tit. 1–6): "Roman citizens are free who have been made free by the act of manumission, by the census, or by a lawful will." (See also Cicero, Top. ii. 10.) Any one known to absent himself from the registration was

called *incensus*, and was subject to the severest punishment. In the time of Servius Tullius this punishment might be imprisonment or death. In the days of the republic the *incensus* might be sold as a slave: "Maxima capitis diminutio est, per quam et civitas et libertas amittitur, veluti cum incensus aliquis venerit." (*Ulpian*, "Digest," tit. xi. 11.) 3d. They were charged with the administration of the finances of the state. The tribute assessed upon a Roman citizen depended upon the amount of his property, as registered in the census; and the regulation of taxes was placed in their hands, though they did not receive nor disburse the revenues.

The censorship continued 421 years, when its powers were absorbed by the emperors. Augustus extended the census to the provinces, and ordered a general enumeration of persons and property throughout the empire. Domitian assumed the title of "perpetual censor." The enumeration continued to be made for several centuries, but the ceremony of lustration was not observed after the reign of Vespasian; and later, the censuses were taken but once in fifteen years. With the dissolution of the Roman empire, the census seems to have disappeared from history; and in the general decline of intellectual life that followed, even the original meaning of the word was practically lost from the customs of nations.

II. The Census during the Middle Ages.—In mediæval times the word "census" was still employed, but it was applied almost exclusively to the records of landed estates and the assessment of taxes. Until the thirteenth century there is no record of a distinct enumeration of the population in the annals of any mediæval people. In that dreary waste of history a few attempts were made to learn something concerning the people and their condition. In the year 780, Charlemagne appointed officers called *missi dominici*, or royal commissioners, who travelled from province to province to examine the condition of his empire. Their reports contained some valuable statistics concerning the people, the soil, and the products of his vast dominions. (See Martin's "Histoire de France," tom. ii. 277–284.) These reports were not kept up after the death of Charlemagne.

A more elaborate and successful effort in the same direction was made in England in 1081, by William the Conqueror, in the institution of the famous "Doomsday Book." An inquisition was made throughout the kingdom concerning the quantity of land contained in each county, the name of each Saxon and Norman proprietor of land, and the slaves and cattle belonging to each. All these were registered in a book, each article beginning with the king's property, and proceeding downward according to the rank of the proprietors. By this register the king could know the wealth, rank, and position of all his subjects. It served as the basis of taxation, and was used in the courts as the evidence of property. Of this book Burke says: "It was a work in all respects useful, and worthy of a better age."

Several early attempts at a census were made in Spain—one by Peter the Ceremonious, king of Aragon, in the fourteenth century, the results of which were not published until the present century; and another in the fifteenth century, by order of the Crown of Castile.

In different parts of Europe a few statistical works appeared; but their scope was narrow and their materials were scanty and inaccurate.

It would appear that a comprehensive census is found only in enlightened despotisms or in free communities. Neither of these were frequent in the Middle Ages, and this may account for the absence of enumerations of the people during that period.

III. The Census in Modern Times.—The modern census is of slow growth, and seems to have developed only as nations came to appreciate the fact that the strength and glory of a state depend upon the condition of its people and their industries. While rulers were unwilling to allow their people any share in public affairs, there was little attention paid to the population and its condition. Till within the last two centuries scarcely an effort was made in any modern country to obtain any comprehensive knowledge of the people.

Sweden has the honor of being the first modern government to establish a systematic plan, and to record important facts concerning its population. The frequent recurrence of famine and pestilence in that country near the beginning of the sixteenth century led the clergy to keep a register of the marriages, baptisms, and burials within their several parishes. The keeping of this register was made obligatory by an ecclesiastical law of 1686, which is still in force. That law required a register of marriages, births, and deaths, with many accompanying particulars; a record of all persons removing to or from each parish; a list of the inhabitants by houses and households; and a record of all extraordinary accidents occurring during the year. These registers were intended to serve the requirements of religion, and also to afford the means of correcting the register of landed property and households kept by the tax-collectors. As these registers were made on a uniform plan, and by a body of intelligent and cultivated men, who were well acquainted with the people of their parishes, the records were exceedingly accurate and valuable. For a long time the results were not collected; but in consequence of a memorial presented to the Diet in 1746 by the Academy of Sciences of Stockholm, schedules of questions concerning the movement and condition of the population were distributed among the parishes, with orders to the pastors to make returns from their registers for the previous twenty-five years. In the year 1749 a return was made, which contained a large number of valuable details concerning the condition of the population, but it was many years before these facts were published. The number of inhabitants was long regarded as one of the most important state secrets; and it was forbidden under heavy penalties to reveal to the public anything respecting it. It was only in 1762 that permission was given to publish some extracts from the official reports concerning the progress of the population. It was from facts thus obtained that Doctor Price prepared his first essay in the form of a letter to Doctor Franklin, which laid the basis for the famous life-tables founded on the statistics of Sweden.

From 1749 to 1751 the reports of population were made annually; from 1754 to 1772, triennially; from 1775 to the present time the census has been taken once in five years. In towns the head of the household, in accordance with instructions, fills up the schedules, which are collected by the agents of the police. In the country districts the census is still taken by the pastors as a part of their parochial duties.

England was very slow in achieving a census. In 1592, when the plague was in London, records were kept of the number of deaths in the city; but the practice soon fell into disuse, and was not revived until 1603, the first year of the reign of James I., when a weekly account was ordered to be kept of burials and christenings in London. These records were regularly kept thereafter, but little attention was paid to them until the year 1661, when Sir William Petty, writing under the name of Captain John Graunt, published a tract entitled "Natural and Political Observations, mentioned in a following index, and made upon the Bills of Mortality of London, with reference to the Government, Religion, Trade, Growth, Air, Diseases, and several changes of said City." This work attracted much attention, and the author followed it up by several similar works—one on the mortality bills of Dublin; another in 1686, entitled "An Essay concerning the Multiplication of Mankind," together with an "Essay on Political Arithmetick," concerning the growth of the city of London.

It is curious to observe what vague and erroneous opinions prevailed, even among the most intelligent thinkers of that time, concerning the number of people in any state or city. A striking illustration of this may be seen in the fact that when Sir William began his investigation of the population of London, he mentions it as a matter of general belief that the city then contained several millions of people. The imperfections of the statistical methods employed in his day may be seen in the following passage from Sir William's "Third Essay in Political Arithmetic," 1686, pp. 21 and 22:

"Proofs that the number of people in the 134 Parishes of the London Bills of Mortality, without reference to other cities, is about 696 thousand—viz.:

"I know but three ways of finding the same:

"1. By the houses, and families, and heads living in each.

"2. By the number of burials in healthful times, and by the proportion of those that live to those that die.

"3. By the number of those who die of the plague in pestilential years, in proportion to those that 'scape."

In applying his first method he has no count of the houses, but, as he says, "pitches upon a number" as a rough estimate, then guesses at the average number of families to a house and persons in a family, and finally applies his arithmetic. His second and third methods were even more vague.

During the eighteenth century several efforts were made to guess at the population of England, but nothing of value was accomplished till near the close of that century. Considering the fact that economic science had already attained a high degree of development in England, that many writers had successfully investigated and ably discussed statistical subjects, and that censuses had been ordered in the American colonies by the home government since the seventeenth century, it is surprising that no attempt was made to ascertain the population of any one of the three united kingdoms by actual inquiry until 1790; when Sir John Sinclair, a high authority in matters of public finance in his time, and a man of rare intelligence, enterprise, and perseverance, undertook the compilation of a complete popula-

tion, agricultural, commercial, and industrial census of Scotland. For this purpose he addressed one hundred and sixty questions, on as many different subjects, to all the clergymen of the Established Church. He had much difficulty in obtaining answers from them, but by dint of persistently-repeated appeals he succeeded, after several years, in securing returns from nearly all the parishes. The returns were published by him successively in a series of twenty-one volumes. The energy of this remarkable man may be judged from the fact that he secured no less than 900 contributors to his census, and that the whole compilation and publication was completed in just seven years. He subsequently prepared a masterly compendium of the series, entitled an "Analysis of the Statistics of Scotland." His statistics were not absolutely accurate, but they formed, although the work of a single individual, a more complete census than any yet undertaken by any government. Sir John Sinclair may be said to be the founder of British public statistics; for it was mainly at his suggestion that Parliament, on December 31, 1800, passed an act providing for a general enumeration of the population of England, Wales, and Scotland in the following spring, and every tenth year thereafter. The bill was offered in the Commons by Charles Abbott (afterwards Lord Tenterden), and the motion for leave to introduce it was seconded by Mr. Wilberforce. The first census was taken on the 10th of March, 1801, in England and Wales; for Scotland a later day was assigned, owing to the inclemency of the season. The law contained but one schedule, and the following inquiries were made: The number of houses, inhabited and uninhabited; the number of families; the number of inhabitants, male and female; a classification of the population according to occupation, in three divisions: 1st, persons chiefly employed in agriculture; 2d, persons chiefly employed in trade and manufactures or handicrafts; 3d, all other persons not comprised in these two classes; the number of baptisms and burials each tenth year from 1700 to 1800; and the number of marriages from 1754 to 1801. In the two subsequent enumerations, in 1811 and 1821, the same schedule was followed, except that the occupations of the heads of families only were entered. In that of 1821 a classification of ages was also adopted. In 1831 a uniform system of registration of births, marriages, and deaths was established by act of Parliament for England and Wales, under the supervision of the registrar-general's office. Under the act the territory to which it was applied was divided into over two thousand registration districts. The same act provided that subsequent enumerations in England and Wales should be taken by the local registrars under the direction of the registrar-general. The creation of a regular statistical service greatly facilitated the census of 1841 in England and Wales. In Scotland the less efficient method of employing the parish schoolmasters as local censors was continued.

In Ireland the first attempt at a general census was made in 1811, with very unsatisfactory results. It was repeated in 1821, but produced nothing but a mere enumeration of doubtful accuracy. The next census, taken in 1831, was subjected to a correction in 1834. In 1841 the constabulary force was employed as census-takers, with better results. An attempt was made, in connection with the census of the year last named, to obtain statistics of the rural economy of the Irish kingdom, which proved very successful.

Great efforts were made to render the sixth census of England, Wales, and Scotland, in 1851, superior in results to the preceding enumerations. The special law enacted for the purpose provided that the census should be taken on one and the same day—31st of March—in the three parts of the kingdom named. For that purpose 30,610 competent enumerators were appointed, with the authority of the registrar-general, by the 2190 district registrars then in function in England and Wales. Only as much territory was assigned to each enumerator in the registration districts as could be conveniently canvassed by one person. There being no uniform system of registration in Scotland, the thirty-two sheriffs of that kingdom were authorized to appoint 1010 temporary registrars—generally parochial schoolmasters—and 8130 enumerators; the government appointed 257 enumerators for the smaller islands. Some days before the census-day the enumerators delivered to every occupier of a house or tenement a "householder's schedule," containing inquiries as to the name, the head of family, condition, sex, age, occupation, and birthplace of every person in Great Britain, and also as to the number of blind, deaf, and dumb. For the use of the lower classes of Wales schedules were printed in Welsh. The schedule was to be filled up in the night of March 30–31. No one present on that night was to be omitted except workingmen and others performing night-labor away from their habitations. Travellers were enumerated at the hotels and houses at which they arrived on the following morning. Simultaneously with the household schedules the enumerators distributed in the proper quarters forms for collecting information respecting places of worship, scholastic establishments, and miscellaneous institutions. The schedules were taken up by the enumerators at an early hour on the 31st of March. The collectors filled up those parts which persons had either neglected or were unable to fill. They were also required to note all the unoccupied houses and buildings in course of construction. The floating population—that is, such persons as spent the night named in barges or boats on canals or small streams, in barns, sheds, tents, and the like—the enumerators were required to estimate according to the best information they could obtain. Special notice was to be taken of all extraordinary assemblages of people anywhere at the time of the census.

The enumerators were allowed one week for the transcription of their schedules and the completion of summaries and estimates called for in their very full instructions. The revision of the returns by the district registrars, in which the latter were to pay particular attention to nine specially-defined points, had to be completed in a fortnight. The revised returns were subjected to another revision by the superintendent registrars before they were finally transmitted to the census office.

The custom-house officers took the census of sea-going vessels in port. Persons belonging to the navy and commercial marine were also separately enumerated by the proper authorities. The government furnished the statistics of the army, half-pay officers, and pensioners, the civil service, the civilians and Europeans in the East India Company's service, and of all British subjects living in foreign parts, as far as they could be ascertained through consular and diplomatic organs.

The British census of 1851 was the most successful statistical operation, both as regards quickness and accuracy of execution, performed up to that time in any country where public statistics were cultivated. The plan of the census of 1861 did not vary in any essential respect from that of the preceding one. Its execution was equally rapid and fruitful of satisfactory results, in spite of the greater difficulty of the task from the growth of population, etc.

In Ireland the censuses of 1851 and 1861 were again taken by the constabulary force. The mode of enumeration was essentially the same as in England, except that the schedules represented a wider field of inquiry. The additional interrogatories related to insanity, idiocy, degree of education, attendance at school, buildings other than habitations, and language. Since 1804 a general registration of births and deaths in Ireland is made by civil officers; up to that time registers were kept only for the Protestant population.

While both in Ireland and in Scotland an agricultural census, which serves to determine the area devoted to the culture of different products of the soil, and the number of live-stock, had been required for many years, a first cattle census was taken in England and Wales only in May, 1866; it was followed soon after by a comprehensive agricultural census.

The digestion of the English and Irish census-reports by the central statistical authorities is conducted in a thoroughly scientific manner. The general reports and the special compilations therefrom on a variety of subjects are unsurpassed by the corresponding records of any other country. Their great value to statisticians and economists is universally acknowledged. The movement of the population of the United Kingdom is annually determined by the registrar-general's office through the agency of the district registrars.

In 1871 the eighth census of the United Kingdom was taken. Over 32,000 enumerators were employed in taking it. Several minor inquiries were added to the schedules, and some important inquiries concerning education were made to supply the demand for information by the school board established under the Elementary Education act of 1870. In London alone the school board was supplied with certain particulars concerning the 700,000 children between the age of three and thirteen living within the limits of the London school board district.

France established a census only after many ineffectual attempts and against formidable obstacles. The first comprehensive suggestion of a census was made by Vauban, the great engineer and scholar of the seventeenth century. Seeing the distress into which France had been plunged by the long wars of Louis XIV., and deploring the heavy and unequal burdens of taxation which had been laid upon the people, he entered upon a careful survey of the condition of France, and in the first years of the eighteenth century developed a plan to sweep away the great army of fiscal officers and establish a uniform tax on all the property of the realm.

This he called the "projet d'une dixme royale," which he

published in 1707 in a volume addressed to the king. In order to apply his plan, it was necessary to know the number and classes of the population. His method of estimating the number was peculiar. Selecting a portion of France which he regarded as having an average density of population, he caused it to be accurately measured and its population estimated. From this he calculated the area of France and its population; but near the conclusion of his book he appealed to the king to provide by law for the numbering of the people, and set forth in strong and eloquent language the advantages of such an enumeration. "There is no battalion," said he, "in the kingdom, however insignificant it may be, that is not subject at least to a dozen reviews and inspections during each year. If such pains be taken with one battalion, of how much greater importance it is to enumerate and review the condition of that great body of the people from which the king draws all his glory and all his riches!" This book appeared in January, 1707. It gave great offence to Louis XIV., because it assumed that the glory of the realm consisted of the people and their wealth, and it further assumed that kings and ministers needed to study the people and their wants, in order to the proper performance of their duties. By a royal decree of February 14, 1707, the book was ordered to be seized and burned in the pillory, and all the booksellers were forbidden, under heavy penalties, to keep or sell it. Vauban survived the shock of this disgrace but six weeks. He died of a broken heart. The treatment he received is a striking illustration of that arrogant ignorance which refuses to draw instruction from the only true source of knowledge and statesmanship.

Several attempts were made at different times to ascertain such facts relating to the people as would aid the French monarchs in making their military levies; but nothing of value was accomplished except by individual effort. In the latter part of the reign of Louis XV., M. D. Gourney, minister of commerce, organized a bureau of information, which gave some attention to the subject of population. M. Moheau, who was attached to this bureau, collected some important statistics, which were published by order of the government in 1774. In 1784 appeared the work of M. Necker, minister of finance of Louis XVI., entitled "Traité de l'Administration des Finances," in which the number and condition of the population were discussed. But nothing was done to establish a census until after the Revolution of 1792. Before the close of the eighteenth century a law was passed requiring prefects of the departments to prepare from the civil registers exact annual abstracts of the number of marriages, births, and deaths. This law, with some modifications, is still in force. In 1801 the legislature decreed that national censuses should be taken once in five years. A census was taken in 1801, and another in 1806. No other was taken under the first Napoleon. The next general enumeration was taken six years after the final restoration of the Bourbons. Since that year quinquennial censuses have been the rule.

Belgium has carried the work of census-taking to a high degree of thoroughness and completeness since the revolution which made her an independent sovereignty. This revolution was immediately followed by active efforts in the direction of statistics. One of the first acts of the provisional government in 1831 was the creation of a special statistical service. In 1841 a central commission of statistics was established by royal decree, with which M. Quetelet and other distinguished statisticians have been connected from its organization. In 1843 provincial statistical commissions were instituted throughout the kingdom. In 1856 a law was enacted newly regulating the mode of taking the census and keeping the civil register. It provided that a general census should be taken every ten years throughout the kingdom, and that the population-returns should form the basis of representation. The census was to be taken in such a manner as to give the actual as well as the legal population. The prescribed inquiries included surnames and Christian names, sex, age by year and month, birthplace, civil status, occupation or condition, habitual domicil, and town and country population. Three schedules, printed in the French, German, and Flemish languages, were distributed and collected throughout the kingdom by special census-agents. Both the distribution and collection were to be made in one day. Temporary census bureaus were established, one for each province, which were to receive the returns of the agents after they had been revised by the communal juries—bodies appointed for each community, and consisting of officials and private citizens. The statistics of schools and public institutions were taken by means of special schedules. The military authorities were charged with the army census. The refusal to give information to the census-agents was punishable by fine and imprisonment. The law of 1856 also contained provisions regarding the keeping of civil registers, which ensured greater accuracy in the recording of the movement of the population.

Two general censuses have been taken under the law of 1856—one in that year and another in 1866. In the latter, comprehensive inquiries into the agricultural, mining, and manufacturing industries of the kingdom were made. In 1858 a special census of deaf-mutes and the blind was taken. The central statistical commission receives the returns of the successive censuses, yearly abstracts from the civil registers, and the results of special inquiries, and prepares the whole for publication.

Prussia.—As in many European countries, Prussia obtains her population-reports through a central bureau of statistics, which was established in 1805, and continues to the present day, though with some modifications. The labors of the bureau are directed to—1, general statistics; 2, births, marriages, and deaths; 3, schools and churches; 4, medical statistics; and 5, statistics of mechanical trades and manufactures. From 1805 to 1820 these inquiries were made annually, but since the latter date, information relative to the first, third, and fourth subjects was collected but once in three years. When the customs union of 1834 was established, triennial censuses of the population were authorized, and have been taken regularly since that date.

At first, the inquiries concerning population were the actual population, according to sex, age, birthplace, religion, immigration, and emigration. In 1840 the enumeration was made nominative, which resulted immediately in a large increase in the population-returns. In 1846 the number of families was determined, and in 1849 the distribution of the population by habitations. In 1858 the persons of the two sexes between seventeen and forty-five years of age were returned in five classes. In 1861 the unmarried and widowed were specially classified. With the census of the same year an inquiry was added in reference to the language spoken and the social condition and occupations of the population. The Prussian census is taken by civil officers, in the month of December, on one day, by means of printed schedules. Great expedition is shown in the publication of the returns. In addition to the statistics of population, many statistics are obtained showing the nature, extent, and distribution of real property, wages and salaries, insurance, aid and co-operative societies, and the numerical strength of the Catholic and Protestant churches.

Austria.—During the last half of the eighteenth and the first half of the nineteenth century no censuses were taken in Austria, except such as were connected with military conscription and inquiries to ascertain what portion of the population were liable to do military duty. Separate systems of enumeration prevailed in the different provinces, and the materials for a general knowledge of the whole population of the empire were very meagre. A uniform enumeration was made throughout the empire for the first time in 1851, but its results were so imperfect that in 1855 a commission of high administrative officers was appointed for the preparation of a new census law, which received the imperial sanction in 1857. By its provisions the military needs of the state were no longer the main motive for a census; but statistics of population, wealth, and industry were to be obtained as a basis for the safe conduct of public affairs. It provided that a census, based on the actual population, should be taken once in six years, exclusively by the civil authorities. Printed schedules were distributed by municipal and administrative officers, to be filled up by the heads of families, owners of tenement-houses, and those in charge of convents, schools, and public institutions. Detailed printed instructions accompanied the schedules. Those that intentionally failed to furnish the desired information were punished by fine and imprisonment. The schedules called for information under the following heads: Composition of families, including servants; age; sex; names and titles; civil status; social condition; religion; occupation; marriages, births, and deaths; the number of cities, towns, hamlets, villages, dwellings, and renters. The number of Austrian subjects living in foreign parts was obtained through the imperial legations. The census of the naval and military population was separately taken by the proper authorities. In 1828 a central bureau of statistics was created, and charged with the duty of consolidating the census-returns and preparing them for publication.

Russia.—Partial censuses were taken by order of the Russian government in 1700, 1704, 1705, and 1710. In 1718, Peter the Great required all landed proprietors to make a declaration of the number of serfs belonging to each. The same year he organized a special commission to visit the separate provinces of his empire for the purpose of making a general census. No enumeration of females was made in these early censuses, which were taken solely for the purposes of revenue and military conscription. A decree of 1722 directed that a census should be taken once in twenty years; but this interval of time was not regularly observed

during the remainder of the eighteenth century. In 1802 a central bureau of statistics was organized under the direction of the minister of the interior, who superintended the returns of population, agriculture, commerce, and industry. This bureau was reorganized in 1852 under the name of the statistical commission. The commission has taken censuses in 1812, 1815, 1834, 1850, 1860, and 1870. The census is taken by means of printed schedules distributed by the local authorities, who are made responsible for the proper returns. The work of consolidating and publishing the returns devolves upon the statistical commission.

Norway.—A decennial census was instituted in Norway in 1815, and has continued up to the present time, comprising inquiries as to age, sex, civil status, number of families and habitations, useful domestic animals, and the territorial area of each district. A bureau of statistics superintends all forms of public statistics except those pertaining to the administration of justice, public education, and financial administration. Inquiries are made once in five years in regard to the condition of industry. Annual exhibits are made of births, marriages, and deaths, of commerce and navigation, of the administration of justice, and of the population suffering from physical and mental disabilities.

Spain paid but little attention to public statistics after her census of 1798 until 1856, when a central statistical commission was organized, under whose supervision a general census was taken in 1857, and since then once in three years. The census is taken in one night by government officials charged with the collection, verification, and consolidation of the returns. A final revision is made by the statistical commission.

Switzerland.—The original constitution of the Swiss federation required a census to be taken once in twenty years. Most of the inquiries were conducted by the several cantonal governments. The returns were not uniform, and were generally inaccurate. In 1860 a law of the Federal assembly prescribed a decennial census for the whole federation, and instituted a federal bureau of statistics under the direction of the interior department. The first census under the new law was in 1860. The inquiries included sex, age, civil condition, origin, birthplace, domicil, religion, language, physical disabilities, immigration, the distribution of real property, the number of families, and the number of habitations and other buildings. The statistical bureau is endeavoring to extend the range of the census, but finds its efforts somewhat impeded by the difficulty of dealing with twenty-five cantonal governments. The cantonal statistics collected by the local governments are consolidated and published by the central bureau. The latter is endeavoring to give a more national character to the statistical service. Until a few years ago, the different cantons followed different methods in the collection of vital and mortuary statistics, but at the instance of the bureau they have now adopted a uniform plan. In 1866 the central bureau initiated the census of live-stock, and later collected very full statistics of railways, savings banks, and fire-insurance companies.

Italy.—Soon after the establishment of the modern kingdom of Italy, in 1859 and 1860, a bureau of statistics was created with ample powers, under the direction of Doctor Maestri, an eminent statistician. The first general census, which was to afford the basis of representation in the national parliament, was taken December 31, 1861, under a law prescribing general enumerations once in ten years. The census is taken in one day by means of previously distributed schedules. Since 1861 the central bureau has been charged with additional inquiries relative to mutual-aid societies, savings banks, public charities, industrial corporations, libraries, and institutions of education.

The census in modern *Greece* dates from her last struggle for independence. The first general enumeration of the people was made in 1836. From that date censuses were taken annually until 1845; since when they have been taken at irregular intervals—viz., 1848, 1853, 1856, 1861, and 1868.

Statistical Congress.—The work of taking modern censuses has been greatly facilitated, and the value of the results greatly increased, by the efforts of the "International Statistical Congress," an organization which resulted from the great exposition held in London in 1851. The congress is composed principally of men from all civilized nations, who in their own countries are members, leaders, and chiefs of bureaus of statistics, or who have charge of the census. Sessions of the congress were held in Brussels in 1853, Paris in 1855, Vienna in 1857, London in 1860, Berlin in 1863, Florence in 1867, at The Hague in 1869, and the eighth and last at St. Petersburg, August, 1872.

The census has been a leading topic of discussion by the congress. Statements have been made of the condition of the census movement in the various countries, and the congress earnestly recommended uniformity in the census inquiries, in order that comparisons could be made of the vital statistics of the different countries. Many valuable modifications have been made in the censuses of nearly all the nations, in consequence of the suggestions of the congress. As a result of these efforts, Messrs. Quetelet and Heuschling published at Brussels in 1865 a volume of international statistics, in which the population reports of the United States and all the leading states of Europe are collected and arranged in comparative tables.

The Census of the United States.—Considering the character of the present work, the census of the United States should receive much more attention than that of any other country. The matter will be distributed under three heads:

I. *The Colonial Period.*—The American census originated in the colonial period of our history. The British board of trade played an important part in colonial affairs. At times it was almost the supreme directing power, and under its instructions several enumerations of the population of the colonies were attempted. The tables were prepared under the immediate direction of the colonial governors by the sheriffs and justices of the peace, and were exceedingly inaccurate. Mr. Bancroft, speaking of enumerations in the latter part of the seventeenth century, says: "The positive data in those days are half the time notoriously false." (*History*, vol. ii., p. 450, *note.*) Speaking of the same materials in the middle of the eighteenth century, he says: "Nearly all are imperfect." (Vol. iv., p. 128, *note.*) The so-called enumerations should rather be called computations. No general examination, embracing all the colonies, was ever attempted. The tables prepared for the board of trade were in great part based on muster-rolls and returns of taxables. "Enumeration is a slow and laborious process," says Sir G. C. Lewis, "and until experience has taught us its necessity, where correctness is required there is a disposition, especially among uncultivated people, to rely upon computation." Besides, the aggregates found in the tables were no doubt generally too large. "To count," says Doctor Johnson, "is a modern practice; the ancient method was to guess; and when numbers are guessed they are always magnified." That no accurate enumerations of population were made in the colonial period should excite no surprise. The census had not yet assumed scientific form and definiteness. England took her first census in 1801, and even then the work was so imperfectly done that the results were of no great value. On general grounds it would be absurd to suppose that the board of trade took accurate enumerations of the British colonists in America a half century or century before England counted her own people. Besides, the directing authority was three thousand miles distant from the people to be enumerated, and the sparseness of the population, scattered over immense areas, as well as the free and independent modes of life prevailing in many localities, made thoroughness and accuracy impossible. Superstition also opposed census-taking. In 1712, Governor Hunter undertook an enumeration of the inhabitants of New York. In writing to the home government he excused the imperfection of the returns in part by saying that "the people were deterred by a simple superstition and observation that the sickness followed upon the last numbering of the people." (*Colonial History of New York*, vol. v., p. 339.) Governor Burnett of New Jersey, in a communication to the English board in 1726, alluding to an enumeration made in New York three years before, said: "I would have then ordered the like accounts to be taken in New Jersey, but I was advised that it might make the people uneasy, they being generally of a New England extraction, and thereby enthusiasts; and that they would take it for a repetition of the same sin that David committed in numbering the people, and might bring on the same judgments. This notion put me off at that time, but, since your lordships require it, I will give the orders to the sheriffs that it may be done as soon as may be." (*Ib.*, vol. v., p. 777.)

The tables prepared under the direction of the board of trade are so inaccurate that the more careful of recent writers have generally preferred to construct new tables rather than rely on them. Mr. Bancroft constructs a valuable table, showing the population at different dates from 1750 to 1790. (*History of the United States*, vol. iv., pp. 127, 128, *note.*) He uses as data the returns, computations, and official papers of current history, and also private letters and journals. Mr. Bancroft says: "He who will construct retrospectively general tables from the rate of increase in America since 1790 will err very little." In 1688, the period of the English Revolution, the population of the colonies was about 200,000. The aggregates found in three tables prepared for the board of trade are here presented (see Bancroft, vol. iv., p. 128, *note*):

Year.	Whites.	Blacks.	Total.
1714	375,750	58,850	434,600
1727	502,000	78,000	580,000
1754	1,192,896	292,738	1,485,634

Mr. J. D. B. DeBow, following "Holmes's Annals" as his chief authority, gives three other tables:

Year.	Total.
1701.....	262,000
1749.....	1,046,000
1775.....	2,803,000

II. *The Continental Period.*—In the Continental Congress the question early arose, How shall the burdens of the war be distributed? During the whole struggle for independence Congress found no more perplexing question. On the 26th of December, 1775, that body authorized and directed the emission of $3,000,000 in bills of credit. It also resolved that the thirteen United Colonies be pledged for the redemption of these bills; that each colony provide ways and means to sink its proportion in such manner as it sees fit; that the proportion of each colony be determined according to the number of its inhabitants of all ages, including negroes and mulattoes; and that it be recommended to the colonial authorities to ascertain in the most effectual manner their respective populations, and to send the returns to Congress properly authenticated. Most of the colonies failed to comply with this recommendation. Immediately after the adoption of the Declaration of Independence, Congress began to discuss the form of a confederation to be entered into by the States. After long discussion the Articles of Confederation were perfected and submitted to the States in 1777, but failing of an earlier ratification, they did not go into operation until 1781. The ninth article declared: "The United States in Congress assembled shall have authority . . . to agree upon the number of land forces, and to make requisition from each State for its quota, in proportion to the number of white inhabitants in such State." In November, 1781, a resolution was introduced into the Congress recommending to the several States that they cause to be taken and transmitted to Congress the number of their white inhabitants, pursuant to the ninth article of the Confederation. The resolution failed to pass, and the article was inoperative. The financial machinery provided by the eighth article of the Confederation wholly broke down; rather, it was never set in motion. In 1783, Congress sought to induce the States to provide new machinery. An amendment to the eighth article was proposed, which declared that "All charges of war and other expenses that have been or shall be incurred for the common defence or general welfare, and allowed by the United States in Congress assembled, except so far as shall be otherwise provided for, shall be defrayed out of a common treasury, which shall be supplied by the several States in proportion to the whole number of white and other free citizens and inhabitants, of every age, sex, and condition, including those bound to servitude for a term of years, and three-fifths of all other persons not comprehended in the foregoing description, except Indians not paying taxes in each State; which number shall be triennially taken and transmitted to the United States in Congress assembled, in such mode as they shall direct and appoint." This amendment did not prevail, and the Articles of Confederation remained unchanged until they were superseded by the present national Constitution. The proposed amendment, however, contains the original suggestion of the "three-fifths rule." During the continental period no general enumeration of population was secured. Various estimates and computations were produced in Congress from time to time, but they came no nearer accuracy than those made in the colonial period. Thus far, no complete enumeration had been effected. But it had become clear that there never could be such enumeration until the work was done by a central directing authority. It was left to the Constitution to give us first an enumeration of population, and afterwards a national census.

III. *The Constitutional Period.*—The framers of the Constitution had few, if any, more difficult questions to deal with than the apportionment of representatives and direct taxes. After long deliberation the matured opinion of the convention assumed the well-known form: "Representatives and direct taxes shall be apportioned among the several States which may be included within this Union according to their respective numbers, which shall be determined by adding to the whole number of free persons, including those bound to service for a term of years, and excluding Indians not taxed, three-fifths of all other persons. The actual enumeration shall be made within three years after the first meeting of the Congress of the United States, and within every subsequent term of ten years, in such manner as they shall by law direct." In a subsequent clause this enumeration is called a census, but it did not contemplate a census in the present received sense of that word. Enumerations of the people have almost always originated in military or fiscal necessities, and have been used for immediate practical ends. The varied and important uses for which statistics are now employed are altogether modern. But while the framers of the national Constitution never contemplated a census that should answer the thousand questions of social and political science, they nevertheless provided an instrument by which many of those questions are now answered. At its second session, the first Congress passed a law to carry the constitutional provision into effect. It was approved March 1, 1790. As this law was the model of subsequent legislation upon the same subject for fifty years, its leading provisions are here stated. The marshals of the several judicial districts were authorized and required to cause the inhabitants within their districts, excluding Indians not taxed, to be enumerated; the marshals were empowered to appoint as many assistants as the service required; the enumeration was to commence August 1, 1790, and was to be completed within nine months thereafter; the marshals were to file the returns with the clerks of their respective district courts, who were directed to receive and carefully preserve the same; the aggregates were to be transmitted to the President of the United States by September 1, 1791; each assistant marshal was required to cause a correct schedule of the inhabitants enumerated within his division, duly signed, to be set up for inspection at two of the most public places within said division; and every person above sixteen years of age was required to give the census-taker all necessary information in his possession. The law further prescribed the necessary oaths, penalties, forms, and compensation. Although all inquiries strictly pertained to population, the schedule incorporated in the law covered two or three items of information not strictly required by the Constitution. The inquiries were six in number: 1, Names of the heads of families; 2, free white males of sixteen years and upwards, including heads of families; 3, free white males under sixteen years; 4, free white females, including heads of families; 5, all other free persons; 6, slaves. Under this law the first real enumeration of population within the United States was made.

Just before the census law of 1800 was enacted, two learned societies memorialized Congress on the subject. The American Philosophical Society, Thomas Jefferson its president, represented that the decennial census offered an occasion of great value for ascertaining sundry facts highly important to society, and not otherwise to be obtained. It therefore prayed that the next census might be so taken as to present a more detailed view of the inhabitants of the United States under several different aspects; such as the effect of soil and climate on human life; the increase of population by birth and emigration; and the conditions and vocations of the people. To gain the first of these ends, the society suggested that the population should be much more minutely analyzed with respect to age. To gain the second, it was proposed that a table should be used presenting in separate columns the respective numbers of native citizens, citizens of foreign birth, and aliens. To reach the third end, it was proposed that the number of free male inhabitants of all ages engaged in different professions and pursuits should be ascertained, such as merchants, agriculturists, handicraftsmen, mariners, etc. The other memorial came from the Connecticut Academy of Arts and Sciences, Timothy Dwight president. It had in contemplation to collect the materials for a complete view of the natural history of man and society in this country. Its suggestions were similar to those contained in the former memorial, but were less detailed. Both memorials were presented to the Senate January 10, 1800, and were referred to the committee already charged with drafting a census bill. They do not seem to have attracted any attention. In the year 1800 the national legislature was poorly prepared to appreciate the value of such a census as these memorialists prayed for; but it is interesting to note the fact that there were then thoughtful men in the country, who appreciated the importance of statistical investigation, and who saw the national Constitution had provided all necessary machinery to gather its materials. The law of 1800 contained some new features of minor importance. The schedule was considerably extended. It registered the name of the county, parish, town, etc. where the family resided; the name of the head of each family; free white males under ten years of age; free white males of ten and under sixteen; free white males of sixteen and under twenty-six; free white males of twenty-six and under forty-five; free white males of forty-five and upwards. The last five inquiries were duplicated in reference to females. All other persons,

except Indians not taxed, and slaves, were also enumerated, but without distinction of age.

The general direction of the census was placed in the state department, where it remained until the passage of the present census law.

In 1810 the population schedule of 1800 was used without change or modification. The scope of the census was enlarged so as to embrace other statistics than those relating to population. An act approved May 1, 1810, amendatory of the census act approved March 1, 1810—thereby showing that the enlargement was an afterthought—required the marshals and their assistants at the time for taking the enumeration to take, under the direction of the secretary of the treasury, and according to such instructions as he should give, an account of the several manufacturing establishments within their several districts and divisions. The construction of the schedule was left to the discretion of the secretary of the treasury. The one used was a mere aggregation of items, and evinced no skill in selecting and classifying the inquiries. For this reason, as well as the further one that the manufacturers were but poorly prepared to co-operate with the census-takers, the results obtained were of no great value.

The census of 1820 presents no new features of marked importance. The population schedule discriminated between foreigners naturalized and not naturalized, while slaves and free colored persons were classified with respect to age. A new manufacturers' schedule was introduced, which was an improvement upon that of 1810. It comprehended fewer details, but was much more discriminating in inquiries and more scientific in arrangement. This part of the work, however, was so imperfectly done by the census-takers, that the results obtained possessed but little value.

In the census of 1830 no attempt was made to obtain industrial statistics of any sort. The schedule made a more minute classification of population than had been before attempted. The number of the deaf and dumb and the blind in the three great classes of white, free colored, and slave population was ascertained as far as practicable in conducting a new experiment.

In 1840 still other statistics of population were collected, the number of insane and idiotic people was recorded, the number of persons engaged in the great industries, such as agriculture, mining, manufactures, and commerce, was ascertained; likewise the number of Revolutionary pensioners. Several columns were added to the schedule for educational statistics of universities or colleges, academies, and grammar, primary, and common schools; the number of scholars in these schools; together with the number of white persons over twenty years of age who could not read and write. The attempt to obtain statistics of industry was renewed, and an extended though badly-arranged list of questions was incorporated in the population schedule. As there was no penalty for refusing to answer these questions, in some localities the people refused to answer them, on the ground that they were illegal and inquisitorial. A leading journal asked: "Is this Federal prying into the domestic economy of the people a precursor to direct taxes? Is nothing to escape its inquisitors or tax-gatherers? Is it worthy of the dignity and high functions of the Federal government to pursue such petty investigations?" (See "Compendium of the United States Census," 1850, p. 12.) The industrial statistics obtained, however, were the most valuable yet procured.

There have been two important events in the history of the American census: first, the incorporation in the national Constitution of the clause requiring a decennial enumeration of the people; secondly, the passage of the law under which the last three censuses have been taken.

As the time for taking the seventh census drew near, the subject began to attract an unusual degree of attention. A census board, consisting of the secretary of state, the attorney-general, and the postmaster-general, was created by an act approved March 3, 1849. This board was empowered to appoint a secretary, and was charged with the duty of preparing forms, schedules, etc. for taking the next census, but was instructed not to incorporate into the schedules more than one hundred questions of all kinds. At the next session of Congress the Senate raised a special committee on the census, and imposed upon it a similar task. Several eminent statisticians were called to Washington for consultation. As the result of this preparatory work a bill was finally matured and passed which greatly extended the sphere of the census. This act, approved May 23, 1850, is entitled "A general act providing for the census of 1850, and for every subsequent census." It created a census office in the newly-created department of the interior, and placed the taking of the seventh and each succeeding census under the charge of an officer known as the superintendent of the census. The six schedules incorporated in the law bore the following names by number: 1, "Free inhabitants;" 2, "Slave inhabitants;" 3, "Persons who died during the year ending June 1;" 4, "Productions of agriculture;" 5, "Products of industry;" 6, "Social statistics." Two important new features were incorporated in the first schedule: the name, age, sex, and color of each person, together with the place of his birth, whether State, Territory, or country, were required.

The third or mortality schedule contained a class of inquiries wholly new in the American census, and which led to valuable results. The fourth, fifth, and sixth schedules related to subjects that had received some attention in previous censuses, but they were now for the first time investigated with much thoroughness. The census of 1850 was a great improvement on all its predecessors, and went far to place our census in the front rank of national enumerations.

The census of 1860 was taken, under the superintendence of Mr. J. C. G. Kennedy, on the same plan as that of 1850, with but few modifications. Its statistics, however, were more complete than those of 1850.

Before the census of 1870 was taken, an attempt was made to procure a new law which should provide new machinery and remodel the old schedules. An elaborate bill passed the House of Representatives, but failed to receive the sanction of the Senate. The census of 1870 was taken under the law of 1850, with such modifications as were required by the amendments to the Federal Constitution. Some important additions to the inquiries were also made by the census office, under the superintendence of Mr. Francis A. Walker. In consequence of the abolition of slavery the old schedule relating to statistics of slaves was dropped. To meet the requirements of the fourteenth amendment to the Constitution, two columns were added to the population schedule—the first to obtain the number of male citizens of the United States in each State of twenty-one years and upwards; the second to obtain the number of such citizens whose right to vote is denied or abridged on other grounds than rebellion or crime. Many changes were made by the census office in the forms of the inquiries, by which they were rendered more definite and more easily understood. Besides the inquiries concerning "place of birth," two columns were added requiring a statement of the parentage of each person. This has enabled us to know the number of our people born of foreign parents. An inquiry was also added concerning the public debt of towns, cities, counties, and States, the results of which are very interesting. A striking feature has been added in the publication of results by the construction of fourteen finely-engraved, graphic maps, illustrating the various classes of statistics. They represent the density of the total population; the distribution of the colored and foreign elements of population; the dispersion over the States of natives of the leading European countries; the illiteracy and the wealth of each section in contrast; the geographical and political divisions of the United States at each period from the organization of the government to 1870; the range in degree of four leading groups of diseases; and the range in degree of five principal agricultural products.

The ninth census was completed in a much shorter space of time than any of its predecessors. The actual enumeration of inhabitants began June 1, 1870, and was completed on the 9th of January, 1871. On the 1st of November, 1872, the superintendent announced the completion of his report. It is not too much to say that the reports of the ninth census form one of the noblest contributions which any country has ever made to statistical science.

It clearly appears from this historical review that the census of the United States is the result of a uniform and steady development. Its germ is found in the national Constitution, and its epochs of growth are the periods of the recurring decennial enumerations. Instead of one schedule, comprehending six inquiries, as in 1790, we now have six schedules, comprehending about one hundred inquiries. Two other series of facts exhibit this growth in a manner equally striking—viz., the official publication of the results of successive censuses, and the total cost of each census. These facts are shown in the following exhibit:

1790. "Return of the whole number of persons within the several districts of the United States, etc."—an octavo pamphlet of 52 pages, published in 1792. Cost of this census, $44,377.18.

1800. "Return of the whole number of persons within the several districts of the United States, etc."—a folio of 78 pages, published in 1801. Cost of second census, $66,609.04.

1810. The report of this census was in two folio volumes: I. "Aggregate amount of each description of persons within the United States, etc."—an oblong folio of 90 pages, the date of publication not named. II. "A series of tables showing the several branches of American manufactures, exhibiting them in every county of the Union, so far as

they are returned in the reports of the marshals and the secretaries of the Territories, and of their respective assistants, in the autumn of 1810; together with returns of certain doubtful goods, productions of the soil, and agricultural stock, so far as they have been received"—170 pp., 4to. Cost of third census, $178,444.67.

1820. I. "Census for 1820, etc."—a folio of 164 pp., published in 1821. II. "Digest of accounts of manufacturing establishments, etc."—a folio of 100 pp., 1823. Cost of fourth census, $208,525.99.

1830. "Fifth census of enumeration of the inhabitants of the United States"—a folio of 163 pp., 1832. (This report was so wretchedly printed that Congress required by law a republication, which was made the same year under the immediate direction of the secretary of state.) Cost of the fifth census, $378,543.13.

1840. I. "Compendium of the enumeration of the inhabitants and statistics of the United States"—a folio of 378 pp., 1841. II. "Sixth census or enumeration of the inhabitants of the United States"—folio, 470 pp., 1841. III. "Statistics of the United States, etc."—folio, 410 pp., 1841. IV. "Census of pensioners of Revolutionary and military service, with their names, ages, and places of residence, etc."—4to, 196 pp. Cost of sixth census, $833,370.95.

1850. I. "The seventh census of the United States"—quarto of 1022 pp., 1853. II. "Statistical view of the United States"—octavo, 400 pp., 1854. III. "Mortality statistics of the seventh census, etc."—octavo, 304 pp., 1855. IV. "Digest of the statistics of manufactures"—octavo, 143 pp., 1859. Cost of seventh census, $1,329,027.53.

1860. I. "Preliminary report of the eighth census, 1860"—octavo, 294 pp., 1862. II. "Final report:" vol. I. "Population," pp. 694, 1864; II. "Agriculture," pp. 292, 1864; III. "Manufactures," pp. 746, 1865; IV. "Mortality and miscellaneous statistics," pp. 584, 1866. Cost of eighth census, $1,922,272.42.

1870. "Ninth census of the United States." Vol. I. "The statistics of the population of the United States, embracing the tables of race, nationality, sex, selected ages, and occupations, to which are added the statistics of school attendance and illiteracy, of schools, libraries, newspapers, and periodicals, churches, pauperism and crime, and of areas, families, and dwellings"—quarto, pp. 804, 1872; II. "The vital statistics of the United States, embracing the tables of deaths, births, sex, and age, to which are added the statistics of the blind, the deaf and dumb, the insane, and the idiotic," 1872; III. "The statistics of the wealth and industry of the United States, embracing the tables of wealth, taxation, and public indebtedness, agriculture, manufactures, mining, and the fisheries, with which are reproduced, from the volume on population, the major tables of occupations," 1872; also, "A compendium of the ninth census, compiled pursuant to a concurrent resolution of Congress." Cost of the ninth census, $3,336,511.41.

STATE CENSUSES.—In most of the States of the Union a census is required at some time within the interval between the national censuses, for the purpose of ascertaining the basis of representation in their legislatures. In some of the States (for example, Massachusetts, Rhode Island, and New York) the enumerations are made with great care, and many valuable statistics are obtained in connection with them. But in most of the States nothing but a simple enumeration is attempted, and this is made with but little accuracy. In all the States, except Connecticut, Georgia, and West Virginia, a census is authorized or required by their constitutions. The constitution of Indiana, adopted in 1851, required a census in 1853, and every six years thereafter. The constitution of Pennsylvania requires a census to be taken once in seven years, in such manner as the legislature may direct. In Kentucky a census was required to be taken in 1857, and every eight years thereafter. In the following States censuses are required once in ten years, beginning as follows: Tennessee, 1841; Michigan, 1854; Illinois, New York, Wisconsin, and California, 1855; Massachusetts, Kansas, Minnesota, and Oregon, 1865; Alabama, Arkansas, Florida, Iowa, Louisiana, Nebraska, Nevada, North Carolina, South Carolina, and Texas, 1875; and Missouri, 1876. The constitutions of Maryland, New Jersey, and Rhode Island permit the taking of a census once in ten years. The constitution of Mississippi requires a census to be taken once in ten years, after a day to be fixed by the legislature. The constitution of Maine permits a census once in five years, and requires it once in ten years. Delaware and New Hampshire have no provisions in their constitutions requiring a census. The constitution of Ohio permits a State census; for many years the legislature has provided for a State statistician, who makes annual reports on vital and other statistics.

The classes enumerated in the several State censuses are as follows: In Kentucky and Tennessee, qualified voters; in Pennsylvania, taxable inhabitants; in Michigan, white inhabitants and civilized persons of Indian descent not belonging to Indian tribes; in Indiana, white male inhabitants over twenty-one years of age; in Illinois, Oregon, and Texas, white inhabitants; in Maine, the whole population except foreigners not naturalized, and Indians not taxed; in Nebraska and Wisconsin, the whole population except Indians not taxed and soldiers and sailors in the army and navy of the United States; in New York, the whole population except aliens and colored persons not taxed. In all the other States where a census is required the whole population is taken.

Besides the works already referred to, the following may be consulted on the general subject: SINCLAIR (Sir JOHN), "Analysis of the Statistical Account of Scotland," 8vo, Edinburgh, 1825; MACAULAY'S "History of England," vol. i., chap. iii.; MCCLINTOCK and STRONG, "Encyclopedia of Biblical, Ecclesiastical, and Theological Literature;" SMITH, "Dictionary of the Bible," 3 vols. 8vo, London, 1860–63; SMITH, "Dictionary of Greek and Roman Antiquities," 8vo, London, 1842; BABBAGE, "Ninth Bridgewater Treatise," 8vo, London, 1837; "Journal of the Statistical Society of London," vols. i. to xxxiv., 8vo, London, 1839; HUME, "Essay on the Populousness of Ancient Nations," Philosophical Works, vol. iii., Boston edition, 1854; CAPTAIN JOHN GRAUNT (Sir William Pettit), "Natural and Political Observations upon the Bills of Mortality," 5th edition, 16mo, London, 1676; "Annuaire de l'Économie Politique et de la Statistique," 1e–28e année, Paris, 1844–72; "Journal des Économistes," 1e–28e année, Paris, 1841–69; "Report of the Proceedings of the International Statistical Congress, Fourth Session, at London, 1860," quarto, London, 1861; "British Almanac for the year 1872," 12mo, London, 1873; AD. QUETELET, "Statistique Internationale" (Population), 4°, Bruxelles, 1865; AD. QUETELET, "Physique Sociale, ou Essai sur le Développement des Facultés de L'Homme," Bruxelles, 1869, 2 vols., 8vo.

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Cent [Lat. *centum*, a "hundred"], a coin of the U. S. worth the one-hundredth part of a dollar, or nearly one halfpenny sterling. It is now coined of an alloy of copper, tin, and zinc, and is legal tender for the payment of sums not exceeding twenty-five cents. The Dutch cent is the one-hundredth of a guilder, and is worth about one-third of the American cent.

Centaure'a [Lat.], a genus of herbs of the order Compositæ, several species of which are naturalized from Europe in the U. S. It includes the blue bottle (*Centaurea Cyanis*), common in corn-fields, of which the flowers yield a fine blue dye; the sweet sultan (*Centaurea moschata*), a fragrant garden-flower; the knapweed (*Centaurea Jacea*), sometimes cultivated for the fine yellow color it affords the dyer.

Cen'taurs [Gr. Κένταυροι; Lat. *Centauri*], fabulous animals which the ancient Greek poets imagined to be half men and half horses, the head and anterior part being human. They were supposed to be the offspring of Ixion and a cloud, and to have lived in Thessaly. The battle of the Centaurs with the Lapithæ was celebrated in Greek mythology, and was a favorite subject of the ancient Greek artists.

Centau'rus (the "Centaur"), a constellation of the southern hemisphere, contains two stars of the first magnitude, designated respectively as α Centauri and β Centauri.

Cen'taury, a popular name of several Old World herbs of the genus *Erythræa* and order Gentianaceæ; and also of the *Sabbatia angularis*, their American representative, all valuable bitter tonics, used in dyspepsia and intermittent fevers. The *Erythræa Chilensis* of Chili has similar uses. The *Erythræa acaulis* of Barbary is extensively used for dyeing yellow.

Centen'nial [Lat. *centennis*, from *centum*, "a hundred," and *annus*, "a year"], occurring once in a hundred years, or completing the period of a hundred years. The term is used chiefly to denote the anniversary of an event which is celebrated one hundred years after it occurred, and at the end of each subsequent period of one hundred years.

Centennial Exhibition. The Congress of the U. S., by two acts, approved Mar. 3, 1871, and June 1, 1872, provided for the celebration in the year 1876 of the one-hundredth anniversary of the Declaration of American Independence by an "international and universal exhibition," designed to be of the most cosmopolitan character. It is intended that the exhibition shall be held in Fairmount Park in the city of Philadelphia. The first of the above-mentioned acts of Congress provides for the appointment (by the President) of the "U. S. Centennial Commis-

sion," consisting of two commissioners from each State and Territory. The second act incorporates the Centennial Board of Finance, and provides for the issue of stock to the amount of ten millions of dollars, in one million shares of ten dollars each. It also has been proposed to distribute the stock among the people of the different States and Territories in the ratio of their population, but subscriptions are received without regard to the amount allotted to each State. The stockholders organized a board of directors on April 1, 1873.

The stimulus given to industrial pursuits by the great exhibitions already held in London, Paris, etc. has been very remarkable; and it is believed this undertaking, even as a business investment, will be profitable to the country. It is designed to make it a "comprehensive display of the industrial, intellectual, and moral progress of the nation during the first century of its existence."

Center. See CENTRE.

Cen'tering, the framework upon which an arch or vault of stone, brick, or iron is supported during its construction. The simplest form of centering is that used by masons and bricklayers for the arches of common windows and doors. This is merely a board of the required shape, upon the curved edge of which the bricks or stones of the arch are supported until they are keyed in. In building bridges or other structures where arches of great span are to be constructed, the centering is usually made of framed timbers or timbers and iron combined.

Centerville. See CENTREVILLE.

Cen'tigrade [from the Lat. *centum*, a "hundred," and *gradus*, a "step," "degree"] **Thermometer,** the name of a thermometer having its scale between the freezing and the boiling-point of water divided into one hundred equal parts, or degrees, the freezing-point being taken as zero, and the boiling-point as 100°. This scale was invented about the year 1741 by Prof. Anders Celsius of Upsala in Sweden, and hence it is often called Celsius's thermometer. Its use was for many years mostly limited to Sweden and Russia, but it is now the scale generally used in France; and its excellencies so commend it that it will probably come into almost universal use. In Germany it is rapidly superseding the scale of Réaumur, while in England, Holland, and the U. S., where Fahrenheit's scale is more generally known, the centigrade is used in chemical and other scientific operations, and thermometers are often marked with both scales, one on each side of the mercurial column. The advantages of the centigrade scale are that its zero and its hundredth degree are natural, and not arbitrary, and, above all, that its divisions are in harmony with the decimal system of measurement. The objection to the centigrade, that its degree is too large, is obviated by dividing the degree into decimals, which are marked on the scale, thus greatly increasing its precision. One degree centigrade is equal to 1.8 Fahrenheit, or, conversely, one degree Fahrenheit nearly equals .55 of a degree centigrade; but there are some practical difficulties in reducing temperatures from one to the other, which will be noticed under the article THERMOMETER (which see, by PROF. W. GIBBS, M. D., LL.D.).

Cen'tipede [Lat. *centum*, a "hundred," and *pedes*, "feet"], a popular name for various insects of the order Myriapoda, but properly given to those of the sub-order Chilopoda, and especially to the family Scolopendridæ. They have long slender bodies, and twenty-one to twenty-three pairs of feet. Some tropical species are nearly a foot long. The bite of many species is poisonous, and even dangerous. *Scolopendra heros* is the largest U. S. species, and is found in the South.

Cen'to [from the Lat. *cento*, "patchwork"], a name applied to literary trivialities in the form of poems manufactured by putting together distinct verses or passages of one author, or of several authors, so as to make a new meaning. The cento was a favorite recreation in the Middle Ages.

Cen'tral, a township of Franklin co., Mo. Pop. 2271.

Central, a township of Jefferson co., Mo. Pop. 1789.

Central, a post-township of St. Louis co., Mo. P. 8923.

Central, a township of Humboldt co., Nev. Pop. 23.

Central, a township of Essex co., Va. Pop. 3449.

Central, a township of Rockingham co., Va. P. 2882.

Central, a township of Doddridge co., W. Va. P. 833.

Central America. See AMERICA, revised by PROF. J. S. NEWBERRY, M. D., LL.D.

Central Bridge, a post-village of Schoharie township, Schoharie co., N. Y., at the junction of the Schoharie Valley and the Albany and Susquehanna R. Rs., 36 miles W. of Albany.

Cen'tral City, the capital of Gilpin co., Col., is situated among the Rocky Mountains, 40 miles W. by N. from Denver, on the Colorado Central R. R. It derives its prosperity from its gold-mines, which produced $1,650,000 in 1870. It has many fine stone and brick buildings, several quartz-mills, a national bank, six churches, and a fine school building. Two daily and weekly papers are issued here. Pop. 2360.

Central City, a post-township of Marion co., Ill. Pop. 833.

Central Falls, a post-village of Lincoln township, Providence co., R. I. It is situated on the Blackstone River, about 6 miles N. of Providence, and has one weekly newspaper and extensive manufactures.

Central Forces, in mechanics, are those which radiate from a point or centre. A body impelled by a constantly acting force towards a fixed centre will move up to that point with a constantly increasing velocity; but if it have an initial motion in a direction towards some point other than the centre, the constantly acting central force will deflect it from its original path, but will not draw it to the centre of force. The resultant path will be a curve. The straight line from the moving body to its centre of force is called a "radius vector," and it is found, mathematically, that radii vectores of a body moving in a curve under the influence of a central force will pass over equal areas in equal times, whatever the rate of motion. We further find that the velocity of such a body is at all times inversely proportional to the perpendicular from the fixed point on the tangent to the curve at the point considered. Therefore, if the motion be uniform, the path of motion is a circle. If the path be an ellipse, and the centre of force be the centre of the curve, the central force is directly proportional to the distance; but if the centre of force be at a focus of the ellipse (or of a hyperbolic or parabolic path), the force acts with an energy inversely proportional to the square of the distance.

The laws of central forces are abundantly verified by the observed motions of the planets; and the same laws show that unless some disturbing force interfere the planets can never be drawn into the sun by gravitation.

Centra'lia, a city of Marion co., Ill., at the junction of the main line and the Chicago division of the Illinois Central R. R., 253 miles S. of Chicago. It has a national bank, two newspapers, machine-shops of the Illinois Central R. R. Company, a coal-mine, an iron-foundry, and various other manufactories. There are in Centralia several parks, a public library, six churches, a high school, and graded schools. The Southern Illinois fair-grounds are situated in the city. Pop. 3190; of township, 3579.

FLETCHER & WILLCOX, PUBS. "SENTINEL."

Centralia, a post-village of Nemaha co., Kan., on the Central branch of the Union Pacific R. R., 62 miles W. of Atchison. It is one of the most thriving towns in that region.

Centralia, a post-village of Boone co., Mo. It has one weekly newspaper.

Centralia, a post-borough of Columbia co., Pa., on the railroad which connects Mauch Chunk with Mount Carmel, 12 miles W. of Mahanoy City. Pop. 1342.

Centralia, a post-township of Wood co., Wis. P. 893.

Cen'tral In'stitute, a township of Elmore co., Ala. Pop. 907.

Central Park. The Central Park, the most important public work undertaken by New York City, next to the Croton Aqueduct, was the first place deliberately provided for the inhabitants of any city or town in the U. S. for exclusive use as a pleasure-ground, for rest and exercise in the open air. The well-known Boston Common, it is true, dates back to 1634, and by a clause in the city charter it is made public property for ever, and cannot be sold or exchanged. Its original purpose, however, was not as a place for exercise and recreation, but for a "common," such as the earlier settlers had known in the villages of the mother-country, and such as still exist there—places on which the owners of cattle, horses, sheep, and geese pasture them in common; and it is only since Boston and other New England towns, such as Salem and Lynn, have increased so greatly in size, that these tracts—all comparatively small; the Common in Boston is only 48 acres—have been appropriated to their present use.

New York, we believe, never had a common, but the city remained for so many years confined to the lower part of the long and narrow island on which it is built that there was no need felt for any ground being set apart, either for the pasturing of cattle or for the recreation of the inhabitants. The Battery supplied, for many years, a most charming promenade, many of the streets long retained a semi-rural or village character, and the immediate suburbs of the city, which, within the easy memory of men now living, began as low

down as Canal street, were as pleasant places for strolling, on foot or in the homely vehicles of the time, as could be desired. The very name of the Bowery tells us what was the look of the old country-road with its overarching trees; it is not long since an old pear tree stood to mark where once the old Stuyvesant farm sunned its broad acres, that now show ranks of houses where once waved ranks of corn; and not a few of the hugest of New York fortunes are the result of the rise in the value of land once cultivated as market-gardens by the fathers of its present aristocratic owners.

It was not till more than two hundred years had elapsed since the founding of the city that the inhabitants of New York began to feel the need of some place specially devoted to open-air enjoyment. The late A. J. Downing was the first to propose the establishment of a great public park, and the articles he wrote in 1850 on the subject in the "Horticulturist," a journal devoted to rural affairs he was at that time editing, gave eloquent expression to the public feeling, and soon bore practical fruit. In 1851, Mr. A. C. Kingsland, then mayor of New York, in a message to the common council, strongly recommended the establishment of a public park within the limits of the city, and it was at once referred to the committee on land and places. This committee reported in favor of adopting the mayor's recommendation, but the report gave rise to an unfortunate controversy that postponed for two years the undertaking of the so-much needed improvement. When it was first determined in the popular mind that New York must have a public park, two rival schemes presented themselves for consideration. One of these was the Jones's Wood scheme, the other the Central Park scheme, and the advocates of each measure mustered such good argument and such powerful influence that the legislature itself was puzzled for a time, and after having on the 21st of July, 1853, passed an act authorizing the city to take possession of the land now known as the Central Park, it actually on the same day passed another act authorizing the city to take possession of Jones's Wood! But the opinion of the public was too plainly in favor of the central site, and the next year (April 11, 1854) the act relative to Jones's Wood was repealed, and no further attempt was made to revive it. The site known as Jones's Wood had very little to recommend it, and it had two serious defects—its insufficient size and its position at one side of the city. Its recommendations were, the undulating character of its surface, the fact that it was already covered with a good growth of forest trees, and, above all, that it lay along the East River, always an animated scene with its steamboats, shipping, the islands, and the neighboring shore. Unfortunately, one of these islands, Blackwell's, extended along the whole water-front of the proposed park, which was bounded on the N. and S. by Seventy-fifth and Sixty-sixth streets, and on the W. by the Third avenue; and an island inhabited by convicts would not have been an edifying prospect. There is little to be gained by thinking of what might have been, but the Jones's Wood scheme might have had a better chance if, instead of limiting itself to the narrow area of 150 acres included between the above-named streets and the East River, it had boldly proposed to take possession of Blackwell's Island, and even to pass over to the shore of Long Island itself by means of (eventually) several bridges. Engineering difficulties we do not pretend to have thought about may have stood in the way of such a project; but, apart from any such lions in the way, the plan itself had many obvious advantages. It would have given us much more variety than we have at present, together with a water-view, always a delightful addition to a public pleasure-ground, and as much land, with as irregular an outline, as was needed. For in truth it would appear that the only recommendations the Central Park site had to offer were just its more central position and its greater size. And it is not to be denied that these were very considerable advantages, and that, on the whole, no better solution of the problem than this offered could have been found within the limits of the island. If the project for a park had been mooted either earlier or later, we might have avoided what we think will generally be admitted a serious drawback to the beauty of the park—the presence of the two huge reservoirs, which no ingenuity could make agree with any design in landscape gardening. Earlier, we might have secured our park below the small reservoir at Fortieth street; later, we might have had it upon the Harlem River. In either case it would not have been necessary to lose 150 acres out of a little more than 800, as we do in the Central Park to-day.

As we have said, the popular preference for the larger and more generally accessible site was plainly expressed, and great gratification was manifested when the legislature had settled the matter in such a way that a beginning might reasonably be looked forward to in carrying out the long-wished-for scheme. On the 17th of Nov., 1853, five commissioners were appointed by the supreme court, through Judge William Mitchell, to take the land for the Central Park. These commissioners were William Kent, Michael Ulshoeffer, Luther Bradish, Warren Brady, and Jeremiah Towle. All these gentlemen were well known in the community, and a general confidence was felt that their difficult task would be performed with fairness and judgment. Nor did this confidence prove to be ill-grounded. The commissioners employed nearly three years in the work of estimating and assessing, sending in their report on the 4th of Oct., 1856, and, as Judge Harris remarked in confirming their report, it is an evidence of the success with which they accomplished their intricate task that but about one in forty of the owners of the lots taken for the park appeared before him to object to the award of the commissioners. The supreme court confirmed the report of the commissioners, and in Feb., 1856, the common council passed an ordinance for the payment of $5,160,369.90, of which $1,657,590 were to be paid by the owners of lands adjacent to the park, in view of the benefit they would receive from their neighborhood to it.

As the legislature had done nothing during its winter session towards arranging a government for the park, the city authorities took the matter into their own hands, and on the 19th of May, 1856, the board of aldermen adopted an ordinance appointing the mayor and the street commissioner commissioners with full authority to govern the park, to determine upon a plan for its improvement, and to appoint such persons as they might see fit to carry out their intentions. At that time Mr. Fernando Wood was mayor and Mr. Joseph S. Taylor street commissioner, and they sought the best advice they could obtain from gentlemen who held public and social positions—such as, taken with their reputation for taste and judgment, necessarily gave their opinions weight. These gentlemen, Washington Irving, George Bancroft, James E. Cooley, Charles F. Briggs, James Phalon, Charles A. Dana, and Stewart Brown, were invited to attend the meetings of the commissioners, and to form a board of consultation for the purpose of discussing what course had best be pursued in order to secure a suitable design for laying out the park. The first of these meetings was held on the 29th of May, 1856. Mr. Irving was made president of the board, and the preliminaries were settled for carrying out the objects of the commission. Many plans were presented at subsequent meetings for the improvement of the park, but nothing suitable, and matters dragged until a plan was presented by Mr. Egbert L. Viele, a gentleman who had been appointed engineer of the park. This plan was strongly recommended by Mayor Wood, and was adopted, but fortunately nothing further was done towards carrying it out. No money was appropriated for the use of the commission, and the body accomplished nothing whatever of benefit to the public. It was soon found that unless either the legislature or the city authorities took more active measures for securing a plan for laying out the park, the enterprise must fall through; and accordingly, on the 17th of April, 1857, the legislature appointed a new commission, consisting of eleven members, who were to hold office for five years, and who were empowered to spend a sum of money the interest on which was not to exceed $30,000. To raise this money the common council of the city issued stock having thirty years to run. This stock was highly popular, and was immediately taken up by the public.

The new commission went vigorously to work, and after discarding Mr. Viele's crude and insufficient plan, advertised for new plans to be sent in in competition. On the 1st of April, 1858, the latest day on which plans were to be sent in, thirty-three had been received. These were placed upon public exhibition, and up to the 21st of April the board held frequent meetings in the room in which the plans were hung, in order to make easier a careful examination and full discussion of the merits of the designs. On the 21st of April the plan No. 33, bearing the motto "Greensward," was declared on the first ballot, by the votes of seven out of the eleven members, to be entitled to the first prize of $2000.

The authors of "Greensward," the successful plan, proved to be Mr. Frederick Law Olmsted and Mr. Calvert Vaux; both well known and highly esteemed by a large and cultivated circle in this community. Mr. Olmsted, young as he was, had already a national reputation. He had long been a successful practical farmer, and while still engaged in that pursuit had published a remarkable little book, the record of a vacation ramble, called "Walks and Talks of an American Farmer in England." He became more widely known by a series of letters written from the Southern States to the New York "Times" newspaper, under the signature of "Yeoman," and afterwards republished in book-form with the title "The Seaboard Slave

States." This book contained the first trustworthy account of the condition of society in the South, especially in the regions remote from the great cities, that had, up to that time, been published at the North. To write such a book as this last required energy and courage in no small measure: to these qualities were added a love of natural scenery and the power to trace the secret of the combinations to which a landscape owes its charms, a singular faculty for observation, and, as was afterwards shown in the management of the Central Park, an ability altogether exceptional for administration.

Mr. Calvert Vaux is an Englishman by birth and training, who came to this country and adopted it for his permanent home in 1852. He was the partner in business of the late A. J. Downing, and after Mr. Downing's death in 1853 he succeeded to his large and profitable clientage. At the time of the acceptance of his and Mr. Olmsted's design for the park he was successfully established as an architect, and had published a valuable and popular book on domestic architecture.

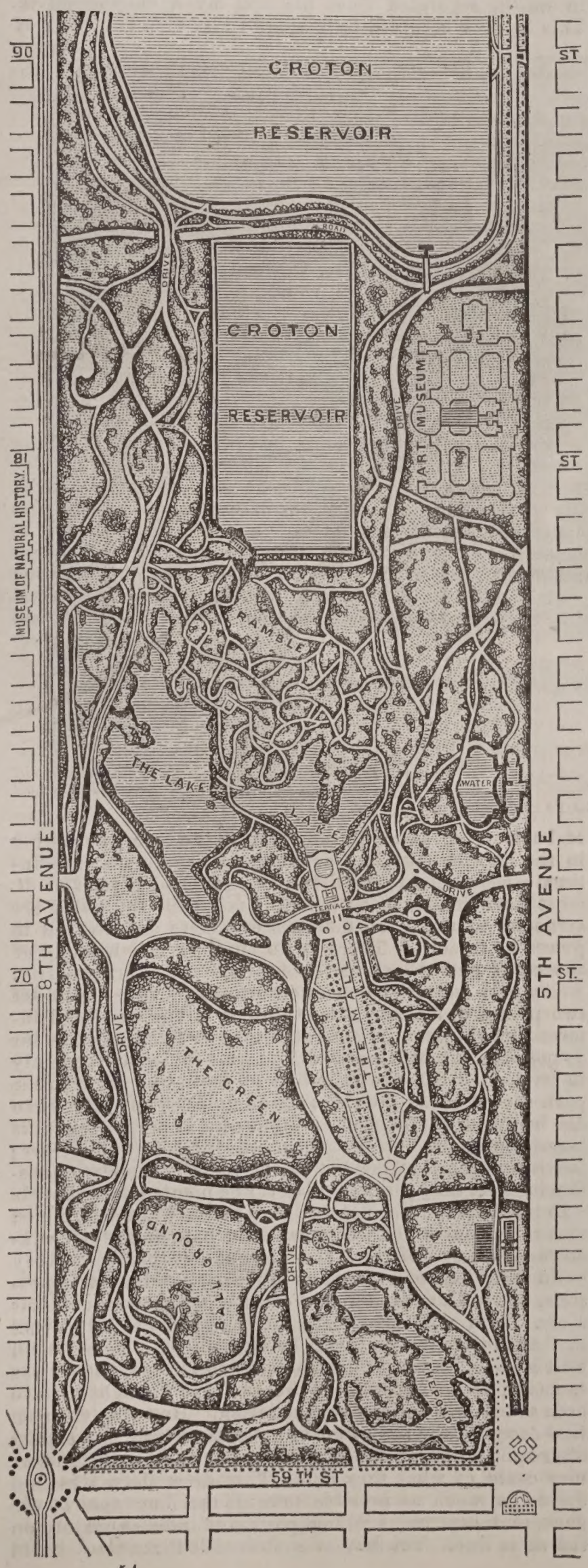


FIG. 1. Map of Central Park.

Here, then, were two men thoroughly fitted for the work that was put into their hands, and that work one the importance of which can hardly be estimated, not merely to the city which owns it, but to the whole country. It was our first great public park; it has already proved the parent of others, two of them, at least, of far greater importance than their original, and in the end no doubt every city on the continent of any considerable size will have a public park. What a piece of good fortune, then, that the Central Park, from which they all date, should have been, from the first, the fruit of a pure and manly taste, of sound sense, and of practical knowledge! It has been a first-rate example, according to its opportunities, and no matter how much it may be improved upon by other communities with ampler space and a more varied and picturesque conformation of ground to begin upon than fell to us, the Central Park will always be looked upon with a sort of affectionate pride, as having been the first to point out the way and to show us the possibility of walking in it.

The Central Park is two and a half miles long and half a mile wide. It extends from Fifty-ninth street on the S. to One-hundred-and-tenth street on the N., and is bounded on the E. and W. by the Fifth and Eighth avenues. It is thus a perfect parallelogram, but it is virtually divided into two unequal parts, between which are the two great reservoirs of Croton water—one a quadrangular basin of masonry, the other much larger, with an irregular outline, and confined in an embankment of earth lined with stone. The two basins cover in all nearly 150 acres. The smaller of the two is nearly a third of the short diameter of the park in width, while the larger nearly touches the eastern and western boundaries of the park, and extends N. and S. from Eighty-fifth street nearly to Ninety-eighth street. The original park enclosure contains 776 acres, to which have been added 68 acres at one time, and, more recently, Manhattan Square, so that it now contains 862 acres. It follows that nearly one-sixth of the ground covered by the Central Park is occupied by these unsightly embankments, which obstruct the view and offer nothing in return, since the water they contain cannot be seen except by mounting to a level with their summits. If the park were large enough, there could be no objection to such a division as we now have into Upper and Lower Parks, particularly if it were made by a sheet of water or by any picturesque feature—a ravine, for instance. But, as it is, there is no compensation for the loss of the ground, and moreover the communication between the two divisions is narrowed, especially by the larger reservoir, to such a point that all dignity is quite lost.

The two divisions of the park which we have called "the Upper" and "the Lower" are not only separated artificially from one another by the two reservoirs; they are really quite diverse in character. The Upper Park is distinguished by the freer sweep and greater variety of its horizon lines, by the fine views that it commands of the surrounding country, and by the greater play of the surface, making it easy for the landscape-gardener to produce his legitimate effects with grass and trees, rocks and water, and not obliging him to make up for want of interest in the natural features of the place by a resort to architecture. Up to the present time the Upper Park must have called for a much smaller expenditure of time and money than has been found necessary in the lower portion, since that is almost entirely artificial. The park lies along the eastern slope of a long ridge of rock which crops out of the ground somewhere about Thirtieth street, and extends thence to Manhattanville. This ledge is not continuous, but is broken by several transverse ridges with answering depressions, which indicate, we suppose, the points where the ends of the inclined strata would be found as they lie overlapping one another. There are four of these *irregular* ridges, the chief of them crossing the park diagonally, and the greatest elevation will be found in the central, westerly, and north-westerly portions. In the Lower Park were two swampy valleys lying between three of these ridges, and into these has been collected all the surface-drainage, with the happy result of producing two sheets of water—one, the smaller, a picturesque pond with steep rocky banks intermingled with patches of grass and shrubbery; the other a sheet of water nearly twenty acres in extent, the view across which from the most favorable point is of considerable breadth, and entirely unbroken for at least a quarter of a mile. The ridge that divides these two valleys has been treated with great skill. One large boggy tract has been filled in to an average depth of two feet, all the rocks that stuck out of the ground have been removed by blasting, and some large adjoining ledges reduced in the same way, and the depressions filled up; so that there have been secured thirty acres of level, or but slightly undulating, ground. East of this fine green extends another level space eighty rods in length and twelve in width, separated from the first by a carriage-drive. This tract is occupied by a broad walk, with two rows of

FIG. 2. Mall and Ward's Shakspeare.

American elms on each side, called "The Mall," which leads directly to the Terrace, the chief attraction to most persons in this portion of the park, and which we shall presently describe.

These are the main features of the landscape of the southern part of the Central Park—the "Lower Park," as it is conveniently called—but the designers have known how to introduce great variety in the treatment, and they have been so successful that this portion of the grounds must long be the favorite with the general public over the less finished and more natural upper half.

To the Lower Park there are nine entrances. Four of these are on the southern side, answering to the four avenues that touch the park there—viz. the Fifth, the Sixth, the Seventh, and the Eighth. Of these the Sixth and Seventh stop at the park, while the Fifth and Eighth continue along its eastern and western sides respectively. Of the five other entrances, three are on the Fifth avenue at Sixty-fourth, Seventy-second, and Seventy-ninth streets—although that at Sixty-fourth street is rather an entrance to the Museum than to the park proper—and two are on the Eighth avenue, at Seventy-second and Seventy-ninth streets, opposite, as will be noticed, two of the gates on the Fifth avenue. These entrances are at present merely openings in the boundary-wall, and as the erection of formal gateways is a very unimportant feature, so far as the decoration of the park is concerned, and practically is a matter of very little importance, it is to be hoped that it may be put off for some considerable time longer, until the growth of public culture shall make good taste in the design more certain than probably could be hoped for now. Whoever is in the habit of using the park, not merely as a place of recreation, but as an episode in his daily walk to his place of business, or as an introduction to the long ride thither in the cars or omnibus, or whoever, having no such intimate acquaintance with it, has examined a plan of it, must have remarked with how much skill the walks are arranged to unite the different entrances and to lead to places of interest. There is no twisting and winding of the paths and drives merely for the sake of irregularity. Every path and drive has a well-defined purpose: it unites two points or leads to some thing it is supposed will interest the visitor. In general, it may be stated that, as far as possible, the walks and drives *lead in*, for it is plainly to be desired that the attention of those who come to the park should not be drawn to the boundaries any more than can be avoided. The park is so narrow in proportion to its length that no skill will avail to hide the defect altogether; for though the planting-out of the walls is merely a question of time, the houses could never be planted-out. People who build on the Fifth and Eighth avenues are determined that their houses shall command the park from their windows, and, lest the trees should shut out their view, they build their houses so high as to make that danger impossible, and with a superfluous caution set turrets on their roofs. It is a misfortune, but it is now too late to avoid it, that in time the park will be shut in by a nearly solid wall of city houses. This was easy to foresee, and it was so manifest an objection to the site that it ought to have been taken into serious consideration. However, the men who designed the park were of a practical turn, and crying after spilt milk was not in their books; they made the best they could of what they had. They drew the walks and drives as much as possible towards the long axis of the park, and kept the striking points of interest mainly on the same line. Yet they so contrived it that there should

be also a circuit-drive for the pleasure of those who should come to the park rather for exercise than for sight-seeing, and who would naturally prefer as long a stretch as possible.

Along this central line of the Lower Park, then, are found the Children's Shelter, an immense tent of rustic woodwork, handsome, solid, well-contrived, with abundance of seats and benches and capacious fixed tables for the accommodation of children and their nurses; the Swings, and, near both these, the Dairy, where a good plain lunch may always be had, with excellent milk; then, passing under the Marble Archway, we reach the Mall with the statues of Shakspeare and "The Indian Hunter" by Ward

FIG. 3. Lake from Circle.

—statues of which any park in the world might be justly proud; farther on, the Casino, a restaurant close by the Carriage-concourse, where horses and carriages wait while their owners walk about, or take refreshments as they listen to the music in the pretty Pavilion sitting under the Vine-trellis, which is rather affectedly called in the latest report "the Pergola"—an Italian name for the thing. We notice a slight tendency on the part of the commissioners to give fine names to common things. For our part, we should like to get rid of such names as Casino, Carrousel, Pergola, Concourse, Esplanade, Plaza, Belvedere, and to have in their places plain English titles. Perhaps "Casino" and "Esplanade" are naturalized, or at least well enough understood to be allowed, but for the rest we are sure it would be better to take more homely names. Finally, we have, near the centre of the park, the Terrace, thus far, the only instance in our country of that treatment of a bluff or of a hillside sloping to a level ground which is so common

FIG. 4. Terrace.

in Europe, and which, as an opportunity, has been made so much of by foreign landscape-gardeners. When well treated it is very effective and very popular. Everybody likes "a view" (and many a mistake in house-building and in house-buying has been made under the impression that if a thing is desirable now and then, it is desirable always); and one that is obtained, not by climbing, but by walking to the edge of a terrace or out upon a balcony, owes some of the pleasure that it gives to its unexpectedness. The Terrace at the park is small and insignificant, of course, compared with those at St. Germain, at Meudon, or at Perugia; but few modern public parks have so fine a

one. It looks out upon the Lake, a handsome irregular piece of water always alive with boats, and across it to the Ramble. It consists of two flights of ample steps of light-colored freestone, with noble ramps, elaborately sculptured with arabesques of birds and flowers, and with rails equally handsome terminating in stone pedestal-posts, which will at some distant day be the support of statues. All the railings that enclose the Terrace are similar in design to the stair-rails, though the carving in no two of the panels is alike; and wherever the design calls for them the pedestal-posts are repeated, so that, if ever they are all crowned with statues, the effect ought to be singularly imposing. The only obstacle to one's complete enjoyment of the Terrace *as* a terrace is the fact that it is crossed by a carriage-drive; but it is only on very crowded days that this can make it dangerous or troublesome to pass directly from the Mall to the platform that overlooks the Lake. The lower level is reached either by passing *underneath* the carriage-drive through a well-lighted and prettily decorated hall, or by crossing the drive and descending the steps above alluded to. People take one or the other as convenience or inclination prompts, but here, as everywhere in the park, it has been made impossible for accidents to occur to pedestrians unless by their own fault. The carriage-drives, horseback-drives, and walks are kept distinct throughout, and at convenient points, wherever it has been found necessary, the walks are carried over or under the drive. There is no part of the park where a child or an old person or an invalid cannot move about in safety by simply keeping to the walks; and there are several points in the park where areas of considerable extent have been arranged with a particular view to the complete security of all persons, whether young or old, who come to amuse themselves with playing or strolling about, unconfined by formal pathways. Such are "the Ball-ground," "the Green," "the Children's Quarter" near the "Dairy," and the "Ramble." The "Mall," too, and the "Esplanade" are capital places for children and nurses; they may spend the whole day here without interruption, and refreshments may be had close at hand in the Casino.

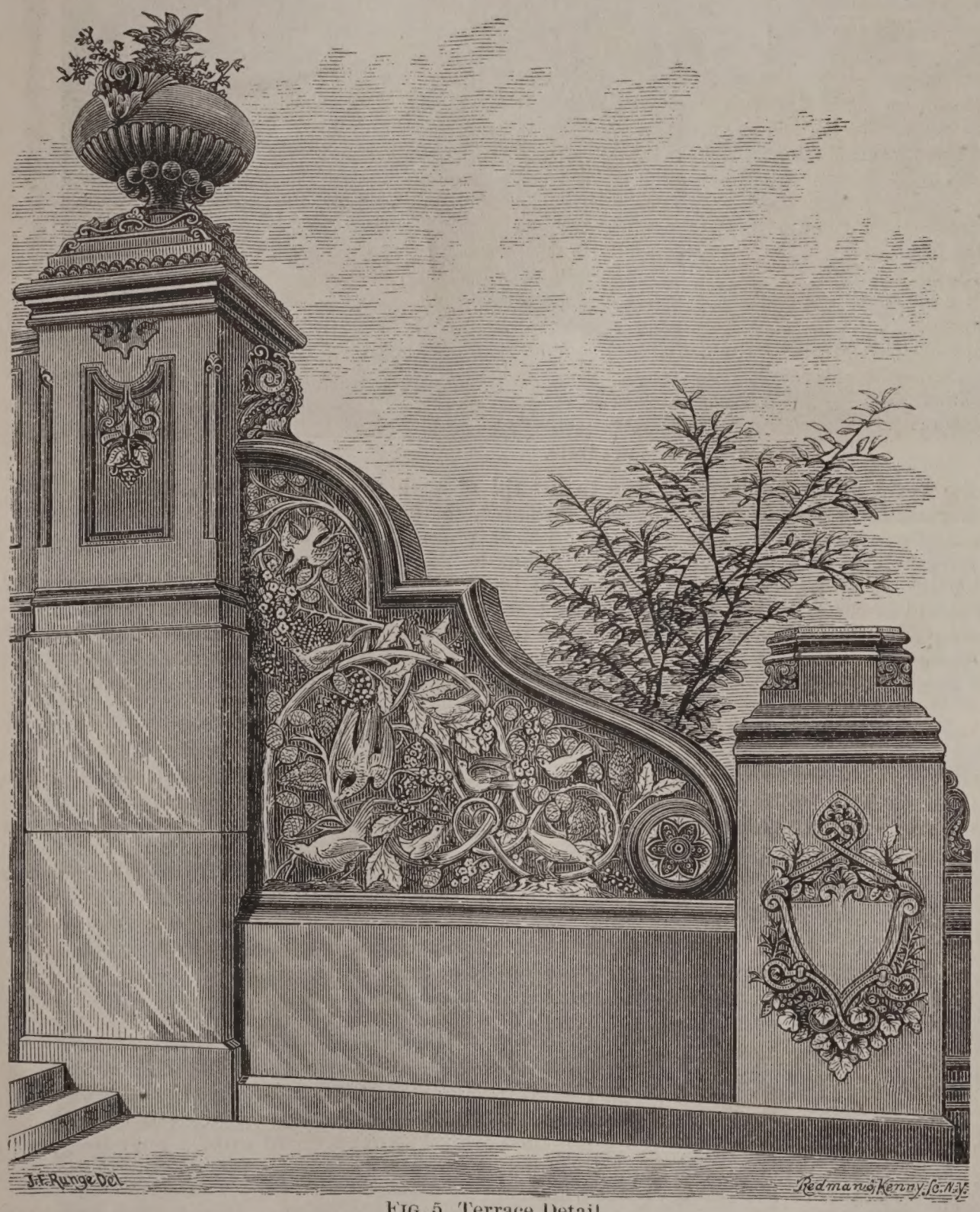


FIG. 5. Terrace Detail.

These are the principal points to be noted in the Lower Park, with the exception of the Ramble, which, to many people, is, and must always be, one of the pleasantest features of the place. It is a rocky hill that rises from the northern side of the Lake, and which the art of the landscape-gardener has transformed from barrenness into rural beauty. Pretty walks run in every direction, with good seats conveniently placed; and what with abundant shrubbery, charmingly varied in character, and allowed to grow as freely as it will, a plenty of the commonest wild flowers, and a running stream where ducks of the finer breeds and a crane or two to pique curiosity have their quarters, there are not many places near the city where so much of the charm of wildness may be enjoyed as in these few acres. Our wild birds of this region build and breed freely here, and before "the Ring" entered on their brief but disastrous rule quail were abundant. But these men, who were as ignorant in all practical matters connected with the proper management of the park grounds as they were in matters of taste, cut away a great deal of the underbrush, much of which had been carefully planted, and all of it encouraged to grow. Many of the trees, too, that feathered naturally to the ground, and whose growth no one, with any knowledge of what constitutes beauty in a tree, would think for a moment of interfering with, have been deprived of their lower branches. Trees such as the ash, the elm, the lime, and the beech, with almost all the Coniferæ—firs, pines, spruces, and hemlocks—have this beautiful habit of feathering to the ground; and perhaps there is no surer test of the mere cit than the liking he has for trimming up the lower limbs, thus depriving the tree not only of a chief beauty, but of a feature essential to its well-being, for, as is often seen, a tree, especially if it be an evergreen called upon to support a weight of snow or to resist a strong wind, will succumb if by the cutting away of its broad base all the weight has been thrown to the top. And these limbs, once removed, are never supplied again, so that the loss is irremediable. The pranks of "the Ring" in the park were wild and various, but in nothing did they offend so seriously as in this matter. One of the immediate results has been that the quail and many other birds, who depend upon the shelter afforded by the lower branches of these trees and by the underbrush, have either died or left for other places where "Rings" are unknown, or too well known to be allowed to meddle with public interests.

The Ramble is laid out, as we have said, upon a hillside, and this hill has been tunnelled to admit the passage of one of those traffic-roads that make so important a feature in the design of the park. The park, lying as it will in the midst of a thickly populated region, ought not, it is evident, to lay itself open to the charge of being an obstruction to the daily business of the neighboring region; and this was plainly seen by the designers, who also saw, however, that it was of equal importance that the traffic of the neighborhood ought not to be allowed to obtrude itself upon the park. The ingenuity which has met both difficulties and both wants, as they have been met by the traffic-road, is its own best commendation. Four of these roads cross the park, uniting, E. and W., Sixty-fifth, Seventy-ninth, Eighty-fifth, and Ninety-seventh streets, respectively. They are only so much curved as has been found necessary to accommodate them to the surfaces of the park, nor are they sunk any farther than is made necessary by the same conditions. Indeed, it is not correct to say that they are ever *sunk* at all, the road-bed being always on a level with the avenues that bound the park;

they only appear in certain cases to be sunk because they cut through rising ground. They are paved, lighted, and provided with sidewalks like ordinary streets, and they are in common use as traffic-roads, though not of course to the extent that they will be when the region about the Central Park becomes more densely populated. The object of the designers has been to make them completely independent of the park as a pleasure-ground, and they are so; indeed, in only a few cases can they be entered at all from the park, except where their terminations are coincident with the park gateways, and in no case can they be so entered by carriages. The gates that here and there communicate with them are to facilitate the removal of rubbish or the bringing in of materials. These communications are, however, not for the use of the public, and visitors to the park are not supposed to be aware of their existence. In no instance do these roads ever cross the surface of the park on a level with the walks and drives, but always under them or over them—generally by the former mode—and they are well planted-out by shrubbery where, without it, they would obtrude themselves upon the view.

The Ramble has a central point of interest to those who

FIG. 6. "Glen."

do not care for the solitude and quiet that make it attractive to so many, in the Belvedere, a picturesque edifice composed of a balustraded platform, with a tower from which a view of no mean extent can be had by those who like a moderate climb. The platform itself commands a pretty view, into which the rectangular tank of the smaller reservoir, on the edge of which it is built, enters as the most important feature.

It will thus be seen that almost all the special attractions of the Lower Park—we mean those apart from what may properly be called the landscape—are brought near the long axis running N. and S. This arrangement draws the main body of the visitors away from the boundaries, and thus prevents them from being forced upon our observation. Yet this result is brought about quite naturally and without effort; no one perhaps would perceive it if his attention were not called to it. There are, however, other points of interest in this Lower Park, and no doubt every year will see the attractions more and more distributed, until the present centralization will be overcome and forgotten. There are the collections of the Natural History Society, temporarily exhibited in the old Arsenal building, with the cages near it—some exposed and some under shelter—containing the animals which have from time to time been presented or loaned to the city. The latest report of the commissioners informs us that the collections of the Natural History Society have been open to the public every week-day during the year (1872), and that the attendance on many days may be estimated at 10,000. By the joint action of the park department and the trustees of the Museum two days in each week, Monday and Tuesday, are reserved for special students and for teachers and pupils of public schools; by this means opportunities are given for lecturing to classes with abundant illustration, and the Museum becomes an important part of the educational system of the city. The collections are constantly increasing in value, partly by purchase and partly by presents from those who are interested in the success of the institution. Manhattan Square, a piece of ground lying between Eighth and Ninth avenues and between Seventy-seventh and Eighty-first streets, was some time ago added to the park, and it is now decided to carry out a plan long contemplated for establishing a Zoological Garden and a Museum of Natural History upon this site. The plans for the new building for the accommodation of the Natural History Society have been already designed and accepted, and the work will be begun without delay. We suspect, however, that it will be found necessary to establish the Zoological Garden in some other place. Either institution would need all the room that the square affords.

The present collection of living animals belonging to the park, with those loaned to the trustees by private owners or by proprietors of travelling-shows, though comparatively small, is of great interest and gives an immense deal of pleasure. The animals are well housed and cared for under the direction of an intelligent keeper, whose special report makes one of the most valuable features of the annual report of the trustees. "The department has already received specimens of many of the most valuable foreign tropical animals, and now desires additions to its collections of our native species. Of the various American deer, only two, the common Virginia deer (*Cervus Virginianus*) and the American elk (*Cervus Canadensis*), are found in the park. Specimens of the black-tailed deer, the mule-deer, the reindeer, the Mexican deer, the moose, the caribou, and the prong-horned antelope would be much valued. Specimens of almost any of the smaller animals of the Far West, the squirrels, gophers, rabbits, and hares, would be desirable acquisitions. Thirteen species of foxes are enumerated as peculiar to this continent, of which but two, the common gray and red fox of the East, have as yet reached the park. The department usually pays the transportation-expenses of animals given to it, and it is found that when sent by express, with proper directions as to the supply of air, water, and food, they come by rail and boat from the more distant parts of the country with safety."

The sheets of water which in summer add so much to the landscape effect of the park are thronged in winter by skaters, for whose comfort and safety every provision is made by the park authorities. The ice is flooded, scraped, and swept with great skill and promptness, information as to the state of the ice is conveyed by signal to all parts of the city, temporary structures of wood, sufficiently warmed, are provided for putting on skates and for refreshment, and the means of cheap and healthful exercise are supplied to thousands of people, men and women, boys and girls. A visitor who watches these crowds of skaters from the banks or from the bridge that commands so wide a view of the lake, will surely be struck with the good behavior of the crowd; he will see no rudeness, no coarse manners, but a general good-nature and civility; and though the excellent park-police are always on hand, they have hardly ever any occasion to make an arrest, or even to administer a rebuke.

The building for the Metropolitan Museum of the Fine Arts is to be erected in the park on the ground between

the smaller reservoir and the Fifth avenue—a decision greatly to be regretted, we think, both because of the effect the building will have of still further closing up the already scrimped communication on that side between the Upper and Lower Parks, and from the injury to the appearance of the building itself, placed alongside or under the shadow of these immense water-tanks. We have to regret that land outside the park could not have been obtained on the eastern side, answering to Manhattan Square on the W., and the new Museum have been built on that. Besides giving a better and freer site for the building, it would have given greater apparent breadth to the park itself at the point near the reservoirs, where it presents an unfortunately cramped aspect.

Long before the Central Park was finished—and in the main it may be said to be finished now—it was found too small for the immediate demand upon it, especially in the way of drives and horseback rides; and it was plain that ampler provision must be made for the needs of the future. What was felt to be wanted was not merely room for more extended drives and rides than are possible within its present limits, but a more continuous park accommodation for

FIG. 7. Ball Ground.

the region N. of One Hundred and Tenth street, which region is rapidly being built up and settled. It was felt very early that the park was too far away from the populous part of the city, too much time was consumed merely in getting to it, and the approaches to it were devoid of all interest and variety. It has long ceased to be possible to control the southern approaches to the park; the land is all taken up, and is too valuable, but the disposition of the upper part of the island is within our own control, and the problem, How to provide for the future in this direction, has been solved in a most satisfactory manner by Messrs. Vaux and Olmsted in the Park-way System. (See PARK-WAYS.) This system, if it could have been taken in hand a little earlier, would have made the park begin, in fact, at Madison Square, by the simple plan of changing Fifth avenue or Broadway into a stately Mall, with a plantation of trees along the middle, a double carriage-track, a horseback-ride, and ample sidewalks; in short, a finer Champs Elysées. There might easily, at small expense, have been a Circus or Round at Thirty-fourth and Forty-second streets. The reach between Madison Square and the Central Park having been thus transformed from a dull walk between nearly unbroken lines of stone walls to an open promenade for exercise and enjoyment, the work now in hand of enlarging and planting the park-ways (called by the unmeaning name of "boulevards," in our New York love of French names), by which the western side of the upper part of the island is being saved from the monotony and meanness of the lower part, would have been only an extension of the plan, and would have made the Central Park merely a beautiful incident in the long line of drives, rides, and walks, with delightful accompaniments of grass and trees, stretching from Madison Square to the Westchester suburb now being laid out under the control and management of the Park Commission. No city in the world would have had such ample accommodation for enjoyment and exercise—convenient, too, to the great majority of her inhabitants—as New York, if this plan, once easy of execution, could have been carried out. The portion of it that covers the land S. of the Central Park has long ceased to be possible, but the connections N. of the park, between it and the Westchester suburb, are now being created, and when finished will make an era in the material and social history of our island. The plan will be fully explained in the article on PARK-WAYS; it has been thus cursorily alluded to here to show that a need widely felt and often expressed, of more park accommodation, has been attentively considered, and that there is every prospect of its being satisfactorily met, in the upper part of the island at least, by those who have the park in charge.

The park has been a great civilizer, and its mission in this respect is only just begun. When it was first established it was the only park in the country; now there are a dozen, and there will be more and more. Without the Central Park we should not have had in this generation the Brooklyn Park, the Fairmount Park in Philadelphia—a noble undertaking—the Chicago Park; nor would those stupendous projects of the Yosemite Valley Park and the Park of the Great Cañon of the Yellowstone have been conceived and carried out. Indeed, they are Gargantua's play-grounds, and make Hyde Park and Versailles look pinched and mean. They have been laughed at as bits of brag, but, in truth, they are the merest good sense and wise provision, with no trace of exaggeration. Would that the founders of New York could have so looked ahead, even fifty years ago! Would that we ourselves could look ahead in season, and, forecasting the time when our city shall cover the lower half of Westchester county, seize promptly on at least 3000 acres (the area of the Philadelphia Park) of that region.

We must not forget that if it was a great piece of good-fortune to get the Central Park at all—and who can doubt it?—it was an inestimable happiness that it was entrusted to the hands that have made it what we see it. New York can never honor the men enough who, with the exception of a brief time of nightmare, when "the Ring" tried to make it their stye, have cared for it with disinterested devotion from the beginning. They deserve our gratitude for this, that, in a dark time, when public honor, and even common honesty in public men, seemed thrown overboard, they helped us to support our self-respect, and to make a return to better things seem possible by keeping steadily in view the sight of at least one civic department administered with good sense, economy, and honesty, and with a single eye to the public good. CLARENCE COOK.

Cen'tral Point, a township of Goodhue co., Minn. Pop. 160.

Cen'tral Prov'inces, The, one of the great administrative divisions of British India, are situated between lat. 18° and 24° N., and between lon. 77° and 83° E. Area, 82,838 square miles. They were formed into a chief commissionership in 1861, and they are divided into four commissionerships and nineteen districts. The line of railway connecting Bombay with Calcutta passes through these provinces, and has completely altered the condition of the country, which, up to the time when it was formed into a chief commissionership, was almost unknown. The traffic that passes through the capital, Jubbulpore, is larger than that of any other city in India, except Bombay. The revenue of the provinces in 1869–70 amounted to £1,043,954. Pop. in 1871, 7,987,476.

Cen'tral Square, a post-village of Hastings township, Oswego co., N. Y., at the crossing of the New York and Oswego Midland and the Syracuse Northern R. Rs. Pop. 359.

Cen'tral Vil'lage, a post-village of Windham co., Conn., is on the Boston Hartford and Erie R. R., 20 miles N. N. E. of Norwich. It is on the Moosup River, at or near its entrance into the Quinebaug. It has water-power and a number of cotton-mills. Pop. about 2000.

Cen'tre, or **Center** [Gr. κέντρον; Lat. *centrum*], originally a "point;" hence the point of a compass which remains fixed while the other is moved round to describe a circle. The centre of a circle is a point within it equally distant from every part of the circumference. The centre of a sphere is a point equally distant from every point of the surface. In war, the term *centre* is applied to the main body of an army located between the two wings. In French politics the *Centre* is used to designate a party of moderate royalists or conservatives who support a policy intermediate between that of the *Droit,* "right," and that of the *Gauche,* "left."

Cen'tre, a county which is the most central part of Pennsylvania. Area, 1000 square miles. It is partly bounded on the N. W. by the West Branch of the Susquehanna, and is intersected by Bald Eagle Creek. The surface is diversified by several ridges, one of which is called Bald Eagle Mountain. The soil of the valleys is fertile. Grain, hay, butter, wool, and potatoes are the chief crops. Among the manufactures are those of flour, lumber, leather, carriages, harnesses, etc. Coal, iron, and limestone abound. This county is traversed by the railroad which connects Lockhaven with Tyrone. Capital, Bellefonte. Pop. 34,418.

Cen'tre, a post-village, capital of Cherokee co., Ala., is near the Coosa River, about 140 miles N. by E. from Montgomery, near a steamboat landing. It has two churches, an academy, and one newspaper-office.

W. C. Stiff, Pub. "Cherokee Advertiser."

Centre, a township of Polk co., Ark. Pop. 614.
Centre, a township of Prairie co., Ark. Pop. 772.
Centre, a township of Sebastian co., Ark. Pop. 1903.
Centre, a township of Sacramento co., Cal. Pop. 461.
Centre, a township of Boone co., Ind. Pop. 3885.
Centre, a township of Dearborn co., Ind. Pop. 4699.
Centre, a township of Delaware co., Ind. Pop. 4375.
Centre, a township of Grant co., Ind. Pop. 2641.
Centre, a township of Greene co., Ind. Pop. 1870.
Centre, a township of Hancock co., Ind. Pop. 3495.
Centre, a township of Hendricks co., Ind. Pop. 2795.
Centre, a post-township of Howard co., Ind. Pop. 2857.
Centre, a township of Jennings co., Ind. Pop. 2633.
Centre, a township of Lake co., Ind. Pop. 1932.
Centre, a township of La Porte co., Ind. Pop. 1147.
Centre, a township of Marion co., Ind. Pop. 4274.
Centre, a township of Marshall co., Ind. Pop. 4830.
Centre, a township of Martin co., Ind. Pop. 1170.
Centre, a township of Porter co., Ind. Pop. 1394.
Centre, a township of Posey co., Ind. Pop. 955.
Centre, a township of Ripley co., Ind. Pop. 1581.
Centre, a township of Rush co., Ind. Pop. 1645.
Centre, a township of Starke co., Ind. Pop. 555.
Centre, a township of St. Joseph's co., Ind. Pop. 717.
Centre, a township of Union co., Ind. Pop. 1896.
Centre, a township of Vanderburgh co., Ind. P. 1689.
Centre, a township of Wayne co., Ind. Pop. 2855.
Centre, a township of Allamakee co., Ia. Pop. 1048.
Centre, a township of Appanoose co., Ia. Pop. 1723.
Centre, a township of Cedar co., Ia. Pop. 2899.
Centre, a township of Clinton co., Ia. Pop. 1317.
Centre, a township of Decatur co., Ia. Pop. 1738.
Centre, a township of Dubuque co., Ia. Pop. 1039.
Centre, a township of Emmett co., Ia. Pop. 146.
Centre, a township of Fayette co., Ia. Pop. 504.
Centre, a township of Guthrie co., Ia. Pop. 924.
Centre, a township of Henry co., Ia. Pop. 6310.
Centre, a township of Monona co., Ia. Pop. 138.
Centre, a township of Pottawattamie co., Ia. P. 528.
Centre, a township of Wapello co., Ia. Pop. 1693.
Centre, a township of Winnebago co., Ia. Pop. 432.
Centre, a township of Atchison co., Kan. Pop. 1605.
Centre, a township of Doniphan co., Kan. Pop. 2248.
Centre, a township of Lyon co., Kan. Pop. 126.
Centre, a township of Marion co., Kan. Pop. 539.
Centre, a township of Wilson co., Kan. Pop. 855.
Centre, a township of Buchanan co., Mo. Pop. 1918.
Centre, a township of Dade co., Mo. Pop. 1568.
Centre, a township of Greene co., Mo. Pop. 1681.
Centre, a township of Hickory co., Mo. Pop. 1245.
Centre, a township of Knox co., Mo. Pop. 2416.
Centre, a township of Ralls co., Mo. Pop. 726.
Centre, a township of Vernon co., Mo. Pop. 2603.
Centre, a township of Camden co., N. J. Pop. 1718.
Centre, a township of Chatham co., N. C. Pop. 1255.
Centre, a township of Stanley co., N. C. Pop. 1065.
Centre, a township of Carroll co., O. Pop. 1227.
Centre, a township of Columbiana co., O. Pop. 2895.
Centre, a township of Guernsey co., O. Pop. 1016.
Centre, a township of Mercer co., O. Pop. 1255.
Centre, a township of Monroe co., O. Pop. 2585.
Centre, a township of Morgan co., O. Pop. 1353.
Centre, a township of Noble co., O. Pop. 1703.
Centre, a township of Williams co., O. Pop. 1628.
Centre, a township of Wood co., O. Pop. 1331.
Centre, a township of Berks co., Pa. Pop. 1529.
Centre, a township of Butler co., Pa. Pop. 843.
Centre, a township of Columbia co., Pa. Pop. 1322.
Centre, a township of Greene co., Pa. Pop. 1777.
Centre, a township of Indiana co., Pa. Pop. 1555.
Centre, a post-township of Perry co., Pa. Pop. 1121.
Centre, a township of Snyder co., Pa. Pop. 885.
Centre, a township of Oconee co., S. C. Pop. 1910.
Centre, a township of Richland co., S. C. Pop. 1124.
Centre, a township of Fauquier co., Va. Pop. 4356.
Centre, a township of Calhoun co., West Va. P. 520.
Centre, a township of Gilmore co., West Va. P. 1201.
Centre, a township of Wetzel co., West Va. P. 1336.
Centre, a township of Wyoming co., West Va. P. 622.
Centre, a township of Outagamie co., Wis. P. 1201.
Centre, a post-township of Rock co., Wis. Pop. 1064.

Cen'tre Col'lege, Danville, Ky., was chartered as a State institution in 1819. An amendment to the charter gave the control of the school to the Presbyterian synod of Kentucky, upon condition of synod's paying $20,000 towards the endowment. The condition was fulfilled, and Centre College became a synodical school in 1831. The following list gives the names of its presidents and the dates of their election: Rev. Samuel Findlay (pro tem.), 1822; Rev. J. Chamberlain, D. D., 1822; Rev. D. C. Proctor, D. D. (pro tem.), 1826; Rev. Gideon Blackburn, D. D., 1827; Rev. J. C. Young, D. D., 1830; Rev. L. W. Green, D. D., 1857; Rev. W. L. Breckinridge, D. D., 1863; Ormond Beatty, LL.D., 1872. Under the long presidency of Dr. Young the college rose to great eminence among Western schools. It retained both its numbers and reputation until the civil war, when the number of students was reduced from 200 to less than 50. The close of the war did not bring peace to the Church. The synod of Kentucky was rent asunder, the larger body joining the Southern Presbyterian Church—the smaller, and with it Centre College, adhering to the General Assembly. Litigation ensued, and all the courts, both State and Federal, decided that the Assembly had the rightful control. Amidst this litigation (now closed) the number of students steadily increased, the last annual catalogue giving a roll of 91, with a training-school of 95 pupils; total, 186. Centre College aims to give simply a liberal education. The college course em-

braces the usual curriculum, along with special advantages for acquiring the leading languages of modern Europe. Other features of interest are a four years' course of lectures on the history, structure, and literature of the English language, and a daily lecture by the professor of ethics on biblical themes or on subjects relating to the development of a true Christian manhood. Students find boarding in private families. The village is quiet and healthful, and there is a high degree of culture among the citizens. Tuition to ministers' sons and young men of limited means is $5, to all others $50. The faculty consists of a president, vice-president, and seven other instructors. The libraries of the college contain about 8000 volumes. Facilities for instruction in the sciences are good and increasing. The alumni at the close of 1872 numbered 754. Among them are some of the most distinguished men of the land. The college year begins the first Monday in September, and closes the last Thursday in June. The endowment yielding an income amounts to about $140,000; the buildings and grounds are estimated at $75,000 additional.

ORMOND BEATTY.

Cen'tre Creek, a post-township of Martin co., Minn. Pop. 377.

Centre Creek, a post-township of Jasper co., Mo. Pop. 765.

Cen'tre Grove, a township of Dickinson co., Ia. Pop. 283.

Centre Grove, a township of Guilford co., N. C. Pop. 1110.

Cen'tre Hall, a post-village of Centre co., Pa. It has one weekly newspaper.

Cen'tre Har'bor, a post-township of Belknap co., N. H., 37 miles N. of Concord, on Lake Winnipiseogee, is a place of summer resort. It is visited by the steamboats which ply on the lake, and is noted for its fine scenery. Pop. 446.

Cen'tre of Grav'ity, the point in a body which is always in the line of the resultant of the weights of all the particles composing that body, no matter in what position the body be placed. Each particle of a body held above the surface of the earth is acted upon by gravitation, and we may look upon the gravitation of each particle as being one of a system of parallel forces, and the gravitation of the whole as a resultant of those forces. Whatever be the direction of these forces with respect to the mass, the resultant will always pass through a fixed point within the mass, which point is the centre of gravity for the body. Every mass which is supported above the earth must have its centre of gravity so placed that a line drawn from it perpendicularly downward will fall within the base; otherwise the body will fall. The centre of gravity of many bodies may be found by geometrical rules, but with the supposition that the bodies are of homogeneous or uniform specific gravity—a condition which is not often found exactly fulfilled in practice.

Cen'tre of Mag'nitude, The, is a point so situated that all straight lines passing through it, and terminated by the circumference or superficies of the figure or surface, are bisected in it.

Cen'tre Point, a post-village of Washington township, Linn co., Ia. Pop. 443.

Cen'treport, a post-village of Huntington township, Suffolk co., N. Y., on the Northport branch of the Long Island R. R., 37 miles from New York.

Cen'tre Star, a post-township of Lauderdale co., Ala. Pop. 1627.

Cen'tre Vil'lage, a post-village of Colesville township, Broome co., N. Y., on the Susquehanna River, has an extensive tannery. Pop. 146.

Cen'treville, a post-village, capital of Bibb co., Ala., on the Cahawba River, at the Lower Falls, 38 miles S. E. of Tuscaloosa. Pop. of Centreville township, 1285.

Centreville, a village in Hamden township, New Haven co., Conn., on the New Haven and Northampton R. R., about 6 miles N. of New Haven. It has manufactures of various kinds.

Centreville, a post-village of St. Clair co., Ill., 7 miles S. S. E. of St. Louis, on the St. Louis and Cairo and the Illinois and St. Louis R. Rs. It has two steam flouring mills. Coal is mined in the vicinity. Pop. 1116.

Centreville, a post-village, capital of Wayne co., Ind., on the Pittsburg Cincinnati and St. Louis R. R., 5 miles W. of Richmond. It has a female college, a national bank, and one weekly newspaper. Pop. 1077.

Centreville, a post-village, capital of Appanoose co., Ia., on the Chicago and South-western R. R., 125 miles W. S. W. of Muscatine. It has a national bank and two newspaper-offices. It is the present terminus of the Missouri Iowa and Nebraska Railway, has a fine court-house, several churches in process of building, and manufactures of various kinds. It is underlaid with an abundant supply of coal of very fine quality. Pop. 1037. ED. OF "CITIZEN."

Centreville, a post-township of Linn co., Kan. Pop. 1034.

Centreville, a township of Neosho co., Kan. Pop. 889.

Centreville, a post-village and seaport in Barnstable township, Barnstable co., Mass., on the S. side of Cape Cod.

Centreville, a township of Washington co., Me. Pop. 145.

Centreville, a post-village, the shire-town of Queen Anne co., Md., 30 miles E. by N. from Annapolis, in a township of the same name, situated in a large peach-growing region. Steamboats leave twice a day for Baltimore. It has an academy, an agricultural implement factory, a foundry, and two newspapers. It is the terminus of the Queen Anne's and Kent R. R. Pop. of township, 5360; of village, 915. ED. "OBSERVER."

Centreville, a township of Delta co., Mich. Pop. 86.

Centreville, a twp. of Leelenaw co., Mich. Pop. 939.

Centreville, a post-village, capital of St. Joseph co., Mich., on Prairie River and on the Air-Line division of the Central R. R., 132 miles E. of Chicago. It has one newspaper-office, a large knitting factory, good schools, and one national bank. Pop. 749.

ED. "ST. JOSEPH REPUBLICAN."

Centreville, a post-village of Anoka co., Minn., on the Lake Superior and Mississippi R. R., 17 miles N. of St. Paul, in a township of the same name, on the Rice Lakes. It is a famous resort for sportsmen. Pop. of township, 687.

Centreville, a post-village, capital of Reynolds co., Mo., on the West Fork of Black River, about 40 miles S. by W. of Potosi. Pop. 32.

Centreville, a township of Dixon co., Neb. Pop. 168.

Centreville, a station in Jersey City, N. J., on the Central R. R. of New Jersey, 7 miles from New York. It is a thriving place, inhabited by people doing business in New York.

Centreville, a post-village and township of Allegany co., N. Y. Pop. 167; of township, 1043.

Centreville, a village of Portland township, Chautauqua co., N. Y. Pop. 141.

Centreville, a village of Mooers township, Clinton co., N. Y., on Chazy River and on the Ogdensburg and Lake Champlain R. R., 15 miles W. of Rouse's Point. It has three churches, and an active trade and manufactures.

Centreville, a village of Clay and Cicero townships, Onondaga co., N. Y. Pop. 288.

Centreville, a borough of Butler co., Pa. Pop. 366.

Centreville, a post-borough of Crawford co., Pa. Pop. 322.

Centreville, a post-village of Warwick township, Kent co., R. I., has one national bank, and manufactures of cotton goods.

Centreville, a township of Anderson co., S. C. Pop. 1880.

Centreville, a post-village, capital of Hickman co., Tenn., on Duck River, 50 miles S. W. of Nashville. P. 175.

Centreville, a post-village, capital of Leon co., Tex., 130 miles N. E. of Austin City, has one newspaper. Pop. 221.

Centreville, a post-village of Fairfax co., Va., 27 miles W. of Washington. Pop. of Centreville township, 1721.

Centreville, a township of Tyler co., West Va. Pop. 1079.

Centreville, a township of Manitowoc co., Wis. Pop. 1650.

Centrip'etal and **Centrif'ugal,** terms used in botany, and applied to two modes of inflorescence. When the terminal flower-bud is the first to expand, the inflorescence is said to be centrifugal. When the expansion begins with the bud which is nearest the base of the floral axis (or nearest the circumference in a cyme or corymb), and proceeds towards the terminal or central bud, the inflorescence is centripetal.

Centripetal and **Centrifugal Forces.** If we suppose a body to move in a circle with a uniform velocity, it is shown by the laws of motion that it must be acted upon continually by a uniform force directed towards the centre; which force expends itself each instant in deflecting the

moving body from the straight line in which it would normally move, this line being a tangent of the circle in which motion takes place. The force with which the body is impelled towards the centre is called *centripetal;* the equal and opposite force which tends to make it fly from the centre is the *centrifugal* force. Both together are the *central* forces. Each is equal to the weight of the body multiplied by the square of the velocity, and divided by the acceleration of gravity and the radius.

Centrop'olis, a post-township of Franklin co., Kan. Pop. 1034.

Cen'turies of Mag'deburg, the first church history by the Protestants, the preparation of which occupied many eminent scholars for a long period. The plan of an extended work, which should reveal the deviations of the Roman Church from the practices of the early Christians, was first conceived by Matthew Flacius of Magdeburg in 1552. The labor begun by him was carried forward by Wigand, Matthew Judex, Basil Faber, Andreas Corvinus, and Thomas Holzhuter, and the means therefor were provided by the evangelical princes and great men. The work appeared at Bâle in 13 vols., each volume covering a century (1559–74). The *centuriatores,* as the authors were called, never brought it down beyond the year 1300. In refutation of the "Centuries," Baronius wrote the "Annales Ecclesiastici."

Centu'rion [Lat. *centurio,* from *centuria,* a "hundred men"], an officer of the ancient Roman army who commanded one hundred men or a company called *centuria.*

Cen'tury [Lat. *centuria,* from *centum,* a "hundred"], a company of one hundred men in the Roman army; also a civil division of the Roman people formed for the purpose of voting. According to this division, which was founded on property, the people voted in the *comitia centuriata.* (See COMITIA.) Servius Tullius divided the citizens of Rome into 193 centuries. In modern times the term is mostly used to denote a period of 100 years.

Century Plant. See AGAVE.

Cephalas'pis [from the Gr. κεφαλή, "head," and ἀσπίς, a "shield"], a genus of fossil fishes armed with rhomboidal ganoid plates of enamelled bony structure. Several species are found in the upper Silurian and in the Devonian rocks. They had large heterocercal tails, and appear to have been rapidly moving, predaceous fishes. The name is derived from the large plate which covered the head, the sharp anterior edge of which may have served the fish as an offensive weapon.

Cephaliza'tion [from the Gr. κεφαλή, "head"]. As the head is the seat of power in an animal, the part that gives honor to the whole, it is natural that among species rank should be marked by means of variations in the structure of the head; and not only by variations in structure, but also in the extent to which the rest of the body directly contributes, by its members, to the uses or purposes of the head. *Cephalization* is, then, simply the degree of head domination in the structure, as implied in the derivation of the term. The following are some of the ways or methods in which it is manifested:

1. With *superior* cephalization—that is, as species rise in grade or rank—more and more of the anterior part of the body or of its members render service to the head; with *inferior,* less and less. In many cases, part of the organs that serve as feet in the lower tribes serve as jaws in the higher, or, in other words, are transferred from the locomotive to the cephalic series, and thus the structure indicates higher cephalization.

2. With *superior* cephalization the structure of the head or of the anterior portion of the body becomes more and more compacted, perfected, and condensed or abbreviated; with *inferior,* the same portion becomes more and more lax in its parts or loosely put together, and imperfect in the parts or members themselves, and at the same time the whole is more and more elongated and spaced out or enlarged.

3. With *superior* cephalization the posterior portion of the body becomes more and more compacted, or firmly put together and abbreviated; that is, as concentration goes on *anteriorly* there is abbreviation *posteriorly.* Even the tail shows grade; for great length or size or functional importance is actually a mark of inferior grade, other things being equal.

4. With *superior* cephalization there is an upward rise in the head-extremity of the nervous system; and this reaches its limit in man, in which it becomes *erect* and points heavenward. With *inferior,* there is the reverse condition, and the limit is seen in the *horizontal* fish.

5. With *inferior* cephalization there is not only a less and less concentrated or compacted and perfected state of the whole structure before and behind, but in its lower stages the degradation of the structure extends to an absence of essential parts, as teeth, members, senses; and often also to a gross enlargement of the body beyond the size which the system of life within can properly wield, and in this case the body is stupid and sluggish.

The laws of cephalization act conjointly with another principle in animal life—that of the *oppositeness subsisting between the cephalic or anterior and the posterior extremities of the animal structure,* which is a kind of antero-posterior or fore-and-aft polarity. This oppositeness or polarity is *up and down* in the plant, and *fore and aft* in the animal. The fore and aft becomes strictly up and down *in position* in man; and this by elevating heavenward the cephalic extremity, not by a change of the axis of symmetry to that of the plant.

The following are examples of cephalization, and of decephalization as the reverse steps are properly designated, in some of the classes of animals:

The subdivisions of the division of brute mammals (or quadrupeds) containing the larger species are four:

First, the Quadrumanes, or monkeys.

Second, the Carnivores, or flesh-eaters, including the lion, cat, dog, bear, and the like.

Third, the Herbivores, or plant-eaters, including the elephant, rhinoceros, horse, hog, ox, deer, etc.

Fourth, the Mutilates, including the whales, dolphins, etc., in which the limbs are degraded to the structure and uses of fins, and part are wanting, and therefore the species are in a sense, *mutilated,* whence the term *Mutilates.* Such forms are appropriately styled *degradational* forms, since they correspond to a degradation of the mammalian structure or type. These several subdivisions have their distinctions, and also their naturalness, strongly exhibited in characters based on this principle of cephalization. Illustrations of this fact may be drawn first from the fore limbs.

In the Quadrumanes or monkeys the fore limbs are so constructed and arranged that they serve (1) for carrying their young, (2) for supplying the mouth with food, (3) for taking their prey, and (4) for locomotion; in the Carnivores, they serve (1) for taking their prey, and (2) for locomotion; in the Herbivores, only for locomotion—for cattle use their fore legs for their simple legitimate object of walking, nothing higher, nothing lower; in the Mutilates, or whales (*degradational* species, as before styled), they are fit only for something lower, for they are merely fins, like those of fishes. It thus appears that in the passage from Carnivores to Herbivores the fore limbs lose all cephalic use, they not even serving in the latter to get or carry food to the mouth; and lower down, in the whales and related species, they are degraded into swimming organs.

Passing, now, from the highest of these four subdivisions —that of the monkeys—up to man, there is a sudden elevation of structure, corresponding well with the spiritual elevation. The fore limbs are taken out of the foot-series, and thus rescued from the inferior service of locomotion. As in some brutes, these members serve to carry the young and to collect food and convey it to the mouth. But along with such uses there are others more exalted, demanded by the spirit within. Moreover, far the larger part of the body is thus made to belong to the anterior portion, and this anterior portion is consequently much increased, while the posterior stands on its narrow base of two feet, and is reduced to a minimum.

Let us now look at the above four subdivisions of mammals with reference to other methods of cephalization, and see how they exhibit, in accordance with this principle, their differences of grade.

The Quadrumanes, or monkeys—the highest of the brute species—have the body most raised from the horizontal; the head in the typical species shortest and most compacted; and the superior species among them—the man-apes, as the gorilla and orang—have no tail, so that this kind of posterior abbreviation is at its extreme limit.

The Carnivores, as the cat, lion, etc., also have a short, well-compacted head, but one more projecting than that of the higher monkey; the hind feet, as well as fore feet, are provided with claws to aid in climbing; and the mouth is prostituted from the proper or normal use of the organ to that of carrying its young or its prey.

The Herbivores, as the ox, horse, tapir, etc., have the head very much elongated (a strong mark of decephalization), and in some appropriated to the inferior use of self-defence; part of the teeth usually wanting; and the feet fitted for locomotion, and not in any case for grasping. Moreover, in the ox, goat, deer, and allied species, and in the horse, the hind legs are very much the stronger, on which account from this group come the draft-animals used by man; and this characteristic indicates a backward transfer of force, which is a prominent mark of decephalization.

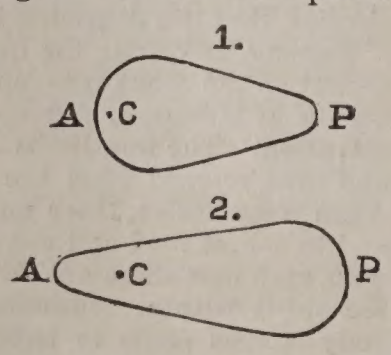
The Mutilates, or the whales, have a head sometimes

many yards in length, made of bones imperfectly united; the teeth often entirely wanting, and sometimes excessively numerous—the latter a mark of feeble concentration in the life-system, in consequence of which the parts grow or multiply to excess (something as a tree grows in size, because given up to the uncontrolled power of growth); and not only the fore legs reduced to fins and feeble in locomotion, but the hind limbs wanting; the body behind enormously enlarged and prolonged; and the prolonged tail, thus made, serving as the main organ of locomotion—a low, fish-like condition of the structure, indicating in a striking manner its extreme decephalization. If the Carnivore is a *prosthenic* animal, or *strong before*, the whale, like a fish, is eminently *metasthenic*, or *strong behind*.

The four grand divisions of mammals are thus strikingly marked off by characters based on this principle of cephalization.

Turn now to man, at the head of the system of life. He is vastly above even the man-apes in the form of the head, as well as in its perfection of make, for the jaws project but slightly, when at all, beyond the forehead, and his back, in his natural position, only a little behind the posterior side of the brain. His nervous system stands vertical, with the brain at the summit; and in average specimens of the race the brain is nearly treble the size of the brain of a gorilla. His teeth are simply for cutting soft food and for chewing, not for tearing flesh or branches of trees, or for carrying his young. His fore limbs take no part in locomotion; they are transferred completely from the locomotive series to the cephalic. His feet may be thought to be inferior to a monkey's, since they cannot clasp a stick or branch, like a hand. But this latter quality makes a good climber, and serves well a being with the monkey's propensities and necessities, but is not befitting man's erect body and higher purposes, which are best served by feet that give a firm support.

The question as to the condition of the life-forces thus passes from the sphere of speculation to one of direct observation. A lion, for example, exhibits to the eye the high degree of cephalization of its structure by its strength anteriorly, or that of its head and fore limbs, and the correlate form and structure of these and other parts of the body; and a whale manifests its low degree by its degraded head and senses, its feeble limbs partly obsolete, and the immense size and strength of the tail; and this is so obvious that the muscular or motorial force of the two might be sufficiently well represented by the annexed figures; Fig. 1 corresponding to that of the lion, and 2 to that of the right whale, A being the anterior or cephalic extremity, and P the posterior or caudal extremity. The figures give a faint idea of what is meant by *cephalization* and *decephalization*. If the sensorial forces of the lion were taken into consideration, the contrast between the two would be still greater. C is the position of the prime systemic centre; its remoteness from the front margin in the right whale (Fig. 2) is one of the marks of the extreme decephalization of the structure. The arrangement of the muscular force in different Herbivores might be represented by figures intermediate between 1 and 2.



For further illustration, the Articulates may be referred to; that is, the sub-kingdom of animals, including insects, spiders, centipedes, crustaceans (crabs, lobsters, etc.), and worms, the body and members of which are jointed. The three classes are—1, Insecteans; 2, Crustaceans; 3, Worms. The transfer of members from the locomotive to the cephalic series, or the reverse—one of the most striking marks of cephalization in animals having limbs—is well shown in the two higher of these classes. The three orders or grand divisions of Insecteans are—1, Insects; 2, Spiders; 3, Myriapods or Centipedes.

Insects, the highest, have *three* pairs of feet and *three* pairs of mouth-organs. Spiders have *four* pairs of feet and *two* of mouth-organs. Here *one* pair out of the series of head-organs in insects is transferred in spiders to the locomotive series. Insects and spiders are hence very distinct types of structure; and the higher is based on superior cephalization; for in insects a larger part of the structure is embraced in the cephalic or anterior portion than in spiders.

Both insects and spiders are structures with fixed or closed limits, for the number of pairs of feet is limited, and the segments of which the body is made admit of no increase beyond the normal or regular number. But Myriapods are not limited in the number of segments of the body, or in that of the pairs of feet; on the contrary, they allow of any number of feet and of indefinite lengthening behind. The order is distinguished by the degradational character of indefinite posterior elongation, and as indefinite a number of legs—an evidence of low decephalization.

It appears, then, that in passing from Myriapods to typical spiders there is first posterior abbreviation—one mark of cephalization; and in addition the body of the spider is not worm-like in being made up of a large number of similar segments, but has an anterior part set off for the purposes of the head and locomotion (called the cephalothorax) distinct from the abdomen. Next, in passing from spiders to insects, one pair of locomotive organs, the anterior, becomes a pair of jaws—that is, it is given over to head-uses; and, moreover, the head becomes a separate segment from the thorax, which shows further concentration of the forces anteriorly, or a higher grade of cephalization.

The orders of Crustaceans are three: 1, Decapods, or the ten-footed; 2, Tetradecapods, or the fourteen-footed; 3, Entomostracans, or species with defective feet. In the highest, the Decapods, there are *five* pairs of feet and *six* pairs of mouth-organs; while in the next order, that of Tetradecapods, there are *seven* pairs of feet and *four* pairs of mouth-organs. In the latter, then, the feet have gained *two* pairs, the mouth has lost *two*; or, in other words, *two* pairs have passed from the cephalic to the locomotive series. Hence, the Decapods and Tetradecapods differ on the same principle as insects and spiders; that is, in the transfer of part of the mouth-organs of insects to the locomotive series. Like the latter, also, the feet are perfect and *fixed* or *limited* in number, the regular or normal number never being exceeded. They are, therefore, regular or normal types.

In descending to the third order, or the Entomostracan, from the Tetradecapods, the mouth loses other pairs of organs by this method of transfer—in some *one* pair, in others *two*, in others *three*, in others *four* (or all). The Entomostracans are defective in both their feet and segments, and are *degradational* forms; and hence these several grades of transfer have not separately the importance which belongs to them in the regular or normal types. In going up from Entomostracans to Tetradecapods, the system of structure becomes normal and the number of mouth-organs or jaws four pairs, the locomotive numbering seven pairs; and then in passing from Tetradecapods to Decapods, the two of the seven pairs of locomotive organs become jaws, or are turned over to the head.

Again, among Decapods, or ten-footed Crustaceans, the prime difference between the crab and the lobster or shrimp is, that in the former the head of the latter is shortened, and its parts abbreviated and more compacted together, and the abdomen or tail-portion reduced from great length and great strength (which makes an organ of locomotion) to a very short, narrow, and feeble organ packed away under the rest of the body. There is concentration and compacting of the whole structure—a shortening in before and behind—on an extraordinary scale, and thus the crab exhibits its higher grade of cephalization.

Again, an insect and a crab are both Articulates, and are built on a common fundamental type of structure. At the same time, the insect, though very much the smaller, is greatly higher in degree of cephalization. The head and thorax of the insect answer together to the *head alone* of the crab, its three pairs of jaws and three pairs of legs corresponding to simply the six pairs of jaws in the Decapod. Thus, abbreviation before and behind, and concentration of the system, are here carried to an extreme perhaps not exceeded in the whole animal kingdom. We appreciate this when we consider the minuteness of the brain—or, more properly, of the cephalic ganglion—of a bee or an ant, and the wonderful instinctive intelligence, and also mechanical power, which proceed from it.

The varieties of the human race afford other illustrations of the principle of cephalization. The lower races of men have projecting jaws, a retreating forehead, and generally a head elongated behind. With upward progress in cephalization, the jaws shorten in, and the head changes in proportions from elongation hindward to fulness in front, with increasing breadth and height and verticality of forehead. There is an increase of head-power accompanying this shortening before and behind, and the bringing of the mouth directly under the vertical forehead; and all is an effect of upward progress in cephalization. It has been stated by American dentists that it is not uncommon for the outer incisor to be crowded out, and the posterior molar to fail of development; and this, if true, may be a direct effect of the shortening of the jaws still going on. Whether so or not, it is certain that the jaws of man are made short through the rejection of twelve of the forty-four teeth that belong to the typical mammals, man having but thirty-two, so that the progress in cephalization of the mammalian

type has apparently forced out three from either side of either jaw—viz. one incisor and two premolars. Another effect of cephalization, or concentration headward, in the highest type of mammals has been a shortening of the arms, the arms being extra long in the apes, man-apes included. Dr. B. A. Gould found in his measurements of soldiers (to which work he was called by the Christian Commission during the war) that the negroes had the arm on an average an inch longer than the whites. We may hence conclude that cephalization has presided over the greater part of the changes in form which man has undergone in passing from the savage to the civilized state.

It follows from the facts that have been presented, that if the animal races have made progress through the ages as a consequence of a struggle for life and natural selection, as claimed by Darwin, or if there has been any system of natural causes at the basis of evolution, the progress must have been subordinated to this law of cephalization. The brain is the part of an animal that, in one way or another, comes most into contact with the outer world; for all the senses react upon it, and hence all outside influences and the whole constitution of the being bear upon its condition. It would be likely, therefore, to undergo modifications for better or worse according as the conditions favor progress or the reverse. This may not unfrequently be the source of new varieties of animals—that is, the means by which an impress is made on the embryo and a new variety initiated.

The evidences of the connection of grade, and also of classification, with cephalization, might be traced through all the grand divisions of the animal kingdom. But to give full illustrations of the subject in the various departments of zoology would require a mention of details that would here be out of place. Sufficient has been brought forward to explain the principle, and give some idea of its importance. J. D. DANA.

Cephalo'nia [anc. *Cephallenia;* Gr. Κεφαλληνία], the largest of the Ionian Islands, and now constituting one of the nomarchies of the kingdom of Greece, is in the Mediterranean near the W. coast of Greece. It is about lat. 38° N. and lon. 20° 30′ E. The greatest length is 32 miles, and the area 300 square miles. The surface is mountainous, the climate is pleasant, and the soil is mostly thin. The highest summit rises about 5000 feet above the level of the sea. The chief articles of export are currants and olive oil. The principal towns are Argostoli and Lixuri. There are many ancient ruins upon the island. This island was called *Samos* by Homer. Pop. in 1870, 77,382.

Cephalop'oda, or **Ceph'alopods** [from the Gr. κεφαλή, "head," and πούς (gen. ποδός), the "foot," because the "arms" or "feet" surround the mouth], the highest class of the Mollusca, including the cuttle-fishes, nautili, argonauts, ammonites, etc., all marine and carnivorous, and all laterally symmetrical, having a shell usually straight, but sometimes coiled in a vertical plane. The nautili and argonauts alone have external shells, though many extinct species had them; but the other living species have generally an internal shell, of which "cuttle-fish bone" affords an example. The cephalopods have muscular arms or tentacles, used in prehension and locomotion; many have fins, and all have the power of locomotion by forcibly expelling water from the gill-chamber. They generally have two large eyes, ear cavities, each containing an otolite, two jaws, and a fleshy, spinous tongue. The nervous system is well developed. The brain is a peri-œsophageal ring. The gills are either two or four in number, placed in a chamber into which water is admitted by a slit, and from which it is expelled through a "siphon" or "funnel." The class is divided into two orders—Dibranchiata and Tetrabranchiata, 2-gilled and 4-gilled cephalopods.

The Dibranchiata are swimmers, having (except the argonauts) an internal shell, or rarely none at all; eight or ten arms, with suckers and sometimes sharp hooks upon them; and an ink-bag filled with a dark fluid for coloring the water, concealing the animal in times of danger. The Dibranchiata are divided into octopods, having eight arms only (argonauts and Octopodidæ), and decapods, having ten arms, two of which are longer and used as tentacles (squids, belemnites (fossil), cuttle-fishes, and spirulæ).

The Tetrabranchiata are mostly extinct. They have external chambered shells, are creepers instead of swimmers, have four gills instead of two, have very numerous arms, eyes on a stem instead of being sessile, and have one heart with a single chamber, while the Dibranchiates have also two gill-hearts. The Tetrabranchiata have no ink-bag. The *Nautilus* proper (not the argonaut or paper nautilus) is the only living genus. The fossil species are very numerous, and include Nautilidæ, Orthoceratidæ, and Ammonitidæ.

Cephalop'tera [from the Gr. κεφαλή, the "head," and πτερόν, a "fin" or "wing"], a genus of cartilaginous marine fishes belonging to the ray family, and including the *Cephaloptera vampirus,* called sea-devil or vampire, sometimes weighing several tons. It is much wider than it is long, measuring some seventeen feet by ten. Each side of the head has a pre-cephalic fin coiled upon itself in the shape of a horn. It is sometimes found on the southern coast of the U. S., and is said to have been known to seize the cables of small vessels and tow them for miles at a great speed.

Ce'pheus, a constellation of the northern hemisphere, comprises about thirty-five stars, the largest of which is Alderamin, a star of the third magnitude.

Cerac'chi (GIUSEPPE), a skilful Italian sculptor, born about 1760, came to Philadelphia in 1791, and executed fine busts of Washington, Alexander Hamilton, and others. Among his works is a statue of Bonaparte. As an accomplice of Arena in a conspiracy against the life of Bonaparte, he was executed in 1802.

Ceram', or **Zeram',** an island of the Malay Archipelago, is the largest of the Moluccas except one. It is between Booroo and Papua, about 3° S. of the equator. Its length E. and W. is nearly 200 miles, and its area about 6500 square miles. Pop. 67,000. It is partly occupied by mountains, the highest points of which rise 8000 feet or more above the level of the sea. The vegetation here is luxuriant, and the highlands are mostly covered with forests. The clove and nutmeg grow wild in Ceram, which also produces the sago-palm in abundance. The lowlands are peopled by Malays, who are bold sailors and pursue trade. The mountains are inhabited by fierce Alfooroos. The Dutch claim the sovereignty of this island.

Ceramia'ceæ, a natural order of cryptogamous plants, or a sub-order of Algæ, consisting of sea-weeds of a rose color, with fronds formed of cells arranged in rows or in a single row; the sporocarps contain cells or spores, often in fours, with a transparent perispore, and enclosed in receptacles. They are found in the seas of the northern temperate zone. Many of them are beautiful, and some species afford food, as dulse and CARRAGEEN (which see). The edible birds' nests of the Chinese market are supposed to derive their value from a plant of this order.

Ceram'ic [from the Gr. κέραμος, "potter's clay," an "earthen vessel" or "pottery"], pertaining to pottery, fictile. The term ceramic art is applied to the department of plastic art, which comprises all objects made of baked clay, as vases, urns, bassi-rilievi, etc.

Cerami'cus [Gr. Κεραμεικός; see last article], a place near Athens and without the walls where citizens who fell in battle were buried at the public expense; the potter's field or quarter.

Ceras'tes [from the Gr. κέρας, a "horn"], or **Horned Snake,** a genus of venomous serpents of Northern Africa, having a flattened head, two rows of plates under the tail, and keeled but not spinous scales. The nostril is small and semi-lunar. Its name is derived from the horned scale which grows upon the eyelids of the male. Several deadly species of *Clotho* of West and South Africa have somewhat similar horns, and are by some included in this cognate genus.

Cerastes.

Ce'rate [Lat. *ceratum,* from *cera,* "wax"], a compound of wax with other oily and medicinal substances in such proportions as to have the consistence of an ointment. Simple cerate is made by melting together equal parts of white wax and olive oil; they are to be heated together, and carefully stirred into a uniform consistence while cooling.

Cerati'tes [from the Gr. κέρας, a "horn," and λίθος, a "stone"], a genus of fossil Ammonitidæ characteristic of the trias formation, to which it is peculiar. It is distinguished by having the lobes of the sutures serrated, while the intervening curves, directed towards the aperture, are simple.

Cer'berus [Gr. Κέρβερος], the triple-headed dog which, as the ancient Greeks imagined, guarded the portal of the infernal regions. He resisted only those who attempted to come out of Hades. Hercules is said to have overpowered him and dragged him out. The name Cerberus was given by Hevelius to a northern constellation.

Cerca'ria, the larval form of various trematode worms (*Distoma, Bilharzia,* etc.). The perfect worm deposits an egg, which hatches into a curious little sac, formerly known as *Opalina,* itself often entozoic, and once believed to be

an infusorian. The opalina in turn gives birth by internal gemmation to one or more *Cercariæ*, which are oval tailed organisms which swim actively in water, and finally enter, if possible, into the bodies of insect larvæ, mollusks, fishes, etc., and are thus often indirectly, or in many cases directly, introduced into the stomachs of men and various vertebrate animals. Here they become developed into trematode worms.

Cer'cis Canaden'sis, Red Bud, or **Judas Tree,** a small tree of the natural order Leguminosæ, is a native of the U. S., and is cultivated as an ornamental tree. It has cordate, pointed leaves, and red-purple flowers in umbel-like clusters. It flowers early in the spring, before its leaves are opened. (See JUDAS TREE.)

Cercoce'bus [from the Gr. κέρκος, a "tail," and κῆβος,

Cercocebus fuliginosus.

a "monkey"], a genus of long-tailed African monkeys, collectively called "mangabeys" by Buffon. They are remarkable for their ludicrous antics, their almost constant grotesque grinning, and their general good temper. The sooty monkey (*Cercocebus fuliginosus*) is the best known.

Cercopithe'cus [from the Gr. κέρκος, a "tail," and

Cercopithecus cynosurus.

πίθηκος, an "ape"], a genus of small, long-tailed African monkeys of the family Simiadæ. The species are very numerous. They have mostly long hair, and long and large tails, which they carry over the back. They are collectively called guenons by some authors. One of the best known is the malbrouck (*Cercopithecus cynosurus*), or dog-tailed monkey.

Cère, a river of Southern France, noted for the picturesque beauty of its valley, flows through Cantal and Lot, and enters the Dordogne. It is about 55 miles long.

Cere'a, a market-town of Italy, in the province of Verona, in Lombardy, 19 miles S. S. E. of Verona. It has the ruins of an ancient castle. Pop. 5518.

Ce'real [Lat. *cerealis*, from *Ceres*, the goddess of agriculture]. Originally, *cerealis* signified pertaining to Ceres or sacred to Ceres. Bread or grain was called *cerealia munera* ("cereal gifts," or "gifts of Ceres"). In modern language, cereal means pertaining to edible grain or breadstuffs, as wheat, rye, maize, and barley; as a noun it denotes those articles of food.

Cerea'lia, or **Cereal Plants,** the plants which produce edible grains, and are cultivated for their seeds, which are used as breadstuffs. With the exception of buckwheat, they belong to the order Graminaceæ (true grasses), but differ widely in structure and characters. Having been cultivated from a very remote antiquity and modified by cultivation, their original forms and native countries cannot be ascertained. Difficulty is found in arranging the numerous varieties in their proper species. The most important cereal grasses are wheat (*Triticum*), barley (*Hordeum*), maize (*Zea*), rye (*Secale*), rice (*Oryza*), and oats (*Avena*). Rice is the chief food of a greater number of the human family than any other grain, but wheat is generally admitted to be superior as a material for bread to all the other cereals. Maize will thrive in regions which are too warm for wheat. The cereal grains are extensively used in the manufacture of fermented and distilled liquors.

Cerebellum. See BRAIN, by PROF. HENRY HARTSHORNE, A. M.

Cer'ebro-spi'nal Flu'id, a serous liquid, of alkaline reaction, containing a small percentage of saline and animal matters. It fills the subarachnoid space, between the arachnoid membrane and pia-mater, both within the skull and the vertebral canal. It prevents injury from concussions and shocks, and perhaps prevents undue pressure upon the brain by withdrawing itself into the spinal canal at times when the brain contains more blood than usual. In certain diseases it is secreted in great excess.

Cerebro-spinal Meningitis. See MENINGITIS.

Cere'do, a post-village of Wayne co., West Va., on the Ohio River, about 12 miles S. E. of Ironton (O.). It has a manufactory of glass bottles. Pop. including Ceredo township, 1297.

Cereop'sis, a genus of Australian geese, extremely common on the continent and islands of its native region. They are large and easily domesticated, but are quarrelsome, and when tamed are so fierce and so tyrannical in the poultry-yard that they have not been generally bred. Unlike other geese, they seldom seek the water. The *Cereopsis Novæ Hollandiæ*, or Cape Barron goose, is the best known species.

Ce'res, the Roman name of the goddess of agriculture, whom the Greeks called DEMETER, and to whom men were supposed to be indebted for the gift of breadstuffs. She was said to be the daughter of Cronos (Saturn) and the mother of Proserpine. The most remarkable part of the myth of Ceres was the abduction of her daughter by Pluto, and the long search which Ceres made for her. (See PROSERPINE.)

Ceres, the name of an asteroid discovered by Piazzi at Palermo in Jan., 1801. It was the first asteroid ever discovered. Its apparent size is nearly equal to that of a star of the seventh magnitude.

Ceres, a township of McKean co., Pa. Pop. 798.

Ceres'co, a township of Blue Earth co., Minn. Pop. 313.

Cérésole (PAUL), a Swiss statesman, born Nov. 16, 1832, son of a clergyman, studied law in Lausanne. He held several offices in the cantonal government of Vaud, and became a member of the Swiss Federal Assembly in 1870, of which he became vice-president in 1872, and president in 1873. He was identified with a movement by which the central government was greatly strengthened.

Ce'reus, a genus of plants of the order Cactaceæ, comprises about 100 species, some of which have beautiful flowers. The *Cereus speciosissimus*, a native of Mexico, is cultivated in greenhouses. Its flowers are large and of a fine scarlet color, and its fruit, when well ripened, is delicious. The night-blooming cereus (*Cereus grandiflorus*), a native of South America, bears large, beautiful, and fragrant flowers, which expand and fade in the course of one night. It has been used in medicine as an antispasmodic.

Cerigno'la, an episcopal town of Italy, in the prov-

ince of Foggia, 24 miles S. E. of Foggia. It has a college and several convents; also manufactures of linen. The Spaniards gained here a decided victory over the French in 1503, and the French commander, the duke of Nemours, was killed in that action. Pop. 17,242.

Cer'igo [anc. *Cythera;* Gr. Κύθηρα], one of the Ionian Islands, now constituting, with the neighboring small islands, an eparchy of the nomarchy of Argolis and Corinth, in the kingdom of Greece, is in the Mediterranean, and is separated by a narrow strait from the Morea. Area, 107 square miles. The surface is mountainous and rocky. The soil is not rich, but produces some wheat, olives, grapes, etc. Here is a remarkable stalactitic cavern. The ancient *Cythera* was sacred to Venus, and said to be her favorite residence. Capital, Capsali. Pop. in 1870, 10,637.

Cerin'thus [Gr. Κήρινθος], a heretic who lived in Asia Minor and Syria between 50 and 100 A. D. He was the founder of a sect called Cerinthians, and appears to have been a Gnostic. He taught that the righteous shall arise from the dead and enjoy a millennium in this world. The statements of the early Christian writers on the subject of his doctrines are contradictory. It is supposed that St. John wrote his Gospel to confute the errors of Cerinthus.

Ce'rite, or **Och'roite,** a name of a mineral which contains a silicate of cerium, and is found in Sweden. It occurs in granular pieces of a clove-brown, cherry-red, or gray color, and has a splintery fracture and adamantine lustre. It contains in 100 parts—peroxide of cerium, 26.55; oxide of lanthanum, 33.38; silica, 16; carbonic acid, 4.62; peroxide of iron, 3.53; alumina, 1.68; lime, 3.56; water, 9.1.

Ce'rium (symbol Ce; equivalent 92), a rare metal which is obtained from cerite. It is not employed in the arts and manufactures, but its oxalate is a valuable anti-emetic medicine in certain cases. Combined with oxygen, it forms two oxides. It is difficult to procure it in a separate or metallic state.*

Cerre'to Sanni'ta, a town of Italy, in the province of Benevento, is on a slope of the Apennines, 22 miles N. E. of Capua. It has a cathedral with fine paintings, a collegiate church, and manufactures of coarse woollen cloth. Pop. 5168.

Cer'ro-de-Pas'co, or **Pasco,** a town of Peru, department of Junin, is 138 miles N. E. of Lima, and 13,673 feet above the level of the sea. It is ill-built and irregular. The population is variable, and consists of miners. Here are rich silver-mines. Pop. 14,000.

Cer'ro Gor'do, a county in the N. of Iowa. Area, 576 square miles. It is drained by Shell Rock River and Lime Creek. The surface is undulating; the soil is fertile. Corn, wheat, and wool are staple crops. It is intersected by a branch of the Milwaukee and St. Paul R. R., and by the Central R. R. of Iowa. Capital, Mason City. Pop. 4722.

Cerro Gordo, a post-village, capital of Holmes co., Fla., 105 miles W. N. W. of Tallahassee, on the navigable Choctawhatchie River. Pop. 672.

Cerro Gordo, a post-township of Inyo co., Cal. P. 474.

Cerro Gordo, a township of Piatt co., Ill. Pop. 1650.

Cerro Gordo, a celebrated battle-field and mountain-pass in Mexico, through which the National road from Vera Cruz to the city of Mexico passes. Here Gen. Scott defeated a greatly superior force of Mexicans under Santa Anna, April 18, 1847. Following up his success at Vera Cruz, Scott's army had arrived at Plan del Rio, a small plain 50 miles from Vera Cruz, when intelligence reached him that the pass of Cerro Gordo had been fortified by Santa Anna. The level ground terminates at Plan del Rio, from which the road ascends in a long circuit among lofty hills, whose commanding points had been fortified by the enemy. His right rested on a precipice overhanging an impassable ravine, his entrenchments extending to the road, on which was placed a battery. On the other side the lofty and difficult height of Cerro Gordo commanded the approaches in all directions. Half a mile to the rear of this height the Mexican army, numbering upwards of 13,000, with five pieces of artillery, were encamped. Resolving to attempt to turn the enemy's left and attack in rear while threatening his front, Scott caused daily reconnoissances to be made in the hope of finding a route by which to reach the Jalapa road and cut off the retreat of the Mexicans. A road was made through difficult slopes and over chasms, which was only abandoned when a further prosecution of the work would have brought on an action. Scott now determined to gain the Jalapa road by assaulting and carrying the height of Cerro Gordo, and on the night of April 17 issued his plan of battle, which provided for the attack in front of the enemy's whole line of intrenchments, at the same time turning them. At an early hour on the morning of the 18th, Twiggs' (second) division of regulars, already far advanced towards the enemy's left, was to move before daylight and take up position across the National road in the enemy's rear, to cut off retreat towards Jalapa; reinforcements were also provided for for Twiggs; Worth's (first) division to follow at sunrise; Pillow's brigade to march at 6 A. M. along an already carefully reconnoitred road, and hold itself in readiness as soon as the attack on our right commenced to pierce the enemy's line of batteries at a point to be selected by him, and once in the rear of that line to attack the enemy in reverse, or pursue with vigor if the enemy abandoned their line. The cavalry to be held in reserve, also Wall's battery; and, looking to the success of the movement, a vigorous pursuit of the enemy was to be continued until stopped by darkness or fortifications.

This plan of attack was successfully executed. Twiggs was reinforced during the night by Shields' brigade, consisting of one New York and two Illinois regiments. In selecting their ground for bivouacking and an opposing height for a battery, a sharp combat took place, but the height was occupied and a battery of three 24-pounders placed thereon. During the night an 8-inch howitzer was with great difficulty and labor placed opposite the enemy's right battery.

Early on the 18th the general attack commenced. Pillow's brigade twice assaulted the enemy's line of batteries on the left; but, though unsuccessful, they served to distract their opponents; Twiggs' division, storming the strong and vital point of Cerro Gordo, pierced the centre, gained command of all the intrenchments, and cut them off from support; Riley's brigade of infantry pushed on against the main body of the enemy, and the guns of their own fort being turned on them, they fled in confusion; Shields' brigade bravely assaulted the left, carried the rear battery of five guns on the Jalapa road, and rendered important aid in completing the rout of the enemy. At an early part of the engagement Gen. Shields received a severe but not fatal wound, being shot through the lungs. The moment the fate of the day was decided the reserve forces were pushed on towards Jalapa in advance of the pursuing columns of Twiggs' division and Shields' brigade (the latter now under Col. E. D. Baker), and Gen. Patterson was sent to take command. The rout was complete; 3000 prisoners were taken, 4000 or 5000 stand of arms, and 43 pieces of artillery. Our loss in the two days was 431, of whom 63 were killed. The immediate results of this important battle were the occupation of Jalapa the next day, the abandonment of the works and artillery at La Hoya, and the occupation by Worth's division of the castle and town of Perote, with fifty-four guns and immense supplies of ammunition.

Cer'ro Gor'do de Potosi', a famous mountain of Bolivia, is immediately S. W. of Potosí. It contains rich silver-mines. Altitude, 16,150 feet.

Certal'do, a town of Italy, in the province of Florence, is picturesquely situated on the Elsa, 18 miles S. W. of Florence. It was the birthplace of Boccaccio, whose house is still preserved. Pop. 6562.

Certif'icate [from the Lat. *certus,* "certain," and *facio,* to "make"], in law. (1) A writing made by a court, or signed by a judge or officer, giving notice of the existence of certain facts. A certificate of a judge is frequently resorted to for the purpose of determining the amount of costs to be recovered in an action, as, for example, to state whether the title to real property came in question at a trial. (2) A writing issued by any one, though not a judge or officer of court, having the means of knowledge, stating certain facts, such as a "certificate of registry" by custom-house officers setting forth the national character of a ship. Certificates of various kinds became of much importance under the recent stamp acts of Congress, stamps being imposed upon them by law. (See the stamp laws *passim.*)

Certiora'ri [Lat. "to be made more certain"], a writ issued from a supreme court to an inferior court or a special body having judicial powers, such as commissioners, magistrates, assessors of taxes, etc., acting in a summary manner or in a method different from the common law. Its object is to review the proceedings of the inferior court or tribunal, or to remove them before trial and judgment, and it is applicable either to civil or criminal cases. When used as a means of review of an actual decision or determination made by the inferior tribunal, its office is to correct errors made in point of law, rather than to reconsider the subject on matters of fact. Thus, if a board of assessors of taxes should decide that a bank could be taxed under State au-

* This metal takes its name from the planet Ceres, following the analogy of the names Mercury, Palladium, etc. Old writers speak of gold as "Sol," the Latin for "Sun," silver as "Luna," the "Moon." Copper was called Venus; lead, Saturn; tin, Jupiter; and iron, Mars. These terms were used by the alchemists, and seem to have had some reference to astrology.

thority upon that portion of its property which is invested in the bonds of the U. S. government, it would decide a point of law which might, by means of a writ of *certiorari*, be submitted to the various State courts, and finally to the Supreme Court of the U. S. This writ may also be resorted to for the purpose of supplying any defects in the return of its proceedings by the inferior tribunal to the superior court. It may be considered in this aspect as auxiliary to the main purpose of removing the record itself.

Certo'sa di Pavi'a, La, a celebrated monastery near Pavía, in Italy, in the province of Pavía, in the Gothic style, was founded in 1396 by Visconti, the first duke of Milan. Here is a magnificent church 235 feet long, adorned with fine paintings, sculptures, and mosaics.

Ceru'men [from the Lat. *cera*, "wax"], a Latin term denoting the yellow waxy matter secreted by certain glands lying in the passage that leads from the external opening of the ear to the membrane of the tympanum. It possesses a peculiarly bitter taste, and physiologists have believed that in consequence of this property it prevents insects from entering the auditory canal.

Ce'ruse [Lat. *cerusa*], a name of white lead, which is a carbonate of lead, and is extensively used by house-painters, who mix it with linseed oil. It has been employed by ladies as a cosmetic.

Ce'rusite, or **Cerussite,** native carbonate of lead, occurs in fibrous, compact, and earthy masses, and in numerous crystalline forms which may be referred to a right rhombic prism. When pure, it consists of 16.42 per cent. of carbonic acid and 83.58 of oxide of lead, or 77 per cent. of metallic lead. When perfectly pure, it is colorless and transparent, with an adamantine lustre, which is resinous on fractured surfaces. Next to galena, cerusite is the most common ore of lead.

Cerut'ti (Giuseppe Antonio), an Italian Jesuit, born June 13, 1738. His principal work is an "Apology for the Order of Jesuits." He was a friend of Mirabeau, whom he assisted in some of his works. Died Feb. 2, 1792.

Cervan'tes Saave'dra, de (Miguel), a celebrated Spanish author, born at Alcalá de Henares Oct. 9, 1547. He was educated in the universities of Salamanca and Madrid. He enlisted about 1570 in the papal army, and was wounded at the famous naval battle of Lepanto in 1571. Having been captured by the Algerines about 1575, he was detained in slavery at Algiers and endured great sufferings. He was ransomed in 1580, returned to Spain, and served several campaigns in the Spanish army. In 1584 he produced "Galatea," a pastoral romance; the same year he married Catalina de Palacios Salazar y Vozmediano. He afterwards wrote numerous dramas, among which was a tragedy called "Numancia." Some of these were performed with success, but they did not enrich him, and he continued to suffer from poverty. He resided at Seville between 1588 and 1600. His celebrity is founded on a satirical work called "Don Quixote de la Mancha," which was designed to correct the taste of his countrymen, who delighted in the extravagant romances of chivalry. The first part of "Don Quixote" appeared in 1605, and obtained immediate and immense popularity. The second part was published in 1615. Cervantes resided at Madrid from 1605 until his death. Among his other works are his "Novelas Exemplares" ("Moral Tales," 1613), and a poem entitled "Viaje al Parnaso" ("Journey to Parnassus," 1614), which is greatly admired. He died on the same day as Shakspeare, April 23, 1616.

"'Don Quixote,'" says Hallam, "is the only book in the Spanish language which can now be said to possess much of a European reputation. It is to Europe in general what Ariosto is to Italy and Shakspeare to England. Numerous translations, and countless editions of them, in every language, bespeak its adaptation to mankind; and no critic has been found paradoxical enough to withhold his admiration. . . . Few books of moral philosophy display so deep an insight into the mechanism of the mind as 'Don Quixote.' And when we look also at the fertility of invention, the general probability of events, and the great simplicity of the story, we shall think Cervantes fully deserving of the glory that attends this monument of his genius." (*Introduction to the Literature of Europe.*) (See T. Roscoe, "Life and Writings of Cervantes," 1839; Lockhart, "Life of Cervantes," 1822; Pellicer, "Vida de Cervantes," 1800; Ticknor, "History of Spanish Literature," vol. ii.; Mérimée, "Notice sur Cervantes," 1806.)

Cer'via, a town of Italy, in the province of Ravenna, on the Adriatic, 12 miles S. S. E. of Ravenna. It has a cathedral and several convents; also salt-works, from which about 50,000 tons of salt are annually obtained. Pop. 5820.

Cer'vidæ [from *cervus*, a "deer"], a family of animals of which the deer is the type.

Cervin, Mont [Ger. *Matterhorn*], a sublime peak of the Pennine Alps, is on the frontier between Piedmont and Switzerland, and 12 miles W. N. W. of Monte Rosa. It has an altitude of 14,825 feet above the level of the sea. The part which is above the height of 11,000 feet is almost inaccessibly steep, and is described as an obelisk of naked rock. The pass of Mont Cervin is practicable in summer for horses and mules at an elevation of 10,938 feet.

Cesalpi'no, often Anglicized as **Cæsal'pin** (Andrea), an eminent Italian physiologist and botanist, born at Arezzo, in Tuscany, in 1519. He was professor of medicine and botany at Pisa, and became about 1595 physician to Pope Clement VIII. He wrote several medical treatises, among which is "Ars Medica" (1601), and an important work "On Plants" ("De Plantis," 1583), in which he propounded an improved system of botany. He was the first who proposed a natural system of classification on philosophical principles. Died Feb. 23, 1603. (See Fuchs, "Andreas Cæsalpinus," etc., 1798.)

Ce'sar Creek, a township of Dearborn co., Ind. Pop. 556.

Ces'ari (Giuseppe), an Italian painter, sometimes called Il Cavaliere d'Arpino and Giuseppino (Fr. *Le Joséphin*), was born at Arpino or Rome about 1565. He worked mostly in Rome, was patronized by several popes, and was very successful and popular. He was the chief of the conventional school, opposed by the naturalists, the Caracci, Caravaggio, and their scholars. His works display much skill in execution, but are deficient in simplicity. Died in 1640.

Cese'na, a town of Italy, in the province of Forlì, and on the railway between Bologna and Ancona, 18 miles by rail S. E. of Forlì. It is situated on the slope of a hill which is close to the river Savio. It has a cathedral; a Capuchin church, in which is a fine painting by Guercino; a library founded in 1452; and several convents. It has sulphur-mines in the vicinity. Pop. 7777.

Cesenat'ico, a seaport-town of Italy, in the province of Forlì, on the Adriatic, 8 miles E. N. E. of Cesena. It is partly enclosed by walls. Pop. 5725.

Cesnola, di (Luigi Palma), Count, was born near Turin July 29, 1832. He belongs to an old family; his uncle, Count Alarino Palma, who was distinguished in the Italian revolution of 1821, fought for Greek independence, was president of the tribunal at Missolonghi, and a judge of the supreme court at Athens. Di Cesnola graduated at the Italian Royal Military Academy, after having fought in the war of Italian independence, and was afterwards on the staff of General Ansaldi in the Crimea. In 1860 he came to America, and after the battle of Bull Run in 1861 he entered the volunteer service, and was made colonel of the Fourth New York Cavalry. "His regiment entered the service 1200 strong, received 800 recruits, and returned at the close of its term 190 men. Di Cesnola distinguished himself upon many occasions, especially at Perryville, Brandy Station, and Aldie. At the last-named battle his gallantry so impressed Major-General Kilpatrick that he presented him his own sword upon the field. That day he led five charges, and at the last his horse was shot under him; he was wounded, and fell into the hands of the enemy. He was confined many months in Libby Prison, where he acted as military instructor to his fellow-prisoners. He was specially exchanged upon the unanimous request of the officers of his regiment, and was thus enabled to take part in the closing scenes of the war. The war over, he was brevetted brigadier-general, became an American citizen, and received the appointment of consul at Cyprus, where he made a successful resistance to Turkish tyranny. In 1869 he took sides with Greece against Turkey, and in the absence from Cyprus of the Greek consul he acted for him with great tact and discretion, closing in three days the civil and criminal affairs of 300 Hellenic subjects and issuing passports to 500. The Greek population of the island showed the liveliest appreciation of his services, and the president of the Greek cabinet, M. Boulgaris, tendered him the chief command of the Greek cavalry in the event of a war with Turkey."

Such were the distinguished antecedents of Di Cesnola when he began those explorations which have made his name famous wherever the serious art and the scientific investigation of the sources of history are held in honor. Instead of resting in ease in his quiet consular post, his active mind and body sought occupation, and soon found it in the task of exploring the soil of Larnica, a seaport of the island of Cyprus, and long reputed the site of the ancient Citium. Upon reaching Cyprus, Di Cesnola had heard of the great bronze tazza recently discovered at Amathunta, and presented by Napoleon III. to the Louvre. He at once began his researches among tombs that had been opened years before, and was rewarded with

the discovery of many terra-cottas. Besides many statuettes of the crowned Venus, he found a number of little figures bearing plain marks of Assyrian, Egyptian, and Phœnician influences, such indeed as the varying history of the island might have led him to expect to come across; and he now pushed on his diggings eagerly, seeing that the result of them must surely be to throw new light upon the ethnography, history, religion, and art of the East. His excavations were not confined to Larnica. He soon discovered the necropolis of the ancient Idalium, and in these tombs made discoveries of marbles, coins, bronzes, engraved gems, and objects in gold, with hundreds and hundreds of terra-cottas. The mere catalogue of these things would take up many pages of this book; and it does not need to be said that the report of discoveries so important to the historian, the archæologist, and the artist roused an enthusiasm among the learned and cultivated classes everywhere such as has not been known since the discovery of Herculaneum or the later finding of Nineveh.

Di Cesnola kept on his plodding work with high hopes and quiet zeal, and soon made his crowning discovery of the necropolis and temple of ancient Golgos—a discovery made under the very noses of the French archæologists, the count de Vogüé, Mas-Latrie, and others, who had spent several hundred thousand francs in searching for the temple of Venus, but had only succeeded in defining the site of the ancient city, now occupied in part by the village of Athieno. In the temple of Venus, which had been thrown down, were found buried in the ruins a thousand statues, and no less than thirty-four inscriptions in the Cypriote language—a most important addition to our means of studying this tongue, since, according to the duc de Luynes in his "Numismatique et Inscriptiones Cypriotes," Paris, 1852, there existed only three Cypriote inscriptions, and they were not deciphered. It is impossible to state exactly the number of articles brought away from Cyprus by Di Cesnola, and included in the now famous collection known over the civilized world by his name. In Aug., 1870, when the representative of the Russian Imperial Museum examined it, there were about 13,000 pieces, comprising statues and small figures, 1800 lamps, 5000 vases, 2000 coins, 600 gold ornaments, 1700 pieces of glass, 300 pieces of bronze, and 100 inscriptions.

The collection was coveted by every country in Europe; but though Di Cesnola was ready to sell it to any purchaser who would keep it together and call it by his name, the "Di Cesnola Collection of Cypriote Antiquities," yet he desired above all things that it should belong to America—a country to which he was bound by the name of citizen and by tenderest domestic ties. For a long time it seemed most probable that the British Museum would become the purchaser, but as the authorities refused to comply with Di Cesnola's conditions, efforts were made to secure it for America. Mr. Hitchcock, who had been the companion of Di Cesnola in Cyprus, and who warmly desired to see the collection lodged in some institution of America, prepared an admirably complete and interesting account of Di Cesnola and his discoveries, which he first delivered as a lecture in several places, notably in New York before an audience invited by the trustees of the Metropolitan Museum of Fine Art, and also before the students of Dartmouth College. This lecture was afterwards printed in "Harper's Monthly Magazine" for July, 1872, with many effective illustrations. To Mr. Hitchcock, more than to any other American, is due the wide interest excited in our country by Di Cesnola's discoveries. Another American, Mr. W. T. Blodgett, being in London while the British Museum was debating the purchase of the collection, wrote to a public-spirited citizen of New York, Mr. John Taylor Johnston, the president of the Metropolitan Museum of Fine Art, strongly advising the purchase of the whole collection; and Mr. Johnston, who had been already much interested in Mr. Hitchcock's description, directed the purchase by Mr. Blodgett of the whole collection on his own personal account. The bargain was struck without delay, and Di Cesnola came at once to New York, bringing a large part of his noble trophy with him, the rest following not long after. During the whole of the winter of 1872–73, and the greater part of the following summer, he was occupied in arranging, classifying, and cataloguing the articles, some of which had been broken in the transit. After this labor was completed, and the whole made ready for the public, Di Cesnola returned to Cyprus in the autumn of 1873, to take possession of his consular office again and to renew his diggings; the results of which cannot fail to be of the highest interest to the learned and the artistic world. (This article is mainly drawn from Mr. Hitchcock's paper in "Harper's Magazine," above alluded to. See also "L. P. di Cesnola, Generale e Console Americano in Cipro," Di Agostino e Gallo, Vercelli, 1869; and "L. P. di Cesnola in Cipro," Narrazione di Giov. di Agostino Vercelli, 1871. For a fuller account of the discoveries in Cyprus see article Cyprus and the works cited there.) Clarence Cook.

Cespe'des (Manuel Carlos), the leader of the Cuban insurrection, and president of the Cuban republic, born April 18, 1819, was educated at the University of Havana, became a lawyer at Bayamo, issued in Oct., 1868, an address to the Cubans, in which he proclaimed the republic and the independence of Cuba. On April 10, 1869, Cespedes was elected by the Constituent Cortes president of the republic. Killed by the Spaniards Feb. 27, 1874.

Cessart, de (Louis Alexandre), a French engineer, born in Paris in 1719, planned the naval works at Cherbourg, and published a valuable treatise on hydraulic works. Died in 1806.

Ces'sio Bono'rum [Lat., the "giving up of goods"]. This is a proceeding derived from the civil or Roman law, whereby a debtor surrendered his property for the benefit of his creditors. The effect of it in the later law was to exempt the debtor's person from imprisonment. The same phrase is used in modern times to denote the surrender of his property by an insolvent for the benefit of his creditors. It will be observed that it is much more limited in its effect than a modern bankrupt law as adopted in England and the U. S., which not only relieves the debtor from imprisonment, but discharges him, if his assets amount to a certain percentage of his debts, from the residue which they do not suffice to pay.

Cess'na, a township of Hardin co., O. Pop. 732.

Cess-pool, a well for the reception of the drainage of a locality. It is apt to be a source of very unwholesome emanations.

Ces'tius, Pyr'amid of, an antique Roman monument standing close to the Porta San Paolo of Rome, is 125 feet high. It is built of brick and tufa, faced with Carrara marble. The internal walls were decorated with paintings. This pyramid is supposed to have been erected before the Christian era.

Ces'toid Worms [from the Lat. *cestus*, a "band," alluding to their ribbon- or tape-like form], a family of entozoa, including the tapeworms (of which some ten species are found in man) and nearly 200 smaller species, some barely visible, some 100 feet or more in length. They are found in all classes of vertebrate animals, living when perfect in the intestines, but in the scolex or larva state inhabiting the living tissues. Cestoid worms are divided into more or less perfectly marked androgynous or bisexual segments (proglottides), which are formed successively behind the neck of the cestoid, each segment acquiring a sort of individual life. Cestoid worms are remarkable for having no mouth or digestive apparatus; the animal which they inhabit performs the operation of digestion for them, so that they have only to absorb nutriment by osmotic action. Each segment impregnates itself, becomes in time detached, passes out of the intestine, and finally bursts and discharges its numerous ova; which, scattered by wind and water over grass, etc., are devoured by various animals. Then the ovum hatches into a free embryo or "proscolex," which pierces the walls of the intestinal canal, enters the blood-vessels, finds a lodgment in an appropriate tissue, where it encysts itself, and changes into the "scolex" or "hydatid" state, as in "measly pork." Now, if the living scolex is swallowed in food, it is almost sure to develop into the complete tapeworm. Sometimes it imperfectly develops its segments even while in the cystic state, and is then called a strobila.

Cestra'cion, a genus of sharks including the "nurse" or Port Jackson shark (*Cestracion Philippi*) and the cat shark (*Cestracion Zebra*) of the China Sea, interesting to naturalists as the sole surviving relics of the once extensive family Cestraciontidæ, the family of sharks whose remains first appear in the lowest Devonian rocks. They differ from the true sharks in having the mouth at the anterior extremity, instead of under the head, and in having the mouth paved with solid bony plates for crushing their victims.

Cestui que Trust, in law. This is a phrase derived from the Norman French, and means the person for whose benefit property, either real or personal, is held in trust. The phrase grows out of the distinction which English jurisprudence maintains between courts of law and equity.

Property may be owned in such a manner that in a court of law one person will be recognized as the owner, while in the view of a court of equity his ownership will be deemed to be formal and for the benefit of another. The formal owner can in that court be called to an account by the beneficial owner. The legal owner is called a trustee, while the beneficial owner is the *cestui que trust*. Sometimes this relation is created by express words; at other times it is

implied by law from the relations of the parties. There has been an attempt on the part of some legal writers to substitute in the place of the somewhat barbarous term "cestui que trust" a supposed equivalent, "beneficiary." This course has not met the approval of the legal profession, and its members still adhere tenaciously to the ancient form. The topic is of growing importance in law, and the whole subject will be more fully considered under the terms TRUST and TRUSTEE.

Cestui que Vie, in law, a person for whose life an estate in land is granted or devised. An example is an estate granted to A during the life of B. The latter person is termed *cestui que vie*, and the owner is termed *tenant pur autre vie* ("for the life of another"). Though such an estate is a freehold, it is not of so high a character as an estate for one's own life.

Ces'tus [Fr. *ceste*, from the Gr. κεστός, "embroidered"], a girdle or band which women wore round the waist in ancient times. The cestus of Venus was supposed to have the power of exciting love. The gauntlet used by ancient pugilists to protect their hands was called *cestus* or *cæstus*.

Ceta'cea, or **Cetaceans** [from the Gr. κῆτος, a "whale"], an order of mammals characterized by a fish-like form and adapted to strictly aquatic life. Regarded as of a "degradational" type, they are by some associated with the Sirenia in a subdivision called Mutilata. Many writers call the Sirenia "herbivorous cetacea," but some assign them to the pachyderms, while others assign them a position as an independent order. Whatever their position, the extinct Zeuglodontia appear to furnish a connecting link between them and the true Cetacea. (See SIRENIA.) The true Cetacea have the hind legs reduced to two small bones concealed in the flesh, the fore legs transformed into fins; a fish-like tail which spreads horizontally; warm blood; respiration by lungs (though in some species it can be suspended for a considerable time); and the young are born alive and nourished by the mother's milk. The right whales and fin-backs are reckoned as constituting a sub-order called Toothless cetaceans (Mysticete), while the other living species are placed in the sub-order of Toothed cetaceans (Denticete). The restricted order comprises the Balænidæ, or right whale family, the Balænopteridæ, or fin-backs, the Physiteridæ, or sperm whales, the Ziphiidæ, the Delphinidæ, or true dolphins, the Iniidæ and Platanistidæ, or fresh-water dolphins, and the extinct sub-order Zeuglodontia; to which many authors add the sub-order Sirenia or "herbivorous cetacea." Fossil cetaceans first appear in the eocene, and are found in all the cenozoic formations. Nearly all the families are represented by extinct species. Among the more remarkable may be mentioned a huge *Zeuglodon*, whose vertebræ abound in the Gulf States.

Cetot'olites [from the Gr. κῆτος, a "whale," οὖς, ὠτος, an "ear," and λίθος, a "stone"], fossil cetacean teeth and ear-bones found in the red crag of Suffolk (England), belonging to the pleiocene period. They appear to have been washed out of some earlier stratum. They are valuable as a source of superphosphate manure.

Cetraria. See ICELAND MOSS.

Cette, a fortified seaport of France, in the department of Hérault, on the Mediterranean, on a strip of land between the sea and the broad inlet of Thau, the outlet of the Canal du Midi, and on the railway to Bordeaux, 18 miles S. W. of Montpellier. It has a good harbor and a considerable coasting and inland trade, large fisheries, manufactures of made wines, perfumery, glass, soap, etc., large shipyards and salt-works, and the extensive export trade of the Canal du Midi, of which it is the port, and with which it is connected by the canal of Cette across the tongue of land. The harbor is protected by two large moles and a breakwater. The city was founded in 1666. It forms a half circle about the cliff-like hill, on which is the fortress. Pop. 24,177.

Cetti'gne, the capital of the principality of Montenegro, is situated 19 miles E. of the Austrian town of Cattaro, about 3000 feet above the sea. It contains a convent, which was founded in 1458, and is the residence of the bishop; the state prison, and the palace of the prince. In the Peace of Cettigne of Sept., 1862, Montenegro recognized the sovereignty of the Porte. Pop. 700.

Ce'tus [Gr., "the Whale"], a great constellation, one of those called southern by Ptolemy. It contains a number of nebulæ and the variable star Mira, or o Ceti.

Ceu'ta (anc. *Septa* or *Septum*), a fortified seaport-town on the N. coast of Africa and on the Mediterranean, opposite to Gibraltar, which is 17 miles distant. It is in Morocco or Fez, but it has belonged to Spain since 1640. The castle occupies the summit of a mountain which is the ancient *Abyla* and one of the Pillars of Hercules. Ceuta is the chief of the Spanish *presidios* on the African coast. It is the seat of a Roman Catholic bishop, and has several convents and a convict establishment. Pop., without the garrison and convicts, 7114.

Cévennes (anc. *Cebenna Mons*), a mountain-range in the S. of France, forms the watershed between the Rhone and the Garonne. It extends from the vicinity of Carcassonne in a N. N. E. direction to the Canal du Centre. The central mass of the Cévennes is in the departments of Ardèche, Lozère, and Upper Loire. The highest summit is Mont Mezin or Mézen, which has an altitude of 5764 feet. Some of the peaks are extinct volcanoes. These mountains were a stronghold of the Protestants called Camisards, and were the scenes of several religious wars.

Ceylon, see'lon [native *Singhala;* anc. *Taprobane*], an island of Asia, belonging to the British, in the Indian Ocean, about 55 miles from the S. extremity of Hindostan, from which it is separated by Palk Strait. It lies between lat. 5° 56′ and 9° 50′ N., and between lon. 80° and 82° E. Length from N. to S., 271 miles. Area, 24,705 square miles. The southern and eastern coasts are bold and rocky, and present a very picturesque appearance, which is increased by the luxuriant tropical vegetation, the verdant slopes of its mountains, and groves of noble palms draped in perennial green. The surface is finely diversified by mountains, valleys, and plains. The highest summit is Pedrotallagalla, which rises 8280 feet above the level of the sea. The celebrated mountain called Adam's Peak is 7240 feet high, and is remarkable for its conical form and the sacred associations with which it is connected. The Singhalese have a tradition that Booddha ascended to heaven from this peak. The mountains of Ceylon are mostly formed of gneiss and granite, and dolomite occurs in the more level parts of the island. Among the minerals are iron, tin, coal, plumbago, and salt. Many sapphires, rubies, amethysts, and other precious stones are found here. The climate is humid and hot, but more pleasant and moderate than the mainland of India. The average annual rainfall is about eighty inches.

Ceylon is remarkable for the luxuriance and variety of its flora. Among its indigenous trees are the cocoa-palm, palmyra, and other species of palms, the coral tree (*Erythrina Indica*), the bread-fruit, the cinnamon, the satin-wood, and ebony. The bo tree or peepul (*Ficus religiosa*) attains a great age, and is deemed sacred by the natives. Coffee, cotton, rice, tobacco, and pepper are cultivated here. The chief articles of export are coffee, cinnamon, cocoanuts, cocoanut oil, coir, hides, pearls, and plumbago. Among the wild animals found here are the buffalo, bear, deer, leopard, and elephant. The last are very numerous.

The native population is composed mostly of Singhalese, whose historical records, extending back through many centuries, are partially corroborated by existing ruins of cities and temples, which indicate that Ceylon in a remote antiquity was inhabited by a numerous and civilized people. The most celebrated among its monuments is the cave-temple of Dambool, which was built about 100 B. C., and is profusely adorned with images and sculpture. It was dedicated to Booddha. Booddhism is still the prevailing religion of the island. The Roman Catholic Church has two vicariates apostolic, with an aggregate population of 157,000, while the native Christians connected with the Protestant missions number 16,000. There are also many Mohammedans, called Moors. Among the remarkable antiquities of Ceylon are numerous colossal ruined tanks, constructed for the irrigation of the soil.

Among the peoples of the island are the singular Veddahs, one of the most degraded races of mankind. Besides the above races, there are many Kandyans in the interior, and Hindoos, Malabarians, and naturalized descendants of the old Dutch and Portuguese colonists on the coast.

Ceylon has two harbors—Point de Galle on the S. coast, and Trincomalee on the N. E. coast. The latter is one of the finest harbors in the world, and is capable of admitting any number of the largest ships. The Oriental mail-steamers, which ply between England and Calcutta, touch at this island, which has an extensive commerce. The value of the exports from Ceylon to the United Kingdom in 1870 was £3,450,974; of the imports from the United Kingdom, £941,344; public revenue in 1869, £946,494; expenditures, £881,373; public debt, £701,000. In ancient times it was visited for the purpose of traffic by the Egyptians, Greeks, and Romans. The Portuguese formed a settlement at Colombo in 1517, and were expelled from the island by the Dutch and natives in 1658. The British invaded the island in 1795, and captured the Dutch forts and towns. The island was formally annexed to the British crown in 1802. Civil pop. in 1871, 2,405,287. Ceylon is divided into six administrative provinces, called the Western, Central, Southern, Northern, North-western, and Eastern provinces. Cap-

ital, Colombo. (See SIR JAMES E. TENNENT, "Ceylon, Physical, Historical and Topographical.")

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Ceylon, a township of St. Croix co., Wis. Pop. 348.

Cezim'bra, a seaport-town of Portugal, in Estremadura, on a bay of the Mediterranean, 19 miles S. of Lisbon. It has valuable fisheries. Pop. 5797.

Chablais, the most northern part of Savoy, bordering on Lake Geneva. It was the oldest possession of the House of Savoy, and was ceded to France by King Victor Emmanuel in 1860. Capital, Thonon.

Cha'brias [Χαβρας], an able Athenian general, who had command of an army in 392 B. C. In 378 he commanded in a war against the Spartans. He gained a naval victory over the Spartans at Naxos in 376, and was killed at the siege of Chios, where he commanded a fleet, in 357 B. C. He was the inventor of a famous manœuvre, which consisted in receiving a charge in a kneeling posture, with shields resting on the ground and the spears pointed against the enemy.

Chachapoy'as, a town of Peru, capital of the department of Amazonas, 200 miles N. E. of Lima, was founded by Francisco Pizarro in 1536, and was formerly flourishing, but in consequence of the continued revolutions has gradually decreased. It is the seat of a Roman Catholic bishop, and has a theological seminary and a beautiful cathedral. Pop. about 8000.

Cha'co, El Gran, an extensive region of South America, is near the middle of the continent. It is partly in Bolivia and partly in the Argentine Republic. It is bounded on the E. by the Paraguay River, and traversed by the Pilcomayo. The surface is generally level, and the S. portion is said to be an arid and desert plain, but the soil in some parts is fertile. It has few civilized inhabitants.

Chacornac (JEAN), a French astronomer, born at Lyons, France, June 1, 1823. During the years 1853–54 he was in charge of the observatory of Marseilles, and in the latter year was appointed astronomer of the Paris Observatory. He was an astronomer of reputation, and distinguished for his discoveries of asteroids, as well as for his writings on the planetary systems. Napoleon III. made him chevalier of the Legion of Honor 1858. He contributed the atlas to the "Annals of the Observatory of Paris," 1858 and 1863. Died at Paris Sept. 26, 1873.

Chad'bourne (FULL ANSEL), an American naturalist, born at Augusta, Me., in 1823, has been successively professor of natural science in Bowdoin College, Me., and Williams College, Mass., and president of the University of Wisconsin. He has published "Natural Theology" (1868), and other works. He became in 1872 president of Williams College.

Chadd's Ford, a post-village of Birmingham township, Delaware co., Pa., 30 miles S. W. of Philadelphia, on the Brandywine Creek at the junction of the Wilmington and Reading and the Philadelphia and Baltimore Central R. Rs. Near here was fought the battle of Brandywine, Sept. 11, 1777.

Chad'wick (EDWD), an Englishman, noted as a sanitary reformer, was born in the environs of Manchester Jan. 24, 1801. He was appointed secretary to the poor-law board in 1834, and published in 1842 an important "Report on the Sanitary Condition of the Laboring Population." As a member of the new board of health appointed in 1848, he distinguished himself by his efficient efforts to improve the sanitary and social condition of the people, and to reform the distribution of the poor-law funds.

Chære'mon, an Athenian tragic poet, from several of whose dramas passages are quoted by Athenæus, although Suidas in his brief notice of him calls him a comic poet. Little is known of his life, but he is referred to by Ephippus, who seems to speak of him as a contemporary, and he is criticised by Aristotle. He may be placed therefore about 380 B. C. He fell below the dignity of the great tragic poets of the preceding century, and wrote dramas better fitted to be read than to be acted. Ten titles of plays written by him are known, besides the "Centaurus," which is called by Athenæus "drama in many metres," and by Aristotle a "mixed rhapsody of all metres." There are also three epigrams in the Anthology bearing his name. (The fragments of his tragedies are collected in WAGNER'S and in NAUCK'S "Fragmenta Tragicorum Græcorum.")

HENRY DRISLER.

Chære'mon of Alexandria, a Stoic philosopher and historian who flourished in the times of the early Roman emperors. He is often spoken of as librarian of the Alexandrian Library, but this is probably an incorrect inference from the language of Suidas, who calls him the teacher of Dionysius, who was librarian of this library, and who succeeded Chæremon in his philosophical school. He went from Alexandria to Rome to take charge, along with Alexander of Ægæ, of the education of Nero. He wrote a work on hieroglyphics, and one on the history and religion of Egypt, a fragment from which, concerning the Egyptian priests, is preserved, and makes the loss of the rest regretted. He wrote a treatise on comets and a grammatical work. (The fragments of his writings are collected in MÜLLER'S "Hist. Græcorum Fragmenta," vol. iii., pp. 495–499.)

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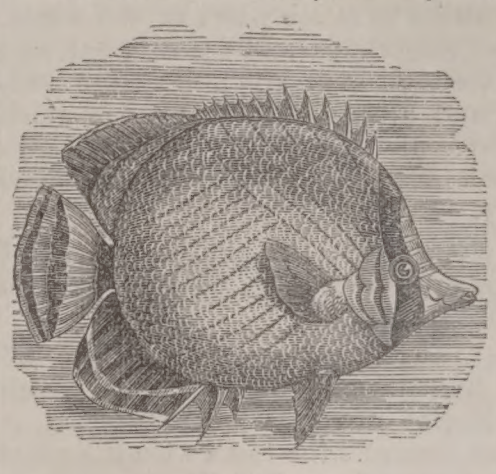
Chærone'a [Gr. Χαιρώνεια], an ancient town of Bœotia, 5 miles N. of Lebadea, was the native place of Plutarch. Here Philip of Macedon gained an important victory over the Athenians and Thebans in 338 B. C., and Sulla defeated the army of Mithridates in 86 B. C. The site is occupied by the modern village of *Kapurna*. A few years ago a colossal lion was excavated from the mound which was raised in honor of the Thebans who were killed in battle here in 338 B. C. This lion is described by Colonel Mure as a "noble piece of sculpture, and the most interesting sepulchral monument in Greece."

Chætodon'tidæ, a family of the acanthopterous marine fishes named *Squamipennes* ("scaly-finned"), because of the incrustation of parts of the dorsal and anal fins with scales. The scales are strongly ctenoid (comb-shaped). The typical genus *Chætodon,* and those nearly allied to it, have hair-like teeth; some of the family, however, have trenchant teeth, and some have teeth both on the jaws and palate. Their colors are often gay, and disposed in stripes or bands. Many singularities of form occur in this family. The flesh of most of the Chætodontidæ is of fine flavor. *Chelmon rostratus* and *Toxotes jaculator,* both Asiatic fishes, are remarkable for catching insects by shooting drops of water at them from their mouths; but some of the latest authorities exclude these fishes from the family, of which the southern coasts of the U. S. have several species.



Chætodon.

Chaff [Lat. *palea;* Fr. *paille*], the common name of the dry and membranaceous scales which constitute the floral envelopes of the graminaceous plants, and enclose the grain or seed. These scales are the glumes and palets (*paleæ*) of botanical language.

Chaf'finch [from *chaff* and *finch,* because the bird searches in chaff for grain], a common European, Asiatic, and African song-bird, the *Fringilla cœlebs,* which devours not only seeds, but young plants, but is very valuable as a destroyer of noxious insects. It is esteemed for the table in Southern Europe, and in Germany is prized for its loud song, in which some birds greatly excel. Good singers are sold for extraordinary prices.

Cha'gres, a small seaport-town of Colombia, on the Isthmus of Panama and on the Caribbean Sea, at the mouth of the Chagres River, about 9 miles W. S. W. of Aspinwall. It is a miserable collection of huts, with a shallow harbor.

Chagrin' Falls, a post-village of Cuyahoga co., O., on the Chagrin River, 17 miles E. S. E. of Cleveland. It has several iron-foundries and paper-mills. Pop. 1016; of the township, 1321.

Chain, or **Gunter's Chain,** in surveying, is a measure twenty-two yards long, composed of 100 iron links, each of which is 7.92 inches long. Ten square chains make an acre = 4840 square yards.

Chain Cable. See CABLE.

Chain Mail, or **Chain Armor,** consisted of hammered iron links connected together in the form of a garment. Such armor, which was much used in the twelfth and thirteenth centuries, was more flexible and convenient to the wearer than that which was formed of plates.

Chains, Hanging in. It was once customary for judges in England to direct the bodies of malefactors, after execution, to be hung in chains upon a gibbet, in order to strike terror into other offenders, and that it might afford "a comfortable sight to the relations and friends of the deceased." An act to abolish the practice was passed July 25, 1834, by Parliament.

Chain-Shot, a name of missiles used in naval warfare, consisting of two balls which are connected by a chain about eight inches long, and are discharged from a cannon.

Chala'za [Gr. χάλαζα, a "hailstone"], in botany, a membrane which unites the nucleus and integuments at the base of the ovule. It often differs in color from the rest of the integuments, and is conspicuous in the ripened seed. The cords which attach the yolk of an egg to the lining membrane at the ends of the shell are also called chalazæ.

Chalce'don [Gr. Χαλκηδών], an ancient Greek city of Bithynia, on the Bosphorus, opposite to Byzantium, from which it was about 1½ miles distant. On all the coins of Chalcedon the name is written Καλχηδών. It was founded 685 B. C., and became a large town, containing numerous temples. The Romans obtained possession of it in 74 B. C., and under the Roman empire it was a free city. The philosopher Xenocrates was born here about 396 B. C. In 451 A. D. a general council of the Church was held at Chalcedon, on the subject of the doctrinal disputes of the Nestorians and Monophysites. This, the fourth œcumenical council, condemned the heresy of Eutyches.

Chalced'ony [Gr. χαλκηδών], a precious stone which was so named because it was found near the ancient Chalcedon, is a beautiful variety of quartz. It is identical with common quartz or silex in chemical composition. It occurs in trap and other rocks in many parts of the world. It is generally translucent, sometimes semi-transparent, and exhibits various colors, among which are milk-white, reddish-white, blue, green, and brown. Chalcedony is much used in jewelry for necklaces, brooches, etc. Among collections of antique gems are many beautiful engraved specimens of chalcedony.

Chalced'onyx, a name given to agates formed of cacholong, or a white opaque chalcedony, alternating with a grayish translucent chalcedony.

Chal'cis [Gr. Χαλκίς], an ancient maritime town of Greece, on the island of Eubœa and on the Euripus, which is here only 40 yards wide, 18 miles N. E. of Thebes. A bridge across the Euripus connects the town with the coast of Bœotia. Chalcis was a city of great antiquity, and retained its importance down to recent times. Its greatness was attested by the numerous colonies which it planted on the coasts of Macedonia, Italy, and Sicily. Its first colony was Cumæ, in Campania, which it is said to have founded about 1050 B. C. Chalcis was successively subject to the Athenians, Romans, and Venetians, and as an important military point was often taken and retaken by armies. It contained numerous temples and theatres, and was about nine miles in circumference. Here the orator Isæus was born and Aristotle died. The site is occupied by the modern Egripo or Negropont, which is the chief town of the island, and has an old castle built on a rock in the middle of the Euripus.

Chalcis, a genus of reptiles found in warm regions in both continents, which gives its name to the family Chalcidæ. This family is by some made to include the glass-snakes, the blind-worms, the amphisbæna, etc., but is generally limited so as to include a few tropical species. Many of these reptiles are popularly considered snakes, but they are really saurians, having generally no visible legs, those members when they exist being in most cases concealed beneath the skin. They have movable eyelids, small ears, and a short thick tongue. In spite of these facts, some few naturalists still class them with serpents.

Chalcis is also the name of a genus allied to the ichneumon-flies, and the type of the great family Chalcididæ. These insects are of great service in the destruction of noxious insects upon which their larvæ feed.

Chaldæ'a [Gr. Χαλδαία], the ancient name of a country of Asia, bordering on the Euphrates and the Persian Gulf, and bounded on the S. W. by Arabia Deserta. Chaldæa proper was the southern part of Babylonia, but the name was sometimes used to designate a more extensive region. The term Chaldæans (or Chaldees) was applied by the Hebrew prophets and other ancient writers to the inhabitants of the city of Babylon and all the subjects of the Babylonian empire. Thus, Isaiah calls Babylon "the beauty of the Chaldees' excellency" (chap. xvii. 19), and Pliny speaks of Babylon as *Chaldaicarum gentium caput.* The Chaldæans appear to have been the great pioneers in the cultivation of astronomy. They were also famous as astrologers and magicians. (See Babylonia.)

Chaldæ'an Chris'tians, a branch of the Church of Rome, consisting of those Nestorians who acknowledge the pope. They are of the Eastern rite, and are under the patriarch of Babylon and twelve bishops, three of whom reside in Persia. They number about 70,000 souls.

Chal'dee Lan'guage, or **East'ern Arama'ic,** a Semitic dialect, in which parts of the books of Daniel and Ezra were written, as well as several verses in Genesis, Judges, etc. It resembled the Hebrew and Syriac. It does not appear to be certain that this was the common language of ancient Babylon. The Targums were written in a later Chaldee. (See Winer's "Chaldee Grammar," and Hupfeld in the "Theologische Studien" for 1830.)

Chal'der, an old Scottish dry measure containing sixteen bolls.

Chaldron, chaul'dron or chau'dron [Lat. *caldarium;* Fr. *chaudron*], a dry measure used for coals, and containing thirty-six bushels. Coal is now sold by weight in the U. S.

Chaleurs Bay, an inlet of the Gulf of St. Lawrence, Canada, separates Quebec from New Brunswick. It extends E. and W. about 90 miles, and is about 22 miles wide at the broadest part. It affords good anchorage, and can be navigated without danger. It has important mackerel fisheries.

Chal'ice [Lat. *calix,* a "cup, a goblet;" Fr. *calice,* a "drinking-cup," a "bowl"]. This term was formerly used as a name for an ordinary drinking-cup, but it is now almost exclusively applied to a communion-cup, a vessel used for the wine in the sacrament of the Eucharist. Chalices are commonly made of silver or gold.

Chalk, chawk [Lat. *creta;* Fr. *craie*], a calcareous earth, a soft variety of limestone or carbonate of lime. Its color is generally white. It is friable, easily pulverized, has an earthy fracture, and is very meagre to the touch. In geology, it is a sedimentary rock of great extent and importance, and a member of the cretaceous formation, which is more recent than the Jurassic and older than the tertiary formation. Chalk is abundant in England and in several other countries of Europe, and good commercial chalk is reported to exist in Dakota. The strata often contain flint nodules, distributed in layers through it like the hornstone in the earlier limestone. They are more or less rounded, and are all of concretionary origin. Chalk is a mineral of animal origin, and is mostly composed of the shells or carapaces of microscopic marine animals. According to Ehrenberg, a cubic inch of chalk often contains more than a million of microscopic organisms, among which far the most abundant are the rhizopods (called also Foraminifera). Chalk is extensively used in the preparation of lime, and is commonly employed by carpenters to mark boards. The material sold under the name of whiting or Spanish white, and used to make putty, is chalk in a purified state. Purified chalk is also employed by artists as a pigment, and is administered in medicine as an antacid. (See Cretaceous System.)

Chalk, Black, also called **Drawing Slate,** a mineral used by artists for drawing and writing, is a variety of clay which derives its color from the carbon which it contains. It is easily cut or broken, and makes a black mark on white paper.

Chalk Bluff, a township of Greene co., Ark. Pop. 1030.

Chalk Level, a post-township of St. Clair co., Mo. Pop. 851.

Chalk, Red, or **Reddle,** is an argillaceous oxide of iron, of a brownish-red color, containing a large portion of clay. It is used by carpenters and painters.

Challenges. See Jury, by Prof. T. W. Dwight.

Chal'mers, a township of McDonough co., Ill. Pop. 1484.

Chalmers (Alexander), a Scottish writer, born at Aberdeen Mar. 29, 1759. He is famous as the author of a "General Biographical Dictionary," in 32 vols. (1812–17), and as the editor of a well-known edition of the British poets, with notes. Died Dec. 10, 1834.

Chalmers (George), a Scottish antiquary and lawyer, born at Fochabers in 1742. He was clerk to the board of trade from 1786 to 1825. His greatest work is entitled "Caledonia: An Account, Historical and Topographical, of North Britain" (3 vols., 1807–24), which displays profound research and much erudition. Among his other works is a "Life of Mary Queen of Scots" (1818). Died in 1825.

Chalmers (Thomas), D.D., LL.D., D. C. L., a Scottish divine, was born at Anstruther, Fifeshire, Mar. 17, 1780, and was educated in the University of St. Andrew's. In 1803 he was ordained minister of the parish of Kilmany. His favorite studies for some years before and after this event were mathematics and natural philosophy. He published in 1808 an "Inquiry into the Extent and Stability of the National Resources." While composing an article on "Christianity" for Brewster's "Encyclopædia" in 1809, he examined the evidences of its truth, and acquired convictions which rendered him a more earnest and devout preacher of the gospel. He married Miss Grace Pratt in 1812, and was elected minister of the Tron Church, Glasgow, in 1815. He soon gained distinction as an eloquent and powerful pulpit orator, and delivered a series of dis-

courses on astronomy in connection with religion, which were published in 1817, and were immensely popular. In 1819 he became minister of St. John's parish, Glasgow, in which he established schools and made strenuous efforts to improve the morals of his parishioners. He was appointed professor of moral philosophy in the University of St. Andrew's in 1823, and obtained the chair of theology in the University of Edinburgh in 1828. He published in 1832 a work entitled "Political Economy," and in 1833 his Bridgewater treatise "On the Adaptation of External Nature to the Moral and Intellectual Constitution of Man," which was received with great favor. Dr. Chalmers was the leader of the Evangelical party, which was involved with the "Moderate" party in a contest in relation to patronage. This contest resulted in the disruption of the Church of Scotland in May, 1843. Dr. Chalmers and 470 other clergymen then seceded and organized the "Free Church." He expended the latter years of his life in perfecting his "Institutes of Theology" and in officiating as principal of the Free Church College. He died May 30, 1847. (See "Memoirs of his Life and Writings" (4 vols., 1850–52), published by his son-in-law, Rev. WILLIAM HANNA; FRANCIS WAYLAND, "Memoirs of the Christian Labors of Thomas Chalmers.")

Chalonnes-sur-Loire, a town of France, department of Maine-et-Loire, on the river Loire, here crossed by a suspension bridge, 11 miles S. W. of Angers. Pop. 6505.

Châlons-sur-Marne (anc. *Catalauni* or *Catalaunum*), a city of France, capital of the department of Marne, is on the right bank of the Marne and on the railway from Paris to Strasburg, 107 miles E. of Paris. It is situated in a fertile plain, which is part of the former province of Champagne, and has a stone bridge across the river. It is a bishop's see, and contains a fine cathedral, a botanic garden, and a public library of about 25,000 volumes; also manufactures of cotton, linen, and woollen fabrics. Champagne wine is produced in the vicinity. In the Catalaunian Plain adjacent to Châlons the Roman general Aetius and Theodoric the Visigoth gained a great victory over Attila in 451 A. D. In the early part of the Dark Ages, Châlons was one of the most important commercial cities of Europe, and had about 60,000 inhabitants. In 1857 the celebrated Camp de Châlons was established near Châlons, in which always one or two French army corps were kept for drilling; it was evacuated by the French in Aug., 1870, and entirely abandoned in 1871. Pop. 17,692.

Châlon-sur-Saône, or **Châlons-sur-Saône** (anc. *Cabillonum*), a town of France, department of Saône-et-Loire, is on the right bank of the Saône and on the railway from Dijon to Lyons, 77 miles by rail N. of Lyons. It is at the head of steamboat navigation, and has an active trade, being the eastern terminus of the Canal du Centre, which connects the Saône with the Loire. The chief public buildings are a cathedral founded in the thirteenth century, St. Peter's church, and the town-hall. It has a theatre and a large public library; also manufactures of glass, jewelry, hosiery, linen fabrics, pottery, etc. Pop. 19,982. *Cabillonum* became the capital of Burgundy under Gontran, who died in 593 A. D.

Chalyb'eate [from the Gr. χάλυψ (gen. χάλυβος), "iron" or "steel"], containing iron in solution, applied to waters which are impregnated with iron. There are two kinds of chalybeate water—the carbonated, which contains carbonate of iron, and may be recognized by forming an ochreous deposit of red oxide of iron on the stones near the mouth of the spring; and the sulphated, which contains sulphate of iron (copperas) in solution.

Cham [French for Ham, son of Noah], assumed name of AMEDÉE DE NOÉ, a French caricaturist, born Jan. 26, 1819, studied with Paul Delaroche and Charlet. His first grotesque sketches appeared in 1842, and since then has followed an uninterrupted series in various almanacs, and principally in "Charivari."

Chamæ'leon [Gr. for "ground-lion"], a genus (*Chamæleo*) of saurian reptiles constituting a family (Chamæleontidæ), and according to some writers a separate tribe (Dendrosaura) of lizards. Ten or twenty species are known, of which one is found in Southern Europe. None are American. They have a compressed body, with granular scales in circular bands; the head almost fixed, but the eyes with a wonderful power of motion, each eye being covered by a lid pierced with one small hole; ears concealed beneath the skin; the tail prehensile; the movements extremely slow; the tongue cylindrical and extensile, in appearance resembling a common angle-worm; the toes in two opposable sets, fitted for grasping boughs, etc. Many fables have been related of the chamæleon, such as that it lives upon air, has the power of changing color at will, or assuming the color of the object upon which it is placed. The food of the chamæleon is insects, which it catches by darting out its long, sticky tongue; but its lungs are large, and it has a habit of enormously dilating itself with air. Its changes of color are not altogether voluntary, and it does not appear to assimilate its color to the object upon which it is placed. But its colors are somewhat changeable. This has been explained (1) by the action of the nervous energy, which, as in blushing, may perhaps affect the circulation of the blood in the skin, and it is certain that fear or other emotions will cause the color to change; (2) by the varied amount of air in the animal's lungs; (3) by the action of light; (4) by the presence of two differently colored layers of pigment-cells in the skin, so arranged as to move upon each other and produce various effects of color. It is probable that all these conditions may contribute to the result.

Chamæleon.

It is said that that lack of nervous co-ordination between the two sides which in most animals is only seen in diseased or defective organizations, is either normal to the chamæleon or is very easily produced in it. It is even asserted that one side of the reptile may be awake while the other is asleep. If modern science finds this creature so remarkable, it is not strange that the ancients made the chamæleon the possessor of many marvellous powers.

Chamæleon, of Heraclea on the Pontus, a Peripatetic philosopher, a disciple of Aristotle or Theophrastus. He was the author of several philosophical treatises, chiefly on moral subjects, and of a variety of writings on the ancient Greek poets—*e. g.* Æschylus, Anacreon, Thespis, Homer, Lasus, Pindar, Sappho, Simonides, and Stesichorus. These essays seem to have treated of the lives of the poets, as well as to have entered into the criticism of their works. His commentary on Homer must have been of considerable extent, as the fifth book is referred to by Tatian. Titles of fifteen different works, with a few fragments, are preserved by Athenæus and others. (An account of his life and writings is given by KÖPKE, Berlin, 1856; CLINTON, "Fasti Hellenici," vol. iii., p. 493.)

HENRY DRISLER.

Chamæ'rops, a genus of palms having fan-shaped leaves and flowers in spathes about six to eight inches long. The *Chamærops humilis*, often called palmetto, is the only species of palm indigenous in Europe. The fruit is a triple, spongy drupe, which is edible. The leaves are used for making brooms, hats, and seats of chairs. The fibre of the leaves is a valuable material for cordage and paper, and is imported into France to be used in the manufacture of carpets. The blue palmetto of the Southern U. S. is *Chamærops Hystrix*. Other species of this genus are found in tropical countries.

Cham'ber, an apartment of a house, a private apartment, a lodging-room; a hollow or cavity, as the chamber of the ear. In politics, the term is applied to a legislative assembly, as the (former) Chamber of Deputies in France. The room which the U. S. Senate occupies is called the Senate Chamber. Chamber of commerce is the title of an association or body of merchants which is commonly formed in each large commercial city for the promotion of the mercantile interests and general prosperity of the place.

CHAMBER of a cannon or of a small firearm is a contracted part of the bore at the breech end. The chamber contains the charge of powder, but it is too small to admit the shot or shell. These cavities are of various forms, spherical, cylindrical, conical, etc. Carronades and mortars are usually chambered.

Chamber-Counsel, a lawyer or counsellor-at-law who gives opinions in his private chamber, but does not conduct causes in court.

Cham'berlain [Lat. *camerarius;* Fr. *chambellan;* It. *camerlingo*], an officer attached to the court of a monarch, and who formerly had charge of the private apartments of the palace. He was originally the keeper of the treasure-chamber. The office of chamberlain was one of the grand offices of the Crown in France. The lord chamberlain of England is an officer of high rank in the royal household, and has the function of endorsing the king's answer on petitions presented to him, and often communicates His (or Her) Majesty's pleasure to Parliament and to the council. He has control over all the officers and servants of the royal chambers except those of the bed-chamber. All tradesmen and artificers in the service of the sovereign

are appointed by him. He is a member of the privy council.

The lord great chamberlain, another officer, is an official of the British court of noble birth and holding the title by inheritance. He has charge of the House of Lords during sessions, walks by the right hand of the sovereign in certain processions, and performs many other duties, chiefly of a ceremonial character.

Chamberlain (Joshua L.), LL.D., a distinguished American general and educator, born in Bangor, Me., Sept. 8, 1828. He graduated at Bowdoin College in 1852, entered the volunteer service of the U. S. in 1862, and became a major-general in 1865. He received six wounds while in the army. From 1866 to 1870, inclusive, he was governor of Maine, and in 1871 he became president of Bowdoin College.

Cham'berlen (Hugh), an English physician, born in 1664, practised in London. He invented the obstetric forceps. Died in 1728.

Cham'bers, in law. A judge is said to act at "chambers" when a legal proceeding is carried on before him out of court, either at his office or residence or other convenient place, including the court-room itself. Business done before a judge at chambers, as distinguished from that transacted in court, is increasing in modern times. The codes of procedure in some of the American States expressly provide that certain acts shall be done by the *court*, and others by a *judge*, referring in the last instance to an act done at chambers. Through the same medium a great change has been worked in England in the practice of the court of chancery. Formerly the details of business in that court were transacted by an officer termed "master in chancery," who exercised an almost independent jurisdiction, acting without communicating with the judge until he made his report of his conclusions, which was then submitted to the court as a basis for its decree. By the 16 Vict., ch. 80, the office of master was abolished, and the business formerly committed to him was directed to be transacted under the direction and control of the judge, or, in other words, at chambers. Under this system each of the judges has under his control chief clerks and junior clerks, who act in his behalf in taking accounts and making inquiries, and who are more directly responsible to him than were the masters under the earlier practice. Under the law of 1873 for the reorganization of the English courts (36 and 37 Vict., ch. 66), the duties of chamber clerks after that act goes into effect (Nov. 2, 1874) are to be performed by officers of the court in the permanent civil service of the Crown. The same law also provides for official and special referees, who may, under the direction of a court or judge, perform acts similar to those formerly entrusted to masters in chancery.

T. W. Dwight.

Cham'bers, a county of Alabama, bordering on Georgia. Area, 700 square miles. It is partly bounded on the E. by the Chattahoochee River, and is traversed by the Tallapoosa. The soil is mostly fertile. Cotton, grain, and wool are the staples. This county is intersected by the East Alabama and Cincinnati, the Savannah and Memphis, and the Atlanta and West Point R. Rs. Capital, Chambers Court-house (or La Fayette). Pop. 17,562.

Chambers, a county of Texas, bordering on the Gulf of Mexico. Area, 900 square miles. It is bounded on the W. by Galveston Bay, and intersected by Trinity River. The surface is nearly level. Cotton, corn, fruit, cattle, swine, and sugar-cane are raised. The county is well timbered. Capital, Wallisville. Pop. 1503.

Chambers (Ezekiel F.), LL.D., born in Kent co., Md., Feb. 28, 1788, graduated at Washington College, Md., in 1805, became a lawyer, served in the war of 1812–15, and was made a brigadier-general of militia. He was U. S. Senator from Maryland (1826–35), taking a prominent position; was a judge in the State courts (1834–51), and in 1852 declined the secretaryship of the navy. Died Jan. 30, 1867.

Chambers (George), LL.D., born in 1786 at Chambersburg, Pa., graduated at Princeton in 1804, became a very prominent lawyer, was a member of Congress (1833–37), and became in 1851 a justice in the supreme court of Pennsylvania. He prepared a number of valuable papers on the early history of the State, some of which were destroyed at the burning of Chambersburg in 1863. Died Mar. 25, 1866.

Chambers (Robert), LL.D., a Scottish writer and publisher, born at Peebles July 10, 1802. He became a bookseller in Edinburgh, and wrote several works, among which is "Traditions of Edinburgh" (1824). He entered into partnership with his brother William in 1832, after which they published many cheap and popular works entitled "Information for the People," "Cyclopædia of English Literature," "Papers for the People," "Chambers's Encyclopædia" (1859–68), etc. Died in 1871.

Chambers (William), a Scottish author and editor, a brother of the preceding, was born at Peebles April 16, 1800. He founded Chambers's "Edinburgh Journal" in 1832, and became a partner with his brother in an extensive publishing-house of Edinburgh. They were distinguished for their enterprise and their successful efforts to supply the people with cheap and instructive literature. (See Chambers, Robert.) He was the author of several works, among which is "Things as they are in America." He was chosen lord provost of Edinburgh in 1865.

Cham'bersburg, a post-township of Pike co., Ill. Pop. 788.

Chambersburg, a township of Iredell co., N. C. P. 949.

Chambersburg, the capital of Franklin co., Pa., on the Conococheague and Falling Spring creeks, at the terminus of the Cumberland Valley and Franklin R. Rs., 52 miles S. W. of Harrisburg. It is in the southern portion of the fertile limestone valley between Blue and South mountains. It has three newspapers, a national bank, manufactories of wool, paper, and iron, an academy, a female seminary, and well-conducted public schools. It was settled by the Scotch-Irish. On the 30th of July, 1863, a body of Confederate cavalry under Gen. McCausland entered the town and laid it under tribute of $200,000 in gold or half a million in currency; this demand not being complied with by the inhabitants, McCausland ordered the town to be fired. About two-thirds of the place was destroyed, 2500 persons were deprived of homes, and property to the value of $1,000,000 was destroyed. It has been entirely rebuilt. Pop. 6308.

Jean Cook, Ed. "Repository."

Chambers Court-house, or **La Fayette,** a post-village, capital of Chambers co., Ala., is about 70 miles E. N. E. of Montgomery. Pop. 1382.

Chambéry [It. *Ciamberi*], a city of France, capital of the department of Savoy, is beautifully situated on the river Leysse, in a rich vine-clad valley about 60 miles E. S. E. of Lyons. It is on the railway which connects France with Italy and passes through a tunnel near Mont Cenis. It contains an old castle of the dukes of Savoy, a cathedral, several convents, and a public library. Here are manufactures of silk gauze, lace, hats, etc. It was formerly subject to the king of the Sardinian States, but was ceded to France in 1860. Pop. 18,279.

Cham'bliss (John R.), an American Confederate officer, born in Virginia in 1833; graduated at West Point 1853, and resigned from the army in 1854 to devote himself to agricultural pursuits in Virginia. He was actively identified with the State militia, being colonel, etc. At the outbreak of the civil war he espoused the Confederate cause, and was appointed a brigadier-general, serving with gallantry. At the battle of Deep Bottom, Va., Aug. 16, 1864, while leading a brigade of cavalry, he was killed.

G. C. Simmons, *Clerk Board of Eng'rs.*

Chambliss (William P.), an American lawyer and soldier, born in Virginia; served during the war with Mexico as lieutenant, subsequently captain, Third Tennessee Volunteers. At the close of the war he resumed the practice of his profession at Pulaski, Tenn.; was elected member of the State legislature 1853–54; Mar., 1855, he was commissioned in the army a first lieutenant Second Cavalry, and stationed in Texas, where he was mainly engaged, till 1861, against the Camanches and other hostile Indians; promoted captain Fifth Cavalry April, 1861, and major Fourth Cavalry 1864. He was engaged in the actions of Manassas and Peninsular campaigns of 1862 up to June 27, when, at the battle of Gaines's Mill, after having been wounded six times, he was taken prisoner while leading a cavalry charge. Resigned from the army Nov., 1867, and became superintendent of a railway and mining company in Canada.

G. C. Simmons, *Clerk Board of Eng'rs.*

Cham'blissburg, a township and post-village of Bedford co., Va. The village is 35 miles W. S. W. of Lynchburg. Pop. 3428.

Cham'bly, a county of Canada, in Quebec, has an area of 211 square miles. It is bounded on the E. by the Sorel River, and on the W. by the St. Lawrence, which separates it from Montreal. It is intersected by the Grand Trunk R. R. Capital, Longeuil. Pop. in 1871, 10,498.

Cham'bly Ba'sin, a beautiful post-village of Chambly co., province of Quebec (Canada), at the mouth of the Chambly and St. John's Canal and on Richelieu River, 16 miles E. of Montreal, has an important trade with Lake Champlain, and is the seat of Chambly College. It has a large hospital for the sick and poor, under the care of the Sisters of Charity. Pop. about 800.

Cham'bly Can'ton, a manufacturing village of Chambly co., province of Quebec (Canada), 1 mile above Chambly Basin, at the rapids of the Richelieu, which furnishes water-power for extensive lumber and woollen mills, a foundry, etc. Pop. about 700.

Chambon-Feugerolles, Le, a French town in the department of Loire. Its manufactures consist chiefly of iron and steel fabrics. Pop. 6954.

Chambord, a village and royal château of France, department of Loir-et-Cher, 8 miles E. of Blois. Here is a magnificent château begun by Francis I. in 1526, and finished by Louis XIV. It is in the midst of a beautiful park 21 miles in circumference. This castle was given to Marshal Saxe by Louis XV., and was presented to Marshal Berthier by Napoleon I. In 1821 it was purchased by subscription for the duke of Bordeaux, who is usually styled Count de Chambord. It is surmounted by a great number of turrets and minarets. Its most prominent features are six enormous round towers, each sixty feet in diameter. Pop. 332.

Chambord, de (Henri Charles Ferdinand Marie Dieudonné d'Artois), Comte and Duc de Bordeaux, was born in Paris Sept. 29, 1820. His father was the duke of Berry, a son of King Charles X., who abdicated in his favor in Aug., 1830. Since that date he has been recognized by the French legitimists as the heir to the throne, and has received the title of Henry V. He married in 1846 a daughter of the duke of Módena, but he has no children, and remains the only surviving member of the elder branch of the Bourbon family. He passed many years at the castle of Frohsdorf, near Vienna. He claims the throne by divine right, and avows his devotion to the antiquated political ideas of which the white flag is the symbol. After the deposition of Napoleon III. (1870) he issued a proclamation to the French people, which was not approved even by the royalists.

Chambre Ardente [Fr. "fiery chamber"], an extraordinary court, chiefly held for the trial of heretics, was first convened by Francis I. of France in 1535. Its name was given on account of the unusual severity of its sentences, burning alive being one of its most common punishments. Henry II.'s reign was especially distinguished for the cruelties practised by this court against the Huguenots. The last victim of the Chambre Ardente was one Voisin, executed in 1680, in the reign of Louis XIV., on a charge of sorcery.

Chambre Introuvable, a sarcastic name given to the French Chamber of Deputies which was elected after the second restoration of Louis XVIII., in July, 1815. The majority of it were fanatical royalists, were hostile to the ministry, and supported an extremely reactionary policy. They showed no inclination to repress the outrages committed in the south of France by mobs of royalists and fanatics, who massacred many Protestants and liberals. This chamber was dissolved in 1816.

Chamis'so, von (Adelbert), a poet and naturalist, born in Champagne, in France, Jan. 27, 1781. He removed with his parents to Berlin in 1790, learned the German language (in which all his works are written), and served for some years in the Prussian army. In the capacity of naturalist he accompanied an exploring expedition which sailed from Russia in 1814, and circumnavigated the globe. He wrote several works on natural history, but his reputation rests chiefly on his lyrical poems and ballads, which are very popular, and the highly original tale of "Peter Schlemihl" (1814), translated by William Howitt (1843). Died Aug. 28, 1838. (See J. E. Hitzig, "Leben und Briefe von A. von Chamisso," 2 vols., 1839.)

Chamois [Ger. *Gemse*], a goat-like antelope (*Rupicapra Tragus*) of the mountains of Central and Southern Europe and Western Asia, found especially in the Alps. It is about the size of a large goat, and is remarkable for its great speed, for its ability to leap enormous chasms, and for its delicate power of scent. It is highly prized as food, and chamois-hunting is a favorite though perilous amusement in Switzerland and the Tyrol. Its summer haunts are in the high Alps, near the snow-line. Its skin furnishes true chamois leather, but the article generally sold under that name is made of sheep skin.

Chamois.

Chamois, a post-village of Osage co., Mo. It is situated on the Missouri River and the Missouri Pacific R. R., 100 miles W. of St. Louis. It has one weekly newspaper.

Cham'omile, a name given to several herbs of the order Compositæ, but especially to *Anthemis nobilis* and *Matricaria Chamomilla,* both European herbs closely resembling each other, and nearly identical in order and properties, though the latter is milder, and in Germany is more generally esteemed as a medicine. The one first mentioned is common in American gardens. Chamomile is much used in domestic medicine, has tonic, stimulant, and diaphoretic powers, and was once used as a febrifuge. Its smell is agreeable, and depends upon the presence of a volatile oil. The chamomile flowers imported from England are of the first, those from Germany of the second, species. They are largely, but illegally, used in England in flavoring beer—a practice which is said to be injurious to health.

Chamouni, Valley of, in the French department of Haute-Savoie, a wonderful valley in the Alps, 15 miles long and three-quarters of a mile broad, traversed by a small stream, the Arve, 3400 feet above the sea. It is entered on the N. E., from Martigny, by the Col de Tête Noire, and at the other end by diligence from Geneva, 53 miles distant, through the valley of the Arve. It is enclosed by Mont Blanc and the Aiguilles Rouges and Mont Breven. The glaciers Mer de Glace and Argentière are the most remarkable in Switzerland. This beautiful vale, now visited by innumerable travellers each summer, was scarcely known until it was explored and described by the Englishmen Pococke and Wyndham in 1740. Many peculiar plants grow in the valley, and furnish a remarkably rich-flavored honey. In 1099 a Benedictine monastery was established at the village Chamonix or Prieuré. In early times this region was known as *Les Montagnes Maudites*—a name still retained for the roughest part between the Dome of Mont Blanc and the Mer de Glace.

Champagne, a former province in the N. E. part of France, was bounded on the E. by Lorraine and on the S. by Burgundy. It was drained by the Marne, Seine, Aube, and other rivers. It is now mostly comprised in the departments of Marne, Aube, Ardennes, Haute-Marne, and Yonne. The surface is diversified with plains and hills, on which latter is grown the famous Champagne Wine (which see). In the twelfth century Champagne was independent or governed by native princes. Thibaud, count of Champagne and king of Navarre, who died in 1253, was the most powerful feudatory of the French king. By the marriage of Philip IV. of France with Joanna, the heiress of the king of Navarre about 1285, Champagne was annexed to France.

Champagne Wine. a name applied to wines of vari-

ous kinds, white or red, still or sparkling, which are produced in Champagne. Of these the sparkling and foaming varieties (*vin mousseux* and *demi-mousseux*) are best known. After the vintage-season this wine stands till December, is then racked off, and fined or purged with isinglass; in the following March it is bottled and corked with care, the bottles being placed with the corks downward, so that the sediment may be drawn off. When this has been removed, some brandy and sugar are introduced, and the bottles are recorked. While this process is going on the breakage of bottles is often very great, and buyers estimate the value of the wines partly by the breakage—the best wines breaking the most bottles.

Even in France, but still more in other countries, a very large part of the so-called champagne wine is factitious, being made of cider, light Rhenish and other cheap wines, and other substances. Happily, in most cases these preparations are quite as harmless, and often quite as palatable, as the genuine product of the Champagne vineyards; for some of the imitations are nearly perfect representatives of the appearance, taste, and bouquet of the original article.

Champagne wine is prized in medicine as a restorative in certain low conditions, especially when the stomach is very irritable and will hardly tolerate any other stimulant, the carbonic acid present acting as a sedative to that organ.

Champagnolle, a township of Calhoun co., Ark. Pop. 505.

Champaign′, a county in the E. of Illinois. Area, 1000 square miles. It is drained by the Sangamon and Vermilion Rivers. The surface is nearly level; the soil is deep and very fertile. A large proportion of the county is prairie. Live-stock, grain, wool, tobacco, and dairy products are extensively raised. Its manufactures are of growing importance, those of carriages, lumber, and flour being at present the largest. It is intersected by the Central, the Indianapolis Bloomington and Western, and the Toledo Wabash and Western R. Rs. Capital, Urbanna. Pop. 32,737.

Champaign, a county in the central part of Ohio. Area, 390 square miles. It is intersected by Mad River. The surface is partly undulating, and in some parts nearly level; the soil is highly productive. Cattle, grain, wool, and dairy products are the most important staples. The manufactures are increasing in extent, those of flour, lumber, and carriages being at present the largest. It is traversed by the Atlantic and Great Western, the Pittsburg Cincinnati and St. Louis, the Cleveland Columbus Cincinnati and Indianapolis, and the Cincinnati Sandusky and Cleveland R. Rs. Capital, Urbana. Pop. 24,188.

Champaign, a city of Champaign co., Ill., on the Chicago division of the Central R. R., 128 miles S. S. W. of Chicago, and on the Indianapolis Bloomington and Western R. R., 48 miles S. E. of Bloomington. The State Industrial University is located at this point, with an attendance of about 600 students. There is a finely improved park of ten acres in the place. Street-cars connect it with Urbanna, the county-seat, 2 miles E. The public library contains about 1000 volumes. There are four banks, eleven churches, three public-school buildings, a young ladies' seminary, and three newspapers. It has increased rapidly in the last decade. Pop. 4625, or, including the township, 5335. Ed. Champaign County "Gazette."

Cham′pak, or **Chum′pac** (*Michelia Champaca*), an East Indian tree remarkable for the beauty of its flowers and foliage. The flowers are of a pale yellow tint, and have a sweet, oppressive perfume, much celebrated in Oriental poetry, and alluded to in the writings of Shelley. This tree is venerated by the Brahmans and Booddhists.

Champ de Mars, a large oblong park or public square in the environs of Paris, between the Seine and the Military School. It is devoted to military exercises and public gatherings, and was the site of the great temporary buildings of the Exposition Universelle of 1867. Its name has a double reference to the *Campus Martius* of ancient Rome and other Italian cities, and to the old Frankish field-meetings for legislative and other purposes, held annually in March or May, and historically known as *Champs de Mars* or *de Mai*.

Cham′perty [remotely from the Lat. *campi pars*, "part of the field"], in law, is the act of aiding a person in the prosecution of a lawsuit or other legal proceeding, with an agreement to share in the proceeds of the litigation or to make some profit from it. It is distinguished from "maintenance," in which there is no such element of gain. The two acts are, however, closely allied, and governed by substantially the same principles. Champerty may present itself either in the civil or criminal law. Criminal proceedings are not frequently prosecuted against champertors, as they scarcely accord with existing public opinion. The topic is of most importance in the civil law. A contract affected by champerty is usually void, though sometimes this rule is modified by statute. It was a doctrine of the English common law, based on this general idea of opposition to champerty, that a right of action cannot be assigned. This proposition has long been discarded in equity courts, both in England and America, and the assignee has been regarded as a beneficiary, and the assignor as a trustee, so that an action can only be brought in a common-law court in the name of the assignor. This mere formality has been abolished in a number of the American States under the lead of the legislation of New York, and the assignee is now permitted to sue in his own name. The old doctrine has been wholly swept away in England during this year (1873), and the assignee is now declared to have the title both in law and equity, acquiring, however, in substance the same rights as before in equity. Accordingly, the assignee can there sue in his own name, and in general act as legal owner (36 and 37 Vict., ch. 66, § 25). There has not been a disposition to extend the doctrine of assignability to pretended titles to land. Should an owner who has been evicted from his land by one claiming title assume to transfer it, the act would be void. This doctrine is recognized in a considerable number of the American States; and even in New York, under the legislation already referred to, the assignee in this case cannot acquire a right to sue in his own name. This doctrine is in part grounded on the opinions of an English statute passed in the time of Henry VIII., and recognized here. The doctrines of champerty would prevent an attorney from entering into an agreement with his client to receive a portion of the subject in litigation as a compensation for his services. This rule has been changed in a number of the American States by legislation, though even there it might be considered as illegal for an attorney to take an assignment of a claim with a view to its prosecution. The rules of the ancient law on this subject would seem to be giving way, and the modern view would seem to tend to allow freedom to deal in rights of action as well as in tangible property. In the progress of time it is probable that scarcely any trace of the old law will remain, except so far as to prohibit attorneys from purchasing claims with intent to collect them, and to prevent combinations or conspiracies to promote litigation, which should be dealt with in the same manner as other conspiracies are treated. (See Maintenance.) T. W. Dwight.

Champfleury, the assumed name of Jules Fleury, a French author, chief of the realistic school, born Sept. 10, 1821. He was a companion of Mürger, Dupont, and De Banville, and produced in 1847 "Chien-Caillu," immediately pronounced by Victor Hugo a chef d'œuvre. Among his numerous works are "Les Excentriques" (1852), "Aventures de Mariette" (1853), and "Les Bourgeois de Molinchart" (1854).

Champigny, a village near Paris, France, on the Marne, was on Nov. 30 and Dec. 2, 1870, the scene of protracted and bloody encounters between the French troops under Ducrot and the Germans. On Dec. 3 the French recrossed the Marne.

Cham′pion [from the Lat. *campus*, a "field" of battle], a person in the Middle Ages, and even in more recent times, who appeared and took part in judicial combats (see Battel) as the hired representative of women, children, feeble persons, and other non-combatants. The practice was of very ancient origin, but the occupation of the professional champion came to be looked upon as very disreputable. In the more romantic periods of chivalry, however, knights and gentlemen might contend, especially with those of their own rank, in behalf of injured ladies and children, and were called champions. The crown of England since the time of William the Conqueror has had a champion at coronations—a mounted yeoman, armed to the teeth, who challenges all who deny the king to be the true sovereign.

Champion, a post-village and township of Jefferson co., N. Y., about 15 miles E. of Watertown, and on the Utica and Black River R. R. Pop. of the township, 2156.

Champion, a township of Trumbull co., O. Pop. 820.

Champion Hills, Hinds co., Miss., about midway between Jackson and Vicksburg, the scene of a desperate struggle May 16, 1863. The forces under Gen. Grant were marching from Jackson, Miss., towards Vicksburg, when they were met at this point by a Confederate force under Gen. Pemberton. A desperate battle of five hours' duration ensued, the Confederates being forced to retire to the Big Black River. The Confederate loss was heavy in men and artillery. The battle was mainly fought on the side of the U. S. forces by Hovey's division of McClernand's, and Lo-

gan's and Crocker's division of McPherson's corps, which suffered heavily in killed and wounded. This battle is also known as Baker's Creek.

Champlain', a county of Canada, in Quebec, is bounded on the S. E. by the St. Lawrence, and intersected by the river St. Maurice. Among its products are oats, flax, and maple-sugar. Pop. in 1871, 22,052.

Champlain, a post-village of Champlain co., Quebec (Canada), on the N. side of the St. Lawrence, 75 miles above Quebec. It has a lighthouse. Pop. about 400.

Champlain, a post-village of Clinton co., New York, on the Chazy River and on the Ogdensburg and Lake Champlain R. R., about 20 miles N. of Plattsburg. It has a national bank, a newspaper, and manufactures of iron, etc. Pop. 1850. Champlain township is on Lake Champlain, at its N. extremity. It contains four villages—Champlain, Perry's Mills, Cooperville, and Rouse's Point. Pop. 5080.

A. N. MERCHANT, PROP. CHAMPLAIN "JOURNAL."

Champlain (SAMUEL), a French navigator and pioneer, the founder of Quebec, was born at Brouage, in France, about 1570. He made a voyage to Canada in 1603, and soon returned to France. In 1608 he ascended the river St. Lawrence to the site of Quebec, where he planted a colony. He discovered Lake Champlain in 1610, after which he passed several years in Canada. He was appointed governor of Canada in 1620. He wrote several narratives of his voyages. Died at Quebec in 1635.

Champlain, Lake, forms part of the boundary between New York and Vermont, and extends from Whitehall, N. Y., northward to Canada. It is about 125 miles long, and is narrow in proportion to its length. The southern half averages less than two miles wide, and in many places is less than a mile. In the northern part, where large islands occur in it, the width is ten miles or more. The greatest depth is about 280 feet. The water of this lake is discharged by the Sorel or Richelieu River, which issues from its N. extremity. The chief towns on its shores are Burlington and Plattsburg. Occupying a basin between the Adirondacks and the Green Mountains, this lake is remarkable for its beautiful and picturesque scenery. Numerous steamboats ply daily between Whitehall and Canada in the summer. A naval battle was fought on Lake Champlain between Gen. Arnold and the British Oct. 13, 1776, in which the latter had the advantage. Sept. 11, 1814, Com. McDonough gained an important victory over the British fleet near Plattsburg. This lake is connected with the Hudson River by the Champlain Canal.

Cham'plin, a post-township of Hennepin co., Minn. Pop. 292.

Champlin (JAMES TIFT), D. D., born in Colchester, Conn., June 9, 1811, valedictorian of the class of 1834 Brown University, where he was tutor 1835–38. From 1838 to 1841 pastor of Baptist church Portland, Me.; from 1841 to 1857 professor of ancient languages in Waterville College (now Colby University); from 1857 to 1872 president of that institution. During his connection with the college (which contributed greatly to its prosperity) Dr. Champlin published an edition of "Demosthenes on the Crown" (1843), "Demosthenes' Select Orations" (1848), "Æschines on the Crown" (1850), "A Text Book on Intellectual Philosophy" (1860), "First Principles of Ethics" (1861), "A Text Book of Political Economy" (1868), besides other works which are in less general use.

Champlin (Gen. STEPHEN G.) entered the U. S. service at the outbreak of the late civil war as major of the Third Michigan Volunteers, was severely wounded at Fair Oaks, became a brigadier-general of volunteers in 1862, and took part in the battles of Antietam and Fredericksburg. Died Jan. 29, 1864.

Champ'ney (BENJAMIN), artist, born at New Ipswich, N. H., Nov. 20, 1817, practised lithography in Boston, and studied art in Europe, which he visited several times. He has painted many landscapes of the Alps and the White Mountains.

Champney (JAMES WELLS), a genre painter, born at Boston, Mass., July 16, 1843, practised wood-engraving and designing, served for a time as a volunteer in the late civil war, taught drawing for some years, practised painting in Europe four years, and returned to the U. S. in 1870.

Champollion (JEAN FRANÇOIS), a celebrated French linguist and Egyptologist, born at Figeac (Lot) Dec. 23, 1790. He studied several Oriental languages in Paris, and became in 1809 professor of history in the academy of Grenoble. In 1814 he published a "Geographical Description of Egypt under the Pharaohs." From the inscriptions on the Rosetta Stone he obtained a key to the mysterious symbols and hieroglyphics of ancient Egypt. His reputation is founded chiefly on this important discovery, which he announced to the Academy of Inscriptions in 1822. In 1824 he published a "Summary of the Hieroglyphic System of the Ancient Egyptians," in which he proves that the phonetic alphabet is the key to the whole hieroglyphic system. In 1828 he visited Egypt, the monuments of which he explored in company with Rosellini. Having spent sixteen months in Egypt, he returned home, and was admitted into the Institute in 1830. A chair of Egyptian antiquities was founded for him in the College of France. He died Mar. 4, 1832. Among his chief works (published after his death by his brother Jean Jacques) are an "Egyptian Grammar" (1836–41) and an "Egyptian Dictionary" (1842–44). The results of the researches of Champollion and Rosellini in Egypt appeared in a great work entitled "Monuments of Egypt and Nubia considered in Relation to History, Religion, etc." (4 vols., 1835–45). Bunsen expressed the opinion that his discovery of the art of deciphering the hieroglyphics was the greatest discovery of the century. (See SILVESTRE DE SACY, "Notice sur Champollion," 1833; ROSELLINI, "Tributo di Riconoscenza alla Memoria di G. F. Champollion," 1832.)

Champollion-Figeac (JEAN JACQUES), a French antiquary, a brother of the preceding, was born at Figeac in 1778. He published, besides other works, "Chronicles of the Greek Kings of Egypt" (1819), a "Treatise on Archæology" (1843), and "Paleographic Documents Relating to the History of Fine Arts and Belles Lettres in the Middle Ages" (1868). He became in 1849 librarian to Louis Napoleon. He edited some posthumous works of his brother. Died May 9, 1867.

Chanahatch'ee, a post-township of Elmore co., Ala. Pop. 1095.

Chance [from the late Lat. *cadentia,* a "fall" or "throw" of the dice], a word popularly used to denote that which happens without special causation or evident design; a convenient term which does not, however, correspond to the real facts of any supposable case. To the religious mind the idea of chance is objectionable, as not harmonizing with the doctrine of the Divine providence; to the philosopher it is equally objectionable, as being inconsistent with the uniform operation of natural laws. The word as used in the expression "theory of chances" is simply synonymous with PROBABILITY (which see).

Chanceford, a post-village and township of York co., Pa., about 40 miles S. E. of Harrisburg and 6 from the Susquehanna River. Total pop. 2501.

Chan'cel [from the Lat. *cancelli,* "lattice-work"], the part of a church where the altar or communion-table is placed, or the portion of a church occupied by the clergy, and usually separated from the nave by a screen of lattice-work. The chancel of Gothic churches corresponds in position to the apsis of the ancient basilicas. In England the term chancel is usually confined to parish churches which have no aisles or chapels around the choir.

Chancellor, a township of Spottsylvania co., Va. Pop. 1446.

Chan'cellor [Lat. *cancellarius;* Fr. *chancelier;* Ger. *Kanzler*], the title of a civil officer of high rank in several countries. The cancellarius was a notary or scribe under the Roman emperors. The chancelier of France was for several centuries one of the most powerful ministers of state and keeper of the seal. His office was abolished about 1790, and the functions of chancellor were transferred to the minister of justice. In the new German empire, established in 1871, the Kanzler is one of the chief functionaries, and Prince Bismarck now holds the office. The British cabinet always includes two ministers of state, called respectively chancellor of the exchequer and lord chancellor. The former acts as minister of finance (see EXCHEQUER), and the latter is keeper of the great seal. (See CHANCELLOR, LORD HIGH.)

CHANCELLOR OF A UNIVERSITY is the chief officer of a collegiate institution, sometimes elected for a term of years, and sometimes for life.

Chan'cellor, an American law officer in some of the American States who has the powers of a court of equity, and whose proceedings are based on the practice and jurisdiction of the English court of chancery. In other States jurisdiction in law and equity is vested in the same court, as in the State of New York, where the supreme court has this compound jurisdiction.

Chancellor, The Lord High, an officer in England who presides over the high court of chancery, and who also has various special powers of a legal nature. He is also prolocutor of the House of Lords. His office is conferred upon him by the delivery of the great seal. There may also be an officer termed "the lord keeper of the great seal," whose functions are substantially the same. The duties of the office are sometimes discharged by commissioners, instead of by a single person, when the great seal

is said to be "in commission." Some of the powers of the chancellor are in that case, by statute, exercised by the senior commissioner. The judicial powers of the chancellor are considerably changed by 36 and 37 Vict., ch. 66, which goes fully into effect on Nov. 2, 1874. After the chancellor then in office ceases to hold it the duties attached to it will be principally of an appellate character, the chancellor becoming president of "Her Majesty's court of appeal," which tribunal will exercise the appellate powers at present vested in the House of Lords and in the judicial committee of the privy council. (See Foss, "Judges of England," CAMPBELL'S "Lives of the Lord Chancellors," and BLACKSTONE'S "Commentaries," for further information.) The chancellor of the duchy of Lancaster may also be referred to in this connection. He has a jurisdiction in certain matters of equity resembling that exercised by the lord chancellor, though not so general in its nature.

Chan'cellorsville, a small village of Spottsylvania co., Va., near the Rappahannock River, about 65 miles N. by W. from Richmond.

On assuming command of the Army of the Potomac Jan., 1863, Gen. Hooker found it in a weakened and despondent condition; its numerical force had been greatly decreased by sickness and desertions, which latter were still frequent. On the contrary the recent successes of the confederates had inspired them with boldness and enthusiasm. Hooker devoted the remaining winter months to repairing the demoralized condition of his army, and gathering back those away from duty; and his efforts were so successful that by April he had not only restored confidence, but by additions found himself in command of a well equipped army of upwards of 120,000 men, composed of (about) 100,000 infantry, 10,000 artillery, and the remainder cavalry, encamped around Falmouth, Va. The confederate army under Lee, which was still encamped on the opposite bank of the Rappahannock, held a line running north-east to south-west, its right wing extending to Port Royal on the Rappahannock, its left wing resting about two miles above Fredericksburg on the same river; thus affording only two lines of retreat—one to Richmond, the other to Gordonsville. Its strength was probably upwards of 60,000 men.

Everything being in readiness Hooker decided to move at once upon Lee. The larger portion of the cavalry was placed under Gen. Stoneman and (April 13) he was despatched in advance of the main army for the purpose of destroying the confederate communications and harassing their retreat which it was deemed must result from the contemplated advance. Owing to frequent rains, which swelled the rivers Stoneman did not get fairly away till the 27th and Hooker gave orders for his general movement to commence the next day.

Gen. Hooker's plan of attack was as follows: His army was divided into seven corps—of these three were to be massed about two miles below Fredericksburg, to cross there and make a bold feint, two of the corps to immediately return and join Hooker; in the meanwhile the remaining four corps were to cross above Fredericksburg.

This plan was successfully executed. The 1st Corps (Reynolds) 3d (Sickles) and 6th (Sedgwick), all under command of Sedgwick, were moved on the 28th to the position assigned them, and on the 29th one division of the 6th crossed the river about two miles below Fredericksburg and drove in the pickets; a division of the 1st crossing about two miles lower down; the other divisions, with the 3d Corps, remaining on the north bank in plain view of Lee's army, whose columns were soon seen coming up from Port Royal. On the 30th Sickles silently withdrew his Corps and proceeded to join Hooker. In the meanwhile the crossing of the Rappahannock above had been going on; the 11th Corps crossed first (28th), followed by the 12th, then the 5th (29th); this column moved along, crossed the Rapidan at Germania and Ely's Ford; both columns then advancing towards Chancellorsville, at the junction of the Gordonsville turnpike with the Culpeper and Orange C. H. plank road. By the evening of the 30th the 2d Corps had crossed and the four corps were massed at the same point and Gen. Hooker had arrived and taken up his headquarters at Chancellorsville. Lee though thus far outgeneraled appears to have been undismayed, and quickly realizing the movement below to be a feint, concentrated his army in front of Hooker, leaving but a small force in his works on the Fredericksburg heights.

Reconnaissances having been made by Hooker on Friday morning (May 1) towards Fredericksburg without opposition, an advance of the 5th and 12th Corps was ordered to be made on two roads leading towards Fredericksburg, which was soon met by the confederates and after a sharp engagement Gen. Hooker ordered the advance to fall back to their intrenchments which in the meantime had been thrown up. The right of Hooker's army was held by Howard (11th Corps) then a division of Sickles (3d Corps), who had now arrived from below, then Slocum (12th Corps) Couch (2d Corps) with Meade (5th Corps) on the left.

During the night and on Saturday a movement of Confederates was observed along Sickles' front and in direction of our right, which being continued Birney (in command 1st div. 3d Corps) reported to Sickles who received orders to make a reconnaissance in force and ascertain the nature of the movement which being promptly executed an engagement soon ensued, mostly skirmishing. From prisoners here captured intelligence was gained that the movement was under command of Stonewall Jackson; it was at once comprehended that it contemplated one of his sudden attacks, and arrangements were immediately made to check it. Sickles was ordered to push on and Williams' division of Slocum's corps to co-operate. This order was executed vigorously and attacked the column moving up the road cutting it in two and Williams had commenced a flank attack on Jackson's right when the furious discharge of musketry announced (5 P. M.) that Jackson's attack had been commenced. Although anticipated, it was believed that the attack would be resisted; but Schurz's division (11th Corps), the first assailed, at once gave way flying in confusion, quickly followed by Devens' (who was wounded) division; the brigades of Bushbeck and McLean gallantly resisting but finally compelled to fall back before greatly superior numbers. The 2d division of the 3d Corps (Berry's) was sent to Howard's aid; the batteries of Captain Best were placed on a ridge across the road and after a short but severe contest succeeded in checking the further advance of Jackson. This disaster compelled the recall of the divisions of Slocum and Sickles; Williams returning found his works partially filled by the confederates; while Sickles with his two divisions found himself with the victorious army of Jackson in his rear and between him and Hooker. He had also about 1000 cavalry under Pleasonton. He had barely got his guns in position, when, at nearly dark, furious and successive charges were made upon his position, all of which were repelled with great loss to the confederates from the artillery of Sickles and Pleasonton which poured their fire into the advancing columns. It was at this juncture that Stonewall Jackson received his fatal wound at the hands of his own men, it is reported; his loss being the greatest the South had yet been called upon to bear. A portion of the ground lost during the day was regained by a successful charge at midnight and communications were restored; during the night Hooker determined to contract and reform his lines. Reynolds (1st Corps) had arrived on Saturday afternoon and was posted on the right with Meade (5th); which portion of the line they fortified strongly during the night; the 11th which had been re-organized were placed on the left in the intrenchments. The army of Lee received strong reinforcements during the night and preparations were made for a fierce conflict the next day (Sunday).

At daylight the attack was renewed, the confederates opening a musketry fire along the whole line; but the great effort was in the same direction as the day before, the possession of the plank road to Chancellorsville; and here they met the same troops which had sustained and repelled their assaults of the day before. Berry's and Birney's divisions (3d Corps) supported by Whipple's (3d) and Williams' (12th Corps) supported the artillery of Sickles, against which the confederates threw themselves again and again only to be cut down and hurled back until Sickles for want of ammunition was compelled to retire to a second line. Sickles had before retiring sent for assistance to enable him to hold his position; but his appeal was unheeded. Hooker had been stunned by a ball which struck a pillar against which he was leaning, and was unconscious at the time, and his appeal was unnoticed. French and Hancock of the 2d Corps had done gallant work, in charging and driving back the confederate left; but Sickles was not reenforced; yet though his ammunition was exhausted he continued to maintain his position, repelling successive charges at the point of the bayonet when he was again compelled to retire, and the whole line was now withdrawn a mile back from Chancellorsville, which position was strongly fortified.

Sedgwick meanwhile (May 2) had received orders to cross the Rappahannock and advance on Chancellorsville until he should come up with the rear of Lee's army which he was to attack simultaneously with Hooker's attack on the front. This order was not received by Sedgwick till nearly midnight but he soon had his corps in motion and by noon had stormed and carried Cemetery and Maryo heights, and after reforming his command moved on the road to Chancellorsville; but he was soon met by the force he had driven from the heights, reinforced by a portion of the army of Lee who being now disengaged from Hooker

turned to check Sedgwick's advance; severe fighting continued till dark Sedgwick being unable to force the confederates from the strong position they had taken; the chance of joining Hooker was now small and the next day made it impossible, for the army of Lee now concentrated against him in large numbers forcing him by night time across the river at Bank's ford he having rescued his corps from its critical position by desperate fighting but with fearful loss.

On the 5th Hooker recrossed his whole army over the Rappahannock without opposition and the terrible struggle was ended. The losses are estimated at about 18,000 on each side.

Stoneman returned on the 8th having been nine days in the rear of Lee's army, and had advanced to within two miles of Richmond but his operations conferred no benefit to the Federal army.

Chance-Medley, in law, the killing of a person in self-defence upon a sudden and unpremeditated encounter or a casual affray.

Chancery, Court of. See COURTS, by GEORGE CHASE, LL.B.

Chan'da, or **Chandah,** a town of Hindostan, on the Upper Godavery, 105 miles by the Peninsular Railway S. of Nagpoor. High stone walls flanked with round towers enclose a space seven miles in circuit, occupied by houses, plantations, and a citadel.

Chandâl'a, the name given in India to a member of the lowest of all the impure classes. (See CASTE.)

Chandeleur Islands, a range of low islands in the Gulf of Mexico, off the E. coast of St. Bernard's parish, La., separating Chandeleur Sound from the Gulf. The sound has also numerous small islands. At the N. end of the northernmost island stands Chandeleur lighthouse, in lat. 30° 3′ 8″ N., lon. 88° 51′ 38″ W. It is built of brick, and is 56 feet high, with a fixed white light.

Chan'deree', a decayed town of India, in Malwah, near the river Betwa, about 110 miles S. of Gwalior. Here is a hill-fort which was formerly deemed impregnable. The ruins seen here indicate former splendor and importance.

Chandernagore, a French town in India, on the river Hoogley, about 20 miles above Calcutta; lat. 22° 50′ N., lon. 88° 23′ E. It was founded by the French in 1676, and for some time rivalled Calcutta, but it is now decaying. It was taken by Lord Clive in 1757, and restored to the French in 1816. Pop. 28,512.

Chand'ler, a township of Manitou co., Mich. P. 190.

Chandler (ABIEL), born at Concord, N. H., Feb. 26, 1777, graduated at Harvard in 1806, taught school eleven years, and became a successful merchant of Boston, Mass. He died at Walpole, N. H., Mar. 22, 1851, and left $50,000 to found the scientific school connected with Dartmouth College, and bequeathed a considerable sum to the New Hampshire Insane Asylum.

Chandler (Prof. CHARLES FREDERICK), PH. D., M. D., LL.D., was born at Lancaster, Mass., Dec. 6, 1836, was educated at the Lawrence Scientific School of Harvard College, at Göttingen, and Berlin, and received the degree of doctor of philosophy in Göttingen in 1856. In 1857 he took charge of the chemical department of Union College at Schenectady, N. Y. In 1864 he was appointed professor of analytical and applied chemistry in the School of Mines of Columbia College, about to be organized in New York, which position he still holds. In 1858 he was appointed to the chair of chemistry in the New York College of Pharmacy, and in 1872 a portion of the duties of the chair of chemistry in the College of Physicians and Surgeons was assigned to him. In 1865 he became chemist to the metropolitan Board of Health, which position he retained till 1873, when he was appointed president of the board. In the same year he received the degrees of M. D. from the University of New York and LL.D. from Union College. In 1869 he was elected a member of the Chemical Society of Berlin, in 1871 of London, in 1872 of Paris. In 1870 he established, with his brother, Prof. W. H. Chandler of the Lehigh University of Bethlehem, Pa., the "American Chemist," a monthly journal devoted to chemical science. Though chiefly devoted to the work of instruction, he has published a number of papers on chemical subjects, among which are "The Inaugural Dissertation," Göttingen, 1856, containing miscellaneous chemical researches; "Report on Waters for Locomotives and Boiler Incrustations," 1865; "Examinations of Various Rocks and Minerals," published in the geological reports of Iowa and Wisconsin; "Investigations on Numerous Mineral Waters of Saratoga, Ballston, Chittenango," etc., and of various waters designed for the supply of cities; as well as papers on the purification of coal-gas, on petroleum, and on milk. Most of these papers have appeared in the "American Chemist" and in the annual reports of the health department of New York.

Chandler (JOHN), born in what is now Monmouth, Kennebec co., Me., then a part of Massachusetts, in 1760. He was the son of parents in the most humble circumstances, and although apprenticed to learn the trade of a blacksmith, he became afterwards, by his own industry and perseverance, very wealthy. On the outbreak of war with Great Britain in 1812, he was commissioned a brigadier-general, being at that time a major-general of militia. He represented his district in Congress from 1805 to 1808, and was U. S. Senator from Maine from 1820 to 1829. Died at Augusta, Me., Sept. 25, 1841.

Chandler (JOSEPH R.), a distinguished philanthropist and diplomat, born in Kingston, Mass., in 1792. He was for several years a member of Congress from Philadelphia, where he was a lawyer and journalist, and was U. S. minister at Naples at the time of the expulsion of the Bourbon monarchy (1858–61).

Chandler (RALPH), U. S. N., born Aug. 23, 1829, in the State of New York, entered the navy as a midshipman Sept. 27, 1845. He served on the W. coast of Mexico during the Mexican war, and participated in several slight engagements with the enemy near Mazatlan. In the sloop-of-war Vandalia at the battle of Port Royal, Nov. 7, 1861, commanded the steamer Maumee in both attacks on Fort Fisher, and was recommended for promotion by Rear-Admiral Porter. FOXHALL A. PARKER, U. S. N.

Chandler (RICHARD), an English antiquary and traveller, born in Hampshire in 1738. He explored Asia Minor and Greece in company with the artists Revett and Pars in 1763–66. They published in 1769 "Ionian Antiquities, or Ruins of Famous Buildings in Ionia." Chandler was the author of "Travels in Asia Minor" (1775) and "Travels in Greece" (1776), which are highly esteemed. Died in 1810.

Chandler (ZACHARY), born at Bedford, N. H., Dec. 10, 1813, became U. S. Senator from Michigan in 1855, and has been twice re-elected.

Chand'lerville, a post-twp. of Cass co., Ill. P. 1047.

Chan'dore, a fortified town of British India, in the presidency of Bombay, is on a hill-range, and commands an important pass about 130 miles N. E. of Bombay. It was taken by the British in 1804. Pop. about 7000.

Chand'poor', a town of British India, in the North-west Provinces, about 75 miles N. E. of Delhi. P. 12,000.

Chang and Eng. See ENG AND CHANG, by PROF. ABRAHAM JACOBI, M. D.

Changarnier (NICOLAS ANNE THÉODULE), a French general, born at Autun April 26, 1793. He served with distinction in Algeria, to which he went in 1830, became a colonel in 1838, and a general of division in 1843. In May, 1848, he was appointed governor-general of Algeria, but before the end of the year he obtained the command of the national guard at Paris and of the first military division. He became a member of the National Assembly in 1849, but continued to command the army or garrison of Paris until 1851. At the *coup-d'état* of Dec. 2, 1851, he was arrested and confined for a short time. He afterwards passed many years in exile. After the outbreak of the Franco-German war he offered his services to the emperor, and although he did not receive a command, he took a leading part in the defence of Metz, and signed, with Bazaine and other generals, the capitulation.

Chang-Chau-Foo, a city in China, in the province of Fo-Kien, 25 miles N. W. from the port Amoy, on a tributary of the Kian-Long-Kiang. The city is surrounded by a wall four and a half miles in circumference. The entrance is over a bridge 780 feet in length, with twenty-two water-passages. In the city is a magnificent Booddhist temple built in the eighth century, which has two towers of seven stories. The streets are unusually broad, and are adorned with fine shops, ornamented arches, and trees. The inhabitants are amiable. There is a considerable manufacture of silk, besides sugar, mirrors, crystal, and quicksilver. The exports consist mostly of tea, sugar, porcelain, and paper. Pop. 1,000,000.

Chang-Choo-Foo, a large city of China, province of Kiang-Soo, 75 miles S. E. of Nankin; lat. 31° 55′ N., lon. 121° 43′ E.

Chang-Sha', a city of China, capital of the province of Honan, on the river Heng-Kiang, about 360 miles N. of Canton.

Chanhas'sen, a township of Carver co., Minn. Pop. 1084.

Chank Shell, the popular name of the shell of several species of *Turbinella,* a genus of gasteropodous mollusks, natives chiefly of the Indian and Pacific oceans. These shells are worn as ornaments by Hindoo women, and some specimens are said to be valued at £100 sterling. More

than two million of them have been exported from Madras in one year. Some of them are used as medicine-cups, and are held sacred.

Chan'nahon, a township and post-village of Will co., Ill., 35 miles E. N. E. of Ottawa and 45 miles S. W. of Chicago. Pop. 1164.

Chan'nel, a port of entry in Newfoundland, is the most western town of any importance in that island. The cod and halibut fishery is carried on here. It is connected by steamers with St. John's, 300 miles distant. It has considerable trade. Pop. 584.

Chan'nel Isl'ands, a group of islands off the N. W. coast of France, belonging to Great Britain, but governed by their own laws. They are the only parts of the dukedom of Normandy now belonging to the English crown. King John in 1204 lost all the rest. The chief islands of the group are Jersey, Guernsey, Alderney, and Sark. The area of the whole is 73 square miles. Pop. in 1871, 90,563.

Chan'ning (Edward Tyrrel), LL.D., an American scholar, born at Newport, R. I., Dec. 12, 1790. He was one of the founders of the "North American Review," to which he contributed many critical and biographical articles. He became professor of rhetoric at Harvard in 1819, and retained that position nearly thirty-two years. Died Feb. 8, 1856.

Channing (Walter), M. D., an American physician, a brother of the preceding, was born at Newport, R. I., April 15, 1786. He studied medicine in Edinburgh, and began its practice in Boston in 1812. He was professor of obstetrics and medical jurisprudence at Harvard from 1815 to 1854. He published several works.

Channing (William Ellery), D. D., eminent alike in the Unitarian ministry and as one of the first of American writers, was born at Newport, R. I., on the 7th of April, 1780. The surroundings of his childhood and early youth seem to have favored the early development of that spirituality and moral dignity which marked his character in after life. He entered Harvard in 1794, where he graduated in 1798 with the highest honors. The oration delivered by him on this occasion was received by the audience with tumultuous acclamations. Soon after this, while living in Richmond, Va., in the capacity of tutor, the evils of slavery seem to have impressed him most painfully: at this time also he writes in a letter (showing that he already looked forward to entering the ministry), "Religion is the only treasure worth pursuing. I consider the man who recommends it to society as more useful than the greatest sage and patriot who adorns the page of history." In the summer of 1800 he returned by sea to Newport, and to the hardships he endured on that voyage may be ascribed the permanent indisposition with which he had to contend during all his after life. In 1802 he took the position of regent at Harvard, meantime continuing his theological studies. In 1803 he became pastor of the Federal Street church in Boston. As a preacher he attained at once a brilliant distinction, and he was soon recognized as standing in the foremost rank of the Unitarian ministry, both as respects eloquence and personal influence. In 1814 he delivered, on the fall of Napoleon, what is perhaps the finest of all his efforts as an orator—viz. a discourse on "The goodness of God in delivering the Christian world from military despotism." In 1820 Harvard College conferred upon him the degree of doctor of divinity. In 1822 he visited Europe, and while in England made the acquaintance of Wordsworth, Coleridge, and many others. The rare sweetness and earnestness of his character caused Coleridge to say of him, "He has the love of wisdom and the wisdom of love." He was deeply interested in the peace movement, to which he lent his support, without, however, taking the extreme ground of entire non-resistance. His "Remarks on the Life and Character of Napoleon Bonaparte," which appeared in the "Christian Examiner" in 1828, probably contributed more than any other of his writings to carry his fame into all civilized countries. Perhaps the greatest of his theological discourses is that on the "Evidences of Christianity," delivered in 1821 at Harvard; the subject has seldom, if ever, been more admirably treated. He gave his earnest sympathy to the anti-slavery and temperance movements, and his last public discourse was in commemoration of the abolition of slavery in the British West India Islands. He died Oct. 2, 1842, and was buried at Mount Auburn.

Channing's range both of thought and study was very large, and he appears to have possessed in an eminent degree that comprehensive sympathy which belongs only to great and gifted natures. He was averse to controversy, fearing to be led or to lead others away, by the excitement of such discussions, from the simple quest of truth. He appears to have been, moreover, most anxious not to bias the convictions of others by his personal influence or by his eloquence, but to leave every mind in the enjoyment of absolute freedom. So deep, indeed, was his sense of the sacredness of the human mind and conscience, that he was unwilling to force them even with the power of irresistible persuasion. He sought, above all, to teach the love of truth, and desired not so much that others should accept his opinions or convictions as that they should be perfectly true to their own.

It has been said, by a writer in "Frazer's Magazine," "Channing is unquestionably the finest writer of the age." His style is always forcible, clear, and elegant, and it often rises into graceful and lofty eloquence. "I do not believe," says Dr. Peabody, "there is a line in all his writings which ever received a different coloring from any thought of its influence on his own reputation. . . . He wrote not for himself, but as one dedicated to truth." His works have been collected in six 12mo volumes, published in Boston (1848), and again in crown 8vo (London, 1855). Some of his writings have also been translated into French and German. (See "Memoirs," by his nephew, W. H. Channing, 1848.)

J. Thomas.

Channing (William Ellery), a son of Dr. Walter Channing, born June 10, 1818, has been connected with various journals, has published several volumes of poems, and has written much prose, including "Thoreau, the Poet-Naturalist" (1873).

Channing (William Henry), a Unitarian minister, a nephew of William E. Channing, was born in Boston May 25, 1810. He graduated at Harvard in 1829, and preached in the cities of New York, Boston, Cincinnati, and Liverpool, England. He contributed to the "North American Review," and published, besides other works, a "Memoir of William Ellery Channing" (3 vols., 1848).

Chant [from the Lat. *cantus*, a "song;" Fr. *chant;* It. *canto*], a name originally given to plain vocal music, especially to such as was used in Christian congregations. It is now limited to such musical compositions as are sung to words which are not metrical, or if metrical words are used, the verbal cadences are not observed in the music. St. Ambrose and Pope Gregory the Great greatly improved the chant, which was, and still is, chiefly used in liturgical worship, though in non-liturgical services passages of Scripture are often chanted in simple harmonies.

The reading of the service in a half-chanting style by the clergyman is called *intonation;* and a somewhat similar method of reading the Scripture in Jewish synagogues is called *cantillation.*

Chantenay, a town of France, in Loire-Inférieure, on the Loire, 1 mile S. W. of Nantes. Pop. 9066.

Chantilly, a beautiful town of France, department of Oise, on the railway from Paris to Amiens, 23 miles N. N. E. of Paris. It has a fine hospital, and celebrated manufactures of blond lace and porcelain. Annual races are held here. Here is a ruined castle which was the residence of the great prince of Condé. This castle, which was one of the finest in France, was destroyed during the Revolution in 1793. The forest contains 6500 acres. Pop. 3322.

Chantil'ly, a post-village of Fairfax co., Va., about 20 miles W. of Washington. On the afternoon of the 1st of Sept., 1862, the right of Gen. Pope's army was attacked by the Confederate army under "Stonewall" Jackson. A severe struggle ensued, which was continued in the midst of a terrific thunder-storm till dark. Gens. I. I. Stevens and Phil Kearney of the U. S. army were both killed in this engagement.

Chan'trey (Sir Francis), an English sculptor, born in Derbyshire April 7, 1781, was a son of poor parents. He learned the trade of carver in Sheffield, and removed to London about 1804, after which he devoted himself to sculpture. He was a pupil of Nollekens, and excelled in portraits and monumental sculpture. In 1818 he was chosen a member of the Royal Academy. Among his best works are a bronze statue of William Pitt in London, a statue of Canning at Liverpool, and a statue of Washington in the State House at Boston, Mass. He was knighted in 1837. Died Nov. 15, 1841.

Chan'try [Fr. *chantrerie*, from *chanter*, to "sing"], a term signifying (1) an endowment or bequest to provide masses to be sung for the soul of the testator or the souls of others; (2) the office or position held by one who celebrates such masses; (3) a chapel erected especially for the celebration of the masses thus provided for. Such chantries are sometimes within, or perhaps more frequently outside, but attached to, some church or monastery, and are often richly adorned with paintings and statuary.

Chanute, a village of Neosho co., Kan. It has one weekly newspaper.

Chanzy (Auguste), a French general, born Mar. 18,

1823, in the department of Ardennes, distinguished himself in the Italian campaign of 1859, became a colonel and commander of a subdivision of the Algerian province of Oran in 1864, and a general of brigade in 1868. In Oct., 1870, he was called to France with the rank of a general of division, and in December he so distinguished himself in the battles near Orleans that the provisional government appointed him commander-in-chief of the Army of the West, consisting of four corps. In Jan., 1871, his army was almost annihilated by Prince Frederic Charles in the battles at Le Mans. In Feb., 1871, he was elected a member of the National Assembly, and in March he was for a time held as a prisoner by the insurgents of Paris. He wrote "The Second Army of the Loire" (1871).

Chapa'la, a lake in Mexico, is an expansion of the Rio Grande de Lerma, and lies on the table-land of Anahuac. It is mostly included in the state of Jalisco. Area, estimated at 1350 square miles.

Chap-Books, the name given to a humble variety of literature which was formerly vended by itinerant chapmen. They were small volumes printed on coarse paper, dealing with popular theology or history, the lives of godly or famous personages, fortune-telling and the reading of dreams, and giant, witch, and goblin tales in verse or in prose. The older black-letter chap-books, without dates, are extremely rare.

Chap'el [Lat. *capella;* Ger. *Kapel;* Fr. *chapelle*], a building erected for the purposes of public worship, but not possessing the full characteristics of a church. In this sense places of worship erected by dissenters are called chapels in England, and the term is also applied to supplementary places of worship in the Established Church, such as parochial chapels, chapels-of-ease, free chapels, and the like. It is sometimes applied to a domestic oratory or to a place of worship erected by a private individual. Chapels-of-ease are structures built to accommodate parishioners who live at a great distance from the church.

Chapel, a township of Talbot co., Md. Pop. 2791.

Chapel, a township of Clarke co., Va. Pop. 1793.

Chapel Hill, a post-village of Orange co., N. C., on New Hope River, 28 miles W. N. W. of Raleigh. It is the seat of the University of North Carolina, founded in 1789. Pop. of township, 2799.

Chapel Hill, a post-village of Washington co., Tex., is on the Houston and Texas Central R. R., 60 miles N. W. of Houston. Pop. 602.

Cha'pin, a post-village of Morgan co., Ill., on the Toledo Wabash and Western R. R. where it is crossed by the Rockford Rock Island and St. Louis R. R., 44 miles W. of Springfield.

Chapin, a township of Saginaw co., Mich. Pop. 258.

Chapin (Alonzo Bowen), D. D., an American Episcopalian divine, born in Connecticut Mar. 10, 1808. He became a lawyer when a young man, but was ordained in 1838, and afterwards became distinguished as an author and editor of religious periodicals. Died July 9, 1858.

Chapin (Aaron Lucius), D. D., an American clergyman, born Feb. 6, 1817, in Hartford, Conn., graduated at Yale in 1837, and at the Union Theological Seminary in New York in 1842. He was professor in the New York Institution for the Deaf and Dumb 1838–43. He was ordained pastor of the First Presbyterian church in Milwaukee, Wis., Jan. 24, 1844, and was inaugurated as the first president of Beloit College, Wis., July 24, 1850, which office he still retains. He received the degree of D. D. from Williams College in 1853, was for some years one of the editors of the "Congregational Review," and has contributed several articles to that and other like journals, and published occasional sermons.

Chapin (Calvin), D. D., an American Congregational divine, born at Springfield, Mass., July 22, 1763, graduated at Yale in 1788, and was eminent for his services in the missionary, Bible, and temperance societies. Died Mar. 17, 1851.

Chapin (Edwin Hubbell), D. D., born in Union Village, Washington co., N. Y., Dec. 29, 1814, educated at the seminary in Bennington, Vt., was made D.D. at Harvard University in 1856, commenced preaching in 1837, first settled over a society of Universalists and Unitarians in Richmond, Va.; removed to Charlestown, Mass., in 1830; thence to Boston in 1846, to New York in 1848, where he is still pastor of the Fourth Universalist church, corner Fifth avenue and Forty-fifth street, one of the wealthiest societies in the city. Dr. Chapin is a powerful and effective pulpit orator, has been a frequent lecturer before lyceums, etc., and has exercised great influence for good. His speech before the Peace Convention at Frankfort-on-the-Main, in 1850, commanded great attention. He is the author of "Moral Aspects of City Life" (1853), "True Manliness" (1854), several volumes of sermons and religious lectures, and some occasional discourses. His "Crown of Thorns" had a large circulation.

Chap'lain [Lat. *capellanus,* from *capella,* a "chapel"], a clergyman attached to a chapel without a parish, to the household of any dignitary or nobleman, to a public institution, regiment, or an army post, or ship of war. Army chaplains once carried the relics of a patron saint at the head of the troops. The U. S. army has both post and regimental chaplains. The U. S. Senate and House of Representatives, as well as most State legislatures, also have chaplains. Many prisons and large almshouses have chaplains attached. The British army and navy have chaplains from the churches of England and Scotland and the Roman Catholic Church. Forty-eight Anglican and six Scottish ministers are chaplains to the British sovereign.

Chap'let [Fr. *chapelet*], a garland or wreath to be worn on the head; the circle of a crown; a string of beads used by the Roman Catholics (see Rosary) by which they enumerate their prayers; in architecture, a little moulding carved into round beads, pearls, olives, etc.

Chap'lin, a post-township of Windham co., Conn. Pop. 704.

Chaplin (Daniel), an American officer of volunteers, born in Bridgeton, Me., Jan. 22, 1820. During the civil war Col. Chaplin displayed admirable qualities, and rose to the command of the first regiment of Maine heavy artillery, which became, through his strict discipline, one of the finest artillery regiments in the defences of Washington. On the opening of Gen. Grant's campaign in 1864, Col. Chaplin's regiment was attached to the Army of the Potomac, and participated in all the battles of that memorable campaign; and it was at the head of his men, in the battle of Weldon R. R., Aug. 20, 1864, that Col. Chaplin was mortally wounded. He was brevetted brigadier and major-general for gallant and meritorious conduct.

G. C. Simmons, *Clerk Board of Engr's.*

Chaplin (Jeremiah), D.D., born at Rowley, Mass., Jan. 2, 1776, graduated at Brown University in 1799, was three years tutor in Brown University, pastor of Baptist church Danvers, Mass., 1802–18, and president of Waterville College 1820–32. Died at Hamilton, N. Y., May, 1841.

Chap'line, a twp. of Jefferson co., West Va. P. 1867.

Chap'man, a township of Clinton co., Pa. Pop. 1301.

Chapman, a borough of Northampton co., Pa. P. 388.

Chapman, a post-township of Snyder co., Pa. P. 1007.

Chapman (Alvan Wentworth), M. D., born at Southampton, Mass., Sept. 26, 1809, graduated at Amherst College, and removed to Appalachicola, Fla., where he attained fame as a botanist. He was a judge of the probate and county courts (1865–66), collector of U. S. internal revenue (1865–66), and collector of customs at Appalachicola (1866–69). The genus *Chapmannia* was named in his honor. He has published "Flora of the Southern U. S." (1860).

Chapman (George), an English poet and translator, born in 1557. He became a resident of London and a friend of Shakspeare and Spenser. He produced numerous comedies and tragedies, and was the first translator of Homer into English verse. His version of the "Iliad" was published in 1598, and that of the "Odyssey" in 1614. These versions have been highly commended by Dr. Johnson, Coleridge, and other critics. Died in 1634.

Chapman (George Thomas), D. D., an Episcopalian minister, born in England Sept. 21, 1786, came to the U. S. in 1795, and graduated at Dartmouth in 1804. He received ordination in 1816, became a popular preacher, and published several volumes of sermons, etc.

Chapman (John Gadsby), an American artist, was born in Alexandria, Va., and received his training as a painter in Italy, which was for many years his home. He executed the painting called the "Baptism of Pocahontas," in the Capitol at Washington, and published a drawing-book.

Chapman (Nathaniel), M. D., born in Alexandria co., Va., May 28, 1780, was educated at Philadelphia and in Europe. In 1804 he settled in Philadelphia, where he was professor of materia medica (1813–16) and of the practice and institutes of medicine and clinical medicine (1816–50) in the University of Pennsylvania. He wrote several medical works, among which was "Lectures on the Theory and Practice of Medicine." Died July 1, 1853.

Chapman (Reuben) was elected governor of Alabama in 1847, and served his term with the sympathy of his party and the respect of all.

Chapman (William), an American officer, born in 1810 in Maryland, graduated at West Point in 1831, and Feb. 20, 1862, became lieutenant-colonel of Third Infantry. He

served chiefly at frontier posts 1831–61; in Black Hawk expedition 1832; at Military Academy as assistant instructor 1832–33; as adjutant Fifth Infantry 1833–38; in military occupation of Texas 1845–46; in the war with Mexico 1846–48; engaged at Palo Alto, Resaca de la Palma, Monterey, Vera Cruz, San Antonio (wounded), Churubusco (brevet major), Molino del Rey (brevet lieutenant-colonel), Chapultepec, and city of Mexico; in Florida hostilities 1857; on Utah expedition 1857–60. In the civil war he served in the Virginia Peninsula 1862; engaged at Yorktown and Malvern Hill; in North Virginia campaign 1862, engaged at Manassas (brevet colonel). Retired from active service Aug. 26, 1863, and chiefly employed in command of draft rendezvous at Madison, Wis., 1863–65, and various special duties.

GEORGE W. CULLUM, U. S. A.

Chap'manville, a post-township of Logan co., West Va. Pop. 924.

Chapoo, a town of China, in the province of Che-Kiang, on the estuary of the Tshen-Tang. Although its harbor is shallow and the tides very rapid, Chapoo has become a place of great commercial importance, as the whole Chinese trade with Japan is carried on from this town.

Chap'paqua, a post-village of New Castle township, Westchester co., N. Y., on the Harlem R. R., 32 miles from New York. This place is known as the country residence of the late Hon. Horace Greeley, and also that of I. T. Williams, for twenty years his friend and legal counsellor. It has one shoe establishment employing some forty-five hands, one sash and blind factory, three stores, and one hotel. It has an excellent boarding-school, under the patronage of the Society of Friends; there is also a saline chalybeate spring near the place.

Chappe (CLAUDE), a French engineer, born at Brûlon in 1763, was the inventor of a telegraph. He produced in 1792 a system of signals and a machine which he called a telegraph, by which a despatch was transmitted from Paris to Lille, 48 leagues, in thirteen minutes and forty seconds. Numerous lines of his telegraph were soon extended through other parts of France. Died Jan. 23, 1805.

Chapped Hands are sometimes a sort of chilblain on the hands, and, like chilblain, this disease appears to pass by insensible gradations into a form of eczema, while many cases of chapped hands are simply eczematous, without any recognizable connection with chilblain. Glycerine, borax, benzoated oxide-of-zinc ointment, and various like applications are useful.

Chaptal (JEAN ANTOINE), COMTE DE CHANTELOUP, an eminent French chemist, born at Nogaret, Lozère, June 5, 1756. He graduated as M. D. at Montpellier in 1777, and became professor of chemistry at that place in 1781. He supported the popular cause in the Revolution, and introduced the manufacture of certain chemicals for which France had previously been dependent on foreigners. About 1796 he was chosen a member of the Institute. He was minister of the interior for five years (1801–05), and afterwards a senator. His chief works are "Chemistry Applied to the Arts" (1806) and "Elements of Chemistry." Died in 1832. (See FLOURENS, "Éloge historique de Chaptal," 1835.)

Chap'ter [Fr. *chapitre,* from the Lat. *capitulum,* a diminutive of *ca'put,* a "head"], a division of a book. The division of the Bible into chapters as at present is commonly ascribed to the cardinal Hugo de St. Cher, who lived in the thirteenth century, but there is reason to suppose that it may be much older. In many histories the chapter is the principal division. The term is also applied to the canons of a cathedral, who in a collective capacity form a chapter, over which the dean presides. This chapter is the bishop's council. The place in which it meets is called the chapter-house.

Chapter-house, a building or apartment where the monks of an ecclesiastical establishment, or the dean, canons, and prebendaries of a cathedral or collegiate church are convened. Chapter-houses are often joined to or built near a church, and sometimes are richly adorned. In some cases they are used merely as burial-places.

Chap'tico, a post-village and township of St. Mary's co., Md., 40 miles S. S. E. of Washington. Pop. 3553.

Chapul'tepec, a strong Mexican fortress, stormed by the American forces under Gen. Scott Sept. 13, 1847. It is situated about 2 miles S. W. of the city of Mexico, and consists of an isolated eminence about 150 feet high, fortified by a strong citadel which crowns the hill, designed to protect the causeway forming the approach to the city. Its approaches were also strongly guarded by outworks at its base and on its acclivities. The castle contained, besides a strong garrison, the military school of the republic.

In the plan for the capture of the city of Mexico the reduction of Chapultepec was considered indispensable to success. The extraordinary natural strength of this place, and the skill and money which had been expended to make it impregnable, rendered this a hazardous undertaking. To mask the intended attack, Twiggs, with Riley's brigade and Taylor's and Steptoe's batteries, was left at the southern gates of the city, and kept up an effectual fire during the 12th Sept., and down to the afternoon of the 13th, compelling the enemy to withdraw within the walls of the city, and thus holding a good part of the Mexican army, under Santa Anna, on the defensive. Heavy batteries at well-selected points were established on the night of the 11th, and a vigorous fire was opened on the castle and outworks on the morning of the 12th, continuing with good effect throughout the day and on the morning of the 13th, while preparations for the attack were being made. Pillow's and Quitman's divisions were to assault the former on the W., and Quitman on the S. E. side, Worth's division to support Pillow, and Smith's brigade of Twiggs' division to support Quitman. An assaulting party of 260 men, under Capt. McKenzie, Second Artillery, was furnished Pillow, and Twiggs' division supplied a similar one, under Capt. Casey, Second Infantry, to Quitman. The signal for attack was to be the momentary cessation of firing from the heavy batteries. About 8 A. M. of the 13th notice was sent to Pillow and Quitman that the concerted signal was about to be given, and both columns shortly after moved forward with great vigor, the batteries throwing shot and shell upon the enemy over the heads of the attacking columns.

Pillow's approach on the W. side lay through an open grove filled with sharpshooters, who were quickly dislodged; on emerging into an open space at the foot of a rocky hill, Pillow was severely wounded, the immediate command devolving upon Gen. Cadwalader. Clark's brigade of Worth's division was now sent to Pillow's support. A strong redoubt, midway, was to be carried before reaching the heights. The advance was over rocks, chasms, and mines, and in the face of a heavy fire of cannon and musketry. Without wavering the redoubt was carried, and the enemy driven from shelter to shelter, without time to fire a single mine unless endangering the lives of their own men. The ditch and main wall of the work was reached, scaling-ladders were brought in use, and a lodgment soon made, followed by streams of troops.

Simultaneously with Pillow's advance on the W., Quitman approached the S. E. of the same works over a causeway strongly fortified and defended. Smith's brigade had been thrown out to the right to turn the batteries near the foot of Chapultepec and support Quitman's storming-party. The contest was desperate for a short time, but the valor of the Americans overcame every obstacle, the batteries and works were carried, and the ascent was continued; the enemy were driven from their stronghold, and the Stars and Stripes floated from the heights of Chapultepec. This victory virtually ended the war, the city of Mexico being entered the next day, the 14th. The American loss in killed and wounded during the 12th, 13th, and 14th was 863; the Mexican loss was much greater.

Chara'ceæ [from *Chara,* one of the genera], a natural order of aquatic cryptogamous plants, approaching the Equisetaceæ in their acrogenous habits and their verticillate tubular branches, but differing from them in having lateral, scattered fruit of two kinds. Some of the species have also incrustations of carbonate of lime, analogous to the siliceous coating of some Equisetaceæ. But their simple cell-structure is believed by many theorists to ally them with the lower Algæ. The phenomena of cyclosis were first observed in the cells of characeous plants. The fossils called gyrogonites are calcareous incrustations which once covered the reproductive organs (nucules) of these plants. The Characeæ are abundant in fresh and salt stagnant water, especially in temperate regions. The species are few.

Char'acter [Gr. χαρακτήρ; Fr. *caractère;* Ger. *Charakter*], a mark or figure engraven on an object; a letter or type used in writing or printing; the peculiar qualities impressed on a person by nature or habit; distinctive qualities of heart, mind, and manners. The term is often used to denote a person or actor in an epic poem or drama. In art, the expression of character, either of animate or inanimate objects, is, after correct delineation, the most important part of the work. In botany, and other branches of natural history, character is an enumeration or brief description in scientific terms of the essential and distinctive marks of a species, genus, order, etc.

Charade [Fr.], a social amusement, consisting sometimes of the division of a word into its constituent syllables or letters, and then making some statement as to each syllable and the whole word, the company being required to guess the word. In "acting charades" each syllable is

introduced prominently, but not too conspicuously, into the successive scenes of a dialogue, the whole word being brought into the last scene. Sometimes the name *charade* is used to designate any parlor drama.

Charadri'adæ [from *Charadrius*, one of the genera], a family of wading birds which includes several genera of plovers, lapwings, turnstones, etc., mostly found in the temperate climates of both continents. Many of its species are prized as game-birds.

Cha'rax of Per'gamus, priest and philosopher, flourished probably in the times of Antoninus Pius and M. Aurelius. He wrote a Greek history in forty books, in which he speaks of Augustus as having lived long ago, and of Nero and his successors. This history must have been very prolix, as in the ninth book he is treating of the return of the Heraclidæ. He wrote also a work entitled Χρονικά, in at least sixteen books, and philosophical treatises. (The fragments of his writings are collected in MÜLLER'S "Fragmenta Historic. Græcorum," vol. iii., pp. 636–645.)

HENRY DRISLER.

Char'coal [Fr. *charbon;* Lat. *carbo*], a common name of a variety of carbon; a carbonaceous substance obtained by the partial combustion of wood. The term is also applied to the solid residuum which results from the destructive distillation of animal matter and peat. (See BONE BLACK or ANIMAL CHARCOAL.) Except the diamond, charcoal is the substance in which carbon exists nearest to purity. It burns without flame or smoke, and produces a greater heat than an equal weight of wood. It is used as an ingredient in the composition of gunpowder, as an agent in clarifying liquors, and for other purposes, among which is the smelting of ores. Charcoal contains, besides carbon, oxygen and hydrogen, with a small proportion of ashes. It has an extraordinary capacity for absorbing gases. It is said that it will absorb ninety times its bulk of ammoniacal gas. It is infusible, is not soluble in acids or other liquids, is not liable to decay, and is not altered by any degree of heat if it be not exposed to the air or to oxygen. It is a very bad conductor of heat, and hence powdered charcoal is placed round tubes to prevent the escape of heat. Powdered charcoal is used to preserve or sweeten tainted flesh. Common charcoal intended for fuel is made by burning or heating a pile of wood without free access of air. The sticks of wood, which are not more than four feet long, are arranged in a conical pile around a central aperture, and covered with turf, sods, or other material which prevents the free access of air. Charcoal-dust, mixed with earth and moistened, makes a good outer covering. An opening is left at the top for the escape of smoke and vapor. The pile is usually ignited at the top, and continues burning with a slow smouldering fire for a week or more. The charcoal used as an ingredient of gunpowder is made from wood which is free from resin. Charcoal is often prepared by roasting wood in iron cylinders. By this method there is a larger proportion of charcoal saved, and the product is of better quality; there is also a large quantity of pyroligneous acid produced, which is of great value in the arts.

Charbon Roux (*i. e.* "red charcoal"), is charcoal obtained by subjecting wood to heated air or steam raised to the temperature of 572° F. By this process from 36 to 42 per cent. of charbon rouge is obtained, whereas not more than 25 per cent. of charcoal is obtained by the ordinary method. It has a dark-red color, and contains 75 per cent. of carbon. It is extensively used in Europe in the manufacture of gunpowder and iron blooms. HENRY HARTSHORNE.

Charcoal Blacks are made both from animal and vegetable substances—*e. g.* burnt ivory, bones, vine-twigs, peach-stones, nut-shells, the smoke of oil or rosin condensed, etc. Those which are derived from vegetable substances when mixed with white are usually of a blue tint. (See LAMPBLACK.)

Chardin (Sir JOHN), a French traveller, born in Paris Nov. 26, 1643. As a dealer in jewels and gems he made a journey to India and Persia in 1664. Having passed many years in Persia, and studied its language, history and customs, he became a resident of London in 1681, and was knighted by Charles II., who sent him on a mission to Holland about 1682. He published "Travels in Persia and the East Indies" (3 vols., 1686–1711), a work of much merit. Died Jan. 26, 1713.

Char'don, a post-village, capital of Geauga co., O., is situated on a ridge about 14 miles from Lake Erie and 170 miles N. E. of Columbus. It is on the Painesville and Youngstown R. R., 12 miles S. by E. from Painesville. It has three or more churches and two weekly newspapers. Pop. 885; including Chardon township, 1772.

Charente, a river of France, rises in Haute-Vienne, and flows in a very tortuous course westward through the departments of Charente and Charente-Inférieure, and enters the Atlantic opposite the Isle of Oléron. Total length, about 157 miles. It is navigable for steamboats from its mouth to Saintes, and by means of twenty-seven locks is navigable for 102 miles.

Charente, a department in the W. part of France, has an area of 2294 square miles. It is intersected by the rivers Charente and Vienne. The surface is undulating, and in some parts hilly; the soil is mostly calcareous and dry. Several deep limestone caverns occur here. Extensive forests of chestnut trees grow on the hills. Truffles are found in abundance. A large part of Charente is occupied by vineyards, the product of which is mostly converted into brandy. The chief article of export is Cognac and Jarnac brandy. Here are manufactures of iron, paper, and leather. Capital, Angoulême. Pop. 378,218.

Charente-Inférieure, a department in the W. part of France, is bounded on the W. by the Atlantic, and on the S. W. by the estuary of the Gironde, and is intersected by the river Charente. Area, 2635 square miles. The surface is nearly level; the soil is very fertile. The staple products are grain, wine (which is mostly converted into brandy), hemp, and flax. The salt-works on the sea-coast are the most valuable in France. It has manufactures of glass, earthenware, and leather. Capital, La Rochelle. Pop. 479,559.

Charenton, a town of France, department of Seine, on the right bank of the Marne, 5 miles S. E. of Paris. It has large chemical-works. A bridge across the river connects this town with Charenton St. Maurice, where is the large national asylum for lunatics. This bridge has been the scene of several conflicts between armies contending for the possession of Paris. Pop. 6190; of St. Maurice, 4931.

Cha'res [Χάρης], an Athenian general notorious for his corruption and incompetence, was chosen commander-in-chief in the Social war, which began in 358 B. C. This war was provoked by his extortions.

Chares, a Greek statuary, born at Lindus, was a pupil of Lysippus and the founder of the Rhodian school of sculpture. He lived about 300 B. C. Among his works was the Colossus at Rhodes, regarded as one of the Seven Wonders of the World. It was a bronze statue of Apollo, or rather of the sun-god, about 105 feet high, and was thrown down by an earthquake in 224 B. C.

Chares of Mytilene is mentioned by Plutarch in his Life of Alexander as holding the office of εἰσαγγελεύς (one who bears messages and introduces persons to the royal presence) to that monarch. His position gave him the opportunity of collecting many facts and anecdotes about Alexander, which he afterwards published in a work, of which the tenth book is quoted by Athenæus, and which is several times referred to as authority by Plutarch. (The fragments of his works are collected in MÜLLER'S "Scriptores de Rebus Alexandri," p. 114–120; "Alexandri Magni Historiarum Script.," ed. Geier, pp. 290–308.)

HENRY DRISLER.

Charge, in heraldry. The ordinaries and figures depicted on an escutcheon or shield are called charges, and a shield with such figures is said to be charged. The charges ought to be few and strongly marked. The shield belonging to the head of the house has fewer charges than the shields of collateral or junior members.

Charge, in law, a burden imposed on a thing; a duty or obligation imposed upon a person; sometimes merely a formal and distinct allegation. More specifically, it is used in the following connections: (1) A burden imposed upon land, particularly in a court of equity. It is a common course in a will to "charge" the devisor's estate with the general payment of debts or legacies, or with the payment of a particular debt or legacy. In such a case the land is burdened with the debt, so that it is a lien or encumbrance upon it; and this would follow it into the hands of a purchaser. A charge of this kind may be created by implication. Thus, if a testator should provide as follows, "*After* the payment of $1000 to A, I devise my mansion-house to B," that sum would be charged upon the land as owned by B, and would follow it in case of sale or other transfer. (2) A charge upon the person. A will or other instrument may be so drawn as to confer a benefit upon a person, and at the same time impose upon him an obligation. Should he accept the benefit, he will by implication take upon himself the burden or obligation, though it may outweigh the benefit. No person is bound to accept such a devise or provision, so that the charge in the case supposed is in truth created by the grantee's or devisee's own act, in conjunction with the grantor's or testator's direction. (3) Directions to a jury. In a jury trial, as the decision of questions of law appertains to a judge, and matters of fact belong to the jury, it is a common practice for the judge to instruct

or "charge" the jury upon the questions of law. These instructions the jury are legally bound to follow. The idea lying at the root of the word "charge" in this case would seem to be the obligation or duty of the jury to accept the version of the law propounded by the judge. (4) In equity practice the words "charge and discharge" are found in connection with the taking of accounts in that court of moneys paid and received. The *charge* means the statement of debts due by the party against whom the account is rendered, and *discharge* means the items of credit presented by the latter. These might be so presented as to make counter-statements necessary. This practice, in its details, is disfigured by much technicality, and has been abandoned both in England and in some of the American States, and much simpler methods are now resorted to. (5) In equity pleadings there is a statement made by the plaintiff, known as the charging part of the bill (or complaint), in which he sets forth certain facts, anticipatory of a defence which he supposes that the defendant will make. The word charge here means a distinct and formal affirmation, and the pleader sets forth the defendant's claim as a mere pretence on his part, and alleges on his own part the facts in opposition to it. T. W. DWIGHT.

Chargé d'Affaires, a French phrase used by many nations as the title of a diplomatic agent of lower grade than a minister. He is accredited, not to the sovereign, but to the department of foreign affairs. He sometimes acts as deputy or substitute of the ambassador in the absence of the latter.

Char'iot [Lat. *currus* or *bigæ;* Fr. *char* or *chariot*], a vehicle used by the ancients in war and in journeys of pleasure. The ancient chariot had only two wheels, which revolved on axles, and was generally drawn by two horses. It was closed in front and open behind. War-chariots were used by the ancient Greeks, Romans, Philistines, Britons, and other nations. The four-horse chariot in which Roman generals rode when they entered Rome in triumph was called a *quadriga.* (See CARRIAGES, etc., by L. P. BROCKETT, M. D.)

Charis'ius, an Attic orator, a contemporary of Demochares, nephew of Demosthenes. He wrote, like Isocrates, orations for others, and in this, as Cicero says in his "Brutus," he imitated Lysias. His orations must have been extant in the time of Quintilian, for he speaks favorably of them. Three passages are quoted by Rutilius Lupus, in his work "De Figuris," in a Latin translation to illustrate certain rhetorical figures. HENRY DRISLER.

Charisius (AURELIUS ARCADIUS), a learned jurist who lived under Constantine and his sons, and filled the office of "magister libellorum." He wrote several works on legal subjects. Extracts from three of his writings are contained in the "Digest." HENRY DRISLER.

Charisius (FLAVIUS SOSIPATER), of Campania, a celebrated grammarian, whose date is uncertain, but who preceded Priscian, as the latter quotes from him, and he flourished in the latter part of the fifth century. He was a man of some distinction, and is styled "magister urbis" in the inscription of his work, which is a Latin grammar in five books, "Institutionum Grammaticarum libri quinque," written for the use of his son. Portions of the work have been lost; the remainder is given in the various collections of Latin grammarians, most recently by Lindemann and Keil. HENRY DRISLER.

Char'itable U'ses, property, either real or personal, held by a trustee to be devoted by him to charitable purposes. The word "charitable" in this connection is nearly synonymous with public. Trusts for charitable purposes would include funds in the hands of trustees devoted to the repair of highways or streets in cities, the support of paupers, the foundation of colleges, churches, and hospitals, etc. etc. (The subject will be more fully treated under TRUSTS, by PROF. T. W. DWIGHT, LL.D.)

Char'ites (sing. **Cha'ris**), [Gr. Χάρις, Χάριτες; Lat. *Gratiæ*], the Graces of classic mythology, were said to be the daughters of Jupiter. They were patrons of poetry and art, and presided over festivals and social enjoyments. There were three Graces, whose respective names were Aglaia, Euphrosyne, and Thalia.

Char'iton, a river of the U. S., rises in the S. part of Iowa. Having crossed the boundary between Iowa and Missouri, it flows southward through Adair, Macon, and Chariton counties of the latter State, and enters the Missouri River 3 miles above Glasgow. Total length, about 250 miles.

Chariton, a county of Missouri. Area, 740 square miles. It is bounded on the S. W. by the Missouri, on the W. by Grand River, and intersected by the Chariton River. The surface is undulating, and diversified by forests and fertile prairies. Grain, wool, tobacco, and live-stock are extensively raised. Timber, coal, and limestone abound here. It is traversed by the St. Louis, Kansas City and Northern R. R. Capital, Keytesville. Pop. 19,136.

Chariton, a post-village, capital of Lucas co., Ia., is on the Chariton River and on the Burlington and Missouri River R. R., 55 miles W. of Ottumwa. It has a national bank, six churches, a large public hall, and two newspaper-offices. Pop. 1728; of Chariton township, 2601.

MAPLE & FOLSOM, PROPS. CHARITON "PATRIOT."

Chariton, a township of Appanoose co., Ia. Pop. 888.

Chariton, a township and village of Chariton co., Mo. Pop. 651.

Chariton, a township of Howard co., Mo. Pop. 4043.

Chariton, a township of Macon co., Mo. Pop. 1269.

Chariton, a township of Randolph co., Mo. P. 1699.

Chariton, a township of Schuyler co., Mo. Pop. 833.

Char'iton, of Aphrodisias in Caria, is the probably assumed designation of the writer of a Greek romance. Neither his name nor his real country is known, and the position which he assigns himself, that of secretary to the orator Athenagoras of Syracuse, mentioned in Thucydides, cannot be true. His work, which treats of the loves of Chæreas and Callirrhoë, and of the mishaps and adventures thence arising, is in eight books, and has come down to us almost entire. An outline of the incidents is given in Dunlop's "History of Fiction." It has been edited with copious notes by D'Orville, with a Latin translation by Reiske, revised edition, Leipsic, 1783.

HENRY DRISLER.

Char'ity, Sisters of [Fr. *sœurs* (or *filles*) *de la charité,* or *sœurs grises, i. e.* "Gray Sisters," so called from their dress], a name applied to several orders of celibate women in the Roman Catholic Church. The first congregation of this name was established at Châtillon, in France, by Saint Vincent de Paul in 1629. Confirmed by the see of Rome, this congregation greatly multiplied, and its houses are now found in all parts of the world. This order is devoted to the care of the sick and the protection of foundling or destitute children and aged persons, and hence is popularly regarded with more favor than almost any other order of nuns.

Mrs. Eliza Ann Seton of Maryland in 1809 founded a congregation of Sisters of Charity under a distinct rule, which is still followed to a considerable extent in the U. S., though many of its houses have united with the French order. Several congregations of Augustinian nuns and of other Roman Catholic orders are called Sisters of Charity and Sisters of Mercy, and have branches in the U. S. The Sisters of Charity have many claims to the gratitude of mankind, and, besides the direct good accomplished by them, their example has led many who do not profess celibacy, and who do not belong to their Church, to engage in acts and lives of benevolence.

Charlemagne [Lat. *Carolus Magnus*], king of the Franks and Roman emperor, born April 2, 742, probably at Aix-la-Chapelle, was a son of Pepin le Bref. After his father's death, in 768, he reigned over the Franks, jointly with his brother Carloman, until the death of the latter in 772. From that time sole ruler, during a reign of forty-three years he carried on incessant wars on all his borders, extending his domains, and at the same time spreading Christianity, subduing rebellions, and building up the vast dominion over which he was crowned as a successor of the Roman cæsars by Pope Leo III. in 800. In 772 he began a thirty years' war against the determined Saxons, after the successful opening of which Charlemagne was called to the assistance of Pope Hadrian I. against Desiderius, king of the Lombards, who had demanded the banning of Charlemagne and the coronation of the sons of Carloman, because the former had put away the daughter of Desiderius on account of sterility, and taken the Swabian princess Hildegard to his bed. Charlemagne marched two armies over the Alps and conquered Lombardy in 774; returned and beat the Saxons again, and hastened into Spain in 778 to help the Arabian rulers of that country against the Osman caliph of Cordova. It was in this war that the hero of romance, Roland or Orlando, fell in the pass of Roncesvalles. The extensive domain of Charlemagne was only rendered secure by ceaseless vigilance and warfare. In 799 the Romans revolted against Pope Leo III., and were again brought into subjection by Charlemagne, who in return, while he was praying on the steps of St. Peter's church, was crowned by Leo with the iron crown of the Western empire, unexpectedly to him, as he pretended, on Christmas Day, 800. Charlemagne laid the foundations of his empire securely. He was sagacious, energetic, and vigilant, as a ruler and commander alike. He watched over and fostered agriculture, trade, art, and letters with untiring zeal, clearing away forests, draining swamps,

founding monasteries and schools, building up cities, constructing splendid palaces, as at Aix, Worms, and Ingelheim, and drawing to his court scholars and poets from all nations, as Alcuin, Paulus Diaconus, and Turpin. He was himself proficient in science as well as all hardy accomplishments, speaking Latin and knowing Greek. He was tall and stately, measuring seven of his own foot-lengths, simple in his life, "excelling all men of the time, to all alike dread and beloved, by all alike admired," as he was described by the historian Nithard. His fame spread through all lands. He was about to become united by marriage with the Byzantine empress Irene, but after her fall was not on friendly terms with her successor, Nicephorus. The caliph Haroun-al-Rashid sent an embassy to the court of Charlemagne, with gifts in token of good-will. He had three sons, Pepin, Charles, and Louis, among whom he intended to divide his empire, but Pepin and Charles died before their father. In 813 he associated his son, Louis le Débonnaire, with himself in the empire. He died at Aix-la-Chapelle Jan. 28, 814, and was succeeded by his son Louis. His descendants were called Carlovingians. (See HAURÉAU, "Charlemagne et sa Cour," 1854; G. P. R. JAMES, "Life of Charlemagne," 1832; EGINHARD, "Vita Caroli Magni," 1521; BREDOW, "Carl der Grosse," 1814; THÉODORE NISARD, "Histoire de Charlemagne," 1843; ABEL, "Jahrbücher des Fränkischen Reiches unter Karl dem Grossen," Berlin, 1866.)

Char'lemont, a post-township and village of Franklin co., Mass. The village is on the Vermont and Massachusetts R. R., 128 miles W. N. W. from Boston. Pop. 1005.

Charlemont, a township of Bedford co., Va. Pop. 2820.

Charleroi, a strongly fortified town of Belgium, in Hainaut, is on the river Sambre and on the railway between Brussels and Namur, 33 miles S. of Brussels. This place was fortified by Vauban, and was held alternately by the French and Spaniards. It has important manufactures of cutlery, glass, nails, etc. In this vicinity are extensive coal-mines, and smelting furnaces which produce cast iron. Railways extending in various directions connect it with Paris and other towns. Pop. 13,294.

Charles, a county in the S. of Maryland. Area, 499 square miles. It is bounded on the S. and W. by the Potomac River, which is here navigable. The surface is uneven, and partly covered with forests of oak, ash, chestnut, etc. Tobacco, grain, and wool are staple products. Capital, Port Tobacco. Pop. 15,738.

Charles I., emperor. See CHARLEMAGNE.

Charles II., emperor. See CHARLES THE BALD (of France).

Charles III., surnamed THE FAT [Fr. *Charles le Gros*], emperor of the Franks, born in 822 A. D., was a younger son of Louis II., who at his death, in 876, divided the empire between his three sons, Carloman, Louis, and Charles. After the death of his brothers, which occurred before 884, Charles inherited their dominions, and was the nominal ruler of a large empire, but he was imbecile and had little real power. He was deposed by his nephew Arnulph in 888, and died in the same year.

Charles IV., emperor of Germany, born in 1316, was a son of John de Luxembourg, king of Bohemia. He was elected emperor in 1346 as the successor of Louis V., whom the pope had deposed. He issued in 1356 the Golden Bull, which for more than four centuries was the fundamental law to regulate the election of German emperors. He died in 1378, and was succeeded by his son Wenceslaus.

Charles V., DON CARLOS I. of Spain, afterwards emperor of Germany, was the eldest son of the archduke Philip of Austria, and a grandson of the emperor Maximilian I. His mother was Joanna, the daughter and sole heiress of Ferdinand of Aragon and Isabella of Castile. He was born at Ghent Feb. 24, 1500, and educated in Flanders, having as his preceptor Adrian of Utrecht. On the death of his father in 1506, Charles inherited the Low Countries and Franche-Comté, and in 1516 he succeeded Ferdinand as king of Spain, to which he removed his court in 1517. In 1519 he was elected emperor of Germany, defeating Francis I. of France, who was also a competitor for that dignity. He was crowned as emperor at Aix-la-Chapelle Oct. 22, 1520. Charles V. and Francis I. of France were then the most powerful sovereigns on the continent of Europe, and were rivals. Their ambitious designs against Italy led to hostilities, which commenced in 1522. In this war Henry VIII. of England was the ally of Charles V., whose army defeated Francis at the battle of Pavía (1525), and took him prisoner. The war was suspended by the treaty of Madrid in 1526. Charles married in that year Isabella, a daughter of Immanuel, king of Portugal. The war was renewed in 1527 by Francis I. and Pope Clement VII., who had formed an alliance against the emperor. Under the constable of Bourbon the army of Charles assaulted Rome and took the pope prisoner in 1527. Peace was restored by the treaty of Cambrai in 1529. Charles employed his power to check the progress of the Protestant Reformation, for which purpose he assembled the Diet of Augsburg in 1530. This Diet ordained that severe penalties should be inflicted on the Protestants. In 1531 the German Protestant princes formed, for mutual defence, the League of Schmalkalden, and extorted some concessions from Charles, who, being then engaged in a war against the Turks, thought it expedient to temporize. In 1535 he conducted in person an expedition against Barbarossa, whom he defeated at Tunis. In 1536 his army invaded the south of France, but was not successful, and was soon forced to retreat. A truce of ten years was concluded between Charles and Francis I. in 1538, but it was broken in 1542. The French gained a victory at Ceresole, in Italy, in 1544, soon after which the war was ended by a treaty of peace. Resolving to extirpate heresy among his subjects, he published in 1546 the ban of the empire against the elector of Saxony and the landgrave of Hesse, who were chiefs of the Protestant party. They took arms in self-defence, but were defeated at Mühlberg in April, 1547. Their cause, however, found an able defender in Maurice of Saxony, who, as the head of a league, took arms against Charles early in 1552. Charles, surprised by his rapid and skilful movements, was compelled to flee, and hostilities were ended by the important treaty of Passau, Aug. 22, 1552, which secured religious liberty to the German Protestants. In the autumn of 1575 he formally resigned to his son Philip the sovereignty of the Low Countries, Spain, and his other hereditary dominions. He also abdicated the imperial crown, and was succeeded as emperor by his brother Ferdinand. His motive for abdicating appears to have been partly ill-health. He retired to the monastery of St. Yuste, near Plasencia, in Spain, where he died Sept. 21, 1558. (See ROBERTSON, "History of the Reign of Charles V.;" PRESCOTT, "History of Philip II. of Spain," vol. i.; LUIGI DOLCE, "Vita di Carolo V.," 1561; A. PICHOT, "Charles Quint," 1854; STIRLING, "The Cloister Life of the Emperor Charles V.," 1852; SANDOVAL, "Historia de la Vida de Carlos V.," 1606; KERVYN DE LETTENHOVE, "Commentaries de Charles V.," Brussels, 1862.)

Charles VI., emperor of Germany, the second son of the emperor Leopold I., was born Oct. 1, 1685. He claimed the throne of Spain as a relative of Charles II., who died without issue in 1700, and who appointed Philip of Anjou as his heir. In the war of the Spanish succession, which ensued, the cause of Charles was supported by Austria, England, and a portion of the Spaniards. These allies were defeated at Almanza in 1707 by the army of Philip, who finally obtained the throne by the aid of Louis XIV. of France. On the death of his brother, Joseph I., in 1711, Charles was chosen emperor of Germany. Having no son, he wished to secure for his daughter, Maria Theresa, the succession to his hereditary dominions, and appointed her his heir by a Pragmatic sanction (1724). Died Oct. 20, 1740. (See SCHIRACH, "Biographie Kaiser Karl's VI.," 1778.)

Charles VII. (CHARLES ALBERT), emperor of Germany, a son of Maximilian Emmanuel, elector of Bavaria, was born at Brussels in 1697. He married a daughter of the emperor Joseph I. in 1722, and became elector of Bavaria on the death of his father in 1726. When Charles VI. died, in 1740, this elector claimed part of the Austrian dominions. To obtain these he and his allies, France and Prussia, waged war against Maria Theresa. He was elected emperor in 1742, but his army was defeated by that of Maria Theresa. Died Jan. 20, 1745.

Charles I. (CHARLES STUART), king of Great Britain, born at Dunfermline, Scotland, Nov. 19, 1600, was the third son of James I. and Anne of Denmark. He became heir-apparent to the throne on the death of his brother Henry in 1612. He inherited extreme notions in relation to royal prerogatives from his father, whom he succeeded in Mar., 1625. He married Henrietta Maria, a daughter of Henry IV. of France, in the same year, and in disregard of public opinion chose for his prime minister and adviser the unpopular duke of Buckingham, who had been his father's favorite. The Parliament, animated by a growing spirit of liberty, was sparing in its grants of supplies, and was soon involved in a contest with the court. Charles dissolved several Parliaments in the first five years of his reign, and had recourse to arbitrary methods of raising money. He governed for eleven years without a Parliament, and after the death of Buckingham employed Laud and the earl of Strafford as his chief ministers. During this period the Puritans were severely persecuted, and the pa-

triot Hampden was prosecuted because he refused to pay the illegal tax called ship-money. In 1638 the Scottish people, on whom he attempted to impose the Liturgy, rose in arms to assert their liberty, and subscribed the National Covenant. Charles, who had not power to enforce his policy in Scotland, summoned a Parliament, which met in April, 1640, but, as it was not subservient, it was dissolved in the next month. The Scottish insurgents invaded England in August, and defeated the royal army at Newburn-on-Tyne. This disaster and the want of money induced the king to call a new Parliament, which met in Nov., 1640, and was the famous Long Parliament. Both Houses were resolute in resistance to despotic power. They impeached the earl of Strafford, who was executed in 1641, and they imprisoned Laud. In Jan., 1642, the king made a rash and abortive attempt to arrest Pym, Hampden, and three other members of the House of Commons. Provoked by this outrage, the Parliament appealed to arms. The royalists at first gained several victories, but they were defeated at Marston Moor in 1644, and again in June, 1645, at the battle of Naseby, where Charles commanded in person and Cromwell led the right wing of the Roundhead army. He was here so completely beaten that he soon gave himself up to the Scottish army, which transferred him in 1647 to the custody of the English Parliament. Having been tried and convicted in a high court appointed for the occasion, he was beheaded Jan. 30, 1649. He was distinguished for his literary culture and good taste in the fine arts. He was regarded as a martyr by a large portion of his subjects. (See HUME, "History of England;" WILLIAM HARRIS, "Life of Charles I.," 1758; DISRAELI, "Life and Character of Charles I.," 1828.)

Charles II., king of Great Britain, son of Charles I., was born May 29, 1630. He went into exile in 1645, and joined his mother in Paris. In 1649 he assumed the title of king, and he was proclaimed king by the Scottish Parliament "on condition of his good behavior." He landed in Scotland in June, 1650, and was crowned at Scone early in 1651. The austere Covenanters required him to sign "articles of repentance," and subjected him to restraints which were very irksome to a man who was naturally fond of ease and pleasure. A Scottish army fighting for the king was defeated by Cromwell at Dunbar in Sept., 1650. Charles, having recruited his army, led it into England, hoping that many English royalists would rally to his support. He was pursued by Cromwell, who gained a decisive victory over the royal army at Worcester, Sept. 3, 1651. Charles then became a fugitive, and after several narrow escapes took refuge in France.

After the death of Cromwell, the royalist party, which was always the most numerous, and was now favored by the law of reaction, easily regained the ascendency. Charles was restored in 1660 to almost unlimited power. He appointed Lord Clarendon prime minister, and married in 1662 Catherine, a daughter of the king of Portugal. In 1665, without good reason, he declared war against the Dutch—a war which was contrary alike to the feelings and commercial interests of the English people. The Dutch admiral De Ruyter, by entering the Medway and burning some ships of war at Chatham, induced him to make peace in 1667. Lord Clarendon was removed from power in 1667, and was succeeded by a corrupt ministry called the CABAL (which see). These ministers abused their power to promote popery and absolute monarchy, and in their foreign policy were subservient to Louis XIV. Charles accepted a pension from the French court, that he might be enabled to reign without the aid or control of parliaments. He also became an ally of France in another war against the Dutch in 1672, but this war, which was unpopular, was ended in 1674. The king showed partiality to the Roman Catholic Church, of which he had secretly become a member. A rumor of a popish plot caused a violent excitement among the people in 1678. Charles dissolved Parliament in that year, and called another, which in 1679 passed the Habeas Corpus act in opposition to the will of the court. The prevalence of corruption and profligacy in politics and morals, together with the despotic policy of the court, rendered this reign one of the most disgraceful in English history. In 1683 the patriots Algernon Sidney and Lord Russell were put to death for their complicity in the Rye-House Plot. Charles died without lawful issue Feb. 6, 1685, and was succeeded by his brother, James II. Charles II. was indolent, unambitious, and depraved in morals. (See HUME, "History of England;" MACAULAY, "History of England," vol. i.; WILLIAM HARRIS, "Life of Charles II.," 1765; LORD HALIFAX, "Character of Charles II.," 1750.)

Charles I. of France. See CHARLEMAGNE.

Charles, surnamed THE BALD [Fr. *Le Chauve*], or **Charles II.,** king of France, the fourth son of Louis le Débonnaire, was born at Frankfort on the Main in 823 A. D. On the death of his father (840) he inherited all of France which is W. of the Rhone. He was unable to resist the Normans, who invaded France, and was compelled to pay them tribute in 845 and again in 861. Having invaded Italy with success, he was crowned as emperor by the pope in 875 A. D. He is styled Charles II. among the German emperors, as well as Charles II., king of France. He died in 877, and was succeeded by his son, Louis le Bègue.

Charles III. of France, called THE SIMPLE, a son of Louis le Bègue, was born in 879 A. D. Eudes, count of Paris, was elected king by the barons in 883. Charles assumed the title of king in 893, and after the death of Eudes, in 898, he reigned alone. He was a feeble prince, and failed to defend his kingdom from the Normans. In 923 the nobles elected Raoul (or Rodolph) of Burgundy to the throne. Charles died in 929, leaving a son, Louis Outremer.

Charles IV. of France, surnamed THE HANDSOME [Fr. *Le Bel*], the third son of Philippe le Bel, was born in 1294. He began to reign in 1322. He aided his sister Isabella to dethrone her husband, Edward II. of England. He died without male issue in 1328, and was succeeded by Philip of Valois.

Charles V., called THE WISE [Fr. *Le Sage*], king of France, born Jan. 21, 1337, was a son of John II. He acted as regent during the captivity of John, who was taken prisoner by the English in 1356. He became king on the death of his father, in 1364, at a time when France was invaded by English armies. He acted on the defensive and avoided a general battle. The French general Du Guesclin expelled the English from Poitou, Saintonge, etc. Charles founded the Royal Library of Paris. He died Sept. 16, 1380, leaving the throne to his son, Charles VI. (See MICHELET, "Histoire de France;" BARTHÉLÉMY DE BEAURÉGARD, "Histoire de Charles V.," 1843.)

Charles VI., called THE BELOVED [Fr. *Le Bien-Aimé*], a son of Charles V., was born in Paris Dec. 3, 1368. He was the first prince who received the title of dauphin. He became insane in 1392, after which the kingdom was distracted by the rivalry between the dukes of Burgundy and Orleans. In 1407 a civil war broke out between the Burgundians and the Armagnacs. France was also invaded by Henry V. of England, who gained a great victory at Agincourt Oct. 21, 1415. Charles died in 1422.

Charles VII., surnamed THE VICTORIOUS, king of France, born Feb. 22, 1403, was a son of Charles VI., whom he succeeded in 1422. At that time Henry VI. of England was recognized as king of France by a faction which had possession of Paris, and France was partially occupied by the English, who besieged Orleans in 1428. From the ruinous state to which the country was reduced by intestine discord and foreign invasion, it was restored by the heroism of Joan of Arc and the prudent policy of Charles, who became master of Paris in 1436. He waged war with success against the English, and recovered Normandy in 1450. He died July 22, 1461, and was succeeded by his son, Louis XI. (See VALLET DE VIRIVILLE, "Histoire de Charles VII.," 3 vols., 1862–65.)

Charles VIII., surnamed THE AFFABLE, king of France, born at Amboise July 30, 1470, was a son of Louis XI., whom he succeeded in 1483. He married, in 1491, Anne, duchess of Brittany. He led an army into Italy in 1494, and conquered Naples early in 1495. Alarmed by his victorious progress, the king of Spain, the German emperor, and other powers formed a league against him. As Charles was marching homeward he encountered and repulsed the army of the allies at Fornovo, and then returned to France. He died without issue April 7, 1498, and was succeeded by Louis XII. (See PHILIPPE DE SÉGUR, "Histoire de Charles VIII.," 1835.)

Charles IX., king of France, the second son of Henry II. and Catherine de Médicis, was born at St. Germain-en-Laye June 27, 1550. He succeeded his brother, Francis II., in 1560. During his minority his mother had the chief control of the government. His reign was disturbed by civil or religious wars, which began in 1562, between the Catholics and Huguenots. The court generally cooperated with the Catholic party, but Catherine was jealous of the duke of Guise, the leader of the Catholics, and sometimes opposed him by her intrigues. The civil war was several times suspended by treaties, and renewed in consequence of the perfidy of the court. Charles married, in 1570, Elizabeth, a daughter of the emperor Maximilian II. He made overtures of peace to the Huguenots, and negotiated a marriage between his sister Margaret and Henry of Navarre. On the occasion of this wedding he invited Coligni and other Protestant leaders to court, and treated them with a simulated favor which lulled their suspicions. It appears that he and his mother were responsible for the massacre of the Protestants which commenced

Aug. 24, 1572 (St. Bartholomew's Day). Charles admitted that he had consented to this crime. He died without issue May 30, 1574. (See VARILLAS, "Histoire de Charles IX.," 1683; SISMONDI, "History of France.")

Charles X., king of France, born at Versailles Oct. 9, 1757, was a younger brother of Louis XVI. He was originally styled the count of Artois. In 1773 he married Maria Theresa, a daughter of the king of Sardinia. He emigrated in 1789, and instigated the French royalists to revolt in 1795, but he declined to land and put himself at their head, for which conduct he was accused of cowardice by some of his own party. He remained in exile until 1814, and when he returned to Paris exclaimed, "Friends, nothing is changed in France; there is only one Frenchman the more!" He began to reign on the death of Louis XVIII. in Sept., 1824, and his conduct soon confirmed the proverbial saying, that "the Bourbons learn nothing and forget nothing." His policy was reactionary, and his advisers were a conclave of fanatical priests. In Aug., 1829, he dismissed the ministers and formed an ultra-royalist ministry, the chief of which was the prince de Polignac. In Mar., 1830, 221 deputies, forming a majority of the Chamber, avowed their hostility to the ministry. The court then dissolved the Chamber, and ordered a new election, which resulted in the return of another Chamber that was opposed to the ministers. The king and his ministers then resorted to a *coup-d'état*. On the 25th of July, 1830, they issued ordinances which subverted the freedom of the press, and dissolved the new Chamber. The Parisians appealed to arms, barricaded the streets, and after a contest of three days were completely victorious. Charles abdicated in favor of his grandson, the duke of Bordeaux, and escaped to England. He died Nov. 6, 1836. (See LORIEUX, "Histoire du Règne de Charles X.," 1834; LAMARTINE, "History of the Restoration.")

Charles I. of Anjou, king of Naples, count of Anjou and Provence, born about 1220, was the youngest son of Louis VIII. of France, and a brother of St. Louis. He married Beatrice, a daughter of Raimond Berenger, count of Provence, and became his heir. At the instigation of the pope he attacked and defeated Manfred, king of Naples, in 1266, and usurped his throne. Provoked by his tyranny, the Sicilians revolted and massacred a multitude of Frenchmen on the 30th of Mar., 1282. This event was called "The Sicilian Vespers." Died in 1285.

Charles I. of Spain. See CHARLES V. (emperor).

Charles (or **Carlos**) **II.,** king of Spain, born in Nov., 1661, was the son of Philip IV., who died in 1665. Anne of Austria became regent during the minority of Charles, who was her son. He married, in 1678, Louise, a niece of Louis XIV. of France. In 1689 he became an ally of England and other powers in a war against Louis XIV. He was an incapable ruler and a man of morbid condition of mind and body. As he was childless, he became in the latter part of his life anxious and irresolute about the choice of his successor. By his last will he appointed Philip, duke of Anjou, as his heir. Died in 1700.

Charles III., king of Spain, a son of Philip V., was born in 1716. He ascended the throne on the death of his brother, Ferdinand VI., in 1759, and was an ally of France in the war against England which began in 1762. He promoted education and reform, and expelled the Jesuits from Spain in 1767. In 1779, as an ally of France, he declared war against England. These allies besieged Gibraltar without success. He died in 1788, and was succeeded by his son, Charles IV.

Charles IV. of Spain, a son of Charles III., was born at Naples Nov. 12, 1748. He became king in 1788, before which he had married Maria Louisa Theresa of Parma. In 1792, through the evil influence of the queen, her depraved favorite Godoy was appointed prime minister. In 1793 war was declared by the French against the Spaniards, who were defeated in many battles. Charles sued for peace, and the war ended in July, 1795. As an ally of France he declared war against England in 1796. Charles abdicated in favor of his son Ferdinand in Mar., 1808, but Napoleon in the same year deposed him, and placed his own brother Joseph on the throne. Died Jan. 19, 1819.

Charles X. (or **Charles Gustavus**), king of Sweden, born at Nyköping in 1622, was a son of the prince of Deux-Ponts. His mother was a sister of King Gustavus Adolphus. He was the heir-apparent in the reign of Christina, and became king when she abdicated in June, 1654. He was an able and a warlike ruler. In 1655 he invaded Poland because the Polish king had not renounced his claim to the throne of Sweden. He took Warsaw, and speedily drove the king out of Poland. During his absence the Danes declared war against him. He defeated them and compelled them to cede Scania to Sweden (1658). He died in 1660, and left the throne to his son Charles. (See LUNDBLAD, "Konung Carl X. Gustaf's Historia," 2 vols., 1823–29.)

Charles XI., king of Sweden, the son of Charles X., was born in 1655. By a treaty with Poland in 1660, Esthonia and other provinces which Charles X. had conquered were ceded to Sweden. Charles XI. assumed the royal functions in 1672, and formed an alliance with Louis XIV. of France. He defeated the Danes, who invaded Sweden in 1677, but in 1679 he signed a treaty of peace and married a sister of the king of Denmark. His reign henceforth was pacific and prosperous. In 1682 he was invested by the states with absolute power, of which he made a good use. He died in 1697, and was succeeded by his son, Charles XII.

Charles XII. of Sweden, born at Stockholm June 27, 1682, was the eldest son of Charles XI. and Ulrica Eleonora of Denmark. He learned Latin, French, and German, and formed in his youth simple and frugal habits of living. He began to reign in April, 1697, and chose Count Piper as his chief minister and adviser. In 1700 a league was formed against Sweden by Peter I. of Russia and the kings of Denmark and Poland, who designed to aggrandize their dominions at his expense. At the head of a well-disciplined army Charles assumed the offensive in May, 1700. He marched first against Copenhagen, and compelled the Danish king to sue for peace, which was concluded in Aug., 1700. With prompt and rapid movement he then led about 8000 men against Peter the Great, who was besieging Narva with nearly 70,000 men. Charles gained a decisive victory at Narva in Nov., 1700, soon after which he invaded Poland. He defeated the Poles in several battles, and deposed Augustus, king of Poland, in 1704. Provoked by recent acts of hostility on the part of the czar Peter, he advanced towards Moscow in Sept., 1707, with an army of 43,000 men. The Russian army was not able to resist his impetuous progress, and he crossed the Beresina in June, 1708. Having arrived at Smolensko, he was induced by Mazeppa, hetman of the Cossacks, to march southward into the Ukraine. Here many of his men perished from cold and want of provisions, and his army remained inactive during the severe winter of 1708–09. At the beginning of the next campaign he had only 18,000 Swedes in his army. He besieged Pultowa, to relieve which Peter advanced with an army of 70,000 men. The decisive battle of Pultowa, July 8, 1709, resulted in the defeat of Charles, who lost about 9000 men killed and 6000 prisoners. He retreated into Turkey, and was kindly received by the sultan, who gave him a residence at Bender. He induced the sultan to declare war against Russia, but this war was soon ended by a treaty. Charles remained in Turkey several years, and at length was involved in a quarrel with the Turkish rulers, who treated him as a prisoner. He escaped in 1714, and travelling *incognito* through Hungary and Germany, reached Stralsund in November of that year. The Russians, Danes, and Prussians continued to wage war against the king of Sweden, and they took Stralsund in Dec., 1715, after a long siege. The energy and audacity of Charles remained unabated, notwithstanding his reverses, and while the allies threatened to invade Sweden, he invaded Norway. He was killed at the siege of Frederikshall Nov. 30, 1718, and left a great reputation as a military genius. He was never married, and his sister Ulrica Eleonora inherited the throne. (See VOLTAIRE, "Life of Charles XII.;" NORDBERG, "Karls XII. Historia," 1740; LUNDBLAD, "Konung Carls XII. Historia," 2 vols., 1830; POSSELT, "Geschichte Carl's XII.," 1804.)

Charles XIII., king of Sweden, born 7th Oct., 1748, was a son of King Adolphus Frederick and a nephew of Frederick the Great. He was before his accession an admiral of the Swedish navy, and gained a naval victory over the Russians in 1788. In 1792 he became regent during the minority of his nephew, Gustavus IV., and retained that office until 1796. The States-General deposed Gustavus in 1809, and elected Charles as his successor. Having no son, Charles, with the consent of the Swedish Diet, adopted Gen. Bernadotte as his son and heir in 1810. Died Feb. 5, 1818.

Charles XIV. of Sweden. See BERNADOTTE.

Charles (or **Carl**) **XV.** (LOUIS EUGÈNE), king of Sweden and Norway, was born May 3, 1826. He succeeded his father, Oscar I., in July, 1859. He married in 1850 a Dutch princess of Orange. Died in Sept., 1872, leaving a daughter, Louisa, crown-princess of Denmark. The crown descended to his brother, Oscar II., Frederick, duke of Ostrogothia.

Charles, archduke of Austria, an eminent general, born at Florence 5th Sept., 1771, was a son of the German emperor Leopold II. Having served several campaigns against the French, he obtained in 1796 the chief command

of the Austrian army of the Rhine, and defeated the French general Jourdan at Wurtzburg in September of that year. He also compelled Moreau to retire across the Rhine. He retired from active service on account of ill-health in 1800. In 1805 he commanded in Italy, and defeated Massena at Caldiero. He became general-in-chief of the Austrian armies in 1806. He could not prevent Napoleon from entering Vienna, but he encountered him with success at the great battle of Aspern in May, 1809. The archduke and Napoleon commanded the armies at Wagram July, 1809, where the French claimed the victory. He resigned the command soon after this event. He wrote an able work called "Principles of Strategy" (1814). He died 30th April, 1847, leaving a son, Albert.

Charles Albert, king of Sardinia, was born Oct. 2, 1798. He was a son of Prince Charles Emmanuel of Savoy-Carignan. He became king on the death of Charles Felix in 1831, and adopted a liberal policy. Co-operating with the movements of the popular party in the cause of the unity and liberation of Italy, he declared war against Austria in the spring of 1848. Having been defeated at Novara in Mar., 1849, he abdicated in favor of his son, Victor Emmanuel. Died July 28, 1849.

Charles (surnamed) **the Bold,** sometimes called **Charles the Rash** [Fr. *Charles le Téméraire*], duke of Burgundy, born at Dijon Nov. 10, 1435, was a son of Philip the Good. He was styled count de Charolais until he became duke in 1467. He married Margaret, a sister of Edward IV. of England, in 1468, and became one of the most powerful sovereigns of his time. His dominions included the Netherlands. He waged war against Louis XI. of France and other princes. In 1476 he was defeated by the Swiss at Morat. He afterwards invaded Lorraine, and was defeated and killed at Nancy Jan. 5, 1477. He was succeeded by his daughter Mary, who was married to the emperor Maximilian I. (See KIRK, "History of Charles the Bold," 1868; COMINES, "Mémoires.")

Charlesbourg, a flourishing post-village of Quebec co. (Canada), 4 miles from Quebec, has a heavy trade in lumber, and is the seat of a convent of the Sisters of the Good Shepherd. Pop. about 800.

Charles City, a county in the S. E. of Virginia. Area, 184 square miles. It is bounded on the N. and E. by the Chickahominy, and on the S. by the James River. The surface is undulating. Grain, wool, and tobacco are the chief products. Two Presidents of the U. S., Harrison and Tyler, were born in this county. Capital, Charles City Court-house. Pop. 4975.

Charles City, a post-village, capital of Floyd co., Ia., is on Cedar River and the Iowa division of the Illinois Central R. R. where it is crossed by the Milwaukee and St. Paul R. R., 139 miles W. N. W. of Dubuque. It has a national bank, a savings bank, a furniture factory, and various other industries, and two newspapers. Pop. 2166.

DYKE BROS., PUBS. "INTELLIGENCER."

Charles City Court-house, a post-village, capital of Charles City co., Va., is about 1 mile N. of the James River and 28 miles S. S. E. of Richmond.

Charles Edward, "the Young Pretender," or more fully **Charles Edward Louis Philip Casimir Stuart,** son of James Stuart, the first "Pretender," and of the Polish princess Clementina Sobieski, was born at Rome Dec. 31, 1720. Unlike his father and his grandfather James II., he had much native talent and firmness of purpose. He was well educated, and skilled in athletic exercises, as well as in music and the fine arts. In early youth he served with much honor in the Spanish army against Austria. War having broken out between France and England, and his father having abdicated his claim to the British throne, he in 1744 embarked with a powerful fleet and army for England, Marshal Saxe being in command; but the expedition was broken up by a great storm, which destroyed a large part of the fleet. In the following year (July 25) he landed with a few attendants at Moidart. He soon had a large following, mostly of Highlanders. With these he entered Edinburgh Sept. 17, destroyed Sir John Cope's army at Preston Pans Sept. 21, entered England, and could easily have taken London, but for the insubordination of the Highland chiefs, who compelled him to retreat to Scotland, repulsing the royal troops at Clifton. On Jan. 17, 1746, he defeated Hawley at Falkirk. The character of his forces soon compelled his retreat to the Highlands, whither he was followed by the duke of Cumberland. He fought the latter at Culloden Muir (April 16), and was there utterly overthrown; but though his army was inferior in numbers and worn out by exposure and hunger, he would doubtless have won a complete victory but for the jealousy of the clan MacDonald. As it was, the battle was totally lost, and with it the last reasonable hope of the Stuart line. After many months of suffering he escaped from the Western Islands by the aid of the famous Flora MacDonald. He lived upon various parts of the Continent under the title of count of Albany. His ill-fortune and the unfaithfulness of the countess (who was the mistress of Alfieri) led him to grossly intemperate habits. He died at Rome Jan. 30, 1788.

Charles (ELIZABETH RUNDLE), an English authoress, born about 1826. She was married to Andrew P. Charles, Esq., of London. Among her works, which are very popular, are "Chronicles of the Schönberg-Cotta Family" (1863) and "Diary of Mrs. Kitty Trevylyan" (1864).

Charles Emmanuel I., duke of Savoy, surnamed THE GREAT, was born in 1562. He succeeded his father, Philibert Emmanuel, in 1580, and married Catherine, a daughter of Philip II. of Spain. He was an ambitious prince, and waged war against Henry IV. of France and other powers. Died in 1630.

Charles Friederich August Wilhelm, duke of Brunswick, born Oct. 30, 1804, son of Friedrich Wilhelm, who perished at the battle of Quatre-Bras, had for his guardian George IV. of England. Assuming the reins of government in 1823, he ruled so capriciously and arbitrarily that he was deposed by the German Diet. He lived afterwards in Paris and London, and died in Aug., 1873, bequeathing his immense fortune to the city of Geneva.

Charles (JACQUES ALEXANDER CÉSAR), a French savant and aëronaut, born at Beaugency Nov. 12, 1746. He was a popular lecturer on physical science in Paris, and gained distinction by his experiments in electricity. He also made an improvement in the art of ballooning by substituting hydrogen gas for heated air. He and M. Robert were the first persons who ever ascended in a balloon. They ascended in 1783 to the height of 7000 feet. Died April 7, 1823.

Charles Martel, king of the Franks, born in 690 A. D., was a son of Pepin d'Héristal, duke of Austrasia. He succeeded his father as mayor of the palace in 714, and obtained royal power, while Chilperic was the nominal king. He gained near Poitiers in 732 a most important victory over a large army of Saracens who had invaded the kingdom. This is known as the battle of Tours, and is regarded as one of the decisive battles of the world's history. For this victory he was surnamed MARTEL (*i. e.* the "Hammer"). He died in 741 A. D., and was succeeded by his sons, Carloman and Pepin le Bref.

Charles Mix, a county in the S. E. of Dakota, is bounded on the S. W. by the Missouri River. Capital, Greenwood. Pop. 152.

Charles River, Mass., rises in Worcester co., and pursues a very tortuous course through Norfolk and Middlesex cos. It meets the tide-water at Boston, forming part of Boston harbor, and separating that city from Cambridge. Total length, about 75 miles.

Charleston, a county of South Carolina, bordering on the Atlantic. Area, 1900 square miles. It is bounded on the N. and N. E. by the Santee River, and drained by the Cooper River. The surface is level; the soil is mostly sandy, and is partly fertile. Cotton, rice, and corn are the chief crops. It is intersected by the North-eastern, the South Carolina, and the Savannah and Charleston R. Rs. Capital, Charleston. Pop. 88,863.

Charleston, a post-village, capital of Coles co., Ill., on the Indianapolis and St. Louis R. R., 45 miles W. of Terre Haute. It has two national banks and two newspaper-offices, and is the seat of a medical college and an infirmary. Pop. 2849; of Charleston township, 4472.

Charleston, a post-township of Lee co., Ia. P. 1241.

Charleston, a post-township of Penobscot co., Me. Pop. 1191.

Charleston, a township of Kalamazoo co., Mich. Pop. 1369.

Charleston, a post-village, capital of Tallahatchee co., Miss. It has one weekly newspaper.

Charleston, a post-village, capital of Mississippi co., Mo., on the St. Louis and Iron Mountain and the Cairo Arkansas and Texas R. Rs., 12 miles from Cairo. It has three churches, an academy, and one newspaper. P. 635.

WM. BURNS, ED. CHARLESTON "COURIER."

Charleston, a post-township of Montgomery co., N. Y. It has five churches, and manufactures of woollens, flour, sash and blinds, etc. Pop. 1601.

Charleston, a post-village, capital of Swain co., N. C., is about 50 miles S. S. E. of Knoxville, Tenn.

Charleston, a township of Chester co., Pa. Pop. 907.

Charleston, a post-township of Tioga co., Pa. Pop. 2014.

Charleston, the chief city of South Carolina and capital of Charleston county, is situated in lat. 32° 46′ N., lon. 79° 57′ W., about 7 miles from the Atlantic Ocean and 120 miles from Columbia, the capital of the State. The city stands upon a tongue of land between the Ashley and Cooper rivers. Northward stretches an extended plain occupied by fruit, floral, and vegetable farms; southward the two rivers unite, forming a spacious and beautiful harbor, one of the safest and most commodious on the Atlantic coast. The depth within the harbor is from 40 to 50 feet, but only 18 feet at the entrance; however, the work of deepening the latter is now progressing. The city covers 5¼ square miles, is triangular in form, has 53 3/16 miles of streets, and 9⅕ miles of water-front. The population in 1850 was 42,985; in 1860, 48,409; in 1870, 48,956. The proportion of the white to the colored population in 1870 was 22 to 26. Between 1860 and 1865 the population was greatly reduced by war-influences. Commerce by land and sea was totally destroyed. The railroads leading into the interior were torn up, the wharves decayed, the docks filled up, and the capital of the merchants was destroyed or rendered unavailable. Charleston was not made a port of entry for more than a year after the end of the war. As soon as it was, industry revived, and commerce has since steadily increased. The city is the seat of a large wholesale trade carried on with the interior, and is the port through which the large interior cities of the neighboring States draw their supplies of merchandise from the great commercial centres. There is also a growing trade in flour, bacon, grain, etc., carried on overland with St. Louis, Chicago, and the cities of the West and the North-west. Charleston is the first rice and fourth cotton port in the U. S. In 1873 the receipts of rice were 49,284 tierces, and of cotton 391,307 bales, being an increase over the year previous of respectively 5607 tierces and 109,221 bales. The principal exports are in cotton, rice, naval stores, lumber, and phosphate rock (a fertilizing substance of great value). The exports in 1873 were—

	Total.	Foreign.	Coastwise.
Cotton, bales	385,185	160,169	225,016
Rice, tierces	37,672	none.	37,672
Naval stores, barrels	215,413	70,476	144,973
Lumber, feet	20,759,280	2,148,110	18,621,170
Phosphate rock, tons	29,838	2,435	27,403

The exports of each article were larger than those of the year before, particularly the foreign exports of cotton and naval stores, which increased 50 per cent. A large quantity of vegetables grown upon the suburban farms is annually exported to New York and other Northern cities. In the spring of 1873, 18,178 barrels of Irish potatoes and 101,956 packages of other vegetables were shipped northward. The value of foreign exports for the year ending Dec. 24, 1873, was $14,746,697, of which $2,911,770 represented the exports for Dec., 1873. The bulk of coastwise imports cannot be ascertained, but it is very large; the foreign imports are small, but growing; their value for the year ending Dec. 24, 1873, was $891,083. The vessels owned in Charleston in 1873 were 15 ocean sailing-vessels, aggregating 1713 tons; river sailing-vessels 130, tons 2125; ocean steamers 6, tons 1031; river steamers 9, tons 1593.

Manufactures are carried on in iron, wood, and phosphate rock. The census of 1870 sets down the manufactories of all kinds at 224, employing $1,538,539 capital, 2579 hands, paying annually $616,962 in wages, consuming $1,264,731 in materials, and producing $2,431,763 in manufactured articles. Since then, however, considerable increase has occurred in manufactures. In 1873 the manufacture of phosphate rock alone employed $2,010,000 capital. In the same year 56,298 tons of manufactured fertilizers, worth $3,000,000, nearly all produced by this industry, were shipped into the surrounding country. The manufacture of locomotives was begun in the South Carolina R. R. machine-shops in 1873.

The U. S. census of 1870 fixes the valuation of all property in the city at $54,730,166, while by the State assessment for 1872 it was only $41,047,625, and by the city assessment for 1873, $28,178,991. Of the last amount, $9,204,271 represented the personal and $18,974,720 the real property. The municipal tax in 1873 was 19¼ mills on the dollar, yielding $542,445. By licensing all classes of business $89,182 additional were collected. The State tax in 1873 was 15 mills, 3 mills being for county purposes. The city debt is $5,127,208, contracted before the war in aid of railroads. The municipal expenditures of 1873 were $1,087,736.40, of which $189,829.52 were spent in reducing the debt. The banking capital is $3,000,000, divided between seven banks of discount, whose aggregate deposits are $1,600,000. In addition there are five savings banks, aggregate deposits $1,155,990. There is one local fire insurance company, capital $26,000. There are three daily, one tri-weekly, one semi-weekly, five weekly, one semi-monthly, two monthly, and one quarterly publication. A city court, sitting once a year, and presided over by a judge elected for life by the legislature, and the mayor's court, constitute the municipal tribunals. There is a county jail, and a house of correction which is in the suburbs. The inmates are made to cultivate a farm, which produces nearly enough to pay for supporting that institution and an adjoining asylum for the aged and infirm. Pauperism and crime characterized respectively one-third and one-fifth of 1 per cent. of the population.

The principal educational institutions are—Charleston College, founded in 1785, endowment over $200,000, income without tuition $14,000, cost of tuition $40 per annum, number of faculty 6, students 34, alumni since 1866, 50; and the Medical College of South Carolina, no endowment, number of faculty 12, of students 60, cost of course $60. The former has an excellent museum of natural history, and the latter one of the best pathological and anatomical museums in the U. S. There is one high school for boys, with 5 teachers and 100 pupils; cost of tuition $40, annual donation from city $2000. Number of public schools 4, teachers 72, pupils 3000. Teachers' salaries aggregate $36,000 per annum, and vary from $400 to $2000 each. One of these schools is a normal school for girls; it has two departments. In the higher girls are prepared to become teachers. The other schools are divided into primary, intermediate, and grammar departments, each of the two last being the field of promotion for the one below. Each school has a principal, and a sub-principal for each department. All of the schools are under the direction of a superintendent, who is subject to the control of a board of commissioners composed of one citizen from each ward, chosen every two years by the people. The Charleston Library is the principal institution of that kind. Established in 1748, it formerly contained 24,000 volumes, but lost about 8000 by the war. Many of its books are of great value. The society owns a building on Broad street. It has no endowment; its income is about $2000. The Apprentices' and Minors' Library Society had a building on Meeting street and 10,000 volumes, which were destroyed by fire in 1861. It was reorganized in 1873.

The churches number 39: Episcopal 11, Presbyterian 8, Catholic 5, Methodist 5, Baptist 4, Lutheran 3, Unitarian 1, Independent 1, Orphans' chapel 1; also two Jewish synagogues; average sittings 500 each. St. Michael's and St. Philip's, Episcopal, and the Central Presbyterian, are the finest church edifices. The benevolent institutions are the city orphan-house, endowment $190,000, annual cost $21,377, inmates 303, city donation $20,000 a year; the Catholic orphan asylum, inmates 109, annual city donation $6000; almshouse, inmates 75, besides outside pensioners, cost to the city $10,000 a year; asylum for aged and infirm, inmates 58, annual cost $3515; city hospital, patients treated 1223, annual expenses $20,977, cost to the city $7287. There is an asylum for colored orphans, supported by the State, cost $5000 a year. The Confederate Widows' Home, St. Philip's Church Home, Sailors' Home, Ladies' Mutual Aid Association, and Ladies' Fuel Society are among the private benevolences.

The most noted public buildings are the Arsenal and the Citadel, occupied by U. S. troops, the market, city hall, court-house, city orphan-house, Charleston Hotel, Mills House, Academy of Music, new custom-house, and the post-office. The Battery, a small park on the S. front of the city, is the chief public resort.

The city railroads are the City Railway, for passengers only, capital $200,000, miles of track 8, passengers carried annually 1,000,000; Enterprise Railroad, for freight and passengers, capital $250,000, miles of track 3, now building. Three steam railroads centre in the city, the principal of which is the South Carolina. There is a steam ferry to Sullivan's Island, a summer resort, carrying 200,000 passengers annually. The city is lighted by a private gas company. The paved streets are 9¼ miles, planked 5⅛, shelled 1⅜. The tidal sewerage is in vogue: miles of sewers, 5¼, besides inclined drains.

Charleston was founded in 1680 by an English colony. During the first half century its growth was slow, but it attained commercial importance before the end of the second. It was taken by the British in 1780, after a gallant defence, and evacuated by them in 1782. It was the State capital until 1790, when the seat of government was removed to Columbia. It was the seat of the great Democratic convention of 1860, and later in the same year of the convention which passed the famous Ordinance of Secession. The reduction of Fort Sumter, its principal harbor defence, was the first conflict of the great civil war and the first triumph of the Confederate arms. In Dec., 1861, nearly half of the city was destroyed by fire. During the last two years of the war it sustained a protracted siege and bombardment, and was finally evacuated by the Confederates Feb. 19, 1865.

W. E. Simmons, Jr., late Ed. "News and Courier."

Charleston, a township of Orleans co., Vt. It has an academy, and manufactures of lumber, leather, starch, etc. Pop. 1278.

Charleston, or **Kanawha Court-house,** the capital of West Virginia and of Kanawha co., at the mouth of the Elk River, on the Kanawha River, 65 miles from its mouth and 150 miles S. S. W. of Wheeling. The Chesapeake and Ohio R. R. passes the city on the opposite side of the Kanawha. Steamboats navigate the Kanawha River up to this point. The city has one daily and three weekly newspapers, two national banks, two iron-foundries, and several large manufactories. A considerable trade in lumber, salt, and coal is carried on. There are ten salt furnaces, one of which makes 2000 bushels of salt per day. The seat of the State government was removed to Charleston in 1869. Pop. 3162; of township, 3857.

CHARLES B. WEBB, ED. "KANAWHA CHRONICLE."

Charleston, College of. In June, 1770, a meeting of the citizens of Charleston, S. C., was held to petition the general assembly for the establishment of a college. In Oct., 1775, an act was passed providing for three colleges, one of which was to be located in Charleston. In Mar., 1789, the Rev. Dr. Robert Smith was elected president. In Oct., 1794, the first commencement was celebrated. In 1805 Dr. George Buist was elected president, and served three years. Upon his death Mr. Mitchell King was elected to supply his place.

After a suspension of some years, in 1826 the Rev. Jasper Adams of Brown University was elected president, and in 1830 the new building (subsequently enlarged by the addition of wings) was erected. From 1826 to 1838 the chair was filled by Dr. Adams, with the exception of one or two intervals, in which Mr. King and the Rt. Rev. Dr. Bowen officiated temporarily. In 1838, Rev. Dr. Brantley was elected, and was succeeded in 1844 by W. P. Finley, LL.D., who served until 1857, when the present president, N. Russell Middleton, LL.D., was elected.

The plan upon which the college is now conducted repudiates all coercion; if the students are indolent or ill-behaved, they are dismissed, and the discipline of the college has decidedly improved under this method. The institution being intended chiefly for the use of the citizens, to keep their sons under parental influences and preserve their acclimation, has never been largely supplied with students, the number varying from 30 to 60.

N. R. MIDDLETON.

Charlestown, a post-village, capital of Clarke co., Ind., is 2½ miles from the Ohio River and 12 miles N. N. E. of Louisville, Ky. It has four or more churches and one newspaper. Pop. 2204; of Charlestown township, 3294.

Charlestown, a post-village of North-east township, Cecil co., Md., on the North-east River and on the Philadelphia Wilmington and Baltimore R. R., 7 miles E. by N. of Havre de Grace. It was settled in 1742, and burned by the British in 1813. Pop. 223.

Charlestown, a former city and seaport of Middlesex co., Mass., is a northern suburb of Boston, lat. 42° 2′ N., lon. 71° 3′ 33″ W. It is situated on a peninsula nearly enclosed by the Mystic and Charles rivers, and is connected with Boston and Chelsea by five bridges. The ground is uneven, and rises into two eminences, Breed's and Bunker Hills, which afford delightful situations for dwellings. The city is handsome and well built, with pleasantly shaded rather irregular streets. Three avenues, Main, Bunker Hill, and Medford streets, traverse the peninsula, and, converging at its neck, make the fine broad avenue Broadway, passing through Somerville and over Winter Hill. The city has thirteen churches, two national banks, three newspapers, public parks, horse-railways, a public library, and numerous charities. Here is also a State prison, after the plan of that at Auburn, N. Y., in which there are 600 convicts. There is an extensive U. S. navy-yard, occupying seventy to eighty acres, extending from the Charles to the Mystic rivers, in which are three large ship-houses, a ropewalk, the largest in the U. S., and machine-shops for the manufacture of copper-work, machinery, and ordnance, capable of employing 2000 men. A dry-dock connected with the navy-yard is built of granite and cost $670,000. There are $10,000,000 worth of government stores in the yard. Charlestown has manufactures of steam-engines, boilers, and machinery, chemicals, stone-ware, brass-ware, brushes, sugar, soap, leather, mechanics' tools, gas fixtures, whips, drain-pipes, New England rum, tobacco, oils, etc. To commemorate the battle of BUNKER HILL (which see) a granite shaft 220 feet high, 31 feet square at the base, and 15 at the top, was commenced in 1825 and finished in 1843. It is called the Bunker Hill Monument, and from its summit is afforded a magnificent view of the surrounding country. The corner-stone of this tower was laid by La Fayette, and at the celebration of its completion, June 17, 1843, the anniversary of the battle, was present a vast gathering of people, including the President and his Cabinet. Charlestown is supplied with water from Mystic Lake, 5 miles distant. The water-works were finished in 1864, at a cost of $1,461,259. In 1872 there was a balance over expenses of $144,576—a singular instance of water-works paying a balance over maintenance. The water flows from the lake one mile by gravitation, is then pumped by three engines to a reservoir on Tuft's Hill, from which it flows four miles, and supplies Charlestown and the neighboring towns; in all, a population of 100,000. Charlestown is memorable from its associations with the Revolution. It was burned by the British on the day of the battle of Bunker Hill. The city charter dates from 1847. The city of Charlestown, also the towns of West Roxbury and Brighton, were annexed to Boston Oct. 13, 1873, to become a part of that municipality Jan. 5, 1874. Pop. 28,323.

WM. H. DECOSTA, PUB. "ADVERTISER."

Charlestown, a post-village of Sullivan co., N. H., on the Connecticut River and the Vermont Central R. R., 50 miles W. of Concord. It has a national bank, a savings bank, four churches, and manufactures of lumber, boots and shoes, etc. Pop. of Charlestown township, 1741.

Charlestown, a post-township of Portage co., O. P. 675.

Charlestown, a post-township and village of Washington co., R. I. The village is on the Stonington and Providence R. R., 40 miles S. S. W. of Providence. Pop. 1119, including 115 Indians of the Narragansett tribe.

Charlestown, a post-village, capital of Jefferson co., West Va., on the Baltimore and Ohio and South Virginia R. Rs. It has four churches, a fine court-house, a jail, one newspaper, and a national bank. In this place John Brown was tried and executed Dec., 1859. On the 18th Oct., 1863, a Confederate force of 1200 or 1400 men, under Gen. Imboden, surrounded the place at daylight, and attacked the Union troops stationed there. Being surprised, they were panic-stricken, and, flying in confusion, were nearly all captured. The place was recaptured within an hour by a force of U. S. troops under Col. Geo. D. Wells, and the Confederates driven from the town. Pop. 1593.

W. W. B. GALLAHER, ED. "FREE PRESS."

Charlestown, a post-township of Calumet co., Wis. Pop. 1250.

Charleville, a town of France, in the department of Ardennes, on the river Meuse, which separates it from Mézières. It is well built and handsome, and has a college and a large public library; also manufactures of hardware, nails, copper, leather, etc. A suspension bridge crosses the river here. This place was formerly fortified. Pop. 11,244.

Charlevoix, a county of Canada, in the province of Quebec, bounded on the E. by the St. Lawrence. It abounds in limestone, and has saline and sulphur springs. Iron and plumbago have been found in this county. Capital, St. Paul's Bay. Pop. in 1871, 15,611.

Charlevoix, a county of the N. part of the S. peninsula of Michigan, bordering on Lake Michigan. Its surface is largely covered with timber, and it abounds in lakes. Potatoes, grain, and maple-sugar are the most important crops. Capital, Charlevoix. Pop. 1724.

Charlevoix, a post-village, capital of Charlevoix co., Mich. It has one newspaper. Pop. of township, 456.

Charlevoix, de (PIERRE FRANÇOIS XAVIER), a French Jesuit and historian, born at Saint-Quentin Oct. 29, 1682. He went as a missionary to Canada in 1720, and descended the Mississippi to its mouth. He wrote, besides other works, a "History of Canada" (3 vols., 1744). Died Feb. 1, 1761.

Charlotte, a county in the S. W. of New Brunswick, Canada, is bounded on the S. by the Bay of Fundy and Passamaquoddy Bay, and on the W. by the river St. Croix, which separates it from Maine. The soil is fertile. It is intersected by the New Brunswick and Canada R. R. Capital, St. Andrew's. Pop. in 1871, 25,882.

Charlotte, a county in S. S. E. Virginia. Area, 550 square miles. It is bounded on the S. W. by the Staunton River. The surface is uneven; the soil is productive. Tobacco and grain are the staple crops. It is intersected by the Richmond and Danville R. R. Capital, Marysville or Charlotte Court-house. Pop. 14,513.

Charlotte, a township of Livingston co., Ill. P. 746.

Charlotte, a post-township of Washington co., Me. Pop. 467.

Charlotte, a city, capital of Eaton co., Mich., on the Grand River Valley branch of the Michigan Central and the Peninsular R. Rs., 19 miles S. W. of Lansing. It has a national bank, a fire department, two newspapers, lumber, and other manufactories. Pop. 2353. ED. "REPUBLICAN."

Charlotte, a township of Bates co., Mo. Pop. 1289.

Charlotte, a township of Chautauqua co., N. Y. It has six churches, and manufactures of leather, cheese, lumber, etc. Pop. 1682.

Charlotte, a post-village of Monroe co., N. Y., on Lake Ontario, at the mouth of the Genesee River, 7 miles N. of Rochester, with which it is connected by railroad. Here is a custom-house and an iron foundry.

Charlotte, a post-village, capital of Dickson co., Tenn., 38 miles W. of Nashville. Pop. 276.

Charlotte, a post-township and village of Chittenden co., Vt., on the Rutland division of the Vermont Central R. R., 12 miles S. S. W. of Burlington. Pop. 1430.

Charlotte, a city, the capital of Mecklenburg co., N. C., on the Atlanta and Richmond R. R., and the terminus of the North Carolina division of the Richmond and Danville and the Charlotte Columbia and Augusta R. Rs. It has one national and two other banks, one daily and four other newspapers, three academies, and various manufactories. Gold-mines have been opened in the vicinity. There is a branch of the U. S. Mint in this city. Pop. 4473; of township, 2212. JOHNSTONE JONES, ED. "OBSERVER."

Charlotte Amalie, a town of the West Indies, capital of the island of St. Thomas. It stretches a mile along the shore, with white-walled, red-roofed houses, contrasting with the palms on the neighboring hills. It has a good harbor and an extensive trade, and is a station for the mail-packets which ply between Southampton and the West Indies and for the steamers from New York to Brazil. Pop. 12,560.

Charlotte Court-house, a post-village, capital of Charlotte co., Va.

Charlotte Hall, a post-township of St. Mary's co., Md. Pop. 1601.

Charlotte Harbor, an inlet on the W. coast of Florida, in Manatee county, is nearly 24 miles long, and is sheltered from the sea by several islands. It is shallow, its greatest depth being nearly ten feet. Good oysters and fish abound here. Cattle are exported to Key West.

Charlot'tenburg, a town of Prussia, in the province of Brandenburg, on the river Spree, 3 miles W. of Berlin, at the end of the Thiergarten park. It has a palace with a fine park and a famous palmery, and a mausoleum in which are statues of Frederick William III. and Queen Louisa, by Rauch. Here are manufactures of cotton and hosiery. Pop. in 1871, 19,518.

Char'lottesville, the capital of Albemarle co., Va., is on the Rivanna River and on the Chesapeake and Ohio R. R., 97 miles by railroad W. N. W. of Richmond; it is 61 miles N. N. E. of Lynchburg by the Orange Alexandria and Manassas R. R. One mile W. of this town is the University of Virginia, founded in 1819 by Thomas Jefferson, and endowed by the State. Here are two national and two other banks, a cloth, an agricultural implement, two tobacco, and other factories. The city has an academy and several other schools, seven churches, an insurance company, and two newspapers. Monticello, the residence of Jefferson, is three miles distant. Pop. 2838; of township, 7145. ED. "CHRONICLE."

Char'lottetown, the capital of Prince Edward Island and of Queen's county, is situated on the N. bank of East River, near the S. coast. It has an excellent harbor and a large export trade. The town is well laid out, and has a fine colonial building, post-office, and athenæum, a normal school and lunatic asylum, and is the seat of Prince of Wales, St. Dunstan's (Roman Catholic), and a Methodist college. It has excellent public schools. It is the see of a Roman Catholic bishop, has nine churches, and seven weekly, one semi-weekly, and one fortnightly periodical. Pop. in 1871, 8807.

Charl'ton, a county of Georgia, bordering on Florida. It is partly bounded on the E. by the Satilla and St. Mary's rivers. The surface is level; the soil is sandy. Pine timber abounds. Corn, rice, wool, and sweet potatoes are the chief products. Capital, Trader's Hill. Pop. 1897.

Charlton, a post-township and village of Worcester co., Mass., on the Boston and Albany R. R., 57 miles W. S. W. of Boston. Lumber and woollens are manufactured. P. 1878.

Charlton, a post-township and village of Saratoga co., N. Y. Pop. 1607.

Charlton (ROBERT M.), an American lawyer and author, born at Savannah, Ga., Jan. 19, 1807. He published a volume of poems in 1838, and became U. S. Senator in 1852. Died Jan. 18, 1854.

Char'mides [Χαρμίδης], an Athenian philosopher, born about 450 B. C., was an uncle of Plato and a pupil of Socrates. He was one of the tyrants who obtained power by the aid of Lysander the Spartan, and was killed in battle by the army of Thrasybulus about 404 B. C.

Char'nock (Rev. STEPHEN), an English nonconformist, born in London in 1628; died July 27, 1680. He is best known by his able treatise on "The Being and Attributes of God" (1682, folio). A second folio volume appeared in 1683. His whole works were published in nine volumes, 8vo, in 1815, and a new edition in 1866.

Cha'ron [Gr. Χάρων], in classic mythology, the ferryman who transported the souls of the dead across the rivers of the infernal regions. The poets feigned that he was the son of Erebus and Nox.

Charon'das [Χαρώνδας], an eminent Greek legislator, born at Catana, in Sicily, flourished about 650 B. C. He composed laws in verse, which were adopted by the Athenians and other nations.

Cha'ron of Lamp'sacus, son of Pythocles, one of the early writers of history preceding Herodotus, who are known under the name of "logographi." Little more is to be gathered of his life than the brief summary given by Suidas, who places him in the time of the Persian wars, Ol. 75 (*i. e.* B. C. 480). Plutarch refers to him as writing still after the death of Xerxes, which occurred B. C. 465. He composed a number of works on historical subjects, particularly an account of the Persians (Περσικά), and another of the Greeks (Ἑλληνικά). Suidas gives the titles of several other histories of separate countries, some of which, Creuzer and Müller think, may be but different names of the same work; some probably belong to other writers of this name. Suidas speaks of two others—one of Carthage, who wrote accounts of the tyrants of Europe and Asia; the other of Naucratis, who wrote the lives of Alexandrian and Egyptian priests, a history of kings, and an account of Naucratis. (The fragments of the works of Charon of Lampsacus are collected in CREUZER'S "Histor. Græc. Antiq. Frag.," and in MÜLLER'S "Histor. Græc. Frag.," vol. i., pp. 32–35.)

HENRY DRISLER.

Charost, de (ARMAND JOSEPH DE BÉTHUNE), DUC, a French philanthropist and economist, born at Versailles July 1, 1728, was a descendant of the renowned Sully. He founded hospitals and published treatises on agriculture. Died Oct. 27, 1800.

Charr, the *Salmo umbla*, one of the most beautiful and most delicious fishes of the salmon family, caught in the British Islands, Switzerland, and Sweden. It is not a game fish, though it will occasionally rise at the fly or take a minnow. It lives in the clear water of lakes and streams, and is so much hunted for market that it is believed to be rapidly becoming extinct. It seldom weighs much more than a pound, and is quite variable in color and marks.

The Northern Charr.

Charrette, a township of Warren co., Mo. Pop. 2690.

Charrières, de (MADAME SAINT HYACINTHE), a French authoress, born in Holland in 1740, married M. de Charrières, a Swiss gentleman, and lived in the neighborhood of Neufchâtel. She wrote several romances of Swiss life that were praised by Sainte-Beuve. The best known are "Lettres Neuchateloises" (1784) and "Caliste" (1786). She was intimate with Benjamin Constant while he was yet young, and their interesting correspondence has been published. Died Dec. 20, 1805.

Chart [from the Fr. *carte;* Lat. *charta*, "paper"], a hydrographic map for the use of navigators, is the projection of some portion of the sea or coast on a plane surface. Charts are generally constructed on the principle of Mercator's projection. In the English and U. S. services, after coasts have been surveyed by the government, charts are engraved and sold at prices below their cost, in order to encourage their general use. The navigating charts, showing the dangers of the coasts with sufficient clearness to enable mariners to avoid them, are usually on a uniform scale, and the U. S. charts are generally on the polyconic

projection. The preparation of charts is a part of the duty of the hydrographical department at the admiralty in England, and in the U. S. of the coast survey department.

Char'ta Epispas'tica [Lat. for "drawing" (or blistering) "paper"], the pharmaceutical name for blistering paper. It is prepared by applying to one surface of smooth bibulous paper a mixture of oil, wax, spermaceti, resin, Canada balsam, water, and powdered cantharides. When applied to the skin it adheres, and after a time raises a blister as perfectly as the blistering cerate does, while it is much cleaner and more easily applied.

Various *chartæ emplasticæ*, or adherent medicated papers (*papiers emplastiques*), are employed by many French physicians instead of the less neat and convenient plasters of ordinary pharmacy.

Charte [Fr.], the name applied in France (1) to the "Grand Charter" of John II., prepared by the States-General and agreed to by the king: this was the basis upon which the States-General asserted their liberties at the commencement of the Revolution; (2) that by which Louis XVIII. in 1814 acknowledged the rights of the people; (3) that of 1830, which was sworn to by Louis Philippe, recognizing the popular sovereignty.

Char'ter [Fr. *chartre* or *charte*, from the Lat. *charta*, "paper"], a formally written instrument given as evidence of a grant, contract, or other transaction between man and man; an instrument executed with form and solemnity bestowing rights and privileges. In public law the term is applied to those formal deeds or instruments by which sovereigns guarantee the rights and privileges of their subjects, or by which a sovereign state guarantees those of a colony. The founders of several of the British colonies, now States of the Union, obtained charters from the king of England for the same. In municipal law the word is principally used to designate a grant obtained from the king of franchises, privileges, or estates by letters patent under the great seal. A leading instance is found in the creation of corporations. In early times corporations were created principally in this manner. It has been doubted whether municipal corporations could at first be created in any other way than by royal charter. The better opinion is that there could be valid charters other than royal. It is now quite frequent to originate them by act of Parliament. The act of incorporation in that case has the force of a statute. There are certain special rules appertaining to royal charters, as distinguished from corporations created by act of Parliament. Thus, the king cannot limit the perpetuity of a corporation, while Parliament may. Accordingly, when the Bank of England was established by way of experiment, the aid of Parliament was called in to limit its duration. A general statute now confers that power upon the king to limit the time of corporate existence. So the Crown cannot force a new charter upon an already existing corporation. The king cannot derogate from his own grant. Parliament may abolish the institution or modify it at pleasure. Nor can the king remove corporators at discretion, as each corporator is supposed to have a freehold estate. So a charter cannot create exclusive right or prohibit trade, or in any way change the established law of the land. These propositions are of but little practical use in the U. S., as, since the Revolution, corporations are created by act of the legislature. There is a number of municipal and other charters in existence which were granted by the king prior to the Revolution, and which remain in force, notwithstanding the change in government. (As to general rules of law in which the rules concerning strict charters agree with corporations created by the legislature, see CORPORATION.)

T. W. DWIGHT.

Char'ter-House [a corruption of *Chartreuse* (see CARTHUSIANS)], a hospital and school in London, founded in 1611 by Sir Thomas Sutton, who endowed it with the revenues of more than twenty manors, lordships, and other estates. It was originally a Carthusian monastery, founded in 1371. It is an asylum for poor brethren, the number of whom is limited to eighty, and they must be bachelors, members of the Church of England, and fifty years old. Each brother receives, besides food and lodging, an allowance of £26 a year for his clothing, etc. The school is for the benefit of "the sons of poor gentlemen to whom the charge of education is too onerous." The number of scholars is limited to forty-four, but there are large numbers of day and boarding pupils who are not charity scholars. Among the eminent men educated here were Addison, John Wesley, George Grote, Bishop Thirlwall, and Thackeray. The reputation of the school is high.

Char'ter Oak, a tree famous in colonial history, once stood in Hartford, Conn. When Sir Edmund Andros came

Charter Oak.

to Hartford in 1687, by command of King James II., to resume the charter of the colony, the charter was concealed by Capt. James Wadsworth in a hollow of this oak. This historic tree was blown down by a gale in Aug., 1856.

Charter Oak, a township of Crawford co., Ia. P. 67.

Chart'er-Par'ty [Fr. *chartre-partie*, so called from such documents being at one time divided (in Fr. *parti*), and one-half given to each party concerned], the title given to a contract in which the owner or master of a ship, with consent of the owner, lets the vessel or a portion of her to a second party for the conveyance of goods from one port to another port; hence the vessel is said to be "chartered." It must specify the voyage to be performed, and the terms on which the cargo is to be carried. On the part of the ship it is covenanted that she shall be seaworthy, well found in rigging, furniture, and provisions, and that the crew be suitable in number and competency; that she shall be ready to receive the cargo on a given day, wait its complete delivery for a certain period, and sail for the stipulated port when laden if the weather for the time permits. The freighter's portion of the contract obliges him to load and unload at suitable periods under specified penalties, and to pay the freight as agreed on. The master must not take on board any contraband goods, or otherwise render the vessel liable to seizure. The owner is not responsible for losses caused by war, fire, or shipwreck, unless arising from negligence of the master or crew. A charter-party sometimes assumes another character, and is a mere lease of a ship, which is manned by the charterer, who then has the usual rights and incurs the liabilities growing out of possession.

Chartier (ALAIN), an eminent French poet, born in Normandy about 1385, was secretary to Charles VI. and to Charles VII. He wrote a prose work called "Le Curial," and popular poems, among which is "The Book of the Four Ladies" ("Le Livre des Quatre Dames"). He contributed to improve and refine the French language. Died about 1455.

Char'tiers, a township and post-village of Alleghany co., Pa. The village is on the Alleghany Valley R. R., 239 miles W. of Harrisburg. Total pop. 2269.

Chartiers, a township of Washington co., Pa. Pop. 1870.

Chart'ism [so called from "the people's charter," noticed below], a political movement in Great Britain between 1835 and 1850, in which attempts were made to secure universal male suffrage, equal representation, the vote by ballot, annual parliaments, the abolition of property qualification for office-holders, and the payment of salaries to members of Parliament. These changes were demanded in "the people's charter" of 1838. The movement was primarily caused by the sufferings of the working-classes; and as a whole, the demands of the Chartists were reasonable, moderate, and just; but they excited the greatest alarm in England, and the movement was opposed by force, some of their meetings being fired upon by the troops, prominent Chartists being imprisoned, and Parliament refusing to entertain their petitions. But various parliamentary reforms and the repeal of the corn laws in 1846 having in a measure relieved the distress of the working-classes, Chartism gradually declined.

Chartres (anc. *Autricum*), a city of France, capital of the department of Eure-et-Loir, is on the river Eure, and on

the railway which connects Paris with Le Mans, 49 miles S. W. of Paris. It is built at the base and on the declivity of a steep hill. The streets are narrow and crooked. Here is a Gothic cathedral of the eleventh century, said to be the most perfect in France; it is surmounted by two towers, one of them 382 feet high, with rich ornamentation, and the other exceedingly massive. Chartres has two other remarkable churches, an episcopal palace, and a public library of about 30,700 volumes; also manufactures of hosiery, hats, leather, etc. Here is a large weekly market for grain and flour. During the Middle Ages, Chartres was the capital of the district of *Chartrain*, made by Francis I. a duchy, and given as an appanage to the dukes of Orleans. Hence the title duke of Chartres was given to the eldest son of the duke of Orleans. More recently the same title was given to Prince Robert of Orleans, grandson of King Louis Philippe, and second son of Duke Ferdinand of Orleans. Pop. 19,442.

Chartreuse, La Grande, a large and famous monastery in the French Alps, 12 miles N. N. E. of Grenoble, in the midst of wild and impressive scenery, 3281 feet above the sea. The convent was founded by Saint Bruno in 1084, somewhat higher up the mountain than the present buildings. The name of the order, Carthusians, comes from this convent, and the English Charter-house is a corruption of its name. The buildings are extensive, but rudely built, and date from 1689. The monastery had been repeatedly burned before the present structure was built. The monks were stripped of their possessions, which were considerable, in the French Revolution, and abandoned the convent until 1826. They have never recovered their former wealth and dignity.

Char'tulary [Late Lat. *chartularia*] is, as its name implies, a collection of charters. So soon as any body, ecclesiastical or secular, came to be possessed of a considerable number of charters, considerations of convenience and safety would suggest having them classified and copied into a book or roll. Such book or roll has received the name of a chartulary. Mabillon traces chartularies in France as far back as the tenth century, but it was not until the twelfth or thirteenth century that they became common. They were kept not only by all kinds of religious and civil corporations, but even by private families. Many of them have been printed, and their contents are often of the greatest value in historical, archæological, and genealogical inquiries.

Charyb'dis [Gr. Κάρυβδις], now called **Galofaro,** is an incessant undulation, rather than a whirlpool, on the Sicilian side of the Strait of Messina, opposite the rock of Scylla. It is caused by the meeting of currents, and is seldom dangerous. It was anciently much dreaded by mariners. (See Rear-Admiral William Henry Smyth's monograph on the Mediterranean, p. 519, 8vo, 1854.)

In Greek mythology, Charybdis was a daughter of Poseidon, and was killed by Zeus with a thunderbolt and hurled into the sea, where she henceforth drew the approaching ships into the deep.

Chase [Fr. *chasse*], a pursuit, a hunting; the sport of hunting or pursuing game. In nautical language, chase is the pursuit of a hostile vessel and also the vessel pursued. The chase of a gun is the name of the greater portion of the length between the muzzle and the trunnions. In forestry, chase is a row or rank of trees or plants, especially hedge-plants; also an extent of waste or forest-land formerly appropriated in England for the breeding of deer and other game.

Chase [Fr. *châssis*], in printing, an iron frame in which the pages of type are wedged up to secure the letters from separating or dropping out in the process of printing. Chases are of different dimensions, according to the number of pages in a sheet and the size of the paper.

Chase, a county in E. Central Kansas. Area, 757 square miles. It is intersected by the Cottonwood River, and also drained by several creeks. The surface is undulating; the soil is fertile. Tobacco, grain, live-stock, and wool are produced. It is traversed by the Atchison Topeka and Santa Fé R. R. Capital, Cottonwood Falls. P. 1975.

Chase, a post-township of Lake co., Mich. Pop. 520.

Chase (Carlton), D. D., born at Hopkinton, N. H., Feb. 20, 1794, graduated at Dartmouth in 1817, was ordained deacon in 1818, and priest in 1820, and in 1844 was consecrated Protestant Episcopal bishop of New Hampshire. Died at Claremont, N. H., Jan. 18, 1870.

Chase (Dudley), born in Cornish, N. H., Dec. 30, 1771, an uncle of S. P. Chase, graduated at Dartmouth in 1794, was chief-justice of Vermont (1817–21), and U. S. Senator from 1813 to 1817, and again from 1825 to 1831. Died Feb. 23, 1846.

Chase (Irah), D. D., born at Stratton, Vt., Oct. 5, 1793, graduated at Middlebury College in 1814, studied at Andover Theological Seminary, and was ordained to the Baptist ministry in 1817. He labored as missionary in West Virginia, and was in 1818 appointed professor in the theological school at Philadelphia. From 1825 to 1845 professor at successive periods of biblical theology and ecclesiastical history in the Theological Institution (which he was largely instrumental in founding) at Newton Centre, Mass. He published several works, mainly controversial. Died at Newton Centre, Mass., Nov. 1, 1864.

Chase (Philander), D. D., an American Episcopal bishop, born in Cornish, N. H., Dec. 14, 1775, and graduated at Dartmouth in 1796. He went in 1817 as a missionary to Ohio, where he planted the Episcopal Church. He became bishop of Ohio in 1819, and bishop of Illinois in 1835. He founded Kenyon College, O., and Jubilee College, Ill. Published "Reminiscences" (2 vols. 8vo). Died Sept. 20, 1852.

Chase (Pliny Earle) was born at Worcester, Mass., Aug. 18, 1820, and graduated at Harvard College in 1839. While engaged for many years as a teacher in Philadelphia, and afterwards in mercantile life, he employed his leisure in metaphysical, philological, and physical studies, producing many able and learned papers, published in the "Proceedings of the American Philosophical Society," and in various scientific journals, several of which were copied in the London, Dublin, and Edinburgh "Philosophical Magazines" and other foreign journals. These articles have procured him wide distinction as a man of science. In 1871 he was appointed professor of physics in Haverford College. The Magellanic gold medal of the American Philosophical Society was awarded to him in 1864 for his paper on the "Numerical Relations of Gravity and Magnetism."

Chase (Salmon Portland), an American statesman and jurist, son of Ithamar Chase, a farmer of New Hampshire, and nephew of Dudley and Philander Chase, above noticed, was born at Cornish, N. H., Jan. 13, 1808. He was sixth in descent from Aquila Chase, who emigrated from England to Massachusetts in 1630. His mother was of Scotch descent. The stock to which he belonged was prolific in eminent men. His grandfather, Samuel Chase, had seven sons, five of whom received an education at Dartmouth College. During the war of 1812 Ithamar Chase engaged in the glass manufacture at Keene, N. H., but this business resulted unfortunately on the reintroduction of foreign manufactures. He died in 1817, leaving his family in straitened circumstances. Salmon's education, however, was not neglected. He was first sent to a school at Windsor, Vt., and when twelve years of age went to Ohio to live with his uncle, the bishop, who resided near Columbus. Here he divided his time between hard work on the bishop's farm and hard study in the bishop's academy, which was afterwards removed to Cincinnati. In 1823 he returned to New Hampshire, and the next year entered Dartmouth College, from which he graduated in 1826. He then repaired to Washington, and supported himself by teaching a school whilst studying law under the direction of William Wirt. Here he obtained his license to practise law in 1829, and in the spring of 1830 went to Cincinnati to pursue his profession. For a few years, like most young men without influential business connections, he had to struggle hard to maintain a professional existence, and his first efforts in court, as often happens to men of great talent, were failures. But all these difficulties were finally overcome. During the weary hours of waiting for business he occupied himself in preparing an edition of the "Statutes of Ohio," with notes and an historical introduction. This brought him into notice, and in 1834 he was appointed solicitor for the U. S. Bank in Cincinnati. From this period he never wanted employment.

He early engaged in the controversy respecting slavery and the slave-power in the U. S., and took the then unpopular anti-slavery side. He held slavery to be against natural law and right, and was for confining it within its narrowest limits of power and territory. In 1837 he appeared as counsel for Matilda, a colored woman claimed as a fugitive slave, and took the ground that Congress had no right to impose on State officers the duty of assisting to render up fugitive slaves, nor to legislate on the subject at all—that the States were, by the Constitution, solely responsible for the performance of that duty, and had a right to prescribe such proceedings as they saw fit to prevent unjust arrests and detentions. These views were enforced with great eloquence and power, though unsuccessful at that time. In a subsequent case he took the broad ground that slavery was a local institution, dependent upon State laws for its existence and continuance. His great maxim was, "Slavery is sectional, freedom is national." In 1842

he was employed to defend Van Zandt, the original of Van Tromp in "Uncle Tom's Cabin," who had been a Kentucky farmer, but from a conviction of the wrong of slavery had liberated his slaves and removed to Ohio, near Cincinnati. Here he was indicted, under the Fugitive Slave law of 1793, for harboring fugitive slaves and aiding them to escape. The cause was carried to the Supreme Court of the U. S., where it was ably argued by Mr. Chase and Hon. W. H. Seward in 1846, and became one of the *causes célèbres* of the country.

The subject had now become fully introduced into the politics of the country, and Mr. Chase was virtually the founder and leader of the Liberty party, which resulted in the formation of the Free-Soil party, and ultimately of the great Republican party, which became the means of prostrating the slave power and abolishing slavery in the U. S. A convention of this party, under the guidance of Mr. Chase, was held at Columbus, O., in Dec., 1841, after it became apparent that no hope was to be expected from President Tyler or the old Whig party in the direction of anti-slavery. Other conventions were held at Buffalo, Cincinnati, and Columbus in 1843, 1845, 1847, and 1848, resulting in the latter year in the nomination of Mr. Van Buren and Charles Francis Adams as the candidates of the Free-Soil party for President and Vice-President. Mr. Chase was the moving spirit in these conventions. He presided over the last, and drew up the platform of principles and policy which it adopted. Most absorbing and prominent among these, at this time, was that of preventing the extension of slavery into the new Territories.

Mr. Chase was originally a Whig, but in the pursuit of his great object of crushing slavery and the political forces which supported it, he allied himself to any party that, for the time being, would further his aims. On the 22d of Feb., 1849, he was elected to the Senate of the U. S. by the Democrats, including the Free-Soil section of the party. During his senatorial term, from 1849 to Mar., 1855, occurred those great debates in Congress upon the question of extending slavery into the new Territories, California, New Mexico, Kansas, and Nebraska, which resulted in the Compromise acts of 1850 and the repeal of the Missouri Compromise. These acts produced a state of feeling in the Northern States which resulted in the formation of the Republican party. It is needless to say that Mr. Chase took a leading part in the debates referred to, and he was always noted for the frankness with which he declared his sentiments on the questions at issue. They were the same which he had always maintained—that slavery was local and exceptional, sustained only by local laws, and that all new territory was free territory by the laws of nature and the principles of American government, and could only be made slave territory by usurpation and wrong; and that only the original States, who had entered into the constitutional compact, were bound to render up fugitive slaves, and then only after such proceedings had as they might deem just and reasonable for preventing illegal seizures and detentions. He failed to carry his measures in Congress, but the result in after years showed the sagacity with which he comprehended the entire situation. He lived to see the fulfilment of his predictions and the consummation of his most cherished hopes.

In Oct., 1855, he was elected governor of Ohio, and re-elected in 1857. In 1860 he was a prominent candidate for the presidency before the Republican convention which nominated Mr. Lincoln. In the following session of the Ohio legislature he was again chosen Senator of the U. S., but had scarcely taken his seat in Mar., 1861, when he was nominated by President Lincoln as secretary of the treasury, upon the duties of which position he immediately entered.

The period of civil war that ensued rendered his duties as financial minister of the government most important and arduous; and it is almost universally conceded that he discharged them with pre-eminent ability and success. He found the treasury empty and the government credit below par. But he inaugurated measures which met the pressing demands of a gigantic war, amounting to six or seven hundred millions per annum, and stimulated the industrial energies of the country. These measures cannot be examined in detail. They belong to the history of that struggle. A cardinal principle kept in view was, to issue a sufficient amount of such securities and notes as would furnish a currency that would enable the people to meet their engagements and avoid bankruptcy. This kept them in heart, and kept every branch of industry in constant activity. It obviated those commercial crises which are the usual consequences of such wars. This financial policy was largely due to the recommendations of Secretary Chase, although able financiers in Congress and out gave him wise and energetic co-operation.

One of the measures resorted to, which should be noticed as exciting a difference of opinion in the constitutional power of Congress, was the issue by the government, in Feb., 1862, of currency notes which were made a legal tender in the payment of debts. It is due to Secretary Chase to say that whilst he recommended the issue of the notes, the making them a tender originated in Congress, though acquiesced in by him. Another measure of permanent importance to the country was the establishment, in Feb., 1863, of a national banking system, by which all notes issued were to be based on funded bonds of the government of equal or greater amount. This system was entirely originated by Secretary Chase, and will probably be regarded as one of his greatest achievements for the benefit of his country. He hoped that it would effectually abolish a resort to State bank issues of paper currency, which, it is known, he latterly regarded as bills of credit within the meaning and prohibition of the Constitution.

Mr. Chase resigned the secretaryship of the Treasury in the last of June, 1864, and on the 6th of Dec. following he was appointed chief-justice of the Supreme Court of the U. S., in place of Chief-Justice Taney. The duties of his new office were no less important to the country than those which he resigned. Many of the momentous questions which arose out of the issues of the war had to be ultimately adjudicated by the high tribunal over which he was called to preside—questions affecting vast private interests and the future stability of the government. It was the singular fortune of Chief-Justice Chase that he bore a conspicuous and leading part not only in the great political movement which brought on the American civil war and abolished slavery, but in the successful conduct of that war, and in the final settlement of the constitutional issues and changes to which it gave rise. The status and reconstruction of the Southern States; the rights of their citizens, personal and political; the constitutionality of acts of Congress and of the executive in various matters during the impulses and excitements of the war; the construction of those important amendments to the Constitution which were necessitated by the event of the contest,—these were among the subjects upon which the Supreme Court was called to decide. As presiding officer of the court and as a constitutional judge, the chief-justice fully met the duties, responsibilities, and the dignity of his high position. But his long service in political life and absence from the bar induced him to lean largely upon the experience of the other members of the bench in matters of technical law. In every case of public consequence depending upon constitutional or fundamental principles he exhibited the same largeness of mind which characterized his entire career. His opinions on some questions have been criticised as exhibiting a leaning against the Federal government and its authority, in which as an executive officer he had taken so large a part. For example, on the question of the constitutionality of the legal-tender notes he changed his opinion, and held them unconstitutional. But it is fairly due to him to accept his own explanation, that he assented to the law as a pressing necessity when passed, but subsequent reflection convinced him that he was mistaken. His opinions are characterized by great clearness and chasteness of style, and may be cited as models of juridical composition. They ever betrayed the fine scholar and the practised writer.

In 1868 he was called upon, as chief-justice, to preside over the Senate pending the impeachment and trial of President Johnson—the only instance of such a trial in the history of the Federal government.

In June, 1870, he had a stroke of paralysis, from the effects of which he labored more or less till his death. He attended the regular terms of court commencing in Dec., 1871, and Dec., 1872, and whilst his mind still remained clear and his logical powers unimpaired, his powerful frame was much enfeebled, and his general appearance indicated that his tenure of life was by a slender thread. He died in the city of New York May 7, 1873, in the sixty-sixth year of his age.

JOSEPH P. BRADLEY, *U. S. Supreme Court.*

Chase (SAMUEL), an American judge, born in Somerset co., Md., April 17, 1741. He was a delegate in Congress from 1774 to 1778, and signed the Declaration of Independence. In 1796 he became an associate justice of the Supreme Court of the U. S. He was impeached in 1804 for misdemeanor in the conduct of several political trials, but was acquitted by the Senate. John Randolph was one of the instigators and managers of this impeachment. Judge Chase died June 19, 1811.

Chase (THOMAS), a brother of Pliny Earle Chase, noticed above, was born at Worcester June 16, 1827. He graduated at Harvard with high honors in 1848. He served as tutor and Latin professor at Harvard for three years He visited Europe in 1853–55, and studied at the University of Berlin. On his return he was appointed (in

1855) professor of philology and of classic literature at Haverford College. He has published, besides other works, excellent editions of Virgil, Horace, and Livy, and a volume entitled "Hellas," a description of his personal observations in Greece in 1862. He has contributed to this work the article on the Codices of the New Testament.

Chas'idim [Heb. for "saints"], a name applied among the ancient Jews to a sect of pietists who originally aimed at strict ceremonial purity under the Mosaic law, warmly espousing the cause of the Maccabees, and opposing the Hellenizing tendencies of some of their fellow-Israelites. Some writers believe that the Essenes, Pharisees, and other strict followers of the Law all sprang from the Chasidim, but that the name was finally taken by a moderate party, who received the traditions as of equal authority with the Law. In recent times the name is applied to a sect of Jews who sprang up in Poland in the eighteenth century, and who aim at a restoration of the ancient piety of their nation. Their ceremonial is extremely formal. Their peculiar mystical and cabalistic doctrines and customs are repudiated by the orthodox Jews. They are now chiefly found in Eastern Europe.

Cha'sing, or **Encha'sing,** the art of working raised figures in metal; the art of embossing or making metallic bas-reliefs. Much chasing is done by filling the vessel to be chased with a composition of pitch, and then hammering with a point and chisel on the outside. Closely connected with chasing is the art of stamping with a punch from the inside, a very ancient art. Phidias and other ancient Greek artists practised the art of chasing on statues which were formed of ivory and gold. Cellini's chasing ranks with the best ever made. As an art it is chiefly practised in Europe and the East.

Chas'ka, a post-village, capital of Carver co., Minn., in a township of its own name, on the left bank of the Minnesota River, 32 miles W. S. W. of St. Paul, and on the Minneapolis and St. Louis and the Hastings and Dakota R. Rs. The St. Paul and Sioux City R. R. passes on the opposite side of the river. It has one weekly newspaper. Total pop. 847.

Chasles (Michel), a French geometer, born at Épernon Nov. 13, 1793. In a "Memoir on Two General Principles of the Sciences, Duality and Homography," he established the basis of a new theory of conic sections. He became in 1846 professor of the higher geometry in the Faculty of Sciences, Paris. He extended and simplified several important theories of pure geometry. Among his works is a "Treatise on Higher Geometry" (1852).

Chasles (Victor Euphémion Philarète), a French journalist and author, and professor of foreign literature at the College of France, born Oct. 8, 1799, was apprenticed to a printer by his father, a prominent democratic journalist of the Revolution. He went to England, where he assisted Valpy in his editions of the classics, and afterwards studied in Germany. He has contributed to the "Journal des Débats," the "Revue des Deux Mondes," and many other journals, and made admirable translations for the "Revue Britannique."

Chasseloup-Laubat, a French statesman, born May 18, 1805, at Alessandria, in Italy, was maître de requêtes during the reign of Charles X., member of the Chamber of Deputies, and councillor of state under Louis Philippe. He became in 1849 member of the legislature, in 1851 minister of the navy, in 1859 minister of the colonies, in 1862 senator, and in 1869 president of the ministry which was to carry out the liberal promises of the imperial message of July 12, 1869. Died Mar. 29, 1873.

Chassepot, a breech-loading rifle musket, which takes its name from its inventor, Antoine Alphonse Chassepot, a French officer and inspector of arms, whose first model was brought out in 1863. It has been since repeatedly improved. This musket has attracted much attention in consequence of its use by the French in the recent war with Germany. The chassepot belongs to the same class with the German needle-gun, having in its cartridge a mass of fulminating material, which is exploded by means of a needle thrust into it along the axis of the bore. Military critics have objected to the chassepot that it is too light and fragile, too expensive, too easily fouled by the powder and the fulminate, and that it is difficult to clean it properly. The more recent forms of it are free from some of these objections.

Chasseur, a French word signifying a "hunter," a "sportsman," the name of certain light troops in the French army who are distinguished as good marksmen. There are chasseurs both among the infantry and cavalry. In the Austrian army are similar troops called *Jägers*. The light troops which fought under Garibaldi in 1859 and 1860 were called *Cacciatori dei Alpi—i. e.* "hunters of the Alps."

Chasseurs de Vincennes is one of the names given to a famous corps in the French army. About the year 1835, when certain improvements had been made in the French rifle, the duke of Orleans ordered the formation of a company of riflemen armed with the new rifle; they were garrisoned at Vincennes. They proved so efficient that in 1838 a whole battalion was organized, which was called indifferently the tirailleurs (sharpshooters) or chasseurs de Vincennes.

Chastellux, de (François Jean), Marquis, a French general and writer, born in Paris in 1734. He wrote an "Essay on Public Happiness" (1772), which was highly commended by Voltaire, and became in 1775 a member of the French Academy. As major-general under Rochambeau he fought for the U. S. (1780–82). He was a friend of Washington and Jefferson. Among his works is "Travels in North America" (2 vols., 1786). Died in 1788.

Chas'uble [Lat. *casubula* or *casula*], the uppermost garment worn by priests in the Roman Catholic Church when robed for the mass. It was called also "the vestment," and under that name seems occasionally to have been used in the English Church after the Reformation. Originally it covered the priest from head to foot, like a little house, whence some writers think it had its name of *casula*, and in this shape it is still worn in the Greek Church. It is made of velvet, is of an elliptical shape, with a hole in the middle for the head; it has no sleeves. It has two parts, one hanging down before; another, on which a cross is embroidered, hanging down behind.

Chat (*Saxicola*), a genus of small birds of the very numerous family Sylviadæ, distinguished by a bill slightly depressed and widened at the base. They have rather longer legs than most of the family. They are lively birds, flitting about with incessant and rapid motion in pursuit of the insects on which they chiefly feed. They are found

Whinchat.

in Europe, Asia, Africa, and Australia. Three species are British—the stonechat, whinchat, and wheatear. The yellow-breasted chat of the U. S. (*Icteria polyglotta*) is a larger bird, and belongs to the family Turdidæ.

Chateaubriand, de (François Auguste), Viscount, a celebrated French author and diplomatist, born of a noble family at Saint-Malo Sept. 14, 1769. He studied the ancient languages at Dol and Rennes, and was destined for the Church, but he preferred other pursuits. Impelled by a love of adventure, he visited the U. S. in 1791. Having traversed the primeval forests of the South, and studied the nature and life of the aborigines, he found there the inspiring source of a new and romantic literature. He returned in 1792 to France, where he married Mademoiselle de Lavigne. The same year he joined the royalist emigrants who had taken arms to fight against the dominant party; he was wounded at Thionville, and became an exile in England. He passed nearly eight years in England in extreme poverty, and during this period wrote several works. In 1800 he returned to France, and began to write for the "Mercure de France." He published in 1801 "Atala," a romance, the scene of which is laid among the American aborigines. It excited much admiration. His "Genius of Christianity" (1802) promoted the revival of a religious spirit in French society, then recoiling from the skeptical theories

of the Revolution. In 1806 and 1807 he travelled in Greece, Asia Minor, and Palestine. He published in 1809 a prose epic entitled "The Martyrs, or the Triumph of the Christian Religion," and in 1811 his "Itinerary from Paris to Jerusalem." He was admitted into the French Academy in 1811. In 1814 he expressed his implacable enmity to Napoleon in an eloquent pamphlet entitled "Bonaparte and the Bourbons." After the restoration of 1815 he acted with the royalists, became a peer of France, and was sent as ambassador to Berlin in 1820. In 1822 he was transferred to the court of St. James. He was appointed minister of foreign affairs in 1823, but was removed by the agency of Villèle in June, 1824. He afterwards acted with the liberal opposition, and wrote articles against the Villèle ministry, which were inserted in the "Journal des Débats." In 1828 he was sent as ambassador to Rome by Martignac, but he resigned when Polignac became prime minister in 1829. His sympathy for the Bourbons was so strong that he refused to swear allegiance to Louis Philippe in 1830. In the latter part of his life he lived in retirement, and associated intimately with the accomplished Madame Récamier. Among his works is an interesting autobiography called "Mémoires d'Outre-Tombe" (1849–50, 12 vols.). He died July 4, 1848. He had a poetical imagination, and a superior talent for describing natural scenery. (See VILLEMAIN, "Châteaubriand, sa Vie, ses Écrits et son Influence," 1858; COUNT DE MARCELLUS, "Châteaubriand et son Temps," 1859; SCIPION MARIN, "Histoire de la Vie et des Ouvrages de Châteaubriand," 1833; SAINTE-BEUVE, "Causeries du lundi," tome i. and ii.)

Châteaudun, a handsome town of France, department of Eure-et-Loir, is on the river Loir, 28 miles S. S. W. of Chartres. It has an old castle of the tenth century, a communal college, a public library, and manufactures of blankets. Oct. 18, 1870, the town was stormed and almost entirely destroyed by the Germans. Pop. 6781.

Châteaugay, a county of Quebec (Dominion of Canada), bordering on New York. It is bounded on the N. W. by the Chateaugay River. Capital, Saint-Martins. Pop. 16,166.

Chateaugay, a post-village of Franklin co., N. Y., on the Chateaugay River and on the western division of the Vermont Central R. R., 73 miles E. by N. from Ogdensburg. It has a newspaper, and manufactures of lumber, starch, butter, cheese, etc. Pop. of Chateaugay township, 2971. A. N. MERCHANT, PROP. "STAR."

Château-Gontier, a town of France, department of Mayenne, on the river Mayenne, here crossed by a stone bridge, 18 miles S. of Laval. It has manufactures of linen and woollen fabrics. Pop. 7364.

Château-Renard, a town of France, department of Bouches-du-Rhône, near the Durance, 17 miles N. E. of Arles. Pop. 5409.

Châteauroux, a town of France, capital of the department of Indre, is in an extensive plain on the river Indre, 62 miles S. E. of Tours. It has a castle built in the tenth century, a chamber of commerce, and a society of arts; also manufactures of wool, cotton, cutlery, paper, hats, and hosiery. Nearly 2000 persons are employed here in the manufacture of strong woollen fabrics. Good iron is found in the vicinity. Pop. 17,161.

Château-Thierry, a town of France, department of Aisne, on the river Marne, here crossed by a bridge, about 60 miles by railway E. N. E. of Paris. It is on the slope of a hill crowned by the ruins of a vast castle built by Charles Martel for Thierry IV. It was the native place of the great poet Lafontaine, to whom a marble monument has been here erected. Pop. 6519.

Chatel (FERDINAND FRANÇOIS), a French priest, was born in 1795 at Gannat, became a priest in 1818, renounced the communion of Rome in 1830, and founded in 1831 the "French Unitarian Church," the fundamental principle of which was to recognize nothing but the law of nature. The church of Chatel in Paris was closed by the police in 1842, revived in 1848, and again closed in 1852. Died in 1857.

Châtellerault, a town of France, department of Vienne, on the river Vienne, 18 miles N. N. E. of Poitiers. It is near the railway from Tours to Bordeaux. It has a handsome stone bridge, an old castle, a theatre, an exchange, and hospital; also important manufactures of cutlery, and a large trade in millstones, wines, etc. Here is a national manufactory of swords and bayonets. The Scottish dukes of Hamilton derive from this place the title of duke of Châtelherault, which was given by King Henry II. to James Hamilton in 1549. Pop. 14,278.

Chat'field, a post-village of Fillmore co., Minn., near Root River, about 35 miles W. S. W. of Winona. It has an academy and one newspaper-office. Pop. of Chatfield township, 1661.

Chatfield, a post-township of Crawford co., O. P. 1247.

Chat'ham, a fortified town, river-port, and naval arsenal of England, in the county of Kent, on the right bank of the Medway, and 30 miles E. S. E. of London. The river here begins to expand into an estuary. Chatham is defended by several forts or castles crowning the adjacent heights, by which it is flanked on the S. and E. It derives its importance from its naval and military establishments, which are separated from the town and the country by a line of fortifications which are considered the best in England, except those of Portsmouth. Here are a military hospital, barracks for infantry, marines, artillery, and engineers, and magazines, storehouses, and dépôts on a large scale. Chatham has also one of the largest royal shipbuilding establishments in the kingdom. The dockyard is nearly a mile long, and contains several building slips and wet-docks, sufficiently capacious for the largest ships. Connected with it are extensive saw-mills, forges, and a metal-mill which produces copper sheets, copper bolts, etc. In 1667 the Dutch admiral De Ruyter sailed up the Medway and burned some shipping at Chatham. Pop. in 1871, 44,135.

Chatham, a county of Georgia, bordering on the Atlantic. Area, 358 square miles. It is bounded on the N. E. by the Savannah River, and on the S. W. by the Ogeechee. The surface is level; the soil is sandy and partly sterile, but that which is near the rivers is fertile. Corn and rice are the staple crops. It is intersected by the Central R. R., the Savannah and Charleston R. R., and the Atlantic and Gulf R. R. Capital, Savannah. Pop. 41,279.

Chatham, a county in Central North Carolina. Area, 700 square miles. It is drained by the Haw and Deep rivers, which in the S. E. part unite to form the Cape Fear River. The surface is diversified; the soil is fertile. Grain, wool, live-stock, cotton, and tobacco are raised. Iron ores abound. Coal-mines have been opened near Deep River. It is intersected by the Western R. R. of North Carolina and the Raleigh and Augusta R. R. Capital, Pittsborough. Pop. 19,723.

Chatham, a port of entry of Northumberland co., New Brunswick, on the right bank of the Miramichi, 6 miles below Newcastle, has a heavy trade in lumber and salmon, several steam-mills and foundries, is lighted with gas, and is the seat of a Roman Catholic bishop. It has one weekly paper. Pop. of census sub-district in 1871, 4203.

Chatham, a post-town of Ontario (Dominion of Canada), capital of Kent co., on the river Thames, and on the Great Western R. R., 45 miles E. of Detroit, Mich., and 11 miles N. of Lake Erie. It has a court-house, five churches, two weekly papers, an extensive trade in lumber, wood, potash, tobacco, soap, and pork, and has extensive manufactures of iron castings, machinery, and woollen goods. Pop. in 1871, 5873.

Chatham, a post-village and township of Middlesex co., Conn., on the E. side of the Connecticut River, about 25 miles N. E. of New Haven. Here are cobalt-mines and manufactures of sleigh-bells, etc. Total pop. 2771.

Chatham, a township and post-village of Sangamon co., Ill. The village is on the St. Louis Alton and Chicago R. R., 10 miles S. of Springfield. Pop. 1460.

Chatham, a township and post-village of Barnstable co., Mass., on the ocean, at the S. E. extremity of Cape Cod, about 80 miles S. E. of Boston. It has a fair harbor, and is resorted to as a summer residence. There are four churches, good public schools, and one newspaper. It has two lighthouses, lat. 41° 40′ 15″ N., lon. 69° 56′ 30″ W. Pop. of township, 2411.

B. D. GIFFORD, ED. CHATHAM "MONITOR."

Chatham, a post-township of Wright co., Minn. Pop. 161.

Chatham, a township of Carroll co., N. H. Pop. 445.

Chatham, a post-village of Morris co., N. J., near the Passaic River and on the Morris and Essex R. R., 26 miles W. of New York. On the Passaic River there are several mills. The township of Chatham has an academy, and contains the important village of Madison. Pop. of township, 3715.

Chatham, a post-township of Columbia co., N. Y., contains villages called CHATHAM CENTRE and CHATHAM VILLAGE (which see). Chatham post-office and station is on the Harlem Extension R. R., 132 miles N. of New York. Pop. of township, 4372.

Chatham, a township of Medina co., O. Pop. 980.

Chatham, a township of Tioga co., Pa. Pop. 1575.

Chatham, a township of Pittsylvania co., Va. Pop. 4262.

Chatham (William **Pitt**), Earl of, one of the most distinguished of English statesmen, born Nov. 15, 1708, and educated at Eton and Oxford, was the son of Robert Pitt, a country gentleman, and grandson of a colonial governor. After travelling on the Continent he entered the army as a cornet in the Blues, and soon after, in 1735, was returned to Parliament from Old Sarum, a family borough. He had shown remarkable promise in his studies, and in the House of Commons he soon became prominent, engaging in the fierce opposition to the Walpole government headed by the prince of Wales, and embittered by a quarrel between the prince and the king. Upon the fall of the Walpole administration, the king, notwithstanding a strong personal dislike, saw best to give Pitt an office, and in 1746 he was made treasurer of Ireland, and then paymaster-general, and in 1755, upon the breaking out of the Seven Years' war, after the resignation of Fox, he became the head of the government, with the nominal title of secretary of state. His measures for the reorganization of the army and navy were opposed by the king, but upon his resignation he was recalled, and pursued his plans against the French vigorously, aiding Frederick the Great, capturing Canada through Wolfe, and improving the navy to such an extent that the French were driven from the seas. After the accession of George III. in 1761, Pitt's energetic military measures were opposed by the growing influence of the Tories, and a peace was negotiated unwillingly by Pitt, whose ministry soon afterwards went out. Pitt remained in the opposition until 1766. His health was become feeble; he nevertheless combated zealously the more obnoxious acts of Bute's government, and upon its defeat in 1766 was desired to form a cabinet, in which he chose for himself the unimportant office of privy seal, with a seat in the House of Lords. The new ministry was weak and inefficient, and after it went out in 1768, Lord Chatham never again held office. When the war for American independence began, he, though sinking under the infirmities of age, called back all his great powers of eloquence to oppose the cruel and oppressive measures which were put in practice against the colonies; but when, in 1778, the timid policy of the duke of Richmond was gaining ground in the legislature, which favored peace with France and a recognition of the American States, Pitt, feeble, pale, and dying, arose in the House of Lords and summoned his fleeting powers to denounce this course of weakness and shame so eloquently that the measure was defeated. He sank back in a swoon at the close of his appeal, and four days afterwards, April 11, 1778, he died.

Lord Chatham's character was above reproach, and throughout his life his actions were impelled by deep patriotic feelings. The effects of his extraordinary eloquence were enhanced by his tall and stately form and dignified bearing. His speeches, which were composed in a vigorous, eloquent, idiomatic English style, have only been partially preserved in the "Chatham Papers," 4 vols., 1838–40. (See F. Thackeray, "Life of Chatham," 2 vols., 1827.)

J. Thomas.

Chatham Centre, a post-village of Columbia co., N. Y., on the Boston and Albany R. R., 20 miles S. S. E. of Albany.

Chatham Four-Corners. See Chatham Village.

Chatham Islands, a group in the South Pacific Ocean, discovered by Broughton in 1791, about 400 miles E. of the Middle Island of New Zealand. They are about lat. 44° S., and between lon. 177° and 179° W. Chatham Island, the largest of the group, is nearly 90 miles in circumference, and contains a large lake. Area, 425 square miles. The others are for the greater part mere rocks. The soil and climate are good; besides the natives there are a few British colonists. Pop. 600.

Chatham Village, or **Chatham Four-Corners,** a post-village of Columbia co., N. Y., on the Boston and Albany R. R. and terminus of the Hudson and Chatham, the Harlem, and the Harlem Extension R. Rs., 22 miles S. E. of Albany. The name of the post-office is Chatham Village. It has one newspaper-office, a blast furnace, academy, foundry, machine-shops, cotton-mill, and two paper-mills. Pop. 1387. C. B. Canfield, Prop. "Courier."

Chatoyant [from the Fr. *chat*, a "cat"], a French word used in mineralogy to denote the changeable or floating internal light which is reflected by certain minerals, and resembles the light reflected from the eye of a cat. Among the minerals which are chatoyant are adularia and Cat's Eye (which see).

Châtre, La, a fine old town of France, department of Indre, on the river Indre, 22 miles S. E. of Châteauroux. It has a fine church, a ruined castle, a considerable chestnut market, and manufactures of woollen and leather. P. 5167.

Chats'worth, the mansion of the duke of Devonshire, one of the most splendid private residences in England, is situated in Derbyshire, on the river Derwent, 3 miles N. E. of Bakewell. It is surrounded by a beautiful park about ten miles in circumference. This domain was given by William the Conqueror to his natural son, William Peveril. It was purchased by Sir William Cavendish, who built here in 1570 a mansion in which Mary queen of Scots was confined for thirteen years. The present mansion was built in 1706 by the first duke of Devonshire. It is nearly a quadrangle with an interior court, and is ornamented with balustrades and Ionic pillars. The façade is 720 feet long. Chatsworth contains rich collections of paintings, statuary, bas-reliefs, and books. Here is a conservatory which covers nearly an acre, is 65 feet high, and has 70,000 square feet of glass.

Chatsworth, a township and post-village of Livingston co., Ill. The village is on the Toledo Peoria and Warsaw R. R., 70 miles E. of Peoria. It has one weekly newspaper. Pop. 999. Pop. of township, 1622.

Chattahoo'chee, a river of Georgia, rises in the Blue Ridge in the N. E. part of the State. It flows south-westward, through the gold-region of Georgia, to West Point, below which it flows southward and forms the boundary between Georgia and Alabama. At the S. W. extremity of Georgia it unites with the Flint River to form the Appalachicola. Its length is estimated at 550 miles. Small steamboats can ascend it to Columbus, which is about 325 miles from the Gulf of Mexico.

Chattahoochee, a county in the W. of Georgia. Area, 250 square miles. It is bounded on the W. by the Chattahoochee River, and on the N. W. by Upatoy Creek. The soil is productive. Corn and cotton are the principal crops. Capital, Cusseta. Pop. 6059.

Chattahoochee, a post-village of Gadsden co., Fla., near the junction of the Flint and Chattahoochee rivers, and on the Jacksonville Pensacola and Mobile R. R., 40 miles N. W. of Tallahassee.

Chattanoo'ga, a city of Tennessee, capital of Hamilton co., pleasantly situated on the left bank of the Tennessee River, about 200 miles by water below Knoxville, and 150 miles S. E. of Nashville by the Nashville and Chattanooga R. R. It is a terminus of the Western and Atlantic R. R., which connects it with Atlanta, Ga., and is the north-eastern terminus of the Alabama and Chattanooga R. R., which extends south-westward 295 miles to Meridian. It is also a terminus of the East Tennessee Virginia and Georgia, the Cincinnati Southern, and the Memphis and Charleston R. Rs. The river is navigable for steamboats above and below this point. This is the largest town of East Tennessee. It has three national banks, two rolling-mills, a furnace, machine-shops and foundries, a cotton-factory, water-works, a street railroad, and fine academies and schools. Two daily and two weekly papers are issued here. Coal and iron are found in the adjacent hills. After the retreat of Rosecrans to Chattanooga from the battle-field of Chickamauga, Sept., 1863, the Confederates under Bragg at once seized the passes which covered his line of supplies from Bridgeport, and, sending a cavalry force across the Tennessee above Chattanooga, struck various points on the railroad, making the supplying of the army difficult and hazardous. Gen. Grant relieved Gen. Rosecrans in October, and assumed general command of the departments of the Tennessee, Cumberland, and Ohio. Gen. Thomas was placed in immediate command of the department of the Cumberland, and Gen. Sherman, who had been telegraphed to bring his corps up at once from Mississippi, was assigned to the department of the Tennessee. The supply of the army at Chattanooga being of the first importance, Gen. Grant ordered Hooker with the Eleventh and Twelfth corps, which had been sent from the Army of the Potomac, to cross at Bridgeport and menace Bragg with a flank attack, while a force under W. F. Smith was to be thrown across the river at Brown's Ferry, a few miles below Chattanooga, and secure the points of Lookout Mountain commanding the river. These operations were successfully carried out on the 27th, 28th, and 29th of October, and communication restored with the dépôt of supplies. The loss in these operations for reopening communication on the S. side of the Tennessee, on the side of the U. S., had been about 450, while the Confederate loss is estimated as high as 1500.

Gen. Sherman's army was now coming up, and on the 23d of November the movement against the Confederates was commenced. Gen. Thomas's troops attacked the Confederate left at 2 P. M., and carried the first line of rifle-pits, which was held during the night. The battle was renewed on the 24th along the whole line. Sherman carried the end of Missionary Ridge nearly up to the railroad tunnel; Thomas had strengthened himself in his advanced position, and repelled every attempt on the part of the

Confederates to recover their lost position at the centre; while Hooker had been fighting desperately, and had partially carried Lookout Mountain, and intrenched himself in a strong position, the Confederates abandoning the mountain entirely during the night. Fighting was resumed at early dawn of the 25th, continuing until dark. Missionary Ridge, Lookout Mountain top, and all the rifle-pits in Chattanooga valley were now in possession of the U. S. troops, having been carried after a most desperate struggle. The Confederate army was routed, and pursued by Sherman and Hooker back to Georgia. A severe fight occurred at Taylor's Ridge, near Ringgold, Ga., Nov. 27, resulting in dislodging the Confederates, after which their retreat continued. Forty cannon and thousands of small-arms were captured. The loss on the part of the U. S. forces amounted to between 6000 and 7000 in killed, wounded, and missing. The Confederate loss in killed and wounded is estimated at 2500; in prisoners, 6000. The result of this battle cut off Bragg from communication with Longstreet, and forced the latter to abandon the siege of Knoxville and retreat to Virginia.

This battle must be regarded as one of the most remarkable of the war, owing to the apparently impregnable position held by the Confederate army upon lofty mountains. Pop. 6093. ED. CHATTANOOGA "TIMES."

Chat'tel [remotely from the Lat. *capitalis*, a man's "capital" or property], in law. This is a word of comprehensive meaning, and, with certain exceptions, includes all property of a personal or movable nature. The common law distinguishes between hereditaments on the one hand and chattels on the other. Though this distinction is in the main founded on a difference in the nature of things, the one being in general immovable and the other movable, yet it is in part arbitrary, since there are some things which are in their nature chattels, and yet in law, in a particular case or for some special purposes, within the rules governing interests in land. No one could deny that pigeons are in general movables or chattels, yet they might become so connected with the land by their abode in a pigeon-house as to descend as land to an heir. The same remark might be made of a key of a house, which, though in its owner's pocket, might be regarded in law as part of the house or land. Mr. Austin expresses the same idea in the following words: "Things which are physically movable may be immovable by institution." So in some cases an owner's intention may impress upon a movable thing the legal qualities of an immovable, as where money is directed by a testator to be laid out in land, it is for legal purposes deemed to be land. These same doctrines may be regarded from an opposite point of view, and that which is really land may become in contemplation of law a chattel, as where land is directed by a testator to be sold and converted into money. Certain temporary interests in land are in law treated as chattels of a peculiar nature (chattels real), such as leases for a definite number of years. There is here no completeness of classification, and much time must be spent by a legal practitioner in acquiring arbitrary distinctions, and particularly in determining when chattels attached to the land are to be deemed a part of it. The addition of machinery, buildings, trees, and shrubs to land, either by the owner or some stranger, has given rise to an important class of questions usually treated under the term "fixtures."

Chattels personal are usually sub-divided by text-writers into two principal classes: such as are in possession and in action. The first term needs no special explanation. It would include the common case of a movable thing, like a watch or a domestic animal, in the possession or under the control of its owner. A so-called thing in action, or chose in action, is intangible. It is a mere right, and can only be made available or reduced into possession by a legal proceeding. An instance is a note or bond, or, according to some authorities, a right to recover damages for a wrong committed. This classification is imperfect, as it is plain that there are some rights which cannot be brought within it; such as patents or copyrights, which, though derived from the state and in the nature of monopolies, are considered as chattels. Some writers would discard this common-law distinction, and divide property of a movable nature into corporeal and incorporeal. This is not satisfactory, for, though such a distinction is prevalent in the law of real estate, it is well shown by Mr. Austin to be unphilosophical. He advocates a classification which philosophically seems to be correct between those rights which can be affirmed against all persons, and those which can only be asserted against particular persons and those who represent them. The former case is equivalent to complete ownership, such as that of a field or watch; the latter is illustrated by the rights growing out of a contract, or even a wrong, as no one could claim these except a party to the contract or one injured by the wrong. While the comprehension of these distinctions is of service to the student in tending to give him clear conceptions of his subject, the old classification cannot be disregarded by the practising lawyer, who is so bound by precedent that he cannot ask a court to dismiss from its view elementary propositions concerning things in possession and things in action. We would adopt the words of Mr. Maine, who says: "The lawyers of all systems have spared no pains in striving to refer these classifications to some intelligible principle, but the reasons of the severance must ever be vainly sought for in the philosophy of law. They belong not to its philosophy, but to its history." They must be accepted as historical facts. They can only be reduced to symmetry, if at all, by legislation. (See, for further distinctions, PROPERTY, OWNERSHIP, and TITLE.) (Consult AUSTIN, "On Jurisprudence," 3d ed.; WILLIAMS, "On Personal Property;" SCHOULER on the same; KENT'S "Commentaries.")

T. W. DWIGHT.

Chat'terer, a significant popular name often given to birds of the family Ampelidæ, which belongs to the order Insessores and tribe Dentirostres. The chatterers have depressed bills like those of flycatchers, but rather shorter and broader in proportion. They feed chiefly on insects and their larvæ. Many of them have richly-colored plumage, and some of them have excellent powers of song.

Chat'terton (THOMAS), an English poet, born at Bristol Nov. 20, 1752. He was a precocious youth, fond of antiquities, and was educated at the parish school. He began to write verses at the age of twelve, and was apprenticed to an attorney of Bristol in 1767. Soon after this date he exhibited to his friends manuscript copies of poems which he said were composed by Rowley, a monk of the fifteenth century, and produced other ingenious fabrications. Disgusted with the drudgery of legal studies and business, he removed to London in April, 1770, and adopted the profession of author. He produced with great rapidity songs, satiric poems, letters in the style of Junius, and other works, some of which were inserted in the public journals, but brought him little remuneration. He was reduced to extreme destitution, and was found dead in his lodging-room in Aug., 1770. Among his poems are "The Tragedy of Ella," "The Battle of Hastings," and the "Tournament." (See JOHN DIX, "Life of T. Chatterton," 1837; "Edinburgh Review" for April, 1804 (by SIR WALTER SCOTT); T. CAMPBELL, "Specimens of the British Poets.")

Chattoo'ga, a county in the N. W. of Georgia. Area, 360 square miles. It is drained by the Chattooga River and several creeks. The surface is diversified by mountains or high ridges and fertile valleys. Cotton, tobacco, and grain are raised. Limestone, marble, iron, and lead are found here. Capital, Summerville. Pop. 6902.

Chattooga, a township of Oconee co., S. C. Pop. 596.

Chau'cer (GEOFFREY) was born before 1346, and died in 1400. He was a son of John Chaucer, vintner of London. Of the year and place of his birth nothing is known, though much has been surmised or asserted. He deposed in Oct., 1386, that he was of the "age of forty and upwards," and had been armed twenty-seven years. A Geoffrey Chaucer was in the service of Lionel, third son of Edward III., in 1357, not improbably in the condition of page. The poet himself has told us that he was in the army which invaded France in the autumn of 1359, and that this was his first military service. It appears from public records that he was a valet of the king's chamber—a place always filled by gentlemen—in 1367, and that in June of the same year the king granted him a salary for life, or till he was otherwise provided for, in consideration of services past and to be rendered. Before this time he had married Philippa, possibly a daughter of Sir Payne Rouet and sister of the third wife of John of Gaunt, certainly a lady in the household of the queen. At various times from 1370 to 1380 Chaucer was employed on royal missions in Italy, France, and Flanders, and for somewhat more than ten years from 1374 he held offices in the customs. He was elected to Parliament for Kent in the year 1386, but towards the end of that year was dismissed, for reasons unknown, from his place in the customs; and although he received other public appointments in 1389, he lost them again, and remained in comparative poverty until the accession of Henry IV., whose favor he immediately received, but lived only a year to enjoy.

Chaucer left behind him neither property nor descendants. His wife died in 1387, and a son, Lewis, to whom he dedicated a treatise on the astrolabe in 1391, is not heard of after that. Thomas Chaucer, a person of great wealth and consideration, has generally been assumed to be a son of the poet, but upon insufficient evidence.

The chief work of Chaucer, and one which has secured him an immortal and still brightening fame, is "The Canterbury Tales," a series of about twenty stories narrated by pilgrims to the shrine of Saint Thomas. The persons and

characters of the pilgrims are sketched with marvellous spirit in an introductory Prologue, and both here and in the tales there is displayed a dramatic power of the comic sort second only, and scarcely second, to Shakspeare's. "Troilus and Cressida," "The House of Fame," and "The Legend of Good Women" are also admirable poems. "The Canterbury Tales" were excellently edited by Thomas Tyrwhitt in 1773, and his edition has not been superseded. The best edition of the other poems is by Robert Bell. A society was formed in 1868 for the purpose of printing a selection of the best texts of Chaucer's poems, and has accomplished the larger part of its work. F. J. CHILD.

Chaudet (ANTOINE DENIS), an eminent French sculptor and painter, born in Paris in 1763. He studied in Rome, worked in Paris, and was chosen a member of the Institute about 1805. Among his best works are "Paul and Virginia," "Cincinnatus," and a bas-relief of "Joseph Sold by his Brethren." Died in 1810.

Chaudière, a river of the Dominion of Canada, rises in the S. part of the province of Quebec, flows northward, and enters the St. Lawrence about 7 miles above Quebec. Length, 120 miles. Two and a half miles from its mouth is a remarkable cataract, called the Falls of the Chaudière, which is about 100 feet high.

Chaudière, a lake of Canada, about 15 miles W. of the city of Ottawa, is an expansion of the Ottawa River.

Chaudordy, de (EMILE), COMTE, a French statesman, was after 1855 employed in the French ministry of foreign affairs. He retained his position under Jules Favre, and went as the representative of Favre with the delegation of the provisional government in Sept., 1870, to Tours, and in Jan., 1871, to Bordeaux.

Chaud'war', an ancient and ruined city of Hindostan, in Orissa, near Cuttack. The ruins extend many miles, and include the remains of several temples and reservoirs. Scarcely any parts of the temples are visible except the foundations.

Chaumonot (PIERRE MARIE JOSEPH), a French Jesuit and missionary to the North American Indians. He was born in France in 1611, went to Canada in 1639, and after many labors and hardships died near Quebec in 1693. He wrote a grammar of the Huron language, which was published in 1835.

Chaumont, a fortified town of France, capital of the department of Haute-Marne, is on an eminence near the river Marne, about 141 miles E. S. E. of Paris. It is connected by railways with Paris, Troyes, and Vesoul. It has a triumphal arch commenced by Napoleon, and a public library of 35,000 volumes; also manufactures of drugget, hosiery, cotton yarn, and gloves. On Mar. 1, 1814, the allied powers here concluded a treaty against Napoleon. Pop. 8285.

Chaumont, a post-village of Lyme township, Jefferson co., N. Y., situated on Chaumont Bay, an inlet of Lake Ontario, at the mouth of Chaumont River. It has extensive fisheries and large quarries of excellent limestone. Pop. 370.

Chauncey, a post-village of Dover township, Athens co., O. Pop. 201.

Chaun'cey (CHARLES), B. D., second president of Harvard University, was born in England in 1592, and educated at Cambridge, where he was a professor of Greek and Hebrew. He came to New England in 1638, became president of Harvard in 1654, and died Feb. 19, 1672.

Chauncey (CHARLES), LL.D., an American lawyer, born at New Haven, Conn., Aug. 17, 1777, graduated at Yale in 1792. He removed to Philadelphia about 1798, and practised there with much distinction. Died Aug. 30, 1849. —His father, CHARLES CHAUNCEY, LL.D. (1747–1823), was an eminent jurist of Connecticut.

Chauncey (ISAAC), a commodore in the U. S. navy, born at Black Rock, Fairfield co., Conn., Feb. 20, 1772. At an early age he manifested a love for the sea, and entered the merchant service about 1785, displaying such energy and ability that he obtained command of a ship when he was only nineteen years old. During one of his voyages between Charleston and New York the entire crew and all the officers were stricken down with yellow fever, and Chauncey, alone and unaided, brought the vessel safely to New York. On the organization of the navy in 1798, Chauncey was appointed a lieutenant, was promoted to be commandant in 1802, and captain in 1806. He served with distinction in the war with Tripoli, and for his services there received the thanks of Congress, which body also voted him a sword, but the resolution was never carried into effect. He was in command of the navy-yard at Brooklyn, N. Y., from 1808 till the outbreak of the war with Great Britain, when he was placed in the command of the lakes. He reached Sackett's Harbor Oct., 1812, and at once entered upon the important and arduous duties on shore of supervising the construction of a fleet, while at the same time he was obliged to maintain a sharp lookout for the enemy on the lakes, naval superiority on those waters being of the greatest importance to both nations. Chauncey retained this important command till the close of the war, and won for himself the highest honors for gallantry and skill as a naval commander. He subsequently commanded the Mediterranean squadron (1816–18), was in command of the navy-yard at Brooklyn, and was president of the navy commission at the time of his death, which occured in Washington Jan. 27, 1840. No officer of the navy ever served his country more faithfully, or better acquitted himself of the high trusts reposed in him.

Chauny, a town of France, department of Aisne, on the river Oise, at the commencement of the canal of St.-Quentin, and on a railway, 18 miles W. of Laon. It is partly built on an island in the Oise, which is here navigable. It has an active trade, and manufactures of hosiery, chemicals, etc. Pop. 9080.

Chausses, shōss, a French word signifying "hose," stockings, or breeches. In the armor of the Middle Ages it was the name of defence-pieces for the legs. Some of them were made of chain-mail, some of riveted plates, and others of padded and quilted cloth.

Chautau'qua, the most western county of New York. Area, 1099 square miles. It is bounded on the N. W. by Lake Erie, and is drained by Conewango Creek. Among its features is CHAUTAUQUA LAKE (which see). The surface is partly undulating; the soil is fertile. Grain, hay, fruit, and dairy products are extensively raised. The manufacturing interests are increasing; they include carriages, lumber, leather and leather goods, flour, cooperage, metallic wares, etc. There is a spring of inflammable gas at Fredonia, formerly used to illuminate the houses. This county is intersected by the Erie R. R., the Atlantic and Great Western R. R., the Buffalo Corry and Pittsburg R. R., and the Lake Shore R. R. Capital, Mayville. Pop. 59,327.

Chautauqua, a township of Chautauqua co., N. Y. It contains Mayville, the capital of the county. Pop. 3064.

Chautauqua Lake, in Chautauqua co., N. Y., is a beautiful sheet of water about 18 miles long and from 1 to 3 miles wide. It is 726 feet higher than Lake Erie, and is said to be the highest navigable water in the U. S. The surplus water flows through an outlet into Conewango Creek. Steamboats ply between the outlet and Mayville, which is at the N. W. end of the lake. Near the S. E. end is the large village of Jamestown.

Chauvenet (WILLIAM), LL.D., a mathematician, born in Pennsylvania in 1820, graduated at Yale in 1840. He was professor of mathematics and astronomy at the U. S. Naval Academy at Annapolis, Md. (1845–59), and the author of several works on those sciences. Died in 1870.

Chauve-Souris. See BAT.

Chauvinisme, a French term derived from Chauvin, a character in a popular comedy which was performed at the time of the restoration of the Bourbons, 1815. Chauvin was a bragging veteran of Napoleon's army, who talked much of Austerlitz and Jena, and vowed to take revenge for the battle of Waterloo. A Chauviniste may be defined as one who has exaggerated and ridiculous sentiments of patriotism, and is excessively warlike or quarrelsome.

Chaux-de-Fonds, a town of Switzerland, in the canton of Neufchâtel, is situated in a narrow gorge of the Jura Mountains, 9 miles N. W. of Neufchâtel. It is 3070 feet above the level of the sea. It has extensive manufactures of clocks and watches. Above 160,000 watches are manufactured annually. Nearly every house of this town is surrounded by a garden. Pop. in 1870, 19,930.

Cha'ves (anc. *Aquæ Flaviæ*), a town of Portugal, province of Villa Real, on the river Tamega, 52 miles W. of Braganza. It was once fortified, and has a Roman bridge of eighteen arches over the river. Here are hot saline springs, and baths which are well frequented. Pop. 6382.

Chay-Root, Choya, or **Indian Madder** (*Oldenlandia umbellata*), an herb of the order Rubiaceæ, a native both of India and of Mexico, cultivated in India for its roots, the bark of which affords a beautiful red dye. The quality is improved by keeping. The coloring-matter is used to paint the red figures on chintz. Several plants of this genus abound in the U. S.

Cha'zy, a post-village of Clinton co., N. Y., in Chazy township, about 13 miles N. of Plattsburg. Chazy township is bounded on the E. by Lake Champlain. The village is on the Montreal and Plattsburg R. R. Pop. of township, 3206.

Chazy Limestone, a member of the lower Silurian formation, derives its name from Chazy in Clinton co., N. Y. According to Dana, the Trenton period of geology is divided into two epochs, one of which is called the Chazy epoch.

Chea'dle, a neat town of England, in the county of Stafford, in a pleasant valley, 180¼ miles by rail N. W. of London. It has a fine Gothic fifteenth-century church, and manufactures of cotton tape; also copper- and brass-works. Pop. 3191; of parish, 4803.

Cheat, in law. This topic may be considered under two principal divisions: 1, at common law; 2, by statute, then termed "false pretences."

1. The common law regarded a "cheat" as a crime when one person defrauded another not by mere words, but by some outward and visible means, such as a false token or sign. A mere lie was not in this sense a cheat, though in a civil sense and as a basis for a civil action it may amount to a fraud. Thus, the act of marking false brands upon articles sold, calculated to deceive and defraud persons in general, would come within the scope of the criminal offence. This view led to fine-spun and artificial distinctions. For example, if a man in purchasing goods gave his own check on a bank in which he knew that he had no funds, it would be a mere lie reduced to writing, and thus not a cheat; while if he gave another man's check under the same circumstances, the act would be cheating, as the paper was then a token or symbol. Under these rules false personation may be a common-law cheat, particularly where the personator by dress or tokens represents himself to be another person, and thus causes injury to others. Some have even maintained that the defrauder might himself be a symbol or token, as where, knowing that he held a relation (such as apprenticeship) which prevented him from entering into a public engagement (enlisting as a soldier), he professed to be able to, and did in fact, enter into it.

The crime of forgery, though usually, from its magnitude as an offence, discussed separately from the various classes of cheats, is, in reality, comprised within the same category. The "false token or sign" necessary to constitute cheating at common law must be of such a nature that its tendency in general would be to deceive, though in fact it may be used only to injure particular individuals; as, *e. g.*, the use of false dice in games of chance. Moreover, it is essential that any injury sustained be properly attributable to some confidence or belief which the use of the token, etc. inspired. If other considerations than the device influence a person's action, there is merely an attempt to cheat. This is, however, also indictable. Cheating belongs to the lower grade of criminal offences, termed "misdemeanors."

2. *False Pretences* constitute a very reprehensible mode of fraudulent deception. The failure of the common law to provide a remedy where no symbol was employed made statutory provisions necessary for wrongs thus occasioned. Reference can here be made only to such regulations as the various States have generally agreed in establishing. False pretences may be defined as false representations, with intent to defraud, by words or acts concerning past or present facts and events. Statements of a promissory nature in regard to any future transaction, and perhaps all representations as to the future, are insufficient to afford a ground for prosecution. The false representation may be made by acts without words, as if one purports by his peculiar dress to belong to a particular institution of learning, such as Cambridge University. A false sample may also be referred to. Mere expressions of opinion, however, or mere exaggerations of language, by which no reasonable man would be influenced, cannot be considered false pretences within the statutes. It is a further rule that the deception practised must be the efficient operative cause of the injury sustained. The criterion always is, Whether, if there had been no such deceit practised, the transaction between the parties would have been consummated? There has been much discussion upon the point whether the representation must be calculated to deceive a person of ordinary prudence, or whether it will be sufficient, though the party was weak, that he was actually defrauded. The question is still open. The false pretence may be made by an agent in such a way as to make his principal criminally liable.

Property acquired under false pretences is held by the wrongful possessor under a voidable title as regards the true owner, but if transferred to an honest purchaser, who acts in good faith, without knowledge of the fraud, the latter's claim is indefeasible. On the other hand, when goods are stolen the thief can, with but few exceptions, give no better title than he himself possesses. The reason for the difference is, that in the one case the wrong-doer acts with the owner's consent, even though it be procured fraudulently, while in the other his will is in no way exerted. According to general principles, this offence would be a misdemeanor, though the statutes of some of the States make it a felony. T. W. Dwight.

Cheat'ham, a county of the N. part of Middle Tennessee. Area, 375 square miles. It is intersected by the Cumberland River and the Harpeth. The surface is undulating. Tobacco, corn, wheat, and oats are the staple crops. Lumber is an important product. It is traversed by the Nashville and North-western R. R. Capital, Ashland City. Pop. 6678.

Cheatham (B. F.), a general in the Confederate army, born in Tennessee, served during the war with Mexico as captain of Tennessee volunteers and as colonel Third Tennessee Voltigeurs to July, 1848. During the recent civil war he espoused the Confederate cause, was appointed major-general, and bore a conspicuous part at Chickamauga, Missionary Ridge, Franklin, Nashville, etc.

Cheat River, of West Virginia, is formed by the junction of several branches which rise among the Alleghanies in Randolph county, and unite in Tucker county. It flows nearly northward, and enters the Monongahela in Fayette co., Pa. Its length without the branches is about 75 miles. It takes its name from the extremely variable volume of its waters; for while it is sometimes a large stream, it often becomes in a few hours quite insignificant.

Chebanse, a post-village of Iroquois and Kankakee cos., Ill., on the Central R. R., 65 miles S. S. W. of Chicago. It has one newspaper, and has a very extensive trade in grain. Pop. of township, 2530. Ed. "Herald."

Cheboy'gan, a county of Michigan, at the N. extremity of the Lower Peninsula, is bounded on the N. by Lake Huron and traversed by the Cheboygan River. Lumber, potatoes, and maple-sugar are the chief products. Capital, Cheboygan. Pop. 2196.

Cheboygan, a post-village, capital of Cheboygan co., Mich. It has one weekly newspaper.

Check [Fr. *échec* and *cheque*], a hindrance or obstruction, a curb or restraint; a repulse; a mark put against names in going over a list; a token which is given to a passenger on a railroad or steamboat, and is a duplicate of a token fastened on his baggage in order to identify it. Also a term used in the game of Chess (which see).

Check is also the name of a variegated cloth, the pattern of which consists of quadrangles or rectangular spaces like a chessboard. It is made of cotton, linen, or wool.

Check, or **Cheque,** a bill of exchange drawn upon a bank or banker, or person holding a position similar to that of a banker. It has some peculiarities which distinguish it from an ordinary bill of exchange, particularly when it is payable without any specific mention of time. It is then, in point of law, payable on demand and without days of grace. If payable a fixed number of days after date, it varies but slightly from a bill of exchange, and will follow the ordinary rules as to days of grace. It is usually said in the law-books that a check is not accepted as a bill is. Acceptance, however, as will be seen hereafter, has recently become quite common, and is perfectly lawful. A check may be considered under the following heads: 1, Its form and requisites; 2, The duty of the holder as to demand of payment (*a*) towards the drawer, (*b*) towards the endorser, and herein of crossed checks; 3, The effect of the check upon the banker, and, under this, of acceptance; 4, A check considered as payment of a debt or as cash; 5, The civil and criminal liability of drawers having no funds.

1. A check in its ordinary form is simply an order addressed to the banker to pay a person named or his order or bearer, or the equivalent of a bearer (such as a mere numeral), a sum of money. A check may preserve this form and be post-dated. This class of checks is not used in England, owing to the provisions of the stamp acts. It is quite common at the present time to make a check payable to order, as the endorsement of the name of the payee operates as a receipt. In some instances a note may amount to a check. Thus, if a customer makes a note payable at his bank, he implicitly requests its payment in the same general manner as if he had drawn his check. In filling up a check care should be taken to so draw it that additional words, which might increase its amount, cannot be inserted in blank spaces. Thus, if the drawer had written the words "fifty dollars," and had left sufficient space between the word "fifty" and that which preceded it to insert "one hundred and," and such words had been fraudulently inserted, and the bank had paid the check in good faith, supposing it to be drawn for one hundred and fifty dollars, the drawer would be the loser. When, on the other hand, due caution has been exercised, the loss from forgeries will fall on the bank, rather than on the drawer, though the former may in some instances

recover from the holder. The drawer may simply sign his name to a blank printed form of check, or even to a blank sheet of paper, at the same time authorizing it to be subsequently filled up by some person acting in his behalf. If so filled he will be bound. Even should the agent acting fraudulently fill it up for a larger sum than was directed, the drawer would still be bound to a person who took the check in good faith. This would not be strictly a case of forgery, but that of an agent defrauding his principal, and yet acting within his apparent authority.

2. *The Duty of the Holder as to Demand and Notice:* (*a*) *As to the Drawer.*—The drawer has a right to expect that the holder will demand payment with promptitude, as, if the banker fails to pay, recourse may be had to him. Presentment should be made, in general, as early as the next day, and if payment is not made, due notice given. However, a failure to present is not necessarily fatal to the holder's claim. Whether it is or not depends on the fact whether an injury is caused to the drawer. If, for example, he had no funds in the bank, want of presentment is unimportant, as it is plain that he sustains no harm; so, if after giving the check, he withdraws his funds. If, however, the banker should become insolvent with sufficient funds of the drawer in his possession, want of presentment would be a sufficient defence. (*b*) *Demand as to Endorsers.*—Endorsements upon checks are common. An endorsement is necessary when the instrument is payable to order; it is admissible when payable to bearer. The legal effect of endorsement, as in the case of a bill of exchange, is to make the endorser liable, provided that the steps necessary to charge him are taken. These are substantially the same as in bills of exchange. There are cases in which no presentment is necessary to bind the endorser, as where he endorses and puts in circulation a void or forged check, even though he does this innocently. In some cases custom enlarges the time for presentment. Thus, if there be a custom to pay checks through the "clearing-house" (see CLEARING-HOUSE), the time required for them to pass through the system of exchanges there adopted will be allowed. In England a practice of *crossing* checks is resorted to. A check is said to be "crossed" when it is marked by the drawer in such a way that, instead of being presented through an ordinary holder, it must come to the paying bank through a banker. This practice has given rise to a number of perplexing questions recently settled by statute (21 and 22 Vict. ch. 79). The additional time necessary to present the check in this manner must of course be allowed there to the holder. It is believed that crossing checks is not practised in this country. A practice has grown up in some of our large cities to pay drafts drawn on bankers by checks drawn by such bankers, in turn, upon some regularly organized bank, instead of cash. This practice has an important effect upon the subject of demand. Though the check is not payment of the draft, yet it must be presented on the *same day* that it is received, or the drawers of the draft may be discharged. The holder of the draft might have insisted on the money instead of taking the check, and if not paid might have protested the draft.

3. *Effect of the Check on the Banker on whom it is Drawn, and herein of Acceptance.*—According to the better opinion, a check gives no right of action to the holder against the banker. Of course the latter should, in general, pay it, but the holder has no means of enforcing this obligation if the banker refuses to perform it. This rule grows out of the nature of a deposit in a bank, in respect to which there is much popular misconception. This fact is perhaps partly due to the ambiguity lurking in the word "deposit." This is sometimes and properly used to mean the act of entrusting a specific chattel to a person, who is bound to return the identical thing delivered to him. That, however, is not the nature of an ordinary bank account against which checks are drawn. The banker is not bound to render the specific money delivered, but only engages to pay an equivalent amount. The relation of *debtor* and *creditor* is created by the transaction. Although the banker is bound to pay checks when he is in funds, it is a duty between him and the depositor or creditor. It cannot be enforced by the payee of the check, who is no party to the contract. Nor can the check be treated as an assignment by the depositor of so much money as it represents. These rules have led to a very important practice of certifying checks. An officer of a bank—*e. g.* a teller or cashier—has by custom acquired an authority to mark such checks as are presented to him as good. This act is treated in law as an acceptance, and the bank becomes liable. The practice is attended with danger, as it practically gives to a teller power to establish without limit fictitious claims against the bank, as he may certify checks for persons who have overdrawn their accounts, or even who have closed their accounts, or have had no dealings with the bank, which will still be binding upon it on general principles of law. (See AGENT, ESTOPPEL, and BILL OF EXCHANGE.) A cashier or teller, however, cannot, where he has no funds, validly certify his own check. On the other hand, certification of a check is attended with some hazard to the holder, as he may thereby release the drawer should the bank fail even on the same day and between the time of certification and of presentment for payment. (*National Bank of Jersey City agt. Leach*, N. Y. Court of Appeals, 1873.) In the financial crisis of 1873 in New York certified bank-checks by general consent played an important part in monetary transactions, and became for a considerable time, through the association of a number of national banks, a substitute for currency. It may be added that banks sometimes pay checks for customers who have no balance due them. These are called "overdrafts." The bank in such a case has a claim upon the dealer for the sum overdrawn.

4. *A Check Considered as Payment or as Cash.*—The general presumption of law is that a check is issued by a drawer to a payee in payment of debt, and not as a means of making a loan. The intention, however, may be shown by affirmative proof. Considered as payment, it is not in general absolute. It is rather a means of obtaining payment, whether it be the debtor's own check or that of a third person. Accordingly, if the check is not paid, the creditor may resort to his original claim, though if there be an agreement to receive the check as full payment, it must be followed. In other words, a check is not money, but a means of obtaining money, and debts cannot be paid in anything but money, unless there be an agreement for some substitute. The gift of one's own check, unless it be certified, is a mere naked promise, and may be countermanded at any time before payment. The death of a drawer in such a case before payment would be a revocation of the authority. It is common for a bank to receive on deposit not only cash, but checks drawn either on itself or on some other bank, payable to the depositor. Such a deposit is not to be treated as cash in case the check is drawn on another bank. It is rather received conditionally, in case it turns out to be good, and the depositor will be liable on his endorsement, which is usually required. Where, however, the check is given by another dealer, the receiving bank is absolutely bound by the credit which it gives the depositor as if it had paid the check.

5. *Civil and Criminal Liability of Drawers of Checks having no Funds with the Bank:* (*a*) *Civil Liability.*—It is a general rule that a man who draws a check with knowledge that he has no funds commits a fraud towards the payee. If he should purchase goods under such circumstances, the seller could rescind the sale as fraudulent. It will not be enough to sustain the sale that he has reasonable grounds to expect funds, but they must be *actually on hand* to pay the check. This view proceeds upon the theory that a check is in the nature of a representation that the money is immediately available; and where a drawer has notice to the contrary he makes a representation known to be false which avoids the contract as between him and the seller, though it would be otherwise should the rights of innocent purchasers intervene. (See SALES.) (*Loughran agt. Barry*, 6 Irish Com. Pleas, 457, A. D. 1872.) (*b*) *Criminal Liability.*—It was not a crime at common law to give one's own check for goods bought with knowledge that it was worthless, since this was only an affirmation or a base lie reduced to writing, and there was no token or symbol of falsehood on which the common law lays stress. It might accordingly be a criminal cheat (see CHEAT) knowingly to pass off the worthless check of another. Under the statutory offence of false pretences it is criminal to give one's own check on such a sale, knowing that the drawer had no funds nor any reasonable grounds of expecting them. There might be cases, such as that of *Loughran against Barry*, above cited, where the contract would be rescinded on account of a representation known to be false, and yet the drawer would not be guilty of crime, by reason of the absence of a true criminal intent. (See farther SHAW "On the Law of Bankers' Checks," London, 1871; also PARSONS "On Bills and Notes;" and other text-writers on same subject, as CHITTY, BYLES, STORY, etc.)

T. W. DWIGHT.

Checkers. See DRAUGHTS.

Chedu'ba, an East Indian island, in the Bay of Bengal, near Aracan, has an area of about 250 square miles. It is about lat. 18° 50′ N. and lon. 93° 40′ E. The soil is fertile, and produces cotton, sugar, rice, indigo, etc. This island was captured from the Burmese by the British in 1824.

Cheek's Creek, a township of Montgomery co., N. C. Pop. 960.

Cheese [Lat. *caseus;* Ger. *Käse*], the coagulated, pressed, and dried caseine of milk, containing also a large percentage of water, with some salt, oil (butter), etc. It is extensively prepared for food, chiefly from the milk of

cows, but that of goats, sheep, asses, and other animals is used to some extent in various countries. In China the caseine of peas is pressed and dried into cakes, which resemble cheese in taste as well as chemical composition. Cheese often contains various coloring-matters, generally anatto, which is added for its rich golden color, or herbs, which are employed to give it a green or mottled appearance. Coagulation is usually produced by the addition of rennet, which is usually prepared from the stomach of young calves, and which, from the pepsin and other active principles derived from the gastric juice, is believed to give to cheese a stomachic or eupeptic property, so that its use is recommended in some cases of dyspepsia. Various plants, such as the yellow bedstraw of Europe (*Galium verum*) and the *Pinguicula vulgaris*, or butterwort, are in some places employed instead of rennet. Hydrochloric acid is used in Holland. The process of making cheese varies in different places. Generally, the milk is heated to a temperature of from 100° to 112° F., the rennet added, and the whole stands from half an hour to an hour, when the curd is chopped, salted, drained, and pressed, so as to consolidate the curd and expel the whey or serum of the milk. The cheese-press is of various forms, and the pressure to which cheese is subjected is in most cases very great. Skimmed milk makes an inferior quality of cheese, though some fine kinds, like the celebrated Parmesan cheese, are made from it. In the U. S. cheese is manufactured on a larger scale in factories, which are often owned by a large number of farmers in common; the result being, on the whole, a decided improvement in the quality of the product, with a large diminution of the cost of manufacture. Great quantities of cheese are exported from the U. S. to Great Britain and the West Indies.

Among the remarkable varieties of cheese may be mentioned those made at Stilton, Huntingdonshire, Cottenham, Cambridgeshire, and the Vale of Cheddar, Gloucestershire, England; the Scotch Dunlop cheese; the Highland cheese, flavored with lovage leaves; the Swiss Gruyère and the Schabzeiger, known as "sap-sago," which is made green with leaves of the melilot; other varieties of green cheese, in which sage or grass is used; the globular and conical cheeses, of which the Westphalian are celebrated. Among the Dutch cheeses, that of Gouda is called the best. It excels in keeping qualities. In parts of Germany boiled potatoes are mashed and mixed with the curd. France and Italy produce much excellent cheese. The English cream and slip-coat cheese, and the German *Schmirküse*, are soft curds, often from sour milk, mixed with cream, and sometimes flavored with pepper, etc. Some of the stronger sorts of cheese are rasped fine and used as a condiment. The cheese of Limburg is partly putrefied before it is ready to be eaten. The French *Roquefort* cheese is made of sheep's and goats' milk, and ripened with much care in caverns. *Brie* (French), *Vaschrein* (German), and *Neufchâtel* (Swiss) cheese are made of pure cream. They are successfully imitated in the U. S., as are all the more famous European cheeses. The better qualities of the Laplander's reindeer cheese are highly commended by travellers. Cheese is made in Europe and Asia from the milk of the buffalo. In Arabia and the East buttermilk curds are dried into a cheese which is powdered before eating. It is a villainous product, not much relished even by the natives.

CHARLES W. GREENE.

Cheese-maggot, the larva of *Piophila casei*, a black dipterous fly of the family Muscidæ, to which the house-fly belongs. The perfect insect is three-twentieths of an inch long. It is a pest of dairies, laying its eggs in cracks of cheese, the destined food of its larvæ. To preserve cheeses from this pest it is of advantage to brush or rub them frequently, and to remove all injured cheeses, besides keeping them dry and in a well-aired place. The same rules are applicable to their preservation from the other insects by which they are sometimes infested. Among these may be mentioned the cheese-mite, *Tyroglyphus siro*, of the family Acaridæ. Those cheeses of the Netherlands which are prepared with hydrochloric acid, instead of rennet, are reported to be uninjured by insects, but are rather hard.

Cheese-mite.

Chee'tah, or **Hunting Leopard,** the *Guepardа jubata* or *Cynailurus jubatus*, a carnivorous mammal of the cat family, having longer legs than any of the true cats, and approaching the Canidæ in its almost non-retractile claws, its manner of hunting, as well as in temper and disposition when tamed. It is found throughout Africa, and in Asia nearly as far N. as Siberia. It is generally spotted like the leopard, but, like that animal, is sometimes entirely black. In India and Persia it is trained for the chase of antelopes and deer. The cheetah is kept leashed and hooded until the game is found near, when it is let loose, and drawing stealthily near its victim, it rushes suddenly upon it, and can with difficulty be made to let go its hold. This animal is readily domesticated. In Ceylon, the true leopard is called *cheetah*.

Chee'ver (EZEKIEL), an eminent school-teacher, born in London Jan. 25, 1615, emigrated to America in 1637. He was one of the founders of the colony of New Haven, where he taught for twelve years. He removed to Charlestown, Mass., in 1661, and he taught in the Latin School in Boston for thirty-eight years. Died Aug. 21, 1708.

Cheever (GEORGE BARRELL), D.D., an American divine, born at Hallowell, Me., April 17, 1807, graduated at Bowdoin College in 1825. In 1833 he became minister of a Congregational church in Salem, Mass. He published, in 1835, a satirical allegory called "Deacon Giles's Distillery," for which he was prosecuted by a certain distiller, and was condemned to imprisonment for thirty days. He was distinguished as a zealous advocate of temperance and as an opponent of slavery. In 1839 he removed to New York City, and from 1846 to 1867 was pastor of the Church of the Puritans in that city. Among his works are "Studies in Poetry" (1830), "Lectures on Pilgrim's Progress" (1843), and "Wanderings of a Pilgrim in the Shadow of Mont Blanc" (1846).

Cheever (Rev. HENRY THEODORE), a younger brother of the above, author of "Island World of the Pacific" (1851) and other works, was born at Hallowell, Me., in 1814, and graduated at Bowdoin in 1834.

Cheha'lis, a river of Washington Territory, rises in Lewis co. on the E. side of the Coast Range, flows in a W. N. W. direction through Chehalis co., and enters Gray's Harbor. It is navigable for steamboats. Total length, about 125 miles.

Chehalis, a county of Washington Territory, bordering on the Pacific Ocean. Area, 1600 square miles. It is intersected by the Chehalis River, and also drained by the Satsop, Hoquium, and other small rivers. The surface is hilly and undulating; the soil of the valleys is fertile. It is mostly covered with dense forests of fir, cedar, spruce, maple, and ash. Oats, wheat, wool, and potatoes are raised. Coal is found. Capital, Montesano. Pop. 401.

Cheirol'epis [from the Gr. χείρ, a "hand," and λεπίς, a "scale"], a genus of fossil lepido-ganoid fishes peculiar to the Devonian measures. Eight species have been found. They had large heads, the spine rudimentary and the body covered with small lozenge-shaped ganoid scales. The first ray of each fin was converted into a strong spine. The pectorals and ventrals were largely developed, the dorsal small and farther back than the anal fin. The generic name was given in allusion to the scaly pectoral fins.

Cheironec'tes [from the Gr. χείρ, the "hand," and νήχω, to "swim"], a genus of marsupial quadrupeds, differing from the opossums in having webbed feet and

Cheironectes.

aquatic habits. The only species, *Cheironectes palmatus*, or the yapock, is common in Brazil and Guiana. It has a soft woolly fur; the color of the upper parts of the body is gray, with large patches of black and a dorsal black line; the breast and belly are white; the tail is long, thick at the base, tapering, and covered with scales. The cheek-pouches are very large. Fishes, insects, and crustaceans are the chief food of this animal, which is a marsupial representative of the otter. (See also CHIRONECTES.)

Cheke (Sir JOHN), an English scholar and Hellenist, born at Cambridge June 14, 1514. He became in 1540 first professor of Greek in the university of that place, and distinguished himself as a reviver of classical learning. In 1544 he was appointed Latin tutor to Prince Edward. He

was secretary of state in 1553, but on the accession of Queen Mary he was deprived of his office because he was a Protestant, and he went into exile. He was seized in Flanders in 1556 by the agents of Philip II. of Spain, and taken to England. Compelled to choose between death by fire and a profession of the Catholic religion, he accepted the latter. Died Sept. 13, 1557. (See STRYPE, "Life of Sir J. Cheke," 1705.)

Che-Kiang, a maritime province of China. Area, 39,150 square miles. It is intersected by the Grand Canal. The surface is diversified; the soil is very fertile. Silk is the chief article of export. The other products are tea, cotton, indigo, camphor, and fruits. It has manufactures of silk stuffs, crape, paper, etc. The chief towns are Hang-Chow-Foo and Ningpo. Pop. 26,256,784.

Chelms'ford, a town of England, capital of the county of Essex, at the confluence of the Chelmer and Cann rivers, on the Eastern Union Railway, 29 miles N. E. of London. Two fine bridges cross the river here. The town is well built, has an old church, a handsome county hall, a theatre, and assembly-rooms. Pop. 5513.

Chelmsford, a post-township of Middlesex co., Mass., on the S. side of the Merrimack River. It contains the village of North Chelmsford, on the Boston Lowell and Nashua R. R., 3 miles W. of Lowell; also South Chelmsford and West Chelmsford. The town is also traversed by the Framingham and Lowell and the Stony Brook R. Rs. It has granite-quarries and important manufactures. Pop. of township, 2374.

Chelmsford (Sir FREDERICK THESIGER), LORD, an English lawyer and judge, born in London in 1794. He became solicitor-general in 1844 and attorney-general in 1845, but he resigned in 1846. He was reappointed in 1852. On the formation of a conservative ministry in 1858, he was appointed lord chancellor and received the title of Lord Chelmsford. He resigned with his colleagues in June, 1859, and was again lord chancellor from July, 1866, to Feb., 1868.

Chelo'nia [from the Gr. χελώνη, a "tortoise"], or **Testudina'ta,** one of the three great orders of true reptiles, characterized by the possession of a carapace or horny dorsal shell composed of several united pieces; a ventral shell, plastron, or sternum; a horny, bill-like mouth, without teeth; eyes with three lids; and external ear-openings. The carapace represents the blended ribs and vertebræ, the plastron the sternum of other animals, these elements being intimately blended with the proper dermal elements. The spinal column is entirely immovable, for the vertebræ are thoroughly ankylosed with the shell and with each other. The genus *Emysaura* forms a transition from this order to the saurians through the alligators and crocodiles, having its carapace much contracted, while the neck, tail, and limbs are greatly elongated. The lung-sacs of the Chelonia have their cavities subdivided by imperfect partitions. They are very capacious, and the large quantity of air they contain materially aids in buoying up the heavy body as the animal swims in the water. Since the ribs and sides are fixed, the chelonians breathe by gulping down air through the nostrils, thus filling the lung-cavities for a time, the air being occasionally renewed. The order is divided into two sub-orders—the Chelonii, true or sea-turtles, which have the fore feet, or more frequently both fore and hind feet, transformed into paddles; and the Amydæ, or land-tortoises. The sea-turtles comprise the largest living species, one of which, the *Sphargis coriacea* of the Atlantic and Mediterranean, has been found to weigh nearly 2000 pounds; but the fossil shell of *Colossochelys atlas,* a land-tortoise of East Indian deposits, is sometimes twenty feet long, and it must have weighed much more than the *Sphargis.* The sea-turtles are of two families—Sphargidæ and Chelonoidæ, or loggerheads. The land-tortoises are much more numerous in genera and species, and are divided into seven or more families. They are peculiarly abundant in North and South America, but are found in nearly all warm and temperate regions.

There are several edible species both of land and sea chelonians. The flesh of some others is disagreeable or even injurious. The best known is the green turtle (*Chelonia midas*), found throughout a large part of the Atlantic, but having its head-quarters about the Bahamas, and notably at Ascension Island in the South Atlantic. Another famous edible species is the great *Testudo Indica,* a land-tortoise of the coasts of the Pacific and Indian oceans, of which the head-quarters are at the Galapagos Islands. Some species are valuable for their oil; others for that of their eggs; and one at least, the *Eretmochelys imbricata* of tropical seas, the inedible hawksbill turtle, affords the valuable tortoise-shell of commerce.

Tracks ascribed to chelonians have been found in triassic rocks, but their remains are first observed in the upper oolite. In the more recent formations their remains are abundant in both hemispheres.

CHELONIA is also the name of a genus of sea-turtles, to which the green turtle belongs.

Chel'sea, a populous south-western suburb of London, in Middlesex, on the left (N.) bank of the Thames, 4½ miles W. S. W. of St. Paul's. The river is here crossed by a fine iron bridge. Many of the nobility and gentry formerly resided at Chelsea. The principal public edifice is the noble hospital for superannuated soldiers. (See CHELSEA HOSPITAL.) Chelsea has waterworks for the supply of London, a chain pier, and manufactures of floor cloth; also a training college for male teachers, and one for female teachers. Here is a place of public amusement called Cremorne House Gardens. Pop. in 1871, 71,086.

Chelsea, a post-village of Hull township, Ottawa co., Quebec, Canada, on the Gatineau River, 8 miles from Ottawa. It has a postal savings' bank and a large lumber-trade. Pop. about 400.

Chelsea, a post-township of Butler co., Kan. Pop. 277.

Chelsea, a township of Kennebec co., Me., 3 miles E. of Augusta. It contains the Togus mineral springs and the U. S. military asylum. Pop. 1238.

Chelsea, a city of Suffolk co., Mass., is a north-eastern suburb of Boston, and is 3 or 4 miles N. E. of Boston Common. It is separated from Charlestown by the Mystic River, which is here crossed by the Chelsea Bridge. It is bounded on the S. and S. E. by an inlet of the sea called Chelsea Creek, which separates it from East Boston. Chelsea has a U. S. marine hospital and a U. S. naval powder-magazine, eleven or more churches, an academy, two newspapers, benevolent societies, a national and a savings bank, and a large elastic rubber factory; also manufactures of sewing-machines, brass-ware, linseed oil, iron safes, woollens, brushes, machinery, tools, etc. It is connected with Boston by the Eastern R. R. and by a ferry 1½ miles across. Pop. 18,547. ED. "TELEGRAPH AND PIONEER."

Chelsea, a post-village of Sylvan township, Washtenaw co., Mich., on the Michigan Central R. R., 55 miles from Detroit. It has one weekly paper. Pop. 1013.

Chelsea, a post-village, capital of Orange co., Vt., 22 miles S. by E. from Montpelier. It has a national bank, an academy, and manufactures of leather, lumber, and woollen goods. Pop. including Chelsea township, 1526.

Chelsea Hospital, at Chelsea, England, is an asylum for disabled or superannuated soldiers. Founded as a college in 1610, it was made a hospital in 1682. It has accommodations for about 660 persons, and is governed by a board of commissioners, comprising, *ex-officio,* the lord president of the council and the first lord of the treasury. It supports about 500 in-pensioners and nearly 70,000 out-pensioners. The former receive, besides board, lodging, and clothing, a small sum of money, varying from eight pence a week for a private soldier to three shillings six pence for a color-sergeant. The out-pensioners receive daily a sum of money varying from four pence to two shillings six pence for life.

Cheltenham, chĕlt'nam, a town and fashionable watering-place of England, in the county of Gloucester, and on the Bristol and Birmingham Railway, 96 miles by the road or 121 by railway W. N. W. of London. It is pleasantly situated in a picturesque valley on the Chelt, a small tributary of the Severn, and is sheltered on the E. and S. E. by a semicircle of the Cotswold Hills. It derives its prosperity and importance from its mineral springs, which contain sulphates of soda and magnesia, with iodine, iron, and carbonic acid. It has elegant squares, terraces, and crescents, and numerous villas, interspersed with gardens and shrubberies. The public promenades are among the finest in England. It has ten or more churches, besides chapels of dissenters, a general hospital, a theatre, a zoological garden, and a well-endowed grammar-school founded in 1574. Cheltenham is famous for its colleges and schools, among which is the proprietary college for the sons of gentlemen. This has usually about 600 pupils. Pop. in 1871, 44,519.

Cheltenham, a post-township of Montgomery co., Pa. Pop. 2462.

Chemical Affinity. See AFFINITY.

Chemical Analysis is the identification and separation of the elements of chemical compounds or mixtures of any sort. When conducted simply with reference to determining what elements exist in any substance it is termed *qualitative analysis.* When the absolute or relative quantities of the elements are ascertained it is *quantitative analysis.* The theory of qualitative chemical analysis is to put the substance to be analyzed under such conditions and associations as shall cause all its various elements, one after another, to present certain characteristic phenomena or to

enter into certain recognizable combinations, and is based on the grand truth that each chemical element has constant and absolute peculiarities which it carries into its compounds. Thus, the fact that silver and mercury are the only elements whose compounds with chlorine are insoluble in dilute nitric acid, is taken advantage of to separate these two metals from all others. Any nitric solution of metals which is not made milky or turbid on the addition of hydrochloric acid does not, and cannot, contain silver or sub-salts of mercury. Again, any nitric solution wherein hydrochloric acid produces a white milkiness or a white curdy separation, or a fine dazzling white powder, which neither dilute hydrochloric acid, dilute nitric acid, nor hot water will clear up, must contain either silver or mercury, or both. In case such a white separation—or "precipitate," as the chemist technically terms it—is formed by hydrochloric acid in a solution of metals, the liquid, together with the suspended precipitate, is poured upon a filter (a conical cup folded from a circle of paper specially prepared for the purpose) sustained in a glass funnel. The liquid, which retains all the other elements in solution, passes the pores of the paper, but the precipitate of silver chloride and mercurous chloride remains upon it. The filter is next repeatedly filled with water until the acid liquid has been washed out from the precipitate and the pores of the paper, and we have then all the silver and all the mercury that existed in the form of sub-salts in the filter, and all the other elements in the "filtrate," as the liquid which has passed through is designated.

The substances which are employed to bring about those chemical changes which serve the purposes of chemical analysis are called *reagents*, and the chemical processes themselves are termed *reactions*, for the reason that at least two substances must always be involved in chemical transformations, and that both act and are reacted upon. Thus the hydrochloric acid employed in our separation of silver and mercury from all other metals is a reagent, and the precipitation is the evidence of a reaction.

Chemical reactions have been known and employed to identify certain bodies from the earliest times. Pliny described the use of paper dyed in nutgalls for detecting iron sulphate when mixed with verdigris as an adulteration. The reaction is a blackening of the paper (formation of ink). In many cases it is easy to recognize a substance by simply applying in this manner a single reagent, which is then called a test. Thus, copper in its solutions is tested by a bit of clean iron wire, which precipitates it as a red powder. A clean piece of copper is a test for mercury in solution, the latter metal forming a silvery coating on the former. Lime-water is a test for carbonic acid gas, making with it a white precipitate of carbonate of lime. Hydrochloric acid is a test for ammonia, as the vapors of the two, when brought together, produce a white cloud. But there are circumstances under which such simple tests fail to give unequivocal answers to the chemical inquirer, and it is needful to frame a system of operations which takes account of all possible contingencies, and which enables the analyst not only to prove with certainty that such and such elements exist in any substance he analyzes, but also gives him equal assurance that nothing else is present in it—a system, in short, which can lead him to a complete knowledge of the composition of any body. Such systems of procedure, more or less satisfactory, have been devised out of the collective experience of chemists, and their details are found in our treatises on qualitative chemical analysis. In respect to the elements and compounds of mineral or inorganic chemistry a very perfect plan has been elaborated, which has received in all essential points the sanction of universal usage.

This system of analysis applies to all the metals and their oxides, and to all their compounds with mineral elements or acids. It supposes that the elements, etc. are in a state of solution either in water or an appropriate acid, and gives directions for obtaining such solutions. The substance is first subjected to a "preliminary examination," which often leads to the detection of some of its ingredients, or demonstrates the absence of certain elements, and furnishes useful hints as to the mode of solution and subsequent procedure. The actual examination begins with the application of four "general reagents," which serve to dissect the substance into six "groups" as regards its bases or metallic oxides.

The solution being in nitric acid, the first reagent is hydrochloric acid, which precipitates the first group—viz., silver and mercury (the latter from mercurous salts). The acid filtrate from these chlorides is submitted to a stream of sulphuretted hydrogen gas, which precipitates the second and third groups, consisting of twelve metals together, as sulphides. These are collected and washed upon a filter, and upon them is poured sulphide of ammonium. This dissolves and carries through the filter the sulphides of the second group—viz., arsenic, antimony, tin, gold, platinum, molybdenum, and tungsten, while the sulphides of mercury (from mercuric salts), lead, bismuth, copper, and cadmium, constituting the third group, remain undissolved.

The filtrate from the precipitate by sulphuretted hydrogen is next taken in hand, made alkaline by ammonia, and sulphide of ammonium is added to it. This throws down, as hydroxides or phosphates, aluminium, chromium, glucinum, and the cerium metals; as phosphates, calcium, barium, strontium, and magnesium; and as sulphides, nickel, cobalt, manganese, zinc, iron, uranium, thallium, and indium —making a fourth group.

To the ammoniacal liquid, separated by a filter from the last precipitate, is added carbonate of ammonium, whereby the fifth group—viz., barium, calcium, and strontium—are precipitated as carbonates.

Lastly, the liquid filtered from the above carbonates may contain the alkalies and magnesium.

The resolution of these groups is accomplished by further application of appropriate reagents. Each group is treated after a certain order which experience has taught. To illustrate: the white precipitate obtained by hydrochloric acid, already described, may contain silver chloride or mercurous chloride, or both. To complete its examination we employ the deportment of these chlorides towards ammonia-water, which easily dissolves silver chloride to a clear liquid, but converts white mercurous chloride into a black substance that remains undissolved. It is only needful then to pour dilute ammonia upon the white content of the filter; and if it blacken, the presence of mercury is demonstrated. The ammonia-water that passes the filter is dropped into excess of dilute nitric acid; the separation of a white curdy substance is evidence of silver.

After thus isolating the two metals we may apply further confirmatory tests. Thus, the black mercury compound remaining in the filter may be mixed with carbonate of sodium, dried, introduced into a small glass flask, and heated to redness, when metallic mercury will distil off and gather on the cold part of the vessel in brilliant globules. So, too, the white curds of silver chloride separated by nitric acid from the ammoniacal solution may be gathered and washed on a filter, the latter burned, the precipitate and ashes mixed with moist carbonate of sodium into a pellet, and heated strongly on charcoal by aid of a jeweller's blowpipe. The silver is thus reduced to the metallic state, and may be found, even when present in extremely minute quantity, by cutting out the charcoal to a little depth around the spot where the pellet was placed, grinding it in a smooth mortar of porcelain or agate, and carefully washing away the coal-powder by a gentle flow of water. The flattened silver particles will reveal themselves by their lustre.

The detection of acids is accomplished in another portion of the substance by the use of other reagents, after the same general plan.

In quantitative chemical analysis it is needful to convert each element of a substance into some form or compound which will admit of complete separation from all the others, and also of accurate weighing or measuring. In many cases an element must be separated in one form, and converted into another for weighing. Silver may be both separated and weighed as chloride or as metal, whilst zinc must be separated as carbonate or sulphide, but can only be weighed accurately as oxide. Many of the reactions employed in qualitative analysis also serve in quantitative estimations; the latter branch of analysis has, however, a multitude of processes peculiar to itself.

In most cases the determination of the quantity of an element or ingredient consists in the collection of a precipitate on a filter, washing, drying, burning away the paper at a red heat, and weighing the ignited residue. This requires a delicate balance, accurate weights, vessels of glass, porcelain, and platinum, which are unalterable by acids and by heat, and great nicety of manipulation. It also requires a perfect knowledge of the deportment of the precipitate towards all the reagents and solvents with which it must have contact, and a certainty that it can be obtained of perfectly definite and known chemical composition. Our present stock of this kind of knowledge is the fruit of a multitude of the most painstaking experiments, and every day the labor of skilled investigators is adding to its variety and extent.

To certain branches or general modes of analysis technical names are applied. Thus "blowpipe analysis" designates a system of operations carried on mainly by aid of the blowpipe, which serves for identifying a large share of the elements, and even for quantitatively estimating the precious metals, as well as lead, copper, nickel, and some others. "Spectral analysis," which furnishes the most sensitive tests for the presence of the alkali metals, is based on the fact that the light proceeding from a flame in which

the vapor of any substance is intensely heated, manifests, when viewed there by a prism, lines or bands of color whose position and number are characteristic. "Volumetric analysis" is a branch of quantitative analysis, in which measured volumes of solutions of determined strength are employed in reactions whose completion is indicated by some change of color or other marked phenomenon. "Organic analysis" is either ultimate or proximate. The former signifies the estimation of carbon, hydrogen, nitrogen, and the other elements of organic compounds. Proximate organic analysis is the separation of organic compounds from each other, as is done, for example, in determining the proportions of water, oil, starch, etc. in seeds. "Assaying" is the term usually applied to the estimation of the valuable metals, or ingredients of an ore or other commercial article.

Some of the most striking discoveries of science have been steps in the development of chemical analysis. The recognition of oxygen, chlorine, baryta, and manganese were results of Scheele's analysis of the mineral "wad" or pyrolusite. Among the first fruits of quantitative analysis was the discovery of the laws of definite and multiple combining proportions. Those philosophers who, like Bergmann and Dalton, were the first to announce, and those who, like Berzelius, Dumas, and Stas, have done most to establish, these laws, have been eminent for their skill in analytical chemistry.

The utility of chemical analysis manifests itself in a multitude of directions. By it the values of bullion, coinage, and plate are established; ores of all the metals are worked and sold on the chemist's report of their analysis. The same is true of a host of commercial articles, such as various alkalies, acids, salts, medicines, dyestuffs, fertilizers, etc. Chemical analysis furnishes the consumers of these and many other articles a protection against the dishonesty or ignorance of producers or dealers. The physician often gathers decisive diagnostic hints from the analysis of urine; the advocate relies upon chemical analysis for the detection of poisons which can be employed in the perpetration of murder.

There are indeed limits to the application of chemical analysis. It is not difficult to make mixtures some of whose constituents no chemist can identify with the knowledge now at his disposal. The composition of a large number of drugs, such as vegetable extracts, is nearly or quite unknown; and if a professional chemist certifies that he has analyzed a "compound syrup" of sarsaparilla, yellow dock, and buchu, or a "bitters" containing the virtues of a dozen of the best vegetable remedies, and has found it to be a pure and efficacious medicine, the simple fact is, he has not done it, and cannot do it, and there is a fraud involved in the assertion.

The successful pursuit of analytical chemistry requires a long course of the most patient and conscientious experimental work; it is therefore an admirable disciplinary study, and is recognized as such in the higher schools of Europe and this country.

(The best extended treatises on chemical analysis are Rose's "Handbuch der Analytischen Chemie;" Fresenius, "Qualitative Analysis," and the same author's "Quantitative Analysis;" Bunsen's "Gasometric Methods;" Hoppe-Seyler's "Handbuch der Physiologisch- und Pathologisch-Chemischen Analyse;" and Gorup-Besanez, "Zoochemischen Analyse." The "Zeitschrift für Analytische Chemie," edited by Fresenius, and now (1872) in its eleventh volume, is a complete repertory of all that is currently published on the subject.) S. W. Johnson.

Chemical Equivalents. See Chemistry.

Chemillé, a town of France, in the department of Maine-et-Loire, in the arrondissement Cholet, on a railway, 20 miles S. S. E. of Angers, and on a small stream called the Hyronne. It has manufactures of linen handkerchiefs, woollen cloths, flannels, blankets, etc. Here is also a trade in cattle and agricultural products. The neighboring country produces considerable quantities of grain and white wine. Pop. 4414.

Chemistry [etymology uncertain*]. The present condition of chemical science has been reached by a gradual process of evolution. More than at any previous time, the individual characteristics which it exhibits represent the results of the united labors of all the workers in its domain from the dim ages of alchemy to the present day. A rapid historical sketch of its development, therefore, cannot but form an appropriate introduction to a consideration of its present condition.

History.—The alchemists had no science in any proper sense. Most of the valuable facts they have handed down to us were collected in the search for the philosopher's stone, the universal solvent, or the elixir vitæ. Here and there, it is true, there were those who speculated upon the facts which had been observed, and who strove to evolve from them some general principles. But so unsatisfactory were the results that, although the word "chemistry"—signifying, however, the art of making gold and silver—came into use early in the fourth century, it was not until near the close of the seventeenth century that chemistry proper had any existence. For our present purpose it is sufficient to extend our investigation only to the progress of the conception of the constitution of matter. The four elements of Aristotle (B. C. 384–322), earth, air, fire, and water, held undisputed sway until the eighth century. Then the Arabian alchemist Geber introduced the theory that the metals were made of mercury and sulphur, and suggested, for the first time, the idea that differences of properties were due to differences of composition. In the thirteenth century Albertus Magnus united these two conceptions into one, by asserting that the physical properties of bodies depended upon the elements of Aristotle, and their chemical properties upon those of Geber. In the fifteenth century Basil Valentine, the last of the alchemists, added "salt" to Geber's elements, and refined the idea involved in them by asserting that by sulphur was meant the inflammable principle, by mercury the volatile principle, and by salt the fixed principle. Paracelsus (1493–1541) appeared mainly as the reformer of medicine. Accepting Basil Valentine's views of matter, he maintained that the health of the human body depended upon the presence in it of a just proportion of the three principles. The first book upon chemistry was written by Libavius in 1595; he defined it as the art of producing remedies. The period of Iatro chemistry closes with Lemery (1645–1715), who sought again to introduce the ideas of Aristotle by uniting two of his elements, water and earth, to those of Basil Valentine. A new and more hopeful era opens with the English chemist Boyle (1627–91). He opposed the views thus far held upon the constitution of matter, and argued that the true elements were the bodies—themselves undecomposable—which were obtained by the decomposition of other substances, and which could be used to form these substances again. The differences observed in the elements themselves he accounted for by supposing that their smallest particles differed either in size or form. Stahl (1660–1734) accepted the theory that chemical properties depended upon the presence of certain definite constituents, and sought to demonstrate it experimentally. By a closely-knit argument, founded on observed facts, he succeeded in giving to his theory of combustion—called the "phlogistic theory," because it assumed the presence of phlogiston in all combustible bodies, which phlogiston passed off in burning—a solidity which enabled it to maintain itself for nearly two hundred years. In the steady progress of the science, however, the materials for the overthrow of the phlogistic theory were being prepared. Black (1728–99), when a medical student in Edinburgh, wrote, on his graduation in 1754, a thesis entitled "De Humore acido a cibis orto, et Magnesia alba." Appended to it was a series of chemical experiments upon the mild and caustic alkalies, which were afterwards extended and published separately in 1756. In this paper he shows that the mild alkalies differ from the caustic in the fact that they contain a large amount of "fixed air," which, when a mild alkali is treated with an acid, escapes with effervescence. A mild alkali is therefore a caustic alkali, plus fixed air. Now between the current theories of phlogiston and of causticity there is a close analogy. As by the former combustible bodies were compounds of phlogiston, so by the latter caustic alkalies were compounds of the caustic principle. And as, in burning, the combustible gave up its phlogiston and became a calx, so a mild alkali in the fire took up the fiery caustic principle and became itself caustic. Black, however, proved that this explanation of causticity was false; he showed that in burning the mild alkali did not gain but lost something, this loss being the "fixed air;" and that it was this loss of fixed air which made a caustic alkali. This research of Black made the framing

* Perhaps the most probable etymology is that which derives the term from *Khem*, one of the ancient names of Egypt; signifying also "black" or "dark," in allusion perhaps to the dark and mysterious character of the art of alchemy, or else to the fact that Egypt was especially distinguished for its knowledge of secret and rare arts. The derivation from the Greek χυμός, "juice," seems highly improbable, principally because the original spelling of the word as seen in *alchemy* (whence the modern *chemistry* is derived) had not the first syllable in *chy*, as it should have had coming from the Greek χυ; for the Greek term itself was χημεία (not χυμεία); though many modern writers, misled by this supposed etymology from χυμός, write *alchymy* (or *alchymie*), as well as *chymist* and *chymistry*. And though the interchange of one vowel or diphthong for another is very common in Greek, as α for η, ει for ι, we believe no instance can be pointed out in which υ interchanges with η. There seems, moreover, no reason to suppose that the mixture or preparation of "juices" of any kind was the chief occupation of the alchemists, their great problem having been the transmutation of baser metals into gold; and, from what we know of the experiments, their chief agent was fire.

of an argument against phlogiston easy. It is not surprising, therefore, that not long afterwards Lavoisier (1743–94), furnished with abundant material by the remarkable discoveries of Priestley (1733–1804), Cavendish (1731–1810), and Scheele (1742–86), undertook a crusade against the Stahlian hypothesis. As Black had shown that the loss of causticity depended upon the assumption of a gaseous matter—fixed air—by the alkali, so was it not clear that the loss of combustibility depended upon the assumption of another kind of gaseous matter—vital air—by the combustible? As the conversion of a mild into a caustic alkali did not consist of the taking up of "causticum," but in the evolution of fixed air, so the production of a metal from its calx did not consist in the taking up of "phlogiston," but in the evolution of oxygen. His conclusive experiment with mercury established the analogy, and gave phlogiston its deathblow.

Meanwhile, numerical relations had begun to take their place in the science. Though Homberg (1652–1715) had attempted to fix the quantity of a base required to saturate several different acids, yet it was not until 1777 that Wenzel (1740–93) succeeded in establishing the true idea of definite chemical combination. His analyses were surprisingly accurate. He proved, for example, that 123 parts of lime, or 222 parts of potash, neutralized 240 parts of nitric or 181.5 parts of sulphuric acid. Hence, 123 parts of lime are the equivalent, in neutralizing power, of 222 parts of potash; and so of the quantities of the acids, as given. Richter (1762–1807) extended these experiments, and drew up the first tables of equivalents. He showed that the quantity of the bases A and B which combined with an acid C would also combine with the acids D, E, and F, and hence, that the composition of many salts could be calculated from the known composition of other salts; thus laying the foundation of Stoichiometry. Richter also pointed out that the ratio between the amount of an acid required to saturate certain bases, and the amount of oxygen contained in those bases, was definite. Thus early was the law of definite proportions established. It was soon followed by another of not less importance. In 1804, Dalton (1766–1844), in a research upon olefiant and marsh gases, observed that the latter contained, to the same weight of carbon, twice as much hydrogen as the former. Extending this observation to other bodies, he was at once led to the law of multiple proportions, which asserts that when one body combines with another in more than one proportion, the quantities uniting in the second and subsequent cases are simple multiples of the first. It was in pondering upon the cause of so remarkable a law that Dalton devised the atomic theory. It seemed clear to him that the definite weights with which bodies enter into combination represent definite quantities of matter, indivisible by chemical means. These definite quantities of matter he proposed to call atoms; they were of the same size, but their weights were proportional to the combining weights in each case. These atoms combined with each other, forming compounds; hence the quantities combining must be definite in weight; they might be multiples in one case of the quantities in another, and the weight of the compound must be the sum of the weights of its constituents. These atomic weights being relative, Dalton chose the smallest of them, that of hydrogen, as a standard, calling it unity. In 1808 he published a table of atomic weights, in which that of nitrogen is 5, of carbon 5, of oxygen 7, of sulphur 13, of iron 38, of zinc 56, of silver 100, of mercury 167, etc. Some of Dalton's contemporaries accepted his views in full, others only in part. Among the latter was Wollaston (1766–1828), who accepted Dalton's numbers, but preferred to call them equivalents, on the ground that an equivalent was a fact, an atomic weight only a hypothesis. Davy (1778–1829) also rejected the hypothesis of atoms, but proposed "proportional numbers" for Dalton's atomic weights. Nevertheless, the atomic theory stimulated investigation, and chemists set themselves at work to revise, and if possible to make more accurate, these numbers of Dalton.

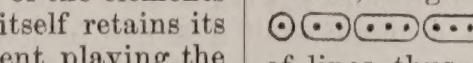
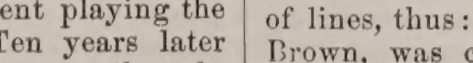
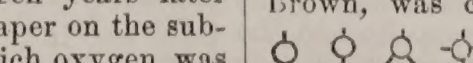
Contemporaneously with this progress in the determination of the combining weights of the elements was an advance in ascertaining their combining volumes. Gay-Lussac (1778–1850), in connection with Humboldt, proved in 1805 that water was formed by the union of one volume of oxygen with two volumes of hydrogen. Continuing his researches, he showed in 1809 that the combination of any two gases always took place in simple volume-ratios, and that the volume of the product always bore a simple ratio to that of its constituents. This discovery was not only an important confirmation of the law of definite proportions, but it furnished a means by which an atomic weight could with certainty be determined. For, since, according to Dalton, bodies combine in proportions represented by the weight of their atoms, and, according to Gay-Lussac, the simple gases also combine by volume in a simple ratio, it is evident that the relative weights of these volumes ought to represent the atomic weights. But the relative weight of a given volume is the density; hence the atomic weights of simple gases are proportional to their densities. Singularly enough, Dalton—who, more than any other, should have welcomed this new confirmation of his views—refused to accept it, and attacked the accuracy of the results. Berzelius (1779–1848), however, warmly espoused the new theory of volumes, and constructed his tables of atomic weights in accordance with it. By the improvements in methods of analysis which he devised, he was able, in 1815, to give a wonderfully accurate table of this kind, in which—following Wollaston—he took oxygen as the standard and called it 100. Hydrogen he gave as 6.24. The influence of Gay-Lussac's law is here clearly apparent. For, since by Wollaston's equivalents the ratio of the hydrogen in water to the oxygen is as 1 to 8, and by Gay-Lussac's law the volumes are as 2 to 1, it is clear that the ratio of the weights of these volumes is as 2 to 16, or as 6.24 to 100, as Berzelius gave it. Moreover, he substituted for the arbitrary notation of Dalton—which consisted of circles—a system of symbols, in which each atom was represented by the first letter of its Latin name. A bar drawn through a symbol signified a double atom, and a dot over it indicated an atom of oxygen. Water was written H_2O, or, abbreviated, $\dot{\bar{H}}$; nitric acid, N_2O_5, or $\ddot{\bar{N}}$. In order to bring his atomic weights into accordance with the equivalents of Wollaston and Davy, Berzelius had recourse to an unfortunate hypothesis. He admitted the existence among the elements of double atoms, inseparable in combination, which were represented by his barred symbols. These double atoms of Berzelius were equal in weight to the equivalents of Wollaston.

Two parties were now in the field. On the one side was Dalton with his atomic theory, maintaining that when but a single combination between elements took place it always took place atom to atom, and considering the atomic weight to be the quantity of a substance which united with one atom of hydrogen; and Wollaston and Davy, rejecting the theory of atoms, and asserting that an equivalent of any element was the quantity of it by weight which combined with 10 parts of oxygen. On the other was Berzelius—already more than a match for any of his contemporaries—accepting the theory of Dalton, and contending that the atomic weights were proportional to the gaseous volumes, being the relative weights of these volumes when equal, but conceding the existence of inseparable double atoms. Dalton confounded the idea of atomic weight with that of equivalent; Wollaston and Davy retained the idea of equivalent, but carried it out inconsistently; Berzelius conceived the true idea of an atom, and sharply distinguished it from that of an equivalent. In the case of non-volatile bodies, as the metals, however, he too considered an atomic weight to be the quantity which combined with 100 of oxygen to form the first degree of oxidation, though, for special reasons, he varied this rule in some cases. The great weight of his authority bore down all opposition, and for twenty years his views were the absolute basis of chemical science. His theory, nevertheless, had its weak points; and in 1848 Gmelin (1788–1853) in the fourth edition of his "Lehrbuch der Chemie," attacked the chief of these, the theory of double atoms. "There is no compound," he says, "containing but one atom of hydrogen, nitrogen, etc., as small as that adopted by Berzelius. Hence two atoms of these bodies are the *equivalent* of one atom of oxygen. If the atoms be supposed twice as great, the idea of an atom will coincide with that of an equivalent, and all confusion will be avoided." He therefore proposed that the formulas of water, hydrochloric acid, and ammonia, which Berzelius had written H_2O, H_2Cl_2, and H_6N_2, should be written HO, HCl, and H_3N. This argument of Gmelin, strengthened by the old idea of Wollaston that atoms were purely hypothetical and equivalents were actual, succeeded in leading chemists to ignore the positive results obtained by Gay-Lussac, and to sink back into the old equivalent system of notation. The view of chemical equivalency thus adopted, however, based as it was on negative statements mainly, was full of inconsistencies. Adopting, as less cumbrous, the hydrogen scale of equivalents, and therefore assuming that an equivalent of any substance was the quantity of it which united with one atom of hydrogen, the chemists who advocated it gave 14 as the equivalent of nitrogen, although it was certain that this quantity combined, not with one, but with three atoms of hydrogen. In the case of salts, a class of bodies termed ternary by Berzelius, and formulated on the dualistic or electro-chemical view, the same is true. Wenzel, Richter, and even Berzelius, had studied the neutralization of acids by bases, and had formed tables of equivalencies between them. It was impossible to assert that all bases were equivalent to each other. One equivalent of alumina, for example, sat-

urated three times as much sulphuric acid as one equivalent of potash; and phosphoric acid, equivalent for equivalent, required three times as much base as nitric. In general, polyacid bases and polybasic acids could not be brought into accordance with the theory except by strained hypothesis or arbitrary assumption. Consistency required the adoption of formulas which were at variance with fact. The need of a reform was apparent, and it was soon begun. The reformer was Gerhardt (1816–56). He was struck with the fact that on the existing notation, whenever any organic reaction gave rise to the formation of water or of carbonic gas, the quantity of these bodies evolved never corresponded to a single equivalent, but always to two or a multiple of two. Moreover, he observed that if the equivalents of carbon, hydrogen, and oxygen were taken at 6, 1, and 8, respectively, then that all organic formulas contained an even number of carbon and of oxygen atoms. If, he reasoned, C_2O_4 (in which $C_2 = 12$ and $O_4 = 32$) be the smallest quantity of carbonic gas which can be set free in any reaction, is it not a complete molecule? and is it not better to write the formula CO_2, in which $C = 12$ and $O_2 = 32$? So, if H_2O_2 be a molecule of water, is it not better to double the weight of the oxygen atom and write it H_2O? Thus did Gerhardt sharply define the ideas of molecule and atom, and thus did he construct his tables of atomic weights, which, while closely accordant with those of Berzelius, avoided his hypothesis of double atoms. In accordance with the law of Gay-Lussac, and with the law of Avogadro and Ampère—that equal volumes of all gases contained the same number of molecules—Gerhardt defined a molecule to be that quantity of any substance which in the gaseous state occupied two volumes, the standard volume being that occupied by an atom of hydrogen. As Berzelius had written many of his formulas in accordance with his dualistic ideas—nitric acid, for example, being $N_2O_5H_2O$ or $H_2N_2O_6$—which formulas corresponded to 4 volumes of vapor, Gerhardt at once halved them, writing nitric acid HNO_3, and so brought them to the 2-volume standard. He regarded molecules as units, whence the name "unitary" given to his system. He maintained that the determination of the arrangement of the atoms within the molecule was impossible, and hence opposed the use of rational formulas. He rejected the compound radical theory of Lavoisier and Berzelius, and accepted, with curious inconsistency, Laurent's theory of "residues," essentially similar.

Gerhardt's early death prevented the full development of his views. His atomic weights were never fully accepted until after they had become modified by the influence of two physical laws discovered some time before. In 1819 two French chemists, Dulong (1735–1838) and Petit (1791–1820), showed that the specific heats of simple bodies were inversely proportional to their atomic weights; or, what is the same thing, that the atoms of all simple bodies have the same specific heat. Although Berzelius had regarded this law in fixing certain of his atomic weights, yet it was not until re-investigated by Regnault in 1849 that it was generally used. He called attention to the fact that to make the equivalent weights then in use accord with the law of specific heats, it was necessary only to halve the equivalents of hydrogen, nitrogen, chlorine, bromine, iodine, phosphorus, arsenic, potassium, sodium, and silver. But this, in all but the last three cases, was to return to the atomic weights of Berzelius. Gerhardt, however, in doing this, had arbitrarily assigned to the protoxides the formula R_2O, while the law of specific heats allowed this formula only in the cases of potassium, sodium, and silver. For all other metals, therefore, the protoxides were RO, and the atomic weights of Berzelius were more accurate than those of Gerhardt. The second law which influenced atomic weight was the law of isomorphism, discovered in 1819 by Mitscherlich (1794–1863). He proved that bodies similarly constituted crystallize similarly; and hence that bodies really isomorphous—*i. e.*, having crystalline forms nearly or quite identical—ought to be represented by analogous formulas. For example, cuprous sulphide is isomorphous with silver sulphide; its formula should therefore be Cu_2S, analogous to Ag_2S, and not Cu_4S, as Gerhardt wrote it. Thus, in due time, all the considerations which bear upon the question of atomic weights appear to have been regarded, and these weights established to the satisfaction of all.

Another of the most prolific of modern chemical theories must be briefly glanced at in this place. This theory, called the theory of types, was first proposed in 1839 by Dumas, upon his discovery of trichloracetic acid. He stated it thus: When equivalent substitution of any of the elements of a compound takes place, the compound itself retains its original chemical type, the replacing element playing the same part as that which is replaced. Ten years later Wurtz discovered the amines, and in his paper on the subject compared them either to ether, in which oxygen was replaced by amidogen (NH_2), or to ammonia, in which one atom of hydrogen was replaced by an alcoholic radical. The investigation of these "compound ammonias" was continued by Hofmann, who accepted the latter view, and has since given it a most remarkable development. In 1851, Williamson extended the idea of types by his beautiful researches upon etherification, and especially by the discovery of mixed ethers. The water-type had been suggested already by Laurent (1807–53), who had formulated caustic and anhydrous potash upon it; it had been extended by Sterry Hunt. But Williamson went farther: he showed conclusively that if an alcohol molecule contained the ethyl group once, that of ether contained it twice—that if alcohol be represented by replacing half the hydrogen in water by ethyl, $\left.\begin{matrix}C_2H_5\\H\end{matrix}\right\}O$, then ether ought to be represented by replacing the whole, $\left.\begin{matrix}C_2H_5\\C_2H_5\end{matrix}\right\}O$. By a rapid generalization of this view he showed that the acids, bases, and salts, not only of mineral, but also of organic chemistry, were readily referable to the water-type. Two types were now established, the water and the ammonia types. Gerhardt increased the number by proposing the type hydrogen (HH), not only for free elements, like chlorine and potassium, but for the hydrides, aldehydes, ketones, and radicals of the carbon series; and the type hydrochloric acid (HCl) as the type of the haloid salts and ethers. In the same year Williamson suggested the idea of "condensed types" for the polybasic acids and the polyacid bases. On the water-type twice condensed, $\left.\begin{matrix}H_2\\H_2\end{matrix}\right\}O_2$, he formulated sulphuric acid, by replacing half the hydrogen by the radical (SO_2), $\left.\begin{matrix}(SO_2)\\H_2\end{matrix}\right\}O_2$. Odling showed that phosphoric acid was derived from the water-type trebly condensed, $\left.\begin{matrix}(PO)'''\\H_3\end{matrix}\right\}O_3$; the replacing power of a radical being indicated by dashes $(PO)'''$. In 1854 he introduced the conception of "mixed types," arguing that if a poly-equivalent radical could replace the hydrogen atoms in several similar molecules, either wholly or partially, it could also thus unite several dissimilar molecules.

Two distinct ideas are involved in the theory of types: one is the idea of the replacing body or radical; the other is that of the body in which the replacement takes place, or the type itself. The first of these involves clearly the conception of replacing power; those substances being first formulated upon the theory of types whose radicals replaced but a single atom of hydrogen. The brilliant research of Wurtz upon the glycols, made in 1856, proved that ethylene replaced two atoms of hydrogen. And, starting from this, Cannizzaro in 1858 established the analogy for several of the metals, and thus originated the principle of classifying the elements according to their replacing power. The same year Kekulé gave a vigorous impulse to this idea of elemental replacing power by establishing, in a paper on the chemical nature of carbon, the fact that this element had a replacing power of four. Gradually, the names atomicity, quantivalence, and equivalence came into use to express this replacing power—an atom being a monad, dyad, triad, or tetrad, or a univalent, bivalent, trivalent, or quadrivalent radical, according as its replacing power is equal to one, two, three, or four atoms of hydrogen. Wurtz, however, prefers to use the terms monatomic, diatomic, triatomic, etc. for the same purpose. But this combining or replacing power is not invariable. A given element, according to the law of multiple proportions, may form a series of compounds with another element, and in each of these its equivalence must be different. It was early observed, however, that this variation in equivalence always took place by twos; so that an atom might replace 1, 3, 5, or 7, or 2, 4, 6, or 8 hydrogen atoms. The equivalence never changes from even to odd, or the reverse. Odling therefore divided the elements into two groups, calling the group of even equivalence artiads, and the group of odd equivalence perissads. If an atom is a perissad in one of its compounds, it is so in all; and so if it is an artiad. Out of this classification of the elements according to their equivalence, involving as it does the predetermination of their compounds, there grew, insensibly and almost inevitably, the idea of molecular arrangement. Though isomerism had necessitated the supposition that differences of arrangement must exist, yet hitherto the precise character of this difference could not be determined. To express the idea, three sorts of graphic formulas were devised. The first, by Kekulé, consisted of ovoids, longer or shorter according to the equivalence:  ; the second, by Foster, consisted simply of lines, thus:  ; and the third, by Crum Brown, was composed of circles with radiating lines:  . The latter notation—using symbols in

place of circles—is in general use. If oxygen be a dyad, and hydrogen a monad, the graphic formula of water must be H—O—H : the oxygen must link the two H atoms together; there is no other arrangement possible.

The second part of the theory of types is involved in the idea of the body in which the replacement is effected; *i. e.*, the type itself. Four of these were fixed by Gerhardt—namely, HH, HCl, H_2O, and H_3N; to which Odling subsequently added H_4C. HH and HCl were soon after united; and indeed it was soon shown that all the others were easily derived from the hydrogen type. Upon examination of these types, it is evident that the atoms united to the hydrogen successively increase in equivalence, the Cl being a monad, the O a dyad, etc. The reason, therefore, why these substances are really typical is obvious: it is because they represent the combinations of monads, dyads, triads, tetrads, etc. with other elements; *i. e.*, all possible compounds. In this light the type theory appears as only a special case of the broader theory of equivalence, into which, by the labors of Kekulé, Wurtz, Hofmann, Boutlerow, and others, it has already been completely merged.

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Theoretical Chemistry.—Modern science regards matter as divisible into masses, molecules, and atoms. A mass of matter is any portion recognizable by the senses. A molecule of matter is the smallest quantity of any substance which can exist by itself, and which can enter into or leave a chemical change. An atom is the smallest particle of matter which can exist in combination. A molecule is made up of atoms, and a mass is made up of molecules. These divisions of matter are held together by attractions, called, respectively, mass, molecular, and atomic attraction. Mass attraction is called gravitation; molecular attraction is called cohesion; and atomic attraction is called chemism. Differences in molecular composition produce differences in the physical properties of bodies; differences in atomic composition produce differences in their chemical properties. The only differences possible in atomic composition are: (1) a difference in the kind of atoms in the molecule; (2) a difference in the number of these; and (3) a difference in their arrangement. Hence, upon these three all the chemical differences observed in matter must depend. Water differs from salt because a molecule of the former, made up of oxygen and hydrogen, differs from a molecule of the latter, made up of chlorine and sodium, in the *kind* of atoms which it contains. Litharge differs from red lead because their molecules, while containing in both cases lead and oxygen atoms, differ in the *number* of these present in each; cane-sugar and milk-sugar are different, because the kind and number of atoms composing their molecules being alike, the *arrangement* of them is different. Chemistry, therefore, may be defined as the science which treats of the atomic composition of bodies, and of those changes in matter which result from an alteration in the kind, number, or relative position of the atoms which compose the molecule.

Chemistry, then, is the science of atoms. It takes cognizance only of those facts which depend upon differences of atomic constitution. Hence, no substance is chemically understood until the kind, the relative and absolute number, and the arrangement of the atoms within its molecule, are known. To determine the first of these, the kind of atoms, is the business of qualitative analysis; it affirms that a water-molecule contains only oxygen and hydrogen atoms, and a salt-molecule only atoms of chlorine and of sodium. The relative number of atoms contained in a molecule of any substance is ascertained by quantitative analysis, being obtained by dividing the percentage of each constituent by its atomic weight, and clearing the quotients of fractions. The absolute number of atoms in any molecule is fixed from the molecular weight, which is obtained generally from physical data. Knowing the weight of the molecule, it is easy to distribute this weight among the constituent atoms in the proportions given by analysis; then, dividing the quantity of each substance present by its atomic weight, the absolute number of atoms is obtained. The arrangement of the atoms within the molecule is ascertained either directly, being deduced necessarily from the law of equivalence, or indirectly, by experiment. Since the strength of the atomic attraction varies in the different parts of a molecule by reason either of distance or position, it is possible to break up the molecule so as to obtain certain groups existing in it in other and recognizable forms. Hence, by breaking up a molecule by suitable means, and studying its derivatives, the character of its groupings, and consequently the arrangement of the atoms within it, may be accurately determined.

Molecular constitution is the basis of chemical classification. In the first place, all substances are divided into two classes, according as their molecules are made up of like or of unlike atoms. A substance like sulphur, carbon, or iron is made up of molecules containing like atoms, and is called a simple or elementary substance; a substance like salt, water, or sugar is made up of molecules containing unlike atoms, and is called a compound substance. These two kinds of molecules are easily distinguished by the fact that upon rearranging the atoms between two contiguous molecules the former yields no new substance, while from the latter some different form of matter is obtained. If, for instance, two molecules of simple matter be represented by AA and AA, it is evident that rearrangement would only produce AA and AA again, exactly like the others; but if rearrangement be effected between two compound molecules, AB and AB, then the product would be AA and BB, two new forms of simple matter. It should be mentioned that if the agent employed was not powerful enough to produce the rearrangement, the result would be, apparently, that first given, even if the substance were compound; it may be, therefore, that some of the bodies now considered elementary will be proved compound upon the discovery of some new and more energetic rearranging force. Thus far, however, sixty-three substances have resisted all attempts to decompose them and to evolve from them other forms of matter. These substances, therefore, are regarded as elementary. Since each molecule is made up of like atoms, and these are peculiar to itself, it follows that the number of known kinds of atoms is sixty-three also. The number of atoms contained in a simple molecule is called its atomicity. It is obtained by dividing the weight of the whole molecule by the weight of a single atom. The molecular weight is generally obtained by means of the law of Avogadro or Ampère, which asserts that equal volumes of all gases contain the same number of molecules. Whence it follows (1) that the molecules of all bodies in the gaseous state must be of the same size; and (2) that the molecular weights must be as the weights of equal volumes. Taking, for example, the weight of one liter of hydrogen (.0896 gram) as unity, the weight of one liter of oxygen (1.43 grams) is 16, the weight of a liter of arsenic vapor (13.41 grams) is 150, and the weight of a liter of mercury vapor (8.96 grams) is 100. Hence, a molecule of oxygen is 16, a molecule of arsenic is 150, and a molecule of mercury is 100, times as heavy as a molecule of hydrogen. But the weight of a molecule of hydrogen, containing two atoms, is 2; hence the molecular weight of oxygen is 32, of arsenic is 300, and of mercury 200. Since the atomic weight of oxygen is 16, that of arsenic is 75, and that of mercury is 200, it is evident that the molecule of oxygen is diatomic, that of arsenic tetratomic, and that of mercury monatomic. Most of the elementary molecules are diatomic.

Atoms differ from each other (1) in weight, (2) in the quality of their combining power, and (3) in the quantity of this power. An atomic weight is the weight of an atom, referred to that of hydrogen as unity. Since an atom is the smallest quantity of an element which can enter into the composition of a molecule, it is evident that by analyzing the molecules of several different compounds of a given element, and by comparing together the quantity of this element contained in each, the atomic weight may readily be fixed. Thus, it is found that the quantity of bromine contained in a molecule of its hydrogen compound is 80; of its mercury compound is 160; of its boron compound is 240; and of its silicon compound is 320. Its atomic weight is therefore 80, because it is the smallest quantity by weight in which bromine enters into combination. According to the quality of their combining power, atoms are divided into two classes, called positive or negative, according as, in electrolysis, they go to the negative or positive pole. To the former or positive class belong the metals in general; to the latter or negative class, the non-metals. This distinction is a purely relative one, since an atom may be positive when associated with one atom and negative with another. This property of atoms affects the quality of the molecule into which they enter; the hydrates of positive atoms, for example, being bases, and the hydrates of negative being acids. Besides the differences now noticed, atoms differ also in their equivalence, or their power of entering into combination with other atoms. Taking the atom of

hydrogen as the standard, it is found that other atoms have combining powers two, three, four, five, and even six, times as great. Such atoms are called, therefore, monads, dyads, triads, tetrads, pentads, and hexads. The combining power of a hexad atom being six times as great as that of a hydrogen atom, and that of a dyad atom being three times as great, a complete molecule formed by their union must be composed of one hexad and three dyad atoms. But atomic equivalence is variable; a monad may act as a triad or even as a pentad. This variation, however, always takes place by twos; so that atoms of even equivalence (called artiads) remain even, and atoms of odd equivalence (called perissads) remain odd.

Compound molecules are built up by the union of dissimilar atoms. But since atoms do not exist free and uncombined, a direct union of these is impossible. Hence the union must take place by way of exchange. If, for instance, the two simple molecules AA and BB be brought together, the attraction of unlike atoms for each other being stronger than that of like, rearrangement will take place, and AB and AB, two compound molecules, will result. The number of atoms which a compound molecule may contain is apparently unlimited. Two classes of compound molecules are distinguished: in one the characteristic constituent atoms are united directly together; in the other they are linked together by the intervention of a third atom. The former are called binary compounds, because, whatever the absolute number of atoms present, they can never be of more than two kinds. The latter are called ternary, because there must always be present at least three atoms. Salt, for example, is a binary compound, because made up of molecules containing sodium and chlorine atoms; nitric acid is a ternary compound, because made up of molecules consisting of hydrogen, nitrogen, and oxygen atoms, the two first being linked together by the last. It is evident that only a poly-equivalent atom can link others together; and, in fact, the dyad oxygen and the triad nitrogen perform by far the largest part of this work. Hence, ternary molecules may be divided into two groups, according as oxygen or nitrogen performs in them the linking function. Moreover, the quality of the chemism of atoms here comes in, and each of these groups may be subdivided into three classes, according as the dominant atom united to hydrogen is positive or negative, or as the molecule contains both thus united. The classification of simple and compound molecules above given may be conveniently presented in a tabular form, thus:

- MOLECULES
  - Like atoms ..... Element.
  - Unlike atoms
    - United directly ..... Binary.
    - United indirectly
      - By a dyad
        - $\bar{R}$ and H Acid.
        - $\overset{+}{R}$ and H Base.
        - $\bar{R}$ and $\overset{+}{R}$ Salt.
      - By a triad
        - $\bar{R}$ and H Amide.
        - $\overset{+}{R}$ and H Amine.
        - $\bar{R}$ and $\overset{+}{R}$ Alkalamide.

The principle upon which compound substances are named is essentially that proposed by Lavoisier. Every molecule must contain at least two atoms, one of which is positive to the other, which is negative. In the case of binary molecules the rule is: Place the name of the positive first, and then that of the negative, changing the termination of this into *ide*. A substance composed of potassium and sulphur would therefore be called potassium sulphide. If the positive atom varies its equivalence, this fact is indicated by giving it, for the higher of two stages, the termination *ic*, and for the lower the termination *ous*, as mercuric and mercurous oxides. Should a third stage be developed below the *ous*-compound, the prefix *hypo* is given, as hyposulphurous oxide; or if above the *ic*-body, the prefix *per*, as perchloric oxide. Ternary molecules are similarly named, except that the negative terminations are *ate* and *ite*, instead of *ide*. Sodium and iodine united directly form sodium iodide, a binary, but if united by oxygen they form sodium iodate, a ternary. So hydrogen and phosphorus united by oxygen form hydrogen phosphate; potassium and hydrogen thus united form potassium hydrate. Besides these systematic names the acids have more common ones, which are formed from the name of the characteristic atom by adding *ic* or *ous* as in the case of binaries, *ic* corresponding to *ate*, and *ous* to *ite*. Thus, hydrogen sulphate is sulphuric acid, and hydrogen nitrite is nitrous acid.

The system of chemical notation now in use is also old, being essentially that devised by Berzelius. The atomic symbols are the first letters of their Latin names, or, when two have the same letter, the first and some other distinctive letter. The symbol of sodium—Latin, *natrium*—being Na, and that of chlorine being Cl, a molecule of sodium chloride, or salt, is represented by placing them together, thus: NaCl, the positive coming first. If more than one atom of any constituent be present, the number is indicated by a numeral placed below and to the right of the symbol; thus, water is written H_2O. In the case of ternary molecules especially it is necessary to express not only the kind and the number of atoms the molecule contains, but also their arrangement. The formula HNO_3, for example, indicates only that a molecule of nitric acid contains one atom of hydrogen, one of nitrogen, and three of oxygen. But since several bodies might be represented by such a formula, it is necessary to go farther and to fix the constitution of the molecule. This may be done by the use of graphic or of rational formulas. The graphic formula of nitric acid is

$$H—O—\overset{\overset{O}{\|}}{N}—O$$

; the rational formula is $NO_2(OH)$. Both express the fact that two of the oxygen atoms act simply to saturate the nitrogen, while the third links the hydrogen to it. Moreover, this question is one of practical importance, since the basicity or salt-forming power of the acid is directly as the number of hydrogen atoms, thus linked, which it contains. Nitric acid, as above, contains one such atom, and is monobasic; sulphuric acid,

$$H—O—\overset{\overset{O}{\|}}{\underset{\underset{O}{\|}}{S}}—O—H,$$

or $SO_2(OH)_2$, is dibasic; phosphoric acid

$$H—O—\overset{\overset{O}{\|}}{\underset{\underset{O}{\|}}{\underset{\underset{H}{|}}{P}}}—O—H,$$

or $PO(OH)_3$, is tribasic. By exchanging its hydrogen for a metal, an acid forms a salt; KNO_3, potassium nitrate, is formed by replacing the hydrogen in HNO_3 by potassium. When an acid and a base are brought together, a salt and water are the products. Thus hydrogen nitrate $NO_2(OH)$ and potassium hydrate $K(OH)$ act to produce potassium nitrate $NO_2(OK)$ and $H(OH)$, or H_2O. Water, acting upon a positive oxide, yields a base; upon a negative oxide, an acid; while a positive oxide acting upon a negative oxide yields a salt.

Chemical changes are called reactions—the substances producing them, reagents. Reactions are represented by equations, in which the symbols of the factors, or substances acting, form one member, and the symbols of the products, or the substances which result, form the other. Reactions are of three kinds—analytical, in which a complex molecule is broken up into simpler ones; synthetical, where two or more simpler molecules unite to form a more complex one; and metathetical, in which a simple transposition of atoms takes place between molecules. Since every symbol represents an atom, and hence an atomic weight, the quantities of matter entering or leaving any chemical reaction are expressed in the equation. Whence, knowing the factors, it is easy to calculate the weight of the product, or to ascertain what quantity of the factors is required to yield a given weight of the product. Chemical calculations, founded on atomic weights, constitute the department of Stoichiometry.

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General Chemistry.—This branch of chemical science is essentially descriptive. It takes up the elements, grouped according to their several analogies, and discusses their history, their occurrence, their methods of preparation, their properties, and their compounds with each other. It is obvious that such a treatment must be an extended one,

covering the entire sixty-three simple substances and their innumerable compounds. We must refer those interested, therefore, to any of the larger treatises upon chemistry for these details, and content ourselves with giving the annexed tabular statement of the names, equivalences, symbols, and atomic weights of the elements at present known:

Perissads.		*Symbol.*	*At. wt.*
Monads:			
Hydrogen,	.....	H	1
Fluorine,	.....	F	19
Chlorine,	I, III, V, VII.	Cl	35.5
Bromine,	I, III, V, VII.	Br	80
Iodine,	I, III, V, VII.	I	127
Lithium,	.....	Li	7
Sodium,	I, III.	Na (*Natrium*)	23
Potassium,	I, III, V.	K (*Kalium*)	39
Rubidium,	.....	Rb	85
Cæsium,	.....	Cs	133
Silver,	I, III.	Ag (*Argentum*)	108
Thallium,	I, III.	Tl	204
Triads:			
Nitrogen,	I, III, V.	N	14
Phosphorus,	I, III, V.	P	31
Arsenic,	I, III, V.	As	75
Antimony,	III, V.	Sb (*Stibium*)	122
Bismuth,	III, V.	Bi	210
Boron,	.....	B	11
Gold	I, III.	Au (*Aurum*)	196
Pentads:			
Columbium,	.....	Cb	94
Tantalum,	.....	Ta	182
Vanadium, Also $(V_2)^{VIII}$ and $(V_2)^{IV}$	III, V.		51.3
Artiads.			
Dyads:			
Oxygen,	.....	O	16
Sulphur,	II, IV, VI.	S	32
Selenium,	II, IV, VI.	Se	79
Tellurium,	II, IV, VI.	Te	128
Calcium,	II, IV.	Ca	40
Strontium,	II, IV.	Sr	87.5
Barium,	II, IV.	Ba	137
Magnesium,	.....	Mg	24
Zinc,	.....	Zn	65
Cadmium,	.....	Cd	112
Glucinum,	.....	G	9.3
Yttrium,	.....	Y	61.7
Cerium,	.....	Ce	92
Lanthanum,	.....	La	92
Didymium,	.....	D	96
Erbium,	.....	E	112.6
Mercury,	$(Hg_2)''$, II.	Hg (*Hydrargyrum*)	200
Copper,	$(Cu_2)''$, II.	Cu (*Cuprum*)	63.5
Tetrads:			
Carbon,	II, IV.	C	12
Silicon,	.....	Si	28
Titanium,	II, IV.	Ti	50
Tin,	II, IV.	Sn (*Stannum*)	118
Thorium,	.....	Th	115.7
Zirconium,	.....	Zr	89.5
Aluminum,	$(Al_2)^{VI}$	Al	27.5
Platinum,	II, IV.	Pt	197
Palladium,	II, IV.	Pd	106.5
Lead,	II, IV.	Pb (*Plumbum*)	207
Indium,	.....	In	74
Hexads:			
Molybdenum,	II, IV, VI.	Mo	96
Tungsten,	IV, VI.	W (*Wolfram*)	184
Ruthenium,	II, IV, VI.	Ru	104.2
Rhodium,	II, IV, VI.	Ro	104.3
Iridium,	II, IV, VI.	Ir	197
Osmium,	II, IV, VI.	Os	199
Chromium,	II, IV, VI.	Cr	52.5
Manganese,	II, IV, VI.	Mn	55
Iron,	II, IV, VI.	Fe (*Ferrum*)	56
Cobalt,	II, IV.	Co	59
Nickel,	II, IV.	Ni	59
Uranium,	II, IV.	U	120

G. F. Barker.

Chem'mis [Gr. Χέμμις], the name given by Diodorus Siculus to the Egyptian king who built the great pyramid; the same as Cheops (which see).

Chemnitz, a town of Germany, in Saxony, on the Chemnitz River, and at the base of the mountain called Erzberge, about 44 miles W. S. W. of Dresden. It is on the railway from Riesa to Zwickau. It is the principal manufacturing town of Saxony, and has extensive manufactures of cotton, linen, wool, hosiery, machinery, etc. Nearly 20,000 looms are employed in this vicinity in the production of stockings, mitts, etc., which are partly exported to the U. S. Chemnitz has also works for printing calico. The factory laborers own cottages and gardens in which they work when the looms are still, and their condition is superior to that of their class in most other cities. For four centuries it was a free imperial city. It was formerly fortified, but the walls have been converted into promenades. It has a castle, a gymnasium, a school of commerce, several technical schools, and an exchange. Pop. in 1871, 68,229.

Chem'nitz [Lat. *Chemnitius*], (Martin), an eminent German Lutheran theologian, was born at Treuenbrietzen, in Brandenburg, Nov. 9, 1522. He was educated at Wittenberg, and became minister of a church at Brunswick in 1554. In a work called "Examen Concilii Tridentini" (1565) he ably refuted the doctrines approved by the Council of Trent. Chemnitz and Mörlin were the authors of the "Corpus Doctrinæ Pruthenicæ" ("Body of Prussian Doctrine," 1566), which was a standard work among the Protestants. He was appointed superintendent at Brunswick in 1567. He was one of the authors of the "Formula Concordiæ" (1579). Among his works is "Loci Theologici" ("Theological Topics," 1591), which excels most similar books in learning and method. Died April 8, 1586.

Chemung, she-mŭng′, a river of New York, formed in Steuben county by the union of the Conhocton and Tioga rivers. It flows in an E. S. E. direction through Chemung county, and enters the North Branch of the Susquehanna about 1 mile below Athens, in Bradford co., Pa.

Chemung, a county of New York, bordering on Pennsylvania. Area, 406 square miles. It is intersected by Chemung River and Cayuta Creek. The surface is diversified by hills and alluvial river-bottoms; the soil is fertile. Tobacco, grain, lumber, wool, dairy products, and cattle are the staples. The manufactures include lumber, leather, flour, furniture, metallic wares, cooperage, carriages, etc. It is traversed by the Erie R. R. and the Northern Central R. R. Capital, Elmira. Pop. 35,281.

Chemung, a post-township of McHenry co., Ill. Pop. 2222. Chemung Station is on the Chicago and Northwestern R. R., 66 miles N. W. of Chicago.

Chemung, a township and post-village of Chemung co., N. Y. The village is on the Erie R. R., 24 miles W. S. W. of Owego. Pop. of township, 1907.

Chenan'go, a county in S. E. Central New York. Area, 898 square miles. It is partly bounded on the E. by the Unadilla River, and drained by the Chenango, Susquehanna, and Otselic rivers. The surface is partly hilly; the soil is generally fertile. It is an agricultural county; dairy products, hops, grain, and wool are the chief crops. The manufactures include lumber, flour, cheese, carriages, furniture, etc. It is intersected by the New York and Oswego Midland R. R., the Utica Chenango and Susquehanna R. R., and the Albany and Susquehanna R. R. Capital, Norwich. Pop. 40,564.

Chenango, a township and village of Broome co., N. Y. The village is at the junction of the Syracuse Binghamton and New York and the Utica Chenango and Susquehanna R. Rs., 73 miles S. S. E. of Syracuse. Pop. of township, 1680.

Chenango River rises in Oneida co., N. Y., flows S. S. W. through Madison and Chenango counties, and enters the Susquehanna at Binghamton. Length, 90 miles.

Cheney (Charles Edward), D. D., was born at Canandaigua, Ontario co., N. Y., Feb. 12, 1836. He graduated at Hobart College, Geneva, N. Y., in 1857, and studied at the Theological Seminary of Virginia. Nov. 21, 1858, he was ordained deacon, and became assistant rector of St. Luke's church, Rochester, N. Y. Subsequently he took charge of St. Paul's church at Havana, N. Y., and in Mar., 1860, he was ordained a presbyter, and took charge of Christ's church in Chicago. He was in Dec., 1873, elected assistant bishop of the Reformed Episcopal Church.

Che'ney's Grove, a twp. of McLean co., Ill. Pop. 1164.

Chengwata'na, a post-village, capital of Pine co., Minn., on Snake River, about 70 miles N. of St. Paul. Pop. of township, 99.

Chénier, de (André), an excellent French poet, a brother of the following, was born at Constantinople in 1762. He was educated in Paris, and was sent to London in 1787 as secretary of legation. He returned to Paris in 1790, and became a moderate supporter of the popular cause. He produced beautiful elegies and eclogues, in which the influence of Greek poetry was predominant, and which gave a new direction to the poetry of France. Having in some of his writings censured the acts of the Jacobins, he was committed to prison. He there wrote an admir-

able poem entitled "The Young Captive." He was executed in July, 1794, and left unfinished poems called "America" and "Hermes." (See H. DE LATOUCHE, "Notice sur André Chénier;" SAINTE-BEUVE, "Causeries du Lundi," tome iv.)

Chénier, de (MARIE JOSEPH), a French poet of the Revolution, born Aug. 28, 1764, at Constantinople, where his father was consul. His tragedies "Gracchus," "Fénélon," "Timoléon," and others were inspired by an intense love of freedom, and composed in a noble style. He wrote likewise patriotic songs; among them "Le Chant du Départ." Died Jan. 10, 1811.

Cheno'a, a post-village of McLean co., Ill., on the Toledo Peoria and Warsaw R. R., where it is crossed by the Chicago and Alton R. R., 48 miles E. of Peoria. It has one newspaper-office. Pop. of Chenoa township, 2351.

Chenopodia'ceæ [from *Chenopodium,* one of the genera], a natural order of exogenous plants, chiefly herbaceous. They are destitute of stipules, have small inconspicuous flowers, and a persistent calyx. The stamens are never more numerous than the segments of the calyx. They are found in most parts of the world. The order comprises the beet and spinach, and many species which have a weed-like appearance and grow in waste places.

Chenopo'dium [from the Gr. χήν, a "goose," and πούς, ποδός, a "foot"], a genus of herbaceous plants of the order Chenopodiaceæ, natives of America, Europe, and Asia. They are weeds, growing in gardens and waste places, and often covered with a white mealiness. Several species are naturalized in the U. S., and are known by the names of goosefoot, pigweed, and lamb's quarter. The *Chenopodium anthelminticum* (wormseed) is a native of the U. S. The seeds of this plant are administered as a remedy for worms. Among the more important plants of this genus is QUINOA (which see).

Cheo'ah, a township of Cherokee co., N. C. Pop. 1427.

Che'ops [Gr. Χέοψ], the name given by Herodotus to the despotic builder of the great pyramid in Egypt, now identified with Suphis I. (or Shufu) of the monuments. He was the second king of the fourth dynasty, which was established at Memphis about 2500 B. C., according to the more sober English Egyptologists. Professor C. Piazzi Smyth (1867) tries to fix the date of the great pyramid, on astronomical grounds, at 2170 B. C. Bunsen's date is 3280 B. C.

Chepach'et, a post-village of Gloucester township, Providence co., R. I. It is on the Chepachet River, and has extensive manufactures.

Chep'stow, a town and river-port of England, in the county of Monmouth, on the river Wye, 2½ miles from its entrance into the estuary of the Severn, and 141 miles by rail W. of London. It is surrounded by grand and beautiful scenery, a good view of which is obtained from a rock called Windcliff, 970 feet high. At Chepstow occurs the highest tidal bore in Europe, rising suddenly often fifty feet, and sometimes more than sixty-five. Large vessels can ascend the river to this port. A railway bridge built by Brunel here crosses the Wye. Pop. 3364.

Che'quest, a township of Van Buren co., Ia. Pop. 967.

Cher, a river of Central France, rises in the department of Creuse, flows in a general north-west direction through the departments of Allier, Cher, and Loir-et-Cher, and enters the river Loire immediately below Tours. Its total length is 207 miles. Destructive floods sometimes occur. It is navigable in the last 47 miles of its course.

Cher, a central department of France, has an area of 2853 square miles. It is bounded on the E. by the river Loire, and intersected by the Cher. The surface is nearly level, and extensively covered with forests; the soil is variable; the staple products wine, hemp, flax, and wool. It has mines of coal and iron, and manufactures of woollen fabrics. Capital, Bourges. Pop. 336,613.

Cheraw, a post-village of Chesterfield co., S. C., on Pedee River, at the head of navigation, 140 miles N. of Charleston, the terminus of the Cheraw and Darlington R. R. It has seven churches, two academies, several other schools, a public library, and one newspaper. During the late civil war this place was captured, Mar. 3, 1865, by the Federal forces under Gen. Sherman. It had been a dépôt of supplies for the Confederates, and twenty-five cannon, thousands of small-arms, tons of gunpowder, and immense commissary stores fell into the hands of the Federals. Pop. 960; of township, 2258. T. LITTLE, ED. "DEMOCRAT."

Cherbourg [Lat. *Caroburgus*], a fortified seaport-town and important naval station of France, department of Manche, on the English Channel, and at the N. end of the peninsula of Cotentin, 229¾ miles by rail W. N. W. of Paris; lat. 49° 38′ N., lon. 1° 37′ W. Its climate is mild. The streets are narrow. It contains a communal college, a public library, a museum, and a theatre; also manufactures of hosiery, chemicals, lace, and leather, but the industry of the inhabitants is chiefly employed in the arsenal and dockyards. Vast sums of money have been expended here in fortifications and in public works for the improvement of the harbor. The latter is sheltered by land on three sides, but is open to heavy seas and storms on the N. To protect it from these a breakwater, or *digue,* was commenced in the reign of Louis XIV. and completed under Napoleon III. Cherbourg breakwater is the most gigantic work constructed for such a purpose in ancient or modern times, and is a noble monument of the skill and perseverance of the French engineers. (See BREAKWATER.) At the apex of the angle formed by the meeting of the two branches of the breakwater there is a central fort or battery measuring 509 feet on the inner line of the parapet, which forms a flat semi-ellipse. Besides the batteries on the mole (*digue*), Cherbourg is defended by twenty-four regular forts and redoubts. On the land side it is defended and commanded by La Roule and Fort d'Octeville, which occupy two adjacent heights. The naval port consists of an outer harbor 776 feet long by 663 wide, its minimum depth being 58 feet, and the entrance to it is 206 feet wide. The harbor communicates by means of a lock with a wet-dock 957 feet long by 712 wide. In Aug., 1858, the government completed an inner wet-dock, which is cut out of the solid rock, and is about 930 yards long by 437 wide. Cherbourg was besieged by the English in 1378, 1418, and 1450. William the Conqueror founded a hospital here. Pop. 37,215.

Cherbuliez (ANTOINE ELYSÉE), a prominent writer on political economy, born in 1797 at Geneva, became professor of law and political economy, first at Geneva, and subsequently at the Polytechnicum at Zurich. He wrote against the Socialists, and especially against Proudhon. His chief work is "Outline of the Science of Political Economy" (2 vols., 1862). Died at Zurich Mar. 14, 1869.

Cherbuliez (VICTOR), nephew of the preceding and son of André Cherbuliez, professor of Hebrew at Geneva, born about 1832, has become known as a clever novelist. His "A propos d'un Cheval," a revery on ancient art, appeared in 1860, and was followed by the romances "Comte Kostia" (1863), "Paule Meré," "Le Roman d'une honnête femme" (1866), "Le grand œuvre" (1867), and others.

Cher'ibon, or **Sher'ibon,** a seaport-town of Java, capital of a division on its northern coast, 128 miles E. S. E. of Batavia. It is the residence of a Dutch governor, is defended by a fort, and has a considerable trade in coffee, indigo, teakwood, etc. Pop. about 11,000.

Cherimoy'er, or **Chirimoy'a** (*Anona Cherimolia*), a fruit of South and Central America, now common in the East Indies and other tropical countries. It is sometimes described as the finest of all fruits, and sometimes as inferior to the mangosteen only. Both flowers and fruit emit a pleasant fragrance, but when the tree is covered with blossoms the odor is almost overpowering. The fruit varies from the size of an orange to sixteen pounds or more in weight. It is roundish or heart-shaped, greenish, and covered with small knobs and scales. Internally, the fruit is snow-white and juicy, and contains a number of small brown seeds. The eatable part is soft like a custard, and forms almost the entire mass of fruit. The cherimoyer attains excellence only in particular situations, and some varieties are much finer than others. No tropical fruit better deserves attention in hot-houses.

Cher'okee, a county of Alabama, bordering on Georgia. Area, 550 square miles. It is traversed by the Coosa River. The surface is diversified by high ridges; the soil is mostly fertile. Cotton, grain, wool, and tobacco are raised. It is intersected by the Selma Rome and Dalton R. R. Capital, Centre. Pop. 11,132.

Cherokee, a county in the N. W. of Georgia. Area, 475 square miles. It is intersected by the Etowah River, and also drained by several creeks. The surface is partly hilly and partly undulating; the soil is generally fertile. Cotton, tobacco, wool, and grain are raised. It contains mines of gold and quarries of statuary marble. Capital, Canton. Pop. 10,399.

Cherokee, a county in the W. N. W. of Iowa. Area, 576 square miles. It is intersected by the Little Sioux River. The surface is undulating; the soil is productive. Wheat, corn, and cattle are raised. It is traversed by the Dubuque and Sioux City R. R. Capital, Cherokee. Pop. 1967.

Cherokee, a county in the S. E. corner of Kansas. Area, 604 square miles. It is intersected by Spring River, an affluent of the Neosho, which runs through the S. W.

part of the county. The soil is fertile. Cattle, corn, tobacco, and wool are raised. It is traversed by the Missouri River Fort Scott and Gulf R. R. Capital, Columbus. Pop. 11,038.

Cherokee, a county which forms the W. extremity of North Carolina. Area, 625 square miles. It is intersected by the Hiawassee River. The surface is partly mountainous, and the Unaka or Smoky Mountain extends along the N. W. border. The soil of the valleys is fertile. Corn, wool, and tobacco are raised. Gold, zinc, lead, and excellent white marble abound. Capital, Murphy. Pop. 8080.

Cherokee, a county of the E. of Texas. Area, 1144 square miles. The surface is somewhat hilly; the soil is excellent, producing fine crops of corn, wheat, cotton, and fruit. Wool-growing and stock-raising are also carried on. Timber and the best iron ores abound. Lumber is manufactured, and also iron to some extent. It is intersected by the International R. R. Capital, Rusk. Pop. 11,079.

Cherokee, a post-village in the township of same name, capital of Cherokee co., Ia., on the Little Sioux River and on the Iowa division of the Illinois Central R. R., 59 miles E. N. E. of Sioux City. It has two weekly newspapers. Pop. including the township, 719.

Cherokee, a township of Cherokee co., Kan. P. 370.

Cherokee, a township of Spartanburg co., S. C. Pop. 1675.

Cherokee, a township of York co., S. C. Pop. 1895.

Cher'okees', a tribe of North American aborigines who were formerly numerous and powerful. They occupied the southern portion of the Appalachian Mountains and large tracts in Georgia and Alabama. They have been considered the most civilized of the Indians in the U. S. In 1838 all the Cherokees living in Georgia were removed to the Indian Territory beyond the Mississippi, in which a large tract of land was appropriated to them. Many of them cultivate the soil and are industrious in their habits. They have a written language, written laws, and an organized government. Their alphabet, which was invented by George Guess, a Cherokee, consists of eighty-five characters. Their present territory embraces 9,776,000 acres, with a population in 1872 of 18,000, besides several hundred in North Carolina.

Cher'ry, the name of numerous trees and their fruit belonging to the genus *Prunus* and order Rosaceæ, but placed by some in a separate genus or sub-genus (*Cerasus*), distinguished by having the stone or pit of the fruit round, while the plums of the genus *Prunus* proper have flattened pits; but with several species the distinction does not hold good. There is therefore no such genus or sub-genus as *Cerasus*. But those cherries which have their flowers and fruit in racemes (clusters), called bird cherries, are properly placed in a sub-genus, *Padus;* and the evergreen species, called cherry-laurels, are placed in a sub-genus, *Lauro-cerasus*.

Cultivated cherries are of many varieties, and belong to two distinct species—*Prunus avium* and *vulgaris*—both Old World species, the former comprising the "dukes," "oxhearts," "bigarreaus," etc., and the latter the "morellos," "guignes," and sour cherries. The former in Europe yields valuable timber. They are useful as dessert fruit and for preserving, and are employed in the manufacture of various liqueurs (Maraschino, Kirschwasser, cherry-brandy, etc.). There are numerous wild species of cherry in both continents. Those best known in the U. S. are the choke-cherry and the black cherry (*Prunus Virginiana* and *serotina*); the bark of both species is very useful in medicine; the latter is a large tree yielding a very useful timber.

Cherry, a township of Montgomery co., Kan. P. 802.

Cherry, a township of Butler co., Pa. Pop. 903.

Cherry, a township of Sullivan co., Pa. Pop. 1710.

Cher'ry Creek, a township and village of Chautauqua co., N. Y. The village is 18 miles S. E. of Dunkirk. It has three churches, a State bank, and some manufactures. Pop. of township, 1359.

Cher'ryfield, a township and village of Washington co., Me. The village is 30 miles W. of Machias. It is on the Narraguagus River. Shipbuilding is carried on, and the manufacture of lumber, leather, doors, sash, blinds, etc. Pop. of township, 1760.

Cher'ry Grove, a township and village of Carroll co., Ill. The village is about 15 miles S. W. of Freeport. Pop. of township, 1154.

Cherry Grove, a township of Goodhue co., Minn. Pop. 884.

Cherry Grove, a township of Warren co., Pa. P. 61.

Cherry Hill, a township of Indiana co., Pa. P. 1976.

Cherry Lane, a post-township of Alleghany co., N. C. Pop. 309.

Cher'ry Lau'rel, a name given to the evergreen cherry trees, such as the bay laurel, *Prunus Laurocerasus,* a native of Asia; the Portugal laurel, *Prunus Lusitanica,* a native of Southern Europe; and the "mock orange" of the Southern U. S., *Prunus Caroliniana.* They are all prized as ornamental shrubs or trees, and all abound in poisonous hydrocyanic acid, especially in the kernels and leaves. They have also an essential oil, resembling that of bitter almonds. The leaves of the first-mentioned species are used in flavoring sauces, etc., and in preparing cherry-laurel water, sometimes used in medicine as a sedative; but its strength is variable, and it should not be used.

Cher'ry Ridge, a post-township of Wayne co., Pa. Pop. 1101.

Cher'rytree, a borough of Indiana co., Pa. Pop. 360.

Cherrytree, a post-township of Venango co., Pa. Pop. 2326.

Cher'ry Val'ley, a township and post-village of Winnebago co., Ill. The village is on the Chicago and Northwestern R. R., 84 miles W. N. W. of Chicago. Pop. of township, 1421.

Cherry Valley, a post-village of Otsego co., N. Y., on a branch of the Albany and Susquehanna R. R., 68 miles W. of Albany. It has an academy, a national bank, and one weekly newspaper. Cherry Valley was the scene of a dreadful massacre by the Tories and Indians in the British service Oct. 11, 1778. Thirty-two inhabitants, nearly all women and children, were murdered, besides sixteen soldiers of the Continental army. The rest of the citizens were made prisoners and taken away, and all the buildings were burned. Pop. 930; of Cherry Valley township, 2337.

Cherry Valley, a post-township of Ashtabula co., O. Pop. 726.

Cher'ryville, a township and post-village of Gaston co., N. C. The village is on the Wilmington Charlotte and Rutherford R. R., 43 miles N. W. of Charlotte. Pop. of township, 2003.

Cher'siphron [Gr. Χερσίφρων), an eminent Cretan architect who flourished about 600 B. C. He designed the temple of Diana at Ephesus, one of the Seven Wonders of the World, but he died before it was finished. It was adorned with 127 Ionic columns of marble sixty feet high, and was 425 Roman feet in length.

Cher'so (anc. *Crepsa*), an island of Illyria, in the Adriatic, 12 miles S. S. W. of Fiume. Area, with Osero, 95 square miles. The products are oil and wine. There are large anchovy-fisheries. Capital, Cherso. Pop. 17,500.

Cherso, a town of Illyria, in the Austrian province of Trieste, situated on the above island, 25 miles S. of Fiume. It has a fair harbor, and trades in fish, wine, and lumber. Pop. 8095.

Chersone'sus [Gr. Χερσόνησος], the ancient name of several peninsulas of Europe and Asia, as Chersonesus Aurea (Malacca), Chersonesus Cimbrica (Jutland), Chersonesus Thracia (Gallipoli), and Chersonesus Taurica (Crimea).

Chert, or **Hornstone,** a silicious mineral, a variety of quartz with many of the characters of flint, but differing from it in being of a tougher nature, and breaking with a splintery instead of a conchoidal fracture. It is always massive, and is of various colors—white, red, yellow, gray, and brown. It is common in the mountain limestone, oolite, and greensand formations; it sometimes forms rocks, and often contains petrifactions. The term chert is often applied to the silicious concretions which occur as nodules in limestone rocks. The limestone is said to be "cherty" when it contains so much of these concretions as to render it unfit for building and conversion into lime.

Cher'ub (plu. **Cher'ubim** or **Cherubs**), [etymology doubtful, though, according to a somewhat popular view, the cherubim are angels who excel in knowledge as the seraphim are conceived to excel in love; and in this view the name has been supposed to be related to the Hebrew *kârab,* to "grasp," and hence to "know"], the name of a winged being mentioned in the Scriptures. A cherub guarded Paradise and prevented the return of fallen man. Figures of cherubim were placed over the mercy-seat in the Holy of Holies, and were wrought into the hangings of the temple. In the book of Ezekiel cherubim with four wings and many eyes, with forms partly human and partly bestial, are described. They appear as four-winged beings of a generally human form in Christian art. Most writers regard them as angels, but many critics believe that they are symbols, rather than real existences.

Cherubi'ni (Maria Luigi Carlo Zenobi Salvador), an eminent Italian composer, born at Florence Sept. 8, 1760,

was a pupil of Felici and Sarti. He visited London in 1784. After 1786 he passed the most of his time in Paris, where his opera "Lodoiska" was performed with success in 1791. He composed, besides other works, operas entitled "Iphigenia in Aulide" (1788), "Elisa" (1794), "Medea" (1797), and "Anacreon." He acquired a European reputation as a composer of sacred music. Among his works in this department is a grand requiem. He was a professor in the Conservatory of Paris, and a member of the Royal Academy. Died Mar. 15, 1842. (See L. DE LOMÉNIE, "M. Cherubini, par un homme de rien," 1841; RAOUL-ROCHETTE, "Notice sur la Vie et les Ouvrages de Cherubini.")

Cherus'ci, an ancient and celebrated German tribe mentioned by Cæsar, inhabited a country on the north side of the Silva Bacenis (Hartz Forest). The famous Hermann (Arminius) was a chief of the Cherusci. Having formed a league with other German tribes, he defeated the Roman general Varus near the Lippe in 9 A. D. According to Tacitus, the Cherusci were conquered by the Catti or Chatti after the death of Arminius.

Cher'vil [Fr. *cerfeuil*, from the Lat. *cerefolium*], an umbelliferous plant which is cultivated in Europe as a pot-herb and used in soups. The leaves have a peculiar, somewhat sweetish and aromatic smell and taste. It is a native of Europe and naturalized in the U. S. Its systematic name is *Chærophyllum sativum*. Other species are cultivated; one or more have roots of some value, which somewhat resemble those of the carrot.

Chesaning', a post-village of Saginaw co., Mich., on the Shiawassee River and the Jackson Lansing and Saginaw R. R., 43 miles N. E. of Lansing. It has one weekly newspaper. Pop. 721; of Chesaning township, 1507.

Chesapeake, a township of Elizabeth City co., Va. Pop. 2703.

Chesapeake, a township of Matthews co., Va. P. 1700.

Chesapeake Bay [from an Indian word meaning "mother of waters"], a large inlet of the Atlantic, extends from Capes Charles and Henry northward through Maryland and Virginia to the mouth of the Susquehanna River. It is about 200 miles long, and varies in width from 4 to 40 miles. The distance from Cape Charles to Cape Henry is nearly twelve miles. The coasts on each side are deeply indented by numerous inlets and estuaries, which are navigable. The Chesapeake is so deep that the largest ships can ascend from the ocean nearly to the northern extremity. It contains numerous islands. The largest rivers which flow into it are the Susquehanna, the Potomac, and the James River.

Chesapeake City, a post-village of Cecil co., Md., at the western terminus of the Chesapeake and Delaware Canal, 84 miles N. E. of Annapolis. Pop. 1008; of Chesapeake City township, 2683.

Chesebro (CAROLINE), an American writer, born at Canandaigua, N. Y. She contributed largely to periodical literature, and was the author of several novels, among which are "Dreamland by Daylight," "Isa, a Pilgrimage," "The Foe in the Household," etc. Died Feb. 16, 1873.

Ches'elden (WILLIAM), F. R. S., an English anatomist and surgeon, born in Leicestershire in 1688. He began to lecture on anatomy in London about 1711, and published in 1713 "The Anatomy of the Human Body," which was long used as a text-book. He was afterward chief surgeon of St. Thomas's and Westminster Hospitals, and acquired a high reputation as an operator. Among his works is "The Anatomy of the Bones" (1733). Died in 1752.

Cheshire, England. See CHESTER.

Cheshire, chêsh'ir, a county which forms the S. W. extremity of New Hampshire. Area, 770 square miles. It is bounded on the W. by the Connecticut River, and drained by the Ashuelot. The surface is hilly, and partly occupied by mountains, among which is the Grand Monadnock. The soil of the valleys is fertile. Tobacco, grain, wool, and dairy products are largely raised. The manufactures are extensive, and comprise lumber, furniture, wooden-ware, leather, cotton and woollen goods, etc. It is intersected by the Cheshire R. R., the Ashuelot R. R., and the Monadnock R. R. Capital, Keene. Pop. 27,265.

Cheshire, a township and post-village of New Haven co., Conn. The village is on the New Haven and Northampton R. R., 15 miles N. of New Haven. Pop. of township, 2344.

Cheshire, a township and post-village of Berkshire co., Mass. The village is on the North Adams branch of the Boston and Albany R. R., 9 miles N. of Pittsfield. The town has valuable beds of glass sand, and important manufactures. Pop. of township, 1758.

Cheshire, a post-twp. of Allegan co., Mich. Pop. 1443.

Cheshire, a post-township of Gallia co., O. Pop. 1895.

Ches'ney (FRANCIS RAWDON), an officer noted as an explorer, was born in Ireland in 1789. Aided by the British government, he explored a route from Europe to India by way of the Red Sea, and in 1836 descended the Euphrates in a steamer from Beer (Bîr) to its mouth. He published "The Expedition for the Survey of the Euphrates and Tigris" (4 vols., 1850). In 1855 he obtained the rank of major-general. Died Jan. 30, 1872.

Chess [Fr. *échecs;* Ger. *Schach;* from Persian, *shah*, a "king"*]. The origin of this game is undoubtedly Oriental, but its date is lost in antiquity. Terms connected with it are found in the Sanscrit, as well as in some other Asiatic languages. It was probably introduced into Europe by the Arabians as early as the eighth century. Some slight modifications have been made in it in modern times, but the game appears to have been, in its most essential characters, the same for two or three thousand years. No other game approaches it in the scope afforded, by the number and variety of powers of the pieces, for skill and foresight, involving the faculties of memory and conception especially to a large degree. Dr. Benjamin Franklin admired it greatly, and wrote upon the advantages obtainable by it in the cultivation of the mind and character; particularly in promoting the habit of circumspection. With Napoleon I. it was a favorite recreation, and many other men of superior intelligence (as, for instance, J. J. Rousseau) have greatly enjoyed it. Yet capacity for eminent skill in it has often been possessed by men who have not otherwise displayed remarkable ability.

The *chess-board* is divided into sixty-four squares, alternately white and black. A white square should always be at the corner next to the right hand of each of the two players. The pieces used are as follows, upon each side, of different colors, commonly white and red:

A *King*, placed at the beginning of the game near the middle of the back line or row of squares. This is the most important piece on the board. It can move but a single square in any direction; it can *take* any piece belonging to the adversary which is upon an adjoining square, except the king—although the piece near it may be *protected* by some other piece being in a position to take in return. The king can never be taken; when so placed that if it were any other piece it might be captured by the adversary, the king is *in check;* and it is always necessary for the king in such a case, at the next move, to be placed where he is not in check. If this cannot be done, it is *checkmate*, and the game is ended. *Stalemate* occurs when, there being few pieces on the board, none of them, including the king, can be moved without placing the king in check.

A *Queen*, the most valuable *active* piece on the board, placed, on commencing, next to the king in the back row, on that square nearest the middle which has *her own color*—*i. e.* white queen on white square, black or red queen on black square. The queen can move and take any piece of the adversary (except the king, as above said) at any distance in a straight line upon the board, either in the direction of the squares or diagonally; always provided that it cannot leap over intervening pieces. The queen can be taken by any other piece.

Two *Rooks* or *Castles*—one placed in the beginning of the game at each end of the back row of squares. The rook can move or take only in the direction of the lines of squares (*i. e.* not diagonally), but at any distance when not obstructed by other pieces. It ranks in value next to the queen.

Two *Bishops*, one of which stands at the side of the king, and the other at the side of the queen, on the back row. One is thus upon a black square, and one upon a white one; and as they move or take only *diagonally* across the board, each keeps upon the same color throughout the game.

Two *Knights*, whose station is, at the opening, one at the side of each of the bishops, being thus next to the castles or rooks, and completing the back row. The movement of the knight is peculiar—one square diagonally, and then one forward or backward; or the converse, one square forward or backward, and then one diagonally. It can, moreover, *leap over* any intervening pieces to occupy an empty square or to take an adversary's piece. The knight and the bishop rank as about equal in value; probably in the early part of the game the knight is worth rather the most, and the bishop somewhat more when but few pieces are left upon the board.

Eight *Pawns*, arranged at first in the row of squares next to the more important pieces just described. The pawn *moves* only forward, but *takes* only diagonally. In either case it can go but a single square, except that, when a pawn first moves from its place in the second row, it may, at the option of the player, move two squares. If, how-

*Checkmate is *shah mat*—*i. e.* "king confounded or overcome."

ever, an adversary's pawn is at that time so placed as to take the pawn moved if it were moved but one square, the moving pawn may be taken, as it is called, *en passant*. When a pawn can be advanced so far as to reach the adversary's back row, it becomes a queen or any other piece the player chooses, except a king. It is possible, therefore (as the game is conducted by many, though not all, players), to have more than two queens upon the board at a time. Pawns are the least valuable of all the pieces. Yet skill in their use is important towards winning the game; so much so that in the famous treatise of Philidor ("L'Analyse du Jeu des Échecs," London, 1749) the theory was maintained that "the pawns are the soul of chess."

Castling is a change of position allowed on either side, by which the king and a castle or rook are made to pass each other, each moving two squares if the change be made upon the king's side, and the castle three squares and the king two if it be upon the side of the queen. Castling can only be effected, however, when no pieces intervene, when neither the king nor the castle has yet been moved, and when the king is not in check, and will not have to move, in castling, over a square exposed to check from any piece belonging to the antagonist.

The squares are commonly named after the principal pieces. Thus, that upon which the king stands is the king's square; next to it, the queen's square; then, on one side, king's bishop's square, king's knight's and king's rook's squares; on the other side, queen's bishop's square, queen's knight's and queen's rook's squares; in front of these the king's pawn, queen's pawn, king's bishop's pawn, queen's bishop's pawn, king's knight's pawn, queen's knight's pawn, king's rook's pawn, and queen's rook's pawn.

A *gambit* is a mode of opening the game in which a strong attack is gained by the sacrifice of a pawn. There are several kinds of gambit in use. A curiosity of the chess-board is the "knight's problem"—viz. to place a knight alone upon any square, and then move it, in its usual manner, over every square of the board successively until it returns to the place from which it started. This was thought worthy of resolution by a mathematical process by the celebrated Euler, but many persons have resolved it experimentally.

The *rules* of chess are, with slight variations among individual players, absolute. The most important are the following:

1. If a piece be touched it must (if possible) be moved somewhere.

2. When a move has been made, and the hand has been withdrawn from it, the move cannot be retracted.

3. If you touch one of the adversary's pieces which can be taken, it must be taken, unless this be omitted with the consent of the adversary.

4. On giving check to the adversary's king, notice must be given by saying "check;" otherwise he is not bound to pay any attention to it.

5. When all the pieces on both sides have been removed in the course of a game, except just enough for one player to checkmate the other (as, king and rook, or two bishops, or bishop and knight, against king), the checkmate must be accomplished within fifty moves or it is counted a drawn game.

Among the most famous chess-players have been Danican-Philidor, Kermay de Légal, La Bourdonnais, Deschapelles, Lewis, McDonnell, Paulsen, and Paul Morphy. The last named, a native of the U. S., now living, is the most extraordinary chess-genius ever known. In 1858 he visited Europe, and conquered in turn all the most distinguished living players. His most astonishing feat has been playing, *blindfold*, six games at once with as many different players, and winning them all.

The *automaton* chess-player of MM. Kempelen and Maelzel, exhibited in Europe and America many years ago, was a very ingenious contrivance by which many persons were induced to believe (what is impossible) that the game was actually played by machinery wound up for the purpose. After the death of Maelzel, this automaton, having been taken to pieces, was purchased at Philadelphia by several gentlemen, and about 1842 the late Dr. J. K. Mitchell solved the riddle of its construction and operation, and put it together again for the amusement of his friends. A skilful player was, when it was exhibited, concealed within the table at which the "automaton" figure sat, the game being played upon a board on that table, and made known to the hidden operator by the rising and falling of magnetic "keepers" under the influence of the pieces, each of which contained a small portion of iron. (See "The Chess-player's Hand-book," by Howard Staunton, London, 1847; "Chess and Chess-players," by George Walker, London, 1850; and "Life of Philidor," by George Allen, Greek professor in the University of Pennsylvania, Philadelphia, 1863.)

H. Hartshorne.

Chess, or **Cheat,** a common name of *Bromus secalinus*, a plant of the order Graminaceæ. It is a troublesome weed which often infests wheat-fields. Many farmers believe (incorrectly) that wheat is liable to be transmuted into chess.

Chest [Lat. *pectus;* Fr. *poitrine*], or **Tho'rax,** is the part of the body between the neck and the abdomen. The chest is rather conical in form, the lower end of the cone being shut in by the diaphragm, a large muscular partition which projects upward from the lower ribs, convex towards the chest and concave towards the abdomen. The combination of bone, cartilage, muscle, and tendon in the chest is such as to permit of an expansive movement, and yet to guard against over-expansion, which would be fatal to the delicate textures within. The bones of the chest are an effectual protection against injury from without.

The parts which constitute the chest walls are—1. The spinal column, divided into twenty-four vertebræ, twelve of which, called the dorsal vertebræ, form the thoracic portion. 2. Twelve ribs, attached to the transverse processes of the dorsal vertebræ, and ending in front in the costal cartilages, by which most of the ribs are connected with 3. The sternum or breast-bone, occupying the middle line in front. 4. The diaphragm. The chief contents of the chest are the heart, the great blood-vessels, the lungs, the trachea or windpipe, the bronchi or branches of the trachea, the œsophagus, and the thoracic duct, by which most of the chyle and lymph are discharged into the blood. The importance of these parts and their liability to deranged action render the chest the seat of a large number of diseases which may end in death. Of the three organs which Bichat called the "tripod of life"—viz. the brain, heart, and lungs—the chest contains two; hence its condition in many diseases is an object of solicitude to the physician.

Chest diseases depend in some cases on alterations in form by disorders affecting the bones in early childhood, such as rhachitis (rickets). The lungs and air-passages are subject to many diseases, among which are consumption or phthisis pulmonalis, pneumonia, pleurisy, and bronchitis. The heart is subject to pericarditis, endocarditis, and chronic organic disease of the valves, as well as to enlargement (hypertrophy), dilatation, and degeneration of its muscular texture, besides many functional derangements. The aorta may be affected with degeneration of its walls, and with consequent aneurism. The great veins are liable to over-distension, and to obstruction by tumors or by coagulation of the blood. The exploration of the chest by physicians is now conducted not only by investigation of the symptoms of the disease, but by a minute and elaborate examination into the physical conditions of the contained organs by means of auscultation, percussion, measurement, etc.

Revised by Willard Parker.

Chest, a post-township of Clearfield co., Pa. P. 1178.

Chest, a township of Cambria co., Pa. Pop. 870.

Ches'ter, or **Chesh'ire,** a maritime county of England, is bounded on the N. by Lancashire, on the S. and W. by Shropshire and Wales, on the E. by Stafford and Derby. It has a coast on the Irish Sea and the estuaries of the Dee and Mersey. Area, 1105 square miles. The surface is mostly level and well wooded; the soil is a fertile clayey or sandy loam adapted to grazing and dairy-farming. The surface-rock is new red sandstone. The chief rivers, besides the Mersey, are the Dee and Weaver. Coal, copper, and lead are found in the county. Here are many extensive dairies which produce good cheese; the quantity of cheese made annually is estimated at 12,000 tons or more. Chester has a good system of canals, and is traversed by several railways. Capital, Chester. The other chief towns are Macclesfield, Stockport, and Birkenhead. In 828 A. D. Egbert annexed Chester to his kingdom. William the Conqueror erected it into a county palatine. Pop. in 1871, 561,131.

Ches'ter, an episcopal city of England, capital of the county palatine of Chester, is on the right bank of the Dee, 22 miles from the sea and 16 miles S. S. E. of Liverpool. Six important railways converge to this point, and connect it with Liverpool, Manchester, London, Holyhead, and other towns. It stands on a rocky eminence, is mostly enclosed by ancient and massive walls, and is one of the most picturesque cities of England. The two main streets were cut out of the rock by the Romans five feet or more below the level of the houses. These streets are lined with shops, over which are piazzas or "rows" for foot-passengers. It has an old and massive sandstone cathedral 375 feet long, with a tower 127 feet high. Among its other edifices are a castle and St. John's church, the latter supposed to have been founded in 698 A. D., and now partially in ruins. Here is a stone bridge across the Dee with a single arch 200 feet in span. Chester has a public library,

a museum, and a theatre. It returns two members to Parliament. Cheese, coal, copper, and cast iron are exported from this port by the river, which is navigable for small vessels. Chester occupies the site of an important Roman station called *Deva* (or *Devana*) *Castra*. Pop. in 1871 of the municipal borough, 35,701.

Chester, a county in the S. E. of Pennsylvania. Area, 738 square miles. It is bounded on the N. E. by the Schuylkill River, and also drained by the Brandywine and Octorara creeks. The surface is pleasantly diversified. Among its remarkable features is a long narrow valley called Chester Valley, which extends across the county from the Schuylkill to Octorara Creek. The soil is very fertile. Cattle, fruit, grain, and garden and dairy products are extensively raised. Iron, paper, woollen goods, machinery, etc. are largely manufactured. Fine white marble is quarried in the valley. Among the minerals found in this county are copper, lead, zinc, kaolin, zircon, titanium, sapphire, corundum, amethyst, etc. It is intersected by the Pennsylvania R. R., the Philadelphia and Baltimore Central R. R., the Wilmington and Reading R. R., the Chester Valley R. R., and the West Chester and Philadelphia R. R. Capital, West Chester. Pop. 77,805.

Chester, a county of South Carolina. Area, 570 square miles. It is bounded on the E. by the Catawba River and on the W. by Broad River. The surface is moderately hilly; the soil is productive. Corn, cotton, and wool are the chief products. It is intersected by the Charlotte Columbia and Augusta R. R. Capital, Chester or Chester Court-house. Pop. 18,805.

Chester, a beautiful port of entry, post-village, and township of Lunenburg co., Nova Scotia, 45 miles W. by S. of Halifax, is on Chester Basin, which is studded with numerous islands. Its manufactures and fisheries are important. The village of Chester Basin, 5 miles distant, is also celebrated for its beauty.

Chester, a township of Dallas co., Ark. Pop. 510.

Chester, a post-township of Desha co., Ark. P. 260.

Chester, a township and post-village of Middlesex co., Conn. The village is on the Connecticut Valley R. R., 32¾ miles S. S. E. of Hartford. Pop. of township, 1094.

Chester, a township of Logan co., Ill. Pop. 1062.

Chester, a city, capital of Randolph co., Ill., on the Mississippi River, 76 miles below St. Louis, and on the Iron Mountain Chester and Eastern R. R. It is the shipping-point for the Chester coal-fields. It has eight churches, two newspapers, a bank, rolling-mills, foundries, flour-mills, an elevator, and three coal-dumps. Pop. 1615.

CHARLES L. SPENCER, PUB. "VALLEY CLARION."

Chester, a township of Wabash co., Ind. Pop. 3143.

Chester, a township of Wells co., Ind. Pop. 1212.

Chester, a township and post-village of Howard co., Ia. Pop. 324.

Chester, a township of Poweshiek co., Ia. Pop. 568.

Chester, a post-township of Penobscot co., Me. P. 350.

Chester, a township and post-village of Hampden co., Mass. The village is on the Boston and Albany R. R., 82 miles W. N. W. of Worcester. There are important emery-mines in the township, and several factories. Pop. of township, 1253.

Chester, a township and post-village of Eaton co., Mich. The village is on the Grand River Valley R. R., 54 miles S. E. of Grand Rapids. Pop. of township, 1117.

Chester, a township of Ottawa co., Mich. Pop. 1405.

Chester, a township of Wabashaw co., Minn. P. 835.

Chester, a township and post-village of Rockingham co., N. H. It has manufactures of boots, shoes, barrels, tubs, etc. Pop. 1153.

Chester, a township of Burlington co., N. J. P. 2586.

Chester, a township and post-village of Morris co., N. J. The village is on the Chester R. R., a branch of the Morris and Essex R. R., 40 miles W. of New York City. It is a place of summer resort, and has an institute for young ladies. Pop. of township, 1743.

Chester, a post-village of Orange co., N. Y., on the Erie R. R., 55 miles N. by W. from New York. It has a national bank, an academy, and three churches. Pop. 666; of Chester township, 2113.

Chester, a township of Warren co., N. Y. The post-village of Chestertown contains an academy. Pop. of township, 2329.

Chester, a township of Clinton co., O. Pop. 1173.

Chester, a township of Geauga co., O. Pop. 727.

Chester, a township and post-village of Meigs co., O. Pop. 1656. The village is about 18 miles S. E. of Athens.

Chester, a township of Morrow co., O. Pop. 1073.

Chester, a township of Wayne co., O. Pop. 1921.

Chester, a city of Delaware co., Pa., on the Delaware River and the Philadelphia Wilmington and Baltimore R. R., 15 miles W. S. W. of Philadelphia. It was settled by the Swedes in 1643, and is the oldest town in the State. In Chester are large shipyards, in one of which 1300 men are employed. There are also manufactures of woollen and cotton goods, metals, etc. It has numerous churches and public schools, two national and one private bank, and one daily and five weekly papers. There is an academy in the city, and in the neighborhood is the Crozer Theological Seminary (Baptist). Chester has increased rapidly in the last decade. It was incorporated a city in 1866. Adjacent are the boroughs of Upland and South Chester, which have considerable manufactories. Pop. 9485; of township, exclusive of city, 1452.

WM. ORR, ED. DELAWARE CO. "DEMOCRAT."

Chester, a post-village, capital of Chester co., S. C., on the Charlotte Columbia and Augusta R. R., and the terminus of the King's Mountain R. R., 65 miles N. N. W. of Columbia. It has a national bank and one newspaper. P. of township, 944. E. C. MCLURE, ED. "REPORTER."

Chester, a township and post-village of Windsor co., Vt., on the Vermont Central R. R., 39 miles S. E. of Rutland. Here are manufactures of furniture, leather, lumber, carriages, boots and shoes, sash and blinds, etc. It is the seat of an academy. Pop. of township, 2052.

Chester, a township and post-village of Chesterfield co., Va. The village is on the Richmond Fredericksburg and Potomac R. R., 13 miles S. of Richmond. Pop. of township, 2313.

Chester, a township and village of Dodge co., Wis. The village is 17 miles S. W. of Fond du Lac. Pop. 1876.

Chester (COLBY M.), U. S. N., born in 1845 in Massachusetts, graduated at the Naval Academy as ensign in 1863, became a master in 1866, a lieutenant in 1867, and a lieutenant-commander in 1868. He served in the steamer Richmond at the battle of Mobile Bay Aug. 5, 1864, and was commended "for coolness and courage" by the commanding officer of that vessel, Capt. Thornton A. Jenkins, in his official report to Rear-Admiral Farragut of the part taken by the Richmond in the battle.

FOXHALL A. PARKER, U. S. N.

Chester (JOSEPH LEMUEL), a distinguished American antiquary, born in Norwich, Conn., in 1821. He has published "Greenwood Cemetery, and other Poems" (1843), a treatise on "The Law of Repulsion" (1853), "Educational Laws of Virginia," etc. (1854), and other works. He has since been engaged in the publication of all the marriage, burial, and baptismal registers of Westminster Abbey, with annotations.

Chester Court-house, S. C. See CHESTER.

Ches'terfield, a town of England, in Derbyshire, 24 miles by railway N. N. E. of Derby. It has a church built in the thirteenth century, with a remarkable twisted spire 230 feet high. Here are manufactures of silk and cotton stuffs, laces, hosiery, earthenware, and machinery. Mines of coal, lead, and iron are worked in the vicinity. Pop. in 1871, 11,426.

Chesterfield, a county in the N. E. of South Carolina. Area, 868 square miles. It is bounded on the E. by the Great Pedee River and on the W. by Lynche's Creek. The surface is hilly; the soil in some parts is fertile. It produces corn, cotton, and some tobacco and rice. It is intersected by the Cheraw and Darlington R. R. Capital, Chesterfield Court-house. Pop. 10,584.

Chesterfield, a county in the S. E. of Virginia. Area, 300 square miles. It is bounded on the N. and N. E. by the James River, and on the S. by the Appomattox. The southern suburbs of Richmond are in this county. The surface is uneven. Tobacco, corn, and wheat are the chief crops. Coal is found here. It is intersected by the Richmond and Danville R. R. and the Richmond Fredericksburg and Potomac R. R. Capital, Chesterfield Court-house. Pop. 18,470.

Chesterfield, a post-township of Hampshire co., Mass. Pop. 811.

Chesterfield, a township of Macomb co., Mich. Pop. 2175.

Chesterfield, a township and post-village of Cheshire co., N. H., 8 miles S. W. of Keene. It has manufactures of leather, lumber, augers, etc. Pop. of township, 1289.

Chesterfield, a township of Burlington co., N. J. Pop. 1748.

Chesterfield, a township of Essex co., N. Y. Pop. 2795.

Chesterfield, a township of Nash co., N. C. Pop. 863.

Chesterfield, a township of Fulton co., O. Pop. 926.

Chesterfield Court-house, a post-village, capital of Chesterfield co., S. C., is about 90 miles N. E. of Columbia.

Chesterfield Court-house, the capital of Chesterfield co., Va., is about 12 miles S. S. W. of Richmond.

Chesterfield Inlet, a long and narrow inlet of British America, extends westward from the N. part of Hudson's Bay. It is about 250 miles long, and 25 miles wide at the broadest part. It encloses many islands.

Chesterfield, EARLS OF (1628), Barons Stanhope (1616, England).—GEORGE PHILIP STANHOPE, eighth earl, born Nov. 29, 1822, succeeded his kinsman Nov. 30, 1871. Died Dec. 1, 1872.

Chesterfield (PHILIP DORMER **Stanhope**), FOURTH EARL OF, an English author and courtier distinguished for his wit and politeness, was born in London Sept. 22, 1694. He was the eldest son of Philip the third earl and Elizabeth Saville, who was a daughter of the marquis of Halifax. He studied at Cambridge, made a tour on the Continent in 1714, and was elected a member of Parliament in 1715. In 1726 he inherited the earldom and passed into the House of Lords. He became an eloquent debater, and gained distinction by his graceful manners and fine taste. In 1733 he married Melusina Schulemburg, countess of Walsingham. He was a strenuous opponent of Sir Robert Walpole about 1734–40, was appointed lord lieutenant of Ireland in 1745, and one of the principal secretaries of state in 1746. He resigned office in 1748. He was intimate with Pope, Swift, Voltaire, and Bolingbroke. His reputation as a writer is founded chiefly on his "Letters to his Son" (1774), the style of which is much admired. "Take out the immorality," said Dr. Johnson, "and it should be put into the hands of every gentleman." Died Mar. 24, 1773.

Ches'ter Hill, a post-village of Marion township, Morgan co., O. Pop. 354.

Ches'terton, a post-village of Porter co., Ind.

Ches'tertown, a seaport, the capital of Kent co., Md., on the right (W.) bank of Chester River, about 30 miles in a direct line E. of Baltimore. It is the seat of Washington College, and has a national bank and three newspapers. Pop. 1071; of township, 3639.

PLUMMER & USILTON, PUBS. "KENT NEWS."

Ches'terville, a township and post-village of Franklin co., Me., 22 miles N. W. of Augusta. It has manufactures of furniture, spools, doors, etc. Pop. 1011.

Chesterville, a village of Westerlo township, Albany co., N. Y. Pop. 247.

Chesterville, a post-village of Chester township, Morrow co., O. Pop. 282.

Chest, Military [Fr. *caisse militaire*], is a technical name for the money and negotiable securities carried with an army, and intended to defray its current expenses. In the British military system this department is managed by the commissariat; in the U. S., by the paymaster-general.

Chest'nut [Lat. *castanea;* Fr. *châtaigne*], a forest tree of the natural order Cupuliferæ. The genus *Castanea* is distinguished by having sterile flowers interruptedly clustered in long and naked cylindrical catkins, and coriaceous and farinaceous ovoid nuts enclosed in a hard and prickly 4-valved involucre. The *Castanea vesca* is a large tree growing wild in Europe and the Northern U. S. It has oblong-lanceolate and pointed leaves, serrate with coarse pointed teeth, and smooth and green on both sides. Each involucre (called the bur) contains from one to three edible nuts, often compressed and flattened on one or both sides. The wood is light and cross-grained, but durable, is a valuable material for fences, and is much prized for finishing rooms. The chestnut is an ornamental and stately tree, and in Europe attains a great age. A chestnut tree on Mount Etna is celebrated for its longevity, and is said to have measured 200 feet in circumference. The fruit of the Spanish chestnut (which some botanists call *Castanea vulgaris*) is larger than that which grows in the U. S. This tree prefers a dry, light soil, and usually grows in hilly districts. Chestnuts form an important article of food in France and other countries of Southern Europe, where they are cultivated, and used either roasted or boiled. The best variety of French chestnuts are called *marrons*. Among the other species of *Castanea* is the silvery chestnut of Java (*Castanea argentea*), the fruit of which is edible, and the chinquapin (*Castanea pumila*), a small tree indigenous in the Southern U. S. The nuts of the chinquapin are good to eat, but are not so large as chestnuts. California has another species of chinquapin. At Totworth, in England, there is a chestnut tree which was a boundary-mark in the reign of King John (1199–1216).

Chestnut, a township of Knox co., Ill. Pop. 1144.

Chest'nut Creek, a post-village, capital of Baker co., Ala., about 35 miles N. N. W. of Montgomery.

Chest'nut Hill, a township and village of Ashe co., N. C. The village is 5 miles N. E. of Jefferson. Pop. 1412.

Chestnut Hill, a township of Monroe co., Pa. Pop. 1419.

Chestnut Hill, a northern suburb of Philadelphia, is on the Wissahickon Creek, about 10 miles N. N. W. of the State-house. It is finely situated on high ground, and is surrounded by beautiful scenery. Here are numerous elegant country-seats.

Chest Springs, a post-borough of Cambria co., Pa. Pop. 269.

Chesun'cook Lake, in Piscataquis co., Me., is about 24 miles long and from 2 to 4 miles wide. It is an expansion of the Penobscot River.

Chetimach'es Lake, or **Grand Lake,** is in the S. part of Louisiana, between the parishes of St. Mary's and St. Martin's. It is about 40 miles long, and is too shallow for navigation. It is an expansion of the Atchafalaya Bayou.

Cheto'pa, or **Cheto'pah,** a city of Labette co., Kan., on the Indian Territory line, on the Neosho River and on the Missouri Kansas and Texas R. R., 72 miles S. S. W. of Fort Scott. It has one newspaper-office, planing-mills, two banks, flour-mills, a foundry, and large stock-yards. There are four churches, and a school building costing $25,000. Pop. 960. CAVANESS & VAN LANDIGHAM, PUBS. "SOUTHERN KANSAS ADVANCE."

Chetopah, a township of Neosho co., Kan. Pop. 821.

Chetopah, a township of Wilson co., Kan. Pop. 580.

Chet'wynd, VISCOUNTS and Barons Rathdowne (Ireland, 1717).—RICHARD WALTER CHETWYND, sixth viscount, born Dec. 13, 1800, succeeded his father Feb. 27, 1821.

Chevalier (MICHEL), a French political economist, born at Limoges Jan. 13, 1806. He was sent to the U. S. in 1832 to examine the American railroads, and published in 1836 "Letters on North America." Among his important works is one entitled "On the Material Interests of France" (1838). He became an advocate of free trade. In 1840 he was appointed professor of political economy in the College of France, and in 1841 chief engineer of mines. He was deprived of these places by the republicans in 1848, but was reinstated by Napoleon in 1852. In 1851 he was admitted into the Institute. He is the author of "History and Description of the Ways of Communication in the United States" (2 vols., 1840–42), "Mexico, Ancient and Modern" (1863), and other works.

Chevaux-de-Frise, a French military term, used also in English, and applied to large and strong pieces of timber from which wooden or iron spikes project in various directions. They are employed to impede the advance of cavalry or of a storming-party in a fortified place. The cheval-de-frise is variously constructed of wood or iron. Sometimes it consists of an iron barrel or cylinder about six feet long, having twelve holes to receive as many spears, which can be packed away in the barrel when not in use.

Cheverie, a seaport of Kempt township, Hants co., Nova Scotia, on the Basin of Minas, exports annually some 30,000 tons of gypsum to the U. S.

Cheverus (JEAN LOUIS ANNE MADELEINE LEFEBVRE), D. D., a French cardinal and philanthropist, born at Mayenne Jan. 28, 1768. He was appointed bishop of Boston, Mass., in 1808, archbishop of Bordeaux in 1826, and a cardinal in 1835. Died July 19, 1836. (See HUEN-DUBOURG, "Vie de Cheverus.")

Cheves (LANGDON), LL.D., an American statesman and lawyer, born in Abbeville district, S. C., Sept. 17, 1776. He was a member of Congress from 1811 to 1816, and was Speaker of the House of Representatives during one session (1814–15). In this position he voted against the bill to recharter the U. S. Bank, but he was afterwards president of that bank (1819–22). Died June 25, 1857.

Chev'iot Hills, a mountain-range extending along the border between England and Scotland. The range is about 35 miles long. Its direction is nearly N. E. and S. W. The highest point is Cheviot Peak, which rises 2684 feet above the level of the sea. The rocks of which the range is formed are porphyry, trap, and mountain limestone. Grouse abound on these hills, which afford good pasture, and are grazed by sheep of a superior breed, called Cheviots. They have been the scene of many conflicts between the English and Scotch.

Chevreau (HENRY), a French politician and devoted

partisan of Louis Napoleon, born Oct. 23, 1823, at Belleville, near Paris, was appointed at the age of only twenty-six years prefect of the department of Ardèche, and, after being employed for a short time in the ministry of the interior, in succession prefect of Loire-Inférieure, of the Rhône, and of the Seine. From Aug. 9 to Sept. 4, 1870, he was minister of the interior in the last Bonapartist ministry.

Chevreul (Michel Eugène), a French chemist, born at Angers Aug. 30, 1786. He published in 1823 "Chemical Researches on Fat Substances of Animal Origin," and became director of the dyeworks at Gobelin in 1824. He succeeded Vauquelin as professor of applied chemistry in the Museum of Natural History in 1829. He published in 1839 an important work "On the Law of the Simultaneous Contrast of Colors and the Distribution of Colored Objects." Among his other works is "Lectures on Chemistry Applied to the Art of Dyeing" (1831).

Chev'ron [Fr. *chevron*, signifying "rafter"], an ornament and badge of rank of gold or silver lace, or of braid, worn on the sleeve, deriving its name from its resemblance in form to a pair of rafters. It is of French origin, and has been used to denote periods of service in the ranks (*chevrons d'ancienneté*) or the rank of non-commissioned officers. The corporals and the various grades of sergeant have from one to four chevrons, of different colors in different branches of the service.

Chevron, in heraldry, an ordinary representing the rafters of a house, and generally denoting the foundation of his own family by the bearer. The chevron is formed of two lines, joined at the top, and descending to the extremities of the field in the form of a pair of rafters.

Chevron, or Zigzag Moulding, in architecture, a moulding in the form of a succession of chevrons. In general it is characteristic of Norman architecture, but is also found during the transition period from Norman to Early English.

Chev'y Chase, one of the most famous of British ballads. In its present form the piece does not seem to be older than the beginning of the seventeenth century. But more ancient versions existed; and Bishop Percy has published a poem of the sixteenth century which obviously suggested passages in the more recent composition. It is impossible to reconcile its incidents with history, but the event commemorated appears to have been the desperate battle at Otterburn (1388) between the Scottish and English bordermen.

Chew (Richard L.), U. S. N., born Sept. 7, 1843, in the District of Columbia, graduated at the Naval Academy in 1861, became an ensign in 1862, a lieutenant in 1864, and a lieutenant-commander in 1866. He served in the frigate Minnesota when she was attacked by the iron-clad Merrimack, Mar. 8 and 9, 1862, and was attached to the West Gulf blockading squadron during 1863 and 1864, and participated in the battle of Mobile Bay.

Foxhall A. Parker, U. S. N.

Chewink', Ground Finch, or **Tow'hee Bun'ting**

Chewink.

(*Pipilo erythrophthalma*), a very common passerine bird of the U. S. and Canada, represented in the far West by several other species of the genus. It lives in thickets, scratching among leaves for the insects and seeds which are its food. It is variegated with brown, white and red, and is seven and a half inches long. It nests on the ground, and flies with a peculiar jerking motion.

Cheyenne, a county in the western part of Nebraska. It contains much excellent pasturage and some timber. It is intersected by the Union Pacific R. R. Capital, Sidney. Pop. 190.

Cheyenne City, the capital of Wyoming Territory and of Laramie county, is on the Union Pacific R. R., at the northern terminus of the Denver Pacific R. R., 106 miles N. of Denver and 516 miles W. of Omaha. Elevation, 5931 feet. It has an extensive round-house and shops of the Union Pacific R. R., several churches, one national bank, waterworks, a park, an artificial lake, a public library, and iron and soap manufactories. The railroad was opened to this place in 1867, since which it has increased rapidly. One daily and two weekly newspapers are published here.

H. Glafcke, Ed. "Leader."

Cheyenne Indians, a tribe of savages dwelling in the U. S. Territories E. of the Rocky Mountains. Most authorities refer them to the Algonquin stock, but others as confidently to the Dakota group. They are associated with the Arapahoes, but are much more roving in their habits than the latter. They are a tall, courageous race, and are fine horsemen, often at war with their neighbors. They probably do not number more than 3000 persons, and are divided into three bands.

Chiabre'ra (Gabriello), an eminent Italian lyric poet, born at Savona June 8, 1552. He was an admirer and imitator of Pindar, and the founder of a new school of poetry. He composed canzoni and odes remarkable for their sublimity, and in some of his verses rivalled the graceful style and genial spirit of Anacreon. He wrote numerous poems in many varieties of verse. In his mature life he resided at Florence, Genoa, and Savona. Died Oct. 14, 1637. "He borrowed from Pindar," says Hallam, "that grandeur of sound, that pomp of epithets, that rich swell of imagery, that unvarying majesty of conception which distinguish the odes of both poets." (See "Vita di G. Chiabrera," written by himself, Milan, 8vo, 1821; Henry Stebbing, "Lives of the Italian Poets," 1831.)

Chia'pas, a state in the S. E. part of the Mexican confederation, has an area of 16,771 square miles. It is bounded on the N. by Tabasco, on the E. by Guatemala, and on the W. by Tehuantepec. It exports cocoa and vanilla. Extensive and remarkable ruins of an ancient city are visible at Palenque in this state. Capital, San Cristóbal. Pop. in 1871, 193,978.

Chiaramon'te, a town of Sicily, in the province of Noto, situated on a hill about 30 miles W. S. W. of Syracuse, commands a beautiful prospect. Wine of good quality is produced in this vicinity. Pop. 7108.

Chia'ri, a town of Italy, in the province of Brescia, on the railway from Milan to Brescia, 11 miles W. of the latter, was formerly fortified. It has several churches, and manufactures of silk fabrics. Pop. 5297.

Chiaroscu'ro [It., "clear dark;" Fr. *clair-obscur*], the distribution of light and shadow in art. The reproduction of the effects of light and shade is one of the greatest difficulties an artist has to deal with. The conditions of its treatment are: (1) The natural separation of the lights and darks, the play of light in the shadow and of shade in the light, as is seen in nature; the softening of the lights and the transparency of the shadows. In connection with chiaroscuro must be taken into consideration the choice of colors and the preservation of the color-effects. (2) In composition chiaroscuro consists in the massing of lights and shades in different regions of a painting, and the juxtaposition and balancing of these masses, so as to duly heighten or modify the effect of each, and to render the effect of the whole simple and harmonious instead of patchy and confused. The greatest masters of chiaroscuro were Rembrandt, Titian, and Correggio.

Chiasma. See Decussation.

Chiava'ri, a town of Italy, in the province of Genoa, on the Gulf of Rapallo, at the mouth of the Sturla, 21 miles E. S. E. of Genoa. The streets are bordered with arcades and well-built houses. The town is enclosed by cultivated hills, and has many handsome villas in the environs. Here are several picturesque old towers and three churches; also manufactures of silk, lace, and furniture. Chiavari has a valuable anchovy-fishery and a slate-quarry. Pop. 6995.

Chibouque, a smoking-pipe used in Turkey and

Egypt. It has a mouthpiece of amber or glass, a rather long wooden stem, and a bowl of clay.

Chica, chee'kå, a resinous dyestuff, used to give an orange-red color to cotton. It is obtained by boiling the leaves of the *Bignonia Chica,* a plant which grows on the banks of the Orinoco. This plant is a climber with bipinnate leaves, heart-shaped leaflets, and flowers in drooping clusters.

Chica, or **Pito,** is a fermented liquor made from Indian corn in some parts of South America, and similar to ordinary beer; but the Indians sometimes prepare it by chewing the grains, and that which is so prepared is most highly esteemed. To make this liquor particularly strong and well flavored, they pour it into an earthen jar which contains beef; and having made the jar airtight, they bury it in the ground, where it is left for years. On the birth of a child it is their custom thus to bury a jar of chica, to be drunk at the same child's marriage. Chica has an agreeable flavor, and is very intoxicating.

Chica'go, a city and port of entry of Illinois, the capital of Cook co., the largest city in the State, and the largest commercial centre in the upper Mississippi Valley, situated on the south-western shore of Lake Michigan, its city hall being in lat. 41° 52′ 20″ N., and lon. 87° 35′ W. from Greenwich. The Chicago River, a navigable stream, traverses the city by its two principal branches from N. to S. The city contained in 1831 about a dozen families; in 1832 there were nearly 800 inhabitants; in 1837, 4170; in 1840, 4853; in 1850, 29,963; in 1860, 109,260; in 1870, 298,977. There are no perfectly reliable data for estimating the present population of the city. Its increase during the three years and more since the U. S. census was taken has been very rapid, and on the basis of school censuses and city directories its citizens claim from 400,000 to 468,000. Chicago has a large internal commerce both by water and by rail, and a constantly increasing foreign commerce, by way of the lakes, the Welland Canal, and the St. Lawrence, with Canada and European ports. The latest report of foreign imports into the city, including all classes of conveyances, American and foreign vessels, cars, bonded and sealed, etc., is for the year ending Oct. 1, 1872, and gives a total value (in currency) of $9,560,791, on which duties were paid amounting to $1,808,684.17, and the duty accumulated on the bonded goods amounted to $343,790.44. The domestic and foreign exports for the year ending Jan. 1, 1873, amounted to $5,356,054. The exports consisted of grain, flour, Indian corn and meal, other grains and feed, broom corn, beans, beef, pork, cured meats, lard, and grease. The imports were of various classes, the most important being dry goods, iron and steel, wines, liquors, ale and porter, glass, cigars, tea, coffee, carpets, salt, fruits and nuts, fancy goods, lumber, rice, cutlery, earthen and china ware, sugar, fish, and miscellaneous goods. The arrivals of vessels from foreign ports for the year ending Dec. 31, 1872, were—American vessels, 50, with a tonnage of 14,412 tons; foreign vessels, 152, with a tonnage of 43,802 tons. The clearances for foreign ports for the same time were—American vessels, 317, with a tonnage of 85,856 tons, and 150 foreign vessels, with a tonnage of 42,748 tons. There has been no material change in the aggregate number of arrivals and clearances during the past five years, but the vessels in the coasting trade had slightly diminished, and those in the foreign trade increased. But this foreign commerce, which had made the port of Chicago tenth in the list of ports in the U. S. in the amount of its imports and exports, although a thousand miles inland, is a mere trifle compared with its internal commerce. In the receipt and shipment of wheat and flour, of corn and corn meal, oats, rye, and barley, of live-stock, of pork, beef, and salted and smoked meats, and of lumber, Chicago is the largest market, with possibly a single exception, in the U. S., and in several minor articles its trade is very large. The fifteenth annual report of the board of trade for the year 1872 states the aggregate wholesale trade of the city in dry goods, groceries, iron, clothing, boots and shoes, drugs, books, and the like, for the year, at $500,000,000, and this was probably an under-estimate. The following table shows the receipts and shipments of grain and breadstuffs in each year since 1860, as officially reported to the Chicago board of trade:

Year.	Flour received, barrels.	Flour shipped, barrels.	Wheat received, bushels.	Wheat shipped, bushels.	Corn received, bushels.	Corn shipped, bushels.	Oats received, bushels.	Oats shipped, bushels.	Rye received, bushels.	Rye shipped, bushels.	Barley received, bushels.	Barley shipped, bushels.	Total receipts of flour reduced to wheat-bushels.	Total shipments of flour reduced to wheat-bushels.
1861	1,479,284	1,603,920	17,385,002	15,835,953	26,369,989	24,372,725	2,067,018	1,633,237	490,989	393,813	457,589	226,534	53,427,365	50,481,862
1862	1,666,391	1,739,849	13,978,116	13,808,898	29,574,328	29,452,610	4,688,722	3,112,366	1,038,825	871,796	872,053	532,195	57,650,804	56,477,110
1863	1,424,206	1,522,085	11,408,161	10,793,295	26,611,653	25,051,450	11,086,131	9,234,858	865,508	651,094	1,280,342	946,223	57,660,722	54,287,345
1864	1,205,698	1,285,343	12,184,977	10,250,026	13,807,745	12,235,452	16,351,616	16,567,650	1,060,116	893,492	1,018,813	345,208	49,848,908	46,718,543
1865	1,134,100	1,293,428	9,266,410	7,614,887	25,952,201	25,437,241	11,659,080	11,142,140	1,194,834	999,289	1,774,139	607,484	54,950,114	52,268,181
1866	1,847,145	1,981,525	11,978,753	10,118,907	33,543,061	32,753,181	11,040,264	9,961,215	1,679,541	1,444,574	1,742,652	1,300,821	68,396,423	65,486,323
1867	1,720,001	2,015,455	13,695,244	10,557,123	22,772,715	21,267,205	12,355,006	10,226,026	1,291,821	1,213,389	2,360,984	1,846,891	60,215,774	55,187,909
1868	2,192,413	2,399,619	14,772,094	10,374,683	25,570,494	24,770,626	16,032,910	14,440,830	1,523,820	1,202,941	1,915,056	901,183	69,680,233	63,688,358
1869	2,218,822	2,339,063	16,876,760	13,244,249	23,475,800	21,586,808	10,611,940	8,800,646	955,201	798,744	1,513,110	633,753	63,417,510	56,759,515
1870	1,766,037	1,705,977	17,394,409	16,432,585	20,189,775	17,777,377	10,472,078	8,507,735	1,093,493	913,629	3,335,653	2,584,692	60,432,574	54,745,903
1871	1,412,177	1,287,574	14,439,656	12,905,449	41,853,138	36,716,030	14,789,414	12,151,247	2,011,788	1,325,867	4,069,410	2,908,113	83,518,202	71,800,789
1872	1,532,014	1,361,328	12,724,141	12,160,046	47,366,087	47,013,552	15,061,715	12,255,537	1,109,086	776,805	5,251,750	5,032,308	88,426,842	83,364,224
1873*	1,556,093	1,560,383	16,626,923	15,958,897	32,774,013	28,330,355	13,475,590	12,481,372	810,561	683,622	2,293,039	1,722,689		

The value of grain and flour handled during the year in the city was not less than $100,000,000.

The following table shows the movement, by lake, by Illinois and Michigan Canal, and by the various lines of railroad, of the other leading articles of internal commerce of the city during the year 1872:

Commodities.	Received.	Shipped.
Beef, tierces and barrels	14,512	39,911
Pork, barrels	121,023	208,664
Provisions and cut meats, pounds	48,256,615	238,727,484
Lard, pounds	19,911,797	86,040,785
Salt, barrels	606,673	513,850
Liquors and highwines, barrels	163,991	169,564
Lead, pounds	20,235,635	10,842,717
Lumber, feet	1,183,659,283	417,980,507
Shingles, number	610,824,420	436,827,375
Coal, tons	1,398,024	177,687
Tallow, pounds	6,019,606	5,312,527
Potatoes, bushels	1,214,071	94,249
Cattle, number	684,075	510,025
Sheep, number	310,211	145,016
Hogs, live and dressed, number	3,488,528	1,981,295
Horses, number	2,500	
Wool, pounds	28,181,509	27,720,089
Hides, pounds	32,387,995	28,959,292
Seeds, pounds	44,755,412	22,358,542
Butter, pounds	14,574,777	11,497,537

Number of hogs packed in 1872 in Chicago, 1,225,236, of the average net weight of 232.54 pounds. The aggregate value of the receipts and shipments of these commodities was about $270,000,000, and, adding the grain, flour, and feed, about $370,000,000. The number of vessels arriving during the year 1872 in the coasting-trade was 12,622, and their tonnage, 3,001,538; the number of coasting-vessels clearing the same year was 12,064, and their tonnage 2,889,186. Adding the vessels to and from foreign ports, and the entire arrivals of the year were 12,824, tonnage 3,059,752; the clearances 12,531, tonnage 3,017,790. The number of vessels belonging to the district of Chicago in 1872 was 654, having an aggregate tonnage of 99,403 tons. The increase in commerce and trade in 1873 was about 20 per cent.

Manufactures.—The city has become a prominent manufacturing centre. We have no exact statistics of the manufacturing establishments within the city limits of very recent date, but the census of 1870 gives those of Cook county, which were almost entirely either in or for Chicago, as follows: 1440 manufacturing establishments, employing 31,105 hands, of whom 24,705 were adult males, 4652 adult females, 1748 children, having a capital employed estimated at $39,372,276, paying for wages $13,045,286, using annually raw material valued at $60,362,188, and producing annually goods of the value of $92,518,742. In Dec., 1871, just after the great fire, Mr. Charles Randolph, secretary of the board of trade, stated the capital employed in manufactures in the city of Chicago, in round numbers, at $40,000,000, the annual product at $70,000,000; and that they furnished, directly and indirectly, the means of subsistence to 60,000 persons. Since the fire many new branches of industry have been introduced, and the aggregates both of capital and production have been increased one-third. The largest branches of manufacture were—the packing and curing of meats and provisions, which produced annually $19,153,851; sawed and planed lumber, $6,955,180; iron

*Nine months only.

and iron-ware, about $5,000,000; clothing, $6,269,590; distilled and malt liquors, $5,275,166; flouring-mill products, $3,110,686; printing and publishing, $2,152,950; tobacco, snuff, and cigars, $2,136,146; agricultural implements, $2,081,000; leather, tanned and curried, $3,333,121; machinery, $2,056,044; animal and vegetable oils, $2,364,833; furniture, $1,825,549; boots and shoes, $1,666,723; confectionery, $1,848,660; carriages, wagons, sleds, children's carriages, etc., $1,517,368; gas, $1,566,431; marble and stone-work, $1,383,964; soap and candles, $1,050,150; bookbinding, $888,400; sash, doors, and blinds, $874,550; bread and other bakery products, $695,410; brick, $583,575; coffee and spices ground, $752,851; lead pipe and shot, $798,410; malt, $743,401; paints, $544,400; and tin, copper, and sheet-iron ware, $803,976, were the only other manufactures producing an aggregate of above $500,000 per annum.

Finances.—The assessed valuation of the city for the year 1872, made up before Oct. 1, 1872, was $284,197,430; for the year 1871 (completed before the great fire), $289,746,470; for 1870, $275,986,550. The true valuation of Cook county in 1870, according to the ninth census, was $575,000,000. Of this probably about $550,000,000 belonged to Chicago. The city tax (a levy of fifteen mills on the dollar) for the year 1872–73 was $4,262,961.45. The city held a lien on the Illinois and Michigan Canal, for moneys paid for its enlargement, of $2,955,340, and this the State has assumed and is paying in instalments, the whole payment being completed in 1873. The bonded debt of the city April 1, 1873, was $13,544,000 ($559,000 of these bonds having been cancelled the previous year); the floating debt at the same date was $1,849,332.04, nearly all of which was provided for and payable from the tax levy of 1872. The amount of internal revenue (national) tax collected in the year ending Oct. 1, 1872, was $5,685,388.85. The assets of the city, including its buildings, lands, water-works, street lamps and posts, accrued and accruing taxes, etc., to meet its bonds and other liabilities, were appraised April 1, 1873, at $20,072,726.07. The receipts of the city treasurer, during the year ending April 1, 1873, were $9,215,434.90, and the expenditures for the same term were $8,325,875.37, leaving a balance in the treasury of $889,559.53. The school fund of the city is stated at $2,774,674.93, yielding an annual revenue of $91,483.88.

Banks, Insurance Companies, etc.—In Jan., 1873, Chicago had twenty-two national banks, with an aggregate capital of $9,000,000, and fifteen State banks, savings banks, and loan and trust associations, with a capital and surplus of $3,105,000. The number of private banking-houses is very large, and their business larger than that of the banks. The weekly clearances at the clearing-house during the summer and autumn of 1873 averaged $24,500,000, and once reached $31,000,000. There were in July, 1873, four fire insurance companies in the city, with a capital of $1,180,500, and assets of about $1,667,000, and a great number of agencies and branch offices of companies from other States and countries, and six life insurance companies, with $1,800,000 capital and $3,355,000 assets. There are agencies of all the leading life insurance companies of the country in the city.

Education.—Chicago has been a great educational centre for the North-west, and with its immediate suburbs has done much for general, and particularly higher, education. There are within the city limits one university, the University of Chicago, organized in 1859, having a law school and an astronomical and scientific school, besides its undergraduate course, having 18 professors and other instructors, and in 1873, 27 students in the law department, 8 in the scientific school, 90 in the college proper, and 304 in the preparatory departments; 19,600 volumes in its libraries, a fine astronomical observatory, having the second refractor in size in this country, a meridian circle of the first class, and all the necessary appliances for astronomical instruction and observation; one college, St. Ignatius' College, founded in 1870, having 18 professors and other instructors, 67 students, of whom 44 are in the collegiate and 23 in the preparatory department, and 5000 volumes in its libraries. There are four medical schools or colleges, two regular, one eclectic, and one homœopathic, having in all 66 instructors, 480 students, and 6000 volumes in their libraries; 1 college of pharmacy, with 3 instructors, 50 students, and 1000 volumes in library; four theological seminaries, one Congregational, one Baptist, one Lutheran, and one Presbyterian, with 14 professors and 127 students, and 33,000 volumes in their libraries; there are also three business or commercial colleges, with 24 instructors and 788 students; four female colleges or seminaries of high grade, with 58 instructors and 710 students; sixty-five private schools and academies, with 332 instructors and 14,496 pupils; three orphan and half-orphan asylums, with 22 instructors and teachers, and 239 children; one reform school, with 14 teachers and assistants and 212 inmates. There are about 200 Sunday schools, with 4500 teachers and 50,000 scholars, and 35,000 volumes in their libraries. Prior to the great fire of Oct. 8, 1871, there were in the city nine or ten public libraries, having an aggregate of more than 100,000 bound volumes and about 150,000 pamphlets; one art museum, with a very fine collection of paintings, statues, casts, etc.; three art galleries, two scientific museums, and a number of associations for literary and scientific improvement, with libraries and art collections of considerable value. These were all destroyed by the flames, but most of them are reorganizing, and some have already made a fair beginning in their new collections. Turning to her public schools, we find that Chicago has a well-organized system of public instruction, thoroughly graded, and embracing the Normal School, an institution of high character, with 5 instructors (1 male and 4 female) and 95 students, all females. The principal receives a salary of $2500 per annum, and the four lady teachers an average of $1050 each. The average age of the pupils in the course, which occupies four years, is eighteen and a half years. There is one high school, with 11 male and 10 female teachers, and a four years' course of instruction, and 612 scholars, 304 of them in the junior or lowest class; the age of these pupils ranges from fifteen years nine months to eighteen years seven months. The average salaries of the male teachers are $2082, and of the female teachers, $1000. The grammar school course comprises five years; there are twenty-two grammar schools, with 21 male and 154 female teachers, and 3851 male and 3707 female pupils, whose ages range from ten years ten months to fourteen years and ten months; the average salaries of the male teachers are $2190, and of the female teachers $731. There are thirty-five primary schools, with 352 teachers, all females; the primary school course occupies five years. There are in the primary schools 12,316 male and 11,833 female scholars. The average salaries of the primary teachers are $688. The whole number of schools of all grades is 59; of male teachers, 33; of female teachers, 520; of male pupils, 16,379; of female pupils, 16,027; of both, 32,406. The average salaries of the male teachers are $2164 per annum, of the female teachers $710. Adding the number of pupils in the female seminaries, private schools, orphan asylums, etc., 15,457, to the aggregate in the public schools, we have 47,863 children in school out of a total school population—*i. e.* between six and twenty-one years—of 88,219. It should be noted that among the private schools are included the parochial schools of the Catholics and Lutherans, of which there are thirty-seven. In the great fire fifteen school-houses, furnishing accommodations to more than 10,000 pupils, were burned, and the remainder were for a time used as temporary shelter for thousands of the homeless. The greater part of these school-houses, as well as several new ones, have been rebuilt since that time, and the city is now (Oct., 1873) reasonably well supplied with school edifices. The number of volumes in all the public libraries of Chicago, including those in the colleges, seminaries, and professional schools, is about 80,000 volumes.

The city has long been famous for its newspapers and periodicals. The latest statistics obtainable give the whole number of these, excepting annual publications, as 102, of which 11 were dailies (3 of them German), having an aggregate daily circulation of about 150,000 copies; 5 triweeklies, circulation 40,000; 45 weeklies, aggregate weekly circulation 450,000 copies (of these 5 were German, 5 Scandinavian, and 1 Bohemian); 3 semi-monthlies, circulation 10,000; 33 monthlies (one of them German and another Swedish), having an aggregate monthly circulation of 270,000; 1 bi-monthly, circulation 1000; and 4 quarterlies, circulation 16,000; 16 of these papers are political, 18 religious, 8 professional, 18 literary, 10 devoted to commerce, finance, etc., 5 juvenile, 6 advertising, 5 agricultural, and the remainder miscellaneous.

There were in July, 1873, 209 churches in the city—viz. Baptist, 18; Baptist mission chapels, 9; Free Baptist, 1; Christian, 1; Congregational, 17; Episcopalian, 18; Evangelical Association, 6; Evangelical Lutheran, 10; United Evangelical, 6; Independent, 2; Jewish synagogues, 5; Methodist, including the German and Scandinavian Methodist, 22; African Methodist Episcopal, 2; Scandinavian Lutheran, 4; Presbyterian, 18; Independent Presbyterian missions, 5; Scotch Presbyterian, 1; United Presbyterian, 1; Reformed Presbyterian, 1; Presbyterian missions, 10; Reformed (Dutch), 3; Roman Catholic, 27; Swedenborgian, 4; Swedenborgian mission, 1; Unitarian, 5; Universalist, 3; Adventists, 2; Disciples, 1; Christadelphians, 1; Pilgrims, 1; Friends' meeting-house (Orthodox), 1; Friends (Hicksite), 1; Church of God, or Winnebrennarians, 1; Spiritualists, 1. Many of the church edifices before the fire were remarkable for their architectural beauty. That great calamity destroyed thirty-nine churches, and among

them many of the costliest and most elegant structures in the city. The Catholic cathedral (St. Mary's) and the Church of the Holy Name, the First and Second Presbyterian, the Westminster church, the New England Congregational, the First Methodist Episcopal church, and the Methodist Block, Trinity and St. James's (Episcopal), the Jewish synagogue, the Church of the Unity, St. Paul's Universalist, and the Swedenborgian Temple, were the most noteworthy. The First Baptist on Wabash avenue, the Methodist church corner of Wabash avenue and Harrison street, Plymouth church, and Rev. Robert Laird Collier's, were among those spared by the fire, but most of these have gone into other hands or have been devoted to business purposes. Many of the churches destroyed have been rebuilt, either on their own or new sites, and with greater beauty than before. Among these are the First and Second Presbyterian, the Church of the Unity, St. Paul's, and most of the Catholic churches. New churches are also constantly going up, many of them fine specimens of ecclesiastical architecture.

Benevolent and Charitable Institutions.—There are in the city eight hospitals; one infirmary, beside cliniques connected with all the medical colleges; dispensaries, 6; orphan asylums, 7; asylums for the aged and indigent, 2; home for the friendless, 1; benevolent, mutual, and religious societies and associations, 90. There are also 49 Masonic lodges, encampments, and conclaves; 38 Odd Fellows' lodges; 20 of Knights of Pythias; 6 of Sons of Temperance; 12 of Good Templars; 5 of Benai Berith; 5 of Ancient Order of Chaldeans; 10 of German Harugari; 14 of Sons of Hermann; 4 of Independent Order of Red Men; 1 of Ancient Druids; 3 of Foresters; 10 of Ancient Order of Good Fellows; and 5 of the American Protestant Association. No notice of the benevolent and charitable institutions of Chicago would be complete which failed to give some account of the Chicago Relief and Aid Society, an organization founded in 1857, and which has had from that time the management of the voluntary charities of the city to the poor, infirm, and helpless. When the great calamity of Oct. 8, 1871, fell upon Chicago, and the charities of America and Europe were evoked for the relief of the fire-smitten city, the greater part of these princely charities were placed in the hands of this society for distribution to the more than 100,000 persons of all classes who were suddenly reduced to destitution. Within the next fifteen months they had received and disbursed to the sufferers, with a judgment and wisdom never surpassed, the sum of $5,687,979.66, together with supplies valued at over half a million more. There should not be omitted, also, from this list of benevolent and charitable associations the Young Men's Christian Associations of the city, which were not only very efficient in the time of its great extremity, but before and since in organizing mission schools and ministering both to the physical and spiritual wants of the poor and the vicious.

Public Buildings of Note and Parks and Boulevards.—The public buildings of the city before the fire were many of them elegant structures, but those which have been erected since possess both elegance and durability. The new building for the U. S. government's use, the custom-house, court-house, and post-office, is a magnificent structure; the new chamber of commerce is a finer building in every respect than its predecessor; and the projected city hall is to be the finest building of its class in the country. The Crystal Palace for the inter-State exposition in Sept., 1873, was a very imposing structure. The city has been noted for some years past for the extent and magnificence of its hotels. All the larger ones were destroyed by the fire, but the Pacific, said to be the largest hotel on the continent, Palmer's, the New Sherman House, the New Tremont, and the Clifton House are not surpassed in beauty by any structures of the kind in the world. The warehouses of the city are remarkable for their extent and their graceful proportions. During the year after the fire 1274 brick, stone, and iron buildings were erected, many of them of vast size, and more than twice that number were in course of construction. Of frame buildings the number exceeded 5000. The aggregate value of these buildings (those completed and in progress) exceeded $120,000,000. There are nine public parks in the city, connected with each other by boulevards. These are—Lincoln Park, originally a cemetery, and containing 240½ acres; Washington Park, 2⅜ acres; Lake Park, not completed, 42¼ acres; Dearborn Park, 1⅓ acres; Ellis Park, 3½ acres; Union Park, 11¼ acres; Jefferson Park, 6¾ acres; Wicker Park, 3½ acres; and Vernon Park, 3⅞ acres. Nearly 95 acres of Lincoln Park are outside the present city limits. The avenues or boulevards connecting them with each other are some of the finest streets in the city. Chicago, to a greater extent than most cities, has elegant suburban villages, some of them small cities, around it. Among these are South Chicago, Hyde Park, Evanston, Morgan Park, Lake Forest, etc.

Railroads.—Much of the prosperity of Chicago has been due to the concentration of so many trunk-lines of railroads. There are ten powerful trunk-lines which bring freight and passengers into the city, and, including branch lines, twenty-six railroads contribute directly to the growth of the city. These lines have nearly 10,000 miles of completed track. The number of regular passenger trains out each day is 94, and of in-trains 92. The number of regular freight trains each day is 143. Besides these there are from eight to ten extra passenger and about twenty extra freight trains each day. The gross earnings of the roads centring in Chicago for the year ending Sept. 30, 1873, were nearly $83,000,000, and the net earnings over all expenses about $20,000,000. Eighty Pullman palace sleeping cars and about twenty sleeping cars of other manufacturers arrive and leave daily. The ten trunk-roads which are tributary to the commerce of Chicago are the Chicago and Northwestern Railway, Illinois Central R. R., Chicago Rock Island and Pacific, Chicago Burlington and Quincy, Chicago and Alton (St. Louis), Michigan Central, Lake Shore and Michigan Southern Railway, Pittsburg Fort Wayne and Chicago, Pittsburg Cincinnati and St. Louis, and the Chicago Danville and Vincennes R. Rs. There are also city railroads, having an aggregate length of 70 miles, carrying 27,500,000 passengers annually, and reporting gross receipts of $1,377,000. There is one important canal, connecting the Mississippi River with Lake Michigan by way of the Illinois River and its tributary, the Des Plaines. This canal is the medium of an immense traffic both in the receipt and shipment of grain, provisions, lumber, and other goods. It has recently been deepened, for twenty-six miles of its course, eight feet, at an expense of $3,300,883.71; and this, with the deepening of the bed of Chicago River and its South Branch, permits the waters of Lake Michigan to flow through the river and branch into the canal, and to be carried into the Illinois and Mississippi rivers. This obviates what was a great source of annoyance and sickness in Chicago—viz. the offensive condition of the waters of the Chicago River. There are no ferries, properly so called, in Chicago. Steamers ply across the lake (Lake Michigan) to Michigan City, New Buffalo, and St. Joseph, all railroad stations, but they are hardly to be reckoned as ferry lines. The Chicago River and its branches are crossed by numerous drawbridges, and there are also two tunnels under the river, constructed at an expense of $1,083,276.48, for passengers and teams. The water-supply of the city is derived from Lake Michigan. An iron cylinder nine feet in diameter was driven into the lake bed thirty-one feet below the bottom, at a distance of two miles from the shore, and a tunnel excavated thence to the shore and to the waterworks, where it is forced by powerful pumps to the summit of a tower 130 feet high, and thence distributed over the city. The supply, 19,000,000 gallons daily, is sufficient for the present needs of the city, and by the use of additional reservoirs and pumps, now constructing, can be increased threefold or more. The cost of these waterworks to April 1, 1872, was $4,712,615.18, and they yield already an income from the water-rates of more than $500,000 annually. The city is supplied with illuminating gas by private corporations.

Paving and Sewering.—There are 534 miles of streets in the city. Of this number, 108 miles, or about one-fifth, have been improved by paving, macadamizing, or otherwise. The Nicholson wood pavement is used on all the principal streets, covering nearly 80 miles, while the newer avenues have been in some cases covered with the macadam or improved Telford pavement. The sewers laid, up to April, 1873, were about 925,000 feet, or nearly 180 miles, and their cost about $3,150,000.

History.—The site of Chicago was visited and occupied for a short time by the Jesuit Marquette in 1673, and the portage between the Chicago and Des Plaines rivers passed over repeatedly by La Salle in 1681. In 1804 the U. S. government established a small military post there called Fort Dearborn, garrisoned by a single company of infantry, most of whom were massacred by the Indians in Aug., 1812. The fort was soon after destroyed, but was rebuilt in 1816, and became the nucleus for a small number of settlers—squatters who were not in civilization much above the Indian tribes which surrounded them. It was not until the negotiations which resulted in the removal of the Pottawattomies to a reservation twenty days' journey W. of the Mississippi were commenced that this marshy and muddy prairie lying around the mouth of the Chicago River began to be regarded as a place where a great city would be built. After the close of the Black Hawk war in 1832, Northern Illinois and Southern Wisconsin were thrown open to settlement. In that year there were about 800 people within the present limits of Chicago, all very

poor, and the tax-levy of $1.50 assessed upon them was very burdensome. The place was already named Chicago, a corruption of the Indian name of an adjacent river, "Chekagow." Up to 1837 it was dependent upon Ohio for flour. In 1839 its first shipment of wheat (1678 bushels) was made; in 1840 it had a population of 4470 inhabitants, and from this time onward its growth was very rapid, increasing from 28,000 in 1850 to 109,000 in 1860, and to 298,977 in 1870. For a long time it struggled with intermittent fever, cholera, bilious remittent fever, and other diseases dependent upon its low marshy situation, its stagnant water, its foul-smelling river, and its muddy and undrained streets; but by the artificial elevation of its streets and the skilfully devised system of sewerage and drainage adopted it has become a healthful city in ordinary seasons, and compares well in point of cleanliness with the other large cities of the Union.

Chicago was incorporated as a city in 1837, when it had a mere handful of inhabitants. The use of the Nicholson or wooden block pavement was commenced in 1856, and the principal streets are now admirably paved and sewered. The elevation of the streets about eight or ten feet for sewerage purposes, and the screwing up block after block of very heavy buildings for this purpose, including in the number some of the largest hotels, was the most stupendous experiment of its kind ever undertaken. The city early became largely interested in the grain, pork, provision, and lumber trades, and before it was twenty-five years old had taken the lead in all these departments of trade. It was while in the full tide of prosperity, and when perhaps its rapid growth had made it careless, that on the 8th and 9th of October a disaster befel it such as in some respects was unparalleled in the history of great cities. For about thirty-six hours the devouring flames swept over the city, and before them the grandest and most substantial warehouses, public buildings, dwellings, churches, etc. vanished like the breaking of a bubble. The fire extended over 2124 square acres, or nearly three and one-third square miles, much of it in the very heart of the business portion of the city. This area contained about 73 miles of streets and 17,450 buildings, the homes of 98,500 people. It destroyed nearly all the public buildings and almost one-half the public school buildings of the city, its largest railway dépôts, its principal halls, theatres, opera-houses, and art buildings, all its larger hotels (of which many were of the first class), five of its great grain elevators, with 1,642,000 bushels of grain in them, nine daily and many weekly newspaper establishments, thirty-nine churches, nearly all the banks, and all the most prominent business blocks. The money value of the losses was carefully estimated, and was said to be, in round numbers, on buildings, $52,000,000; on business property, goods, etc., $85,000,000; on personal effects, $59,000,000; making a total of property burned of $196,000,000. There was a salvage on this of about $5,000,000, but the interruption to business and the total derangement of trade which followed could not be estimated at less than $29,000,000, making a grand total of $220,000,000. At first it was supposed that the depreciation of real estate which had followed would amount to from eighty millions to one hundred millions more, but it was found that real estate actually advanced in value within one year nearly 50 per cent. Of the ninety-six and a half millions of insurance upon the property destroyed, only an average of 40 per cent., or a little more than $38,000,000, was ever paid, 68 companies, with $24,000,000 liabilities, being completely wiped out, and many others paid but a small percentage of the claims. This great disaster called forth the most extraordinary liberality from every part of the civilized world; the contributions from all quarters for the relief of the sufferers by the fire amounted to $7,119,256.50, of which, as we have already stated, $5,687,000 were disbursed through the Chicago Relief and Aid Society. But if the disaster was greater than had ever befallen a city before, the recovery from it was equally astounding. At the end of two years from the conflagration very few traces of it remained; the rebuilt city is vastly more magnificent and substantial than that which perished in the flames. Aside from the 8033 temporary buildings erected at the cost and under the direction of the relief committee, there have been in the two years which have elapsed since the fire, 9000 buildings erected, of which 3000 were of brick, stone, or iron, many of them of great extent and imposing architecture; and 6000 frame buildings, but many of them very substantial. The business of the city has increased till her assessment, taken at the usual percentage (about 60 per cent. of actual market value), in less than a year from the occurrence of the fire, was but $5,000,000 less than the previous year, and now (in Oct., 1873) largely exceeds it. Though perhaps somewhat unduly self-appreciative, yet few cities have a more brilliant prospect in the future. Its constantly enlarging facilities for commerce and manufactures, its importance as a great railroad centre, the irrepressible energy and pluck of its citizens, and the influx of wealth from all quarters, make it certain that it is to be one of the largest and busiest cities of the continent in the not remote future.

(For the statistical matters contained in this article we are indebted to George W. Thacher, Esq., for the last eighteen years a prominent citizen of Chicago.)

L. P. Brockett.

Chicago, a post-township of Douglas co., Neb. P. 260.

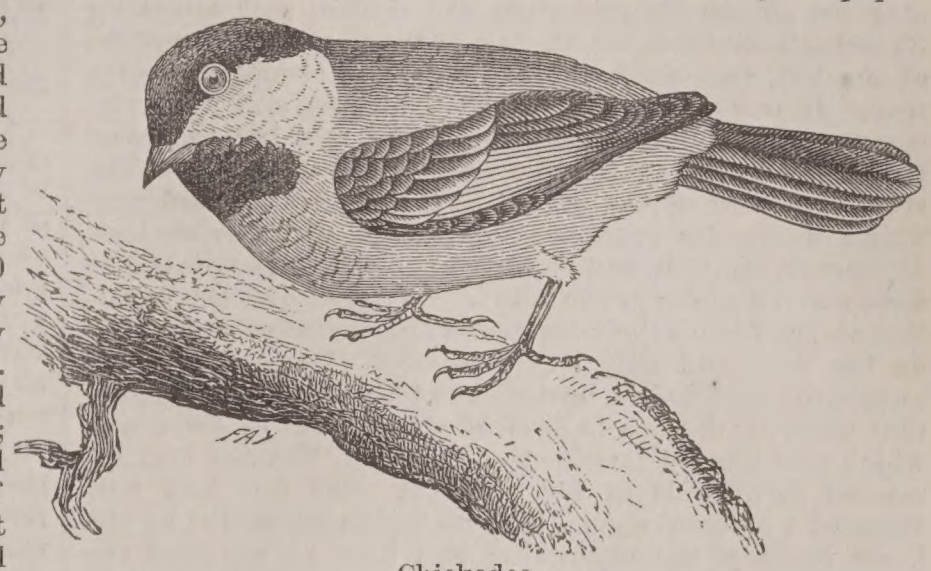
Chichen', a town of Central America, in Yucatan, 18 miles S. W. of Valladolid. Here are the remains of an ancient town, comprising a vast ruined building 450 feet long, a pyramid the base of which is 550 feet square, and a remarkable domed edifice.

Chich'ester (anc. *Regnum*), an episcopal city of England, capital of Sussex, on the South Coast Railway, 17 miles E. N. E. of Portsmouth. It stands on a plain between an arm of the sea and the South Downs. It is well built, and has clean wide streets. Here is a cathedral built in 1199, which is 410 feet long by 227 wide. The town is connected by a canal with the sea, which is two miles distant. It sends two members to the House of Commons. It was formerly the capital of the kingdom of Sussex. Pop. in 1871, 7850.

Chichester, a post-township and village of Merrimack co., N. H., 8 miles E. N. E. of Concord, on the Suncook Valley R. R. It has manufactures of leather, lumber, etc. Pop. 871.

Chichester, Earls of (United Kingdom, 1801), Barons Pelham (England, 1762), and baronets (1611).—Henry Thomas Pelham, third earl, first church estate commissioner, born Aug. 25, 1804, succeeded his father in 1826.

Chick'adee [a name derived from its note], the popular name of the black cap titmouse (*Parus atricapillus*) and other American passerine birds of the same genus and of nearly related genera. The common chickadee is frequent all the year round throughout a great part of North America, and is one of the bravest and most cheerful of our winter birds. It shares with several others the name snowbird, and its familiar cry and sprightly manners render it a great favorite with children. It nests in a hollow tree, and feeds on insects in their season, and on seeds in winter.



Chickadee.

Chickahom'iny, a river in the E. part of Virginia, rises about 20 miles N. W. of Richmond, flows south-eastward, and after a course of about 75 miles enters the James River. It forms the boundary between Henrico and Charles City counties on the right, and Hanover, New Kent, and James City on the left. Along the margins of the Chickahominy is found the theatre of operations of Gen. McClellan operating against Richmond during May and June, 1862. In close proximity to this river occurred the battles of Seven Pines and Fair Oaks, May 31–June 1, 1862, Mechanicsville, June 26, Gaines's Mill, June 27, Savage's Station, June 29, White Oak Swamp, June 30, 1862, and Cold Harbor, June 3, 1864. (See Confederate States, by Hon. Horace Greeley, LL.D.)

Chickahominy, a township of Charles City co., Va. Pop. 1372.

Chicka'lah, a post-township of Yell co., Ark. P. 175.

Chickamau'ga, a creek which rises in Walker co., Ga., flows north-eastward and northward, and enters the Tennessee River about 6 miles above Chattanooga.

Chickamauga, a post-village of Hamilton co., Tenn., on the Chickamauga Creek and the Western and Atlantic R. R., 12 miles E. of Chattanooga. (See Chickamauga, Battle of.)

Chickamauga, Battle of. The battle of Chickamauga, fought between the forces of the U. S., under command of Gen. W. S. Rosecrans, and those of the Confederates, under Gen. Braxton Bragg, commenced on the morning of Sept. 19, about 9 o'clock. Of Rosecrans' army, Gen. McCook commanded the right wing, Thomas the left, and Crittenden the centre, while Gen. Polk held chief command of the Confederate right and Hood of the left. The Confederates first attacked the extreme left of the U. S. army with heavy masses, the endeavor being to turn it, and thus gain possession of the roads to Chattanooga. A desperate conflict was continued during the day, but Thomas maintained his position. On the right the conflict had been severe at times, but on the whole the day closed with the advantage on the Union side. During the night Thomas was reinforced from the other wings of the army, and had strengthened his position by hastily thrown up breastworks. The attack was renewed by the Confederates on the morning of the 20th against the left and centre, and the tide of battle here ebbed and flowed throughout the day, with heavy losses on both sides, but without material advantage to either; but Bragg was unable to turn Thomas's flank and occupy the coveted passage to Chattanooga. The fight along the left centre had been equally desperate, bloody, and indecisive. But on the right a fearful disaster had fallen. In answer to Thomas' call for aid, Rosecrans had despatched Negley's and Van Cleve's divisions from the right and centre. Wood was directed to close up on Reynolds on the right centre, and Davis to close on Wood. According to Rosecrans' report, Wood overlooked this direction, but supposed that he was to *support* Reynolds, and attempted to do so by withdrawing from the line and passing in the rear of Brannan, thus opening a gap in the line of battle, which being quickly perceived by Longstreet, a decisive charge was made, striking Davis in flank and rear, and throwing the whole division into confusion. Pouring in through this gap, the Confederates cut off the Federal right and centre, and attacking Sheridan's division, which was advancing to the support of the left, compelled it, after a gallant struggle, to give way. It was afterwards rallied, however, and by a circuitous route joined Thomas, who was now left to breast the tide of battle against the whole army of Bragg. The right and part of the centre had been broken and sent flying in disorder towards Chattanooga, with terrible loss. Rosecrans, McCook, and numerous subordinate commanders were carried along in the whirl. Sheridan and Davis rallied and re-formed their decimated and scattered commands on the way, and halted at Rossville. Rosecrans, being unable to join Thomas, hastened to Chattanooga to prepare that place for defence in case of a total rout of his army, which now seemed imminent. But Gen. Thomas still remained immovable in his position. His line had now assumed a crescent shape, with its flanks supported by the lower spurs of the mountain; and here he repulsed the furious onsets of the Confederates. About 3½ P. M. the Confederates discovered a gap in the hills in rear of his right flank, through which Longstreet poured his massive columns. At this critical moment Gen. Gordon Granger, who had been posted with his reserves to cover the left and rear, arrived on the field. He had heard the sound of the cannon, and marched his force there without orders. Gen. Thomas pointed out to him the gap through which the Confederates were debouching, and he at once threw in Steedman's brigade of cavalry. The conflict was terrible, but the gap was taken. Two divisions of Longstreet's corps repeatedly assaulted the position, but a battery of six guns placed in the gorge repelled them with fearful slaughter. About sunset they made their last charge, when they were met and driven back at the point of the bayonet, and returned no more. In the mean time, Thomas had repulsed the repeated attacks on his left and front, and at nightfall the Confederate army retired beyond range of his artillery, leaving Thomas in possession of his hard-fought field. Considering the extreme labor of his troops, the scarcity of ammunition, food, and water, Gen. Thomas determined to retire on Rossville, where they arrived and took post before morning of the 21st, receiving supplies from Chattanooga, and offering battle during the day, but the attack was not seriously renewed. On the night of the 21st he withdrew within the defences of Chattanooga.

The result of the battle was a nominal victory to the Confederates on the field, though Chattanooga and the possession of East Tennessee, the prize for which the battle was fought, still remained in possession of the Union forces. The Union loss is reported at 16,000, killed, wounded, and missing; the Confederate loss, 18,000; they captured 36 guns, 8500 small-arms, and large quantities of accoutrements.

Chick'aming, a post-township of Berrien co., Mich. Pop. 992.

Chickasa'ba, a township of Mississippi co., Ark. Pop. 448.

Chick'asaw, a county in the N. E. of Iowa. Area, 540 square miles. It is intersected by the Wapsipinicon River. The Red Cedar River passes through the S. W. part of it. The surface is undulating; the soil is fertile. Cattle, wool, grain, and tobacco are raised. It is traversed by a branch of the Milwaukee and St. Paul R. R. The Cedar Falls and Minnesota branch of the Illinois Central R. R. crosses the S. E. corner of the county. Capital, New Hampton. Pop. 10,180.

Chick'asaw, a county in the N. E. of Mississippi. Area, 700 square miles. It is drained by the Yallobusha River, which rises in it, and by the Oktibbeha. The surface is nearly level; the soil is fertile. Corn and tobacco are the staple crops, but wool, cattle, and cotton are also raised. The Mobile and Ohio R. R. crosses the N. E. corner of the county. Capital, Houston. Pop. 19,899.

Chickasaw, a township of Chickasaw co., Ia. Pop. 1076.

Chickasaw Bluffs, Battle of, before Vicksburg, Miss. The U. S. forces under Gen. W. T. Sherman assaulted this strongly fortified position Dec. 29, 1862, but, though the head of the assaulting column reached the works, the severe fire from the rifle-pits and batteries caused them to fall back to the point of starting, leaving many dead, wounded, and prisoners on the field. The Confederate loss was but light.

Chick'asaw In'dians, a warlike tribe which formerly occupied the northern parts of Alabama and Mississippi. They were visited by De Soto in 1540. They waged war against the French in 1736. Having ceded their lands to the U. S. for a large sum of money, they removed beyond the Mississippi River to the Indian Territory in 1837–38, and formed a political connection with their kindred tribe, the Choctaws. The united tribes numbered in 1872 some 22,000 souls, the Choctaws being the more numerous.

Chick'atuck, a post-township and village of Nansemond co., Va., 8 miles S. E. of Smithfield. Pop. 2709.

Chick'en-pox, a contagious febrile disease, chiefly of children, and bearing some resemblance to a very mild form of smallpox. Chicken-pox is distinguished by an eruption of vesicles or blebs, which rarely become pustular or yellow, and leave only a very slight incrustation, which falls off in a few days, without any permanent mark or pit as in smallpox. It is a disease of little or no danger, the fever being often hardly perceptible, and never lasting long. It usually occurs but once in any one patient.

Chick'ering (Jonas), an American philanthropist, born in New Ipswich, N. H., April 5, 1798. He became distinguished as a pianoforte-maker, having begun that business for himself in 1823. He acquired great wealth, which he used freely, but not ostentatiously, in various charities. Died Dec. 8, 1853.

Chickering (Thomas E.), a son of Jonas Chickering, was born at Boston, Mass., Oct. 22, 1824. He succeeded his father as the head of a large pianomaking business, and was colonel of the Forty-first Massachusetts Infantry in the civil war, serving chiefly in Louisiana. Died at Boston Feb. 14, 1871.

Chick's Springs, a post-township and village of Greenville co., S. C., about 9 miles N. E. of Greenville. Here are two mineral springs—one alterative and slightly sulphurous, the other a tonic iron spring. Pop. 1226.

Chick-pea (*Cicer*), a genus of plants of the order Leguminosæ, having pinnate leaves and 2-seeded pods, inflated like bladders. The common chick-pea (*Cicer arietinum*) grows wild in the countries around the Mediterranean. It is an annual, of a stiff upright habit. The seeds abound in farina, and have a slightly bitterish taste. They are about the size of common peas, and curiously wrinkled. They are used as food, either boiled or roasted, and are the common pulse of the East. They are an important article in French and Spanish cookery. They have been in general use from the earliest times, and the plant is extensively cultivated in Egypt, Syria, India, Europe, Mexico, etc. The herbage affords nutritious food for cattle. Drops exude from this plant, which, on drying, leave crystals of almost pure oxalic acid. In France, in India, and in Mexico the free use of the chick-pea as food is said sometimes to lead to paralysis.

Chicla'na, a town of Spain, in the province of Cadiz, 12 miles S. E. of Cadiz. The houses are built of white stone. It has a fine hospital, and manufactures of linen, earthenware, and brandy. Here are mineral springs which are much frequented. Pop. 9097.

Chi'co, chee'co, a post-village of Butte co., Cal., in a township of the same name, on Chico Creek and on the

Oregon division of the Central Pacific R. R., 96 miles N. of Sacramento. It is in a rich farming district, and has a steamboat connection with Sacramento. It has one weekly newspaper. Pop. including township, 3714.

Chico'a, a township of Pitt co., N. C. Pop. 1683.

Chic'opee, a river of Massachusetts, rises in Worcester county, flows nearly westward, and enters the Connecticut 4 miles above Springfield. It affords abundant water-power.

Chic'opee, a post-village of Hampden co., Mass., on the Connecticut River, at the mouth of the Chicopee, 4 miles N. of Springfield. It was formerly called CABOTVILLE. It has a national bank, a newspaper-office, and several cotton-mills of the Dwight Company (which employs a capital of $1,500,000 or more); also manufactures of swords, cutlery, machinery, and brass cannon. The Ames Company have here the largest manufactory of swords in the U. S. Pop. of Chicopee township, including Chicopee and Chicopee Falls, 9607.

Chicopee Falls, a post-village of Chicopee township, Hampden co., Mass., on the Chicopee River, 5 miles N. of Springfield and 1½ miles E. of Chicopee Centre, with which it is connected by a branch railroad. It has extensive water-power, four large cotton-mills, a bleachery, and manufactures of knitting machines, agricultural tools, Maynard rifles, guns, pistols, levels, planes, and plumbers' goods. It has four churches. Pop. about 3000. A. W. PAGE, P. M.

Chic'ory, or **Suc'cory,** an herb of the order Compositæ, sub-order Liguliflorae. The common chicory or succory (*Cichorium Intybus*) is a perennial plant, found wild in most parts of Europe and naturalized in the U. S., growing in waysides, borders of fields, etc. It has a long, carrot-like root of a dirty or brownish-yellow color, and white within. The stem rises two to five feet, the leaves resembling those of the dandelion; the flowers rather large, beautiful, and generally blue. Chicory is extensively cultivated in Europe for its roots and for feeding cattle with its leaves. The blanched leaves are sometimes used as a salad. To this genus belongs also the endive. Chicory is much used with coffee. The roots are dried and roasted in heated iron cylinders, which are kept revolving as in coffee-roasting. During roasting the addition of two pounds of lard or butter for every hundredweight of chicory communicates to it the general appearance of coffee. Chicory contains sugar, but otherwise does not supply the animal economy with any useful ingredient. Some dislike the taste of chicory, and when largely used it has a tendency to produce diarrhœa; but many people prefer to use coffee mixed with chicory.

Chicot, shee'ko, a county which forms the S. E. extremity of Arkansas. Area, 800 square miles. It is bounded on the E. by the Mississippi River. The surface is level, and is drained by magnificent bayous. The soil is fertile. Cotton, tobacco, and corn are the chief crops. Capital, Lake Village. Pop. 7214.

Chicot, a post-village of Chicot co., Ark., on the Mississippi River, is the terminus of two railroads. It has two churches, two schools, machine-shops, and a newspaper. ED. OF "TIMES."

Chicoutimi, a county of the Dominion of Canada, in Quebec, is intersected by the river Saguenay, and borders on a large lake called St. John's. Lumber is exported from it. Capital, Chicoutimi. Pop. in 1871, 17,493.

Chicoutimi, a post-village, capital of Chicoutimi co., Quebec (Canada), on the S. side of the river Saguenay, 75 miles from its mouth. It has a court-house, jail, a convent of the Good Shepherd, and an important trade in lumber, which is shipped direct to England and other regions.

Chictawau'ga, a township of Erie co., N. Y. Pop. 2465.

Chief-Justice, the title of the highest in rank of the judges of a court. The chief-justice of the U. S. is an officer who presides over the Supreme Court, controlling its docket, regulating the order of business, and assigning to the associate justices the cases in which they are to prepare opinions. He reads decisions in practice cases; administers the oath to the President and Vice-President at their inauguration; presides when the President is on trial after impeachment; and nominates persons to be appointed registers in bankruptcy by the district judges. Like his associates, he is required to attend at least one term of the circuit court in his circuit during each period of two years. He ranks next to the President in official dignity. His salary is $6500.

Chiem See, a lake of Bavaria, 42 miles S. E. of Munich, is at an elevation of 1726 feet above the sea. It is 12 miles long, about 7 miles wide, and 458 feet deep. It contains many fish. The surplus water is discharged through the Alz into the river Inn.

Chie'ri (anc. *Carrea Potentia*), a town of Italy, in the province of Turin, on the slope of a hill 8 miles S. E. of Turin. It had manufactures of fustians, etc. in 1422. Here is the church of St. Domenico, built in 1260, and the church of Santa Maria della Scala, which was founded in 1405, the largest Gothic structure in Piedmont. Chieri has manufactures of silk, cotton, and linen fabrics. Pop. 10,036.

Chie'ti, formerly **Abruzzo Citeriore,** a province of Central Italy, is a mountainous region. The chief products are corn, oil, fruits, rice, and wine. Area, 1277 miles. Pop. in 1871, 339,961.

Chieti (anc. *Teate*), a fortified episcopal city of Italy, capital of the province of Chieti or Abruzzo Citeriore, is situated on a hill near the Pescara, 40 miles E. of Aquila, 115 miles N. of Naples, and 6 miles from the Adriatic. It is the see of an archbishop, and has a cathedral, a college, and a fine theatre. Here are some manufactures of silk and woollen goods. Chieti occupies the site of the ancient *Teate*, a large and important city, the remains of which are still visible. Among these are the ruins of a theatre and several temples. Pop. in 1872, 23,607.

Chignec'to Bay, an inlet in British North America, is the northern part of the Bay of Fundy, and extends between New Brunswick and Nova Scotia. It is about 30 miles long.

Chi'goe, or **Jig'ger** (*Sarcopsylla penetrans*), a species of flea, much smaller than the common flea, found in the West Indies and North and South America, attacking any exposed part of the human body, effecting a lodgment between the skin and flesh, often under the nails of the toes, and also infesting dogs and mice. At first its presence is indicated by a slight itching, but ulceration is likely to result, which is not only painful, but even dangerous when the female chigoe is allowed to remain and deposit her eggs, about sixty in number. Before these are deposited her abdomen becomes distended to the size of a pea. The ulcer speedily contains a great colony of chigoes. The natives are very expert in extracting the chigoe, which is also removed by washing with tobacco juice. Rubbing with tobacco leaves is a preventive of its attacks, but cleanliness and the wearing of shoes is still better. Death has followed neglect to remove the chigoe.

Chi- (or **She-**) **Hoang-Ti,** called also **Tsin-Chi-Hoang-Ti,** and sometimes **Ching-Wang,** one of the greatest emperors of China, ruled that country from 246 to 210 B. C. The country now called China was then divided into eight feudatory kingdoms or principalities. He formed the design of subjugating them all and consolidating them into one great empire. This he at length accomplished, and by expelling some barbarous nations extended the empire to nearly its present limits. He also built the Great Wall of China, employing upon it several millions of men for ten years, of whom it is said half a million perished before the work was finished. He is also said to have been the first Chinese sovereign who caused a statistical survey of the whole empire, with a valuation of lands, products, etc., in order that the tributes might be justly apportioned. But his memory is stained by his attempted destruction of the ancient books of the country. This attempt he made in order to weaken or destroy the authority of the learned class, who were his enemies, and also to obliterate the national reverence for antiquity, which formed the chief support of the authority of that class. He appears to have been the first ruler of China (if we except those of a very remote antiquity) who assumed the title of *hoang* or "emperor," his predecessors having been called by the more modest title of *wung* or "king." Chi-Hoang-Ti has been compared to Napoleon, whom he certainly resembled in the force of his will, as well as in the extent of his power.

Chihua'hua, a state of Mexico, bordering on Texas, has an area of 105,299 square miles. It is bounded on the N. E. by the Rio Grande del Norte, and is drained by the Conchos. The W. part is occupied by a long mountain-chain called Sierra Madre. The surface E. of this chain is mostly a high table-land; the soil is generally arid and sterile. The state is rich in minerals, including gold, silver, copper, lead, tin, and cinnabar. The silver-mines, which are in the Sierra Madre, were formerly very productive. The chief wealth of the inhabitants consists in herds of cattle, horses, and mules. This state is infested by Apaches, who greatly retard its prosperity. Capital, Chihuahua. Pop. of the state in 1871, 179,971.

Chihuahua, a town of Mexico, the capital of the above state, is about 310 miles N. N. W. of Durango; lat. 28° 50′ N., lon. 105° 33′ W. It has a fine stone cathedral which cost about $800,000, a state prison, a state-house, and a mint. It is supplied with water by a good stone aqueduct

three miles long. Silver-mines have been opened in the vicinity. Chihuahua has an active trade with San Antonio in Texas. Pop. 12,000.

Chil'blain [Lat. *pernio*], one of the secondary effects of cold and moisture upon the human system, principally affecting the feet, hands, nose, ears, etc. Chilblains are frequently chronic in their character. Mild cases are marked by swelling and redness of the affected part, accompanied by intolerable itching. The more severe forms assume an ulcerated, and sometimes even a gangrenous, character. Those troubled with chilblains should carefully protect the feet and hands from cold, should wash the feet frequently and dry them very thoroughly, and avoid going near a fire when they are very cold. Benzoated oxide-of-zinc ointment, citrine ointment, borax and sugar of lead in oil or glycerine, tincture of iodine, sulphurous acid solution, and various stimulant applications are all useful, some being suited to the condition of certain patients, while others may require different applications. The severer forms may need surgical treatment.

Child (Francis J.), Ph. D., born in Boston Feb. 1, 1825, graduated at Harvard in 1846. After taking his degree he was for some time tutor in mathematics at Harvard, and subsequently in rhetoric and history. In 1849 he visited Europe, where he spent about two years. In 1851 he succeeded Prof. E. T. Channing as Boylston professor of rhetoric and oratory. Prof. Child is especially distinguished for his thorough acquaintance with early English literature. As a Chaucer scholar he has perhaps no superior in America or Europe. He has contributed to this "Cyclopædia" the admirable article on Ballad Poetry.

Child (Lydia Maria), an American writer, born at Medford, Mass., Feb. 11, 1802. Her maiden name was Francis. She was married in 1828 to David Lee Child, a lawyer, and became editor of the "National Anti-Slavery Standard" in 1841. She published, besides other works, "Letters from New York" (2 vols., 1844), "The Oasis," "Fact and Fiction," "Philothea, a Grecian Romance," "The Progress of Religious Ideas" (3 vols., 1855), and "Eminent Women of the Age" (Hartford, 1868).

Childbirth. See Obstetrics.

Childe (John), an American officer and engineer, born Aug. 30, 1802, at West Boylston, Mass., graduated at West Point in 1827. He served, while lieutenant of artillery, on ordnance duty 1828–34; garrison and engineer duty at Newport Harbor, R. I., 1834–35. Resigned Dec. 31, 1835, and assumed the profession of civil engineer, in which he became eminent, particularly in the construction of railroads and bridges and improvements of rivers and harbors. His official reports are models of logical force and accuracy, and his inventive talent for mechanical improvements was remarkable. Died Feb. 2, 1858, at Springfield, Mass., aged fifty-five. George W. Cullum, U. S. A.

Chil'dermas [from *child* and *mass*], or **Holy Innocents' Day** (Dec. 28th, or in the East the 29th), is observed by the Roman, Anglican, Greek, and various Eastern churches as a festival in honor of the children killed by Herod. It was considered unlucky to marry or to begin any work on this day. The learned John Gregory says: "It hath been a custom, and yet is elsewhere, to whip up the children upon Innocents' Day morning, that the memory of Herod's murder might stick the closer, and in a moderate proportion to act over the crueltie again in kinde." Throughout the day, however, the children might exercise a certain authority over the rest of the household.

Chil'dersburg, a township and post-village of Talladega co., Ala., on the Selma Rome and Dalton R. R., 90 miles N. E. of Selma. Pop. 1112.

Chil'dren (John George), F. R. S., an English electrician, born at Tunbridge in 1777. He constructed a galvanic battery with plates about four feet long and two wide, by which he demonstrated that the quantity of electricity is in proportion to the size of the plates, and its intensity depends on their number. Died in 1852.

Childs (George W.), an American journalist and publisher, born in 1829 at Baltimore, Md. He became a resident of Philadelphia in his youth, and in 1849 became a partner in a publishing-house. He purchased in 1864 the "Public Ledger," a daily newspaper of Philadelphia, which he made very successful. He is also distinguished for liberality.

Childs (Henry Halsey), M. D., a son of Timothy Childs (see below), was born in Pittsfield, Mass., June 7, 1783, and graduated at Williams in 1802. He was for many years president of the Berkshire Medical College, and was lieutenant-governor of Massachusetts in 1843. He was distinguished for his benevolence, integrity, and professional enthusiasm. Died Mar. 22, 1868.

Childs (Linus), born in 1803 at Southbridge, Mass., graduated at Yale in 1824, became a lawyer of Boston, Mass., and was for some time agent of a manufactory at Lowell. He was active in State politics, and was a prominent member of the prudential committee of the American board of commissioners for foreign missions, and of the trustees of Andover Theological Seminary and Phillips Academy. Died Aug. 26, 1870.

Childs (Orville W), an able civil engineer, was chief engineer of the New York State works (1840–47), aided in constructing the Champlain Canal, and in the survey of the Nicaragua ship-canal route. He contributed much to professional literature. Died at Philadelphia Sept. 6, 1870.

Childs (Thomas), an American officer, born in Pittsfield, Mass., in 1796, graduated at West Point in 1814 in the artillery. He served with distinction in the war of 1812–15 at the battle of Niagara, and at Fort Erie in 1814; he was engaged in the Florida war against the hostile Indians from 1836 to 1842, and in the war with Mexico, at Palo Alto, Resaca de la Palma, Monterey, Vera Cruz, and Cerro Gordo. For his distinguished conduct in the Florida war he was brevetted major, lieutenant-colonel, and colonel, and in the Mexican war brevetted brigadier-general. Died Oct. 8, 1853.

Childs (Timothy), M. D., born in Deerfield, Mass., in 1748, was a distinguished patriot and an army-surgeon in the Revolutionary war. At the end of the war he successfully resumed his medical practice at Pittsfield. Died Feb. 25, 1821.

Chilhow'ie, a post-township of Johnson co., Mo. Pop. 1362.

Chi'li [Sp. *Chile*], a republic of South America, is a long and narrow tract bounded on the E. by the Andes and on the W. by the Pacific Ocean. It extends from lat 24° to 43° 20′ S., and from lon. 70° to 74° W. It is about 1200 miles long, and varies in width from 90 to 130 miles. Area, estimatad at 132,616 square miles. The dispute with Bolivia concerning the northern frontier was settled by the treaty of 1866, which gave to Bolivia possession of the Bay of Mejillones, but secured to Chili an equal share of the guano of the disputed territory.

Physical Features.—The surface is mountainous, and belongs entirely to the western slope of the great Cordillera of the Andes, which here attains a very great height. The mean elevation of the Chilian Andes is nearly 14,000 feet above the level of the sea. Among the peaks of the Chilian Andes is the porphyritic Nevado of Aconcagua, which rises 22,422 feet, and was once said to be the highest peak in South America. The volcano of Antuco near the eastern border of Concepcion is 8917 feet high. Other active volcanoes occur on the border of Chili. Besides the central chain of the Cordillera, Chili is traversed by lateral ridges separated by deep valleys, some of which are fertile. The richest soil and most luxuriant vegetation are found in the southern and central parts. The country N. of Valparaiso is mostly arid and sterile. The coast of Chili is bold and rocky, with deep water close to the shore. This region is subject to earthquakes, one of which in 1822 destroyed several cities, and raised the coast four feet above its former level. This change of level was permanent and very extensive.

Geology and Minerals.—The predominant rocks of Chili are granite, porphyry, basalt, quartz, clay-slate, limestone, etc. A long and narrow belt of palæozoic and fossiliferous strata extends along the coast S. of Santiago. Many silver-mines have been opened in the N. part of Chili, but the desert nature of the country and the scarcity of water render the mining operations difficult and expensive. Gold, copper, lead, iron, bismuth, antimony, cobalt, and quicksilver are also found here, the mines of copper being especially important. Extensive beds of bituminous coal have been opened near Talcahuano.

Climate, Productions, etc.—The climate of this region is remarkably healthy. Rain falls only between June and September, but the northern desert is subject to long droughts which continue for years. In the central parts of Chili storms of hail and terrific thunder are frequent in the winter. The hottest months of the year are January and February, during which the mercury sometimes rises to 95° F. in the shade. The southern part is covered with dense forests. The laurel, myrtle, cypress, and other evergreens attain here a gigantic size. In the middle portions the soil is adapted to grazing and the cultivation of grain. The staple productions are wheat, barley, maize, hemp, and potatoes. Apples, pears, plums, peaches, oranges, and other fruits are abundant. The chief articles of export are silver, copper, wheat, hides, and wool.

Rivers, Lakes, and Harbors.—Chili has no large rivers or large lakes. The streams are mostly mere mountain-

torrents, and are not navigable. The Biobio, which is one of the principal streams, is nearly 200 miles long. Many small lakes occur among the mountains. The best ports and harbors are at Valdivia, Valparaiso, Concepcion, and Coquimbo.

Political Divisions, Government, etc.—Chili is divided into fifteen provinces, named Chiloe, Llanquihue, Valdivia, Arauco, Concepcion, Nuble, Maule, Talca, Curico, Colchagua, Santiago, Valparaiso, Aconcagua, Coquimbo, and Atacama, to which must be added the colony of Magallanes. The chief cities are Santiago, the capital, Valparaiso, Talca, and Concepcion. The executive power is exercised by a president elected for a term of five years. The legislature consists of two houses—the chamber of deputies, who are elected for three years, and the senate, the members of which are chosen for a term of nine years. The established religion is Roman Catholic. A large proportion of the population are of Spanish descent, and the other inhabitants are mostly Indians or aborigines. The public revenue in the budget of 1871 was estimated at 11,550,000 pesos (1 peso = 93 cents), and the expenditure at 12,542,493 pesos. The public debt in 1870 was 39,924,833 pesos. The value of the exports in 1869 amounted to $27,720,000, and that of the imports to $27,230,000. In 1871, Chili had 472 miles of railroad in operation. Pop. in 1865, 2,166,000. The number of vessels arriving in the ports of Chili in 1869 was 4009. The army embraces 5018 men of the line and 54,992 national guards. The fleet consists of 12 steamers.

History.—Chili was a part of the dominions of the inca of Peru when the latter was conquered by Pizarro. Almagro invaded Chili in 1535, soon after which the conquest of the country, except Araucania, was completed by Valdivia, who founded Santiago in 1541. He was defeated and killed in 1553 by the Araucanians, whom the Spaniards were never able to conquer. In 1810 the Chilians revolted against the king of Spain, and a junta which had met at Santiago elected the marquis de la Plate, a native of Chili, president of the republic. On Feb. 12, 1817, the Spaniards suffered a decisive defeat at Chacabuco; on Jan. 1, 1818, the independence of Chili was formally proclaimed by Bernardo O'Higgins, the commander-in-chief of the Chilian patriots; and on May 5 of the same year it was fully secured by the great victory of the Chilians on the river Maypu. The last stronghold of the Spaniards, the island of Chiloe, was captured in Jan., 1826. The first constitution was adopted in 1824, and a second in 1828. From May, 1837, to Mar., 1839, a war was carried on with Peru. On April 25, 1844, a treaty was concluded with Spain which recognized the independence of Chili. During the administrations of President Bulnes (1841–51) and of President Manuel Montt (1851–61) Chili remained free from the troubles which agitated most of the other South American republics. Two insurrections during the administration of the latter were easily suppressed. Agriculture, mining industry, and navigation steadily advanced, and a considerable immigration from Europe took place. During the two administrative terms of President Perez (1861–71) Chili, in union with Peru, Bolivia, and Ecuador, was involved in a war with Spain, which began in 1865. A Spanish fleet on Mar. 31, 1866, bombarded Valparaiso, but had to raise the blockade on April 14, owing to the remonstrances of the European powers. Actual hostilities soon after ceased, but a formal truce was not concluded until July, 1869, through the mediation of the government of the U. S. On Sept. 18, 1871, F. Errazuriz was elected president for the term 1871 to 1876. The new president, as well as his two immediate predecessors, supported the interests of the conservative and Church parties. The liberal party of Chili contends in particular for the introduction of universal suffrage and religious toleration. From 1859 to 1873 the republic was entirely free from intestine commotions, but it had often to suppress the insurrections of the Araucanians. (See Asta Buruaga, "Diccionario jeografico de la Republica de Chili," 1868; Valenzuela, "Historia jeneral de la Republica de Chili," 4 vols., 1866–68; Hunter, "A Sketch of Chili," 1866.)

A. J. Schem.

Chili, a township and post-village of Hancock co., Ill., on the Keokuk branch of the Toledo Wabash and Western R. R., 15 miles S. S. E. of Carthage. Pop. 1601.

Chili, a post-township and village of Monroe co., N. Y., on the New York Central R. R., 58 miles E. N. E. of Buffalo. Pop. 2367.

Chil'iad [Gr. χιλιάς, from χίλιοι, a "thousand"], an assemblage of things grouped or ranged by thousands. The word is chiefly used by the early computers of logarithmic tables, who expressed the extent of the table by saying it contained the logarithms of so many *chiliads* of absolute numbers.

Chiliasts. See Millennarians.

Chillicoth'e, a post-village of Peoria co., Ill., on the Illinois River and on the Peoria branch of the Chicago Rock Island and Pacific R. R., 18 miles N. N. E. of Peoria. It is a large grain dépôt, and possesses various manufacturing industries. A daily packet-boat runs to Peoria. It has one weekly newspaper. Pop. of township, 1486.

S. Stowell, for Ed. of "Democratic Union."

Chillicothe, capital of Livingston co., Mo., on the Hannibal and St. Joseph R. R. and on the Omaha branch of the St. Louis Kansas City and Northern R. R.; also the terminus of the Chillicothe and Des Moines City R. R., 76 miles E. of St. Joseph. It is the principal town in the Grand River Valley. It contains ten churches, two newspapers, two banks, three flouring-mills, two planing-mills, one foundry and machine-shop, fifty-seven stores, one academy, and graded free schools. Plenty of timber and water. Coal in abundance in the vicinity. Pop. 3978; of township, 2118.

Marsh & Desha, Props. of "Tribune."

Chil'licoth'e, or **Chilicoth'e,** a beautiful city, the capital of Ross co., O., is finely situated on the Scioto River, and in a plain enclosed on several sides by verdant hills nearly 500 feet high. It is on the Marietta and Cincinnati R. R., and on the Ohio and Erie Canal, about 48 miles S. of Columbus and 99 miles E. by N. from Cincinnati. The streets are wide, straight, and lighted with gas. It has a stone-front court-house, which cost about $100,000, thirteen or more churches, five newspaper-offices, three national banks, and four commodious brick union school-houses; also manufactures of steam-engines and farming-implements, flour-mills and other manufactories, and the Marietta and Cincinnati R. R. shops. Chillicothe was the capital of Ohio from 1800 to 1810. Pop. 8030.

J. R. S. Bond & Son, Pubs. "Scioto Gazette."

Chil'lingworth (Rev. William), an eminent English divine and controversialist, born at Oxford in Oct., 1602. In 1618 he became a scholar, and in 1628 a fellow of Trinity College, Oxford. In 1630, through the influence of John Fisher, the famous Jesuit, he became a Roman Catholic, and entered the Jesuit College in Douay, France. In 1631 he was persuaded by his godfather, Laud, then bishop of London, to reconsider the question and return to Oxford. In 1637 he put forth his great work, "The Religion of Protestants a Safe Way to Salvation," a work of singular acuteness and ability. He became chancellor of Salisbury and prebendary of Brixworth. In theology he was a latitudinarian, and in politics a royalist. Died at Chichester Jan. 31, 1644. His collected works appeared in 1742. (See Des Maizeaux, "Life of Chillingworth," 1725; August Neander, "Erinnerung an den evangelischen Gottesgelehrten W. Chillingworth," 1832.)

Chillisqua'que, a township and post-village of Northumberland co., Pa., about 55 miles N. of Harrisburg. Pop. 1597.

Chillon, commonly pronounced shil'lọn [Fr. pron. she'yôn'], a castle and fortress of Switzerland, in the canton of Vaud, 6 miles S. E. of Vevay. It is at the E. end of the Lake of Geneva, on an isolated rock, almost surrounded by deep water. It was built by Amadeus IV. of Savoy in 1238, and was long used as a state prison. Bonnivard was confined here from 1530 to 1536 for his efforts to liberate the Genevese. This place is the scene of Byron's poem, "The Prisoner of Chillon."

Chil'mark, a post-township of Dukes co., Mass., on the island of Martha's Vineyard. Pop. 476.

Chi'lo, or **Chi'lon** [Gr. Χίλων or Χείλων], a Spartan who is enumerated among the Seven Wise Men of Greece. He became one of the ephori of Sparta in 556 B. C. Among the maxims ascribed to him is "Know thyself." He is said to have died of joy when his son gained a victory at the Olympic games.

Chil'oe, an island of South America, in the Pacific Ocean, forms (with many small isles) a province of the republic of Chili. Area, 2398 square miles. It is separated from the mainland by a strait about a mile wide. Length from N. to S., about 110 miles; average width, nearly 40 miles. It is mountainous and covered with magnificent forests. The western shores are rocky, and rise abruptly to the height of 1500 feet or more. The climate is extremely moist. The soil is fertile, and produces wheat, barley, potatoes, etc. Capital, San Carlos. Pop. in 1869, 61,607.

Chil'tern Hund'reds, The Stew'ardship of, in England, a nominal office which a member of Parliament, desiring to withdraw, receives and immediately resigns; since a member cannot resign unless disqualified, and an appointment by the Crown works such disqualification. In old times the steward's duties were to protect from the robbers who lurked in the forests of the Chiltern Hills. When this office is occupied the stewardship of the manors of East

Hendred, Northshead, and Hempholme is made to serve the same purpose.

Chil'ton, a post-village, capital of Calumet co., Wis., on the Manitowoc River, 24 miles N. E. of Fond du Lac. It has a newspaper-office. Pop. of Chilton township, 1517.

Chimæ'ra [Gr. Χίμαιρα], a monster of classic mythology, was described by Homer as having the head of a lion, the body of a goat, and the tail of a dragon. It was supposed to exhale flames of fire. In modern languages the the term chimera is applied to any wild or incongruous fancy.

Chimæ'ra, a genus of cartilaginous fishes, ranked by

Chimæra, or Sea Cat.

Cuvier with the sturgeons (Sturionidæ), but now generally regarded as the type of a distinct family, of which only two or three species are known. The gills have a single wide opening, as in the sturgeons; but the gill-lid or operculum is merely rudimental and concealed in the skin, while there is an approach to sharks in the structure of the gills. The only known species of chimæra is *Chimæra monstrosa,* occasionally found in the British seas, and more common in more northern latitudes. It is sometimes called the "king of the herrings." It pursues the shoals of herrings, and is consequently sometimes taken in the herring-nets. It is seldom more than three feet long. Its general color is silvery white, the upper parts mottled with brown. It produces very large leathery eggs.

Chima'ra, or **Chimari** (anc. *Ceraunii Montes, i. e.* "thunder mountains"), a mountain-range of Albania, between lat. 40° and 41° N., and near lon. 19° E., terminating in Cape Linguetta, called by the ancients *Acroceraunia.*

Chimbora'zo, a conical mountain-peak of South America, is the culminating point of the Colombian Andes, and is 90 miles S. by W. from Quito. Its height, according to Humboldt, who ascended to within 1663 feet of its summit, is 21,422 feet. It rises only 12,000 feet above the adjacent table-land. It was formerly supposed to be the highest mountain in the world, but it is exceeded by Aconcagua, Parinacota, and Sahama of the Andes, and several of the Himalayas. No person has ever reached the summit of Chimborazo, which presents a magnificent spectacle from the Pacific Ocean at a distance of 100 miles or more.

Chime [Fr. *carillon*], the consonant or harmonic sounds of several instruments; correspondence of sound; music performed on a set of bells in a church tower. The term is sometimes used to denote a set of bells which chime or ring in harmony.

Chimere [Fr. *chimère,* from the Sp. *zamarro,* a "sheep skin"], the upper robe worn by a bishop, to which the lawn sleeves are now generally attached. Since the time of Queen Elizabeth it has been of black satin, but previously it was of a scarlet color, like that now worn by bishops assembled in convocation and when the sovereign attends Parliament.

Chim'ney [Fr. *cheminée*], a flue or cluster of flues for carrying off smoke or sustaining a draft in fires maintained in buildings for economical or other purposes. There are no remains of chimneys in the ruins of ancient cities, and no evidence from literature that such chimneys existed. Fires were either of charcoal in open braziers, or the smoke of a wood-fire was allowed to escape through a hole in the roof. The earliest remains of chimneys in Europe are somewhat doubtfully referred to the twelfth century. An earthquake in Venice in 1347 destroyed many chimneys. The year 1368 is assigned for the building of the first chimney in Rome. Early in the seventeenth century many houses of well-to-do yeomen in England had no chimneys. Their general use in France was of even later date. The earliest chimneys were cylindrical and very high. Many-flued chimneys are much later. Of late the construction of tall chimneys for manufacturing purposes is very common, some exceeding in height the tallest spires. They are built from the inside.

The principle of the draught of chimneys is, that a column of heated air is lighter than a column of cool air of the same height, and the greater the height of the heated column, the greater the difference of weight between the column of air within and without the flue. This is one reason why the chimneys of furnaces and mills are made so high, since a powerful draft can thus be easily maintained. It is also important to have the flue vertical, so as to prevent the friction of the air and the loss of heat which a long passage causes. If all the draft passes through the fire, so that the rising air becomes well heated, there is but little danger of downward currents causing a smoky chimney. The throat of the chimney of an open fireplace should be well contracted, and be directly over the fire, thus causing an intensity of draft at the throat, which will tend to overcome any downward currents which may exist in the chimney.

In towns especially chimneys are liable to be overtopped by neighboring buildings, and such chimneys are liable to become smoky during high winds, because the lofty walls deflect the wind and cause it to blow down the chimney. Various revolving and other cowls and chimney-tops have been devised to remedy this trouble. One of the best of these is Espy's ventilator, which does not rotate, and which is always effective, whatever be the direction of the wind. Another cause of smoky chimneys is insufficient ventilation. If air cannot enter a room rapidly enough to supply the draught of the chimney, it is obvious that the draft will be diminished. The most complete investigations in the matter of curing smoky chimneys are those of Count Rumford.

Chimney Rock, a post-village and township of Rutherford co., N. C., about 72 miles W. N. W. of Charlotte. Pop. 1024.

Chimpan'zee, the *Troglodytes niger,* an anthropoid or tailless ape of tropical Africa, noteworthy as one of the species of mammals which most closely approach the form and anatomical structure of man. It is about five feet high, covered with dark hair, is gregarious, and arms itself for defence with clubs and stones. It can be tamed and taught to walk, sit in a chair, and eat like a human being. Its arms are much longer than a man's, it has thirteen dorsal vertebræ and pairs of ribs instead of twelve, and the structure of its hand is far less delicate and complete than man's.

China. See Chinese Empire.

China, kī'na, a name of cinchona bark often to be met in books, and in common use on the continent of Europe. It is especially used by homœopathic practitioners. The name is derived, not from the empire of China, but from *kina* or *quina,* the Peruvian name of cinchona.

China, or **China-ware.** See Porcelain, by Prof. C. F. Chandler, Ph. D., LL.D.

China, a township of Lee co., Ill. Pop. 2351.

China, a post-township of Kennebec co., Me. P. 2118.

China, a post-township of St. Clair co., Mich. P. 1637.

China'bee, a township of Talladega co., Ala. P. 810.

China Clay. See Kaolin.

China Grass, or **Chinese Grass,** a vegetable fibre which the Chinese manufacture into a beautiful fabric called "grass cloth." It is also manufactured in Europe to some extent. It is obtained mostly from the *Bœhmeria nivea,* a plant of the order Urticaceæ. (See Ramie.) Grass cloth has a glossy appearance and a silky lustre. The plant yielding this excellent fibre flourishes in the southern parts of the U. S. under proper cultivation.

China, Great Wall of, the most remarkable fortification ever erected by human hands, was constructed by order of the celebrated emperor Chi- (or Tchi-) Hoang-Ti, for the purpose of protecting the northern and north-western frontier of the empire from the hordes of barbarians who were then swarming in that part of Asia. To accomplish this great object, several millions of men, it is said, were occupied for the space of ten years, during which time half a million of those employed on the work perished. It was completed in 211 B. C. The entire length of the wall is about 1250 miles, the height being from twenty to twenty-five feet, with towers about 100 yards apart and forty feet high. The wall is much thicker at the base than at the summit, which, however, is sufficiently broad to admit of six horsemen riding abreast. Each face of the wall was built of hewn stone or brick, with earth filled in between. No inconsiderable part of this great fortification is now in a ruinous condition, and some travellers whose attention has been directed chiefly to such portions—which, being constructed principally of earth, do not after a lapse of nearly twenty-one centuries present a very imposing ruin—have been led to speak disparagingly of the whole work. But those Europeans who have examined the work more carefully speak of it in a very different tone, and assert

that the portions which are faced with stone exhibit masonry of a very superior kind, the stones being admirably fitted together, and that the arches, in particular, are exceedingly well constructed. To give an idea of the quantity of material used in the erection of this great wall, it may be stated that a careful calculation has shown that it would be more than sufficient to construct a wall six feet high and two feet thick twice round the world. (See PAUTHIER'S "Chine.")

China Grove, a township and post-village of Pike co., Ala., 32 miles S. E. of Montgomery. Pop. 1080.

Chinande'ga, a town of Central America, in Nicaragua, is in a fertile plain about 10 miles from the Pacific Ocean and 18 miles N. W. of Leon. The houses are built of adobes, and are only one story high. Cotton and sugar are produced in the vicinity. Pop. 8000.

China, Pride of (*Melia Azedarach*), a small and beautiful tree of the order Meliaceæ, a native of Southern and Western Asia, naturalized in the Southern U. S. It is often called "pride of India," "China tree," and "bead tree." The bark of its root is used as a vermifuge, and constitutes the drug azedarach. It has a sweetish fruit about the size of a cherry, often eaten by children without harm, though considered poisonous. Its wood is hard and beautiful. This tree is naturalized in the south of Europe. An allied species, the *Melia Azedarachta*, the margosa or neem tree of India, yields a febrifugal bark, and a sap (toddy) used as a beverage, while the pulp of its fruit, like the olive, affords a useful oil.

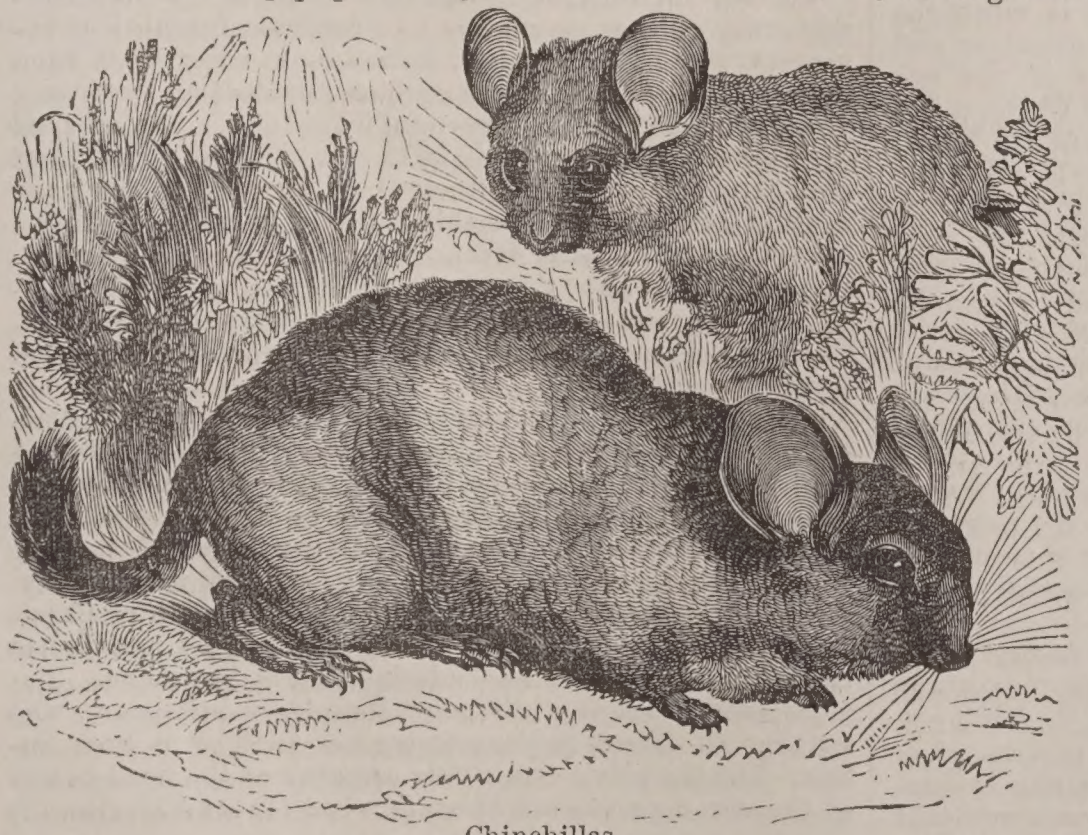
China Root, the rhizome of *Smilax China*, a climbing shrubby plant allied to sarsaparilla, a native of China, Cochin-China, and Japan. The stem is round and prickly, the leaves thin and roundish oblong; the rhizome tuberous and large, sub-astringent and diaphoretic. It is occasionally used in medicine in Europe, but it is also employed in the East as an article of food, for it abounds in starch.

China Sea [Fr. *Mer Orientale;* Chinese, *Toong Hai*] is that portion of the Pacific Ocean which extends between China and Siam on the W., the Philippine Islands on the E., and Borneo on the S. The chief ports on this sea are Canton, Manila, and Singapore.

China Wax, a substance resembling beeswax, produced by an insect (*coccus*) which lives on the *Fraxinus Chinensis*, an ash tree of China. The wax is scraped from the branches, melted, and strained. China also exports Japan wax, obtained from the fruit of *Rhus succedanea*, a sort of sumach tree.

Chin'cha Isl'ands, three small islands in the Pacific Ocean, about 14 miles from Peru, to which they belong; lat. 13° 39′ S., lon. 76° 28′ W. Here are large deposits of guano, and here multitudes of penguins and other oceanic birds build nests and breed. Neither of these islands is more than a mile in extent. They present cliffs 300 feet high and perpendicular, with numerous caves into which the sea dashes. The entire supply has been recently estimated at 40,000,000 tons. The exportation of this manure from Peru in the years 1871–72 was 1,187,327 tons.

Chinchil'la [Sp. pron. chin-cheel'yâ], (*Chinchilla*), a



Chinchillas.

South American quadruped of the order Rodentia, and of a family, Jerboidæ, allied to the rabbits. There are several genera of Jerboidæ, distinguished in part by the toes, the true *Chinchilla* having four, with the rudiment of a fifth, on the fore feet, and four on the hind feet. All the family are gregarious, feed on roots, and live either in holes in rocky districts or in burrows. They are valued for their fur, particularly the chinchilla of the Andes (*Chinchilla lanigera*), of which the fur constitutes an important article of commerce. Their numbers are decreasing in consequence of the demand for the fur. The ancient Peruvians were accustomed to employ this fur as wool for the manufacture of fine fabrics. It might profitably be kept in a domesticated state. Chinchilla wool is variable in quality, and is perhaps the product of several species. The chinchilla is about the size of the common rat.

Chinchi'lla (anc. *Salaria*), a city of Spain, in the province of Albacete, on a hill 10 miles S. E. of the city of Albacete. It was formerly fortified, and is still enclosed by old walls. It has a fine church, and manufactures of cloth, linen, glass, earthenware, etc. Pop. 6044.

Chinese Architecture. In China the rise of the arts seems to have been constantly repressed by the state of mechanical drudgery and servitude in which the people are kept. In their painting, for example, the most exact imitation of plants, fruits, and trees is thought indispensable. Every matter relating to building is the subject of regulation by the police, which, rather than theory, governs its architecture. The laws of the empire detail and enforce with the greatest precision the mode of constructing a lou or palace for a prince of the first, second, or third rank, of a grandee, of a mandarin, etc. According to the ancient law of the kingdom, the number and height of the apartments, the length and height of a building, are all regulated with precision, from the plain citizen to the mandarin, and from the latter up to the emperor himself. This alone is sufficient to account for the poverty and want of invention in Chinese art.

In speaking of the principles of Chinese architecture, the word is not applicable in the same way as when we speak of classical architecture, but is meant to apply to those primitive causes which gave birth to it. Character and taste in every species of architecture are the necessary results of these elements. There can be no doubt that the tent is the real model of all Chinese buildings. One of the strongest proofs of this fact is the form of the Chinese roof. Nothing but a tent or pavilion could have given the idea of it. Again, there is nothing like the appearance of a member of wood, similar to the architrave, destined to lie on the tops of the columns, and receive and support the remainder of the carpentry. The Chinese roofs, on the contrary, jut out beyond the columns, whose upper extremity is hidden by the eaves; hence the omission of the use of capitals. It is easy to perceive that extreme lightness must result from this imitation.

Lightness, in fact, is the essential character of Chinese architecture, but there is another characteristic quality, both of the model and the copy, that is observable in the edifices of China; and this is its gay appearance. In this respect scarcely any style presents a more pleasing effect. Its roofs, single and double, brilliantly painted, its gayly-diapered porticoes, the gloss over the whole surface, the harmony of this species of decoration with the light and flowing forms of the buildings themselves, so please the eye when it is accustomed to see them that our cold and monotonous mode of decoration may well appear uninviting in contrast.

REVISED BY CLARENCE COOK.

Chinese Camp, a post-township of Tuolumne co., Cal. Pop. 2220.

Chinese Empire, a vast territory of Eastern and Central Asia, occupying nearly a third of that continent. It lies between lat. 18° 20′ and 56° N., and lon. 70° and 143° 30′ E. It is bounded on the N. by Russian Asia, on the W. by Independent Tartary, S. by Hindostan and Farther India, and E. by the Pacific Ocean. The area is about 4,098,823 square miles; the population is variously estimated at from 446,500,000 to 550,000,000. The empire, besides China proper, contains Corea, which is nearly independent, also Manchooria, Mongolia, Thibet, and the Loo Choo (Lieu-Khieu) Islands. These regions, together, are nearly equal to a tenth part of the habitable globe.

CHINA PROPER [called in the Chinese language *Choong-Kway*, "central kingdom"*] occupies about one-third of the area of the

* According to Pauthier, the Chinese did not, as is commonly supposed, give the name of Central Kingdom to their country because they considered it in the centre of the world, but because in the time of Confucius the country was divided into many petty kingdoms, the central one of which, having the chief power, gave name to the empire.

empire. It extends in latitude from 21° to 41° N., and in longitude from 98° to 123° E. It is separated from the dependency of Mongolia on the N. by the Great Wall of China, by far the most extensive fortification ever undertaken by man. This wall is about 1250 miles in length, and is from twenty to twenty-five feet high. (See CHINA, GREAT WALL OF.) On the W. of China lies Thibet, on the S., Burmah, Anam, and the China Sea, and on the E., the Pacific Ocean. The important islands of Formosa and Hainan also belong to China proper. The capital of the empire is Peking.

China has a coast-line of more than 2500 miles, with an area of about 1,279,072 square miles, and a population variously estimated at from 420,000,000 to 536,909,300.

China is divided into eighteen provinces, viz.:

PROVINCES.	Area in sq. miles.	Population in 1852.	Capitals.
Pe-Chee-Lee	59,934	46,313,360	Pao-Ting-Foo.
Shan-Tong	65,100	41,700,621	Tsee-Nan-Foo.
Shan-See	55,278	20,166,072	Tie-Yuen-Foo.
Ho-Nan	65,100	33,173,526	Kai-Foong-Foo.
Kiang-Soo	44,500	54,494,644	Nan-King.
Ngan-Hwi	48,461	49,201,992	Ngan-King-Foo.
Kiang-See	72,180	43,814,866	Nang-Chang-Foo.
Che-Kiang	44,470	26,256,784	Han-Chow-Foo.
Fo-Kien	39,183	14,779,158	Foo-Chow-Foo.
Hoo-Pee	70,460	27,370,098	Woo-Chang-Foo.
Hu-Nan	74,325	18,652,507	Chang-Sha-Foo.
Shen-See	67,400	10,207,256	See-Sang-Foo.
Kan-Soo	86,608	15,354,875	Lan-Choo-Foo.
Se-Chuen	166,832	21,435,678	Ching-Too-Foo.
Quang-Tong	79,451	19,174,030	Canton.
Quang-See	78,260	7,313,895	Kwei-Lin-Foo.
Kwei-Chu	64,547	5,228,219	Kwei-Yang-Foo.
Yun-Nan	107,983	5,561,320	Yun-Nan-Foo.
Total.	1,279,072	536,909,300	Peking.

Geology.—The geology of China is not well known, but it is certain that the azoic rocks are very extensive in the S. and W. The Devonian and cretaceous strata are also extensive. Evidences of glacial action have also been observed. Coal and petroleum are found, the former abundantly. The anthracite coal seems to be especially important, but the coal of China is probably not of the carboniferous age. Silver is mined very extensively in the S. W. Gold, copper, lead, mercury, zinc, and especially iron, are abundant. Kaolin and the fictile clays are excellent in quality, and industrially very important. The engineering of mines is not well understood in China. Salt is produced in very great quantities, and yields the government a large revenue.

Physical Geography.—China is divided into three great valleys, each with its great river. These valleys are separated by two principal mountain-chains. The most northern of these chains (the Thsin-Ling, or Blue Mountains) extends in an irregular manner from W. to E., separating, to some extent, the valley of the Hoang-Ho on the N. from that of the Yang-Tse-Kiang on the S. South of the valley of the latter river is the great Yan-Ling chain, which extends north-eastwardly from the Himalayas to the Pacific. This range is said to have but few passes, and to have peaks 12,000 or more feet high. The valley of the Choo-Kiang, or Canton River, lies S. of this range. It is much the smallest of the three great basins, but is very populous, and commercially important. The eastern parts of the two former valleys constitute the Great Plain of China, a fertile and populous district. In the N. E. is a fourth basin, that of the Pei-Ho. The Yang-Tse-Kiang, the largest river of China, is a magnificent stream, which is of great importance to the internal commerce of the empire. It has a course of 2900 miles. The Hoang-Ho is about 2000 miles in length, but is so rapid as to be unsuited to Chinese navigation; but at present both these mighty streams are successfully navigated by American and European steamers, built expressly for the purpose. The two rivers are connected with each other and with Peking by the Grand Canal, which is said to be the largest and formerly the most important in the world. It is 650 miles long. A recent alteration in the course of the Hoang-Ho has, it is said, greatly diminished the usefulness of this famous canal.* The waters of China abound in fish, which furnish immense supplies of food.

Productions, etc.—China is the principal source of the commercial supply of tea for the whole world, Japan and Assam being the only other countries where its production is at all important. It also produces great quantities of silk, cotton, camphor, varnish, indigo, rhubarb, rice, maize, barley, wheat, tobacco, and fruits of many kinds. The population of China is so great that it has become necessary to carry on agriculture with great care in order to produce sufficient food. Every year the emperor of China, accompanied by the great dignitaries of the state, repairs to the Sacred Field and ploughs a furrow, by way of example to the nation. The steepest hillsides, it is said, are terraced, to increase the surface of the soil, rocks are covered with earth, the lakes have numerous floating gardens, and the bottoms of streams are planted with aquatic vegetables whose seeds or roots are used as food. The greatest economy is practised in the saving of manures. The wealthy Chinese have a strong liking for ornamental horticulture, and many of the most beautiful of our cultivated flowers have been developed in their gardens.

The production of food is not sufficient for the home-supply, great quantities of rice being imported from Siam and the Malay islands. This trade is carried on in small vessels, called *droghers*, which are often commanded by Englishmen or Americans.

The botany of the empire is very rich, from the extreme range of its latitudes and its great variations in altitude. In general, the flora may be said to resemble that of America more than that of Europe. The bamboo is one of the characteristic plants of China, and is largely used in building and for a great variety of purposes. It is said to be next to the rice-crop, commercially the most valuable production of the country. Among the native trees of China may be mentioned the curious gingko tree, well known in our parks and private grounds.

The zoology of China has not been thoroughly explored. The elephant, rhinoceros, antelope, and deer of several species are known, and bears, tigers, and other carnivorous animals are said to exist. Wild camels have been found in the western dependencies. Among the native insects is the silkworm. The ichthyology of this empire is very rich, though little studied by Europeans. The domestic animals of China are generally inferior to those of the Western nations. In addition to the kinds kept by us, they make use of the camel in the northern provinces. Domestic fowls are kept in great numbers, including several beautiful pheasants of kinds not known in Europe.

Inhabitants.—The Chinese are generally spoken of as a Mongolian race, but their language and physiognomy connect them with the races of Farther India rather than with the Mongols proper. Their language is of the so-called monosyllabic family, and has resemblances to the Burmese and other similar languages. (See CHINESE LANGUAGE AND LITERATURE.) Their coarse black hair, tawny skin, and oblique eyes give them a highly characteristic expression. They are generally a peaceable, industrious, and thrifty people, but they are said to be sensual, cruel, dishonest, and deceitful. It is probable that there are many persons of superior character among the better classes, and that the sweeping statements so often made against their character as a people are gross exaggerations.

Though the Chinese are skilled in imitative workmanship, they seem at present to be singularly destitute of inventive genius. Anciently, however, it must have been otherwise, for the mariner's compass, gunpowder, printing, and the manufacture of porcelain, paper, silk, and clocks, all were certainly first invented in China. Though not without taste in ornamental work, their skill in this direction must be considered good artisanship rather than really art in the best sense of the latter term. Their knowledge of astronomy is considerable, though wrong in theory.† Of physical and natural science they are profoundly ignorant. Their system of medicine is extremely unphilosophical and puerile.

Government.—The government is regarded as a patriarchal one. The emperor, though theoretically absolute, is really limited in his power by a carefully-digested code of laws, which, however, he can modify by his edicts. At the capital reside the ministers of state, six in number, three being Chinese and three Manchoos. These, with several assistants, constitute the privy council of the emperor. Next below this council is the grand college, which has important legislative and administrative functions. Besides these there is a college of censors or inspectors, who see that all officers in the country are faithful in their duties. The six privy councillors are each at the head of one of the six departments of state, viz.: (1) civil service, (2)

* In 1853 (or, according to some authorities, about 1850), the Hoang-Ho, leaving its former channel at a distance of about 200 miles from the sea, made for itself a new course towards the N. E., so that now its waters are discharged into the Gulf of Pe-Chee-Lee. Besides greatly injuring the Grand Canal, this change has made its former valley almost a desert from drought, while the country near its present course is frequently deluged with water. It is proposed by the Chinese government to restore the stream to its old bed. (See the "Journal of the Royal Geographical Society" for 1870.)

† They are said to have been able to calculate eclipses long before the Christian era, and their observations of a planetary conjunction which occurred 2375 B. C. have enabled chronologists to fix the date of the reign of the emperor Chuen-Hiu, whose date is given in Chinese official documents so as pretty nearly to agree with the above.

the finances, (3) religion, (4) war, (5) justice, (6) public works. A seventh department, that of foreign relations, has recently been established by the prince Kung, uncle to the emperor T'oong-Chee. Each of the eighteen provinces is under a governor, and has an internal administration of its own. Government officers have the title of mandarin, and are of various grades. The principle of competitive examination for the public service has long been carried out in China more thoroughly and successfully than in any other country.

Education is held in the highest esteem in China, and learning is rewarded not only by honorary titles, but by lucrative offices under the government. A great majority of the men can read and write. Recently, the government has sent quite a number of young men to America to be instructed in the sciences.

The manners and customs of the Chinese differ much from ours, but are certainly far removed from barbarism. Vice, as in all populous countries, is very prevalent, but among the better classes, at least, virtue is held in high honor. Crime is punished with extreme severity. Notwithstanding the rigor of the legal administration, the personal freedom of good citizens is remarkably secure. The position of the women, especially those of the lower classes, as in other Asiatic countries, is lamentably degraded.

In consequence of the density of the population of China, vast numbers of her people have in late years emigrated to Manchooria, Borneo, Siam, the Sandwich Islands, the United States, Peru, Guiana, and the West Indies. They are a remarkably industrious and thrifty class of emigrants, but the low rates at which they are willing to work render them objects of dislike to other laborers, and threaten seriously to complicate the social problems of the time.

Religion.—The religious (or rather philosophical) system of Confucius is the basis of the social life of China. (See CONFUCIUS.) It is received by most of the educated classes. BOODDHISM (which see), modified by Confucianism, is the popular religion. The worship of deceased ancestors is a highly important part of the national religion. There is also a numerous sect called Tauists, who worship certain beings called Sang-Ching, or the "Three Pure Ones." (See TAUISM and LAO-TSE.) The Tauists are believers in spirits, and many of their performances resemble the wonders of our modern Spiritualists. There have been a few Jews and many Mohammedans in the empire for centuries. Christianity was introduced by the Nestorians in the seventh century, but Nestorianism seems to have been entirely suppressed by persecution in the fourteenth century. Roman Catholic missionaries first went to China about 1240. Huc estimates the number of Roman Catholics in the empire at 700,000, but other respectable authorities place the number at about 300,000. There are many Protestant and several Russian-Greek missionaries in China, who have had some success in making converts.

History.—Although the Chinese civilization is undoubtedly far older than that of the Greeks, only the merest hints of the existence of China are to be found in the ancient classic authors. All the best geographers appear to be agreed in considering the *Serica* of the later Latin writers (ἡ Σηρικὴ of Ptolemy) as corresponding with the northwestern part of China. The name Serica (which is also the Latin term for "silk") was doubtless derived from the silk (called, according to Klaproth, *sirkek* by the Mongols) for which the country was so celebrated. The Latin word *Sinæ* (Gr. Θῖναι and Σῖναι), supposed to be identical in origin with the Chinese *Tsin*, or *Tseen*, the name of a province which has furnished, through the Hindoos,* to the Western nations the name for the whole country, properly denoted the people of a city or province in the central part of China. It was applied by Ptolemy to the people dwelling in the south of China: it appears also to have been used in a vague and general sense for the Chinese nation. (See on this subject SERICA and SINÆ, in SMITH'S "Dictionary of Greek and Roman Geography.")

The Chinese myths give the empire a duration of 7000 years, but the historical period, according to most authorities, begins with the year 2207 B. C., though some dates previous to that time are given with tolerable certainty. Bunsen, however, states that systematic Chinese history hardly goes farther back than 1991 B. C., the date of the accession of the great emperor Yu, the Charlemagne of the East, who extended the sway of the Shen-See dynasty to Southern China, and who rendered the Great Plain habitable by diverting the Hoang-Ho to a new channel.

The national hero of China is the great emperor Shee-(Chi-) Hoang-Ti, sometimes called Ching-Wang (246–210 B. C.), who restored unity to the divided empire, expelled the Mongols, and caused a great part of the national literature to be burned, in order to destroy the power of the learned classes and overcome the popular reverence for tradition. He was the builder of the Great Wall above alluded to.

The art of printing was practised as early as 202 B. C. Booddhism was introduced in 65 A. D. The earliest authentic account of China known to have been published in Europe is that of Marco Polo, who lived seventeen years in the country, and returned to Europe in 1295. The country had been previously visited by Roman Catholic missionaries.

The long course of Chinese history has been disturbed by many civil wars and contests with the Mongols. The present reigning dynasty, said to be the twenty-sixth in number, is of Manchoo origin, and was established in 1649; and to this day the Manchoos have an influence in the national politics far exceeding their relative importance as a people.

The Chinese long excluded foreigners with the utmost jealousy from their country. China was visited by the Portuguese in 1517, but they were forbidden to land in the empire in 1521. In 1537, however, they obtained a footing at Macao, which has since been in their power. In 1862 it was definitively ceded to them. The Dutch and Spanish early opened a trade with China by way of their Eastern colonies. The British made several unsuccessful attempts to establish commerce with China. The first effort was made in the reign of Queen Elizabeth, but it was not till 1700 that Canton was opened to their trade. The Russian overland trade was established in 1727, and the first American consul was allowed to reside in Canton in 1802. During all this time foreign merchants were often treated with much indignity. In 1838, in consequence of the unlawful importation of opium by British ships, serious troubles broke out at Canton, and in the following year actual hostilities began between Great Britain and China. After the capture of Canton, Amoy, Shang-Hai, and other important cities the Chinese were compelled to make peace, to cede Hong-Kong to the victors, and to open Canton, Amoy, Foo-Chow, Shang-Hai and Ning-Po to European commerce. The number of these "treaty-ports" has since been increased to fifteen. The Russians have an overland trade and regular mails from Kiakhta on the Siberian frontier, and British merchants are attempting to establish a land trade between India and China by way of the Irrawaddy River.

In 1850 a man of humble origin, named Tao-Kwang, who had received some notion of Christianity from a tract issued by missionaries, conceived the idea of founding a new religion and at the same time expelling the Manchoo dynasty. He was joined by many of the lower orders who were suffering from want, and in October of the same year the first battle of the Tae-Ping rebellion was fought. This rebellion at one time threatened the existence of the empire, and was finally suppressed in 1864, after great bloodshed. It is probable that but for the aid of contingents furnished by England and France the rebellion might have been successful.

The foreign warehouses at Canton were burned in 1856, and attempts having been made to poison the British at Hong-Kong in 1857, hostilities were commenced against China by Great Britain and France: and in December of that year Canton was bombarded, and on the 5th of Jan., 1858, it was taken. In the following June a treaty was made by the Chinese, which was soon violated. In Oct., 1860, the English and French forces entered Peking, and the Chinese government granted all their demands. The allies then turned their arms against the Tae-Ping rebellion, which received its fatal blow by the capture of Nanking (July 19, 1864) and the suicide of the rebel emperor. The rebellion of the Mohammedans in the province of Yun-Nan, called Panthays, which began about 1850, led in 1868 to the establishment of an independent Mohammedan government in the capital of the province. The leader assumed the name of King Solomon (Ooensoai), and his empire in 1872 embraced about 63,000 square miles, with a population of 4,000,000. In 1873 this government was reported as subjugated, its sultan killed, and Yun-Nan reduced to Chinese rule. Another Mohammedan rebellion, which in 1862 broke out in the capital of the province of Shan-See, led to the establishment of the independent empire of East Toorkistan, under the rule of Yakoob Ooshbegi, which in 1872 had an area of 740,000 square miles and about 1,000,000 inhabitants. In consequence of these troubles the Chinese government, under the advice of Prince Kung, the foreign minister, has adopted the policy of seeking the alliance of foreign powers. In 1867 the American minister, Mr. Burlingame, was sent by the government as extraordinary ambassador to the U. S. and the principal European nations, but unfortunately died before his plans had been fully carried out. In 1868 the government established a university at Peking, to which American and European professors were appointed. On June 21, 1870, a bloody massacre of Europeans and native Christians took place at Tien-Tsin.

* The Hindoo name for China is *Cheen* (or *Tcheen*).

The chief articles of export are tea and raw silk. The former was, in 1870, valued at 30,280,000 taels (1 tael = $1.39), in 1871 at 40,120,000; the latter in 1870 at 21,270,000 taels, in 1871 at 25,960,000. The chief articles of import are opium (25,000,000 taels) and cotton goods (22,000,000). The total exports, exclusive of precious metals, amounted in 1870 to 61,690,000 taels, the imports to 69,290,000. The merchant-navy numbered about 8000 vessels, with an aggregate tonnage of 616,000. The number of entrances and clearances in the Chinese ports in 1870 is stated to have been 14,136, with an aggregate tonnage of 6,907,528. The duties levied in the ports open to foreigners amounted in 1870 to 9,545,848 taels. The army numbered about 600,000 men, exclusive of 200,000 Tartar troops. The soldiers, when not performing active service, carry on a trade at home. The war-navy consists of 826 vessels, with 3600 guns.

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Chinese Language and Literature. As the leading member of the group of monosyllabic languages which occupy South-eastern Asia, and constitute, with a possible exception or two, the whole of the monosyllabic class, the Chinese has for the student of language a very great interest. This monosyllabism is not, as a few scholars have held, a state to which they have been reduced by a process of phonetic decay, but manifestly a primitive condition. It represents a stage out of which all other languages, whether of the agglutinative or inflective type, have passed, while these, from arrested development, have remained behind. Chinese words are not only altogether destitute of inflection, but they are hardly parts of speech in the sense which we attach to the term, being to a great extent still in the root state. The same word may, according to its position in the sentence, be noun, adjective, adverb, or verb; *e. g., sin* must be variously translated "fidelity," "faithful," "faithfully," "believe." This indefiniteness, however, attaches to the words only when taken separately, and disappears in the sentence. Chiefly by the value given to position, but partly also (especially in the spoken language) by the use of certain words as signs of grammatical relation, logical precision of statement is attained. Of this class are such words as *tzŭ* and *erh*, both meaning "son," and *t'eu*, "head," which have nearly the force of substantive endings, and *tih*, of an adjective ending. Being cut off from the resources of derivation for the multiplication of forms, while the development of signification has gone on as in other languages, the number of homophonous words is very great. The phonetic combinations of which the language admits are comparatively few and simple, and this poverty has been still further increased by phonetic decay, the effects of which are traceable even here, though of course to a much more limited extent than in inflective languages. The number of distinct vocables differs considerably in the various dialects, the highest limit being not far from 1000 and the lowest 500. The Kwan-hwa has, according to Edkins, 532 monosyllables; according to Morrison, who, however, includes in one class the aspirate and unaspirated mutes, only 411; the Shanghai dialect (Edkins), 570; the Fuchau (Baldwin and Maclay), 928; the Canton (Williams), 707. By the aid of tones, similar to those which we use for the purpose of emphasis and expression, this number is increased two or three fold, being raised in the Kwan-hwa to about 1600. The same phonetic combination pronounced in different tones constitutes so many different words, and so essential a part of the pronunciation is the tone, that a wrong tone will sooner occasion misunderstanding of a word than will the substitution of a wrong consonant. In the modern dialects the number of tones varies from four to eight, the smaller number being found in some of the districts of Central China; in the Kwan-hwa there are five, in the Fuchau and Amoy dialects, seven, in the Canton, eight. In the dictionaries of the T'ang dynasty (A. D. 618–905), which are still the standard rhyming dictionaries, only four tones are recognized—namely, the *p'ing*, "level," *shang*, "rising," *ch'u*, "vanishing," and *juh*, "re-entering" or "abrupt;" and these, divided into an upper and lower series, constitute the eight tones of the Canton dialect. The original identity of meaning in words which differ merely in tone is in some cases still apparent; *e. g., ting* (noun), "nail," and *ting* (verb), "to nail;" *mai*, "buy," and *mai*, "sell;" but in general the etymological connection, if it exists, cannot be traced. The number of words which coincide both in sound and tone being, however, still very large, other means are necessary to remove the ambiguity, and in the spoken language phrases composed of two or more words are largely used in the place of simple terms. Two synonyms are frequently thus joined; *e. g., shu-mu*, "tree." *Shu* and *mu* have each various significations besides that of "tree," but there is no other in which they agree, and the combination thus becomes definite. Other phrases are taken in a collective sense; *e. g., hiung-ti*, "older brother younger brother," for "brother" or "brothers;" or in a derived sense; *e. g., tung-si*, "east-west," for "thing." These phrases, which often extend to four or five words, make a near approach to proper compounds, one of the words uniformly receiving a stronger accent, supported in the case of the longer phrases by a secondary accent.

Another feature not peculiar to the Chinese, but worthy of mention for the prominent part which it plays, is the frequent use of numeratives in counting; like our *head* of cattle, *brace* of ducks. More than a hundred such words are in use, each limited to a certain class or classes of objects.

Spoken by a population variously estimated at from two to four hundred millions, the Chinese not unnaturally is divided into strongly marked dialects. Of these the Kwan-hwa, commonly called by Europeans the mandarin or court dialect, has the widest currency, being spoken with minor differences over the whole north and west of the empire, and on the east reaching as far south as the Yang-tze Kiang. It is, further, the language of official communication throughout the empire, and the only one of the popular dialects which has received any considerable literary cultivation. Phonetically, it is the poorest of the dialects. The only consonant finals of which it admits are the nasals *n* and *ng*, and the sonant initials *b, d, g, v, z*, found in some of the other dialects, are wanting here. The south-eastern dialects, in the provinces of Canton and Fukien, on the other hand, are the most archaic, having preserved the final mutes *p, k, t*. Differing largely in vocabulary, as well as in the form and tone of the words common to them, these several dialects are not generally understood (except the Kwan-hwa) beyond the limits of a single province. There are in addition many local dialects, less marked in character and of a more limited currency. This diversity does not, however, extend to the written language, which is uniform throughout the empire, and, to a degree unapproached in any other literature, uniform also throughout the whole course of its history. Its development has been to some extent independent of the spoken language, and forms one of the most interesting chapters in the history of writing.

According to Chinese tradition, knotted cords, similar perhaps to the Peruvian *quippos*, were used in the earliest times for keeping records. In the mystical figures of the Yih-king, ascribed to Fuh-hi, Chinese scholars are wont to find a kind of graphic system. The date of the invention of the present characters, commonly ascribed to Tsang-kié, about 2600 B. C., cannot be fixed even approximately, but the history of the successive stages of the development of the system is written in the characters themselves. The first signs were purely ideographic, being rude representations of the objects named. A circle with a point in the centre stood for the sun, a crescent for the moon, a three-pointed peak for a mountain. The changes of form which they have undergone, arising in part from the different materials used in writing, have left in the present characters little resemblance to the objects pictured. The limits of this method of direct representation were soon reached. A few words denoting position and number were represented by points and strokes; thus, a point above or below a horizontal line signified "above" or "below;" a stroke through the centre of a circle, "middle;" one, two, or three horizontal strokes, the numerals 1, 2, 3. The combining of two or more signs to express a single idea, either by direct or symbolical representation, was another easy step; thus "water" and "eye" make up the sign for "tear;" "man" and "mountain" stand for "fairy;" "sun" and "moon" for "light."

By far the greater number of characters, however, are formed on a new principle, the combination of an ideographic and phonetic element in one sign. The number of homophonous words is, as we have seen, very large, and a sign having been found for one of these, it is used phonetically to represent the sound of the others, being differentiated in each case by an additional sign, which indicates in a general way the meaning. In this combination one of the parts, termed the *phonetic* or *primitive*, gives up its meaning and retains only its sound; the other, the *radical*, gives up its sound and retains only the meaning. For example, the syllable *tau* has among other significations the following: "sword," "anxious," "appetite," "heart of a tree," "long narrow boat," "a species of fish of a slender form." The first of these, "sword," being represented ideographically, the others are written phonetically by the same sign, further defined by the radicals for "heart," "eat," "tree," "boat," "fish." The Chinese written language aims to provide a sign not merely for every word etymologically distinct, but to a considerable extent also for the different significations of the word. In the example above given the boat and fish were sword-shaped, and hence apparently their name, and possibly the other

meanings may be traced ultimately to the same origin. The word *tau* has various other significations besides those given, and is written with at least half a dozen different phonetics, each of which enters into combination with one or more radicals. The number of different phonetics employed in writing a single word is in some cases twenty or more, and the aggregate number of characters thus formed may exceed a hundred. Some characters are used both as phonetics and radicals. *Tau*, "sword," which in the above examples appeared as a phonetic, enters into other characters as a radical, with the meaning "cut," "divide." A character composed of a radical and phonetic may itself be employed as a phonetic in forming new characters. The sound of a composite character is not always that of the phonetic which it contains, but the variation is usually not great, and more frequently in the initial than in the final sound. The number of phonetics in common use is about 1000. Marshman in his "Clavis" enumerates 3867, but more than half of these are employed only once or twice each. These phonetics represent the sound of the word as a whole, without analyzing it into its elements.

There is, however, a kind of syllabic spelling called Fan-ts'ieh, introduced from India by Booddhist priests, and first currently used in dictionaries of the fifth and sixth centuries to mark the sound of characters with more precision. One series of characters is chosen to represent the initial sounds, another the final sounds, together with the tone, the number of both varying according to the dialect. Thus, *king*, "classic," in the dictionary of K'ang-hi is spelled with the characters *k-ien l-ing*, the first being simply the sign of the initial *k*, the second of the final *ing*.

In the arrangement of the characters Chinese dictionaries follow three different methods. By the first the characters are distributed according to their meaning under a certain number of categories, such as heaven, earth, body, etc. This method is found in the "Erh-ya," the oldest dictionary in the language, containing definitions of classical terms, and itself sometimes reckoned among the classics; also in many others, especially dictionaries of foreign languages, Mongol, Mantchoo, etc. The second principle of arrangement is according to the radical part of the character. This appears first in the "Shwoh-wen," published A. D. 100, in which 10,000 characters are arranged under 540 radicals, a number slightly increased in subsequent dictionaries, but in the "Tzŭ-wui," published during the Ming dynasty, reduced to 214. This last number is retained in the two principal dictionaries of the present dynasty, the "Cheng-tzŭ-t'ung" and the "K'ang-hi-tzŭ-tien." In the last-mentioned work, with a total of about 44,000 characters, the number found under the different radicals varies from 5 to 1300, or, counting duplicate forms, 1900, the following radicals having each 1000 and upward: *mouth, heart, hand, tree, water, plant.* Under each radical the characters are arranged in the order of the number of strokes contained in the phonetic. In most cases the radical under which a given character should be sought is apparent at a glance; the doubtful cases, where the radical is obscured or where the arrangement is somewhat arbitrary, are resolved by means of a key in which these characters are arranged according to the total number of strokes under the radical to which they are assigned. The third and last method of arrangement is according to the sound of the characters. The usual order in works of this class is the following: the characters are divided into four great classes, according to the tone; each tone divided into smaller classes, according to the final sound, and these sometimes further subdivided, according to the initials. The earliest extant dictionary of this class, the "T'ang-yün," published in the eighth century, employs a series of 206 finals. Lieu-p'ing-shui, in the thirteenth century, reduced the number to 107, and his system has since been generally followed. Another dictionary belonging here, the "Pei-wen-yun-fu," is one of the most extensive lexicographical works in any language. It was prepared under the superintendence of the emperor K'ang-hi, and employed the labors of seventy-six scholars, most of them members of the Imperial Academy, for eight years. It gives by numerous citations the fullest illustration of the usage of the language, and was published in 1711, in 130 thick volumes. A translation was announced by Callery, but only one volume published (Paris, 1844). Of the total number of characters in the language, extravagant statements have often been made. The more complete dictionaries contain from 40,000 to 60,000, of which obsolete and duplicate forms and proper names make up perhaps one-half. The number of really different characters which have the sanction of good usage is not far from 25,000, of which about one-tenth are ideographic, and the remaining nine-tenths composed of an ideographic and phonetic element united. Even in the number last given a large proportion of the characters are of rare occurrence, and a knowledge of from 5000 to 10,000 is sufficient for almost all the needs of the scholar.

In no language are the differences between the literary and colloquial idioms so great as in Chinese. The number of characters being many times as great as the number of distinct vocables, the former are not subject to the same variety of meaning, and the precautions against ambiguity required in the spoken language are to some extent unnecessary. A sentence may be perfectly definite when written, yet when spoken be altogether unintelligible. In the classical style this conciseness is carried to the extremest limit. It is in general true of the classical books that, while to the eye they are definite, to the ear they convey no meaning. In this ancient style, termed Ku-wen, all historical, philosophical, and critical works are still written, and no accomplishment is so highly valued among scholars as the mastery of it. Novels and dramatic compositions, which are regarded as quite inferior classes of literature, are written in the Kwan-hwa, in a style but little elevated above the colloquial, and, like it, abounding in compound phrases. The Wen-chang, the style of the literary essays, which is also much cultivated, is of a more artificial character than the Ku-wen, and less esteemed.

The relation of the Ku-wen to the ancient spoken language, whether and how far it represents it, and how far it is the product of a merely literary development, are points upon which scholars are not agreed. That the Chinese have not invented or borrowed a system of alphabetic writing, as so many peoples their inferiors in civilization have done, is the less surprising when we consider that the defects of their system are less sensible in an uninflected language like the Chinese, and that it has undeniable advantages in enabling them to distinguish the great number of words which are identical in sound, but differ in meaning. Still, it is attended with very serious evils, not the least of which is this—that the labor involved in learning and holding in the memory so many arbitrary characters absorbs no small portion of the intellectual energy of the people. Attempts have been made, not without success, to romanize some of the popular idioms, the tones being marked by diacritic signs. Books have been published by missionaries in this character in the Shanghai, Ningpo, Fuchau, and Amoy dialects. To the concise classical style, however, this method is quite inapplicable.

The Chinese characters have undergone in the course of their history great changes of form, and six varieties are now in use. The oldest is the Chuen, called by foreigners the *seal* character, used in seals and often also in ornamental inscriptions and title-pages. The Li-shu, introduced not long before the Christian era, with the change from the iron style to the brush, and the substitution of silk and linen for wooden tablets and slips of bamboo, differs little, except in a certain heaviness of stroke, from the more modern forms of the characters. It is found in inscriptions and prefaces. This was succeeded by the Kiai-shu, or pattern style, which followed on the invention of paper, and is the usual character employed in careful writing, and is occasionally found in printed books. The Sung-shu, the common book-character, introduced about the tenth century, differs from the preceding in a greater squareness and angularity of form, better suited to cutting on wooden blocks. Two forms adapted to rapid writing are in use—the Hing-shu, or running hand, frequently found in prefaces and inscriptions; and another, still more abbreviated, in which there is left little trace of resemblance to the ordinary square character—the Ts'au-tzŭ, or grass character. In no country is the art of calligraphy so highly esteemed or so sedulously cultivated as in China, and no written character is so well adapted to the display of it.

Of the Chinese language in general we may say, in conclusion, that notwithstanding its poverty of forms, it has been made, solely by the genius of those who use it, superior as an instrument of thought to many, perhaps to most, inflected languages. Whether its capacity of development will prove equal to the further demands to be made upon it is questionable. It has thus far shown a marked indisposition to the incorporation of foreign words, and yet does not seem able to supply from native resources the exact terminology which any considerable advance in scientific knowledge will require.

Chinese Literature.—In the history of literature there is hardly to be found another example of so high an antiquity, and none of so great a longevity, as the Chinese—an age which at least reaches, and perhaps exceeds, three thousand years. Neither in language, literature, nor institutions, is the modern period in China separated from the ancient by so wide an interval as elsewhere; an unbroken tradition holds together all. Such is the continuity that to the superficial observer it has the appearance of uniformity. In few countries has the cultivation of letters been so general. In theory, at least, all offices beneath the throne are

not only open to the scholar, but official promotion is made to depend directly on scholarship. The entrance to the various grades is guarded by public competitive examinations, which at each successive step become more rigorous. This system, introduced under the Han dynasty near the commencement of the Christian era, has been adhered to with more or less fidelity under the succeeding dynasties. Under such conditions, with the long history and vast population of China, a literature of immense extent is a natural result. Nor is any great literature so purely national, so little affected by foreign influences, as the Chinese. Booddhism, brought from India in the first century of the Christian era, has created for itself a literature apart, without much disturbing the general course of development. During the past three centuries of intercourse with Western nations their influence upon the literature, except in the department of mathematics, has been hardly felt. The exaggerated reverence paid to the classical models has so strengthened the conservative tendency as to check the growth of originality. Nor have the examinations for degrees, in which the chief requirement for success is familiarity with the classics, been so conducted as to attain the most happy results, either for the government or for the national literature.

There is, however, more of variety both in the history and the literature of China than the commonly received opinion gives to them. The first period of marked activity is that commencing with Confucius (died B. C. 478) and Lao-Tzŭ, and covering a period of about three centuries. Mencius and many other less celebrated writers belong to this period, which was rudely brought to a close by Shi Hwang-Ti, the founder of the Ts'in dynasty. This ruler, famous also as the builder of the Great Wall, having consolidated into an empire the petty states into which China had been divided, and fearing that the study of the literature would lead to an attempt to restore the old order of things, ordered (B. C. 212) the destruction of all books except those on medicine, divination, and husbandry, and the records of his own dynasty. Many scholars were put to death for the crime of hiding books or for the freedom of their utterances. This edict remained in force only twenty-two years, the Ts'in dynasty having been soon succeeded by the Han, under which strenuous efforts were made to recover the lost books. The catalogue of the library thus formed, which is found in the history of the Han dynasty, enumerates more than 13,000 volumes by 600 different authors. This collection perished in the burning of the imperial palace at the close of the dynasty, and similar collections made under succeeding dynasties met a like fate. Including the burning of the books by Shi Hwang-Ti, five great catastrophes of this kind are enumerated by Chinese historians, the last in the sixth century.

The period of the T'ang dynasty (A. D. 618–905) was the golden age of Chinese poetry; that of the Sung (960–1279) was the era of philosophical speculation and of criticism; the Yuen (Mongol) dynasty (1280–1367) was the most flourishing period of the drama, and produced also some of the best novels; the Ming and the reigning Mantchoo dynasties have been less distinguished for the originality of their productions than for works of an encyclopædic character, digests of the older literature. Printing from wooden blocks was invented before the close of the sixth century, but did not come into general use until the tenth. Movable types were employed as early as A. D. 1040, four centuries before the invention was known in Europe, without, however, displacing wooden blocks, which have remained in general use. During the present dynasty two large collections, of several thousand volumes each, have been printed by the government—one with copper, the other with wooden movable types. Chinese literature is abundantly supplied with works in bibliography and literary history, which for many centuries have been favorite subjects of study. One of the most admirable bibliographies to be found in any language is the catalogue of the imperial library, published in 1790 in 200 books. It contains notices of 10,500 works (a single one of which, the encyclopædia of the Ming, is composed of 22,877 books), giving the author, the history, and the contents of each, together with an estimate, almost uniformly just, of its merits. The plan of arrangement, which dates from the T'ang dynasty, is in four divisions—viz., classics, history, philosophy, belles lettres; novels and the drama are excluded. In the several dynastic histories an important section is devoted to the literature of the period. An index expurgatorius of works prohibited on account of their moral or political tendency has been published by the present dynasty. It contains many thousand volumes, mostly written about the close of the Ming dynasty.

The most important contributions by European scholars to this subject are: Wylie, "Notes on Chinese Literature," Shanghai, 1867; Schott, "Entwurf einer beschreibung der chinesischen litteratur" ("Abhand. der Berlin. Akad.," 1853); Bazin, "Le Siècle des Youên" ("Journal Asiatique," 1850–52). The last treats of the literature of the Mongol dynasty only.

The term *king* or "classic" is used in a narrower and a wider sense. It belongs *par excellence* to the "Five King," but very commonly includes also the "Four Books," and is not unfrequently used in a still wider sense. Among the "Five King" the first place is accorded to the "Yih," partly for its antiquity and partly for its enigmatical character. The proper text consists of eight trigrams, made up of horizontal lines, whole and broken, afterwards increased by combination to sixty-four hexagrams. With these are incorporated commentaries by Wĕn-Wang, the ancestor of the Chau dynasty, by his son Chau-Kung and by Confucius, which constitute the only intelligible part of the work. These mystical figures, ascribed to the ancient sage Fuh-Hi, are supposed to embody the most profound moral and political wisdom. They are much used in divination, and on this account the work is said to have been excepted from the general destruction of books under Shi Hwang-Ti. Next in rank is the "Shu King," a collection of historical documents relating to the Yu, Hia, Shang, and Chau dynasties, and covering the period, according to the received chronology, from the middle of the twenty-fourth century down to B. C. 721. The compilation is ascribed to Confucius, and is said to have comprised originally 100 chapters, but after the time of Shi Hwang-Ti, who made special efforts to destroy all copies of the "Shu," only fifty-eight chapters could be found. It was recovered in two portions, the genuineness of one of which is much disputed. The "Shu" is largely occupied with discourses on government put in the mouths of the ancient sovereigns, the historical matter being quite subordinate. The third classic is the "Shi King," or "Book of Odes," which contains 305 pieces (originally 311, but of six only the titles are preserved), selected by Confucius as the most worthy of preservation out of nearly 4000. They are divided into four classes—"Kwoh-fung," or "Manners of the States," gathered for presentation to the emperor in his visits to the feudal princes; "Siao-ya" and "Ta-ya," "Lesser and Greater Eulogiums," which bestow praise or blame upon the rulers and high officers; and "Sung," hymns of praise sung at the funeral rites of emperors and kings. The poetical merit of these pieces is very unequal, but is in general superior to that of later productions. They belong, with few exceptions, to the Chau dynasty, and for the light which they throw on the history and customs of the time are of great value. Biot has drawn from them the materials for a valuable memoir published in the "Journal Asiatique" for 1843. The fourth place among the classics is occupied by the Rituals, three in number. The "Li-ki," which is designated by imperial authority as one of the "Five Classics," is a compilation made in the first century B. C. out of the older Rituals. Two of these are preserved. One, the "Chau-li" ("Chow Ritual"), is supposed to have been written early in the Chau dynasty, and gives a detailed account of the various offices in the state, and the duties belonging to each. In it are found the models of the six administrative boards of the Chinese government. The "I-li" ("Decorum Ritual"), which is perhaps of equal antiquity, is of a more domestic character—a code of etiquette giving rules for the guidance of individual conduct under all circumstances. The last of the "Five Classics" is the "Ch'un Ts'eu" ("Spring and Autumn Annals"), the only one of which the authorship can be properly ascribed to Confucius, his labors upon the others being merely those of an editor. It is a chronicle of events from 720 to 480 B. C., written in continuation of the "Shu King." In it are recorded thirty-seven eclipses of the sun (the earliest 720 B. C.), which, with few exceptions, have been proved by calculation correct. The "Four Books" (*i. e.*, the "Books of the Four Philosophers") are next in rank. Two of them, the "Ta Hioh" and the "Chung Yung," formed parts of the "Li-ki" ("Book of Rites"), but were detached and arranged in the present order by Chu Hi, the great critic of the twelfth century. The "Ta Hioh" ("Great Learning") is a discourse on the principles of government, in eleven chapters, the first containing the words of Confucius, and the remaining ten a commentary on them, commonly ascribed to his disciple, Tsĕng Ts'an. The "Chung Yung" ("Invariable Mean") is a philosophical treatise attributed to K'ung Keih, the grandson of Confucius, in which the observance of the right mean is set forth as the highest wisdom and virtue. The "Lun Yu" ("Miscellaneous Conversations") of Confucius and his disciples is a collection of mostly disconnected sayings embodying the substance of his teaching, which was altogether of a practical character, on ethics, government, ceremonies, and the like. The last and most extensive of the "Four Books" contains the works of Mencius, who now ranks second only to Confucius in the general esteem, though not until the twelfth century were his writings defi-

nitely admitted to a place among the classics. One of the fundamental doctrines of his philosophy is the inherent goodness of human nature. The "Five King" and "Four Books" have all, with the exception of the "Ch'un Ts'eu," been translated into one or more of the European languages. Dr. Legge has undertaken an edition, now well advanced towards completion, of the whole in the original text, with English translation, commentary, and extensive introduction (vols. i., ii., "Four Books;" vol. iii., "Shu King;" vol. iv., "Shi King," Hongkong, 1861–72). An arrangement of the classics made in the T'ang dynasty enumerates thirteen—viz., besides the foregoing the two Rituals, "Chau-li" and "I-li," two additional recensions of the "Ch'un Ts'eu," and the "Hiau King," or classic of Filial Piety. The last purports to be a conversation between Confucius and his disciple Tsĕng Ts'an, and, though highly esteemed, entire confidence is not felt in its genuineness. Many other works bear the title of *king* ("classic"); nor is it confined to the orthodox school, but applied also to the canonical books of the Tauist and Booddhist faiths, and even to works of a more miscellaneous character, such as important technical writings. Thus we have the "Ch'a King" ("Tea Classic"), on the culture of the tea-plant, and the "Shan-hai King" ("Hill and River Classic"), an ancient geographical work from which many poetical allusions are borrowed.

The historical works, which are very voluminous, fall mostly into three classes. First in importance are the histories of the several dynasties, the work of official historiographers, and constructed mostly on a uniform plan. The variety of subjects treated of, each in a distinct section, gives them an encyclopædic character. The order, varying somewhat in the separate works, is in general the following: first, the personal history of the successive emperors of the dynasty, followed by a series of memoirs on chronology, rites, music, jurisprudence, political economy, state sacrifices, astronomy, influence of the five elements, geography, and literature, closing with biographies of the eminent men of the dynasty, and historical and geographical notices of foreign nations. The series as at present established consists of twenty-four histories, comprising 3264 books. They are of very unequal merit; some of them the work of single authors, others prepared by a board of scholars. At the head of the list stands the "Shi-ki" of Szŭ-ma Ts'ien of the Han dynasty, which reaches from the earliest period down to B. C. 122, and has served as a model for the subsequent histories. Not until the dynasty is ended, and has given place to another, can the official history be published. There is, however, a summary of events under the present dynasty by a private author, entitled "Tung-hwa-luh," long circulated in manuscript, and at length, after a considerable portion had been expunged, printed. The history is brought down to 1818. The second class of histories follows a chronological order. The oldest work of this class, next to the "Ch'un Ts'eu" of Confucius, is the "Bamboo Record," found A. D. 279 in the tomb of one of the princes of Wei. It reaches to B. C. 298. There is some reason to think that the original has been lost, and that the work which now passes under the title, and which is printed with a translation in the prolegomena of Dr. Legge's "Shoo King," is a forgery. The most celebrated general history on this plan is the "Tzŭ-chih-t'ung-kien" of Szŭma Kwang, a writer of the eleventh century. It was revised in the next century under the direction of Chu Hi, and published with the title "Tung-kien-kang-muh." Continuations were added in the following dynasties. De Mailla translated it into French (Paris, 1777–83, 12 vols. 4to). The abridgment of the above work, entitled "Kang-kien-i-chi-luh" ("History Made Easy"), is one of the most useful compendiums. Another class of works, called "Complete Records," follows neither the one nor the other of the above methods, but gives with more freedom of arrangement a general survey of the subject treated.

In biographies the literature is unusually rich. Besides the space accorded to them in the dynastic histories and in statistical works, separate biographies, many of them of a collective character, abound. The "T'ang-ts'ai-tzŭ-chuen" is a collection of 397 literary biographies of the T'ang and the succeeding five short dynasties, by Sin Wĕn-fang of the Yuen. It was long given up for lost in China, and was recovered from Japan. The "Kau-sĕng-chuen" of the Liang dynasty, with its continuations, contains biographies of more than a thousand Booddhist priests.

The geographical works are hardly surpassed in extent by those of any country. There are works in the geography of the whole empire, such as the "Ta-ts'ing-yih-t'ung-chi," published under the present dynasty in 500 books, which give under each province the topography, population, taxes, etc.; under each prefecture and department, the antiquities, public works, eminent and notorious characters born there, productions of the soil, and a variety of other details. In addition, every province, every prefecture, every department, nearly every district, and frequently a town or famous locality within a district, has its separate description, amounting in all to thousands of volumes. Some of these works are of considerable antiquity, and in successive editions have been gradually enlarged. Of the history and geography of Eastern Asia, beyond the limits of the empire, Chinese literature contains many valuable notices. The accounts of the journeys of Booddhist pilgrims to India between the fourth and the tenth centuries are the most important sources of information for the history of Booddhism in India during that period that we possess. Fah-Hian (A. D. 400–415) travelled overland to India, thence to Ceylon, returning by water to China. His account, "Fuh-kwo-ki," has been translated into French by Rémusat (Paris, 1836), and into English by Beal (London, 1869). Yuen-Chwang during sixteen years (629–645) traversed India in every direction. His life has been translated by Julien ("Vie de Hiouen-Thsang," Paris, 1853), as has also the "Si-yih-ki," which contains his itinerary, accompanied by copious extracts from Sanscrit works, now lost, concerning the kingdoms of India ("Mémoires sur les Contrées Occidentales," Paris, 1857, 2 vols., 8vo).

The three principal philosophical and religious sects, the Confucianists, Tauists, and Booddhists, have each an extensive literature. Of the orthodox school the most celebrated among the near successors of Confucius and Mencius was Sün-tzŭ, who held, in opposition to Mencius, to the original depravity of human nature. In the eleventh and twelfth centuries, under the Sung dynasty, Chau-tzŭ, and especially Chu Hi, gave a new impulse, and in some particulars a new direction, to philosophical speculation. The authority of Chu Hi, who was equally eminent as a commentator of the classics and in other departments of literature, has remained paramount to the present day, though under the present dynasty there is some disposition to rebel against it. The "Sing-li-ta-ch'uen-shu," published in 1415, is a collection of the principal cosmological writings of his school. Laotzŭ, the founder of the Tauist school, was a contemporary of Confucius. His philosophy is contained in the "Tautĕ King" (translated by Julien, Paris, 1842), one of the most sententious and profound books in the language. The most popular of the writings of this school is the "T'ai-shang-kan-ying-pien" (translated by Julien under the title "Le Livre des Récompenses et des Peines," Paris, 1835), which consists of about a hundred short maxims, accompanied by illustrative narratives. Tauism has long since degenerated into superstitious practices, its followers being devoted to magic, alchemy, and the like. Booddhism was introduced from India in the first century of our era. The earliest translation from the Sanscrit, the "Sutra of forty-two sections," was made A. D. 67, and for several centuries there was constant activity in this work. The catalogue of Chi-Shing, published in 730, gives a list of 2278 separate works which had been translated up to that date. These constitute the more important part of the literature of Chinese Booddhism, though in the fifth and sixth centuries original works began to appear, and have since greatly multiplied.

In the history of Chinese poetry there are two distinctly marked periods. In the earlier, previous to the T'ang dynasty, the structure was less artificial and the rhythm freer. In the "Shi King" the verses are mostly of four syllables; the rhyme is often imperfect, and sometimes altogether wanting. In the T'ang period a more rigid consecution of tones was introduced, and verses of five and seven syllables became the favorites. The tones for rhythmical purposes are divided into two classes—the *p'ing* or "even" tone constituting one, while the other three tones are considered "uneven." In every verse the first, third, and fifth syllables are indifferent with respect to tone; the second, fourth, and sixth must alternate, so that the order is either "even," "uneven," "even;" or "uneven," "even," "uneven."

The weakest side of Chinese literature is the scientific. It has a tolerably complete system of arithmetic, older than the Christian era, a system of algebra which dates from the thirteenth century, but no theoretical astronomy worthy of the name, except what is borrowed from the West. For the regulation of the calendar, and for astrological purposes, observations of a simple character were very early made, and numerous eclipses recorded. During the Ming dynasty mathematical knowledge had greatly declined, and the first Jesuit missionaries recommended themselves to the imperial favor chiefly by their acquirements in this science. The mathematical works since published are mainly based on European methods. Medical writers are numerous, and some of them very ancient, but the science, notwithstanding its long history, has made little progress. The chief work on materia medica is the "Pun-Ts'au," in fifty-two books, compiled by Li Shi-chin of the Ming dynasty. He made extracts from more than 800 earlier writers, and gives 1892 medicaments, selected and original.

ADDISON VAN NAME, *Lib. of Yale Coll.*

Chinese White, a name sometimes given to the white oxide of zinc, used as a pigment as a substitute for white lead. It is not liable to be changed much by atmospheric action.

Ching-Hai, a fortified seaport-town of China, in the province of Che-Kiang, at the mouth of the Takia River, 9 miles N. E. of Ning-Po. It has a strong citadel on a high and steep rock, and is 3 miles in circumference. The British defeated the Chinese here in Oct., 1841.

Ching-Kiang-Foo, written also **Tchang-Kiang,** a fortified city of China, province of Kiang-Soo, on the right bank of the Yang-Tse-Kiang, near its junction with the Imperial Canal, and about 42 miles E. of Nanking. It was a populous and important commercial city before it was taken by the Tae-Pings in 1859. It was captured by the British in July, 1842. Pop. in 1868, estimated at 150,000.

Chingleput', or **The Jaghire,** a maritime district of India, in the province of Madras, has an area of 2993 square miles. It is bounded on the E. by the Indian Ocean, and is adjacent to Madras. The chief river is the Palaur. The soil is poor. Capital, Chingleput. Pop. in 1871, 940,744.

Chingleput (anc. *Singalapetta*), a town of India, in the above district, 36 miles S. W. of Madras, has a large citadel or fort. It is accessible to an enemy only on the S., being protected on the other side by a large tank.

Chin-In'dia, or **Farther India,** a name given by the celebrated geographer, Malte-Brun, to the region between China and Hindostan, also often called the Peninsula beyond the Ganges. It comprises Siam, the Burman empire, Anam, Laos, Malacca, etc.

Chi'no, a township of San Bernardino co., Cal. P. 308.

Chinon, or **Chinnon,** a town of France, department of Indre-et-Loire, on the river Vienne, 25 miles S. W. of Tours. It has remains of a large castle, which was the residence of several kings of England. Here Henry II. of England died, and here Rabelais was born. Charles VII. of France resided here when Joan of Arc presented herself to him. Pop. 6895.

Chinook' Indians, a collection or race of aborigines, consisting of several tribes or bands, formerly inhabiting the banks of the Lower Columbia in Washington Territory and Oregon. They were fish-eaters, and spoke a peculiar and very difficult language; so that the traders and trappers invented the "Chinook jargon," a *lingua franca* designed to facilitate intercourse with them. Vocabularies of this jargon and the Chinook language were prepared by the late George Gibbs (1863). Relics of this race still exist.

Chin'quapin (*Castanea pumila*), a small tree, a native of the Southern U. S., belongs to the same genus as the chestnut. It bears a small nut which is edible. California has another species.

Chin'quepin, a twp. of Lexington co., S. C. Pop. 253.

Chintz, a highly-glazed printed muslin or calico, with a pattern in many colors on a white or light-colored ground. It is chiefly used for bed-hangings or curtains, for covering furniture, and other purposes where gay or rich colors are desirable, and where there is much exposure to dust, which does not adhere to its surface.

Chio'ggia (anc. *Fossa Clodia*), a fortified seaport-town of Italy, in the province of Udine, on an island of the Adriatic, 14 miles S. of Venice. It is built on piles like Venice, and is connected with the mainland by a stone bridge of forty-three arches. It has a fine main street lined with porticoes, a cathedral, several high schools, a theatre, and a harbor protected by two forts. Here are shipbuilding-yards, salt-works, and fisheries. Pop. in 1871, 26,336.

Chion'ides, a Greek comic poet of the old comedy, who began to exhibit, according to Suidas, in B. C. 487. Aristotle states that he was much later than Epicharmus, and this would place him some years after the date assigned above. Though not the first in time, yet from the more careful and artistic preparation of his pieces he was regarded as the leader of the old Attic comedy. The titles of three plays are preserved, and the fragments are collected in MEINEKE, "Fragm. Vet. Com. Græc.," vol. ii., pp. 5–9. HENRY DRISLER.

Chi'on of Heraclea, on the Pontus, a pupil of Plato, sought to free his native city by slaying the tyrant Clearchus (B. C. 353). He, with his associates, was slain by the friends of Clearchus, and the city fell under a worse tyranny than before. There are seventeen letters extant under the name of Chion, which are, however, the production of a later age. They have been edited by Coberus, Leipsic, 1765, and by Orelli in his edition of Memnon, Leipsic, 1816. HENRY DRISLER.

Chipica'ni, a peak of the Bolivian Andes. Height, 19,740 feet.

Chip'man (DANIEL), LL.D., born in Salisbury, Conn., Nov. 15, 1765, graduated at Dartmouth in 1788, and soon became distinguished as a lawyer and an author. He was a member of Congress from Vermont (1815–17), and was prominent in the politics of that State. He published a valuable work on the "Law of Contracts" (1822), "Reports of Cases in the Supreme Court of Vermont" (1824), and other works. Died April 23, 1850.

Chipman (NATHANIEL), LL.D., an American soldier and jurist, a brother of the preceding, was born at Salisbury, Conn., Nov. 15, 1752, graduated at Yale in 1777. He was an officer of the Revolutionary army, but was admitted to the bar in 1779. He was chief-justice of Vermont for several years, and judge of the U. S. district court for Vermont (1791–93). His works on the laws of Vermont are highly commended. He published "Principles of Government" (1793) and other works. Died in 1843.

Chipman (WARD), LL.D., a jurist of New Brunswick, born July 10, 1787, graduated at Harvard in 1804. He became chief-justice of the supreme court of the province in 1834. Died Dec. 26, 1851.

Chip'munk, a popular name for the *Tamias striatus,*

Chipmunk.

or striped squirrel of the U. S., especially common in the North. It is five or six inches long, with a tail of four and a half inches.

Chipo'la, a township of Henry co., Ala. Pop. 732.

Chip'pewa, a post-village and port of entry of Ontario, Dominion of Canada, Welland co., on the Niagara River, about 3 miles above Niagara Falls and 48 miles S. S. E. of Toronto, on the Erie and Niagara branch of the Great Western Railway. It has manufactures of steam-engines, leather, lumber, and stoves, and a large trade in grain and lumber. Pop. 1300.

This village is memorable as the scene of an important victory of a portion of the American army under Maj.-Gen. Joseph Brown, over a superior British force under Maj.-Gen. Rial, July 5, 1814. A re-invasion of Canada having been determined upon, Gen. Brown had, according to instructions, assembled at Buffalo, N. Y., a division consisting of two brigades of regulars, a brigade of volunteers, and a few Indians. The regulars were commanded by Brig.-Gens. Winfield Scott and Ripley, the volunteers and Indians by Gen. P. B. Porter; there was also a corps of artillery under Major Hindman; in all about 3500. In accordance with orders of Gen. Brown, issued on the 2d of July, Scott's brigade, with Hindman's artillery corps, passed the Niagara on Sunday morning, the 3d, landing about a mile below, while Gen. Ripley, at a later hour, landed about the same distance above Fort Erie. Gen. Scott led, and the British commandant being completely surprised, surrendered with scarcely any resistance at 6 A. M. A garrison was placed in the fort, and Gen. Scott was ordered to advance on the morning of the 4th with his brigade and Towson's artillery towards Chippewa. The enemy's outposts were soon met and driven in; a charge of the Nineteenth Dragoons was also repelled by a single company. The enemy being found strongly posted behind Chippewa Bridge, Gen. Scott took up a well-selected position for the night, where he was joined by Gen. Brown and the main body of his army. The British army lay behind Chippewa Creek, across which was a bridge; the Americans occupied a similar position at Street's Creek, a mile and a half farther up. Between those two creeks is a plain, which was the battle-ground, behind it a forest, and in front the Niagara. Skirmishing commenced soon after daybreak, but nothing serious occurred until about 4 P. M., when Gen. Porter was ordered to advance rapidly under,

cover of the adjoining wood, and throw himself between the British skirmishers and their main body. Porter, advancing as ordered, soon fell in with a body of the light troops of the enemy, which he routed, and was pursuing when, coming out of the wood, he found himself in front of the whole British army drawn up in line of battle. Scott was now ordered to cross, with his brigade and Towson's artillery, the bridge in his front, and attack the enemy's left. The order was promptly executed by Scott, and his command were soon closely engaged with the enemy. Porter's command had given way, nor could he, though displaying great gallantry, stay their flight. Scott's brigade becoming much exposed by this retreat, a portion of Ripley's brigade was ordered to fall upon the enemy's right and rear; but such was the impetuosity of the attack of Scott and his gallant troops that before Ripley became engaged the enemy's line was broken, and driven in confusion to their intrenchments behind the creek, destroying the bridge behind them. The credit of this decisive conflict between our inexperienced troops and a superior number of veteran European soldiers is mainly due to Gen. Scott, who by his skill and gallantry secured this important victory, Gen. Brown not being present till the battle had been decided. The number actually engaged on the American side was 1900; the British force numbered 2100. Our loss in killed and wounded was 328; the British loss was reported at 505.

Chippewa [native, *Ojibway* or *Ojibbewa*], a river of Wisconsin, rises in Ashland county, flows nearly southwestward through Chippewa and other counties, and enters the Mississippi River at the foot of Lake Pepin, 6 miles above Wabashaw. Entire length, about 220 miles. It traverses extensive forests of pine.

Chippewa, a county of Michigan, which forms the E. extremity of the upper peninsula. It is bounded on the N. by Lake Superior, and on the E. by the river St. Mary. It is drained by the Tequamenon River. The surface is uneven. Limestone abounds here. Oats, potatoes, butter, and maple-sugar are produced. Capital, Sault Ste. Marie. Pop. 1689.

Chippewa, a county in the W. of Minnesota. Area, 720 square miles. It is traversed by the Chippewa River. The surface is undulating; the soil is fertile. Wheat, oats, butter, and hay are staple crops. Capital, Montevideo. Pop. 1467.

Chippewa, a large county in the N. W. of Wisconsin. It is intersected by the Chippewa River, and also drained by the Yellow River and other streams. The surface is uneven, and mostly covered with forests. Large quantities of pine lumber are exported from it. Sandstone occurs here as a surface-rock. The soil is fertile. Wheat, oats, corn, cattle, hay, and butter are produced. Lumber and brick are manufactured. Capital, Chippewa Falls. Pop. 8311.

Chippewa, a township of Isabella co., Mich. Pop. 315.

Chippewa, a township of Mecosta co., Mich. Pop. 140.

Chippewa, a township of Douglas co., Minn. Pop. 164.

Chippewa, a township of Pope co., Minn. Pop. 116.

Chippewa, a post-township of Wayne co., O. Pop. 2510.

Chippewa, a township of Beaver co., Pa. Pop. 817.

Chippewa Falls, a post-village, capital of Chippewa co., Wis., on the Chippewa River, about 88 miles E. of St. Paul, Minn. It has water-power and several mills, and a trade in lumber. It has one national bank and one newspaper. Pop. 2507.

Chippewa Indians, or **Ojibways,** a tribe of North American aborigines who inhabit Michigan, Wisconsin, Minnesota, and both sides of the basin of Lake Superior. They were constant allies of the French, and waged a long warfare against the Sioux. In 1855 they ceded their lands to the government of the U. S. They have several widely separated reservations in the above States and in Canada, and are broken up into "bands." They numbered in 1869 about 19,000. They are of the Algonkin stock, as is shown by their language and customs. Long-continued efforts have been made to convert them to Christianity by Roman Catholic and Protestant missionaries, without marked success.

Chipping Bird, or **Chipping Sparrow,** a common little North American bird (*Spizella socialis*, Bonap.). It is between five and six inches long, whitish underneath, crown chestnut, back and sides ashen, with streaks of white and black. Its song consists of six or seven notes rapidly repeated.

Chiquichi'qui Palm, or **Piassa'ba** (*Leopoldinia Piassaba*), one of the palms which yield the piassaba fibre, used for making coarse brushes and brooms for sweeping streets, for cables, etc. It grows on the banks of the rivers of Venezuela and the north of Brazil, and has very large, regularly pinnate leaves, much used for thatching. The commercial fibre is obtained from the marginal processes of the leaf-stalks, which split into fine fibres, hang down five or six feet, and entirely conceal the stem. It has long been used for cables on the Amazon, and has now become an important article of commerce.

Chiquimu'la, the easternmost department of Guatemala, Central America, bordering on the Caribbean Sea, between the Bay of Honduras on the N. and the state of San Salvador on the S. Area, 4000 square miles. Pop. 80,000. Capital, Chiquimula de la Sierra, with 6000 inhabitants.

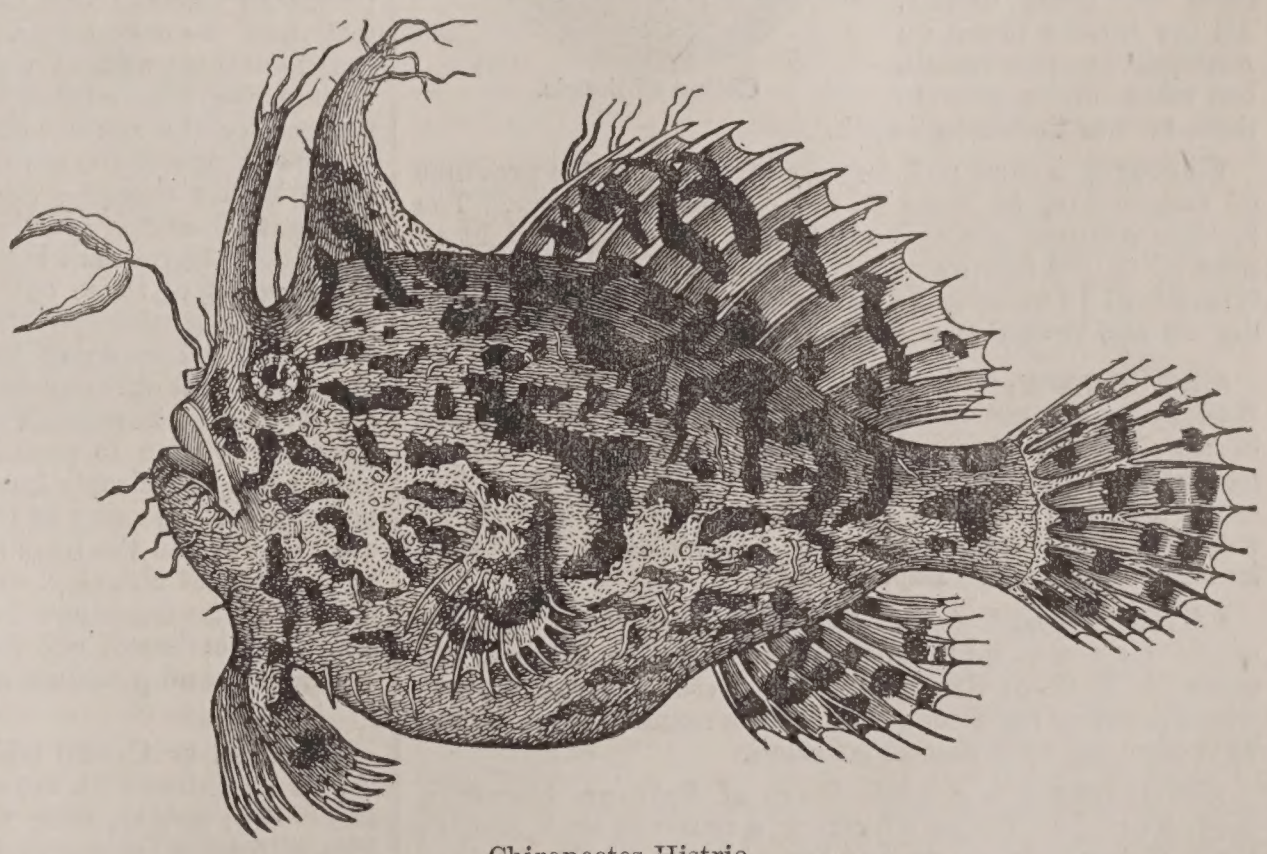
Chiri'qui, the westernmost province of Panama, in Central America. Area, 500 square miles. Pop. 17,279. Capital, David, beautifully situated, with 4625 inhabitants.

Chiriqui, Lagu'na de, or **Bahi'a del Almiran'te,** a bay of Panama, nearly enclosed by a jutting headland and islands at its mouth. The W. entrance, Boca del Dragon ("Dragon's Mouth"), affords passage for the largest ships, and the bay within is a secure harbor. Lat. 90° N., lon. 32° 30′ W. From ancient tombs in this region much gold has been of late obtained.

Chiris'ophus, a Lacedæmonian officer who joined Cyrus the Younger in his expedition against Artaxerxes (B. C. 401) at Issus, with 700 heavy-armed men. He first appeared prominently after the death of Clearchus, when he was, at the suggestion of Xenophon, appointed to lead the van of the retreating Greeks. After reaching Trapezus, Chirisophus attempted to secure vessels for the Greeks, but was unsuccessful. At Sinope, through Xenophon's refusal of the office, he was chosen commander of the Greek forces, but six or seven days after, while at Heraclea, the army was broken up into three parts, which set out separately. Chirisophus died soon after at Calpe.

HENRY DRISLER.

Chironec'tes [Gr. χείρ, "hand," and νήχω, to "swim"], a genus comprising numerous small marine fishes of the family Lophiidæ, remarkable for grotesque forms. The mouse-fish (*Chironectes gibbus*) of the U. S. Atlantic coast



Chironectes Histrio.

is a familiar example. The *Chironectes histrio* of the Brazilian coast is larger. (See also CHEIRONECTES.)

Chisa'go, a county of Minnesota, bordering on Wisconsin. Area, 420 square miles. It is bounded on the E. by the St. Croix River, and contains several small lakes. The surface is uneven. Cattle, grain, potatoes, and butter are largely produced. Lumber is one of the chief articles of export. It is intersected by the Lake Superior and Mississippi R. R. Capital, Chisago City. Pop. 4358.

Chisago City, a post-village, capital of Chisago co., Minn., on a small lake 35 miles N. by E. of St. Paul.

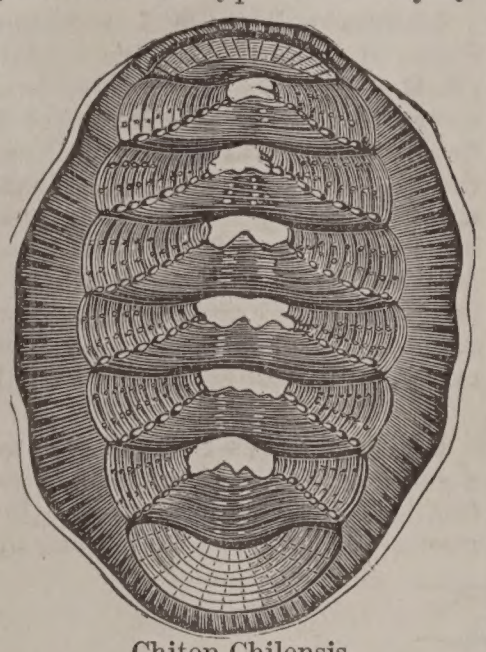
Chisago Lake, a post-township of Chisago co., Minn. It contains the greater part of Chisago Lake and other smaller lakes, which abound in fish. Pop. 775.

Chis'elhurst, a parish of England, in Kent, 11 miles S. E. of London. Here is Camden Place, the property of Earl Camden. The emperor Napoleon III. fixed his residence at Chiselhurst early in 1871, after he was released from captivity by the emperor of Germany, and here, Jan. 9, 1873, he died.

Chis'wick, a town of England, in the county of Middlesex, on the Thames. It contains the gardens of the London Horticultural Society. In Chiswick House, a villa belonging to the duke of Devonshire, both Fox and Canning expired. Hogarth lies buried in the churchyard. Pop. 8508.

Chi'tin [from the Gr. χιτών, a "tunic"], in chemistry, the name of the substance which forms the skeleton of all insects and crustaceans, as well as of some mollusks and other inferior animals. In insects it constitutes the external skeleton, the scales, and the tracheæ, and penetrates into the most remote portions; one of the layers of the intestinal canal consists of chitin. We can make preparations of these parts by treating insects with a solution of potash, which dissolves all but the chitin; in this way we can microscopically examine the most delicate parts. It is a white, amorphous body, which usually retains the form of the tissue from which it is prepared. Its composition is represented by the formula $C_9H_{15}NO_6$. The best method of obtaining chitin is by successively boiling the elytra of the cockchafer with water, alcohol, ether, acetic acid, and alkalies. Treated with hot dilute sulphuric acid, it is converted into glucose and lactamide.

Chi'ton, a genus regarded as the type of the family Chitonidæ, gasteropodous mollusks, near kindred of the limpets. The shell is composed of eight transverse calcareous pieces, overlapping each other, and strongly attached to the mantle, which is leathery and fibrous. They have the power of rolling themselves up into a ball. The oval foot extends the whole length. More than 200 species are known; they occur in all climates, most abundantly on rocks at low water, but some of them at great depths. All the species found on American coasts are small, but some others grow to three or four inches in length.



Chiton Chilensis.

Chitore, a town and fortress of India, in the province of Rajpootana, 64 miles E. N. E. from Odeypoor. The fortress consists of a rock smoothly scarped to a height of from 80 to 190 feet by nature, surmounted by a rude bastioned wall 12 miles in its entire circuit. The enclosure is narrow and irregular, and contains temples and palaces.

Chit'tagong, a district of British India, on the Bay of Bengal, in the presidency of Bengal, of which it is the S. E. extremity. Area, about 2800 square miles. A great part of the country is mountainous and covered with forests. The soil is fertile, but little cultivated. Towns are only found on the sea-coast. The population is more than half Mohammedan. Pop. 790,000.

Chitteldroog' (anc. *Sitala Durga*, "the spotted castle"), a town and fortress of Hindostan, in Mysore, 128 miles N. N. W. of Seringapatam. Here is a rock-fortress which is one of the strongest and most remarkable in India. It is occupied by a British garrison.

Chittenan'go, a post-village of Sullivan township, Madison co., N. Y., has a tannery, a national bank, a woollen mill, a weekly paper, and three churches. Pop. 968.

Chittenango Springs, or **White Sulphur Springs,** in Sullivan township, Madison co., N. Y., is a saline and sulphur spring, with accommodations for receiving visitors, and is highly recommended for many cases of disease.

Chit'tenden, a county in the N. W. of Vermont. Area, 516 square miles. It is bounded on the W. by Lake Champlain, and is drained by the Lamoille and Winooski rivers. The surface is partly mountainous; the soil is generally fertile. Butter, cheese, cattle, potatoes, corn, and oats are extensively produced. The manufacturing interests are important and various; those of lumber and furniture being the most extensive. It is intersected by the Vermont Central R. R. Capital, Burlington. Pop. 36,480.

Chittenden, a post-township of Rutland co., Vt. It has manufactures of lumber, etc. Pop. 802.

Chittenden (Martin), a son of the following, born in Salisbury, Conn., Mar. 12, 1769, graduated at Dartmouth in 1789. He was for several years a judge in the courts of Vermont, a member of Congress from that State (1803–13), and governor (1813–15). Died Sept. 5, 1841.

Chittenden (Thomas), an American statesman, born at East Guilford, Conn., Jan. 6, 1730. He was one of the founders of the State of Vermont, of which he was chosen first governor in 1778. He was several times re-elected. Died Aug. 24, 1797.

Chit'tenden's Falls, a village of Stockport township, Columbia co., N. Y., has manufactures of paper.

Chit'ty (Joseph), an English writer on law, was born in 1776, and called to the bar in 1816. He published, besides other legal works, "Pleadings and Parties to Actions" (1808), a "Practical Treatise on the Criminal Law" (1818), a "Treatise on Medical Jurisprudence" (1834), and "General Practice of the Law in all its Departments" (3d ed., 1837–42), which are highly commended. Died in 1841.

Chiu'sa-Sclafa'ni, a town of Sicily, in the province of Palermo, 30 miles S. S. W. of Palermo, was founded about 1320. Agates are found near it. Pop. 6592.

Chiv'alry [Fr. *chevalrie*, from *cheval* (Lat. *caballus*), a "horse"], a term applied to the system or dignity of knighthood, but originally denoting a body or assembly of knights or horsemen. The word has, in fact, the same etymology as *cavalry*, and in the Italian and Spanish languages the same term is used for both. Chivalry may be more fully defined as a peculiar institution originating in the Middle Ages, and including with the rank and dignity of knighthood all those customs, manners, and sentiments which were deemed appropriate to a noble and accomplished knight. Its origin is to be traced to the peculiar customs and sentiments of the Teutonic nations (in nothing, perhaps, more remarkable than for the respect which they evinced for the female sex), modified to some extent by the spirit of Christianity. It is undoubtedly closely connected with the feudal system. It has been observed that while feudality presents the political side of society in the Middle Ages, chivalry exhibits its moral and social side. Whatever may have been the follies and abuses which too often accompanied it, the institution of chivalry undoubtedly had its origin in a generous feeling, which prompted humane and brave men to provide for the protection of the defenceless. For this purpose courage was indispensable; and as women in that rude and semi-barbarous age especially needed protection, chastity and a respect for the sex bordering on adoration came to be regarded as among the cardinal virtues of a true knight. To these higher qualities were necessarily added others of a different character, growing out of the feudal system, and especially the relation between the vassal and his lord. If the conduct of those educated and trained under the influence of chivalry too often presented a glaring contrast with the ideal purity of its social and moral code, it does not prove that chivalry had not a pure and noble origin; it only proves how much easier it is to commend and admire virtue than to practise it. The history of mankind shows but too clearly how seldom the precepts of a high and noble philosophy or the principles of a pure religion are exhibited in the lives and conduct of its votaries. Yet in the case of chivalry, as in that of Christianity, the influence of its teachings has surely, though very slowly, it must be confessed, effected an important change in the sentiments and practices of society in many respects.

J. Thomas.

Chives, or **Cives** (*Allium Schœnoprasum*), a plant of the same genus with the onion, a perennial, six inches to one foot in height, with very small, flat, clustered bulbs. The leaves are tubular and radical; the flower-stem is terminated by a cluster of bluish-red flowers. This plant grows wild in Europe, Asia, and Western North America. Chives are sometimes cultivated in kitchen-gardens, and are used for flavoring soups and dishes. Their properties are very similar to those of the onion. The part used is the young leaves. There are several varieties.

Chizerots and **Burins,** races in France who are despised, living in the arrondissement of Bourg-en-Bresse, in the department of Ain. They are believed to be descended from the Saracens. Although industrious and prosperous, they, like the Cagots, are held in the utmost detestation by their neighbors. They are looked upon as covetous and malicious; they marry among themselves. From time im-

memorial they have been field-laborers, cattle-dealers, butchers, etc. Many of them are very good-looking. The young women are handsome, with large black eyes. Many of these people are well-to-do business-men. (See MICHEL, "Histoire des Races Maudites," 2 vols., 1847.)

Chlad'ni (ERNST FLORENS FRIEDRICH), born at Wittenberg, Germany, Nov. 30, 1756, was the founder of the science of acoustics. He devoted much time to the perfecting of the theory of sound, and published, besides other works, "Discoveries on the Theory of Sound" (1787), a "Treatise on Acoustics" (1802), and a "Treatise on Fiery Meteors" (1819). Died April 3, 1827.

Chlamydosau'rus [from the Gr. χλαμύς (gen. χλαμύδος), a "cloak" or "mantle," and σαῦρος, a "lizard"], often called the "frilled lizard," a singular genus of reptiles, bearing on its neck a large plaited frill, of which the best known species is the *Chlamydosaurus Kingii*, a native of Australia. The general color of the chlamydosaurus is yellow-brown mottled with black, and it is remarkable that the tongue and the inside of the mouth are also yellow. The frill forming so conspicuous an ornament to this creature is covered with scales and toothed on the edge. During the early stage of the animal's life this appendage does not reach even the base of the fore legs, but when the animal has attained maturity it extends considerably beyond them. The chlamydosaurus is very courageous, and when provoked it erects the frill, and by showing its teeth presents a formidable aspect. When at rest its frill lies back in plaits upon the body. This lizard measures at full growth nearly a yard in total length.

Chlamydosaurus.

Chlamydoph'orus [from the Gr. χλαμύς, a "cloak," and φέρω, to "carry"], a small edentate quadruped of Chili and the Argentine Republic, nearly related to the armadillo, but resembling the common mole in size and habits. It is remarkable for being covered with a shell of square plates on the head, neck, and back, with another similar shell on the posterior extremity. Its internal skeleton resembles in several respects that of birds. Its tail is carried under its belly. There is but one known species, the *Chlamydophorus truncatus*, called pichiciago by the natives.

Chlamydophorus.

Chla'mys [Gr. χλαμύς], a woollen outer garment of the Greeks, differing from the usual *amictus* of the men, the ἱμάτιον, in being finer, gayer in color, and oblong instead of square. It was fastened round the neck by a brooch (fibula), and hung down the back to the calf, or over the left shoulder, covering the left arm.

Chlo'ral, a name composed of the first syllable of *chlorine* and the first syllable of *alcohol*, designating a liquid composed of chlorine, carbon, hydrogen, and oxygen, obtained by the action of chlorine on absolute alcohol. Its formula is $C_2HO_2Cl_3$. When kept for a time it becomes solid, but is not changed in composition, and may be restored to its original form by heat. With water it forms a solid hydrate known as chloral hydrate or hydrate of chloral. This article is now much used in medicine as a hypnotic. It enters the circulation, and is, by the alkalies contained in the blood, converted into formic acid and chloroform. The chloroform doubtless is the principal source of the hypnotic effect of the medicine. The dose is from twenty to forty grains to an adult. Much larger doses have been given with no bad results, but well-authenticated fatal cases of chloral poisoning indicate the necessity of caution in its use. The sleep produced by chloral is wonderfully sweet and refreshing to most patients. Chloral sometimes increases hysterical symptoms, and unless well diluted is irritant to the stomach. It is peculiarly valuable in tetanus. Given in large doses, chloral powerfully diminishes reflex action, and is a physiological antidote in poisoning by strychnia.

Chlorantha'ceæ [from *Chloranthus*, one of the genera], a natural order of exogenous plants nearly allied to pepper. They are herbaceous and half-shrubby, have jointed stems, opposite, simple leaves, with minute stipules between them. The flower has no calyx or corolla; the fruit is a drupe or 1-seeded berry. The order comprises but few known species, some of which are natives of China and Japan, and some are tropical. They are generally aromatic, and have important stimulating properties. The *Chloranthus officinalis* is prized in Java as a remedy for fever. The leaves and berries of the *Chloranthus inconspicuus* are used by the Chinese to impart a peculiar flavor to tea.

Chlo'rate, a compound formed by the union of chloric acid with a salifiable base. The best known of these salts is chlorate of potash, which, mixed with combustibles, such as sulphur and charcoal, forms highly explosive compounds which ignite by a blow or friction. It is also a useful medicine.

Chlorhydric Acid. See HYDROCHLORIC ACID, by PROF. C. F. CHANDLER, PH. D., LL.D.

Chlo'ric Ac'id (ClO_5, or, in the new notation, ClO_3), a compound of one atom of chlorine with five (or three) atoms of oxygen. It occurs in combination with potash as the white crystalline salt called chlorate of potash. (See CHLORATE.) This acid has not been obtained in its anhydrous state, but combined with water it is a syrupy liquid, setting fire to dry organic substances with which it comes in contact.

Chlo'ride [Fr. *chlorure*], a binary compound of chlorine with some other substance. Common salt is a chloride of sodium, and calomel is a chloride of mercury. When chlorine unites in two different proportions with the same base, the terms protochloride and bichloride are applied to such compounds.

Chlo'rine [from the Gr. χλωρός, "pale green"], a non-metallic gaseous chemical element, discovered by Scheele in 1774, and named by him "dephlogisticated marine air." Soon after, from a mistaken view of its nature, it received the name of "oxymuriatic acid." In 1810, Davy proved it to be an elementary body, and gave it the name which it now bears. It occurs very largely as the chloride of sodium, common salt, in the vegetable, animal, and mineral kingdoms. In ordinary conditions it is a gas which may be easily obtained by moistening bleaching-powder with dilute sulphuric acid. It is a yellowish-green gas with a suffocating odor, is not combustible, and is a feeble supporter of ordinary combustion. A lighted candle placed in it burns with a smoky flame, the hydrogen of the oil alone burning. Antimony, copper, and arsenic, in fine division or in thin leaves, at once become red hot and burn when introduced into chlorine. Paper soaked in turpentine likewise bursts into flame. Chlorine is a perissad (a monad), having the symbol Cl, and the equivalent 35.5. It is very heavy, its specific gravity being 2470 (air = 1000). Two volumes of chlorine in one of water yield a solution resembling the gas in color, odor, and other properties. Chlorine is a bleacher of cotton and linen, and a powerful disinfectant. It can be condensed by pressure and cold into a transparent greenish-yellow limpid liquid, with a specific gravity of 1330, which also possesses bleaching properties and a powerful odor. Chlorine in very minute quantity produces a sensation of warmth in the respiratory passages, increasing the expectoration; in large quantities it causes spasm of the glottis, violent cough, and a feeling of suffocation. Its inhalation is liable to be followed by dangerous disease of the air-passages. The antidotes to the effects of chlorine in the lungs are the inhalation of the vapor of water, alcohol, ether, or chloroform. Chlorine unites with many substances to form a class of compounds known as chlorides.

Chlo'rite [from the Gr. χλωρός, "green"], an abundant green mineral composed of silica, alumina, magnesia, and protoxide of iron in variable proportions. It is rather

soft, and is easily broken. It rarely occurs crystallized in hexagonal crystals, and sometimes foliated like talc, from which it is readily distinguished by yielding water in a closed tube.

Chlorite Schist, or **Chlorite Slate,** a green slaty rock in which chlorite is abundant in foliated plates, usually blended with minute grains of quartz, and sometimes with felspar and mica. It is one of the metamorphic rocks, and is often found graduating into mica schist or clay-slate.

Chlorocarbon'ic A'cid ($COCl_2$), a compound formed by exposing a mixture of chlorine and carbonous oxide to the action of light. It is also called phosgene gas and carbonyl chloride.

Chlo'roform [a term derived from the first syllable of *chlorine* and the first syllable of *formyl*], ($CHCl_3$), was long known to chemists before it was discovered to have valuable properties; but the power which it possesses of producing anæsthesia has led to the preparation of chloroform on an extensive scale. It is also a useful chemical reagent. To four parts of bleaching-powder sufficient water is added to make a thin paste, to this is added one part of spirits of wine; the whole is introduced into a retort, which must not be more than half filled. Heat being applied, chloroform, water, and a little alcohol distil over. As the chloroform is heavier than water, two layers of liquid are obtained, the upper water and alcohol, and the lower chloroform. The upper liquid is poured off, the chloroform agitated with fused carbonate of potash, sulphuric acid, and alcohol, which abstract the remaining traces of water, and on subsequent redistillation the chloroform is obtained pure. It may be prepared by several other methods.

It is a remarkably limpid, volatile, mobile, colorless liquid, which has a characteristic odor and an agreeable sweetish taste. It has a specific gravity of 1.48, that of water being 1, and boils at 142° F. It has been regarded as a terchloride of formyl, and also as a chloride of methenyl. It is analogous to bromoform, iodoform, and nitroform. It is not inflammable in the ordinary sense, but when thrown on hot coals it burns with a green flame, evolving much smoke. It is slightly soluble in water, readily in alcohol and ether. It dissolves camphor, amber, resins, wax, caoutchouc, iodine, and bromine, as well as many alkaloids. The employment of chloroform as an anæsthetic has already been considered under ANÆSTHESIA; but it may be here observed that numerous cases of death from its use have occurred, even when administered by skilful physicians. It is sometimes administered by the stomach as an anodyne; and when applied to the surface of the body is a powerful blistering agent, very useful as a derivative.

Chlo'rophane [from the Gr. χλωρός, "green," and φαίνομαι, to "appear"], a name given to those varieties of fluor spar which when heated shine with a beautiful emerald-green, phosphorescent light.

Chlo'rophyl [from the Gr. χλωρός, "green," and φύλλον, a "leaf"], the green coloring-matter of the leaves of plants. It is soluble in alcohol, but insoluble in water, and is somewhat similar to wax. Light is indispensable to its formation, and hence arises the phenomenon of blanching which occurs when plants are deprived of light. It is also called endochrome, especially in the lowest orders of plants.

Chloro'sis [from the Gr. χλωρός, "pale green"], a disease almost peculiar to young women and girls, and usually associated with other troubles peculiar to that time of life. It takes its name from a greenish-yellow tint of the skin which some patients exhibit. There is also great pallor and debility, often disturbance of the heart's action, breathlessness, and a variously perverted and capricious appetite. The disease is characterized by a deficiency of the cell-elements of the blood. Most cases are readily curable by the use of exercise, good air, proper food and clothing, and, above all, by the administration of iron, which is almost a specific in this disease.

Chlorosis is also the name of the "yellows," a disease which attacks plants and trees, especially the peach tree. A deficiency of chlorophyl causes a blanched and yellow appearance. Damp soil, wet weather, and insufficient culture and manuring are assigned as causes, but widespread climatic influences of a character which is little understood appear to be the principal cause of this destructive malady. No treatment except underground drainage and good culture promises any benefit.

Chlorox'ylon [from the Gr. χλωρός, "green," and ξύλον, "wood"], a genus of plants of the order Cedrelaceæ, its fruit having only three cells and splitting into three parts. *Chloroxylon Swietenia* is the satin-wood of India, a tree which grows about sixty feet high. The satin-wood is exported, and is used by cabinet-makers and brushmakers.

Choate (RUFUS), LL.D., one of the most eminent advocates and orators that America has produced, was born in Essex, Mass., the 1st of Oct., 1799. Both his parents were distinguished for quickness of intellect, as well as weight of character. He entered Dartmouth in 1815. After taking his degrees, he remained in the college as tutor for one year. He commenced the study of law at Cambridge, and subsequently studied under the distinguished orator and lawyer, Mr. Wirt, then U. S. attorney-general at Washington. He began the practice of law in his native State at Danvers, whence he removed to Salem and afterwards to Boston. While at Salem he was elected to Congress (1832), and later (1841) he was chosen Senator as successor to Mr. Webster, who had been appointed secretary of state under President Harrison. After Webster's death Mr. Choate was the acknowledged leader of the Massachusetts bar, and was regarded by the younger members of the profession with a love equal to their reverence. His health having failed, in 1858 he retired from business, and a sea-voyage having been recommended by his physicians, he embarked for Europe in 1859, but he was unable to proceed farther than Halifax, where he died on the 13th of July.

As an orator Mr. Choate's powers were of the rarest order. He was not merely eloquent when he spoke on themes that were calculated of themselves to touch the feelings or stir the passions of his audience, but his genius enabled him to interest and fascinate his hearers even while discussing the driest and most unpromising subjects. Mr. Choate's superior foresight made him dread more than many others the dangers that threatened his country. And it may be that his anxiety to conciliate the South, whence the principal danger was to be apprehended, was carried too far; his conduct in this respect certainly gave serious offence to many who were jealous of the rights and dignity of the North. But there can be no reasonable doubt that had he lived till the breaking out of the civil war he would have been found no less true to his country than many others who, after having long earnestly advocated in vain a policy of conciliation towards the South, proved themselves among the most determined and most devoted supporters of the Union. (See "Works of Rufus Choate, with a Memoir of his Life," by S. G. BROWN, 1862.)

Choate (RUFUS), son of the preceding, born in Salem, Mass., in 1834, graduated at Amherst College in 1855, and was admitted to the bar in 1861. On the outbreak of the recent civil war he entered the service as lieutenant of Massachusetts volunteers, participating in the battles of Winchester, Cedar Mountain, Antietam, etc., and was promoted to be captain for good conduct. Resigned in 1862 on account of failing health. Died Jan. 15, 1866.

Cho'card, or **Choquard** (*Pyrrhocorax*), a bird of the family Corvidæ, differing from the chough in having a shorter bill, but resembling it in its habits. The only European species is the alpine chocard, called alpine chough and alpine crow. It is about the size of a jackdaw, of brilliant black, with yellowish bill and red feet.

Choc'olate [Fr. *chocolat;* from the Mexican name *chocolatl* (from *choco,* "cacao," and *latl,* "water")], a dried paste made from the seeds of *Theobroma cacao,* mixed with sugar and spices, as cinnamon, cloves, cardamom, vanilla, etc. The paste is poured into moulds to cool and harden. Chocolate, when used as a beverage, is dissolved in hot water or milk. Sometimes the yolk of an egg is added, and sometimes it is dissolved in soup or wine. It is also employed in making certain liqueurs, and is extensively employed in confectionery. In a pure state it is very nourishing. Good chocolate is smooth, firm, soluble, aromatic, not viscid after having been boiled and cooled, but oily on the surface, and leaves no sediment. Chocolate is often adulterated with rice-meal, oatmeal, flour, potato-starch, roasted hazel-nuts, or almonds. The Mexicans, from time immemorial, were accustomed to prepare a beverage from roasted cacao, mixed with maize-meal and spices.

Choc'olay, a township of Marquette co., Mich. Pop. 260.

Cho'conut, a post-township of Susquehanna co., Pa. Pop. 939.

Chocowin'ity, a township of Beaufort co., N. C. Pop. 1630.

Choc'taw, a county of Alabama, bordering on Mississippi. Area, 800 square miles. It is bounded on the E. by the Tombigbee River. The surface is hilly or undulating; the soil is fertile. Cotton, corn, wool, and some tobacco are raised. Capital, Butler. Pop. 12,676.

Choctaw, a county in N. Central Mississippi. Area, 900 square miles. It is drained by the Big Black River, which rises in it. The surface is undulating; the soil is fertile. Cotton, corn, and wool are produced. Capital, Greensborough. Pop. 16,988.

Choctaw, a township of Arkansas co., Ark. Pop. 860.

Choctaw Corner, a post-township of Clarke co., Ala. Pop. 891.

Choctaw Indians, a tribe which formerly inhabited the State of Mississippi, on both sides of the Yazoo River. They are now settled in the Indian Territory, on the S. side of the Arkansas River. They cultivate the soil, are partially civilized, and are governed by written laws. They are politically connected with the Chickasaws, who live near them, and are represented in the same general council. Their number, exclusive of the Chickasaws, was in 1869 estimated at 12,500 souls, and they had sixty-nine public schools, with 1847 pupils.

Chodowie'cki, a distinguished German engraver and painter, born Oct. 16, 1726, who lived in Berlin, and engraved as many as 3000 plates, most of them small, in a manner original and graceful. Died Feb. 7, 1801. Wilhelm Engelmann has published a catalogue of his works (Leipsic, 1857; sup. 1860).

Chœr'ilus [Gr. Χοιρίλος], an Athenian tragic poet who flourished about 500 B. C. He was a competitor of Æschylus in a tragic contest, and gained prizes for thirteen of his dramas. None of his works are extant. He is supposed to have been the first author of written tragedies.

Chœr'ilus of Iasus, an inferior poet, was an attendant of Alexander on his march to the East, and sought to flatter him by his verses. To him, according to the scholiast on Horace, Alexander said, "He would rather be the Thersites of Homer than the Alexander of Chœrilus." The scholiast adds that Alexander agreed with him to give him a gold piece for every good verse, but a blow for every bad one, and that Chœrilus received only seven gold pieces in all, but was killed by the blows for his numerous bad verses. This author is treated of by Näke in his work on Chœrilus of Samos. HENRY DRISLER.

Chœr'ilus (or **Chœril'lus**) **of Samos,** born about B. C. 470, though Suidas places him somewhat earlier, was the author of an epic poem the exact title of which is not known, but which treated of the wars of the Greeks with Darius and Xerxes. Suidas attributes his taste for literature to his intercourse with Herodotus, who had formed an attachment to him. He afterwards found a shelter at the court of Archelaus, king of Macedonia, where he died, not later than B. C. 399. Chœrilus departed from the usage of the earlier epic poets in taking for the subject of his poem a contemporary historical event. Fragments are preserved in the writings of Aristotle, Ephorus, Josephus, etc. These have been collected into a volume with a dissertation on the life and poetry of Chœrilus, by Näke, Leipsic, 1817. HENRY DRISLER.

Choir [Lat. *chorus;* Fr. *chœur*], a company of singers in a church; also that part of a church in which the choristers sing. In ordinary language, and even as used by architects, it denotes the entire space which is enclosed for the performance of the principal part of the service. In this sense is includes the choir proper and the presbytery, and corresponds to the chancel in parish churches.

Choiseul, de (ÉTIENNE FRANÇOIS), DUC DE CHOISEUL ET D'AMBOISE, a French statesman, born June 18, 1719. He entered the army, gained the rank of lieutenant-general, and was sent as ambassador to Vienna in 1756. Favored by Madame de Pompadour, he became prime minister and favorite of Louis XV. He was considered an able diplomatist, and was popular with the nation, but he was removed from power by the influence of Madame du Barry in 1770. Died May 7, 1785. (See Mémoires de M. le Duc de Choiseul, écrites par lui-même," 2 vols., 1790.)

Choiseul-Gouffier, de (MARIE GABRIEL FLORENT AUGUSTE), COUNT, a French scholar and traveller, ambassador to Turkey, born Sept. 27, 1752. Having visited Greece and Asia Minor in 1776, he published a "Picturesque Journey in Greece (1782; new ed. 1841). Died June 20, 1817.

Choisy-le-Roi, a town of France, in the department of the Seine, on the Seine and on the Paris and Orleans Railway, 6¼ miles S. of Paris. It has manufactures of porcelain, glass, chemicals, etc. Pop. 5172.

Choke-Cherry, the *Prunus Virginiana* and its fruit, a species of bird-cherry, a native of North America, having small fruit in racemes; the fruit is rather agreeable, but astringent. The bark is used as a febrifuge and tonic, under the name of wild-cherry bark; and by distilling with water a volatile oil is obtained from it, associated with hydrocyanic acid.

Choke Damp. See CARBONIC ACID.

Cho'king, the obstruction of the pharynx or œsophagus, or more rarely of the larynx or trachea, by masses of food or other foreign bodies. Choking by obstruction of the pharynx or œsophagus is sometimes relieved by the operation of an emetic, sometimes by the use of gullet-forceps, of which there are many varieties, or by other appropriate instruments. Œsophagotomy, or cutting, has been resorted to, but this is one of the most formidable operations of surgery, and is not often necessary. When foreign bodies lodge in the larynx, aphonia, or loss of speech, is one of the symptoms. If the substance is in the windpipe or bronchi, the surgeon may often detect its presence by auscultation. The symptoms caused by foreign bodies in the œsophagus are often surprisingly like those which occur when similar bodies lodge in the air-passages. These symptoms are various; there may be spasmodic coughing, redness of the face, ineffectual attempts to swallow, and great discharge of saliva, and generally there is great difficulty of breathing. Surgical aid should always be called.

Chol'era [Gr., probably from χολή, "bile"], a disease characterized by purging and vomiting, followed by great prostration, and in many cases by fatal collapse. Comparatively mild cases occur with frequency even in temperate latitudes, and are known as sporadic cholera or cholera morbus; and such cases, though very distressing, are seldom fatal, while the more severe or epidemic form (known as Asiatic cholera) appears to arise in India, where it is endemic, and to be carried by ships, caravans, religious pilgrimages, etc., westward to Egypt, Persia, and Arabia, and thence to Europe and around the world by the regular channels of commerce. The disease is probably of miasmatic origin, and local conditions may favor or check its local development; but whether the disease ought to be called contagious or not is one of the most warmly disputed points in medicine. It is certain that habitual personal contact with the sick is often not followed by the disease. It is held by many that the disease is propagated by drinking water; by others, that its germs are taken up from the air the patient breathes. It is regarded by many as certain that the disease is largely propagated from the stools or alvine discharges of the sick; and all such discharges should be treated with powerful disinfectants, and deposited, if possible, in places not frequented by those who are well; and especial care should be taken not to let them be thrown into vaults and privies in common use. As to whether personal quarantines and cordons do any good in preventing the spread of cholera, the most diverse opinions are held, some writers strongly affirming, and others as strongly denying, their usefulness.

Without describing the various stages of the fatal disease—the premonitory painless diarrhœa, the alarming and profuse purgation which follows, carrying off the fluids of the body, the profound collapse, the reaction, with the dangerous febrile condition which may follow—it is enough to say that treatment should be chiefly preventive. No diarrhœa in a cholera season should be neglected. Opiates will usually control the precursory diarrhœa. During the active stage of the disease cold compresses to the bowels are sometimes useful. The administration of diffusive stimulants in small doses during the stage of collapse should be persisted in. Friction by the hand may relieve the spasm of the muscles. Great care should be taken for a long time lest a relapse should occur. The food of convalescents should be of the very lightest and blandest character for some days. REVISED BY WILLARD PARKER.

Chol'era Infan'tum, or **Acute Intes'tinal Catarrh'.** This intense and dangerous form of infant diarrhœa is mostly found in hot climates, the hot season, and close air; more amongst the poor than the rich. It is by no means confined to the U. S.; on the contrary, it is very frequent in Europe, and just as frequent in the first summer of the infant as in the second. It has no direct relation to dentition, which is illogically accused of being the cause of so many diseases of infancy, and results but rarely from exposure or from mental emotions of either infant or mother (wet-nurse). The usual cause is improper feeding in hot weather. The former is a direct injury; the latter, by debilitating the nervous system and lowering the functions of all the digestive organs, diminishes the general strength and power of endurance. Nursing infants are but seldom affected; many infants will recover from an attack by being returned to the mother's or nurse's breast. Still, an improper condition of breast-milk (an undue proportion of water, or fat, or caseine, or the admixture of medicinal agents taken by the mother or nurse, or a change produced by mental emotions in the latter) is known to be injurious. Weaned infants, however, and such as are brought up on artificial food, are mostly attacked. Artificial food is seldom identical, in its nutritive value, with mother's milk. Cow's milk contains less sugar and more butter and caseine than mother's milk, and requires cook-

ing and skimming before being diluted with water (better still, barley water). Vegetable food is dangerous unless carefully selected and prepared. Thus it is that the first passages in cholera infantum contain undigested food of all sorts, particularly lumps of coagulated milk, which is also brought up by vomiting. Afterwards the passages are very thin, watery, of an acid or fetid smell, very copious and frequent; vomiting accompanies this diarrhœa, more or less. Moaning and crying are soon replaced by debility, and even complete collapse; the body is rapidly deprived of a large portion of the water contained in it, and emaciates; the eyes lie deep in the orbits; the sutures and fontanelles of the skull sink; the skin becomes dry, the feet and hands cold, while the temperature of the trunk is rising; the face looks shrunk and senile; the pulse becomes weak and frequent, the voice feeble, the expression of eyes and face listless, and sopor or coma or convulsions set in. Death is a frequent result. The principal preventive consists in supplying the well infant with proper artificial food when no breast-milk is available, and at regular times, and in attending to its general health. When the disease has made its appearance the principal means of checking it are the following: during the first few (3–6–8) hours no food or drink ought to be given. The irritated stomach must be kept at rest; vomiting will cease on that condition only. After that time give a teaspoonful of ice-water or a small piece of ice (size of a bean), with or without a few drops of brandy, every five or ten minutes, as long as the tendency to vomit persists. When feeding is to be recommenced, avoid milk (except breast-milk) in whatever form. Barley-water, oatmeal gruel (strained), in tea or tablespoonful doses, now and then, with the white of eggs (1–3 in twenty-four hours), will readily be taken and well digested. Many cases will get well with this dietetical treatment. At the same time the air must be kept as cool and fresh as possible, day and night. The infant will recover faster out of than in doors. The medicinal treatment, which is, under all circumstances, the domain of a physician, varies according to the nature of the case. Mercurial remedies (calomel) can be avoided. Subnitrate of bismuth, with opium in small doses, and preparations of chalk, nitrate of silver, astringents, such as tannic or gallic acids, catechu, are frequently resorted to, the latter principally in cases which threaten to become chronic. A. JACOBI.

Choles'terin [from the Gr. χολή, "bile," and στέαρ, "fat"], one of the lipoids, or non-saponifiable fats, was originally discovered in gall-stones, but is an ordinary constituent (in very minute quantity) of bile, blood, the tissue of the brain, and of pus and other morbid fluid products. It is generally thought to be a product of disassimilation, and is hence considered an excrementitious substance. It separates from its solutions in glistening pearly scales, which, when examined under the microscope, appear as very thin rhombic tablets. Different formulæ have been assigned for its composition, the one generally accepted being $C_{26}H_{44}O$. It is not always easy of detection, but it may be readily distinguished from all similar substances by its rhombic tablets.

Cholet, a town of France, department of Maine-et-Loire, on the river Maine, 32 miles S. S. W. of Angers. It is well built, and has manufactures of fine woollen and mixed fabrics. Pop. 13,360.

Cholmondeley, chum'ly, MARQUESSES OF, and Earls Rocksavage (United Kingdom, 1815), Earls Cholmondeley (1706), Viscounts Malpas (1706), Barons Cholmondeley (England, 1689), Barons Newburgh (Great Britain, 1716), Viscounts Cholmondeley (1661), Barons Newburgh (Ireland, 1714), and baronets (1611).—WILLIAM HENRY HUGH CHOLMONDELEY, third marquess, joint hereditary lord grand chamberlain of England, born Aug. 31, 1800, was member of Parliament for South Hants 1852–57, and succeeded his brother May 8, 1870.

Cholu'la, a decayed town of Mexico, in the state of Puebla, is situated on the table-land of Anahuac, about 70 miles E. S. E. of Mexico. Elevation above the sea, 6912 feet. According to Cortez, it contained 20,000 houses in the first part of the sixteenth century, and about 400 temples. The present population is about 5000. Here is a remarkable ancient pyramid of clay and brick, which is 164 feet high, with a base each side of which measures 1440 feet. It is supposed that this was erected by the aborigines or ancient Mexicans. Humboldt reported that he found 16,000 inhabitants, but it has greatly decreased since.

Chone'tes [from the Gr. χώνη, "cup" or "funnel-shaped cavity"], a genus of fossil brachiopodous molluscoids nearly allied to the genus *Producta*. It is characterized by a transversely oblong shell, and by having the long margin of the ventral valve armed with a series of tubular spines. More than twenty-eight species have been found in the palæozoic formations. They are found in Europe and America.

Chopin (FRÉDÉRIC FRANÇOIS), a Polish pianist and composer, born near Warsaw Mar. 1, 1809, removed to Paris about 1832. He composed concertos, waltzes, nocturnes, preludes, and mazurkas which display a poetic fancy and abound in subtle ideas, with graceful harmonic effects. His compositions are strikingly peculiar in melody, rhythm, and harmony, and possess a delicate though powerful charm. He was one of the first of pianists, and his playing, like his music, was marked with a strange and ravishing grace. Died in Paris Oct. 17, 1849. In 1869 a monument was erected to him at Warsaw. (See LISZT, "Chopin," 1852; BARBEDETTE, "Chopin," 1869.)

Chopine, or **Chiopine,** chop-een' [Sp. *chapin;* probably from the It. *scappino*, a "sock"], a high clog or slipper. Chopines were probably of Eastern origin, but were introduced into England from Venice during the reign of Elizabeth. They were worn by ladies, and were usually made of wood covered with leather, often of various colors, and frequently painted and gilded. Some of them were as much as half a yard high; and in Venice, where they were universally worn, their height distinguished the quality of the lady.

Chop'tank, a river which rises in Kent co., Del., and flows south-westward into Maryland. It expands into an estuary, forming the boundary between Talbot and Dorchester counties, and communicates with Chesapeake Bay. Length, nearly 100 miles. Sloops can ascend it about fifty miles.

Chora'gus, or **Chore'gus** [Attic Gr. χορηγός], a person at Athens who, on behalf of his tribe, supported the chorus, and who, in competition with the other tribes, exhibited musical or theatrical performances. The choragus who surpassed his competitors received a tripod for a prize, but he had the expense of consecrating it and of building the monument on which it was placed. (See CHORUS.)

Chora'le [Low Lat., from *chorus*, a "choir"], or **Cho'ral,** a melody to which hymns or psalms are sung in public worship by the congregation in unison. The melody of the chorale moves in slow and strictly-measured progression, and is of a character that disposes the mind to devotion. The term chorale is now applied only to the music of the Protestant churches, but choral melodies still in use can be traced with certainty to the early centuries of Christianity. The pure, simple chorale has in a great degree been cast aside.

Chord [Fr. *corde*, from the Gr. χορδή, a "string"], in geometry, is the straight line which joins the two extremities of the arc of a curve; so called because while the arc resembles the bow (*arcus*), the chord may be likened to the bow-string. The chord of a circular arc may be found by multiplying the radius by twice the sine of half the angle which the arc subtends. The use of chords in trigonometry is mostly superseded by the use of sines, which are much more convenient.

Since two circles can cut each other in only two points, they can have only one common chord. But by the transcendental "principle of continuity," to which modern geometry owes so much, the circle may be considered as a curve of the second order, and as such two circles may be said to have four points of intersection, two of which are, however, always imaginary. These imaginary points are called "circular points at infinity." This view also gives the two circles six common chords, instead of one. Four of these chords are imaginary, and the fifth is infinitely distant; while the sixth (and most obvious) chord may or may not cut the two circles in real points. This last chord is often called the RADICAL AXIS (which see), and has many remarkable properties.

Chord, in music. See CONSONANCE.

Chore'a [Gr. χορεία, a "dance"], or **St. Vitus's Dance,** a disease characterized by irregular, involuntary, and often grotesque muscular action, without appreciable organic change in any tissue, and generally without pain or any known derangement of mental action or of sensation. It is most common in children after the second dentition and before puberty; much more common in girls than in boys; sometimes attacks pregnant women and other adults, though some cases once called adult chorea would now be recognized as locomotor ataxy, a very different disease. Chorea is sometimes hereditary, sometimes epidemic. Many writers have classed the dancing mania (the original "St. Vitus's dance"), tarantism, and the strange excesses of certain religionists (dervishes, French prophets, "jumpers," and "convulsionists") all as varieties of chorea. Stammering has been called a chorea of the vocal organs. The

disease is sometimes associated with rheumatism and with anæmia. Such complications should receive special treatment. The metallic tonics are generally useful, and so are systematic gymnastics, life in the open air, and a kind and unobtrusive discipline, which shall teach the young patient the power of the will over the movements of the body.

Chor'ley, a town of England, in Lancashire, on a hill and on the river Chor, 20 miles N. W. of Manchester. It is connected by a railway with Preston and Bolton. It has an ancient parish church in the Norman style, and a handsome Gothic church. The place owes its prosperity to various manufactures of cotton yarn, muslin, jaconet, calico, and gingham. Mines of coal and lead and quarries of slate are worked in the vicinity. Pop. 15,013.

Cho'roid Coat [from the Gr. *χορίον*, "skin," and *εἶδος*, "appearance"], the second of the tunics of the eye, covering the posterior five-sixths of the eyeball, and coming as far forward as the edge of the cornea. In front it is continued by the ciliary processes and the iris. It joins the sclerotic by means of the ciliary ligament and muscle. It is highly vascular, and is pigmentary, being of a kind of chocolate color. It is in three layers. The outermost is connected to the sclerotic by the *membrana fusca*. This coat consists principally of the vorticose veins, with pigment-cells. The middle layer (*tunica Ruyschiana*) consists of capillaries. The inner layer consists of tesselated epithelium, charged with pigment. This layer is lined by the retina. The choroid coat is liable to an inflammatory disease known as choroiditis.

Cho'rus [Gr. *χορός*; Lat. *chorus*], a Latin word by which is understood the union of musicians for the performance of a musical work. In modern music a combination of voices or instruments is called a chorus. A vocal chorus is mixed or complete where it consists of all or part of the four principal voices. There are also choruses for male and female voices. An instrumental chorus is the name applied especially to a combination of wind instruments. A musical passage thus unitedly rendered is termed also a chorus. In operas and the oratorio it is of the greatest importance. In the immense musical festivals or jubilees recently held in different parts of Europe and America the choruses have comprised many thousand voices.

Chorus in the ancient drama was a band of singers and dancers employed on the stage. In the Attic tragedy and comedy the chorus consisted of a group of males and females, who remained on the stage during the performance as witnesses. When a pause took place in the drama the chorus sang or spoke verses having reference to the subject. At times the chorus took part with or against the persons in the drama, by way of advice, comfort, or dissuasion. Its leader was called the coryphæus. The charge of organizing it was considered a great honor. At times the chorus was divided, and spoke or sang antiphonally. How the musical element of the ancient chorus was constituted is not known. It was doubtless very simple, and was accompanied by flutes.

Chose in Action, in law, a thing in action. This is a term used to express all rights enforceable by action in a court of justice. Blackstone, in his "Commentaries," confines it to rights growing out of contracts. Modern usage extends it to claims arising from torts or wrongs. (See Contracts, Torts, Assignment, Chattel, etc.)

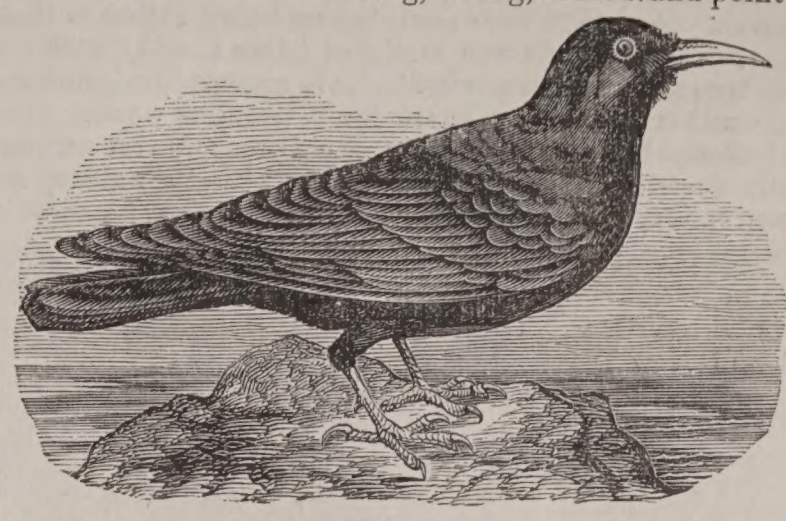
Cho'tank, a township of King George co., Va. Pop. 2814.

Choteau, a county in the N. part of Montana. It is intersected by the Missouri River and the Milk River. The surface is partly mountainous, but it contains some broad treeless plains and considerable arable land. Area, 14,195 square miles. The climate is quite moderate, from the comparatively small elevation above the sea. Capital, Fort Benton. Pop. 517.

Cho'tyn, Kho'tin, or **Choc'zim,** a fortified town of Southern Russia, in Bessarabia, on the Dniester, 45 miles S. W. of Kamieniec. It is an important military post, which formerly belonged to the Turks, from whom it was taken by the Russians in 1739. Pop. in 1867, 20,917.

Chouans, a name of the French royalists of Brittany who revolted against the French Convention in 1792. Chouan, which signifies an "owl," was the nickname of Jean Cottereau, who was the leader of the insurgents, and had previously been a smuggler. This insurrection was called *La Chouannerie*. Cottereau gained some success in guerilla warfare, and eventually united his troops with the Vendeans. They were defeated at Le Mans in Dec., 1793. Cottereau was killed in a fight in July, 1794. New movements of the Chouans took place in 1799, and again in 1814 and 1815, but they were easily suppressed.

Chough, chŭf [etymology uncertain], (*Fregilus*), a bird of the crow family, approaching the character of the starling, but resembling the crow in having its nostrils covered with bristles. The beak is long, strong, arched, and pointed.



Chough.

The tail is slightly rounded. The Cornish chough, or red-legged crow (*Fregilus graculus*), inhabits many parts of Europe and Asia and the north of Africa, dwelling on high cliffs. Its long claws enable it to cling to a rock, but it seems unwilling to set its feet on turf. It lives in societies like the rook. It feeds on insects, berries, grubs, and grain. It is easily tamed, and exhibits in the highest degree the disposition which characterizes others of the crow family. Other species of chough are natives of Australia, Java, etc. The alpine chough is a Chocard (which see).

Choules (John Overton), D. D., born at Bristol, England, Feb. 5, 1801, studied theology at Bristol College (England). He arrived in America in 1824, and engaged immediately in teaching, for which he seems to have had unusual adaptation, and to which he devoted himself, to some extent, throughout his life. He was pastor of Baptist churches in New Bedford, Mass., Buffalo, N. Y., Jamaica Plain, Mass., and Newport, R. I., and edited several works, the most important of which was Neal's "History of the Puritans," and published "The Young Americans Abroad" and "A History of Christian Missions." Died in New York Jan. 5, 1856.

Chouteau (Auguste and Pierre), two brothers noted as the founders of the city of St. Louis, Mo. They removed from New Orleans to the site of St. Louis in 1764. Auguste died in 1829, and Pierre in 1849. The latter had a son Pierre (born 1789; died Sept. 8, 1865), an eminent merchant in the fur-trade.

Chowan', a river of North Carolina, is formed by the Meherrin and Nottoway rivers, which unite about 5 miles above Winton. It flows south-eastward, and then southward, forms the boundary between Chowan and Bertie counties, and enters Albemarle Sound at its western end. It is about 50 miles long, and is navigable for sloops.

Chowan, a county in the N. E. of North Carolina. Area, 240 square miles. It is bounded on the S. by Albemarle Sound, and on the W. by the Chowan River. The surface is nearly level. Corn and cotton are staple products. Capital, Edenton. Pop. 6450.

Chrestom'athy [Gr. *χρηστομάθεια*], according to the etymology, is that which is useful to learn. The Greeks frequently formed commonplace books by collecting the various passages to which in the course of reading they had affixed the mark *χ* (*χρηστός*). Hence books of extracts chosen with a view to utility have received this name.

Chres'tus of Byzantium, one of the most distinguished pupils of Herodes Atticus, a contemporary of the emperor Aurelius. He was celebrated for his eloquence, and taught rhetoric with great success, having many distinguished men among his hearers. Of his writings nothing is preserved. Philostratus has given notices of him in his lives of the Sophists. Henry Drisler.

Chrism [Gr. *χρῖσμα*, from *χρίω*, to "anoint"], the oil which is used in the Greek, Roman Catholic, and Oriental churches in the administration of baptism, confirmation, ordination, extreme unction, etc. There are two kinds of chrism—the one, a mixture of oil and balsam, is used in baptism, confirmation, and ordination; the other, which is mere oil, is used in extreme unction. The chrism of the Eastern Church contains more than forty ingredients.

Chris'ome [from the Gr. *χρῖσμα*, an "anointing"], the white vesture laid by the priest on the child in former times at baptism, to signify its innocence. It was generally presented by the mother as an offering to the church, but if the child died before the mother was churched after the next child's birth, it was used as a shroud. A chrisome child is a child in chrisome cloth.

Christ [Gr. Χριστός; Lat. *Christus*], a word which was

at first a title of our Saviour, now in general use as part of his name. It is Greek, signifies *anointed*, and corresponds exactly in meaning and use with the Hebrew word Messiah. As kings were anointed on being called to their offices, so the Saviour was anointed (Acts x. 38) "with the Holy Ghost and with power." This anointing signifies a consecration or setting apart for a peculiar work. (For the historical account of Christ, see JESUS; for an account of the doctrines held with regard to Christ's nature, see CHRISTOLOGY, by PROF. W. G. T. SHEDD, D.D.)

Christadel'phians ("brothers of Christ"), a religious body of recent origin who are becoming numerous in some parts of the U. S. They attach equal importance to the Old and New Testaments, and believe that the intention of the Creator is to recall to immortal life all who love him in this life, who shall people this world. All who have not caught the immortal principle perish in death. They reject the doctrine of a personal devil. Christ, they believe, is the Son of God, deriving from the Deity moral perfection, but from his mother the common nature of Adam. They ascribe to him the threefold character of prophet, priest, and king. The first office he fulfilled by his life and death on earth; as priest he now mediates before the Deity; and as king he will return to earth and reign from the throne of David over the glorified world.

Christ'church, a borough and seaport of England, in Hampshire, on the English Channel, and at the head of the estuary formed by the rivers Avon and Stour, 24 miles S. W. of Southampton. Here is a priory church, one of the most interesting of English ecclesiastical structures, which was partly built on an ancient foundation in the reign of William Rufus. Christchurch has manufactures of springs for watches and clocks, and several breweries. The phenomenon of a double tide occurs here every twelve hours. Pop. 9368.

Christ Church, a town of New Zealand, capital of the province of Canterbury, is situated on the banks of the river Avon, 7 miles from the sea. It is connected by railway with Lyttleton, which is its port, and by telegraph with nearly all the leading towns. It is the seat of an Anglican bishop, and has a college. Pop. in 1871, 7931; with the suburbs, 12,466.

Christ Church, a township of Charleston co., S. C. Pop. 4493.

Chris'tening, a term used as a synonym for baptism. It is disliked by some as favoring the doctrine of baptismal regeneration, being, according to its derivation, expressive of the notion that a person is made a Christian in baptism. But it is usually employed without the intention of conveying any such opinion.

Chris'tian, a county in S. Central Illinois. Area, 875 square miles. It is bounded on the N. by the Sangamon River, and intersected by the South Fork of that river. The surface is nearly level; the soil is fertile. Corn, wheat, cattle, hay, tobacco, and butter are produced. It is traversed by the Central, the Toledo Wabash and Western, the Springfield and Illinois South-eastern, and the Indianapolis and St. Louis R. Rs. Coal is found here. Capital, Taylorsville. Pop. 20,363.

Christian, a county of Kentucky, bordering on Tennessee. Area, 700 square miles. It is drained by Little River and several creeks. The surface of the N. part is hilly, and that of the S. is level; the soil is fertile. Tobacco, corn, wheat, and live-stock are largely raised. Coal and limestone abound here. The county is intersected by the St. Louis Evansville Henderson and Nashville R. R. Capital, Hopkinsville. Pop. 23,227.

Christian, a county in the S. W. of Missouri. Area, 500 square miles. It is drained by the James River and Swan Creek. The soil of some parts is fertile. Corn and tobacco are the staple crops. Copper, iron, and lead are found here. Capital, Ozark. Pop. 6707.

Christian, a township of Independence co., Ark. Pop. 1327.

Christian II., king of Denmark, a son of John, was born July 2, 1481. He began to reign in 1513, and married Isabella, a sister of the emperor Charles V., in 1515. In 1520 he invaded Sweden, which he partially conquered. He usurped the throne of Sweden, and abused his power by cruelty, but he was expelled by Gustavus Vasa in 1522. His Danish subjects also revolted, deposed him, and elected his uncle, Frederick I., in 1523. Christian retired to Flanders, and returned with an army in 1531, but was defeated and kept in prison until his death, Jan. 25, 1559. (See BEHRMANN, "Kong Christiern II., Historie," 1815.)

Christian IV., king of Denmark, born April 12, 1577, was the son and successor of Frederick II., who died in 1588. He became in 1625 the commander of the Protestant armies in the Thirty Years' war against the emperor of Austria. In 1626 he was defeated by the imperialist general Tilly at Lutter. He waged war against Sweden from 1611 to 1613, and again from 1643 to 1645. He was an able ruler, and promoted the prosperity of Denmark. He died Feb. 28, 1648. (See RASMUS NYERUP, "Charakteristik af Kong Christian IV.," 1816.)

Christian VII., king of Denmark, born Jan. 29, 1749, was a son of Frederick V. His mother was Louisa, a daughter of George II. of England. He began to reign in Jan., 1766, and married his cousin Caroline Matilda, a sister of George III. of England, in the same year. His physician, Struensee, obtained the chief power in 1770, and was supported by the favor of the queen, but he was unpopular with the nation. Christian VII. was so feeble and morbid that he was incapable of reigning. He died Mar. 13, 1808, and was succeeded by his son, Frederick VI., who had been regent since 1784.

Christian VIII., king of Denmark, born Sept. 18, 1786, was a cousin of Frederick VI. He was chosen king of Norway in 1814, but being unable to defend it against Bernadotte, who invaded Norway, he abdicated in Oct., 1814. He succeeded Frederick VI. in 1839, and died Jan. 20, 1848, leaving the throne to his son, Frederick VII.

Christian IX., king of Denmark, a son of Friederich Wilhelm, duke of Sleswick-Holstein, was born April 8, 1818. He ascended the throne in Nov., 1863, and was soon involved in a war against the German confederation, which disputed the right of the king to incorporate Sleswick with Denmark. The Danes were defeated, and Christian IX. signed in Aug., 1864, a treaty by which he ceded the duchies of Sleswick, Holstein, and Lauenburg to Austria and Prussia.

Christia'na, a post-hundred of Newcastle co., Del. Pop. 5370.

Christiana, a post-village of Sadsbury township, Lancaster co., Pa., on the Pennsylvania R. R., 21 miles E. by S. of Lancaster, has manufactures of iron castings and machinery, and a brisk trade.

Christiana, a post-township of Dane co., Wis. Pop. 1342.

Christiana, a township of Vernon co., Wis. Pop. 1133.

Chris'tian Commis'sion, or, more fully, **The United States Christian Commission,** a great organization in the Northern U. S. during the late civil war. It was organized Nov. 14, 1861, at New York. Its work was designed to supplement that of the great Sanitary Commission, for while the object of the latter was more especially the care of the sanitary condition of the national armies, the relief of the wounded and sick, etc., the Christian Commission also gave especial attention to the religious needs of the troops, co-operating with the chaplains, while the Sanitary Commission more especially co-operated with the medical officers of the army. At the same time the two societies entered into a generous rivalry in the work of supplying the material wants of the sick and wounded soldiers. The Christian Commission was first proposed by Mr. Vincent Collyer of New York, and originated by a call of the Young Men's Christian Association of New York (Sept. 23, 1861) upon all similar associations in the North to unite in this great undertaking. The good work accomplished by the Commission can never be duly estimated. (See Moss, "Annals of the Christian Commission.")

Chris'tian Connec'tion (or simply **Christians***), a religious denomination which arose in the U. S. about the beginning of the present century. This body originated in three distinct movements in three of the older denominations of the U. S.: (1) in the "O'Kelly Secession" (1793) from the Methodist Episcopal Church. O'Kelly's followers were at first called "Republican Methodists," but afterwards chose the name of "Christians," and declared the Bible alone to be their rule of faith and church government. (2) Dr. Abner Jones of Hartland, Vt., a Baptist, organized in 1800 a church which disavowed all creeds and sectarianism, and received the Bible as their only rule. They were joined by many ministers and others, chiefly of the Baptist and Freewill Baptist denominations. (3) A body of Presbyterians of Kentucky and Tennessee, who seceded in 1801 from the parent Church, and in 1803 took the name of Christians. The above three bodies were finally united into a "general convention," which meets quadrennially. The churches, however, are independent in church government.

The "General Baptists" of England and Wales hold

*This name is often pronounced Krīst'chan, in order to distinguish it from the common word, Christian.

doctrinal views very similar to those of the Christians, and the two bodies are in fellowship with each other. They invite all believers to their communion.

They are opposed to infant baptism, have no creed except the Bible, practise immersion in baptism, and are, as a general rule, Unitarian in their doctrines. They have in the U. S. about 150,000 communicants, and support several colleges and other schools. They are also found in England and her colonies. The denomination called "Campbellites" and "Disciples" also call themselves "Christians." (See DISCIPLES OF CHRIST.)

Christian Era [Fr. *ère Chrétienne*], the name of the great era from which all Christian nations compute their time, once supposed to correspond to the date of the birth of Christ. But, according to some of the best authorities, Christ was born on the 5th of April, four years before the commencement of our era (others say on the 25th of December, four or five years before that time). The practice of reckoning time from the (supposed) birth of Christ appears not to have been introduced into the Christian Church until the sixth century, when Dionysius surnamed the Little (Exiguus), a monk of Syria, first made use of it about 527 A. D. It was soon after introduced into Italy, and into France in the following century. The first instance recorded of its being employed in England was in 680. But the practice did not become universal throughout Christendom until about the middle of the fifteenth century.

Christia'nia, the capital of Norway and of the stift of the same name, is picturesquely situated in a valley and at the head of the navigable Christiania Fiord, about 55 miles from the sea; lat. of observatory, 59° 55′ N., lon. 10° 43′ E. The environs of the city are beautiful, and visitors who approach it by the fiord pass through magnificent scenery. It contains a cathedral, a citadel, a royal palace, a great arsenal, a town-hall, two theatres, an exchange, an asylum for lunatics, and a university founded in 1811, which has a library of 150,000 volumes. The average number of students is nearly 600. Connected with the university is an astronomical observatory. Here are manufactures of cotton, paper, glass, soap, etc. The chief articles of export are timber, iron, and glass. The harbor and fiord are closed by ice for three or four months in the year. It is a bishop's see, and was founded in 1624 by Christian IV. on the site of the burned royal city of Opslo. Pop. in 1869, 64,935.

Christian'ity [from the Gr. Χριστιανός, a "follower of Christ"], a system of religion which comes to us with a claim to be accepted as of divine origin. It professes to be no product of the human intellect, and acknowledges no author but the Being whom it sets before us as the object of worship. It claims to be the only true religion, and is consequently exclusive; that is to say, it admits of no compromise with any other religious system.

As a system it cannot be viewed as distinct from the religion of the Jews and of the patriarchs; it is the same religion adapted to new circumstances; there has been a change of dispensation alone. In studying Christianity we are obliged constantly to revert from the New Testament to the Old, and in some measure to trace the history of this through the preparatory dispensations. Christianity may be regarded as having its foundation in the doctrine of the existence of one God. Man is represented as involved in misery, incapacitated for the service of God, and liable to punishment for sin in a future state. The doctrine of the atonement claims special attention—a doctrine taught in all the sacrifices of the patriarchal and Jewish dispensations, as well as by the words of the Bible. Man being utterly incapable of effecting his own deliverance, God sent his Son to save sinners, to make them holy and partakers of eternal life.

By Unitarians and others who do not accept the above view, atonement or reconciliation with God is made to depend on repentance, while the life and death of Christ are represented as an example to us of obedience, virtue, goodness, and beneficence, under most trying circumstances; in which view the doctrines of a propitiatory sacrifice and imputed righteousness fall to the ground. These doctrines, however, are held by most of those who receive the doctrine of the Trinity and the generally received doctrine as to the incarnation of the Son of God, which is regarded as a glorious example of Divine condescension and a very great exaltation of human nature, while the highest dignity and bliss of which humanity is capable is believed to be attainable only by faith in Jesus Christ. According to this view, the connection between faith and salvation arises from the Divine appointment, which, however, provides for bringing into exercise, in harmony with the intellectual and moral nature of man, most powerful and excellent motives for all that is morally good, the partakers of salvation being thus fitted for the fellowship of God.

The doctrine of divine grace is a part of the system of Christianity on which very important differences of opinion subsist, especially as to the relation of grace to individual men. Such are the differences concerning election, and concerning man's ability or inability to exercise saving faith of himself. But by Christians generally the relation of the believer to Christ, and his faith in Christ, are ascribed to the Holy Ghost or Spirit of God, the third person of the Godhead. (See CALVINISM and ARMINIANISM.)

Salvation is viewed as beginning in regeneration, and as carried on in sanctification, and all its joys as connected with the progress of sanctification in this life or in that which is to come. Faith in Christ cannot be unaccompanied with repentance; though believers are holy in contrast to what they once were, yet there is none in this life free from sin, the tempter of our first parents being still the active enemy of men. Responsibility belongs to human nature; and the doctrine of a judgment to come may be considered as to a certain extent a doctrine of natural religion, as may also that of the immortality of the soul; but the clear and distinct enunciation of these doctrines belongs to the Christian religion.

Of the moral element of Christianity it is sufficient here to state that it is harmonious with the doctrinal part and inseparable from it; that it is founded upon the teachings of the Bible with regard to the moral attributes of God, and is exemplified in the character of Jesus Christ; and that it is divisible into two great parts—one of the love of God, and the other of the love of man.

Among what are termed the means of grace, which form so important a part of the system, the doctrine contained in the Bible first claims attention as the means of conversion and of edification, the instrument by which salvation is begun and carried on. The ordinances of worship, prayer, and sacraments are means of grace, concerning the relative importance of which, as compared with the other means, considerable difference of opinion prevails. The same remark applies also to the combination of Christians into an organized body with its own system of church government and discipline.

The truth of Christianity is supported by many different evidences, independent, but mutually corroborative. It appeals to reason, and demands to have its claims examined. Nor is there any faith where there is not a mental conviction arrived at by reasoning, direct or indirect. (See EVIDENCES OF CHRISTIANITY.)

Christianity is now the dominant religion in all countries of America, in Australia, and in Europe (except in Turkey), and it makes steady progress in Asia and Africa. It is divided into a large number of denominations or sects, which may be classed in three large groups—the Roman Catholic Church, the Oriental churches, and all the other churches. Most or all of the denominations of the third class are sometimes comprised under the name Protestants. In 1872 the aggregate population connected with the various denominations of Christians was estimated at about 380,000,000, in a total population of the globe of about 1,380,000,000. The Roman Catholic Church numbered a population of about 197,000,000, and the Oriental churches about 83,000,000. (See EASTERN CHURCHES, GREEK CHURCH, ROMAN CATHOLIC CHURCH, and the names of various denominations.) J. THOMAS.

Christian Knowledge, Society of. See SOCIETY OF CHRISTIAN KNOWLEDGE.

Christians (a religious denomination). See CHRISTIAN CONNECTION.

Chris'tiansand, a fortified seaport-town of Norway, is near its southern extremity and on the Skager-Rack, about 160 miles S. W. of Christiania. It has a good harbor, a citadel, a Gothic cathedral, the finest sacred building in Norway except the one at Trondhjem, a custom-house, and a gymnasium. Shipbuilding is the principal industry. It is a bishop's see and the capital of a stift. Timber, salmon, etc. are exported hence. Pop. 10,876.

Chris'tiansburg, a post-village of Shelby co., Ky., on the Louisville and Lexington R. R., 49 miles E. of Louisville.

Christiansburg, a incorporated town, capital of Montgomery co., Va., on the Atlantic Mississippi and Ohio R. R., 86 miles W. of Lynchburg, 2200 feet above the sea-level. It has a female college, an academy, tobacco and shoe factories, two churches, and one newspaper. Pop. 864; of township, 3316. NELSON CONRAD,
ED. MONTGOMERY "MESSENGER."

Christians of St. Thomas, a very ancient Christian sect of India, found especially along the Malabar coast. They claim to be descendants of converts made in India by the apostle Thomas, but they are generally believed to have been converted by Persian missionaries in the early ages of the Church. In 1599 the greater part were induced

by the Jesuits to unite with the Church of Rome, and at present about three-fourths of their number are Roman Catholics. Of the latter class more than one-half have a Syriac church-service, while the remainder are of the Latin rite. Of those who are not united to the Church of Rome there were in 1859 about 70,000, and ten years later they claimed for themselves 190,000 members, which is undoubtedly in excess of their number. They acknowledge the supremacy of the Jacobite patriarch of Antioch, though they were formerly Nestorians of the patriarchate of Mosul. Our knowledge of the history of this interesting people will probably be always limited, most of their literature having been burned as heretical by order of the synod of Diamper (1599). There was anciently, it would seem, more than one sect among them. According to Mr. Ludlow, they are at present both socially and morally much debased, though they were once the dominant class in Malabar. They are now found principally in Travancore. (See HOUGH's "History of Christianity in India," 4 vols., 1839–45.)

Chris'tianstad', a fortified town of Sweden, capital of a læn of its own name, is on the river Helge, about 9 miles from its entrance to the Baltic and 267 miles S. W. of Stockholm. It has broad streets and wooden houses. In the vicinity are the immense alum-works at Andrarum (5000 tons annually). It has an arsenal, a barrack, and a fine church; also manufactures of linen and woollen fabrics and gloves. Pop. 7710.

Chris'tiansted', the chief town of the Danish island of St. Croix, in the West Indies, is on the N. E. coast. It has a good harbor, which is defended by a fort. The governor-general of the Danish West Indies resides here. Pop. estimated at 7500.

Chris'tiansund', a seaport-town of Norway, on three islands in the Atlantic, which enclose its harbor. It is in the district of Romsdal, and 85 miles W. S. W. of Trondhjem. The trade is good, and fishing is largely pursued. Pop. 5709.

Chris'tiansville, a township and post-village of Mecklenburg co., Va., 15 miles S. of Lunenburg. Pop. 2550.

Christi'na, queen of Sweden, born Dec. 6, 1626, was the only surviving child of Gustavus Adolphus. She received a solid and masculine education, and learned Latin, Greek, Hebrew, politics, etc. When her father died, in 1632, she was recognized as his successor, under the regency of Oxenstiern. In 1644 she assumed royal power, and in 1648 concluded the treaty of Westphalia, by which Pomerania was annexed to Sweden. Her mind was strong and her character eccentric. Her subjects wished that she should choose a husband, but she manifested a constant aversion to marriage. Her eccentricity was also exhibited in the extravagant patronage of authors, pedants, artists, and buffoons. In 1650 her cousin, Charles Gustavus, was designated as heir to the throne by the states of Sweden, with the assent of the queen. Impatient of the personal restraint which the etiquette of court imposed on her, she abdicated the throne in June, 1654, while still in the bloom of youth. This act has been variously attributed to levity and magnanimity. She reserved supreme power over her suite and household, embraced the Roman Catholic religion, and became a resident of Rome. She patronized artists, founded an academy at Rome, and meddled with astrology and other chimerical pursuits. In 1657 she caused her grand equerry, Monaldeschi, to be put to death for treason. It is said she wished to recover the crown of Sweden when the king died in 1660, but she did not succeed. Died April 19, 1689. (See LACOMBE, "Histoire de Christine," 1762; ARCHENHOLZ, "Memoirs of the Life of Christina," Stockholm, 4 vols., 1751, in French; H. WOODHEAD, "Memoirs of Christina of Sweden," 1863; GRAUERT, "Christine, Königin von Schweden und ihr Hof," 2 vols., 1838–42.)

Christi'nos, the name of a political party in Spain during the regency of Queen Maria Christina, embracing the adherents of the queen. They were opposed by the CARLISTS (which see).

Chris'tison (Sir ROBERT), a Scotch physician, professor of materia medica in the University of Edinburgh, born July 18, 1797, studied in Paris with Orfila. He has written, among other works, a "Treatise on Poisons" (1829), a standard authority. He was made a baronet in Nov., 1871.

Christ'lieb (THEODOR), D. D., was born in Würtemberg in 1833, studied at Tübingen, taught in France, and became a preacher in London, where he published his famous lectures on "Modern Doubt and Christian Belief." He returned to Germany in 1865, and in 1868 became university preacher and professor of theology at Bonn. In 1873 he visited the U. S. as a delegate of the Evangelical Alliance. Here he delivered an address of great ability upon the rationalism of the present day.

Christ'mas [so called because an especial mass, the "mass of Christ," was celebrated on that day; Fr. *Noël;* Ger. *Weihnachten;* It. *Natale, i. e.* "birthday"], the day on which the birth of the Saviour is celebrated. The observance of the 25th of Dec. is ascribed to Julius, bishop of Rome, A. D. 337–352. The Eastern Church had previously observed the 6th of Jan., in commemoration both of the baptism and of the birth of Christ. Before the end of the fourth century the East and the West had exchanged festivals, the West adopting Jan. 6, in commemoration of our Lord's baptism, and the East adopting Dec. 25, in commemoration of our Lord's birth. The exact date of Christ's birth appears not to have been known to the early Church, and cannot now be determined. That the date was preserved in the public archives at Rome, though asserted by some of the ancient Fathers, is now not generally credited. As for the year, critical opinion is gravitating towards the year 5 or 4 B. C. And as for the day, we may be helped to a decision by considering that between the middle of December and the middle of February there is generally in Palestine an interval of comparatively dry weather, preceded and followed by the early and the latter rain. Thus, there might have been shepherds on the plain of Bethlehem watching their flocks by night.

Christmas is celebrated on the 25th of Dec. in nearly every part of Christendom. Among the causes that operated in fixing this period, perhaps the most powerful was that most heathen nations regarded the winter solstice as the beginning of the renewed life and activity of the powers of nature. The Romans, Celts, and Germans, from the oldest times, celebrated the season with great feasts. At the winter solstice the Germans held their Yule-feast, and believed that during the twelve nights reaching from the 25th of Dec. to the 6th of Jan. they could trace the personal movements on earth of their great deities. Some of these usages passed over from heathenism to Christianity, and have partly survived to the present day. But the Church sought to banish the deep-rooted heathen element by introducing its grand liturgy, besides dramatic representations of the birth of Christ and the first events of his life. Hence the so-called "manger-songs" and Christmas carols. Hence also the Christmas trees adorned with lights and other decorations, the custom of reciprocal presents and of Christmas meats and dishes. Christmas became a universal festival.

In the Roman Church three Christmas masses are usually performed—one at midnight, one at daybreak, and one in the morning. The day is also celebrated by the Anglican churches. The Greek and Lutheran churches likewise observe Christmas, but the Presbyterians and the English dissenters reject it in its religious aspect, although in England and the U. S. people of nearly all sects keep it as a social holiday, on which there is a cessation from all business. The festivities formerly lasted with more or less brilliancy till Candlemas, and with great spirit till Twelfth Day. (See CASSEL, "Weihnachten Ursprung, Bräuche und Aberglauben," 1862.)

REVISED BY R. D. HITCHCOCK.

Christmas Carols [Fr. *carole;* It. *carola*, a "round dance," perhaps from the Lat. *corolla*, a "circlet;" Welsh, *coroli*, to "dance," the name being thence applied to the music or song accompanying such a dance]. The word carol signifies a song of joy. The practice of singing sacred songs in celebration of the nativity of Christ as early as the second century is considered as established. Christmas carols are believed to have been devised as a substitute for the songs of the old heathen festivals. The oldest printed collection of English Christmas carols bears the date of 1521. By the Puritan Parliament Christmas was abolished altogether, and holly and ivy were made seditious badges; and in 1630 the Psalms, arranged as carols, were advertised. After the Restoration, the Christmas carols again exhibited their ancient hearty, jovial character. Those with which the dawn of Christmas is now announced in England are generally religious, though not universally so. The custom is by no means peculiarly English, being found in other countries of Europe.

Christol'ogy [Gr. Χριστολογία, "doctrine concerning Christ"] may include everything relating to the work as well as to the person of Christ, but as the work of Christ is discussed under Soteriology, it is better to confine Christology to the person, and we shall so employ it.

The incarnation of one of the persons of the Trinity results in a peculiar kind of self-consciousness, which is neither divine alone nor human alone, but Divine-human. Jesus Christ is not merely God, for in this case he would not differ as a person from the unincarnate Logos in the bosom of the Father. (John i. 18.) Neither is he merely man, for in this case he would not differ in respect to the

species of his personality from Socrates or any other human being. But he is God and man united—the God-man—a unique and singular species of person.

The early Church was not forced, by false theories respecting the nature of Christ, to make nice distinctions and definitions, and consequently made none. It was content with worshipping Jesus Christ; and worship is a more direct and impressive affirmation of his divinity than even a dogmatic assertion of it. In course of time, however, several errors arose which compelled the Church to make a careful and guarded statement of the peculiarity of Christ's complex person. The first of these errors was Arianism, which denied the existence of a truly and properly divine nature in Jesus Christ. The Arians allowed that he had in the composition of his wonderful personality a very exalted nature, which is higher than that of any creature whatever, but which is not literally and metaphysically divine. This highly exalted and superhuman nature, united with a human soul and body, constituted the Arian Christ. The second error was Patripassianism. The Patripassians asserted the real and strict Deity in Christ's person, but denied his humanity. According to them, the one solitary person of God (for they also denied a real distinction of persons in the Godhead) united itself with a human body, but not with a human soul. This single person of God, whom they denominated the Father, thus united with a material body, was the Patripassian Son of God, or Christ. Anterior to this union there was no Son of God. The third error was the Nestorian. This pertained to the relations of the two natures to each other, and not to the natures themselves, both of which were conceded. The Nestorian Christ is two persons, one divine and one human, in union. The important distinction between a nature and a person is not recognized. Nestorianism overlooked the fact that the second person in the Trinity did not assume into union with himself a human individual, but a portion of human nature not yet individualized. The Logos, in the words of Hooker, "did not assume a man's person into his own person, but a man's nature to his own person; he took *semen*, the seed of Abraham (Heb. ii. 16), the very first original element of our nature, before it was come to have any personal subsistence." The union is embryonic, and thus yields only a single personality. But instead of thus blending the divinity and the humanity into one self, the Nestorian scheme places two distinct selves, one divine and one human, side by side, and allows only a moral and sympathetic union between them. There is a God and there is a man, but there is no God-man. The fourth of the ancient errors in Christology is the Eutychian or Monophysite. This is the opposite error to Nestorianism. It asserts the unity of self-consciousness in the person of Christ, but loses the duality of the natures. In and by the incarnation the human nature is transmuted into the divine, so that after the incarnation there remains only one nature. For this reason the Monophysites held that it is correct to say that "God suffered," meaning thereby that Jesus Christ suffered in the divine nature.

The Council of Ephesus in 431 made some beginning towards the settlement of the questions involved, but it was reserved for the Council of Chalcedon in 451 to make the final statement. The Chalcedon symbol defines Christ's person as follows: "We teach that Jesus Christ is perfect as respects Godhood and perfect as respects manhood—that he is truly God, and truly a man consisting of a rational soul and body. He was begotten of the Father before creation as to his deity, but in these last days he was born of Mary, the mother of God, as to his humanity. He is one Christ existing in two natures, without mixture, without change, without division, without separation—the diversity of the two natures not being at all destroyed by their union in the person, but the peculiar properties of each nature being preserved, and concurring to one person and one subsistence."

This statement asserts the continued and everlasting existence of two natures in Christ's complex person, and adjusts their relations to each other. In the first place, the union of the two natures does not confuse or mix them in such a manner as to destroy their distinctive properties or transmute one into the other. The deity of Christ is just as pure and simple deity after the incarnation as before it; and the humanity of Christ is just as pure and simple human nature as that of Mary his mother or any other human individual, sin being excluded. In the second place, the Chalcedon statement prohibits the division of Christ into two selves or persons. The incarnating act, while it makes no changes in the properties of the two united natures, gives as a resultant a person that is a *tertium quid*—a resultant that is neither a human person nor a divine person, but a *theanthropic* person. Contemplating Jesus Christ as the result of the union of God and man, he is not to be denominated simply God, and he is not to be denominated simply man, but he is to be denominated God-man.

This union of two natures in one self-conscious ego may be illustrated by reference to man's personal constitution. An individual man is one person, but this person consists of two natures—a material nature and an immaterial nature. The personality, the self-consciousness, is the result of the *union* of the two. Neither one taken by itself would yield the person. Both body and soul are requisite in order to a complete individuality. The two natures do not make two individuals in union and alliance. The material nature, taken by itself, is not the man, and the mental part, taken by itself, is not the man; only the union of both is. Yet in this intimate union of two such diverse substances as matter and mind, body and soul, there is not the slightest alteration of the properties of each substance or nature.

It follows from this statement of the Council of Chalcedon that while the properties of one nature cannot be attributed to the other nature, the properties of both natures may be attributed to the person resulting from their union. While it is not proper to say that the Divine nature suffered, it is proper to say that the God-man suffered. The first statement attributes to one nature the properties and acts of the other, and is therefore not allowable. The second statement asserts that Jesus Christ, the self-conscious Ego resulting from the incarnation, endured a passion the seat and medium of which was the human nature in this Ego. Here, again, the analogies of finite existence furnish an illustration. A man suffers the sensation of heat from a coal of fire. In this instance it would not be correct to say that the man's immaterial nature suffers, in the sense of being itself burned by the fire. The immaterial soul is not the sensorium in this instance. It is not the seat of the physical sensation. To say that it is would be to attribute to an immaterial nature the properties of a material nature. Yet, at the same time, the self-conscious person, the Ego resulting from the union of body and soul, feels the sensation of physical pain, but it feels it in and through the material part, and not the immaterial. In like manner, the entire humanity of Christ, the true body and reasonable soul, sustained the same relation to his divinity that the fleshly part of a man does to his rational part. It was the sensorium, the passible medium, by and through which it was possible for the self-conscious Ego, the God-man, to suffer. Hence, while it is proper to say that Jesus Christ, the God-man, existed before Abraham, and was born in the reign of Augustus Cæsar, that he was David's son and David's Lord, it would not be proper to say that the divine nature of Jesus Christ was born in B. C. 750, or that it died upon the cross in A. D. 30.

The positions taken at Chalcedon have been reaffirmed both in the mediæval and the modern Church. The doctrine of Christ's person is in some of its aspects even more mysterious and baffling to finite comprehension than the doctrine of the Trinity, and Christian science has not been inclined to go beyond the general outlines and distinctions made in 451. The Lutheran Church, in connection with the doctrine peculiar to them of the ubiquity of Christ's person, have made some attempts to explain that peculiarity of Christ's self-consciousness by which it is sometimes that of finite weakness and sorrow, and at other times that of infinite majesty and power. But the endeavor runs too near the brink of the confusion of natures, and their transmutation into each other, to be regarded as a real advance upon the Chalcedon Christology. (For the literature of Christology see DORNER's "Person of Christ;" HAGENBACH's "History of Doctrine;" HOOKER's "Ecclesiastical Polity," book v., chs. 51–55; PEARSON "On the Creed;" SCHAFF'S "Church History," III., 747–777; SHEDD'S "History of Doctrine," I., ch. 5.)

W. G. T. SHEDD.

Christophe (HENRI), a negro king of Hayti, was born Oct. 6, 1767. He joined in 1790 the insurgents who were fighting against the French, and was appointed a general of brigade by Toussaint l'Ouverture. He had a high command under Dessalines, and after the death of the latter in 1806 became master of the northern part of the island. Civil war ensued between Christophe and Péthion. Early in 1811, Christophe was made king of Hayti and crowned in 1812 as Henri I. He instituted orders of nobility with such titles as duke of Marmalade and count of Lemonade. His cruelty provoked his subjects to revolt, and, unable to quell this rebellion, he killed himself Oct. 8, 1820. Boyer then became ruler of Hayti.

Chris'topher, POPE, deposed and succeeded Leo V. in 903, and was himself deposed and put to death in the following year. He was succeeded by Sergius III.

Christopher, SAINT, a native of Syria or Palestine, supposed to have suffered martyrdom about 250 A. D. The

Roman Catholic Church celebrates his festival on the 25th of July. Many wonderful legends are told of his gigantic size and his miraculous deeds, but modern antiquaries are disposed to doubt whether this popular hero ever existed.

Christopou'los (Athanasius), a modern Greek lyric poet, born at Castoria in May, 1772. He lived in Constantinople and Moldavia. He produced erotic and drinking songs much admired by his countrymen. He has written also learned works on the modern Greek tongue. Died Jan. 29, 1847.

Christ's Hospital, or the **Blue-Coat School,** London, was founded by Edward VI. in 1553 as a hospital for orphans and foundlings. The dress worn by the boys at present consists of a blue woollen gown, with a red leather girdle, yellow breeches and stockings, a clergyman's bands, and a blue worsted cap, but this they seldom wear, generally going about bareheaded. The color of the dress was formerly russet. No child is admitted before seven or after ten years of age, and none can remain after fifteen, except "king's boys" (who attend the mathematical school founded by Charles II. in 1672) and "Grecians" (the highest class), of whom eight are sent on scholarships to the universities. About 800 boys can be admitted. The great hall of the hospital is a magnificent room. Latin and Greek are the basis of instruction, but the modern languages, drawing, etc. are taught. In 1683 the governors built a preparatory school at Hertford, where the children are instructed till they are old enough to enter the hospital, the girls remaining permanently there. It can receive about 400 of both sexes. Among the eminent persons educated at Christ's Hospital were Stillingfleet, Coleridge, and Lamb.

Chris'ty, a township of Lawrence co., Ill. Pop. 2904.

Chro'mate of Lead, a fine yellow pigment often called chrome yellow. It is a native compound of chromic acid and lead, and is extensively used by painters.

Chromat'ic [from the Gr. *χρῶμα*, "color" or "modification" in music], in music, is a term applied to a succession of notes at the distance of a semitone from each other. The word *χρωματικός* was used in a somewhat similar sense by the ancient Greeks. Ascending chromatic passages are formed by the whole tones of the diatonic scale being raised or elevated by a sharp or a natural, according to key, and descending passages by their being lowered by a flat or a natural. It is usual to speak of the chromatic scale, but the foundation of the system of music does not rest on a chromatic basis, but on a diatonic one.

Chromatics. See Colors.

Chrome. See Chromium.

Chrome Green, an oxide of chromium useful in coloring porcelain and enamel.

Chrome Yellow. See Chromate of Lead.

Chro'mic A'cid, a compound of trioxide of chromium (CrO_3) with water (OH_2). The formula is CrO_4H_2. It forms several colored compounds, which are used as pigments or dyes. Among these are the chromate and bichromate of potash and the chromate of lead. The ruby derives its color from this acid. Chromic acid is used in surgery as a caustic.

Chro'mic I'ron, or **Chro'mite,** is the most abundant ore of chromium, and is found at Unst in the Shetland Isles, near Portsoy in Scotland, near Gassin in France, in Maryland, Pennsylvania, and in other regions. It is composed chiefly of the oxides of chromium and iron. It sometimes occurs crystallized in octahedrons, but commonly massive.

Chro'mium, or **Chrome** [from the Gr. *χρῶμα*, "color"], (symbol Cr), atomic weight, 26, or (new) 52.5, a metal discovered by Vauquelin in 1797, and so named from the many colored compounds it produces. It is whitish, brittle, and very infusible. Specific gravity, 5.5. It occurs naturally in the form of chromate of lead (PbO_4Cr) and in that of chromite of iron or chrome iron ore (FeO_4Cr_2). Combined with oxygen and water, it forms Chromic Acid (which see). Chromium is not used in a metallic or separate state, but several of its compounds are valuable pigments and dyestuffs. The oxide of chromium, which is green, is useful in enamel-painting, and is employed in coloring wall-paper. The chromate and bichromate of potash are salts largely used by dyers and calico-printers. The latter is an anhydrous compound which is of immense service in the arts.

Chromo. See Lithography.

Chron'icle [from the Gr. *χρονικός*, "relating to time" (*χρόνος*)], an historical register of facts and events arranged in the order of time; a history in which the events are related in the order of time. The histories written in the Middle Ages were chronicles. Among the most celebrated writers of chronicles were Froissart, Eginhard, Monstrelet, Holinshed, and Geoffrey of Monmouth.

Chron'icles [Lat. *Chronica*; Gr. *τὰ Χρονικά*], the name of two canonical books of the Old Testament. They were originally one book, containing a resumé of the sacred history from the creation until the Babylonian exile; the last two verses are repeated as the first verses of Ezra. The Hebrew name signifies "annals." The Septuagint named it *Παραλειπόμενα* ("Paraleipomena," Supplements), and the Vulgate borrowed this name. The character of the book, however, does not justify the name. It supplements the other historical books only occasionally, often it is identical with them. Hence the usual title is more correct. The book was composed at or soon after the time of Nehemiah by an unknown author. Its peculiar characteristic is that it is written from the stand-point of interest in the Levitical and ritualistic institutions, and not from the stand-point of the theocracy. Its authority was assailed, during the first half of this century, by the rationalists, but the searching criticism to which it has been subjected has convinced unprejudiced scholars that, allowance being made for the peculiarities of view which it acquired from the post-exilic Judaism, it contains valuable contributions to our knowledge of the history of the Israelites.

W. G. Sumner.

Chron'ogram [from the Gr. *χρόνος*, "time," and *γράμμα*, a "letter"], an inscription in which a certain date is indicated by printing some of the letters in larger type than the others, and taking them as Roman numerals. The date 1632 is thus expressed in the inscription of a medal of Gustavus Adolphus: ChrIstVs DVX ergo trIVMphVs. If it is a verse, it is called chronostichon.

Chron'ograph [Gr. *χρόνος*, "time," and *γράφω*, to "write"], an instrument used (chiefly in astronomy) for recording the exact instant of the occurrence of an event, such as the transit of a star over the spider-lines of a telescope. The record is made by electro-magnetism. One point or pen, governed by the clock, marks uniformly the seconds. Another is brought into action by an electric key under the finger of the observer. The first chronograph was simply Morse's telegraphic instrument slightly modified. The method was originally suggested by Prof. Locke of Cincinnati about 1850. The chronographs now in use usually employ a rotating cylinder covered with paper, and turning on a helical axis, each revolution occupying one minute.

Chronol'ogy [from the Gr. *χρόνος*, "time," and *λόγος*, a "treatise"] is the science of the dates of events in history. Mathematical chronology deals with such units of time as begin and end with the period of complete evolution of recurring celestial phenomena. (See Calendar.) As in geography and navigation longitude is measured from some arbitrary line, such as the meridian through Greenwich, so in historical chronology dates are fixed by giving their distance from some arbitrary point of time, usually chosen because of some remarkable occurrence which signalized it. Such a point, or epoch, forms the beginning of an era. The mathematical or astronomical units of time have not been the only units used in historical chronology. In early times accurate methods of mathematics were unknown, and such vague periods as "a generation," or the life of leading persons in a nation, such as kings, were assumed as units in chronology. The great variety of eras in ancient times confuses the student. Thus, the era of the Greeks began with the year of the Olympiad in which Corœbus was victor, being the first of those games at which the victor's name was recorded (776 B. C.). From this point the Greeks reckoned time by Olympiads or periods of four years. The Romans reckoned from the founding of the city (753 B. C.), which is believed the first fixed point from which time was ever computed. The Mohammedan era commences with the flight of Mohammed (622 A. D.), called the Hejra. The Roman and Greek methods of recording time continued in use long after the birth of Christ. After 312 A. D., however, the authorized system throughout the Roman empire was by indictions, periods of fifteen years, and this mode was at one time almost universal in the West, though the Olympiads were followed in the East till 440 A. D. The Christian era, first proposed in 527 A. D., is now universally used in Christendom (except among the Oriental Christians, many of whom profess to reckon time from the creation), though its use was not uniform in Europe till a short time before the discovery of America by Columbus. Chronology has to determine the relationship of different eras, so as to express in language appropriate to one mode of computation the date of an event recorded in another. The Christian era is attended by this inconvenience, that we must count backward for the dates of occurrences prior to the birth of Christ.

Different systems of chronology, such as the Chinese, Egyptian, Indian, and Chaldean, have been used in differ-

ent countries. Of sacred chronology there have been various schemes. In these the epochs are the Creation of the World and the Flood, but the manuscripts of the Bible do not agree as to the dates of these events. The chronology of Ussher reckons 4000 years from the creation to the birth of Christ, and to the flood 1656 years; the Samaritan makes the former much longer, though it counts from the creation to the flood only 1307 years; the Septuagint removes the creation of the world to 6000 years before Christ, and 2250 years before the flood. These differences have never been reconciled. It is now, however, universally admitted that the first chapter of Genesis leaves the period of the creation quite indefinite, and the most generally approved scheme interprets the *days* of creation as periods of indefinite length. (Manuals of chronology have been written by IDELER, 1831; BRINCKMEIER, 1843; BLAIR, 1851; and LÜOKE, 1862.)

Chronom'eter [from the Gr. χρόνος, "time," and μέτρον, a "measure"], a watch of peculiar construction and great perfection of workmanship, used for determining geographical longitudes, or other purposes where time must be measured with extreme accuracy. The chronometer differs from the ordinary watch in the principle of its escapement, which is so constructed that the balance is entirely free from the wheels during the greater part of its vibration; and also in having the balance compensated for variations of temperature. Marine chronometers generally beat half seconds, and are hung in gimbals in boxes about six or eight inches square. The pocket chronometer does not differ in appearance from the ordinary watch, excepting that it is generally a little larger. Chronometers are of immense utility in navigation, and ships going on distant voyages are usually furnished with several, for the purpose of checking one another, and also to guard against the effects of accidental derangement in any single one. The accuracy with which chronometers have been found to perform is truly astonishing, the departures from perfect uniformity of rate of running amounting only to small fractions of a second from day to day for long periods of time.

Chron'oscope [from the Gr. χρόνος, "time," and σκοπέω, to "see"], an instrument invented in 1835 by Wheatstone for measuring the duration of the electric spark. It consisted essentially of a plane mirror revolving with a high but known velocity; the elongation of the image of the spark as seen in this mirror furnishing the measure of the duration. In 1858, Feddersen substituted a concave for the plane mirror, with better results. In 1867, Rood replaced the concave mirror by a set of achromatic lenses and a plane mirror, and succeeded in measuring intervals of time as small as 40 one-billionths of a second. A chronoscopic apparatus was constructed by Fizeau for measuring the velocity of light. In this there was employed a rotating circular disk with sectors alternately open and closed. A ray from a luminous source transmitted through one of the open sectors, and reflected back from a distant mirror, is, with a certain velocity of rotation, intercepted by a closed sector, and with a higher velocity is transmitted through the next following open sector. The distance traversed in Fizeau's experiment was 8633 mètres (about 5⅜ miles). With this and the known velocity of rotation the velocity of light per second is computed. Foucault used for the same determination a chronoscope with a concave revolving mirror and a distance of only three mètres (about ten feet). Chronoscopes for measuring the time of flight of projectiles have been invented by Wheatstone, Hipp, Henry, Navez, Benton, De Brettes, Gloesener, Schultz, and Bashforth. In these the beginning and end of the interval measured are marked by the passage of the induction spark, or mechanically by electro-magnetism, generally upon a revolving cylinder, but in some upon a fixed arc before which a pendulum swings. For marking *equal* minute intervals steel tuning-forks have been recently used in various ways.

Chru'dim, a town of Bohemia, on the Chrudimka, a small river, 62 miles S. E. of Prague. It has a noble collegiate church, a convent, and a gymnasium; also manufactures of cloth and a large market for horses. Pop. 11,218.

Chrys'alis [Gr. χρυσαλλίς, from χρυσός, "gold"], a name originally belonging to those pupæ of butterflies which have golden-yellow spots, but extended to the pupæ of lepidopterous insects generally, and even to those of other orders. The chrysalides of lepidopterous insects are enclosed in a horny case, sometimes angular, sometimes round, generally pointed at the posterior end, sometimes at both ends. Before the caterpillar goes into this state it often spins a silken cocoon, with which foreign substances are sometimes mixed, in which the chrysalis is concealed. Chrysalides are often suspended by cords, and generally remain nearly at rest; some bury themselves in the earth. Most of them have at least a slight power of motion.

Chrysan'themum [from the Gr. χρυσός, "gold," and ἄνθεμον, a "flower"], a genus of herbs and shrubs of the order Compositæ, tribe Senecionideæ, having an involucre with imbricated scales, a naked receptacle, the fruit destitute of pappus. The species of this genus are annuals, perennials, or shrubby, and all have leafy stems. They are natives chiefly of the temperate parts of the Old World. *Chrysanthemum carinatum*, an annual species with white ray florets and dark-red disk, a native of Barbary, is frequently cultivated. *Chrysanthemum Indicum*, the Chinese chrysanthemum, a native of Eastern Asia, has long been cultivated as an ornamental plant. Its colors are various—red, lilac, rose-color, white, yellow, orange, or variegated. It flowers in autumn and winter, is easy of cultivation, and is easily propagated by cuttings, suckers, or parting the roots.

Chrys'elephan'tine [from the Gr. χρυσός, "gold," and ἐλέφας, ἐλέφαντος, "ivory"] **Statues,** a term applied to images of gold and ivory extensively made among the ancient Greeks. The works executed by Phidias at Athens in the time of Pericles are the most famous of this class, the greatest being the colossal Athena of the Parthenon, twenty-six cubits high, representing the goddess in armor. The Olympian Zeus of Phidias was also of world-wide renown. The combination of gold and ivory was chiefly employed in temple statues; and though the more famous works of this class belong to an advanced period, this kind of art was very ancient, and probably borrowed from the adorning of wooden images with the precious metals. The flesh parts were oftenest of ivory, the clothing and ornaments of gold.

Chrysip'pus [Gr. Χρύσιππος], an eminent Stoic philosopher, born at Soli, in Cilicia, in 280 B. C., was a son of Apollonius of Tarsus. He was a pupil of Cleanthes, and was distinguished for his skill in dialectics and his subtlety as a disputant. He once said to Cleanthes, "Teach me only your doctrines, and I will find the arguments to defend them." The Sorites is said to have been invented by Chrysippus. He wrote a great number of works, none of which are extant. He was considered to be the greatest Stoic philosopher except Zeno. Died in 207 B. C. (See RITTER, "History of Philosophy;" J. F. RICHTER, "Dissertatio de Chrysippo Stoico," 1738.)

Chrysober'yl [from the Gr. χρυσός, "gold," and βήρυλλος, "beryl"], a gem, the finer specimens of which are very beautiful, is an aluminate of glucina. Lapidaries sometimes call it Oriental or opalescent chrysolite. It is of a green color, inclining to yellow, semi-transparent, and has a double refraction. It occurs crystallized in six-sided or eight-sided prisms; sometimes in macles or twin crystals. Some specimens exhibit a beautiful opalescent play of light.

Chrysocol'la [Gr. χρυσόκολλα], a hydrated silicate of copper, sometimes called copper-green, was used as a pigment by the ancient Greeks. The color is verdigris or emerald-green, passing into sky-blue, with a shining or dull resinous lustre. It is found native in considerable abundance in Missouri and Wisconsin.

Chrys'olite [Gr. χρυσόλιθος, from χρυσός, "gold," and λίθος, a "stone;" Fr. *chrysolithe*], a mineral composed of silica, magnesia, and protoxide of iron, of a fine green color, with vitreous lustre, transparent, and having double refraction, in hardness about equal to quartz, and with a conchoidal fracture. It often crystallizes in four-sided or six-sided prisms, variously modified. Very fine specimens are brought from Egypt and from some parts of the East, also from Brazil. Chrysolite is used as an ornamental stone, but is not highly valued.

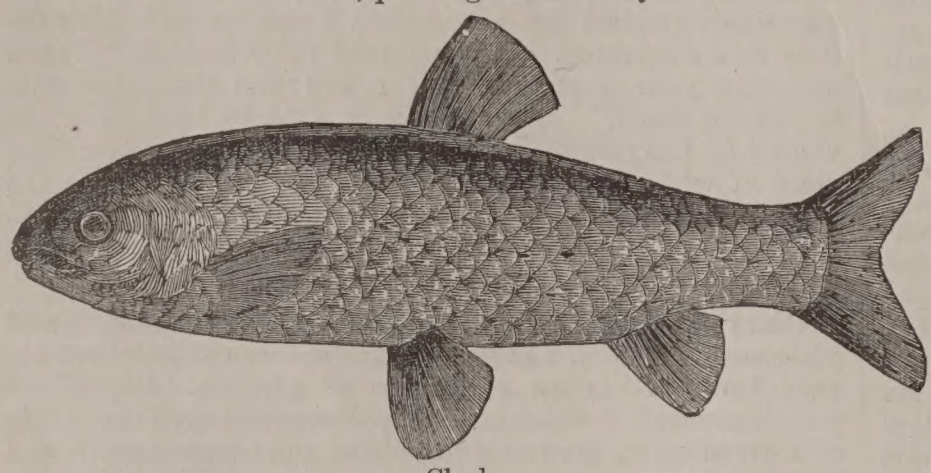
Chrys'oprase [Gr. χρυσόπρασος, from χρυσός, "gold," and πράσον, a "leek," from its peculiar tint], a very rare variety of chalcedony, valued far above common chalcedony as an ornamental gem; a stone of this kind fit for mounting in a ring is worth from fifty to one hundred dollars. It is of a fine apple-green color in choice specimens, but inferior ones exhibit other shades. It is often set in a circlet of diamonds or pearls. It is apt to lose its color through time if kept in a warm place, but dampness is favorable to its preservation, and it is therefore kept in damp cotton. It is found in Lower Silesia, in Colorado, and in Northern New York. The chrysoprase of the ancients is not certainly identified by modern authorities.

Chrys'ostom [Gr. Χρυσόστομος (*i. e.* "golden-mouthed")], (JOHN), the most accomplished orator of the ancient Greek Church, was born at Antioch in Syria about 347 A. D. He was brought up by his widowed mother, Anthusa, his father, Secundus, having died soon after his birth. He studied rhetoric under Libanius, the famous Sophist, and philosophy under Andragathius. Quitting the

legal profession, upon which he had entered, he was ordained deacon by Bishop Meletius in 381, and presbyter by Bishop Flavian in 386. His fame as a preacher spread throughout Christendom. On Feb. 26, 398, he was consecrated archbishop of Constantinople, having, by a mixture of force and fraud, been carried thither against his will. His boldness as a reformer brought him into trouble. Both among the clergy and at the imperial court enemies rose up against him. In 404 he was banished to Cucusus, a mountain-village in the Tauric range, between Cilicia and the Lesser Armenia; and in 407 he died at Comana, in Pontus, on his way into still remoter exile on the eastern shore of the Black Sea. He was little of stature, with a large, bald head, hollow cheeks, and deep sunken eyes. His eloquence was of the highly ornate Asiatic type, but also very incisive and practical. In rebuke he was terrible, calling things by their right names. He had great reverence for the Scriptures, lived abstemiously, defied danger, promoted missions, and died exclaiming, "Glory be to God for all things! Amen." The best edition of his works is the Benedictine, 13 vols. folio, Paris, 1718–38. (See NEANDER, "Life of Chrysostom," in German, 2 vols., 1821, 3d ed. 1848; G. HERMANT, "Vie de Saint J. Chrysostome," 1664; PERTHES, "Life of Chrysostom," 1854; STEPHENS, "Life of Chrysostom," 1872.)

Chrzanow'ski (ADALBERT), a Polish general, born in 1788, served in the Polish revolution in 1830, when he was suspected of sympathy with the Russians, and in Piedmont in 1849, where he commanded the Sardinian army. After the disastrous battle of Novara he was dismissed. His last years he passed in Louisiana, where he died Mar. 2, 1861.

Chub (*Leuciscus cephalus*), a European fish of the family Cyprinidæ, of the same genus with the roach, dace, etc. The color is bluish black, passing into silvery white on the



Chub.

belly; the cheeks and gill-covers a rich golden yellow. The chub rarely attains a weight exceeding five pounds. It is plentiful in many of the rivers of England, and occurs in the south of Scotland. It is found in many rivers of the continent of Europe. There are several species in the U. S. very much like the above. They are not in great esteem for the table. The chub rises well at a fly, and takes freely a variety of baits.

Chuck-Will's-Widow (*Antrostomus Carolinensis*), a bird of the family Caprimulgidæ, a native of the southern parts of the U. S. It has received its singular name from its note, which resembles these syllables articulated with distinctness, and is repeated like that of the whippoorwill.

Chucui'to, or **Chuquito,** a town of Peru, department of Puno, is pleasantly situated on the western shore of Lake Titicaca, 101 miles E. of Arequipa. Mines of gold and silver have been opened in the vicinity. Pop. about 5000.

Chudleigh Cape, the N. E. point of Labrador.

Chumbul', a river of India, rises in the Vindhyan Mountains, flows nearly north-eastward, and enters the Jumna 85 miles S. E. of Agra. Length, 500 miles.

Chunam', the name of a fine quicklime made in India from calcined shells or from very pure limestone, and used for chewing with BETEL (which see); also used for cement and plaster. When chunam is used for plaster it is mixed with fine river sand and thoroughly beaten up with water; coarse sugar and eggs are sometimes added. When beautiful work is desired, three coats are applied to a wall, the last being in the form of a fine paste consisting of four parts of lime and one of fine white sand, beaten up with whites of eggs, sour milk, and butter (*ghee*).

Chunar', a town of British India, in the presidency of Agra, on the Ganges. It is fortified, and has several military institutions. Pop. 11,058.

Chu'prah, a town of British India, presidency of Bengal, on the Ganges, 35 miles W. N. W. of Patna. It is the chief town of the district of Sarun. It contains many mosques and pagodas. Here is a British military station. Pop. estimated at 30,000.

Chuquibam'ba, a mountain of Peru. Height 21,000 feet.

Chuquisa'ca, the extreme south-eastern department of Bolivia. Area, 72,802 square miles. The surface is variable. The rainfall is considerable. The mountainous western part only is inhabited, where the climate is pleasant. The soil yields cinchona, grain, tobacco, sugar, coffee, and cocoa. The exports are cattle, horses, wine, spirits, and sugar. Capital, Chuquisaca. Pop. 223,868, besides 50,000 wandering Indians.

Chuquisaca (golden bridge), **Su'cre,** or **La Pla'ta,** the capital of Bolivia, is situated on a plateau near the Andes, 9343 feet above the level of the sea; lat. 19° 23′ S., lon. 65° 30′ W. It is well built, with regular, spacious, and clean streets. It has a magnificent cathedral with a large dome, a president's palace, a university, a college, several monasteries, and a theatre. It is an archbishop's see and the seat of the national legislature. The climate is pleasant. Rich silver-mines are worked in the vicinity. Pop. 23,979.

Chur [Fr. *Coire*], the capital of the Swiss canton of Grisons, is in a valley and on or near the river Rhine, 60 miles S. E. of Zurich, with which it is connected by railway. It has an ancient cathedral of the eighth century and a bishop's palace; also manufactures of cutting tools and zinc-ware. Pop. in 1870, 7552.

Church [from the Gr. κυριακόν, *i. e.* the "Lord's house" (from Κύριος, the "Lord"); Anglo-Saxon, *cyric* or *circ;* Ger. *Kirche;* Scottish, *kirk;* Lat. *templum;* Fr. *église;* Sp. *iglesia;* It. *chiesa*]. The primary signification of the English word church is the "house of the Lord;" it came afterwards to denote a collective body of Christians meeting in such a house for worship, and also the entire body of Christian people, as when we speak of Christ as "the Head of the Church." In this last sense it corresponds to the Greek ἐκκλησία (Lat. *ecclesia,* whence the Fr. *église,* Sp. *iglesia,* and It. *chiesa*), from ἐκκαλέω, to "call out," to "summon," to "assemble."

The earliest Christian ecclesiastical structures were copied not from the heathen or Jewish temple, but from that combination of a hall of justice and a market-place to which the name basilica was given. The reason of this is probably to be found not so much in the opposition between Christians and heathens, as in the different conceptions which they formed of the nature and objects of worship. The rites of heathenism were performed exclusively by the priest, the people remaining without the often roofless temple, which was not for worshippers, but was the abode of Deity. This mysterious character rendered it unsuitable for services in which the people were to participate, and for the delivery of those public addresses which were employed as a means of Christian teaching and exhortation. To such purposes the basilica was readily adapted. Slightly changed in form, it served the purposes of Christian worship, but there was nothing in its form which tended to awaken sentiments of devotion. The cross had been used by Christians from a very early period, and gradually it had become the principal distinctive emblem of Christianity. Nothing could be more natural than that when it became desirable to give distinctively Christian character to the basilica, this should be effected by such a modification as should convert it into a representation of this emblem. Nor did this alteration lead to any very extensive change in form. The basilica frequently has side entrances, in place of, or in addition to, that from the end. All that was requisite, then, to convert the simple parallelogram into a cross was, that at each side, in place of direct communication with the exterior, should be passages or arms running out at right angles; which arms cut the building across, and were therefore *transepts.*

A central tower or spire is very frequently erected over the point at which the arms or transepts intersect the body of the cross. From this point the portion of the building westward to the Galilee or great entrance is called the nave, while the portion eastward to the high altar is the choir. In the more complete churches the nave, and frequently the choir, are divided longitudinally by two rows of pillars, the portion at each side being generally narrower and less lofty than that in the centre. These side portions are the aisles. Vestries for the priests and choristers generally exist in connection with the choir. Along the sides of the choir are seats or stalls, usually of carved oak; and amongst these seats, in a bishop's church, the most conspicuous is the *cathedra,* or seat for the bishop, from which the cathedral takes its name. The larger English cathedral churches have a chapter-house attached, which is

commonly octagonal, and is often one of the most beautiful portions of the whole. Cloisters are frequent, and the sides of those which are farthest from the church or chapter-house are enclosed by other buildings, such as a library and places of residence for officials. It is here that, in Roman Catholic churches, the hall, dormitories, and kitchens for the monks are commonly placed. Beneath the church there is the crypt. The baptistery is another adjunct, frequently altogether detached. The position of the nave, choir or chancel, aisles, and transepts is nearly invariable, but the other portions vary greatly.

In ordinary language, any building set apart for Christian ordinances is called a church, though when of a minor kind it is frequently designated as a chapel. After a long period of neglect the building of churches in a style emulative of the older architecture has greatly revived.

When applied to a body of Christian people, the word Church is very nearly the equivalent of the Greek word ἐκκλησία, as used in the New Testament. The whole body of the Church on earth is called the "Church militant," as contending with evil and sin; the saints after death are called collectively the Church triumphant. Protestants distinguish between the *visible* and the *invisible* Church—the invisible Church consisting of all who are spiritually united in Christ; the visible Church consisting of all who profess the religion of Christ. Roman Catholics do not in the same manner acknowledge the distinction, but regard a connection with the hierarchy and participation of ordinances as establishing a connection with the true Church. Many Protestants regard the Church as subsisting in virtue of the authority of Christ and through the faith of individual believers; Roman Catholics regard the succession of the hierarchy and the regular administration of the sacraments as essential to the existence of that catholic or universal Church which Christ planted. They also regard the Church in its official action as so guided by Heaven as to be infallible. Protestants, for the most part, regard the Church of Rome and the Greek Church as forming part of the visible Church, but Roman Catholics are not accustomed to make a corresponding admission with respect to Protestants. From the hierarchical principle of the Church of Rome and of the Greeks results an employment of the word Church to designate the hierarchy alone. But most Protestants employ it to denote collectively all the followers of Christ, or to designate some particular body of Christians worshipping in one place, or the members of some particular denomination.

REVISED BY J. THOMAS.

Church, a township of Wetzel co., West Va. Pop. 1607.

Church (ALBERT E.), LL.D., an American officer and mathematician, born in 1807 in Salisbury, Conn., graduated at West Point in 1828. He served, while lieutenant of artillery, at the Military Academy as assistant professor 1831 and 1833–37, and as acting professor of mathematics 1837–38, and in garrison at Newport and Boston harbors 1832–33. He resigned Mar. 13, 1838, and was appointed professor of mathematics in the U. S. Military Academy, and still holds the position. He is member of several scientific associations and author of valuable mathematical works, specially prepared for the use of his cadet pupils—viz. "Elements of Differential and Integral Calculus," 1842, and of an "Improved Edition containing the Elements of the Calculus of Variations," 1851, of "Elements of Analytical Geometry," 1851, of "Elements of Analytical Trigonometry," 1857, and of "Elements of Descriptive Geometry, with its application to Spherical Projections, Shades, and Shadows, Perspective and Isometric Projections," 1865.

GEORGE W. CULLUM, U. S. A.

Church (Rev. ALONZO), D. D., LL.D., an eminent Presbyterian divine, and president of the University of Georgia from 1829 to 1859. He was a native of Vermont, and was a graduate of Middlebury College in that State.

Church (BENJAMIN), a famous Indian fighter, born in Plymouth (now in Massachusetts) in 1639. He fought in King Philip's war, and commanded the colonists in the battle in which Philip was slain. He also led five expeditions against the French and Indians in Maine. He removed in 1674 to Little Compton, R. I., where he died, in consequence of a fall from his horse, Jan. 17, 1718. He was distinguished for piety, valor, and integrity.

Church (FREDERICK EDWIN), an American landscape-painter, born at Hartford, Conn., in May, 1826. He visited South America in 1853, and derived from the scenery of the Andes materials for several paintings. He gained a high reputation by his "View of Niagara Falls from the Canadian Shore." Among his other works are "The Heart of the Andes," "Morning on the Cordilleras," "Sunrise on Mt. Desert Island," "The Parthenon," and "Jerusalem."

Church (JOHN HUBBARD), D. D., a Congregational minister, born at Rutland, Mass., Mar. 17, 1772, graduated at Harvard in 1797, became pastor of a church in Pelham, N. H., in 1798, where he was minister for forty years. He was prominent in the Bible and missionary societies, and an advocate of classical learning. Died June 13, 1840.

Church (PHARCELLUS), D. D., born Sept. 11, 1801, in Seneca, Ontario co., N. Y., educated at Hamilton, N. Y., pastor of Baptist churches in Poultney, Vt., Providence, R. I., Rochester, N. Y., Boston, Mass., was for ten years editor of the "Chronicle" (Baptist), New York City, a frequent contributor to other journals, and author of "Philosophy of Benevolence," "Religious Dissensions," "Antioch," "Pentecost," "Memoir of Theodosia Dean," "Templeton," etc.

Church (Sir RICHARD), a Greek general, was born in Ireland in 1785, and entered the British army. In the Greek war for independence he commanded the land forces. Afterwards he was the chief of the anti-Russian party, and minister under King Otho. Died Mar. 20, 1873.

Church (SAMUEL), LL.D., a distinguished American jurist, born at Salisbury, Conn., in 1785, graduated at Yale in 1803, was eleven years a judge of probate in his native State, a judge of the superior court in 1833, and chief-justice of Connecticut (1847–54). Died Sept. 12, 1854.

Church (SANDFORD E.), an eminent American jurist, born in Milford, Otsego co., N. Y., April 18, 1815, studied law and rose to prominence in his profession. He was chosen lieutenant-governor of the State of New York in 1850, and again in 1852. In 1857 he was elected comptroller, this latter being the last elective office held by him. He was nominated in 1859 for comptroller, but defeated, and nominated again in 1863, with the same result. In 1862 he was Democratic nominee for Congress from the twenty-seventh New York district. In May, 1870, he was appointed by Gov. Hoffman chief-justice of the State of New York, which position he accepted and still holds. In 1872 he was requested to stand as candidate for the Democratic nomination for governor, but he declined the honor. In politics he has ever been a steadfast Democrat, and, though frequently approached by opposing parties, he has never sacrificed his political principles to personal preferment. Under Pierce and Buchanan the opposition made him tempting offers, but notwithstanding he was opposed to the Nebraska bill, he rejected all proffers of prospective patronage. After his defeat in 1864 he retired from active political life.

Church Calendar. See CALENDAR, EASTER, and EPACT, by PRES. F. A. P. BARNARD, S. T. D., LL.D., L. H. D.

Church Creek, a post-township of Dorchester co., Md. Pop. 1144.

Church Dis'cipline, in its more limited sense, includes the means employed by the Church, besides the ministration of the word and sacraments, to secure on the part of its members faithfulness to their profession and blamelessness of life. It rests upon the authority of Christ, and arises out of the very constitution of the Church. Among early Christians it assumed forms of great severity towards offenders. At a later period discipline was chiefly exercised with respect to persons accused of heresy and schism. The penances of the Church of Rome form an important part of its discipline, and therewith its indulgences are connected, as well as its rule of auricular confession. In the Protestant churches public confession of sins by which scandal has been given, and submission to public rebuke, are sometimes required. The power of exclusion from church membership is generally retained until repentance and reformation of life. In a wider sense, church discipline is used to designate the whole polity of a Church, including its CHURCH GOVERNMENT (which see).

Church Gov'ernment. It is obvious that the Church must have a fixed polity according to which its affairs are administered. It is disputed among Christians how far this has been prescribed by Divine authority, and how far left to the discretion of men. The form of government depends primarily on the idea entertained of the constitution of the Church. Congregationalists place church government in the hands of the members of the congregation and the office-bearers whom they have elected. Baptists distinguish between the church proper and the congregation, hence they lodge this power in the church, as the primary body. Episcopalians, Presbyterians, and the various Methodist churches agree that many congregations are to be united under a common government; but this, according to Presbyterians, is properly carried on by ministers and elders of these congregations meeting for this purpose; while, according to Episcopalians, it is more or less absolutely in the hands of bishops. The government of the Methodist Episcopal churches is chiefly in the hands of the quarterly conference and the annual and general conferences, in which the laity have more or less share.

Church History. See ECCLESIASTICAL HISTORY, by PROF. PHILIP SCHAFF, PH. D., S. T. D.

Church Hill, a post-township of Queen Anne co., Md. Pop. 3655.

Chur'chill, or **Missinnip'pi,** a river of North America, rises in a lake near lon. 109° W. It flows nearly northeastward, passes through Nelson's Lake, and enters Hudson's Bay in lat. 59° N. Length, estimated at 800 miles.

Churchill, a county in the W. of Nevada. Area, 6000 square miles. It contains Humboldt and Carson Sink, a lake which has no outlet. The western part is traversed by Carson River. The surface is mountainous; the soil is mostly sterile. The streams are absorbed by the sands of the desert. Sulphur, salt, and soda abound. Ores of silver are found here. Capital, Stillwater. Pop. 196.

Churchill, a township of Lyon co., Nev. Pop. 40.

Churchill (Lord ALFRED), a brother of the duke of Marlborough, was born in 1824, studied at the Sandhurst Military College, served in the British army (1842–48), and afterwards was long a member of Parliament. He is distinguished for his interest in the African race, and was a delegate to the sixth meeting of the Evangelical Alliance at New York in 1873.

Churchill (CHARLES), an English poet and satirist, was born at Westminster in 1731. He was a fellow-student and friend of the poet Cowper. Although he had a strong aversion to the clerical profession, he was ordained as a priest in 1756. In 1758 he succeeded his father as curate at St. John's, Westminster. His parishioners were scandalized by his dissipated and licentious habits, and by his negligence of his duties. He produced in 1761 "The Rosciad," a witty satire on theatrical managers and performers, which was very successful. About this time he resigned his curacy and quitted the profession of clergyman. He defended himself against certain critics by an admired poem entitled "The Apology." He was an intimate friend of John Wilkes, whom he assisted in the "North Briton." In 1763 he published "The Prophecy of Famine," a satire on the Scots, which is much admired. Among his other works are "The Conference," "Gotham," and "The Author." "Churchill," says Thackeray, "has those brilliant flashes of insight and spontaneous felicities of expression by which every true critic at once distinguishes the man of natural power from the man of mere cultivation." He died at Boulogne, France, during a visit, in 1764. (See TOOKE, "Life of Churchill;" and MACAULAY'S essay entitled "Charles Churchill," 1845.)

Churchill (SYLVESTER), an inspector-general in the U. S. army, born in Woodstock, Vt., Aug. 2, 1783, educated in Vermont, published a newspaper till 1812, when he was appointed a first lieutenant of artillery U. S. A.; promoted to be captain Aug., 1813; assistant inspector-general, with the rank of major, Aug. 29, 1813; retained May, 1815, in artillery; major Third Artillery 1835; inspector-general, with rank of colonel, June 25, 1841. Gen. Churchill served with credit during the war of 1812–15; from 1815 to 1836 was on garrison or special duty; served during the war with the Creek Indians, and in Florida 1836–41, when he was appointed inspector-general; accompanied Gen. Wool in the war with Mexico, and for distinguished services at Buena Vista was brevetted brigadier-general U. S. A.; retired from active service Sept. 25, 1861. Died at Washington, D. C., Dec. 7, 1862.

Church'ing of Wom'en, a usage prevailing in certain branches of the Church, of women on recovery after childbearing going to church to give thanks. It appears to have been borrowed from the Jewish law (Lev. xii. 6). In the Church of the early ages it was accompanied with various rites, and in the Roman Catholic and Greek churches it is imperative. In the Anglican Church, also, a service for the churching of women finds a place in the Liturgy.

Church'man (JOHN), an able preacher of the Society of Friends, was born at Nottingham, Pa., June 4, 1705, entered upon his ministry in 1733, and preached in many parts of the U. S. and Europe. A narrative of his experiences was published in 1780 in London. Died July 24, 1775.

Church Methodists. See PRIMITIVE WESLEYANS.

Church Mills, or **Wegat'chie,** a post-village of Rossie township, St. Lawrence co., N. Y., on the Oswegatchie River, has a woollen mill and other manufactories. Pop. 201.

Church of England and Wales. See ENGLAND, CHURCH OF, by REV. BEVERLEY R. BETTS.

Church of God, a denomination of Christians first organized at Harrisburg, Pa., in 1830, by the converts and followers of John Winebrenner, formerly a minister of the German Reformed Church. The doctrines of this Church are a belief in the Bible as the authoritative revelation of God; also in the Trinity, in human depravity, the vicarious atonement, and the freedom of the will (rejecting the Calvinistic doctrine of election). This Church also practises adult immersion as the only baptism, and administers the Lord's Supper to all Christians who desire it. They believe that literal washing of the feet is one of the ordinances of the Church. In all other respects the Church of God agrees with other evangelical Christian churches. The congregations of this denomination are in part independent in church government, but are united into "elderships," which are again joined into one "general eldership," which owns the church property. They have several newspapers and colleges, and in 1866 numbered 25,000 members, having about 400 churches and 350 ministers.

Church of Scotland. See SCOTLAND, CHURCH OF, by DAVID INGLIS, LL.D.

Church of Scotland, Free. See FREE CHURCH OF SCOTLAND, by DAVID INGLIS, LL.D.

Church Rates, in England, and formerly in Ireland, a tax on the parishioners and occupiers of land for repairing the church and defraying all expenses (other than that of maintaining the minister) incident to divine service. The chancel being regarded as belonging to the clergy, the expense of maintaining it is frequently laid on the rector or vicar. The origin of church rates is a matter involved in obscurity. It is certain that the expenses paid in this manner formerly were paid out of the tithes. Lord Campbell is of opinion that the contributions of the parishioners were at first voluntary, and that the custom at last assumed the form of an obligation. There is no legal mode of compelling the parishioners as a body to provide the rate; and this has occasioned difficulty in imposing the tax in parishes in which dissent is prevalent. In recovering the rates from individuals refusing to pay, formerly the only mode was by suit in the ecclesiastical court; at present, in cases under ten pounds, the justices of the peace, on complaint of the church-wardens, inquire into the merits of the case and order payment. Against the decision of the justices an appeal lies to the quarter sessions. There are few social arrangements in England that have been the cause of greater irritation than the church rates. Since the first bill for the abolition of church rates was introduced by Lord Althorp in 1834, scarcely a session has passed in which some attempt has not been made at legislation on this subject. Church rates in Ireland ceased with the disestablishment of the Church of Ireland in 1871. In Scotland the system is similar to that in England, though the name of church rates is not used.

Church'ville, a post-village of Riga township, Monroe co., N. Y., on the New York Central R. R., 15 miles W. by S. of Rochester. It has five churches, a flouring and saw mill, a machine-shop, and a foundry.

Church-Wardens in the Anglican churches are officers whose duty is to protect the church edifice, to superintend the performance of public worship, and maintain order during service. There are generally two in each parish. In some dioceses they are appointed by the clergymen, and in others are chosen by the parishioners. Their assistants are sometimes called questmen.

Church'yard (THOMAS), born in 1520, was a prolific author of prose and verse in the early part of Queen Elizabeth's reign. He was at first a servant of the earl of Surrey, and afterwards a soldier. Some of his works have been from time to time reprinted, more for the pleasure of bibliophiles than on account of any great merit. His "Worthiness of Wales," "Chips concerning Scotland," and "Legende of Jane Shore" are the best known of his works. Died in 1604.

Churn, an apparatus for agitating cream for the separation of butter, of which many forms are in use. Trials to test the merits of different churns have failed to settle which is the best for actual use, for the same machine under different conditions does not always yield the same result. The oldest form is the upright or plunge churn. Barrel churns, sometimes of monster size, are used in large dairies in Holland. For small or moderate-sized dairies perhaps the most suitable is the box churn, having the agitators fixed on a horizontal spindle. To all forms of churns power can be and is applied. Horse-power is in very general use in large dairies in Great Britain. In exceptional cases steam-power is used. (See BUTTER, by PROF. C. F. CHANDLER.)

Chur'ton (RALPH), archdeacon of St. Andrew's, is best known for his Bampton Lecture on the prophecies relating to the destruction of Jerusalem, delivered in 1785. He was born near Bickley, Cheshire, Dec. 8, 1754, was educated at Brazenose, Oxford, and died Mar. 23, 1831. He was a laborious and faithful minister, and the author of several biographical and other works of decided merit.

Churubus'co, a village or hamlet of Mexico, on the

Rio de Churubusco, about 6 miles S. of the city of Mexico, the scene of a battle between the American forces under Gen. Winfield Scott, marching on the city of Mexico, and the Mexicans, defending the approaches to their capital, under President Santa Anna. The battle of Contreras was fought on the same day, and both can be described in connection.

Leaving a competent garrison at Puebla, Gen. Scott advanced his forces upon the capital Aug. 7–10, 1847, the army becoming united about the head of Lake Chalco. Reconnaissances made Aug. 12–13 upon the Peñon, a strongly fortified, isolated mound, commanding the principal approach to the capital from the E., and upon Mexicalcingo to the left of the Peñon, resulted in Scott's falling back upon a previously entertained project of turning these strong eastern defences by passing S. of Lakes Chalco and Jochimilco, thus reaching the hard though much broken ground to the S. and S. W. of the capital, near San Augustin. By a sudden inversion, Worth's division, followed closely by Pillow's and Quitman's, marched on the 15th. Twiggs' division being left at Ayotla till the 16th to threaten the Peñon and Mexicalcingo, and deceive the enemy as long as practicable, marched on the 16th towards Chalco, met and dispersed a force of Mexicans double his own in numbers, under Gen. Valencia.

Worth's division arrived at San Augustin on the 18th, and was pushed forward to San Antonio, 3 miles distant, on the direct road to the capital.

A reconnaissance was commenced on the 18th, and continued next day, to the left of San Augustin over difficult fields of rocks and lava which extend from San Antonio towards Magdalena; Pillow's division was advanced to make a road for heavy artillery, and Twiggs's thrown forward to cover this operation. At 3 P. M. of the 19th this advance came to a point where the road could only be continued under the fire of twenty-two pieces of the enemy's artillery, strongly entrenched and supported by cavalry and infantry. Our batteries had advanced within range of the enemy's camp, and Pillow's and Twiggs' divisions moved forward to dislodge him from his position. A battle ensued which lasted till nightfall, our troops maintaining their position.

Observing the hamlet of Contreras on the road leading from the capital, through the entrenched camp, to Magdalena, and the streams of reinforcements advancing from the capital by that road, Gen. Scott determined to occupy that place and arrest reinforcements, and Col. Morgan was ordered with his regiment (the Fifteenth) to move forward for this purpose. Riley with his brigade was already on the enemy's left and in advance of this hamlet, and Shields was ordered to follow and support Morgan. The night of the 19th found these troops, with the brigades of Gens. P. F. Smith and Cadwalader, all under Smith, in and about Contreras, on the same road with the enemy's entrenched camp, and half a mile nearer the capital. At 3 A. M. (Aug. 20th) the movement was commenced on the rear of the enemy's camp, Riley leading, followed by Cadwalader and Smith. Despite the darkness, rain, and mud, an elevation behind the enemy was reached by Riley, from whence his intrenchments were stormed and carried in seventeen minutes. Cadwalader successfully executed the part assigned him of diverting the enemy, and brought up to the general assault two of his regiments, who poured destructive volleys into the works. Smith's brigade (temporarily under Major Dimick, First Artillery), in the mean time following, discovered a long line of Mexican cavalry outside the works, which were attacked and routed. Shields, remaining at Contreras, held large numbers of the enemy in check, and by pursuit added largely to the brilliant results of the day. The American force here engaged numbered (including Shields) not more than 4500, while the Mexican army numbered 20,000, all of whom, not captured or killed, now fled. Two 6-pounders taken from the Fourth Artillery at Buena Vista (though without dishonor) were here recaptured, besides twenty-two pieces of ordnance, 800 prisoners, 700 mules and many horses, and immense quantities of small-arms and ammunition.

The battle being over before the advancing brigades of Worth's and Quitman's were in sight, they were ordered back to their old position, and Worth was ordered to attack San Antonio, which place he soon forced, its garrison being shaken by the news of the victory at Contreras. While these operations were going on on the left, a party was sent to reconnoitre the strongly fortified church or convent of San Pablo in the hamlet of Churubusco, and Twiggs with a brigade and a battery ordered to follow and attack the convent. Pierce's brigade was at the same time sent to attack the Mexican right and rear, in order to favor the movement on the convent and cut off retreat; Shields to follow Pierce closely and take command of the left wing. The line from right to left soon became briskly engaged; Shields, in the rear of Churubusco, being hard pressed, was reinforced by the rifles and Sibley's troop Second Dragoons.

Worth's division, being soon reunited and in hot pursuit from San Antonio, was joined by Gen. Pillow, who, discovering that San Antonio had been carried, hastened to the attack of Churubusco. The hamlet bearing this name, besides the strongly fortified convent of San Pablo, presented a strong field-work at the head of a bridge over which the road passes from San Antonio to the capital, and within and about these works the entire remaining forces of Mexico were collected, some 27,000 men; the American force being about 8000.

Twiggs hotly pressing the convent, Worth and Pillow manœuvred closely upon the *tête-de-pont*, which latter was finally assaulted and carried at the point of the bayonet; and twenty minutes after the convent, which had held out for two hours and a half, yielded to Twiggs' division, and signals of surrender were displayed; but not, however, until the Third Infantry had entered the works.

Shields in the mean time had been hotly engaged on the right against superior numbers with varying success, but resulting in a final victory for him; so that on the forces of Worth and Pillow coming up in rapid pursuit of the enemy, they were joined by Shields, and the three pursued the fugitives to within a mile and a half of the capital. Thus, in a single day were two great battles fought and victories won, by which 3000 prisoners were taken, 4000 killed or wounded, thirty-seven pieces of ordnance captured, the entire army dispersed, and the capture of the ancient capital and an honorable peace ensured. The American loss was 1053, killed and wounded.

Chusan′, an island near the E. coast of China, province of Che-Kiang, about 45 miles N. E. of Ning-Po. It is nearly 50 miles in circumference, and is mountainous, but mostly fertile and well cultivated. The products of the soil are tea, rice, cotton, tobacco, etc. The camphor tree and bamboo flourish here. The climate is pleasant and healthy. Ting-Hai, the capital, was taken by the British in July, 1840, and again in Oct., 1841, but it was restored to the Chinese at the end of the war.

Chut′ny, or **Chut′ney,** a stimulating condiment very largely used in India, and to a considerable extent in Great Britain and America. Chutny is a compound of mangoes, capsicum, and lime-juice, with some portion of other fruits, such as tamarinds, etc., the flavor being heightened by garlic. It is sometimes manufactured for sale in England, but not in large quantities. Families occasionally make it for their own use, and various receipts are given for its manufacture.

Chwalynsk′, a town of Russia, in the government of Saratov, a river-port on the Volga. It has various manufactures and large fruit gardens. Pop. 14,262.

Chyle [from the Gr. χυλός, "juice," "chyle"], a fluid produced in the small intestines, and absorbed from them by the lacteals and the veins. The food undergoes various changes in the alimentary canal, one of which is its conversion in the stomach into a pulpy mass termed *chyme*. The chyme, which passes into the small intestine, is acted upon by the bile, pancreatic fluid, and intestinal juice, and through their influence is separated into the *chyle*, and into matters unfit for nutrition, which ultimately find their way out of the system. The mode in which the nutritious chyle is taken up by vessels distributed over the small intestines is described in the article DIGESTION. Obtained from the thoracic duct of an animal that has been killed while the process of digestion is going on (especially if it has taken fatty food), chyle is a milky-looking or yellowish fluid, with a faint alkaline reaction. Like the blood, it coagulates after its abstraction from the animal, and in about three hours a small clot is separated. On examining chyle under the microscope we find that it contains enormous numbers of minute molecules of fat, together with nucleated cells (chyle-corpuscles), apparently identical with the white blood-cells. The chemical constituents of chyle are much the same as those of blood—fibrin, albumen, fat, extractive matters, and salts being the most important. But it may be regarded as certain that the greater part of the saccharine and nitrogenous elements of food enters the veins directly from the stomach and the small intestines, through the capillaries, and that the chyle of the thoracic duct consists principally of the fatty parts of food mingled with lymph from the lymphatic glands.

Chyme [from the Gr. χυμός or χύμα, "liquid," for χεῦμα, verbal noun from χέω, "to pour"], a name sometimes given to the food after the process of stomach-digestion, and before the action of the intestinal juice, bile, and pancreatic fluids has taken place upon it. The name is of late not much used, but it is a convenient term, and as such deserves to be retained.

It is a recognized fact that during the process of stomach-

digestion some part of the nutritive matter of the food is taken up by the walls of the stomach, and passes directly into the venous blood. Of the remainder, Mialhe states that the albuminoid elements are changed by the gastric juice into a new substance called albuminose; while Lehmann and others, following up a hint from Mialhe, have shown that each albuminoid affords a peculiar kind of albuminose (or peptone, as it is now often called). The principal varieties now recognized are albumen-peptone, caseine-peptone, and fibrine-(or musculine-) peptone. The peptones are believed to be already fitted for absorption into the circulation. Upon starch, sugar, and oils the gastric juice has but little effect. Chyme, then, consists of the peptones and the starchy, saccharine, and fatty elements of food, mingled with certain residual matters which are not useful as food, but which, with other waste products, are ultimately expelled directly from the alimentary canal.

Chytræ'us (David Kochhaff), a German theologian, born in Swabia Feb. 26, 1530, was a scholar of Camerarius and Melanchthon, professor at Rostock, and member of the Diet of Augsburg, of which he wrote an account (1576), and various other religious conferences. He was one of the framers of the "Formula Concordiæ" and author of "Chronicon Saxoniæ," "De Lectione Historiarum," etc. Among his other writings are "Historia Confessionis Augustanæ" (1578) and "De Morte et Vita Æterna" (1590). His complete works have been several times reprinted. Died June 25, 1600. He was one of the most learned and influential Lutheran divines of his time. His life has been written by Schutzius and several others.

Cialdi'ni (Enrico), an able Italian general, born in Módena Aug. 8. 1811. He entered the Spanish army in 1835, and fought in several campaigns against the Carlists. In 1848 he returned to Italy, and joined the Italian patriots in the war against Austria. He served Victor Emmanuel as a general in the Crimean war (1854–55). In June, 1859, he commanded with success against the Austrians at Palestro. He defeated the papal general Lamoricière at Castelfidardo in 1860, and besieged Gaeta, which he took in Feb., 1861. He became a senator of Italy in 1864, commanded one of the armies operating against Austria in 1866, and was appointed chief of the royal staff in the same year. In Oct., 1867, he was requested by the king to form a cabinet after the resignation of Ratazzi, but without success. He withdrew from the army, and opposed the ministry of Lanzi. He accompanied Amadeo as ambassador extraordinary to Madrid, and after discharging his mission remained in Spain.

Cib'ber (Colley), an English dramatist and actor of German extraction, was born in London in 1671. He began to act comedies in 1689, and married a Miss Shore in 1693. In 1695 he produced a play called "Love's Last Shift, or the Fool in Fashion," which was successful. He also wrote "The Careless Husband" (1704), "The Nonjuror" (1717), and "An Apology for the Life of Colley Cibber," which is an amusing work. In 1730 he was appointed poet-laureate. Died Jan. 30, 1766. Notwithstanding the reputation for stupidity which Pope's "Dunciad" has conferred upon Cibber, there is no doubt that he was in reality one of the most brilliant writers of that brilliant age. His morals, however, were not of the purest.—His son Theophilus (1703–58) was an actor, an author, and a writer of repute, and husband of Susanna Maria Cibber, a celebrated actress, the sister of Dr. Arne, the musical composer.

Cib'ol, a plant of the onion or garlic genus, the *Allium fistulosum*, an Asiatic plant, much cultivated in parts of Europe for its tops, which are tubular, somewhat like those of the onion. It stands in the ground all winter, growing from year to year without replanting, and has no bulb.

Cibo'lo, a river of Texas, rises in Kendal county, flows south-eastward, and enters the San Antonio near Helena. Entire length, about 110 miles.

Cibo'rium [Gr. κιβώριον, the "pod" of the lotos-bean; hence a cup-shaped vessel], in the Roman Catholic Church, a variety of the pyx, or vessel used to contain the consecrated host. The ciborium is of gold or silver, and its cover is frequently surmounted by a cross. The name is also given to a canopy over the altar sustained by four columns, to which the pyx, in the form of a dove, was suspended by chains.

Cibra'rio (Luigi), an Italian historian and jurist, born at Turin Feb. 23, 1802. He published, besides other works, a "History of the Monarchy of Savoy" (1840), and a "History of Turin" (1847). He became minister of public instruction in 1852, and minister of foreign affairs in 1855. Died Oct. 1, 1870.

Cica'da [Gr. τέττιξ], the Latin name of a well-known European insect, called also **Cica'la** [It.], which gives its name to a genus of Hemiptera noted for the shrill noise which it makes. The cicada of the ancient classic poets was chiefly admired for its shrill song. The cicadas frequent shrubs and trees, and feed on their juices, having an apparatus for piercing the bark and sucking out the juice or sap. Their organ of sound is situated on each side of the under and anterior part of the abdomen. Cicadas abound in tropical and sub-tropical regions. They mostly have transparent and veined wing-covers. We have several species of cicada in the U. S., of which the best known is the "seventeen-year locust," *Cicada septemdecim*. The *Cicada canicularis* is a well-known species with a W-shaped mark on the back. Its appearance was once said to be a forerunner of wars.

Cicatriza'tion [from the Lat. *cicatrix*, a "scar"], the healing of a broken surface in the skin or in a mucous membrane, by which process a dense fibrous material is substituted for the lost texture. The new tissue is called the cicatrix, and usually resembles, to a considerable extent, the structure which it replaces; it is, however, less elastic, and from its shrinking in volume sometimes produces an appearance of puckering. The glands and other special structures of the original tissue are wanting in the cicatrix, which, however, usually performs its office well. The cicatrix of burns and scalds has often a remarkable tendency to contract and distort the neighboring surface.

Cic'ely (*Myrrhis*), a genus of umbelliferous plants, of which one species, sweet cicely (*Myrrhis odorata*), is common in Central and Southern Europe and in Asia, but in Great Britain it appears to have been introduced. It is a branching perennial, two feet high or upward, with large triply pinnate leaves and pinnatifid leaflets, somewhat downy beneath; the fruit and the whole plant powerfully fragrant, the smell resembling that of anise. The seeds, roots, and young leaves are used in soups, etc. The plant was formerly much in use as a medicinal aromatic. The U. S. have at least four wild plants somewhat resembling the above—the rough and the smooth sweet cicely, *Osmorrhiza brevistylis* and *longistylis*, of the Atlantic States, and *Myrrhis occidentalis* and *Osmorrhiza nuda* of the far West. The roots are sometimes eaten, having an agreeable taste, but several poisonous umbelliferous plants closely resemble cicely, and caution should be observed in gathering it.

Cic'ero, a township and village of Cook co., Ill., on the Chicago Burlington and Quincy R. R., 4 miles W. of Chicago. Pop. 1545.

Cicero, a post-village of Jackson township, Hamilton co., Ind. It has one weekly newspaper. Pop. 422.

Cicero, a township of Tipton co., Ind. Pop. 3646.

Cicero, a township and post-village of Onondaga co., N. Y. Pop. 2902.

Cicero (Marcus Tullius), an illustrious Roman orator, author, and statesman, was born at Arpinum (now Arpino), about 70 miles E. S. E. of Rome, on the 3d of Jan., 106 B. C. He is often called Tully by English writers. He was liberally educated by his father, an opulent *eques* of the same name, was a pupil of Archias, the Greek poet, and learned to speak Greek fluently. He also became deeply versed in Greek literature and philosophy. His disposition was genial and amiable, his habits temperate and exemplary. In the year 91 B. C. he assumed the manly gown (*toga virilis*), and began to study law under Mucius Scævola the Augur, who was a jurist of great eminence. In his early youth he wrote "Pontius Glaucus" and other poems, which were admired by his contemporaries, but are not extant. According to Plutarch, "he was regarded as the best poet, as well as the greatest orator, in Rome." He passed through a course of discipline in rhetoric and elocution, studied logic under Diodotus the Stoic, attended the lectures of the Greek philosopher Philo, and neglected no mental exercise, however arduous. At the age of twenty-five he began to plead in the Forum, and, according to the custom of Roman advocates, his services were always gratuitous. About the year 80 he defended Roscius Amerinus with courage and success when he was prosecuted for a capital crime by an agent or favorite of Sulla, then dictator, the fear of whose enmity deterred the other advocates from pleading for the defendant.

His constitution was naturally delicate, and his physical condition was such that his friends advised him to abandon the bar or to improve his health by travel. In 79 B. C. he departed from Rome and went to Athens, where he passed about six months, and studied philosophy with Antiochus of Ascalon, Zeno the Epicurean, and Demetrius Syrus. He there formed an intimate friendship with the celebrated Titus Pomponius Atticus. He afterwards extended his travels through Asia Minor, and returned to Rome with a great improvement in his lungs, voice, and constitution.

In 75 B. C. he obtained the office of quæstor, the first step in the gradation of public honors, and it was decided

by lot that he should perform the duties of quæstor in Sicily. The integrity, moderation, and humanity of his official conduct excited general admiration among the people of Sicily. He returned to Rome in the year 74, married (about 79 B. C.) an heiress named Terentia, and soon rose to the foremost rank in his profession. His chief forensic rival was Hortensius. Cicero excelled in sarcasm and witticisms, with which he often seasoned and enlivened his orations and arguments. No advocate had greater power over the feelings and sympathies of his auditors. It was his habitual practice to act as counsel for the defence in criminal trials, but he deviated from this rule in the case of Caius Verres, who was prosecuted by the Sicilians in 70 B. C. for nefarious acts of cruelty and rapine. Only two of his admirable orations against Verres were actually spoken in court, for the evidence against the accused was so convincing that his counsel declined to plead, and Verres went into exile before the decision of the cause. Cicero was elected ædile in 69 B. C. by a majority of the voters of every tribe, and in that capacity had the charge of the temples and public edifices. Having offered himself in 66 as a candidate for the office of prætor, which was the next in the ascending scale of public honor, he was elected first *prætor urbanus* by the suffrages of all the centuries. The duty of prætors was to preside as judges over the highest courts. According to Plutarch, "he acted with great integrity and honor as president in the courts of justice." During his term of office as prætor he made an important political oration for the Manilian Law ("Pro Lege Manilia"), the object of which was to appoint Pompey commander-in-chief in the war against Mithridates the Great.

After the expiration of his term of office (which was one year) he prepared to compete for the consulship, and offered himself as a candidate in 64 B. C. Catiline was one of the defeated candidates in this election, which resulted in the choice of Cicero and C. Antonius. Cicero entered upon the office on the 1st of January, 63, at a time when the republic was in a critical condition in consequence of the prevalence of corruption, sedition, and treasonable designs. He succeeded in forming a political alliance between the senate and the equites or knights, and by this wise policy promoted the cause of liberty and order. "He was," says Middleton, "the only man in the city capable of effecting such a coalition, being now at the head of the senate, yet the darling of the knights." He acquired great celebrity by the courage and energy with which he defeated the conspiracy of Catiline, whom he denounced in four eloquent orations. Catiline, who was the leader of a large number of desperate men, had formed a plot to burn the city and massacre many of the senators. Cicero, who was notified of this plot by a woman named Fulvia, pronounced before the senate on the 8th of November his first oration against Catiline, who was present and rose to reply, but his voice was drowned by cries of "traitor!" and "parricide!" (See CATILINE.) The versatility and elasticity of Cicero's mind were signally exemplified by the fact that during the crisis of this conspiracy, before Catiline was defeated in battle, he defended Murena against a charge of bribery in an oration which abounds in witty and good-humored raillery.

For the defeat of this great conspiracy, Cicero received unbounded honor and applause. Men of all ranks and all parties hailed him as the saviour of the republic and father of his country. In the language of Juvenal,

"Roma Patrem Patriæ Ciceronem libera dixit."

"Cicero could boast," says William Ramsay, "of having accomplished an exploit for which no precedent could be found in the history of Rome. In the garb of peace he had gained a victory of which the greatest among his predecessors would have been proud, and had received tributes of applause of which few triumphant generals could boast." He incurred, however, the enmity of many persons by the capital punishment of Lentulus, Cethegus, and other accomplices of Catiline. He was censured for violation of the constitution and laws by the execution of these conspirators, although they had been condemned to death by the senate. At the expiration of his consulship, having refused to accept the government of a province, he returned to the senate as a private individual (62 B. C.), and purchased an elegant mansion on the Palatine Hill. He also owned villas or country-seats at Tusculum, Arpinum, Formiæ, and other places. He opposed the triumvirs Cæsar, Crassus, and Pompey, whose coalition he considered to be dangerous to the peace and liberty of the state, and he endeavored, without success, to detach from that coalition Pompey, who was his personal friend. In 59 B. C. his malignant enemy Clodius obtained power as tribune of the people, and proposed a law "that whoever has put to death a Roman citizen without due trial shall be interdicted from fire and water." Many thousands of Roman citizens now expressed sympathy for Cicero, but as the consuls were hostile to him, he yielded to the storm and went into exile in April, 58 B. C. A law was then speedily enacted to interdict Cicero from earth and water, and his house on the Palatine Hill was burned by Clodius. The lack of fortitude which he exhibited in his exile (which was passed in Greece) is severely criticised by several writers. In a letter to his wife Terentia he wrote, "It is not my crimes, but my virtue that has crushed me." The excessive violence of his enemies tended to produce a speedy and strong reaction. The new consuls and tribunes elected for the year 57 were friendly to Cicero, whose recall was also advocated by Pompey and a majority of the senate. In August, 57, a bill for his restoration was adopted by an overwhelming majority of the voters, who had come from various parts of Italy to the *comitia centuriata* at Rome. "There had never been known," says Middleton, "so numerous and solemn an assembly of the Roman people as this." On his return to Rome he was greeted with abundant demonstrations of popular favor and enthusiasm. Between 57 and 52 he pleaded several causes in the courts, and found leisure to write two important works, entitled "De Republicâ" ("On the Republic, or the Principles of Government"), and "De Legibus," a philosophical treatise on the origin, nature, and perfection of law.

For a term of one year (51 B. C.) he acted as proconsul or governor of Cilicia and Pisidia, where his administration was a model of moderation, purity, and probity. He returned to Italy in the year 50, and found that a civil war was imminent between Cæsar and the senate. He hesitated whether he should take an active part in the coming contest, and wished to act as a mediator, but eventually he joined the army of Pompey, who fought for the senate. "He fluctuated greatly," says Plutarch, and was in the utmost anxiety; for he says in his letters, "Whither shall I turn? Pompey has the more honorable cause, but Cæsar manages his affairs with the greatest address. In short, I know whom to avoid, but not whom to follow." His wit, however, did not fail even in this gloomy crisis. When Pompey asked him, "Where is your son-in-law?" (Dolabella), Cicero replied, "He is with your father-in-law." After the battle of Pharsalia (August, 48 B. C.), Cato offered the command of the army to Cicero, but he declined it, and, returning to Italy, submitted to the power of Cæsar, who treated him with clemency. He afterwards devoted himself to literary labors in retirement, and found consolation in the calm enjoyments of speculative philosophy. In the ensuing period of three or four years (47–44) he produced numerous works on philosophy and rhetoric, which are admirable monuments of his profound and varied learning as well as of his immense mental activity. As a philosopher he preferred the principles of the New Academy. In the year 45 he lost his accomplished daughter Tullia, whom he regarded with the fondest affection. He approved the assassination of Cæsar, and denounced the conduct of Mark Antony in a series of orations called Philippics, the first of which was spoken in the senate in September, 44. The second Philippic is a masterpiece of eloquent invective. For a few months in the year 43, while Octavius co-operated with the senate against Antony, Cicero was the most prominent statesman in Rome. Between December, 44, and May, 43 B. C., he uttered his last twelve Philippics, which were received with general applause, but the republican cause was soon ruined by the coalition of Octavius with Antony and Lepidus. Cicero was proscribed by them, and was killed by the soldiers of Antony near his Formian villa in December, 43 B. C. He left one son, named Marcus Tullius. The moral character of Cicero is admitted to be excellent even by those who censure his public conduct. His worst foible was vanity, exhibited in a habit of self-laudation. According to Niebuhr, "The predominant and most brilliant faculty of his mind was his wit. In what the French call *esprit*—light, unexpected, inexhaustible wit—he is not excelled by any of the ancients." As an orator he surpassed all the ancients except Demosthenes. Modern critics concur in unanimous admiration of the consummate grace and beauty of diction which enchant successive generations in the periods of Cicero. He amplifies everything. His words seem to gush forth without effort in an ample stream; and the sustained dignity of his oration is preserved from pompous stiffness by the lively sallies of a ready wit and a vivid imagination. His periods are sonorous, but present a great variety of cadences. His "Letters," of which more than eight hundred are extant, are models of exquisite Latinity, and are highly prized for the light which they throw on the history and antiquities of the Roman republic. Among his works which remain entire are about fifty orations; also treatises, entitled "De Finibus, libri v." (an Inquiry into the Supreme Good); "Brutus seu de Claris Oratoribus" (a critical notice of Roman orators); "De Amicitiâ" (a dialogue on friendship); "Tusculanæ Disputationes" (disputations

on various questions of philosophy); "De Naturâ Deorum, libri iii." ("On the Nature of the Gods"); "Orator, seu de Optimo Genere Dicendi" ("The Orator, or On the Best Manner of Speaking"); and "De Officiis, libri iii." (an excellent treatise on ethics). One of his greatest works, "De Republicâ," is lost except a large fragment. He also wrote treatises, "De Gloriâ" ("On Glory") and "De Virtutibus" ("On the Virtues"), which are not extant. Mutilated copies have been preserved of his works entitled "De Legibus" and "Academicorum, libri iv." Among the best editions of his complete works are those of Ernesti, Halle, 5 vols. 8vo, 1774–77; Olivet, Paris, 9 vols. 4to, 1742; and Orelli, Zurich, 9 vols. 8vo, 1826–37. (See PLUTARCH, "Life of Cicero;" CONYERS MIDDLETON, "History of the Life of Cicero," 1741; F. FABRICIUS, "Historia Ciceronis," 1563; ABEKEN, "Cicero in Seinen Briefen," 1835, and an English version of the same, 1854; W. FORSYTH, "Life of M. T. Cicero," 2 vols., 1864; LAMARTINE, "Cicéron," 1852; ORELLI, "Onomasticum Tullianum;" J. MORABIN, "Histoire de Cicéron," 3 vols., 1745; DRUMANN, "Geschichte Roms.") WILLIAM JACOBS.

Cicero (MARCUS TULLIUS), the only son of the preceding, was born in 65 B. C. He is said to have been dissipated, indolent, and intemperate. In the year 49 he joined the army of Pompey, and received the command of a squadron of cavalry. Soon after the battle of Pharsalia (48 B. C.) he went to Athens, and studied philosophy under Cratippus. Having been appointed a military tribune by Brutus in 44 B. C., he defeated C. Antonius, and did good service in the Macedonian campaign. By the favor of Octavius (Augustus) he became consul in the year 30, and was governor of Asia (Syria) in 29–28.

Cicero (QUINTUS TULLIUS), a brother of Cicero the great orator, was born about 102 B. C. He was elected prætor for the year 62, after which he officiated as governor of Asia for three years, and returned to Rome in 58 B. C. He was appointed in the year 55 legate (*legatus*) to Cæsar, whom he attended in an expedition to Britain, and in 54 he commanded a legion in winter quarters in Gaul. He defended his camp with success against the attack of a large army of Gauls. In the civil war he took arms for the senate against Cæsar, but he made his peace with him in 57 B. C. He was proscribed by the triumvirs, and killed in 43 B. C.

Cicero Corners, a village of Cicero township, Onondaga co., N. Y., has a large steam-mill and three churches. Pop. 212.

Cicerone, che-chȧ-ro′nȧ [from *Cicero,* a derisive reference to the loquacity of guides], an Italian word signifying a guide who shows and explains to travellers the interesting objects, antiquities, and famous places which abound in Italy.

Cicisbeo, che-chis-bā′o [Fr. *cicisbée* or *sigisbée*), a name applied since the sixteenth century, in Italy, to the acknowledged attendant upon a married lady. In Italian society it was at one time unfashionable for the husband to associate with his wife anywhere except in his own house. In society or at places of amusement the wife was accompanied by her cicisbeo, who attended at her toilet to receive her commands for the day. This custom, which was once universal, has now almost disappeared. Cicisbeo is synonymous with *cavaliere servente.* The custom is highly commended by several Italian writers.

Cicogna′ra, da (LEOPOLDO), COUNT, an Italian antiquary and writer on art, was born at Ferrara Nov. 26, 1767. He was for many years president of the Academy of Fine Arts in Venice, and was a friend of Canova. His chief work is a "History of Sculpture from the Renaissance of that Art to the present Century" (3 vols., 1813–18), which is highly esteemed. He wrote a "Life of Canova" (1823). Died Mar. 5, 1834.

Cicu′ta, the ancient Latin name of the *Conium maculatum* (hemlock), a poisonous plant which was used at Athens as means of capital punishment. This is the plant which is popularly called cicuta in the U. S. and Europe. (See CONIUM.) Cicuta is also the name of a genus of umbelliferous plants which are poisonous. The *Cicuta maculata* (spotted cowbane) grows in swamps in the U. S. Its root is a very deadly poison. Other equally poisonous species grow in the U. S. and in Europe.

Cid [Arab. *seid,* a "lord"], surnamed EL CAMPEADOR (the "champion"), the most celebrated national hero of Spain, was a Castilian whose proper name was RODRIGO (or RUY) DIAZ DE BIVAR. He was born at Burgos about 1040. He became commander of the army of Sancho II. of Castile, who reigned from 1065 to 1072. About 1085 he was banished by Alfonso VI. He had married Doña Ximena, a relative of King Alfonso. Even while in exile he was the commander of a retinue of knights and vassals, and he waged war with success against several princes. He gained a victory over the Moors, and became sovereign of Valencia in 1094. Died in 1099. His exploits have been embellished by many marvellous and fabulous inventions. His life is the subject of an anonymous epic called "The Poem of the Cid," which, according to Southey, is the "oldest and finest poem in the Spanish language," and also of a tragedy by Corneille (1636). (See R. SOUTHEY, "Chronicle of the Cid," 1808; M. J. QUINTANA, "Life of the Cid," in Spanish and French, 1837; "Romancero General," 1604.)

Ci′der [Fr. *cidre;* It. *cidro*], the fermented juice of apples, extensively prepared in parts of England, in Ireland, in the northern districts of France, and in North America. In Normandy vast quantities of apples are grown for the preparation of cider. The apples are first reduced to pulp in a mill, and the pulp is afterwards subjected to pressure. The apple-juice is placed in casks in a cool place, when fermentation begins, part of the sugar is converted into alcohol, and a clear liquid is obtained, which can easily be racked off from sedimentary matter. Cider is largely used as a beverage. It contains from 5¼ to 10 per cent. of alcohol, and is intoxicating when drunk in large quantities. Cider quickly turns sour, becoming *hard cider,* owing to the development of acid, and great difficulty is experienced in the attempt to keep it sweet. Large quantities are used in the manufacture of VINEGAR (which see, by PROF. C. F. CHANDLER, PH. D., LL.D.)

Cienfue′gos, a town of Cuba, 111 miles S. E. of Havana, is the capital of a district of its own name. Sugar is exported from this place. Pop. 9950.

Cie′za, a town of Spain, in the province of Murcia, near the river Segura, and on a railway, 24 miles N. W. of Murcia. It has manufactures of linen cloth. Pop. 9516.

Cigar′, or **Segar′** [Fr. *cigare;* Sp. *cigarro*], a small roll of tobacco-leaves for smoking. The cigars of Havana are the most highly prized, but those from Manila, usually called cheroots, are also excellent. The manufacture of cigars in the U. S. is an important industry. For the outer part or wrapper of a cigar the tobacco raised in the Connecticut Valley is considered the best, from its fine elastic quality. A very small cigar wrapped with paper is called a cigarette.

Cil′ia [the plu. of *cilium,* the Lat. for "eyelash"], the hairs which grow from the margin of the eyelids. The term is also applied to microscopic filaments which project from animal membranes, and which are often endowed with quick, vibratile motion. In most of the very low animals the respiratory function is effected by means of vibratile cilia; many animalcules and the gemmules of the acrites move by a similar mechanism; and it has recently been ascertained that vibratile cilia have a share in the performance of some important functions in the highest classes of the animal kingdom, where they have been detected on the membrane lining the female generative organs and in the respiratory passages and the ventricles of the brain. Cilia in botany are long hairs situated on the margin of a vegetable body.

Cilic′ia [Gr. Κιλικία], an ancient division of Asia Minor, was bounded on the N. by Mount Taurus, on the E. by Mount Amanus, on the S. by the Mediterranean, and on the W. by Pamphylia. The surface is partly mountainous, and partly occupied by fertile plains adjacent to the sea. The chief river was the Cydnus. The principal towns were Tarsus, Soli, Seleucia, Mallus, and Aphrodisias. The ancient Cilicians were distinguished for maritime enterprise and also for piratical habits. In early ages Cilicia was an independent kingdom. It was afterwards a part of the Persian empire, and was reduced to a Roman province in the time of Pompey. It coincides nearly with the Turkish division of Adana. Among the eminent natives of Cilicia were Saint Paul, Chrysippus the Stoic philosopher, and Aratus the poet.

Cil′ley (JONATHAN), an able lawyer and politician, born at Nottingham, N. H., July 2, 1802, graduated at Bowdoin College in 1825, was admitted to the bar of Maine in 1829, became Speaker of the Maine house of representatives, and in 1832 a presidential elector; was elected to Congress in 1837, and Feb. 24, 1838, was killed in a duel by William J. Graves of Kentucky. The combatants fought with rifles, eighty yards apart, and fired three times each. The affair caused much excitement at the time, Cilley's friends declaring the duel to have been unfairly conducted, and denouncing Graves as a murderer.

Cimabu′e (GIOVANNI), an Italian painter, born in Florence in 1240, was eminent as a restorer and reformer of the art of painting. The fine arts at that time had degenerated into a formal conventionalism. He received lessons in art from two Greek or Byzantine painters, and formed a more natural style than that of his masters. He painted in distemper and in fresco, and adorned the church of St. Francis at Assisi with his works. He excelled in design and expression. Died about 1302. Among his pupils was Giotto. (See VASARI, "Lives of the Painters.") REVISED BY C. C.

Cimaro'sa (Domenico), an Italian composer, born at Naples Dec. 17, 1755, was a pupil of Durante. He resided at St. Petersburg and at Vienna and other German courts. He composed a number of successful operas, among which are "Il Matrimonio Segreto" ("The Secret Marriage") and "L'Olimpiade." His works are remarkable for originality and spirit. Died Jan. 11, 1801.

Cimarron', a post-village, capital of Colfax co., N. M. It has one weekly newspaper.

Cim'bri [Gr. Κίμβροι], a warlike people of ancient Europe whose origin is involved in obscurity. They were regarded as Germans by Cæsar and Tacitus, whose opinion has been adopted by most moderns. H. Müller and other writers suppose that they were Celtic, and that Cimbri is another form of *Cymri*, which is the Welsh name of their own nation. In 113 B. C. the Cimbri and the Teutones issued from the N. part of Germany, crossed the Eastern Alps, and invaded the territory of the Romans, whom they defeated in battle. They afterwards moved across the Rhine, and pillaged part of Gaul. The Cimbri and Teutones gained another victory over the Romans in the year 109. Within a period of six years they defeated four consuls and routed five Roman armies, so that great consternation prevailed at Rome. They invaded Spain in 104 B. C. In 102 B. C., Marius defeated the Teutones at Aquæ Sextiæ (Aix), in Gaul. The army of Cimbri at the same time invaded the north of Italy by a different route, and gained a victory over the Roman consul Catulus near the Adige. The infantry of the Cimbri had shields fastened together with chains. The two Roman armies were then united under the joint command of Catulus and Marius, who gained a great victory over the Cimbri near Vercellæ (Vercelli) in July, 101 B. C. It is said that more than 100,000 Cimbri were killed in this battle. The Cimbri in the time of Tacitus lived near the North Sea, and in Jutland, which was called the Cimbric Chersonese. (See Pullmann, "Die Cimbern," 1870.)

Cimin'na, a town of Sicily, in the province of Palermo, 19 miles S. E. of the city of Palermo. Pop. 5269.

Cimme'rians [Gr. Κιμμέριοι], according to the Homeric legends, were a people dwelling "beyond the ocean-stream," where the sun never shines and perpetual darkness reigns. Hence the proverbial expression, "Cimmerian darkness." The historical Cimmerii were a nomadic race of great antiquity, who lived between the Borysthenes (Dnieper) and the Tanais (Don). According to Herodotus, they were expelled from that region by the Scythians, and migrated to Asia Minor. They waged war against Alyattes, king of Lydia, about 600 B. C. The Strait of Yenikale derived from them the name of Cimmerian Bosphorus. Some antiquarians identify the Cimmerii with the Cimbri and the Cymry (which see).

Cimo'lian Earth [Gr. γῆ Κιμωλία], a kind of earth which the ancients used to obtain from the islands Cimolus and Siphnus in the Cyclades. It was sometimes used in medicine, but was especially employed instead of soap in washing clothes. It appears to have been a variety of steatite or soapstone.

Ci'mon, or **Ki'mon** [Κίμων], an eminent Athenian commander and statesman, born about 502 B. C., was a son of Miltiades, who commanded at Marathon. He served with distinction at the great battle of Salamis, 480 B. C. Cimon and Aristides commanded the Athenians, who, cooperating with the other Greek armies, prosecuted the war against Persia in 476 B. C. Soon after this date he became commander-in-chief of the allies, who preferred him to the Spartan Pausanias. He defeated the Persians on the Strymon, and in 466 gained a great naval victory at the mouth of the Eurymedon. He was for some time the most prominent statesman of Athens, and a rival of Pericles. Cimon improved Athens by planting trees and building walls to the Piræus. It 461 B. C. he was banished by ostracism, but he was permitted to return in 456. He obtained command of a fleet in 449, and besieged Citium, in Cyprus, where he died in the same year. He was a conservative in politics. (See Plutarch, "Life of Cimon;" Cornelius Nepos, "Cimon;" Grote, "History of Greece;" Thirlwall, "History of Greece.")

Cinalo'a, or **Sinalo'a,** a state of the Mexican confederation, is bounded on the S. W. by the Gulf of California, and intersected by the rivers Culiacan and Cinaloa. Area, 28,915 square miles. The surface is partly mountainous. The rainy season begins about June 20, and lasts nearly two months. Capital, Culiacan. Pop. 163,095.

Cincho'na, commonly pronounced sin-ko'na [for etymology see below], a genus of trees of the order Rubiaceæ, tribe Cinchoneæ, producing the bark commonly known as Peruvian bark, Jesuits' bark, etc., and from which the alkaloids quinia (quinine) and cinchonia are obtained. The trees of this genus are sometimes of great magnitude, but some of them in high mountain-regions are shrubs with stems only eight or ten feet in height. They are all natives of South America, between lat. 20° S. and lat. 10° N., and chiefly grow on the eastern slopes of the Cordilleras. Other tropical countries have of late been stocked with cinchona trees, especially Java and some other Dutch colonies. The British government has successfully introduced them into India and St. Helena; and the bark produced on the Neilgherry Hills is remarkably rich in quinia. All cinchonas are evergreen, with laurel-like, entire opposite leaves, and generally with beautiful fragrant flowers. Of more than thirty species, several are comparatively worthless in medicine.

Much difficulty has been experienced in ascertaining the species by which the different varieties of cinchona bark are produced. The commercial names are derived partly from the color of the kinds, and partly from the districts in which they are produced or the ports whence they are shipped. The best sort, known as Calisaya or royal yellow bark, is chiefly the product of *Cinchona Calisaya*, a large tree, growing in hot mountain-valleys of Bolivia and Peru. The proper discrimination of the different kinds requires experience. The taste is always bitter, but it is possible to distinguish by the taste those varieties which contain quinia most largely from those in which cinchonia is the principal alkaloid.

The collection of the bark is carried on by Indians, who pursue their occupation during the dry season. The trees are felled as near the root as possible, that none of the bark may be lost, and the bark, being stripped off, is carefully dried; the quilled form of the thinner bark is acquired in drying. Even the roots of the best species are carefully peeled. The bark is made up into packages averaging 150 pounds weight, called drums or seroons. A number of spurious kinds of bark are either sent into the market separately or are employed for adulterating the genuine kinds. The very numerous varieties are classed as (1) yellow, (2) red, (3) pale, and (4) Carthagena barks.

The Peruvian Indians call the trees *kina*, from which the Spanish name *quina* is derived, but it is not certain that they knew the use of the bark before the arrival of the Spaniards. It is a medicine of great value in the cure of intermittent fevers and diseases attended with much debility, also in certain diseases of the nervous system. It seems to have been first imported into Europe in 1639 by the wife of the viceroy of Peru, the countess of Cinchon (from whom it was named), who had been cured of an intermittent fever by means of it. The Jesuits afterwards carried it to Rome and distributed it, and thus it acquired the name of Jesuits' bark. It acquired great celebrity in Spain and Italy, being sold at high prices by the Jesuits, by whom it was lauded as an infallible remedy, while by physicians it was coldly received, and by the Protestants generally repudiated. It was, however, used in England in 1658. It seems to have been employed without discrimination, and to have fallen into the hands of empirics. It was again brought into notice by Sir Robert Talbor, who acquired great celebrity through the cure of intermittents by means of it, and from him Louis XIV. purchased his secret in 1679. Soon afterwards Morton and Sydenham, the most celebrated English physicians of that age, adopted the remedy, and its use from this period gradually extended. The discovery of the alkaloids on which its properties chiefly depend, within the present century, constitutes a new era in the history of this medicine.

The active principles of cinchona are the alkaloids Quinia (which see), cinchonia, and several other alkaloids of less importance. When isolated, the alkaloid cinchonia has the formula $C_{40}H_{24}N_2O$, and can be obtained in a crystallized state. The alkaloid quinia is now extensively in use in medicine in the form of disulphate of quinia, and is given in doses of from one to twenty grains in almost all the cases to which the bark is applicable, and for this reason the bark itself is much less used than formerly.

Revised by Willard Parker.

Cincinna'ti, a township of Tazewell co., Ill. P. 758.

Cincinnati, a township of Harrison co., Ia. Pop. 447.

Cincinnati, the "Queen of the West," the county-seat of Hamilton co. and metropolis of the State of Ohio, one of the largest and most important inland cities of the U. S., is situated in lat. 39° 6′ 30″ N. and lon. 84° 24′ W., 764 miles from New York and 610 miles from Washington, in the beautiful Valley of the Ohio, extending along the northern bank of the Ohio River and over the adjacent hills for miles. The main portion of the city is in the valley, and is built on two plateaux. The territory of the city has an area of twenty-four square miles, on which regular streets, mostly 66 feet in breadth, are laid out, and paved with boulders or wooden blocks. Cincinnati is di-

vided into twenty-five wards, besides the suburbs Clifton and Avondale, which, in connection with Mount Auburn and East Walnut Hills, now parts of the city, contain some of the most beautiful private residences and country villas. Quite a number of other suburban towns surround the city; among which may also be counted the cities of Covington, Newport, Dayton, and Ludlow in the State of Kentucky, which are situated right opposite Cincinnati, and connected with the same by bridges and ferries. The government of the city rests in the hands of the mayor, who is endowed with the veto power, boards of councilmen, of aldermen, of police commissioners, fire commissioners, of education, park commissioners, of health, of sewerage, of city improvements, of water-works, of revision, and a number of minor boards. While the population of the city in 1800 amounted only to 800, it had increased in 1860 to 161,044, and in 1870 to 216,239, of whom 136,627 were born in the U. S., 49,448 in Germany, 18,264 in Ireland, 4033 in England and Wales, and the rest in other foreign countries.

Cincinnati occupies a prominent position as a commercial and manufacturing city, and is the native place of many prominent men. Its favorable position, extensive railroad connections, and numerous factories make it the commercial emporium of the adjacent fertile and densely settled States and the centre of Western manufacture. The best proofs of its growing prosperity are the numerous new buildings and the rapid extension of the business portion of the city beyond its former boundaries. Among the public buildings the most prominent are the Cincinnati College, the court-house, the city hall, the Ohio and Miami colleges, the Public Library, the Masonic Temple, Odd Fellows' Hall, the workhouse, house of refuge, the new city hospital, the post-office, and the house of the Jesuits, while Pike's and Robinson's opera-houses, the Catholic Institute, Sinton's and Mitchell's blocks, the Wesleyan Female College, and the Cincinnati Hotel may be ranked among its finest private structures. The finest view of the city may be had from the house of the Passionist Fathers on Mount Adams (formerly the observatory), the Catholic seminary, and the Lookout House. Among the churches, St. Peter's cathedral, with its beautiful steeple of Dayton stone and its chimes; St. Francis Xavier's church of the Jesuits, St. Paul's Methodist church, the Second Presbyterian, St. John's Episcopal, and the Central Christian church are the most prominent. The total number of churches is 151 (11 Baptist, 2 Christian, 4 Congregational, 4 Disciples of Christ, 2 Friends, 5 German Evangelical Unionists, 3 German Reformed, 1 Independent Methodist, 4 German Lutheran, 27 Methodist Episcopal, 2 Protestant Methodist, 1 Calvinistic Methodist, 3 colored Methodist, 1 Swedenborgian, 14 Presbyterian, 2 United Presbyterian, 3 Reformed Presbyterian, 8 Protestant Episcopal, 42 Catholic, 3 United Brethren in Christ, 1 Universalist, 3 Unitarian, 5 Jewish synagogues). Cincinnati has 5 literary colleges, 2 academies of the Sisters of Notre Dame, 6 medical colleges, 1 law school, 1 college of dentistry, 5 commercial colleges, and a university. The city has 26 district, 4 intermediate, a normal, and two high schools, with 91 male and 420 female teachers, and 26,449 pupils. The colored population has its own schools, as well as the Catholics and other religious associations. Among the numerous libraries, the most prominent are the Public Library, with 59,695 volumes, open to everybody; the Young Men's Mercantile Library, with 26,800 volumes; the Historical Library, with 1738 volumes and many valuable MSS. Among the benevolent institutions under the control of the city government are the house of refuge, the poorhouse, the hospital, the lunatic asylum. Besides these city institutions, private charity supports three orphan asylums, three hospitals, a widows' home, a children's home, a home for the friendless, House of the Good Shepherd for fallen women, Union Bethel, a protectory for fallen boys, and a vast number of benevolent aid societies. Cincinnati has 22 lodges of Free Masons, 43 of Odd Fellows, 15 of Good Fellows, 6 of Red Men, 12 of Knights of Pythias, 4 of the Seven Wise Men, 4 of the Grand Army of the Republic, 5 of the B'nai B'rith, 10 of the Druids, 12 of the American Protestant Association, 7 divisions of the Sons of Temperance, 4 orders of Good Templars, and 11 of the Harugaris. It has an academy of medicine, an astronomical society, an historical and philosophical society, a society of natural history, a zoological society, an acclimatization society, a society for the prevention of cruelty to animals, a wine-growers' association, a horticultural society, and a literary club. There are also a chamber of commerce and a board of trade. Cincinnati has 8 daily and 33 weekly papers, 3 semi-monthly and 27 monthly publications. It has 6 theatres. Eighteen railroads connect Cincinnati with all parts of the country; 354 steamboats ply between the different points on the river. It has 11 horse railroads, 1 inclined plane railroad, 4 steam ferries, and two fine bridges (one of them, the splendid Cincinnati and Covington suspension bridge, built by Roebling, connects Cincinnati with Kentucky).

The commerce of Cincinnati is very large. Its chief article of exportation, pork, has given it the name of "Porkopolis." It has also a large trade in tobacco, groceries, beer, and whisky. The imports in 1872 amounted to $317,646,608, and the exports to $200,607,040. The manufactures of Cincinnati are not less important than its commerce. In 1871 different articles, amounting altogether in value to $235,988,365, were manufactured. The principal manufactures are iron, metal, and wooden wares, leather, soap, candles, clothing, whisky, beer, chemicals, earthenware, carriages, paper, boots and shoes, books, tobacco, cigars, etc. Cincinnati has five national banks, with an aggregate capital of $4,000,000, and thirty private banks. In 1872 the tax receipts of the city amounted for ten months to $3,956,218.92; the expenses to $4,009,837.20. The bonded debt amounted to $6,001,500, and the real estate of the city to more than $20,000,000. The taxable property was estimated on the duplicate of 1873 at $175,084,296. Cincinnati has 21 steam fire-engines and 326 fire-alarm telegraph stations.

Spring Grove Cemetery, containing 443 acres, is the finest and largest burial-place. Among the seven parks of the city, the Garden of Eden, containing 225 acres, is the largest. The beautiful Tyler Davidson fountain on Fifth street, surrounded by an esplanade, cast in Müller's bronze foundry in Munich (Bavaria), after designs by Albert von Kreling, by order of Henry Probasco, is one of the grandest ornaments of the city. Cincinnati is the seat of a police court, 3 superior courts, 3 courts of common pleas, 1 district court, 1 probate court, and the U. S. court for the southern district of Ohio. Since 1853 Cincinnati is the seat of the Catholic archbishop.

Cincinnati was founded by New Jersey men in 1789, and laid out by Col. Ludlow, who plotted it on a plan similar to that of Philadelphia. The nucleus was formed by Fort Washington, below which the village of Cincinnati was mainly built. For years it did not promise to rise much above the ordinary village, and not until 1816, when steamboat navigation was introduced on the Western rivers, did it push forward. From that date, however, it made rapid strides to prominence, and occupied in a few years the first rank among Western cities, which it maintained for a long while. It was incorporated as a town in 1802, and as a city in 1819. Its first mayor was Major Ziegler. Towards the middle of the century it attracted a vast German immigration, and several parts of the city, called "Over the Rhine," are almost entirely settled by Germans.

Of the local works on Cincinnati, the following are some of the most important:

Drake, Daniel, "Notices concerning Cincinnati," Cincinnati, 1810, 8vo; "Natural and Statistical View or Picture of Cincinnati and the Miami Country," Cin., 1815, 12mo; "Early Physicians, Scenery, etc. of Cincinnati," Cin., 1852, 12mo; Drake, B., and Mansfield, E. D., "Cincinnati in 1826," Cin., 1827, 12mo; Cist, C., "Cincinnati in 1841," Cin., 1844, 12mo; "Cincinnati in 1851," Cin., 1851, 12mo; "Cincinnati in 1859," Cin., 1859, 12mo; Lea, T. G., "Plants of Cincinnati," Phila., 1849, 8vo; Stevens, G. E., "The Queen City in 1869," Cin., 1869, 18mo; Foote, J. P., "Schools of Cincinnati," Cin., 1855, 8vo; "Spring Grove Cemetery Illustrated," Cin.; Maxwell, S. D., "Suburbs of Cincinnati," Cin., 1870, 4to; Taft, A., "Cincinnati and her Railroads," Cin., 1870, 8vo; "Cincinnati and the Miami Country Celebration," Cin., 1834, 8vo; Clark, P. H., "Black Brigade of Cincinnati," Cin., 1870, 8vo.

Revised by G. Brühl.

Cincinna'ti, Order of [named from the patriot Cincinnatus], a society founded in the U. S. in 1783 by the officers of the Revolutionary army, whose object was to cherish and perpetuate the feelings of patriotism, friendship, and fraternity which had been produced by the toils and dangers they had experienced in common, and to relieve the wants of the families of such as had fallen in the war. General Knox was one of the authors of its constitution. The badge of this society is a bald eagle, suspended by a dark-blue ribbon with white borders, a symbol of the union of the U. S. with France. The privilege of membership was extended to a number of French officers. Considerable dissension and discussion was excited on the question of the succession of regular membership, which at first was limited to the eldest male posterity, together with their kindred who should be worthy, etc. Popular jealousy was roused by the privilege granted to primogeniture, which was denounced as a germ of hereditary aristocracy. At a general meeting held in Philadelphia in 1784 this subject was discussed, and some change was made in the constitution as a concession to the popular sentiment. Gen. Washington accepted in 1787 the office of president of the order, which he continued to hold by successive re-elections until his

death. Branches of the order were organized in each of the States. Of these some have been abolished or discontinued, but others remain active and hold annual meetings. Hamilton Fish was elected president of the order in 1872.

Cincinnatus, a township and post-village of Cortland co., N. Y., 75 miles S. E. of Oswego. Pop. 350; of township, 1155.

Cincinna'tus (Lucius Quintius), [so called because he wore his hair in long curling locks, *cincinni*], an eminent Roman patriot and dictator, born about 519 B. C., belonged to the patrician order. He cultivated a small farm with his own hands, and was regarded as a model of pristine virtue and simplicity of habits. About 458 B. C. he became consul. According to Smith's "Dictionary," he was illegally appointed consul suffectus in 460 B. C. He was appointed dictator two years later, and gained a victory over the Æqui. In the year 450 he was an unsuccessful candidate for the office of decemvir. He was chosen dictator in 439 B. C., to oppose the machinations of Spurius Melius, accused of treason. Much of what is related of him by Livy is now thought to be legendary.

Cinc'ture [Lat. *cinctura*, a "girding," from *cingo, cinctum*, "to gird"], in architecture, is the ring or fillet at the top and bottom of a column which divides the shaft from the capital or base. It is also used, like the Latin *cinctura*, for a girdle.

The Gabine Cincture (*cinctus Gabinus*), in ancient Rome, was a peculiar mode of wearing the toga, the garment itself being tied in a knot in front. This cincture was seldom employed except upon the most solemn occasions. It took its name from the town of Gabii, where its use is said to have been once common.

Cin'eas [Gr. Κινέας], a Thessalian orator and negotiator, who, as Plutarch says, in youth had heard Demosthenes. He became a confidential minister of Pyrrhus, king of Epirus, who, in 280 B. C., sent Cineas to Rome to negotiate a treaty of peace or alliance. His artful and plausible speeches were frustrated by Appius Claudius, and his mission was a failure. Died after 278 B. C.

Cin'erary Urn [Lat. *urna cineraria*, from *cinis* (gen. *cineris*), "ashes"], a vessel used by the people of antiquity to contain the ashes of the dead gathered from the funeral pile. The embers were drenched with wine, and placed in the urn, which was then placed in a family mausoleum. Only the rich could afford so expensive a rite. Slaves and inferior persons were burned, and their ashes placed in the *olla*, or common clay pot, which was then stored in a columbarium. Cinerary urns were of marble, clay, glass, alabaster, or sometimes even of gold. The celebrated urn known as the Portland vase in the British Museum is of this character. (See Portland Vase.) Cinerary urns often had epitaphs and beautifully wrought artistic figures upon them.

Cini'si, a town of Sicily, in the province of Palermo, is 14 miles W. N. W. of Palermo, and near the sea. Here is an old feudal castle which has been converted into a convent. Pop. 6714.

Cin'na (C. Helvius), a Roman poet and a friend of Catullus, was perhaps the same as the Cinna whom Virgil compliments in his ninth eclogue. He wrote an epic poem called "Smyrna," of which only a few lines are extant. He was killed in 44 B. C. by a mob of Cæsar's adherents, who mistook him for another Cinna, who was an accomplice of Brutus.

Cinna (Lucius Cornelius), a Roman patrician who was a partisan of Marius in the civil war between Marius and Sulla. He became consul in 87 B. C., while Marius was in exile and Sulla was conducting a campaign in Asia. By an effort to reinstate Marius he provoked a violent conflict, and was driven out of Rome, but he and Marius soon returned with an army and obtained the mastery in that capital. They massacred many friends of Sulla. Cinna was re-elected consul as a colleague of Marius, who died in 86 B. C. He raised an army and marched to oppose Sulla, who was returning from Asia, but was killed by his own mutinous soldiers in 84 B. C. His daughter Cornelia was married to Julius Cæsar.

Cin'nabar [Fr. *cinabre* or *cinnabre*; Ger. *Zinnober*; Lat. *cinnabaris*; Persian *kambar*], a red pigment sometimes called vermilion, is an ore of mercury, from which nearly all the mercury of commerce is obtained. It is a sulphide of mercury, composed, when pure, of 86.2 per cent. of mercury and 13.8 of sulphur. It occurs massive and crystallized in six-sided prisms; has an adamantine, almost metallic lustre, and a carmine color. Specific gravity, nearly 8.5. The term vermilion is usually applied to this mineral when it is reduced to powder in order to be used as a pigment. It is a rare mineral. The most productive mines of cinnabar are those of China, of Almaden in Spain, New Almaden in California, and Idria in Carniola. The annual product of the mine of New Almaden is about 2,600,000 pounds.

Cin'naminson, a post-township of Burlington co., N. J. Pop. 3112.

Cin'namon [Lat. *cinnamomum*] is the aromatic bark of certain trees of the genus *Cinnamomum*, which belongs to the order Lauraceæ, natives of tropical and sub-tropical parts of the East. Cinnamon is mentioned in the Old Testament by a name almost the same as that which it still bears. True cinnamon is chiefly produced by the *Cinnamomum Zeylanicum*, which grows in the island of Ceylon; introduced into the West Indies in 1782, it is now cultivated there also. The tree attains the height of twenty to thirty feet, and is eighteen inches in thickness. The leaves are oval, four to six inches long, with a blunt point; they have the taste of cloves. The fruit is somewhat like an acorn in shape; it is a small drupe, brown when ripe. The branches of three to five years' growth being cut down, the epidermis is scraped away; the bark is split longitudinally with a knife and taken off. The pieces are then exposed to the sun, when it curls up into quills, the smaller of which are thrust into the larger, and the whole tied up in bundles. Cinnamon is arranged according to its quality by persons who chew it, although in a short time it produces painful effects on their mouths. It is used by cooks and confectioners, and in medicine as a stomachic and carminative. Its virtues depend chiefly upon the essential oil which it contains. Oil of cassia is very often substituted for this oil, as cassia is for cinnamon. Indeed, the ordinary cinnamon of commerce is cassia, that name being given to the product of probably eighteen or twenty different species of *Cinnamomum*. The root of the cinnamon tree contains camphor. The fruit yields a highly fragrant, concrete oil, called "cinnamon suet," and in Ceylon was formerly made into candles for the use of the king. *Cinnamomum Loureirii*, of Cochin-China and Japan, yields a bark even superior to that of *Cinnamomum Zeylanicum*. A species of cinnamon grows at the elevation of 8500 feet in the Himalaya Mountains. The oil of cinnamon is generally prepared in Ceylon by grinding coarse pieces, soaking them in sea-water for two or three days, and then distilling. Two oils pass over—one lighter, the other heavier, than water. Oil of cinnamon varies in color from yellow to cherry-red; the yellow variety is the best. Oil of cinnamon leaf is prepared in Ceylon, and is met with in commerce under the name of clove oil, which it resembles. Cinnamon water is obtained by adding water to cinnamon, and distilling, or by diffusing the oil of cinnamon through water by the aid of sugar or carbonate of magnesia. Spirit of cinnamon is procured by acting upon cinnamon with spirit of wine and water and distilling; and tincture of cinnamon, by soaking cinnamon in spirit of wine. The medicinal properties of cinnamon are aromatic and carminative, and it is serviceable in nausea and vomiting, and in cases of flatulence and of spasm of the stomach. The eocene deposits of the U. S. and other countries abound in fossil remnants of trees referred to the genus *Cinnamomum*.

Cin'namon Bear, or **Yellow Bear,** a bear occasionally found in the U. S., is regarded as a mere variety of the common black bear. (See Bear.)

Cinnamon Stone is a variety of lime garnet of a clear cinnamon-brown color, and is a silicate of alumina and lime. The finer specimens are highly prized and used in jewelry. Many of the stones sold as hyacinths are in reality cinnamon stones. They are found most abundantly in Ceylon.

Cinque Cento, chĕn-kwå chĕn'to [an Italian word signifying "five hundred"], a term used to designate the style of art which arose in Italy about the year 1500, after the fall of the great schools. It is sensuous in its character, the subjects being usually borrowed from ancient mythology or history. The same term is also applied to the literature and architecture of that period, and is nearly synonymous with the later Renaissance (which see).

Cinquefoil, sink'foil [from the Fr. *cinque*, "five," and *feuille*, a "leaf"], a common name of the five-finger or Potentilla (which see); also a bearing in heraldry, which is usually depicted with five leaves issuing from a ball as a centre point. Cinquefoil, in architecture, is an ornamental foliation in five compartments, used in the tracery of windows, panellings, and the like. The cinquefoil is often represented in a circular form, the spaces between the points or cusps representing the five leaves.

Cinque Hommes, a township of Perry co., Mo. Pop. 2910.

Cinque Ports (*i. e.* "five ports"), the English seaport-towns of Dover, Sandwich, Hastings, Romney, and Hythe, to which William the Conqueror granted important privileges. Winchelsea, Rye, and Seaford were subsequently

added to the original five ports. They are under the government of a lord warden. The Cinque ports in early times were required to furnish such shipping as the sovereign required for the public service. In the time of Edward I. they were bound to furnish fifty-seven ships, equipped and manned at their expense, for fifteen days. The Cinque ports became so powerful and audacious that they sent out piratical expeditions and waged war without authority from the king. The Municipal Reform act has broken up the ancient organization of the ports.

Cin'tra, or **Sintra,** a town of Portugal, in Estremadura, on the slope of the Serra de Cintra, 14 miles N. W. of Lisbon. It is remarkable for the picturesque beauty of its situation and its delightful climate. It has an ancient castle, originally occupied by Moorish kings, and afterwards by Christian sovereigns. On two hills are the Penha convent and a Moorish castle, and within the town is a palace. The citizens of Lisbon are accustomed to spend their Sundays in Cintra.

Cione di Andrea. See ORCAGNA.

Ciotat, La (anc. *Citharista*), a maritime town of France, department of Bouches-du-Rhône, is on a bay of the Mediterranean 14 miles S. E. of Marseilles. It is well built, and has a good harbor, with an active trade in wine, fruits, and olive oil. Pop. 10,017.

Ci'pher [Fr. *chiffre;* Arabic, *kifr,* "empty"], the symbol 0 in numerical notation, which is sometimes called "naught," and has no intrinsic value, but serves to determine the local value of the other digits or figures by which it may be accompanied in the expression of a number.

Cipher, or **Mon'ogram,** an intertexture of letters, as the initials of a name; an arrangement of the initial letters of a person's name, used as a private mark by artists and others. The term is also applied to certain characters or arbitrary signs used in writing despatches, etc. in cases where secresy is desirable. (See CRYPTOGRAPHY.)

Circæ'a, a genus of herbaceous plants of the order Onagraceæ, having a corolla of two petals and two stamens. The *Circæa Lutetiana* (enchanter's nightshade) is a native of Europe and the U. S., growing in damp woods. It bears small whitish flowers in racemes.

Circars, Northern, an extensive maritime province of British India, in the presidency of Madras, with 470 miles of sea-coast. The surface is diverse. The principal rivers are the Godavery and Kishna. The soil is fertile, yielding cotton, grain, and tobacco. Area, 23,760 square miles. Pop. estimated at 3,000,000.

Circas'sia, a region in the Western Caucasus belonging to Russia, and extending from lat. 42° 30′ to 45° 40′ N., and from lon. 37° to 46° E. The soil is fertile, and the climate cool and healthful. The forests are of luxuriant growth. Coal and iron abound. Area, about 33,000 square miles.

The name Circassians is often applied to the people of the neighboring parts of the Caucasus, but the Circassians proper inhabit only the north-western part of the Caucasus, with the exclusion of Abkasia, or the portion between the Black Sea in the W. and the lower bank of the river Kuban in the N. They number from 500,000 to 600,000, and are divided into fifteen tribes or clans. The language of the Circassians, like the other tongues spoken in the Caucasus, is difficult to learn, and its philological relations, and the ethnological relations of these peoples, are very difficult questions. The Circassians are a warlike people, among whom it is held more honorable to live by plunder than by industry. They cherish the most unrestrained love of independence. There are five distinct ranks—viz. chiefs, nobles, freemen, dependants, and slaves. The class of freemen makes up the great mass; they possess property and enjoy the same political rights as the nobles. The fourth class, the dependants, are the vassals of the princes and nobles. The fifth class comprises the slaves, or those who have been made captive in war. The princes and nobles are principally Mohammedans, while the great mass of the people have a religion which is a mixture of Christianity and paganism. The Circassians are ignorant. Besides agriculture and the rearing of cattle, they possess few other branches of industry, and are given to wild and lawless pursuits. The Circassians are handsome, strong, active, and temperate, and are characterized by self-dependence, courage, and prudence. They are chiefly known through their struggles to maintain their independence against Russia, and for their custom of selling their daughters to the Turks and Persians.

Cir'ce [Gr. Κίρκη], a sorceress of classic mythology, celebrated for her skill in magic arts, was a sister of Pasiphaë. According to Homer, she was a daughter of the Sun, and lived on the island of Ææa, where she transformed many men into swine and other beasts by her drugs and incantations. Ulysses passed a year with her. (See the "Odyssey," book x.)

Circensian Games. See CIRCUS.

Cir'cle [from the Lat. *circulus,* a diminutive of *circus,* a "ring"], in geometry, is a plane figure bounded by a curved line which is everywhere equally distant from a point within called the centre. The curved line which bounds the circle is called the circumference. The distance from the centre to the circumference is called the radius, and any two radii which together form a straight line constitute the diameter.

In the mechanic arts the ratio of the diameter to the circumference is assumed to be as 7 to 22, which is exact enough for practical operations, though the real ratio can never be perfectly expressed. In ordinary mathematical work it is assumed to be as 1 to 3.1416, which is very slightly too large. Mr. William Shanks, a British mathematician, has carried out the decimal to 607 places. The diameter and circumference are in fact incommensurable, and it is conclusively demonstrated that the famous problem of "squaring the circle" can never be solved.

The circle is one of the conic sections, it being exhibited by cutting a right cone in a plane parallel to its base. It is often referred to the second order of curves, and regarded as an ellipse, whose foci coincide with each other.

In astronomy, the term "great circle" is applied to those circles which divide the celestial sphere into two equal parts, as the equator and the MERIDIAN (which see).

SIX-POINTS CIRCLE, the circle which passes through the middle points of the sides of a triangle. It passes also through the feet of the three perpendiculars let fall from the angles upon the opposite sides, and possesses many remarkable properties. The same circle is referred to by some European writers as the *nine-points circle,* since, besides the six points already named, the middle points of the three lines joining the corners of the triangle to the intersection of the three perpendiculars also lie in its circumference. Feuerbach, Brianchon, and many others have investigated the properties of this circle. The first of these geometers discovered that it touched the inscribed as well as the three exscribed circles of the triangle.

Circle, Mural. See MURAL CIRCLE.

Circle of Perpetual Apparition, a lesser circle of the celestial sphere, is parallel to the equator, and increases with the latitude of the place where the observer is stationed. All stars included in it are always above the horizon. These are called circumpolar stars.

Cir'cleville, a city, the capital of Pickaway co., O., is on the Scioto River, the Ohio Canal, and the Cincinnati and Muskingum Valley R. R., 104 miles E. N. E. of Cincinnati and 25 miles S. of Columbus. It occupies the site of highly interesting ancient works, consisting of a circle and square, perfect in form, fully described in Howe's "History of Ohio." It has 14 churches, 2 national banks, 1 private bank, 7 building-and-loan associations, 2 large pork-packing establishments, a number of mills and factories, and 3 weekly newspapers. The lands in the vicinity of Circleville are largely devoted to broom-corn culture, thus making it a leading market for that article. The celebrated speech of Logan the Indian chief was made 4 miles S. of Circleville. Camp Charlotte, where Lord Dunmore encamped in 1774, and made a treaty of peace with Indians, is 7 miles S. E. of Circleville. Pop. 5407; of Circleville township, 515.

ALFRED WILLIAMS, ED. "HERALD AND UNION."

Circleville, a township and village of Pendleton co., West Va., 130 miles S. E. of Wheeling. Pop. 1108.

Cir'cuit [Lat. *circuitus,* from *circum,* "around," and *eo, itum,* to "go"], a name given in England, Wales, and Ireland to certain divisions of the country made for judicial purposes. These circuits are visited by judges at appointed times for holding courts. The judges were anciently called justices in eyre (from the Lat. *eo, ire,* to "go").

Circuit Court, the name of the courts of the U. S. next inferior to the supreme judicial court. The U. S. are divided into circuits, and in each circuit one of these courts is held. The presiding judge is either the chief-justice of the U. S., one of his associates, a special circuit justice, or, in some instances, a district judge. The circuit court has jurisdiction, direct or appellate, both in law and equity. It also hears appeals from a court of admiralty in certain cases. Criminal cases may also in some circumstances come before it. Several States of the Union have circuit courts. (See COURTS, by GEORGE CHASE, LL.B.)

Cir'cular [Lat. *circularis;* Fr. *circulaire*], round, like a circle, circumscribed by a circle; ending in itself, as a parologism in which the second proposition proves the first, and is proved by it. "Circular sailing" is the

method of sailing by the arc of a great circle. As a noun, circular sometimes signifies a document addressed to a circle of persons or to a number of persons having a common interest, as a circular letter.

Cir′cular Func′tions, a term which, as generally employed, is synonymous with trigonometrical functions.

Circular Notes. See LETTERS OF CREDIT.

Cir′cular Numbers are numbers whose powers end on the same figure as they do themselves; such are numbers ending in 0, 1, 5, 6.

Cir′cular Parts, in spherical trigonometry, the name given to two rules invented by Lord Napier, and demonstrated in his "Mirifici Logarithmorum Canonis Descriptio" (see also TODHUNTER'S "Spherical Trigonometry"), for obtaining the formulæ relative to a right-angled spherical triangle.

Circular Points at Infinity, the two imaginary points in which any circle intersects the infinitely distant right line in its plane.

Cir′culating (or **Recur′ring**) **Deç′imal,** a decimal in which certain digits are continually repeated. Thus, .15723723 ...., *ad infinitum,* is a circulating decimal of which the figures 723 constitute the *recurring period,* called also the *repetend.*

Circulating Library. See LIBRARIES, by A. R. SPOFFORD, Esq., Librarian of Congress.

Circula′tion of the Blood. In all animals, even the simplest and lowest, there is a movement, more or less regular, of blood, or of a fluid equivalent to it, furnishing material for the formation and repair of the body. Sponges, while living, have no closed *internal* circulation, but their nutrition and aëration are sustained by the incessant flow of the water in which they exist through their numerous pores. Other Protozoa (as the lowest group of animals is designated), as Rhizopoda, have, within their soft, jelly-like substance, cavities (vesicles) which alternately contract and dilate, serving the purpose of aëration of their bodies, with redistribution of their material. Animals a grade higher, as the Actinia (sea-anemone), have a free communication between the stomach and the general cavity of the body, from which, through fine ramifications to certain parts, the nutritious fluid is circulated, though never separated as true blood. In worms no distinct circulation of blood has been proven to exist. Cavities (*lacunæ*) there are, and in some, as the leech, vessels called *pseudo-hæmal* vessels, ramifying through the body and containing a fluid, generally red, but these always have a tubular communication with the exterior. In insects there is a dorsal segmented vessel, with valves between the segments, which conveys the blood forward by its rhythmical contractions. The blood, which is often colored, and contains corpuscles (though never colored, as in vertebrates, by the corpuscles), then flows into lacunæ, or spaces through the body, coming in contact with the air introduced by the tracheal tubes. Crustaceans, as the lobster, have a muscular heart, with six arterial branches, going to the head, stomach, liver, and posterior parts. Thence the blood passes through a number of lacunæ, and returns by a number of veins, which expose it, in the *gills,* to the air before reconveying it to the heart. Thus the heart of the crustacean is *systemic,* not respiratory, in its mode of distribution of the blood. The oyster has a heart, not far from the muscle which closes its shell; its vascular system, however, is incompletely closed. In the cuttle-fish there is a strong systemic heart, with valves; it sends blood to all the organs except the gills. The blood returns into a contractile venous enlargement (*sinus*), which conveys it to the gills through from two to four branches or veins. Other sinuses then receive it, and these, being contractile, send it back to the heart. All invertebrates (animals without an internal skeleton) have, if any, a *systemic* heart, and none of them have *colored* corpuscles in their blood.

Vertebrated animals always (except the anomalous *Amphioxus*) have blood containing both red and colorless corpuscles, the former of which give to it its color. In fishes the heart is branchial or respiratory. Consisting of an auricle and a ventricle, it receives venous blood from the body, and propels it, by four or five arched vessels, through the gills, whence it circulates, to be returned by veins to the auricle. In the eel, torpedo, and one or two other fishes, contractile venous sinuses assist this return.

In fishes generally it is supposed that the impulse of the heart suffices for the whole round of the circulation. More probably, however, this is supplemented by arterial, if not venous, propulsion, and by a power acting in the (intermediate) capillary region. All vertebrated animals have a closed circulatory system, consisting of a heart, arteries, capillaries, and veins. In all vertebrates there is, also, a portal system, composed of veins going from the digestive, and sometimes other, organs to the liver—in fishes to the kidney also—whence veins again convey the blood to the heart.

Reptiles and amphibia have a heart with three cavities—two auricles and one ventricle. Of the auricles, one receives blood from the lungs (except in the early stage of life of the frog, and some other amphibia; and from the lungs and gills *both* in the perennibranchiate amphibia, as Proteus); and the other receives the blood from the body generally. These two kinds of blood (aërated, or arterial, and non-aërated, or venous) mingle in the single ventricle, whence they are redistributed to the lungs and all over the body by arteries. In the crocodile, however, a partition almost separates the two halves of the ventricle, thus approaching the arrangement in the higher animals.

Birds have four cavities—two auricles and two ventricles—making a completely double heart, always situated in the middle of the thorax or chest. One auricle receives the blood by large veins coming from the body generally. This auricle passes the blood into its connected ventricle, which sends it, by pulmonary arteries, to the lungs. Thence it returns, by pulmonary veins, to the other auricle, and this conveys it into its attached ventricle. That cavity then propels it through the aorta, or main arterial trunk, for general distribution over the body. In birds the portal venous system mainly connects the liver with the digestive organs; but a few of its veins communicate with the kidneys, posterior internal organs, and lower extremities.

All mammals (viviparous vertebrated animals which suckle their young) have a double heart, consisting of two auricles and two ventricles—a respiratory and a systemic heart conjoined. In man, for instance, the right auricle and ventricle constitute the respiratory or pulmonary heart—the left, the systemic; and after birth, although closely adherent together, no direct communication exists between them. In the dugong the two ventricles are partly separated by a deep notch. In the ox and many other ruminants a bony deposit strengthens the inter-ventricular wall. Only in man and some of the anthropoid (man-like) apes does the heart incline to the left side; in other animals it is usually median. This promotes the symmetry which is so especially important in swift-running animals, as the hound and deer, and in birds for flight.

The arrangement of the branches of the aorta differs in the several classes of vertebrated animals. Fishes have four or five aortic arches, going to the gills. The lower reptiles have three aortic arches on each side; the higher reptiles, one on each side, descending over the roots of the two lungs to form together the abdominal aorta. Birds have only one—the right aortic arch, passing over the root of the right lung. In mammals, including man, there is only a single aortic arch, over the root of the left lung; this, giving off branches above, becomes in its descent the abdominal aorta. The manner of origin of the ascending branches (subclavian and carotid) of the aorta differs also, even among the Mammalia. In man it is least symmetrical; two arterial trunks passing upward from the aorta on the left side (left carotid and subclavian), while there is one (*arteria innominata*) only on the right, soon subdividing into two. The horse and ruminants have but a single aortic principal branch, which gives off all four of the carotid and subclavian arteries. The portal circulation in mammals is never connected with the kidneys.

A *rete mirabile* is a network of closely interjoining (anastomosing) arteries, which finally unite into a single trunk. Whales and other Cetacea (aquatic, fish-like mammals) have *retia mirabilia* connected with their intercostal arteries within the chest, evidently serving the purpose of reservoirs to retain and distribute aërated blood while the animal is submerged for a long time. There are also in the same animals venous plexuses or *retia,* for the detention, under like circumstances, of impure, non-aërated blood. Protective arrangements of the arteries exist in certain special instances, as the passage through the pelvic bones of the main artery of the hind part of the tail in the whale; of the great artery of the anterior extremity through the humerus or arm-bone of the lion; and of the corresponding artery through the coffin-bone (hoof-bone) of the horse. In all these cases vigorous action of the muscles in locomotion or prehension might unduly obstruct, at times, the flow of arterial blood but for such a provision, by which muscular or tendinous pressure upon the artery is prevented by its enclosure within bony walls.

The circulation of the blood in man corresponds altogether (except in the unsymmetrical location of the heart and of some of the arterial trunks) with the mammalian type above described. In connection with the human circulation, however, some additional particulars may be here given.

Action of the Heart. (For anatomy, see HEART; also ARTERY, CAPILLARY, and VEIN.)—Being composed of spirally-arranged muscular fibres, the heart, by its rhythmical

contractions and relaxations, empties itself and becomes filled with blood alternately, in an adult man or woman, between sixty-five and seventy-five times a minute while at rest in health. From the right ventricle the venous blood (poured into it from the right auricle, which receives it from the great *venæ cavæ*) is sent through the pulmonary artery and its branches to the capillaries which ramify minutely throughout the lungs. These combine to form small veins whose union into larger trunks finally constitutes the four pulmonary veins, which empty the (now aërated or arterialized) blood into the left auricle. This conveys it into the left ventricle, whence it is impelled through the aorta, by the branches of which it becomes distributed all over the body in capillary networks, to return to the heart by means of the veins; all of which empty at last into the ascending and descending *venæ cavæ*.

For the maintenance of this round of the circulation the *valves* of the heart are indispensable. Membranous and muscular valves (tricuspid and mitral) intervene between each auricle and its corresponding ventricle. Pocket-like (three-folded, semilunar) valves also exist at the mouths of the two great arteries which convey blood from the heart; namely, the pulmonary artery from the right ventricle, and the aorta from the left ventricle. When the auricles are contracting, the (tricuspid and mitral) valves between them and the ventricles are open, allowing the blood to flow through. The auricles being emptied and the ventricles filled, the latter then contract, and at the same time, and in the same act, close the auriculo-ventricular valves; so that the blood is forced onward through the two arteries above named (pulmonary artery and aorta). While the ventricles are contracting (this being called the *systole*), the heart is spirally twisted, elongated,* and thrust slightly forward against the space between the fifth and sixth ribs, below the left nipple. This quite perceptible movement is the impulse of the heart. No power other than that of elasticity has been proved to exist in the dilatation (*diastole*) of the cavities of the heart. The immediate cause of the systolic contraction is most probably the contractility resident in the heart's muscular tissue, acting under the stimulus of aërated (oxygenated) blood. It is also placed under the modifying influence of the nervous apparatus or system, having minute ganglia upon its surface, and being connected with the brain and spinal cord by branches of the pneumogastric nerve. Why the action of the heart should be so regularly rhythmical is not known. But as it has been shown (by Bowman and Marey) that *all* muscular action is alternating or vibratory in its character, it is possible that the spiral arrangement of the heart's fibres may have to do with the peculiar manner of the heart's contraction. With some (especially cold-blooded) animals the heart has been found to contract for some minutes, or even hours, after its removal from the body, and sometimes when quite emptied of blood.

Of the *sounds* of the heart, audible when the ear is placed over it against the chest, the first (longest and loudest) is explained principally by the closing, with vibration, of the auriculo-ventricular walls during the systole of the ventricles. Other minor causes are the impulse of the heart, the rush of blood into the great arteries, and the friction of the heart's muscular fibres amongst themselves. The second sound has been shown experimentally to be caused by the flapping together, *after* the systole, of the pocket-like (semilunar) valves at the mouths of the aorta and pulmonary artery.

Arterial Circulation.—Since the arteries contain, in their middle coat, a portion of (smooth, pale, involuntary) muscular as well as elastic tissue, this must have an important influence upon the blood-movement. The fact that the relative amount of muscular tissue is greatest in the smallest arteries, which are farthest from the heart, suggests their adaptation to the purpose of supplementing the action of the heart in propelling the blood through the capillaries. The same idea is reasonably connected with the observation that after death the arteries are always found to have emptied themselves, by their last contraction, into the veins. It is also supported by the apparent need of such an arterial power to complete the circulation commenced by the merely branchial (not systemic) heart in fishes, and by the fact that in acephalous (born without a head) children the heart is found to be absent, so that the circulation in them must have been arterial and capillary only; as well as by the proof that during early embryonic life every human being is likewise without a heart, the blood-movement then depending on the blood-vessels alone. Notwithstanding these and many other obvious reasons in favor of such a view (which was accepted by the distinguished John Hunter and Sir Charles Bell), the more common opinion among physiologists has been, for many years, that the office of the muscularity of the arteries is of a "stop-cock" or "flood-gate" nature, opposing a graduated resistance to the impulse given to the flow of blood by the heart. Lately, however, careful experiments by Legros and Onimus ("Journal de l'Anatomie et de la Physiologie," 1868–70) have given new confirmation to the former opinion, in favor of a truly active part taken by the arteries in the circulation. Certainly, in some way these vessels have to do with the regulation of the changing supply or determination of blood to various parts of the body at different times. This variation we see in blushing; in the erectile tissues and organs; in the effect of friction or mustard, etc. upon the skin; in the increased flow of blood to the jaws during the time of dentition in infants, to the ovaries during ovulation, the uterus in gestation, the male reproductive organs of some animals at certain periods, and the antlers of the deer during their annual new growth. In all these variations the vaso-motor nerves (belonging to the ganglionic system) must have an important influence.

Capillaries.—Having but a single elastic coat, without muscularity, these very (microscopically) minute vessels simply adapt themselves to the blood that passes through them. Yet besides the transudation of the lymph or plasma of the blood *from* them for the nutrition of the tissues, and the absorption *into* them of waste materials, a force is probably added to the forward movement of the blood in the capillary region. Prof. Draper of New York has pointed out that this may occur in two ways, both of which are common to animals and plants. One is capillary attraction—*i. e.* the attraction of fine tubes for liquids in which they are immersed, such as is observed in inanimate (metallic or glass) tubes or porous bodies, as well as in living plants and animals. The other is the "vital affinity," or attraction of nutrition, exercised by the tissues towards materials present in the blood, and withdrawing them constantly from the current, thus making room, by diminution of resistance, for its onward flow. The volume of the capillary system in man is about 300 times that of the arteries.

Venous Circulation.—On account of the distance traversed by the blood (passing as it does through the capillary ramifications) before it reaches the veins, and their greater aggregate volume (three times that of the arterial system), as well as the obtuseness of the angles made generally by their branches with the main trunks, the flow of the blood is much slower through the veins than through the arteries. Veins have, as the arteries have not, valves along their course, opening only towards the heart. By these the propulsive power is economized, and on account of their influence also, the effect of muscular pressure, during exercise, upon the veins, always favors the blood-movement towards the heart. Inspiration, by lessening the pressure upon the auricles and *venæ cavæ* during the expansion of the chest, tends to promote the return of venous blood to the heart. Forced expiration has an effect the reverse of this, but by increase of pressure upon the heart it favors the expulsion of the blood through the arteries.

The velocity of the movement of the blood through the arteries averages from twelve to twenty feet in a second; in the capillaries, about two inches in a minute; in the veins, from six to twelve feet in a second. Experiments prove that the whole round of the circulation is accomplished in a little less than half a minute during rest and health.

The discovery of the circulation of the blood, as now understood, was made by Dr. William Harvey in 1619, first published by him, however, in 1628. He was *partially* anticipated by Servetus, Realdus Columbus, and Cæsalpinus; almost entirely so by Paolo Sarpi, whose claim in this respect has been generally overlooked. The discovery was completed by the demonstration (with the aid of the microscope) of the blood-corpuscles and the capillaries, between 1658 and 1687, by Swammerdam, Malpighi, and Leeuwenhoek. (See, on the circulation, CARPENTER'S, MARSHALL'S, or DALTON'S "Treatises on Physiology;" "Essay on the Circulation of the Blood," by CHARLES BELL, London, 1819; "Physiologie Médicale de la Circulation du Sang," par E. J. MAREY, Paris, 1863; LEGROS and ONIMUS, "Experimental Observations" in the "Journal de l'Anatomie et de la Physiologie," 1868–70; and "Essays upon the Arterial Circulation and Vaso-motor Physiology," by H. HARTSHORNE, in "Transactions of the American Medical Association," 1856 and 1872.) HENRY HARTSHORNE.

Circulation of Sap in plants is its ascent from the roots to the leaves and other green parts, and its partial descent after elaboration in these organs. The sap drawn from the ground by the roots (see ENDOSMOSE) ascends in exogenous plants especially through the alburnum. The descent takes place chiefly through the liber or inner bark. It appears that on its return to the root a small portion is excreted, and that the greater part ascends again, readapted to the use of the plant. Much of the water which is taken

*This was proved by the late Dr. Pennock of Philadelphia, many years ago, by many elaborate experiments, although not yet admitted by all writers on physiology.

up by the roots is thrown off by the bark and leaves. The sap is also laterally diffused through the cellular tissue of plants. Physiologists dislike the term *circulation* applied to sap, as suggesting a closer analogy than really exists to the circulation of blood in animals, since sap does not flow freely through vessels, but exists in closed cells, passing from cell to cell through the cell-walls, being impelled by osmotic action. (See CYCLOSIS and LEAF.)

Cir'cum, a Latin preposition signifying "round" or "about," and forming the prefix to many compound words.

Circumcis'ion [Lat. *circumcisio,* from *circum,* "around," and *cædo, cæsum,* to "cut"], the cutting off of the prepuce, a religious or sanitary practice in many ancient and modern nations. The prevalent idea has been that it originated with Abraham, who circumcised himself and his household, and transmitted the custom to his descendants. But circumcision was common in Egypt as early as the fourth dynasty of kings, and probably earlier, long before the birth of Abraham, 1996 B.C. At the present day it prevails from China to the Cape of Good Hope and in parts of Australia and in many of the South Sea Islands, and early Spanish travellers found it to be prevalent in the West Indies and in Mexico. It has been long practised by tribes in South America. Whether Abraham obtained his knowledge of circumcision from the Egyptians we cannot determine. The Philistines and some of the Canaanites were not circumcised; and the institution in the family of Abraham was sufficient to mark off that family from the surrounding nations. In the case of Abraham's descendants the rite acquired a religious significance as the token of the covenant between God and his people. Saint Paul looked upon circumcision as symbolical of the spiritual change of heart.

The Jews are accustomed to circumcise their children on the eighth day after birth; the Arabians, in the thirteenth year, in remembrance of their ancestor Ishmael. The Copts and Abyssinians are perhaps the only people professing Christianity among whom circumcision is practised, though it is probable that some Christians of the Caucasus have adopted it from their Mohammedan neighbors. The circumcision of females, or what is equivalent, is not unknown among various African and Arabian tribes.

Circum'ference [from the Lat. *circum,* "round," and *fero,* to "carry"], a curved line which encloses a plane figure, and is synonymous with periphery. It is applied especially to the curved line which encloses a circle, and bears a certain constant ratio to its diameter. (See CIRCLE.) The term perimeter is used to designate the whole bounding lines of a plane figure enclosed by several straight lines, as a square or polygon.

Cir'cumflex [from the Lat. *circum,* "about," and *flecto, flexum,* "to bend;" literally, "bent about" or "over"], in grammar, a character or accent originally denoting a rise and fall of the voice on the same long syllable, marked in Greek ~ or ^, and in Latin ^.

Cir'cumnaviga'tion [from the Lat. *circum,* "around," and *navigo, navigatum,* to "sail"] means, literally, a sailing round, and is usually applied to the act of sailing round the globe. This was formerly considered a great achievement. The first person who circumnavigated the earth was Magellan, in 1519. Sir Francis Drake sailed round the globe in 1577. Among the other celebrated navigators who performed this voyage was Captain James Cook, in 1768–79.

Cir'cumpo'lar [from the Lat. *circum,* "around," and *polus,* the "pole"] **Stars,** stars which revolve within the circle of perpetual apparition, and appear to move around the pole, and complete their diurnal circles without setting. The number of stars so circumstanced increases with the latitude of the place, or, in other words, with the elevation of the pole above the horizon of the observer.

Circumstantial Evidence. See EVIDENCE, by PROF. T. W. DWIGHT, LL.D.

Circumvalla'tion [from the Lat. *circum,* "about," and *vallum,* a "rampart"]. In fortification, an intrenchment or series of defensive works erected by a besieging army, facing outward from the place invested or besieged, is called a line of circumvallation. It is designed to defend the besieging army against an attack from a hostile army operating in the rear. It usually consists of a chain of redoubts, either isolated or connected by a parapet.

Cir'cus (plu. **Cir'ci**), [originally, a "circle" or "circular space"]. The circus of ancient Rome was a large structure without a roof, for chariot and horse races, and for the exhibition of athletic exercises and conflicts of wild beasts. It appears that it was originally of a circular or oval form, whence the name. The Circensian games, according to tradition, originated in the time of Romulus, when they were dedicated to the deity Consus, and called *Consualia.* The rape of the Sabines occurred at the Circensian games. After the war in which Tarquinius Priscus captured Apiolæ, his victory was celebrated by games. A space was marked out for a circus, and the senators and knights erected scaffoldings round it for themselves. The games thenceforth were held annually, and a permanent edifice was afterwards constructed. This was distinguished as the Circus Maximus. It was enlarged at various times. In the time of Julius Cæsar it was 1875 feet long and 625 feet wide; the depth of the buildings surrounding the space was about 312 feet. Its dimensions were subsequently much greater. All the circi in Rome, of which there were a considerable number, are nearly obliterated, but a circus on the Appian Way, about two miles from Rome, known as the Circus of Maxentius, is still in a state of preservation. Its construction is believed to have differed very little from that of other ancient buildings for similar purposes. Along the sides and at the end were ranges of stone seats for the spectators. At the other end were the *carceres* or stalls, covered and furnished with gates, and in which the horses and chariots remained until on a given signal the gates were thrown open. In the centre was the *spina,* a long and broad wall round which the chariots drove, terminating at both ends in *metæ,* or goals. The games were inaugurated by a procession from the Capitol, in which persons bearing the images of the gods went first, and were followed by the performers in the games, the consuls, and others. The circus was particularly designed for races, an amusement of which the Romans were passionately fond. In consequence of the popular enthusiasm, the victor received substantial pecuniary rewards. A pitched battle was sometimes represented. By the formation of canals and the introduction of vessels a sea-fight was occasionally exhibited, but under the empire this was transferred to the amphitheatre. In providing for the killing of wild beasts vast sums of money were expended. Animals were procured from every part of the Roman empire. The exhibition attained a political importance which none who aspired to popularity ventured to overlook. Pompey is said to have given public exhibitions in the circus for five days, during which 500 lions and twenty elephants were destroyed. The principal Circensian games were held annually in September, and lasted five days.

Cirencester (pron. sis'eter), (anc. *Corinium*), a town of England, in Gloucestershire, on the river Churn, and on a branch of the Great Western Railway, 89 miles by rail W. N. W. from London. It has an agricultural college, several hospitals, and manufactures of carpets, woollen cloths, and cutlery. Canute held a council here in 1020. Cirencester partly occupies the site of *Corinium,* an ancient Roman town two miles in circuit. Pop. in 1871, 7681.

Ciril'lo (DOMENICO), M. D., F. R. S., a meritorious Italian savant and patriot, was born at Grugno in 1734. He practised medicine in Naples, and published, besides other works, "Fundamenta Botanica" (1771), which is an able treatise on botanical philosophy, and a "Flora of the Kingdom of Naples" (1788–93). In 1799 he was chosen a member of the legislature of the Parthenopean Republic. He was put to death by the royalists in the same year.

Cirrhopoda, an incorrect form of CIRRIPEDIA (which see).

Cirripe'dia (plu.), or **Cir'ripeds** [from the Lat. *cirrus,* a "curl," and *pes* (gen. *pedis*), a "foot"], a name applied to certain animals which were for a long time considered as an order of mollusks. More recently, however, they have been shown to belong to the Articulata (Arthropoda), either as a distinct class, a sub-class of Crustacea, or as a group of ostracoid entomostracans. Barnacles are familiar examples of cirripeds, but quite a number of species are now known, all marine, and all in their mature state attached to objects of various kinds, as rocks, seaweeds, shells, etc. Some are found in the skin of whales, some in the flesh of sharks. They are distributed over the world; the species, however, are not very numerous. They are divided into pedunculated and sessile, those of the former family supported on a flexile stalk, which is wanting in the latter. Barnacles (Lepadidæ) are pedunculated cirripedia, and Balani (acorn-shells, sessile barnacles) are without a stalk.

The likeness of these animals to mollusks is chiefly external. The gills, when these exist, occupy the same relative position as in crustaceans, but the aëration of the blood is also effected in the *cirri,* as the limbs are called, of which there are six pairs on each side, each composed of many joints and fringed with stiff hairs. The *cirri* nearest the mouth are short and form a sort of net for the capture of minute animals, being incessantly thrown out from a lateral opening, and drawn in again in such a manner as to convey to the mouth any prey which they may have caught. Almost all are hermaphrodite, but in a

few genera the sexes are distinct, the mæles being not only very small in comparison with the females, and more short-lived, but, in their mature state, parasitic on the females, or attached to them; while in some appear complemental males attached to hermaphrodites. The young swim freely in the water, and are furnished with eyes, which disappear after they have permanently fixed themselves. They have also shells different from those of their mature state. The shelly coverings of the cirripedia are all formed according to a certain type, but they differ extremely in the number of pieces of which they consist, some having only five valves, and others have more than 100 additional pieces. They are from half an inch to several inches in length.

Cir'rus (plu. **Cirri**), a Latin word signifying a "lock of curled hair," is used in botany to denote a tendril, a spiral and filiform appendage of climbing plants. It twines around such objects as occur in the vicinity, and thus obtains support for the stem, which is too weak to support itself in an erect position. The cirrus is a modified leaf, or in some cases is an elongation of the midrib of a pinnate leaf.

The term *cirrus* is also applied to a thin fleecy cloud floating in the sky at a great elevation, and called mare's tail, or curl-cloud.

Cis, a Latin preposition meaning "on this side," is often prefixed to the names of rivers or mountains to form adjectives; as Cisalpine, "on this side of the Alps;" Cispadane, "on this side of the Po." These terms are used with reference to Rome.

Cisal'pine Republic, a former state in the north of Italy, founded by the French in 1797, comprised Lombardy, Rovigo, the duchy of Módena, the Venetian territory S. and W. of the Adige, the Valtelline, and the legations of Bologna, Ferrara, and the Romagna. Area, about 16,000 square miles, with a population of 3,500,000. Milan was the capital. An intimate connection was formed in 1798 between this republic and France by a treaty of alliance offensive and defensive. In 1802 it took the name of the Italian Republic, and chose Napoleon as its president. It was transformed into the kingdom of Italy in 1805, and continued to be subject to Napoleon until 1814.

Ciscauca'sia, one of the two divisions of Caucasia. Area, 86,030 square miles. It contains the government of Stavropol and territories of Kuban and Ter. Pop. 1,418,698.

Cisleitha'nia, since 1867 the usual, though not official, collective name of that part of the Austro-Hungarian monarchy which is situated this side (as viewed from Vienna) of the river Leitha. It embraces all the German crownlands, Istria, Dalmatia, Galicia, and the Bukovina; in general, all the provinces not appertaining to the Hungarian crown. (See TRANSLEITHANIA.)

Cis'padane Repub'lic, a former state of Italy, was organized by the French after the battle of Lodi in 1796. It was bounded on the N. by the river Po (anc. *Padus*), and comprised Módena, Reggia, Bologna, and Ferrara. In 1797 it was merged in the Cisalpine Republic.

Cis'platine Repub'lic, for some time (from Oct., 1828, to July, 1831) the name of the republic of Uruguay. Previously this republic had been, under the name of Cisplatine Province, a part of Brazil.

Cis'rhenane Repub'lic, a name selected for the projected confederation of the German towns situated west of the Rhine in 1797. The project was not carried into execution, because the peace of Campo Formio transferred the entire left bank of the Rhine to France.

Cissam'pelos [Gr. *κισσάμπελος*, the name of a kind of vine, from *κισσός*, "ivy," and *ἄμπελος*, a "vine"], a genus of plants of the order Menispermaceæ, of which some possess valuable medicinal properties, particularly *Cissampelos Pareira*, a native of the warm parts of America, the root of which is known by the name of PAREIRA BRAVA (which see).

Cissey, de (ERNEST LOUIS OCTAVE), a French general, born in Paris in 1810. He became general of division in 1859, and was taken prisoner by the Germans at Metz in 1870. He served against the Commune in the siege of Paris in March and April, 1871, and was appointed minister of war in June, 1871.

Cis'soid of Di'ocles [Gr. *κισσώδης*, "ivy-like," from *κισσός*, "ivy"], a curve invented by the Alexandrian mathematician Diocles, with a view to the solution of the problem of the duplication of the cube, or the insertion of two mean proportionals between two given straight lines. It may be regarded as the pedal of a parabola with respect to the vertex; in other words, it is the locus of the vertex of a parabola which rolls upon an equal parabola, so that corresponding points of the curves always coincide with their point of contact; it is also the inverse of a parabola with respect to its vertex. Its equation is $(a-x)y^2=x^3$.

Cista'ceæ [from *Cistus*, one of the genera], a natural order of exogenous plants, herbs, or shrubs, mostly natives of Southern Europe and Northern Africa. Several are natives of the U. S. They have regular flowers, hypogynous and mostly indefinite stamens, and an inverted embryo in mealy albumen. Many of the species are prized for the beauty of their flowers. The *Cistus creticus* and a few others yield the resinous balsamic substance called gum labdanum.

Cister'cians [from *Cistercium*, now *Citeaux*, their first abbey], or **Bernardines,** an order of Benedictine monks and nuns which was founded in 1098. Through the influence chiefly of Saint Bernard of Clairvaux, who became a monk of Citeaux in 1113, the order in little more than a century after its foundation had more than 1800 abbeys. The Cistercians were distinguished from the order of Clugny by their severe rule and strict poverty; by being submissive to the bishops; by not meddling with the cure of souls; by their dress and by their peculiar government. Among the fraternities of Cistercians were the nuns of Port Royal, the Recollets, and the Trappists. Among the English abbeys were Woburn, Tintern, and Rievaulx; among the Scottish, Melrose, Glenluce, Balmerino, and New Abbey. Riches and indolence brought this order into decay. Before the Reformation many of its convents had ceased to exist. In 1872 only a small number of convents were in existence, chiefly in France and Austria.

Cis'tern [Lat. *cisterna*, from *cista*, a "box" or "chest"], a tank constructed for holding water. Where the supply of water is uncertain, or where rain-water is used, every house requires a cistern. Cisterns are variously constructed—of iron, or wood lined with lead, zinc, cement, or of slate, in which case, the sides and bottom are grooved, and cemented to prevent leakage; large cisterns are generally made cylindrical, so that the pressure acts at all points equally from the centre. Some are simply excavated in the earth and plastered with hydraulic cement.

Cis'tus, or **Rock Rose,** a genus of plants, the type of the order Cistaceæ, comprises several species which are natives of the Levant and Southern Europe, and are cultivated for the beauty of their flowers. (See CISTACEÆ.) The cistus of the English poets is the rock-cist (*Helianthemum*), a genus of which there are four British and several American species.

Cit'adel [It. *citadella*, dimin. of *città*, a "city," a "little city," because in ancient times, though but a small portion of the city, it was the most essential part of all, and in fact represented the whole], a fort of four or five bastions in or near a town, or a strong fort constructed within fortifications. It is designed partly to enable the garrison to keep the inhabitants of the town in subjection; and in case of a siege it serves as a place of retreat for the garrison, and enables it to hold out after the town has been captured.

Citadel (post-office name **New Memphis**), a post-village of Douglas co., Col., on the Denver and Rio Grande R. R., 30 miles S. of Denver, near Castle Rock, a remarkable mass of sandstone. The "Independence Colony" is settled here.

Cita'tion, in law. 1. This term is principally used in connection with an ecclesiastical court, to indicate the act of summoning persons to appear before it. A citation gives the court jurisdiction over the parties cited or summoned. The surrogates' or probate courts in the U. S. have a jurisdiction corresponding in part with the English ecclesiastical courts, and resort to a citation unless some other method is supplied by statute. The citation is prospectively abrogated in England by an act of Parliament taking effect Nov. 2, 1874. After that time proceedings in all the higher courts will be commenced by a uniform method—the summons.

2. "Citation" is also employed to mean a reference to precedents or authorities in support of a law argument. These are commonly indicated by well-known abbreviations, to be found in such works as Bouvier's "Law Dictionary," 12th and later editions.

Citeaux, formerly **Cisteaux** (anc. *Cistercium*), a hamlet of France, in Côte-de'Or, about 10 miles S. S. E. of Dijon. Here was a celebrated monastery of the Cistercian order founded in 1098. Remains of the magnificent buildings of this monastery are still visible.

Cithæ'ron [Gr. *Κιθαιρών*], **Mount,** now **Elatea,** a famous mountain-range of Greece, on the boundary between Attica and Bœotia, was covered with forests. The highest summit rises 4620 feet above the level of the sea. It is often mentioned by ancient classical poets.

Cith'ara [Gr. *κιθάρα*], a stringed musical instrument of the ancient Greeks and Romans, resembled a guitar or harp.

Derived from this word, or cognate with it, are the English *guitar* (Old Eng. *gittern* and *cithern*); Dutch *cyter;* Ger. *Zither*.

Cit'ies of Ref'uge. The Levitical law set apart six cities of refuge for the manslayer, in which he might be safe from the avenger of blood. These cities were Hebron, Shechem, and Kadesh-Naphtali on the west of Jordan; Bezer, Ramoth-Gilead, and Golan on the east. The Hebrews kept the roads to the cities clear, and signs were set up to show the way. The manslayer was protected in the cities of refuge until the death of the high priest, after which the avenger of blood had no claim against him. Thus this institution was connected with the typical emblems of the Jewish religion, while it restrained the avenging of blood.

Cit'izen [Lat. *civis;* Fr. *citoyen*, from *cité*, a "city"], a resident in a city; in free states one who has the elective franchise, and may take part in legislative or judicial deliberations. Between a citizen and a subject this distinction is sometimes made, that while the latter is governed, the former also governs; and thus, though a citizen may be a subject, many subjects are not citizens. In this sense, which is substantially that attached to the term by the Romans, it has come down to modern times. In Greek communities the citizenship was at first readily attained by those who were not born to it; but at a later period, when the organization of Greek civic life had reached a higher degree of perfection, admission to citizenship was procured with much greater difficulty. In Sparta, according to Herodotus, there were only two instances of their conferring citizenship in full measure on strangers. The Perioeci, who shared the Spartan territory, though not on equal terms, were probably, as regarded political rights, much in the same position with the Roman plebeians. In Rome there were perfect and less perfect citizens. All the private rights of citizenship belonged to the citizens of the lower class, but the honors of the magistracy were denied them. But all citizens of all classes in the *comitia centuriata*, and in the tribes even the *liberti* or freedmen, had the right of voting. But it would appear that in the case of the Ærarians and Cærites, though they were reckoned citizens, the right of voting was in abeyance. Inferior in rank to the citizens there were two other classes—the Latini and the Peregrini. Roman citizenship was acquired most frequently by birth, but for this it was requisite that both father and mother should be citizens. If a citizen married a Latina or a Peregrina, the children followed the status of the mother. In earlier times the citizenship could be conferred only by a vote of the people assembled in the comitia. In some of the provinces the *Latinitas* was given as a step to the *Civitas*, the former being converted into the latter in the case of any one who had exercised a magistracy in his own state or city. The constitution of Caracalla extended citizenship to the whole Roman world, the distinction between Cives and Latini being preserved only in the case of freedmen and their children. Even this distinction was abolished by Justinian, the only divisions of persons henceforth being into subjects and slaves.

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Citizen, in modern law, is used to indicate the class of persons who owe an indefeasible allegiance to a state, and are entitled to certain rights and privileges appertaining to freemen. This view prevailed at a date as early as the time of Bodin (A. D. 1576), who defines a citizen to be "a free subject holding of the sovereignty of another man." (Knolles' translation, A. D. 1606.) Citizenship, in this sense, is not to be confounded with the elective franchise or the holding of offices of government. Children, the insane, and the non-voting classes in general are citizens. The same writer says: "They are to be called citizens that enjoy the rights and privileges of the state. This is to be understood according to the condition and quality of every one; the nobles as nobles, the commons as commons, the women and children in like case according unto the age, sex, and condition and deserts of every one of them. . . . It may be well said that special privileges make not a man a citizen, but the mutual obligation of the sovereign to the subject, to whom, for the faith and obeisance he receiveth, he oweth justice, counsel, aid, and protection which is not due unto strangers."

The subject may be further considered under the following general divisions: I. The mode of becoming a citizen; II. The obligations, rights, and privileges of a citizen with special reference to the Constitution of the U. S.

I.—1. The leading mode of acquiring citizenship is by birth in the country or under a state of allegiance. Birth in the country confers citizenship without reference to the citizenship of the parent, who at the moment of birth owes at least a local allegiance, and though an alien is temporarily a subject, except in the case of foreign ambassadors and ministers. This rule would apply to the case of persons, though in a foreign country, who were in our army, as their allegiance would be due to the U. S. On this same principle the children of American ambassadors born abroad are citizens.

2. A more difficult question is as to the citizenship here of children born abroad of American parentage. It should be noted in the discussion of this question that allegiance is twofold—perpetual and local. When an American citizen goes to a foreign country, he cannot by his own act put off his citizenship. He is still subject to our laws, and can, according to modern views, still be governed by our criminal legislation. "The power to tie and bind the subject cannot be tied down to places." It would seem on principle that as the mutual obligation from which citizenship springs still exists, his child would still be a citizen, though not born within the territory of the state to which allegiance is due. Lord Bacon, who would naturally look upon this subject with the eye of a philosopher, plainly took this view. In his famous argument concerning the *post nati* in the time of King James I., he said: "If a man look narrowly into the law on this point, he shall find a consequence that may seem at the first strange, but yet cannot be well avoided; which is, that if divers families of English men and women plant themselves at Rouen or at Lisbon, and have issue, and their descendants do intermarry among themselves, without any intermixture of foreign blood, such descendants are naturalized to all generations, for *every generation is still of liege parents*, and therefore naturalized; so as you may have whole tribes and lineages of English in foreign countries." (Harg., *State Trials*, 81.) If this broad proposition should be attended with any evil consequences, they could be corrected by suitable legislation. The strictly legal authorities are, however, hopelessly in conflict. The proposition that the foreign-born children of citizens are aliens is argued with great force and power by Mr. Horace Binney in his well-known article on the "Alienigenæ of the United States" (2 *Am. Law Register*, 193, A. D. 1854). An outline of his argument is that there are no early legal decisions affirming the citizenship of such persons, but that, on the other hand, the preamble to an early statute on this subject (25 Ed. III., stat. 2) of the year 1350, the language of text-writers, such as Lord Coke, Jenkins, and Blackstone, the expressions of authors of digests, such as Comyns and Mr. Bacon, all point to the fact that the persons in question are aliens. The argument is legal and based upon authorities, and does not enter into the philosophy of the subject as depending on the doctrines of allegiance. Opposed to this view of Mr. Binney is a recent and carefully considered case in the New York court of appeals (*Ludlam* vs. *Ludlam*, 26 New York R., 356). This case maintains that the statute of 25 Ed. III., ch. 2, above referred to, was simply an affirmation of already-existing law, and that the common law proceeds solely upon the doctrine of allegiance, which does not depend upon locality and place, and cannot be confined within boundaries. It holds that the true test of the allegiance of the child is parentage, that it is transmitted from the father to the child, and that, accordingly, the state may claim allegiance from the children of its citizens wherever born. These doctrines are supported by a reference to *Calvin's Case*, 7 Coke R., 1, in the sixth year of James I., and other authorities. The doctrine of this case appears to be based on sound principles of political philosophy, whatever view may be taken of the result of the legal decisions. The discussions of this subject by various writers led to the following important enactment by Congress in Feb., 1855: "Persons heretofore born, or hereafter to be born, out of the limits and jurisdiction of the U. S. whose fathers were or shall be at the time of their birth citizens of the U. S., shall be deemed and considered, and are hereby declared to be, citizens of the U. S.: Provided, however, that the rights of citizenship shall not descend to persons whose fathers never resided in the U. S." If the theory of Mr. Binney be correct, this statute conferred citizenship where it did not before exist; if that of *Ludlam* vs. *Ludlam* be sound, then it restricted the rights of the foreign-born descendants of citizens, perhaps unnecessarily.

3. Citizenship by Naturalization.—An alien may be made a citizen by the act of a state or a nation co-operating with his own act. Sometimes this citizenship is complimentary or honorary; usually it is attended with true, or intended, renunciation of foreign citizenship. The question thus recurs, Whether a person can by his own act put off his citizenship? The prevailing opinion of jurists, with some dissent, is that he cannot. This proposition seems quite clear where the sovereign distinctly refuses to permit the renunciation of citizenship. The tie of allegiance creates reciprocal rights and duties; the state cannot rightfully discard the citizen without just cause of forfeiture, nor can the citizen repudiate his obligations to the state without its consent. Assuming that mutual agreement is necessary

to dissolve the relation of sovereign and citizen, the more difficult question is, Whether the agreement of dissolution can be *inferred* from the prolonged absence of the citizen, coupled with foreign naturalization, and the failure of the state, after notice, to reclaim him? The better opinion would seem to be that there must be some affirmative act of renunciation on the part of the state to which the allegiance is due, though there are weighty opinions to the contrary. For the purpose of settling the perplexing and irritating questions that frequently arise, the U. S. have entered into treaties of naturalization with a number of foreign powers. (For details see NATURALIZATION.) Naturalization may take place either by a mere law of a general nature, such as that which provides that every alien woman who marries a citizen of the U. S. shall be deemed and taken to be a citizen, or it may occur in special instances affirmative on the part of the individual to be naturalized. In this country the power to naturalize is exclusively vested in Congress by a provision in the U. S. Constitution. There is an important provision concerning citizenship in the fourteenth amendment to the U. S. Constitution as follows: "All persons born or naturalized in the U. S., and subject to the jurisdiction thereof, are citizens of the U. S. and of the State wherein they reside." The precise effect of this provision has not yet been settled by judicial decision. It would seem, however, that it should not be construed by implication to deprive any person of citizenship who would possess it by common law, such as the children of ambassadors or other citizens born abroad. The ninth amendment would lead to this conclusion: "The enumeration in the Constitution of certain rights shall not be construed to deny or disparage others retained by the people." Citizenship at present, as will be shown hereafter, leads to important rights and privileges of which it would be unjust to deprive any one entitled to them. The words "subject to the jurisdiction of the U. S." would exclude from citizenship the children of foreign public ministers and members of the Indian tribes, though Indians born out of the tribal organizations would seem to be citizens.

Interesting questions concerning citizenship arise in case of the union of two separate nations, or of the division of a single nation into two separate states. The first of these cases was discussed with much acuteness and learning when Scotland and England were united under James I.; the second has been extensively considered by the courts, both in England and America, in connection with American independence. *Calvin's case* (7 Coke's Reports) is the leading English authority upon the whole subject, where it was declared that the *post nati* (persons born after the union) of Scotland were natural-born subjects, and could inherit lands in England. In respect to the result of our own Revolution, opinions differ as to the time when the separation between England and the U. S. became complete, though they substantially agree as to the effect of the division. The American view is, that the separation took place at the Declaration of Independence, July 4, 1776; the English, that it was consummated at the treaty of peace in 1783. Accordingly, a person born in England before July 4, 1776, who did not reside in the U. S. after that date, became, as to this country, an alien, as well as all his descendants. The effect of this rule is not to work a forfeiture of vested rights, and the real estate owned by a former citizen continued to be vested in him, though he could not, after the day named, acquire an indefeasible title to land.

II.—The provisions of the U. S. Constitution concerning citizenship have recently assumed great importance, growing out of the controversies concerning the legal condition or *status* of persons of African descent. The Constitution as originally adopted made no provision concerning citizens of the U. S., except an incidental direction that Senators, Representatives, and the Executive should be such citizens. There were, however, distinct clauses concerning the rights and privileges of the citizens of the several States, such as that the judicial power of the U. S. shall extend to controversies between a State and a citizen of another State, and between citizens of different States, and that the citizens of each State shall be entitled to all privileges and immunities of citizens in the several States. This last clause has led to much judicial discussion, some points of which will be noticed hereafter. Under the clause which provided that the judicial power should extend to controversies between citizens of different States, the question arose in the now famous case of *Scott* vs. *Sandford* (19 Howard's Reports, 39), whether an emancipated negro could be considered as a "citizen of a State;" and it was decided that he could not be so regarded, and accordingly that he could not maintain an action on that basis in the Federal courts. It would seem to follow that he could not claim the benefit of the other constitutional provision respecting privileges and immunities. The division of public opinion occasioned by this decision, and the desire to settle by a positive rule the condition of the slaves emancipated by the thirteenth amendment to the Constitution, as well as that of the colored race in general, led to the fourteenth and fifteenth amendments, the provisions of which are now to be considered, as far as they affect citizenship. All persons born or naturalized in the U. S. are declared to be citizens of the U. S. and of the State in which they reside; and it is provided that "no State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the U. S.;" and also that the "right of citizens of the U. S. to vote shall not be denied or abridged by the U. S. or by any State on account of race, color, or previous condition of servitude." Though the condition of the colored race led to these amendments, their construction is not to be confined to it. It will be observed that the same words are here used as in the body of the Constitution—"privileges and immunities"—except that they are here declared to belong to "citizens of the U. S.," while there they appertain to "citizens of each State" in reference to the "several States." The meaning of the words "privileges and immunities" in the body of the Constitution has been, as already stated, much considered. They have been held to mean such privileges, etc. as are of a general nature, such as security to life and liberty, the right to acquire property, to have access to courts of justice, and freedom to pursue and obtain happiness and safety, with such restrictions as are necessary to the public good. Whatever guarantees upon these points a State accords to its own citizens, it must extend to citizens of other States. But the Constitution before the amendments gave no directions as to the mode in which a State should treat its own citizens, except in a few specially marked instances, such as the prohibition to pass bills of attainder and *ex-post facto* laws. In other respects the State was left to its own action towards its people. Under the amendments there is provision made for the privileges and immunities of citizens of the U. S. A momentous question now arises: Does this provision trench on the great power which has all along been vested in each State to regulate the conduct of its own citizens? Does Congress under it have the right to enter upon the once exclusive field of State legislation and the domain of State constitutions, and to override all its action as to privileges and immunities of citizens? This question came up for careful consideration before the Supreme Court of the U. S. in the very important case of the *Butchers' Benevolent Association* vs. *the Crescent City Live-stock Company* (A. D. 1872). The State of Louisiana had granted an exclusive right to the latter company to engage in the business of slaughtering cattle within a certain district, including the city of New Orleans. It was claimed by the plaintiffs, who had been engaged in the same business, and who were by the act prohibited from following it, that the law created a monopoly, that its exclusiveness was contrary to the spirit of free institutions, and that it was opposed to this provision of the U. S. Constitution. It was, however, considered by the court that there is now a clear distinction between citizens of the U. S. and citizens of a State—that there may be persons of the former class who are not members of the latter, and that the constitutional amendment is solely applicable to privileges and immunities of citizens of the U. S., *as such;* and that accordingly the clause does not refer to such regulations as the State may make for *its own* citizens, though they may also fill the character of citizens of the U. S. If it be asked, What scope there is in this construction for the amendment? the answer is, that the court does not seek to lay down any abstract rule on the subject, and will decide questions as they arise. Some instances of its application may be suggested, such as the right to visit the seat of government to assert a claim or to seek its protection; to freely approach its seaports, sub-treasuries, land-offices, and courts of justice; to be protected on the high seas; to assemble and petition for the redress of grievances; to invoke the privilege of the writ of *habeas corpus;* and freely to change the residence from one State to another. These appertain to citizens of the U. S. in general. It was decided by the same court that a claim to practice law in a State by one of its citizens (Mrs. Bradwell) did not come within the phrase "privileges and immunities" of a citizen of the U. S. It is a matter of congratulation to all who desire to see the equilibrium of forces between the general government and the States properly preserved, that the court was able to see its way clear to a somewhat rigorous construction of the clauses of this amendment. The effect of the fifteenth amendment has not been settled by the courts, but its object is well known. It of course abrogates all State law or constitutional provisions creating distinctions among citizens of the U. S. as to the exercise of the right of suffrage based upon race and color, and for ever prevents the

introduction of them either through the action of the States or the general government. T. W. DWIGHT.

Cit'ric A'cid [from the Lat. *citrus*, a "citron"], a vegetable acid present in limes and lemons, and to a less extent in gooseberries, currants and other fruits. In preparing it the juice of lemons is allowed to ferment, and chalk being added citrate of lime is formed. This precipitate being treated with sulphuric acid, sulphate of lime is formed, and the acid remains in solution. It is tribasic, having the symbol $C_6H_8O_7$. It is readily soluble in water, and has an intensely sour taste; it is used in medicine as an antiscorbutic and refrigerant, and by the silk-dyer to heighten the colors of safflower and cochineal, and by the calico-printer for discharging mordants.

Cit'ron [Gr. *κίτρον*; Lat. *citro* and *citrus*; It. *cedro*; Fr. *citron*], the fruit of the citron tree (*Citrus medica*), which is cultivated in the south of Europe and other warm countries. It is a native of India. By some botanists it is regarded as perhaps the original type of the species which produces the lemon, sweet lemon, lime, and lume; but by others some of these are regarded as distinct species. The citron tree has oblong leaves; the fruit is large, rough, and furrowed; the rind thick and tender; the pulp sub-acid and refrigerant. The part chiefly valued is the rind, which has a delicious odor and flavor, and is made into preserves. The juice is employed to make a syrup for flavoring liquors. The cedrat is a variety of the citron, from which chiefly the fragrant oil of cedrat, used by perfumers, is procured. The varieties of citron are numerous. The fruit of the largest kinds is sometimes nine inches long and twenty pounds in weight.

Citronel'la [Fr. *citronelle*], a perfume prepared from the *Melissa officinalis*, or common BALM (which see); also, a liquid prepared in Barbados from the rind of the citron, and used in France for flavoring the best brandies. The name *citronelle* is also given in France to the common southernwood (*Artemisia Abrotanum*). The term citronella is, however, chiefly applied by perfumers at present to an oil imported from Ceylon. It is the product of *Andropogon Schœnanthus*, a kind of grass. Several tons of the oil are exported annually.

Citron Melon. See MELON.

Citros'ma [from the Gr. *κίτρον*, "citron," and *ὀσμή*, "smell"], a genus of trees of the order Monimiaceæ, natives of the tropical parts of South America. The leaves abound in an oil similar to the oil of citron.

Ci'trus [a Latin name from the Gr. *κιτρία*, the "citron tree"], a genus of evergreen trees of the order Aurantiaceæ, natives of the warm parts of Asia. It comprises the citron (*Citrus medica*), the orange (*Citrus Aurantium*), the lemon (*Citrus Limonum*), bergamot, cedrat, lume, tangerine, shaddock, lime, and other trees which are extensively cultivated for their fruit or for their leaves and flowers, which are used in perfumery. The genus is distinguished by numerous stamens irregularly united in bundles by their filaments, and a pulpy fruit with a spongy rind. The leaves and the rind abound in volatile oil. These oils are isomeric with each other, with the oil of turpentine, and with a great variety of other oils. The fruit (*hesperidium*) is in structure a sort of large berry.

Cittadel'la, a town of Northern Italy, in the province of Padua, on the Brentella, 14 miles N. E. of Vicenza. It has manufactures of paper and woollen fabrics. Pop. 7213.

Città-della-Pie've, a town of Italy, in the province of Perugia, 23 miles W. S. W. of Perugia, was the native place of the eminent painter Perugino. Pop. 6755.

Città di Castel'lo (anc. *Tiberinum*), a town of Italy, in the province of Perugia, on the Tiber, about 28 miles N. W. of Perugia. It has a cathedral, several palatial mansions, and Gothic structures. Pop. in 1872, 24,088.

Cittano'va, a town of Italy, in the province of Catanzaro. Pop. 11,103.

Città Vec'chia, a fortified city of Malta, 6 miles W. of Valetta, is on a limestone hill in which extensive catacombs were excavated at a remote period. It has a large and handsome cathedral. It was called *Medina* by the Saracens, who occupied it for some time. Pop. 7000.

Cit'y [Fr. *cité*; Lat. *urbs* or *civitas*; Ger. *Stadt*], a large town, an incorporated town; a term used to include both a large collection of houses and its inhabitants. As first used in the languages of modern Europe, the word *city*, like the Latin *civitas*, was equivalent to state rather than to town or borough (*urbs*); and while the latter signified a collection of households governed by municipal laws, but subject to the laws of the country of which they formed a part, the title *city* was given to such towns as, with their surrounding district, were independent of external authority. Nearly the only cities in this sense now are the free towns of Germany and such of the cantons of Switzerland as consist of a town and its surroundings. In England the cities are towns which either are or have been sees of bishops, though there are several towns which were anciently episcopal, but which are not now called cities. In America the term is applied to most towns which are incorporated and governed by a mayor and aldermen.

City Point, a post-village and port of entry of Prince George co., Va., on the James River, at the mouth of the Appomattox, 10 miles by railroad E. N. E. of Petersburg. This point being a good landing, was seized by the troops under Gen. Butler in his movement up the James, May, 1864, and later, June, 1864, became the head-quarters of Gen. Grant after his passage of this river; and during his subsequent operations against Petersburg and Richmond was the principal landing and dépôt of supplies for his army.

Ciudad de las Casas, the capital of the Mexican department of Chiapa, is about 450 miles S. E. of Mexico. It has a cathedral, a Catholic college, and several monasteries. It was formerly called *Ciudad Real*. Pop. 6430.

Ciudade'la, a city and seaport of the island of Minorca, on its W. coast, 25 miles N. W. of Mahon. It has a cathedral and several convents; also manufactures of woollen fabrics. Pop. 5726.

Ciudad' Real', a province of Spain, is intersected by the river Guadiana, and bounded on the S. by the Sierra de Morena. Area, 7840 square miles. Capital, Ciudad Real. Pop. 264,908.

Ciudad Real ("city of the king"), a town of Spain, capital of the above province, is situated on a plain about 5 miles S. of the Guadiana and 102 miles S. of Madrid. It has several fine churches, monasteries, and hospitals. The nave of the parish church is a magnificent Gothic structure. Here are manufactures of linen and coarse woollen fabrics. This town was the head-quarters of the Hermandad, or Holy Brotherhood, founded in 1249 for the suppression of robbery. Pop. 10,366. The French here defeated the Spaniards in Mar., 1809.

Ciudad' Rodri'go, a fortified town of Spain, on the river Agueda, here crossed by a fine bridge, about 90 miles S. W. of Salamanca. It has a Gothic cathedral founded in the twelfth century, and a citadel. During the Peninsular war it was considered an important point as a key of Spain on the west. It was invested and taken by the French general Massena in July, 1810. The army of the duke of Wellington assaulted and took this place, with 150 guns, in Jan., 1812. For this achievement the Spanish government gave him the title of duke of Ciudad Rodrigo. Pop. 6429.

Cives. See CHIVES.

Civ'et [Fr. *civette*; Arabic, *zubâd*], a brown substance

Civet.

of a strong, offensive odor which is used in perfumery, because when mixed in small proportions with certain other

perfumes it is considered to improve them greatly. It is quite costly, and is consequently much adulterated. It is produced by a carnivorous animal called the civet or civet-cat (*Viverra Civetta*), an animal which ranks between the weasels and the foxes. Other species are found—one in India and one in Java, and the latter produces part of the civet of commerce. The civet-cat, when wild, feeds upon birds, small quadrupeds, and reptiles, and generally takes its prey by surprise. It is very commonly kept in confinement for the sake of its perfume, which is removed from a glandular sac twice a week by means of a spatula, and is obtained most abundantly from the male, and especially after he has been irritated. A dram is a large quantity to obtain at a time. The civets kept for this purpose are fed on raw flesh, the young partly on farinaceous food. The town of Enfras, in Abyssinia, is a principal seat of the civet trade. The civet-cat of the South-western U. S. is of a different genus from the above. (See BASSARIS.)

Civiale (JEAN), a French surgeon, was born July, 1792. He was the inventor of lithotrity. Died in June, 1867.

Civida'le (anc. *Forum Julii*), a walled town of Northern Italy, in the province of Udine, on the river Natisone, here crossed by a bridge, 10 miles E. N. E. of Udine. It has a fine Gothic church, said to be about 1000 years old; also manufactures of silk and cotton. Pop. 6838.

Civ'il Death, in law, is the cessation of legal rights while the physical life remains. Civil death occurs where a man by act of Parliament or judgment of law is attainted of treason or felony; he loses his civil rights and capacities, and becomes, as it were, *dead* in law. It also took place formerly where any man abjured the realm by the process of the common law, or went into a monastery and became there a professed monk, in which cases he was absolutely dead in law, and his next heir succeeded to the estate. In New York the sentence of a criminal to imprisonment for life causes civil death.

Civ'il Engineer', a person whose profession is the science or construction of bridges, railroads, aqueducts, harbors, canals, machinery, etc. (See ENGINEERING, by GEN. J. G. BARNARD, U. S. A.)

Civil'ian, in general or in popular use, signifies a person whose pursuits and employment are civil—*i. e.* neither military nor clerical. As a legal term, it denotes a man learned in the civil or Roman law; also a person who is versed in the principles and rules in accordance with which civil rights may be freely, blamelessly, and successfully vindicated. In England the term is applied particularly to a member of the college of doctors of law exercent in the ecclesiastical and admiralty courts, in which the civil law is recognized.

Civi'lis (CLAUDIUS), a heroic chief of the Batavi who served for many years in the Roman army. When Vespasian and Vitellius were contending in civil war for the imperial throne, the adherents of the former induced Civilis to make a feigned demonstration of hostility to the Romans, in order to detain in Gaul the Roman army, which was inclined to fight for Vitellius. Having raised a large army, Civilis revolted in earnest in 69 A. D., was joined by many Germans, and defeated the Romans in several battles. In 70 A. D. he was defeated by Cerealis, a general of Vespasian. Tacitus states that negotiations ensued between Cerealis and Civilis, but his history here ends abruptly, leaving the subject unfinished.

Civiliza'tion [Fr. *civilisation,* from the Lat. *civilis,* "like a citizen" (*civis*), and hence "refined," "polite"], a term denoting a refined and improved state of society, as distinguished from a barbarous or savage condition. Whether civilization is an artificial condition, or the original state of mankind, from which the savage races have descended, is an interesting but still unsettled question. The idea that our civilization is the result of development from the rudest beginnings is a favorite one with many popular scientific writers. (See LUBBOCK'S "Uncivilized Man.") The progress of our civilization from the barbarism of the Dark Ages affords one of the most interesting phases of history. (See GUIZOT'S "History of Civilization," and DRAPER "On the Intellectual Development of Europe.")

Civil Law. See LAW, by PROF. T. W. DWIGHT, LL.D.

Civil List, in Great Britain, the name given to an annual appropriation for the expenses of the royal household, for certain civil offices, for pensions, etc. The appropriation of money for the civil list by Parliament, and its acceptance by the Crown, has been regarded as the fulfilment of a kind of contract between these two branches of government. The same name is used for a similar appropriation in other countries.

Civ'il Ser'vice is a name for the duties rendered to the state, other than naval and military service. The reform of civil service has received of late much attention in Great Britain and the U. S.; and in the former country much has already been accomplished. At the head of the British civil service are placed the officers of the royal household, under several departments. Then come the officers of the House of Lords and the House of Commons, and a vast number of departments which cannot here be enumerated. The general designations for the civil servants of the Crown are commissioners, secretaries, and clerks. Nearly all enter the service as clerks, and they rise chiefly by seniority. Those officials belong to the civil service who receive annual salaries and whose chief occupation is writing. This class does not include men to whom weekly wages are paid; they come under a different category. The "Civil Service List" contains the names of about 15,000 persons. In old age they are pensioned.

Appointments to the British government offices were formerly obtained by favor, but now merit and abilities are conditions superadded. In 1855 a commission was appointed to examine candidates for the service. If a candidate fails at the first examination, he is generally allowed another chance, and sometimes a third. When the candidate has received his certificate, he enters one of the public offices and goes through a six months' probation; if successfully, he then becomes a clerk at a definite salary.

In the U. S. civil service a much-needed reform has been inaugurated. Office-seeking has become one of the most corrupting trades in our country, and there has long been a demand for a system of competitive examinations for those offices which are non-elective. Such a system has been introduced, and, though its details are not yet perfect, it is hoped that it may lead to greater efficiency in the performance of official duties, and prevent, to some extent at least, the alarming evils which result from a wrong use of government patronage.

Civil War of the United States. See CONFEDERATE STATES, by HON. HORACE GREELEY, LL.D.

Ci'vita Vec'chia (anc. *Centum Cellæ* and *Trajanus Portus*), a city and fortified seaport of Italy, in the province of Rome, 36 miles W. N. W. of Rome by railway. It is enclosed by walls and well built, has a large church, an arsenal, a theatre, and a lighthouse. The harbor was constructed by the emperor Trajan, and is formed by two large moles, and a breakwater which protects shipping from a heavy sea. It is a free port, and is regularly visited by steam-packets from Genoa, Marseilles, Naples, etc. It is connected by a railway with the city of Rome. Pop. 8533.

Clack'amas, a county in the N. W. of Oregon. Area, 1700 square miles. It is bounded on the E. by the Cascade Range of mountains, and drained by the Willamette and Clackamas rivers. The soil is fertile. Wool, wheat, oats, butter, and potatoes are raised. It is heavily timbered. There are manufactures of woollens and paper. It is intersected by the Oregon and California R. R. Capital, Clackamas. Pop. 5993.

Clackamas, a post-village, capital of Clackamas co., Or., on the Oregon and California R. R., 12 miles S. of Portland.

Clackman'nan, the smallest county of Scotland, has an area of 47 square miles. It is bounded on the S. by the river Forth, and on the N. by the Ochil Hills. It consists chiefly of the romantic valley of the North Devon. The soil is partly fertile. Coal, ironstone, copper, sandstone, and greenstone are found here. The chief articles of export are coal and iron. Capital, Clackmannan. Pop. in 1871, 23,742.

Clackmannan, the capital of the above county, is on the river Devon, near its entrance into the Forth, 9 miles E. of Stirling. This town is noted for its ale. King David Bruce resided here in 1330. Pop. in 1871, 6425.

Cladras'tis, a genus of leguminous trees represented in the U. S. by the *Cladrastis tinctoria* of the Southern States, a small tree somewhat resembling the common locust. It is called yellow locust, yellow wood, fustic, and yellow ash. Its wood is yellow and its bark is cathartic.

Claf'lin (LEE), a distinguished philanthropist of Boston, Mass., born in 1791. He acquired wealth in the manufacture of shoes, and bestowed munificent gifts of money upon the Wesleyan academy at Wilbraham, Mass., the university at Middletown, Conn., and the Boston Theological Seminary. Died Feb. 23, 1871.

Claf'lin (WILLIAM), LL.D., born at Milford, Mass., Mar. 6, 1818, was governor of Massachusetts from 1869 to 1871. He has been for many years a prominent leather-merchant in Boston.

Clag'gett (JOHN THOMAS), D. D., the first Protestant Episcopal bishop of Maryland, was born in Maryland Oct. 2, 1742. He graduated at Princeton in 1764, became bishop of Maryland in 1792, and died Aug. 2, 1816.

Clai'borne, a parish of Louisiana, bordering on Arkansas. Area, 1050 square miles. It is drained by Bayou d'Arbonne. The surface is undulating; the soil is productive. Cattle, corn, and cotton are extensively raised. Capital, Homer. Pop. 20,240.

Claiborne, a county in the W. of Mississippi. Area, 740 square miles. It is bounded on the N. W. by the Big Black River, and on the W. by the Mississippi. The soil is fertile, especially near the rivers. Corn and cotton are staple crops. Capital, Port Gibson. Pop. 13,386.

Claiborne, a county of Tennessee, bordering on Virginia. Area, 350 square miles. It is bounded on the S. by Clinch River. The surface is mountainous. Grain, tobacco, and wool are staple products. Cumberland Gap, a pass through the Cumberland Mountains, is on the N. border of this county. Capital, Tazewell. Pop. 9321.

Claiborne, a post-township of Monroe co., Ala. Pop. 2245.

Claiborne, a township of Union co., O. Pop. 1947.

Claiborne (William Charles Cole), an American lawyer and statesman, born in Virginia in 1773, was a member of Congress from Tennessee (1797–1801), governor of Mississippi Territory (1802), governor of Louisiana Territory (1804), and of the State of Louisiana (1812–16). He was chosen U. S. Senator in the latter year, and died Nov. 23, 1817.

Claim [from the Lat. *clamo*, to "call," to "call for," to "demand"], a demand of a right; the act of demanding from another person something due; a right to claim or demand; a title to any debt or privilege. The term is sometimes applied to the thing claimed, as land or other property. In law, claim is a challenge of interest in anything that is in possession of another, or at least out of the possession of the person who claims it.

Claims, Court of, a court of the U. S. for the relief of those persons who have claims against the government. Before the year 1855 such claims could be settled only by act of Congress. In that year this court was created, consisting of three judges appointed by the President with the advice and consent of the Senate. (See, for further information, Courts, by George Chase, LL.B.)

Clairaut (Alexis Claude), a French geometer, born in Paris May 7, 1713. He produced in 1731 "Researches on Curves of Double Curvature," "Theory of the Figure of the Earth" (1743), a "Theory of the Moon, etc." (1750), and "Elements of Geometry." His reputation was increased by his prediction of the return of Halley's comet in 1759. Died May 17, 1765.

Clair'mont, a village of West Farms township, Westchester co., N. Y. Pop. 158.

Clairvoy'ance [Fr., from *clair*, "clear," and *voir*, to "see"]. Hitherto, the nature of spirit has been discussed theologically and metaphysically. Its scientific investigation has been considered either impracticable or undesirable. In this border-land between the known and unknown ignorance and charlatanism have held high carnival. Science, purely material, is entirely occupied with matter and its inherent force, and beyond the retort and crucible has no place for spirit. Belief in spiritual being outside of physical existence is superstition. The mention of a fact bearing in that direction provokes a smile of scornful pity. When the oil is exhausted the flame no longer burns; when the fuel is spent the fire goes out; when the instrument is destroyed the music is not heard; when the complex co-ordination of conditions called a living being is subverted, life, intelligence, spirit are no more. Such are the illustrations of material science. The spiritual realm has remained unknown, or rather, its existence has been denied.

These reflections are rendered pertinent by the consideration that whatever else of pretence and folly be blown away, the central fact of clairvoyance remains undisturbed; and clairvoyance is a super-sensuous perception depending on the spiritual nature of man, without which it would be impossible. In the present state of psychological knowledge the facts are ill-observed, loosely recorded, and theories out of place. The world of spirit, to which "force" furnishes the key, perhaps may at some future time broaden into as wide a field as the physical world now presents. Superstition will then have no place for concealment. Ghosts, witchcraft, visions, trance, ecstasy, and the innumerable phases of spiritual phenomena will be co-ordinated, the chaff blown away, the vital facts preserved, and a true science of the soul, based on accurate observation and discriminating research, founded.

The existence of a somnambulic or sleep-walking state, induced by unknown causes and accompanied by peculiar phenomena, is generally admitted. It is also admitted that a state similar to, if not identical with, these can be induced by artificial means, usually by fixing the attention in gazing intently into a "magic mirror" or "crystal," repeating formulæ, by incantations, fasting, drugs, or by an operator making what are termed magnetic passes. The interference of a second person is not essential, and perhaps without exception distorts the result. This admission by no means endorses the theories which have sprung fungus-like therefrom, of mesmerists, biologists, magnetists in an endless array, best known by their barbarous terminologies.

The trance or clairvoyant state has been observed in all ages and among all races of mankind—Chinese, Hindoos, Turks, as well as Christians. It has in seasons of great religious excitement become epidemic, the devotee falling in convulsions, becoming cataleptic, and after hours, days, or even months of apparent death, awakening with mind overwrought with visions of the strange world in which it had dwelt during its apparent unconsciousness. The records of clairvoyance are as old as history. If prophecy, the "clear-seeing" of the future, be its fruit, the prophets and sages of the past were all more or less endowed with this gift. Socrates and Apollonius predicted and were conscious of events transpiring at remote distances. Cicero mentions that when the revelations are being given some one must be present to record them, as "these sleepers do not retain any recollection of them." Pliny, speaking of the celebrated Hermotinus of Clazomenæ, remarks that his soul separated itself from the body and wandered in various parts of the earth, relating events occurring in distant places. During the periods of inspiration his body was insensible. The day of the battle of Pharsalia, Cornelius, a priest of renowned piety, described, while in Padua, as though present, every particular of the fight. Nicephorus says that when the unfortunate Valens, taking refuge in a barn, was burned by the Goths, a hermit named Paul in a fit of ecstasy cried out to those who were with him, "It is now that Valens burns!" Tertullian describes two females celebrated for their piety and ecstasy, that they entered that state in the midst of the congregation, revealed celestial secrets, and knew the innermost hearts of persons. Saint Justin affirms that the Sibyls foretold events correctly, and quotes Plato as coinciding with him in that view. Saint Athenagoras says of the faculty of prescience that "It is proper to the soul." Volumes might be readily filled with quotations like the foregoing, showing that clairvoyance has been manifested and received as a truth by profound thinkers in every age. Swedenborg, Zschokke, and Davis are not peculiarities of modern times, but are repetitions of Socrates, Apollonius, and countless other sages who deeply impressed their personality on their times.

Perhaps for purposes of investigation the artificially induced mesmeric state has advantages over the spontaneous, which presents itself at undeterminate times, although its spontaneous exhibition is more reliable in its results. Its natural manifestation requires a finely developed nervous system. It is not always, though at times it may appear to be, the result of disease. The more perfect the health the more reliable the results. The visions produced by disease, like those by drugs, bear to true clairvoyance the same relations that the dreams of indigestion do to those of refreshing sleep.

Clairvoyance must be regarded as a peculiar state of the mind, in which it is in a greater or lesser degree independent of the physical body. It presents many gradations from semi-consciousness to profound and death-like trance. However induced, the attending phenomena are similar. The condition of the physical body is that of deepest sleep. A flame may be applied to it without producing a quiver of the nerves; the most pungent substances have no effect on the nostrils; pins or needles thrust into the most sensitive parts give no pain; surgical operations can be made without sensation. Hearing, tasting, smelling, feeling, as well as seeing, are seemingly independent of the physical organs. The muscular system is either relaxed or rigid; the circulation impeded in cases until the pulse becomes imperceptible; and respiration leaves no stain on a mirror held over the nostrils.

In passing into the clairvoyant state the extremities become cold, the brain congested, the vital powers sink, a dreamy unconsciousness steals over the faculties. There is a sensation of sinking or floating. After a time the perceptions become intensified. We cannot say the senses, for they are of the body, which for the time is insensible. The mind sees without physical organs of vision, hears without organs of hearing, and feeling becomes a refined consciousness which brings it *en rapport* with the intelligence of the world. The more death-like the condition of the body the more lucid the perceptions of the spirit or mind, which for the time owes it no fealty. If, as there is

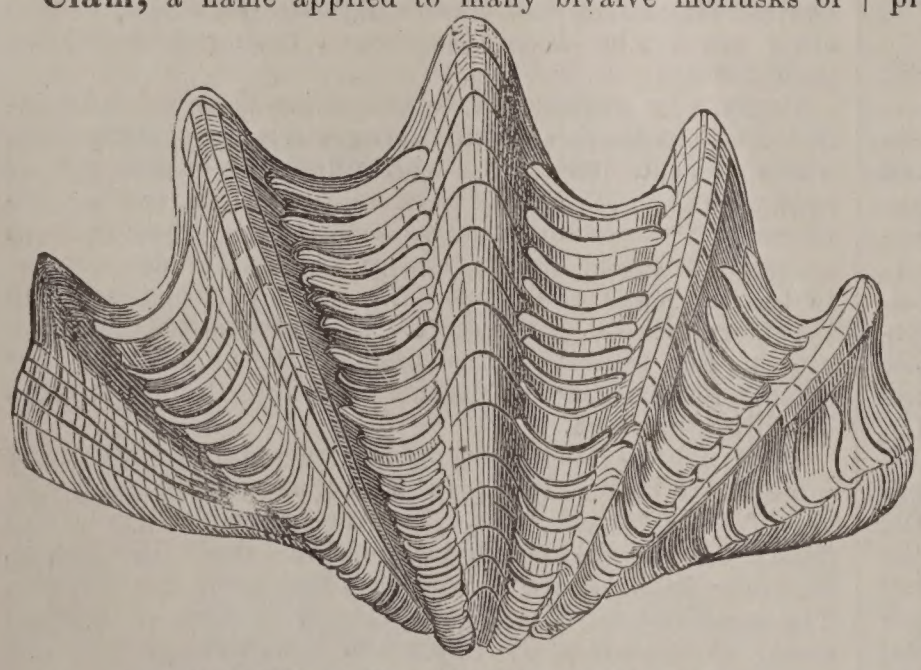
every reason to believe, clairvoyance depends on the unfolding of the spirit's perceptions, then the extent of that unfolding marks its perfection. However great or small this may be, the state itself is the same, differing only in degree, whether observed in the Pythia of Delphic oracles, the vision of Saint John, the trance of Mohammed, the epidemic catalepsy of religious revivals, or the illumination of Swedenborg or Davis. The disclosures made have also a general resemblance, but they are so colored with surrounding circumstances that they are extremely fallible. The tendency of the clairvoyant is to make objective the subjective ideas he has acquired by education—if a Christian, to see visions of Christ; if a Moslem, of Mohammed—somewhat as dreams reflect the ideas of wakefulness. Yet there is a profound condition which sets all these aside, and the mind appears divested of all physical trammels, and to come in direct contact with the thought-atmosphere of the world. Time and space have no existence, and matter becomes transparent.

If there is an independent spiritual existence after the death of the physical body, the clairvoyant in this independent stage closely approximates to that existence. It may be an open question whether the spirit leaves the body and actually visits the remote places it describes, or gains such knowledge by intensity of perception that annuls space, as it does time, in its retrospection and prevision. The many authentic instances of "double-presence" which have been observed lead to the former conclusion.

Baron Reichenbach, in his "Dynamics," has investigated the sensitiveness of the clairvoyant to refined emanations of force, and Denton, in his "Soul of Things," has carried the investigation still farther, though in a somewhat similar direction. The field is broad as the spirit of man, and its threshold has been scarcely crossed. Clairvoyance is no miraculous power, but an inherent faculty, a foregleam in this life of the next spiritual life. For if man exists as a spirit after the dissolution of the physical body, his present life is that of a spirit clad in flesh, and should manifest some of the characteristics of the next untrammelled condition. HUDSON TUTTLE, *Berlin Heights, O.*

Clal'lam, a county in the N. W. of Washington Territory. It is bounded on the N. by the Strait of Juan de Fuca, and on the W. by the Pacific Ocean. The county takes its name from the Clallam tribe of Indians found here. The surface is hilly. Mount Olympus rises on or near the southern border to the height of 8100 feet. Capital, New Dungeness. Pop. 408.

Clam, a name applied to many bivalve mollusks of



Giant Clam (*Tridacna gigas*).

various genera. Perhaps the most noteworthy of these is the *Tridacna gigas*, which is said to possess the largest shells known. A single pair of these has been known to weigh over 500 pounds. The flesh is used as food. Two of these valves are used in the church of St. Sulpice, Paris, to contain the holy water. This species is found in the Pacific. The common clam of the U. S. (*Mya arenaria*) is much used as food, and is very important as furnishing bait for the fisheries. It is found also in Europe and Asia, and on the shores of Alaska. The round clam, or quahaug, has the name of *Venus mercenaria*, because its shells were made into *wampum* by the North American Indians, and used as money. The fresh-water clams are properly mussels. The genus *Chama* comprises numerous species, which are perhaps those to which the name is most appropriately given.

Clamecy, a town of France, department of Nièvre, on the river Yonne, about 24 miles S. of Auxerre, was formerly fortified. It has several Gothic churches, a fine modern château, and manufactures of paper and earthenware. Pop. 5616.

Clam Lake, a post-village of Wexford co., Mich. It has one weekly newspaper.

Clan [Irish and Gaelic, *clann;* Manx, *cloan,* "children," *i. e.* descendants of a common ancestor], a body of men confederated together by common ancestry. It is applied especially to the communities of the Scottish Highlanders, divided from each other by distinctive surnames. It has sometimes been applied to the great Irish septs, but these were completely broken down by the power of the English before the word came into use in the English language. In Scotland it was used to designate the freebooters of the Border as well as the Celtic tribes. There were characteristics common to both—such as predatory habits and their distribution into communities, each with a common surname. It was long the policy of Scotland to require all the Highland clans to have some representative who should be security at court for their behavior. Clans that could find no such security were called "broken clans," and their members were outlaws. The Macgregors were a broken clan, whom the law followed for centuries with cruel ingenuity. The clans are never treated in the old acts otherwise than as nests of thieves. The clans cannot be better understood than by keeping in view some peculiarities which set them in contrast with feudal institutions. Feudality has a relation to land, from the serf bound to the soil, through the vassal who possesses it, up to the feudal lord. Among the Highlanders the relation was patriarchal, and had no connection with land. It often happened that the head of a clan and the feudal lord of the estates occupied by it were different persons.

Clancar'ty, EARLS OF (1803), Viscounts Dunlo (1807), Barons Kilconnel (Ireland, 1797), Viscounts Clancarty (1823), Barons Trench (1815, United Kingdom), and Marquesses Heusden in the Netherlands, a noble family of England.—WILLIAM THOMAS LE POER TRENCH, third earl, born Sept. 21, 1803, succeeded his father Dec. 8, 1832.

Clan'ricarde, MARQUESSES OF (1825), Barons Dunkellin (1543), Viscounts Burke (1629, Ireland), Barons Somerhill (United Kingdom, 1826).—ULICK JOHN DE BURGH, first marquess, K. P., P. C., lieutenant and custos rotulorum of the county and town of Galway, born Dec. 28, 1802, was ambassador to St. Petersburg 1835–40, postmaster-general 1846–52, lord privy seal 1857–58, succeeded his father as earl of Clanricarde July 27, 1808.

Clanton (JAMES H.) studied law and practised his profession in Montgomery co., Ala., which in 1855 sent him to the House. From 1861 to 1865 he served as a general in the Confederate army, but after the end of the war he returned to his old profession. He died Sept. 27, 1871.

Clap (ROGER), born at Sallom, in Devonshire, England, April 6, 1609, settled at Wareham, Mass., in 1630, and was afterwards one of the founders of Dorchester, Mass. He held prominent public offices, and served (1665–86) as captain in Castle William, now Fort Independence. He wrote for his children valuable memoirs of the prominent men of New England. These have been several times reprinted. He was eminent for piety. Died Feb. 2, 1691.

Clap (THOMAS), a Congregational divine, born at Scituate, Mass., June 26, 1703, graduated at Harvard in 1722. He was president of Yale College from 1739 to 1766. He was an eminent natural philosopher and astronomer. He published "The Nature and Foundation of Moral Virtue" (1765), a "History of Yale College" (1766), and other works. Died Jan. 7, 1767.

Clapp (THEODORE), an eloquent Unitarian minister, born in Easthampton, Mass., in 1792. He preached in New Orleans for about thirty-five years. Died in 1866.

Clap'perton (HUGH), CAPTAIN, a Scottish traveller and explorer of Africa, was born at Annan in 1788. In 1823 he accompanied Dr. Oudney and Denham in an expedition to Lake Tchad. Having returned to England in 1825, he soon renewed the enterprise in company with Richard Lander and others. His chief object was to discover the course of the Niger. He entered Africa at the Bight of Benin and penetrated to Saccatoo, where he was detained nearly a year by the sultan. He died near that place in April, 1827. (See R. LANDER, "Records of Captain Clapperton's Last Expedition," 1830.)

Claqua'to, a post-village, capital of Lewis co., Wash. Ter., on the Newaukum River, 35 miles S. by W. from Olympia.

Claque, clăk [a French word signifying the noise made in clapping the hands], a body of persons called "claqueurs," employed for securing the success of a performance

by bestowing applause upon it, and thus giving a false notion of the impression it has made. This artifice came first into operation in theatres and concert-rooms, and arose from friendly or party motives. It was in Paris that it was first turned into a trade. One Sauton, in 1820, established an office for the insurance of dramatic success, and was thus the organizer of the Parisian claque. The directors or managers of a theatre send an order to the office for whatever number of "claqueurs" they think necessary. Although no public offices of the kind have yet been established in the U. S., the artifice is extensively practised.

Cla'ra, a post-township of Potter co., Pa. Pop. 195.

Clare, a maritime county of Ireland, in Munster, is bounded on the N. W. by Galway Bay, on the E. and S. by the Shannon River, and on the W. by the Atlantic Ocean. Area, 1200 square miles. The surface is mostly hilly; the soil of the valleys is fertile. This county contains many small lakes. The principal rock is carboniferous limestone. Coal, copper, lead, and marble are found here. The staple products of the soil are oats, potatoes, wheat, and barley. Capital, Ennis. Pop. in 1871, 147,994.

Clare, a county in N. Central Michigan. Area, 576 square miles. It is intersected by the Muskegon River. The surface is nearly level, and mostly covered with forests. In this region the grayling is caught, hence it is a summer resort for sportsmen. It is intersected by the Flint and Pere Marquette R. R. Pop. 366.

Claremont, a township and post-village of Richland co., Ill., on the Ohio and Mississippi R. R. Pop. 1278.

Claremont, a post-township of Dodge co., Minn. Pop. 538.

Claremont, a pleasant post-village of Sullivan co., N. H., near the Vermont Central R. R., about 48 miles W. by N. from Concord. It has a national bank, and manufactures of cotton and wool. The Concord and Claremont R. R. passes through it. Claremont township is bounded on the W. by the Connecticut River. It has a savings bank, three paper-mills, a furnace, a water-wheel manufactory, a high school, and a library of 4000 volumes. It has three weekly, one semi-weekly, and one monthly newspaper. Pop. of township, 4053.

ED. CLAREMONT "COMPENDIUM."

Clar'ence, a post-village of Cedar co., Ia., on a branch of the Chicago and North-western R. R., 34 miles E. by S. from Cedar Rapids. It has one weekly newspaper. P. 726.

Clarence, a post-township of Calhoun co., Mich. Pop. 1075.

Clarence, a post-village of Clay township, Shelby co., Mo. It has one weekly newspaper. Pop. 444.

Clarence, a township and post-village of Erie co., N. Y. The village is near the New York Central R. R., and 15 miles N. E. of Buffalo. The township contains several villages, fifteen churches, and an academy. Pop. 3147.

Clarence, Duke of, a name sometimes given to the younger princes of the royal house of England. The title was derived from Clare or Clarence (Lat. *Clarentia*) in Suffolk. Some authorities, however, say it was derived from Clarenza in the Morea, of which an English knight was duke during the Crusades.

Clar'enceville, a port of entry and post-village of Missisquoi co., Quebec (Canada), near the Vermont line and the head of Lake Champlain. It has an academy.

Clarenceux, or **Clarencieux,** anciently **Surroy,** the first of the two provincial kings of arms in the English college of heralds, the second being Norroy. The jurisdiction of Clarenceux extends to the Trent, that of Norroy comprehending the portion N. of that river. Clarenceux is named after the duke of Clarence, third son of King Edward III. It is his duty to visit his province, to survey the coat-armor within it, to register descents and marriages, and to marshal funerals which are not under the direction of Garter king of arms, who is his superior, or of Bath king of arms, who manages the heraldry of the order of the Bath, and who has heraldic duties in Wales. Clarenceux also grants arms with the approval of the earl-marshal.

Clar'endon, a county in Central South Carolina. Area, 700 square miles. It is bounded on the S. and W. by the Santee River, and is drained by the Black River. The surface is undulating or level. Corn, rice, and cotton are the staple crops. Capital, Manning. Pop. 14,038.

Clarendon, a post-village, capital of Monroe co., Ark., on White River, 60 miles E. of Little Rock, and on the Arkansas Central R. R. at the junction of the Pine Bluff branch.

Clarendon, a township and village of Calhoun co., Mich. The village is on the Michigan Central R. R., 105 miles W. S. W. of Detroit. Pop. of township, 1150.

Clarendon, a township and post-village of Orleans co., N. Y. The village is 4 miles from the New York Central R. R., and 11 miles from Lake Ontario. Pop. of township, 1668.

Clarendon, a township and post-village of Rutland co., Vt. The village is on the Vermont Central R. R., 6 miles S. of Rutland. Clarendon has mineral springs, which are visited for the cure of kidney and skin diseases and other complaints. Pop. of township, 1173.

Clarendon, Constitutions of, a name given to certain laws made by a general council (or parliament) of the English barons and prelates at Clarendon, in Wiltshire, in 1164, whereby King Henry II. checked the power of the Church, and narrowed the exemption which the clergy had claimed from secular jurisdiction. These ordinances, sixteen in number, defined the limits of the patronage and jurisdiction of the pope, and provided that the Crown should be entitled to the election to vacant dignities in the Church. The constitutions were unanimously adopted, and Becket, the primate, reluctantly signed them. But they were at once rejected by Pope Alexander III. when sent to him for ratification, and Becket thereupon retracted his consent, and imposed upon himself the severest penances. This, and the other measures adopted by the archbishop to vindicate the independence of the clergy, led to disputes between him and the monarch. (See BECKET.) Notwithstanding the humiliation to which the king submitted after Becket's death, most of the provisions of the constitutions of Clarendon continued permanent.

Clarendon, EARLS OF (1776), Barons Hyde (1756, Great Britain).—EDWARD HYDE VILLIERS, fifth earl of this line, born Feb. 11, 1846, was M. P. for Brecon district 1869–70. He succeeded his father June 27, 1870.

Clarendon (EDWARD HYDE), FIRST EARL OF, an eminent English statesman and historian, born at Dinton, Wiltshire, Feb. 18, 1609. He was educated at Oxford, and studied law under his uncle, Nicholas Hyde, who became chief-justice. He was a member of the Long Parliament, which met in 1640, and he acted at first with the popular party, but when the civil war broke out in 1642 he attached himself to the royalist cause. He wrote several able state papers, which defended the policy of the king against the Parliament. In 1643 he was appointed chancellor of the exchequer and privy councillor. He accompanied Charles, prince of Wales, to Jersey in 1645–46, and served him as counsellor while he was an exile in France and Holland. On the restoration of Charles II. in 1660, Hyde became prime minister and lord chancellor of England, and in 1661 he was created earl of Clarendon. He opposed popery, and was more moderate than many of the royalists. In Aug., 1667, he was removed from office and impeached by the House of Commons, which condemned him to perpetual banishment. He died at Rouen in Dec., 1674. His daughter, Anne Hyde, was married to the duke of York (James II.). He left a "History of the Rebellion and Civil Wars" (1702). A complete edition with annotations by Bishop Warburton was published at Oxford in 1826. (See "Life of Edward, Earl of Clarendon," by himself, 1759; T. H. LISTER, "Life of Lord Clarendon," 3 vols., 1838.)

Clarendon (GEORGE WILLIAM FREDERICK VILLIERS), FOURTH EARL (of the Villiers family), born Jan. 12, 1800, was the eldest son of the Hon. George Villiers, who was a son of the earl of Clarendon. He was sent as ambassador to Madrid in 1833, and succeeded to the earldom on the death of his uncle in that year. In 1840 he became lord privy seal in the Whig ministry, which he resigned in 1841. He was president of the board of trade in the new ministry formed by Lord John Russell in 1846, and was appointed lord lieutenant of Ireland in 1847. He exhibited moderation, tact, and energy in the government of that island, which was then much agitated. Having been recalled in 1852, he entered the ministry of Lord Aberdeen in Jan., 1853, as secretary of foreign affairs. He retained this office in the cabinet of Lord Palmerston, who became premier early in 1855, and acquired a high reputation as a diplomatist. He resigned with his colleagues in 1858, and again became secretary of foreign affairs in Nov., 1865. The Liberal ministers resigned in consequence of the defeat of the Reform bill in June, 1866. Lord Clarendon was appointed secretary of foreign affairs by Mr. Gladstone in Dec., 1868. Died June 27, 1870.

Clarendon Press, a celebrated printing and publishing establishment connected with Oxford University, England. It was founded in 1672, and took its name from the fact that the printing-house, erected in 1711, was built from the profits arising from the sale of Clarendon's "History of the Rebellion," of which work the university has a perpetual copyright.

Clar'et [Fr. *vin de Bordeaux*], a name given in England and the U. S. to red French wines produced near Bordeaux. The French *clairet* signifies "pale wine."

Clar'idon, a township of Geauga co., O. Pop. 909.

Claridon, a township and village of Marion co., O., 7 miles E. of Marion. Pop. 1483.

Clarin'da, a post-village, capital of Page co., Ia., on the Nodaway River, 62 miles S. E. of Council Bluffs. It has two weekly newspapers, a woollen factory, and a national bank. Pop. 1022.

Cla'rinet', or **Clar'ionet'** [Fr. *clarinette*], a wind-instrument invented in Nuremberg in 1690. Its tone is produced by a thin piece of reed nicely flattened and fixed on the mouth-piece. On the body of the instrument there are holes and keys for the fingers of the performer. In fulness and variety of tone the clarinet is the most perfect of wind-instruments. Its construction, however, does not admit of every key in music being played on the same instrument.

Clar'ington, a post-village of Salem township, Monroe co., O. Pop. 728.

Clar'ion, or **Clar'in,** a species of trumpet more shrill in tone than the ordinary trumpet; also the name of an organ-stop.

Clar'ion, a county in the N. W. of Pennsylvania. Area, 600 square miles. It is intersected by the Clarion River, and bounded on the S. W. by the Alleghany River. The surface is hilly; the soil is generally fertile. Cattle, grain, and wool are raised extensively. Coal, petroleum, and iron are found here. Capital, Clarion. Pop. 26,537.

Clarion, a township and village of Bureau co., Ill., on the Chicago Burlington and Quincy R. R., about 18 miles N. E. of Princeton. Pop. 1023.

Clarion, a post-village in a township of the same name, capital of Wright co., Ia., about 85 miles N. of Des Moines. It has one weekly newspaper. P. 37; of township, 153. A. M. White, Pub. Wright County "Monitor."

Clarion, a post-borough, capital of Clarion co., Pa., is on the Clarion River, about 75 miles N. N. E. of Pittsburg. It has a national bank and three weekly newspapers. Carrier Seminary, a large institution of learning, is located here. The county of Clarion now produces a large amount of oil, and the county-seat is improving rapidly. Pop. of Clarion borough, 709; of township, 1059.

R. B. Brown, Ed. of "Democrat."

Clarion River, of Pennsylvania, rises in McKean co., flows nearly south-westward through Elk and Clarion counties, and enters the Alleghany River. Entire length, about 130 miles.

Clark, a county in the E. of Illinois. Area, 460 square miles. It is bounded on the S. E. by the navigable Wabash River. The surface is diversified by prairies and forests; the soil is fertile. Grain, cattle, live-stock, butter, tobacco, hay, and timber are largely produced. Coal is found here. The most numerous manufactories are those of carriages and wagons. It is intersected by the St. Louis Vandalia Terre Haute and Indianapolis R. R. Capital, Marshall. Pop. 18,719.

Clark, a county of Mississippi, bordering on Alabama. Area, 650 square miles. It is intersected by the Chickasawha River. The surface is undulating, the soil productive. Corn, wool, rice, and cotton are raised. It is traversed by the Mobile and Ohio R. R. Capital, Enterprise. P. 7505.

Clark, a county of the S. W. central part of Ohio. Area, 380 square miles. It is intersected by Mad River, and also drained by Lagonda Creek. The surface is finely diversified; the soil is very fertile. Wheat, corn, wool, butter, tobacco, and live-stock are largely produced. The manufacturing interests are varied and important; the most numerous are those of flour, agricultural tools, and carriages. It is traversed by the Atlantic and Great Western R. R. and several other railroads. Capital, Springfield. Pop. 32,070.

Clark, a county of the N. W. central part of Wisconsin. Area, 1584 square miles. It is intersected by Black River. The surface is uneven or hilly; the soil is productive. Lumber, wheat, oats, butter, and potatoes are produced. It is intersected by the West Wisconsin R. R. Capital, Neillsville. Pop. 3450.

Clark, a township of Greene co., Ark. Pop. 500.

Clark, a township of Johnson co., Ark. Pop. 1399.

Clark, a township of Pope co., Ark. Pop. 966.

Clark, a township of Johnson co., Ind. Pop. 1474.

Clark, a township of Montgomery co., Ind. Pop. 2175.

Clark, a township of Perry co., Ind. Pop. 1567.

Clark, a township of Tama co., Ia. Pop. 336.

Clark, a township of Faribault co., Minn. Pop. 347.

Clark, a township of Atchison co., Mo. Pop. 1276.

Clark, a township of Cole co., Mo. Pop. 800.

Clark, a township and village of Lincoln co., Mo., on the St. Louis Kansas City and Northern R. R., 135 miles N. W. of St. Louis. Pop. 1887.

Clark, a township of Union co., N. J. Pop. 331.

Clark, a township of Brown co., O. Pop. 1691.

Clark, a twp. of Harrison co., West Va. Pop. 2085.

Clark, a township of Randolph co., West Va. Pop. 496.

Clark (Abraham), an American patriot, born at Elizabethtown, N. J., Feb. 15, 1726. He was chosen a delegate to the Continental Congress in 1776, and signed the Declaration of Independence. He was re-elected to Congress. Died Sept. 15, 1794.

Clark (Alonzo), M. D., an eminent physician of New York City, graduated A. B. at Williams College 1828, took the degree of M. D. in the College of Physicians and Surgeons of New York in 1835, was for a time professor of pathology and materia medica in the Vermont Medical College at Burlington, professor of physiology and pathology in the New York College of Physicians and Surgeons from 1848 to 1855, professor of pathology and practical medicine in the same institution in 1855, which place he still holds. He was appointed physician to the Bellevue Hospital, New York, in 185–, and to St. Luke's Hospital, New York, in 1861. In 1853 he was elected president of the New York State Medical Society. No member of the profession in New York State or City enjoys a more honorable reputation. Dr. Clark has published valuable professional papers.

Clark (Alvan), born at Ashfield, Mass., Mar. 8, 1804, was an ingenious farmer's boy who became in youth an engraver for calico print-works at Lowell, Mass. He possessed native skill in portrait-painting, an art which he practised with great success, but when over forty years old he took up, with his sons, the construction of refracting telescopes. He was the first American who successfully made large achromatic lenses. In this department, and in the field of astronomical observation, he won great fame at home and abroad. He invented a valuable double eye-piece for measuring small arcs, and received in 1863 the La Lande prize of the French Academy of Sciences for his discoveries.

Clark (Charles E.), U. S. N., born Aug. 10, 1843, in Vermont, graduated at the Naval Academy, an ensign in 1863, became a master in 1866, a lieutenant in 1867, and a lieutenant-commander in 1868. He was attached to the steamer Ossipee from 1863 to 1865, participating in the battle of Mobile Bay, Aug. 5, 1864, and was commended for "zeal and energy" by his commanding officer, Commander William E. Leroy. Foxhall A. Parker, U. S. N.

Clark (Daniel), an American jurist, born at Stratham, N. H., Oct. 29, 1809, graduated at Dartmouth in 1834, was U. S. Senator from New Hampshire (1857–66), and judge of the U. S. district court in 1866.

Clark (Rev. Daniel A.), a Congregational preacher of uncommon pungency and power, born at Rahway, N. J., Mar. 1, 1779. Among other places he was settled for four years (1820–24) in Amherst, Mass., and rendered valuable service in starting the college there. His sermons were published in 3 vols. 12mo, 1836–37. Died in New York City Mar. 3, 1840.

Clark (Davis Wasgatt), D. D., a bishop of the Methodist Episcopal Church, born in Maine Feb. 25, 1812, graduated at Wesleyan University in 1836, became distinguished as a preacher, editor, and author. He became president of Lawrence University in 1852, president of Indiana Asbury University in 1853, and a bishop in 1864. He published an "Algebra" (1843), "Mental Discipline" (1848), "Man Immortal" (1864), and other works. Died May 23, 1871.

Clark (George Whitefield), D. D., an American clergyman, born Feb. 15, 1831, at South Orange, N. J., graduated at Amherst College in 1853, and at Rochester Theological Seminary in 1855. He was ordained Oct. 31, 1855, and became pastor of the Baptist church at New Market, N. J. In 1859 he accepted the pastorate of the First Baptist church at Elizabeth, N. J. About 1868 he became pastor at Ballston Spa, N. Y. In 1870 he published his "New Harmony of the Four Gospels" and his "Notes on Matthew," and near the close of 1872 "Notes on Mark." He is now engaged in preparing "Notes on the Gospels of Luke and John."

Clark (Horace F.), LL.D., born at Southbury, Conn., Nov. 29, 1815, was a son of the Rev. D. A. Clark. He graduated at Williams College in 1833, was admitted to the New York bar in 1837, and became a leading lawyer. He married in 1848 a daughter of Cornelius Vanderbilt. He was a Democratic member of Congress from New York

City (1856–61), after which he was a prominent and successful railroad president, banker, and stock operator. He was distinguished for energy, liberality, and agreeable social qualities. He also took a prominent part in the reform movement in N. Y. City in 1871–72. Died June 19, 1873.

Clark (Sir JAMES), BART., K. C. B., F. R. S., a physician, born at Cullen, Scotland, Dec. 14, 1788. He studied medicine at Edinburgh. About 1826 he settled in London, where he attained eminence as a physician. In 1829 he published an able work "On the Sanative Influence of Climate." He was appointed physician in ordinary to Queen Victoria in 1837. His "Treatise on Pulmonary Consumption" (1835) is highly esteemed. Died June 29, 1870.

Clark (Dr. JOHN), born in Bedfordshire, England, Oct. 8, 1609, emigrated to Massachusetts, but was driven to Rhode Island in 1638, and in the same year founded the first Baptist church at Newport. This church claims to be older than the first church at Providence, and therefore the first of that faith in the New World. Clark visited England in company with Roger Williams, and together they obtained from Charles II. the charter which secured civil and religious liberty to Rhode Island. Callender, in his history of that State, classes Clark with the ablest projectors and legislators of that commonwealth. While he was pastor at Newport he preached once at Lynn, Mass., for which he was imprisoned and fined twenty pounds, under the act of Nov. 15, 1644. Died April 20, 1676.

Clark (LABAN), D. D., a Methodist Episcopal minister, born at Haverhill, N. H., July 19, 1778, began to preach in 1800. He was one of the founders of the Wesleyan University at Middletown, Conn., and was for many years an able and influential preacher. Died Nov. 28, 1868.

Clark (LEWIS), U. S. N., born in 1845 in Connecticut, graduated at the Naval Academy in 1863, became a master in 1866, a lieutenant in 1867, and a lieutenant-commander in 1868. While attached to the steam-sloop Richmond he participated in the battle of Mobile Bay, Aug. 5, 1864, and was commended for "coolness and courage" by his commanding officer. FOXHALL A. PARKER, U. S. N.

Clark (LEWIS GAYLORD), an American writer, born at Otisco, N. Y., in 1810. He was for many years editor of the "Knickerbocker Magazine." He was a writer of much humor and pathos. His style was admirable and his temper genial. Died Nov. 3, 1873.

Clark (LINCOLN) was born in Massachusetts, but removed to Alabama, where he settled first in Pickens, then in Tuscaloosa, which, in 1845, sent him to the House. In 1848 he removed to Dubuque, Ia., from which he, in 1851, was elected to Congress.

Clark (MYRON), born at Hoosick, N. Y., Sept. 12, 1790, became a tanner of Bennington and Manchester, Vt., was (1824–29) an assistant judge of the county court, and became one of the governor's council (1829–31), judge of probate (1831–34), and State senator (1862–64). He was much interested in railroad affairs. Died Mar. 9, 1869.

Clark (THOMAS MARCH), D.D., LL.D. Cantab., Protestant Episcopal bishop of Rhode Island, was born at Newburyport, Mass., in 1812, graduated at Yale in 1831, received holy orders in 1836, became bishop in 1854. He has published several religious works, and is a popular and influential preacher.

Clark (WILLIS GAYLORD), an American poet, born at Otisco, N. Y., in 1810, was a twin-brother of Lewis Gaylord, noticed above. He wrote for the "Knickerbocker Magazine" a series of amusing articles called "Ollapodiana." Among his poems is "The Spirit of Life" (1833). In the latter part of his life he was the chief editor of the "Philadelphia Gazette." Died June 12, 1841.

Clarke, a county in the S. W. of Alabama. It is bounded on the S. E. by the Alabama River, and on the W. by the Tombigbee. The surface is moderately diversified; the soil is partly fertile and partly sandy. Cotton and corn are staple crops. Capital, Grove Hill. P. 14,663.

Clarke, a county in S. W. Central Arkansas. Area, 900 square miles. It is bounded on the E. by the Washita River, and on the S. and W. by the Little Missouri. The surface is undulating; the soil fertile. Wheat, corn, cattle, wool, and cotton are produced. Timber and minerals abound, and lime is extensively burned. The Cairo and Fulton R. R. traverses the county. Capital, Arkadelphia. Pop. 11,953.

Clarke, a county in N. E. Central Georgia. Area, 280 square miles. It is intersected by the Oconee River. The surface is hilly. Gold, granite, kaolin, and pyrites are found here. Wheat, wool, corn, and cotton are the chief products. Capital, Watkinsville. Pop. 12,941.

Clarke, a county of Indiana, bordering on Kentucky. Area, 400 square miles. It is bounded on the S. E. by the Ohio River. The surface is nearly level; the soil fertile. Wool, cattle, grain, and tobacco are extensively raised. It is intersected by the railroad which connects Indianapolis with Louisville, and also by the Louisville division of the Ohio and Mississippi R. R. and the Louisville New Albany and Chicago R. R. The manufacture of cooperage is important. Capital, Charlestown. Pop. 24,770.

Clarke, a county in the S. of Iowa. Area, 432 square miles. It is drained by the Whitebreast River and several creeks. The surface is undulating; the soil fertile. Wheat, corn, and wool are largely produced. It is intersected by the Burlington and Missouri River R. R. Capital, Osceola. Pop. 8735.

Clarke, a county in E. Central Kentucky. Area, 210 square miles. It is bounded on the S. by the Kentucky and Red rivers. The surface is uneven; the soil is productive. Live-stock, wool, grain, and tobacco are staple products. Capital, Winchester. Pop. 10,882.

Clarke, a county which forms the N. E. extremity of Missouri. Area, 516 square miles. It is bounded on the N. E. by the Des Moines River, and on the E. by the Mississippi. It is intersected by the Fox and Wyaconda rivers. The surface is undulating; the soil fertile. Grain, tobacco, cattle, and wool are largely raised. It is intersected by the Missouri Iowa and Nebraska R. R. Capital, Waterloo. Pop. 13,667.

Clarke, a county in the N. of Virginia. Area, 208 square miles. It is intersected by the Shenandoah River, and is part of the Great Valley of Virginia. The Blue Ridge extends along the south-eastern border. The soil is based on limestone, and is fertile. Grain, stock, and wool are the staple products. Capital, Berryville. Pop. 6670.

Clarke, a county in the S. W. of Washington Territory. Area, 1350 square miles. It is bounded on the S. by the Columbia River, which also forms half of the western boundary, and it is intersected by the Cathlapootle River. The surface is partly mountainous. Wheat, wool, and cattle are raised. Capital, Vancouver. Pop. 3081.

Clarke, a township of Chariton co., Mo. Pop. 939.

Clarke, a township of Clinton co., O. Pop. 1877.

Clarke, a township of Coshocton co., O. Pop. 867.

Clarke (ADAM), LL.D., a celebrated Wesleyan divine and commentator, was born at Moybeg, Ireland, in 1760. He was educated at Wesley's Kingswood school, sent out by Wesley as an itinerant preacher in 1782, president of the Wesleyan Conference in 1806, 1814, 1822, became eminent for his Oriental and biblical learning, and published a "Bibliographical Dictionary" (6 vols. 12mo, 1802); "Bibliographical Miscellany" (2 vols., 1806); "Succession of Sacred Literature" (1808); "Commentary on the Bible" (1810–25); "Rymer's Fœdera" (1819); "Wesley Family;" sermons and miscellaneous works, published since his death, 13 vols. 8vo. Died in 1832.

Clarke (DORUS), D. D., a Congregational minister, born in Westhampton, Mass., Jan. 2, 1797, graduated at Williams College in 1817, and became an influential and able editor and author of religious and denominational literature.

Clarke (GEORGE ROGERS), an American general, born in Virginia Nov. 19, 1752. He took a British fort at Vincennes in 1779, and served against Benedict Arnold in Virginia in 1780. He became a brigadier-general in 1781, and after peace was concluded in 1783 settled in Kentucky. Died Feb. 13, 1818.

Clarke (HENRY F.), an American officer, born in 1820 in Pennsylvania, graduated at West Point in 1843, and became, June 29, 1864, assistant commissary-general of subsistence, rank of lieutenant-colonel, and colonel A. D. C. Sept. 28, 1861, U. S. volunteers, having been in the artillery till 1857. He served at seaboard posts 1843–45; in military occupation of Texas 1845–46; in war with Mexico 1846–48, engaged at Palo Alto, Resaca de la Palma, Monterey, Vera Cruz, Cerro Gordo, Amazoque, San Antonio, Churubusco, Molino del Rey (wounded), Chapultepec (brevet captain), and the city of Mexico; as assistant instructor at the Military Academy 1848–51; in Florida hostilities 1851–52; as adjutant Second Artillery 1852–55; as instructor of artillery and cavalry at the Military Academy 1855–56; as chief of commissariat on Utah expedition 1857–60; and assistant in commissary department at Washington, D. C., 1860–61. In the civil war was chief commissary of the department of Florida 1861, engaged in defence of Fort Pickens; of Army of Potomac in its various operations 1861–64 (brevet colonel and brigadier-general); as purchasing commissary at New York, in charge of subsistence supplies for the States of Connecticut, New York, and New Jersey 1864–67. Brevet major-general Mar. 13, 1865, for faithful and meritorious services in the subsistence department. Since 1867 chief commissary division of the Missouri. GEORGE W. CULLUM, U. S. A.

Clarke (James Freeman), D. D., an eminent American Unitarian preacher, editor, and author, born at Hanover, N. H., April 4, 1810, since 1841 settled in Boston, Mass. Besides other works he has published "Service-Book and Hymn-Book for the Church of the Disciples" (1844–56), "Christian Doctrine of Forgiveness" (1852), "Christian Doctrine of Prayer" (1854), "Orthodoxy" (1866), "Steps of Belief" (1870), and "Ten Great Religions" (1871).

Clarke (John A.), D. D., an Episcopalian divine, born at Pittsfield, Mass., May 6, 1801, graduated at Union College in 1823, became rector of St. Andrew's Church, Philadelphia, and was a popular pulpit orator and writer of religious works. Died Nov. 27, 1843.

Clarke (Mary Cowden), an English authoress, a daughter of Vincent Novello, the composer, was born in London June 22, 1809. She was married in 1828 to Charles Cowden Clarke. Among her works are "The Complete Concordance of Shakspeare" (1846), a work remarkable for completeness and accuracy, and "World-Noted Women" (1858).

Clarke (Richard H.), LL.D., born at Washington, D. C., in 1827, graduated at Georgetown College, D. C., in 1846. He has been a lawyer and *littérateur* of Washington, D. C., and of New York. As a writer he has given much labor to the preparation of biographies of American Roman Catholics; his principal work is "The Lives of the Deceased Bishops" of his Church in this country (2 vols. 8vo, 1872).

Clarke (Samuel), D. D., an English philosopher and theologian, born at Norwich Oct. 11, 1675. He was educated at Cambridge. He published in 1704 his "Demonstration of the Being and Attributes of God," his chief work. He became in 1706 chaplain to Queen Anne and rector of St. James, London. In 1712 he published "The Scripture Doctrine of the Trinity," on which point his opinions were semi-Arian. He defended the Newtonian philosophy against Leibnitz, with whom he corresponded. The correspondence was published in 1717. His edition of Homer, with a Latin version and notes, was extensively used by students. Died May 17, 1729. (See Hoadley, "Life of S. Clarke;" William Whiston, "Historical Memoirs of Samuel Clarke," 1748.)

Clarke (William), an American general and explorer, born in Virginia Aug. 1, 1770, was a brother of George Rogers Clarke. Associated with Captain Lewis, he conducted an exploring expedition across the continent to the mouth of the Columbia River in 1804. He was afterwards raised to the rank of brigadier-general, and was governor of Missouri Territory from 1813 to 1820. Died Sept. 1, 1838.

Clarke (William Cogswell), born at Atkinson, N. H., in 1810, graduated at Dartmouth in 1832, and at the Law School in Cambridge, Mass. He practised law at Laconia and Manchester, N. H. He held, among other offices, that of judge of probate and attorney-general of New Hampshire. Died April 25, 1872.

Clarke River, or **Flathead River,** rises in the Rocky Mountains, in the W. part of Montana. It flows north-westward, traverses the northern part of Idaho, and enters Washington Territory. Near the northern boundary of Washington it enters the Columbia. Entire length, about 650 miles. Gold is found near this river in Montana.

Clarke's Creek, a township of Morris co., Kan. Pop. 320.

Clarkesville, a post-village, capital of Habersham co., Ga., is on the Chattahoochee River near its source, about 85 miles N. E. of Atlanta. It has four churches. Pop. 263.

Clarkesville. See Clarksville.

Clarks'burg, a post-village of Collingwood township, Grey co., Ontario (Canada), on Beaver River, 1 mile from Georgian Bay. It has woollen mills and other manufactures, and a postal savings bank. Pop. about 300.

Clarksburg, a post-township of Montgomery co., Md. Pop. 3064.

Clarksburg, a township of Berkshire co., Mass. Lumber, gunpowder, and brick are manufactured. Pop. 686.

Clarksburg, capital of Harrison co., W. Va., on the Monongahela, at the confluence of the Fork and Elk rivers, and on the Baltimore and Ohio R. R. It is situated in a coal-region, and has two banks, two academies, three newspapers, and numerous manufactories.

C. W. Walters, Ed. Clarksburg "Conservative."

Clarks'dale, a township of Coahoma co., Miss. Pop. 1931.

Clark's Fac'tory, a post-village of Middletown township, Delaware co., N. Y., has extensive tanneries.

Clarks'field, a post-township of Huron co., O. P. 1062.

Clark's Fork, a post-township of Cooper co., Mo. Pop. 1126.

Clark's Mills, a post-village of Kirkland and Whitestown townships, Oneida co., N. Y., has a cotton-factory and other manufacturing interests. Pop. 420.

Clark'son, a post-township of Monroe co., N. Y. Pop. 1884.

Clarkson (Thomas), an English philanthropist, born at Wisbeach, in Cambridgeshire, Mar. 28, 1760. He was educated in the University of Cambridge, where he wrote in 1786 a Latin prize-essay on the question, "Is Involuntary Servitude Justifiable?" He was so deeply interested in that subject that he resolved to devote his life chiefly to the abolition of the slave-trade and the relief of the oppressed. He became an associate of William Dillwyn, George Harrison, and other members of the Society of Friends, who had previously formed themselves into an anti-slavery committee. Mr. Wilberforce co-operated, and was the chief advocate of the cause in Parliament. Clarkson diligently collected and diffused information about the slave-trade. Their efforts excited violent opposition, and were several times defeated in Parliament, but finally an act to abolish the slave-trade was passed in Mar., 1807. He published in 1808 "The History of the Abolition of the Slave-Trade." In 1823 he was chosen president of the Anti-Slavery Society. Among his works is a "Memoir of the Life of William Penn" (1813). Died Sept. 26, 1846.

Clark's Sta'tion, a township of Washoe co., Nev. Pop. 16.

Clarks'ton, a post-village of Independence township, Oakland co., Mich. Pop. 471.

Clarks'town, the capital of Rockland co., N. Y., is 3 miles W. of the Hudson River and 35 miles N. of New York. It is sometimes called New City. The name of the post-office is Clarkstown. Pop. of Clarkstown township, 4137.

Clarks'ville, a township of Clarke co., Ala. Pop. 200.

Clarksville, a post-village, capital of Johnson co., Ark., about 3 miles N. of the Arkansas River and 100 miles W. N. W. of Little Rock. Pop. 466.

Clarksville, a post-village of Butler co., Ia. It has one weekly newspaper.

Clarksville, a post-village of Calumet township, Pike co., Mo. It has one weekly newspaper. Pop. 1152.

Clarksville, a post-township of Coos co., N. H. Pop. 269. It has manufactures of starch.

Clarksville, a post-village of New Scotland township, Albany co., N. Y. Pop. 236.

Clarksville, a township of Allegany co., N. Y., has manufactures of pine lumber. Pop. 784.

Clarksville, a village of Brookfield township, Madison co., N. Y., has several large manufactories, and is the seat of Brookfield Academy. Pop. 322.

Clarksville, a township of Davie co., N. C. Pop. 919.

Clarksville, a borough of Mercer co., Pa., on the Atlantic and Great Western R. R., about 22 miles N. W. of Mercer. Pop. 359.

Clarksville, a post-village, capital of Montgomery co., Tenn., on the Cumberland River and the Memphis and Louisville R. R., 199 miles N. E. of Memphis and 50 miles N. W. of Nashville. It has a male and female academy, a national bank, two weekly newspapers, various manufactories, three tobacco warehouses, and ships 15,000 hogsheads of tobacco a year. There are iron-mines in the vicinity. Pop. 3200.

Ingram & Doak, Props. "Tobacco Leaf."

Clarksville, the county-seat of Red River co., Tex., is the oldest town in Northern Texas. The Trans-Continental R. R. runs through it. It has several schools and churches, Protestant and Catholic. It is 350 miles N. of Galveston, in the N. E. corner of the State, and is the centre of a very rich country. It has two weekly papers. Pop. 613.

Ed. "Standard."

Clarksville, a post-village of Mecklenburg co., Va., on the Roanoke River at the junction of the Dan and Staunton, 102 miles S. W. of Richmond. It has a State bank, a building and loan association, six tobacco warehouses, and one newspaper, and is the terminus of the Roanoke Valley R. R. from Keysville on the Richmond and Danville R. R. Pop. of township, 3700.

Wm. Townes, Jr., Ed. "Roanoke Valley."

Clar'no, a post-township of Green co., Wis. P. 1637.

Cla'ry (*Salvia Sclarea*), a plant of the order Labiatæ, and of the same genus with sage; it is a native of Southern Europe, and cultivated in gardens for its aromatic proper-

ties. The seed is sown in spring, and the plants flower in the second year. Clary is stimulating and antispasmodic. It has an odor resembling that of balsam of Tolu, and is used for seasoning soups and for flavoring.

Class [Lat. *classis*], a term applied in natural history to a large group of plants or animals formed by the reunion or association of several orders. Classes, orders, genera, and species are common to all methods of classification. The term *class* is also used to denote a portion of society separated from other portions by some distinction of rank, fortune, or more intrinsic qualities. (For the well-defined classes of the Hindoos, see CASTE.)

Clas'sic, or **Clas'sical** [Lat. *classicus,* from *classis,* a "rank" or "class"], pure, refined; conformed to the best and most perfect standard; also pertaining to the ancient Greek or Latin authors, or rendered famous by association with ancient writers, as "classic ground." The ancient Roman people were divided into six classes, and the persons of the first or highest class were called *classici.* Hence the term came to signify the highest and purest class of writers in any language, though formerly it was applied only to the most esteemed Greek and Latin authors. The epithet "classical," as applied to ancient writers, is determined less by the purity of their style than by the period at which they wrote. The classical age of Greek literature begins with Homer, the earliest Greek writer whose works are extant, and extends perhaps to the time of the Roman emperor Antonine, but signs of decadence appeared about 300 B. C. The Latin classical period is shorter; its earliest writer is Plautus, and it ended about 200 A. D. Some critics, however, include Claudian, who was born about 365 A. D., among the classics.

Classifica'tion [from the Lat. *classis,* a "class," and *facio,* to "make"], literally, the "making of classes" or the act of classifying, has various applications in science and art. In natural history it is the grouping of the various species under their proper genera, families, orders, classes, etc. Thus, all material bodies are arranged under the three kingdoms—viz., animal, vegetable, and mineral (the last-named kingdom including every inorganic substance found in a state of nature, comprising not merely what are popularly termed minerals, but also air and water).

Again, for the sake of illustration, we will consider the classification of the animal kingdom. This is usually divided by naturalists into four great sections, termed "grand divisions"—namely, Vertebrata (or vertebrates), Articulata (or articulates), Mollusca (or mollusks), and Radiata (or radiates). Each of these grand divisions is subdivided into classes. Thus, all the vertebrates are sometimes grouped under four great classes—namely, mammals, birds, reptiles, and fishes, while each of these classes is further divided into orders, families, genera, and species.

In geology, classification denotes the grouping of the various kinds of rock, either according to their composition or according to the period in which they are supposed to have been formed. (See GEOLOGY.)

In æsthetics, classification is an arrangement by which works of art are distributed into certain classes; as, for instance, in galleries of paintings the works should be arranged according to the schools, each school being subject to a chronological order of the masters. In numismatology the coins should be arranged by countries, and these again by the chronological order of the monarchs; and so with other branches of the arts.

Clas'sis [Lat., a "class"], in the Reformed churches in America and in Holland a church court corresponding to the presbytery in Presbyterian churches. It is composed of the pastors and a number of elders of a certain district. The classis hears appeals from the consistories, and appeal from the classis is to a particular synod. The classis also confirms and dissolves pastoral connections, ordains and deposes ministers, sends two ministers and two delegates to the synod, and three ministers and three delegates to the general synod.

Clat'sop, a county which forms the N. W. extremity of Oregon. Area, 1050 square miles. It is bounded on the N. by the Columbia River, on the S. by the Nehalem, and on the W. by the Pacific Ocean. The surface is partly mountainous; the soil fertile. Wheat, cattle, wool, and lumber are produced. Capital, Astoria. Pop. 1255.

Claude (JEAN), an eminent French Protestant theologian, born near Agen in 1619. He was distinguished for eloquence and wisdom, and had several doctrinal disputes with Bossuet. In 1666 he became pastor of the Protestant church at Charenton, near Paris. Among his works is a "Defence of the Reformation" (1673). When the Edict of Nantes was revoked (1685) he removed to the Hague, where he died in 1687.

Claude Lorrain. See GELÉE (CLAUDE).

Claudia'nus (CLAUDIUS), a Latin epic poet, born at Alexandria about 365 A. D. He became a resident of Rome, and gained the favor of Stilicho. His poems were so popular that a statue was erected to him in Rome by the senate and the emperor. Among his works are "The Rape of Proserpine," "The Battle of the Giants," and a "Eulogy of Stilicho" ("De Laudibus Stilichonis"). Died after 408 A. D. He had a fertile imagination, and is regarded as the last of the classical Latin poets. (See T. MAZZO, "Vita di Claudiano," 1668.)

Clau'dius, or, more fully, **Tiberius Claudius Drusus Nero,** the fourth emperor of Rome, was born at Lugdunum (Lyons) in 10 B. C. He was a son of Drusus Nero, and a nephew of the emperor Tiberius. He was naturally infirm in body, and his education was neglected. On the death of Caligula (who was his nephew) he was proclaimed emperor by the army in 41 A. D., and was unwillingly recognized by the senate, who preferred a republic. He began his reign with a show of clemency, but his wife, the infamous Messalina, acquired great power, which she abused by acts of cruelty. He built a great aqueduct called Aqua Claudia, and successfully invaded Britain in person. He was poisoned in 54 A. D. by his wife Agrippina. (See SUETONIUS, "Claudius;" "TACITUS, "Annales.")

Claudius (APPIUS), surnamed CRASSUS, a Roman patrician and decemvir, was elected consul in 451 B. C. He rendered himself infamous by an attempt to enslave and dishonor Virginia. For this offence he was imprisoned. According to Livy, he committed suicide. (See ARNOLD, "History of Rome.")

Claudius (MARCUS AURELIUS), surnamed GOTHICUS, an emperor of Rome, was born in Illyricum in 214 A. D. He was proclaimed emperor by the army on the death of Gallienus (268 A. D.), and their choice was ratified by the senate. He defeated the rebel Aureolus in the same year, and gained a victory over the Goths or Scythians in Servia in 269. He died at Sirmium in 270 A. D., and was succeeded by Aurelian.

Clau'dius Cæ'cus (APPIUS), a Roman patrician who was censor about 310 B. C. He constructed the great road called Via Appia from Rome to Capua. He was afterwards consul, and became blind (hence his name Cæcus). He wrote a legal work and a poem.

Clau'dius Pul'cher (APPIUS), a Roman patrician, was a brother of P. Clodius the demagogue, whom Milo killed. He became consul in 53 B. C., and censor in the year 50. During his censorship he expelled Sallust the historian from the senate. He was an adherent of Pompey in the civil war. Died about 48 B. C.

Claudius Pulcher (PUBLIUS), a Roman general, was a son of Appius Claudius Cæcus, noticed above. He was noted for his pride. During the first Punic war he was elected consul for 249 B. C., and took the command of the fleet. He was defeated by the Carthaginians in a naval battle.

Clau'sen (HENRIK NICOLAI), an able Danish theologian and liberal statesman, born in the island of Laaland April 22, 1793. He became in 1820 professor of theology in the University at Copenhagen, and wrote, besides other works, "Popular Discourses on the Reformation" (1836). In 1840 he was chosen a deputy to the States, and near the end of 1848 was appointed minister of Denmark without a portfolio.

Clau'sewitz, von (KARL), a Prussian general and writer on war, was born at Burg June 1, 1780. He served on the staff of the Russian army in 1813, and wrote an "Account of the Campaign of 1813" (1814). He died Nov. 16, 1831, and his posthumous works were published in 10 vols. (1832–37; 3d ed. 1869).

Clau'sius (RUDOLF JULIUS EMANUEL), a prominent physicist, born Jan. 2, 1822, became in 1855 professor at the Polytechnic Institution of Zurich, in 1867 at the University of Würzburg, and in 1869 at that of Bonn. He obtained distinction by mathematical calculations based upon the dynamical theory of heat—calculations which, it is claimed, show the necessity of a Creator and the possibility of miracles. These calculations have received the approval of many scholars.

Claus'thal, a town of Germany, in the province of Hanover, is situated on a hill 1740 feet above the level of the sea, and about 56 miles S. S. W. of Hanover. It is the chief mining town of the Hartz, and has a mint, a mining academy, a gymnasium, and a valuable museum; also manufactures of camlet and other fabrics. Silver and lead are mined in the vicinity. Pop. in 1871, 9138.

Cla'verack, a post-village and township of Columbia co., N. Y. The village is on the Hudson and Chatham branch of the Boston and Albany R. R., 4 miles S. E. of

Hudson. It is the seat of Claverack Academy and the Hudson River Collegiate Institute, a very flourishing institution. The township contains Philmont and Smoky Hollow, important factory villages. Pop. of township, 3671.

Clav'icle [from the Lat. *clavicula*, a diminutive of *clavis*, a "key" (perhaps because it "locks" or "makes fast" the scapula with the sternum)], or **Collar-bone,** a bone which, with the scapula and the head of the humerus, forms the shoulder. In man it is horizontal and immediately above the first rib, and articulates internally with the sternum or breast-bone, and externally with the acromion process of the scapula. Its office is to keep the shoulders apart, and to afford a fulcrum by which the muscles give lateral movement to the arm. It is absent in those animals in which the movement of the fore limbs is only backward and forward, as in the ox, the horse, etc.; it is present in all Quadrumana and in those Rodentia in which the anterior extremities are used for prehension, as the squirrel; it exists in the bat, mole, and hedgehog. In the mole it is a cube, very short, broad, and of extreme strength. In many Carnivora the clavicle is a small bone suspended (like the hyoid bone) amongst muscles, and not connected with the sternum or the scapula. In birds, to counteract the tendency of the pectoral muscles to approximate the shoulders, the clavicles are large, and united at an angle in the median line into a single bone, the "furculum," popularly called the "merry-thought" or "wish-bone." In this class of animals additional support to the anterior extremity is afforded by the extension of the coracoid process of the scapula into a broad thick "coracoid bone." This bone presents various modifications in reptiles, fishes, and certain mammals.

In man the ossification of the clavicle takes place sooner than that of any other bone, commencing the thirtieth day after conception; and at birth it is ossified in nearly its whole extent; but the sternal end is not complete till the eighteenth or nineteenth year. The clavicle in transcendental anatomy is considered to be the hæmapophysis of the atlas.

Clay [Ang.-Sax. *clæg;* Fr. *argille;* Lat. *argilla*], a term applied to those kinds of earth which when moist have a notable degree of tenacity and plasticity. Clays are not easily definable as minerals, but they appear to owe their origin to the decomposition of other minerals, such as felspar, etc., and consist largely of alumina, with silica and water. They owe their plasticity to the alumina which they contain. (See ALUMINA and KAOLIN.) Common clay, when sufficiently plastic, is of great use for making bricks, tiles, etc. Clay is used in plastic art as a means of adjusting the form which is to be given to any work in the more enduring material of which it is ultimately to be composed. As modelling clay is apt to crack, it must be kept damp by sprinkling it or by covering it with a wet cloth when the artist is not at work. Clays of the finer sorts are much used in making pottery, porcelain, etc. These are called fictile clays.

Argillaceous earth not unfrequently contains 40 per cent. of alumina, but generally the proportion is much smaller. The felspar which yields the alumina of clay soils contains also soda and potash, substances essential to vegetation, and which render clays fertile under cultivation. A mixture of calcareous matter exercises a favorable influence on crops. Thorough drainage has greatly increased the value of clay soils under cultivation. Wheat, beans, and clover are crops which they yield in great perfection. Chemical investigations have shown that clay soils have remarkable powers for absorbing ammonia and other substances which constitute the food of plants. On account of these powers dry argillaceous earth is an excellent disinfectant.

Clay, a county in the E. of Alabama. Area, 600 square miles. It is drained by several creeks, affluents of the Tallapoosa River. The surface is undulating; the soil fertile. Corn, tobacco, cotton, and wool are staple products. Capital, Ashland. Pop. 9560.

Clay, a county in the S. E. of Dakota. Area, 396 square miles. It is bounded on the S. by the Missouri, and is intersected by the Vermilion River. The soil is fertile, consisting of rolling prairie ("bench-land") and river-intervale ("bottom-land"). Wheat, oats, and hay are the chief crops. There is considerable timber in the county. It is intersected by the Dakota Southern R. R. Capital, Vermilion. Pop. 2621.

Clay, a county in the N. E. of Florida. Area, 430 square miles. It is bounded on the E. by the St. John's River. The surface is nearly level, and is heavily timbered. Cotton, sugar-cane, fruit, and rice are raised. Capital, Green Cove Spring. Pop. 2098.

Clay, a county of Georgia, bordering on Alabama. It is bounded on the W. by the Chattahoochee River. The surface is nearly level; the soil fertile. Cotton, wool, rice, and corn are staple products. It is intersected by the South-western R. R. Capital, Fort Gaines. Pop. 5493.

Clay, a county in the S. E. of Illinois. Area, 450 square miles. It is intersected by the Little Wabash River. The surface is nearly level; the soil is fertile. Grain, hay, wool, butter, tobacco, and live-stock are raised. It is traversed by the Ohio and Mississippi and the Springfield and Illinois South-eastern R. Rs. Capital, Louisville. P. 15,875.

Clay, a county in the W. of Indiana. Area, 360 square miles. It is drained by the Eel River. The surface is nearly level; the soil is fertile. Grain, hay, butter, and stock are largely raised. Timber, coal, and iron are found here. Clay county is intersected by the Indianapolis and St. Louis and the Terre Haute and Indianapolis R. Rs. Capital, Bowling Green. Pop. 19,084.

Clay, a county in the N. W. part of Iowa. Area, 576 square miles. It is intersected by the Little Sioux River. The soil is productive. Grain, live-stock, and hay are the chief products. Capital, Peterson. Pop. 1523.

Clay, a county in the N. N. E. of Kansas. Area, 720 square miles. It is intersected by the Republican River. The surface is undulating; the soil is fertile. Wheat, corn, and cattle are the chief products. It is intersected by a branch of the Kansas Pacific R. R. Capital, Clay Centre. Pop. 2942.

Clay, a county in the S. E. of Kentucky. Area, 600 square miles. It is intersected by the South Fork of the Kentucky River. The surface is mountainous. Coal and iron are found here, and salt is produced from salt-wells. Wool, corn, and tobacco are staple products. Capital, Manchester. Pop. 8297.

Clay, a county of Minnesota, bordering on Dakota. Area, about 900 square miles. It is bounded on the W. by the Red River of the North, and also drained by Buffalo River. The surface is nearly level; the soil is based on limestone, and is fertile. This county contains extensive prairies. It is intersected by the Northern Pacific R. R. Pop. 92.

Clay, a county in the W. N. W. of Missouri. Area, 415 square miles. It is bounded on the S. by the Missouri River. The surface is undulating; the soil is fertile. Grain, flour, wool, and tobacco are staple products. Limestone and sandstone occur here as surface-rocks. It is intersected by the Kansas City branch of the Hannibal and St. Joseph R. R., also by the St. Louis Kansas City and Northern R. R. Capital, Liberty. Pop. 15,564.

Clay, a county in the S. E. of Nebraska. Area, 576 square miles. It is drained by the Little Blue River and the West Fork of Big Blue. The surface is undulating; the soil fertile. Limestone abounds here. It is intersected by the Burlington and Missouri River R. R. in Nebraska. Capital, Sutton. Pop. 54.

Clay, a county in the W. of North Carolina. Area, 200 square miles. It is drained by the Hiawassee River. The surface is hilly. Corn, tobacco, and wool are the chief products. Capital, Hayesville. Pop. 2461.

Clay, a county of Tennessee, bordering on Kentucky. It is intersected by the Cumberland River. The surface is undulating; the soil fertile. It is a good region for grazing, as well as for grain crops. It was organized since the census of 1870. Capital, Celina.

Clay, a county in the N. of Texas. Area, 1100 square miles. It is bounded on the N. by the Red River, and intersected by the Little Wichita. It is a stock-raising region, but is adapted to grain. The bottom-lands are well timbered. The surface is rough and broken. Capital, Henrietta. Returned as having no population in the U. S. census of 1870.

Clay, a county of the central part of West Virginia. Area, 400 square miles. It is intersected by the Elk River, and contains large amounts of cannel and bituminous coal, with iron and salt. The surface is broken, the soil good and well timbered. Grain, cattle, and tobacco are raised. Capital, Marshall or Clay Court-house. Pop. 2196.

Clay, a township of Bradley co., Ark. Pop. 630.

Clay, a township of Columbia co., Ark. Pop. 357.

Clay, a township of Izard co., Ark. Pop. 275.

Clay, a township of White co., Ark. Pop. 517.

Clay, a township of Bartholomew co., Ind. Pop. 778.

Clay, a township of Carroll co., Ind. Pop. 949.

Clay, a township of Cass co., Ind. Pop. 814.

Clay, a township of Dearborn co., Ind. Pop, 1269.

Clay, a township of Decatur co., Ind. Pop. 2065.

Clay, a township of Hamilton co., Ind. Pop. 1413.

Clay, a township of Hendricks co., Ind. Pop. 1571.

Clay, a township of Howard co., Ind. Pop. 1350.
Clay, a township of Kosciusko co., Ind. Pop. 1973.
Clay, a township of La Grange co., Ind. Pop. 1248.
Clay, a township of Miami co., Ind. Pop. 972.
Clay, a township of Morgan co., Ind. Pop. 1234.
Clay, a township of Owen co., Ind. Pop. 1284.
Clay, a township of Pike co., Ind. Pop. 747.
Clay, a township of Spencer co., Ind. Pop. 1385.
Clay, a township of St. Joseph co., Ind. Pop. 1442.
Clay, a township of Wayne co., Ind. Pop. 1094.
Clay, a township of Clay co., Ia. Pop. 310.
Clay, a township of Grundy co., Ia. Pop. 329.
Clay, a township of Hardin co., Ia. Pop. 1394.
Clay, a township of Harrison co., Ia. Pop. 456.
Clay, a township of Jones co., Ia. Pop. 925.
Clay, a township of Marion co., Ia. Pop. 1372.
Clay, a township of Shelby co., Ia. Pop. 129.
Clay, a post-township of Washington co., Ia. P. 788.
Clay, a township of Wayne co., Ia. Pop. 473.

Clay, a township and village of St. Clair co., Mich. The village is on the St. Clair River, 30 miles N. E. of Detroit. Pop. 1475.

Clay, a township of Adair co., Mo. Pop. 1340.
Clay, a township of Atchison co., Mo. Pop. 1673.
Clay, a post-township of Clarke co., Mo. Pop. 1119.
Clay, a township of Douglas co., Mo. Pop. 333.
Clay, a township of Dunklin co., Mo. Pop. 1426.
Clay, a township of Greene co., Mo. Pop. 840.
Clay, a township of Harrison co., Mo. Pop. 911.
Clay, a township of Holt co., Mo. Pop. 887.
Clay, a township of La Fayette co., Mo. Pop. 3508.
Clay, a township of Linn co., Mo. Pop. 939.
Clay, a township of Monroe co., Mo. Pop. 1518.
Clay, a township of Ralls co., Mo. Pop. 1701.
Clay, a township of Shelby co., Mo. Pop. 1433.
Clay, a township of Sullivan co., Mo. Pop. 877.

Clay, a township and post-village of Onondaga co., N. Y. The village is on the Syracuse Northern R. R., 10 miles N. W. of Syracuse. The township has five churches, several villages, and is one of the best farming towns in the State. Pop. 3156.

Clay, a township of Guilford co., N. C. Pop. 835.
Clay, a township of Auglaize co., O. Pop. 1095.
Clay, a township of Gallia co., O. Pop. 1400.
Clay, a township of Highland co., O. Pop. 1345.
Clay, a township of Knox co., O. Pop. 940.
Clay, a township of Montgomery co., O. Pop. 2541.
Clay, a township of Muskingum co., O. Pop. 776.
Clay, a township of Ottawa co., O. Pop. 2174.
Clay, a township of Scioto co., O. Pop. 927.
Clay, a township of Tuscarawas co., O. Pop. 1205.
Clay, a township of Butler co., Pa. Pop. 1062.
Clay, a township of Huntingdon co., Pa. Pop. 814.
Clay, a township of Lancaster co., Pa. Pop. 1440.
Clay, a township of Hanover co., Va. Pop. 3085.
Clay, a township of Braxton co., West Va. Pop. 2164.
Clay, a township of Hancock co., West Va. Pop. 1507.
Clay, a township of Harrison co., West Va. Pop. 1574.
Clay, a township of Marshall co., West Va. Pop. 1005.

Clay, a township of Monongalia co., West Va. Pop. 1972.

Clay, a township of Randolph co., West Va. Pop. 540.
Clay, a township of Ritchie co., West Va. Pop. 2746.
Clay, a township of Taylor co., West Va. Pop. 738.
Clay, a township of Wirt co., West Va. Pop. 533.
Clay, a township of Wood co., West Va. Pop. 1108.

Clay (Cassius Marcellus), an American statesman, born in Madison co., Ky., Oct. 19, 1810. He graduated at Yale in 1832. He opposed the annexation of Texas to the Union, advocated the abolition of slavery, and made speeches in the Northern States in 1844 in support of Henry Clay as a candidate for the presidency. In 1845 he became the editor of the "True American," an anti-slavery paper issued at Lexington, Ky. He was attacked by mobs, against which he defended himself bravely in several bloody conflicts. He served as a captain in the Mexican war (1846–47), supported Abraham Lincoln in 1860, and became a brigadier-general in 1861. He was minister to Russia 1862–69.

Clay (Clement Comer, Jr.), born in Madison co., Ala., in 1819, is the son of C. C. Clay (1789–1866), who was for many years a prominent official of the U. S. and of Alabama. The younger Clay became a lawyer in 1840, a judge in 1844, was U. S. Senator from Alabama from 1854 to 1861, in which latter year he entered the Confederate Senate. After the war he was accused of complicity in the murder of President Lincoln, but after a short imprisonment was fully acquitted.

Clay (Henry), an American lawyer, orator, legislator, and statesman, thrice a candidate for President, and once very nearly elected, was born near "The Slashes" in Hanover county, not far from Richmond, Va., April 12, 1777. His father was a poor Baptist preacher, who died in 1782; his mother—a woman of noble character and fervid piety—married again ten years afterwards, and migrated to Kentucky, leaving this son (the fifth of seven children) a clerk in a retail store in Richmond, which he soon left for employment as a copyist in the office of Mr. Peter Tinsley, clerk of the high court of chancery, whom he served four years, passing thence to the office of Mr. Robert Brooke, then attorney-general, afterwards governor. Licensed as a lawyer in 1797, though not yet of age, he followed his mother to Kentucky, opened a law-office at Lexington, and soon achieved a lucrative practice. Kentucky, separating from her parent, Virginia, soon called a convention to frame a State constitution, and young Clay publicly besought her to provide therein for a gradual abolition of slavery, but was sternly overruled, as he was half a century later, when, in the fulness of his fame, he renewed this counsel on the revision of the State constitution in 1849–50.

Kentucky strongly sympathized with her mother State in its opposition to John Adams's administration, with its Alien and Sedition acts, and idolized Mr. Jefferson, Virginia's oracle, for whom she cast her first presidential vote in 1800. Young Clay was one of her favorite orators in that excited canvass, and was first chosen to represent his county (Fayette) in the legislature of 1803–04. Late in 1806, when scarcely eligible, he was chosen by the legislature of his State to fill a vacancy in the U. S. Senate caused by the resignation of General John Adair. His term expired with his first session, but he had already made his mark as a champion of the policy of internal improvement by the construction of roads, bridges, etc. He was again chosen to the legislature in 1807, and elected Speaker of the House. He now proposed that each member should clothe himself wholly in American fabrics, which was stigmatized by Mr. Humphrey Marshall as the project of a demagogue—language which led to a duel wherein both parties were slightly wounded. At the session of 1809, Mr. Clay was again chosen to fill a vacancy in the U. S. Senate—this time for two years. In Aug., 1811, he was elected to the House, and on the first day of his service was chosen its Speaker—an extraordinary proof of his ability and popularity. This Congress, in June, 1812, declared war against Great Britain, Mr. Clay being one of its foremost advocates, as he remained throughout the struggle, until despatched to Europe by President Madison as one of the negotiators of peace—a service which he rendered at Ghent with eminent ability. Returning to his country in Sept., 1815, he was received as a victor, and, having been re-elected to the House in his absence, he was rechosen Speaker without opposition. He had been conspicuous in defeating the recharter of the first bank of the U. S. in 1811: he was equally active and influential in promoting the charter of the second in 1816. He was now, as he had been, a champion of protection to home industry, and of national internal improvements; and he was foremost in effecting the compromise whereby Missouri was admitted as a slave State, on condition that all Federal territory north of latitude 36° 30′ should be consecrated to free labor. Having favored, in 1816, an increase of the pay of members of Congress from eight dollars per day to fifteen hundred dollars per annum, Mr. Clay was formidably opposed in his next canvass by John Pope, afterwards Jackson's governor of Arkansas Territory, but saved his seat by a vigorous effort.

In 1824 five candidates were started for President—William H. Crawford of Georgia, who had the caucus nomination; John Quincy Adams of Massachusetts, then President Monroe's secretary of state; General Andrew Jackson of Tennessee, then a U. S. Senator; John C. Calhoun of South Carolina, then secretary of war; and Henry Clay of Kentucky, then Speaker of the House. Mr. Calhoun soon withdrew, and was made Vice-President by pretty general consent, while Jackson, Adams, and Crawford (no one having a majority) were the three highest on the electoral vote, which compelled the House to choose between them. Mr. Clay, having received the votes of Kentucky,

Ohio, and Missouri only, with four of those cast from New York, was four votes behind Mr. Crawford, and so could not be voted for in the House. He and his friends cast their votes for Mr. Adams, electing him by the vote of thirteen States, to seven for Jackson and four for Crawford. Mr. Adams made Mr. Clay his secretary of state; whereupon a cry of "Bargain!" was raised, and General Jackson was at once proposed for next President. He was elected over Mr. Adams, Mr. Calhoun being again chosen Vice-President. At the next choice of President (1832) Mr. Clay was run against General Jackson, and was badly defeated by him. He had just been returned to the U. S. Senate, in which he played a leading part for many years ensuing, especially in the tariff compromise of 1833, whereby a conflict with South Carolina was averted, and in resistance to the new financial policy propounded by Mr. Van Buren in 1837, whereby the treasury was to be divorced from all connection with banks and their notes. Mr. Clay was again a candidate for President, before the first Whig national convention held at Harrisburg in Dec., 1839, but General Harrison was nominated and triumphantly chosen. His death and Tyler's course brought Mr. Clay forward as the unanimous choice of his party in 1844, when a desperate effort was made to elect him, but without success, James K. Polk of Tennessee carrying both the great States of New York and Pennsylvania by a handful of votes, when New York alone would have elected Clay. The annexation of Texas and the resulting war with Mexico were fruits of this election.

Mr. Clay's name was once more, and for the last time, presented to the Whig national convention of 1848, but General Taylor was nominated over him and elected. Mr. Clay had in 1842 bidden farewell to the Senate, but was persuaded to return to it after 1844, and bore a leading part in effecting the slavery compromise of 1850. He returned to Washington from Kentucky for the last time near the close of 1851, and was soon prostrated by disease, under which he gradually sank until his death, June 29, 1852, in the seventy-sixth year of his age.

Though not successful as an aspirant to the presidency, he was a gallant party chief, an admirable orator, a skilful legislator, wielding unequalled influence, not only over his friends, but even over those of his political antagonists who were subjected to the magic of his conversation and manners. HORACE GREELEY.

Clay (HENRY, JR.), son of the distinguished orator and statesman of the same name, an American officer and lawyer, born April 10, 1811, in Ashland, Ky., graduated at West Point 1831; resigned Nov. 1, 1831. Counsellor-at-law 1833–46; member of the Kentucky house of representatives 1835–37; and lieutenant-colonel Second Kentucky Volunteers in the war with Mexico 1846–47, engaged at Buena Vista, where, while gallantly leading a charge of his regiment, he was mortally wounded, and in that condition lanced to death, Feb. 23, 1847, aged thirty-six.

GEORGE W. CULLUM, U. S. A.

Clay (JAMES B.), brother of the preceding, born in Kentucky in 1817, chargé d'affaires to Lisbon 1849, elected to represent his father's district in Congress 1857; espoused the Confederate cause, and died in Montreal, Canada, Jan. 26, 1864. G. C. SIMMONS, *Clerk Board of Eng'rs.*

Clay Banks, a post-township of Oceana co., Mich. Pop. 462.

Clay Banks, a post-township of Door co., Wis. Pop. 319.

Clay'burg, a post-village of Black Brook and Saranac townships, Clinton co., N. Y., has valuable iron-mines.

Clay Cen'tre, a post-village, the capital of Clay co., Kan., on the Republican River, about 125 miles W. of Leavenworth. It has one weekly newspaper. Pop. of the township, 1134.

Clay Cit'y, a post-village of Clay co., Ill., on the Little Wabash River and on the Ohio and Mississippi R. R., 102 miles E. of St. Louis. Pop. 594; of Clay City township, 1364.

Clay Court-house, or **Marshall,** a post-village, capital of Clay co., West Va., on the Elk River, 50 miles E. N. E. of Charleston.

Clay'mont, a post-village of New Castle co., Del., on the Philadelphia Wilmington and Baltimore R. R., 8 miles N. E. of Wilmington.

Clay'more [from the Gaelic *claidheamhmor*, a "broadsword"], sometimes spelled **Glaymore,** the Gaelic name of a kind of broadsword which is not much used at present. It had a double-edged blade about forty-two inches long and two inches wide. The handle was often twelve inches long.

Clay Slate. See SLATE.

Clays'ville, a post-township of Marshall co., Ala. Pop. 827.

Claysville, a post-village of Donegal township, Washington co., Pa. Pop. 284.

Clay'ton, a county in N. W. Central Georgia. It is drained by the Flint River, which rises in or near it. The soil is partly fertile. Cotton and corn are the staple crops. It is intersected by the Macon and Western R. R. Capital, Jonesborough. Pop. 5477.

Clayton, a county in the E. N. E. of Iowa. Area, 760 square miles. It is bounded on the E. by the Mississippi River, and intersected by the Turkey River. The surface is diversified by undulating prairies and woodlands; the soil is fertile. Hay, grain, wool, butter, and cattle are extensively produced. Lead is found here. The manufactures embrace flour, furniture, carriages, cooperage, lumber, etc. A branch of the Milwaukee and St. Paul R. R. passes through this county. The Chicago Dubuque and Minnesota R. R. passes along the eastern border of the county. Capital, El Kader. Pop. 27,771.

Clayton, a post-village, capital of Barbour co., Ala., 75 miles S. E. of Montgomery, in a fruit and grain growing district. It has one weekly newspaper.

E. QUILLIN, ED. "COURIER."

Clayton, a post-village of Kenton and Duck Creek hundreds, Kent co., Del., 11 miles N. of Dover, at the junction of the Delaware and the Maryland and Delaware R. Rs. and the Smyrna branch. Pop. 124.

Clayton, a post-village, capital of Rabun co., Ga., about 100 miles N. E. of Atlanta. Pop. 70.

Clayton, a post-village and township of Adams co., Ill., on the Toledo Wabash and Western R. R., 28 miles E. N. E. of Quincy. It has one weekly newspaper. Pop. of Clayton township, 2063.

Clayton, a township of Woodford co., Ill. Pop. 1022.

Clayton, a township and village of Clayton co., Ia., on the Chicago Dubuque and Minnesota R. R., 45 miles N. W. of Dubuque. Pop. 954.

Clayton, a township of Taylor co., Ia. Pop. 530.

Clayton, a township and village of Genesee co., Mich., on the Port Huron and Lake Michigan R. R. Pop. 1047.

Clayton, a post-village of Lenawee co., Mich.

Clayton, a post-village and township of Gloucester co., N. J., on the West Jersey R. R., 21 miles S. of Camden. Total pop. 3674.

Clayton, a post-village of Jefferson co., N. Y., on the St. Lawrence River, by the Thousand Islands. It is a summer resort, and has a good harbor. Shipbuilding and rafting are carried on. It has one weekly newspaper. Pop. 1020; of township, 4082.

CLARK & CLARK, PUBS. CLAYTON "INDEPENDENT."

Clayton, a post-village and township of Johnston co., N. C., on the North Carolina R. R., 14 miles S. E. of Raleigh. Pop. 1534.

Clayton, a township of Perry co., O. Pop. 1195.

Clayton, a township of Crawford co., Wis. Pop. 1416.

Clayton, a township of Winnebago co., Wis. Pop. 1340.

Clay'ton (JOHN), an English botanist, born in Kent in 1686, emigrated to Virginia in 1705. He wrote on the natural history of Virginia. Linnæus and Gronovius published in 1739 a "Flora of Virginia, exhibiting the Plants which J. Clayton has collected." Died Dec. 15, 1773.

Clayton (JOHN MIDDLETON), LL. D., an American statesman, born in Sussex co., Del., July 24, 1796, graduated at Yale in 1815, studied law, which he practised in Delaware, and gained a high reputation. He was elected a Senator of the U. S. in 1829, joined the Whig party, and was re-elected to the Senate in 1835. In 1845 he was again chosen to represent Delaware in the national Senate, and in Mar., 1849, he became secretary of state in the cabinet of President Taylor. He negotiated with the British government the Clayton-Bulwer Treaty in 1850. Having resigned on the death of President Taylor in July, 1850, he was chosen a U. S. Senator for six years (1851–57). Died Nov. 9, 1856.

Clayton (POWELL), an American Senator, was before the late civil war a lawyer of Leavenworth, Kan. In 1861 he became colonel of the First Kansas Cavalry, and afterwards a brigadier-general, serving with ability, chiefly in Arkansas. He was governor of Arkansas 1866–71, and in the latter year was chosen U. S. Senator for six years.

Clayton (THOMAS), an American jurist, born in Delaware in 1778, was a Whig member of Congress from his native State (1813–17), and U. S. Senator (1823–26), and again (1837–47). He was for a time chief-justice of the

court of common pleas and of the supreme court of Delaware. Died Aug. 21, 1854.

Clayto'nia [named in honor of John Clayton, noticed above], or **Spring Beauty,** a well-known genus of American and Asiatic flowers of the order Portulacaceæ. These beautiful flowers open in early spring, and are common in most of the U. S., one species being found in Alaska. The tubers of the *Claytonia tuberosa* are eaten in Siberia. Some of the species are naturalized in Europe.

Clay'tonville, a township and post-village of Brown co., Kan. The village is 18 miles N. W. of Atchison. Total pop. 2048.

Clay'ville, a post-village of Paris township, Oneida co., N. Y., has important and thriving manufactures. P. 944.

Clazom'enæ [Κλαζομεναί], an ancient Greek city of Ionia, was situated on a bay of the Ægean Sea, near Smyrna. It was the birthplace of the great philosopher Anaxagoras, who was born about 500 B. C. Its site is near the modern *Voorla*, on the S. side of the Gulf of Smyrna.

Clean'thes [Gr. Κλεάνθης], a Greek Stoic philosopher, born at Assos, in Asia Minor, about 300 B. C. He studied under Zeno at Athens, where at the same time he supported himself by manual labor. When Zeno died, about 260 B. C., Cleanthes succeeded him as the head of the Stoic school. He was solid and practical rather than speculative. His numerous works are lost except a hymn to Jupiter, which is commended as noble and elevated in sentiment. (See W. T. Krug, "Dissertatio de Cleanthe," 1819.)

Clear'ance, in mercantile language, is a certificate from the custom-house, the emigration officers, or both, signed before the departure of a ship, denoting that all the formalities have been observed and all dues paid. If a foreign vessel she must also be certified by the consul of the nation to which she belongs. The term "cleared" is usually applied to vessels which depart from a port with such a clearance.

Clear'chus [Gr. Κλέαρχος], a Spartan general who entered the service of Cyrus the Younger of Persia. He commanded a body of Greeks who fought for Cyrus against Artaxerxes, king of Persia, at Cunaxa, 401 B. C. After the defeat of Cyrus, Clearchus was captured by treachery, and was put to death by Artaxerxes in 400 B. C.

Clear Creek, a county in N. Central Colorado. It is drained by Clear Creek, an affluent of the South Platte River, and borders on the Middle Park. The surface is mountainous. Gray's Peak, near the border of this county, is over 14,000 feet high. Gold and silver are found here, the latter in great quantities. It is one of the chief silver-regions in Colorado. The soil of the valleys is very fertile. Capital, Georgetown. Pop. 1596.

Clear Creek, a township of Drew co., Ark. P. 776.

Clear Creek, a township of Hot Springs co., Ark. Pop. 231.

Clear Creek, a township of Sevier co., Ark. P. 238.

Clear Creek, a township of Washington co., Ark. Pop. 1199.

Clear Creek, a township and village of Alexander co., Ill. The village is on the E. bank of the Mississippi River, and 20 miles N. W. of Caledonia. Pop. of township, 1068.

Clear Creek, a township of Huntington co., Ind. Pop. 1273.

Clear Creek, a post-township of Monroe co., Ind. Pop. 1325.

Clear Creek, a township of Jasper co., Ia. P. 1125.

Clear Creek, a township of Johnson co., Ia. P. 728.

Clear Creek, a township of Keokuk co., Ia. Pop. 1118.

Clear Creek, a post-township of Nemaha co., Kan. Pop. 367.

Clear Creek, a township of Cooper co., Mo. Pop. 1198.

Clear Creek, a township of Vernon co., Mo. P. 445.

Clear Creek, a post-township of Mecklenburg co., N. C. Pop. 615.

Clear Creek, a township of Ashland co., O. P. 1198.

Clear Creek, a post-township of Fairfield co., O. Pop. 1743.

Clear Creek, a township of Warren co., O. P. 2605.

Clear'field, a county of W. Central Pennsylvania. Area, 1150 square miles. It is drained by the West Branch of the Susquehanna and by Clearfield Creek. Much of the surface is hilly, with fertile valleys. Cattle, grain, wool, and lumber are among the chief products. The manufacturing interests are varied. Semi-bituminous coal is found. The Clearfield branch of the Pennsylvania R. R. traverses the county. Capital, Clearfield. Pop. 25,741.

Clearfield, a post-village, capital of Clearfield co., Pa., on the West Branch of the Susquehanna River, which is crossed by two bridges, and on the Tyrone and Clearfield branch of the Pennsylvania R. R. It has two national and one other bank, two newspapers, a public park, an academy, a machine-shop, foundry, lumber manufactories, and brick-works. Pop. 1361.

G. B. Goodlander, Prop. Clearfield "Republican."

Clearfield, a township of Butler co., Pa. Pop. 847.

Clearfield, a township of Cambria co., Pa. Pop. 1531.

Clearfield, a township of Juneau co., Wis. Pop. 203.

Clear Fork, a township of Tazewell co., Va. Pop. 3415.

Clear Fork, a township of Raleigh co., West Va. Pop. 552.

Clear Fork, a township of Wyoming co., West Va. Pop. 529.

Clear'ing, a term used by bankers, denoting the exchanging of checks, drafts, and notes drawn upon each other, and the settlement of the balances resulting from the same.

Clearing-House, the place where the exchanges or clearings are made.

The New York Clearing-House.—The clearing-house system was first established in London about the beginning of the present century. It was introduced into this country by the banks of the city of New York, which established the New York Clearing-House by organizing an association and commencing operations on the 11th of Oct., 1853. At that time it consisted of fifty-two banks, five of which were soon closed by their inability to meet its requirements. They have since been established in the cities of Boston, Philadelphia, Chicago, and St. Louis. The cities of Hartford, Providence, Baltimore, and Cincinnati also employ a similar system, using a prominent bank as a clearing-house, settling the balances by checks upon it.

There are now (Oct. 15, 1873) in the city of New York seventy-five banks, with an aggregate capital of $87,501,300, many of them situated at remote distances from others. Each in its daily dealings receives large amounts of bills of, and checks on, other banks, so that at the close of the day's business every bank has in its drawers various sums thus due to it by other banks. It is in like manner itself the debtor of other banks, which have during the day received its bills and checks drawn upon it. Before the establishment of the clearing-house it was necessary for each bank every morning to make up its account with every other bank, and to send its porter to present the bills and checks so received to the debtor banks for payment. The balances of their indebtedness were adjusted by payments in gold, which became so laborious, dangerous, and complicated that the balances were settled only weekly, on Friday, instead of daily—a course that induced much evil. This was obviated by the clearing-house system, through which the settlements are so simultaneously and almost instantly effected that the transactions adjusted through it have amounted in one day to the enormous sum of $206,034,920.51, in adjusting which the exchanges were settled in the space of an hour. The establishment of the clearing-house system closed 2500 bank ledger accounts, with numerous daily entries in each; enabled the banks to settle every day with each other without delay or loss; and with comparatively little trouble brought each officer into intimate and friendly relations with the others, thus enabling them by united action to aid and strengthen each other in times of excitement and financial danger, and to exert by their combined power a salutary influence upon the banking business of the country at large.

It is doubtful if without the aid of the banks of the city of New York the U. S., upon the breaking out of the rebellion in 1861, could have raised the loans necessary to carry on the war in time to have prevented the success of the enemies of the Union. It is certain that without the Clearing-House Association, the banks could not have furnished the funds which at once established the credit of the government, and enabled it, by the restoration of confidence, to negotiate its bonds to the enormous amount of over $2,000,000,000. During those exciting times the machinery of the Clearing-House worked with regularity and exactness; the banks, united as one, daily equalized their resources, and presented to the world a most important as well as practical proof that in "union is strength."

The panic of 1873 was only checked by similar action, the experience of the war enabling the banks to act with such promptness in combining their entire resources by the use of loan certificates to the extent of over $25,000,000,

as to sustain themselves against a panic, the serious results of which was greatly modified by their action.

The transactions of the Clearing-House to the 1st of Oct., 1873, a period of twenty years, shows the total transactions to amount to the sum of $387,587,804,028.49, an average of $63,000,000 per day for the entire period. The largest average daily transactions for any one year was for the year ending Oct. 1, 1869, amounting to $125,088,789.91. Of this vast business so exact and complete is the system that no difference of any kind exists in any of its books or accounts; neither has a loss occurred from its organization to the present time.

During the war the government issued "certificates of indebtedness" bearing interest, which were found to be desirable as a reserve for the banks. Accordingly, an arrangement was made for the issue of special certificates bearing interest, and available only to banks, members of the Clearing-House Association, and which were recognized in the national banking act of 1864 as part of the lawful reserve for a national bank. The principal of these certificates was made payable on demand, in legal-tender notes, at the office of the assistant treasurer of the U. S. in New York, and the interest to the manager of the Clearing-House and chairman of the Clearing-House committee jointly. This interest was payable semi-annually. The certificates were made available by a vote of the association for the settlement of balances at the Clearing-House, and were so used, thus changing daily the amounts held by each bank, and frequently (by the presentation of them by individual banks to the U. S. treasury for payment) changing the aggregate amount issued. The interest was collected and disbursed to the several banks by the Clearing-House regularly every six months, and each bank received the exact amount of interest due it, notwithstanding the amounts held by it for the whole period had changed daily.

The apparent intricacy of the calculations necessary to arrive at such results troubled some of the banks in other cities, who were desirous of availing themselves of the privileges offered by the use of these certificates; and in one or two instances committees were sent to New York to ascertain the process of computation in use, the simplicity of which, when explained, not only astonished them, but confirmed them in the opinion of the usefulness of an institution capable of adjusting with so much ease calculations which, at first sight, appeared so difficult. The largest amount of Clearing-House certificates in use in the city of New York at any one time was $36,000,000.

The Clearing-House is located at No. 48 Wall street. The clearing-room is provided with a continuous line of desks, sixty in number, in the form of an oval, one for each bank, each desk bearing the name and number of the bank by which it is occupied; the banks being numbered according to the date of their organization, the oldest (the Bank of New York) being No. 1, etc. etc. Each bank is represented every morning by two clerks—one a messenger, who brings with him the checks, drafts, etc. that his bank has received the day previous upon the other banks, which are called the "exchanges," and are assorted for each bank and placed in envelopes. On the outside of each envelope is a slip on which is listed the amounts of the various items which it contains. These envelopes are arranged in the same order as the desks for the several banks. The messengers, sixty in number, take their places in a line outside of the line of desks, each opposite the desk assigned to his bank, while on the other or inside of the desk is a clerk with a sheet containing the names of all the banks arranged in the same order, with the aggregate amounts his messenger has against each bank.

The hour for making the exchanges or general delivery is 10 o'clock A. M. Just previous to that time the manager takes his position at an elevated desk and calls the house to order. At a signal from a bell struck precisely at ten o'clock, each messenger moves forward to the desk next his own, and delivers the envelopes containing the checks, etc. for the bank represented by that desk to the clerk on the inside, together with a printed list of the banks in the same order, with the amount opposite each bank. The clerk receiving it signs and returns it to the messenger, who immediately passes to the next desk, delivering the exchange for the bank represented by that desk, and so on until he has made the circuit of the room and reached his own desk, the starting-point, having delivered to each bank the exchanges he had for it, and consequently delivering his entire exchanges for all the banks. Every other messenger does the like, the whole moving on at the same time. In other words, each messenger has visited every bank and delivered to each, everything his bank has received the day previous from it, taking a receipt for the same, consequently the entire exchanges are delivered; while each clerk upon the inside has of course received from every other bank the amounts each had against his bank. This operation occupies exactly ten minutes, and accomplishes what could not otherwise be done in less than six or eight hours.

Besides the saving of time gained by this method, each bank is enabled to know the exact balance for or against it at once, as the clerks, after receiving the envelopes containing the checks, etc., immediately enter from the slips, upon their own sheets, the aggregate amount from each bank; the difference between the total amount they have received and the total amount brought by them being the balance either due to or from the Clearing-House to each bank.

The messengers then receive from their several clerks the various envelopes containing the exchanges, and return to their banks, reporting their condition, debtor or creditor as the case may be. The clerks then report to the assistant manager the amount they have received, they having reported the amount each brought upon first entering the room. These amounts are entered in separate columns on what is termed a "proof sheet," and if no errors have been made the manager, finding that both columns agree, announces that the "proof is made," and the clerks return to their respective banks. If, however, any error has been made by any of the sixty clerks, it is indicated on the proof sheet, and the clerks are then required to revise and examine their work; and not until every error has been discovered and corrected are the clerks allowed to leave.

The clerks are allowed thirty-five minutes after the delivery of the exchanges to enter, report, and prove their work. If any errors are discovered after that time, fines are imposed for each error, which are collected monthly by drafts on the banks fined.

Various and ingenious methods are resorted to for discovering errors, and the manager, from long experience, generally is enabled to anticipate the nature of the error, whether in entry, footing, or transposition, and thereby facilitate its discovery by applying at once the best method of examination. When it is remembered that there are sixty sheets, each containing 120 entries, in all 7200 entries, the difficulty in discovering where the error is in the shortest possible time is apparent.

The entire business of the morning is usually accomplished in one hour. The debit banks are required to pay to the manager in legal-tender notes or coin, previous to half-past one o'clock the same day, and the credit banks receive immediately after that hour, the amounts due by or to them respectively, thus by one process settling exactly the entire transactions of all the banks of the day previous.

A record is kept of the daily transactions of each bank, and a statement of the loans, specie, legal tenders, deposits, and circulation made weekly to the manager of the Clearing-House, so that the movement of each bank can be determined and its condition pretty accurately estimated.

WILLIAM A. CAMP, *Manager of N. Y. Clearing-House.*

Clear'ing-nut, the seed of *Strychnos potatorum*, a small tree of the same genus with that producing the nux-vomica, abundant in India, and much used for clearing water. These seeds being rubbed on the inside of a vessel, any muddy water put into it very quickly becomes clear, all impurities settling to the bottom. The tree has ovate, pointed leaves, and a shining, black, edible, pulpy fruit, with one seed. The wood is very hard.

Clear Lake, in Lake co., Cal., is 112 miles N. of San Francisco, and is nearly 24 miles long. The width varies from 2 to 6 miles. It is surrounded by a picturesque region, which is frequented by tourists and hunters. Deer, bears, panthers, and foxes abound here. Fish of various kinds are found in this lake.

Clear Lake, a township of Mississippi co., Ark. Pop. 126.

Clear Lake, a township of Pulaski co., Ark. Pop. 378.

Clear Lake, a township of Sangamon co., Ill. Pop. 1566.

Clear Lake, a township of Steuben co., Ind. Pop. 455.

Clear Lake, a post-village of Cerro Gordo co., Ia., on the E. shore of Clear Lake and on a branch of the Milwaukie and St. Paul R. R., 10 miles W. of Mason. It is a summer resort, and has one weekly newspaper. The lake is about 6 miles long, and has two steamboats. Pop. 775.

ED. CLEAR LAKE "OBSERVER."

Clear Lake, a township of Cerro Gordo co., Ia. Pop. 175.

Clear Lake, a township of Hamilton co., Ia. Pop. 131.

Clear Lake, a post-township and village of Sherburne co., Minn., on a branch of the St. Paul and Pacific R. R., 60 miles N. W. of St. Paul. Pop. 137.

Clear Lake, a township of Sibley co., Minn. Pop. 156.

Clear Spring, a township of Lagrange co., Ind. Pop. 1223.

Clear Spring, a post-township of Washington co., Md. Pop. 2763.

Clear'story, or **Clerestory,** in churches, the uppermost arcade, with side openings, interposed between the roof of the centre aisle and the roof of the side aisles. The lateral arcades constitute the triforium, or blindstory.

Clear Water, a post-township of Wright co., Minn. Pop. 552.

Cleaveland (PARKER), LL.D., an American mineralogist and chemist, born in Rowley, Mass., Jan. 15, 1780. In 1805 he was chosen professor in Bowdoin College, and in all the fifty-three years of his connection with the institution missed on his own account only three recitations. His admirable work on "Mineralogy and Geology," which earned for him the title of "father of American mineralogy," was published in two volumes in 1816, and passed to a second edition in 1822. Died in Brunswick, Me., Oct. 15, 1858.

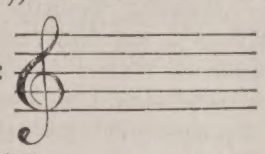
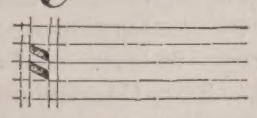
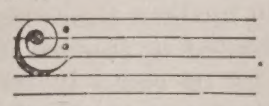
Cleaveland. See CLEVELAND.

Cleav'ers, or **Cli'vers** (*Galium Aparine*), a popular name of a plant of the order Rubiaceæ, an annual, with whorls of eight leaves, stem and leaves rough with bristles, the fruit hispid, and ready to adhere to one's clothing; a common weed in the U. S. and in most parts of Europe, which has, from time to time, been brought into notice as possessing power over formidable diseases, including lichen, leprosy, and cancer. The plant is certainly a powerful diuretic.

Cle'burne, a county of Alabama, bordering on Georgia. Area, 500 square miles. It is intersected by the Tallapoosa River. The soil is generally fertile, and produces corn, wool, tobacco, and some wheat and cotton. Capital, Edwardsville. Pop. 8017.

Cleburne, a post-village, capital of Johnson co., Tex. It has one weekly newspaper. Pop. 686.

Cleburne (PATRICK R.), a general, born in Ireland Mar. 17, 1828, removed to Arkansas, where he was a lawyer before the civil war. He commanded a division of the Confederate army at the battle of Stone River, which ended Jan. 2, 1863, and at Chickamauga in September of that year. He was killed at the battle of Franklin, Tenn., Nov. 30, 1864. He was a daring and popular officer.

Clef [a word originally French, from the Lat. *clavis*, a "key"], a character placed on the musical staff, by which the names of the notes are fixed. There are three clefs—viz. the G, the C (rarely used), and the F clef. The G clef is on the second line, thus:  ; the C clef on the third line, thus:  ; and the F clef on the fourth line, thus:  . The C clef is sometimes placed on the fourth line for instruments and for the tenor part in vocal music.

Clem'atis [Gr. κληματίς, from κλῆμα, a "shoot of the vine," so called from its resemblance to a vine], a genus of herbs and shrubs of the order Ranunculaceæ, having four colored sepals, no corolla, and for fruit numerous one-seeded achenia with long, persistent feathery styles. They have the popular name of "virgin's bower." The species are numerous, generally with climbing stems, natives of very different climates. The long styles give the plants a beautiful appearance even in winter. The flowers of many species are also beautiful. *Clematis Vitalba*, "traveller's joy," is the only native of Great Britain. The twigs are capable of being made into baskets. It rapidly covers walls or unsightly objects. The acrid and vesicant leaves are used as a rubefacient in rheumatism, and those of other species are employed in the same way. In the U. S. there are many native species. A number of species are commonly cultivated in our gardens.

Clem'ens (Hon. JEREMIAH), an American politician, born at Huntsville, Ala., Dec. 28, 1814, became a lawyer in 1834, distinguished himself in State politics, and in the affairs of Texas in 1842. He served with distinction in the Mexican war, and was rapidly promoted in the army, and became colonel in 1848. He was U. S. Senator from Alabama (1849–53). He held office under the Confederacy, though not a warm friend of that cause. He advocated the re-election of Lincoln in 1864. Died at his native town in 1865. Col. Clemens was an eminent lawyer and the author of several works of fiction.

Clemens (SAMUEL LANGHORNE), better known as MARK TWAIN, an American humorist, born in Monroe co., Mo., Nov. 30, 1835. He became a journalist at Virginia, Nev., in 1862, and subsequently followed the same profession at San Francisco and at Buffalo, N. Y. He has published "The Jumping Frog" (1867), "The Innocents Abroad" (1869), "Roughing It" (1872), etc.

Clemens Romanus. See CLEMENT I.

Clem'ent [Lat. *Titus Flavius Clemens* or *Clemens Alexandrinus*] **of Alexandria,** an eminent Father of the Christian Church, is supposed to have been a native of Athens, and originally a pagan. He passed the greater part of his life at Alexandria, where he became a disciple of Pantænus, a Christian philosopher. He was ordained a presbyter, and in 202 A. D. retired to Palestine to escape persecution. About 206 he returned to Alexandria, and was a teacher of catechumens. He succeeded Pantænus at the death of the latter, and acquired a high reputation for wisdom and virtue. Origen was one of his pupils. Clement was more addicted to speculative philosophy than most of the Fathers of the Church. Among his extant works (written in Greek) are "Pædagogus" and "Stromata" (Gr. Στρωματεῖς), which is a medley of religious thoughts, anecdotes, and maxims of philosophy. Died about 220 A. D. (See KAYE, "Account of the Writings, etc. of Clement of Alexandria," 1835; REINKENS, "De Clemente Presbytero Alexandrino," 1851.)

Clem'ent I. (or **Cle'mens Roma'nus**), the earliest of the Apostolic Fathers, a bishop, accounted by Roman Catholic writers as fourth in the order of succession at Rome. Origen (254) identifies him with the Clement of Phil. iv. 3, but this may be only a conjecture. Irenæus (202) makes him the third after the apostles Peter and Paul, Linus being the first and Cletus (or Anacletus) the second. Eusebius says he died in the third year of Trajan, "having for nine years superintended the preaching of the Divine word." Accordingly, he presided over the Church from 91 or 92 to 100 or 101 A. D. His Epistle to the Corinthians, written about 96 or 97 A. D., consists of fifty-nine short chapters, and in bulk is about one-third larger than Saint Paul's First Epistle to the Corinthians. It used to be read in many ancient churches, but was not included in any of the ancient lists of authoritative books. Other writings ascribed to Clement are not his. (See CLEMENTINES.)—CLEMENT II., a native of Saxony, was elected pope in 1046. He crowned the emperor Henry III., and died in 1047. He was the first of the six German popes.—CLEMENT III., a native of Rome, was elected pope in 1187. He promoted the third crusade against the Saracens. Died in 1191. There was also an anti-pope of this title, who died in 1100. —CLEMENT IV. (GUY FOULQUES) was born in France. He succeeded Pope Urban IV. in 1265, and died in 1268.—CLEMENT V., POPE, was a Frenchman named BERTRAND DE GÔT. He was chosen pope in 1305, as successor to Benedict XI. To gratify Philippe le Bel, king of France, he resided at Avignon, which became the capital of the popedom. This innovation gave much offence, and caused a long schism in the Church. He suppressed, in 1311, the order of Templars. He died in 1314, and was succeeded by John XXII.—CLEMENT VI. (PIERRE ROGER), born at Limousin, in France, succeeded Benedict XII. as pope in 1342. He reigned at Avignon, the sovereignty of which he purchased from Joanna of Naples. He died in 1352, and was succeeded by Innocent VI.—CLEMENT VII. (ROBERT COUNT OF GENEVA), ANTIPOPE, was bishop of Cambray when in 1378 he was elected antipope in the time of Urban VI. With him began the great Western schism. Died in 1394.—CLEMENT VII. (GIULIO DE' MEDICI), a cousin of Leo X., succeeded Adrian VI. as pope in Nov., 1523. He joined Francis I. of France and the Venetians in a league against Charles V., whose army, commanded by Constable Bourbon, took Rome by assault in 1527. The pope then became a prisoner for several months. He refused to gratify Henry VIII. of England by granting him a divorce from Queen Catharine, and issued a famous bull against him in 1534. He died in the same year, and was succeeded by Paul III.—CLEMENT VIII. (IPPOLITO ALDOBRANDINI), POPE, a native of Fano, in Italy, was chosen in place of Innocent IX. in 1592. He annexed the duchy of Ferrara to the Papal States. He died in 1605, and was succeeded by Leo XI.—CLEMENT VIII. (EGIDIO MUÑOZ), ANTIPOPE, was canon at Barcelona, and was in 1424, after the death of Benedict XIII., elected pope by three cardinals. His resignation in 1429 ended the great schism of the West.—CLEMENT IX. was born at Pistoja in 1600, and was chosen pope in June, 1667, as the successor of Alexander VII. He died in Dec., 1669, and was succeeded by Clement X.—

Clement X. (Emilio Altieri) was a native of Italy. He was nearly eighty years old when he became pope in 1670. He died in 1676, and was succeeded by Innocent XI.—Clement XI. (Giovanni Francesco Albani) was born at Pesaro, in Italy, in 1649. He succeeded Innocent XII. in 1700. In 1713 he issued the famous bull *Unigenitus*, which condemned 101 propositions of Quesnel's work on Grace and Predestination. This bull was approved by the Jesuits and opposed by the Jansenists. Clement aided the Pretender in his effort to seize the British crown in 1715. Died in 1721. Innocent XIII. was his successor. (See Lafitau, "Vie de Clément XI.," 1752.)—Clement XII. (Lorenzo Corsini) was born at Florence in 1652. He became pope in 1730, as the successor of Benedict XIII. He died in 1740, and was succeeded by Benedict XIV.—Clement XIII. (Carlo Rezzonico) was born in Venice in 1693, and succeeded Benedict XIV. as pope in 1758. He offended the French and Spanish monarchs by impolitic attempts to assert his prerogative. He issued a bull in favor of the Jesuits, who had been expelled in 1767 from France and Spain. He died in 1769, and was succeeded by Clement XIV.—Clement XIV. (Giovanni Vincenzo Antonio Ganganelli), an eminent and learned pope, was born near Rimini in 1705. He succeeded Clement XIII. in 1769. He took measures to conciliate several Catholic powers which Clement XIII. had offended. He was more liberal than many of the popes, and had a good reputation for ability and virtue. Among the important events of his pontificate was the suppression of the order of the Jesuits, which he formally decreed in July, 1773. He founded the Clementine Museum in Rome. Died in Sept., 1774. (See Caraccioli, "Vie de Clément XIV.," 1775; Theiner, "Geschichte des Pontificats Clements XIV.," 3 vols., 1853.)

Clemen'ti (Muzio), an excellent Italian pianist and composer, born at Rome in 1752. He was patronized by Mr. Beckford, who took him to England about 1765. At the age of eighteen he composed his "Opera 2," which is regarded as the basis on which the whole fabric of modern sonatas for the piano has been founded. He composed numerous sonatas, and wrote "Gradus ad Parnassum." Died Mar. 10, 1832.

Clem'entines, or **Pseu'do-Clem'entines,** a name given to two writings, the "Homilies" and the "Recognitions," falsely ascribed to Clement of Rome. They originated in Rome about the middle of the second century. They were edited by Schwegler (1847) and others.

The name Clementines is also applied to that part of the canon law which was collected and published by Pope Clement V. (1305–14).

Clem'monsville, a township of Davidson co., N. C. Pop. 978.

Clenden'nin, a township of Mason co., West Va. Pop. 1657.

Cleobu'lus [Gr. Κλεόβουλος], one of the Seven Wise Men of Greece, was king of Lindus, in Rhodes, in the sixth century B. C. His favorite maxim was Ἄριστον μέτρον, which inculcates the advantages of moderation.

Cleom'brotus [Gr. Κλεόμβροτος], a Spartan general, was a brother of Leonidas, who fell at Thermopylæ. He commanded the army in 480 B. C., after the death of Leonidas. He was the father of Pausanias, who defeated the Persians at Platæa.

Cleombrotus I., king of Sparta, a grandson of the preceding, began to reign in 380 B. C. He commanded the Spartans at Leuctra, where he was defeated by Epaminondas and killed in 371 B. C. He left two sons, Agesipolis II. and Cleomenes II.

Cleome'des [Gr. Κλεομήδης], an ancient Greek astronomer whose native place and period are unknown. He wrote a remarkable treatise on astronomy entitled "The Circular Theory of the Heavenly Bodies," which is extant and has been printed. This contains several scientific truths, as the spherical figure of the earth and the revolution of the moon about the earth. The refraction of light was noticed by him.

Cleom'enes, an Athenian sculptor of whom little is known. He is mentioned by Pliny as the author of a group of Muses possessed by Pollio in Rome. His name also appears on the famous statue of Venus de' Medici.

Cleomenes, or **Kleomenes** [Gr. Κλεομένης], **I.,** king of Sparta, succeeded his father, Anaxandrides, about 518 B. C. He liberated Athens from the domination of the Pisistratidæ in 510, but he afterwards attempted to restore Hippias. He procured the dethronement of Demaratus, who had reigned jointly with himself. He died in 489 B. C., and was succeeded by his half-brother, the heroic Leonidas.

Cleomenes III., king of Sparta, of the Agidæ line, was a son of Leonidas II. He began to reign in 236 B. C., and resolved to restore the ancient Spartan virtue and discipline. He declared war against the Achæan League, and defeated Aratus at Megalopolis in 226 B. C. He put to death all the ephori except Agesilaus (who escaped), made a new division of land, and restored the old social system. Antigonus, king of Macedon, who was an ally of the Achæans, defeated Cleomenes at Sellasia in 222 B. C. Cleomenes fled to Egypt, and killed himself in 220 B. C. (See Plutarch, "Cleomenes" and "Aratus.")

Cle'on, or **Kleon** [Gr. Κλέων], an Athenian demagogue distinguished for his insolence and venality, was a tanner in his youth. He is first mentioned in history about 428 B. C. He was a leader of the democracy or lower classes. In 425 B. C., Cleon and Demosthenes conducted a successful expedition against Sphacteria. He was elated with this victory, which increased his credit so much that he obtained the command of an army which was sent against the Spartan general Brasidas in 422 B. C. Cleon and Brasidas were both killed in the battle of Amphipolis, where the Athenians were defeated.

Cle'on, a township of Manistee co., Mich. Pop. 85.

Cleo'na, a township of Scott co., Ia. Pop. 847.

Cleopa'tra [Gr. Κλεοπάτρα], a daughter of Philip of Macedon, was a sister of Alexander the Great. She was married in 336 B. C. to Alexander, king of Epirus, who was her mother's brother. After the death of her brother she was assassinated by the order of Antigonus.

Cleopatra [Gr. Κλεοπάτρα], a celebrated and fascinating queen of Egypt, born in 69 B. C., was a daughter of Ptolemy Auletes. She was distinguished for her personal charms, was richly endowed with mental gifts, and was mistress of the Greek and other languages. Her father, dying in the year 51, left the throne to her in partnership with her brother Ptolemy. The latter deprived her of royal power, but Julius Cæsar interposed in 48 B. C., and restored her to the throne after her brother Ptolemy had been killed in battle. She captivated the affection of Cæsar, and accompanied him to Rome in the year 46. After he had been killed in 44 B. C., she returned to Egypt. Soon after the battle of Philippi (42 B. C.) she was summoned by Antony to appear before him in Cilicia. He was fascinated by her charms, and became so infatuated that he neglected his interests and public affairs, and spent much time with her in Alexandria. Her fleet fought against Augustus at the naval battle of Actium, at which she was present, 31 B. C. She was the first to order a retreat on this occasion, and was eventually taken prisoner by Augustus, who intended to exhibit her in a triumphal procession in Rome. To frustrate this design, she killed herself by the poison of an asp in 30 B. C.

Clep'sydra, or **Clepsy'dra** [Gr. κλέπτω, to "steal," and ὕδωρ, "water," because the water seems to steal away imperceptibly], an instrument for measuring time by the gradual flow of water through a small orifice. Two kinds have been used—one wherein the fluid is allowed to escape through the orifice; the other, in which uniformity of flow is secured by maintaining the fluid at a constant level. The clepsydra is supposed to have been used among the Chaldæans. The Greeks and Romans employed it extensively. In modern times the invention of pendulum clocks has superseded it, though it is still used in China. It anciently had in some instances a musical attachment by which attention was called to the hour, as by the stroke of a bell in our clocks.

Clerc (Laurent), a celebrated deaf-mute, born at La Balme, near Lyons, France, Dec. 26, 1785. When one year of age he lost his hearing in consequence of a severe burn. At the age of twelve he became a pupil of the abbé Sicard at Paris, and in 1805 was a teacher of deaf-mutes under that eminent instructor. He came to the U. S. in 1816 with Gallaudet, and was one of the founders of the Hartford asylum for the deaf and dumb, which was opened in 1817. He was a laborious and successful teacher of deaf-mutes. Died at Hartford, Conn., July 18, 1869.

Cler'gy [from the Gr. κλῆρος, originally meaning an "inheritance;" Lat. *clerus*], a collective term applied to the ministers of the Christian religion in contradistinction to the laity. This use of the term is ancient, and gradually became prevalent as the ministers of religion more and more exclusively were regarded as God's "heritage." In the Church of Rome the distinction between the clergy and the laity became more marked through the multiplication of titles among the priesthood, the ascription to them of peculiar privileges, their assumption of peculiar official insignia, and the doctrine of celibacy. In harmony with this distinction is that of an indelible character derived from ordination, so that a renunciation of the clerical office is either viewed as an impossibility or apostasy. In the Protestant churches the distinction between clergy and

laity is less wide. Among the rights asserted by the clergy in the Middle Ages, and which caused much dispute, was exemption from lay jurisdiction, even in cases of felony. The clergy were distinguished into the *higher clergy* and the *lower clergy*, the latter including janitors, acolytes, exorcists, etc. The term *secular clergy* is the designation of priests of the Church of Rome who are not of any religious order, but have the care of parishes. Monks who are in holy orders are designated regular clergy, because they obey a monastic rule (*regula*).

Cler'gyman, an ordained minister, authorized to preach and to administer the ordinances according to the rules of some denomination of Christians; in England the term is popularly restricted to ministers of the Established Church. (See CLERGY.)

Clerk [Lat. *clericus;* Fr. *clerc*]. This word formerly signified a clergyman, an educated man, a scholar. In modern usage it is applied to a scribe, secretary, writer, or accountant; a person who is employed in writing in a public office, bank, or counting-house.

Clerk (JOHN), a Scottish naval tactician, born at Eldin about 1730. He is said to be the inventor of the manœuvre in naval tactics called "breaking the line." This plan was first tried by Lord Rodney in April, 1782, when he gained a victory over the French admiral de Grasse. Clerk published in 1782 an "Essay on Naval Tactics." Died May 10, 1812.

Clerk to the Signet. See WRITER TO THE SIGNET.

Clermont, a city of France, capital of the department of Puy-de-Dôme, is finely situated on an eminence 208 miles S. by E. from Paris, with which it is connected by a railway. It is near a range of extinct volcanoes, and is surrounded by remarkable scenery. It has some manufactures, and a considerable trade with Paris in the products of the surrounding country. It has a Gothic cathedral of the thirteenth century, a college, a public library of 1600 volumes, a theatre, a normal school, and a botanic garden. Clermont occupies the site of the ancient capital of the Arverni, which was originally called *Nemosus*, and afterwards *Augustonemetum*. It became a bishop's see about 250 A. D. The great council in which the Crusades originated was held here by Pope Urban II. in 1095. Clermont was the capital of Auvergne for several centuries. Pop. 37,690.

Clermont, a town of France, department of Oise, on the Railway du Nord, about 50 miles N. of Paris. It has a college and a public library. Pop. 5743.

Cler'mont, a county in the S. W. of Ohio. Area, 462 square miles. It is bounded on the S. W. by the Ohio River and on the W. by the Little Miami. The surface is partly hilly; the soil is fertile. Grain, wool, tobacco, and dairy products are extensively raised. The manufacturing interests are various and quite extensive, including lumber, furniture, cooperage, saddlery, flour, clothing, carriages, etc. Blue limestone abounds here. Capital, Batavia. P. 34,268.

Clermont, a township and post-village of Fayette co., Ia. The village is on Turkey River, 100 miles N. of Iowa City. It has one weekly newspaper. Pop. 1263.

Clermont, a township and post-village of Columbia co., N. Y., on the Hudson River R. R., 12 miles S. S. W. of Hudson. Pop. 1021.

Clermont-l'Hérault, a town of France, department of Hérault, 25 miles W. of Montpellier. It has a communal college and an old ruined castle; also manufactures of woollen cloth. Pop. 6050.

Cle'thra [Gr. κλήθρα, an "alder"], a genus of trees and shrubs of the order Ericaceæ. The *Clethra alnifolia* occurs from Maine to Florida, and westward. Its racemes of fragrant white flowers are mentioned in one of Whittier's poems. The *Clethra acuminata* is a small tree of Virginia and North Carolina.

Cleveland, a wild mountainous district, with some picturesque and fertile valleys, forming the E. part of the North Riding of Yorkshire, England. It includes Gisborough, Stokesley, and the Moors. It is 30 miles long from E. to W. and 15 miles wide from N. to S. It gives the title of duke to the Vane family.

Cleveland, a county of North Carolina, bordering on South Carolina. Area, 500 square miles. It is drained by the First Broad River. The surface is hilly; the soil productive. Grain and wool are the chief products. Alum and copperas are produced. It is intersected by the Wilmington Charlotte and Rutherford R. R. Capital, Shelby. Pop. 12,696.

Cleveland, a post-village, capital of White co., Ga., about 85 miles N. N. E. of Atlanta. Pop. 145.

Cleveland, a township of Elkhart co., Ind. Pop. 549.

Cleveland, a township of Whitley co., Ind. Pop. 2041.

Cleveland, a post-township of Le Sueur co., Minn. Pop. 1052.

Cleveland, an incorporated post-village of Oswego co., N. Y., on the N. shore of Oneida Lake, and on the New York and Oswego Midland R. R., 41 miles S. E. of Oswego, has 2 glass-factories, 1 large tannery, 3 saw-mills, 1 grist-mill, 2 boatyards, and 2 printing-offices. Pop. 895.

CHARLES R. KING, PUB. "LAKE SIDE PRESS."

Cleveland, the second city of Ohio in extent and population, is situated upon the S. shore of Lake Erie, at the mouth of the Cuyahoga River, in lat. 41° 30′ 5″ N., and lon. 81° 42′ 6″ W., and constitutes the seat of government for Cuyahoga co. Its railroad distance from Columbus, the capital of the State, is 138 miles. Its area exceeds 25 square miles, more than 16,000 acres of territory being included within its limits. It was founded in 1796, a survey being completed in October of that year by Gen. Moses Cleaveland, one of the directors of the Connecticut Land Company, in whose honor the city was named. No permanent settlement was accomplished earlier than 1800, although several attempts were made to establish a colony upon what was at that time considered the site of a future city. Dec. 23, 1814, an act was passed by the legislature incorporating the village of Cleveland, the limited government being vested in a president, recorder, and three trustees. In 1836 a city charter was obtained and the first mayor elected. In 1855 a union was effected with Ohio City, which had sustained a separate existence upon the W. side of Cuyahoga River, at the expense of many jealousies and disputes, requiring the intervention of the courts.

The history of Cleveland for each decade exhibits a remarkable increase in population, as well as in material wealth and prosperity. The number of inhabitants in 1810 was 57; in 1820, 350; in 1830, 1000; in 1840, 6071; in 1850, 17,034; in 1860, 43,417; in 1870, 93,018; and with the acquisition of the populous territories of what were formerly known as East Cleveland and Newburg, and the rapid increase since the last U. S. census, its population at the present time may be safely estimated at 150,000. With railroads converging from all directions except the north; with the chain of great lakes opening communication with the rich iron and copper mines of Lake Superior, and affording cheap transportation for merchandise and products of all descriptions; with the Ohio Canal traversing the interior of the State, connecting Lake Erie with the Ohio River at Portsmouth, opening a passage to all the principal markets of the South, and, with its tributary, the Ohio and Pennsylvania Canal, penetrating the extensive coal-fields of Ohio and Pennsylvania,—the commercial facilities of Cleveland are second to no city in the West. Its harbor is considered the most commodious and safe of any upon Lake Erie. It consists of two piers, each extending from the mouth of Cuyahoga River 1200 feet into the lake, between which is a channel 200 feet wide, and of sufficient depth for the safe entry of the largest vessels.

The number and tonnage of vessels of all kinds owned in Cleveland and enrolled during the year 1873 was—propellers 28, tonnage 83,223; steamers 2, tonnage 259; tugs 26, tonnage 962; barques 3, tonnage 1269; steam-barges 2, tonnage 144; schooners 66, tonnage 25,282; scows 23, tonnage 2302; barges 1, tonnage 86; yachts 1, tonnage 6; canal-boats 50. Plans are prepared and surveys have been made with the view of constructing a harbor of refuge at this point for the protection of shipping upon the S. shore of the lake, the estimated cost of the work being $2,000,000. The most vital elements in the growth and prosperity of Cleveland are to be found in her manufactories. The number of distinct manufacturing establishments is 325, the amount of capital invested being about $20,000,000. Of this number, 82 are largely engaged in the manufacture of iron, with $5,000,000 invested as capital and 9000 men engaged as laborers; the gross amount of wages paid in 1873 being $7,475,650; the amount of iron produced in the same year by 12 of the principal establishments being 238,500 tons. During the year 1872 the petroleum refining interests were consolidated. The present number of refineries is 6, with an aggregate capital of $2,600,000. During the year 1873 more than 2,000,000 barrels of crude oil were consumed, producing 1,500,000 barrels of refined, valued at $12,000,000, and giving employment to 2000 men. In the same year 50,000 sewing-machines were manufactured by one firm.

The assessed valuation of the city, Jan. 1, 1873, was $65,000,000. The total bonded and floating debt at the commencement of 1873 was $3,209,000, the property owned by the city being valued at $6,015,400.75, including a sinking fund of $1,551,106.41. The disbursements by the city government during 1872 were $853,942.13. It has six national banks.

The house of correction and workhouse was first occupied in Mar., 1871, being built at a cost of $171,000. Its inmates are furnished by the police court, court of common pleas, and probate court. The total number of prisoners received from its opening to Sept. 10, 1873, was 2472, the average number in confinement being 260. The other prisons of the city are the central police station, five precinct stations, and the county jail.

The Cleveland Medical College was established in 1843. Its faculty is composed of 15 professors; its alumni number 1211; average attendance of students is 125; cost of tuition, $40; graduation, $30; its library contains 2000 volumes, and its museum several hundred anatomical and pathological preparations, models, and drawings; the Cleveland Eye, Ear, and Throat Institute is conducted under its sanction. The Cleveland Homœopathic College was founded in 1850. Its faculty numbers 17 professors; its alumni are 650; average attendance, 100; cost of tuition, $75; library, 1000 volumes; its museum is stored with extensive collections pertaining to the science. The medical department of the University of Wooster was established in Cleveland in 1866. Its faculty is composed of 14 professors; the average number of students in attendance is 80; alumni, 600; cost of tuition, $65. Its library is well selected, and it possesses a museum of great value. The Ohio State and Union Law College was opened in Cleveland in 1858. The public schools of the city are 32 in number, organized in accordance with the provisions of the State law. The number of teachers is 234; amount of salaries paid annually, $169,000; number of pupils, 10,300. There are also 3 high schools, with 15 teachers and 454 scholars. The Catholic parochial schools are 15 in number; 68 teachers, 6200 pupils; convent, 10 teachers. Three industrial schools, with an average attendance of 200 pupils, are supported by appropriations from the city treasury and donations from citizens for the benefit of destitute children. The Cleveland Public Library was opened on Feb. 18, 1869, with 6300 volumes, the present number being 17,000. It is supported by a tax of one-tenth of a mill on the assessed valuation of the city. Its income is about $6500; increase, nearly $500 annually. The Cleveland Library Association, chartered in 1848, and subsequently united with the Mercantile Library, enjoys an endowment of $23,000, and its library contains 10,500 volumes. The Cleveland Law Library was established in 1870 by a joint-stock company; capital stock, $20,000, every person purchasing two shares at $25 each being a member. It contains 2000 volumes, with an annual increase of 300. It is supported by dues from members and an income of $500 per year derived from fines assessed by the police court on State cases. In addition to these are the libraries of the Western Reserve Historical Society, Kirtland Society, and Bethel Free Reading-rooms. There are 4 English and 2 German daily papers, 1 German, 3 English tri-weeklies, and 35 miscellaneous weekly and monthly publications.

The churches of Cleveland are 102 in number: Evangelical Protestant, 3; Disciples, 2; Hebrew, 2; Christian, 2; Free-Will Baptist, 1; Society of Friends, 1; Spiritualists, 1; Swedenborgian, 1; Unitarian, 1; United Brethren, 1; Universalist, 1; Reformed, 5; Methodist Episcopal, 18; Protestant Episcopal, 11; Roman Catholic, 15; Presbyterian, 8; Baptist, 8; Congregational, 4; Evangelical Association, 4; United Evangelical, 3; Evangelical, 4; Evangelical Lutheran, 2; miscellaneous, 4.

Charity (St. Vincent's) Hospital was opened in the year 1866, and was built by general subscription and donations. It has capacity for 200 patients, the average number being 60; the total number admitted to Sept. 1, 1873, 3500. It is supported by donations and the revenue derived from paying patients. The City Infirmary is maintained at an annual cost of about $14,000. The total number of inmates received during the nine months ending Jan. 1, 1873, was 439; maximum weekly number, 180; minimum, 126; average, 150. In connection with the infirmary is a farm, the total products of which in 1872 amounted to $11,900.82; an out-door relief is organized for the purpose of rendering assistance to the needy outside of the infirmary. The Cleveland City Hospital, to which the first patient was admitted July 23, 1866, has no endowment, but enjoys an annual income of $7000, derived from the rental of beds to railroad companies and individuals, and donations from the charitable. The average number of inmates is 175, and the total number of names upon the register Sept. 10, 1873, was 577. The Foundling Hospital, established in Jan., 1873, has an average of 20 inmates. It has no endowment, and is supported by donations. The Lying-in Hospital was also established in Jan., 1873, and is managed in connection with Charity Hospital. The average number of inmates is 14, and the total number admitted to Sept. 15, 1873, was 24. The Homœopathic Hospital was founded in 1868 by the faculty of the Cleveland Homœopathic College; average number of patients is 20; total admitted, 550. The U. S. Marine Hospital was opened in 1852 for the benefit of sailors, and is supported by appropriations from Congress and a tax of forty cents per annum on all sailors in the Cleveland district. It has a capacity for 50 inmates, the average number being 20, and the total number admitted since April 1, 1865, 2331.

The benevolent institutions are four in number. The Home for the Aged Poor was founded in 1870 by the "Little Sisters of the Poor." It has no endowment, but is supported by donations and solicited charity. The average number of inmates is 90, their ages ranging from sixty to ninety-five years, and the total number received since the opening of the Home is 125. The Home for Working-women was opened in Nov., 1869, and enlarged in 1872. It has no endowment, but its buildings and lot, valued at $40,000, were presented by a benevolent gentleman of the city to the Woman's Charitable Association, by which it is conducted. Its income in 1873 was about $5000, derived from boarders, and its average number of inmates during the same year was 35. The Retreat, supported by the Woman's Christian Association, was founded in July, 1869. It has no endowment; its inmates average 9, and the total number admitted to Sept. 15, 1873, was 175. Trinity Church Home is supported by the congregation of Trinity Episcopal Church. The Cleveland Protestant Orphan Asylum was organized Feb. 22, 1852, and chartered Feb. 22, 1853. It enjoys an endowment of $50,000, its income being about $5000 per annum. The total number of children to whom its benefits have been extended is 1900, the average number in the asylum 60. St. Mary's Female Orphan Asylum was founded in 1851, with a slight endowment. Its benefits are extended to female orphans from five to eighteen years of age. The average number of inmates is 100, the total number admitted being 400. St. Joseph's Female Orphan Asylum is tributary to St. Mary's, and is devoted to the care of the younger class of orphans. It was founded in 1859, is without endowment, and has an average of 70 inmates. St. Vincent's Male Orphan Asylum was founded in 1852, without endowment, and is supported by fairs held throughout the diocese and by contributions. Its average number of inmates is 150. The Jewish Orphan Asylum was founded in 1868, without endowment. It is supported by the order of I. O. B. B., districts Nos. 26 and 27, private subscriptions, and donations. Its average number of inmates is 170, and the total number to whom assistance had been rendered to Sept. 1, 1873, is 295. The Bethel Home for the Destitute has for its purpose the providing of a home, food, and temporary shelter for the needy who are sailors, residents of the city, or strangers. It is provided with substantial buildings, and it is impossible to measure its charity by numbers. The Children's Aid Society was established in 1857, and its primary object is to co-operate with the city council in promoting the interests of the Cleveland industrial schools. During the sixteen years of its existence it has secured homes for 1100 children, and extended its provident care to more than 5000.

The city is well provided with public parks. The Public Square, containing ten acres and centrally located, is beautifully laid out with fountains, lawns, walks, rustic houses, and numerous shade trees, and its centre is ornamented with an elegant marble monument to Commodore Perry, in commemoration of his victory on Lake Erie in 1813.

The railroads centering in the city are—the Atlantic and Great Western, the Cleveland Columbus Cincinnati and Indianapolis, the Cleveland and Mahoning Valley, the Cleveland and Pittsburgh, the Lake Shore and Michigan Southern, the Lake Shore and Tuscarawas Valley, the Rocky River, the Valley, and the Cleveland and Newburg. The city railroads are five in number; the Kinsman Street, or Woodland Avenue, length 3¾ miles, track double, capital $250,000, cost (including paving, buildings, etc.) $200,000, income $90,000 per annum, passengers carried 2,000,000; the East Cleveland and Garden Street Branch, length of double track 4½, and single track 2¼ miles, authorized capital $300,000, paid in $180,000, cost about $150,000, annual receipts $84,000, passengers carried 1,800,000; the St. Clair Street, length of double track 3 miles, capital, $200,000, $113,000 paid in, total cost (including paving, running stock, etc.) about $100,000, annual receipts exceed $50,000, passengers carried over 1,200,000; the Detroit Street, length 3 miles, single track, capital $80,000; the Brooklyn Extension, capital $35,000, length 3 miles, single track (the two operated by lessees), $75,000 invested in running stock, receipts about $70,000 per annum, passengers carried 1,300,000; the Collamer and St. Clair Street, 2½ miles in length.

The gas-works are two in number, owned by private corporations, with a united capacity of 800,000 cubic feet

per day. The city is supplied with pure water from Lake Erie by extensive waterworks, upon which had been expended to Jan. 1, 1873, $1,340,104.20, there being in use at that time 68 miles 1292 feet of pipes. To avoid the impurities imparted to the water by the drainage of the city, a tunnel, extending 1¼ miles into the lake, has been constructed, at a cost of $550,000, rendering the total amount expended upon works, pipes, etc. at the completion of the tunnel about $1,900,000. There are in use 80 miles of gas-pipe, 43 miles of sewering, 14 miles of stone and 12 miles of wooden paving.

F. H. Bradner, Commercial Ed. "Cleveland Leader."

Cleveland, a township of Greenville co., S. C. Pop. 814.

Cleveland, a post-village, capital of Bradley co., Tenn., on the East Tennessee and Virginia R. R., 29 miles E. by N. from Chattanooga. It has three newspapers. A branch railroad 27 miles long connects it with Dalton, Ga. It has a national bank and a female institute. Pop. 1658; of township, 1734. Ed. Cleveland "Banner."

Cleveland (Charles Dexter), LL.D., an American scholar and writer, born at Salem, Mass., Dec. 3, 1802, graduated at Dartmouth in 1827. He was appointed professor of Latin and Greek in Dickinson College, Pa., in 1830, and of Latin in the University of New York in 1832. He opened in 1834 a seminary for young ladies in Philadelphia. He published, besides other works, a "Compendium of English Literature from Sir John Mandeville to William Cowper" (1850), a "Compendium of American Literature" (1858), and a "Compendium of Classical Literature" (1861). Died Aug. 18, 1869.

Cleveland (Chauncey F.), LL.D., an American lawyer, born at Hampton, Conn., in 1799. He was admitted to the bar in 1819, soon became distinguished in State politics, was governor of Connecticut in 1842 and 1843, and member of Congress (1849–53).

Cleveland (John Fitch) was born at French Creek, Chautauqua co., N. Y., Feb. 4, 1819. He received a common-school education, and passed his early life in agricultural pursuits. Since 1843 he has been connected with the "New York Tribune," on which at present he holds the important position of financial editor. He has also for many years been compiler of the "Tribune Almanac." From 1862 to 1870 he held the office of assessor of internal revenue.

Clev'enger (Shobal Vail), an American sculptor, born at Middleton, O., in 1812. He worked for some time in Boston, and afterwards visited Italy, where he passed several years. Among his works are statues of Daniel Webster and Henry Clay and a bust of Edward Everett. He died at sea as he was returning from Italy in 1843.

Cleves, a town of Rhenish Prussia, 3 miles S. W. of the Rhine and 50 miles N. W. of Düsseldorf, was formerly the capital of the duchy of Cleves. It is built in the Dutch style, and has a fine old castle, a Protestant gymnasium, and a collegiate church of the fourteenth century; also manufactures of cotton, silk, and woollen fabrics, hosiery, etc. Pop. in 1871, 9038.

Clew, or **Clue** [Anglo-Saxon, *cleow*], originally a ball of thread; also the thread which guides a person in a labyrinth, and hence that which serves as a guide in anything of an uncertain or intricate nature; in nautical language, the lower corner of a square sail. To clew up is to haul up the clew of a sail. Clew-lines are small ropes used to draw the sail up to the yard. Clew-garnets are the same as clew-lines, but the term is only applied in connection with the courses or lower sails.

Clichy, a town of France, department of Seine, is 4½ miles N. W. of Paris, of which it is a suburb. It has manufactures of chemical products and white lead. P. 13,666.

Clif'den, Viscounts (1781), Barons Clifden (Ireland, 1776), Barons Mendip (Great Britain, 1794), Barons Dover (United Kingdom, 1831).—Henry George Agar Ellis, fourth viscount, born Sept. 2, 1863, succeeded his father Feb. 20, 1866.

Cli'ent [Lat. *cliens*], in ancient history, a Roman citizen whose relation to his patron was in many respects similar to that of a serf to his feudal lord. It was the duty of a patron to watch over the interests of his clients and protect them, and to defend them in lawsuits. He also frequently made them grants of land on lease. In return, the client was bound to defend his patron, and contribute towards any extraordinary expenses he might be subject to. He might not appear as accuser or witness against him in judicial proceedings—a prohibition which was reciprocal. The body of clients was increased by the institution by which foreigners, who, as allies of Rome, had a share in its franchise, might choose themselves patrons on their coming to settle in the city. The obligations of clients were hereditary, and could not be shaken off unless through the decay of the family of the patron. The clients have by some been regarded as plebeians who of their own will entered into certain relations with the patrician families. The term client has been appropriated in modern times to one whose cause is prosecuted or defended, and his person or interests represented, either by an attorney or by an advocate. The custom of practising gratuitously as advocates long prevailed among the Roman patricians; and from it the usage was derived, which still prevails in Great Britain, of considering the fee of a counsel as a gratuity which cannot be legally claimed. At present the etiquette of the bar appears to be this: that a lawyer cannot refuse without reasonable excuse to plead gratuitously the cause of a client who sues regularly *in formâ pauperis*, or to defend a prisoner if called on to do so by the court.

Clif'ford, a post-township of Susquehanna co., Pa. Pop. 1532.

Clifford (John Henry), LL.D., an American lawyer, born at Providence, R. I., Jan. 16, 1809, graduated at Brown University in 1827, was governor of Massachusetts (1853–54), and attorney-general of that State (1849–53 and 1854–58).

Clifford (Nathan), an American jurist, born at Rumney, N. H., Aug. 18, 1803, became a citizen of Maine in 1827, member of Congress (1839–43), U. S. attorney-general (1846–47), was subsequently U. S. minister to Mexico. He became a justice of the U. S. Supreme Court in 1858, and is the author of two volumes of "U. S. Circuit Court Reports" (1869).

Clifford (Thomas), Lord, an English politician, born in 1630. He entered Parliament in 1660, and was appointed a commissioner of the treasury in 1668. In 1671 he became a member of the notorious cabinet called the Cabal (which see). He obtained the title of baron in 1672. Died in 1673.

Clif'ton, a beautiful town and fashionable watering-place of England, in Gloucestershire, is a western suburb of Bristol. It is built on the sides and top of a steep carboniferous limestone hill 308 feet high, which commands picturesque views, and is separated from a similar cliff by a deep chasm, crossed by a fine bridge, beneath which flows the navigable Avon. Here are tepid springs which contain carbonic acid and salts of magnesia, and have a temperature of 73° F. Pop. 20,701.

Clifton, a post-village of Stamford township, Welland co., Ontario (Canada), on the Niagara River at the suspension bridge, 1 mile below the Niagara Falls. It is the E. terminus of the Great Western Railway, and is on the Erie and Niagara Railway. It has a very large export trade to the U. S. and a large museum. Pop. about 3500.

Clifton, a post-village and township of Wilcox co., Ala. Pop. 1696. The village is about 80 miles S. W. of Montgomery.

Clifton, a post-village of Columbus City township, Louisa co., Ia. Pop. 200.

Clifton, a post-township of Washington co., Kan. Pop. 713.

Clifton, a township of Wilson co., Kan. Pop. 918.

Clifton, a post-township of Penobscot co., Me. P. 348.

Clifton, a township of Keweenaw co., Mich. Pop. 615.

Clifton, a post-village of Passaic co., N. J., on the Erie R. R., 3 miles S. E. by S. of Paterson. It contains many fine residences, and is well known for its picturesque scenery.

Clifton, a post-village of Chili township, Monroe co., N. Y., on Mill Creek, has a number of manufacturing establishments.

Clifton, a village of Southfield township, Richmond co., N. Y., is the seat of a "Seamen's Retreat," and a "Mariners' Family Asylum." It is in the S. E. part of Staten Island.

Clifton (Clarksboro' post-office), a township of St. Lawrence co., N. Y., has extensive beds of magnetic iron ores, furnaces for iron and steel, and a railroad track to De Kalb. Pop. 221.

Clifton, a post-village of Miami township, Greene co., O. Pop. 253.

Clifton, a township of Alleghany co., Va. Pop. 1018.

Clifton, a post-village of Mason co., West Va. It has one weekly newspaper. Pop. 693.

Clifton, a township of Grant co., Wis. Pop. 1076.

Clifton, a post-township of Monroe co., Wis. P. 501.

Clifton, a township of Pierce co., Wis. Pop. 615.

Clifton Factory, a township and village of St. Mary's co., Md. The village is 55 miles S. E. of Washington. Pop. 3001.

Clifto'nia, a genus of evergreen trees and shrubs of the order Cyrillaceæ. The *Cliftonia ligustrina,* a small tree or shrub, popularly called "titi," or buckwheat tree, grows in the Gulf States. Its fragrant white blossoms appear in early spring.

Clifton Park, a post-village and township of Saratoga co., N. Y., 15 miles N. of Albany. The township contains six churches, several villages, and has an academy at Jonesville. Pop. 2657.

Clifton Springs, a post-village of Manchester and Phelps townships, Ontario co., N. Y., on the Auburn branch of the New York Central R. R., 10 miles E. N. E. of Canandaigua. It has four churches, a free union school, copious sulphur springs, and is the seat of "Clifton Springs Sanitarium." It has one weekly newspaper. Pop. 746.

Clif'ty, a township of Bartholomew co., Ind. P. 1133.

Climac'teric Year [from the Gr. κλιμακτερικός, from κλῖμαξ, a "ladder"], the name given to certain years in the life of man that were long supposed to have a peculiar significance to him, and to constitute, as it were, critical points in his health and fortune. The mystical number 7, multiplied into the odd numbers 3, 5, 7, and 9, produced the crises of this kind. The sixty-third year, called the "grand climacteric," was the most important, and was supposed to be fatal to most men, its influence being ascribed to the fact that it is the multiple of the two mystical numbers 7 and 9. Certain recent physiologists, while rejecting the theory of numerical influence, insist that there was a germ of truth in this old belief.

Cli'mate [from the Gr. κλίμα, "slope," "inclination," "exposure"], the condition of any place with respect to the temperature, the moistness or dryness, and the currents of the atmosphere, that vast ocean of air at the bottom of which we live. Enveloping both land and water, the atmosphere absorbs the heat and moisture generated on both by the rays of the sun. By the winds this most mobile of the elements carries from the sea to the parched lands invisible vapors and fertilizing rains. In this wonderful medium alone the highest forms of vegetable and animal life, and man himself, thrive and find the amount of oxygen, heat, and water which is indispensable to organic life. The atmosphere thus performs the part of a universal mediator between land and water, and between inorganic nature and living beings. These physical agencies, fostering life and acting through the atmosphere, constitute climate.

Heat and water are the two elements of which every plant and animal requires a certain share. The laws of the distribution of heat and rain are therefore the most important topics of the science of climate. To them we must add the course of the winds, which play a prominent part in both. The temperature may be considered as the most fundamental of the phenomena of climate, for the winds are essentially due to differences of temperature, and the rains are regulated both by changes of temperature and the course of the winds. The distribution of heat, the course of the winds, and the distribution of rains, therefore, is the order in which they have to be considered.

Distribution of Heat.—All heat available for the purposes of organic life comes from the sun. Its distribution over the globe, however, depends upon both *astronomical* and *physical* causes. Though this mighty orb pours its life-giving rays in a uniform and uninterrupted stream upon the face of the earth, the spherical form of our planet, and its movements of daily rotation on its axis and annual revolution around the sun, establish permanent differences of temperature in every latitude between the poles and the equator, and periodical ones between day and night and the various parts of the year. The first give the great zones of climate, torrid, temperate, and frigid; the other, the daily periods and the seasons. To these causes we have to trace the groundwork of climate and its fundamental laws, which are summed up under the name of "astronomical climate." These laws, again, are variously and often greatly modified by physical agencies, such as the different absorbing power of land and water for heat, the action of the winds and marine currents, and the elevation above the level of the sea. The astronomical climate, modified by these secondary causes, is the "physical climate," which is in fact the actual climate.

Astronomical Climate.—The most general law in the distribution of heat is its gradual decrease from a maximum at the equator to a minimum at the poles. The cause of this inequality, so fruitful in consequences, is the spherical form of the earth. The rays of the sun fall most thickly and produce their full effect when perpendicular, as in the equatorial regions; less thickly and with diminished intensity when slanting, as in the intermediate latitudes; when tangent, as at the poles, they lose their heating power. Each day testifies to this fact. The horizontal rays of the rising and setting sun have but little heating power; the heat increases with the ascending sun; it is greatest at noon, when the sun is highest. The torrid, temperate, and frigid zones correspond to the noon, the declining, and the setting sun of the day. It is, therefore, to the geographical form of our globe that we must trace those permanent differences of temperature which carry with them corresponding differences in the systems of winds and rains that characterize the great climatic zones.

The Seasons.—Again, while the sun shines, the earth receives more heat than it emits by radiation; during the night it loses more than it receives. When the days and nights are of equal length, the gain and loss correspond to each other, and the average temperature is constant. But long days and short nights give a season of accumulated heat higher than the annual average, or the summer; long nights and short days a season of cold below the average temperature, or the winter.

If the axis of the earth were perpendicular on the plane of its orbit, the sun would always be opposite the equator, and the line separating the lighted from the shaded hemisphere pass through the poles, cutting all parallels into two equal parts. The days and nights being then equal at all times on all parallels, no annual seasons of heat and cold would exist. But the axis being inclined 23½°, and always remaining parallel to itself while the earth revolves around the sun, an ever-varying inequality of days and nights and of temperature is the consequence. Only twice a year, on the 20th of March and the 22d of September, is the sun opposite the equator. It is then the time of the equinoxes and average temperature. On the 21st of June, the north pole being inclined 23½° towards the sun, the sun's rays fall perpendicular on the Tropic of Cancer, and the border of the lighted hemisphere reaches the opposite side of the Arctic Circle, 23½° beyond the pole. This is the time of the solstice, or of the longest day and shortest night and of the highest sun in all the northern hemisphere. It is therefore the summer season, while the southern hemisphere has the shortest day, the longest night, the lowest sun, and the winter season. On the other solstice, the 21st of December, the reverse takes place.

The following table, giving the duration of the longest day and shortest night on the 21st of June, with their differences in various latitudes of the northern hemisphere, shows the increasing inequality of days and nights from the equator to the poles. The fractions are decimals of an hour:

Table of the Longest Days in Various Latitudes.

Latitude.	Longest Day. Hours.	Shortest Night. Hours.	Difference. Hours.
Equator	12.0	12.0	0.0
10°	12.7	11.3	1.4
20°	13.3	10.7	2.6
North Tropic	13.5	10.5	3.0
30°	14.0	10.0	4.0
35°	14.5	9.5	5.0
40°	15.0	9.0	6.0
45°	15.6	8.4	7.2
50°	16.3	7.7	8.6
55°	17.3	6.7	10.6
60°	18.7	5.3	13.4
Arctic Circle	24.0	0.0	24.0
67.5	1 month	0.0	No night.
69.5	2 "	0.0	
73.3	3 "	0.0	
78.3	4 "	0.0	
84.	5 "	0.0	
North Pole	6 "	0.0	

From this table we see that the difference in the length of days and nights increases very slowly in the tropical regions, then more and more rapidly to the Arctic Circle, where the sun does not set on the 21st of June.

Beyond that limit to the pole the sun makes the circuit of the horizon without disappearing for months in succession, and at the pole the year is divided into one day and one night of six months each. The reverse again occurs in the opposite season.

Thus in the tropical regions the temperature is nearly constant throughout the year, while the increasing inequality of days and nights towards the pole causes an increasing difference between the temperature of summer and winter.

The length of the days, however, in the high latitudes compensates for the diminished intensity of the sun's rays, and so it happens that the accumulated heat of a long summer day in the temperate regions may be equal to, or greater than, that of a day in the tropical regions. A summer day in Labrador or St. Petersburg may be as warm as a day under the equator, but these northern latitudes have only a few such days in the year.

Towards the equator the number of warm days gradually increases. Thus the polar regions have short summers and long winters, passing rapidly from one to the other with great differences of temperature. In the temperate regions summer and winter are about of equal length, with long transition seasons of spring and autumn and variable

JOHNSON'S WORLD SHOWING THE DISTRIBUTION OF THE TEMPERATURE OF THE AIR

BY PROF. A. GUYOT LL.D.

Explanation of Colors.

Zones of Temperature

Torrid Zone; *mean temperature 70 degrees of Fahrenheit and above.*

Temperate Zones; *temperature between 70 and 30 degrees.*

Frigid Zones; *temperature below 30 degrees of Fahrenheit.*

Regions of greatest heat.

Regions of greatest cold.

The arrows show the directions of the marine currents.

Explanation of Figures.

The figures near the lines in the main map, indicate the mean temperature of the year; those near the names of places and near the lines in the smaller maps, the Winter and Summer temperatures, represented by the average of January and July.

Explanation of Lines.

The lines in the main map pass through places having the same average annual temperature and are called Isothermal lines, meaning lines of equal mean heat. The temperatures are corrected for the effect of the elevation above the Sea-level. Their curving towards the poles denotes a greater, and towards the equator, a lesser degree of heat than that due to the latitude.

WINTER.

Lines of equal mean Temperature in January.

SUMMER.

Lines of equal mean Temperature in July.

Entered according to Act of Congress, in the Year 1872, by A.J. Johnson, in the office of the Librarian of Congress, at Washington.

temperature. An everlasting summer with constant heat reigns in the tropical regions. Though the intensity of the sun's rays is greatest at the time of the solstice, their full effect is produced only somewhat later, and the atmosphere attains its highest temperature in July. It is the same with the daily periods; the highest temperature is felt not at noon, but about two o'clock, and the lowest a little before sunrise.

Physical Climate.—According to the laws of astronomical climate, we should expect the same average temperature and the same periodic changes in all places situated on the same parallel of latitude, but thermometric observations prove it to be quite otherwise. On the western side of the Atlantic Ocean, Labrador has a frozen and treeless climate, while on the other side, in the same latitude, we are greeted by the mild atmosphere, rich verdure, and fertile fields of the British Isles. New York with its icy winter is in the same latitude as Naples with its orange groves. On the western coast of our continent, San Francisco, with its mild, snowless winters and cool summers, is on the parallel of Washington, with a frozen Potomac in the cold season and a burning summer sun.

Isothermal Lines.—To render visible to the eye the actual distribution of heat, as given by observations of the thermometer, Humboldt introduced the *isothermal lines*, or lines which connect together all places having the same mean temperature, either of the year, of a season, or of any particular month. The annual isothermal lines show the average amount of heat belonging to each place; the monthly and season isothermals, its distribution throughout the year. A glance at Map No. VI. will teach us many important laws of this distribution.

To read the map aright, let us remember that when the lines in either hemisphere bend away from the equator towards the poles, they indicate a heating influence; when they bend from the poles towards the equator, they indicate a cooling influence. It is evident, again, that the greater the difference between the isothermal lines and the parallels, the greater also the deviation from the astronomical temperature arising from physical causes. To eliminate the local influence of the elevation, the temperatures have been reduced to what they would be at the level of the sea in the same place.

The principal facts that we note in this review are the following:

On the whole, the greater disturbances occur in the northern hemisphere, which has the most land; the isothermal lines are far more uniform in the southern hemisphere, which has most water.

The greatest deviations are found on the opposite coasts of the Atlantic Ocean. The isothermal line of 50° Fahrenheit of temperature, which passes near New York in the fortieth degree of latitude, reaches Ireland and London, on the other side of the Atlantic, eleven degrees of latitude farther north. The isothermal of 40°, which passes through Central Canada and Nova Scotia about the forty-sixth degree of latitude, touches the southern part of Iceland and the coast of Norway in the sixty-fourth degree of latitude, or eighteen degrees farther north. The isothermal of 30° passes through Central Labrador, and Cape North in Europe, though their latitudes differ by twenty-one degrees. In higher latitudes the difference is still greater.

From these remarkable deviations of the isothermal lines, we see that not only Western Europe is a great deal warmer than Eastern America in the same latitude, but that the difference increases more and more towards the pole. It is also evident from the bending of the lines that the heating influences bear towards the north-east.

Similar modifications of the annual isothermal lines take place in the North Pacific. Here also the eastern (or Asiatic) is colder than the American coast, and the climate of California and Oregon much milder than that of a corresponding latitude in Asia; but all these differences are reduced to nearly one-half of what they are on the opposite coasts of the Atlantic.

It can thus be accepted as a law that in the two great land masses of the northern hemisphere the western coasts are warmer than the eastern coasts. Moreover, while the average temperature of the oceans is higher, the bending of the lines southward in the interior of these continents shows a lower temperature than that due to their latitude.

In the southern hemisphere the law of the temperature of the opposite coasts seems to be reversed. In America and in Africa the western is colder than the eastern coast, and in this hemisphere the average temperature of the continents is rather higher than that of the ocean.

Climatic Zones.—There are four parallels, usually made prominent in globes and maps, which are peculiar limits in the distribution of light on the surface of the earth. Two are traced at the distance of about 23½° on each side of the equator, and are called on the north the *Tropic of Cancer*, and on the south the *Tropic of Capricorn*. The other two, 23½° from either pole, are the *North Polar* and the *South Polar Circles*, also called the *Arctic* and *Antarctic Circles*. The two tropics mark the extreme limits of the central region where the sun, in its yearly course, can be seen vertical, the sun being vertical on these parallels on the longest days of the year—viz. the 21st of June in the northern, and the 21st of December in the southern hemisphere. The polar circles are the parallels on which the longest day is twenty-four hours, and mark the limits of the circular area around the poles within which the summer sun does not set every day. The globe is thus divided into six bands, or *zones*, in three groups, which, from the general character of their temperature, are termed the warm or *torrid*, the *temperate*, and the *frigid* zones. The portion of the earth's surface occupied by each of the zones is very unequal. Their comparative area, in English square miles, is as follows:

North tropical zone	39,109,628	Warm regions.....78,219,256
South tropical "	39,109,628	
North temperate zone	51,110,763	Temperate regions...102,221,526
South temperate "	51,110,763	
North polar "	8,229,748	Cold regions.....16,459,496
South polar "	8,229,748	

The whole globe.....196,900,278 English square miles.

It is thus seen that, by a wise arrangement of Providence, the temperate regions, most favorable to man's development, are the most extensive; next are the warm regions; while the frigid zones, unfit for man's progress, cover but an inconsiderable portion of the earth's surface.

True Zones of Climate.—It is evident that the astronomical zones of climate, whose limits are determined by the distribution of light, do not coincide with the zones of actual temperature. Taking as the limits of the true tropical zone the isothermal lines of 70° on both sides of the equator, which nearly coincide with the boundaries of climate, plants, and animals characterizing the tropical regions, and for those of the frigid zone the isothermal line of 30° in both hemispheres, we obtain zones of irregular shape, which are marked on the map by different colors.

The tropical zone is broadest in Africa, the north temperate in Europe, and we can judge at a glance that Africa is the warmest of the tropical, and of all the continents of the globe, and Europe the warmest of the temperate continents. The highest and lowest temperatures are found in the largest continents—the warmest in Central Africa, the coldest in Northern Asia.

The maps of the isothermal lines of January and July, representing the extreme winter and summer temperatures, show how much greater are the variations in the interior than on the coast. While in January the lines in the interior indicate a lower temperature, those of July, strongly bent northward, betoken a much higher temperature than in the shore region.

Thus, as a rule, the coast of the continent has more equable, the interior more excessive, season temperatures.

This wide departure of the actual from the astronomical temperature is a most striking fact, the principal causes of which are to be found in the different manner in which land and water are affected by the solar rays and in the action of the great currents of the atmosphere and the sea.

Land and Sea Climates.—Water has a great capacity for heat, but a feeble conducting power; it grows warm slowly in the rays of the sun, and never rises to a high temperature. It is the same in cooling; it gives up its heat slowly, and the surface layer growing cool falls lower by its weight, and gives place to the warmer molecules of the inferior strata. Thus the heating and cooling are slow, and do not reach extremes. Land rapidly absorbs the solar rays; the surface layer is quickly heated and soon attains a high temperature, but loses it by radiation with equal rapidity. It reaches, therefore, great extremes of heat and cold. The *sea* or *oceanic climate*, therefore, is characterized by equableness, without extremes of temperature; the *land* or *continental*, by great extremes; it is excessive. This is clearly shown by a few examples, in which the temperatures of the coldest and the warmest months are compared in places situated in the same latitude, but more or less under the influence of the sea or of land:

Differences of Temperature between the Coldest and Warmest Months in Similar Latitudes.

Name of places.	Lat.	Jan. Fahr.	July. Fahr.	Difference. Fahr.
Faroe Islands	62°	39.0	61.7	22.7
Bergen, Norway	60°	34.9	60.3	25.4
St. Petersburg, Russia	60°	15.6	62.6	47.0
Yakutsk, Siberia	62°	— 43.8	62.2	106.0
Penzance, S. W. Eng.	50°	42.6	62.0	19.4
Banaul, Siberia	53°	— 4.7	67.1	71.8
Eastport, Me	45°	22.5	62.4	39.9
Fort Snelling, Minn	45°	13.1	73.4	60.3
Bermudas, Atlantic	32°	62.6	84.2	21.6
Natchez, Miss	32°	52.2	81.3	29.1
Madeira, Africa	32°	63.5	73.8	10.3
Cairo, Egypt	30°	56.3	86.6	30.3

We see by the rapid increase of the differences how the variations augment as we advance from the sea into the interior of the continents. The absolute extremes of temperature differ even more. The highest degree of heat ever observed at the Faroe Islands is only 56° 3′ F., and it freezes but little there, while the meteorological annals of St. Petersburg indicate heats of 92°, and cold of 40° below zero F., or extremes of 132° F. apart. It is at once the cold of the poles and the heat of the tropics. At Yakutsk the mercury often remains frozen for weeks, implying a continued cold of at least 40° F. below zero. Further south and near the tropics the differences between the seasons become naturally less, but the influence of the ocean and of the continent is always very marked. The difference between the extreme temperatures, which at Madeira is only from 20° to 27°, reaches in Egypt 56° F. In the Sahara ice has been known to form by the intensity of radiation, and heat to rise to the enormous height of 140°.

The course of the isothermal lines of January and July is thus easily explained: while the interior, overheated by rapid absorption during the long summer days, is warmer than the coast, it is colder in winter by more rapid radiation. All this shows how great is the influence of the sea upon the distribution of temperature in the different seasons of the year. It tends to bring the extremes together, and to maintain at all times that equability of temperature which, with the abundant moisture, is the distinctive quality of the sea climate.

This difference in the land and sea climates tells even upon the average temperature of the whole earth.

Owing to a great preponderance of land, the northern hemisphere has a warm summer, while the southern hemisphere, having more water, has a mild winter, giving together a high average. In the opposite season the northern hemisphere has a cold winter, and the southern hemisphere a moderate summer, giving a low average. Prof. Dove has calculated that the average temperature of the whole earth in July, during the northern summer, is 62°.4 F., while in January, during the southern summer, it is only 54°.3, or 8°.1 lower than in July.

But if the action of the solar rays on land and water explains some season changes of temperature, other causes are required to account for the permanent deviations of the annual isothermal lines.

Influence of Winds and Marine Currents.—Our daily experience in northern latitudes teaches us that most of the changes not due to the declination of the sun are connected with changes of the wind. Equatorial winds from the south bring us a share of heat from the tropics; polar winds, the chilling breath of a northern atmosphere. If, from any cause, one of these great currents becomes prevailing throughout the year in a particular region, a certain amount of heat or cold is added to or subtracted from the solar heat, considerably modifying the astronomical temperature. The great marine currents perform the same functions, carrying tropical and polar temperatures far into the middle latitudes. Thus it is that the south-westerly winds, which blow almost two-thirds of the year over Western Europe, and the constant flow of the warm waters of the Gulf Stream, greatly increase the average temperature of that continent, and strongly deflect the course of its isothermal lines. (See articles WINDS and MARINE CURRENTS.)

ARNOLD GUYOT.

Cli′max [Gr. κλῖμαξ, a "staircase"], a Latin term used in rhetoric to denote a figure by which several propositions or several objects are presented in such an order that the proposition or object adapted to produce the least impression shall strike the mind first, and the others rise by successive gradations of impressiveness. A sentence in which the order is reversed is called an *anti-climax*.

Climax, a township of Kalamazoo co., Mich. P. 1389.

Climbers (in ornithology). See SCANSORES.

Climbing Fern (*Lygodium palmatum*), a rare species of fern of the sub-order Osmundineæ, is remarkable for its habit of climbing or twining upon shrubs and weeds. It occurs in the U. S. from Massachusetts to Florida and westward.

Climbing Perch. See ANABAS SCANDENS.

Climbing Plants, or **Climbers,** the popular term for those plants which seek support from other objects in order to ascend from the earth, as the vine, etc. This end is accomplished in different ways. Some climb by means of rootlets growing from the stem, as the ivy; some by means of tendrils which twine round branches of trees, as the grapevine, the pea, etc.; some by adhering disks, as in the Virginia creeper; and many by the twining of their own stems around those to which they cling. Twining plants turn only in one direction, either from right to left or from left to right. The pole-bean and passion-flower are examples of the former; the hop of the latter. Certain woody twining plants, which form one of the most remarkable features of many tropical forests, are called lianas. Some climbing plants, like the dodders, are parasitic, living upon the sap of the plants on which they climb. Tendrils are sometimes parts of leaves or stipules, and sometimes transformed branches. They lay hold of the proper support, and then by curling, and thus shortening themselves, draw up the plant.

Clinch, a county in the S. of Georgia. Area, 800 square miles. It is bounded on the W. by the Allapaha River. The surface is level. Rice, corn, oats, and some cotton are raised. It is intersected by the Atlantic and Gulf R. R. Capital, Homerville. Pop. 3945.

Clinch (DUNCAN L.), an American general, born about 1798 in North Carolina, entered the army as first lieutenant in 1808, and rapidly rose by promotion. He was especially distinguished in the Florida war (1835–36), but resigned his commission in the latter year. He was a member of Congress from Georgia (1843–45), and died Nov. 27, 1849.

Clinch′er-Built, Clink′er-Built, or **Lap-Jointed,** a term applied by shipwrights to vessels when the lower edges of the side planks overlap the row beneath, like slates or shingles on the roof of a house. If the planks are all smooth, meeting edge to edge, the construction is called *carvel-built* or *jump-jointed*. Carvel-building requires that the seams should be very close and calked with oakum.

Clinch River rises in the S. W. part of Virginia, flows south-westward, and enters East Tennessee. Pursuing the same general direction between two ridges called Clinch Mountain and Powell Mountain, it unites with the Holston at Kingston to form the Tennessee River. The whole length is estimated at 300 miles.

Clines, a township of Catawba co., N. C. Pop. 1904.

Cling′man (THOMAS L.), an American Senator, born in Surrey co., N. C. He graduated at the University of North Carolina in 1832, and was elected a Whig member of Congress in 1843, after which he was re-elected. Having become a Democrat, he was chosen a Senator of the U. S. in 1858. He served as a colonel in the Confederate army. He proved himself an able politician, and also became distinguished as a geologist.

Clingman's Dome, in Jackson co., N. C., is the highest peak of the Great Smoky Mountains, between North Carolina and Tennessee. It rises to 6660 feet above the sea, and is the second in height in the Appalachians. It was named after Thomas L. Clingman, who ascended it in 1858.

Clin′ic, or **Clin′ical** [from the Gr. κλίνη, a "bed"], belonging to a bed; and hence performed (or pursued) at the bedside, as CLINICAL MEDICINE (which see). (For CLINIC (as a noun) see CLINIQUE.)

Clin′ic, or **Clinical Baptism** [for etymology, see preceding article], an ordinance in the ancient Church administered on a sick bed or death bed.

Clin′ical Med′icine, that branch of the science of medicine which is occupied with the investigation of diseases at the bedside. (See CLINIQUE.)

Clinique, or **Clin′ic** [for etymology, see CLINIC], a French term (used for *école clinique*, or "clinical school") applied to a school in which medicine is studied and instruction is given at the bedside, or in which the patients are examined by the medical teacher in the presence of the students. It is often Anglicized as CLINIC, particularly in the U. S.

Clink′stone is a felspathic rock of a grayish-green color, having so remarkable a tendency to lamination that it sometimes furnishes tiles for roofing. It is a compact, homogeneous rock, passing gradually into gray basalt. The slab gives a metallic ring or "clink" when struck with a hammer, whence its name. It is found in volcanic districts.

Clinom′eter [from the Gr. κλίνω, to "lean," and μέτρον, a "measure"], an instrument used by geologists to determine and measure the dip of a stratum. It consists of a compass furnished with a small spirit-level, and on the lid—which can be fixed at right angles to the compass-box—there is a graduated quadrant and plumb-line.

Clin′ton, a county in S. Central Illinois. Area, 480 square miles. It is intersected by the Kaskaskia River and by Shoal Creek. The surface is nearly level; the soil fertile. Corn, wheat, wool, and tobacco are raised. Coal is found here. The most numerous manufactories are those of flour and of carriages. The Ohio and Mississippi R. R. passes through it. Capital, Carlyle. Pop. 16,285.

Clinton, a county in N. W. Central Indiana. Area, 432 square miles. It is drained by the South Fork of Wildcat River. The surface is nearly level; the soil is productive. Corn, wheat, butter, tobacco, and wool are largely

produced. It contains a large prairie. Lumber, carriages, and flour are manufactured. It is intersected by the Logansport Crawfordsville and South-western and the Indianapolis Cincinnati and Lafayette R. Rs. Capital, Frankfort. Pop. 17,330.

Clinton, a county in the E. of Iowa. Area, 696 square miles. It is bounded on the E. by the Mississippi River and on the S. by the Wapsipinicon. The surface is finely diversified by undulating prairies and woodlands; the soil is fertile. Corn, wheat, oats, wool, and butter are produced extensively. Flour and carriages are manufactured in this county. It is intersected by the Iowa division of the Chicago and North-western and by several other railroads. Capital, Clinton. Pop. 35,357.

Clinton, a county in the S. of Kentucky. Area, 250 square miles. The Cumberland River flows near its northern border. The surface is hilly; the soil is mostly fertile. Tobacco, corn, and wool are staple products. Coal is found here. Capital, Albany. Pop. 6497.

Clinton, a county in Central Michigan. Area, 576 square miles. It is drained by the Maple and Looking-glass rivers, affluents of Grand River, which touches the south-western part of the county. The surface is level, and partly covered with forests of sugar-maple; the soil is fertile. Grain, timber, wool, butter, and potatoes are largely produced. It is intersected by the Detroit and Milwaukee and other railroads. Capital, St. John. Pop. 22,845.

Clinton, a county in N. W. Missouri. Area, 460 square miles. It is drained by several small affluents of Platte River. The surface is nearly level; the soil is fertile. Corn, cattle, wool, and tobacco are largely raised. Limestone is abundant here. It is intersected by the Hannibal and St. Joseph and several other railroads. Capital, Plattsburg. Pop. 14,063.

Clinton, a county which forms the N. E. extremity of New York. Area, 1092 square miles. It is bounded on the E. by Lake Champlain, and is drained by the Au Sable, Chazy, and Saranac rivers. The surface is partly mountainous; the soil near the lake is fertile. Potatoes, oats, hay, and wool are the chief crops. Cattle are raised extensively. Leather, lumber, starch, brick, and iron are manufactured. Iron-ore abounds here. The county is traversed by the Ogdensburg and Lake Champlain, the Montreal and Plattsburg, and the Whitehall and Plattsburg R. Rs. Capital, Plattsburg. Pop. 47,947.

Clinton, a county in S. W. Ohio. Area, 467 square miles. It is drained by the East Fork of the Little Miami and by Todd's Creek. The surface is undulating; the soil is fertile. Grain, tobacco, hay, wool, and dairy products are largely raised. It is intersected by the Cincinnati and Muskingum Valley R. R. and the Marietta and Cincinnati R. R. Capital, Wilmington. Pop. 21,914.

Clinton, a county in N. Central Pennsylvania. Area, 1000 square miles. It is intersected by the West Branch of the Susquehanna River. The surface is partly occupied by the Alleghany Mountains; the soil of the valleys is fertile. Lumber, flour, grain, tobacco, and wool are largely produced. Coal and iron abound here. This county is traversed by the Philadelphia and Erie R. R. and the Bald Eagle division of the Pennsylvania R. R. Capital, Lockhaven. Pop. 23,211.

Clinton, a post-village of Huron co., Ontario (Canada), on the Buffalo and Goderich branch of the Grand Trunk Railway, 13 miles from Goderich. It has extensive trade and manufactures and one weekly paper. Here are valuable salt-wells, and a vein of rock-salt twenty feet thick. Pop. about 2000.

Clinton, a township and post-village of Greene co., Ala., about 75 miles N. W. of Selma. Pop. 2224.

Clinton, a post-village, capital of Van Buren co., Ark., on the Little Red River, about 65 miles N. by W. from Little Rock.

Clinton, a township and post-village of Middlesex co., Conn. The village is on the New Haven New London and Stonington R. R., 23 miles E. of New Haven. It has one national bank. Pop. 1404.

Clinton, a post-village, capital of Jones co., Ga., about 15 miles N. E. of Macon. Pop. 362.

Clinton, a township of De Kalb co., Ill. Pop. 1004.

Clinton, the capital of De Witt co., Ill., on the Central R. R., 23 miles S. of Bloomington. It has one national bank and two weekly newspapers. Pop. 1800.

Clinton, a township of Boone co., Ind. Pop. 1220.

Clinton, a township of Cass co., Ind. Pop. 1021.

Clinton, a township of Decatur co., Ind. Pop. 828.

Clinton, a township of Elkhart co., Ind. Pop. 2099.

Clinton, a township of La Porte co., Ind. Pop. 797.

Clinton, a township of Putnam co., Ind. Pop. 1036.

Clinton, a township and post-village of Vermilion co., Ind., on the Wabash River, about 16 miles N. of Terre Haute. Pop. of village, 564; of township, 2223.

Clinton, a city, capital of Clinton co., Ia., on the Mississippi River, 42 miles above Davenport, and 138 miles by railroad W. of Chicago. The river is here crossed by an iron bridge which is about 4000 feet long, and cost $600,000. The cars of the Chicago and North-western R. R. pass over this bridge. Clinton contains three banks, the repair-shops of the railroad company, foundries, sash-and-blind factories, a paper-mill, eight saw-mills, etc.; in all twenty-five manufactories, paying out $65,000 monthly as wages. Four newspapers are published here, one of them daily. It is the eastern terminus of the Iowa Midland, and the southern terminus of the Chicago Clinton and Dubuque R. Rs. Pop. 6129; of Clinton township, exclusive of the town, 1841. ED. "HERALD."

Clinton, a township of Franklin co., Ia. Pop. 475.

Clinton, a township of Linn co., Ia. Pop. 1205.

Clinton, a township of Pocahontas co., Ia. Pop. 55.

Clinton, a township of Ringgold co., Ia. Pop. 341.

Clinton, a township of Wayne co., Ia. Pop. 643.

Clinton, a post-village of Douglas co., Kan., 11 miles W. S. W. of Lawrence. Pop. of Clinton township, 1030.

Clinton, a post-village, capital of Hickman co., Ky., about 300 miles W. S. W. of Frankfort, is on the Mobile and Ohio R. R. Pop. 272.

Clinton, a post-village, capital of East Feliciana parish, La., 32 miles N. of Baton Rouge. A railroad 25 miles long connects it with Port Hudson on the Mississippi. It has good female schools. The parish ships yearly 30,000 bales of cotton. It has one weekly newspaper. Pop. 930.
S. LAMBERT, ED. "PATRIOT DEMOCRAT."

Clinton, a post-village and twp. of Kennebec co., Me., is on the Me. Central R.R., 46 miles W. S.W. of Bangor. P. 1766.

Clinton, a manufacturing town of Worcester co., Mass., on the Nashua River, and on the Worcester and Nashua R. R. where it crosses the Boston Clinton and Fitchburg R. R., 45 miles W. by N. from Boston and 16 miles N. E. of Worcester. It has five churches, one national bank, one newspaper, and manufactures of ginghams, combs, Brussels and Wilton carpets, wire-cloth, machinery, etc. The Lancaster mills of this place employ about 1200 hands, operating on 950 looms, and producing annually nearly 7,000,000 yards of ginghams and plaids. P. including Clinton township, 5429. ED. "COURANT."

Clinton, a post-village and township of Lenawee co., Mich., on the Raisin River, and on the Jackson branch of the Lake Shore and Michigan Southern R. R., 42 miles N. W. of Toledo, O. Pop. 752; of township, 1356.

Clinton, a township and village of Macomb co., Mich., 20 miles N. E. of Detroit. Total pop. 3590.

Clinton, a post-village of Hinds co., Miss., 10 miles W. of Jackson, on the Vicksburg and Meridian R. R. It is the seat of Mississippi College.

Clinton, a post-village, capital of Henry co., Mo., on the Missouri Kansas and Texas R. R., 40 miles S. W. of Sedalia, at the junction of the Clinton and Memphis and Clinton and Kansas City branches. It is called the "model town" of Western Missouri. It has one national bank and two weekly newspapers. Pop. 840.

Clinton, a township of Texas co., Mo. Pop. 721.

Clinton, a township of Essex co., N. J. Pop. 2240.

Clinton, a post-borough of Hunterdon co., N. J., on the S. branch of the Raritan River, and near the New Jersey Central and Easton and Amboy R. Rs., about 10 miles N. of Flemington. It has four churches, a national bank, one newspaper, carriage manufactories, and a large trade. Iron and manganese mines have been opened in the neighborhood. Pop. 785; of township, 3134.
J. CARPENTER, JR., PUB. CLINTON "DEMOCRAT."

Clinton, a township of Clinton co., N. Y. It contains much white Potsdam sandstone. Pop. 2206.

Clinton, a township of Dutchess co., N. Y. Pop. 1708.

Clinton, a post-village of Kirkland township, Oneida co., N. Y., on the Utica division of the Midland R. R., at the junction of the Rome branch, 9 miles W. by S. of Utica, and on the Erie Canal. It has six churches, a weekly and a monthly periodical, one seminary for boys, and four for young ladies. It is also the seat of Hamilton College. In the vicinity are large quarries of good building-stone. There are also various manufactures. Pop. 1640.

Clinton, a post-village, capital of Sampson co., N. C., 35 miles E. of Fayetteville. Pop. of Clinton township, 2777.

Clinton, a township of Franklin co., O. Pop. 1800.

Clinton, a township of Fulton co., O. Pop. 3235.

Clinton, a township of Knox co., O. Pop. 984.

Clinton, a township of Seneca co., O. Pop. 1526.

Clinton, a township of Shelby co., O. Pop. 3591.

Clinton, a township of Vinton co., O. Pop. 1724.

Clinton, a township and village of Wayne co., O. The village is on the Pittsburg Fort Wayne and Chicago R. R., 10 miles S. W. of Wooster. Pop. 1502.

Clinton, a township of Butler co., Pa. Pop. 1132.

Clinton, a township of Lycoming co., Pa. Pop. 1315.

Clinton, a township of Venango co., Pa. Pop. 901.

Clinton, a township of Wayne co., Pa. Pop. 1178.

Clinton, a township of Wyoming co., Pa. Pop. 834.

Clinton, a post-village of Laurens co., S. C. It has one monthly newspaper.

Clinton, a post-village, capital of Anderson co., Tenn., on Clinch River, 18 miles N. W. of Knoxville, on the Knoxville and Ohio R. R. Pop. 325.

Clinton, a post-village, capital of De Witt co., Tex., is on the Guadalupe River, about 95 miles S. by E. from Austin. Pop. 217.

Clinton, a township of Monongalia co., West Va. Pop. 1900.

Clinton, a post-village and township of Rock co., Wis., on the Chicago and North-western R. R. where it crosses the Western Union R. R., 78 miles N. W. of Chicago. It has three or more churches, and some manufactures. Pop. of Clinton township, 1943.

Clinton, a township of Vernon co., Wis. Pop. 823.

Clinton (Charles), the father of George Clinton (1739–1812), was born in Longford co., Ireland, in 1690, of English stock. In 1729 he emigrated to America, but the passengers were starved and robbed by the ship's master, who landed them on Cape Cod, where many of them died. Clinton settled in Ulster co., N. Y., became a judge, and a lieutenant-colonel in the French and Indian wars, and was the founder of the distinguished Clinton family of New York State. Died Nov. 19, 1773.

Clinton (De Witt), an eminent American statesman, born at Little Britain, Orange co., N. Y., Mar. 2, 1769, was a son of General James Clinton, and a nephew of Governor George Clinton. His mother's name was Mary de Witt. Having graduated at Columbia College, N. Y., in 1786, he studied law, and became in 1790 private secretary to his uncle, then governor of New York. He was a man of ardent temperament, dignified manners, inclined to reserve, and of noble personal appearance. He married about 1796 Maria Franklin of New York City. He entered public life as a Republican or Anti-Federalist, and was elected a member of the lower house of the State legislature in 1797, and of the State senate in 1798. He took an active part in political movements, and soon became the most influential leader of his party in the State of New York; he also devoted much attention to natural sciences. In 1801 he was elected a Senator of the U. S., in which capacity he distinguished himself as an eloquent debater. Prof. Renwick states that "he was on all sides looked up to as the most rising man in the Union" when he was appointed, in 1803, mayor of the city of New York. This officer was then appointed by the governor and council, and had more extensive powers than the mayor has at the present time. Having been reappointed, he held the office of mayor for nearly eleven years, and rendered important services to the city. He also served as lieutenant-governor of New York for two years (1811–13), and was one of the commissioners appointed in 1809 to examine and survey a route for a canal from the Hudson to Lake Erie. In 1812 he differed from President Madison in relation to the war against Great Britain, and became his competitor for the presidency. Mr. Clinton was nominated by the Republican members of the legislature of New York, and was supported by many Federalists. He received eighty-nine electoral votes, cast by Massachusetts, Connecticut, New Hampshire, Rhode Island, New York, New Jersey, Delaware, and Maryland, but was not elected. His course and policy at this period offended many of the Republicans (or Democrats), and appear to have impaired his popularity for a time. He was removed from the mayoralty about the end of 1814, and retired to private life, from which, however, he was soon raised by his sagacious foresight and successful efforts to promote the prosperity of the State. In 1815 he composed an able argument for the construction of the Erie Canal, of which great and beneficent enterprise he was the principal promoter. This argument was in the form of a memorial to the legislature of the State, which early in 1817 passed a bill authorizing the construction of that canal. He was elected governor of New York almost unanimously in 1817, but his former political opponents organized against him a party who were called "Bucktails," and who denounced the projected canal as visionary and impracticable. In 1820 he was re-elected governor, Daniel D. Tompkins being the defeated candidate. Governor Clinton was at the same time president of the board of canal commissioners. He distinguished himself by his liberal patronage of science and his efforts to promote the education of the people. In 1822 he declined to be a candidate for the office of governor. He was removed from the position of canal commissioner in 1824, and was again elected governor by a large majority in the same year. The Erie Canal was completed in 1825, and brought a great access of trade and prosperity to the city of New York and other portions of the State. When the opening of the canal was celebrated in October of that year, Governor Clinton was conveyed in a barge with triumphal demonstrations from Lake Erie to the city of New York. He was re-elected governor in 1826, and died at Albany before the expiration of his term of office, Feb. 11, 1828. His first wife died in 1818, and about two years later he married Catherine Jones. He left several sons and daughters. (See James Renwick, "Life of De Witt Clinton," 1840; William W. Campbell, "Life of De Witt Clinton," 1849; David Hosack, "Memoir of De Witt Clinton," 1829.)

Clinton (George), the fourth Vice-President of the U. S., born in Ulster co., N. Y., July 26, 1739. He was an uncle of De Witt Clinton. He practised law in his youth, and was elected in 1775 to the Continental Congress, in which he voted for the Declaration of Independence, but he was absent when it was signed, having been called to take command of a brigade of militia. He was chosen governor of New York in 1777, and continued in that office, by several re-elections, until 1795. In 1788 he presided over the State convention called to ratify the Federal Constitution, which instrument he disapproved, because it gave too much power to the central government. He was afterwards the principal leader of the Republican party in the State of New York, and was chosen governor of that State in 1801. In 1804 he was elected Vice-President of the U. S. by the Democrats, who elected Jefferson as President. He was re-elected Vice-President in 1808, when Mr. Madison became President. Died April 20, 1812.

Clinton (Sir Henry), an English general, a grandson of the earl of Lincoln, was born in 1738. He served as major-general at the battle of Bunker Hill, June, 1775, and was appointed commander of the British army in North America early in 1778. He evacuated Philadelphia in June, 1778, and moved his army by land to the city of New York. He conducted an expedition against Charleston, S. C., which he besieged and took in May, 1779. In Oct., 1781, he sailed from New York with about 7000 men to relieve Cornwallis, but the latter surrendered at Yorktown before the arrival of Clinton. He was superseded by General Carleton in 1781. Died at Gibraltar, Dec. 24, 1795.

Clinton (James), a general, born in Ulster co., N. Y., Aug. 9, 1736, was a son of Col. Charles Clinton, and the father of the statesman De Witt Clinton. He became a colonel in 1775, and served under Gen. Montgomery in Canada. He was raised to the rank of brigadier-general in 1777, and took part in Sullivan's operations against the Indians in New York in 1779. In Oct., 1781, he assisted at the siege of Yorktown. Died Dec. 22, 1812.

Clinton Falls, a post-township of Steel co., Minn. Pop. 338.

Clinton Gore, a township of Kennebec co., Me. Pop. 257.

Clinto'nia, a township of De Witt co., Ill. Pop. 2638.

Clinton Lake, a township of Sherburne co., Minn. Pop. 152.

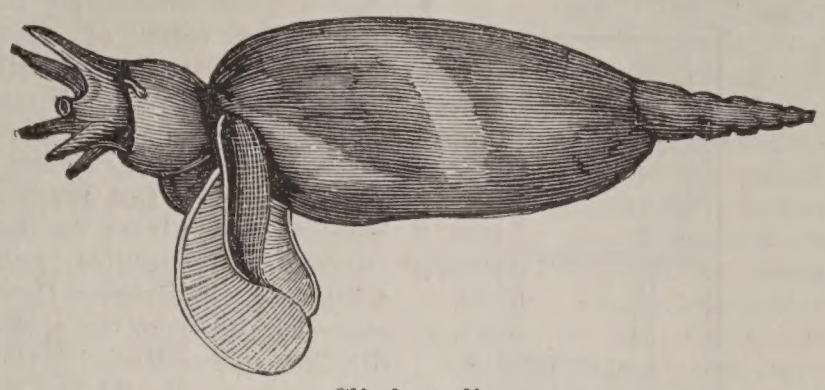
Clinton State Prison, at Dannemora, in Clinton co., N. Y., 16 miles W. of Plattsburg, is built of dressed stone with slate roof. The main building is T-shaped, but there are several other buildings all enclosed in a stockade of 37 acres. There are usually about 500 convicts here, mostly employed in the iron and nail works. The iron ore has been in part mined upon the grounds, but is now obtained from various mines leased or owned by the State. Charcoal is employed in reducing the iron. It is furnished by woodlands measuring 17,500 acres, yielding annually 900,000 bushels. The prison lot has 250 acres. Besides mining, smelting, rolling, and nail-cutting, the convicts saw lumber, manufacture nail-kegs, and perform other kinds of labor. The prison was built in 1844–45.

Clin'tonville, a post-village of Au Sable township, Clinton co., N. Y., is the seat of the extensive works of the Peru Iron Company.

Clintonville, a village of Hartwick township, Otsego co., N. Y., has a cotton factory.

Cli'o [Gr. Κλειώ], one of the nine Muses, presided over history, and was represented as holding in one hand a half-opened roll or scroll, and in the other a cithara.

Clio, a genus of pteropodous mollusks, of the section



Clio borealis.

Gymnosomata. *Clio borealis* is a principal part of the food of whales, and is very abundant in the Arctic seas. It is scarcely an inch long; the head is furnished with six retractile tentacula; the organs of locomotion are two delicate fins, joined to the neck. It has no shell. Of these creatures the water is sometimes so full that a whale cannot open its mouth without engulfing them in great numbers. *Clio australis* is extremely abundant in the southern seas. Several other species are found in the Indian Ocean, etc.

Clip'per [from the verb *clip*, to "move fast"] is a name given to a ship built expressly with a view to speed. The commerce in merchandise of a perishable nature which rendered a quick passage desirable was probably among the first causes which directed especial attention to the form of vessels adapted to offer least resistance to the water. For many years fruit-clippers have been celebrated for their rapid passages, and the opium-clippers and slavers have attained an unenviable distinction for speed. The modifications of the old form of vessel have been gradual, the desideratum aimed at being the combination of the greatest carrying capacity with the form best adapted for speed. A clipper, as compared with an ordinary sailing-ship, is longer and narrower (though of late the tendency has been to increase the beam); very sharp at the bows, which are generally hollowed more or less below the water-line; gracefully tapering towards the stern, which is usually elliptical. The Americans have fully done their part in introducing swift clipper ships, and have perhaps been the most successful in the improvement of vessels of this class. It may be observed that clippers are much less used than they were a few years ago, quick freights being now despatched on fast steamers, and heavy goods being sent in vessels of larger carrying capacity.

Clis'thenes, or **Cleis'thenes** [Gr. Κλεισθένης], an Athenian statesman, the grand-uncle of Pericles, lived about 500 B. C. He increased the number of the tribes of Attica from four to ten, and made important changes in the constitution, which he rendered more democratic. He became very popular, and was the foremost Athenian statesman of his time.

Clith'eral, a post-township of Otter Tail co., Minn. Pop. 220.

Clitherall (Alexander B.) was a native of Alabama. In 1857 he was elected to the Senate, and returned in 1859. During the war he was appointed register of the Confederate treasury, and resided for some years in Richmond. He died in 1868.

Clith'eroe, a market-town of England, in Lancashire, on the river Ribble, 28 miles N. of Manchester, with which it is connected by railway. The houses are of stone. It is situated at the base of Pendle Hill, which is 1800 feet high, and near Pendle Forest, which is reputed to be the scene of the exploits of the Lancashire witches. It has the ruins of a castle built in the twelfth century. Here are manufactures of cotton fabrics. It returns one member to Parliament. Pop. in 1871, 8217.

Cli'tus, or **Cleitus** [Gr. Κλεῖτος], a Macedonian officer who took part in Alexander's expedition against Persia, and saved his life at the battle of the Granicus, in 334 B. C. He enjoyed the favor of Alexander, who appointed him satrap of Bactria in 328 B. C. In the same year a dispute occurred at a feast between them, and Alexander, who was excited with wine, killed Clitus with a spear.

Clitz (Henry B.), a son of the late Capt. John Clitz, U. S. A., born in New York, graduated at West Point in 1845, served with honor in the Mexican war as an infantry officer, was wounded at Yorktown, Va., and Gaines's Mill in 1862, and was taken prisoner in the latter engagement; served as commandant of cadets and instructor in tactics at West Point (1862–64), became lieutenant-colonel Sixth Infantry, and in 1869 colonel Tenth Infantry. In 1865 he was brevetted brigadier-general U. S. A.

Clitz (John M. B.), U. S. N., born Mar. 10, 1823, in the State of New York, entered the navy as a midshipman in 1837, became a passed midshipman in 1843; a lieutenant in 1851, a commander in 1862, a captain in 1866, and a commodore in 1873. He was actively employed during the civil war in command of various vessels of the North Atlantic squadron, frequently in action with batteries on the James River while co-operating with the army, in both the Fort Fisher fights, and recommended for promotion by Rear-Admiral Porter in his commendatory despatch of Jan. 28, 1865. Foxhall A. Parker, U. S. N.

Clive (Robert), Lord, the founder of the British supremacy in India, was born at Styche, in Shropshire, Sept. 29, 1725. At school he showed little aptitude for learning and much propensity to mischief. He went to Madras in 1744, and became a clerk in the service of the East India Company, then a trading corporation possessing only a few acres of land. His work here was so uncongenial that he attempted to kill himself, but his pistol missed fire. War having broken out between the English and French, he entered the service as an ensign in 1747. In this field he found scope for his talents, and employment congenial to his audacious disposition. His military genius and resolute spirit procured his rapid promotion. In 1750 and 1751 he defeated the French at Arcot and other places. He made a voyage to England for his health in 1753, taking with him his wife, a sister of Maskelyne, the astronomer. In 1755 he returned to India as governor of Fort St. David. He waged war with success against the nabob Surajah Dowlah, and took Calcutta in 1757. In June of that year, with 3000 men, he gained a decisive victory over the nabob's army of 60,000 men at the battle of Plassey. For this service he was rewarded with the office of governor of Bengal. He had become immensely rich when he returned to England in 1760, and he was raised in 1761 to the Irish peerage as baron of Plassey. In 1764 he was again sent to India, with authority to rectify the disorders which prevailed after his departure from that region. He proved himself an able administrator, and restored discipline. He returned to England in 1767. His enemies in Parliament accused him of having enriched himself by a tyrannical abuse of power, and a committee was appointed in 1773 to investigate his conduct. This inquest resulted in his acquittal. He became addicted to the excessive use of opium, and committed suicide in London Nov. 22, 1774. (See Sir John Malcolm, "Life of Lord Clive," 3 vols., 1836.)

Cloa'ca [a Latin word signifying a "sewer;" Fr. *cloaque*], a name applied to the anal orifice of birds, which also serves for the escape of urine, and is the external organ of reproduction. A similar anatomical arrangement is found in one order of mammals, the Monotremata, in all reptiles, and in many fishes.

Cloa'ca Max'ima [a Latin phrase meaning the "largest sewer"], a subterranean passage through which a great part of the sewage of ancient Rome was conveyed to the Tiber. Drains from the parts of the city around the Forum were commenced by Tarquinius Priscus, but the construction of the Cloaca Maxima is attributed to Tarquinius Superbus. Niebuhr expresses the opinion that it was at first designed to drain the valley of the Forum, but it appears to have been afterwards extended. Passing

Mouth of Cloaca Maxima at Rome.

from the Forum by the temple of Vesta, it terminated in the Tiber, where the mouth of it is still to be seen. It consists of three large arches, one within the other. The innermost vault is more than thirteen feet in width. The arches were built of large blocks of tufa, about five feet five inches long and three feet high, fixed together without cement. The sewer was kept clear by a stream of water from the aqueducts. Large portions of this and of other cloacæ remain in some places visible, but they are generally at a considerable depth below the present level of the streets. The surveillance of the Roman cloacæ was one of the duties performed by the censors. Notwithstanding its great age, the Cloaca Maxima is in admirable preservation.

Clocks. From the earliest period of human history men have sought for means to measure time. This was not a matter of such extraordinary importance to the savage as to the civilized man, for upon the former there was no pressure to accomplish any work or employment within a given space of time. To him, therefore, the divisions of time by the sun's rising, setting, and nooning were sufficient, when he could see them. But very early men began to divide the day into several portions, and soon the night also. At first, these divisions were of about three or four hours each. After a time the division of the night and the day into twelve hours each was found to be more convenient, and then there came the necessity for means of measuring these divisions of time. The first in use was the dial, which by its shadow on a horizontal plate marked the passage of the hours by the progress of the sun. But as this could only be of service in the daytime, and when the skies were not obscured by clouds, something else was necessary. The hour-glass, which measured time by the flowing of sand through a narrow passage from one spherical vessel into another, and which was so graduated that all the sand would run out from the upper glass in just an hour, was a very good instrument to measure the lapse of an hour, but it could not be depended upon to give the time of day, and required watchfulness to turn it as soon as the sands had all run down. King Alfred's device of twelve candles, graduated so as to burn two hours each, was not much better, and in some respects even more inconvenient. The clepsydra was a step in advance of these. It was a water-jar containing several gallons of water, which ran out from a small graduated orifice in the bottom of the jar at such a rate that the quantity of water in the jar would be lowered to a certain marked point each hour, and the jars being filled at sunrise every day, marked off the hours with tolerable regularity. As glass was not then used for the jars, the only way of determining the time was by looking into the jar or measuring the depth of the water by a graduated stick. We do not know just when or by whom these clepsydræ were invented, though they are credited to Greece. They were introduced at Rome about 158 B. C. by Scipio Nasica. Eighteen years later they were improved by Ctesibius, by the addition of a toothed wheel and index driven by the water which flowed from the bottom of the jar. Thus improved, these water-clocks have been in use in the East for about two thousand years. In the more enlightened west of Europe, however, there was a demand for further improvements.

The first of these, which possibly came from the Saracens, and perhaps from their Western empire in Spain, was the substitution of a weight for the water to turn the toothed wheel. It may have been introduced at a still earlier date than this, for Archimedes had discovered the advantage of weights in the turning of small machines some centuries earlier. But after this substitution there still remained the difficulty that the weight was not so regulated as to cause the index to pass over equal spaces of the dial in equal times. How this difficulty was obviated during the Dark Ages we have no means of knowing. There is a record of a clock of very elaborate workmanship having been sent by Pope Paul I. to King Pepin of France in 760, and of another being invented by Pacificus, archdeacon of Genoa, in the ninth century. The invention of an escapement of some kind is attributed to Gerbert about A. D. 1000. Though rude, it probably answered the purpose, for within the next 380 years tower-clocks of great size were set up in Canterbury cathedral (1292), in the abbey of St. Albans (1326), at Genoa (1353), and one which struck the hours at Westminster in 1368. The clock whose construction is best known, and which was undoubtedly the best timekeeper of any of that period, was that made by Henry de Vick, a German, and set up in Paris for Charles V. in 1379. We have deemed the movement of this clock worthy of a pictorial illustration, as showing what were the methods of constructing a balance and escapement at that time. The toothed or crown-wheel I is the escapement-wheel; the pallets or levers *i h* having bevelled edges, and projecting from the suspended upright spindle or vertical axis K M, on which is fixed the regulator or balance L L, give it a vibratory motion, as the motion induced by the weight A in uncoiling the cord and causing the cylinder B to revolve is communicated to the various toothed or cog-wheels, and finally to the crown or escapement-wheel, causes them alternately to strike the teeth of that wheel. There would still be an irregularity in these motions, and a consequent defect in the clock as a timekeeper, were it not for the weights *m m*, placed on the balance or regulator, and which, by the distance they are removed from the spindle, increase or diminish the resistance of the pallets to the escapement-wheel. This was the principle on which all clocks were made for the next 270 years, but the English do not seem to have been successful in making good timekeepers till 1540, when one set up at Hampton Court by an unknown maker became celebrated for its accuracy. It was not until a century later (some time between 1641 and 1658) that either an English clockmaker named Harris, or the Dutch philosopher Huyghens, adapted Galileo's discovery of the substantial isochronism of the pendulum beats to the marking of time by making the escapement or crown-wheel horizontal, instead of vertical, and attaching the pallets to the pendulum-rod. Subsequent improvements were made in the escapement, especially the substituting the anchor escapement for that of Huyghens by Dr. Hooke, 1666–80, and the further improvement of this in the dead-beat escapement of George Graham, invented in 1700, in which the arms of the escapement are set at right angles, and the outer surface of the pallet B and the inner surface of the pallet C are arcs of circles, of which A, the point of attachment to the pendulum-rod, is the centre. This ensured great accuracy as timekeepers. Other escapements, as the duplex, detached, pin-wheel, gravity, etc., have been devised, but have not come into very general use, and are not, perhaps, preferable in all respects to Graham's. Other improvements have been attempted in the pendulum itself. These have been mainly in the matter of compensation for the expansion and contraction of the pendulum-rod by heat and cold. Graham's mercurial compensation pendulum, invented in 1715, in which a tube or ball having mercury in it was substituted for the bob of the pendulum, and the gridiron pendulum of Harrison, invented in 1726, composed of five rods of steel and four of brass, which, expanding differently, compensated by their action for the changes induced by heat or cold, were the principal of these.

Fig. 1.

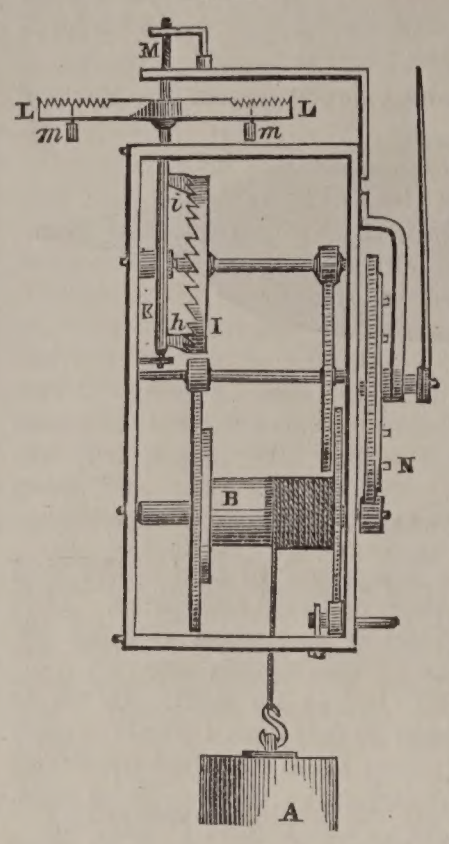
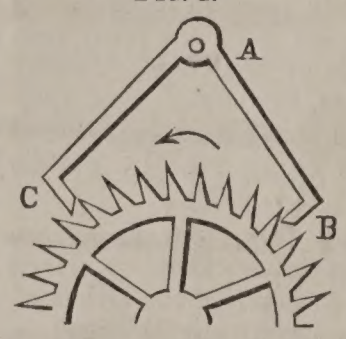


Fig. 2.



The American clockmakers, retaining the dead-beat escapement, made the pendulum-rod of wood and covered it with gold-leaf; and this has been found to be as effectual a contrivance as either the mercurial or gridiron pendulum. In the cheaper clocks, where absolute accuracy is not so important, they have obtained substantial accuracy by turning a screw thread upon the lower end of the pendulum-rod, and putting upon this a nut, which, while it holds the sliding pendulum-bob in place, can by one or two turns regulate it in accordance with the temperature of the season. To accommodate what is known as the cycloidal curve in the arc described by the pendulum, its attachment to the pinion moved by the weights, or afterward by the spring, was made by hammering its upper end into a thin slip of steel which passed into a slit in the pinion, and was held in place by two little cheeks or projections at the top. While the workmanship was gradually perfected, the principles on which clocks were made in England, France, and Germany have not changed, except in a single particular—that of a substitution of steel springs for weights—from the beginning of the eighteenth century to the present time. Even now, very considerable numbers of these brass-wheel clocks, with weights, and standing in a case six feet high, are still made, and some of them are still exported to the U. S. The manufacture of this description of clocks was introduced into this country before the Rev-

olutionary war, but comparatively few were made, though of good workmanship.

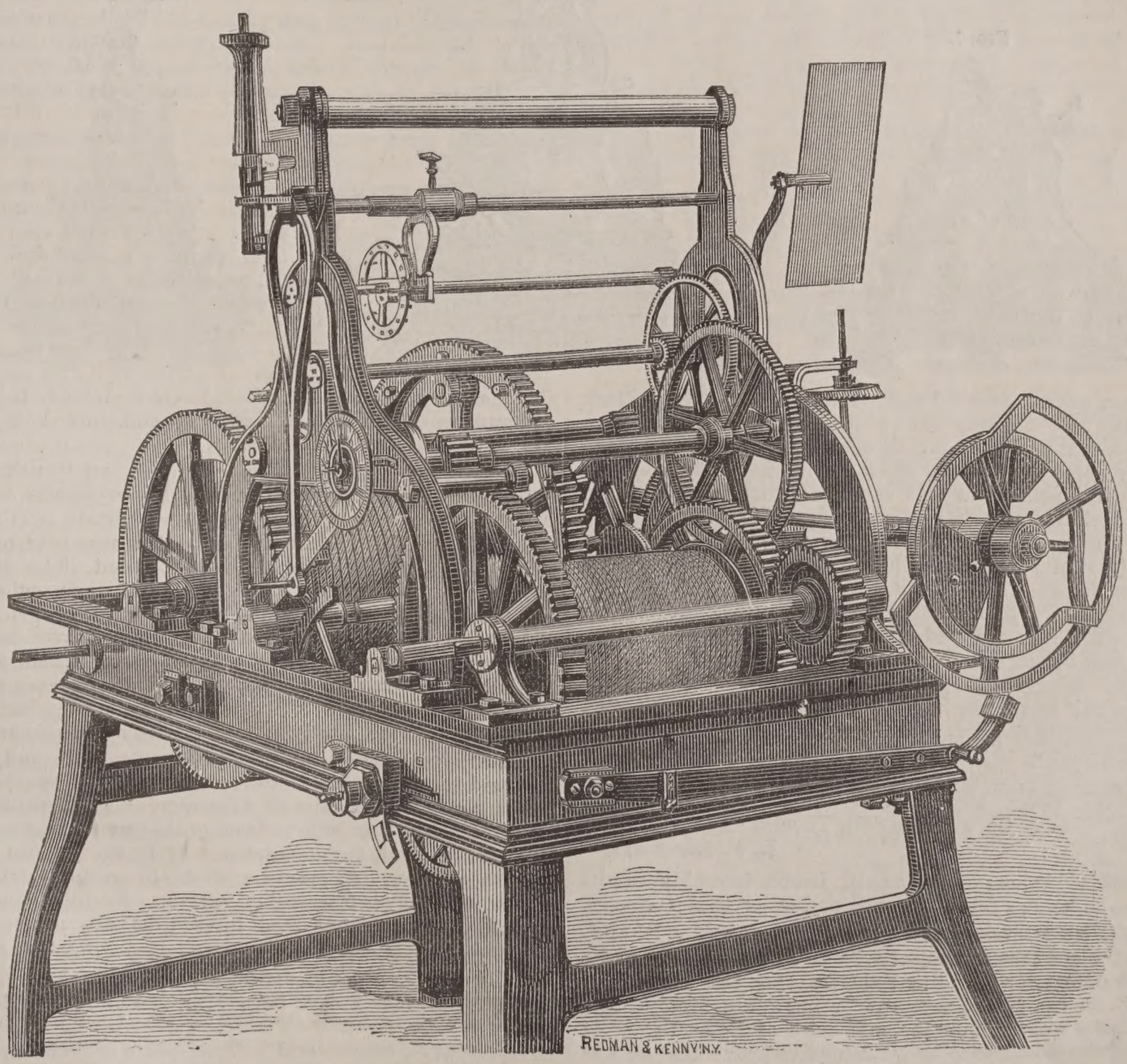
About 1792, Eli Terry, then residing in Norwich, Conn., but subsequently engaged in clockmaking at Plymouth, Conn., made, it is believed, the first clock with wooden wheels ever made in this country or elsewhere. Mr. Terry had learned his trade from Thomas Harland, an English clockmaker who had established himself at Norwich in 1773. In 1793 Mr. Terry commenced the manufacture of both wooden and brass-wheel clocks at Plymouth, and continued the business there and in Naugatuck for many years. The wooden-wheel clocks were good timekeepers, and were generally preferred to the brass-wheel clocks. They were sold in large quantities by peddlers in all parts of the country, and generally without the case, which was a separate expense, being made by the cabinetmaker. From 1806 to 1815 the number of clockmakers largely increased (Messrs. Seth Thomas, Silas Hoadley, Herman Clark, Asa Hopkins, and others engaging in the business), and many thousands were made. In 1814, Mr. Terry invented what was known as the "short shelf-clock," in which, by a change of arrangement and smaller weights, the pendulum being brought forward and greatly shortened, and the weights being carried and run on each side, the whole was reduced to a more compact form, and clock and case were sold together for a moderate price. This modification was adopted by other manufacturers, and soon became general. These clocks were made with wooden wheels, but after the introduction of rolled brass into the market, machinery was invented by which the blank wheels of the clock could be struck out of the rolled brass with a die, and the teeth afterwards cut by machinery, and the brass-wheel clocks could be made cheaper than wooden ones.

The next improvement was the substitution of coiled steel springs for the weights, thus assimilating the clock to the watch. This has been done in Europe for two hundred years, but only with the most costly parlor clocks, and the springs used were equal in quality to the best watch-springs. Of course, this would not answer for cheap clocks for the million, and various experiments were tried with cheap springs. Coiled brass springs were used, but these soon lost what little temper they had, and so did their purchasers. An elliptic steel spring connected with a fusee was tried, but with no better success. Finally, a new and completely successful process of making a superior steel spring was invented in this country; and the springs thus produced have for many years been sold at a price compatible with their use in cheap clocks. This, together with the cheapening by machine-labor of the production of all parts of the clocks, has led to their very general introduction, and to the reduction of the size of clocks, till now twenty-four of the smallest sized pendulum clocks can be packed in a box of one cubic foot in dimensions. One result of this reduction in the size and price of clocks was an enormous increase in the demand for them, both in this and foreign countries. Clocks to run thirty hours were made which sold in quantities at nine dollars the dozen, and a fair eight-day clock at forty-eight dollars the dozen.

In 1852 there were thirty-one clock companies in existence, of which nine failed, four were burned out, and five closed their business as unprofitable within the next five years. But these companies in 1853 and 1854 made immense sales, the Jerome Manufacturing Company alone shipping 440,000 clocks per annum. Since the reorganization of the business there are only fifteen or sixteen firms engaged in it, all but two or three of them in Connecticut; the number of clocks made is about 1,200,000, and their value not less than $3,500,000. They are exported very largely to all the countries of Europe, to China and Japan, to India, Western Asia, Egypt, South Africa, and to Mexico and most of the South American states. But while American manufacturers have thus supplied the world with cheap but serviceable clocks, they have not, until within a few years past, been able to compete successfully with European manufacturers in the finer and high-priced grades.

Tower clocks, which until within the past twenty years were imported, are now made of excellent quality by A. S. Hotchkiss for the Seth Thomas Clock Company, the Howard Watch and Clock Company, Charles Fasold, and by several other firms. Cut No. 3 represents the movement of one of the Hotchkiss tower clocks erected in Steu-

FIG. 3.



benville, O., and a similar one is on the City Hall, New York. The clocks are remarkable for their accuracy and the perfection of their mechanism, and have proved admirable timekeepers. They have the pin-wheel escapement (very clearly delineated on the second and third cross-bars), the pins having an ingenious contrivance of a shoul-

der to keep the oil upon them; and also a very remarkable arrangement (at the right of the figure) for regulating automatically the gas-jets which illumine the face of the clock, so that they may burn any required number of hours. Regulators, formerly imported in all cases, are now made of the best quality by the Howard Watch and Clock Company of Boston. Regulator clocks are also made by the Seth Thomas Clock Company of Thomaston, Conn., the William L. Gilbert Clock Company of Winsted, the Waterbury Clock Company, and Welch, Spring & Co. The wooden pendulum-rod, covered with gold-leaf, which is one of the characteristics of these regulator clocks, is, we believe, an invention of Mr. Silas B. Terry, a son of the pioneer in American clockmaking, and himself for forty-five years in the business. The French parlor or mantel clock, a costly and beautiful ornament to the homes of the wealthy, had so long been imported that it was considered hopeless to attempt to compete with it; but since 1866 Messrs. Seth Thomas' Sons & Co. have been engaged in the manufacture of these articles, and have produced clocks which in the perfection of their workmanship, their accuracy as timekeepers, and the elegance and variety of their patterns, as well as in their moderate price, compete so favorably with the foreign parlor clock that they have well-nigh driven it from the market. The illustrations show some of the styles of these clocks in bronze; the marble

FIG. 5.

FIG. 4.

FIG. 6.

FIG. 8.

FIG. 7.

FIG. 9.

styles are equally tasteful and attractive. The Terry Clock Company at Waterbury have also commenced the manufacture of a neat parlor clock. Of other special kinds of clocks we may name the calendar clock, first successfully made for the general market in this country, which gives the day of the week and month, and sometimes the changes of the moon; the marine clock, a watch on a large scale, which, properly made, is an excellent timekeeper; the railroad clock, which is of similar but somewhat more delicate construction, and with a compensating arrangement for the jar to which it is exposed, etc., etc. The electric or magnetic clock belongs properly to the departments of astronomy and telegraphy. The mechanism for striking the hours or half or quarter hours, in most clocks, is complicated and not readily understood without careful drawings. (For the facts relative to American clockmaking we are indebted to Henry Terry, Esq., of the Terry Clock Company of Waterbury, Conn., and Seth E. Thomas, Esq., of Seth Thomas' Sons & Co. and the Seth Thomas Clock Company of New York.) L. P. BROCKETT.

Clock'ville, a post-village of Lenox township, Madison co., N. Y., has a woollen mill and other manufactories.

Clo'dius (PUBLIUS), surnamed PULCHER (*i. e.* "handsome"), a profligate Roman tribune and patrician, was a brother of Appius Claudius Pulcher. (See CLAUDIUS.) In 62 B. C. he committed sacrilege by intruding himself, disguised as a woman, into the mysteries of Bona Dea. At his trial for this offence he attempted to prove that he was not in Rome at that time, but Cicero testified that he saw Clodius in Rome on that day, and thus incurred his enmity. Clodius was acquitted by means of bribery, and was elected tribune of the people in 59 B. C. He persecuted Cicero by the enactment of a law that he should be interdicted from fire and water. He was killed in an encounter with Milo, his political enemy, in 52 B. C.

Clois'ter [from the Lat. *claustrum,* an "enclosure;" Fr. *cloitre;* Ger. *Kloster*], a term which originally denoted a covered ambulatory running round certain portions of monastic and collegiate buildings, but it was subsequently often applied to any monastic establishment. The cloisters usually ran along three sides of a quadrangle, called the *garth.* The roof, often vaulted, was supported by pillars and arches. The portions of these arches above the mullions were often glazed, and sometimes the whole arches, so that they became windows. Cloisters were used for exercise and recreation. Often, when glazed, they had stalls for study, and frequently a stone bench, on the inner side.

Clonmel', a parliamentary borough of Ireland, is on both sides of the river Suir, 14 miles S. S. E. of Cashel. It is mostly in the county of Tipperary, and partly in that of Waterford. The Suir is here crossed by several bridges, one of which has twenty arches. It has a church of the twelfth century. There is a trade in grain, cattle, and butter, also manufactures of cotton. In 1650 Cromwell demolished the castle. Pop. in 1871, 9484.

Clonmel, EARLS OF (1793), Viscounts Clonmel (1789), and Barons Earlsfort (Ireland, 1784).—JOHN HENRY REGINALD SCOTT, fourth earl, born Mar. 2, 1839, succeeded his father in Feb., 1866.

Clontarf', a town and bathing-place of Ireland, on the sea 3 miles E. N. E. of Dublin. Here, in 1014, Brian Boru gained a great victory over the Danes. Near this town is Clontarf Castle, the residence of the Vernon family. Pop. 7814.

Clootz (JEAN BAPTISTE), BARON, a visionary character of the French revolution, born near Cleves, Prussia, June 24, 1755. Taking the name of Anacharsis, he traversed Europe, proclaiming the brotherhood of the human race. He contributed large sums to the French republican cause, to which he looked for the fulfilment of his hopes of universal freedom. He was expelled from the Jacobin Club at the instigation of Robespierre, and guillotined for a fictitious offence Mar. 23, 1794.

Clop'tin, a post-township of Dale co., Ala. Pop. 800.

Close-Hauled, in navigation, is the mode in which the sails are arranged in order to make the ship move in a direction the nearest possible towards that point of the compass from which the wind blows. In the thorough attainment of this result, much, of course, depends upon the shape of the vessel.

Clos'ter, a thriving post-village of Harrington township, Bergen co., N. J., on the Northern R. R. of New Jersey, 19½ miles N. of Jersey City.

Clot. See BLOOD and COAGULATION.

Clothaire I., born in 497 A. D., was the fourth son of Clovis, king of the Franks. He became king of Soissons in 511, when the dominions of Clovis were divided among his sons. By murdering two of his nephews he obtained the sovereignty of Austrasia and Orleans, and reigned at Paris over all the former dominions of Clovis. He died in 561 A. D., leaving four sons—Caribert, Gontran, Sigebert, and Chilperic I., who divided the realm between them.

Clothaire II., a son of Chilperic I., was a minor when he inherited the kingdom of Soissons in 584 A. D. His mother Frédégonde was regent until 597. He put to death Brunehaut, queen of Austrasia, and usurped the throne of that country in 613 A. D. He thus became sovereign of all France. Died in 628 A. D. He was one of the Merovingian dynasty.

Clothes-Moth. See MOTH.

Clo'tho, in classic mythology, one of the PARCÆ (which see).

Clotho, an asteroid discovered by Tempel in 1868.

Clotho (a serpent). See PUFF ADDER.

Clotil'da, SAINT, queen of France, was a daughter of Chilperic, king of Burgundy. She was married in 493 A. D. to Clovis I., whom she induced to profess the Christian religion in 496. She opposed Arianism. Died in 545 A. D.

Cloud, a county in the N. of Kansas. Area, 720 square miles. It is intersected by the Republican River. The surface is nearly level or undulating. Grain, tobacco, and wool are raised. Capital, Concordia. Pop. 2323.

Clouds [Lat. *nubes*] are collections of extremely minute particles of water suspended in the atmosphere. These particles are often, in consequence of the great elevation at which they float, in a frozen state, even in summer. It is now known that when masses of air fully charged with aqueous vapor, but at different temperatures, come in contact with each other and mix, the space occupied by the resulting mass will be overcharged, and the vapor, which was invisible so long as completely mingled with the air, becomes precipitated, so to speak, in the form of water-dust, and then takes the appearance of fog or cloud. Why these minute particles remain suspended in the atmosphere, and do not descend as similar particles of earth would do, has not yet been satisfactorily explained. Some have conjectured that the watery particles are hollow, like soap-bubbles. But this—supposing it to be true, of which there is no proof—would not account for their suspension unless they were filled with a gas lighter than the surrounding air. It is not improbable that electricity, which appears to exert so great an influence in giving the different kinds of clouds their form and character, may be the principal agency by which these various collections of water-dust are kept suspended at different elevations, according to the character of the cloud. The only difference between fog and cloud is that while the latter remains high in the atmosphere, the former seems to rest upon the earth; in other words, fog is simply cloud close at hand. Hence, when a cloud high up in the air strikes against the side of a mountain, to a person at that point on the mountain it appears precisely like fog.

To clouds in their infinitely varied forms we are indebted for some of the most glorious scenes that nature ever presents to the eye of man; and a landscape, however beautiful, seems incomplete unless the accompaniment of clouds is added to the picture. (For a particular account of the different kinds of clouds, and their connection with the changes of the weather, the reader is referred to METEOROLOGY.)

Clough (ARTHUR HUGH), an English poet, born at Liverpool Jan. 1, 1819, was educated at Rugby. He was one of Dr. Arnold's favorite pupils. His distinguished schoolfellow, Arthur Penrhyn Stanley, who has written a valuable notice of Clough, says that "over the career of none of his pupils did Arnold watch with a livelier interest or a more sanguine hope." From Rugby he passed to Oxford, where "he carried away the Balliol scholarship with a renown beyond that of any of his predecessors." From Balliol he was elected to a fellowship at Oriel, and he remained at Oxford until 1848, when a sense that he had done his work there, and that he was a little too alien in speculative and in practical thought from the tone of the university to be of further use or to find a fit abode there—that he might honorably seek a more unshackled career without—led Clough to withdraw from Oriel. In 1848 appeared his first published poem, "The Bothie of Tober-na-Vuolich: a Long-Vacation Pastoral," which was quickly recognized as a work of remarkable power and beauty. But it was something besides a successful literary venture. If it has been called Clough's "Farewell to Oxford," it is because it is revolutionary; it shows that the thought of his time had awakened strong echoes in his nature; that if he had not broken with the ancient past—which he had not, and which he never could—he at least was ready to go forth with hearty confidence to meet the present, and to take an active part in the real business of life. "A sense of fresh, healthy manliness; a scorn of base and selfish motives; a frank admiration for common life; a love of earth, not only for its earthly sake, but for the divine and the eternal interfused in it—such, and other such," says Palgrave, "are the impressions left." The poem is written in English hexameters, which have a certain wild flavor that is very stimulating. "Viewed critically, Clough's work is wanting in art; the language and the thought are often unequal and incomplete; the poetical fusion into a harmonious whole imperfect. It is poetry, however, which belongs to a very uncommon class: it should be judged by the thoughts awakened, rather than by the mode of expressing them." After his withdrawal from Oxford in 1848, Clough spent a year or two in travel on the Continent, going as far as the Italian lakes. On his return he published in 1849 a series of poems of which the earliest date back to 1840, under the title of "Ambarvalia." This collection contains many striking pieces, revealing the depth and earnestness of Clough's nature, with much of that tenderness which his friends declare to have been so notable a characteristic of his, and also a strong tendency, by no means incompatible with this, toward sarcasm.

His tutorship at Oxford relinquished, he passed from one employment to another: was warden of University Hall, London; came to America, and resided here for a few months in 1852; returned to England to accept an appointment in the education department of the privy council office; went to France and Vienna in 1856 on duties connected with the secretaryship to the commission of report on military education; and in leisure hours gradually completed the long revision of Dryden's translation of Plutarch begun in America, comparing that inaccurate though spirited text throughout with the original, and retouching it with a skill and taste in which his careful study of Chaucer and our early literature gave him a special mastery.

Meanwhile, with his usual energetic sympathy for all that touched the welfare of the poor and the wretched, he undertook much anxious work to assist his wife's cousin, Florence Nightingale, in her own arduous labors. His health, never very robust, gave way, and by the advice of his physicians he went on a journey to Greece and Constantinople, and returned much benefited. A second journey to Auvergne and the Pyrenees, and then to Italy in company with Mr. and Mrs. Alfred Tennyson, undertaken with the hope of completing the good work of the former, was not so fortunate. Near the Italian lakes he was struck by the malaria, and pushed on with difficulty to Florence, where fever carried him off, Nov. 13, 1861. Clough contributed several papers of value to the "North American Review," and to the "Atlantic Monthly" one of his best poems, "Amours de Voyage." While here he made one of an intimate circle of the most cultivated scholars and men of letters in Boston and Cambridge. He was beloved here, as at home, for the noble beauty of his character, as well as respected for the range and thoroughness of his attainments. He is come to be reckoned one of the chief names of the time in poetry; his reputation has steadily risen, and Emerson's words in 1848 are like to be justified: "He will make Tennyson look to his laurels." CLARENCE COOK.

Clove Bark. See CULILAWAN BARK.

Clo'ver [from a root akin to *cleave, cloven,* because the leaves are parted or cleft], or **Tre'foil** (*i. e.* "having three leaves"), (*Trifolium*), a genus of plants of the order Leguminosæ, containing many species, some of them very important in agriculture. The name is popularly extended

to plants not included in this genus, but belonging to the same order, and having the leaves formed of three leaflets. The true clovers (*Trifolium*) have herbaceous, not twining stems, roundish heads or oblong spikes of small flowers, the pod containing one or two, rarely three or four, seeds. Twenty native or naturalized species belong to Great Britain, and more than twelve species to the U. S., most of them natives. The most important is the common red clover (*Trifolium pratense*), a native of Europe, growing in meadows and pastures. Its heads of flowers are nearly globular, very compact, about an inch in diameter, purplish-crimson, flesh-colored, or whitish. The leaflets have often a whitish horseshoe mark in the centre. The zigzag clover (*Trifolium medium*) resembles the common red clover, but is distinguished by the smooth tube of the calyx, and by the broader, less membranaceous, and acuminated stipules. The stems are more rigid than in *Trifolium pratense;* the heads of flowers larger, more nearly globose, and of a deeper purple color; and the leaflets have no white spot. It is common in Europe, and grows in the U. S. White clover (*Trifolium repens*) is a common native of Europe and also of North America. Alsike clover (*Trifolium hybridum*), a perennial, regarded by some as intermediate between the common red and the white clover, has of late attained a very high reputation. It was introduced from the south of Sweden. Crimson or Italian clover (*Trifolium incarnatum*), an annual, native of the south of Europe, with oblong spikes of rich crimson flowers, is much cultivated in Europe, producing a heavy crop. Egyptian clover (*Trifolium Alexandrinum*), an annual species, a native of Egypt, where it is the principal fodder for cattle, is supposed to be one of the best kinds of clover. It has oval heads of pale-yellow or whitish flowers. Yellow clover, or hop trefoil (*Trifolium procumbens*), is common on dry gravelly soils in Great Britain and the U. S., but not much esteemed. The *Trifolium reflexum*, or buffalo clover of the U. S., deserves the attention of agriculturists.

Clover is now very frequently cultivated in alternation with grain crops. The kinds most generally sown are the common red, white, and alsike. The common red clover is the finest and most valuable. It frequently grows well on sandy loams, though sown every alternate year on the same land. But in some places the land becomes "clover-sick" when sown too frequently with this crop. From ten to twenty pounds of seed are usually sown upon an acre. Red clover is much valued for hay. When it grows well, it bears to be cut more than once in a year. White clover is esteemed for pasture; it grows short and thick on the ground, and throws out stems and flowers during the most of the growing season. Alsike clover has been recently introduced; it rises much higher than white clover, and promises to be a useful addition to our pasture-plants. White and alsike clovers are valuable for bee-pasture. Clovers perform an important part in restoring fertility to exhausted land. They are often ploughed under when green, and thus greatly benefit worn-out soils. Their leaves gather food from the atmosphere, which they store up in their roots and stems, and these on decomposing afford food for crops which are more dependent on the soil itself. The chief profit in raising clover is in the increased value of the manures it yields, which are highly nitrogenous.

Clover, a township of Henry co., Ill. Pop. 1695.

Clover, a township of Jefferson co., Pa. Pop. 868.

Clo'verdale, a post-township of Sonoma co., Cal. Pop. 612.

Cloverdale, a township and post-village of Putnam co., Ind., on the Louisville New Albany and Chicago R. R., 11 miles S. S. E. of Greencastle. Pop. 1740.

Clover Hill, a township and village of Appomattox co., Va., 2 miles N. E. of Appomattox. Pop. 3840.

Clover Hill, a township and village of Chesterfield co., Va. The village is on a branch of the Richmond Fredericksburg and Potomac R. R., 8 miles W. of Chesterfield. Pop. 3210.

Clo'verport, a post-village of Breckinridge co., Ky., 110 miles below Louisville, on the Ohio. Coal is found in the vicinity. It has one weekly newspaper. Pop. 849.

Clover Valley, a township of Elko co., Nev. Pop. 80.

Cloves [from the Sp. *clavo, i. e.* a "nail," so called from its resemblance to a nail], the smoked and dried flower-buds of the clove tree (*Caryophyllus aromaticus*), of the order Myrtaceæ. The tree is from fifteen to forty feet high, with a beautiful pyramidal head. The leaves are large, ovate-oblong, and evergreen; the flowers are produced in great profusion. Leaves, flowers, and bark have an aromatic odor. The fruit sometimes appears in commerce in a dried state under the name of "mother cloves;" it has an odor and flavor similar to cloves, but weaker. The flower-buds are gathered, and are dried by the smoke of wood-fires, and afterwards by the sun, or by the latter alone. The clove tree is a native of the Moluccas, and the Bencoolen and Amboyna cloves are the best; but they are now cultivated in Sumatra, Zanzibar, Mauritius, the West Indies, Brazil, and Guiana. The Dutch, to secure to their colonists a monopoly of this spice, once destroyed the trees in the other Molucca Islands, and confined the cultivation to the isle of Ternate. Before the discovery of the Spice Islands merchants brought them from Arabia, Persia, and Egypt to the Mediterranean.

Their aromatic qualities depend on two essential oils, which together form one-seventh of the weight of the cloves. The oil is obtained by repeatedly distilling with water, when two oils pass over—one of which is lighter and the other is heavier than water. The oil has a hot, acrid taste, is of a light yellow color when pure, and brown when not carefully prepared. It is a mixture of eugenic acid ($H.C_{10}H_{11}O_2$) and a hydrocarbon ($C_{10}H_{16}$), isomeric with oil of turpentine. It is soluble in ether, alcohol, and the fixed oils. It is useful in medicine to check nausea and griping caused by the administration of purgatives, and as a remedy for toothache.

REVISED BY C. F. CHANDLER.

Clo'vis [Lat. *Clodovæus*] **I.,** called also **Chlodwig** (probably allied to the German *Ludwig*, "Lewis"), king of the Franks, was born in 465 A. D. He was the son and successor of Childeric, who reigned at Tournay and died in 481. By a victory over the Romans and Gauls in 486 A. D., Clovis obtained possession of Soissons, which then became his capital. He married in 493 Clotilda, a Christian princess, and about three years later, through her influence, was converted to the new faith and baptized. In 507 he defeated Alaric, king of the Visigoths, in a great battle near Poitiers. By this victory he added Aquitaine to his dominions. He chose Paris as his capital in 507. He died in 511 A. D., and France was then divided among his four sons—Thierri, Clodomir, Childeric, and Clothaire. His descendants are called Merovingians, from Merovig, the grandfather of Clovis. (See VIALLON, "Clovis, le grand premier Roi Chrétien," 3 vols., 1788.)

Clowes (TIMOTHY), LL.D., an American Episcopalian divine and scholar, graduated at Columbia College in 1808. He was distinguished as a mathematician. In 1823 he became president of Washington College, Md., and was for many years a prominent educator of youth. Died at Hempstead, Long Island, in 1847.

Clown [from the Lat. *colonus*, a "husbandman"], a term originally applied to a rustic, now quite generally designates a professional jester or buffoon. In dramatic literature it is frequently the title of a prince's jester or court-fool (Ger. *Hofnarr;* Fr. *fou;* Sp. *gracioso;* It. *buffo*), a privileged character at European courts in former times.

Club [etymology uncertain], an association of persons for some common purpose, as of politics, literature, etc., denoting especially a body meeting for social purposes, and consisting of members belonging for the most part to some one class. Club-life in London had its origin in the days of Elizabeth, when the Mermaid tavern, in Fleet street, enlivened by Shakspeare, Raleigh, Ben Jonson, Beaumont, and Fletcher, became the home of a sort of club. Jonson afterwards founded a club at the Devil tavern, Fleet street. These were informal social meetings to which all were welcome who could bring humor or wit. In the last century clubs named after the proprietors of the houses in which the meetings were held were established by politicians in England.

After the close of the great European war in 1815 many officers, no longer needed for war, were placed upon half-pay; and this pay was insufficient to support them without careful economy. If they could dine at a club, it would be cheaper than if each maintained a separate establishment. Hence arose the United Service Club; and the success of this speedily led to others for different classes and for persons of different political opinions. At the present time there are in London sixty-eight great clubs. Each club comprises a definite number of members; and this number cannot be exceeded. The members pay a sum of money on entrance and an annual subscription. The clubs usually comprise news-rooms, libraries, dining-rooms, and drawing-rooms. There are arrangements for the members to sleep at certain establishments called club-chambers, which, however, are not properly clubs. Some of the clubs are furnished with bath, billiard, and smoking rooms. The restaurant is usually very complete; everything is of the best, and is supplied to members nearly at cost. In nearly all hard drinking is discouraged. Some of the club-houses rank among the most elegant buildings in London. Somewhat similar organizations exist in the larger cities of the U. S., especially in New York, but their extent and influence are much smaller than in England. The clubs which

sprang up in France after 1789 were not clubs in the English sense of the word, but meetings of the great political parties.

Club-Foot (*Talipes*). This deformity is mostly congenital, and usually affects both sides. The inner margin of the foot is elevated, the external one depressed and touches the ground. The middle and anterior portions of the foot are retarded in their growth, and its joints become immovable (ankylotic). The deformity becomes more pronounced when the child begins to walk, sometimes to such an extent that the upper part of the foot takes the place of the sole. At the same time the muscles of the leg become emaciated, and lose their muscular texture altogether. The cause has been sought for in diseases of the brain or spinal cord contracted before birth, or by continued pressure in the womb. But a more rational explanation is yielded by the consideration of the early condition of the fœtus. The lower extremities are first formed (about the end of the first month of pregnancy) on the anterior aspect of the abdomen of the fœtus, under the skin, in such a manner that the knee-pit is looking towards the abdomen. In order to assume its normal shape the whole extremity, including the foot, has to turn round its axis. When this process, as far as the foot is concerned, remains incomplete, club-foot is the result. A mild degree of club-foot is perceptible in every fœtus about the fourth or fifth month of pregnancy. Some cases are the result of an abnormal obliquity of the small bones of the tarsus (posterior portion) of the foot, and a primary shortness of the gastrocnemius muscle of the leg. Club-foot, when acquired after birth, results from paralysis of the extensors of the foot. In that case the action of the flexors results in the same deformity. Mild cases require but little treatment. Manual stretching of the foot, proper bandaging, the application of a splint or plaster of Paris, are often sufficient. More serious cases require the cutting of one or more of the flexors (tendo achillis, plantar aponeurosis, anterior tibial muscles), with bandaging or the wearing of an appropriate apparatus (Scarpa's shoe).

A. Jacobi.

Club-Mosses, or **Ground-Pines** (Lycopodiaceæ), a natural order of cryptogamous plants (acrogens), in some species resembling the Coniferæ in general aspect, but frequently having something of the habit of the mosses. They also approach the ferns through *Ophioglossum*, in their reproduction. The genera are few, the living species quite numerous. The genus *Lycopodium* yields the drug lycopodium, a fine inflammable powder consisting of the sporules of the plant. This article is much used in pharmacy and in pyrotechnics. Many of the tropical species have active poisonous properties, and some have been used in medicine. Many of our native species are very beautiful, and are much used in Christmas decoration. The fossil plants of this order were often mighty trees (*Lepidodendron*), and seem to have furnished much material for the oldest coal deposits. At the other extreme must be placed the curious grass-like quill-worts (*Isoëtes*), which are mostly small aquatic plants of singular habit.

Chas. W. Greene.

Clu'niacs, or **Congregation of Clugny,** a reformed Benedictine congregation, founded in 909 at Cluny in France. It rapidly spread, and at one time had more than 2000 convents, with immense wealth. It began to decay in the thirteenth century. It was finally suppressed in 1790 by the French Constituent Assembly.

Cluny, formerly **Clugny** (anc. *Cluniacum*), a town of France, department of Sâone-et-Loire, on the Grône, here crossed by two stone bridges, 14 miles N. W. of Mâcon. Here are the remains of a rich and famous Benedictine abbey, founded in 910 A. D. Cluny has manufactures of gloves, lace, linen, paper, and pottery. Pop. in 1866, 4253.

Clupe'idæ [from *Clupea* (herring), perhaps the most important of its genera], a family of malacopterous fishes allied to the Salmonidæ, and distinguished from them chiefly by the absence of an adipose fin. The scales are easily detached. The fins are without spinous rays. The gill-openings are very large; the teeth small and generally numerous; the maxillary bones of three pieces easily separated; the body generally long; the air-bladder is always large; the roe consists of a vast number of eggs. A few of the fishes of this family ascend rivers, the rest are exclusively marine. They generally appear in shoals, and some of them periodically visit certain coasts in great numbers. They are found in many parts of the world, some species especially having a wide geographic range. To this family with its widest limits belong the herring, shad, pilchard, anchovy, sardine, etc., but the latest authorities divide it into several families.

Cluseret (Gustave Paul), a French revolutionist, born June 13, 1823, resigned in 1858 his place as captain in the French army because he had adopted the principles of Mazzini. In 1859 he served under Garibaldi, and in 1861 entered the volunteer army of the U. S., in which he became in 1862 a brigadier-general. In 1864 he published in New York the "New Nation," to urge the nomination of Fremont for the presidency. His attempts, in 1870, to proclaim in Lyons and Marseilles the "Red Republic" failed. In Mar., 1871, the Communists of Paris appointed him chief of the war department; on May 1 he was deposed, arrested, and impeached, but after a few days set free, and fled to England.

Clu'sia [so called in honor of the botanist Lécluse or Clusius], the name of a genus of small tropical trees and shrubs of the order Clusiaceæ. Some of them are called balsam trees, from their resinous or balsamic products. They are often epiphytes, growing on larger trees, over the bark of which they send their roots in search of decayed parts from which they may extract nourishment; sometimes a root is sent to the ground, and becomes a kind of stem. According to good authorities, they are sometimes parasitical. *Clusia rosea*, a native of the West Indies and tropical America, yields an abundant resin, which is used in medicine and for covering boats instead of pitch. A resin which exudes in large quantities from the disk of the flowers of *Clusia insignis*, known as the wax-flower of Demerara, is used to make a gently-stimulating and soothing plaster. *Clusia flava*, or yellow balsam tree, grows in Southern Florida and the West Indies. It abounds in a yellow resin or balsam, which has medicinal qualities, and is largely used in the West Indies instead of pitch.

Clus'tered Col'umns, or **Compound Piers,** form one of the richest features in Gothic ecclesiastical architecture. The columns or shafts are sometimes attached to each other throughout their whole length, sometimes only at the base and the capital. When surrounded by floriated fillets they are compared by Sir Walter Scott to "bundles of lances that garlands have bound."

Clutts'ville, a township of Madison co., Ala. P. 1311.

Clu'ver (Philip), a learned geographer, born at Dantzic in 1580. He published an "Introduction to Universal Geography, Ancient and Modern" (1629; best ed. Amsterdam, 1729), "Germania Antiqua," and "Italia Antiqua" (1624). Died in 1623.

Clyde, the principal river on the W. coast of Scotland, celebrated for the beauty of its scenery, rises in the Lowther and Moffat Hills. It drains the counties of Lanark, Renfrew, and Dumbarton, and flows generally in a N. W. direction. Near the town of Lanark occur the Falls of the Clyde, a series of cascades and rapids. The river descends 230 feet in a course of six miles over old red sandstone rocks, amid very picturesque scenery. The highest of these cascades is Corra Linn, forming three distinct leaps, in all eighty-four feet high. At Glasgow the Clyde becomes navigable for large vessels, and at Greenock it is four miles wide. Below Greenock it flows southward, and expands into the Frith of Clyde, which is about thirty miles wide. Its length is 75 miles, not including the frith.

Clyde, a post-village of Cloud co., Kan. It is on the Republican River, and has one weekly newspaper.

Clyde, a township of Whitesides co., Ill. Pop. 1093.

Clyde, a township of Allegan co., Mich. Pop. 298.

Clyde, a township of St. Clair co., Mich. Pop. 1176.

Clyde, a post-village of Wayne co., N. Y., on the Erie Canal, and on the Clyde River where it is crossed by the Central R. R., 44 miles E. of Rochester. It has six churches, two banks, one newspaper, a manufactory of glass, and several malthouses. Pop. 2735. Ed. Clyde "Times."

Clyde, a post-village of Sandusky co., O., at the junction of the Lake Shore and Michigan Southern and the Cincinnati Sandusky and Cleveland R. Rs. It has a newspaper and various manufactures.

W. W. White, Ed. Clyde "Independent."

Clyde, a township of Iowa co., Wis. Pop. 1124.

Clyde, Lord. See Campbell (Colin).

Cly'man, a township and post-village of Dodge co., Wis. The village is on the Chicago and North-western R. R., 8 miles N. of Watertown and 138 miles N. W. of Chicago. Pop. of township, 1426.

Cly'mer, a township and post-village of Chautauqua co., N. Y. The village is on the Buffalo Corry and Pittsburg R. R., 83 miles S. W. of Buffalo. Pop. of township, 1486.

Clymer, a township of Tioga co., Pa. Pop. 1079.

Clymer (George), an American statesman, born in Philadelphia in 1739. He was elected to the Continental Congress in 1776, and signed the Declaration of Independence. He was re-elected a member of Congress in 1780, and was a member of the convention which formed the

Federal Constitution in 1787. He was the founder of the Pennsylvania Agricultural Society. Died July 23, 1813.

Clytæmnes'tra, or **Clytemnestra** [Gr. Κλυταιμνήστρα], the wife of Agamemnon, king of Mycenæ, was a sister of Castor and of Helen. She became the paramour of Ægisthus, and murdered Agamemnon on his return from Troy. She was killed by her son Orestes.

Cni'cin, or **Centau'rin** ($C_{14}H_{18}O_5$?), the bitter principle of *Cnicus*, or *Centaurea benedictus*. It is in odorless, silky needles, having a pure bitter taste. (See BLESSED THISTLE.)

Cni'dus [Gr. Κνίδος], sometimes written **Gnidos,** an ancient Greek city of Caria, in Asia Minor, was on the Ægean Sea and on the promontory of Triopion. It was one of the six cities of the Doric league called *Hexapolis*, and had an extensive commerce. Here were several famous temples of Venus, one of which contained a celebrated marble statue of Venus by Praxiteles. Cnidus was partly built on a small island, connected by a causeway with the mainland. Conon the Athenian defeated the Spartan fleet near Cnidus in 394 B. C.

Coach. See CARRIAGES, etc., by L. P. BROCKETT, M. D.

Coadju'tor [from the Lat. *co* (for *con*), "together with," and *adjuvo, adjutum*, to "help"], an assistant; in ecclesiastical law, a term technically applied to one appointed to assist a bishop or other dignitary. Coadjutant bishops in the Roman Catholic Church are usually bishops of sees *in partibus*. In the Protestant Episcopal Church of the U. S. they are called assistant bishops.

Coagula'tion [from the Lat. *co* (for *con*), "together," and *ago*, to "drive," to "force"], the changing of a liquid to a semi-solid or curd-like consistency. Thus, the white of an egg becomes solidified on the application of heat. The caseine of milk is coagulated (curdled) by the action of rennet and by many acids. The fibrine in the blood, chyle, and lymph is coagulated after the removal of these fluids from the living animal. Great importance was formerly attached by physicians to the appearance of the blood-clot or coagulum after bleeding.

Coaho'ma, a county in the W. N. W. of Mississippi. Area, 575 square miles. It is bounded on the N. W. by the Mississippi River. The surface is level, low, and partly subject to inundation. The soil is fertile. Cotton and corn are largely raised. Capital, Friar's Point. Pop. 7144.

Coal, a general name given to several carbonaceous substances derived from vegetable tissue. It was formerly limited to what is now known as charcoal, the residual carbon of wood, from which the volatile constituents have been expelled by heat; but it is at present almost universally used to denote the various kinds of mineral fuel. As these have no definite composition, the vagueness of the term has given rise to much discussion in scientific books and courts of law. These substances form part of an unbroken series which begins with woody fibre and ends with graphite. They are all derived from the decomposition of vegetable tissue in the changes which it undergoes when buried under water, earth, or rock. The different products of this progressive change, which is a sort of distillation, are peat, lignite, bituminous and anthracite coal, graphite, and asphaltum, which are solids; petroleum and water, which are liquids; carbonic acid, carburetted hydrogen, etc., which are gases. Of these, all the solids, excepting asphaltum, are residual products, while that substance and the liquids and gases are the evolved products or distillates. The first mineralized solid formed from vegetable tissue is called lignite, if derived from wood—peat, if from herbaceous vegetation. Neither of these substances has any definite formula of composition, as each individual specimen may represent a distinct stage of the process of bitumenization. The nature of the change which takes place in the formation of peat and lignite from vegetable tissue will be best understood by the comparison of typical examples of each given below:

Vegetable tissue.		Loss.	Peat.
Carbon	49.1	21.50	27.6
Hydrogen	6.3	3.50	2.8
Oxygen	44.6	29.10	15.5

Wood.		Loss.	Lignite.
Carbon	49.1	18.65	30.45
Hydrogen	6.3	3.25	3.05
Oxygen	44.6	24.40	20.30

In this process the evolved products represented by the loss are water, carbonic acid, carburetted hydrogen, or petroleum. Where peat and lignite have been longer buried in the earth they have suffered still further loss and change, and are converted into what is termed bituminous coal, as will be seen in the following example:

Lignite.		Loss.	Bituminous coal.
Carbon	30.45	12.35	18.10
Hydrogen	3.05	1.85	1.20
Oxygen	20.20	18.13	2.07

This is the condition in which we find most of the beds of peat and lignite which accumulated in what is called the carboniferous age millions of years ago, and which, deeply buried, have been subjected to a slow and general distillation, resulting in the formation of the different varieties of bituminous coal. Where exposed to peculiar influences, as to heat from volcanic eruptions, or in the elevation of mountain-chains where all the strata are baked and hardened, the volatile constituents of bituminous coal are partially or perfectly driven off, giving us, first, semi-bituminous coal, then anthracite, and finally graphite. The process by which anthracite and graphite are formed from ordinary coal is indicated in the succeeding formulæ:

Vegetation of the Coal Marshes.

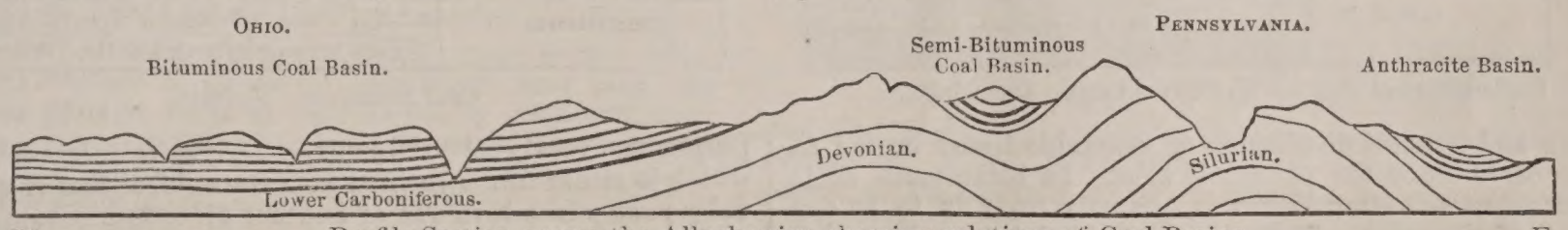
Bituminous coal.		Loss.	Anthracite.
Carbon	18.10	3.57	14.53
Hydrogen	1.20	0.93	0.27
Oxygen	2.07	1.32	0.65
Anthracite.		**Loss.**	**Graphite.**
Carbon	14.53	1.42	13.11
Hydrogen	0.27	0.14	0.13
Oxygen	0.65	0.65	0.00

All the varieties of coal mentioned above shade into each other, and we have lignites which exhibit every degree of approach to bituminous coals, semi-bituminous coals intermediate between these latter and anthracite, and graphitic anthracites by which the anthracites are connected with the graphites.

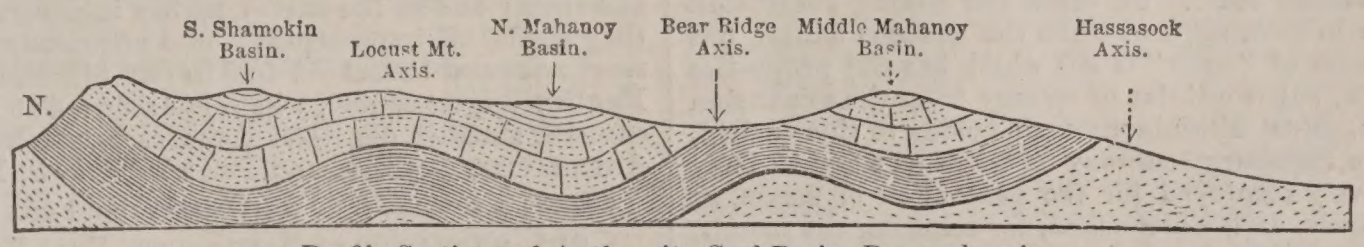
The geological position of the different varieties of coal accords with the theory of their origin given above. For example, the oldest rocks known contain comparatively little carbonaceous matter, as they date from a period when the vegetation of the globe was scanty and mostly marine. Here we have only the residual products of the distillation of vegetable tissue, graphite and anthracite. In the carboniferous age the terrestrial vegetation was luxuriant over large areas, and conditions prevailed favorable to the formation of beds of peat. These, submerged and deeply buried under sediments which were deposited upon them, have, as a general rule, been changed to our beds of bituminous coal—to anthracite where local causes have carried the process of distillation further. In formations more modern than the carboniferous we find the accumulations of vegetable matter usually classed as lignites. These contain more water and oxygen, and are less valuable fuels, than the true coals, but shade into them imperceptibly. In the present period we see the formation of coal only in its initial stages—viz. the growth of vegetation and the accumulation of bitumenized vegetable tissue in marshes, where oxidation is prevented or retarded by water. By artificial processes we can, however, hasten the changes in vegetable tissue, and by properly conducted distillation produce lignite, bituminous coal, and anthracite. We find, too, that Nature is locally accelerating her processes, and by volcanic heat distilling lignites and bituminous coals to anthracite. Near Santa Fé, New Mexico, and on Queen Charlotte's Island, excellent anthracite has been produced by volcanic heat from cretaceous lignites. At Los Bronces, in Sonora, triassic coal is converted into anthracite by a similar cause. In Eastern America all the coal strata, except those of the small triassic basins of Virginia and North Carolina, are of carboniferous age. In the Valley of the Mississippi, where they have suffered no local metamorphosis, they are all of the bituminous class. In the Alleghanies the same strata, having been somewhat affected by the causes which resulted in the upheaval of the mountains, have lost a portion of their volatile matter, and have become what are known as semi-bituminous coals. To this group belong the coals of Blossburg, Broad Top, Frostburg, and a belt running down to Alabama. Still farther E. the carboniferous strata are more metamorphosed, and the coal which they contain is converted into anthracite. In Rhode Island a coal-basin of limited extent, and of the same age with those of Pennsylvania, seems to have been still nearer the focus of metamorphic action; and here the coal is partially converted into graphite, forming the variety known as graphitic anthracite.

The value of coal in the economy of civilization is now so well understood and so fully appreciated that it requires no lengthy exposition. Coal may indeed be considered as the mainspring of our civilization. In its combustion the heat of the sun, absorbed in the growth of the plants from which it is derived, is all given out again, subject to human control; and, as heat is but another name for physical force, coal becomes the most important source of power at our command. The power developed in the combustion of a pound of coal is theoretically equal to 10,800,000 foot-pounds. But by our imperfect methods of utilization not more than 1,500,000 foot-pounds are made available for our purposes. This is about the amount of power exerted by a man of ordinary strength during a day of labor. Hence 300 pounds of coal will represent the labor of a man for a year. The annual production of coal in the British Islands in 1871 was 117,000,000 tons. Of this, aside from all exported or employed for heating, lighting, smelting, etc., it has been estimated that 20,000,000 tons are devoted to the development of motive-power, and that this is equivalent to the labor of 133,000,000 of men who are producers and not consumers. Hence, if we may suppose that the remainder of the coal product of the United Kingdom pays the expense of the entire production, we may estimate the contribution annually made to the wealth of the British Islands by their coal product to be greater than that of 100,000,000 of laborers industriously employed and requiring no food and no pay.

Such being the value of coal, its geographical distribution becomes of great interest and importance. Among the nations of Europe the English occupy a pre-eminent position, not only from the extent of their coal-fields, but



Profile Section across the Alleghanies, showing relations of Coal Basins.



Profile Sections of Anthracite Coal Basin, Pennsylvania.

from the industries dependent upon them. The British coal area is estimated to be 11,859 square miles, and the coal production in 1871 was 117,352,028 tons. The coal area of France is about 2000 square miles, and the production in 1868 was 12,800,000 tons. Belgium has a coal area estimated at 500 square miles, and in 1871 produced 13,671,470 tons. In Prussia the coal area has been considerably increased by the cession of the Rhine provinces, and she now has probably 4000 square miles of very deep and valuable coal strata. The production of coal in Prussia and the other German states in 1869 was 26,774,368 tons. The coal area of Spain is not definitely known. Her coal-field in the province of Asturias is one of the most important on the continent of Europe, but as yet her coal production is small. Russia and Austria are less liberally supplied with coal than the other nations of Europe.

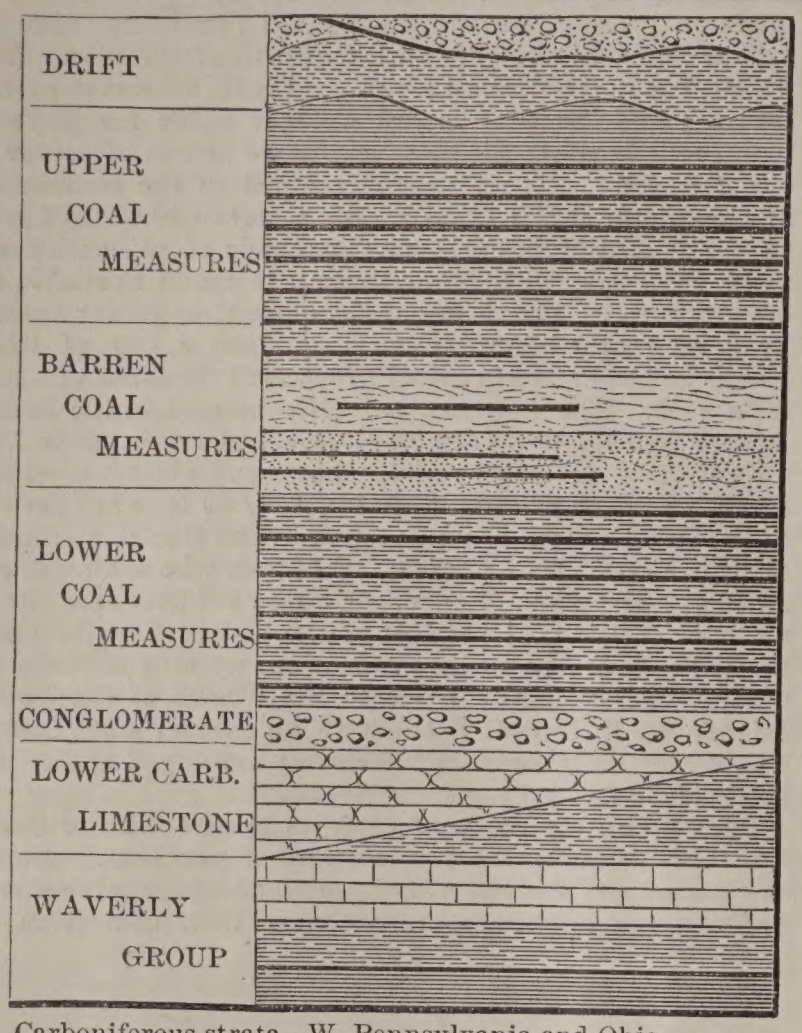
Coal also occurs in China, India, Australia, Japan, and Borneo. So far as known, it is all of mesozoic age, though in China and Japan anthracite and well-formed bituminous coals are found, and have been worked for centuries.

When we turn to the U. S., we find a coal area which throws all those which have been mentioned into insignificance. And yet it should be said that the coal-basins of the U. S. are shallow as compared with those of Europe, and the vertical thickness of coal they contain considerably less. Their importance cannot, therefore, be accurately measured by their superficial extent. Even with this qualification, however, the coal-fields of America are by far the most extensive and richest in the world. The coal area of the U. S. is divided into several distinct basins, of which the most important are the following: 1st, the Alleghany coal-field, bordering the Alleghany Mountains on the W. side, and reaching from the N. line of Pennsylvania to the middle of Alabama. Its area is computed at 58,737 square miles. 2d, the Illinois coal-field, which covers a large part of Illinois and portions of Indiana and Kentucky. Its area is estimated at 64,887 square miles. 3d, the Missouri coal-field, lying W. of the Mississippi in the States of Iowa, Kansas, Arkansas, Missouri, and Texas, and supposed to extend over 47,138 square miles. To these great expanses of coal territory must be added the anthracite basins of Pennsylvania and Rhode Island, the coal-fields of Virginia, Michigan, and North Carolina, and the numerous and extensive deposits of cretaceous and tertiary coals of the far West. Combining all these, the productive coal area of the U. S. will be seen to exceed 200,000 square miles. The production of coal in the U. S. was in 1870, 33,310,905 tons, of which Pennsylvania furnished 23,448,793 tons (15,648,437 tons anthracite, 7,800,356 tons bituminous coal). The coal production of the U. S. for 1872 was estimated at 40,000,000 tons.

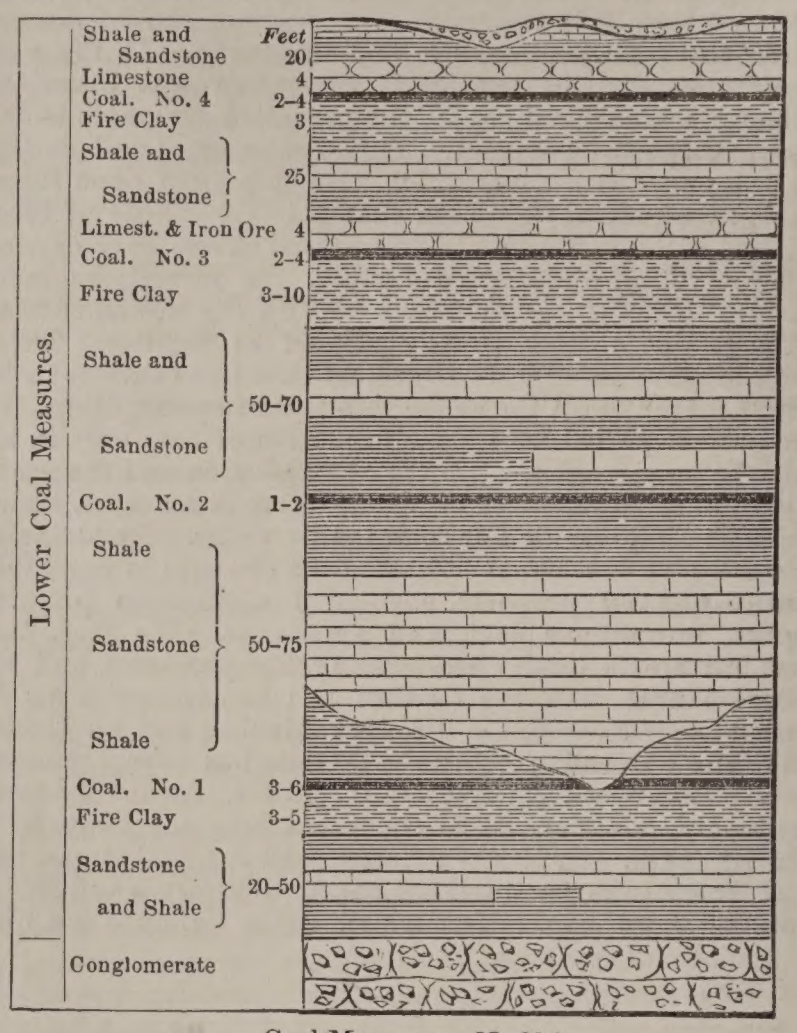
The different chemical and physical properties exhibited

by the various kinds of coal fit them for a wide range of uses in the arts. Coals are primarily divided into two great groups—the hard and soft, or the anthracite and bituminous coals—but each of these groups is capable of subdivision into several varieties. For example, we have at the base of the series—1, *Graphite*, which is a coal deprived of all its volatile matter, and consisting only of a portion of its carbon mingled with all its ash. This is practically incombustible, and is never used as a fuel nor classed as a coal. 2, *Graphitic anthracite*, containing 1 or 2 per cent. of gaseous matter, igniting with difficulty, and forming an inferior fuel. This is the prevailing variety of coal in the Rhode Island coal-basin. 3, *Anthracite*, containing from 3 to 10 per cent. of volatile matter, sometimes 95 per cent of carbon, igniting with some difficulty, but producing in combustion an intense local heat. When burning it gives off a little blue flame (carbonic oxide), is valueless for purposes of illumination, but the best of all fuels for smelting iron, and is extensively used for the generation of steam and for household purposes. 4, *Semi-bituminous coal*, containing from 15 to 20 per cent. of gaseous matter, but generally caking in the fire; of little value as an illuminator, but kindling readily, with high heating power. It is the most highly valued of all coals for the generation of steam. The semi-bituminous coals produce a dense and excellent coke, and in the raw state are preferred to all others for blacksmiths' use, as they form a hollow fire and produce intense heat in combustion. 5, *Bituminous coals*, which have been subjected to no local metamorphic action, but are the natural product of the

The following sections, general and local, will serve to give an idea of the mode of occurrence of coal in the carboniferous rocks, and of the nature of the associated strata.



Carboniferous strata—W. Pennsylvania and Ohio.



Coal Measures—N. Ohio.

slow and general distillation of vegetable tissue buried in the earth since the palæozoic ages. In bituminous coals the volatile matter varies in quantity from 30 to 50 per cent. of the mass. They are subdivided into *coking*, *furnace*, and *cannel* coals. Of these the coking coals melt and adhere in burning, and when the gaseous matter has escaped a mass of "coke" is left which has the properties of anthracite, but is cellular or spongy from the expansion of the gases. Most bituminous coals belong to this variety, of which the Pittsburg coal may be taken as a type. They are extensively employed for the generation of steam, as household fuels, and, when coked, for smelting the metals, their adhesive character preventing their being used for this purpose in the raw state. Caking coals which are sufficiently free from sulphur, their great contaminating ingredient, are termed "gas coals," as they are chiefly employed for the production of illuminating gas. In the volume and illuminating power of their gas they are exceeded by the cannel coals, but their deficiency in this respect is more than compensated for by the greater value of the coke which is derived from them. The furnace coals are those bituminous coals which do not melt or adhere in the fire, and can therefore be employed in the raw state in the blast furnace. These are termed "open-burning," and sometimes "splint coals," but the latter term is more appropriately applied to a kind of cannel coal which contains a large percentage of carbon, comparatively little gas, and has high heating power. The famous Brier Hill coal of Ohio and the Brazil coal of Indiana are typical furnace coals. The cannel coals have a more homogeneous texture, and are less pitchy and brilliant, than the other bituminous coals. They represent the carbonaceous mud which accumulated in the open lagoons of the coal marshes, while the surrounding mass of spongy vegetable tissue formed the cubical coal. The cannels are rich in gas, but have comparatively low heating power. They are favorite household fuels, are employed for the production of oil by distillation, but are nearly valueless for metallurgical purposes. Nearly all coal-fields contain more or less cannel, which is either interstratified with the cubical coal or gradually passes into it in one or another direction. As a general rule, the cannels contain more ash than the furnace or gas coals; and as the earthy matter increases in quantity, they shade off imperceptibly into bituminous shale. The most esteemed household fuel in our Atlantic cities is the English Wigan cannel, which is preferred to the American cannels, since it generally contains much less ash. (See ANTHRACITE, LIGNITE, and PEAT.) J. S. NEWBERRY.

Coal, a township of Northumberland co., Pa. P. 2920.

Coal, a township of Harrison co., West Va. Pop. 2058.

Coal Banks, a village of Fremont co., Col., on the Arkansas River, 12 miles below Cañon City, has productive mines of coal, called "cañon" coal.

Coal'burg, a post-village of Kanawha co., West Va., on the Kanawha and the Chesapeake and Ohio R.R., 16 miles S. E. from Charleston. It has mines of bituminous coal.

Coal Creek, a twp. of Montgomery co., Ind. P. 1773.

Coal-fish (*Merlangus carbonarius*), a fish of the family Gadidæ, and of the same genus with the whiting, corresponding in form and fins, but of a different color, the upper parts being nearly black. It is much larger in size, and is noted for its voracity. These fish are found in large

Coal-fish.

shoals, and when attracted by bait will keep near a boat till great numbers are taken. Although a coarse fish, the coal-fish is much used for food in northern parts. It is found in the most arctic regions, both on the European and

American sides of the Atlantic. The liver of the coal-fish abounds in oil, which is used for various purposes. This is one of the fishes known as pollock in the U. S.

Coal Gas. See GAS, by PROF. C. F. CHANDLER.

Coal-Mines, a post-village of Queen's co., N. B., on Salmon River, has rich mines of coal and large manufactures of lumber. Steamers run regularly in summer to St. John, 77 miles distant.

Coal-Mines, a township of Russell co., Kan. P. 156.

Coal Oil. See PETROLEUM, by PROF. C. F. CHANDLER.

Coal Tar. See TAR, by PROF. C. F. CHANDLER.

Coal'port, a village of Meigs co., O., 1 mile below Pomeroy, on the N. bank of the Ohio. It has extensive coal-mines.

Coalport, a village of Alleghany co., Pa., 7 miles below Pittsburg, on the left bank of the Ohio, at the terminus of a coal railroad.

Coal'ton, a post-village of Boyd co., Ky., near Ashland, with which it is connected by rail. It has mines of excellent block coal.

Coal Val'ley, a township and post-village of Rock Island co., Ill. The village is on the Peoria and Rock Island R. R., 12 miles S. E. of Rock Island. Pop. 2545.

Coal'ville, a post-village, capital of Summit co., Ut. It is the southern terminus of a branch railroad, 5 miles long, from Echo City on the Union Pacific R. R. It has beds of valuable cretaceous coal.

Coan' (TITUS), D. D., an American missionary, born at Killingworth, Conn., Feb. 1, 1801. He graduated at Auburn Seminary in 1833. In 1834 he sailed for the Sandwich Islands, where his success as a missionary was very great. He contributed important papers on volcanoes to the "American Journal of Sciences" (1840–70).

Coast-Guard, in Great Britain, a force posted along the coast, and originally intended to prevent smuggling merely, but now made to serve as a defensive force also. The organization was formerly in the employment of the customs department, but in 1856 the coast-guard was transferred to the admiralty. Under this arrangement the admiralty may from time to time issue orders for additions to the coast-guard, which must not, however, exceed 10,000 men in all. The coasts are divided into eleven districts, each of which is under a navy captain, who has a guard-ship at one of its ports. The able seamen, named on the ships' books, and employed on shore in coast-guard service, are in three classes—chief boatmen, commissioned boatmen, and boatmen. In time of war all of these men may be called upon to serve as regular sailors on board ship. The coast-guard are taught naval gunnery, gunboat exercise, and the serving of land-batteries. Besides the eleven district guard-ships there is a head-quarters' ship.

THE ROYAL NAVAL COAST VOLUNTEERS is a corps organized in connection with the coast-guard for the defence of the coasts of the United Kingdom. By an act of Parliament passed in 1853, the admiralty was empowered to raise a number, not to exceed 10,000, of coast volunteers for five years' service, and to be exercised twenty-eight days in each year, either on shipboard or on shore; not to be sent more than fifty leagues from the coast unless in cases of emergency, when the distance may be extended to one hundred leagues. In ordinary cases one year's active service entitles them to discharge. Their pay, allowance, and rank during exercise and active service are the same as those of able seamen.

Coasting-Trade, the trade which is carried on by sea between the different ports of the same country. Coasting vessels or vessels employed in this commerce are subject to certain rates and regulations differing from those relating to oversea traders, and the masters are required to keep books proving that their cargoes come strictly within the limits of coasting-trade. Formerly in Great Britain no goods or passengers were allowed to be carried from one port of the United Kingdom to another except in British vessels, but this restriction was repealed in 1854.

The coasting-trade of the U. S. is very extensive. Formerly, this trade was chiefly carried on by means of schooners and sloops, but of late years its character has much changed. Since the introduction of screw steamers for this service there is a prospect that they will to a great extent supersede the use of schooners on our coast.

Coast-Line is the name given to the line which bounds the coast of any country, island, or continent. Very important results follow from the degree to which a coast is indented by inlets, gulfs, or other natural interruptions of a straight line; and in proportion as a coast-line is longer as compared with the simplest possible line enclosing the same area, so is there generally facility of access, shelter for ships, and a capacity for commerce. The coast of Europe is very remarkable in this respect as compared with any other part of the world; for with an area of 3,816,400 square miles, one side of which is in contact with Asia, there is a length of coast of nearly 20,000 miles; while Africa, with an area of 11,600,000 square miles, has less than 15,000 miles of coast; and even Asia, whose area is 17,310,000 square miles, has only 30,000 miles. Of both North and South America, the Atlantic and Pacific coasts are very different, for the former presents in all upwards of 23,000 miles, and the latter only 15,500 miles of coast-line. The most important trading countries are, with few if any exceptions, always those with the longest coast-line.

Coast Range, or **Coast Mountains,** a range of mountains in California extending nearly parallel with the coast of the Pacific Ocean, from Oregon to the southern boundary of the State. San Bernardino, a peak of this range, rises 8500 feet above the level of the sea.

Coast Survey. An accurate acquaintance with the physical features of the coast that bounds its territory is an economical necessity to every nation largely engaged in commerce. The ocean being the great outlet of production, the highway over which the currents of commerce are constantly flowing to and fro, the diminution of its hazards is a matter of the greatest moment. Among the dangers to which the mariner is exposed, the most formidable are those which beset him when he approaches the land, arising out of his unacquaintance with the sea-bottom beneath him, with the currents that carry him out of his course, with the situation of reefs, shoals, or dangerous shores, and with the courses that would take him safely to his destination. Against these dangers no absolute security can be provided, but they can be very much diminished by supplying accurate charts of the coasts and their approaches, and by maintaining lighthouses and buoys to mark available channels or warn against hidden dangers. To supply this want the governments of all maritime nations have in modern times undertaken surveys of their coasts by the most exact geodetic and hydrographic methods, resulting in elaborate charts for the guidance of the navigator, and aiding in the selection of sites for lighthouses and the proper location of buoys. Such a survey of the coast of the U. S., carried on under the authority of the Federal government, has also for a number of years been in progress, and it is the object of this article to review the history, methods, and present condition of this important public work.

In the early part of this century the only charts of our coasts and harbors in existence were those made in the latter half of the last century by Des Barres, Roman, Gauld, and other surveyors, acting under the orders of the British admiralty. Respectable chiefly by the great extent of coast-line represented, their charts were the merest preliminary explorations, and fell far short of the wants of navigation. The necessity for a thorough survey was perceived very early in the history of the nation, and, upon the recommendation of President Jefferson, Congress in 1807 passed an act authorizing the President to cause a survey to be made of the coasts of the U. S., in which were to be designated the islands, shoals, and places of anchorage within twenty leagues of the shores; and such other matter as might be deemed proper for completing an accurate chart of every part of the coast; it also authorized the survey of St. George's Bank and the soundings and currents beyond the limits aforesaid to the Gulf Stream.

The plan of survey adopted by government was submitted by Prof. F. R. Hassler, a native of Switzerland, who had gained experience in similar works abroad, and who was accordingly appointed to superintend its execution. It consists substantially of three operations: first that of *geodesy*, or the accurate determination of the geographical position of numerous points along the coast by astronomical and trigonometrical methods; second, that of *topography*, or the delineation of the coast-line and the characteristic features of the land; and third, the *hydrography*, or a nautical survey of the channels, shoals, and approaches to the shore, including observations of currents and tides. The geodesy furnishes the framework for the map, without which the accumulation of unavoidable inaccuracies in its topographic survey would soon attain objectionable proportions; but taking a fresh departure from each point that has been trigonometrically determined, the errors of the land-survey are checked and kept within bounds inappreciable on its scale of representation. The nautical survey, equally taking frequent points of reference supplied by the two preceding operations, cannot run into any material error of position.

To appreciate the necessity of a geodetic survey as the basis of a series of coast-charts, it must be borne in mind that the figure of the earth is a spheroid, and that conse-

quently methods of plane surveying, when extended over areas of large extent, would lead to intolerable errors of misrepresentation. Geodesy takes account of the true figure of the earth, determining with the greatest attainable accuracy the distances and bearings between the series of points by the processes of base-measurement and triangulation, and determining the curvature of the surface at suitably chosen points in the series by the determination of their differences of latitude and longitude. The geographical position of the intermediate points can then be computed with great precision, and the whole chain projected upon a suitable plan that enables us to preserve as nearly as possible their principal relative positions. The steps of the principal triangulation are made as large as possible, in order to avoid the accumulation of error, and the operations are checked at intervals by the lineal measurement of some of the distances, serving as a verification for the entire chain.

The delay naturally attending new enterprises, the necessity of procuring all the instruments from Europe, where they had to be specially constructed, the interruption caused by the war between England and the U. S., and the subsequent pressure upon the public finances, prevented active operations from being undertaken until 1817, when a commencement was made near the important harbor of New York. But the work had been hardly begun when the last-mentioned cause led to its abandonment by the failure of Congress to provide funds for its continuance. From 1817 to 1832 detached portions of the coast were surveyed by naval officers, some harbors were surveyed, and hydrographic reconnaissances made of the coast of some of the States; but no general survey was attempted, nor did these detached surveys yield more than the most indispensable information. On the repeated representations of Hon. S. L. Southard, secretary of the navy, and others, Congress in 1832 again made a small appropriation for carrying out the law of 1807, under which the operations of the Coast Survey passed anew under the charge of Hassler, who was authorized to employ, in the conduct of the work, such astronomers and other persons as he should judge proper, in addition to the officers in the military and naval service. Mr. Hassler continued to direct the work until his death, which occurred in the year 1843.

In reviewing the history of this early period it is proper to remember that the first years were necessarily years of organization and instruction. The superintendent had to systematize methods, to train up assistants, to cause the work to grow from a small beginning until it comprehended the various operations of a geodetic survey upon the land, and included the hydrography of the adjacent waters. When the results accumulated it was necessary to provide for their computation and reduction, and also for the preparation of maps and charts upon a plan suited to our extended coast, and for the engraving of the maps themselves. All these things were new in this country. The amount of knowledge, skill, and labor required to overcome these and other difficulties was hardly appreciated. The results show how large an amount of work had been done, and how the work was extending beneficially at the time of Mr. Hassler's death.

The condition of the work as Mr. Hassler left it will be made intelligible by the following brief statement: A base-line had been measured in the vicinity of New York, the commercial importance of which obviously indicated it as the proper point of beginning. The triangulation had extended eastward to Rhode Island and southward to the head of Chesapeake Bay, the primary triangulation crossing the neck of New Jersey and Delaware, while a secondary triangulation skirted the coast of New Jersey, meeting with another series which extended down Delaware Bay. The topography had kept pace with the triangulation, and the hydrography of New York bay and harbor, of Long Island Sound, of Delaware bay and river, and the off-shore soundings from Montauk Point to the capes of the Delaware were substantially completed. The triangulation covered an area of 9000 square miles, furnishing determinations of nearly 1200 stations for the delineation of 1600 miles of shore-line; 168 topographical maps had been surveyed and 142 hydrographic charts.

The progress thus sketched, although really very considerable and highly creditable to the late superintendent, was still felt to be inadequate to the pressing demands of commerce, and clamors arose in Congress against the administration of the survey, ascribing the slow progress to an unnecessary refinement in the processes employed, and claiming the results to be inadequate to the expenditure. An investigation was accordingly instituted in 1842 by a Congressional committee, which, after a severe and unfriendly scrutiny, practically resulted in a complete endorsement of the principles on which the survey had been conducted by Hassler, while at the same time a more efficient plan of organization was put in force. According to this plan the personnel consists of a superintendent, under whose general direction the work is carried on by assistants detailed from the army for the survey on land, and from the navy for the nautical work, so far as officers could be spared from the respective services; and in addition to these of a number of civil assistants, who form a more permanent nucleus, preserving unity of system and method. The responsibility of carrying into effect the provisions of the adopted plan, and of expanding the work to a scale commensurate with the growing demands of commerce, fell mainly upon Hassler's successor, Prof. A. D. Bache. His appointment was made upon the united representations of the colleges, learned societies, and men of science in the country, whose estimate of his merits has been abundantly justified by the brilliancy of his official career. Upon his recommendation Congress provided the means for carrying on the work independently in many places at once; each section having its own base and geographical determinations, but all designed to form, when completed, a continuous chain of triangulation and a homogeneous survey of the whole coast. In 1845, besides extending in both directions the former work, active operations were commenced on the coasts of Virginia and North Carolina, and of Alabama and Mississippi in the Gulf of Mexico; two years later they had been extended to the States of South Carolina, Georgia, Louisiana, and Texas; and two years later still the important survey of the reefs and keys of Florida was commenced. On the annexation of California the Pacific coast was at once included in the operations.

While the field-work was thus pushed with great vigor in every quarter, the publication of the charts and other results was made to keep pace as rapidly as possible. The annual reports of the superintendent, besides giving an account of the progress of the work, have been, since 1857, accompanied by an appendix which contains the maps, charts, and sketches produced during each year, and valuable contributions to knowledge in the form of scientific discussions of various subjects connected with the survey, such as tides, terrestrial magnetism, harbor hydraulics, and ocean physics, and of new methods of observation and computation employed by persons engaged in the work. These valuable volumes have been widely circulated by a wise liberality of Congress, and are to be found in most public libraries. The charts are, besides, printed in sheets for the use of mariners, and can be obtained at a low price in the principal seaports, where agencies for their sale have been established. In addition to the charts, printed sailing directions or "Coast Pilots" are issued in book-form, and tide-tables predicting the heights and times of high and low water for all ports of the U. S. are published annually.

Some estimate of the magnitude of the work may be formed by considering that the general coast-line of the Atlantic, including the large open bays, is 3030 miles, that of the Gulf of Mexico, 2160, and that of the Pacific coast (including Fuca Strait, but exclusive of Alaska), 1870 miles, making a total of 7060 miles. A measurement of the shore-line, including bays, sounds, islands, and rivers, made as nearly as practicable where the survey is not yet made, gives similarly for that of the Atlantic coast, 14,725 miles; of the Gulf of Mexico, 10,400 miles; and of the Pacific coast, 4250 miles. The proportion of this vast extent of coast-line that had been surveyed and mapped at the outbreaking of the civil war in 1861 may be stated at about three-fourths of the Atlantic, fully one-third of the Gulf, and nearly one-fourth of the Pacific coast. The war of 1861–65 seemed likely at first to put a stop to the Coast Survey, but it was soon perceived that by preserving its organization the information gathered in its archives and the experience and skill of its officers could be made more useful to the cause of the Union than the individual efforts of its members could possibly be when merged in general organization of the military forces. The great knowledge and judgment of the superintendent was brought into requisition for planning the details of the blockade and of naval attacks upon the ports in possession of the Confederacy. The military and naval officers engaged on the Survey at that time of course at once rejoined their proper corps. Some of the civil assistants were detailed to aid, by their special knowledge of localities, in guiding the operations of the squadrons on the Southern coasts, where all lighthouses and buoys had been removed, and no local pilots could be obtained; others joined various armies to aid in reconnaissances and surveys, while others, again, obtained leave of absence to enter the army, and served with distinction. The resources of the office were taxed to the utmost to produce charts for the blockading fleets, and to compile for the use of the armies maps of the country in which they were to operate. By a wise foresight, Prof. Bache had caused to be collected in the Coast Survey office all the extant geographical maps of the country, which enabled him to issue

a series of maps of the Southern States that proved of the greatest service in the movements of troops, and which remain to the present day the best maps of those regions.

The value of the services rendered by the Coast Survey and its officers was on all occasions freely acknowledged by the commanders of our forces and brought to the notice of the government. Accordingly, after the close of the war the work enjoyed the increased favor of Congress, and while the great military and naval establishments that the war had rendered necessary were reduced to their lowest possible limits, the regular operations of the Coast Survey were resumed on a moderate scale of expenditure, which has since been gradually increased. In 1866 the expenditure was $300,000, and in 1872, $720,000. During the latter years of the war Prof. Bache's health was impaired by the overtasking and anxieties of those trying times, and after a prolonged illness he died in Feb., 1867. Of his eminent services to science in America it is the province of his biographer to speak. In reference to his conduct of the great national work we are considering, his successor, Prof. Benjamin Peirce, the eminent mathematician and astronomer, says: "What the Coast Survey now is, he made it. It is his true and lasting monument. It will never cease to be the admiration of the scientific world. . . . It is only necessary, conscientiously and faithfully, to follow in his footsteps, imitate his example, and develop his plans in the administration of the survey."

Under the administration of Prof. Peirce the survey has resumed the extension it had before the war, and is now rapidly approaching completion. At the close of 1872 the field-parties consisted of five astronomical and twelve triangulation parties, thirteen topographical parties, and as many hydrographical parties, including one engaged in the exploration of the newly-acquired coasts of Alaska. In addition to these, continuous tidal observations were making at five stations on the Atlantic and four on the Pacific coast. With the exception of most of the coast E. of Penobscot Bay, and the ocean-coast of Florida between St. Augustine and Cape Florida, the survey presented a continuous whole from Quoddy Head to the Tortugas, wanting only a portion of the off-shore soundings, and the survey of some sounds and estuaries; again, from St. Mark's to the mouths of the Mississippi, and from Galveston to Corpus Christi Bay, the land survey was completed, and the hydrography nearly half done. On the Pacific coast the work had likewise made considerable progress, and an exploring party was surveying the most important harbors on the coast of Alaska. A survey of Lake Champlain, included in the work of the Coast Survey by a special provision of law, was more than three-fourths completed.

The plan of publication is as follows: the main series of charts gives a continuous representation of the coast on a scale of 1:80,000, or about three-quarters of an inch to a mile. On these charts are exhibited all natural and artificial features of the shore, such as streams, hills, houses, and roads, together with the depth of water and configuration of the sea-bottom, the channels and shoals, as also the lighthouses, buoys, and other aids to navigation. Besides being characterized by the greatest precision, which is the first and essential condition of their value, they also do honor to the country as works of art, being in point of execution surpassed by none that are produced by other nations. A series of 110 of these charts will comprise the whole coast from the north-eastern boundary to the Rio Grande, fifty-one of which have been completed, while a large number are partially drawn and engraved. The same range of coast is also covered by a series of sixteen other charts on a smaller scale, that of 1:400,000, of a more general character, known as "off-shore charts," and intended for use in sailing along or approaching the coast; of which seven sheets have been issued. Another still more general chart of the coast, on a scale of 1:1,200,000, and reaching farther out to sea, is published to serve the purpose of navigating on courses between distant points. In addition to the foregoing charts, there are published very numerous charts of separate harbors, bays, rivers, anchorages, passages, and dangers, on scales varying from 1:5000 to 1:60,000, according to the character of the subject and amount of detail to be represented. Of such charts more than 200 have already been published of places on the Atlantic and Gulf coasts, and over 100 on the Pacific coast.

When once a continuous survey of the whole coast has been obtained, there will still be a necessity of maintaining the organization of the Coast Survey for the purpose of watching the unceasing changes that take place in the channels leading to our harbors, which for the most part are barred by shifting sands. Such changes, produced by the action of the waves and tidal currents, often also by the encroachments on the harbor areas by wharves and docks, render necessary changes in buoys and beacons, and often call for works of protection or improvement, which can only be planned after minute surveys and a careful study of the physical causes that are at work. Most important service to commerce and navigation has already been rendered in this direction by the advisory boards, composed of the superintendent of the Coast Survey, the chief of engineers of the army, and an officer of the navy, in studying these problems for the principal harbors, and laying down for each the principles of preservation or improvement. The subject of physical hydrography has been made a special department in the Coast Survey, and the reports to the harbor commissioners of New York and Massachusetts contain discussions that may serve as models for all similar inquiries.

The gradual extension of at least the trigonometrical work of the Coast Survey over the entire area of our country to serve as a basis for better maps, and in future of detailed topographical surveys, is a proposition favorably viewed by many statesmen, and indeed inevitable in the development of the country. The main series of triangles following the Appalachian chain will already afford many bases of departure for the trigonometrical survey of the States through which it passes; and on the Pacific coast the primary triangulation will equally afford such facilities. The plan proposed by the present superintendent of connecting these two coast series by two other chains, a northern and southern one, has already received the sanction of Congress, with the additional provision that trigonometrical points may be determined from these main chains for such of the States as provide for a topographical and geological survey of their domain. The plan of a general geodetic survey of the whole country is thus happily inaugurated.

An account of the Coast Survey would be incomplete without a brief notice of the incidental contributions to science which have been made and are constantly being added to during the progress of the work. Its geodetic operations furnish important data for determining the figure of the earth. (See FIGURE OF THE EARTH and GEODESY.) In 1869 the primary triangulation extending from Passamaquoddy Bay in Maine to Cape Henry in Virginia, a distance of 750 miles, was connected with five measured base-lines distributed along the series. The length of any one of these base-lines, computed through the triangulation from another, did not differ more than at a rate of a quarter of an inch in a mile. The apparatus for measuring base-lines, constructed in the Coast Survey office, is extremely perfect, each measuring-bar consisting of two rods of different metal, so combined as to compensate the effect of temperature and preserve the lengths between the points of contact unchanged when exposed to varying temperatures. In the measurement the contacts of the agate ends are made by means of the lever of contact and level first used by Bessel in comparing standards of length, but here adapted to measurement at inclinations up to 4° with the same precision as on level ground. The necessity for the greatest attainable accuracy in such operations is apparent when we remember that an error in the base-line will affect the whole distance depending upon it by triangulation in the same ratio; thus, if the base-line were in error by but its ten-thousandth part, a distance of one hundred miles depending on it would be in error, from that source alone, by fifty-three feet. The angles of the primary triangulation have been measured by means of a theodolite having a circle of thirty inches diameter, graduated to five minutes of arc, and reading to single seconds by means of micrometer microscopes; about thirty measures of each angle are taken, the mean of which has generally no greater uncertainty than one-eighth of a second. The same instrument serves for determining the azimuths of many sides of the triangulation, or their direction in reference to the true north. Knowing thus the exact distance between any two points, and the direction of the line joining them, on the surface of the globe, we have only to ascertain their latitudes and difference of longitude in order to deduce the curvation of that portion of the globe which is occupied by our operations.

The latitudes are chiefly determined with an instrument called the *zenith telescope* or equal-altitude instrument, first applied to that purpose by Capt. A. Talcott of the U. S. army, and remodelled and specially adapted to the purpose in the Coast Survey. By the aid of this instrument, and the great accuracy which modern star-places have attained, the latitude of a station may readily be determined in three nights with such precision as to leave no greater uncertainty than one-tenth of a second. The comparisons of differences of latitude so observed at many stations with their differences deduced from the triangulation has developed the existence of small irregularities in the direction of

gravity, arising doubtless from local attractions, even in places where the outward conformation of the surface affords no such indication.

The accurate determination of the longitude of some point in the Coast Survey from the principal observatories in Europe has been one of the great problems of the work. All available methods have been resorted to—the observation of lunar occultations and eclipses, and of right ascensions of the moon; the transportation of chronometers; and finally the comparison of time by means of the electric telegraph. The latter method has yielded the most consistent results, which are also confirmed by the others within their limits of precision. The difference of time between the observatories of Greenwich and Cambridge has thus been determined within a limit of uncertainty no greater than one-twentieth of a second of time. The differences of longitude between Cambridge and other principal stations of the Survey are determined by the aid of the electric telegraph. A series of such determinations has been extended southward as far as Galveston and westward to San Francisco, fixing the geographical positions of many important places on the way. The method of recording observations of time on a chronographic register, by means of a galvanic circuit, known in Europe as the *American method*, originated in the Coast Survey with the first attempts to determine longitude by means of the electric telegraph. The idea of comparing the local time of different places by means of the electric telegraph is sufficiently obvious, but the refined methods by which the intervention of human senses and operations, and the consequent liabilities to error, are in the greatest possible degree avoided, and by which the time of transmission is measured and eliminated from the longitude, have been the result of careful study and long experience. By this perfect and admirable method we are able to measure arcs of longitude with the same degree of accuracy with which arcs of latitude have heretofore been measured, and a new element has thus been introduced into geodesy.

The variation of the compass being an important element in navigation, observations have been made at several hundred places along the coast, not only of the deviation of the magnetic needle, but also of its inclination and of the intensity of the earth's magnetism, these elements being necessary for a complete study of the distribution and changes of this subtle force. At many points these observations are from time to time repeated, and their discussion, in connection with the more ancient observations that have been collected, has largely added to our knowledge of the secular variation. A magnetical chart has been constructed, from which the surveyor can learn the variation of the needle at any place with considerable accuracy.

The subject of the tides has received great attention in the Coast Survey. Long-continued tidal registers are kept up at selected points on the coast, for the purpose of ascertaining, upon the basis of observation, the complicated laws governing the tides in the different seas that wash our shores. Self-registering tide-gauges are used, by which a continuous curve, representing the successive changes in the height of water, is traced on paper moved by clockwork by a pencil actuated by the rising and falling of a float in a vertical box to which the tide has free access. The discussion of these observations, made at different times by Prof. Bache, has already largely increased our knowledge of the laws to which they are subject, and has rendered possible the predictions of high and low water for all ports in the U. S., which are published annually in advance. But highly important results are yet to be obtained from the discussion of the observations when continued through a full lunar cycle of nineteen years. Such a series has been completed for Boston harbor, which has yielded, in addition to exact data for future predictions, an independent estimate of the moon's mass.

A hydrographic survey of our coast would be incomplete if it did not embrace the investigation of that remarkable ocean-current which sweeps along in the vicinity of our Atlantic coast. The method of exploring the Gulf Stream adopted by Prof. Bache was to determine the limits of the stream by the temperature of its water at all depths by means of deep-sea thermometers along lines crossing the stream at right angles at various points. Twenty-one such sections have been run, along which the temperature of the water at various depths has been determined, and also sections of the bottom wherever it has been possible to obtain soundings; over 3500 casts having been made for the purpose. It is necessary that the thermometers employed should be self-registering, and able to withstand the crushing pressure of the water without having their indication affected thereby. Until recently the metallic self-registering thermometers invented by Saxton were exclusively employed, being found best to fulfil the required conditions; latterly, the simpler Miller-Casella self-registering thermometer with protected bulb has also been employed. (See GULF STREAM for an account of the results of these explorations.)

In conclusion, it may be said that the U. S. Coast Survey is a national work of which Americans may justly be proud, it having been declared, by the most competent foreign scientific authorities, to stand in the very front rank of similar works of other nations, and to be one of the most perfect examples of applied science.

J. E. HILGARD, *U. S. Coast Survey Office.*

Coat'bridge, a town of Scotland, in the county of Lanark, on the Caledonian Railway, 8 or 9 miles E. of Glasgow. It has seven churches, two academies, and several banks; also eight malleable-iron works. It is the centre of a mineral district in which are numerous smelting-furnaces, and derives its prosperity from the manufacture of iron. It is a place of rapid growth. Pop. 10,501.

Coatesville, a post-borough of Chester co., Pa., on the Brandywine Creek, and on the Central R. R. where it crosses the Wilmington and Reading R. R., 39 miles W. of Philadelphia. It is in the rich and beautiful Chester Valley. It has a national bank, a newspaper, a banking-house, seven rolling-mills, woollen and paper mills, and water and gas works. Pop. 2025.

WILLIAM J. KAUFFMAN,
PROP. CHESTER VALLEY "UNION."

Coa'ti [a word of Brazilian origin], the name of a genus (*Nasua*) of quadrupeds of the Ursidæ (the bear family), by some referred to Viverridæ (the civet family), although their plantigrade character allies them to the former. They are very nearly allied to the raccoons, and, like them, are exclusively American. They are remarkable for the long snout, which is a sort of flexible proboscis, and is employed in rooting up the earth to obtain worms and insects. They are often domesticated in South America.

The coati-mondi (*Nasua narica*) or solitary coati is considered by many naturalists to be the only species of the genus, while others reckon at least five species. The coati-mondi is a native of Brazil, Mexico, and the intermediate countries. It is often seen in menageries.

Coat'icook, a post-village and port of entry of Barnston township, Stanstead co., Quebec (Canada), on the Grand Trunk Railway, 26 miles N. of Island Pond, Vt. It has a weekly paper. Pop. about 2000.

Coat-of-Arms, in the Middle Ages, was a coat worn by princes and great barons over their armor. It was made of cloth of gold or silver, of fur or of velvet, and bore armorial insignia. The "coat-of-arms," as understood by heraldry in the present day, is nothing more than a relic of the ancient armorial insignia. (See HERALDRY, by REV. B. R. BETTS.)

Coat-of-Mail, in the armor of the Middle Ages, was a suit formed of metallic scales or rings linked to each other. (See ARMOR.)

Co'balt, a hard white metal of sp. gr. 8.5 to 8.9, with a granular fracture, quite malleable at red heat, attracted by the magnet, and even capable of receiving weak magnetic power when rubbed with a magnet, though arsenic destroys this property. It is unalterable in air and water at ordinary temperatures, though at red heat it decomposes water. The metal was first obtained in an impure state by Brandt in 1733, but the ores had already been used since the middle of the sixteenth century for imparting a blue color to glass. Their use was apparently known to the Greeks and Romans, as some of their pigments have been found to contain cobalt. The name is derived from the German word *Kobold*, an "evil-minded sprite," the miners believing that the presence of ores which were heavy and had a metallic lustre, but were, so far as they knew, of no value, containing no copper or silver, was due to his influence. Before their value was discovered the ores were used in Hesse for repairing roads.

Ores of cobalt are found in various parts of the world, though they are never very abundant. They are almost invariably associated with nickel compounds, and the metal is generally united with arsenic and sulphur. The principal supplies come from Schneeberg, Saxony, from Westphalia, Bohemia, Hesse, and Cornwall, England, though they occur in other localities. Mine La Motte, Mo., the Gap mine in Pennsylvania, Chatham, Conn., and mines on the N. shore of Lake Superior have furnished some cobalt.

The principal minerals in which cobalt occurs are *smaltite*, or smaltine, gray cobalt or tin-white cobalt, an arsenide of cobalt; *cobalt glance*, or cobaltine, the sulpharsenide; *cobalt bloom*, or erythrine, the hydrated arsenate; *earthy cobalt*, or asbolan, also called black oxide of cobalt, a combination of the oxide with iron and manganese oxides, found in several places in Europe, as well as in Missouri; *cobalt vitriol*, or bieberite, an impure sulphate

found in the rubbish of some old mines; *syepoorite*, the sulphide, occurring in North-western India, and used by the Indian jewellers to give a rose color to gold. The first two being the more common, are used for the manufacture of smalt and zaffre. Cobalt also occurs incidentally in some nickel minerals, in selenide of lead, cerite, and in Flemish coal. The metal is nowhere found native, except in some meteorites, some of which have been found to contain from 0.1 to 1 per cent.

The metal may be reduced from its oxide by heating in a current of hydrogen. If the heat has been too low, the cobalt is pyrophoric, and burns with a red flame when brought in contact with the air. It forms several oxides, of which the most important are the protoxide, CoO, and the sesquioxide, Co_2O_3, both of which give a series of salts. The highest oxide, CoO_2, has not yet been isolated. Cobalt combines with arsenic or antimony, giving brittle gray products. It also alloys with gold and silver, a small amount of cobalt rendering those metals quite brittle. In the case of gold one sixty-fifth part is sufficient to cause brittleness. With tin it gives a ductile alloy of a violet color. With mercury it forms an amalgam which is magnetic. The alloy with iron is extremely hard.

Cobalt salts are prepared by extracting the roasted ore with an acid, precipitating out the arsenic by means of sulphuretted hydrogen or by an iron salt, and then precipitating out the cobalt by means of chlorine water, which converts it into sesquioxide, or by the use of nitrite of potassa, filtering and dissolving. The chloride is used as a sympathetic ink. The writing, which is an extremely pale pink color, almost invisible, becomes blue when the water of hydration is removed by heat; but it gradually absorbs water and disappears again. The presence of nickel salts gives a greenish cast to the lines. In the arts the compounds of cobalt are applied for coloring either as pigments or enamels. The principal preparation is *smalt*, or azure blue, which is a double silicate of cobalt and potassium, prepared by fusing the roasted ore with carbonate of potassium and clean white quartz sand. The nickel, arsenic, and other impurities settle to the bottom, forming what is termed by the workmen a "speiss." The glass is poured off into water, then ground, and elutriated. The coarser qualities are called "blue sand," and contain some arsenic. The best quality contains little or no arsenic, and is known as "king's blue." The color is very intense, one part of oxide of cobalt being sufficient to give a decided color to 250 parts of glass. The presence of nickel seriously affects the color. It is stated that the manufacture of artificial ultramarine has nearly driven smalt from the market. Smalt is sometimes adulterated with ultramarine; the fraud may be detected by the addition of an acid to the article, which causes a change in the color of the ultramarine, and the development of sulphuretted hydrogen.

Zaffre, zaffer, or safflor is the roasted ore mixed with twice its weight of quartz sand. It is used for coloring glass, enamels, and pottery glaze. The well-known willow-pattern plates are colored by this substance. *Thénard's blue*, or cobalt ultramarine, is a pigment obtained by calcining phosphate or arseniate of cobalt with alumina. *Rinman's green*, or cobalt green, consists of the mixed and ignited oxides of zinc and cobalt; it is also used as a pigment. *Cobalt yellow*, another pigment not very generally used, is the yellow precipitate obtained by treating the solution of a cobalt salt with nitrite of potassa. A combination of the oxides of iron, cobalt, and manganese is also used to give a black coloration to glass.

In the laboratory cobalt is recognized by the brilliant blue color which it imparts to a bead of borax glass.

C. F. Chandler.

Cobalt-Bases, Ammoniacal, a series of bodies which contain the elements of ammonia, NH_3, united with cobalt or oxide of cobalt, and which form salts with salt radicals, Cl, Bi, I, and with acid radicals, SO_3, SO_4, CO_3, NO_3, CrO_3, etc. (See Watts' "Dictionary of Chemistry," i., 1057; "Journal pour Chemie," lxxii., 209; and a paper by Gibbs and Genth, published in the "Smithsonian Contributions to Knowledge," 1856.)

Coban', or **Ve'ra Paz,** a city of Central America, in Guatemala, is the capital of the department of Vera Paz, and on the Rio Dolce, 64 miles N. of Guatemala. It is situated on a hill in a fertile table-land. It is a Dominican mission, and was once the centre of their activity. On every street corner is a chapel with a crucifix. The chief church is very large, but falling into decay. Pop. 12,000.

Cobb, a county in the W. N. W. of Georgia. Area, 450 square miles. It is bounded on the S. E. by the Chattahoochee River. The surface is hilly. Kenesaw Mountain in this county rises 1828 feet above the level of the sea. Cotton, wool, corn, and wheat are raised. Gold, silver, copper, and granite are found here. It is intersected by the Western and Atlantic R. R. Cap., Marietta. P. 13,814.

Cobb (David), a soldier of the Revolution, born at Attleborough, Mass., Sept. 14, 1748, graduated at Harvard (1766), practised medicine for many years, was a lieutenant-colonel in the Continental army, member of Congress from Massachusetts (1793–95), was for many years a judge of common pleas, and lieutenant-governor in 1809; he resided for many years in Maine. Died April 17, 1830.

Cobb (Howell), an American lawyer and Methodist preacher, born in Georgia in 1795. He has written much, including a work on legal forms (1845) and a compilation of the penal laws of Georgia.

Cobb (Howell), an American Democratic politician, born in Jefferson co., Ga., Sept. 7, 1815. He was elected a member of Congress in 1843, 1845, and 1847. In 1849 he was chosen Speaker of the House of Representatives. He became governor of Georgia in 1851, and was appointed secretary of the treasury by President Buchanan in 1857. He resigned near the end of 1860, and was president of the Congress of secessionists which met in Feb., 1861. In the civil war he was a major-general of the Confederate army. Died suddenly in New York City Oct. 9, 1868.

Cobb (Joseph Beckham), a son of T. W. Cobb (see below), born in Oglethorpe co., Ga., April 11, 1819, was the author of novels and other works, among which are "The Creole" (1848) and "Leisure Hours" (1858). Died Sept. 15, 1858.

Cobb (Sylvanus), D. D., a Universalist minister, born in Norway, Me., in 1799, was the author of a "Commentary on the New Testament" and other works, and editor of a denominational newspaper for twenty years. Died in East Boston, Mass., Oct. 31, 1866.

Cobb (Sylvanus, Jr.), a son of the preceding, born in Waterville, Me., in 1823, has written many popular tales for the "New York Ledger" and other papers.

Cobb (Thomas R. R.), General, a brother of General Howell Cobb (see above), born in Jefferson co., Ga., in 1820, had a high reputation as a lawyer and author of legal works. He was a member of Congress and general of the army of the Confederate States, and was killed at the battle of Fredericksburg, Va., Dec. 13, 1862.

Cobb (Thomas W.), a lawyer, born in Columbia co., Ga., in 1784, was a member of Congress from Georgia (1817–21 and 1823–24), U. S. Senator (1824–28), and a State judge (1828–30). Died Feb. 1, 1830.

Cobb (Williamson R. W.) was born in Ray co., Tenn., in 1807. He began business as a peddler of clocks, but his political talents brought him in the House in 1844, and to Congress in 1847. In 1863 he was elected to the Confederate Congress, but did not take his seat. He died by accident Nov. 1, 1864.

Cobbe (Frances Power), a rationalistic writer, was born in Dublin in 1822. In early youth she was much troubled with religious doubts. "As she was one day musing on the great problem of existence, she said to herself that although she knew nothing of God or of any law beyond her own soul, she would at least be true to that, and merit the approbation of her own conscience. This resolution, we are told, brought almost immediately a renewed faith in God." She afterwards read with great interest the writings of Theodore Parker, whose views on all essential points she appears to have cordially adopted. Among her numerous works may be named "Intuitive Morals" (London, 1855), "Broken Lights," and "Dawning Light." She has also edited a complete edition of Parker's works.

Cob'bett (William) was born at Farnham, in Surrey, Mar. 9, 1762. He enlisted in the army, served eight years in America, and returned to England in 1791. Having obtained a discharge from the service, he emigrated to the U. S. in 1792, and settled in Philadelphia, where he edited a Federalist paper called "Peter Porcupine's Gazette." He returned to England in 1800, and began to issue in London, in 1802, "The Weekly Political Register," which was at first a Tory paper, but gradually changed and became a strenuous opponent of Pitt and an advocate of radicalism. He was prosecuted for libel, and sentenced in 1810 to imprisonment for two years. He continued to publish the "Register" until his death. Among his popular works are "Rural Rides," "Cottage Economy," and "Advice to Young Men and Women." In 1832 he was elected a member of Parliament for Oldham. Died June 18, 1835. He was a vigorous writer, and distinguished for his common sense. (See "Life of Cobbett," Philadelphia, 1823.)

Cob'bold (Thomas Spencer), M. D., F. R. S., F. L. S., an English scientist, born May 26, 1828, was educated at Edinburgh. He is distinguished for his original investigations in helminthology.

Cobbs (Nicholas H.), D. D., Protestant Episcopal bishop of Alabama, born in Virginia in 1796, was ordained

deacon in 1824, priest in 1825, and became bishop in 1844. Died Jan. 11, 1861.

Cob'den (RICHARD), an eminent English statesman, born at Dunford, near Midhurst, in Sussex, June 3, 1804, was a son of a poor farmer who owned a small estate. He learned mercantile business in the warehouse of his uncle in London, and became a partner of a firm of cotton manufacturers in Manchester. Between 1834 and 1838 he travelled in Egypt, Greece, France, and the U. S. In 1837 he offered himself as a candidate for Parliament in the borough of Stockport, but was not elected. He advocated free trade, and was the most prominent member and orator of the Anti-Corn-Law League, formed in 1839. In 1841 he was returned to Parliament for Stockport. He spoke against the corn laws in Parliament and in many public meetings. As a parliamentary orator he was distinguished for his extensive information and cogency of reasoning. He was a man of sound judgment and uncommon energy. After the corn laws had been repealed in 1846, Sir Robert Peel acknowledged that Mr. Cobden was entitled to more credit for this reform than any other man. In 1847 he was chosen to represent the West Riding of Yorkshire. He was one of the leaders of the Manchester party or school, which advocated electoral reform, a pacific foreign policy, and non-intervention in foreign quarrels. He was defeated in the election of 1857, because he opposed Lord Palmerston's Chinese policy. In 1857 he revisited the U. S., and was elected a member of Parliament for Rochdale. Lord Palmerston in that year offered him a seat in the cabinet as president of the board of trade, but he declined it, because he disapproved the foreign policy of Palmerston. He negotiated in 1860 an important commercial treaty with France in the interest of free trade, which increased the commerce between the British and French dominions. He was one of the few British statesmen who sympathized with the Union cause in the American civil war. Died April 2, 1865. (See J. GARNIER, "R. Cobden, les Ligueurs et la Ligue," 1846; J. MCGILCHRIST, "Life of Richard Cobden," 1865.)

Cob'ham, a township and village of Surrey co., Va. Pop. 2110.

Cobi'ja, or **Puerto de la Mar** (*i. e.* the "seaport"), a town of Bolivia, in the department of Atacama, is on the Pacific Ocean; lat. 22° 34′ S., lon. 70° 21′ W. It is the only legal seaport of Bolivia, but it is a very small place, and has little trade, being cut off from the interior by the desert of Atacama. Pop. 2380.

Cob'leigh (NELSON EBENEZER), D. D., LL.D., a divine, educator, and journalist of the Methodist Episcopal Church, was born in Littleton, N. H., Nov. 24, 1814, graduated at the Wesleyan University, Conn., in 1843, was elected professor in McKendree College, Ill., 1853, professor at Lawrence University, Wis., 1854, president of McKendree College 1858, editor of "Zion's Herald," Boston, Mass., 1863, president of East Tennessee Wesleyan University, Athens, Tenn., 1867, and editor of the "Methodist Advocate," Atlanta, Ga., 1872. He is author of numerous and able reviews.

Cob'lentz (anc. *Confluentes* or *Confluentia*), a fortified city of Rhenish Prussia, is finely situated at the confluence (whence its name) of the Rhine and the Moselle, 50 miles S. S. E. of Cologne, with which it is connected by a railway. The Rhine is here crossed by a bridge of boats 485 yards long, and the Moselle is crossed by a stone bridge. Here are handsome churches, a Catholic gymnasium, a palace, and an old castle of the electors of Treves. The church of St. Castor was commenced about 836 A. D. Coblentz is a free port, and has an active trade in wine, grain, etc.; also manufactures of cotton and linen fabrics and japanned wares. On the opposite side of the Rhine is the strong fortress of Ehrenbreitstein. Coblentz is said to be the strongest place in the Prussian dominions. Pop. in 1871, inclusive of Ehrenbreitstein (2504) and the garrison (6331), 33,363.

Co'bles, a township of Alamance co., N. C. Pop. 875.

Cob'leskill, a post-village of Schoharie co., N. Y., on Cobleskill Creek and the Albany and Susquehanna R. R., 45 miles W. of Albany. It has a national bank and one weekly newspaper. Pop. 1030; of Cobleskill township, 2847.

Cob-Nut, the name given to different varieties of the cultivated hazel-nut. In the West Indies the name cob-nut, also called hog-nut, is given to the fruit of *Omphalea triandra,* a tree of the natural order Euphorbiaceæ. A white juice is obtained from the tree which turns black in drying, and in Guiana is used instead of ink. The fruit is a 3-celled capsule, each cell containing one nut, which, if the embryo is retained, has cathartic properties, but after its extraction is wholesome and palatable.

Cob'oconk, a post-village of Victoria co., Ontario (Canada), is the present N. terminus of the Toronto and Nipissing Railway, 87 miles N. by E. of Toronto.

Co'bourg, a port of entry and capital of Northumberland co., Ontario (Canada), on Lake Ontario and on the Grand Trunk Railway, 69 miles E. by N. of Toronto, and is the S. terminus of the Cobourg Peterborough and Marmora Railway. It has a good and commodious harbor, and has regular lines of steamers to many of the principal lake and river ports of Canada and the U. S. The town is finely laid out, well built, and lighted with gas. Among the finest buildings are Victoria Hall, owned by the county, and Victoria College (Wesleyan Methodist), connected with Victoria University. Cobourg has manufactures of woollen goods, railway carriages, castings, lumber, beer, etc., and exports lumber, provisions, flour, and iron ore. It has three weekly papers. Pop. in 1871, 4442.

Co'bra de Capel'lo [a Portuguese term signifying "hooded snake"], the name of a venomous serpent, sometimes applied to other species of the genus *Naja,* of the family Viperidæ, though it is more usually limited to the *Naja tripudians,* a native of the Indies, the most venomous of known reptiles. Other species of *Naja* are found in the warmer parts of Asia, Africa, and Australia, and in the East Indian Islands. The term cobra de capello is derived from a singular faculty possessed by these snakes of expanding and elevating the skin of the back of the neck into the resemblance of a hood. This phenomenon is shown when the creature is angry or excited, and is produced by the structure and action of the skeleton, as well as of the skin and muscles. The back of the hood is usually ornamented with two eye-like spots joined by a curved dark stripe, the whole resembling a pair of spectacles; hence it is often called the "spectacle snake." The color of the cobra is not uniform; some are brownish olive, having the spectacles white, edged with black. Another variety has cross-bands of black. Specimens without spectacles have been found in Java, Borneo, and other islands. The cobra attains a length of from three to five or more feet. It is sluggish in its habits, and easily destroyed. It feeds on lizards and other small animals. Its venom is secreted by two large glands in the head, and is extremely powerful, often causing death in two hours or less. This poison, though generally fatal if introduced through a wound, is said to be harmless when taken into the stomach. The only successful treatment is immediate excision or thorough cauterization of the wound, but Fayrer believes that artificial respiration will save many cases. The cobra, together with other serpents, is an object of worship among many of the Hindoos. It is asserted that thousands of people perish annually in British India from the bite of this reptile, and the government now pays a bounty for the destruction of this and other dangerous serpents.

Cobra de Capello.

Co'burg [Lat. *Melocabus*], a town of Central Germany, in the duchy of Saxe-Coburg-Gotha, is on the river Itz and on the railway from Dresden to Munich, 26 miles N. of Bamberg. It is one of the residences of the duke of Saxe-Coburg-Gotha, and is the seat of all the high courts of the duchy. It has a ducal palace with a library of 26,000 volumes, a theatre, an observatory, an evangelical gymnasium, and a large arsenal. On a hill 500 feet high is an old castle in which Luther was concealed in 1530. Here are manufactures of cotton, linen, and woollen fabrics, etc. Pop. in 1871, 12,819.

Co'ca, the leaves of a shrub (*Erythroxylon Coca*) of the order Erythroxylaceæ, a narcotic and stimulant used by the inhabitants of Peru, Brazil, and Bolivia, and especially by the Indians of Ecuador and of the Peruvian Andes. The leaves are chewed with a little unslaked lime or alkaline ashes. The effects resemble those of opium, although less narcotic; it dilates the pupil of the eye, while opium contracts it. It lessens the desire for food, and enables the person who uses it to endure greater and more protracted exertion than he otherwise could, and with less food. It possesses the remarkable property of preventing the difficulty of respiration common in the ascent of great elevations. Used in excess, it weakens the digestion, produces various disorders, and finally impairs both body and mind. It is supposed that about 30,000,000 pounds of the dried leaf are consumed in a year, about 10,000,000 of the human race habitually using it. Its

powers are believed principally to depend upon an active principle called cocaïne.

Co′caïne ($C_{16}H_{19}NO_4$?), an alkaloid extracted from coca leaves. It crystallizes in colorless, odorless prisms, having a slightly bitter taste, and resembling atropine in its properties.

Cocce′ius (Nerva), an eminent Roman jurist, was a grandfather of the emperor Nerva. He was elected consul in 22 A. D. His learning is highly extolled by Tacitus. Died about 33 A. D.

Cocce′jus, Cocceius, or **Cock** (Johann), an eminent German theologian, born at Bremen Aug. 9, 1603. He was professor of Hebrew at Franeker from 1636 to 1650, when he became professor of theology at Leyden, where he died Nov. 5, 1669. He wrote commentaries of great learning and ability on nearly the whole of the Old Testament, but is best known as the founder of the so-called "Federal School" in theology. His doctrine of the covenants of works and grace is drawn out in the treatise "Summa Doctrinæ de Fœdere et Testamento Dei" (1648; 2d ed. 1653).

Coccejus (Samuel), Baron, a German statesman, son of Heinrich Coccejus, born at Heidelberg in 1679, became in 1727 Prussian minister of state, and in 1746 chancellor. He was the author of a new code of laws ("Codex Fridericianus," 1747–50). Died in 1755. (See Trendelenburg, "Friedrich der Grosse und sein Grosskanzler Samuel von Coccejus," 1863.)

Coc′cius (Ernst Adolf), a prominent German oculist, born Sept. 19, 1825, at Knauthain, near Leipsic, became in 1849 lecturer at the University of Leipsic; established in 1857 a clinical institution of eye-diseases, of which he was the director until 1867. He wrote numerous works, all of which are regarded as important contributions to opthalmological literature.

Coc′co Root is the product of plants of the nearly-allied genera *Colocasia* and *Caladium*, of the order Araceæ, cultivated in tropical countries for their flat corms, which abound in starch, and are used as food after being roasted or boiled to remove the acridity. The above names strictly belong to *Colocasia antiquorum*, a stemless plant with ovate leaves, and flowers enclosed in a cylindrical ereet spathe. *Colocasia esculenta* is a much-cultivated plant of tropical America. *Colocasia macrorrhiza* is the taro of the South Sea Islands. *Colocasia Himalensis* forms the principal food of many of the inhabitants of the Himalaya Mountains.

Coccos′teus [from the Gr. κόκκος, a "berry," and ὀστέον, a "bone," alluding to the prominences on its bony armor], the name of a genus of fossil ganoid fishes of the Devonian measures. Eight species have been found in Scotland. It was allied to the *Cephalaspis*, but differed in having, in addition to the bony helmet of that genus, a cuirass covering the dorsal and ventral aspects of the body as far as the origin of the dorsal fin, from which to the tail—more than one-half the length of the animal—all seems to have been without the protection even of a scale.

Coc′culus In′dicus, the very poisonous seed of the *Anamirta Cocculus*, a beautiful climbing plant of the order Menispermaceæ. The seed is brought from the East Indies, and is sometimes used for medicinal purposes, and illegally in the preparation of malt liquors. It possesses acrid and intoxicating qualities. It is used for stupefying fish, that they may be taken by the hand; in some of the U. S. this practice is forbidden by law. An ointment made with it is very efficacious for ringworm. It contains a poisonous principle, called Picrotoxine (which see), while the pericarp contains another called menispermin, equally poisonous. It imparts to beer a bitter taste, and at the same time an apparent richness, but renders it very deleterious in its effects.

Coc′cus [from the Gr. κόκκος, a "berry," so called because some species of the insect were formerly supposed to be the seed of a plant], a genus of insects of the order Hemiptera, allied to the aphis family, although very distinct. The Coccidæ are sometimes called "scale insects" and gall insects, but they are not to be confounded with the gall-flies (Cynipidæ). They are very numerous, and are attached to plants, on the juices of which they feed, often producing much mischief by their punctures, and giving great trouble to gardeners. Various washes of soap, sulphur, tobacco, etc. are employed to destroy them, but moist heat, or as much exposure to steam as the plant can bear, has been found in many cases efficacious. The destructive coffee-bug belongs to this family. The male Coccidæ have only two wings, which shut horizontally upon the body; the abdomen is terminated by two threads. The females are wingless; they have a beak, which they insert into plants to suck their juices. This interesting family contains not only many troublesome species, but some which are of great value for the beautiful dyes which they yield. Among them are Cochineal (which see) and kermes. Other species produce lac and wax.

Cocentay′na, a Spanish town, in the province of Alicante, 30 miles N. of Alicante. It is ill built, but has considerable manufactures of cloths, taffetas, etc. Pop. 7369.

Cochabam′ba, a department of Bolivia, S. of Chuquisaca, in the centre of the republic. The climate is healthful and spring-like. The soil is exceedingly fertile and rich in manifold products. So abundantly do cereals grow that it has been called the granary of the republic. Area, 26,803 square miles. Cattle and horses are plenty. The noble metals are found, but in smaller quantities than elsewhere. Pop. 319,892.

Cochabamba, sometimes called **Orope′sa,** a city of Bolivia, capital of the department of Cochabamba, is about 150 miles N. N. W. of Chuquisaca, and 8440 feet above the level of the sea. The city was founded in 1565. The houses are mostly one story high, well built, and surrounded by gardens. The trade is large. It has fifteen churches, and some manufactures of cotton. Pop. 40,678.

Cochec′ton, a township and post-village of Sullivan co., N. Y. The village is on the Erie R. R., 106 miles S. E. of Owego. Pop. of township, 1490.

Co′chin, a rajahship of India, on the Malabar coast, is bounded on the S. W. by the ocean, and on several sides by Travancore and Malabar. It is in the presidency of Madras. Area, 1988 square miles. The climate is very wet. Here are extensive forests of teak and other trees. Rice, pepper, ginger, yams, and sweet potatoes are among the productions of the soil. Chief town, Cochin.

Cochin, a seaport-town of Hindostan, in the district of Malabar, was formerly the capital of the above country. It is situated at the entrance of an extensive backwater or lagoon, 80 miles S. S. E. of Calicut. The lagoon, which is nearly 120 miles long, and is navigable, affords valuable facilities for communicating with the interior. Cochin has great natural advantages for trade and shipbuilding. The Jews, of whom there are many both of the white and black castes, have a synagogue, almost the only one in India. It is also a Roman Catholic episcopal see. Here the Portuguese erected in 1503 their first fort in India. They were expelled from Cochin by the Dutch in 1663. The town was ceded to the British in 1814. The chief articles of export are teak-timber, cardamoms, coir, etc. Pop. 20,000.

Cochin-China. See Anam, by Prof. A. J. Schem.

Coch′ineal [Sp. *cochinilla*, originally the name of the coccus insect used in dyeing; see Kermes], a substance used in dyeing crimson and scarlet and in the preparation of the colors carmine and lake. It consists of the bodies of the females of the *Coccus cacti*, which feeds on plants of the cactus family, particularly on the cochineal plants (*Opuntia cochinillifera*, *Hernandezii*, and *Tuna*), nearly allied to the prickly pear. It is a native of the warm parts of America, and is cultivated for the sake of the valuable insect which feeds on it. This cultivation was practised by the Mexicans long before the country was known to Europeans. It is now carried on also in parts of the West Indies and Peru, and in the Canary Islands, where it forms a very important article of commerce with Europe and the U. S. The cochineal insect is very small, a pound of cochineal being calculated to contain not less than 70,000 in a dried state. The male is of a deep-red color and has white wings. The female is wingless, and of a deep-brown color, covered with a white powder, flat beneath, convex above. The cultivator procures branches laden with the insects, and keeping the branches till the mother-insects have laid their eggs, he places their bodies, with the eggs, in little nests formed of some cottony substance upon the cochineal plants, and the young insects, when hatched, soon spread over them. The gathering of the cochineal is very tedious, and is accomplished by brushing the branches with some soft brush, such as the tail of a squirrel. The insects are killed by boiling water, by heating in ovens, or by exposure to the sun. They must be quickly killed, to prevent them from laying their eggs, which diminishes their value. When killed and dried, they may be kept for almost any length of time without injury. The coloring principle of cochineal is carminic acid ($C_{14}H_{14}O_8$), known in an impure state as *carmine*, and combined with alumina as *carmine lake*. Cochineal is used for dyeing wool and silk scarlet and crimson. The colors are very brilliant, but not durable. They are easily spotted by water and alkalies. The mordants used are alum, cream of tartar, and tin salt. Revised by C. F. Chandler.

Cochit′uate Lake, of Massachusetts, in Middlesex co., about 18 miles W. by S. from Boston, is the principal source of the water by which that city is supplied. It is nearly three miles long, and has an area of 650 acres. It is connected with Sudbury River by an artificial channel,

through which, at low water, the supply for the city is increased.

Coch'ran (John Webster), an eminent inventor, born at Enfield, N. H., May 16, 1814, removed in 1832 to Boston, Mass., patented in 1833 a steam heating-apparatus, and in 1834 a revolving cannon, constructed on the principle afterwards used in the revolving pistol. He afterwards invented valuable machinery for the curvilinear sawing of timber. He resided in Europe many years, and afterwards returned to the U. S., having acquired wealth and fame by his inventions.

Cochran (William) was a Northern man of Irish descent who settled in Tuscaloosa, Ala., about 1837. He became a law-partner of Gen. Crabb, and acquired a great reputation.

Coch'rane (Sir Alexander Forester Inglis), an English admiral, born April 22, 1758, served with distinction in Egypt and the West Indies, and commanded the English fleet which assisted in taking Washington in Aug., 1814. Died at Paris Jan. 26, 1832.

Cochrane (John), General, born at Palatine, Montgomery co., N. Y., Aug. 27, 1813, graduated at Hamilton College, Clinton, N. Y., in 1831, became a lawyer and removed to New York City in 1846, was a Democratic member of Congress (1856–62), served as a brigadier-general of volunteers (1862–63), and in 1864 was nominated for Vice-President on the Fremont ticket.

Cochrane (John Dundas), Captain, a British naval officer, son of Admiral Sir Alexander Cochrane, called the "pedestrian traveller," was born about 1780. He purposed a journey round the globe, and traversed Russia and Siberia on foot. When he arrived in Kamtchatka he married, and abandoned his original project. He returned by way of Russia to England in 1823, and published a narrative of his travels. Died Aug. 12, 1825.

Coch'ranton, a post-borough of Crawford co., Pa. Pop. 459.

Cocin'ic Acid, or **Cocostearic Acid** ($HC_{13}H_{25}O_2$), the fatty acid of cocoanut oil.

Cock [Fr. *coq*], the male of the common domestic fowl.

Jungle Cock: *Gallus giganteus.*

The name is also applied to the males of many other kinds of birds. The ancients regarded the domestic cock as sacred to Mars. The cock is said to have been the emblem of the ancient Gauls, though the tradition does not rest on authority, and is supposed to have been a mere play of words between the Latin *gallus*, a "cock," and Gallus, a Gaul; the cock was placed, after the Revolution, on the ensigns of France. It is introduced by artists amongst the emblems of our Lord's passion, in allusion to Saint Peter's sin, and for the same reason it is Saint Peter's emblem, as the lion is the emblem of Saint Mark.

There is reason to believe that the domestic fowl is the descendant of more than one recognized species of the genus *Gallus*, all, however, of Asiatic origin. Among these are the *Gallus giganteus*, or Kulm fowl, a large bird of India and the Eastern Archipelago; *Gallus Sonneratii*, a spirited fowl of Hindostan; *Gallus æneus*, *furcatus*, and *bankiva* of the Archipelago, and others; but there is very good reason to believe that they are all of one stock, since the domestic fowl, like the pigeon, has a remarkable tendency to develop strongly marked varieties in breeding.

Cock (Thomas), M. D., a prominent physician of New York, born at Glen Cove, Long Island, in 1802. He distinguished himself by his courage and ability during the yellow-fever season in New York in 1822, and in the epidemic of cholera in 1832. He was a professor in the New York College of Physicians and Surgeons, and an active Christian philanthropist. Died June 14, 1869.

Cockade [Fr. *cocarde*], a ribbon or badge worn on the hat or cap by officers of the army or navy; an appendage to the headdress, worn as a military or naval distinction or as a badge of a party. During the revolution of 1789 the French people generally assumed the tricolored ribbon (red, white, and blue) as a badge of patriotism or the symbol of the new *régime*. The army also wore the tricolored cockade until the Restoration, when the legitimists adopted the white cockade. In England a white rose was the badge of the Stuarts, and became a favorite theme in Jacobite songs after the Stuarts had ceased to reign.

Cock'atoo' [a word derived from the cry of these birds], the name applied to several birds nearly allied to the parrots (of the family Psittacidæ), from which they are distinguished by the greater height of the bill and by the lengthened and rounded tail. In the genus *Plyctolophus* the head is large, and surmounted by a crest of long pointed feathers, with their tips directed forward, which can be expanded like a fan or depressed by the bird. The cockatoos are of generally whitish plumage, often finely mixed with red, orange, and other colors. The name cockatoo is also extended to allied genera, *Cacatua*, *Nestor*, *Calyptorhynchus*, and *Microglossum*. The genus *Microglossum*, to which belongs the giant cockatoo of New Guinea, is remarkable for the structure of the tongue, which is cylindrical, tubular, capable of being greatly protruded, and which terminates in a horny tip. The cockatoos are natives of Australasia

and the Malay Islands. They not only eat fruits and seeds, but the larvæ of insects. None of the cockatoos learn to

White-crested Cockatoo.

speak with fluency. The owl parrot (*Strigops*) and the hairy parrot (*Dasyptilus*) are kindred to the cockatoos.

Cock'atrice [called in Latin *basiliscus* and *cocatrix*], a fabulous monster or venomous serpent, which has been sometimes identified with the basilisk. It was said to be hatched from a cock's egg, and its breath and look were fatally poisonous. The word occurs in the English version of the Old Testament as the name of a venomous serpent.

Cock'burn (Sir Alexander J. E.), Bart., an English judge, born in 1802. He was elected to Parliament as a liberal in 1847, and was appointed attorney-general in 1851. In 1856 he became chief-justice of the court of common pleas, and in June, 1859, lord chief-justice of the court of queen's bench. He was selected by the British ministers to act as an arbitrator of the tribunal which was organized for the settlement of the "Alabama claims" at Geneva, in 1871–72.

Cockburn (Sir George), G. C. B., a British admiral, born April 22, 1772, entered the navy in 1781, assisted in the capture of Washington (D. C.) in 1814, and conveyed Napoleon to St. Helena in 1815. He was a lord of the admiralty from 1818 to 1828. Died at Leamington Aug. 19, 1853.

Cock'chafer, the common English name of the *Melolontha vulgaris*, a European coleopterous insect of the family Melolonthidæ, famous for the ravages which it commits, the winged beetle feeding on the leaves of fruit and forest trees, the grub devouring the roots of pasture-grasses and corn. The cockchafer is an inch in length, of a pitch-black color, with a whitish down, giving a powdered appearance; the grub is an inch and a half long, whitish, with a red head and six legs. The cockchafer does not live long in its perfect state, but it lives nearly four years in the larva form. The female deposits her eggs in the earth. The whole grass of a field has been destroyed in a short time by the grubs, and the beetles themselves strip the trees like locusts. The river Severn is said to have been so filled with their bodies in 1574 that the water-wheels of the mills were clogged; and in 1688 they were so abundant in some parts of Ireland that they hung in clusters on the trees like bees swarming, and the noise of their jaws at work was compared to that of the sawing of timber. This insect does not occur in the U. S., but others of the same family and of similar habits abound.

Cocke, a county of East Tennessee. Area, 250 square miles. It is drained by the French Broad River, and bounded on the S. E. by Iron or Smoky Mountain. The surface is hilly. Tobacco, wool, and grain are produced. It is intersected by the Cincinnati Cumberland Gap and Charleston R. R. Capital, Gorman's Dépôt. Pop. 12,458.

Cocke (John), General, born at Brunswick, Nottoway co., Va., in 1772, was a member of Congress from Tennessee (1819–27), major-general of volunteers in the Creek war (1813), and served as colonel at the battle of New Orleans (1815). Died in Granger co., Tenn., Feb. 16, 1854.

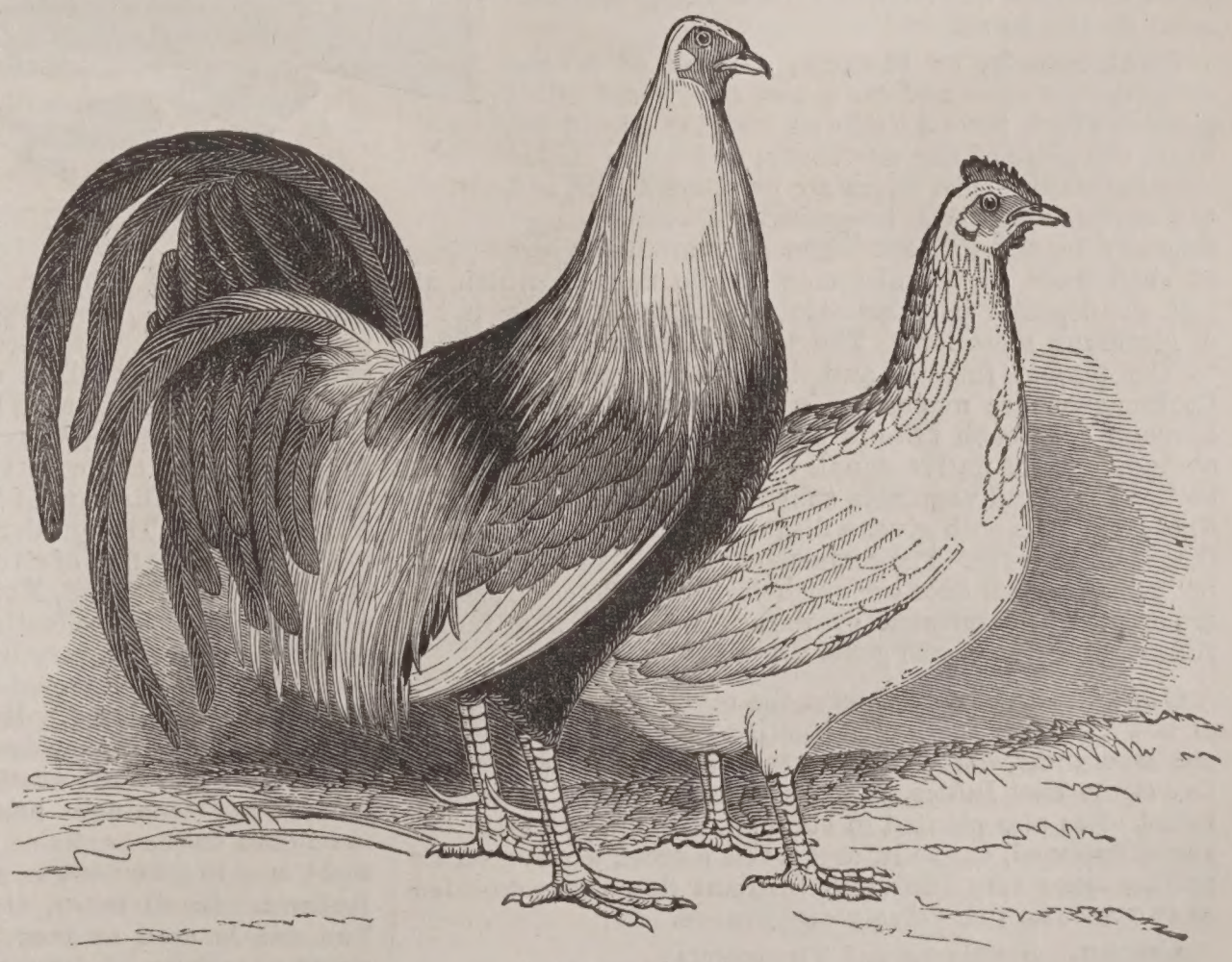
Cock'er, a small spaniel, similar to the Blenheim dog. The small size of the cocker fits it for ranging in coverts, and it is much employed by British sportsmen in pheasant and woodcock shooting; but it cannot easily be trained to wait for the sportsman. It is sometimes called the "cocking-dog," taking both its names from its behavior when game is discovered. It somewhat resembles the setter.

Cock'erill (John), an English engineer and well-known promoter of modern commerce, born in Lancashire Aug. 3, 1790. In 1802 he went to Belgium, where his father had long been employed as a machinist, and in 1816 established at Seraing, near Liége, a large machine-shop, the king of Holland being for a time in partnership with him. He also established coal-mines, iron-mines, and extensive factories in many parts of Europe. In 1839 he failed, and died in 1840.

Cock'ermouth, a town of England, in Cumberland, on the river Derwent, at the mouth of the Cocker, 24 miles S. W. of Carlisle. It is poorly built. Here are the ruins of a castle founded about 1100, and razed by the army of the Parliament in 1648. It has manufactures of cotton and woollen goods, hats, hosiery, and paper. Pop. 5388.

Cock'eysville, a post-village of Baltimore co., Md. It is a station on the Northern Central R. R., 15 miles N. of Baltimore.

Cock-Fighting, a barbarous sport which is said to have originated with the Athenians. It existed in the days of Thomas à Becket, and until the time of the Commonwealth it flourished, a pit at Whitehall having been erected and patronized by royalty. It was prohibited in 1654, but,



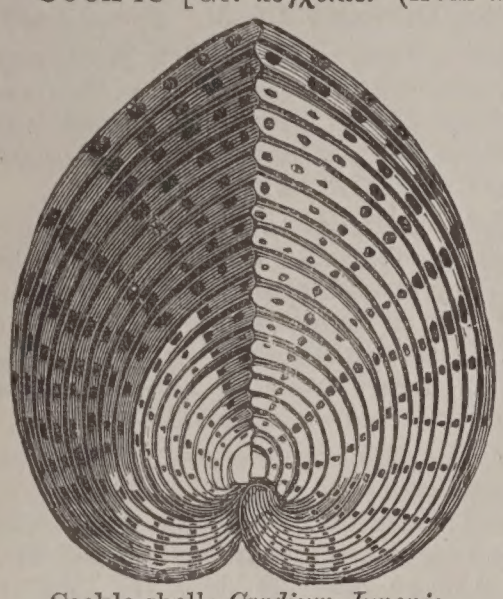
Grey Game Fowl.

though there have been other acts passed with the view of putting it down, it still exists both in England and the U. S. Cocks of the breeds known as game fowl are chosen. These birds often exhibit the highest degree of courage.

Much art is displayed in training and in trimming and preparing the cock for the combat; the fastening on of the

steel spurs or "gaffs" is a matter requiring considerable experience. Young cocks are called stags; two years is the best age. In fighting, a certain number of cocks on either side is agreed upon, and before the match the cocks are shown, and matched according to their weights. The cocks within an ounce of each other in weight are said to "fall in," and are matched for the "main." Those which do not fall in are matched to fight what are called "byes." The main is fought for a stake upon each battle, and so much for the main or the winner of the most battles in the main; while the byes have nothing to do with the main, and are fought for smaller sums. The nations of Spanish origin are especially fond of this sport, which has also been very popular in parts of the U. S.

Cock'le [Gr. κογχύλιον (from κόγχη, a "shell"); Lat. *conchylium*], a name given to various acephalous mollusks, chiefly of the genus *Cardium*. The *Cardium edule*, or common cockle, and other species, constitute an important supply of food in England and other European countries. The species are very numerous, and are chiefly tropical. *Cardium Junonis* is one of the finest species. Several species occur on the Atlantic and Pacific coasts of the U. S.



Cockle-shell: *Cardium Junonis.*

Cock'le, or **Corn-Cockle** [Fr. *coquelicot*], a common name of the *Lychnis Githago*, an annual plant of the order Caryophyllaceæ, a native of Europe. It often occurs as a weed in the wheat-fields of the U. S., and produces black seeds, which are injurious to the appearance and quality of wheat flour. The lobes of the calyx are linear, and longer than the corolla, which is purple-red.

Cock'ney. The origin of this term, applied to a native or citizen of London, is involved in obscurity. In 1517, Henry VIII. made an order with reference to the feast of the King of the Cockneys, held on Childermas Day. The term Cockney School was applied to a literary coterie sisting of Hazlitt, Keats, Leigh Hunt, Shelley, etc.

Cock'pit, in a ship of war, is a room near the after hatchway, under the lower gun-deck. It adjoins the surgeon's cabin and the surgery, contains the medicine-chests for all the crew, and is the place where the wounded men receive surgical treatment during an action.

Cock'roach, or **Roach,** a name of several orthopterous insects of the genus *Blatta* and allied genera, which have a flattened body, the head beneath the plate of the prothorax, and wings folded longitudinally. The elytra are parchment-like, and the wings sometimes imperfectly developed, particularly in the females. The eggs are in a sort of shell fixed to the abdomen of the mother, which at last she deposits in a suitable situation, attaching it by a glutinous secretion. The larvæ are similar in form to the perfect insects, and, like them, very voracious. Cockroaches are numerous in warm countries, and the common cockroach (*Blatta orientalis*) was imported from abroad, but its native country is uncertain. It devours both animal and vegetable substances, and a dark-colored fluid from its mouth gives a disgusting smell to everything that it passes over. The common cockroach is an inch long, but some tropical ones are much larger. The cockroaches are remarkably infested by parasitic insects and fungi. Borax, used freely, will generally drive them away.

Cocks'comb [named from the resemblance of its head of flowers to the comb of a cock], a name applied to various amaranths, but especially to the *Celosia cristata*, native of the East Indies, and a familiar inmate of conservatories, often also planted in borders. Its upright stem becomes flattened, expands, and forms a crest, bearing on its surface many very small and brilliant flowers, so crowded as to present a rich velvety appearance.

Cocoa. See Cacao and Theobroma.

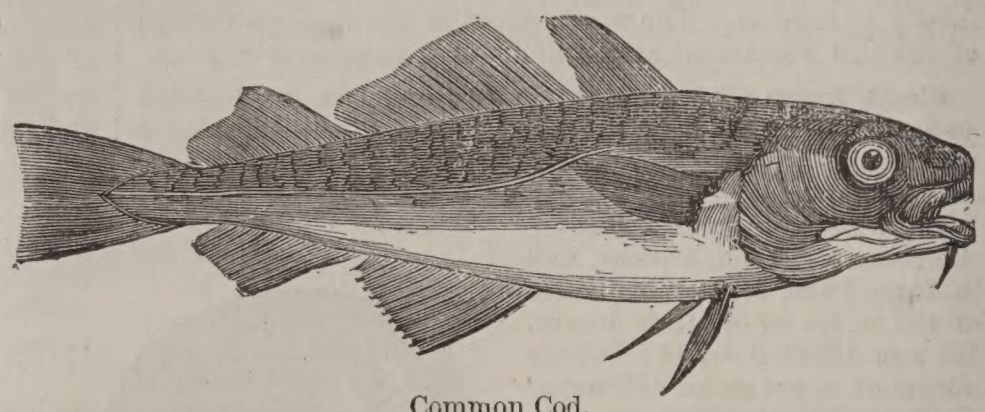
Co'coa-Nut, the fruit of the *Cocos nucifera*, a tree of the order Palmaceæ, which is indigenous or cultivated in nearly all tropical countries. It has pinnate leaves, from twelve to twenty feet long. The trunk or stem is branchless, and grows to the height of sixty to ninety feet, bearing at its summit a crown of leaves. These trees prefer a sandy soil, and are seldom found growing far from the sea, unless they have been planted by man. The thick and hard shell of the nut is well adapted to preserve the seed when it is carried by the waves to some distant shore or sandbank; hence the cocoanut-palm is one of the first large plants that usually appear on a new island of coral formation as soon as sufficient soil has been collected there. It affords a large variety of useful products. The nut, which is an important article of food to the people of tropical countries, is eaten both ripe and unripe. The young unripe fruit contains a pleasant milky fluid, which is used as food and is prepared in various ways. The kernel yields about 70 per cent. of a fixed oil called *cocoanut oil*, which is an important article in the manufacture of stearine candles and marine soap. In tropical countries it is used as lamp oil and as an article of food. It can be separated by compression in the cold into a more liquid portion called oleine, and a more solid part termed cocostearine or cocosine. (See Cocinic Acid and Cocinin.)

The terminal bud (palm-cabbage) of *Cocos nucifera* is edible and is considered a delicacy, but its removal causes the death of the tree, which is sometimes cut down for its sake. The stem abounds in a saccharine sap called "toddy," which is esteemed as a pleasant beverage, either in the state in which it is drawn from the tree, or after fermentation, which takes place in a few hours. From the fermented sap (palm wine) a spirituous liquor called "arrack" is obtained by distillation. The dried leaves of the cocoanut-palm are useful for thatching houses, for making mats and baskets, and for other purposes. The wood of the lower part of the stem is very hard, takes a beautiful polish, is employed for a variety of purposes, and is imported for ornamental joinery under the name of porcupine-wood. The most important fibrous product of this tree is coir, the fibre of the husk of the immature nut. (See Coir.) The shell of the nut is made into cups, ladles, etc., and is often finely polished and elaborately ornamented by carving. The double cocoa-nut is the product of the *Lodoicea Seychellarum*, a palm growing in the Seychelle Islands.

Co'coa Plum, the edible fruit of the *Chrysobalanus Icaco*, a shrub of the order Rosaceæ, growing in the southern part of the U. S. and the West Indies. The fruit resembles a large plum, yellow, purple, or black in color.

Cocoon. See Silkworm and Chrysalis.

Cod (*Gadus morrhua*), a fish of great commercial importance, belonging to the family Gadidæ. The genus is distinguished by three dorsal and two anal fins and a barbule beneath the chin. The cod has been known to reach



Common Cod.

a weight of 100 pounds. The roe of the female is estimated to contain from four to nine millions of eggs, a reproductive power which seems intended to provide for the extensive fisheries which are carried on in the northern parts of the Atlantic and Pacific oceans and in the Arctic seas. The cod is not known in the Mediterranean. It occurs both on rocky coasts and on sandbanks, where the largest are usually caught in depths of from twenty-five to fifty fathoms. The productiveness of the banks of Newfoundland excels that of all other known regions, but the cod-fisheries near Holland, Norway, Iceland, and the north of Scotland are also productive. The cod-fisheries of Alaska promise to become very important. The Dutch and the English engaged in the cod-fishery in the fourteenth century, about the same period. More than 6000 European vessels are employed in it, besides boats along the shores. The fishery is carried on partly by long lines and partly by hand lines. One man has been known to catch from 400 to 550 fish on the banks of Newfoundland in ten hours, and eight men to take 1600 in a day on the Dogger Bank, near Holland. Small fishes, shell-fish, etc. are used for bait. The cod is used as food, either fresh, salted, or dried. Great quantities of dried cod are carried from Newfoundland to the West Indies and the south of Europe. Cod tongues and sounds (or air-bladders) are esteemed a delicacy, and are often salted and sent to market. Several varieties and species seem to be peculiar to the American coasts. The cod-fisheries of the U. S. are principally carried on from Massachusetts and Maine, though the fisheries on the Pacific coast are assuming considerable importance.

Cod'dington (WILLIAM), born in Lincolnshire, England, in 1601, came to Salem, Mass., in 1630, was a merchant of Boston, and fled to R. I. in 1638 in consequence of his defence of Anne Hutchinson and others. He soon became a Quaker and an advocate of liberty of conscience, was elected a judge, and afterwards governor of R. I. (1640–47). In 1651 he was again appointed governor of the island by the Commonwealth of England, but resigned soon. He was again governor (1674–75). Died in Nov., 1678.

Code [Lat. *codex*], a collection of laws made by public authority. In modern law, it more commonly means a methodical arrangement of law, either customary or statutory, in chapters and sections. In a number of the American States the general statutes (see STATUTE) are arranged in this manner under the title of "Revised Laws," "Revised Statutes," or "Codes." How far it is practicable to accomplish useful results in the codification of customary or common law is a subject of much controversy among jurists. On the one hand, it is claimed that as law of this nature can be enunciated or stated, the statement can be reduced to writing in the form of general and particular propositions. It is added, as to the common law of England, that it has been for ages in writing, and that all that is now known of it is derived from written sources such as reports and treatises of recognized authority. The rules there found are susceptible of collation, analysis, and systematic arrangement. The materials thus obtained may be recast by the codifier, and moulded into the form of positive and authoritative statement in *his own language*. True, the judge in deciding a cause states a principle as applied to the particular cause before him; the codifier may seize upon the principle that underlies the specific case, and state it in a positive and precise form. From this mode of collecting and arranging legal propositions it is claimed that a number of benefits will be secured, such as reducing the labor of lawyers, decreasing the size of their libraries, introducing legal reforms by comprehensive legislation, and affording to the public increased opportunities to become acquainted with general rules of law. (See "Report of Civil Code for New York by Commissioners," Albany, A. D. 1855.) On the other hand, it is urged that a code, being inflexible in its character, prevents the true growth of law. Discussions in court will turn upon the construction of *words* used in the code, instead of there being an examination of legal principles. The interpretation of specific words is to the last degree attended with uncertainty. Leading inquiries concerning the great statute of frauds passed in the reign of Charles II. are still regarded in the courts as open to consideration. This objection is truly formidable. Where customary law prevails, little if any attention is paid in the decision of causes to the particular language in which the court in a former case cited as a precedent expressed its views. The principle of the decision is seized upon and stated in perhaps wholly different words. The arguments applied to the construction of statute or codified law must, from the nature of the case, be in the main textual criticism. There must be interpretation of particular words, reconciliation of discordant phrases, and minute consideration of mere forms of expression. While a rule of law is in process of formation discussions as to its true principle should be as free and unfettered as possible until, after a long interchange, and perhaps collision, of opinions, the true rule is evoked, with its various qualifications and limitations. This process, so beneficial in its character, could not be made available if the rule in its early stages had already been hardened into fixed forms of statute law. Mr. Austin, in his great work on jurisprudence, though from the bent of his mind inclined to favor codification, sees the great difficulties attending it in its more perfect forms, and suggests that the work can only be accomplished successfully, if at all, by lawyers of the very highest ability and most comprehensive views, for no others can see the full scope of the subject and draw the needful sections. It may be added that in a country like our own, where legislation is fluctuating and often inconsiderate, there would be great danger, even though a well-devised code of laws were once introduced, that its symmetry would shortly be marred and the coherence of its provisions broken up. No argument for a code in the modern sense can be derived from the work of Justinian on the Roman law. The "Pandects," the great body of the Roman law, is, in the main, a mere collection of extracts from distinguished writers in *their own language*, and which had already become settled law. The "Institutes" are substantially a bare reproduction of a well-known work of Gaius, a distinguished Roman jurist. Besides, the development of the Roman law was different in some respects from our own. In that system much was made of the opinions of text-writers, while nearly the whole development of English jurisprudence has taken place through the medium of adjudged cases or "case law." The true method of growth would seem to be that the courts should render decisions, while text-writers of ability should collect them, arrange the principles in a scientific manner, criticise them when faulty, and call the attention of the courts to needful improvement. By the work thus done law will make a steady progress, and adapt itself to the wants of the community. Radical changes must be produced by legislation. It is in vain to hope that a code will reduce libraries or make thorough study unnecessary. Jurisprudence will take on an historical form, for courts must apply the code to specific cases, and a body of case law will soon grow up, the roots of which will be sought in the past as heretofore, and its results modify the code itself, just as great masses of case law collect around an instrument so brief as the U. S. Constitution. (See also AUSTIN "On Jurisprudence," vol. ii., p. 1129, and POMEROY'S "Introduction to Municipal Law," chap. iii., and the works of Savigny.)

Some of the leading codes may be referred to.

1. *Justinian's Code of Roman Law.*—The word *code* is used here as describing the whole mass of codified Roman law under the order of the emperor Justinian, including the "Code" of that system, the "Institutes," "Pandects," and "Novels." These, taken together, constitute the *corpus juris civilis*, or whole body of civil law. (These will be more fully considered under LAW, CIVIL.) The Theodosian code of Roman law may also be referred to, which is of comparatively little interest. (See "Foreign Quarterly Review," vol. ix., 374.)

2. *French Codes.*—Of these there are five principal ones—the civil code, of civil procedure, of commerce, of criminal procedure, and of criminal law. There are also codes upon special subjects. French codification is largely due to the emperor Napoleon.

3. *Code of Louisiana*, based on the Code Napoleon, and principally prepared by Edward Livingston. It is divided into three books, and is concerned with the civil as distinguished from the criminal law. Mr. Livingston also prepared a draft of a penal code for the State, which was not adopted, as well as one for the U. S. (These are to be found, together with introductory reports explaining the grounds of them, in a work published by the National Prison Association, with an introduction by the late Chief-Justice S. P. Chase, A. D. 1873.)

4. *New York Code of Procedure.*—The object of this is to assimilate law and equity, and to have but one form of action. It assumes to regulate in a general way both pleadings and practice, and to state in a condensed form the general rules. A large body of case law has grown up in connection with the code regulations. The results of these decisions are collected in "Annotated Codes" or in works of practice. The system has been adopted in substance in a considerable number of the States. Commissioners in New York have also reported a political, a civil, and a penal code, which have not been adopted by the legislature.

Mention may also be made of various collections of maritime rules, such as the "Consolato del Mare," "Laws of the Hanse Towns," "Ordonnance de la Marine" (of the time of Louis XIV. of France), "Laws of Oléron," and the "Laws of Wisby," which will be noticed again in connection with maritime law, as well as of the Code of Prussia, etc.

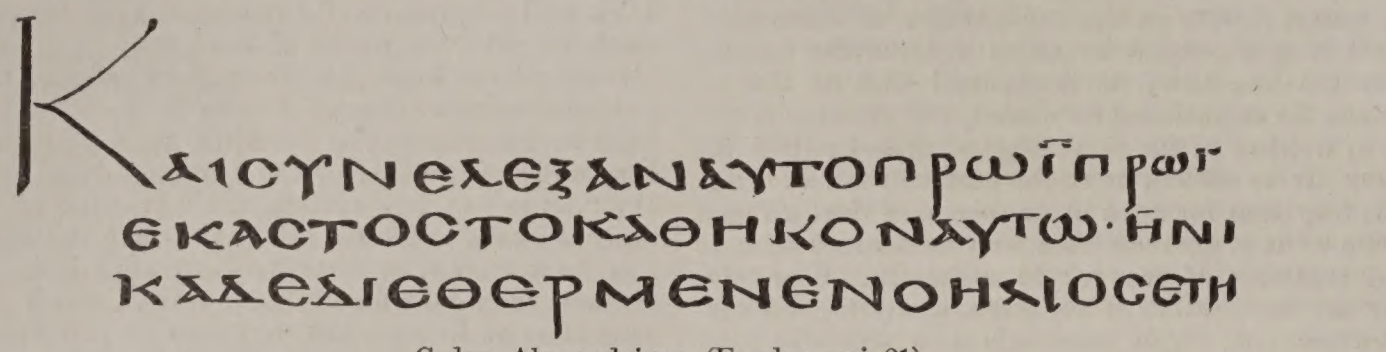
T. W. DWIGHT.

Code'ia [from the Gr. κώδη, a "poppy-head"], ($C_{18}H_{27}NO_3 + H_2O$), one of the alkaloids to which opium owes its hypnotic powers. Its salts are sometimes administered in place of morphia salts. It is asserted that it possesses many of the valuable properties of that drug, without its disadvantages. The dose is much larger than that of morphia. (See OPIUM, by PROF. C. F. CHANDLER.)

Co'dex (plu. **Cod'ices**), [a Latin word signifying the "trunk" or "stem" of a tree; later it was applied to wooden tablets covered with wax, which were used for writing on]. In modern Latin, codex is a manuscript volume, and is especially applied to a manuscript copy of the Scriptures. *Codex rescriptus* is a synonym of PALIMPSEST (which see). Among the most ancient manuscripts of the New Testament are the *Codex Alexandrinus*, the *Codex Vaticanus*, and the *Codex Sinaiticus*.

Co'dex Alexandri'nus, the third in antiquity of the great uncial extant manuscripts of the Bible in the Greek language. (See PALEOGRAPHY.) It contains the Old Testament (in the Septuagint version), with some deficiencies in the Psalms, and all the books of the New Testament, with a few chasms where leaves are wanting. To these it adds the one genuine, and a fragment of the apocryphal, Epistle of Clement of Rome to the Corinthians. The Catholic Epistles follow the Acts; then come the Pauline Epistles, with that to the Hebrews before the Pastoral Epistles; the Apocalypse, which is rare in extant manuscripts, stands at the close of the New Testament.

This codex is now preserved in the British Museum, having been presented to Charles I. in 1628 by Cyril Lucar, patriarch of Constantinople, who had previously been patriarch of Alexandria, from which city he brought the manuscript. It is in quarto form, about thirteen inches high and ten broad, each page being divided into two columns of fifty lines each, having about twenty letters or upwards in a line. It is written on thin, fine, and very beautiful vellum, in uncial (or capital) letters of an elegant yet simple form, and without any space between the words. The punctuation, which is infrequent, consists merely of a point placed at the end of a sentence, usually on a level with the top of the preceding letter; and a vacant place follows the point at the end of a paragraph, the space being proportioned to the break in the sense. The black ink, in which the body of the codex was written, has turned to a yellowish-brown; but the vermilion, freely used in the initial lines of the different books, is still bright. The manuscript bears an ancient Arabic inscription on its margin, asserting that it was written by the martyr Thecla; Tregelles, however, explains the origin of this inscription by remarking that the New Testament in the codex as we have it commences with Matthew xxv. 6, this lesson (Matthew xxv. 1–13) being that appointed by the Greek Church for the festival of Saint Thecla. The Egyptian, therefore, who wrote this Arabic note, observing the name of Thecla on the now mutilated upper margin of the codex, where such *rubrical* notes are commonly placed by later hands, hastily concluded that she wrote the book. But though not by Thecla, it may be that the neat chirography of the codex is due to a female hand, for we know that women as well as men were employed as copyists at Alexandria.



Codex Alexandrinus (Exodus xvi. 21).

Καὶ συνέλεξαν αὐτὸ πρωῒ πρωΐ, ἕκαστος τὸ καθῆκον αὐτῷ· ἡνίκα δὲ διεθέρμενεν ὁ ἥλιος, ἐτή-*

The general consent of palæographers refers this manuscript to the beginning or middle of the fifth century of our era. In the general style of the writing and in the shape of the letters (especially those which furnish the best tests, as *α*, *δ*, *ε*, *π*, *σ*, *φ*, and *ω*), it holds a middle place between copies of the fourth and sixth centuries. There are no accents or breathings, and the contractions of words (as $\overline{\Theta C}$, $\overline{IC}$, $\overline{XC}$, $\overline{\Pi HP}$, $\overline{KC}$, etc., for Θεος, Ιησους, Χριστος, Πατηρ, Κυριος, etc.) are only such as are found in other manuscripts of the more ancient class. Of itacisms (as the interchange of *ι* and *ει*, *η* and *ι*, *ε* and *αι*) it contains no more than others of the same date. The references in the margin to the tables of parallel passages called the "Canons of Eusebius" (A. D. 268–340?), and the insertion, before the Psalms, of the epistle to Marcellinus by Athanasius, patriarch of Alexandria (A. D. 300?–373), prove that the manuscript was not written before the fourth century; while the absence of the so-called Euthalian divisions of the Acts and Epistles into chapters, which came into vogue very soon after 458, and the shortness and simplicity of the *subscriptions* at the end of the books, appear tolerably decisive (says Scrivener) against a later date than about 450. The insertion of the Epistles of Clement points to a period when the canon of Scripture was in some particulars a little unsettled, or about the age of the Synod of Laodicea (363). It appears from the table of contents that the manuscript formerly contained the apocryphal Psalms of Solomon, but these are separated from the other books in the list, as wholly different in kind. This separation conforms to the prohibition of such psalms, at the Synod (or, as it is sometimes called, Council) of Laodicea, from being read in churches.

This manuscript is of great importance to the critic, and exhibits a text more nearly approaching that found in later copies than is read in others of its high antiquity. It is designated, in critical editions, by the letter A. It has been published in elegant style, in *quasi* facsimile, uncial type, bearing a general resemblance to the written characters, having been cast for the purpose, and (what is more important) the edition exhibiting the manuscript page for page, line for line, and letter for letter. The handsome folio volume containing the New Testament appeared in 1786, edited by Charles Godfrey Woide; the four folio volumes containing the Old Testament were edited by Henry Hervey Baber, and published in 1816–28. An edition of the New Testament, in small letter, in which Woide's text has been corrected from the manuscript itself, was published in 1860, edited by B. H. Cowper. The Old Testament has been edited by Field.

THOMAS CHASE.

Co′dex Be′zæ or **Cantabrigien′sis** (designation, D), an uncial manuscript, probably of the sixth century, containing the four Gospels and the book of Acts in Greek and Latin on opposite pages. It was presented to the University of Cambridge in 1581 by Theodore Beza, who obtained it during the French civil wars in 1562, when it was found in the monastery of Saint Irenæus at Lyons. This manuscript has several peculiar features. The Gospels stand Matthew, John, Luke, Mark, an order found also in some of the manuscripts of the Old Latin version. The peculiarities in the text are striking, consisting of interpolations, sentences recast, and occasional omissions. The interpolations had probably been introduced into some still older copy from the margin of another manuscript, where they had been subjoined by some who wished to *add* whatever they could obtain from various sources to make the narrative more full and complete. These additions would be very serious were this manuscript our only record of the original writings; but when they are removed the text which remains is valuable for comparative criticism, and is strongly corroborative of the other most ancient MSS.

The text of this codex, both Greek and Latin, was published by Dr. Thomas Kipling at Cambridge in two handsome folio volumes in 1793, in type cast for the edition, and so wonderfully exact that it possesses nearly all the advantages of an actual facsimile. A more scholarly and accurate edition was brought out in 1864 by F. H. Scrivener. Whiston, who had an extravagant admiration of the manuscript, published an English translation of it in 1745.

THOMAS CHASE.

Co′dex Ephrae′mi, or **Co′dex Ephrae′mi Sy′ri Rescrip′tus** (designation, C), an ancient and valuable palimpsest manuscript of portions of the Greek Bible, preserved in the great library in Paris called by turns National, Royal, and Imperial. It was brought from the East by Andrew John Lascar, a learned Greek patronized by Lorenzo de' Medici, and Catharine de' Medici carried it to Paris. The ancient writing is read with difficulty, having been erased about the twelfth century in order that the vellum might be used for transcribing some Greek works of the Syrian Father Ephraem. The treasure which lay below was first noticed by Peter Alix in the latter part of the seventeenth century. Several readings from the palimpsest were published by Küster in 1710, in his reprint of Mill's Greek Testament. In 1716, Bentley sent Wetstein to Paris to collate the whole manuscript. This work, for which fifty pounds were paid, was performed as far as was then possible. Wetstein told Bentley that it had cost him two hours to read one page. This collation Wetstein used in his own edition of the Greek Testament (1751–52). In 1834 a chemical preparation (*tinctura Giobertina*) was applied to the leaves in order to revivify the ancient writing. But although much that had been illegible was thus brought fully to light, every part of the manuscript was stained and discolored in the process, and some passages made more difficult to read than before. The conquest of all the difficulties which beset the deciphering of this codex is one of the greatest triumphs of Tischendorf. This enthusiastic, patient, keen-sighted, and skilful palæographer occupied himself from December, 1840, till September, 1841, in examining and copying the manuscript for publication, and has given the world the first complete transcript of it; the New Testament portion being published at Leipsic in 1843, the Old Testament in 1845.

Codex C is an uncial manuscript, about the size of Codex A, but written in characters a little larger (Tregelles) and somewhat more elaborate, and with but one column on a page. All its characteristics point to a date as early as the fifth century. Three correctors at least have left on it traces of their work; the earliest may have been of the sixth century, the second (who revised such portions only

* For *διεθέρμαινεν*.

as were used for church lessons or other ecclesiastical purposes) perhaps of the ninth. By him and by the third hand (whose changes are few) small crosses were interpolated as stops, and there are marks of cantillation as guides in intoning. In critical authority Tregelles places this MS. next to the Sinaitic and the Vatican. T. CHASE.

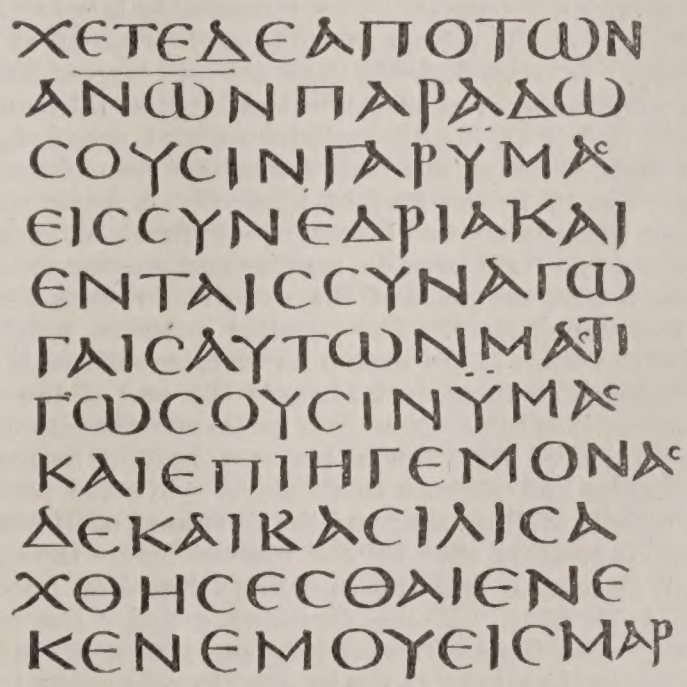
Co'dex Sinait'icus (designated, ℵ *aleph*), the most recently discovered of the uncial manuscripts of the Greek Bible, and inferior to no other in antiquity, authority, and completeness.

In 1844, Constantine Tischendorf—who, although but twenty-nine years old, was already famous as an editor of the Greek Testament and as the decipherer of the Codex Ephraemi—in a journey undertaken in search of ancient manuscripts of Holy Writ, arrived at the ancient Greek convent of Saint Catharine on the range of Mount Sinai. Here he was shown a beautiful codex of the Gospels, the pride of the convent, written upon exquisite white parchment in letters of gold, and adorned with beautiful paintings of the four Evangelists, our Saviour, the Virgin Mary, and the apostle Peter, and said to have been the gift of Theodosius III. From the character of the writing it must date from the seventh or eighth century; but Tischendorf found it very inaccurate, and of slight critical value. Something much more precious than this costly codex had been thrown aside as worthless by the unintelligent guardians of the convent library. In a large basket filled with remains of torn and damaged manuscripts which stood in the middle of the room, Tischendorf found a considerable number of vellum leaves of a Greek manuscript of the Septuagint version of the Old Testament, which his practised eye at once recognized as one of the oldest in existence. The contents of the basket had been destined for the flames, two baskets full of similar materials having been already burned in the stove. Tischendorf easily obtained possession of forty-three sheets, about one-third of the number which he rescued, but was not permitted to take the other portions, nor even to copy more than a single leaf. Unfortunately, he had betrayed the value of the treasure of which the monks had before been so unconscious. Of the portion he obtained he published a lithographic facsimile in 1846, under the name of *Codex Friderico-Augustanus*, in honor of his patron, Friedrich August, the king of Saxony. Of course, Tischendorf was hoping all the time that he should at length obtain the rest of the manuscript. He made proposals for it through a friend whom he had found at the court of the viceroy of Egypt, but only to learn that the monks, having learned its value, would not part with it for any sum of money. In 1853 he visited the monastery a second time, in the hope of being permitted to copy those parts of the codex which he had left behind, but he could gain no tidings of them whatever. He found, however, one trace of the codex—a single shred, in a roll of parchment, containing eleven lines from the first book of Moses. But few years passed before Tischendorf felt impelled for a third time to journey to the East, in the hope of prosecuting his search for ancient copies of the sacred text over a wider field and more fully than before. To facilitate his researches, he succeeded in gaining the powerful patronage and protection of the emperor Alexander II. of Russia, the great champion of the Oriental Orthodox Church, and of his imperial consort. Near the beginning of the year 1859 the enthusiastic scholar presented himself for the third time at the gates of the convent. After repeated calls from below, a door in the convent wall was opened thirty feet above the ground, and a rope let down to receive the letters which the traveller brought. Ordinarily, guests are received through this same door, seating themselves on a cross-piece of wood at the end of the rope, and being then drawn up by the servants of the convent. Tischendorf's credentials procured him a more distinguished reception. In honor of his imperial commission the steward of the convent soon appeared in person, in the name of the prior, and conducted the guest, through a door seldom used, "into the still, friendly asylum." The luggage and the dragoman took the usual journey through the air.

After five days' tarriance, during which Tischendorf had carefully examined the treasures of the library, as well as ascended Mount Sinai, when he was preparing to take his departure, and had sent his Bedouins after the camels, as he was taking a walk with the steward, the conversation turned upon the text of the Old Testament. Returning at twilight to the convent, the steward invited him to partake of a luncheon in his cell, and while they were eating remarked that *he* had here a copy of the Septuagint, thereupon bringing out of a corner of the room a large manuscript, wrapped in a red cloth according to the Oriental custom, which he had brought to his own cell from the library of the *σκευοφύλαξ*, or keeper of the sacred utensils. Glancing at the pile of vellum, Tischendorf soon recognized it as belonging to the same codex of which he had rescued some leaves from the basket of fuel fifteen years before; and, eagerly turning over the different sheets, beheld, to his astonishment, in addition to a large part of the Old Testament, the beginning and the end of the New, and the Epistle of Barnabas. It appears that soon after the original discovery in the waste-basket the monks had found these sheets, and placed them with the fragments which Tischendorf rescued from destruction. The German guest, concealing his emotion, begged the privilege of taking the manuscript to his own chamber; to his unspeakable joy, he found that it contained the New Testament *entire*, whereas all the other manuscripts of the first class (as regards antiquity) are more or less imperfect; and he could not withhold an offering of praise and thanksgiving to that Divine Being who had suffered so valuable a boon for the Church of Christ to come into his hands. The first night he spent in transcribing the Epistle of Barnabas (now found for the first time entire in the original Greek), in spite of a dim lamp and the cold temperature; "indeed, it seemed impious to sleep."

Understanding the aversion of the monks to part with manuscripts in their possession, Tischendorf asked and obtained, after some opposition, permission to copy the whole codex at Cairo, where there were greater facilities for the work than at the convent. With the assistance of two of his own countrymen, with incessant toil he completed his transcript, but he was not able to give his copy that careful revision and comparison with the original without which it would be unfit for publication. At Tischendorf's suggestion the monks were at last persuaded to offer the whole codex as a gift to that great monarch whom they recognized as the shield and bulwark of the Eastern Church; and in a little less than eight months after his discovery of the treasure they committed it to his hands to be borne to St. Petersburg—to be held for a time, however, as a loan made simply to facilitate the publication of an accurate edition, until the confirmation of their new archbishop's election should enable him to present it formally to the emperor, as he afterwards did.

The Codex Sinaiticus is written upon vellum sheets of extreme fineness and beauty, the delicate skins of antelopes or of wild asses (probably the former). It consists of three



Codex Sinaiticus (Matthew x. 17, 18).

-χετε δὲ ἀπὸ τῶν ἀνθρώπων παραδώσουσιν γὰρ ὑμᾶς εἰς συνέδρια, καὶ ἐν ταῖς συναγωγαῖς αὐτῶν μαστιγώσουσιν ὑμᾶς· καὶ ἐπὶ ἡγεμόνας δὲ καὶ βασιλῆς† ἀχθήσεσθαι‡ ἕνεκεν ἐμοῦ, εἰς μαρ-§*

hundred and forty-six leaves, of which one hundred and ninety-nine contain twenty-two books of the Old Testament and Apocrypha in the Septuagint version, beginning

* ΑΝΩΝ is a contraction for ΑΝΘΡΩΠΩΝ.
† For *βασιλεῖς*
‡ For *ἀχθήσεσθε*.
§ An English Bible printed in the same style would read somewhat as follows:

WAREOFMNFORTHEY
WILLDELIVERYOUUP
TOTHECOUNCILSAND
THEYWILLSCOURGE
YOUINTHEIRSYNA
GOGUESANDYESHALL
BEBROUGHTBEFORE
GOVERNORSANDKINGS
FORMYSAKEFORATES

at the first book of Chronicles; while the remaining one hundred and forty-seven present *the whole* of the New Testament, the Epistle of Barnabas, and a part of the Shepherd of Hermas. (To these should be added the forty-three leaves of the Codex Friderico-Augustanus.) It is written in uncial letters of exceeding beauty and simplicity of shape, approaching closely to the forms of the best papyri. Such testing characters as alpha, delta, epsilon, pi, and sigma are as unadorned as possible, without flourishes, knobs, or thickened points at their extremities—a proof of antiquity. It resembles the Vatican Codex in the absence of *initial* letters larger than the rest, which seem to have been regularly used after the beginning of the fifth century. It has but little punctuation, and that in the oldest manner. Its peculiarities of orthography and etymology belong to a period as early as the fourth century of our era. It is conspicuous for the brevity of its titles and subscriptions—*e. g.*, "According to Matthew," "Acts," "To (the) Romans." Longer titles, as "The Holy Gospel according to Matthew" (wrongly translated in our version "The Gospel according to St. Matthew"—*Horne's Introduction*, 3d ed., p. 410), were not introduced until a later date.

It has, moreover, certain other signs of antiquity peculiar to itself. It has always been regarded as one of the striking proofs of the remote age of the Vatican Codex that it is written in three columns on each page, presenting to the eye, when the book is open, six narrow columns at once, thereby the more closely resembling the appearance of the ancient *volumina* or papyrus-scrolls when extended for reading. Just as in the first books printed after the invention of printing many of the peculiarities of the manuscripts were carefully imitated, so when manuscripts began to be written on leaves instead of scrolls, it is natural to suppose that some of the peculiarities of the older form would be retained. A very few other manuscripts have been found with the same number of columns on a page as the Vatican. But the Sinaitic Codex stands *alone* among known manuscripts in presenting *four* narrow columns on a page, seldom exceeding two inches in breadth, and *eight columns* at once when the book is opened; so that its claims to the benefit of this argument for antiquity are the strongest. This fact, with certain other indications, renders it probable that this codex was copied directly from an old Egyptian papyrus manuscript. The remarkably large size and great beauty of the vellum sheets is another proof of high antiquity. In size, indeed, they are the largest known, "each page being even at present as large as thirteen and one-half inches in length by fourteen and seven-eighths inches high, although marginal notes have sometimes been partially cut off by the ancient binder." A single animal could contribute only two leaves, or one sheet, of such unusual size. As time went on, smaller and coarser sheets of parchment took the place of the exquisite vellum used in the oldest manuscripts. The peculiar order in which the books of the Bible follow each other corresponds with what Epiphanius, who flourished towards the end of the third century, testifies to as existing in some manuscripts of his day, and proves that the codex was written before our present order had become established; while the presence of the Epistle of Barnabas and the Shepherd of Hermas is a strong indication that it was written before the age of Cyril of Jerusalem and the so-called Council of Laodicea (about A. D. 363). Those divisions called "the larger chapters," with their corresponding summaries of contents, which appear in all the copies of the Gospels written from the fifth century downward, are wanting in the Sinaitic and Vatican manuscripts alone. On the other hand, the Sinaitic Codex exhibits the Ammonian sections and Eusebian canons in red ink in the margins; which, if written by the original copyist, prove that the manuscript cannot be ascribed to an *earlier* date than some time within the first half of the fourth century.

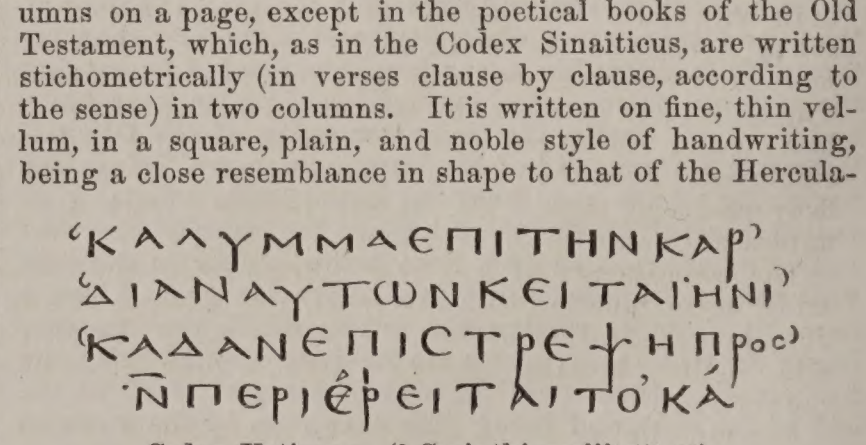
There is a striking agreement between the readings of this codex and those defended by Origen (186–253); while the marked coincidence of its text with certain readings known to have been approved by Eusebius, as well as the imperial beauty of the manuscript, renders it even possible that the Codex Sinaiticus was one of the fifty volumes of Holy Scripture which Eusebius himself, at the order of the emperor Constantine, caused to be prepared on beautiful skins by skilful calligraphists in the year 331, soon after the foundation of Constantinople. At any rate, we can assign it with moral certainty to the fourth century of our era, and with the highest probability to the first half of the same.

The publication of the original text of this and other ancient manuscripts is rendered difficult by the various *corrections* they have undergone in different ages. The Codex Sinaiticus abounds in such alterations, "brought in by at least ten different revisers, some of them systematically spread over every page, others occasional or limited to separate portions of the manuscript, many of them being contemporaneous with the first writer, far the greater part belonging to the sixth or seventh century, a few as recent as the twelfth." In many cases nothing short of the skill of a Tischendorf can identify with certainty the original writing under the alterations.

The Codex Sinaiticus has been published in a style worthy of its unique importance and value. The enlightened sovereign of Russia was easily persuaded to signalize the one-thousandth anniversary of the establishment of his empire, in 1862, by bringing out an edition of the manuscript—now properly characterized by the additional title of *Petropolitanus*—in a style surpassing in splendor and in accuracy of imitation any previous work of the kind. The text is printed in three folio volumes (ii.–iv.), the leaves of the shape and size of those in the manuscript itself; the first volume contains valuable introductory matter, and twenty-one admirable *facsimile* plates, representing chiefly pages of the manuscript, and two being covered with facsimile specimens of other important manuscripts for comparison. The work is "printed upon paper at once thick and fine, the ink being made to resemble that of the original in color, and the type being greatly varied, so as to imitate the various shapes and sizes of the letters employed by the scribe: the very spaces, too, between the letters have been carefully measured and represented with all faithfulness." But three hundred copies of this truly imperial edition were printed, two hundred of which were distributed by the emperor himself as presents to various public bodies and learned men; the rest were given to Tischendorf for sale, their price being fixed by him at two hundred and thirty Prussian thalers. Several of the foremost colleges and libraries in the United States possess this valuable work, in a few instances as a donation from its imperial patron. A cheap manual or popular edition, containing the New Testament and its appendages in ordinary Greek type, was published in 1863; and an octavo edition of the New Testament, together with the variations of the Vatican manuscript and of the Elzevir edition from the Sinaitic readings, appeared in 1865. English readers will be interested in examining the various readings of the three most celebrated manuscripts of the original Greek text as presented by Tischendorf in his edition of the authorized English version of the New Testament, which was published by Baron Tauchnitz in 1869 as the one thousandth volume of his "Collection of British Authors."

THOMAS CHASE.

Co'dex Vatica'nus (designation, B), a beautiful uncial manuscript of the Greek Bible in the Vatican Library, dating from the fourth century. Its marks of antiquity are similar to those of the Sinaitic codex; and indeed Tischendorf not only pronounces it as of precisely the same age, but is confident also that it was written by one of the four copyists to whom he ascribes that manuscript: it is, however, the copy evidently of a different exemplar, and cannot be considered as one of the fifty copies ordered by Constantine through Eusebius. It presents three narrow columns on a page, except in the poetical books of the Old Testament, which, as in the Codex Sinaiticus, are written stichometrically (in verses clause by clause, according to the sense) in two columns. It is written on fine, thin vellum, in a square, plain, and noble style of handwriting, being a close resemblance in shape to that of the Herculanean papyri. The manuscript contains the greater part of the Old Testament, and the New as far as Hebrews ix. 14. It appears to have belonged to the Vatican Library from the latter part of the fifteenth century. Its earlier history is unknown, but Tischendorf regards it as the work of an Alexandrian scribe. In critical authority it is inferior to no other manuscript.



Codex Vaticanus (2 Corinthians iii. 15, 16).

κάλυμμα ἐπὶ τὴν καρδίαν αὐτῶν κεῖται· ἡνίκα δ' ἂν ἐπιστρέψῃ πρὸς κύριον, περιαιρεῖται τὸ κά-*

This codex has always been difficult of access. Scholars all over the world rejoiced when it was announced that Cardinal Mai was preparing an edition of it. After a long delay, his edition appeared in the Christmas holidays of 1857, three years after his death; but it proved to have been so carelessly and inaccurately executed as to be of little value; a smaller edition, also prepared by the cardinal, appeared in 1859, avoiding some of the errors of the

* $\overline{\text{KN}}$ is a contraction for KYPION.

former, but introducing almost as many new ones. Mai's edition was reprinted in several places—in Berlin with corrections by Philip Buttmann. In 1867 the New Testament was published in Leipsic, in common cursive characters, by Tischendorf; but he had been allowed to collate the whole manuscript no farther than partly through the third Gospel, and only to consult it on difficult or doubtful passages beyond that point. While falling short of the *highest* character, on account of the restrictions placed upon his use of the manuscript, this edition will generally be held decisive on the disputed points on which its editor gives his deliberate judgment upon personal examination of the passage. The codex is now publishing by papal authority, in magnificent style, edited by Carlo Vercellone and Giuseppe Cozza. The size and shape of the manuscript are accurately represented, and it is copied line for line and letter for letter, in printed characters approaching facsimile, Tischendorf having lent for the purpose the type which had been cast for the imperial edition of the Sinaitic Codex, and the writing being astonishingly alike in the two manuscripts. The first volume to be published, but the fifth of the entire work, containing the New Testament, appeared in 1868. In some of the four subsequent volumes, containing the Old Testament, Vercellone is replaced by Caietano Sergio. THOMAS CHASE.

Cod'icil [Lat. *codicillus*, dimin. of *codex*], an addition or supplement to a will for the purpose of explaining, altering, or adding to its contents. Of codicils, as of wills, the last prevails where it contains provisions contradictory to those of a former will or codicil. (See WILLS AND TESTAMENTS, by PROF. T. W. DWIGHT, LL.D.)

Cod'lin, a name of several varieties of apples, some of which are highly esteemed in England, and are used chiefly for culinary purposes. The codlin ripens in summer or autumn, and cannot be kept long.

Codlin Moth (*Pyralis Pomona*). This moth is one of the Tortricidæ; it is small, with short and broad wings. It is very destructive in apple-orchards, laying its eggs in the eyes of the newly-formed fruit, within which the larva feeds, thus arresting the growth of the fruit, and causing it to die prematurely.

Cod-Liver Oil (*Oleum Morrhuæ*), an oil obtained from the liver of the cod, also from many allied species, as pollock, dorse, ling, hake, haddock, etc. In these fish, as in the shark tribe, the tissue containing oil is almost entirely confined to the liver. Cod-liver oil is prepared largely in Great Britain, Norway, Newfoundland, and the U. S. There are three varieties sold in commerce—pale, pale-brown, and dark-brown oil.

The oil is sometimes prepared by placing the livers in a tub upon a wooden strainer, and subjecting them to pressure, when the light-colored oil exudes, and is removed. As the livers partially putrefy, more oil escapes, which is darker, and constitutes the pale-brown oil; while finally the residue, boiled with water, parts with the remaining dark-brown oil. The pale oil thus resembles more nearly the oil present in the livers, while the other varieties are more or less impregnated with the products of putrefaction. The oil is often extracted by steaming, which produces the best oil and the largest yield. Various other methods are employed. Even the purest oil has a peculiar disagreeable fishy odor and taste. The darker varieties leave a very unpleasant nauseous sensation.

The constituents of cod-liver oil are oleic and other acids, in combination with glycerine, and holding in solution the constituents of the bile, acetic acid, phosphoric acid, iodine, bromine, chlorine, and a principle called gaduine.

As a remedial agent it is used in the treatment of scrofula, consumption, chronic rheumatism, and diseases of the bones and joints. Its virtues have been ascribed to iodine, bromine, and other specific ingredients, but its principal efficacy is probably due to its nourishing and fattening properties. For emaciated old people it is sometimes of great service in conjunction with other remedies. It is commonly taken in doses of from a dessert-spoonful to a table-spoonful three times a day.

Cod'man (JOHN), D. D., an American Congregational divine, born at Boston, Mass., Aug. 3, 1782, graduated at Harvard in 1802, studied in Edinburgh, and became pastor of a church at Dorchester, Mass., in 1808. He was a prominent advocate of clerical education. He published many sermons, etc. Died Dec. 23, 1847.

Codo'gno, a town of Italy, in the province of Milan, between the Adda and the Po, by rail 24 miles S. E. of Lodi. It is well built, and has manufactures of silks. It is noted as a market for cheese. Pop. 8917.

Cod'rington (Sir EDWARD), G. C. B., an English admiral, born in 1770. He served as captain at Trafalgar in 1805, and became a vice-admiral in 1821. He commanded the English, French, and Russian fleets which defeated the Turks at Navarino in 1827. Died in London April 28, 1851.

Codrington (Sir WILLIAM JOHN), G. C. B., a general, a son of the preceding, was born in 1800. He served at the Alma and Inkerman in 1854, and directed the attack on the Redan of Sebastopol in Sept., 1855. In November of the same year he became commander-in-chief of the army in the Crimea, a member of Parliament in 1857, and in 1859 governor of Gibraltar.

Co'drus [Gr. Κόδρος], the last king of Athens, is supposed to have reigned about 1060 B. C. According to tradition, he sacrificed his life for his country during a war between the Athenians and the Dorians. An oracle having predicted that the people whose king was slain by the enemy should be victorious, Codrus went in disguise to the Dorian camp, and provoked a quarrel in which he was killed. His son Medon was then chosen archon of Athens.

Codyville Plantation, a township of Washington co., Me. Pop. 62.

Coe, a township of Rock Island co., Ill. Pop. 1175.

Coe, a township of Isabella co., Mich. Pop. 987.

Coeffi'cient [from the Lat. *co* (for *con*), "with," and *efficio*, to "effect"], in algebra, one of two simple or compound factors whose product constitutes a term. Thus, in the term $2ab^2c$, $2ab^2$ is the coefficient of c, $2a$ of b^2c, and 2 of ab^2c. In the latter case, 2 is frequently called the "numerical coefficient" of the term, the others being distinguished as "literal coefficients." In an algebraical expression, and especially in quantities whose terms involve constant as well as variable factors, it is usual to restrict the term "coefficient" to the former, and to refer to the latter as "facients."

Coehorn, ko'horn, so named from Baron Coehorn, who invented it, is a small mortar, frequently a twenty-four-pounder. Coehorns, being easily moved and taking little powder, are found very useful in sieges, if grouped in great numbers. They are generally made of bronze.

Coehorn (Lieutenant-General MENNO, BARON COEHORN), colonel-proprietor of the superb regiment bearing his name, general of artillery, director-in-chief of the fortifications, and engineer-general of the United States or Provinces of Holland, styled by the distinguished Prussian engineer Zastrow "the prince of engineers," and by the French "the Dutch Vauban," was to Vauban himself exactly, in regard to recent fortifications, what Zwingli was to Luther, more restricted as to his stage, in prescience, originality, and soldiership. But even while saying this let it be considered no disparagement of Vauban. Most honest and generous of men, without envy he recognized Coehorn's merit as early as 1676, and did all he could to induce Louis XIV. to make any advances which could induce Coehorn to enter the French service. Sprung from a distinguished, noble, and military stock, originally Swedish, near Leeuwarden in Friesland, he was born in 1641, distinguished himself while yet a youth in mathematics, was appointed captain at the age of sixteen, became colonel at thirty-three, and with that rank, with his own regiment, "Nassau-Frise," defended Fort William, the key-point of Namur, against his rival Vauban, Louis XIV., and the great Luxemburg, until, wounded himself, he had only 150 effectives left. He had previously distinguished himself at the siege of Maestricht (1674) by his invention of the mortars which immortalize his name, first employed in that operation, and at the siege of Grave, where he won renown by devising means to transport a whole battalion at once across the wide and rapid Meuse, a daring operation, into the trench of a bastion to which the river served as a wet ditch, which decided the fate of the place. Coehorn already stood very high, not only as an engineer, but as a soldier, the last for conduct in the bloody battles of Senef, Cassel, and St. Denis. At Fleurus, 1st July, 1690, as brigadier-general, with eight battalions, he set at naught the efforts of the finest French cavalry, and covered the retreat of the prince of Waldeck's army, whereupon, the victorious Marshal Luxemburg declared, "the Dutch infantry at Fleurus had outdone the Spanish infantry at Rocroi." In 1695, Coehorn, having demanded full power to use his own methods, retook Namur, trebled in strength, though defended by Megrigny, second only to Vauban and Marshal Bouflers, unexcelled as a tenacious soldier: witness his subsequent defence of Lille in 1708. "Coehorn, the chief-engineer (his title was lieutenant-general of engineers) signalized himself so eminently that he was esteemed the greatest man of the age, and outdid even Vauban, who had gone far beyond his predecessors in the conduct of sieges." In Mar., 1696, Coehorn, lieutenant-general in the field in command of troops, by a daring, prompt, and skilful operation, made himself

master of Givet, and burned the immense magazines and stores of supplies accumulated there by the French. This stupendous blow paralyzed the French operations for the campaign, and until another harvest could be sown, grown, reaped, and garnered. Coehorn continued to increase his glory, fighting and fortifying until the last days of his life, destroying the French lines near Sluys, defended by Boufflers, in 1702, and capturing Bonn in 1703; bursting up the French lines at Hanuye, and accumulating stroke upon stroke of genius and daring until 17th Mar., 1704, at the age of sixty-three, a stroke of apoplexy—a disease which had been menacing him for some time—put an end to his existence and usefulness. His encomiums have been confined to no language; his praises have resounded from enemies even more than friends and countrymen. Montalembert, himself a first-class engineer, who alone suggested improvements to Coehorn's system, of which, pure and simple, Bergen-op-Zoom is the finest example, ranks himself among the most decided admirers of this "prince of engineers," whom he styles "a great man." According to the spirit of Straith's admissions, Coehorn possessed the merit of being able to contrive, equally well, defences for localities of any nature. Tyler (R. B. Engineers) says, "Coehorn, greatly to his credit, alone, of all modern engineers, established the one great truth in engineering—viz. that the same fortification cannot apply to places with wet as to those with dry ditches." Coehorn always held "it requires as much genius to defend a fortress well as it does to fortify it with ability," which Vauban corroborated by his observation that "amongst the multitude of the gallant and devoted officers of his day, he knew but few fitted to be governors of a besieged place." Coehorn fortified, defended, and took equally well.

Coehorn possessed a genius that would have made him the idol of the American people, whose making of war displays, as Rossel says, "all the exuberance of life inherent in a people seriously active, in the full force of youth, intelligent, and incapable of fear." Vauban was characterized by an economy of material and life at the expense of time; Coehorn economized neither, provided he attained his end by crushing out resistance. In Coehorn it was force substituted for industry, or rather industry employed to the utmost in multiplying the means of destruction. Coehorn's audacity and resources overwhelmed at once the enemy and the mind with wonder, and as an original thinker he ranks ahead of all the engineers who preceded him, and his works, like those of Shakspeare, are for all time.

No finer eulogy can be found of any man than that of Coehorn in the "Dictionnaire de la Conversation." This presents him as a truly disinterested patriot of ideal Roman simplicity and probity; as an unerring strategist; in fine, as one of those rare characters of whom we read in the annals of the remote past, whose record will not stand the close criticism and analysis applied in these practical days of unbelief as to everything but the absolute and tangible. One comparatively small matter demonstrates Coehorn's prescience. As the bayonet was first "seriously employed" by the French, according to their own writers, in the battle of Turin, 1692 (first bayonet charge in the battle of Spires in 1703), and as Coehorn had armed the Dutch infantry with it many years before, this is pretty good proof, in addition to the many others he has given, that he knew how to profit by improvements in military armament as quickly, or even more, considering the latter's favor and influence, than Vauban. Auguste Demmin, in his "History of Arms and Armor" (448), admits that the *fusil-musket* with socket-bayonet was the weapon "attributed to Vauban which Coehorn, his rival, introduced among the Dutch infantry about 1680." J. Watts de Peyster.

Cœlestine. See Celestine.

Cœ'le-Syria [Gr. ἡ κοίλη Συρία, "the hollow Syria"], a beautiful valley of Syria between the mountain-ranges of Lebanon and Anti-Lebanon, is about 90 miles long, and has an average width of 7 miles, but in some parts its breadth is far greater. It is now called El Bukaa. It is intersected by the river Litany (anc. *Leontes*). The chief city of Cœle-Syria was Baalbec (*Heliopolis*).

Cœn'obites [from the Gr. κοινός, "common," and βίος, "life"], or **Synodites,** the name given to those monks who live in communities, in contradistinction to the anchorites or hermits, who withdraw from all society and live in absolute solitude. (See Monastery.)

Coesse, a post-village of Union township, Whitley co., Ind. It is on the Pittsburg Fort Wayne and Chicago R. R. Pop. 192.

Coeymans, quee'manz, a township and post-village of Albany co., N. Y. The village is on the Athens branch of the New York Central R. R., and on the Hudson River, 12 miles S. of Albany. It has a mineral spring, flagstone-quarries, and manufactures of brooms, straw-paper, soap, etc. It has two weekly newspapers. Pop. 3077.

Ed. "Herald."

Cof'fee [from the Arabic *kahwah;* Fr. *café;* It. *caffè;* Ger. *Kaffee*], the seeds of the tree *Coffæa Arabica,* of the order Rubiaceæ; also an infusion of these seeds used as a beverage. There are a number of species of *Coffæa,* but this one only is known to possess valuable properties. It is a native of Western Africa, Abyssinia, and perhaps of Arabia, but is now naturalized in many tropical countries. The coffee tree in a wild state attains a height of from twelve to twenty feet, and bears but few branches. In cultivation the tree is topped at from six to ten feet in height, and made to assume a pyramidal form, with branches almost from the ground. The leaves are oblong-ovate, and four or five inches long; they are evergreen, opposite, shining, and leathery. The flowers are small, snow-white, and very fragrant, and are clustered in the axils of the leaves. It has a succulent fruit of a dark-red color when ripe, in which are two cells lined with a cartilaginous membrane, each containing a single seed. The seeds are hard, semi-elliptical in shape, and are commonly called coffee-beans or coffee-berries.

Coffee-plantations are often laid out in quadrangles; the trees are pruned to the same height, and the ground is carefully weeded. Where the climate is dry, abundant irrigation is required, but the supply of water is cut off as the fruit begins to ripen, in order to improve its quality. The tree yields its first crop when it is three years old. The coffee tree blooms for eight months in the year, so that its fruits are at any time of very unequal ripeness; in the West Indies and Brazil three gatherings of coffee are made annually. The fruit is placed on mats or large floors adapted to the purpose, where it is dried by the sun's rays, being meanwhile frequently turned. The dried pulp of the fruit and the membrane which immediately encloses the seeds are removed by passing between heavy rollers, and the coffee is afterwards freed from impurities by winnowing. As it is not, however, prepared with the same care in all places where it is cultivated, there are great differences in quality and price.

The earlier history of coffee is involved in some obscurity. It was not known to the Greeks or Romans, but in Abyssinia and Ethiopia it has been used from time immemorial, and in Arabia it was in general use before the end of the fifteenth century, and over the rest of the East in the sixteenth century. In 1690 it was carried by the Dutch from Mocha to Java, where it was soon extensively raised, and young plants were afterwards sent to the botanical garden at Amsterdam, from which the Paris garden obtained a tree. A layer of this was carried in 1720 to Martinique, where it succeeded so well that in a few years all the West Indies could be supplied. The Dutch planted it in Surinam in 1718, and it was introduced into the Mascarene Islands in the same year.

The following are the most important varieties in commerce: Mocha coffee, which comes from Arabia, and is considered superior to every other; it is known by its small gray beans inclining to greenish; Java or East Indian coffee has large yellow beans; Jamaica coffee has beans somewhat smaller and greenish; Surinam coffee has the largest beans; Bourbon has beans yellow and whitish pale. Coffee is also imported from Brazil, Ceylon, Central America, Maracaibo, and Liberia. Leonhard Rauwolf, a German physician, appears to have been the first to make coffee known in Europe by the account of his travels (1573). Soon after the first introduction of coffee, Coffee-Houses (which see) arose almost everywhere. In Arabia and the East, coffee is usually drunk in the form of a thick decoction of the unroasted seeds; and for the sultan's coffee the pericarp, with the dried pulp roasted, is employed. The principal commercial supply is from Brazil, Java being second and Ceylon third on the list.

Chicory root, dandelion root, carrot, and the seeds of barley, buckwheat, Indian corn, and rye, are sometimes used as cheaper substitutes for coffee. They are prepared by roasting, like coffee. But they are all wanting in *caffeine,* the most important constituent in coffee, and are therefore very different from coffee in their qualities. Coffee is subject to a great adulteration, most of the articles specified as substitutes being employed for this purpose. But the principal material of mixture is chicory, the use of which for this purpose was legalized in England in 1853.

The leaves of the coffee tree are used by the natives of Sumatra instead of the seeds. They are prepared by drying, and are said to contain a larger proportion of caffeine than the coffee-beans. Coffee owes its peculiar properties to the presence of—1, *caffeine* or *theine* ($C_8H_{10}N_4O_2$), which occurs in the roasted bean to the extent of nearly one per cent., and which is also found in tea, the *Paullinia,* maté, etc.; 2, a volatile oil which, according to some authorities,

is not present in the raw bean, but is developed in roasting; 3, a form of tannic acid called caffeo-tannic and also caffeic acid. The following, according to Payen and others, is the average composition of unroasted coffee:

Free caffein	0.8
Legumin (vegetable casein)	10.0
Other nitrogenous matter	3.0
Dextrine, sugar, etc.	15.5
Caffeo-tannic and caffeic acids (with potash, caffein, etc.)	5.0
Fat and volatile oil	13.0
Cellulose	34.0
Earthy matter	6.7
Water (hygroscopic)	12.0
	100.0

with a small quantity of two aromatic principles—one oily, and the other soluble in water.

Coffee loses 16 per cent. in weight and gains 30 per cent. in bulk if roasted till it assumes a reddish-brown hue; when roasted till the beans become chestnut-brown, they lose 20 per cent. by weight and gain 50 per cent. in bulk. The percentage of caffeine is greatly reduced by roasting, but the aroma is much increased. The action of the bowels is not retarded by the use of coffee, as is sometimes the case with strong infusions of tea, because there is less tannic acid in coffee than in tea. Coffee is exhilarating, refreshing, and nourishing, and, according to some physicians, tends to lessen the normal or excessive waste of the animal frame. When used in excess coffee is very injurious to health, and on certain constitutions its effects seem to be always deleterious. CHARLES W. GREENE.

Cof'fee, a county in the S. of Alabama. Area, 700 square miles. It is intersected by Pea River. The surface is nearly level; the soil is mostly sandy. Cotton, rice, corn, tobacco, and wool are raised. Capital, Elba. Pop. 6171.

Coffee, a county in the S. of Georgia. Area, 1000 square miles. It is bounded on the N. by the Ocmulgee, and on the S. W. by the Allapaha River. The surface is nearly level; the soil is sandy. Cattle, rice, and wool are produced. It is intersected by the Brunswick and Albany R. R. Capital, Douglas. Pop. 3192.

Coffee, a county of Middle Tennessee. Area, 300 square miles. It is drained by Duck River, which rises in it. The surface is hilly; the soil fertile. Tobacco, wool, and grain are raised. It is intersected by the McMinnville and Manchester R. R. Capital, Manchester. Pop. 10,237.

Coffee, a township of Wabash co., Ill. Pop. 1502.

Coffee (JOHN), an American general, born in Nottoway co., Va., in 1772, was colonel and brigadier-general of Tennessee volunteers in 1812–13, served with distinction against the Creek Indians, wounded at Emuckfau, Jan. 22, 1814, participated in the attack on Pensacola, and was distinguished in the defence of New Orleans 1814–15; remained in service till June, 1815; was appointed surveyor of public lands Mar., 1817. Died near Florence, Ala., July, 1834.

Coffee-house [Fr. *café*], a house or saloon where coffee and other refreshments are served out to customers. Coffee-houses were established at Constantinople in 1554, in London in 1652, and at Paris in 1662. For many years the use of coffee and the frequenting of coffee-houses were assailed by various writers. Before the general introduction of newspapers, coffee-houses were, particularly in England, important centres or sources of information, where people assembled to learn the news and discuss politics.

Coffee-leaves are sometimes used as a substitute for tea. They contain 1.2 per cent. of caffeine and considerable caffetannic acid. When dried and treated with boiling water, they yield an infusion of a deep brown color, resembling in taste and odor a mixture of tea and coffee.

Cof'fee Town, a township of Jackson co., Ala. P. 640.

Cof'feeville, a township and village of Clarke co., Ala., 1 mile E. of the Tombigbee River, and about 120 miles S. W. of Montgomery. Pop. 1200.

Coffeeville, a post-village, capital of Yalabusha co., Miss., on the Mississippi Central R. R., 131 miles N. by E. from Jackson. It has one weekly newspaper.

Coffeine. See CAFFEINE, by PROF. C. F. CHANDLER, PH. D., LL.D.

Cof'fer [Fr. *coffre*], a casket for keeping jewels, money, etc. In architecture this term is applied to the sunken panels in vaults and domes, or to deep panels in ceilings. In fortification, coffer is a particular kind of caponnière.

Cof'ferdam [from *coffer*, a "casket" or tight box, and *dam*], in civil engineering, the name of a watertight enclosure for laying the foundation of bridge-piers, dams, wharves, etc. Cofferdams are often constructed of piles in two rows, with clay packed between. When finished, the water is pumped out by steam-power. Where the water is too deep for cofferdams, various forms of the caisson are used; in which case the pier is sometimes gradually lowered to the bottom of the stream. (See FOUNDATION.)

Cof'feyville, a post-village of Montgomery co., Kan. It is on the Verdigris River and the Leavenworth Lawrence and Galveston R. R., 141 miles S. by W. of Lawrence.

Cof'fey, a county in the S. E. of Kansas. Area, 576 square miles. It is intersected by the Neosho River. The surface is undulating; the soil fertile. Grain and wool are staple products. Coal and limestone abound here. The Missouri Kansas and Texas R. R. (Neosho division) passes through it. Capital, Burlington. Pop. 6201.

Cof'fin [from the Gr. κόφινος, a "basket," and allied to *coffer*, a "casket;" Fr. *cercueil;* Ger. *Sarg*], a box in which the dead are placed for burial. The customs both of burning and burying the dead prevailed among the ancient Greeks and Romans. (See FUNERAL.) Their coffins were composed of various materials, the most common being baked clay or earthenware. Some were narrow and triangular in form, the undermost side being much the broadest. The practice among the ancient Romans was to bury the dead, though previous to the recognition of Christianity burning became comparatively common. A kind of stone brought from Assos, in the Troad, was used for coffins; it was said to consume the body, except the teeth, in forty days, and from this circumstance was called SARCOPHAGUS (which see). Roman stone coffins have been found in England, some entirely above the ground, others so near the earth's surface that the lids were visible, and when within a church coffin-lids often formed part of the pavement. The Saxons used wooden coffins, though the common people were simply wrapped in cloth. Coffins of lead were used in the Middle Ages, as well as in more recent times. In our day, highly-ornamented caskets and coffins of elm or other wood are much used, but we have also so-called "burial cases" of iron, often covered with velvet or rich cloth.

Coffin (GEORGE W.), U. S. N., born Oct. 12, 1845, in Massachusetts, graduated at the Naval Academy in 1863. He served in the Ticonderoga at both the Fort Fisher fights, and led the seamen of that vessel in the assault upon the fort on Jan. 15, 1865, where he was wounded in the thigh. FOXHALL A. PARKER, U. S. N.

Coffin (Admiral Sir ISAAC), BART., born at Boston, Mass., of a Nantucket family, May 16, 1759. His father was a Tory, and collector of the port of Boston. Young Coffin entered the navy in 1773, serving against the U. S. in the Revolutionary war. He had, however, throughout life a strong regard for his native land. He was rapidly promoted, and attained in 1830 the rank of admiral of the white. In 1826 he visited Nantucket, where he founded and endowed the Coffin School. Died July 23, 1839.

Coffin (JAMES HENRY), LL.D., born at Northampton, Mass., Sept. 6, 1806, graduated at Amherst in 1838. He was professor of mathematics and astronomy in Williams College, Mass. (1838–43), and in Lafayette College, Easton, Pa. (1846–73). He was a distinguished scientist, and published a treatise on the "Winds of the Northern Hemisphere" (1851), "Solar and Lunar Eclipses," and other works. Died Feb. 7, 1873.

Coffin (JOHN H. C.), born at Wiscasset, Me., Sept. 15, 1815, graduated at Bowdoin College, and in 1836 was appointed professor of mathematics in the U. S. navy. He served at sea and in nautical surveys, was detailed in 1844 for duty at the Naval Observatory, and prepared descriptions and discussions of the work with the mural circle in the "Nautical Almanac" from 1846 to 1849, and a great part of those for 1845. He published also a discussion of the personal equation in bisecting a star by a micrometer thread ("Astronomical Journal," iii., p. 121). He was professor of mathematics or professor of astronomy and navigation in the U. S. Naval Academy (1853–65), and from 1866 to the present time has been in charge of the preparation of the "American Ephemeris and Nautical Almanac."

Coffin (JOSHUA), an American genealogist, born at Newbury, Mass., Oct. 12, 1792, graduated at Dartmouth in 1817, was a teacher of the poet Whittier, and published "The History of Ancient Newbury" (1845), and numerous papers, etc. upon family genealogies. Died June 24, 1864.

Coffin (TIMOTHY GARDNER), a lawyer, born at Nantucket, Mass., Nov. 1, 1788, was a sailor in youth, but having been disabled by a fall, he sought an education, graduated at Brown University in 1813, and as a lawyer attained the first rank. Died at New Bedford, Mass., Sept. 19, 1854.

Cof'fin's Grove, a township and village of Delaware co., Ia. The village is about 50 miles W. of Dubuque. Pop. of township, 1003.

Co'gan House, a post-twp. of Lycoming co., Pa. P. 599.

Coghet'ti (FRANCESCO), an Italian painter, born Oct. 4, 1804, has produced powerful fresco-paintings for several Roman palaces. He made a long study of Raphael, and founded an excellent school, marked by a serious study of the masters.

Cognac (anc. *Condate;* modern Lat. *Conacum*), a town of France, department of Charente, on the river Charente, 24 miles W. of Angoulême. It has an old castle, in which Francis I. was born. In 1526 an alliance of France, England, the pope, Milan, and Venice, against Charles V., was concluded here. Brandy of excellent quality is made here, and is the chief article of export. About 6000 butts of Cognac brandy (see BRANDY, by PROF. C. F. CHANDLER) are produced annually. Pop. in 1866, 9412.

Cogniard (HIPPOLYTE), French comic writer, long director of the Varieties Theatre, born Nov. 20, 1807, was instrumental in substituting the opéra bouffe on the French stage for the old vaudevilles. He wrote, mostly in collaboration with his brother THÉODORE (born April 30, 1806), a vast number of vaudevilles.

Cogniet (LEON), a French historical painter, was born Aug. 29, 1794. His paintings represent scenes of terror, as the "Massacre of the Innocents," "Tintoretto painting his Daughter's Corpse," etc. He had many scholars.

Cog'nizance [Old Fr. *cognizance;* modern Fr. *connaissance;* It. *cognoscenza;* from the Lat. *cognosco,* to "know"], knowledge or notice; jurisdiction or right to try and determine causes; a badge worn by a retainer or dependant to indicate the party or person to which he belongs. In law, an acknowledgment or confession; also the power which a court has to hear and determine a particular species of suit. In heraldry, cognizance is a crest, coat-of-arms, or similar badge of distinction.

Cogno'men, a Latin word signifying a surname; the last of the three names usually borne by ancient Romans of good family. Cicero, for example, was the *cognomen* of the great orator, Marcus Tullius Cicero. It served to designate the family (*familia*) to which he belonged, as the other two names—viz. the *prænomen* and the *nomen*—served respectively to denote the individual and the class (*gens*) to which his family belonged.

Cogno'vit Actio'nem [Lat., "he has recognized the action"], in law, is a confession of a defendant subscribed by him, and giving authority to a plaintiff to enter up judgment against him. It is executed after an action has been commenced, and is supposed to be given in court. The subject in England is regulated by statutes prescribing at what time in the progress of the case it may be given as a means of protecting the defendant from imposition, and the forms of law with which it should be accompanied, such as proof of the time of its execution and a mode of filing it or a copy of it. Statute law in some of the American States provides a convenient substitute for a *cognovit.* Thus, in New York, and in other States following its code, a defendant may offer in writing to the plaintiff to allow him to take judgment for a specified sum or otherwise; and on the acceptance in writing of the offer judgment may be entered accordingly. It is also provided that should the offer not be accepted in the prescribed manner, it shall be deemed in law to be withdrawn and the litigation may continue.

Cogre'dients [from *co* (for *con*), "together," and *gradior,* to "go"], "[things] meeting together or agreeing." In mathematics, two set of facients or variables, each set containing the same number, are said to be cogredient if on replacing the variables of the first set by certain linear functions of themselves, those of the second set become also replaced by the same linear functions of themselves.

Cogs'well (JONATHAN), D. D., a Calvinistic divine, born Sept. 3, 1782, graduated at Harvard in 1806, was a tutor in Bowdoin College, professor of ecclesiastical history in the Theological Institution at East Windsor, Conn. (1834–44). He published "The Hebrew Theocracy" (1848), "Calvary and Sinai" (1852), and other works. Died at New Brunswick, N. J., Aug. 1, 1864.

Cogswell (JOSEPH GREEN), LL.D., an American *littérateur,* born at Ipswich, Mass., Sept. 27, 1786, graduated at Harvard in 1806, visited the East Indies, after his return studied law, and became a tutor in Harvard in 1814. He afterwards studied in Europe, and became a librarian and professor of mineralogy at Harvard (1820–23). With the historian Bancroft he founded the celebrated Round Hill School at Northampton, Mass. He was many years superintendent of the Astor Library. He contributed much excellent matter to periodical literature, and enriched the botanical and mineralogical collections at Harvard University with thousands of European specimens. Died at Cambridge, Mass., Nov. 26, 1871.

Cogswell (MASON FITCH), M. D., born at Canterbury, Conn., in 1761, graduated at Yale in 1780, became an eminent surgeon of Hartford, Conn., and was one of the founders of the asylums at Hartford for the deaf and dumb and for the insane. Died in Dec., 1830.—His son, M. F. COGSWELL, JR., M. D. (born Nov. 10, 1809, died Jan. 21, 1865), was also an eminent physician.

Cogswell (WILLIAM), D. D., a Congregational divine, born at Atkinson, N. H., June 5, 1787, graduated at Dartmouth in 1811, became general agent of the American Education Society in 1829, professor of history at Dartmouth (1841), professor of theology and president of Gilmanton Theological Seminary in New Hampshire (1844), and was the author of works on theology, etc. Died April 18, 1850.

Cohahui'la, a state in the N. part of Mexico, bordering on Texas, is bounded on the N. and E. by the Rio Grande del Norte. Area, estimated at 57,977 square miles. The surface is hilly; the soil in some parts is sterile, and other parts produce pasture. It has several silver-mines. Capital, Saltillo. Pop. in 1871, 95,397.

Cohas'set, a township and post-village of Norfolk co., Mass., on the South Shore R. R., 21½ miles S. E. of Boston. Mackerel-fishing is one of the chief industries of this place. The township is detached from the rest of the county. It has a savings bank and two insurance companies. Minot's Ledge Lighthouse is on its coast, in lat. 42° 16′ 9″ N., lon. 70° 45′ 14″ W. Pop. 2130.

Cohe'sion [from the Lat. *cohæreo, cohæsum,* to "hold together"], in natural philosophy, is the force by which the particles of homogeneous bodies are kept attached to each other, and with which they resist separation. Adhesion denotes the attractive force existing between two different bodies brought into contact, as a drop of water on a plate of glass; or between two bodies of the same matter, as two lumps of lead when their smooth surfaces have been pressed together. The three different forms which matter assumes—solid, liquid, and gaseous—are determined by the degree of cohesive force existing among the elementary particles. In solids this force is greatest, and is that which causes solidity; in liquids it is less powerful; and in aëriform fluids it may be regarded as negative, the particles having a tendency to repel each other.

Cohoc'tah, a township and post-village of Livingston co., Mich., about 45 miles S. of Saginaw. Pop. 1176.

Cohoc'ton, a post-twp. of Steuben co., N. Y. P. 2710.

Cohoes, ko-hōz′, or **Cahoes,** a city of Albany co., N. Y., on the right bank of the Mohawk River, at its junction with the Hudson River, on the Erie and Champlain Canals and Rensselaer and Saratoga and Troy and Schenectady branch of the New York Central and Hudson River R. R., is 9 miles N. of Albany. It has 2 newspaper-offices, 1 national and 1 State bank, 2 axe-factories, the Harmony Manufacturing Company's cotton-mills (five in number, one of which is one of the largest, if not the largest and most complete cotton-mill in the world), 20 knitting-mills, 1 pin-factory, 1 rolling-mill, and 1 horse-railroad, connecting with the city of Troy, 3 miles S. The city receives its supply of water for all purposes from the Mohawk River. The Cohoes Falls are in the city limits. Pop. 15,357. ED. "CATARACT."

Co'hort [Lat. *cohors;* Fr. *cohorte*], in the armies of ancient Rome, was the tenth part of a legion, and consisted usually of 600 men. The prætorian cohort was a body of picked troops who attended the commander of the army, and at a later period formed the guard of the emperor.

The term "cohort" is applied by some botanists to groups or assemblages of natural orders.

Coif [Fr. *coiffe*], an ancient name for a head-dress of any kind; at present especially applied in Great Britain to a cap worn by serjeants-at-law. Hence the serjeantcy is called by Blackstone the "degree of the coif."

Coimba'toor' a district of British India, presidency of Madras, S. of Mysore, has an area of 8392 square miles. It is a flat region, producing cotton, grain, tobacco, cattle, and sheep. The climate is mild. In the W. the ox is worshipped. Capital, Coimbatoor. Pop. 1,227,208.

Coimbatoor, a city of India, capital of the above district, is on the Noyel River, near lat. 11° N. and lon. 77° E., and 1483 feet above the level of the sea. The climate is healthy, but the water is brackish. Pop. 20,000.

Coim'bra, a city of Portugal, capital of the province of Beira, on the river Mondego, here crossed by a stone bridge, 115 miles N. N. E. of Lisbon. It is on the railway from Lisbon to Oporto. Built around a conical hill rising abruptly from the river, with many towers, and surrounded by groves of orange and olive trees, it presents a very picturesque external appearance, but the streets are narrow and steep. It is the seat of a Catholic bishop. Coimbra derives its importance from its university, the only one in Portugal, with 1200 students and an old library of 30,000 vols. It was founded in 1307. There are several fine churches; also manufactures of linen and woollen fabrics. Coimbra was founded by the Goths, and afterwards occupied by the Moors, from whom it was taken by Ferdinand I. of Castile in 1064. It became the capital of Portugal in 1139. Pop. 18,147.

Coin′, a town of Spain, in the province of Malaga, about 22 miles W. of Malaga. It has an episcopal palace and several convents; also fine public walks and gardens in the environs. Here are manufactures of linen and woollen fabrics, paper, and soap. Pop. 10,200.

Coin′age [Fr. *coin*, a "stamp" or "die," remotely from the Lat. *cuneus*, a "wedge"]. The precious metals were first employed as currency in the form of unstamped bullion, and values and amounts were then determined and expressed by weight; hence the origin of the terms "pound," "livre," "mark," etc. But the commercial character of society and the gradual advance of civilization soon led to the invention of coins, the first step in this direction being the employment of stamped pieces of bullion of indefinite size and form. The finished appearance of the coins issued by existing commercial nations indicates artistic taste and skill of a character which pertains to a highly advanced civilization.

A coin is money consisting of a piece of metal of known weight and composition, possessing real exchangeable worth, its denomination and value being stamped upon its face and guaranteed by the government. Its value is not —except in the case of smaller denominations, such as copper and other minor coins—merely representative (like that of a promissory note), but absolute and intrinsic. The coin-standard of a nation is, with very rare exceptions, the basis of its currency, whatever the character of the latter may be. "Men in their bargains," says Locke, "contract not for denominations or sounds, but for the intrinsic value, which is the quantity of silver (or gold), by public authority, warranted to be in pieces of such denominations."

Gold and silver are peculiarly adapted for coinage, possessing all the necessary qualities. They are capable of exact mechanical subdivision and reunion with comparative ease and without waste; they are durable, readily identified, of perfect sameness, and comparatively indestructible. They possess, moreover, values in the market less fluctuating (at least at the present time) than that of any other available commodity, and a relation between their respective weights, specific gravities, and values which ensures a convenient bulk and the greatest facility for transportation.

There has not always been assigned by law to given quantities of the precious metals the same nominal value as now. Thus, in England, a pound troy of pure gold about the year 1363 was required by law to be coined into fifteen pounds sterling; whilst the same weight of standard gold (eleven-twelfths fine) at the present day is rated at £46 14*s.* 6*d.* A troy pound of silver at the former period was coined into twenty-five shillings, but of late years the same weight of standard silver is coined into sixty-two shillings. The market values of gold and silver relative to each other have also undergone great change, the relative value of equal weights of each, now (in 1873) about as 15½ to 1, having been in the early part of the twelfth century as 9 to 1 only.

There is reason to believe that the cost of production of the precious metals will hereafter be less disturbed and uncertain than prior to the comparatively recent discoveries of extensive gold-fields in California and Australia, and, consequently, that their market values will be less subject to sudden fluctuations. Within the past sixty years the value of gold has fluctuated from 15⅛ to 15⅞ times that of silver (averaging about 15½ times), and never falling so low as that of 15 times such value.

Until within comparatively few years the money of account of nearly all European nations, as well as of the U. S., was based either upon a silver standard, or upon one of gold and silver both. Experience has shown that it is preferable that gold be the sole standard, and that the disadvantages attending the application of any other standard are great and inherent. The standard coin which is to be legal tender in payment of unlimited amounts should be made of the heavier and more valuable of the two metals. Silver is about 15½ times as heavy, and about 28⅓ times as bulky, as gold of equivalent value. Again, a double standard, based upon the assumption that the relative value of gold and silver is invariable, must be imperfect, resting, as it does, upon a false basis. Whenever the relative market value differs appreciably from the arbitrarily fixed coin standard (assumed invariable), the relatively dearer metal (whether gold or silver) is driven from circulation.

It is desirable where a system of specie payment obtains, or where the precious metals enter largely into financial transactions, that both gold and silver should be in simultaneous circulation. This can only be accomplished by making gold the standard of account and legal tender of payment in all amounts, and by so fixing the relation of silver to gold that the silver shall be relatively *overvalued*, and admitted as legal tender of payment only in limited amounts.

An accurate knowledge of the relative market values of gold and silver is desirable in order that it may be possible to so fix the relative quantity of metal in the coins of like denominations as to ensure the overvaluing of the silver. For this purpose the weight of the silver coins of the standard fineness should be fixed relatively to gold, at a point somewhat lower than that demanded by their nominal values; without, however, permitting the divergence to be so wide as, by the inducement of a large profit, to encourage their fraudulent or unauthorized manufacture by private parties. The ratio of 15 to 1 to represent the relative value of equal weights of gold and silver, respectively, is therefore a desirable one for purposes of coinage, being at once a simple ratio, and near, but sufficiently below, the mean market ratio to ensure the overvaluing of the silver. (For engravings of coins, see NUMISMATICS.)

The monetary systems of the different nations are in general heterogeneous in their character, and their relations to each other not unfrequently exceedingly complex. That the metallic money of the several commercial countries should differ in any respect is an inconvenience, but the interruption to the freedom of international exchange is greatly augmented when this difference is such as to involve troublesome fractional operations in the process of reduction from the currency of one country to that of another. This want of harmony has for many years, and especially of late, attracted public and merited attention, and earnest attempts are being made to establish an international coinage system on a comprehensive and simple basis. There seems to be no difference of opinion as to the immense advantages to be derived from the establishment of a simple correlated system of international coinage, and the view is rapidly gaining ground that such correlated system should be based on a gold standard—silver to be subsidiary—and that the standard units of the system should possess simple numerical relations as to weight with the metric unit of weight—the gramme—the only unit of weight which promises to be generally accepted in facilitating the international exchange of commodities. It is also important to adopt a standard fineness of a decimal character. The generally approved standard of fineness of coins for international uses is that of nine parts pure metal (gold or silver, as the case may be) to one part of copper alloy.

A memorial of the American Statistical Association, addressed to the Congress of the U. S. in the year 1868, calls attention to certain principles which it urges should govern in the establishment of a system of international coinage. It recommended that our coinage should have simple relations as to weight with the unit of weight of the metric system—the gramme; that the standard as to fineness of our coinage—whether of gold or silver—should continue to be nine-tenths of fine metal to one-tenth of alloy; that the weight in grammes and the fineness of the coins hereafter to be issued should be legibly stamped thereon; that, in pursuance of the foregoing, the gold dollar should contain one and a half grammes of fine gold, or its equivalent, one and two-thirds grammes of standard gold, nine-tenths fine, and that other gold coins should be in proportion; that the silver half dollar and smaller silver coins should contain of fine silver at the rate of twenty-two and a half grammes to the dollar, or their equivalent, twenty-five grammes of standard silver, nine-tenths fine; that the gold coinage, as above described, should be made legal tender in payment of sums in all amounts; and that the silver coin should be made subsidiary, and admitted as legal tender in amounts not exceeding ten dollars in any one payment.

The Association calls attention to the fact that to reduce our gold and our subsidiary silver to these proposed standards, respectively, only insignificant changes—to wit, a reduction of three-tenths of 1 per cent. in the weight of the gold coins, and an increase of five-tenths of 1 per cent. in the weight of the silver coins of the then existing standards —were required. The proposed reduction in the weight of the smaller gold coins is considerably less than the deviation now allowed to the mint. The change above proposed with regard to the subsidiary silver has already been accomplished by act of Congress approved Feb. 12, 1873, and said silver coins are continued as legal tender in amounts not exceeding five dollars in any one payment.

It will be observed that the weight of the silver coins is precisely 15 times the proposed weight of the gold coins of like denomination, but as the value of the gold relatively to silver is sensibly in excess of this ratio, the silver is overvalued, as, according to the experience of commercial nations, it should be.

At a meeting of the American Association for the Advancement of Science, held at Burlington, Vt., in 1867, a resolution was adopted deprecating the establishment of an international system of coinage of which the units should have other than simple relations to the metric unit of weight; and at Salem, in Aug., 1869, the same Associa-

TABLE I.—The Existing Coinage of the United States.

TABLE *showing the standard weights, expressed both in troy and metric units, of the several coins (gold, silver, nickel, and bronze) of the U. S., now issued under authority of law approved Feb.* 12, 1873; *together with the standard proportions of fine metal and alloy of each description of coin; also, the tolerance—or rate of deviation from the standard allowed by law—in the weight, both of single pieces and of large numbers when delivered together, and the tolerance as to fineness; also, the extent to which the several descriptions of coins are made legal tender in payment of debt.*

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.
	Fineness in thousandths.			Standard weight of each coin.		Standard weight of pure metal.		Tolerance of the mint, or deviation allowed—												
								In fineness.	In the weight of single pieces.			In the weight of a large number of coins taken together.								
												Quantity delivered.		Deviation.						
															Equivalent number of—					
Denomination of Coins.	Pure Metals.	Alloy.	Number of pieces that may be coined from 100 grammes of standard metal.	Troy. Grains.	Metric. Grammes.	Troy. Grains.	Metric. Grammes.	Thousandths.	Troy grains.	Milligrammes.*	Equivalent value of the amount of deviation allowed in 1000 dollars' worth of coins taken singly.	Number of pieces.	Value.	Troy ounces.	Troy grains.	Milligrammes.*	Value.	Equivalent value of the amount of deviation allowed in each 1000 dollars' worth of coins when delivered in the amounts specified in Col. 14.	Ratio of the weight of standard silver coin to that of standard gold coin of like denomination.	To what extent a legal tender.
Gold.											Cents.						Cents.	Cents.		
Double Eagle	900	100	2.991—	516.00	33.4363—	464.40	30.0926+	1	½	32.40	96.9—	250	$5000	.01	4.8	311+	18.60+	3.72+	.....	In all amounts.
Eagle	900	100	5.982—	258.00	16.7181+	232.20	15.0463+	1	½	32.40	193.8—	500	5000	.01	4.8	311+	18.60+	3.72+	.....	" "
Half Eagle	900	100	11.963+	129.00	8.3591—	116.10	7.5232—	1	¼	16.20	193.8—	1000	5000	.01	4.8	311+	18.60+	3.72+	.....	" "
Three-dollar piece	900	100	19.938+	77.40	5.0154+	69.66	4.5139—	1	¼	16.20	323.0—	1000	3000	.01	4.8	311+	18.60+	6.20+	.....	" "
Quarter Eagle	900	100	23.926+	64.50	4.1795+	58.05	3.7616—	1	¼	16.20	387.6—	2000	5000	.01	4.8	311+	18.60+	3.72+	.....	" "
One-dollar piece	900	100	59.815+	25.80	1.6718+	23.22	1.5046+	1	¼	16.20	969.0—	1000	1000	.01	4.8	311+	18.60+	18.60+	.....	" "
Silver.																				
Trade Dollar	900	100	3.674+	420.00	27.2156—	378.00	24.4940+	3	1½	97.20	357.1+	1000	$1000	.02	9.6	622.1—	2.29—	2.29—	16.27+	Not exceeding $5.
Half Dollar	900	100	8.000	192.90	12.5000	173.81	11.2500	3	1½	97.20	777.6—	1000	500	.02	9.6	622.1—	2.49—	4.98—	15.00	" "
Quarter Dollar	900	100	16.000	96.45	6.2500	86.81	5.6250	3	1½	97.20	1555.2—	1000	250	.02	9.6	622.1—	2.49—	9.95+	15.00	" "
Dime	900	100	40.000	38.58	2.5000	34.72	2.2500	3	1½	97.20	3887.9+	1000	100	.01	4.8	311.0+	1.24+	12.44+	15.00	" "
Copper-nickel.																				
Five-cent piece †	.....	.....	20.000	77.16	5.0000	.....	.....	†	3	194.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	Not exceeding 25 cents.
Three-cent piece †	.....	.....	51.441	30.00	1.9440—	.....	.....	†	2	129.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	" "
Bronze.																				
One-cent piece ‡	.....	.....	32.151—	48.00	3.1103	.....	.....	.....	2	129.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	Not exceeding 25 cents.

* 1000 milligrammes make one gramme; 1 gramme equals 15.432349 troy grains; 1 troy grain equals 64.79895 milligrammes.

† One-fourth nickel and three-fourths copper; the deviation not being more than one-fortieth in the weight of nickel.

‡ Tin and zinc, five per cent.; copper, ninety-five per cent.

tion expressed, also by resolution, their approval of "the proposed adaptation of the American coinage to the metric system, by making the value of the dollar precisely that of one and a half grammes of fine gold; seeing in this a new step towards the promotion of fraternity among nations by the unification of weights, measures, and coinage, inasmuch as all monetary units which have simple relations to the gramme must have simple relations to each other."

No action on the subject of the change of the weight of the gold coinage has yet been taken by Congress, although it is now (June, 1873) believed that such action in the direction of these recommendations will not be long delayed.

The leading simple metrical systems of gold units proposed may be classed under three heads: *First.* The dollar, florin, franc, and penny units, based upon tergrammes of gold nine-tenths fine (the term tergramme denoting the third part of a gramme). *Second.* Systems having for their basis the decagramme of gold of nine-tenths fineness, which unit has been advocated by Chevalier, Dr. Farr, and other European political economists. (See Report of Dr. Farr to the International Statistical Congress, held at The Hague in 1869.) *Third.* Systems based upon the decagramme of pure gold as the unit.

These three systems, by reason of each bearing a simple relation to the metric unit of weight—the gramme—must of necessity possess simple relations to each other, and may be regarded, essentially, as different phases of one and the same system.

According to certain lately published estimates and statements, by a careful investigator, relative to the four principal existing coin standards, it appears that the British sovereign is used by 35,000,000 people; the franc, by 77,000,000; that the gold dollar unit is used in countries having an aggregate population of 80,000,000; and that the domain of the silver dollar has about 552,000,000 inhabitants.

The first of the three accompanying tables shows, with reference to the existing system of coinage in the U. S., the weight and fineness of the standard coins now authorized to be manufactured and issued from the mint, and the "tolerance," or deviation from the standard, allowed in the coining, both as to weight and fineness. (See p. 1012.) The second table compares the existing system of U. S. coinage with a proposed system on a simplified and strictly metric basis. The third table compares with each other the weights of the coin-representatives of the units of account of several countries, as now existing, and also modifications proposed on the basis of a simplified and strictly metric system.

TABLE II.—UNITED STATES COINAGE.—*Existing and Proposed Systems Compared.*

DENOMINATION OF COIN.	Aggregate Weight. Existing System. Grains troy.	Aggregate Weight. Existing System. Equivalent metric grammes.	Aggregate Weight. Proposed System. Metric grammes.	Proposed weight of each piece. Grammes.	Proposed weight of each piece. Tergrammes (or thirds of a gramme).
Gold (nine-tenths fine).					
3 Double Eagles	1548.	100.31—	100	33⅓	100
6 Eagles	1548.	100.31—	100	16⅔	50
(10 Decagrammes of standard gold of the value of six metric dollars)	.....	.....	100	10	30
12 Half Eagles	1548.	100.31—	100	8⅓	25
20 Three-dollar pieces	1548.	100.31—	100	5	15
24 Quarter Eagles	1548.	100.31—	100	4⅙	12½
60 Dollars	1548.	100.31—	100	1⅔	5
Silver (nine-tenths fine).					
8 Half dollars	.....	100	100	12½	
16 Quarter dollars	.....	100	100	6¼	
40 Dimes	.....	100	100	2½	
Copper-nickel (¼ nickel, ¾ copper).					
20 Five-cent pieces	1543.2+	100	100	5	
50 Three-cent pieces	1500.	97.20—	100	2	
Bronze (5 per cent. tin and zinc, 95 per cent. copper).					
30 One-cent pieces.	1540.	93.31+	100	3⅓	

TABLE III.—COINS OF VARIOUS COMMERCIAL NATIONS.

Number of pieces which may be coined from 100 *grammes of gold of the fineness of nine-tenths, and the weight of each piece in grammes; also, the number of pieces which may be so coined under the proposed metric system, and the weight of each piece in grammes and in thirds of a gramme.*

DENOMINATION OF COIN.	Existing relations. Number of pieces.	Existing relations. Weight of each piece.	Proposed relations. Number of pieces.	Proposed relations. Weight of each piece, expressed in— Grammes.	Proposed relations. Weight of each piece, expressed in— Tergrammes
		Grammes.			
Dollars (U. S.)	59.815+	1.672—	60	1⅔	5
Double Eagles (U. S.)	2.991—	33.436+	3	33⅓	100
Twenty-Yen pieces (Japan)	3.	33⅓	3	33⅓	100
Victorias (or ten-sol pieces of 300 metric pence—proposed English coin)	.....	.....	10	10	30
Sovereigns (England)	12.291+	8.136			
Ten-Mark pieces (Germanic Empire)	25.11	3.982+	25		12
Union Crowns (Vereins-krone of Germany—Trade coin—coined from 1858 to 1872)	9.	11⅑	9	11⅑	33⅓
Ten-Crown pieces (projected coin for the three Scandinavian kingdoms)	22.32	4.480+	22⅔	4½	13½
Ten-Franc pieces (France)	31.	3.226—	30	3⅓	10
Half-Imperials (Russia—5 gold roubles or 5.15 silver roubles)	15.003+	6.665+	15	6⅔	20

In the above it is not proposed to disturb the value of the pound sterling of Great Britain, or of its representative the gold sovereign, but it is contemplated to substitute the Victoria (or decagramme of gold nine-tenths fine) of 10 sols, or 300 metric pence, as the British unit of account, in place of the pound sterling of 240 sterling pence, or 244 (more exactly 244.09) metric pence.

TABLE IV.—*Statement of Weight, Value, and Fineness of Foreign Gold Coins, according to trials made at the Mint of the U. S.*

COUNTRY.	DENOMINATIONS.	Weight	Fineness.	Value.	Value after Deduction.
		Oz. Dec	*Thous.*		
Austria	Ducat	0.112	986	$2.28.3	$2.27
"	Souverain	0.363	900	6.75.4	6.72
"	Four Florins	0.104	900	1.93.5	1.91.5
Belgium	Twenty-five Francs	0.254	899	4.72	4.69.8
Bolivia	Doubloon	0.867	870	15.59.3	15.51.5
Brazil	Twenty Milreis	0.575	917.5	10.90.6	10.85.1
Central Amer.	Two Escudos	0.209	853.5	3.68.8	3.66.9
" "	Four Reals	0.027	875	0.48.8	0.48.6
Chili	Old Doubloon	0.867	870	15.59.3	15.51.5
"	Ten Pesos	0.492	900	9.15.4	9.10.8
Denmark	Ten Thaler	0.427	895	7.90	7.86.1
Equador	Four Escudos	0.433	844	7.55.5	7.51.7
England	Pound or Sov., new	0.256.7	916.5	4.86.3	4.83.9
"	" " average.	0.256.2	916	4.85.1	4.82.7
France	Twenty Francs, new	0.207.5	899	3.85.8	3.83.9
"	" " average.	0.207	899	3.84.7	3.82.8
Germany	Ten Thaler, Prussian	0.427	903	7.97.1	7.93.1
"	Twenty Marks	0.256	900	4.76.2	4.73.8
Greece	Twenty Drachms	0.185	900	3.44.2	3.42.5
Hindostan	Mohur	0.374	916	7.08.2	7.04.6
Italy	Twenty Lire	0.207	898	3.84.3	3.82.3
Japan	Old Cobang	0.362	568	4.44	4.41.8
"	" "	0.289	572	3.57.6	3.55.8
"	Twenty Yen	1.072	900	19.94.4	19.84.4
Mexico	Doubloon, average	0.867.5	866	15.53	15.45.2
"	" new	0.867.5	870.5	15.61.1	15.53.3
"	Twenty Pesos (Max.)	0.086	875	19.64.3	19.54.5
"	" " (Repub.)	1.081	873	19.51.5	19.41.8
Naples	Six Ducati, new	0.245	996	5.04.4	5.01.9
Netherlands	Ten Guilders	0.215	899	3.99.7	3.97.6
New Granada.	Old Doubloon, Bogota.	0.868	870	15.61.1	15.53.3
" "	" " Popayan.	0.867	858	15.37.8	15.30.1
" "	Ten Pesos	0.525	891.5	9.67.5	9.62.7
Peru	Old Doubloon	0.867	868	15.55.7	15.47.9
"	Twenty Soles	1.055	898	19.21.3	19.11.7
Portugal	Gold Crown	0.308	912	5.80.7	5.77.8
Russia	Five Roubles	0.210	916	3.97.6	3.95.7
Spain	One Hundred Reals	0.268	896	4.96.4	4.93.9
"	Eighty Reals	0.215	869.5	3.86.4	3.84.5
"	Ten Escudos	0.270.8	896	5.01.5	4.99
Sweden	Ducat	0.111	875	2.23.7	2.22.6
"	Carolin, Ten Francs	0.104	900	1.93.5	1.91.5
Tunis	Twenty-five Piastres	0.161	900	2.99.5	2.98.1
Turkey	One Hundred Piastres.	0.231	915	4.36.9	4.34.8
Tuscany	Sequin	0.112	999	2.31.3	2.30.1

TABLE V.—*Statement of Weight, Fineness, and Value of Foreign Silver Coins, according to trials made at the Mint of the U. S.*

COUNTRY.	DENOMINATIONS.	Weight.	Fineness.	Value.
		Oz. Dec.	*Thous.*	
Austria	Old Rix Dollar	0.902	833	$1.02.3
"	Old Scudo	0.836	902	1.02.6
"	Florin before 1858	0.451	833	51.1
"	New Florin	0.397	900	48.6
"	New Union Dollar	0.596	900	73.1
"	Marie Theresa Dollar 1780	0.895	838	1.02.1
Belgium	Five Francs	0.803	897	98
"	Two Francs	0.320	835	36.4
Bolivia	New Dollar	0.801	900	98.1
Brazil	Double Milreis	0.820	918.5	1.02 5
Canada	Twenty Cents	0.150	925	18.9
"	Twenty-five Cents	0.187.5	925	23.6
Central Amer.	Dollar	0.866	850	1.00.2
Chili	Old Dollar	0.864	908	1.06.8
"	New Dollar	0.801	900.5	98.2
China	Dollar (English), assumed	0.866	901	1.06.2
"	Ten Cents	0.087	901	10.6
Denmark	Two Rigsdaler	0.927	877	1.10.7
England	Shilling, new	0.182.5	924.5	23
"	" average	0.178	925	22.4
France	Five Franc, average	0.800	900	98
"	Two Franc	0.320	835	36.4
Germany, N	Thaler before 1857	0.712	750	72.7
" "	New Thaler	0.595	900	72.9
" S	Florin before 1857	0.340	900	41.7
" "	New Florin	0.340	900	41.7
Greece	Five Drachms	0.719	900	88.1
Hindostan	Rupee	0.374	916.5	46.6
Italy	Five Lire	0.800	900	98
"	Lira	0.160	835	18.2
Japan	Itzebu	0.279	991	37.6
"	New Itzebu	0.279	890	33.8
"	One Yen	0.866.7	900	1.00.8
"	Fifty Sen	0.402	800	44.6
Mexico	Dollar, new	0.867.5	903	1.06.6
"	" average	0.866	901	1.06.2
"	Peso of Maximilian	0.861	902.5	1.05.5
Naples	Scudo	0.844	830	95.3
Netherlands	Two and a half Guilders	0.804	944	1.03.3
Norway	Specie Daler	0.927	877	1.10.7
New Granada	Dollar of 1857	0.803	896	98
Peru	Old Dollar	0.866	901	1.06.2
"	Dollar of 1858	0.766	909	94.8
"	Half Dollar 1835 and 1838	0.433	650	38.3
"	Sol	0.802	900	98.2
Portugal	Five Hundred Reis	0.400	912	49.6
Rome	Scudo	0.864	900	1.05.8
Russia	Rouble	0.667	875	79.4
Spain	Five Pesetas (dollar)	0.800	900	98
"	Peseta (pistareen)	0.160	835	18.2
Sweden	Rix Dollar	1.092	750	1.11.5
Switzerland	Two Francs	0.320	835	36.4
Tunis	Five Piastres	0.511	898.5	62.5
Turkey	Twenty Piastres	0.770	830	87

As tending to facilitate in Great Britain the transition from the sterling to the metric basis, it may prove interesting to note the fact that the payment of a sterling half-crown a month is almost exactly equivalent to that of a metric penny a day, the average number of days in a calendar month being 30½, the same as the number of metric pence in a sterling half-crown.

Tables IV. and V., prepared by the director of the mint, to accompany his Annual Report, in pursuance of the act of Feb. 21, 1857, show the weight, fineness, and value of foreign gold and silver coins. The third column expresses the weight of a single piece in decimal fractions of the troy ounce. The fourth column expresses the fineness in thousandths. In the fifth column of Table IV. is shown the value as compared with the standard amount of fine gold in the gold coin of the U. S. In the sixth column of Table IV. is shown the value as paid in the mint, after the uniform deduction of one-half of 1 per cent. The former is the value for any other purposes than recoinage, and especially for the purpose of comparison; the latter is the value in exchange for coins of the U. S. at the mint. The values in the fifth column of Table V. have been calculated on the assumption that the price of silver of the U. S. standard as to fineness (nine-tenths) is 122½ cents per ounce troy.

It is worthy of remark that Japan is, as yet, the only country in which the coins which represent the standard units of account are of gold of the fineness of nine-tenths, and possessing as to weight simple relations to the gramme, the metric unit.

E. B. ELLIOT,
U. S. Treasury Dept., Washington, D. C.

Coir is the fibre of the cocoanut and other palms. It is a valuable material for ropes, mats, etc. The husks are steeped in water in pits for six months or more, and then beaten with a stick till the fibre readily separates. Coir is one of the best materials for cables on account of its lightness, elasticity, and strength. Large quantities of coir rope are made in the Laccadive Islands by the hand, without the aid of machinery. Coir is produced from the fibre of various trees, especially the GOMUTI PALM (which see). It is largely produced in the Malay Islands.

Coit (THOMAS WINTHROP), D. D., LL.D., an Episcopalian divine, born at New London, Conn., June 28, 1803, graduated at Yale in 1821, was president of Transylvania University, Lexington, Ky., and became a professor at Trinity College, Hartford, Conn., in 1849. He published a "Theological Commonplace Book" (1832), "Puritanism" (1844), and other works.

Coits'ville, a township and post-village of Mahoning co., O., about 21 miles S. E. of Warren. Pop. 1161.

Cojutepec', a thriving, well-built town of Central America, in the state of San Salvador, 15 miles S. of old San Salvador. Pop. about 15,000.

Coka'to, a township and village of Wright co., Minn., on the St. Paul and Pacific R. R., 61 miles W. N. W. of St. Paul. Pop. 452.

Coke [probably allied to the verb "cook"], the charcoal obtained from bituminous coal by distillation or by heating with an almost entire exclusion of air. The former, called gas-coke, is abundantly produced in gas-works; the latter process is conducted in heaps or in ovens. Coking in heaps (the Meiler method) consists in placing the coal in ridges with wooden stakes driven within, which are afterwards removed for the introduction of lighted coal. During the process of heating much smoke and vapor are thrown out, consisting mostly of tar, water, and coal-gas. When the smoke ceases to be evolved, the air is excluded and combustion extinguished by covering the mound of hot cinder with fine coal-dust. Where this business is large, chimneys of firebrick are erected, around which the coal is placed, the larger masses in the centre, the whole being finally covered with fine coal or dross. Firebrick ovens are also used for coking, and are more economical. In these the coal is introduced through the top, and a little air is admitted by openings. When the smoke has ceased the openings are closed for from twelve to twenty-four hours; the coal is then raked through a door, and water thrown upon it to stop combustion. Caking coal is the most suitable for making coke; even when small it may be used, and a little water sprinkled over it greatly assists the coking operation. The weight of coke usually amounts to between 60 and 70 per cent. of the coal employed; at the same time the coal increases in bulk about one-fourth. It will sometimes absorb moisture from the air to the extent of 30 per cent., and contains an amount of ash ranging from ½ to 15 per cent. Coke is largely employed in the smelting of metallic ores, etc. where great heat is required.

Coke (Sir EDWARD), an eminent English jurist and judge, born at Mileham, in Norfolk, Feb. 1, 1552. He graduated at Cambridge, studied law in the Inner Temple, and was called to the bar in 1578. His legal learning and tact in conducting causes soon procured for him a large practice. He was appointed recorder of Norwich in 1586, recorder of London in 1592, and solicitor-general the same year. He became Speaker of the House of Commons in 1593, and attorney-general in 1594. In 1606 he was appointed chief-justice of common pleas, in which position he resolutely opposed illegal encroachments of the Crown at a time when the subserviency of justice to royalty was general. To still his unwelcome decisions the court made him chief-justice of the king's bench, but found him no less independent and freedom-loving than before. Among other bold judicial acts, he decided that the king had no right to stay proceedings in a court of law; for which he was deprived of the justiceship in 1616. He sided with the popular party in Parliament, and for his intrepid course was imprisoned in the Tower in 1622. He had a principal part in framing the Bill of Rights, and in carrying it through Parliament. Sir Edward Coke's legal learning was various and profound. His "Reports" far excelled any that had preceded them. "Coke upon Lyttleton, or the First Institute," is still a standard upon matters of municipal and constitutional law in England. He wrote, besides a second, third, and fourth book of "Institutes," the "Complete Copyholder" and "Reading on Fines." Died Sept. 3, 1633.

Coke (THOMAS), D. D., LL.D., the first bishop of the Methodist Episcopal Church, born at Brecon, Wales, Sept. 9, 1747, was educated at Oxford, and became a minister of the Church of England, but subsequently joined Wesley, and became a most laborious and faithful itinerant. He was made a bishop for America by Wesley in 1784, but did not confine his labors to this country. He traversed Great Britain and Ireland frequently, and crossed the Atlantic eighteen times. He founded the Wesleyan missions in the East and West Indies, and expended nearly all his large fortune in the undertaking. He died May 2, 1814, on a voyage to India, and was buried at sea. He was a volu-

minous writer, and left, among numerous other works, a "Commentary on the Holy Scriptures" (6 vols., 1803–07), and a "History of the West Indies" (1808). (See STEVENS's "History of Methodism," and "History of the Methodist Episcopal Church.")

Cokesbury, a township and post-village of Abbeville co., S. C. The village is on the Greenville and Columbia R. R., 48 miles S. S. E. of Greenville. Pop. 700; of township, 2179.

Col [from the Lat. *collum*, a "neck"], a French word signifying "neck," is applied to several passes of the Alps, as Col de Balme, Col de Tenda, etc.

Co'la, or **Kola-Nut,** the seed of the tree *Cola acuminata*, of the natural order Sterculiaceæ, a native of the western tropical parts of Africa, and cultivated in other warm countries. The natives of Guinea believe that to eat a portion of one of these seeds before their meals improves the flavor of whatever they may eat, and that when sucked or chewed they will render even putrid water agreeable to the palate. They are about the size of a pigeon's egg, of a brownish color and bitter taste. They are said to possess properties analogous to Peruvian bark.

Col'berg, a fortified seaport-town of Prussia, in Pomerania, on the river Persante near its entrance into the Baltic, about 143 miles N. E. of Berlin, with which it is connected by a railway. It has a handsome rathhaus, an old cathedral, salmon and lamprey fisheries, commerce, and salt-works. It is partly surrounded with swamps which can be readily covered with water. It has sustained several protracted sieges. Pop. in 1871, 13,130.

Col'bert, a county in the N. W. of Alabama. Area, 750 square miles. It is bounded on the N. by the Tennessee River. The surface is hilly or undulating; the soil is fertile. Cotton, corn, and wool are produced. It is intersected by the Memphis and Charleston R. R. Capital, Tuscumbia. Pop. 12,537.

Colbert (JEAN BAPTISTE), a French statesman and financier, was born at Rheims Aug. 29, 1619. He entered the service of Cardinal Mazarin in 1648, and became secretary to the queen in 1654. Mazarin at his death recommended Colbert to the king, who in 1661 appointed him controller-general of the finances, which were then in a ruinous condition. The annual revenue exacted from the people in 1660 was about 84,000,000 livres, but only 32,000,000 were received into the treasury, the rest being kept by the farmers of the revenue. Colbert reformed the financial system, and established order and economy in the government. In the course of twenty years he raised the gross revenue to 115,000,000, while the expense of collecting it was reduced to about 30,000,000. He promoted commerce and manufactures, opened canals and roads, and founded colonies in America. He also made reforms in the department of marine, of which he was appointed minister in 1669. No minister perhaps ever contributed so much to the prosperity of France. He was a liberal patron of literary and scientific men, and was the founder of the Academy of Inscriptions and Academy of Sciences. His influence at court was undermined by Louvois, and his efforts to dissuade Louis XIV. from his ruinous wars and extravagant expenses were unavailing; but he retained the office of controller-general until his death. Died in Paris Sept. 6, 1683. (See PIERRE CLÉMENT, "Histoire de Colbert," 1846; A. DE SERVIEZ, "Histoire de Colbert," 1842; GOURDAULT, "Colbert, Ministre de Louis XIV.," 1870.)

Col'borne, a post-village of Cramahe township, Northumberland co., Ontario (Canada), on the Grand Trunk Railway, 15 miles E. of Cobourg, has manufactures of flour, leather, lumber, furniture, and iron castings, and one weekly paper. Pop. about 1500.

Col'bourne, a township of Worcester co., Md. P. 861.

Col'burn (WARREN), a mathematician, born at Dedham, Mass., Mar. 1, 1793, taught school in Boston. He published in 1821 a "Mental Arithmetic," which had an extensive circulation. Died at Lowell Sept. 13, 1833.

Colburn (Rev. ZERAH), born at Cabot, Vt., Sept. 1, 1804. In early life he had a wonderful faculty of computation, which failed him as he came to maturity. He became a Methodist preacher (1825), and professor of languages at Norwich University (1835). Died at Norwich, Vt., Mar. 2, 1840.

Col'by Univer'sity, a Baptist college, incorporated by the legislature of Massachusetts in 1813 as "The Maine Literary and Theological Institution," was first established near Bangor, but subsequently (1818) transferred to Waterville, Me. In 1820 it was chartered by the State of Maine as "Waterville College," which name it bore till 1867, when, having been munificently endowed by Gardner Colby, Esq., a merchant of Boston, the name was changed to that of Colby University. Number of instructors in 1872, 7; pupils, 52.

Colcha'gua, a province of Chili, is bounded on the N. by the province of Santiago, on the E. by the Andes, on the S. by the province of Curico, and on the W. by the Pacific Ocean. Area, 3516 square miles. The province is traversed by the rivers Rapel, Mataquito, and Tinguirica. The climate is better than in any other province, and the soil is very fertile. Gold and copper are found, especially in the mountains in the interior. Pop. in 1869, 149,747. Chief town, San Fernando.

Col'chester (anc. *Camalodunum*), a parliamentary borough and river-port of England, in Essex, on the river Colne, 12 miles from the sea, and on the Eastern Union Railway, 51 miles N. N. E. of London. It is well built on the sides and summit of an eminence, and has imposing remains of a castle built soon after the Norman Conquest. Great quantities of Roman remains have been found here, including bushels of coins of Roman emperors, vases, urns, lamps, etc. It has eight parish churches, some of which are antique structures, several hospitals, a theatre, and a custom-house. There are manufactures of silk and a valuable oyster-fishery. It returns two members to Parliament. Pop. in 1871, 26,361.

Colchester, a county in the central part of Nova Scotia, bordering an inlet of the sea and the Bay of Fundy. It is intersected by the Nova Scotia Railway. Capital, Truro. Pop. in 1871, 23,331.

Colchester, a post-village of New London co., Conn., 28 miles S. E. of Hartford. It has manufactures of India-rubber and paper, and is the seat of Bacon Academy. Pop. 1321; of Colchester township, 3383.

Colchester, a post-township of Delaware co., N. Y. Pop. 2652.

Colchester, a township and post-village of Chittenden co., Vt. The village is on the Vermont and Canada R. R., 4 miles N. of Burlington. The township contains the important village of WINOOSKI (which see). Pop. 3911.

Colchiç'eine ($C_{35}H_{42}N_2O_{11}$), an alkaloid prepared from colchicine by the action of acids.

Col'chicine ($C_{37}H_{30}N_3O_{11}$?), a very powerful alkaloid extracted from all parts of *Colchicum autumnale* (meadow saffron). It produces, even in very small doses, violent vomiting and purging.

Col'chicum, a drug much valued in the treatment of neuralgic gout and rheumatism and some other diseases. It is the seed and root of *Colchicum autumnale*, or meadow saffron, a European herb of the order Melanthaceæ. It has sedative, diuretic, cathartic, and diaphoretic properties, and when given in an overdose is a dangerous poison.

Col'chis [Gr. Κολχίς], an ancient province of Asia, was bounded on the N. by the Caucasus, on the S. by Armenia, and on the W. by the Pontus Euxinus (Black Sea). It was celebrated in ancient fable and poetry as the place to which the Argonauts sailed for the golden fleece, and as the home of Medea. It was noted for its wine and fruits, and was the native country of the pheasant, which derived its name from Phasis, a river of Colchis. It is now part of the Russian dominions.

Col'cothar Vitri'oli, or **Cro'cus Mar'tis,** a brownish-red sesquioxide of iron, obtained by the calcination of copperas (sulphate of iron) in the manufacture of Nordhausen sulphuric acid. It is used as a polishing powder.

Cold [Lat. *frigus;* Ger. *Kälte*], the absence or want of heat. It is scarcely necessary to observe that the distinction between heat and cold is merely relative. Thus, if air or any substance coming in contact with the human body is of a lower temperature than the body, it absorbs heat from the latter, producing the sensation of cold; if of a higher temperature, it imparts a feeling of heat or warmth. The same substance at the same time may give the sensation of cold to one person and that of warmth to another, in case the temperature of the one is much lower than that of the other person. Water at a certain temperature will often feel warm to one's hand in winter, while water of the same temperature will in summer cause the sensation of cold, because in the former case it is warmer, and in the latter cooler, than the surface of the body to which it is applied. But since gases are found to expand $\frac{1}{490}$th of their volume for every increase of one degree F., it has been inferred that if this law holds good at very low temperatures, the temperature of —458 F., or —273 C., is an absolute zero, because at that temperature there would be no gaseous tension, and no possibility of detecting any further decrease of heat. The lowest temperature yet recorded is —220 F.

All warm-blooded animals have a power of maintaining the proper temperature of the body in defiance of external

cold, believed to be mainly due to a process analogous to combustion, in which carbon and hydrogen taken in food unite with oxygen derived from the air by respiration. If the combustible materials are not furnished, or if the supply of oxygen be deficient, there must be a depression of temperature. Now, if the temperature of a bird or mammal (except in the case of hibernating animals) be lowered about 30° below its normal standard (which in birds ranges from 108° to 112°, and in mammals from 98° to 102°), the death of the animal is the result. The symptoms following a great depression of the temperature of the body are, retardation of the circulation of the blood, causing lividity of the skin, followed by pallor; a peculiar torpor of the muscular and nervous systems manifests itself in an indisposition to make any exertion, and in extreme drowsiness. The respiratory movements become slower, and the loss of heat goes on with increasing rapidity till death supervenes.

In hibernating animals the power of generating heat within their own bodies is slight, their temperature nearly approximating that of the external air, so that it may be brought down nearly to the freezing-point. At this temperature the vital functions are scarcely perceptible, but when the temperature is again raised vital activity returns. The respirations in marmots fall from 500 to 14 in an hour, and are performed without apparent movement of the chest walls; the pulse sinks from 150 to 15 beats in a minute; and the animal can with difficulty be aroused from torpor.

Cold is a powerfully depressing agent, and in certain conditions is a fruitful cause of disease and death. Its most obvious effects occur in the freezing of parts of the body. In such cases the restoration to a normal temperature must be very gradual, or the frozen part may become affected by gangrene. It is often beneficial to place the frozen part in water near the freezing-point. It is said to be usual in Russia to rub the part affected with snow. The effects of cold upon the general system may result in bronchitis, pneumonia, or other serious diseases.

Cold Bath, a township of Clarke co., Ark. Pop. 645.

Cold Brook, a township of Warren co., Ill. P. 1256.

Cold Brook, a post-village of Russia township, Herkimer co., N. Y., has several manufactories. Pop. 170.

Cold Creek, or **Hume,** a post-village of Hume township, Allegany co., N. Y. Pop. 254.

Col de la Seigne (sāñ), an Alpine pass leading from Savoy into the Val d'Aosta in Piedmont, is 7 miles W. S. W. of Mont Blanc. Height, 8422 feet. (See Col.)

Col'den, a township and post-village of Erie co., N. Y. The village is 20 miles S. E. of Buffalo. Pop. 1472.

Colden (Cadwalader), lieutenant-governor of the province of New York from 1761 to 1775, repeatedly acting as governor in the absence of the chief executive, born in Scotland in 1688, emigrated about 1708 to Pennsylvania, where he practised medicine, invited to New York in 1718 by Gov. Hunter, was the first surveyor-general of the colonies. Died in 1776, of grief, it is said, at witnessing the destruction caused by the great fire of that year. Among his works are numerous essays on medical subjects, and others on natural philosophy, natural history, and the mathematics. He carried on a long correspondence with Linnæus, to whom he sent great numbers of American plants. Among these the illustrious Swedish botanist found more than 200 new species, which he described in the "Acts of the Academy of Sciences" of Upsala in 1743–44. To a new genus discovered among these plants Linnæus attached the name *Coldenia*.

Colden (Cadwalader David), an American lawyer, born in Queen's co., Long Island, April 4, 1769, became mayor of New York in 1818, and a member of Congress in 1822. He wrote a "Life of Robert Fulton." Died Feb. 7, 1834.

Cold Harbor, a locality in Hanover co., Va., about 10 miles N. E. of Richmond.

In May, 1864, Gen. Grant, continuing his movement from Spottsylvania, had successfully crossed the Fifth, Sixth, and Second corps over the North Anna River at Jericho Ford and at Chesterfield Bridge, above and below Lee's army. An attempt to cross direct in his front proved unsuccessful, and it being discovered that Lee's position was one of remarkable strength, from which he could be dislodged only by a loss incommensurate with the advantage to be thus gained, Gen. Grant determined to withdraw to the N. bank, which was skilfully accomplished on the night of the 26th of May, and another flank movement was commenced. The advance was led by two divisions of cavalry under Gen. Sheridan, and the Sixth corps, Gen. Wright. Considerable severe fighting was done on the 28th, 29th, and 30th, resulting in the success of the national arms; and on the 31st, Sheridan, with his two divisions, occupied Cold Harbor, driving the Confederates from the place, and maintaining his position until relieved, June 1, by the Sixth corps and the Eighteenth corps (Gen. W. F. Smith), which latter had just arrived (*viâ* White House) from Butler's army on the James River. At 5 P. M. both Wright and Smith attacked Lee, carrying a good part of his first line; but subsequent attempts to force him from his second line were unsuccessful, and the effort was abandoned after a loss of 2000 men. The portion of the army not engaged in the main attack received repeated assaults, all of which were repulsed with great loss to the enemy. Ineffectual attempts were made by the Confederates during the night to regain the ground lost during the day. The 2d of June was devoted to the redisposition of the army. The Second corps (Hancock) was moved forward, and placed on the left of the Sixth, which was resting on the left of the Eighteenth; the Ninth corps (Burnside) was drawn in to Bethesda Church, and the Fifth corps (Warren) extended to the left, to connect with Smith. In executing this operation both Warren and Burnside sustained attacks, which were repulsed, with the loss of some prisoners, however.

The morning of June 3d opened with rain, but at 4 A. M., the Second, Sixth, and Eighteenth corps furiously assaulted the Confederates in their intrenchments. Barlow's and Gibbons' divisions of the Second corps carried a portion of the enemy's line, but were compelled to withdraw before reinforcements could reach them. An equally gallant and vigorous assault, though less sanguinary, was also made by the Sixth and Eighteenth corps, but without success. Warren, whose line was much extended, was engaged only with his artillery, while Burnside failed to move at the time arranged upon, and a later movement, which promised success, on the left of Lee's line, was recalled, owing to the failure of the attack on the right; and the army intrenched themselves in their position close to the Confederates' main line of works. The attack lasted but about half an hour, yet in that short time Grant's loss was not less than 7000, while Lee's loss did not probably exceed 3000. At a later hour in the day an order was given to renew the attack, but the order was subsequently withdrawn. An attack was made on Gibbons' division about 9 P. M., which was repulsed. The total Federal loss at and around Cold Harbor was upwards of 13,000.

The two armies remained confronting each other till June 12, when Grant, moving rapidly, crossed the Chickahominy at the lower crossings, reaching the James River on the 15th, which was also successfully crossed on pontoons and ferry-boats.

Cold Spring, a township and post-village of Shelby co., Ill. The village is 50 miles S. E. of Springfield. Pop. of township, 1656.

Cold Spring, a township of Phelps co., Mo. P. 964.

Cold Spring, a township of Cattaraugus co., N. Y., has manufactures of lumber, shingles, hubs, spokes, etc. Pop. 835.

Cold Spring, a post-village of Putnam co., N. Y., on the E. bank of the Hudson and on the Hudson River R. R., 52 miles N. of New York. It is pleasantly situated among the Highlands, one mile above West Point. It has five churches, a library, three public schools, a furnace, and manufactures of cannon, machinery, brass castings, etc. It has one weekly newspaper. P. 3086. Ed. "Recorder."

Cold Spring, a post-village of Huntington township, Suffolk co., N. Y., on the E. side of Cold Spring Harbor, has some manufactures and shipbuilding, and formerly was a whaling port, but that business is now pursued on only a small scale. Pop. 750.

Cold Spring, a township of Lebanon co., Pa. P. 80.

Cold Spring, a post-village, capital of San Jacinto co., Tex.

Cold Spring, a post-township of Jefferson co., Wis. Pop. 740.

Cold'stream, a border-town of Scotland, in Berwickshire, on the left bank of the Tweed, 15 miles S. W. of Berwick. The river is here crossed by a bridge. Near this place is the famous ford where the English and Scottish armies formerly crossed the Tweed. Here General Monk raised the regiment still known as the Coldstream Guards (which see). Pop. in 1861, 1834.

Coldstream Guards, a regiment in the Foot Guards or Household Brigade, is the oldest corps in the British army except the First Foot. It was raised at Coldstream in 1660 by General Monk, and was first called Monk's regiment.

Cold Water, a township of Butler co., Ia. Pop. 461.

Cold'water, a city, capital of Branch co., Mich., on the Coldwater Creek and on the Michigan Southern and Mansfield Coldwater and Lake Michigan R. Rs., midway

between Detroit and Chicago. It has seven churches, two national banks, two newspapers, and manufactures of iron, wood, oil, flour, etc. There is a park, two libraries, and a high school. The State school for orphans is in Coldwater. Pop. 4392; of Coldwater township, 1526.

A. J. ALDRICH, ED. COLDWATER "REPUBLICAN."

Cold Water, a township of Isabella co., Mich. Pop. 151.

Cold Water, a township of Cass co., Mo. Pop. 439.

Cole, a county near the centre of Missouri. Area, 410 square miles. It is bounded on the N. E. by the Missouri River, and on the S. E. by the Osage. The surface is hilly; the soil of the river-bottoms is fertile. It is intersected by the Missouri Pacific R. R. Grain, tobacco, and wool are raised. Coal is found, and limestone is abundant. Jefferson City is the county-town and the capital of the State. Pop. 10,292.

Cole, a township of Sebastian co., Ark. Pop. 527.

Cole, a township of Benton co., Mo. Pop. 865.

Cole (THOMAS), a landscape-painter, born in Lancashire, England, Feb. 1, 1801, was taken to Ohio by his parents when he was a child. He visited Italy about 1831, and returned to New York in 1832 with several Italian landscapes. He painted a number of fine views of the Catskill Mountains. Among his other works are four allegorical pictures of the "Voyage of Life," a series called "The Course of Empire," a "View of Mount Etna," and a "Dream of Arcadia." Died at Catskill, N. Y., Feb. 11, 1848. (See his "Life" by L. L. NOBLE, 1855.)

Colebrook, a township and post-village of Litchfield co., Conn. The village is 28 miles N. W. of Hartford. Pop. 1141.

Colebrook, a township and post-village of Coos co., N. H. The village is about 50 miles N. of Mount Washington. It has three churches, school and academy, a newspaper, five carriage manufactories, and a woollen factory, besides manufactures of starch, lumber, leather, etc. P. 1372. ALBERT BARKER, PUB. "NORTHERN SENTINEL."

Colebrook, a post-township of Ashtabula co., O. Pop. 800.

Colebrook, a township of Clinton co., Pa. Pop. 332.

Colebrookdale, a township and post-village of Berks co., Pa. The village is about 15 miles E. of Reading. Pop. of township, 1660.

Colebrooke, or **Grand Falls,** a post-village and port of entry of Victoria co., N. B., near the Great Falls of the river St. John, which are 180 feet high and very imposing. Steamers ply between Colebrooke and St. John (202 miles) during high water. There is a fine suspension bridge over the falls. Pop. about 700.

Colebrooke (HENRY THOMAS), an English Orientalist, born June 15, 1765, went to India in 1782, and was employed in the civil service of the East India Company. He became professor of Sanscrit in the College of Fort William. He published a "Sanscrit Grammar" (1805), a "Dictionary of the Sanscrit Language" (1808), "Miscellaneous Essays" (2 vols., 1837), "On the Sacred Books of the Hindoos" and "Algebra of the Hindoos." His works display sound critical judgment and great learning. Died in London Mar. 10, 1837.

Cole Hill, a township of Chesterfield co., S. C. P. 710.

Coleman, a county in W. Central Texas. Area, 1000 square miles. It is bounded on the S. by Colorado River. The surface is broken and rocky. Wood and water are scarce, and grazing is the chief pursuit. Capital, Camp Colorado. Pop. 347.

Coleman (LYMAN), D.D., an eminent American scholar, teacher, and author, born at Middlefield, Mass., June 14, 1796, has traveled and studied in Europe and the East, has been connected with several literary institutions, and is now (1873) professor in Lafayette College, Easton, Pa. He has published "Antiquities of the Christian Church" (1841), "Ancient Christianity" (1852), "Historical Text-Book and Atlas of Biblical Geography" (1854), "Prelacy and Ritualism" (1869), and other works.

Coleman's, a township and village of Edgefield co., S. C. The village is about 22 miles N. E. of Edgefield and 4 miles S. of the Greenville and Columbia R. R. Pop. 2243.

Colen'so (JOHN WILLIAM), D.D., an English theologian, born Jan. 24, 1814, graduated at Cambridge in 1836. He was appointed bishop of Natal in South Africa in 1854. Among his works is "The Pentateuch and Book of Joshua Critically Examined" (1862), which was condemned by the Houses of Convocation. He maintains that some books of the Old Testament are not divinely inspired. He was declared deposed from his see by his metropolitan, an act whose validity was denied by the privy council. He has acquired some distinction as a mathematician.

Coleop'tera [from the Gr. κολεός, a "sheath," and πτερόν, a "wing"], the name of an extensive order of insects, including all those popularly termed beetles, having four wings; the first pair, of a horny consistency, serve as defensive coverings to the second pair, which are larger in size and folded transversely beneath the elytra or wing-covers when the beetle is at rest. In some species the membranous wings are wanting, but the elytra are always present. The head supports two antennæ of various forms, but nearly always consisting of eleven joints. Coleoptera have two compound eyes, but no ocelli. The mouth is fitted for gnawing, tearing, or chewing, and exhibits in great perfection the complicated structure which belongs to the mouth of all the masticating or mandibulated insects. The anterior segment of the thorax greatly surpasses in extent the two other segments; the abdomen is united to the trunk by a great part of its breadth. The Coleoptera and their larvæ are very voracious, feeding on both animal and vegetable substances. This is a very numerous order, being estimated to contain 80,000 species or more.

Colepeper. See CULPEPER.

Colerain', a post-township of Franklin co., Mass. It has three churches, three cotton factories, manufactures of carriages, boxes, castings, chair-stuff, lumber, etc. Pop. 1742.

Colerain, a township and post-village of Bertie co., N. C. The village is on the E. bank of Chowan River, and 100 miles N. of Beaufort. Pop. 1968.

Colerain, a township and post-village of Belmont co., O. The village is 8 miles N. of the Ohio Central R. R. and 20 miles S. W. of Steubenville. Pop. 1308.

Colerain, a township of Hamilton co., O., 42 miles S. W. of Dayton. Pop. 3689.

Colerain, a township of Ross co., O. Pop. 1635.

Colerain, a township of Bedford co., Pa. Pop. 1204.

Colerain, a post-township of Lancaster co., Pa. Pop. 1655.

Coleraine, a seaport-town of Ireland, in the county of Londonderry, is on the river Bann, 4 miles from its mouth, and 47 miles N. N. W. of Belfast. Vessels of 200 tons can come up to the town, and steamers ply regularly between it and Liverpool and Glasgow. It has a court-house and a custom-house; also manufactures of fine linen fabrics called "coleraines," and of paper, soap, etc. Pop. in 1871, 6236.

Coleridge (HARTLEY), an English poet, son of Samuel T. Coleridge, was born near Bristol Sept. 14, 1796. He was a dreamy, wayward, and eccentric genius. He became a fellow of Oriel College in 1818, but he soon lost his fellowship by his intemperance. He published a volume of admired poems in 1833. Among his other works is "The Worthies of Yorkshire and Lancashire" (1835). He had marvellous conversational powers. Died Jan. 6, 1849.

Coleridge (HENRY NELSON), a cousin of the above, was born in 1800. He was called to the bar in 1826. He published, besides other works, an "Introduction to the Study of the Greek Classic Poets" (1830) and "The Table-Talk of Samuel T. Coleridge" (1835). He edited several works of his uncle. Died Jan. 26, 1843.

Coleridge (Right Honorable Sir JOHN TAYLOR), D. C. L., an English jurist, a nephew of S. T. Coleridge, born at Tiverton in 1790, educated at Oxford and the Middle Temple, was called to the bar in 1819, became a serjeant in 1832, judge of the king's bench in 1835, and privy councillor in 1858. His reputation as a lawyer and literary critic is high.

Coleridge (SAMUEL TAYLOR), an English poet and critic, born at Ottery St. Mary, in Devonshire, Oct. 21, 1772, was a son of the vicar of that parish. In 1791 he entered Jesus College, Cambridge, where he attained great proficiency in classical learning. He abruptly quitted Cambridge in 1792, and enlisted in a regiment of dragoons under the assumed name of Silas Tomken Comberbatch. His relatives soon procured his discharge from the army. He visited Bristol in 1794, and became an associate of Robert Southey and other young men who, like himself, had adopted democratic and revolutionary ideas. They formed a project to emigrate to the banks of the Susquehanna and to found a "pantisocracy," in which they proposed to enjoy a community of goods. As they could not raise money enough for the outfit, they were compelled to abandon the enterprise. His friend and patron, Joseph Cottle of Bristol, paid him thirty guineas in advance for a volume of poems (published in 1796). In 1795 he married Sarah Fricker, a sister of Southey's wife, and became a resident of Nether Stowey (Somersetshire), where he asso-

ciated with the poet Wordsworth, and remained nearly three years. During this period he composed the "Ancient Mariner" and other poems. Coleridge and Wordsworth wrote in parternership a collection of "Lyrical Ballads." He held Socinian views in this early part of his mature life, and began to preach in the Unitarian churches, but his success as a preacher was hindered by his instability and want of punctuality. In 1798 he visited Germany with Wordsworth, and studied at Göttingen. He removed to Keswick, in the Lake country, in 1800, and resided with Southey and Wordsworth. The unfriendly critics of the Reviews applied to these three friends the appellation of "Lake Poets," in reference to their local habitation. In 1808 he lectured on poetry and the fine arts in London, and in 1809 commenced the publication of the "Friend," a periodical. His wife and family remained at Keswick, dependent on Southey, while Coleridge led a wandering life, and formed many speculative and literary projects, which he failed to realize. His natural infirmities of character were increased by the use of opium. He passed many of his later years in the house of Mr. Gillman at Highgate, near London, where he began to reside in 1816. Among his works are "Christabel" (1816), "Biographia Literaria" (1817), "Zapolya," a drama (1818), "Aids to Reflection" (1825), and "Literary Remains" (1836). "Osorio, a Tragedy" (first printed in 1873), was the original drama from which his "Remorse" was adapted. He died at Highgate July 25, 1834. (See GILLMAN, "Life of S. T. Coleridge," 1838; COTTLE, "Reminiscences of Coleridge and Southey," 1847.)

Coleridge (SARA HENRY), the only daughter of the preceding, was born at Keswick in 1803. She passed many of her early years in the house of her uncle, Robert Southey, and was married in 1829 to her cousin, Henry N. Coleridge. She edited several works of her father, and wrote an admired imaginative tale called "Phantasmion" (1837). Died May 3, 1852. Her memoirs and letters, edited by her daughter, were published in 2 vols., 1873.

Coles, a county in S. E. Central Illinois. Area, 550 square miles. It is intersected by the Kaskaskia and Embarras rivers. The surface is nearly level; the soil is fertile. Cattle, grain, tobacco, and wool are raised. It has manufactures of lumber, carriages, etc. The greater part of the county is prairie. It is traversed by the Illinois Central and the St. Louis Alton and Terre Haute R. Rs. Capital, Charleston. Pop. 25,235.

Cole's, a township of Prince William co., Va. P. 1279.

Coles (EDWARD), an American statesman, born in Albemarle co., Va., Dec. 15, 1786, was private secretary to President Madison (1810–16) and minister to Russia (1817–18). Soon after his return he set free his slaves. He was governor of Illinois (1823–26). Died at Philadelphia, then his residence, July 7, 1868. He published a "History of the Ordinance of 1787."

Colesville, a post-village and township of Broome co., N. Y., on the Susquehanna River and the Albany and Susquehanna R. R. The township has ten churches, numerous villages, and some manufactures of leather, etc. Pop. 3400.

Col'fax, a county in the E. of Mississippi. Area, about 360 square miles. It is partly bounded on the E. by the Tombigbee River, and is intersected by the Mobile and Ohio R. R. It is in one of the finest cotton-regions of the South. This county was organized since the census of 1870. Capital, West Point.

Colfax, a county in the E. of Nebraska. Area, 400 square miles. It is bounded on the S. by the Platte River, and intersected by Shell Creek and other streams. The soil is fertile, producing grain, vegetables, and fruit. Grazing is excellent and water-power abundant. It is traversed by the Union Pacific R. R. Capital, Schuyler. Pop. 1424.

Colfax, a county in the N. E. of New Mexico. Area, 3700 square miles. It is drained by the Canadian River, which rises in it. The Rocky Mountains extend along the western border. The valleys are fertile. Wool is raised. Capital, Cimarron. Pop. 1992.

Colfax, a post-village of Placer co., Cal., on the Central Pacific R. R., 54 miles N. E. of Sacramento. It has gold-mines in the vicinity.

Colfax, a post-village of Fremont co., Col., 50 miles S. of Cañon City. It is in Wet Mountain Park in a fine farming region. It was settled by a colony of Germans in 1870. Pop. of colony in 1870, 230.

Colfax, a township of Champaign co., Ill. Pop. 633.

Colfax, a post-village of Clinton co., Ind., at the junction of the Indianapolis Bloomington and Western and Logansport Crawfordsville and South-western R. Rs. P. 187.

Colfax, a township of Dallas co., Ia. Pop. 582.

Colfax, a township of Grundy co., Ia. Pop. 278.

Colfax, a post-village, capital of Grant parish, La., on Red River about 25 miles N. W. of Alexandria. Pop. 40.

Colfax, a township of Benzie co., Mich. Pop. 71.

Colfax, a township of Huron co., Mich. Pop. 91.

Colfax, a township of Mecosta co., Mich. Pop. 146.

Colfax, a township of Oceana co., Mich. Pop. 77.

Colfax, a township of Wexford co., Mich. Pop. 172.

Colfax, a township of Daviess co., Mo. Pop. 584.

Colfax, a township of De Kalb co., Mo. Pop. 796.

Colfax, a township of Rutherford co., N. C. Pop. 964.

Colfax, a township of Darlington co., S. C. Pop. 1418.

Colfax, a post-village, cap. of Whitman co., Wash. Ter.

Colfax, a township of Dunn co., Wis. Pop. 233.

Colfax (SCHUYLER), an American statesman, born in the city of New York Mar. 23, 1823, was a grandson of Gen. William Colfax, who commanded Washington's life-guards. In 1836 he removed with his mother, who was then a widow, to Northern Indiana. He settled at South Bend, and studied law, and became in 1845 editor of the "St. Joseph Valley Register," a Whig paper issued at South Bend. In 1850 he was a member of the convention which formed a new constitution for Indiana, and he opposed the clause that prohibited colored men from settling in that State. As a Whig candidate for Congress he was defeated in 1851, but was elected in 1854, was six times re-elected, and continued to represent that district until 1869. In 1856 he made an eloquent speech in Congress on the subject of the conflict in Kansas. He was chosen Speaker of the House of Representatives in Dec., 1863. During the civil war he was a friend and confidential adviser of President Lincoln. He performed a journey across the continent to California in 1865, and was again elected Speaker of the House about the end of that year. He gained a high reputation as a presiding officer, and was the most popular Speaker of the House since Henry Clay. In 1867 he was chosen Speaker for the third time. In May, 1868, he was nominated as candidate for the office of Vice-President of the U. S. by the Republicans, who at the same time nominated Gen. Grant for the presidency. They were elected in Nov., 1868, receiving 214 electoral votes out of 294, which was the whole number.

Colhoun' (EDMUND R.), U. S. N., born May 6, 1821, in Pennsylvania. Entered the navy as a midshipman April 1, 1839, became a passed midshipman in 1845, a lieutenant in 1861, a commander in 1862, and a captain in 1869. He served on the E. coast of Mexico during the Mexican war, commanded the steamer Hunchback at the capture of Roanoke Island and Newbern, N. C., in the spring of 1862, and was in several engagements with batteries on Black Water River, Va., during the fall of that year. In reference to the fight at Roanoke Island, Commander Murray in his official report of Feb. 8, 1862, says: "The Hunchback, Acting-Lieutenant Colhoun, took a position very near the batteries, and sustained considerable damage from the fire of the enemy, which she is now repairing. During the whole of the engagement, and in spite of her injuries, she maintained her proximity to the enemy, to his great apparent embarrassment and to the admiration of the other ships." And in his report to Rear-Admiral Lee of the heavy fighting on the Black Water, Lieutenant-Commander Flusser writes: "I was well supported. Colhoun and French both did their duty." He commanded the monitor Weehawken during the summer and fall of 1863 in her various engagements with the forts and batteries of Charleston harbor. On the 7th of Sept., 1863, while going into action, the Weehawken grounded, and in this perilous situation remained for twenty-four hours, exposed to the fire of Fort Moultrie. Captain Colhoun's conduct on this occasion is thus highly commended by Rear-Admiral Dahlgren in his report of Sept. 8, 1863: "Captain Colhoun has, in my opinion, more than compensated for the misfortune of getting aground by the handsome manner in which he has retorted upon the enemy, and defended the glorious flag that floats above him. At 11.30 A. M. I telegraphed to him, 'Well done, Weehawken! Don't give up the ship.' His vessel is now off, and the crews of the other monitors cheered spontaneously as he passed. I commend Captain Colhoun, his officers, and men to the notice of the department." Captain Colhoun was in both the Fort Fisher fights, and for "his energy, bravery, and untiring zeal" was recommended for promotion by Rear-Admiral Porter in his "commendatory despatch" of Jan. 28, 1865.

FOXHALL A. PARKER, U. S. N.

Col'ic [Lat. *colica;* Fr. *colique;* from the Gr. κωλικός, "pertaining to the colon"], a term applied to diseases attended with severe pain of the abdomen; its supposed particular connection with the large intestine is not always certain. The disease, anciently called the "colic passion" (Latin, *colica passio*), is now generally believed to be spas-

modic in character, and to be caused, at least in part, by irregular contractions of the muscular coat of the intestines. This complaint arises from various causes and exhibits different symptoms. It is sometimes attended with constipation, and ceases when the regular action of the bowels is restored. A good remedy in such cases is a dose of castor oil (about one ounce for an adult), with thirty or thirty-five drops of laudanum. Warm baths and fomentations are often necessary. When colic resists mild and simple remedies, medical assistance should be procured, for colic is closely allied, as a symptom, to several severe and dangerous diseases. Painters' colic arises from the absorption of lead into the system, and therefore attacks persons employed in lead-mines or using preparations in which lead is used. This latter disease is often called *colica Pictonum*, or "colic of the Pictones," the latter being the ancient name of the inhabitants of Poitou, where this disease was once common. REVISED BY WILLARD PARKER.

Coligny, de (GASPARD), an eminent French admiral and Huguenot, was born at Châtillon-sur-Loing Feb. 16, 1517. He served with distinction at the battle of Cérisoles in 1544, and became admiral of France in 1552. In 1557 he was taken prisoner by the Spaniards at Saint-Quentin. He was the second in command of the Protestant army in the civil war which began in 1562, and when the prince of Condé was killed at Jarnac in 1569 he succeeded him as commander-in-chief. The war was suspended in 1570 by a treaty of peace, in which the court acted a treacherous part. Coligny went to Paris to attend the marriage of Henry of Navarre in Aug., 1572, and was received with feigned kindness by Charles IX. He was wounded in the street by a partisan of the duke of Guise, and was killed, two days later (Aug. 24), in the general massacre of St. Bartholomew. (See PÉRAULT, "Vie de Coligni;" BRANTÔME, "Discours sur l'Amiral de Châtillon;" DUFEY, "Coligny, Histoire Française," 4 vols., 1824.)

Coli'ma, a state of the Mexican republic, on the western coast. Area, 2392 square miles. The interior is mountainous, the volcano Pico de Colima being the highest point (10,800 feet); the plains are fertile, and produce sugar, rice, cacao, cotton, and tobacco. Capital, Colima. Pop. in 1871, 48,649.

Colima, a town of the Mexican republic, capital of the state of Colima, is about 250 miles W. of Mexico. It is situated in a fertile plain. Its port is on the Pacific Ocean, about 30 miles S. W. of Colima. Pop. 31,000.

Colise'um, or **Colosse'um** [supposed to have taken its name from a colossal statue of Nero which stood near the Flavian Amphitheatre], a name of the Flavian Amphitheatre in Rome, now one of the most magnificent ruins in the world. (See AMPHITHEATRE.)

Col'lamer (JACOB), LL.D., an American lawyer and Senator, born at Troy, N. Y., in 1792. He emigrated to Vermont in his youth, graduated in 1810 at the University of Vermont, was admitted to the bar in 1812, and became eminent in his profession. He was a judge of the supreme court of Vermont from 1833 to 1841, was elected a member of Congress in 1843, 1844, and 1846, and was appointed postmaster-general by President Taylor in Mar., 1849. In July, 1850, he resigned in consequence of the death of Taylor. He was elected a U. S. Senator in 1854, and re-elected in 1860. Died Nov. 9, 1865.

Collarino. See ASTRAGAL.

Collat'eral Security, an additional and separate security given for the repayment of borrowed money or for the performance of an obligation. A person who borrows money often gives a promissory note signed by himself, and deposits in the hands of the lender a note or notes signed by another party, or other property, such as stocks of corporations, or even tangible chattels. These collateral notes or other items of property are to be returned if the loan is repaid.

Colla'tion [from the Lat. *confero, collatum,* to "bring together"]. This is a doctrine of the civil or Roman law whereby an heir returns property that he has already received to the estate under which he claims to receive his share, so as to make it a part of the fund for distribution, or, in technical language, of the succession. It resembles the doctrine of advancement as applied in the common law of England in case of intestacy. An important rule is that an heir is not bound to make collation if he does not choose to share in the estate. The doctrine of collation is not applied to the case of purchases by an heir for a valuable consideration, but simply to that portion of the estate which he has received in advance of his share.

Collea'ta, a post-township of Clay co., Ala. Pop. 411.

Col'lect [Lat. *collecta*], a term applied to certain short prayers in church liturgies adapted to particular days or occasions, perhaps because of the brevity of such prayers, the matter of the epistle and gospel being *collected* into the collect of the day. The word is thought by some to have originated from an ancient practice of the minister collecting the previous devotions into a brief prayer at the end of the service; accordingly, one of the service-books of the ancient Catholic Church was called "Collectarium." According to others, all Christian assemblies were once called *collecta,* which term came to be limited to the prayers offered up in such meetings. Some of the collects used in the Anglican Church are taken from the old Roman Missal, and were probably, to a very considerable extent, the composition of Saint Jerome.

Col'lege [Lat. *collegium,* an "association," from *collega,* a "partner;" akin to the word *colligo,* to "collect"]. A college was originally any association of men for some common purpose. In ancient Rome there were colleges of tribunes, of quæstors, and of other officials for political purposes; of various classes of priests for religious objects; and of craftsmen in the several departments of industry for their common advantage. In modern nations the term college has been applied to organizations for a great variety of purposes. The most familiar use of the word, aside from its connection with educational institutions, is in the phrases "College of Cardinals" at Rome, and "College of Electors" for President and Vice-President of the U. S.

But for several centuries the name college has been given almost exclusively to institutions for promoting the higher education. A distinguished writer thus explains this use of the name: "A college, in the modern sense of that word, was an institution which arose within a university—probably within that of Paris or Oxford first—being intended either as a kind of boarding-school or for the support of scholars destitute of means, who were here to live under particular supervision. By degrees it became more and more the custom that teachers should be attached to these establishments. And as they grew in favor they were resorted to by persons of means who paid for their board; and this to such a degree that at one time the colleges included nearly all the members of the University of Paris. In the English universities the college may have been first established by a master, who gathered pupils around him, for whose board and instruction he provided. As his scholars grew in number, he associated with himself other teachers, who thus acquired the name of *fellows.* Thus it naturally happened that the government of colleges, even of those which were founded by the benevolence of pious persons, was in the hands of a principal called by various names, such as rector, president, provost, or master, and of fellows, all of whom were resident within the walls of the same edifices where the students lived. When charitable munificence went so far as to provide for the support of a greater number of fellows than was needed, some of them were entrusted, as tutors, with the instruction of the undergraduates, while others performed various services within the college or passed a life of learned leisure."

The two great universities of England are now composed of several colleges, each of which has an organization very similar to that above described. Every college has its separate government, and all are united in the common government of the university. Nearly all the students of the university connect themselves with some college, and most of the instruction is provided by the colleges, but all degrees are conferred by the university. The original idea of the college was a community where students should *live together in common,* and the provision for their instruction was, in many cases at least, a later addition.

When the early settlers of New England founded the first college in the New World, they took as their model the institution with which many of them had become familiar during their university-life at Oxford or Cambridge. They fixed the period of study at four years, and prescribed a uniform course of studies. A president, a board of fellows, and a bursar (*i. e.* treasurer) were to reside at the college, and to be charged with its government and management. In the course of time the board of president and fellows came to exercise government without instruction, and the fellows ceased to be resident at the college. In this way, probably, the term "fellow" came to have its peculiar and inappropriate meaning in connection with the government of a college.

In the external organization of American colleges there is a general adherence to one controlling idea. An incorporation, usually organized under a special charter, is entrusted with the control of the college property, and is authorized to appoint all instructors, to make laws and regulations for the government of the college, and to confer degrees. The members of the corporation are variously styled fellows, trustees, regents, or managers. In some cases the board is self-perpetuating, the members being authorized to select their own associates and successors. In other cases particularly in the State universities, the

appointing power is vested in some branch of the State government. In others, still, the graduates of the college elect some fixed portion of the corporation. In many instances the governor and other State officials are *ex-officio* members of the corporation.

The distinction between a college and a university has always been maintained in England and elsewhere in Europe, but in the U. S. this distinction has been generally disregarded, and the more comprehensive name university has frequently been given to an institution hardly worthy to be called a college. Most of the so-called universities in this country are in no respect different from colleges, while some colleges might properly claim the appellation university.

Many of the American colleges, including most of those founded before the present century, were designed especially to train men for the ministry. The motto of Harvard University clearly shows this design. The course of study in the earlier colleges was arranged with reference to this leading purpose. A century ago the studies pursued were Latin (which was required to be the *spoken* language among the students), the Greek Testament, and mathematics of very limited range; while logic, metaphysics, rhetoric, oratory, and divinity received special attention in the latter part of the course. In the earlier part of the eighteenth century this last-mentioned class of studies occupied the largest portion of the student's time. Towards the close of that century increasing attention was given to natural philosophy and astronomy. Modern languages and physical and political sciences had no place in the curriculum until several years of the present century had passed, and history has been quite recently introduced. Until about the year 1840, Greek, Latin, and mathematics formed the principal part of what was termed a liberal education. Chemistry, mineralogy, and geology had gained a recognition, but were kept chiefly in the background. About the time referred to there became manifest a growing dissatisfaction with the established routine of studies, and many began to inquire whether some improvement upon that routine was not both desirable and practicable. All students, whatever might be the variety in their tastes, their acquirements, or their abilities, were required to pursue the same unvarying course, and to advance by fixed classes at a uniform rate of progress. The question began to be asked whether some variation from the prescribed routine might not profitably be introduced, and whether it was expedient for all to pursue the same course, without regard to their proposed future occupations. The development of the physical sciences, and the increasing demand for engineers and for men able to apply science to the affairs of practical life, induced many to seek a different kind of education from that given in the existing colleges. The studies long pursued were represented as too abstract, too little connected with the requirements of the present age.

Various methods were proposed for meeting the evident demands of the times. Some favored the transformation of the existing colleges by substituting new kinds of studies for those so long pursued. Some proposed to add new studies to the old in the same institutions. Others would have parallel courses of study, with liberty to each student to select from these courses that which most accorded with his tastes or his proposed occupation. Still others would have new colleges founded expressly and exclusively for the "new education." Each of these methods except the first has been practically tried. In no case has the old curriculum been cast aside. It meets the wants of a very large class of students, and its utility has been too long and too thoroughly tested. And yet it was no longer sufficient. New subjects of interesting and profitable study had risen to notice; new sciences had been created within a half century. There was no good reason why these should not have a recognized place in the arrangements for the higher education. Young men were interested in them, and saw them to be useful and profitable. The change was inevitable, and it has come forward with increasing power during the last thirty years.

The change first proposed was that of introducing elective studies. The student was to choose among certain studies such as he preferred. This selection was liable to disregard *system*, and the studies chosen in this way could hardly constitute a *course* of study. Much knowledge of the chosen branches might be acquired, but it would hardly constitute a thorough or liberal education. This kind of elective system, instead of elevating a college, tended rather to depress the standard of learning within it, and to render it less useful to the community, and practically it did not attract an increasing number of students, as was anticipated. A system not unlike this was established in the University of Virginia when it was opened to students in 1825. This entire freedom in the choice of studies was a favorite idea of Thomas Jefferson, and the last years of his life were devoted to the establishment of that university, in which his idea should be practically tested. Each student pursues the studies of one or more of the "schools" of the university, and continues to do so as long and as far as he chooses. Degrees are given in each school separately to those only who pass the prescribed examination. Comparatively few of the large number of students take any degree. The amount of knowledge imparted is doubtless large, but much of it is in studies which at some colleges are considered preparatory.

Another method of promoting variety and comprehensiveness in college studies has been that of arranging several *courses* of study in the same institution, and permitting each pupil, after due consideration and with the best attainable advice, to select that course which is adapted to his tastes and purposes. It is claimed for this method that it allows each to study that in which he is interested, and for which he expects soon to have some practical use, and that this greater interest and immediate utility will ensure earnestness and thoroughness of study. At the same time, as the choice is to be made from among several *courses* of study, and not from isolated studies, the education thus attained is claimed to have a good degree of unity and of completeness in the chosen department of knowledge. This method may be regarded as an application to education of the principle of the division of labor. One essential difference between the so-called "old" and "new" educations is that the former lays the principal stress on mental development, culture, and discipline, which may afterwards be directed into such course of active life as shall be chosen, while the latter undertakes the immediate preparation of the student for his intended occupation, and makes the acquirement of mental discipline and culture merely an incidental result of the studies proposed. The old way proposed first to discipline the mind, then to teach it to use its powers; the new way proposes to do both at once—to acquire the discipline while learning to do, and actually beginning to do, that which is to occupy the life. This latter way accords with the natural desire of young men to enter early into the activities and excitements of life. In the restless onward movement of this New World this way of preparation for life-work will inevitably attract large numbers. In the newer States, especially, the impulse is to *do*, rather than to spend years in *learning* to do. Most of those States have established State universities, the general government having given to them large tracts of land for their endowment. But few of these institutions have as yet become prominent, though their prospective resources, growth, and influence are full of promise. In these universities there are usually several projected courses of study, with the design of providing for all the various educational wants of the commonwealth. As the institutions are still young and undeveloped, they have not yet shown how much they will be able to do. Each of them adopts its own method of classification and instruction, but all agree in the endeavor to include a very wide range of studies. This kind of "university system" has slight resemblance to the systems pursued in the universities of England and Germany. It has grown out of the peculiarities and necessities of the American people, and has been adopted because it is believed to be suited to their needs. No well-adapted system can be transferred, ready made, from one country or age to another. All American colleges are modifications of the first college at Cambridge, but all of them differ from that and from each other. And so the many young universities endeavor to suit their instructions to the present wants of those who resort to them. The chief of those wants is a speedy and economical preparation for some active employment. This implies an almost exclusive attention to what pertains to that employment. He who proposes to be an engineer studies engineering, but wastes no time upon Latin or Greek. He who is to be engaged in mining acquaints himself with chemistry, geology, mineralogy, and metallurgy. This attention to some particular department of knowledge is one of the present peculiarities of technical and scientific education in this country. As no man can acquire all knowledge, each becomes a specialist in his own department, and no one "takes all knowledge for his province." Not only in the newer States, but in the older ones also, this method is pursued. The older colleges—even the oldest of all—are swerved from their former courses by this powerful impulse of the times. The past four years (since 1869) have witnessed the introduction of extended elective courses into the ancient university at Cambridge. Nearly all the older colleges have long given their students a limited range of elective studies during the last half of their course. But this recent innovation at Harvard extends the elective element through three-fourths of the whole term of study. What the effect will be upon the future

career and influence of that venerable institution it is yet too soon to affirm. This movement for giving change and variety to college studies has even reached that very ancient and conservative institution, the University of Oxford in England. For generations and centuries classic learning—*i. e.* Latin and Greek—has there reigned supreme, but this supremacy of the long past has at length been broken. Early in 1872 the statutes of the university respecting examinations were amended by the proper authority in such a manner as to include mathematics, natural science, jurisprudence, modern history, and theology among the branches in which candidates for honors and degrees shall be examined, and to give the candidates a wide range of both subjects and authors in which they may propose to pass examination. The latitude of election is even greater than in most American institutions.

Besides the introduction of elective courses of study into many of the colleges and universities of the U. S., there have been established other colleges for exclusively scientific and practical studies. Some of these have been organized as separate departments of existing colleges; others are wholly distinct from other institutions. Of the first class, the Sheffield Scientific School, connected with Yale College, is by common consent the foremost. Of the second, the agricultural and industrial colleges endowed by Congressional grants, and established since 1862, are the most important.

The changes in collegiate studies within thirty years past are due very largely to the rapid development of the physical sciences. Material things, their qualities, properties, and relations, have been studied more thoroughly and effectively by the present generation than by all that had gone before. In former times science has been employed largely upon speculative or purely intellectual subjects. But the science of nature, as distinct from the science of man or of mind, now claims the chief attention. And yet the older science has never been abandoned. Vast as is the domain which invites the examination of the physical scientist, and widely as he may extend his investigations, there is another domain which they cannot touch. The new education has asserted its right to recognition, and that right has been conceded; but the old education has not been abandoned, and never can be, for the material world is but a part of that with which human knowledge is concerned. For the time, physical sciences are most conspicuous, and they may even appear to supersede all other branches of knowledge. New colleges and universities may give them pre-eminence, and may set aside old themes of thought and study as obsolete. Relatively, these sciences will undoubtedly continue to be more important than in former ages; but the spirit of adaptation to the changing wants of successive periods, which is now evident in the oldest and most conservative universities, will unquestionably adhere to the colleges of the future. No man can presume to say what developments of knowledge are yet to appear, but whatever they shall be, the educated men of coming generations will modify their views of education in accordance with them. When the States now young shall have become older, it is reasonable to believe that increase of wealth and leisure will bring increased desire for thoroughness and completeness of knowledge, and that the colleges and universities of those States will provide for that more perfect education. Times and opinions will change, and colleges will change with them. There will be hereafter distinctively American universities. They will be unlike those of any former time or country, but will be of and for the American people.

The necessity which now compels scholars to resort to Europe to complete their studies will not always continue. The beginning has already been made of post-graduate courses of study, in which students shall be encouraged to perfect themselves in their education, taking the requisite time therefor, instead of hastening to put their half-acquired education to practical use and pecuniary profit, and contenting themselves with a superficial knowledge of that which time and study would enable them to acquire thoroughly. The establishment of fellowships for the support of post-graduate students through a prolonged and thorough course of study has in it the promise of rich results to American scholarship in future generations.

There have been very marked changes in the government and discipline of colleges since the beginning was made at Cambridge in 1636. At first, as was inevitable, the mode of governing them was an exact imitation of that prevailing in the English universities at the beginning of the seventeenth century. This mode was but slightly modified till the Revolution. When the colonies became States, the change was felt through all their institutions. Until the spirit of liberty animated the colonists to shake off their dependency the fines, the tasks, the bondage of the lower classes to the higher, and the corporal punishments of English colleges were retained. The students were doubtless younger, on the average, in those early times than now, but the sentiment of authority was also stronger, and the practice of severity far more common. It was not uncommon for an offending student to be condemned to have his ears boxed by the president! The change in this respect is certainly an improvement. Regularity of attendance is still secured generally by a system of monitorships for marking or recording the presence or absence of students at public exercises. In the so-called university system attempts are now made to dispense with all such records of attendance, and to leave each one to follow his own choice in this matter, on the assumption that a willingness to be present will control all who have any desire for learning. The voluntary systems of the Old-World universities are appealed to as proof that compulsory attendance is unnecessary. Whether the altered conditions involved in the difference of age and mental discipline do not render this appeal inappropriate, experience will determine.

The custom of recording the degree of merit in each recitation of every student prevails generally in American colleges. One of the youngest of the so-called universities announces its utter rejection of this custom, and its reliance upon the love of learning rather than the spirit of emulation, or the desire for college rank and honors, as the leading motive for scholarship. This, too, is an innovation, the excellence or defect of which must be decided by experience. College examinations, from that of candidates for admission till the final trial of those about to graduate, are now conducted usually in writing, the same test being applied to an entire class at the same time. The justice of this method is so obvious that the admissibility of any other can hardly be considered. And yet the first examination of this kind in an American college was held not far from 1850.

The question whether women shall not be admitted to all the privileges of the long-established colleges has of late excited much interest. That they should have an opportunity for as thorough and extensive education as the other sex is now very generally conceded. That they have mental ability fully equal no teacher of children can doubt. The establishment of colleges expressly for them, where they are trained in the highest studies that men pursue, is proof that their claims to this highest education are practically admitted. But the question is, Shall they be admitted into the same colleges with men? The original theory of a college, as a place where students should live together in common as one family, necessarily excluded them. But since the present idea of a college is essentially different from the original one, there is now a possibility of so modifying the old colleges as to admit women to their privileges. The State universities, and some other colleges of recent origin, provide for their admission. The same instructors, library, and apparatus can serve for both classes of students as well as for one. There is a claim of *justice* upon the State universities not to limit their benefits to one half of the people, where all have equal rights. When colleges were monkish institutions they were necessarily for men alone. But men and women are associated in all other periods of life; why not, therefore, while they are receiving their education? There must be some differences, for women cannot be expected to build railroads or to manage coal or iron mines, but the principal part of education may be the same for both sexes. The knowledge to be acquired is the same; the difference is only in certain uses or applications of it.

The number of students in American colleges, and the number of institutions to which that name may properly be given, it is not easy to ascertain. Below is given a carefully prepared list of colleges. A perfectly accurate list has been repeatedly attempted, but never secured. The number of students in some colleges includes those in preparatory departments, who are not properly college students. The number who propose to receive the degree of Bachelor of Arts, according to the usage of former times, is relatively smaller than it was a generation or two ago. The changes in the studies and the objects of study within a few years—of which this article has given a brief outline—explains this admitted fact. The students have chosen a different course, because the times have demanded it. They have done what was set before them to be done. There is no less devotion to learning now than in former times, but a different kind of learning is required of many. Knowledge is wider and deeper and more various than in any previous age, and is destined to grasp truths and principles yet unthought of. American colleges will hold fast all old truths, and will welcome and appropriate and utilize all that is new as fast and as far as it is proved to be truth. *All kinds* of truth will be accepted, for all truths in their foundation and their origin are one.

JOHN G. BAIRD *Asst. Sec. Conn. Board of Education.*

TABLE I.—*Colleges of the U. S. incorporated and empowered by Charter to confer Degrees in Arts.*

NAME.	Location.	Denomination.	Organized.	President.
University of Alabama	Tuscaloosa, Ala	None	1831	Nathaniel T. Lupton, A. M.
Howard College	Marion, "	Baptist	1837	Col. J. T. Murfee.
East Alabama College	Auburn, "	Meth. Episcopal		
Southern University	Greensborough, Ala	" "		Rev. A. S. Andrews, D. D.
Talladega College	Talladega, "	Am. Miss. Ass	1869	A. A. Safford (Prin.).
St. John's College	Little Rock, Ark	Masonic	1857	O. C. Gray, A. M.
Cane Hill College	Boonsborough, Ark	Cum. Presbyterian	1868	Rev. F. R. Earle, A. M.
University of California	Berkeley, Cal	State	1855	Daniel C. Gilman, A. M.
Pacific Methodist College	Santa Rosa, Cal	Meth. Epis., South	1861	A. L. Fitzgerald, A. M.
University College	San Francisco, Cal	Presbyterian	1859	Rev. Wm. Alexander, D. D.
University of the Pacific	San José, "	Meth. Episcopal	1852	Rev. A. S. Gibbons, A. M.
St. Augustine College	Benicia, "	Prot. Episcopal	1868	Rev. William P. Tucker, A. M.
San Rafael College	San Rafael, "		1869	Alfred Bates.
Sonoma College	Sonoma, "		1858	Rev. W. N. Cunningham.
College of California	Vacaville, "	Baptist	1870	M. Baily, A. M.
Petaluma College	Petaluma, "	"	1866	Mark Baily, A. M.
Hesperian College	Woodland, "	Christian		J. N. Pendegast.
Colorado College	Golden City, Col.			
Yale College	New Haven, Conn	Congregational	1700	Rev. Noah Porter, D. D., LL.D.
Wesleyan University	Middletown, "	Meth. Episcopal	1831	Rev. J. Cummings, D. D., LL.D.
Trinity College	Hartford, "	Prot. Episcopal	1823	Rev. A. Jackson, D. D., LL. D.
Brandywine College	Brandywine, Del.			
Delaware Agricultural College	Newark, "		1833	
Delaware College	Newark, "	State	1870	William H. Purnell, A. M.
Emory College	Oxford, Ga	Meth. Epis., South	1838	Rev. O. L. Smith, D. D.
University of Georgia	Athens, "	State	1801	Rev. A. A. Lipscomb, D. D., LL.D.
Mercer University	Macon, "	Baptist	1838	Rev. A. J. Battle.
Oglethorpe University	Atlanta, "	Presbyterian	1835	Rev. David Wills, D. D.
Marshall College	Griffin, "	Baptist	1854	J. M. Bonnell.
Atlanta University (colored)	Atlanta, "		1869	E. A. Ware, A. M.
Masonic College	Covington, Ga.			
Bowdon College	Bowdon, "	None	1856	Rev. F. H. M. Henderson, A. B.
Wheaton College	Wheaton, Ill	Congregational	1855	Rev. J. Blanchard, A. M.
Lombard University	Galesburg, Ill	Universalist	1857	Rev. William Livingston, A. M.
Knox College	" "	Congregational	1841	
Abingdon College	Abingdon, "	Christian	1855	J. W. Butler, A. M.
Illinois Wesleyan University	Bloomington, Ill	Meth. Episcopal	1857	Rev. O. S. Munsell, D. D.
Eureka College	Eureka, "	Christian	1852	A. M. Weston (acting).
Illinois Soldiers' College	Fulton, "		1867	L. H. Potter.
North-western University	Evanston, "	Meth. Episcopal	1854	Rev. C. H. Fowler, D. D.
Monmouth College	Monmouth, "	United Presbyterian	1856	Rev. David A. Wallace, D. D., LL.D.
Jubilee College	Robin's Nest, "	Prot. Episcopal	1847	Rt. Rev. H. P. Whitehouse.
Illinois College	Jacksonville, "	Congregational	1830	Rev. J. M. Sturtevant, D. D.
Shurtleff College	Upper Alton, "	Baptist	1835	Rev. A. A. Kendrick, D. D.
McKendree College	Lebanon, "	Meth. Episcopal	1828	Rev. Robert Allyn, D. D.
Southern Illinois College	Carbondale, "		1856	
Lincoln University	Lincoln, "	Cum. Presbyterian	1866	Rev. J. C. Bowdon, D D.
Chicago University	Chicago, "	Baptist	1859	Rev. J. C. Burroughs, D. D., LL.D.
Illinois Industrial University	Urbana, "		1868	J. M. Gregory, LL.D.
Quincy College	Quincy, "	Meth. Episcopal	1854	
Marshall College	Henry, "		1855	
Augustana College	Paxton, "	Lutheran	1860	Rev. T. N. Hasselquist, D. D.
Westfield College	Westfield, "	U. Breth. in Christ	1867	Rev. S. B. Allen, A. M.
Lake Forest College	Lake Forest, "			
North-west College	Naperville, "	Evangelical Asso	1861	Rev. A. A. Smith, A. M.
Howard College.				
Mendota College	Mendota, "	Lutheran		Rev. J. W. Corbet, A. M.
Blackburn University	Carlinville, "	Presbyterian	1867	Rev. J. W. Baily, D. D.
Freeport College	Freeport, "	"	1872	Rev. W. D. F. Lummis, A. M.
Indiana University	Bloomington, Ind	None	1828	Rev. Cyrus Nutt, D. D.
Indiana Asbury University	Greencastle, "	Meth. Episcopal	1835	Rev. R. Andrews, D. D.
Moore's Hill College	Moore's Hill, "	" "	1854	Rev. F. A. Hester, D. D.
North-western Christian Univ	Indianapolis, "	Christian	1854	Rev. W. F. Black, A. M.
Wabash College	Crawfordsville, "	Presbyterian	1834	Rev. Joseph F. Tuttle, D. D.
Union Christian College	Merom, "	Christian	1858	Rev. Thomas Holmes, D. D.
Earlham College	Near Richmond, Ind	Friends (Orthodox)	1859	Joseph Moore, A. M.
Brookville College	Brookville, "	Meth. Episcopal	1853	Rev. —— Johns, A. M.
Hartsville University	Hartsville, "	United Brethren	1851	J. W. Scribner, A. M.
Hanover College	Hanover, "	Presbyterian	1853	Rev. G. C. Hickman, D. D.
Rockport College	Rockport, "	Meth. Episcopal		Rev. —— Cully, A. M.
Purdue College	Lafayette, "			Richard Owen.
Fort Wayne College	Fort Wayne, "	Meth. Episcopal	1846	Rev. Levi Beers, A. B.
De Pauwe College	New Albany, "	" "	1850	Rev. E. Rowley, D. D.
Concordia College	Fort Wayne, "	Lutheran	1850	Rev. W. Sihler, Ph. B.
Salem College	Bourbon, "	Baptist	1870	O. W. Miller, A. M.
Howard College	Kokoma, "	None	1869	John O. Hopkins, A. B. (acting).
Simpson Centenary College	Indianola, Ia	Meth. Episcopal	1867	Rev. A. Burns, D. D.
Iowa State University	Iowa City, "	None	1860	Rev. George Thacher, D. D.
Norwegian Lutheran College	Decorah, "	Lutheran	1861	Prof. L. Larsen.
Central University of Iowa	Pella, "	Baptist	1854	Rev. L. A. Dunn.
Cornell College	Mount Vernon, Ia	Meth. Episcopal	1857	Rev. W. F. King, D. D.
Iowa Wesleyan University	Mount Pleasant, "	" "	1855	Rev. John Wheeler, D. D.
Burlington University	Burlington, "	Baptist	1853	L. S. Wortman, A. B. (Prin.).
Griswold College	Davenport, "	Prot. Episcopal	1859	Rev. E. Lounsbery, A. M.
Whittier College	Salem, "	Friends	1867	Henry Dorland.
Iowa College	Grinnell, "	Congregational	1848	Rev. G. F. Magoun, D. D.
Upper Iowa University	Fayette, "	Meth. Episcopal	1858	Roderick Norton, A. M.
Iowa Lutheran College	Albion, "	Lutheran	1860	
Washington College.				
Tabor College	Tabor, "	Congregational	1866	Rev. W. M. Brooks, A. M.
Fairfield College	Fairfield, "	Lutheran	1858	William Brush, A. M.
Humboldt College	Humboldt, "	None	1869	Rev. S. H. Taft.
Oskaloosa College	Oskaloosa, "	Christian		
Washburn College	Topeka, Kan	Congregational	1865	Rev. P. McVicar, D. D.
Baker University	Baldwin City, Kan	Meth. Episcopal	1857	Rev. R. L. Harford, D. D.
State University	Lawrence, "	State	1864	John Fraser, A. M.
Irving College	Irving, "			
State Agricultural College	Manhattan, "	State	1863	Rev. Jos. Denison, D. D.
Lincoln University	Topeka, "	Presbyterian.		
Ottawa College	Ottawa, "			
Manhattan College.				
Lecompton College.				
Hope College.				
Highland University	Highland, "	Presbyterian	1859	Rev. T. H. Dinsmore, A. M.

TABLE I.—*Colleges of the U. S. incorporated and empowered by Charter to confer Degrees in Arts.*—Continued.

NAME.	Location.	Denomination.	Organized.	President.
Kentucky University	Lexington, Ky	Christian	1858	John B. Bowman, A. M. (regent).
Bethel College	Russellville, Ky	Baptist	1856	Noah K. Davis, LL.D.
Berea College	Berea, "		1858	Rev. E. H. Fairchild.
Georgetown College	Georgetown, "	Baptist	1838	Rev. B. Manly, D. D.
Centre College	Danville, "	Presbyterian	1819	O. Beatty, LL.D.
Kentucky College	Harrodsburg, "	Christian	1858	
Shelby College	Shelbyville, "			
Augusta College	Augusta, "	Meth. Episcopal.		
Bacon College	Harrodsburg, "		1836	
Eminence College	Eminence, "		1856	Prof. W. S. Giltner.
Centenary College	Jackson, La	Meth. Epis., South.	1825	Rev. C. G. Andrews, A. M.
Louisiana State University	Baton Rouge, La	None	1860	Col. D. F. Boyd.
Mount Lebanon University	Mount Lebanon, La	Baptist	1853	
Straight University	New Orleans, "	Evangelical	1869	Rev. J. W. Healey, D. D.
Baton Rouge College	Baton Rouge, "		1838	
Franklin College	Opelousas, "		1839	
Leland University	New Orleans, "	Baptist		E. E. S. Taylor, D. D.
Bowdoin College	Brunswick, Me	Congregational	1798	J. L. Chamberlain, LL.D.
Colby University	Waterville, "	Baptist	1820	Rev. —— Robbins, D. D.
Bates College	Lewiston, "	Free-Will Baptist	1863	Rev. A. B. Cheney, D. D.
State Agricultural College	Orono, "		1865	Rev. Charles F. Allen, D. D.
St. John's College	Annapolis, Md	State	1789	James M. Garnett, A. M.
Washington College	Chestertown, Md	"	1782	R. C. Berkeley, A. M.
St. James's College	Washington co., Md	Prot. Episcopal	1842	
West Maryland College	Westminster, "	Methodist	1868	Rev. James T. Ward, D. D.
Maryland Agricultural College	Hyattsville, "		1856	Rev. Samuel Regester, D. D.
Frederick College	Frederick, "	State	1797	J. S. Bonsall, A. M.
Williams College	Williamstown, Mass	Congregational	1793	P. A. Chadbourne, A. M.
Tuft's College	College Hill, "	Universalist	1855	Rev. A. A. Miner, D. D.
Amherst College	Amherst, "	Congregational	1821	Rev. William A. Stearns, D. D.
Harvard University	Cambridge, "	None	1638	Charles W. Eliot, LL.D.
Agricultural College	Amherst, "	State	1870	Col. W. S. Clark.
Olivet College	Olivet, Mich	Cong. and Presb.	1859	J. H. Hewitt, A. M.
University of Michigan	Ann Arbor, Mich	None	1841	J. B. Angell, LL.D.
Kalamazoo College	Kalamazoo, "	Baptist	1855	Rev. Kendall Brooks, D. D.
Albion College	Albion, "	Meth. Episcopal	1860	George B. Jocelyn, D. D.
Hillsdale College	Hillsdale, "	F. Baptist		Rev. D. M. Graham, D. D.
Adrian College	Adrian, "	Meth. Episcopal	1858	A. H. Lowrie, A. M.
Hope College	Holland, "			
Grand Traverse College	Benzonia, "			
University of Minnesota	Minneapolis, Minn	State	1868	William W. Folwell, A. M.
Hamline University	Red Wing, "	Meth. Episcopal	1856	Jabez Brooks, A. M., D. D.
Carleton College	Northfield, "	Congregational	1866	Rev. J. W. Strong, D. D.
Mississippi College	Clinton, Miss	Baptist	1851	Rev. Walter Hillman, A. M.
University of Mississippi	Oxford, "	State	1848	Rev. J. A. Waddell, D. D.
Madison College	Sharon, "	None	1851	John S. Robinson.
Oakland College	Oakland, "	Presbyterian	1830	W. L. Breckenridge, D. D.
Jefferson College	Washington, Miss		1813	
Alcorn University (colored)	Jackson, "		1871	Hon. Henry R. Revels.
Tongaloo University	Tongaloo, "		1870	H. J. Steele (Prin.).
University of Missouri	Columbia, Mo	State	1840	Daniel Read, LL.D.
Washington University	St. Louis, "	None	1857	Rev. W. G. Eliot, D. D.
William Jewell College	Liberty, "	Baptist	1848	Rev. Thomas Rambant, S. T. D., LL.D.
Westminster College	Fulton, "	Presbyterian	1852	Rev. A. L. Rice, D. D.
Jefferson City College	Jefferson City, Mo	Prot. Episcopal	1867	W. H. D. Hatton.
Lewis College	Glasgow, "	Meth. Episcopal	1867	J. C. Hall, A. M.
Mount Pleasant College	Mount Pleasant,"	Baptist	1855	
Christian College	Canton, "	Christian.		
Central College	Fayette, "	Meth. Epis., South.	1871	Rev. J. C. Wills, A. M.
Pardee College	Louisiana, "			
College of Missouri	Kidder, "			
Masonic College	New Palmyra, "		1831	
St. Charles College	St. Charles, "	Meth. Episcopal	1837	
Lindenwood College	Near St. Charles,"	Presbyterian	1858	French Strother.
McGee College	College Mound, "	Cum. Presbyterian	1853	Rev. J. B. Mitchell, D. D.
Grand River College	Edinburgh, "		1858	J. E. Vertrees.
Lincoln College	Greenwood, "	UnitedPresbyterian		Rev. M. M. Brown, A. M.
Hannibal College	Hannibal, "	Meth. Epis., South.	1868	Rev. L. Baier, A. M.
Johnson Male and Female College	Macon City, "	Meth. Episcopal		Rev. E. W. Hall, A. M.
St. Paul's College	Palmyra, "	Prot. Episcopal	1848	J. A. Wainwright, A. M., M. D.
Bethel College	" "		1848	Rev. W. B. Corbin.
Nebraska State College	Nebraska City, Neb	Prot. Episcopal	1863	Rev. John McNamara, D. D.
Congregational College	Fontenelle, "	Congregational.		
Dartmouth College	Hanover, N. H	"	1770	Rev. Asa D. Smith, D. D., LL.D.
College of New Jersey	Princeton, N. J	Presbyterian	1748	Rev. James McCosh, D. D., LL.D.
Rutgers College	New Brunswick, N. J	Reformed	1771	Rev. W. H. Campbell, D. D., LL.D.
Burlington College	Burlington, "	Prot. Episcopal	1846	Rt. Rev. Wm. H. Odenheimer, D. D.
St. Lawrence University	Canton, N. Y	Universalist	1856	A. G. Gaines (acting).
Alfred University	Alfred, "	Seventh-Day Bapt	1836	Rev. Jonathan Allen.
Hamilton College	Clinton, "	Presbyterian	1812	Rev. S. Gilman Brown, D. D., LL.D.
University of Rochester	Rochester, N. Y	Baptist	1850	Martin B. Anderson, LL.D.
Cornell University	Ithaca, "	None	1868	Andrew D. White, LL.D.
Union University	Schenectady, N. Y	"	1795	Rev. E. N. Potter, D. D.
University of the City of N. York.	New York City, "	"	1831	Rev. Howard Crosby, D.D., LL.D. (Chan.).
Columbia College	" " "	Prot. Episcopal	1754	F. A. P. Barnard, S. T. D., LL.D.
Hobart College	Geneva, "	"	1824	Rev. M. Van Rensselaer, D. D.
Madison University	Hamilton, "	Baptist	1832	Rev. E. Dodge, D. D., LL.D.
St. Stephen's College	Annandale, "	Prot. Episcopal	1858	R. B. Fairbairn, D. D.
College of the City of New York	New York City, "	None	1866	Alexander S. Webb, LL.D.
Martin Luther College	Buffalo, "	Lutheran	1853	
Syracuse University	Syracuse, "	Meth. Episcopal	1871	Alexander Winchell, LL.D. (Chan.).
Wake Forest College	Wake Forest, N. C	Baptist	1833	Rev. W. W. Wingate, D. D.
Davidson College	Davidsonville, "	Presbyterian	1837	J. K. Blake (chairman).
University of North Carolina	Chapel Hill, "		1795	Rev. Solomon Pool.
Trinity College	Trinity, "	Meth. Epis., South.	1852	Rev. B. Craven, D. D.
Olin College	Iredell co., "		1853	James Southgate.
North Carolina College	Mount Pleasant, N. C	Lutheran	1859	L. A. Bickle, A. M.
Rutherford Male and Female Col.	Excelsior, "	None	1870	Rev. R. L. Abernathy, A. M.
Santa Fé University	Santa Fé, N. Mex	Presbyterian	1870	Rev. D. F. McFarland.
Marietta College	Marietta, Ohio	None	1835	Rev. Israel W. Andrews, D. D.
Western Reserve College	Hudson, "	"	1827	Rev. Carroll Cutter, A. M.
Denison University	Granville, "	Baptist	1831	
Kenyon College	Gambier, "	Prot. Episcopal	1826	Eli T. Tappan, A. M.
Wittenberg College	Springfield,"	Evan. Lutheran	1845	Rev. S. Sprecher, D. D.

TABLE I.—*Colleges of the U. S. incorporated and empowered by Charter to confer Degrees in Arts.*—Continued.

NAME.	Location.	Denomination.	Organized.	President.
Willoughby College	Willoughby, Ohio	Meth. Episcopal	.....	L. T. Kirk.
Harlem Springs College	Harlem Springs, Ohio	.....	1867	Robert H. Hovey, B. S.
Ohio Wesleyan University	Delaware, "	Meth. Episcopal	1845	Rev. F. Merrick.
Muskingum College	New Concord, "	.....	1837	Rev. David Paul, A. M.
Miami University	Oxford, "	State	1824	Rev. A. D. Hepburn.
Oberlin College	Oberlin, "	Congregational	1833	Rev. James H. Fairchild, D. D.
Ohio University	Athens, "	.....	1804	W. H. Scott (acting).
Otterbein University	Westerville, "	United Brethren	1847	Rev. H. A. Thompson, A. M.
Urbana University	Urbana, "	Swedenborgian	1851	Rev. F. Sewall, A. M.
Antioch College	Yellow Springs, "	Un. Congregational	1853	
Wilberforce University (colored)	Near Xenia, "	Af. Meth. Episcopal	1856	Rt. Rev. D. A. Payne, D. D.
German Wallace College	Berea, "	Meth. Episcopal	1864	William Nast, D. D.
Xenia College	Xenia, "	" "	1850	William Smith, A. M.
Mount Union College	Mount Union, "	" "	1858	O. N. Hartshorn, LL.D.
Farmers' College	College Hill, "	" "	1846	Charles D. Curtiss.
Heidelberg College	Tiffin, "	Reformed	1850	G. W. Willard, D. D.
Richmond College	Richmond, "	None	1835	L. W. Ong, A. M.
Baldwin University	Berea, "	Meth. Episcopal	1856	Rev. W. D. Godman, D. D.
University of Wooster	Wooster, "	Presbyterian	1870	Willis Lord, D. D.
Franklin College	New Athens, "	Pres. and Un. Pres.	1825	A. F. Ross, LL.D.
Capitol University	Columbus, "	Lutheran	1850	Rev. W. F. Lehmann.
Buchtel College	Akron, "	Universalist	1872	Rev. S. H. McCallister.
Hiram College	Hiram, "	Christian	1866	B. A. Hinsdale, A. M.
Ohio Central College	Iberia, "	Un. Presbyterian	.....	E. F. Reid.
"One-Study" University	Scio, "	Meth. Episcopal	1859	A. D. Lee, A. M.
Pacific University	Forest Grove, Or	.....	1859	Rev. S. H. Marsh, D. D.
Sublimity College	Sublimity, "	United Brethren	1858	J. H. Garrison.
Oregon College	Oregon City, "	Baptist	1850	George C. Chandler, D. D.
Willamette University	Salem, "	Meth. Episcopal	1851	T. M. Gatch, A. M.
Christian College	Monmouth, "	.....	.....	T. F. Campbell.
Haverford College	West Haverford, Penn	Friends (Orthodox).	1833	Samuel J. Gummere, A. M.
Lehigh University	S. Bethlehem, "	Prot. Episcopal	1866	Henry Coppée, LL.D.
Baptist University	Lewisburg, "	Baptist	1847	Rev. J. R. Loomis, LL.D.
Muhlenberg College	Allentown, "	Lutheran	1848	Rev. F. A. Muhlenberg, D. D.
Pennsylvania College	Gettysburg, "	"	1832	Milton Valentine, D. D.
Westminster College	Wilmington, "	UnitedPresbyterian	1852	E. T. Jeffers.
Alleghany College	Meadville, "	Meth. Episcopal	1815	Rev. George Loomis, D. D.
Western University	Pittsburg, "	None	1820	George Woods, LL.D.
Franklin and Marshall College	Lancaster, "	German Reformed	1853	Rev. J. W. Nevin, D. D.
Moravian College and Theol. Sem.	Bethlehem, "	Moravian	1807	Rt. Rev. E. de Schweinitz, S. T. D.
Dickinson College	Carlisle, "	Meth. Episcopal	1783	Rev. J. A. McCauley, D. D.
Washington and Jefferson College	Washington, "	Presbyterian	1802	Rev. G. P. Hays, D. D.
Lincoln University	Lower Oxford, "	"	1853	Rev. J. N. Rendall, D. D.
Waynesburg College	Waynesburg, "	Cum. Presbyterian	1850	A. B. Miller, D. D.
Andalusia College	Andalusia, "	Prot. Episcopal	1861	Rev. H. T. Wells, LL.D.
Lebanon Valley College	Annville, "	United Brethren	1866	L. H. Hammond, A. M.
Lafayette College	Easton, "	Presbyterian	1831	William C. Cattell, D. D.
University of Pennsylvania	Philadelphia, "	None	1749	C. J. Stillé, LL.D. (Provost).
Agricultural College	Ag. Coll. P. O. "	"	1859	Rev. James Calder, D. D.
Swarthmore College	Swarthmore, "	Friends (Hicksite)	1869	E. H. Magill, A. M.
Mercersburg College	Mercersburg, "	Reformed	1865	Rev. E. G. Higbee, D. D.
Palatinate College	Myerstown, "	German Reformed	.....	Rev. H. J. Wickes, A. M.
Maimonides College	Philadelphia, "			
Ursinus College	Freeland, "	German Reformed	1870	Rev. J. H. A. Bomberger.
Brown University	Providence, R. I	Baptist	1765	Rev. E. G. Robinson, D. D., LL.D.
Erskine College	Due West, S. C	A. R. P	.....	James Boyce.
Newberry College	Walhalla, "	Lutheran	1858	Rev. J. P. Smeltzer, D. D.
University of South Carolina	Columbia, "	State	1806	R. W. Barnwell, LL.D.
Furman University	Greenville, "	Baptist	1851	James C. Furman, D. D.
College of Charleston	Charleston, "	None	1789	N. R. Middleton.
Wofford College	Spartanburg, S. C	Meth. Epis., South	1853	A. M. Shipp, D.D.
Claflin University (colored)	Orangeburg, "	Meth. Episcopal	1869	Rev. A. Webster, D. D.
Maryville College	Maryville, Tenn	Presbyterian	1819	Rev. P. M. Bartlett, D. D.
Cumberland University	Lebanon, "	Cum. Presbyterian	1842	B. W. McDonnold, D. D., LL.D.
East Tennessee University	Knoxville, "	None	1869	Rev. T. W. Humes, S. T. D.
University of Nashville	Nashville, "	"	1785	E. Kirby Smith (Chan.).
Greenville and Tusculum College	Greenville, "	Presbyterian	1868	Rev. W. S. Doak, A. M.
Union University	Murfreesboro', Tenn	Baptist	1848	Rev. Charles Manly, D. D.
East Tennessee Wesleyan Univ	Athens, "	Meth. Episcopal	1867	J. A. Dean, A. M.
Central Tennessee College (colored)	Nashville, "	" "	1866	Rev. John Braden, A. M.
Mossy Creek College	Mossy Creek, "	Baptist	1871	
University of the South	Sewanee, "	Prot. Episcopal	1868	Gen. J. Gorgas (Vice-Chan.).
Bethel College	McKenzie, "	Cum. Presbyterian.		
Fisk University (colored)	Nashville, "	None	1867	A. K. Spence, A. M. (acting).
West Tennessee College	Jackson, "	.....	.....	Rev. E. L. Patten, A. M.
Andrew College	Trenton, "	Meth. Episcopal.		
King College	Bristol, "	Presbyterian	1868	Rev. J. D. Tadlock.
Jonesborough College	Jonesborough, "	Meth. Episcopal	1865	H. Presnell, A. M.
Colorado College	Columbus, Texas	Lutheran	1857	Rev. J. J. Shœver.
Baylor University	Independence, "	Baptist	1846	W. Carey Crane, D. D.
Waco University	Waco, "	"	1857	Rufus C. Burleson D. D.
Masonic College	Belton, "			
Rutersville College	Opelousas, "			
Galveston College	Galveston, "			
Aranama College	Goliad, "	.....	1852	J. E. C. Doremus, D. D.
Henderson College	Henderson, "	.....	1871	G. H. Gould.
University of Deseret	Salt Lake, Utah	Latter-Day Saints	1850	John R. Park, M. D.
Middlebury College	Middlebury, Vt	Congregational	1797	
State University	Burlington, "	None	1801	M. H. Buckham, A. M.
Norwich University (military)	Northfield, "	Prot. Episcopal	1834	Rev. M. Douglass, D. D.
Richmond College	Richmond, Va	Baptist	1844	B. Puryear, A. M.
Randolph-Macon College	Ashland, "	Meth. Epis., South	1832	Rev. J. A. Duncan, D. D.
Roanoke College	Salem, "	Lutheran	1852	Rev. D. F. Bittle, D. D.
Emory and Henry College	Emory, "	Meth. Epis., South	1838	E. W. Wiley, D. D.
Hampden-Sidney College	Prince Edward co., Va	Presbyterian	1775	J. M. P. Atkinson, D. D.
Washington and Lee University	Lexington, "	.....	1871	Gen. G. W. Custis Lee.
University of Virginia	Charlottesville, "	State	1824	C. S. Venable, LL.D.
College of William and Mary	Williamsburg, "	Prot. Episcopal	1693	Benjamin S. Ewell.
Virginia Ag. and Mech. College	Blacksburg, "	.....	1872	C. L. C. Minor.
Alleghany College	Blue Sulphur, "	Baptist	1854	
Stover College	Harper's Ferry, "	Free-Will Baptist.		
Rector College	Pruntytown, "	Baptist	1839	
Wytheville College	Wytheville, "	Lutheran	.....	Rev. E. W. McDonald.
West Virginia University	Morgantown, W. Va	State	1867	Rev. A. Martin, D. D.

TABLE I.—*Colleges of the U. S. incorporated and empowered by Charter to confer Degrees in Arts.*—Continued.

NAME.	Location.	Denomination.	Organized.	President.
Bethany College	Bethany, W. Va	Christian	1841	W. K. Pendleton.
Marshall College	Long Lane, W. Va.			
Western Virginia College	Flemington, "	Free-Will Baptist	1868	Rev. W. Colegrove, A. M.
Washington University	Seattle, Wash. Ter		1868	E. K. Hill.
University of Wisconsin	Madison, Wis	State	1848	Rev. J. W. Twombly, D. D.
Galesville University	Galesville, "	Meth. Episcopal	1855	Rev. Harrison Gilliland, D. D.
Wayland University	Beaver Dam, Wis	Baptist	1854	A. S. Hutchens.
Beloit College	Beloit, "	Congregational	1847	Aaron L. Chapin, D. D.
Carroll College	Waukesha, "	Presbyterian	1846	W. L. Rankin, A. M.
Lawrence University	Appleton, "	Meth. Episcopal	1849	George M. Steele, D. D.
Milton College	Milton, "	Seventh-DayBaptist	1867	Rev. W. C. Whitford, A. M.
North-western University	Watertown, "	Evan. Lutheran	1865	Rev. A. F. Ernst, A. M.
Prairie du Chien College	Prairie du Chien, Wis		1865	W. S. Perry.
Racine College	Racine, "	Prot. Episcopal	1852	Rev. J. DeKoven, D. D.
Ripon College	Ripon, "	Congregational	1863	Rev. W. E. Merriman, A. M.
Janesville College	Janesville, "			
Columbian College	Washington, D. C	Baptist	1822	J. C. Welling, LL.D.
Howard University (colored)	" "	Congregational	1866	Gen. O. O. Howard, LL.D.
National Deaf-Mute College	" "	National	1864	E. M. Gallaudet, Ph. D., LL.D.

TABLE II.—*Colleges and High Schools in the U. S. directed by the Fathers of the Roman Catholic Church.*

NAME.	Location.	Organized.	President.
St. Joseph's College	Spring Hill, Ala	1829	Rev. J. Montillot, S. J.
St. Andrew's College	Fort Smith, Ark.		
St. Mary's College	San Francisco, Cal	1863	Brother Justin.
St. Vincent's College	Los Angeles, "	1867	Rev. James McGill, C. M.
St. Ignatius' College	San Francisco, "	1855	Rev. Joseph Bayma, S. J.
Santa Clara College	Santa Clara, "	1851	Rev. A. Varsi.
Franciscan College	Santa Barbara, "	1868	Rev. J. J. O'Keefe, O. S. F.
College of our Lady of Guadaloupe	Santa Inez, "	1844	Brother Paschal Dovan, O. S. F.
St. Mary's College	Wilmington, Del	1847	
Georgetown College	Georgetown, D. C	1789	Rev. John Early, S. J.
Gonzaga College	Washington, "	1858	Rev. James Clark.
St. Patrick's College	Ruma, Ill.		
St. Ignatius' College	Chicago, Ill	1870	Rev. F. Coosemans.
St. Viateura College	Bourbonnais Grove, Ill	1866	Rev. P. Beaudoin.
St. Aloysius College	East St. Louis, "	1868	Rev. F. H. Zahel, D. D., D. C. L.
University of Notre Dame	Notre Dame, Ind	1842	Rev. A. Lemonnier.
St. Meinrad's College	St. Meinrad, "	1860	Rev. J. Hobie, O. S. B.
St. Benedict's College	Atchison, Kan	.....	Very Rev. G. Christoph, O. S. B.
Topeka College	Topeka, "		
St. Joseph's College	Bardstown, Ken	1819	
St. Mary's College	Marion co., "	1821	Rev. L. Elena, C. R., LL.D.
Cecilian College	Cecilian P. O., Ken	1860	H. A. Cecil.
Jefferson College	St. Michael, La.		
St. Charles College	Grand Coteau, La	1837	Rev. J. Boduit, S. J.
College of the Immaculate Conception	New Orleans, "	1859	Rev. F. Gautrelet, S. J.
St. Joseph's Day School	Natchitoches, "	1856	Rev. J. Lee Bezonet.
Calvert College	New Windsor, Md	1852	A. H. Baker, A. M.
St. Charles College	Ellicott City, "	1848	Rev. S. Ferte, D. D.
Mount St. Mary's College	Near Emmetsburg, Md	1808	Very Rev. J. McCaffery, D. D.
Borromeo College	Pikesville, "	1860	Rev. E. Q. S. Waldron.
Loyola College	Baltimore, "	1853	Rev. S. A. Kelly, S. J.
Mount St. Clement's College	Ilchester, "	1868	M. Holans, Rector.
Rock Hill College	Ellicott City, "	1857	Brother Bettelin.
Boston College	Boston, Mass	1864	Rev. Robert Fulton, S. J.
College of the Holy Cross	Worcester, "	1843	Rev. J. B. O'Hagan.
St. Philip's College	Detroit, Mich.		
St. John's College	St. Joseph, Minn	1867	Rev. Alexius Edelbrock, O. S. B.
O'Fallon College.			
Pass Christian College	Pass Christian, Miss	1866	Brother Isaiah.
St. Louis University	St. Louis, Mo	1833	Rev. J. G. Zealand, S. J.
St. Vincent's College	Cape Girardeau, Mo	1844	Rev. A. Verrina.
St. Joseph's College	St. Joseph, "	1867	Brother Agatho.
College of the Christian Brothers	St. Louis, "	1859	Brother James.
Seton Hall	South Orange, N. J	1856	Very Rev. M. A. Carrigan, D. D.
San Miguel College	Santa Fé, N. Mex.		
Canisius College	Buffalo, N. Y	1870	Rev. W. Becker, S. J.
St. Bonaventura College	Allegany, N. Y	1859	Rev. M. Casini, O. S. F.
Seminary of our Lady of Angels	Suspension Bridge, N. Y.		
St. Joseph's College	Buffalo, "	1862	Brother Francis.
College of St. Francis Xavier	New York City, "	1847	Rev. H. Hudon, S. J.
St. John's College	Fordham, "	1840	Rev. Joseph Shea, S. J.
Manhattan College	New York City, "	1863	Brother Paulian.
St. Joseph's College	Rhinecliff, "	.....	Rev. M. J. Scully.
St. John Baptist's College	Brooklyn, "	1870	Rev. T. J. Landry, C. M.
Mount St. Mary's of the West	Near Cincinnati, Ohio	1851	F. J. Pabisch, D. D., LL.D.
St. Xavier College	Cincinnati, "	1832	Leopold Bushart.
St. Louis College	Louisville, "	1866	F. Hours.
La Salle College	Philadelphia, Penn	1862	Brother Oliver.
St. Thomas College	Bryn Mawr, "	1846	Very Rev. Thomas Galberry, O. S. A.
St. Joseph's College	Philadelphia, "	1852	Rev. P. J. Blenkinsop.
St. Vincent's College	Westmoreland co., Penn	1846	Rt. Rev. B. Wimmer, O. S. B.
St. Francis College	Loretto, "	1850	Rev. C. V. Neeson.
St. Mary's College	San Antonio, Tex.		
St. Mary's University	Galveston, "	1854	Brother Boniface, C. S. C.
St. Joseph's College	Brownsville, "	1869	Rev. P. F. Parisot.
Holy Angels' College	Vancouver City, Wash. Ter	1872	Rev. P. Fr. Hylebos.
Pio Nono College	St. Francis, Wis	1871	Joseph Salzman, D. D.
St. John's College	Prairie du Chien, Wis	1865	Brother Benedict.
St. John's College	Norfolk, Va.		
St. Vincent's College	Wheeling, W. Va.	1865	Rev. A. Louage.

F. A. P. BARNARD.

Col'lege, a township of Linn co., Ia. Pop. 1468.

College, a township of Knox co., O. Pop. 926.

College Corner, a post-village of Oxford township, Butler co., O., on the Cincinnati and Indianapolis Junction R.R., 19 miles N. W. of Hamilton, has one weekly newspaper.

College Hill, a post-village of Hamilton co., O., 6

miles N. of Cincinnati. It is the seat of Farmers' College and the Ohio Female College.

College Mound, a post-village of Chariton township, Macon co., Mo. It is the seat of McGee College. Pop. 183.

College Point, a post-village of Flushing township, Queens co., N. Y., has manufactures of India-rubber goods, etc. It is on Long Island Sound and on the Flushing and North Side R. R., 11 miles E. of New York. Pop. 3652.

Colle'giants, a sect of Christians in Holland, so called from their assemblies, which they called "colleges." They rejected all creeds, had no regular ministry, and no form of church government. Their communion was open to all. The name *Rhynsbergers* is sometimes given them, from the town of Rhynsberg, where they had annual meetings.

Col'leton, a county of South Carolina, bordering on the Atlantic. Area, 1550 square miles. It is intersected by the Edisto River, and bounded on the S. W. by the Combahee. The surface is a level, alluvial plain; the soil is mostly fertile. Cotton, rice, and corn are staple crops. It is intersected by the South Carolina R. R. and the Charleston and Savannah R. R. Cap., Walterborough. P. 25,410.

Colleton (James), governor and landgrave of South Carolina (1686–90), called a colonial parliament in 1687, and proposed radical alterations of the laws. He became exceedingly unpopular with the High-Church party, and was impeached and removed from office in 1690, and driven from the province.

Collet'ta (Pietro), an Italian historian and general, born at Naples Jan. 23, 1775. He was a general in the army of Murat (1812–14), and was minister of war at Naples in 1820, but became an exile in 1821. He wrote a "History of the Kingdom of Naples from 1734 to 1825" (1834). Died at Florence Nov. 11, 1833.

Col'ley, a post-township of Sullivan co., Pa. Pop. 336.

Col'lidine ($C_8H_{11}N$), an alkaloid found with many others in the products of the destructive distillation of bones and other animal substances, of coal, of quinine, and of cinchonine. It is a colorless oily liquid, having an aromatic odor.

Col'lier (Henry Watkins), an American judge, born in Lunenburg co., Va., Jan. 17, 1801, became judge of the Alabama circuit (1827–37), chief-justice for Alabama (1837–49), and governor (1849–53). Died Aug. 28, 1855.

Collier (Jeremy), an English non-juring bishop, born in Cambridgeshire Sept. 23, 1650. He graduated at Cambridge in 1676, and was ordained a priest in 1677. He was a zealous Jacobite, and wrote several works against the government of William III. In 1696 he gave absolution to Freind and Parkins, who were condemned to death for treason. A sentence of outlawry was passed against him, after he had fled to escape prosecution. His chief works are a "Short View of the Profaneness and Immorality of the English Stage" (1698), which caused a great commotion, and "Essays on Several Moral Subjects" (3 vols., 1697–1705). The "Short View" provoked replies from Congreve, Vanbrugh, and Dr. Filmer, but the playwrights were worsted in the contest, and the bellicose tract of the sturdy moralist shamed the English stage out of its grossness. Died April 26, 1726.

Collier (John Payne), an English critic and antiquary, born in London Jan. 11, 1789. He published in 1820 "The Poetical Decameron," and in 1831 a "History of English Dramatic Poetry to the Time of Shakspeare, and Annals of the Stage to the Restoration" (3 vols.), which is commended. He also produced an edition of Shakspeare's works (1844), and "Notes and Emendations to the Text of Shakspeare's Plays, from Early Manuscript Corrections in a Copy of the Folio of 1632" (1852).

Collieries. See Mines and Mining, by Prof. F. L. Vinton, E. M.

Collima'tion [from the Lat. *collimo*, to "aim"], **Line of,** a term used in astronomy to denote the line which joins the optical centre of the object-glass of the telescope with the spider-line, which is designed to mark the middle of the field of view in the focus of the eye-glass. The line of collimation gives the direction of the point in the heavens at which the telescope aims, and of which the position is recorded by the observer from the readings of the circles of the instrument. Adjustment for collimation is the process by which the spider-line in the focus, or (if there are several) the central line of the system, is brought truly to the optical axis of the instrument. As there are usually two systems of lines, collimation may be either vertical or horizontal.

Col'limators, fixed telescopes, often employed in observatories to assist in collimating the principal or working instrument. They are so situated that the working telescope may look directly down the axis ("down the throat") of the collimator, the spider-lines of the latter being the objects observed in the process of collimation.

Collin, a county in the N. of Texas. Area, 870 square miles. The surface is two-thirds prairie, the rest timberland, and nearly all very fertile and well watered. Cotton, wool, grain, and tobacco are raised. It is traversed by the Houston and Texas Central R. R. Capital, McKinney. Pop. 14,013.

Collin d'Harleville (John François), a French dramatist and poet of much merit, whose works still survive on the stage, was born May 30, 1755, at Mervoisen, near Chartres. His first work was a comedy, "The Inconstant," performed in 1786. He afterwards produced "The Optimist," "Castles in Spain," "The Old Bachelor," "The Governess," and many other plays, besides several poems—one of them entitled "Melpomene and Thalia," an allegory. His collected dramatic works form four volumes in 8vo, first published in 1805. Died at Paris Feb. 24, 1806.

Collin'ear [from the Lat. *col* (for *con*), "with," and *linea*, a "line"]. Two or more figures or systems of points are collinear when the relation between them is such that to any point in either system corresponds but one point in the other or others, while to the several points of a right line in either system correspond those of a right line in the others. In establishing such a relation between two plane figures, four pairs of corresponding points may be chosen arbitrarily; this being done, all other pairs are defined. It is always possible to give the planes of two collinear figures such a position that the one figure shall be the projection of the other with respect to some centre of projection in space. The term collinear appears to have originated with Möbius, in whose "Barycentric Calculus" the nature of this relation is thoroughly examined. It includes the relations of affinity and similarity, and is identical with the "homographic" relation as defined by Chasles.

Col'lingwood, a port of Lake Huron, on the S. shore of Georgian Bay, in Nottawasaga township, Simcoe co., Ontario (Canada). It has large manufactures of lumber, leather, flour, beer, and other commodities; has good schools, two weekly newspapers, a lighthouse, and a large trade. Collingwood is the N. terminus of the Northern Railway, 94 miles N. by W. of Toronto, and has regular lines of steamers to various lake ports. Pop. 2829.

Col'lingwood (Cuthbert), Lord, an English admiral, born at Newcastle-upon-Tyne Sept. 26, 1750, entered the navy in 1761. He was an intimate friend of Lord Nelson, and was distinguished as a naval tactician; followed Admiral Graves to America (1774), and was made lieutenant after the battle of Bunker Hill (1775). In 1780 he became a post-captain. He took part in the naval victory which Lord Howe gained over the French in June, 1794, and rendered important services at the battle off Cape St. Vincent in Feb., 1797. In 1799 he gained the rank of rear-admiral; in 1804, that of admiral. He was the second in command at the battle of Trafalgar, Oct., 1805, and the chief command devolved on him before the end of the action in consequence of the death of Nelson. For his part in this victory he was raised to the peerage. Died at sea near Minorca Mar. 7, 1810.

Collin'ic Ac'id ($H.C_6H_3O$), an aromatic acid produced by the action of oxidizing agents on gelatine and similar bodies.

Col'lins, a township of Fayette co., Ala. P. 1173.

Collins, a township of Jackson co., Ala. P. 1520.

Collins, a township of Drew co., Ark. Pop. 463.

Collins, a township of Story co., Ia. Pop. 611.

Collins, a township of McLeod co., Minn. P. 191.

Collins, a township of Erie co., N. Y. At Versailles, a village partly in this township, is the Thomas Orphan Asylum, founded in 1864 for Indian children. Pop. of township, 2100.

Collins, a township of Edgefield co., S. C. Pop. 733.

Collins, a township of Georgetown co., S. C. P. 1440.

Collins (Anthony), an able and liberal English writer on theology, was born in Middlesex June 21, 1676. He was an intimate friend of John Locke, and was a subtle disputant. Among his works, which excited much commotion and were censured by the clergy, are "Priestcraft in Perfection" (1709), a "Vindication of the Divine Attributes," a "Discourse on Free Thinking" (1713), and a "Discourse on the Grounds and Reasons of the Christian Religion" (1724). Died Dec. 13, 1729.

Collins (Arthur), an English antiquarian of great industry and of high authority, was born in 1682. He was author of the "Peerage of England" (1709), "Baronetage of England" (1720), and other works. Died at Battersea Mar. 16, 1760.

Collins (Charles), D. D., was born in North Yarmouth, Me., April 17, 1813, and graduated in 1837 at Middletown,

Conn. He has been distinguished as an educator in the Methodist denomination, having been president of Emory and Henry College, Va., Dickinson College, Pa., and of the State Female College, Memphis, Tenn. He has been an effective writer in the periodicals of his denomination, and is author of a volume entitled "Methodism and Calvinism Compared."

Collins (JOHN) was born in 1717, governor of Rhode Island (1786–89), and a member of the first Congress under the Constitution. Died in 1795.

Collins (NAPOLEON), U. S. N., born May 4, 1814, at Madison, Ind., entered the navy as a midshipman Jan. 2, 1834, became a passed midshipman in 1840, a lieutenant in 1846, a commander in 1862, a captain in 1866, and a commodore in 1871. He commanded the steamer Anacostia, Potomac flotilla, in the fights with the Aquia Creek batteries during the summer of 1861, and the gunboat Unadilla at the battle of Port Royal Nov. 7, 1861. On the 7th of Oct., 1864, in the steam-sloop Wachuset, Commander Collins ran alongside of and captured the privateer Florida at anchor in the harbor of Bahia, Brazil.

FOXHALL A. PARKER, U. S. N.

Collins (WILLIAM), an eminent English lyric poet, born at Chichester Dec. 25, 1720, was educated at Oxford. He became a resident of London in 1744, and was a friend of Doctor Johnson. He produced in 1747 an admirable ode on "The Passions," and lyric poems, among which are odes to Mercy and Evening. In 1749 he received a legacy of £2000 from an uncle. He was subject to melancholy, and was confined in an asylum in the latter part of his life. Died in 1756. Among his works is "The Dirge in Cymbeline." (See JOHNSON, "Lives of the Poets.")

Collins (WILLIAM), an English landscape-painter, born in London Sept. 18, 1787, became a student in the Royal Academy in 1807. His favorite subjects were familiar and rural scenes and views on the sea-coast. He was elected a Royal Academician in 1820, and visited Italy in 1836, after which he produced several pictures of Italian scenes which were much admired. Among his works are "Cromer Sands," "Prawn-Fishers," and a "Frost Scene." Died Feb. 17, 1847.

Collins (WILLIAM WILKIE), a novelist, a son of the preceding, was born in London in 1825. He was first articled to a tea-merchant; then entered Lincoln's Inn. He produced in 1848 a "Life of William Collins" (his father), and is the author of numerous popular novels remarkable for their dramatic construction, among which are "Antonina" (2d ed. 1850), "Basil" (1852), "The Dead Secret" (1857), "Woman in White" (1859–60), "Armadale" (1866), "Man and Wife" (1870), and the "Lighthouse" and "Frozen Deep," dramas.

Col'linson (PETER), F. R. S., an English merchant and naturalist, born in Westmoreland Jan. 14, 1693. He lived in London, and was a member of the Society of Friends. He promoted botanical science by importing foreign seeds and plants, and wrote several scientific memoirs. He rendered valuable gratuitous services to the Philadelphia Library. Died Aug. 11, 1768.

Col'lin's Store, a township of Madison co., Ala. Pop. 933.

Col'linsville, a post-village of Hartford co., Conn., on the Farmington River, on a branch of the New Haven and Northampton R. R., and on the Connecticut Western R. R. 25 miles W. N. W. of Hartford. It has a large axe-factory, paper-mills, manufactures of ploughs and cutlery, and a savings bank.

Collinsville, a post-village of Madison co., Ill. It is on the St. Louis Vandalia Terre Haute and Indianapolis R. R., 11 miles E. by N. of St. Louis. It has two weekly newspapers.

Collinsville, a post-village of Milford township, Butler co., O., on the Cincinnati Richmond and Chicago R. R., 11 miles N. by W. of Hamilton. Pop. 140.

Colli'sion [Lat. *collisio,* from *collido, collisum,* to "strike together"], in mechanics, the impact of two bodies, one or both of which were previously in motion. The laws of the direct impact of two spherical bodies are deduced from the principle that the sum of the momenta of the impinging bodies, estimated in a fixed direction along the line of motion, is not altered by the collision. The velocities of the bodies after impact, however, depend upon the hardness and elasticity of these bodies. If inelastic and completely incompressible, they will move after impact as one body, with a velocity and in a direction which is ascertained by dividing the algebraical sum of their previous momenta by that of their masses. If compressible and not wholly without elasticity, a certain compression takes place on collision, and is immediately followed by a more or less perfect restitution of form, according to the degrees of elasticity which the bodies possess. In this case the bodies will *not* move as one body after collision, but the impinging body will move more slowly than the other, and may even have the direction of its motion reversed.

Collision, in maritime law. (See ROAD, LAW OF THE, by PROF. T. W. DWIGHT, LL.D.)

Collo'dion [from the Gr. κολλώδης, "sticky," from κόλλα, "glue"], a clear, colorless, gummy liquid, insoluble in water or alcohol, but soluble in ether, consisting of pyroxyline or gun-cotton dissolved in a mixture of alcohol and ether. When dried, it gives a transparent residue, becoming electric by friction, and exploding less readily by heat, percussion, etc. than ordinary gun-cotton. It is used principally in photography, though it also finds application in surgery and medicine for covering wounds to exclude the air, coating caustic substances, etc. Small quantities of gun-cotton for the preparation of collodion are made by immersing cleaned cotton in a solution formed by dissolving nitrate of potassium in concentrated sulphuric acid. Larger quantities are made by treating cotton with a mixture of concentrated commercial sulphuric and nitric acids. Some water is added, in order to cause the formation of the lower nitro-compounds of cellulose; but if too much water is added, the cotton dissolves, instead of forming the desired compound. The operation is conducted at a temperature of about 150° F., and great care and judgment are required throughout the process. After treatment the cotton is washed with cold water, the use of alkalies for neutralizing the excess of acid having a bad effect on the quality of the collodion if it is to be used for photography. The best gun-cotton for this purpose shows an increase of 25 per cent. in weight over that of the cotton originally employed. In making the solution of the gun-cotton, if too much alcohol is employed the sensitiveness of the film and its capacity for adhering to glass are impaired; if too little, the film is apt to contract after sensitizing. Photographers make use of two kinds of collodion—the "plain" and the "iodized," the latter being the plain collodion which has received the addition of some iodides or bromides, generally the iodides of cadmium and ammonium. Plain collodion is often of two kinds—"positive" and "negative," the pyroxyline for these being prepared according to a slightly different formula. For the "positive collodion" less water is used in the preparation of the pyroxyline.

Small balloons, lighter than those made from gold-beaters' skin, are sometimes made with collodion. The liquid is poured into a flask and shaken about until the interior is completely covered, the ether and alcohol are then evaporated off by a blast directed into the flask. By drawing the air out of the flask by means of a tube suitably adjusted, the film is detached, the balloon collapses, and may be drawn out. It is then distended and dried.

C. F. CHANDLER.

Collot-d'Herbois (JEAN MARIE), a French Jacobin, born in Paris in 1750, originally a strolling player, was a member of the Convention, and a partisan of Robespierre, notorious for his violence and cruelty. He became a member of the Committee of Public Safety in 1793, and was sent to Lyons, where he caused hundreds to be put to death. In the crisis of the 9th Thermidor, 1794, he acted with the enemies of Robespierre. In 1795 he was transported to Cayenne, where he died Jan. 8, 1796.

Col'lum, a Latin word signifying "neck," is applied in botany to that part of the axis of a plant whence the stem and root diverge. In the beginning it is a space easily distinguishable, but in the process of time it is externally obliterated.

Col'ly, a township of Bladen co., N. C. Pop. 1220.

Coll'yer (Rev. ROBERT), an able and eloquent Unitarian divine and a popular lecturer, born at Keighly, England, Dec. 8, 1823. In 1847 he came to the U. S., and became a Methodist preacher. Three years later he embraced Unitarian views. Since 1859 he has been pastor of Unity church, Chicago.

Col'man, a township of Elmore co., Ala. Pop. 868.

Colman (BENJAMIN), D.D., a Congregational divine, born at Boston, Mass., Oct. 19, 1673, graduated at Harvard in 1692. On a passage to England he was taken prisoner by a French vessel in 1695, but finally visited England, and returned to America in 1699. He became pastor of the Brattle street church, Boston (at that time an independent church), with which he was connected till his death (Aug. 29, 1747).

Colman (GEORGE), an English dramatic author, was born at Florence, April 28, 1733. He produced in 1760 "Polly Honeycomb," and in 1761 the "Jealous Wife," comedies, and a good metrical translation of Terence (1764). In 1777 he became the proprietor of the Hay-

market Theatre. He wrote and adapted several other dramas. Died Aug. 14, 1794.—His son, GEORGE COLMAN, born Oct. 21, 1762, became director of the Haymarket Theatre in 1785, and wrote numerous successful comedies and farces, among which are "John Bull" (1805), "Inkle and Yarico," and "The Heir-at-Law." He published autobiographic memoirs, entitled "Random Recollections" (2 vols., 1830). Died Oct. 26, 1836.

Colman (HENRY), an American agricultural writer, born in Boston Sept. 12, 1785. He was minister of a Unitarian church at Salem, Mass., from 1825 to 1831, and was afterwards appointed agricultural commissioner for that State. He visited Europe in 1842, after which he published, besides other works, "European Agriculture and Rural Economy." Died in London Aug. 14, 1849.

Colman (SAMUEL), an American artist, born at Portland, Me., in 1832. He ranks high as a painter of American and European landscapes. His first picture was exhibited in 1850.

Col'mar [Lat. *Columbarium*], a city of Elsass, is finely situated on the river Lauch, near the base of the Vosges, 36 miles N. N. E. of Strasburg. It is well built, and contains a cathedral built in 1363, a theatre, a college with a library of 60,000 volumes. The old ramparts have been converted into boulevards. Colmar has extensive manufactures of cotton fabrics, cutlery, paper, hosiery, and ribbons. It was an imperial city in the Middle Ages, and was ceded to France in 1697. Pop. in 1871, 23,045.

Colne, a market-town of England, in Lancashire, is on a high ridge at the junction of the Midland Railway with the Lancashire and Yorkshire Railway, 32 miles N. E. of Manchester. It has manufactures of woollens, cottons, calicoes, and mousselines-de-laine. Coal and limestone abound in the vicinity. Colne is an ancient town, and many Roman coins have been found here. Pop. 6315.

Co'lo, a post-village of New Albany township, Story co., Ia. It is on the Iowa division of the Chicago and Northwestern R. R., 173 miles E. of Clinton. Pop. 226.

Col'ocynth [Gr. κολοκυνθίς; Lat. *colocynthis*], a well-known purgative medicine, the dried and powdered pulp of the colocynth gourd, a fruit about the size and color of an orange, with a smooth, thin, solid rind. *Cucumis Colocynthis*, the plant which produces it, is nearly allied to the cucumber. It is common in Southern Europe, Asia, and Africa, and is grown also to some extent in the U. S., especially by the Shakers. The fruit, when it begins to turn yellow, is gathered, peeled, and dried quickly. It is chiefly in the form of "compound extract of colocynth" that it is used in medicine. In large doses it is a drastic, irritant poison. It owes its cathartic properties to a bitter neutral principle called colocynthin. The seeds of the plant have no cathartic principle. The extract of colocynth is used in pills in combination with other purgatives, and frequently with extract of hyoscyamus. In small doses colocynth acts as a safe and useful purgative, and when associated with hyoscyamus the latter prevents much of the pain which usually results from the use of colocynth by itself.

Colocyn'thin ($C_{56}H_{84}O_{23}$?), the bitter principle of colocynth. It is resolved by the action of acids into colocynthein ($C_{40}H_{54}O_{13}$) and sugar, and is, for this reason, supposed to be a glucoside.

Colo'gna, a town of Italy, in the province of Verona, 20 miles S. E. of Verona. It has manufactures of silk. Pop. 6496.

Cologne [Ger. *Köln;* anc. *Oppidum Ubiorum*, afterwards *Colonia Agrippina*], a fortified city of Prussia, the capital of the province of Rhenish Prussia, on the left bank of the Rhine, 24 miles S. E. of Düsseldorf; lat. 50° 56′ N., lon. 6° 58′ E. It is at the intersection of several important railways, and is connected with Deutz by a handsome iron bridge across the river and a bridge of boats. Cologne is a fortress of the first rank. It is built in semicircular form close to the river. The streets are narrow and dirty. Outside the walls are fine gardens and promenades. It has an archbishop's palace, an observatory, a botanic garden, a public library, a museum, a theatre, an arsenal, with a curious collection of armor, a seminary for the education of Catholic clergymen, three gymnasia, and one pro-gymnasium, a normal school, and a fine town-house. Here are several remarkable and ancient churches—viz. that of Saint Peter, containing a picture of the crucifixion of Saint Peter painted and presented by Rubens; the church of Saint Mary, founded about 1000 A. D.; and that of Saint Ursula, which is said to contain the bones of 11,000 virgins who were massacred by the Huns. The greatest object of interest is the cathedral, which was founded in 1248, and is one of the noblest specimens of Gothic architecture in Europe. It is in the form of a cross, is 510 feet long and 231 feet wide. The towers, when finished, will be about 500 feet high. The construction of this edifice was suspended by the Reformation. Early in the nineteenth century the national enthusiasm of the Germans raised large sums of money to repair and complete it, and Zwirner was appointed architect of the work. Cologne has extensive manufactures of silk and woollen fabrics, cotton yarn, velvet, hosiery, lace, hats, thread, clocks, and *eau de cologne*. About 1,500,000 bottles of this perfume are annually exported from this town. It derives also much prosperity from the navigation of the Rhine, and has an active trade in grain, wine, oil, etc. Cologne was annexed to the German empire in 870 A. D., and was afterwards one of the most populous and wealthy cities of the Hanseatic League. The archbishops of Cologne were princes and electors of the German empire during several centuries. Pop. in 1871, 129,233.

Cologne, a township and post-village of Mason co., West Va. Pop. of township, 1023.

Cologne Water. See EAU DE COLOGNE.

Colo'ma, a post-twp. of El Dorado co., Cal. Pop. 925.

Coloma, a township of Whitesides co., Ill. Pop. 856.

Coloma, a post-township of Waushara co., Wis. Pop. 309.

Colom'bia, United States of, formerly **New Granada,** a republic of South America, is bounded on the N. by the Caribbean Sea and Venezuela, on the E. by Venezuela and Brazil, on the S. by Brazil and Ecuador, and on the W. by the Pacific Ocean. The Amazon forms part of the southern boundary, and the Orinoco flows along the eastern border of this republic. Area, 357,179 square miles, but a considerable portion of the border territory is claimed by Brazil and Venezuela. Pop. in 1864, 2,794,473, exclusive of the independent Indians, whose number amounts to about 126,000.

Physical Features.—The most prominent features of this region are the Andes, three chains of which extend through the western part. These are called the Cordillera of the Coast (or Choco), the Central Cordillera or Quindiu Chain, and the Eastern Cordillera. Between the last and the Quindiu Chain lies the broad valley of the Magdalena, which is separated from the long valley of the Cauca by the same Quindiu Chain. The highest peak in Colombia is the peak of Tolima, which is in lat. 4° 46′ N., and rises 18,317 feet above the level of the sea. Other summits of the central Cordillera rise above the limits of perpetual snow. These mountains seriously obstruct the communication between the sea-coast and the interior. In the south-eastern part of Colombia occur extensive plains called *llanos*. The chief rivers of the interior are the Magdalena and the Cauca, which flow nearly northward to the Caribbean Sea.

Minerals.—Colombia is rich in mineral resources, though they have been imperfectly explored. Gold is obtained in Antioquía and the valley of the Cauca. Platina is found in the Choco, and silver is said to occur at Marquetones. Coal is found in the plain of Bogotá.

Climate, Productions, etc.—The climate of the lowlands is hot, humid, and in some parts unhealthy. The yellow fever is endemic at Cartagena and other places on the coast. Torrents of rain, it is said, fall incessantly in the forests of Darien. The middle regions, called *templadas*, enjoy a more temperate and salubrious climate. A large portion of the country is covered with luxuriant forests, in which are found the wax-palm and the *Cinchona*, which yields quinine. Cotton, rice, sugar-cane, tobacco, cocoa, and tropical fruits are among the productions of the soil near the coast. Maize and wheat flourish on the elevated plains of the interior, but agriculture is generally neglected. Many cattle and horses are reared on the llanos. Among the wild animals are the jaguar, puma, tapir, monkey, alligator, armadillo, and deer.

Colombia is divided into nine states—viz. Antioquía, Bolivar, Boyaca, Cauca, Cundinamarca, Magdalena, Panamá, Santander, and Tolima. Capital, Bogotá. The present constitution was adopted May 8, 1863. The legislative power is vested in two chambers—a house of representatives and a senate. The executive power is exercised by a president elected for a term of two years. The religion of the state is the Roman Catholic.

History.—The Spaniards planted a colony in 1510 on the Gulf of Darien. This part of the continent was called New Granada, and continued to be subject to Spain until 1811, when it revolted with success. New Granada, Venezuela, and Ecuador united to form the republic of Colombia, but the union was dissolved in 1831, when each of these three states became a separate republic. A civil war or revolution broke out in 1860 between the Federalists and Liberals, the latter of whom were directed by General Mosquera. In Sept., 1861, the name of New Granada was exchanged for that of the "United States of Colombia" by the congress of the liberal party. A. J. SCHEM.

Colom'bic Acid ($C_{42}H_{46}O_{13}$), the acid contained in colombo root.

Colom'bin, or **Colombo Bitter** ($C_{21}H_{22}O_7$), the active principle of colombo root.

Colom'bo, a seaport-town and the capital of Ceylon, on its W. coast, in lat. 6° 55′ N., and lon. 79° 45′ E., and near a rocky headland, the *Jovis extremum* of Ptolemy. It is fortified and defended by seven batteries, besides several bastions, etc. The harbor is small, and is only safe during the S. E. monsoon. The mean temperature is about 80° F., and the average annual rainfall is 72.4 inches. Colombo has a lighthouse, a military hospital, a government-house, and churches for the English, Dutch, and Portuguese. The houses are mostly of one story, each having a verandah in front. Many of the Europeans reside in the suburb Colpetty. Most of the foreign trade of Ceylon is transacted at this port. It was occupied by the Portuguese in 1517, taken by the Dutch in 1603, and conquered in 1796 by the British, who still possess it. Pop. in 1871, 100,238.

Colombo (Realdo), [Lat. *Realdus Columbus*], an Italian anatomist, born at Cremona, succeeded Vesalius as professor at Padua in 1544. He was the reputed discoverer of the pulmonary circulation. He wrote an important work on anatomy, "De Re Anatomica" (1559). Died about 1576.

Colombo Root, the root of *Cocculus palmatus*, a menispermaceous vine from Eastern Africa. It contains colombin, berberine, and colombic acid, starch, coloring-matter, etc. It is one of the most useful of the mild tonics.

Co'lon [Lat. *colon;* Gr. κῶλον], in anatomy, is that part of the large intestine which leads from the cæcum to the rectum. In the adult of the human species it is about four and a half feet long, and consists of four portions—the right or ascending, the transverse, and the descending colon, and the sigmoid flexure (so called from its resemblance in shape to the ancient form of the Greek letter *sigma,* C for Σ). The colon, owing to the peculiar arrangement of its muscular fibres, consists of a series of pouches, which serve to detain the contents of the intestine on their way to the rectum. The colon is provided with numerous glands, which assist in removing the waste matters from the blood. It is believed also to have the power to some extent of digesting food; and it is certain that persons who are unable to swallow food have often been kept alive for a long time by nourishing liquids thrown into the intestinal canal by enema.

Colon, a township and post-village of St. Joseph co., Mich. The village is on the Michigan Central R. R., 53 miles S. W. of Jackson. It has one weekly newspaper. Pop. of township, 1504. Ed. "Enterprise."

Colo'na, a township and village of Henry co., Ill. The village is on the Illinois division of the Chicago Rock Island and Pacific R. R., 170 miles W. S. W. of Chicago. Pop. of township, 1223.

Colonat. See Slavery.

Colonel [from the Fr. *colonne,* a "column," *i. e.* the chief of a column], the title of the highest officer of a regiment in the armies of the U. S., England, France, and other countries. The colonel is the officer next higher than lieutenant-colonel, and next lower than a brigadier-general. In the British army at the present time the position of a colonel is a sinecure, the real active commander of the regiment being the lieutenant-colonel. Every British regiment has a colonel, who is a general officer, and whose command is merely honorary, but he receives high pay, which varies from £500 a year in the infantry of the line to £1800 a year in the Horse Guards.

Colo'nial Corps, in the British army, are certain regiments of native troops in the East and the West Indies, South and West Africa, etc., which are officered (except in Malta) by the British. The native troops of British India are not included in the colonial corps, being paid from the Indian revenues, and not from the army estimates.

Col'oniza'tion Soci'ety, The Amer'ican, an association formed in 1816 for the purpose of transporting negroes from the U. S. to Africa. Many years earlier, Samuel Hopkins, D. D., had advocated such an enterprise. Among the principal founders of the society were Charles F. Mercer of Virginia, the Rev. Doctor Finley of New Jersey, and Bishop Meade. The constitution of the society was adopted at a meeting held in Dec., 1816. In 1820 the society sent out a company of eighty-six colonists to Liberia. Bushrod Washington was the first president of the society. They afterwards sent out nearly 10,000 free colored persons to Liberia, which became in 1847 an independent republic. Henry Clay was for many years president of the Colonization Society.

Colon'na, the name of a celebrated noble and powerful Roman family which has produced many eminent generals, ecclesiastics, cardinals, and authors. This family acquired distinction as early as the twelfth century. In the succeeding centuries they were adherents of the Ghibelline party. Otho Colonna was elected pope in 1417. (See Martin V.) The Colonna palace in Rome is celebrated for its rich treasures of art.

Colonna (Fra Francesco), a Dominican monk, born at Venice about 1449, was professor of theology at Padua, and author of a work "Hypnerotomachia Poliphili" (1499), a singular *mélange* of fables, antiquities, and architecture. Died in 1527.

Colonna (Vittoria), a celebrated Italian poetess, a daughter of the constable of Naples, was born in 1490. She married in 1507 the marquis of Pescara, afterwards a famous general killed in battle in 1525. She was eminent for virtue and beauty, as well as poetical genius. She composed poetical laments on the death of her husband, and many religious poems ("Rime Spirituali," 1548). In 1541 she retired into a convent at Orvieto. Died in 1547. "The rare virtues and consummate talents of this lady," says Hallam, "were the theme of all Italy in that brilliant age of her literature." (See Mrs. Henry Roscoe, "Vittoria Colonna: her Life and Poems," 1868.)

Colonnade [from the It. *colonna,* a "pillar"], a range of columns attached to or detached from the body of the building they are designed to ornament and support. When it surrounds the building on the exterior, the colonnade is called a *peristyle;* when detached from the general line and projecting forward, it is called a *portico;* but when comprised under the same cornice as the building itself, it is styled a *colonnade.*

Col'ony [Lat. *colonia,* from *colonus* (from *colo,* to "till," to "cultivate"), a "husbandman," a "settler"], a term denoting a settlement formed in a distant region or country by emigrants who are under the protection and supreme government of the mother-country. The British colonies in Australia and America are practical instances of the colony in this sense; but there are other dependencies (like the Indian empire) which deviate more or less from the true characteristics of a colony. Territories have afforded profitable residence without being colonies; the most conspicuous of this class is the British empire in Hindostan, where the British people scarcely hold land or concern themselves in agriculture, from which the term colonist is taken. The Greeks established communities in Asia Minor, Africa, Italy, and France, for Marseilles was a Greek colony, founded by the inhabitants of Phocæa about 600 B. C.

The principle of colonial responsibility to a central government was brought to great perfection by the policy of Rome, that not only every conquered territory, but every district where citizens settled, should be an integral part of the empire. There were various grades of colonies—some where there was the full privilege of Roman citizenship, and others where citizenship was of an inferior grade. The Italian colonies of the Levant in the Middle Ages bore some resemblance to those of ancient Rome. The settlements of the barbarians who destroyed the Roman empire were not colonies, for the tribes were not connected with any parent state; and the Normans, who spread over Europe at a later period, were unconnected in the countries where they settled with the government of the states whence they migrated. Hardly a trace of the genealogy of the Normans of England or France can be found anterior to their settlement in the latter country, so little connection did they preserve with the country of their ancestors. With the exception of the Italians in the Levant, the Spanish and Portuguese were the first among modern Europeans to establish true colonies. The Spanish monarchs aimed at the creation of a new empire in America, which was looked on as the property of the Spanish crown. Other governments of Europe subsequently colonized America, Africa, and Asia. The permanent settlement of British colonists in America dates from the reign of James I. The settlers were privileged companies with royal letters-patent, but practically they were almost independent (with the exception of those whose charters were resumed by the Crown). They were largely dissenters seeking refuge from the grievances of the Established Church.

The great advantage of a colony is that it widens the field of enterprise and gives a larger choice of the means of livelihood. It is especially an addition to the existing stock of a very valuable and important kind of raw material—viz. land. It is to the agriculturist, then, that it generally holds out its first inducements. In modern times penal colonies have been established by several European nations. (See Transportation.)

Colony, a township of Adams co., Ia. Pop. 190.

Colony, a township and village of Delaware co., Ia.

The village is 30 miles W. N. W. of Dubuque. Pop. of township, 1400.

Col'ophon [etymology doubtful] is the name of the last page of ancient books. The colophon formerly gave the date, printer's name, etc., with much of the information now conveyed on the title-page.

Colophon [Gr. Κολοφών], an ancient Greek city of Ionia, in Asia Minor, was near the sea-coast, and on the river Ales or Halesus, about 9 miles N. of Ephesus. It was one of the seven cities which claimed the honor of being the native place of Homer. The celebrated philosopher Xenophanes was born here about 600 B. C. It was also the native place of the poet Mimnermus. The Colophonian cavalry had a high reputation. It was anciently famous for its resin (colophony), which was the product of the noble pine forests which even now exist near its site. A village of miserable cabins occupies the site of ancient Colophon.

Col'ophony [Gr. Κολοφωνία ῥητίνη—*i. e.* "Colophonian resin," from its place of export, Colophon], the chemical name of resin of pine, or rosin. (See RESINS, by PROF. C. F. CHANDLER, PH.D., LL.D.)

Col'or [Lat. *color*; Gr. χρῶμα]. Among the various appearances of external objects is that which depends solely on the kind of light which those objects reflect or transmit to the eye. Several other properties, as form, roughness, smoothness, etc., may be discerned by the sense of touch, but color, properly speaking, can be perceived by the sight alone. For though blind persons are said to be sometimes able to distinguish certain colors in cloths by the touch, they only perceive the roughness, harshness, or other property which is usually imparted to the cloths by the particular material employed in dyeing, but they have not any perception of the color itself.

According to the classification of Newton, there are seven primary colors—viz. red, orange, yellow, green, blue, purple, and violet, which, when combined together in their proper proportions, produce white light; but according to some other eminent authorities (including the celebrated optician Brewster), the number of primary colors may be reduced to three—red, yellow, and blue (or green); all the other colors being in their view produced by different combinations of those three elements. Some bodies (certain kinds of colored glass, for example) appear to be of one color by reflected and of another by transmitted light. The cause of the appearance called color may be simply stated thus: if a body absorbs every other kind of light and reflects or transmits red light only, it will appear of a red color; if it absorbs every kind except yellow light, it will appear yellow, and so on. Again, if it absorbs nearly all the rays, reflecting or transmitting scarcely any, it will appear dark or black; and if the greater part of the light is absorbed except a little red and a little yellow, the object will appear of a dark-brown color. (See OPTICS.)

Colora'do, a river of Texas, rises in the high table-lands in the N. W. part of the State. Its general direction is south-eastward. It passes by Austin City, Bastrop, and Columbus, and enters Matagorda Bay near the town of Matagorda. Total length, estimated at 850 miles. Steamboats can ascend it above Austin City.

Colorado, or **Rio Colorado** (*i. e.* "Red River"), a large river of the U. S., rises among the Rocky Mountains by two branches—namely, Green and Grand rivers—which unite in Utah about lat. 38° N. It flows generally south-westward, and passes through the north-western part of Arizona to the south-eastern border of Nevada. It afterwards runs nearly southward, forms the boundary between Arizona and California, and enters the head (or N. end) of the Gulf of California. The entire length, including Green River, is estimated at 1200 miles. It is navigable for small steamboats for 300 miles or more. Among the most wonderful natural objects in North America is the Great Cañon of the Colorado, between lon. 112° and 115° W. Here the river flows between walls of rock which are nearly vertical, and are in some places 6000 feet high. This cañon is more than 300 miles long.

Colorado, a Territory of the U. S., situated in the central belt of States and Territories in the Rocky Mountain region, lying between the 37th and 41st parallels of N. lat., and between the 102d and 109th meridians of W. lon. from Greenwich. It is bounded on the N. by Wyoming Territory and Nebraska, E. by Nebraska and Kansas, S. by the Indian Territory and New Mexico, and W. by Utah. Its area is 104,500 square miles, or 66,880,000 acres, or about equal to that of the whole of New England and the State of Kentucky.

Face of the Country, Geology, Soil, etc.—The Territory is traversed near its centre, from N. to S., by the main chain of the Rocky Mountains, whose snow-capped peaks constitute the watershed of the continent. The mountain-valleys have an altitude of from 5000 to 8000 feet, while the highest culminating crests rise to a height of from 11,000 to 15,000 feet above the level of the sea. The other surface divisions of Colorado are the plains and valleys, and the parks. The plains embrace the section E. of the Sierra Madre, being elevated, rolling prairie, rising gradually from the eastern boundary to the mountains westward, being well watered by the South Platte and Arkansas rivers and their tributaries. The soil is fertile, being covered with rich nutritious grasses, upon which cattle pasture the year round. Vast herds of buffalo and numerous other graminivorous animals roam over these plains, existing upon their grasses; and experiments show that domestic animals thrive as well upon the indigenous herbage. The section of the plains lying near the South Platte, in the north-eastern part, is an iron region abounding in red hematite ore. Magnetic and hematite ores are also found in sections of the mountain country, as in the vicinity of the Golden Gate in Jefferson co., and it is believed that the mining and manufacture of this metal will soon be extensive in Colorado, furnishing machinery for mills and mines, implements for agriculture and the lumber-trade, and rails for iron roads. In the vicinity of the eastern foot-hills of the mountains are the principal outcroppings of the great coal-beds, the strata varying from five to thirty feet thick, stated by geologists to underlie a large portion of the plains, sometimes extending eastward nearly to the Nebraska and Kansas line. This coal is generally of the variety known as lignite, of excellent quality for household economy, as well as for manufactures and for railroads: the mines being already extensively worked in Boulder, Jefferson, Arapahoe, and Douglas cos., but increased facilities for transportation are required to develop this branch of the mineral wealth. A large vein of albertite coal, the stratum being from ten to twenty feet in thickness, has recently been discovered on White River in Summit co., and there are evidences of its extending sixty miles in one direction and twenty-five in another. It resembles cannelite, burning with great readiness and intense heat, and is estimated to contain fifty to sixty gallons of oil to the ton. The percentage of carbon in this coal is from 58.70 to 59.20, and though very brittle and crumbling upon long exposure to the air, it is nearly as hard as anthracite. In the southern part of the plains are numerous Mexican settlers, principally engaged in cattle-herding and agriculture, being aided in the latter by irrigation, for which there are excellent facilities; and the result of its employment is abundant and certain crops. The soil of the plains rests upon calcareous rock, and is principally of alluvial formation, having been washed from the vast granite mountains rising above their western limits, and contains elements of great fertility. Near the streams a large proportion of decomposed vegetable matter enters into its composition, united with ashes and sand; on the plateaus there is less vegetable deposit, the soil being principally composed of sandy loam and friable clay. This section of country is exceedingly well adapted to agriculture; cereals, vegetables, and fruits being cultivated with a success that is astonishing in view of the altitude of the surface of the earth and the scarcity of rain at certain seasons of the year. The quality of the wheat grown in Colorado is excellent, and the average yield thirty bushels to the acre, while fifty, sixty, and even eighty bushels have been grown on some of the new lands under irrigation. In character the wheat resembles that of California more than the Eastern wheat. The average yield of oats is fifty bushels, and of barley forty bushels to the acre, and instances are given of a yield of 100 bushels to the acre of each. The yield of Indian corn, when irrigated, in the vicinity of the Denver Pacific Railway, is almost beyond belief. Single fields have yielded 316 bushels to the acre, and 150 to 200 bushels are represented as an average crop. The vegetables are of great size and of excellent flavor, and though the yield is slightly less than in some of the Eastern States, the quality is far superior.

The average yearly precipitation of water in these plains or valleys is twenty inches, falling principally in the rainy season of May, June, and July, and in the snows of winter. For two months in the year, therefore, irrigation is an absolute necessity for abundant crops, and the farmer in selecting his lands does so with a view to the convenience with which this artificial means of supplying the requisite water can be introduced. The construction of acequias or irrigating canals is performed chiefly with the plough and scraper, attended with but small expense, the certain abundance of the resulting crops more than repaying the extra outlay. Acequias thirty miles long, having a fall of four feet per mile, watering 20,000 acres, have been constructed, each adjoining proprietor contributing his share towards their construction and maintenance. In the vicinity of the Denver Pacific Railway, about the head-waters of the

South Platte, at Greeley, Evans, and other points, irrigation is practised on a still more extensive scale, and with the highest success. The present most important resource of the plains of Colorado is stock-raising, the rich nutritious grasses which abound there furnishing an ample supply of food to keep the cattle in excellent condition during the entire year, as the grass, when ripe, dries upon the stalk, forming hay superior to that prepared by the most careful curing in the Eastern States. The winters are so mild that not once in five years is there any necessity for shelter and the gathering of hay and fodder for the cattle during any portion of the winter months. Since the opening of the Union Pacific, Kansas Pacific, and Denver Pacific Railways, Colorado has become very largely interested in stock-grazing, as ready markets are furnished by means of these railways for all the cattle the farmers can rear.

The parks of Colorado are a distinctive and remarkable feature of the mountain-region, being apparently the basins of former lakes upheaved and deprived of their waters by volcanic agency, with their original shape and situation at the foot of high mountains undisturbed, while their lowest depths are from 6000 to 9000 feet above the level of the sea. Many of these parks are of small size, being little valleys at the sources of single streams or the beds of small lakes, into which several streams from the surrounding mountains are emptied; yet there are four of these elevated valleys, the smallest of which extends 20 by 50 miles, and the largest 100 by 200, equal to the size of some of the most important of the New England States. These are called the North Park, Middle Park, South Park, and San Luis Park.

The North Park reaches to the northern boundary of the Territory, and within forty miles of the Pacific R. R., it being the basin in which converge the small streams forming the head-waters of the North Platte River. Its surface is alternately meadow and forest, supporting an abundance of game, such as deer, antelopes, and bears; its streams are well supplied with dainty fish; but on account of its great elevation, added to its northern latitude, it has not the same advantages for agriculture possessed by the other large parks, which have less altitude, besides a more southerly location.

Middle Park lies next below North Park, being separated therefrom by a range of mountains extending from S. E. to N. W., which constitutes a section of the dividing-ridge of the continent, separating the rivers of the Atlantic from those of the Pacific slope. The waters of this park flow into the Colorado of the West, emptying into the Gulf of California. Middle Park is 50 miles wide by 70 long, and embraces within its basin several ranges of hills, besides two or three distinct and extensive valleys; it is surrounded by the great mountain-peaks of the Territory, including Pike's Peak, Gray's Peak, Long's Peak, and Mount Lincoln, rising to an elevation of from 13,000 to 14,500 feet, snow-capped mountains circling its whole area. It is milder in climate and possesses a vegetation superior to that of the North Park, but inferior to that of the South Park.

South Park is 30 miles wide and 60 long, lying on the eastern side of the divide, and furnishing the head-waters of the Arkansas and South Platte rivers. This is the most beautiful and the best known of all the parks, discoveries of rich mines having opened roads and scattered settlements throughout its limits. The soil is fertile and the scenery magnificent, offering, aside from the rich deposits of precious ores, inducements to settlers unsurpassed upon the continent. Water and forests are both plentiful, and the climate is delightful.

The San Luis Park is in the southern portion of the Territory, between the Rio Grande del Norte and the head-waters of the Arkansas River, surrounding a beautiful lake of the same name, which is sixty miles in length, receiving the waters of nineteen streams, with no apparent outlet. This is the largest of the parks, having an area of 18,000 square miles, and containing, besides those streams emptying into the San Luis Lake, sixteen others which empty into the Rio Grande del Norte. This park is remarkable for its natural scenery, the grandeur of its forests, the fertility of the soil, the purity of its waters, and the vast deposits of peat in the vicinity of San Luis Lake. It contains a population of 25,000, principally of Mexican descent, who are chiefly occupied in herding and agriculture. Cattle subsist the year round upon the indigenous grasses of these elevated pastures, without other food, and with no shelter except that afforded by the forests and undergrowth. The grass, whether green or cured into hay upon the stalk by the dry winds of the later summer months, appears to possess qualities similar to that of the plains, although growing at a much greater altitude. In fact, it is surprising how little the vegetation seems to be affected in this region by elevation above the sea-level, the luxuriant pastures and majestic forests of South and Middle Parks being from 7000 to 10,000 feet above the sea. Cereals and tender vegetables thrive abundantly at 7000 feet, while potatoes, cabbages, and turnips, are cultivated at an elevation of 8000. Beautiful flowers and nutritious grasses grow at 11,000 feet, and evergreen trees attain considerable size at 11,500 feet, above sea-level.

The gold and silver mines of Colorado, until recently, were supposed to be located principally in the park and mountain country, commencing in Summit and Boulder counties, between the 105th and the 106th meridians, near the 40th parallel, extending thence in a south-westerly direction through the Territory. The region embracing the mines possesses a width of from 30 to 60 miles. These mines are of gold, silver, and copper, the gold ore rarely being without an intermixture of more or less silver, or the silver ore without traces of gold, and frequently all three metals are combined in the same ore, this being the case in several of the most profitable mines in the Territory. In 1873 a new mining territory was discovered in the S. W. corner of the Territory, said to be richer in silver and gold than any mining district before known.

The mountains of Colorado all belong to the Rocky Mountain system, and consist for the most part of elevated table-lands (the plains and valleys already described), having an altitude of from 4000 to 9000 feet above the sea; from these plateaux rise numerous peaks and summits to heights varying from 11,000 to nearly 15,000 feet, the lower portions of them covered with trees, mostly evergreens, but the upper portions either gray bare rock or snow-covered, and some of them with extensive glaciers. The most noted of these summits are Gray's Peak, Long's Peak, Pike's Peak, Mount Lincoln, the Mountain of the Holy Cross, Mount Grant, Mount Sherman, Rabbit Ears, Mount Yale, Tarry-all Mountain, Mount Harvard, Dome Peak, Black Butte on the Wet Mountain range, and the Spanish Peaks. The Rocky Mountains in Colorado are the sources of many large rivers, some flowing into the Mexican Gulf and some into the Pacific. On the eastern slope are found the principal sources of both the North and South Platte, as well as those of their principal tributaries, the Republican and Smoky Hill Forks of the Kansas River, and the entire upper course of the Arkansas River, with that of its principal tributaries. In the S. part of the Territory the Rio Grande del Norte derives its head-waters from the slopes that bound San Luis and Las Animas Parks, and from the precipitous sides of the Sierra La Plata and the Uncompahgre ranges, which there form the boundaries of the great Colorado plateau. On the W. the Green River, the Grand River, and its principal affluent, the Gunnison River, as well as the San Juan, the streams which form the Rio Colorado of the West, all have their sources, and the greater part of their independent course, in Colorado. The Grand River penetrates to the centre of the Territory, and finds its ultimate source in Grand Lake on the E. side of the Middle Park, and but a very short distance from the upper waters of one of the affluents of the South Platte, and the Arkansas River at two points almost interlocks with the sources of the Grand and Gunnison rivers.

Geology and Mineralogy.—In speaking of the mineral wealth of Colorado we have made some necessary allusions to its geological structure, but this deserves more particular description. The present accomplished head of the geographical bureau at Washington, Dr. F. V. Hayden, has explored the Territory in so many different directions that we are able to comprehend its geology much better than that of some of the older States and Territories. Its various superficial formations are not, however, local, but extend into other States and Territories adjacent. The prevailing geological character of the Rocky Mountains throughout their whole extent is eozoic, but this is much more widely developed in Southern than in Northern Colorado. Between the 37th and 39th parallels it spreads out to a breadth of nearly 300 miles. In the centre of this expanse of eozoic rocks are the great parks, extending, though in interrupted lines, from N. to S. through the entire Territory, and into New Mexico. These are tertiary. Along the eastern border of the eozoic or gneissoid formations, extending from Wyoming to the centre of New Mexico, with the exception of two breaks of moderate length, runs a narrow bed of Devonian and carboniferous rocks. But the coal-beds of the Territory are almost entirely tertiary, or perhaps cretaceous. On the south-western border of the mountains a similar narrow stratum of Silurian rocks comes to the surface. W. of these, and following the same curves, with about the same width, are triassic and Jurassic rocks, and these crop out also on the E. side of the mountains between Pueblo City and the Spanish Peaks. The only positively volcanic rocks in Colorado are those in the valleys of the upper Rio Grande del Norte and Canadian River. The valley of the Rio Grande, Dr. Hayden believes to have been

at some remote period a vast volcanic crater. In the N. W., between the affluents of Green River, there are considerable tracts of tertiary, forming the surface of the elevated plateaus; but the remainder of Western Colorado, including the valleys of the principal streams, is cretaceous. E. of the Rocky Mountains, the valleys of the Arkansas and South Platte rivers and their tributaries are cretaceous, but all the remainder of the Territory is tertiary. The mineral wealth of the Territory is very great. The minerals of commercial value are auriferous iron and copper pyrites, zinc, blende, argentiferous galena, brittle silver ore, fahlerz (a compound of iron, copper, and zinc, with occasionally silver and mercury), specular iron, hematite and magnetic pyrites, cerussite (a carbonate of lead), anglesite (sulphate of lead), native gold and silver, horn silver, embolite (a bromo-chloride of silver), titanic iron ore, micaceous iron ore, spathic iron ore, smithsonite (a carbonate of zinc), copper-glance, salt, coal, and albertite coal. Of the other minerals of the Territory, the most common are yellow ochre, a bog-iron ore; quartz in all its forms, especially those most in demand as secondary precious stones—rock-crystal, agate, amethyst, bloodstone, cornelian, chalcedony, chrysoprase, jasper, onyx, and sardonyx; opals are abundant; all the varieties of felspar, hornblende, diorite, garnet, mica, leucite, chlorite, amphibole, epidote, tourmaline, calc-spar, gypsum, anhydrite, heavy spar, meteoric iron, beryl, brucite, and idocrase. There are numerous mineral springs, hot and cold, soda, sulphur, chalybeate, magnesian, and others, some of them in the vicinity of the great parks and others in smaller valleys in the mountains.

Vegetation.—Colorado cannot be called a treeless region, though its vast plains have few trees except in the river-bottoms, and these few mainly cottonwoods and box-elder, with some scrub-oaks, and pine and spruce on the foot-hills and spurs of the mountains which extend into the plains. The sides of the mountains up to the snow-line are covered with pine of various kinds, spruce, and fir, those lowest in altitude being of much inferior quality to those higher up the mountain. These furnish at present what lumber and timber is needed, but, unless replaced by new growth, the result of extensive planting of trees, will not do so for many years. The native grass of Colorado is remarkably rich and nutritious, furnishing the best of pasture to its vast and constantly increasing herds of cattle and sheep. The soil is admirably adapted to the growth of cereals, which yield astonishing crops, both in quantity and quality. Vegetables of all kinds and most of the fruits do well also, though peaches and apples are liable to be winter-killed. Grapes succeed well in the valleys of Southern Colorado, where they can have a southern exposure. The soil of the greater part of the Territory is very fertile where it can have sufficient moisture.

Climate.—The climate of the Territory is remarkably healthful. The air is clear, dry, and pure, and though most of the country is elevated, it is admirably adapted to the cure of diseases of the lungs and throat. Neither intermittent nor remittent fevers prevail there, as in most new countries. The annual range of the thermometer is much less than in other sections of the country. In the parks it does not average more than 60°, the highest temperature not exceeding 80° nor the lowest falling below 20°.

Zoology.—The wild animals of Colorado are those of the Rocky Mountains generally. The buffalo has long ranged over its grand parks and along its extensive plains; while the grizzly and black or brown bear, the elk, antelope, and red deer, the coyote or prairie wolf, the fox, the gopher or prairie dog, the sage-hare, and many smaller animals abound. At certain seasons wild-geese and several species of wild-duck are found in the lakes and marshes of the Territory, and the sage-hen and other species of grouse and the usual variety of song-birds are abundant. Of birds of prey there are two species of eagle, several vultures, hawks, and owls in the mountains.

Agricultural Productions.—We have no definite or authoritative statement of the agricultural condition of the Territory later than the census of 1870. At that time there were 320,346 acres of land in farms, of which 95,594 acres were under cultivation. (Stock-raising, being conducted with herdsmen on the public lands, requires no purchased lands or farms at present.) The average size of farms was 184 acres. The value of farms was $3,385,748, and of farming implements, etc., $272,604. The Territory contained at that time 6446 horses, 1173 mules and asses, 25,017 milch cows, 5566 working oxen, 40,153 other cattle, 120,928 sheep, and 5509 swine. These numbers have since been greatly increased, especially the cattle, sheep, and swine. Within the past three years the pastoral or stock-raising facilities of the Territory have received a very rapid development, and there are now not less than 200,000 cattle and 500,000 sheep in its pastures. The chief productions of the Territory in 1869–70 were 255,939 bushels of spring and 2535 of winter wheat; 5235 of rye; 231,903 of Indian corn; 332,940 of oats; 35,141 of barley (this crop, as well as the wheat, has enormously increased since that time); 178 of buckwheat; 890 pounds of tobacco; 204,925 of wool; 7500 bushels of peas and beans; 121,442 of Irish potatoes; 392,920 pounds of butter; 33,626 of cheese; 19,520 gallons of milk sold; and 19,787 tons of hay.

Manufactures.—The total number of manufacturing establishments in 1870 was 256, employing 49 steam-engines of 1433 horse-power, and 31 water-wheels of 792 horse-power. In these there were employed 876 hands. The amount of capital invested, $2,835,000; wages paid during the year, $528,221; amount of raw material used, $1,593,280; of products, $2,852,820.

Railroads.—For so new a Territory, Colorado is well supplied with railroads, while more are in course of construction. The Kansas Pacific, from Kansas City, Mo., to Denver, has 194 miles of its route in the Territory. It was completed in 1870, and now leases also the Denver Pacific, 106 miles in length (which connects Cheyenne on the Union Pacific with Denver), and the Boulder Valley R. Rs., 15 miles in length, from Hughes to Erie. The Denver and Rio Grande R. R., projected to run from Denver to El Paso on the Rio Grande, in Texas, a distance of 850 miles, has completed its main track to Pueblo, a distance of 120 miles, and a branch to Cañon City, 65 miles in length. This branch is intended to follow up the valley of the Arkansas and South Arkansas rivers, and entering San Luis Park at the N. by the Duntho Pass, traverse its entire length, and join the main road (Denver and Rio Grande) near Fort Garland. The Colorado Central R. R. branches in all directions, N., S., E., and W., from Golden City. One branch, 18 miles in length, connects it with Denver; another with Longmont, 41 miles distant; another with Black Hawk and Central City, 21 miles in length; another still with Floyd Hill, 17 miles distant. Other branches not yet completed will extend to Georgetown, to Jefferson, to Littleton, and to Bradford. All these roads, as well as three other roads now constructing, are E. of the Rocky Mountains. W. of these mountains no roads have been projected, and as there are very few settlers except Mexican rancheros, it is hardly probable that they will be built for some years to come. The completed railways of the Territory up to July, 1873, amount to 597 miles; 719 miles more are in course of construction within the Territory, and perhaps one-half of that amount will be completed before 1875.

Finances.—The assessed valuation of Colorado in 1870 was $17,338,101; the true valuation was estimated at $20,243,303. In 1872 her assessed valuation was over $30,000,000. The Territory has no debt, but the counties have pledged their credit to railroads to the extent of $678,829. At the close of 1872 there was a surplus of $50,000 in the territorial treasury. No tax was levied for 1872, and that for 1873 was one and a half mills on the dollar of taxable property. The railroads in operation in the Territory in 1872 delivered in Denver alone an average of 10,000 tons of freight per month, and the business of that city for the year was estimated at more than $14,000,000. The yield of the precious metals in 1872 was nearly $30,000,000. There were in Nov., 1872, six national banks in Colorado (five of them in Denver), having an aggregate capital of $575,000, and carrying an average amount of deposits of about $1,800,000. There were no savings banks in the Territory. There were no fire or life insurance companies, but most of the leading companies at the East were represented there.

Population.—The first census taken of Colorado was that of 1860, when there were 34,277 inhabitants, of whom 34,231 were whites; in 1870 the true population is stated at 47,164, of whom 456 were colored and 7480 were Indians. A considerable portion of the inhabitants of Southern Colorado are of Mexican extraction, but this fact does not seem to have been noticed in the census. The population in Jan., 1873, was stated by Gov. McCook to be about 80,000, exclusive of nomadic Indians. Of the population not Indian, 24,820 were males and 15,044 females. Of the colored race, 285 were males and 171 females. The population above ten years of age was 30,349, of whom 17,583 were engaged in some occupation; in agriculture, 6462; in professional and personal services, 3625; in trade and transportation, 2815; in manufacturing, mechanical, and mining industries, 4681. The Indians in the Territory are all of the Ute tribe, and mainly of the Tabequache, Yampa, Grand River, and Uintah bands of that tribe. They are all friendly, and have a reservation in Western Colorado of 14,784,000 acres, or a little more than one-fifth of the Territory. A few of them wander about, but most of them confine themselves to their reservation.

Education.—Our latest full reports on education in the Territory are to Jan. 1, 1872. The number of school dis-

tricts at that time was 160; the number of schools, 120; in Jan., 1873, there were 175; the number of male teachers, 80; of female teachers, 84; total, 164—in Jan., 1873, 230. Average monthly pay of male teachers, $69; of female teachers, $54; average number of days in which schools were taught was 92; number of school-houses, 80; of which there were brick, 4; stone, 4; frame, 41; log, 25; adobe, 6. Value of school-houses Jan. 1, 1872, $82,574.05—in Jan., 1873, $186,645. The total population of school age (from five to twenty-one years) in 1871 was 7742, of whom 4357 were enrolled in the schools, and the average attendance was 2611; in Jan., 1873, there were 5640 children enrolled. The amount of school-tax levied in 1871 was $79,901.04, and the rate 41 cents on the assessed valuation. Of this, at the close of the year, but $47,387.53 had been collected, and the districts had raised by local taxation $33,886.49 more. The total expenditure for school purposes was $67,395.48, or $3.66 per month per pupil. The amount of the school fund was $81,274.02; in Jan., 1873, it had increased to $121,372. Graded schools are in successful operation in Denver, Central, Black Hawk, Greeley, and several other towns in the Territory. Teachers' institutes were held in 1871 in Arapahoe and Boulder cos. There are no normal schools, colleges, or universities in Colorado. There is a theological seminary (Episcopal) at Golden, with two professors. There are two academies of high order: St. Mary's Academy, a Roman Catholic institution for girls, at Denver, with 9 instructors and 120 pupils, a library of 1200 volumes, and $5800 annual income; and Jarvis Hall Collegiate School at Golden, an Episcopal institution, under the care of the bishop, with 9 instructors and 67 pupils (boys), and a library of 250 volumes. This school is in connection with the territorial school of mines. There are also an Episcopal academy, established in 1872, at Georgetown, with 2 teachers, and a high school for girls, Wolfe Hall, at Denver, of which Bishop Randall is rector, with other teachers in charge. The Roman Catholics have also St. Joseph's Academy, for girls, at Trinidad, with 5 instructors; St. Mary's boys' school at Denver, and are erecting a hospital and school at Central City, and schools at Conejos and Costilla. There were in 1870, besides these, 16 private schools, with 20 teachers—8 males and 12 females—and 396 pupils, 203 males and 193 females. The total income of these schools was $7090. The territorial school of mines, which is to receive the agricultural land-grant, was provisionally organized in 1872, and has its instruction at present in connection with Jarvis Hall. The number of persons of ten years old and over in 1870 who could not read and write (exclusive of tribal Indians) was 6823, of whom 3400 were males and 3423 females.

Libraries.—There were 30 public libraries in the Territory in 1870, with 11,385 volumes, and 145 private libraries reported, with 27,959 volumes.

Newspapers.—There were 14 newspapers of all classes published in the Territory in 1870, having an aggregate circulation of 12,750, and issuing annually 1,190,600 copies. This number has since somewhat increased, and the circulation is now nearly 20,000. Of these papers, 5 are dailies, with an aggregate circulation of somewhat more than 3000, 9 are weeklies, with a present circulation of about 15,000; 1 is a monthly, with a circulation of 1000: this is an advertising sheet. Four of the dailies and six of the weeklies are political, and one daily and three weeklies literary and miscellaneous.

Churches.—In 1870 there were 55 church organizations of all kinds, with 47 church edifices, 17,495 sittings, and church property valued at $207,230. Of these, the Baptists had 5 churches, 4 church edifices, 855 sittings, and $11,000 worth of church property; in 1872 they had 13 churches, 12 ordained and 2 licensed ministers, and 469 members. There were, in 1870, 2 Christian churches, but no particulars are given of them. In 1870 there were 4 Congregational churches, with 4 edifices, 1050 sittings, and $28,200 of church property; in 1872 there were 6 churches, 4 ministers, and 173 members. In 1870 there were 9 Episcopal churches, 8 church edifices, 2000 sittings, and $46,040 of church property; in 1872 there were 10 clergymen, 9 parishes, and about 300 communicants. There was in 1870 one Jewish synagogue. In 1870 there were 14 Methodist churches, 13 church edifices, 3815 sittings, and $50,800 worth of church property; in 1872 there were 26 ordained ministers, 23 churches (6 of them with parsonages), 1070 members, 207 probationers, and church property valued at $121,100. In 1870 there were 6 Presbyterian churches, 5 church edifices, 1200 sittings, $21,800 of church property; in 1872 there were 3 presbyteries in the Synod of Colorado (which, however, includes some of the adjacent Territories), 22 ministers, 21 churches, 560 communicants, and 1251 children in the Sunday schools. In 1870 there were 14 Roman Catholic churches, 13 church edifices, 8575 sittings, and $49,300 of church property; in 1872 there were 15 clergymen in the vicariate apostolic of Colorado, 17 churches and chapels, besides 14 chapels building, and the adherent Catholic population was stated at about 10,000.

Constitution, Courts, Delegates in Congress, etc.—Colorado is still under territorial organization, and her territorial constitution is similar in its provisions to those of the other new Territories. It contains a provision, engrafted by Congress upon the organic act of all the new Territories, "that there shall be no denial of the elective franchise or any other rights to any person by reason of race or color, except to Indians not taxed." The judicial power of the Territory is vested in a supreme court, district courts, probate courts, and justices of the peace. The supreme court consists of a chief-justice and two associates, appointed by the President of the U. S. for the term of four years. For district court purposes the Territory is divided into three districts, in each of which one of the justices of the supreme court holds the sessions. There is also in each district a clerk of the court, who appoints deputies in each county. The supreme and district courts have chancery as well as common-law jurisdiction. The probate judges are appointed by the legislature for each county. The Territory is represented in Congress by one delegate, who has the right to debate, but not to vote. The present delegate is Jerome B. Chaffee of Central City.

Counties.—Colorado has now (in 1873) twenty-one counties. As it was not organized as a Territory until 1861, it has of course no former record of county population, though its population as an unorganized Territory was recorded in 1860. The following are the counties and their population in 1870, and their county-seats at present:

Counties.	Population.	Capital.
Arapahoe	6829	Denver.
Bent	592	Las Animas.
Boulder	1939	Boulder.
Clear Creek	1596	Georgetown.
Conejos	2504	Conejos.
Costilla	1779	San Luis.
Douglas	1388	Franktown.
El Paso	987	Colorado City.
Fremont	1064	Cañon City.
Gilpin	5490	Central.
Greenwood	510	Kit Carson.
Huerfano	2250	Badito.
Jefferson	2390	Golden.
Lake	522	Dayton.
Larimer	838	La Porte.
Las Animas	4276	Trinidad.
Park	447	Fair Play.
Pueblo	2265	Pueblo.
Saguache	304	Saguache.
Summit	258	Breckenridge.
Weld	1636	Evans.

The principal towns are Denver, the capital, which in 1870 had 4759 inhabitants, and is now (1873) estimated to have about 14,000; Central City, Greeley, and Black Hawk have between 2000 and 3000; Georgetown, Golden City, St. Vrain, Pueblo, and Boulder have nearly 2000 each; Evans, Kit Carson, and Cañon City are growing towns.

History.—Colorado has had a brief history. In 1857 a party of civilized Cherokees made the first organized attempt to explore it, but were driven back by the roving tribes of Indians. In 1858 a company from Georgia, and another from Lawrence, Kan., reported that they had discovered gold in paying quantities in the valleys near the base of Pike's Peak, a lofty mountain discovered by Gen. Z. M. Pike in 1806. In May, 1859, gold was discovered in large quantities in the vicinity of the sources of Clear Creek, 50 miles N. of Pike's Peak. This discovery caused great excitement, and there was a general rush of emigrants to Pike's Peak, as the whole region was called, during the next two years. Many of the emigrants, not provided with food or other necessary articles for so perilous and tedious a journey, perished miserably by the way, or reached there in a starving condition; but others followed, till in 1860 the Territory, though not yet organized, had nearly 35,000 inhabitants. It was found, after the first placers were exhausted, that both gold and silver, but especially gold, existed there in large quantities, but in new conditions—combined with sulphur and copper or iron in the form of pyrites, and very difficult of extraction. This discovery checked the fever of the gold-miners, and though the Territory was organized in Feb., 1861, under the name of Colorado, its growth was very slow for some years. Meantime, two other discoveries had been made: one, that, rich as it was in the precious metals, its greatest wealth lay in its admirable climate and its fine pasture-lands, which made it the finest stock-raising region on the continent; the other, that the vast elevated plains of Eastern Colorado, which had formed a portion of the so-called "Great American Desert," and so late as 1863 were re-

garded as worthless for agricultural purposes, were really, when irrigated, the richest and most arable portion of the continent. These two discoveries have done much to turn the tide of emigration to Colorado within the past four years, and the invention of new processes of extracting gold and silver from the pyrites inexpensively has given a fresh impetus to its mining industry. Colorado sent two regiments of cavalry, one of infantry, and a battery of artillery into the service of the government in the war of 1861, besides organizing a force for home defence. A convention was called, a State constitution prepared and adopted, and application made for the admission of Colorado into the Union as a State in Dec., 1865. The bill passed both houses of Congress in April, 1866, but President Johnson vetoed it. Another bill was passed for its admission in Jan., 1867, but this was also vetoed. A bill was subsequently passed in Congress giving permission to the Territory to apply for admission, but its legislature failed to avail themselves of it. In the session of 1872–73 application was made, but Congress denied it. The present population of the Territory is nearly sufficient to entitle the new State to a member of the House of Representatives, and it is probable that its admission will not be long delayed.

In Sept., 1873, Hon. Felix R. Brunot and Mr. Thomas K. Cree, chairman and secretary of the board of Indian commissioners, negotiated with the Utes, who occupy an immense reservation in Western Colorado, a treaty by which the U. S. government comes in possession of a tract of mining lands in the S. W. corner of Colorado extending from the 107th meridian W. to the Utah line, and northward from the northern boundary of New Mexico 100 miles. This tract, enclosing about 6000 square miles, is very rich in silver ores of great purity, assaying from $1000 to $4000 per ton, and gold-bearing quartz has been found which is said to have yielded $36,000 to the ton. It will be known as the San Juan River Mining District, and there is already a colony of 250 or 300 miners at work there. The treaty, which will in all probability be ratified by the Senate, binds the Government to pay to the Utes the annual income from $500,000.

Governors.—The governors of the Territory have been—

John Evans.....1861–65	Edward M. McCook...1869–73
Alexander Cummings.1865–67	...1873–
A. Cameron Hunt.....1867–69	

As a Territory Colorado has never had a presidential vote.

L. P. Brockett.

Colorado, a county in the S. E. of Texas. Area, 905 square miles. It is intersected by the Colorado River. The soil is generally fertile, and produces good crops of cotton and maize. The county is well timbered, and is traversed by the Galveston Harrisburg and San Antonio R. R. Capital, Columbus. Pop. 8326.

Colorado City, a post-village, capital of El Paso co., Col., at the base of Pike's Peak, on a small affluent of the Arkansas River and near the Denver and Rio Grande R. R., 76 miles S. of Denver. Gold is found in the vicinity.

Colorado Springs, a post-village of El Paso co., Col., on the Denver and Rio Grande R. R., 75 miles S. of Denver. It has a delightful climate and mineral springs, and is a place of summer resort. It was founded by a company of educated Eastern men and called the Fountain Colony. It has a bank, a weekly paper, four churches, four hotels, good schools, and is surrounded by fine scenery.

Color-Blindness, want of sensibility in the eye to differences of color. This defect exists in different degrees, but is not necessarily accompanied with any other imperfection of vision. In extreme cases the colors most strongly contrasted seem not to differ except as to degree of brightness or dulness. Very remarkable examples are given by Brewster in his "Natural Magic." Color-blindness is sometimes called Daltonism, because the distinguished John Dalton and his brothers suffered from it.

Color-Guard, The, in the U. S. infantry, consists of the color-bearer and a guard of eight corporals in each regiment. They must all be good soldiers. The color-guard is attached to the right-centre company in the line, and its post on the field is one of honor as well as danger. (See Color-Sergeant.)

Colorine, a township of Lowndes co., Ala. Pop. 2951.

Coloring-Matters. Nature abounds in these principles, and art has added to the number. The colored appearance is not an inherent property of the body itself, but due to its effect upon ordinary light, which is composed of rays of all colors. If a body absorbs nearly all the light, it appears black; if it absorbs scarcely any, but throws it off, it will appear white; but if the body contains any substance (pigment) that has the power of decomposing white light, its color will depend upon which of the rays it absorbs and which it reflects. Strictly speaking, therefore, the *color* of a pigment is due to light which it cannot absorb, and which is reflected to the eye of an observer. (See Dyestuffs, Dyeing, and Pigments, by Prof. C. F. Chandler.)

Col'orist, a painter who excels in coloring or in whose work success in color is the chief excellence. According to some critics, Titian was the greatest colorist that ever lived. "The sixteenth century," says Ruskin, "produced the four greatest *painters*—that is to say, managers of color—that the world has seen; namely, Tintoret, Paul Veronese, Titian, and Correggio."

Col'ors, a military term applied to banners or flags carried by each regiment of infantry. The banners of the cavalry are called standards. Each U. S. regiment has two colors, one national and one regimental. They are made of silk, and display the honors and distinctions of the regiment.

Colors, Complementary. See Complementary Colors.

Color-Sergeant, in the U. S. infantry, is called, in strict military language, the color-bearer. He has no higher rank than other sergeants, but is detailed by the colonel for carrying the regimental colors. In the British army he is a non-commissioned officer of higher rank and better pay than the ordinary sergeants. There is one to each company of infantry, and the office is specially given to meritorious soldiers. He fulfils the ordinary regimental and company duties of sergeant, but in addition to these he attends the colors.

Colos'sæ [Κολοσσαί or Κολασσαί], an ancient and ruined city of Asia Minor, situated in Phrygia, on the river Lycus. It was nearly destroyed by an earthquake in 65 A. D. Saint Paul's Epistle to the Colossians was addressed, in 62 (some say 58–60) A. D., to the believers at Colossæ. Its site is about 3 miles N. of the modern *Chonas* or *Khonos*.

Colos'sal [from *colossus*], in the fine arts, a term applied to any work remarkable for extraordinary dimensions. It is, however, more especially applied to works in sculpture. It seems probable that colossal statues had their origin from the attempt to astonish by size at a period when the sciences of proportion and of imitation were in their infancy. In Babylon we learn from Daniel that the palaces contained statues of great size, and in the present day the ruins of India present us with statues of extraordinary dimensions. The Egyptians surpassed the Asiatics in these gigantic monuments. The taste for colossal statues prevailed also among the Greeks. The principal Roman colossus was the figure of himself, as the sun, set up by Nero before the Golden House; it was in bronze, the work of Zenodorus; and if, as Pliny says, it was 110 feet high, it was larger than the Colossus of Rhodes.

Colos'sians, The Epistle of Saint Paul to the, was written at the same time and place as those to the Ephesians and Philemon, probably during the apostle's first imprisonment at Rome. It seems to be directed against certain Jewish heresies of the Alexandrian or Gnostic type.

Colos'sus [Gr. Κολοσσός] **of Rhodes,** a brazen statue of Apollo, or perhaps of the sun-god, executed by Chares of Lindus, and completed in 280 B. C., was one of the Seven Wonders of the World. The statement that one foot rested on each side of the harbor of Rhodes, and that ships passed under it in full sail, does not rest on good authority. It was 105 feet in height, and was ascended by a winding staircase. It was overthrown by an earthquake about 224 B. C., and was never re-erected. Its fragments remained on the spot till 672 A. D.

Colos'trum [a Latin word of uncertain etymology], the first milk yielded after accouchement. It contains more sugar, more butter, and rather less caseine than true milk, and also contains a much greater proportion of phosphates and chlorides, which may possibly give to colostrum the evacuant properties which it is said to possess. It also has a great number of leucocytes, called "colustrum corpuscles."

Colquhoun (Patrick), a Scottish political economist, born at Dumbarton Mar. 14, 1745. He became a merchant in Glasgow, and promoted the manufacture of muslin in Scotland. In 1761 he went to Virginia, and in 1789 settled in London. He published, besides other works, a "Treatise on the Police of the Metropolis" (1796) and "On the Population, Wealth, etc. of the British Empire." He applied his mind to the elevation of the poor classes. Died April 25, 1820.

Col'quitt, a county in the S. W. of Georgia. Area, 600 square miles. It is drained by the Ocopilco, and bounded on the E. by Little River. The surface is nearly level. Cotton, tobacco, wool, and rice are raised. Capital, Moultrie. Pop. 1654.

Colquitt, or **Col'quit,** a post-village, capital of Miller

co., Ga., on Spring Creek, about 100 miles S. of Columbus. It has one weekly newspaper.

Colquitt (WALTER T.), an American lawyer and Senator, born in Halifax co., Va., Dec. 27, 1799. Having removed to Georgia, he was elected a member of Congress in 1838, and a Senator of the U. S. in 1842, by the Democrats. Died in Macon, Ga., May 7, 1855.

Colt (SAMUEL), a celebrated American inventor, born at Hartford, Conn., July 19, 1814. He invented a pistol called a revolver, for which he obtained a patent in 1835. He began about 1848 to manufacture revolvers at Hartford, where he erected an extensive armory. Colt's revolvers soon attained a world-wide reputation, and were adopted as cavalry arms by most civilized nations. (See REVOLVER.) Died in 1862.

Col'ton, a post-township of St. Lawrence co., N. Y., has extensive forests and numerous lakes, and is the seat of important manufactures of sole-leather. Pop. of Colton village, 633; of township, 1719.

Colton (CALVIN), LL.D., an American writer and Episcopal clergyman, born at Longmeadow, Mass., in 1789. He wrote, besides other works, "Four Years in Great Britain" (1835) and a "Life of Henry Clay" (3 vols., 1844). Died at Savannah, Ga., Mar. 13, 1857.

Colton (CHARLES), U. S. N., born Feb. 15, 1843, in Wisconsin, graduated at the Naval Academy in 1861, became ensign in 1862, a lieutenant in 1864, and a lieutenant-commander in 1866. He served in the steam-sloop Oneida at the battle of Mobile Bay, Aug. 5, 1864, and is thus highly spoken of by the executive officer of that vessel, Charles H. Huntington: "Too much praise cannot be awarded to Lieutenant C. S. Colton, Lieutenant E. N. Kellogg, and Acting Ensign John Sears, commanding gun divisions, for the admirable examples of courage they afforded their men, and for their skill in directing the fire of the guns." FOXHALL A. PARKER, U. S. N.

Colton (WALTER), an American writer, born in Rutland, Vt., May 9, 1797. He was a chaplain in the navy. Among his works are "Ship and Shore in Madeira, Lisbon, etc." (1835), "Deck and Port" (1850), and "Three Years in California" (1850). Died in Philadelphia, Jan. 22, 1851.

Col'uber, the Latin name of a genus of serpents, originally including many species agreeing only in having a double row of plates on the under side of the tail. Most of the poisonous species, with many harmless ones, are now excluded from the genus. A number of them are of brilliant colors. The serpent of Æsculapius (*Coluber Æsculapii*) was taken by the ancients as a symbol appertaining to the god of medicine. It is four or five feet long, and of a brown color. It is very gentle and easily tamed. It is a native of Southern Europe.

Colubri'na [from *Coluber*, one of the genera], one of the two great sub-orders of serpents, is distinguished from the Viperina by being oviparous instead of ovo-viviparous, and has also a different arrangement of the teeth and maxillary bones. The sub-order probably comprises more than half the existing species of serpents. Comparatively few of them are venomous.

Colum'ba, SAINT, called also **Saint Colm,** was born at Gartan, county Donegal, Ireland, in 521 A. D. In 563 A. D. he set out on his mission to Scotland. He founded in Iona, one of the Hebrides, an abbey and a college which had a high reputation. Died in 597 A. D.

Col'umban', or **Colomban,** SAINT, an Irish monk, born in Leinster Nov. 21, probably in 543 A. D. He founded the monastery of Luxeuil, near Besançon, in France, about 590 A. D., and was the author of a monastic rule. He was a man of real learning and genius. Died in Italy in 615 A. D., after two years' residence there.

Columba'rium [a Latin term originally signifying a "dove-cote"], among the ancient Romans a sepulchre containing niches like pigeon-holes (whence the name), in which were placed burial-urns for receiving the ashes of slaves and dependants after incremation.

Colum'bia, or **Or'egon,** a river of the U. S., is the largest American river that enters the Pacific Ocean. It rises on the western slope of the Rocky Mountains in British Columbia, about lat. 50° N. and lon. 116° W. It flows north-westward nearly 150 miles, and then southward to Washington Territory, in which it unites with a large branch called Clark's River. Below this junction it pursues a very tortuous course to the northern boundary of Oregon. From this point it flows westward in a nearly direct line, and forms the boundary between Oregon and Washington Territory until it enters the Pacific. It is a rapid stream, passing through many mountain-gorges, and its navigation is much obstructed by falls. The tide ascends to the Cascades, a series of rapids, where the river passes through the Cascade Range, 140 miles from its mouth. At its mouth is a bar covered with twenty feet of water at low tide. Vessels of 300 tons or more can ascend the river to the Cascades. At the Dalles, in Oregon, the river is contracted to a channel about 100 yards wide between basaltic rocks. Steamboats ply daily on the Columbia, both below and above the DALLES (which see). Entire length, estimated at 1400 miles. A large affluent, called Lewis or Snake River, enters it near lat. 46° 20′ N. The scenery of the Columbia is sublime, especially where it passes through the Cascade Range.

Colum'bia, a county in the S. W. of Arkansas. Area, 825 square miles. It is drained by the Dorcheat River. The surface is nearly level; the soil fertile and well timbered. Cotton, corn, and wool are raised. Capital, Magnolia. Pop. 11,397.

Columbia, a county of Florida, bordering on Georgia. Area, 800 square miles. It is partly bounded on the N. W. by the Little Suwanee River. The surface is nearly level; the soil is fertile and well timbered. Rice, cotton, corn, wool, and fruit are raised. It is intersected by the Jacksonville Pensacola and Mobile R. R. Capital, Lake City. Pop. 7335.

Columbia, a county in the E. of Georgia. Area, 580 square miles. It is bounded on the N. E. by the Savannah River. The surface is uneven; the soil is based on granite and other rocks. Cotton, corn, and wool are raised. It is intersected by the Georgia R. R. Capital, Appling. Pop. 13,529.

Columbia, a county of New York, bordering on Massachusetts. Area, 688 square miles. It is bounded on the W. by the Hudson River. The surface in the E. is hilly, and in the other parts nearly level. The soil is fertile. Cattle, grain, wool, and dairy products are raised, and iron, cotton, and woollen goods, paper, and a great variety of articles are extensively manufactured. Its commerce is also extensive. Limestone, marble, iron, and lead are found here. It is intersected by the Boston and Albany R. R., the Hudson River R. R., and the Harlem Extension R. R. Capital, Hudson. Pop. 47,044.

Columbia, a county in the N. W. of Oregon, is bounded on the N. and E. by the Columbia River. The surface is partly mountainous, and covered with forests of fir, cedar, and hemlock. The soil is fertile. Capital, St. Helen. Pop. 863.

Columbia, a county of E. Central Pennsylvania. Area, 425 square miles. It is intersected by the North Branch of the Susquehanna River, and also drained by Fishing and Catawissa creeks. The surface is hilly; the soil of the valleys is derived from limestone, and is fertile. Wool and grain are staple products, and carriages, leather, iron, and metallic wares are extensively manufactured. It is traversed by the Lackawanna and Bloomsburg, the Danville Hazleton and Wilkesbarre, and Catawissa branch of the Philadelphia and Reading R. Rs. Capital, Bloomsburg. Pop. 28,766.

H. L. DIEFFENBACH, ED. "THE COLUMBIAN."

Columbia, a county in S. Central Wisconsin. Area, 727 square miles. It is intersected by the Wisconsin and the Fox or Neenah River. The surface is undulating; the soil fertile. Cattle, grain, and wool are raised; wagons and carriages are manufactured. The Milwaukee and St. Paul R. R. passes through it. Capital, Portage City. Pop. 28,802.

Columbia, a township and post-village of Henry co., Ala. The village is 110 miles S. E. of Montgomery. Pop. of township, 1382.

Columbia, a post-village of Tuolumne co., Cal., is near the Stanislaus River, 4 miles N. of Sonora. It has four churches. Gold-mines have been opened here. Pop. 1125; of the township, 2192.

Columbia, a post-township of Tolland co., Conn. Pop. 891.

Columbia, a post-village of Monroe co., Ill., about 100 miles S. by W. from Springfield. Pop. 1246.

Columbia, a township of Du Bois co., Ind. P. 1622.

Columbia, a post-township of Fayette co., Ind. Pop. 929.

Columbia, a township of Gibson co., Ind. P. 2238.

Columbia, a township of Jennings co., Ind. P. 1272.

Columbia, a township of Martin co., Ind. Pop. 831.

Columbia, a city, capital of Whitley co., Ind., on the Detroit and Eel River and the Pittsburg Fort Wayne and Chicago R. Rs., 19 miles W. N. W. of Fort Wayne. Two newspapers are issued here. Pop. 1663; of Columbia township, 2934.

Columbia, a township of Tama co., Ia. Pop. 718.

Columbia, a township of Wapello co., Ia. Pop. 2101.

Columbia, a post-village, capital of Adair co., Ky., 100 miles S. S. W. of Frankfort. It has one weekly newspaper. Pop. 506.

Columbia, a post-village, capital of Caldwell parish, La., on the Washita River, 230 miles by water N. N. W. of Baton Rouge. Pop. 235.

Columbia, a post-township of Washington co., Me. Pop. 668.

Columbia, a township and post-village of Jackson co., Mich. The village is 10 miles S. E. of Jackson. Total pop. 1002.

Columbia, a township of Tuscola co., Mich. P. 424.

Columbia, a township and village of Van Buren co., Mich. The village is on the Kalamazoo and South Haven R. R., 27 miles W. of Kalamazoo. Total pop. 1269.

Columbia, a post-village, capital of Marion co., Miss., on Pearl River, 90 miles S. by E. from Jackson. Pop. 66.

Columbia, a post-village, capital of Boone co., Mo., 10 miles N. of the Missouri and 24 miles E. of Boonville. A branch road connects it with the St. Louis Kansas City and Northern R. R. It is the seat of the State university and the Christian and Baptist female colleges. It has two national banks, a library, and two newspapers. Pop. 2236; of township, 5560. ED. "HERALD."

Columbia, a post-township of Coos co., N. H. P. 752.

Columbia, a post-township of Herkimer co., N. Y. Pop. 1637.

Columbia, a township of New Hanover co., N. C. Pop. 1715.

Columbia, a township of Randolph co., N. C. Pop. 1254.

Columbia, a post-village, capital of Tyrrell co., N. C., on a creek or inlet of Albemarle Sound, 182 miles E. of Raleigh. Pop. of township, 1206.

Columbia, a post-village of Hamilton co., O., on the Ohio River, 5 miles above Cincinnati. Pop. 1105.

Columbia, a post-township of Hamilton co., O. Pop. 3184.

Columbia, a township of Lorain co., O. Pop. 892.

Columbia, a township of Meigs co., O. Pop. 1286.

Columbia, a township and village of Bradford co., Pa. The village is on the Williamsport and Elmira R. R., 58 miles N. of Williamsport. Pop. 1521.

Columbia, a post-borough of Lancaster co., Pa., on the left bank of the Susquehanna River (here nearly one mile and a quarter wide), 80 miles by railroad W. of Philadelphia. It is the south-western terminus of the Reading and Columbia R. R., 45½ miles long, and the northern terminus of the Columbia and Port Deposit R. R. A railroad bridge across the river connects Columbia with Wrightsville. It contains two national and three private banks, three newspaper-offices, waterworks, a female institute, two rolling-mills, a mill for railroad iron, engine and boiler works, several iron-furnaces, a patent rake manufactory, and a fine library. Here is an extensive market and dépôt for lumber, which is brought down the river by rafts. Pop. 6461. A. M. RAMBO, ED. "COURANT."

Columbia, the capital of South Carolina and seat of justice of Richland co., is on the left (E.) bank of the Congaree River, just below the confluence of the Saluda and Broad, 137 miles by railroad N. N. W. of Charleston; lat. 33° 57′ N., lon. 81° 7′ W. It is on the Charlotte Columbia and Augusta and the Wilmington Columbia and Augusta R. Rs., is the south-eastern terminus of the Greenville and Columbia R. R., and is connected with Charleston by a branch of the South Carolina R. R. It is the seat of South Carolina College, called since 1865 the South Carolina University, founded in 1804. Columbia has a State-house, penitentiary, an asylum for the insane supported by the State, a Presbyterian theological seminary, a Methodist female college, two national banks, one cotton factory (just out of the corporate limits), three foundries, two sash and door factories, an orphans' home, waterworks, a park, and large libraries connected with the theological seminary (18,300 vols.) and South Carolina University (30,000 vols.). Four daily, eight weekly (four of them religious), two tri-weekly, and one monthly newspaper are published here; there is also one quarterly publication. It is at the head of steamboat navigation. It was taken by Gen. Sherman's army Feb. 17, 1865, and was then much injured by fire. Pop. 9298; or, including the township of Columbia, 10,130. ED. OF "SOUTHERN PRESBYTERIAN."

Columbia, a post-village, capital of Maury co., Tenn., on Duck River and on the Nashville and Decatur R. R., 46 miles S. S. W. of Nashville. It is the seat of Jackson College, and has one national bank, two female seminaries, and three weekly and one monthly newspaper. Pop. 2550.

Columbia, a post-village of Brazoria co., Tex., on the W. bank of the Brazos River. It has an extensive trade, carried on in steamboats and by rail. It is the W. terminus of the Brazoria and Houston Tap R. R. Pop. 426.

Columbia, a township and post-village of Fluvanna co., Va. The village is on the James River, 25 miles S. E. of Charlottesville. Pop. of township 2331.

Columbia, British. See BRITISH COLUMBIA.

Columbia College, an institution of learning in New York City, originally chartered as "King's College" by George II., Oct. 31, 1754. Moneys had been previously raised for the endowment of the college, under acts of the provisional assembly authorizing lotteries for the purpose, of which the first was passed as early as 1746. It received also a liberal grant of land from Trinity Church, and on a portion of this its first building was erected. The Episcopal denomination has always had a controlling influence in its governing board, but it is not, and has never been, sectarian in its teaching. Its original site was near the City Hall Park, and was approached through Park place, which has since been extended over it. In 1857 the college was removed to East Forty-ninth street, where it has since occupied buildings not originally erected for it; but these will soon be replaced by others more suitable, unless it should be a second time removed to a point farther up the island. The occurrence of the public troubles which led to the war of the Revolution seriously interfered with the business of the college, and finally arrested its operations altogether. On the night of May 10, 1775, the president, Dr. Cooper, being a zealous loyalist, fled, through fear of popular violence, and no commencement was held that year. Early in the following year the building was converted into a military hospital, and all the students were dispersed. Business was resumed in May, 1784, when the college, on its own application, was erected into a university, under the corporate title of "The Regents of the University." The body which now bears this name in the State of New York is of more recent creation. In 1787 the university scheme was abandoned, and the institution received its present name of "Columbia College." A medical department was connected with the college from 1767 to 1813, when it was discontinued. In 1860 the "New York College of Physicians and Surgeons" became connected with Columbia College. The law department (established in 1858) has met with great success. The number of law-students (1873–74) was 425. The law-graduates of 1873 numbered 138. The school of mines (organized in 1864) embraces five distinct courses of scientific study: (1) mining engineering; (2) civil engineering; (3) metallurgy; (4) geology and natural history; (5) analytical and applied chemistry. The college has in its four faculties more than 60 professors and instructors, and nearly 1000 students (1873). Its principal library contains nearly 17,000 volumes; the library of the law school, 4000; that of the school of mines, 5000; and the botanical library, 1100. This latter was the gift of the late eminent naturalist Dr. John Torrey, who presented to this college, at the same time, his immense herbarium, embracing over 50,000 specimens. This collection has recently been more than doubled in magnitude by the addition to it of the extensive herbarium of Prof. Meisner of Bâle, presented by Mr. J. J. Crooke of New York in 1872. It is now probably the largest and most complete in the world, except the royal collection at Kew, England. The cabinets and apparatus of the college for the illustration of the various branches of physical and chemical science, and of geology, mineralogy, and natural history, are surpassed for completeness and excellence by few. The gross income of the college for 1873 was more than $260,000, largely derived from ground-rents. This income is rapidly increasing, and the financial prospect of Columbia College is excellent.

The presidents of the college have been—Samuel Johnson, D. D. (1753–63); Myles Cooper, S. T. D., LL.D. (1763–75); Rev. W. Moore (1784–87); Dr. W. S. Johnson (1787–1800); C. H. Wharton, D. D., LL.D. (1800); Rt. Rev. Benjamin Moore (1800–11); W. Harris, S. T. D. (1811–29); Hon. W. A. Duer (1829–42); N. F. Moore, LL.D. (1842–49); Charles King, LL.D. (1849–64); and Rev. F. A. P. Barnard, S. T. D., LL.D., L. H. D. F. A. P. BARNARD.

Colum'biad, a sea-coast howitzer, of cast-iron, proposed by the late Colonel George Bomford, chief of ordnance, and introduced (about) 1812. Some of these guns were in service during the war with England, 1812–15. Three calibres were recommended — 50-pounders, 100-pounders, and 150-pounders—for coast defence, particularly against shipping, as a single shell of the larger sizes exploding in a vessel's side, or on her decks, would, it was thought, produce great injury, if not complete wreck.

Meyer's Technologie des Armes à feu mentions under date 1815, "the explosion of an English vessel hit by an American shell before New York;" and again, under the same date, "Very good results were obtained in America from ovoidal (spherico-cylindrical) percussion shells of the calibre of 100, which are fired from a kind of carronade designated by the name of Columbiad." This is the first notice given by this diligent and accurate author of the existence of such a gun, or of a percussion shell, in the world. He seems to have searched thoroughly from the commencement of the Christian Era.

Halleck ("Military Art and Science," page 280) states (in a note), after designating large howitzers as "*Paixhans Guns*," or "*Columbiads*"—"the description of one of Colonel Bomford's Columbiads which was at Governor's Island, New York Harbor, was taken to France by a young French officer, and thus fell into the hands of General Paixhans, who immediately introduced them into the French service."

Whether General Paixhans received as above the description of the columbiad or not, there would seem to be no doubt that this gun was the first howitzer of cast-iron of like calibre and length that was successfully used for shell-firing. 8-inch and 10-inch howitzers had been proposed and made at earlier dates—that is, chambered guns shorter than cannon and longer than mortars, and having trunnions in advance of their vents, and near the centre of gravity of the gun—but these guns were of bronze, generally shorter than the columbiads, and were not designed or used for shell-firing at low angles, but for heavy projectiles, to obtain great range.

In 1749, France adopted the 8-inch size howitzer, but suppressed it in 1803 as useless, upon Gassendi's recommendation, retaining only a 5½-inch field howitzer. In 1804, 9-inch and 11-inch howitzers, proposed by Villantrois, were made at Douai of eight calibres length, and were fired with lead-filled shells at high angles; and in 1810, at Seville in Spain a 10-inch howitzer of seven calibres length was cast to obtain a long range at the siege of Cadiz.

From 1809 to 1819, according to Meyer, Paixhans was interested in experiments to prove the superiority of hollow projectiles over hot shot for naval warfare, and the destructive effects of bursting shells. In 1819 he presented his treatise *Nouvelle Force Maritime*, but not published until 1822, in which he first proposes his *Canon-Obusier*, an 8-inch howitzer shell gun of cast-iron. The English claim that General Millar, who introduced a like gun in 1824, proposed it in 1820.

In the U. S. the 8-inch howitzer and 10-inch howitzer shell guns were remodelled in 1841 and 1844, intending these last, called *Columbiads*, to be fired with solid shot and with one-sixth their weight of powder; but subsequently they were reserved for shell-firing only, and a new pattern (without a chamber and heavier) was adopted in 1858; two of which (one cast solid and one hollow, and as proposed by Gen. Rodman, cooled from the interior) were subjected to comparative proof, both enduring the remarkable number of 4082 rounds, with solid shot and service charge, without destruction.

In 1861, the Rodman exterior form of guns was adopted for the Columbiads, as for all others, and calibres of 13, 15, and 20-inch smooth-bore, 10-inch and 12-inch rifled, and 13 and 15 mortars, adopted for sea-coast guns.

Col. Bomford, the inventor of the columbiad, distinguished himself through his long military career by many other valuable suggestions in artillery science. Among others, he proposed and carried out the first practical experiments demonstrating the proper exterior lines of a cannon, as shown by the pressure of the fire-charge at regular distances from the bottom of the bore. He also proposed the 12-inch gun of 1846, and while testing its capabilities carried on a series of experiments proving the best and simplest form of fuse-shells fired from heavy guns, with the safety-caps sufficient to protect the fuse from extinction by ricochet on land or water.

P. V. Hagner, U. S. A.

Columbia, District of. See District of Columbia, by L. P. Brockett, M. D.

Columbia Falls, a township of Washington co., Me. It has manufactures of lumber. Pop. 608.

Columbian'a, a county in the E. N. E. of Ohio. Area, 490 square miles. It is bounded on the S. E. by the Ohio River. The surface is partly hilly and partly undulating; the soil is calcareous and very fertile. Cattle, grain, and wool are raised. Building-stone, leather, pottery, brick, etc. are here produced extensively. Coal and limestone are found. It is intersected by the Cleveland and Pittsburg R. R. and the Pittsburg Fort Wayne and Chicago R. R. Capital, New Lisbon. Pop. 38,299.

Columbiana, a post-village, capital of Shelby co. Ala., on the Selma Rome and Dalton R. R., 72 miles N. N. E. of Selma. It has one weekly newspaper. Pop. of Columbiana township, 1040.

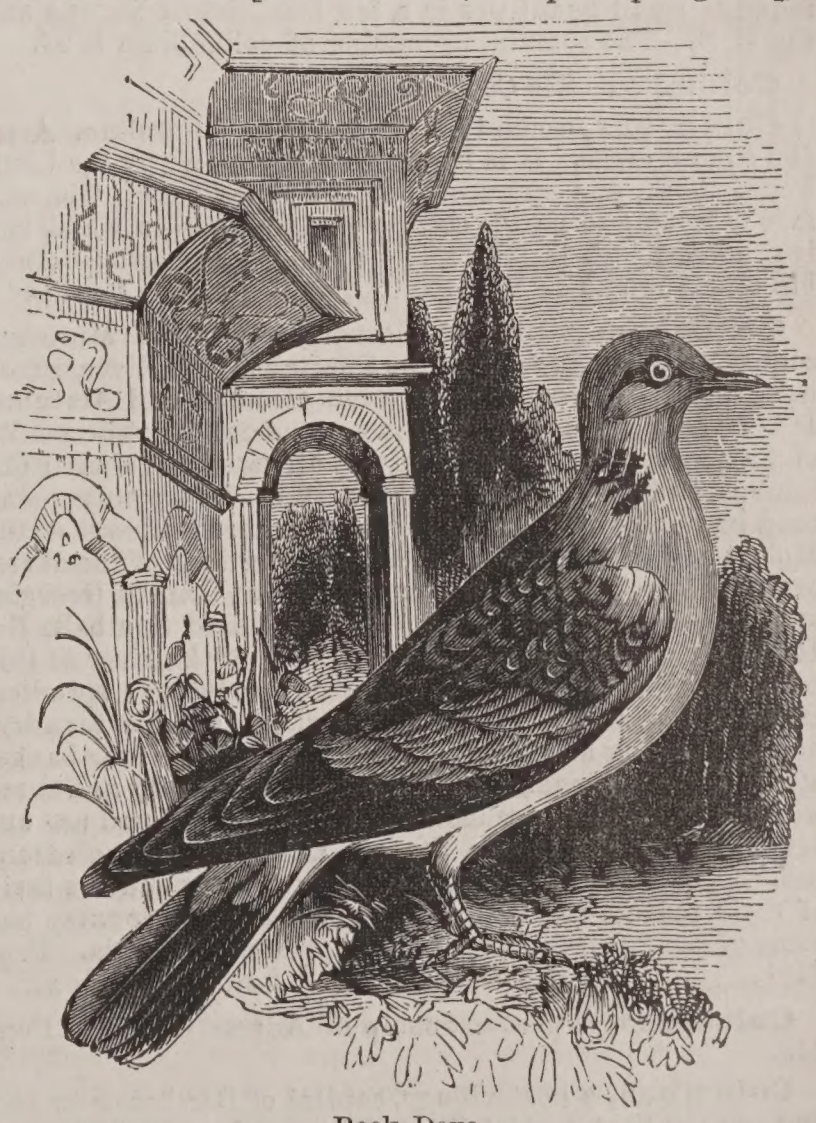
Columbiana, a post-village of Fairfield township, Columbiana co., O. It is on the Pittsburg Fort Wayne and Chicago R. R., 60 miles N. W. of Pittsburg, Pa., and has one weekly newspaper. Pop. 870.

Colum'bian Col'lege, Washington, D. C., was incorporated by an act of Congress in 1821. Its founders were mainly members of the Baptist denomination. The name of Luther Rice, so honorably connected with the cause of foreign missions, is no less honorably connected with the educational movement which led to the establishment of this institution. The record of the college has been honorable, if not illustrious. The college proper has sent forth about 400 graduates, of whom 120 have entered the Christian ministry; 5 have been foreign missionaries; 18 have been professors in colleges, and 4 have been college presidents. The medical department has sent forth 382 graduates. The law department, though of comparatively recent foundation, has already contributed 581 members to the legal profession, some of whom have attained to distinction at the bar and to stations of public honor. By an act of Congress, approved Mar. 3, 1873, the corporation of the Columbian College was changed into "The Columbian University," and the friends of the institution are now taking steps for the establishment of schools of science, technology, and of the fine arts as a part of its university system, hoping that it may avail itself of the magnificent libraries and collections of the capital. The presidents of the institution have been as follows: Rev. William Staughton, D. D., Rev. Stephen Chapin, D. D., Rev. Joel S. Bacon, D. D., Rev. Joseph G. Binney, D. D., Rev. Geo. W. Samson, D. D. The present president is James C. Welling, LL.D. The college in 1872 had 18 instructors, 283 students, and property to the value of $350,000.

James C. Welling.

Columbian Grove, a post-township of Lunenburg co., Va. Pop. 1422.

Colum'bidæ [from *Columba*, the principal genus], a



Rock Dove.

family of birds forming the transition from the passerine to the gallinaceous orders. They agree with the true gallinaceous birds in the character of the bill, and in the soft membrane at the base of it; the sternum is deeply notched. A dilated crop is developed from both sides, in which they differ from all other birds. The stomach is a true gizzard, and the lower larynx has a single pair of muscles. The male assists his mate in rearing the young, which are at first supported by a milky fluid secreted in the crop. The Columbidæ resemble the passerine birds in their powers of flight, in living in a state of monogamy, in building their nests in trees and crevices of rocks, and generally in laying but two eggs at a time. In domestication there have arisen

many remarkable varieties, as carrier-pigeons, fan-tails, tumblers, etc. The domesticated varieties are descended from the rock-dove, *Columba livia*, of the Old World. The study of these varieties has been thoroughly carried out by Mr. Darwin, and seems to have suggested his theory of the origin of species. (See PIGEON.)

Col'umbine (*Aquilegia*), a genus of perennial plants of the order Ranunculaceæ. They have five petals, all alike, with a short spreading lip, produced backward into large hollow spurs, much longer than the calyx; pistils five. The *Aquilegia vulgaris*, or common columbine, a native of Europe and of the Rocky Mountains in the U. S., is cultivated in gardens for its showy flowers. The *Aquilegia Canadensis*, a native of the U. S., has beautiful scarlet flowers of curious structure.

Colum'bium, or **Nio'bium,** a rare metal originally discovered in columbite from Massachusetts by Hatchett in 1801. Wollaston in 1809, in investigating minerals containing columbium, expressed the belief that the metal was identical with tantalum, and this view was generally accepted until 1846, when H. Rose showed that the two were distinct, though tantalum occurs in many of the columbium minerals. Rose, indeed, inclined to the belief that what had been described as columbium really consisted of two metals, which he called niobium and pelopium. Further investigations showed him that but one metal was the basis of the supposed two; so the name pelopium was dropped, and the name niobium was retained, the symbol Nb being now used for columbium. The black powder produced by heating columbium compounds with sodium has been supposed to be the metal, but Delafontaine states that this powder is the protoxide, and that the metal is a steel-gray powder obtained by igniting the chloride $NbCl_5$ in a current of hydrogen. With tantalum, columbium forms a group distinct from the other elements. The principal minerals in which columbium is found are columbite, a columbate of iron and manganese; bragite, a columbate of yttrium and iron; samarskite, a urano-columbate of yttrium and iron; pyrochlore, a columbate of lime, cerium, etc.; æschynite, a titano-columbate of cerium, iron, lanthanum, etc. Some of these minerals contain tungsten. They are found in small quantities in a few localities in Europe and the U. S. The combining number of columbium is 94.

Columbo. See COLÓMBO ROOT.

Colum'bus, a county in the S. of North Carolina. Area, 600 square miles. It is bounded on the N. W. by the Little Pedee River, and intersected by the Waccamaw. The surface is level, and partly occupied by swamps, in which rice is produced. It is intersected by the Wilmington Columbia and Augusta R. R. Capital, Whitesville. Pop. 8474.

Columbus, a city of Georgia, capital of Muscogee county, is on the E. bank of the Chattahoochee River, which here forms the boundary between Georgia and Alabama. It is 100 miles W. S. W. of Macon and 292 by railroad W. of Savannah. Steamboats ply at all seasons between Columbus and Appalachicola, Fla., light drafts only being used in summer. Columbus is the northern terminus of the Mobile and Girard R. R., the eastern terminus of the Western Alabama, the western terminus of the Central Georgia, and the southern terminus of the North and South R. Rs. It has six cotton-factories, and the falls of the river at this point afford a water-power sufficient for 100,000 spindles. It has three saw-mills, two machine-shops, and one foundry, besides planing and flouring mills. There are four banks, one of them national, and four papers, one daily and three weekly. The public schools for white and colored are unsurpassed by any in the State. Columbus has pleasant suburbs, noted for the beauty of their scenery and the taste of their private residences. The neighboring country has some of the finest farming-land in Western Georgia. Pop. 7401. A. R. CALHOUN, PROP. "ENQUIRER-SUN."

Columbus, a post-township of Adams co., Ill. Pop. 975.

Columbus, a post-village, capital of Bartholomew co., Ind., on the East Fork of White River and on the Jeffersonville Madison and Indianapolis R. R., 41 miles S. S. E. of Indianapolis. Another railroad extends from this point north-eastward to Cambridge. It has one national bank and two newspaper-offices. Pop. 3359; of township, 5187.

Columbus, a post-village, capital of Cherokee co., Kan., on the Missouri River Fort Scott and Gulf R. R., 50 miles S. of Fort Scott. It has one weekly newspaper. Pop. 402.

Columbus, a city of Hickman co., Ky., on the Mississippi River, 196 miles by rail below St. Louis. It is the northern terminus of the Mobile and Ohio R. R., 472 miles long. The St. Louis and Iron Mountain R. R. terminates at Belmont, on the other side of the river, and crosses by means of inclined planes and a ferry. It has one weekly newspaper. Pop. 1574. R. SUMMERS, ED. "DISPATCH."

Columbus, a township and post-village of St. Clair co., Mich. The village is 15 miles S. W. of Port Huron. Total pop. 1218.

Columbus, a township of Anoka co., Minn. Pop. 71.

Columbus, the capital of Lowndes co., Miss., is on the navigable Tombigbee River and on a branch of the Mobile and Ohio R. R., 235 miles by rail from Mobile. It has 3 banks, 3 wagon-factories, 10 churches, a female seminary, a university, and 2 public academies, and a very large trade, especially in cotton. It has 3 weekly, 1 tri-weekly, and 3 monthly newspapers. Pop. 4812.

LEWIS & BLISS, EDS. "PRESS."

Columbus, a township and post-village of Johnson co., Mo. The village is 10 miles N. W. of Warrensburg. Pop. of township, 1394.

Columbus, a city, capital of Platte co., Neb., on the Platte River and the Union Pacific R. R., 92 miles W. of Omaha. It has a bridge across the Platte, one bank, three school-houses, a high school, five churches, various industries, and a weekly newspaper. Pop. of Columbus township, 1233. M. K. TURNER, ED. "PLATTE JOURNAL."

Columbus, a township and post-village of Chenango co., N. Y. The village is about 40 miles S. of Rome. Pop. of township, 1197.

Columbus, a post-village, capital of Polk co., N. C., about 90 miles W. of Charlotte. Pop. of Columbus township, 744.

Columbus, the capital of Franklin co. and of the State of Ohio, is pleasantly situated on each side of the Scioto River, but principally on the eastern side, and 70 miles from its mouth, 110 miles N. E. of Cincinnati, and 350 miles from Washington, D. C. It is in lat. 39° 57′ N. and lon. 83° 3′ W. from Greenwich. Previous to 1863 the city occupied an area of 1100 acres; by an annexation of territory that year its area was increased to 2700 acres. In 1871 its corporate limits were enlarged by the annexation of territory from surrounding townships, increasing the whole area of the city to 6752 acres. It is well surrounded on all sides by an almost unlimited extent of level land.

At the time Columbus was laid out as a town in 1812, it was an almost unbroken forest, with no resident within its limits. Three years afterward, in 1815, its population was 700; in 1820, 1450; in 1830, 2437; in 1840, 6048; in 1850, 17,882; in 1860, 18,554; and in 1870, 31,274. The increase from 1820 to 1830 was 987, making 70 per cent.; from 1830 to 1840 it was 3611, making 150 per cent.; from 1840 to 1850 it was 11,834, nearly 200 per cent.; from 1850 to 1860 it was only 772; and from 1860 to 1870 the increase was 12,720, being over 70 per cent. Of the whole population in 1870 (31,274), 23,663 were of native, and 7611 of foreign birth; 29,427 were white, and 1847 colored.

Commerce.—Its shipments and receipts are by rail and canal, principally by rail. The cash capital employed in trade amounted in 1872 to $3,034,400, and the sales to $13,281,450.20. The leading commodity is coal. The geographical situation of Columbus, with a vast coalless district extending N. and N. W. of it for hundreds of miles, its accessibility to a coal-seam of enormous quantity and superior quality, make it a great outlet for the article. The shipments of coal over the Hocking Valley road for 1872 were 433,936 tons; the number of tons is expected to reach over 1,000,000 for 1873. This is a new road to the mines; shipments were formerly made by canal.

Manufactures.—The principal article manufactured here is furniture, of which there are three large factories, employing a cash capital of $193,000 and 355 hands; products for 1872, $900,000. Car-building is also carried on very extensively, giving employment to 300 hands; a capital of $400,000 is employed; the products in 1872 reached $1,500,000. Of rolling-mills, iron-furnaces, and pipe-works there are five large establishments, employing 1200 hands, with a capital of $1,000,000; products for 1872, $2,600,000. The manufacture of boots and shoes is carried on here by two firms, employing a capital of $230,000 and 220 hands; products for 1872, $690,000. In the manufacture of regalias one firm employs a cash capital of $35,000 and 80 hands; products for 1872, $120,000. In edge-tool manufacturing two firms employ a capital of $210,000, with 180 hands; products for 1872, $350,000.

Finances.—From April 8, 1872, to April 8, 1873:

Receipts	$213,112.30
Disbursements	212,309.29

The valuation of property on the city duplicate for the year 1872—

Real estate	$15,718,240.00
Chattel property	8,677,610.00
Total	$24,395,850.00

The city levy by the city council for 1872 was eight and eight-tenths mills. The following statement shows the taxes levied for all purposes for 1873:

State debt	$20,223.76
General revenue	15,167.82
Asylum	27,807.67
Common schools	25,279.70
Total State taxes	$88,478.95
County	25,279.70
Poor	20,223.76
Bridge	40,446.52
Building	10,111.88
Infirmary building	25,279.70
Agricultural college	10,111.88
City schools	176,957.90
Corporation purposes	240,157.15
Total taxes levied	$637,048.44
Valuation of lots	$16,368,250
Valuation of chattels	8,911,450
Total valuation	$25,279,700

Debt.—The total funded debt of the city on April 8, 1872, was $888,000, since which time there have been added—new city hall, $10,000; extension of waterworks, $50,000; completion of sewers, $62,000; total funded debt April 10, 1873, $1,010,000. The floating debt of the city is $60,000. There is due the city on tax duplicates for December and June, $105,436.72, which will more than cover the floating debt and current expenses.

City Courts and Prisons.—There is one city court, presided over by the mayor, two common pleas courts, and one probate court. There is a county prison and a State penitentiary. The latter contained during 1872 an average of 1014 3-5 convicts. The number remaining in the prison Oct. 31, 1872, was—from State courts, males, 905; females, 27; from U. S. courts, males, 16; from U. S. military courts, males, 7; total, 955.

There are also two houses of reformation. Number of inmates in 1872, women, 65; children, 123; total, 188.

Education.—Columbus is the seat of Capitol University (Lutheran); cost of buildings, $80,000. It has 5 professors and 4 tutors. Its library contains 2500 volumes. The regular course requires two and a half years. Its income is derived from the Lutheran synod of Ohio. The Ohio Agricultural and Mechanical College has 10 professors. It has funds as follows: Proceeds from sale of land, $435,000; donation of Franklin co., O., to the college in bonds, $300,000; total, $735,000. It was opened for students in 1873. Terms, $14 per session of five months. The Starling Medical College has 13 professors, 70 students (1872), and an endowment of $35,000 by Lyne Starling. This college contains a well-stored museum and an unrivalled chemical laboratory. Terms, $50 per course.

The public schools are as follows: high school, 1; grammar schools, 25; primary and ungraded, 74; total, 100. Number of teachers in high school, 7; in grammar schools, 27; in primary and ungraded schools, 71; of music, 1; superintendent and assistants, 4; total number (men 14, women 96), 110. Number of pupils in high school, 211; in grammar schools, 1714; in primary and ungraded schools, 4129; total, 6054.

Number of youths, in 1872, between five and twenty-one years	10,117
Number of school buildings owned	25
" " " rooms	117
" " recitation-rooms, offices, etc	38
" " seats for pupils	5,379
Value of school sites	$123,550
" " buildings	269,650
" " furniture	15,841
Total value of school property	$409,041

The total receipts for public schools (1872) were $162,543.50; the disbursements for the same period were $150,016.10; which sum includes $68,453.05 for superintendent's and teachers' salaries, also $32,452.81 for buildings erected. The funded debt of the board of education consists of $50,000 in bonds dated Aug. 1, 1870.

Private Schools.—St. Mary's of the Springs (Roman Catholic), number of teachers, 15. In 1872 there were 120 boarding pupils. Its income is from tuition; the cost for the same is, including board, per session of five months, $70, $75, $80, and $90, according to the studies pursued. There is a library of 400 volumes. St. Aloysius's Seminary (Roman Catholic) has 4 professors; number of students for 1872, 30. It derives its chief support from the Catholics of the diocese of Columbus. A library of 700 volumes is connected with it. In the Roman Catholic schools the number of teachers is 20, of pupils 1100. Their income is derived from donations of the Roman Catholic Church. Salaries paid the teachers, $6000; value of school property, $30,000; number of rooms, 20; number of buildings, 4. There are two business colleges; attendance in 1872, 391; number of teachers, 9.

Libraries.—Ohio State Library has 31,984 volumes; additions made in 1872, 959 volumes; income from State taxation 1842–52, $5600; from 1824–42 appropriations, varying from $350 to $1000, were annually made for the same. Appropriation in 1872, $5000; disbursements in 1872, $4894.43. The Public Library has 2060 volumes; income derived from taxation (new). The Circulating Library has 900 volumes; income derived from membership fee. The Young Men's Catholic Library has 700 volumes; income derived from membership fee. Law Library (State) has 5418 volumes; additions in 1872, 276 volumes.

Newspapers and Periodicals.—Daily, 2, circulation, 4500; weekly, 7, circulation, 27,000; semi-weekly, 2, circulation, 1500; periodicals, monthly, 5, circulation, 25,500.

Churches.—Number, 43; number of sittings, 25,000; value, $1,200,000; membership, 14,100. Those of remarkable architectural beauty are the St. Joseph's cathedral (Roman Catholic), which cost $250,000, built of solid sandstone; next come the Trinity (Episcopal) and the First and Second Presbyterian.

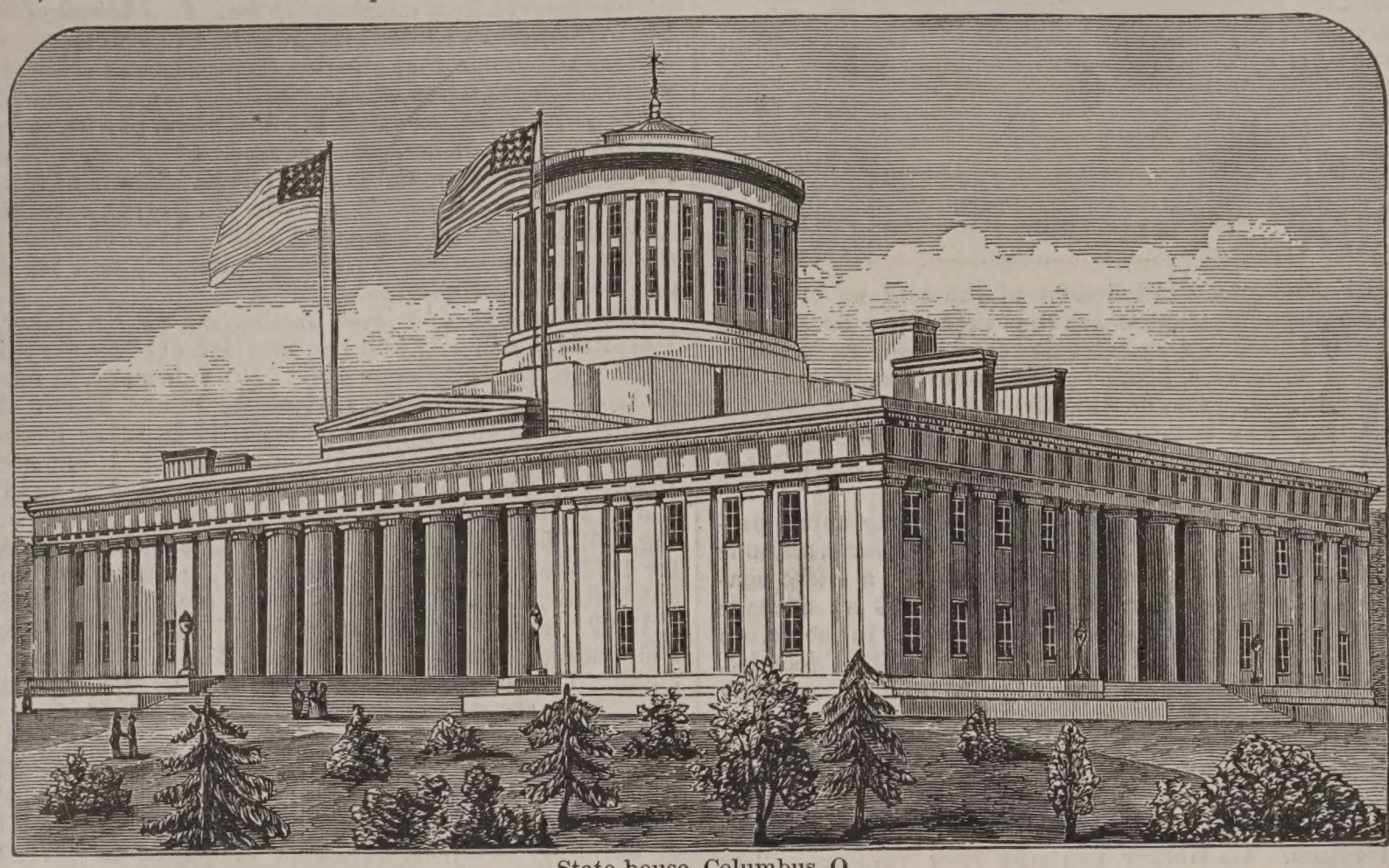
Benevolent and Charitable Institutions, etc.—Number, 48. Hospitals 2, one city and one presided over by the Sisters of St. Francis, inmates in 1872, 250; infirmary, 1, number of inmates in 1872, 300; asylum for insane, 1, completed in 1874; orphan asylum, 1, inmates 50 in 1872; home for aged, 1, inmates in 1872, 70; for children, 1, inmates in 1872, 80; for the friendless, 1, inmates 170 in 1872. There is one deaf and dumb asylum. Cost of building, $625,000; value of ground, etc., $900,000; expenses for 1872—salaries for teachers, $16,825; current expenses, $56,216.49; total, $73,041.49; actual cost per pupil (1872), $216.09; number of inmates in 1872, 390—231 males, 166 females; number of teachers, 26. The inmates are classified as follows: scientific, 29; grammar, 84; primary, 225. Departments of trade: printing, book-binding, and shoemaking. There is one institution for idiotic and imbecile youth. In 1872 the number of inmates was 212—males 72, females 140; number of teachers, 11; cost of buildings, $275,000. There is one blind institute. Cost of building, $318,000. Number of pupils in 1872, 112; expenses, $29,225; total number admitted, 752; number of teachers, 14. There are 2 children's aid societies, attendance 140 in 1872. The relief and aid societies number 9. Of Masonic bodies the membership is 400; Odd Fellows, number 16, members 2600; Druids, number 5, members 600; Good Templars, number 2, members 300; Knights of Pythias 4, members 300; Knighthood 4, members 367; Red Men 3, members 470; Catholic benevolent societies 4, members 700.

Public Buildings of Note.—The State-house is a grand and attractive edifice, of great solidity and magnitude, Doric in its style of architecture. It covers two acres of ground, is a bold and noble structure, and is built of beautiful gray limestone. The cost of the building complete was $1,359,121. The time consumed in building it was fifteen years. Height of building from ground to top of blocking course, 61 feet; to pinnacle of cupola, 158 feet; total number of rooms in the building, 53. The Blind Institute, cost $318,000. The architectural character is English, of the later period of Elizabeth. The central arcaded portico is of cut stone, flanked on either side by cast-iron piazzas of the same general character. The Deaf and Dumb Asylum is built of brick, elaborately trimmed with lime and sandstone; cost, $625,000. The front of the building is 270 feet in length. It is surmounted by seven towers, the central one 115 feet high. The new Insane Asylum, which is still in progress, consists of, first, ashlar stone three feet four inches high; on this cut-stone belt-course rests the brickwork proper of the superstructure. It is one mile around the outside walls, and is estimated to cost $1,200,000. St. Joseph's Cathedral (Roman Catholic) is a vast and noble structure, Gothic in the style of its architecture. The material of the walls is sandstone, of a kind which becomes hardened by exposure to the atmosphere. Dimensions, 92 by 185 feet. It will cost $250,000. The spire is to be 250 feet in height. Trinity Church (Protestant Episcopal) is Gothic in style, built of sandstone, in the shape of a cross; it is an imposing edifice; cost, $70,000. The city hall, 187½ feet long by 80 wide, cost $210,000, and the opera-house (building) will cost $120,000. There is an Odd Fellows' Temple costing $75,000. A new union dépôt is in course of erection, to cost $300,000. There are two well-located public parks of good size. The city railroads are four in number; miles of route, 11¾; capital, $227,000; cost, $183,000. There are three national banks.

The steam railways centering in the city are the Baltimore and Ohio (Central Ohio division), the Columbus and Hocking Valley R. R., the Pittsburg Cincinnati and St. Louis, and the Cleveland Columbus Cincinnati and Indianapolis R. Rs. Two new roads are building—one from here to Toledo, and one to Cleveland.

The waterworks are public, and cost $424,299.51; length of pipe laid, 23¾ miles. There are 184 fire-hydrants and 113 stop-valves; 550,000 gallons of water can be supplied every twenty-four hours. The gasworks are private; capital $400,000. Twenty-four miles of main pipe have been laid in the streets. The gas-consumers number 2100. There are 661 street-lamps.

History.—Columbus was selected for the capital of Ohio in 1812, as the State wanted a capital at or very near the centre. Chillicothe was originally the seat of government. In Feb., 1810, the legislature appointed five commissioners to examine and select the most eligible site. In their report to the legislature, dated Sept. 12, 1810, the commissioners recommended a site twelve miles above Franklinton, now a part of Columbus (made so by annexation in 1872). At the session in 1812 a company composed of Lyne Starling, John Kerr, Alexander McLaughlin, and James Johnston proposed that the legislature establish



State-house, Columbus, O.

the seat of the State government on the high bank E. of the Scioto River, nearly opposite Franklinton. The same company made proposals for the erection of a State-house, penitentiary, and other public buildings, the same to be completed by 1817. An act was passed Feb. 14, 1812, accepting the proposals and bond of the company, and permanently establishing the seat of government on the lands named therein, the legislature to commence their sessions there on the first Monday of Dec., 1817, and there continue to May, 1840, and from thence until otherwise provided by law. The refugee lands upon which our State capital was located comprised a narrow tract of four miles wide from N. to S., and extended forty-eight miles eastwardly from the Scioto River. On the 18th of June, 1812, the same day on which the U. S. declared war against Great Britain, the first public sale of lots took place. In 1814 the "Western Intelligencer" was removed from Worthington to this city, and the title changed. The first saw-mill was built in 1813. The first tavern was opened in 1813; the first school in 1814; the first census taken in 1815; the first market-house erected in 1814; the first bridge over the Scioto River was built in 1813. Two churches were built in 1814—a Methodist and Presbyterian; both log cabins. The town was incorporated on the 10th of Feb., 1816. A U. S. court-house was erected in 1820. The first sængerfest of the North American Sængerbund ever held in Columbus took place June 5 and 7, 1852. (See STUDER; "Columbus, its History, Resources, and Progress," 1873.) JACOB H. STUDER.

Columbus, a township and post-borough of Warren co., Pa., on the Atlantic and Great Western and the Philadelphia and Erie R. Rs., 27 miles W. N. W. of Warren, Pa. Pop. 1257.

Columbus, a city, capital of Colorado co., Tex., on the W. bank of the Colorado River, 95 miles S. E. of Austin City. It is the W. terminus of the Galveston Harrisburg and San Antonio R. R. The river is crossed by a railroad bridge. The trade of Columbus is extensive. It has one weekly newspaper, and is the seat of Colorado College.

Columbus, a post-village of Columbia co., Wis., on Crawfish River and the Milwaukee and St. Paul R. R., 63 miles W. N. W. of Milwaukee. It has one national bank and two weekly newspapers. Pop. 1888; of Columbus township, 2840.

Columbus (Don BARTHOLOMEW) was a younger brother of Christopher Columbus, whom he accompanied in his second voyage to America in 1493. He was appointed governor of Hispaniola, where he founded the town of St. Domingo in 1496, and showed himself an able commander. He died in St. Domingo in 1514.

Columbus [It. *Colombo;* Sp. *Colon*], (CHRISTOPHER), the discoverer of America, was born at Genoa in 1436. His origin was humble and obscure, and accounts of his early life are meagre. His son and biographer, Fernando Colombo, wrote: "The admiral tells us himself in a letter that his occupation, like that of his ancestors, was to traffic on the sea." His father, Dominico Colombo, according to some writers, was a wool-carder. In a will made 1594 he calls himself "formerly a weaver" (*olim textor pannorum*). His mother's name was Susanna Fontanarossa. There were three sons, and a daughter who married a butcher. Of his education and early life Columbus wrote in a letter to the king of Castile (1501): "In my young years I was a sailor, and I have continued to follow the sea to this day; it is the art which they should pursue who wish to know the secrets of this world. I occupied myself much with navigation; with astronomy, geometry, arithmetic I was not less familiar. I had a hand sufficiently skilled and enough of knowledge to draw the terrestrial globe, with the position of cities, mountains, rivers, and all ports that there were. While quite young I studied books of cosmography, history, philosophy, and other sciences; it is that which has aided me in my undertaking." He studied at the University of Pavia, and went to sea at fourteen. He mentions in letters the command of a cruiser in the service of René, count of Provence, and voyages to the Archipelago, as well as one in 1477 to the isle of Thule, which he says the moderns call Friesland (a supposed typographical error for Iceland). There is an account of a cruise upon four Venetian galleys, richly laden, when Columbus jumped from his burning ship and swam two leagues by the aid of an oar to the Portuguese coast, and walked to Lisbon, where he found several Genoese. Some say that he went to Lisbon voluntarily in 1470, attracted by the fame of the Portuguese prince, Henry. Las Casas describes him at this period as having a long face, ruddy in places, an aquiline nose, clear gray eyes, a quick, commanding glance, and light hair, which had commenced to grow gray at thirty. His dress was simple. He expressed himself easily and eloquently. Gentle and kind, he warmly attached those to him who knew him intimately. His temper, naturally irascible, he had learned to control. Always attentive to the duties of religion, his piety consisted above all in doing good to his fellows. He fell in love with and married Filipa Moñis de Palestrello, who was in the convent where he went to pray. Her father was an able navigator, governor of Porto Santo, but poor, and leaving little but charts and instru-

ments. Columbus supported his family, and helped sustain his father and educate his brothers by making maps and charts. He went on expeditions to West Africa. He lived some time at Porto Santo, where his wife bore a son named Diego. Here he heard of great reeds and a bit of carved wood seen out at sea floating from the west. The idea of a western ocean-way to India gradually occupied his mind, fed by ancient tradition and contemporary speculations. Toscanelli, an Italian mathematician, had written, at the instance of King Affonso of Portugal, instructions for a western route to Asia. With him Columbus entered into a correspondence, which greatly strengthened his theories. He applied for means to accomplish this voyage to Genoa and to John II. of Portugal, who long kept him waiting with half promises. His wife died, and he left Portugal in indignation. He lived (1484–86) at the Franciscan convent of St. Mary's of Rabida in Andalusia, whither he had wandered, impoverished, with his son. The prior took an interest in his plans, and gave him letters to Fernando de Talevera, confessor to Queen Isabella. He plied the court with untiring solicitations, following the king and queen on all their expeditions against the Moors, until he was granted two small vessels, with the title of viceroy or governor-general of all the lands that he might discover. On the 3d of Aug., 1492, he sailed from Palos, with 120 men, in the Niña, Pinta, and Santa Maria. He stopped several weeks at the Canary Islands. After he had sailed a great distance over an unknown sea, the crew became dismayed, impatient, and finally mutinous. They had begun to talk of throwing him overboard when land was discovered, on the 12th of Oct., 1492. This was San Salvador (Cat Island), or perhaps Watling's Island, one of the Bahamas. He soon discovered Cuba and Hispaniola (Hayti), and returned to Spain in Mar., 1493. He was received with abundant demonstrations of honor and joy by the public and the court, which gave him the title of admiral. In Sept., 1493, he sailed with seventeen ships on a second expedition, during which he discovered Jamaica, Porto Rico, and other islands, founded a colony in Hispaniola, and returned to Spain in June, 1496. He commenced a third voyage in May, 1498, and visited the Terra Firma at the mouth of the Orinoco. Francisco de Bobadilla was sent to the West Indies in 1500, with power to supersede Columbus as governor. By his order Columbus was carried in chains to Spain in 1501. The public expressed such indignation at this ill-treatment that King Ferdinand disavowed the conduct of Bobadilla, but declined to reinstate Columbus in his office. Having sailed on his fourth voyage in May, 1502, he explored the coasts of Honduras and Costa Rica, but was shipwrecked and escaped to Jamaica, which island he left, after long hardships, for Spain, June 28, 1504. Died May 20, 1506, at Valladolid.

The life of Columbus by his son, Don Diego Colon, appeared in Barcia's "Historiadores Primativos" (vol. i., Madrid, 1749). The relation of the first voyage by himself was published (Madrid, 1825–37) in Navarrete's "Viages de los Españoles," first and second volumes. This also appeared with notes by Cuvier, Balbi, Rémusat, and others in "Relations des quatre voyages, suivres par divers lettres et pieces inedites" (3 vols., Paris, 1828). Torre has published a collection of his writings in Italian. (See also his Life by Irving, Arthur Helps, Lamartine, and Spotorno, Leipsic, 1823, and Humboldt's "Examen Critique de l'histoire de la geographie.")

Columbus, or **Colon** (Diego), the eldest son of the preceding, was born at Lisbon about 1472. He accompanied his father on the second voyage, and became governor of the West Indies soon after his death. He married Doña Maria de Toledo, a daughter of one of the grandees of Spain. His right to the office of viceroy of the New World was recognized by Charles V. about 1520. Died in 1526.

Columbus, or **Colon** (Don Fernando), the biographer of the discoverer, was an illegitimate child of the same and Beatrix Henriques, a noble lady of Cordova. He was born Aug. 15, 1488, accompanied his father on his fourth voyage, and afterwards devoted himself to study and contemplation, collecting around him men of science and gathering a library of 12,000 volumes, which he willed to the Dominican cloister of St. Paul in Seville. Died without issue about 1541.

Columbus, or **Colou** (Louis), son of Admiral Diego, withdrew his rights to the viceroyalty of India 1540, and received the title of duke of Veragua and marquis of Jamaica and a pension. With Diego, the fourth admiral, son of Christopher, second son of the great Columbus, the male line became extinct.

Colum'bus Cit'y, a township and post-village of Louisa co., Ia., near the crossing of the Burlington Cedar Rapids and Minnesota and the Chicago Rock Island and Pacific R. Rs., and 40 miles N. of Burlington. It has one national bank and one weekly newspaper. Pop. of township, 2344.

R. H. Moore, Ed. Louisa County "Safeguard."

Columbus Grove, a post-village of Pleasant township, Putnam co., O., on the Dayton and Michigan R. R., 84 miles N. of Dayton. Pop. 578.

Colum'busville, a village of Newtown township, Queen's co., N. Y. Pop. 1251.

Columel'la [a diminutive of the Lat. *columna*, a "column"], in botany, the remaining central column or axis formed of the placentas when the carpels of certain fruits have separated; also the axis of the capsules of mosses. In conchology, the upright pillar around which the whorls of univalve shells are wound is called the columella.

Columella (Lucius Junius Moderatus), an ancient Roman rural economist, born at Cadiz (*Gades*), in Spain. He flourished about 20–40 A. D., and was a practical cultivator of the soil. He passed the greater part of his life near Rome. He is the author of an important Latin work entitled "De Re Rusticâ," which is a copious and systematic treatise on agricultural and rural affairs in twelve books, one of which is in verse. His Latinity is nearly pure.

Col'umn [Lat. *columna*], in architecture, a cylinder of stone or wood used to support a roof, an entablature, or an arch. In countries where forests abound the earliest columns would be made of the trunks of trees, and in India, in Assyria, Persia, and Asia Minor we find the stone columns of a later age imitating in the shapes of their shafts the forms of carpentry, and in the capitals the blocks of wood by which the shafts were surmounted for the purpose of giving a better bearing to the weight the column must carry. But we may be sure that utility would be the first consideration, and that it was late when the artist began to decorate the parts that originally were merely constructive. The Egyptians did not confine themselves to the use of cylindrical columns, but had them of many forms—square, hexagonal, and Pococke (quoted by Gwilt) mentions one, at least, triangular in plan. Some of them are smooth on the surface, and these are ornamented with hieroglyphics. Others look as if they were composed of bundles of rods or stems tied together at intervals by bands. These are less elegant in form than the Gothic columns which they recall, and were perhaps no more based upon an imitation of stems of trees bound together in the one case than in the other. Certainly, the clustered columns of the Gothic architecture were not based upon any such imitation. The porticoes of some of the grottoes at Beni-Hassan are supported by pillars, polygons of sixteen sides in plan, "each slightly fluted, except the inner face, which was left flat for the purpose of introducing a line of hieroglyphics." These columns have no bases, and each is crowned with an abacus only slightly exceeding the diameter of the summit, which in its turn is only slightly less than that of the bottom of the column. From their resemblance to the Doric column of the Greeks, those of the Beni-Hassan grottoes have been called Proto-Doric, but there is no proof whatever of any connection between the two.

The Greeks in early times employed the so-called Doric and Ionic columns, of which the Ionic seems to have been by far the earlier brought over from Asia, though all the most ancient temples of Greece whose ruins are in existence to-day belonged to the Doric style. As the reader will find descriptions and engravings of each of the Greek "orders" as they are called, "Doric," "Ionic," and "Corinthian," in their proper places, we shall not describe them here. It is necessary to remark, however, that while there can be no doubt that many features in Indian architecture and in the architecture of Assyria, Persia, and Asia Minor are reminiscences of wooden forms, there is no such reminiscence to be found in the Greek Doric, though there may be possibly in the capital of the Ionic column. The Doric is essentially a stone construction, and its supposed origin in the imitation of carpentry forms is purely imaginary. The Greek columns were generally composed of many cylindrical pieces, placed one upon another until the requisite height was attained. These were cut in the nearest quarry, and being attached in couples by means of an axle fixed in holes drilled in the centre of each, intended finally for iron clamps, they were rolled as wheels to the site of the building they were to adorn. When they had been placed in position, and well strengthened by iron clamps, the outer surfaces were dressed to give the column the look of being made of a single stone. When the material was of fine marble, this could be perfectly done, as the Greeks excelled in making joints, but where the stone was coarse or defective, they covered the whole shaft with a coating of stucco.

The Greeks ornamented all their shafts with longitudinal incisions, which we call flutes. In the so-called Doric col-

umns these incisions are about twenty in number; this is the case with all the Athenian examples, but "at Pæstum the exterior order of the great temple," says Gwilt, "has twenty-four, the lower interior order twenty, and the upper interior sixteen only." These flutings are separated from each other in all Greek examples by a sharp edge, but "their horizontal section varies in different examples. In some the flutes are formed by segments of circles; in others the form approaches that of an ellipse." The sole use of these flutes is to break up the light on the surface of the column, and to increase the effect of perpendicularity. The Doric column, as found in the Parthenon at Athens, was the last result of the exquisite sense of refinement in form possessed by the Greek architect, and every portion of it is in symmetry with those scientific laws which in the last analysis are one with beauty. The Romans employed the Corinthian in preference to any of the other orders, though the Greeks rarely used it except in small buildings, such as the Temple of the Winds and the Monument of Lysicrates. The Romans also made use of a capital formed by a union of the Corinthian and the Ionic, to which the name of "Composite" has been given, but it has nothing to recommend it.

When the Christian religion arose in the decaying days of the Roman empire, the new sect had need of buildings for their worship, and in erecting new ones made use of the materials abundantly supplied at first by the ruins of the temples and palaces. In this way the Roman columns were worked into buildings with which they had no affinity, and it was only with the exhaustion of the supply, and with the necessity of new materials, that the antique forms were developed naturally to meet the new requirements, and the Gothic column was created—an old body with a new soul. In the Gothic system there is no longer a fixed order of proportions, as with the Greeks, but the architect followed the law of his own eye, both in proportion and in decoration, and the consequence is a great variety in both, and great inequality in excellence. The Gothic columns were developed from the precedent forms of both Greek and Roman architecture, and we find in the vast variety of their capitals and bases all three forms in embryo.

In the time of the Renaissance there was an effort to return to the classic forms, but the result was chiefly a new combination and a new individuality. The Gothic could not be entirely shaken off, nor the spirit of the classic fully entered into, and the Renaissance column therefore has distinct traces of the influences under which it was formed. Since the introduction of iron no new developments of the column have been introduced, as might have been hoped, but builders have contented themselves with imitating in the new material the forms that belong to stone and wood alone, and which have no meaning when employed in a material different in its nature from both.

CLARENCE COOK.

Column [from the Lat. *columna*, a "pillar"] signifies, in military tactics, a mass of soldiers several ranks in depth, as opposed to line. There may be columns of brigades, of regiments, of divisions, or of companies, presenting a depth depending on the number of elements in the column. In a battalion the formation is called *open column* when the distance between the elements of the column is such as to admit of their wheeling into line; when the distance is only a few yards it is termed *close column*, or "column closed in mass;" when intermediate between these two, it is "column at half distance." Battalions are drawn up in column with either the right or left in front, or the battalions may be doubled upon their centres. To pass from column to line is to "deploy;" to pass from line to column is to "ploy." The relative advantages of column and line in drawing up troops for action are among the matters closely studied by the commanders of armies. Sometimes the name column is given to a small army, especially when engaged in active operations.

Colure [Lat. *colurus*; Gr. κόλουρος, from κόλος, "clipped," and οὐρά, a "tail," perhaps because a part is always below the horizon], one of the two great circles of the celestial sphere which intersect each other at right angles in the poles of the equator. The equinoctial colure passes through the equinoctial points, and the other is called the solstitial colure.

Colu'sa, a county in the N. W. of California. Area, 2200 square miles. It is bounded on the E. by the Sacramento River, and drained by Sycamore and other creeks. The Coast Range of mountains extends along the western border. The soil is generally fertile. Wool, wheat, barley, and cattle are raised. Capital, Colusa. Pop. 6165.

Colusa, a post-village, capital of the above county, is on the Sacramento River, 50 miles in a direct line N. N. W. of Sacramento. It has one weekly newspaper. Pop. 1051; of township, 2193.

Col'ver (NATHANIEL), D. D., a Baptist divine, born at Orwell, Vt., in 1794, entered the ministry in 1836, became eminent as a preacher and as an opponent of slavery. He preached in Boston, Detroit, Cincinnati, and Chicago, and founded the Colver Institute at Richmond, Va., after the civil war. Died Sept. 25, 1870.

Colvocores'ses (GEORGE M.), an American naval officer, born in Greece, entered the navy as midshipman in 1832, served with honor in the civil war, and was placed on the retired list as captain in 1867. He was murdered at Bridgeport, Conn., June 3, 1872.

Col'well (STEPHEN), an American author, born in Brooke co., Va., Mar. 25, 1800, practised law and became an iron-merchant of Philadelphia. He wrote a number of religious, political, and commercial books and pamphlets. Died Jan. 15, 1871.

Colym'bidæ [from *Colymbus*, one of the genera], the name applied to web-footed birds having short wings, and legs placed so far back that when standing they assume an erect position, and a compressed bill, pointed at the tip. The three principal genera are the divers, including the loon (*Colymbus*), which have the front toes webbed; and the grebes (*Podiceps* and *Podilymbus*), with the feet lobed, each toe with a separate membrane. They are aquatic in their habits, and possess great powers of diving and swimming. Several species occur in America.

Col'za, a variety of rutabaga or Swedish turnip (*Brassica campestris*), which is cultivated for its seeds, from which oil similar to rapeseed oil is made in Europe. The oil is used for lamps, lighthouses and machinery, and the leaves and refuse seeds after the oil is expressed are fed to cattle and sheep. The roots are not bulbous.

Co'ma [from the Gr. κόμη, "hair"], in astronomy, the nebulous envelope of a comet's nucleus. In botany, the name is sometimes given to the head or top of a tree, and also to the hairy crest of certain seeds.

Coma [Gr. κῶμα, "heavy sleep"], a medical term signifying a state of lethargy or unnatural profound sleep. It occurs in apoplexy, epilepsy, and other diseases of the brain. The patient is quite or nearly insensible to external impressions. Coma is also seen in narcotic poisoning. In the fatal forms the breathing is stertorous, the pupils of the eyes contracted or dilated, insensible to light, and immovable.

Co'ma Bereni'ces (*i. e.* "Berenice's Hair"), a small constellation of the northern hemisphere, between Boötes and the tail of Leo. (See BERENICE.)

Comac'chio (anc. *Comacula*), a fortified town of Italy, province of Ferrara, is 3 miles from the Adriatic and 29 miles E. S. E. of Ferrara. It is situated in the marshes of Comacchio, in which great numbers of eels are caught. These and other fish are cured in an excellent manner. It is the seat of a bishop, and has salt-works. Pop. 6475.

Comal', a county near the central part of Texas. Area, 575 square miles. It is bounded on the S. W. by the Cibolo, and intersected by the Guadalupe River. The surface is hilly, the soil fertile, producing cotton, corn, and fruit. There is some timber and plenty of building-stone. There are manufactures of saddlery, harness, and various other goods. Capital, New Braunfels. Pop. 5283.

Coma'na, an ancient city of Cappadocia, on the river Sarus, was the site of a temple of Artemis-Tauropolis. Comana was ruled by the chief priest, next in rank to the king. The site is now occupied by *El-Bostân*.

Coman'che, a county in the S. W. of Kansas, bounded on the S. by Indian Territory. Area, 800 square miles. It is bisected diagonally by Crooked or Nescutunga Creek.

Coman'che, a county in N. Central Texas. Area, 1050 square miles. It is intersected by the Leon River. The surface is partly hilly. A range called the Comanche Mountains extends along the south-western border. The soil is fertile. The W. part of the county is covered with forests. Corn, wheat, and cattle are raised. Capital, Comanche. Pop. 1001, according to the census of 1870, which, however, reports the return of population as incomplete.

Comanche, a post-village, capital of Comanche co., Tex.

Coman'che In'dians, or **Camanches,** a warlike tribe of American savages who roam over the northern part of Texas and of Mexico. They are nomadic, and range over a wide extent of territory, including part of New Mexico and the valley of the Rio Grande. They have large numbers of horses. Their principal occupations are robbery and war. They always fight on horseback, and have some firearms, but more commonly use the bow and arrow. They are by treaty placed upon a large reservation in the S. W. part of the Indian Territory, with some Kioways and Apaches. The Comanches were estimated in

1872 at 3180 souls. They appear to be of the same stock with the Shoshonees or Snakes.

Comar'ca [It.], a judicial district. Comarca di Roma, the district of Rome and its vicinity, including in particular Tivoli and Tubiaco.

Comatula. See FEATHER STAR.

Co'ma-Vig'il (*i. e.* "wakeful coma"), a name sometimes applied to the semi-comatose state observable in certain cases of fever, etc.

Comaya'gua, formerly **Valladolid,** a city of Central America, the capital of Honduras, on the river Humuva, about 180 miles E. of Guatemala. It is the seat of a bishop, and has a cathedral, a college, a hospital, and several convents. It was founded in 1540 by Alonzo de Cáceres. It was once much larger, but has been visited repeatedly by war and pestilence. Pop. 8000.

Comb [from the Lat. *como*, to "comb or dress the hair," and more remotely from *coma* (Gr. κόμη), "hair;" Anglo-Saxon, *camb;* Ger. *Kamm;* Lat. *pecten;* Fr. *peigne*], an implement used for cleaning the hair, as well as for adjusting and keeping it in place. The ancient Greek and Roman combs were made of box-wood, but, later, ivory combs came into use among the Romans, as they had long before among the Egyptians. Combs are made of tortoise-shell, ivory, horn, wood, bone, metal, and India-rubber. The old method of cutting the teeth is by a saw, which has two blades of steel set parallel to each other, with a space between them equal to the thickness of the intended tooth. The teeth are then finished by means of thin, wedge-shaped files. By these processes the material corresponding to the spaces between the teeth is wasted; but combs are now made by a method in which the otherwise wasted material is made to form the teeth of a second comb. The plate of material is cut through by means of a cutter, consisting of two thin chisels inclined to each other; between these, and connecting the ends, is a small cross-chisel. When this cutter descends with sufficient force upon the plate, it will cut one of the teeth; while the cutter is rising, the table carrying the plate is made to advance a distance equal to the thickness of one tooth, and thus the successive cuts are made. The plate is easily parted into two combs, the teeth of which only require filing and finishing. India-rubber combs are made by pressing the material into the required form in moulds, and "vulcanizing" or combining it with sulphur afterwards.

Combaco'num, an ancient city of Hindostan, in the Carnatic, 20 miles E. of Tanjore. It is regarded as a holy city by the Hindoos, and has numerous pagodas and tanks, the water of which is supposed to be capable of washing away sin. Pop. estimated at 40,000.

Combe (ANDREW), M. D., born in Edinburgh Oct. 27, 1797, wrote "The Principles of Physiology Applied to the Preservation of Health" (1834), often reprinted, and the "Physiology of Digestion" (1836). Died Aug. 9, 1847.

Combe (GEORGE), a phrenologist, a brother of the preceding, born in Edinburgh Oct. 21, 1788, practised law in his native city for many years. He produced in 1819 "Essays on Phrenology" and "The Constitution of Man Considered in Relation to External Objects" (1828; 9th ed. 1860). He married in 1833 a daughter of Mrs. Siddons, the actress. In 1838 he visited the U. S. and delivered lectures on phrenology. Died Aug. 14, 1858.

Combermere, VISCOUNTS (1827), Barons Combermere (1814, United Kingdom), and baronets (1677).—WELLINGTON HENRY STAPLETON COTTON, second viscount, born Nov. 24, 1818, was M. P. for Carrickfergus 1847–57, and succeeded his father Feb. 22, 1865.

Com'bermere (STAPLETON **Cotton**), VISCOUNT, an English general, born Nov. 17, 1773. He served in India, and in 1810 obtained command of the cavalry under the duke of Wellington. At the battle of Salamanca, 1812, he was severely wounded. In 1814 he was raised to the peerage, in 1825 he became commander-in-chief in India, and a field-marshal in 1855. Died Feb. 21, 1865.

Combi'nant, in mathematics, is a covariant (or invariant) of two or more quantities, which possesses the additional property of remaining unaltered, a factor excepted, when the quantities are replaced by linear functions of themselves.

Combination. See CO-OPERATION, by HON. THOMAS HUGHES, M. P., and TRADE UNIONS.

Combination, Alternation of Position. See PERMUTATION.

Combreta'ceæ [from *Combretum*, one of the genera], a natural order of exogenous plants, trees, or shrubs, mostly natives of tropical countries, and distinguished by a convolute embryo. They possess astringency, and some of them are employed in dyeing. The order comprises about 200 known species. There are in the Southern U. S. several unimportant shrubs of this order, and one large tree, the *Terminalia Catappa*, which grows in Florida and the East and West Indies, and produces an edible nut resembling the almond.

Combs (LESLIE), GENERAL, a lawyer, born in Kentucky in 1794. He served with great distinction as an officer in the war of 1812, afterwards practised law in his native State, and became a prominent Whig politician and general of militia.

Combus'tion [Lat. *combustio*, from *con*, intensive, and *uro, ustum*, to "burn"], the process of burning, which usually consists in the union of oxygen with the combustible substance. The evolving of heat and light which attends the process of combustion announces intense chemical action. Some substances burn at ordinary temperatures, such as phosphorus, which glows when exposed to the air; wood, coal, etc. require to be raised in temperature before they possess the power of combining with the oxygen of the air. Chlorine and some other gases may be made to support combustion in certain limited circumstances. Different combustible substances give off different amounts of heat. The mode in which the heat evolved may be measured is either—1. To observe the quantity of ice which a given weight of the combustible will melt when burning; 2. To notice the weight of water which the combustible will convert into steam; or, 3. To estimate the number of pounds of water which the burning body will raise from 32° to 212° F. The amount of heat evolved appears to be proportional to the quantity of oxygen required to burn the various combustibles. The quantity of heat given out during the combustion of any burning body is the same whether the burning takes place rapidly or slowly, yet the sensible heat may vary according to the rapidity of the process.

COMBUSTION, SPONTANEOUS. See SPONTANEOUS COMBUSTION.

Com'edy [Gr. κωμῳδία, probably from κῶμος, "festivity," and ᾠδή, a "song;" Lat. *comœdia;* It. *commedia;* Fr. *comédie*], a species of drama, of which the characteristics in modern usage are—that its incidents and language resemble those of ordinary life; that the termination of its intrigue is happy; and that it is distinguished by greater length and greater complexity of plot from the lighter theatrical piece entitled a farce. The original Attic comedy was a burlesque tragedy in form, in substance a satire on individuals, and founded on political or other matters of public interest. The Attic comedies are usually assigned to three schools—the "old," the "middle," and the "new comedy." The old comedy lasted till the end of the Peloponnesian war. It was characterized by personalities, great freedom and irregularity, and was a powerful political engine. The middle comedy was more finished, less personal and direct in its aims, satirizing systems and opinions rather than individual men; it ceased with the Macedonian conquest. The new comedy was very much like our modern comedy in scope and general character.

Come'gys (CORNELIUS G.), M. D., a native of Delaware, and professor of the institutes of medicine in Miami University, Oxford, O., published in 1858 a "History of Medicine," 8vo.

Come'nius (JOHN AMOS), a Slavic educational reformer and philologist, born in 1592, was a Moravian minister, and taught school at Lesna, in Poland. In 1631 he published "Janua Linguarum Reserata" ("The Gate of Languages Unlocked"). He went to Sweden in 1642, and was employed by Oxenstiern in reorganizing the schools. In 1648 he settled at Amsterdam. Among his other works are "Opera Didactica" (1657) and "Orbis Sensualium Pictus" (1658), the original child's picture-book. Died Nov. 15, 1671.

Co'mes (gen. **Com'itis**), a Latin word signifying a companion among the later Roman emperors, was the title of an officer with territorial jurisdiction. It was nearly equivalent to count or earl. (See COUNT.)

Com'et [Gr. κομήτης (from κόμη, "hair"); Lat. *cometa*, so called because its tail was supposed to resemble a lock of hair], a celestial body revolving about the sun, generally in an extremely elongated orbit, and consisting of exceedingly attenuated matter. The characteristic features of a comet are—a definite point or nucleus, a nebulous light or coma around the nucleus, and usually a luminous train or tail following or preceding the nucleus. Sometimes several tails are observed on one comet. Formerly, when the train preceded the nucleus—as is the case when a comet has passed its perihelion—it was called the beard. Neither the tail nor the nucleus is now considered absolutely essential to a comet, but all bodies are classed as comets which have the peculiar motion of comets and an extremely ec-

centric orbit. Among the differences between comets and planets are the following: planets move in the same direction from west to east, which is called "direct motion," but the movements of comets are sometimes from east to west, or retrograde; the orbits of all the planets are limited to a comparatively narrow zone on either side of the ecliptic, but the paths of comets cut the ecliptic in nearly every direction, some being even perpendicular to it; the orbits of all the planets are nearly circular—the orbits of comets present every degree of eccentricity. Of 200 comets whose orbits have been ascertained with more or less accuracy, forty or more appear to describe ellipses, seven or eight hyperbolas, and the rest parabolas. In general, it is held that comets with parabolic or hyperbolic orbits are only occasional visitors to the solar system, whose return is not to be looked for. The discovery that comets are extraneous to our atmosphere was made by Tycho Brahe, who ascertained the fact by observations of the comet of 1557. Newton demonstrated that they are guided in their movements by the principle which controls the planets; and Halley was the first, by determining the elements of a number of comets from recorded observations, to identify the comet of 1682 with one observed in 1607 and in 1531, and thus confidently to predict its return at the end of 1758 or beginning of 1759. The comet passed the perihelion on the 12th of Mar., 1759, exactly a month before the date fixed upon by astronomers. There are other comets whose periodicity is established and whose paths are accurately known; for example, those of Encke, Peters, and Faye (which see).

In 1770, Messier discovered a comet, known as Lexell's, which remained visible a long time, and observations showed the orbit to be an ellipse whose major axis was only three times the diameter of the earth's orbit, and indicated a period of five and a half years. It was impossible to identify this comet with any before observed, and yet it was very difficult to conceive that a bright comet with so short a period should have previously escaped observation. What was still more remarkable, it was never seen again, though carefully looked for in the places where according to previous observations its orbit should have been. It gave occasion to many sarcasms by the wits of the day at the expense of astronomers. At present the explanation is easy. The comet was never seen before 1770, because of its nearest point to the sun having been as distant as the orbit of Jupiter. In 1767 it was in such close proximity to Jupiter, moving in the same direction, and nearly in the same plane, that the attraction of this great planet entirely changed its orbit. Its passage to the perihelion in 1776 took place by day, and in 1779, before another return, it again encountered the vast body of Jupiter, the attraction of the planet deflecting it into more distant regions, and so changing the form of the orbit that if it had been again visible it would not have been recognized. The great comet of 1680—which gave Newton the means of proving that comets revolve around the sun in conic sections, and that they are retained in their orbits by the same force as that which regulates the movements of the planets—was the most remarkable for brilliancy among all those of which we have any authentic account. This comet is supposed to be the one that appeared about the time of Cæsar's death (44 B. C.), and that seen in the reign of Justinian (531 A. D.), and in 1106. There is, however, some doubt among astronomers as to these points. This comet came nearer to the sun than any known, except perhaps the comet of 1843. It approached the sun within less than 600,000 miles, about two-thirds of the sun's diameter. The tail or train of comets is nearly always turned away from the sun, frequently assuming a curved form. It increases in length with its proximity to the sun, but in most cases does not acquire its greatest length till after its perihelion. It is believed to consist of finely-divided matter, which is driven off from the comet by some unknown force residing in the sun.

The comets most remarkable for brilliancy in the present century have been the comets of 1811, of 1843, and of 1858 (Donati's), the latter having a period of about 1950 years, and an aphelion distance of some 15,000,000,000 miles. It has been a question among astronomers whether comets are self-luminous, or merely reflect the light of the sun. The fact of their becoming invisible in receding from the sun, though still of considerable apparent size, strongly leads to the adoption of the latter hypothesis. Experiments were made by Arago which showed that the light from comets is partially polarized in the same way that the sun's light is reflected by our own atmosphere, which strongly corroborates the same belief. The substance of the nebulosity and the tail is of almost inconceivable tenuity. Stars seen through them suffer no diminution of brightness, though the light traverses millions of miles of the cometary atmosphere; comets have never been observed to cause any sensible disturbance of the planetary motions, though themselves much affected by the neighborhood of a planet. The curvature of the tail and the acceleration of the periodic time in the case of Encke's comet indicate their being affected by a resisting medium which has never been observed to have the slightest influence on the planetary periods. Even the nuclei of comets appear to be of extremely small density. There are accounts of stars of a very low order of magnitude being seen through the nuclei.

Comets were formerly regarded with dread, as presaging pestilence, war, or some other great calamity, not merely by the ignorant, but by a large portion of the people. Milton alludes to this notion when he says that a comet

> "from his horrid hair
> Shakes pestilence and war!——"
> *Paradise Lost*, book ii., l. 710.

Halley's comet in 1456, being observed soon after the Turks had taken Constantinople, was regarded by all Europe with a superstitious terror, and to the Ave Maria was added the prayer, "Lord, save us from the devil, the Turk, and the comet!" The occurrence of a lunar eclipse at Constantinople at the same time increased the portentousness of the event. The discoveries of the magnitude of the space filled by cometary bodies, and their prodigious velocity, together with the confessed impossibility of always predicting their approach, have produced fears of another kind in the public mind. The groundlessness of such alarms from the extreme improbability of collision with the nucleus, and the probable harmlessness of a contact with the extremely attenuated surrounding matter, seems sufficiently evident. Already on many occasions some of the matter in the tail of comets must have come within the earth's atmosphere. Whether the effect is deleterious or salubrious, or whether it has any influence at all, is a matter of question.

Observations with the spectroscope have failed to give satisfactory evidence of the chemical constitution of comets, though some of them seem to consist in part of vaporized carbon or hydro-carbon gases. In Mar., 1872, Schiaparelli received the gold medal of the London Astronomical Society for his discovery that comets are sometimes connected with those remarkable displays of meteoric phenomena known as "meteoric showers." The importance of this discovery has been recognized by Donati, Peters, Prof. Newton, Oppolzer, Le Verrier, Chladni, Schellen, and other eminent savants. (See Meteorites.)

Comet-Finder, a telescope of low magnifying power and large field of view, used in searching for comets.

Com'fort (George Fisk), A. M., an able Methodist educator, born Sept. 30, 1833, in Berkshire, N. Y., graduated at Wesleyan University, Middletown, Conn., in 1857. He taught in Amenia Seminary, N. Y., in 1857–58, in Fort Plain Seminary, N. Y., in 1858–59, in Van Norman's Female College in 1860, travelled and studied in Europe and the East (1860 till 1866), was professor of modern languages and æsthetics in Alleghany College, Meadville, Pa., 1866–68; was chief originator and organizer of the American Philological Association (1869), and its secretary from 1869 to 1873; was one of the principal movers in founding the Metropolitan Museum of Art, New York (1869–72); was appointed professor of modern languages and æsthetics and dean of the College of Fine Arts in Syracuse University, N. Y., 1873; author of various essays upon linguistics, æsthetics, and pedagogics; is a corresponding member of the Archæological Institutes of Rome, Berlin, and Paris, and author of an excellent series of text-books for the study of the German language (1868–72).

Comfrey, kum'fre (*Symphytum*), a genus of perennial plants of the natural order Boraginaceæ, distinguished by a 5-cleft calyx and a corolla enlarged upward, its throat closed by awl-shaped scales. The species are natives of Europe and Asia. *Symphytum officinale* was formerly much esteemed as a vulnerary. It is often seen in the U. S. in gardens, and is also naturalized in our fields.

Comines, or **Commines,** a town on the S. W. frontier of Belgium, is divided by the river Lys into two nearly equal parts, one of which is in France. It is 9 miles N. of Lille. Here are important manufactures of ribbons, threads, etc. Pop. of the French town, 6246; of the Belgian, 3480.

Comines, de (Philippe), lord of Argenton, an historian and statesman, born near Menin, in Flanders, in 1445. The son of an ancient race, his education was conducted with the greatest care, notwithstanding he had early lost his parents. He entered the service of Charles the Bold, who employed him in important diplomatic business. About 1472 he proved untrue to the duke, forming a secret compact with Louis XI. while he was held a prisoner by Charles, who took him captive at Peronne, and became a minister of the French king, his enemy. After the death of Louis XI., Comines was an adherent of the duke of Orleans, aiding that

prince in his ambitious plans against the French government. This cost Comines his ministerial office; whereupon he aided the Bourbon prince the more zealously. He wrote memoirs of historical events from 1464 to 1498 (1523), Langley-Dufresnoy, London, 1747, more complete; and Dupont, Paris, 1840–47. Died at Argenton, Oct. 17, 1509. (See FELIX VAN HULST, "P. de Comines.")

Comi'so, a town of Sicily, in the province of Noto, about 41 miles W. S. W. of Syracuse. It has manufactures of paper. Pop. 15,803.

Comitia, ko-mish'e-ạ [from the Lat. *com* (for *con*), "together," and *eo, itum*, to "go"], in ancient history, were certain political assemblies of the Roman people. The comitia were of three kinds, distinguished by the epithets *curiata, centuriata*, and *tributa*. The comitia curiata were the assemblies of the patrician houses or *populus*, and in these, before the plebeians attained political importance, was vested the supreme power of the state. The name curiata was given because the people voted in *curiæ*, each curia giving a single vote, representing the sentiments of the majority of the members composing it, which was the manner in which the tribes and centuries also gave their suffrages in their respective comitia. After the institution of the comitia centuriata, the functions of the curiata were nearly confined to the election of certain priests and passing a law to confirm the dignities imposed by the people. The comitia centuriata were the assemblies of the whole Roman people, including patricians, clients, and plebeians, in which they voted by centuries. By the constitution of the centuries these comitia were chiefly in the hands of the plebeians, and so served originally as a counterpoise to the powers of the comitia curiata, for which purpose they were first instituted, it is said, by the king Servius Tullius. These comitia quickly attained the chief importance, and public matters of the greatest moment were transacted in them, as the election of consuls, prætors, etc. The comitia tributa were the assemblies of the plebeian tribes. According to tradition, they were first instituted after the expulsion of the kings, and in them were transacted matters pertaining to the plebeians alone, as the election of their tribunes, etc.

Comity of Nations. See INTERNATIONAL LAW, PRIVATE, by PRES. T. D. WOOLSEY, S. T. D., LL.D.

Comman'der, in the British navy, is an officer next under a captain in rank, but independent of him. He is, in effect, the captain of a ship of war under eighteen guns, or of a sloop of war or a bomb-vessel. In matters of etiquette he ranks with a major of the army. The duties of a commander on shipboard are almost exactly the same as those of a captain.

In the U. S. navy a commander is of the grade next below that of captain, and next above that of lieutenant-commander. He takes rank with a lieutenant-colonel of the army.

Commander-in-Chief, a title given to the officer in whom is vested the supreme command of all the land or naval forces of any nation. In Great Britain he is appointed by the sovereign and holds office for life. His duties have never been clearly defined as distinguished from those of the cabinet minister who presides over the war office. He is responsible to the Crown for the discipline and efficiency of the army. The office of the commander-in-chief, technically called "Horse Guards," comprises the departments of the military secretary, the adjutant-general, and quartermaster-general. Great changes have recently been effected in the status of the commander-in-chief, who has lost his separate official abode, and is now more completely subordinate to the secretary of war and responsible to Parliament. The office is usually vacant, and its duties performed by a "field-marshal commanding in chief." In the U. S. the President is the commander-in-chief.

Commandite [from the Late Lat. *commenda*, a "trust"], **Société en,** in France, a word used to express a partnership in which a person advances capital without taking charge of the business. In this country a person thus connected with a firm is termed a special partner. (See PARTNERSHIP, by PROF. T. W. DWIGHT, LL.D.)

Commandments. See DECALOGUE.

Commandments of the Church are rules imposed upon the laity of the Roman Catholic Church, which are regarded as just as binding as the Decalogue. They are frequently called the five commandments, and are variously given; those most commonly taught are as follows:

"1. The Catholic Church commands her children on Sundays and holy days of obligation to be present at the holy sacrifice of mass, to rest from servile works on those days, and to keep them holy.

"2. She commands them to abstain from flesh on all days of fasting and abstinence, and on fast days to eat but one meal.

"3. She commands them to confess their sins to their pastor at least once a year.

"4. She commands them to receive the blessed sacrament at least once a year, and that at Easter or during the paschal time.

"5. To contribute to the support of their pastor.

"6. Not to marry within the fourth degree of kindred, nor privately without witnesses, nor to solemnize marriage at certain prohibited times."

Commen'da [Late Lat. *commenda*, a "trust," from *commendo*, to "entrust"] was originally the conferring of a vacant benefice for temporary administration on a clergyman already provided with one; afterwards it came to be the bestowal of such a benefice for a long period or for a lifetime. As, however, after the eleventh century abuses crept in, and influential ecclesiastics especially availed themselves of the commenda to increase their incomes, it was found necessary to oppose it. This was done by Gregory VII. and Innocent X., and also at the Councils of Constance and Trent. Formerly in the Church of England, when a clergyman was promoted to a bishopric, all his other preferments became void, but the interest in the living was retained by its being *commended* to the care of a bishop (called the commendatory) by the Crown till there should be provided for it a proper pastor. Such a living was called an *ecclesia commendata*, and it was said to be held *in commendam*. The holding of benefices and livings in commendam in England has been abolished by law. Among the ecclesiastical orders of knights the name *commenda* (commandery) was given to the domain over which the members (*commendatores*) exercised jurisdiction.

Commen'sal [from the Lat. *com* (for *con*), "together," and *mensa*, a "table"], a term recently (1870) introduced into natural history to denote those small animals, sometimes mistaken for parasites, which accompany or attach themselves to others, not to prey upon them, but to share their prey. The word means a "table-companion." Thus, a Siluridan fish of Brazil, of the genus *Platystoma*, accommodates in the cavities of his mouth quite a family of small commensal fishes, of a species to which the name *Stegophilus insidiosus* has been given, which take toll of his food as it passes to his throat.

The term commensal was originally applied to certain court-officers of France who were furnished with food at the king's table.

Commen'surable [Lat. *com* (for *con*), "with," and *mensura*, "measure"], applied to magnitudes measurable by a common unit. It is one of the inscrutable things in geometry that there are magnitudes of which the relations to each other are determinate, yet incapable of numerical expression. Such magnitudes are said to be incommensurable. Magnitudes, on the other hand, of which the relations to each other can be numerically expressed with exactness, are called commensurable. By this is meant that, in the case of such magnitudes, there exists some smaller magnitude capable of being contained in each an exact number of times, without, in either case, a fractional excess. But no linear dimension, however small, is small *enough* to be a common measure of the diagonal and the side of a square, or of the diameter and the circumference of a circle. These pairs of magnitudes are therefore examples of relative incommensurability. In reasoning upon cases of incommensurability, the method of proceeding is to show that what we mean to prove of a magnitude incommensurable with another is very nearly true of either of two magnitudes commensurable with that other, the one greater and the other less than the incommensurable; and that the approximation to the truth is closer and closer as these commensurables are taken more and more nearly to the incommensurable. This approach can be carried so far that the commensurables shall differ from each other by less than any assignable quantity; while yet the incommensurable will always lie between them; and as the proposition to be proved is not true of the larger of the two commensurables, because that is too large, nor of the smaller, because that is too small, we infer that it must be true of the incommensurable, which is always smaller than the larger commensurable, and larger than the smaller. Very many of the quantities symbolized in mathematical investigations—*e. g. sines, cosines, logarithms*, and (generally) *roots*, are incommensurable with each other, with the quantities from which they are derived, and with any common unit.

F. A. P. BARNARD.

Commentry, a town of France, department of Allier, on the Œil, 8 miles S. E. of Montluçon, in the centre of important coal-fields. It derives its prosperity from coal-mines and iron-works, and has increased rapidly in recent times. Its manufactures of looking-glasses are very celebrated and remunerative. Pop. 9978.

Com'merce [Lat. *commercium;* a word related to *merx,* "merchandise"], the removal and exchange of commodities. Owing to the fact that until within a comparatively late period of the world's history the means of locomotion and carriage overland were infinitely inferior to those over navigable waters, the term has generally been limited to exchange of commodities by sea, and, as seas usually separated nations, to exchange of commodities between nations. It is in this restricted sense that the subject will be treated in this article.

The scene of the dawn of commerce has been assigned by some writers to the shores of the Indian Ocean, but the earliest authentic evidence of commerce which we now possess is of that carried on by the Phœnicians, a nation inhabiting the northern shores of Palestine, on the Mediterranean Sea, and closely allied with the Hebrews, not only by vicinage, but similarity of language and pursuits. Gadera (or Gades), the modern Cadiz, and Ituke, the Roman Utica, were settled by colonists from Phœnicia about the year 1100 B. C., or during the reign of King David in Israel. Massilia, the modern Marseilles, was founded not long after by the Phocæans. The foundation of Tyre and Sidon and the settlement of Phœnicia are ascribed by Herodotus to the period B. C. 2700–2800, which, according to some chronologies, was several hundred years before Noah's flood. The splendor of the Phœnician cities of Tyre, Sidon, and Aradus; their manufacture of woollens, glass, and jewelry; the germ of political representation afforded by the conventions at Tripolis; the use of arithmetic, an alphabet, and coined money by this now almost forgotten nation; the size and strength of their merchant-vessels, the intrepidity and skill of their navigators, and the adventurous character of their commerce, which extended certainly to Britain, and perhaps to the Baltic, on the W. and N., and Abyssinia and India on the S. and E., —are among the few unquestioned facts which forty centuries of destroying time have left unimpaired. Carthage was settled by colonization from Tyre about the ninth century B. C., and continued, long after the conquest of Phœnicia by Babylonia, one of the principal commercial ports of the world. In B. C. 509, Carthage made a commercial treaty with Rome, the text of which still exists, and had even made an earlier one with the Etruscans, who were themselves a great commercial people. But neither the enterprise nor opulence of Carthage could shield her from the military superiority of jealous Rome, and the year B. C. 146 witnessed her conquest and destruction. Alexandria in Egypt, which had been founded by Alexander of Macedon B. C. 332, after his destruction of Tyre, now became one of the chief centres of commerce. In B. C. 48, Alexandria was taken by Julius Cæsar, and eighteen years afterwards fell permanently beneath the power of Rome. Corinth (B. C. 786–395), Athens (B. C. 476–360), and Rhodes (B. C. 408–42) were also important centres of ancient commerce, rivalling in wealth and splendor, and excelling in intellectual progress and the arts, the cities already named. The consular and Zollverein systems and reciprocal commercial treaties were known to the Greeks even at this remote period; while Rhodes gave to Rome the earliest code of maritime laws of which we have any knowledge. Eventually, these great cities all fell beneath the devouring arms of Rome, and their commerce, with their power, died away. Alexandria, under Roman rule, now sustained the burden of the world's commerce until the foundation of the Byzantine empire. The Roman polity is deemed to have been hostile to commerce, but this was only so during the empire, which saw its perpetuity threatened by that powerful and freedom-loving middle class that commerce always tends to create. Yet even under the empire Rome was the centre of a great corn-trade from all parts of the Mediterranean; Alexandria continued to be a great commercial mart, and the Levant was kept more free of pirates than at any previous time.

The subjugation to Rome of the principal commercial nations of antiquity took place at a period when many causes, political, religious, and social—not the least among the latter of which was the then increasing dearth of coin —were hastening the downfall of that colossal empire itself. With the decadence of Rome the commerce of the world received a blow from which it did not fully recover until the rise of the Italian republics of the Middle Ages, though meanwhile the Jews, now dispersed throughout Europe, kept alive the expiring spirit of trade, a taste for which they had probably learnt from their ancient intercourse with Tyre, and materially promoted its re-establishment by their introduction of banks into Italy during the ninth century (*Putnam's Dictionary of Dates*), and of bills of exchange during the twelfth century (*Anderson*). Venice, Genoa, Florence, Pisa, and, somewhat later, Barcelona, rose into opulence and power; the former giving to the world its first great banking establishment, and the latter its first modern code of commercial law. During the half century previous to the discovery of America, the commerce of Venice extended to, and her coins passed current in, all parts of the known world. The trading cities of the German and Baltic seas and rivers grew into prominence during the same period; and from sixty-six to eighty-five of them, united into an association for mutual protection against pirates and the enjoyment of monopolies purchased from the feudal barons, formed the celebrated Hanseatic League. From the twelfth to the sixteenth century this association triumphantly defended the rights of commerce on the seas, and taught its political value to the once disdainful princes of interior Europe. From the beginning of the fifteenth century Portugal had become a great maritime and commercial nation, and to the daring and enterprise of her navigators is due that discovery of a sea-route to India which, together with the discovery of America by Spain—another country destined to share for a time the commercial supremacy of the world—totally changed the great currents of trade, and led alike to the decay of the Italian cities and the Hanseatic League, and the rise of that immense commercial opulence and power which successively awaited Holland and England.

Asia Major, with the products of its varied climes and teeming populations of Tartary, Persia, India, China and Japan, has in all ages been the objective point of commerce, and the nations who found the best route to it have in turn all held the sceptre of commercial greatness. The Phœnicians opened a channel to Asia by way of Suez; the Hebrews overland by way of Palmyra or Tadmor; the Suez route was reopened by the Greeks, and successively kept open by the Romans and Venetians; the Genoese penetrated to Asia by way of the Euxine; the Portuguese led the way by the Cape of Good Hope, and relinquished it to the Dutch; the Hansards opened an overland route by way of Novgorod; Spain sought for a path westward, and stumbled upon a new world; England discovered a route by way of Cape Horn; and America has paved one with iron rails, first by way of Panama, and afterwards *viâ* San Francisco. France has acquired both glory and profit by reopening the long-abandoned Suez route; and Russia, even at the present day, is exciting the jealousy of England by extending her borders and military posts to the north-western limits of India. Before the voyages of the great Spanish, Portuguese, Dutch, and English navigators had virtually laid the world open to commercial visitation, the currents of commerce changed with the progress of maritime discovery. Since then these currents have been subject to the various influences of new commodities, steam-navigation, canals, railways, and telegraphs. The principal articles of modern commerce, such as cotton, sugar, tea, coffee, iron, etc., formed no portion of the commerce of remote eras; seas, rivers, and lakes once impenetrable to commerce are now brought within its domain by the talisman of steam; interior countries, which once took no part in the commercial activity of the world, have arrived at a prominent position through the influence of canals and railways; while the telegraph has brought the most distant countries together, and swept away a thousand local and devious channels of trade to merge them into those long, continuous, and direct streams that now flow through the world. (For particulars of the commerce of the various modern foreign countries see those countries by name.)

American Commerce.—The aboriginal inhabitants of America knew little or nothing of commerce. The Peruvians constructed a magnificent coast-road in their country, 1200 miles long, but were unacquainted with either horses or wheels. Although possessing a splendid sea-coast, they had no ships. They understood the value and use of guano, but transported it by the most primitive means of carriage. The earliest commerce in America consisted of the supplies brought by the Spaniards to their colonies, and the gold and Indian slaves carried away in return. In 1510 negro slaves were imported into Hispaniola, and even then at such a sacrifice of life that the king of Spain wrote the next year to a colonial official: "I do not understand how so many negroes died; take much care of them." In 1517, Charles V. granted to a courtier a monopoly to import 4000 negro slaves into Hispaniola during eight years; this grant was modified in 1523. About this time a custom-house was established at Hispaniola, implying a regular commerce. In 1518 there were twenty-eight sugar-works on the island. In 1524 a sea-going vessel was built at Panama by Balboa, and shipwrights paid two dollars per day and rations. In 1545 the mines of Potosi were opened, and the shipment of bullion to Europe became a great and established trade, which remained in the hands of Spain for several centuries. During this period the colonies of North America were founded and developed, and many new streams of commerce began to flow between America and the rest of the world, and various parts of America itself.

In 1508 the Newfoundland fisheries were opened by France; in 1577 there were no less than 150 French vessels engaged in the trade; and although this number subsequently diminished, it increased so greatly after the Peace of Ryswick that previous to the capture of Louisburg, Cape Breton, in 1745, the number of vessels was 600, of men 27,000, and the annual product of fish valued at $4,500,000. In 1615, Virginia exported tobacco to England. In 1616 the Puritans of Massachusetts colony shipped four cargoes of fish and oil to Spain and the Canary Islands, and in 1624 a load of fish and peltry to England. Before the close of the seventeenth century the whale-fishery from Nantucket was established, and. Massachusetts annually exported 100,000 quintals of cod to the Levant. In 1646 the English began to export sugar from Barbadoes, and within the following fifty years the culture and export of this staple became established in most of the countries of tropical America. The culture and export of tobacco increased enormously, and in 1718 coffee was introduced into Surinam by the Dutch, and rapidly grew into commercial importance. From the year 1700 we have a complete summary, by values, of the commerce between the American colonies and Great Britain; and, as the colonial system was in full force at this time, this includes substantially the entire foreign trade of what are now the United States. Pennsylvania at this period exported corn to Spain and Portugal, and in common with New England carried liquors and provisions to the West Indies and Newfoundland. The Carolinas sent rice and tobacco to England and the West Indies, and carried back manufactures, tropical fruits, and specie dollars. Virginia exported rice, tobacco, corn, and lumber. New York exported wheat, beef, pork, tobacco, and peltry to England, and lumber and provisions to the West Indies, etc. It was her fears for the loss of this great and varied commerce, excited by the efforts made by the colonists to build their own merchant-vessels and trade directly with foreign countries, that led Great Britain to pass the Navigation act of 1651, which forbade this traffic except in English bottoms. This act was evaded by the New England colonists, and led to the acts of 1660 and 1663, which forbade foreign traffic altogether, except with England or her dependencies. The discontent occasioned by these measures was only answered by further restrictive acts on the part of Great Britain, the last of which, imposing in 1767 a colonial tariff for the benefit of the mother-country on tea, paper, glass, etc., led to the Revolution and independence. The following table exhibits the annual commerce between Great Britain and the North American colonies of New England, New York, Pennsylvania, Maryland, Virginia, the Carolinas, Georgia, Louisiana, and Florida, at quinquennial periods from the beginning of the eighteenth century to the Revolution—British official (fixed), not market, values:

Years of Peace or War.	Year.	Exports from America to Great Britain.	Imports from Great Britain into America.	British product of Greenland and Southern fisheries.
P.	1700	£395,021	£344,341	£469
W.	1705	150,964	291,723	
W.	1710	249,816	293,660	
P.	1715	297,247	451,368	
W.	1720	468,188	319,705	
P.	1725	415,650	549,693	4,262
P.	1730	572,583	536,861	11,103
P.	1735	652,327	668,664	8,678
W.	1740	718,416	813,382	
W.	1745	554,431	535,253	1,300
P.	1750	814,769	1,313,084	6,368
P.	1755	939,554	1,112,998	28,857
W.	1760	831,945	2,712,957	10,824
P.	1765	1,160,299	1,972,513	14,893
P.	1770	1,095,485	1,954,875	25,609
W.	1775	1,953,401	197,100	25,058

The following table exhibits the same commerce annually from 1776 to 1789, inclusive:

Years of Peace or War.	Year.	Exports from America to Great Britain.	Imports from Great Britain into America.	British product of Greenland and Southern fisheries.
W.	1776	£105,643	£56,430	£ 48,336
W.	1777	13,610	58,793	152,085
W.	1778	17,994	37,564	40,157
W.	1779	23,597	350,700	34,664
W.	1780	19,763	829,070	41,922
W.	1781	99,879	854,701	40,698
W.	1782	37,640	266,730	39,630
W.	1783	170,241	1,003,120	37,148
P.	1784	749,329	3,679,472	66,776
P.	1785	893,596	2,308,223	84,277
P.	1786	843,119	1,603,466	153,052
P.	1787	893,638	2,014,112	215,287
P.	1788	1,023,789	1,886,142	160,610
P.	1789	1,050,199	2,525,300	150,155

The expansion of these sums, which, notwithstanding their long growth, are exceedingly limited compared with those that followed after the treaty of 1783 had secured political independence and commercial freedom to the colonies, very strikingly exhibits the extent of the advantages our forefathers mutually pledged their "lives, fortunes, and sacred honors" to secure. The following table exhibits the commerce of the U. S. with all countries at quinquennial periods from 1790 to 1832, inclusive—American official (declared), not market, values:

Years of Peace or War.	Year.	Imports.	Exports of Domestic Commodities.	Re-exports of Foreign Commodities.	Imports from Great Britain and dependencies only.
P.	1790*	$23,000,000	$19,666,000	$539,156	No data.†
P.	1795	69,756,268	39,500,000	8,489,472	$30,972,215
P.	1800	91,952,768	31,840,903	39,130,877	42,577,590
P.	1805	120,000,000	42,387,002	53,179,019	No data.
P.	1810	85,400,000	42,366,679	24,391,295	" "
W.	1814	12,965,000	6,782,272	145,169	Nothing.
P.	1815	113,041,274	45,974,403	6,583,350	No data.
P.	1820	74,450,000	51,683,640	18,008,029	‡29,277,938
P.	1825	96,340,075	66,944,745	32,590,643	42,394,812
P.	1830	70,876,920	59,462,029	14,387,479	26,804,984
P.	1831	103,191,124	61,277,057	20,033,526	47,956,717
P.	1832	101,029,266	63,137,470	24,039,473	42,406,924

The difference between the imports from Great Britain and her dependencies, shown in this table, and the imports from Great Britain, shown in the previous one, allowing for growth of country, variation in modes of valuation, want of correspondence in the statistical year, etc., is, roughly, the measure of our commercial emancipation from the domination of the mother-country. From 1793 to 1810, inclusive, excepting the single year 1802, Great Britain was at war, and this country at peace, except so far as regards the brief contest with Tripoli and the Embargo and Non-intercourse acts. This was the halcyon period of our foreign carrying-trade, as will be seen in a glance at the column of re-exports. Our neutral flag was respected on every sea, and our commercial enterprise made known to every clime. The following table exhibits the commerce of the U. S. annually from the commencement of the expansion of 1833–37 to the present time:

Events.	Year.	Imports.	Exports of Domestic Commodities.	Re-exports of Foreign Commodities.
Panic and contraction. Rapid expansion.	1833	$108,118,311	$69,950,856	$19,822,735
	1834	126,521,332	80,623,662	23,312,811
	1835	149,895,742	100,459,481	20,504,495
	1836	189,980,035	106,570,942	21,746,360
	1837	140,989,217	94,280,895	21,854,962
	1838	113,717,404	95,560,880	12,452,795
	1839	162,092,132	101,625,533	17,494,525
	1840	107,141,519	111,660,561	18,190,312
	1841	127,946,177	103,636,236	15,469,081
	1842	100,162,087	91,798,242	11,721,538
	1843≋	64,753,799	77,686,354	6,552,697
	1844‖	108,435,035	99,531,774	11,484,867
	1845	117,254,564	98,455,330	15,346,830
	1846	121,691,797	101,718,042	11,346,623
	1847	146,545,638	150,574,844	8,011,158
	1848	154,998,928	130,203,709	21,128,010
	1849	147,857,439	131,510,081	13,088,065
	1850	178,138,318	134,900,233	14,951,808
	1851	216,224,932	178,620,138	21,698,293
	1852	212,945,442	154,931,147	17,289,382
	1853	267,978,647	189,869,162	17,558,460
	1854	304,562,381	215,156,304	24,850,194
	1855	261,468,520	192,751,135	28,448,293
	1856	314,639,942	266,438,051	16,378,578
	1857	360,890,141	278,906,713	23,975,617
Panic and re-exp. Gradual expansion.	1858	282,613,150	251,351,033	30,886,142
	1859	338,768,130	278,392,080	20,895,077
	1860	362,166,254	316,242,423	26,933,022
War and suspension.	1861¶	335,650,153	228,699,486	20,645,427
	1862¶	205,771,729	213,069,519	16,869,466
	1863¶	252,919,920	305,884,998	26,123,584
	1864¶	329,562,895	320,035,199	20,256,940
	1865¶	248,555,652	323,743,187	32,114,157
Suspension and expansion.	1866	445,512,158	550,684,277	14,742,117
	1867	417,833,575	438,577,312	20,611,508
	1868	371,624,808	454,301,713	22,601,126
	1869	437,314,255	413,961,115	25,173,414
	1870	462,377,587	499,092,143	30,427,159
	1871	541,493,708	562,518,651	28,459,899
	1872	640,338,766	549,219,718	22,769,749

* To Dec. 31; the following years end Sept. 30.

† The exports from Great Britain (only) to the U. S. this year, according to the British official tables, were £3,431,778. ‡ 1821.

≋ Nine months, ended June 30.

‖ This and all following years end June 30. Since 1861 the domestic exports, except from Pacific ports and exports of specie, valued in paper money.

¶ The sums for these years are exclusive of the imports and exports at Southern ports, which cannot be ascertained, and are from the disfigured MS. records of the treasury, and differ both from those printed in the "Finance" and "Commerce and Navigation Reports" previous to the revision exercised by the bureau of statistics in 1867. For comparison of these discrepancies and analysis of the accounts, see introduction to "Commerce and Navigation Reports," 1867.

The principal articles of the importations of 1872, and the principal countries from whence imported, are shown in the following table—sums in millions of dollars and tenths:

Animals, Canada	3.5	Leather, manfs., England and Germany	1.0
Beer, ale, porter	1.5	Linseed	4.3
Books, printed m	2.3	Marble	1.0
Breadstuffs, Canada	9.5	Musical Instrs., France	1.0
Chemicals, England	18.4	Oils, Levant	2.1
Opium, "	2.1	Paints, England	1.4
Watches, Clocks	3.4	Paper, manfs., England	1.6
Clothing	9.4	Precious stones, "	3.1
Coal, Canada	1.3	Meats, poultry, lard, butter, cheese, etc., Canada	4.4
Coffee, Brazil	37.9	Rice	2.3
Copper, manfs., England	2.1	Rags	6.0
Cotton goods, "	29.9	Salt, England, West Indies, and Spain	1.2
Dyewoods, West Indies	3.2	Silk, raw	5.6
Earthenware, England	5.3	" manfs., Eng. and Fr.	36.3
Fancy Goods, England and Germany	5.6	Spices, China and E. Ind.	2.7
Flax, England	1.4	Steel, England	4.0
Flax, manfs., Gt. Britain	21.2	" manfs., England	8.9
Fruit, Levant and West Indies	10.4	Spirits and Wines, France	8.6
Furs, England	3.5	Sugar and Molasses, Cuba	91.9
Glass, manfs., England	5.8	Tea, China and Japan	22.9
Gold and silver coin, etc., Mexico	13.7	Tin, China and England	15.8
Gold, manufactures	1.4	Tobacco, manfs., Cuba	4.4
Gums, England	1.7	Cigars, "	2.8
Hair	1.6	Wood, hard, West Indies	1.3
" horse, England	1.3	Boards, etc., Canada	8.5
Hats and bonnets, straw	2.3	Furniture, etc	1.5
Hemp, Great Britain	7.2	Wool, S. Amer. and Eng.	27.4
" manfs., Great Britain	1.9	Carpets, England	5.7
Hides, South America	16.0	Woollen dress-goods, Eng.	20.4
India-rubber, Brazil	4.8	Woollen, manfs., England	25.4
Indigo	1.5	Zinc, Germany and Belgium	1.4
Iron, pigs, Great Britain	11.2	Other articles specified	103.6
" manfs., " "	31.5	" " not "	22.4
Lead, pigs, England	3.4		
Leather, England and Fr.	7.6	Total	640.3
" gloves, " "	4.6		

The principal articles of the domestic exportations of 1872, and the principal countries whither exported, are shown in the following table—sums in millions of dollars and tenths:

Agricultural implements	1.5	Wood manufactures	1.2
Animals	1.8	Naval stores, Gt. Br. & Ger.	3.4
Breadstuffs, United King.	84.6	Oil-cake, Eng	4.0
Carriages	1.4	" coal, Ger., Fr. & Gt. B.	34.1
Seeds	3.8	" whale	1.5
Coal	2.0	Ordnance stores	1.2
Cotton, England	180.7	Provisions, Eng	60.0
Cotton manufactures	2.3	Sewing-machines	2.4
Drugs	1.8	Steel manufactures	1.0
Dyes	1.0	Tallow	7.0
Firearms	1.0	Tobacco, Ger., Gt. B. & Fr.	24.1
Fruits	1.0	Tobacco manufactures	2.5
Furs	3.3	Turpentine	2.5
Gold and silver, England	75.2	Other manufactures not specified	4.2
Hides	1.4	Other raw material not specified	2.9
Iron manufactures	2.7	Other articles specified	10.7
Engines	3.9		
Leather manufactures	3.1	Total	549.2
Lumber, W.I., S.A., & Eng.	12.5		
Furniture	1.5		

The importation from England of commodities the growth or production of other climes, such as salt, furs, gums, etc., is due to the fact that by reason of her vast capital, low rate of interest, and other advantages, England is substantially the commercial emporium of the world, and transacts an enormous transshipment commerce with all countries. (The influence of taxes, tariffs, etc. upon commerce has not been adverted to in this article, that being treated under the heads FREE TRADE, PROTECTION, and REVENUE REFORM.)

It has been the interest in all ages of certain classes to deny that commerce is beneficial, and that agriculture and manufactures alone are entitled to national consideration, but such a position is utterly untenable. Production cannot advance beyond the rudest limits without commerce, whose essential function it is to exchange that which is not needed for that which is, or to remove commodities from places where they are not wanted to places where they are. In fact, commerce is inseparably bound up with production; there is no actual dividing-line between them; the carriage of seeds to be planted, of textiles to be woven, of ores to be smelted, and the removal of the results to places of deposit, are all commercial functions. Foreign commerce is in like manner inseparable from production, and forms part of it. The implements, materials, agencies, and even remoter sources, of national productive industries, depend upon foreign commerce, which would perish without them. Commerce has exercised a potent influence in propagating and extending religion; in its train have ever followed opulence, national strength, political liberty, letters, arts, and sciences; its stimulation has always been marked by a general progress in the condition of men; its retardation by a corresponding retrogradation, and its discouragement or decline by poverty, national dissolution, tyranny, slavery, ignorance, and crime. It has destroyed the barriers of distance, alienage, race, religion, and caste; it has equalized the conditions of life in various parts of the earth, and tended to realize that homogeneousness of the human race which the profoundest thinkers have maintained is an indispensable preliminary to its highest development. ALEX. DELMAR.

Commerce, a township and post-village of Oakland co., Mich., on the railroad between Bay City and Toledo, and 28 miles N. W. of Detroit. Pop. of township, 1392.

Commerce, a post-village, capital of Scott co., Mo., on the Mississippi River, 154 miles below St. Louis. It has one weekly newspaper. Pop. of township, 1267.

Commerson (PHILIPPE), a French botanist, born at Châtillon-les-Dombes Nov. 18, 1727. He accompanied as naturalist the expedition of Bougainville, which sailed in 1767, and he visited South America and explored Madagascar, etc. He died in the Isle of France in 1773, leaving some works in manuscript. Commerson was a man of profound science. An exceptional honor was conferred on Commerson by the French Academy of Natural Sciences in electing him a member notwithstanding he had never sent them a memoir. Unfortunately, when this distinction was conferred he had been already eight days dead.

Commina'tion [from the Lat. *comminor,* to "threaten," because in it God's threatenings against sin are repeated] is the name of a penitential service in the Liturgy of the Church of England. In that of the Protestant Episcopal Church of the U. S. it is nearly all omitted.

Commissa'riat [Fr., from *commissaire,* a "commissioner"], a term originally meaning a "commissionership," has come to be applied to that department of the military administration which has in charge the furnishing of food for the men. The other supplies of the troops, including forage for horses, etc. (with the exception of ordnance stores), are furnished by the quartermaster's department. In ancient Rome the quæstors attended to the victualling of the troops. The first English commissary-generals were called provant-masters. The British commissariat is now under the charge of a commissary-general-in-chief. That of the U. S., at present, is under an officer who has the rank of a brigadier-general and the title of commissary-general of subsistence. The accounts of the U. S. commissary officers are referred for settlement to the third auditor of the Treasury department. (See SUBSISTENCE OF ARMIES.)

Com'missary [Fr. *commissaire*], a term nearly synonymous with deputy, signifies one to whom the power and authority of another is committed. It is sometimes used in a sense nearly equivalent to that of commissioner. In the army the officers of the commissariat department are styled commissaries of subsistence. The officers having charge of musters in and out are commissaries of musters. In ecclesiastical law, a commissary is appointed by a bishop to exercise jurisdiction in remote parts of the diocese.

Commis'sion [Lat. *commissio,* from *committo, commissum,* to "commit"], the act of committing or performing; also a writing, generally in the form of a warrant or letters-patent. Instruments bearing this title are issued by the executive to officers in the army and navy, judges, and others. The term is sometimes applied to a number of persons joined in an office or trust. All the officers of armies above the grade of sergeant hold their authority by warrants called commissions, and hence they are called *commissioned officers.* The practice of buying and selling all commissions under the rank of colonel formerly prevailed in the British army, but it was abolished by royal warrant, against the will of the House of Lords, in 1871.

COMMISSION, in law. See TRUSTEES, by PROF. T. W. DWIGHT, LL.D.

Commis'sion Mer'chant, Agent, or **Factor,** a person who sells goods which belong to another party or person, by whom they have been consigned to him for that purpose. The owner of the goods is called the consignor, and the commission merchant the consignee. The latter receives for his services a percentage on the sum for which the goods are sold.

Commissionnaire [Fr.], an attendant at European hotels, employed to attend at the arrival of railway trains and steamboats to secure customers, to take charge of baggage, see it passed through the hands of the custom-house officers, and send it on to the hotel; for which services they charge a fee. They likewise procure visés to passports, and act as valets-de-place.

Committee. See INSANITY, by PROF. T. W. DWIGHT.

Com'modore, in the British navy, is a title given to the senior captain of a squadron when there is no admiral present. It is not a permanent rank, but is bestowed for a time on a captain. A commodore usually commands more ships than one, detached from a fleet on some special service; and he then hoists a pennant. In the U. S. navy the title of commodore was formerly given by courtesy to a captain commanding a squadron. The office was recognized by law in 1862, commodores taking rank next below rear-admirals, and next above captains. Their rank corresponds to that of brigadier-general in the army. (See ADMIRAL.)

Com'modus (LUCIUS ÆLIUS AURELIUS), a Roman emperor, born in 161 A. D., was the son of Marcus Aurelius and Faustina. He was carefully educated. He succeeded his father in the year 180, and soon manifested the excessive cruelty and sensuality of his disposition. His wife Crispina and many other innocent persons were put to death by his order. He abandoned the government to Perennis and other favorites. Assuming the title of Hercules, he claimed from his subjects divine honors. His officers Eclectus and Lætus conspired against him, and caused him to be strangled in 192. He was succeeded by Pertinax.

Common. See HEREDITAMENTS INCORPOREAL, by PROF. T. W. DWIGHT, LL.D.

Common Carriers. See CARRIERS, COMMON, by PROF. T. W. DWIGHT, LL.D.

Com'mon Coun'cil, a name given in some cities of the U. S. to one of the governing bodies which control the municipal and local affairs. The other is sometimes called select council.

Com'moner, one of the common people, applied in general to all persons except the hereditary nobility; also a student of the second rank in the University of Oxford (England), who pays for his board or *commons* and other charges. The term "great commoner" has been applied to the English patriot Hampden, and to the elder William Pitt before he entered the House of Peers.

Common Law. See LAW, by PROF. T. W. DWIGHT.

Common Pleas, Court of. See COURTS, by GEORGE CHASE, LL.B.

Common Prayer, Book of, a collection of all the forms of worship used in the Church of England. The King's Primer, published by Henry VIII. in 1546, was the first form of this book, but it contained only the Creed, Lord's Prayer, Commandments, and Litany. Edward VI. had this primer twice revised and republished (in 1549 and 1552), and his second Liturgy is very similar to that which now exists. He caused the Sentences, Exhortation, and the Confession and Absolution to be prefixed to the Daily Service, and introduced the Decalogue into the Communion Service (1548). At this time certain Romish customs were abolished. In the reign of Elizabeth the Liturgy was again revised (1559), but with few alterations. After the conference with the Presbyterians at Hampton Court, James I. instituted another revision, and added the explanation of the sacraments in the Catechism (1604). It was again revised under Charles I. (1633). After the restoration of Charles II., when a conference had been held with the dissenters at the Savoy, the Common Prayer-Book was further revised in 1662. Certain forms were added, and slight changes were made in the services; and a very few have been made since that time. A revision was made under William III., and several changes proposed, but they were rejected by convocation (1689), and have not been restored. The Protestant Episcopal Church in the U. S. has adopted the Anglican Prayer-Book with a few modifications.

Com'mons, the dinner provided in English colleges and inns of court for their members. In the inns of court it is provided only during term. Separate tables are appointed for the benchers, the barristers, and the students.

Common Schools. The aim of common schools is to provide elementary instruction for all the children of proper age in the community. Such schools were unknown in ancient nations. "The wisdom of the Egyptians" was not for the mass of the people. Babylon and Nineveh and the Medo-Persian empire won renown by their victories in arms, but not by educating their inhabitants. The schools of Athens were for those who had the wealth and leisure to profit by them. Sparta cared for the bodies of her children, but neglected their minds. Rome trained her citizens to be soldiers, rather than scholars; they were masters of the pilum rather than of the alphabet.

The origin of common schools is found in the Christian Church. Christianity, in its ideal, and as illustrated in the life of its Founder, is the religion of beneficence. It recognizes the value of every human being, and esteems the man as more than the accident of his birth or rank; and it aims to benefit him for the whole period of his existence. With this estimate of man, and with the beneficent impulse received from the teachings and the example of their Master, the Christian clergy very early acknowledged and assumed the duty of educating the people. Synods and councils of the early Church frequently enjoined this duty, and directed that it should be performed gratuitously, especially for the poor. One council ordered that a grammar school should be established in connection with every cathedral, a parochial school in every town and village, and other schools wherever opportunity could be found. These schools were to receive as pupils the poor and the rich without distinction. By this means large numbers were able to gain knowledge who would otherwise have been doomed to perpetual ignorance. But it was easier to command universal education than to secure it. The difficulty of bringing under instruction the scattered population of rural districts was almost insurmountable. Yet the early servants of Christianity attempted the education of all. Wherever they went they founded both churches and schools. Some of their schools took the form of monasteries, which were at once the academies, the libraries, and the universities of those early times.

The schools thus established had very slight resemblance to the common schools of our times. The instruction was meagre, and pertained largely to church dogma and scholastic theology. Books were few and costly, being necessarily in manuscript. Education could not have the fulness and completeness that are now easily possible. Ideas were relatively few, and were restricted to a narrow range of subjects. The schools resembled the parish schools of later times, rather than the common schools of this day. As they were under church control, they were in fact church schools. When wars and civil commotions incident to the unsettled state of society interrupted them, as was frequently the case, their influence was diminished, and ignorance extended its sway. But the fundamental idea of *educating all the people* was never lost. The Church of those early centuries never fully accomplished what it attempted, but that grand idea was so deeply planted in the convictions of the Christian world that it could not be plucked up. The development of that idea has given to the world the modern school-system. In this way the common school is the outgrowth of the Christian Church.

The invention of the art of printing greatly increased the facilities for teaching all the people. Books ceased to be the exclusive possession of the few, for a single volume no longer represented the labor of months for its mere reproduction. But the Reformation, with the intense mental activity which it induced, gave to popular education its strongest impulse. The Reformers previous to Luther had used their influence in favor of universal instruction, but his efforts in the same cause were most effective, as his influence was greatest. His ideas respecting schools were far in advance of any previously maintained, and were nearly identical with those now upheld in Germany and the U. S. He advocated the maintaining of schools by the *civil government,* rather than the Church. Through his influence a free-school system was established in Saxony as early as 1527, and other German states followed the example, particularly those in which the Reformation became predominant. In the early part of the next century the Germans were probably the best-educated people in Europe. The religious wars which so largely occupied the first half of that century prevented the development of educational plans, but very soon after these wars ceased many states of Germany renewed their devotion to popular education, and in some of them compulsory attendance laws were passed. The Swiss Reformers contemporary with Luther were zealous friends of schools, and the impulse which they gave to education in their country is still felt. In Scotland, John Knox advocated the founding of schools in every parish at the cost of the Kirk. His views were widely adopted, and more than a century later were substantially embodied in a law requiring such schools, the expense to be divided between the parish and the parents of pupils. The Established Kirk of Scotland has continued these schools from that time, and other churches in that land have established their own schools. Within a few years some changes in the mode of management have been introduced. For a long time the Scotch were the most universally educated people in Europe, but the Prussians now claim that honor. The pre-eminence of Prussia in this respect is of recent origin. The present educational system of Prussia was not put in force till after the conquest of that country by Napoleon in 1806. A similar system had been nominally in force for nearly a hundred years previous, but had not been carried out. Wars rather than schools had filled the mind of the nation, particularly

during the reign of Frederick the Great. As the military spirit has long been dominant in Prussia, the discipline of the schools is essentially military. The state rules its schools as strictly as its army. The complete supremacy over education long exercised by the Church is now exercised in Prussia by the government. The Prussian system is the general model for schools in other parts of Germany.

Within the last few years a remarkable interest in popular education has sprung up in every country in Europe. Only the beginnings are yet seen. Each nation is striving, in its own way, to set up a school-system adapted to its peculiar wants. Many years must pass before the perfected results of these efforts can appear, but the prospect is that the close of the nineteenth century will find common schools maintained for the elementary instruction of all the children in Europe. Other parts of the world, particularly the colonies and other dominions of Great Britain, those regions where American missionaries have extensive influence, and, most wonderful of all, the Japanese empire, are moving in the same direction.

But the most complete and successful trial of the common-school system has been made in the U. S. The first settlers of Massachusetts and Connecticut were hardly established in their new homes before they provided for the education of their children. In the more southern colonies schools were not so highly valued. But the early records of the towns and colonies now included in those two States contain frequent mention of votes and appropriations for maintaining schools. Each town set up its own school, and ere long the colonial legislatures adopted codes requiring a school in every considerable settlement. These schools were not in all respects like the common schools of this day, for many of them provided for instruction not only in reading, writing, and other elementary branches, but in Latin and other studies preparatory for college. Though burdened by poverty, and not seldom by taxation for carrying on inevitable wars, those sturdy pioneers never ceased to uphold their schools. New Hampshire early followed the example of her southern neighbors, and Maine, as a part of Massachusetts, participated in her institutions. Emigrants from these Eastern States settled in Vermont, Northern New Jersey, and the central and western parts of New York and Pennsylvania. Wherever they went they carried with them that New England institution, the public school, and those flourishing commonwealths cordially adopted it. And when Ohio, Michigan, and the States westward of them, even to the Pacific, received their first settlers from the Eastern States, common schools at once appeared in every hamlet. In the Southern States little was done for popular education till after the great civil war which ended in 1865. Before the war many of these States possessed funds for supporting public schools, and made some not very successful efforts to maintain such schools. But, except in a few localities, they had a scattered population, of which a large portion was not permitted to receive instruction, and another large portion was extremely ignorant, and content to remain so. The wealthier class among them was indeed highly cultivated, but wealth was not so generally diffused as in the Northern States, and those who had it could accomplish little for instructing the untrained multitudes around them. But since the restoration of peace these States have made great exertions to establish public schools, and, notwithstanding many hindrances, especially the impoverishment occasioned by the war, and the unwillingness to admit both white and colored children into the same schools, which in the thinly-settled districts can hardly be avoided, many of them are making commendable progress. Every State in the Union, and nearly every organized Territory, has now the beginning, at least, of a common-school system.

The schools in the U. S. differ from those in European countries in that they are established and controlled under State instead of national authority. In Great Britain or Germany the national parliament enacts laws for all the schools in the realm, but no act of the American Congress relates to the establishing or controlling of common schools. Each State passes such laws on this subject as it pleases. Under these State laws a superintendent of schools is appointed for each State (except Delaware), and in most of the States each county has also its superintendent. In the New England States no county superintendents are appointed, but each town has its own school officers. In Arkansas, Louisiana, and Texas, districts composed of from one to fourteen counties have their district superintendents, and in New York each county constitutes from one to four districts, with a corresponding number of superintendents. Most of the larger cities in all the States have their own school superintendents.

The support of schools is derived from various sources. The earliest schools of New England were maintained partly by appropriations from the town treasuries, and partly by rate-bills to be paid by the parents or guardians of pupils, or, if they were unable, by the towns. The rate-bill system was long retained, but is now abandoned in all the States. Schools receive support (1) from the income of permanent funds. Most of the States have such funds, the annual interest of which is expended for education, the principal remaining intact. In some cases counties, towns, or other small divisions of States possess similar funds. (2) The greater part of the cost of schools is provided by taxation. Of this a part is levied (*a*) as a State tax. In some States the avails of certain special taxes, as capitation-tax, licenses, etc., are appropriated for schools; in others a fixed sum, or the amount raised by a certain rate of taxation, or a certain amount for every child of "school age," is distributed among the several counties or towns. (*b*) In some States each county has its separate school-tax. (*c*) Town taxes for schools are levied in most of the States which have organized townships. (*d*) District taxes are frequently levied, both for current and special school expenses. (A district, in this sense, is usually a part of a town.) (3) Besides moneys received from funds and taxes, small amounts are raised by voluntary contributions or subscriptions.

The sources of permanent school-funds may be briefly named. The earliest considerable State fund was established by Connecticut in 1795. A tract of land containing about 5700 square miles, now constituting the N. E. part of Ohio, and known as the "Western Reserve," because Connecticut reserved it when she ceded to the general government all her other public domain, was sold for $1,200,000, and the entire sum was set apart to be a perpetual fund for supporting public schools, the interest alone to be expended. By judicious management the principal of this fund was afterwards increased to over $2,000,000. Massachusetts appropriated a part of her unoccupied lands in what is now the State of Maine for creating a similar fund. In all the newer States one thirty-sixth part of all the land (the sixteenth "section" or square mile in every six-mile-square township) is set apart by national law to be converted into a permanent fund in each State for supporting common schools. In the States most recently admitted, beginning with Minnesota in 1858, *two* sections, the sixteenth and thirty-sixth, in each township, are devoted to this purpose by the terms of the acts of Congress admitting those States. West Virginia, containing no public lands, is an exception. The States which have exercised proper care in disposing of their school-lands have secured magnificent endowments. In some States a large part of this fund has been lost through mismanagement, the faithlessness of officials, or the absorption of it in the expenditures of the late civil war.

The common schools in those States where they are efficiently conducted accomplish quite fully what they attempt. The system provides for (1) the examining and approving of teachers by competent authority; (2) the regular visiting and examining of all public schools by competent officials, who are paid for their services; (3) the maintaining of schools in as many districts or localities as the convenience of the people requires: in this way the children of sparsely settled communities have good school privileges; (4) the establishing of graded schools wherever the population is sufficiently compact to require them: in these schools the range of studies is often so extended in the higher departments as to include history, philosophy, algebra, geometry, French, and astronomy; also drawing and vocal music, which are now finding a place in schools of lower grade; (5) high schools, which, as the highest departments of graded schools or under separate management, are maintained in the larger towns of many States: in Massachusetts they are required by law in all towns containing a certain number of inhabitants; the studies in these schools, besides the higher English branches, sometimes include a complete preparation for entering college; (6) in New York City the public-school system includes "The College of the City of New York." In several States, most notably in Michigan, a State university, including all the departments of scientific and professional education, crowns the system of free public instruction. Most of the newer States received from the U. S. government grants of land expressly for endowing these universities. Additional endowments have in some cases been provided by State appropriations or individual contributions. Pupils of both sexes are admitted to many of these institutions. The tuition fees are usually small, and in some States certain classes of pupils can obtain instruction without charge. Where this is done, the common school system rises by regular gradations to the university and the professional school.

As subsidiary to the common-school system—(1) Normal schools for the training of teachers are established in each of the States except Nevada, the least populous of all. (2) Teachers' associations are formed, teachers' institutes are

held, and educational publications are encouraged in most of the States. (3) Arrangements are made for procuring libraries, books of reference, maps, and charts; also philosophical, astronomical, and chemical apparatus, particularly for the more advanced schools. (4) Uniformity of text-books is secured in some cases for entire States by State authority, more commonly in towns or other small sections by local authority. (5) In several States the law gives the power of compelling the attendance of all children of certain ages for a specified number of weeks each year. Where school-expenses are provided by taxes and the income of funds, compulsory attendance is generally advocated.

The most perplexing question respecting common schools relates to moral and religious training, and results from diversities of religious opinions. As the schools are supported chiefly by taxes levied upon all classes indiscriminately, no one sect can be favored without injustice to all others. But the right moral training of a child is even more important than the culture of his intellect, and common schools cannot safely omit all such training. Nor can it be wisely remitted to other times and places, for the principles of honesty, virtue, truthfulness, and morality are for constant daily use. The problem is to give such instruction as shall be efficient for its purpose, but shall not violate the rights or excite the just apprehensions of any sect. If this can be accomplished, the amount of such training may be too small to give general satisfaction. The idea of universal education was developed, as has been seen, in the Christian Church, and for centuries the Church accomplished nearly all that was attempted for popular instruction. In the U. S., and in Germany since the time of Luther, the state or civil government has taken the place of the Church in the management of public schools. But the old traditional opinion that the right to such management belongs exclusively to the Church has never disappeared. Very naturally, this opinion is held most tenaciously (though not exclusively) in the Roman Catholic Church, and from that source particularly, as well as from others, the demand has come that moneys for supporting schools be divided among the several religious parties, and each be permitted to maintain its separate school. To assent to this demand would be to annihilate the common-school system. In populous communities the plan proposed might educate most of the children, but in thinly-peopled regions they must be educated together or not at all. In truth, neither the Church nor the State has the first right and duty of training children. The family takes precedence of both, and whatever either of them may do for universal education, that earliest of all human institutions can never be superseded, either in its duties or its rights. "The newborn child is placed neither at the door of the church nor on the steps of the court-house, but in the midst of the family."

The difficulty that is experienced in common schools of the lower rank becomes more urgent when higher studies are to be pursued. Both teachers and text-books in such studies as history and philosophy must advance positive opinions, some of which will inevitably conflict with those of a part of the people. There is obvious injustice in compelling people to pay taxes for supporting the teachers of doctrines which they abhor, and in thus depriving them, wholly or in part, of the means for establishing such schools as teach the views which they approve. This religious question is arising in all countries where diverse religions are found, and it is sure to claim increased attention in the future. It does not admit of a ready solution, and perhaps no single solution will ever be discovered. It may assume such proportions as to limit free popular education to a lower range of studies than its most ardent friends have hoped. Surely, the earnestly religious part of the people, who are the firmest friends of schools for all, cannot consent to the total banishment of moral training from the common schools. A severe struggle upon this point is one of the possibilities of the near future.

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Ass't Sec. Conn. State Board of Education.

Commons, House of. See PARLIAMENT.

Common Time, in music, that in which each measure or bar contains notes equal in value to one semibreve or whole note; such, for example, as two minims or four crotchets. It is indicated by a large C, placed in the staff immediately after the clef.

Commonwealth′, a state, a body politic; properly a free state, a republic. The official title of Massachusetts is the "Commonwealth of Massachusetts," and several other States use the title commonwealth.

Commonwealth of England, in history, the form of government established in England on the death of Charles I. in 1649, and which existed during the protectorate of Oliver Cromwell and his son Richard, until the restoration of Charles II. in 1660. The substitution of a democratic for a monarchical form of government was provided for and enjoined by two successive charters. The first charter of the Commonwealth was drawn up in Dec., 1653, by the council of officers who on the voluntary resignation of the Parliament in the early part of the same year had declared Cromwell "Protector;" it was styled the "Instrument of Government." The second charter, called the "Petition and Advice," was framed in May, 1657, by the Parliament which the Protector had assembled in the previous year. Under the first charter the English government may be classed among republics, with a chief magistrate at its head; under the second it became substantially a monarchy, and Oliver Cromwell from 1657 to the period of his death was virtually king of England.

Commune, a French word signifying "common," is the name of a small territorial division in France. Each canton is subdivided into communes, each of which is governed by a mayor and a municipal council. The law for the organization of communes was enacted in 1791, but communes had existed in French towns before that date.

Commune of Paris, an organized band of socialists, outlaws, and proletaires connected with the International Association who revolted against the new régime or Versailles government on the 18th of Mar., 1871. Paris had a few days before this date been evacuated by the Germans, who had taken it after a long siege. The National Guard of Paris had been permitted to retain their arms, and a large part of that guard supported the Commune, whose head-quarters were in the suburbs of Belleville and Montmartre. Among the prominent leaders of the Commune were Flourens, Félix Pyat, Assi, Delescluze, Paschal, Grousset, General Cluseret, Dombrowski, Arnould, Jules Vallès, Blanqui, and Rochefort. Their principles and aims are thus defined by one who was a member of the Commune: "Their philosophy is atheism, materialism, the negation of all religion; their political programme is absolute individual liberty by means of the suppression of government, and the division of nationalities into communes more or less federated; their political economy consists essentially in the dispossession, with compensation, of the present holders of capital, and in assignment of the coin, land, etc. to associations of workmen." The same writer affirms that "the central committee of the National Guard, exclusively composed of workmen, members of the *Internationale,* has taken the initiative, and alone has the merit of the movement."

As those members of the National Guard who favored the cause of order were irresolute and not inclined to fight, the Communists quickly became absolute masters of Paris. Their ranks were reinforced by many convicts, whom they released from the prisons, and by many foreign refugees. The leaders who had some intelligence, some definite purpose, and some lingering scruples were soon discarded one after another and imprisoned, and the control of the Commune was obtained by desperadoes and outlaws, who initiated a reign of terror. On the 26th of March an election was held in Paris to choose members of the Commune, but as the party of order declined to vote, only 180,000 votes were cast, and the election resulted in the triumph of the insurgents. On the 29th they issued a proclamation in these terms: "The central committee has remitted its powers to the Commune. Citizens: your Commune is constituted. The vote of the 26th of March has sanctioned the victorious revolution," etc. The government organized at Versailles sent an army to suppress the insurrection. On the 2d of April a large body of insurgents marched against Versailles, but they were repulsed at Meudon, and much injured by the fire of Fort Mont Valérien. Gustave Flourens, one of the commanders of the Commune, was killed in this action. The army of the republic began to besiege Paris under the command of Marshal MacMahon. The chief command of the besieged forces was held successively by Dombrowski, Cluseret, Rossel, and Delescluze. Violent dissensions disturbed the counsels and hindered the success of the Commune. On the 5th of April they arrested Darboy, archbishop of Paris, and other persons, whom they kept in prison as hostages. The insurgents, who occupied several forts in the environs, made an obstinate resistance to the besiegers. The official journal of the Commune announced on May 1st that a committee of public safety had been appointed. This committee was composed of five members—viz. Antoine Arnaud, Félix Pyat, Charles Gérardin, Ranvier, and Léon Meillet. Rossel, who bore the title of delegate of war, resigned the command on the 9th of May, and was succeeded by Delescluze. Having captured several of the forts, the besieging army, about 90,000 strong, entered Paris on the 22d of May by several gates, enclosing the insurgents in a great semicircle. The latter continued

for five days fighting behind barricades in the streets, and revenged their defeat by atrocious acts of cruelty and vandalism. They set fire to the public buildings, and endeavored to destroy the ancient monuments and treasures of art. Among the finest edifices that were burned were the Tuileries, the Palais de Justice, the Palais Royal, and the Hôtel de Ville. The Louvre was partly consumed. During the last days of the power of the Commune they shot Archbishop Darboy, Bonjean, president of the court of cassation, and other persons whom they held as hostages. In order to execute their incendiary designs on a grand scale, they ignited petroleum, gunpowder, and other explosive materials in many parts of the city. Delescluze was killed while fighting in the street on the 26th of May. The civil war ended on the 27th, when M. Thiers issued a bulletin stating that 25,000 Communists had been taken prisoners. Large numbers of these were put to death, and several thousand were punished with deportation. The ringleaders of the Commune who survived the battles were mostly arrested and executed. "The Commune," says the "Edinburgh Review" for July, 1871, "has been supremely arbitrary and supremely stupid. In the name of liberty it destroyed every condition of freedom; in the name of the common interests of the city, it reduced that city to the depth of ruin, drove away the wealthier classes, and pauperized the lower. . . . As a means of government the secret committee of the Commune was odious and contemptible, but as an engine of social war it was terrific, for in the frenzy of despair it let loose all the powers of destruction. We shall not attempt to describe in detail the appalling spectacle of Paris as it appeared in the month of May in this year, an awful prelude to the most tremendous catastrophe in the history of man."

The Commune of Paris took a prominent part in the revolution of 1790. After it was constituted by the law of May 21, 1790, it was a political power in the capital which proved itself superior to the lawful authority of the Assembly and the nation. It was in the Commune and the Jacobin Club that the real authors of the excesses of the revolution had established their stronghold. From this arsenal of crime came forth the conspiracies and seditious movements which overturned the throne and stained the revolution with the bloody outrage of the 10th of Aug., 1792, and the massacre of September. (See SEMPRONIUS, "Histoire de la Commune de Paris," 5th ed. 1871; BEAUMONT-VASSEY, "Histoire Authentique de la Commune de Paris," 1871; "Guerre de Communeaux de Paris, 18 Mars–18 Mai," 1871," 1871; MORIAC, "Paris sous la Commune," 2d ed. 1871.)

WILLIAM JACOBS.

Communica'tio Idiom'atum ("conjoint possession of attributes"), the name marking the doctrine that the One person of Christ has conjoint possession of the attributes of the two natures—that the attributes of the two natures are so held together in the One person as *in it* to have fellowship with each other; the person which conjoins the nature conjoins their attributes in itself. The two natures are inseparable, both actively and passively. What is proper to either nature in the abstract belongs to Christ in the concrete; and what the divine, which is the assuming nature, has in itself, the human, which is the assumed nature, has in and through its personal conjunction with the divine. (See KRAUTH'S "Conservative Reformation," 476–481.)

PROF. C. P. KRAUTH.

Communion Service. See EUCHARIST, by PRES. F. A. P. BARNARD, S. T. D., LL.D., L. H. D.

Commu'nipaw, a station in Jersey City, N. J., on the Central R. R. of New Jersey. Communipaw had a famous abattoir or slaughter-house, which supplied great quantities of meat for the New York markets. It was closed in 1874.

Com'munism, the theory which teaches that property should be held in common—a theory which Plato advocates in his "Republic," and which was probably practised before his time by the followers of Pythagoras. In later times the Neo-Platonist Plotinus attempted to establish community of goods upon the plan which had been proposed by Plato. Among the Jews the Essenes and Therapeutæ practised a sort of communism. The first Christian church at Jerusalem for a time made no distinction of property; and, following their example, certain monastic and semi-monastic organizations had their possessions in common. Booddhism and other Oriental religious systems have for ages had followers who have practised a rude communism. In Europe there were numerous mediæval sects of heretics (Catharists, Brethren of the Free Spirit, etc.) who advocated some practice of the kind. Later came the Anabaptists of Münster, the Libertines of Switzerland, the Familists of England. Still later we find the Herrnhuters, the Shakers, the Harmonists, the Buchanites, and numerous other religious communists—some practically successful, and others not. Bacon, More, and other English theorists long ago wrote treatises which looked towards the ultimate establishment of communism, but Robert Owen was the first great advocate of the doctrine in that country. The first French Revolution brought forward a number of communistic theories, but none survived long. In later times, Saint-Simon, Fourier, Louis Blanc, Proudhon, Cabet, and Considérant have been representative French communists. Karl Marx is the best-known German representative of these ideas. It is remarkable that the most successful communistic experiments of modern times have been organized and conducted by those who are inspired by strong religious notions, like the Shakers, Oneida Communists, and Harmonists. The teachings of the great communists of the present century have, however, not been without value, since the highly successful co-operative movements of Europe have been in part guided by the best thought and truest philanthropy of the better class of communistic writers. (See CO-OPERATION, by THOMAS HUGHES, M. P.)

Commute [from the Lat. *com* (for *con*), "with," and *muto*, to "change," literally to "exchange one thing for another"], in law, to exchange one penalty for another, usually less severe. A sentence of death is often commuted into a long imprisonment. Also, to receive one thing for another; thus officers in the army are allowed so many rations each; these they commute for cash.

Comne'nus [Gr. Κομνηνός], the name of a Byzantine family of Italian origin, from which descended six emperors of the East and all the emperors of Trebizond. (See ALEXIS I., ANDRONICUS I., ISAAC I., MANUEL I., and ANNA COMNENA.)

Co'mo, a province of Italy, bounded on the N. by Switzerland and Sondrio, on the W. by Novaro, on the S. by Milan, on the E. by Bérgamo and Sondrio. Area, 1049 square miles. It consists of the territory about Lake Como and the eastern part of Lake Lugano, and reaches westward to Lago Maggiore. This province contains several magnificent regions; the finest of them is the tract called Brianza, lying between Monza and the two southern branches of Lake Como, which is as much as 25 miles long and from 1 to 3 miles broad, and watered by the Adda. The province produces much silk and wine. The principal industry is the rearing of silk-worms. Pop. in 1871, 480,339.

Como (anc. *Comum*), a city of Italy, in Lombardy, capital of a province of the same name, is at the south-western extremity of the Lake of Como, 24 miles N. of Milan, with which it is connected by a railway. It is beautifully situated in a valley enclosed by verdant hills, covered with gardens and groves of orange and olive trees. On a hill overlooking the town are the ruins of the Castle Baradello, which was destroyed by Frederick Barbarossa. It has a fine cathedral founded in 1396, by the side of which is a clock-tower built in 1463. Here are also an ancient town-hall, a public library, a museum, theatre, and botanic garden. Here are manufactures of cotton yarn, silk and woollen fabrics, and soap. It has a trade by the lake with Ticino and Germany. Pop. in 1872, 24,350. *Comum* was an important town under the Romans. Pliny the Younger and Volta were natives of this place.

Como, Lake [It. *Lago di Como;* anc. *Larius Lacus*], a lake of Italy, in Lombardy, is an expansion of the river Adda, which enters it at the foot of the Lepontine and Rhetian Alps, and issues from the south-eastern extremity of the lake. It is divided into two branches, one of which, extending south-westward, is called the Lake of Lecco. It is 698 feet above the sea, and about 35 miles from Como to the northern end, and is nearly 3 miles wide. Its greatest depth is 1925 feet, the superficial extent 62 square miles. It is celebrated for the beautiful scenery of its shores, covered with elegant villas. Numerous steamboats ply on this water.

Comonfort' (IGNACIO), a Mexican general and president, born at Puebla Mar. 12, 1812. He was chosen a member of Congress in 1842, and senator nearly six years later. He co-operated with Alvarez against Santa Anna in 1854, and became provisional president on the resignation of Alvarez Dec., 1855. The clergy and conservatives raised an unsuccessful revolt against Comonfort, who in 1856 issued a decree to confiscate the property of the Church. He was proclaimed constitutional president Dec., 1857, but his power was rendered only nominal by the enmity of the clergy and the disaffection of the army. He was driven into exile Jan., 1858. In 1863 he commanded a republican army against the French invaders. He was killed by bandits Nov. 13, 1863.

Comorn, a county of Hungary, is bounded on the N. by the counties of Presburg and Bars, on the E. by Gran, on the S. by Stuhlweissenburg, and on the W. by Raab. Area, 1146 square miles. It is divided into nearly equal

parts by the Danube, besides which it is also traversed by the Waag River. In the N. it is level, but in the S. mountainous. The country at the entrance of the Waag into the Danube consists of large swamps. The soil is generally fertile and well cultivated; sheep-raising is extensively pursued. Chief town, Comorn. Pop. in 1869, 143,090.

Co′morn, a fortified town of Hungary, capital of the above county, is on the left bank of the Danube, at the mouth of the river Waag, 46 miles W. N. W. of Pesth, on the Great Schütt Island at its eastern extremity. The streets are narrow and irregular. The Danube is here crossed by a bridge of boats. The fortress of Comorn, originally built by Matthew Corvinus, is considered one of the strongest in Europe, and requires for its defence 15,000 men. Comorn has eight churches and two theatres; also manufactures of woollen cloth and leather, a trade in wine, grain, wood, and fish, and coal-mines in the vicinity. It was besieged and bombarded by the Austrians in 1848 and 1849 without success, but finally capitulated of its own choice, Sept. 27, 1849. Pop. in 1869, 12,688.

Com′oro Isles, a group of four volcanic islands in the Mozambique Channel, between Africa and Madagascar. They are mountainous, and the highest peaks rise about 6000 feet above the sea. The inhabitants are upright and well-mannered. They are of mixed Arab and negro blood. Area, 1050 square miles. The soil is fertile. The prolific tropical vegetation includes the cocoa and areca palms, excellent rice and maize, yams, bananas, mangos, pineapples, oranges, lemons, cotton, wild indigo, and sugar-cane. Excellent wood for shipbuilding is found. The principal exports are palm oil and tortoise-shells. The greater part of the people are Mohammedans, but fetishism is practised among them. They support themselves mostly by tillage; there are among them skilful cutlers, weavers, and jewellers. Three of the islands have each their own sultan. The rule of the rest is exercised by numerous elective chiefs. Mayotte, one of these islands, is a French colony. The island of Johanna is celebrated for its beauty. Pop. about 49,000.

Compans (Jean Dominique), Count, a French general, born at Saliès, in Haute Garonne, June 26, 1759. He served in the armies of the Alps and of Italy; and in 1799 at the head of a division of the Army of the Alps, then commanded by Grenier, he raised the siege of Coni, took Fossano and Savigliano, and reopened communications between the right and left divisions of the French army; he thus relieved a portion which was hemmed up by the Austrians and was suffering fearful hardships, shoeless and half naked among the Alpine snows, and depending upon wild herbs for nourishment. He served afterwards in Italy, which had been reopened to the French arms by the battle of Marengo; and the assaults of Mincio, Montebello, and Villafranca witnessed his bravery. After the peace of Lunéville, Compans was made commandant of the province of Cuneo. Falling at one time into the hands of brigands, who then swarmed in the country, he thought himself lost, until one of the band approached and addressed him: "Have no fear, general; we have not forgotten how in war-times you protected our wives and children and preserved our dwellings." In the Prussian campaign Compans was raised to the rank of general of division. He was created a count of the empire in 1808. He served with distinction through the Russian campaign, took up arms again in the Hundred Days, and was taken prisoner at Waterloo. Died Nov. 10, 1845.

Company. See Joint-Stock Company and Partnership, by Prof. T. W. Dwight, LL.D.

Com′pany [Fr. *compagnie*], in an army, is a body of men commanded by a captain, and forming an aliquot part of a regiment or battalion of infantry. A full company consists of about one hundred men. In the British service a regiment of infantry generally comprises ten or twelve companies. The captain of each company is assisted by two subaltern officers, the lieutenant and ensign. A regiment of cavalry is divided into troops instead of companies. In the U. S. army each of the three arms of the service is divided into companies. Each battalion of infantry is divided into ten companies, and each company has a captain and two lieutenants. The cavalry companies are often known as troops, while the artillery company is more properly a battery. The U. S. marine corps also has its companies.

Company Shops, a thriving post-village of Alamance co., N. C., 2 miles W. of Graham, on the North Carolina R. R., is the site of the repair and construction shops and the general offices of the Richmond and Danville R. R.

Comparative Anatomy, the science of the structural constitution of animals; so called because it is based upon the comparison of the anatomy of different animals.

I. Primary Elements.

Animal bodies either consist of homogeneous substance, or of that substance disposed in tissues. Tissues, in the vast majority of cases, are made up into organs, the simplest forms of which are the sac, the tube, and the segment. By multiplication and modification of these elements, organs become complex. The simplest expression of tissue is, on the other hand, the nucleated cell, and all tissues are made of multiplied and modified cells, with the addition of unorganized or homogeneous substance.

This substance, whether homogeneous or exhibiting structure, is chemically identical throughout the animal kingdom, and constitutes the living part of plants. It belongs to the class of protein compounds, and is called gelatin, albumen, fibrin, etc., or, regarded structurally, protoplasm. Its composition is $C_{24}H_{17}N_3O_8$, with very small amounts of sulphur and phosphorus added under some circumstances. It is therefore a nitryl of cellulose—*i. e.*, $C_{24}H_{20}O_{20} + 3NH_3$.

According to the latest investigations, the cell is not usually a hollow body, but consists of a superficial layer, which represents the wall (but which may be of considerable thickness), and a central body which fills it, which is called the nucleus. This nucleus may contain another visibly distinct body, or nucleolus. The essential difference between the nucleus and the wall consists in the fact that the former alone is capable of direct nutrition from the blood, while the wall is derived from it by additions on its inner surface. All growth originates in the nucleus; that is, all cell-division or discharge of homogeneous protoplasm has its origin there. Hence it has been called the germinal matter, while the wall is termed formed matter. Formed matter exhibits the active functions of life other than growth. Thus it contracts, as in muscular tissue, or is irritable and conductive of force, as in nerves. It constitutes the primary substance of secretions, by its breaking down and mingling with special compounds brought by the blood. It may then be concluded that the formed protoplasm or wall converts heat, etc. into motion, chemism, etc., while the germinal matter converts heat into growth-force.

II. Tissues.

Tissues are naturally arranged, according to their structure, into four groups—viz., connective tissue, tissue of independent cells, nerve-tissue, and muscular tissue. The connective tissue consists of cells, frequently presenting narrow prolongations, which are separated by formed substance of various character, but always either gelatinous or solid. It includes the supporting and connecting tissues of the body, as the osseous, cartilaginous, connective, etc., as well as those of less consistence, as the vitreous humor of the eye, adipose tissue, etc. The tissues of independent cells include those floating in fluids, as blood- and lymph-corpuscles, with those which are stationary, but not bound together by connective substance, as the epithelium. The muscular tissue consists of elongate cells, which are massed together in longitudinal bundles or fibrillæ, without the intervention of non-cellular substance. The nervous tissue consists of isolated cells surrounded by formed matter, which terminate in tubular prolongations or nervous fibres which extend throughout the body. These cells are of delicate texture, and are separated by the equally soft altered cell-contents.

The *connective tissue* (figs. 1 and 2) is composed in the lower animals more exclusively of cells than in the higher. The formed matter exterior to the nucleus of the cells assumes various forms. In the gelatinous tissues (which are most abundant in young animals) this substance is relatively large in quantity and thin in consistence. In the more numerous forms the latter assumes a fibrous character, and consists of bands of fibres, with the cells scattered at intervals. In the upper layer of the true skin the cells assume a radiate form, and contain the coloring pigment (fig. 3) which is generally characteristic of the animal. These cells may contract under nervous influence, so as to obliterate the color, as in many fishes. In

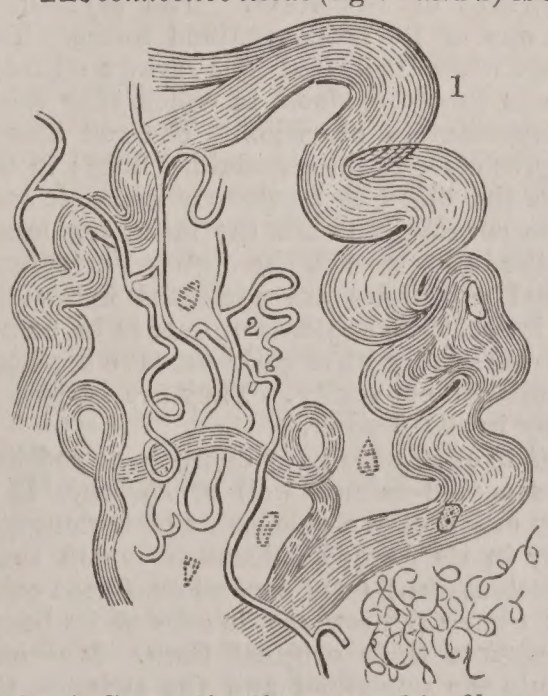


Fig. 1. Connective tissue: 1, white fibrous element; 2, yellow fibrous element.

many of these they are expanded only at certain seasons of the year; in the squids (*Loligo*) they pulsate during life, and produce great changes in the appearance of the skin. In many batrachians and reptiles one color may be rapidly substituted for another, as in the tree-frog, chamæleon, etc. Here there is more than one stratum of pigment-cells, each containing a peculiar color. Under nerve influence the inferior cells may expand while the superficial contract, and, penetrating between the latter, give color to the whole surface of the skin. Cartilage (fig. 4) differs from other forms in the large quantity of formed matter which is discharged from the germinal centres or nuclei, and which separates the latter widely. It is but slightly fibrous in typical cartilage, but in fibro-cartilage highly so. In elastic tissue certain bands of fibres agglomerate and harden, and become elastic through the addition of toughness to the original qualities. By hardening in extended layers, connective

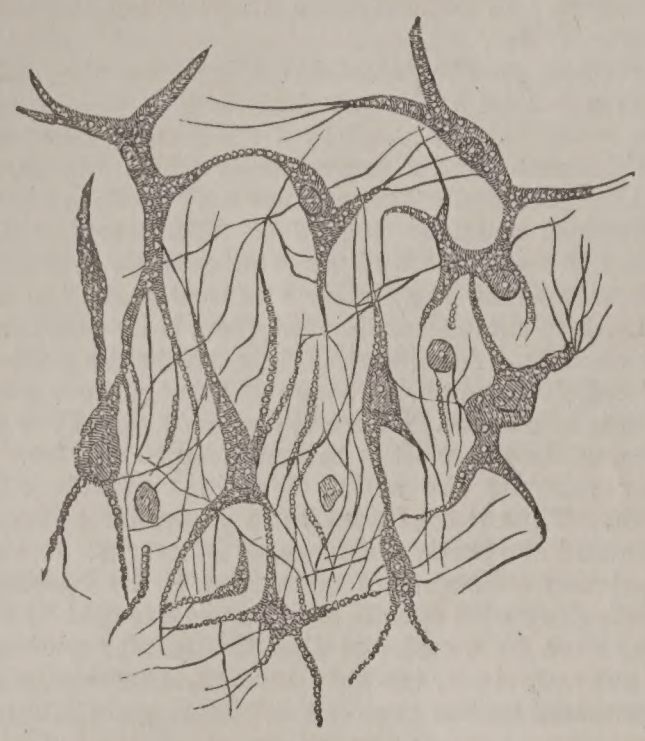


FIG. 2. Connective tissue, partially developed.

tissues form basement membranes, or those supporting glandular structures. Osseous tissue (fig. 5) is developed either in typical connective tissue, skin, or cartilage, but usually in the latter. It consists of a deposit of phosphate of lime in the formed intercellular substance by the minute capillaries which traverse it. It is generally concentric to the cells.

The connective tissue is the medium for transmission of the blood-vessels in most regions of the body.

The *tissues of independent cells* are various in situation and function. As epithelium it covers the surfaces of the cavities of the body, as well as its exterior. Its cells are packed together, forming a stratum which may be depressed and hardened, as the epidermis or outer skin, or soft and of little consistency, as inside of the mouth. The cells are flat or cylindric, and in some situations furnished with movable cilia. The columnar epithelium (fig. 6) is only found in the mucous membrane; the spheroidal exists as the lining of the urinary and perspiratory vessels and ducts; the ciliated (fig. 7) belongs to the air-passages, the conjunctiva of the eye, and the lining of the ventricles of the brain. The crystalline lens of the eye is one of its most modified forms. The lymph-corpuscles are white nucleated cells thrown off from the lymphatic glands into the blood, in which they float. They are highly important in nutrition. The red blood-corpuscles (fig. 8) give color to the circulatory fluid; in the invertebrates, where the blood is frequently white, it contains only the white corpuscles, while the latter are much more numerous in the lower than in the higher Vertebrata. In this class the red corpuscles are nucleated below the Mammalia; in the latter, their contents appear to be homogeneous. They are disk-like, with slightly concave surfaces, sometimes with a median convexity. They are largest in Batrachia, especially in the *Proteus*.

The *muscular cell* is of a peculiarly elongate or rod-like form, and possesses a well-defined wall or sheath. It is composed originally either of a single cell, which elongates with growth, chiefly in its formed substance (but in some measure with its nucleus also), or of several confluent cells. In the fresh water *Hydra* the contractile cells of its body-walls and arms preserve their original form. Muscular cells are divided into the unstriped and the striped—the former having homogeneous formed matter; the latter exhibiting transverse divisions (figs. 9 and 10), which produce the appearance of a series of disks. Muscles terminate in tendons, which present a form of connective tissue, the nuclei being few and the formed substance fibrous, and very dense and hard.

The *nerve-cells* (fig. 11) are found in nervous centres—*i. e.*, brain and spinal cord—and in ganglia. They form, with the intervening substance, the gray nerve-matter. The white matter and the nerves proper are composed of nervous fibres or tubes. The nerve-cell has to various observers presented a greater complexity of structure than other cells. In some, fibrous layers in the wall and covering the nucleus have been observed, the external layer being continuous with the external walls of the nerves. Others describe tubular vacuities in the nucleus. Nerves consist of more or less granular formed protoplasm, surrounded by a sheath or neurilemma, and containing nuclei. Many nerves exhibit thick walls, while in others, especially the sympathetic, the nerve-walls are extremely thin.

III. Organs and Systems.

Tissues arranged and united in forms, so as to be usable for vital processes, form organs. All organs not constructed of cells alone are composed of elementary parts, which may be regarded as repetitions of the sac, the tube, or the segment, no matter how complex they may be. The organs are classified into systems by their structural connection with one another, which of course signifies functional association for some common vital process. The systems are as follows:

1. *Cellular Systems*—The nervous, the muscular, the mucodermal.
2. *Sac and Tube Systems*—The digestive, the circulatory, the respiratory, the urogenital.
3. *Segment System*—The skeletal.

The nervous system consists of central bodies or ganglia, and nerves which extend from them to the periphery of the body. The structure presents much variation among the several groups of animals. The muscular is composed of muscles and the tendons by which they are attached to the part of the skeleton to be moved by them. The muscles are composed of innumerable fibrillæ enclosed in a common sheath. The bundles in invertebrate animals are smaller, till in some of the lowest they are composed of but few fibrillæ. Unstriped fibres prevail in invertebrate animals, excepting the Arthropoda, where the muscles are striped. The fibres in vertebrates are striped, excepting in involuntary muscles, where they are unstriped, save only in the heart. In invertebrates they may have thick sheaths, and the contents are frequently granular. In most Arthropoda the central part of the striped fibrillæ retains the original cell-nuclei in one or more columns. The mucodermal system covers the body externally, and as mucous membrane enters and lines all the cavities that communicate with the open air; as serous membrane it lines the closed cavities. In animals no system presents greater varieties of exterior structure. In invertebrates it is sometimes hardened by segments produced by a deposit of lime, which resemble bone (sea-urchin), or form a more elastic substance, chitin (Arthropoda). In vertebrates it may support osseous pieces of various forms (scales), or hairs, or feathers, which are simply enlarged hairs finely branched. Finally, as horn it appears as nails, claws, and horn-sheaths; these are simply thickened epidermis.

The digestive system is a tube usually open at both extremities. Portions of its course are enlarged into stomach, large intestine, etc., while glandular bodies are distributed along it from one end to the other, and pour their contents into it. These glands are formed of sacs, in a few cases simple (fig. 12) (gastric glands of stomach), in others simply forked, but usually many times divided and subdivided, forming masses of lobules. Some of these bodies are almost universal in the animal kingdom. Thus, it is usual to find one or more situated near the cavity of the mouth (fig. 13), which secretes a fluid to aid in deglutition; another, most frequently met with, discharges its secretion into the alimentary canal just beyond the stomach. This is the liver and its representatives. The walls of the canal are supplied with several layers of muscular tissue in the vertebrates, and in a less complex form in lower animals.

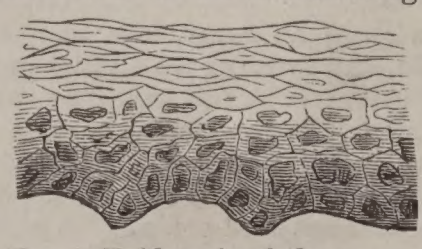


FIG. 3. Epidermis of the negro.

The circulatory system consists of tubes for the conduct of the results of digestion throughout the body; it originates from branches of the digestive canal in the lowest types (Medusæ), but becomes highly specialized, so that communication with that system is had by endosmosis only. It early acquires a specially muscular enlargement, which pulsates. This organ becomes more specialized, isolated, and divided, and is known as the heart. The arteries (which take blood from it) are muscular throughout their length. The veins are not so, but are distinguished by the presence of valves in the higher animals.

The respiratory system consists of a series of tubes which carry air through the body; in some animals (snails, spiders) these are blind, forming pulmonary sacs, on which capillary arteries are distributed. In animals inhabiting the water this system is little or not at all developed, it being replaced by branchiæ or gills. In vertebrates it does not exist, but large sacs, connected by tubes with the digestive system, answer the same functional purpose, except among fishes, where it is used as a float. Gills aërate the blood in this class.

The urogenital system consists of tubes, sacs, and glandular and cellular bodies, which are connected with the outer air at the posterior end of most animals, and are usually blind at their termini. Their exit is usually common to the alimentary canal, and is called cloaca. These organs exhibit usually bilateral symmetry, the opposite sides having distinct exits, except among females of some of the higher animals, where the discharge tubes unite and form a chamber called the uterus. The tubes are termed oviducts (or tubæ Fallopii), and terminate in a fibrous and cellular body, the ovary. In its circumference appear cells, which grow, and after discharge are modified into the embryo. Originally, the embryo-cells of low animals grow into adults by a simple vegetative process, but in higher forms a stimulus to such growth is required from the other or male sex. In this sex the ovaries produce, by a form of secretion, independent cells, each of which bears a long cilia or lash (*spermatozoöids*), and being modified in structure are properly termed testes. The efferent tube is called the vas deferens. These only unite near their point of exit. The urinary system is present in the vertebrates only. Tubes connect it with the reproductive canals near their termini. These are derived from paired glandular bodies, the kidneys, and usually unite into a common reservoir before exit—*i. e.*, the urinary bladder. The object is the removal of uric acid, etc. from the blood.

The skeletal system exists only in vertebrates. It constitutes the solid framework of the body, and is axial or internal. It is composed of cartilaginous and osseous tissue. It is composed of segments, which possess a solid centrepiece and two opposite arches attached to it—one superior, the other inferior. It thus forms two tubes connected by a solid axis. The upper protects the nervous—the lower, the nutritive organs. Each segment is divisible into subsegments, which are originally separate. These are much modified in form at the anterior extremity of the body—above, to contain the brain; below, to aid the sense of hearing, to prepare food for digestion, etc. Appendages to inferior segments are seen in limbs, which are the supports of the body and resistant elements in motion. They are also composed of segments arranged in lines or radii.

IV. Classification of Animals.

All known animals are referable to seven "branches" or primary types. Four plans of structure cover these, without expressing their intimate or essential structure. The four are the *radiated* (Cœlenterata and Echinodermata); the *longitudinally-jointed*, with external and ring-shaped skeleton (Vermes and Arthropoda); the *bag-shaped* (Mollusca and some Protozoa); and the *vertebrated*, whose essential character is mentioned above under the skeleton of the Vertebrata. The characters may now be given in more detail.

Branch I., Protozoa.—Low animals, composed of single or aggregated solid cells or protoplasmic masses, without blood or nerves. When symmetrical, bilateral or radiate.

Branch II., Cœlenterata.—Hollow animals, without special digestive organs, or with a sac-like stomach opening into the common cavity. Circulatory system wanting or represented by branches from the digestive cavity. No nervous system. The form is radial and bilateral, or radial only.

Branch III., Echinodermata.—Digestive system independent of the body-walls, not filling the cavity; the circulatory system present, largely isolated; a water-circulatory system; nervous system an œsophageal ring, with radii; skin with hard protective bodies. Form bilateral and radial.

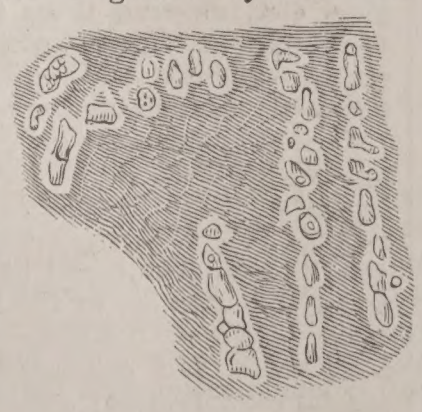


Fig. 4. Cartilage cells.

Branch IV., Vermes.—Digestive system isolated, not occupying the body cavity; circulatory system incomplete or wanting; nervous system an œsophageal ring, with ganglia, or consisting of the chief ganglia only. No jointed limbs; body elongate. In development the alimentary canal is excavated in the embryo.

Branch V., Mollusca.—Alimentary canal complete, isolated; circulatory system incomplete at the distal extremities; nervous system with ring round œsophagus, which bears a ganglion above and one below; a third ganglion inferiorly placed, connected by a ring with the former. Form sac-like. Intestines excavated from yolk of egg, not formed by a fold.

Branch VI., Arthropoda.—Digestive system complete; circulatory with complete central organ, but open extremities; nervous system with œsophageal ring and ganglia, and generally an axis on the inferior surface of body, with ganglia at intervals. Skin hardened into a chitinous, jointed skeleton, which is furnished with jointed legs. Form bilateral. Intestines formed by excavation of yolk, not by infolding of membrane.

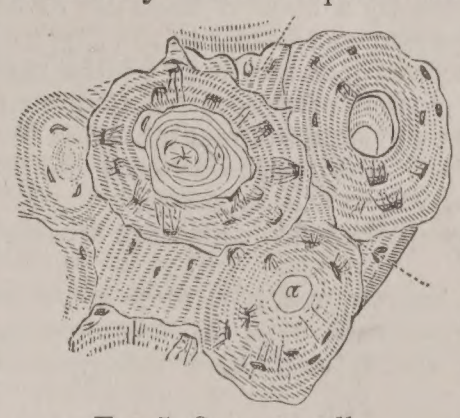


Fig. 5. Osseous cells.

Branch VII., Vertebrata.—Alimentary system complete; respiratory, a branch from it; circulatory, with complete circuit; nervous, of a longitudinal ganglionic axis on the upper side (spinal cord), with usually ganglionic bodies at one end (brain). An internal bony or cartilaginous skeleton, consisting of solid axis; superior tube for nervous and inferior for other systems. Form bilateral. Digestive tubes formed by the infolding of a membrane formed on the yolk.

A few years ago the number of species of animals known was stated to be 500,000, of which 400,000 were Arthropoda; of the remainder, 25,000 were Vertebrata.

The classes of animals number thirty-six, distributed and defined as follows:

Protozoa—*Rhizopoda.*—Bodies of homogeneous protoplasm, which throws out threads or arms of the same substance, which are elastically retractile. No internal organization; often a silicious covering, which is perforated. (Fig. 14.)

Spongiæ.—Unicellular animals (fig. 15), in which the cells are frequently associated in large numbers on axes of a horny, calcareous, or silicious nature, forming branched masses. These are penetrated by canals.

Infusoria.—Body with wall distinguished from contents, with mouth and often anus; often a contractile vesicle and ovarian nucleus. Surface frequently ciliated. (Fig. 16.)

Cœlenterata—*Hydrozoa.*—The cavity of the body the only digestive system; skin distinct; form radiate only. (Fig. 17.)

Medusæ (jelly-fish).—Digestive system an open sac communicating with the body cavity, from which canals radiate as isolated grooves. Eight series of swimming-lobes on the surface. Form bilateral. (Fig. 18.)

Anthozoa (corals, etc.).—Digestive system the body-cavity and an appended open sac, the former divided round the walls by vertical septa into grooves, which continue into tubular tentacles. Septa and skin often filled with deposit of carbonate of lime. (Fig. 19.)

Echinodermata—*Crinoidea.*—Body cup-shaped, the surface covered with mineralized plates, which are solidly united, but wanting on a part next the stomach; arms present, formed of articulating segments. (Fig. 22.)

Asterida.—Body depressed, star-shaped, covered with calcareous plates, which are wanting on a part of the dorsal surface, and which articulate with each other in clusters (star-fishes). (Fig. 20.)

Echinida.—Body discoidal or globular, surface covered with calcareous plates, which are immovably united together; no arms (sea-urchins). (Fig. 21.)

Holothurida.—Body elongated, cylindric, covered with soft skin; a calcareous ring round œsophagus; mouth surrounded by tentacles (trepangs). (Fig. 23.)

Vermes—*Gephyrea.*—Body cylindric, not jointed, alimentary canal complete in the hollow body; a nervous system, an œsophageal ring and abdominal axis.

Rotatoria.—Alimentary canal developed in the hollow body; ciliated disks or wheel-organs for movement; a water-circulatory system.

Cestoda.—Body jointed, nearly solid, without digestive system; head with suckers and hooks; a water-circulatory system (tape-worm).

Trematoda.—Body not jointed, solid except in the developed digestive tubes, and water-circulatory system; head with suckers and hooks (flukes).

Acanthocephala.—Body hollow, not jointed, cylindric, without digestive canal; head with a hook-bearing proboscis.

Nematoda.—Body hollow, unjointed; digestive canal well developed.

Turbellaria.—Body unjointed, flat, solid, except in the

developed digestive canals; nervous system of two supra-œsophageal ganglia; surface covered with cilia.

Annelida.—Body hollow, segmented, with well-developed digestive canal and nervous system; the latter an œsophageal ring and abdominal ganglion chain; a system of respiratory tubes (earth-worms, etc.). (Fig. 23.)

Mollusca—*Bryozoa.*—Head, tongue, and foot wanting; a shell-producing mantle enclosing the hinder portion of the body; mouth surrounded by a crest of tentacles as respiratory organs. Nervous system rudimental. (Fig. 24.)

Tunicata.—Head, tongue, and foot wanting; a large bag-like mantle, which bears a shell of connective tissue, enclosing saclike gills. Nervous system rudimental. (Fig. 25.)

Brachiopoda.—Head, foot, and tongue absent; mantle large, bearing large shells, which are dorsal and ventral; branchiæ supported on two spiral arms, which are attached to the shell. (Fig. 26.)

Acephala.—Head and tongue wanting, foot anterior; mantle covering the body on each side, and enclosing laminiform branchiæ; two shells, right and left (mussel, clam). (Fig. 27.)

Gasteropoda.—Head, tongue, and foot present, the latter extending posteriorly; mantle small, posterior; gills comb-like on the back. Shell, when present, single, spiral (conch, snail). (Fig. 28.)

Pteropoda.—Head, tongue, and foot, the latter developed into two lateral fins; mantle covering the hinder part of body; gills comb-like on the back. (Fig. 29.)

Cephalopoda.—Head and tongue present; foot divided into arms, which radiate from the mouth as a centre; posterior part of body enclosed in a mantle; gills on back; cartilages behind eyes, and ganglia in head (cuttle-fish). (Fig. 30.)

Arthropoda—*Crustacea.*—Two pairs of antennæ; post-abdomen developed; limbs on all segments of the body, those of the thorax converted into mouth-organs; respiratory organs, gills or wanting (shrimp, crab). (Fig. 31.)

Arachnida.—No antennæ nor anterior cephalic segments; the last pair of cephalic limbs of the form of legs; three additional pairs on the thorax; head and thorax united into a cephalothorax, abdomen and developed post-abdomen without legs; respiration by tracheæ or sacs (spider, scorpion).

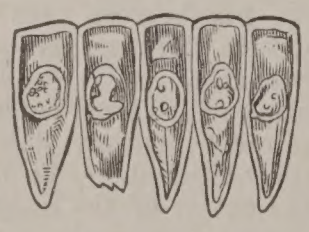


Fig. 6. Columnar epithelium from the intestine of the rabbit.

Fig. 7. Ciliated epithelium from the membranes of the human nose.

Myriopoda.—One pair of antennæ; a part of the thoracic limbs used as mouth-organs; abdomen not distinguished, many-jointed, furnished with limbs throughout; post-abdomen rudimentary; respiration by means of tracheæ (centipedes).

Insecta.—One pair of antennæ; abdomen without limbs, post-abdomen rudimentary; three pairs of limbs on the thorax; respiration by means of tracheæ; usually two pairs of wings (insects). (Fig. 32.)

Vertebrata—*Leptocardii.*—Cranium membranous, without mandibular arch, no brain; heart with one chamber; five aorta-roots (lancelet).

Dermopteri.—Cranium and skeleton cartilaginous; no mandibular arch; heart with two chambers; five aorta-roots (lamprey).

Pisces.—Cranium and skeleton osseous or cartilaginous, or both, with under jaw composed in part of malleus, and supported by incus and stapes, as hyo-mandibular bone, etc. Limbs with many segments in contact with scapula without intervening humerus; pelvis mostly wanting. Brain well developed; optic lobes generally larger; cerebellum distinct; two chambers of the heart; five aorta-roots on each side. A parasphenoid bone (shark, sturgeon, sucker, perch).

Batrachia.—Skeleton osseous; cranium with parasphenoid, no basi-occipitals; under jaw embracing malleus, and supported by a single "quadrate" bone, "the incus;" limbs with humerus and few radii; pelvis present; brain with cerebral hemispheres largest, and small cerebellum. Three chambers to the heart; four or three aorta-roots; a coracoid bone (salamander, frog).

Reptilia.—Skeleton osseous, with coracoid bone and mandible, latter with malleus, and supported by incus; no parasphenoid, but a basi-occipital; brain with large cerebral hemispheres; two or one aorta-roots; two aorta-bows; heart with three or four chambers; metatarsal bones distinct; limbs with few radii; a humerus and pelvis.

Aves.—Skeleton osseous, with coracoid bone and mandible, which includes malleus, and is supported by single incus; a basi-occipital, no parasphenoid; metatarsal and tarsal bones united; humerus and pelvis present: optic lobes lateral, small; four chambers to the heart; one aorta-root and bow, turning to the right (birds).

Mammalia.—Skeleton osseous, without coracoid bone; with the stapes, incus, and malleus withdrawn into the ear, and simple, mandible sessile on the squamosal bone; cranial axis behind the basi-occipital; limbs ambulatory, with distinct tarsal and usually metatarsal bones; optic lobes inferior; cerebral hemispheres very large; one aorta-root and bow, turning to the left; heart with four chambers.

The preceding descriptions express a few of the structural peculiarities of the animals included in the respective divisions—*i. e.*, such as are common to those of each, and by which they may be distinguished from each other. But the innumerable characters found in the subordinate or contained divisions and species of each remain to be considered.

V. The Nervous System.

1. *In Invertebrates.*—In Protozoa, and perhaps Cœlenterata, where the nervous system has not been certainly discovered, spontaneous movements in the taking of food and moving from place to place are readily observed. It is therefore evident that the contractibility of their protoplasmic walls is under the direction of stimuli which do not require nerves for their conduction or direction. The nervous system of higher animals must therefore be looked upon as designed for the specialization or location of movements—a capacity entirely necessary to the activity of special mental powers. These demand particular movements for special objects; hence the necessity of concentrating the directors of movements in particular parts—*i. e.*, nerves, muscles, etc.

In the Bryozoa, the lowest mollusks, there is not certainly known to be an œsophageal ring, but there is a considerable ganglion above the gullet, which sends nervous threads around the horse-shoe respiratory crest. One of these extends on each side at the base of the processes, but, though they approach, they are not known to unite on the inside of the arc. In Tunicata in like manner a single ganglion exists above the œsophagus, between it and the vent, and sends out nerves in a radiating manner. These are distributed to the orifices of the body and to the muscles. In Brachiopoda the system is more highly developed, there being a complete œsophageal ring, with a broad band-shaped ganglion on the inferior side. The latter represents two united ganglia, and gives off on each side a strong nervous trunk. These trunks turn forward and outward, and soon divide, the weaker branch going to the spiral respiratory arms, representing that above described in the Bryozoa. The stronger branch goes to the muscles that close the shells, to the mantle, etc. Each one forms a ring in the former locality, which gives off small threads. In Acephala (called also Lamellibranchs or bivalves) the ganglia are transparent, yellowish, orange, or rosy, containing fat cells, as well as the nervous. There are three well-separated pairs of ganglia, the ganglia of each pair connected by a commissure. The anterior pair is near the mouth; they are rarely close together (*Venus, Mactra*) or united (*Mesodesma, Teredo*); they give off on each side a nervous thread which extends to the foot, and is connected with the foot-ganglion pair. These are wanting in the oyster and other genera which want the foot. This forms an open œsophageal ring. The nerves of the foot are derived from the ganglion, but none of the intestinal nerves. These are derived from the third pair of ganglia, which are the most posterior, and which are connected with the front pair by a nervous stem on each side, forming a second ring round the digestive axis. It sends nerves to the mantle, gills, etc., meeting those from the anterior ganglia. In *Ostrea, Pinna, Mytilus,* etc. its nerves contribute to form a circuit which extends round the edge of the mantle, connecting with the anterior pair.

In Gasteropoda the ganglia and commissures are homologous with those of the Acephala, but the former are concentrated near the mouth, forming much more contracted rings. The two supra-œsophageal ganglia (or "brain-ganglia") are connected by short commissures. They send down commissures to the foot-ganglia, which are close to the œsophagus; the visceral ganglia or third pair are behind these, and connected with the superior ganglia by special commissures; sometimes they are on the upper side of the œsophagus, and connected by commissure below it. The superior sends nerves to the lips, mouth, tentacles, and eyes; the foot-ganglia to the under side of the œsophagus, to the ear, and the foot; the visceral ganglia to the mantle, gills, heart, intestines, and certain muscles. In the naked

division (Opisthobranchia) the upper ganglia give a special ganglion to the tentacles; the foot-ganglia in like manner are adjoined by a pair for the gills. In *Chiton* all three pairs of ganglia are found on the inferior side of the œsophagus. In *Turbo*, *Littorina*, *Janthina*, *Phasianella*, and *Patella* the superior pair occupies the opposite sides of the gullet. In *Natica* all three are closely massed together. As in other higher Mollusca, a sympathetic nervous system exists which supplies the involuntary organs of the body.

The Pteropoda exhibit the three pairs of ganglia connected by commissure. In the Gymnosomata they are all separate, but in the Thecosomata they are concentrated on the lower side of the œsophagus, so as not to be readily distinguished.

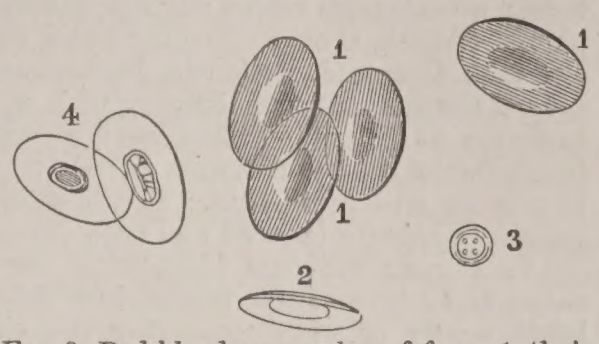


FIG. 8. Red blood-corpuscles of frog: 1, their face; 2, edgewise; 3, lymph-globule; 4, corpuscles changed by acid.

In Cephalopoda this system displays the most concentrated type known among mollusks. In *Nautilus* the ganglia are almost confluent, and form thick bands, one above and two below the œsophagus. The cerebral pair give off each an enormous optic nerve, appropriate to the size of the eyes in this class. The pedal pair supply the tentacles and organ of hearing, and the visceral pair the other organs. The inferior arches rest on the cephalic cartilage which characterizes the Cephalopoda.

The nervous system is in many of the Vermes very imperfectly developed, including the œsophageal ganglia with a few divergent nerves. In the Annelida the most highly developed condition is observed, where each body-segment possesses a ganglion connected by a longitudinal double commissure, which originates from the ring. In the Arthropoda this type is also the basis of the various arrangements observed, and is constantly discoverable in the larvæ of the various forms. As a general rule, it may be understood that where a special organ exists the ganglion of the segment in or on which it is placed is enlarged for its supply, as in the thoracic ganglia of insects. Here several segments are confluent; correspondingly, nervous ganglia unite, forming larger masses, thus supplying the legs and wings. The transition from the simple type found in the larvæ to the modified and concentrated types of the adults has often been observed in tracing the history of the growth and metamorphosis of insects. In the Crustacea and Arachnida the concentration is carried still farther than in insects. Thus in some lower Crustacea there are numerous ganglia, and the lateral commissures of the abdominal axis are only united in front; in the highest division, the Decapoda (crabs, lobsters, etc.), the axis is largely undivided, is short, and the ganglia are massed together. In the scorpions (Pedipalpi) there are but few distinct ganglia, but in the spiders (Aranea) there are no ganglia in the abdomen, and the nervous axis is short, massed together, and undivided. On the other hand, in the lowest Arachnida, the Acaridæ, there is no abdominal axis by defect, and the œsophageal ring is incomplete above, reminding one of the condition of the lowest Mollusca.

2. *In Vertebrates.*—In this branch the nervous system reaches its highest development, though in the lowest form, the Leptocardii, it can hardly be considered to be more perfect functionally than in many Mollusca. Here there is a spinal cord or medulla, but no brain, but in its place a slight enlargement of the diameter of the medulla.

The spinal cord of vertebrates, like the brain, is composed of gray and white nerve-tissue, the gray being the ganglionic or cellular tissue, and the white the fibrous or conducting. Unlike the brain, the spinal medulla possesses the white substance externally, and the gray internally. The cord is divided longitudinally by an anterior and a posterior fissure of some depth, and by two less profound lateral ones. The gray substance exhibits in section a crescentic outline, the horns of the crescent being turned externally and reaching the lateral grooves. Here each horn gives origin to a nervous stem, and the two soon unite and pass out through a foramen between the vertebræ. The posterior bears a ganglion, and is devoted to the function of sensibility or feeling; hence it is termed *sensory*. The anterior is the smaller, and is termed *motor*, as its office is to convey the stimulus which gives origin to muscular movements or contractions. After leaving the spinal column the single stem divides again, each branch containing fibres from both roots. The extremity of the cord is divided into a number of radiating threads, together constituting the cauda equina. In all the Vertebrata, from the Dermopteri to (and including) the Aves, there is an axial tube of small diameter; in Mammalia this is wanting, except a short anterior trace of it. Birds add the peculiarity of a sinus rhomboidalis, which is a long rhomboidal expansion of the tube in the sacral region (rump), which is open superiorly. The spinal nerves in many of the branches form networks by unions and separations opposite the fore and hind legs, which are called the brachial and sacral plexus. The ganglia of the sensory root are in the Batrachia accompanied each by a deposit of white phosphate of lime, forming a rounded mass. In some fishes with a short spinal cord the division of the cauda equina takes place far anteriorly, as in *Diodon* and most other Plectognathi, thus leaving a very short axis.

The anterior part of the column enlarges, and is called the medulla oblongata; as this is within the cranium, it is reckoned as part of the brain. The six columns are here better defined, and there are added two well-defined oval prominences termed the corpora olivæformia between the lateral columns of Mammalia. This contains a corpus dentatum of gray matter. The fibres of the posterior columns cross or decussate; they are, however, only those of the anterior or motor root of the spinal nerves that do so, having passed upward through the column; the fibres of the posterior roots decussate in the gray matter of the cord near their exit, and pass thence into the brain without further exchange. The divergence of the posterior columns leaves a rhomboidal cavity or basin in the superior face of the medulla, which is the fourth ventricle. The roots of the auditory (seventh) nerve originate below its fundus. This chamber is variously exposed in different vertebrates. The postero-lateral columns (corpora restiformia) diverge upward and backward, and support the first great brain ganglion, the cerebellum. In the Elasmobranchi (sharks, etc.) the fourth ventricle is greatly extended laterally, having a lobate outline, with sinuous walls; in other Vertebrata this peculiarity does not exist. In Dermopteri, one division (Hyperotreti) exhibits prominent lateral lobes, which do not open externally; they are wanting in the remainder of the class (Hyperoarti). In many bony fishes there are ganglionic enlargements of the medulla, corresponding to the origin of the nervus vagus; hence vagal lobes. There are numerous lobes on the medulla of the pike. The medulla is straight in most vertebrates, but in Reptilia and birds it is bent rather abruptly downward and forward after entering the cranium.

The cerebellum is a simple oval or flat body in the fishes, Batrachia, and reptiles, excepting in the crocodiles. In these it develops two small lateral lobes, while the middle portion, now called the *vermis*, becomes transversely grooved. In the birds the lateral lobes are a little larger and the plicæ deeper, and on section it yields a digitate and serrate outline of gray matter with a white centre, called the *arbor vitæ*. In Mammalia the size is increased, especially as regards the lateral lobes. In Dermopteri it is small—in the division Hyperoarti apparently composed of two lateral ganglia. In sharks it is much enlarged longitudinally, and on section displays a weak arbor vitæ; in *Pristis* (saw-fish) it even reaches the cerebrum, covering the optic lobes. In other fishes it is smaller, in the usual osseous orders a flat transverse commissure bridging the fourth

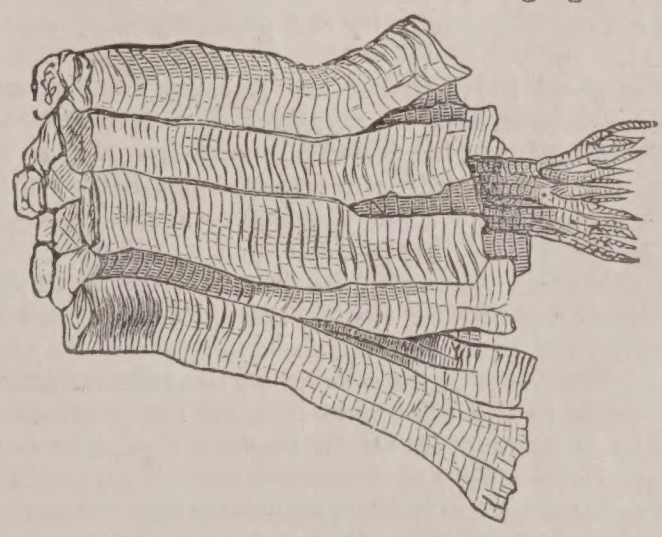


FIG. 9. Striated muscle magnified.

ventricle; in *Polypterus* it is similar, but in *Lepidosteus* and *Amia* it is larger and oval. In Batrachia and in Dipnoi it is more insignificant than in any other division, being a very small transverse commissure, not nearly covering the fourth ventricle. In Batrachia this cavity contains a triangular network of blood-vessels, which fits it, called the plexus chorioideus; this is only seen elsewhere in the tortoises (Testudinata). In reptiles the cerebellum is still small and transverse, but exceeds that of the Batrachia; it is convex and scutiform; the fourth ventricle is nearly closed. In the crocodiles it is first approximately closed.

Anterior to the cerebellum, the brain is best understood

as a double body, bilaterally symmetrical, and composed of a series of ganglia on each half of the divided axis or prolongation of the medulla oblongata. These ganglia are, primarily, the optic lobe, the cerebral lobe or hemisphere, and the olfactory lobe. The middle columns of the medulla support the optic lobes, while the cerebral lobes are supported by the middle and anterior columns. The optic lobes are the largest of the ganglia from the Dermopteri to the Batrachia (fig. 33), with the following exceptions: the cerebral hemispheres are larger in elasmobranchs and *Polypterus*, The lobi are sub-globular, and exhibit no marked external peculiarity till we reach the Batrachia, where they are smaller than the hemispheres, as in all the succeeding classes. In the tailless Batrachia (Anura) they are divided transversely, forming four sub-round bodies; it is possible that the anterior one should be considered the lobus ventriculi tertii, or optic thalamus, of the next ganglion or cerebrum; but as it is united with the posterior in the tailed Batrachia (salamanders) and Proteida (*Necturus*) (fig. 34), they are more probably the anterior bodies of the corpora quadrigemina of mammals. The posterior, and half or all of the anterior, are covered by a fold or lamina, which rises from the posterior part of the posterior bodies in the Anura. In the Urodela the posterior is reduced, like the cerebellum, to a narrow transverse commissure, while in *Necturus* both it and the cerebellum are wanting.

In Reptilia the optic lobes are more simple, but they are partially divided into superior and inferior bodies. In lizards the superior is laminar, and separated by a vacuity from the inferior; but in serpents the latter is a mere fissure. In harmless snakes (fig. 36) the lateral bodies are connected by a commissure, but in the venomous *Trigonocephalus* and *Bungarus* they are united behind; in Vipera the superior and inferior bodies appear to be quite separated from each other. In birds the optic lobes are simple, and situated infero-laterally, since the cerebellum and hemispheres are in contact. In Mammalia they are superior, and continuous with each other, and consist of four protuberances, the corpora quadrigemina. They are much reduced in size, and cover a narrow vacuity or tube, the

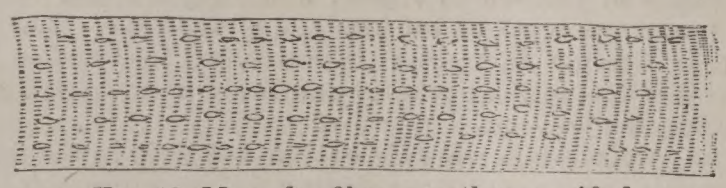


FIG. 10. Muscular fibre, greatly magnified.

aquæductus Sylvii. In front of the anterior pair is situated a sac-like body, the pineal gland, which is the rudiment of an important organ of the brain of lower orders, the epiphysis. This is a highly vascular membranous body, which rises to the inner surface of the cranium in Dermopteri, fishes, Batrachia, and Reptilia. It is very variable in structure in fishes; in reptiles (lizards) it often communicates with the outer surface by the foramen parietale of the table of the skull. Directly opposite to it another sac descends from the cavity below the optic lobes (the aquæductus Sylvii), which is termed the hypophysis. It exists in the classes which possess the epiphysis, and is represented among Mammalia by the pituitary body and infundibulum.

The cerebral hemispheres are small in the classes below the Batrachia, except in sharks and a few fishes, as the Dipnoi, Polypterus, and Ginglymodi (gar). In Dipnoi, Crassopterygia, Chondrostei (sturgeons), Ginglymodi and Halecomorphi (*Amia*) the hemispheres are at a distance from the optic lobes, being supported by the elongate crura of the medulla oblongata; in other classes and orders the hemispheres are sessile. In the mammals alone we find the pons varolii, a body of transverse fibres which cross and bind together these crura cerebri on the inferior side. The hemispheres in the mammals present many peculiarities: their size is increased, and in many the surface is thrown into vermiform ridges or "convolutions." In the fishes and higher types they are hollow, enclosing the "lateral ventricles." The floor of these is occupied by various bodies in the different types. Thus in Batrachia there is a body on the inner side of each. In reptiles this is represented by a narrow body, while another mass occupies the outer part of the floor of the ventricle. In Mammalia two bodies, little separated, occupy this position—viz., the "lobus ventriculi tertii" (or thalamus opticus) and the corpus striatum. The cerebral hemispheres are not united till in certain birds we find a narrow bridge connecting them, the fornix. In the lowest Mammalia (Marsupialia, etc.) we observe another connecting body in a rudimental state above the fornix. This is the corpus callosum, which in higher mammals is a massive bridge, and much larger than the fornix. There is another bond of connection called the anterior commissure, which is short and sub-cylindric: its size in mammals is nearly in inverse ratio to the development of the corpus callosum. The ventricles are separated by the septum lucidum in this class only, but is much reduced in the monotremes (duck-bill). The characters of the brain in the orders of Mammalia may be best expressed in tabular form, thus:

I. No calcarine sulcus nor hippocampus minor; corpus callosum rudimental; hemispheres smooth, leaving cerebellum and olfactory lobe exposed: Monotremata, Marsupialia.

II. Corpus callosum well developed, short, without rostrum; no calcarine sulcus nor hippocampus minor; hemispheres smooth, short; olfactory lobes and cerebellum not covered: Edentata, Rodentia, Insectivora, Cheiroptera.

III. Corpus callosum longer, with a recurved rostrum in front; no calcarine sulcus nor hippocampus minor; the hemispheres convoluted, and partially covering the olfactory lobes and cerebellum: Proboscidia, Hyracoidea, Ungulata, Carnivora (hoofed and carnivorous animals).

IV. Corpus callosum long, with rostrum; a calcarine sulcus and hippocampus minor; hemispheres mostly convoluted, partly or wholly covering the olfactory lobes and cerebellum: Primates (monkeys, man).

Exceptions to the definition of the Primates are seen in some of the Lemuroidea, in which the hemispheres are smooth. In man they have nearly twice the size seen in the allied forms of apes (chimpanzee, etc.). The calcarine sulcus is on the lower side of the posterior part of the hemisphere, and the hippocampus minor is the convex body within the ventricle, which its presence causes; it forms the inner wall of the posterior horn of that chamber.

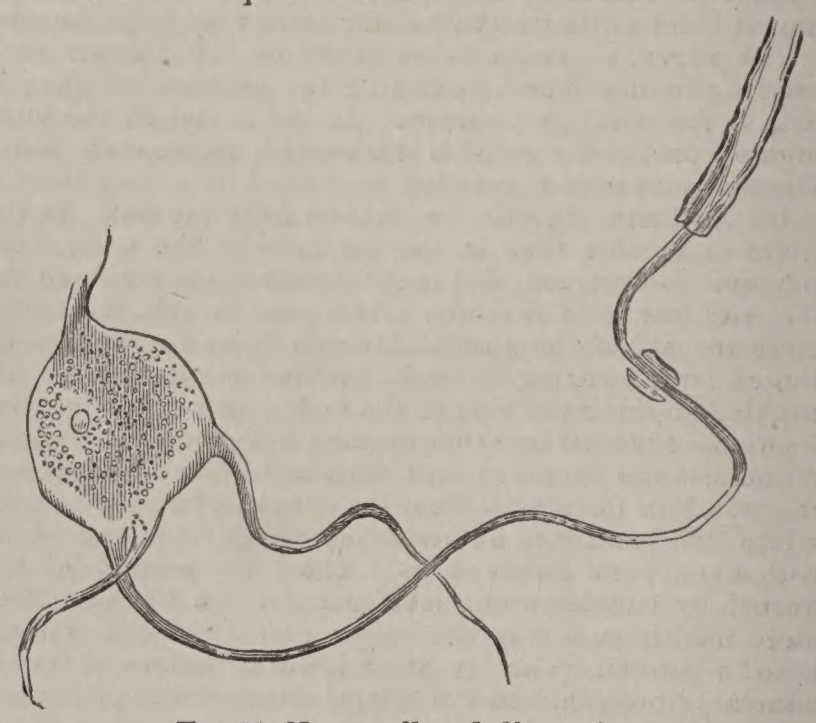


FIG. 11. Nerve-cell and filaments.

The *olfactory lobes* are very large in elasmobranchs, and are connected with the hemispheres by a narrow commissure. In fishes they are less developed, and in batrachians are sub-cylindric and separated by a groove. In reptiles they are continuous with the hemispheres, obpyriform in shape, and often slender; they are frequently hollow. In birds and mammals they bear a smaller proportion to the whole brain, and are entirely concealed in Primates.

The optic nerve originates by fibres derived from the optic lobes. Its fibres decussate or cross from the right side to the left, and *vice versâ*, shortly after leaving the brain in all Vertebrata, excepting the lower Actinopteri (Halecomorphi, Ginglymodi, and Chondrostei), the Elasmobranchii, and the Dermopteri. In all of these the nerves are connected by a commissure, which is in part (*Amia*) composed of fibres which leave the brain and return again, forming a short circuit. In the Dermopteri this "chiasma" takes place near the roots of the nerves; in the others, at a greater distance from the brain.

The remaining cranial nerves are in fishes only four pairs, the vagus, glossopharyngeus, trigeminus, and facialis. The first two and the last two are each approximated. The vagus exhibits in the fishes above the Dermopteri two distinct roots. The first is the nervus (ramus) lateralis, which extends posteriorly beneath the scapular arch, and runs along the middle of the side of the body to the tail; it is abortive in Dermopteri. The second or larger nerve supplies the gills and viscera. The nervi trigeminus et facialis have four distinct origins, which sometimes unite and form one or two plexuses outside the cranium. The branches are distributed to different parts of the head; but one, which especially characterizes many bony fishes, but is wanting in Clupeidæ, Plectospondyli, *Amia* (gar), Chondrostei, and elasmobranchs, the ramus lateralis, runs upward within the cranium, issues above, and extends along the back to the caudal fin, supplying the dorsal fin. In Der-

mopteri and Dipnoi the glossopharyngeal is a branch of the vagus; in other vertebrates it is distinct.

In Batrachia the rami laterales of the vagus are present; and the glossopharyngeus unites with the vagus, forming a ganglion, from which nerves issue. The origins of the nervi trigeminus and facialis are wholly or in part common, and they support a ganglion Gasserii. The hyoid and scapular muscles are supplied from the first pair of spinal nerves, and the vagus supplies branches to the scapula. These characters are in part those of reptiles, but more prominently those of fishes. In the Reptilia there are nervi accessorii, as well as hypoglossi. The latter supplies the hyoid and scapular regions, and the former certain muscles inserted in the scapula in front. The rami laterales of both vagus and trigeminus are not present, and the facialis has a distinct origin. In mammals all these nerves are present, except laterales, but the facialis frequently is identical with the trigeminus in origin.

VI. The Muscular System.

Muscles are entirely wanting to the Protozoa and to the Cœlenterata, excepting the Medusæ. In the latter, delicate bundles of unstriped fibres exist, extending vertically from both the inner and outer surfaces of the umbrella, while between them concentrically curved bundles run between the eight circulatory canals. Among echinoderms the innumerable segments of which they are composed give origin and insertion to many muscles. In addition there are muscles devoted to the masticatory apparatus. This consists in Echinoidea of five tooth-like bodies, which form a pyramidal mass when closed. For the opening and shutting of these, twice ten paired and twice five single muscles are arranged, as well as several others. In Holothurida five longitudinal muscles extend from the hard œsophageal ring to the vent. A sphincter closes the mouth, and the superior part of the gullet is thickened with muscular walls. The tentacles possess muscles.

In Mollusca muscles are universally present, though fewer in number than in the groups just described. In Bryozoa (or Polyzoa) a system of muscles is arranged for the withdrawal of the crown into the sheath-like body; these are median, longitudinal, slender muscles. Those designed for projecting it again are horizontal, curved, and situated on the inner wall of the body; the successive contractions of these from below upward will produce the result. Avicularia are peculiar bird-head-like bodies, situated near the mouth in the marine Bryozoa; they are furnished with a bird-like beak, with an under jaw which frequently closes with a snap, and slowly opens. These movements are conducted by muscles whose movements are automatic. The large mantle enclosing the body of the Tunicata is composed of two muscular layers—the one of transverse (hence annular) fibres, the other of longitudinal or oblique. Muscles for producing progressive movement or swimming are found in many genera. These are annular, and at intervals around the body. *Appendicularia* possesses a long and deep rudder-like tail, which contains muscular layers. The Brachiopoda are attached to a fixed body by a muscular arm or anchor, which enters the shell through a foramen. This is connected with the dorsal and ventral valves of the shell by corresponding opposite muscles, which determine the direction of its open borders. There are two pairs of adductor muscles arranged longitudinally, and two pairs of abductors (divaricatores), one of the pairs smaller, and sometimes wanting. There are muscles also in the mantle and branchial arms. In lamellibranchs or Acephala there are powerful musculi adductores. There is but one in the Ostreidæ, Aviculidæ, and Muelleriidæ. They are of very unequal size in the Mytilidæ, but sub-equal in the remaining Acephala. In *Anomia* there are three.

There are also retractor muscles of the siphons, and a band round the edge of the mantle. The muscles of the foot are often large. The principal one divides next the body, and each half is inserted near the hinge of the shell between the adductor muscles. In Gasteropoda the muscular structures have a different arrangement. The foot is largely muscular, and its upper and posterior region gives insertion to the columellar muscle, which attaches the animal to the shell. It arises from the columella at the beginning of the last whorl. Its size depends on the size of the whorl and length of foot. Other muscles are devoted to the elongation or retraction of the proboscis and the penis. In Cephalopoda the columellar muscle is represented by a large symmetrically divided mass, which arises from the cephalic cartilages, and is inserted into opposite sides of the shell. An annular muscle surrounds the neck, and another the funnel. From the latter diverge the longitudinal muscles of the tentacles, which are perforated by radial muscular fibres. The mantle is occupied by a flat muscle. The usually muscular foot is here represented by a flat body, which projects forward from beneath the mantle. It is rolled up, forming a tube. By the energetic expulsion of water from the mantle-chamber through this tube the animal is driven through the water, the mantle end first.

The interior surface of the outer chitinous skeleton of the Arthropoda is lined with a muscular layer. Longitudinal and oblique muscles connect the annuli, which repeat each other in those forms (Myriopoda and larvæ) in which the segments are similar. Where (as in all the higher types) the segments are much specialized, the muscles are modified accordingly, either by increase of size or number. Muscles of the dorsal and ventral regions are usually more

Fig. 12. Tubular follicle of the pig's stomach.

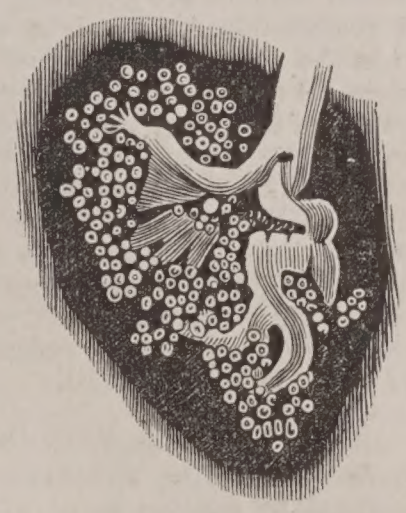


Fig. 13. Lobule of parotid gland, magnified.

enlarged than those of the lateral, while in the types where the sides are soft, to allow of the movements of the back and belly plates, the latter are connected by straight muscles which pass through the viscera. All the limb-muscles are within them, or are inserted into internal processes of the chitinous walls. Sometimes they are inserted into fibrous bodies which have been hardened by calcareous or chitinous deposit, which also subserve the purpose of levers.

Arthropoda possess muscles which perform the functions well known among vertebrates as rotators, elevators, depressors, retractors, protrusors, etc. But the flexors and extensors exceed the others greatly in importance and size. Their relative size is the reverse of what is seen in vertebrates; in the latter the extensors are the more important; in the Arthropoda the flexors exceed the extensors several fold.

2. *In Vertebrates.*—The muscles of the animals of this type are divided into two classes by their position and the relation they bear to the skeleton, and are termed episkeletal and hyposkeletal. The former are situated on the upper surface of the vertebræ—*i. e.*, of the body and arches, including ribs—and are developed in the fœtus coincidentally with the vertebræ. Hence they are in segments which correspond to these, and are separated by intervals termed inter-muscular septa. The hyposkeletal are developed later, and below the vertebræ; they are in part attached to the latter, or to the abdominal walls or the limbs.

In vertebrates below the Batrachia the hyposkeletal muscles are developed to a very slight degree. The segments of the episkeletal series (or myocommata) cover the sides of the body posterior to the head, and meet on the median line below. They present an angle forward, near their middles, having thus an open chevron shape. In Batrachia the tails and sides retain the largely developed myocommata, while the abdominal muscles have the character of those of the Reptilia. In these and higher Vertebrata the hyposkeletal muscles are well developed. In the latter numerous muscles (spinalis, semispinalis, longissimus dorsi, sacrolumbalis, inter transversales, levatores costarum, complexus, splenius, recti postici, and recti laterales) are derived, by subdivision, from the upper portion of the myocommata. In the same way the inferior half gives rise to the recti abdominis, which extend from the pelvis to the sternum; the sterno-hyoidei from the sternum to the hyoid apparatus; the genio-hyoidei from the latter to the lower jaw. On the sides the derivative muscles are obliquely directed—viz., the external intercostales; the obliqui externi of the abdomen; the subclavius from the first rib to the clavicle, and the scaleni from the anterior dorsal ribs to the cervical ribs and processes; lastly, the sterno-cleido mastoid extends from the sternum and clavicle to the skull. The fasciculi of these muscles are all directed, as is the lower part of the myocomma of the fish, from above, or dorsally, downward and posteriorly. The hyposkeletal muscles occupy the inner side of the body-walls, and include, besides many others, the diaphragm of Mammalia

and birds. This septary muscle is wanting or rudimental in vertebrates below the Aves.

The muscles of the limbs are of two kinds: (1) those that originate from the body, and (2) those that take origin on some bone of the limb. The former move the whole limb, the latter, its parts. They are extensors, flexors, and rotators; among the most notable of the last is that which, in the Mammalia, rotates the radius of the fore arm on the ulna. Of flexors, the pectorales major and minor pertain to the fore limb; they are enormously developed in birds, subserving the function of flight. The extensor of the hind limb, the glutæus maximus, is greatly developed in man, as essential to the erect attitude. The longitudinal dorsal muscular tendons are generally ossified in birds.

A remarkable modification of the muscular system is seen in the electrical organs of certain fishes, the torpedo, electric eel (*Gymnotus*), and catfish (*Malapterurus*). Here a system of enormous cells, packed in parallel columns, discharges electricity instead of developing movement or contraction. The contents are gelatinous, and are divided by connective tissue into transverse disks, imitating striped muscular fibre. The columns are vertical in the torpedo and longitudinal in the other genera. They are richly supplied with nerves, which are distributed on one face only. The rays possess rudimental organs of the same kind at the base of the tail.

VII. The Muco-Dermal System.

1. *In Cœlenterata, Echinodermata, and Mollusca.*—The superficial or cellular layer of the skin, or epidermis, is universally present in animals. The inferior layer in vertebrates is fibrous, and belongs strictly to the system of areolar or connective tissues; it is not found in the Cœlenterata, but is represented by a non-cellular, granular, and sometimes slightly striate "true skin." In these animals and in polyps (Anthozoa) there are two or three layers of cellular skin, of which the lower contains the "nettle-cells." These are minute bladders .02 to .07 millimètres long, and one-third to two-thirds as thick, which contain a hair-like body coiled within them. These are suddenly projected upon external irritation, and act as irritants or offensive weapons upon the object they strike, producing sometimes severe smarting and paralysis. These cells occur also as an external lining of the mesenterial threads of polyps. The true skin is the layer in which is deposited the carbonate of lime, which, penetrating or not the folds of the internal cavity of the body, produces the radiating and tubular solid structures characteristic of corals. In the Gorgoniidæ the deposit of the basis of the first simple, and therefore of the axis of the compound, animal, is horny; this is afterwards covered with a thin calcareous layer.

In the Echinodermata the dermal system fulfils an important function, as the basis of deposit of mineral matter in the form of innumerable symmetrical segments. In the Holothurida these deposits are frequently isolated and internal, and sometimes entirely wanting; the tentacles always contain them. Among Mollusca the superficial layer consists of ciliated epithelium (except on the eye-peduncles). The true skin is fibrous, and contains many cells; it is in the form of a sac, and often reaches considerable thickness. An extensive fold derived from the posterior part of the body in Cephalopoda and Gasteropoda, or the superior in Acephala, envelops the body more or less completely. In mollusks which possess a shell the latter is produced by the margin of the mantle. This margin is

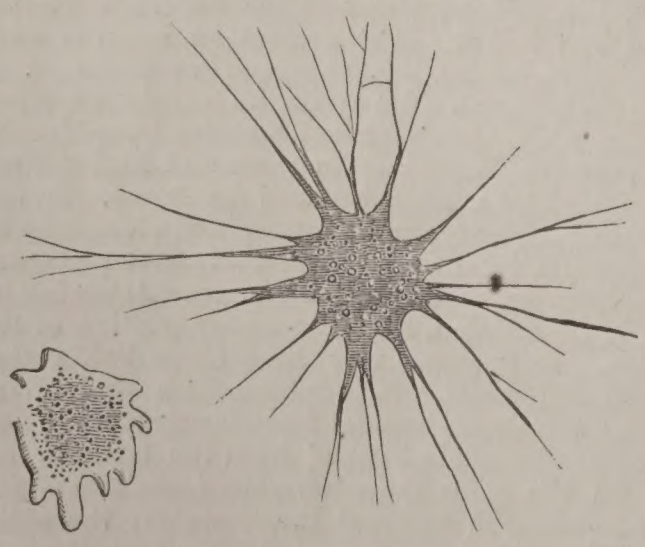


Fig. 14. Amœba, Rhizopods.

supplied with glands which secrete or separate carbonate of lime, which they deposit on the general border. Thus the shell takes the form of the body, which the mantle closely enfolds. In Gasteropoda it is sub-cylindric; the shell has the same character, being sometimes partially or wholly straight (*Vermetus, Teredo*), or generally spirally twisted. In the bivalves the mantle has the form of two lateral oval laminæ, thus producing the well-known form of the shells. The periodical deposits of lime by the mantle are seen in the lines of growth of all shells. The form of the mantle border is faithfully repeated in the shell; thus the projections caused by the protrusion of the proboscis in *Murex, Strombus,* etc., is seen in the convexities and canals of their margin. In Acephala the mantle extends beyond the body, enclosing a space known as the mantle-chamber. The margins of the mantle in a large number of families are extensively united, thus forming a nearly closed chamber. They are entirely separated in the oyster, the *Arca, Myophoria,* etc. They are sometimes only united by a bridge; when more extensively, there usually remains an opening through which the foot is protruded. Of these some leave a single opening at the posterior end of the body (Mytilidæ, Unionidæ), or the latter is divided into two (*Tridacna, Isocardia, Cyprina*). Of these the upper is the point of exit for excrement and water, while the lower admits water to the gills and food to the mouth. The lips of these openings are in many families prolonged into tubes, sometimes very extensively. These may be united or separate. They are either fixed or retractile; when the latter, the space they occupy in the shell requires that the line of attachment of the mantle to the shell should be indented, sometimes to a great degree. The opening for the foot also admits water. It is much reduced in size in genera with a rudimental foot (as *Gastrochæna, Aspergillum,* etc.), and is finally closed in *Pholadidea.*

Besides the mineral substance, the colors of the shell are secreted by special pigment-glands on the margins of the mantle.

The shell is not always composed of carbonate of lime; in *Lingula, Pinna,* etc., the material is phosphate of lime, and resembles bone. The pearl layers of many shells are aragonite. The shell may be composed of laminæ or prisms, or both. *Anomia* exhibits the first, *Inoceramus* the second, and *Strombus* the third type. In Brachiopoda the shell-valves are dorsal and ventral; in Acephala, right and left; in Gasteropoda and Cephalopoda the shell is central and single. In Acephala tightly-closed valves indicate retractile siphons; posteriorly gaping shells, projected ones.

The valves are united by a marginal hinge, composed of teeth, pits, and cartilage ligament, in most families.

In Gasteropoda the coil may be flat (*Planorbis*) or much prolonged (*Mitra*). The "body-whorl" is that last made; it may be either contracted (certain snails), or greatly enlarged, as in *Cypræa,* where it almost or quite conceals all the other turns, in its fold.

In the fossil *Endocardines* (or *Rudistes*) the valves are fastened by hinge-processes on the inner face of the free and smaller valve.

The shell of Cephalopoda is distinguished by its septa. These enclose chambers, the animal only occupying the last one constructed. This structure is not without parallel among Gasteropoda (where the unused portion is generally broken off), but the Cephalopoda are peculiar in that the body is not entirely withdrawn from the first chamber, but leaves a long tube, which passes through all the chambers, and secretes a pearly sheath, which is known as the siphon of the shell. In life this contains nothing but air, which is wanting in carbonic acid. The margins of the septa are simple in *Nautilus, Orthoceras,* etc., but fold in a most complicated and symmetrical manner in *Ammonites, Baculites,* etc. In *Goniatites, Aturia,* etc., the folds are fewer and more simple.

The *Argonauta* (paper nautilus) is peculiar in the character of its shell, which only belongs to the female. It possesses indeed no true shell secreted by the mantle, in common with other octopod genera, but that which bears the name is secreted by the margin of the large expansions of the two posterior arms. These enclose the shell, which is thus evidently a product of their inner face.

The byssus is a fibrous rope or thread-like body which is secreted by a gland in the foot of certain Acephala. By means of it the animal is attached to fixed bodies. It is well developed in *Mytilus,* rudimental in some *Uniones.*

2. *In Arthropoda.*—The external covering of the body and limbs of animals of this class has been already stated to be chitin. This substance is composed chemically of $C_{17}H_{14}NO_{11}$—that is, a protein body, $C_8H_6NO_3$, plus a hydrated carbon, $C_9H_8O_8$. In higher Crustacea and in various Myriopoda (*Iulus, Polydesmus,* etc.) it is accompanied by an equal or even greater amount of carbonate and phosphate of lime; of these the former exceeds the latter in quantity. The chitin layer proper is a secretion from a layer of cells, which in turn lies above a stratum of connective tissue. The cells resemble the epithelial, and have distinct nuclei. The chitin originates from these as a transparent layer, but frequently becomes streaked or fibrous.

The pattern on which each segment of the arthropod

body is constructed is that of an annulus composed of several pieces. These are a median dorsal and ventral, and a pair of lateral shields on each side. The number of these rings in the different orders averages twenty and less, but in some Myriopoda it rises as high as 140 (*Geophilus*). They are greatly modified in forming the head, to which five segments are reckoned by some (seven by others). In Myriopoda those remaining are very similar to each other, while in the other orders they are much modified, and generally arranged in groups. These are distinguished in insects as head, thorax, and abdomen; in Crustacea the first two and part of the third series are united into a cephalothorax, while the numerous remaining segments are the post-abdomen. In Arachnida only, however, we have the true cephalothorax, including head and thorax only, the abdomen remaining entirely distinct. The number of segments in the Crustacea Decapoda Amphipoda and Isopoda, is 20; in the Copepoda and insects, 12; in Arachnida it varies from 12 to 19.

The limbs of Arthropoda are composed of hollow, variously altered cylinders, articulated together where com-

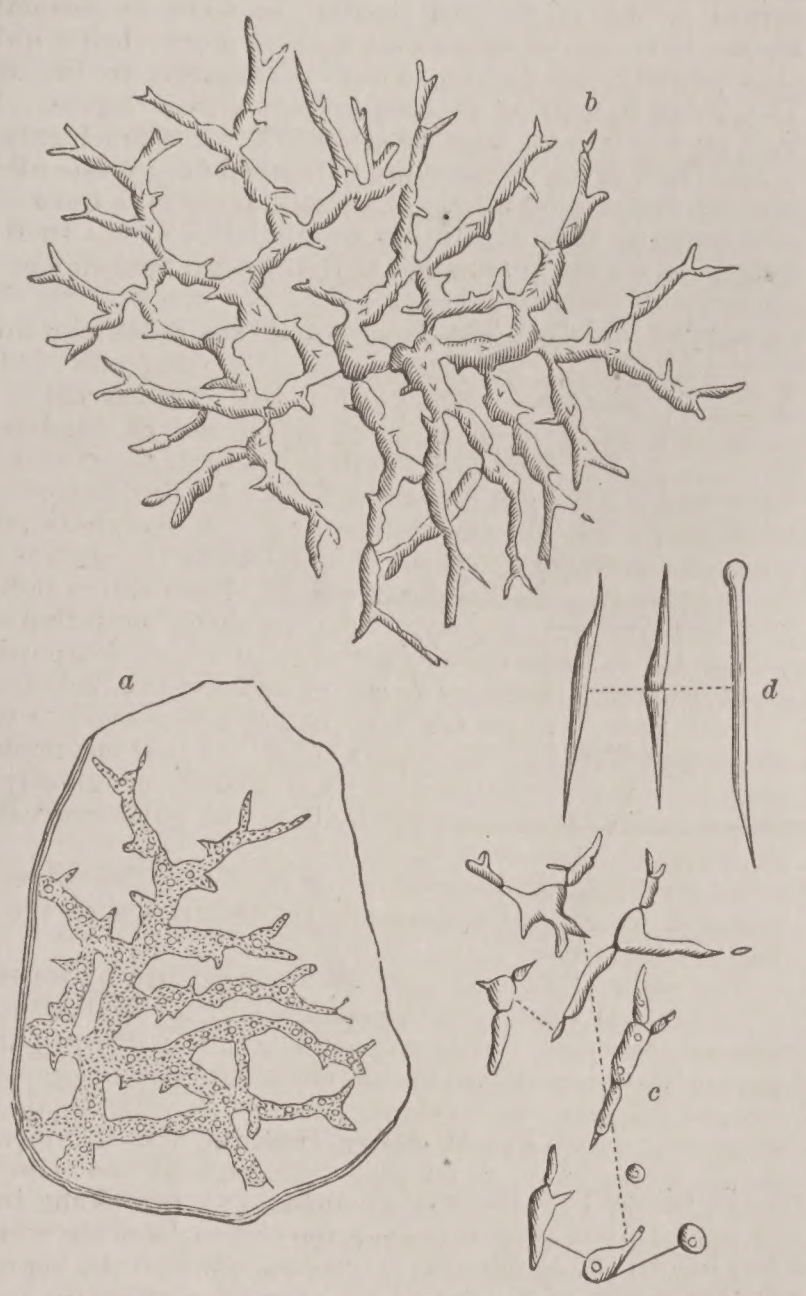


FIG. 15. *Vioa Freyeri*, Hanc.: *a*, entire animal on a shell of *Placuna placenta*; *b*, *c*, the sponge removed, the branches in different stages of growth; *d*, spicules.

posed of more than one segment. In Crustacea and Myriopoda they are present on all the segments of the body; in Arachnida and Insecta on head and thorax only. In the last-named class only those of the head are modified to aid in seizing and devouring food; in the Crustacea, those of the thorax are partly (*Gammarus*) or wholly (*Astacus*) devoted to this service. As organs of progression only those of the thorax are employed in Insecta; in Arachnida the last head-limb is included; they thus possess four pairs of limbs, while the Insecta have but three. The larvæ of lepidopterous and some (tenthredenid) hymenopterous insects possess false feet or pro-legs on the abdominal segments. In the former they are beset by an arched series of minute claws, which are absent in the latter. The abdominal legs of Myriopoda are, like the thoracic, simple. In Crustacea they are in part swimming organs, and many of them bear plates and fringes in which the blood is exposed and oxygenized.

The organs of the head, or altered feet, are in jawed insects as follows: 1st, wanting; 2d, antenna; 3d, mandible; 4th, maxilla; 5th, labium. In insects with a tubular mouth it is similar, except that the third pair are bristles for puncturing, the fourth similar, and the fifth a tubular body or rostrum, enclosing them. The hemipterous rostrum is of this type. In Lepidoptera, where there is a tubular or suctorial tongue-like rostrum, the third segment is rudimentary, the fourth is the rostrum, and the fifth is the labium. Of the jawed type of the Coleoptera are the orders Orthoptera and Neuroptera. In the Hymenoptera (bees, etc.) the mandibles are developed as jaws, but the maxillæ are elongate, and form the opposed halves of a tube which encloses a projectile tongue. The suctorial orders, Hemiptera and Lepidoptera, have been mentioned; the structure in the Diptera (flies) is similar to that of Hemiptera.

The antennæ of insects are organs of special sense, but whether of hearing, smell, or taste is not well known. In the basal segment of certain Crustacea (*Sergestes*, etc.) a chamber containing grains of sand has been suspected to be an organ of hearing; while a microscopical nervous structure in the posterior wings of Coleoptera has been regarded as of similar significance. The antennæ are set with bristles, which evidently subserve the ordinary but here highly delicate sense of touch. The Crustacea are distinguished by the presence of two pairs of antennæ; the second pair only of these is present in other Arthropoda, excepting the larvæ of insects, where the first pair exists in a rudimental state, the second being absent. In Myriopoda they are as in Insecta, but in Arachnida both appear to be wanting; the second pair is, however, present as jaw-antennæ, taking the place of the absent mandibles.

In Insecta the forms of the antennæ are very numerous. The typical structure is that of a succession of (nine to twelve) sub-similar cylindric segments. Thus they appear in carnivorous and other Coleoptera, in phryganoid Neuroptera, acridiid Orthoptera, nematocerous Diptera, etc. In most Diptera they are excessively shortened and of few joints; the last is enlarged, and supports at its base a large bristle, which is frequently plumed. In Lepidoptera Diurna they are club-shaped; in Sphingidæ, triangular in section, and in Lepidoptera Nocturna, fusiform and often plumed. In many Orthoptera they are very short; in Hymenoptera short (bees), elbowed (ants), or much prolonged (Ichneumonidæ). The Coleoptera exhibit the greatest varieties. In some (*Elater*, *Dictyopterus*) they are serrated; in Silphidæ, short and clubbed; in Longicornia their length is often excessive; in Curculionidæ some of the basal segments are elongate, forming an elbow with the remainder. In Lamellicornia the terminal segments are expanded, leaf-like, one on each side of the axis, and open and shut like the leaves of a book.

In Myriopoda the maxilla and labium of insects are represented by a large labium. In the Strongylia there are a second and third labia; but in Chilopoda the last is represented by a pair of powerful foot-jaws, which are perforated for the conduct of poison. The first leg corresponds to the third of the insect. In Arachnida the insect maxilla is represented by jaws, which are simple in spiders, acute, and perforated by a poison duct, but in Phalangia, scorpions, etc. (Pedipalpi) are furnished with an opposable joint, or are cheles.

In Crustacea the second pair of maxillæ are not united into a labium, as in Insecta. The cephalothorax in some of the higher order of Decapoda (crabs, lobsters, etc.) is distinguished from the abdomen by a groove, as in the crayfish (*Astacus*): in all of them the ambulatory limbs arise from the abdomen. One or more of these are chelate (furnished with nippers) in the Decapoda and other orders, but in the Stomapoda the first pair has instead the last joint opposed to the whole length of the penultimate, forming a reversed scissor-like organ. The limbs of the post-abdomen usually bear branchial organs, while those of the last segment are in the form of plates, which, when extended, form a swimming shield (lobster), or are hook-like bodies for maintaining the hold in the shell (*Pagurus*).

The limbs in Insecta are always similar in construction, though the hinder may be much elongated (grasshopper), and never chelate. They consist of four regions—the coxa, femur, tibia, and tarsus. The coxa attaches the limb to the body by a ball-and-socket or hinge-like joint, and may be from globular to laminar in form. The femur is the stoutest joint, containing the muscles which flex and extend the rest of the leg. The tibia is slender and often long; the tarsus usually consists of several joints. In some Hemiptera it consists of but one or two; in most Coleoptera it embraces at least five. In the latter order the number is an important index of relationship. The lower groups (Phytophaga, etc.) possess but three; the curculios, longicorns, etc. possess four, and the Tenebrionidæ and others five in front and four on the hind limbs only; lastly, the serricorn, clavicorn, monilicorn, and other types with five joints, all round. The last joint usually consists of a pair of chitinous hooks; others may be modified by expansion, etc. for adhesion to vertical surfaces, etc.

3. *In Vertebrates.*—The skin in the Vertebrata is primarily smooth and soft. Its epithelial glands may secrete mucus, as in many fishes, or glands seated in the true skin may separate sweat. The latter are simple, convoluted, and

with a long efferent duct. The epithelial layer produces the horny sheaths of claws and horns, feathers and hairs. Mammalia are generally covered with hairs, but in the manis it is thrown into extensive folds, which are ossified, and become the scales of those remarkable animals. In the shell of the armadillos and on the head of various batrachians it is penetrated by ossification, which is confluent with that of bony structures below them. Hairs are an epithelial growth in the form of a hollow cylinder. The epidermis is sunk into a pit of the true skin, and then returns outward as the hair. It increases in length by addition of cells and pigment from below. A modification of the same structure is seen in feathers, where the axis is split laterally, and thus develops the barbs and fibrillæ on each side. Birds are covered with feathers. The first growth appears as down, in which the fibrillæ are softer and in much smaller number, so as not to be coherent; the bases of the true or mature feathers are furnished with the same. Those of the body are generally soft; in aquatic birds excessively dense on the lower surfaces. They arise from certain patches only. There is one on each scapular region, and one along the middle line of the neck above. Another is on the rump, and one on each side of the breast. The abdomen presents a large median patch. In ostriches, penguins, and a few others the feathers are evenly distributed over the whole body. Besides the main shaft of the feather, a second one is developed behind it in many birds. It is generally much smaller than the first, but it is equal to it in the Casuariidæ. The largest feathers are developed on the caudal vertebræ and on the fore limb. In the latter they subserve the function of flight. Those attached to the carpus and manus are the longest and most important, their length bearing a direct relation to the powers of flight of the bird. These are the *primary* quills; they are enormously developed in the swallows and swifts, in the humming-birds and frigate-pelicans (*Tachypetes*), etc. They consist of naked shafts only in many of the ostriches. The quills attached to the fore arm are the *secondaries;* they are proportionately large in gallinaceous birds. Those inserted into the skin of the humerus are the *tertials*, and are most highly developed in the wading families (Grallæ) and certain song-birds—*e. g.*, the Motacillidæ. The caudal quills or rectrices are from twelve to eighteen in average number; they are greatly elongated in the tropic-bird (*Phaeton*), *Milvulus*, etc., and are almost wanting in some gallinaceous birds, in some tinamous, etc. The rump-feathers or tail-coverts are sometimes so developed as to conceal them, as in the peacock, *Pharomacrus*, *Egretta*, etc.

The scales of reptiles are areæ of true derm, bounded by simple folds, which are covered exactly by epidermis. These areæ may be filled with an osseous deposit, as in *Heloderma;* in snakes they are soft. In tortoises the intervening folds are very shallow, and remotely correspond to the skeleton below. The epithelial layer is horny (tortoise-shell), while the derm is ossified and united with the osseous skeleton below. In Crocodilia the distinct ossifications occupy the dermal areæ of the back, or on both surfaces of the body in the caimans, etc. The areæ are symmetrically distributed on the head in serpents, most Lacertilia and some tortoises. In the first they are fewest and most regular, numbering usually nine on the upper surface. They correspond remotely with the cranial bones, and hence are called parietal, frontal, superciliary, prefrontal, internasal, rostral, etc. In venomous snakes and boas the vertex is frequently covered with scales.

Fishes frequently display ossifications of the epidermis as well as of the true skin, as on the cranium of sturgeons, their dorsal and lateral shields, etc. The scales which cover the bodies of most fishes are developed in pouches of the true skin by deposit of mineral matter. Their exposed surfaces are covered by epidermis, which enters between them, and reaches there the true skin. In eels they are small and separated. In fishes with closed swim-bladder (Physoclysti) the scales develop spinous projections which produce the effect of a comb on the margin, and are hence called *ctenoid*. Most of those in fishes, with the duct of the swim-bladder (Physostomi), have smooth surfaces and edges, and are termed *cycloid*. In many fishes of early periods, and some now living (*Lepidosteus*, *Polypterus*), the scales are pavement-like and glossy, with a layer of *ganoin*. These are crossopterygians or Physostomi. Sharks have separated mineralized bodies, with flat bases and produced points, granules, etc., whence they have been termed *placoids*. In Dermopteri and Leptocardii the skin is smooth.

The internal parts of the muco-dermal system are the mucous and serous membranes. The former are continuous with the epidermis, and line the cavities of the digestive, respiratory, and reproductive systems. The latter line the closed chambers, being continuous with the mucous membrane only at the fontanelles of the oviducts (tubæ Fallopii). In the thoracic cavity they form a sac, with one side thrust in upon the other, the thoracic viscera being on the outside of the entering portion. The abdominal viscera occupy in the same way the outside of the membrane lining the cavity, which is termed the peritonæum. In the thorax it is the pleura.

4. *The Teeth.*—These bodies are generally developed in an internal or external epithelial layer, like some of the dermal, bony, or mineral plates or pieces. In Protozoa and Cœlenterata they are wanting. In Echinodermata they are present as five hard sub-triangular plates, which close the mouth by their close contact, like radii from its centre. In Mollusca they are described under the digestive system, so that it only remains to consider them in Vermes and Vertebrata. In the former they consist exclusively of hooks, mostly arranged round the mouth. In the Trematodes they occur, weakly developed, in a few genera, in one of which they are attached to an organ at the posterior extremity of the body. In Nematoda, *Chiracanthus* has hooks on the head and body, and *Strongylus* horny teeth round the pharynx. In Acanthocephala all the genera possess a retractile proboscis, which is studded with recurved hooks in various circles. In Cestoda, the tapeworms have hooks as well as suckers on the head, which are especially well developed in the cysticercus larval stage. The Tetrarhynchidæ possess four projectile proboscides, each of which is set with several rows of recurved hooks.

The teeth of vertebrates are developed on papillæ of the mucous membrane, which is usually sunk into successive cavities or alveolæ of the jaw and palate bones. In Leptocardii there are none, and in Dermopteri they are horny processes in concentric series round the inside of the funnel-shaped mouth. The two largest are situated at the

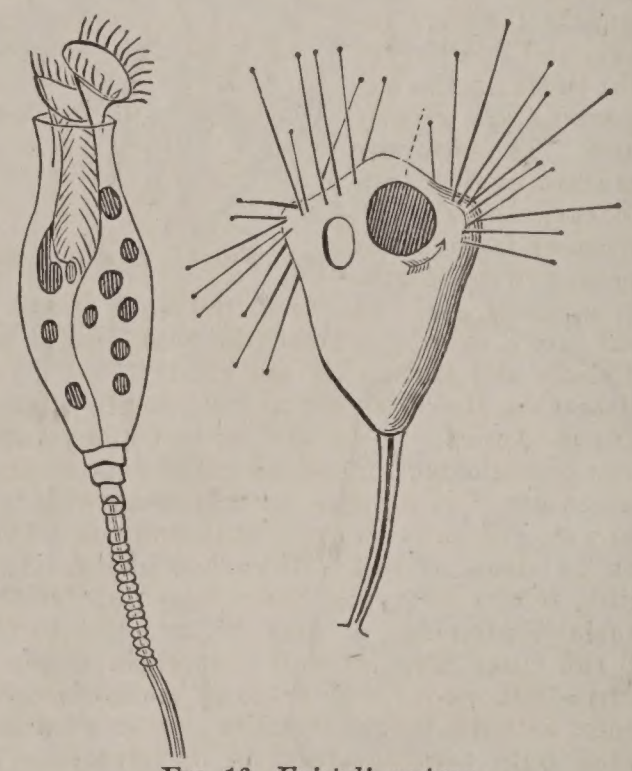


FIG. 16. *Epistylis nutans.*

mouth of the œsophagus. In fishes generally bony teeth are present, but are not usually developed in alveolar cavities, but on the surface of the bones. True teeth are usually composed of a very dense substance allied to bone, called dentine. Exterior to this they have a deposit of a still denser and harder substance, the enamel, which covers the crown. The root is sheathed in a layer of true bone, the cement. Dentiné is distinguished from bone (*osteine*) by the presence of great numbers of parallel tubuli, which radiate from the central cavity to the circumference of the tooth. Enamel is, on the other hand, of the nature of a secretion, filling vertical hexagonal cells which stand upon the dentine. Hence it is composed of prisms. It contains, like dentine, a trace of fluoride of calcium, besides the phosphate of lime of which both are composed.

In fishes the teeth are usually covered with dentine instead of enamel, and may be composed internally of true dentine or of its variety, vasodentine. This substance retains the numerous blood-vessels which characterize the early stage of deposit of dentine, which are easily seen in a section of the teeth. Of such character are the teeth of Elasmobranchii, which are moreover of very various form. Thus, they are pavement-like, with vertical lamellar roots, in skates and rays, or they are rootless and with swollen crowns of differing sizes, etc., arranged in symmetrical band-like pavements, as in cestracionts. The crowns may be more elevated, as in hybodonts, or finally isolated and with sharp apices and cutting edges in the existing squalodonts. In Holocephali the teeth are most rudimental, consisting only of the calcified walls of the vessels arranged in alveolar cavities of the jaws. In Dipnoi the teeth form a single serrate cap for each jaw. In Actinopteri the teeth are generally composed of a larger proportion of dentine.

In sturgeons they are only present during immature age. In the Lepidosteidæ the external or dentinal surface is inflected in deep folds, which are closed so as to resemble grooves externally. Physostomi generally have large teeth on the jaws, but in some Characinidæ and all other Plectospondyli, *Coregonus* (grayling), some *Mormyri*, etc., there are none. In some of these fishes there are numerous teeth on the lower segment of the fifth pair of hyoid arches, or the "inferior pharyngeal bones." In Characinidæ these are of very varied type; in Catostomidæ the bones are much prolonged, and the teeth are comb-like in one row, and work against a projecting inferior table of the basi-occipital bone. In Cyprinidæ they are stout, in one or more short rows, and may be hooked, sharp-edged, conic, or grinding in type, according to the food of the fish. This structure does not exist in other fishes. In *Esox* the teeth are raptorial and very numerous; in Clupeidæ, rudimental and wanting. Only in the order to which the latter pertains, the Isospondyli, do we find fishes with fangs sunk in deep alveoli, the extinct Saurodontidæ from the cretaceous formations. In Nematognathi they are more or less bristle-like, and packed together like a brush. In eels they are often dagger-like. In physoclystous (or the higher) fishes they are generally brush-like, frequently with canines intermixed; but in Pediculati they are large, incurved, on flexible ligamentous bases. In some Plectognathi they are incisor-like, and in Pharyngognathi those on the hyoid apparatus are greatly developed. The latter are sub-quadrate, oval, or narrow (*Scarus*), and arranged pavement-fashion for the crushing of hard substances, as shells, etc. In *Scarus* the teeth of the jaws are confluent into a shining, parrot-like beak, useful in scraping out shells and cutting off sea-weed.

FIG. 17. *Hydra viridis.*

In Batrachia the teeth are usually small, often wanting (bufoniform Anura), or in the extinct Labyrinthodontia with deep complicated inflections of the dentine and superficial cementum. In reptiles we find teeth with fangs and with crowns, generally covered with enamel. These may be sunk in deep alveoli (Rhynchocephalia, Acrodonta, Crocodilia, Ichthyopterygia, Sauropterygia, Ornithosauria, Dinosauria-Goniopoda), or may be attached to the inner side of the outer alveolar wall (Lacertilia in general, and Dinosauria-Orthopoda); may stand immediately on the jaw-bones, without fangs (Ophidia), or on a thick column of ossified pulp (*osteo-dentine*) in an alveolus (*Pythonomorpha*). The crowns are generally compressed conic; in some (*Lælaps*) knife-shaped. In herbivorous lizards they present an oblique face inward. In Crocodilia the young teeth rise within the pulp-cavity of the old, and throw them off; in most other orders the successional teeth appear at the side of the fang, and provoke absorption, which cuts off the crown of the old. Tortoises and birds are toothless; Anomodontia are so likewise, except a strong maxillary tusk.

In Mammalia the dental armature is distinguished into series—viz., the incisors, canines, pre-molars, and molars. Their normal number on each side of each jaw is I. 3; C. 1; Pm. 4; M. 3; total, 44. The incisors are normally flat and transverse-edged; the canines longer and conic; the pre-molars compressed, with one to three cusps; and the molars oval in section, with a double series of cusps. In *Ornithorhynchus* there is but one, a horny tooth. In marsupials the number of incisors is excessive (as 8 or 10), or, as in kangaroos, less numerous and the median much enlarged. In these and their gigantic extinct allies two in the lower jaw are much enlarged as tusks. In Rodentia there are but two incisors above and below, which have enamel on the external face only, hence the inner wears more rapidly, and the opposed pairs act as efficient cutters in gnawing. The other teeth are molars only, and these of the complicated type to be mentioned later. In Insectivora the incisors are enlarged, but in Edentata they are always wanting. In Cheiroptera and Carnivora they are similar to each other, and much reduced. In Quadrumana they are well developed, broad, opposed cutters, and are generally 4–4 in number. The proboscidians, on the other hand, have but one (the outer) pair of incisors in each jaw, which are developed into huge tusks above (Elephantidæ) or below (Dinotheridæ). In these cases the opposing pair is reduced or wanting. The Artiodactyla-Ruminantia are remarkable for the entire absence of superior incisors, and the close resemblance of the inferior canine to the lower incisors, producing the appearance of eight of the latter.

The canine is largely developed in the Carnivora, hogs, *Hippopotamus*, and certain extinct proboscidians, as *Eobasileus*, etc. The pre-molars are wanting in rodents and many proboscidians, but numerous in marsupials, insectivores, etc. In Carnivora they are numerous, and the last is peculiarly formed, being the sectorial or flesh-tooth characteristic of the order. The two outer tubercles and connecting ridge are developed into a longitudinal notched blade, while the inner remains a small tubercle at the front of the inner side. In dogs there are two tubercular molars behind it; in weasels and cats, one; in the extinct Hyænodontidæ, several, but all of the sectorial form.

Molar teeth are composed of one, two, or three rows of tubercles. In the first case they may be one- or two-rooted. Thus, in cetaceans generally they are simple cones, covered with cement instead of enamel. In some extinct groups (*Zeuglodon*, etc.), the crowns are compressed and the roots two. In Edentata they are simple throughout, and covered with cement. This forms a thick layer, and encloses a thin one of dentine, which by its superior hardness forms the ring-like grinding surface of the crown; it is filled within by osteo-dentine. In insectivorous animals the tubercles are in two, sometimes three rows, and acute and elevated; thus they appear in Cheiroptera, many marsupials, Insectivora, etc. In kangaroos, sirenians, tapirs, and *Dinotherium* they appear as two transverse crests or keels. These crests are multiplied in *Mastodon*, reaching six or seven. In *Stegodon* they are more numerous; the intervals are a little deeper, and with some cementum in their bottoms. In *Elephas* they are deepened to the roots of the tooth, and filled to the top with cement; are narrowed by the approach of the much elevated transverse crests, which have now reached a great number. Their summits readily wear in use, and thus present bands of alternating dentine, enamel, and cementum.

The transverse crests of *Tapirus* may unite at the inner extremity, forming a V in Bathmodontidæ among hoofed animals, or be connected by an external longitudinal crest in *Rhinocerus*, *Palæotherium*, and *Hyrax*. The outer crest may so be indented as to form two Vs, and the inner portions reduced to knobs, as in *Limnohyus* (Perissodactyl), or curved crests (*Anchitherium*). The latter may be cut off and curve lengthwise, so as to produce four Vs or crescents on the grinding face.

From this point the succession of forms seen in approaching the elephants is repeated in two series, ending in the ox and horse. The intervals deepen, the crescents become elevated, and the tops, being soon worn off in use, present a figure formed by the edges of enamel plates, which enclose islands of dentine. The spaces between them are filled with cementum. In the horse and ox there are five crescent-shaped columns in the upper molars and two in the lower. In other artiodactyls there are four above and two below. In deer the crown and roots are subequal in length, but in the Cavicornia the crown is much the longer.

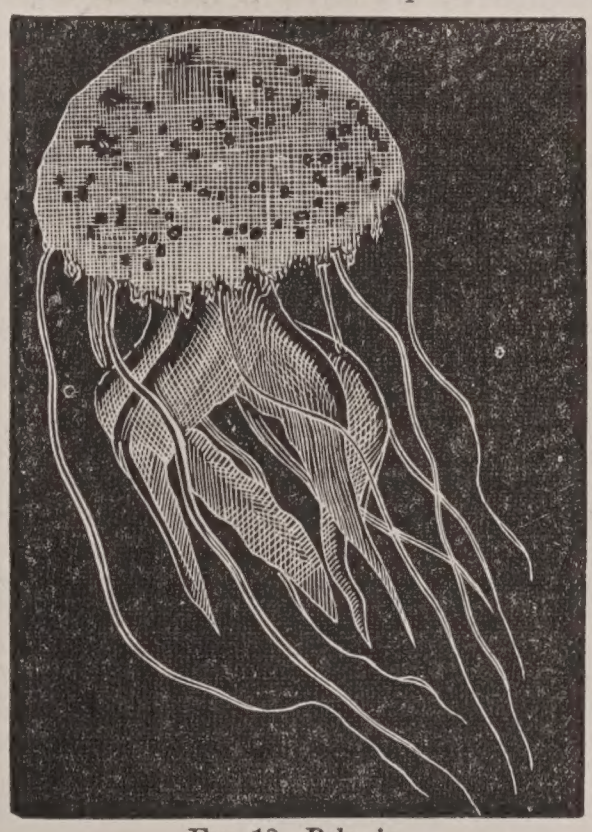


FIG. 18. *Pelagia.*

The same transition is seen in the rodents. In *Mus* the molars are only tubercular; in squirrels there are elevated crests. In *Arvicola* and beavers there are deep inflections of the enamel of the sides of the tooth, producing a zigzag section when the crown is worn, while in Caviidæ the tooth is entirely divided into several columns by the deep descent of the enamel coating from above. In porcupines figures are produced by both lateral and coronal folds.

Simpler teeth are seen in men and apes, where the molars present four obtuse tubercles (in the last sometimes five); and in the hogs, where the tubercles are more numerous, and sometimes irregular. In *Hippopotamus* each of the four tubercles is trifoliate in section.

VIII. The Digestive System.

1. *In Invertebrates.*—The prominent features of the digestive system in Cœlenterata have been pointed out. There is none in the Hydræ, the inner surface of the urn-shaped body-cavity performing that function; an excretory pore exists in the foot-like support. In polyps a small sac is sometimes formed at the summit of this cavity by the reflexion of the inner skin; it opens into the cavity, and is entered above by the mouth. The body-cavity is ridged on the sides by prominent folds, whose margins bear reproductive organs and nettle-cells. In the Medusæ the body is turned the other side up at maturity, though its position is that of the polyps in the larval state. Hence the stomach is below the body-cavity. The latter is sometimes wanting, and is ridged occasionally, as in polyps. It is produced downward in some genera by its walls becoming a peduncle for the stomach. The latter is bell-like, and often widely open; it is generally closable by the contraction of its margin. The latter bears bunches of tentacles, etc., which in the Rhizostomæ are greatly enlarged and prolonged into four leaf-like bodies, which bear the four mouths at their extremities, and the tubular œsophagi throughout their length. From the body-chamber rise the four radiating tubular canals, which extend through the umbrella to a tube which passes round its margin.

In Crinoidea there is a central column to the body-cavity; round this the alimentary canal winds, and, returning, issues near the mouth. In Asterioidea the stomach is a sac, connected with the mouth by a short gullet, which is closable at the mouth. The stomach is divaricated into five pairs of bunches of cæca, which send out radial tubes, two into each arm of the animal. The vent is wanting in the Ophiuridæ, but present in most Asteriidæ; in the latter case there is an enlarged rectum, which gives rise to five horny radial cæca (often bifurcate), which alternate with those of the stomach. In the Holothurida the vent is present, and the alimentary canal elongate, and divisible into œsophagus (closed behind by a sphincter), intestine, and rectum. The last receives the mouths of the respiratory organs.

In the Vermes this system does not branch radially; otherwise its character is very various. That it is a blind sac in many orders has been already shown. In those without arms it is either a simple blind tube (*Turbellaria-Rhabdocœla, Nephelis, Aspidogaster, Branchiobdella*, etc.), or is early divided into two parallel tubes, as in Trematodes. In tape-worm and *Monostomum* these tubes unite at the posterior end of the body. In the Nemertina, in which the canal is simple, there are two constrictions at the end of the œsophagus, to the anterior of which is attached a projectile stylet furnished with venom-glands. In Polia the alimentary canal becomes a solid ligament, which is turned forward and attached to the wall of the cavity. In *Pontobdella* the blind canal is furnished with a few branches or cæca. In the Turbellaria-Dendrocœla it forms a large number of branching cæca.

In the families with vent, it is wound or knotted (Capitibranchiata and some Dorsibranchiata), simple (Abranchiata, Gordiacea, Nematoda), or furnished with cæca on the sides. There is but one on each side in *Hæmopis*, but many in the leeches.

In Vermes in general there are no Cuvierian glands, and there are often liver-cells on the canal walls.

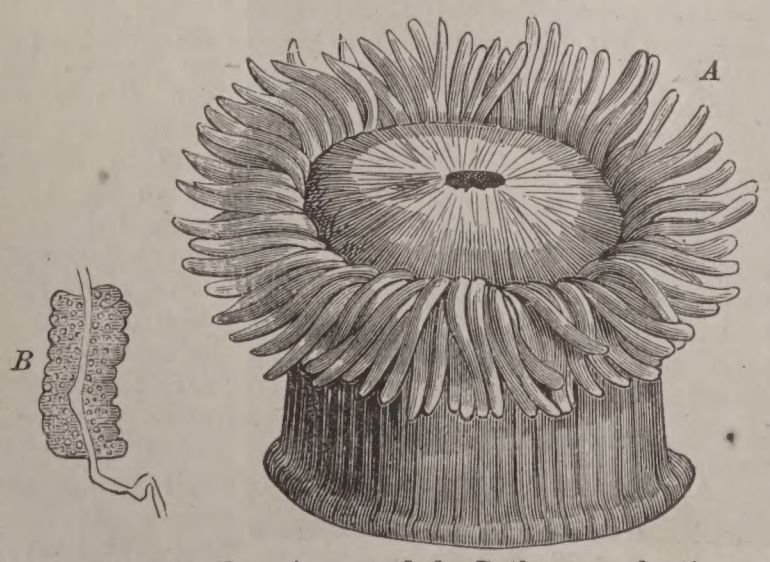


Fig. 19. *Paractis alba: A*, expanded; *B*, the reproductive organ of *Cereus*.

In Mollusca an anus and liver are always present, excepting that the former is wanting in most Brachiopoda. An almost universal peculiarity of mollusks is that the alimentary canal, after fewer or more numerous convolutions in the body-cavity, returns and issues not far from the mouth on the dorsal or lateral face of the body; this prevails from the Bryozoa to the Cephalopoda. The general characters of the canal can be expressed schematically as follows:

A. A more or less projectile œsophageal body or tongue, with a movable membrane armed with reverted horny teeth, and more or less retractile into a sheath; no crystal style in the stomach (except two or three genera). Stomach large, unsymmetrical; canal short, with a large pyloric cæcum; liver very large, lobular, discharging anterior to stomach; mouth with horny beaks: Cephalopoda.

Course of canal with two abrupt turns: 1st, at transverse stomach; 2d, of intestine double, under œsophagus; rectum transverse, opening in mantle-hole; liver double, of many cæca, entering each end of stomach: Gasteropoda-Scaphopoda.

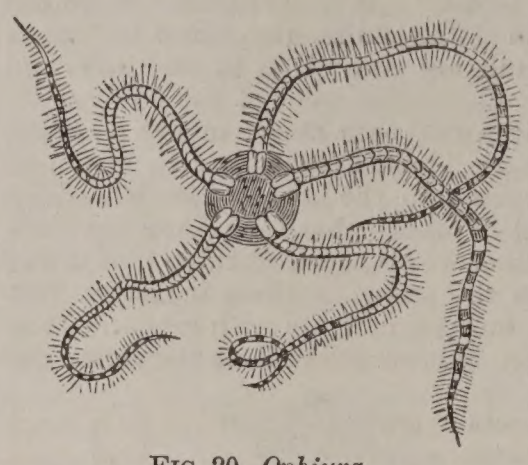


Fig. 20. *Ophiura.*

Course of canal little enlarged at stomach, and with an intestinal one; altogether a loop opening forward near heart; liver single, lobulate: Gasteropoda - Heteropoda.

Intestine short (straight), emptying on right side, never in breathing cavity (rarely on back), rarely issuing from anterior part of stomach; latter elongate (longitudinal), receiving straight œsophagus at either end or side, often divided in two or three, when one or more is furnished with horn-armed ridges or teeth; horny jaws: Gasteropoda-Opisthobranchia.

1. Liver lobulate, compact.
2. " " subdiffuse, with connecting canals.
3. " of blind canals.
   - *a.* Branching from large stomach-opening in body.
   - *β.* " in lateral body-wings.
   - *γ.* " in gills.
     - *x.* Two posterior body-trunks of liver.
     - *y.* One " " (including four families).
     - *z.* Three " "

Stomach (with very few exceptions) elongate into a cæcum; intestine rising from middle and turning forward to the vent; ridges armed with horny plates in stomach: Pteropoda.

Stomach a widening of canal, rarely with one or two constrictions; intestine not convoluted (except *Chiton*), emptying into breathing-cavity on right side; small flat jaws, sometimes horny; a pharyngeal lump, with internal cartilage supporting tongue, on lower side of end of œsophagus: Gasteropoda-Prosobranchia.

AA. Movable armed tongue wanting.

a. A crystalline style in cæcal appendage to stomach; lips at entrance of œsophagus; canal mostly uniform, much turned; end of rectum free in cloaca; stomach oval or round: Acephala.

aa. No crystal style; mouth opening between more or less cartilaginous spiral appendages; canal bound by an extra mesenteric sheath; stomach little distinct; liver double with large (sometimes several) discharge canals: Brachiopoda.

1. Canal shorter, ending in blind enlargement.
2. " longer, ending in lateral anus.

Mouth opening at base (or side) of a gill-sac; œsophagus short; stomach not large, simple, both with intestine, forming a ∨; latter directed forward, opening on same side as mouth: Tunicata.

Mouth surrounded with ciliated tentaculæ (in one genus with a conic lid); œsophagus well defined; stomach distinct, oftener double than single; intestine rising from end of first or single stomach, swollen in part of a straight course to anus near mouth: Bryozoa.

In Gasteropoda there is a pair of salivary glands; in most Cephalopoda, two pairs (in *Sepia* and *Loligo* but one pair, and in *Nautilus* none).

The *radulæ*, or tooth series, and their supporting band, present an enormous number of separate teeth in some of the Gasteropoda. In the Cephalopoda and Pteropoda they are less numerous. In some of the Pulmonata they number as many as 26,800. They are arranged in rows, longitudinal as well as transverse. The latter are more or less irregular in their course, but strictly bilateral. There is a series of median plates or teeth, with one or more rows of lateral ones. The following divisions are indicated by the different tooth-structures in Gasteropoda:

a. Rhachiglossa; only median plates, which are often toothed (0—1—0): Volutidæ.

b. Toxoglossa; no median plates; on each side a single lateral tooth of an awl-like form; no basal membrane of radula; lateral teeth moved by special muscles (1—0—1): Conidæ, Pleurotomidæ.

c. Hamiglossa; a middle plate and single lateral plate (1—1—1): Muricidæ, Bucciniidæ, Olividæ, Lamellariidæ, Fasciolariidæ, Turbinellidæ.

d. Tænioglossa; median plates, and on each side three lateral plates; fourteen families; among them Littorinidæ, Cerithiidæ, Turritellidæ, Cassididæ, Tritoniidæ, etc. (3—1—3).

e. Ptenoglossa; no middle plates; lateral plates similar, numerous (∞—0—∞): Scalaria, Janthina.

f. Rhipidoglossa; middle plates; laterals 4—6 or more, of various forms; outside of these numerous small hook-like teeth (∞—4—6—1—4—6—∞): Neritidæ, Trochidæ, Haliotidæ, Fissurellidæ. The Pulmonata (except Testacella) exhibit a close similarity to this division in their dentition.

The digestive canal in Arthropoda does not turn on itself as in mollusks, but issues at the extremity of the body opposite to that which it enters. The œsophagus is usually straight, and is expanded in the thoracic region into the usually longitudinal stomach. Anterior to this point it has sacciform dilatations (Orthoptera) or diverticula in some types, as the bees, Lepidoptera, flies, etc. After leaving the stomach, the canal, after few or no windings, reaches the anus.

In Crustacea and Insecta there is an extensive fatty mass on each side of the posterior part of the canal, known as the corpus adiposum; in Arachnida it is frequently wanting. The form of the stomach in this class varies; thus in Pedipalpi (scorpions, etc.) it is simple or nearly so, but in Aranea (spiders) and *Pycnogonum* (whale-louse) it branches into radiating diverticula; in the latter these penetrate even into the femora and tibiæ. The digestive system is supplied with various glandular organs. Those nearest the mouth are the "salivary glands," which are present in all the classes except the Crustacea. They are complex glands, and their secretion in some forms (larvæ of some Lepidoptera) hardens on exposure to the air into silk-like threads. The so-called liver-glands or tubes are situated either before or behind the stomach. As their function is unknown, and their position is inconstant, the above name is but provisional. In Insecta they are slender and tubular, sometimes very elongate and undivided. There are usually but four in Coleoptera, but more in Orthoptera and Hymenoptera, forming a whorl. In Arachnida (*Scorpio, Mygale,* etc.) and *Limulus* they are more complex, and present a series of more numerous openings into the intestine. In the decapod Crustacea the organ exhibits its highest development. It is there a complex follicular gland of large size on each side of the alimentary canal, and opening posterior to the stomach. Other simple glands are in the Insecta distributed over the surface of the stomach, and are enclosed by its muscular layer.

The stomach-walls are thin or muscular, in some types ridged within and furnished with horny teeth: Orthoptera, some Coleoptera.

2. *In Vertebrata.*—In most of this branch of animals the stomach is present as a distinct enlargement of the alimentary canal, and the intestine is short or long as the food is flesh or vegetable and mixed in character. The liver is present in all, and is of a highly complex glandular character, except in the Leptocardii, where it is a simple diverticulum of the alimentary canal.

In the Leptocardii the pharynx is very capacious, and is abundantly fringed with long processes. It opens into a sac-like stomach, which is continued as the slender straight intestine to the vent. There are no teeth. In the Dermopteri the intestine is also simple and straight. In fishes it presents a good many variations. In some, as the sharks and siluroids, the stomach is large, and the pylorus is remote from the cardiac entrance. In most Clupeidæ, Hyodontidæ, Characinidæ, *Amia,* and *Polypterus,* it is sac-like, with the pylorus near to the cardiac entrance. In most fishes the stomach is bent on itself, but in *Chimæra, Symbranchus, Amphipnous, Fistularia,* and *Belone,* it is straight. The stomach in some sturgeons and in *Heterotis* and *Chatœsus* (clupeoids) is gizzard-like (*i. e.,* sub-round), with muscular walls and tendinous lamina on the sides. It is closed at the pylorus in most fishes by an annular muscle. In the higher fishes (Physoclysti) there are generally found diverticula from the beginning of the intestine at the pylorus, which are termed pyloric cæca. They are also abundantly found in the lower groups, or Physostomi, but their entire absence is more common. They are wanting in Nematognathi, eels, *Fistularia, Chirocentrus, Hyodon,* the Gobiidæ, and Blenniidæ, and in *Amia, Polypterus,* and the Elasmobranchii. They exist in vast numbers in some Salmonidæ and Lepidosteidæ, and are numerous in electric eels and sturgeons. In *Platax* there are but four, in *Chologaster* two, and in *Amblyopsis* one.

The succeeding part of the canal is generally to be distinguished into small intestine and rectum. These are separated by a strong valve in Elasmobranchii (except *Chimæra*) in *Lepidosiren, Polypterus, Zoarces, Accipenser, Mastacembelus,* and it is not strong in *Orestias* and *Clarotes.* The rectum is distinguished in the lower forms by the possession of a spiral internal valve or partition. In Elasmobranchii, *Polypterus,* and *Lepidosiren,* the spiral partition is continuous by its inner margin with a median membranous axis, which is suspended from the ileo-cæcal valve; in *Raja miraletus* there is no axis, and the partitions are transverse and perforated; in *Squatina, Polyodon,* and *Accipenser ruthenus,* it has no axis, and revolves spirally on the wall of the rectum. It is also present in *Amia* and *Trachypterus.* In *Accipenser rubicundus* there is no spiral valve, but the walls of the rectum are areolate, somewhat as in tripe. The gall-bladder is always present, and discharges beyond the pylorus.

In Reptilia the divisions of stomach, intestine, and rectum are well marked; in Batrachia rather less so. In both the canal is elongate, and held in a folded position by a mesentery, but in batrachian larvæ it is much more extended, and is horizontally coiled. The liver is large in Batrachia, and usually in three lobes, but in the Brevicipitidæ and Engystomidæ there are but two. There is a sphincter valve at the pylorus, and sometimes one at the end of the small intestine. The gall-duct discharges below the pylorus. In tortoises, whether carnivorous or not, the alimentary canal is elongate.

In some Emydidæ and Trionychidæ there is a cæcum or sac on each side of the rectum, the bursa analis. In many Lacertilia the rectum is double or divided by a muscular valve; in *Iguana* and *Basiliscus* there is a septary valve with small orifice. In serpents the œsophagus is greatly elongate, and the gall-bladder peculiar in being separated from, and sometimes far behind, the liver. The rectum presents many peculiarities. In *Cœlopeltis* and *Homalopsis*

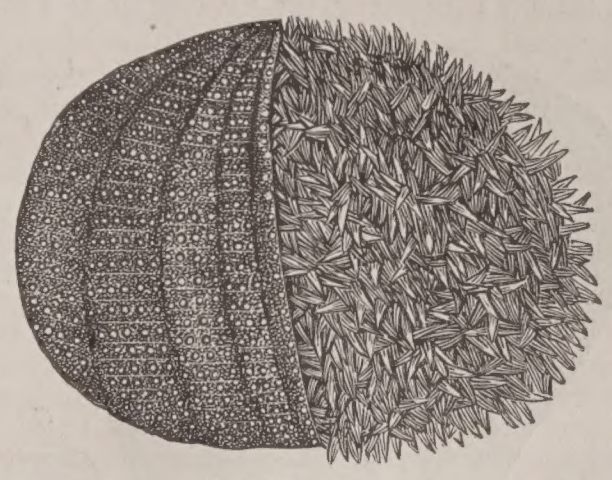


FIG. 21. *Echinus.*

the internal surface is longitudinally folded; in *Hydrophis* with short interrupted folds; in *Dryiophis, Dipsas, Vipera,* and *Caudisona,* transversely folded; in *Boodon geometricus, Bungarus, Elaps,* and *Ancistrodon,* the folds are developed into partitions, which are pierced by a single hole each. A pancreas is present in lizards and serpents.

The alimentary canal of birds is distinguished by the peculiarity of the stomach, which is a gizzard—that is, with walls composed on the convex face or borders of contractor muscles, which have a median and common tendon extended sheet-like on the plane side of the stomach. This is, however, not found in certain marine birds, as penguins, where the stomach is a simple sac; and it is little developed in *Sarcorhamphus* and *Vultur.* It is a double sac in *Apteryx.* The crop is a bag-like expansion of the œsophagus, for the temporary stowage of food; it is found in gallinaceous birds, vultures, etc.

Adjoining the stomach is frequently found another more symmetrical expansion, the proventriculus, whose walls are studded with simple glands, whose secretion softens hard food. It occurs in Gallinæ, *Crypturus,* Insessores, *Ibis,* ducks, condor, etc. The rectum is not strikingly distinguished from the ilium, but it sends off at its origin two huge cæca, which extend forward towards the stomach on each side of the intestine. They are excessively elongate in *Phasianus, Crypturus, Dicholophus, Apteryx,* etc., and very short in *Apenodytes, Ibis,* etc. They are apparently absent in *Sarcorhamphus.*

In Mammalia the stomach, intestine, and rectum are well distinguished. There is neither crop, proventriculus, pyloric nor rectal cæca, nor rectal valves. The gall-bladder is not separated from the liver, and discharges below the pylorus, as does also the excretory duct of the pancreas. There are glands in the intestines of many forms, known as Peyer's, and the salivary glands of the œsophagus or pharynx are always present. The intestine (colon) is frequently prolonged beyond the origin of the rectum, forming a cæcum; the mouth of the rectum is closed by a strong valve. The stomach is transverse, with a portion projecting beyond the cardium—the fundus. This is excessively elongate in the bat *Desmodus.* The stomach is simple or undivided in Primates, Carnivora, Proboscidia, Perissodactyla,

Cheiroptera, and squirrels. It is lobulate and subdivided in Monotremes, marsupials (generally), many rodents, some cetaceans, and most of all in artiodactyles (ruminants, etc.). In *Ornithorhynchus* the cardium and pylorus issue from a division one-third the size of the remainder of the stomach; in kangaroos the stomach is slender, sacculated, and wound in one and two-thirds turns on itself; the fundus is large. In the hog the fundus is profoundly sacculate. In Artiodactyla-Ruminantia there are four chambers, of which the first is generally the largest, being an enormous expansion of the fundus. In the musk it is not in direct communication with the œsophagus, but is so in the ox. In the former there are five sacs, the last the best defined, with reticulating ridges on the inner wall (tripe), and entered by both cardium and pylorus. The first stomach of the ox represents the first four of *Moschus;* it is followed by the reticulate, which receives the œsophagus; between it and the pylorus are two chambers, whose walls are thrown into elevated folds. The first division has strong papillæ on the inner walls, which are very large in the deer.

In many of the Rodentia (*e. g., Fiber*) the cæcum is exceedingly large and long. In the Primates, etc., it terminates in a narrow, curved extremity, the processus vermiformis.

IX. The Circulatory System.

1. *In Invertebrata.*—This system, as is well known, consists of organs for the propulsion and conveyance of the fluid results of digestion throughout the body for the maintenance of all its functions. It consists essentially of a system of tubes radiating from the central muscular organ, in which resides principally the contractile or propulsive

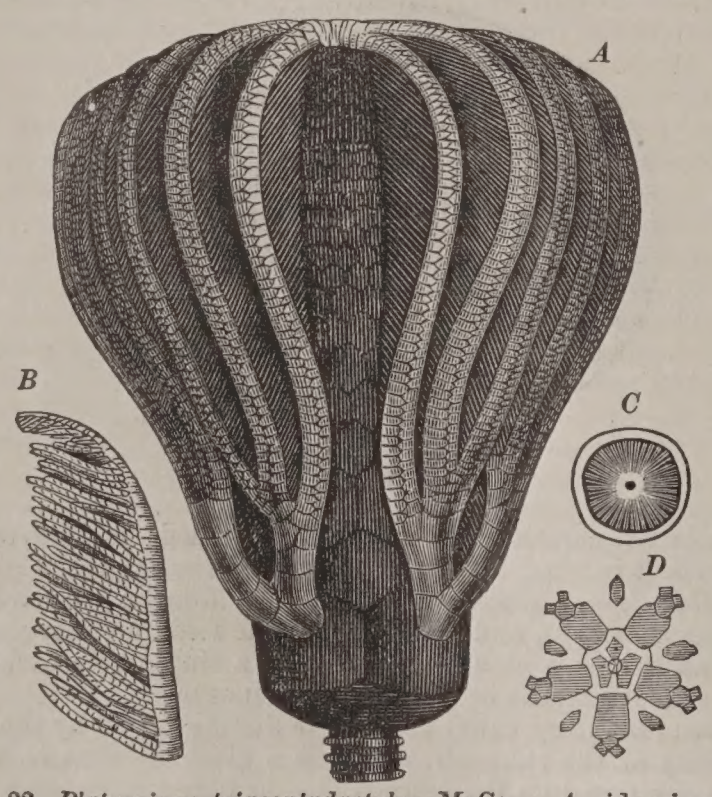


Fig. 22. *Platycrinus triacontadactylus*, McCoy: *A*, side view; *B*, terminus of arm; *C*, articular surface of a stem-segment; *D*, structure of the basin or body.

activity. This centre is in the lowest forms simply a tube, but is greatly specialized in the highest forms. We may divide the system into the systemic, the water-vascular, and the lymphatic systems. The second is found in the aquatic invertebrates, and the last in vertebrates only.

The systemic circulatory tubes first appear in Cœlenterata. In Protozoa the contents of the body are in motion, and probably a small pulsating vesicle contributes to this end. In no cœlenterate class excepting the Medusæ do the tubes appear as isolated; they have been already described as radiating from the stomach or the adjoining body-cavity, and continuing round the margin of the disk as a single tube. The Echinodermata possess a true circulatory system, with a well-developed water-vascular system. The vessels of the former are not derived from the stomach, but form an isolated series. The peculiarities of the classes are as follows:

a. Vessels arising from a basal sac, which connect by a short tube with stomach; vessels radiating, penetrating the pieces and arms: Crinoidea.

aa. From an oral ring.

b. Superior and inferior oral and anal rings: an asymmetrical heart, emptying into the former; no respiratory artery; stomach-arteries (five) collected into two, which enter superior ring at point of entrance of heart: Asteroidea.

Rings and heart connected by marginal intestinal artery: Echinoidea.

bb. Only oral circulatory ring: no heart; distinct respiratory artery (where lungs exist); intestinal arteries gradually disappearing posteriorly: Holothurida.

In echinoids and asterioids there is a septary column extending from the upper to the lower surface, unsymmetrically near the middle line. In a fold of it are placed the shell-canal of the water-circulatory system and the heart. The latter has a narrow opening into the oral ring, which from this fact is termed arterial. The opposite end of the heart communicates by a duct with the superior anal or venous ring. The arterial ring is the smaller and more muscular, and lies between the more superficial nervous ring and the deeper water-canal ring. In the asterioids it sends an artery along the median line of each arm below. The venous ring is larger, and sends two vessels, one on each side of each arm. In Holothurida the vessels are delicate and not largely developed. In all classes the tubes are without cilia internally, and have a wave-like pulsation in life.

The water-circulatory system is greatly developed in the Echinodermata, and forms the basis of their means of movement from place to place. Its central organ consists, first, of a ring canal, which surrounds the œsophagus within the arterial ring; secondly, of a calcareous (or shell) canal which rises from a point on the ring canal to the dorsal (or anal) side of the body, and terminates in a peculiar shield, the madrepore plate, which is perforated by numerous pores. In the Holothurida, where the body is elongate, this shell canal does not reach the posterior end of the body, but terminates freely in its cavity, sometimes in one, often in many tubes, each of which terminates in a madrepore plate. The peripheral system consists of five vessels, which arise from the ring canal, and run at equal distances along the interior face of the body-walls (on the medial line of the arms in Asterioidea), and send branches right and left. These terminate in a large hourglass-shaped sac on each side in Asterioidea, the "ampullæ," or in numerous smaller ones in Holothurida. These project through pores (ambulacra) between the plates, hollow processes which frequently are enlarged as a wart at base or end, and which are used as feet. They are regularly arranged in bands in Asteriida and Echinida, but in some holothurians are distributed in patches (*Psolus*) or all over the body, or in two kinds—one dorsal, the other ventral (*Holothuria*). They are retractile and protrusible by erection. The interior of the water-vessel system is covered with cilia. In all the classes the œsophageal ring communicates with "Poli's vesicles," small bladders situated round its circumference.

In Mollusca and Articulata the arterial and venous vessels are not universally continuous at their extremities by capillaries, as in Vertebrata, but the circulating fluid is emptied into cavities of the connective tissues or lacunæ, whence it is taken up by the extremities of the veins by suction. In some of the highest forms of both (Cephalopoda, Pedipalpi) the capillary vessels are numerous. The prominent peculiarities of the classes in respect to circulation may be indicated as follows:

A. No distinct central organ or vascular system.

a. No lacunary canals; liquid moves in continuous inner concavity of body, without definite direction and with doubtful external orifice: Bryozoa.

aa. Vessel-like lacunary system; five large sinuses; post-abdominal and foot largest; anal (annular) throat and buccal smaller; two mantle-edging vessels: Scaphopoda.

AA. A distinct heart.

a. Neither arteries nor veins; no chambers to heart; a system of canal-like lacunæ decussating from a dorsal and ventral principal; one through the gill-sac, and with fine body ramifications, continuous with each other; two (sometimes more) from heart: Tunicata.

aa. A venous system; no branchial auricle or gill-hearts; one ventricle, and a false heart on each mantle artery: Brachiopoda.

One branchial auricle; no gill-hearts; one branchial artery; ventricle embracing the intestine: Gasteropoda.

Two branchial auricles; no gill-hearts; two branchial arteries; ventricle embracing intestine: Acephala.

Two branchial auricles, and two hearts or expansions on the two branchial arteries; a circulus cephalicus; ventricle not embracing intestine: Cephalopoda.

aaa. No venous system, or a rudiment rarely; branchial veins and arteries: Crustacea.

AAA. No distinct heart; a longitudinal dorsal sinus, more or less subdivided.

a. No pulmonary arteries or veins; no venous system: Insecta.

aa. A pulmonary artery and vein; no venous system: Arachnida-Aranea.

A venous system: Arachnida-Pedipalpi.

In Acephala and Gasteropoda the ventricle receives the contents of certain veins direct, without aëration in the gills; hence the blood forced into the aorta is, as in most reptiles, of a mixed character. In Cephalopoda all the venous blood passes through the gill-hearts and gills, and

is oxygenized before returning through the auricles to the ventricle. In a few Gasteropoda there are two auricles, as *Haliotis, Fissurella, Chiton.* In a few Acephala (as *Ostrea*) the ventricle does not embrace the intestine.

In Gasteropoda the vessels of this system form extensive ramifications in the foot. They have moreover communication externally by pores, which enables them to absorb large quantities of water. By means of this water-vascular system the foot is inflated, as in erectile tissue, to a size which would forbid its withdrawal into the shell were it not for the power of expulsion of the water.

Among Arthropoda, the decapod Crustacea and the pedipalp Arachnida only possess a complete circuit with veins

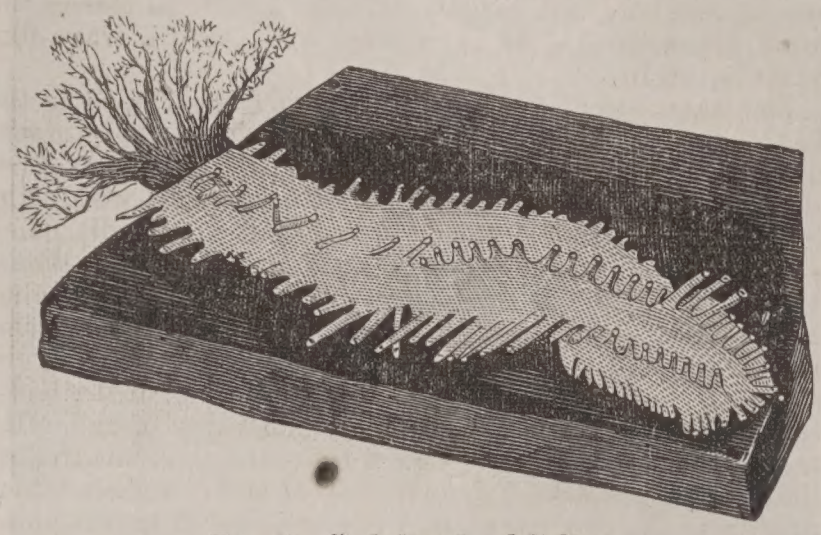


FIG. 23. *Cladodactylus doliolum.*

and capillaries. In the former the heart sends two aortas forward and two backward; the larger (inferior) of the former is the aorta cephalica, and supplies the head; the two posterior are the aortæ abdominales superior and inferior. A large sinus in the bottom of the anterior abdomen gives origin to the branchial arteries. In Myriopoda the dorsal trunk gives off a pair of lateral trunks to each segment of the body. From the anterior section of the dorsal trunk in Chilopoda the lateral arteries unite beneath the œsophagus and give rise to a longitudinal vessel which accompanies the abdominal nervous axis. In insects the lacunar currents of the body are four principal ones—*i. e.*, one beneath the dorsal trunk, one along the nervous chain, and one along each side. The blood also circulates outward in the tubular ribs or nervures of the anterior part of the wings, and returns along the posterior.

2. *In Vertebrata.*—In the fishes generally the heart is the right or venous heart (except in Dipnoi), but always there are vessels passing directly from the gill-veins into the aorta, whether the gill-veins return arterial blood to the ventricle (making mixed blood) or not (leaving venous blood). The first case occurs among Dipnoi; the second in *Monopterus* (apodal). In *Amphioxus* the usual trunk-like divisions of the heart are blended into one chamber. The gill-artery is rythmical, pulsating, as also the origin of the special gill-arteries; so also is the portal vein, which has the same peculiarity in *Myxine.*

The aorta often forms no distinct isolated circulatory trunk. Sometimes arterial blood passes through a cartilaginous canal, which inwardly is only isolated by perichondrium, as in *Acipenser* and *Spatularia.* In other fishes it is also not isolated, but with its dorsal face (on which an elastic longitudinal band runs) let into the vertebral column (*Esox, Salmo, Silurus, Alosa,* etc.). Many arteries subdivide minutely into retia mirabilia, then continue from the reunited vessels. The arterial blood of the Chorioidea of most fishes must pass through such structure twice before passing into its branches.

In the venous system, not only in the veins that pass to the liver, do the stems lose themselves in capillaries, in order to be again collected into one or more trunks to go to the heart, but in many fishes this structure prevails in most of the veins of the body. The vena caudalis and the intercostales very often subdivide minutely and mix with (or surround) the renal, suprarenal, and other arterial glanduliform bodies, before they return to the veins for the heart. Many veins of walls of the trunk, of the swim-bladder, and of the generative organs appear as roots of the portal system. These structures delay and prolong the venous circulation.

Stagnation of venous blood-currents is common, also blind closings of veins and obliteration of connecting trunks; and at certain periods the so-called "blood-corpuscle-holding" cells and membranes are met with—*e. g.*, in the kidneys. The blood-corpuscles one often finds involved in transformation or degeneration. The formation of exudations occurs not seldom; the transformation of blood-corpuscles into pigment-cells often follows. (These arrangements appear not only as metamorphoses of the blood, but also as favoring rejuvenation of the organic substance and new construction. The great periodical changes, repeated yearly in the increase of the contents of the generative organs, which the animal undergoes, the extraordinary circumference of body which many can reach in high old age, as also the destruction and perforation of the organic substance which parasites produce, and which demand a restitution, is not yet sufficiently estimated. Blind terminations of capillaries have been shown in the skull-cartilage of *Acipenser.* The change of blood-corpuscles to pigment-cells is seen in the kidneys of *Cottus, Pleuronectes.* In Leptocardii the portal heart is behind (above) the colon; it pulsates from behind forward. It bends sharply forward, and empties into the gill-artery heart, taking up the venæ cavæ during the curve. The gill-artery heart is straight, equally thick, its cavity without the pericardium longitudinal in the median line, beneath the whole length of the gill-membrane. From it emerge regularly (alternating as beginnings of the gill-arteries) small contractile bulblets in the intervals between the pointed arches of the gills. From the latter the blood through the gill-veins is transferred into a dorsal contractile aorta. Independently of what passes through the gills, a part of the blood is led directly into the aorta by two contractile arterial bows (one on each side of the posterior end of the oral cavity), which issue from the gill-artery heart. These aorta-bows exist also in *Amphipnous,* where each gill-arch that does not bear a gill contains an arterial bow. In *Monopterus* one-fourth the blood passes the gills and traverses an arterial bow in the fourth gill-less gill-arch. The portal-vein heart extends the whole length of the intestine. It is straight, and continued on the colon anteriorly between the gills, then becomes narrower and terminates. It pulsates from behind forward, with pauses (as in the gill-heart) of about a minute. The venæ-cavæ heart is on the dorsal side of the intestine, from the anterior point of the colon, increasing posteriorly to the end of the colon, where it suddenly turns over into the gill-artery heart. Its contraction alternates with that of the inferior or portal-vein heart. This colon (which is green) is equivalent to the liver, and gives blood to the venæ-cavæ or portal heart. On each side of the aorta, on the upper arches of the gills, is a vena cava descendens, which meets a posterior vein (vena cava ascendens), and together they empty themselves into the curve of the venæ-cavæ heart just before entering the gill-artery heart. The blood is colorless.

In Dermopteri, Elasmobranchii, and Actinopteri the muscles of the heart are always of striped tissue. The right or venous heart has the following divisions: an auricle receiving the united veins through a sinus venosus; a ventricle; and a bulbus arteriosus. There are valves between all these. In Demopteri the auricle is more roomy than the ventricle, and is separated from the sinus by a membranous double valve; it has two membranous valves in the ostia venosa and ostia arterialia, each. From the latter proceeds the truncus communis branchialis, which is somewhat "bellied" at its origin, but has no evidence of muscular structure.

In Elasmobranchii and Ganoidea there is a bulbus arteriosus, similar in possessing a ring-like layer of striped muscle-tissue, which ceases abruptly at the boundaries of the gill-arteries, and in numerous valves which are affixed by threads. There are two cross-rows of these in *Chimæra, Carcharias, Scyllium,* and *Galeus;* three in *Sphyrna, Mustelus, Acanthias, Alopias, Lamna, Rhinobatus,* and *Torpedo;* four in *Hexanchus, Heptanchus, Centrophorus,* and *Trygon;* four to five in *Raja;* five in *Scymnus, Myliobatis, Pteroplatea,* and *Squatina.* In Ganoidea there are two at the commencement and one at the end of the bulbus; there are nine in *Polypterus,* each of which contains three complete and some abortive veins; there are fifty-four to sixty in *Lepidosteus bison.* In *Amia* there are but three rows; the two inferior, in the bulbus, with two large and two small valves; the superior with only two.

In Teleostei there is no striped muscle-tissue on the outer layer of the bulbus, but an elastic material of thread-bundles, which is produced into pillars on the inner side. There is one pair of valves at the ostium bulbo-ventriculare; between these are sometimes one or two smaller adjoining valves. The only exceptions are species of *Butyrinus,* where there are four valves in two rows, with no muscular bundles round the bulbus. In Teleostei, sharks, and in Ganoidea-Holostei there is a pair of valves at the ostium sino-auriculare, often attached by strong threads. In *Acipenser* there is a ring-like valve in two parts—one with four, the other with five pockets, each one attached by a strong thread. The large, expansible, thin-walled auricle has usually on one or two sides an auricula. Within it are numerous trabeculæ carneæ. The ventricle is on the abdominal side of the auricle. The latter in passing over it is narrowed sometimes (*e. g.*, in *Petromyzon*) for some length. There are usually two valves in the ostium arterio-ventricu-

lare, sometimes four in *Orthagoriscus* and *Acipenser*. The ventricle is thick, with the muscle-structure in two layers. Within are various parietal depressions, ribs, etc., between the muscles.

The heart's position is usually between the claviculæ, which form in Goniodontidæ a kind of transverse bony septum. In Apodes, and particularly in Symbranchii, the heart is more posterior. In Plagiostomi it lies in its sac immediately under the elongation of the copulæ of the gill-arches, which pass through the cartilago-subpharyngea impar. In *Petromyzon*, with the pericardium, it lies in a sort of incomplete capsule, which is separated from the gill-cavity by muscles forming a kind of diaphragm.

The heart-capsule (in all fishes except Leptocardii) is fibrous, is attached to the bulbus arteriosus, and often sends threadlike processes to the heart proper, which are often tendinous, sometimes accompanied by blood-vessels, as in *Anguilla*, or are blood-vessels only, as in *Acipenser*.

In Dipnoi the auricle is externally one, internally divided by an incomplete septum. Into the left auricle enters the vena pulmonalis, at whose entrance is placed a semilunar valve. There is no valve at the ostium atrio-sinosum. From both auricles the ventricle is entered by a common ostium, which has a valve. The ostium possesses a papillar muscle, which is bound with a thread-cartilage which closes the ostium during systole. The bulbus arteriosus (without valves at its origin) forms a curve. It contains two lateral, longitudinal spiral foldings of different lengths, which fade away at their extremities.

In Actinopteri-Chondrostei, on the upper surface of the heart, are numerous bottle- or vesicle-shaped elevations, which are of different sizes in different or in the same animal, sometimes large, sometimes almost wanting. A varied number of arterial vessels from the subclaviæ and mammariæ penetrate the heart-sac and distribute themselves to these elevations, which have various arrangements. These surround bladders which involve their entering arteries in rosy, spongy tissue composed of granules and meshes of fibre and cells containing granules. From the bases of these, vessels enter the heart. This cellular structure is sometimes surrounded by fluid. An elevation frequently contains these bladders, each of which is filled with either cells, nuclei, or liquid. They are connected to the cellular structure by pedicels. These structures may be for the renewal of the muscular tissue of the heart.

In general, on the trunks, except in the Leptocardii, from the anterior extremity of the bulbus arteriosus (which is external to the heart-sac), there issues an incontractile "gill-artery trunk," from which on each side issue directly or indirectly, through other communicating trunks, the branchial arteries.

In myxinoids the truncus communis branchialis is variable, running in a membranous cavity which surrounds the anterior end of the ventricle and projects into the membranous pouch that envelops the gill-sac. Each gill-sac contains an artery which forms a circle at the entrance of the gill-branches, and sends off radiating arteries. In *Petromyzon* four arterial branches on each side leave the truncus communis branchialis, which divides anteriorly into two trunks, each of which divides into three arteries, and an anterior twig is sent to the anterior row of gill-lamellæ. The special branchial arteries pass (except the first and last) between the two gill-pouches, and give their branches through diaphragms to the gill-arches.

In Plagiostomi, from the truncus branchialis communis there issue on each side one or two trunks, each of which afterwards divides into two. In *Raja* and *Pristis*, where one goes off, it divides into three, and the terminal portion into two. In *Pristis* the first of the three runs forward to the trunk in the cartilage, and is taken up by it. The special branchial arteries issuing from the primordial trunks pass between the two rows of gill-laminæ, which are in separate gill-sacs, a special artery supplying the anterior hyoid gill. In many ganoids (*Lepidosteus*, *Acipenser*) the first gill receives the first branch from the arteria branchialis, and the last gill the last branch. In these the branchial arteries run towards the first gill, then bend posteriorly and give off branches successively. In *Spatularia* the first gill receives the second branch, the second gill the first branch, the others regularly. The arrangement in *Amia* is as in the Teleostei.

In Actinopteri the gill-artery stem runs forward in a canal beneath the copulæ of the gill-arches, which bound it above; laterally it is bounded by processes of the same; beneath by the culiform membrane (which latter is wanting in Apodes). Often (*e. g.*, in *Salmo*) it gives off first a common stem, which divides to the fourth and third gill-arches; then gives one to the second arch, and one to the first, by the forking of the trunk. But (*e. g.*, in *Murænophis punctata*) two distinct branches of the common trunk can be given to the two posterior gill-arches. In Dipnoi two trunks leave the branchial artery on each side: (1) a common vessel for the half gill and the two gill-less "visceral" arches, and (2) a stem for the posterior gill. The first divides in two, which as aorta-bows unite under the skull to form an aorta-root. The first aorta-bow gives off a branch for the half gill, which sends off the carotid before entering the half gill. The aorta-bow gives off also a posterior carotid before union with the posterior aorta-bow. From the second goes

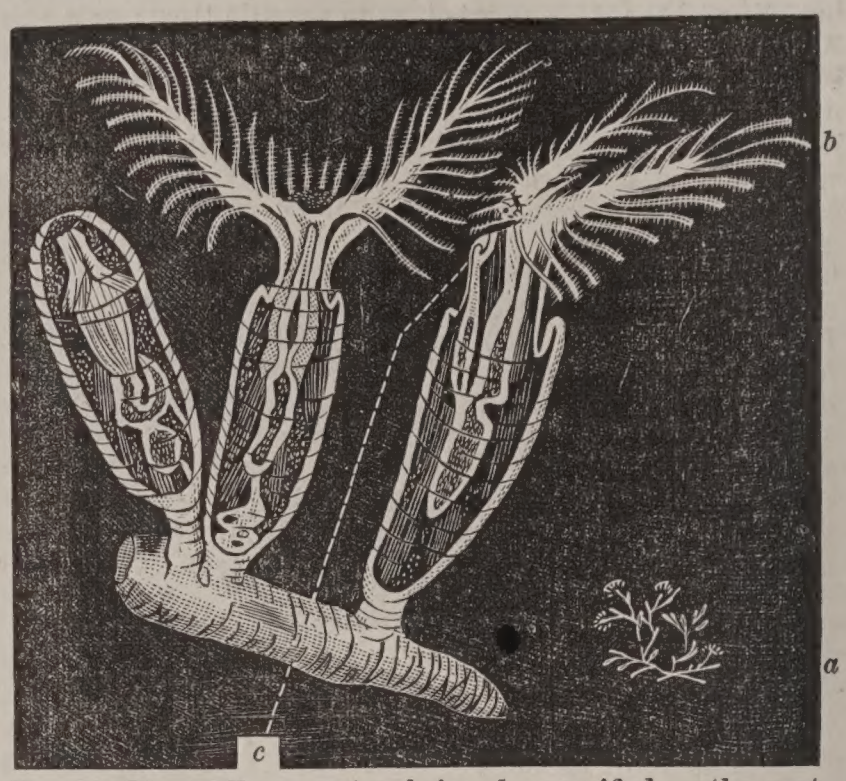


FIG. 24. *Plumatella*: *a*, natural size; *b*, magnified; *c*, the vent.

an artery for the fibres of the external gill. The second trunk divides into two gill-arteries for the fourth aorta-bow. The extremities of both become arteries for the outer gill-threads. The last gill-artery from its upper extremity gives off a branch for the posterior half gill.

The gill-veins unite (in the absence of an arterial heart) for the construction of the great arterial trunk. But often arterial trunks for the body go immediately from the gill-veins. The carotid arteries leave the gill-veins. In myxinoids the gill-veins, after leaving the gill-sacs, form a median trunk, which is prolonged posteriorly as an aorta and anteriorly as an arteria vertebralis impar. All or most of the gill-veins are connected by a trunk running parallel to the aorta, which is continued anteriorly as the arteria carotis communis. Both carotids accompany the œsophagus forward, giving branches to it and to the hyoid region. Each divides behind the head into the arteria carotis externalis (for the tongue and the muscles of the head), and the arteriæ communes internales, which unite, forming a bow, at the origin of the vertebral column, which receives the vertebralis impar; from the latter originates a median head-artery, which, extending anteriorly, gives off branches for the nose, etc. In *Petromyzon*, with the exception of the first and last, each gill-vein issues from the interstitium between two adjacent gill-sacs. There is no arteria vertebralis impar. The carotis communis rises from the first gill-vein, which sends another branch to the formation of the aorta. Each carotid divides into an external and internal; the two internal carotids do not unite to form a median head-artery.

In other fishes each gill-vein originates from the two connected "gill-leaf rows," except those from the two half gills. In Elasmobranchii all or most of the gill-veins come together to form the aorta, either immediately or after the union of some (thus forming homologues of the aorta-roots).

The arrangement of the carotids is various. In *Chimæra* the first gill-vein from the half gill forms the posterior carotid; the second, which like the rest contributes to the aorta, sends off the carotis anterior. In *Raja* the posterior carotid originates from the aorta-root which is formed by the union of the two first gill-veins. It runs in the canalis spinalis. The carotis anterior originates from the vessels of the pseudobranchiæ of the spiracle. In *Chimæra* and Rajidæ the posterior carotids remain ununited; wherefore no anteriorly united circulus cephalicus exists. In the sharks they run under the base of the skull, and unite and give origin to the cerebral artery.

In the Ganoidea there are various arrangements of the gill-veins in the formation of the aorta. The carotids are as in Plagiostomi. (See *Raja* above.) In *Lepidosteus* there is a third cerebralis from near the origin of the aorta. In it the union of the anterior gill-veins is the origin of the aorta. The second pair unite below this, and forming a thicker trunk receive the first aorta. The third pair unite below the union of the second pair and the aorta origin, and forming a still thicker trunk, receive the second stem,

all forming three steps in profile. The sections would be—first ○, second ♋, third ♌. The posterior carotid comes off anteriorly to the mouth of the third pair of gill-veins. The subclavians are vessels disproportionately large; they come off on each side a little behind the embouchure of the posterior gill-vein tube, take the place of the cœliac and superior mesenteric arteries, and send a branch to the stomach, which does not give a strong branch to the spleen, but approaches the pylorus as a bundle of little vessels. In Actinopteri, by the gill-veins is formed a complete arterial circle (circulus cephalicus) without the cavity of the cranium. The gill-veins of each side unite to form the commencement of the aorta, and run together anteriorly as the sphenoideum, through a cross anastomosis. This circulus can be wider or narrower. It is the former when all the gill-veins of each side unite into the aorta-bow, and where both bows are connected anteriorly by a cross trunk, and unite posteriorly to form the aorta, as in *Gadus* and *Lota*. It is narrower when each of the bows forming the aorta is formed from the anterior gill-veins only, and where the hinder gill-veins enter the aorta; *e. g.*, *Scomber*, *Salmo*, etc. The aorta is sometimes independent, free, entirely surrounded by strong tissue, as in most Teleostei, sometimes in a canal of the processes of the vertebræ, without the usual distinct trunk-envelope; sometimes it is in a canal inferior to the vertebral column, with the superior surface

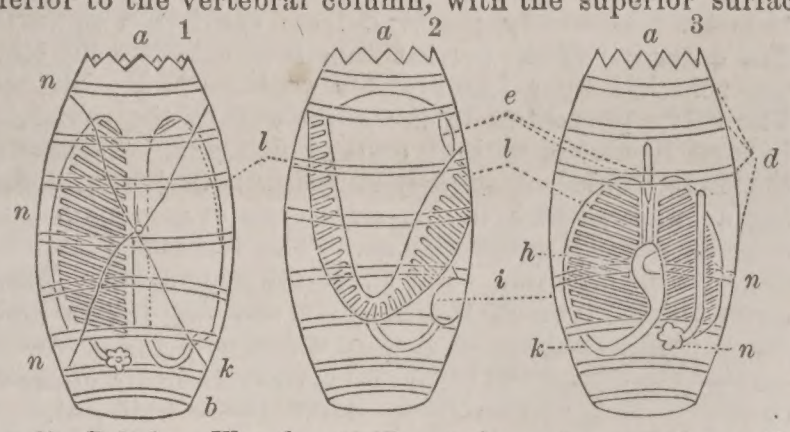


FIG. 25. *Doliolum Ehrenbergii*, Kr.: 1, from above; 2, from side; 3, from below; *a*, mouth; *b*, vent; *d*, annular muscle-bands; *e*, endostyle; *h*, œsophagus; *k*, intestine; *l*, branchial membrane; *n*, nervous system.

thin walled. The commencement of the aorta, in which the gill-veins empty, is under the cranium, first enclosed superiorly by the basilar cartilage. A short section is enveloped below by a fibrous membrane, but soon it is enclosed beneath by the vertebral arch elements, which are arched upward and supplied with intervertebral cartilage. Along the whole length of the aorta-canal there runs in its cavity, from the base of the skull, an elastic band which adheres above to a skin-fold whose continuation as a very thin perichondrium lines the inner side of the canal, to which it closely adheres.

In the Squalidæ and many Actinopteri the aorta is embedded in a gutter of the vertebral bodies. On the side of this there are (in *Esox*) fibrous longitudinal ridges. In these the aorta possesses an external skin on the inferior surface only. It appears from point to point swollen with sinuses. Each such swelling is separated from that succeeding by a contraction. There is a small cross bridge of thread tissue within from one lateral ridge to another. Within the canal is found (in *Esox*, Clupeidæ, Salmonidæ, *Silurus*, etc.) a fibrous longitudinal elastic band, as in *Acipenser*. It commences at the skull beneath, and extends along the whole vertebral column. As an immediate continuation of the basis of this is the elastic artery-envelope. Although in Eventognathi the aorta is more isolated from the vertebral column, and the fibrous longitudinal band is absent, it yet exhibits sinuses in regular position. When the aorta is free it does not always run under the median line; in *Belone* it is on the left side.

In Reptilia and Batrachia the aorta is formed of two roots (which do or do not result from more than one pair of aorta-bows) from the bulbus arteriosus, and which embrace the œsophagus. A ramus communicans anterior exists between the carotids. Each corresponding branch of the aorta either becomes an intercostal artery, or enters the intervertebral foramen for the spinal canal.

The Batrachia have a carotid from each anterior aorta-bow, and a pulmonalis from each posterior aorta-bow. In all Urodela aorta-bows, either united or directly or indirectly issuing from the bulbus arteriosus, contribute to the formation of an aorta-root by the perennial rami communicantes on each side. The Trachystomata agree with fishes in the arrangement of the greater vessels. The bulbus arteriosus upon issuing from the ventricle makes a bend to the right side, and is thereafter in its longer portion straight. At its fore end three arches on each side issue, which are functionally gill-arteries. Through the union of three corresponding gill-veins into one stem an aorta-root arises, two of which form the aorta. The anterior gill-vein sends out a carotid, the hinder a pulmonic artery. The Proteidæ have the system differently arranged. The bulbus is divided into two diverging branches, each of which results in two aorta-bows. The anterior follows the first gill-vein; the second divides in two, of which the anterior follows the second gill-vein; the posterior the third. Each of the two aorta-bows proper consists of an uninterrupted continuation and a respiratory portion. The third bow wants the direct continuation. The three respiratory portions each consists of a gill-artery, intermediate respiratory vessels, and a gill-vein. The two anterior gill-veins of each side empty into the continuation of the original aorta-bows. The third gill-vein passes over into the continuation of the second aorta-bow. The continuation of the two primitive aorta-bows and the second and third gill-veins forms an aorta-root. The point of confluence of the aorta-roots lies over the heart. The anterior vessel which results from the union of the continuation of the anterior aorta-bow and anterior gill-vein has two branches—an arteria hyoidea mandibularis and a carotis interna anterior. Each aorta-root formed from the second aorta-bow possesses a postero-cephalic elongation forward, which gives off a carotis posterior, and forms the commencement of an arteria vertebralis. The aorta-root gives off posteriorly a visceral artery, which, after branching for the œsophagus, is destined to become a spermatica interna. From the single aorta proceed subclavian arteries, which are continued as the epigastric, gastric, cœliac, many small mesenteric, renal, and symmetrical iliac vessels. Besides there are pairs of dorsal arteries, which pierce the transverse processes on each side, and emerge in the longitudinal vertebral artery. In *Protonopsis* four vessels on each side go directly from the bulbus arteriosus. They follow the gill-arches. The anterior sends branches to the tongue, and finally becomes the carotid. The two middle vessels form the aorta-root, and, after giving off branchlets for the head, unite close behind the cranium. The fourth vessel bends over the œsophagus, gives it branches, gives a branch to the third aorta-bow, and becomes the pulmonic artery. In Salamandra in the neighborhood of the pharynx is placed the somewhat forward-curved bulbus arteriosus. From its anterior enlargement go on each side four aorta-bows with three mouths. The three posterior bows on each side form aorta-roots which are prolonged anteriorly. The union of both bows into an aorta occurs behind the skull, beneath the first vertebra and above and before the heart. The issuing point of the arterial twigs on the anterior bow is an enlargement—the so-called carotid tumor (or gland). The branches issuing from it are the arteria hyoideo-mandibularis and carotis. The latter divides into the cerebral and occipital. An obliterated continuation of the anterior aorta-bow, binding it to an aorta-root, is called ductus Botalli. The fourth aorta-bow, whose mouth is that of the third, sends off a visceral artery which gives branches to the pericardium and œsophagus, and becomes the pulmonalis. From the aorta-roots issue the arteria maxillaris interna from its anterior prolongation, and the arteria occipitalis to the occiput and glandula auricularis. The aorta is under the vertebræ, and descending gives off the subclavian and intercostal (in pairs), the gastric, cœliac, mesenteric, and numerous renals. Between the kidneys go off the iliacs (which give off the femoralis and epigastrica), and a cloacal branch which is continued as a caudal artery.

In the Anura, on each side are three bows, of which the foremost and hindmost do not contribute to form the aorta-root, which is a continuation of the middle bow. It unites with that of the other side far posteriorly. Two pipes issue from the bulbus. There is one semilunar valve at the base of each. Each of these vessels is internally divided by two partitions into three canals, and each partition is prolonged to the wall of each issuing vessel. At the farther end of the anterior of these canals is an enlargement (carotid tumor), from which issue the arteria hyoidea (lingualis) and the carotid. The latter is divided into ophthalmic and cerebral branches, which last enters the cranium and has anterior and posterior branches. The latter form the basilar, which becomes the anterior spinal artery, into which below the supravertebral vessels empty. The middle canals form the aorta-roots. The right is large, but the left small, after giving off the cœliaco-mesenteric artery, which is so large as to appear like its proper continuation. The third canal gives off two branches. The first, after giving branches to the ramus mandibuli and shoulder muscles, becomes a strong cutaneous vessel, which, with its accompanying vein, running between the levator and anterior adductor muscles of the humerus, gives off branches to the integument of the whole back. The second branch is the pulmonic. Each aorta-root before their union gives off other branches to the larynx, œsophagus, and shoulder, also a subclavian and a supravertebral artery, which runs longitudinally,

crossing the diapophyses, and giving a branch to each intervertebral foramen. The left root also gives off a cœliacomesenteric artery. Union of the aorta-roots takes place opposite the sixth vertebra. The descending aorta gives branches for the kidneys and generative organs. To the two latter go five and six vessels. Each gives a branch to the kidney on one side and to the genitals on the other. Division into common iliac arteries then takes place. In the Gymnophiona, *Cæcilia* have a long muscular bulbus, at whose narrow origin are valves. The cavity is divided by a septum at its anterior extremity into dorsal and ventral chambers. The dorsal terminates in the arteria pulmonalis for the lung; from the ventral proceed two aorta-roots, each of which near the trachea reaches to the hyoid apparatus, and forms a bow behind the skull, from which the carotids proceed. The union of the aorta-roots is hypaxonic, above and a little before the heart. Each root gives off intervertebral (mostly obliquely directed forward) and vertebral arteries.

In *Reptilia* there is a completed form of heart. The division of the auricles is externally visible. The division of the ventricles is partial or complete. In embryonic forms

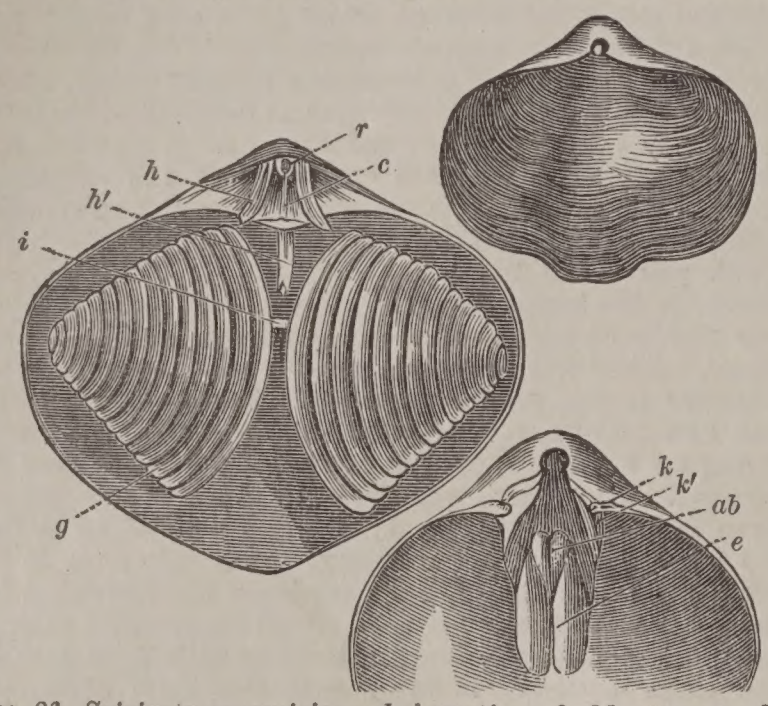


FIG. 26. *Spirigera concentrica: ab*, insertion of adductor muscles; *c*, of divaricator muscles; *e*, of adjustator ventralis; *g*, branchial arms; *h*, hinge-sockets; *i*, gill-bridge; *k*, hinge teeth; *r*, tubular body.

the position of the heart is near the gill-slits. This state is characterized by the presence of several aorta-bows which embrace the œsophagus, and form the aorta-roots by successive obliterations of most of the aorta-bows and their connecting anastomoses. There is a ductus Botalli, so that each aorta-root is permanently formed, either through confluence of two aorta-bows, or it is a continuation of a single trunk.

In Lacertilia, Ophidia, and Testudinata, in the ventricle are found fleshy columns of various sizes, which enclose spaces opening into a common cavity. The septum ventriculorum (more or less incomplete) is connected to the sides of the ventricle by tendinous or fleshy cords. The left ventricle is narrower, more dorsal, thick-walled, communicating with the left auricle; the right is broader, straight, ventral. That into which arterial blood enters, and which, as regards its position, is homologous with the left ventricle, is called the cavum arteriosum; the right is the cavum venosum. No trunks arise from the first. From the cavum venosum there issue by three ostia the arteria pulmonalis and two trunci arteriosi, each ostium having three semilunar valves. The space between the orifice of the arteria pulmonalis and those of the trunci arteriosi is the originating point of a flap or muscular valve which extends towards the right border of the ventricle. This divides the cavum venosum into two incomplete cavities, an anterior and posterior, which are completely separated by the systole, during the latter part of which it shuts the entrance to the arteria pulmonalis. A simple bulbus arteriosus is wanting, but its place is supplied by the confluence of the bases of the three great vessels, which are then separated by simple walls. This arterial trunk, containing a cone, is covered by the pericardium, and wants (except in some Testudinata) the striped muscular walls.

In Lacertilia the heart is not far removed from the hyoid region. It is farthest in *Amphisbæna;* among Lacertilia it is farthest in the Varanidæ. Among Varanidæ the septum atriorum is nearly complete, except near the ostium venosum dextrum. Among Pachyglossa, Geccotidæ, Chalcidæ, and Scincidæ, the septum is very incomplete. The walls of the great vessels are united near their origin. A peculiarity of most Sauria is that each aorta-root takes up the common carotid from an arterial trunk which originates afterwards, so that each aorta-root is formed by the union of two aorta-bows as follows: The trunci arteriosi continue, the right as an aorta-root, the left the same after giving off the truncus impar, which divides into the carotids. Each of the latter gives off near its basis an outward directed arterial bow, which empties into the aorta-root of its side. It constitutes thereafter a primitive aorta-bow, whose original branches are the carotids. This occurs in (1) *Scincus, Anguis, Pseudopus, Lacerta, Ameiva, Platydactylus, Uromastix, Iguana*, etc., and the aorta-bows from the truncus impar are obliterated, while they are utterly wanting in (2) Varanidæ, Chamæleonidæ, *Amphisbæna*.

In the hearts of serpents the form is elongate, and is far removed from the hyoid region. The end of the pericardial sac appears confluent with the serous lining of the thorax. The cavum venosum arteriosum is always incomplete. The walls of the three trunks are separate, as far as is known. The left trunk continues as the aorta-root without branches; the right gives off the coronaries, etc.; then, where it turns itself posteriorly, a subvertebral anterior branch; then numerous intercostals.

The truncus caroticus impar divides into two arteriæ carotidæ communes, of which the right is scarcely visible in some species; but when visible it may be smaller than, equal to, or larger than, the left.

The Testudinata have the heart broad, abbreviated posteriorly, and widely removed from the hyoid apparatus. The outer sac of the pericardium is attached to the end of the ventricle by a band which encloses the portal vein. The valve, stretching to the right wall of the ventricle, is in some furnished with an ossified cartilage. The walls of the three trunks are slightly united near their origin, forming a bulbus, which in *Emys Europæa* is surrounded by a ring of striped muscle-tissue. The truncus dexter soon after its origin gives off a short anterior arteria innominata, which gives off the carotids and subclavians. The truncus sinister gives off (before union with the dexter) the cardiac branch for the heart and œsophagus, also the gastro-epiploica and mesenterica. After these branchings the aorta-root is narrow. Each carotid gives off (1) the hyoidea (for the pharynx, trachea, larynx, hyoid, and lingual regions); (2) the mylohyoideæ; (3) the carotis externa; (4) the carotis interna; and (5) the intervertebrales, which pass through the foramina intervertebralia to the arteria spinalis. The posterior cervical, the dorsal, and caudal pass from epaxional trunks. The cervical is a single vessel which passes from the carotis externa to the subclavian. From each side the neck there runs to the rump, over the diapophyses in the canal covered by the carapace, a trunk, which, besides the intervertebralis, gives off arteries analogous to the intercostals. The continuation of this is a caudalis, superior to the diapophyses. The intercostals of each side open into a lateral longitudinal trunk, which communicates anteriorly with the subclavian, posteriorly with the iliac vessels. From the aorta proceed symmetrical spermatic, suprarenal, iliac, renal, and hypogastric vessels. It is continued as the caudalis inferior.

The Crocodilia have a complete septum ventriculorum; the right ventricle anterior; each ventricle emitting its respective truncus arteriosus. There is an opening connecting the trunci arteriosi (which corresponds to the bulbus arteriosus), by which arterial and venous blood are mixed. The heart is over the sternum; the left ventricle is thick walled; the right more capacious, reaching to the apex. The right contains a muscular fold which is stretched from a septum behind the origin of the pulmonary artery to the outer wall. It has two valves at each ostium venosum. From the left ventricle issues the truncus arteriosus dexter; from the right ventricle the truncus sinister and pulmonalis. These two trunks are separated at their origin by a common septum; at the origin of each are two semilunar valves. The walls of all three are united between the trunci arteriosi near the semilunar valves. Before uniting, the trunci arteriosi give off the dexter truncus innominatus and subclavia dextra. From the truncus arteriosus sinister, near its union with the dexter, issues the cœliac artery; it then becomes much narrower. The common carotid divides near the head into two branches. Besides these there are other branches to the larynx, neck, tongue, and other parts.

In Aves (birds) the septum ventriculorum is complete. The heart's position is in the middle line of the thorax, its axis parallel with that of the body, its apex between the lobes of the liver, the heart-sac attached to the membrane of the lungs. The auricular appendages do not project, but are tightly drawn down. The right auricle is stronger and with larger appendages than the left. They have comb-shaped muscular columns or ridges. Into the right auricle empty the venæ cavæ. At the mouths of the veins are weak muscular flaps which are attached to the pectinate muscles, whose contraction assists the passage of venous blood into

the right ventricle; the fœtal foramen ovale is closed. The chambers of the ventricles are not very different in size; they do not reach the apex. The septum is very convex into the right chamber. The orifice of the right ventricle is closed by a very strong muscular valve as thick as the outer wall. It is strongest in Natatores, weakest in Cursores, especially in *Apteryx*, where it is almost membranous, and is attached by its free borders by short chordæ tendineæ to the wall of the ventricle. Its free border in most is turned towards the convex septum, to which it is closely pressed in systole, thus preventing regurgitation. It is opposed by a second very weak muscular valve. At the origin of the pulmonalis are three semilunar valves.

From two low ridges at the orificium atrio-ventriculare sinistrum proceed usually numerous tendinous threads, which attach themselves to two or three valves which correspond to the mitrals. Three semilunars are found at the origin of the aorta. The boundaries of the left ventricle are nearly three times the thickness of those of the right. The left auricle has numerous and complicated muscle-bundles; it receives two pulmonic veins through one ostium. There is a valve-like muscular process whose free border is turned to the cavity, and apparently directs the blood to the ventricle. The single aorta, giving off immediately the coronaries, very soon divides; the truncus arteriosus has a branch which is either the innominata or subclavia. In the latter case there is a common carotid. It continues as aorta descendens on the right side of the vertebral column. The left arterial trunk is an innominate or a subclavian. Either each innominate furnishes its common carotid, which is most usual, or else the left or the right furnishes a truncus caroticus impar. Examples of the first kind are furnished by all Natatores (except *Podiceps*); of the second by many Insessores, and some of the Cursores; of the third the *Phœnicopterus* furnishes the only example. In *Botaurus stellaris* both aortas unite on the neck. Sometimes one of the two carotids runs laterally and superiorly on the neck (*e. g., Psittacus chrysotis*). They run in the whole length of the never entirely closed canal, beneath or in front of the vertebral processes. From each originates a vertebral artery, which before entering the cervical canal gives off the œsophagea descendens, transversa colli, and transversa scapulæ. It finally joins the occipital. It does not form the basilar, which results from the union of branches of the cerebral carotids; and after giving off branches finally results in the arteria spinalis anterior. When one truncus caroticus only exists the vertebralis of the imperfect side originates from the subclavian. Sometimes (in *Anas boschas* and *Ciconia nigra*) the vertebralis continues itself downward in the canal of the rib attachments as the common stem of the intercostales. Each common carotid usually divides into the facialis and the cerebralis; more rarely it is continued as the latter and gives off the branches of the former. The subclavian gives off an external thoracic and axillary; the latter, the brachial, and then the ulnar and radial. From the aorta descendens arise more or less numerous intercostales and lumbales, a strong cœliaca, then a mesenterica superior (both penetrating the diaphragm in *Apteryx*), afterwards renales; from which branches for the generative parts proceed.

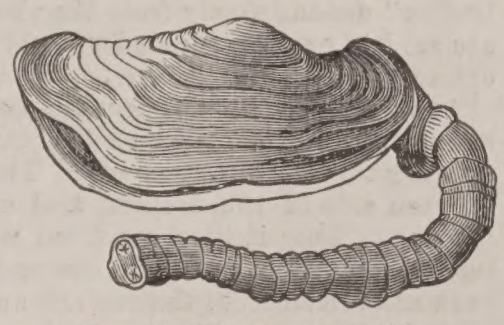


FIG. 27. *Panopæa australis.*

Next are two crurales, each giving off an epigastrica. Each results in the ischiadica, which descends to the knee. The sacra media usually gives off the renales posteriores, the mesenterica inferior, two lateral pudendæ internæ, and the hypogastricæ. Finally, it produces the vascular network on the breast and abdomen which is devoted to the panniculus adiposus laid bare by the shedding of feathers during incubation.

In Mammalia the heart is unattached by cellular tissue to the diaphragm, except in man, the higher apes, and Cetacea. It is straight (except in man, the higher apes, and *Talpa*), has two ventricles, and the foramen ovale is always closed. The ventricles are externally separated (in part) in Sirenia. The heart is broad and flattened in all Cetacea; a little less so in *Phoca, Bradypus, Manis,* and *Elephas;* rounded in Carnivora, Rodentia, and Marsupialia. It has a valvula tricuspidalis; in *Ornithorhynchus,* a transverse muscular valve of the right ventricle, as in birds; the valve in *Echidna* is membranous, has a large tuberculum Loweri,* and no Eustachian valve (in *Felis, Canis, Ursus, Phoca, Gulo, Mustela, Procyon, Talpa, Halmaturus, Equus, Sus,* and Ruminantia). There is no tuberculum, but two semilunar valves to the vena cava ascendens in *Didelphis, Dasypus, Hystryx, Cavia, Lepus, Sciurus* (in *Sciurus maximus* a trace of the tubercle). No Eustachian valve, but a crossband below the fossa ovalis, with filamentous muscle-processes in *Myrmecophaga* and *Bradypus.* It has a Eustachian valve and weak tuberculum Loweri in man, many apes, lemurs, *Lutra,* etc. Both valve and tuberculum are wanting in *Ornithorhynchus* and *Delphinus.*

In many ruminants and perissodactyls in advanced age there is a single or double bone in the septum atrio-ventriculare, and occasionally in Solidungula in the septum opposite the ostium venæ cavæ ascendentis. The aorta-stem at its root is single and curved to the left; it soon gives off coronales (one only in *Elephas*). Its branches vary; *e. g.* (1) A short aorta divides into an anterior (superior) and posterior. (2) The aorta superior gives off a subclavia sinistra, and continues as the truncus caroticus, or divides into a truncus caroticus and both subclaviæ; in Solidungula it also gives off the vertebralis dextra. From the aorta-arch originate the innominata, giving off carotides subclavia dextra and subclavia sinistra in most Marsupialia, in Rodentia, Edentata, Carnivora, *Sorex, Halicore, Auchenia, Sus;* in which last the two carotids spring from a truncus impar vel primus. (3) In other cases two trunci innominati alone are given off, as in Cheiroptera, *Talpa, Phocæna.* (4) The aorta gives off a truncus anonymous dexter, carotis sinistra, subclavia sinistra (as in Monotremata, *Phascolomys,* and *Bradypus, Dasypus, Cyclothura didactyla,* all Muridæ, *Erinaceus,* Phocidæ, many Quadrumana, man, etc.). (5) Two subclaviæ arise, with a truncus caroticus impar between (*Elephas*). (6) Besides the above subordinate arteries from the aorta, are thoracica interna sinistra and dextra from innominata dextra in *Phocæna* and *Halicore.* In some plunging animals occur widenings of the aorta (*Lutra, Phoca,* the young of *Delphinus, Monodon,* etc.). The common carotids have their length proportioned to that of the neck. In the short-necked Delphinidæ there is none, both carotids springing from the innominata. It is often divided into two (facialis and cerebralis). The cerebrales enter as single trunks into the cranium in Quadrumana, Cheiroptera, Insectivora, Rodentia, Marsupialia, Solidungula, and some Carnivora, as Ursus, Lutra, Canis, Mustela, or pass through a rete mirabile (*Phocæna*) formed of branching trunklets, or springs from a rete mirabile formed from its origins (Ruminantia, Suidæ, Felidæ). When without retes the cerebrales have various points of origin; they are either head branches (1) or collateral branches (2) of the carotids; or they are branches of the carotides internæ, which give off the cerebrales after some others (Cheiroptera, Insectivora, most Rodentia, some Carnivora, as in *Lutra,* where the carotis interna, a branch of the common carotid, gives off the occipitalis first), or they appear as branches of the maxillares internæ (*Hystrix cristata*) or as branches of Ophthalmicæ (*Cavia dasyprocta*). The bipolar retia mirabilia, from which the cerebrales spring, may be formed of branches from various sources. In *Felis* they come from a larger rete, which is composed of terminal twigs from the common carotid. In *Sus* they are composed of terminal branches of the carotis interna, and give rise to the cerebral vessels. In *Ovis* three branches of the internal maxillary are the sources of each rete mirabile. In *Bos* they are formed from branches of the internal maxillary, which enter through the foramina ovale and opticum and the fissura orbitalis. Here also the branches of the occipital and vertebrals lose themselves in a network which communicates with each rete mirabile. The retia mirabilia of the

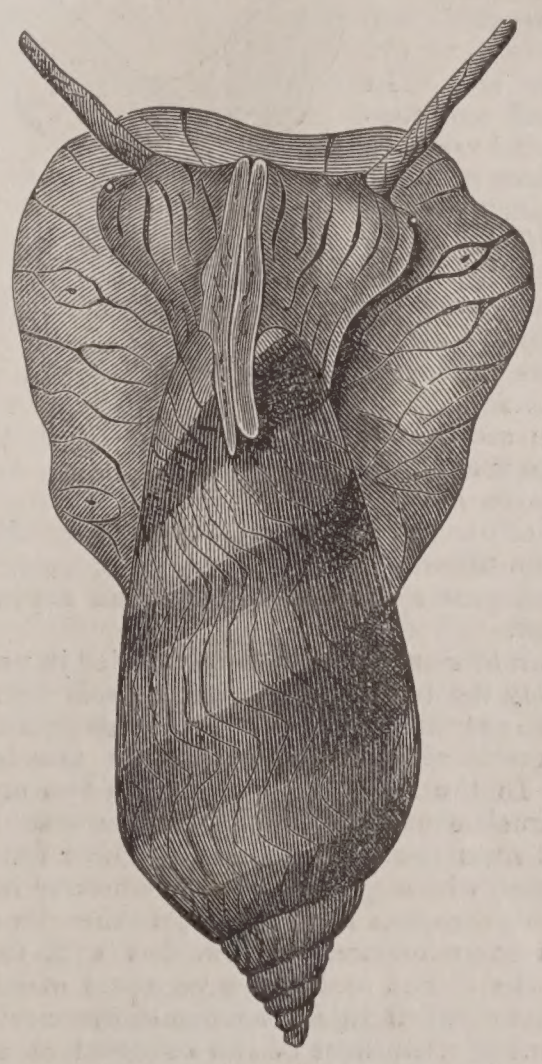


FIG. 28. *Voluta undulata.*

* A process separating the mouth of the vena cava descendens from the vena cava ascendens in the right auricle.

Delphinidæ (with artery traversing) are principally formed from the branches of the carotis interna, yet are closely connected with retia lying outside the cranium, formed of branches of the carotis externa and cervico-occipitalis. The rete of each side always communicates with that of the other. The vessels bearing blood from the carotids to the brain enter the skull as follows: through the canales carotici (in Quadrumana, *Ursus, Mustela, Meles, Lepus, Castor*), through the foramina jugularia (*Equus, Sus*), through the foramen lacerum anterius (*Hystrix*), foramen opticum (*Cavia*), foramen ovale and fissura orbitalis superioris (*Ovis*). In Cheiroptera and many Insectivora and Rodentia the carotis interna passes through the "pessulus," which is between the limbs of the stapes. Besides the cerebrales, the vertebrales conduct blood to the brain. In man and many others these unite and form the basilaris, in others (*Mustela, Canis*, etc.) they continue as occipitales, and send smaller branches, which form the basilar artery. Sometimes a communication before reaching the basilar forms a circle. In ruminants this arises from the vertebralis (which is set apart for both canalis spinalis and neck muscles), for the basilaris is very small, and still smaller in Solipedia and Suidæ, where it is constituted by the union of the occipitales in the foramen magnum; and finally in Delphinidæ, by the shortening of the neck, the vertebralis is wanting. It, with the cervicalis ascendens and occipitalis, forms one stem, the cervico-occipitalis, which connects with the spinales through numerous retia mirabilia. The always present circulus Willisii is formed either partly in the cerebrales and partly by division of the basilaris, or through the cerebrales and divided basilari-occipitales, or only by the cerebrales. There are still other modifications of the circle of Willis. The subclavian becomes the axillary and the brachial; the latter in Cetacea and Phocidæ is absent. In many Edentata, and in *Stenops* and *Tarsius*, the arm-arteries possess many retia mirabilia (*Dasypus sexcinctus*, etc.). In *Bradypus* and *Stenops* the trunk of the brachialis passes through many embracing extended arterial vessels. In *Cyclothura didactyla* and *Tarsius* the artery empties itself into these; in other cases they are confined to the fore arm. In *Sus* there is a small one connecting the ulnaris and radialis. In some the brachiales give off only subordinate branches (*Trichecus, Mustela, Cricetus, Sciurus*); in others it is forked. The division of ulnar and radial arteries is variously situated, either high on the humerus (*Phocæna, Cebus, Callithrix, Lagothrix*, where they are often afterwards connected, etc.), or in the middle of the same (*Didelphis, Halmaturus*), or near the elbow (*Homo, Felis*). Sometimes the brachialis, oftener the ulnaris (in very many apes, marsupials, many rodents), passes through the foramen supracondyloideum humeri.

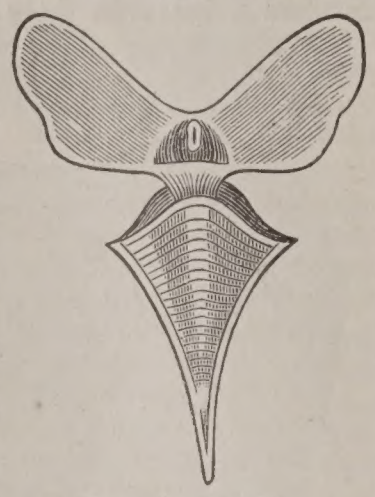


FIG. 29. *Cleodora.*

The aorta thoracica of most Mammalia is peculiar in not giving off immediately the intercostales. In *Mustela* there springs from it at the extremity of the chest a trunk (which divides into two vertebrales), from which the arteriæ intercostales issue. In the Delphinidæ there are two descending arteriæ thoracicæ internæ (or mammariæ internæ), which arise, the left from the arcus aortæ, the right from the innominata dextra, which give off the five anterior intercostales. Here also descends from the aorta thoracica a single trunk, which communicates by branches with the arterial network of the thorax and of the vertebral canal. The intercostales pass through this enormous thoracic rete mirabile, which connects with those of the vertebral canal and the base of the skull. The branches of the aorta abdominalis are usually the phrenicæ inferiores, suprarenales, renales, spermaticæ internæ, lumbales, the cœliaca, the mesenterica superior, and the mesenterica inferior. The cœliaca and mesenterica superior are one stem in *Cavia cobaya*, or originate as one and soon divide (*Talpa* and *Vespertilio murinus*), or originate separately, but connect by strong anastomoses (*Phocæna*). The mesenterica inferior often is trifling, in Marsupialia and Monotremata wanting. Certain twigs of it, forming retia mirabilia, occur in *Sus;* in the same genus is a rete on the stomach from the coronaria ventralis sinestra. Branches for the transversalis and oblique muscles for the psoas, etc., leave the aorta abdominalis. The arteriæ iliacæ communes (so called) seldom are homologous with those of man. In Cetacea they correspond generally with the hypogastricæ. They give off the epigastricæ, which otherwise come from the crurales. In most Mammalia they are homologous with the crurales, since not from them, but from a continuation of the aorta, are given off the hypogastricæ, or at least vessels which rise in *Homo* from the hypogastricæ. So in Monotremata and marsupials the ischiadicæ, and in many others the sacræ laterales, spring in pairs from the aorta beyond the iliacæ communes. In some, with strong skin-muscle or skin-system, from the crurales arise large musculo-cutaneæ, which anastomose with similar descending branches of the axillares (*Erinaceus*). The division of the cruralis is higher or deeper than in *Homo*. In the posterior extremity of the Phocidæ, in many Edentata, and *Stenops* are retia mirabilia, which are weaker than those of the upper extremity, and the sacra media is a continuation of the aorta; larger in large-tailed animals, running in an inferior vertebral canal, often forming retia (*Stenops, Bradypus, Myrmecophaga*). In *Phocæna* it passes through retia; sometimes weak (in *Erinaceus, Lepus*, ruminants, often in Solipedia). There is none in *Manatus australis*, where the aorta forms two hypogastricæ, which lose themselves in two huge retia subvertebralia.

FIG. 30. *Octopus vulgaris.*

X. THE RESPIRATORY SYSTEM.

Apparatus for oxygenizing a circulating fluid is wanting in Protozoa and Cœlenterata. In the other branches its type varies so that a number of distinct systems must be recognized, which are adaptations of as many distinct regions of the body for the purpose of respiration. These may be reckoned as follows:

1. The external pore-system of the Echinodermata.
2. The system of diverticula from the alimentary canal of the Holothurida-Dendropneumones and of most Vertebrata.
3. The gill-system of Mollusca and Crustacea.
4. The tracheary system of terrestrial Arthropoda.
5. The pharyngeal gill-system of Ascidia, fishes, and Batrachia.

It will, however, be convenient to divide the subject first between the Invertebrata and Vertebrata.

1. *In Invertebrata.*—The wall of the body of the Echinida and Asteroida is pierced with a great number of pores, which terminate in blind sacs and are filled with water. In all echinoderms the cavity of the body is filled with water, by which blood is oxygenized. It enters through perforated plates (laminæ cribrosæ) situated in the angles of the arms in the Asteriida, but the orifices which admit it into the body of the Holothurida are not certainly known. In the latter class singular organs called the "slipper-shaped bodies" depend freely from the viscera; their hollow stems are said to contain a blood-vessel; the extremity is like the open end of a short slipper.

The Holothurida-Dendropneumones possess an extensive system of branching blind tubes, which form a mass extending throughout the body. They form two bodies, one on each side of the rectum, and open into the latter near the anus: from it they are filled with water. In some Asteriida (*Petraster militaris*) five radiating tubes, the one for each arm, issue from the rectum, and are filled and emptied of water from it.

In Polyzoa (Bryozoa) and Brachiopoda we have a somewhat similar arrangement of branchiæ. In the former they form a double crest of tentacular fringes round the mouth; they are hollow, and the circulatory fluid moves through them, as elsewhere in the body-cavity, by ciliary movements on its walls. In Brachiopoda, as already stated, there are well-developed arteries. The gills are situated as fringes on straighter and shorter or longer and spirally-coiled arms within the shell, one on each side of the mouth. Their position is somewhat like that in the Polyzoa when retracted. In hingeless Brachiopoda the calcareous arms are wanting, but here the gill-supports are cartilaginous. In Lingula the inner surface of the mantle is furnished with folds and crests, which are supposed to aid respiration. In the Acephala the arrangement is totally different. The gills are curtain- or sheet-like (whence the name of this class, Lamellibranchiata), and hang two from each side of the body within the mantle. Sometimes their margins are free (many Monomyaria, Mytilidæ, Arcidæ, *Lithodomus, Cyclas*, etc.); in others immediately united (Veneridæ, *Mactra, Donax*, Unionidæ, Pholadidæ, etc.), or are connected by an intervening membrane (Solenidæ, *Cardium*, etc.). The union of the pairs of margins encloses two chambers, one within the other. Each gill-lamella consists of two layers, which enclose tubes and other cavities between them.

Sometimes the outer gill lacks one layer, or sometimes the whole gill is wanting (*Lucina*, *Corbis*, etc.). In others its outer lamina is truncated above, so as to expose the ends of the cavities it embraces. The lamellæ of the opposite side are symmetrical, or not in accordance with the relations of the shell-valves.

The branchial structure in Gasteropoda presents many varieties. In the division Opisthobranchia the branchiæ and auricles lie behind the ventricle of the heart; in Prosobranchia the relative positions are reversed. In the former

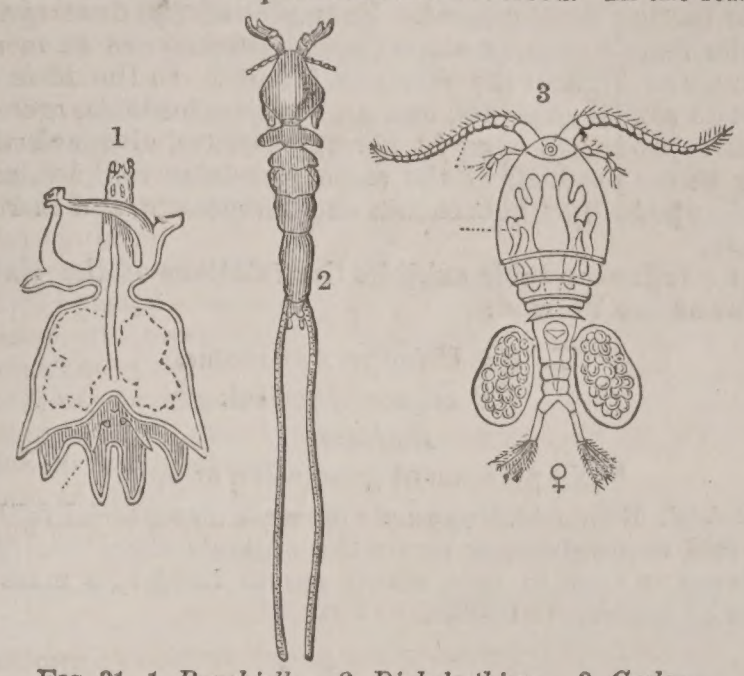


FIG. 31. 1, *Brachiella*. 2, *Dichelesthium*. 3, *Cyclops*.

the branchiæ are variously extended processes of the dorsal integument of the body, each of which is supplied with an artery. In the lowest group, the Dermatobranchia, these branchiæ are wanting, and the arteries are distributed for blood aëration beneath the dorsal integument. In the Placobranchia they are represented by lateral wing-like expansions of the integument, which may fold over the body. In numerous types the processes are distributed over the body in thread, prism, leaf, and other forms. These are the Ceratobranchia; many of the processes contain liver-cells. In the Polybranchia the processes are arranged along the back, and are branched or forked, and sometimes of diverse forms on the same animal. Other families, as Doridida, have a rosette of branchiæ round the arms only. All the preceding groups form the "naked-gilled" primary division, Nudibranchia. In the remainder of the sub-class the gills are concealed by the edge of the mantle, forming the Tectibranchia. The least specialized of these (Hypobranchia) have symmetrically arranged fringes round the edge of the body, with but few interruptions; while in the higher division, Pleurobranchia, the fringe exists on one side only. The fringe becomes more localized and drawn under the mantle as the size of the shell increases in the succession of genera. Especially in *Bulla*, where the shell is large, the gill is drawn beneath the mantle, and concealed by the upturned margin of the foot.

In Prosobranchia the gill or mantle-sac is generally well defined. It consists of a chamber bounded within by the body-wall and above by the mantle, which also closes it laterally by adhesion to the body-wall. The gills and excretory orifices of the digestive, urinary, and genital systems are seen on its walls. There is generally a single gill, shaped like a half feather, and with two dependent (in *Paludina* three) laminæ of transparent membrane. In many genera there is a rudiment of a second, while in a few the latter is well developed. The orifice of the mantle-sac is on the left side, and can be closed by a sphincter muscle. The mantle is originally composed of lateral halves, which are not always completely united; their separation at the margin produces the deep fissure in the shell of *Pleurotoma*, and divisions higher up correspond to the holes in the shell of *Haliotis*. In the latter genus there are two gill-sacs and two gills, and in others two gills. In some a thickened rib marks the halves of the mantle, and the two gills are placed closed together on it, so as to appear as one. In Patellidæ and Chitonidæ there is no distinct gill-sac, the branchiæ being marginal fringes, as in many Opisthobranchia. In the Pulmonata the mantle-sac does not contain any gills; it has an opening on the right side of the body, produced by a fissure in the mantle margin, which is closed by a sphincter muscle. This orifice opens and shuts regularly for the admission of air. The mantle-sac becomes a lung by the distribution of the venous trunks and branches over its surface. An extensive ring-like trunk (circulus pulmonalis) surrounds its margin, from which vessels converge towards the centre, forming a network which gathers itself again into a few, then a single trunk, the vena pulmonalis, which empties into the auricle of the heart.

In Cephalopoda the mantle is free, and encloses a cavity on the abdominal, instead of, as heretofore, the dorsal face of the body, agreeing in this respect with the Pteropoda. The cavity contains two branchiæ in the greater number of genera (Dibranchiata), or two in *Nautilus* and probably its extinct allies, the Ammonitidæ, etc. These constitute the sub-class Tetrabranchiata. The gills are elongate, triangular, feather-shaped bodies, whose axis bears on one side the artery, on the other the vein. In Dibranchiata it bears a row of bows on each side, in which a blood-vessel passes from artery to vein. On each of these stand bipinnate processes, so that the whole becomes tripinnate. The arch bounds a membrane in the decapod division, but in the Octopoda the loop is not closed. In Tetrabranchiata the first branches of the gill are leaf-like, with pinnate, leaf-like subdivisions. They are free in the mantle-sac; those of the dibranchiates are attached to the mantle.

In all Crustacea except the Decapoda the gills consist of fringes and expansions of the limbs. In the latter they are regular feather-shaped bodies, arranged within an abdominal cavity above the limbs; the bases form a curved line and the apices are directed inward. The tracheary system prevails in all other Arthropoda. It consists of a great number of tubes, which communicate with the air by means of small orifices or stigmata. These pierce the walls of the segments, usually one on each side, where they are present. They subdivide to a great extent internally, and penetrate all the organs of the body. There are marked varieties of this structure. Instead of issuing by stigmata, the trachea may be produced into a leaf-shaped process which arises from the usual position of the stigma, and may there ramify extensively within the lamella, constituting a trachean gill. This occurs in the larvæ of many Neuroptera. The walls of the tracheæ are elastic, yet firmly bound by a spiral thread, whose close volutions form an interior layer of the tube-wall. In other localities it is wanting, and the tube expands sac-like. In some insects these exist near the stigmata. In the Arachnida (except the group of low forms, the *Trachearia*) this sac-like structure only exists as a large pulmonary chamber, with single stigma, situated on the anterior part of the abdomen on each side.

In insects the stigmata rarely exceed nine or ten pairs; in Myriopoda they are far more numerous. In the Acarina there are but two. In insects they usually have a valve, which opens externally to prevent the entrance of foreign bodies; in some forms they project in laminæ, branched, pinnate, or botryoidal. In the larvæ of many Phryganeidæ and some Lepidoptera the trachea-gills are arranged in six rows along the back. In the larvæ of *Libellula* and *Æschna* they are attached to the inner wall of the rectum.

In ascidian Mollusca there are no free or pinniform gills. There is, on the contrary, a large pharyngeal cavity, which lies between the mouth and the digestive system proper, the alimentary canal both issuing from and discharging into its cavity in many cases. In others it discharges at the side. The pharynx may occupy a small part of the whole length of the cavity of the body; in the latter case the other organs are pushed to one side of it (*Boltenia*, *e. g.*). The mouth and other parts are frequently furnished with cilia. The gills consist of a sac whose walls are abundantly pierced by holes of different forms in the different groups, or it is reduced to a band of such structure only.

2. *In Vertebrata.*—In the Leptocardii there is a large pharyngeal cavity, with a large open mouth whose border is supported by a cartilage. This gives out branches which are the axes of abundantly ciliated tentacles which sur-

FIG. 32. *Dytiscus* and larva.

round the mouth. On the sides of the pharynx are numerous fissures, which communicate with the outer medium. In the Dermopteri the respiratory organs consist of a series of sacs on each side (which number seven to ten), on whose septary walls the arteries and veins are distributed. In some genera these communicate internally with the pharynx or œsophagus; in the lamprey, on the other hand, with a blind tube which lies beneath the œsophagus and empties into the pharynx. Each sac opens externally by a slit. In Elasmobranchi-Plagiostomi (sharks, rays) the arrangement

is similar, the slits numbering five, rarely six and seven, and communicating with the œsophagus. The septary walls are double, and contain a cartilaginous arch with radii, which elevate the walls into transverse ridges. A trace of the first embryonic external fissure remains in this order as a spiracle or tube from the pharynx to the sides of the top of the head behind the eyes. In Holocephali (*Chimæra*) the external slits are concealed by an opercular flap, which produces the appearance of a single slit. In Actinopteri the hyoid respiratory system is fully developed. The arches support, instead of sac-septa, radiating fringe-like laminæ, which receive the branches of the branchial artery and vein. The fissures are only those between the arches, which are covered externally by an osseous "operculum" or lid. The number of branchiæ is usually four and a half, but in some Pediculati there are but three, in some eels but two. In *Lepidosiren* there is but one. While the processes are usually narrow, lamellar, in Lophobranchii they are subcylindric and branched, each one forming thus a tuft; their number is also reduced.

Besides these fringes there are in some Dipnoi and some Batrachia (Trachystomata, Proteida), and in the larvæ of many salamanders, cartilaginous processes of the arches which bear a double row of fringes, forming the external gills.

The true pulmonary system consists of ducts and chambers, which originate from the alimentary canal, and are connected with it or the pharynx. It is not found in any Vertebrata below the Actinopteri. On the other hand, the hyoid respiratory organs do not exist above the Batrachia. In Actinopteri the pulmonary system consists of a sac with walls either thin and semi-transparent, or rarely thicker and lined with muscular meshes or a few cells (*Lepidosteus, Dipnoi*, etc.). In Physostomi it is connected with the stomach or œsophagus by a tube, the ductus pneumaticus; in *Lepidosteus* the latter enters the œsophagus on the upper side; in *Polypterus* on the under side of the same. In Physoclysti this sac is entirely isolated. Its function is that of a float, and it is hence called the swim-bladder. It usually forms a single chamber, but in Cyprinidæ, Characinidæ, and Sternopygidæ, it is divided by narrow constrictions into two, sometimes into three, chambers. In Cobitidæ and some Siluridæ (*Clarias, Gasterobranchus, Ageniosus*, and *Saccobranchus*) the anterior part, or the whole of it, is enclosed in an osseous case. In Gadidæ the diapophyses are expanded and adherent to it; in Campostoma it is suspended in the abdominal cavity, and surrounded by the spirally coiled intestine. It is furcate, and sometimes branched posteriorly, in Sciænidæ. In Nematognathi and Plectospondyli it is immediately connected with the auditory organs by a chain of small bones, which are supported on the sides of the anterior vertebræ. Besides *Lepidosteus* and *Amia*, the genera *Platystoma* (Nematognathi) and *Chirocentrus* (Isospondyli) possess cellular layers on the inner side of the swim-bladder. In *Lepidosiren* only among fishes is the swim-bladder deeply divided longitudinally, its halves being homologous with lungs. They are cellular within, and lie above the alimentary canal next the vertebral column. They unite, and passing round the œsophagus enter it below by a glottis with small cartilage. In *Saccobranchus* a sac extends on each side above the ribs from the pharyngeal cavity, which is designed to contain water to supply the gills during drought.

In Batrachia we have a further development of the structure seen in *Lepidosiren*. Here the sacs are separate, being connected by the branches of the tube or trachea which leads to the œsophagus. The sacs, now lungs, are occupied by a central longitudinal cavity and a thick layer of cells round the walls. The trachea from this order upward consists of cartilaginous rings, partly or completely closed, which are modified at the glottis into a vocal organ. This consists of a number of segments, the uppermost of which support two parallel tendinous plates (chordæ vocales), whose edges are separated by a slit-like opening, which is opened or contracted by their relaxation or tension. The trachea is longer in reptiles and other vertebrates than in Batrachia, and its inferior branches are called bronchiæ. In all, the œsophagus passes above the lungs, and the stomach is behind them. The interior of the lung continues as a sac in reptiles, being especially elongate and thin-walled posteriorly in serpents. In these animals one of the lung-sacs is nearly always wanting or rudimental. In birds and Mammalia the central cavity is only represented by the bronchi and their branches, the cells occupying the remaining space. In Aves the bronchi are each dilated into a chamber, which is furnished with muscles for altering its form. These are most fully developed in singing-birds, of whose musical faculties they are the organ.

XI. The Urogenital System.

1. *In Invertebrates.—The Reproductive System.*—In the lowest forms of life reproductive organs are only periodical appearances, and their sexuality can only be determined by microscopic examination of their products. In most Echinodermata the organs are permanent, but it is not till we reach Mollusca with a head, that the organs of the sexes essentially differ. A usual mode of reproduction in Protozoa and Cœlenterata is by budding and by fission. The production of ova is a higher form of the budding process, the result being a germ of a new generation, which may or may not require the offices of opposite sexual cells for their further development. Examples of full development of the female element alone (agamogenesis) are known in animals as high in the series as insects. In the Mollusca the two sexual elements, ova and spermatozoöids, are constantly produced, even in hermaphrodites, although they may be the products of the same glandular follicles, as in Gasteropoda-Opisthobranchia and Pulmonata, and in Pteropoda.

The following table exhibits the relations of the classes as far as the Vermes:

I. *No Urinary Apparatus.*

♂ ♀ organs identical.

Radiata.

* No permanent generative organs.

Polypi. Either androgynous on each mesenterial fold, or the fold monœcious, or rarely the animals dicœcious; spermatozoa or eggs in sacs, which are in band-like mass on sides of mesenterial folds.

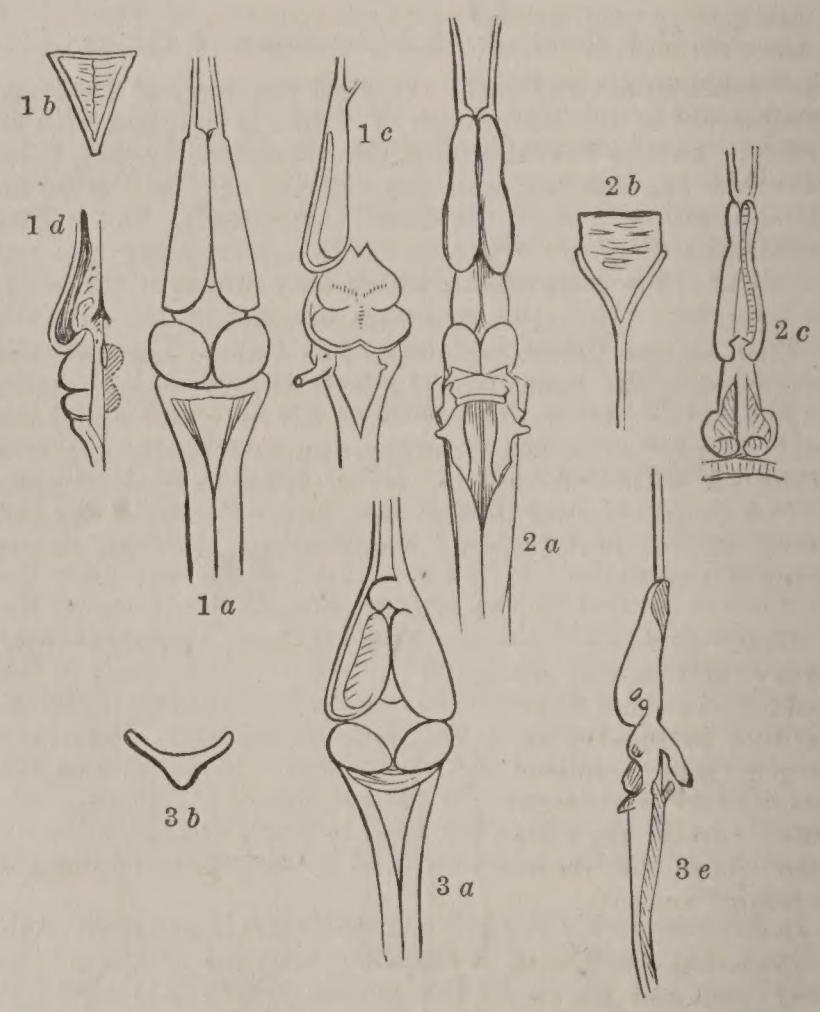


FIG. 33. 1. *Rana esculenta.* 2. *Dactylethra Capensis.* 3. *Bufo viridis.* *a*, brain from above; *b*, choroid plexus; *c*, horizontal section of the lobes and hemispheres; *d*, of hemisphere; *e*, longitudinal vertical section.

Hydræ. Androgynous; the eggs single in a lower sprout, spermatozoa in a higher sprout; no permanent organs.

Medusæ. Dicœcious; eggs and spermatozoa developed in large cells or bladders, which are attached to stomach, water-canals, mouth, feet, border, etc., etc.

Ctenophora. Androgynous and monœcious; capsules of both kinds in combined or separate bands on radial water-canals; sometimes on central canal or stomach, emerging by same canals.

Crinoidea. Comatula; sacs on swollen bases of pinnules monœciously containing eggs or spermatozoa without tails. (By one observation sometimes androgynous.)

** Permanent organs.

Asteriida. One or many blind sacs each side of septum (which terminates between arms near or far off); sometimes found to reach the end of the arm; much subdivided; orifice of emission through lamina cribrosa in some Asteriadæ; into the body-cavity in others and in Ophiuridæ; all androgynous, with very few dicœcious exceptions; in some not known.

Echinida. Dicœcious; five (ever less?) sacs or masses of saclets, each opening by narrow duct through separate openings (sometimes four or three) near vent, and lying near together, reaching to middle of shell; males white colored, yellow, red, etc.

Holothuriida. Bunch of few or many tubes embracing œsophagus, and opening on median dorsal line; diœcious, or in *Synapta* and *Apneumona* androgynous; the spermatozoa in projecting masses of walls of ovary-tube.

Mollusca.

* Generative organs not always permanent.

Bryozoa. Androgynous; ♂ organs round body below stomach on a string, with many cells, containing spermatozoa; ♀ with very few ripe ova behind stomach, also on a string; spermatozoa bursting into body-cavity, and reaching ovary; ova break through outer wall or a posterior orifice.

Tunicata. Androgynous; some doubtful, some of same species diœcious, others androgynous; testes and ovary separate, both emptying into cloaca separately; ovary usually with but one egg; organs slightly different in appearance.

** Always permanent.

Brachiopoda. Androgynous; a thick branching glandular body following pallial or generative artery filled with ovary-cells, and surrounded and penetrated by a reddish cell containing male element; discharging near mouth from a large, much-plicate, trumpet-mouthed oviduct, which is not continuous with genital mass.

II. *Urinary Organs Present* (*Bojanus' Glands*).

A. ♀ ♂ organs identical, permanent.

Acephala. ♀ and ♂ organs not different, of minute cells gathered in more or less compressed masses, which form main mass, or more simple along central tube or duct, which passes through Bojanus' body or unites with duct of latter, or has opening near latter; spermatozoa in *Dimyaria* long-headed and round-headed; in *Monomya* round only; diœcious, except a *Pecten* or *Cardium*, etc., and hermaphrodite individuals of *Anodonta*. In Unionidæ sexes externally different; gills serve as brood-sac. Androgynous; genera *Ostrea, Cyclas, Pandora, Pecten*, etc.

AA. ♂ organs distinguished by penis or stylet.

a. Animals hermaphrodite.

Gasteropoda-Opisthobranchia. Spermatozoöida and ova produced by the same glandular body (with few exceptions).

Pulmonata. An oviduct with abdomen gland and seminal receptacle; a vas deferens terminating in penis; a stylet-sac with stylet, all emptying into a common cloaca.

Pteropoda. Similar to the last, but no distinct vas deferens, and no stylet; penis usually separate from and in front of vagina.

aa. Sexes distinct.

Gasteropoda in general. Penis behind the right eye; ovary and testis embedded in the liver; oviduct frequently enlarged into a uterus, issuing on the right side; rarely an albumen gland or receptaculum seminis; no stylet.

Cephalopoda. ♀ with ovary enclosed in a peritoneal sac, and with two (sometimes one) oviducts continuous; ♂ without stylet; with a vas deferens and so-called seminal vesicle and prostata near the penis.

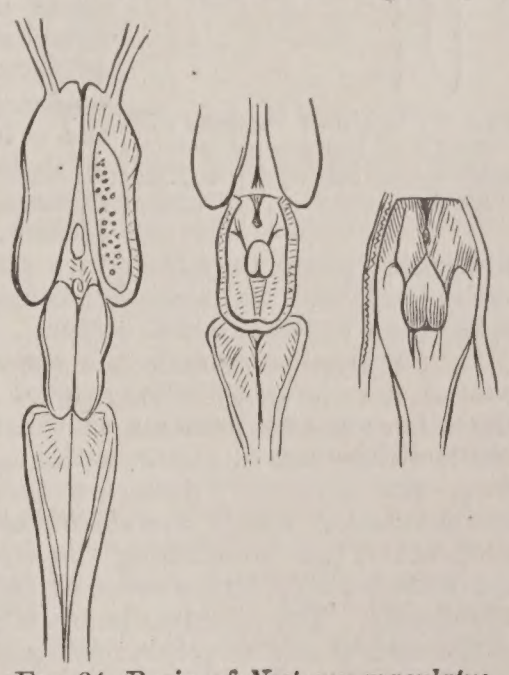


FIG. 34. Brain of *Necturus maculatus.*

The preceding structures present in their details the greatest variety. The generative organs are situated on the right side of the body, but the exits are in some groups on the opposite side, and usually (the female at least) in the mantle-sac. Their inner walls are lined with ciliated epithelium. The stylet is a slender, acute calcareous body of various form, which is inserted into the vagina or body of the other individual in coitus. Its function is supposed to be that of an irritant only.

The males of Cephalopoda are more readily distinguished from the females than in Gasteropoda, being generally smaller. In *Argonauta* the female only bears the shell. But the chief peculiarity of the male is seen in the modified structure of one of the arms, by which it is said to be "hectocotylized." It differs from other arms in being stouter and entirely hollow, terminating in a hollow thread which is open at the extremity, giving exit to the contents. It is developed in a bladder on its inner wall, and is first closely rolled together; the thread bears a bladder which is later lost. The primary bladder finally bursts, its remains forming a fringing membrane on the sides. At the period of impregnation its cavity becomes, in some way unknown, filled with spermatozoöids. During an embrace it is torn off, and enters the mantle-sac of the female. It swims independently as a worm, and several are sometimes found in one female. The spermatozoöids are supposed to be discharged into the vagina by the hollow thread.

Many opisthobranchs are self-impregnating. Pulmonata impregnate each other, while in *Lymnæa* an individual impregnates a second, and is impregnated by a third, forming thus a chain of individuals.

In Arthropoda the sexes are always in separate individuals (diœcious), excepting in the lowest Crustacea (Cirripedia) and the lowest Arachnida (Tardigrada). These orders are either sessile or with but little power of movement; hence the appropriateness of their monœcious condition. The sexes of Arthropoda are generally distinguishable by external characters, but it is in the Insecta and Entomostraca (Lernæoida) that this difference becomes most remarkable. Thus in Hymenoptera (bees and ants) and Neuroptera (termites) not only are the sexes very distinct, but there are other forms (neuters, workers, soldiers, etc.) produced in connection with imperfect development of the reproductive organs. In the bees and wasps the additional forms are repressed males; in ants, repressed females. In termites it is asserted that both sexes contribute to produce them.

The external orifices of the reproductive system are confined to the abdomen, and are below and before the vent of the alimentary canal. In most orders they are posterior, but in Myriopoda, scorpions, and some higher Crustacea they are in front of the abdomen. The female internal organs consist of ovary and oviduct on each side, or the two oviducts may unite into one on the middle line, or there may be a single median ovary. On the oviduct are usually found diverticula, the receptaculum seminis (which is wanting in Crustacea, except *Ostracoda*) and another sac of uncertain use. The lower part of the oviduct is enlarged and the muscular walls are thick, forming a vagina, which often continues past the proximal part of the oviduct as bursa copulatrix. The ovaries consist of cæca of varying forms. In Crustacea, Arachnida, and Myriopoda they are few in number, but in Insecta they are very numerous, forming a gland-like body whose component cæca are bound together by connective tissue. In Termes their number reaches 2000 to 3000. Other glands (glandulæ sebaceæ) pour their contents into the oviducts, which serve many important purposes—*i. e.*, to attach the eggs to a solid base (*arilus*) or to the parent's body; to construct a shell (*Blatta*) or cocoon. In certain low Crustacea (Lernæoida, Isopoda, etc.) these glands open outwardly independently of the oviducts, and the secretion forms a sac round the eggs, by which they are suspended externally. The last abdominal segments in many insects are modified into organs designed for the conduct of eggs to a proper nidus; thus, in Orthoptera it is composed of sabre-shaped plates with saws within; in Hymenoptera it is partly represented by an offensive weapon, the sting. In Chrysididæ, Diptera, and Phalangia and *Acari* they are modified into a tube which is projected telescope-fashion.

The male organs of Arthropoda consist of testes, vasa deferentia, glands, vesiculi seminales, and penis. The testes resemble the ovaries of the female in structure and position, but are frequently less complex. They are more commonly also united on the median line, as in low Crustacea (Cyclopidæ, Cypridididæ, Myriopoda), and among Insecta in Lepidoptera, many Hymenoptera, Orthoptera, etc. The vasa deferentia on the other hand remain distinct in these cases, except in Scolopendra and various Entomostraca. In many Crustacea and chilognath Myriopoda the vasa deferentia issue externally separately, but in many others unite to form a ductus ejaculatorius, which is enlarged in diameter. The muscles of this region are especially developed where a penis is well developed. Glandulæ mucosæ discharge into these ducts in insects and myriopods, but are wanting or rare in Crustacea and Arachnida. They are sometimes sac-like, sometimes filiform. They secrete a substance which hardens round a body of seminal secretions, forming a capsule which is usually taken into the female vagina, but may be attached to the body externally, or even (Chilopoda) to external objects.

The penis is present in most Arthropoda, but is wanting in Entomostraca, Chilopoda, and scorpions. In Crustacea, Brachyura, and Isopoda, etc., it is double. In all cases it is composed of a modified pair of limbs, which is especially clear in crabs. The intromittent organ is occasionally far removed from the orifice of the vasa deferentia. In spiders (Aranea) the extremity of the palpus bears a receptaculum seminis and penis, which the animal fills voluntarily by application to the external orifice, and discharges in the oviduct of the female. In *Argulus* a similar mode of connec-

tion depends on the structure of one of the legs, and in chilognath Myriopoda a pair of legs is altered for a similar purpose. In certain tailed Decapoda there are two pairs of such organs, those on the last segment of the post-abdomen serving as conductors from receptacles in the fifth pair of legs. In dragon-flies the exceptional case occurs where the accessory organ is a fissure in the second abdominal segment.

In Vermes the type of the reproductive system presents the varieties seen in Mollusca. Thus, they are androgynous, monœcious, and diœcious. Many of them develop by an alternation of generation, the one produced by true reproduction, the other stages by gemmation. In Turbellaria (or planarians) the Dendrocœla are bi-sexual, but the Rhabdocœla possess a common outlet for the two organs, testis and ovarium. Trematodes (flukes) are monœcious, each animal possessing distinct sexual organs of both kinds. The developmental stages of the young vary from three to six, and all but the first of these are due to gemmation in the cavity of preceding stages, or metamorphosis while encysted, etc. In tape-worms (Cestodes) the animal is made up of a head with organs of attachment, which, posterior to a long neck, is followed by a great number of identical segments. These contain each male and female organs, and a water-vascular system. The ovary and testis are at opposite ends of the segment, and between them is the branched uterus. This terminates in a vagina, which is approximated by a sheath containing a penis, which is perforated by the vas deferens. There are glands attached to the female organs. Each segment of a cestode is then self-impregnating. In Acanthocephala and Nematoda we have the higher condition of an entire separation of the sexes. In the former there is a penis which is retracted in a bursa which is prehensile in function. In this order there are alternate generations produced by gemmation in the body of the nurse stage. In Nematodes many genera (Strongyliidæ, Ascaridæ, and Filariidæ) are furnished with a penis and bursa at its base. In the last family *Trichocephalus* has a bristle-like penis, one-third the length of the body, which, when projected, is accompanied by an extended sheath. In Ascaridæ the penes or "spicula" are two in number. In *Sclerostomum* (gape-worm) the male is much smaller than the female, and becomes attached to her permanently. In *Heterura* he remains attached for considerable periods. Cucullanidæ are without bursa. In *Anguillula* and other genera there are two oviducts, which unite to form a single vagina.

aa. The Urinary Organs.—These are present in Mollusca from the Acephala upward. In the latter they are represented by a pair of kidneys and their discharge ducts only. These are called "Bojanus' organs;" they are relatively of large size, and lie one on each side above the heart, etc., extending from muscle to muscle. They are frequently united together along the middle line. They are hollow and spongy, and their fibres are lined with secreting cells. They terminate either by a single duct near that of the reproductive system, or unite with the latter, or the genital duct enters that of Bojanus' bodies. These bodies have communication with the external water, and by a cribriform surface with the heart-sac; likewise with the capillary veins. The function of the organs is not only that of a kidney, but as a mingler of water with the blood.

In Gasteropoda the kidney is single and contains calcareous nodules; its secretion is purple in *Murex;* it is large and hollow, and contains water. It is surrounded by a network of veins, which frequently open into it, so that blood-corpuscles are found in it, as well as its products in the blood. It usually opens directly into the mantle-sac, but otherwise by a ureter, and always independently of the rectum, vagina, or vas deferens.

The kidneys of Cephalopoda differ much from those of other classes, and for a long time their nature was considered doubtful. They form a large, rather loose mass on that part of the vena cava which approaches the gills, and on the gill-veins as well, consisting of a great number of minute sacs with bifurcations and internal processes. Each principal one opens by a fissure in the walls of the vein. They are constantly in motion.

In Arthropoda the existence of kidneys is a matter of question. The vasa Malpighii (described under the "Digestive System") are diverticula of the alimentary canal, and their function was formerly believed to be that of the liver. Gall has, however, never been found in them, but on the contrary uric acid. This has also been found in the intestine and in the corpus adiposum.

2. *In Vertebrata.—a. The Reproductive System.*—Vertebrates are usually diœcious, but a few fishes—viz., the eels and certain Serrani—are hermaphrodites. The organs of the female are primarily an ovary; an oviduct may or may not be present. Thus, in the Leptocardii the ovaries are collections of cells along the sides of the abdominal cavity, which drop their ova into it, which are discharged by an orifice anterior to the anus. In Dermopteri the structure is similar, except that the ovarian cells are collected into plate-like masses. In Elasmobranchii the ovaria are included in a peritoneal sac; occasionally, as in Squalidæ and Scylliidæ, there is but one, medial and symmetrical. The oviducts are here present, and are homologous with the tubæ Fallopii of mammals; each dilates into a uterus, and empties into a common uro-rectal cloaca. Their proximal ends are open and expanded, presenting the so-called fontanelles. In true fishes we have various structures: in the Salmonidæ and some Clupeidæ there are no oviducts, but the eggs fall into the abdominal cavity and are expelled through a pore. In most other fishes and in *Lepidosteus* the ovarian membrane is prolonged as an oviduct, and usually discharges externally without union with other canals; in *Lepidosteus* they enter the ureters. They are united in various Physoclysti. They are, as in Elasmobranchii, open as internal fontanelles in *Amia*, *Chondrostei*, and *Polypterus;* in all they have a common external opening with the ureters.

In Batrachia the tubæ Fallopii are proximally open, and extend in many coils far in front of the ovaries. They are distally united with the ureters. In Reptilia, Aves, and Mammalia, the oviducts (or tubæ Fallopii) are not ordinarily connected with the ovaries, but only at certain seasons by their trumpet-shaped fontanelles. In birds these organs are not developed on one side of the body. In reptiles, birds, and monotrematous mammals, the genital, urinary, and digestive canals have a common exit or cloaca. In marsupials and placentals the genito-urinal excretory ducts are separated from the digestive, being in the female distinct or opening into a common vulva, but in the male are united for some length. In Mammalia the females are viviparous, and the ovum is hatched in expansions of the oviducts, or uteri. In marsupials these are separate, and the distal parts of the oviducts are not united into a vagina. In placental mammals, on the contrary, the oviducts unite, forming a single undivided vagina. In Edentata and Rodentia this union does not produce an expanded uterus, as the young are developed in the separate oviducts; but in higher mammals the enlarged oviducts unite into a muscular chamber, the uterus. A false uterus occurs in the kangaroos by the union of the cavities of the oviducts near the middle of their length; two opposite symmetrical curvatures are in contact, and their adjacent walls disappear; they then turn shortly back (forward in the animal) and make another short bend before they take a direction to the external orifice.

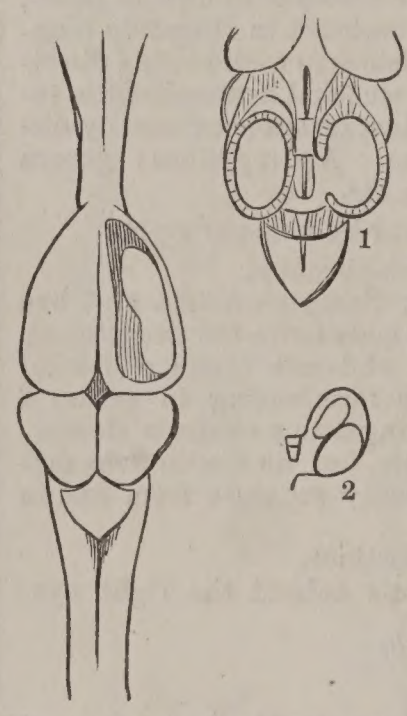


FIG. 35. Brain of *Varanus niloticus:* 1, horizontal section of optic lobes; 2, vertical section.

In placental mammals the embryo is attached to the wall of the uterus by a body called the placenta. It is on the allantois, and presents to the wall great numbers of villi, which interdigitate with corresponding processes from the mother. Both are furnished with abundant blood-vessels, which maintain intercommunication with each other, thus nourishing the embryo. As we descend the scale we only find a trace of this structure in some of the sharks. The allantois is an embryonic structure which characterizes exclusively vertebrates above and including Reptilia. The amnion is another sac, formed by the folding of the germinal layer of the embryo over its back; the edges of the folds then uniting, the two inner enclose the amniotic sac; the outer becomes the chorion. The amnion is absent, like the allantois, in all classes below Reptilia.

The placenta exhibits several distinct typal forms in Mammalia; it may be disciform or ring-like (zonary), or may be scattered in tufted bodies over the chorion (cotyledonary), or the villi may be scattered all over the same (diffuse). The orders of mammals may be thus arranged in this respect:

1. With decidua, placenta discoidal: Primates, Cheiroptera, Insectivora, Rodentia, Edentata (Orycteropidæ, Dasypidæ).

2. With decidua, zonary: Carnivora, Proboscidia, Hyracoidea.

3. Without decidua, cotyledonary: Perissodactyla, Artiodactyla, and Ruminantia, Edentata (Bradypidæ).

4. Diffuse: Artiodactyla-Omnivora, Cetacea, Edentata (Manidæ).

The male organs are, in the early stages of growth, as in the lower animals, undistinguishable in structure. They are generally homologous with the female in details, even when most distinct. The relation may be thus expressed:

♂	♀
Testis.	Ovary.
Vas deferens, Uterus masculinus.	Oviduct, Uterus.
Cowper's glands.	Cowper's glands.
Penis.	Clitoris.
Scrotum.	Labia majora.
Preputium.	Labia minora.

The vas deferens is, however, generally a persistent Wolffian duct, which in the embryo is the excretor of the embryonic bodies (Wolff's) which precede the kidneys. The Fallopian tube of higher mammals, on the other hand, is the persistent Müllerian duct, which passes outside of the former. In the batrachian Urodela the efferent ducts of the testis pass through the kidney and empty into a genito-urinary duct, while in Anura (except Discoglossidæ) they only pass through the edge of the kidney and discharge into the ureter.

Among reptiles the penis is present in the tortoises and crocodiles only, and in no lower forms; it is merely grooved beneath. In the ostrich it is quite similar. In the lower groups of birds it is present, but wanting in the more specialized; in Mammalia it is universal. It is composed of two superior bodies, the corpora cavernosa, originating from the pubis, and the corpus spongiosum, whose lower face embraces the urethral tube, and whose extremity forms the glans or head. The testes are almost universally situated near the kidneys, in the abdominal cavity, but in the higher mammals they descend from that position, and carrying a fold of the serous membrane (tunica vaginalis) and muscle

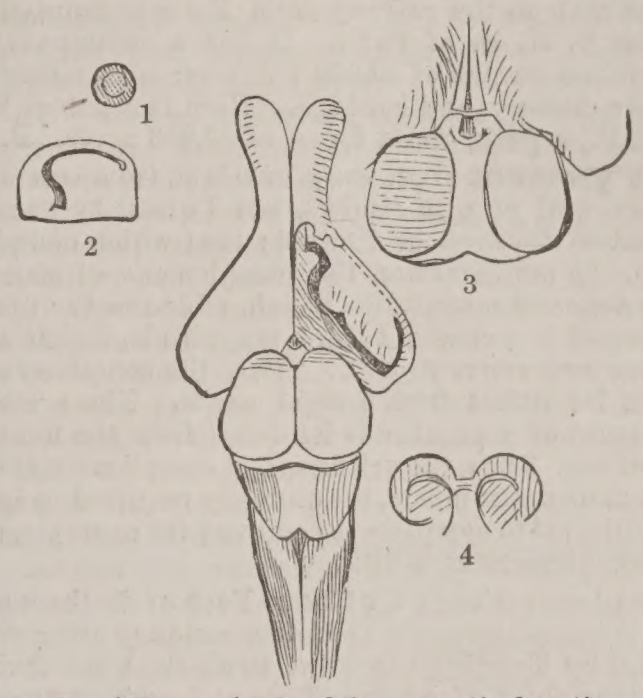


FIG. 36. Brain of *Dipsas dendrophila:* 1, vertical section of olfactory lobe; 2, vertical section of right hemisphere; 3, vertical section of optic lobes; 4, transverse section of lobes.

(cremaster), they are suspended externally, generally behind the penis; in Marsupialia in front of it. In some rodents and others this descent of the testes is periodical.

aa. Urinary organs.

Kidneys are present in the higher Vertebrata, inclusive of the Reptilia, but are supposed to be represented in Batrachia and fishes by structures which are embryonic in the former—*i. e.*, the Wolffian bodies. The latter consist of two bodies, one on each side of the vertebral column, and are composed of transverse tubuli terminating in expansions which embrace convoluted capillaries, the "Malpighian tufts." The Wolffian tubules empty in the Wolffian duct, which extends along their outer side, and empties in the embryo into the allantois. The kidneys appear later in embryonic life, behind the Wolffian bodies, and have a similar structure. They also discharge by a duct on each side, which is distinct from the Wolffian, and constitutes the ureter. This discharges at first into the allantois, but with the approach of the lateral walls in the embryo, and the closing of the ventral fissure, a portion of the allantois is included, and becomes the urinary bladder.

The Leptocardii are not known to possess either Wolffian bodies or kidneys. In the Pisces the connection of the ureters with the oviducts is various. Thus in *Polypterus* they unite and enter a single tube, the united ureters. In *Lepidosteus* each ureter receives its corresponding oviduct; in *Amia* the oviducts are open proximally. In Batrachia the ureters are always connected with the oviducts. In the tailed order the ureter becomes a genito-urinary duct, because it receives the vasa efferentia of the testis, which pass through the kidney to reach it; it empties into the cloaca. In the Anura the vasa efferentia enter the kidney, but do not reach the ureter, but are collected into a special duct analogous to the deferens, which enters the ureter at its lower part. This tube also receives the secretion of the kidneys, so that the original ureter becomes useless, and is atrophied in the frogs, or persists as a cæcum in the toads. In the discoglossid frogs the arrangement is as in the salamanders. In the allantoidal vertebrates the ureters discharge into the urinary bladder, which in turn empties by a single urethra, of greater or less length, into a genito-urinary chamber in the higher Mammalia, or the cloaca in the other classes. It is continued throughout the penis in those males that possess that organ. The kidneys in most Carnivora, in the Cetacea, and some Artiodactyla, are lobulate, or like a bunch of grapes in form, as is seen in the embryos of man and other mammals. In the cats (Felidæ) the divisions are not visible externally.

The osseous system will be discussed in an article especially devoted to that subject. EDWARD D. COPE.

Compar'ative Philol'ogy is that branch of the science of language which examines and classifies languages as undivided wholes—not, like etymology, tracing individual words through the various languages in which they occur, but comparing languages chiefly by the study of the general character of their vocabularies. It, however, does not confine itself to the mere collation of vocabularies and to the study of grammatical forms. By the study and comparison of literatures, of the literary history of nations, of popular traditions, mythologies and creeds, and of the dialectic variations of time or place, it seeks to discover the marks which integrate languages into groups, and which differentiate these groups from each other. It thus renders important services to the nearly related science of ethnology, since, with some limitations, kinship in language implies kinship in blood—a doctrine the truth of which is now generally admitted, though formerly opposed by eminent philologists.

Comparative philology, though almost entirely a growth of the present century, took its origin long since. The missionaries of the Roman Catholic Church in America, especially in the Spanish regions, long ago collected great numbers of vocabularies, which are now prized not only as collections of words, but as affording illustrations of the relative fixity or mutability of barbaric languages—a point in regard to which the greatest diversities exist, some languages changing greatly, it would appear, in a single generation, while others preserve a large degree of sameness over great areas of space and through great epochs of time.

But the British occupation of India, and the consequent study of Sanscrit literature, gave to all branches of linguistic science a wonderful impulse; indeed, not till that time did studies of this class assume a truly scientific character. (See BÄCKER, "Grammaire Comparée des Langues de la France" (1860); BAISSAC, "De l'Origine des Dénominations Ethniques" (1867); BALBI, "Atlas Ethnographique" (1826); BASTIAN, "Sprachvergleichende Studien" (1870); BAUDRY, "Grammaire Comparée des Langues Classiques" (1868); BEAMES, "Comparative Grammar of Modern Aryan Languages in India;" KUHN and SCHLEICHER, "Beiträge zur Vergleichenden Sprachforschung," etc. (1856–69), *sqq.;* BENLOEW, "Aperçu Général de la Science Comparative des Langues" (1858); BLEEK, "Ueber den Ursprung der Sprache" (1868), and "Comparative Grammar of South African Languages" (1869); LOUIS LUCIEN BONAPARTE, "Specimen Lexici Comparativi" (1847); the writings of BOPP, especially his "Comparative Grammar" (1833; 3d ed. 1869, *sqq.*, translated by Eastwick; 3d ed. 1862); DIEFFENBACH, "Lexicon Comparativum" (1847–51); EICHOFF, "Grammaire Générale Indo-Européenne" (1867); FICK, "Vergleichendes Wörterbuch" (1870); J. GRIMM, "Deutsche Grammatik" (2d ed. 1869–72); KELLE, "Vergleichende Grammatik" (1863); LATHAM, "Comparative Philology" (1862), and his other writings on language; F. MAX MÜLLER, "Lectures on the Science of Language" (6th ed. 1871); A. F. POTT, "Etymologische Forschungen," etc. (1833–36; new ed. 1859–71), and his other works; RAPP, "Grundriss der Grammatik," etc. (1852–55); RENAN, "De l'Origine de Langage" (4th ed. 1864); "Histoire Générale et Système comparé des Langues Sémitiques" (4th ed. 1864); "Revue de Linguistique" (Paris, 1807, *sqq.*); DE SACY, "Principles of General Grammar" (translated by Fosdick, 1847); SCHELE DE VERE, "Outlines of Comparative Philology" (1853); SCHLEICHER, "Compendium der vergleichenden Grammatik" (3d ed. 1871); "Sprachvergleichende Untersuchungen" (1848–50); "Zur Morphologie der Sprache" (1859); STEINTHAL, "Charakteristik der hauptsächlichen Typen des Sprachbaues" (1860); WHITNEY, "Language and the Study of Language" (1867); "Zeitschrift für vergleichende Sprachforschung" (Berlin, 1851, *sqq.*); LAZARUS and STEINTHAL, "Zeitschrift für Völkerpschychologie und Sprachwissenschaft" (1859–69).

Com′pass [perhaps a corruption of the Lat. *circum*, "around," and *passus*, a "step," originally "that which goes round" or "embraces," because it embraces, so to speak, the entire horizon with its circle; Fr. *compas*, also *boussole*)], the name of an instrument used to show the magnetic meridian or the position of objects with reference to it. Among its various forms are the *mariner's* compass, the *azimuth* compass, and the *variation* compass. These several applications each demand a special construction, but the essential parts are invariably the same. These parts are the needle, which consists of a magnetized bar of steel, and, fitted to its centre, a cap, which is supported on a pivot upright and sharp at the point to lessen the friction, and on which the needle may move with the slightest attraction. A circular card is attached to the needle of the *mariner's* compass, which turns with it, and indicates the degrees, which with the thirty-two points, divided into half and quarter points, are all marked on its circumference. The pivot is fastened to the bottom of a circular box, which contains the needle and card, and has a glass cover to protect the needle from the air. This is called the compass-box, and is suspended in a larger box or binnacle by two concentric brass circles called gimbals; the outer one is attached by horizontal pivots to the inner circle and to the outer box, the two sets of axes being at right angles to each other. Thus, the inner circle, carrying the compass-box, needle and card, is sustained in a horizontal position, and is not subject to the rolling of the ship.

"Boxing the compass" is the enumeration, by name, of the thirty-two points which are marked upon the compass-card. These points are—north, north by east, north-north-east, north-east by north, north-east, north-east by east, east-north-east, east by north, east, etc. The point "east"

Mariner's Compass.

is frequently marked O on compasses. This is from the German *Ost*, "east." The steering of ships is much more difficult since the introduction of iron-plated ships. These vessels, being highly magnetic, produce much disturbance of the needle, and it requires all the skill of science to counteract it. It is found best to build the ship with her head south, but to change it to the north during the process of plating, as the magnetism acquired during building is modified by the hammering attendant on the plating. It is, however, found requisite to often change the first adjustments.

The *azimuth* compass has its circle divided only into degrees; it is used to show the bearing of objects with respect to the magnetic meridian, and is furnished with sights for the more accurate noting of the angles.

The *variation* compass shows such changes as occur daily in the deviation of the magnetic from the true meridian. The needle is much longer than in the mariner's compass, in order to make minute variations more apparent.

The origin of the compass is undoubtedly to be ascribed to the Chinese, who more than a thousand years B. C. made use of the loadstone to guide their cars or carriages without the aid of the sun or stars. It is certain that they employed the magnetic needle in the navigation of vessels soon after the Christian era, if not earlier. There is, indeed, every reason to believe that the mariner's compass was not an original European invention, but was introduced from China. None of the early European writers speak of it as invented in Europe; and it is certain that the compasses used by the Italians in the thirteenth century were constructed exactly like those made in China about the same period. The compass is mentioned by Guyot of Provence as early as 1190, and by Raymond Lully, 1286.

Compass Plant, the *Silphium lancinatum*, a remarkable plant of the order Compositæ, sub-order Tubulifloræ, tribe Senecionidæ. It grows on the great prairies of the Mississippi Valley, and its radical leaves have, while growing, the property of pointing quite nearly to the north and south. In gardens it does not always show this property, but the testimony of numerous observers, scientific and otherwise, seems to establish the fact as above stated. In the poem of "Evangeline" Mr. Longfellow speaks of a "delicate flower" on the prairies whose leaves point northward, but the plant in question is very large and coarse. With its congeners it abounds in resin and has medicinal properties. It is often called "rosin-weed."

Compasses. See Dividers.

Compensa′tion of Er′rors, the neutralizing in philosophical instruments for measurement (*e. g.* of time, pressure, temperature, distance, etc.) of errors caused by certain properties of the material agents used, by the introduction of other material agents which, acting alone, would produce errors of an opposite character. Thus, the expansion of the pendulum-rod by heat may be counteracted by making its weight of a much more expansive material, as lead or mercury, and connecting it with the rod by its lower end. (See Pendulum, by Pres. F. A. P. Barnard, S. T. D., LL.D., L. H. D.)

Com′petine, a township and post-village of Wapello co., Ia. The village is 85 miles S. E. of Des Moines. P. 1033.

Competi′tion [Lat. *competitio*, from *com* (for *con*), "together," and *peto, petitum*, to "seek"], the act of endeavoring to gain what another endeavors to gain at the same time; emulation; strife for superiority. The most important practical use of the term is in the political economy of commerce, where competition is a great motive-power of enterprise and production. Competition in trade and manufactures tends to reduce prices, as well as to improve the quality of goods. Most attempts to supersede competition by some other motive to exertion have been unsuccessful.

Compiègne, a town of France, department of Oise, on the Oise and on the railway from Paris to Saint-Quentin, 44 miles N. N. E. of Paris. It has a communal college and a public library of 28,000 volumes; also manufactures of muslin, hosiery, and cordage. Here is a palace built by Louis XV., a park, and a forest of 30,000 acres. P. 12,150.

Com′plement [Lat. *complementum*, from *com* (for *con*), intensive, and *pleo*, to "fill"], a full quantity or number; the number required or limited; that which completes or fills up. In mathematics, the complement of any magnitude is a second magnitude, which, added to the first, gives a sum equal to a constant third magnitude, which is purely arbitrary and conventional. Thus, the complement of an angle is its defect from a right angle. The arithmetical complement of a number is its defect from the next higher power of ten. Thus, the arithmetical complement of 64 is 36.

Complement, in music, the quantity required to be added to any interval to complete the octave; for example, a fourth is the complement of a fifth.

Complemen′tary Col′ors. Each of the three primary colors is complementary to that secondary color which is produced by blending the other two; thus, red is the complementary color of green. Blue and orange are complementary colors, and each presents the most complete contrast to the other. The secondary colors have also each their complementary colors. Colors complementary to each other are always harmonious, and hence the subject is one of practical importance in personal and artistic decoration. The following is a table of some of the principal colors which are complementary to each other:

Red	is complementary to	Green.
Blue	"	Orange.
Yellow	"	Purple.
Red-purple	"	Yellow-green.
Blue-purple	"	Yellow-orange.
Dark-purple	"	Citron-yellow.
Blue-green	"	Red-orange.
Olive	"	Dark-orange.
Russet	"	Dark-green.

Complexion. See Skin.

Com′plin, or **Com′pline** [from the Lat. *compleo*, to "complete," because it finishes the day], the last of the canonical hours in the Greek and Roman Catholic churches, following vespers; also the prayer for that hour, anciently ordained to be said about nine o'clock in the evening.

Compluten′sian Bi′ble, a polyglot in six volumes, folio, so called from *Complutum*, the Latin name of Alcalá in Spain, where it was printed. It was projected by Cardinal Ximenes, who spent about $120,000 upon it. It was commenced in 1502, printed between 1514 and 1517, authorized by Pope Leo X. in 1520, but apparently not published before 1522.

Compo′nent [from the Lat. *com* (for *con*), "together," and *pono*, to "put;" literally, "composing" a part; hence, as a noun, "that which composes" a constituent part], something which unites with another to form a compound. In mathematics, any one of the factors of a composite number or of a literal product.

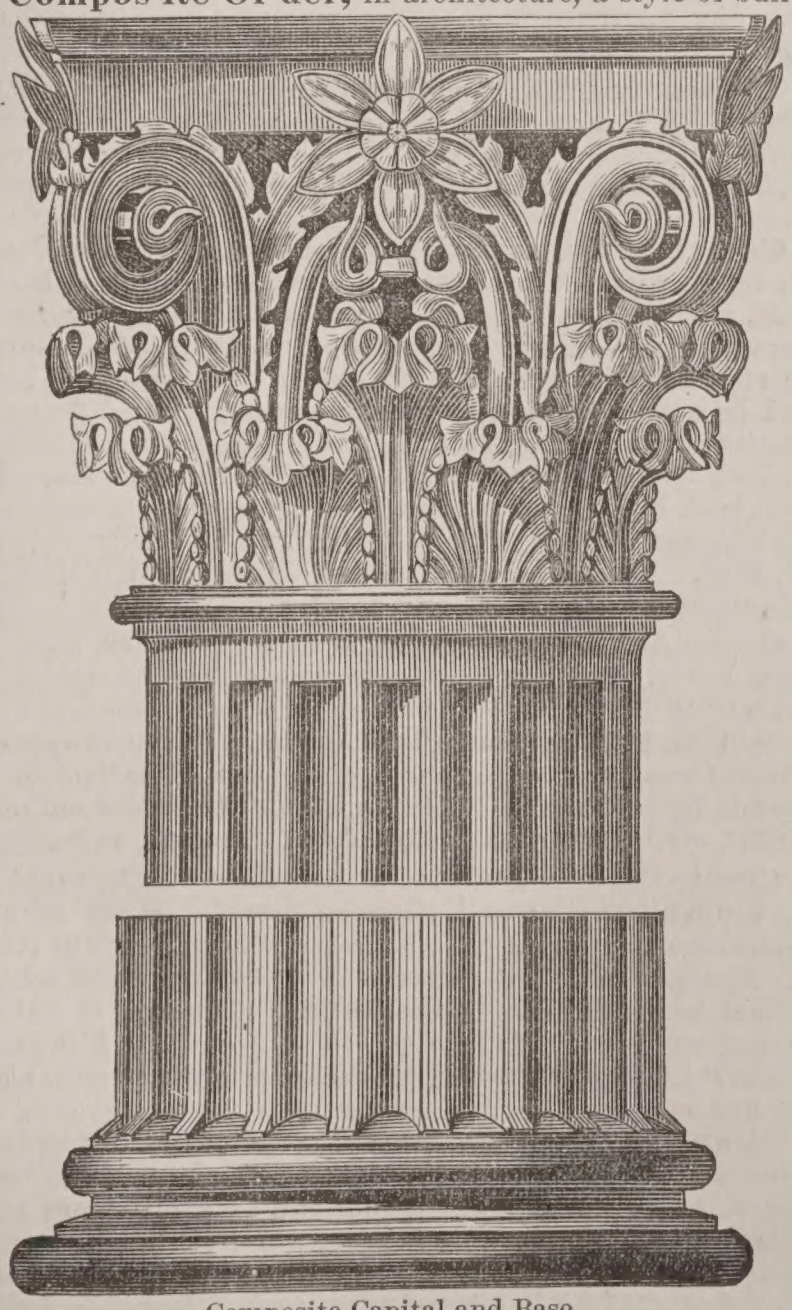
Compo'ser [for etymology, see preceding article]. This term is usually applied to a person who composes operas, oratorios, airs, or other pieces of music; one who invents new combinations of musical notes.

Compos'itæ [from the Lat. *com* (for *con*), "together," and *pono, positum,* to "put," referring to its compound flowers], the largest natural order of exogenous plants, distinguished by heads of flowers which are composed of florets crowded together upon a common receptacle, and surrounded by an involucre, so as to resemble single flowers. Another marked peculiarity is that the five (rarely four) anthers of each floret unite into a tube. The order contains both herbaceous plants and shrubs, those which are natives of temperate climates being generally herbaceous, those found in warm regions not unfrequently shrubby, and several, especially in St. Helena, are arborescent. They have alternate, opposite, or verticillate leaves, without stipules. The florets are bisexual, unisexual, or neutral, those of the circumference (or ray) often differing in this respect, as well as in form and color, from those of the centre (or disk) of the same head. Chaff-like bracts are often interspersed among the florets. The calyx is superior, adhering to the ovary, and afterwards to the fruit, its limb being either wanting or divided into a pappus of bristles, hairs, or feathers. The corolla is of one petal, superior, strap-shaped, tubular, or more rarely labiate, different forms often appearing in ray and disk of the same head. It is rarely three or four-toothed, but often five-toothed. The ovary is one-celled, with a single ovule, the style simple, with a cleft apex; the fruit an achenium; the seed destitute of albumen. The order contains more than 1000 genera and about 10,000 known species. In the Linnæan system they form with a few others the class Syngenesia.

The order is divided into three sub-orders—the Tubulifloræ, the Labiatifloræ, and the Ligulifloræ. The artichoke, thistle, daisy, chamomile, sunflower, dandelion, chicory, and lettuce are well-known plants of this order.

From the seeds of some a fixed drying oil is expressed, the oil of the sun-flower, the *Madia,* and the *Guizotia* being among the most important. Many are valuable for their medicinal properties, as chamomile, arnica, wormwood, tussilago, etc. Not a few are characterized by bitterness and by stimulating properties; also anodyne, narcotic, diaphoretic, and diuretic properties. Some, as arnica, are poisonous. A large number are ornaments of our flower-gardens, especially in the latter part of summer and in autumn. Amongst these are the xeranthemum, dahlia, aster, and chrysanthemum. This order is called Asteraceæ by Lindley and others.

Compos'ite Or'der, in architecture, a style of building characterized by the employment of pillars designed to combine the lightness and grace of the Ionic order with the ornate finish of the Corinthian. In many cases the Ionic volute was blended with the Corinthian acanthus leaf, as in the example given. This union is regarded by most critics as an incongruous one, and the Composite style is considered effeminate. It was employed chiefly in the Roman empire in its period of decadence. The accompanying cut represents the Composite style as seen in the temple of Vesta at Tivoli. It is comparatively free from the characteristic faults of the order. Many writers consider the Composite order a mere variety of the Corinthian.



Composite Capital and Base.

REVISED BY C. COOK.

Composi''tion [Lat. *compositio*], in general, is the act of composing, or that which is composed; in literature, the act of inventing or combining ideas and expressing them in words; also a literary production, book, or essay. In music, it is the act or art of disposing and arranging musical sounds into airs, tunes, songs, etc. The term is also applied to an air or other piece of music. In printing, it is the setting of types, or putting them together to form words and sentences.

COMPOSITION, in the fine arts, is that combination of the several parts by which a subject is agreeably presented, each part being subordinate to the whole; such an arrangement of the objects represented that they shall all tend to illustrate the central thought or idea.

COMPOSITION, in bankruptcy, a percentage which creditors agree to receive from a bankrupt instead of full payment. (See INSOLVENCY, by PROF. T. W. DWIGHT, LL.D.)

Composition of Forces or **Motions,** in mechanics, signifies combining or uniting several forces or motions, and determining the result of the whole. If a body is impelled by two forces which act in the same direction, the *resulting* force, or *resultant,* is equal to the sum of both; that is to say, the effect produced is the same as would be produced by a single force acting in the same direction, and equal to their sum. If the two forces act in opposite directions, the resultant is equal to their difference, and the body will move in the direction of the greater. If the lines of direction of the two forces make an angle with each other, the resultant will be a mean force in an intermediate direction. Thus, if the two forces be represented in intensity and direction by the two sides of a parallelogram, then the resultant is represented in intensity and direction by the diagonal of the parallelogram which passes through the angle formed by those two sides.

Com'post [from the Lat. *com* (for *con*), "together," and *pono, positum,* to "place"], a mixture of substances adapted to the fertilization of the soil, which substances, being allowed to undergo chemical changes for a considerable time in heaps, become more valuable then they could have been if applied separately. Composts are made of farmyard manures and earth, road-scrapings, peat, leaves, and clearings of ditches. By allowing these to lie for six months in heaps of from three to four feet in depth, food is prepared for plants. The use of guano and other light manures will no doubt supersede in a great measure the necessity of this laborious process. The wonderful effects that have resulted from the application of nitrates, ammonia salts, and phosphoric acid should impress farmers with the truth that the valuable elements bear a small proportion in weight to the whole mass of farmyard dung or composts, and that the mixing of manures in heaps with earth often does not pay for the labor expended. Still, in some circumstances, the chemical or commercial fertilizers are best applied to the soil after composting them with earth or with coarse manures. The action of frost upon composts is highly beneficial, especially when peaty earth is used.

Compostella. See SANTIAGO DE COMPOSTELLA.

Com'pound [from the Lat. *com* (for *con*), "together," and *pono,* "to put"], a substance formed by the union of two or more substances joined by chemical affinity. The adjective "compound," which means composite or composed of several parts or elements, is applied in botany and other sciences to various objects which are not simple. A compound leaf is formed of several leaflets articulated to a common petiole, and is either pinnate or digitate. Compound motion is that which is effected by two or more conspiring forces or powers.

Com'pound An'imals are organisms of low grade, in which parts regarded by some theorists as individuals, and which are certainly distinct in many vital functions, are merged into one compound system. The living mass in all truly compound animals appears to originate from a single ovum, and the subsequent development of the individual parts by gemmation resembles in some respects the growth of vegetables. Examples of compound animal life are found in coral-polyps, cestoid worms, certain molluscoids,

etc. There is, however, much difference of opinion as to what constitutes animal individuality.

Compound Fracture, in surgery, is a fracture of any bone when the skin and tissues covering the bone are so lacerated that air may enter the fracture. The treatment of compound fracture requires the highest surgical skill. (See FRACTURE.)

Compound Interest. See INTEREST.

Compound'ing of Fel'ony, in England and the U. S., is the act of taking, or agreeing to take, a reward for forbearing to prosecute a felony, and is punishable with fine and imprisonment. A note or other promise taken on such a consideration is illegal in its inception, and cannot be enforced in a court of justice by the promisee. (See FELONY, by PROF. T. W. DWIGHT, LL.D.)

Compound Microscope. See MICROSCOPE, by PRES. F. A. P. BARNARD, S. T. D., LL.D., L. H. D.

Compressed Air, as a means of the transmission of motive-power, has been thoroughly tested in the railway tunnels of Mont Cenis and the Hoosac Mountain in Massachusetts. Compressed air, as an agent for transmitting power, is advantageously used only in those cases where belts or shafting could not be employed on account of the great distance between the motive-power and its point of application. At the Hoosac Tunnel the air was compressed partly by water-power (as at Mont Cenis), and partly by steam, which works by means of air-pumps. The compressed air is transmitted through tubes, and gives motion to drills by means of pistons working in cylinders somewhat as in steam-engines. The exhaust air from the engines aids in ventilation and in keeping down the temperature—important considerations in underground operations; and perfect ventilation may at any time be secured by turning on a blast directly from the reservoirs.

Compressed Air-Bath, an apparatus in which patients with pulmonary diseases are placed and submitted to increased atmospheric pressure. The great expectations formerly entertained from this treatment have not been realized, but it appears to be a useful adjunct, especially in bronchitis and asthma.

Compressibil'ity, the property of being compressible into smaller space; susceptibility of being reduced by pressure to smaller dimensions. All bodies, in consequence of their porosity, are compressible, though liquids resist compression with immense force. Water, if subjected to a pressure of 15,000 pounds on a square inch, loses one-twentieth of its volume. Solids are compressible in different degrees. Gases are more compressible than either liquids or solids. A number of cubic inches of air can be compressed into the space of one cubic inch. Carbonic acid and several other gases can be condensed by pressure into a liquid and even a solid state.

Com'promise [from the Lat. *com* (for *con*), "together," and *promitto, promissum,* to "promise"], something promised or agreed upon mutually; an amicable agreement between two parties or persons who have been involved in a controversy that they will settle the difference by mutual concessions, or, as used in the civil law, a mutual promise of such parties to refer their differences to the decision of arbitrators.

Compromise, a township of Champaign co., Ill. P. 707.

Comp'ton, a county in Canada, in the S. part of Quebec, borders on Maine, New Hampshire, and Vermont. The soil is fertile. It is drained by the Chaudière and St. Francis rivers. Capital, Cookshire. Pop. 13,665.

Compton (HENRY), an English prelate who had a large share in the revolution of 1688. He was born in 1632, held first a commission in the army, then entered the Church, became bishop of Oxford in 1674, was transferred to the see of London in 1675, was the instructor of the daughters of the duke of York (afterwards James II.), who became consequently attached to the Protestant faith. He incurred thereupon the bitter hostility of James, who, through the infamous Judge Jeffries, deposed him from his episcopal functions. This was one of the grievances done to the Protestant religion alleged by William in his proclamation on landing. James, in alarm, re-established Compton, who, however, openly joined himself to the party of the invader, and with his own hands crowned him king. Died July 7, 1713.

Compton Centre, a post-village of Compton county and township, Quebec (Canada), 1 mile from Compton Station on the Grand Trunk Railway, 182 miles from Portland, Me.

Comptrol'ler [for pronunciation and etymology see CONTROLLER], a name applied in the U. S. government to three highly important officers in the treasury department.

The FIRST COMPTROLLER countersigns warrants drawn by the secretary of the treasury upon the treasurer, examines the accounts of the first and fifth auditors, receives appeals from the sixth auditor, superintends unsettled accounts of the treasury, navy, war, and interior departments, prosecutes all debts and delinquencies in behalf of the U. S., etc.

The SECOND COMPTROLLER examines the accounts of the second, third, and fourth auditors, countersigns warrants for the pension and Indian bureaus, and performs duties in the navy and war departments analogous to those of the first comptroller in the treasury department.

When a claim has been granted by the proper comptroller there is no revision or appeal allowed. When a claim has been refused by the comptroller, appeal may be made to the court of claims. (See CLAIMS, COURT OF.)

The COMPTROLLER OF THE CURRENCY issues printed notes to the national banks, exchanges new currency for that which is worn out, superintends the national banks, reports their condition annually to Congress, and has numerous other important duties. He gives heavy bonds when entering upon his duties, and is allowed no share in the profits of any banking association.

Com'stock, a township and post-village of Kalamazoo co., Mich. The village is on the Michigan Central R. R., 4 miles E. of Kalamazoo. Pop. 2018.

Comstock (ANDREW), M. D., an elocutionist, born in New York in 1795, published a "System of Phonetics" and "Elocution" (16th ed. 1844), and other works.

Comstock (CYRUS B.), an American officer, born in 1831 in Massachusetts, graduated at West Point in 1855; major of engineers Dec. 28, 1865. He served in constructing fortifications 1855–59; as assistant professor at the Military Academy 1859–61; in the civil war in erecting defences of Washington 1861–62; in Virginia Peninsula 1862, engaged in various engineer operations; in Maryland campaign 1862, engaged at South Mountain and Antietam; as chief engineer Army of the Potomac 1862–63; in Rappahannock campaign 1862–63, engaged at Fredericksburg and Chancellorsville; in the department of the Tennessee 1863, engaged at Vicksburg (brevet major), and as chief engineer Army of the Tennessee; assistant inspector-general of the military division of the Mississippi 1863–64; as senior A. D. C. to Lieut.-Gen. Grant, rank of lieutenant-colonel, 1864–66; in Richmond campaign 1864–65, engaged at Wilderness (brevet lieutenant-colonel), Spottsylvania, Cold Harbor, assaults of Petersburg and mine, and Fort Harrison; as chief engineer of the expedition to Cape Fear River, N. C., 1865, engaged at Fort Fisher (brevet colonel U. S. A. and brevet colonel and brigadier-general U. S. V.); as senior engineer in Mobile campaign 1865, engaged at the siege of Spanish Fort, storming of Blakely, and capture of Mobile (brevet brigadier-general U. S. A. and brevet major-general U. S. V.); and A. D. C. to the general-in-chief, rank of colonel, 1866–70. Since 1870 he has been superintendent of the geodetic survey of the northern lakes.

GEORGE W. CULLUM, U. S. A.

Comstock (GROVER S.), born at Ulysses, N. Y., Mar. 24, 1809, graduated at Hamilton College, Clinton, N. Y., in 1827, studied law, and was admitted to the bar in 1830. Powerfully moved by the preaching of Rev. C. G. Finney, he studied theology at the institution at Hamilton, N. Y., and became a Baptist minister. He sailed in 1834 as a missionary to British Burmah, and finally went to Aracan. In 1837 he founded a church at Kyouk Phyou. Here he remained, in spite of the deadly climate, which carried off his wife and children, until his death, which occurred April 25, 1844. He is especially honored by his denomination as one of its most laborious and devoted missionaries.

Comstock (JOHN LEE), an American author, born at East Lyme, Conn., in 1789, served as an army-surgeon in the war of 1812–15. His work on "Natural Philosophy" is said to have reached a sale of about 1,000,000 copies. Besides numerous works for schools on natural and physical science, he published a "History of the Greek Revolution" (1829), etc. Died at Hartford, Conn., Nov. 21, 1858.

Comte (ISIDORE AUGUSTE MARIE FRANÇOIS XAVIER), a French philosopher and mathematician, founder of the system of POSITIVISM (which see), was born Jan. 19, 1798, at Montpellier. He entered in 1814 the Polytechnic School in Paris. He became in 1820 a disciple of Saint-Simon, and contributed articles to his journal "L'Organisateur," in which the germ of his ideas already appeared. He was entrusted by his master with the preparation of a Saint-Simonian "Politique Positive," which proved unsatisfactory to the old philosopher. In 1832 he was appointed a tutor of mathematics and an examiner of candidates at the Polytechnic School; which posts he resigned in 1852. He lived obscurely, with straitened means, and died Sept. 5, 1857. His writings were "Cours de Philo-

sophie Positive" (6 vols., Paris, 1830–42), and "Système de Politique Positive, ou Trinité de Sociologie, Instituant la Religion de l'Humanité" (1851–54); besides "Calendrier Positiviste" (4th ed. 1852), and "Catechisme Positiviste" (1853). A clearer exposition of his doctrines is contained in Littré's "Comte et la Philosophie Positive" (1863). His "Cours," etc. was published in English in a condensed form by H. Martineau (2 vols., 1853). (See ROBINET, "Notice sur l'œuvre et sur la vie de Comte," and LEWES, "Exposition of the Principles of the Positive Philosophy.")

Co'mus [Gr. Κῶμος] was originally the Greek name of those songs of carousal which young people would sing when passing the houses of their friends or lovers. Thence it became the name of the god of such revel; and Philostratus gives a description of a picture in which Comus was represented as a youth, drunken, sleeping, leaning forward on a down-turned torch. Milton makes him a foul sorcerer, the son of Bacchus and Circe.

Con, a Latin particle signifying "together," and sometimes "with." It is commonly changed to *col* before *l*, *com* before *b*, *m*, and *p*, *cor* before *r*, and to *co* before a vowel or *h*. Hence we have *collect*, *combine*, *compress*, and *correct*, instead of *conlect*, *conbine*, etc.; *coagulate* and *cohabit*, instead of *conagulate* and *conhabit*. Sometimes *con* is intensive, as *concutio*, *concussum*, to "shake violently."

Co'nant (HANNAH O'BRIEN CHAPLIN), wife of T. J. Conant, was born in Danvers, Mass., in 1812. She was distinguished for her great attainments and fine literary taste. She was the author and translator of numerous works, among which is a "History of the English Bible" (1859). Died in Brooklyn, N. Y., Feb. 18, 1865.

Conant (ROGER), a colonist, born in Devonshire, England, in 1593, settled in Plymouth Colony in 1623, founded Salem, Mass., in 1626, and became a justice of the "quarterly court." Died Nov. 19, 1679.

Conant (THOMAS J.), D. D., born at Brandon, Vt., Dec. 13, 1802, graduated at Middlebury College in 1823, professor of languages in Waterville College (now Colby University) till 1833, and appointed in 1835 professor of biblical literature in the Theological Seminary at Hamilton, N. Y. From 1850 to 1859 he occupied a similar position in the Theological Seminary at Rochester, N. Y. In 1839 he published a translation of Gesenius's "Hebrew Grammar;" in 1857, a new version, with notes, of "the Book of Job"—a work which has attained a European reputation. He has since published similar versions of "Genesis" and the "Psalms" in the interest of the American Bible Union. By common consent he is one of the most accomplished Hebraists in America.

Con'cave [from the Lat. *con*, intensive, and *cavus*, "hollow"]. A curve is said to be *concave* at a given point when the lines joining the latter to adjacent points on the curve fall between the spectator and the curve, and *convex* when the curve is interposed between the spectator and the small chords in question. A surface is said to be concave or convex at any point when the plane sections through that point and the spectator's eye are all concave or convex; when some of these sections present their concavity and others their convexity to the spectator, the surface is sometimes said to be concavo-convex. This is the case with the hyperboloid of one sheet. When at a point on a curve the centre of curvature and the point of view fall on the same side of the tangent, we have concavity; when on opposite sides, convexity. (See LENS.)

Conceal'ment, in law, the suppression of the truth to the injury of another. A distinction is taken between such facts as are extrinsic to the contract, such as the existence of war or peace, and those which are intrinsic. Concealment of extrinsic facts is not, in general, fraudulent. (See FRAUD, by PROF. T. W. DWIGHT, LL.D.)

Concepcion', a town of the Argentine Republic, capital of the province of Entre Rios, on the China, is the see of a Catholic bishop and a national college. Pop. 6050.

Concepcion, a province of Chili, between the ocean and the Argentine Republic, and the provinces of Maule on the N. and Aurico on the S. Area, 5453 square miles. It is traversed by the Biobio. The climate is mild and favorable for tillage and pasturage. The fruit of the *Araucaria imbricata* (*piñon*) is abundantly produced. Coal, wheat, and excellent wine abound. Pop. 148,340.

Concepcion, La, a seaport of Chili, capital of the above province, is situated on the river Biobio, 7 miles from its mouth; lat. 36° 49′ S., lon. 73° 5′ W. It has broad streets and many handsome houses. It is a bishop's seat. Its port, Talcahuano, is one of the best in Chili. It has an extensive foreign trade, and exports large quantities of hides and tallow. Concepcion was ruined by earthquakes in 1730, in 1752, and in 1825. Pop. 13,958.

Concept' [Lat. *conceptus*, from *concipio*, to "conceive;" Ger. *Begriff*], in metaphysics, a thing which may be conceived; a collection of attributes united by a sign, and representing an object of possible intuition. Kant and his followers use the word concept to indicate notions which are general without being absolute. They divide these into three different classes: "Pure concepts," which derive nothing from experience; "empirical concepts," wholly derived from experience; "mixed concepts," ascribable partly to experience and partly to the pure understanding. A concept is "clear" when its object can be distinguished from any other; "distinct," when its component parts can be defined.

Concep'tion [Lat. *conceptio*, from *concipio*, *conceptum*, to "conceive"] is a psychological term denoting the last, finishing process by which consciousness takes possession of an object. It is distinguishable from sensation as active from passive. As long as an object is allowed to impress the mind through the senses, immediately and directly, without any reaction or interference from the side of the mind, consciousness is in a merely passive state; and this passive state of consciousness is called sensation. In order to master an object, the mind cannot stop, however, at the mere sensation; it must make the sensation itself the subject of a scrutiny and discrimination; and this active part of the whole psychological process by which the mind takes possession of an object is called perception and conception; the former referring to the sensation as representing the details of the object, the latter as involving the whole of it. As we go over an object with the finger-tips to ascertain the exact position and relations of its outlines, thus perception runs over all the outlines given in the sensation, partly verifying their truth with respect to the object, partly lifting them into perfect clearness of consciousness. Conception does not begin its work until perception is through with its task. The mode and the meaning of an object as a whole is the task of conception, and thus the conception of an object corresponds very nearly to that which we generally call a view of the object; with this difference only, that a view always is understood to be more or less influenced by the individuality of the subject, while the conception always is supposed to be, strictly and scientifically, the subjective equivalent for the idea of the object. The difference between conception and imagination is, simply, that conception is a process and imagination a faculty; in the process of conceiving the faculty of imagination is very largely used.

Conception, in physiology. See EMBRYOLOGY, by PROF. J. C. DALTON, M. D.

Conception, Immaculate, Doctrine of the. See IMMACULATE CONCEPTION OF THE BLESSED VIRGIN MARY, by PROF. R. D. HITCHCOCK, D. D., LL.D.

Conception, Orders of the Immaculate. Among the orders of the Roman Catholic Church there have been the following: (1) The Knights of the Immaculate Conception of the Blessed Virgin, an order founded in 1618, at Vienna, with the intention of bearing arms against heretics and infidels. The institution was confirmed by Pope Urban VIII. in 1623, but the brotherhood did not flourish, and soon was extinct. (2) The Nuns of the Immaculate Conception of Mary, founded at Toledo, in Spain, in 1484, by Beatrix de Sylva, and confirmed by Pope Innocent VIII. in 1489. They afterwards joined the Clarisses, and took their rule, which rule was changed by Pope Julius II. in 1511. They are often called Conceptionists. (3) The Congregation of the Immaculate Conception of the Blessed Virgin is the appellation of the lay sisters attached to the nuns of Notre Dame, who were established by the blessed Peter Fourier (1565–1640).

Concep'tualism, a doctrine of the Schoolmen intermediate between realism and nominalism. The Realist asserts that genera and species have an independent existence—that there exist certain "ideas," the pattern after which single objects are fashioned. The Nominalist asserts that nothing exists but things and names of things—that universals are mere names. The Conceptualists assign to universals an existence which may be called psychological—that is, independent of single objects, but dependent on the mind of the thinking subject in which they exist as conceptions. Abelard is considered the founder of this doctrine, which was held by Reid, and probably by Aristotle.

Concerti'na [from *concert*], a modern musical instrument invented by Prof. Wheatstone of London. Its sounds are produced by free vibrating metallic springs, as in the accordion. The scale of the concertina is very complete and extensive, beginning with the lowest note of the violin, G, and ascending chromatically for three and a half octaves

to C. Every sound in the scale is double, and can be produced either by opening or closing the bellows.

Concer'to, an Italian term applied to a piece of music composed for a particular instrument, as a piano or violin, which bears the chief part in it and is usually accompanied by the full band. It is a composition for a solo instrument with orchestral accompaniments, adapted to give the performer an opportunity to display the highest artistic skill as well as intellectual cultivation.

Concetti, kon-chet'tee [an Italian term, rendered by English writers on rhetoric "conceits"], ingenious thoughts or turns of expression, points, *jeux d'esprit,* etc. in serious composition. In the sixteenth century the taste for this species of brilliancy, often false and always dangerous, spread rapidly in the poetical composition of European nations, especially in Spain and Italy, where the name of concetti was applied rather in a good than a bad sense, the critical taste being much perverted. Tasso is not free from concetti. For a century after his time they became offensively prominent in Italian poetry. Marino and Filicaia are marked examples. In France concetti were equally prevalent in the seventeenth century, and were peculiarly in vogue with the fair critics of the Hôtel Rambouillet, so well ridiculed in Molière's "Précieuses Ridicules." In England, Donne and Cowley are instances of a style full of concetti.

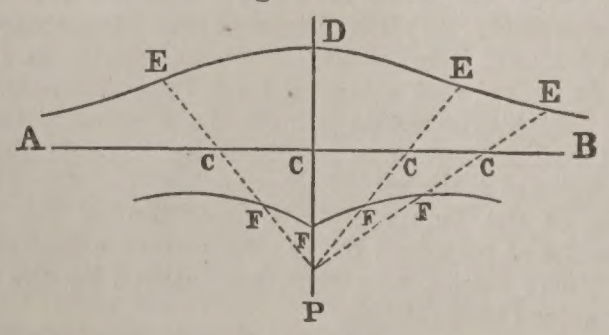
Con'cha, de la (Don José), Marquis de la Habaña, a Spanish general, born in Buenos Ayres in 1800. He was captain-general of Cuba from 1849 to 1852, and was again appointed to that office in 1854. In 1862 he was sent as minister to France. In 1863 he was Spanish war minister, and in 1864 was appointed president of the senate.

Concha, de la (Don Manuel Gutièrrez), Marquis del Duero, brother of the preceding, a Spanish general, born April 25, 1808, in Córdova del Tucuman, in the Argentine Republic. He distinguished himself in the war against the Carlists, was, 1839, appointed brigadier-general and, 1840, field-marshal, and overthrew in 1843 the regency of Espartero. After the outbreak of the revolution in Sept., 1868, he was appointed prime minister by Queen Isabella, but soon resigned when his advice was not followed.

Conchif'era [from the Lat. *concha,* a "shell," and *fero,* to "bear"], in Lamarck's arrangement of mollusks a class containing those which have bivalve shells. The term is now used to indicate the class usually called Acephala, but it does not include the Brachiopoda.

Con'cho, a county in W. Central Texas, is bounded on the N. E. by the Colorado River, and is drained by the river Concho. Area, 1025 square miles. Wood and water are scarce. The surface is generally rough and rocky, but affords good sheep-pasturage. According to the census of 1870, the pop. was 0.

Con'choid [from the Gr. κόγχη, a "shell," and εἶδος, "appearance"] **of Nicomedes,** a curve of the fourth degree, invented by Nicomedes as a means of trisecting an angle, of constructing two geometrical means between two given straight lines, and of finding a cube double a given cube. The curve may easily be described, and is occasionally used in architecture as a bounding line of the meridian section of columns. It is generated as follows: Let A B be



Conchoid.

a straight line, and P any point not upon it; then if lines P E, P E′, etc. be drawn, cutting A B, which is called the directrix, in points C C′, and let C E, C F be laid off from the points of intersection, each equal to a given line; the curves traced by the successive points E and F form the conchoid. That branch which is most remote from P (the "pole" of the conchoid) is called the first or superior conchoid, and the other branch, traced by points F F′, is the second or inferior conchoid. Both branches may extend to infinity, and they have the line A B for a common asymptote. The constant distance C E of the points E and F from the points of intersection is called the modulus of the curve. If we take C in the line E P as origin, and the lines A B and E P, at right angles to one another, as co-ordinate axes, the equation to the conchoid is $x^2 = \frac{(b+y)^2(a^2-y^2)}{y^2}$, where a is the modulus of the curve, and b = the perpendicular distance of P from A B. If $a = b$, P becomes a cusp point of the first species.

Conchoi'dal, a term used in mineralogy to describe a variety of fracture. When the fractured surface of a mineral exhibits curved concavities similar to the valve of a bivalve mollusk, it is said to have a conchoidal fracture, as flint, anthracite coal, etc.

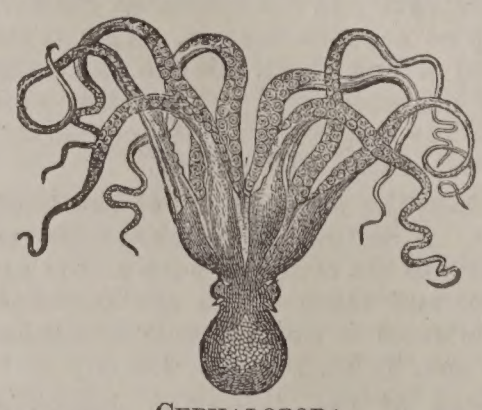
Conchol'ogy [from the Gr. κόγχη, a "shell," and λόγος, a "discourse," a "treatise"], a treatise on shells; also the science which treats of shells and their inhabitants. The soft parts of the Mollusca were almost unknown to the earlier naturalists, hence their external coverings or shells were separately classified, without reference to the contained animals. The more scientific modern method requires that the species shall be thoroughly investigated, as well as regards their soft as their hard parts. Malacology (from the Gr. μαλακός, "soft," and λόγος, a "discourse," a "treatise," *i. e.,* a "treatise on soft animals") is a more proper designation for this science, but the word Conchology has become so well known in this connection that it has been found difficult to supersede it. Thus, the latter name is still commonly used, but with the enlarged signification that it is the science or classification and description of molluscous animals, including their shells.

Mollusca (from the Lat. *mol'lis,* "soft") is the second of the five great divisions or structural types of the animal kingdom. An external shell, in nearly all cases, protects the animal, and may be regarded as an exo-skeleton, replacing the bones of the Vertebrata. Occasionally, as in the cephalopods or cuttle-fish, the shell is internal, and in some of the gasteropods it is rudimentary or entirely wanting; still, the absence of the internal skeleton, and consequently of the bony envelopes protecting the great nerve-chord, will, even in such cases, sufficiently distinguish the Mollusca from the Vertebrata. Shells are composed principally of carbonate of lime, with but little other mineral or animal material, and are therefore much harder than the bones of the vertebrates, which contain a large proportion of gelatin. The Mollusca also have colorless blood, while that of the vertebrates is red.*

The Mollusca do not attain the size and strength or exhibit the complex structure of the vertebrates, but they cannot justly be said to be of inferior or lower type; their plan of conformation is more simple, but it is just as perfectly adapted to the purposes of their existence. The greater number of individuals of the more simple organisms seem to compensate, in the economy of nature, the superior individual force of the more complex ones.

Geology reveals to us that in the early ages of the world shells were among its first inhabitants, flourishing in its waters almost to the exclusion of other types of animal life, and leaving their imperishable coverings on the geological shores, to become in our day the great record of the succession of strata by the aid of which the geologist reads so unerringly the history of the past.

Classification.—The Mollusca are divided into three great branches or types of structure called *classes,* corresponding to the classes Mammalia, Aves, Pisces, etc., of the subkingdom Vertebrata, and it will be convenient for our purposes to diagnose these three classes somewhat hastily, before describing in detail their structural peculiarities and habits. The first two are *encephalous*—that is, the animal is furnished with a distinct head, and the shell, when developed (as it usually is), is univalve or in one piece. They are named



Cephalopod:
Octopus tuberculatus (about one-tenth its natural size).

Gasteropod:
Helix desertorum.

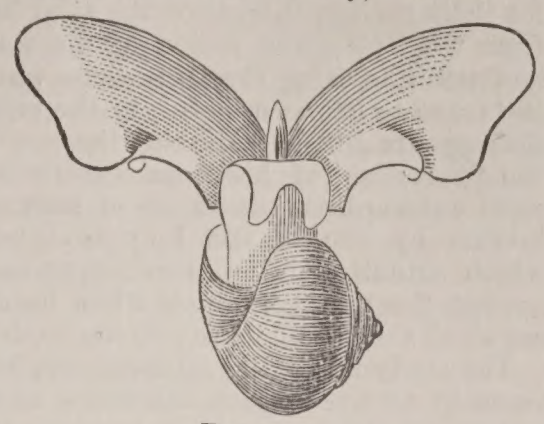
1. Cephalopoda [from the Gr. κεφαλή, the "head," and πούς, ποδός, a "foot"]. In this class the head is encircled by eight or more feet, or more properly arms, used in swimming and in seizing food.

2. Gasteropoda [from the Gr. γαστήρ, the "belly," and πούς, ποδός, a "foot"]. The

*A few molluscous animals possess red blood, but, viewed with a microscope, the entire fluid is found to be colored, whereas in vertebrate blood the color is due to red corpuscles floating in a colorless fluid.

animal is destitute of separate limbs, but glides, creeps, or swims by the muscular action of the under part of its body.

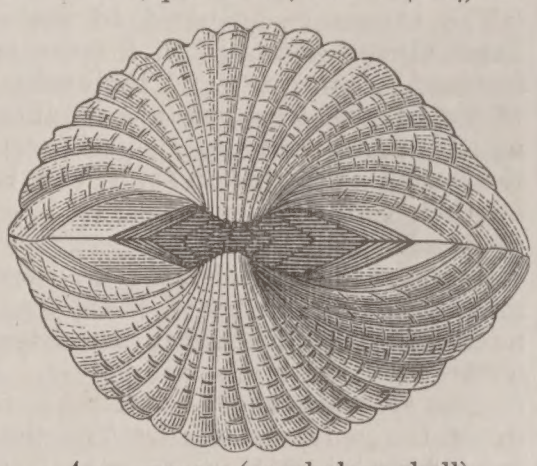
In an aberrant form of this class, formerly considered a distinct class, locomotion is effected solely by means of a pair of wing-like fins attached antero-dorsally, and used in swimming. These are the PTEROPODA (from the Gr. πτερόν, a "wing," and πούς, ποδός, a "foot").



PTEROPOD:
Limacina antarctica (enlarged).

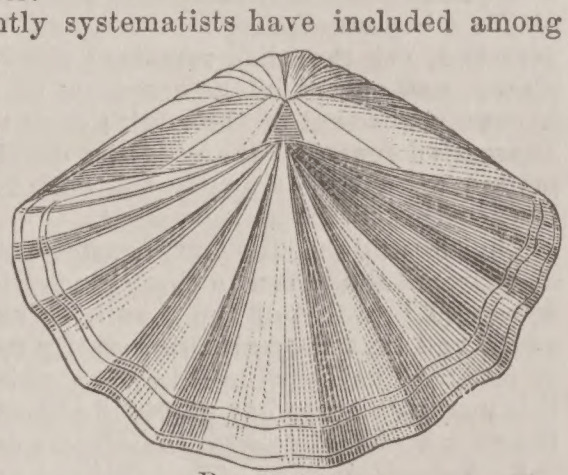
The third class is *acephalous*, or without a head, and the shell (which always envelops the animal) is *bivalve*, or composed of two distinct, generally similar, pieces, united at the back by a horny hinge called the *cartilage*. The distinctive nomenclature used for the encephalous classes is inapplicable here, because the foot is more or less specialized or entirely wanting in the various bivalve families—some of them being sedentary or attached, while others are locomotive. The best designation for the class is

3. ACEPHALA [from the Gr. α, privative, and κεφαλή, the "head"]. Most conchologists use the term *Conchif'era* (shell-bearers) for this class, but it is an objectionable word, inasmuch as it is equally applicable to the other two classes. Others call the bivalve mollusks *lamellibranchiates* (plate-gilled), describing their respiratory organs, but this term is also objectionable, because (as we shall show hereafter) the differences in the organs of respiration enable us to divide the gasteropods satisfactorily into *orders*, and a designation indicating inferior value in one class cannot properly be used to express a high value in another.



Arca granosa (acephalous shell).

Until quite recently systematists have included among the mollusks certain aberrant forms, such as the brachiopods or lamp-shells, the tunicates, and the bryozoans. Of these the first only possess a shell, but the external bivalve test differs in its relation to the contained animal from the acephalous mollusks in this respect, that its valves are applied dorsally and ventrally instead of bilaterally. Internally, we find in one valve a shelly process acting as a support to the animal, and (in this respect) simulating the vertebrate skeleton. The tunicates are shelless animals, enclosed in elastic gelatinous integuments, having two openings only—an orifice for the mouth, and one for the excretions. The organ of respiration is a ribbon-like band crossing the interior cavity. Finally, the Bryozoa, microscopic polypous animals, attach themselves in generally symmetrical patterns upon the surface of rocks or shells, the aggregation of their minute cells resembling corals. All these aberrant forms have been excluded from the true Mollusca by some of the best systematists of the age; but by way of compromise they are generally assigned a position immediately following them as a sub-branch, named MOLLUSCOIDEA (which see). The brachiopods are generally represented in conchological cabinets and described in conchological works. Scientific opinion as to their place is by no means uniform.



BRACHIOPOD:
Spirifera Walcotti (fossil).

While dealing with exclusions it may be well to mention the cirripeds or barnacles, and the echinoderms or sea-urchins. These were included in the Mollusca by Linnæus, whose "Systema Naturæ" divided all invertebrates into two classes—the VERMES (mollusks, etc.) and the INSECTA. Lamarck and Cuvier also included the barnacles in the Mollusca, and even so recently as 1855, Professor T. Rymer Jones so arranged them.*

ANATOMY AND PHYSIOLOGY OF THE MOLLUSCA. 1. REPRODUCTION.—The Cephalopoda and nearly all of the marine Gasteropoda are *diœcious*—that is, the sexes are distinct; but the pulmoniferous terrestrial and fluviatile snails, the Pteropoda, the Nudibranchiata or naked marine mollusks, and a few other marine genera, such as *Bulla* and its allies, are *monœcious*, or with sexes united in the same individual. The Acephala are partly diœcious and partly monœcious.

In the Cephalopoda or cuttle-fishes one of the arms of the male becomes a specialized reproductive organ, and in copulation becomes detached from its owner. It has been found *living* within the sac of the female. In consequence of this very curious method the male organ has been considered by some naturalists to be a parasitic worm, while others have supposed it to represent the normal form of the male animal.

The sexes in the cephalopods are distinguished by external differences of form, as well as by the *pen* or internal shell. The eggs in their passage from the ovary are invested with a gelatinous fluid which greatly enlarges after deposition. The egg-mass is always clustered; in the genus *Se'pia*, the typical cuttle-fish, it assumes the appearance of a bunch of black grapes; in *Oc'topus* it is irregular and attached to sea-weed; and in *Loli'go* it is pudding-shaped, the eggs united by a ligament to a common centre. The liquid of the eggs is at first colorless, but soon after impregnation a central speck appears in each, which grows so rapidly that before the yolk is consumed the embryo has attained a recognizable form; so that previous to hatching the fœtal cuttle-fish already presents all the organs necessary to its after existence. The most remarkable physiological feature of the embryo is the duct for the conveyance of the yolk which communicates with the œsophagus through the head, penetrating in the front of the mouth, instead of entering the walls of the abdomen, as in the vertebrates. Only one oviposit takes place yearly, but the number of eggs contained in the mass is considerable, reaching forty thousand in the *Loli'go vulga'ris*.

The shell of the *Argonaut*, the paper nautilus as it is called, is not a mere egg-case, being developed both by the male and female. It is therefore a true shell, although produced under abnormal conditions, being formed *after* the birth of the animal.

The powerful, complexly-organized gasteropods, including the predatory tribes respiring by the aid of branchiæ, are diœcious, and of course sexual union is with them a necessity; but it is no less necessary with the monœcious helices or garden snails, in which the co-operation of two individuals is required for reciprocal impregnation. As a preliminary to actual connection the two snails become lively and crawl around one another, while from the generative orifice on the right side of the neck of either is protruded a sacculus containing a sharp-pointed spiculum or dart, with which they strike one another upon the skin; the dart-sack is then withdrawn, and another sack extruded containing both male and female organs. In the eggs of the Gasteropoda much diversity is exhibited, and three distinct types are recognizable, according with the habits and situation of the animals. Thus, the land snails deposit separate eggs covered by calcareous shells; the phytophagous fluviatile and marine species, animals inhabiting shore-lines and shallow waters, cover their eggs with a gelatinous substance, by means of which they are agglutinated into one mass; and finally, the zoophagous mollusks, inhabitants of deeper and rougher waters, where the spawn is more exposed to the depredations of other animals, protect them by horny pouch-shaped coverings variously aggregated: these masses, small and gelatinous when expelled from the female, rapidly enlarge and toughen until they frequently attain a bulk exceeding that of the parent, and the integument becomes as tough as parchment. Sometimes these egg-cases are separately extruded, and in such instances they are individually attached to a piece of timber, shell, or rock by the animal, but ordinarily the whole cluster is expelled together. The process of laying is thus described by Sir E. Home: "A friend of mine saw the female (*Turbinel'la py'rum*) shed her eggs; a mass, apparently of mucus, passed along the deep groove in the lip of the shell in the form of a rope, several inches in length, and sunk to the bottom; this rope of eggs, enclosed in mucus at the end last discharged, was of so adhesive a nature that it became attached to the rock or stone on which the animal deposited it. As soon as the mucus came in contact with the salt water, it coagulated into a firm membranous structure, . . . and this connected nidus, having one end fixed and the other loose, was moved by the waves, and the young in the

*"Animal Kingdom and Comparative Anatomy," 2d edit., p. 466, London, 1855.

eggs had their blood aërated through the membrane, and when hatched they remained defended from the violence of the sea till their shells had acquired strength."

The terrestrial mollusks lay few eggs, but the marine and fluviatile species are more fecund. The Helices deposit from twenty to fifty oval eggs, pure white in color, which they hide in the earth or under stones, or cover with leaves. They so rapidly increase in size and hardness that in a day or day and a half they aggregate a greater bulk than the parent, and the shells have become opaque and consistent. The arboreal helices and bulimi of the Philippine Islands generally deposit their eggs in clusters, within two leaves previously curled together by the animal for their protection; the *Buli'mus Mindoroen'sis* arranges its eggs in parallel rows agglutinated perpendicularly to the surface of a leaf. The eggs of the African Achatinæ differ from those of other land snails in the color being deep yellow instead of white. An *Achati'na Numid'ica* which I kept alive for two years deposited about seventy yellow eggs, which were loosely covered with earth; in a few days nearly every one of them had hatched, and shortly afterwards they entered the earth to pass the torpid season. Alas! the rigor of an American winter proved too much for their tender constitutions, although my vivarium was kept in a heated apartment, for in the ensuing spring fifty-one of them were no more. Those that survived had by that time attained a bulk three times exceeding that of the egg.

The large South American snails lay eggs as large as those of a pigeon, and they are eaten by the natives, but African snails of equal size deposit eggs not more than one-eighth of the above bulk.

The *Natica*, a predatory sea mollusk, constructs a nest of agglutinated sand, in form resembling an inverted bowl with convex sides, a small circular aperture at the top and attached by its broad base. The eggs, encased in the usual tough tissue, are suspended to the inner surface, so that the sea-water has access to them through the contracted aperture, while at the same time they are shielded from the attacks of enemies of their race.

The Acephala were, until a few years ago, supposed to be generally hermaphrodite, but the number of these is being constantly reduced by the discovery of the diœcious character of various families. In the diœcious bivalve Mollusca the spermatozoa are discharged into the water, whence they are inhaled with the respiratory currents by the opposite sex. In many cases the sex cannot be distinguished by the shell alone, but in others the posterior portion of the shell of the female is enlarged in order to cover and protect the charged ovary. So great is the sexual difference in the shells of some of the Unionidæ or fresh-water mussels of the United States, that they have been frequently mistaken for distinct species.

Reproduction commences in the Acephala long before full growth is attained. The *Cy'clas* or *Sphæ'rium* reproduces when so immature as to possess hardly any of the external characters of the species; and oysters, although they do not attain full growth under three or four years, spawn when four months old. So prolific are they that the ova of a single oyster have been estimated as high as ten million in number. Mr. Isaac Lea found the oviducts of the *Anodon'ta undula'ta* charged with about six hundred thousand individuals. This accurate observer has described and figured the embryonic forms of numerous species of American Unionidæ, which in all cases differ widely from the parent; the valves are granulose on their external surfaces, and frequently furnished with basal hooks, which, by interlocking, keep them together; in form these valves are rounded or oval, and they are attached to the animal by a single central muscle, instead of the two lateral muscles of the adult. As the ovary is included in the body of the animal, its enlargement when gravid would, in many cases, be so great as to preclude the closing of its valves, thus endangering its safety: in such cases the ova are expelled from the nidus while still immature, but allowed to complete their growth in the branchial fringes, where, spread over a much greater surface, they enjoy the advantage of respiration in the ciliary currents.

The Brachiopoda are believed to be all monœcious.

Viviparous Reproduction.—This is not uncommon in the phytophagous gasteropods; indeed, different species of the same genus are dissimilar in reproduction; thus, one of the periwinkles (*Littori'na ru'dis*) is viviparous, while another (*Littori'na litto'rea*) is oviparous—that is, in the former the young are lodged and retained in the branchial cavity until fitted for a separate existence. The *Paludi'na* is another familiar example, exhibiting the same care for its young, which may be found within the parent shell perfectly formed and numbering from fifty to a hundred individuals. The *Cym'ba Neptu'ni*, a zoophagous gasteropod, is retained within the folds of the large foot of its parent until its shell has grown to the length of one and a half inches.

Maternal instinct is shown in the selection of favorable situations for oviposition, as in the Ampullariæ, which deposit their eggs in shallow water, where, anchored to a stick or stone, they are exposed to the sun's vivifying influence; the fresh-water snails, which attach the mass of gelatinously-enveloped ova to floating objects, in order to obtain for them the advantages of the solar heat and protect them from the dispersing action of the waves; the *Ianthina*, a mollusk inhabiting the mid-ocean, which constructs a float (attached to her own body), to the under surface of which the eggs are glued; while the *Argonaut* hatches them within the protection of her beautiful shell. But perhaps the most extraordinary instance of maternal care is that exhibited by one of the limpets (*Calyptræ'a Chinen'sis*), which actually sits upon her eggs, and continues thus to protect the young animals when hatched until they have acquired shells sufficiently strong to defy aggression.

The study of the larval metamorphoses of mollusks has recently received much attention, and many curious and important discoveries have been made in this connection. We have already noticed the larval condition of the Unionidæ, and like differences occur in many Acephala. The larvæ of the *attached* species are provided with a ciliated swimming-disk, and are extremely active; they are also provided with eyes, which are lost when the animal, becoming adult, attaches itself for life and has no further use for visual organs. Similar changes occur in the brachiopods; and the development of the nudibranchiate sea snails is thus described by Messrs. Alder and Hancock: "The spawn is deposited in the shape of a gelatinous band, always arranged in a more or less spiral form, and fastened to corallines and the under sides of stones by one of its edges. The ova are minute and very numerous, amounting in some species to several thousands. Before the period of exclusion the young may be seen revolving on their own axis by means of vibratile cilia, and on escaping from the egg they swim about freely in the water by the same means. The larva is extremely minute, and has more the appearance of a rotiferous animalcule than a mollusk. It is enclosed in a transparent, nautiloid, calcareous shell, with an operculum. Its structure is very simple, showing no signs of the external organs that distinguish the future adult. The principal portion visible outside the shell is composed of two flat disks or lobes, fringed with long cilia, by the motion of which it swims freely through the water. These are often withdrawn into the shell, and the operculum is closed upon them when the animal is at rest." In this stage of its existence the tentacles are not developed, but are replaced by two ear-like veils; afterwards the tentacles appear, the foot enlarges and projects beyond the operculum, and the mantle becomes detached, yet the shell remains; finally, the latter is displaced, and except in the retention of the frontal veils the appearance is that of the adult; soon the foot exercises its locomotive function, the gills are developed, the jaws and tongue appear, and finally the veils fall, and the animal has attained its full development.

Thus we find that the larval gasteropods are provided with an external shell even in those genera in which it is finally concealed in a fold of the mantle or entirely absent in the adult, and that they are temporarily furnished with a pair of ciliated fins by which they can swim about freely. In this manner nature has provided alike for the protection of the young animal and for the dispersion of the species.

2. *Nervous System.*—The principal nerve-centre is a ring of ganglia surrounding the throat in the cephalopods and gasteropods, and situated on the posterior adductor muscle in the Acephala. This ring is perhaps somewhat analogous to the vertebrate brain in its functions, and from enlargements of it are distributed the nerves to every portion of the body. From this typical plan of the molluscous nerve-system there are, in some cases, considerable variations. In the most complex organisms the concentration into an œsophagal ring is the most perfect, but in those animals which are more simply organized the centres are more or less dispersed; so that in the *So'len*, for instance, the cerebral and abdominal nerves have their origin at opposite extremities of the long body, but are connected by a long commissure.

The various senses are unequally developed in the different classes of the Mollusca. The animal, when protruded from its protecting shell, is of course measurably defenceless; hence the most delicate and the most important of the senses is that of

Touch.—This sense resides in every external portion of the animal, the moist, glutinous skin being particularly sensitive. So delicate, indeed, is it that the slightest impression alarms the mollusk and causes its immediate retreat. Specialized organs of touch exist in the *tentacula* of the encephalous species, organs arising from the top of the head or near the mouth, generally two (but sometimes four) in

number. They are very flexible, and generally retractile at the will of the animal. In the *Nau'tilus* about one hundred of these tentacles surround the mouth, but only four of these are organs of sensation. There are also, in many genera, tentacular filaments arising from the sides of the mantle or body, and not generally retractile. The *Halio'tis* or ear-shell, *Cypræ'a* or cowry, *Tur'bo*, etc., are genera possessing these beautiful fringed appendages. In the bivalve species these filaments also exist; in those having the mantle open, like the oyster, they form the *beard* or fringe which lines its margin, while in those having a closed mantle they are attached to the circumference of the orifices. It is supposed that mollusks are not very sensible to pain, and their tenacity of life and power of reproducing lost or mutilated parts is wonderful; the latter extends to the growth of new tentacula, and even, in well-ascertained instances, of a new head!

Taste.—The possession of this sense is rather inferred from the habits of the animals, the selection of food, etc., than from any specialized organs discovered by naturalists—their use being in most cases conjectural only. We can readily suppose that the Acephala, which swallow everything small enough to enter the mouth, cannot have very delicate gustatory organs; indeed, the only selection made by them is in the reflex muscular action of the stomach, which enables them to eject through the mouth indigestible substances. The encephalous species, however, and particularly the carnivorous ones, are certainly endowed with the faculty of taste, as their food is carefully selected.

Smell.—There is no reason to suppose that this sense is possessed by the bivalves, but its existence in the univalves is very evident, as snails will approach food for which they have a preference, directed by the odor only, and cephalopods are known to avoid the vicinity of certain strong-smelling plants.

Sight.—The encephalous mollusks are provided with two eyes, placed on the sides or front of the head; they are either sessile or elevated on stalks or pedicels. Sometimes these stalked eyes are on short tubercles placed in the rear of the tentacles or branching from them, and sometimes they are situated at the extremity of the tentacles themselves. The eyes of cuttle-fish and of many carnivorous gasteropods are complex in organization, and endowed with visual powers equal to those of vertebrates, but the structure is much more simple in the plant-feeders, and is believed to possess only limited powers, having perhaps in most cases no faculty of distinguishing form or color, but merely a general susceptibility to light.

It can no longer be doubted that the black objects which occupy the summits of the tentacles in helices are eyes; it is said that the snail will avoid an object placed in its path before ascertaining its position by actual contact, and that it is capable of perceiving, and is attracted by, gay colors. Nature has provided for the safety of these tentacular eyes by giving the animal the power of withdrawing them rapidly *through* the tubes to their bases upon the approach of danger. This action is accomplished by the disappearance of the tentacle through its own cavity by a motion which may be likened to the inversion of the finger of a glove.

The bivalve Mollusca enjoy visual faculties proportioned to their locomotive powers; thus, those which, like the *Pecten*, are of active habit, have a number of eyes situated among the tentacular filaments on the margin of the mantle, but in the fixed genera the eyes are rudimentary or absent. The North American Unionidæ appear to be sensitive to light. In a communication addressed to the Academy of Natural Sciences of Philadelphia, 1857, Mr. Lea says: "I became satisfied that the closing of the siphonal tubes, on my approach to the specimens I had in my vivarium, was not altogether occasioned by the vibration caused by my approach, and I accordingly arranged numerous individuals of several species with a view carefully to observe them. In the course of these examinations, repeatedly made, I found several species of *Unio* quite sensitive to my passing my hand between them and the light, while others showed no signs of sensitiveness. Some individuals were more sensitive than others, and the females exhibited this power much more than the males, often withdrawing not only their siphons, but their mantle, within the valves. It is difficult to say with certainty how far their visual organs are developed. The fringes of the branchial and anal siphons are, in the Uniones, formed of small, subconical tentacula. With a good lens the terminal points of the tentacula may be observed to be rounded and furnished with at least the appearance of an eye; and that it will prove to be a true eye, however imperfect, there can be but little doubt."

Hearing.—Some of the cephalopods possess external ears, and auditory capsules, connected with auditory nerves, are found near the bases of the tentacles in gasteropods. The capsules contain one or more oval or rounded vibratory bodies termed *otolites*, and the occurrence of one of these vibrators in the vesicular cavity indicates the single auditory organ of the Acephala and Brachiopoda. Considering that such an exquisitely delicate sense of touch pervades the whole exposed surface of the mollusk, thus enabling it to perceive by vibration the approaching objects, it may be doubted if the auditory faculty be very highly developed.

Voice.—With but few exceptions, mollusks are dumb. The cephalopods squeak and groan when removed from the water, and some of the nudibranchiates, the *Æolis* and *Tritonia*, emit audible sounds.

3. *Muscular System.*—The prehensile arms of the cuttle-fishes, the foot of the gasteropods and of some bivalves, and the wings of pteropods, exhibit great muscular power. It is with its foot that the *Pho'las* excavates the cave in solid rock or mud which becomes its lifelong dwelling, and with the same organ the razor-shell (*Solen*) buries itself with great rapidity beneath the wet sand of the sea-shore. In many of the gasteropods the foot is the swimming organ, as it is that of locomotion in all of them; but in bivalves another class of muscles become more important; they are those which, attaching the animal to the valves of its shell, enables it to open and to close them. These *adductor* muscles are sometimes two in number, as in the clam (*Ve'nus*), and to this class the term *dimyaries* is applied, whilst others have but a single central muscle of attachment, like the oyster, and these are called *monomyaries*. We find also in the Acephala other muscles in the border of the mantle, controlling its movement. Their position is indicated upon the inner surface of the valves by an impression running parallel with the margin, and called the *pallial line*. When the animal possesses retractile siphons, the position of the siphonal muscle is shown in the shell by a *sinus* of the pallial line, which otherwise is said to be *entire*.

Gasteropods are attached to the axis of their shells by muscles passing into the foot and operculum, thus enabling them, when alarmed, to retire quickly and to close the door against the enemy. In non-spiral shells, like the limpet, this muscle is attached to the inner surface in a half circle, making a horseshoe impression within the shell.

The cephalopods only, have muscles attached to internal cartilages, representing the attachment to the bones in the vertebrates.

4. *Digestive System.*—The cephalopods are furnished with a pair of horny jaws (*maxillæ*), of which one is much superior to the other in size. They may be likened to the mandibles of the parrot, have cutting edges and sharp-pointed ends, which are useful in dividing their food. In the helices the mouth has an upper jaw only: it is frequently ridged across to assist the process of comminution, which is effected by its opposition to the siliciously armed tongue; in the fresh-water snail (*Limnea*) this superior jaw is assisted by two lateral accessory ones. None of the gasteropods are possessed, like the cuttle-fishes, of both superior and inferior maxillæ, and many of them are entirely destitute of these organs. Bivalves have a mouth supplied with a pair of soft membranous palpi.

Encephalous Mollusca are provided with a tongue or *lingual ribbon* studded with denticles, which usually are arranged in the form of a triple band. The central portion is the *rhachis*, and the similar lateral portions are called the *pleu'ræ*. The recurved silicious denticles are in numerous transverse series, those of the centre being differently shaped from the pleural ones. As they are worn away with use, a constant growth maintains their effectiveness, and they number in some cases as many as twenty-five thousand in a single individual. Following the threefold division of the tongue or lingual ribbon, the teeth of the central portion are called *rhachidian* or centrals, the others *uncinian* or laterals. The tongue is elliptical in the land snails, forked, fleshy, and placed at the end of the muscular proboscis of the carnivora; but in most of the phytophagous tribes it is very long—in the limpet, for example, when extended, it exceeds the length of the animal, and when retracted it lays reversed along the gullet and coiled spirally within the stomach. In the *Bulla* the rhachis is unarmed, and trituration is effected by the calcareous plates lining its muscular gizzard.

The bivalves have no tongue; the so-called *gastric dart*, a styliform cartilaginous body contained in the stomach of some species, is the representative of a gizzard rather than of a tongue.

Modern investigators have assiduously studied the lingual dentition of mollusks, and many hundreds of specific forms have been described and figured. Unfortunately for conchological science, many of these students, misled by the great significance of dentition characters in the classification of the Mammalia, have attempted classifications of mollusks based entirely on relationships of dentition, which, instead of according with other structural resemblances, destroy the natural groups and force into juxtaposition the

most heterogeneous forms. It might be supposed that the study of the dentition would at least indicate whether the animal be carnivorous or herbivorous, but even in this respect it fails, because its relationships have occasioned the separation of carnivorous mollusks from others to which they are closely allied, to place them among the herbivora, with which they have no other affinities.

In mollusks the liver is always of large size, and the existence of a renal organ has been demonstrated in nearly all the species observed. The intestine is sometimes straight, terminating posteriorly, as in the *Chiton*, but more generally it is convoluted, and is more so in the herbivorous than in the carnivorous species. In the Encephala it generally turns upon itself, the funnel opening on the under side of the neck in the cephalopods, and on the right side, behind the head, in the gasteropods. In bivalves the intestine is much convoluted, passes through the ventricle of the heart and terminates near the respiratory aperture, whence the excrements are washed away by the water from the gills.

5. *Circulation.*—The heart includes an auricle, occasionally double, which receives the blood from the gills, and a ventricle for its propulsion into the arteries; from the capillary extremities of these it is collected into the veins, again passes through the gills, and becomes arterial blood. It is colorless or pale gray. In the cephalopods there are two additional branchial hearts, and the œsophagus is more or less enveloped in a wide venous sinus. In the Acephala the visceral cavity forms part of the circulatory system. Mr. Alder has counted 120 pulsations per minute in the *Vitri'na*, and half as many per minute in some nudibranchs; but it may be fairly inferred that the difference is due partly to the condition of excitation of the animals under observation.

6. *Respiration.*—The cuttle-fishes, Acephala, and brachiopods are water-breathers—that is, they respire water containing air, absorbing the oxygen of the latter during the process. The gasteropods, however, are divided into water- and air-breathers, and the latter class, besides including all of the land snails, comprehends most of those inhabiting fresh water, as well as a few marine species.

In the pulmoniferous species the lung is formed by a fold of the mantle, forming a chamber having pulmonary vessels distributed over its walls. The cavity of the lung opens on the anterior portion of the right margin of the mantle, and its alternate expansion and contraction in breathing is quite visible to the eye unassisted by a lens. The same folded mantle forms the cavity for the gills of the aquatic species, except in the nudibranchiates; in these the branchiæ are arranged in a plumose festoon on the animal's back, and entirely exposed.

The bathymetrical distribution of marine mollusks is determined principally by the quantity of oxygen required by them for respiration, and a transition from sea to fresh water, or *vice versâ*, or even a great change of depth in the same element, is generally destructive to their existence. Some sea mollusks, although water-breathers, are littoral in station, the moist sea air and visits of the tides sufficing for their respiration; such animals will sometimes live for a lengthened period when removed from their native element. For example, a species of *Littori'na*, or periwinkle, of which several individuals were collected at San Domingo (1871), has now survived for nearly a year in various cabinets in Philadelphia.

The carnivorous gasteropods generally receive the water for respiration through a tube specialized from the mantle-margin, and called the *siphon;* while in the herbivora the mantle is simply somewhat prolonged and curled up. The bivalve Mollusca are in the same manner divided into those having specialized siphons, and those having merely a rudimentary fold of the mantle.

7. *Food.*—The bivalve species, generally sedentary or attached, and seldom active, obtain microscopic food from the currents of water directed into the mouth by the joint action of the lips and branchiæ, while the cephalopods, on the other hand, dart through the water with great rapidity after their prey, seize it with their long arms, and draw it to their powerful jaws. Once enclosed in the eight powerful arms, which are covered with formidable sucker-like disks, escape is impossible, and even large fishes and crustaceans become the victims of these voracious animals. Man has been attacked by them, and there are well-attested instances of narrow escapes from these monsters—some of the species attaining gigantic proportions, with bodies several feet long, and arms still longer, the whole weighing several hundred pounds.

The food of the zoophagous gasteropods includes fishes, crabs, zoophytes, and particularly bivalve Mollusca. With their spiny tongues they bore through the shells of the latter, which are incapable either of resistance or escape. Tender, succulent plants, algæ, etc. are eaten by the land and fresh-water species; the snails showing a preference for the tender shoots of cabbage, lettuce, etc. which is very annoying to gardeners. In Europe these animals multiply so fast and are so destructive to gardens that it is necessary to collect and destroy them. An American gentleman on his first visit to the Royal Botanical Gardens at Kew was surprised to see a bucketful of snails in the hand of a gardener, who informed him that it was part of his daily duty to collect and destroy that quantity, which he had done for years.

8. *Shell-Growth.*—The majority of the mollusks are covered with an external shell; the Acephala always are so covered, the shell being in two pieces, united at the back or commencement of growth by a ligament or hinge; these are called *bivalves.* The gasteropods are generally provided with a single or *univalve* shell, which is in form some modification of the spiral principle, varying from *fusiform,* in which the elongation of the axis gives it a conspicuous spindle shape, through countless intermediate forms to *planorboid,* in which the whorls revolve on the same plane with the initial one. A few gasteropods have no shell whatever, the nudibranchiates, for example; others have a more or less perfect internal one secreted beneath the mantle, as in the naked slugs or snails. In the genus *Chiton* it is composed of a number of transverse pieces called valves, united by a ligament, and allowing some freedom of motion, by which the convexity can be accommodated to the surfaces over which the animal passes or to which it attaches itself. In the *Patella* and the limpets generally the spiral nucleus is obscured or lost, so that the shell assumes a conical form, open at the base.

Only two living genera of cephalopods, the *Nautilus* and the *Argonaut,* have external spiral shells; all others are possessed either of an internal calcareous plate imbedded under the back, of porous texture, called cuttle-bone, or of a somewhat horny narrower plate called the *pen.*

The nucleus of the shell covers the young animal in the egg even before its internal organs assume definite form; it is generally of a transparent horn-color. After birth the enlargement of the shell is effected by additions to the lip or circumference of its aperture; these additions are effected by an exudation of carbonate of lime and animal matter from the *mantle* or contiguous part of the animal, which becomes calcified on exposure. Of course as the animal increases in bulk, so the circumference of this growth-margin enlarges, and the spiral shell "grows;" and the lines running parallel with the aperture which the outer surface exhibits are called "growth-lines," and indicate these successive additions. The *epidermis,* or horny external skin of animal matter which invests most shells, protecting them from the corroding action of the elements, is exuded from the neck or collar of the animal, and here also originates the cellular or main substance of the shell; but the interior lining of porcelanous or pearly matter comes from that portion of the animal containing the viscera. Of course in limestone regions land and aquatic mollusks flourish, and their shells are large and ponderous, while in places destitute of that material they are rare and small, and their shells fragile and of horny rather than calcareous material.

In case any portion of the shell occupied by the animal becomes fractured, a viscid exudation takes place from the exposed portion of the latter, which soon hardens, repairing the fracture; but if the break occur in one of the earlier whorls, which the growth of the animal has compelled it to vacate, there is no means of repairing the injury, which accordingly remains, but a partition is thrown across the whorl immediately in the rear of the animal for its protection. Such being the method of construction of the shell, it will be readily understood that spines, tubercles, ribs, etc. on the external surface are the consequence of inequalities of like character in the mantle of the animal, and that colors, whether in bands or spots, are exuded by pigment-cells similarly arranged upon its collar. The inner surface being secreted by the transparent visceral covering which is never exposed to the light, is of course white. Some shells, like the cowry, olive, bulla, etc., are entirely enveloped in the mantle, and the colors are thus derived from its entire surface. In consequence of this protection, the epidermis is not developed in such cases. Thickening and contraction of the lip of the shell indicate adult characters, and further growth generally leaves these thickened portions visible externally, forming *varices;* but the animal in many cases possesses the power of removing both these external varices, spines, etc., and all internal thickenings—even the partitions of the whorls and the very axis of the shell—when the room is needed for its growth or when they impede its movements. Analysis has revealed the existence of muriatic and sulphuric acids in the saliva of some species, and it is believed that these are the agencies employed in the removal of superfluous shell-material.

In nacreous shells the beautiful *mother-of-pearl* constituting the lining or inner surface is composed of alternate, minutely-undulated layers of thin membrane and carbonate of lime. Precious pearls are similarly composed, and are originated by the irritation of intruding extraneous substances, causing the animal to cover them by the deposition of successive layers of pearly material. Pearls are frequently found attached to the internal surface of many species of bivalve mollusks, both marine and fluviatile, but the most valuable ones are those which are completely detached and spherical, and are only found in the soft parts of the animal. The Chinese and others have made the manufacture of pearls a branch of human industry by the careful introduction of irritating substances within the shells.

The *operculum* is generally a horny lid (sometimes stiffened by an exterior calcareous layer, and occasionally it is entirely calcareous) which is developed in the embryo, and grows with the growth of the animal; its accretions are exuded from the latter, and applied to the circumference in the same manner as in shell-growth. Typically, the operculum is closely fitted to the aperture of the shell, so that when the animal is at rest it acts as a door, preventing the intrusion of marauding enemies. It is a means of defence, hence generally developed in the harmless herbivorous species. It is occasionally found in the carnivorous Mollusca, but then it is often so small in proportion to the size of the mouth of the shell as to be nearly useless for defensive purposes.

Ordinal Classification.—The following outline of the main features of the most approved classification will give an idea of the application of the foregoing structural details to the systematic arrangement of the Mollusca:

Class I., Cephalopoda (the cuttle-fish).

Order 1, *Dibranchiata.*—Animal swimming, naked (shell, when present, internal), mandibles horny; arms eight or ten, provided with suckers; branchiæ two.

Order 2, *Tetrabranchiata.*—Animal creeping, with an external shell (as the *Nautilus* and *Ammonite*); mandibles calcareous; arms very numerous; branchiæ four. Only a few living representatives of this order are known, but several hundred fossil species have been described.

Class II., Gasteropoda (univalve mollusca).

Order 1, *Prosobranchiata.*—Animal creeping or swimming, protected by a shell, usually large enough to cover it; branchiæ plume-like, situated before the heart; sexes distinct.

This large order, containing fifteen thousand species, is divided into two sections, as follows:

A, *Siphonostomata.*—Carnivorous; provided with a breathing-siphon. The shell is spiral, with imperforate axis, the aperture terminating in a prolongation or canal. Operculum lamellar, horny. In this section are included the strombs, murices, whelks, cones, volutes, and cowries, all well-known marine shells.

B, *Holostomata.*—Respiratory siphon wanting, or replaced by a lobe in the collar of the mantle; gills plume-like, placed obliquely across the back or attached to the right side of the neck. Shell spiral or limpet-shaped, generally somewhat globular, with the margin of the aperture mostly rounded and continuous. Inhabiting both sea and fresh water; a large portion of the former and all of the latter being phytophagous. The naticas, pyramidellas, cerites, turritellas, periwinkles, nerites, turbos, trochi, ear-shells, and limpets are the familiar marine representatives of this section; while the fresh-water genera include the melanians, paludinas, and ampullarias.

Order 2, *Pulmonifera.*—Plant-eating, air-breathing snails, inhabiting land or fresh water; some furnished with opercula; monœcious. Includes the garden snails, helices, cyclostomas, limnæans, etc., about seven thousand species. The terrestrial Mollusca are confined to this order; more than half of the fresh-water univalves also are lung-breathers.

Order 3, *Opisthobranchiata.*—Shell rudimentary or wanting; branchiæ arborescent, more or less completely exposed on the back or towards the sides of the body near its rear end. The sexes are united in each animal. These are marine snails, met with only on the high seas, swimming on the surface, which they render brilliant by their gaudy coloring. They can only be preserved in alcohol, which, unfortunately, destroys their brilliant tints. A few of them, the *Bulla* and its allies, secrete a shell within the folds of the mantle.

Order 4, *Pteropoda.*—Marine animals, swimming by the aid of a pair of wing-like fins proceeding from the sides of the neck. Shell glassy and translucent, sexes united. A small group of pelagic animals almost unknown to collectors.

Class III., Acephala (bivalves).

Marine or fresh-water mollusks protected by a bivalve shell. Two systems of classification have been proposed, neither of which is entirely satisfactory. The first divides them, in accordance with the number of adductor muscles, into *Monomyaria, Dimyaria,* etc., and the second is founded on the presence or absence of the siphon and the character of the pallial impression, thus:

1. *Without siphons. Pallial line simple.*
   (The oysters, arks, marine and fresh-water mussels.)
2. *With siphons.* (*a*) *Pallial line simple.*
   (Chamas, tridacnas, lucinas, cockles, cyclades, clams, etc.)
   (*b*) *Pallial line sinuated.*
   (Veneridæ, mactras, tellinas, razor-shells, gapers, pholades, or borers, etc.)

The above brief outline of classification is all that our space will allow us to present. Recent systematists admit no less than three hundred families of Mollusca, including several times that number of genera, and the species described amount to between twenty-five and thirty thousand living species, besides nearly an equal number of fossil forms. The latter characterize by peculiar genera and species every geological period. They have become the "testimony of the rocks" and "the medals of creation," for without them the geologist would, in many cases, be utterly at a loss to classify the earth's strata. The primary classes of the Mollusca are all represented from the earliest period containing their fossil remains, but some of the lower divisions have become extinct, while others have originated at various subsequent periods. The ammonites and the Brachiopoda are familiar shells, which at one time swarmed in the ancient seas; the former have become entirely extinct, while of the latter a few species still exist.

Economical Value of the Mollusca.—Small as most of these animals are, the immense number of individuals enables them to take an important position in the economy of nature; mountain-chains are formed of their disintegrated shells; ships and piers are destroyed by the insidious attack of the *Tere'do* or ship-worm, and by the same little animal the accumulations of floating timber which would otherwise block up the mouths of bays and rivers, and the wrecks which would impede navigation, are removed.

As articles of food, mollusks are of important value to man and beast. Large numbers of fishes, birds, and mammals prey on them habitually, and of many species they form almost the entire sustenance. Man has, in all ages, consumed large quantities of shell-fish—even the pre-historic cave-men ate them, and at the present time the annual consumption of them is so enormous that it would be difficult to calculate the quantities and values. In the waters of the State of Maryland alone, according to official report, 563 vessels are licensed for the oyster-fishery, and bring to market upwards of ten million bushels annually. The oyster of the waters of the Middle and South Atlantic coast of the United States belongs to the species *Ostre'a Virginia'na,* while that of the northern coast (*Ostre'a borea'lis*) is smaller, more rounded, and rugose. To the latter the European species is nearly related. *Ostrea Virginiana* has been successfully transplanted to the waters of Europe and California, where it flourishes, and is regarded as superior in flavor to the "natives." Besides oysters, many other marine bivalves and univalves are brought to market. Among the terrestrial species the Roman snail is an esteemed delicacy in the Latin countries of Europe, and large numbers are bred for sale.

Shells are extensively used for manufacturing purposes—for the making of buttons and many other articles; for cameo-cutting, in which advantage is taken of differently colored layers to produce striking effects of figure and background. Precious pearls, as previously stated, are secreted in the soft parts of those genera of Mollusca which form nacreous shells. They have frequently been found in the fresh-water Unionidæ or mussels of both hemispheres, but the principal product is from the pearl-fisheries of the Indian Ocean, an industry employing over sixty thousand hardy divers. *Mother-of-pearl,* used in manufactures, is derived principally from the *Meleagri'na margaritif'era,* inhabiting the Gulf of California.

The byssus of the *Pinna* or fan-mussel is spun into articles of hosiery in Italy: it is a beautiful but expensive material, resembling the finest silk. (See Byssus.) From remote antiquity mollusks have furnished brilliant dyes, such as the far-famed Tyrian purple, discovered and first used by the Phœnicians—a color yielded by mollusks of the genera *Pur'pura, Mu'rex,* etc. Many of the natives of Africa and Asia use the shell of the money-cowry (*Cypræ'a mone'ta*) as money, and whole cargoes of this species are exported by civilized nations to be used in trading with the natives. The *wampum* of the North American Indians, consisting of strings of fragments of the shell of the clam (*Ve'nus mercena'ria*), was also used in lieu of coin.

The molluscous fauna of the United States is very rich

in species, including three hundred land shells, six hundred fluviatile gasteropods, seven hundred Unionidæ or fresh-water mussels, six hundred species of marine Mollusca of the Atlantic, and about the same number of the Pacific coast; in all, nearly three thousand species.

The study of conchology is one of the most fascinating subjects in the whole range of natural science, and has perhaps engaged the attention of more investigators than any other department of zoology. Collectors explore assiduously every portion of the earth's surface and its waters for specimens, and the habits of the mollusks, as well as their geographical and bathymetrical distribution, are thus becoming extensively known. Private collections and cabinets abound, and public museums containing large numbers of species are to be found in every large city. Perhaps the finest conchological collection in the world is that of the Academy of Natural Sciences of Philadelphia, which contains about twenty-one thousand species and numerous varieties, with extensive series illustrating geographical distribution; aggregating, probably, nearly two hundred and fifty thousand specimens. The library of this institution contains nearly a thousand published works relating to the science of conchology. GEORGE W. TRYON, JR.

Conch-shell, a popular name for the shells of certain carnivorous gasteropods of the genera *Triton, Strombus,* etc. They are found chiefly in tropical seas. Many tons of these shells are annually exported from the Bahamas to Europe, where the finest are used in cutting shell-cameos, and the rest are useful in the porcelain manufacture. Conch-shells were formerly much used in the U. S. as "dinner-horns" by farmers, but have been largely superseded by those made of tin.

Con'chos, a river of Mexico, an affluent of the Rio Grande, flows through the state of Chihuahua. Its general direction is N. N. E. Length, about 330 miles.

Con'clave [from the Lat. *con* (for *cum*), "with," and *clavis,* a "key," originally, a room that may be locked up]. This term is applied either to the apartment in which the cardinals of the Roman Catholic Church assemble to elect a new pope, or more frequently to the assembly itself. The usages of the Church require that the conclave must be held in a single apartment having only one door, which is locked after the entrance of the cardinals, in order that they may have no intercourse with the public while the election is going on. When a pope dies, nine days are allowed for the funeral solemnities. The cardinals assemble on the tenth day, and voting begins on the eleventh. From their separate cells, into which they are locked every night, the cardinals come together twice a day till some one of their own number is made pope by a majority of two-thirds of all the votes. Each cardinal is attended by two or three waiters, called *conclavists,* sworn to secresy like the cardinals. This method, in its main features, dates from 1274. Since Gregory XV. (1621–23), the choice has been either by scrutiny (ballot), by inspiration, or by compromise, usually the first. Since 1823 the place of meeting has been in a long wing of the Quirinal Palace in Rome; for nearly 400 years before that, in the Vatican. (See CARDINAL.)

Concom'itance, Sacramen'tal, the doctrine of the Roman Catholic Church, that the body and blood of Christ *sacramentally accompany* each other, so that *both* are *sacramentally* received under *either* species, whether of bread or wine; hence, that the communion in one kind imparts all that is received sacramentally in both kinds. Aquinas substituted this term for the older one, "Unio naturales." (See ASCHBACH, "Kirch. Lex." s. v., and TRANSUBSTANTIATION.) The Lutheran Church maintains that from a *natural* concomitance we cannot argue to a *sacramental* one, which is wholly supernatural and dependent on the will of Christ; that this doctrine implies that the officiating priest receives both body and blood twice; and that it holds equally good for *one kind* in the sacrifice of the mass. (See KRAUTH'S "Conservative Reformation," 620, 621.)

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Concom'itant [from the Lat. *con,* "together," and *comitor,* to "attend as a companion"], a term of modern algebra, applied to a quantic which is related to a given system of quantics in the following manner: Let u, u_2, etc. be a given system of quantics, which by linear transformation of their variables become converted into u'_1, u'_2, u'_3, etc., and let u and u' be quantics respectively derived from these two systems according to the same definite rule; then if u is converted into $m\,u'$, where m denotes some power of the modulus of transformation, by the same or by reciprocal systems of linear transformations of its variables or facients, u is said to be a concomitant of the given system u_1, u_2, etc. If u should contain no variables, and be therefore identically equal to $m\,u'$, it is called an invariant of the given system of quantics; if, containing variables, it should be converted into $m\,u'$ by the same linear transformations, it is called a covariant; but if its conversion into $m\,u'$ should require linear transformations reciprocal to those first employed, it is called a contravariant. Lastly, if u should contain two sets of variables, and still become converted into $m\,u'$ by transforming one set by the original and the other by the reciprocal substitutions, it is called a mixed concomitant of the given system of quantics. Concomitants, therefore, embrace covariants and contravariants.

Con'cord [Lat. *concordia,* from *con,* "together," and *cor, cordis,* "heart"], literally, "agreement in heart or sentiment;" agreement between persons; unity of opinions or sentiments; peace and harmony. In music, a combination of two or more sounds, forming harmony agreeable to the ear; the relation, harmony or agreement between two or more consonant sounds, such as the union of the major or minor third with the perfect fifth and octave. (See CONSONANCE.)

Concord, a township of Coosa co., Ala. Pop. 754.

Concord, a township of Green co., Ark. Pop. 960.

Concord, a township of Adams co., Ill. Pop. 1140.

Concord, a township of Bureau co., Ill. Pop. 2309.

Concord, a township of Iroquois co., Ill. Pop. 878.

Concord, a township and post-village of Morgan co., Ill. The village is on the Rockford Rock Island and St. Louis R. R. Pop. of township, 1280.

Concord, a township of De Kalb co., Ind. Pop. 1472.

Concord, a township of Elkhart co., Ind. Pop. 4725.

Concord, a township of Dubuque co., Ia. Pop. 1109.

Concord, a post-village, capital of Hancock co., Ia. Pop. of township, 149.

Concord, a township of Louisa co., Ia. Pop. 892.

Concord, a township of Ottawa co., Kan. Pop. 720.

Concord, a post-twp. of Somerset co., Me. Pop. 452.

Concord, one of the three capitals of Middlesex co., Mass., is on the Concord River and on the Fitchburg R. R., 20 miles N. W. of Boston. It has a national and a savings bank, a court-house, a jail, and a fine public library; also manufactures of cotton and of woollen flannels, and of carriages. The provincial Congress met here in 1774 and 1775. On the 19th of April, 1775, several men were killed here in a skirmish between the British troops and the citizens of Concord. It is noted as being the residence of Emerson, and as having been that of Hawthorne, Thoreau, and other literary celebrities. Pop. of Concord township, 2412.

Concord, a township and post-village of Jackson co., Mich. The village is on the Michigan Central R. R., 90 miles W. of Detroit. It has one weekly newspaper and one banking-house. Pop. of township, 1465.

H. A. WETMORE, PUB. "NEWS."

Concord, a post-township of Dodge co., Minn. P. 792.

Concord, a township of Clinton co., Mo. Pop. 2491.

Concord, a township of Washington co., Mo. Pop. 1343.

Concord, a city, capital of Merrimack co. and of the State of New Hampshire, is pleasantly situated on the

State Capitol, New Hampshire.

right bank of Merrimack River, 73 miles by rail N. N. W. from Boston, 474 N. N. E. from Washington, 130 S. from

Mount Washington, White Mountains, and 30 S. from Winnipiseogee Lake; lat. 43° 12′ 20″ N., lon. 71° 29′ W. It is one of the largest railroad centres in New England. At this station trains are made up for the Boston Concord and Montreal, the Northern, the Concord and Claremont, the Contoocook Valley, the Boston Nashua and Lowell, the Boston Lawrence and Concord, and the Portsmouth R. Rs. Trains also connect at Nashua for Worcester and New York *viâ* Worcester and Nashua R. R., for Wilton *viâ* Nashua and Wilton, for Acton, Providence, and New Bedford *viâ* Nashua and Acton, at Manchester for North Weare *viâ* Manchester and North Weare, and at Hooksett for Pittsfield *viâ* Suncook Valley R. R. The streets are wide, have fine sidewalks, and are beautifully shaded. The principal business is on Main street. Many of the business and public buildings are fine and expensive structures. The State-house is built of Concord granite at an expense of $250,000. In the council chamber are large oil portraits, set in gilt frames, of all the governors of the State from 1785 to 1873. The court-house and city hall cost $45,000. New Hampshire Historical Society library contains over 6000 volumes of valuable books and 3000 pamphlets. The city contains the State asylum for the insane, with a fund of over $221,000, number of patients, 272; orphans' home, St. Paul's School, 160 students (Episcopal), and a jail and State prison. There are 15 church edifices, 52 schools with 2600 scholars, 6 hotels, 200 stores and shops for trade of various kinds, 4 weekly and 2 daily newspapers, 2 national banks (capital of $350,000), 5 savings banks (deposits $3,380,000), 2800 dwelling-houses, and in 1870, 12,241 inhabitants. The manufactories are varied, the most important of which are granite quarried and dressed, annually valued at $750,000; carriages, $550,000; furniture, $429,000; belting and leather hose, $390,000; railroad repair-shops, $290,000; foundry and machine work, $260,000; harnesses, $250,000; woollen goods, $250,000; cotton goods, $235,000; leather tanned, $175,000; sale of boots and shoes, $150,000; organs and melodeons, $120,000; confectionery and bakers' bread, $100,000; printing, $110,000; and many smaller factories of $90,000 and less. Whole number of manufactories, 137; capital invested, $2,276,350; males employed, 2143, females, 364; annual pay-roll, $1,329,500; value of goods manufactured, $4,600,000. The water-power is valuable, but not much of it is improved. The city waterworks cost $300,000, and the sewerage $100,000. Valuation of the city, $12,000,000.

A. J. Fogg, Ed. of "New Hampshire Gazetteer."

Concord, a township of Erie co., N. Y., contains Springville and other villages. Pop. 3171.

Concord, a post-village, capital of Cabarrus co., N. C., on the North Carolina R. R., 20 miles N. E. of Charlotte. It has a cotton-factory and two public gins, iron manufactories, foundry, machine-shops, one boys' and two girls' academies, a national bank, and a weekly newspaper. There are large mines in the vicinity. Pop. 878; of township, 1259. Charles F. Harris, Ed. Concord "Sun."

Concord, a township of Iredell co., N. C. Pop. 869.

Concord, a township of Randolph co., N. C. P. 1028.

Concord, a township of Champaign co., O. Pop. 1035.

Concord, a township of Delaware co., O. Pop. 1092.

Concord, a township of Fayette co., O. Pop. 981.

Concord, a township of Highland co., O. Pop. 1262.

Concord, a post-township of Lake co., O. Pop. 797.

Concord, a township of Miami co., O. Pop. 4701.

Concord, a township of Ross co., O. Pop. 2772.

Concord, a township of Butler co., Pa. Pop. 926.

Concord, a township and village of Delaware co., Pa. The village is on the Philadelphia and Baltimore Central R. R., 25 miles S. W. of Philadelphia. Pop. of township, 1293.

Concord, a township and village of Erie co., Pa. The village is on the Atlantic and Great Western R. R., about 30 miles N. E. of Meadville. Pop. of township, 1436.

Concord, a township of Clarendon co., S. C. Pop. 800.

Concord, a township of Sumter co., S. C. Pop. 1519.

Concord, a township and post-village of Essex co., Vt., 37 miles E. N. E. of Montpelier. The township has five churches, and manufactures of lumber, furniture, starch, sash, blinds, cassimeres, and other commodities. Pop. of township, 1276.

Concord, a post-township of Jefferson co., Wis. Pop. 1627.

Concor'dance [Lat. *concordantiæ*, from *concordo*, to "agree"], an index or dictionary in which all the important words used (*verbal* concordance) or subjects treated of (*real* concordance) in any work are arranged alphabetically, and references made to the places where they occur. Of biblical concordances the number is very large. The earliest was to the Vulgate by Antony of Padua (born in 1195; died in 1231 A. D.). Next in order was the Hebrew concordance of Rabbi Isaac Nathan (finished in 1448, published in 1523). The first Greek concordance to the New Testament, by Xystus Betuleius (whose real name was Birck), appeared in 1546. Kircher's concordance to the Septuagint appeared in 1607. The best are—For the Hebrew, Fürst (1840); for the New Testament Greek, Bruder (1853); for the Septuagint, Trommius (1718); for the Vulgate, Dutripon (1838). The first English concordance was by John Marbeck (1550); the best by Alexander Cruden (1737). The Englishman's Greek concordance to the New Testament (1839) is very valuable. Among the chief concordances to the German Bible are those of Lankisch (1677), Schott (1827), and Hanff (1828–34). The first French concordance was by Mark Wilks (1840). There is a concordance to Shakspeare by Mrs. Mary Cowden Clarke (1845), and to Tennyson by Brightwell (1869). The special lexicons, as to Homer by Crusius, and to Plato by Ast, are essentially concordances.

Concor'dat [Lat. *concordata*, "things agreed upon," from *concordo*, "to agree;" Fr. *concordat;* It. *concordato*], a treaty in relation to the ecclesiastical affairs of a Roman Catholic state, between the pope, as head of the Roman Catholic Church, and the government of that state. The treaties between the pope and Protestant powers are usually called conventions. The name concordat was first given to the treaties made by Pope Martin V. with Germany, France, and England in 1418. These treaties are called in history the Concordats of Constance. The name, however, is often given to various ecclesiastical treaties of older date than the ones just mentioned.

The usual subjects of concordats have been the right claimed by the popes to fill vacant sees and benefices, and to appropriate the whole or a part of the revenues during the vacancy, as well as to confer on the clergy certain immunities from taxation and civil jurisdiction, and to offer an asylum to criminals. The "Calixtine Concordat," one of the most famous of the earlier treaties of the kind, was concluded in 1122 between Henry V. of Germany and Pope Calixtus II., and has since been regarded as a part of the fundamental law of the Roman Catholic Church of Germany. At Frankfort, in 1446, the electors of Germany made formal demands upon the pope for the redress of certain ecclesiastical grievances. These demands were granted by Pope Eugene IV. in 1447 in the "Concordat of the Princes," or "Frankfort Concordat." This, with the "Aschaffenburg Concordat," or "Vienna Concordat," of 1448, which granted large powers to the pope, was long of great importance in the ecclesiastic law of Germany. Concordats have been chiefly adverse to the popes. Among the most celebrated concordats was that which Bonaparte as first consul forced upon Pius VII. (July, 1801), which was ratified in 1802, and has since, for the most part, regulated the relations of the Gallican Church to the Roman see. The clergy became subject to the civil power in all temporal matters; and though the pope in matters of discipline had very large powers, and was still to confer canonical institution, the appointment of all the bishoprics was retained by the government. By the concordat which was entered into between Rome and Austria at Vienna on the 18th of Aug., 1855, the emperor Francis Joseph I. promised that the pope should have direct communication, free from surveillance by the civil power, with the bishops, clergy, and people. Bishops were to have free communication with their clergy and their flocks, and to perform all functions which are prescribed by the canon law. The whole system of national education, even in private schools, was placed under the control of the Church. No one could teach theology without episcopal permission. The government bound itself to prevent the dissemination of books pointed out by the bishops as dangerous to religion. All questions of marriage, except in so far as they involved civil consequences, were reserved exclusively for the ecclesiastical courts. This concordat was abrogated without the consent of the pope in July, 1870. Important conventions were concluded in the nineteenth century with the Netherlands in 1827, with Russia in 1847, and with Wurtemberg in 1857. (A complete list of the important concordats is given by A. J. Schem in McClintock and Strong's "Cyclopædia.")

Con'cord, Book of (*Concordia, Concordien-Buch*), the collection of the Confessions which are received either by the entire Lutheran Church or by the larger part of it. It was published in 1580, and supplanted a great number of bulky Corpora Doctrinæ. It contains—1, the three General Creeds, the Apostles', Nicene, and Athanasian; 2, the Augsburg Confession; 3, the Apology of the Confession; 4, the Schmalcald Articles; 5, the Smaller and the Larger Catechism of Luther; and 6, the Formula of

Concord, to which the "Book of Concord" is related as the whole to a part, though the two are often confounded. (See KRAUTH'S "Conservative Reformation," art. vii.)

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Con'cord, For'mula of (*Concordiæ Formula*), the last part of the "Book of Concord," in which it appeared, for the first time, in 1580. It consists of two parts, of which the first may be said to be the text, the second the commentary, and has an appendix of testimonies. It was occasioned by the vacillations of MELANCHTHON (which see), real and seeming, the Crypto-Calvinistic and other controversies, and the appearance of a number of Corpora Doctrinæ objectionable in various respects. Protracted and patient conferences and labors, in which the greatest divines of the Lutheran Church, especially Andreæ and Chemnitz, took part, preceded and accompanied the preparation of it. Eighty-six of the states of the empire united in it. Augustus of Saxony was among its most important promoters. Its topics are—the Rule of Faith and the Creed, Original Sin, Free-Will, Justification, Good Works, the Law and the Gospel, Third Use of the Law, the Lord's Supper, the Person of Christ, the Descent into Hell, Ceremonies, the Aliaphora, Predestination, various sects and heresies. "The war of the Formula was fought for great principles; it was bravely and uncompromisingly fought, but it was fought magnanimously under the old banner of the Cross. It was crowned with victory, and that victory brought peace." (See KRAUTH'S "Conservative Reformation, and its Theology," art. vii.)

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Concor'dia, a goddess of the Roman mythology, may be considered a personification of domestic concord and of harmony between several classes of the body politic. Several temples were erected to her in ancient Rome. The sessions of the senate were sometimes held in the Temple of Concord (Ædes Concordiæ).

Concordia, a parish in the N. E. of Louisiana. Area, 790 square miles. It is bounded on the E. by the Mississippi River, on the W. by the Washita, and on the S. W. by the Red River. The surface is level, low, and subject to inundation; the soil is fertile. Cotton is the staple crop. Capital, Vidalia. Pop. 9977.

Concordia, a post-village, capital of Cloud co., Kan., on the Republican River, about 60 miles N. W. of Junction City. It has one weekly newspaper.

Concord River, of Middlesex co., Mass., is formed by the junction of the Assabet and Sudbury Rivers, at the village of Concord. It flows northward, and enters the Merrimack near Lowell. The scenery of this river has been described by Thoreau in his work entitled "A Week on the Concord and Merrimack Rivers."

Con'cow, a township of Butte co., Cal. Pop. 490.

Con'crete [from the Lat. *concresco, concretum,* to "grow together"], in philosophy, is a term applied to any quality which is considered in connection with the object to which it belongs; a quality not concrete is abstract. Thus "wisdom" is an abstract quality; but when we speak of a "wise man," the quality becomes concrete.

Con'crete, a compound of hydraulic cement or of mortar with gravel, which hardens into a stone-like mass. It is sometimes moulded into blocks and used as an artificial building-stone, but more often it constitutes the foundation of buildings which would otherwise have to rest upon sand or insecure earth. It is also used as a flooring for cellars, and is said to effectually prevent the rising of miasmata and vapors from the earth. The name concrete is often applied to a mixture of coal-tar or asphaltum with gravel, much employed for walks or pavements, and also used as a roofing-material. (See CEMENT, by GEN. Q. A. GILLMORE, U. S. A.)

Concre'tion [Lat. *concretio,* from *con,* "together," and *cresco, cretum,* to "grow"], in medicine, an extraneous solid which accumulates within the body. Concretions may be chemical precipitates from the secretions, and as such occur in the bladder, the gall-cyst, or salivary ducts. These are called calculi, and are sometimes of organic and sometimes of non-organic matter. Again, concretions may be of phosphate or carbonate of lime, occurring in tubercular or other degenerate masses; while in the joints they are sometimes of urate of soda, as in "gouty concretions." Within the alimentary canal they are often composed of hair which has been swallowed, or of cholesterin, and sometimes of magnesia salts.

Concu'binage [Lat. *concubinatus,* from *con,* "together," and *cubo,* to "lie"], a term used to denote the relation of a man and woman who habitually cohabit without lawful marriage; or, more frequently, a kind of inferior marriage, which does not give the woman the legal position of a wife. Concubinage was lawful among the ancient Hebrews, as the cases of Abraham, Jacob, and many other examples show. Concubinage in ancient Rome was often a union between persons who could not legally intermarry on account of difference in rank. It appears that in general the children of a concubine were illegitimate among the Romans, though many examples of their apparent legitimacy have been adduced. The Church of Rome never formally forbade concubinage until the Council of Trent. The Protestant churches have uniformly opposed it, as contrary to the spirit of Christianity. The only relic of legalized concubinage in enlightened countries is MORGANATIC MARRIAGE (which see).

Concur'rent, acting in conjunction; agreeing in the same act or opinion; contributing to the same event. Jurisdiction is said to be concurrent or cumulative when it may be exercised in the same cause by any one of two or more courts. To prevent the collision which might arise from each of the courts claiming to exercise the right, it has been established as a rule that the judge who first exercises jurisdiction in the cause acquires a right *jure præventionis* to judge in it, exclusive of the others. This right of prevention appears to be peculiar to criminal jurisdiction.

Concus'sion [from the Lat. *concutio, concussum,* to "shake violently" (from *con,* intensive, and *quatio, quassum,* to "shake")], in surgery, the disturbance caused by a fall or blow. In all severe injuries a concussion or shock is caused to the nervous system, which may require the assiduous care of a physician. (See SHOCK.)

CONCUSSION OF THE BRAIN [Lat. *commotio cerebri*] sometimes causes alarming symptoms, even to suppression of the functions of the brain, yet without any apparent organic disease. Slight concussion of the brain (popularly called "stunning") causes vertigo, loss of memory, tinnitus aurium, and stupefaction; but these are temporary. When more severe, there is loss of sensation and volition, with vomiting, the patient being apparently in a sound sleep, but without stertorous breathing. The pulse is variable, being more rapid and feeble than in compression of the brain; the extremities are cold. Little can be done until reaction occurs, when the case can be treated according to general principles. In some cases of concussion it is necessary to use local or general stimulants, but usually moderate heat applied to the surface, abundant supplies of air, and proper adjustment of the injured parts are all that are required until consciousness is partly restored, when a small portion of wine or other stimulant may be useful. The effect of these should be carefully noted, and the patient should be placed in a comfortable position in bed during the process. In all cases absolute rest is essential. If the concussion has been severe, the patient is often not secure until a long time after, even though apparently well, for serious nervous lesions may be slowly developed.

REVISED BY WILLARD PARKER.

Concussion Fuse. See FUSE.

Condamine, La (CHARLES MARIE), a French savant, born Jan. 28, 1701, accompanied Bouguer to Peru, 1736, in order to determine the figure of the earth. He published an "Account of a Journey to South America" (1745) and "The Figure of the Earth Determined" (1749). Died Feb. 4, 1774.

Condé, a town of France, department of Nord, at the confluence of the Haine and Scheldt, 7 miles N. N. E. of Valenciennes. It is well built, and has strong fortifications constructed by Vauban. It has a town-hall, an arsenal, and a military hospital; also manufactures of chicory, starch, cordage, and leather. It has been several times besieged, and was taken by the Austrians in 1793. The princes of Condé derived their title from this town. Pop. in 1866, 4642.

Condé, de (HENRI I. DE BOURBON), PRINCE, born Dec. 9, 1552, was a son of Louis I. (see below). He was a cousin of Henry of Navarre, and joined the Protestant army about 1584. He died Mar. 5, 1588, and it is supposed he was poisoned by his servant. He left a son, Henry II., prince de Condé, who was educated a Catholic, and was the father of the great Condé. Died in 1646.

Condé, de (LOUIS HENRI JOSEPH), PRINCE, styled also DUKE OF BOURBON, the last of the line of Condé, was born in 1756. He was the father of the duc d'Enghien, who was murdered in 1804. Condé fought against the French Republic (1792–1800), and was found dead in 1830, having died by violence, and perhaps by his own hand.

Condé, de (LOUIS I. DE BOURBON), PRINCE, an eminent French general, born at Vendôme May 7, 1530, a son of Charles de Bourbon, duc de Vendôme, brother of Antony of Bourbon, and uncle of Henry IV. As an adversary of the family of Guise he took a prominent part in the conspiracy of Amboise in 1559. He was the general-in-chief of the Huguenots in the civil war which began in 1562. He was defeated and taken prisoner at Dreux in that year.

In 1567 he commanded at the battle of Saint-Dénis. Having been defeated and wounded at the battle of Jarnac, Mar. 15, 1569, he was killed after he had surrendered. (See DESORMEAUX, "Histoire de la Maison de Condé.")

Condé, de (LOUIS II. DE BOURBON), PRINCE, styled THE GREAT CONDÉ, a celebrated French general, born in Paris Sept. 8, 1621, was a son of Henri II., prince of Condé, and was the first prince of the blood. In his youth he was called the duc d'Enghien. He married, in 1641, Clarie Clémence de Maillé-Brézé, a niece of Cardinal Richelieu. In May, 1643, he gained a signal victory over the Spaniards at Rocroi. He defeated the Bavarian general Mercy at Nordlingen in 1645, and inherited his father's title in 1646. He gained a decisive victory over the Spaniards at Lens in 1648. In the civil war of the Fronde, which began in 1649, he at first supported Mazarin and the royalist party. Early in 1650 he was arrested by Mazarin, whom he offended by his haughty conduct. After he had been confined nearly a year he was released, and raised an army to fight against the court. He marched in 1652 against Paris, which was defended with success by Turenne. In 1653 he was condemned to death, and entered the service of the king of Spain, who gave him command of an army in Flanders. He was there opposed to Turenne, over whom he could not gain much advantage. The war was ended by a treaty between France and Spain in 1659. The prince of Condé was then pardoned, and returned to the service of the French king. Having obtained the command of an army in Flanders, he fought an indecisive battle at Seneffe against William, prince of Orange, in 1674. Died Dec. 11, 1686. "The art of war," says Voltaire, "seemed in him a natural instinct." Bossuet pronounced a funeral oration on him. (See DESORMEAUX, "Histoire de Louis, Prince de Condé," 4 vols., 1768; LORD MAHON, "Life of the Prince of Condé," 1840; VOLTAIRE, "Siècle de Louis XIV.")

Condé, de (LOUIS JOSEPH DE BOURBON), PRINCE, the only son of the duke of Bourbon, was born Aug. 9, 1736. He served with distinction in the Seven Years' war (1755–62), and emigrated as a royalist in 1789. He led the French emigrants who in 1792 fought against the republic in cooperation with the Austrian army. He disbanded his corps of emigrants, 1801, returned to France, 1814, and died May 13, 1818.

Condensa'tion [Lat. *condensatio*, from *con*, and *densus*, "dense, compact"], the act of rendering a body more dense and compact by bringing its particles into closer proximity and increasing its specific gravity. The term is often applied to the conversion of a vapor or gas into a liquid or solid either by pressure or by the agency of cold.

Condensed Milk. See MILK, by PROF. C. F. CHANDLER, PH. D., LL.D.

Condensing Steam-Engine. See STEAM-ENGINE, by PROF. W. P. TROWBRIDGE.

Condé-sur-Noireau, a town of France, department of Calvados, on the river Noireau, 23 miles S. S. W. of Caen. It has manufactures of muslin, linen, woollens, cutlery, and leather. Pop. 6643.

Con'dict (JOHN), a surgeon in the Revolutionary war, born in 1755, was a member of Congress from New Jersey (1799–1803 and 1819–20), and U. S. Senator (1803–17). Died at Orange, N. J., May 4, 1834.

Con'die (D. FRANCIS), M. D., an American physician and author, was born in Philadelphia May 12, 1796, and graduated as M. D. at the University of Pennsylvania in 1818. He has published, besides other works, "Diseases of Children" (4th ed., 1854), edited Churchill's "Diseases of Women," and contributed much to the periodical literature of his profession.

Condillac, de (ÉTIENNE BONNOT), ABBÉ DE MUREAUX, an eminent French philosopher, born at Grenoble in 1715, was a brother of the abbé de Mably. He associated in his youth with J. J. Rousseau and Diderot. In 1746 he published an ingenious "Essay on the Origin of Human Knowledge" ("Essai sur l'origine des connaissances humaines," 2 vols.), and in 1749 a "Treatise on Systems" ("Traité des Systèmes," 2 vols.). His reputation was widely extended by his admirable "Treatise on Sensations" ("Traité des Sensations," 3 vols., 1754). He was chosen a member of the French Academy in 1768. He adopted the theory that our knowledge and ideas are derived from the operations of the senses. Died Aug. 3, 1780. Among his works is "The Art of Thinking," forming part of a series entitled "Cours d'Études." He argues that man owes the development of his faculties to the use of signs. His complete works appeared in 1798 (23 vols.; new ed. 1824, 16 vols.). (See ROBERT, "Les Théories logiques de Condillac," 1869.)

Con'dit, a township of Champaign co., Ill. Pop. 755.

Condi''tion [Lat. *conditio*, from *condo, conditum*, to "build" or "found"], in logic, denotes that which must precede the operation of a cause, that which must exist as the ground or necessary adjunct of something else. For instance, when an impression is made on wax by a seal, the seal is said to be the cause of the impression, and the softness of the wax is a condition.

CONDITION, in law, has several significations. 1. *In the Civil Law.*—The principal case here is a clause in a contract, whereby a party, anticipating that an event may produce some change which he is desirous to guard against, provides what shall be done in case the event happens. For example, if it is provided that if a house that is sold is found to be subject to a certain burden or servitude the sale shall be void, the provision is a condition. Conditions were classified in an artificial manner (for which see POTHIER on "Obligations," DOMAT, and other text-writers). 2. In common law, it means the *status* of a person in respect to his legal rights, capacities, and disabilities. (The subject will be more fully considered under the word STATUS.) 3. In common law it further means a qualification or restriction annexed to an estate arising either upon a conveyance or under a will, whereby the estate is created or enlarged or defeated, or a like clause affecting the existence of an instrument or the operation of a contract. The leading instance to be considered is a qualification annexed to an estate. It is important, at the outset, to distinguish between a *condition* and a *covenant*. A condition either enlarges or defeats an estate; a covenant is a mere engagement under seal to do an act. If a condition be broken, the estate either does not exist at all, or, if vested, the grantor may by appropriate means defeat it. In case a covenant is broken, the remedy is to sue for damages, or to compel the covenantor to perform it, or to prevent him by injunction from breaking it. The same act may by suitable words have imparted to it both the character of a condition and a covenant, when a grantor will have his choice of remedies. Conditions as to their form are either express or implied; as to their relation to the estate, they are either precedent or subsequent. A condition is said to be precedent when it precedes the vesting or enlarging of the estate; it is subsequent when, the estate having vested, its regular effect is to defeat it. The distinction does not depend upon any form of words, but upon the intent of the parties. It will be observed that the regular effect of a condition subsequent is to lead to a forfeiture. As the spirit of the law is opposed to forfeiture, it is governed by technical rules that would not be applied in case of a mere action upon a promise or covenant. Great care must be taken not to confound rules which appertain to the one subject with those which prevail in the other. It is an elementary rule that a condition subsequent does not affect the nature of the estate; it only qualifies it to this extent, that in the happening of the specified event it may be made to terminate before its natural expiration. Thus, an estate in fee or for life or for years remains a member of its class, though it may be defeated by the happening of the event which is called a condition. It should also be stated that the happening of the prescribed event does not *of itself* defeat the estate. There must be an affirmative act on the part of the grantor whereby he repossesses himself of his estate. This is technically called a "re-entry." In well-drawn instruments a power of re-entry is expressly reserved. This rule is so rigidly adhered to that if a lease should prescribe that an estate of a tenant should, on the happening of an event, be null and void, a re-entry would still be necessary. This rule leads to an important principle, that the right to take advantage of the forfeiture may be waived expressly or by implication, as where rent upon a lease is accepted with knowledge of the cause of forfeiture. The technical rules of the common law do not apply to testamentary provisions or legacies of personal property, as that branch of jurisprudence was developed by the ecclesiastical courts from the Roman law. Much caution is accordingly necessary in discriminating between devises of land and legacies of personal property, for, though in the same instrument, they will be governed by different rules. The rule that the grantor must re-enter is to be confined to a strict case of *condition*. It does not apply to a *conditional limitation*. The distinction between the two should be pointed out. In a condition the estate on the happening of the prescribed event is to return to the grantor; in a conditional limitation it is to pass over to a third person. An illustration will show the difference between them. Thus, if a testator should give his daughter an estate to be defeated in case she entered a convent, there would be a condition; but if he had added that in the event supposed it should go to his brother, it would be a conditional limitation. The main importance of the distinction is, that in case of the conditional limitation no re-entry is necessary, and the estate

on the happening of the event passes at once to the person designated. (The law of conditions will be found in the works on real property, such as WASHBURN, CRUISE, and HILLIARD, and to a certain extent in works on landlord and tenant, such as TAYLOR.) T. W. DWIGHT.

Conditioned, Philosophy of the, a name given to the system of Sir William Hamilton. It is a development and application of the general principle of the Antinomies of Kant. It regards the judgment of causality as derived from an impotence of the mind—the principle of the conditioned—the law that the conceivable has always two opposite extremes, and that the extremes are equally inconceivable. We conceive of existence as conditioned in time, and thus expressing at once and in relation the three categories of thought which afford us in combination the principle of causality, the law of which is that when an object is presented phenomenally as commencing, we cannot but suppose that the complement of existence which it now contains has previously been. (See HAMILTON'S "Metaphysics," lect. xxxviii., xxxix.)
C. P. KRAUTH.

Condom, a town of France, department of Gers, on the Bayse, here crossed by two bridges, 24 miles N. N. W. of Auch. It has a noble Gothic church, two hospitals, and manufactures of cotton and mixed fabrics. It was founded in 721 A. D. Pop. 8140.

Condona'tion [Lat. *condonatio*], in the law of divorce, means the conditional forgiveness of an offence for which, without such forgiveness, a divorce may be obtained. In form it may be either express or implied. It is sometimes difficult to decide whether the acts are of such a nature as to justify an implication of forgiveness. Cohabitation of the parties with knowledge that the offence has been committed, and with the means of establishing its commission in a court of justice, will lead to an implication of forgiveness. Condonation is conditional in this sense, that a repetition of the offence revives the original charge. According to some authorities, the original charge may be revived by the commission of an offence of an inferior grade. The forgiveness is said to imply that the innocent party shall in all respects be treated kindly. The point, however, is not fully settled. When an offence has been condoned and not repeated, it must be treated as though it had never existed. The original charge is blotted out conditionally. (The subject will be found fully treated in the treatises on divorce, such as BISHOP and POYNTER. The ecclesiastical reports in England and those of the court of divorce may be advantageously referred to.)

Con'dor [a Spanish word of Peruvian origin], the

Condor.

Vultur or *Sarcorhamphus gryphus*, or *Gryphus typus*, the great vulture of the Andes, the largest known bird of prey; it is four feet high. The average expanse of wing is not over nine feet. It is not much larger than the lämmergeyer, but it has a more gigantic appearance than that of any other bird except the ostrich.

The condor is known to soar to the height of nearly six miles, far above ordinary clouds, and thence to survey the vast expanse in search of prey. This rarefied space, incapable of long sustaining human life, is his native air, and he only descends to capture his prey. Condors rarely attack human beings, notwithstanding their gigantic size and strength. They pursue the deer, the llama, and young cattle, and devour them with great voracity. After these meals they are almost unable to fly, and are easily caught by the Indians. The eggs are white, and three or four inches long; they are deposited on the bare rocks, as the condor makes no nest. The female guards the young for a year; they are for several months covered with down or soft frizzled hair which causes them to appear almost as large as the adult. The condor is found in the Cordilleras of South and Central America and Mexico, and is said to inhabit the southern range of the Rocky Mountains, but it is found chiefly in the highest peaks of the Andes.

Condorçet, de (MARIE JEAN ANTOINE NICOLAS CARITAT), MARQUIS, an eminent French philosopher and mathematician, born at Ribemont, in Picardy, Sept. 17, 1743, of an ancient family of Dauphiné. He studied in the college of Navarre, and became in 1762 a resident of Paris. Having written an "Essay on the Integral Calculus," he was admitted into the Academy of Sciences in 1769. He was an intimate friend of D'Alembert. In 1777 he was chosen perpetual secretary of the Academy of Sciences, and in 1782 was admitted into the French Academy. He had a large share in the "Encyclopédie." He favored the popular cause in 1789, wrote several able political treatises, and published the influential "Feuille villageoise," and was elected to the National Convention in 1792. He was a moderate republican, and voted generally with the Girondists. He married in 1786 Sophie, sister of Gen. Grouchy, noted for her beauty (born in 1764, died in 1822). Having been proscribed by the Jacobins in May, 1793, he remained secreted in the house of a friend in Paris for eight months. During this period he wrote a "Historical Sketch of the Progress of the Human Mind" ("Esquisse d'un Tableau historique des Progrès de l'Esprit Humain," 1795). This is regarded as his greatest work. He believed in human perfectibility, and had noble ideas of human destiny. He quitted his place of refuge early in 1794 in order to enjoy a rural excursion, was arrested, and confined in prison at Bourg-la-Reine, where he took poison and died Mar. 28, 1794. "Thus died," says Lamartine, "this Seneca of the modern school. The day of recognition has not come for him, but it will come and will exculpate his memory from reproach." A collection of his numerous works was published by O'Connor and Arago (12 vols., 1847–49). (See D. F. ARAGO, "Biographie de Condorcet," 1849.)

Condottie'ri, an Italian word signifying "conductors," was applied to the mercenaries who during the Italian wars in the fourteenth and fifteenth centuries took service under any prince or government that chose to engage them. They consisted principally of heavy-armed cavalry, and for a long period the wars of Italy were left entirely to them. There came to be an understanding between them to spare their troops as much as possible, until at length battles were fought with little more hazard than would be incurred in a tourney. Among the most celebrated were Lodrisio, about 1339; Fra Moreale, 1350; Guarmeri, Lando, and Francisco di Carmagnola, about 1412; Francisco Sforza, about 1450; and the English Hawkwood.

Conduction. See HEAT, by PROF. W. GIBBS, M. D., LL.D., and ELECTRICITY, by PRES. HENRY MORTON, PH. D.

Conduc'tor [from the Lat. *con*, intensive, and *duco, ductum*, to "lead"], a leader, a guide, a director, or commander. Conductor in music is the person placed at the head of a band of musicians to lead the performance and beat the time. The term is applied to a person who has charge of a train of railway cars and receives the fare. Also a metallic lightning-rod or other substance through which electricity will pass freely. (See ELECTRICITY.) The metals are the best conductors of electricity. Among the numerous non-conductors are glass, wax, silk, wool, resin, caoutchouc, amber, gems, sulphur, lime, and dry air.

Cone [Gr. κῶνος; Lat. *conus*], in mathematics, the name of a solid whose surface is generated by a straight line moved in such a manner as to pass through a fixed point and to touch continually a given curve or directrix. The fixed point is called the *vertex;* the part of the cone on which the directrix lies is the *lower nappe*, and the other part is the *upper nappe*. There are many varieties of the cone, but the term is usually applied to those having circular bases. The most common kind is the right cone, which may be conceived as being generated by the revolution of a right-angled triangle round one of its legs. The line from the apex of a cone to the centre of the base is called the axis, and in the right cone it is perpendicular to the base. In the oblique cone the axis is inclined to the plane of the base at an angle other than a right angle. A truncated cone is the lower part of a cone cut by a plane parallel to the base. Four curves, called the *conic sections*, may be formed by a plane cutting the right cone. If the cone be cut by a plane parallel to the base, the section is a circle; if the plane cut the cone across, making any angle

other than a right angle with its axis, the section is an ellipse. If the cutting plane be parallel to the side, the section will be a parabola. In every other case than those stated the section will be a hyperbola, unless section is made through the apex, when a point is produced. Hence the point is one of the conic sections. If two cones were set one above the other, point to point, the one being a continuation of the other through the apex, or, more strictly, if a cone be regarded as consisting of two nappes, as in the definition given, the plane producing the hyperbolic section would cut the second as well as the first, though none of the other planes would. There are thus two equal branches of the hyperbola belonging to the two nappes of a cone.

Cone [Lat. *strobilus*; Gr. κῶνος and στρόβιλος], in botany, is a term applied to a collective fruit and form of inflorescence sometimes called a **Strobile,** which is a spike furnished with scales, each of which has two naked seeds at its base. Such cones are characteristic of the trees of the natural order Coniferæ, and are so called because some of them are conical in form. The scales of true cones are closely compacted together, until they separate to permit the dispersion of the seeds. In some of the Coniferæ the fruit assumes a berry-like form. The Greeks called the cone στρόβιλος, from στρέφω, to "twist," alluding to the beautiful spiral arrangement of the scales.

Cone (Spencer Houghton), D. D., born in Princeton, N. J., April 30, 1785, pursued a partial course at the College of New Jersey, became an actor, and played with great success for seven years, principally in Philadelphia. From 1812 to 1815 he was an editor in Baltimore, and had command of a company of volunteers which were called into service during the war of 1812. He was ordained to the Baptist ministry in 1815, was pastor at Alexandria, Va. (1816–23), Oliver Street church, New York, 1823–41, First Baptist church, New York (1841–55), and was noted as a pulpit orator and presiding officer, and as an advocate of a new version of the Bible into English. Died in New York Aug. 23, 1855.

Cone'cuh, a county in the S. of Alabama. Area, 750 square miles. It is drained by the Sepulga River. The surface is uneven; the soil is sandy and mostly poor. Cotton and wool are produced. Pine lumber is procured in the forests. It is intersected by the Mobile and Montgomery R. R. Capital, Evergreen. Pop. 9574.

Coneglia'no, a town of Italy, in the province of Treviso, on a railway, 30 miles N. of Venice. It has a cathedral, and silk and woollen manufactures. Pop. 6834.

Cone'jos, a county of Colorado, bordering on New Mexico. It is bounded on the E. by the Rio Grande del Norte. It is generally well watered and timbered, and has much good grazing-land. The W. part is occupied by the Ute reservation. Cattle and wool are staple products. The surface is partly mountainous. Gold and silver are found abundantly. It comprises part of the beautiful and fertile San Luis Park. Capital, Conejos. Pop. 2504.

Conejos, a post-village, capital of Conejos co., Col., on one of the head-streams of the Rio Grande.

Con'emaugh', a post-borough of Cambria co., Pa., on the Conemaugh River and the Central R. R., 80 miles E. of Pittsburg and 2 miles E. of Johnstown. Pop. 2336.

Conemaugh, a township of Cambria co., Pa. P. 728.

Conemaugh, a township of Indiana co., Pa. P. 1493.

Conemaugh, a township of Somerset co., Pa. P. 1172.

Cone-Shells (*Conidæ*), a family of prosobranchiate gasteropodous mollusks, of the section Siphonostomata, having a shell of inversely conical form; the spire on the base of the cone (sometimes a sharp point, sometimes almost flat); the aperture long, narrow, and straight, extending from the base of the cone to its apex. The animal is carnivorous, and has a proboscis capable of much extension. The shell is covered with an epidermis. The mollusks of the genus *Conus* inhabit shores and banks of sandy mud, chiefly within the tropics, a few only occurring in the Mediterranean. More than 270 living species are known, besides many fossils. The genus *Pleurostoma* is of nearly world-wide distribution, and has about 450 living species, with 300 fossil ones. Most of the living species are marine. These two genera constitute the family, and are for convenience divided into many sub-genera. Many of these shells are very beautiful.

Conesto'ga, a post-township of Lancaster co., Pa., in the Conestoga Valley, which gives name to a once celebrated stock of large horses. Pop. 2079.

Cone'sus, a township and post-village of Livingston co., N. Y. The village is on a branch of the Erie R. R., 38 miles S. of Rochester. Pop. 1362.

Conesus Centre, a post-village of Conesus township, Livingston co., N. Y. Pop. 237.

Conesville, a post-township of Schoharie co., N. Y. Pop. 1314.

Cones, Volcanic. See Volcanoes, by Prof. Arnold Guyot, Ph. D., LL.D.

Conewa'go, a township of Adams co., Pa. Pop. 1029.

Conewago, a township and village of York co., Pa. The village is on the Northern Central R. R., 17 miles S. E. of Harrisburg. Pop. 1382.

Conewago, a township of Dauphin co., Pa. P. 831.

Conewan'go, a post-township of Cattaraugus co., N. Y. Pop. 1281.

Conewango, a township of Warren co., Pa. P. 1212.

Co'ney, a township of Lancaster co., Pa. Pop. 1984.

Coney Island, a place of summer resort, is in the Atlantic, 11 miles S. of the city of New York, and is near the S. W. extremity of Long Island. It is 1½ miles long. Here are several hotels for the accommodation of visitors.

Confarrea'tion [Lat. *farreum* or *confarreatio,* from *con,* "together," and *far,* "meal"], a mode of marriage among the ancient Romans practised by the patricians only. It consisted in the employment of certain words in the presence of ten witnesses, and in the performance of a religious ceremony in which *panis farreus,* a peculiar kind of bread, was eaten by bridegroom and bride. The offices of Flamen Dialis, Flamen Mercurialis, and Flamen Quirinalis were open only to those who were born of parents thus married. The custom probably did not come down to the time of Cæsar.

Confed'eracy [Lat. *confœderatio,* from *con,* "together," and *fœdus* (gen. *fœderis*), a "league"], a federal compact; an alliance or league of independent states; several states or nations united by a league; a coalition. In law, a combination of two or more persons to commit an unlawful act. The term confederacy has often been applied to the government of the U. S.

Confederate States, or **Southern Confederacy.** The earlier authentic assertions of a right (alleged therein to have been reserved by the States in ratifying the Federal Constitution) to resist the constituted authorities and subvert the laws of the Union when one or more of those States should adjudge any exercise of Federal authority unwarranted by the said Constitution, were made by the legislature of Kentucky in 1798, and by that of Virginia in 1799; the Kentucky resolves in which this doctrine was formulated having been prepared by Thomas Jefferson, as those of Virginia were by James Madison. In neither case did these resolves appear to contemplate disunion, but rather a *nullification* of the obnoxious Federal act by the sovereign power of a State. The first distinct avowal of disunion sentiment was made on the floor of the House of Representatives by Josiah Quincy (of Boston, Massachusetts), who, in opposing the purchase of Louisiana, asserted that this measure (which he agreed with its author, President Jefferson, in pronouncing unconstitutional) virtually dissolved the Union, so that the States were freed from its obligations and should prepare for peaceable or forcible separation. This avowal elicited little sympathy or approval. Again, during our last war with Great Britain (1814–15) some of the more ardent Federalists of New England, being intensely hostile to that war, openly advocated secession, and a convention held by them at Hartford, Connecticut, was popularly and not unreasonably regarded as impelled by a spirit inimical to the Union. Hence, the members of this convention were ever after under the ban of public opinion, and the Federal party never regained the public confidence. Again, when the North and South came into fierce collision respecting slavery on the question of admitting Missouri as a slave State, menaces of disunion if she were excluded were heard —this time from the South. When in 1828 Congress passed a stringently protective tariff, South Carolina, under the lead of John C. Calhoun, George McDuffie, and General James Hamilton, Jr., threatened to nullify the operation of that act within her own borders; and, though that tariff was modified in 1832, she adhered to her resolve and proceeded to call a convention whereby the existing tariff was pronounced null and void. General Jackson, then President, denied her right to do this with effect in a vigorous and masterly proclamation, whereof Edward Livingston, secretary of state, was understood to be the scribe, and, in some degree, the author. Congress proceeded to modify still further the tariff, and South Carolina thereupon waived the execution of her ordinance; so a collision was averted.

African slavery, which, though the slaves were few at the North, had been all but universal, became at length distinctively Southern, and was reprobated by an intelligent, conscientious, growing minority at the North. They agitated for the overthrow of human bondage, regardless of

the fact that the Federal Constitution conferred on Congress or the non-slaveholding States no power over the domestic institutions of the South. Prophecies and threats of disunion were now freely uttered in the slave States. The question of organizing new Territories from the public domain constantly inflamed this controversy; the South insisting that her people had a right to migrate to any Territory, and there hold their slaves as in their own States; the North denying this, and demanding the conservation of the national domain to free labor. Another compromise in 1850 essayed to end this dispute, but with poor success, the collisions between free and slave labor which followed the organization (in 1854) of Kansas as a Territory widening and deepening the agitation. An attempt to array the South under the banner of State Rights against the compromise of 1850 had broken down, even South Carolina refusing to sustain it; but when, in 1860, Abraham Lincoln had been chosen President, on a platform of resistance to slavery extension, by all the electoral votes of the free States except three of the seven cast from New Jersey, the long-meditated struggle for disunion was inaugurated by South Carolina, whose legislature was then holding a called session. A convention was summoned, which promptly met and by ordinance (December 20) declared the State no longer in the Union—Georgia, Alabama, Mississippi, Florida, Louisiana, and Texas following her example, making seven States in all which had declared themselves out of the Union before Mr. Lincoln was inaugurated (March 4, 1861). Some of these were barely carried for secession, and in none but South Carolina was the step taken with an approach to unanimity. The other eight slave States, though urged to unite in secession, refused to do so, mainly by overwhelming majorities. In pursuance of an invitation from South Carolina, the seceded States, forming an aggregate population of 2,656,948 free persons and 2,312,046 slaves, sent delegates to a convention which met at Montgomery, Alabama, February 4, 1861, and promptly formed a confederacy under a constitution modelled on that of the Union, except that it expressly asserted the right to take slaves into any State or Territory of said Confederacy, and there hold them as property. Of this Confederacy, Jefferson Davis of Mississippi was made President, and Alexander H. Stephens of Georgia Vice-President—at first *pro tem.*, but they were in due time chosen without opposition for a regular term of six years. Montgomery was continued as the capital of the Confederacy, and its first Congress there assembled.

Hostilities against the Union were inaugurated by Confederates while Mr. Buchanan (who offered no resistance) was still President. General David E. Twiggs had willingly surrendered (February 18) to them at Indianola, Texas, the largest Federal force anywhere embodied; the detachments guarding our Mexican and Indian frontiers were likewise captured, and their arms and munitions treated as spoils of war; the Federal sub-treasury at New Orleans, containing $500,000, had been turned over to the new government, as had several national fortresses and vessels; so that when Mr. Lincoln assumed the duties of President the war had been fairly inaugurated on the side of the Confederacy, but not on that of the Union. Still, he forbore to initiate hostilities—unless the sending of food to the hungry garrisons of the Southern forts still held for the Union could be deemed such—until fire was opened (April 12), by express, repeated orders from the Confederate war department, upon Fort Sumter in Charleston harbor, South Carolina, on an islet which had been all but created by Federal effort and expenditure. Batteries had been erected without opposition so near it that this fort was reduced within thirty-six hours; its garrison of seventy men, under Major Robert Anderson, being allowed to march out, salute their flag, and be transported northward, not prisoners of war.

A tremendous excitement was produced throughout the country by tidings of this almost bloodless cannonade. At the South it was regarded as at once a general call to arms and an omen of easy, speedy triumph. At the North, where the hope of a peaceable solution had till this time been obstinately cherished, it was received with momentary amazement, followed by intense indignation. "It is an impeachment of our manhood—a challenge to fight!" was the general exclamation. Partisanship, hitherto rampant, of the South, as wronged and outraged by Northern abolitionism, was overawed and silenced; the national flag was everywhere displayed; President Lincoln called out for three months 75,000 militia to "repossess the forts, places, and property which had been seized from the Union." But part of the regiments called out were to be furnished by Virginia, North Carolina, Kentucky, Tennessee, Missouri, and Arkansas, whose Democratic governors spurned the call as a usurpation, and by Maryland and Delaware, whose authorities were little better inclined to the suppression of secession by force of arms. Virginia, whose convention, then in session, had previously refused by two to one to secede, now passed an ordinance of secession, and North Carolina soon followed the example, as Tennessee and Arkansas did somewhat later. Governor Claiborne F. Jackson tried to lead Missouri the same road, but the convention called at his beck utterly refused, so that he was obliged to raise Confederate troops and inaugurate civil war by virtue solely of his executive authority. He was speedily arrested by the prompt, decisive action of Captain Nathaniel Lyon and Francis P. Blair, Jr., who raised a force which captured his "Camp Jackson," near St. Louis, and most of the men he had assembled; and he was soon forced to flee the State, which, though its people were pretty evenly divided, adhered to the Union, as did Kentucky under kindred auspices. These two last were for years ostensibly represented in the Confederate Congress, but not by their own choice. When the Confederacy was full grown it embraced the States of Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Florida, Tennessee, Arkansas, Louisiana, and Texas—eleven in all—covering nearly half of the inhabited area of the Union, with rather less than a third of its people. Considering, however, that Kentucky, Missouri, and Maryland contributed largely, persistently, to the Confederate armies, it is fair to estimate the practical Confederate strength at one-half that of the States which remained loyal to the Union.

The Confederate Congress, two days after Mr. Lincoln's inauguration, had authorized the raising of a military force of 100,000 men, to be under the chief command of President Davis. The States which had seized forts, arms, vessels, money, and other public property of the Union were requested to turn them over to the Confederacy, and generally did so. Commissioners were sent from Montgomery to Washington to negotiate for a peaceful adjustment of all questions arising between the Union and its new-born competitor. They were courteously received by Hon. William H. Seward, Mr. Lincoln's secretary of state, but no reconciliation of the antagonist pretensions was practicable, and they left, asserting that they had not been frankly, candidly met. The Confederacy had organized its revenue system, and commenced collecting duties on imports from the loyal States and elsewhere, before striking the blow at Sumter which was deemed necessary to draw Virginia and other hesitating States out of the Union. Two days after President Lincoln's call for militia, President Davis, by proclamation, accepted that as a declaration of war, and authorized (May 17) the issue of letters of marque and reprisal against the commerce of the United States. A loan of $5,000,000 was advertised at Montgomery, to which $8,000,000 were subscribed. Before the close of April the Confederacy had 35,000 men in arms, of whom 10,000 were being pushed rapidly northward, and the Confederate Congress, which organized at Montgomery on the 29th of April, adjourned on the 21st of May to meet at Richmond, Virginia (the newly-chosen capital), on the 20th of July. Treasury notes had already been authorized, and a heavy loan, based on a pledge of cotton by the planters to the Confederacy. All debts due from inhabitants of the Confederate to those of the loyal States were impounded, and directed to be paid into the Confederate treasury. This act was obeyed to the extent of not paying the loyal creditors, but the Confederate treasury was but slightly replenished from this source. At length, when war had begun in earnest, all male citizens of the United States over fourteen years old were required by law and proclamation (August 14) either to swear allegiance to the Confederacy or leave its borders within forty days. The Confederate marshals were directed to apprehend and imprison all who disobeyed this edict. A Confederate privateer having been captured and her crew imprisoned in New York as criminals, President Davis, by proclamation (July 6), declared that he would retaliate upon Union prisoners of war any infliction upon those Confederates, and proceeded to make good his word. President Lincoln recoiled before this menace, and thenceforth treated privateersmen as prisoners of war. Regular exchanges of prisoners between the belligerents were initiated in the winter of 1861–62, and thenceforth accorded without objection. The Confederate authorities, however, did not scruple to treat belligerent Unionists resident within their borders, especially those of East Tennessee, as traitors. Jefferson Davis as President, and Alexander H. Stephens as Vice-President, were unanimously elected (November 6) for a term of six years ensuing; their previous election having hitherto been provisional only.

The civil war, formally initiated by the bombardment and reduction of Fort Sumter, was prosecuted thenceforth during 1861 with varying fortunes, but with a preponderance of success for the Confederacy. Its first signal triumph was the easy capture (April 20) of the Norfolk navy-yard, with three or four national vessels, including the frigate Merri-

mack (which months afterwards, having been transformed into the rebel iron-clad Virginia, wrought fearful havoc among the national vessels in Hampton Roads), with nearly two thousand cannon, besides small arms, munitions, etc. of immense value—all abandoned without firing a shot by the naval officers who should have defended and saved them. The Sixth regiment of Massachusetts militia, hastening to the relief of menaced Washington City, had just before been assailed (April 19) in the streets of Baltimore by a mob, which showered hardware, paving-stones, and other missiles upon it from housetops as it peacefully traversed their city, killing three and wounding fifteen of the Massachusetts men, while eleven of the mob were killed and four severely wounded. The militia passed on, but Baltimore was held by the mob, and communication by telegraph or otherwise between the Federal capital and the North arrested until General B. F. Butler reoccupied it, unresisted, by an advance from Annapolis (May 5–13). That important city was henceforth firmly held for the Union. General Butler, being in command at Fortress Monroe, ordered an advance under Brigadier-General Pierce against a Confederate outpost at Big Bethel, Virginia, but the ill-directed attack was repulsed by General J. B. Magruder with considerable loss to the Unionists. That portion of Virginia westward of the Alleghany range having opposed secession and still adhering to the Union, a Confederate army was sent across the mountains to overbear this (alleged) disloyalty to the State, but was promptly met by a greater Union force under General George B. McClellan, and driven from Philippi (June 2), then beaten at Rich Mountain and also at Laurel Hill, and again at Carrick's Ford (July 12), and the remnant driven in disorderly flight over the dividing ridge. Hostilities were renewed on the Kanawha by the advance (Aug. 1) of a fresh Confederate force under General John B. Floyd, afterwards succeeded by General Robert E. Lee, but these were met and baffled by a stronger Union army under General Wm. S. Rosecrans, and indecisive actions ensued at Carnifex Ferry, on Cheat Mountain, and at Alleghany Summit, which left West Virginia almost wholly under the flag of the Union at the close of 1861. In Eastern (or old) Virginia hostile armies confronted each other near Harper's Ferry and Winchester under Generals Robert Patterson (Union) and Joseph E. Johnston (Confederate) for a month without fighting, until a stronger Union force under General Irwin McDowell was pushed forward by Scott from Washington and Alexandria to Centreville, menacing the Confederate force concentrated around Manassas Junction, and advancing (June 21) to attack its left near Sudley Church. The advance was gallantly made, and for a time promised success; but Johnston's army from Winchester arrived by rail at the critical moment, and was hurried forward to the support of the recoiling regiments, so that the fortunes of the day suddenly changed, and the Union troops, exhausted by twelve hours' marching and fighting under a July sun, had to give way before this unexpected effort, and retired in a disorder not uncommon on battle-fields, even among veteran troops. The Confederates, unaware of the completeness of their victory, did not pursue it, though their President Davis, had arrived on the field about the close of the battle. The Union loss in this affair was not less than 4000 men, mostly wounded and prisoners, with at least twenty cannon and large quantities of small arms; the Confederates lost about 2000, including two generals (Bee and Bartow) killed. The men who fought were not far from 25,000 on each side, but quite as many more Union soldiers listened to the sound of the guns at Centreville, Fairfax Courthouse, in Washington, and on the Potomac, who should have been on the bloody field.

General McClellan was now called from West Virginia, and soon made commander-in-chief, vice General Scott retired; but there was no more serious fighting on this line till October 20, when a Union force of 1900, pushed across the Potomac opposite Harrison's Island, was attacked near Ball's Bluff by General Evans's brigade, mainly Mississippians, and nearly destroyed; its commander, General E. D. Baker of Oregon, being killed, with 300 of his men, and more than 500 taken prisoners. Two months after, General E. O. C. Ord, with the Third Pennsylvania brigade, having advanced, also on General McClellan's right, to Dranesville, was there attacked by a rebel brigade under General J. E. B. Stuart, who was quickly repulsed, with a loss of 230 men. This closed the campaign on the Potomac. Meantime, General Butler, sailing from Fortress Monroe (August 20), had captured Forts Hatteras and Clark at the entrance to Pamlico Sound, taking 700 prisoners under Commodore Bowen, 25 guns, 1000 muskets, and some stores. A more formidable expedition, 10,000 strong, under General T. W. Sherman and Commodore S. F. Dupont, left Hampton Roads October 29, and steered for Port Royal, South Carolina, where it bombarded and reduced the Confederate forts on Hilton Head and Phillips' Island, driving out their defenders and taking undisputed possession of the Sea Islands adjacent, which were thenceforth firmly held by a Union land and naval force which menaced both Charleston and Savannah, and repeatedly, though unsuccessfully, struck at the railroad connecting them.

In the West, Missouri was this year the arena of a violent though desultory conflict. Major-General John C. Fremont, who had been appointed to command here, was hastening westward to organize at St. Louis an army under the depressing influence of the Bull Run disaster in the East, when Governor C. F. Jackson returned from a two months' sojourn in the Confederacy and prepared to dispute possession of the State, though a convention of her people had declared (July 20) his office and those of his adherents vacated by treason, and all their disloyal acts null and void. He thereupon assumed to take Missouri out of the Union by proclamation (July 31), negotiated a close alliance with the Confederacy, and was raising a large army, in good part from Arkansas, when General Nathaniel Lyon, commanding 6000 Unionists at Springfield, took the field against Jackson's far more numerous but not so well-provided army, led by General Sterling Price, who suddenly resigned his command to General Ben McCulloch from Arkansas. Lyon, having advanced to Wilson's Creek, sent General Sigel with 1200 men to flank the enemy, whom he assailed in front, but his force was too small; Lyon fell mortally wounded, and the Union attacks in front and flank were repulsed; but the Unionists retired deliberately and unpursued to Springfield, insisting that they had fought quadruple their numbers and not been beaten. Major Sturgis, who succeeded General Lyon, soon afterward retreated to Rolla, abandoning all Southern Missouri to the Confederates. McCulloch returned to Arkansas, but Price advanced in large force to the Missouri River at Lexington, where he invested Colonel Mulligan and his Irish brigade, numbering 2780 men, and pressed them so vigorously that Mulligan was forced to surrender (September 20) before Fremont could relieve him. Fremont took the field directly afterwards, and pushed down to Springfield at the head of 30,000 men; but Price avoided him by retreating, and there was no fight, except that Colonel Zagonyi, with 300 Union cavalry, routed a far larger force which held Springfield, capturing that city. Fremont was still looking for Price when he was relieved (November 2), and ordered to turn over his command to General David Hunter, who, in pursuance of his orders, retreated to Rolla, again abandoning all Southern Missouri to the enemy. Brigadier-General U. S. Grant was at this time in command of the important post of Cairo at the junction of the Ohio with the Mississippi, watched by a Confederate force at Columbus, Kentucky. Grant, with 2850 men on four steamboats, dropped down the river to Columbus, landing at Belmont in Missouri, and attacked the Confederate camp on that side. The attack was spirited, and at first successful; but Major-General (Bishop) Polk, commanding at Columbus, crossed with five regiments, increasing the Confederate force to 5000, by which Grant was beaten off and driven to his boats with a loss of 500 men. The Confederate loss was rather more. One month later, Colonel Jefferson C. Davis, acting under General John Pope, commanding in Central Missouri, surprised a Confederate camp at Milford, and captured 1000 prisoners (including three colonels) and as many horses and muskets. General Pope reported 2500 prisoners taken this month, with a loss on his part of barely 100. So closed the campaign of 1861.

The battles of the bloody year 1862 were initiated at Mill Spring, near the Cumberland River, in Southern Kentucky, where General George B. Crittenden, having just supplanted General F. K. Zollicoffer in chief command of the Confederate force in that quarter, ordered an attack on the Unionists in their front, who, being in superior numbers and led by General George H. Thomas, repulsed them (January 19) after a hot struggle of two hours, and, following them to their camp, found it deserted—Crittenden having fled across the Cumberland, leaving ten guns, 1500 horses, etc. General Zollicoffer was killed while leading the attack. This blow was soon followed by one more serious, directed from St. Louis by General Halleck, who sent from Cairo Brigadier-General U. S. Grant with 15,000 men, and Commodore A. H. Foote with seven gunboats, to open a way into Tennessee. Fort Henry, 80 miles up the Tennessee River, was quickly reduced (February 6) by the gunboats, the garrison mainly escaping to Fort Donelson, 12 miles eastward, commanding the navigation of the Cumberland, leaving their chief, General Lloyd Tilghman, a prisoner. General Grant followed the fleeing Confederates, and nearly invested, with his force considerably increased, their stronghold, two miles below Dover, held by 15,000 men under the Virginian general John B. Floyd (late United States secretary of war). Commodore Foote, ascending the Cumberland, first attacked (February 14) the river-batteries, but

was repulsed with considerable loss. Floyd, seeing Grant proceeding leisurely to cut off his retreat, anticipated that result by an advance under General Simon B. Buckner on Grant's right towards Dover, commanded by General John A. McClernand of Illinois, who was overpowered and driven back after a protracted deadly struggle, losing a six-gun battery. The Union centre, under General Lew Wallace, sent two brigades to McClernand's support, by which the Confederate advance was arrested, and General Grant, arriving on the field at 3 P. M. from a conference with Commodore Foote, ordered a general attack, which was crowned with success. Wallace recovered by it the ground previously lost by McClernand, while General C. F. Smith led the Union left clear over the breastworks in their front, and the day closed with a decided Union victory. A cold night of suffering followed, during which General Floyd, despairing of cutting his way out, surrendered his command to General Gideon J. Pillow, who passed it to General Buckner, who, after some parley, surrendered next morning (February 16) not less than 6000 men, besides 2000 sick and wounded. General N. B. Forrest, with 800 cavalry, escaped up the bank of the swollen river, while Floyd, Buckner, and a remnant got across by boat before daylight and fled. One result of this success was the immediate evacuation of the Confederate camp at Bowling Green, Kentucky, as also of Nashville and all Northern Tennessee; Governor Isham G. Harris and his legislature being among the fugitives. Nashville was promptly occupied by the Unionists, while the main army of Tennessee, under General A. Sidney Johnston, retreated unmolested to Corinth, Mississippi, leisurely followed by General Don Carlos Buell, who had commanded the Union forces in Kentucky. General Grant's army, now confided to General C. F. Smith, was embarked and moved up the Tennessee to Savannah and Pittsburg Landing, nearly opposite Corinth. These Union successes compelled the evacuation of Paducah and Columbus, while General Pope, with 40,000 Unionists, marching down through Eastern Missouri, drove Major-General McCown, with 9000 Confederates, from New Madrid, taking thirty-three cannon and many thousand muskets, also tents, wagons, etc., without a serious contest. Brigadier-General Makall, with 6700 men, 123 cannon, and 7000 small arms, was now caught between Pope's army and Foote's fleet on Island No. 10 in the Mississippi, and compelled to surrender. Commodore Foote, dropping down the river, routed the Confederate flotilla in a brief engagement before Memphis, which thereupon surrendered without a blow. By July 1st the Mississippi River saw none but the Union flag floating above Vicksburg, which successfully resisted successive attempts at its reduction by Commodore Foote from above and Commodore Farragut from below.

General C. F. Smith was soon disabled by sickness and died, and the command of his army again devolved upon General Grant, who, while awaiting the arrival of General Buell from the North, was attacked at Pittsburg Landing by an advance in force of the Confederates from Corinth, 50,000 strong, under General A. S. Johnston, while General Grant was still at Savannah, eight miles below. The Unionists, about 40,000 strong, were completely surprised without intrenchments or even abatis, and were driven with heavy loss from Shiloh Church, three miles inland, to the brink of the river, having lost heavily in guns, killed, wounded, and prisoners. Meantime, General A. S. Johnston had been shot dead, the Union gunboats on the Tennessee had come into play, General Grant had joined his shattered army, while the advance of General Buell's force was beginning to come to its relief. Night brought a cessation of hostilities, and General Beauregard had succeeded to the chief command of the Confederates. On the Union side, General W. H. L. Wallace had been killed at the head of his division. General Nelson's division of Buell's army had crossed the Tennessee in boats at 5 to 6 P. M., and taken position on the field by 7. Two more divisions were on hand by sunrise next morning, when the battle was reopened by an advance of the Union forces, of whom 25,000 (including General Lew Wallace's division of General Grant's army) were fresh, while only 3000 of the Confederates had not yet been engaged. The fighting throughout the forenoon was spirited, but the forces were unequal, and the Confederates had lost by 4 P. M. all the ground they had gained the day before, and were soon afterwards in full retreat. There was but a faint show of pursuit. The reported Union loss in the two days' fighting was 1735 killed, 7882 wounded, 3956 missing; total, 13,573. Beauregard reported the Confederate loss at 1728 killed, 8012 wounded, 957 missing; total, 10,699.

General Grant was soon superseded by General Halleck, who, taking command of the combined army, advanced by approaches to Corinth, which was evacuated by General Beauregard, who retreated with little loss into the heart of Mississippi. Meantime, General O. M. Mitchell, with part of Buell's army, had advanced eastward up the Tennessee, taking Huntsville and other towns on the river, but failing to carry Chattanooga. Mitchell was now transferred to the command on the coast of South Carolina, where he sickened and died.

The war in the Territories was early initiated by an effort of Colonels Loring and G. B. Crittenden to carry over the 1200 regulars stationed in New Mexico to the Confederacy; but their intrigues were repulsed on every hand, and they were constrained to flee to El Paso, where Major Lynde, who had 700 men, made a pretence of resistance, advancing twenty miles to meet a much smaller Texan force, then retreating, and surrendering his entire command, which was paroled and marched northward for exchange, suffering terribly from heat and thirst. General H. F. Sibley, commanding a Confederate force of 2300 Texan volunteers, undertook the conquest of New Mexico in the fall of 1861; but his advance was retarded by lack of supplies till the opening of 1862, when he met Colonel E. R. S. Canby, commanding a much larger Union force, at Fort Craig. The Unionists were first drawn out of their stronghold, and then defeated by a brilliant charge on McRae's battery, which was taken. Canby's men fled precipitately to the fort, which Sibley could not reduce; so he turned it and pushed on to Apache Pass, where his farther advance was opposed by 1300 men, mainly Colorado volunteers, under Colonel John P. Slough, whom he defeated by another Texas charge, which routed Slough's motley crowd and cleared the road to Santa Fé, which Sibley soon entered in triumph. But his brilliant victories proved barren; he could not feed and clothe his little army from all the resources of New Mexico, while Canby was in the way of his receiving supplies from Texas, had any been sent. Forced to evacuate the capital of New Mexico for Albuquerque, whence (April 12, 1863) he moved down the Rio Grande, he encountered Canby at Peralta, but escaped him, after some fruitless long-range fighting, by destroying his train and dragging his guns over a desolate, waterless, mountainous region east of the river, and thus made his way down to Fort Bliss, Texas, having left half his force dead or prisoners, though never defeated; and returned to report his sage conclusion that New Mexico was not worth a quarter of the cost of taking and holding it.

Some of the largest of the semi-civilized tribes settled in the Indian Territory were incited by their old Democratic agents and other influential whites to link their fortunes with the Confederacy soon after the Union defeats at Bull Run and Wilson's Creek. Their aid proved, however, of little worth, and they were glad to return to the protection and alliance of the Union so soon as the progress of events had made it probable that this was the stronger side.

General Sterling Price, after Pope's successes in Missouri near the close of the campaign of 1861, unable to fight a pitched battle, retreated rapidly through Springfield and Cassville, closely pursued, and fighting when he must, till he had reached Arkansas and formed a junction near Boston Mountain with General Ben McCulloch, commanding a division of Texas and Arkansas volunteers, which raised his force to an equality with that of his pursuers. General Albert Pike now added to the ration-consuming power of the Confederates a brigade of Indians, swelling their total to nearly 20,000 men. Earl van Dorn, late a captain of Union regulars, now a Confederate major-general, assumed chief command, and resolved to fight the Unionists (now led by General Samuel R. Curtis of Iowa) before they could be concentrated. Advancing rapidly from his camp at Cross-Timber Hollows, Van Dorn fell upon General Franz Sigel, holding the extreme Union advance at Bentonville. Sigel retreated (March 3, 1862) fighting, and falling back coolly, until reinforced at 4 P. M., when he encamped at Leetown on Curtis's right. Curtis held a good position on Sugar Creek, which Van Dorn avoided by moving far to the left and attacking in overwhelming force the extreme Union right under Colonel Carr, holding a swell of ground known as Pea Ridge. Carr, fearfully overmatched, resisted stubbornly for seven hours, during which he was repeatedly wounded, lost a fourth of his men, and was driven back half a mile. Curtis, who had but scantily reinforced him up to 2 P. M., now ordered Generals Asboth and Sigel to the support of Carr, himself accompanying Asboth, whose batteries were soon engaged with the enemy's, and he severely wounded. Night closed the combat as Sigel was coming into position on Asboth's left. Next morning, General Curtis, having completed his dispositions, ordered his centre to advance, and the cannonade was reopened on both sides, but the Confederates soon desisted and disappeared, fleeing through Cross-Timber Hollows in their rear so rapidly as to defy pursuit. The Union loss in this battle was 1351 out of 10,500 men. Van Dorn's force was at least 16,000, including 5000 Indians. Among his killed were Generals Ben McCulloch and McIntosh; among his wounded, Generals Price and Slack. Lack of ammunition was the reason alleged for his hasty retreat.

General Curtis then advanced without resistance to Batesville, Arkansas, and thence marched to Helena on the Mississippi, but once resisted by 1500 cavalry under General Albert Rust, who were easily routed with a loss of 100 to 8 Unionists.

Curtis's movement south-eastward opened Missouri once more to Confederate incursions. Tidings of Union reverses in Virginia filled the invading ranks with volunteers from all quarters. Colonel Porter, commanding some 2000 of these raw levies, was attacked near Kirksville by Colonel John McNeil with 1000 cavalry and a battery, and after a desperate fight was defeated and his force virtually destroyed. Colonel Poindexter, with 1200 Confederates, was attacked by Colonel Odin Guitar while crossing the Chariton River, and his command likewise captured or destroyed. After several more petty conflicts the Confederates were again chased out of Missouri and compelled to take refuge in Arkansas, where General T. C. Hindman was now in chief command. General Blunt commanded the Unionists, who had again entered that State some 5000 strong; General F. J. Herron, encamped at Wilson's Creek with 7000 men, hastened to his aid when apprised of his danger, reaching Fayetteville, Arkansas, December 7. Hindman, deceiving Blunt by a threat of fighting, turned his left, and with 10,000 men fell upon Herron's 4000 infantry and artillery at Prairie Grove, his cavalry having been pushed forward to help Blunt. A spirited fight ensued, Herron, desperately charged, bravely holding his ground until 2 P. M., when the welcome sound of Blunt's batteries was heard opening on his left. The forces engaged were now nearly equal, and the battle raged till after dark, little ground being gained on either side. Next morning the Confederates had left the field. Hindman's loss was 1317, including General Stein, killed. The Union loss was 1148, of whom 953 were from Herron's 4000.

An expedition consisting of thirty-one steamboats and 11,500 men, led by General A. E. Burnside and Commodore L. M. Goldsborough, sailed from Fortress Monroe January 11, 1862, for Roanoke and Albemarle Sounds, North Carolina, landing (February 5) on Roanoke Island a force by which Fort Bartow, its main defence, was speedily taken by assault, with a Union loss of 300, while about 2500 Confederates were captured. The next point of attack was Newbern, which was likewise carried by assault (March 14). Among the captures were two steamboats, sixty-nine cannon, and 500 prisoners. The Union loss in the assault was 600. Fort Macon, on the coast, was next invested and taken, with its garrison of 500 men. This was the first of the regular Union fortresses retaken from the enemy. Washington, Plymouth, and other North Carolina ports fell without resistance, but General Reno was repulsed in a fight at South Mills, and General Foster in an attempt on the important railroad junction at Goldsboro'.

General Benjamin F. Butler, having raised in New England six regiments of 1000 men each for the purpose, and being aided by a fleet under Captain David G. Farragut, left Fortress Monroe (February 25, 1862) for his rendezvous on Ship Island, Mississippi, whither one of his brigades under General J. W. Phelps had preceded him, and where his troops were soon augmented to 15,000. His objective point was New Orleans, a city of 170,000 inhabitants, defended by 3000 men under General Mansfield Lovell, but the strong forts St. Philip and Jackson, half way between the city and the mouths of the Mississippi, were Lovell's main reliance. Earnest efforts to strengthen them by a raft or boom across the river were all but thwarted by the high stage of the heavily-swelling current. Captain Farragut, with his fleet of forty-seven armed vessels and 310 guns, appeared before the forts April 17, opened fire next morning, and destroyed or evaded three fire-rafts sent down to annoy him. After three days' ineffective bombardment, the Itasca, Captain Caldwell, steamed up to the great boom or chain, and cut it with sledge and chisel, when another fire-raft was sent down to no purpose, and two more days were wasted in fruitless cannonading; then Farragut, with his fleet in three divisions, resolved to fight his way by the forts against the sweeping current; which he successfully did, fighting and capturing or scattering the Confederate gunboats above, with a net loss of the Varuna steamship sunk and some 200 men. The forts, thus rendered useless, were soon surrendered. Captain Farragut, with nine of his vessels, steamed directly up to the city, whence a thick black smoke apprised him that the Confederates were burning ships, steamboats, etc. laden with cotton, sugar, flour, etc. Lovell drew off his men, and the city ungraciously signified that she could make no resistance. Passing up to Carrollton, eight miles above, Farragut found its works abandoned and in flames. General Butler, having reduced the forts, soon came up and took possession, which was not thenceforth disputed.

All the towns on the Mississippi below Vicksburg were easily captured by Farragut, and an attempt to retake Baton Rouge (August 5), by a force of 2500 Confederates under Major-General John C. Breckenridge, was repulsed by an equal Union force under General Thomas Williams, who was killed. The Confederates lost 300 men, including General Clarke and six colonels. The Union loss was 250. The lower parishes of Louisiana hereupon fell to the Unionists without serious resistance. Butler was relieved by General N. P. Banks December 16, having just before been outlawed as a felon by Jefferson Davis.

General George B. McClellan had been called from West Virginia to the command of the Army of the Potomac soon after the Union disaster at Bull Run, and on the retirement of General Scott made commander-in-chief of the Union armies. A very large force, fully 200,000 strong, was rapidly gathered around him and drilled into the coherence of a regular army. The far weaker Confederate force confronting him gradually recoiled to Centreville and Manassas Junction, where they spent the winter of 1861–62. General McClellan remained quiet till expressly ordered (February 22) by President Lincoln to advance, when he moved out to Manassas Junction, to find it evacuated by the Confederates, who, under General Joseph E. Johnston, had quietly retired behind the Rapidan. General McClellan now transferred the bulk of his army by water to Fortress Monroe, preparatory to an advance on Richmond up the peninsula between the James and York Rivers. Meantime, General Banks was left in command in the Valley of Virginia, and had just left for Washington, when his 7000 men, now under General James Shields, well posted near Kernstown, were attacked by Stonewall Jackson with but 4000 men, who were defeated with a loss of at least 1000. General Shields's loss was about 600.

Just before McClellan reached the James, the Confederate iron-clad Virginia (late the United States steam-frigate Merrimack) had sallied out of Norfolk (March 8), and, attended by two gunboats, made directly for the Union frigates Congress and Cumberland, lying near Newport News, and disdaining to reply to their rapid cannonade, of which the balls rebounded from her sloping roof of iron as though they were peas, struck the Cumberland with her iron beak, smashing in the frigate's bow, so that she filled and sank in half an hour, carrying down a part of her crew. The Congress, seeing the fate of her consort, set sail and ran aground under the batteries of Newport News, where she was raked by the ram until her commander, Lieutenant Joseph B. Smith, and most of her officers and men, were either killed or wounded, when her flag was hauled down; but her captors were prevented from burning her by a fire from the Union batteries on shore. The Merrimack afterwards returned and bombarded her until she was set on fire and blown up; half her crew of 434 men having fallen. The steam-frigate Minnesota and frigate Lawrence, hurrying to the aid of the Cumberland and Congress, had severally grounded in the harbor. The Lawrence soon got off and returned to port, but the Minnesota, still aground, was cannonaded for hours by the entire Confederate flotilla, the Merrimack being unable to approach nearer than a mile, owing to the shallowness of the water. At 7 P. M. all three desisted and steamed towards Norfolk. At 10 the new Union iron-clad Monitor, Lieutenant John L. Worden, steamed into the roadstead on her trial-trip from New York. At 6 A. M. the hostile fleet reappeared and made for the Minnesota, but the little Monitor interposed, and the strange combat was renewed and continued with varying fortunes until the Confederate fleet sheered off and stood for Norfolk. The Merrimack was badly crippled, her commander, Franklin Buchanan, being among her wounded. She never fought again, and was dismantled and sunk when Norfolk was evacuated by the Confederates not long afterwards. The little Monitor (styled "a cheese-box on a raft") remained master of the situation, but was lost, months afterwards, in passing Cape Hatteras.

General McClellan reached Fortress Monroe April 2d. Of his army, 58,000 had preceded him, and as many more soon followed. Advancing up the peninsula, he was soon arrested by Confederate batteries on Warwick Creek (which nearly crosses the peninsula abreast of Yorktown), manned by General J. B. Magruder, who had some 11,000 men in all wherewith to hold a line thirteen miles long. Thirty days were spent here; when McClellan had planted his breaching-batteries, and was nearly ready to open fire, it was found that Magruder had retreated. On reaching Williamsburg, McClellan's advance was stopped by works known as Fort Magruder, where Hooker's division fought nine hours and lost heavily. At length the Confederate position was flanked by General Hancock of Sumner's division, and Magruder retreated during the night, leaving 700 of his severely wounded. The total Union loss was 2228, that of the Confederates probably less. West Point, at the head of York River, was occupied May 6, with a

Union loss of 200. This movement up the peninsula, coupled with Burnside's successes in North Carolina, compelled the Confederates to evacuate Norfolk, with its navy-yard, about 200 guns, and some worthless vessels. That city they never recovered. General McClellan, no longer resisted, advanced to the Chickahominy on the 20th.

Here he halted and fortified with over 100,000 effective men, believing the Confederate army in his front nearly if not quite equal in numbers to his own. Meantime, General Fremont, to whom Western Virginia had been assigned as a department, advanced into the Alleghanies and threatened Staunton from the direction of Monterey. Jackson sent General Edward Johnson to oppose Fremont's advance under Milroy, who retreated and was joined by General Robert C. Schenck near McDowell, where a battle was fought, with a Union loss of 461, the Unionists retreating after nightfall. Jackson recrossed Shenandoah Mountain, and marched rapidly down the Valley to Front Royal, where he surprised and routed Colonel John R. Kenly, taking 700 prisoners. Pushing on to Strasburg, Jackson compelled Banks to retreat rapidly to Winchester, where he fought five hours, and then, being greatly outnumbered, retreated hurriedly to Martinsburg and Williamsport, where he crossed the Potomac, having lost about 1000 men, besides the sick and wounded in his hospitals. Jackson's cavalry pursued to Martinsburg, but most of his infantry were halted not far beyond Winchester, and soon retreated rapidly to confront Fremont and McDowell, who were hastening to bar his way. Fremont, crossing the Alleghanies by a rugged route, reached Strasburg June 1, a few hours after Jackson had passed that point. Jackson, still retreating, destroyed the numerous bridges behind him, and turned to fight (June 7) at Cross Keys, where he checked Fremont; then, again retreating, he crossed the South Fork at Port Republic, falling with a superior force upon General Tyler, who, with a part of Shields's division of McDowell's army, was forced back with loss. Jackson thus balked all his foes, having lost but 1167 men since he left Winchester. His baffled pursuers were now recalled, and he, triumphant, was soon ordered to join General Robert E. Lee, now in chief command at Richmond. The rebel general Heth had attacked Colonel Crook at Lewisburg, West Virginia, and been routed on the same day with Jackson's demolition of Kenly.

An unsuccessful attack (May 15) on Drewry's Bluff, eight miles below Richmond, by a Union fleet under Commander John Rodgers, was followed, May 27, by a fight near Hanover Court-house between the Union Fifth corps, General Fitz-John Porter, and General L. O'Brien Branch's North Carolina division, which was driven off with a loss of 700, to 400 on the Union side.

Keyes's Fourth corps having been thrown forward across the Chickahominy to Seven Pines on its right and Fair Oaks on its left, was attacked (May 28) by the Confederates under General Jos. Johnston, who judged that Keyes might be overwhelmed before he could be sufficiently supported. Four divisions, under Longstreet, D. H. Hill, Huger, and G. W. Smith, were designated to make the attack, supported by all the rest of the Confederate army. Hill, at 1 P. M., first attacked Casey's division at Fair Oaks, surprising it while its defences were still uncompleted, and pushing it back on Couch's division near Fair Oaks, with a loss of six guns, two of its colonels killed, and many men. Keyes barely held his ground at Fair Oaks till Sumner's corps, rapidly thrown across the Chickahominy, came to its aid. Heintzelman's corps, though nearer, came into the fight later, and our right was now attacked by Smith's corps, directed by Jos. Johnston as commander-in-chief, till he was struck by a shell, and so badly wounded that he was disabled for months. Lee succeeded him. McClellan was at New Bridge, several miles up the Chickahominy, with the corps of Fitz-John Porter and Franklin, which were not brought into action. The battle raged without much advantage to either side till dark, when the Confederates drew off. They made a pretence of attacking next morning, to cover their removal of arms and stores from the camp of Keyes's corps, but the fighting amounted to little. Hooker, by Heintzelman's order, made a reconnoissance in force to within four miles of Richmond, meeting no resistance, but was recalled to Fair Oaks by McClellan. The Union loss in this affair was 5739, including five colonels killed and seven generals wounded. Of Keyes's 12,000 men, 4000 fell or were captured. General McCall's divison of McDowell's corps now joined McClellan, raising his total to 156,828, and his effective force to 115,102.

No further offensive movement was made by him until Jackson, whose movements had been studiously concealed, came in on Lee's left, and was pushed forward to assail and turn McClellan's extreme right at Mechanicsville, being supported by Branch, D. H. Hill, Longstreet, and A. P. Hill, with the bulk of the Confederate army.

A. P. Hill, on Jackson's arrival, crossed the Chickahominy and attacked Fitz-John Porter's corps of 27,000 strong, which, recoiling from Mechanicsville, took up a strong position behind it across Beaver Dam Creek, but was repulsed (June 26), Jackson having not yet got into position. Porter now retreated by order to Gaines's Mill, where he was at once reinforced by Slocum's division of Sumner's corps, raising his force to 35,000 men. But opposed to them were 50,000 veterans, led by their ablest commanders, including Longstreet and Jackson. After fighting gallantly for several hours, he telegraphed for aid to McClellan, who sent two brigades of Sumner's corps to his assistance, but the field was lost before their arrival. Porter lost nineteen guns, but halted just off the field, and was not pursued. The Union loss that day was 8000, that of the Confederates about 5000. But McClellan's base of supplies, West Point, had been captured by Stuart's cavalry, and he decided to retreat by his left flank through White-Oak Swamp to the James. This movement puzzled Lee, who did not pursue with vigor, and the first attacks upon the Union rear were easily repulsed. Finally, McCall's division, serving as rear-guard, was assailed (June 30) in great force at Glendale, and after hard fighting defeated and driven; McCall himself being captured, with most of his guns. The struggle ended at 9 P. M., Hooker's and two brigades of Slocum's division having arrived too late to win the battle, but in time to check pursuit. The loss of men in this action was about 3000 on either side.

The Union forces were now concentrated at Malvern Hill on James River, where they were attacked by the entire Confederate army, which was signally defeated in one of the most desperate actions of the war. The first attack was made at 3 P. M.; the most desperate charge was made at 6, and repulsed with great slaughter. The Confederate loss in this struggle must have been nearly or quite 10,000, that of the Unionists perhaps half as many. McClellan during the evening moved down the James to Harrison's Landing, where Lee did not choose to assail him. He claimed 10,000 prisoners, 52 guns, and 35,000 small arms as captured during the seven days' fighting, from Mechanicsville to Malvern inclusive. The Union loss during those days is reported by McClellan at 1582 killed, 7709 wounded, and 5958 missing; total, 15,249. Jackson's and A. P. Hill's losses during those days were reported by them as 1585 killed, 7688 wounded; total, 9336. This is probably about half the total Confederate loss, which included General Griffith and three colonels, killed. General Hooker soon afterwards reoccupied Malvern Hill without resistance, taking 100 prisoners, but the Union army was soon withdrawn by the President's order to the Potomac. Its retreat and embarkation were unmolested. General McClellan and his staff reached Aquia Creek August 23.

Major-General John Pope had been called from the West to Washington, and given the chief command of Fremont's, Banks's, and McDowell's forces, aggregating 50,000 men. Major-General Halleck was also called from the West to Washington, and made general-in-chief. Pope concentrated his forces near Culpeper Court-house, and sent Banks forward with 8000 men to Cedar Mountain, where he was confronted by Stonewall Jackson, from Richmond, with 25,000 men. Banks attacked (August 9) under every disadvantage of position, and was steadily repulsed, losing 2000 men; Jackson's loss was 1314. Pope arrived at nightfall with Ricketts' division and part of Sigel's (late Fremont's) corps, but Jackson, seeing that Pope was about to move against him in superior force, soon retreated across the Rapidan.

Pope, continuing to act on the offensive, soon found the whole army of Virginia concentrating upon him, and retreated across the Rappahannock. Lee did not choose to force a passage on his front, and sent Jackson around by a long flank march up that river. Encamping at Salem, and emerging through Thoroughfare Gap, he struck the Alexandria Railroad at Bristow Station, in Pope's rear, and captured two trains of cars running westward from Warrenton. He now sent Stuart with two regiments to Manassas Junction, seven miles farther north, which he surprised, taking eight guns, 300 prisoners, and seven trains laden with provisions, etc. Colonel Scammon, with two Ohio regiments, now crossed Bull Run and assailed Jackson, but was easily beaten off, and General F. G. W. Taylor, with four New Jersey regiments, renewed the experiment with like result; all of Jackson's and A. P. Hill's divisions being by this time at the Junction.

Pope, by this time aware that something was wrong in his rear, began to fall back on Bristow Station, where Hooker drove Ewell, capturing part of his train. Ewell fell back on Manassas, which Pope's gathering force compelled Jackson to abandon, moving westward, leaving the captured provisions, which he could not remove. Moving towards Thoroughfare Gap, he encountered Rufus King's

division of McDowell's corps, which fought him stoutly, but did not bar his way. The loss on either side was heavy, Major-General Ewell being among the Confederate wounded.

Pope, now at Centreville, still hoped to envelop and crush Jackson, but was baffled by the non-arrival of Fitz-John Porter at Manassas Junction, and by the emerging of Longstreet's corps through Thoroughfare Gap, driving off Ricketts' division, which attempted to push it back. Before noon (August 29) Longstreet had come in near Gainesville, on the right of Jackson's hotly-engaged corps at Groveton, and the battle raged furiously till night, when Pope claimed advantage, and expected to crush the enemy next day. But the reinforcements he reasonably expected from McClellan's army did not come up; and Pope, unsupported, was beaten and retreated on Centreville, near which Franklin's corps, 8000 strong, had stood idle all that day (August 30). Here Pope was reinforced by Sumner, as well as by Franklin; and Lee, now in command, did not choose to attack him in front, but sent Jackson to gain his rear again by a flank march to the northward. Gaining Pope's rear, Jackson attacked his flank rear near Chantilly, where Reno's two divisions and Phil Kearney's confronted him. General Kearney was killed, as was General Isaac I. Stevens, commanding one of Reno's divisions; but Jackson gained no victory. Pope quietly retreated to the Potomac unassailed, and resigned his command, which was given to General McClellan. The Union loss in this brief and bloody campaign was hardly less than 25,000, including 9000 prisoners; the Confederate loss was hardly less than 15,000. Colonels Fletcher Webster (son of Daniel) of Massachusetts, Roberts of Michigan, O'Conner of Wisconsin, Koltes of Pennsylvania, Cantwell of Ohio, and Brown of Indiana, were among the Union killed. Major-General R. C. Schenck was wounded.

General Lee, reinforced from Richmond by D. H. Hill's fresh division, crossed the Potomac, unopposed, opposite Leesburg, and advanced to Frederick, whence he issued (September 8) an address to the people of Maryland, implying that he came as a liberator, but obtained few recruits. Intent on capturing a Union force of 12,000 men holding Harper's Ferry, he divided his army. McClellan followed Lee's right wing, moving west towards Hagerstown, overtaking it at Turner's Gap of South Mountain, and driving it westward, after a fight (September 14) in which he lost 1568 men and took 1500 prisoners. Franklin simultaneously cleared Crampton's Gap on the left. Harper's Ferry was surrounded by the Confederates in great force under Stonewall Jackson, and after a brief cannonade was surrendered (September 15) by General D. S. Miles, who was killed by a ball just as he had raised the white flag. Colonel Davis had escaped with 2000 cavalry during the night, but 11,583 men and seventy-three guns were the trophies of this triumph.

Lee rapidly concentrated his army around Sharpsburg, along a ridge facing Antietam Creek. McClellan soon confronted and attacked him (September 17), and a bloody, determined battle was fought there between 87,000 Unionists and 70,000 Confederates, of whom but 40,000 were in position at the outset. McClellan's loss was 2010 killed, 9416 wounded, and 1043 missing; total, 12,469; Lee's, 1842 killed (including Generals Branch of North Carolina, Starke of Mississippi, and G. B. Anderson of Georgia), 9399 wounded, and 2292 missing; total, 13,533. That was the bloodiest day America has known. Many regiments lost more than half their men. It was in one sense a drawn battle, yet when McClellan, after a day's rest, advanced to renew it, he found that Lee had recrossed the Potomac into Virginia. An irresolute attempt by General Porter to follow was repulsed by Lee's artillery, with a Union loss of 200 prisoners. Lee retreated at leisure by Bunker Hill and Winchester, while Stuart, with 1500 cavalry, made a raid to Chambersburg, Pennsylvania, where he paroled 275 sick and wounded Unionists and destroyed valuable stores, passing around McClellan's army and recrossing the Potomac below Harper's Ferry. McClellan, facing Lee, had moved down to Warrenton, Virginia, where he was relieved of his command (November 7). General Burnside succeeded him, and, still moving to the left as Lee faced him, at length threw a bridge across the Rappahannock at Fredericksburg, and assailed (December 13) Lee's army, holding the heights south of that river, attempting also to flank his right; but the attack in front, 60,000 strong, led by Hooker and Sumner, was repulsed with great slaughter, while that by 40,000 men under Franklin, in flank, was unsuccessful. The Union loss in this disastrous affair was 1152 (including Major-General G. D. Bayard) killed, 9101 wounded, and 3234 missing; total, 13,771. The Confederate loss was about 5000, including General Maxcy Gregg (just chosen governor of South Carolina) and General T. R. R. Cobb of Georgia. Burnside purposed to renew the attack next day, but was dissuaded, and recrossed the Rappahannock unassailed during the night of the 15th–16th. Burnside attempted (January 20, 1863) to cross the Rappahannock by fords above Fredericksburg, but was baffled by a terrible storm, and desisted. Eight days later he was relieved from the command.

General Halleck had taken command of Grant's and Buell's combined forces, now swelled to 100,000 men, directly after the battle of Pittsburg Landing, and by slow and regular approaches had forced Beauregard to retreat with little loss from his fortified position at Corinth. Beauregard was pursued by Pope as far as Baldwin and Guntown, Mississippi, but to little purpose. Meantime, General O. M. Mitchell, with a division of Buell's army, had struck eastward up the Tennessee, occupying Huntsville, Bridgeport, Tuscumbia, etc., and making considerable captures of munitions, railroad cars, etc., with little loss. An attempt on Chattanooga under General Negley was repulsed by Kirby Smith. Subsequent to this the war in that quarter languished under Buell's command, while daring raids were made in all directions by Confederate guerillas and cavalry under Generals N. B. Forrest and John Morgan. Clarksville (Tennessee), Henderson, and Cynthiana (Kentucky) were among the towns thus pounced upon, while at Murfreesboro', Tennessee, Forrest captured some 1500 Union troops. The general result of these partisan conflicts was adverse to the Union cause.

General Bragg, having succeeded Beauregard in chief command in this quarter, advanced in June with 45,000 men from the heart of Mississippi into Tennessee, crossing the Tennessee just below Chattanooga, and striking boldly northward through a rugged, mountainous, thinly-peopled region. At Richmond, Kentucky, his advance, under Kirby Smith, fought (August 29) and routed in detail a Union division under General M. D. Manson of Indiana, who was taken prisoner with nearly 5000 of his men. Smith boasted that his prisoners equaled in number his entire force. Smith entered Lexington in triumph. Munfordsville, Kentucky, was captured (September 16) by Bragg, who claimed 4000 prisoners. Thence Bragg advanced unopposed through Bardstown to Frankfort, where he inaugurated (October 1) Richard Haines as Confederate governor of Kentucky. Cincinnati, in great alarm, fortified the Kentucky approaches to the Ohio, and Louisville seemed in imminent peril.

General Buell, leaving Nashville strongly garrisoned, had of late been marching northward on Bragg's left with an army finally swelled by raw levies to 100,000, or at least twice the number of Bragg's much better disciplined force. Still, Buell hesitated to attack, distrusting the effectiveness of his men, but at length moved (October 1) from Louisville to Bardstown and Springfield; Bragg retiring and concentrating before him. Moving thence on Harrodsburg, his left was struck (October 9) near Perryville by five divisions of Bragg's army under General L. Polk, which outnumbered and drove the inferior force directly opposed to it, killing Major-General James S. Jackson, a Kentucky member of Congress. The fight was maintained from 2 P. M. till dark, with advantage at last on the Union side, but Buell's total loss this day was 4348, and Bragg's but 2500. Buell had 58,000 men under his command, but not half of them were engaged, as he did not know his left wing was in action until 4 P. M. Advancing at sunrise next morning to renew the battle, he learned that Bragg had decamped, and he did not stop till he was behind the Cumberland Mountains in East Tennessee.

General Grant, left in command of West Tennessee, with Rosecrans in Northern Mississippi, the two attempted a combined movement on General Stirling Price at Iuka, Mississippi. Rosecrans alone attacked (September 19), but Price held his ground firmly, abandoning it during the ensuing night. His loss was at least 1000; Rosecrans' was 782. Price retreated to Ripley, Mississippi, where he was succeeded by Van Dorn, who now, with at least 30,000 men, undertook to drive or capture Rosecrans and his 20,000, holding the former Confederate fortifications at Corinth. One of the great charges of the war was made by Price, but failed, because Van Dorn was seven minutes too late on his side. The rebel loss in this repulse was at least 5000, including 1423 killed and 2248 prisoners. On the Union side 315 were killed, including General P. A. Hackleman of Indiana, 1812 wounded, and 232 missing; total, 2359. Van Dorn and Price retreated precipitately.

General Rosecrans was hereupon given command of the Army of the Ohio (renamed the Army of the Cumberland), in place of General Buell. He had 65,000 effective men, mainly clustered around Bowling Green, Kentucky, whence he soon transferred his head-quarters to Nashville, and prepared to advance. Meantime, the brigade of Colonel A. B. Moore of Illinois, at Hartsville, nearly 2000 strong, was surprised and captured by John Morgan with 1500 cavalry.

Rosecrans, with 46,910 men in three divisions, led by Generals Thomas, McCook, and Crittenden, left Nashville December 26, advancing slowly, with some desultory fighting, to Stone River, opposite Murfreesboro', where his right under McCook was surprised and crushed by Hardee at 7 A. M., December 31st; McCook losing twenty-eight guns and nearly half his men. But when Rosecrans' centre was assailed in turn by the triumphant Confederates, his firmness and soldiership, with those of General Thomas, saved the day. Heavy fighting continued throughout the day, with little to boast of on either side since McCook's disaster. But the Confederates had assailed him at all points without success, losing heavily, having been so roughly handled that they did not care to try again. Next day (January 1, 1863) there was a little desultory fighting, mainly at long range. On the day following (January 2) a heavy cannonade was begun by the Confederates, and replied to with spirit; and at 3 P. M. a great charge was made on the Union left by Breckenridge's corps, aided by a heavy enfilading fire from Polk's artillery, but was repulsed after a bloody struggle by the divisions of Negley and Jefferson C. Davis, supporting the fire of Crittenden's batteries, and charging in turn. The Confederates lost four guns and some prisoners, and were pursued across Stone River, where the victors intrenched and rested for the night. The next day passed with little fighting. Bragg at 11 P. M. began to evacuate Murfreesboro', where Rosecrans, on advancing next morning, found only the desperately wounded. Rosecrans reported his losses in this protracted struggle at 1533 killed, 7245 wounded, and 2800 prisoners; total, 11,578 out of 43,400. Bragg reported his loss at over 10,000, including 9000 killed and wounded, out of 35,000. Cavalry raids by Forrest in West Tennessee, John Morgan in the heart of Kentucky, and Wheeler on the Cumberland, were made this winter to little purpose. Colonel A. D. Streight of Indiana was sent by Rosecrans (April 10) with 1800 cavalry to operate on Bragg's rear, but was surrounded near Rome, Georgia, by Forrest and Reddy, and compelled to surrender. Sundry minor conflicts in this quarter inflicted in the aggregate about equal losses on either belligerent.

Commodore Foote had triumphantly swept down the Mississippi from Cairo to Vicksburg, co-operating with General Pope on the Missouri and General W. T. Sherman on the Kentucky side. Columbus, Kentucky, was abandoned on his approach; New Madrid, Missouri, and Island No. 10 in the Mississippi, were successively taken by Pope, compelling General Makall to surrender 123 guns and 6700 men; then Forts Pillow and Randolph, which opened the river to Memphis, where a Confederate fleet of steamboats undertook to bar the way, but was soon demolished (June 4), when Memphis was quietly surrendered. An expedition thence up White River, to open communications with General Curtis, did not find him, but lost the steamboat Mound City, with 150 men, by a ball through her boiler in an attack on St. Charles, which was taken. Commodore Davis steamed down to Vicksburg, and communicated with Farragut below it from New Orleans; but a combined naval attack (July 1) on that stronghold was repulsed, and the siege raised July 24.

General Grant, now at Jackson, Tennessee, after the battles at Iuka and Corinth had his department enlarged so as to include Mississippi, while 11,500 men were sent him under McPherson. He had advanced as far as Oxford, Mississippi, on the way to Vicksburg, when Van Dorn struck (December 20) with cavalry at Holly Springs in his rear, where Grant's stores were awaiting a further reopening of the railroad. The place was occupied by Colonel R. C. Murphy of Wisconsin, who surrendered nearly 2000 men, nearly half of them in hospital. Grant at once cashiered Murphy in a stinging order, but meantime his stores, worth $4,000,000, had been destroyed or carried off, and he was compelled to turn back into Tennessee.

General W. T. Sherman, with 30,000 men, left Memphis on steamboats December 21, and fell down the Mississippi to co-operate in the reduction of Vicksburg. Ascending the Yazoo, he made (December 22) a resolute attack on the rebel batteries commanding Chickasaw Bayou, but the ground was difficult, the banks strong and well manned, and he was repulsed with a loss of 2000, while General Pemberton reports the Confederate loss at 267.

General John A. McClernand now superseded General Sherman, and at once resolved on the reduction of Fort Hindman (known as Arkansas Post), 50 miles up the Arkansas River. His force was so large, and his dispositions so well made, that his first assault compelled its surrender, with 5000 prisoners and seventeen guns. The Union loss in the assault was 977. General Grant arrived from Memphis and assumed chief command February 2, 1863.

Attempts to cut a channel across the narrow isthmus opposite Vicksburg on which the Union army was encamped proved failures, and a boat-expedition under General L. F. Ross from the Mississippi, through Yazoo Pass, into the Coldwater and Tallahatchie Rivers, was stopped and turned back by Confederate works at the head of the Yazoo, returning to the Mississippi unmolested; and one or more kindred attempts to circumvent the defences of Vicksburg were likewise baffled. At length General Grant decided to gain their rear by the south rather than the north, and, defying high water and other impediments, marched his army 70 miles to Hard Times, nearly opposite Grand Gulf. Commodore Porter, commanding the Union fleet above Vicksburg, ran the batteries of that city with eight gunboats and eight barges, whereof but two were destroyed by their fire, the rest appearing before Grand Gulf in season to bombard its defences, but to no purpose. Grant thereupon crossed (April 30) at Bruinsburg, some miles below, and, taking them in reverse, easily took possession of Port Gibson and Grand Gulf, defeating General Bowen, who had been sent from Vicksburg to resist him, with a loss of nearly 1000 on each side. Moving up the Big Black, General Grant's advance easily crushed at Raymond two rebel brigades under Gregg; Union loss, 443; Confederate, 723. Advancing to Jackson, the capital of the State, McPherson was there resisted by General W. H. T. Walker, who was promptly defeated, with a Confederate loss of 845 to 265 Union. Here seventeen guns were taken and much material destroyed.

By this time General Jos. Johnston had arrived with reinforcements, and assumed chief command of the Confederates, directing Pemberton to join him with the defenders of Vicksburg. Grant of course moved rapidly westward to bar such junction, and at Champion Hills encountered (May 16) Pemberton, who attempted too late to move northward and join Johnston, but was compelled to fight thrice his force, and was beaten with a loss of General Tilghman among the killed, 2000 prisoners, and fifteen guns. General Loring's division was cut off from Pemberton's, and escaped southward to Jackson. At the crossing of the Big Black, Pemberton fought again, but was soon put to flight, with a loss of eighteen guns and 1500 prisoners. Pemberton, with whatever he still had left, fled into Vicksburg, necessarily abandoning his strong defences on the Yazoo, with a number of heavy guns. The Confederate navy-yard and hospital at Yazoo City, with 1500 sick and wounded, were among the fruits of these successes. Grant followed Pemberton closely, and tried to carry his stronghold by assault, but was repulsed with heavy loss. He then sat down to patient sapping and mining, fortifying his rear against Johnston, who was threatening him from Clinton and Jackson, and worked away until Pemberton was starved into a surrender (July 3), having still 1500 men fit for duty, besides 10,000 in hospitals. Grant reports his total loss from his landing at Bruinsburg to his triumphant entry (July 4) into Vicksburg at 943 killed, 7095 wounded, and 537 missing; total, 8515, of whom 4236 fell before Vicksburg; and claims 37,000 prisoners, of whom a large part were sick or wounded, with arms and munitions for 60,000 men. Among the Confederates killed were Generals Tracy, Tilghman, and Green. Grant now turned, with a force raised to 50,000, upon Johnston, who had but 24,000, pushed him back to Jackson, and there besieged him, with a loss of 600 on either side, until he decided to decamp, retreating by Brandon to Morton.

During these momentous operations Colonel B. H. Grierson, with 1700 cavalry, raided northward from Lagrange, Tennessee, through Pontotoc, by Jackson and Natchez, to the Mississippi at Baton Rouge, taking 500 prisoners and 3000 small arms, having traversed 600 miles of mainly horrible roads in sixteen days, losing but twenty-seven men. Milliken's Bend, on the Mississippi, held by General E. A. Dennis with 1400 men, was attacked by the Confederate general Henry McCulloch with a superior force, which was repelled with a loss of some 500 to either side. Helena, Arkansas, held by General B. M. Prentiss with 4000 men, was likewise attacked (June 30) by the Confederate general Holmes with 7646, losing 1636, whereof 1000 were captured. Helena was thereafter let alone.

General Banks, commanding at New Orleans, found Galveston already surrendered (October 8, 1862), without resistance, to a Union fleet of four gunboats, and thence quietly held till he sent down a regiment, of which part was debarked (December 28), when General Magruder, just appointed to command in Texas, organized a fleet of mercantile steamers, shielded by cotton-bales and manned in good part by volunteers, with which he came down the bayou in the night (December 31) and boldly attacked the Union fleet in the harbor, captured the Harriet Lane, sunk the Westfield, and compelled the troops ashore to surrender. And the Confederate corsair Alabama, arriving off the bar soon after, silenced and took the Union gunboat Hatteras, Captain Blake, which sunk six minutes afterwards. Major

O. M. Watkins, blockading the mouth of the Sabine with two gunboats, was attacked by two Confederate gunboats from up-river, and easily captured.

General Banks had 30,000 men, which sickness, desertion, and detachments soon reduced to 14,000. Having pushed these westward, so as to clear the country of all enemies to the Atchafalaya by an easy fight at Carney's Bridge, he at once returned and laid siege to Port Hudson on the Mississippi, where the Confederates had established batteries to dispute the passage of the river. Commodore Farragut, with four frigates and five gunboats, passed the batteries, losing one of his best vessels in so doing. Banks, deeming the garrison too strong to be successfully assaulted by his force, again moved westward to Alexandria, driving General R. Taylor and taking 2000 prisoners, several steamboats, and twenty-two guns. Again Banks returned to the Mississippi at Port Hudson, which he invested and soon tried to carry by assault, but was beaten off with a loss of 2000 against 300. He now besieged in due form, and at length made (June 10) a second assault, which likewise failed. But no relieving army appeared, supplies were very short, and the garrison were on short allowance, with little to eat left, when a tremendous salute from the investing Union batteries and gunboats gave notice (July 6) that Vicksburg had fallen. Upon being convinced of this fact, General Gardener surrendered the fort with its garrison of 6408 men, of whom many were sick or wounded. Banks's effective force was that day about 10,000; his total captures during the campaign, 10,584 men, seventy-three guns, and 6000 small arms.

Brashear City, on the Atchafalaya, was surprised and captured by the Confederate general R. Taylor (June 22), with a Union loss of 1000 men and ten guns. The Union camp of General Dudley near Donaldsonville was in like manner surprised (July 12) by 1200 Texans, and 300 prisoners taken. Banks returned to New Orleans, and sent General Franklin with a fleet and 4000 men to take the fort at Sabine Pass; but the naval attack was repulsed with a loss of two gunboats, fifteen guns, and 250 men, which exceeded the whole number opposed to them.

General Banks pushed out a part of his command, under General C. C. Washburne, to Opelousas, to make his own movement on Texas. On his retreat to the Teche, General Washburne's right was attacked (November 1) by General R. Taylor, and roughly handled, the Sixty-seventh Indiana being captured entire. Reinforcements being brought up, Taylor drew off, having inflicted a loss of 716, and suffered but 425.

General Banks, with 6000 men, steamed from New Orleans to the Rio Grande, thence capturing Brazos Santiago, Brownsville, Aransas Pass, Fort Esperanza (commanding Matagorda Bay) with little opposition and hardly any loss, there being no considerable force to oppose him. He then returned to New Orleans, leaving General N. J. T. Dana in command, but the latter found no hostile force in that part of Texas, and accomplished very little.

When the spring of 1863 had fairly opened, General A. J. Smith's corps from Sherman's army, supported by Commodore Porter with a powerful steam-fleet, advanced up Red River, menacing Shreveport, while General Steele was to co-operate by a movement from Little Rock, which had been taken by an advance with 12,000 men from Helena six months before. General Price, who was in command there, was far outnumbered and easily routed. He burned six steamboats and some stores, falling back to the vicinity of Red River. Steele lost but 100 killed and wounded in this advance, and took 1000 prisoners.

Banks's advance, which should have passed Alexandria before March 1st, only reached that point on the 16th, and he was not ready to advance farther till about April 1st, at which time the river was rapidly falling, and barely navigable for gunboats. By this time his 40,000 men had been reduced by details and sickness to 20,000, whereof the van had reached Sabine Cross-roads, near Mansfield, when, as it moved carelessly through a pine-woods region, it was attacked in great force, outflanked and routed, and an attempt to re-form was baffled by the presence of a supply-train which should have been elsewhere. Retreating, or rather fleeing, three miles to Pleasant Grove, the routed van re-formed upon General Emory's division, and was again charged headlong by the flushed Confederates, and brisk fighting ensued, in which the Confederate general Mouton was killed. Every attack was repulsed, and darkness closed the combat. General Banks retreated during the night fifteen miles to Pleasant Hill, where General Smith's corps was awaiting him, raising his entire force to 15,000. At 11 A. M. the Confederates appeared, and skirmished continuously till 4 P. M., when they made a grand attack, and were again beaten off, losing 400 prisoners. General M. Parsons (Confederate) and Colonel Lewis Benedict (Union) were among the killed. Banks's loss in these fights was 3969, mainly taken prisoners at the first collision. Though successful in the last struggle, he did not again advance, but marched to the Red River at Grand Grove, thence convoying the fleet, which was often hard aground, back to Alexandria. His rear and his vessels were repeatedly and sharply assailed; in one attack, General Thomas Green of Texas was killed. The Eastport, one of the gunboats, being hard aground, was blown up. The rest of the fleet was saved, and taken down to the Mississippi, passing Alexandria with great difficulty by the help of dams. Having now to spare A. J. Smith's corps, Banks continued his retreat, forced to fight and push aside General Bee with 8000 men, with a loss of 250 on either side. One steamboat was burned and three captured by Confederates near Dean's Bayou, 30 miles below Alexandria, some 500 Unionists being made prisoners. Part of them were retaken in repulsing (May 6) a Confederate attack on Banks's advance near Mansura, and an attack on his rear (May 19) at Yellow Bayou on the Atchafalaya.

General Steele's advance from Little Rock to co-operate with Banks was, by the retreat of the latter, exposed to great peril. The Confederates under General Fagan turned upon him in great force, drove in or captured his foraging parties, and at length struck his advance a heavy blow (April 25) at Marks's Mill, taking some 1500 prisoners. Steele thereupon retreated, and was attacked (April 30) by Kirby Smith at Jenkins's Ferry on the Sabine; but the Unionists, though inferior in numbers, had the advantage in position, and repulsed their assailants after a sharp contest, in which the Union loss was 700; the Confederate, 2300, including three generals. Steele's retreat to Little Rock was thenceforth unmolested. Several spirited contests were afterwards had in different parts of Arkansas with varying results, but the north-eastern half of its area was generally held by the Unionists, the other half by the Confederates nearly to the last.

In 1864, General Rosecrans being now in command in Missouri, General Price entered it from Batesville, Arkansas, first resisted at Pilot Knob by General Hugh S. Ewing, who held his post throughout a day's fighting, and then retreated. Price advanced to Jefferson City, but, finding it too strong to attack, pushed westward to Lexington, and thence to the Little Blue, sharply followed by General Pleasanton with a superior force, and overtaken at the Big Blue, where he made a stand, but was soon driven westward. Sharply pursued, Price was again overtaken at the Little Osage, where he was again routed with the loss of eight guns and 1000 prisoners, including Major-General Marmaduke, a brigadier, and five colonels. The residue were chased to Fayetteville, Arkansas, but without much fighting.

General Hooker, on succeeding to the command of the Army of the Potomac, had found it exceedingly demoralized by its disaster at Fredericksburg, the desertions averaging 200 per day. After devoting two months to reorganizing and reinspiring it, during which its force had been gradually raised to 100,000 infantry, 13,000 cavalry, and 10,000 artillery, he judged himself ready to assume the offensive. Despatching most of his cavalry under Stoneman to destroy railroads, dépôts, etc. in Lee's rear, his van forded the Rappahannock at Kelly's Ford, above Fredericksburg, advancing rapidly to Chancellorsville, where he established his head-quarters and paused. General Anderson, who had been watching the fords, being too weak to resist, fell back quietly before him to within five miles of Fredericksburg, where Lee met him with two divisions. Meanwhile, Stonewall Jackson with two more moved rapidly from Lee's right below Fredericksburg, and passed silently around Hooker's right, several miles west of Chancellorsville. Suddenly, just before sunset (May 2), Howard's corps, holding the Union right, was struck in flank and rear while ignorant of danger, and in part at supper with arms stacked, by Stonewall Jackson's corps, 25,000 strong, which burst from the thick woods of that region and literally demolished it. Ten minutes after the first shot its men were rushing in wild consternation towards Chancellorsville and the river beyond; thousands of them were unarmed, while very many of them were made prisoners. Two or three regiments were sacrificed in unsuccessful attempts to stay Jackson's impetuous rush. Finally, General Pleasanton got his battery of horse artillery into position, and arrested the advance by murderous discharges of grape at short range. Here fell Stonewall Jackson, mortally wounded: it was said by a volley from some of his own men. It was dark, and they were in the woods; all that is certain is that he died of his wounds eight days afterwards. The flight was here stopped, and some of the lost ground regained, but the Eleventh corps was temporarily extinct; so Hooker drew back his right towards Chancellorsville.

The Confederates next morning followed up their decided success by charge after charge in great force on General Sickles's corps, now holding the Union right, and caused it

to give some ground during the day. The carnage of that day was frightful, Sickles having 4000 out of 18,000 killed or wounded. Hooker had been stunned by a cannon-ball striking a pillar of the Chancellorsville House against which he leaned, and hence failed to support Sickles when support was needed.

Sedgwick, with 22,000 men, had been left in front of Fredericksburg. He crossed the river early this morning, just below that city, and was reinforced by Gibbon, who crossed on a pontoon bridge, raising his troops to 30,000. By noon he had stormed and carried Marye's Heights, taking some guns and prisoners, thence pushing out four miles to Salem Church. But this brought him full upon Lee's army, which, having crossed to assail Hooker, now turned upon him, fighting him till darkness interposed. Next morning (May 4) Hooker remained passive, and Sedgwick, finding himself overpowered, retreated across Banks's Ford, having lost nearly 5000 men. Lee might now have turned in full force upon Hooker, but his men had been overworked, and he hesitated. Hooker recrossed the Rappahannock unassailed during the ensuing night, claiming that he brought back one more gun than he took over, and that he had inflicted greater loss than he suffered, though his own (including Sedgwick's) was no less than 17,197 men. Lee's loss must have been heavy, but was not made public. Stoneman's cavalry returned May 8, having inflicted little loss and suffered little.

Lee soon after recalled Longstreet from a fruitless demonstration against Suffolk, Virginia, and while Hooker was planning to flank him by crossing the Rappahannock below Fredericksburg, was himself executing a more extensive and daring flank movement by Culpeper Court-house and Sperryville into the Shenandoah Valley, and down that across the Potomac. This movement was first fully developed to Hooker by an advance in great force under General Early on Winchester, held by General Milroy of Indiana, who evacuated it when too late, and lost twenty-nine guns and 4000 men in his hurried flight across the Potomac. Ewell pursued unresisted to Chambersburg, Pennsylvania, which Jenkins, with his cavalry, had reached some days before (June 17). Early's division of Ewell's corps moved forward to York, Pennsylvania, while Johnson's division pressed northward to Carlisle, and Imboden's brigade swept the valley of the Potomac westward to Cumberland, Maryland. By June 25th all of Lee's army had forded the Potomac, and was advancing into Pennsylvania. Ewell's van reached Kingston, but 13 miles from Harrisburg. As counted by two Unionists as it passed through Hagerstown, Lee had 91,000 infantry, 280 guns and 6000 cavalry, while 5000 cavalry under Stuart entered Pennsylvania without traversing Hagerstown.

General Hooker had waited long below and around Washington, incredulous that Lee would invade the free States. At length he too crossed the Potomac with 100,000 men, of whom 15,000 were spared him from the defences of Washington. He wished to draw 10,000 more from Maryland Heights, opposite Harper's Ferry, but was forbidden to do so by General Halleck. Hooker thereupon asked (by telegraph) to be relieved from the command, and was promptly directed by Halleck to turn it over to General Meade, which he did, and was no more seen in the Army of the Potomac.

A cavalry fight (June 28), inaugurated by Stuart and repelled by Kilpatrick, was the first notice that the two great armies were nearing each other. They casually encountered near Gettysburg, Pennsylvania, where General Buford's division of Unionists met the Confederate van under Heth, and drove it back upon its corps (Hill's), by which they were driven in turn. The sound of guns brought up General Wadsworth's division of Reynolds' (First) corps, Reynolds himself going forward to reconnoitre, and being shot dead as he did so. General Doubleday assumed command, but his force, being too weak, was driven back, capturing 800 prisoners as they retreated. Doubleday halted on Seminary Ridge, just west of the village, where the residue of Reynolds' and all the Eleventh corps soon came up, Howard assuming command. Ewell's (Confederate) corps next came up from York, and again gave the ascendency to their side, driving the Unionists through Gettysburg, with the loss of their wounded in hospital and several guns. Howard took position on Cemetery Hill, just south of the village, and despatched couriers to Meade and Sickles for aid. Sickles was at Emmittsburg, ten miles away, but hastened to the scene of conflict; Meade, who was at Taneytown, expecting and preparing to fight on Pike Creek, sent Hancock at once to take command at Gettysburg, directing his corps under Gibbon to follow. Slocum arrived at 7 P. M., and took command, Hancock returning to report to Meade. Before morning (July 2) each army had been concentrated around Gettysburg, save that Sedgwick's (Sixth) corps, which was 30 miles distant at 7 P. M., did not arrive until 2 P. M. of that eventful day. One hour later, Sickles, who held an advanced position on the Union left, was attacked in overwhelming force by Longstreet just as he was about to recede, and was crushed back with heavy loss, losing a leg by a cannon-shot. Meantime, Sykes's (Fifth) corps had seized Round Top, the highest point on that wing, and firmly held it. Hancock rushed to Sickles's relief, and Longstreet's advance was arrested, but he held the ground from which Sickles had been driven. Ewell also had assailed and driven the weakened Union right, and the second day's fighting closed with the advantage still on the side of the Confederates.

The third day (July 3) opened with an advance of the Union right under Slocum, who had now been rejoined by a division sent over the day before to support the imperilled left. Slocum retook the ground he had lost, and rested upon it. Then there was a lull of an hour or more.

At 1 P. M. the roar of 115 heavy guns from Hill's and Longstreet's front, crossing their fire over the Union centre at Cemetery Hill, announced the crisis of the struggle. For two hours they ploughed the Union lines, being less effectively replied to by the less numerous Union artillery. At length the Union guns stopped firing in order to cool their pieces, and now the grand Confederate column of assault emerged from behind their suddenly silent batteries and pressed swiftly towards the Union lines. Pickett's and Heth's (now Pettigrew's) divisions led, charging up to the mouths of the Union guns, but were repulsed with terrible carnage. Pettigrew's brigade, having lost 2000 out of 2800 men, retreated under the command of a major. When the remnant regained their own lines the battle of Gettysburg had been lost and won, though a charge was afterwards made by Crawford's division of Sykes's corps on the Union left, capturing a battery with 260 men, and retaking 7000 small arms, with Sickles's wounded, who had lain for twenty-four summer hours unguarded within the Confederate lines.

General Meade reports his total loss in these three bloody days at 2834 killed, 13,709 wounded, and 6643 missing (mainly taken prisoners on the 1st). He claims as trophies three guns, 24,978 small arms, and 13,621 prisoners, including wounded. He estimates the Confederate loss as much greater, which is probable, as about 7000 of them were buried at Gettysburg, with 4000 Unionists. Among the Confederate killed or mortally wounded were Generals Pender, Barksdale, Garnett, Armistead, and Semmes. Had Meade known how badly the Confederates were beaten, he might probably have crushed them; but he doubted and hesitated while Lee retreated to the Potomac, sorely annoyed by the way. Lee says his rear remained near Gettysburg till after daylight of the 5th. He might have been assailed at the Potomac, as his bridge had been burned by General French in his absence, and the river was swollen by heavy rains; yet he rebuilt his bridge, and crossed (July 12–13) his infantry and guns without loss; but a cavalry charge by General Kilpatrick on his rear-guard drove it across with a loss of 125 killed (including General Pettigrew) and 1500 prisoners. Lee retreated the length of the Shenandoah, and resumed his position behind the Rappahannock, General Meade following and facing him on the north bank.

General Keyes, with 3000 men, was ordered from Fortress Monroe to capture Richmond during Lee's absence in the North, but though few troops had been left to defend it, he desisted without a serious effort.

A series of partisan affairs ensued on either bank of the Rappahannock, the most important of which was the capture by storm of Rappahannock Station with 1000 men by the Union brigades under General David A. Russell. The Confederate rifle-pits at Kelly's Ford were in like manner taken, with 400 prisoners.

Meade, aware that Longstreet had been detached for service in Georgia and Tennessee, now advanced to attack Lee's depleted army at Mine Run, but finally concluding that its position was too strong, desisted and retreated across the Rapidan, and thus closed the campaign of the Army of the Potomac in 1863.

General Morgan made a fresh raid clear through Kentucky, striking and crossing the Ohio (July 7) at Brandenburg, 40 miles below Louisville, with a mounted force said to number 4000. He then made his way through Indiana and Southern Ohio to Buffing Island, not far below Parkersburg, but found the river patrolled by armed steamboats, while a considerable land force was pressing in his rear. Ultimately, less than 400 of his men escaped; all the rest were made prisoners with little fighting. Morgan himself was taken prisoner and confined in the State prison at Columbus, Ohio, whence he escaped and regained the Confederate lines, but was surprised and shot in East Tennessee not long afterwards.

General Burnside had been sent from the East to the Ohio, taking his (Ninth) corps with him. Having despatched a

cavalry force under Colonel H. S. Saunders across the Cumberland Mountains to burn railroad bridges and destroy stores, in which it was quite successful with little loss, he crossed those mountains with 20,000 men, and suddenly appeared (September 3) at Knoxville, where he was hailed by the long-suffering Unionists as a deliverer. He next moved on Cumberland Gap, where he captured General Frazier with fourteen guns and 2000 men. But his activity was here arrested by the reverse encountered by Rosecrans at Chickamauga.

Rosecrans had stood idle at Murfreesboro' since January 1, 1863, awaiting reinforcements and supplies, till June 24, when he advanced, taking three guns and 500 prisoners at Shelbyville, and soon cleared all Middle Tennessee of armed Confederates; Bragg retreated before him with little loss. Crossing the Tennessee at several points, Rosecrans compelled him to evacuate Chattanooga without fighting, retreating down the railroad that led into Georgia. Rosecrans, misled by his easy success, was pursuing in hot haste, when Bragg, having been reinforced by Longstreet's corps from Virginia, turned suddenly on his widely-scattered divisions, compelling him to concentrate hastily behind the Chickamauga Creek. He had 55,000 men; Bragg had scarcely more, and the first day's fighting (September 19) was indecisive. Next morning, Rosecrans' right, while attempting to close down on his centre, was struck heavily by Longstreet and torn to fragments, the *débris* flying in impotent dismay to Chattanooga, and sweeping Rosecrans along with it. But General Thomas, farther to the left, stood firm, gaining ground somewhat, but maintaining a bold front, and, resting on a wooded ridge, repulsed all attacks until night closed the bloody encounter, when the Confederates drew off, and Thomas stood still through the following day (September 21). At night, still unassailed, he retired to the position assigned him by Rosecrans in front of Chattanooga.

The Union loss in this bloody, protracted struggle was 1644 killed (including General W. H. Lytle of Ohio), 9262 wounded, 4945 missing; total, 15,581. Bragg's admitted loss was 18,000, but he claims to have taken 8000 prisoners (including wounded) and fifty-one guns. But he failed to take Chattanooga, which Rosecrans firmly held, though suffering badly for forage, owing to the barring in of the Tennessee River below him and the raids of Wheeler's Confederate cavalry on the trains coming to supply his rear, until he was directed to turn over his command to General Thomas.

General Longstreet, with his corps, was now detached from Bragg's army, and sent to drive Burnside out of East Tennessee. Longstreet drove the Union forces west of Knoxville, but here Burnside was found too strong, and an assault made (November 28) on an outpost known as Fort Sanders was repulsed with a loss of 800 Confederates, including two colonels killed. The Union loss was but 100. Longstreet thereupon raised the siege, and returned to the army of Virginia.

General Grant succeeded to the command of Rosecrans' army, while Sherman was ordered from Vicksburg still further to reinforce it, General Hooker having already been sent in haste with the Eleventh and Twelfth corps from the Army of the Potomac. Meantime, Wheeler had burned a supply-train of 1000 wagons in the Sequatchie Valley, and another at McMinnville, fighting several cavalry commands sent against him, burning many railroad bridges, and escaping into Alabama with but little loss.

Grant found Hooker at Bridgeport, below Chattanooga, and directed him to clear the river, so that supplies could reach the hungry army around Chattanooga. Hooker crossed the Tennessee unmolested, and advanced to Wauhatchie, overlooked by Law's division from Lookout Mountain. At 1 A. M., October 29, Geary, in Hooker's front, was attacked with great impetuosity, but easily beat off his assailants, with a loss of about 400 on each side.

Sherman arrived November 15, soon followed by his army, which was diverted to Grant's left, up the Tennessee. All being at length ready, Grant advanced against Bragg, who was still looking down into Chattanooga from the west of Lookout Mountain. General Grant's Fourth corps first moved out (November 22), directly in front of Chattanooga, seizing the Confederate outposts before they could be supported, and taking 200 prisoners; then Hooker's command, during a heavy mist, mounted (November 24) the south and west sides of Lookout Mountain, climbing, fighting, and at length entrenching themselves on the ground they had won. Meantime, Sherman crossed the Tennessee in his front, and having firmly intrenched himself, assaulted the north end of Mission Ridge, Thomas's cavalry raiding and burning stores in Bragg's rear, while his infantry felt their way up the river till they clasped hands with Sherman's left; and now Hooker crossed the Chattanooga Valley from Lookout Mountain to Mission Ridge, pushing the enemy before him and taking 2000 prisoners. Meanwhile, Sherman, stubbornly opposed, was making little progress on the left, until Grant at 2 P. M. gave Hooker orders to advance in the centre. His men obeyed with alacrity, charging right up the long, steep ascent, and reaching the west on six points at once, when the Confederates were seized with panic and fled, abandoning forty guns and losing many prisoners. Darkness alone prevented the destruction of the beaten army, which retreated rapidly to Dalton, Georgia, Cleburne in their rear repulsing with ease an attempt to drive his men through a narrow gap in White Oak Ridge, inflicting a loss of 439 to 130. Pursuit was maintained to Ringgold, Georgia.

General Grant states his losses in the above battles at 757 killed, 4529 wounded, and 330 missing; total, 5616; and claims 6142 prisoners. The Confederate loss in killed and wounded was undoubtedly the smaller.

Charleston, South Carolina, and the railroad connecting it with Savannah, Georgia, were often menaced, and sometimes struck at, by the Union forces at Port Royal and the adjacent Sea Islands, but nothing decisive was effected, save the reduction (April 11, 1862), by General Q. A. Gillmore, of Fort Pulaski, commanding the main entrance to Savannah, until Commodore Dupont, having easily taken possession of the islands and most of the coast-towns of Georgia, steamed down to Jacksonville, which, with Pensacola and other Florida ports, were conceded to him without a struggle. Attempting upon his return to Port Royal to advance upon Charleston off Stono Inlet and river, he was stopped by batteries, and an attack (June 16) by General H. G. Wright with 6000 Unionists on Secessionville was repulsed with a loss of 574 men. Several kindred but feebler attempts to reach Charleston were baffled, as was one by Commodore Dupont to reduce Fort McAllister on the Ogeechee. The Confederates made a sally in the dark of rams and gunboats (January 31, 1863) out of Charleston, disabling two of the blockading gunboats and alarming the residue, but taking refuge behind Fort Sumter when daylight appeared. The blockade was not interrupted.

Dupont, with nine iron-clads, next (April 6) bombarded that port at close quarters, but found his way to Charleston impeded by all manner of piles, chains, etc., and was compelled to retire with little loss on either side. The Atlanta, a Confederate gunboat, steaming down from Savannah, was met by the Weehawken, Captain John Rodgers, as she emerged from Wilmington River, and torn to pieces in fifteen minutes. She surrendered four large guns and 165 men.

General Quincy A. Gillmore having succeeded General Hunter in command, and being considerably reinforced, commenced operations by seizing the north end of Morris Island, south of Charleston, and thence besieging Fort Wagner, near its north end, which was regularly assaulted after bombardment July 18, but the storming-party was quickly repulsed with a loss of 1500, including General Strong and Colonels Shaw and Chatfield, killed. The Confederate loss was but 100.

Gillmore, undismayed, next established a battery of great guns on a platform in a marsh west of Morris Island, whence he could shell Charleston, five miles distant. Eleven batteries rained shot and shell on Forts Wagner and Sumter and the batteries on Cummings' Point. Pushing steadily his approaches to Wagner, he had ordered Commodore Terry to assault (September 7), when he found that the Confederates had evacuated both fort and island, leaving eighteen guns in Wagner and seven in Battery Gregg. Next night, Commodore Dahlgren, now commanding the besieging fleet, sent a large force in row-boats to scale the walls of Fort Sumter, but it was repulsed with a loss of three boats and 200 men.

General Gillmore early in 1864 despatched General Truman Seymour with a fleet and 6000 troops to Florida, where he easily took possession of Jacksonville and Baldwin, capturing valuable stores, but advancing rashly westward to Olustee, he was there suddenly attacked by General Finnegan, and beaten with a loss of 2000 to 730 Confederates. Seymour retreated to Jacksonville, burning $1,000,000 worth of stores.

In North Carolina the Confederate general M. Hoke besieged and captured (April 20, 1863) Plymouth, held by General Wessels with 2000 men. Among the spoils were twenty-five guns, 7000 small arms, and 1600 effective men. Hoke's loss was but 300.

General Grant, having been made (March 1, 1864) lieutenant-general of the Union armies, repaired to Washington and assumed the more immediate direction of the Army of the Potomac, which had been largely reinforced. General Kilpatrick had just led his cavalry on a raid to within six miles of Richmond, whence, after some indecisive fighting, he made his way unharmed to Fortress Monroe. But Colonel Ulric Dahlgren, with 400 of his men, having ad-

vanced by a separate route on Kilpatrick's right, reached Richmond a day later, and striking thence by a more northerly route, was stopped and killed by a regiment of militia at Dabney's Ferry on the Mattapony, his men dispersed, and most of them captured.

General Grant, with Meade's army, crossed the Rapidan unresisted (May 4–5) at Germania and Ely's Fords, striking due south into the Wilderness. Lee, though looking for him at a higher crossing, at once turned to the right, and attacked in full force. The ground, thickly covered for the most part with small trees, and thoroughly familiar to the Confederates, while strange to the Unionists, was especially favorable to the army which must match its superior knowledge and determination against superior numbers. Two days of desperate fighting, with great slaughter and little advantage to either side, were closed at dark on the 6th with a dashing attack on the Union right by General Gordon, who took 4000 prisoners, including General Truman Seymour.

Next morning, General Lee awaiting an attack behind his intrenchments, General Grant put his army in motion southward, and was unmolested save by Stuart's cavalry during his march to Spottsylvania Court-house. He had lost in the Wilderness no less than 20,000 men, including General James S. Wadsworth of New York, killed, and seven generals wounded. General Sedgwick of Connecticut was killed two days afterwards. The Confederate loss was 8000, including Generals Samuel Jones, Stafford, and A. G. Jenkins, killed, and Longstreet was disabled for months.

There was heavy fighting around Spottsylvania Court-house for two or three days. On the 11th, at daybreak, Hancock's corps carried by assault a part of the Confederate works, capturing Generals Edward Johnson and George H. Stewart, with 3000 men. General Lee narrowly escaped. Hancock captured thirty guns, but after holding them for hours only brought off twenty of them. But he was unable to advance, and days of desperate fighting, which cost the Unionists at least 20,000 men at this point, proved Lee's position impregnable. Acting on the defensive and behind strong works, his loss was much less than Grant's, but it included Generals Daniels, Perrin, and J. M. Jones, killed.

Grant again moved southward, transferring his right to his left, while his cavalry under Sheridan made a fresh raid towards Richmond, fighting (May 11) and killing General J. E. B. Stuart a few miles north of that city. Crossing the Chickahominy at Meadow Bridge, Sheridan returned with little loss to Grant's army.

General Butler, with 30,000 men, embarking all but his cavalry, moved up the James and occupied City Point, below Richmond. He was to have seized Petersburg, but missed it, General Beauregard being hastily summoned from Charleston to aid D. H. Hill in defending it. Butler even failed to cut the railroad between that city and Richmond, and was rather worsted by Beauregard in a fight near Procter's Creek, which cost the Unionists 4000 and the Confederates 3000 men. Butler was further assailed on several succeeding days, but held his ground with little loss.

General Grant, moving by poorer and more circuitous roads than the direct one held by Lee, on approaching the North Anna (May 17) found his enemy strongly posted, well intrenched, and ready to receive him. There was more fighting here, generally with results favoring the Unionists, but Lee's position could only be stormed at an immense cost of life, and Grant, again moving by his flank, pressed on to Cold Harbor, where he ordered a general assault on the Confederate lines, here, as before, confronting him. Those lines were defended by deep and strong *abatis* of slashed timber, the limbs so intertwisted with each other as to defy speedy untying. The assault was deployed at sunrise (June 3), and in a few minutes was repulsed with great slaughter. The Union loss was 1705 killed, 9072 wounded, and 2406 missing. Generals P. A. Porter, L. O. Morris, and F. F. Wood (all of New York) were among the killed, with six colonels.

General Grant, unable to interpose between Lee's army and Richmond, now decided to pass the James below that city, while Sheridan was sent on a fresh raid around Lee's left, to tear up railroads and burn stores in his rear. Disappointed in his expectation of finding Hunter in possession of Gordonsville, he was soon surrounded by enemies, with whom he fought an indecisive battle at Trevilian's, returning to Grant with 370 prisoners, having lost in all 735 men.

Grant appeared south of Richmond in time to have seized Petersburg, but the precious moment was squandered by uninformed or timid subordinates until Lee's army was in good part behind its defences. Assault after assault was now made (June 16–18) on those defences with heavy loss, and no result but the knowledge that they could not be thus carried. Then abortive attempts were made (June 21–24) to turn them by the south, which A. P. Hill resisted and baffled, taking in all at least 5000 prisoners. Then Wilson, with 8000 cavalry, raided down the Weldon and Danville Railroad, but was fought and beaten at Stony Creek and Reams's Station, losing thirteen guns and 1000 prisoners.

Grant now moved the Second corps from his extreme left to his extreme right, and threw it across the James, as if about to attack Richmond from the east. And now (July 30) a mine which had been skilfully run from the centre of the Union lines under one of the forts or bastions of Petersburg, was exploded, blowing 300 Confederates into the air and opening a gap in their lines. Hereupon the cannon thundered all along the Union front; but the column of assault, which should have rushed forward on the instant, did not move for several minutes, and then advanced bravely into the chasm made by the explosion, and there halted. The Confederates of course rallied from every side, and poured volley after volley upon the helpless crowd huddled together in the "crater," inflicting on the Unionists a loss of 4400 men, mostly prisoners, while the entire Confederate loss was but 1000.

Again (August 12) Hancock assailed Lee's extreme left below Richmond, but with little advantage, the Union loss in operating on this flank aggregating 5000, while the Confederate was much less, but included Generals Chambliss and Gherardie, killed.

Lee having necessarily sent several divisions from his right to his left, Grant ordered General Warren southward to seize and hold the Weldon Railroad; but Warren's divisions were struck in flank by A. P. Hill at the critical moment, and twice rolled up on themselves, with an aggregate loss of 4455 men, mainly prisoners. The Confederates had lost but 1200, but Warren had seized the Weldon Railroad, and he thenceforth held it.

Hancock was sent to seize this road also at Reams's Station, farther down, which he did, but was in turn attacked and driven off by Hill, with a loss of five guns and 2400 men. Hill lost but half so many.

Again, after a pause, Warren advanced (October 1) by order, with four divisions, to the Squirrel Level road in his front, fighting for two days and losing 2500 men, but holding his ground, and intrenching it so firmly that it could not be taken from him. To cover this advance, General Butler on the Union side had assaulted Fort Harrison with the Tenth and Eighteenth corps, taking the fort with fifteen guns. He next attempted Fort Gilmer, but was repulsed with a loss of 300, including General Dunnovan, killed. General Field attempted next morning to retake Fort Harrison, but was beaten off with heavy loss. A few days later General Kautz, whose Union cavalry had been pushed up the Charles City road to within five miles of Richmond, was there surprised and driven, with a loss of nine guns and 500 men. The Confederate general Gregg of Texas was killed in the ensuing fight, which had no result.

Hancock was next ordered farther to the Union left to find and turn the Confederate flank, and in a fight with Hill's corps, which attempted to interpose between his divisions, took 1000 prisoners. Darkness arrested the fighting, but Hancock drew off in the night, having lost 1500 men and inflicted equal loss upon the enemy. Thus closed on this point the campaign of 1864, with Warren holding the Weldon Railroad, and Butler threatening Richmond; the losses of the Army of the Potomac during the year having aggregated 88,387 men.

When Virginia separated from the Union her western counties, including most of those lying beyond the Alleghanies, strongly protested against the ordinance, voted "No," when it was submitted to the ordeal of popular suffrage, and refused to be bound by it. Calling a convention at Wheeling, they decreed a separation from the old State and the formation of a new one, first named Kanawha, but since known as West Virginia. They had previously organized a loyal State government for Old Virginia, which (hardly an eastern county being represented in it) readily agreed to the organization of the new State. Meantime, the Confederates had seized Harper's Ferry and destroyed the Baltimore and Ohio Railroad for some distance west of it, and they soon sent a force over the Alleghanies to secure obedience to the Confederate authorities at Richmond. It was promptly confronted by General McClellan with a far larger army, organized in Ohio, but largely composed of West Virginians. A part of it routed (June 3, 1861) the enemy at Philippi, another detachment at Rich Mountain (July 12), and the main body under General Garnett, who, in full retreat, was overtaken and routed at Carrick's Ford on the Cheat River, where Garnett was killed and some prisoners were taken. The residue escaped over the Alleghanies.

General J. D. Cox, advancing up the Kanawha, drove the Confederates under General Wise before him; Wise burning (July 28) Gauley Bridge to arrest the pursuit.

General John B. Floyd now assumed command of the Confederates, inspirited by their triumph at Bull Run, and had an indecisive conflict (August 10) with General Rosecrans at Carnifex Ferry. Floyd held his ground, but retreated during the ensuing night.

General R. E. Lee now assumed command in this quarter, and there was much marching with little serious fighting till winter closed the campaign, and little of consequence occurred here the next year, when General J. C. Fremont succeeded to the command of the Union forces, but was hurried over the mountains to resist Stonewall Jackson's raid down the Valley. Thereupon the Confederate general Heth raided across the mountains and attacked (May 23, 1862) Colonel George Crook at Lewisburg, but was beaten off with loss. Thenceforward the operations on either side in this quarter were limited to inconsiderable raids and surprises.

General Franz Sigel was assigned chief command (Union) in the Valley in the spring of 1864, when, with 10,000 men, he advanced to New Market, where he was met by General John C. Breckenridge with an equal force, and routed with a loss of six guns and 700 men.

Breckenridge was unable to follow up his victory, being obliged to send much of his force over the mountains to oppose Crook, who, with 6000 men, had beaten McCausland's far inferior but well-posted force near Dublin Station, and had broken the Virginia and Tennessee Railroad at that point. General Averell, with 2000 cavalry, raiding farther west, had tried to destroy the Confederate salt-works near Wytheville, but had been beaten off by John Morgan. Both Crook and Averell thereupon retreated.

General David Hunter was now assigned to the command of Sigel's beaten army, which was strengthened, while Breckenridge had been called off to reinforce Lee at Richmond. Hunter advanced to Piedmont, near Staunton, where he was confronted by General W. E. Jones with a hastily-collected army, which was beaten (June 8) in a spirited action, wherein Jones was killed and 1500 of his men captured.

Hunter thereupon occupied Staunton, where he was joined by Crook and Averell, and then, with 20,000 men, pressed on to Lynchburg and fiercely assailed it, but was met and beaten off by a superior Confederate force under Early, hastily despatched by rail from Lee's army. Outnumbered and short of ammunition, he retreated over the Alleghanies into West Virginia, whence he regained the Potomac by a long and toilsome circuit. Meanwhile, the Valley was left without any considerable Union force, and Early hurried down it with 20,000 triumphant veterans, Sigel retreating and burning stores till he had crossed the Potomac and took post on Maryland Heights, where Early did not choose to assail him, but crossed into Maryland, scouring the country for cattle, horses, and provisions of all kinds, threatened Pennsylvania, and then turned upon Baltimore. General Lew Wallace could hardly muster 5000 men to oppose him, but fought him (July 9) at the passage of the Monocacy, near Frederick, and was of course defeated, losing 2000 men (mainly prisoners), while the victors lost but 600. Early now turned upon Baltimore, and menaced Washington, skirmishing (July 12) with its outpost defences, but made off rapidly into Virginia with 2500 captured horses and 5000 cattle.

General Wright's Sixth corps had just been sent from Grant's army to the relief of Washington, as had Emory's Nineteenth corps, just arrived by sea from New Orleans. Wright followed Early to the Shenandoah, where his rear was sharply turned upon and repulsed (July 19), with a loss of 500. Wright recoiled to Leesburg, and turned over his command to Crook, while Averell had (July 20) a cavalry fight near Winchester, and took four guns and 200 prisoners.

Wright's and Emory's corps being now recalled to the James, Crook, supposing Early gone likewise, advanced to Winchester, and was there beaten (July 24), and driven to Martinsburg and across the Potomac, with a loss of 1200, including General Mulligan, killed.

Early now sent B. T. Johnson with 3000 cavalry on a raid into Pennsylvania, where they burned without resistance Chambersburg and the barracks at Carlisle. Averell, with an equal cavalry force, soon encountered the raiders, but they escaped with little loss into Virginia. Pursuing to Moorefield, Averell at last struck the raiders (August 4) and worsted them, with a loss of their guns, wagons, and 500 prisoners.

General Grant now sent Sheridan to command in this department, where Hunter's army, just arriving from the West, the Sixth and Nineteenth corps (whose recall to the James had been countermanded), and Torbert's and Wilson's divisions of cavalry from Grant's, had raised his effective force to 30,000 men.

Sheridan, after taking time to reorganize his army, advanced to Winchester, and found Early strongly posted and fortified on Opequan Creek, whence he dislodged him (September 19) after an obstinate fight, in which his loss was fully 3000 prisoners, including wounded, while among his killed were Generals Rhodes and Godwin.

Early rallied his beaten army at Fisher's Hill, a very strong position south of Winchester, where his flanks were guarded by two mountains. Here Sheridan again attacked and routed him (September 25), taking sixteen guns and 1100 prisoners. Pursuing the remnant to Port Republic, he sent his cavalry to Staunton and to Waynesboro', destroying provisions and munitions, then retired down the Valley to Winchester, burning all the grain and forage as he passed, so that the enemy should find no subsistence there. This devastation was made an excuse for the attempts to burn New York and other cities by incendiaries soon afterwards.

Sheridan had encamped on Cedar Creek, and apprehending no danger had gone on a visit to Washington, when Early, reinforced, having stealthily followed down the Valley, determined to surprise the unsuspecting army before him. In this he succeeded perfectly, flanking Crook's force on both sides in the dense darkness, and rushing into the camps with a fearful yell just before daylight, and in fifteen minutes Crook's army was a fleeing, panic-stricken mob, having lost twenty-four guns and 1200 prisoners. Sheridan was at Winchester on his return when the disastrous tidings met him, and, riding at full speed, reached his beaten army at 10 A. M. He spent two hours in reviving the spirits of his men, and after repulsing one fresh attack on his left, ordered at 3 P. M. a general advance, which was successfully made, followed by a second charge, which was still more successful—though the Confederates opposed to them nearly all the cannon of both armies—facing the foe to the rear, and driving them through Staunton, recovering the twenty-four guns lost in the morning, and taking twenty-three others, with 1500 prisoners. The total loss of men this day was about 3000 to each side, including the Confederate general Ramseur and the Union general Bidwell of New York, killed. This closed the campaign in that quarter.

There were various partisan conflicts in Alabama, Mississippi, and West Tennessee during 1864, but none of consequence, save at Fort Pillow, Tennessee, which was assailed and taken (April 13) by the Confederate general Forrest, killing Major L. F. Booth, who commanded, with most of his garrison of 557 men, of whom 262 were blacks, many of them after resistance had ceased. This was in accordance with the threats previously made by Confederate officers, that colored troops should in no case receive quarter.

General S. D. Sturgis with 12,000 men was sent from Memphis in quest of Forrest, whom he found at Guntown, Mississippi, where Sturgis was speedily routed and driven back to Memphis, with a loss of at least 4000, mainly prisoners. Forrest's entire force was not much greater than this. General A. J. Smith now assumed command, and pressed Forrest back to Tupelo, Mississippi, where the Confederates thrice assaulted his lines, and were repulsed with loss, but with no decisive result. Smith retreated, and again advanced to Holly Springs, not seriously opposed, while Forrest raided into Memphis with 3000 cavalry, and took a few prisoners, but failed to capture the Union generals of whom he was in quest, or to liberate the captured Confederates.

East Tennessee was this year the scene of several partisan conflicts to little purpose; and John Morgan raided through Pound Gap into Eastern Kentucky, capturing and paroling General Hobson with 1600 Unionists in a field at Licking River. General Burbridge struck the raider at Mount Sterling, and again near Cynthiana, capturing or dispersing at least half his force, and chasing the rest into South-western Virginia. Attempting here to destroy the salt-works near Abingdon, Burbridge was beaten off (October 3), with loss, by General Breckenridge.

General Sherman, on Grant's transfer to the East, was left in chief command at the West. Advancing with 100,000 men from Chattanooga early in May, 1864, he was confronted by Joseph E. Johnston, who, having but 54,000, declined a pitched battle, but availed himself of the broken country and fortified positions on the rugged road to Atlanta. He was stubbornly resisted (May 10) at Resaca, where the railroad crosses the Oostenaula River, and was at first repulsed with loss, but soon flanked the position and compelled its abandonment. Checking Sherman's advance at Adairsville and Cassville, Johnston made his next determined stand at the Allatoona Pass, and days were expended in fighting and flanking before he could again be driven. He next made a stand at Kenesaw Mountain,

flanked by Pine and Lost Mountains, connected by strong field-works, where he for several days resisted every effort to move him. In one assault (June 27) Sherman lost 3000 men, including Generals Harker and Dan McCook, killed; Confederate loss, 442. And now, by again advancing his right, Sherman forced Johnston out of his impregnable position, compelling him again to retreat, which brought him to Atlanta. Here he was relieved by General Hood, who condemned his cautious policy, which had only depleted his army by 14,700 men in two months' constant fighting. Reinforcements had nearly kept its ranks full, its present strength being 51,000. Sherman advancing his left under McPherson to break Hood's railroad connection with the East, Hood struck heavily (July 20) at his right under Thomas, but was repulsed after a bloody struggle, which cost the Confederates at least 4000 men, including Generals W. S. Featherston of Mississippi, Armistead of Georgia, and George M. Stevens of Maryland, killed. The Union loss was but 1500. Supposing that Atlanta had been silently evacuated, the Unionists thereupon rushed up to within two miles of the city, but found here strong works well manned, and were repelled with loss. Major-General McPherson of Ohio was killed, as was General Greathouse of Illinois, and another bloody struggle resulted, with advantage to the Unionists, though it cost them over 4000 men. The Confederate loss was nearly double, including General W. H. T. Walker of Georgia, killed.

A pause in the fighting now ensued, and General Stoneman with 5000 Union cavalry raided upon the railroads and stores in Hood's rear, but, scattering or dividing his forces too much, he was surrounded and captured with 1000 men, as Colonel Harrison, with 500 more, had just been.

Sherman now moved the Army of the Tennessee, led by Hooker, from his extreme left to his extreme right, initiating a new flanking movement, when Hood assailed Logan's (Fifteenth) corps on the new Union right, but was repulsed with heavy loss. Hood now sent Wheeler's cavalry to raid on the Union rear, while Kilpatrick's Union cavalry pressed to the Confederate rear, breaking both the railroads leading southwardly from Atlanta, and returning to camp August 22. Sherman again threw forward his right till most of his army was behind Atlanta, holding firmly the railroad to Macon. Hood had already sent off part of his army to Jonesboro', whence Hardee with two corps attacked (August 31) Howard fiercely, but was beaten off with a loss of 2000 to Howard's 500. And now Jonesboro' was assailed in its turn by Jefferson C. Davis's corps, and carried, eight guns, General Govan, and many men being captured. Hood hereupon exploded his munitions and burned his stores in Atlanta, and escaped eastward. Slocum took quiet possession of what was left September 1. Sherman returned to the city, and gave his men a well-earned rest.

Wheeler's raid was prosecuted throughout Northern Georgia and East Tennessee, returning through the Sequatchie Valley, and being chased across the Tennessee near Florence. He destroyed much property, but with little influence on the fortunes of the war.

Hood, rejoined by Hardee, now passed Sherman's right, and sent French's division to capture the Union post at Allatoona, which General J. M. Corse held with 1944 men, but so gallantly that assault after assault by quadruple numbers was repulsed with fearful slaughter. General Cox at length relieved Corse, who was wounded, as were most of the higher officers. He had lost in all 707 men, while French left 231 dead, 411 prisoners, and 800 muskets. Hood, still marching northward, surrounded Resaca, but did not assault it, Sherman being too near. Sherman, at length learning that Hood had advanced into Middle Tennessee, gave up the pursuit, sending the Fourth and Twenty-third corps to Chattanooga, with orders to report to Thomas at Nashville, while he, facing about, returned to Atlanta, and reorganized and equipped his remaining forces for his march to the sea.

Hood, with 35,000 infantry and artillery, struck boldly for Nashville, preceded by Forrest with 10,000 cavalry. Of course there was immense destruction of stores, bridges, and dépôts—$1,500,000 worth of boots and provisions having been burned at Johnsonville, Tennessee, to save them from capture.

Thomas concentrated 30,000 men at Pulaski, but was unable to cope with Hood's army, now swelled to 55,000 in all, which still clung to the Tennessee River till assured that Sherman had cut loose from Atlanta, marching southward, when he set his columns in motion northward. General Schofield, on his part, retreated from Pulaski to Columbia, and thence to Franklin, in a bend of the Harpeth, where he, with less than 20,000 men, but a good position, was assailed (November 30) with desperate resolve. The Confederates were repulsed with a loss of at least 4500, including Generals Cleburne, Gist, Adams, Trahl, and Granbury. The Union loss was 2320, but no guns. Schofield continued his retreat that night. Hood followed, and soon sat down before Nashville.

The movement was audacious, as Thomas was at least his equal as a commander, and could soon concentrate a larger force than that which attempted to besiege him. But Thomas would not strike till he was ready, while severely cold weather impeded operations. At length Thomas struck out (December 15), and, after two days' skilful fighting, drove his besiegers at all points, heading them toward Alabama, and taking fifty-three guns and 4462 prisoners, including a major-general. Hood got across the Tennessee at Bainbridge with a few guns and barely the *débris* of an army. Thomas had taken in this brief campaign seventy-two guns and 11,857 prisoners, besides administering the amnesty oath to 2207 deserters from the Confederate service. The aggregate Union loss in this campaign was 10,000. And General Stoneman, moving eastward from Knoxville, had cleared East Tennessee of armed Confederates, captured Wytheville and the lead-mines and salt-works, driving Breckenridge's depleted force over the mountains into North Carolina.

General Sherman, after despatching Thomas with two corps to the defence of Tennessee, had still with him four corps, numbering in all 65,500 men. Concentrating these around Rome and Kingston, Georgia, he destroyed the railroads about him, cut the telegraph which still connected him with the North, and stood clear of all communications as he commenced his famous march to the sea. There being no considerable army in his front, he advanced rapidly through Atlanta, Macon, Milledgeville, and Millen to Savannah, slightly opposed at several river-crossings, while Kilpatrick with his cavalry covered his flanks and screened his movements, so that Augusta seemed to be his objective point. Fort McAllister on the Ogeechee was assaulted (December 13) by Hazen's division, and communication at once opened with Dahlgren's fleet, when Savannah was evacuated (December 20) by Hardee, after destroying his vessels and stores. Thus far, Sherman had on this march lost but 567 men, and had taken 167 guns with 1328 prisoners. He remained a month in Savannah, while Generals Dana, Davidson, and Grierson, who had been sent out from Vicksburg and Memphis to distract attention from his march, swept over large portions of Mississippi and Alabama, breaking up railroads, destroying stores, and taking prisoners. These raids were uniformly successful, but General Foster, who had ascended Broad River from the Sea Islands to break the railroad connection between Charleston and Savannah near Gordonsville, was beaten off, losing 746 men.

Sherman, leaving Savannah well garrisoned, set his column again in motion (February 1, 1864), traversing the heart of South Carolina with little resistance, except from its flooded swamps, and compelling Hardee to evacuate Charleston and its harbor-defences, retreating northward with 12,000 men. Columbia, the State capital, though undefended, was undesignedly burned. Kilpatrick, who, with 5000 cavalry, still covered the advance on the left, was surprised and routed by Wade Hampton near the north line of the State, but soon rallied his men and beat off his assailants. Reaching Fayetteville, North Carolina, March 11, Sherman found himself confronted by Joe Johnston with 40,000 men, collected by Hardee, Beauregard, Cheatham, and Bragg, and including Wheeler's and Hampton's cavalry. After halting three days, Sherman once more advanced, when his left wing was attacked (March 15) in a narrow pass by Hardee, who was soon driven; but Slocum on the right was next assailed (March 18), when approaching Bentonville, by Johnston with his main body. The Confederates withdrew after a sharp action, in which Sherman lost 1643 men and took 1625 prisoners, including wounded, burying 267 Confederate dead. Next day, Sherman advanced to Goldsboro', and halted his troops while he made a hasty visit to General Grant at City Point.

Wilmington, North Carolina, had long been the principal port through which blockade-runners found access to the Confederacy. General Butler, with Commodore Porter, led an army and fleet to reduce it (November 16, 1864), but returned to Fortress Monroe unsuccessful. General A. H. Terry was next despatched with a stronger force, which, after a heavy bombardment by Porter's fleet, carried Fort Fisher by assault (January 16, 1865), killing Major-General Whiting, its commander, and taking 169 guns and 2083 prisoners, with a Union loss of 110 killed and 536 wounded; but 300 more were lost by the explosion next day of the fort's chief magazine.

General Schofield was now sent to Terry's aid, ranking him, and raising his force to 20,000, with which Schofield entered Wilmington, February 22; Hoke retreating after a sharp fight, burning two privateers and other vessels, with heavy stores, but leaving sixty-five guns. Schofield now advanced inland, losing 700 men by a surprise, but beating

off (March 10) an attack on his left by Hoke, who here lost heavily and retreated, enabling Schofield to communicate and co-operate with Sherman on his arrival at Goldsboro'.

General Canby, commanding at New Orleans, moved eastward in the spring to menace Mobile, while General James H. Wilson, with Grant's and Thomas's cavalry, 15,000 strong, pushed southward from Eastport, Mississippi, the head of steamboat navigation on the Tennessee, confronted only by Forrest with but 5000, whom Wilson easily defeated near Maplesville and routed (April 2) at Selma, Alabama, which he took, with thirty-two guns and 2700 prisoners. Crossing the Alabama, Wilson entered Montgomery, which Adams had just left, burning 125,000 bales of Confederate cotton. Turning eastward, Wilson soon appeared at Columbus, Georgia, where he took fifty-two guns and 1200 prisoners, burning a gunboat, 250 cars, and 115,000 bales of cotton. Taking by assault Fort Tyler on the Chattahoochee, Wilson pushed on to Macon, Georgia, where he learned that the war was virtually at an end.

General Canby, with nearly 30,000 men, aided by Porter's powerful fleet, invested Mobile, which was held by Dick Taylor with some 15,000. Investing Spanish Fort, he reduced it by bombardment, taking 652 prisoners, and then assaulted Blakely, which was carried by assault, with a Union loss of 1000 to 500 Confederate killed and wounded, with 3000 prisoners. Mobile was then evacuated by General Maury, who, with 9000 men, escaped up the river, abandoning 150 guns.

General Grant, still before Petersburg, had bloodlessly (December 7, 1864) extended his left twenty miles down the Weldon Railroad to Hicksford, which he fortified and held. He next essayed to advance his left to Dabney's Mill, but was resisted and driven back to Hatcher's Run, where the Confederates were in turn repulsed (February 6, 1865), and the ground up to this point held and fortified. The Union loss in this operation was 2000; the Confederate, 1000, including General Pegram, killed.

General Sheridan moved up the Valley from Winchester with 10,000 mounted men, drove Early (March 2, 1865) from his intrenched camp at Waynesboro', taking eleven guns and 1600 prisoners, thence rode into Charlottesville, where he destroyed immense stores and miles of the Richmond and Lynchburg Railroad, and, passing behind Lee's army, reported to Grant at Petersburg March 27.

Lee, assuming the offensive, sent Gordon with two divisions against the centre of the Union line before Petersburg. Charging at daybreak (March 25), Gordon surprised and took Fort Stedman in his front, capturing three batteries and some prisoners, but not being properly supported, he was attacked and routed in turn by the Ninth corps, losing 2000 prisoners; besides which the loss to either side was about 2500. Grant interpreted this rash assault as premonitory to a Confederate evacuation of Richmond and Petersburg, which he resolved to harass if not intercept. Again throwing forward his left (March 29) to seize the Boydton plank-road, while Sheridan's cavalry on its flank advanced to Dinwiddie Court-house, he was opposed by Lee with most of his army, who suddenly struck Warren's corps in flank and rear, with intent to repeat the lesson of Chancellorsville. Two divisions were then broken, but Griffin's, behind them, stood firm while the fugitives were rallied, and Warren was thus enabled to repel his assailants with heavy loss; but an attempt to carry their works was defeated in turn. Meantime, Sheridan had gained Dinwiddie Court-house, but, attempting to advance thence to the Boydton plank-road, was foiled, but advanced again next morning (April 1) to Five Forks, where he connected with Warren, advancing on his right, and ordered a general charge on the Confederate works in their front, held by two divisions, who were fearfully overpowered and routed, with a loss of 5000, mainly prisoners. The Union loss was but 1000, including General Frederick Winthrop, killed. And now, sending two divisions eastward to Gravelly Church, Sheridan again connected with the Union lines before Petersburg, whence a general cannonade preluded the assault, which was delivered at daylight next morning (April 2), Wright's Sixth corps gaining the rear of these works by the south, and taking many prisoners, while Ord's corps carried Forts Gregg and Alexander by storm, losing 500 men. A. P. Hill, in attempting to retake some of the captured works, was shot dead, and his corps utterly defeated.

Lee now, at 10½ A. M., telegraphed to Davis that Richmond must be evacuated at once, and it was evacuated between that time and next morning, while its immense warehouses, filled with provisions, munitions, and stores of all kinds, were fired by the departing Confederates, burning out the heart of the city. Flames and explosions notified the Unionists in front that the Confederate capital was abandoned, and General Weitzel at 4 A. M. (April 3) was assured by a negro from the city that Davis and all his official or military adherents had departed. Picking his way through the abatis, earthworks, rifle-pits, torpedoes, etc. which encircled the burning city, Weitzel at 6 A. M. led his men into the city, soon followed by President Lincoln, who was at City Point. Petersburg was simultaneously abandoned, Lee retreating up the railroad towards Danville, while ringing of bells and immense gatherings all over the North and West hailed the relinquishment of Richmond as the downfall of the Confederacy.

Davis escaped by train to Danville, while Lee halted two days at Amelia Court-house, vainly seeking provisions for his hopeless army, now reduced, mainly by prisoners, to 35,000 men. Grant was soon on his trail. The fleeing host was first seen from Deatonsville, and was struck near Sailor's Creek by Custer's horse, supported by Crook's and Davis's divisions. Here sixteen guns, 400 wagons, and some prisoners were taken, while Ewell's thinned corps was cut off from Lee's rear, and so enveloped that it was obliged to surrender. Ewell himself was among this day's 6000 prisoners.

Lee crossed the Appomattox at Farmville, repelling General Theodore Read, who tried to stop his way with two regiments. But Humphrey's Second corps was again so close on his rear that he was obliged to turn and fight a few miles beyond Farmville, repulsing his assailants with a loss of 600. But this lost a day, which was wasted by attempts to bar the Danville road, while Lee was really making for Lynchburg. Undeceived on this point, pursuit was resumed on the morning of the 8th, Grant having meantime sent Lee a courteous note inviting a surrender. Sheridan pushed his troops twenty-eight miles on the 28th, reaching Appomattox Court-house, heading Lee's army, intercepting its sorely-needed supplies from Lynchburg, and planting himself across the road whereon it must move on the morrow, and sending word to Grant, who ordered a forced march of Griffin's and Ord's corps to Appomattox Station during the night. Lee had meantime sent a note to Grant inviting a meeting, with a view to peace, at 10 A. M. In the morning (April 9) Grant replied, saying he had no authority to make peace, but urging a surrender. Lee's weary, famished army set forth as usual this morning, and, seeing cavalry in their front, advanced to push it aside, when it was withdrawn to the flanks, disclosing solid regiments of infantry behind it. Lee, seeing that further fighting would be a useless slaughter of his men, at once called a parley, which resulted in a surrender, "each officer and man to be allowed to return to his home, not to be disturbed by United States authority so long as they observe their paroles and the laws in force where they may reside." The number thus paroled at this point was 27,000. Johnston's army in North Carolina surrendered on the same terms to Sherman at Raleigh, April 26, and Dick Taylor's to Canby at Citronelle, Alabama, May 4. E. Kirby Smith, commanding the Confederates west of the Mississippi, attempted to make a stand after the surrender of Lee, but his men all deserted him, and, taking whatever Confederate property they could lay hands on, dispersed to their several homes.

Jefferson Davis halted at Danville, anxiously awaiting advices from Lee, until astounded (April 10) by tidings of his surrender. He then fled southward to Greensboro', North Carolina, and again halted till it was evident that Johnston would soon capitulate, when he flitted again to Washington, Georgia, with a cavalry scout, which at first numbered 2000, but rapidly wasted. Here he abjured the state of a ruler, and was making his way to the coast with his family and a few faithful followers when he was surprised and captured (May 11) while encamped near Irvinsville by two detachments of cavalry sent out from Macon by General Wilson to look for him. His family was liberated at Savannah, but he was held a close prisoner in Fortress Monroe for two years, then released on bail and never brought to trial. So ended the Southern Confederacy.

HORACE GREELEY.

Confedera'tion [for etymology see CONFEDERACY], a league, a federal compact, an alliance of princes, states, or nations. It is nearly synonymous with confederacy. The republic of Mexico is called the *Mexican Confederation*. The numerous states of Germany were united in 1815 by the congress of Vienna, and formed the Germanic confederation (*der Deutsche Bund* in German). Before the adoption of the Federal Constitution of the United States in 1788, the government of this country was a weak confederation of thirteen independent States, which recognized no superior or central authority.

Confederation, Articles of, a document drawn up by the Congress of the United States, November 15, 1777, and adopted finally July 9, 1778, by which the several States united in a league of perpetual friendship "for the common defence, the security of their liberties, and their mutual and general welfare." These articles, thirteen in number, were soon ratified by all the States, but the con-

federation proved almost an utter failure, from the fact that Congress had very limited powers. There was indeed no executive authority of any kind. For these reasons a convention called by Congress met at Philadelphia May 14, 1787, with Washington as its president, and on September 14 of that year the convention closed its labors and reported the CONSTITUTION OF THE UNITED STATES (which see).

Confedera'tion of the Rhine [Ger. *Rheinbund*], the name of a league formed in July, 1806, by sixteen German states under the protection of Napoleon. The princes of these states signed an act of confederation, dissolving their connection with the Germanic empire and forming an alliance with the French emperor. They were the kings of Bavaria and Würtemberg, the arch-chancellor, the elector of Baden, Murat, duke of Berg, the landgrave of Hesse-Darmstadt, the princes of Nassau-Usingen, Nassau-Weilburg, Hohenzollern-Hechingen, Hohenzollern-Sigmaringen, Salm-Salm, Salm-Kyrburg, the duke of Aremberg, the count of Leyen, and the princes of Isenburg-Birstein and Liechtenstein. In September, 1806, the confederation was joined by the elector of Wurzburg; in December, 1806, by the elector (subsequently king) of Saxony, and the Saxon dukes of Weimar, Gotha, Coburg, Meiningen, and Hildburghausen; in 1807, by three dukes of Anhalt, two princes of Lippe, three princes of Reuss, the prince of Waldeck, and the new kingdom of Westphalia; in 1808, by the dukes of Mecklenburg-Strelitz, Mecklenburg-Schwerin, and Oldenburg. The confederation had an area of 126,075 square miles, and a pop. of 14,608,877. In 1810 a part of the confederation was incorporated with France, and its territory reduced to 114,467 square miles, with 13,475,000 inhabitants. In consequence of the downfall of Napoleon the confederation was dissolved in 1813, and its members united with the other German states to form the Germanic Confederation.

Con'ference [from the Lat. *con'fero*, to "confer" (from *con*, "together," and *fe'ro*, to "bring"), alluding to the different parties bringing together or comparing their thoughts], the act of conversing on a serious subject; an oral discussion; a formal discourse; a meeting for consultation or instruction; a meeting of two branches of a legislature by their committee when they disagree respecting the passage of a bill. In such cases each house appoints a committee of conference, in order to settle the difference by a compromise. In English law, conference signifies also the interview of an attorney or solicitor with a counsel when consulting him.

In a political sense, conference denotes the meeting of plenipotentiary ministers of several states for the peaceable settlement of international complications. Of special importance in modern history are the conferences of Vienna, held in 1820 and 1834, the Paris conference of 1856, and the London conferences of 1864, 1867, and 1871. "International conferences" have also of late been held on many non-political questions. Among the most important of these are the conferences of Geneva, August, 1864, for the organization of the sanitary commission, and of Paris, June and July, 1867, for the examination of the monetary question.

CONFERENCE is also an ecclesiastical term used in various senses. In the Roman Catholic Church the term was formerly applied to certain assemblies of priests or canons presided over by an arch-priest or dean. They originated in the eleventh century, but are now seldom convened.

PASTORAL CONFERENCES are meetings held annually, quarterly, or monthly by pastors of various Protestant churches for the discussion of pastoral duties and for other similar purposes. They are held in the French Protestant churches, also among English dissenters, and in many churches of the United States, etc.

The Wesleyan Church in England has an annual meeting of its preachers called the "Conference," which has administrative and other powers, defined by Wesley's "Deed of Declaration" (1784). A similar conference is held in Ireland. (See STEVENS, "History of Methodism.") In the Methodist Episcopal Church and the Methodist Episcopal Church South, a "General Conference" meets every four years. It has full power to make "rules and regulations," subject to certain restrictions found in the "Discipline," part II., chapter 1. It is presided over by the bishops. In the same churches the territory where preachers are stationed is divided into "conferences," which are again divided into "districts." The preachers and certain lay delegates of each conference meet in an "annual conference," where preachers receive their appointment for the year from the presiding bishop. There are "quarterly conferences" held in each circuit or station.

"General" (triennial) and "annual" conferences are also held by the Free-will Baptists, and "yearly conferences" by the Six-Principle Baptists, the minor Methodist bodies, and others.

The "Conference of Hampton Court," in 1604, was a meeting of King James I., nine bishops, and nine other divines of the Anglican Church, and four Puritan theologians, held with reference to the differences between the Anglicans and the Puritans. This meeting led to some slight changes in the Anglican Liturgy.

The "Savoy Conference" at the palace of the bishop of London in the Savoy, in 1661, consisted of thirteen Anglican bishops and eleven non-conformist divines, with a number of other theologians on each side as counsellors. Instead of healing the breach, the Savoy Conference increased the differences between the two parties.

The "Evangelical Church Conference" ("Evangelische Kirchenconferenz") is the name given to the regular (annual or biennial) meetings of delegates of the governments of the German states and Austria for the discussion of important church questions.

Confer'va, a genus of plants of the division Algæ, order Confervaceæ. The plants consist of simple or branching jointed filaments, which are filled with green, purple, or red endochrome, and are found, some in fresh, some in salt water, and some on moist earth. The name Conferva is not strictly limited to the genus or the order, but is often extended to its near allies. Among the Confervaceæ are included many plants which have flat fronds. Many also consist of cells immersed in a slimy matter. Reproduction takes place by *spores* formed in the interior of the cells, and which at last are discharged through the walls of the mother-cell. Confervaceæ are found plentifully in many mineral waters. Their abundance often gives a color to the water of tanks, marshes, etc. The etymology of this word is doubtful, and the limits of the genus and order are unsettled. Most British and American Confervæ are now referred to *Cladophorus* and other genera. (See HARVEY'S "Nereis Boreali-Americana," part iii. (1858), in vol. x. of the "Smithsonian Contributions;" also S. O. GRAY'S "British Sea-weeds," 1867; WOOD, "The Fresh-water Algæ of the U. S.," 1872.)

Confes'sion [Lat. *confessio*, from *confiteor*, *confessus*, to "confess;" Ger. *Beicht*], one of the seven sacraments of the Roman Catholic Church; a disburdening of the conscience in the hearing of an authorized priest with a view of obtaining absolution. Most Protestants assert that such confession is not enjoined in the New Testament, and that auricular confession was established as an essential part of church discipline at the fourth Lateran Council (1215 A. D.), though the practice may have been older. By a canon of the above council, confession must be made orally at least once a year, but frequent confession is recommended by the Church, and generally practised. The custom of making a money-offering with confession is optional, though formerly regarded as obligatory. The Greek Catholic Church, as well as the Catholic Maronites and the Armenians, holds that special confession is wholesome in cases of mortal sin, but does not consider it binding. The Greek Church regards this discipline as necessary for the reception of the Eucharist. The Lutheran Church professes that private confession may be retained in the Church, but that particular statement of sins is not necessary. The Church of England employs a general form of confession in its services, but retains private confession in the rubric for visitation of the sick. The Scottish and most of the other Protestant churches do not recognize it at all.

The SIGILLUM CONFESSIONIS ("seal of confession") both in the Roman Catholic and the German Protestant churches means the obligation of a confessor or priest not to divulge the secrets of the confessional. This custom of secresy was made binding by the fourth Lateran Council, and its violation by a priest makes him subject to the severest ecclesiastical penalties.

Confession, in criminal law, an admission by a person that he has committed or participated in a crime. It is either judicial or extra-judicial. It is said to be judicial when made in the course of legal proceedings. An instance is the plea of guilty. An extra-judicial confession does not have the same weight as one that is judicial, and is insufficient for conviction unless corroborated by proof of the actual commission of the offence (*corpus delicti*). A confession must be voluntary—that is, not the result of hopes or fears held out or caused to the prisoner by one having authority, such as a public official or the party against whom the act was committed (prosecutor). It is not necessary that it should be spontaneous. The question of the admissibility of a confession in evidence is decided by the judge; its effect after its admission is determined by the jury. Questions concerning the admissibility of confessions frequently arise when taken by magistrates making an examination of a prisoner charged with crime.

Confes'sional [Ger. *Beichtstuhl*], the seat in which the priest sits to hear confession in a Roman Catholic

church. Confessionals are closed cells, having a door in front for the priest to enter by, and an opening on one or both sides, like a small window, for the penitents to speak through. By the ancient canons confessionals were required to be so built that priest and penitent could both be seen by all present.

Confession of Faith. See CREED.

Confirma'tion [Lat. *confirmatio*, from *con*, intensive, and *firmo, firmatum*, to "make firm" or "strong"], literally, corroboration or strengthening; a ceremony of the Christian Church which is not practised by most denominations of Protestants, though retained by the Anglican and Lutheran churches. In the ancient Church the rite was administered immediately after baptism, if the bishop happened to be present at the solemnity, which is still the custom in the Greek and African churches. In the Roman Catholic Church there is interposed a delay of not less than seven years after infant baptism; in the Lutheran Church the rite is usually delayed for from thirteen to sixteen years, and in the Anglican Church, from fourteen to eighteen years. There is, however, no established limit to the period. The ceremony consists in the imposition of hands by the bishop, accompanied by an invocation of the Holy Ghost as the Comforter and Strengthener. But both in the Lutheran and Anglican churches the ceremony is made the occasion of requiring from those who have been baptized in infancy a renewal of the baptismal vow made for them by their godfathers and godmothers, who are thereby released from responsibility. In the Roman Catholic Church confirmation is held to be one of the seven sacraments. It can be received only once, as it is counted among the three sacraments which impress upon the soul an ineffaceable character.

Confisca'tion [Lat. *confiscatio*, from *fiscus*, a "treasury"], the forfeiture of land or other property to the public treasury as a part of the punishment of certain crimes. During the French Revolution a large quantity of land owned by the Church was confiscated—*i. e.* was taken from the Church in order to convert it into a source of national revenue.

Conflict of Laws. See INTERNATIONAL LAW, PRIVATE, by PRES. T. D. WOOLSEY, S. T. D., LL.D.

Conform'able, a geological term applied to strata which lie parallel to each other. In some cases a bed is disturbed from its original position before another bed is deposited on it. If the new bed or stratum is not parallel to the former, it is said to be *unconformable*. Conformable in general signifies agreeable, suitable, consistent, compliant.

Confu'cianism, the state religion of China; a religious, or rather philosophical, system, which has greatly modified the destinies of China. It is professed at present chiefly by the learned classes, though it has much influence upon the Booddhism of the common people. (See CONFUCIUS.)

Confu'cius, the Latinized form of **Kong-Foo-Tse,** or **Khoong-Foo-Tse,** the greatest of Chinese philosophers, was born, according to the best authorities, in 551 B. C., in Loo, a kingdom or state which now forms part of the modern province of Shang-Toong. He was of illustrious descent, and his father, Shuh-Liang-Heih, was a soldier remarkable for strength and courage. After the death of his first wife, Shuh-Liang-Heih, then in advanced age, married a young lady of remarkable virtues, who became the mother of an only son, the subject of this notice. Confucius was often called Kew or K'ew, because his mother went to a certain hill called Ne-Kew (*i. e.* "hill Ne") and offered her prayers that Heaven might bless her with children. From this circumstance he was also called Ne, and after his death "The venerable Ne."

In childhood, Confucius was, we are told, remarkable for his exemplary obedience to his mother, for his respectful treatment of those older than himself, and for his observance of all the ceremonies with which the Chinese honor the dead and living. To go through the different forms of politeness usual among persons of great culture formed his favorite pastime. He was at school singularly obedient, gentle, and modest, and possessed, it is said, wonderful intellectual quickness. He married when at the age of nineteen, and was made a mandarin of an inferior grade at about the same period. In discharging the duties of his office he showed great intelligence and faithfulness. He took care that nothing should be sold in the markets that could endanger the health of the people, and that unreasonable prices should not be charged for the necessaries of life. The charge of the public lands and of the sheep and cattle was afterwards given to him, and through his industry and sagacity the greatest improvements were introduced into agriculture, and abundance and affluence were made to replace dearth and poverty among the tillers of the earth.

At the age of about twenty-two Confucius first appeared as a public teacher, giving his instructions, however small the fee offered him, to all who had the ability and a true desire to learn. Having once shown them how to acquire wisdom, he expected his pupils to be able to pursue their studies alone and without further assistance from him. He said, "When I have presented one corner of a subject to any one, and he cannot from it learn the other three, I do not repeat my lesson." His mother died when he was twenty-four, and, following the custom of his country, he mourned for her three years, filling no public office during that time. He is said to have studied music when twelve years old, and to have acquired wonderful skill in that art.

In 499 B. C. we find Confucius one of the ministers of the king of Loo. A dispute having occurred between this prince and the neighboring king of Tsi (or Ts'e), it had been arranged that the two rulers should meet on the common frontier and settle their differences in a friendly interview. It was the design of the king of Tsi to seize the person of the king of Loo during this interview, but Confucius (who is said to have possessed in a wonderful degree the gift of reading human character) suspected his treacherous scheme, and by his foresight and resolute courage baffled all his plans, and obtained for his sovereign the secure enjoyment of his rightful possessions. Confucius filled for a while the position of minister of crime. At length, the king of Loo having found the precepts of his minister too high and difficult to be conveniently practised, Confucius perceived that his services were no longer desired, and retired from public life. From this date he appears to have passed most of his time in travelling from place to place, spreading his doctrines as he went, and always accompanied by his disciples. He spent the last five years of his life in his native state of Loo, teaching and completing the work which he had before begun.

Several of the disciples of Confucius gave promise of attaining eminence in philosophy, but the sage himself seems to have centred all his most earnest hopes and warmest affections on his favorite and most gifted pupil Yen-Hoei (or -Hwuy). To him he looked as his successor in those labors for the promotion of wisdom and virtue in which his own life had been passed. But he was destined to disappointment, for the early death of the beloved pupil crushed all these brilliant hopes and plunged Confucius into the deepest sorrow. Confucius, though very observant of the outward forms of propriety and politeness, was not wanting in spontaneous and heartfelt affection. He appears to have looked upon the observance of those forms as directly advantageous to society, besides exerting an indirectly useful influence through their effect upon the minds of those who followed them. He died 478 B. C.

Confucius had one son, Pé-Yu (or Pih-Yu), who died before his father, leaving a son named K'ung Keih, also called Tse-Sse (or Tsze-Sze), who was distinguished as a philosopher, and who wrote a famous work called "Chung-Yung."

Confucius has enjoyed a renown more extended than that of any other of the human race. Through all the changes of the Chinese dynasties, by whatever causes brought about, his descendants have received peculiar honors. At this day they number more than eleven thousand males, and are said to constitute the only hereditary nobility in China. From his own time to the present his writings have been the principal objects of study in all the schools of that vast empire. It has, however, been justly observed that the aim and scope of the Confucian philosophy were limited to this present life, and none of his sayings indicate that he had any definite belief in a continued existence after death. His life and teachings tended to the promotion of the useful and practical only. "There is a total difference in kind between the philosophy of Confucius and the philosophies of Plato, Aristotle, Bacon, and Locke. The Chinese sage did not aim to investigate the mysteries of the universe, or even the hidden laws of nature or of the human mind. His great object was to lay down such rules as would best promote the happiness and virtue of the community at large. And it must be acknowledged that in the practical wisdom of his precepts, both to rulers and subjects, he has never been surpassed by any philosopher of any age or nation. That wise and beautiful thought which is the basis of Chinese government—that the ruler or officer should be as a father, and the people as children—dates, there is reason to believe, from a very remote antiquity. Confucius did not originate this idea, but he did everything in his power to give it practical efficacy."

In the "Analects" (in Chinese *Lun-Yu, i. e.* "Digested Conversations") of Confucius are to be found the best and most trustworthy indications of his genius and character. They are well worthy to be read by whoever would rightly understand his philosophy. It is doubtful whether among any of the pagan writers of the West anything surpassing these sayings in practical sagacity and lofty morality can be found. Indeed, they seem amply to justify the enco-

miums they have called forth upon the wisdom of the Chinese sage.

The following will serve as illustrations of the character of his sayings: "Learning without thought is labor lost; thought without learning (or knowledge) is perilous." "When we see men of worth, we should think of equalling them; when we see men of a contrary character, we should turn inward and examine ourselves." "He who exercises government by means of his virtue may be compared to the north polar star, which keeps its place, and all the [other] stars turn towards it." "Good government obtains when those who are near are made happy, and those who are far off are attracted." When asked what were the necessary conditions of a government, he answered, "Sufficiency of food, military equipment, and confidence of the people in their ruler." Being asked which could be most easily dispensed with, he replied, "The military equipment." And when pressed to say which of those yet remaining might be most easily dispensed with, he said, "Part with the food; from of old death has been the lot of all men, but if the people have no faith in their rulers, there is no standing for the state." In one place he gives us the negative form of the golden rule: "What you do not like," he says, "when done to yourself, do not do to others." Again he says, "I am not concerned that I have no place (or office); I am concerned how I may fit myself for one. I am not concerned that I am not known; I seek to be worthy to be known." "The superior man is affable, but not adulatory; the mean man is adulatory, but not affable."

One of his disciples said of Confucius, "There were four things from which the master was entirely free: he had no foregone conclusions, no arbitrary predeterminations, no obstinacy, and no egotism." (See LEGGE'S "Life and Teachings of Confucius;" PAUTHIER'S "Chine;" PLATH'S "Confucius und seiner Schüler Leben und Lehre," 1867; and the "Edinburgh Review" for April, 1869.)

J. THOMAS.

Con'garee', a river of South Carolina, is formed by the Broad and Saluda rivers, which unite at Columbia. It flows south-eastward, and joins the Wateree to form the Santee River. Steamboats ascend this river to Columbia.

Congaree, a township of Lexington co., S. C. Pop. 1095.

Congé d'Élire, kôn'zhâ' dâ'leer, a French phrase signifying "permission to choose," is the name given in England to the king's warrant or license to the dean and chapter in the older dioceses to elect a bishop for a vacant see. The bishop is, however, nominated by the sovereign (or premier), so that the dean and chapter have no real power or liberty to choose.

Congen'ital Diseases. These must be distinguished from hereditary diseases, which may show themselves either soon after birth or at some later period, and from malformations of the infant, resulting from either an arrest of development or a disease of the fœtus contracted during its intra-uterine life. Both of these classes will be discussed in future. Congenital diseases proper are—1st, transmitted from the diseased mother either before or during birth; 2d, acquired during birth, without a direct maternal influence; 3d, acquired shortly before birth. To the first class belong puerperal fever and primary syphilitic and gonorrhœal infection; to the second, asphyxia, atelectasis (unexpanded condition) of the lungs, and cephalhæmatoma (sanguineous tumor upon the head); to the third, acute fatty degeneration of the fœtus and newly born. *Puerperal fever* is transmitted from the mother; the blood of the babe is infected. The principal symptoms are high fever, abscesses in the subcutaneous tissue, particularly around the joints, erysipelas, and a severe form of jaundice. It terminates fatally within a limited number of days, rarely weeks. When the vagina of the mother is infected with syphilitic ulceration, the child is subject to be attacked with a *primary ulceration.* When it is the seat of gonorrhœal discharge, it gives rise to the most dangerous forms of *purulent inflammation of the eyelids,* which, unless treated at once, is apt to result in blindness. The treatment consists in absolute cleanliness; the eyes must be opened frequently and washed out with water. Ice is applied constantly to the outside, and a solution of nitrate of silver to the inside of the eyelids. *Asphyxia* is mostly seen after protracted labor or abnormal presentation of the child, the breech or the feet being born before the head. In such cases the umbilical cord is apt to be compressed, circulation thereby permanently or temporarily stopped, and premature respiratory movements brought on. The child is born almost or apparently lifeless, blue or pale, with no respiration and no pulsation of the heart. Artificial respiration is brought on by Marshall Hall's, Sylvester's, or Howard's method, by slapping the buttock of the babe, by alternately placing it in warm and cold water, by slapping its breast with a wet cloth, by swinging it forcibly in the air, by the application of an electro-magnetic current to its chest. When the surface is very blue a few drachms of blood may be allowed to flow from the untied umbilical cord. *Atelectasis* depends on an absence of the normal expansion of the lungs which follows the entrance of the air. The muscles of the chest may not be sufficiently developed, or their innervation may not be satisfactory from some disease of the brain, or the lungs may be inflamed or filled with mucus or some foreign substance introduced into them during birth (blood, mucus, amniotic liquor, etc.). Emetics will empty the lungs (tickling of the fauces is sometimes sufficient), mustard plasters and the electrical current excite the nerves, and the above-mentioned methods of inducing respiration will restore the normal action. *Cephalhæmatoma* results from two causes: the external layer of the cranial bones of the new-born is but little developed; thus the blood-vessels located in it are but little protected. Now but little violence, sometimes none at all, is required to burst them. A hæmorrhage takes place between the bone (usually one of the parietal) and its enveloping membrane (periosteum), which from a small size may increase to that of a walnut or small apple in the course of four or six days. It is not dangerous, will always get well in from four to ten weeks when left alone, but is apt to undergo suppuration or putrefaction when interfered with; for instance, by lancing. *Acute fatty degeneration* of more or less of the organs is not frequent. The covering epithelium of the lungs and bronchial tubes, of the uriniferous tubes of the kidneys, of the intestines, also the cells of the liver and blood-vessels, sometimes even the whole body, are affected. Thus, the physical functions are not rightly performed. One of the most fearful symptoms is uncontrollable hæmorrhage from the stomach, the bowels, and particularly from the umbilical cord. It is almost always fatal.

ABRAHAM JACOBI.

Con'ger Eel (or **Con'ger**), a genus of marine fishes of the eel family, having the tail longer and more pointed than the fresh-water eels, the dorsal fin commencing nearer the head, and the teeth of the upper jaw placed together, so as to form a cutting edge. The species are not at all numerous. The American conger (*Conger Americanus*) is from three to five feet long, and is occasionally seen in fish-markets. It has a very disagreeable taste. The *Conger vulgaris* is a native of British seas. In form the conger much resembles the fresh-water eel; its color is brown above, shading into dull white beneath; the fins whitish edged with black, and the lateral line almost white. The English conger attains a large size, often five to ten feet long and eighteen inches in circumference, weighing more than 100 pounds. It is very strong, and is a formidable antagonist when hauled into a boat by the fisherman's line. Great numbers are consumed as food by the poorer classes. The principal conger-fishery of Great Britain is on the Cornish coast.

European Conger Eel.

Conges'tion [Lat. *congestio,* from *con,* "together," *gero, gestum,* to "carry" or "heap"], in pathology, a term indicating fulness of blood, or hyperæmia, a condition to which much importance has been attached by medical writers. Congestions are either active or passive. Active congestions are always essential parts of a further morbid process, such as inflammation. Passive congestions are often determined by some mechanical cause of obstructed or retarded circulation. Active congestions of the brain or lungs are in themselves very alarming symptoms of disease; while the passive congestions, resulting from cirrhosis of the liver or from organic disease of the heart, are fruitful causes of local or general dropsies.

REVISED BY WILLARD PARKER.

Con'gleton, a market-town of England, in Cheshire, is in a deep valley on the river Dane, 22 miles S. of Manchester. It has manufactures of silk ribbons and other silk fabrics. Pop. in 1871, 11,344.

Congleton (HENRY BROOKE PARNELL), LORD, a British statesman, born July 3, 1776, was for many years a Liberal member of Parliament. He became secretary at war in 1830, and paymaster of the forces in 1835. He was well versed in financial affairs, and wrote several works, one of which was "On Financial Reform" (1830). Committed suicide June 8, 1842.

Conglom'erate [Lat. *conglomeratus,* from *con,* "to-

gether," *glomero, glomeratum*, to "wind," as on a ball, to "gather"], or **Pudding-Stone,** the name of a rock consisting of rounded, water-worn pebbles cemented and compacted together. These pebbles are fragments of quartz and other hard rocks, the rubbing and polishing of which must have required a long period of time. They are united by a silicious, calcareous, or ferruginous cement, sometimes so loosely that they are easily separated by a blow with a hammer. In other cases they are very firmly united, so that the rock breaks as if it were a homogeneous mass. Conglomerates occur in various formations and several geological ages.

Con'go, or **Zaïre,** a large river in the S. W. part of Africa, forms the boundary between Loango and the kingdom of Congo. It flows nearly westward, and enters the Atlantic in lat. 6° S., and near lon. 13° E. Its source has not been explored by Europeans, and its length is not known. According to Behm, whose opinion is fully endorsed by Sir Henry Rawlinson, the Lualaba discovered by Dr. Livingstone is the upper course of the Congo, and not of the Nile. The mouth is 10 miles wide. About 140 to 180 miles from the sea this river is confined by high rocks in a channel from 300 to 500 yards wide, and here occur several great cataracts. The Congo is said to be three or four miles wide above these cataracts. According to Petermann, its annual discharge of water is much greater than that of the Mississippi.

Congo, a large country of Western Africa, in Lower Guinea, is bounded on the N. by Loango, on the S. by Angola, and on the W. by the Atlantic Ocean. The coast-region is level, and has a very hot climate. In the central portion are fertile uplands, which produce the palm tree, sugar-cane, the yam, the orange, etc. The soil yields maize, manioc, pulse, plaintains, oranges, pineapples, tamarinds, etc. The oil-palm yields palm wine. Among the animals found here are lions, leopards, elephants, buffaloes, hogs, and monkeys. The capital is Banza, which the Portuguese call São Salvador. The inhabitants are divided into innumerable petty tribes, each with a chief, and all subject to the Lindy N'Congo, who resides at Banza Congo. It was discovered by the Portuguese in 1486.

Congoon', a maritime town of Persia, province of Fars, on the Persian Gulf, 130 miles S. W. of Shiraz. It has a good roadstead. Pop. about 6000.

Congrega'tionalism is a system of administering church affairs which secures to each congregation the right of regulating, without external interference, the details of its worship and discipline according to its own understanding of the principles of the New Testament, while it inculcates the duty of maintaining the fraternal communion of believers, especially of such as profess the same faith and accept the same order.

According to the fundamental principle of congregationalism, any association of believers, united by formal covenant for mutual watchfulness and help, the maintenance of divine worship, the observance of Christian rites, and combined efforts to promote the kingdom of God, is a church of Christ; and as such is competent to elect and ordain its own officers, admit or reject applicants for membership, exclude unworthy members, control its own property, and transact its own business. The orderly prosecution of church-work calls for the appointment of various officers, on whom is laid the special responsibility of oversight and direction; and long usage, based upon the instructions of the New Testament, recognizes the office of pastor and that of deacon as needing to be perpetuated in the Church. The pastor holds the office of a bishop or elder. By virtue of his ordination he becomes a minister, whose function is not only to preach, but to officiate in the administration of sacraments, as well as at the marriage service and the burial of the dead; and this rank as a minister he retains, even though his position as a pastor of a particular church may have been resigned. Ordinarily, each church has but one pastor, and for his support provision is made in the form of a stipulated salary, voluntarily contributed by the congregation. Among ministers, whether installed as pastors or not, there is no disparity of rank. The deacons are not salaried officers, nor technically ministers, but they are helpers of the pastor, and have special charge of receiving the charities of the church and making distribution for the relief of the poor.

The congregational system holds to the Holy Scriptures as the sufficient and exclusive rule of ecclesiastical polity, recognizes no organized and visible Church apart from local and particular assemblies of believers, and repudiates all claims of superior bodies to exercise legislative or judicial authority over the brotherhood.

Nevertheless, the relation of neighboring churches is most intimate and friendly, and is manifested in various ways; especially by mutual consultations and co-operation, the occasional transfer of members, and formal or informal associations for common work. Thus congregationalism differs from independency in maintaining the fellowship of distinct churches, and from presbyterianism in denying the right of a presbytery or synod to exercise authority over the churches.

In its principles this system is remarkably unsectarian and liberal, and its development during the last two hundred and fifty years has been closely identified with increased liberty of religious thought, and with the practical union of men holding different tenets in common works of philanthropy and beneficence.

As a system of church order, congregationalism is not necessarily connected with any school of theology or any class of doctrine. Its methods of administering church-affairs may be adopted alike by Calvinists, Arminians, Socinians, and Arians. The church government of the different denominations of Baptists is, for the most part, simply congregational. Some Methodists have followed the same order. The churches in this country known as Unitarian are built upon the same platform. This is true also of Christians and Universalists. All these denominations are to be grouped together as occupying common ground in opposition to the idea of a Church comprising many congregations, and of a government administered by a priesthood.

At the same time, the churches which are generally known as Congregational hold firmly to positive and evangelical views of truth, being Calvinistic rather than Arminian, Trinitarian rather than Socinian or Arian, accepting the doctrine of a future state of endless retribution, recognizing the families of believers as fit subjects of baptism, and regarding the mode of administering baptism as of comparatively small importance. Each church has its own articles of belief, which with greater or less fulness indicate the system of doctrine taught from the pulpit and accepted by the members. Some churches have taken as their standards the Confession and Catechisms of the divines who met at Westminster, London, in 1648; but the creeds in common use are much briefer, and being intended for use as formulas for the reception of members, are for the most part so framed as to be acceptable to Christians generally.

The Congregationalists, when assembled in a national council at Boston in 1865, declared in general terms their "adherence to the faith and order of the apostolic and primitive churches held by their fathers," but "extended to all believers the hand of Christian fellowship upon the basis of those great fundamental truths in which all Christians should agree." So also at Oberlin in 1871 the elders and messengers of the Congregational churches of the U. S., in forming a permanent national organization, thought it sufficient to define their doctrinal position by these words: "They agree in the belief that the Holy Scriptures are the sufficient and only infallible rule of religious faith and practice; their interpretation thereof being in substantial accordance with the great doctrines of the Christian faith commonly called evangelical, held in our churches from early times, and sufficiently set forth by former general councils."

The early home of congregationalism was New England, to which it was brought at the earliest settlement of the colonies; but as the population has moved westward, this form of church order has spread extensively through the West and North-west, till more than half of the 3200 churches designated as Congregational are W. of the Hudson River, while in the South and South-west this denomination is but little known. Recognizing the importance of culture and an educated ministry, the Congregationalists have been distinguished as the founders and liberal supporters of schools, colleges, and theological seminaries. Their theological schools are at Bangor, Andover, Hartford, New Haven, Oberlin, Chicago, and Oakland (California). The Congregationalists have earnestly co-operated with other denominations in missionary and benevolent organizations which, like the American Bible Society, have invited to united effort. Among the societies which are now chiefly under their direction are the American Board of Commissioners for Foreign Missions, the American Home Missionary Society, the American Congregational Union, the Education Society, the American Missionary Association, the Congregational Publication Society, the Congregational Library Association, and the Western College Society. These, however, are not strictly ecclesiastical organizations, but associations of individuals over which the churches, as such, have no control. Indeed, the congregational theory of administration hardly permits such widespread and far-reaching activities to be included within the province of a particular Church.

The theory and practice of congregationalism have been much discussed in the present generation. (A valuable re-

pository of essays may be found in the "Congregational Quarterly," established in Boston in 1859, of which fourteen volumes have been published. Other authorities are "Debates and Proceedings of the National Council of Congregational Churches" at Boston, 1865; DEXTER'S "Congregationalism;" POND'S "Manual;" BACON'S "Congregational Order;" UPHAM'S "Ratio Disciplinæ;" PUNCHARD on "Congregationalism;" CUMMINGS'S "Dictionary of Congregational Usages and Principles;" BUCK'S "Massachusetts Ecclesiastical Law;" "Contributions to the Ecclesiastical History of Connecticut," and numerous local histories and church manuals.)

Statistical summaries of the Congregational churches may be found each year in the January number of the "Congregational Quarterly," representing the numerical strength of the denomination and its changes during the preceding statistical year.

The returns thus published in 1872 for the U. S. showed 3202 churches, 3124 ministers, 312,054 church members, and 368,937 in Sabbath schools; 13,271 members had been received during the year on profession of faith, and 10,969 by letter from other churches; 4701 had died, and 9799 had taken letters of dismission. The increase in one year had been 81 churches, 26 ministers, 5536 church members, and 7472 in Sabbath schools. In 1862, ten years before, the aggregate returns showed 2555 churches, 2678 ministers, 255,034 members, and 246,178 in Sabbath schools. (For Congregationalism in England, see INDEPENDENTS.)

E. W. GILMAN.

Congress, a township of Morrow co., O. Pop. 1347.

Congress, a township and post-village of Wayne co., O. The village is about 45 miles S. S. W. of Cleveland. Pop. of village, 309; total pop. 2581.

Con'gress [Lat. *congressus*, from *congredior, congressus*, to "go together," to "meet;" Fr. *congrès*], in politics, a meeting of the sovereigns of states or their representatives for the purpose of arranging international matters. The first general European congress was after the conclusion of the Thirty Years' war in Germany, at Münster and Osnabrück, 1648. Remarkable general congresses have been—of the Pyrenees (1659); at Aix-la-Chapelle (1668); at Nimeguen (1676); at Ryswick (1697); at Utrecht (1713); at Aix-la-Chapelle (1748); at Teschen (1779); at Paris (1782); at Versailles (1785); at the Hague (1790); at Rastadt (1797); at Erfurt (1808); at Vienna (1814, concluded at Paris 1815); at Aix-la-Chapelle (1818); at Troppau (1820); at Laybach (1821); at Verona (1822). More recently the word CONFERENCE (which see) is commonly applied to international meetings of statesmen for the settlement of international complications. (See PHILLIMORE, "On International Law," ii., 45.)

CONGRESS also comes into use as a name for international meetings of scholars of a particular science, as statistical congress, archæological congress, etc.

CONGRESS, the title of the national legislature of the U. S. of America. It consists of a House of Representatives and of a Senate. The former is composed of members chosen every second year. The qualification of electors is the same as that required in their respective States for electors to the lower house in the State legislature. The number of representatives is apportioned according to the population of each State, and a new apportionment is made every ten years after the census is taken by authority. The Senate is composed of two members from each State; the Senators are chosen for six years by the legislature of the State. The House of Representatives chooses its own Speaker; the Vice-President of the U. S. is *ex-officio* president of the Senate. Bills for revenue purposes must originate in the House of Representatives, but are subject to the proposal of amendments by the Senate. The Senate has the sole power of trying impeachments, but it can only convict by a majority of two-thirds of the members present, and its sentence extends only to removal from office and disqualification to hold any office of honor or profit under the U. S. The regular meeting of Congress is on the first Monday in December, annually. Every bill which passes the two houses is sent to the President for approval or disapproval; in the latter case he returns it, with his reasons, to the house in which it originated; if on reconsideration it is passed again by a majority of two-thirds in each house, it becomes law. The powers of Congress are limited, and separated from those of the State legislatures by the Constitution. Members of Congress cannot legally have any interest in any contract with or claim against the government; they are forbidden to prosecute cases before the court of claims, or to present claims to any of the departments. The Senate consists (in 1873) of 74 members, and the other house of 292 members. No person is eligible to the Senate under the age of thirty years, nor to the House of Representatives under the age of twenty-five. (For a full statement of the origin, character, and powers of Congress, see CONSTITUTION OF THE UNITED STATES.)

Congress Spring, at Saratoga, N. Y., a saline mineral spring whose waters are highly charged with carbonic acid gas. When fresh, Congress water contains more than its own bulk of this gas, 100 cubic inches of water holding in solution 116 inches of the acid. Its saline ingredients are the carbonates, chlorides, iodides, bromides, etc. of potassium, sodium, lime, iron, magnesia, strontia, and other bases. These solid matters are found in the proportion of nearly 33 grains to a pound of the water, which possesses valuable tonic and deobstruent qualities.

Congress, Statistical. See STATISTICAL CONGRESS.

Con'greve (WILLIAM), a witty English dramatic poet, born of an old Staffordshire family near Leeds Feb., 1670. He was educated at the University of Dublin, and entered the Middle Temple as a student of law, but he never devoted much time to the study or practice of that profession. His first drama, "The Old Bachelor," was performed with great success at Drury Lane when Congreve was not yet nineteen years of age. The "Double Dealer," in the following year, did not succeed. He produced in 1695 a comedy called "Love for Love," which added much to his fame and fortune, and in 1697 "The Mourning Bride," a tragedy, which was greatly admired. He obtained several lucrative civil offices. His comedy called "The Way of the World" (1700) failed so completely that he renounced the drama in disgust. He affected to depreciate his dramatic triumphs, and was more ambitious to pass for a man of fashion than a poetical genius. Died Jan. 19, 1729. (CHARLES WILSON, "Memoirs of the Life of W. Congreve," 1730.)

Congreve (Sir WILLIAM), BART., F. R. S., an English officer and engineer, born in Middlesex May 20, 1772. He invented several improvements in canal-locks, and in 1804 the Congreve rocket. (See ROCKET.) He published several professional works. Died May 14, 1828.

Co'ni, or **Cu'neo,** a town of Italy, in Piedmont, capital of the province of Cuneo, is on the river Stura, 54 miles by railway S. by W. from Turin. It has a cathedral, a fine town-hall, a royal college, a theatre, several convents and palaces. It was a strong fortress before 1800, and was dismantled by the French after the battle of Marengo in that year. Here are manufactures of linen and hemp. Coni has an extensive trade. Pop. in 1871, 22,882.

Con'ic Sec'tions, in mathematics, the sections of a right cone by a plane. If the cutting plane is perpendicular to the axis, the section is a *circle;* if it is parallel to one side of the cone, the section is a *parabola;* if it makes a greater angle with the base than is made by the side of the cone, the section is a *hyperbola;* if it is oblique to the axis, and only cuts the conical surface, it is an *ellipse*. The circle, the line, and the point may each be regarded as particular cases of the ellipse; the line as a particular case of the parabola; the triangle as a particular case of the hyperbola. The study of conic sections is specially interesting and important on account of its connection with the laws of moving bodies. The orbits of planets, the paths of projectiles, the undulations of light and sound, are all either circular, elliptic, parabolic, or hyperbolic.

Conif'eræ [from the Lat. *conus*, a "cone," and *fero*, to "bear"], an important natural order of exogenous plants, comprising the pines, firs, etc. They agree with the other exogens in the structure of the stem and in the mode of vegetation, but differ remarkably from most of them in fructification. Their ovules are not enclosed in an ovary, but are fertilized by the direct application of the pollen to the *foramen*, with no style or stigma; and for this reason they, with the Cycadaceæ, are called gymnosperms. The flowers are unisexual, the male and female being sometimes on the same, sometimes on different plants. The male flowers have either one stamen or one bundle of stamens, the anthers often crested. The female flowers are in cones or solitary. The place of ovaries is supplied by the flat scales of the cones. The ovules are usually in pairs. The fruit is either a cone, a berry-like fruit, or a solitary naked seed. The seed has a hard, crustaceous integument. The embryo is surrounded by fleshy, oily albumen. The cotyledons are either two or numerous and whorled. The Coniferæ are trees or shrubs, mostly with resinous juice, and awl-shaped or needle-shaped leaves. Some of the Coniferæ attain a height almost unrivalled among other forest trees. The *Sequoia* of California affords the most striking example. The woody fibre is marked with circular disks, which, when highly magnified, exhibit a small internal circle surrounded by a larger one. This peculiarity of the wood of the Coniferæ is important, as enabling us to refer many fossils, particularly of the coal formation, to this order. Most of the Coniferæ have very narrow,

veinless, evergreen leaves, but some few are deciduous, and others have flat and wide leaves. By far the larger number of them belong to the northern hemisphere. They are very long-lived; some of them are supposed to be capable of enduring to the age of 2000 or 3000 years. Besides the valuable timber obtained from many of the Coniferæ, they are remarkably productive of turpentines and resins. Astringent substances are also found in their bark, and fixed oil in their seeds. The seeds of some species are used as food. By some botanists this order is divided into two, three, or more orders.

Co'niine, also called **Conine, Conicine,** and **Cicutine,** a volatile alkaloid constituting the poisonous principle of the *Conium maculatum,* or poison hemlock. It was discovered in 1827 by Giesacke, but first prepared in a pure state by Geiger in 1831. Formula, $C_8H_{15}N$. It exists in all parts of the plant, but in greatest quantities in the seeds just before maturity. Coniine is stated by Walz to exist in the ripe seeds of the *Æthusa Cynapium,* or fool's parsley, and Wagner claims to have found it in the root of the *Imperatoria.* Coniine is obtained by mixing the bruised seeds of the plant with a strong base, as lime, and distilling the base over with water. It is an oily liquid of specific gravity 0.89, boiling at about 170° C. (338° F.), with a penetrating repulsive and suffocating odor and a sharp taste. It has a strong alkaline reaction in the presence of water, but the blue color produced by it on reddened litmus paper is not permanent. At a low temperature it takes up considerable amounts of water, but if the solution is warmed it becomes turbid. It is but slightly soluble in water, but very soluble in alcohol and ether. It is very inflammable, burning with a bright smoky flame. When exposed to the air it slowly decomposes, ammonia being evolved and a resinous substance being left. With acids it forms crystallizable salts which are soluble in water and alcohol, are odorless when dry, and are decomposed by heat. According to Geiger, the salts are less poisonous than the base itself. Other authorities assert that the reverse is the case. In any case, the action is that of an acrid narcotic poison. One of the tests in the laboratory for the presence of this alkaloid is the peculiar odor developed by setting it free from its combinations by means of caustic potash.

In 1872, Schiff obtained synthetically a substance identical in composition with coniine, and resembling it in odor, appearance, and general reactions. This product has, however, optically no rotatory power, and differs from the natural coniine in a few other details. The name *paraconiine* has therefore been proposed for the artificial product.

The alkaloid, as well as the leaves and seeds of the *Conium maculatum,* is used in pharmacy as a narcotic.

C. F. Chandler.

Con'ington (John), a distinguished classical scholar and literary writer, was born Aug. 10, 1825, in Boston, England, and educated first at Rugby under Dr. Arnold, and then at Oxford, where he became a fellow of University College in 1848. While still a B. A. he published an edition of the "Agamemnon" of Æschylus, with a poetical version, in which he inaugurated the double career, which he successfully followed up, of critical editor and translator. In 1852 he had begun, in conjunction with Mr. Goldwin Smith, an edition of the works of Virgil, the first volume of which was published in 1858. In 1854 he was appointed to the chair of Latin in the university, and from this time to his early death in 1869 his pen was constantly busy. His Æschylean studies were continued in the edition of the "Choëphoræ" in 1857, but after this he felt drawn more particularly to the studies connected with his chair. In 1863 appeared a version of the Odes of Horace, and the second volume of his Virgil. In 1866 he published a spirited translation of the "Æneid" in the ballad measure of Scott, which he followed up the next year by completing the version of the "Iliad" begun by his friend Mr. Worsley. He completed his translation of Horace, and prepared an edition of the "Satires" of Persius, with a translation, just before his death in 1869. The last volume of his edition of Virgil appeared after his death, under the supervision of his friend and fellow-worker, Mr. Nettleship, in 1871. Two volumes of miscellaneous writings, with a memoir prafixed, were issued in 1872, the second volume containing a prose translation of the "Eclogues," "Georgics," and "Æneid" of Virgil. Henry Drisler.

Coniros'tres [from the Lat. *conus,* a "cone," and *rostrum,* a "bill"], a tribe of birds of the order Insessores (perchers), characterized by a strong conical bill without notches. It comprises numerous species, among which are crows, finches, larks, buntings, sparrows, starlings, and birds of paradise. Many recent systematists reject the term altogether, and group these birds in the section Oscines (singers), of the order Passeres and sub-class Insessores.

Coni'um [Gr. κώνειον], the leaves of the poisonous hemlock, *Conium maculatum,* an Old World umbelliferous plant naturalized in the U. S. It is in medicine a useful sedative, hypnotic, and anodyne. In over-doses it produces a dangerous paralysis. With this drug Socrates and Phocion were poisoned. Stimulants and emetics are the best antidotes.

Conjeveram, or **Cauchipoo'ra** ("golden city"), a town of Hindostan, on the railway, 62 miles S. W. of Madras, in the presidency of Madras. It consists mostly of mud cabins, extends over considerable ground, and contains large gardens and cocoa groves. It is noted for two interesting pagodas with remarkably fine sculptures. Pop. 20,000.

Conju'gate [Lat. *conjugatus,* part. of *conjugo,* to "yoke together"], an adjective frequently used in pure and applied mathematics with reference to two quantities, points, lines, axes, curves, etc., which present themselves simultaneously and have reciprocal properties.

Conjuga'tion [Lat. *conjugatio,* from *con,* "together," and *jugo, jugatum,* to "yoke"], in grammar, a regular distribution of the several inflections of verbs into their different voices, moods, tenses, numbers, and persons; a synopsis or statement of the changes of form or inflections to which a verb is subject. In Latin grammar there are four different forms of regular verbs, which are called the first, second, third, and fourth conjugations, and in some languages the number is even greater. (See Grammar.)

Conjugation is also a process occurring among the lower forms of organic life, in which the substance of two distinct organisms, coming into contact, is passed into a single mass. In plants it is always attended with reproduction, sometimes also in animals. It has been observed in numerous algæ and in some fungi.

Conjunc'tion [Lat. *conjunctio,* from *con,* "together," and *jungo, junctum,* to "join"], one of the aspects of the planets. Two or more heavenly bodies are in conjunction when they have the same longitude. The sun and moon are in conjunction at the time of new moon. In general, a heavenly body is in conjunction with the sun when it is on the same side of the earth and is in a line with him. When Mercury and Venus are in a line between the earth and the sun they are said to be in inferior conjunction. When the sun is between the earth and one of the planets the latter is in superior conjunction.

Conjunction, in grammar, a part of speech used to connect words or sentences; that part of speech which expresses the relation of propositions to each other. Conjunctions are co-ordinate when they unite expressions of equal grammatical importance; subordinate when they unite a dependent clause to a principal one.

Conk'lin, a township and village of Broome co., N. Y. The village is about 20 miles E. of Owego. Pop. 1440.

Conk'ling (Alfred), the father of Roscoe C., born at East Hampton, N. Y., Oct. 12, 1789, graduated at Union College in 1810, became a lawyer, was member of Congress (1821–23), afterwards U. S. district judge for Northern New York, and was minister to Mexico in 1852. He published several legal works. Died Feb. 5, 1874.

Conkling (Roscoe), an American statesman, born at Albany, N. Y., Oct. 30, 1829, studied and practised law. In 1846 he removed to Utica, of which place he was elected mayor in 1858, and was elected to represent his district in the U. S. Congress four times, and in 1867 and 1873 to the U. S. Senate.

Conk'lingville, a post-village of Hadley township, Saratoga co., N. Y. Has a large tannery and a manufactory of veneers.

Conlie, a French village, in the department of Tarthe, is situated 14 miles W. of Le Mans. Near it the French government established in Oct., 1870, a large fortified camp which could receive about 50,000 troops. After the battle of Le Mans the camp was, on Jan. 14, 1871, occupied by the Germans. Pop. of the village in 1866, 1720.

Connara'ceæ [from *Connarus,* one of the genera], a natural order of exogenous plants (trees or shrubs), natives of tropical countries, and nearly allied to the Leguminosæ. They have compound leaves destitute of stipules. They differ from the Leguminosæ by having the radicle remote from the hilum. Among the products of this order is the beautiful zebra-wood (the wood of *Omphalobium Lamberti*), a native of Guiana.

Con'naught, the most western province of Ireland, is bounded on the N. and W. by the Atlantic Ocean, on the E. by Ulster and Leinster, and on the S. by Munster. Area, 6863 square miles. It is divided into the counties of Galway, Leitrim, Mayo, Roscommon, and Sligo. The surface in the western part is mountainous. The coast is deeply indented, and affords good harbors. The river Shannon

forms the eastern boundary of the province. Connaught was formerly a kingdom of the Irish pentarchy. Pop. in 1871, 845,993.

Con'neaut', a post-borough of Ashtabula co., O., on Conneaut Creek and on the Lake Shore R. R., 68 miles E. N. E. of Cleveland and 2 miles from Lake Erie. It is a shipping-point for produce. Here the first settlers of Northern Ohio landed in 1796. The mouth of the creek makes a good harbor. Conneaut has a lighthouse, a good trade, and one weekly newspaper. Pop. 1163; of Conneaut township, 3010.

Conneaut, a township of Crawford co., Pa. P. 1729.

Conneaut, a township of Erie co., Pa. Pop. 1538.

Conneaut'ville, a post-village of Crawford co., Pa., on the Erie and Pittsburg R. R., 35 miles S. S. W. of Erie. It has one national bank and one weekly newspaper. P. 1000.

Connecticut, kon-net'e-kŭt, a river of the U. S., rises in the extreme northern part of New Hampshire, near the frontier of Canada. Its W. bank forms the entire boundary between New Hampshire and Vermont. (See NEW HAMPSHIRE.) It flows in a general S. S. W. direction until it enters Franklin co., Mass. It afterwards intersects Massachusetts and Connecticut, flowing nearly southward to Middletown (Connecticut), below which its course is S. E., and enters Long Island Sound at Saybrook. Length, about 450 miles. The valley of the Connecticut is celebrated for the beauty of its scenery, the fertility of its soil, and the luxuriant growth of the tobacco-plant known as the "Connecticut seed-leaf," which is used principally as "wrappers" in making cigars. It is not an uncommon thing for the crop to exceed 2000 pounds to the acre. Vessels drawing eight feet can ascend to Hartford, which is about 50 miles from its mouth. Its principal affluents are the Deerfield, Farmington, and Chicopee rivers.

Connecticut, one of the six New England, and one of the thirteen original, States of the American Union, lying

Connecticut Seal.

in the eastern division of the U. S., and bounded as follows: N. by Massachusetts, E. by Rhode Island, S. by Long Island Sound, and W. by New York. No one of its boundaries is a continuous straight line, that on the N. having a notch where the town of Southwick, Mass., interrupts the boundary; the eastern following at its lower portion the sinuosities of Pawcatuck River; the southern being the line of the sound shore; and the western boundary, after following a course S., slightly bearing W. till within about 15 miles of the sound, suddenly turns S. E. for about 8 miles, then S. W. for about 13, then S. E. for 6 or 7. The northern line is about 88 miles long; the eastern, 45 miles; the western, by the indirect line we have described, 72 miles. The sea or sound coast, from Pawcatuck River on the E. to Byram River on the S. W., is about 100 miles. The average length of the State from E. to W. is 86 miles, and its average breadth from N. to S., 55 miles. It lies between N. lat. 41° and 42° 3′, and W. lon. 71° 55′ and 73° 50′. Its area is 4674 square miles.

Face of the Country, Rivers, Mountains, Valleys, etc.— The State is mainly drained by its three principal rivers and their tributaries, the Housatonic, the Connecticut, and the Thames, though these are supplemented by numerous small streams from 10 to 15 miles in length, and one about 35 miles in length, the Quinnipiack, which, like the larger rivers, all discharge their waters into the sound. The Housatonic River rises in the N. W. part of Berkshire co., Mass., pursues a generally southern course till it reaches about the middle of the State of Connecticut, when it turns S. E., and discharges its waters into the sound at Bridgeport. The Connecticut (see CONNECTICUT RIVER), rising near the Canada line, separates New Hampshire and Vermont, and passes through Massachusetts and Connecticut to the sound, deflected at Middletown to the S. E., like the Housatonic and Thames, and on about the same parallel. The Thames, a broad and noble river, is only known by that name from Norwich to New London Harbor. The Yantic and Quinnebaug unite to form the Thames at Norwich, and the Quinnebaug itself takes the Shetucket as its principal tributary—a tributary formed by the union of the Willimantic and Hop rivers. These streams drain most of Windham and a part of New London counties. The principal tributary of the Connecticut in the State is the Tunxis or Farmington River, which drains a part of Litchfield and Hartford counties. The chief affluent of the Housatonic is the Naugatuck River, which receives the waters of several towns of Litchfield and New Haven counties. The State has no prairies and but little absolutely level land. Its central valley begins at the sound, and, embracing a tract of the average breadth of about 20 miles, including the towns of East Haven, New Haven, and West Haven, passes N. E., its eastern border crossing the Connecticut River below Middletown, while its western border continues on the W. side of the river through Hamden, Cheshire, Southington, Farmington, Avon, Simsbury, and Granby into Massachusetts; the eastern border passing at the same time through Portland, Glastonbury, Manchester, East Windsor, and Somers to the Massachusetts line. The lower part of this valley is sandy and alluvial, but barren except when it is highly manured. In many places it forms extensive plains of drifting sand, and these sometimes invade the portions which have, under the stimulus of strong manures, grown a moderate crop. But at the point where it approaches the Connecticut River the character of the soil changes; the underlying rock, for the remainder of the course of the valley through the State, is the new red sandstone, and above it a rich, deep clayey loam, with sand enough to make it permanently arable; and there is hardly any section of the U. S. which yields, year after year, such ample crops as this portion of the Connecticut River valley. There are in the lower and western portions of this valley some ranges and several isolated buttes or elevated bluffs of trap-rock, which in some volcanic convulsion or earthquake was interjected through rifts in the overlying rocks. On the W. side these bluffs and ranges have a precipitous and sometimes an almost perpendicular descent, while on the E. side they descend to the level of the valley by a gentle declivity. There are also two or three cross ranges, of no great height, of trap-rock connecting with mountains on the eastern or western border of the valley. These trap ranges are broken by several gaps, cutting them completely through; one of these affords a passage for the Farmington River; another opens a way for the railroad from Hartford to Waterbury. The eastern part of the State, which is drained by the Thames and its affluents, has no broad valley, but numerous narrow ones, and the underlying rocks being granitic and metamorphic, the hills which bound these valleys are gently rounded slopes, cultivable even to their summits. This portion of the State is excellent grazing-land, and much of it is celebrated for its dairy products; while the numerous waterfalls and the uniformity of the streams make it a favorable region for manufactures, which are largely conducted in this section. The western part of the State, drained by the Housatonic and its tributaries and by the Tunxis, is of broken surface, with sharp cliffs and large boulders, while the surface is much of it covered with rocks. Less than a moiety of the land is susceptible of successful tillage, and the passage from one valley to another over the rough and precipitous hills is very difficult. Many of the valleys, though narrow, afford good and succulent pasture, and the butter, cheese, and condensed milk of Litchfield county have a reputation far beyond the limits of the State. S. of the point (Brookfield) where the Housatonic turns south-eastward the western part of the State is sandy and gravelly, though portions of it yield fine crops by the application of highly stimulating manures. The proximity of this portion of the State to New York has led to extensive culture of the small fruits and vegetables, which find a ready market in the metropolis. The shore line for a distance of from 5 to 15 miles back from Long Island Sound is alluvial and diluvial, and excessively sandy, but, by the application of large quantities of menhaden and the fish and other guanos, yields good crops of potatoes, rye, oats, and Indian corn. There are no elevations deserving the name of mountains in the State, the highest elevation being considerably below 1000 feet.

There is a large amount of mineral wealth in the State.

Neither gold nor silver has been found in any considerable quantities, though both the copper and lead ores are argentiferous. Copper is found in various parts of the trap-rock range; the Simsbury copper-mines were worked many years before the Revolutionary war, and subsequent to that event were made the State prison and worked by convict labor. The copper-mines in Bristol have yielded large amounts of copper, but owing to the comparatively small percentage of pure metal in the ore, and the heavy expense of raising it, the mines in both places have proved unprofitable in face of the abundant yield and purer ores of the Lake Superior region. Argentiferous galena, yielding a large percentage of silver, has been worked at various times in Middletown, but the net result has not been profitable. The iron ores of the State have been worked with advantage for about 125 years. Bog-iron ore is found in various parts of the State, but the extensive beds of hematite ore in Salisbury and Kent, as well as less extensive ones in Sharon, Cornwall, and Canaan, have yielded the best quality of charcoal iron in the country. These mines were opened about 1750, and the greater part of the iron required for cannon, for the chains across the Hudson, and for other purposes during the Revolutionary war, came from the Salisbury furnaces. The valley of the Housatonic above New Milford, and the narrow valleys which branch out from it, abound in limestone of the best quality, both for burning and building or ornamental purposes; and the Canaan lime, as it was called, held for many years the first rank in the market. The New Preston marble-quarries in the town of Washington, Litchfield co., furnish an admirable quality of dense white marble of pure color and fine grain, for which there is a constant demand. But the finest building-stone in the State, and that most in demand all over the U. S., is the red sandstone (better known as brownstone or freestone) from the quarries on both sides of the Connecticut River at Portland and Cromwell. The Portland quarries are the oldest, but both towns yield a stone identical in quality and color—an excellent building-stone, and which is in great demand for covering or veneering the fronts of brick buildings from its excellent properties of durability, resistance to climatic action, and quiet but effective color. Quarries at Bolton and at Haddam yield excellent qualities of flagging stone, which splits smoothly and wears well. There are also at the latter place extensive quarries of granite and gneiss. Sulphate of barytes (heavy spar) is found in large veins in the E. part of Cheshire and Southington, and is quarried and sent to New York, Boston, and Philadelphia to be used with white lead for paints. Hydraulic lime in immense quantities is found on the borders of Southington and Berlin, and large quantities of hydraulic cement are manufactured from it. There are quarries of a good tiling slate. In Milford and North Milford there is a quarry of a beautiful green marble of a quality nearly or quite equal to *verd antique*, but the expense of working it has proved very heavy. Fire-clay, porcelain-clay of excellent quality, and potter's clay are found in various parts of the State, and firebricks and firebrick furnaces and crucibles are made at New Milford, and the felspar quarried for porcelain at Middletown. There are mineral springs in various parts of the State, but those most celebrated are the slightly sulphurous chalybeate springs at Stafford. Salt is made by evaporation from sea-water at Stonington and other points on the shore of Long Island Sound.

Vegetation, Zoology, and Climate.—The forest trees of Connecticut, now much less numerous than formerly, since large tracts have been felled for ship-timber, for furnace and brick-kiln use, and for the production of charcoal, are those which are most serviceable in manufactures. Neither the pine nor the hemlock is abundant, but the white oak (an excellent ship-timber), the yellow and red oak, the hickory or walnut, the chestnut, butternut, tulip tree or white wood, beech, birch, ironwood or hop-hornbeam, sugar, rock, silver, and red maple, ash, elm, sassafras, wild cherry, red cedar, juniper, and among the shrubs or small trees the alder, box-elder, shad-bush, spice-bush, etc., are the principal trees of the forests which yet remain. Among the wild fruits are wild grapes, beach and sloe plums, crab-apples, whortleberries, blackberries, dewberries, raspberries of several varieties, barberries, cranberries, gooseberries, strawberries, partridge and wintergreen berries.

The State has been so long settled, and is so densely populated, that there are very few wild animals left in it. Foxes are occasionally, though rarely, found in the western counties, and the gray rabbit, gray, red, striped, and flying squirrels are found, though not in large numbers, in most parts of the State. Occasionally the wild-cat is seen in the larger forests, while the skunk, the muskrat, the woodchuck, and the smaller burrowing animals, moles, field-mice, and those pests, the Norway and water rat, appear in considerable numbers. Among birds, the birds of prey are represented by the eagle (two or three species), several species of hawk, some of them large, four or five species of gulls, as many of owls, the crow, raven, etc., while the robin, oriole, redbird, crow blackbird, blackbird, jay, blue-bird, hanging-bird, woodpecker, thrush, brown thresher, several of the finches, the wren, swallow, whippoorwill, humming-bird, etc., represent the class of song-birds; the grouse family and its congeners, and the pigeon, quail, partridge, pinnated grouse or heath-hen are found, snipe and woodcock are plenty in swamps and woods along the sea-shore, and several species of duck, wild geese, etc. are found along the rivers and bays. Fish, especially of the edible kinds, abound in the waters of the State. The shad, tautaug or blackfish, bluefish, porgy, black, rock, and striped bass, flounder, sturgeon, pickerel, perch, roach, sheepshead, weakfish, catfish, menhaden, etc. abound; the salmon, formerly so abundant in the Connecticut River, has recently been restored to it, and in the sound are found the shark (several species), the stingray, the skate, and occasionally the porpoise and the blackfish, a small species of whale. The shores of the sound abound in the best qualities of shellfish, the oysters, long or soft-shelled clams of several species, quahogs or round clams, scallops, and mussels being of excellent flavor. Lobsters, crabs, king-crabs, sea-urchins, sea-spiders, etc. are also very plentiful. Reptiles are less abundant than in most States. The only venomous snakes are the rattlesnake and two or three species of adder, and these are not abundant. The other snakes, of which there is a very considerable variety, though no great number of individuals, are all harmless, except the racer or blacksnake, our North American representative of the boa constrictor tribe, which crushes its prey in its folds. These are now found but rarely. Two or three species of frogs, as many of toads, and four or five of the lizard tribe, are the only other reptiles worthy of note. The *climate* of the State does not vary materially from that of the other States of the same latitude on the Atlantic slope. The spring opens usually from the 10th to the 20th of April, and except occasionally a single slight frost in September there is no more cold weather until November. The winters are, away from the sea-board, usually severe, and considerable snow lies on the ground sometimes for months. The temperature in summer is often high, and averages about 70° F. during the summer months, permitting most varieties of the grape and Indian corn to come to perfection. In the Connecticut Valley heavy fogs prevail during a part of the summer and autumn months. There seems to be little or no marsh miasm in the State, and intermittent and remittent fevers do not originate there. In diseases of the lungs, though more favorable than most of the other New England States, it is less so than the Southern or South-western States.

Agricultural and Manufacturing Products, Fisheries, etc.—Connecticut is not largely an agricultural State, much of her wealth being invested in manufacturing, commercial, and banking enterprises; but her fertile lands are under a high state of cultivation, while the comparatively barren ones are, under skilful husbandry, made to produce fair crops. The State Agricultural Society is an efficient body, and has done much to promote good farming. The statistics of the leading crops for the year 1872 were—Indian corn, 1,705,000 bushels, raised on 54,647 acres, and estimated as worth $1,568,600; wheat, 37,100 bushels, raised on 2182 acres, and worth $61,215; rye, 311,000 bushels, raised on 19,683 acres, and worth $342,100; oats, 1,063,000 bushels, raised on 29,692 acres, and worth $648,430; barley, 23,000 bushels, raised on 995 acres, and worth $20,700; buckwheat, 94,900 bushels, on 4942 acres, and worth $91,104; potatoes, 1,819,000, on 18,190 acres, and worth $1,491,580; tobacco, 8,336,000 pounds, on 5052 acres, and worth $2,500,800; hay, 534,000 tons, raised on 472,566 acres, and worth $13,910,700. The live-stock in the State in Jan., 1873, was as follows: 50,300 horses, valued at $4,974,167; 106,800 milch cows, worth $4,218,600; 111,200 oxen and other cattle, worth $4,521,392; 83,200 sheep, worth $410,176; 63,700 hogs, worth $836,381. According to the census of 1870, Connecticut had 1,646,752 acres of improved land in farms, and 717,664 acres unimproved, of which 577,333 acres were woodland. The cash value of its farms was $124,241,382, and of farming implements, $3,246,599. The total amount of wages paid for farm-labor was $4,405,064, and the estimated value of all farm products for the year 1869–70 was $26,482,150. The following additional statistics of the agriculture of the State are only collected at each decennial period, and refer to the census year 1869–70: The value of animals slaughtered or sold for slaughter was $4,881,858; the value of home manufactures, $53,297; of forest products, $1,224,107; of market-garden products, $599,718; of orchard products, $535,594; of wool, 254,129* pounds; of hops, 1004 pounds; of maple-

* There is reason to believe this an under-estimate.

sugar, 14,266 pounds; of sorghum molasses, 6832 gallons, and of maple molasses, 168 gallons; of sweet potatoes, 867 bushels; of peas and beans, 13,038 bushels; of beeswax, 1326 pounds; of honey, 32,158 pounds; of domestic wine, 27,414 gallons; of clover seed, 1725 bushels; of grass seed, 4471 bushels; of butter, 6,716,007 pounds; of cheese, 2,031,194 pounds; of milk sold, 6,253,259 gallons.

Connecticut is eminently a *manufacturing* State, ranking in the capital employed, notwithstanding the smallness of her territory, fifth, and in the value of her manufactured products eighth, in the list of States. It is to be regretted that the statistics of her manufactures in the census report are confessedly so inaccurate. The superintendent of the census estimates that the reported capital invested in manufactures is not more than one-fourth of that actually employed, and that in the other particulars there are necessarily great errors, mostly, it is supposed, in the way of under-estimate. The census of 1870 reports that in the year 1869–70 there were in Connecticut 5128 manufacturing establishments, operated by 711 steam-engines of 25,979 horse-power and 1988 water-wheels of 54,395 horse-power; these establishments employed 89,523 persons, of whom 61,684 were adult males, 20,810 adult females, and 7029 children. The capital invested is stated at $95,281,278, the amount of annual wages paid at $38,987,187, the value of materials at $86,419,579, and the annual product at $161,065,474. Among the largest of these industries were manufactures of cotton goods, of which there were 111 establishments, employing 12,086 hands, having a reported capital of $12,710,700, paying $3,246,783 in annual wages, using raw material of the value of $8,818,651, and producing goods valued at $14,026,334; woollen goods, of which there were 103 factories, employing 7285 hands, having a reported capital of $12,490,400, paying for annual wages $2,860,120, using raw material costing $11,016,925, and producing annually goods valued at $17,365,148; various manufactures of iron, of which there were in all 120 establishments, employing 3866 persons, having a reported capital invested of $5,202,650, paying as annual wages $977,897, using raw material of the value of $3,632,317, and producing iron and iron goods of the annual value of $7,018,711; hardware and saddlery hardware, 155 establishments, employing 7721 persons, reporting a capital invested of $7,138,645, paying wages to the annual amount of $3,748,822, using raw material valued at $5,344,811, and producing goods to the annual value of $12,672,034; India-rubber and elastic goods, 13 establishments, employing 1946 persons, a capital estimated at $2,345,000, paying as wages annually $761,434, using raw material estimated at $2,355,488, and producing annually goods to the amount of $4,239,329; firearms and small-arms, 8 establishments, employing 1607 hands, reporting $1,793,770 of capital invested, $1,100,668 wages paid annually, $315,247 worth of raw material used, and $2,222,873 of goods annually produced.* In the manufacture of clothing there are 244 establishments, employing 3414 hands and a capital reported at $1,250,220, expending $2,666,068 for raw material, and producing goods to the value of $4,481,259; of hat and cap manufactories there were 33, employing 2464 hands, a reported capital of $1,153,300, and producing from $1,894,647 worth of raw material, goods to the value of $3,740,871; there were 205 carriage and wagon factories, employing 2341 hands, and producing from $1,798,299 worth of raw material goods to the value of $4,164,480; there were 42 establishments for the manufacture of plated ware, employing 2107 hands, a capital reported at $2,337,500, and producing from $2,005,090 worth of raw material, goods to the value of $4,066,806; in the manufacture of machinery of all kinds there were 108 machine-shops, employing 2770 hands, reporting a capital of $4,342,641, and producing from $1,617,444 worth of raw material, machinery to the value of $5,010,379; there were 9 factories for sewing-machines and sewing-machine fixtures, employing 2525 hands, capital reported at $2,492,000, and producing from $1,356,015 worth of raw material, machines and fixtures to the value of $4,507,850; there were 23 silk-factories, employing 1703 hands, reporting a capital of $1,414,130, and producing from $2,049,834 worth of raw material, silk goods to the value of $3,314,845; the manufacture of paper is conducted in 66 paper-mills, employing 1397 hands, reporting a capital of $2,988,046, and producing from $3,327,266 worth of raw material, paper to the value of $4,874,241. The other branches of manufacturing industry which produced goods to the reported value of over $1,000,000 were—agricultural implements, 38 establishments, producing goods to the value of $1,183,947; bleaching and dyeing, 18 establishments, producing goods worth $2,849,743; boots and shoes, 38 establishments, producing $1,939,652 worth of goods; brass-founding and brass-wares, 47 establishments, producing goods to the amount of $2,404,990; carpets, 21 factories, with $1,530,000 capital, producing $2,027,136 worth of carpets; clocks and clock-cases and materials, 28 factories, employing 1471 hands, and making from $941,572 worth of raw material $2,747,153 worth of clocks and cases; cutlery, including edge-tools and axes, 125 establishments, employing 2378 hands, and producing goods to the value of $3,059,806; drugs and chemicals, 6 manufactories, employing 261 hands, and producing goods to the value of $1,289,845; flouring-mill products, 150 establishments, producing flour, etc. to the value of $2,946,010; furniture, 56 shops, producing $1,103,690 worth of furniture; hosiery, 14 factories, making $1,251,742 worth of goods; leather, tanned and curried, by tanneries, producing $1,024,316 worth of leather; lumber, sawed and planed, 145 mills, producing $1,774,014 worth of lumber; printing and publishing, 42 offices, producing papers, periodicals, books, etc. to the value of $1,094,440;† saddlery and harness, 106 shops, producing $1,055,350 worth of goods; straw goods, 3 factories, employing 1010 hands, and producing goods to the value of $1,026,000; tin, copper, and sheet-iron ware, 129 shops, employing 968 hands, and producing wares valued at $1,625,774; tobacco and cigars, 100 shops, producing goods to the amount of $1,133,665. There are 20 quarries and mines (mostly quarries), having a reported capital of $1,496,100, and producing annually to the amount of $1,227,400. There are also 171 fishing establishments, exclusive of the whale fisheries, having $421,775 capital, and yielding an annual product of $769,799.

Railroads.—There are 22 railroads wholly or in part in the State, having an aggregate length of 886 miles, aside from sidings, etc., which, added, made about 978 miles of completed railroad-tracks in April, 1873. The total number of miles of road in operation by all these railroads, including the portion in other States, is 1163 miles, exclusive of sidings, etc. The total capital of these roads was $41,542,100. Their cost and equipment have been not far from $50,000,000. The gross receipts for the year ending April, 1873, were $11,368,425.26, and the net income was $3,169,902.41. Only one of these roads can really be considered a trunk-line—viz. the New York, New Haven and Hartford, extending from New York to Springfield, Mass., and connecting there with the Boston and Albany R. R. of Massachusetts, with which it forms part of the trunk-line to Boston, Portland, and Halifax. The capital of this road is $15,500,000. The Hartford Providence and Fishkill forms a part of the New York and New England, which is intended to extend from Boston to Fishkill, and, crossing the Hudson by a lofty bridge, connect with the Erie Railway. The Norwich and Worcester, in connection with the Shore line and a line of steamers, forms another route from New York to Boston. The Shore line skirts the sound from New Haven to Stonington, and forms, with the New York and New Haven and the Stonington and Providence, a very direct route from New York to Providence, R. I. The New Haven Middletown and Willimantic R. R., not yet completed between Middletown and Willimantic, is intended to form a very direct route between New York and Boston, known as the Air-Line route. The Connecticut Western has a general N. W. course from Hartford through Litchfield co., connecting with the Naugatuck, Housatonic, and Harlem R. Rs. The remaining railroads, except some short branches, traverse the valleys from S. to N., and the State is very thoroughly gridironed with railways. Telegraphic wires run along all the railroad routes, and in some instances connect with towns on other highways.

Finances.—The valuation (called in this State the "grand list") for purposes of taxation amounted for the year Oct., 1872–73, to $348,855,457. The true valuation of the State, according to the census of 1870, was $774,631,524. The taxation of the State for the year ending Mar. 30, 1874, was estimated at $2,072,510, of which the State tax proper (on real and personal estate) was $697,710, the remainder being made up from the dues from savings banks, railroads, insurance and express companies, interest, commutation tax, etc. The State debt outstanding April, 1873, was $5,095,900, and there were funds on hand to retire $500,000 of the State bonds. The amount of interest paid on State bonds was $333,402. The amount of revenue received from all sources during the year ending April 1, 1873, was $2,054,465.24, and there was a balance in the treasury from the previous year of $716,345.40. The expenditures for all purposes, including the purchase and destruction of $673,400 of the State bonds, was $2,201,073.50. Besides the State debt, which will probably be extinguished within ten years, there were in 1870 town, city, and borough

* These returns are certainly an under-estimate, as in favorable years a single establishment produces goods to a larger amount than that attributed to the whole eight, and another nearly reaches that amount.

† Under-estimated.

debts, for which bonds had been issued, to the amount of $6,837,417, and debts not bonded of $2,969,486, as well as $6103 of county indebtedness; making the entire debts of the smaller incorporated communities $9,816,006. The State has little or no direct foreign commerce; there are indeed a few vessels which run to the West Indies, in connection with a coasting-trade, and some whale-ships (though the number is decreasing every year) from the ports of New London, Mystic, and Stonington. The cod and mackerel fisheries, on the coast of the British provinces, are also conducted in part from the sound ports. The internal trade and commerce of the State is very large. Being readily accessible, and with but a few hours' travel to New York and its suburban cities, as well as to Boston and its suburbs, the agricultural, horticultural, manufacturing, fishery, and quarried products of the State find a good and quick market. Its numerous banks, savings banks, life, fire, and accident insurance companies also promote its internal commerce, and have conspired to render it, in proportion to its population and territory, one of the richest of the States, if not the richest State in the Union.

Banks.—In proportion to its extent and population Connecticut has been more largely engaged in banking than perhaps any other State in the Union. For many years she supplied the West very largely with currency for moving its crops to market. The changes resulting from the establishment of the national banking system, and the organization of national banks in most of the Western cities and towns, have led to the abandonment of much of this business, but the principal banks of the State, as well as the private bankers, still do a large foreign business. There were on the 1st of April, 1873, 80 national banks in the State, having an aggregate capital of $27,000,000; 4 State banks of discount, with a capital of $1,450,000; 11 trust companies with power of discounting, having an aggregate capital of $2,263,890, and deposits to the amount of $2,869,406.19. There were also 78 savings banks, with assets amounting to $71,271,394.10, and 17 private banking houses, some of them with large capital. Thus, the capital on hand for banking purposes, aside from the deposits in the national and State banks, and the capital and deposits of the private bankers, was over $100,000,000.

Insurance.—Both life and fire insurance, and of late years accident insurance also, have formed an important portion of the business of the State. There were in July, 1873, 29 fire insurance companies incorporated by the State, and agencies of 63 companies incorporated by other States, and of 8 foreign companies. Of the 29 Connecticut fire and marine insurance companies, 13 were joint-stock companies, including one steam-boiler inspection and insurance company, having a paid-up capital of $5,812,000, subsequently increased to $7,062,000. The gross assets were $12,650,000, and the liabilities, not including capital, were $6,761,013.57. The gross amount of risks in force in these companies was $702,014,478, and of premiums received thereon, $8,459,184.53. To these sums respectively must be added $1,464,333 of risks on marine and inland business, and $46,133.83 of premiums thereon. The mutual fire insurance companies, 16 in number, had cash assets to the amount of $620,694.39, and had about $63,000,000 of risks in force at the beginning of 1873. There were in the State July 1, 1873, 8 life and 2 accident insurance companies, having a paid-up capital of $2,069,864, and assets amounting to $80,090,576. The net amount of outstanding insurance on Jan. 1, 1873, was $461,019,045, of which $73,836,241 was insured in 1872. One of these companies (the Connecticut Mutual) is, with one exception, the largest life insurance company in the U. S. 23 life insurance companies from other States also did business in the State.

Population.—The growth of the State in population has not been as rapid as that of some of the Western and Southern States, owing to the limited extent of its territory and the constant emigration of its citizens to other regions. According to the census of 1870, there were living, in that year, 137,000 citizens of other States who were born in Connecticut, and the entire number who in the past eighty years had migrated to other States exceeds the present population of the State. In 1790 Connecticut had a population of 237,946; in 1800, 251,002; in 1810, 261,942; in 1820, 275,148; in 1830, 297,635; in 1840, 309,978; in 1850, 370,792; in 1860, 460,147; in 1870, 537,454. The density of the population to the square mile is 113.1. Of the entire population in 1870, 265,270 were males, 272,184 females. The whole number born in the State or in the U. S. was 423,815 (of whom 350,498 were born in the State); of these, 207,014 were males and 216,801 females; 113,639 were of foreign birth, of whom 58,256 were males and 55,383 were females. Of the foreign-born population, 87,157 were from Great Britain and Ireland, 12,443 from Germany, 10,861 from British America (mostly Canadian French), 821 from France, 492 from Switzerland, 511 from Sweden, Norway, and Denmark, 117 from Italy, 191 from the West Indies, 154 from Austria, 99 from Holland, 95 from Bohemia, 83 from Poland.

Education.—The State has a high reputation for the excellence of its facilities for education. It has for its public schools a school fund having a capital of $2,043,375.62, and yielding an annual income of $132,943; a town deposit fund of $763,661.83, yielding an income of $45,712.80; and an annual income from local funds of $11,348.05. The State treasury pays the annual sum of fifty cents per head for the children of school age towards the support of public schools, amounting in 1873 to $66,472; the towns raised by school-tax in 1873, $642,194.11, and the districts, $485,525.56, while from voluntary contributions and other sources $60,268.49 more were added, making $1,442,669.01 received for the public schools during the year, while $1,528,440.07 was expended, of which $384,230.11 was for new school-houses and repairs, and $888,871.89 for teachers' wages. The number of children between four and sixteen years of age in the State in Jan., 1873, was 132,943, and the total cost of education annually per head $10.95. The number of different scholars registered during the year was 114,805; the number of children in other than public schools was 9029. The average attendance in the public schools in winter was 67,559; in summer, 58,113. The average wages per month of male teachers was $67.01; of female teachers, $34.09. The number of school districts in the State in 1873 was 1521; of public schools, 1638; of departments in public schools, 2348, of school-houses, 1647; of graded schools, 232. The average duration of the schools in months and days was eight months and three days. There is a State normal school at New Britain, which has 7 instructors, 185 students, and graduated 37 teachers in the year 1872–73. Its annual expenditure is about $12,000. Seven teachers' institutes were held in the State in 1872–73, with an average attendance at each of 113 teachers; usually, nine are held; the expense is about $3000 per annum. There are in the State, according to the census of 1870, 265 private schools and schools of secondary instruction, including under this head boarding-schools, female seminaries, institutes, collegiate and rectory schools, etc. In these there are 430 teachers and instructors, 140 males and 290 females; 7292 pupils, 3755 males and 3537 females; and endowments and tuition sufficient to give them an annual income of $164,220. There are also 6 parochial schools, with 5 male and 28 female teachers, with 1539 pupils (793 males and 746 females), the income of which is not reported. There are three colleges in the State: 1, Yale College at New Haven, founded in 1701, which is really a university in the German sense, having, in addition to its classical course, faculties and schools of theology, law, and medicine, an admirable scientific school with a large corps of professors, a school of art, and a school of agriculture. It had in the classical course, in 1873–74, 512 students; in the theological seminary, 101; in the law school, 46; in the medical school, 32; in the Sheffield Scientific School, 242; and in the art school and as resident graduates, 70; making a total of 955 students and 82 professors and other instructors. 2, Trinity (formerly Washington) College at Hartford, founded in 1823, and now entering, in its fiftieth year, upon a career of great activity and usefulness from its new site, its ample endowments, and facilities. In 1873 it had 89 students and about 20 professors and instructors. 3, Wesleyan University at Middletown, founded in 1831, and now also liberally endowed. In 1872–73 it had 189 students and 15 or 16 professors and instructors. These three colleges are respectively under the care of the Congregationalists, the Episcopalians, and the Methodists. There are in connection with the Wesleyan University and Trinity College the nuclei for post-graduate courses which will probably develop into scientific schools. There is at Hartford a theological seminary, also belonging to the Congregationalists, called the Theological Institute of Connecticut, which has 5 professors and 29 students; and at Middletown the Berkeley Divinity School, under the control of the Episcopal Church, having 4 professors and 31 students. The Baptists have a large and flourishing collegiate institute at Suffield, with a full corps of teachers and pupils of both sexes. Of schools of special instruction there are 3 in the State. The American Asylum for the Deaf and Dumb at Hartford is the oldest institution of its class in this country, and the mother of all the others. It was founded in 1817 by Rev. Thomas H. Gallaudet, and has 25 instructors and other officers, and an average annual attendance of about 230 pupils, and a total attendance during the year of 280. Of these, 60 were from Connecticut, the remainder from other States. The course of instruction includes a high class, with a course nearly analogous to that of the first two years in our colleges, though with a smaller measure of classical instruction. The whole term

of instruction, including this class, is seven years. There is also a home school for deaf-mutes at Ledyard, in charge of Mr. Z. C. Whipple, where these children are taught articulation by a process invented by Mr. Whipple; this school is yet small in numbers. The blind persons of school age in the State are provided for at the Perkins Institution and Massachusetts Asylum for the Blind in Boston. The annual appropriation is $6000, but it is not all called for. The usual number of pupils is about 25. There is a school for imbeciles and idiots at Lakeville, Salisbury, Litchfield co., which is aided by the State. It had 61 pupils in 1872–73, and has been very successful in developing the dormant intellects of these unfortunate children. There are also two reformatory schools, established by the State. The State Reform School at Meriden has been in existence for many years, and is in a prosperous condition. It had in Mar., 1873, 301 boys under instruction and training, 160 having been discharged and 147 received during the year. The Connecticut Industrial School for Girls at Middletown was opened in 1870. It had on April 1, 1873, 75 girls remaining in the institution; 34 had been dismissed during the year, and the same number received. There are in the State two hospitals for the insane: the General Hospital for the Insane at Middletown, which had in the year ending Mar. 31, 1873, 336 patients, an average residence of 265, and at the close of the year 271; and the Insane Retreat at Hartford, an incorporated institution, but largely aided by the State, which had nearly as many patients.

Libraries.—The public libraries of the State are some of them very large and of great value. In the ninth census no report was made of private libraries in the State, though some of them are known to be of great extent and value. Of the 63 public libraries reported by the census marshals, and containing in the aggregate 285,937 volumes, are the State Library with 12,000 volumes; the library (or rather libraries) of Yale College, containing 101,000 volumes, and forming the most valuable collection in the State; the library of Wesleyan University, containing nearly 30,000 volumes; that of Trinity College, about 15,000 volumes; the Watkinson Library of Reference and the Connecticut Historical Society's library, containing together about 37,000 volumes; the Silas Bronson Library at Waterbury, with 15,000 volumes; Otis Library at Norwich, with 7500 volumes; the library of the Theological Institute at Hartford, about 8000 volumes; the Young Men's Institute Library at Hartford, with 23,000 volumes; the New Haven Young Men's Institute Library, with 11,000 volumes; the New Britain Institute, with 5000 volumes, etc. Of the private libraries, the most remarkable are—the very large library of Mr. George Brinley of Hartford, devoted exclusively to American local and general history, and more complete on this subject probably than any other in the U. S.; the library of Hon. Henry Barnard, also of Hartford, mostly devoted to educational topics, and more complete on that subject than any other, public or private; the library of Hon. J. Hammond Trumbull, also of Hartford, on Indian languages and literature; those of President Porter, of Ex-President Woolsey, and of Prof. E. E. Salisbury, all of New Haven, the last being very full on all Oriental languages and science, etc.

Newspapers.—In 1870 Connecticut had 71 newspapers of all classes, having an aggregate circulation of 203,725 copies, and issuing annually 17,454,740 copies. Of these, 16 were daily, having a circulation of 35,730; one was semi-weekly, with a circulation of 800; 43 were weekly, with a circulation of 107,395; 2 were semi-monthly, with 900 circulation; 7 were monthly, with 56,400 circulation; 1 bi-monthly, with 1150 circulation; 1 quarterly, with 1350. The daily papers are, we believe, without exception, political; of the weeklies, 5 are religious, 10 or 12 literary, and the remainder political or miscellaneous; the monthlies are religious, scientific, and literary; the bi-monthly is theological and literary; the quarterly scientific.

Churches.—The census of 1870 reports 826 church organizations of all denominations, 902 church edifices, with 338,735 sittings, and $13,428,100 of church property. Of the Baptists, the census reports 116 churches, 120 edifices, 45,150 sittings, and $1,378,400 worth of church property. The Baptist "Year-Book" for 1873 gives 118 churches, 123 ordained ministers, 19,590 members, 108 Sunday schools, with 1613 teachers, 13,835 scholars, and 16,555 volumes in libraries. The contributions to benevolent objects, exclusive of the support of the churches, pastors, and Sunday schools, were $158,585.80; inclusive of these, about $290,000. Of the Christians in 1870, there were 4 churches, 4 church edifices, 750 sittings, and $6500 church property. Of the Congregationalists, the census reported 290 organizations, 360 church edifices, 133,175 sittings, $4,728,700 worth of church property. The "Congregational Quarterly" in Jan., 1873, reported 294 churches, 355 ministers, of whom 241 are engaged in pastoral work, 49,524 members, 49,952 scholars in Sabbath schools; benevolent contributions, $300,622.05, besides $183,093.69 of charitable legacies. Add expenses of home support, and the total would be about $833,000. The Episcopal Church, according to the census, had 139 parishes, 147 church edifices, 50,962 sittings, and $3,275,534 of church property. The "Connecticut Register" and the "Episcopal Almanac" for 1873 give 144 parishes, 174 clergymen, 11,046 families adherent, 15,969 communicants, 1595 Sunday-school teachers, 11,236 Sunday-school scholars, $326,513.84 of benevolent contributions, with home expenses about $475,000. The Friends have 2 organizations and 3 meeting-houses, with 350 sittings and $1500 of church property. The Lutherans in 1870 had 4 churches, 3 church edifices, 1240 sittings, and $23,500 of church property. The Methodist Episcopal Church in 1870 had 184 churches, 188 church edifices, 63,975 sittings, and $1,834,025 of church property. According to the "Conference Minutes" for 1873, there were 204 churches, 185 travelling and 135 local preachers, 21,308 members in full connection, 2193 probationers, $1,893,050 of church property, $22,097 of benevolent contributions, outside of church, ministerial, and Sunday-school support, or with these about $230,000; there were 170 Sunday schools, with 2837 teachers and 17,584 scholars. There are also 2 Protestant Methodist and 7 African Methodist churches in the State. The Presbyterian Church in 1870 had 7 churches, 10 church edifices, 3875 sittings, and church property valued at $195,300. In 1873 there were 16 churches and 27 ministers of that denomination, of whom 16 were pastors. In 1870 there were 1 Reformed (Dutch) and 1 Reformed (German) church in the State. In 1870 the census reported the Roman Catholics as having 44 parishes, 34 church edifices, 26,418 sittings, and property valued at $1,429,500. In 1873 Sadlier's "Catholic Directory" reports 76 churches, besides 9 more building, 60 chapels and outstations. The diocese of Hartford comprises the whole State, and is governed by a bishop, assisted by a vicar-general. A cathedral is building at Hartford, and there are convents and monasteries. There are also 77 priests, 1 male and 9 female academies, 18 male and 19 female free parochial schools, with 8000 pupils, 3 orphan asylums, with 150 orphans, and an adherent population (somewhat exaggerated) of 140,000 persons. In 1870 there were 7 Second Advent churches and the same number of church edifices, with 1380 sittings, and church property valued at $8700. There is 1 Unitarian congregation, with a church edifice having 225 sittings, and church property worth $6000. The Universalists have 18 congregations, 15 church edifices, 17 ministers; the church edifices have 6850 sittings, and the church property is valued at $309,100. The Jews have 4 synagogues and 5 rabbis; the number of sittings must exceed 2000, and the value of the property is hardly less than $120,000.

Constitution.—The present constitution of the State was adopted in 1818, the State having previously been under the charter granted by Charles II. in 1662. Repeated efforts have been made to call a constitutional convention for the revision of the constitution or the formation of a new one, but these efforts have not as yet proved successful. The constitution provides for perfect freedom of religious worship; for the promotion of education and the various interests of the State; for a legislature in two branches, each town to be represented by one or two representatives in the house of representatives, such representatives to be chosen annually; the senate to be composed of not less than 18 nor more than 24 members, to be chosen annually, one from each senatorial district (the number of districts is now 21); the election for both senators and representatives, as well as for the governor, lieutenant-governor, secretary of state, treasurer, and comptroller (all of whom are chosen annually), is held on the first Monday in April, and they assume office on the first Wednesday in May. The house of representatives has nearly 250 members. The commissioner of the school fund, the State librarian, and the board of education are appointed by the legislature, the last in classes, having four years to serve. The secretary of the board of education is chosen by that board. Every male citizen of the U. S. who shall have attained the age of twenty-one years, who shall have resided in the State for one year and in the town where he offers to vote six months, and who is able to read any article of the constitution, is entitled to the privileges of an elector upon taking the oath prescribed by law. Convicts, idiots, and imbeciles are excluded from these privileges. The judiciary of the State consists of the supreme court of errors, consisting of one chief-justice and three or four associate judges, who shall also be judges of the superior court; of a superior court, over which the chief-justice and his associate judges preside, together with six other superior court judges, who are eligible for promotion to be judges of the supreme court. These are all chosen for a term of eight years, and

are eligible for re-election, but by the constitution they are disqualified from further service when they reach the age of seventy years. There are now also in the counties of Hartford, New Haven, New London, and Fairfield courts of common pleas, each presided over by a single judge. The supreme court is the court of final appeal, and has jurisdiction over all matters brought to it from the lower courts on writs of error. The superior court has cognizance of all causes, civil and criminal, which are brought before it by suit, appeal, writ of error, *scire facias*, complaint, petition, or otherwise, according to law, and may try the same by jury or otherwise, as the law may require, and proceed therein to judgment and execution; but in all criminal trials punishable by death the court must consist of at least two judges, one of whom must be a judge of the supreme court. The courts of common pleas have concurrent jurisdiction with the superior court in regard to smaller offences and civil actions up to a certain limit, being created to relieve the superior court from too great a pressure of small causes. Connected with this subject of the judiciary are the criminal statistics of the State. The State prison at Wethersfield has an average of 180 prisoners. The buildings are old and somewhat incommodious, but the general management of the prison is good, though stern. The prison is somewhat more than self-supporting, so far as ordinary expenses go, the excess of earnings over ordinary expenses being $3430 in 1872–73. There are ten jails in the State, two each in the counties of New London and Fairfield, and one in each of the other counties. To these jails there were committed in the year ending Mar. 31, 1873, 2954 persons—viz. 2358 white males, 425 white females, 140 colored males and 31 colored females. Of these, 424 males and 63 females were minors; 759 were natives of this State, 584 natives of other States, and 1611 of foreign birth; 239 were strictly temperate, 1598 were reported as moderate drinkers, and 1120 as habitually intemperate. Of the whole number, 455 were committed for offences against the person, 565 for offences against property, and 1934 for offences against society.

Representation in Congress.—The State has four representatives in Congress, each congressional district consisting of two counties—viz. first district, Hartford and Tolland counties; second, New Haven and Middlesex; third, New London and Windham; fourth, Fairfield and Litchfield.

Counties.—There are eight counties in the State. Their names and population in 1860 and 1870 were as follows:

Counties.	Pop. in 1860.	Pop. in 1870.
Hartford	80,962	109,159
New Haven	97,345	121,382
New London	61,731	66,688
Fairfield	77,476	95,370
Litchfield	47,318	48,732
Windham	34,747	38,535
Middlesex	30,859	36,117
Tolland	21,709	22,015

Principal Towns and Cities.—There are nine cities in the State. Of these, seven have a population of more than 10,000 inhabitants—viz. New Haven, 50,886; Hartford, 37,825; Bridgeport, 19,876; Norwich, 16,653; Waterbury, 13,148; Middletown, 11,143; Meriden, 10,521; while New London has 9580 and New Britain, 9480. The town of Norwalk has 12,122 inhabitants. The following towns have a population above 5000: Stamford, 9138; Danbury, 8754; Derby, 8027; Greenwich, 7672; Enfield, 6322; Stonington, 6320; Killingly, 5712; Fairfield, 5642; Vernon, 5447; Windham, 5413; Groton, 5119.

History.—The territory now embraced in the State of Connecticut, as well as the eastern part of Long Island, was first explored by the Dutch from the neighboring colony of New Netherlands, who laid claim to it, before 1620, but made no settlement within its limits till 1633. The first English patent to the New England proprietors was granted Nov. 3, 1620, by James I., and included all the territory between 40° and 48° N. lat., and extended from the Atlantic Ocean to the Great South Sea. The patent of Connecticut, granted in Mar., 1631, by the council of Plymouth, embraced "all that part of New England in America extending in breadth 120 miles, as the coast lieth, from the Narragansett River towards Virginia, and in longitude from the Western Ocean to the South Sea." This grant did not define the northern boundary of the prospective colony, but that defect was remedied by the patent of Massachusetts, which made their S. boundary a due W. line three miles S. from every part of the Charles River. The same year (1631) an Indian chief who was sachem of the region along the Connecticut River sent messengers to Gov. Winthrop of the Massachusetts Colony, and to Gov. Winslow of the Plymouth Colony, inviting them to come and settle or send emigrants to the Connecticut Valley. The invitation was not immediately accepted, but the following year an exploring-party from Plymouth ascended the Connecticut River as far as the mouth of the Tunxis River at Windsor, and there fixed upon a site for a settlement. The first trading-house and fort in the State was erected by the Dutch, at what is now known as Dutch Point in Hartford, June 8, 1633, Jacob van Curler, the agent of Wouter van Twiller, the Dutch governor of the New Netherlands, having purchased the land of Sassacus, sachem of the Pequots, and landed on that day at the point with a small company of Dutch soldiers. The trading-house and fort which he erected was called the House of Hope, and was held by the Dutch for several years, but was finally sold to the English colonists. The same year (1633), somewhat later in the season, a party from Plymouth, under command of Capt. William Holmes, sailed up the Connecticut River with a load of timber to build their trading-house at the mouth of the Tunxis, the site selected by them the previous year. The Dutch opposed their passage, and threatened to fire upon them; but after a short parley they sailed on past the House of Hope to their destination. Neither of these establishments, however, merits the name of colony, though the trading-house at the mouth of the Tunxis was the nucleus around which the Windsor colony subsequently gathered. The first permanent settlement of colonists was made at Wethersfield in the autumn of 1634, by a party of emigrants from Watertown, Mass. These emigrants suffered terrible hardships, and nearly perished in the cold and severe winter of 1634–35. Some additions were made to their number in 1635, and in 1636 colonies migrated from Watertown, Dorchester, and Newtown (afterwards Cambridge), Mass., and established themselves at Wethersfield, Windsor, and Hartford. At the close of that year there were about 750 inhabitants in the three towns. In 1635 a landing was made by a party under John Winthrop, Jr., at Saybrook, and the next year a good fort erected and a garrison stationed there. There was no permanent settlement, however, until 1639. The three towns, Wethersfield, Hartford, and Windsor, were for one year under the government of Massachusetts, but in 1637 organized an independent government, and immediately declared war against the Pequot tribe of Indians, who had murdered without provocation about thirty of the settlers. They were promised assistance from Massachusetts, but could not wait for it, and a force of ninety men, under command of Capt. John Mason, sailed from Hartford for Narragansett Bay on the 20th of May, 1637, and with the doubtful aid of some Indian allies, who were in great terror of the invincible Sassacus, attacked and destroyed the Pequot fort, and, killing 400 or more of the Indian warriors, completely broke up the tribe. In 1638 the first settlement was made at Quinnipiack (now New Haven) by a company of wealthy English people, under the leadership of Rev. John Davenport and Theophilus Eaton, afterwards governor of the colony. This settlement, with the adjacent towns, Milford, Guilford, etc., remained a separate colony until 1665, when it was united with Connecticut under the charter of 1662. The Saybrook colony was united with Connecticut in 1644, and before 1653 there were flourishing settlements at Farmington, New London, Middletown, Norwalk, Branford, and one or two other points, as well as two considerable towns, East Hampton and South Hampton, on Long Island, which belonged to their jurisdiction. For nearly thirty years they lived under a constitution of their own framing, a perfectly independent people. After the restoration of Charles II. to the throne of Great Britain there came a necessity for a royal charter, and John Winthrop, Jr., very adroitly succeeded in persuading the monarch in one of his most amiable moods to put his hand to the charter of 1662, which embodied most of the privileges of their previous constitution. The charter included the New Haven colony, to which they objected, and they were not formally united with the Connecticut colony until 1665, when the fear of invasion by the Dutch led them to consent to a union. In 1685–87 a strenuous effort was made by James II. to abrogate all the New England charters, and place all the colonies under one government, with a royal governor appointed by the Crown. The demand was made for the charter of the Connecticut colony by Sir Edmund Andros, the royal governor, in person, in Oct., 1687; but after some debate in the general court or colonial legislature at the evening session, the lights were suddenly extinguished, and the charter conveyed away secretly, and hidden in the hollow of an ancient oak on the Wyllys estate, subsequently known as "the Charter Oak." Sir Edmund Andros took possession of the government, and ruled very oppressively for a year and a half; but on his deposition after the fall of James II. the old charter was again recognized as the supreme law of the colony, and continued in force for 129 years thereafter. The general court or colonial legislature, which had judicial as well as

legislative and executive functions, held two annual sessions—one in May, the other in October. From 1665 to 1701 both sessions were held in Hartford, but in the latter year it was ordered that the May session should be held in Hartford and the October session in New Haven. When, by the adoption of the constitution in 1818, it was ordered that there should be but one session of the legislature annually, it was agreed that it should meet the even years at New Haven and the odd years at Hartford; and this arrangement is still continued, though by vote of the State in 1873, Hartford is to be the sole capital after 1874.

During the first and second French wars the colony of Connecticut was very prompt to send her full quota of soldiers to the British and colonial armies, and in the Revolutionary war, she furnished more men in proportion to her population, and more aid in proportion to her wealth, than any other colony. Twenty days before the Declaration of Independence the general assembly of Connecticut instructed their delegates in the Continental Congress to propose to that body "to declare the united American colonies free and independent States, absolved from all allegiance to the king of Great Britain." Governor Jonathan Trumbull ("Brother Jonathan") was perhaps the most wise and efficient of Washington's counsellors during the war. The State was the fifth of the States of the Union to adopt and ratify the Constitution of the U. S., performing that act Jan. 9, 1788. The events which preceded the war of 1812 were very destructive to the commercial interests of the State, which was at the time very largely engaged in the West India and the coasting trade, as well as in the fisheries, and many of her wealthiest citizens were ruined by the embargo and other acts and the Berlin and Milan Decrees of Napoleon. The State, however, furnished its full quota of men and means for the war, and did its whole duty. In Dec., 1814, a convention of delegates from the several New England States—all of which had suffered very heavily from the war in their commerce—met at Hartford to take into consideration the condition of public affairs and prepare a statement of their grievances. The convention was composed of the ablest and best citizens of those States, and entertained no disloyal purpose, but the speedy conclusion of the war made any subsequent action on their part unnecessary. In 1818 the State adopted its present constitution, by which all relics of slavery and of a State Church were abolished. This constitution was at the time of its passage one of remarkable liberality and wisdom. It now needs modification in regard to the basis of representation, and perhaps some other minor matters. The State, as we have seen, by its charter could claim a strip of land nearly sixty miles in breadth to the Pacific Ocean, but as this claim interfered with that of other States, an amicable settlement was made, the State only retaining a tract of land in Central and Western New York, and one in Northeastern Ohio. The avails of these lands, which were sold on the most liberal terms, were by the State consecrated to the support of public schools, and form the basis of her present school fund. Since 1818 the State has been generally prosperous and peaceful. She took an active part in the war of 1861–65, and sent her full quota of men into the field, as thoroughly equipped and supplied with all that was needful to their efficiency as those of any State in the Union. Her soldiers were distinguished on all the battle-fields of the war, and her war-governor, Buckingham, was one of the President's most trusted counsellors. Politically, the State is very equally balanced between the Democratic and Republican parties, and her legislation is in consequence more cautious and honest than it would be if either party were largely in the ascendency.

The arms of the State are three vines in fruit, two and one, all proper. The motto is *Qui transtulit sustinet*—"He who transplanted will sustain."

Governors of the State.

Samuel Huntington	1785–96	Isaac Toucey	1846–47
Oliver Wolcott	1796–98	Clark Bissell	1847–49
Jonathan Trumbull	1798–1809	Joseph Trumbull	1849–50
John Treadwell	1809–11	Thomas H. Seymour	1850–53
Roger Griswold	1811–13	C. H. Pond (acting)	1853–54
John Cotton Smith	1813–18	Henry Dutton	1854–55
Oliver Wolcott	1818–27	William T. Minor	1855–57
Gideon Tomlinson	1827–31	Alexander H. Holley	1857–58
John S. Peters	1831–33	Wm. A. Buckingham	1858–66
Henry W. Edwards	1833–34	Joseph R. Hawley	1866–67
Samuel A. Foote	1834–35	James E. English	1867–69
Henry W. Edwards	1835–38	Marshall Jewell	1869–70
William W. Ellsworth	1838–42	James E. English	1870–71
Chauncey F. Cleveland	1842–44	Marshall Jewell	1871–73
Roger S. Baldwin	1844–46	Charles R. Ingersoll	1873–

The following tables show the electoral votes for President and Vice-President at each presidential election from 1788 to 1872, and the popular vote for President at each election from 1824 to 1872. The record of the popular vote previous to 1824 is not exact:

Election Year.	Candidates for President and Vice-President.	Electoral Votes.
1788	Washington and Adams	7 and 5
"	Samuel Huntington of Conn. for V. P.	2
1792	Washington and Adams	9
1796	Adams and T. Pinckney of South Carolina	9 and 4
"	John Jay of New York for V. P.	5
1800	Adams and C. C. Pinckney of South Carolina	9
1804	C. C. Pinkney and R. King of New York	9
1808	C. C. Pinckney and R. King	9
1812	D. W. Clinton and J. Ingersoll of Pa.	9
1816	Rufus King and J. Ross of Pa.	9 and 5
"	John Marshall of Virginia for V. P.	4
1820	James Monroe and D. D. Tompkins	9
1824	J. Q. Adams and Andrew Jackson	8
1828	J. Q. Adams and Richard Rush of Pa.	8
1832	Henry Clay and John Sergeant of Pa.	8
1836	M. Van Buren and R. M. Johnson	8
1840	W. H. Harrison and John Tyler of Virginia.	8
1844	Henry Clay and Theodore Frelinghuysen	6
1848	Zachary Taylor and Millard Fillmore	6
1852	Franklin Pierce and William R. King	6
1856	J. C. Fremont and W. L. Dayton	6
1860	Abraham Lincoln and Hannibal Hamlin	6
1864	A. Lincoln and A. Johnson	6
1868	U. S. Grant and S. Colfax	6
1872	U. S. Grant and H. Wilson	6

Popular vote for President from 1824 *to* 1872.

Election Year.	Candidates.	Majority Vote.	Minority.
1824	Adams and Crawford	7,587	1,978
1828	Adams and Jackson	13,829	4,448
1832	Clay and Jackson	17,755	11,269
1836	Van Buren, Harrison, etc	19,234	18,466
1840	Harrison and Van Buren	31,601	25,296
	Birney		174
1844	Clay and Polk and Birney	32,832	31,784
1848	Taylor and Cass	30,314	27,046
	Van Buren		5,005
1852	Pierce and Scott	33,249	30,357
	Hale		3,160
1856	Fremont and Buchanan	42,715	34,995
	Fillmore		2,615
1860	Lincoln and Douglas	43,692	15,522
	Breckinridge and Bell	14,641	3,291
1864	Lincoln and McClellan	44,691	42,285
1868	Grant and Seymour	50,995	47,952
1872	Grant and Greeley	50,638	45,880

L. P. Brockett.

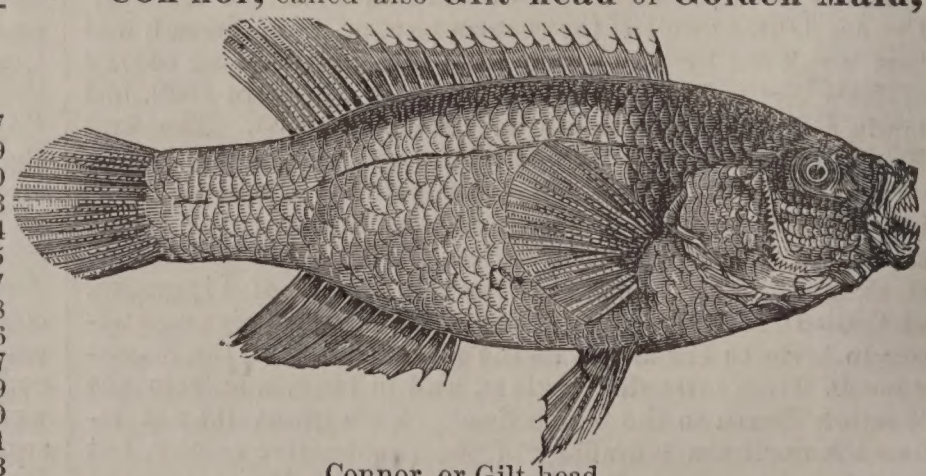
Con'nellsville, a post-borough of Fayette co., Pa., on the Youghiogheny River and on the Pittsburg Washington and Baltimore R. R., 57 miles S. S. E. of Pittsburg. It has a paper-mill and a woollen factory. It has also extensive mines of bituminous coal, and manufactures immense quantities of coke, which is called the best in the world. It has one weekly newspaper. Pop. 1292; of the township, exclusive of the borough, 1163.

Con'ner (David), born at Harrisburg, Pa., in 1792, entered the U. S. navy as midshipman in 1809, served with great honor in the war of 1812–15, and in the Mexican war as commodore. Died at Philadelphia Mar. 20, 1856.

Con'nersville, a post-village, capital of Fayette co., Ind., on the Whitewater River and on the Fort Wayne Muncie and Cincinnati R. R., 67 miles N. W. of Cincinnati. It has a fine court-house, seven churches, one national bank, and one woollen factory. It is on the Cincinnati and Indianapolis Junction R. R. It has two weekly newspapers. Pop. 2496; of township, 1211.

Connoquenes'sing, a township of Butler co., Pa. Pop. 1051.

Con'nor, called also **Gilt-head** or **Golden Maid,**



Connor, or Gilt-head.

a small European marine fish, the *Crenilabrus tinca.* A somewhat similar fish is the conner, blue perch, chogset, or bergall of the Atlantic waters of the U. S. (*Ctenolabrus cœruleus*). It is a tolerable fish for the table, for which it is extensively caught.

Co'no, a township of Buchanan co., Ia. Pop. 579.

Conococheague, a post-township of Washington co., Md. Pop. 1402.

Co′no-cu′neus [a compound of the Lat. *conus,* a "cone," and *cuneus,* a "wedge"], a skew surface of the fourth order, generated by a line moving on two directors, one of which is rectilinear and perpendicular to all generators, and the other is a circle usually perpendicular to the plane which contains its centre and the other director. The rectilinear director, and the line at infinity perpendicular to the latter, are double lines on the surface. Its equation is $c^2x^2 = y^2\,(a^2 - z^2)$, where a is the radius of the circular director, and c the distance of its centre on the axis of y from the rectilinear director or axis of x. This surface was discovered by Wallis.

Co′noid [Gr. κωνοειδής, "cone-like," from κῶνος, a "cone," and εἶδος, "form"], a skew surface, generated by the motion of a line which remains parallel to a plane, and has a rectilinear director. When the directing plane and line are perpendicular to each other, the latter is a line of striction on the surface. This line being taken as axis of z, the equation of the surface may be reduced to the form $z = f\left(\frac{y}{x}\right)$, whatever the nature of its second director. Should the latter be also a right line, not in the same plane with the first director, the conoid will be an equilateral paraboloid. The cono-cuneus of Wallis, already described, is also a conoid; and another example is the skew helicoid, the curvilinear director of which is a helix, having the rectilinear director for its axis. The under surface of a spiral staircase presents a familiar illustration of this conoid. A conoid may be regarded as having three directors—one curvilinear and two rectilinear; one of the latter being at infinity. If the first of these directors be a curve of the mth order, then the order of the conoidal surface will be $2m$, and each rectilinear director will be a multiple curve on the conoid of the mth order of multiplicity. The directing plane being horizontal, the lines of level on the surface will be the generators; the lines of greatest slope, since they cut the former lines perpendicularly, will be projected into circles on the directing plane. Formerly it was a custom to give the name *conoid* to any solid generated by the rotation of a conic section around one of its axes. In this acceptation the term is obsolete, and has been replaced by that of a *quadric of revolution.*

Co′non, or **Ko′non** [Κόνων], an Athenian general of high reputation, entered public life about 413 B. C. He was one of the ten generals chosen in 407, and was defeated by Lysander at Ægospotami in 405. He commanded the combined fleets of Persia and Athens which defeated the Spartans at Cnidos in 394 B. C. He afterwards rebuilt the long walls of Athens. His son Timotheus was an eminent commander.

Co′non of Samos, a Greek geometer and astronomer, was a friend of Archimedes, who expressed in one of his works a high estimation of his sagacity. He lived at Alexandria about 250 B. C. Conon invented the curve called the spiral of Archimedes. His works are all lost.

Con′quest, a township and post-village of Cayuga co., N. Y. The village is 12 miles N. of Auburn. Total pop. 1821.

Conquest. See INTERNATIONAL LAW, by PRES. T. D. WOOLSEY, S. T. D., LL.D.

Con′rad I., of Germany, was elected emperor in 911 A. D. He was previously duke of Franconia. He waged war against Henry the Fowler and Arnulf, duke of Bavaria. His dominions were invaded by the Magyars. Died in 918.

Conrad II., called THE SALIC, was a son of Henry, duke of Franconia. He was elected king of Germany in 1024, and was crowned as emperor by the pope in 1027. He is said to have been a wise ruler and the author of the written feudal law of Germany. He died in 1039, and was succeeded by his son Henry III.

Conrad III., of Germany, born in 1093, was the first of the Hohenstaufens and a grandson of Henry IV. He was elected emperor in 1138, and waged war against Henry the Proud, duke of Saxony. The party names of Guelph and Ghibelline originated in this war. In 1147 he led a crusade. He besieged Damascus without success, and returned in 1149. He died in 1152, and was succeeded by Frederick Barbarossa. (See GUNDLING, "Geschichte und Thaten Kayser Conrads III.," 1720.)

Conrad IV., son of Frederick II., emperor of Germany, was born in Apulia in 1228. He was crowned king of the Romans in 1237, and on the death of his father in 1250 assumed the title of emperor. He was supported by the Ghibellines, but the pope and the Guelphs recognized his competitor, William of Holland. Conrad marched into Italy in 1251, and took Naples. He died in 1254.

Conrad V., or **Con′radin,** the son and heir of Conrad IV., was born in 1252. The kingdom of Naples was usurped by his uncle Manfred. Instigated by the pope, Charles of Anjou waged war against Manfred and conquered Naples. Conrad was defeated and captured at Tagliacozzo in 1268 by Charles, by whose order he was beheaded.

Conrad (CHARLES M.), a native of Winchester, Va., was taken in childhood to Mississippi, and thence to Louisiana. In 1828 he was admitted to the bar, was U. S. Senator from Louisiana 1842–43, member of Congress 1849–50, and secretary of war 1850–53. He was a Confederate brigadier-general and member of the Congress of the Confederacy during the civil war.

Conrad (ROBERT T.), an American dramatist and orator, born in Philadelphia June 10, 1810. He studied law, and became a judge of the court of general sessions in 1838. Among his works are a tragedy entitled "Aylmere," which was very successful, and a volume of poems (1852). He was elected mayor of Philadelphia by the American party in 1854, and judge of quarter sessions in 1856. Died June 27, 1858.

Conrad (TIMOTHY ABBOTT), an American conchologist and palæontologist, born in New Jersey in 1803. He published, besides other works, "Fossil Shells of the Tertiary Formation of North America" (1832), and wrote "Palæontology of the State of New York," which was published at the expense of that State (1838–40). He was one of the naturalists employed in the geological survey of New York.

Conrad Hill, a township of Davidson co., N. C. Pop. 1115.

Con′ring (HERMANN), a learned jurist, born at Norden, in East Friesland, in 1606. Among his works, which are in Latin, is a "Commentary on the Origin of the German Law" (1643). Died in 1681.

Con′salvi (ERCOLE), CARDINAL, an Italian statesman and reformer, born at Rome June 8, 1757. He became in 1800 chief minister of Pope Pius VII., and negotiated the concordat with Bonaparte in 1801. He promoted art and learning, and was an able diplomatist. Died Jan. 24, 1824. (See CRÉTINEAU-JOLY, "Mémoires du Cardinal Consalvi.")

Consanguin′ity [from the Lat. *con,* "with," and *sanguis, sanguinis,* "blood"], in law, is relationship by blood, or that subsisting between persons descending from a common ancestor, or where one descends from the other. It is either lineal or collateral. It is said to be lineal when one of the persons whose relationship is to be traced is descended from the other. It is said to be collateral when they are descended from a common ancestor, and one is not descended from the other. There are two principal modes of reckoning collateral consanguinity. One method is to count the degrees intervening between the one farthest removed from the common ancestor and such ancestor. Thus, the son of the nephew of A on that system of computation is related to A in the third degree, as being three removes from the common ancestor, the father of A. This is the method of the canon and common law. The civil law reckons the degrees from the one relative to the other, ascending, on the one hand, from one of the parties to the common ancestor, and then counting downward to the other. On that theory A would be related to the son of his nephew in the fourth degree. The civil law method is generally employed in this country. In reckoning lineal consanguinity the two systems do not differ. Thus, the father and son are related in the first degree, the grandfather and grandson in the second. It frequently becomes necessary to resort to these rules not only in considering the transmission of estates, but in ascertaining persons who are disqualified to act as judges or jurymen by reason of relationship.

Con′science [Lat. *conscientia,* from *con,* intensive, and *scio,* to "know;" Ger. *Gewissen*], a word originally meaning CONSCIOUSNESS (which see), but now applied to the moral sense, the power or feeling we have which enables us to know whether an act or desire is right or wrong. (See MORAL PHILOSOPHY, by PRES. NOAH PORTER, D. D., LL.D.)

Conscience, Cases of. See CASUISTRY.

Conscience, Courts of, in England, called also **Courts of Requests,** were constituted for the recovery of small debts by special local acts of Parliament, in London, Westminster, and other trading districts. They were abolished with few exceptions when the county courts were established.

Conscience (HENRI), a Flemish novelist, born at Antwerp Dec. 3, 1812. He passed six years as a common soldier, and several more in poverty and in unsuccessful efforts to obtain employment. His first work was "The Year of Miracles, 1566" (1837), which was well received. In 1838 he produced "The Lion of Flanders," "Jakob van Arte-

velde" (1849), "The Poor Gentleman" (1851), and "Valentyn" (1866).

Con'sciousness [Lat. *conscientia;* Fr. *conscience;* Ger. *Selbstbewusstseyn*] is the state in which we are when all or any of our mental faculties are in exercise. It is a condition or accompaniment of every mental operation. In metaphysical terminology it signifies the knowledge which the mind has of its own operations. "We not only feel," says Cousin, "but we know that we feel; we not only act, but we know that we act; we not only think, but we know that we think; to think without knowing that we think is as if we should not think; and the peculiar quality, the fundamental attribute of thought, is to have a consciousness of itself. Consciousness is this interior light, which illuminates everything that takes place in the soul; consciousness is the accompaniment of all our faculties, and is, so to speak, their echo." That consciousness is not a particular faculty of the mind, but the universal condition of intelligence, the fundamental form of all the modes of our thinking activity, and not a special mode of that activity, is strenuously maintained by Amédée Jacques, and also by Mr. Francis Bowen and Mr. Tappan. This view is in accordance with the opinion of Aristotle and that of certain Schoolmen. "No man," says Dr. Reid, "can perceive an object without being conscious that he perceives it. No man can think without being conscious that he thinks." And as on the one hand we cannot think or feel without being conscious, so on the other hand we cannot be conscious without thinking or feeling. "Annihilate the object of any mental operation, and you annihilate the operation." This view of consciousness, as the common condition under which all our faculties are brought into operation, or of considering these faculties and their operations as so many modifications of consciousness, has of late been generally adopted; so much so that psychology, or the science of mind, has been denominated an inquiry into the facts of consciousness. This view, however, has many strenuous opponents, especially among recent writers of the materialistic school.

Con'script Fa'thers [Lat. *Patres Conscripti*, from *con*, "together," and *scribo, scriptum*, to "write"], an appellation given to the senators of ancient Rome, because after the expulsion of Tarquin, when Brutus added another hundred to the number of senators, the names of the new members were "written together" with those of the old, and the whole body received the appellation of Conscript Fathers.

Conscrip'tion [Lat. *conscriptio*, a "written list"], a compulsory enrolment of men for military service. This is the system by which the armies of France and some other countries are recruited. The soldiers who are thus compelled to enter the army are called conscripts. The conscription was established in France during the Revolution of 1789. The number required for the service is drawn by lot from the number of young, able-bodied men who are not exempt.

Consecon, a post-village of Prince Edward co., Ontario (Canada), on Weller's Bay, Lake Ontario, at the mouth of Consecon Creek, has valuable water-power and extensive fisheries. Pop. about 500.

Consecra'tion [Lat. *consecratio*, from *con*, intensive, and *sacro*, to "make sacred"] is the act or ceremony of giving a person or thing to the service of God. It was a widely-spread religious ceremony of the ancient world. In the Old Testament we read of the consecration to the Lord of the first-born of man and beast, and the dedication of the Levites, etc. The custom, as regards places and things, was not transmitted immediately from Judaism to Christianity. As soon as the persecution of the Christians ceased, according to Eusebius, "the sight was afforded us so eagerly desired by all—of the festivals of dedications and consecrations of the newly-erected houses of prayer throughout the cities." The practice of consecrating religious edifices is continued to the present time. The forms were at first simple, consisting of prayer, the celebration of the Eucharist, thanksgiving, and benediction; but they subsequently became more imposing, and the bishops, etc. assumed the exclusive power of consecrating. The service which sets apart bishops for their official work is especially designated as consecration.

Conservation of Force. See CORRELATION OF FORCES, by PROF. J. H. SEELYE, S. T. D.

Conser'vative [from the Lat. *con*, intensive, and *servo, servatum*, to "keep," to "preserve"]. In politics, this term is applied to persons who oppose reform, progress, or radical changes in institutions or laws. In England the party formerly called Tory is now termed Conservative.

Conserva'tor, an officer who is charged to preserve the public peace or prevent and punish a breach of the peace. In England the sovereign is the principal conservator of the peace. The lord chancellor, the justices of the queen's bench, and the master of the rolls are conservators of the peace throughout all parts of the kingdom, and can commit breakers of the peace anywhere. Other judges possess the power only within the limits of their own jurisdiction.

Conser'vatory [from the Lat. *conservo, conservatum*, to "preserve"], in horticulture, a glazed structure in which exotic plants are cultivated. It is distinguished from an orangery by its having a glazed roof, whilst that of the latter is opaque, and from a green-house by the plants being in the free soil, thus growing from the floor, while in the green-house the plants are grown in pots placed on shelves. Conservatories are used for plants in a growing state during the winter, and are therefore warmed according to the temperature which such plants require. One of the largest conservatories in the world is that erected at Chatsworth in Derbyshire, England, for palms and other tropical plants; it covers more than an acre of ground, and is above sixty feet high.

Conser'vatory [Fr. *conservatoire;* It. *conservatorio;* Ger. *Conservatorium*], a school for the study of vocal and instrumental music. These schools were first so called because they were designed to conserve the science and art of music. They are of ancient origin, and were probably founded by ecclesiastics for the purpose of improving the character of church music. They were originally charity schools, recruited from foundlings and orphans of both sexes. The first conservatory was the famous one of Santa Maria di Loreto in Naples, founded by Giovanni di Tappia in 1537. Among the most famous conservatories of the present day may be mentioned the Conservatoire de Musique of Paris (founded in 1784), those of Vienna (1816), Brussels (1833), and Leipsic (1842). There are several successful schools of music in the U. S. called conservatories.

Conshohock'en, a post-borough of Montgomery co., Pa., on the Schuylkill River and on the Philadelphia and Reading R. R., 13 miles N. W. of Philadelphia. It has several blast-furnaces, machine-shops, and rolling-mills; also one national bank and one weekly newspaper. Gas-pipes and water-pipes are made here. Pop. 3071.

Considérant (VICTOR), a French socialist, born at Salins Oct. 12, 1808, was the chief disciple of Fourier. He became the editor of the "Démocratie Pacifique" in 1845, and a member of the National Assembly in 1848. He wrote "Destinée Sociale" (3 vols., 1834–44). He afterwards founded a colony called Reunion, near San Antonio, Tex., but returned to France in 1869.

Considera'tion [Lat. *consideratio;* etymology doubtful], mature thought, serious deliberation, meditation; also motive of action, reason. In law, it is the material cause of a contract, the reason which induces a contracting party to make a contract. The leading distinction respecting considerations is, that they are either *good* or *valuable*. A *good* consideration is based upon relationship or natural love, and is of avail only in an executed contract—*e. g.* a deed of land. A *valuable* consideration either confers some benefit on the promisor or causes some inconvenience or harm to be sustained by the promisee. Under these rules marriage is a valuable consideration. (See CONTRACT, by PROF. T. W. DWIGHT, LL.D.)

Consignee. See BILL OF LADING and SHIPPING.

Consign'ment, in mercantile law, is the term applied to goods which are consigned or transferred by the owner into the possession of another, either as his own or as an agent or factor for sale or for some other specified purpose. The word is sometimes used to denote the act of consigning.

Consis'tory [Lat. *consistorium*, from *con*, "together," and *sisto*, to "stand"], the place of meeting of the cabinet of the Roman emperors; the name is also applied to the council of cardinals, sometimes assisted by other prelates, who attend in person or by proxy, which meets in the Vatican to advise the pope in ecclesiastical and temporal affairs. A court under this title for the regulation of discipline and worship, composed of civil and ecclesiastical jurists, was established by the Lutheran princes of Germany at the time of the Reformation. The earliest was that of Wittenberg, founded in 1537. The lower church courts of the Reformed ("Dutch" and "German") churches in the U. S. are also called consistories.

Con'sole [etymology doubtful], in architecture, a projection like a bracket, used to support cornices or such movable objects as busts and vases. It frequently has the form of a letter S.

Con'sols, a contraction of "consolidated annuities," is the common name given to the annuities of three per cent. which the British government pays as interest on the national debt. This debt was contracted by loans negoti-

ated at different times and at various rates of interest. To obviate the confusion which arose from the variety of stocks thus created, they were consolidated into one fund, kept in one account at the Bank of England. The Consolidated Annuities act was passed in 1757.

Con'sonance [Lat. *consonantia*, from *con*, "together," and *sono*, to "sound"], a term in music applied to a harmonious blending of sounds which so satisfy the ear that no other sound is expected to follow. The effect of consonance depends on the greater or less simplicity of the interval formed by the combined sounds. Intervals whose relative vibrations can be expressed by numbers from one to six are considered consonant. Consonant intervals are therefore the third, fourth, fifth, sixth, and octave; from which it follows that there is only one consonant fundamental chord in music—*i. e.* the common chord, being a bass note with its third, fifth, and octave. The system of harmony of the ancient Greeks was different from ours, as they treated the third and sixth as dissonances. Their name for consonance was our word "symphony," and for dissonance, "diaphony." As early as the fourteenth century we find the important rule that two perfect consonances following in similar progression are not allowable. In the sixteenth century, Zerlino ascertained the true mathematical proportions of the major and minor thirds. The exact limit between consonance and dissonance is not definitely fixed.

Con'sonant, a letter which can be freely sounded only when joined with another letter called a vowel. Consonants are divided into *mutes* and *liquids* (or semi-vowels). Mutes are those letters which may be said wholly to interrupt or stop the voice when they occur at the end of a syllable—in other words, when they are not immediately followed by a vowel—as *p, k, t, b, g, d.* The liquids or semi-vowels do not wholly stop the voice; they are *l, m, n,* and *r.* The aspirates *f, v,* and *th* are usually classed with the mutes, though they admit of the voice passing beyond them, so to speak, when they terminate a syllable, as in *if, have,* etc. The sibilant *s* is by some called a liquid.

Con'sort [Lat. *consors*, "allotted together," from *con*, "together," and *sors* (gen. *sortis*), a "lot"], in Great Britain, a term applied to the husband or wife of the reigning sovereign viewed in a public capacity, as participating to a limited extent in the sovereignty. Before the year 1857 the husband of Queen Victoria possessed no English title, and no place in court ceremonials except such as was conceded to him by courtesy. The title of prince consort was conferred upon him in that year.

Conspir'acy [Lat. *conspiratio* (from *con*, "together," and *spiro*, to "breathe," to "whisper")], an agreement between several persons to commit some crime, as to kill a ruler or deprive him of power. In law, it is an agreement of two or more persons to carry into effect some unlawful purpose, or to accomplish some lawful purpose by unlawful means. It is a crime of which the true basis is the unlawful combination, and may be prosecuted, though no overt act has been performed. Statute law in some instances makes a conspiracy a grave offence, as, *e. g.*, to destroy a ship with intent to injure insurers.

Con'stable [Late Lat. *comes stabuli*, "count of the stable," or *constabulus;* Fr. *connétable*], the former title of a military officer of the highest rank in France. The constable rose gradually in importance until he became *ex-officio* commander-in-chief of the army, the supreme military judge, and chief arbitrator in questions of chivalry. Mathieu de Montmorenci, who became constable in 1218, was the first who had the supreme command. The office was abolished in 1627. Napoleon I. appointed his brother Louis constable of the empire, and Berthier vice-constable. Under the Restoration the dignity was again abolished. In England the lord high constable was a personage of high rank and authority until the office was abolished by Henry VIII. A lord high constable is now appointed only on the occasion of great state ceremonies, such as a coronation. In England and the U. S. constables are inferior civil officers appointed to preserve the peace, to arrest felons, execute civil and criminal processes, etc. Some of the U. S. have an officer called "constable of the commonwealth," who is over a part of the constabulary forces, the members of which are his deputies.

Constable, a township and village of Franklin co., N. Y. The village is about 60 miles E. of Ogdensburg. Total pop. 1546.

Constable (John), an English landscape-painter, born in Suffolk in 1776, became a student in the Royal Academy in 1799. He was elected a Royal Academician in 1829. Among his works are the "Corn-Field" (1826) and the "Valley Farm" (1835). Died Mar. 30, 1837. His works are commended by Ruskin as "original, honest, free from affectation, and manly in manner." (See C. R. Leslie, "Life of John Constable," 1843.)

Con'stableville, a post-village of West Turin township, Lewis co., N. Y., on Sugar River, has four churches, a good trade, and several manufacturing establishments. Pop. 712.

Con'stance, a fortified city of Baden, is on the Rhine and the S. W. shore of the Lake of Constance, 35 miles N. E. of Zurich. It is one of the oldest towns in Germany, and was formerly a free imperial city. It has a magnificent cathedral, founded in the eleventh century; also manufactures of silk and cotton goods and watches. Here was held in 1414–18 an important council of the Church. Pop. in 1871, 10,052.

Constance, Council of [Lat. *Concilium Constantinense*], the seventeenth of the so-called œcumenical councils of the Roman Catholic Church, was convened by writ of the German emperor Sigismund, and opened on All Saints' Day, 1414, by John XXIII., one of the three claimants of the papacy. There were present during parts of the session, besides the emperor, seven patriarchs, twenty-one cardinals, one hundred and fourteen bishops and archbishops, besides many princes, nobles, and ambassadors from most of the Catholic powers and from the emperor Michael Palæologus. Representatives were also present from the principal universities of Europe. One of the objects of this council was the ending of the schism caused by the rival popes (John XXIII., Gregory XII., and Benedict XIII.). This object was accomplished by deposing all three (1415), and choosing Martin V. in their stead. The council also condemned the opinions of Wickliffe and Huss, and cited the latter to appear before it (1414). In the following year Huss was perfidiously burned at the stake for heresy, at Constance, notwithstanding the imperial safeguard which he possessed. In 1416 his friend, Jerome of Prague, met the same fate. The question of the relative authority of the pope and of the Church assembled in general council was warmly and persistently discussed by the Council of Constance, without decisive results. The reform of certain acknowledged abuses was also attempted, with no great success. The forty-fifth and last session was held April 22, 1418.

Constance, Lake of [anc. *Brigantinus Lacus;* Ger. *Boden See*], a lake of Central Europe, borders on Baden, Bavaria, Switzerland, the Tyrol, and Würtemberg, 1290 feet above the ocean-level. Area, 184 square miles. It is about 40 miles long, and 9 miles wide at the broadest part. The greatest depth is 912 feet. The Rhine enters this lake near the south-eastern end, and issues from the north-western extremity. In 1770 the water rose in one hour twenty feet above the ordinary level. This lake is said to contain twenty-five species of fish, including salmon. Several steamboats ply on it.

Con'stans (Flavius Julius) **I.,** born about 320 A. D., was the third son of the emperor Constantine I. On the death of his father, in 337, he became the sovereign of Italy, Africa, etc. His brother Constantine invaded Italy, and was killed in battle in 340, after which Constans was master of all the Western empire. He was defeated and killed by Magnentius in 350 A. D.

Constant de Rebecque (Benjamin), an eminent French political writer, born at Lausanne Oct. 25, 1767. He studied at Edinburgh, where he was a fellow-student of Erskine and Mackintosh, and afterwards in Germany. In 1799 he became a member of the French tribunate, but, having opposed the ambitious designs of Bonaparte, he was banished from France with Madame de Staël in 1801. He wrote in 1813 an able pamphlet "On the Spirit of Conquest and Usurpation." He returned to Paris in 1814, and was a member of Napoleon's council of state during the Hundred Days. In 1819 he was elected to the Chamber of Deputies, in which he was a very popular leader of the liberal party, and gained distinction as an able and witty debater. Among his works are "Cours de Politique Constitutionelle" (4 vols., 1817–20), a treatise "On Religion, considered in its Source, its Forms, and its Developments" (5 vols., 1823–31), and another in 2 vols. on the "Religion of Rome, considered in its Relations to Greek Philosophy and Christianity." Died Dec. 10, 1830. The style of his writings is much admired, and he has been called a second Voltaire. (See L. de Loménie, "B. Constant," 1841.)

Constan'tia, a superior wine from the Cape Colony, South Africa, produced upon the three Constantia estates, 12 miles S. of Cape Town. It is free from the earthy taste which characterizes ordinary Cape wines. It owes its excellence to the highly alkaline soil, the choice variety of grape employed in making it, the genial exposure of the estates, and perhaps more than all to care and skill in its preparation. There are white and red Constantia wines.

Constantia, a post-village and township of Oswego co., N. Y., on Oneida Lake and on the New York and Oswego Midland R. R., 34 miles S. E. of Oswego. Iron ore is found in the township, which contains also Cleveland and other villages. Pop. of Constantia village, 587; of township, 3437.

Constanti'na, a fortified city of Algeria, capital of a province of its own name, and seat of a Catholic bishop, is on a high hill surrounded on three sides by ravines; lat. 36° 24′ N., lon. 6° 8′ E. It is over 2000 feet above the level of the sea. It is surrounded by walls built by the Arabs, and has a citadel, and a fine old Roman bridge across one of the ravines. Here are manufactures of woollen cloth and saddlery. Remains of the ancient Roman *Cirta*, which was a great city of Numidia, are visible here. This place was besieged by the French in 1836; Oct., 1837, it was taken by assault. Pop. in 1866, 35,417.

Con'stantine, a post-village of St. Joseph co., Mich., on the St. Joseph River and on a branch of the Michigan Southern R. R., 94 miles by railroad S. W. of Lansing. It has a national bank and a weekly newspaper. Pop. 1290; of Constantine township, 2406.

Constantine (Flavius Valerius Aurelius), surnamed the Great, the first Christian emperor of Rome, was born in 272 (some say 274) A. D. He was a son of Constantius Chlorus and his wife Helena, and was originally a pagan. In the reign of Diocletian he gained distinction by his military talents, and became a favorite of the army. He was at York when his father died in July, 306, and was then proclaimed emperor by the army under his command. Galerius, who regarded him with jealous enmity, granted to him the title of cæsar, and conferred the higher rank of augustus on his own son, Severus. Maximian and his son Maxentius assumed imperial power at Rome, so that in 307 A. D. six men became competitors for the empire. Constantine married Fausta, a daughter of Maximian. After the death of Galerius (311), Licinius and Maximian were masters of the eastern provinces of the empire, and Constantine reigned in Gaul. In 312, Maxentius was defeated and killed by the army of Constantine, who then entered the city of Rome and became master of all the western part of the empire, including Italy and Africa. On the eve of this decisive battle he is said to have seen a sign of the cross in the sky, bearing the inscription: Ἐν τούτῳ νίκα ("By this conquer"). He afterwards treated the Christians with increasing favor, and adopted wise measures for the promotion of public prosperity and order.

In 314 he waged a short war against Licinius, who was the sole emperor of the eastern provinces. This war was followed by a peace of nine years, during which Constantine devoted himself to political reforms, organized a better form of government, and adopted a more humane code of laws, which recognized Christianity as the religion of the state. He renewed in 323 the war against Licinius, whom he defeated near Adrianople. After another decisive victory he reigned over the Roman empire with undivided power. He assembled at Nicæa, in 325 A. D., the first general council of the Church, and moderately favored the orthodox in the controversy against the Arians. He had a son, Crispus, who was accomplished and popular. Having been falsely accused of a crime by Fausta, his step-mother, Crispus was put to death. Constantine selected Byzantium as his capital, and enlarged or rebuilt that city, to which he gave the name of New Rome or Constantinople—"city of Constantine." This was founded by imposing ceremonies in May, 330 A. D. In the latter part of his life he showed favor to the Arians, and was baptized by an Arian bishop only a week before his death. The question is still warmly debated whether the man, or only the emperor, was converted. He died at Nicomedia May 22, 337 A. D., having divided the empire between his three sons, Constantine, Constantius, and Constans. He has a high reputation as a statesman and emperor. (See Eusebius, "Vita Constantini;" Gibbon, "Decline and Fall of the Roman Empire;" Joseph Fletcher, "Life of Constantine the Great," 1852.)

Constantine (or **Constantinus**) **VII.,** emperor of the East, surnamed Porphyrogenitus [Gr. Πορφυρογέννητος, *i. e.* "born to the purple" or "born in purple"], was born in 905 A. D. He was a son of the emperor Leo VI., who died in 911. Romanus Lecapenus usurped the imperial power in 919, after which Constantine passed many years in retirement and study. He began to reign in 944. He wrote several works of some merit. Died in 959.

Constantine XIII., surnamed Palæologus, the last emperor of Constantinople, was born in 1394. He succeeded his brother, John VII., in 1448. The Turkish sultan, Mahomet II., besieged Constantinople with an army of 250,000 men, and took it by storm in 1453. Constantine was killed, fighting bravely to the last.

Constantine [Lat. *Constantinus*], Pope, a native of Syria, succeeded Sisinnius in 708 A. D. Died in 715.

Constantine (Nikolaevitch), grand duke of Russia, the second son of the emperor Nicholas, was born Sept. 21, 1827. He became grand admiral of the fleet and a favorite leader of the old Russian party. In the Crimean war (1854–55) he commanded the Baltic fleet and acted on the defensive. He married the princess Alexandra of Saxe-Altenburg in 1848. He was in 1862 governor-general of Poland, but resigned in 1863.

Constantine (Pavlovitch), grand duke, the second son of the emperor Paul of Russia, was born May 8, 1779. He commanded a corps at the battle of Austerlitz (1805), and displayed in several actions a courage bordering on rashness. In 1814 he was appointed generalissimo of the Polish troops and viceroy of Poland. When Alexander died without issue in 1825, Constantine was the legitimate heir, but he renounced the throne in favor of his younger brother, Nicholas. In the reign of Nicholas he was viceroy of Poland, and by his tyranny provoked the Poles to revolt in 1830. Died of cholera June 27, 1831.

Constantino'ple [Turk. *Stambool** or *Istambool* in common language, and *Constantinieh* in documentary writing; modern Gr. *Istampoli;* Gr. Κωνσταντινόπολις; Lat. *Constantinopolis, i. e.* "city of Constantine"], a celebrated city of Turkey in Europe, capital of the Ottoman empire, was originally called Byzantium (which see). It is beautifully situated on the Bosphorus where it enters the Sea of Marmora, and in the province of Room-Elee. Lat. 41° 1′ N., lon. 28° 59′ E. The site is a triangular peninsula, bounded on the N. by an inlet of the Bosphorus called the Golden Horn, and surrounded by water on all sides except the W. Few cities can boast so magnificent a position; commanding the two opposite shores of Europe and Asia, it combines the advantages of security and great facilities for trade with the choicest gifts of nature and exquisite beauty of scenery. It occupies seven hills, rising one above another as they recede from the water. This variety of surface, with the numerous gardens, mosques, minarets, and cypress trees, renders the external aspect of the city very picturesque and imposing. The Golden Horn, which is five or six miles long, and varies in width from one to four furlongs, forms a safe and very commodious harbor, which is sufficiently deep to admit the largest ships. As the tide is here scarcely felt, the constant depth of the water permits vessels to land their cargoes with convenience and ease. The Bosphorus, here nearly one mile wide, separates Constantinople from Scutari, and the Golden Horn separates the city from the large suburbs named Galata and Pera. Along the western border of the city proper a lofty stone wall four miles long, and now in a ruinous condition, extends from the Sea of Marmora to the Golden Horn. This wall was built during the Byzantine empire, and presents picturesque specimens of mural ruins. The streets of the city are mostly narrow, crooked, and dirty. It contains about 350 mosques, 180 hospitals, and numerous Christian churches. It is the see of Greek, Latin, and Armenian patriarchs.

The Seraglio, the palace of the sultan, stands on the shore of the Bosphorus at the N. E. point of the peninsula, and commands a beautiful view. This palace, with its gardens, groves, and governmental offices, includes an area of nearly three miles in circuit, which is washed on one side by the Golden Horn. The principal gate or entrance to the Seraglio is called the Sublime Porte, from which is derived the diplomatic name of the sultan's court. Within the precincts of the palace is the celebrated Divan and the Harem, with the "Garden of Delight." The mean annual temperature is about 56° F.

Among the remarkable edifices are the "Castle of the Seven Towers," built about 1000 A. D., and now partly ruined; the mosque of Solyman the Magnificent, a masterpiece of Saracenic architecture; the mosque of Selim II., and those of Mustapha III., Achmet, and Mahomet II. The mosque of Achmet has six minarets, more than any other in the world. Connected with the mosque of Mahomet II. are eight endowed academies. Near the Seraglio stands the celebrated and magnificent mosque of St. Sophia, once a Christian cathedral, built by the emperor Justinian between 531 and 538 A. D. It is in the form of a Greek cross, 269 feet long, and is surmounted by a flattened dome, which is 180 feet above the ground, and is much admired. It is adorned by 107 columns of fine porphyry, marble, and granite. A lofty minaret rises at each of the four corners of this mosque. Among the antiquities now visible here are the "Burnt Column," erected by Constan-

* The Turkish name *Istambool* (contracted into *Stambool*) is supposed by some a corruption of the Greek phrase εἰς τὴν πόλιν ("to the city"). More probably it is a corruption of Islambul (*islam*, "believers," and *bul*, "multitude").

tine the Great; the pillar of Marcian; vestiges of the Boucoleon palace; the aqueduct of Valens; and the Theban obelisk, on the site of the ancient Hippodrome.

The city proper is divided into separate quarters for the Jews, Armenians, and Greeks. The Greek quarter, called the *Fanar*, extends along the shore of the Golden Horn, which is always covered with merchant vessels and numerous small boats. A bridge of boats connects Fanar with Pera and Galata; the latter is the residence of European merchants, and contains a great number of warehouses. Pera is the residence of the foreign ambassadors, whose palaces are situated on a hill. The numerous cemeteries around Constantinople are among its greatest ornaments.

The city has an extensive foreign commerce, which is mostly in the hands of the Greeks, Italians, British, French, and Germans. The chief articles of export are silks, carpets, hides, wool, potash, linseed, madder, and valonea. Among the imports are grain, iron, coffee, sugar, cotton stuffs, woollen stuffs, metallic goods, drugs, gums, jewelry, furniture, and porcelain. The arrivals at this port in 1870 were 23,483 vessels, the tonnage of which was 4,998,754; departures, 23,151; tonnage, 5,091,871. Here are manufactures of silk and cotton goods, morocco, leather, saddlery, carpets, and meerschaum pipes.

It is stated that the city has been subjected to twenty-four memorable sieges. It was taken by the crusaders in 1204, and by the Turks in May, 1453; but in nearly all the other cases the siege ended in the success of the party which defended the city. Pop., including suburbs, estimated at 1,075,000, about one-half of whom are Mohammedans, 220,000 Greeks, 250,000 Orthodox Armenians, 30,000 United Armenians, and 55,000 Jews. (See KRAUSE, "Die Eroberungen Constantinopels," 1870; CONSTANTIUS, "Ancient and Modern Constantinople," 1834, translated by John P. Brown, 1868.)

Constan'tius I., called **Constantius Chlo'rus** (FLAVIUS VALERIUS), a Roman emperor, born about 250 A. D., was the father of Constantine the Great. The emperors Diocletian and Maximian chose Constantius and Galerius in 292 A. D., and gave to each the title of cæsar. Constantius ruled over Gaul, Britain, and Spain, and became emperor in 305, when Diocletian abdicated. Died in 306 A. D.

Constantius II. (FLAVIUS JULIUS), the second son of Constantine I. and Fausta, was born at Sirmium in 317 A. D. He inherited, in accordance with his father's will, the Asiatic provinces and Egypt in 337. He waged war against the Persians, by whom he was several times defeated. He defeated Magnentius on the Drave in 351, and in Gaul in 353. In 355 he gave the title of cæsar to his cousin Julian. He showed favor to the Arians. He died in 361 A. D., and was succeeded by Julian.

Constella'tion [from the Lat. *con*, "together," and *stella*, a "star"], a group of stars. From time immemorial it has been the practice of observers to form the stars into artificial groups, which have received the name of constellations. They are represented by the figures of men, animals, and other objects to which might be traced a fancied resemblance. Before the invention of almanacs the risings and settings of the constellations were looked to by husbandmen, shepherds, and seafaring men as the great landmarks (so to speak) of the seasons, and of the weather which each season was expected to bring with it. Thus, the risings and settings of Boötes, with the bright star Arcturus, which took place near the equinoxes, portended great tempests. The great heat in July was ascribed to the rising of Canis the dog, with its bright star Sirius. The appearance of Castor and Pollux was hailed as the harbinger of fair summer weather. Many nations have from early times arranged the stars into constellations, but our nomenclature is chiefly derived from that of the Greeks and Romans. Eudoxus, who lived about 360 B. C., gave a description of the heavens, with the names and characters of all the constellations recognized in his time. This work is lost, but a poetical paraphrase of it, written about a century later by Aratus, is extant. It describes twelve zodiacal constellations, twenty in the northern hemisphere, and thirteen in the southern. The "Almagest" of Ptolemy includes the preceding, with three additional constellations —one northern and two southern. These are the ancient stellar groups. Large additions to the nomenclature have been made in modern times, owing to the discovery of constellations in the southern hemisphere which were never visible to the world known to the ancient authors. Some stars of the northern heavens not included in the ancient groups have been formed into new ones. Lacaille went in 1751 to the Cape of Good Hope, where he spent nearly four years in making a catalogue of the southern stars and forming them into constellations. (The principal groups will be more fully noticed under their alphabetical heads.)

The following list comprises all the constellations now generally recognized, although some of the more recent ones are understood to be temporary. The first twenty are known as Ptolemy's northern constellations; next come the twelve zodiacal, and then the fifteen southern constellations of Ptolemy; the forty-eighth was added by Tycho Brahe, though first named by Conon the Samian; the next ten are from Hevelius. All after the fifty-fifth are S. of the equator. Those from Indus to Apus inclusive were named by Bayer; the next thirteen are from Lacaille, and the last two from Royer.

1. Ursa Minor, the Lesser Bear.
2. Ursa Major, the Greater Bear.
3. Draco, the Dragon.
4. Cepheus.
5. Boötes, the Herdsman.
6. Corona Borealis, the Northern Crown.
7. Hercules.
8. Lyra, the Lyre.
9. Cygnus, the Swan.
10. Cassiopeia.
11. Perseus.
12. Auriga.
13. Ophiuchus or Serpentarius, the Serpent-bearer.
14. Serpens, the Serpent.
15. Sagitta, the Arrow.
16. Delphinus, the Dolphin.
17. Equuleus, the Little Horse.
18. Pegasus, the Winged Horse.
19. Andromeda.
20. Triangulum Boreale, the Northern Triangle.
21. Aries, the Ram.
22. Taurus, the Bull.
23. Gemini, the Twins.
24. Cancer, the Crab.
25. Leo, the Lion.
26. Virgo, the Virgin.
27. Libra, the Scales.
28. Scorpio, the Scorpion.
29. Sagittarius, the Archer.
30. Capricornus, the Goat.
31. Aquarius, the Water-bearer.
32. Pisces, the Fishes.
33. Cetus, the Whale.
34. Orion.
35. Eridanus, the River Po.
36. Lepus, the Hare.
37. Canis Major, the Greater Dog.
38. Canis Minor, the Lesser Dog.
39. Argo, the Ship Argo.
40. Hydra, the Water Serpent.
41. Crater, the Cup.
42. Corvus, the Crow.
43. Centaurus, the Centaur.
44. Lupus, the Wolf.
45. Ara, the Altar.
46. Corona Australis, the Southern Crown.
47. Piscis Australis, the Southern Fish.
48. Coma Berenices, the Hair of Berenice.
49. Canes Venatici (the Greyhounds, Asterion and Chara).
50. Lacerta, the Lizard.
51. Lynx, the Lynx.
52. Sextans Uraniæ, Tycho's Sextant.
53. Cameleopardalis, the Giraffe.
54. Vulpecula et Anser, the Fox and Goose.
55. Leo Minor, the Lesser Lion.
56. Monoceros, the Unicorn.
57. Indus, the Indian.
58. Grus, the Crane.
59. Phœnix, the Phœnix.
60. Musca, the Fly.
61. Pavo, the Peacock.
62. Toucan, the Toucan.
63. Hydrus, the Water-snake.
64. Dorado, the Sword-fish.
65. Piscis Volans, the Flying-fish.
66. Chamæleon, the Chamæleon.
67. Triangulum Australe, the Southern Triangle.
68. Apus, the Bird of Paradise.
69. Apparatus Sculptoris, or Sculptor, the Sculptor's workshop.
70. Fornax Chemica, the Chemical Furnace.
71. Horologium, the Clock.
72. Recticulum Rhomboidale, the Rhomboidal Net.
73. Cœla Sculptoris, the Graving tools.
74. Equus Pictorius, the Painter's Easel.
75. Antlia Pneumatica, the Air-pump.
76. Octans, the Octant.
77. Norma, the Square-rule.
78. Circinus, the Compasses.
79. Telescopium, the Telescope.
80. Microscopium, the Microscope.
81. Mons Mensæ, the Table-Mountain.
82. Crux Australis, the Southern Cross.
83. Columba Noachi, Noah's Dove.

There have been many more constellations proposed, and some others are needed, especially S. of the equator. Indeed, were it not for the great difficulties attending a change, and the seeming fixity of the present nomenclature, sanctioned by the usage of ages, it is not unlikely that a new arrangement of all the stars would be attempted, and many of the present monstrous figures banished from the maps of the celestial globe.

Constipa'tion [from the Lat. *con*, intensive, and *stipo*, to "stow," to "crowd," referring to that state of the rectum in which it is impacted with fecal matter], a condition of the system marked by sluggish action of the bowels upon their contents, due either to diminished secretion of the juices of the mucous membrane or to a want of action of the muscular coat of the intestines. Sedentary habits predispose to constipation, and so does too large a proportion of animal food. Brown bread, ripe fruits, fresh vegetables, and active exercise tend to avert this disorder. An abdominal compress of cold water, covered with a flannel bandage, sometimes proves beneficial. For many cases the use of mild cathartics is necessary. They may be taken in proper doses for many years without bad effects. The use of nux vomica in small daily doses is often useful, and the same is true of belladonna in some constitutions. It is frequently advisable to employ enemata of warm or cold water, and also kneading or careful manipulation of the abdomen. But perhaps the most rational treatment is a careful readjustment of the diet, and the adoption of active habits of life. Ill-chosen and ill-cooked food, perhaps the most frequent cause of intestinal troubles, should be especially avoided. There is no doubt also that habitual constipation may in some instances be overcome by the persistent and systematic attempt to perform the impaired function at a regular time each day.

Constitution [from the Lat. *con*, "together," and *statuo*, to "place"], in American law, a written statement of the fundamental rules of government, either of a State or of the United States. The word as here used has a widely different signification from that which prevails in England. There it simply means the leading rules of government, without reference to any formal statement. The "constitution" thus consists of documents emanating from time to time from the king or from Parliament, and of traditions and customs. These may be collected in treatises and reduced to a systematic form, but have never received the legal sanction indispensable in America—that of recognition by the nation as distinguished from Parliament. In this country "the people," consisting in each State of those who hold the elective franchise, are by prescribed forms called upon at intervals either to establish the constitution or to amend it. It thus has an authority superior to that of the government organized under it. One extremely important result is, that if any of the departments exceed the limits marked out in the constitution, the act is irregular and void. An illustration of the doctrine is found in an act of the legislature which transcends the constitution; the judicial department will declare it void. The courts have no such power in England. An act of Parliament is commonly said to be "omnipotent;" there is no judicial power which can exercise the function of arresting the regular operation of the act. The power of the courts in the U. S. is, in the best sense of the word, a "veto"—forbidding a direction which has actually been clothed with legislative forms from being carried into effect, on account of its repugnance to the will of the people. The further examination of the subject may be conducted under the following general divisions; I. The mode of originating an American constitution; II. The relation between a State and the U. S. Constitution, and the office of each; III. Principal provisions in American constitutions, including "constitutional limitations."

I. The prevailing method of generating or amending a constitution is the "constitutional convention." It is certainly not the only method, since it sometimes happens that a constitution provides special and different modes of amendment, as is the case with the U. S. Constitution and some others. A distinction has been taken between a "constitutional" and a "revolutionary" convention. These do not differ necessarily in their internal character or in their modes of conducting business, but in their origin. A constitutional convention originates by orderly processes—is the creature of law. A revolutionary convention is irregular in its origin. Its ordinances may have a *de facto* validity, and become law on receiving the sanction of the people. The regular method is to have a law of the legislature or a constitutional provision as a basis for the existence of the convention. When a body of delegates of this kind is assembled by legal methods, its powers become a subject of much importance, and are not yet definitely ascertained. Some would hold that the convention holds within its grasp all the powers which inhere in the "people" that created it. In other words, it is sovereign. This is startling doctrine, and will scarcely command general assent. Another extreme view in the other direction is, that it is a mere deliberative body, having power to discuss propositions, to agree upon them, and to recommend them for adoption. Under this view the convention is but little more than a debating society, with very limited powers for preserving order or securing itself from the intrusion of strangers. The true view would seem to be that while the convention is itself acting in subordination to law, yet it has, as *incidental* to the accomplishment of its purposes, such powers as are necessary to carry them into effect. It may accordingly preserve order, punish contempts of its authority, provide for submission to the vote of the people of its proposed ordinances, and do such other acts as reasonably serve to make deliberation free and complete, and also to secure the full expression of the popular will. There are cases where the constitution of the State itself or the act of the legislature provides for the calling of a convention in a prescribed manner and with specified powers. While the restrictions of a constitution must be accepted as binding, it may well be doubted whether an act of the legislature can deprive a convention sanctioned by the people of powers which have been already referred to as incidental to its complete working.

The common method of transacting business is to parcel out among different standing committees the various topics to be provided for, such as a committee on "the Bill of Rights," "the Judiciary," "the Legislative Department," etc. These committees, after due consideration of the subjects entrusted to them, report to the convention, when the matter is taken up by the entire body, discussed, approved, or rejected. (For detailed information see JAMESON, "On Constitutional Conventions.") The debates in conventions are frequently published in a permanent form, and contain much information of great value on legal and constitutional topics. (Reference may be made to the "Madison Papers," containing debates on the U. S. Constitution, ELLIOTT'S "Debates," and those published in New York, Virginia, Massachusetts, Illinois, and Pennsylvania.)

II. *The Relation between a State and the U. S. Constitution, and the office of each.*—A State constitution is adopted to regulate the action of the various departments of the government and to secure the rights of the people. It is a common statement that a State government has all the powers possessed by the English Parliament, except so far as it is restrained either by the State or national constitution. The object of a State constitution is not so much to confer power, as it is to restrict and define that which already exists. It is to subject the will of the people to prescribed forms, which cannot be overcome by an ordinary act of legislation, but only by an amendment of the constitution itself. On the other hand, the U. S. government is called into existence by a written instrument. It has no powers except those which are contained within it, either in express terms or by reasonable implication. The acts done under its legitimate powers, such as the laws of Congress or treaties with foreign nations, are the supreme law of the land, and all State laws or State constitutions are so far subordinate. It is plain, however, that a State constitution or law may be in conflict with some provision of the U. S. Constitution or law or treaty, or an act of Congress may trench upon legitimate State authority. There must be some power entrusted with the function of deciding these questions in such a way as to keep the two governments within their proper sphere of action. This power appertains to the Supreme Court of the U. S., and in the exercise of its appellate jurisdiction it may review the decisions of State courts for this purpose, under clauses of the "judiciary acts" of Congress passed under the provisions of the Constitution. It thus becomes the final interpreter of the Constitution, and may declare a State law or constitutional provision void as being repugnant to the U. S. Constitution or the laws of Congress or treaties with foreign powers. So, when an act of Congress is not warranted by constitutional rules, it will be declared void. In this way the complex system of government works harmoniously, sound judgment dictating that the rights of the States should be preserved by the court with the same jealous and scrupulous care as those of the U. S. The court cannot exercise this power by the promulgation of an edict or ordinance, but only through the medium of a "case" or controversy between litigating parties. In deciding the case it may proceed upon principles which become a rule for the future, and a body of constitutional law is thus formed which either truly expounds the Constitution or departs from it. If an error be committed, it can only be rectified by a subsequent act of the court overruling the decision or by an amendment of the Constitution. Another point may be adverted to. A State law may be opposed to a State constitution. The duty of deciding this point regularly devolves upon the courts of the particular State, and the U. S. court follows their lead. However, having once acceded to the State interpretation, if that be subsequently reversed in the State court, it will not feel bound to change its view, but may adhere to the first construction. There is thus to be collected from the decisions of State courts a mass of what may be called "State constitutional law." Much of this is special in its nature, having but little value beyond State limits. Other parts of it are general in their character, while some portions of it are coincident with decisions in the U. S. court, as in some instances the same restrictions are found in both instruments.

III. It is not intended under this head to advert to the general scheme of the various State and U. S. constitutions. The text of the latter is given hereafter in full. (See CONSTITUTION OF THE U. S.) Reference will only be made to such provisions in the nature of restrictions as are of a general nature. These are restrictions upon unsound legislation, such as prohibitions of bills of attainder and ex-post facto laws, or laws impairing the obligation of contracts; some of the States in the same spirit prohibit divorces by the legislature. Or they may be limitations upon legislation opposed to the spirit of American institutions. Under this head may be ranked prohibitions against granting titles of nobility. There are also limitations for the protection of individual rights addressed to all departments of government. They tend to secure liberty of speech and of the press, religious freedom, to prevent deprivation of rights except through orderly processes in courts of justice, including trial by jury; also to prevent renewed trials for the same offence, to check excessive punishments, etc. A number of such provisions are found in the earlier amendments to the U. S. Constitution. It is an important remark that these were only intended to bind the action of

Congress or other departments of the general government. For this reason like clauses are inserted in the State constitutions. The last three amendments (thirteenth, fourteenth, and fifteenth) are operative upon the States as well as upon Congress. Many of the provisions now considered are taken from the English law, and in the very words of statutes or text-writers. They thus become fundamental law in the sense in which they were used in the country whence they were derived. The last three amendments of the U. S. Constitution were especially intended to secure rights to citizens of African descent, though not confined to them. (See CITIZEN.) Fundamental provisions of this sort, when considered together, are frequently termed a "Bill of Rights." (See BILL OF RIGHTS.) There is in some instances a tendency to insert in the State constitutions matters which are more properly the subject of legislation. Sometimes a political party desires to make its policy on a question like that of internal improvements a permanent one, and secures to that end a provision in the constitution; or perhaps legislatures prove themselves to be unwise or even corrupt, and it is thought well to reduce their capacity to do mischief by shearing them of their legitimate powers. Provisions framed to accomplish such objects do not long prevail, and a reaction in public sentiment soon leads to an amendment of the constitution. The better view is, that constitutions should only deal with fundamental law. When legislators are ignorant or vicious, the true remedy is at the ballot-box, where the voters may show their will to have more suitable men. (See on the general subject COOLEY, "On Constitutional Limitations;" HOUGH'S "Collection of State Constitutions;" also the same author's "Annotated New York Constitution of 1846;" STORY, "On the U. S. Constitution;" KENT'S "Commentaries;" and the treatises of RAWLE, SARGENT, and PASCHAL. The most complete view of the principles governing the whole subject may be obtained from the opinions written by the judges of the Supreme Court of the U. S. in deciding specific cases involving the construction of the Constitution. These are collected in the reports of DALLAS, CRANCH, WHEATON, PETERS, HOWARD, BLACK, WALLACE, etc. Abstracts of the points decided may be found in BRIGHTLY'S "Digest" and ABBOTT'S "National Digests." These works may be used for easy reference to the volumes of the reports above named. Full expositions of questions arising under the various State constitutions will in like manner be found in the published reports of the decisions of the courts of the respective States.) T. W. DWIGHT.

Constitution of the United States, the fundamental or organic law of the union of the States, thereby united. This, with all acts of the States in Congress assembled, and all treaties made in pursuance of its provisions, constitutes the supreme law of the land throughout the Union. The first Constitution of the U. S. was the Articles of Confederation, adopted by the States during the war for their independence. (See CONFEDERATION, ARTICLES OF; also see CURTIS, "History Constitution U. S.," p. 139; SPARKS, "Writings of Washington," letter to Henry Lee, 22d Sept., 1788, to Benjamin Lincoln, 26th Oct., 1788, and to James Monroe, 22d Feb., 1789.) The first Articles proving inefficient for the accomplishment of the objects of the Union, mainly upon the grounds that they conferred no power upon the central head to regulate commerce with foreign nations, nor to act directly upon the citizens of the several States respectively in the collection of the *quotas* levied upon the States to meet the public expenditures and to sustain the public credit, etc., the Congress, being urged by appeals from several quarters, took up the subject of amendment and general revision on the 21st of Feb., 1787, and then came to the following resolution upon it:

"*Resolved*, That, in the opinion of Congress, it is expedient that, on the second Monday in May next, a convention of delegates, who shall have been appointed by the several States, be held at Philadelphia, for the sole and express purpose of revising the Articles of Confederation, and reporting to Congress and the several State legislatures such alterations and provisions therein as shall, when agreed to in Congress and confirmed by the States, render the Federal Constitution adequate to the exigencies of government and the preservation of the Union." (See ELLIOTT'S "Debates on the Federal Constitution," vol. i., p. 120.)

It was under this resolution of Congress, and in response to it by eleven of the States in choosing and sending delegates, that the ever-memorable Federal Convention assembled in Philadelphia the 14th of May, 1787. Each of the old thirteen States then composing the Union was represented in it, except Rhode Island. George Washington, almost universally styled the "Father of his Country," was unanimously chosen president of the convention. As a whole, it was unquestionably the ablest body of jurists, legislators, and statesmen that had ever assembled on the continent of America. The convention remained in session from the 14th of May till the 17th of September ensuing. Their entire deliberations and proceedings were with closed doors. The journal of these proceedings was not published until over forty years afterwards. The actual and practical result, however, of their labors in the execution of the high trust committed to them was immediately communicated to Congress, and, being approved by that body, was speedily communicated to the respective States. This was their grand work in framing and proposing that matchless system of Federal government set forth and embodied in the new Constitution for the government of the U. S. of America, which was adopted and ratified by eleven States before the close of the year 1788; so that it went into operation between the States ratifying at the time appointed in 1789. The other two, North Carolina and Rhode Island, adopted and ratified it in less than two years afterwards. The last of the old thirteen which came into the Union, so remodelled in its Federal structure, was Rhode Island. Several features in this new form and constitution of government for separate states and communities are without a parallel in ancient or modern times. It was in contemplation of one of these peculiar features that the learned De Tocqueville, a profound philosopher of France, and one thoroughly versed in the science of politics, made the following commentary: "This Constitution, which may at first be confounded with the federal constitutions which have preceded it, rests, in truth, upon a wholly novel theory, which may be considered as a great discovery in modern political science. In all the confederations which preceded the American Constitution of 1789 the allied States, for a common object, agreed to obey the injunctions of a federal government, but they reserved to themselves the right of ordaining and enforcing the laws of the union. The American States which combined in 1789 agreed that the Federal government should not only dictate, but should execute, its own enactments. In both cases the right is the same, but the exercise of the right is different, and this difference produced the most momentous consequences." (See DE TOCQUEVILLE'S "Democracy in America," vol. i., p. 198.)

It was in view of the same peculiar, specific difference between the Constitution of the Federal republic of the U. S. and that of all others of a similar general type which caused Lord Brougham, in his "Political Philosophy," thus to speak of the wonderful machinery of the government of the U. S.: "It is," says he (vol. iii., p. 336), "not at all a refinement that a federal union should be formed; this is the natural result of men's joint operations in a very rude state of society. But the regulation of such a union upon pre-established principles, the formation of a system of government and legislation in which the different subjects shall be, not individuals, but States, the application of legislative principles to such a body of States, and the devising means for keeping its integrity as a federacy, while the rights and powers of the individual States are maintained entire, is the very greatest refinement in social policy to which any state of circumstances has ever given rise, or to which any age has ever given birth."

The following is the text of the new Constitution proposed by the Convention of 1787, and adopted by a number of the States sufficient for it to go into operation in 1789; beginning with the preamble, and ending with the last of the Amendments. A. H. STEPHENS.

CONSTITUTION OF THE UNITED STATES. We, the people of the United States, in order to form a more perfect union, establish justice, ensure domestic tranquillity, provide for the common defence, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America.

ARTICLE I., Sec. 1. All legislative powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

Sec. 2. The House of Representatives shall be composed of members chosen every second year by the people of the several States, and the electors in each State shall have the qualifications requisite for electors of the most numerous branch of the State legislature.

No person shall be a representative who shall not have attained to the age of twenty-five years, and been seven years a citizen of the United States, and who shall not, when elected, be an inhabitant of that State in which he shall be chosen.

Representatives and direct taxes shall be apportioned among the several States which may be included within this Union according to their respective numbers, which shall be determined by adding to the whole number of free persons, including those bound to service for a term of years, and excluding Indians not taxed, three-fifths of all other persons. The actual enumeration shall be made within three years after the first meeting of the Congress of the

United States, and within every subsequent term of ten years, in such manner as they shall by law direct. The number of representatives shall not exceed one for every thirty thousand, but each State shall have at least one representative; and until such enumeration shall be made, the State of New Hampshire shall be entitled to choose three, Massachusetts eight, Rhode Island and Providence Plantations one, Connecticut five, New York six, New Jersey four, Pennsylvania eight, Delaware one, Maryland six, Virginia ten, North Carolina five, South Carolina five, and Georgia three.

When vacancies happen in the representation from any State, the executive authority thereof shall issue writs of election to fill such vacancies.

The House of Representatives shall choose their Speaker and other officers; and shall have the sole power of impeachment.

Sec. 3. The Senate of the United States shall be composed of two senators from each State, chosen by the legislature thereof, for six years; and each senator shall have one vote.

Immediately after they shall be assembled in consequence of the first election, they shall be divided as equally as may be into three classes. The seats of the senators of the first class shall be vacated at the expiration of the second year, of the second class at the expiration of the fourth year, and of the third class at the expiration of the sixth year, so that one-third may be chosen every second year; and if vacancies happen by resignation, or otherwise, during the recess of the legislature of any State, the executive thereof may make temporary appointments until the next meeting of the legislature, which shall then fill such vacancies.

No person shall be a senator who shall not have attained to the age of thirty years, and been nine years a citizen of the United States, and who shall not, when elected, be an inhabitant of that State for which he shall be chosen.

The Vice-President of the United States shall be president of the Senate, but shall have no vote, unless they be equally divided.

The Senate shall choose their other officers, and also a president *pro tempore*, in the absence of the Vice-President, or when he shall exercise the office of President of the United States.

The Senate shall have the sole power to try all impeachments; when sitting for that purpose, they shall be on oath or affirmation. When the President of the United States is tried, the Chief-Justice shall preside; and no person shall be convicted without the concurrence of two-thirds of the members present.

Judgment in cases of impeachment shall not extend further than to removal from office, and disqualification to hold and enjoy any office of honor, trust, or profit under the United States; but the party convicted shall nevertheless be liable and subject to indictment, trial, judgment, and punishment, according to law.

Sec. 4. The times, places, and manner of holding elections for senators and representatives shall be prescribed in each State by the legislature thereof; but the Congress may at any time, by law, make or alter such regulations, except as to the places of choosing senators.

The Congress shall assemble at least once in every year, and such meeting shall be on the first Monday in December, unless they shall, by law, appoint a different day.

Sec. 5. Each house shall be the judge of the elections, returns, and qualifications of its own members, and a majority of each shall constitute a quorum to do business; but a smaller number may adjourn from day to day, and may be authorized to compel the attendance of absent members, in such manner and under such penalties as each house may provide.

Each house may determine the rules of its proceedings, punish its members for disorderly behavior, and, with the concurrence of two-thirds, expel a member.

Each house shall keep a journal of its proceedings, and from time to time publish the same, excepting such parts as may in their judgment require secresy, and the yeas and nays of the members of either house on any question shall, at the desire of one-fifth of those present, be entered on the journal.

Neither house, during the session of Congress, shall, without the consent of the other, adjourn for more than three days, nor to any other place than that in which the two houses shall be sitting.

Sec. 6. The senators and representatives shall receive a compensation for their services, to be ascertained by law, and paid out of the treasury of the United States. They shall in all cases, except treason, felony, and breach of the peace, be privileged from arrest during their attendance at the session of their respective houses, and in going to and returning from the same; and for any speech or debate in either house they shall not be questioned in any other place.

No senator or representative shall, during the time for which he was elected, be appointed to any civil office under the authority of the United States, which shall have been created, or the emoluments whereof shall have been increased during such time; and no person holding any office under the United States shall be a member of either house during his continuance in office.

Sec. 7. All bills for raising revenue shall originate in the House of Representatives; but the Senate may propose or concur with amendments, as on other bills.

Every bill which shall have passed the House of Representatives and the Senate, shall, before it become a law, be presented to the President of the United States; if he approve, he shall sign it; but if not, he shall return it, with his objections, to that house in which it shall have originated, who shall enter the objections at large on their journal, and proceed to reconsider it. If after such reconsideration two-thirds of that house shall agree to pass the bill, it shall be sent, together with the objections, to the other house, by which it shall likewise be reconsidered; and if approved by two-thirds of that house, it shall become a law. But in all such cases, the votes of both houses shall be determined by yeas and nays, and the names of the persons voting for and against the bill shall be entered on the journal of each house respectively. If any bill shall not be returned by the President within ten days (Sunday excepted) after it shall have been presented to him, the same shall be a law in like manner as if he had signed it, unless the Congress by their adjournment prevent its return; in which case it shall not be a law.

Every order, resolution, or vote to which the concurrence of the Senate and the House of Representatives may be necessary (except on a question of adjournment) shall be presented to the President of the United States; and before the same shall take effect, shall be approved by him, or, being disapproved by him, shall be repassed by two-thirds of the Senate and House of Representatives, according to the rules and limitations prescribed in the case of a bill.

Sec. 8. The Congress shall have power to lay and collect taxes, duties, imposts, and excises, to pay the debts and provide for the common defence and general welfare of the United States; but all duties, imposts, and excises shall be uniform throughout the United States;

To borrow money on the credit of the United States;

To regulate commerce with foreign nations, and among the several States, and with the Indian tribes;

To establish an uniform rule of naturalization, and uniform laws on the subject of bankruptcies throughout the United States;

To coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures;

To provide for the punishment of counterfeiting the securities and current coin of the United States;

To establish post-offices and post-roads;

To promote the progress of science and useful arts, by securing for limited times, to authors and inventors, the exclusive right to their respective writings and discoveries;

To constitute tribunals inferior to the Supreme Court;

To define and punish piracies and felonies committed on the high seas, and offences against the law of nations;

To declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water;

To raise and support armies, but no appropriation of money to that use shall be for a longer term than two years;

To provide and maintain a navy;

To make rules for the government and regulation of the land and naval forces;

To provide for calling forth the militia to execute the laws of the Union, suppress insurrections, and repel invasions;

To provide for organizing, arming, and disciplining the militia, and for governing such part of them as may be employed in the service of the United States, reserving to the States respectively the appointment of the officers, and the authority of training the militia according to the discipline prescribed by Congress;

To exercise exclusive legislation in all cases whatsoever over such district (not exceeding ten miles square) as may, by cession of particular States, and the acceptance of Congress, become the seat of the government of the United States, and to exercise like authority over all places purchased by the consent of the legislature of the State in which the same shall be, for the erection of forts, magazines, arsenals, dockyards, and other needful buildings; and

To make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this constitution in the government of the United States, or in any department or officer thereof.

Sec. 9. The migration or importation of such persons as any of the States now existing shall think proper to admit shall not be prohibited by the Congress prior to the year one thousand eight hundred and eight; but a tax or duty may be imposed on such importation, not exceeding ten dollars for each person.

The privilege of the writ of *habeas corpus* shall not be suspended, unless when in cases of rebellion or invasion the public safety may require it.

No bill of attainder or *ex post facto* law shall be passed.

No capitation or other direct tax shall be laid, unless in proportion to the census or enumeration hereinbefore directed to be taken.

No tax or duty shall be laid on articles exported from any State.

No preference shall be given by any regulation of commerce or revenue to the ports of one State over those of another; nor shall vessels bound to or from one State be obliged to enter, clear, or pay duties in another.

No money shall be drawn from the treasury but in consequence of appropriations made by law; and a regular statement and account of the receipts and expenditures of all public money shall be published from time to time.

No title of nobility shall be granted by the United States; and no person holding any office of profit or trust under them shall, without the consent of the Congress, accept of any present, emolument, office, or title, of any kind whatever, from any king, prince, or foreign state.

Sec. 10. No State shall enter into any treaty, alliance, or confederation; grant letters of marque and reprisal; coin money; emit bills of credit; make anything but gold and silver coin a tender in payment of debts; pass any bill of attainder, *ex post facto* law, or law impairing the obligation of contracts, or grant any title of nobility.

No State shall, without the consent of the Congress, lay any impost or duties on imports or exports, except what may be absolutely necessary for executing its inspection laws; and the net produce of all duties and imposts, laid by any State on imports or exports, shall be for the use of the treasury of the United States; and all such laws shall be subject to the revision and control of the Congress.

No State shall, without the consent of Congress, lay any duty of tonnage, keep troops, or ships of war in time of peace, enter into any agreement or compact with another State, or with a foreign power, or engage in war, unless actually invaded, or in such imminent danger as will not admit of delay.

ARTICLE II., Sec. 1. The executive power shall be vested in a President of the United States of America. He shall hold his office during the term of four years, and, together with the Vice-President, chosen for the same term, be elected as follows:

Each State shall appoint, in such manner as the legislature thereof may direct, a number of electors, equal to the whole number of senators and representatives to which the State may be entitled in the Congress; but no senator or representative, or persons holding an office of trust or profit under the United States, shall be appointed an elector.*

The Congress may determine the time of choosing the electors, and the day on which they shall give their votes; which day shall be the same throughout the United States.

No person, except a natural-born citizen, or a citizen of the United States at the time of the adoption of this constitution, shall be eligible to the office of President; neither shall any person be eligible to that office who shall not have attained to the age of thirty-five years, and been fourteen years resident within the United States.

In case of the removal of the President from office, or of his death, resignation, or inability to discharge the powers and duties of the said office, the same shall devolve on the Vice-President, and the Congress may by law provide for the case of removal, death, resignation, or inability, both of the President and Vice-President, declaring what officer shall then act as President, and such officer shall act accordingly, until the disability be removed, or a President shall be elected.

The President shall, at stated times, receive for his services a compensation, which shall neither be increased nor diminished during the period for which he shall have been elected, and he shall not receive within that period any other emolument from the United States, or any of them.

Before he enter on the execution of his office, he shall take the following oath or affirmation: "I do solemnly swear (or affirm) that I will faithfully execute the office of President of the United States, and will, to the best of my ability, preserve, protect, and defend the Constitution of the United States."

Sec. 2. The President shall be Commander-in-Chief of the Army and Navy of the United States, and of the militia of the several States, when called into the actual service of the United States; he may require the opinion, in writing, of the principal officer in each of the executive departments upon any subject relating to the duties of their respective offices, and he shall have power to grant reprieves and pardons for offences against the United States, except in cases of impeachment.

He shall have power, by and with the advice and consent of the Senate, to make treaties, provided two-thirds of the senators present concur; and he shall nominate, and by and with the advice and consent of the Senate, shall appoint ambassadors, other public ministers and consuls, judges of the Supreme Court, and all other officers of the United States, whose appointments are not herein otherwise provided for, and which shall be established by law; but the Congress may by law vest the appointment of such inferior officers as they think proper in the President alone, in the courts of law, or in the heads of departments.

The President shall have power to fill up all vacancies that may happen during the recess of the Senate, by granting commissions which shall expire at the end of their next session.

Sec. 3. He shall from time to time give to the Congress information of the state of the Union, and recommend to their consideration such measures as he shall judge necessary and expedient; he may on extraordinary occasions convene both houses, or either of them, and in case of disagreement between them, with respect to the time of adjournment, he may adjourn them to such time as he shall think proper; he shall receive ambassadors and other public ministers; he shall take care that the laws be faithfully executed, and shall commission all the officers of the United States.

Sec. 4. The President, Vice-President, and all civil officers of the United States, shall be removed from office on impeachment for, and conviction of, treason, bribery, or other high crimes and misdemeanors.

ARTICLE III., Sec. 1. The judicial power of the United States shall be vested in one Supreme Court, and in such inferior courts as the Congress may from time to time ordain and establish. The judges, both of the supreme and inferior courts, shall hold their offices during good behavior, and shall, at stated times, receive for their services a compensation, which shall not be diminished during their continuance in office.

Sec. 2. The judicial power shall extend to all cases, in law and equity, arising under this constitution, the laws of the United States, and treaties made, or which shall be made, under their authority; to all cases affecting ambassadors, other public ministers, and consuls; to all cases of admiralty and maritime jurisdiction; to controversies to which the United States shall be a party; to controversies between two or more States; between a State and citizens of another State; between citizens of different States; between citizens of the same State claiming lands under grants of different States, and between a State, or the citizens thereof, and foreign states, citizens, or subjects.

In all cases affecting ambassadors, other public ministers, and consuls, and those in which a State shall be party, the Supreme Court shall have original jurisdiction. In all the other cases before mentioned, the supreme court shall have appellate jurisdiction, both as to law and fact, with such exceptions and under such regulations as the Congress shall make.

The trial of all crimes, except in cases of impeachment, shall be by jury; and such trial shall be held in the State where the said crimes shall have been committed; but when not committed within any State, the trial shall be at such place or places as the Congress may by law have directed.

Sec. 3. Treason against the United States shall consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort.

No person shall be convicted of treason unless on the testimony of two witnesses to the same overt act, or on confession in open court.

The Congress shall have power to declare the punishment of treason; but no attainder of treason shall work corruption of blood, or forfeiture except during the life of the person attainted.

ARTICLE IV., Sec. 1. Full faith and credit shall be given in each State to the public acts, records, and judicial proceedings of every other State. And the Congress may by general laws prescribe the manner in which such acts, records, and proceedings shall be proved, and the effect thereof.

Sec. 2. The citizens of each State shall be entitled to all privileges and immunities of citizens in the several States.

A person charged in any State with treason, felony, or other crime, who shall flee from justice, and be found in another State, shall, on demand of the executive authority of the State from which he fled, be delivered up, to be removed to the State having jurisdiction of the crime.

No person held to service or labor in one State, under

* This mode of election of President and Vice-President has been modified by the Twelfth Amendment, *post*.

the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up on claim of the party to whom such service or labor may be due.

Sec. 3. New States may be admitted by the Congress into this Union; but no new State shall be formed or erected within the jurisdiction of any other State; nor any State be formed by the junction of two or more States, or parts of States, without the consent of the legislatures of the States concerned as well as of the Congress.

The Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States; and nothing in this constitution shall be so construed as to prejudice any claims of the United States, or of any particular State.

Sec. 4. The United States shall guarantee to every State in this Union a republican form of government, and shall protect each of them against invasion, and, on application of the legislature, or of the executive (when the legislature cannot be convened), against domestic violence.

ARTICLE V. The Congress, whenever two-thirds of both houses shall deem it necessary, shall propose amendments to this constitution, or, on the application of the legislatures of two-thirds of the several States, shall call a convention for proposing amendments, which, in either case, shall be valid to all intents and purposes as part of this constitution, when ratified by the legislatures of three-fourths of the several States, or by conventions in three-fourths thereof, as the one or the other mode of ratification may be proposed by the Congress; provided, that no amendment which may be made prior to the year one thousand eight hundred and eight shall in any manner affect the first and fourth clauses in the ninth section of the first article; and that no State, without its consent, shall be deprived of its equal suffrage in the Senate.

ARTICLE VI. All debts contracted and engagements entered into before the adoption of this constitution shall be as valid against the United States under this constitution, as under the Confederation.

This constitution, and the laws of the United States which shall be made in pursuance thereof, and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land; and the judges in every State shall be bound thereby, anything in the constitution or laws of any State to the contrary notwithstanding.

The senators and representatives before mentioned, and the members of the several State legislatures, and all executive and judicial officers, both of the United States and of the several States, shall be bound by oath or affirmation to support this constitution; but no religious test shall ever be required as a qualification to any office or public trust under the United States.

ARTICLE VII. The ratification of the conventions of nine States shall be sufficient for the establishment of this constitution between the States so ratifying the same.

Done in convention, by the unanimous consent of the States present, the seventeenth day of September, in the year of our Lord one thousand seven hundred and eighty-seven, and of the independence of the United States of America the twelfth. In witness whereof we have hereunto subscribed our names.

GEO. WASHINGTON,
Presid't, and Deputy from Virginia.

NEW HAMPSHIRE.	PENNSYLVANIA.	VIRGINIA.
John Langdon, Nicholas Gilman.	B. Franklin, Thomas Mifflin, Robt. Morris, Geo. Clymer, Tho. Fitzsimons, Jared Ingersoll, James Wilson, Gouv. Morris.	John Blair, James Madison, Jr.
MASSACHUSETTS.		NORTH CAROLINA.
Nathaniel Gorham, Rufus King.		Wm. Blount, Rich. Dobbs Spaight, Hu. Williamson.
CONNECTICUT.	DELAWARE.	SOUTH CAROLINA.
Wm. Saml. Johnson, Roger Sherman.	Geo. Read, Gunning Bedford, Jr. John Dickinson, Richard Bassett, Jaco: Broom.	J. Rutledge, Charles Cotesworth Pinckney, Charles Pinckney, Pierce Butler.
NEW YORK.		
Alexander Hamilton.		
NEW JERSEY.	MARYLAND.	GEORGIA.
Wil. Livingston, David Brearley, Wm. Paterson, Jona. Dayton.	James M'Henry, Dan. of St. Thomas Jenifer, Dan. Carroll.	William Few, Abr. Baldwin.

Attest: WILLIAM JACKSON, *Secretary.*

AMENDMENTS.*

ARTICLE I. Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech or of the press; or the right of the people peaceably to assemble, and to petition the government for redress of grievances.

ARTICLE II. A well-regulated militia being necessary to the security of a free state, the right of the people to keep and bear arms shall not be infringed.

ARTICLE III. No soldier shall, in time of peace, be quartered in any house without the consent of the owner, nor in time of war but in a manner to be prescribed by law.

ARTICLE IV. The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated; and no warrants shall issue but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

ARTICLE V. No person shall be held to answer for a capital or otherwise infamous crime, unless on a presentment or indictment of a grand jury, except in cases arising in the land or naval forces, or in the militia, when in actual service, in time of war and public danger; nor shall any person be subject for the same offence to be twice put in jeopardy of life or limb, nor shall be compelled in any criminal case to be a witness against himself; nor to be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use without just compensation.

ARTICLE VI. In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the State and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor, and to have the assistance of counsel for his defence.

ARTICLE VII. In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury shall be otherwise re-examined in any court of the United States than according to the rules of the common law.

ARTICLE VIII. Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishment inflicted.

ARTICLE IX. The enumeration in the constitution of certain rights shall not be construed to deny or disparage others retained by the people.

ARTICLE X. The powers not delegated to the United States by the constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.

ARTICLE XI. The judicial power of the United States shall not be construed to extend to any suit in law or equity commenced or prosecuted against one of the United States by citizens of another State, or by citizens or subjects of any foreign state.

ARTICLE XII. The electors shall meet in their respective States, and vote by ballot for President and Vice-President, one of whom at least shall not be an inhabitant of the same State with themselves. They shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice-President; and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice-President, and of the number of votes for each, which lists they shall sign and certify, and transmit, sealed, to the seat of the government of the United State, directed to the president of the Senate. The president of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted; the person having the greatest number of votes for President shall be the President, if such number be a majority of the whole number of electors appointed; and if no person have such majority, then from the persons having the highest numbers, not exceeding three, on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President. But in choosing the President, the votes shall be taken by States, the representation from each State having one vote; a quorum for this purpose shall consist of a member or members from two-thirds of the States, and a majority of all the States shall be necessary to a choice. And if the House of Representatives shall not choose a President, whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the Vice-President shall act as President, as in the case of the death or other constitutional disability of the President. The person having the greatest number of votes as Vice-President shall be the Vice-President, if such number be a majority of the whole number of electors appointed; and if no person have a majority, then from the two highest numbers on the list the Senate shall choose the Vice-President; a quorum for the purpose shall consist of two-thirds of the whole number of senators, and a majority of the

* Articles I. to X., inclusive, were proposed by the First Congress in 1789–90, Article XI. in 1793, Article XII. in 1803, Article XIII. in 1865, Article XIV. in 1868, and Article XV. in 1870.

whole number shall be necessary to a choice. But no person constitutionally ineligible to the office of President shall be eligible to that of Vice-President of the United States.

ARTICLE XIII., Sec. 1. Neither slavery nor involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction.

Sec. 2. Congress shall have power to enforce this article by appropriate legislation.

ARTICLE XIV., Sec. 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States, and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws.

Sec. 2. Representatives shall be apportioned among the several States according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice-President of the United States, representatives in Congress, the executive and judicial officers of a State, or the members of the legislature thereof, is denied to any of the male inhabitants of such State being twenty-one years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State.

Sec. 3. No person shall be a senator or representative in Congress, or elector of President and Vice-President, or hold any office, civil or military, under the United States, or under any State, who, having previously taken an oath as a member of Congress, or as an officer of the United States, or as a member of any State legislature, or as an executive or judicial officer of any State, to support the constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may, by a vote of two-thirds of each house, remove such disability.

Sec. 4. The validity of the public debt of the United States authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any State shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations, and claims shall be held illegal and void.

Sec. 5. The Congress shall have power to enforce, by appropriate legislation, the provisions of this article.

ARTICLE XV., Sec. 1. The right of the citizens of the United States to vote shall not be denied or abridged by the United States, or by any State, on account of race, color, or previous condition of servitude.

Sec. 2. The Congress shall have power to enforce this article by appropriate legislation. (See LAW, CONSTITUTIONAL, by PROF. T. W. DWIGHT, LL.D.)

Constitutions of Clarendon. See CLARENDON.

Construc'tion [Lat. *constructio*, from *con*, "together," and *struo, structum*, to "build"], the act of building; fabrication, structure; the mode of putting together the parts of a building or system. In grammar, it signifies syntax, or the arrangement and connection of words in a sentence; their meaning or interpretation. In architecture and engineering, construction is that branch of the science which relates to the practical execution of the works required to realize the artist's design; it is immediately connected with the distribution of the different forces, the strains of the parts and materials of a building, and the properties of the various materials used.

Construction. See INTERPRETATION, by PROF. T. W. DWIGHT, LL.D.

Consubstantia'tion [from the Lat. *con*, "together," and *substantia*, "substance"], the transformation, transition, or union of substances originally distinct into a common substance—substantial conjunction; a term used in antithesis to TRANSUBSTANTIATION (which see), which means the transition of one substance into another, either by transmutation or by annihilation and substitution—one substance *in place* of two; while consubstantiation results in one substance *out of* two. The term consubstantiation has been used in the controversies on the REAL PRESENCE (which see), the mode of the presence of the body and blood of Christ in the EUCHARIST (which see). The theories of presence may be thus classified:

I. SUBJECTIVE: 1. Natural—Zwingli;

2. Supernatural—Calvin.

II. OBJECTIVE: 1. *Monistic; one* substance only really present; the body and blood: Roman Catholic *transubstantiation.*

2. *Dualistic;* the two substances really present—bread and wine, body and blood.

a. Substantial conjunction of the two—consubstantiation, IMPANATION (which see), as held by John of Paris and Rupert; falsely charged on the Lutheran Church.

b. Sacramental conjunction—mystical mediating relation of the natural (bread and wine) to the supernatural (body and blood), each unchanged in its substance, and without substantial conjunction; the *Lutheran* view.

This tabular view at once accounts for the fact that the charge of holding this doctrine has been so commonly made against the Lutheran Church, and shows how groundless the charge is. (See KRAUTH'S "Conservative Reformation," 757–775.) The same charge, with an equal want of accuracy, has been made against Dr. Pusey and his school.

C. P. KRAUTH.

Consue'gra, a Spanish town, in the province of Toledo, 38 miles S. E. of Toledo. It is an old place with steep, narrow streets, and a ruined fortress of supposed Roman origin. It manufactures coarse stuffs. Pop. 6870.

Con'sul [from the Lat. *consulo*, to "consult" or "advise"], the supreme magistrate of ancient Rome after the expulsion of the kings. The number was two, and the period of office one year, but there was no restriction as to the number of times the same individual might be elected, although a certain interval was at length required before again holding the office. Consuls were the supreme executive officers, but had no legislative authority. They were originally chosen only from the patricians, but afterwards from the plebeians also. The age required by law was forty-three years, but besides this it was requisite to have passed through the inferior offices of quæstor, ædile, and prætor. They were elected at the *comitia centuriata* some months before their entrance into office, which took place at different periods of the year at different times, but finally in January. During the interval they were termed *consules designati*, or "appointed consuls." Soon after the entrance into office they cast lots for the provinces to fall to the share of each, the superintendence of which was conferred on them by the senate. Under the emperors the nominal office of the consulate was preserved, but its substantial power destroyed; the elections became mere forms, the emperor appointing whom he pleased. Then, too, the custom was introduced of having several sets of consuls in one year; those admitted on the first day gave their name to the year, and were distinguished from the others, who were termed *suffecti* ("substituted"), by the title *ordinarii* ("regular"). Persons also were sometimes dignified with the title without enjoying the office, and were then styled *honorary consuls.* Under Justinian the year ceased to be called by the name of the consul.

Consuls in French history were the persons to whom, after the dissolution of the Directory in Nov., 1799, was entrusted the provisional government of the country. According to the constitution thus framed, Bonaparte, Cambacérès, and Lebrun, called first, second, and third consuls, were elected at the same time by the conservative senate, each for ten years, and invested with different degrees of authority. But the senate having passed various decrees which curtailed the powers of the second and third consuls, and augmented those of the first, the government was gradually assimilated to a monarchy, and after the lapse of four years and a half an easy transition was made from the consular to the imperial form; the title of emperor was substituted for that of consul, and the exercise of the sovereign authority was delegated exclusively to Napoleon Bonaparte.

Con'sul* [Fr. *consul;* It. *console*], a public officer appointed by a government to reside in foreign seaports and other places for the purpose of protecting the interests of commerce and performing administrative, and sometimes judicial, duties in regard to his countrymen who may be in the place where he resides. Consuls also aid in authenticating documents, in protecting the rights of seamen, and in various other minor duties. There are consuls-general, vice-consuls, deputy-consuls, consular and commercial agents, etc. They are not in general considered as diplomatic officers. They are, as a rule, under obligation to obey the laws of the place where they reside. Consuls of the U. S. are governed by detailed provisions of statutes

* Not only the chief magistrates of ancient Rome, but those of other Italian cities, were in a later time called consuls; the Italian republics, it appears, applied the title to those magistrates whom they sent to the colonies in the Levant, and afterwards to their representatives at other ports.

passed by Congress, which are collected in Brightly's "Digest and Supplements." These statutes regulate their appointment and compensation, their duties towards seamen and masters of vessels, their power to take possession of the estates of deceased persons, to administer oaths, perform the acts of a notary, etc. In some countries, such as China, Japan, Turkey, and Persia, they are empowered to exercise judicial functions, both criminal and civil, and to inflict specified punishments. The details of the laws are too voluminous to be stated. An important provision, however, is worthy of special reference. By the act of 22d June, 1860, all marriages in the presence of any consular officer in a foreign country, between persons who would be authorized to marry if residing in the District of Columbia, shall have the same validity as if the marriage had been solemnized in the U. S. The officer is directed to give to each of the parties a certificate of marriage, stating their names, ages, places of birth, and residence, and to forward a duplicate to the department of state at Washington. The general powers of consuls are discussed in the treatises on international law. (See INTERNATIONAL LAW, by PRES. T. D. WOOLSEY, S. T. D., LL.D.)

Consump'tion [Lat. *consumo, consumptum,* to "wear away"], the popular name of various diseases characterized by a wasting of the body, such, for example, as "anæmia" (known as "consumption of the blood"), but applied especially to *phthisis pulmonalis,* a very common and very fatal disease of the lungs. It has long been taught, upon the authority of Laennec, Louis, and Andral, that the characteristic symptoms of pulmonary consumption depend upon the presence in the lung-tissue of a new growth, or neoplasm, called TUBERCLE (which see); but the studies of Virchow, Niemeyer, and other recent pathologists have demonstrated that cases of originally tuberculous consumption are quite rare, although they do occur, the presence of the tubercles giving rise to local pneumonic inflammation in their neighborhood; while ordinary consumption is generally characterized by (1) local consolidation, (2) cheesy degeneration of the solidified spot, and (3) destruction of the degenerated tissue and formation of a cavity. This is the direct result, in most cases, of a "catarrhal" inflammation—that is, of an inflammation of an epithelial surface, such as lines the air-passages—the inflammation being associated with a free discharge of mucus from the surface of the membrane. Next, the air-vesicles of the lungs become filled by inhalation and by other means with the young cells of the secretion. If, as in non-fatal cases of ordinary pneumonia, these cells soon undergo liquefaction and absorption, the patient recovers. But if the accumulation of cells remains unabsorbed in the air-vesicles, it suffers a cheesy degeneration, a sort of slow decay. It appears that an inflammatory process is set up around this caseous degenerate mass, and that the cheesy degeneration is soon present in the inflamed lung-tissue itself. After a time the degenerate mass may assume a more or less complete purulent form, and may be discharged by coughing. This, however, does not always happen. The mass may be absorbed, the pulmonary tissue become indurated and callous, without a trace of tubercle; the bronchial tubes may become dilated, and the disease, spreading slowly, may disorganize but not consume the lungs. This is a very common condition in old consumptive cases. Meanwhile, the less changed bronchi near the seat of the disease pour forth a profuse catarrhal secretion, causing copious expectoration. The pleura near the seat of the disease becomes thickened, and adheres by organized exudations to the wall of the chest. In the majority of cases these changes begin at the apex of one or both lungs.

The first subjective symptoms are usually dull pains about the collar-bones, tightness across the chest, and there is not unfrequently a dry, hacking cough, not very severe in the morning and late at night. Headache, weariness, dyspepsia, and loss of appetite are often present. The pulse increases permanently, in most cases exceeding 90 or 100 beats in a minute. The rapidity of breathing is usually increased. An early symptom is a high evening temperature—103° or 104° F. In the second stage night-sweats are often extremely severe, pus is freely expectorated, hectic fever is decidedly present, the pulse is more frequent. In the third stage, when considerable cavities often form in the lung, the preceding symptoms are much intensified; colliquative diarrhœa supervenes, and yet in many cases the patient continues serene and hopeful, and the mind is remarkably clear and active.

The causes of consumption are very numerous. Niemeyer assigns the first place as a cause to that depraved, ill-nourished state (called the scrofulous diathesis) in which there is a tendency to the increased production of young cells. Any depressing circumstance may tend to the establishment of consumption. An hereditary tendency is one of the most important of these circumstances, but any depressed state of the parent, especially of the mother, whether consumption, starvation, anæmia, scrofula, or any other dyscrasia, appears to have a nearly equal effect on the offspring. Bowditch and others have shown that, other things being equal, it is most frequently observed in places where the air and soil are charged with moisture. Cold weather in itself appears to have little or no tendency to produce the disease, but a very changeable temperature is one of its most fruitful causes.

There has been considerable discussion as to whether consumption is or is not a contagious disease; and facts are not wanting which appear to show a danger of infection, especially to those who take care of and intimately associate with consumptives. Another interesting question is whether consumption is ever caused or promoted by habitual drunkenness, either in the case of the drunkard or of his offspring. The best opinion among physicians appears to be that while in selected cases alcoholic stimulants may be useful adjuvants, the remedy is a dangerous one, since there is no doubt that many more consumptives are injured than are benefited by it. On the offspring of the consumptive the effect of hard drinking is confessedly deplorable. Over-study at school appears to develop the disease in some young people. Overwork, factory-life, the grinding of metals, cabinetmaking, and all kinds of dusty or sedentary work are undoubtedly prolific sources of the disease. Mental trouble, excessive care, too frequent child-bearing, and sexual excess are to be reckoned in the list of causes. Consumption frequently follows measles, typhoid fever, and whooping cough, not improbably resulting from the bronchitis which accompanies those diseases.

It is also thought that pregnancy will check the disease in the female; and while there are numerous observations which go to show that for the time the disease is sometimes (but not always) held in abeyance, it is certain that this abeyance is often followed by a period of greatly increased activity; and the probability that a child born in such circumstances will be sickly and short-lived ought to prevent the resort to any such practice as a curative measure.

The physical signs of consumption are those which are determined by inspection, palpation, auscultation, and percussion of the chest. Their relative importance can be appreciated by none except the well-trained and experienced diagnostician.

The treatment of consumption cannot be discussed except in the most general terms, for no disease is less amenable to mere routine treatment. Yet there is no reasonable question that, especially in its earlier stages, this disease is a curable one. One of the first requisites is the establishment, if possible, of normal nutrition—a process which is usually much impaired in those liable to this disease. The use of such tonics as quinia and strychnia in some conditions, the administration of cod-liver oil, either as food or for its assumed alterative powers, and judicious change of climate, are among the most useful measures. Alcoholic stimulants benefit some patients and injure others, and on the whole do more harm than good; the hypophosphites of soda and lime appear to cause increase of weight and diminution of cough and expectoration in many cases; thorough counter-irritation of the chest-walls is a very important adjuvant; the wearing of sufficient clothing to protect the body from sudden changes of temperature is not less important. Systematic, and even severe, physical labor benefits some patients, but others appear to be injured by any but the gentlest exercise. Special symptoms, like diarrhœa and night-sweats, will require palliative treatment. Life in the open air is advisable, except in wet and bleak weather. The dry air of the Western plains and of the Rocky Mountain region, the equable weather of Florida, and the dry, sandy soil and balsamic exhalations of the great pine forests of the South, are believed to afford favorable conditions for recovery in many cases. Much depends on the peculiar history and temperament of individual cases, and the proper appreciation of these conditions in any case is likely to tax severely the judgment of even the ablest practitioner. CHARLES W. GREENE.

Consumption, in political economy, the converse of production. Although frequently used by political economists, the word has never had a definite meaning. It may be said that everything which is produced by human labor is to cease in its turn to exist. There is a consumption which may be termed annihilation, and a consumption which is gain or an addition to the wealth of the world. Food is an article of production immediately consumed, but the food of the working man sustains him while he is producing more than he consumes. A thousand dollars spent in building a house produces something which lasts for many years. The same sum spent in raising a wheat-crop will seem to be immediately consumed, but it may have in reality been laid out more beneficially than the

other, through the process of reproduction. If a thousand dollars laid out on land increases its value, and makes it worth eleven hundred, while the wheat raised by the expenditure of the other thousand is sold for fifteen hundred dollars, there is less consumption in the latter expenditure than in the former.

Con'tact [Lat. *contactus*, from *con*, "together," and *tango*, to "touch"]. In geometry, two lines, one of which at least is curved, are said to be in contact when they have a common point, from which they recede in such a way that the deflection of the one from the other will, if a sufficiently small departure be taken, become as small a fraction as we please of that departure.

CONTACT, ANGLE OF, the angle made by a curve line with its tangent. It is also called *angle of contingency*, and is equal to the angle of curvature.

Conta'gion [from the Lat. *con*, "with," "together," and *tango*, to "touch"], the transmission, direct or indirect, from one person to another, of disease. If of a given number of healthy persons exposed to association with the sick, a larger proportion becomes ill than is observed among persons not exposed to this cause of disease, it is said to be propagated by contagion. It was formerly called "common contagion" when the disease might possibly arise from some cause other than direct or indirect personal contact; while, if the characters of the disease are well marked, and traceable to no cause except infectious contact, it is said to be due to a specific contagion, which may be in some cases shown to be capable of reproducing the primary disease to an illimitable extent, being conveyed either through the secretions or through exhalations. Contagious diseases are sometimes epidemic, travelling from place to place, but there are epidemic diseases which are by no means contagious. No question in the etiology of disease is more difficult than that of the boundary line between contagious and non-contagious diseases; and, simple as the definition of the term may appear, the nature, conditions, and limitations of contagious influence are as yet almost unknown.

REVISED BY WILLARD PARKER.

Contari'ni, the name of a noble family of Venice that produced numerous doges and senators, of whom the most famous were—AMBROGIO, a senator, who was sent as ambassador to the king of Persia in 1473. He returned in 1477, and published in 1487 a curious account of his mission and travels.—ANDREA, elected doge in 1367. He gained in 1380 an important victory over the Genoese, and saved Venice from imminent danger. Died in 1382.—DOMENICO, elected doge in 1659, waged war against the Turks, who took Candia in 1667 after a famous siege. Died in 1674.—GASPARO, a cardinal and writer, was born at Venice in 1483. He was sent as ambassador to the court of Charles V., and was papal legate at the Diet of Ratisbon in 1541. Died in 1542.

Contempt' [Lat. *contemptus*, from *contemno, contemptum*, to "despise"], in law, is a wilful disregard or disobedience of a public authority. By the Constitution of the U. S. each house of Congress may punish its members for disorderly behavior, and with the concurrence of two-thirds expel a member. The power to punish for contempt is also possessed by either house of Congress, as incidental to the complete exercise of the authority granted by the Constitution, and extends to strangers or persons who are not members. This power of punishing for contempt must be exercised during the session of Congress, and the punishment itself cannot extend beyond the existence of the Congress.

CONTEMPT OF COURT. Courts of justice have an inherent power to punish all persons for contempt of their rules and orders, for disobedience of process, and for disturbing them in their proceedings. When a person is regularly adjudged to be in contempt he cannot be discharged by another court or judge on a writ of *habeas corpus*. In some of the States the law of contempt is carefully regulated by statute.

Contentnea, a township of Pitt co., N. C. Pop. 2118.

Conti, de (ARMAND DE BOURBON), PRINCE, born in Paris in 1629, was a brother of the great prince of Condé. In the civil war of the Fronde he commanded a royalist army against the prince of Condé. He married a niece of Cardinal Mazarin. Died in 1666.

Conti, de (FRANÇOIS LOUIS DE BOURBON), PRINCE, a French general, a son of the preceding, was born in Paris in 1664. He had so high a reputation for valor and other popular qualities that he was chosen king of Poland by a large party in 1697, but Augustus of Saxony obtained the throne. He served with distinction at Steenkerke in 1698, and received the command of an army in Flanders in 1709, but he died in the same year. According to Saint-Simon, he was the "idol of the soldiers and the hero of the officers." (See SAINT-SIMON, "Mémoires.")

Con'tinent [from the Lat. *contineo*, to "continue" (from *con*, "together," and *teneo*, to "hold"), because it has an unbroken extent], a large, unbroken tract of land, greater than an island. The portion of the solid crust of the earth rising above the surface of the ocean is divided into six great bodies, the continents, besides innumerable smaller ones, the islands. A continent is not simply a larger piece of land; it has a general structure found in all, but not in islands, and which may be called the continental structure. Moreover, each continent has special traits of configuration and a diversity of climate, plants, and animals which distinguish it from every other, and stamp upon it a real individuality. Every large body of land has a form more or less triangular. North and South America are triangular; Europe, together with Asia, forms another large triangle; and the main body of Africa is also triangular. In Australia alone the square form seems to predominate, though the tendency to the triangular appears when we consider the continent as prolonged to the southern point of Tasmania. This remarkable coincidence in the fundamental form evidently points to a general law of structure which geology may some time discover. In the two Americas and in the southern continents of the Old World the sharper point of the triangle is turned towards the south, in Asia and Europe towards the W. In the Western World, therefore, the greatest extension of land is from N. to S., 9000 miles, passing through all zones of climate, with great changes in plants and animals; in Asia and Europe the land extends about 9000 miles from E. to W. along the parallels, and the temperature and vegetable and animal forms are very similar.

Notwithstanding their resemblance in general form, the outlines of the continents offer striking differences, some being deeply indented with gulfs, bays, inland seas, and projecting peninsulas, while others present a massive form with simpler outlines, without indentations worthy of notice. Carl Ritter has called attention to the vast importance of this kind of configuration to civilization. Such indentations greatly increase the length of the coast-line, and the contact of land and water favors the formation of convenient harbors, opens the interior of the continents to commerce by the paths of the sea, and facilitates communication with the outer world. The sea penetrating into the land moderates the extremes of heat and cold, and gives moisture and fertility. This subdivision of the continents into peninsulas, which make as many peculiar physical regions, secures a richer development by assisting in the formation of distinct nationalities, such as those reared in the great peninsulas of India and Arabia on the Asiatic, and Greece, Italy, and Spain on the European, portion of the great eastern land-mass. In this respect there is among the continents a significant gradation. No other part of the world has so large a number of indentations, compared to its extent, as Europe has. The triangle which makes the body of this continent has three peninsulas on each of its maritime sides—Greece, Italy, and Spain projecting into the blue waters of the Mediterranean; the peninsulas of Bretagne, Denmark, and Scandinavia on the shores of the Atlantic; while the British Isles themselves are hardly less than a projection of the mainland. Numerous indentations are also found in the large Asiatic continent, though not so many in proportion to its size. Arabia, India, Indo-China in the S., on the shores of the Indian Ocean, and China, Manchooria, with Corea and Kamtchatka, in the extreme eastern point of Asia, on the waters of the Pacific Ocean, form a necklace of rich lands surrounding two-thirds, and containing the most valuable portions of its domain. North America, although less indented, still has the peninsulas of Florida and Nova Scotia on the Atlantic; Labrador and Melville Peninsula on its northern Arctic shore; and California and Alaska on the Pacific. In these three continents the gulfs, bays, and inland seas abound correspondingly. In Europe the large peninsular appendages are to the total area of the continent as 1 to 4; in Asia, as 1 to 5.5; in North America as 1 to 14. In Africa, South America, and Australia the waters of the ocean nowhere penetrate deeply into the heart of the continents. The so-called gulfs or bays—like that of Arica in South America, the Gulf of Guinea in Africa, and the great South Australian Bay—are only slight bends in the coasts; and the projection of the Atlas lands and of Cape Guardafui in Africa, and of York Peninsula in North Australia, are hardly to be counted among the true peninsulas. These three continents are trunks without branches, as Ritter expresses himself, or bodies without members; while the northern continents are beautiful trees with trunks and abundant branches, or bodies richly articulated with useful members.

There are upon the entire globe three bands of land and six continents—the two American continents forming one band; Europe and Africa another; Asia and Australia a

third; the last two pairs being clustered together on one side of the globe, the first isolated on the opposite side. As two of the three bands of land, or four continents, are crowded together in the eastern hemisphere, it contains two-thirds, and the western hemisphere only one-third of the lands. The Old World is thus double the size of the New World. (See EARTH.) ARNOLD GUYOT.

Continen'tal [originally applied in contradistinction to *provincial;* belonging to the whole American continent, and not to any one province or colony], a term applied to the money and troops of the revolting colonies during the Revolutionary war. It was introduced in the early part of that contest by the colonists, to distinguish their own forces from those of the British government. The latter were called "ministerial forces," being under the control of the British ministry. The "Continental Congress" was the Congress of the colonies, and after the Declaration of Independence it was the Congress of the U. S. previous to 1788, when the Constitution came into force. It had only one house.

Continen'tal Sys'tem, a name given to Napoleon's plan for excluding British merchandise from all parts of the continent of Europe. It commenced with the Berlin Decree (issued by Napoleon Nov. 21, 1806), which declared the British Islands in a state of blockade, and treated as prisoners of war all Englishmen found in the territories occupied by the French armies or by the allies of France. The French government was not able to render this blockade complete. The British ministers retaliated by an "Order in Council," which was issued in Jan., 1807, and prohibited all neutral vessels from entering any port belonging to France or her allies; vessels that violated this order were confiscated if captured.

Contin'gency [from the Lat. *contingo*, to "happen"], a fortuitous event; a casualty. In law, contingency is an event the occurrence of which, though uncertain, is sufficiently probable to be provided for.

Contin'gent, fortuitous, occurring without design; in law, depending on an uncertainty. The term is also applied to the quota of troops furnished to the common army by each member of a confederation; the proportion of troops or money furnished by each party to an alliance.

Contin'ued Frac'tions, expressions which arise from the approximate valuation of fractions whose terms are large. For example, the ratio of the circumference to the diameter, $\frac{314159}{100000}$, may be represented by the continued fraction—

$$3+\cfrac{1}{7+\cfrac{1}{15+\cfrac{1}{1+\cfrac{1}{25+\cfrac{1}{1+\cfrac{1}{7\frac{1}{4}}}}}}}$$

For convenience, the fraction may be written thus:

$$3+\frac{1}{7}+\frac{1}{15}+\frac{1}{25}+\frac{1}{1}+\frac{1}{7}+\frac{1}{4}.$$

To convert a proper fraction into a continued fraction, divide the denominator by the numerator, and make of the mixed-number quotient a new denominater to the numerator, 1. Proceed in like manner with the fractional part of this new denominator, and so continue as long as the division leaves a remainder, or as long as is necessary for the object in view. If the given fractional number is, as in the foregoing case, an improper fraction, it must first be reduced to a mixed number, after which the above rule applies to the fractional part.

Continu'ity, Law of, a principle of considerable use in investigating the laws of motion and of change in general, and which may be thus enunciated: *Nothing passes from one state to another without passing through all the intermediate states.* Leibnitz claims the merit of having first made known this law; but, in so far as motion at least is concerned, it is distinctly laid down by Galileo, and ascribed by him to Plato. But, though a perception of its truth seems to have been felt long before, Leibnitz was certainly the first who applied the principle to test the consistency of theories or supposed laws of nature. The argument on which he attempted to establish it *a priori* is, that if any change were to happen without the intervention of time, the thing changed must be in two different conditions at one and the same instant, which is obviously impossible. A remarkable application of the law of continuity was made by John Bernoulli in an "Essay on the Laws and Communication of Motion," which gained the prize of the Academy of Sciences in Paris (1724), to prove that perfectly hard bodies cannot exist, because in the collision of such bodies a finite change of motion must take place in an instant—an event which, by the law now explained, is impossible. This conclusion was objected to by D'Alembert and Maclaurin, who, on account of it, were disposed to reject the law of continuity altogether; but the difficulty is got over by supposing (which on various grounds is extremely probable) that there is no real contact, and that bodies begin to act on each other when their surfaces, or what seem to be their surfaces, are yet at a distance.

Con'toocook, a post-village of Hopkinton township, Merrimack co., N. H., at the junction of the Concord and Claremont and the Contoocook River R. Rs., 11 miles S. W. of Concord. It has four churches, an academy, and manufactures of carriages, lumber, tubs, and woollen goods.

Contour', in the fine arts, the external lines which bound and terminate a figure. The beauty of contour consists in those lines being flowing, lightly drawn, and sinuous. They must be scientifically drawn, and this cannot be done without a good knowledge of anatomy.

Con'tra, a Latin preposition signifying "against," "opposite to;" also a musical term meaning opposite, lower, and applied to the alto and tenor parts when they form the lowest part in harmony. When a part lower than the usual bass is employed, it is called *contra-basso.*

Con'traband [It. *contrabando*, from the Late Lat. *contra bannum*, "contrary to proclamation"], in commercial language, goods exported from or imported into a country against its laws. *Contraband of war* are such articles as a belligerent has by the law of nations the right of preventing a neutral from furnishing to his enemy. Articles contraband of war are, in general, arms and munitions of war and those out of which munitions of war are made. All these are liable to be seized; but very arbitrary interpretations have been affixed to the term by powerful states when able to enforce them by arms. Thus, provisions have been held to be contraband of war when it is the object of a belligerent to reduce his enemy by famine. Where the primary use of goods is military, they would seem to be plainly contraband; where the use is of a doubtful character, and they are suited either for a state of war or peace, their character leaves open an inquiry as to the objects of the shipment and the use to which the goods may be put. The act of carrying contraband goods is not, in general, good ground for confiscation of the ship; the contraband goods only are subject to seizure. The uncertainty respecting the law concerning this whole subject is due to the natural conflict between the necessities of war and the laws of trade. The remark of Calvo appears to be justified, that international law has not yet been able to establish a rule universally accepted and respected concerning the distinctive character of contraband of war. The act of carrying despatches to or for a belligerent, or the act of transporting his ambassadors in a neutral vessel, has given rise to grave discussions involving principles resembling those applied to contraband, though requiring separate consideration. Such acts may become serious violations of the law of nations, substantially identifying the neutral with the belligerent, and subjecting his ship to confiscation by the opposing party to the war. A question of great magnitude arose in the recent civil war in the U. S. in connection with the seizure by an American officer of the Trent, an English ship, then engaged in carrying Messrs. Mason and Slidell, ministers of the insurgents, to a neutral country. The result of the controversy was an assumption by both parties to it that the law of nations does not allow a belligerent at sea to take into his control, from a neutral vessel, such persons. The regular course is to have the ship brought before a prize court of the captor for condemnation. It is, however, claimed by some writers that there is ground for maintaining that a belligerent may take noxious persons, such as military men belonging to the enemy, from a neutral vessel without any prize proceedings, and after their removal release the ship. The exercise of such a right, if it exist, is so delicate and likely to cause irritation on the part of the neutral, that it seems to demand regulation by treaty. (Consult WHEATON, KENT, CALVO, and other text-writers. See INTERNATIONAL LAW No. II., by PRES. T. D. WOOLSEY, S. T. D., LL.D.) REVISED BY T. W. DWIGHT.

Con'tra Cos'ta, a county near the central part of California. Area, 800 square miles. It is bounded on the N. by San Pablo and Suisun bays, and on the W. by the Bay of San Francisco. It is partly occupied by mountains of the Coast Range. Here is Monte Diablo, the central landmark of the State. The county contains valuable lignitic coal and saline springs. Limestone, sandstone, and gypsum are found. Grain, cattle, and wool are raised. The soil is in general productive. Capital, Martinez. Pop. 8461.

Con'tract [Lat. *contraho*, to "draw together"], an agreement in which a party undertakes to do or not to do a particular thing. Contracts are distinguished, according to their form, either as contracts of record, specialties, or simple contracts. Contracts of record are such obligations as are evidenced by judicial records, as, for example, recognizances and judgments. (See these titles severally.) Specialties are contracts under seal, such as deeds, bonds, and covenants. Simple or parol contracts include those agreements which are not comprised within the first two classes, and may be either oral or in writing. As regards the mode of their creation, contracts are further distinguished as express or implied. They are express when stated by the parties thereto consenting in direct and formal terms; implied, when they derive their origin and validity from construction of law, as being of such a nature that reason and justice dictate their fulfilment. Contracts are still differently classified in reference to the time of their performance, as executed and executory. They are said to be executed when the obligations therein created have been already carried out; executory, when their fulfilment is yet to be accomplished. Contracts of every variety include four essential constituent elements: First, there must be appropriate parties; second, there must be mutual consent to the terms of the agreement; third, there must be a valid consideration, either actual or presumed; and, fourth, there must be a definite subject-matter to be acted upon. As regards the first point, all persons are capable of binding themselves by their contracts except certain important classes of individuals who labor under some natural infirmity, either from want of sufficient age (as infants), or from lack of requisite mental soundness (as idiots and lunatics), or who are placed arbitrarily under disability in consequence of their legal status (as married women). Drunkards, seamen, aliens, and bankrupts are also incapacitated in certain instances. Infancy at law is the condition of persons under the age of twenty-one, though in some States females are considered to arrive at majority at eighteen. It is a general principle, though subject to exceptions, in accordance with modern judicial decisions, that an infant's contracts are not void, but voidable; *i. e.* they may be confirmed or disavowed by him, either, in some instances, before majority, or, in all cases, within a reasonable time afterwards. The chief important exception to this rule is an infant's contracts for necessaries, which are considered binding upon him. The import of the term "necessaries" is not invariable, as different articles would be comprised within the designation according to the wealth and station of various persons. The validity of these obligations is established for the same reason that others are considered voidable—that the infant's welfare may be ensured until he arrives at years of discretion. Moreover, the contract of marriage may be entered into by males at the age of fourteen, and by females at the age of twelve, unless there is some statutory provision to the contrary. Idiots and lunatics are relieved from responsibility for their contracts, because they are incapable of understanding the nature of the promises they make, and of giving a valid assent. But it is likewise true of them, as of infants, that contracts for necessaries suitable to their station, if entered into with other parties who act in good faith, are obligatory. Insane persons may also have lucid intervals, and would be liable for agreements made under such circumstances. Temporary mental weakness resulting from intoxication will relieve from liability when it is sufficient in degree to preclude reasonable action, and is not contracted purposely to defraud others. Mere mental feebleness, however originating, which is not so excessive as to prevent a comprehension of the nature of a contract, will be no ground of exemption unless a person affected by it is led into a contract by imposition. Married women, at common law, are placed under an almost entire inability to contract. Their legal existence is deemed to be merged in that of their husbands. In some instances they have power to bind their husbands, as when they act as agents or make engagements for necessaries which their husbands refuse to supply; but agreements of this kind are not their own personal obligations. Courts of equity and recent statutory provisions have considerably extended the powers of married women to enter into engagements which will be binding upon their property. This result in equity has been accomplished through the medium of trusts. The incapacity of aliens extends mainly to their ability to acquire a valid title to real estate, and in some States has been removed. Seamen are relieved, in certain instances, from their stipulations, to protect them from the consequences of their own improvidence; while the engagements of bankrupts are in some instances nullified to prevent injury to their creditors. Persons who are forced into contracts by duress, either through imprisonment or reasonable fear of injury to life or limb, are excused from their fulfilment.

As regards the nature of the obligations which they assume, parties to contracts may act either severally or jointly, or jointly and severally. When any joint liability exists, as in the last two instances, and one of the parties discharges it by paying more than his share of the indebtedness, he may, under the notion of an implied contract, recover from the others their just proportion. This is termed "contribution." It rests on a doctrine of natural justice, and is more completely enforced in a court of equity. The right to enforce agreements against others may also be either several or joint; that is, it may inhere in a single individual or in two or more collectively. No right of this kind, however, can be both joint and several at the same time, and in this respect it differs from the corresponding liability. Parties may also act on their own behalf, or in a representative capacity as agents or partners. For the purpose of making a contract, a corporation, however numerous its members may be, is regarded as a single person. The second element of contracts, assent, is necessarily implied in the term "agreement"—a meeting of minds. Assent must be mutual, and have reference to exactly the same stipulations. There must not only be a proposal, but an acceptance, and if any modification in the terms of the original offer is made by the party by whom it is received, no contract is established. The entire concurrence of all the parties concerned is indispensable. Such proposed change would be, in itself, a new offer, which would need acceptance. It is not necessary that a proposal when made should be acceded to at once. An offerer may contemplate a continuance of the offer for a certain definite or understood period, within which assent may be expressed by the offeree and a valid contract created; or an offer to enter into an agreement may be sent to a person at a distance, who must reply by mail. In cases of this kind the contract, according to the prevailing opinion, though with weighty dissent, is deemed to be completely formed from the time when the letter of acceptance is posted, without regard to the fact of its being received.

The element of consideration is that which gives contracts a legal, as distinguished from a moral, validity, for, as a rule, promises are not enforceable in law which do not rest on such a basis. The consideration is the cause of a contract, the return for a stipulation, the price for a promise. It may be something actually rendered, as is requisite in nearly all simple contracts, or its existence may be conclusively presumed, as in negotiable paper which has passed into circulation, and in contracts under seal. The care and deliberation with which the latter are usually formed are considered a sufficient substitute for an actual consideration. In the case of negotiable paper, a proper consideration will only be conclusively presumed when it is necessary to protect the interests of innocent, unsuspecting third parties into whose hands the paper has passed before maturity. The requisites of a valid consideration are that it shall either be some benefit to the party promising or some disadvantage or injury to the party to whom the promise is made. Considerations are distinguished as good or valuable. The former term is applied to inducements of relationship and natural affection; the latter, to some mode of making return which is either directly pecuniary or estimable pecuniarily through its probable consequences in occasioning profit or loss. Marriage also is included within this latter designation. A good consideration will only support an executed contract, and then simply between the parties themselves. As illustrations of a valuable consideration may be mentioned the payment of money, the performance of work, the forbearance to sue, the delivery of property, the making of a promise for a promise, and the like. In such cases it is not necessary that the consideration be an equivalent for the agreement made. A moral obligation will constitute no legal consideration for a promise, except in cases where there has been a pre-existing legal obligation which is no longer enforceable in a court of justice, as where a debt has existed, but is barred by lapse of time under the provisions of statutes of limitation. If a consideration be illegal or impossible, the contract founded upon it will, in consequence, be rendered nugatory. Considerations are also distinguished, as regards the time of their fulfilment, as executed, executory, and concurrent. They are said to be executed when performed before the promise founded upon them is made, and are insufficient to support such promise unless they grew out of a previous request, since the agreement cannot be the reason of their accomplishment; executory, when they are to be performed in the future; concurrent, when they and the promises based upon them are simultaneous. The last two forms of consideration are sufficient to support all agreements otherwise unobjectionable.

The general principle in regard to the subject-matter of contracts is, that parties may enter into agreements of any character they may choose. Certain important exceptions

are, however, established on grounds of public policy. Thus, the subject-matter must not contemplate any illegal or immoral undertaking. Such agreements are necessarily nugatory, and if attempted to be enforced their illegality may be alleged as a valid defence. But when the terms of the parties' stipulations are not thus contravened, it is the object of the courts to arrive at the exact meaning of the language employed as expressing the intentions of the persons contracting, and to enforce all unfulfilled obligations thence resulting. For this purpose certain definite rules of interpretation and construction have been established, which are adapted to remove ambiguities and resolve uncertainties. These are principally applicable to agreements in writing. If the application of these shows a comprehensible agreement, and no defences alleged prove its invalidity or that its terms have been satisfied either wholly or in part, an adequate remedy will be given for its violation. In courts of law this consists of pecuniary recompense or damages for the injury sustained, while courts of equity, in proper instances, will decree a specific performance of the engagements undertaken.

Certain contracts are required to be in writing, for the better prevention of fraud and convenience in proving their stipulations. This requirement depends upon the so-called "statute of frauds." The principal classes of agreements within its provisions are contracts made upon consideration of marriage, contracts to answer for the debt, default, or wrongful act of another, contracts which are not to be performed within one year, contracts for the sale of any interest in land, and contracts for the sale of personal property of a specified value—usually fifty dollars and upwards. In all these cases the agreement, or some memorandum thereof, when written, must also be signed, or in some States subscribed, by the party charged therewith or his agent. In the sale of goods, the delivery by the seller and the acceptance by the purchaser of a portion of the goods will render a reduction of the contract to writing unnecessary.

The remedy upon contracts by action at law is confined by "statutes of limitations" within certain prescribed periods after their maturity. The provisions generally made are that no action can be brought upon a simple contract after the lapse of six years, or upon sealed instruments after twenty years, from the time when they become due. (See LIMITATIONS, STATUTES OF.) Important and difficult questions also arise as to the effect of the laws of different States upon contracts when obligations are assumed in one country and sought to be enforced in another (for which see INTERNATIONAL LAW, PRIVATE, and MARRIAGE).

The Constitution of the U. S. provides that "no State shall pass any law impairing the obligation of contracts." Much discussion has arisen upon the effect of this prohibition. It has been decided that it applies as well to executed contracts or grants as to those which are executory. Not only agreements between individuals, but with States, as the charters of corporations, confer privileges which are inviolable, unless there is some prior reservation of a power to make alterations. An exception is, however, established in the case of municipal corporations, which are considered mere instruments of government, and continually subject to legislative authority. Moreover, contracts by which States undertake to resign necessary governmental functions are not generally deemed unchangeable by subsequent legislation, though an exception to this rule has been established in the case of taxation. A deprivation by a State of all remedy to enforce contracts is held to be an impairment of their obligation, and therefore unlawful; this is not true, however, when, on a change of remedies, one that is substantial and sufficiently convenient remains or is supplied.

(Reference must be made for different forms of contracts to such topics as AGENCY, BILLS OF EXCHANGE, PARTNERSHIP, SALE, GUARANTY, BAILMENT, SHIPPING, INSURANCE, etc., and for defences to PAYMENT, PERFORMANCE, ACCORD, AWARD, RELEASE, SET-OFF, USURY, etc., etc. Convenient books of reference are the works of PARSONS, ADDISON, CHITTY, HILLIARD, METCALF, SMITH, STORY, POTHIER, "On Obligations," KENT'S "Commentaries," and DOMAT, "On Civil Law.") T. W. DWIGHT.

Contractil'ity [Lat. *contractilitas*, from *con*, "together," and *traho*, *tractum*, to "draw"], a property by which the particles of some bodies resume their original position when the force applied to separate them is withdrawn; also the vital property which gives to certain parts (muscles, for example) the power of contracting, by means of which animals perform their motions. Contractility, in the latter sense, is a property confined to living organisms. It is not peculiar to animals, but is shared by the vegetable kingdom; being, among plants, most apparent, as a rule, in the protophytes, which are microscopic plants of a low grade. Among the lowest forms of animals the whole substance of the organism usually possesses contractility, but in the higher animals this property is, by differentiation, limited more or less completely to the organs called muscles. But such motions as those of cilia are common to both the vegetable and the animal kingdoms; and among animals are common to man as well as to the protozoon. The existence of this important class of motions shows that in no organism is contractility entirely limited to the muscles. Contractility in such cases is quite independent of any will or self-determining power. But at a very low point—if not at the very lowest—in the animal scale we begin to find signs of a self-determining power, or will, residing within the organism, and having a certain degree of control over that contractile quality of the tissues. Upon the exercise of this control depends the power of voluntary motion. Contraction of a muscle may indeed be quite independent of volition or consciousness, as in the beating of the heart and in all motions of non-striated muscles. But all organic motion or contractile action appears to depend upon some stimulus, whether it be the mysterious nervous force or the not less mysterious influences called heat and electricity. The immediate cause of muscular contraction is quite unknown. The theory, that it depends solely upon the oxidation of muscular tissue, is quite exploded. It is now held by many theorists that oxidation of non-organized blood-plasma within the capillaries of the muscles is one of the causes of muscular contraction, and that this oxidation liberates heat, which by the nervous influence is transmuted into kinetic energy. Electricity also appears to have intimate relations with some forms, at least, of organic contraction.

Contrac'tion [for etymology see CONTRACT], the act of contracting or reducing to a smaller volume; the reverse of EXPANSION (which see). In grammar, the abbreviation of a word, the reduction of two syllables into one by the omission of a letter or letters, as *can't* for *cannot*.

Contraction, in surgery, is the diminution or obliteration of the calibre of any hollow vessel, and is more frequently called STRICTURE (which see). But frequently contraction denotes the permanent shrinkage in bulk (of an organ), in area (of a surface), or in length (of a muscle, tendon, or other elongated part). Contraction may result (1) from acute inflammation, with the formation of neoplasms; the latter afterwards degenerating, or rather drying up, into ordinary connective tissue, which occupies less than the space of the original intrusive tissue. This is well illustrated in the case of burns which destroy much skin: the scar contracts, and often causes shocking deformity. Yet it is the result of a process which is essentially reparative, and which is necessary to the recovery of a healthy condition. (2) From nervous irritation, direct or reflex. Thus, the pain of a severe accident to the ankle has been known to be immediately followed by permanent strabismus. (3) From paralysis. Thus, when only one of a pair of antagonistic muscles loses its functional contractility, the other by its normal exercise may produce a permanent deformity.

Contral'to, an Italian word, is a term used in vocal music to denote the part immediately below the treble, formerly called also the *counter-tenor*. It is often popularly called *alto*.

Con'trast, opposition of things or qualities. In the fine arts, contrast is an opposition of lines or colors to each other, so contrived that the one gives greater effect to the other. By means of contrast, energy and expression are given to a subject even when employed on inanimate forms. All art indeed may be said to be a system of contrasts; lights should contrast with shadows, figures with figures, and groups with groups. It is this which gives life, soul, and motion to a composition.

Contravalla'tion [from the Lat. *contra*, "against," and *vallum*, a "rampart"], in fortification, an intrenchment formed by the besiegers between their camp and the place besieged, to secure themselves and check the sallies of the garrison. The line of *contravallation* is thus, as the name implies, a sort of counter-fortification.

Contrayer'va [Sp. *contrayerba*, a "counter-herb" or "antidote"], a drug once in repute as a diaphoretic and stimulant, derived from the root-stocks of four different species of *Dorstenia*, of the order Urticaceæ. The genus is remarkable for the roughly quadrangular receptacle on which the numerous small flowers appear; the staminate flowers in shallow depressions, the pistillate flowers in deeper ones. *Dorstenia Contrayerva* is a perennial Mexican herb with irregularly-lobed leaves. *Dorstenia Houstonia* and *Dorstenia Drakena* also grow in Mexico. The root-stock is about half an inch thick, sending out on all sides many slender fibres covered with small knots. It has an aromatic odor, and a bitter, astringent taste. *Dorstenia Brasiliensis*, a stemless species, with heart-shaped leaves and a circular receptacle, a native of the West Indies and

Brazil, furnishes much of the contrayerva of commerce. These plants have been represented as efficacious for serpent bites, and hence the name contrayerva, an "antidote," like our "snake-root," is given to many different plants.

Contre'ras, a battle-field 14 miles S. of the city of Mexico. The battle was fought Aug. 19 and 20, 1847, between the U. S. forces of Gen. Scott and the Mexican division of Gen. Valencia. (See CHURUBUSCO.)

Contreras, de (JUAN SENEN), a gallant Spanish general, born in 1710 at Madrid, entered the Spanish service in early youth, and in 1727 visited France, England, and Germany on public affairs. In 1788 he fought against the Turks. In 1795 he began to serve against the French. He fought at Talavera in 1809; as a captain-general he defended Tarragona obstinately, but without success. He was taken prisoner and sent to France in 1811, escaped in 1812, returned to Spain in 1814, and died in his native city in 1826. He wrote several books, chiefly military.

Contribu'tion [Lat. *contribuo,* to "impart mutually"], in common law, an obligation imposed upon several persons who are under a common duty, or who own estates subject to a common burden, to share between them the charge of performing the duty of relieving their property of the burden. It is emphatically a rule of equity jurisprudence, and an illustration of the familiar maxim that "equality is equity." The illustrations of it are numerous. Such instances may be cited as general average in the law of shipping; the case of co-sureties, including insurers; that of owners of parcels of land subject to a single mortgage or other lien, where there are no special reasons for casting the burden of payment on one owner more than another; of joint debtors, etc. Contribution is sometimes exacted in a court of law on the theory of an implied contract, but the remedy is not so complete as in equity. It is usually said that there is no contribution among wrong-doers. This proposition must be received with some qualification, for while the rule must be rigidly applied to wilful wrong-doers, and perhaps to such as are guilty of negligence, it could not be properly extended to persons who, acting in good faith, commit a technical wrong, as, *e. g.*, to sureties who execute a bond of indemnity to a sheriff to secure him against the consequences of a trespass in selling property which he has reasonable grounds for supposing belongs to a debtor against whose property he has an execution, while it turns out that the property does not belong to the debtor. T. W. DWIGHT.

Contri''tion [Lat. *con,* intensive, and *tero, tritum,* to "rub," to "wear away" by rubbing], in ordinary usage, denotes thorough repentance for sin. In the Roman Catholic Church contrition (*contritio cordis*) is the complete sorrow and utter detestation which the penitent feels for past sin, joined with the purpose to sin no more. Contrition, confession, and satisfaction are essential parts of the sacrament of penance. ("Canons of Trent," s. xiv., c. 4.) But some, with Dens ("Theol.," vi., 51), hold that *attrition,* or imperfect repentance, joined with confession, satisfaction, and absolution, is sufficient. Others teach that attrition is but a step leading towards contrition.

Control'ler (originally written **Comptroller**), [Fr. *contrôleur*], an officer appointed to control or supervise the accounts of other officers, and to certify whether the matters confided to his care have been controlled or examined. The minister of finance in France was formerly called *contrôleur-général.* In the State of New York a controller is elected by the people. His title is written COMPTROLLER (which see).

Con'tumacy [Lat. *contumacia,* from *con,* intensive, and *tumeo,* to "swell" (with pride)], in civil and ecclesiastical law, a wilful disobedience to any lawful summons or judicial order. In a criminal process contumacy is punished by a sentence of fugitation; in a civil process the only consequence is that the case will be proceeded with and a decree pronounced against the contumacious party.

Con'vent [Lat. *conventus,* from *con,* "together," and *venio, ventum,* to "come"], literally, a "meeting;" a religious house inhabited by a society of monks or nuns, or, more strictly, the society itself. But in exact language the term "convent" designates a meeting (*conventus*) of all the members of a religious community, or, more properly, of those who can vote in the assembly. These voters are called "conventuals," though the latter term is often used in other senses. On certain questions it is customary in some congregations to assemble the convent either for the counsel to be obtained from the brethren or for their consent to some ordinance. All the abbots of a congregation may be called upon in like manner to meet in a "provincial" or "general convent." (See MONACHISM.)

Con'vent, a post-village, capital of St. James parish, La., on the left bank of the Mississippi River, about 50 miles W. of New Orleans. It has one weekly newspaper.

Con'venticle [Lat. *conventiculum,* a diminutive of *conventus,* a "meeting"], a term originally applied to a cabal among the monks of a monastery, formed to secure the election of a favorite as abbot. It was given to the assemblies of Wickliffe's followers as a term of reproach, and was afterwards applied to the meetings of the English and Scottish non-conformists. Severe laws were passed for the suppression of conventicles. The most celebrated is that of 1664, passed by the British Parliament, which forbade persons over five in number and over sixteen years of age, unless of one family, to meet for domestic or social worship. For the first offence the leader and the occupier of the premises received three months' imprisonment or were fined five pounds. The second offence was followed by twofold punishment. Married women found at a conventicle were imprisoned one year, unless their husbands paid a ransom of forty shillings sterling. The third offence was punishable by transportation or by a mulct of £100 sterling. No jury was required for the trial, and a justice of the peace might enforce the act upon the testimony of one person. This act was modified in 1670, and repealed in 1689. An act of Elizabeth's reign (1593) made the frequenting of conventicles punishable by imprisonment and death.

Conven'tion [from the Lat. *con,* "together," and *venio, ventum,* to "come"], a term applied in political language to assemblies of national representatives meeting on extraordinary occasions without being convoked by the legal authority. (See CONVENTION-PARLIAMENT.) In French history the name convention is applied to that assembly which met after the legislative assembly had pronounced the suspension of the royal functions (Sept., 1792), and proclaimed the republic at its first sitting. This body dissolved itself on the establishment of the Directory in Oct., 1796. The Scottish assembly which met on the flight of James II. of England was entitled the Convention of Estates. In the U. S. meetings of representatives specially chosen by the people of separate States to revise and amend the State constitutions are termed State conventions.

CONVENTION, in the language of diplomacy, is generally synonymous with treaty, with the vague distinction that a convention relates to a few or unimportant or non-political points. Contracts between belligerents as to certain rules to be adopted on both sides in carrying on the war are technically termed general conventions. Treaties between the pope and Protestant powers have been often termed conventions.

CONVENTION, in military affairs, a treaty between military commanders concerning terms for a temporary cessation of hostilities, generally between a victor and a defeated general for the evacuation of a district or position by the latter. The two most celebrated conventions of modern times were that of Closter-Seven (1757), between the dukes of Cumberland and Richelieu, and that of Cintra (1808), between Junot and the English generals.

CONVENTION, CONSTITUTIONAL. See CONSTITUTION, by PROF. T. W. DWIGHT, LL.D.

Conven'tion-Parliament, in Great Britain, a parliament convened without the authority of the sovereign, when the crown is in abeyance. As parliaments have no right to assemble without royal authority, the acts of convention-parliaments must afterwards be ratified by a parliament summoned in accordance with the provisions of the constitution. Two convention-parliaments have occurred in English history—the first, that which met in April, 1660, and restored Charles II. to the throne, the Lords assembling by their own authority, and the Commons by virtue of writs issued in the name of the keepers of the liberties of England, by the authority of Parliament; the second, that which met in 1688, each house by its own authority and on the summons of the prince of Orange, and declared that King James II. had abdicated the crown, which was transferred to William and Mary. (See CONVENTION.)

Conver'gent Fraction, the ordinary fraction which is equal to any portion of a continued fraction obtained by neglecting all that follows any particular quotient. Thus,

$1; 1+\frac{1}{2}=\frac{3}{2}; 1+\frac{1}{2}+\frac{1}{3}=\frac{10}{7}; 1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}=\frac{43}{30}$, etc., are three successive convergents of $1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}$, etc.

To obtain the numerator (or denominator) of any convergent corresponding to a certain quotient, multiply the numerator (or denominator) of the preceding convergent by that quotient, and to the product add the numerator (or denominator) of the next preceding convergent; thus $43=10\times4+3$; $30=7\times4+2$.

Converging Series, in mathematics, a series in which each term is less than the term next preceding. Thus, the

geometrical series descending, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, etc., is a convergent or converging series. An infinite series is said to be *convergent* when, however many of its terms may be added together, the sum never exceeds numerically some finite quantity. On the other hand, it is said to be *divergent* when by adding a sufficient number of terms a sum can be obtained which numerically exceeds any given finite quantity, however great. A series is not necessarily convergent when its terms continually decrease in magnitude. If, however, besides decreasing numerically, the terms have alternate signs, the series will be convergent; thus, $1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}$, etc. A series will be convergent if the quotient obtained by dividing each term by the preceding one is numerically less than some assignable *proper* fraction, or if this property obtains from and after a certain term. On the other hand, the terms being all of the same sign, the series will be divergent if the quotient in question is equal to or greater than unity. This test of convergency and divergency cannot be always applied, and recourse must be had to others. For instance, the ratio of the n^{th} to the $(n-1)^{th}$ term of the series $1+\frac{1}{2}+\frac{1}{3}$, etc. being $\frac{n-1}{n}$, is always less than 1, but no proper fraction can be *assigned* than which it is always less, for it approaches unity without limit as n increases. The series is in fact divergent; for the third and fourth terms are together greater than $\frac{2}{4}$; the four following terms are greater than four times the last, or $\frac{4}{8}$; the eight following terms are together greater than $\frac{8}{16}$, and so on; so that the whole series has a greater sum than $1+\frac{1}{2}+\frac{1}{2}+$, etc., which is manifestly divergent. (See CAUCHY, "Cours d'Analyse.")

Conversa'no, a town of Italy, in the province of Bari, 20 miles S. E. of Bari. It is defended by an old Norman castle, and has a cathedral, a bishop's palace, and several convents. Pop. 9731.

Conver'sion [from the Lat. *con*, intensive, and *verto, versum*, to "turn"], in metallurgy, the process by which steel is produced from iron or from iron carbide (cast iron). Iron is converted into steel by long heating in contact with carbon. Cast iron is converted by "puddling," or by the well-known process of Bessemer. The theory in both cases is the same—viz. to oxidize the excess of carbon in the carbide, and so remove it in the form of carbonic acid gas.

Conversion, in law. This word has two significations: 1. In equity jurisprudence it means the theoretical change of land into money or money into land. The will of an owner of property thus to change it, expressed in legal forms, is in some instances equivalent to an actual change, as where a testator directs his land to be sold and converted into money. It is deemed to be sold from the moment of his death, and to have the qualities of personal property. This is termed *equitable conversion*. 2. In the law-courts the word "conversion" is applied to an unauthorized exercise of acts of ownership over the personal property of another. It is deemed to be a wrong or "tort," and the owner of the property may either reclaim it or treat the wrong-doer as having become owner and recover the value of it. Conversion lies at the foundation of the common-law action of trover, which word is derived from the French word *trouver*, to find. There is a legal fiction that the defendant found the plaintiff's property and converted it to his own use. The material part of the case is the conversion. To constitute a case of conversion it is not necessary that there should have been any intent to deprive the owner of his interest. It is enough if there were an intent to appropriate the goods or to exercise an act of ownership over them, even though that were done in entire ignorance of the owner's right. Thus, if an auctioneer should sell stolen goods, not knowing of the theft, he would be deemed to have converted the goods to his own use. As the intent is a main ingredient in the case, it has been considered that a mere trespass, or an accidental loss of property by a carrier, or the use of property as an act of kindness to the owner without any intent to convert it, does not amount to a conversion. There is an important distinction between the case where the original taking of the goods is lawful and where it is not. In the former case there must in general be a demand and a refusal before the conversion takes place. Thus, if I lend a book to another to be returned on request, there is plainly no conversion until I demand it and there is a refusal to return it, since until that time there is no exercise of ownership. When the original taking is unlawful, no demand is necessary. The better opinion is, when an action is brought for conversion, that the title to the chattel does not pass to the wrong-doer by mere force of the judgment of the court, but that there must be actual satisfaction of the judgment on his behalf.

T. W. DWIGHT.

Conver'ter, in metallurgy, the receptacle used to hold the iron or carbide of iron which is subjected to the process of conversion into steel. The Bessemer converter is a large, approximately spherical vessel, lined with fire-clay or brick, the bottom of which is perforated with many holes, through which a powerful blast of air is driven during the process. The vessel is suspended on pivots, and controlled by a hydraulic apparatus; by means of which, when the appearance of the escaping flame shows that the process is complete, it is turned over, and the liquid steel is received into moulds.

Convey'ance, in law, is a deed transferring property from one person to another. In the transference of personal property the term, though strictly applicable, is not generally used.

Con'vict [from the Lat. *con*, intensive, and *vinco, victum*, to "conquer" or "overcome," in allusion to the culprit being completely overcome or overwhelmed by the proofs brought against him], a term applied to a person proved guilty of a crime. The name came by custom to be applied to persons subject to punishment for the more serious class of offences; of late its meaning has been often restricted in Great Britain to criminals who were transported to the distant colonies. Criminals condemned to penal servitude for longer or shorter periods are termed convicts under penal discipline; offenders sentenced to short periods of detention in the ordinary jails are called prisoners. The system of transportation to New South Wales was suspended in the year 1840. In France, however, transportation of convicts still prevails, especially in the case of political offenders. Among the penal colonies of France are Cayenne and New Caledonia.

Con'vis, a township of Calhoun co., Mich. Pop. 1015.

Convoca'tion [from the Lat. *con*, "together," and *voco, vocatum*, to "call"], a meeting of the clergy of the Church of England to discuss ecclesiastical matters in time of Parliament. There is one convocation for the province of Canterbury, and one for the province of York, but the voice of the latter is only a feeble echo of that of the former. Each convocation has two houses—the upper consisting of bishops, and the lower of deans, archdeacons, and proctors. Acts of convocation were formerly of great importance in the canon law, but since the time of Henry VIII. they have no force when opposed to statute law. The convocations have been recently revived, but with little or none of their ancient importance. There is also an Irish convocation, with even smaller powers than those of the English Church.

Convolvula'ceæ [from *Convolvulus*, one of the genera], a natural order of exogenous plants which mostly have twining stems and a milky juice. It comprises nearly 700 known species, many of which are natives of tropical countries, and have beautiful flowers with five stamens. The corolla is monopetalous, and the fruit a capsule. The roots of some species possess purgative qualities, as jalap (*Exogonium Purga*). Among the valuable products of this order is the sweet potato. Some of the species are cultivated for the sake of the flowers, as the *Ipomœa purpurea*, or morning glory, a native of tropical America.

Convol'vulus [from the Lat. *con*, "together," and *volvo*, to "roll"], a genus of plants of the natural order Convolvulaceæ, containing many species, herbaceous or shrubby. The stems are usually twining, the flowers often large and of various beautiful colors; calyx 5-parted, corolla monopetalous, with regular 5-lobed and plaited limb; five stamens; the ovary free, with one to four cells and few ovules; the fruit a capsule somewhat succulent. Some are cultivated as ornamental plants. The *Convolvulus Scammonia* yields scammony. *Convolvulus Scoparius*, a shrubby species, native of the Canary Isles, yields the "oil of rhodium" and one of the kinds of wood called rosewood, which has an odor somewhat like that of roses. The original genus is for convenience divided into several sub-genera. Many botanists elevate these divisions to the rank of genera.

Con'voy [Fr. *convoi*, from *convoyer*, to "carry" or "conduct"], a name given to one or more ships of war employed to protect a fleet of merchant-vessels against an enemy in time of war or against pirates. If a ship part company with the convoy or neglect to obey the signals, all claims for insurance are forfeited. (See INTERNATIONAL LAW No. II., by PRES. T. D. WOOLSEY, S. T. D., LL.D.)

CONVOY, in the military service, is a train of wagons laden with provisions or warlike stores, or a detachment of troops appointed to guard such a train.

Convul'sions [from the Lat. *convello, convulsum*, to "pull violently"], (synonyms *Eclampsia, Acute Epilepsy*), an acute nervous affection occurring in paroxysms, during which the patient loses consciousness, the muscles of the body are spasmodically contracted, and the limbs first stif-

fened and twisted, then agitated by irregular involuntary movements. The face is distorted, the eyeballs rolled upward, the teeth clenched, biting the tongue, which protrudes at the beginning of the attack. Respiration is arrested by the stiffening of the chest-muscles and by closure of the glottis; the patient grows black in the face, and froth oozes from the mouth, and sometimes from the nostrils; the veins of the neck swell. After some time the muscles relax again, respiration is restored, the agitation of the limbs ceases, the patient either returns entirely to consciousness or falls into a heavy sleep, which may last several hours. The appearance and the nature of the attack are the same in the convulsions of epilepsy and in the so-called eclamptic convulsions of children or of women in childbirth. They may result from any cause that first irritates and then suddenly abolishes the functions of the brain and spinal cord. Convulsions occur, therefore, in diseases of the nervous centres; in diseases of other organs of the body, that transmit irritation to these centres; finally, in morbid conditions of the blood which interfere with their nutrition. Under the first head may be mentioned congestion or anæmia (bloodlessness) of the brain, inflammations, tumors, finally premature ossification of the bones of the head, by which the brain becomes subject to abnormal pressure. In other cases more obscure there seems to exist in the brain and cord a congenital susceptibility to irritation, and consequent exhaustion of functions, so that the most trifling circumstance may occasion a convulsion. It is then that are observed the convulsions of hysteria and of epilepsy. The latter is only distinguished by the constitutional tendency that persists during the intervals of the attacks, and suffices to cause their removal. The hysterical convulsion, however, offers some peculiarities, and consciousness, though perverted, is not abolished, the interference with respiration is less complete than in typical eclampsia, and leads to involuntary laughing and crying; there is no lividity of the face or frothing at the mouth; the return to consciousness is immediate, without the transition stage of heavy sleep. Neither the irregular convulsive movements of chorea ("St. Vitus' dance," "clonic" muscular contractions) nor the rigidity of tenanus ("tonic" muscular contractions) are sufficient to constitute a convulsion, in which the two forms of muscular contraction are combined, the last occurring at the beginning, the first at the end of the attack.

Convulsions dependent on transmitted irritations occur principally in children. They may occur spontaneously, owing to a congenital predisposition by which normal physiological processes become irritating, or they may be excited by inflammation of the gums in dentition, by indigestion, by worms, by the invasion of acute diseases, as pneumonia or eruptive fevers; by some accidents, as extensive burns. Women in childbirth are liable to convulsions of a similar character, which may be excited by the mere act of parturition. This dangerous complication (puerperal eclampsia) is more frequently, however, associated with an alteration of the blood that is liable to occur during pregnancy, and due to transient kidney disease (nephritis). The kidneys act imperfectly, and hence part of the elements of the urine that should be secreted by them are retained in the blood, poisoning it, while at the same time part of the albumen of the blood passes off in the urine. These convulsions are therefore called albuminuric or uræmic, and afford most striking illustrations of the morbid influence of altered blood upon the nerve-centres. They occur also in genuine nephritis or Bright's disease, and in that which often complicates the second and third stages of scarlet fever. Various mineral or narcotic poisons introduced into the blood have a similar effect to uræmia in causing convulsions. Finally, a great diminution in the mass of blood, caused by exhausting hæmorrhages or by diarrhœa, has been shown to determine convulsions as certainly as if the blood had been poisoned.

Any convulsion may prove fatal if the arrest of respiration be sufficiently prolonged. The danger varies very much according to the cause, the uræmic convulsions of women in childbirth (*puerperal eclampsia*) being far the most frequently fatal. After them may be successively ranked, 2, uræmic convulsions in primary nephritis, or that complicating scarlet fever; 3, those caused by narcotics (opium) or mineral poisons (lead); 4, by the anæmia resulting from hæmorrhage or diarrhœa; 5, by the irritation of morbid dentition, worms, or indigestion in young children; 6, by diseases of the nervous centres or disorders in their circulation (congestion, anæmia); 7, the convulsions of epilepsy; 8, those that mark the invasion of acute diseases.

The treatment of convulsions may sometimes be addressed exclusively to the cause, as in the last three cases just mentioned, where the danger of the paroxysm itself is known to be small. In the other cases, where life is liable to be endangered by the duration or rapid repetition of convulsive attacks, these urgently demand relief. Means of relief are—1st, compression of the carotids; 2d, alcoholic stimulants; 3d, venesection; 4th, chloral; 5th, chloroform; 6th, antihysterical medicines; 7th, warm baths; 8th, cold applications to head. Each is adapted to a special case. Compression of the carotids has been used principally in idiopathic epilepsy (where, as said, the paroxysm itself is often left without treatment). It is intended to relieve the congestion existing at the base of the brain, and has sometimes proved successful. Cold applications are used for the same purpose, and may be combined with the other methods of treatment. Stimulants are only used where the convulsion results from hæmorrhage or inanition. Venesection may be required in cases of intense venous congestion of the brain, as indicated by extreme lividity of the face and distension of the veins of the neck. It is most often needed in puerperal convulsions. Large doses of chloral (15–30–60 grains) are especially useful for infantile convulsions, or for those of scarlet fever, or during the interval of attacks to prevent their renewal. The sedative action of chloral is entirely analogous to that of inhaled chloroform, but the latter is much more powerful, and may be used in more severe cases, or where the patient is unable to swallow. *Veratrum viride* is a powerful agent to lower the pulse and increase the force of the heart's impulse; hence it may be used in the same cases as venesection, to dissipate the stagnation of blood in the veins. Finally, the warm bath, with or without mustard, may be used in nearly all cases, except perhaps in puerperal convulsions, where it may be contraindicated by the difficulty, and even danger, of moving the patient. On the other hand, the facility of its use with young children makes it especially applicable to them.

An hysterical convulsion may be treated with the nervous stimulants formerly called antispasmodics, especially assafœtida, valerian, ether (internally). In the interval of the attacks galvanism should be applied to the spine. Apart from special indications, therefore, treat the average convulsions as follows: 1st, place the patient in a warm bath, and keep cloths wrung out in cold water on the head; 2d, if the paroxysm begins to rapidly abate, give hydrate of chloral, 3–5 grains to an infant, 10–15 grains to a child, 30 grains to an adult; 3d, if the paroxysm be more severe, administer chloroform by inhalation; 4th, if suffocation be imminent, bleed to a few ounces.

ABRAHAM JACOBI.

Con'way, a small seaport-town of Wales, in Carnarvon county, is on the estuary of the river Conway, here crossed by a suspension bridge 327 feet long, 13 miles E. N. E. of Bangor. Here is Conway Castle, a grand feudal structure built by Edward I. in 1283 on a steep rock, with eight vast towers. Conway is enclosed by embattled walls twelve feet thick. It is on the Chester and Holyhead Railway. Pop. 2523.

Conway, a county near the centre of Arkansas. Area, 1000 square miles. It is bounded on the S. W. by the Arkansas River. The surface is diversified and well timbered, the soil productive. Tobacco, grain, cattle, cotton, and fruit are raised. Coal is found here. It is intersected by the Little Rock and Fort Smith R. R. Capital, Springfield. Pop. 8112.

Conway, a township of Izard co., Ark. Pop. 768.

Conway, a post-village of Franklin co., Mass., about 100 miles W. of Boston. It has an academy, a national bank, a fire insurance company, and important manufactures. Pop. of Conway township, 1460.

Conway, a post-township of Livingston co., Mich. Pop. 1020.

Conway, a post-village and township of Carroll co., N. H., on the Saco River, at the N. terminus of the Portsmouth Great Falls and Conway R. R., has a savings bank and manufactures of straw-board, lumber, leather, etc. North Conway, 5 miles distant, on the Portland and Ogdensburg R. R., 60 miles N. W. of Portland, is a beautiful place, much frequented in summer. It has an academy and manufactures of pottery, lumber, etc. Pop. of township, 1607.

Conway (HENRY SEYMOUR), an English general, born in 1720. He had a high command in Germany in 1761, and became secretary of state in the Whig cabinet in 1765. In 1782 he was appointed commander-in-chief, and made a motion in Parliament to terminate hostilities against the U. S. He was a field-marshal. Died July 10, 1795.

Conway (THOMAS), COUNT DE, a general, born in Ireland in 1733, removed to the U. S. in 1777. He became a brigadier-general in the American army. He was a partisan of Gen. Gates, and took an active part in the intrigues against Gen. Washington. He afterwards entered the French service, became a count, a field-marshal, and governor of the French East Indies. Died about 1800.

Con'wayborough, a post-village, capital of Horry co., S. C., on the Waccamaw River, about 120 miles E. by S. from Columbia, has a weekly newspaper. Pop. 606; of township, 1610.

Co'ny, an animal mentioned in the Bible, is supposed to be the same with the HYRAX (which see).

Cony (SAMUEL), a lawyer, born at Augusta, Me., Feb. 27, 1811, graduated at Brown University in 1829, was a judge of probate (1840–47), and governor of Maine (1864–67). Died Sept. 5, 1870.

Con'ybeare (HENRY), son of W. D. Conybeare, noticed below, an engineer and architect, born in Somersetshire, England, Feb. 22, 1823, has acquired great professional distinction in England and in India.

Conybeare (JOHN), born at Pinhay, England, Jan. 31, 1692, became bishop of Bristol in 1750. He wrote a "Defence of Revealed Religion" (1732), in answer to Tindal. Died July 13, 1755.

Conybeare (Rev. WILLIAM DANIEL), F. R. S., an English geologist, born near London June 7, 1787. He discovered the plesiosaurus, and wrote several treatises on the coal-fields and other strata of Great Britain. In 1845 he was appointed dean of Llandaff. Died Aug. 12, 1857.

Conybeare (W. J.), a son of the preceding, was a fellow of Trinity College, Cambridge. In conjunction with Dean Howson he published "The Life and Epistles of Saint Paul" (1852). Died in 1857.

Con'yers, a post-village, capital of Rockdale co., Ga., on the Georgia R. R., 30 miles E. by S. from Atlanta. It has two weekly newspapers.

Con'yngham, a township of Columbia co., Pa. Pop. 1943.

Conyngham, MARQUESSES OF (1816), Earls Conyngham (1797), earls of Mount Charles (1816), Viscounts Mount Charles (1797), Viscounts Conyngham (1789), Viscounts Slane (1816), Barons Conyngham (Ireland, 1789), and Barons Minster (United Kingdom, 1821).—FRANCIS NATHANIEL CONYNGHAM, second marquess, K. P., G. C. H., P. C., lieut.-gen., born June 11, 1799, succeeded his father Dec. 28, 1832.

Coo'dle Creek, a township of Iredell co., N. C. Pop. 1629.

Cook, a county of Illinois, bordering on Indiana. Area, 1027 square miles. It is bounded on the E. by Lake Michigan and the State of Indiana, and is intersected by the Chicago and Des Plaines rivers. The surface is nearly level; the soil is deep and very productive. Cattle, grain, tobacco, wool, and garden products are raised. It is traversed by a number of railroads, which terminate at Chicago, the county-seat. Cook is the most populous county in the State. Pop. 349,966.

Cook, a township of Westmoreland co., Pa. Pop. 875.

Cook (CHARLES), D. D., an eminent Wesleyan divine, chief founder of Methodism in France, was born in London in 1787, entered the Wesleyan ministry in 1817, went to France in 1818, travelled there, founding Methodist societies and aiding in the revival of the Huguenot churches, till his death in 1858. "He was to France, Switzerland, and Sardinia," wrote Merle d'Aubigné, "what Wesley was to England in his day."

Cook (CLARENCE CHATHAM), an American journalist and art-critic, born at Dorchester, Mass., Sept. 8, 1828, was the son of Zebedee Cook, noticed below. He graduated at Harvard in 1849, and studied architecture in the office of A. J. Downing (his brother-in-law) and Calvert Vaux at Newburg, and afterwards pursued for many years the profession of teaching. In 1863, Mr. Cook contributed to the New York "Tribune" a series of articles on American art, based upon the exhibition of pictures at the New York Sanitary Fair of that year. He continued the profession of teacher until 1869, at the same time contributing the art criticisms which appeared in the "Tribune," besides occasional articles to magazines. In 1869 he went as correspondent of the "Tribune" to Paris, but resigned that position upon the outbreak of the Franco-Prussian war, passed some time in Italy, and on his return to America resumed his former connection with the "Tribune." Mr. Cook has published "The Central Park," New York, F. & J. Huntington, 1868, and the text to accompany a reproduction by heliotypy of Dürer's "Life of the Virgin," published by J. R. Osgood & Co., Boston, 1874.

Cook (ELIZA), an English poetess, born in London in 1817, was the daughter of a respectable tradesman. She began literary life as a contributor to various journals. Her first volume of poems appeared in 1840, and was highly successful. She has published, besides other works, "New Echoes" (1864), and was long editor of the "Journal" which bore her name.

Cook (Captain JAMES), a celebrated English navigator, born of very poor parents at Marton, in Yorkshire, Oct. 27, 1728. He entered the navy in 1755, and served as master of a sloop at the capture of Quebec in 1759. He commanded an expedition sent to the South Pacific Ocean in 1768 to observe the transit of Venus. After he had observed the transit with success on the island of Tahiti, he visited New Zealand and explored the coast of New South Wales. Having made important discoveries in geography, he returned by the Cape of Good Hope, and arrived in England in June, 1771. In 1772 he conducted another exploring expedition in the Resolution and Adventure, in order to discover the *Terra Australis,* a continent supposed to exist in high southern latitudes. He circumnavigated the globe, discovered the island of New Caledonia, and penetrated southward as far as 71° S. lat., but did not find the Terra Australis. He returned to England in July, 1775, having lost only one man by disease during the voyage. He published a well-written journal of his voyage (2 vols., 1777). In July, 1776, he sailed on a third voyage, the object of which was to discover a north-west passage by way of Behring Strait. He discovered the Sandwich Islands in 1778, and explored Behring Strait. Having returned to Hawaii to pass the winter, the natives of that island stole one of his boats. Captain Cook with a few men went on shore to recover it, and was killed by the savages Feb. 14, 1779. (See A. KIPPIS, "Life of Captain James Cook," 1788; HARTLEY COLERIDGE, "Lives of Distinguished Northerns," vol. iii.)

Cook (RUSSELL STURGIS), a Congregational clergyman, born at New Marlborough, Mass., Mar. 6, 1811. From 1839 to 1856 he was one of the secretaries of the American Tract Society, and was the originator of its system of colportage. Died at Pleasant Valley, N. Y., Sept. 4, 1864.

Cook (ZEBEDEE), son of Zebedee Cook and Sarah Knight, was born in Newburyport, Mass., Jan. 11, 1786. His ancestors came from Devonshire, England. Born of parents in humble circumstances, he had few advantages in the way of schooling, and went early to Boston to seek his fortune, and from about 1815 to 1838 was engaged there in the business of insurance. He was among the first to introduce into this country the system of mutual insurance, and in 1838 was invited to New York to be the president of the first company established in that city on the system of a division of the profits between the insurers and the insured. This company was called the Mutual Safety Insurance Company, and was engaged entirely in marine business. While living in Boston, Mr. Cook, always much interested in rural pursuits, gave the first impulse to the formation of the Horticultural Society by an article in the "New England Farmer" for Jan. 9, 1829. On Feb. 24th of the same year a meeting was held in Mr. Cook's office to found a horticultural society, and as the result of this and subsequent efforts the Massachusetts Horticultural Society was incorporated June 12, 1829. Gen. Dearborn was the first president and Mr. Cook first vice-president. In 1834, on the resignation of Gen. Dearborn, Mr. Cook was elected president in his place. He introduced the Isabella grape into New England from cuttings. To Mr. Cook as much as to any one belongs the credit of founding the cemetery of Mount Auburn, the first of these institutions, we believe, in the country. Mr. Cook was twice married. Caroline Tuttle, his first wife, was a granddaughter of Col. David Mason, one of Washington's aides—a man distinguished for his courage and patriotism, and for his interest in the scientific discoveries of his time. By this lady Mr. Cook had nine children. His second wife was Ann Somes, daughter of Hon. Israel Trask. She brought him no children, and still survives him. Died in Framingham, Mass., Jan. 24, 1858.

Cooke, a county in the N. of Texas. Area, 900 square miles. It is bounded on the N. by Red River. The soil is mostly fertile, and is extensively covered with forests. Grain and some cotton are raised. Capital, Gainsville. Pop. 5315.

Cooke (AMOS STARR), REV., a Congregational missionary, born in Danbury, Conn., in 1810, graduated at Yale in 1834. He sailed from Boston in the service of the American Board of Foreign Missions in 1836, and arrived at the Sandwich Islands in April, 1837. In that year he took charge of the education of the royalty and nobility of the realm. He remained in charge of the royal school for twelve years, and exerted a controlling influence in shaping the character of the rising kings and nobles; and the last three Kamehamehas were educated by him. Died at Honolulu Mar. 20, 1871.

Cooke (EDWARD), D. D., an American clergyman and educator, born at Bethlehem, N. H., Jan. 19, 1812, graduated with honor at Middletown in 1838. He was teacher of natural science in the Amenia Seminary, in Dutchess

county, N. Y., and afterwards principal of the newly-founded seminary at Pennington, N. J., 1840–47, and minister in various Methodist Episcopal churches at Boston and elsewhere until 1853. He took the direction of the institute now known as Lawrence University in Appleton, Wis., the presidency of which in its more prosperous days was again offered him, but declined. Returning to the East in 1861, he was two years pastor of the Harvard street church in Cambridge, Mass., where he was one of the board of examiners of Harvard College, which conferred upon him the degree of D. D. in 1855. In 1864, Dr. Cooke was elected to the principalship of the Wesleyan Academy at Wilbraham, Mass., one of the oldest Methodist literary institutes in America.

Cooke (George Frederick), a popular English actor, born in Westminster in 1755. He performed in Dublin and London for many years, was successful in both tragedy and comedy, and was a rival of John Kemble. In 1810 he visited New York, where he died in 1812.

Cooke (Jay), an American financier, born in Sandusky, O., Aug. 10, 1821, went to Philadelphia in 1838, and became a clerk in the banking-house of E. W. Clark & Co., of which he became a partner at the age of twenty-one. He established the firm of "Jay Cooke & Co." in 1861, and became well known as a successful government agent for the war-loans during the civil war of 1861–65. The firm to which he belonged subsequently became agents for the Northern Pacific R. R., and their suspension of payments in 1873 was one of the causes of the financial panic of that year.

Cooke (John Esten), a novelist and lawyer, born at Winchester, Va., Nov. 3, 1830. He published, besides other works, "Leather Stocking and Silk" (1854), "The Virginia Comedians" (1854), and a "Life of General Robert E. Lee" (1871). He served as an officer in the Confederate army in the civil war.

Cooke (John R.), an American lawyer, a brother of General P. St. G. Cooke (noticed below), born in Bermuda in 1788, became a prominent and influential member of the Virginia bar. He was greatly beloved in private life, and was called "a model of lofty courtesy, chivalry, and generosity." Died at Richmond, Va., Dec. 10, 1854.

Cooke (Josiah Parsons, Jr.), an American chemist, was born at Boston, Mass., Oct. 12, 1827, and graduated at Harvard in 1848. He became in 1851 Erving professor of chemistry and mineralogy in Harvard University. He has published "Chemical Physics" (1860), an admirable work entitled "Religion and Chemistry" (1864), "Principles of Chemical Philosophy" (1870), and many valuable monographs.

Cooke (Nicholas), born at Providence, R. I., Feb. 3, 1717, was deputy-governor of his native State in 1775, and governor of the State (1775–78). He was a personal friend of General Washington. Died Sept. 14, 1782.

Cooke (Parsons), D. D., born at Hadley, Mass., Feb. 18, 1800, graduated at Williams College in 1822. He is best known as an able controversialist, and was for many years (from 1840) editor-in-chief of the "New England Puritan" and the "Boston Recorder." Died at Lynn, Mass., Feb. 12, 1864.

Cooke (Philip St. George), an American officer, born 1809 in Berkeley co., Va., graduated at West Point in 1827, and Nov. 12, 1861, brigadier-general U. S. A. He served as infantry officer on the Western frontier 1827–33; in Black Hawk war 1832, engaged in the battle of Bad Axe; and adjutant Sixth Infantry 1832–33. As a dragoon officer he served on frontier duty 1833–46; on expedition to California during the war with Mexico 1846–47 (brevet lieutenant-colonel); as superintendent of cavalry recruiting 1848–52; on frontier duty and scouting 1852–56, engaged in skirmishes against hostile Indian tribes; quelling the Kansas disturbances 1856–57; on Utah expedition, in command of the cavalry, 1857–58; preparing cavalry tactics 1859; and in command of Utah 1860–61. In the civil war he was in Virginia Peninsula 1862, engaged at Yorktown, Williamsburg, Gaines' Mill, and Glendale; in command of Baton Rouge district, La., 1863–64; superintendent of recruiting 1864–66; in command of the department of the Platte 1866–67, and now of the department of the Lakes. Brevet major-general Mar. 13, 1865, for gallant and meritorious services. He studied law and was admitted to practice, and is the author of "Scenes and Adventures in the Army," 1856. George W. Cullum, U. S. A.

Cook'ery [Fr. *la cuisine;* Ger. *Kochen* or *Kochkunst;* Lat. *ars culinaria*] is the art of preparing food for the table by dressing and by the agency of fire. We have no record of a time when cooking was wholly unknown, and it is highly probable that the practice began soon after the discovery of fire. So universal is the art that some writers have regarded it as the distinguishing trait of the human family, and have defined man as "a cooking animal." In its rudimentary form, as seen among the lower races of men, no utensils are employed, but the food is either laid directly upon the fire or suspended above it from poles. The degree of skill and taste manifested by a nation in the preparation of food may be regarded as to a very considerable extent proportioned to its culture and refinement. We read in the Scriptures that Abraham prepared "cakes of fine meal" and "a calf, tender and good," which, with butter and milk, he set before the three angels in the plains of Mamre. We are told of the chief butler and chief baker as officers in the household of Pharaoh. The ancient Egyptians appear to have eaten the flesh of a few animals, together with bread made of barley, wheat, or the centre of the lotus (see Nelumbium), and great quantities of vegetables. In the Homeric age of simplicity, royal Greeks were content to cook their own meats, but before the time of Pericles professional cooks of great skill were known in Greece. These cooks stood in the market at Athens ready to be hired for particular occasions. Magnificent banquets were prepared at an enormous expense, and poets and philosophers appear to have thought it no unworthy ambition to be distinguished as the inventors of a new cake or a popular sauce. The names of many authors of cook-books are preserved, that of Archestratus, a poet of Syracuse, being the most famous. Among all classes of Greeks fish was a principal article of food. Large quantities of salt fish were brought from the shores of the Euxine and Hellespont. These, with meal, cheese, and onions, are said to have formed the chief food of the armies and navies when on service. The Greeks ate the flesh of sheep, pigs, lambs, and goats, though vegetables appear to have constituted their principal food. They had also poultry, game, and sausages made of blood.

In the early days of Rome a gruel made of barley was the chief food of the people, and with vegetables was, till later times, the usual fare of the inferior classes, meat being used but sparingly. By degrees, however, a taste for luxury was imported. Lucullus introduced habits of epicurism from Asia; the gourmand Apicius earned for himself a deathless name by the costliness of his dishes. The wealthy Romans paid especial attention to the elegant serving of their table, as well as to the quality of the viands. With them, as with the Greeks, fish was a necessity as well as a luxury; they took great pains to procure their oysters, and gave large sums for other fish. In the later days of the republic and under the empire a taste for extravagant and eccentric cookery was indulged at an unheard-of expense. Lucullus gave banquets at a cost of 50,000 denarii each.* A single dish composed of nightingales' tongues, the brains of peacocks and pheasants, and the livers of the most costly fish, is said to have cost Vitellius the sum of 1000 sestercia, equal to nearly $40,000, and probably equivalent to $300,000 at the present time. Many similar absurdities might be mentioned. The favorite meat at this time among the Romans was pork, and "hog in Trojan style" was looked upon as the *chef-d'œuvre* of a good cook. This dish was derived from the Greeks. The animal was served whole, being roasted on one side and boiled on the other, and its interior was filled with numbers of ortolans, thrushes, and beccaficoes.

The *pistor* (baker), who made the bread and pastry, and the *structor*, who composed artificial figures of fruit or flesh, and who also arranged the dishes, seem to have shared the duties of the cook. The Romans made a free use of oil in the preparation of their food. The Greeks and Romans used honey for the purposes for which we use sugar. It was an ancient saying that the number of persons at a repast should not be less than that of the Graces nor more than that of the Muses.

With the invasions of the northern barbarians in the fifth century the art of cookery retired into the convents, and was only revived five hundred years later with the rising power of the free cities of Italy—Venice, Florence, etc.

Catharine de Médicis introduced the luxuries of Italian cookery into France during the reign of Henry II. England is said to have been indebted to William the Norman for her first lessons in the refinements of gastronomy. At a later period the taste for luxurious living had become so common in English monasteries that it was found necessary to limit the excesses of the monks and clergy by an edict.

In modern times the French have excelled all other nations in cookery, considered as an art. In the reign of Louis XIV. sumptuous and extravagant cookery was in vogue among the higher classes, but during the succeeding reigns its character was greatly modified and refined.

* More than $7000 of our money, but, if we take into consideration the relative scarcity of the precious metals, probably equivalent to $60,000 at the present time.

American cookery may be said to be derived in about equal measure from the English and the French. From the former we have derived our simpler and more substantial dishes, such as roasts, steaks, and some kinds of pastry—from the latter the more delicate and complicated side-dishes and desserts.

Cook'man (GEORGE G.), an eminent pulpit-orator of the Methodist Episcopal Church, was born at Hull, England, in 1800. While engaged in business he was a local preacher in the U. S., and afterwards in England. Having returned to the U. S. in 1825, he entered the itinerant ranks in 1826, and soon became distinguished as a preacher of great ability and success. He was chaplain to the House of Representatives (1838–39). He was lost at sea on the steamer President while on a voyage to Europe in 1841.

Cook'shire, a post-village, capital of Compton co., Quebec (Canada). It is in Eaton township. Pop. about 400.

Cook's In'let, a part of the Pacific Ocean, is in Alaska, opposite the island of Kodiak, between lat. 58° and 61° N., and lon. 151° and 154° W. It is 130 miles long.

Cooks'town, a post-village of Simcoe co., Ontario (Canada), has an active trade and a postal savings bank. Pop. about 500.

Cook'ville, a post-village, capital of Putnam co., Tenn., about 80 miles E. of Nashville. It has one weekly newspaper. Pop. 156. J. BUCK, JR., ED. "NEWS."

Cool'baugh, a post-township of Monroe co., Pa. Pop. 1028.

Coo'ley (LEROY C.), born in Lyme, N. Y., in 1833, graduated at the New York State Normal School in 1855 and at Union College in 1858. He was a teacher in seminaries at Lockport, Fairfield, and Cooperstown, N. Y., and in 1861 became professor of natural sciences in New York State Normal School at Albany. He is the author of text-books of natural philosophy, physics, and chemistry.

Cooley (THOMAS M.), a jurist, born at Attica, N. Y., Jan. 6, 1824, removed to Michigan in 1843, and became a lawyer in 1846. He has published many volumes of legal reports, digests, and compilations. He became professor of law in Michigan University in 1850, and a justice in the supreme court of Michigan in 1864, and chief-justice in 1867.

Coo'lidge (CARLOS), LL.D., was born at Windsor, Vt., in 1792, graduated at Middlebury in 1811, became a prominent lawyer and State politician, and governor of Vermont (1849–51). Died Aug. 15, 1866.

Cool Spring, a township of La Porte co., Ind. Pop. 1328.

Cool Spring, a post-township of Iredell co., N. C. Pop. 711.

Cool Spring, a township and village of Washington co., N. C. The village is about 125 miles E. of Raleigh. Pop. of township, 1561.

Cool Spring, a township of Mercer co., Pa. Pop. 865.

Cool Springs, a township of Rutherford co., N. C. Pop. 1031.

Cool'ville, a post-village of Troy township, Athens co., O. Pop. 334.

Coo'ly, or **Coo'lie,** a Hindostanee word of Arabic origin, signifying a "slave" or "common laborer," has of late been applied especially to emigrants from India and China, who have superseded the negroes in large numbers since the abolition of slavery in the West Indies. Coolies are said to have been employed in the Mauritius as early as 1834, and were afterwards introduced into the West Indian colonies, Cuba, Peru, British Guiana, and other countries. (See EMIGRATION, by HON. ALEX. DELMAR.)

Coomas'sie, the capital of the kingdom of Ashantee, in Western Africa, is about 120 miles N. N. W. of Cape Coast Castle; lat. 6° 35′ N., lon. 2° 12′ W. It has a fortified royal palace. Pop. estimated at 20,000.

Coombe (WILLIAM), an English humorous and satirical writer, born at Bristol in 1741. Among his works are a "Tour of Doctor Syntax in Search of the Picturesque" (1812), and "Tour of Doctor Syntax in Search of a Wife," both in verse. Died Jan. 19, 1823.

Coon, a township of Buena Vista co., Ia. Pop. 385.

Coon, a township of Vernon co., Wis. Pop. 708.

Coon'tie, or **Coon'ta** [an Indian word], the popular name of the *Zamia integrifolia,* a plant of the natural order Cycadaceæ, a native of Southern Florida. Its stem abounds in starch, from which a part of the Florida arrow-root is prepared. Other species of the genus are cultivated in the Bahamas and in Asia for their starch, which, however, is usually classed as SAGO (which see). Florida once produced great quantities of this commodity, of which the quality is often excellent.

Coop'er, a county in Central Missouri. Area, 558 square miles. It is bounded on the N. by the Missouri River and intersected by the Lamine River. The surface is undulating and hilly; the soil is very fertile. Grain, tobacco, and wool are raised. It contains rich mines of iron, coal, and lead, and quarries of marble and limestone. It is traversed by a branch of the Missouri Pacific R. R. Capital, Boonville. Pop. 20,692.

Cooper, a township of Sangamon co., Ill. Pop. 785.

Cooper, a post-township of Washington co., Me. Pop. 360.

Cooper, a township and post-village of Kalamazoo co., Mich. Total pop. 1254.

Cooper, a township of Gentry co., Mo. Pop. 1498.

Cooper, a township of Montour co., Pa. Pop. 414.

Cooper, a post-village, capital of Delta co., Tex., near the geographical centre of the county.

Cooper, a township of Mason co., West Va. P. 1204.

Cooper (ANTHONY ASHLEY). See SHAFTESBURY.

Coop'er (Sir ASTLEY PASTON), F. R. S., LL.D., D. C. L., an eminent English surgeon, born at Brooke, in Norfolk, Aug. 23, 1768. He began to study surgery under Mr. Cline in London in 1784. He became professor of anatomy at Surgeon's Hall in 1792, and surgeon to Guy's Hospital in 1800. In 1805 he was chosen a fellow of the Royal Society. He gained distinction by a valuable work on hernia (1804–07), and practised surgery with great success in London. His annual income is said to have amounted to £21,000. He was appointed surgeon to the king in 1828. Among his works are "The Principles and Practice of Surgery" (1836–37), a treatise "On Dislocations and Fractures" (1822), and one on the "Anatomy and Diseases of the Breast" (1829–40). Died Feb. 12, 1841. (See B. B. COOPER, "Life of Sir Astley P. Cooper," 1843.)

Cooper (JAMES), GENERAL, was born in Frederick co., Md., May 8, 1810, graduated at Washington College, Pa., in 1831, studied law with Thaddeus Stevens, was a Whig member of Congress from Pennsylvania (1839–43), and was a leading opponent of the repudiation movement in Pennsylvania in 1847. He was attorney-general of Pennsylvania in 1848, U. S. Senator from 1849–55, appointed brigadier-general of Union volunteers in 1861, served in Virginia, and died at Columbus, O., Mar. 28, 1863.

Cooper (JAMES FENIMORE), a popular American novelist, born at Burlington, N. J., Sept. 15, 1789, was a son of Judge William Cooper. The latter removed to Otsego co., N. Y., about 1790, and founded Cooperstown. Young Cooper entered Yale College in 1802, and became a midshipman in the U. S. navy in 1806. In 1811 he quitted the naval service and married Susan de Lancey, a sister of Bishop de Lancey. He published anonymously, in 1819, "Precaution," a novel, which was considered a failure. In 1822 he produced "The Spy, a Tale of the Neutral Ground," which had great success, was republished in various parts of Europe, and translated into several languages. "The Spy" opened a new and fresh field of national and imaginative literature. His next work was the "Pioneers" (1823), in which he gave a graphic description of American scenery and the adventures of life on the frontier of civilization. He published in 1823 "The Pilot," a tale of the sea, which was very popular. He represented with great success in this work the character of sailors and peculiar phases of maritime life and scenery. In the "Last of the Mohicans" (1826) he gave a vivid picture of the life and character of American savages and trappers. In 1827 he visited Europe, where he remained nearly six years, during which he published "The Prairie" (1827), "The Red Rover," an admired tale of the sea, and other works. He criticised and satirized the national defects and foibles of the Americans in "The Monikins" (1835), "Homeward Bound" (1838), and "Home as Found" (1838). Among his other works are a "History of the Navy of the United States" (1839), "The Pathfinder" (1840), "Wing-and-Wing" (1842), "Afloat and Ashore" (1844), "The Chain-Bearer" (1845), and "Oak Openings" (1848). Died at Cooperstown Sept. 14, 1851. "He wrote for mankind at large," says W. C. Bryant; "hence it is that he has earned a fame wider than any [American] author of modern times. The creations of his genius shall survive through centuries to come, and only perish with our language." "His writings," says Prescott, "are instinct with the spirit of nationality. In his productions every American must take an honest pride; for surely no one has succeeded like Cooper in the portraiture of American character, or has given such glowing and eminently truthful pictures of American scenery." In

person he was well formed, dignified, and had an imposing presence. (See "North American Review" for July, 1822, July, 1826, April, 1831, and Oct., 1859; ALLIBONE, "Dictionary of Authors.")

Cooper (MYLES), LL.D., OXON., an accomplished scholar, second president of King's College (now called Columbia College), New York City, born in England in 1735, and educated at Oxford, became a fellow in Queen's College. He came to America in 1762, as assistant to Dr. Samuel Johnson, first president of King's College, and was made president in May, 1763. In the revolt of the colonies he remained loyal to the Crown, and was compelled to flee the country. He became one of the ministers of the English chapel in Edinburgh. Died at Edinburgh May 1, 1785.

Cooper (PETER), an American manufacturer, inventor, and philanthropist, was born in the city of New York Feb. 12, 1791. His early life was one of labor and struggle, as it is with most of our successful men in this country. He commenced in early boyhood to help his father as a manufacturer of hats. He attended school only for half of each day for a single year, and beyond this very humble instruction his acquisitions were all his own. At the age of seventeen he was placed with John Woodward to learn the trade of coachmaking. In this trade he served his apprenticeship so much to the satisfaction of his master that the latter offered to set him up in business, but this he declined, on account of the debt and obligation it would involve.

The foundation of Mr. Cooper's fortune was laid in the opportune invention of an improvement in machines for shearing cloth. This was largely called into use during the war of 1812 with England, when all importations of cloth from that country were stopped. The machines lost their value, however, on the declaration of peace. Mr. Cooper then turned his shop into the manufacture of cabinet-ware. He afterwards went into the grocery business in New York, and finally he engaged in the manufacture of glue and isinglass, which he has carried on for more than fifty years. Mr. Cooper in three particulars—as a capitalist and manufacturer, as an inventor, and as a philanthropist—is connected with some of the most important and useful accessions to the industrial arts of this country, its progress in invention, and the promotion of educational and benevolent institutions intended for the people at large. His attention was early called to the great resources of this country for the manufacture of iron. In 1830 he erected works in Canton, near Baltimore. Subsequently he erected a rolling and a wire mill in the city of New York, in which he first successfully applied anthracite to the puddling of iron. In 1845 he removed the machinery to Trenton, N. J., where he erected the largest rolling-mill at that time in the U. S. for the manufacture of railroad iron. In these works he was the first to roll wrought-iron beams for fireproof buildings. These works have now grown to be very extensive, including mines, blast furnaces, and water-power.

While in Baltimore, Mr. Cooper built, in 1830, after his own designs, the first locomotive engine ever constructed on this continent. It was successfully operated on the Baltimore and Ohio R. R. Next we find Mr. Cooper taking great interest and investing large capital in the extension of the electric telegraph. He was the first and only president of the New York Newfoundland and London Telegraph Company, which continued its operations for eighteen years. He was honorary director of the Atlantic Telegraph Company, president of the American Telegraph Company, and president of the North American Telegraph Association, which at one time represented more than two-thirds of all the lines in the U. S. He took part actively in the first expedition that laid the Atlantic cable in 1854.

Mr. Cooper interested himself early in the New York State canals. Before the water was let into the Erie Canal it was an anxious question what was the best propelling power for the boats to be employed on the canal. Mr. Cooper then made an interesting experiment of propelling a boat by means of an endless chain two miles long, supported on posts and rollers, which was driven by the force of elevated water, and might be driven by any other power. By means of this he propelled a boat two miles in eleven minutes, carrying with him the governor, De Witt Clinton, and other distinguished men at that time. Although this method of propulsion was not adopted at that time, it has since been successfully and very usefully applied by Mr. Weltch in passing boats through the locks of the Delaware and Raritan Canal.

Mr. Cooper has served in both branches of the New York common council. He was a trustee in the Public School Society, first formed to promote public schools in New York, and when that was merged in the board of education he became a school commissioner.

But the most cherished object of Mr. Cooper's life, early conceived and faithfully carried out as soon as his means permitted, was the establishment of an institution for the instruction of the industrial classes. He desired to furnish this instruction during their leisure from work or in the evenings, when they might obtain higher attainments in the practical arts in which they happened to be engaged, or learn some industrial pursuit they might desire. Having felt the need of this sort of instruction during his own early and laborious life, and knowing that neither the common school nor the academy and college can supply the technical knowledge and practical education needed by the great mass of youth, Mr. Cooper determined to set an example in supplying this want of practical instruction for the working classes, that should prove not only useful in his own city, but be contagious throughout our republican land. He saw, with that wise forecast as well as broad philanthropy which characterizes his mind, that the youth must be trained to industry under an advancing and higher order of work which machinery was introducing. Accordingly, in the year 1854 he laid the corner-stone of a large building at the junction of the Third and Fourth avenues in New York, "to be devoted for ever to the union of art and science in their application to the useful purposes of life." This institution has grown under the fostering care of the trustees appointed by Mr. Cooper and his own watchful and unremitting attention, until at the present time it counts over 1500 pupils in the course of the year. It has a school of art for women, taught in the daytime, in which free instruction is given in all branches of drawing, in painting, wood-engraving, and photography. It has likewise a free school of telegraphy for young women. These various schools for the daytime accommodate about 200.

In the evening are opened the free schools of science and art for young men and women. Here the mathematics, practical engineering, and practical chemistry are thoroughly taught, and free lectures are given in natural philosophy and the elements of chemistry. In the art department every branch of drawing and painting is taught. Besides these free schools, there is a large free reading-room and library at the disposal of all comers. About 1500 resort to this daily, where they have free access to 280 periodicals and papers, foreign and domestic, and about 10,000 volumes. Besides this, there is a free course of lectures given every Saturday evening during the winter in the large hall of the Cooper Union, that will seat 2000. Last year there was spent over $56,000 for the support of the different departments.

Mr. Cooper is now in his eighty-third year, and has retired from active business, but his mind is still fresh and active, and still bent on public enterprises and the public good. J. C. ZACHOS, *Curator of Cooper Union.*

Cooper (PHILIP H.), born Aug. 5, 1844, in the State of New York, graduated at the Naval Academy in 1863, became a master in 1865, a lieutenant in 1866, and a lieutenant-commander in 1868. He served in the steam-sloop Richmond at the battle of Mobile Bay, Aug. 5, 1864, and was commended "for coolness and courage" on that occasion by his commanding officer, Captain Thornton A. Jenkins. FOXHALL A. PARKER, U. S. N.

Cooper (SAMUEL), D.D., an eloquent and learned American divine, born at Boston Mar. 28, 1725, graduated at Harvard in 1743. He became pastor of the church in Brattle street, Boston, in 1746, and was intimate with Doctor Franklin. He was an efficient promoter of the popular cause in the Revolution. Died Dec. 29, 1783.

Cooper (SAMUEL), an American general, born in the State of New York about 1795, graduated at West Point in 1815. He became a captain in 1836, and served in the Mexican war (1846–47). In 1852 he was appointed adjutant-general with the rank of colonel. Having resigned his commission in Mar., 1861, he soon became adjutant-general of the Confederate army, and was promoted to the rank of full general. He served as such until the end of the war.

Cooper (SUSAN FENIMORE), the eldest daughter of the great novelist, was born in 1815, and has published "Rural Hours" (1850), "Rhyme and Reason of Country Life" (1854), "Country Rambles," and other works characterized by refined taste and admirable style.

Cooper (THOMAS APTHORPE), an actor, born in London in 1776, played with much applause in London and the U. S. His daughter married a son of President Tyler, under whom Cooper held various government offices. Died at Bristol, Pa., April 21, 1849.

Cooper (THOMAS), M. D., LL.D., a natural philosopher, physician, and lawyer, born in London Oct. 22, 1759. He accompanied Dr. Priestley to the U. S. in 1792, became a Democrat, and took an active part in politics. In 1820 he was chosen president of South Carolina College at Columbia. He published many learned and vigorous pamph-

lets on politics, and several important legal works. Died May 11, 1839.

Cooper (THOMAS SIDNEY), an English painter, born at Canterbury Sept. 26, 1803. He has painted cattle and sheep with great success.

Coop'erage [from *cooper*, a "barrel-maker;" in Old English *coop* (Ger. *Kufe*) signified a "cask"], the art of making various wooden vessels, such as barrels, casks, etc., the sides of which are formed of upright pieces called staves, so skilfully shaped that when all are built and hooped together, their edges shall exactly coincide; the staves are made broadest in the middle, and narrowed in a curved line towards each end; they are made to meet at their inner edges, and by driving the hoops are compressed until the outside gaps are closed, and thus slight inaccuracies of fitting are remedied. The hoops are hammered down from the narrow to the wide part of the vessel by means of a mallet striking a piece of wood held against the hoop. Both wood and iron are used for hoops. The cutting of staves is largely done by machinery. Iron hoops are sometimes put on hot, in order that their contraction on cooling may bind the work together.

Co-opera'tion [from the Lat. *co* (*con*), "together," and *operor, operatus*, to "work"] is the name given to the attempts made within the last forty years, both in Europe and the U. S., but chiefly in France and England, to introduce into the relations under which ordinary and indispensable operations of industry, production, and distribution are carried on, principles which may

> "Ring out the feud of rich and poor
> Ring in redress for all mankind,"

and thus realize gradually, without any violent shock to existing customs, those brilliant anticipations of a "good time coming," and attainable by man through his own exertions, which in the earlier part of the century the efforts and teaching of three remarkable men—Claude Henri Conte de Saint-Simon, Charles Fourier, and Robert Owen—kindled in the imaginations of their disciples. It would occupy far more space than we can spare to give even an outline of the principles by which the divergent theories of these illustrious social reformers are distinguished. (For a literally full, fair, and very readable account of them we may refer those who are interested in such studies to the "Les Réformateurs Contemporains" of LOUIS REYBEAUD, Paris, 1841.) Still less can we give here the history of the schools of thought which arise out of their teachings, or attempt to trace the variety of social systems produced by the successors of these breakers of the fallow ground—men such as J. P. Greaves in England and Pierre Leroux, Cabet, and Proudhon in France. One exception only we must make in favor of M. Louis Blanc, from the influence exercised by his work, "L'organisation du Travail," published in 1840, on the subsequent progress of co-operation.

The systems of Saint-Simon, of Fourier, and of Owen have the common character of claiming to be revelations of a code of principles or laws by which the whole life of man shall be transformed as by an enchanter's wand, and a new-created world of moral order and material prosperity spring up in place of our present civilization. Louis Blanc proposed to start from things as they are, and for that purpose suggested a scheme of which he gives the following outline: The government should take upon itself the supreme regulation of production and the task of putting an end to competition, in which it must slay the evil genius of society by arms borrowed from competition itself. To effect this task the government shall raise a loan, of which the proceeds shall be applied to the creation, in all the more important branches of national industry, of a number of social factories, originally rigorously circumscribed on account of the considerable outlay required for their construction, but organized so as to have an unlimited power of expansion. The government shall draw up the regulations of these factories, which shall be discussed and voted by the representatives of the nation, and thus have the force of law. All workmen who can offer guarantees for their character shall be admitted to work in them up to the limits of the number for whom the original capital can furnish the means of work. And (notwithstanding the difficulty caused by the false education given to the existing generation, which furnishes no motives for energy and emulation except an increase of reward) the salaries shall be equal, for the new education may be trusted to change ideas and customs. During the first year after the establishment of any factory the government shall regulate the hierarchy of functions. At its termination a hierarchy shall be formed by the election of the workers, who will then have had time enough to appreciate each other, and will all be equally interested in the success of the association. For in every year the profits of the work shall be divided into three parts: one to be equally distributed among all the members; a second to be devoted, first, to the support of the aged, the sick, and the infirm; second, to the alleviation of any crisis affecting any other industry, since all the industries should aid each other; while the third shall be consecrated to furnish the means of work to those who desire to join the association, so that it may grow indefinitely. Workers engaged in occupations naturally disposed to scatter and localize themselves shall be admissible into the associations formed for industries which can be carried on upon a large scale; so that each social factory may be composed of different businesses grouped round some great industry, parts of the same whole, obeying the same laws, and sharing in the same advantages. Each member of a social factory shall be entitled to dispose of his salary at his own pleasure, for the evident economy and incontestable excellence of life in common will ere long produce from the association of labor a voluntary association for necessities and pleasures. Capitalists may be admitted into these associations, and draw the interest upon the capital contributed by them, which shall be guaranteed by the budget, but shall not be allowed to share in profits except as workers. (*Organisation du Travail*, Paris, 1848, pp. 103–105.)

Such was the scheme of which Louis Blanc anticipated that were it tried it would lead to the suppression of competition by the absorption of all industries carried on upon any other system, and prepare the way "for the realization of the principle of fraternity, which must be the work of instruction." "Thus would the day arrive when it would be recognized that he owes more to his kind who has received from God a large measure of strength or intelligence. Then would genius assert its legitimate empire not by the importance of the tribute levied on society, but by the importance of the services rendered to it." "For the inequality of capacities has as its true object not the inequality of rights, but the inequality of duties." (*Ib.*, p. 118.)

It will be seen that this remarkable scheme is characterized by that tendency too common in many French proposals, of relying upon the government to do for the people what they despair of being able to do for themselves. Nevertheless, it marks a great epoch in the history of social reform, by the clearness with which it pointed out three principles ever since more or less distinctly felt to be the life-blood of co-operative efforts: 1st, the looking to the association of workers carrying on their accustomed work in common as the true means of raising their social condition through the use of the profits arising from their work; 2d, the restricting the payment of capital to a fixed rate of interest, and giving the capitalist security for his principal in lieu of profit; 3d, the elimination of the ruinous effects of competition, and the substitution of a healthy emulation in its place, by the union of different establishments carrying on the same industry by common centres, by means of which diverse industries may also be united. Thus, setting aside the arbitrary rule of an absolute equality of salaries, which experience has not justified where the attempt to act upon it has been tried, and which seems to us to err as much by sacrificing the individual to the body as the present inequality of payment errs in sacrificing the body to the individual,—this *organisation du travail* may still be regarded as the prolific egg out of which the ideas of co-operation sprang in France, and which has had no inconsiderable influence on the ideas of co-operators in England. There the scheme of united action, which Louis Blanc proposed to realize through the intervention of the government, has been gradually realizing itself through the voluntary action of individuals, who, however, have attacked the problem from another side, on which practically it is more accessible. The new societies imagined by Fourier or Owen rested upon associations where the residents, raising their own food by the cultivation of their own lands, and to a great extent supplying their other wants by their own labor, would have been substantially independent of each other, and not have needed to trouble themselves much about the mutual exchange of their surplus produce. But if the workers are to sustain themselves by the sale of articles which they cannot eat, as M. Louis Blanc proposed, the command of a market through which these sales may be effected becomes an indispensable condition of success. Hence arises the importance of the distributive association or store in any scheme of social improvement founded upon the union of artisans to carry on their accustomed work. But how are these stores to be formed? The answer practically given has been, By unions of consumers, who shall contribute the capital necessary to obtain the articles for their own supply, and divide among themselves the profits arising from this sale, which the shopkeeper, if he supplies that capital, puts into his own pocket. Stores of this nature can be formed by the workers for themselves without any alteration in their

accustomed methods of employment. They can be formed by a very small expenditure of capital in proportion to the business done if the rule of cash payment for all articles supplied by them is adopted. They have in themselves a natural tendency to expansion, since there is no class of persons in them interested in restricting the number of members, while the larger the store the greater is the security for the capital invested in it, and the smaller the proportionate cost of distribution. They are attractive not only by the economy which they realize, but also by the protection against adulteration afforded through their means, since they contain no body of persons benefited by adulteration. They are instruments by which the workers may gradually save up the capital needed to set themselves to work, without feeling any burden from the operation, since the savings are made out of a fund before inaccessible to them—viz. the profits on their own consumption. And this fund enables them to pay interest on the accumulations while they are in process of being made, so that the worker, while preparing the means of becoming his own employer, derives a safe and increasing income from the operation. Again, by the practice of selling at ordinary prices and dividing the accruing profit from time to time, the store is converted into a self-acting savings bank, by which the frittering away of the profits in small expenses is prevented. Thus, by laying his hands upon the thing nearest to him, within his own reach, the supply of his own consumption, the artisan may see the prospect held out to him by Louis Blanc continually drawing nearer, distribution constructing the road leading to production. But to complete this road a further operation is necessary—viz. that the local centres of supply shall be collected under some common head, by which the aggregate wants of large districts may be ascertained, and so a market be obtained for the productive associations, when formed, sufficiently large to absorb their productions. Now this operation is facilitated by the system of distribution existing in society as it is—the well-known division of retail and wholesale trade. Between the consumer and the actual producer there intervene at present not only the retailer, but the dealer from whom this retailer obtains the goods he supplies, and if those goods are not produced at home, but imported, a further set of importers and dealers from whom they buy, and brokers through whom these purchases are made, which we need not specify. For their own advantage, to make the system of self-supply complete, the consumers must therefore form for themselves wholesale centres, whence their local stores may obtain the goods supplied by them, and these centres, when formed, furnish natural channels through which the articles produced by co-operative manufacturing societies may be distributed to the consumers, with a certainty that the proportion between supply and demand shall always be duly preserved, since the production will be founded upon the ascertained wants of the districts supplied. Upon the system thus sketched co-operation has grown up in the United Kingdom with a rapidity of which the following statistics will give an idea: At the close of 1844 the celebrated Rochdale Pioneers' Society was founded by seventeen weavers, with a total capital of £28. At the present time its share capital has risen to £133,000, of which £46,000 is applied to carry on the business, £20,000 being represented by business premises, machinery, and fixtures, and the remainder is invested in the shares of or loans to various other societies, or in land or cottage buildings, of which it owns 122. At Christmas, 1872, it had 6444 members; its business during the year 1872 was £267,000; its income from all sources, £33,646; and its average dividend to its members on their purchases 2*s.* 3*d.* in the pound. The extent to which the example set by Rochdale has been followed is shown by a statement compiled from the latest official returns, published in 1872 for the year 1871, laid before the Co-operative Congress held in April, 1873, at Newcastle-on-Tyne, and showing also the localities in which co-operation has spread most widely in England:

	Lancashire and Yorkshire.	All other counties.	Total of England and Wales.
Property and stock ins'd	£701,570	£484,991	£1,186,564
Members end of 1871.....	157,225	104,963	262,188
Share capital "	£1,863,729	£442,222	£2,305,951
Capital..... "	174,862	40,691	215,553
Cash sales during 1871....	6,082,888	3,356,583	9,439,471
Average stock.....	658,959	374,487	1,029,446
Total expenses.....	200,747	187,974	388,721
Int. on shares and loans	82,656	18,182	100,778
Liabilities	2,157,817	708,501	2,856,318
Assets	2,308,048	717,519	3,025,567
Disposable net profits	438,307	232,414	670,721
Dividend to members.. ..	388,659	194,613	583,290
" to non-members	10,706	51,542	16,248
Applied to education.....	4,126	671	5,097

The statement, indeed, is not perfect, since it takes no notice of Scotland, where there were 255 registered societies, but of which 70 only had made returns to the registrar; and it relates only to about nine-tenths of the societies believed to exist in England and Wales, because no returns had been made from the other tenth. But of these 746, twenty-two only were formed for manufacturing purposes other than the preparation of flour. The collective share capital of these societies (excluding a cotton-factory at Rochdale, within the immediate influence of the Equitable Pioneers, which possessed £98,656) was only £22,195, giving an average of about £1050, while the share capital of the 724 other societies gives an average of about £3050, although the successful conduct of manufacturing operations demands a much larger capital than is needed by a store, which deals for ready money. This fact seems to us a striking proof of the advantage possessed by the method of beginning by organizing distribution, and thus accumulating the capital required for productive enterprise, over that which seeks to obtain the capital at once out of the contributions of the intended workers. A confirmation of this view is afforded by the experience of the Continent: 1st, in the history of French co-operation; 2d, that of the system of co-operative banks introduced by Mr. Schultze Delitzsch into Germany. In France a number of societies sprung up in 1848 under the influence of the ideas of which M. Louis Blanc's *organisation du travail* is the most brilliant expression; and of these many appear still to subsist; indeed, the number is said to have increased of late, and of those which subsisted at the outbreak of the German war, none failed either from the pressure of the siege or the action of the Commune. (*Letters of M. Merlot, and Monsieur Herbart Valleroci's report to Bolton Congress,* 1872, p. 99.) But they do not appear to have made any striking progress. Monsieur Merlot speaks of the want of capital to obtain the instruments of manufacture and a reserve fund to meet embarrassments as the great obstacles to their success. M. C. Limousin, in a monthly journal recently established at Paris, called "Le Bulletin du Mouvement Social," ascribes it—1st, to a refusal to use capital supplied by persons outside; 2d, to the not giving any share of profits to the workers not members; and 3d, to an extreme distrust of those elected to direct the undertakings, so that they are constantly removed. Now, for all these evils an appropriate remedy appears to be provided in the creation of a central fund for the promotion of such productive establishments through the accumulative savings of the consumers to whom the articles manufactured may be sold; for of this capital the workman can feel no jealousy, since it is really supplied by himself. The consumer may counteract the spirit of exclusiveness proper to the factory by the spirit of free admission natural to the store when profits are divided upon purchases; and they may regulate, by the governing action of the distributive stomach, the distrustful impatience of the producing members.

While France has thus been slowly groping her way to productive union, in Germany a peculiar form of combined action has sprung up, suited to the condition of labor in that country. It consists in the formation of local associations for the joint purchase of raw materials, or for obtaining advances of capital by the poorer classes, on terms as advantageous as those at the command of the richer, introduced in 1859 at the suggestion of Mr. Schultze Delitzsch. This movement so prospered that at the end of 1871 it numbered 2059 societies with 1,200,000 members, a subscribed capital of £4,700,000, a loan capital of £12,750,000, and a turn-over of £60,000,000; while in association with it there existed 404 societies connected with manufactures, and 827 stores. (*Report for* 1871, by Mr. Schultze Delitzsch, published 1872.) A similar system has recently grown up with great promise of success in Italy.

To complete this sketch, we must add that both in Germany and in England central associations adapted to bring the separate societies into collective action are in operation, and are beginning to exercise a powerful influence. In Germany the function of the central body appears at present confined to the collection and diffusion of accurate information as to the condition of the local societies, by which they may be guided in their dealing with each other, and to the discussion of any matters affecting generally the interests of the members. In England, while this function has been discharged for the last four years by an annual congress of delegates from various co-operative societies, and by a central board appointed by them to keep alive the sacred fire during the rest of the year, this central board, by the resolutions of the congress held at Newcastle in 1873, was reorganized with the view of giving it increased efficiency. A great advance towards the practical combination of the local distributive stores into a common action for the supply of the wants of large districts has been made by the

formation in 1864, at Manchester, of the North of England Wholesale Society, now called "The Wholesale Society," as the federal head of a mass of co-operative societies, by whom its capital is subscribed, and by whose delegates at their quarterly meetings its governing body is appointed and its operations controlled. Commencing with a capital of £1000 and a business in its first year of little more than £40,000, "The Wholesale" has grown year by year, till in April, 1873, it embraced 277 shareholding societies with 134,276 members, and had made sales amounting during the last quarter to £303,697, and during the year to £1,153,132—an increase of nearly 52 per cent. on the sales of the year preceding. (*Report of Congress at Newcastle.*)

The time has arrived, in the opinion of English co-operators, when the step may safely be taken through this wholesale organization to manufacture articles which the consumers commonly require. Accordingly, "The Wholesale" has recently commenced the manufacture of biscuits, and has decided to begin that of boots and shoes, in which 59 societies only in connection with it had, according to their accounts, an annual trade of £66,876. They are also arranging to enter upon the Manchester trade for the supply of drapery, hosiery, etc., articles constituting no inconsiderable part of the large amount of business done by the stores, which does not now pass through "The Wholesale." This step therefore will probably open the way to other productive fields of manufacturing enterprise.

During the last year also a very promising beginning has been made in uniting banking business to the other modes of co-operative effort, thus making the large accumulated balances of the stores available for the extension of co-operation.

The brief sketch given above may suffice to show how noble a prospect lies beyond the gentle unimposing pass leading from the world where man is the slave of capital to the world where capital shall become the servant of man. The housewives who watched that the kettle did not boil over during ages past little imagined the part that steam was one day to play, and the heads of poor families who have joined in buying a chest of tea and dividing it amongst them, have as little foreseen that they were playing with a power which could turn the worker into his own employer, and rearrange the distribution of wealth among mankind.

The student of social science will find the first act legalizing co-operative societies in England in the statute-book of 1852 (15 Vict., c. 31), and may trace the development of the movement in the subsequent acts 17 and 18 Vict., c. 25, 19 and 20 Vict., c. 40, 25 and 26 Vict., c. 87, 30 and 31 Vict., c. 117, and 34 and 35 Vict., c. 80.

THOS. HUGHES, M. P.

Coop'er Riv'er, in South Carolina, rises in Charleston co., and flowing south-eastwardly unites with Ashley River to form Charleston Harbor.

Coop'er's, a township of Edgefield co., S. C. P. 1795.

Coop'er's Creek, a stream in the interior of Australia, formed in Queensland by the junction of the Victoria and Thomson creeks, flows southward, and empties itself into the salt lake Gregory. Cooper's Creek has a tragic interest, from the fact of the explorers Burke and Wills having perished in its vicinity.

Coop'er's Gap, a township of Polk co., N. C. Pop. 797.

Coop'er's Plains, a post-village of Erwin township, Steuben co., N. Y., on the Rochester division of the Erie R. R., 5 miles N. W. of Corning.

Coop'erstown, a post-township of Brown co., Ill. Pop. 1522.

Cooperstown, a post-village, capital of Otsego co., N. Y., is pleasantly situated at the S. end of Otsego Lake, 69 miles W. of Albany. The lake is 9 miles long, and has two steamboats. Cooperstown has six churches, two weekly newspapers, a union school and academy, a hospital, an orphan asylum, and two national banks. The Cooperstown and Susquehanna Valley R. R., 16 miles long, connects it with the Albany and Susquehanna R. R. Pop. of Otsego township, 4590.

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Cooperstown, a post-village of Jackson township, Venango co., Pa. Pop. 264.

Cooperstown, a township and post-village of Manitowoc co., Wis. The village is 85 miles N. of Milwaukee. Pop. of township, 1563.

Cooper Union. See COOPER (PETER), by J. C. ZACHOS, Curator of Cooper Union.

Coop'ersville, or **Corbeau,** a post-village of Champlain township, Clinton co., N. Y., on Chazy River. Pop. 205.

Cooper's Well, an artesian mineral spring, 4 miles from Raymond, Hinds co., Miss. Its water is an active saline chalybeate, and is much visited for the cure of chronic diarrhœa, dyspepsia, and many other diseases.

Co-or'dinates, in mathematics, a system of lines or surfaces by which the position of a point is determined. If, for example, three lines, x, y, z, be so drawn that each is perpendicular to the plane of the other two, lines may be drawn from any point in space perpendicular to each of the intersecting planes, and the length of the perpendiculars being known, the position of the point will also be known. Two rectilinear co-ordinates are sufficient to determine any point in a plane. If the co-ordinates are so inclined to each other as to form any oblique angles, determining lines may be drawn at similar angles from the point. In polar co-ordinates an initial axis is assumed (one extremity of which is called the pole), and an initial plane passing through the axis. The co-ordinates of any point are the radius vector, its angle with the polar axis, and the angle between the vectorial and initial planes. Various other systems of co-ordinates are employed in analytical geometry; *e. g., trilinear, triangular, tetrahedral, tangential, elliptic, spherical,* etc.

Coorg, a district of India, bounded by the Mysore territories and the presidency of Madras, is between lat. 12° and 13° N. Area, 2116 square miles. The surface is hilly and covered with forests. Porcelain clay is obtained in abundance. Sandal and other valuable woods are found. The geological formation of the country is syenite, granite, and greenstone. The botany and zoology of the country comprise a great variety of species. The laws of hereditary rights differ in this rajahship from those of neighboring nations, inheritances passing by the male line. The manufactures are confined to the blankets which the people wear. In the valleys, which are very fertile, rice is grown. The amount of land under tillage is comparatively small. It is drained by the river Câvery. The inhabitants are a warlike Nair tribe. The country was annexed to the British dominions in 1832. It is now placed, with Mysore, under the administration of a special commissioner. Pop. in 1869, 118,187.

Co'os [Κόως], a New Testament name of the island of Cos (which see).

Coos, ko-ŏs′, a county which forms the N. extremity of New Hampshire. Area, 1950 square miles. It is bounded on the W. by the Connecticut River, and is drained by the Androscoggin. The surface is mostly mountainous and rugged. Mount Washington, the highest peak of the White Mountains, is in the southern part of this county. It is intersected by the Grand Trunk R. R. Cattle, potatoes, grain, and wool are raised. Lumber and starch are the chief manufactures. Capital, Lancaster. Pop. 14,932.

Coos, koos, a county in the W. of Oregon. Area, about 1300 square miles. It is bounded on the W. by the Pacific Ocean, and drained by the Coquille and Coos rivers. The surface is partly mountainous; much of the soil is very fertile. Coal and lumber are exported from this county, which also contains gold. Capital, Empire City. P. 1644.

Coo'sa, a river of the U. S., is formed by the Etowah and Oostenaula, which unite at Rome in Georgia. It crosses the eastern boundary of Alabama, flows south-westward, and then southward, until it unites with the Tallapoosa on the southern border of Elmore co., Ala. The stream thus formed is the Alabama River. The length of the Coosa is estimated at 350 miles.

Coosa, a county of E. Central Alabama. Area, 650 square miles. It is bounded on the W. by the Coosa River. The surface is diversified; the soil fertile. Corn, tobacco, cotton, and wool are raised. Quarries of fine marble and statuary granite have been opened here. The granite is of a beautiful gray tint, and is said to be the best in the U. S. for statuary. Iron and lead ores are also found. The county is well watered, and especially adapted to pasturage. Water-power is abundant. Capital, Rockford. P. 11,945.

Coosawat'chie, a post-township of Beaufort co., S. C. Pop. 2573.

Coos Bay, the principal seaport of Southern Oregon. Its entrance, just N. E. of Cape Arago (lat. 43° 20′ 38″ N., lon. 124° 22′ 11″ W.), is very good, and its bar has fourteen feet of water at high tide. The Coos River flows into it. Four miles from the bar, on the S. shore, is Empire City, the capital of Coos co.; and four miles from the mouth of the river is Marshfield, an important coal-mining centre. The bay is important chiefly for its vast quantities of tertiary lignitic coal, which is found on the S. side over a large area. It is by many regarded as the best coal on the Pacific coast, but is inferior to the bituminous coals. The bay is surrounded by an elevated and densely timbered region.

Coot, a name applied in America to several birds, chiefly ducks of the genus *Fuligula*. Among these are the box coot, or surf duck, of the E. and W. coasts of North America, the broad-billed coot, the white-winged coot or velvet duck, and other species. In the South the name is given to the sora rail (*Ortygometra Carolina*). The name coot in England is generally applied to the *Fulica atra*, a wading bird allied to the rails. The *Fulica Americana*, found in nearly all parts of North America, is the bird to which the name coot should be restricted in this country.

Common European Coot.

Coote (Sir Eyre), K. B., an able general, born in Ireland in 1726, went to India in 1754, became governor of Calcutta (1757), fought at Plassey in the same year, took Pondicherry in 1761, became commander-in-chief in India (1769), and defeated Hyder Ali in 1781. Died April 26, 1783. His nephew, of the same name, served against the Americans in the Revolutionary war.

Copāi'ba [a word of Brazilian origin], **Balsam of,** a stimulant, diuretic, oleo-resinous drug, which has decided value in diseases of the mucous membrane, is obtained chiefly from Pará in Brazil, though the trees which produce it grow extensively in many parts of tropical America. These trees are of many species or varieties, belonging to the genus *Copaifera* and the order Leguminosæ.

Copa'is [Gr. Κωπαΐς], the ancient name of a lake of Bœotia, now called **Topolias.** It receives the river Gavrios, the ancient Cephissus. The extent of the lake varies at different seasons, and in summer it nearly all disappears. It is drained by artificial and natural subterranean channels into the sea. It was once famous for its eels.

Co'pake, a township and post-village of Columbia co., N. Y. The village is on the New York and Harlem R. R., 106 miles N. of New York. Iron of excellent quality is manufactured here. Total pop. 1847.

Co'pal [a term of Mexican origin], a name applied to several resins used in preparing varnishes. The copal of commerce is usually a nearly colorless, translucent substance, which is imported from tropical America, India, and Eastern and Western Africa. The American and African copal is said to come from leguminous trees of the genus *Hymenæa* and allied genera. East Indian copal is of several varieties.

Copan', a ruined city of Central America, in Honduras, on the Copan River, about 30 miles E. of Chuquimula. The remains, which extend nearly two miles along the river, comprise a temple 624 feet long and several pyramidal structures, with sculptured idols resembling those of the ancient Egyptians. (See Stephens, "Central America.")

Copartnership. See Partnership, by Prof. T. W. Dwight, LL.D.

Cope [Lat. *capa*; Fr. *chape*], a sacerdotal cloak reaching from the neck to the ankles, and open in front. It appears to have been modelled by Pope Stephen in 286, on the Roman *lacerna*, or hood. It is one of the vestments of the English Church, but is now seldom worn.

Cope (Charles West), R. A., an English historical painter, born at Leeds in 1811, was the son of an artist. He was elected a Royal Academician in 1848. Among his works are "Lear and Cordelia" (1850), "Royal Prisoners" (1855), "Departure of the Pilgrim Fathers" (1856), and frescoes in the Parliament House.

Cope (Edward Drinker), an American naturalist, a grandson of Thomas P. Cope, noticed below, was born in Philadelphia July 28, 1840. Before he reached the age of twenty he had distinguished himself in herpetology. In 1864 he was appointed professor of natural science in Haverford College, which position he resigned on account of ill health in 1867.

Professor Cope has made numerous contributions to the "Proceedings of the Academy of Natural Sciences of Philadelphia," to the "Transactions of the American Philosophical Society," to Silliman's "American Journal of Science," and other similar journals. Among his most important publications are the following: "Primary Groups of Batrachian Anura" (1865); "Systematic Arrangement of the Lacertilia and Ophidia" and of the Class "Reptilia" (1854–70); "Systematic Relations of the Fishes" (1871)—the two former based on a careful examination of the specimens in all the principal museums of Europe; the last on the unequalled collection made by Professor Hyrtl of Vienna (now in the possession of Professor Cope)—"On the Origin of Genera" (1868); "Synopsis of the Extinct Batrachian Reptilia and Aves of North America" (1869–70); "On the Hypothesis of Evolution, Physical and Metaphysical" (1870); "Extinct Reptilia and Fishes of the Cretaceous Beds of Kansas" (1872); "Systematic Relations of the Tailed Batrachia" (1872), based on Doctor Baird's admirable preparations (the finest ever made in that department); and a work entitled "The Extinct Vertebrata of the Eocene Formations of Wyoming" (1873), describing many of the most remarkable types of Mammalia ever discovered, being the oldest known from the tertiary formations.

Cope (Thomas Pym), a distinguished merchant of Philadelphia, born in Lancaster co., Pa., in 1768. He commenced business in Philadelphia in 1790, and in 1821 established the first line of packets between that city and Liverpool. To his energy Philadelphia was chiefly indebted for the supply of water from the Schuylkill and for the establishment of the Mercantile Library. He was a member of the Society of Friends. Died Nov. 22, 1854.

Copec', or **Copeck,** a Russian coin, said to be the first ever used in that country as currency. The copecs were originally made of silver, but copper copecs were afterwards coined. The value of the copec at present is equal to one one-hundredth part of a ruble.

Copeley, a township of Knox co., Ill. Pop. 1219.

Copenha'gen [Dan. *Kjöbenhavn, i. e.* "merchants' haven"], the capital of Denmark, is situated partly on the eastern coast of the island of Seeland and partly on the island of Amager. It is a seaport on the Sound, near its junction with the Baltic. Lat. 55° 40′ N., lon. 12° 34′ 7″ E. The site is flat, and very little elevated above the level of the sea. It was formerly a strong fortress, and the polygonal citadel on the north-eastern side of the city was deemed impregnable. But that was one hundred years ago. Now the walls are cut through and partially broken down; the ditches are filled, and where formerly stood a fortress, stands now a spacious, elegant promenade. In spite of its old age, Copenhagen is a thoroughly modern city, busy, gay, rapidly progressing in every respect. And in spite of its comparatively small size, it is a great city on account of the life led in it. Among its buildings must first be named Rosenberg, the "Castle of Roses," which, on account of the audacious but perfect harmony of its lines, belongs to first-class architecture. The royal palace, Christiansborg, is an immense but somewhat clumsy pile of buildings. The university and the royal theatre, not yet finished, are very fine buildings; also the metropolitan church called Frue Kirke; St. Peter's, or the German church, with a spire 250 feet high; and the church of the Saviour, with a spire of 288 feet. The University of Copenhagen, founded in 1478, is well endowed, has nearly forty professors, about 900 students, and a library of about 125,000 volumes. A museum for natural objects has just been erected, and is one of the most elegant buildings in Scandinavia. Connected with it are two observatories and a botanic garden. Here is a royal library containing 400,000

volumes, besides 15,000 manuscripts. This city is the great centre of Northern literature and art, and has several museums and collections of antiquities. The Museum of Northern Antiquities is unique, and so is Thorwaldsen's Museum, a mausoleum consisting of four buildings, in the middle of which Thorwaldsen is buried under a rosebush, while all his works are exhibited in the halls around it. The city has a deep, spacious, and secure harbor, formed by the channel between the islands of Seeland and Amager. Here is the great naval station of Denmark. Copenhagen has some manufactures of woollen and linen cloths, porcelain, sail-cloth, watches, leather, etc. Steam-packets ply regularly between this place and the ports of the Baltic. This site was occupied by a small village when Bishop Absalon founded a town here in 1168, and erected a fort. It became the capital of Denmark in 1443. It was most horribly bombarded, during three days, by the British fleet (1807), and suffered great damage. Pop. in 1860, 155,143; in 1870, 181,291.

Copenhagen, a post-village of Denmark township, Lewis co., N. Y., on Deer River, has three churches and a number of manufactories. Pop. 575.

Coper'nican Sys'tem, The, is that astronomical theory which represents the sun to be in the centre, and the earth and planets to move round it. The name is derived from Copernicus, who, though not the first suggester of the theory, contributed far more than any other astronomer to make it popular. The merit of having first formed the general idea of the system is believed to be due to Pythagoras; Copernicus, after the lapse of centuries, again drew attention to it, and greatly increased the probability of its truth by his calculations and arguments; the glory of having matured the idea belongs to Kepler, Galileo, and others, and especially to Newton, who, through the discovery of the law of gravitation, completely demonstrated its truth. Many who reverence the name of Copernicus in connection with this system would be surprised to find, on perusing his work "De Orbium Revolutionibus," how much of error, unsound reasoning, and happy conjecture combined to secure for him the association of his name with that system the complete development of which may be considered as the most wonderful achievement of astronomical science.

Coper'nicus, the Latinized form of **Kopernigk** (Nicolas), a celebrated astronomer, was born at Thorn, in Poland, Feb. 19 (O. S.), 1473. His father, a German merchant from Cracow, died early, leaving his children in the care of Lucas Watzelrode, their maternal uncle, who became bishop of Ermeland in 1489. Nicolas studied in the high school of his town, and then in the University of Cracow. He applied himself eagerly to mathematics under Albert Brudzevski for four years, and then went to Italy, visiting first Bologna, where Dominico Maria taught astronomy, and afterwards Padua, where he became doctor of medicine in 1499. He became intimate with Regiomontanus. Through his uncle he was appointed canon in Frauenburg, 1499. He remained in Italy until 1503, and was professor of mathematics at Rome in 1501. He then entered upon his office of canon, and is found (1517–19) entrusted with the conduct of the episcopal possessions in Allenstein, and on other occasions ably conducting the cathedral's concerns. He never refused the poor his advice and care as physician. His great discovery, that the planets move around the sun, he spent many years in observations and calculations in order to verify. He expounded it in his work "De Orbium Celestium Revolutionibus," finished in 1530, but not published until 1543, from a fear of persecution. He dedicated his book to the pope, and cautiously propounded his system as a mere hypothesis. According to tradition, he received the first copy of his book on the day that he died. It was published in Nuremberg (1543), in Bâle (1566), and in Amsterdam (1617). His theory was rejected not only by the clergy, but by astronomers. "The whole weight of Aristotle's name," says Hallam, "which in the sixteenth century not only biassed the judgment, but engaged the passions, connected as it was with general orthodoxy and preservation of established systems, was thrown into the scale against Copernicus. It must be confessed that the strongest presumptions in favor of his system were not discovered by himself. One of the most remarkable passages in Copernicus is his conjecture that gravitation is not a central tendency, but an attraction common to matter, and probably extending to the heavenly bodies." Died June 11, 1543. (See Gassendi, "Vita Copernici," 1654; Westphal, "N. Copernicus," 1822; D. F. Arago, "Éloge de Copernic;" L. Prowe, "Zur Biographie von N. Copernicus," 1853.)

Copi'ah, a county in the S. W. of Mississippi. Area, 700 square miles. It is bounded on the E. by Pearl River and drained by Bayou Pierre. The soil is productive and adapted to cotton. Corn, rice, wool, and cattle are also raised. Lumber is largely produced. It is intersected by the New Orleans Jackson and Great Northern R. R. Capital, Gallatin. Pop. 20,608.

Copia'po, or **San Francisco de Sel'va,** a town of Chili, capital of the province of Atacama, is on the river Copaipo, 30 miles from its mouth. It is connected with Caldera by a railway. Mines of gold, silver, and other metals occur in the vicinity. Earthquakes are here of frequent occurrence, and have sometimes caused great damage. Pop. 13,381.

Copio'ma, a township of Nemaha co., Kan. Pop. 424.

Cop'land (James), M. D., F. R. S., a Scottish physician and writer, born at Deerness, in the Orkneys, in 1793. He settled in London in 1821. His most important work is a "Dictionary of Practical Medicine" (3 vols., 1833–58). Died July 12, 1870.

Co'ple, a township of Westmoreland co., Va. Pop. 3353.

Cop'ley, a post-village of North Whitehall township, Lehigh co., Pa. Pop. 728.

Copley, a township and post-village of Summit co., O. Pop. 1233.

Copley (John Singleton), an historical and portrait painter, born in Boston, Mass., July 3, 1737. He visited Italy in 1774, settled in London in 1776, and became a member of the Royal Academy in 1783. "The Death of Lord Chatham" is called his masterpiece. Died Sept. 25, 1815. His son became Lord Lyndhurst and chancellor of England. Copley's portraits are among the few significant art-memorials of the past in this country. The possession of one of them, it has been said, is an American's best title of nobility. He was the only native painter of real skill which the New World could boast prior to the Revolution. The heads of leading families, especially in New England, sat to him, and the prices he commanded and the fame he reached were remarkable for the period. His chief defect was in his coloring, but he had the hand of a master. His knowledge was acquired under great disadvantages. Till he was thirty years old he never saw a good picture, yet his portraits are prized as heirlooms. They have a life which only genius could impart. O. B. Frothingham.

Coppée (Henry), LL.D., an American officer and author, born Oct. 15, 1821, at Savannah, Ga., graduated at West Point 1845, was lieutenant of artillery till he resigned, June 30, 1855. He served in the war with Mexico 1846–48, engaged at Vera Cruz, Cerro Gordo, La Hoya, Contreras, and Churubusco (brevet captain), Chapultepec, and the city of Mexico, and as assistant professor at the Military Academy 1848–49, 1850–55. Professor of English literature and history in the University of Pennsylvania 1855–56; author of "Elements of Logic," 1858, and of "Rhetoric," 1859, of "Grant and his Campaigns," 1866, and of several military works, 1858–73; editor of a "Gallery of Famous Poets," 1858, of "Distinguished Poetesses," 1861, and of the "United Service Magazine," 1864–66; contributor to the principal reviews and magazines of the U. S., 1848–73; compiler of "Songs of Praise in the Christian Centuries," 1866, and president of Lehigh University, Bethlehem, Pa., since 1866.

George W. Cullum, U. S. A.

Cop'per [Lat. *cuprum;* Ger. *Kupfer;* Fr. *cuivre*], an elementary metallic substance, was known at a very early period. Before iron was used it was the principal ingredient in domestic utensils and weapons of war. The Romans obtained the best copper from the island of Cyprus, whence its Latin name, *cuprum*, was derived. Copper is distinguished from all other metals by its peculiar reddish color. It is very ductile and malleable, and requires a temperature somewhat lower than gold, but higher than silver (estimated above 2000° F.), for its fusion. Next to silver, it is the best known conductor of electricity, being in the pure state 93.08, while silver is 100. The specific gravity of copper is between 8.91 and 8.95; atomic weight, 63.5; its symbol is Cu. It is very hard, elastic, and tough, with a tenacity only less than that of iron. It crystallizes in the regular system, forming cubes, octahedrons, etc. The principal ores of copper, besides the native metal, are the sulphides of copper, either alone or combined with other metals, such as copper glance (Cu_2S), indigo copper (CuS), copper pyrites (Cu_2S,Fe_2S_3), variegated copper ore ($3Cu_2S,Fe_2S_3$); Fahl ores, containing admixtures of sulphides of copper, iron, zinc, silver, mercury, etc.; enargite, containing sulphides of copper and arsenic; oxidized copper ores, such as red copper (Cu_2O) and black oxide of copper; and copper salts, such as malachite (which is carbonate of copper), silicate of copper, dioptase, chloride of copper, atacamite, phosphate of copper, and arseniate of copper. All these ores contain copper; it is found also in small quantities in

most soils, in seaweed, and in the animal body. Copper forms two oxides, the protoxide (CuO) and the suboxide (Cu_2O); the former is found native in dark steel-gray crystals, with a specific gravity of 5.9; the latter occurs in red, translucent crystals having a specific gravity of 5.8; prepared artificially, it forms a beautiful crimson powder. Protochloride of copper is brown in the anhydrous state, and green when hydrated; it is very soluble in water. There are several sulphides of copper, the principal being the protosulphide and the disulphide, corresponding in composition to the two oxides. They are both found native, and are worked as copper ores. The carbonate of copper is sold as a pigment under the name of blue verditer, and from the subchloride of copper Brunswick green is obtained. The blue and green verdigris of commerce are made by the action of acetic acid upon oxide of copper. The blue vitriol so extensively used in dyeing and calico-printing is sulphate of copper. The smelting of copper is not a complicated process when ores are used which do not contain sulphur, but when the latter is present the operation is very tedious and difficult. The alloys of copper are of great value. Brass is copper alloyed with from 28 to 34 per cent. of zinc; gun-metal consists of 90 parts of copper and 10 of tin; bell and speculum metals contain a larger proportion of tin. Bronze is sometimes made of 91 parts of copper, 2 parts of tin, 6 parts of zinc, and 1 part of lead. Copper is found in Great Britain, Australia, South America, and Cuba. It exists in great quantities on the shores of Lake Superior, where a mass of native copper was found weighing nearly 500 tons. Metallic copper is of very great value in the arts, being especially valuable for ships' sheathing and bolts, and is also the material used in the manufacture of a great variety of wares.

Cop'peras, the commercial name of the hydrated protosulphate of iron, sometimes called "green vitriol." It is composed of 28.9 per cent. of sulphuric acid, 25.7 of protoxide of iron, and 45.4 of water. It is used in medicine, in the dyeing of black, and in the manufacture of ink.

Copper Creek, a twp. of Russell co., Va. Pop. 1339.

Copper Falls Mine, a post-village of Eagle Harbor township, Keweenaw co., Mich. Pop. 454.

Copper Harbor, a post-township of Keweenaw co., Mich., on Keweenaw Point, Lake Superior. It has extensive mines of copper, and a good harbor, which is, however, difficult of approach. Pop. 359.

Cop'perhead (*Ancistrodon contortrix*), a venomous serpent of the rattlesnake family, furnished with loral plates on the head, but without rattles. When full grown it is about three feet long, of a light copper color, with darker transverse bars. It has many local names, is nowhere abundant, but is more common in the Southern than in the Northern States. Its bite is much dreaded and often fatal.

Copperhead, a name which was applied to a party in the Northern States of America supposed to favor the secessionists during the civil war which divided the U. S. from 1861 to 1865. The epithet was given because this party was regarded as an insidious and secret foe to the Union.

Copper-Mines. See MINES AND MINING, by PROF. F. L. VINTON, E. M.

Copperop'olis, a post-village of Calaveras co., Cal., 36 miles E. by N. from Stockton. Here is the Union copper-mine, one of the richest in the State. Gold also is found in the vicinity. It is on the Stockton and Copperopolis R.R.

Copper-Smelting. See METALLURGY, by PROF. J. A. CHURCH, E. M.

Copp's Creek, a township of Barry co., Mo. P. 984.

Cop'rolite [from the Gr. κόπρος, "dung," and λίθος, a "stone"], a name given to the fossil excrement of animals. It was originally applied by Dr. Buckland to certain deposits which he found in the lias, and determined to be the fœcal remains of the gigantic saurians of that period. The term has since come into universal use, owing to the discovery of similar large deposits in rocks of various ages. The true coprolites of the lias are formed like kidney potatoes, of earthy texture, black or ash-gray color, and glassy fracture. They are twisted, showing the mark of the intestine. They are generally found in heaps in particular parts of the deposit. Besides the coprolites of the lias, phosphatic nodules bearing the same name, but far more abundant, have been found. The value of these minerals is derived from the phosphate of lime of which they are partly composed. It is used with great advantage as mineral manure, after having undergone cheap chemical treatment. It is converted into a soluble superphosphate by the action of sulphuric acid. The trade in Great Britain is of great importance, and the production large. Some specimens yield when washed and powdered over 85 per cent. of phosphates. The greensand varieties yield about 60 per cent. of phosphates. The annual yield of England is from 30,000 to 40,000 tons. These coprolites contain from 4 to 5 per cent. of organic matter and a little silica, but from 70 to 80 per cent. of their whole substance is a mixed phosphate and carbonate of lime. Coprolites are not very abundant in the U. S.

Copse, or **Cop'pice** [from the root of the word *chop,* and the Gr. κόπτω, to "cut"], a name given in Great Britain to plantations of trees which are occasionally cut down for firewood, charcoal, or other purposes. There is considerable rough and rocky land in that country which yields more profit as copse-wood than by any other plan. Hop-poles, hoops, tanner's bark, etc. are among the products of copses.

Copt [Arabic, *Ghipt* and *Koobt;* Coptic, *Kibt;* Fr. *Copte* or *Cophte;* Ger. *Kopt;* probably derived from the root of the last syllable of *Egypt.*] The Copts are a Christian people of Egypt, descended from the ancient inhabitants of that country, whose blood, however, is mingled with that of Greeks, Arabs, Nubians, etc. According to an official estimate in 1868–69 they then numbered 500,000. They are largely employed as clerks and government functionaries, while others are merchants and mechanics, and some are peasants. All Copts but the very poorest class have the title of *moallim* ("instructors").

The Coptic Church is monophysite, holds seven sacraments, of which prayer and faith are two, practises trine immersion of infants, and also circumcises male children. The liturgy is in the Coptic language, which few even of the priests understand. Rosaries of beads are used in prayer. Cymbals are employed in public worship. This Church, with that of Abyssinia, is under the Coptic patriarch of Alexandria, who, however, since the eleventh century, has resided in Cairo. It has also thirteen dioceses, one of which, Khartum (embracing all Nubia), was established in 1834. The Copts are extremely intolerant towards Christians of other churches, except the Syrian Jacobites and the Abyssinians.

Besides the above are the United Copts, who are Roman Catholics of the Eastern rite. They are nominally under the patriarch of Alexandria, who resides at Rome and is of the Latin rite. They are governed by a vicar-apostolic, and number about 12,000.

The Greek Copts (Coptic Melchites) are under a patriarch of Alexandria and four nominal bishops. They are few in numbers. Their patriarch bears the title of "Holy and blessed patriarch of the great city of Alexandria, of all Egypt, of Pentapolis, Libya, and Ethiopia, pope and œcumenical judge." That of the Coptic patriarch is "Most holy father, archbishop of the great city of Alexandria, of Babylon, of the Nomes of Egypt, and the Thebaid."

The American Presbyterian mission among the Copts has met with much success.

Cop'tic, a language supposed to be derived from the sacred language of ancient Egypt, with a pretty large admixture of Greek, and in its later form of Arabic words. It prevailed from the time of the Ptolemies till about the tenth century, when it was generally displaced by the Arabic, except in the monasteries. It had three chief dialects, the Memphitic, the Sahidic, and the Bashmuric. The Coptic literature consists to a great extent of homilies, the lives of saints, etc., with some Gnostic works and versions of the Scriptures.

The Coptic letters are chiefly taken from the Greek, though they have added to the Greek alphabet a number of characters representing sounds not found in the classic languages; among these may be mentioned one for *kh,* one for *sh,* and one for *j.* (Those seeking further information on this subject are referred to the Egyptian grammar of the celebrated Champollion, and Peyron's and Benfey's grammars of the Coptic language; to which may be added Quatremère's "Critical and Historical Researches on the Language and Literature of Egypt," 1808.)

Cop'ula [a Latin word signifying a "band"], in logic, is that part of a proposition which affirms or denies the predicate of the subject, or the word which unites the two notions of a sentence—viz. the subject and the predicate. In the sentence, "Art is long," *is* forms the copula.

Cop'way (GEORGE), a chief of the Chippeway tribe of Indians, published the "Acts of the Apostles" (in 1838), an autobiography, a "History of the Ojibway Nation" (1851), and other works.

Cop'y [probably from the Lat. *copia,* "plenty," "abundance," because by multiplying copies of it a work ceases to be a rarity], in the fine arts, a transcript of an original work, a reproduction of a picture or statue by another artist. A copy made by the original artist is called a duplicate, replica, or repetition; in French, a *doublette.* A copy of a statue or other piece of sculpture taken from a mould is called a *cast.*

COPY, in printing, is the subject-matter to be printed, whether it be an original work in manuscript or reprint; in

the first case it is termed *manuscript copy* or written copy; in the second, *printed copy*.

Copyright. See LITERARY PROPERTY, by PROF. T. W. DWIGHT, LL.D.

Coqua'go, the main branch of the Delaware River, rises in the Catskill Mountains in New York. It flows first south-westward, and then south-eastward, until it unites with the Popacton at Hancock, on the line between New York and Pennsylvania. Length, nearly 100 miles.

Coquerel (ATHANASE LAURENT CHARLES), a Protestant minister, born in Paris Aug. 27, 1795. He preached in Paris, and gained distinction as a pulpit orator. In 1848 he was a moderate republican member of the Constituent Assembly. Among his works is "Modern Orthodoxy" (1842) and many volumes of sermons. He was liberal in theology. Died Jan. 12, 1868.—His son ATHANASE became an eminent Protestant pulpit orator, and the leader of the liberal party that seceded when a schism occurred in the Protestant synod in June, 1872.

Coquil'la-Nuts [Sp. *coquillo*, a diminutive of *coco*, "cocoa-nut"], the seeds of *Attalea funifera*, a South American palm. The shells of the seeds or nuts are hard, have a close texture, and are susceptible of a fine polish. This shell is much used in turnery for the heads or handles of umbrellas, for toys and ornamental articles.

Coquim'bo, a province of Chili, is bounded on the E. by the Andes and on the W. by the Pacific Ocean. Area, 19,113 square miles. It contains mines of copper and other metals. Capital, Coquimbo. Pop. in 1870, 159,698.

Coquimbo, or **La Serena,** a seaport-town of Chili, capital of the above province, is on the Coquimbo River near its mouth. It has a good harbor, six or seven miles distant, brick houses with gardens, and a serene climate. Copper, gold, and silver are exported from it. Pop. 7138.

Co'ra, an ancient city of Italy, in Latium, about 36 miles S. E. of Rome. Livy mentions it as being a *colonia Latina* in 503 B. C. Few cities of Latium have more considerable remains of antiquity than Cora. Here are relics of ancient walls built of massive polygonal blocks. The site is now occupied by the town of *Cori*.

Cor'acoid Bone [from the Gr. κόραξ, a "crow," and εἶδος, "form," "resemblance," referring to some fancied resemblance between the coracoid process and a crow's beak], a bone which exists in the skeleton of most birds, of the saurians and chelonians, and also in monotrematous mammals. In the higher mammals it exists as the *coracoid process* of the scapula or shoulder-blade. In transcendental anatomy it has been considered as the hæmapophysis of the fourth (occipital) cephalic vertebra. In birds the coracoid bone is firmly articulated with the sternum on the one side and the scapula on the other, and gives attachment to certain muscles used in flying.

Coracoid Process. See CORACOID BONE.

Cor'al [Gr. κοράλλιον, said by some to be derived from κόρη, a "maiden," and ἅλς, the "sea," *i. e.* "daughter of the sea;" Lat. *corallum;* Fr. *corail;* Ger. *Koralle*], a hard, stony, or calcareous substance, chiefly of marine origin, consisting of the aggregate skeletons of various polyps (alcyonarians, actinarians, and madrepores), and of certain tabulate acalephs, all belonging to the Cuvierian subkingdom Radiata.* The number of species is very great, and the variety of forms and hues is almost endless. Many of them rival in beauty the finest flowers. Carbonate of lime constitutes their principal chemical ingredient. Many kinds are found along the American coasts of the Atlantic and Pacific, especially about the West Indies and Florida (which, with its reefs, is based upon coral), and along parts of the coast of Brazil, where the reefs are very dangerous to navigation; but it is in the Pacific and Indian oceans that the coral formation is most important. Among the more remarkable kinds may be mentioned the red coral (*Corallium rubrum*) of the Mediterranean and Red Sea, which is of value in the manufacture of ornaments; the still more valuable black coral (*Antipathes*); the *Millepora*, etc. (produced by acalephs, and not by polyps); the tree corals; the Meandrinæ, etc., called brain corals, the Astræas or star corals, the Madrepores, and many others.

Red Coral.

* Nothing could be more incorrect than the name "coral insects" often applied to these animals; and it is scarcely correct to speak of them as "builders" of reefs and islands; for instead of working, like the bee in building her cells of wax, the coral is a part of the growth of the polyp, which the latter no more builds than the oak tree builds its own wood. It is also incorrect to speak of the coral as the "home" of these little animals, for the coral is wholly produced inside the polyp, somewhat as bones grow in the higher animals.

Cor'al, a township and post-village of McHenry co., Ill. Pop. of township, 1345.

Coral Islands are among the most striking phenomena of the tropical seas. Whitsunday Island, in the Low Archipelago in the midst of the Pacific, may serve as an example. Rising a few feet above the surface of the ocean, it forms a narrow unbroken ring, nearly circular, which surrounds a central lagoon of shallow water. When approaching it from the windward side, the voyager first perceives the line of angry surf breaking on the white beach of coral sand, in strong contrast with the deep-blue color of the sea. Behind, a garland of luxuriant verdure, its tropical forms enhanced by the noble cocoa-nut palm, extends around the island, enclosing the quiet waters of the lagoon; beyond, the broad ocean again. The island of Natupe, in the same archipelago, is likewise unbroken, but elongated and much larger, the longer axis measuring some twelve miles. Usually, however, the ring is broken by numerous channels, affording entrances into the lagoon, and transforming the ring into a circular line of islands enclosing the lagoon. Such a group is called an *atoll*, a local name in the East Indies, which has been adopted to designate these curious structures. Soundings have proved that the lagoon is always shallow, seldom exceeding a few scores or hundreds of feet in depth, while outside of the atoll the depth rapidly increases to thousands of feet at a short distance from the shore, showing that such an atoll is only the top of a large submarine mountain. Atolls are often clustered together in great numbers, and form archipelagoes. That of Paumotu, or Low Archipelago, counts eighty coral islands, having nearly all central lagoons. The Caroline (together with the Tarawan and Marshall) Islands contain eighty-four atolls. The Laccadives and Maldives are two long series of atolls, in a double row, stretching 800 miles from north to south, from the south-western extremity of India, and continued still farther south in the Chagos Archipelago. The chief of the Maldives calls himself the sultan of the Twelve Thousand Isles, and Admiral Owen says that, counting the single islands in the atolls, this is no exaggeration.

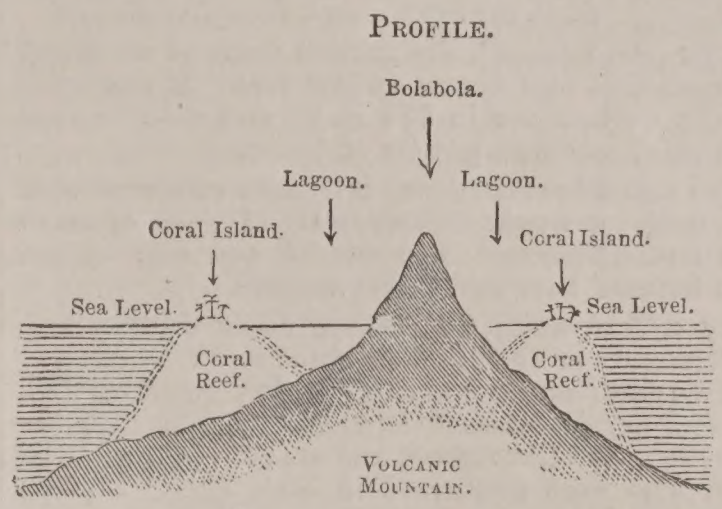
The low islands are associated with the high in a peculiar and very interesting way. A large number of volcanic islands in the Pacific are girdled by coral reef, forming either a fringe near the shore or a barrier around the island at a distance in the sea, leaving between a lagoon often miles broad, and communicating with the outer ocean by deep channels. Bolabola, one of the Society Islands, offers a beautiful example of such a combination. From its high volcanic top the eye, stretching over the quiet waters of the surrounding lagoon to the outer garland of green islands which separates it from the ocean beyond, beholds a spectacle as strange as it is lovely. Tahiti, in the same group, Hogoleu and Pouinipete Islands in the Carolines, and many others, show the same arrangement, which, in fact, differs from an atoll only in having the centre of the lagoon occupied by one or more mountain-tops.

The mode of formation of the coral islands readily explains all these peculiarities. Coral reefs are the work of minute marine animals called polyps which live in countless numbers in the tropical seas. Their structure is of the simplest kind. It is a cylindrical skin with an inside sac, the stomach, and a central opening surrounded by thread-like appendages on the top, which is the mouth, the lower end being attached to the ground. When expanded the animal resembles a flower in form and beauty of color. Between the two skins the coral substance, which is limestone, is secreted, as are the bones in the higher animals. Polyps multiply not only by eggs, but also by budding, like plants, and grow into large societies, in which generation succeeds generation, each leaving behind the solid limestone secreted by the living animal. Thus masses of organized rock are formed, which gradually expand and accumulate upward into a solid wall or reef, reaching the level of low tide. Soon, however, the process of disintegration begins. The more brittle branching corals which abound near the surface are easily broken and crushed by animals feeding on them. Boring shells and small sponges penetrate the solid reef and disintegrate it. Tidal currents and surging waves do their part in the work of destruction, and taking hold of these débris and of the coral sand, throw them on the top of the reef, thus forming the soil of an island which rises to eight or ten feet above the water, but rarely reaches fifteen feet.

Seeds of a few plants which from their hardy nature

escape being spoiled by sea-water are transported by the waves and washed on the shore, or are brought by birds, and under the influence of the warm and moist climate soon grow into a luxuriant vegetation. Variety, however, is wanting, as hardly more than a score of species compose the whole flora. Pandanus trees, and especially the majestic cocoa-nut palms, are the most characteristic ornaments as well as the most useful representatives of the vegetable kingdom in the coral islands.

Bolabola, with Barrier, Reef, Lagoon, and Coral Islands.



But all the conditions necessary for the formation of such an island do not exist in every part of the reef. Some portions remain covered by a shallow sea, which breaks in long, white lines over the invisible barrier. In others the reef is interrupted by deep channels, due to strong tidal currents or to the depth of the sea, which deprives the animals of a proper foundation for their structure, for it has been ascertained that the reef-building polyps cannot live in a depth greater than 100 or 120 feet. The coral reefs, therefore, cannot start from deep water; they need a foundation near the surface, and they find it in submarine mountain-peaks and volcanic cones which form most of the high islands. Growing upward, they repeat at the surface the outlines of the mountain-slopes on which they rest. To this cause the circular form of the atolls and barrier reefs is to be ascribed, and not to any organic law or instinct of the polyps, as was formerly believed, or to their situation on the brim of subaqueous craters.

The formation of the fringing reefs offers no difficulty; but it is not easy to understand why the barrier reefs are so far removed from the islands they surround. This fact, however, has been satisfactorily explained by Darwin. Having found by soundings that the base of the barrier reefs reaches sometimes as low as a thousand or fifteen hundred feet, while it is known that the polyps cannot live at such a depth, he justly infers that the mountains on which they stand have gradually sunk since the structure was begun. During the sinking process the reef, growing perpendicularly to the water's edge, preserves its form and extent, while the island is growing smaller and the surrounding lagoon larger at every step. Finally, the mountain disappearing, the growing reef becomes an atoll with an empty lagoon. Dana's extensive observations entirely confirm this view.

However full of interest and strange beauty the coral islands may be, they offer but scanty resources for man's support. They are still more deficient in means for the higher culture which is the true end of man's existence. With only one kind of rock and no metal for tools; a land without mountains, valleys, or rivers, the arable portion of which is hardly the hundredth part of its area; with a flora reduced to a few species, a fauna wanting in all large animals,—man in that isolated domain, depending for food upon the cocoa-nut and the animals of the sea, has indeed but a poor chance. Starvation, but too frequent, engenders infanticide, war, and cannibalism—evils which intercourse with civilized nations can partially prevent, but Christianity alone radically cure. ARNOLD GUYOT.

Cor'alline [so called from their resemblance to the corals, to which they were formerly referred], the name of certain plants classed with the red algæ, and usually referred to the order Corallinaceæ. They constitute the genus *Corallina*, and several other genera. These plants differ from all others in being of a rigid, stony character, and from the presence (in most species) of a large proportion of carbonate of lime. They are not abundant on our Atlantic coasts, but probably are of much more frequent occurrence in the Pacific. Their fructification and botanical characters are not well known. They occur abundantly as fossils. The *Corallina officinalis* is common on the northern shores of Europe, and also occurs on the Atlantic coast of British America and the U. S. The name coralline is often given to various marine polyps, but should be restricted to coral-like plants.

Cora'to, a town of Italy, in the province of Bari, 24 miles W. of Bari, is situated in a fertile plain. It has a fine church, several convents, and an orphan asylum. Pop. in 1871, 26,220.

Coray, or **Koray** (DIAMANT), [Gr. Ἀδαμάντιος Κοραῆς], a Greek philologist and patriot, born at Smyrna April 7, 1748. He studied medicine at Montpellier, in France, and became a resident of Paris in 1788. To promote the regeneration of Greece and the revival of the Greek nationality, he published editions of ancient Greek authors and wrote several political tracts. He was eminent as a Hellenist. Died April 6, 1833.

Corbaux (FANNY), an English painter and author, born in 1812, the daughter of a well-known statistician. She painted portraits and historical pieces with success, and wrote on Hebrew archæology.

Corbeil, a town of France, department of Seine-et-Oise, on the river Seine and on a branch of the Paris and Orleans Railway, 18 miles S. S. E. of Paris. It has a public library, a theatre, and a corn-hall. It sends flour to Paris. Pop. 5541.

Cor'bel [from the Fr. *corbeille*, a "basket;" Fr. *corbeau*], in architecture, a projecting bracket, often sculptured like a modillion, sometimes in the form of a basket, for the purpose of supporting a superincumbent object or for receiving the springing of an arch. A corbel-table is a projecting battlement, parapet, or cornice resting on a series of corbels.

Cor'bin (THOMAS G.), U. S. N., born Aug. 13, 1820, in Virginia, became a passed midshipman in 1844, a lieutenant in 1852, a commander in 1862, and a captain in 1866. He served as executive officer of the steam-frigate Wabash at the battle of Port Royal, Nov. 7, 1861, and is thus honorably mentioned by Flag-Officer Dupont in his official report of that battle: "I had also an opportunity to remark the admirable coolness and discrimination of the first lieutenant, T. G. Corbin. The good order, discipline, and efficiency, in every respect, of this ship are, to a great extent, the results of his labors as executive officer, and they were conspicuous on this occasion." Referring to the same action, Commander C. R. P. Rodgers writes: "It remains only for me to speak of the executive officer, Lieutenant Corbin, who has filled that post since the Wabash was commissioned. The admirable training of the crew may, in a high degree, be attributed to his professional merit; and his gallant bearing and conspicuous conduct throughout the whole action were good illustrations of the best type of a sea-officer."

FOXHALL A. PARKER, U. S. N.

Cor'bulo (CN. DOMITIUS), an able Roman general who flourished under Claudius and Nero. He commanded the Roman army in a war against the Parthians, whom he defeated. Nero, who was jealous of him, ordered him to be put to death in 67 A. D.

Cor'coran, a post-township of Hennepin co., Minn. Pop. 914.

Corcoran (MICHAEL), a brigadier-general of U. S. volunteers, born in Carrowkeel, Ireland, Sept. 21, 1827, died Dec. 22, 1863. He emigrated to this country in 1849, and settled in New York City. At the commencement of the civil war he departed for Washington with his regiment,

the Sixty-ninth New York, and participated in the first battle of Bull Run, where he was taken prisoner and confined at Richmond, Va., and Charleston, S. C., nearly a year. On being exchanged he organized the Corcoran Legion, and was made a brigadier-general of volunteers, to date from the day of his capture, July 21, 1861. He was thrown from his horse near Fairfax Court-house, Va., Dec. 22, 1863, and fatally injured, never again recovering consciousness. G. C. SIMMONS, *Clerk Board of Eng'rs.*

Corcy'ra [Gr. Κόρκυρα], the ancient name of an island in the Ionian Sea, now CORFÙ (which see). It was colonized by the Corinthians in 734 B. C., and soon became one of the chief maritime powers of Greece.

Cord [so called because it was originally measured with a cord or line] (of wood) is a quantity of wood equal to 128 cubic feet. Firewood is measured and sold by the cord; also tanners' bark and stable manure.

Corday d'Armans, de (MARIE ANNE CHARLOTTE), born in Normandy in 1768, and educated in a convent, was pious, intellectual, and enthusiastic. Her features were beautiful and her deportment dignified. She favored the popular cause in the Revolution, and sympathized with the Girondists, who were proscribed in May, 1793. Having resolved to kill Marat for the public good, she came to Paris, and with much difficulty obtained admission to his house. She found him in a bath, and plunged a knife into his heart July 13, 1793. She was guillotined a few days after this event. "In beholding her act of assassination," says Lamartine, "history dares not applaud; nor yet, while contemplating her sublime self-devotion, can it stigmatize or condemn." (See CHÉRON DE VILLIERS, "M. A. Charlotte de Corday d'Armans, sa Vie, etc.," 1865.)

Cordeliers', or **Cord-wear'ers** [from Old French *cordel,* a "cord" or "rope," so called from their girdles of knotted cord], a minor order of Franciscan or Gray Friars, was founded by Saint Francis of Assisi in 1223, and was sanctioned by Pope Honorius III.

Cordeliers' Club, a society of republicans formed at Paris in Dec., 1790, received this name because their meetings were held in a chapel which had been built by the Cordeliers. Danton was the first president, and among the more celebrated members were Marat, Camille Desmoulins, and Hébert. The Cordeliers clamored for the death of the king in 1793, and in conjunction with the Jacobins conspired for the overthrow of the Girondists in the same year. The society was dissolved in 1794.

Cordia'ceæ, a natural order of exogenous trees and shrubs, mostly natives of tropical countries. They have a drupaceous fruit, an inverted embryo, and plaited cotyledons. They are generally referred to the Boraginaceæ. The order comprises several species of *Cordia,* one of which produces the sebesten plum. The *Cordia bullata* grows in Florida, and is cultivated as an ornamental tree. This genus takes its name from Cordus, a German botanist (1515–44).

Cordille'ra, a Spanish word signifying a "mountain-chain." (See ANDES, by PROF. A. J. SCHEM.)

Cor'don, a word of French origin signifying a string, a line, or band, applied in fortification to the coping of the escarpment or inner wall of the ditch. It usually projects one foot over the masonry of the scarp. A line of troops placed round a town or tract so as to prevent ingress and egress is also called a cordon.

Cór'dova, a province of Spain, is bounded on the N. by Badajos and Ciudad Real, on the E. by Jaen, on the S. by Malaga, and on the S. W. and W. by Seville. It is intersected by the Guadalquivir. The surface in some parts is mountainous. Area, 5189 square miles. Capital, Córdova. Pop. 379,464.

Cordova [Span. *Cordoba,* or *Çordova;* anc. *Colonia Patricia*], a city of Spain, capital of the province of its own name, is situated in a plain on the river Guadalquivir, 71 miles N. E. of Seville, with which it is connected by a railway. The river is here crossed by a noble stone bridge of sixteen arches built by the Moors in the eighth century, and defended by a Saracenic castle. The cathedral, which was originally a beautiful Mohammedan mosque, founded in 786 A. D., presents in the interior a labyrinth of columns of many orders and materials, brought from various ancient temples. Cordova contains a bishop's palace, three colleges, a city-hall, and numerous hospitals. It was formerly noted for the preparation of goat leather, called *cordovan.** Here are manufactures of silk fabrics, paper, silver-ware, hats, etc. The ancient *Corduba,* sometimes called *Patricia,* built 152 B. C. by the Romans, was second only to Gades among the cities of Hispania, and the birthplace of the two Senecas, of the poet Lucan, and of the Arabic physician Averroes. This place was captured by the Moors in 672 A. D., after which it was for several centuries the splendid capital of the Western caliphs. In the tenth century it contained nearly a million inhabitants and 300 mosques. In 1236 it was taken and almost destroyed by Ferdinand III. of Castile. Pop. in 1860, 35,606.

*From this word are derived the old English *cordwainer* and the French *cordonnier,* a "shoemaker."

Cordo'va, a township and post-village of Rock Island co., Ill. The village is on the Western Union R. R., 22 miles N. E. of Rock Island. Total pop. 935.

Cordova, a post-township of Le Sueur co., Minn. Pop. 539.

Cór'dova, a town of Mexico, about 50 miles W. S. W. of Vera Cruz. It is well built, and has an active trade in sugar, coffee, and tobacco; also manufactures of cotton and woollen fabrics. Pop. about 7000.

Córdova, a province of the Argentine Republic, is bounded on the N. by Santiago del Estero and Catamarca, on the E. by Santa Fé and by the territory of the Indians, and on the W. by Rioja and San Luis. It is traversed by the Sierra de Córdova, from which flows the principal river of the province, the Tercero, an affluent of the Paraná. The province is celebrated for its superior pastures. Area, 58,999 square miles. Capital, Cordova. Pop. in 1869, 210,508.

Córdova, capital of the above province, on the river Primero, 387 miles N. W. of Buenos Ayres. It has a fine Gothic cathedral and a university. Córdova exports hides and wool to Buenos Ayres. Pop. in 1869, 28,523.

Cor'dova (JOSÉ), a South American general, born at Antioquía, in Colombia, in 1797. He served under Bolivar in 1820, and fought against the Spaniards at Ayacucho in 1824. Having revolted against Bolivar, he was defeated and killed Oct. 17, 1829.

Cordova, de (FERNANDO FERNANDEZ), a Spanish general, born at Madrid in 1792. He was an opponent of Espartero in 1841, and became captain-general of Cuba in 1851. He was driven into exile by the revolution of July, 1854, and returned to Spain in 1856.

Core'a [native *Gaolee* or *Gauli;* Chinese *Kowlee;* Japanese *Koorai*], a kingdom tributary to China, is the peninsula situated S. of Manchooria, between 34° and 43° N. lat. Its area is 87,764 square miles, and population about 9,000,000. It is bounded on the N. by the rivers Ya-Loo and Tunmen, and the mountain Pe-Ten-Shan. Principal capital, Siool. The Hang-Kiang rises in the mountains and flows into the Yellow Sea. On the southern and western sides are numerous small islands. The climate on the eastern coast and among the mountains is inclement. In the lower parts of the western region and in the valleys of the southern provinces the climate is mild and the soil fertile, producing cotton, rice, fruit, wine, tobacco, etc. The sides of the mountains are rich in vegetation and covered with fine timber. The country abounds in gold, and iron is found in considerable quantities. Silver and copper also abound. The forests abound in wild-boars, tigers, sables, etc. The inhabitants are rude and warlike, and are feared as pirates. Polygamy is general, and a corrupt Booddhism is the prevailing religion. The language is Mongolian in its origin. In 1857 there were 15,200 who professed Catholicism, but the missionaries of that faith have suffered much persecution. The principal exports are cotton fabrics of excellent quality, ginseng, tiger-skins, oxen, etc. The government is virtually an absolute monarchy; the army is in an imperfect condition; the navy consists of twenty-one larger and ninety-two smaller ships of war. Corea is divided into eight provinces. The inner part of the country is but little known. Foreigners are not allowed to land in the country. In 1871 the U. S. sent an expedition against Corea to avenge the murder of the crew of a merchantman (the General Sherman). Fort Condé was bombarded, and taken with little loss on the side of the Americans.

Core'lla, a town of Spain, in Navarre, on the Alama, 13 miles W. of Tudela. It has several oil-mills and liquorice-factories. Pop. 5023.

Corel'li (ARCANGELO), an Italian musician and composer, born near Imola Feb., 1653. He produced, besides other works, "Concerti Grossi" (1712). Died Jan. 18, 1713.

Coreop'sis [from the Gr. κόρις, a "bug," and ὄψις, "appearance"], a genus of herbaceous plants of the natural order Compositæ, is named with reference to the form of the fruit. It has neutral ray florets and a double involucre. Many species of this genus are natives of the U. S., and are popularly called tickseed. The *Coreopsis tinctoria* grows wild in the plains beyond the Mississippi, and is commonly cultivated in gardens for the beauty of its flowers, which are yellow with a brown-purple centre.

Corfù, or **Korkyra,** one of the thirteen nomarchies into which the kingdom of Greece was in 1872 divided. It embraces the islands of Corfù, Paxo, Leucadia, and several smaller islands. Area, 427 square miles. Pop. in 1871, 96,940.

Corfù [an Italian corruption of Κορυφώ, the Byzantine name for the island, from the two "peaks" (κορυφαί) on which the citadel stands; modern Gr. Κορφοί; anc. *Corcyra*], one of the Ionian Islands, belonging since Mar. 29, 1864, to the kingdom of Greece, is separated from Albania by a channel which varies in breadth from two to twelve miles. It is 38 miles long, and has an area of 227 square miles. Pop. in 1871, 75,466. The surface is hilly and picturesque, the highest points being about 3000 feet above the sea. The soil is very fertile. Olive oil is the chief article of export. Capital, Corfù. The people of ancient Corcyra waged war against Corinth. A naval battle which occurred between these powers in 665 B. C. is mentioned by Thucydides as the first sea-fight on record. Corcyra was in alliance with the Athenians in the Peloponnesian war.

Corfù, a fortified seaport-town, capital of the above island, is on the E. coast, 10 miles S. W. of Butrinto; lat. 39° 37′ N., lon. 20° 6′ 2″ E. It has a safe and convenient harbor, and is defended by a citadel and two castles. It has a university founded in 1823, a cathedral, and numerous Greek and Roman Catholic churches, and a lighthouse. An archbishop of the Greek Church resides here. Corfù stands near the site of the ancient town of *Corcyra*. Pop. in 1871, 15,452.

Cor′fu, a post-village of Pembroke township, Genesee co., N. Y. It is a station on the New York Central R. R., 12 miles W. by S. of Batavia.

Coriglia′no, a town of Italy, in Cosenza, is 4 miles from the Gulf of Taranto and about 28 miles N. E. of Cosenza. It has a fine castle, and manufactures of woollen cloth and soap. It is near the site of the ancient *Sybaris*. Pop. 10,624.

Corin′na [Gr. Κόριννα], a celebrated Greek lyric poetess, born at Tanagra, in Bœotia, flourished about 500 B. C. She is said to have instructed Pindar in the art of poetry, and she was a successful competitor of that poet in five poetical contests. Only small fragments of her works are extant.

Corinna, a township and post-village of Penobscot co., Me. The village is on a branch of the Maine Central R. R., 20 miles S. of Dover. It has four churches, an academy, a library association, and manufactures of lumber, boots and shoes, etc. Total pop. 1513.

Corinna, a post-township of Wright co., Minn. P. 220.

Corinne, a city of Box Elder co., Ut., on the Central Pacific R. R., and on the W. bank of the navigable Bear River, 8 miles from its mouth and 80 miles N. of Salt Lake City. It has a large trade with Montana and Idaho, some manufactures, two banks, and one daily paper. The surrounding region is pastoral and agricultural. Pop. 783.

Cor′inth [Lat. *Corinthus;* Gr. Κόρινθος], an ancient and celebrated city of Greece, on the Isthmus of Corinth and near the *Sinus Corinthiacus* (Gulf of Lepanto), about 50 miles W. by S. from Athens. The isthmus is a sterile plain enclosed on several sides by mountains. It is subject to frequent earthquakes. Corinth commanded all the passes between the Peloponnesus and Northern Greece. It had a very favorable position for commerce, and seemed to be destined by nature to be a great maritime power. In consequence of its position it formed the most direct communication between the two principal Grecian seas—the Ionian and the Ægean—and became the emporium of the trade between the East and the West. It was one of the most populous cities of Greece. Its early history is obscure and mixed with fabulous legends. The family of the Bacchiadæ ruled here from 747 to 657 B. C. The Corinthians founded the colonies of Corcyra and Syracuse in 734 B. C. Periander, one of the Seven Wise Men of Greece, became tyrant (prince) of Corinth about 625 B. C., and reigned forty-four years. Soon after his death Corinth became an ally of Sparta, and was ruled by an oligarchy. The Corinthians were defeated by the Athenian general Myronides in 457 B. C. As the ally of Sparta, Corinth fought against Athens throughout the long Peloponnesian war (431–404 B. C.). In 395 B. C. Corinth united with other Greek states in a war against the Spartans, who defeated the allies in several battles. This war, called the Corinthian war, was ended by the peace of Antalcidas in 387 B. C., and Corinth then returned to the alliance with Sparta. Timophanes attempted to make himself tyrant of Corinth, but he was killed by his brother Timoleon in 344 B. C. The battle of Chæronea (338 B. C.) rendered Philip of Macedon master of Corinth, which was subject to his successors until it was annexed to the Achæan league in 243. At this period Corinth was the richest and most luxurious city of Greece, and abounded in statues, paintings, and other works of art. The patron-goddess of Corinth was Aphrodite (Venus), who had a splendid temple on the Acrocorinthus. The numerous fine temples which the wealth of the Corinthians enabled them to erect gave an impulse to architecture, and the most elaborate order of ancient architecture derived its name from Corinth, which was one of the principal seats of Grecian art, but produced no eminent poets or orators.

Having been captured by the Roman consul Mummius in 146 B. C., Corinth was pillaged by his army, and nearly destroyed by fire. The most valuable works of art were carried to Rome. It remained in ruins for a century, and was rebuilt in the year 46 by Julius Cæsar, who planted there a colony of his veterans and freedmen. It soon rose again to be a populous and prosperous city, which was called *Colonia Julia Corinthus.* Saint Paul preached here, and founded a Christian church, to which two of his Epistles were addressed. Pausanias, who visited it between 150 and 200 A. D., says that it contained many things worthy of notice, some being the relics of the ancient city, but the greater part executed in the flourishing period after it was rebuilt by Cæsar. The principal monument of antiquity now remaining here is the citadel, built on a hill called Acrocorinthus, which rises 1886 feet above the level of the sea, and is abrupt and isolated. The view from its summit is singularly magnificent, and comprehends a greater number of celebrated objects than any other in Greece. The Parthenon of Athens is distinctly seen at a distance of nearly fifty English miles. According to Col. Mure, "Neither the Acropolis of Athens nor the Larissa of Argos, nor any of the more celebrated mountain-fortresses of Western Europe can enter into the remotest competition with this gigantic citadel. It is one of those objects, more frequently perhaps to be met with in Greece than in any other country of Europe, of which no drawing can convey other than a very faint notion." Among the few relics of the Greek city are seven Doric columns of a temple standing on the western outskirts of the modern town. These are five feet ten inches in diameter. Lechæum, the port of Corinth, on the Sinus Corinthiacus, was nearly one mile and a half from the city. The site of Corinth is occupied by a small town which the natives call *Gortho.* It was severely injured by an earthquake in Feb., 1858. Pop. in 1861, 4248.

Corinth, a post-township of Penobscot co., Me. Pop. 1462.

Corinth, a post-village, capital of Alcorn co., Miss., is at the junction of the great lines of railroads connecting the Atlantic with the Mississippi and Gulf of Mexico, and the key of the system of Mississippi and Tennessee railroad communications. It has two weekly newspapers. P. 1512.

After the battle of Shiloh, April 6–7, 1862, the Confederate army retreated to Corinth. The national army being reorganized and strongly reinforced, Halleck, who had arrived and taken command, slowly advanced on Corinth by regular approaches, arriving May 21 to within 3 miles of the place, expecting to meet with an obstinate resistance; but Beauregard, deeming it impossible for him to successfully resist, commenced (May 26) secretly evacuating, and by the 29th had removed or destroyed everything of value, retreating with his army southward to Tupelo. Halleck occupied Corinth May 30, and pursuit was given to the Confederates, but without overtaking them.

After his defeat at Iuka, the Confederate general Price retreated to Ripley, Miss., where he was joined by Gen. Van Dorn, raising the force to about 30,000, Van Dorn assuming command, and an attempt to take Corinth by surprise or force was determined upon. This movement began Oct. 2.

Gen. Rosecrans was now in command at Corinth with 20,000 men; to the former extensive line of defences inner lines had been added. Grant's head-quarters were at Jackson, Tenn., Ord's division was at Bolivar.

Van Dorn moved northward to Pocahontas on the Memphis R. R., thence down to Chewalla. Rosecrans, apprised of this advance, deemed it a feint on Corinth, and that the real object was to attack Grant or Ord, but to meet any emergency threw his forces well out to the west, in and beyond the outer line of fortifications; Hamilton on the right, Davies held the centre, McKean on the left. Col. Oliver, with three regiments, held a strong position in advance. Gen. Mansfield Lovell, with one division, held the Confederate right, Price, with Maury's and Herbert's divisions, the left, Maury's division forming the centre.

On the morning of Oct. 3, Lovell's division encountered Oliver's advance; Gen. McArthur was sent forward to develop the Confederate strength, and being vigorously attacked, was reinforced by four regiments from McKean's division. A determined fight was maintained till a successful charge between McArthur's right and Davies' left

forced him from the hill, with a loss of two guns, Davies giving ground a little also.

No doubt now existing as to the design of the Confederates, Rosecrans prepared to resist. He had barely withdrawn and rearranged his line when a furious attack on the centre forced Davies back a short distance, darkness closing the engagement.

On the morning of the 4th the attack was renewed. The advance, which was made in column by division, was subjected to a most severe direct and cross fire, sweeping it through and through; but, undismayed, the advance steadily continued, the men marching "with their faces averted, like men striving to protect themselves against a driving storm of hail." At last they reached the crest of the hill, and, charging the right centre, Davies' division gave way. Fort Richardson, and even Rosecrans' headquarters, were taken; but Rosecrans rallying the troops in person, the fort was retaken, and Hamilton's division advancing on the right, Price's column was shattered and driven in confusion.

Van Dorn's attack was intended to be simultaneous with that of Price, but the nature of the ground over which he had to advance delayed him, and, besides, he was confronted by two batteries (Williams and Robinett). His advance was, however, made, under fire of these two batteries, in the most heroic manner, by the Texas and Mississippi troops. Advancing within fifty yards of Battery Robinett through a murderous fire of grape and canister, they were met by an overwhelming musketry fire from the Ohio brigade, which drove them back to the woods. They were re-formed, and, returning to the charge, led by Col. Rogers, Second Texas, reached the ditch, only to be met again by the deadly fire of the Ohio brigade, which again broke them, and a charge was now made by the Eleventh Missouri and the Twenty-seventh Ohio, which pursued their scattered columns to the woods. By noon the battle was ended. The heroic bravery here displayed called forth the admiration of all. The remains of the gallant Col. Rogers, who fell at the ditch, were carefully buried in a separate grave by his late foe.

The national loss in this sanguinary conflict was 315 killed, 1812 wounded, and 232 prisoners. The Confederate loss was much greater.

Corinth, a post-township of Saratoga co., N. Y. It has manufactures of lumber, leather, etc. Pop. 1500.

Corinth, a post-township of Orange co., Vt., 25 miles S. E. of Montpelier. It has copper-mines and manufactures of linen, and is the seat of an academy. Pop. 1470.

Corinth, Gulf of, or **Gulf of Lepanto** (anc. *Corinthiacus Sinus*), an inlet of the Mediterranean, extends between Hellas proper, or Northern Greece, and the Peloponnesus (Morea). This gulf resembles a large inland lake. In beauty of scenery it equals or surpasses the most picturesque lakes of Northern Italy. "Its coasts," says Leake, "broken into an infinite variety of outline by the ever-changing mixture of bold promontory, gentle slope, and cultivated level, are crowned on every side by lofty mountains of the most majestic forms." It extends E. and W. nearly 80 miles, without including the part called the Gulf of Patras, which is connected with the other portion by a strait less than two miles wide.

Corinth, Isthmus of, a neck of land connecting Attica with the Morea, and separating the Gulf of Corinth from that of Ægina. Its width varies from four to eight miles. This isthmus was the scene of the celebrated Isthmian games and the site of a famous temple of Neptune. (See ISTHMIAN GAMES.) It has been proposed to cut a ship-canal through the isthmus.

Corin'thian Order. This order gets its name from Callicrates, a Corinthian architect, who was said to have invented it. It is more probable that it was an importation from Asia Minor. It was not generally used in Greece before the age of Alexander the Great, and the few examples remaining there do not agree sufficiently with one another to enable us to deduce rules from them for its construction. In these examples volutes are sometimes used with the acanthus leaf, as in the Choragic Monument of Lysicrates, and sometimes not, as on the Tower of the Winds. In one example found in Asia Minor the acanthus leaf is found combined with the ancient honeysuckle ornament. In the Choragic Monument the column rests upon a spreading base, while that of the Tower of the Winds has no base. The Romans greatly affected the Corinthian order, and brought it to perfection. Yet even with them it was not always the same thing, and there are more than fifty varieties of the Corinthian capital to be found either in Rome itself or in various parts of the Roman empire, all executed within the three centuries during which Rome continued to be the imperial city. From these various but not discordant examples the following general rules may be deduced: The capital resembles a vase covered with an abacus and surrounded by one tier of acanthus leaves above another, from amongst which stalks spring out, terminating in small volutes at the angles of the abacus and in the centre of each of its sides. The column is sometimes fluted,

Corinthian Capital.

as in the temple of Jupiter Stator in Rome, or as in the fine example here given from the Porta Aurea of Pola in Istria, and sometimes without flutings, as in the Pantheon. The flutings are separated by a fillet. The column stands upon a base. Its height varies from nine and one-third to ten and one-quarter times the diameter, and the capital from one to one and a half times. The entablature is variously decorated. The architrave is usually profiled with three fasciæ of unequal height, though sometimes there are only two. The frieze is often sculptured with foliage and animals, but it is sometimes left quite plain, as in the temple of Jupiter Stator. The cornice is richly decorated with modillions, dentils, and carving upon the mouldings. Among the principal remaining examples of the order at Rome are the temple of Mars Ultor and Jupiter Stator, and the Pantheon. The celebrated little temple at Nîmes in France, called the Maison Carrée, is a beautiful specimen of the Corinthian, though it probably owes its excellence to having been built by Greek hands. CLARENCE COOK.

Corinthians, THE FIRST EPISTLE OF SAINT PAUL TO THE, one of the canonical books of the New Testament, written from Ephesus in the spring of the year 57, to rebuke the church at Corinth for party spirit, disrespect to the apostle's authority, licentiousness, impropriety at public meetings (and especially at the Holy Communion), vanity, and self-seeking. The apostle also settles some cases of conscience as to eating idol-sacrifices, and a point of doctrine as to the resurrection.

THE SECOND EPISTLE OF SAINT PAUL TO THE CORINTHIANS. Before writing the first Epistle the apostle had sent Timothy to Corinth (1 Cor. iv. 17). Timothy probably brought back a bad report; Titus was then sent, and he reported discontent at the authoritative tone of the first Epistle. The second letter is a sober and conciliatory but earnest statement of the apostle's true and just authority. When he wrote he had reached Macedonia on his way to Achaia, late in the autumn of the year 57.

TWO APOCRYPHAL EPISTLES (OF THE CORINTHIANS TO SAINT PAUL, AND OF SAINT PAUL TO THE CORINTHIANS), existing in the Armenian, are worthless productions. English translations are to be seen in Whiston's "Authentic Records."

THE EPISTLE OF CLEMENT OF ROME TO THE CORINTHIANS has been regarded as spurious by some, but without sufficient reason, and its genuineness is now conceded. The so-called Second Epistle of Clement to the Corinthians is doubtless a part of the pseudo-Clementine Homilies, to which it is now generally referred.

Coriola'nus (CAIUS MARCIUS), an ancient Roman and patrician hero, who, according to tradition, received the surname *Coriolanus* because he defeated the Volsci at Corioli about 490 B. C. During a famine he advised that grain should not be distributed gratis among the plebeians unless they abandoned the right or privilege of electing tribunes of the people. For this offence he was banished. Having obtained command of a Volscian army, he marched against Rome, the citizens of which were unable to resist

him. He was at length appeased by a deputation of Roman matrons, led by his mother Veturia and his wife Volumnia. The story of Coriolanus forms the subject of one of Shakspeare's most celebrated dramas. (See ARNOLD, "History of Rome.")

Corip'pus (FLAVIUS CRESCONIUS), a literary man (*grammaticus*) who was born in Africa and flourished probably in the sixth century, is known as the author of an extravagant panegyric upon Justin the Younger, who was Byzantine emperor from 565 to 578 A. D., and of a poem called "Johannis," celebrating the exploits of Johannes, a proconsul in Africa in Justinian's time. It is believed by some, but without full evidence, that he was the same Cresconius who wrote large and important collections of the canon law, and who was an African bishop of uncertain age. Corippus was a writer of ability, and those parts of his work which are now perfect are highly prized. Much mystery formerly existed with regard to the authorship of his writings, but the discovery of a fairly preserved MS. in 1814 cleared away most of the difficulties which had beset this vexed question. The above works have been often reprinted.

Cork [from the Lat. *cortex*, "bark;" Sp. *corcho*], the bark of the *Quercus Suber*, a species of oak growing in Spain, Italy, and the south of France. The bark may be removed annually without injuring the tree. Cork is extensively used in the form of stoppers for glass bottles, and in the construction of life-preservers and life-boats. When rasped cork is digested in water and alcohol, it leaves about 75 per cent. of insoluble matter, called *suberine*. The cork tree has been introduced successfully in the Southern States, and cork might probably be grown there with profit.

Cork, the most southern county of Ireland, borders on the Atlantic Ocean. Area, 2873 square miles. It is drained by the rivers Blackwater, Lee, and Bandon. The surface is diversified, and presents picturesque scenery. The coast is deeply indented with several bays and inlets, which form excellent harbors. Among these are Bantry Bay and the harbors of Cork and Kinsale. The predominant rocks are old red sandstone and mountain limestone. Here are mines of copper and coal. Capital, Cork. Pop. in 1871, 516,046.

Cork, a city and river-port of Ireland, capital of Cork county, is on the river Lee, 11 miles from the sea and 136 miles S. W. of Dublin by rail. It is the third city of Ireland in population. It is partly built on an island of the river, which is here crossed by nine modern bridges. Many of the houses are built of limestone, red sandstone, and brick, and the main streets are wide and well paved, but the suburbs are mean. Among the principal edifices are the court-house, mansion-house, the exchange, a custom-house, a lunatic asylum, and an episcopal palace. It contains a Protestant and a Catholic cathedral and two large Roman Catholic churches, Queen's College, the Cork Library, a medical school, two or three theatres, a fever hospital, and several convents. Here are manufactures of glass, paper, gingham, iron, gloves, etc. Cork has a large, safe, and landlocked harbor, and derives much of its prosperity from commerce. It is connected by railway with Dublin and other cities. Steam-packets ply between this port and Dublin, Liverpool, Bristol, etc. Cork returns two members to Parliament. It is supposed to have been founded in the sixth century. It is regarded as a county by itself. Pop. in 1871, 78,382.

Cork, EARLS OF (1620), earls of Orrery (1660), Barons Boyle of Youghal (1616), Barons Broghill, Viscounts Kinalmealy, and barons of Bandon Bridge (Ireland, 1628), Barons Boyle of Marston, Somerset (Great Britain, 1711). —RICHARD BOYLE, ninth earl, K. P., P. C., master of the buckhounds, born April 19, 1829, succeeded his grandfather June 29, 1856.

Cork (RICHARD BOYLE), FIRST EARL OF, a British statesman, was born at Canterbury Oct. 3, 1566. He was made privy councillor for Ireland in 1612, raised to the peerage in 1616, became earl of Cork in 1620, lord justice of Ireland in 1629, and lord treasurer in 1631. Died Sept. 15, 1643. He is known as "the great earl of Cork," and was father of Robert Boyle, the philosopher.

Cork Har'bor, an excellent landlocked harbor of Ireland, is formed by the estuary of the river Lee. It is large and deep enough to contain the whole British navy. The entrance, which is one mile wide, is 11 miles from the city of Cork. The harbor expands to eight miles in width. Queenstown is on an island in this harbor.

Corleo'ne, a town of Sicily, province of Palermo, on a hill 21 miles S. of Palermo. It has a royal college, a hospital, and several churches and convents. Pop. 14,600.

Cor Leo'nis (*i. e.* "heart of the lion"), a name of the star *α* in the constellation Leo. It is also called *Regulus*.

Corm [Gr. *κόρμος*, a "trunk" or "stem"], in botany, a short, roundish, bulb-like underground stem, solid, and not scaly; as in the crocus, tulip, and gladiolus. Corms are sometimes called solid bulbs.

Cormenin, de (LOUIS MARIE DE LA HAYE), VICOMTE, a French political writer, born in Paris Jan. 6, 1788. He became in 1828 a liberal member of the Chamber of Deputies, and under the pseudonym of "Timon" wrote political pamphlets which were successful. He was president of the committee which formed a new constitution in 1848. Among his works "Droit Administratif" (1831; 5th ed. 1840) is the most important. After the *coup d'état* of Dec., 1851, he was a member of the council of state. In 1855 he was admitted into the Institute. Died May 6, 1868.

Cormontaigne, de (LOUIS), a French military engineer, born in 1696. He made improvements in the art of fortification, on which he wrote several treatises. He planned the fortifications which were constructed at Metz and Thionville in the reign of Louis XV. Died Oct. 20, 1752.

Cor'morant [Fr. *cormorant;* It. *corvomarino, i. e.* "sea crow;" Ger. *Wasserabe*], (*Phalacrocorax* or *Graculus*), a genus of aquatic web-footed birds of the family Pelicanidæ, characterized by a bare dilatable membrane beneath the lower mandible, extending to the upper part of the throat. The cormorant has a compressed bill, with a strong hook at the point of the upper mandible, wings of moderate length, and stiff tail feathers, used in walking. The species are distributed along the coasts of various countries of Europe, Asia, and America, and feed on fish almost exclusively. They are proverbial for their voracity. They pursue their prey by swimming and diving, and, it is said, sometimes descend to the depth of 100 feet or more. The common cormorant (*Phalacrocorax carbo*) is found on the eastern coast of North America, is mostly of a black plumage, and is about thirty-three inches long. Several other species are found in the U. S. The cormorant is trained by the Chinese, who employ it in catching fish.

Cormorant.

Corn [Anglo-Saxon, *corn;* Ger. *Korn;* Lat. *far* or *frumentum*], a general name given to various seeds, especially to cereal and farinaceous grains which grow in ears and are used for food, as wheat, barley, rye, and maize. In England, corn signifies "wheat," which is the grain most extensively used for breadstuff. In the U. S. the term is commonly applied to maize or Indian corn.

Corn (*clavus*), [from *cornu*, a "horn"], a horny accumulation of epidermic cells upon the surface of the human foot, produced by the pressure of the boot or shoe. Corns may be softened by hot water or poultices, and the horny part can be carefully removed with the knife. When painful, they may be generally much relieved by the occasional application of a solution of nitrate of silver. Various surgical appliances have been devised for the relief of corns, which when neglected may give rise to serious trouble.

Corns in horses are inflamed spots in the sole just above the horny portion. They are often caused by bad shoeing, and are very liable to suppuration. When this occurs the matter should be evacuated, the part poulticed, the surface of the corn exposed by cutting, and the foot dressed with a solution of chloride of zinc—one grain to the ounce of water.

Cor'naceæ [from *Cornus*, one of the genera], a small natural order of exogenous plants, mostly trees or shrubs. They have four-parted flowers, the corolla valvate in the bud, and four stamens borne on the margin of an epigynous disk in the perfect flowers. The fruit is a one or two seeded drupe. The *Cornus florida* (dogwood) and some other species are indigenous in the U. S. The bark of *Cornus* is recommended as a tonic.

Cor'narists, a name applied in the sixteenth century to the followers of DIEDRIK CORNHERT (which see.) After the rise of the Arminian party in the Dutch Church, the Cornarists, who nearly agreed with them, disappear from history.

Corn'bury (EDWARD **Hyde**), LORD, afterwards third earl of Clarendon. He deserted the service of James II. in 1688, and became an adherent of the prince of Orange (William III.), who appointed him governor of New York in 1702. He was censured for rapacity and tyrannical conduct, and was removed in 1708. Died April 1, 1723.

Corn-Crake, or **Land Rail,** the *Crex pratensis,* a European bird, a rare visitant of the U. S. It is a wader,

Corn-Crake, or Land Rail.

seven inches long, of a brown-gray color, haunting corn and grass lands and osier-beds. It is a game bird, quite hard to flush, as it runs rapidly away from a dog.

Cor'nea [*i. e.* "horny," from the Lat. *cornu,* a "horn"], the transparent horny membrane which forms the anterior part of the eyeball. In vertebrates it is simple; in insects it is divided into numerous hexagonal segments. (See EYE.)

Corneille (PIERRE), a celebrated French dramatic author, born at Rouen June 6, 1606, is called the founder of the French drama. He was educated by the Jesuits, and studied law, which he practised for several years without success. In 1629 he produced "Mélite," a comedy, which was performed with applause. Between 1629 and 1635 he wrote several comedies, which are inferior to his later works. His "Médea" (1635), a tragedy, although somewhat bombastic, contains eloquent passages and reveals the dawning of his genius. His reputation was greatly increased by the tragedy of the "Cid" (1636), an imitation of the Spanish drama of the same name. The "Cid" was performed with great applause, and surpassed everything that had appeared on the French stage. He produced in 1639 "Les Horaces" and "Cinna," which are excellent in invention and style. "Cinna" and "Polyeucte" (1640) are considered by some critics as his masterpieces. He was admitted into the French Academy in 1647. Among his other works are "Le Menteur" (1642), a comedy of character and intrigue, and an opera, "Toison d'Or" (1661). He died in Paris Oct. 1, 1684, and left several children. He was an uncle of Fontenelle. The French call him the "grand Corneille," partly to distinguish him from his brother Thomas. In the opinion of many critics he excelled other French dramatists in impressive declamation, sublime thoughts, and a condensed and noble style. (See FONTENELLE, "Éloge de Corneille;" GUIZOT, "Corneille et son Temps," 1852; TASCHEREAU, "Histoire de la Vie et des Ouvrages de Corneille," 1829.)

Corneille (THOMAS), a French dramatist, a brother of the preceding, born at Rouen Aug. 20, 1625. His first work was a comedy entitled "Engagements du Hasard" (1647). He produced in 1656 "Timocrate," "Ariane," the "Earl of Essex," and several encyclopædic works. Died Dec. 8, 1709.

Corne'lia, a Roman matron of patrician family, was a daughter of P. Scipio Africanus, and the mother of Tiberius and Caius Gracchus. After the death of her husband, T. Sempronius Gracchus, she declined an offer of marriage made by Ptolemy, king of Egypt. She was eminent for virtue and mental endowments, and was versed in Greek literature. When a rich Campanian lady expressed a curiosity to see her jewels, she pointed to her two sons, saying, "These are my jewels and ornaments." She lived in the second century B. C.

Cornelian. See CARNELIAN.

Corne'lius (ELIAS), D. D., an eloquent and influential clergyman, was born at Somers, Westchester co., N. Y., July 31, 1794. As secretary of the American Education Society (from 1826 to 1832) he gave a notable impulse to the work of training men for the Christian ministry. Died at Hartford, Conn., Feb. 12, 1832. A few weeks before his death he succeeded Jeremiah Evarts as one of the secretaries of the A. B. C. F. M. His life was written by B. B. Edwards (1833).

Cornelius Nepos. See NEPOS.

Corne'lius, von (PETER), a celebrated German painter, born at Düsseldorf Sept. 23, 1787. He studied and worked in Rome (1811–19), and formed there an intimate friendship with the artist Overbeck. While he was at Rome he produced his "Illustrations of Faust." He manifested his original genius in a series of designs illustrating the "Niebelungen Lied." In 1819 he was made director of the Academy at Düsseldorf, and in 1826 he went to Munich, where he was patronized by King Louis. He devoted himself to fresco-painting, which had long been neglected, and adorned with frescoes of subjects from the "Iliad" the Glyptothek of Munich. Among his greatest works is a picture of the "Last Judgment" in the church of St. Louis in Munich. In the Pinakothek of Munich he painted a series of frescoes to illustrate the "History of Painting" (1841). Invited by the king of Prussia, he went to Berlin in 1840, and painted in the Campo Santo "The Four Horsemen of the Apocalypse" (1848) and other works. Died at Berlin Mar. 7, 1867. (See RIEGEL, "Cornelius, der Meister der Deutschen Malerei," 1866; WOLZOGEN, "Peter von Cornelius," 1867; "Peter von Cornelius, ein Gedenkbuch aus seinem Leben und Wirken, von ERNST FÖRSTER," Berlin, 1874.)

Cornell', a post-village of Livingston co., Ill., on the Chicago and Paducah R. R., 9 miles N. W. of Pontiac. It has one weekly newspaper.

Cornell (EZEKIEL), a brigadier-general of the Revolutionary war, born at Scituate, R. I., was a member of the Continental Congress from Rhode Island (1780–83). He founded a library in his native town.

Cornell (EZRA) was born at Westchester Landing, N. Y., Jan. 11, 1807. Soon after the invention of the telegraph he devoted. his attention to that enterprise, became very wealthy, and in 1865 founded the CORNELL UNIVERSITY (which see).

Cornell (WILLIAM MASON), M. D., D. D., LL.D., a Congregational divine, was born at Berkley, Mass., Oct. 16, 1802, graduated at Brown University in 1827. He left the ministry in 1839 on account of feeble health, studied medicine, and commenced its practice in 1845. He has contributed largely to periodical and other literature.

Cornell College, Mount Vernon, Ia., is under the auspices of the Methodist Episcopal Church. It was established in 1850, and first called the Iowa Conference Seminary. In 1854 the name was changed to Cornell College. It is built in one of the handsomest spots in beautiful Iowa, on a campus of twenty acres, and consists of three massive brick structures: one, the ladies' boarding hall, 72 by 40 feet, and three stories high; another, the gentlemen's boarding hall, 56 by 40, and four stories high; and the third, the main college building, 100 by 60, and five stories high. They have been built at a cost of $80,000, principally small gifts from the pioneer citizens of Iowa. It has a permanent endowment of $86,000, which the friends of the institution are laboring to increase to $200,000. The faculty, headed by the Rev. William F. King, D.D., consists of fifteen professors and teachers. Three of its chairs are endowed: the chair of mental and moral philosophy by the late Bishop Hamline; the chair of civil engineering by Hon. Judge Cooley of Dubuque, Ia.; and the chair of mathematics by the alumni of the institution. The Washington government has selected this college as the one in Iowa to which to detail a professor of military science and civil engineering, thus bringing West Point advantages into the heart of Iowa. Over 7000 students have attended this college, and about 140 of the number have graduated. Mount Vernon, the seat of the institution, is a small town of 1500 inhabitants, who have been drawn together here principally for educational purposes. It is on the C. and N. W. Railway, 66 miles W. of the Mississippi, thus being in the very centre of Iowa's population. About 360 students, from twenty-one different States, make up the annual list in the catalogue. The college is out of debt. J. W. CLINTON, *Agent Cornell College.*

Cornell University, a collegiate institution at Ithaca, Tompkins co., N. Y. In July, 1862, Congress granted to each State 30,000 acres of public land for every Senator and representative it was entitled to; the income to be applied for ever to colleges "where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, . . . in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life." One-tenth of this may be used for experimental farms, but no portion for buildings. New York's share was 990,000 acres. By charter of 1865 and 1867 she established the Cornell University with a foundation of $500,000, given it by Hon. Ezra Cornell of Ithaca, and secured to it the entire income of the land-grant so long as it should use the whole effectively in aid of the objects intended by Congress. It has since received nearly $1,000,000 more, from the founder, from the president, Hon. Andrew D. White, and from Trustees McGraw, Kelley, Sibley, Sage, and others. Its valuable collections and its library of 35,000 volumes are rapidly increasing. Opened Oct., 1868, it had in Oct., 1872, 33 resident professors and instructors, 8 non-resident professors and lecturers, 494 students, including 5 resident graduates and 16 ladies, and 109 alumni.

By the charter no officer or student can be admitted or excluded for any political or religious opinions, but "at no time shall a majority [of the trustees] be of one religious sect or of no religious sect." All departments of study shall be open at the lowest rates consistent with efficiency. Each of the State's 128 assembly districts may send yearly one student for four years' free tuition; the choice to be made by competitive examination from the best scholars, male and female, in the different academies and public schools, but subject to the usual entrance-examination at the university. Since June, 1872, both sexes are admitted on equal terms, except that lady students must be at least eighteen years of age, while boys may enter at sixteen, and must, unless excused, receive military instruction.

The university values "practical" and "scholarly" studies alike when the work in each is equally good. It aims to afford the best facilities for each, to encourage their combination, and, by giving wide liberty of choice, to secure the student's mental discipline through studies which, while of varied character, shall bear directly upon his chosen life-work. Especial provision is made for instruction connected with political, social, and industrial science, and with modern and English classics; thus in history are five professors; in rhetoric and literature, two; in chemistry, three; in mathematics, seven teachers; in modern languages, seven. The engineering school is very large. But instruction is offered as well in Hebrew, Persian, transcendental anatomy, quantics, etc. To promote variety of culture, and to guard against academic seclusion from the world's actual interests, the resident faculty is supplemented by non-resident lecturers, men eminent in their special departments, and often in public life.

There are three "general courses." That in arts has the usual classical curriculum; that in literature replaces Greek, and that in science, Greek and Latin, by other studies. Some "electives" are allowed, and the natural sciences are studied at the outset. These three courses, and "special courses" like civil engineering, architecture, veterinary medicine, zoology, etc., lead to bachelors' degrees, but the masters' degrees require further study. Or the student may select an "optional course," leading to no degree. But in all courses the equivalent of fifteen hours' recitation per week is required. A certain proficiency, as shown by the frequent examinations, is necessary to continue a student in his class, and a certain higher proficiency to graduate him. No "marking list" is kept at daily recitations. There is no college police. Much is left to the student's earnestness and to free and manly intercourse between teachers and taught, but when these fail he is dismissed.

JAMES E. OLIVER, *of the University.*

Cor'net [It. *cornetto*, diminutive for *corno;* Lat. *cornu*, a "horn," because horns were anciently used as musical instruments], a musical instrument usually of brass, and originally of a curved, horn-like shape. Cornets are of various kinds, but the best form is that known as the *cornet-à-pistons* (a French term signifying a "cornet with pistons," because modifications of sound are produced by small pistons moved by the player's fingers). Cornet music is popular and brilliant, but is not considered "high art" by musical critics. Among the most famous cornet-players of the present time may be mentioned the celebrated Levy and Mr. Arbuckle.

Cor'net [It. *cornetta*, a "small flag"], a commissioned officer of cavalry, corresponding in rank with the ensign of infantry. The standard was formerly carried by the cornet, hence the name. There are no cornets in the U. S. army.

Corn'hert, or **Koornhert** (DIEDRIK), an eminent Dutch author and reformer, born at Amsterdam in 1522. He efficiently promoted the Protestant Reformation, but opposed Calvinism. More liberal than the most of his contemporaries, he wrote a "Treatise against the Capital Punishment of Heretics." He gave valuable assistance to the prince of Orange in his contest against Spain, and became secretary of state in Holland in 1572. Among his works is a poem "On the Use and Abuse of Fortune." Died Oct. 20, 1590. His followers in theology were called CORNARISTS.

Cor'nice [Fr. *corniche;* It. *cornice*], in architecture, the upper great division of an entablature, consists of several members, which vary in the different orders. (See ENTABLATURE.)

Cor'nie, a township of Columbia co., Ark. Pop. 413.

Cornie, a township of Union co., Ark. Pop. 752.

Cornif'erous Pe'riod [from the Lat. *cornu*, a "horn," and *fero*, to "produce," referring to the "hornstone" or imperfect flint found in its strata], in American geology, the second of the five great divisions of the DEVONIAN AGE (which see).

Corn, Indian. See MAIZE.

Corn'ing, a half shire and post-town of Steuben co., N. Y., on the Chemung River and Erie R. R., at the junction of the Rochester division, 290 miles N. W. of New York and 17½ W. of Elmira. It is the terminus of the Chemung Canal feeder and of the Corning and Blossburg R. R. It has two newspapers, a school building costing $70,000, a public library, several iron-foundries, flint glass-works, and a manufactory of railroad cars. Pop. 4018; of township, 6502. ED. "JOURNAL."

Corning, a post-village of Adams co., Ia. It is on the Burlington and Missouri River R. R., 211 miles W. of Burlington. It has two weekly newspapers.

Corning (ERASTUS), born at Norwich, Conn., Dec. 14, 1794, became a wealthy iron-merchant and capitalist of Albany, N. Y., and was a member of Congress from the last-named State 1857–63 and 1865–67. He was one of the leading railroad capitalists of the U. S., was one of the regents of the university, and was greatly interested in the cause of popular education. Personally, he was greatly beloved on account of his genial and kindly disposition. Died April 9, 1872.

Cor'nish, a township and post-village of York co., Me., on the Portland and Ogdensburg R. R. and on the Saco River, 30 miles N. W. of Portland. Carriages are manufactured here. Pop. 1100.

Cornish, a township and post-village of Sullivan co., N. H., on the left bank of the Connecticut River, opposite Windsor, Vt., 25 miles N. of Bellows Falls. The township has four churches and manufactures of lumber and leather. Pop. of township, 1334.

Cor'nish Lan'guage, a language closely akin to the Breton (Armorican) and to the Welsh. It ceased to be a spoken language about the beginning of the present century. Its use within historic times appears to have been limited to Cornwall and Western Devonshire, in England. Among the extant remains of this language are a poem on the "Passion of our Lord" (published in 1864 by the Philological Society), and a mystery entitled the "Creation of the World" (Berlin, 1865). (See NORRIS, "Cornish Grammar," Clarendon Press, 1859.)

Corn Laws, in England, the name given to certain former statutes for the regulation of the trade in grain. The corn laws are of ancient origin, dating as far back as 1360. There appears to have been no prohibition against importation till in 1463 an act was passed prohibiting it so long as the price at home was below 6*s.* 8*d.* a quarter. Soon after the accession of Charles II. the policy of increasing duties on importation, for protecting the agricultural and landed interest, began to prevail. An act was passed in 1670 prohibiting importation till the price had reached 53*s.* 4*d.* a quarter, and laying a heavy duty on it above that point. This law was of little benefit to the landed interest, for then and long afterwards Great Britain generally produced more grain than its population required. The price at which importation might begin was raised in 1814. There had been a tendency to what is called a "sliding scale" in the duties on importation, and this arrangement, by the act of 1828, reached what was regarded as a state of perfection. There were, however, writers and speakers who opposed the corn laws, while a powerful party maintained that they were identified with the interests of the country. They argued that protection was

necessary to keep certain poor lands in cultivation, and that it was desirable to cultivate as much land as possible, in order to improve the country. If improvement by that means were to cease, the country would be dependent on foreigners for a large portion of food. Such dependence would be fraught with great danger; in war, supplies might be stopped or the ports blockaded, the result being famine and bread-riots. Protection enabled the landed proprietors and their tenants to encourage manufactures and trade. If the corn laws were abolished half the shopkeepers would be ruined, and that would be followed by the stoppage of many mills and factories. These arguments had great influence over the shopkeepers, the laboring classes, and the learned professions. Ignorance and timidity were combined with selfishness for the support of the corn laws. Statesmen could introduce no change into the existing laws other than to reduce the import duty as the price of grain rose, in order virtually to prohibit importation when the price was low, and encourage it when high, so that at famine-prices grain might come in duty free. The effect of this fluctuation was to render the trade a gambling one; the supplies required being so irregular, foreign countries did not grow corn habitually for the British market. In 1843, Sir Robert Peel tried a modification of the sliding scale, which did not lessen the opposition to the corn laws, the nature of which was now better understood. The people, roused by Cobden, Bright, and other leaders of the Anti-Corn Law League, poured in petitions to Parliament, and at length Sir Robert Peel, now a convert to free trade, carried a measure in 1846 to abolish the corn laws. Every evil prognostication has proved false. There has been no stoppage of imports by war; manufacturers and tradesmen have been more prosperous than before the repeal; the rent of land has risen, and both tenants and proprietors are satisfied; the working-classes find more employment than before. The benefits arising from the repeal of these laws consist in the stimulus given to trade, the removal of anxiety as to the effects of scanty harvests, and less fluctuation of price. Another result was the decline of Chartism, and other schemes for radical social changes.

Corn'planter [Iroquois, *Garianwachia*, the "planter"], a half-breed Seneca Indian and chief of the Six Nations, born about 1732, was the son of John Abeel, a white trader. He fought the English at Braddock's defeat, and was a deadly foe to the colonists during the Revolutionary war, but afterwards became the steady friend of the white people. He was a man of great intelligence, dignity, and moral worth. Died in Warren co., Pa., Feb. 18, 1836. A monument was erected in his honor by the State of Pennsylvania in 1867. (See SNOWDEN'S "Historical Sketch of Cornplanter," 1867.)

Cornplanter, a township of Venango co., Pa. Here are numerous oil-wells. Pop. 10,100.

Corn Snake, the *Scotophis guttatus*, a colubrine, non-venomous serpent of the Southern States, of a brown color, and often five feet long. It is generally not seen except mornings and evenings. It enters houses, devours young chickens and other small animals, but is of gentle and familiar disposition.

Corn'stone, the lower member of the old red sandstone or middle palæozoic series of rocks, as developed in Herefordshire, England, and the adjoining counties. The name cornstone is said to have been given because the soil derived from this stratum is fertile and adapted to the production of corn (wheat).

Cor'nu Ammo'nis, in anatomy, a white prominence within the brain near the middle of each lateral ventricle.

Cornuco'pia [Lat. *cornucopiæ* (*i. e.* "horn of plenty"), from *cornu*, a "horn," and *copiæ*, the gen. of *copia*, "plenty"], in the fine arts, an ornament representing a horn, from which issue flowers, fruits, and leaves. The fable accounting for the origin of this emblem of plenty is, that Amalthæa, when one of her goats had broken off a horn, presented it to the infant Jupiter wreathed with flowers and filled with fruit.

Corn'ville, a post-township of Somerset co., Me. P. 959.

Corn'wall, a county forming the S. W. extremity of England, is bounded by the ocean on all sides except the E. It constitutes a duchy, which is the appanage of the prince of Wales. Area of the county, 1786 square miles, but the duchy is larger, and includes a part of Devonshire. The surface is partly occupied by rugged hills, with some fertile valleys. The river Tamar forms the eastern boundary of Cornwall, which it separates from Devonshire. The extreme western point of the county is a promontory called Land's End. Cornwall is rich in metals, especially tin and copper. The annual average product of the tin-mines is 5000 tons. The quantity of copper obtained here annually is nearly 12,000 tons. The mining of kaolin and felspar is also important. Silver, lead, zinc, antimony, cobalt, bismuth, and iron are found here. The chief towns are Falmouth, Penzance, Bodmin, and Truro. There are in Cornwall many dolmens and other pre-historic remains. The ancient language of Cornwall, called the Cornish language, ceased to be spoken about the beginning of the present century. (See CORNISH LANGUAGE.) Capitals, Bodmin and Launceston. Pop. in 1871, 362,098.

Cornwall, a port of entry, capital of Stormont co., Ontario (Canada), on the N. side of the St. Lawrence River, at the foot of the Long Sault Rapids and Canal, 67 miles above Montreal, and on the Grand Trunk Railway. It has great water-power, and manufactures of woollen goods, flour, etc. It has two weekly papers. Pop. about 3000.

Cornwall, a township and post-village of Litchfield co., Conn. It has important mines of iron ore. The village is 45 miles N. W. of New Haven. Pop. 1772.

Cornwall, a township of Henry co., Ill. Pop. 952.

Cornwall, a post-township of Orange co., N. Y., on the W. bank of the Hudson River, contains the village and U. S. Military Academy of WEST POINT (which see); also Canterbury, Highland Falls, Cozzens' Landing, and other villages. It has seventeen churches, several excellent boarding schools, and many manufactories. The scenery here is very attractive. Pop. of township, 5989.

Cornwall, a post-township of Lebanon co., Pa. P. 2008.

Cornwall, a post-township of Addison co., Vt. P. 969.

Cornwall (BARRY). See PROCTER (BRYAN W.).

Cornwal'lis (CAROLINE FRANCES), an English writer, born in July, 1786. She learned Latin and Greek, and attained a good proficiency in philosophy, history, and natural science. She published a series of twenty-two essays entitled "Small Books on Great Subjects," which are highly esteemed. Among her works, which were all anonymous, was "Pericles, a Tale of Athens" (1847). Died in 1858. A volume of her letters and remains appeared in 1864.

Cornwallis (CHARLES), MARQUIS OF, a British general, born Dec. 31, 1738, was the eldest son of the first earl, whose title and estate he inherited in 1762. He became a favorite aide-de-camp of the king, but he opposed the measures that provoked the American war. With the rank of major-general he took part in the battles of Brandywine and Germantown in 1777. Having obtained the command of an army in South Carolina, he defeated Gen. Gates at Camden Aug. 16, 1780. Mar. 15, 1781, he gained some advantage over Gen. Greene at Guilford Court-house, and invaded Virginia. He occupied Yorktown, which he intrenched, and remained on the defensive. Gen. Washington besieged Yorktown, and compelled Lord Cornwallis to surrender his army of about 8000 men, Oct. 19, 1781. He is regarded as the ablest of the British generals who commanded in this war. In 1786 he was appointed governor-general of Bengal and commander-in-chief of the army in India. He waged war against Tippoo Saib, whom he defeated at Seringapatam in 1792. Having returned to England in 1793, he was raised to the rank of marquis. He became in 1798 lord lieutenant of Ireland, which was then the scene of a rebellion, and he pacified the Irish by moderate measures. He negotiated the treaty of Amiens in 1802, and was appointed governor-general of India in 1805. He died in India in the same year, Oct. 5. His "Correspondence" was published by Ross (3 vols.; 2d ed. 1859).

Cornwall on the Hudson, a post-village of Cornwall township, Orange co., N. Y., has a savings bank, a public library, some manufactures, and is a place of summer resort. Pop. 200.

Coro, a province of Venezuela, is bounded on the N. and E. by the Caribbean Sea, on the S. by Carabobo and Barquisimeto, and on the W. by Maracaibo. Area, 11,250 square miles. The larger part of the province is a low plain. In the interior the Sierra de Coro rises to an elevation of 4250 feet. The form of the province is very irregular, owing to the large peninsula of Paraguaná in its northern part, which is connected with the mainland by a long, narrow isthmus. The soil is in general unfruitful, and in parts poorly watered. The more elevated portions of the mountains are covered with fine forests. The rivers are all small, except the Tocuyo and the Aroa. The chief employments of the inhabitants are cattle-raising and agriculture. It is the most sparsely peopled province of the republic. The principal products are cattle, coffee, cacao, and cotton. Capital, Coro. Pop. 72,321.

Co'ro, a maritime town of South America, in Venezuela, near the Gulf of Maracaibo, 155 miles W. N. W. of Valencia. It is the capital of the province of the same name. Pop. about 7000.

Corœ'bus [Κόροιβος], one of the half-mythical characters of early Greek history, an Elean chiefly noted for

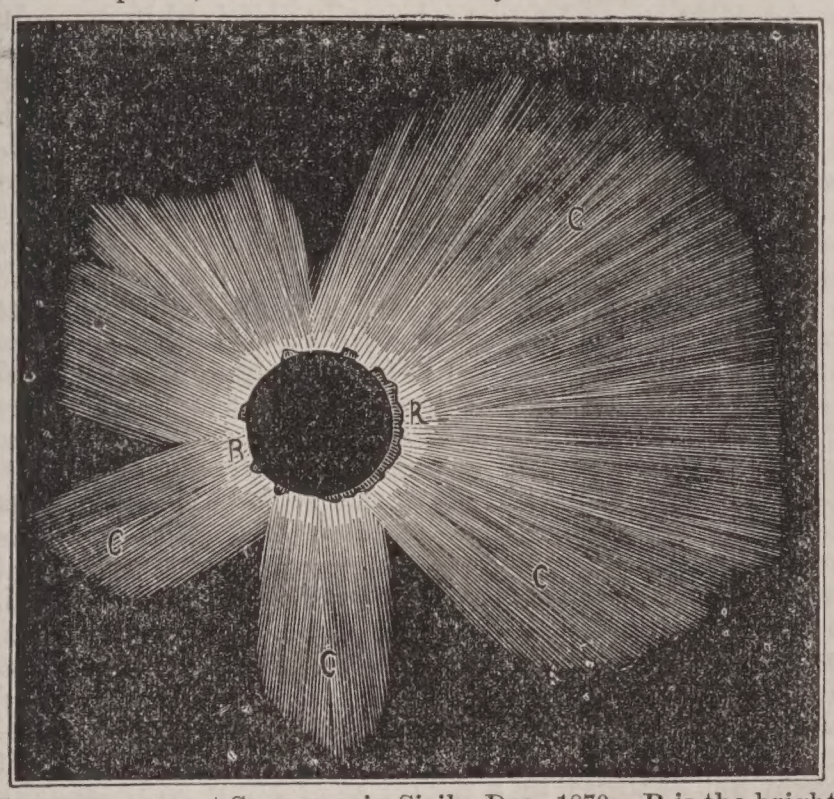
his victory in the foot-race at the Olympian games in 776 B. C. From this victory the Olympiads were reckoned. He slew the monster Pœne, whom Apollo sent to afflict the Argives.—Another Corœbus was a Phrygian hero of the Trojan war, and a suitor of Cassandra.—In Pericles' time there was a famous architect named Corœbus.

Corol'la [a diminutive of the Lat. *corona*, a "crown"], in botany, the inner floral envelope of a plant. It is usually more richly colored than the calyx. Theoretically considered, the corolla is composed of modified leaves (called petals). Corollas are divisible into two classes, monopetalous and polypetalous, the latter of which have several distinct petals. The monopetalous corolla has only one petal, formed by the union of several modified leaves. The corolla is much employed by botanists in their systematic arrangements, and by the French school has been taken as the means of forming fundamental characters of the subclasses in the grand division of exogenous plants.

Cor'ollary [Lat. *corollarium*, from *corolla*, a "little crown" or "garland" given in addition to wages, hence anything over and above], in mathematics, denotes something in addition to the demonstration—viz. an inference or consequence immediately deducible from the demonstration of a proposition. All the corollaries in our editions of Euclid have been inserted by editors; they may be said to constitute so many new propositions, differing from the original ones merely in the fact that the demonstrations have been omitted.

Coroman'del Coast, of India, extends along the E. side of the peninsula from Point Calymere to the mouth of the river Kistnah. It has no good harbor, and is heavily surf-beaten. The cities of Madras, Tranquebar, and Pondicherry are on this coast.

Coro'na [a Latin word signifying a "crown"], a term applied in astronomy to the glory of light seen around the sun when totally eclipsed. Halley regarded the phenomenon as owing to the existence of a lunar atmosphere, but this idea was rejected by Newton, and has since been entirely disproved. Delisle's theory, that it is due to the diffraction of the sun's light in passing tangentially by the moon's sphere, has been asserted by Sir David Brewster to



Corona as seen at Syracuse, in Sicily, Dec., 1870. R is the bright "inner corona," in which may be seen a "sierra" of glowing hydrogen. C is the "outer corona."

be untenable, since any diffraction ring thus occasioned would be too narrow to be visible from the earth. There remains only the conclusion that the corona is a true solar appendage. It appears probable, from various experiments, that the particles forming the corona are prevented from pressing towards the sun by their own motions. It is therefore supposed that they may be members of meteoric systems whose perihelia exist in the sun's neighborhood.

Corona, in architecture, the flat, square, massive member of a cornice, often called the drift or larmier, is situated between the cymatium and the bed-moulding. Its use is to carry the water, drop by drop, from the building.

Corona, Coronet, or **Crown,** a botanical term applied to certain appendages of the corolla, which are modifications of sterile stamens. The corona is in the interior of the corolla, and in some cases has the form of a cup, as in the narcissus. The five hooded bodies seated on the tube of the stamens of the asclepias are called the *crown*.

Coro'na Austra'lis, or **Southern Crown,** a constellation of the southern hemisphere.

Coro'na Borea'lis, or **Northern Crown,** a constellation of the northern hemisphere.

Cor'onach [a Gaelic word], a dirge or lament, mingled with the shrieks and wailings of women, which is still often heard at wakes and funerals, especially in the more primitive parts of Ireland and Scotland. Traces of the same practice are found among many primitive peoples.

Corona'tion [from the Lat. *corona*, a "crown"], the act of crowning a monarch; the ceremony performed on the accession of a sovereign to the throne. In some countries of Europe it is customary for a bishop to place the crown on the head of the sovereign. The ceremony of coronation is a very ancient one, at least as old as King Solomon's time. Anointing often accompanies the coronation, and in Great Britain the sovereign also takes an oath to support the laws, customs, and statutes, the laws of God, the Protestant reformed religion, the Church of England, etc.; security for the Church of Scotland being promised in the oath of accession, which in some instances long precedes the coronation. For example, George IV.'s accession was Jan. 29, 1820, but his coronation was deferred nearly eighteen months—till July 19, 1821. The ceremony is performed in Westminster Abbey, but anciently took place at Kingston-on-Thames or at Winchester. The ancient customs have come down to our time with but little change.

Cor'oner, anciently **Crown'er** [Lat. *coronarius*, from *corona*, the "crown"], formerly an officer of high dignity, who served as a deputy of the Crown and as chief-justice of the king's bench in England. At present in England and most of the U. S. a coroner is an officer who in case of sudden or mysterious death summons a jury, which sits in sight of the body, to determine the cause and manner of death. Coroners may commit persons suspected of homicide after inquest, without warrant, for trial. They also hold inquests in regard to salvage from shipwrecks. They had anciently powers much greater than at present.

Cor'onet [from the Lat. *corona*, a "crown;" Ger. *Kranz*], in heraldry, an inferior crown belonging to the nobility. The monument of John of Eltham (second son of Edward II.), who died in 1334, is said to afford the earliest English representation of this ornament.

Corot (Jean Baptiste Camille), a French landscape-painter, born at Paris in July, 1796. Corot has produced many works, which, after having been long little esteemed, are now much sought after and command very high prices. His work is strongly individual, and in his own peculiar field Corot is unsurpassed. Clarence Cook.

Cor'pi San'ti, formerly belonging to the suburbs of Milan, now forms a separate city. Pop. 62,976.

Cor'poral [corrupted from the Fr. *caporal*, which is derived from the It. *capo*, "head," "chief"], a non-commissioned military officer, next in rank below a sergeant. He is distinguished by two chevrons worn on the arm. A "lance corporal" is a private soldier who is allowed to wear one chevron as a mark of distinction. He may or may not perform the duties of a corporal, but he has no increase of rank or pay.

Corporal [Lat. *corporale*, from *corpus*, the "body," *i. e.* the "Host"], in the Greek and Roman Catholic churches the altar-cloth used for covering the Host, and emblematical of the grave-clothes of our Lord. A "corporal oath" is an oath sworn upon the corporal. The name is retained by the ritualistic party of the Anglican Church.

Corpora'tion [Lat. *corporatio*, an "embodiment," the assumption of a form], in law, an artificial person, consisting of one or more individuals, having certain legal capacities, such as succession of members, powers to sue or to be sued, and to act, no matter how numerous its membership may be, as a single individual. This new person is to be thought of without reference to the members of which it is composed. It must be carefully distinguished from a partnership, in which there is merely a collection of persons, no artificial person being constituted. A contract made with the corporation is not made with the members, nor do they, in a legal point of view, own its property, though they may have an interest in its management on the theory of a trust. Corporations may be considered under the following divisions: I. Their various kinds; II. Their mode of creation; III. Their powers; IV. Visitation; V. Dissolution.

I. They may be variously classified, as regard is had to the number of members, their objects, and the fulness of their powers. When considered as to numbers, they are either aggregate (more than one) or sole. When regarded as to the objects to be accomplished, they are ecclesiastical or lay, while lay corporations are either civil or eleemosynary. It can scarcely be said that there are any "ecclesiastical" corporations in the U. S., in the proper sense of the term. They rather belong to the English law under

the rules of an established Church. Our corporations may be said to be lay. The term "eleemosynary" is substantially equivalent to "charitable," and embraces all that large class of corporate institutions established to promote religion or learning, to relieve the sick or the poor, and in general to accomplish meritorious public objects. Another division of corporations is public and private. A public corporation is designed for governmental purposes, as a city or a village. Others are private. The importance of this distinction lies in the fact that a public corporation, being a mere instrument of government, can be created or dissolved by the law-making power at will, while a private corporation only comes into existence by *the conjunction* of the will of the sovereign power and that of the corporators. Its charter is in the nature of a contract, and it can only be dissolved by an observance of the rules governing the dissolution or impairment of the obligation of contracts. When a corporation is regarded as to the completeness of its powers, it may be either one of full powers or imperfect in its character. In the last case it is termed a *quasi* corporation. Towns in the New England States are true corporations; in New York they are political divisions with certain specified powers, being *quasi* corporations.

II. A corporation may be created either by prescription, royal charter (see CHARTER), or by legislative act. It is said to be created by prescription when it has exercised corporate powers for an indefinite period without interference on the part of the sovereign power. By a fiction of law it is then presumed to have had a charter. The method of creating corporations by royal charter was formerly in use in this country as a branch of the English law. Of course the leading mode of creation is an act of the legislature. It is not necessary that each institution should receive a distinct and separate organization. There may be a general formula provided by the legislature with which any particular body of men desiring to become a corporation may comply, and thus become incorporated. In other words, corporations may be created under general laws as well as organized under special acts. It may be added that the legislature may act indirectly as well as directly. It may confer upon some intermediate authority the power to incorporate. In this way in New York an organization known as "The Regents of the University, etc." has the power under certain conditions to incorporate colleges and academies. To the existence of a private corporation the consent of the members is necessary. This consent may be shown either by an express act of acceptance, or by implication from the exercise of powers under the charter, technically called "user." It should have a name whereby to act or to contract, which may be from time to time changed either by special legislative act or by general law.

III. A corporation, being by fiction of law a person, may have the power to make contracts and to do most other acts possessed by natural persons. In general, however, it has capacity to do such acts as are necessary and convenient to carry forward the special ends for which it was created. At the present time it is usually formed to accomplish a definite object, and it is reasonable that it should have the authority necessary to achieve it. A corporation, like a natural person, may transgress the rules prescribed by law for its action. This fact has caused many perplexing questions to arise as to the effect of an unauthorized act. This subject is known as the doctrine of *ultra vires*—transgression of power. In such a case the better opinion would seem to be that the corporate act, considered as a contract, would be void, though the corporation might be liable to an individual injured by its negligent mode of performing an act which it had no legal authority to undertake. The ordinary powers of a corporation are to make such contracts as are necessary to the accomplishment of its purposes, to hold and acquire property, both personal and real, to have a common seal, to make by-laws for the government of its members or of others, and to elect new members or officers in the place of such as may resign, die, or be removed. The act of removing a member is termed *disfranchisement;* the same act exercised towards an officer is called *amotion.* From early times in England there have been statutes termed "mortmain acts" (see MORTMAIN) to restrain corporations from acquiring lands without license from the king. Such statutes do not, in general, exist in this country. The common practice is to limit in the specific act of incorporation the value of the land which may be acquired. If this restriction be exceeded, the title is still valid, unless the State intervenes and institutes proceedings for a forfeiture. It is a general rule that a corporation cannot acquire land by will except for charitable purposes. It is not uncommon, even in that case, for a State statute to limit the amount which a testator may bestow, or to require that the will shall be made a certain time before his death. A corporation may, like a natural person, act through agents beyond the limits of the State where it is organized, unless restrained by law. It should be added that a corporation may commit a wrong for which it will be liable in damages, such as an act of negligence, publication of a libel, etc. It cannot, in general, commit a crime, except as resulting from a failure to perform a duty prescribed by law. In order to enforce its rights and to subject itself to its legal duties it may sue and be sued at home or abroad, although a proceeding *against* a non-resident corporation would in general be confined to the property within the jurisdiction. Corporations sometimes are made trustees for estates, guardians for minors, etc. In such a case they would be held accountable in a court of equity in the same way as other trustees or guardians.

IV. By "visitation" is meant the power of superintending the corporation and controlling its action. The subject is peculiarly applicable to the management of charitable corporations. The common law distinguishes between a founder of such a corporation, who supplies the funds for its practical working, and the sovereign power which gives it legal existence. The founder in the first sense is allowed to provide rules for the government and discipline of the college or other institution which he has established, and to designate some person or persons (visitors) who shall see that the rules are properly observed. The exercise of this power of visitation is summary, and in general without review by the courts of justice, though in extreme cases of manifest injustice it would be revised. This power in the U. S. is rarely lodged in a single person, as it frequently is in England. Boards of trustees are here entrusted with it. This doctrine does not prevent a court of equity from controlling the funds on the theory of a trust, so as to prevent waste, mismanagement, or perversion from the purposes intended by the donors. In this aspect a corporation is to be regarded as a trustee. The attorney-general, representing the State, may apply to the court to correct abuses in the management of funds which are in the eye of the law directed to public uses. When the case is sufficiently grave the charter of the corporation may be forfeited.

V. A corporation may be dissolved either by compulsory legislation, by surrender of its franchises, coupled with acceptance of it by the state, and by judicial decree. In England an act of Parliament is boundless in its operation, and a corporation may be arbitrarily dissolved by law. In the U. S. a distinction has been taken between private and public corporations. As has been already seen, a charter of a private corporation is a contract, and as, under the U. S. Constitution, no State can pass a law impairing the obligation of contracts, the power of the State legislature cannot be exercised so as to materially change the provisions of the charter without the consent of the corporators. This is the result of the celebrated "Dartmouth College case." (Dartmouth College *v.* Woodward, 4 Wheaton.) The effect of this decision is evaded in a number of the States by the insertion of a clause, either in the charter or some general law, or even in the State constitution, that corporate charters are to be held subject to alteration or repeal. This clause is valid as to all subsequent charters, which are of course accepted in reference to this legislative reservation of power. The most common mode of dissolving a corporation is by judicial decree. Every franchise is accepted on the implied condition that it shall be properly exercised. If there be abuse or neglect to make use of corporate powers, a proceeding may be instituted in behalf of the State to forfeit the charter. The abuse or neglect does not *of itself* destroy the charter, nor can the cause of forfeiture be presented to a court in an indirect manner. For example, it could not be urged by a debtor as creating an incapacity to sue, or by an heir as an incapacity to take an estate by will. A proceeding must be resorted to for the very purpose of forfeiting the charter. State law sometimes provides dissolution as a mode of enforcing the collection of debts, the property being regarded as a trust fund for that purpose, and a court of equity will administer it for the benefit of creditors. The U. S. statutes of bankruptcy are extended to business corporations. It was an old rule of the common law that a dissolution of the corporation extinguished its debts. Its claims could be no longer collected. Its personal property passed to the State, and its land reverted to the grantor. At present there is little room for the application of these rules. A court of equity would, in general, fasten a trust upon the property in favor of creditors, and in all business corporations for the stockholders. Charitable funds would be administered by other trustees.

(For further information consult the treatises of GRANT, ANGELL, and AMES; ABBOTT'S "Corporation Digest;" KYD "On Municipal Corporations;" DILLON "On Municipal Corporations;" KENT'S "Commentaries," lecture 33; MEREWETHER & STEPHENS, "History of Boroughs and Municipal Corporations;" REDFIELD "On Railways." Also the titles MUNICIPAL CORPORATIONS, STOCK CORPORATIONS, RELIGIOUS SOCIETIES, etc.)

T. W. DWIGHT.

Corps d'Armée [Fr.], kōr dar'mā', or **Army Corps,** in the modern system of warfare, is the "tactical" unit of a large army. The Division, in the management of large bodies of troops, has been found to be too small, and hence army corps have been organized, each containing several Divisions. The management of tactical units in the field constitutes the branch of the military art known as "grand tactics." Each army corps has its own system of internal administration, and usually consists of infantry and artillery, the cavalry constituting one or more corps by itself.

Corps Législatif, or **Legislative Body,** was the name of the lower house of the French legislature during the Second Empire. It was established in 1857, and abolished in 1870. The deputies were elected, by universal suffrage, for a term of six years.

Corpulency. See OBESITY.

Cor'pus Catholico'rum and **Cor'pus Evangelico'rum,** names given after the peace of Westphalia to the Catholic and Protestant divisions of the German empire. The elector of Mayence was the head of the Catholics, while the lead of the Protestant confederacy belonged successively to the rulers of Saxony, the elector palatine, and Sweden, and was restored to Saxony by the Diet of 1653. Both bodies were dissolved at the separation of the German empire in 1806.

Cor'pus Chris'ti [a Latin phrase signifying the "body of Christ;" Fr. *fête Dieu*], a festival of the Roman Catholic Church celebrated in honor of the Host (which is held by that Church to be the veritable body of our Lord). It was first established by a bull of Urban IV. in 1264, and is observed on the Thursday after Trinity Sunday.

Corpus Christi, the county-seat of Nueces co., Tex., is situated on a bay of the same name, 8 miles below the mouth of the Nueces River, about 200 miles S. W. from Galveston. Its harbor is not surpassed on the coast, and in commercial importance it ranks among the first cities in the State. It has one weekly newspaper. Pop. 2140.

BARNARD & SON, PUBS. "GAZETTE."

Cor'pus Doctri'næ, the name of certain collections of theological writings which have had especial authority in the German Protestant churches. The chief collection was "Corpus Philippicum" (1560, fol.), containing the Apostolic, Nicean, and Athanasian Creeds, the Confession of Augsburg, Melanchthon's "Loci Communes," etc. The strict Lutherans reject it as leaning towards Crypto-Calvinism, and the elector of Saxony pursued with rigorous measures those who refused to teach it. This, with many other Corpora Doctrinæ, was superseded by the Formula Concordiæ.

Corpus'cular Ac'tion, the power or influence which the minute particles or *corpuscles* of matter exercise on each other, and which, according to some writers, is the cause of all chemical changes.

Corpus'cular Mech'anism, that branch of mechanical science which is concerned with the phenomena of cohesion. These phenomena indicate some relation between the centres of the particles cohering. The exact nature and cause of this relation are not known. (See COHESION.)

Corpus'cular Philoso'phy, a name sometimes given to the atomic philosophy of DEMOCRITUS (which see).

Cor'pus Ju'ris Canon'ici [Lat., signifying "the body of canon law"], a comprehensive name for the original collections of the CANON LAW (which see), including the "Decretum Gratiani" (1151), the "Decretalia" of Gregory IX. (1234), the "Liber Sextus" (1298), the Clementine Decretals (1313), etc. The best edition is that of Richter, Leipsic, 1833–39.

Cor'pus Ju'ris Civi'lis [a Latin term signifying the "body of civil justice"], the name applied to the legal compilations made by order of JUSTINIAN (which see), consisting of the "Institutions," the "Codex," the "Pandects," and the "Novellæ." One of the best editions is that of the Kriegel Brothers, Leipsic, 1833–40.

Corre'a de Ser'ra (JOSÉ FRANCISCO), LL.D., a Portuguese botanist, born at Serpa in 1750. He visited the U. S. in 1813, and became Portuguese minister at Washington in 1816. He wrote several treatises on vegetable physiology, etc. Died Sept. 11, 1823.

Correc'tionville, a post-township of Woodbury co., Ia. Pop. 600.

Correg'gio, da (ANTONIO ALLEGRI), a celebrated Italian painter, was born at Correggio, a small town between Modena and Reggio, most probably in 1494. His father, Pellegrino Allegri, was a small merchant, the owner of a moderate property in houses and lands. His mother, Bernardina Piazzoli, was of good family, belonging to the stock of the Ormani or Aromani. By his father's care Allegri was well educated, and afterwards put to study the arts of drawing and painting—first, with Antonio Bartolotti, master of a school of painting in Correggio, and afterwards with an uncle, Lorenzo Allegri. From these teachers he learned the rudiments of his art, but whence came the influences that formed his peculiar manner is a question not yet answered. At one time he was said to have studied with Andrea Mantegna, but this is not now believed, though it is possible he may have lived in Mantua in his younger days, and have studied Mantegna's pictures there; among them, the magnificent "Victory" now in the Louvre. Bigi considers it proved by documentary evidence that Allegri was in Mantua in 1511, and thinks it possible that at this time he may have worked as an assistant under Andrea Mantegna's son, Francesco. But the influence of Mantegna was widely spread through the north of Italy, and it is not necessary that Allegri should have lived in Mantua to have been moved by him. Nor does he inherit as strongly from the great Mantuan as from Leonardo, and perhaps from certain Venetians, notably, as Signor Cavalcaselle thinks, from Cima, Palma, Lotto, and Pordenone. The stories first told by Vasari, and since repeated by successive biographers, of the poverty and misery of Correggio's life, of his painful efforts to support his family, of the obscurity and neglect in which he lived, and of his death, brought on by drinking cold water when overheated in consequence of carrying home sixty crowns in copper that had been given him for a picture—all these stories are now believed to be false; yet they were long credited, and it is difficult to account for the persistence of the tradition. He was well paid for his work, which was much sought after, and he was in great favor with the duke of Mantua, for whom he painted several of his most famous pictures—the "Education of Cupid" in the British National Gallery, the "Io" and the "Leda" in the Berlin gallery, the "Danaë" in the Borghese gallery, Rome, and the "Antiope" in the Louvre. Whether Correggio ever visited Rome is uncertain; his work bears no evidence of his ever having been there, and it is most likely that he never went so far from home. The story, too, that he visited Bologna, and there exclaimed on seeing the picture of Saint Cecilia by Raphael, "Anch' io son pittore!" ("And I too am a painter!") cannot be traced to any authority, and seems to have no foundation in fact. In 1519 he married Girolama Francesca Merlini, by whom he had a son, Pomponio Quirino Allegri, who also became a painter, but never attained any distinction (born 1521, died ——?), and also three daughters. Correggio died in his native town suddenly of a malignant fever, Mar. 5, 1534, in the forty-first year of his age. The principal works of Correggio are the frescoes on the dome of the church of San Giovanni, and those on the dome of the cathedral at Parma, reckoned his greatest performances. The first was executed in 1520, and represents the ascension of Christ; the second, begun in 1522 and finished in 1530, represented the assumption of the Virgin. These works have given Correggio his splendid fame, but his smaller works have perhaps endeared him more to the world—his "Vierge au Panier;" his "Education of Cupid" in the British National Gallery; the "Reading Magdalen" of the Dresden gallery; and the beautiful "Notte," or "Night," a picture of the Nativity, called so because the light all streams from the head of the infant Christ; the "Marriage of Saint Catherine" in the Louvre; the "Madonna and Child" in the Uffizi gallery in Florence; and the "Madonna" in the Naples gallery, called the "Zingarella," or the Gypsy, because of her singular head-dress. (VASARI, "Lives of Painters and Sculptors," "Life of Antonio da Correggio," with additional notices in his life of Girolamo Carpi; PADRE LUIGI PUNGILEONI, "Memorie istoriche di Antonio Allegri," Parma, 1818; QUIRINO BIGI, "Discorso di Ant. Allegri," Parma, 1860, and a later work on the subject by the same author, "Notizii di Antonio Allegri e di Antonio Bartolotti, suo maestro," Modena, 1873. But chiefly for an exhaustive account of Correggio's life and works see the article (since reprinted as a separate work) "Antonio Allegri," by Dr. Julius Meyer, in his new edition of NAGLER, "Allgemeines Kunstler Lexicon," Leipsic, 1870.)

CLARENCE COOK.

Correla'tion [from the Lat. *correlatio*, "mutual relation"] **of Forces** (otherwise called **Transmutation of Force** or **Energy**), a phrase of recent origin employed to express the theory that any one of the various forms of physical force may be converted into one or more of the other forms. The cardinal point in this theory is the doctrine of heat and its relation to other agents, especially to mechanical motion—the doctrine commonly known as the mechanical theory of heat, and which is of very recent date. In the number for May, 1842, of a German scientific journal (*Annalen der Chemie und Pharmacie*) there appeared a short article of only thirteen pages by Julius Robert Mayer, a physician of Heilbronn, entitled "Observations concerning the Forces of Inanimate Nature." In

this article it was affirmed, for the first time, that there exists a connection between mechanical work and heat by which the one could be converted into the other, mechanical work being obtained by the expenditure of heat, and heat being also obtained by the expenditure of work; there being, under all circumstances, one constant ratio between the quantity of heat and the amount of work. Soon afterwards, though apparently without any connection with the German statement, an English physicist (Joule of Manchester) experimentally demonstrated what Mayer had only asserted, and the scientific world came into possession of a new principle, now technically known as the principle of the equivalence of heat and work.

In the light of this principle it has been demonstrated that heat is nothing more nor less than a certain mode of motion. The heat manifested, *e. g.*, when we rub two flat surfaces briskly against each other, is only our own muscular motion checked by the friction, and changed thereby into the heat which the surfaces reveal. On the other hand, this muscular motion is only the heat of our bodily frame expending itself in this way. In either case the energy has not been annihilated, but only transferred, and appears in a new form. It has long been known that the actual force of a moving body may be changed into the molecular energy of heat. Pieces of dry wood when rubbed together will become so hot as to ignite; the boring tools of a carpenter become hot by being used; when a piece of metal is rubbed vigorously on a rough surface, it becomes too hot to hold. Again, when a train in motion is brought to a stand-still by applying a brake, the rails become hot, and sparks are seen to fly from the wheels. Bullets shot at a target sometimes show signs of fusion after impact. In all these cases the energy of visible motion is transmuted into heat. The amount of the one form of energy which will produce a given amount of the other has been accurately calculated. If a weight of one pound be raised to a height of 772 feet and be let fall, on striking the ground it will generate as much heat as will raise 1 pound of water 1° F.

By a conception of Carnot, a principle which may be termed the reversibility of force has been established. If a certain amount (A) of one form of force produce in disappearing an amount (B) of another form, then B is the quantity of the latter which must disappear in order to the production of an amount A of the former. By Carnot's principle, if an engine, by consuming a certain amount of heat, does a given quantity of work, by the consumption of a similar amount of work it would restore to the source the quantity of heat taken from it. This principle of Carnot is, however, only true in abstract theory. Its verification in practice would exact conditions which cannot be realized; for, though mechanical force can be wholly transformed into heat, it is not possible, by any kind of engine, to transform the heat received from a given source wholly into work. Every such engine abandons by far the larger portion of the heat which it receives, totally unchanged, to a recipient suitable to absorb it (the condenser in the Watt engine—the atmosphere in the case of the high-pressure steam-engine); and if any such engine were "worked backward," to use Carnot's expression, it would not restore to the source all the heat drawn from it during the working forward, unless what was in the first instance an absorbent of heat should become in its turn a source, and should give up the large amount of heat previously abandoned, to be restored by transfer, and not as the result of transformed work. In the case of other forms of force, the process of reversal is attended with equal and sometimes with greater difficulties. The reciprocal interchange is perhaps best illustrated between electricity (dynamic) and chemical affinities.

Visible kinetic force is changed into the kinetic energy of electricity by a magneto-electric machine, and into the potential energy of electricity when a plate of glass is made to revolve against a surface of silk. Again, the actual energy of electricity is transformed into force (or energy) of visible motion when a piece of iron is drawn to the poles of an electro-magnet, when two wires conveying electric currents attract one another, or when a current is made to pass through a wire which is nearer a magnetic needle, and the needle is in consequence forcibly deflected by the current.

Suppose the strength of a current of electricity passing along a wire to be measured by its power to deflect a magnetic needle. Suppose the wire to be of copper, and the amount of deflection noted, and then let the copper be replaced by platinum, which offers a greater resistance to the current. It will be found that the wire becomes hot, and that the needle is deflected through a smaller angle. Energy of heat is here produced at the expense of the energy of electricity in motion. With powerful batteries all metals are fused, even iridium and platinum, which are the least fusible. A battery of thirty or forty Bunsen's cells will volatilize fine wires of lead, tin, zinc, copper, gold, and silver.

When a bar of antimony and a bar of bismuth are soldered together at one extremity, and the free ends united by a copper wire, on the application of heat a current of electricity is found to circulate through the wire, and the strength of the current is an exact and delicate measure of the heat applied. When a crystal of tourmaline changes temperature, its extremities assume opposite electric states, thus affording an example of the change of heat into the potential energy of electric separation. The voltaic arc is a brilliant example of the conversion of electricity into the actual energy of radiant heat and light.

The force of chemical action, or separation, and heat are convertible. A given amount of chemical action produces a definite amount of heat, and this quantity of heat is required to reverse the chemical changes which have produced it. It is difficult to determine accurately the amount of heat equivalent to a given amount of chemical action, chiefly because it is very difficult to confine the transformation of energy to these two forms only; nevertheless, the relation between the amount of heat evolved and the quantity of chemical action has been determined by several eminent physicists; for example, Rumford calculated that 1 gramme of charcoal in combining with $2\frac{2}{3}$ grammes of oxygen to make carbonic acid would evolve heat sufficient to raise the temperature of 8000 grammes of water 1° C. Andrew made the quantity 7900 grammes, and Favre and Silbermann 8080 grammes. Hence, the true quantity must be near 8000 grammes. One gramme of hydrogen, in combining with 8 grammes of oxygen to form water, evolves heat sufficient to raise about 34,000 grammes of water 1° C. (Andrews, 33,881; Favre, 34,462). Similarly, the quantities of heat evolved in the combustion of other elements have been found with equal precision.

The chemical action in a voltaic battery produces electricity. Just as a definite amount of carbon, by its union with oxygen, produces a determined quantity of heat, so the consumption of a definite amount of zinc in the battery produces a definite quantity of electricity, which in its turn gives rise to an invariable amount of heat. When the poles of the battery are connected by a very good conductor, such as a short thick wire, the heat produced is confined to the battery itself; but when a less perfect conductor is used, heat manifests itself in the conductor. In this case part of the heat is in the wire and part in the battery, but the whole amount of heat produced in all the parts of the current by the consumption of a given quantity of zinc is the same in this case as in the other. If the electric current be used to do other work, a corresponding amount of heat is withdrawn from the battery.

Suppose two tubes of glass, closed at one end, to have pieces of platinum wire fused into the closed ends, and to be filled with water and placed with the open ends under water in the same vessel. Let the poles of a battery be connected with the platinum wires. The water will be decomposed, oxygen collecting in one tube and hydrogen in the other. The amount of gas set free in a given time will be proportional to the strength of the current. If the battery be taken away, and the ends of platinum be connected by a copper wire, the gas will soon disappear; and while it is passing into water, a current will be found to circulate through the wire in a direction opposite to that which produced the decomposition. Here, then, electricity in motion produces energy of chemical separation, and the latter again reproduces the former.

Although we may estimate the exact equivalents of the various forms of energy, we are not always able to reverse a given transmutation. A given quantity of mechanical work will produce an equivalent amount of heat, and if all this heat could be changed into mechanical work the original amount would be produced; but we are never able to reconvert all the heat into work. Energy which cannot be reconverted to its previous form is said to be dissipated. Dissipation of energy is constantly going on throughout the universe. Thus, the energy of the sun's rays produces streams of water, winds, and currents. By its action on plants it separates carbon from oxygen—a process which is reversed when wood is ignited. The moon and the sun give rise to tidal energy. *Through all these channels energy is being constantly dissipated.*

Actual force, of all forms, may be transformed into potential force, and may remain in this state for an indefinite period of time. The energy of heat, which is derived from the combustion of coal, was originally derived from radiant heat and light received from the sun, but has been remaining in store for ages.

It is sometimes affirmed that there can be neither creation nor annihilation of energy; but the inexactness of this statement appears from the profound mathematical demonstrations which Clausius of Bonn has recently applied to

the mechanical theory of heat. He has shown that while motion may be converted into heat, and the heat, *to a certain degree*, may be reconverted into motion, yet in the latter process there is always a residuum of heat which cannot be reconverted. Now, as mechanical motion is all the while in the process of conversion into heat, and this at a prodigious rate through the universe, there is thus going on continually an increase of heat and a diminution of motion; and unless this tendency is checked by the interposition of some power other than the forces now acting in the universe, it must result in an equalization of temperature everywhere, and the cessation of all mechanical motion. But such a condition is not yet reached, therefore the universe cannot be eternal, and must therefore have had its existence through some source other than itself. The universe thus starts with a miracle, and it of course follows that miracles are possible at any stage of its continuance. (GROVE, "On the Correlation of Forces;" FICK, "Ueber die Naturkraefte in ihrer Wechselbeziehungen;" CLAUSIUS, "On the Mechanical Theory of Heat;" SIR JOHN HERSCHEL'S "Lectures.")

REVISED BY J. H. SEELYE.

Corrèze, a department of France near its centre, is a part of the former province of Limousin. Area, 2265 square miles. It is drained by the rivers Dordogne, Vezère, and Corrèze. The surface is hilly; the soil is mostly poor. The staple productions are grain, timber, coal, copper, lead, iron, and chestnuts. Capital, Tulle. Pop. 310,843.

Cor'rie (FREDERICK H.), U. S. M. C., entered the marine corps as a second lieutenant in 1861, became a first lieutenant in 1861, and a captain in 1870. He led the marines of the Powhatan in the assault on Fort Fisher of Jan. 15, 1865, and at the close of the war was brevetted a captain "for gallant and meritorious conduct."

FOXHALL A. PARKER, U. S. N.

Corrien'tes, a province of the Argentine Republic, is bounded on the N. by the river Paraná, on the S. E. by the Uruguay, which separates it from Brazil, and on the W. by the Paraná. Area, about 45,455 square miles. The surface is occupied by extensive forests and swamps; the soil is fertile. Capital, Corrientes. Pop. in 1869, 129,023.

Corrientes, the capital of the above province, is on the right bank of the Rio Paraná, here 2 miles broad, a few miles below the confluence of the Paraguay. It has a good harbor, and exports meat, wool, etc. Pop. in 1869, 11,218.

Corro'sive Sub'limate, a name given to mercuric chloride (bichloride of mercury), ($HgCl_2$), a virulent and corrosive poison. (See SUBLIMATE.)

Corr's, a township of Pickens co., Ala. Pop. 495.

Cor'rugated [from the Lat. *con*, intensive, and *rugo, rugatum*, to "wrinkle" (from *ruga*, a "ridge" or "fold")] **Iron,** a name applied to iron in thin plates or sheets which are passed between rollers, producing grooves and ridges in the iron. In this manner the strength of the material is greatly increased, while the square surface of the iron is of course reduced. Corrugated iron is of great value in the construction of buildings, especially for roofs, where lightness and strength are to be combined. It is much used for covering the walls of frame buildings, both within and without. It is frequently "galvanized"—*i. e.* covered with a thin layer of zinc by dipping it in a bath of the fused metal.

Corruption of Blood. See ATTAINDER.

Cor'ry, a city of Erie co., Pa., at the crossing of the Philadelphia and Erie and the Atlantic and Great Western R. Rs., and the terminus of the Oil Creek and Alleghany and the Buffalo Pittsburg and Corry R. Rs., 37 miles S. E. of Erie. It has two national and one savings bank, a daily and three weekly newspapers, a large oil refinery, and numerous large manufactories (making mowers and reapers, boring-machines, pails, furniture, barrels, brushes, and stationary engines), tanneries, blast furnace, etc. There are in the city nine churches, four schools, a park, and a library. Corry has grown up since 1860. Pop. 6809.

J. A. PAIN, ED. CORRY "DAILY BLADE."

Cor'rytown, or **Flat Creek,** a post-village of Root township, Montgomery co., N. Y., 4 miles S. of Canajoharie. On July 9, 1781, a party of 500 Indians and Tories, under one Doxtader, attacked and burned Corrytown, killing many of the inhabitants and making prisoners of many more. Next day Col. Willet, with 150 men, surprised and defeated them with severe loss.

Corseul (anc. *Fanum Martis*), a village of France, department of Côtes-du-Nord, 26 miles E. of Saint-Brieuc. Here are many Roman remains. Pop. about 4500.

Cor'sica [anc. *Cyrnos*, afterwards *Corsica;* Fr. *La Corse*], an island in the Mediterranean, situated between lat. 41° 20′ and 43° N., and lon. 8° 30′ and 9° 30′ E., 55 miles from Italy and 110 from France. It is separated from Sardinia by the Strait of Bonifacio, 9 miles wide. It is 110 miles long N. and S., and is 53 miles wide at the broadest part. Area, 3367 square miles. The W. coast is deeply indented by the Gulfs of Calvi, Porto, Ajaccio, and Valinco. The interior is traversed by a mountain-chain, the highest peak of which, Monte Rotondo, rises near the centre of the island, 8504 feet above the level of the sea. The mountains are mostly covered with forests of oak, pine, cork tree, chestnut, beech, etc. The rearing of cattle and mules is the chief branch of industry. The orange, fig, almond, olive, and citron flourish here. Among the minerals of Corsica are iron, antimony, lead, granite, porphyry, marble, and limestone. The chief towns are Ajaccio, Bastía, and Calvi. Corsica was first colonized by the Phœnicians, who called it *Cyrnos*, was conquered by the Carthaginians, and wrested from them by the Romans soon after 237 B. C. The Genoese became masters of it in 1481. It was ceded by the Genoese to France (of which it forms the eighty-sixth department) in 1768. Pop. 259,861.

Corsica, a post-borough of Jefferson co., Pa. P. 372.

Corsica'na, a city, capital of Navarro co., Tex., on the Houston and Texas R. R., 180 miles N. N. E. of Austin City. Two weekly papers are issued here. It is the seat of Corsicana Military Institute. Pop. 80.

Cor'so, an Italian word for a "race-course" [from the Lat. *cursus*, a verbal noun from *curro, cursum*, to "run"], is often used in Italy as the name of the principal streets of the larger towns. The Corso of Rome is famous as the scene of the diversions of the Carnival.

Cor'son (HIRAM), an American scholar, born in Philadelphia in 1828, became a teacher, and was (1849–53) connected with the Library of Congress and that of the Smithsonian Institution. He was professor of history and rhetoric in Girard College (1865–66), and held a similar position in St. John's College, Annapolis, Md., 1866–70, when he became professor of English language and literature, etc. in Cornell University. He has published Chaucer's "Legende of Goode Women," "Handbook of Anglo-Saxon and Early English," and other valuable works, and has also prepared with great labor a "Thesaurus of Early English."

Cors'sen (WILLIAM PAUL), an eminent German philologist and antiquary, born at Bremen in 1820, was for several years professor at the gymnasium at Stettin, and subsequently at the Landesschule at Pforta until 1866, when he resigned on account of his health. He published a highly important work on "The Pronunciation, Vocalism, and Accentuation of the Latin Language" (2 vols., 1858–59; 2d ed. 1867–69), which received a prize from the Berlin Academy of Science, and is regarded as the best work thus far published on this subject. His essays on the dialects of ancient Italy are also among the best that have been written.

Cort (CORNELIS), a Dutch engraver, born at Horn in 1536. He opened a school in Rome, and produced many good engravings after Titian, Raphael, and other masters. Among his works is "The Transfiguration," after Raphael. Died in 1558.

Cor'te, a fortified town in the interior of Corsica, is situated on the Tavignano. Pop. 6094.

Cor'tes [the plu. of the Sp. *corte*, a "court"], the name of the national assembly or legislature of Spain. The Cortes of Leon, Castile, and Aragon originated about the twelfth century, and were composed of the nobility, dignified clergy, and the representatives of the towns. In the fourteenth century the power of the Cortes seems to have been at its height, after which it gradually declined, and under the reign of Ferdinand and Isabella was reduced almost to a nullity. After the time of Philip II. the Cortes of Spain were only convoked occasionally on the accession of kings, and their sittings were a mere form. A Cortes elected by universal suffrage in 1869 adopted a new and liberal constitution. The Cortes at present consist of a senate, elected for twelve years, and a lower house of deputies, elected for three years, on the basis of one deputy for every 40,000 inhabitants. The number of senators is four for each province. The name is also applied to the legislature of Portugal.

Cor'tez (HERNANDO), the conqueror of Mexico, was born at Medellin, in Estremadura, Spain, in 1485. He studied law at the University of Salamanca, and sailed to the New World to seek his fortune in 1504. He served with distinction under Velasquez in the conquest of Cuba in 1511, after which he married Catalina Juarez, and became the owner of an estate in Cuba. In 1518 he was appointed by Velasquez to conduct an expedition against Mexico, which had recently been discovered. He sailed from Cuba with eleven vessels and about 700 men in Feb., 1519, his pro-

fessed object being the conversion of infidels. He defeated an army of the natives at Tabasco, and landed on the site of Vera Cruz, where he destroyed his ships, to induce his men to fight with more desperate courage when they knew that it was impossible to save themselves by retreat. He learned that he had entered the extensive empire of Montezuma, who reigned over Anahuac and possessed immense treasures of gold and silver. In Aug., 1519, he left the sea-coast and marched against Mexico or Tenochtitlan, the capital of Anahuac. Having defeated the Tlascalans in several battles, he entered Mexico without resistance in Nov., 1519, and was received with friendly demonstrations by Montezuma. The audacious Spaniard seized Montezuma in his own palace, kept him as a prisoner, and extorted from him a large quantity of gold. The captive prince was persuaded or forced to swear allegiance to Charles V., but he refused to adopt the religion of the Spaniards. Velasquez, who was jealous of Cortez, sent Narvaez with about 1000 men to supersede Cortez, or operate against him in case he should not submit. Leaving a part of his force at Mexico, Cortez marched with 250 men to encounter Narvaez, whom he defeated and took prisoner at Zempoalla in 1520. He persuaded the soldiers of Narvaez to enlist in his service, and he returned to Mexico, the people of which, during his absence, had revolted against the Spaniards. In the fight, which continued several days, Montezuma was killed by his own subjects, and the Spaniards were driven out of the city. Cortez gained a victory at Otumba in July, 1520, and took Mexico in 1521. He treated the vanquished with great cruelty. In 1522 the king of Spain appointed him governor and captain-general of the conquered country, called New Spain. Cortez returned to Spain in 1528, in order to vindicate himself against the accusations of his enemies, and was received with favor at court. He returned to Mexico in 1530 with diminished power in civil affairs, but retained the command of the army. Having again sailed to Spain in 1540, he accompanied Charles V. in his expedition against Algiers in 1541. He died at Seville Dec. 2, 1547. (See PRESCOTT, "History of the Conquest of Mexico;" GOMARA, "Historia de F. Cortez," Rome, 1556.)

Cor'tile [It. *cortile*, from *corte*, a "court"], an open quadrangular or covered area in a dwelling-house, surrounded by the buildings or offices of the house itself. It means also a courtyard.

Cort'land, a county near the central part of New York. Area, 485 square miles. It is drained by the Otselic and Tioughnioga rivers. The surface is moderately uneven; the soil is fertile. Cattle, grain, wool, and dairy products are raised extensively. Lumber, flour, cheese, iron and other metallic wares, and carriages are the chief manufactures. It is intersected by the Syracuse Binghamton and New York and the Utica Ithaca and Elmira R. Rs. Capital, Cortland. Pop. 25,173.

Cortland, a village, the capital of the above county, is on the Tioughnioga River and on the Syracuse Binghamton and New York, the Midland, and the Utica Ithaca and Elmira R. Rs., 36 miles S. of Syracuse. It has six churches, a national and a State bank, a State normal school, a lecture association and reading-room, and three newspapers. It is in Cortlandville township. Pop. 3066.

W. HOOKER, ED. "STANDARD AND JOURNAL."

Cortland, a township of Spottsylvania co., Va. Pop. 2222.

Cort'landt, a township of Westchester co., N. Y., on the Hudson River, about 40 miles N. of New York City. It contains the large village of Peekskill. Pop. 11,694.

Cort'landville, a township of Cortland co., N. Y. It contains Cortland Village and McGrawville, and has extensive manufactures of lime, etc. Pop. 6082.

Corto'na (anc. *Corytum* or *Corythus*, afterwards *Cortona*), a town of Italy, in the province of Arezzo, is on a high hill near the Lake of Thrasymene, 50 miles S. E. of Florence. It is the seat of a bishop, and has an old cathedral, which contains fine works of art; a castle built by the Medici, a theatre, a museum of Etruscan curiosities, and a famous academy of sciences. Here was one of the twelve chief cities of ancient Etruria. Its ancient cyclopean walls, supposed to have been erected 3000 years ago, remain perfect in two-thirds of their extent. Etruscan bronzes of exquisite beauty have been found here.

Corun'dum, Sapphire, Ruby, Oriental Amethyst, Oriental Topaz, Adamantine Spar, Salamstone, or **Emery,** a mineral consisting, when pure, of native oxide of aluminum, which is, however, almost invariably mixed with magnetic oxide of iron. It occurs crystallized, massive, granular, in impalpable powder, and in layers. Mineralogically, corundum is divided into three varieties: (1) Sapphire, which includes the purer kinds, as sapphire, ruby, oriental topaz, etc.; (2) corundum proper, the duller kinds crystallized or semi-crystalline, including adamantine spar; and (3) emery, the darker and coarser kinds.

The specific gravity of corundum is about 4, while in hardness it is next to the diamond. It becomes strongly electrical by friction. Its crystalline form is rhombohedral. The ruby or red sapphire is valued next to the diamond, and beyond a certain size (three and a half carats) as equal to it in value. Its color is supposed to be due to chromic acid, but the amount of coloring-matter is so small that it eludes the ordinary tests. The crystals are seldom above half an inch in length. Two crystals an inch in diameter and about two inches long are said to be in the possession of the king of Burmah. The largest ruby known came from China, and after having been in the possession of Prince Mentzikoff, was finally made one of the jewels of the Russian crown. The largest rubies come from the Capelan Mountains, Ava. Smaller ones are found in Saxony and Bohemia, and occasionally in other localities in Europe and the U. S. The blue sapphire occurs much larger, crystals three inches in length being sometimes found. The crystals sometimes exhibit a radiated interior with a play of colors, when it is known as asteria or asteriated sapphire. Sapphires are brought from Ceylon, India, and China, principally from the first-named country. Fine specimens are often found in the beds of streams, whither they have been carried after the decomposition of the rock originally enclosing them. The light-blue sapphires are often exposed to fire by lapidaries to render them more brilliant. With those from Epailly in France heating deepens the color. White sapphires are sometimes cut and passed for diamonds, which they much resemble. The Brazil sapphire is a blue tourmaline.

The Greek σάπφειρος, from which the name was derived, was, according to Dana, not our sapphire, but the stone now known as lapis-lazuli. Rubies and sapphires contain about 1 per cent. of magnetic oxide of iron.

Adamantine spar occurs in brownish crystals. It was used by the ancients as a polishing material, and continues to be used for fine work. The chief supplies are brought from China and the Ural Mountains. Salamstone occurs in pale reddish or bluish transparent crystals. Corundum is found abundantly in Chester co., Pa.

Emery, or "Armenian stone," is mined in Naxos at Cape Emeri, in the vicinity of Smyrna, Asia Minor, in Saxony, the Ural Mountains, Greece, Spain, etc., and in the U. S. at Chester, Mass., and in North Carolina. It occurs in gneiss, granite, mica slates, and in some cases in limestone rocks. Small specimens are also found in several other localities. It is used as a polishing material. The rock is broken up by hammers, and then reduced to powder and sifted, after which, for the preparation of the finer kinds, elutriation is practised. Emery stones and wheels are made by pressing the powder, made into a paste with water, into moulds, and then exposing them to a high heat, no cementing material being required. Emery vulcanite for polishing wheels is made by mixing emery with rubber and sulphur, and vulcanizing in moulds. (See INDIA-RUBBER.) Emery contains from 13 to 30 per cent. of magnetic oxide of iron. The Naxos emery contains about 24 per cent., and the Chester emery, averaging about the same, contains from 9 to 50 per cent. The value of the samples is determined by the amount of glass which a given quantity will wear away. The Ceylon sapphire, which is taken as a standard, wears away four-fifths of its weight of glass. The consumption of emery in the United Kingdom is put at 2000 tons per annum. (See EMERY; also valuable papers on emery by J. Lawrence Smith and C. T. Jackson in Silliman's "American Journal of Science" [2d series], vii. 283; ix. 289; x. 354; xxxix. 87; xl. 112, 123.)

C. F. CHANDLER.

Corun'na, a province of North-western Spain, forming the N. W. part of Galicia, having the ocean W. and N., Lugo E., and Pontavedro S. It has fine forests and pastures and arable lands, besides iron-mines. Area, 3079 square miles. Capital, Corunna. Pop. 609,337.

Corunna [anc. *Adrobicum;* Sp. *Coruña*], a fortified city and seaport of Spain, capital of a province of its own name, is on the Atlantic Ocean, 320 miles N. W. of Madrid; lat. 43° 22′ N., lon. 8° 24′ W. It has a safe harbor defended by two forts, and a lighthouse, which is called the Tower of Hercules, and is ninety-two feet high. It has a citadel, court-house, custom-house, arsenal, theatre, and the palace of the captain-general. Here are manufactures of linen and hats, cordage, canvas, and cigars. On Jan. 16, 1809, a battle occurred here between the French marshal Soult and the British general Sir John Moore, who was killed. Pop. 27,354.

Corunna, a post-village, capital of Shiawassee co., Mich., on the Shiawassee River and the Detroit and Mil-

waukee R. R., 75 miles N. W. of Detroit. It has a national bank, two iron-foundries, and one weekly newspaper. Pop. 1408.

Corval'lis, the county-seat of Benton co., Or., on Willamette River, 100 miles S. of Portland, contains the State Agricultural College, an academy, two public schools, three large saw and planing mills, a number of brick stores, and two weekly newspapers. It is surrounded by a rich agricultural country, which is very healthful. Steamboats visit the town during two-thirds of the year. The principal export is wheat. R. G. HEAD, ED. "DEMOCRAT."

Corvée [etymology doubtful], a French term denoting, in feudal law, the obligation of the inhabitants of a district to perform certain services for the sovereign or feudal lord. Some of these services were performed gratis, others for wages below the value of the labor.

Corvette [from the Lat. *corbis*, a "basket," probably so called from some fancied resemblance in shape], a small vessel of war having three masts, flush decks, and one tier of guns on the upper deck. The masts are square-rigged. A corvette rarely carries more than twenty-six guns.

Corvi'nus (MATTHIAS) **I.,** king of Hungary, a son of John Huniades, was born at Klausenburg in 1443. He was elected king in 1458. He waged war against the emperor Ferdinand III., the Turkish sultan, and the king of Poland. In 1485 he captured Vienna. He had superior military talents and was an able ruler. Died in 1490. (See WENZEL, "Matthias Corvinus," 1810.)

Cor'vus (M. VALERIUS), a famous Roman general, born about 370 B. C., was elected consul in 348. He defeated the Samnites in 343, and was chosen dictator in 342 and in 301 B. C. In the year 299 he was elected consul for the sixth time. Died about 270 B. C.

Cor'win, a township of Ida co., Ia. It contains Ida, the county-seat. Pop. of township, 165.

Corwin (THOMAS), an American statesman and orator, born in Bourbon co., Ky., July 29, 1794, removed to Ohio in early youth, and studied law, which he practised with distinction. He was elected a member of Congress in 1830, joined the Whig party, and advocated the election of Gen. Harrison in 1840 by effective public speeches. In the same year he was chosen governor of Ohio. He was elected to the Senate of the U. S. in 1845, and was appointed secretary of the treasury by President Fillmore in July, 1850. In 1858 he was chosen a member of Congress. He was sent as minister to Mexico in 1861, returned home in 1864, and died Dec. 18, 1865.

Cor'wine, a township of Logan co., Ill. Pop. 1069.

Coryban'tes [Gr. Κορύβαντες, the plural of Κορύβας; etymology doubtful], the name of the frantic priests of Cybele or Rhea. They were distinct from the Galli, who were eunuchs and priests of the same goddess. They celebrated the festivals of Cybele with orgiastic dances and loud cries, beating on timbrels, and cutting their flesh with knives.

Cor'ydon, a post-village, capital of Harrison co., Ind., is on Indian Creek, 115 miles S. of Indianapolis. It has two weekly newspapers, a furniture factory, two flour-mills, and an academy. It is a handsome place, has a sulphur spring, and is quite a summer resort. It was the capital of the State until 1824. Pop. 747.

GEO. W. SELF, ED. "REPUBLICAN."

Corydon, a post-village, capital of Wayne co., Ia., about 65 miles S. by E. from Des Moines, has two weekly newspapers. Pop. 618; of Corydon township, 1277.

Corydon, a township of McKean co., Pa. Pop. 169.

Corydon, a post-township of Warren co., Pa. P. 411.

Coryell, a county of Central Texas. Area, 960 square miles. It is intersected by the Leon River and Cowhouse Creek. The surface is undulating; the soil fertile. Stock-raising is the chief pursuit. Corn and wool are raised. The county has some timber, and is rather dry, but very healthy. Capital, Gatesville. Pop. 4124.

Coryla'ceæ [from *Corylus*, one of the genera], a name given to a natural order of exogenous trees and shrubs, which some botanists call Cupuliferæ. It contains the oaks, chestnuts, beeches, hazels, etc.

Corylus. See HAZEL-NUT.

Cor'ymb [Lat. *corymbus;* Gr. κόρυμβος, the "top" of anything; also a "cluster of flowers or fruit"], in botany, a form of inflorescence consisting of a central axis and lateral pedicels, of which the lower are longer than the upper, and the lengths of the pedicels are so graduated that the flowers are all on the same level, as in the *Spiræa, Kalmia,* and *Cratægus* (hawthorn).

Cor'ypha [from the Gr. κορυφή, "summit"], a genus of tropical fan-leaved palms, one of which, the *Corypha umbraculifera,* or talipot palm, grows in Ceylon to the height of sixty or seventy feet. The leaves of it are used as fans and umbrellas.

Coryphæ'us [Gr. κορυφαῖος], sometimes written in English **Corypheus,** the leader of the chorus in ancient dramas, by whom the dialogue between the chorus and the other actors of the drama was carried on, and who led in the choric song. The name is metaphorically applied to any great leader; thus Dr. Samuel Johnson is sometimes called "the coryphæus of English literature."

Cos, or **Kos** [Gr. Κῶς], called also **Stan'chio,** an island of Asiatic Turkey, in the Mediterranean, is separated from the coast of ancient Caria by a channel about three miles wide. It was called *Lango* in the time of the Knights of Rhodes. It is nearly 22 miles long and 5 miles wide. Area, 85 square miles. The surface is partly hilly, the soil is fertile, and the climate delightful. Among the products are cotton, silk, wine, and fruits. In ancient times it contained a celebrated temple of Æsculapius, and was the native place of Hippocrates, Apelles the great painter, and Ariston the philosopher. Cos is also the name of a seaport-town on this island. Its port is visited by many merchant-vessels. Pop. about 8000, two-thirds of whom are Greeks.

Cosa'la, a Mexican mining-town in the state of Sinaloa, 200 miles S. E. of El Fuerte. Pop. about 7000.

Cosen'za, a province of Italy, bounded on the N. by Basilicata, on the S. by Catanzaro, and on the E. and W. by the sea. It is mountainous, and produces rice, saffron, honey, oil, and wine. Capital, Cosenza. It was formerly named Calabria Citeriore. Area, 2840 square miles. Pop. in 1871, 443,483.

Cosenza (anc. *Consentia*), a fortified city of Italy, capital of the above province, is at the confluence of the rivers Crati and Busento, 12 miles E. of the Mediterranean. It is the seat of a bishop, and contains a fine court-house, a cathedral, a royal college, a theatre, several convents, and an old castle which has been converted into barracks. It has manufactures of cutlery and earthenware, and an active trade in silk, wine, manna, rice, etc. Consentia was the ancient capital of the *Bruttii.* Pop. 11,649.

Coshoc'ton, a county of N. E. Central Ohio. Area, 516 square miles. It is drained by the Tuscarawas and Walhonding rivers, which unite here to form the Muskingum. The surface is partly hilly; the soil is fertile. Cattle, grain, and wool are largely raised, and manufactures are varied and quite important. Coal and iron are abundant here. It is intersected by the Pittsburg Cincinnati and St. Louis R. R. Capital, Coshocton. Pop. 23,600.

Coshocton, a post-village, capital of the above county, is on the Muskingum River just below the junction of the Tuscarawas and Walhonding, on the Ohio Canal and on the Pittsburg Cincinnati and St. Louis R. R., 69 miles E. N. E. of Columbus. A bridge across the river connects it with Roscoe. Coshocton has two weekly newspapers, iron and steel works for axles, springs, and iron bridges, a paper-mill, and one national bank. Pop. 1754.

T. W. COLLIER, JR., ED. COSHOCTON "AGE."

Cosmog'ony [Gr. κοσμογονία, from κόσμος, the "world," and γένω, to "originate"], the science or theory which treats of the origin of the universe. If we except the cosmogony of the East Indians, the earliest extant is that of Hesiod, which is delivered in hexameter verse. The first prose cosmogonies were those of the early Ionic philosophers, of whom Thales, Anaximenes, Anaximander, and Anaxagoras are the most celebrated. In modern times a "Theory of the World" has been produced by Burnet. We do not include in this list of cosmogonies the researches of modern geologists, or the systems to which they have led. The different theories of the origin of the world may be comprehended under three classes: 1st. Those which suppose the world to have existed from eternity under its actual form. Aristotle embraced this doctrine, and, conceiving the universe to be the eternal effect of an eternal cause, maintained that not only the heavens and the earth, but all animate and inanimate beings, are without beginning. 2d. Those which consider the matter of the universe eternal, but not its form. This was the system of Epicurus and most of the ancient philosophers and poets, who imagined the world either to be produced by the fortuitous concourse of atoms existing from all eternity, or to have sprung out of the chaotic form which preceded its present state. 3d. Those which ascribe both its matter and its form to the direct agency of a spiritual cause.

The account given in Genesis of the creation is obviously not a scientific cosmogony, which would not only have been out of place in a divine revelation intended especially to impart religious truth, but would, if given in a scientific

form (since science is constantly progressing and therefore changing), have been adapted to a single age or period only. Or, supposing the highest and *ultimate* facts of science had been given, it would have been so far in advance of all scientific thought yet reached, or that will be reached perhaps for fifty thousand years to come, that it would be wholly unintelligible, and would in all probability appear utterly absurd even to the most advanced intellects. Therefore those few great facts which were necessary to be indicated in order to point out the relation between the Creator and his works have been presented in a popular rather than a scientific form. Nor can it be said that they are any the less true because not presented in scientific phraseology.* An excellent exposition of the harmony between the Mosaic and the geological record of creation is given by Prof. Dana at the end of his "Manual of Geology," to which the reader is referred. (See also TAYLER LEWIS'S "Six Days of Creation.")

Cosmos, a post-township of Renville co., Minn. P. 62.

Cosne (anc. *Condate*), a town of France, in the department of Nièvre, on the Loire, 29 miles N. N. W. of Nevers. It has manufactures of hardware, cutlery, and anchors. Pop. 6575.

Cos'sa, a township of Perry co., Ark. Pop. 240.

Cos'sack [a term of Turkish origin, said to signify "robber"]. The Cossacks are a Slavic race intermixed with Kalmucks and Tartars. They are divided into two classes—the Cossacks of the Don and the Cossacks of Little Russia, or Malo-Russian Cossacks. The latter were not known by the name of Cossacks until 1516. Stephen Bathori, king of Poland, formed them into regiments, under the control of a hetman or ataman, in 1592. They placed themselves under the protection of Russia in 1654, and revolted in 1708. The Cossacks of the Don entered the service of Russia in the sixteenth century. Their territory now constitutes a government (province) of European Russia, with an area of 59,654 square miles, and a population in 1867 of 1,010,135. Tscherkask, their capital, destroyed by fire in 1744, was rebuilt in 1805. They are extensively colonized in Siberia.

The principal hetman (ataman) of the Cossacks is the heir-apparent of the Russian empire. The Cossacks serve in the army both as irregular cavalry and as light artillery. In 1870 there were 183,007 Cossacks, including officers, enrolled in the Russian service. This enrolment includes all the males. More than 30,000 were in the latter year serving in the Russian line, chiefly in Siberia. They also serve to some extent in the Turkish army.

Cos'ta (Sir MICHAEL), a musical composer, born in Naples in Feb., 1810, manifested early a taste for music, and studied under Tritto. He became conductor of the London opera in 1831. He has written "Kenilworth" and "Sir Huon," ballets, "Malek Adel," which failed in Paris, and "Don Carlos," operas, and "Naaman" and "Eli," oratorios.

Costa-Cabral, da (ANTONIO BERNARDO), count of Thomar, a Portuguese statesman, born May 9, 1803, became a judge of Lisbon, and entered the ministry in 1836. He controlled the government, supported by the court, and by oppressive unconstitutional measures brought upon himself the hatred of all parties. He was obliged to retire in 1846 in consequence of a popular insurrection, was recalled in 1849, but was obliged to flee the country in 1851. His brother Silvo led the opposition.

Cos'ta Ri'ca (*i. e.* "rich coast"), the most southern state of Central America, is bounded on the N. by Nicaragua, on the E. by the Caribbean Sea, on the S. E. by Panamá, and on the S. W. by the Pacific Ocean. It lies between lat. 8° and 11° 30′ N. and lon. 83° and 85° 40′ W. Area, 21,495 square miles. The surface is mountainous, the state being traversed by a range which is a continuation of the Andes or Cordilleras. Among the peaks of this range are several active and extinct volcanoes. Mount Cartago (or Irasu) rises about 11,480 feet above the level of the sea. This region is subject to frequent earthquakes. The rainy season continues about six months, between April and October. The name of Costa Rica is said to be derived from the rich gold-mines which are found here. The soil of the table-lands and valleys is fertile. The staple productions are coffee, maize, tobacco, sugar, and dyewoods. The country is extensively covered with forests, in which the mahogany, cedar, and other valuable trees abound. Capital, San José. The government is called a republic, and was established in 1823. The president is elected for a term of three years. Costa Rica was one of the states of the Confederation of Central America, from which she seceded in 1840. Pop. in 1870, 165,000.

Coste (JEAN JACQUES CYPRIEN VICTOR), a French naturalist, born in Castries in 1807. He published, besides other works, a "Voyage of Exploration along the Coasts of France and Italy" (1855).

Cos'tello (LOUISA STUART), an authoress, born in Ireland in 1815. Among her works are a "Summer amongst the Bocages and Vines" (1840) and "Memoirs of Eminent Englishwomen" (4 vols., 1844). She produced a collection of translations from Persian poets entitled "The Rose-Garden of Persia" (1845); also "Jacques Cœur, the French Argonaut, and his Times" (1 vol., 1847). Died April 24, 1870.

Cos'ter (LAWRENCE JANSEN), mentioned by Adrian Junius in "Batavia" (Leyden, 1588), an historical work written 1565–69, following an account current in Haarlem, as the original inventor of movable types. He first cut letters out of wood and printed from them the Dutch "Hailspiegel." Afterwards he made his letters from lead and tin, and called in assistants, whom he swore to secresy. This was about 1440. One of the workmen, named Johann, stole his master's type and forms, and afterwards printed books in Mayence. This story has always been upheld by the Dutch.

Costi'lla, a county in the S. of Colorado, partly bounded on the W. by the Rio Grande del Norte. The main chain of the Rocky Mountains extends along the eastern border of this county, which includes a large part of the fertile valley called San Luis Park. Near the middle of this park is San Luis Lake. The sides of the mountains are covered with forests of pine, fir, cedar, spruce, etc. Gold and silver are found here. Water and timber are abundant. Cattle and wool raising are the chief pursuits. Capital, San Luis. Pop. 1779.

Cos'ton, a township of Worcester co., Md. Pop. 2832.

Cos'tume [from the Lat. *consuetudo*, "custom," "usage;" Fr. *costume*] signifies, in its wider sense, the external appearance which the life of a people presents, and in its more usual sense the modes of clothing and personal adornment which prevail in any period or country. In both senses it plays an important part in art and literature. Homer brings it into view in narrating the achievements of his heroes. In modern times Sir Walter Scott has introduced the fashion of minute description of external costume. In the arts of the painter and actor attention to costume becomes indispensable. The sculptor has been sorely tried by the wigs and breeches of former times, and by the hats and other monstrosities of our own. One way of escaping from the difficulty was to discard the modern dress altogether, and substitute the ancient toga; another was to conceal the figure as much as possible in a cloak. The first of these expedients violates what artists regard as the laws of costume, by which they feel bound to represent every object with appropriate accessories; the second is often open in a less degree to the same objection. The great attention to costume in the earlier stages of art, though sometimes injurious to artistic effect, has been of great value for historical purposes. Among the old masters of the Italian and German schools there is a tendency to exhibit costume with painful minuteness. The mediæval custom of representing historical and sacred characters in the costume peculiar to the country and period of the artist prevailed in the most flourishing age of Italian art. We may learn from Paul Veronese the aspect presented by a feast in the palace of a Venetian grandee, but we can have little conception of the costumes at the marriage in Cana and in other scriptural subjects treated by the Italian painters. The effort to avoid anachronism by antiquarian study belongs almost entirely to the modern schools of art. In dramatic representations attention to costume becomes imperative. When the religious mysteries were brought upon the stage in the Middle Ages, the costume adopted was that of the age and country in which the representation took place; and this state of things continued during the time of Shakspeare, Lope de Vega, and Molière. About 1750 the French actress Clairon introduced a reform, but Talma was the first to bring on the stage a costume really true to history. Garrick and other eminent English actors followed his example.

Cosum'nes, a township of El Dorado co., Cal. Pop. 542.

Cosumnes, a post-township of Sacramento co., Cal. Pop. 694.

Coteau St. Augustin, a suburb of Montreal, in Hochelaga co., province of Quebec (Canada), has iron-works, large tanneries, and a glass-factory. Pop. about 5000.—COTE ST. LOUIS, an extra-municipal suburb of Mon-

* When we remark in popular language, "The sun rises," who shall say that, though the expression is not astronomically true, we do not, for all practical purposes, utter as important a truth as when we say, "The earth by its revolution brings us to that point where the sun becomes visible"?

Nº III

JOHNSON'S WORLD,

SHOWING THE COURSE OF THE TIDAL-WAVE IN THE THREE GREAT OCEANS, AND THE DISTRIBUTION OF VOLCANOES.

By Prof. A. Guyot.

The places situated on the same line have flood time at the same hour which is marked near the line in roman figures.

o Active Volcanoes.

East 120 160 160 West 120 80 Longitude from 40 Greenwich 0 40 80 East

163 123 West 33 43 3 Longitude from 37 Washington 77 117 East 157 163

ARCTIC OCEAN
Arctic Circle
Tropic of Cancer
EQUATOR
Tropic of Capricorn
ANTARCTIC OCEAN
PACIFIC OCEAN
ATLANTIC OCEAN
INDIAN OCEAN
ASIA
AUSTRALIA
NORTH AMERICA
SOUTH AMERICA
EUROPE
AFRICA
GREENLAND
Spitzbergen
Jan Mayen
Iceland
Hekla
Yenisei R.
Lena R.
Obi R.
Yakutsk
Okhotsk
Kamtschatka
Kurile Is.
Aleutian Is.
Alaska Group
St. Elias M.t
Fairweather M.t
Ridgecumbe
M.t Baker
M.t St. Helens
M.t Hood
M.t Shasta
S. Francisco
Mississippi R.
Sandwich Is.
Mauna Roa
Mauna Loa
Central Amer. Group
Group of Antilles
Guadaloupe
St. Vincent
Cayenne
Galapagos Is.
Gr. of Quito
Amazon
Para
Lima
Bahia
Group of Bolivia
Atacama
Lullaillaco
Valparaiso
Tupungato
Group of Chili
Antuco
Villarica
Osorno
Yanteles
Rio Janeiro
Cape Town
St. Helena
Ascension
Azores
Fayal
Canary Is.
Teneriffe
C. Verd Is.
V. Fuego
Algiers
Vesuvius
Etna
Ararat
Aral Tak
V. Peshan
Demavend
Peking
Shanghai
Canton
Calcutta
Muscat
Jeb. Teir
Aden
Onchiko
Otombi
Dodoyo
Monro
Madagascar
Bourbon
Philippine Is.
Marianne Is.
Volcanic Series of Sunda
Borneo
Java
Tombora
Molucca
N. Guinea
Tonga Is.
Society Is.
Marquesas Is.
Otaheite
Tobreinu
Sydney
Melbourne
Tasmania
New Zealand
Mongariro

Entered according to Act of Congress in the Year 1870 by A. J. Johnson, in the Clerks Office of the District Court of the United States for the Southern District of New York.

treal, has extensive quarries of building-stone. Pop. about 4000.—Coteau St. Pierre, Cote St. Antoine, Cote St. Catharine, Cote des Neiges, Cote St. Paul, Cote St. Luc, etc., are all suburbs within the municipality of Montreal (which see).

Côte-d'Or (*i. e.* "region of gold," named in allusion to the wealth of its vineyards), a department in the eastern part of France, formed of a portion of the old province of Burgundy. Area, 3383 square miles. The surface is diversified by hills and valleys, and partly traversed by a chain of low mountains called Côte-d'Or. It is drained by the rivers Seine, Aube, and Saône. Among its minerals are coal, iron, marble, and gypsum. A large part of this department is covered with forests. The soil is mostly fertile. It produces 18,500,000 gallons of wine annually. Here are raised the Burgundy wines. Capital, Dijon. Pop. 382,762.

Cotent'nea, a township of Lenoir co., N. C. P. 1470.

Co'terie [a word of French origin, supposed to be derived from the Lat. *quota*, a "share"], a word said to have been first applied to commercial associations in which each member contributed to the general fund. The name is now given to any circle of an exclusive character, whether social, literary, or political.

Cotes (Roger), an English clergyman, born at Burbage July 10, 1682, was a fellow of Trinity College, Cambridge. He became Plumian professor of astronomy in 1706, and published the second edition of Newton's "Principia," with a learned preface (1713). He wrote "Harmonia Mensurarum" (1722). Died June 5, 1716. Newton had so high an opinion of his abilities that he exclaimed, "If Cotes had lived, we should have known something."

Côte Sans Besoin, a post-township of Callaway co., Mo. Pop. 869.

Côtes-du-Nord (*i. e.* "northern coasts"), a maritime department of France, formed of part of the old province of Bretagne. It is bounded on the N. by the English Channel, on the E. by Ile-et-Vilaine, on the S. by Morbihan, and on the W. by Finistère. Area, 2268 square miles. The surface is partly mountainous; the soil is mostly fertile. Many horses and cattle are reared here. Large quantities of grain and linen goods are exported. Among the minerals are iron, lead, and granite. Capital, Saint-Brieuc. Pop. 641,210.

Co-tidal Lines, a system of lines drawn upon a map, terrestrial globe, or chart, to illustrate the course of the tidal wave. They were devised by Dr. Whewell, and are given in the present work in Map No. III. Each of these lines passes through the places which have high water at the same hour, thus tracing the crest of the wave, and enabling the eye to follow its course with all the modifications that it experiences in each ocean.

A glance at the map of co-tidal lines, which gives the position and shape of the crest of the tidal wave at intervals of an hour, will show that the parent wave from the South Pacific moves on most swiftly in the open and deep ocean S. of the continents. There, also, its motion preserves its normal direction westward, and its crest extends from N. to S., while in the interior of the three oceans both are considerably deflected to the N., and even turned back to the E. (See Tides, by Prof. J. E. Hilgard, U. S. Coast Survey.) Arnold Guyot.

Cotopax'i, a volcano of South America, in Ecuador, in the eastern Cordillera of the Andes, 34 miles S. S. E. of Quito; lat. 0° 40′ S., lon. 78° 39′ W. Its form is almost perfectly conical. It rises 19,498 feet above the level of the sea, and 9800 feet above the adjacent valley, being the highest volcano in America that has been active in recent times. Its first recorded eruption occurred in 1532. In 1698 an eruption destroyed the city of Tacunga, and in 1738 the flames rose 3000 feet above the brink of the crater. A violent eruption occurred in 1768, when clouds of ashes and smoke darkened the air for a distance of many miles. During the eruption of 1803, Humboldt, who was at Guayaquil, about 135 miles distant, heard the explosions of this volcano. A belt about 4400 feet wide is covered with perpetual snow. It was first ascended in 1872 by Dr. W. Reiss.

Cotro'ne (anc. *Crotona*), a town of Italy, province of Catanzaro, on the Mediterranean Sea, 6 miles N. W. of Cape Nau. It is enclosed by walls and defended by a citadel. It is the seat of a bishop, and has a small harbor, a cathedral, and several hospitals and convents. Pop. 5807.

Cotta (Johann Friedrich), Baron von Cottendorf, an eminent publisher, born at Stuttgart April 27, 1764, founded at Tübingen in 1793 the "Allgemeine Zeitung," an able daily journal, afterwards published at Augsburg. He was a friend and liberal patron of Goethe and Schiller, whose works he published. He established a steam press at Augsburg in 1824. He was for many years a member of the Würtemberg Diet, and in 1824 was elected vice-president of the second chamber. Died Dec. 29, 1832.

Cotta (L. Aurelius), a Roman senator, became prætor in 70 B. C. He was consul for the third time in the year 65, and co-operated with Cicero against Catiline in 63 B. C. He was an adherent of Cæsar in the civil war which began in 49 B. C.

Cotta, von (Bernhard), an eminent German geologist, born in Thuringia Oct. 24, 1808, was appointed professor in the School of Mines at Freiberg in 1842. Among his important works are a geognostic map of Saxony in twelve sections, published conjointly with Naumann; "Geognostische Wanderungen" (2 vols., 1836–38); "Anleitung zum Studium der Geognosie und Geologie" (3d ed. 1849); "Geologische Bilder" (4th ed. 1861); "Deutschlands Boden" (2d ed. 1858); "Geologie der Gegenwart" (3d ed. 1871). He has also since 1847 been editing the "Ganenstudien." He favors the theory of evolution.

Cot'tage Grove, a township of Saline co., Ill. P. 713.

Cottage Grove, a township of Allen co., Kan. P. 794.

Cottage Grove, a post-township of Washington co., Minn., 13 miles S. E. of St. Paul. Pop. 705.

Cottage Grove, a post-township of Dane co., Wis. Pop. 955.

Cottage Hill College, for young ladies, at York, Pa., on the Northern Central R. R., 27 miles from Harrisburg and 58 miles from Baltimore, between which places there are five daily trains each way. There are also three daily trains to Wrightsville, making connection at Columbia for Reading and Philadelphia. The borough of York contains 11,003 inhabitants, and is noted for the healthfulness of its situation. The college grounds, upon which are several excellent springs of good water, contain nine acres, which are nicely ornamented with shade-trees and shrubbery. With the Codorus flowing near by the buildings, and with the beautiful scenery around, this is one of the most delightful and attractive locations in the State. Cottage Hill College was founded in 1850 by Rev. J. F. Hey, who for a number of years conducted it as a female college with great success. Under his charge it rapidly increased in distinction until it justly ranked among the best female schools in the State, enjoying a large and influential patronage. In Jan., 1866, the property was purchased from Prof. Hey, and the building has since been furnished with new furniture, new carpets, and new bedding; first-class musical instruments, a chemical and philosophical apparatus, globes, charts, and maps, have been procured; and many important improvements have been made, designed to secure the general comfort of the pupils. On the 21st of Feb., 1868, the institution was chartered by the legislature of the State, with full collegiate powers to confer all literary degrees and academic honors which are usually granted and conferred by other colleges for the education of young women. In 1863, Rev. J. F. Hey resigned the charge of this institution, and Prof. L. B. Heiges conducted the school for the three succeeding years very successfully. In 1866, Rev. D. Eberly succeeded Prof. Heiges, and under his direction the institution was chartered by the legislature of Pennsylvania, as already stated. In 1872, Rev. D. Eberly having resigned, Prof. J. Nelson Clark, M. D., was appointed president. Since the institution was chartered thirty young ladies have graduated.

J. Nelson Clark.

Cott'bus, or **Kottbus,** a town of Prussia, in Brandenburg, on the river Spree, 67 miles S. S. E. of Berlin, with which it is connected by a railway. It is enclosed by walls, and has a royal palace and a gymnasium; also manufactures of woollen cloths, linen goods, hosiery, tobacco, etc. Pop. in 1871, 18,916.

Cotting (John Ruggles), M. D., LL.D., born in Acton, Mass., in 1787, educated at Amherst, Dartmouth, and Cambridge. After spending fifty years of his life in New England, he was yet spared to enjoy thirty more in the valley of the Oconee, near Milledgeville, then the capital of Georgia, where he died, Oct. 13, 1867, and was buried, thus leaving the beautiful impress of that invisible but vital chain binding the hearts of this great people into one mighty nation. Dr. Cotting, having acquired reputation by his publications in chemistry and geology, was induced by cotton-planters of Georgia to make an agricultural survey of two or three counties of that State, the maps and drawings of which were magnificently executed, and were deposited in the museum of the medical college in Augusta; and their fame reached even Russia, whose emperor solicited a copy for the Royal Library of St. Petersburg. He was a Congregational minister, and had held professorships in Amherst College and at Pittsfield Medical School. Paul F. Eve.

Cot'ton [Fr. *coton;* Sp. *algodon;* Arab. *alqoton*], the fibre which surrounds the seeds of various species of cotton-plant, though the numerous cultivated varieties (mostly annual or biennial) are now referred to two or three species, the *Gossypium album, nigrum,* and perhaps *arboreum,* plants of the natural order Malvaceæ, to which an East Indian origin is assigned by the most recent authorities, though they have been grown from time immemorial in Africa and America. The first mention of cotton by any

Cotton-plant.

writer is by Herodotus, about 450 B. C. It is supposed that the cotton culture was first practised in India, but history furnishes no means of ascertaining when, or by what progressive stages of discovery and invention, cotton was first utilized by man. There is no record of any cotton being manufactured in Europe before the tenth century. Cotton is a tropical plant, and nearly all that is raised in the world is produced by the colored races. Its most northern limit is reached in Manchooria, where it is cultivated with success. Columbus found cotton in use among the natives of Hispaniola, but only in its most primitive form. In 1536 the cotton-plant was found growing in the country drained by the Mississippi and in Texas, but it was first planted as an experiment in the U. S. in the year 1621.

As early as the year 1736 the cotton-plant was known on the Eastern Shore of Maryland, in the lower counties of Delaware, and in other places in the Middle States, but it was chiefly regarded as an ornamental plant, and confined to gardens. It was not till after the Revolution that cotton culture was prosecuted with a view to export, though as early as 1739 it is reported that one bag of cotton was exported from Savannah, Ga., and about this time effort was made to bring cotton to perfection in South Carolina. In the year 1784 an American ship, which had on board eight bags of cotton for Liverpool, was seized, on the ground that so much cotton could not have been produced in the U. S. In 1785 the culture of short-staple cotton was commenced in the U. S., and 1,000,000 pounds in 1795 were exported from Charleston, S. C. Since that time the use of cotton, which previously had been for the most part limited to the hot climates where it grew, has marvellously extended, so that at present it constitutes not only the entire clothing of a large majority of the human race, but it has become a part of the material in which the people of all lands are clothed, excepting only the most debased and savage of races. For this great revolution the invention of improved machinery, and especially that of the saw cotton-gin, is the principal cause.

The green-seed or short-staple cotton (*Gossypium album*) is the kind principally used since the Revolution. The black-seed, or sea-island cotton (*Gossypium nigrum*), which is considered very much superior to the former, was introduced about the year 1788, though this can only be grown successfully in certain localities, requiring low and moist land. The Peeler cotton-seed is in more general use at the present day. This is an upland cotton, but will do well on the lowlands. Several other kinds of cotton-seed have been introduced, and fabulous prices have been paid for some of them.

In 1791 only 2,000,000 pounds of cotton were raised in the U. S., and 189,500 pounds exported; while in 1803 the amount exported from the U. S. was over 41,000,000 pounds. In 1791 a cotton-mill was erected at Providence, R. I., supposed to be the first one in America, and from this time cotton was used in this country, though for a few years to a very limited extent. During the year 1800, 500 bales, of 300 pounds each, were consumed in the U. S. Ten years later (1810) 10,000 bales, of 300 pounds each, were used in our own country, and we exported nearly 94,000,000 pounds. Sixty-two mills were in operation during this year. In 1820 the U. S. cotton crop amounted to 369,000 bales, of 300 pounds each, and we exported nearly 128,000,000 pounds. Ten years later (1830) the export of cotton from the U. S. was 271,000,000 pounds, and the amount grown was over 1,000,000 bales. In 1840 over 1,500,000 bales were raised in the U. S. Ten years later (1850) the home consumption of cotton in the U. S. was nearly 600,000 bales, while the amount raised was over 2,000,000 bales. In 1860 the total cotton crop of the U. S. was 4,675,000 bales; consumed here, 978,000 bales.

From the year 1860 to 1870 there was a large decrease in the amount of cotton raised, owing to the civil war, which caused almost entire stagnation in all kinds of business in the southern part of our country, and the consequent liberation of the slaves. In 1870 the total cotton crop of the U. S. was only 3,000,000 bales, of which 2,000,000 were exported. The last three years show a large increase, and we may look forward with confidence that under the new order of things the cotton-growing States will become more fully developed, and will astonish the world with their productions. Since the emancipation of the slaves in the U. S. a new impetus has been given to cotton-growing, and the business is so profitable that it is conducted very carelessly.

The extremes of the cotton-belt, where it may be grown with profit, may be included between the 28th and 40th degrees N. lat.; but the cotton States, properly speaking, are South Carolina, Georgia, Alabama, Mississippi, the northern part of Florida, the northern half of Louisiana, and the eastern half of Texas.

The principal cotton crop of the U. S., as of all other important cotton-regions, is of the short-staple variety. The long-staple sort is used for making the best sewing-thread, for mixing with silk, and for certain other special uses. It is very much higher priced than common cotton, but can be grown only in peculiar and very limited districts, such as the islands on the coast of South Carolina and parts of the mainland of Florida.

It is very unfortunate that better and more economical methods of planting, cultivating, and fertilizing cotton-lands have not been adopted in the U. S. Cotton is not naturally a very exhausting crop, but from the short-sighted policy of too many planters, great areas of what was once good cotton-land are now quite unproductive. A very serious drawback in the cultivation of cotton is the existence of so many insect enemies. In some regions the ravages of insects and their larvæ have led to the complete abandonment of the crop.

British India produces more cotton than any other country except the U. S., and there the industry is one of great importance; but the fibre is generally found to be inferior to that grown in the U. S. Egypt produces much cotton, its best product taking a high rank as regards quality and price. Brazil raises a considerable amount of fibre, and most other warm and tropical countries contribute more or less to the world's supply of the commodity.

Besides the uses of the cotton-fibre as a material for the manufacture of textile fabrics, and its secondary use in paper-making, the seed of cotton now furnishes a large supply of fixed oil obtained by expressing. The residue is useful for fattening stock, being used after the manner of oil-cake. It is also extensively employed in the South as a fertilizer. The cotton-seed oil and meal are exported to Europe in considerable quantities. The oil is used for soap-stock, for softening wool, lubricating machinery, dressing morocco, and for adulterating linseed and other more costly oils. It is considered to be a drying oil, and a small proportion may be used in paint. In the Southern States, when rectified, it is sometimes employed in pharmacy. Cotton-root is used to some extent in medicine, chiefly for its emmenagogue and abortifacient properties. In Brazil and other countries the leaves are believed to have highly important medicinal qualities.

A. T. Longley, *U. S. Agricultural Department.*

Cot'ton, a township of Switzerland co., Ind. Pop. 1700.

Cotton (CHARLES), an English humorous poet, born in Staffordshire in 1630, was an adopted son of Izaak Walton. He translated Montaigne's "Essays" into English, and wrote "Scarronides, or Virgil Travestied" (1687), a "Voyage to Ireland," and other works. He is best known by his continuation of Walton's "Complete Angler." Died in 1687.

Cotton (JOHN), a learned English Puritan minister, born at Derby Dec. 4, 1585, preached over twenty years at Boston in England, emigrated to Massachusetts in 1633, was afterwards pastor of the First church in Boston (organized in 1630), and acquired such influence that he was called the patriarch of New England. Died Dec. 23, 1652.

Cotton (Sir ROBERT BRUCE), an English antiquary, was born in Huntingdonshire Jan. 22, 1570. He graduated at Cambridge in 1585. Having a high reputation for prudence, he was often consulted and employed by King James I. and his ministers. He wrote several political and historical treatises. He died May 6, 1631, and left to his heirs a valuable library, which is now in the British Museum.

Cotton-gin, a machine for freeing cotton from its seeds, which adhere to the fibre with considerable tenacity. Originally, the cotton-gin was an apparatus in which the cotton was passed between two rollers revolving in opposite directions. This, the "roller-gin," is still used for ginning sea-island or black-seeded cotton, which is quite easily freed from its seeds. But green-seeded, upland, or short-staple cotton, the species most generally grown, cannot be ginned by such simple means. In 1793, Mr. Eli Whitney, a native of Massachusetts resident in Georgia, invented the saw-gin, consisting of a hopper, one side of which is composed of parallel wires, between which revolve circular saws, the teeth of which drag the fibre through the wires, leaving the seeds behind. This invention, which brought Mr. Whitney small profit and much litigation, has immensely increased the cotton industry of the world.

Cotton Grove, a township of Davidson co., N. C. Pop. 868.

Cotton, Gun. See GUN-COTTON, by GEN. H. L. ABBOT, U. S. A.

Cotton Hill, a post-township of Sangamon co., Ill. Pop. 754.

Cot'ton Manufac'ture. The manufacture of cotton fibre into articles of use and ornament appears to have been carried on in India from the remotest antiquity, but it has not made any very great progress in the East. It was also known in ancient Mexico, and is still carried on in a rude manner by native African tribes. This industry, which now affords employment and subsistence to many hundreds of thousands of persons, is almost wholly the result of discoveries and inventions made in Great Britain and the U. S. since the middle of the last century. Previously to that period the manufacture was everywhere confined within the narrowest limits. Owing to the difficulty of separating the fibre from the seed, its price, so long as this operation had to be performed by hand, was naturally high; while the cost of spinning and weaving by the wheels and looms in use previously to 1760 added so much to the price of the cloth that its use was confined to the richer classes of society. But in this respect the most signal and extraordinary improvements have been made. The jenny, invented by Hargreaves in 1767, enabled one person to spin from 80 to 120 threads with about the same facility that a single thread had been previously spun. The jenny, however, was fitted only to spin the softer kinds of yarn, or that used as weft, being unable to give the firmness required in the yarn used as warp. But this deficiency was soon supplied; the genius of Arkwright completed (1785) what Hargreaves had begun, by inventing the spinning-frame—that wonderful piece of machinery which spins any number of threads of any degree of fineness and hardness, leaving to man merely to feed the machine with cotton and to join the threads when they break. Nearly at the same time that the spinning department was thus improved, Dr. Cartwright, a clergyman of Kent, invented the power-loom, which has already gone far to supersede weaving by hand. While these extraordinary inventions were being made, Watt was perfecting the steam-engine, and thus not only supplied the manufacturers with a new power applicable to every purpose and easy of control, but one that might be placed in the most convenient situations and in the midst of a population trained to industrious habits. Still, something remained to complete this astonishing career of discovery. Without a vastly-increased supply of the raw material at a lower price than it had previously brought, the inventions of Hargreaves, Arkwright, and Watt would have been of comparatively little value. What they did for the manufacturers, Mr. Eli Whitney did for the cotton-growers. He invented a machine by which cotton fibre is separated from the seed with the utmost facility and expedition. Previously to 1790, the U. S. did not export a single pound of raw cotton. In 1792 they exported 138,328 pounds. Whitney's invention came into operation in 1793, and in 1795, 5,276,306 pounds were exported. A cotton-mill is perhaps, all things considered, the most astonishing triumph of human skill and ingenuity. All the various operations, from the carding of the wool to its conversion into a texture as fine almost as that of the gossamer, are performed by machinery.

China has an immense manufacture of cotton goods, but nevertheless imports them largely from England and Russia. A large part of the Chinese cotton is grown at home, but much also comes from India and Burmah. Except the now comparatively unimportant production of the fabrics in India, most of the cotton manufacture of the present day is carried on in Europe and the U. S., Great Britain taking the lead, and France, Germany, Austria, Russia, Belgium, and Switzerland all having an extensive production of cotton goods. Many of the smaller European states have also considerable cotton manufacturing.

In the U. S. the first successful cotton-mill was that of Mr. Samuel Slater (an Englishman by birth), established at Pawtucket, R. I., in 1790, though at Beverly, Mass., there had been a cotton-manufacturing company in existence for several years, and similar attempts had been made, with small success, at East Bridgewater, Mass., and at Philadelphia. From these small beginnings this manufacture has grown to be one of the most important in the land. The chief seats of the American cotton manufacture are in the New England and Middle States, but the area of the manufacturing district is widening. Especially in Alabama, Georgia, and South Carolina there have been attempts made (and on the whole with very encouraging success) to organize a system of cotton manufacturing. If this attempt be fully realized, it would appear that the South, being the finest cotton-growing region in the world, and having abundant and constant water-power, might successfully compete with other regions which are obliged to transport the raw material for thousands of miles. The mills of the U. S. in 1870 were 958 in number, employing steam-engines with an aggregate horse-power of 47,117, water-wheels with the horse-power estimated at 99,191; running 157,310 looms, 3,694,477 frame spindles, and 3,437,938 mule spindles; and employing 135,369 persons, considerably more than half of whom were females. The capital employed was $140,706,291; wages paid, $39,044,132; cotton used, 398,308,257 pounds; total value of products, $477,489,739. Since the census of 1870 the manufacture of cotton goods in this country has enormously increased.

Cotton Plant, a post-village of Woodruff co., Ark., about 60 miles E. N. E. of Little Rock. Pop. of Cotton Plant township, 1007.

Cotton Valley, a township of Macon co., Ala. Pop. 2120.

Cot'tonwood, a county in the S. W. of Minnesota. Area, 720 square miles. It is drained by the Des Moines and Little Cottonwood rivers. The surface is undulating; the soil fertile. It is intersected by the Sioux City and St. Paul R. R. Pop. 534.

Cottonwood, a township of Siskiyou co., Cal. Pop. 421.

Cottonwood, a post-township of Tehama co., Cal. Pop. 240.

Cottonwood, a township of Yolo co., Cal. Pop. 1319.

Cottonwood, a twp. of Cumberland co., Ill. P. 1342.

Cottonwood, a township of Chase co., Kan., has a weekly newspaper. Pop. 315.

Cottonwood, a post-township of Brown co., Minn. Pop. 607.

Cottonwood Falls, a post-village, capital of Chase co., Kan., on the Cottonwood River and the Atchison Topeka and Santa Fé R. R., 65 miles S. W. of Topeka. Coal and ochre are found in the vicinity. It has good water-power and manufactures, and one weekly newspaper.

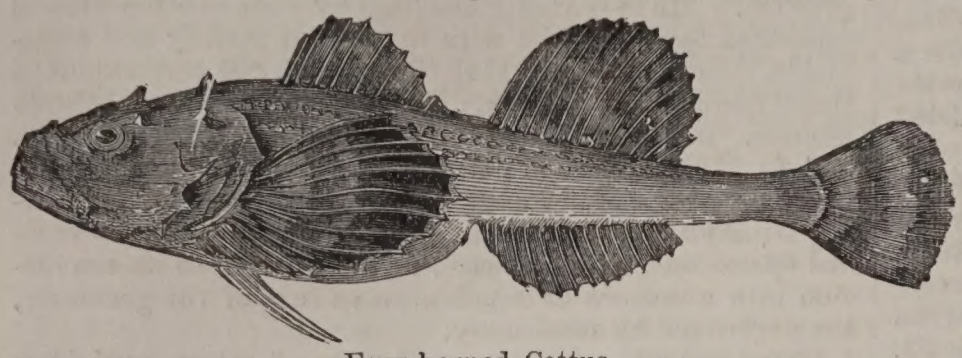
W. A. MORGAN, ED. CHASE COUNTY "LEADER."

Cottonwood Springs, a post-village of Lincoln co., Neb., on the Platte River.

Cot'tonwood Tree, a common name of the *Populus monilifera*, a species of poplar which grows on the margins of streams of the Western U. S. to the height of eighty feet or more. It has deltoid, taper-pointed, serrate leaves. The timber is soft and not very valuable.

Cot'trellville, a township of St. Clair co., Mich. Pop. 2372.

Cot'tus, a genus of acanthopterygian sea-fishes of the



Four-horned Cottus.

family Frigilidæ, containing the "miller's thumb," the sea-bullhead, the sculpin, and numerous other fishes of remarkably repulsive appearance, though several are considered good eating. The four-horned cottus (*Cottus quadricornus*) is a species common to both sides of the Atlantic.

Cot'uit, a post-village of Barnstable co., Mass., on Cotuit River, in Barnstable township, and on the line of Mashpee.—COTUIT PORT, in the same township, 2 miles to the S. E., is a port on Cotuit Harbor.

Cotyle'don [Gr. κοτυληδών], in botany, the seed-lobe or seminal leaf of a plant. This organ forms a part of the embryo, and nourishes the plumule and radicle at the first period of their development. Exogenous plants have generally two cotyledons, and hence are called *dicotyledonous,* and endogenous plants, having a single cotyledon, are called *monocotyledonous.* Cryptogamous plants are *acotyledonous—i. e.* destitute of a cotyledon.

Couch (DARIUS NASH), an American officer, born July 23, 1822, in Putnam co., N. Y., graduated at West Point in 1846; and as lieutenant of artillery he served in the war with Mexico 1847–48, engaged at Buena Vista (brevet first lieutenant); at various posts 1848–55; and in Florida hostilities 1849–50; resigned April 30, 1855; merchant and copper-manufacturer 1855–61. In the civil war he resumed his sword as colonel of the Seventh Massachusetts Volunteers, and July 4, 1862, became major-general U. S. volunteers. He served in the defences of Washington 1861–62; in Virginia Peninsula, engaged at Yorktown, Williamsburg, Fair Oaks, Oak Grove, and Malvern Hill; in the retreat from Manassas to Washington 1862; in Maryland campaign 1862, engaged at Harper's Ferry, and in pursuit from Antietam to the Potomac; in the Rappahannock campaign 1862–63, engaged at Fredericksburg and Chancellorsville; in command of the department of the Susquehanna 1863–64, engaged in defence of Chambersburg, which was evacuated; and in command of a division of the Twenty-third corps 1864–65, engaged in the battle of Nashville, and operations in North Carolina to effect a junction with Gen. Schofield. Resigned May 26, 1865, from volunteer service. He was the Democratic candidate for governor of Massachusetts in 1865, but was not elected; U. S. collector for port of Boston 1866–67, and has been president of the Virginia Mining and Manufacturing Company since 1867. GEORGE W. CULLUM, U. S. A.

Couch'ant [from the Fr. *coucher,* to "lay down" or "lie down"]. In heraldry, a beast lying down, with his head raised, is couchant. If the head is down, he is *dormant.*

Cou'dersport, a post-borough, capital of Potter co., Pa., 174 miles W. N. W. of Harrisburg, has a weekly paper, a tannery, a foundry, several mills, a public library, and graded schools. Pop. 471.

JOHN S. MANN, ED. "POTTER JOURNAL."

Cougar. See PUMA.

Cough [Lat. *tussis*], a physiological act or operation, which consists in the sudden expulsion of air from the lungs, at the beginning of which act the glottis is closed. Coughing is designed for the expulsion of foreign or secreted matters from the air-passages. It is largely a reflex action, generally arising from local irritation. When the irritation is the result of disease, coughing may be a very important symptom. It is partly voluntary and partly involuntary. A cough may sometimes be relieved by expectorant remedies, by mucilaginous diluent draughts, by warm foot-baths, by stimulants, and very often by small doses of opium or of other sedatives.

REVISED BY WILLARD PARKER.

Cough'lan (LAWRENCE), an English Wesleyan preacher, born about 1760, was one of the principal founders of Methodism in Nova Scotia and the neighboring provinces. His labors were great, and he has been called the "Apostle of Nova Scotia." Died in that province in 1834.

Coulin (F——), D. D., born at Geneva Nov. 17, 1828, is a distinguished preacher and writer of the Swiss Free Church, residing at Genthod. He was a delegate to the meeting of the Evangelical Alliance at New York in 1873.

Council, a township of Crittenden co., Ark. Pop. 312.

Council Bluffs, the capital of Pottawattamie co., and the metropolis of Western Iowa, is situated 135 miles W. of Des Moines and 4 miles E. of Omaha. It is the western terminus of the Chicago Burlington and Quincy, Chicago Rock Island and Pacific, and Chicago and North-western R. Rs., the eastern terminus of the Union Pacific, the southern terminus of the Sioux City and Pacific, and the northern terminus of the Kansas City St. Joseph and Council Bluffs R. Rs. The city is built principally upon a plain at the base of the high bluffs from which it derives its name, although not a few of the finest residences are to be found in the numerous "glens" which intersect the bluffs in every direction. The town is connected with Omaha by an iron bridge almost a mile in length, over which street-cars drawn by dummy engines, and regular passenger and freight trains, pass every fifteen minutes. One monthly, four weekly, and two daily papers are published here. Among the public buildings worthy of mention is the institution for the deaf and dumb, a large court-house, and an imposing high-school building. Council Bluffs contains 9 churches, 21 hotels, 17 telegraph-offices, 1 savings, 1 private, and 2 national banks, 2 public libraries, and a free reading-room. A horse railway 5 miles in length connects its eastern, western, and southern extremes. Owing to its superior shipping facilities, Council Bluffs is fast becoming an important manufacturing centre. Steam-engines in large numbers, milling and mining machinery, fanning-mills, agricultural implements of all kinds, cigars, cigar-boxes, and brooms are made here to good advantage. Pop. 10,020. S. W. MOOREHEAD, ED. "DAILY GLOBE."

Council Grove, a city, capital of Morris co., Kan., on the Neosho River and the Missouri Kansas and Texas R. R., 25 miles from Emporia. It has two churches, three schools, a national bank, two newspapers, and a coal-mine. Pop. 712; of Council Grove township, 1080.

JOHN MALOY, ED. COUNCIL GROVE "DEMOCRAT."

Council Hill, a township and post-village of Jo Daviess co., Ill. The village is on the Illinois Central R. R., 7 miles N. E. of Galena. Pop. of township, 725.

Coun'cil, Œcumen'ical [from the Gr. οἰκουμένη (γῆ), *i. e.* the "habitable" (world); because the whole Christian world is, in theory, assembled], otherwise called **General** or **Universal Council,** a title given to certain great ecclesiastical assemblies, so called in distinction from diocesan, provincial, and national councils, which are more limited meetings of the same kind. The Greek and Latin churches acknowledge seven councils—viz.: (1) the first Council of Nice, 325 A. D.; (2) the first of Constantinople, 381 A. D.; (3) the first of Ephesus, 431 A. D.; (4) that of Chalcedon, 451 A. D.; (5) the second of Constantinople, 553 A. D.; (6) the third of Constantinople, 681 A. D.; (7) the second of Nice, 787 A. D. To these the Roman Catholics add the following: (8) the fourth of Constantinople, 869 A. D.; (9) the first of Lateran, 1123; (10) the second of Lateran, 1139; (11) the third of Lateran, 1179; (12) the fourth of Lateran, 1215; (13) the first of Lyons, 1245; (14) the second of Lyons, 1274; (15) that of Vienne, in France, 1311; (16) that of Constance, 1414–18 (in part); (17) that of Bâle, 1431–38; (18) the fifth Lateran, 1512–17; (19) that of Trent, 1545–63; and (20) that of the Vatican, 1869–70. The most important of these are noticed under their alphabetical heads.

Council of War, a conference of military or naval officers, called by the commander-in-chief to advise him in relation to some important business or movement. The commandant of a garrison often solicits the opinion of a council of war before surrendering to the enemy. But in the end the military code leaves these matters to the discretion of the commander.

Coun'over, a post-village of Calmar township, Winneshiek co., Ia. It is on the Iowa division of the Chicago Milwaukee and St. Paul R. R., at the junction of the Decorah Branch R. R.

Counsellor. See ADVOCATE and BARRISTER.

Count [from the Lat. *comes* (gen. *comitis*), a "companion;" Fr. *comte;* It. *conte;* Ger. *Graf*], a nobleman of an order of nobility inferior to dukes and marquises, but superior to viscounts and barons. Counts had anciently territorial jurisdiction, but at present they are simply noblemen having this hereditary title. The use of the word *comes* in this sense dates from the reign of the Roman emperor Augustus, who conferred it upon the senators who immediately surrounded him, and was afterwards commonly applied to their companions by other Roman em-

perors. It was used in Spain about 650 A. D., and for a long period seems to have been of equal dignity with that of duke, no distinction being made till 1297. In the British empire the title of earl is always used instead of count.

COUNTS-PALATINE were originally "officers of the imperial palace" in Germany, who possessed high judicial functions. The term was afterwards applied to feudatories who had palatine jurisdiction (see PALATINE) over outlying territories, where they maintained a palace and the other machinery of a court. The term came still later to be applied as a title of honor by several princes, but is now obsolete.

Coun'ter [from the Lat. *contra*, "against:" Fr. *contre*], a word often used as a prefix to other words, and signifying "against," "corresponding to," or "in answer to." (See etymology of COUNTERFEIT.)

Coun'terfeit [Fr. *contre fait;* literally, "made against"], a term applied chiefly to spurious coin or bank notes, or other factitious currency. The uttering of such coin or notes is a felony punishable by imprisonment, or even by death in some countries. To guard against counterfeiting, bank notes are engraved with designs which cannot be reproduced except at great expense. There are also secret marks and combinations of letters and figures known only to the proper authorities. A peculiar ink and paper are used. Pamphlets called "detectors" are printed with lists and descriptions of counterfeit notes and coins. (See FORGERY, by PROF. T. W. DWIGHT, LL.D.)

Coun'terfort [Fr. *contrefort*], in architecture, a buttress or pier built against or at right angles to a wall, to strengthen it and enable it to resist a particular thrust. In fortification, a mass of stone or brickwork added to the revetment of a rampart in such a way as to form a buttress.

Coun'ter-Guard is an outwork designed to defend the two faces of a bastion or ravelin from a direct fire, so as to retard a breach being made. The counter-guard consists of two lines of rampart parallel to the faces of the bastion or ravelin, and separated from them by a narrow ditch.

Coun'ter-Mark, in numismatics, a stamp often seen on ancient coins or medals, is generally a figure or inscription. Some antiquaries suppose this mark was struck on money taken from an enemy.

Coun'terpart, a correspondent part, a copy, a duplicate. In law, when the parts of an indenture are interchangeably executed by the several parties, that part which is executed by the grantor is termed the *original*, and the others are *counterparts*.

Coun'terpoint [Fr. *contrepoint;* It. *contrapunto*], the art of writing music in several distinct parts. The name is derived from the circumstance of the notes being placed one against or over the other on the score. (See MUSIC, by REV. WILLIAM STAUNTON, D. D.)

Coun'terpoise [Fr. *contrepoids* (*i. e.* that which "weighs against" something else)], a weight sufficient to balance another in the opposite scale; equal force or weight acting in opposition to something. In mechanics, a mass of metal connected with an instrument or machine, either for the purpose of giving steadiness or diminishing the pressure on some particular point.

Counter-Proof, an impression obtained from a freshly-printed proof of an engraving, by laying it, before the ink is dry, on paper and passing it through the press. In this mode a reversed impression is obtained, which is useful in enabling the engraver to judge of the success of his work.

Coun'terscarp, in fortification, is the side of the ditch opposite the scarp. A *revetted* counterscarp is constituted usually by a wall of masonry called a counterscarp-wall; an *unrevetted* counterscarp is of earth at its natural slope.

Coun'tersign, a watchword given daily by the commander of an army, in order that friends may be distinguished from enemies by their knowledge of it. Sentinels require every person who approaches their posts by night to give the countersign.

COUNTERSIGN is also the signature of a public officer or secretary to the charter of a king, or to any writing signed by the principal or superior, as a certificate that the charter or instrument is authentic.

Coun'ter-Ten'or, in music, the highest adult male voice and the lowest female voice.

Coun'ty [Fr. *comté*], originally the territory of a count or earl. In modern usage it denotes a division of a state or kingdom. In England and Scotland the term is equivalent to a shire. The term shire in England is not applied to those counties which were originally distinct sovereignties, such as Kent, Essex, Norfolk, Cumberland, and Sussex. Lancaster, Chester, and Durham are called counties palatine. (See PALATINE.) The primary divisions of the provinces of Ireland are called counties. Each State of the U. S., except Louisiana, is divided into counties, each of which contains a capital or county-town, in which the court-house is located.

County Court, in several of the U. S., is the title of a tribunal higher in rank than the municipal or local courts, and inferior to the supreme court of the State. In some of the States, courts of this grade are called courts of common pleas, and in others superior courts. (See COURTS, by GEORGE CHASE, LL.B.)

Coup, koo, a French word signifying a "stroke," a "blow," is a part of many phrases which are often used by the English and other nations; as *coup d'état*, a "stroke of state," a sudden, forcible political act, usually designed to subvert the constitution, or to increase the power of a ruler by encroachments on the constitution. *Coup de main*, in the language of war, means a "sudden, unexpected attack," a surprise. *Coup d'œil*, a "glance of the eye," is used in the fine arts to express the general effect of a picture or group at first sight. The term sometimes signifies a view, prospect, survey.

Coup'le of For'ces or **Pres'sures,** in statics, denotes two equal pressures having precisely opposite directions, but applied at different points of a body. According to the ordinary method of the composition of parallel forces, the resultant of such a system would be a parallel force having the intensity zero, and applied at an infinite distance. In reality, two such forces have no single resultant, their tendency being to produce rotation about an axis perpendicular to their plane. The theory of couples, their composition, resolution, etc., was first given by Poinsot, and now constitutes an essential branch of statics. The distance between the parallel forces is called the arm of the couple, and the product of either force into the arm the moment of the couple. The statical effect of a couple is unaltered by transportation to a parallel plane, or by any variation in the magnitude and direction of its forces and arm, provided the moment remains the same. On this account a couple, like a simple force, may be conveniently and perfectly represented by a line OA drawn from any origin O perpendicular to its plane, having a length OA proportional to its moment, and a direction such that to an observer at A, looking towards O, the rotation which it is the tendency of the couple to produce shall appear to be direct, like the hands of a clock. Such a line, limited in length and definite in direction, is called the moment-axis of the couple, to distinguish it from the rotation-axis, which is unlimited in length, and simply indicates the direction of the plane of the couple. This mode of representation being adopted, the composition and resolution of couples follow the same laws as those of concurrent simple pressures. Thus, if we regard the moment of a couple as positive or negative, according as the rotation would be direct or retrograde, we may say, The resultant of two or more coaxal couples is another coaxal couple, whose moment is the algebraical sum of the moments of the components. Again: the moment-axis of the resultant of any two couples is the diagonal of the parallelogram whose sides are the moment-axes of the components. The above two properties of couples being established, the general problem of the composition of any number of pressures acting on a body in different directions becomes greatly simplified.

Coup'le of Rota'tions, or **An'gular Veloc'ities,** two equal and opposite rotations around parallel axes. The term was introduced by Poinsot, who first fully investigated the composition and resolution of rotations. A couple of rotations is shown to be equivalent to a translation of the whole body in a direction perpendicular to the plane of the rotation-axis, with a velocity equal to that which either axis possesses in virtue of its rotation about the other. The common velocity of all points of the body is expressed by the product of either of the equal angular velocities into the distance between the axes. This distance is called the arm of the couple, and the product its moment. A couple of rotations therefore may be represented perfectly by a single line, exactly as in the case of a couple of pressures, and the composition and resolution of both kinds of couples follow precisely the same laws. Velocities of rotation and translation are, as it were, reciprocal—a *couple* of either is equivalent to one of the other.

Coupon [from the Fr. *couper*, to "cut"], a cheque or slip of paper cut off from a bond. The term is applied mostly to a dividend or interest certificate, which is attached to the bottom of a bond or debenture, and is cut off when the interest is due, and is then presented for payment.

Courbet (GUSTAVE), a French painter of landscape, animals, and figures, born at Ornans (Doubs) June 10, 1819. His parents were people of moderate estate, who gave him the best education in their power. His father would have had him a lawyer, and in 1839 he went to Paris to study for that profession, but he hesitated between the law

and painting, and finally decided for the latter. On his first visit to the Louvre he was filled with enthusiasm for the works of the Flemish, Dutch, and Venetian painters, and repeated the legend of Correggio, by saying, when he saw Delacroix's "Massacre of Scio," "I could do as well as that if I wished." Although he studied at different times in the painting-rooms of three artists, Flageoulot, Steuben, and Hesse, he says truly of himself that he never had a master. He exhibited for the first time in the Salon of 1844. Characteristically enough, the picture was his own portrait. In the Salon of 1850–51, Courbet exhibited, among others, three pictures, "An Interment at Ornans," "Peasants of Flagey returning from the Fair," and "The Stone-Breaker," which made an uproar in the artistic and cultivated world of Paris, and divided it into two fiercely hostile camps. Courbet's party was strong, but so was that of his enemies; and, disgusted by the rejection of some of his most important pictures from the Salon of 1855, Courbet determined to appeal to the general public, and, erecting a building at his own expense on a piece of ground as near as he could hire to the Salon, he opened an exhibition of forty pictures, charging a fee for admission. The catalogue was prefaced by his declaration of principles. It was long before the war thus begun ceased, and when it ended Courbet's rank as a great but very unequal painter may be said to have been definitely fixed. Courbet has made himself notorious all his life by his extreme opinions in politics and religion, and of late by the part he played in the Commune. It was by his influence that the column of the Place Vendôme was destroyed. For this act of vandalism Courbet was tried, but, after a long imprisonment, was released. One of the first acts of the reactionary government that succeeded the rule of M. Thiers was to confiscate all Courbet's property, to help to pay for the new column which it was voted to set up on the Place Vendôme. Since 1870, Courbet has not been allowed to exhibit in the Salon, and his pictures, thus made a mark of, have gone up greatly in price. CLARENCE COOK.

Courbevoie, a town of France, department of Seine, on the left bank of the river Seine, 5 miles N. W. of Paris. It has large barracks, and manufactures of white lead and brandy. Pop. 9862.

Courcelle, a town of Belgium, on a railroad, 16 miles E. of Mons. It has linen and nail manufactures, and exports coal. Pop. 7463.

Courier [from the Fr. *courir*, to "run"], literally, a runner, a messenger or bearer of despatches, usually on public business. According to Xenophon, couriers were first employed by Cyrus the Great. Herodotus speaks of the Persian *cassids* or foot-messengers, who travelled with great rapidity. They were stationed, one man and one horse, for each day's journey; and by these messengers Xerxes sent the news of his defeat to Persia (480 B. C.). Gibbon bears testimony to the rapidity with which communication was carried on in the Roman empire by the regular institution of posts. The Mexican couriers, according to Prescott, travelled with incredible swiftness. The Peruvian chasquis or runners carried despatches at the rate of 150 miles a day.

Courier, or **Courier de Méré** (PAUL LOUIS), a French scholar and writer, born in Paris Jan. 4, 1772. He entered the army in 1792, and served with distinction. In 1809 he resigned his commission. He translated several Greek classics into French, and produced a good edition and version of Longus (1810). He was liberal in politics, and acquired a high reputation as a political writer. Among his writings, which display wit, eloquence, masculine sense, and genial satire, is the "Pamphlet des Pamphlets" (1824). He was assassinated on his estate in Touraine April 10, 1825. The most complete collection of his writings is "Mémoires, correspondance et opuscules" (1828).

Cour'land, or **Kurland,** a Baltic province, incorporated with Russia by the third partition of Poland, in 1795. It is bounded on the N. by the Gulf of Riga and on the W. by the Baltic, and lies between lat. 56° and 58° N. and lon. 21° and 27° E. Area, 10,556 square miles. The chief river is the Duna, which flows along the north-eastern border. The soil is in some parts very fertile, but there are many forests, lakes, and swamps. The greater part is occupied by Germans. Courland was originally an independent duchy, but from 1561 to 1795 was in feudal subjection to Poland. Capital, Mitau. Pop. 597,288.

Court [Fr. *cour;* It. *corte*, perhaps from the Gr. χόρτος, an "enclosed place;" Lat. *aula* or *regia*], originally an enclosure or yard; the residence of a sovereign; a royal or princely household. In England and some other countries the term usually denotes the family and attendants of the sovereign, regarded in a public capacity. Also a judicial tribunal, whether composed of one or more judges; sometimes the hall or room in which judges sit and try causes. The term "court circle" in England is applied to the nobles, bishops, ministers of state, and other persons who are in the habit of approaching the sovereign and of associating with the other members of the royal family.

Courtais, a township of Crawford co., Mo. Pop. 962.

Court de Gébelin (ANTOINE), a French scholar and author, born at Nîmes in 1725, was the son of Antoine Court, celebrated as the reviver of French Protestantism. He devoted much attention to mythology and the affinity of languages. Among his works is "The Primitive World Analyzed and Compared with the Modern" (9 vols., 1773–84). He assisted Benjamin Franklin in editing a periodical entitled "The Affairs of England and America" (15 vols., Paris, 1776 *et seq.*). Died May 10, 1784.

Courtenay (EDWARD H.), LL.D., an American officer and educator, born in 1803 in Maryland, graduated at West Point in 1821. He served, while lieutenant of engineers, as assistant professor at the Military Academy 1821–24; in construction of Fort Adams, R. I., 1824–26; as assistant to chief engineer 1826–28; and as acting professor of natural and experimental philosophy at the Military Academy 1828–29; appointed full professor Feb. 16, 1829, on the resignation of his lieutenancy, and with great credit to the Military Academy and profit to his pupils held the chair of philosophy till Dec. 31, 1834, when he accepted the professorship of mathematics in the University of Pennsylvania, continuing in it till 1836; civil engineer New York and Erie R. R. 1836–37; at Fort Independence, Mass., 1837–41; and construction of dry-dock, Brooklyn navy-yard, 1841–42. He resumed his former vocation, for which he was admirably fitted, as professor of mathematics in the University of Virginia 1842–53; translator and editor of Boucharlat's "Mechanics" 1833, and was author of a "Treatise on Differential and Integral Calculus, and Calculus of Variations." Died Dec. 21, 1853, at Charlottesville, Va., aged fifty.

GEORGE W. CULLUM, U. S. A.

Court-house, a township of Montgomery co., Ala., includes part of the city of Montgomery. Pop. 9194.

Court-house, a township of Camden co., N. C. P. 1759.

Court-house, a township of Chesterfield co., S. C. P. 1708.

Court-house, a twp. of Spartanburg co., S. C. P. 1229.

Court-house, a twp. of Taylor co., West Va. Pop. 753.

Court'land, a township and post-village of Lawrence co., Ala. The village is on the Memphis and Charleston R. R., 45 miles W. of Huntsville. It has a court-house, male and female academies, two steam-mills, four churches, and a weekly newspaper. Pop. 2553.

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Courtland, a township and village of De Kalb co., Ill., about 50 miles W. of Chicago. Pop. 1293.

Courtland, a township of Jo Daviess co., Ill. P. 1786.

Courtland, a township of Kent co., Mich. Pop. 1338.

Courtland, a post-township of Nicollet co., Minn. Pop. 640.

Courtland, a township of Columbia co., Wis. P. 1449.

Court-Mar'tial, in the army, navy, and marines, a tribunal for the examination and punishment of offenders against martial law or against good order and military or naval discipline. The subjects of courts-martial are usually officers or men in actual service, but when martial law prevails courts-martial sometimes punish offences committed by persons not in the service.

Courts-martial are called "general," "garrison," and "regimental." Summary and informal courts held in the field are sometimes called "drumhead courts-martial." The officers of military and naval courts are a president, a JUDGE-ADVOCATE (which see), and a clerk, all commissioned officers. The sentences passed by these courts are usually subject to the approval of department commanders or other high officers, or even to that of the President of the U. S. (See S. V. BENÉT on "United States Military Law," 1862.)

Cour'town, EARLS OF, and Viscounts Stopford (1762), barons of Courtown (Ireland, 1796), Barons Saltersford (Great Britain, 1796).—JAMES GEORGE HENRY STOPFORD, fifth earl, born April 24, 1823, succeeded his father in 1858.

Courtray [anc. *Cortoriacum;* Flem. *Kortryk*], a fortified town of Belgium, on the river Lys, 26 miles S. W. of Ghent. It is well built and clean, has a castle, a fine old bridge, a noble town-hall, and a beautiful Gothic church founded in 1238. Here are manufactures of damasks and other linen fabrics, hosiery, lace, paper, cotton goods, soap, etc. This place was taken in 880 A. D. by the Normans, who fortified it. In July, 1302, the Flemings here defeated the French in the famous "Battle of the Spurs," so called from the great number of spurs taken from the fallen knights. Pop. in 1864, 23,497.

Courts (in law), public tribunals established for the administration of justice and the interpretation and enforcement of the law. The protection of private rights, the punishment of criminal offences, the regulation of conflicting interests of individuals and states, the exposition and application of legislative enactments, and, in some nations, even of constitutional provisions, are the various important functions which are generally deputed to such judicial organizations. It cannot be said, however, that all tribunals which have been designated courts in various countries and at different epochs have enjoyed all these prerogatives, or have exercised them so exclusively as is understood to be the appropriate province of courts at the present day among civilized communities. In a primitive form of society the powers of the judiciary are usually much restricted, and subjected, to a greater or less degree, to executive and legislative interference. This remark applies also to despotic governments, even though a high degree of civilization be attained, as the history of France and Germany bears ample witness. In modern times, however, it has been recognized as a necessity to confer upon the courts the powers above enumerated, and to render their independence of the other departments of government as complete as possible. They are generally composed of distinct bodies of officials holding their positions during stated terms, and are under no supervisory control for decisions rendered or other legal acts performed but that of superior or appellate organizations of a similar nature. In the exercise of their powers courts do not attempt to ferret out and redress every evil and form of injustice that may exist within society, and determine the law of their own motion by the direct establishment of legal principles, but are confined to the decision of controverted questions presented to them by injured parties, and thus evolve the law indirectly and mediately. Criminal cases are presented by the government, while those of a civil nature are brought either by states or individuals affected therein, at their own option.

But while there is a general agreement among civilized nations at the present day in regard to the objects to be attained by the creation of courts, the modes by which the same results are sought are notably and strikingly diverse. The courts upon the continent of Europe and in Scotland administer a system of jurisprudence derived from the civil or Roman law, while in England and the U. S. they apply a system which they themselves have originated, called, by way of distinction, the "common law." In the latter the rule of precedent holds sway, in accordance with which principles determined in previous decisions are, in general, to be deemed authoritative in subsequent causes involving similar circumstances. In this system, moreover, the mode of trial by jury was developed as a safeguard against oppressive action by the courts, and has been sedulously maintained as far as its application is reasonably practicable. The judge does not examine witnesses nor decide any questions but points of law, so that every inducement may be removed which would lead him to act as advocate instead of arbiter, and awaken his personal interest in the cause. A broad distinction is also drawn between actions which are termed legal and suits which are called equitable, the latter dispensing with a jury, administering a more adequate relief in many instances, and in various ways supplementing the deficiencies of the proceedings applicable to the former. In the European courts, on the other hand, which proceed upon the doctrines of the civil law, the force of precedent is not recognized as a controlling principle. Jury trials have only been introduced as a foreign system, are employed in a comparatively small class of instances, and are looked upon with so little favor that any extension of their application is generally thought undesirable. The judges, moreover, may engage directly in the examination of witnesses and prisoners, and not infrequently, particularly in criminal trials, appear to become so strongly biassed in consequence as seriously to impair one's belief in the impartial administration of justice. And lastly, no distinction of causes and remedies as legal or equitable is attempted. In fact, the English practice in this respect has even excited the derision of continental lawyers, who charge that it presumes two different kinds of justice.

Besides these fundamental points of difference between the two systems, there are great diversities between the several countries in the number, the character, and the functions of the various courts which have been established, and their relations with each other, which will require an investigation into the judicial system of each of the more important modern nations specifically. England, Scotland, France, and the U. S. will be selected for this purpose, and reference made to their most important tribunals in detail.

I. The Courts of England.—By the English and American common-law system courts are distinguished as those *of record* and those *not of record*. A court of the former class is provided with a clerk and a seal, and receives its name from the fact that its proceedings are required to be preserved in accurate *records;* courts of the latter class are inferior tribunals without clerk or seal, and their acts are not formally enrolled. Courts are said to have *original* jurisdiction before which causes are brought in the first instance; *appellate* jurisdiction when decisions rendered in inferior tribunals are transferred to them for review. Civil causes heard before a single judge, with a jury, are said to be heard at *nisi prius* or at circuit; when several judges sit to review causes on appeal they are said to sit *in banc*. Courts are also distinguished as civil or criminal, superior or inferior, as courts of law, of equity, of admiralty, etc.—distinctions which require no explanation. In the following synopsis of the English courts at the present time (Jan., 1874) an account will be given (1) of the superior common-law courts of record; (2) of the superior courts of equity; (3) of the courts of probate, divorce, and admiralty; (4) of the criminal courts; (5) of the appellate courts.

(1) *The Superior Common-Law Courts of Record.*—These are the Court of Common Pleas, the King's or Queen's Bench, and the Court of Exchequer. These several tribunals, which now enjoy very much the same jurisdiction, are considered to have been derived originally from a single organization, the *Aula Regis* (or King's Council), which was the only superior court in the realm during the early history of the Roman kings. This had both civil and criminal jurisdiction, and was ambulatory, or attendant upon the person of the king, holding its sessions in such different parts of the kingdom as he entered in the course of his journeyings. The present courts were, when first created, nothing more than subordinate branches or committees of the council, established for the more speedy transaction of business. The exchequer branch entertained questions relating to the royal revenue; that of the common pleas, civil suits between individuals except for forcible injuries; while there was left to the *Aula Regis* proper, jurisdiction in criminal causes and in civil actions for injury by violence, and a general controlling power over inferior tribunals.

In the reign of Edward I. (1272) the three bodies were constituted separate courts, were all fixed at Westminster, and their powers, as distinct tribunals, determined. Each retained, however, its previous particular jurisdiction. But in the course of time, by a gradual process of encroachment, justified by ingenious legal fictions, each court trenched upon the appropriate province of the others, assuming thereby similar powers, so that at the present day they all entertain co-ordinate jurisdiction in nearly all civil causes. The Court of Queen's Bench, however, still retains exclusive cognizance of criminal matters and the sole superintendence over inferior courts and civil corporations; the Court of Common Pleas has alone the right to entertain real actions—*i. e.* actions for the specific recovery of real property (actions now rarely brought); while the Court of Exchequer still exercises entire control over strict questions of revenue. In other cases the parties to the action may select any one of the courts they may prefer. As regards the organization of these common-law courts, the Queen's Bench and Common Pleas consist each of a chief-justice and five puisne justices; the Exchequer, of a chief baron and five puisne barons. These judges hold office during good behavior, but may be retired on a pension after fifteen years' service. An appeal lies from any one of these courts to the Exchequer Chamber, which, when hearing a cause sent from one of them, is composed of the judges of the other two. A second appeal may also be taken to the House of Lords.

To remedy the inconvenience to suitors arising from the fixed establishment of these courts at Westminster, provision was made at an early period for the hearing of jury trials in every county one or more times during each year. The tribunals for this purpose are called *courts of assize and nisi prius*, are composed of two or more commissioners, of whom a superior court judge, a sergeant-at-law, or a barrister must be one, and in most counties they sit twice each year. Appeals from them, however, can only be heard at Westminster.

(2) *The Superior Courts of Equity.*—It was found at an early period that the common-law tribunals, determining causes as they did only through the instrumentality of juries in the first instance, and in all cases, where no demand was made for specific property, giving only pecuniary damages as relief, were totally inadequate to administer exact justice in a large variety of cases, and the separate system of equity jurisprudence was established to repair the deficiencies of the strict legal methods. These courts are likewise governed by the rule of precedent, but their modes of procedure are less technical, their forms of rem-

edy more diverse, and they employ no juries, though a practice exists of referring special questions to courts of law to be tried by a jury, whose verdict is reported to the equity judge to aid his future action. The equity judges consist, at present, of three vice-chancellors, a master of the rolls, two lords justices, and the lord chancellor. The vice-chancellors and the master of the rolls hold each separate courts at which causes are heard in the first instance; so that there are four equity tribunals of original jurisdiction. Appeals may be taken from either of them to the Court of Appeal in Chancery or to the lord chancellor.

The Court of Appeal in Chancery is composed nominally of the two lords justices and the lord chancellor, but almost invariably it is held by the lords justices alone. Any two of these three judges, however, are sufficient for holding the court, or even the lord chancellor alone. Moreover, each of the justices may, under certain restrictions, sit alone. The chancellor may, in addition, exercise an independent jurisdiction, without acting as a member of the court of appeals. This jurisdiction is ordinary when according to common-law methods; extraordinary, when equitable in its nature. An appeal may be taken to the House of Lords. The term of office of these judges is the same as that of the common-law judiciary, except in the case of the chancellor, who may be deprived of his position at the pleasure of the Crown.

(3) *The Courts of Probate, Divorce, and Admiralty.*—The Court of Probate and that of Divorce were established in 1857 to supersede the former ecclesiastical courts, and received more extended powers. Their names sufficiently define the nature of their jurisdiction. The judges of either of these tribunals may try questions of fact with a jury, or may order an issue to be tried by a court of law. Appeals may be taken to the House of Lords. The Court of Probate has only a single judge, who may, however, associate with himself a common-law judge or judges. The appropriate labor of this tribunal is facilitated by the establishment of district registries throughout the realm. These are forty in number, besides the principal registry in London, all having power to grant probate and administration.

The Court of Divorce consists of the judge of probate, the lord chancellor, and the judges of the superior common-law courts. The probate judge is made judge ordinary, and may act alone or with the other judges. The power to grant divorce, which has been conferred upon this court, was exercised till 1857 only by Parliament. Actions for criminal conversation may also be maintained in this court.

The High Court of Admiralty has cognizance of causes of action arising from the navigation of the seas, as, *e. g.*, claims for repairs of foreign vessels and for supplies furnished them, actions for pilotage fees, for seamen's wages, for personal injuries inflicted at sea or injuries by collision, seizure, and the like; also to determine matters of prize in time of war, and decree the forfeiture of vessels of the enemy or of neutrals in proper cases. This court is held by a single judge, who is appointed by the Crown. He may be the same person as the judge of probate.

(4) *The Criminal Courts.*—These are divided into the inferior and the superior, the former including the general and quarter sessions of the peace, while the latter embrace the assizes, the admiralty sessions, the Court of King's Bench, and the Central Criminal Court. The assizes are held before commissioners twice a year in nearly all the counties. These officials act by virtue of various commissions, the most important of which are those of "oyer and terminer" and "general jail delivery." At oyer and terminer the judges can only act upon indictments found before themselves, and they have jurisdiction whether the offender is or is not in custody. The commission of jail delivery authorizes the delivery of the jail of a specified town. Indictments may be tried found before other justices, but the persons charged must always be in custody to give the court jurisdiction.

The King's or Queen's Bench is the highest court of criminal jurisdiction. This prerogative, as has been seen, it enjoys to the exclusion of the other superior common-law courts.

The other criminal courts require no particular mention.

(5) *Appellate Courts.*—(*a*) The Exchequer Chamber, to which appeals are first taken from the King's Bench, the Common Pleas, and the Exchequer, is composed, as already explained, of the judges of the two courts in which the action was not heard originally.

(*b*) The Judicial Committee of the Privy Council has exclusive jurisdiction of appeals in admiralty and ecclesiastical cases, and in those coming from the colonies. It is a court of record, and is composed of a lord president, all the equity judges, the three chief judges of the common-law courts, and certain other officials to the number of twenty or more. Only four, however, are required to constitute a quorum. Four of the whole number of members receive a salary, are required to attend the sittings, and retain their positions during good behavior. But the members of the Council generally hold office during the pleasure of the Crown. There is no appeal to the House of Lords, and there is, consequently, danger of a conflict of authority between these tribunals of last resort.

(*c*) The House of Lords. Though, in theory, this entire body constitutes the appellate tribunal, and any of the lords might, if so disposed, assume to act as judges, yet the judicial functions are, in reality, entirely delegated to a few members of the legal profession, known as the "law lords." The services of the others are only available when they are needed to make up a quorum, for which three members are required. The organization of this court has several objectionable features, since the sittings are only held while Parliament is in session; there is no regularity of attendance required on the part of members; and a judge may sometimes sit in review of his own decisions. The decisions rendered, however, enjoy generally a great reputation from the eminence of those who usually act as judges.

There is a large number of other courts in England's present judicial system, but they are all of minor importance and need no specific mention.

The inconveniences arising from this complexity of court organization in England are so manifold that a reform has long been felt necessary. Accordingly, an act of Parliament has been recently passed, entitled "The Supreme Court of Judicature Act" (36 and 37 Vict., chap. 66), to come into effect in November of the present year (1874), by which a reorganization is to be effected. The chief tribunals now existing are to constitute in combination a single court, called the "Supreme Court of Judicature." This is, however, to be separated into two divisions—one to be known as "Her Majesty's High Court of Justice," exercising mainly original jurisdiction, while the other will be named "Her Majesty's Court of Appeal," with exclusive appellate powers except in some few classes of instances. There is to be no appeal to the House of Lords. The High Court is to consist of twenty-one judges—viz. all the present equity judges, with the exception of the lords justices, all the common-law judges (whose number, however, will be reduced in future to fifteen), the judge of the Court of Probate and Divorce, and the admiralty judge. Though the present lord chancellor will form a member of this court, his successor will not. The Court of Appeal will be composed of fourteen judges, of whom five will be judges *ex officio*, and nine *ordinary* judges. Additional members may also be appointed if desired. The *ex-officio* judges will be the lord chancellor, the master of the rolls, and the three chief-justices of the common-law courts. All these, as has been seen, are also members of the High Court. The ordinary judges will be the two lords justices in Chancery, the four salaried judges of the Privy Council, and three others to be hereafter appointed. These nine, and any additional judges who may be appointed, will be known as lords justices of appeal. All the judges of both tribunals will hold office for life, though they may be removed by the Crown on the address of Parliament.

For the more convenient despatch of business, the High Court of Justice is to be divided into five divisions, corresponding to the present tribunals, whose jurisdiction it has received. Thus, one division is to consist of the equity judges, who will be members of the High Court, and is to be known as the Chancery Division. In like manner, there will be the Queen's Bench Division, the Common Pleas Division, the Exchequer Division, and the Probate, Divorce, and Admiralty Division; the first three of which will consist of the judges of the present courts from which they derive their names, while the last will be composed of the two judges of the Courts of Probate and Divorce and the Court of Admiralty. Provision is made for a reduction or increase in the number of these divisions, or in the number of judges who may be attached to any particular division, by order in council of the queen. Judges may also be transferred from one division to another by Her Majesty when it shall be thought desirable. Each of these divisions is to possess very much the same jurisdiction as the present court of the same name, and will be in fact the same tribunal, though with some important differences of authority. For instance, the courts which now proceed entirely upon common-law principles will then be enabled to apply the doctrines of equity jurisprudence, for it is provided that in every civil cause or matter entertained in the Supreme Court of Judicature law and equity shall be concurrently administered, and that equitable rules shall supersede those of the law when any conflict arises. It is still true, however, that causes of action which in them-

selves have been hitherto considered distinctively equitable are to be brought before the Chancery Division, which takes the place of the four present chancery courts of original jurisdiction.

In a large number of questions several divisions, it is evident, will have co-ordinate jurisdiction. It is accordingly provided that any person commencing a cause may assign it to any proper division he may think fit by marking his documents with its name. If a wrong assignment be made, a transfer may be had, on proper application, by direction of the court or by a judge of the division in which the matter is brought, or the cause may even be retained if a transfer would be inexpedient. Such causes as may at present be heard by a single judge are to be heard in the same manner when this act goes into effect. Other matters are referred to divisional courts of the High Court, which are to be constituted of two or three judges. These divisional courts are not the same as the divisions already mentioned. Any number of them may sit at the same time, and they may consist of any of the twenty-one judges of the High Court. The divisional courts hear appeals from the decisions of single judges of the High Court and from inferior courts, decide various motions, etc. Appeals from inferior courts, such as the petty and quarter sessions, county courts, etc., here receive final determination. Other appeals may go on to the Court of Appeal.

Every appeal to the Court of Appeal shall be heard either by the whole court or by a divisional court consisting of any number, not less than three, of the judges thereof. Appeals may also be reargued before decision, or be reheard before final judgment, before a greater number of judges, if the Court of Appeal so direct. But no judge shall hear a case on appeal which he himself decided, or helped to decide, originally.

Provision is also made for the appointment of commissioners to hold circuit courts throughout the kingdom, as at present. Referees may also be appointed for the hearing of causes or the determination of much of the incidental business arising in the courts. The rules of practice and pleading are also to be considerably altered and simplified; but for all these minor details reference must be made to the Judicature Act itself. This synopsis of the general organization of the courts shows how fundamental a revolution is to be effected in the judicial system as at present constituted.

II. The Courts of Scotland.—Although both England and Scotland belong to one united kingdom and have but a single legislative body, the Houses of Parliament, their judicial organization is almost entirely diverse. There is one tribunal of supreme appellate jurisdiction, the House of Lords, which is common to both countries, but this is the only element of correspondence in the two systems. Scotland administers the civil law instead of the common. The courts of chief importance are the Court of the Sheriff, or sheriff-substitute, and the Court of Session. The Scottish sheriff differs from the English in not being confined to the performance of merely ministerial duties. He acts also as the chief local judge of the county to which he belongs. The jurisdiction he exercises is both civil and criminal, and is quite extensive in its scope. In civil causes it extends to all actions on contract and for damages, no matter how large the amount involved. In matters, however, relating to landed property his authority is much restricted. He has also a summary jurisdiction, conferred by statute, in small-debt cases, where the sum involved is not above £12. In most cases of this kind there is no appeal from his decisions. The sheriff also takes cognizance of bankruptcy, insolvency, and admiralty questions. His criminal jurisdiction extends to all cases which do not infer death or banishment. No jury is employed in the trial of civil causes, but only in those of a criminal nature. Though, however, these various powers are described as appertaining to the sheriff himself, yet in practice, so far as the capacity of hearing causes originally is concerned, they are delegated to a subordinate officer, appointed by the sheriff, and styled a sheriff-substitute. If it is desired to secure the review of a decision rendered by the substitute in the first instance, then the sheriff himself acts in the capacity of an appellate judge. From him also, in proper cases, an appeal may be taken to the Court of Session, and thence to the House of Lords.

The Court of Session is the highest civil tribunal in Scotland. It takes cognizance of all questions of a civil nature, whether legal, equitable, admiralty, or probate, and exercises both original and appellate jurisdiction. It was established in 1532, and, as originally constituted, consisted of fifteen judges, all of whom sat in a body to hear appeals. This arrangement occasioned great dilatoriness of procedure, but continued nevertheless for nearly three centuries, despite this and other commonly recognized inconveniences. The present organization is much different. The number of members has been reduced to thirteen. Five of these are called "lords ordinary," exercise severally original jurisdiction, and constitute collectively what is known as the "Outer House." The eight remaining judges form the "Inner House," and have, as a general rule, only appellate jurisdiction. They are divided into two divisions of four each, either of which possesses the same authority, and may be selected by any party appealing, at his own option. One division is presided over by the lord justice clerk, the other by the lord president. In some few instances the Inner House may exercise original jurisdiction, and in cases of exceptional difficulty the whole body of thirteen judges may consider a question upon appeal; but such cases are very rare. In the trial of civil causes in the first instance before a lord ordinary juries have been employed since 1815, but by no means to so great an extent as in the English practice. The jury system was introduced as an exotic, and does not thrive very vigorously under the unfavorable conditions of a common prejudice against it on the part of clients and hostile criticism by able members of the bar. Juries may be dispensed with, in general, in the discretion of the court or by consent of parties; and, as might be supposed, a resort to these expedients is not infrequent. The constitution of the appellate branches of the Inner House in this system is evidently faulty. There may be an equal division of the judges in either body, so as to render the determination of any question impossible, or the decisions of one branch may directly contradict those of the other, so as to make the law fluctuating and uncertain. The first evil is remedied by calling in a lord ordinary or three judges of the other house to attend a rehearing of the cause, by which means the whole number of judges is made uneven and a majority rendered certain. In the second case the opinions of the whole court may be taken, but this mode of reference is discretionary, and therefore inadequate to meet the difficulty. The final appeal, which may be taken from the Court of Session to the House of Lords, has this peculiar consequence—that it refers questions arising under the civil-law procedure to jurists trained only in common-law methods as a general rule. It cannot be said, however, that any practical evils have resulted from this co-operation of systems.

There are several other courts in Scotland composed of members of the Court of Session. Only one, however, deserves mention—viz. the High Court of Justiciary, a tribunal exercising an important criminal jurisdiction. The other courts are of inferior importance.

III. The Courts of France.—The most important courts are the Tribunals of the First Instance, the Courts of Appeal, the Courts of Assize, and the Court of Cassation. The Tribunals of the First Instance, as their name implies, entertain causes originally, and they exercise both civil and criminal jurisdiction. One of them is established in each of the arrondissements into which the whole country is divided. Each of these courts consists of from three to twelve judges, the number varying with the population of the districts. When their number is seven or more, they are formed into two chambers—one for the hearing of civil, and the other of criminal, causes. When there are twelve judges, three chambers are formed, two civil and one criminal. The tribunal at Paris is so large as to be divided into ten chambers. In civil cases three judges must concur in order to pronounce a decision, while in criminal actions the agreement of five is necessary. Appeals may be taken to the Courts of Appeal.

The Courts of Appeal are twenty-seven in number, and each of them is named from the city or place in which it is situated. They consist severally of at least twenty-four judges, who are generally divided into three chambers—one of civil jurisdiction, another of criminal, while the third hears appeals in police matters. Seven judges must concur in the determination of civil causes, five in criminal accusations. The Court of Appeal in Paris has six chambers and fifty-nine judges. Each chamber in all these courts has its own president. When momentous state questions are to be decided or causes of exceptional complexity two chambers may be united. This is called "the solemn hearing," and the concurrence of fourteen judges is required in order that a decision may be given. Appeals lie from these courts to the Court of Cassation.

The Courts of Assize are composed of judges of the Courts of Appeal, and exercise only criminal jurisdiction. One of these tribunals is established in each of the departments into which France is divided (about eighty in number), and their institution is peculiar, as compared with French courts in general, in that it exhibits the employment of the English jury system. The jurors, however, are not required to be unanimous in their verdict, a majority sufficing. The number of judges in each court is three, and sessions are held every three months. The large

amount of business in Paris, however, requires two sessions a month. Appeals may be taken to the Court of Cassation.

The Court of Cassation is the highest permanent court of appeal in France. It is composed of a first president, three presidents of chambers, and forty-five other judges called counsellors. It is divided into three chambers—one for the hearing of appeals in civil causes, another in those of a criminal character, while the third is termed the Chamber of Requests, and takes cognizance of petitions, determines whether appeals are admissible, etc. Appeals must be brought within three months after the previous decision was rendered. The judges, as in all the higher courts of France, hold office for life. The constitution and functions of the Court of Cassation differ quite essentially from those which are conferred upon appellate tribunals in England and generally in other countries, and even upon the subordinate French courts of appeal; for it possesses no power to affirm the judgment of the court below, but only, as its name indicates, to reverse a decision, and transfer the cause for another hearing to some tribunal having co-ordinate jurisdiction with the one in which judgment was first rendered. Moreover, notwithstanding the pre-eminent position of this court, its determination of the law is not considered authoritative upon inferior tribunals, but only as presumably correct and open to contradiction. Instances in which its views are disregarded, however, are of course very rare.

Other French courts of limited jurisdiction but great usefulness are the Tribunals of Commerce, established in all the commercial cities and towns, and the Courts of Prudhommes, existing in Paris and a few of the larger cities. The former consist largely of men experienced in mercantile pursuits, and take cognizance of questions arising in commercial transactions. The latter are mechanics' courts, consisting of manufacturers and artisans, and take charge of matters arising from the relations of employer and employed. They relieve the ordinary courts of much labor.

IV. The Courts of the United States.—In accordance with the provision of the Constitution establishing a Supreme Court and conferring upon Congress the power to create inferior tribunals, a regular system of courts has been formed throughout the Union. The most important are the District Courts, the Circuit Courts, and the Court of Claims. Final appeals are taken to the Supreme Court at Washington. All these tribunals exercise both law and equity jurisdiction, and the judicial authority given by the Constitution is variously apportioned among them.

The District Courts are at present (1874) sixty in number. Each State generally constitutes a single district, though some of the larger ones, as New York, Pennsylvania, and a few others, are divided into two or three. New districts are formed by Congress as the population increases or new States are admitted, so that the number is subject to constant variation. Each court consists of a single judge, who must reside in the district for which he is appointed. Original jurisdiction is exercised in civil, criminal, and admiralty causes. The classes of questions of which these courts take cognizance are determined entirely by Congressional enactment, and are variously modified at different times. They entertain exclusively questions of admiralty or maritime jurisdiction in the first instance, including all seizures upon navigable waters under laws of imposts, navigation, or trade of the U. S., actions for injuries committed upon the high seas, suits to recover upon maritime contracts, actions for salvage, for injuries by collision, and matters of prize. They also have sole original cognizance of questions arising from seizures upon land, and of all suits for penalties and forfeitures under the U. S. laws, and also of actions against consuls or vice-consuls. In addition, they have original jurisdiction in all causes under the bankrupt laws. They exercise concurrent jurisdiction with the Circuit Courts of all crimes and offences against the U. S. the punishment of which is not capital, of patent and copyright cases, and of all causes, civil or criminal, affecting persons who are denied in the State courts their rights of citizenship under the U. S. laws. They also have concurrent jurisdiction with the Circuit Courts or with the State Courts of all causes where an alien sues for a tort in violation of the law of nations or a treaty of the U. S., and of all suits at common law where the U. S. or any officer thereof sue. The trial of issues of fact in the District Courts, except in civil causes of a maritime character, is by jury. No person can be arrested in one district for trial in another. Appeals are generally taken to the Circuit Courts, though sometimes to the Supreme Court.

The Circuit Courts are nine in number, and each circuit in which one of these courts is established consists of several States. The nine justices of the Supreme Court are allotted, by their own selection, each to a particular circuit, and each is required to attend at least one term of such court to which he is appointed in each district of his circuit during every period of two years. There is also appointed a special circuit judge in each circuit, within whose limits he must reside. A circuit court is held by the Supreme Court justice thereto allotted, or by the regular circuit judge, or by the district judge of the district sitting alone, or by the Supreme Court justice and circuit judge sitting together and the former presiding, or, in the absence of either of these, by the other (who then presides) and the district judge. Such courts may be held at the same time in the different districts of the same circuit. Two sessions of each court are held annually within each district of the circuit. The circuit courts have both original and appellate jurisdiction. Their original jurisdiction extends, concurrently with that of the State courts, to civil suits in law or equity for more than $500 when the U. S. are plaintiffs, or an alien is a party, or the suit is between a citizen of the State where the suit is brought and a citizen of another State. They also entertain causes arising under the revenue laws and some questions of a particular nature in bankruptcy procedure. Their important concurrent jurisdiction with the District Courts has already been mentioned. Provision is made, moreover, for the removal of certain causes—such as, *e. g.*, actions against revenue officers, suits on titles to land derived from other States, etc.—from the State courts to the Circuit Courts, on proper petition by the defendant and the entering of security. The appellate jurisdiction of Circuit Courts extends to admiralty and maritime causes, and to civil actions referred from the District Courts, where the matter in dispute exceeds the value of $50; also to patent and some other questions. Appeals from the Circuit Courts are taken to the Supreme Court.

The Court of Claims is a tribunal established at Washington, consisting of five judges, of whom one is appointed chief-justice. It has jurisdiction to determine all claims founded upon any law of Congress, or upon any regulation of an executive department, or upon any contract with the government of the U. S., which are presented to it by petition. All petitions in regard to such claims introduced into Congress are required, unless that body otherwise orders, to be transmitted to this court. So the cabinet officers may refer certain claims made upon their departments. Demands which are adjudged valid are payable from the national treasury. The Court of Claims has a single annual session. Appeals are taken to the Supreme Court.

The Supreme Court is the highest tribunal of the U. S. It consists of a chief-justice and eight associate justices, and holds one term annually at Washington. Six justices are required to constitute a quorum. The jurisdiction exercised is both original and appellate, but chiefly, in practice, the latter. The original jurisdiction extends to all cases affecting ambassadors, other public ministers, and consuls, and those in which a State is a party, except that in the latter case no suit can be prosecuted against any State by the citizens of another State. In actions *against* ambassadors or other public ministers, and in many controversies where a State is a party, its jurisdiction is not only original, but exclusive. Its other original authority is shared with the inferior tribunals. In the exercise of its appellate powers the Supreme Court reviews the judgments or decrees of the Circuit Courts, of certain District Courts with Circuit Court powers, of the Court of Claims, and of some tribunals established in the Territories. Moreover, the decisions of the highest State tribunals which are repugnant to the Constitution, treaties, or laws of the U. S. may be re-examined by the Supreme Court, and reversed or modified as may be necessary. Questions also which fail of determination in the Circuit Courts by reason of an equal division among the judges may be transferred to this court for final decision. It has power to review both the law and the fact in any cause of which it takes cognizance on appeal.

The Federal tribunals in this way possess exclusive jurisdiction over subjects of such manifest national importance as patents, copyrights, admiralty causes, and questions of revenue, and have power to determine controversies between States, and to declare void all laws, whether of Congress or of a State legislature, which are in contravention of the provisions of the U. S. Constitution.

V. The judicial systems of the various States of the Union are so diverse that to give any account of them would be impracticable. They all agree in having a number of tribunals, some of original and others of appellate jurisdiction, and the determination of the law by the courts of each State, subject to the review of the Supreme Court of the U. S. in constitutional matters, is conclusive within its own boundaries. Reference must be made to the constitutions and statutes of the States severally for further details.

George Chase, revised by T. W. Dwight.

Cous'cous, called also **Spotted Phalan'ger** or **Sham'sham,** the *Phalangista maculata,* is a white marsupial with black and brown spots. It is about the size of a common cat, and has a prehensile tail and opposable thumbs on the hind feet. It is found in the Spice Islands, and is caught for its fur as well as its flesh, which is eaten. The animal has a disagreeable odor from a secretion of its anal glands.

Couscous, or Spotted Phalanger.

Coushat'ta Chute, a post-village, capital of Red River parish, La. It is on the Red River, and has one weekly newspaper.

Cousin (Victor), a French philosopher, born Nov. 28, 1792, was the son of a watchmaker of Paris. After brilliant academic studies, though he had a strong inclination to music, his mind was directed towards philosophy under Laromiguière, Royer-Collard, and Maine de Biran. In 1815 he succeeded Royer-Collard as professor at the Sorbonne, and continued the teaching of the Scotch philosophy initiated by him, and promoted the reaction against the sensualism of Condillac and the thinkers of the eighteenth century. In a journey to Germany he became indoctrinated with the idealistic philosophy. In 1820 he was suspended on political grounds. He published editions of Proclus (6 vols. 8vo, 1820–27) and Descartes (11 vols. 8vo, 1827), and his celebrated translation of Plato (13 vols. 8vo, 1825–40). In 1827 he was replaced in his chair at the Sorbonne, and shared with Guizot and Villemain a popularity and power in the community unexampled in university annals. He was under Thiers (1840) minister of public instruction for eight months, and delivered in the Chamber of Peers his "Défense de l'Université et de la philosophie" (8vo, 1844). The revolution of 1848 called forth, in refutation of socialism, "Justice et Charité." "Du Vrai, du Beau, et du Bien" appeared in 1853. He taught a philosophy called *eclectic,* which he said was not a method, but a manifestation of the modern spirit of liberty and tolerance in philosophy. Of his numerous works have appeared in this country his "Course of Modern Philosophy" (1855) and "Lectures on the True, the Beautiful, and the Good" (1857), translated by O. B. Wight. Died Jan. 15, 1867.

Coutances (anc. *Constantia*), a town of France, department of Manche, is on a conical hill 8 miles from the English Channel and about 44 miles S. of Cherbourg. It was formerly fortified. It is the seat of a bishop, and has a handsome old cathedral, a public library, a theatre, and manufactures of druggets, worsted stuffs, hardware, etc. Pop. in 1866, 8139.

Couture (Thomas), a French painter, pupil of Delaroche, exhibited first in 1840 "Jeune Venetien après une orgie." His works have brilliant color-effects; among them are "Trouvère," "Fauconnier," "L'Amour d'or," and the famous "Romains de la décadence."

Cove, a post-township of Polk co., Ark. Pop. 456.

Cove, a township of Barbour co., West Va. Pop. 1657.

Cove Creek, a township of Washington co., Ark. Pop. 514.

Cove Creek, a township of Watauga co., N. C. P. 887.

Coveland, a post-village, capital of Island co., Wash. Ter., near the Strait of Juan de Fuca, and about 112 miles N. of Olympia.

Cov'enant [Fr. *convenant* (from *convenir,* to "agree"), literally, an "agreeing" or "agreement;" Gr. διαθήκη; Lat. *fœdus;* Ger. *Bund*], in theology, the promises recorded in the Scriptures, made by God on certain conditions of obedience, faith, etc. on the part of man. The old dispensation (or Old Testament) is called in Greek ἡ παλαιὰ διαθήκη, *i. e.* "the old covenant;" and the new dispensation (or Testament), ἡ καινὴ διαθήκη, "the new covenant."

The so-called "Theology of the Covenants" or "Federal System" began with Cocceius (1603–69), who taught: (1) the covenant of works before the fall; (2) the covenant of grace after the fall. And under this second covenant three economies: (1) prior to the law; (2) under the law; (3) under the gospel.

Covenant [remotely from the Lat. *convenio,* to "come together"], in law, is a promise under seal. There are several words appropriated to sealed instruments or promises contained in them, such as bond, covenant, deed, and obligation. The first, third, and fourth words are used to express the entire instrument, while "covenant" is commonly employed to designate a particular clause in a sealed instrument. Thus, there may be many covenants in a deed. The subject is fruitful in distinctions, covenants being treated in the law-books as to their form, their nature, their relation to other covenants, their assignability, and the like. One of the most important of these is that which classifies covenants into those which "run with the land" and those which do not. To explain this subject it is necessary to state that in ordinary conveyances of land there are found certain clauses which affirm in substance that the grantor is owner in possession, actual or constructive (or seized), and has a good right to convey; that there are no encumbrances on the land; that the purchaser shall quietly enjoy the land without being evicted by any person having a superior title; that the grantor will warrant and defend the title; and that he will make such further deeds or conveyances as he may be called on to make to perfect the title. In brief terms and in technical language these are covenants of seisin, good right to convey, against encumbrances, of quiet enjoyment, of warranty, and of further assurance. The first three of these, it will be observed, affirm an existing fact; the last three concern the future, and are promissory in their nature. The first three do not run with the land; the last three do. The reason of the distinction is technical. The first three, if untrue at all, are so at the very moment when the deed was delivered, and accordingly then conferred a right of action. This immediate right to sue is in the nature of personal property, and closely resembles ordinary rights of action, such as a claim on a promissory note already due. Accordingly, if the grantee in the deed should convey the land, he would not by that act alone transfer these rights of action; they would not, in technical language, "run with the land." On the other hand, as to the three covenants in the future tense, it is clear that no action can be brought upon them until the event against which they are designed to guard happens, or, in other words, until the covenant is broken—that is, until the quiet enjoyment ceases or the grantee is evicted. Until that occurs the covenant will "run with the land," by which expression is meant that the mere conveyance to the second grantee transfers these covenants, as it would the houses, trees, and other additions to land. The distinction thus pointed out also applies to the case of landlord and tenant, and there are abstruse distinctions here to be noted which cannot properly be stated within the brief compass of this article. Some of the common covenants in a lease which run with the land are the agreement of the tenant to pay rent, or to make repairs, or to keep houses insured. It should be added that the rule respecting the assignability of covenants in leases applies to covenants binding either on the tenant or the landlord. There is a growing practice in conveyances of land in towns and cities to insert clauses binding the purchaser to use the land in a particular manner, as to build dwelling-houses upon it, and even such as are of a particular description. Although these clauses do not strictly fall within the technical doctrines of covenants running with the land, yet they are binding in equity law on a subsequent purchaser with notice. The record of the deed containing them will in general be sufficient notice to such subsequent purchaser. The covenant may be enforced through the medium of an injunction or other appropriate equitable remedy. T. W. Dwight.

Cov′enant (National, of Scotland), an agreement to protect the Reformed religion in the Church of Scotland from the attempt of the English government to enforce the episcopal form of worship, was drawn up and published by the Four Tables in Edinburgh, Mar. 1, 1638. It professed to be based upon a document which James VI. had signed in 1580. The Four Tables, as they were called, consisted of—1, nobility; 2, gentry; 3, ministers; and 4, burgesses; and in their hands the whole authority of the kingdom was vested. They elected a general assembly which met at Glasgow in Nov., 1638, and abolished episcopacy; ordering that every person should sign the Covenant on pain of excommunication. The Covenanters prepared for war, and though a treaty of peace was concluded in June, 1639, they entered England in Aug., 1640. An agreement was signed at Ripon, Oct., 1640, by which commissioners were to be appointed, to whom the settlement of the points in dispute was referred. This covenant, under the name of the Solemn League and Covenant, was received by the Parliament of the Assembly of Divines, Sept., 1643. It differed essentially from the covenant of 1638, and according to Hallam "consisted in an oath to be subscribed by all sorts of persons in both kingdoms, whereby they bound themselves to preserve the Reformed religion in the Church of Scotland, in doctrine, worship, discipline, and government, according to the word of God and practice of the best Reformed churches; and to endeavor to bring the churches of God in the three kingdoms to the nearest conjunction and uniformity in religion, confession of faith, form of church government, directory for worship, and catechising; to endeavor, without respect of persons, the extirpation of popery, prelacy (that is, church government by archbishops and other ecclesiastical officers), and whatsoever should be found contrary to sound doctrine and the power of godliness; to preserve the rights and privileges of the Parliaments, the liberties of the kingdoms, and the king's person and authority in the preservation and defence of the true religion and liberties of the kingdoms; to endeavor the discovery of incendiaries and malignants who hinder the reformation of religion and divide the king from his people, that they may be brought to punishment; finally, to assist and defend all such as should enter into this covenant and not suffer themselves to be withdrawn from it, whether to revolt to the opposite party or to give in to a detestable indifference or neutrality." This document was signed by members of both houses and by civil and military officers. A large number of the beneficed clergy who refused to subscribe were ejected. Charles II. signed it very reluctantly at Spey in June, 1650, in the hope of recovering the English throne. After the Restoration a majority in the House of Commons ordered it to be burned by the common hangman in May, 1661. In the same year the Scottish Parliament renounced the Covenant and declared the king supreme. Under the reign of Charles II. the Covenanters were subjected to a fierce and cruel persecution, in which neither age nor sex was spared. It is in the standards of the Covenanters that we have to look for a true embodiment of the tenets held by the great body of English and Scottish Presbyterians of 1643. Others gave in to the Revolution settlement, and afterwards found cause to secede. The Covenanters never gave in, and of course never seceded. Although in point of fact an elder sister of the existing Church of Scotland and all its secessions, the Cameronian body did not assume a regular form till after the Revolution; and it was with some difficulty that it organized a communion with ordained ministers. The stedfastness of members was put to a severe trial by the defection of their ministers, and for a time the people were as sheep without a shepherd. After sixteen years they were joined by the Rev. John McMillan from the Established Church, in 1706. In 1743 they constituted a presbytery at Braehead, under the name of the Reformed Presbytery. Holding strictly to the covenants, the political position of the Covenanters is very peculiar, as they refuse to recognize any laws or institutions which they conceive to be inimical to those of the kingdom of Christ. The Reformed Presbyterians regard themselves as the modern representatives of the Covenanters.

Cov′enanters, a name given to the signers of the Covenant in Scotland. (See COVENANT.) The Covenanters were also called Cameronians, from Richard Cameron, the founder of the sect. (See REFORMED PRESBYTERIANS.)

Cov′ent Garden [a corruption of "convent garden," so called because it was once the garden of Westminster Abbey] is a square in London famous for its market of fruits and flowers. It was formerly a fashionable quarter of the town. Frequent allusions are made to this place in the old English comedies. The market originated about 1656. Covent Garden is one of the most interesting of London sights; it is seen to the best advantage about three o'clock on a summer morning, Tuesday, Thursday, and Saturday being the principal days. The Covent Garden Theatre was opened in 1732, and has been several times burned. The present edifice was opened in 1858.

Cov′entry [Lat. *Coventria*], a city of England, in the county of Warwick, on the Sherbourne, 10 miles N. N. E. of Warwick, on the London and North-western Railway. The modern part of it is well built. Among the remarkable buildings are St. Michael's church, founded in 1313, which is a masterpiece of the lighter Gothic style, has a spire 303 feet high, and is said to be the largest parish church in England; Trinity church; Christ church, with a handsome ancient spire, belonging to the old Grayfriars' convent from which the town has its name; and St. Mary's Hall, built about 1450, an admirable specimen of ornamental architecture. The ancient cathedral was destroyed by Henry VIII. Coventry returns two members to Parliament. It has manufactures of ribbons, fringes, and watches, and is the greatest emporium for ribbons in England. It was formerly famous for the manufacture of broadcloth, caps, and blue thread. In 1044, Earl Leofric and his wife, the celebrated Lady Godiva, founded here a magnificent Benedictine abbey. In the fifteenth century religious mysteries were often acted here before the king. Pop. in 1871, 39,470.

Coventry, a township and post-village of Tolland co., Conn. The village is near the Hartford and Providence R. R., 20 miles E. of Hartford. Total pop. 2057.

Coventry, a post-township of Chenango co., N. Y. Pop. 1490.

Coventry, a township of Summit co., O. Pop. 1817.

Coventry, a township and post-village of Kent co., R. I. The village is on the Hartford Providence and Fishkill R. R., about 30 miles S. W. of Providence. The township contains several manufacturing villages, and has a national bank at Anthony. Total pop. 4349.

Coventry, a post-township of Orleans co., Vt. It has an academy, and manufactures of lumber, leather, and starch. Pop. 914.

Coventry, EARLS OF, Viscounts Deershurst (England, 1689).—GEORGE WILLIAM COVENTRY, ninth earl, born May 9, 1838, succeeded his grandfather in 1843.

Cov′erdale (MILES), an English bishop and Reformer, born in Yorkshire in 1487. An Augustine monk in his youth, he was one of the first Englishmen who adopted Protestant doctrines. In 1535 he published an English translation of the Bible, which was reissued in 1537 with the royal sanction. The version of the Psalms is that of the present Prayer-Book. This was the first entire Bible ever published in English. He edited the "Great Bible," or Cranmer's Bible (1540). In 1551 he was appointed bishop of Exeter. On the accession of Mary, in 1553, he was deprived of his office and imprisoned for two years. He was then permitted to take refuge on the Continent, whence he returned in 1558, and died in London in Feb., 1568.

Cov′ert, a township and post-village of Seneca co., N. Y. The village is 1 mile S. W. of Cayuga Lake and 12 miles N. W. of Ithaca. The township has five churches and some manufactures. Total pop. 2238.

Cov′ert Way, or **Covered Way,** is a path outside the fosse or moat of a fortified place, between the counterscarp and the banquette of the glacis. It is about thirty feet wide, and is sunk so far below the crest of the glacis that soldiers standing upon it cannot be seen by besiegers; hence the name. Sentinels placed in the covert way prevent all access of the enemy's spies, and musketeers mounted on the side next the glacis can pour fire on the enemy over the crest. The covert way is broad enough to allow troops to form on it, either to act defensively or make sorties; and to increase this accommodation enlarged portions, called places of arms, are made.

Covilhã′, a town of Portugal, in the province of Beira, is situated among the mountains, 48 miles E. of Coimbra. It has thermal springs, and manufactures of a woollen cloth called saragoca. Pop. 9022.

Cov′ington, a county in the S. of Alabama. Area, 1000 square miles. It is intersected by the Conecuh River. The surface is nearly level; the soil sandy. Cotton, wool, and rice are raised. Capital, Andalusia. Pop. 4868.

Covington, a county in the S. of Mississippi. Area, 600 square miles. It is drained by Leaf River and several of its affluents. The soil is sandy, and partly covered with pine forests. Cotton, wool, and corn are raised. Capital, Williamsburg. Pop. 4753.

Covington, a post-village, capital of Newton co., Ga., on the Georgia R. R., 41 miles E. by S. from Atlanta, is

the seat of the Southern Masonic Female College, and has one weekly newspaper. Pop. 1121.

Covington, a post-village, capital of Fountain co., Ind., on the Wabash River, the Wabash and Erie Canal, the Indianapolis Bloomington and Western, and a branch of the Chicago Danville and Covington R. Rs., 71 miles W. N. W. of Indianapolis, has two newspapers, a high school, a foundry, and four coal companies. Pop. 1888.

J. H. SPENCE, PUB. COVINGTON "PEOPLE'S FRIEND."

Covington, a city of Kentucky, Kenton co., is on the Ohio River opposite Cincinnati, and just below the mouth of the Licking River, which separates it from Newport. It occupies a nearly level site, and is pleasantly situated. A noble suspension bridge across the Ohio connects it with Cincinnati. It has also a suspension bridge connecting it with Newport. Covington is the northern terminus of the Kentucky Central R. R., which extends to Nicholasville, Ky., and is connected with Louisville by another railroad. It is the seat of a Roman Catholic bishop, has twenty-six churches, six public schools, nine Roman Catholic schools, three English and one German weekly newspaper, three national and one State bank, waterworks, gasworks, paid fire department, and fire-alarm telegraph, two horse-car lines, one orphan asylum, one hospital, two rolling-mills, and one railroad-iron mill; also manufactures of stoves, wood-work, tobacco, etc. It has 40 miles of paved streets. Pop. 24,505. J. W. DAVIS, "JOURNAL."

Covington, a post-village, capital of St. Tammany parish, La., 45 miles N. of New Orleans. Pop. 585.

Covington, a post-township of Dakota co., Neb., has one weekly newspaper. Pop. 225.

Covington, a township and post-village of Wyoming co., N. Y. Pop. 1189.

Covington, a post-village of Miami co., O., on the railroad which connects Columbus with Chicago, 79 miles W. of Columbus, has one weekly newspaper. Pop. 1010.

Covington, a township of Clearfield co., Pa. P. 701.

Covington, a township of Luzerne co., Pa. P. 1182.

Covington, a township and post-borough of Tioga co., Pa., on the Blossburg and Corning and Tioga R. Rs. Pop. of township, 811.

Covington, a post-village, capital of Tipton co., Tenn., on Big Hatchie River, 200 miles W. by S. from Nashville. It has one weekly newspaper. Pop. 447.

Covington, a post-village, capital of Alleghany co., Va., on Jackson's River and on the Chesapeake and Ohio R. R., 205 miles W. of Richmond. Pop. of township, 1268.

Covode (JOHN), born in Westmoreland co., Pa., Mar. 17, 1808, was brought up as a farmer and blacksmith, but in the early days of the Pennsylvania coal trade he went into that business with success, and afterwards was also a woollen manufacturer and railroad stockholder and director. He was a member of Congress from Pennsylvania, 1854–70, and was distinguished for his energy and political influence. His freedom and impetuosity of speech made him many friends and enemies, and won him the title of "Honest John Covode." Died Jan. 11, 1871.

Cow. See CATTLE.

Cow'an, a township of Wayne co., Mo. Pop. 492.

Cowanshan'nock, a township and village of Armstrong co., Pa. The village is on the Alleghany Valley R. R., 48 miles N. E. of Pittsburg. Total pop. 2246.

Cow'ansville, a post-village of Dunham township, Missisquoi co., Quebec (Canada), on the South-eastern Counties Junction Railway, 14 miles from West Farnham Junction. It has a weekly paper. Pop. about 600.

Cow Bay, a port and post-village of Cape Breton co. and island, 22 miles from Sydney, has mines of bituminous coal, and a breakwater for the protection of shipping. Pop. about 2500.

Cow-bird, or **Cow-bunting,** the *Molothrus pecoris,* a bird of the U. S. belonging to the blackbird family. It takes its name from the fact that it associates with cattle in pastures, probably for the purpose of catching the insects which are aroused by the cattle. Like the European cuckoo, it lays its eggs in the nests of other birds, never hatching its own young.

Cow Castle, a twp. of Orangeburg co., S. C. P. 720.

Cow'ee, a township of Macon co., N. C. Pop. 760.

Cowes, West, a seaport and watering-place of England, on the Isle of Wight, at the mouth of the river Medina, 10½ miles S. S. E. of Southampton. It is built on a steep slope, and presents a fine appearance from the sea. Here are many elegant villas and good hotels. Cowes has an active coasting-trade. Pop. 5482.

Cowe'ta, a county in the W. N. W. of Georgia. Area, 378 square miles. It is bounded on the N. W. by the Chattahoochee River. The surface is uneven; the soil is mostly fertile. Cotton, wool, and corn are raised. It is intersected by the Atlanta and West Point R. R. Capital, Newnan. Pop. 15,875.

Cow'hage, Cowitch, or **Mu'cuna,** a drug which consists of short, slender, brittle hairs, which grow on the pods of twining plants of the genus *Mucuna* or *Stizolobium,* natives of the tropical parts of America and Asia. This genus belongs to the order Leguminosæ, and has a knotted, 2-valved pod, divided by transverse partitions. Most of the cowhage brought to market is from the *Stizolobium pruriens* and *Stizolobium urens,* natives of the West Indies. *Stizolobium pruritum* of the East Indies yields cowhage of similar quality. The hairs readily stick in the skin and cause intolerable itching. Cowhage is used in medicine, acting mechanically in killing and expelling worms, particularly the species of *Ascaris.* That it does not act on the inner surface of the intestinal canal is supposed to be owing to the mucous secretion. It is generally administered in syrup or honey. Before the pods of the cowhage plants are ripe they are used as a vegetable, like those of beans, and are very palatable.

Cow Island, a township of Lincoln co., Me. P. 19.

Cow Lake, a township of Jackson co., Ark. Pop. 189.

Cow'ley, a county in the S. of Kansas. Area, 804 square miles. It is intersected by the Arkansas River and Grouse Creek. There is considerable timber, and the soil is fertile. Coal and building-stone are found. Cattle, grain, and wool are raised. Capital, Winfield. Pop. 1175.

Cow'ley (ABRAHAM), M. D., an English poet, the son of a grocer, born in London in 1618, entered Trinity College, Cambridge, in 1636. He said that he became a poet from reading a volume of Spenser that lay in his mother's parlor. He made verses at the age of ten, and his first volume, "Poetic Blossoms," he published at fifteen. He was ejected from college as a royalist in 1643. In 1646 he went to Paris with the queen, and remained ten years. He published in 1647 "The Mistress," a series of poems which abound in frigid conceits. He was imprisoned as a royalist, but was released through interest, and obtained the usufruct of one of the queen's estates, £300 yearly. He studied natural history, and issued "Liber Plantarum" (1662–78). The epic "Davideis," commenced in college, was never finished. His essays, as well as his anacreontics, evidence sensibility and refinement of thought, a facile imagination, a brilliant wit, and cultured mind, but are marred with the prevailing trivial love for glittering ingenuity of style. The most admired poet of his day, he is called on his tombstone "Anglorum Pindarus, Flaccus et Maro." His works were published in 1680 by Sprat, and by Aikin in 1802, 3 vols. Died July 28, 1667.

Cowley (HENRY RICHARD WELLESLEY), FIRST EARL, a British diplomatist, a son of Sir Henry Wellesley and a nephew of the duke of Wellington, was born June 17, 1804. He became minister to Switzerland in 1848, and was ambassador to Paris from 1852 to 1867.

Cow'litz, a county in the S. W. of Washington Territory. Area, 400 square miles. It is bounded on the S. by the Columbia River, and intersected by the Cowlitz. It is finely timbered and contains coal. It is intersected by the Northern Pacific R. R. Capital, Monticello. Pop. 730.

Cow-Pars'nip, the popular name of certain plants of the genus *Heracleum,* of the order Umbelliferæ, having petals bent in at the middle, and flat fruit. The *Heracleum lanatum* grows in the U. S., from North Carolina northward and westward. It is a coarse weed, from three to eight feet high, strong scented, and is said to be poisonous. One species is a native of Europe (*Heracleum Syphnodium*), the common cow-parsnip, a rank weed, with coarse, hairy leaves, and stem about three to five feet high. It is gathered in some parts of England for fattening pigs, and is said to afford wholesome food for cattle. Some Siberian species are much larger, and are valued for the abundant herbage which they yield very early in the season, particularly *Heracleum Panacea,* which sometimes attains a height of ten feet, and the root-leaves are three to five feet long. The species are mostly Asiatic.

Cow'pens, a village of Spartanburg co., S. C., about 100 miles N. N. W. of Columbia. Here the American general Morgan defeated Colonel Tarleton Jan. 17, 1781. The British lost about 300 killed and wounded, and 500 prisoners.

Cow'per, EARLS, Viscounts Fordwich (Great Britain, 1718), Barons Cowper (England, 1706), Barons Butler of Moore Park (England, 1679), Barons Dingwall (Scotland, 1607), and baronets (1642).—FRANCIS THOMAS DE GREY COWPER, seventh earl, a prince of the Holy Roman Empire, captain of the corps of gentlemen-at-arms, born June 11, 1834, succeeded his father April 15, 1856.

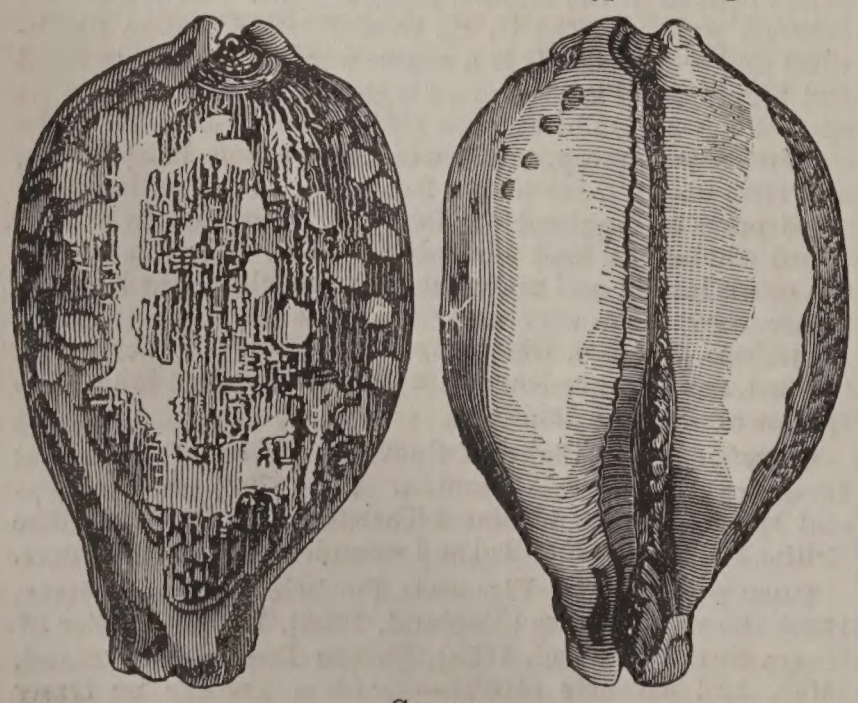
Cowper (William), Earl, an eminent English judge and orator, born in 1664. He was called to the bar in 1688, and elected to Parliament in 1695. He became an excellent debater and the leader of the Whig party in the House of Commons. In 1705 he was appointed lord chancellor. He resigned the great seal when the Tories obtained power in 1710, but was reappointed in 1714. Having resigned office in 1718, he was then created an earl. Died Oct. 10, 1723.

Cowper (William), an English poet, born at Great Berkhamstead, in Hertfordshire, Nov. 26, 1731, was the son of the rector, John Cowper, chaplain of George II., and nephew of Earl Cowper, noticed above. Deprived of his mother at the age of six, he was a tender, shrinking child, and a sensitive, melancholy boy at Dr. Pitman's school, made more so by the rough fagging at Westminster School, where he advanced in classical studies. First articled to an attorney, living in the Temple in 1752, and called to the bar in 1754, he never practised. Appointed clerk of the journals in the House of Lords, he could not bring himself to appear for nervousness. He determined on suicide, but wanted courage. Morbidly dejected, he was taken in 1763 to Dr. Colton's at St. Alban's. In 1767 he went to Huntingdon, and came to know Mrs. Unwin, "Mary" in his poems. The acquaintance grew into a tender friendship. Residing with the Unwins amid gentle and religious influences, where his spirit found repose and ease, he visited their friend, Rev. Mr. Newton, in 1773, whose gloomy religious views had the effect to bring back his mental malady. Tended by Mrs. Unwin through a long illness, in his convalescence he translated the hymns of Madame Guyon, and diverted himself with taming hares. Mrs. Unwin suggested a poem on the "Progress of Error" in Dec., 1780, and in three months he wrote "Truth," "Table-Talk," "Progress of Error," and "Expostulation," published in 1781. Lady Austen, whom he met in 1781, inspired him to write "The Task" (1785), and to translate Homer (1791), and first told him the story of John Gilpin. "The Task" met with great success. In his later life Cowper became more and more the prey of dejection and remorse, which sometimes deepened into insanity. His "Private Correspondence" (2 vols., 1824) is gentle, thoughtful, and pervaded with playful humor. Cowper gave to English taste a simpler and more earnest cast. Editions of his works are Gilfillan's (Edinburgh, 1854, 2 vols.) and Southey's (15 vols., 1837–38). (See the Lives in Southey's edition, and in that of Hailey.) Died April 25, 1800.

Cowper's Glands, two small and rather lobulated yellowish glands which in the male of the human species are found between the layers of the deep perinæal fascia, under the anterior part of the membranous portion of the urethra. They secrete a mucus which flows into the bulbous portion of the urethra by a duct an inch long. The vulvo-vaginal glands (glands of Bartholine) are the analogues in the female.

Cow-Pox Inoculation. This species of inoculation, as a security against the smallpox, was introduced by Dr. Jenner, and it became general in 1799. The genuine cow-pox appears in the form of vesicles on the teats of the cow. It was first brought into use by Jenner, who first vaccinated from arm to arm in 1796. He had been studying and experimenting about it for a number of years before. (See Inoculation and Vaccination, by Frank P. Foster, M. D.)

Cow'ry [Hindostanee], the shell of *Cypræa,* a genus of



Cowry.

prosobranchiate gasteropodous mollusks, of the family Cypræidæ, to all the members of which the name cowry is often extended. They belong to the Siphonostomata, have spiral, convoluted shells, the spire visible in the young, but entirely concealed in the adult, and the outer lip thickened and bent in. The aperture extends the whole length of the shell. The shells, often called "porcelain shells," are sometimes beautifully enamelled. They are most abundant and attain the largest size in warm seas. Many species occur as fossils. A few very small living species are found on the British coasts. Several species occur on the eastern and western shores of America. The name cowry is chiefly applied to the shells of *Cypræa moneta,* which have commercial value from their use as a substitute for coin in many parts of Asia and Africa. They are said to have been used by the ancient Assyrians, and specimens were found by Layard at Nimrood. They are not of great beauty, are yellow and white, often with a yellow ring; they are about an inch long, and nearly as broad as long. They are found in the Indian and Pacific oceans, and are one of the most important exports of the Maldive Islands. In Bengal, 3200 cowries are counted equal to one rupee (fifty cents). Yet cowries to the value of $100,000 are said to have been at one time imported annually into Bengal. Many tons of cowries are used in trade with the west of Africa. In 1849, 300 tons were brought to Liverpool for the African trade.

Cow'slip (*Primula veris*), an herbaceous plant of the order Primulaceæ, is a native of England and other parts of Europe. It bears a beautiful and fragrant flower, which is a general favorite. The flowers, which are small and grow in an umbel at the top of a scape, have sedative properties, and are sometimes used as an anodyne and antispasmodic. American cowslip is a common name of the *Dodecatheon Meadia,* a plant of the same natural order, and a native of the U. S. It is cultivated in gardens for the beauty of its flowers. (See also Caltha.)

Cow Tree, a name given to several trees of different natural orders, the bland juice (*latex*) of which is used instead of milk. They are natives of tropical climates. Some of them belong to the order Moraceæ, and are allied to the fig; others to the closely-related order Artocarpaceæ, one of which is the famous *palo de vaca,* or cow tree, of the Cordilleras (*Brosimum utile*). It grows in rocky situations, at an elevation in equatorial regions of about 3000 feet. It is a lofty tree, with leaves ten to sixteen inches long, and very small flowers. For several months in the year its branches appear dead, but as soon as the trunk is pierced there flows a full stream of sweet and nourishing milk. This juice flows most freely at sunrise. The natives then hasten from all directions with bowls to receive it. The milk has a pleasant odor, and a viscidity which does not belong to the milk of animals. It becomes yellow in a short time, and a cream rises to the surface, which gradually thickens into a cheesy consistency. This milk is much used by the negroes and Indians, but differs very much from the milk of animals, more than one-half being wax and a nitrogenous compound; a little sugar, a salt of magnesia, and water chiefly making up the rest. The hya-hya (*Tabernæmontana utilis,* of the order Apocynaceæ) also yields an abundant thick juice, which is used in Guiana and elsewhere as a substitute for milk, and is harmless, agreeable, and nutritious. The *Gymnema lactiferum,* an asclepiadaceous plant of Ceylon, yields a milk which is used as food.

Cox (Abraham S.), M. D., born in New York in 1800, studied medicine, and attained great eminence in the practice of his profession. Resigning his large and lucrative practice, he accepted, at the commencement of the civil war, the appointment of surgeon in the army, was promoted to be surgeon-in-chief of a division, and at the time of his death was attached to the Army of the Cumberland. The labor and exposure incident to the active campaigns of that army undermined his health, and he died July 28, 1864, at Lookout Mountain, Tenn.

G. C. Simmons, *Clerk, Board of Engineers.*

Cox (David), an English aquarelle painter, born in Birmingham in 1793. "His foliage," says Ruskin, "is altogether exquisite in color, in its impressions of coolness, shade, and mass." He published a "Treatise on Painting in Water-Colors" (1814). Died June 7, 1859.

Cox (Jacob D.), an American general and lawyer, born at Montreal Oct. 27, 1828. He became a major-general of Union volunteers in the autumn of 1862, and served under Gen. Sherman in Georgia in 1864. In December of that year he commanded a division at the battle of Nashville. He was elected governor of Ohio by the Republicans in Oct., 1865, and was appointed secretary of the interior in Mar., 1869. He resigned in Nov., 1870.

Cox (Melville Beveridge), the first Methodist Episcopal foreign missionary, born at Hallowell, Me., in 1799, entered the ministry in 1822, and sailed as missionary to

Liberia Nov. 3, 183[illegible]. Here he labored with great zeal and success for some months. He died of the "African fever" July 21, 1833. (See STEVENS, "History of the Methodist Episcopal Church," vol. iv., pp. 43, 451.)

Cox (RICHARD), bishop of Ely, born in 1499, was the tutor of King Edward VI. He translated for "the Bishops' Bible" the four Gospels, the Acts, and the Epistle to the Romans. Died July 22, 1581.

Cox (SAMUEL HANSON), D. D., LL.D., a Presbyterian author and divine of Quaker parentage, born at Leesville, N. J., Aug. 25, 1793, was ordained July 1, 1817. He was pastor of the Spring street church, N. Y. (1820–33), professor of sacred rhetoric at Auburn Theological Seminary (1834–37), and pastor of the First Presbyterian church, Brooklyn, N. Y. (1837–54). He was an early and eminent advocate of temperance, anti-slavery, and other reforms, and was distinguished for his brilliancy and effectiveness as a platform speaker. He wrote "Quakerism not Christianity," 1833, and "Interviews, Memorable and Useful," 1853.

Cox (SAMUEL SULLIVAN), a Democratic politician, born at Zanesville, O., graduated at Brown University in 1846, was a member of Congress from Ohio (1857–65) and from New York City (1869–75). He is a well-known editor and lecturer, and has published "The Buckeye Abroad" (1852), "Eight Years in Congress," etc.

Coxal'gia, or **Coxi'tis** (*Morbus coxarius*, "hip-joint disease"), a chronic inflammation of the hip joint, which may begin either in the head of the thigh-bone or the socket of the hip-bone, or else in the membrane (*synovial*) that lines its cavity, but which finally extends to all its tissues, cartilages, ligaments, and surrounding soft parts. Inflammation of the bones (*osteitis*), by far the most common origin of the disease in children, is chronic and insidious in its development, and is favored by the incomplete ossification and active nutrition of the bones in childhood. Inflammation of the lining membrane (*synovitis*) is the most frequent form of hip disease in adolescence, and then is often of rheumatic origin. Chronic infantile coxitis principally affects children between one and five years of age, and is often awakened by a fall or blow, especially when such accident occurs to children of a lymphatic or scrofulous constitution. The very first symptom is lameness, followed by pain, first felt in the knee, afterwards excited in the joint itself by direct pressure, by motion of the limb, or by the weight of the body resting upon it. To lessen this weight the patient rests on the ball of his toes, and drags the leg in walking, stiffly extending it. At this stage it is turned a little outward by spasmodic contraction of the muscles on the outer side of the joint. But very soon, in order to still further lessen the weight, the body bends over on the thigh, and the arm and lame part of the back, with the abdomen, are carried forward. When the patient lies down, therefore, a space is left between the body and the bed, and if the spinal column be forcibly straightened out and the curve flattened, the thigh in turn is bent on the body by dragging of the muscle that runs from the spinal column to the head of the thigh-bone (*psoas*). Still, for the purpose of lessening weight, the hips are tilted towards the painful side, and appear oblique, while the leg is thus apparently lengthened. Behind, the nates are flattened. It soon becomes impossible to glide the head of the thigh-bone in its socket; the whole hip moves with every motion communicated to the leg. This sign is most characteristic of the confirmed disease; it is due at first to the spasmodic rigidity of muscles—later to inflammatory adhesions.

In the second stage liquid is poured out into the cavity of the joint to increase the space of this cavity, the thigh is more strongly bent on the body (flexed), and drawn inward (adducted), so that the foot crosses the opposite leg. The affected limb is therefore apparently shortened. A swelling appears in the groin and at the outer aspect of the thigh; the pain becomes intolerably severe; standing and walking are impossible.

In the third stage the cavity fills with matter, the ligaments of the joint are relaxed, abscesses form in the neighborhood, and all the soft parts are swollen by inflammatory exudations. Dislocation occasionally though rarely occurs. More often the head of the thigh-bone separates from its shaft, and adheres to the socket of the joint, while the socket itself is enlarged. The patient's strength is severely undermined, hectic fever sets in, the emaciation is extreme, and death may occur gradually from exhaustion, or more rapidly from acute absorption of pus.

The diagnosis of *morbus coxarius* is only difficult in the first stage. The lameness may simulate that of muscular paralysis, from which it is distinguished by the freedom with which the head of the thigh-bone may be moved; or the pain in the knee may fix suspicion on the wrong joint; or the thigh may exactly imitate hysterical muscular contraction; but in this affection the limb relaxes completely under chloroform.

The prognosis for spontaneous cure is always very unfavorable. After suppuration death may be caused by pyæmia, by exhaustion, by general tuberculosis, or by amyloid disease. Appropriate treatment of the first and second stages offers about 50 per cent. of recoveries; operative treatment of the third stage has so far cured about one-third of the cases submitted to it. In a large number of cases, although the inflammation is arrested, and hence life is saved, the joint becomes permanently immobilized (ankylosis) by fibrous bands within and around its cavity, that hold the articular surfaces firmly together (false ankylosis). This result is to a certain extent favored by the treatment adopted for the cure of inflammations; it is important therefore that the stiffened limb be left in the most favorable position for use—namely, extension.

The treatment varies according to the stage of the disease. During the primary osteitis that so often precedes inflammation of the joint, and is indicated by the one symptom of lameness, constitutional treatment is to be adopted—cod-liver oil, iron, cinchona, nourishing food, fresh air, and salt-water bathing. As soon as the movements of the joint are compromised, local treatment becomes of primary importance. It aims—1st, to immobilize the joint, so as to prevent friction of the inflamed parts; 2d, to extend the limb, so as to separate as much as possible the folds of the lining membrane, to reduce to a minimum size the cavity of the joint, and thus favor the reabsorption of fluids; finally, to leave the limb in the best position for use should it become permanently stiffened. The limb can only be maintained in extension by a force sufficient to overcome the spasmodic muscular contractions. Many apparatuses are devised for this purpose, in which the limb is straightened out and fastened to an inflexible plane, and forcibly retained in this position by means either of a weight attached to the foot or a sliding screw at the knee. The simplest form of apparatus is made by swathing the limb in bandages stiffened by plaster of Paris or dextrine. These are only adapted to the earliest stage, or when cure is already progressing. It enables the patient to walk about. This facility is also afforded by steel apparatus that supports the limb at the waist and foot, and gradually extends it by continued traction at the knee. In other cases the patient is kept in bed, the leg fastened to a simple long splint, with a cross-piece under the foot, to which is attached the weight. A large double gutter, in which were laid the entire pelvis and both lower extremities of the patient, was formerly famous, but is now seldom used. During the employment of such apparatus, ice may be applied to the joint to subdue acute inflammation, occasionally blisters, where fluid has been rapidly effused, more often pressure by means of elastic bands, a powerful means of promoting reabsorption. Leeching is useless, as also are applications of iodine; while cauterization, formerly much in vogue, is now generally condemned.

When suppuration has occurred within the joint, and especially when pus has discharged externally by one or more fistulæ, it is necessary to amputate (resect) the head of the thigh-bone. Very extensive destruction of the hip-bone and certain general diseases, amyloid disease or general tuberculosis, with incoercible diarrhœa, contra-indicate the operation. After it, death may result from such complications or from surgical fever (pyæmia, septicemia). When successful, however, the patient is rescued from an otherwise certain death, and the joint recovers its integrity, ankylosis being much less frequent than after treatment by immobilizing apparatus.

MARY C. PUTNAM JACOBI.

Cox Creek, a post-township of Clayton co., Ia. Pop. 989.

Coxe (ARTHUR CLEVELAND), D. D., a son of Dr. S. H. Cox, noticed above, an American Episcopalian bishop, born at Mendham, N. J., May 10, 1818, graduated at the University of New York in 1838, and took holy orders in 1841. He wrote, besides other works, "Christian Ballads" (1840) and "Impressions of England" (1856). He became rector of Calvary church in the city of New York in 1859, and bishop of Western New York in 1865.

Coxe (JOHN REDMAN), M. D., born at Trenton, N. J., in 1773, received his medical education in Europe, settled in Philadelphia in 1796, was a professor in the University of Pennsylvania (1809–35), and was the author of several medical, scientific, and literary works. Died Mar. 22, 1864.

Coxe (WILLIAM), an English historian, born in London Mar. 7, 1747. He was appointed curate of Denham in 1771. He published, besides other works, "Travels in Russia, Poland, Sweden, and Denmark" (1784), a "History of the House of Austria" (1792), "Memoirs of Sir Robert

Walpole" (3 vols., 1798), and "Memoirs of the Kings of Spain of the House of Bourbon, 1700–88" (1813). He became archdeacon of Wilts in 1805. Died July 8, 1828.

Coxe's, a township and village of Etowah co., Ala., on the Selma Rome and Dalton R. R. Pop. 274.

Coxsack'ie, a post-village of Greene co., N. Y., near the Hudson River, 22 miles S. of Albany. It has six churches, an academy, important manufactures of brick, a national bank, and one weekly newspaper. Pop. of Coxsackie township, 3829.

Coyo'te [a Spanish American name, probably derived from the Mexican *cayotl*, "wolf"], a popular name for the small barking or prairie wolf, of which several varieties occur in the U. S. and Mexico. (See WOLF.)

Coyote, a township and village of Trego co., Kan., on the Kansas Pacific R. R., 273 miles W. of Topeka. P. 17.

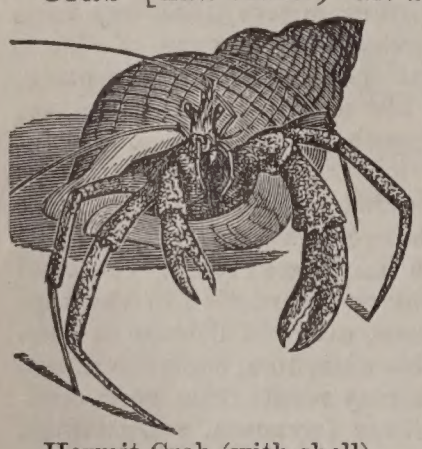
Coy'pu, the South American name of the *Myopotamus Coypus,* a quadruped allied to the beaver, with which it agrees in its teeth, limbs, feet, and in some of its habits; but it differs from the beaver in the form of the skull, having a more elongated muzzle and a contracted palate; and in the tail, which resembles that of a rat. It is the only known species of its genus, and inhabits South America on both sides of the Andes, burrowing in river-banks, and sometimes near the sea-beaches. It is nearly as large as the beaver, has small ears, very long and stiff whiskers, long hair mixed with dense, soft, short hair, the upper parts beautifully pencilled with shades of yellow, the sides and under parts lighter and more uniform in color. The fur has become an important article of commerce under the names of ragondin and nutria, the latter name (signifying in Spanish an "otter") being that chiefly in use in the U. S.

Coypu.

Coz'zens (FREDERICK SWARTWOUT), an American writer, born in New York Mar. 5, 1818, was a wine-merchant. He contributed to the "Knickerbocker Magazine" and "Putnam's Magazine." Among his works are "Prismatics" (1853) and "Sparrowgrass Papers" (1856). Died Dec. 23, 1869.

Cozzens' Landing, a village of Cornwall township, Orange co., N. Y., near the West Point Military Academy, and on the Hudson River.

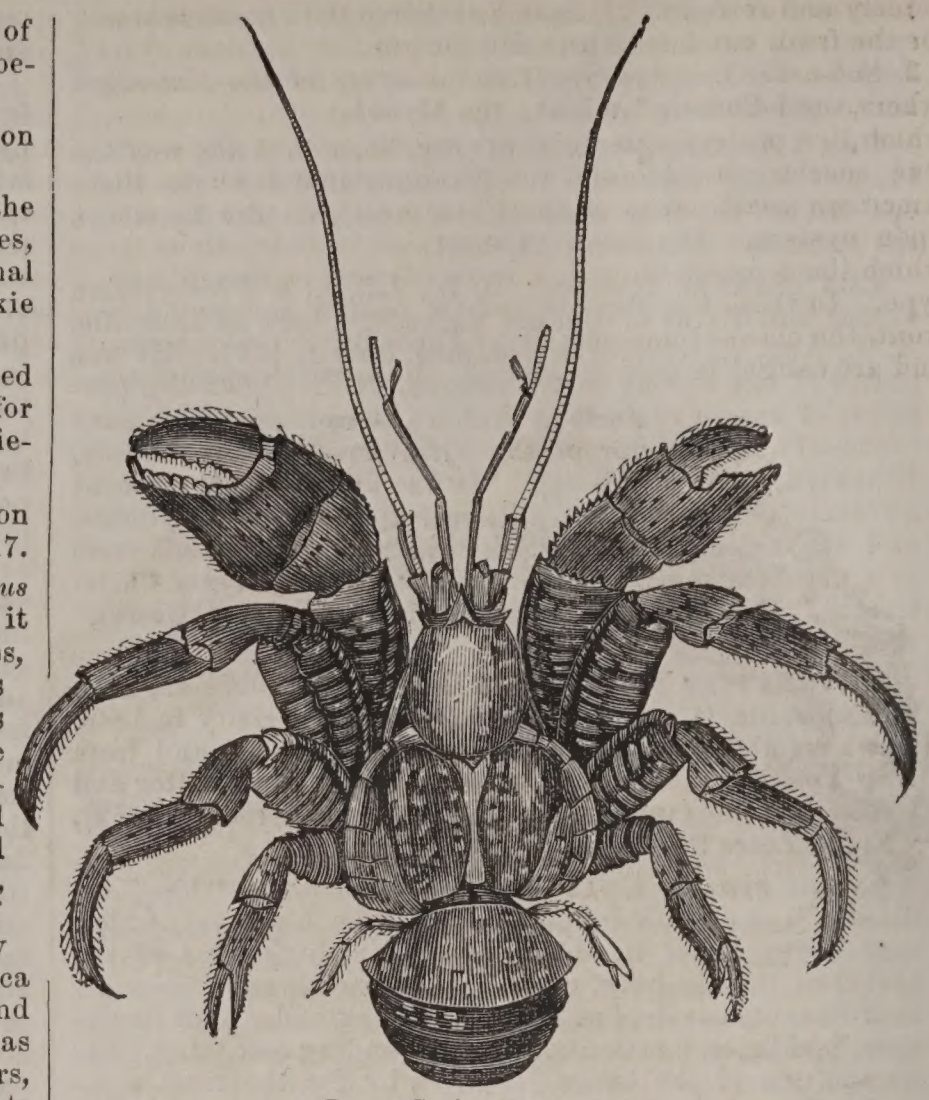
Crab [Lat. *cancer;* Gr. *κάραβος*; Ger. *Krabbe;* Fr. *crabe*], a name popularly applied to many decapod crustaceans, arranged in the sub-orders Anomura (irregularly-tailed crabs) and Brachyura (short-tailed crabs). Among the very numerous species the following are important:



Hermit Crab (with shell).

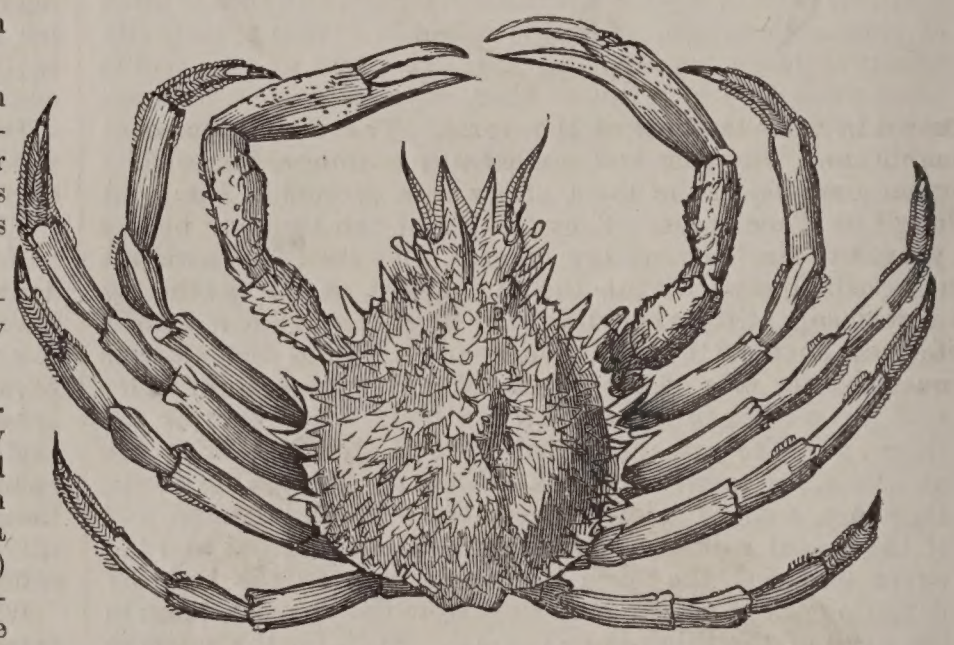
1. *Sub-order Anomura.*—The *Pagurus Bernhardus,* the European hermit crab, has a hard shell, while the abdominal portion is soft, forming a fleshy mass behind the cephalothorax. The comfort of the animal requires some shelter for this appendage, and for this purpose he selects the empty shell of some mollusk. He coils himself in this shell, and secures his position by a sucker at the extremity of the tail, and by several feet on the abdominal sac. He adheres so firmly to this home that he will be destroyed rather than loosen his hold. By protruding his body with his three pairs of legs, he is able to walk in search of prey, but if danger approaches he hastens into the shell, the orifice being filled by one of his claws. He changes his residence as often as he needs a larger one, and may be seen crawling in and out of shells cast upon the beach, in search of a suitable home. He returns to his old home after each trial until he finds one fitted for his comfort. There are many species of the hermit crab, one or more of which

Hermit Crab (without shell).



Purse Crab: *Birgus latro.*

are found on the American coasts. The purse crab (*Birgus latro*) is a hermit crab of Amboyna and some other islands.



Spinous Spider Crab: *Maia spinado.*

It inhabits the fissures of rocks, and seeks its food along the beach at night. When observed, it snaps its claws

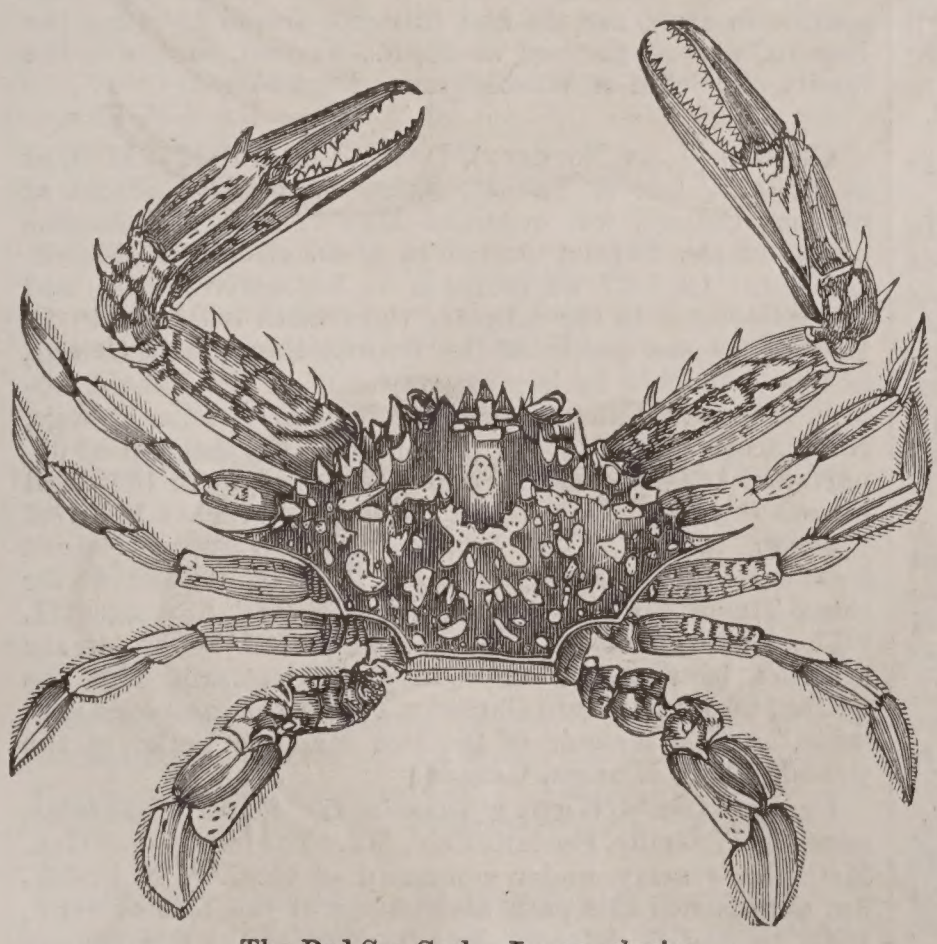
Eriphia spinifrons.

fiercely and retreats. It is said to climb the cocoanut tree for the fruit, but this is probably untrue.

2. *Sub-order Brachyura.*—This sub-order includes, among others, the following families: the Maiadæ, or spider crabs, which live in deep water, and are seldom seen on the shore. One species, the *Libinia canaliculata*, found along the American coast north of the Chesapeake, is said to feed upon oysters. The family Canceridæ includes those of which the common crab of Europe (*Cancer pagurus*) is the type. In these the shell is narrow behind and round in front, the claws of unequal size. These inhabit deep water, and are caught in nets or baskets. Many edible species are

Parthenope horrida.

known in various parts of the world. The Portunidæ resemble the Canceridæ, and are called paddling crabs. The common edible crab of the U. S. (*Lupea dicantha*) is found along the whole coast. These, like other crabs, moult once a year, and are several days casting the shell, but a new one is soon formed. While the new shell is tender, or before it is formed, they are called soft-shell crabs, and are much esteemed as food. The common small edible crab (*Carcinus mœnas*) is a small species found in England and



The Red Sea Crab: *Lupea pelagica.*

France, and one similar to it frequents our coast. These are found at low tide under stones and sand. Some crabs of the genus *Lupea* live in the ocean, floating on the seaweed or resting on the surface of the water. They are called swimming crabs. The *Eriphia spinifrons* is found in nearly all seas. The *Parthenope horrida* lives in the Indian and Atlantic oceans. The *Lupea pelagica* is from the Red Sea. The Ocypodidæ include the little pea crab (*Pinnotheres pisum*). The carapace is quadrilateral or oval, the front transverse and knotted. They inhabit the muscle shell. The ancients were acquainted with one species of this crab, and believed that it found food for the mollusk and warned him of danger. There are several American species of this genus, one of which is a well-known parasite upon the oyster. The land crabs of the tropics are among the most curious members of this family. They live upon mountains at a distance from the sea, and have a kind of leaflet for retaining moisture in the branchial cavities. Once a year they visit the coast to deposit their eggs. It is said that in these journeys they have been observed to form a procession one hundred and fifty feet wide and three miles long. In Jamaica they are much valued as food. They live in moist regions, and make excavations which they inhabit during the day, seeking their food at night. Some species are said to live in dry woods. The violet crab (*Cardisoma carnifex*) inhabits the West Indian Islands, chiefly in the mangrove swamps. Its food is the fruit of a species of *Anona*, but it is said also to frequent cemeteries and devour the bodies. It is highly regarded as food, but only those are eaten which live at a distance from the cemeteries. Another kind of land crab (the *Gelasimus*) is named the calling crab, from the beckoning gesture of the claw which it makes when alarmed. This claw is larger than the other, and is used in digging its burrows. A common American species, the *Gelasimus vocans*, is called the fiddler, because one of its claws is thought to resemble a fiddle. It lives on the land, but is at home also in the water. It remains in its hole in the winter. The Thelphusæ are land crabs, but some of them inhabit fresh water. Many of the so-called land crabs are properly crayfish. (For the king-crab (usually regarded as an entomostracan) see KING-CRAB.)

Crab-Apple (*Pyrus Coronaria*), a small tree growing wild in the U. S., bears rose-colored fragrant blossoms and fragrant greenish fruit, which is prized for preserves. Another wild crab-apple, the *Pyrus angustifolia*, also grows in the Southern States. The cultivated crab-apple is the *Pyrus baccata*, a native of Siberia. (See APPLE.)

Crabb (GEORGE W.) was born in Tennessee, but removed to Alabama. He distinguished himself in the Indian war in Florida, where he was made a major-general. He was elected a member of Congress in 1838, but defeated in 1841. Died in 1847.

Crabbe (GEORGE), an English poet, born at Aldborough, Suffolk, Dec. 24, 1754. He learned the profession of surgeon, which he soon renounced. He went to London in 1780, and soon produced "The Candidate," an unsuccessful poem, and was reduced to extreme poverty, from which he was relieved by the generosity of Edmund Burke, who received him as an inmate in his own house, and secured the publication of "The Library" by Dodsley (1781). Having taken holy orders in 1782, he became chaplain to the duke of Rutland at Belvoir Castle, and married Miss Sarah Elmy. His reputation was increased by the "The Village," a poem (1783). He became curate of Strathern in 1785, and obtained the living of Trowbridge, in Wiltshire, in 1813. Among his works are "The Parish Register" (1807), "The Borough" (1810), and "Tales in the Hall" (1819). He was distinguished for his vigor and the "Chinese accuracy" of his observation. "Mr. Crabbe," says Lord Jeffrey, "is the greatest *mannerist*, perhaps, of all our living poets. The homely, quaint, prosaic style, the eternal full-lengths of low and worthless characters, with their accustomed garnishing of sly jokes and familiar moralizing, are all on the surface of his writings." Died Feb. 3, 1832. (See "Life of George Crabbe," by his son, 1838.)

Crabbe (THOMAS), rear-admiral U. S. N., was born in Maryland in 1788, entered the navy when young, became a captain in 1841, a commodore in 1862, and rear-admiral in 1866. Died at Princeton, N. J., June 29, 1872.

Crab Creek, a township of Henderson co., N. C. P. 607.

Crab Orchard, a post-village of Lincoln co., Ky., on the Knoxville branch of the Louisville and Nashville R. R., 40 miles S. by E. from Lexington. Here are important saline mineral springs, much resorted to from the Southern States. Pop. 631.

Crab Orchard, a township of Mecklenburg co., N. C. Pop. 1522.

Cra'bro [Lat. for *hornet*], a genus of hymenopterous insects belonging to the section Aculeata, or sting-bearers, and to the sub-section Fossores (burrowers). The hornet (*Crabro vulgaris*) is the type of this genus, which is now raised to the rank of a family named Crabronidæ. Some insects

of this family excavate their nests or retreats in wood. In the U. S. they build in fences, trees, etc.

Crab'tree, a township and post-village of Haywood co., N. C. Pop. 1048.

Crack'lins, a township of Montgomery co., Md. Pop. 3477.

Cra'cow, or **Kra'kow,** a city in Austrian Poland, on the left bank of the Vistula, 158 miles S. S. W. of Warsaw. It is connected by a railway with Vienna, Berlin, and Warsaw. It is the seat of a Catholic bishop, and has a castle founded about 700 A. D., a magnificent cathedral, and once had seventy-six churches, but only thirty-six are preserved, besides seven Jewish synagogues, a university (begun in 1343, chartered in 1364, finished in 1401, and reorganized in 1817), a library of 30,000 volumes, a botanic garden, and many monasteries. Cracow was founded about 700 A. D., and was the capital of Poland from 1320 to 1609, when the court was removed to Warsaw. In the sixteenth century it contained thrice its present population. On the third partition of Poland, in 1795, it was annexed to the dominions of Austria. It formed a part of the duchy of Warsaw from 1809 to 1815. By the Congress of Vienna (1815) Cracow, with a small territory, was organized as a republic, under the protectorate of Russia, Austria, and Prussia. After an insurrection in 1846 it was again annexed to Austria. Pop. in 1869, 49,835, about one-fourth of whom are Jews.

Crafts (Samuel Chandler), born at Woodstock, Conn., Oct. 6, 1768, graduated at Harvard in 1790, settled in Craftsbury, Vt., in 1790; held many important offices in Vermont, and was long one of the judges of the State courts; was a member of Congress 1817–23, governor of the State 1829–32, and became U. S. Senator in 1842. In 1802 he explored the Lower Mississippi in company with F. A. Michaux. Died at Craftsbury, Vt., Nov. 19, 1853.

Crafts'bury, a post-township of Orleans co., Vt. It has an academy, and manufactures of woollen goods, doors, sash and blinds, etc. Pop. 1330.

Crag, the name given to a part of the pliocene formation in the east of England, in France, Italy, etc. It consists of a shelly sand and gravel used to fertilize soils which are deficient in calcareous matter. The "coralline crag," etc. of the older pliocene is extensively found in Europe and Asia.

Cra'gin (Aaron H.), born in Weston, Vt., Feb. 3, 1821, was a member of Congress from New Hampshire (1857–61), U. S. Senator (1865–71), and was re-elected in 1870 for six years.

Craig, a county in the S. W. of Virginia, is drained by Craig's Creek. The surface is partly mountainous; the soil is fertile. Tobacco, grain, wool, and fruit are raised. Capital, Newcastle. Pop. 2942.

Craig, a township of Van Buren co., Ark. Pop. 282.

Craig, a post-township of Switzerland co., Ind. Pop. 1843.

Craig (John), a Scottish Reformer, born in 1512. He entered the Dominican order, and had charge of the novices at Bologna. Converted to the doctrines of Calvin, he was tried and condemned to be burned by the Inquisition, but was saved by a mob, who, on the death of the pope, broke open the prison. He returned to Scotland, and became a colleague of John Knox in the church of Edinburgh. He was appointed chaplain to James VI. in 1579, and wrote the National Covenant in 1580. Died in Dec., 1600.

Craig (Lewis S.), an American officer, born in Virginia, entered the U. S. army as second lieutenant of dragoons in 1837; transferred to the infantry 1838; promoted to be first lieutenant in 1840, and captain in 1846. He served with distinction during the war with Mexico at Monterey (brevet major), Cerro Gordo (brevet lieutenant-colonel), Contreras, and Churubusco, severely wounded in the latter. He was killed by deserters, while in discharge of his duty, June 6, 1852, near New River, Cal.

Craig (Sir Thomas), a Scottish lawyer, born about 1540. He was appointed a judge (justice-depute) in 1564. He wrote, besides Latin poems, a celebrated "Treatise on Feudal Law" ("Jus Feudale," 1655). Died Feb. 26, 1608.

Craig'head, a county in the N. E. of Arkansas. Area, 950 square miles. It is intersected by the St. Francis River and the Cache River. The surface is nearly level; the soil fertile. Corn, tobacco, cotton, wool, and live-stock are raised. Capital, Jonesborough. Pop. 4577.

Craigs'ville, a post-village of Blooming Grove township, Orange co., N. Y., has manufactures of cotton goods.

Craik (Dinah Maria), better known as **Miss Muloch,** an English novelist, born at Stoke-upon-Trent in 1826. Her first novel, "The Ogilvies," was published in 1849, and "John Halifax, Gentleman," in 1857. In 1865 she married G. L. Craik, a nephew of the literary historian. Besides novels and other works, she has published a volume of poems.

Craik (George Lillie), one of the most useful writers of his time in the field of literary history and biography, was born in Fifeshire, Scotland, in 1799. In 1830 he published an interesting compilation of biographical anecdote, "The Pursuit of Knowledge under Difficulties," in one volume. This was originally issued by the Society for the Diffusion of Useful Knowledge, but has since been many times reprinted. He wrote several of the books published by the above-named society in their well-known series, and he also rendered much valuable help in the preparation of Knight's "Pictorial History of England," and wrote many of the historical and biographical articles in the "Penny Cyclopædia." In 1836 appeared in the Useful Knowledge series "Paris and its Historical Scenes," 2 vols.; in 1844–45, "Sketches of the History of Literature and Learning in England," six small volumes in three. This excellent work of permanent value was rewritten from chapters on the subject in the "Pictorial History of England." A new and enlarged edition, "Manual of English Literature and the English Language," was published in 1862. In 1845, Craik published "Spenser and his Poetry," 3 vols., and in 1846–47, "Bacon, his Philosophy and Writings," 3 vols. Each of these books was reprinted in 1859–60 in one small volume. The "Bacon" is a remarkable piece of condensation, completeness, and accuracy. In 1848 appeared another book of anecdote, which has had a wide popularity, "The Romance of the Peerage." In 1849, Craik was made professor of history and of English literature in Queen's College, Belfast, and in 1851 he published "Outlines of the History of the English Language," and in 1857 a well-known book, the parent of many others of its kind, "The English of Shakspeare illustrated by a Philological Commentary on his 'Julius Cæsar.'" Besides much valuable information and suggestion, this edition of Julius Cæsar contains two or three original emendations, one of which is of real importance. Prof. Craik died June 25, 1866. A nephew of the professor, of the same name, married Miss Muloch (Dinah Maria).

Clarence Cook.

Craik (James), M. D., derives interest from his long and intimate association with Washington. Their commissions in the army were dated the same day, and their friendship was cemented by fifty years' intercourse. He was born in Scotland in 1731, was surgeon to the expedition against the Indians in 1754, was at Braddock's defeat (9th July, 1755), and subsequently served throughout the American Revolution. Washington said of him, "He was my compatriot in arms, my old and intimate friend." After the Revolution he practised at Mount Vernon, and was the family physician of Washington. Died Feb. 6, 1814.

Paul F. Eve.

Cramp (John Mockett), D. D., born July 25, 1796, at St. Peter's, Isle of Thanet, Kent, England, educated at Stepney College, was ordained May 7, 1818, and became pastor of the Baptist church in Dean street, Southwark, London. In 1827 he returned to his native place, and was associated in the ministry there with his father. In 1842 he became pastor of the Baptist church at Hastings, Sussex. In 1844 he became president of the Baptist college, Montreal, Canada, and president of Acadia College, Nova Scotia, in 1851; the principal of the theological department 1853–60; was reappointed president in 1860, and retired in 1869. In 1831 he published "A Text-Book of Popery;" in 1833, "The Reformation in Europe" (issued by the Religious Tract Society); in 1844, "Lectures for these Times;" in 1868, "Baptist History;" and in 1871, "The Lamb of God." He has published about twenty sermons, lectures, or essays in pamphlet form. He has written also "Paul and Christ: a Portraiture and an Argument," and a memoir of the late Madame Feller of the Grande Ligne Mission, Canada.

Cramp'ton's Gap, a pass in the South Mountains, near Burkittsville, Frederick co., Md. The left wing of Gen. McClellan's army, under command of Gen. W. B. Franklin, approached this pass about noon of the 14th of Sept., 1862, to find it defended by a portion of the Confederate general McLaw's division of Lee's army, under command of Gen. Howell Cobb. After a stubborn fight of four or five hours, the Confederates were forced out of the gap, having suffered severe loss in killed and wounded, besides 400 prisoners and many small-arms.

Cra'nach, or **Kranach** (Lucas), called the Elder, an eminent German painter and engraver, born at Cranach, a town near Bamberg, in 1472. His family name was Sunder. He became court-painter to Frederick, the elector of Saxony, in 1504, and worked for many years at Wittenberg, where

he was much respected and was made burgomaster. He continued to hold the office of court-painter under the two successors of Frederick, John the Constant and John Frederick the Magnanimous, and when, after the battle of Muhlberg in 1547, John Frederick was taken prisoner, Cranach shared his five years' captivity. They were both released in 1552. He was also an intimate friend of Luther and Melanchthon, whose portraits he both painted and engraved. His works consist of oil paintings, engravings on copper, and woodcuts. His most important picture is at Weimar. It is an altar-piece. He was so rapid and prolific a worker that he was called *pictor celeberrimus*, and it is not surprising that his pictures are found in every considerable collection in Europe. There are two good specimens of his work in the Bryan Gallery, New York Historical Society, a "Venus and Cupid" and a "Portrait," and one in the New York Metropolitan Museum, a portrait of John Frederick the Magnanimous. He died Oct. 16, 1553. (See HELLER, "Das Leben und die Werke Lucas Cranach's," 2d ed., Bamberg, 1844. But the latest and best authority is SCHUCHARDT, "Lucas Cranach des Ælteren Leben und Werke," Leipsic, 3 vols., 1851–71.)

CLARENCE COOK.

Cranach, von (LUCAS), a painter, a son of the preceding, was born in 1515. He painted portraits with success. He was burgomaster of Wittenberg. A good specimen of his work is in the Metropolitan Museum, New York—"Portrait of a German Lady." Died in 1586.

Cran'berry (*i. e.* "crane-berry," so called because its slender stalks were fancied to resemble the legs of a crane), the fruit of several species of a sub-genus, *Oxycoccus*, of small, mostly prostrate evergreen shrubs of the natural order Ericaceæ, belonging to the genus *Vaccinium*, but differing from the rest of the genus in having a wheel-shaped corolla, with its four petals decidedly revolute. The species are few, natives of the colder regions of the northern hemisphere. The fruit is acid, and is in great request for making sauces, jellies, etc. The only British species is the *Vaccinium Oxycoccus*, a native also of the northern parts of Europe, Asia, and America. It grows in marshy grounds in the Northern States, and is a wiry shrub with creeping branches, and small oval leaves strongly revolute at the margin. The blossoms are small, but beautiful, and of a deep rose-color. Large quantities of the fruit are collected in the north of England and in other countries, but it is seldom gathered in the U. S. They are often kept for a long time in water. They are an excellent antiscorbutic, and valuable in sea-stores. A sort of wine is made from them in Siberia and Russia. The American cranberry (*Vaccinium Macrocarpon*) is a larger and more erect plant, with larger leaves, less revolute at the edges. The berries are larger and of a brighter red. It is a native of Canada, but is found as far S. as Virginia, growing in sandy bogs and also elevated situations. The berries are largely cultivated near the sea-coast in the Northern States, and large quantities of them exported to Europe. Cranberries are imported into Great Britain from Russia. The berries of the cowberry (*Vaccinium Vitis Idæa*) are sold under the name of cranberries in Scotland, and used in the same way. They also grow in New England, but are there scarcely edible. A third species of cranberry (*Vaccinium Erythrocarpon*), a native of the Alleghanies in Virginia and Carolina, is a shrub four feet high, and with a habit more like that of the whortleberry than the other cranberries; it has an insipid fruit. The "high-bush cranberry" is the *Viburnum Opulus* of the U. S. and Europe. Its fruit has little value. The name mountain cranberry is often given to the *Arctostaphylos Uva Ursi* of the U. S. and Europe, a plant whose leaves are of value as a diuretic.

Cranberry, a township of Alleghany co., N. C. Pop. 458.

Cranberry, a township of Mitchell co., N. C. P. 158.

Cranberry, a township of Crawford co., O. P. 1281.

Cranberry, a township of Butler co., Pa. Pop. 945.

Cranberry, a township and post-village of Venango co., Pa., 60 miles N. N. E. of Pittsburg. Pop. of township, 2337.

Cranberry Isles, a post-township of Hancock co., Me., consisting of small islands just outside of Mount Desert Island. The inhabitants are engaged in the fisheries. Pop. 350.

Cran'bury, a post-village and township of Middlesex co., N. J., on the Camden and Amboy R. R.

Cranch (CHRISTOPHER PEARSE), a son of the following, an American artist and poet, born at Alexandria, Va., Mar. 8, 1813, graduated at Columbian College, Washington, in 1831, studied divinity, but became a landscape-painter and author. He published a volume of poems (1854), and two stories for children, "The Last of the Huggermuggers" (1856) and "Koboltozo" (1857); also a translation of Virgil's "Æneid" (1872). Many of his finest poems appeared in the "Dial."

REVISED BY CLARENCE COOK.

Cranch (WILLIAM), LL.D., an eminent American jurist, born at Weymouth, Mass., July 17, 1769, graduated at Harvard in 1787. He was appointed chief-justice of the U. S. circuit court for the District of Columbia in 1805. He held this position for fifty years, during which, it is said, only two of his decisions were overruled by the Supreme Court of the U. S. As reporter of the decisions of the Supreme Court he prepared nine volumes of reports (1801–15). His legal learning was very profound. Judge Cranch was first cousin to President John Quincy Adams. Died Sept. 1, 1855.

Crane [from the Anglo-Sax. *cran;* Ger. *Kranich;* Gr. γέρανος; Lat. *grus* (gen. *gruis*); Fr. *grue*], a popular name of various birds of the order Grallatores, and belonging to the family Gruidæ, of which the genus *Grus* alone occurs in the U. S. This family differs from herons, storks, etc. in having the short hind toe placed much higher on the leg than the front ones. They are nearly all large birds, with long necks, long legs, and powerful wings. Their wings are not elongated, but rounded. One of these is the common European crane (*Grus cinerea*), which breeds in the northern parts of Europe and Asia; it retires in winter to sub-tropical regions. Flocks of cranes periodically pass over the southern and central countries of Europe, uttering harsh cries, and often alighting for food. This crane, when standing, is about four feet high, its color ashen-gray, with face and neck nearly black. The visits of the crane to Great Britain are now rare; formerly they were more frequent. It feeds on seeds and roots, insects, reptiles, and small quadrupeds. It is highly valued for the table. The whooping crane (*Grus Americana*) is larger than the common crane, which it resembles, except that its plumage is pure white, the wings tipped with black. It frequents the southern parts of the U. S. in winter; in summer it migrates northward. The U. S. have also the sand-hill crane (*Grus Canadensis*) and the *Grus fraterculus*, the little crane. To this family belongs also the demoiselle (*Anthropoides virgo*) or Numidian crane, with which, rather than with the true crane, the Balearic cranes (*Balearica*) are ranked. Cranes use their bills as a weapon of defence, attacking the eyes of an assailant. The blue heron (*Ardea Herodias*) is sometimes called the blue crane.

Crane, a machine employed to raise heavy weights and to deposit them at some distance from their former position. The most common crane consists of an upright revolving shaft, with a projecting arm or transverse jib, at the upper end of which is a fixed pulley. At the other end is a cylinder, which is put in motion by a wheel and pinion or cog-wheel. The weight is fastened to a rope which passes over the pulley and is wound round the cylinder, by means of which the weight is raised to the required height.

Crane, a township of Paulding co., O. Pop. 1686.

Crane, a township of Wyandot co., O. Pop. 3876.

Crane (WILLIAM CAREY), D. D., born in Richmond, Va., Mar. 17, 1816, graduated at Columbian College and Hamilton Theological Seminary, pastor of a Baptist church in Montgomery, Ala., 1839–42. Since then he has occupied many positions of influence and responsibility in the South, and has been president of Baylor University (Independence, Tex.) since 1863. He has contributed largely to the periodical literature of both sections of our country.

Crane (WILLIAM MONTGOMERY), an American naval officer, born at Elizabethtown, N. J., Feb. 1, 1776. He served with distinction in the war against Great Britain (1812–15). He became chief of the bureau of ordnance in 1842. Died by suicide Mar. 18, 1846.

Crane Creek, a township of Mason co., Ill. Pop. 1068.

Crane Creek, a township of Barry co., Mo. Pop. 527.

Cra'ney Island, at the mouth of Elizabeth River in Norfolk co., Va., has a lighthouse fifty feet high, standing in shallow water on iron screw-piles; lat. 36° 53′ 28″ N., lon. 76° 20′ W. On this island the Confederates erected batteries during the civil war.

Cran'ford, a thriving post-village of Union co., N. J., on the Rahway River and on the Central R. R. of New Jersey, 16½ miles from New York. It is finely laid out, and the surrounding region is fertile and picturesque.

Cranganore, a maritime town of Southern India, is on the Malabar coast, about 18 miles N. of Cochin. A Christian church has existed here at least since the fifth century. This place was taken from the Portuguese by the Dutch in 1663, and now belongs to the British.

Craniology. See PHRENOLOGY, by S. R. WELLS.

Cranium. See SKULL.

Crank [allied to the Icelandic *kringr*, a "circle"], an important contrivance which is a part of the machinery of steam-engines, and is the most usual mode of converting alternating circular or rectilinear motion into continuous circular motion, or *vice versâ;* and for this purpose the crank must be connected by a rigid rod with the prime mover. The crank consists usually of a double winch, but is sometimes only single. The part between the two elbow-joints is termed the arm of the crank. The connecting rod which transmits the alternate motion is attached to the crank by a joint, and consequently is made to traverse the circumference of a circle of which the arm is the radius, and so to produce the rotation of the axis. When the connecting rod is in a straight line with the crank (which occurs twice in every revolution), it has no tendency to turn the crank. A fly-wheel is attached to the shaft to equalize the motion, and prevent it from being much retarded at the "dead points"—*i. e.* the positions where the rod exerts no power.

Cran'mer (Thomas), English reformer, born at Aslacton, in Nottinghamshire, July 2, 1489, of an ancient Norman family. He studied at Jesus College, Cambridge, of which he became a fellow in 1510, and was well versed in Greek, Hebrew, and theology. He lost his fellowship by marriage, but it was soon after restored on the death of his wife. In 1523 he was appointed lecturer on theology. He gained the favor of Henry VIII. in 1529 by advising that the question of the king's divorce should be tried by the word of God and referred to the universities. He was appointed a chaplain to the king, who sent him to Rome on a special mission. He married a niece of Osiander in 1532. He was appointed archbishop of Canterbury in 1533 by the king, of whom he soon became the favorite minister and adviser. He co-operated with Henry in the suppression of monasteries, but in 1538 he opposed the law of the "Six Articles" or "Bloody Statutes." He promoted the translation and circulation of the Bible. On the death of Henry VIII., Cranmer, in accordance with the royal will, was appointed one of the regents of the kingdom. He was the head of a commission which composed the Liturgy of the Anglican Church in 1548, and efficiently supported the Protestant cause during the reign of Edward VI. On the accession of Queen Mary, in 1553, he was placed in the Tower on a charge of treason. He was also accused of heresy, and was induced by the hope of saving his life to recant six times, and to subscribe to the doctrines of the papal supremacy and the real presence; but his enemies were determined not to spare his life. He was burned at the stake Mar. 21, 1556, and met his death with great fortitude, thrusting his right hand into the flames before his body began to burn. According to Hume, "He was a man of merit, possessed of learning and capacity, and adorned with candor and sincerity, and all those virtues which were fitted to render him useful and amiable in society." Macaulay and some other writers consider him an unscrupulous time-server. (See Archdeacon Todd, "Life of Cranmer," 1831.)

Crannoge, a term applied to a fortified island, such as are found in the lakes of Ireland and Scotland, and which were used as dwellings and places of refuge by the ancient Celtic inhabitants. The area of a small isle in some cases was enlarged by wooden piles or heaps of stones. Crannoges are mentioned in Irish annals as early as the ninth century. (See Lake Dwellings.)

Crans'ton, a township and village of Providence co., R. I. The village is on the Hartford Providence and Fishkill R. R., 4 miles S. of Providence. It has extensive manufactures of prints, cotton goods, thread, and machinery. Total pop. 4822.

Cranston (Henry Y.), born at Newport, R. I., in 1790, was a prominent official of his native State and city, and was in Congress 1843–47. Died Feb. 12, 1864.

Cran'tor [Κράντωρ], a Greek Academic philosopher, born at Soli, in Cilicia, lived about 300 B. C. He was a pupil of Xenocrates at Athens, and wrote, besides other works, a "Treatise on Affliction," which was highly esteemed. He is mentioned by Horace as an eminent moralist.

Cran'worth (Robert Monsey **Rolfe**), Baron, an English judge, born at Cranworth, in Norfolk, Dec. 18, 1790. He was elected to Parliament as a liberal in 1832, became solicitor-general in 1834, and a baron of the exchequer in 1839. In 1852 he was appointed lord chancellor by Lord Aberdeen. Having resigned in 1858, he was again lord chancellor from July, 1865, to June, 1866. Died July 26, 1868.

Crape [Fr. *crêpe*, from the Lat. *crispus*, "crisped" or "curled"], a light, transparent fabric, made of raw silk deprived of its gloss. Crapes are crisped or smooth, according to the degree of twist in weaving. They are manufactured in Italy, England, and France, and are extensively used for mourning-dresses.

Cra'shaw (Richard), an English poet, was the son of a clergyman. He was educated at the Charter-house and at Cambridge. In 1644 he was ejected from his fellowship for refusing to sign the Covenant. Going to France, he became a Catholic, and, befriended by Cowper, through the influence of Queen Henrietta Maria he obtained a secretaryship to a cardinal, and afterwards became a canon at Loretto, where he died in 1640. His works, marked with fertility of imagination and devout fervor, are "Steps to the Temple," "Delights of the Muses," and "Carmen Deo Nostro" (1646).

Crassula'ceæ [from *Crassula*, one of the genera], also called **Sempervi'væ,** a natural order of exogenous plants (herbaceous or shrubby), all remarkable for the succulence of their stems and leaves. It comprises about 300 species, widely distributed over the world, and abounding in South Africa. They grow in dry situations, and derive nourishment from the air rather than from the soil. Many of them are cultivated in green-houses on account of their grotesque forms. The *Sedum* (stone-crop), houseleek, and other plants of the U. S. belong to this order.

Cras'sus (Marcus Licinius), a Roman triumvir, born about 108 B. C., was in his youth a partisan of Sulla. He was elected prætor in 71 B. C., and defeated Spartacus, the leader of a servile revolt. In the year 70 he was chosen consul as the colleague of Pompey. He amassed an immense fortune by speculation, mining, dealing in slaves, and other methods. Avarice is said to have been his ruling passion, but for the sake of political success he gave large gifts to the people. About 60 B. C. he united with Cæsar and Pompey in a coalition called the first triumvirate. Crassus and Pompey having been chosen consuls in 56 B. C., the former obtained command of Syria for five years. He invaded Parthia in the year 54, in order to enrich himself by plunder. In 53 B. C. he was defeated with great loss by the Parthian general Surena, near Carrhæ (the Haran of the Bible). He was treacherously killed at a conference with Surena soon after that battle (53 B. C.). (See Plutarch, "Life of Crassus.")

Cratæ'gus [Gr. κραταιγός, a "thorn-bush"], a genus of thorny shrubs of the natural order Rosaceæ, sub-order Pomeæ, which contains the pear, apple, etc., but distinguished from the rest of the sub-order by its bony carpels. The species are numerous, natives of the temperate parts of the northern hemisphere, and often have flowers in beautiful corymbs. They are nearly all more or less spiny, hence the name thorn or thorn-bush is popularly applied to them. The only native of Great Britain is the hawthorn (*Cratægus Oxyacantha*), which is now naturalized in the Atlantic States of the Union. A number of other species are now found in plantations and hedges in Great Britain, of which the most common is the cockspur thorn (*Cratægus Crus Galli*), a native of North America from Canada to Carolina. Its leaves are not lobed; its fruit rather larger than that of the hawthorn. The azarole (*Cratægus Azarolus*), a native of the south of Europe, and the aronia (*Cratægus Aronia*), a native of the Levant, are occasionally cultivated for their fruit, which is about as large as the Siberian crab, and is used for dessert or pies, as are the fruits of some American species in Canada. *Cratægus orientalis* and *Cratægus tanacetifolia* have also fruit of considerable size. The latter is much used in Armenia. *Cratægus Pyracantha* differs in appearance from most of the genus. It is an evergreen shrub, with lanceolate, crenate leaves and clusters of rich red berries. It is a native of the south of Europe and the Caucasus. In Great Britain it is cultivated as an ornament, and known as the pyracantha. The American species are at least eleven in number. Apples, pears, and quinces are sometimes grafted upon thorn stocks. The thorn-bushes are used as hedge plants, but are apt to be infested by borers.

Cra'ter [from the Gr. κρατήρ, a "bowl" or "cup"], the mouth or cup-shaped cavity at the summit of a volcanic mountain. Through this aperture the lava, scoriæ, etc. are usually ejected, but these materials sometimes issue by immense rents in the sides of the mountain. (See Volcano, by Prof. Arnold Guyot, Ph. D., LL.D.)

Crater (the "Cup"), one of Ptolemy's northern constellations, situated near Cervus, the "Deer."

Crater, a township of Calhoun co., Ill. Pop. 564.

Crat'erus [Gr. Κρατερός], an eminent Macedonian general, and one of the successors of Alexander the Great. He served under that prince in Asia, and was one of his favorite generals. After the death of Alexander (323 B. C.) he was associated with Antipater in the government of Macedonia. He was defeated by Eumenes, and killed in battle in Cappadocia in 321 B. C.

Cra'tes [Κράτης] **of Athens,** a Greek comic poet who

flourished about 450 B. C. He was also an actor, and performed parts in the plays of Cratinus. His works were greatly admired, and were praised by Aristotle. Only small fragments of them are extant.

Crates of Thebes, a famous Cynic philosopher, lived about 320 B. C., and was a disciple of Diogenes at Athens. He had a high reputation for probity, wisdom, and self-control. He was rich in his youth, but set an example of voluntary poverty. He wrote poems and other works which are all lost.

Crati'nus [Κρατῖνος], an eminent Athenian comic poet of the old comedy, was born in 519 B. C. He was a contemporary and rival of Aristophanes. He was the first comic poet who introduced personal satire into the drama, and undertook to castigate the vices of his prominent contemporaries. Pericles was among the objects of his satire and invective. Cratinus gained a prize for his "Wine-Flask" in 423 B. C., when Aristophanes was his competitor. Died in 422 B. C.

Cratip'pus [Gr. Κράτιππος], a Greek Peripatetic philosopher, a native of Mitylene. He was the most eminent philosopher of that age in the estimation of Cicero, who was his pupil and friend. Pompey, after his defeat at Pharsalia, had an interview with Cratippus, who conversed with him on Providence. Brutus attended his lectures at Athens in 44 B. C. Cratippus wrote a work "On Divination by Dreams."

Cra'ven, a county in the E. S. E. of North Carolina, bordering on Pamlico Sound. Area, 1000 square miles. It is intersected by the Neuse River. The surface is nearly level, and partly occupied by swamps. Cotton, rice, and corn are raised. It is traversed by the Atlantic and North Carolina R. R. Capital, Newbern. Pop. 20,516.

Craven, Earls of, Viscounts Uffington (United Kingdom, 1801), Barons Craven (England, 1665).—George Grimston Craven, third earl, born Mar. 16, 1841, succeeded his father in 1866.

Craven (Charles H.), U. S. N., born Nov. 30, 1843, in Maine, graduated at the Naval Academy as ensign in 1863, became a lieutenant in 1866, and a lieutenant-commander in 1868. He served in the steam-sloop Housatonic off Charleston from early in 1863 to Feb. 14, 1864, when that vessel was blown up by a torpedo-boat. He was in the combined army and navy expedition which resulted in the capture of the greater part of Morris Island July 10, 1863, and commanded a division of boats in the night assault upon Fort Sumter of Sept. 11, 1863.

Foxhall A. Parker, U. S. N.

Craven (Thomas T.), U. S. N., born Dec. 30, 1808, in Portsmouth, N. H., entered the navy as a midshipman May 1, 1822, became a passed midshipman in 1828, a lieutenant in 1830, a commander in 1852, a captain in 1861, a commodore in 1862, and a rear-admiral in 1866. During the summer of 1861 he commanded the Potomac flotilla. During the year 1862, while in command of the steam-sloop Brooklyn, he took part in the engagement with Forts St. Philip and Jackson and capture of New Orleans, and "excited the admiration of his officers and crew by his coolness and the masterly handling of his vessel." He was engaged on the 28th of June, 1862, for two hours and forty minutes with the batteries at Vicksburg. In his report of the passage of the forts on his way to New Orleans, Admiral Farragut writes: "It was not long before we were enabled to bear away and give the forts a broadside of shells, shrapnell, and grape, the Pensacola, at the same time, passing up and giving a tremendous broadside of the same kind to the starboard fort; and by the time we could reload, the Brooklyn, Captain Craven, passed handsomely between us and the battery, and delivered her broadside, and shut us out." Foxhall A. Parker, U. S. N.

Craven (Tunis Augustus), U. S. N., born Jan. 11, 1813, in the State of New York, entered the navy as a midshipman Feb. 2, 1829, became a passed midshipman in 1835, a lieutenant in 1840, and a commander in 1861. He commanded the iron-clad Tecumseh in the engagement with Howlett's battery, James River, June 21, 1864, and on the morning of Aug. 5, 1864, was blown up by a torpedo while gallantly leading the iron-clads into the bay of Mobile.

Foxhall A. Parker, U. S. N.

Craw'fish, or **Cray'fish** [etymologically related to the word *crab*], a name given to several long-tailed decapodous crustaceans, those of Europe and the Pacific States of our country belonging to the genus *Astacus*, while those of the Eastern States and the Mississippi Valley belong to the genus *Cambarus*. They inhabit fresh water, and dig long burrows in the earth. They feed upon insects, mollusks, dead animals, etc. By some they are esteemed for the table. Crawfishes do immense damage by opening passages for water through the levees of the Mississippi, which in some cases have caused extensive crevasses. In New England they are quite rare, but are occasionally seen. Certain salt-water crustaceans are popularly called crawfishes, especially the spiny lobsters, of the genus *Palinurus*.

Craw'ford, a county in the W. of Arkansas. Area, 585 square miles. It is bounded on the S. by the Arkansas River. The surface is partly mountainous. The soil is fertile. Timber, lead, coal, and iron abound. Corn, tobacco, cotton, and wool are raised. Boston Mountain in this county is nearly 2000 feet high. Capital, Van Buren. Pop. 8957.

Crawford, a county in W. Central Georgia. Area, 289 square miles. It is bounded on the S. W. by the Flint River. The surface is uneven; the soil of the southern part is sterile. Cotton, corn, and wool are raised. Capital, Knoxville. Pop. 7557.

Crawford, a county in the E. S. E. of Illinois. Area, 420 square miles. It is bounded on the E. by the Wabash River, and drained by the Embarras River. It contains a large portion of prairie; the soil is fertile. Cattle, grain, tobacco, and wool are raised. Capital, Robinson. P. 13,889.

Crawford, a county in the S. of Indiana. Area, 280 square miles. It is bounded on the S. by the Ohio River, and also drained by Blue River. The surface is uneven. The soil is fertile. Coal and iron abound here. Cattle, grain, tobacco, wool, and lumber are produced. Capital, Leavenworth. Pop. 9851.

Crawford, a county in the W. of Iowa. Area, 700 square miles. It is intersected by Boyer River and by the Chicago and North-western R. R. The soil is productive. Grain and wool are staple products. Cap. Denison. P. 2530.

Crawford, a county in the S. E. of Kansas. Area, 504 square miles. It is drained by small affluents of the Neosho River. It is a part of what was once known as the Cherokee Neutral Lands. The Missouri River Fort Scott and Gulf R. R. runs through the centre, and the Missouri Kansas and Texas R. R. through the N. W. portion of the county. The eastern portion is underlaid with fine beds of bituminous coal. The soil is fertile. Stock-raising and farming are the principal pursuits. The products are corn, wheat, root-crops, flax, castor beans, wool, tobacco, cotton, etc. Capital, Girard. Pop. 8160.

Wasser & Riddle, Eds. "Girard Press."

Crawford, a county in the N. of the southern peninsula of Michigan. Area, 576 square miles. It is drained by the Au Sable River.

Crawford, a county in S. E. Central Missouri. Area, 600 square miles. It is intersected by the Maramec River. The surface is partly hilly. Productive mines of copper, iron, and lead have been opened here. Coal is also found in this county, which is traversed by the Atlantic and Pacific R. R. The soil is fertile. Cattle, grain, and wool are raised. Capital, Steelville. Pop. 7982.

Crawford, a county in N. Central Ohio. Area, 412 square miles. It is drained by the head-streams of the Sandusky and Olentangy rivers. The surface is nearly level; the soil is fertile. Cattle, grain, and wool are largely raised. Lumber, furniture, brick, clothing, metallic wares, etc. are manufactured. It is intersected by the Pittsburg Fort Wayne and Chicago R. R. Capital, Bucyrus. Pop. 25,556.

Crawford, a county in the N. W. of Pennsylvania. Area, 975 square miles. It is intersected by French Creek, and also drained by Oil and Shenango creeks. The surface is undulating; the soil is generally fertile. Cattle, grain, and wool are raised. Furniture, leather, lumber, barrels, carriages, etc. are manufactured. Large quantities of petroleum are procured in this county, which is traversed by the Atlantic and Great Western, the Pittsburg and Erie, and other railroads. Capital, Meadville. Pop. 63,832.

Crawford, a county of Wisconsin, bordering on Iowa. Area, 612 square miles. It is bounded on the W. by the Mississippi and on the S. E. by the Wisconsin River, and intersected by the Kickapoo. The surface is hilly; the soil fertile. Grain and wool are staple products. The Milwaukee and St. Paul R. R. connects Milwaukee with Prairie du Chien, the capital of the county. Pop. 13,075.

Crawford, a township of Yell co., Ark. Pop. 211.

Crawford, a township of Madison co., Ia. Pop. 739.

Crawford, a twp. of Washington co., Ia. Pop. 1317.

Crawford, a township of Cherokee co., Kan. Pop. 593.

Crawford, a twp. of Crawford co., Kan. Pop. 1535.

Crawford, a post-twp of Washington co., Me. P. 209.

Crawford, a township of Buchanan co., Mo. P. 1516.

Crawford, a township of Osage co., Mo. Pop. 2438.

Crawford, a township of Orange co., N. Y., on the Middletown and Crawford R. R. It has five churches, and

a scythe-factory and other manufacturing interests. Pop. 2024.

Crawford, a township of Currituck co., N. C. P. 1867.

Crawford, a township of Coshocton co., O. Pop. 1245.

Crawford, a township of Wyandot co., O. Pop. 1860.

Crawford, a township of Clinton co., Pa. Pop. 400.

Crawford, Earls of (1398), earls of Balcarres (1650), Barons Lindsay (previous to 1443), Barons Lindsay of Balcarres (1633), Lords Lindsay and Barneil (Scotland, 1650), Barons Wigan (United Kingdom, 1826).—Alexander William Crawford Lindsay, twenty-fifth earl, M. A., author of "Letters on Christian Art," "Lives of the Lindsays," "Progression by Antagonism," etc., born Nov. 16, 1812, succeeded his father in 1869.

Crawford (George W.), born in Columbia co., Ga., Dec. 22, 1798, graduated at Princeton in 1820, was admitted to practise law in Georgia in 1822, was a member of Congress in 1843, governor of Georgia (1843–47), and secretary of war under President Taylor (1849–50).

Crawford (Martin J.), an eminent citizen of Georgia, born Mar. 17, 1820, educated at Mercer University, rose to distinction at the bar, was elected to the State legislature in 1845, and elevated to the bench in 1853. In 1856 he was returned to Congress, and continued in the House of Representatives till Jan., 1861, when he withdrew on the secession of Georgia, and became a member of the Congress of the Southern States which met at Montgomery Feb. 4, 1861. He was one of the three commissioners appointed by that body to treat with the authorities at Washington for a peaceful separation of the States. Since the war he has been actively engaged in the practice of his profession.

Crawford (Nathaniel Macon), D. D., an American Baptist minister and eminent pulpit-orator, a son of William H. Crawford, was born near Lexington, Ga., Mar. 22, 1811. He became in 1854 president of Mercer University in Georgia. He was a prominent advocate of liberal education. Died Oct. 27, 1871.

Crawford (S. Wylie), an American officer, born in Franklin co., Pa., Nov. 8, 1829, graduated at the University of Pennsylvania in 1847, appointed assistant surgeon U. S. A. in 1851. He served principally in Texas and New Mexico. In 1861 he was appointed major Thirteenth Infantry U. S. A., promoted to be lieutenant-colonel Feb. 17, 1864, and colonel Sixteenth Infantry Feb. 22, 1869; transferred to Second Infantry Mar. 15, 1869. On the outbreak of the civil war, April, 1861, Gen. Crawford was among the garrison of Fort Sumter. He was commissioned brigadier-general of volunteers April, 1862, and served in the Shenandoah campaign and with the Army of the Potomac up to the closing scenes at Appomattox Court-house, 1865. At Antietam, in 1862, he took command of Mansfield's division after the latter's death, and was severely wounded. Brevet-colonel, brigadier-general, and major-general U. S. A. Retired from active service, on account of wounds received, Feb. 19, 1873.

Crawford (Thomas), an American sculptor, born in New York Mar. 22, 1814. He was a pupil of Thorwaldsen at Rome, where he worked for many years. He was employed in 1849 by the State of Virginia to execute a colossal equestrian statue of Washington, which is at Richmond. Among his works are a statue of "Orpheus," and a colossal statue of the Genius of America, which is on the dome of the Capitol at Washington. Died in London Oct. 10, 1857.

Crawford (William Harris), an American statesman, born in Amherst co., Va., Feb. 24, 1772, removed to Georgia in his early youth. Having studied law, he was admitted to the bar in 1798, and settled at Lexington, Ga. He was elected a Senator of the U. S. in 1807 by the Democrats, and was sent as minister to France in 1813. He became secretary of war in 1815, and was secretary of the treasury from 1816 to Mar., 1825. In 1824 he was nominated for the presidency of the U. S. by a Congressional caucus. In the election of that year he had three competitors—Gen. Jackson, John Quincy Adams, and Henry Clay. Crawford received only forty-one electoral votes. Died Sept. 15, 1834.

Crawford County System. See Caucus, by Hon. Horace Greeley, LL.D.

Craw'fordsville, a post-village of Crawford township, Washington co., Ia. Pop. 249.

Crawfordsville, a post-village, capital of Montgomery co., Ind., on the Indianapolis Bloomington and Western R. R. where it crosses the Louisville New Albany and Chicago R. R., 44 miles W. N. W. of Indianapolis. It is the seat of Wabash College, founded in 1835, and has a national bank and three weekly papers. Pop. 3701.

Craw'fordville, a post-village, capital of Wakulla co., Fla., 20 miles from Tallahassee. It has good soil and climate, and there are several mills and valuable mineral springs in the vicinity.

Crawfordville, a post-village, capital of Taliaferro co., Ga., on the Georgia R. R., 65 miles W. of Augusta.

Crayfish. See Crawfish.

Cra'yon [from the Fr. *craie,* "chalk"], a word of French origin, signifying something to mark with, hence a pencil; a cylinder of charcoal, pipeclay, or chalk colored with various pigments and used for drawing on paper. Cohesiveness is given to the paste of which the cylinder is formed by gum, wax, or soap. Crayons containing plumbago are styled lead pencils.

Crea'gerstown, a township and post-village of Frederick co., Md., 2 miles from the Western Maryland R. R., and about 40 miles N. W. of Baltimore. Pop. 2006.

Cream [Lat. *cremor;* Fr. *crême;* Ger. *Rham*], the oily or butyraceous part of milk, which being lighter rises to the surface. The term cream is applied in different ways to various preparations, indicative of superior quality or of cream-like consistence, as cold cream, shaving cream, etc. The French expression "La crême de la crême" ("The cream of the cream") signifies the most fashionable or aristocratic class of society.

Cream of Tartar, Acid Tartrate of Potassa, Bitartrate of Potassa, Supertartrate of Potassa, or **Potassæ Bitartras** [pharm.]; chemical constitution, $KHC_4H_4O_6$; old system, $KO,HO,(C_8H_4O_{10})$, a compound existing already formed in the juice of the grape and in other vegetable juices. In the juice of the grape it is held in solution by the saccharine matters present, but as it is less soluble in solutions containing alcohol and less sugar, as the sugar is transformed into alcohol in the process of fermentation, it is deposited in the casks, forming the crude tartar or argol of commerce. The amount varies with the variety of the grape, its ripeness, and with the process pursued in making the wine. The well-known "crust" of port wine is simply a deposit of this crude tartar or argol. Cream of tartar was known to the ancients, the Greek name for it being τρύξ, while the Latin term was *fæx vini.* Up to 1764 it was considered to be an acid, and even in 1781 it was denominated in the Prussian Pharmacopœia as *acidum tartari.* Marggraf, however, showed in 1764 that the alkali existed in it already, and was not formed by incinerating it, as had been previously supposed. Argol is an article of export from wine-producing countries, the best qualities coming from Italy and the south of France. It is used as the source of tartaric acid and the various tartrates employed in medicine and the arts.

Argol, as met with in commerce, is of two kinds—red and white, according as it has been deposited in the manufacture of red or white wines, some of the coloring-matter of the wine always existing in it. It contains from 5 to 45 per cent. of tartrate of lime, besides other impurities derived from the wine. It is refined by treatment with boiling water, in which the cream of tartar is quite soluble. The water being then cooled or evaporated, the salt crystallizes out; it is then redissolved in water, 4 or 5 per cent. of pipeclay added to the solution to precipitate the impurities, the liquid drawn off and evaporated. Thus prepared, it consists of colorless rhombic crystals, which usually contain 2 to 5 per cent. of tartrate of lime, besides, in some cases, traces of iron and copper. In damp situations the tartrate of lime is apt to change to the carbonate, and hence is objectionable, both in the crude and the refined article.

Cream of tartar has a pleasant acid taste, and is soluble in about 15 parts of boiling and 240 parts of cold water. It is much more soluble in water containing borax in solution. It is frequently adulterated with sawdust, clay, gypsum, flour, chalk, alum, and sulphate of potash. Samples purchased from several grocers in New York in 1872 were found to contain considerable proportions of gypsum or sulphate of lime, in one case 70 per cent. Cream of tartar is extensively used, in connection with bicarbonate of soda, as a substitute for yeast and leaven for raising bread. (See Bread.) Cream of tartar is often used as a mordant in dyeing wool. In medicine it is used for its cathartic, diuretic, and refrigerant properties. It is frequently prescribed in combination with senna, sulphur, or jalap. It is also used for the preparation of soluble tartar (neutral tartrate of potash), Rochelle or Seignette salts (tartrate of potash and soda), tartar emetic (tartrate of potash and antimony), tartarized iron (tartrate of potash and iron), white and black flux, etc. Salt of tartar is the carbonate of potassa, prepared by the incineration of cream of tartar.

C. F. Chandler.

Cream Ridge, a post-township of Livingston co., Mo. Pop. 956.

Crea'sy (Sir Edward Shepherd), an English historian and lawyer, born at Bixley, in Kent, in 1812. He became professor of history in University College, London, in 1850, and was appointed chief-justice of Ceylon in 1860. Among his works are "Fifteen Decisive Battles of the World" (1851) and a "History of England" (5 vols., 1869–70).

Cre'atine [from the Gr. κρέας, "flesh"], a neutral principle discovered in 1835 by Chevreul in raw muscular flesh, and afterwards carefully studied by Liebig and others. Anhydrous creatine has the formula $C_4H_9N_3O_2$. Creatine is found in the flesh of many if not all vertebrate animals, but is now generally considered to be one of the products of the normal destruction of the tissues. It occurs in the urine. Combined with two equivalents of water, it readily forms brilliant, colorless, transparent crystals, soluble in water.

Creat'inine, a powerful organic base or alkaloid ($C_4H_7N_3O$) which exists in small quantities in the juice of animal flesh and in urine, as one of the products of the physiological destruction of tissues. When creatine is subjected to the action of strong acids, it is changed to creatinine, which is crystallized in colorless rhombic prisms.

Crea'tionism, as distinguished from Traducianism and the doctrine of Pre-existence (which see), is the belief that the human soul is directly created by God, and that it joins the embryo soon after conception. Many passages of Scripture, of the Fathers, and of Aristotle were quoted to sustain this view.

Crébillon, de (Prosper Jolyot), a French dramatic poet, was born at Dijon Jan. 13, 1674. He produced in 1705 "Idoménée," in 1707 "Atrée," "Rhadamiste" in 1711, and "Pyrrhus" in 1726, after which he wrote nothing for twenty years. He was admitted into the French Academy in 1731. His genius was hampered by poverty. Among his later works is "Catilina" (1749). Died June 17, 1762. He is ranked among French dramatists of the first order. (See D'Alembert, "Éloge de Crébillon.")—His son, Claude Prosper Jolyot de Crébillon, *fils*, romancist, is known as one of the most libertine writers of a most dissolute age.

Crécy, a small town of France, department of Somme, about 12 miles N. of Abbeville. It was the scene of a signal victory gained by Edward III. with 40,000 English soldiers over a French army of 100,000 on the 26th of Aug., 1346. It is stated that nearly 30,000 of the French were killed in this action.

Creden'tials [from the Late Lat. *credentia*, "evidence," "trust" (from *credo*, to "believe"); Fr. *lettres de créance*], papers or letters given to an ambassador or other diplomatic agent, in order to enable him to claim the confidence of the court to which he is sent. There are two sorts of credentials—the one sealed, drawn up and countersigned by the minister of foreign affairs; the other open, and signed only by the king.

Cre'di, di (Lorenzo Sciarpelloni), an Italian painter, born at Florence in 1452. He was a fellow-pupil of Leonardo da Vinci. Grace and depth of feeling mark his pictures. Died Jan. 12, 1537.

Cred'it [Lat. *creditum*, a "trust," from *credo, creditum*, to "trust," to "believe," to "lend;" Fr. *crédit*], belief, reliance, reputation for solvency and probity; honor or esteem; influence of a good character. In bookkeeping, *credit*, abbreviated as *Cr.*, is the reverse of *debit*, and denotes in personal accounts those items or values received from the party named at the head of the account. The term credit or creditor is also applied to the side of an account-book on which are entered all moneys, goods, etc. received by the party that keeps the book. In political economy, credit is used to express the lending of money or other property. The party who lends money or sells goods to be paid for at some future time is said to give credit, which is sometimes defined to be the acquisition by one party of the wealth of another in loan. In a majority of cases loans are made by persons who wish to retire from business, or who have more capital than they can advantageously employ, to parties entering into business or who wish to increase their business. "Public credit" is a phrase used to express the general confidence placed in the solvency of a state, and in its fidelity as well as its ability to pay its debts, or at least the interest on the same.

Crédit Foncier [*i. e.* "landed credit," from *fond*, "bottom" or "ground"], in France, a plan of borrowing money by mortgaging land (for a sum not exceeding half its value), and repaying the borrowed money and interest in small and regular instalments. The Crédit Foncier was established Feb. 28, 1852.

Credit, Letters of. See Letters of Credit.

Crédit Mobilier (*i. e.* "credit on movable or personal property"*), a name given to a gigantic scheme or joint-stock company which originated in France in 1852, and was sanctioned by the government, with a capital of 60,000,000 francs. The objects of it are—1. To initiate trading enterprises of all kinds on the principle of limited liability; 2. To supersede or buy up trading companies—*e. g.* railway companies—and to substitute scrip and shares of its own for the shares and bonds of the company; and 3. To carry on the business of a bank or bankers on the principle of limited liability. (See Aycard, "Histoire de Crédit Mobilier," 1867.)

"The Credit Mobilier of America" is the title of an organization chartered in Pennsylvania in 1859 as a corporation for a general loan and contract business, and reorganized in 1864 with the intention, it would appear, of enabling the shareholders of the Union Pacific R. R. to construct their road without incurring any pecuniary liability in case of the failure of the enterprise. To this end the Credit Mobilier was to contract for the construction of the road at the risk of its own stockholders. The honesty of its management having been impeached, the affairs of the Credit Mobilier received (1872–73) an investigation from Congress, certain members of which were charged with having unlawfully profited by the enterprise.

Credit River, a township of Scott co., Minn. P. 448.

Creed [from the Lat. *credo*, to "believe;" Fr. *croyance;* Ger. *Glaube*], a term originally signifying "belief," but commonly applied to a statement or profession of fundamental points of belief [Lat. *symbolum;* Fr. *symbole* or *profession de foi;* Ger. *Glaubensbekentniss*], especially applied to summaries of Christian doctrine. The Protestant churches agree in considering creeds mere standards of belief, the Bible alone affording authoritative rules of faith and practice, but they differ in their estimate of the importance of symbols. Among the more important creeds are the following:

The Apostles' Creed, a summary of the Christian faith which most Christian churches accept. Many ancient writers assert that this was composed by the apostles themselves, before they separated after our Lord's ascension; but this tradition is now almost universally rejected. The substance of it is no doubt very ancient, but in its present form it dates from the fourth century.

The Athanasian Creed, once supposed to be the work of Athanasius, was certainly composed by some other hand. It probably originated in Gaul, not far from the middle of the fifth century, but its author is not known. It is now omitted from the services of the Protestant Episcopal Church in America, but it is still read in the Church of England.

The Niceno-Constantinopolitan (or Nicene) Creed was first adopted at the Council of Nice, 325 A. D. This creed sets forth the faith of the Church in respect to the errors of Arianism. It is admitted by many Protestant churches, and is held as authority in the Roman and Greek churches. The form in which the Nicene Creed now appears in the Anglican prayer-books is essentially identical with the modified form of this creed adopted by the second œcumenical council of Constantinople, 381 A. D., with the addition of "and of the Son," made at Toledo in 589. The above formulas are known as the three catholic or general creeds, because they are received by the Greek and Roman churches, as well as by several Protestant bodies.

The Creed of Chalcedon was an exposition of faith declared by the fourth œcumenical council, held A. D. 451 at Chalcedon. It embraced the Niceno-Constantinopolitan Creed, followed by a statement of the doctrine of Christ's Person.

The so-called Creed of Pope Pius IV. is a statement of the doctrines of the Roman Catholic Church, as established by the Council of Trent. It was issued in 1564 by Pius IV. as a bull. It is slightly altered from the Nicene Creed in the first part, but is much more complicated, and especially enforces the doctrine of transubstantiation. It is sometimes called the "Tridentine Profession."

The Greek Church has no symbolical books, strictly speaking, but approves the "Answers of the Patriarch Jeremiah to the Lutherans" (1574–81), the "Orthodox Confession of Peter Mogila" (1643), and the "Eighteen Articles of the Synod of Bethlehem" (1672).

The Russian Church, in addition to its use of the above-mentioned documents, has of its own: (1) the "Primer for Children" (1720); (2, 3) the "Shorter" and "Longer Catechisms" (1839); (4) the "Treatise on the Duty of Parish Priests" (1776).

The Lutheran Church has had many creeds and confessions. Besides the Apostles', Nicene, and Athanasian Creeds, may be mentioned the Augsburg Confession (1530), the Articles of Schmalcald (1537), the Catechisms of Luther

*The term "mobilier" is especially applied to stocks, government securities, and the like.

(1529), the Confession of Lower Saxony (1571), the Suabian-Saxon Formula (1575), the Torgau Formula (1576), and the Formula Concordiæ (1580).

The Calvinistic Confessions of Bâle (1530), the Tetrapolitan Confession (1531), that of the Helvetic churches (1536), the Palatine Catechism (1563), the "Expositio Simplex" (1566), the "Formula Consensus" (1675), the Gallican Confession (1559), the Belgic Confession (1559–61), the Scottish Confession of 1560, and the great Westminster Confession (1646), and Catechisms (Shorter, 1647; Larger, 1648), are among the most important Protestant symbols. The articles held by the Congregationalists and Baptists are based upon the Westminster Confession.

The Church of England receives the three catholic creeds and the "Thirty-nine Articles." The Anglican Creed at first (1552) consisted of forty-two Articles; in 1562 it was reduced to thirty-eight; and finally in 1571 it was put forth in its present form. A modification of these articles is received by the Protestant Episcopal Church in the U. S. The "Articles" of the Methodist Episcopal Church are also based upon the "Thirty-nine Articles."

Creed'moor, a station on the Central R. R. of Long Island, 11 miles E. of New York City, in Queens co., N. Y., has the largest and most complete rifle-range in the U. S., and is much frequented for target-practice. The range is under the control of an incorporated association, and was established in 1871, chiefly at the expense of the State and the cities of New York and Brooklyn.

Creek, a township of Dewitt co., Ill. Pop. 1022.

Creek Indians, a tribe of American savages formerly living in Alabama and Georgia, were sometimes called Muscogees. They were numerous and warlike. In 1814 they waged war against the U. S., and were subdued by Gen. Jackson. In 1832 they ceded their lands to the U. S., and subsequently removed to the Indian Territory beyond the Mississippi. They are now in a condition of advancing civilization, and numbered in 1872, 12,295.

Creep'er [named from the movements of the bird], a

Creeper.

popular name for several passerine birds of the genus *Certhia* and other allied genera. The best-known North American species are the brown creeper (*Certhia Americana*) and the *Certhia albifrons* of the South-western States. They belong to the family Certhiadæ.

Creery (William R.), born in Baltimore, Md., in 1824, graduated at Dickinson College in 1842, taught in the Baltimore schools (1842–48 and 1862–68), was professor of belleslettres in Baltimore City College (1854–59), president of Lutherville Female Seminary (1859–62), and in 1868 became superintendent of public instruction in Baltimore. In conjunction with Prof. M. A. Newell, he has prepared the Maryland series of school-books.

Cre'feld, a manufacturing town of Rhenish Prussia, is 13 miles N. W. of Düsseldorf, on the railway to Cologne. It is well built, and has more extensive manufactures of silk than any other town in Prussia. Here are also manufactures of cotton, linen, and woollen fabrics, lace, earthenware, etc. Pop. in 1871, 57,128.

Creigh'ton (J. Blakeley), U. S. N., born Nov. 12, 1822, in Rhode Island, entered the navy as a midshipman Feb. 10, 1838, became a passed midshipman in 1844, a lieutenant in 1853, a commander in 1862, and a captain in 1868. In 1862 he commanded the steamer Ottawa, South Atlantic blockading squadron. In 1863, while commanding the steamer Mahaska, he participated in several engagements with the forts and batteries of Charleston harbor.

Foxhall A. Parker, U. S. N.

Cre'ma, a town of Italy, province of Cremona, on the river Serio, 24 miles E. of Milan. It was founded by the Longobards in the sixth century. It is well built, is enclosed by a wall, and has an old castle and a cathedral; also manufactures of silk and lace. Pop. 8075.

Cre'mer (Jacob John), a Dutch novelist, born Sept. 1, 1827, studied painting, but devoted himself to literature. His "Betuwsche Novellen" (sketches of Dutch village life) have been followed by "Anna Roose," "Dr. Helmond," and others.

Crémieux (Isaac Adolphe), a French advocate and republican, born of Jewish parents at Nîmes April 30, 1796. He practised as an advocate in the court of cassation in Paris. In 1842 he was elected a member of the Chamber of Deputies, in which he acted with the radical party. He was minister of justice in the provisional government (1848), and retired from office in June. He was a member of the National Assembly in 1849–50. In Sept., 1870, he became minister of justice after the deposition of Napoleon III. As president of the Universal Israelite Alliance of Paris he has displayed a remarkable activity in behalf of the Jews all over the world.

Crem'nitz, a Hungarian town, in Bars, in a gold and silver mining region. It has a mint and paper and vitriol works. Pop. 8442.

Cremo'na, a province of Italy, bounded on the N. by the provinces of Bérgamo and Brescia, W. by Milan, S. by Piacenza, Parma, and Reggio, and E. by Venetia. Area, 670 square miles. The soil is fruitful, producing grain, maize, rice, flax, wine, olives, etc. Capital, Cremona. Pop. in 1871, 300,595.

Cremona, a city of Italy, capital of the above province, in Lombardy, on the Po, here crossed by a bridge, 47 miles S. E. of Milan. It is surrounded by walls, is well built, with wide streets, and has handsome palaces and a cathedral. Connected with the cathedral is a belfry called Torazzo, 372 feet high, completed in 1284, and one of the most beautiful towers in Italy. Cremona is a bishop's see, and has a city hall, two theatres, a lyceum, a public library, and several hospitals. Here are manufactures of silk and cotton fabrics, porcelain, and chemical products. It was formerly celebrated for the violins of Amati (1590–1620), of Guarneri, and of Stradivari (1670–1728). Cremona was a populous town during the ancient Roman empire. Pop. 30,919.

Crenelle, or **Crenel,** a term used sometimes to denote a battlement, but more frequently an embrasure in a battlement. The word *crenellated* is employed to signify that a building is supplied with crenelles.

Cren'shaw, a county in the S. of Alabama. Area, 550 square miles. It is intersected by the Patsaliga River. The surface is nearly level. Corn, cotton, rice, and wool are raised. Capital, Rutledge. Pop. 11,156.

Crenshaw (Anderson) was born in South Carolina, but removed early to Alabama, where he held positions respectively as a judge of the circuit court, as a judge of the supreme court, and as chancellor of the southern division. He died in 1847.—Walter H. Crenshaw, son of Anderson Crenshaw, came to the House in 1838, and served from that time to 1867 in one or the other branch of the legislature of Alabama, and was never defeated.

Cre'ole [Sp. *criollo*, from *criar*, to "create," to "beget;" also to "nurse;" originally, a "child" or "nursling," a "descendant"], a native of the West Indies or South America who is descended from Europeans. The term is sometimes incorrectly applied to those whose ancestors were partly white, and have in their veins some blood of the Indians or negroes.

Cre'osote [Lat. *creasotum*, from the Gr. κρέας, "flesh,"

and σώζω, to "save," referring to its antiseptic qualities], a colorless, syrupy liquid obtained for commercial purposes chiefly from the tar of beech-wood. It has a great refractive power, and a density of 1.037. It boils at 397° F. Its taste is peculiar, and almost insupportable when placed even in a minute quantity upon the tongue. It has an odor resembling that of smoked meats, which doubtless owe their preservation to its presence in the smoke they absorb. Creosote is sparingly soluble in water, but readily so in ether and alcohol. It is generally adulterated in commerce with a large percentage of phenol (see CARBOLIC ACID), which can with difficulty be detected. The medical properties of true wood-creosote are doubtless important, but have not been sufficiently studied. It is employed in toothache, in obstinate vomiting,and as an outward application in cancer. In an over-dose it is an irritant poison, for which no antidote is known. Distilled with dilute sulphuric acid it yields creosol, $C_8H_{10}O_2$.

Crer'ton, a township of Sumpter co., Ala. Pop. 1562.

Crescen'do [from the It. *cresco*, to "grow," to "increase"], in music, signifies a gradual increasing of sound, or changing from piano to forte and fortissimo. It is marked thus <, or with the abbreviation *cresc.* The swell of a good organ produces a most perfect crescendo.

Cres'cent [from the Lat. *cresco*, to "grow" or "increase"], the figure of the new moon. The term is often used as an emblem of progress. It is generally supposed to be the "arms" of the Turkish empire, but it is more properly the "emblem" of that empire. It was used by the Greeks, and was the symbol of the Byzantine people before it was adopted by the Turks.

Crescent, a township of Del Norte co., Cal. Pop. 977.

Crescent, a township of Pottawattamie co., Ia. Pop. 1117.

Crescent, a township of Alleghany co., Pa. Pop. 364.

Crescent City, the capital of Del Norte co., Cal., is on the Pacific Ocean, about 260 miles N. N. W. of Sacramento. It has a small but safe harbor, and a lighthouse in lat. 41° 44′ 34″ N., lon. 124° 11′ 22″ W., with a flashing white light. It has one weekly newspaper. Pop. 458.

Crescen'zi, de' (PIETRO), an Italian senator, born at Bologna in 1230. He wrote in Latin a treatise on rural economy ("Opus Ruralium Commodorum"), the fruit of long travel and observation and the origin of agricultural science. Died in 1307.

Cres'co, a post-village, capital of Howard co., Ia., on the Milwaukee and St. Paul R. R., 19 miles N. W. of Calmar. It has five churches, a union school, two newspapers, two foundries, and other manufactories, and shipped in 1872, 378,000 bushels of wheat. Pop. 912.

W. R. MEAD, ED. "IOWA PLAIN DEALER."

Cresco, a township and village of Kossuth co., Ia. The village is on the Des Moines Valley R. R., 20 miles N. of Dakota. Pop. 309.

Cres'kill, a post-village of Bergen co., N. J., on the Northern R. R. of New Jersey, 17 miles N. of Jersey City and 2½ miles W. of the Palisades of the Hudson. It is finely situated, and has two parks and a fine railroad station.

Cre'sol [a term which appears to be derived from the first syllable of "creosote" and the first syllable of the Lat. *oleum*, "oil"], called also **Cresyl'ic Ac'id** and **Cres'yl Al'cohol,** a compound (C_7H_8O) derived from coal-tar or from wood-tar by fractional distillation. Most of the CARBOLIC ACID (which see) of commerce contains a large percentage of cresol. It combines with alkalies, like its analogue phenol, and hence is by some called an acid: it is isomeric with benzyl alcohol, and is itself properly one of the alcohols. It refracts light strongly, and boils at 397° F. It is sold in large quantities as "carbolic acid," and used as a disinfectant.

Cress, a name popularly applied to many cruciferous plants having a pungent taste and used in salads. The garden cress (*Lepidium sativum*) is an annual, a native of Asia. It is easily raised by a little artificial heat in winter. It is antiscorbutic. The bitter cress or cuckoo flower (*Cardamine pratensis*) is common in moist meadows in Great Britain. The flowers are white or light purple, and have stimulant and diaphoretic properties. They had once a reputation for the cure of epilepsy, particularly in children. This plant is also a native of America, like many of the other cresses. The young leaves of this species, as well as of *Cardamine amara* and *Cardamine hirsuta*, both British, and the latter American, are used as salads in Europe. The juice of *Cardamine pratensis* is much used as an antiscorbutic in the north of Europe. Water-cress (*Nasturtium officinale*) is a perennial, aquatic, cruciferous plant, used as a spring salad, and is a native of almost all parts of the world. It grows best in shallow running water, with a bottom of sand. Mud is injurious to its growth and flavor. It is often cultivated and brought to market in America and Europe.

Cres'son, a post-village of Cambria co., Pa., on the Pennsylvania R. R., 252 miles W. by N. from Philadelphia, and 102 miles E. of Pittsburg, at the junction of the Ebensburg branch. It is beautifully situated on the top of the Alleghany Mountain, about 3000 feet above the level of the sea. It is a fashionable place of summer resort, and is commended for the purity of its air.

Cresso'na, a post-borough of Schuylkill co., Pa., on the Mine Hill and Schuylkill Haven R. R., about 5 miles S. of Pottsville. Pop. 1507.

Cressy, in France. See CRÉCY.

Crest, in heraldry, the ornament affixed to the helmet, being a personal or hereditary device. Warriors bore insignia peculiar to themselves in this manner among the ancients. The earliest instance of the heraldic crest in England is said to have been that of Edmund Crouchback, earl of Lancaster, about 1280. The crest is in modern blazonry a figure placed upon a wreath, coronet, or cap of maintenance, which surmounts the coat-of-arms.

Crest, a town of France, department of Drôme, on the river Drôme, 14 miles S. S. E. of Valence. It has manufactures of silk fabrics and cotton prints. Pop. 5351.

Crest'line, a post-village of Crawford co., O., on the Pittsburg Fort Wayne and Chicago R. R. where it crosses the Cleveland Columbus and Cincinnati R. R., 63 miles N. by E. from Columbus. It is the terminus of the B. and I. R. R. Here are extensive shops of the railroads; also lock-works and other manufactories, a fine park, a splendid public-school building, six churches, waterworks, and two weekly newspapers. Pop. 2279.

A. BILLOW, PROP. "CRESTLINE ADVOCATE."

Creston, a post-village of Ogle co., Ill. It is a station on the Chicago and North-western R. R., 70 miles W. of Chicago, and has one weekly newspaper.

Cres'ton, a post-village of Union co., Ia., on the Burlington and Missouri River R. R., 190 miles W. of Burlington. Here are the engine-houses and repair-shops of the railroad company. It has three weekly newspapers. P. 411.

Cres'well, a township of Cowley co., Kan. Pop. 214.

Creswell (JOHN A. J.), an American lawyer, born at Port Deposit, Md., Nov. 18, 1828. He was chosen a Republican member of Congress in 1862, and a Senator of the U. S. for a short term in 1865. In Mar., 1869, he was appointed postmaster-general of the U. S. He resigned in Mar., 1873, and was then reappointed.

Cres'wick (THOMAS), an English landscape-painter, born at Sheffield in 1811. He became an associate of the Royal Academy in 1842. He painted British scenery with success. Among his works are "The Weald of Kent," a "Shady Glen," and "Wind on Shore." Died Dec. 28, 1869.

Cresylic Alcohol, or **Cresylic Acid.** See CRESOL.

Cre'ta [the Latin for "chalk," originally signifying "Cretan earth"], a pharmaceutical name for chalk (native carbonate of lime) and for the precipitated carbonate of lime. The former is more generally used. The chalk is powdered, washed, and dried, and is then known as *creta præparata* ("prepared chalk"), an excellent antacid remedy. *Creta præcipitata* (the chemically-prepared chalk) is more finely divided. (See CHALK.)

Creta'ceous [from the Lat. *creta*, "chalk"] **Sys'tem,** in geology, a name applied to the last-formed or uppermost rocks of the secondary or mesozoic period. It takes its name from the chalk, which in Europe is one of the characteristic rocks of the lower strata of this system. Next below the cretaceous lie the Jurassic rocks, and next above come those of the eocene period, which are the oldest of tertiary rocks. Cretaceous beds abound in the U. S.; and on the great plains and on both sides of the Rocky Mountains they are immensely developed, and contain great beds of valuable lignitic coal, which, however, is by some referred to the tertiary, or to a transition group between the cretaceous and the eocene.

Crete, or **Can'dia** [Gr. Κρήτη; Turk. *Kiridi*], a large and famous island of the Mediterranean, is between lat. 34° 57′ and 35° 41′ N., and lon. 23° 29′ and 26° 20′ E. It is 150 miles long, and from 6 to 35 miles wide. The surface is mountainous. Mount Ida rises near the middle of the island to the height of 7674 feet. Numerous caverns occur here, and an extensive one near Mount Ida is fabled to have been that which was anciently the retreat of the Minotaur. Among the minerals are limestone and slate. The chief productions of Crete are cotton, tobacco, olive oil, grapes, oranges, lemons, wine, silk, and wool. The population in ancient times is believed to have amounted

to 1,200,000, and at the time when it was acquired by the Venetians, to 500,000; it is now estimated at 210,000, of whom about 50,000 are Mohammedans, nearly all the others being Christians belonging to the Greek Church, which has eight bishops in the island.

History.—Crete is by some historians considered the cradle of the civilization brought to Europe by the Phœnicians and Egyptians. According to tradition, Minos, a celebrated legislator, reigned over this island before the beginning of the historical period. In the time of Homer, Crete had a dense population of the Hellenic race, and contained a great number of flourishing cities. Crete was visited by the apostle Paul, who planted a church in it. The Venetians became masters of this island in 1204. The Turks conquered it from the Venetians in 1669. In 1866 the Christian inhabitants revolted against the Turks, and demanded annexation to the kingdom of Greece. This war excited much sympathy among Christian nations, but the Cretans were subdued in 1869.

Crete, a township and post-village of Will co., Ill., about 34 miles S. of Chicago. Pop. 1468.

Crete, a city, capital of Saline co., Neb., on the Burlington and Missouri R. R., at the junction of the Beatrice branch, 20 miles from Lincoln. It has four churches, several manufactories, and one weekly paper.

Cre'tin [Fr. *crétin*], a person affected with CRETINISM (which see).

Crétineau-Joly (JACQUES), a French author, born Sept. 23, 1803, at Fontenay, studied theology in Paris, and wrote a number of works in defence of the interests of royalty and the Catholic Church. He is best known by his "History of the Jesuits" (6 vols., 1844–46), an elaborate work in defence of that order. Among his other works are "Histoire de la Vendée Militaire" (4 vols., 5th ed. 1864), "Histoire de Louis Philippe d'Orléans et de l'Orléanisme" (2 vols., 1861–63), "Le Pape Clément XIV." (1853), "Le Cardinal Consalvi" (2 vols., 1864).

Cret'inism [Fr. *crétinisme;* etymology uncertain], a name applied to epidemic idiocy or defective mentality, usually associated with physical deformity and moral debasement. It is frequently hereditary, and is almost always found in connection with goitre. It prevails especially in deep alpine valleys, not only in Switzerland and Italy, but in the Pyrenees and Himalayas. It is also found in China, and in Bengal is frequent on calcareous plains. In Europe it is seldom found at a higher elevation than 3000 feet. Cretins are often very repulsive, dirty, and shameless, their appetite voracious, the mouth large and open, the eyes small and usually crossed, the nose flat and broad, the skull wide at the top, with a narrow base, and the forehead retreating. The complexion is cadaverous, the limbs rachitic, the whole body dwarfish except the hands and feet, which are large. Cretinism is a physical degeneration, caused by defective nutrition, bad ventilation, lack of sunlight, and especially by calcareous matter taken into the system in drinking-water. Like goitre, it is said to prevail especially where magnesian limestone abounds. Cretinism is often incomplete. The institution founded by Guggenbühl on the Abendberg in Switzerland has been the model for many others for the improvement of cretins and other idiots. (See IDIOCY, by HARVEY B. WILBUR, M. D.)

Cre'tius (KONSTANTIN), a German artist, born Jan. 6, 1814, studied with König. He has treated South European peasant-life and later history, especially the Cromwellian period. A seriousness of composition in his works and excellent coloring are to be remarked.

Creuse, a department near the centre of France, has an area of 2151 square miles. The surface is mostly mountainous; the soil in some parts is thin and poor. The principal mineral productions are coal and salt. The rearing of cattle is one of the chief branches of industry. This is one of the poorest departments of France. Capital, Guéret. Pop. 274,057.

Creu'zer (GEORGE FRIEDRICH), a learned German philologist and antiquary, born at Marburg Mar. 10, 1771. He became professor of philology and ancient history at Heidelberg in 1804, and retained that position for forty-four years. His principal work is his "Symbolism and Mythology of Ancient Peoples, especially the Greeks" (4 vols. 8vo, 1810–12). He ascribed to the pagan myths a mystical significance and a supernatural origin. The old poet Voss, in "Antisymbolik," contested the theory, and a lively controversy ensued. He edited the Oxford Plotinus (3 vols., 1835). Died Feb. 16, 1858. (See CREUZER'S autobiography, "Aus dem Leben eines alten Professors," 1847.)

Creuzot, Le, a town of France, department of Sâone-et-Loire, 12 miles S. S. E. of Autun. It is situated in the midst of rich mines of coal and iron, and has extensive blast-furnaces, iron-foundries, machine-shops, and glass-works. Cannon, anchors, steam-engines, etc. are made here. This town has increased rapidly in recent times. P. 23,872.

Crevasse [a French word signifying a "crevice" or "crack," from *crever,* to "burst," to "break," to "split"], a breach in the dike or embankment of a river, as in the levees of the Mississippi. Crevasses are sometimes caused by the burrowing of crawfishes and other animals, and are frequently very destructive. The name is also given to the fissures in glaciers.

Crew, in nautical language, is the company of persons employed in a ship, but the name is mostly limited to seamen and non-commissioned officers. There are upwards of eighty different grades or offices among the crew of the largest war-steamers. Besides the regular crew there are minor groups of workmen, such as the cooper's, carpenter's, sailmaker's crew, etc. In England the master of a merchant-ship, before starting on a voyage, is obliged to send a list of his crew to the customs comptroller at the port of departure, and a similar list within forty-eight hours after his return. This, however, is required of the masters of coasting vessels only twice a year. The number of hands in large sea-going steamers is relatively great, owing to the duties relating to the machinery, a steamer of a thousand tons sometimes requiring sixty or seventy hands. American ships carry smaller crews for their tonnage than those of other nations. This is regarded as a cause of many shipwrecks.

Crewe, a town of England, in Cheshire, 34 miles S. E. of Liverpool. It is a central station of five important railways, and has shops for the manufacture and repair of railway-carriages. Pop. 8159.

Crib'bage [from *crib,* as used in the game], a popular game at cards, usually played by two persons. The game is sixty-one points, which are scored with pegs on a board called a cribbage-board having sixty-one holes on each side. In the U. S. the game, when two or four play, is decided by the winning of two out of three *legs.* Where three play, the first out in a double circuit of the board is the winner. When cribbage is played by three persons a three-cornered board is used. In this case each player receives five cards, and an extra card is dealt, which is added to the crib. When four persons play each has a partner, and each receives five cards, of which he discards one to form the crib. When only two persons play, six cards are dealt to each player, and each discards two, to form what is called the *crib,* which belongs to the dealer. The pack is then cut, and the dealer turns up a card, called the *turn-up,* which is reckoned in scoring as belonging to all the hands and the crib. The cards held in the hands are then played alternately, counting the pips (for every court card ten) up to thirty-one, for which two is scored to the person playing the card that makes it, and scoring in the same way for every combination made according to any of the following rules: Any combination of cards the united pips of which make up fifteen scores two points. A sequence in rank (without regard to suit) of three or more cards scores one for each card. Two similar cards of different suits (as two fives or two knaves) form a *pair,* and score two; three form a *pair-royal,* and four a *double pair-royal,* scoring respectively six and twelve. When the cards are all played each hand is counted by itself, according to the same rules. For example, a hand containing two sevens, an eight, and a nine, with an eight turned up, would score twenty-four: four fifteens (produced by the different combinations of eight and seven) = 8; four sequences of three each = 12; two pairs = 4. If the cards in either hand, or the cards in the crib and turn-up, are all of the same suit, it is called a *flush,* and one is scored for each card. If a knave of the same suit as the turn-up be in either hand or in the crib, the holder scores one; when the turn-up is a knave the dealer scores two. During the play, when it is found impossible to count to thirty-one without passing that limit, it is called a *go,* and the last player scores one.

Crich'ton (JAMES), called THE ADMIRABLE CRICHTON, born in Perthshire in 1551 or 1560, was a son of Robert Crichton, lord advocate of Scotland. Educated at St. Andrew's, before he was twenty he had run through the entire circle of the sciences. He could speak in ten languages, and was adroit in all manly accomplishments. He journeyed through Europe about 1580, challenging all scholars to a learned disputation in any of twelve tongues. He vanquished all the doctors of all the universities; moreover, he disarmed the most famous swordsman of the time in fencing, and by his grace and manly beauty his amorous triumphs were not less distinguished. He found his death in 1583, at the hands of his pupil Vincentio, son of Gonzago, the

duke of Mantua, a dissolute youth whom he had roughly jostled in a carnival encounter. Unmasking on discovering his young opponent, he presented his sword and bared his breast, and the brutal stripling stabbed him. "He was," says Scaliger, "a man of very wonderful genius, more worthy of admiration than esteem." The stories of his accomplishments are no doubt exaggerated. (See P. F. Tytler, "Life of the Admirable Crichton," 1823.)

Crick'et [probably so called from the sound they produce], the popular name of certain orthopterous insects, nearly allied to locusts and grasshoppers, the type of the family Achetidæ. The wings, being horizontially folded, form a slender point beyond the wing-covers. In virtue of

Field Cricket.

a peculiar formation of the wing-covers, and by their friction, the males produce that stridulous sound by which these insects are so well known. Of the typical genus *Acheta* the U. S. have several species, including the common black cricket (*Acheta abbreviata*). The common American mole-cricket (*Gryllotalpa brevipennis*) has wings shorter than the mole-crickets of Europe. The mole-crickets construct chambers for their eggs beneath the surface of the earth, and the passages leading to these cells are long and tortuous, like those of the mole. The climbing crickets (*Œcanthus*) are represented in the U. S. by several species. They are often found upon weeds and shrubs.

Cricket [etymologically related to the word *crook*, it having been formerly played with a crooked stick for a bat], a sport well known as one of the national games of England, is of unknown though ancient date. It has become popular in England within the present century. It is played upon a tract of level, grassy ground, and requires players sufficient to form two sides of eleven, or twenty-two each. The variety of the game known as "double wicket" is that which is generally played, requiring two sets of wickets and bails, two bats and a ball. "Single wicket" may be played by a less number of persons. When a match is to be played, they first "pitch" the wickets, which are wooden frames of three upright sticks or "stumps" twenty-seven inches high. Two horizontal pieces of wood called "bails" are placed on the top of each wicket. The wickets are twenty-two yards apart. The players first toss for first innings, and the director of one side places a batter at each wicket; a wicket-keeper, a bowler, a "long-stop," and fielders are placed in position by the director of the other side. The object of the bowler is so to direct his ball towards the opposite wickets as to knock off the bails or strike down the stumps or upright rods, while the batter's object is to protect his wicket by stopping the ball or driving it out of the field. At a given signal the bowler delivers the first ball. If the batsman misses the ball and it passes the wicket, the wicket-keeper stops it and returns it to the bowler, who delivers another. When the batsman strikes the ball away, he runs to the opposite wicket, his companion crosses to his, and so on till the ball is returned by a fielder to the bowler or wicket-keeper. The batter may possibly have time to make two or three "runs" before the ball is returned. The scorers credit him with these runs. If the wicket-keeper or bowler touches the wicket with the ball before the batsman touches it with his bat or has reached his ground, the striker is out and another takes his place. If one of the opposite party catch a ball before it reaches the ground, or if the striker knocks down his own wicket, or if he prevent a ball from being caught, or strikes it twice, or if a ball which would have hit his wicket is stopped by any part of his person, the striker is out. The duty of the wicket-keeper is to stop with his hands the balls which the batsman misses. The long-stop stands behind him, and stops balls that escape the wicket-keeper. The fielders are posted in different parts of the ground. They must possess quickness of eye and foot, and much depends on their judgment of distance. Fielders throw the ball to the wicket-keeper, who returns it to the bowler. All change places at the end of every four bowls; every four balls are thus delivered from alternate wickets. Four balls are called an "over," and credited to the side which is in. The laws of the Marylebone Club of England are generally taken as the standard rules for this game.

Crick'lade, a town of England, in Wiltshire, on the river Isis, 7 miles S. E. of Cirencester. It consists mainly of a single street of poorly built houses. It has two antique churches. It was formerly a borough-town, but was disfranchised in 1782. Pop. in 1871, 43,552.

Crillon, de (Louis des Balbes de Berton), a famous French warrior, born in Provence in 1541. He served at the siege of Calais in 1558, and fought against the Huguenots in the civil wars. He distinguished himself at Jarnac and Moncontour, and at the naval battle of Lepanto (1571). During the reign of Henry III. he fought for that king against the Catholic League. In 1589 he entered the service of Henry IV., who styled him "the bravest of the brave." He contributed to the victory at Ivry (1590). Died 1615. (See Serviez, "Histoire du brave Crillon," 1844; Abbé de Crillon, "Vie de L. des Balbes de Berton de Crillon," 3 vols., 1826.)—A descendant of "the brave" Crillon, Louis (1718–96), was a distinguished general of the Thirty Years' war, and in the service of Spain became duke of Mahon, and commanded at the futile investment of Gibraltar in 1782.—His grandson, Duc de Mahon (1775–1832), a Spanish general, was viceregent of Navarre under Joseph Bonaparte.

Crime, any act done in violation of those duties which an individual owes to the community, and for a breach of which the law has provided that the offender shall make satisfaction to the public. The ascertainment of these duties, which society imposes upon its members for the general welfare, is derived either from the common concurrence of the moral sentiments of any community or from the enactment of specific laws defining and enforcing particular obligations. Offences against the one variety of duties are said to be *mala in se* (wrongful in themselves), while those against the other are designated *mala prohibita* (wrongful because prohibited by statute). As a general practice, however, legislative prohibition is also extended to the case of crimes which are strictly *mala in se*, both to provide against uncertainty and fluctuation of opinion and to create additional sanctions; so that the precise original distinction between the two classes is no longer preserved. The laws of England recognize a larger variety of crimes not depending upon statute than is generally the case in the American States. But even here, as a rule, there are still some offences for which the common law alone makes provision.

By the common law crimes are divided into two great classes—felonies and misdemeanors. The distinction is based upon the relative enormity of various offences. Thus, the term "felony" includes those which are of greatest magnitude, while "misdemeanor" is reserved for the residue. But nevertheless an understanding of the exact extent of meaning of these two designations can only be attained by an indirect mode of definition—viz. by showing the diversity of punishment in the respective cases. A felony was originally any crime for which the penalty might be a forfeiture of lands or goods; a misdemeanor was one which entailed a milder punishment. In some of the American States the punishments distinguishing felonies have been changed, and are now either death or imprisonment in a State prison. In others, while the common-law distinction has been discarded, no different one has been adopted to supply its place, so that the two terms are used without precision or definiteness of meaning.

In order that a person may be guilty of a crime there must be a concurrence of capacity, intent, and wrongful act. The questions of capacity and intent are, in fact, closely related, since the law adjudges a person incapable of a criminal offence only because it presumes him incompetent to form a criminal purpose. The principal causes

of incapacity are infancy and the want of mental soundness. Infancy exempts from responsibility only when children are so young as to have no acquaintance with the nature of a criminal offence. At the common law a child under seven years of age is conclusively presumed to be unable to commit a crime; between seven and fourteen, his liability depends upon his actual discretion, which must be determined in each particular instance by special proof; after fourteen, he is considered presumptively capable. The want of proper mental capacity to form a criminal intention exists in the case of idiots, lunatics, and all persons who are either permanently of unsound mind, or so deranged at the time of the commission of any wrongful act as not to be aware of its guilty character. Exactly what degree of mental alienation should be sufficient to exempt from responsibility is a matter difficult to determine. The only criterion that can generally be adopted is the wrong-doer's power of appreciation of the wrongful nature of the particular act which he committed. (See INSANITY.) Voluntary drunkenness, however, though it may confuse and disorder the moral perceptions, and produce a kind of temporary insanity as pernicious in its effects as natural aberration, affords, in general, no defence for the criminal offender. Only where a specific intent is an essential element to constitute a crime can a person intoxicated be excused for that particular offence. As a rule, the intent to drink is sufficiently culpable to make the resulting act punishable. If, however, true insanity or delirium tremens should be produced as a consequence of intoxication, and the victim of it should commit an act which if he were sane would be a crime, he will be excused. The law in that case only regards the fact of insanity, without reference to the means by which it has been occasioned. Besides these natural incapacities, which exempt from penalty, there exist certain other causes for exoneration, such as duress and coverture. Whenever an offence is not perpetrated voluntarily, but under the compulsion of force or fear, there is wanting that willing pursuit of crime which is alone a just reason for condemnation. In like manner, the stress of overwhelming necessity relieves from guilt the involuntary wrong-doer. Coverture also, or the condition of a married woman, exempts from liability in some instances, because her action is considered to have been occasioned by constraint exerted by her husband. Thus, all crimes committed by a wife in the presence of her husband, except some of a graver class, as treason, murder, robbery, and the like, are presumed to be done by coercion. This presumption is not a conclusive one, but relieves a married woman from any consequence of her action until rebutted by direct evidence that the crime was exclusively of her own commission. This mode of justification by alleging constraint only applies to married women. Servants and children are not excused, though acting under the command of masters or parents.

The necessity for the existence of a criminal intent in order to make a person responsible for his wrongful acts forms an important distinction between criminal and civil liability, for in civil cases intent need not generally be proved. It has always been a well-recognized maxim in criminal jurisprudence that "the act does not make a man guilty unless his purpose also be guilty." But the intention need not necessarily contemplate the commission of the particular consequence which results. In most instances, of course, the act done will be the specific act intended. But yet, if there be a purpose to perpetrate one crime, and the means used for its accomplishment unexpectedly result in a different offence or affect a person against whom they were not directed, there is still a sufficient connection of intent and act to warrant a holding to accountability. Thus, if a man intends to shoot A and his act results in the death of B, whom he did not intend to injure, he is nevertheless responsible, as though he had actually intended to kill B. This principle, however, is not in all its rigor applicable when the crime committed is strictly in the class of *mala prohibita*, for the original purpose is not then deemed sufficiently reprehensible. A still different case arises where the preconceived intention had reference to the specific act performed, but did not include knowledge of its criminality, as where a person shoots game at a certain season when it is prohibited, without being aware that he is violating the law. In this class of instances it is likewise true that all the necessary elements of a crime are sufficiently present to justify punishment. The principle is, that ignorance of the law must afford no excuse. If such were not the rule, all laws would be ineffective, for would-be offenders would be likely to abstain from examining their provisions, and thereby secure impunity. The accompaniment of intent and act, therefore, which will constitute criminal transgression, may occur in three different forms: First, the intent may be wrongful, and contemplate the very offence committed; second, the intent may be wrongful, but contemplate another offence than the one committed; third, the intent may be really innocent, but contemplate an offence which happens to be prohibited by law, and so criminal.

There are some cases in which, though no actual criminal intent is conceived, yet the law presumes its existence. When acts are characterized by such a degree of negligence or carelessness as to evince a culpable indifference whether wrong is done or not, the wanton disregard of commonly recognized duties is essentially criminal of itself. But if an unlawful act is committed, through mere accident or misfortune, in the prosecution of some legitimate undertaking, the unwitting offender is excused. In like manner, though ignorance of law affords no justification, ignorance of fact, where no reasonable opportunity is granted for acquiring correct information, is a valid excuse. The law may always be known when the facts cannot be ascertained. "The guilt of the accused," it has been said as to these matters of fact, "must depend on the circumstances as they appear to him."

The necessity that an act must concur with the intent depends upon the principle that no mere mental conception or fancy, no matter how reprehensible morally, can ever be taken cognizance of at law without some overt expression of it in an objective result.

The parties engaged in the commission of crimes are distinguished either as principals or accessories. A principal in the first degree is one who is the actual, direct perpetrator of the offence. A principal in the second degree is one who is present, aiding and abetting the act to be done. An accessory is a participant in the wrong-doing in some more remote manner, either by procuration or assistance before the act, or after its occurrence by sharing in the profits acquired or shielding the immediate offenders from justice. In the one case he is called an accessory before the fact; in the other, an accessory after the fact. This distinction between principals and accessories is maintained only with reference to felonies, and even among these an exception is made of the crime of treason. There is no accessory before the fact in the common-law crime of manslaughter, for in it there is no preconceived intent to kill. In treason and in misdemeanors all the participants are deemed principals; in the one case, from the enormity, and in the other from the comparative triviality, of the offence. Where the distinction is preserved there is no reason for diversity of punishment as between principals and accessories before the fact. Accessories after the fact are not so severely punished, as their offence consists in an attack on the administration of justice. A wife is excused for thus shielding her husband. It was formerly the rule that the accessory could not be brought to trial before the principal, but this doctrine has been quite generally changed by statute.

The various crimes which may be committed are classified by legal writers in different ways. Blackstone in his Commentaries treats them as either offences against morals and religion or the law of nations, or as against the existence of the government or state, such as treason, or against public order under the respective titles of public justice, public peace, public trade, public health or economy, and finally, against individuals. These last are subdivided into those which are committed against the person, against habitations, and against property. This classification is incomplete, and no place can be found in it for certain well-established crimes, particularly those which have been created by statute. The most satisfactory treatment of the subject is that adopted by Mr. Bishop, who discusses the general principles of law governing crimes, and then considers specifically each crime known to the law under an alphabetical arrangement. It should be noticed that the criminal law of the Federal government is wholly created by statute, Congress having enacted so-called "Crime Acts." Under the State governments the common law of crimes exists unless changed by statute. It will be impossible in this brief notice to do more than to refer to some of the leading crimes, which are considered under their respective titles: ARSON, BRIBERY, BURGLARY, CHAMPERTY, CHEATING, EMBEZZLEMENT, FALSE PRETENCES, FORGERY, GAMING, LARCENY, LIBEL, MAYHEM, PERJURY, PIRACY, POLYGAMY, RAPE, RIOT, ROBBERY, TREASON, USURY. For punishment of crimes, see PUNISHMENT.

In this brief account only the common-law doctrine of crimes could be considered. Upon this may be further consulted BLACKSTONE'S "Commentaries," book iv.; BISHOP "On Criminal Law;" BISHOP "On Criminal Procedure;" WHARTON'S "American Criminal Law;" RUSSELL "On Crimes;" HALE, "Pleas of the Crown;" HAWKINS, "Pleas of the Crown;" EAST, "Pleas of the Crown;" and FOSTER'S "Crown Law." The statutes of the States severally should also be referred to. Upon the general subject of criminal offences may be consulted ORTOLAN'S "Droit Penal;" BECCARIA "On Crimes;" MITTERMAIER "On Capital Punishment," etc.

T. W. DWIGHT.

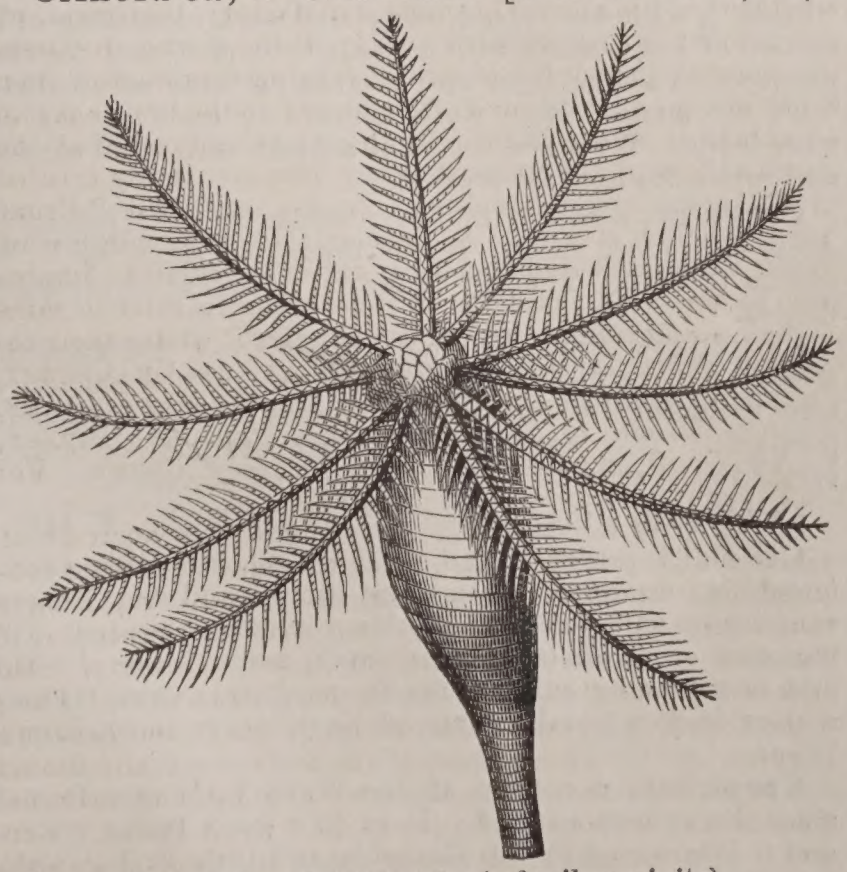
Crime'a, The [Russ. *Krim;* anc. *Taurica Chersonesus*], a peninsula of Southern Russia, forms part of the government of Taurida, and is nearly surrounded by the Black Sea and the Sea of Azof. It is connected with the main land by the isthmus of Perekop, 5 miles broad. Its length E. and W. is nearly 200 miles, and its area 7654 square miles. Pop. about 200,000. The north-western part of the Crimea is a treeless plain, the soil of which is impregnated with salt and fit only for pasturage. The south-eastern part is occupied by wooded mountains and fertile valleys, but they are ill cultivated. The highest peak of these mountains is 5180 feet above the level of the sea. Among the productions are grain, grapes, olives, silk, honey, and wine. Many horses and cattle are reared here, and salt is exported. The chief towns are Simferopol, Sevastopol, and Baktshi-Serai. The majority of the population are Tartars. It was conquered in the thirteenth century by the Tartars, who converted it into the khanat of Krim Tartary. It was annexed to Russia in 1783.

Crimean War, so called because it was chiefly waged in the Russian peninsula of the Crimea. It was carried on by France, Great Britain, Turkey, and Sardinia, against Russia. The motive of the allies was partly to check the growing power and encroachments of Russia, and to prop up the tottering throne of the Turkish sultan. One cause of the war was the claim of Russia to be the protector of the Greek Church in Turkey. After ineffectual negotiations between Russia and the Ottoman Porte, the Russian army entered the principalities in July, 1853, and war was declared by the sultan in October of that year. Early in Jan., 1854, the French and English fleets entered the Black Sea, and these allied powers announced to the czar Nicholas that their combined fleets must have command of that sea. A treaty of alliance between France, England, and the Porte having been signed Mar. 12, the former two powers declared war Mar. 27 and 28. The French and English fleets bombarded Odessa April 22. Lord Raglan took command of the British army, and Marshal Saint-Arnaud of the French. The allied armies landed at Varna May 29, and there suffered severely from cholera. The allies moved their armies to the Crimea early in September, and defeated the Russians at the river Alma on the 20th of that month. Prince Mentchikof commanded the Russian army. The allies commenced the bombardment of Sevastopol Oct. 17, fought a battle at Balaklava Oct. 25, and gained a victory at Inkerman Nov. 5. The British troops, being ill supplied with food and clothing, suffered great privations and hardships in the ensuing winter, and large numbers of them perished. The king of Sardinia joined the allies in Jan., 1855. In May, General Pélissier became commander-in-chief of the French army. On June 18 the allies attacked the important fortresses known as the Malakoff and the Redan, but were repulsed. The French took the Malakoff by storm Sept. 8, and the Russians evacuated Sevastopol about the 9th of that month. An armistice was concluded Feb. 26, 1856, and after the belligerents had met in conference at Paris, a treaty of peace was signed in that city Mar. 30, 1856.

Criminal Law. See LAW, by PROF. T. W. DWIGHT.

Crim'mitschau, a town of Saxony, on the Pleisse and on the railway from Altenburg to Zwickau, 10 miles N. W. of the latter. It has manufactures of woollens and a number of machine-works and breweries. Pop. 15,280.

Crinoid'ea, or **Crinoideæ** [from the Gr. *κρίνον,* a "lily," and *εἶδος,* "appearance"], an order or family of radiated animals of the class Echinodermata. As fossils they are sometimes called stone-lilies, having a radiated, lily-shaped disk supported on a jointed stem. When this stem is cylindrical, the species are termed encrinites; when it is pentagonal, they are called pentacrinites. The recent species of Crinoidea are few, but the extinct species are so numerous that their fossils constitute the greater part of extensive strata of limestone. The Burlington limestone contains a great variety of beautiful crinoids.



Apiocrinites trigintidactylus (a fossil encrinite).

Crin'oline [from the Lat. *crinis,* "hair"], a name first given by the French to a fabric of horse-hair used in ladies' dress. It is now applied generally to structures of steel wire called "hoops," and used for the same purpose—that of distending the skirts. This was called *fardingale* in the time of Elizabeth. In 1744 hoops were so large that a woman occupied the space of six men. In 1796 they had been discarded in private life, but were worn at court until the time of George IV., who abolished them. Hoops have reappeared since 1850; they are made of steel wires covered with cotton thread, and form a skirt which varies in size and shape according to the changes of fashion.

Cri'osphinx [from the Gr. *κριός,* a "ram"], a term applied to images, found in Egypt, of sphinxes having a ram's head instead of a human head. The latter are termed *androsphinxes.*

Cris'field, a post-village of Somerset co., Md., on the Little Annemessex River, and at the southern terminus of the Eastern Shore R. R., 19 miles S. by W. of Princess Anne. It has a tri-weekly steamboat connection with Norfolk, Va. It has two weekly newspapers.

Cri'sis [Gr. *κρίσις,* a "determination," from *κρίνω,* a "judge," to "decide"], a term which is used by physicians to denote the sudden determination of disease towards recovery or towards death. The doctrine of crises is connected with that of a *materies morbi,* or material of disease, in the blood. A doctrine associated with that of crises is the belief in certain days as showing characteristic symptoms, sometimes prognostic of recovery or death. This old belief seems to have had a certain foundation in the facts observable in clinical medicine. The doctrine of crises and of a *materies morbi* is still sometimes taught. A sudden discharge of any suppressed secretion is called a critical discharge when occurring about the turning-point of the disease.

Cris'pi (FRANCESCO), an Italian statesman, born Oct. 4, 1819, at Ribera, became a lawyer in Naples, was in 1848 one of the heads of the insurrection in Palermo, and for two years one of the leaders of the Sicilians in their resistance to Ferdinand I. In 1859 and 1860 he was again at the head of the new revolution of Sicily, and co-operated with Garibaldi in the expulsion of the Bourbons, which caused the annexation of Naples and Sicily to the kingdom of Italy. He led in 1861 the constitutional opposition.

Cris'pin, SAINT, a native of Rome, is supposed to have worked at the trade of a shoemaker in Gaul. According to the legend, he was so benevolent that he stole leather to make shoes for the poor. In 287 A. D. he and his brother Crispinian suffered martyrdom. He is the patron saint of shoemakers. St. Crispin's Day is October 25.

Crispin, Knights of Saint, a secret society among shoemakers, founded in 1866 in Milwaukee, Wis., numbered in 1870 about 100,000 members in 300 lodges. They have an organization similar to that of the Free Masons and other secret orders. All the lodges of one State are under the jurisdiction of a State grand lodge, while the latter is subordinate to the U. S. grand lodge. The object of the order is to protect the interests of the workingmen against employers, to regulate the wages, and to establish special funds in support of the members of the order and their families in case of sickness and death. There is also an order of the "Daughters of Saint Crispin," embracing women employed in the manufacture of shoes and boots.

Crit'ias [Κριτίας], an Athenian orator and one of the Thirty Tyrants, was a pupil of Socrates. He was banished from Athens about 406 B. C., but he returned with Lysander the Spartan in 404, and then became one of the ruling body called Thirty Tyrants. He caused the death of Theramenes. He was killed in a battle by the army of Thrasybulus in 404 B. C.

Crit'ic [Gr. *κριτικός* (from *κρίνω,* to "judge"); Lat. *criticus;* Fr. *critique;* Ger. *Kritiker*], literally and strictly, "[one] fit or competent to judge;" but the term is applied in common parlance to any one who takes upon himself to judge of works of literature, art, etc.—in short, of anything which requires the exercise of the judging, and particularly of the æsthetic, faculty. To *judge* and *condemn* appear to be considered by many as the principal part of the office of a critic. But he who is really "fit to judge"

will be no less able nor less willing to discover beauties, if they exist, than point out defects. It may indeed be the more frequent duty of a true critic to blame than to praise, because works of genuine merit are exceptions to the general rule; nevertheless, it is unquestionably a rarer, as it is a higher and nobler, office to appreciate and do justice to the various kinds and shades of excellence, than simply to condemn what merits condemnation.

Of all the critics of antiquity, the greatest beyond comparison was undoubtedly Aristotle. Aristarchus, who is often styled "the prince of critics," was more properly a grammarian and commentator than a critic, in the wider modern acceptation of this term. Among the Romans, Quintilian was especially distinguished as a critic, but the poet Horace was a critic of a higher and rarer order.

In modern times the greatest names in general criticism among the English are those of Dryden, Pope, Doctor Johnson, S. T. Coleridge, Hazlitt, Mackintosh, and Hallam; to which may be added those of Lords Jeffrey, Brougham, and Macaulay; and lastly that of Carlyle, who, if too often extravagant and wayward, is perhaps, when not biassed by pique or prejudice, not surpassed by any in breadth of comprehension or truth of insight. Among the French the most celebrated names are those of Boileau, Voltaire, Villemain, Sainte-Beuve, and Taine. The literature of Germany is rich in illustrious critics; among the greatest of these, in the department of general criticism, are Lessing, Goethe, and the two Schlegels. It is proper to observe that the Germans have studied the great principles which lie at the base of all sound criticism (*i. e.* the art or science of judging) more philosophically and more thoroughly than the critics of other nations. But it is perhaps in particular criticism that the Germans are most distinguished. Among the most remarkable examples of this kind we may cite Kant in the department of philosophy, Winckelmann in art, and Niebuhr in history, besides a host of other less distinguished names.

Crit'icism [for etymology, see CRITIC] signifies both the act and the art of criticising. In its latter signification it has been defined as "the art of judging with propriety concerning any object or combination of objects." In a more limited meaning its province is confined to literature, philology, and the fine arts, and to subjects of antiquarian, scientific, and historical investigation. The elements of criticism depend on the two principles of beauty and truth, one of which is the final end or object of study in every one of its pursuits—beauty in letters and the arts, truth in history and the sciences. Thus, historical criticism teaches us to distinguish the true from the false or the probable from the improbable in historical works; scientific criticism has the same object with respect to the different branches of science; while literary criticism, in a general sense, has for its principal employment the investigation of the merits and demerits of design, style, or diction, according to the general principles of composition and to the received standard of excellence in every language. In poetry and the arts, criticism develops the principles of that more refined and exquisite sense of beauty which forms the ideal model of perfection in each.

Cri'to, or **Cri'ton** [Κρίτων], a Greek philosopher, was a citizen of Athens, and a friend and disciple of Socrates, whom he attended in his last hours. He wrote seventeen dialogues on philosophy, which are not extant. Plato gave the name of "Crito" to one of his books.

Critola'us [Κριτόλαος], a Greek philosopher, born at Phaselis, in Lycia. He was the head of the Peripatetic school in Athens, and was eminent as an orator as well as a philosopher. He was sent to Rome on an important embassy with Carneades about 155 B. C.

Crit'tenden, a county in the E. of Arkansas. Area, 750 square miles. It is bounded on the E. by the Mississippi River, and on the S. W. by the St. Francis. The surface is mostly level; the soil is alluvial and fertile, except the swamps. Cotton, grain, and hay are raised extensively. It is intersected by the Memphis and Little Rock R. R. Capital, Marion. Pop. 3831.

Crittenden, a county in the W. of Kentucky. Area, 420 square miles. It is bounded on the N. W. by the Ohio River, and on the N. E. by the Tradewater. The surface is undulating or nearly level; the soil is fertile. Cattle, wool, grain, and tobacco are produced. Here are mines of coal, iron, and lead. Capital, Marion. Pop. 9381.

Crittenden, a township of Champaign co., Ill. Pop. 870.

Crittenden, a post-village of Grant co., Ky. P. 295.

Crittenden (GEORGE B.), GENERAL, a son of the following, was educated at West Point, began to practise law in Kentucky in 1835, served with distinction in the Mexican war, resigned his commission of lieutenant-colonel in the U. S. army in 1861, and joined the Southern Confederacy. He became a major-general, was defeated at Mill Spring, Ky., Jan. 19, 1862, was kept in arrest by the Confederates till Nov., 1863, and soon after resigned.

Crittenden (JOHN JORDON), an American statesman, born in Woodford co., Ky., Sept. 10, 1786. He studied law, which he practised with distinction, and was elected to the Senate of the U. S. for a short term in 1817. Having passed about sixteen years in private life, he was re-elected to the national Senate by the Whigs in 1835 for a term of six years. He was a personal and political friend of Henry Clay. In Mar., 1841, he was appointed attorney-general of the U. S., but he resigned in September of that year. He was again elected a Senator of the U. S. in 1843, and was chosen governor of Kentucky in 1848. He was attorney-general in the cabinet of President Fillmore from July, 1850, to Mar., 1853, soon after which he joined the Native American party. In 1855 he again became a U. S. Senator. He opposed the secession movement in 1860–61, and, performing the part of a mediator, offered in the Senate a series of resolutions called the "Crittenden Compromise," which were not adopted. Died July 26, 1863.

Crittenden (THOMAS LEONIDAS), an American general, a son of the preceding, was born at Russellville, Ky., in 1819. He served with honor in the Mexican war. He commanded a division of the Union army at Shiloh, April, 1862, and obtained the rank of major-general of volunteers in the summer of that year. He commanded a corps at the battle of Stone River, which ended Jan. 2, 1863.

Croatan', a township and post-village of Craven co., N. C. Pop. 656.

Croa'tia, a province of the Austro-Hungarian monarchy, is bounded on the N. W. by Carniola and Styria, on the W. by the Adriatic Sea, on the N. E. by Hungary, and on the S. by Turkey and Slavonia. On the seaboard the olive grows, but in the mountainous regions the snow lies eight months. The Julian Alps, which occupy the entire midland, are of limestone formation, are mostly covered with forests, and contain many caverns. The principal rivers are the Save, the Drave, and the Kulpa. Among the chief articles of export are grain, wine, and chestnuts. Capital, Agram. Of the inhabitants, 94.55 per cent. are Croats and Servians, 2.76 per cent. Germans, 1.38 per cent. Magyars; the remainder are Israelites, Italians, and Albanians. Croats and Servians are two Slavic tribes which speak the same language, though the former use the Latin and the latter the Cyrillic alphabet. About 60 per cent. of the population are Roman Catholics, 33 per cent. belong to the Oriental Greek Church; the remainder are Protestants and Jews. This region was anciently inhabited by the Pannonians, who were conquered by the Romans in the reign of Augustus. In 640 A. D. the Croatians or Horvats migrated from the Carpathian Mountains to this country, and gave it the name of Croatia. For several centuries Croatia was an independent kingdom, until in 1097 it was conquered by the king of Hungary. This province, with Slavonia, now forms a division of the Hungarian kingdom (*Transleithania*). Their united area is 8873 square miles. Pop. in 1869, 1,168,037, inclusive of the city of Fiume, which is placed under the immediate control of the Hungarian ministry.

Crochet, kro'shā [a diminutive of the Fr. *croche,* a "hook"], a kind of thread or worsted work consisting of a system of loops made with a small hook designed for the purpose. Various light and elegant patterns of crochet-work are made. Open work is made by omitting one or more loops. Wool and cotton of a great variety of shades and colors are used for crochet.

Crock'er, a county of Iowa, bordering on Minnesota. Area, 432 square miles. It was organized since the U. S. census of 1870. The soil is fertile. Capital, Greenwood Centre.

Crock'ery [from the Anglo-Saxon *croc;* Old English, *crock,* an "earthen vessel," a "pot or jar"], a collective term including all kinds of earthenware used for household purposes. The principal kinds are common or coarse earthenware, stoneware, queensware, and porcelain.

Crockery, a township of Ottawa co., Mich. P. 1125.

Crock'et [allied to the word *crook*], in Gothic architecture, an ornament resembling curved and bent foliage running up on the edge of a gable, pinnacle, or spire. The varieties of crockets are numerous, many kinds of leaf and flower being imitated for the purpose. Crockets only appear in pyramidal or curved lines, never in horizontal lines.

Crock'ett, a county of the W. of Tennessee, formed since the census of 1870. It is in a good cotton region, and is intersected by the Memphis and Ohio R. R. Capital, Alamo.

Crockett, a township of Arkansas co., Ark. Pop. 637.

Crockett, a city, capital of Houston co., Tex., on the line of the International and Great Northern R. R., at the centre of the county. It has an active trade and is very thriving. Here are four churches, a male and female seminary, and a weekly newspaper. Pop. 538.

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Crockett (DAVID), a famous American hunter and humorist, born in Tennessee Aug. 17, 1786. He was elected a member of Congress in 1827, 1829, and 1831, and was a political friend of General Jackson. His habits were eccentric. He enlisted in the Texan army in revolt against Mexico, was taken prisoner at Fort Alamo, and massacred Mar. 6, 1836.

Croc'odile [Gr. κροκόδειλος, a "lizard" or "crocodile;" Lat. *crocodilus*], a genus (*Crocodilus*) of saurian or rather

Nilotic Crocodile.

loricate reptiles, which gives its name to the family Crocodilidæ, other genera of which are also called crocodiles. Like most reptiles, the crocodiles are carnivorous, and owing to their great size, strength, and voracious habits, they are the dread of the countries which they inhabit. They have bony plates embedded in the skin, which form a strong armor. They are called Emydosauri, or tortoise-lizards. Some authors term them Loricata, or mailed reptiles (from the Latin *lorica*, a "coat of mail"). They are capable of walking on land, but are much better fitted for the water. They are furnished with elevated nostrils at the extremity of the skull, so that they can almost wholly conceal themselves in water while breathing the air. The water does not enter the throat, which closes like the valves of the heart. The ears are also guarded by tightly-closing valves. The young crocodiles are hatched from eggs strangely small in proportion to the size of the adult animal, being less in size than the eggs of the goose.

These great reptiles are divided into two families—the true crocodiles and the alligators. They are easily distinguished by the shape of the head, the muzzle of the crocodiles being narrow behind the nostrils, while that of the alligator forms a straight line; and there are other anatomical distinctions. The gavial, or Gangetic crocodile (*Gavialis Gangeticus*), is one of the largest of its order, sometimes being thirty feet long. It has an extraordinary length of muzzle, which gives it a grotesque aspect. It has one hundred and twenty teeth, of similar appearance and equal length. Its color is a dark olive-brown, with black spots. The crocodile of the Nile (*Crocodilus vulgaris*), now seldom seen below the first cataract, is a most formidable animal. Living exclusively on animal food, and preferring tainted meat, it is useful in purifying the waters. It also feeds on fish, and is a dangerous foe to cattle and other animals. It is nearly as large as the former species. The Indian crocodile (*Crocodilus porosus*) is an Asiatic species; it is sometimes called the double-crested crocodile, because the head has two long ridges extending from the front of the eye over the upper jaw. This is never found except in low lands with still water. It is very common in Ceylon. The marsh crocodile (*Crocodilus palustris*), frequently called mugger or goa, has a large range of locality, and sometimes grows to a great length; in the British Museum is a skull twenty-six inches long, denoting a total length of thirty-three feet. It is found in Asia, and is said to occur in Australia. Another species is the American crocodile (*Crocodilus acutus*), often confounded with the alligator. This is found in the hotter portions of America, and occurs in the U. S. It makes a hideous noise at night, so that one unaccustomed to it has no chance of sleep. The margined crocodile (*Crocodilus marginatus*) inhabits the rivers of Southern Africa. It is distinguished from the Egyptian crocodile by the great concavity of the forehead and stronger dorsal plates. Several other living species are known. Many fossil species have been found, especially in the U. S. (See ALLIGATOR, CAYMAN, GAVIAL.)

Cro'cus [Gr. κρόκος, "saffron"], a large genus of iridaceous plants (herbs) native of Asia and Europe. The *Crocus vernus* and other species are well known as affording many varieties of very early spring flowers which are common in cultivation. *Crocus sativus* and other species blossom in autumn. The autumn crocuses are rarely cultivated in the U. S. Their orange-red stigmas, when dried, constitute the drug known as "true" SAFFRON (which see).

Crocus of Mars, a name given to the finely-divided red oxide of iron, used in medicine and in the arts. The "crocus of antimony" of the old chemists was a mixture of the tersulphide and teroxide of antimony. The "crocuses" received their name from their saffron color.

Crœ'sus [Gr. Κροῖσος], a king of Lydia proverbial for his riches, was born about 590 B. C. He succeeded his father Alyattes in 560, and soon extended his dominions by the conquest of the Æolians, Ionians, and other peoples of Asia Minor. Sardis was the capital of his kingdom. He is said to have enriched himself by the golden sand of Pactolus. In 546 B. C. he was defeated in battle and taken prisoner by Cyrus of Persia, who treated him with generosity.

Croetan', a township of Dare co., N. C. Pop. 255.

Croft (WILLIAM), an English composer of cathedral music, was born in Warwickshire in 1677. He was appointed composer to the chapel-royal and organist of Westminster Abbey in 1708. He composed "Divine Harmony" (1712) and "Musica Sacra" (1724). Died Aug. 14, 1727.

Cro'ghan, a township and post-village of Lewis co., N. Y. The village is about 50 miles S. of Ogdensburg. The township has manufactures of lumber, leather, etc. Total pop. 2433.

Croghan (GEORGE), an inspector-general of the U. S. army, born in Kentucky Nov. 15, 1791. He served as volunteer aide in the battle of Tippecanoe 1811; was appointed captain in the Nineteenth Infantry 1812, major 1813, lieutenant-colonel 1814, and inspector-general, with the rank of colonel, 1825. He distinguished himself at the defence of Fort Meigs and sortie May 15, 1813, and for his gallant conduct in the defence of Fort Stephenson, against a greatly superior force of British and Indians, he was presented by Congress with a gold medal with suitable emblems and devices. Died Jan. 8, 1849, at New Orleans.

Cro'ker (JOHN WILSON), a writer and politician, born at Galway, in Ireland, Dec. 20, 1780. He was elected a Tory member of Parliament in 1807. He co-operated with Scott and others in founding the "Quarterly Review," to which he contributed many roughly satirical reviews. In Parliament he obstinately opposed the Reform Bill. Among his works are "Songs of Trafalgar" and an edition of Boswell's "Life of Johnson" (5 vols., 1831). Died Aug. 10, 1857.

Croker (THOMAS CROFTON), a popular Irish writer, born at Cork Jan. 15, 1798. He obtained a clerkship in the admiralty at the age of twenty-one, and retained that position until 1850. He published, besides other works, "Researches in the South of Ireland" (1824), "Fairy Legends and Traditions" (1825), "Legends of the Lakes" (1828), and "My Village" (1832). Died Aug. 8, 1854.

Cro'ly (GEORGE), LL.D., a poet, prose-writer, and pulpit-orator, born in Dublin, Ireland, in Aug., 1780. He took orders in the Anglican Church, and became in 1835 rector of St. Stephen's, Wallbrook, London. Among his works are "Salathiel, a Story of the Past, Present, and Future" (1827); "History of George IV." (1830); "Poetical Works" (2 vols., 1830); "Catiline, a Tragedy," which was praised in "Blackwood's Magazine;" a "Life of Edmund Burke" (1840); and "Marston," a novel (1846). Died Nov. 24, 1860.

Crom'arty, a county of Scotland politically connected with Ross (which see), and comprising nine detached districts inside that county. Area, 344 square miles.

Crom'arty, a town and seaport of Scotland, in the united counties of Ross and Cromarty, is finely situated at the entrance of Cromarty Frith, 18 miles N. N. E. of Inverness. It has a good harbor, which will admit vessels of 400 tons; also manufactures of ropes, sailcloth, and sacking. Hugh Miller was born here. Pop. in 1871, 1476.

Cromarty Frith, a landlocked inlet of the North Sea, in the N. E. part of Scotland. It communicates with Moray Frith, and is adjacent to the counties of Ross and Cromarty. It is 18 miles long, varies in width from 3 to 5 miles, and forms a noble harbor, in which the largest fleet could ride safely. The entrance to this frith is a strait 1½ miles wide.

Cro'mer, a small seaport and watering-place of England, in Norfolk, and on the North Sea, 21 miles N. of Norwich. It stands on the top of a high cliff. It has a fine church in the Tudor style and a public library. All attempts to form a harbor here have been baffled by the heavy sea, which is continually encroaching on the land. Cromer Bay is dangerous to navigators, and is called by sailors "The Devil's Throat."

Cro'mers, a township of Newberry co., S. C. P. 2224.

Crom'lech [said to signify in Welsh a "bent or concave stone"], or **Dolmen,** a rude structure of two or more unhewn stones fixed vertically in the ground, and supporting a large flat stone placed in a horizontal position. Cromlechs are found in England, Wales, Ireland, France, Germany, Denmark, Hindostan, and other countries. The theory of the older antiquaries was that the cromlech was a Druidical altar, but the skeletons and other remains which have been found in many of them tend to confirm the opinion that cromlechs were originally the sepulchral monuments of some now forgotten race. In many instances cromlechs have been discovered in the interior of earthen mounds or barrows. Among the remarkable cromlechs in England are Kit's Coty House in Kent and Chun Quoit in Cornwall. The weight of the flat stone in the latter is estimated at twenty tons.

Cromp'ton (SAMUEL), inventor of the spinning-mule, was born near Bolton, in Lancashire, England, Dec. 3, 1753. Farming and weaving were the employments of his boyhood. For his invention, which was perfected in 1779, he received, in subscriptions from the manufacturers, only £67 6*s.* 6*d.* Parliament in 1812 voted him £5000. He was a shy, sensitive, studious man, fond of mathematics and of music. Died at Bolton June 26, 1827. (See FRENCH, "Life of Crompton," 1859.)

Crom'well, a township and post-village of Middlesex co., Conn. The village is on the Connecticut Valley R. R., 12½ miles S. of Hartford. The town has quarries of brownstone. Total pop. 1856.

Cromwell, a post-village of Douglas township, Union co., Ia. Pop. 166.

Cromwell, a township of Huntingdon co., Pa. Pop. 1380.

Cromwell (HENRY), a younger son of Oliver, was born at Huntingdon Jan., 1628. He served as colonel under his father in Ireland in 1649, became a member of Parliament in 1653, and lord deputy of Ireland in 1657. His administration was moderate and popular. After 1659 he lived as a private citizen. Died in 1674.

Cromwell (OLIVER), lord protector of England, was born at Huntingdon April 25, 1599. He was a son of Robert Cromwell and a grandson of Sir Henry Cromwell. In 1616 he entered Sidney Sussex College, Cambridge, which he quitted on the death of his father, in June, 1617. He married Elizabeth Bourchier in 1620, and settled on his estate at Huntingdon. In the short Parliament of 1628 he made but one speech, and during the eleven years prorogation he devoted his time to the cultivation of his farms. He represented Cambridge in the Short Parliament, which met in April, 1640, and in the Long Parliament, which met the same year. He was then a zealous member of the Country party, and took an active part in the business of the House, but was not a fluent speaker. Once, when he rose to address the house, Lord Digby inquired of Hampden (who was Cromwell's first cousin), "Who is that sloven?" Hampden replied that it was Oliver Cromwell, and added, "That sloven whom you see before you has no ornament in his speech; but if we should ever come to a breach with the king, that sloven, I say, will be the greatest man in England." Having raised two companies of volunteers, he entered the army of the Parliament in 1642 as a captain of cavalry, and distinguished himself by his strict discipline. He soon became a colonel, and formed a body of fanatical soldiers, the redoubted "Ironsides." On the 2d of July, 1644, he commanded the victorious left wing at Marston Moor. The Parliamentarians were divided into two parties, Presbyterian and Independent, of which latter Cromwell was the master-spirit. He was excepted from the "Self-Denying Ordinance," which excluded from military command members of Parliament. When the army was reorganized, and Fairfax appointed general-in-chief, Cromwell was promoted to the rank of lieutenant-general. In command of the right wing at Naseby, June, 1645, he greatly contributed to that decisive victory. In May, 1646, the king surrendered himself to the Scottish army, which transferred him to the custody of the English Parliament, in which the Presbyterians had a majority. In June, 1647, the king was seized by one of Cromwell's officers, and removed from the custody of Parliament into that of the army, which the Independents controlled. Charles hoped to profit by the dissensions between the Presbyterians and the Independents, and intrigued with both. Cromwell defeated the duke of Hamilton, who commanded an army of Scottish royalists, at the battle of Preston Aug., 1648. In December of that year forty-one Presbyterian royalists were ejected from Parliament by Colonel Pride, acting under the orders of Cromwell. This was called "Pride's Purge." Cromwell was a member of the court which tried the king and condemned him to death in Jan., 1649. Cromwell was now the most powerful man in the country, and became a member of the new council of state. In 1649 he went to Ireland as lord lieutenant with an army, and subdued the rebellious Irish royalists with extreme severity. The Scotch proclaimed Charles II. as their king, and raised an army for the invasion of England and the promotion of the royal cause, Cromwell, who had returned to England in May, 1650, was then appointed commander-in-chief. He signally defeated the Scottish army at Dunbar on the 3d of Sept., 1650, and took about 10,000 prisoners. Charles II., having been reinforced, marched into England, and was pursued by Cromwell, who gained a decisive victory at Worcester Sept. 3, 1651. In this great crisis he displayed eminent vigor and sagacity. Clarendon observes that "his parts seemed to be raised, as if he had concealed his faculties until he had occasion to use them." In April, 1653, he dissolved the remnant of the Long Parliament, which was called the Rump, and he soon summoned a new Parliament. He assumed the title of Lord Protector of the Commonwealth in 1653. His domestic policy was favorable to religious liberty and conducive to the prosperity of the country. His foreign policy was dignified and enlightened, and secured for England a more commanding position than she had previously occupied. The title of king was offered to him by Parliament, but he declined it. He was stigmatized as an usurper by the royalists, and also by the republicans. He died on the 3d of Sept., 1658, and was succeeded by his son Richard.

It was long the fashion for historians to represent Cromwell as a fanatic, a hypocrite, and a man of cruel temper and mediocre talents. His character has been vindicated from these calumnies by Carlyle and other recent writers, and it is now generally admitted that as a statesman and commander he displayed abilities of the highest order. "Never," says Macaulay, "was any ruler so conspicuously born for sovereignty. The cup which has intoxicated almost all others sobered him. His spirit, restless from its buoyancy in a lower sphere, reposed in majestic placidity as soon as it had reached the level congenial to it. Rapidly as his fortunes grew, his mind expanded more rapidly still. Insignificant as a private citizen, he was a great general; he was a still greater prince." (See CARLYLE, "Letters and Speeches of Cromwell;" JOHN FORSTER, "Life of Cromwell" in his "Statesmen of the Commonwealth of England," 7 vols., 1840; R. SOUTHEY, "Life of O. Cromwell," 1844; VILLEMAIN, "Histoire de Cromwell," 1819.)

Cromwell (RICHARD), a son of the preceding, was born at Huntingdon Oct. 4, 1626. He entered Lincoln's Inn as a student of law in 1647, and married Dorothy Major in 1649. He was a man of moderate capacity, virtuous and unambitious. After Oliver became Protector, Richard was elected to Parliament, and was a member of the privy council. He succeeded his father as Protector in Sept., 1658, but the army was disaffected, and he was not earnestly supported by the people. He resigned his power in April, 1659, and passed the rest of his life in obscurity and peace. Died in 1712.

Cromwell (THOMAS), earl of Essex, an English courtier and minister of state, was born at Putney about 1490. He became an agent of Cardinal Wolsey, who employed him in important business. Soon after the fall of Wolsey he entered the civil service of Henry VIII., whose favor he gained. He promoted the Reformation by his strenuous efforts to destroy the supremacy of the pope, and co-operated with his friend Cranmer in establishing a new ecclesiastical polity. In 1534 he was appointed principal secretary of state, and about a year later vicar-general with power to suppress monasteries. He was for several years the most powerful subject in England, and was created earl of Essex in 1539. He was a man of superior talents, but is said to have been unscrupulous and rapacious. Froude, however, defends him against these imputations, and gives him a high character. He promoted the marriage of Henry VIII. with Anne of Cleves, because she favored the Lutheran doctrines. His agency in this affair was conducive to his own ruin, for the capricious king regarded her with disgust. Cromwell was tried for treason, and was beheaded July 28, 1540. (See MICHAEL DRAYTON, "Historie of the Life and Death of Lord Cromwell," 1609; FROUDE, "History of England," chaps. vi.–xvii.)

Cro'nos [Κρόνος], a god of the Greek mythology, was

said to be a son of Uranus, and the father of Jupiter, Neptune, Juno, and Ceres. He is commonly identified with the Roman Saturn.

Cron'stadt [Ger. "crown city"], a fortified seaport-town of Russia, is on the flat and arid island of Kotlin, in the Gulf of Finland, about 20 miles W. of St. Petersburg, and opposite the mouth of the river Neva; lat. 59° 59′ 42″ N., lon. 29° 46′ 30″ E. It is an important commercial town, and the greatest naval station of Russia. It is stated that two-thirds of the foreign commerce of Russia passes through Cronstadt, which has three harbors. The outer harbor, which is intended for ships of war, is capable of containing thirty-five ships of the line. The inner harbor is used for merchant-vessels, and has a capacity for 1000 vessels. The place is very strongly fortified. Pop. in 1867, 45,155. Ice renders this port inaccessible for nearly five months in the year.

Cronstadt, in Transylvania. See KRONSTADT.

Crook, a post-township of Boone co., West Va. P. 702.

Crook (GEORGE), an American officer, born Sept. 8, 1828, near Dayton, O., graduated at West Point in 1852, and July 28, 1866, lieutenant-colonel Twenty-third Infantry. He served on frontier duty 1852–61, in Rogue River expedition 1856, and in command of Pitt River expedition 1857; engaged in several actions, in one of which was wounded with an arrow. In the civil war he became colonel Thirty-sixth Ohio Volunteers, and was promoted Oct. 21, 1864, to be major-general U. S. volunteers, serving in West Virginia operations 1861–62, engaged at Lewisburg (wounded and brevet major); in Northern Virginia campaign 1862; in Maryland campaign 1862, engaged at South Mountain and Antietam (brevet lieutenant-colonel); in operations in West Virginia 1862–63; in Tennessee campaign 1863, engaged at Tullahoma, Hoover's Gap, Chickamauga, and pursuit of Wheeler, with constant skirmishes (brevet colonel); in Northern Virginia 1864, making constant raids and in numerous actions (brevet brigadier-general U. S. A. and brevet major-general U. S. volunteers); in Sheridan's Shenandoah campaign 1864, engaged at Berryville, Fisher's Hill (brevet major-general U. S. A.), Strasburg, Opequan, and Cedar Creek; in command of cavalry of Army of the Potomac 1865, engaged at Dinwiddie Court-house, Jettersville, Sailor's Creek, Farmville, and Appomattox Court-house; and in command of the district of Wilmington, N. C., 1865–66. Since the war he has been on rifle tactics board 1866, in command of the district of Idaho 1866–72, and actively engaged against hostile Indians; and is (1873) in command of the district of Arizona, having quelled all Indian disturbances and compelled them to sue for peace. Promoted to be brigadier-general U. S. A. Oct. 29, 1873. GEORGE W. CULLUM, U. S. A.

Crook'ed Creek, a township of Boone co., Ark. P. 646.

Crooked Creek, a twp. of Cumberland co., Ill. P. 981.

Crooked Creek, a township of Jasper co., Ill. P. 1568.

Crooked Creek, a township of Houston co., Minn. Pop. 465.

Crooked Creek, a township of McDowell co., N. C. Pop. 389.

Crooked Island, one of the Bahama Islands, has an area of 160 square miles. Salt is exported from it.

Crooked Lake, in the western part of New York, extends from Penn Yan south-westward into Steuben co., and is about 18 miles long. The greatest width is one and a half miles. The surface is 718 feet above the level of the ocean. It is now generally called Keuka Lake, and is celebrated for the fine vineyards in the vicinity. It lies in a deep valley.

Crooked River, a township of Ray co., Mo. P. 1622.

Crooks (GEORGE R.), D. D., a Methodist divine and journalist, was born in Philadelphia Feb. 3, 1822, graduated in 1840 at Dickinson College, joined the Methodist ministry in 1841, travelled and preached extensively in Illinois, was appointed classical and mathematical tutor in Dickinson College in 1842, principal of the Collegiate Grammar School in 1843, and adjunct professor of ancient languages in 1846. In 1848 he resumed the ministry, occupying important pulpits in Philadelphia, Wilmington, New York, and Brooklyn. In conjunction with Professor McClintock, he prepared "A First Book in Latin," and "A First Book in Greek," which have been successful text-books. He has also published Butler's "Analogy," with an elaborate analysis of the work, notes, index, and life of Butler. His most important production is a "Latin-English Lexicon" for schools and colleges, the preparation of which was shared by Professor Schem. His eminent journalistic career began in 1860, when he was elected first editor of the "Methodist," a weekly newspaper established in New York City by a company of Methodist laymen who were favorable to independent or unofficial journalism in their Church. Under his control the "Methodist" has been an effective power in the denomination, visibly elevating the character of its journalism, successfully advocating lay representation in its councils, and freely discussing all questions relating to its welfare.

Crop, the first stomach of a fowl; also applied to grain and other plants or fruits cultivated on a farm. In geology, crop or outcrop signifies the edge of a stratum where it comes to the surface of the earth. Strata which are not horizontal, and which expose one edge at the surface, are said to *crop out*.

Crop'sey, a township of McLean co., Ill. Pop. 859.

Cropsey (JASPER FRANK), an American landscape-painter, born at Westfield, Richmond co., N. Y., Feb. 18, 1823. He became a resident of England in 1856. Among his works are "The Sibyl's Temple" and "Niagara Falls."

Crop'well, a post-tp. of St. Clair co., Ala. Pop. 1080.

Croquet, kro'kā' [etymology uncertain], the French name of a game recently revived from obscurity, and introduced into this country. It is played with wooden balls and mallets, the object of the game being to propel a ball through a number of hoops or arches fastened into the ground to a fixed goal (turning-post), and thence back to the starting-point (winning-post). The laws of the game have been explained in various treatises. The game is a modification of the ancient sport called "pell-mell." The best place to play croquet on is a level grass-plot or lawn. It can be played by from two to eight persons.

Cros'by, a township of Hamilton co., O. Pop. 2514.

Crosby (ALPHEUS), an American educator, born at Sandwich, N. H., Oct. 13, 1810, graduated at Dartmouth in 1827, was tutor and professor of ancient languages in his *alma mater* (1829–57), and principal of the normal school at Salem, Mass. (1857–65). He edited Xenophon's "Anabasis," and published a Greek grammar and other works, which have been extensively used.

Crosby (Rev. HOWARD), D. D., LL.D., was born in New York City Feb. 27, 1826, graduated at the New York University in 1844, became professor of Greek in the same in 1851, professor of Greek in Rutgers College, N. J., in 1859, pastor of First Presbyterian church in New Brunswick in 1861, resigned his pastorate in 1862, and his professorship in 1863, when he became pastor of the Fourth Avenue Presbyterian church in New York City. In 1870 he was elected chancellor of the University of New York. Of bold, ardent, and energetic temper, his scholarship has always been put to popular use. Besides other works, he has published "Lands of the Moslem" (1850), "Œdipus Tyrannus" (1851), "Notes on the New Testament" (1861), "Bible Manual" (1870), "Life of Jesus" (1871).

Crosby (PIERCE), U. S. N., born Jan. 16, 1824, in Pennsylvania, entered the navy as a midshipman in 1838, became a passed midshipman in 1844, a lieutenant in 1853, a commander in 1862, and a captain in 1868. He served on the E. coast of Mexico during the Mexican war, and in 1861 was employed with the army, and rendered most important service in Chesapeake Bay and in the sounds of North Carolina, particularly at the capture of Forts Hatteras and Clarke, where he was highly complimented for "his efficient services" by Major-General Butler, who commanded the land forces in the attack. He commanded the Pinola at the passage of Forts St. Philip and Jackson and capture of New Orleans, April 24, 1862, and at the passages up and down the Mississippi past the Vicksburg batteries, June 30 and July 15, 1862. He did good service during the years 1863–64 in command of the Florida and Keystone State, North Atlantic blockading squadron, and in 1865 commanded the steamer Metacomet during the operations which led to the fall of Mobile. His services are thus highly spoken of by Rear-Admiral Thatcher in his official despatch to the navy department of April 12, 1865: "I am also much indebted to Commander Crosby, who has been untiring in freeing the Blakely River of torpedoes, having succeeded in removing over 150—a service demanding coolness, judgment, and perseverance."

FOXHALL A. PARKER, U. S. N.

Cro'sier, or **Crozier** [Late Lat. *cruciarium*, from *crux* (gen. *crucis*), a "cross;" Fr. *crosse*], a staff surmounted by a cross, which is carried before an archbishop on solemn occasions. It is about five feet long and is hollow. The term is also somewhat incorrectly applied to the pastoral staff of Roman Catholic bishops, which is curved at the top in imitation of a shepherd's crook.

Cros'land's, a township of Tuscarora co., Ala. P. 316.

Cros'man (ALEXANDER F.), U. S. N., born June 11, 1838, at St. Louis, Mo., graduated at the Naval Academy in 1855, became a master in 1858, a lieutenant in 1861, a lieutenant-

commander in 1862, and a commander in 1870. He was attached to the steam-frigate Wabash during 1863 and 1864, during which period he was constantly in action on shore in co-operation with the army. He was with the naval brigade at the severe engagements of Boyd's Neck and Tulifinny Cross-Roads Nov. 30 and Dec. 6, 1864, and honorably mentioned in the official report of Commander George H. Preble of Jan. 10, 1865. Drowned at Greytown, Nicaragua, April 12, 1872.

FOXHALL A. PARKER, U. S. N.

Cross [Gr. σταυρός; Lat. *crux* (gen. *crucis*); Fr. *croix;* Sp. *cruz;* Ger. *Kreuz;* It. *croce*], an instrument anciently used for inflicting the punishment of death, for ever memorable as the means of our Saviour's passion. As its Greek name indicates, it was often a simple stake, upon which the victim was either impaled or tied. There were also other forms, as the *crux decussata,* or Saint Andrew's cross (X); the *crux commissa,* or Saint Anthony's cross (T); and the *crux immissa* (†), upon which, according to uniform tradition, our Lord suffered. (See CRUCIFIXION.)

Cross, in heraldry, an ordinary formed by lines drawn palewise and fesswise, enclosing (if bounded by the escutcheon) one-fifth of the shield, or one-third if charged. It is one of the honorable ordinaries, and occurs with many varieties of forms.

Cross, a county in the N. E. of Arkansas. Area, 600 square miles. The soil is very fertile, partly level and partly hilly; cotton, grain, and fruit are raised. Timber is abundant. It is intersected by the St. Francis River. Capital, Wiltsburg. Pop. 3915.

Cross, a township of Howard co., Md. Pop. 1734.

Cross, a township of Buffalo co., Wis. Pop. 564.

Cross (CHARLES E.), an American officer, born in Massachusetts in 1837, graduated at West Point in the engineer corps in 1861, and at the time of his death was a captain of engineers, U. S. A. He served in constructing the defences of Washington, and on engineer duty in Manassas campaign of 1861; in Peninsula campaign of 1862 (brevet major July 1, 1862); and at the battle of Antietam, Sept. 17, 1862 (brevet lieutenant-colonel); at the battle of Fredericksburg Dec., 1862, at the battle of Chancellorsville May, 1863; and while in charge of bridge details at the third crossing of the Rappahannock this gallant and accomplished officer was shot through the brain, and instantly killed, June 5, 1863. Brevet-colonel June 5, 1863.

G. C. SIMMONS, *Clerk Board of Eng'rs.*

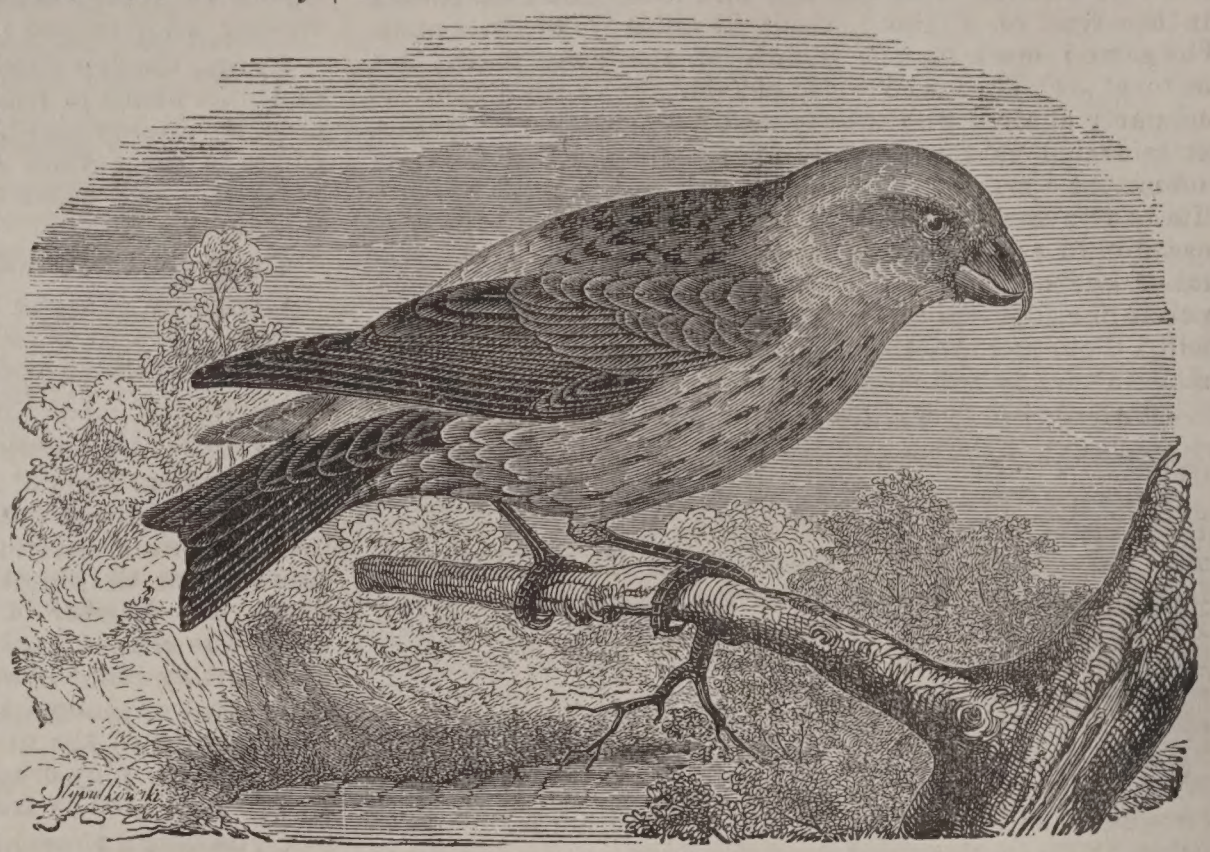
Cross (GEORGE D.), born at Westerly, R. I., Jan. 24, 1799, was for many years a prominent and public-spirited citizen of his native town and State, and was for a long time chief-justice of the common pleas court of Washington co. Died Oct. 1, 1872.

Cross (JOSEPH), D. D., a clergyman, first of the Methodist Episcopal Church, afterwards of the Protestant Episcopal Church, born in Somersetshire, England, in 1813. He removed to the U. S. about 1825, and published various works, among which are "Life and Sermons of Christmas Evans," "Headlands of Faith," and contributions to periodical literature.

Cross (TRUEMAN), an American officer, born in Maryland, appointed an ensign in the Forty-second Infantry, U. S. A., April 27, 1814, second lieutenant Oct., 1814, first lieutenant Jan. 18, captain and assistant deputy quartermaster-general June 18, assistant inspector-general (rank of major) Oct., 1820. He served in the infantry 1821–26, when he was transferred to quartermaster department; colonel and assistant quartermaster-general July, 1838. Killed April 21, 1846, by Mexican banditti near the camp opposite Matamoras, Tex., while serving as chief quartermaster Army of Occupation.

Cross Anchor, a township and post-village of Spartanburg co., S. C. Pop. 1833.

Cross-Bill, the name of several birds of the genus *Loxia.* The *Loxia curvirostra* inhabits the north of Europe, and feeds on pine-cones, seeds, and nuts, its strong bill enabling it to break the shells with ease. The mandibles of the bill cross each other, and are crescent-shaped. The bird is about seven inches long, and subject to great changes of color. The older birds are of a greenish-yellow, spotted with white, and have a gray tinge. The males of a year old are red. The cross-bills migrate southward in winter, and are sometimes seen in England. The American cross-bill (*Loxia Americana*) is distinct from the European, but much resembles it. It is a northern bird, but is sometimes found in Pennsylvania. It feeds on seeds and buds



Parrot Cross-Bill.

of trees. The male is red, but of a whitish color beneath. The parrot cross-bill (*Loxia pityopsittacus*) is seven inches and a half long, of a tile-red color, with dark streaks below. It is similar to the common cross-bill in its habits. It is sometimes seen in England and France. The European white-winged cross-bill (*Loxia bifasciata*) is six and a quarter inches long. It is of a brick-red orange or grayish-brown above, reddish-orange beneath; it is a rare species. The American white-winged cross-bill (*Loxia leucoptera*) is of a crimson color, with black wings and tail; the wings have two white bands. It is about six inches in length. This bird is rarely seen farther S. than New York.

Cross-Bow. See ARBALEST.

Cross Creek, a township of Cumberland co., N. C. Pop. 147.

Cross Creek, a township of Jefferson co., O. P. 1800.

Cross Creek, a post-township of Washington co., Pa. Pop. 1034.

Cross Creek, a township of Brook co., W. Va. Pop. 1907.

Crosse (ANDREW), an English gentleman who gained distinction by his experiments in electricity, was born in Somersetshire June 17, 1784, and was educated at Oxford. He commenced in 1807 experiments with a view to form artificial crystals by a voltaic battery, in which he was successful. In the course of many years spent in this pursuit he obtained not less than twenty-four mineral crystals similar in form to those produced by nature. These discoveries were not published until he explained them before the British Association for the Advancement of Science in 1836. Some excitement was produced in the same year by the apparent generation of insects of the genus *Acarus* during his experiments with a voltaic battery. (See SPONTANEOUS GENERATION.) Died July 6, 1855.

Cros'sen, a town of Prussia, in the province of Brandenburg, at the confluence of the Bober with the Oder, 32 miles S. E. of Frankfort. It has manufactures of woollen cloth and hosiery. Pop. in 1871, 6977.

Cross-Examination, in the law of evidence, is the examination of a witness by a party against whom he is called to testify, and is thus distinguished from a direct examination, which is had by the party calling the witness. The range of a cross-examination is much wider than that of a direct examination, the party examining being allowed to impeach the credit of the witness, and to show the inconsistency of his statements, his bias, his want of memory, and other matters tending to reduce the value of his testimony. The course of the examination, depending on the circumstances of the case, must be largely left to the discretion of the presiding judge. For these reasons leading questions are regularly allowed, though they are in general excluded on the direct examination, as tending to make the answers of the witness mere echoes of the questions asked. It is, however, a rule that if a merely collateral question be asked and answered, the cross-examining counsel will not be allowed to call witnesses to disprove the

truth of the answer. This rule would not extend to a question as to the point whether the witness had not previously given a different version of the facts from that to which he testifies. If such a question is properly put to him as to time, place, and circumstances, and he answers in the negative, he can be contradicted by other witnesses. The same remark may be made as to a question put to him as to expressions used by him showing hostility towards the party against whom he is called. A witness on cross-examination cannot be required to answer whether he has committed a crime the commission of which would subject him to punishment, or has done any act which would subject him to a forfeiture of his estate; though this rule does not extend to an answer which would merely expose him to a civil liability. So he may, to a certain extent, be compelled to answer questions tending to discredit and degrade him. Thus, according to the better opinion, he may be asked whether he has not been confined in the State prison, as the object of the question is not to exclude him from testifying, but to affect the credit due to his statements. He could be shown to be *incompetent* to testify only by the production of the record of his conviction. The true theory of a cross-examination is to qualify the direct testimony, and accordingly the witness should not at this stage of the case be called on by the cross-examining counsel to give independent testimony sustaining his part of the issue, though this rule is not always adhered to in practice. (See EVIDENCE.)

T. W. DWIGHT.

Cross Hill, a township and village of Laurens co., S. C. The village is 45 miles S. of Spartanburg. Total pop. 2393.

Cross Keys, a township of Macon co., Ala. Pop. 2560.

Cross Keys, a township and post-village of Union co., S. C. Total pop. 1349.

Cross Keys, a post-office of Rockingham co., Va. An indecisive action took place here on June 8, 1862, between the armies under command of Gens. Fremont and Jackson. Gen. Fremont's forces attacked "Stonewall's" army at 9 A. M. The battle continued with great violence till 4 P. M., and skirmishing and artillery fire till dark. During the night Jackson's army retreated.

Cross Plains, a township and post-village of Dane co., Wis., on the Milwaukee and St. Paul R. R. Total pop. 1506.

Cross River, a post-village of Lewisboro' township, Westchester co., N. Y., contains a number of manufactories.

Cross Roads, a township of Blount co., Ala. P. 770.

Cross Roads, a township of Etowah co., Ala. P. 345.

Cross Roads, a township of Madison co., Ala. P. 336.

Cross Roads, a township of Pike co., Ala. P. 1120.

Cross Roads, a township of Wilson co., N. C. P. 694.

Cross, The Order of the, originally a spiritual order of knighthood, which was founded in Palestine in the time of the Crusades, and was then called the "Bethlehemite Order." In 1211 the knights of this order adopted the monastic life, and settled in Austria, Bohemia, and other parts of Europe. They still have two establishments in Austria, and one in the Netherlands. They are called "Canons Regular of the Holy Cross." The "Regular Clerks of the Holy Cross" were founded in 1834, in France, by Abbé Moreau. They had in the U. S. in 1868 about 170 members. A congregation of "Daughters of the Holy Cross" was founded in the seventeenth century in France, and numbered in 1870 about 500 members. A second congregation of the same name was founded in 1835 in Belgium.

Cross, The Southern, the most conspicuous constellation of the southern hemisphere, is not visible in the northern hemisphere, except in regions near the equator. It consists of four bright stars arranged in the form of a cross. The two stars which mark the summit and foot of the cross have nearly the same right ascension, and serve as pointers to the South Pole.

Cross'ville, a post-village, capital of Cumberland co., Tenn., about 110 miles E. of Nashville. Pop. 95.

Cros'well (EDWIN), an American politician and journalist, born at Catskill, N. Y., in May, 1797, was a member of the Albany Regency. He became about 1824 editor of the "Albany Argus," a Democratic journal of great influence, which he continued to direct until 1854. Died June 13, 1871.

Crotala'ria [from the Gr. κρόταλον, a "rattle"], a genus of plants of the natural order Leguminosæ, sub-order Papilionaceæ, deriving its name from the inflated pods in which the ripe seeds rattle. It comprises numerous species, partly annual herbaceous plants and partly shrubs. The most important of them is the *Crotalaria juncea*, the sunn hemp of India, an annual plant extensively cultivated for its fibre, which is considered equal to Russian hemp. The *Crotalaria sagittalis*, or "rattle-box," is a small annual growing in most of the U. S. Several other species grow in the Southern States and the West.

Crotalus. See RATTLESNAKE.

Crotch (WILLIAM), an English composer of music, born at Norwich July 5, 1775. He became professor of music at Oxford University in 1797. He published "Styles of Music of All Ages." Died Dec. 29, 1847.

Crotch'et [Fr. *crochet*, diminutive of *croche*, a "hook"], in music, one of the notes or characters of time, equal to half a minim.

Cro'ton [Gr. κρότων], a genus of trees, shrubs, and herbs of the order Euphorbiaceæ; the species are numerous and mostly tropical. Some of them possess the acrid properties of their order in excess. One of the most important is the *Croton Tiglium*, which yields croton oil. It is a native of the tropical parts of Asia. The seeds were formerly used as a purgative, but their use is disapproved on account of their uncertain and violent action; they are now chiefly valuable for the oil which they yield. Some species of croton are fragrant and aromatic, and are employed in medicine. One of these is the CASCARILLA (which see). Eight species are native to the Southern States.

Croton, a post-township of Newaygo co., Mich. P. 923.

Croton, a village of Cortlandt township, Westchester co., N. Y., on the E. bank of the Hudson River and on the Hudson River R. R., 35 miles from New York and 4 miles above Sing Sing. It has four churches, five brickyards, a foundry, and a fine brick railroad station. Here are many fine country residences. Croton is justly celebrated for the beauty of its scenery. Croton Point, in the vicinity, is a peninsula which contains numerous thriving vineyards.

Croto'na, or **Cro'ton,** an ancient Greek city of Italy, was in the peninsula of the Bruttii, and on the Mediterranean Sea. It was founded 710 B. C., and became a populous and important city. The people of Crotona waged war with success against the Sybarites in 510 B. C. This city was the residence of Pythagoras, and the native place of Milo, a famous athlete. The site is now occupied by the town of COTRONE (which see).

Croton Aqueduct. See AQUEDUCT, by GEN. M. C. MEIGS, U. S. A.

Croton Falls, a post-village of Westchester co., N. Y., in North Salem and Somers townships, on the Harlem R. R., 48 miles from New York. It has good water-power.

Croton Oil (*Oleum Tiglii*) is the expressed oil of the seeds of *Croton Tiglium*, a small tree which grows in Hindostan, Ceylon, and other parts of India. In taste it is hot and acrid, varies from a pale yellow to a reddish-brown color, has a faint, peculiar smell, and is miscible with alcohol, ether, and oil of turpentine. It is a powerful purgative, valuable because it can be employed with good effect in very minute portions. Great care must be used in its administration. It is applied externally as a counter-irritant in neuralgia, epilepsy, and pulmonary diseases. The pale oil comes directly from India; that of a darker color is expressed after importation.

Croton River rises in Dutchess co., N. Y., flows south and south-westward through Putnam and Westchester counties. It enters the Hudson River about 35 miles above New York City, which derives from this river its supply of water. Its length is estimated at 50 miles.

Croup. All the forms of croup have one thing in common—viz. an obstruction (catarrhal or inflammatory) in the interior of the larynx, particularly on the vocal chords. The milder form is called "false croup" or "pseudo-croup." The larynx is reddened, its mucous membrane swelled, and its secretion of mucus usually increased. Thereby the passage of air through the larynx is impeded, and spasmodic action of its muscular apparatus effected. It is frequently found in children who have before suffered from "colds," especially from catarrh of the throat and enlarged tonsils, and who have been too carefully kept from the contact with cold air and cold water. The attack of "pseudo-croup" is sudden or preceded by nasal or bronchial catarrh. It takes place after the child has been asleep for some hours. It wakes up about midnight with a barking cough, loud and laborious respiration, small and frequent pulse, and more or less fever. In bad cases the veins of the neck and face swell, the face is bloated and bluish, and suffocation appears imminent. This attack may last from half an hour to six hours. It terminates in perspiration, the cough becoming moister, the voice being hoarse, but may return in the next night. Some children are apt to have many attacks in the course of many years. There are no membranes in the throat, no glands swollen round the neck. A very severe

attack requires an emetic (powdered ipecac, sulphate of zinc, sulphate of copper, turpeth mineral); milder attacks require very little or no treatment. Let the child drink a little hot milk at short intervals. It must not sleep longer than an hour at a time, and should take a drink on waking up. Put a mustard-plaster round the neck, or apply cold water at short intervals. Where the throat is sore, ice-pills every five or ten minutes; where inhalation is very spasmodic, half a teaspoonful of paregoric (one dose) or one grain of Dover's powder. Treat the consecutive general catarrh for four or five days with uniform warm (not hot) temperature of the room, warm water inhalations (kettle on the stove), small doses (hourly) of ipecac, or an antimonial preparation or muriate of ammonia. Where there is a chronic catarrh of the throat (dryness, redness, swelled tonsils, hacking cough, snoring), a teaspoonful of glycerine as a preventive at bed-time.

While this "pseudo-croup," commonly called "croup," is a very mild disease—we have never seen a case terminating fatally—the other form, or "true croup," "membranous croup," is very dangerous. Under ordinary circumstances, and with a treatment exclusively medicinal, ninety out of a hundred die. It consists sometimes in simple inflammatory swelling ("laryngitis"), but usually in the obstruction of the larynx by a deposit of a whitish, grayish, or (through admixture with a little blood) darker "croupous" or "diphtheritic" membrane. The deposit may take place upon or into the normal tissue of the organ. It seldom originates in the larynx; sometimes ascends from the trachea; mostly descends from the throat, where it is discovered in one or more small spots or over a larger surface. In exceptional cases it extends over the interior surface of the nose and the mouth. Such deposits may be known to exist for days; they will then descend, result in hoarseness, increasing to complete absence of voice (aphonia), and in great difficulty of respiration, with final suffocation. When the deposits cover the whole interior of the larynx, both inspiration and expiration are impeded, and aphonia is complete. When they result in serous (watery) swelling of the larynx (especially the posterior insertion of the vocal chords) only, expiration is easier and the voice not entirely suppressed. The first stage is either that of throat diphtheria or of a simple catarrh only, which is attended with but little fever, and therefore little thought of. It may last a few days. In the second stage (twelve hours to fourteen days) the symptoms of obstruction show themselves; the voice is hoarse, and at last absent; respiration is slow, labored, and loud; the muscles of the neck and chest exerted to their utmost; the insertion of the diaphragm drawn in with every inspiration, deep grooves forming with every inspiration above and below the clavicle, the child tossing about, supporting itself on its knees, and throwing the head backward. The lips begin to exhibit a bluish hue. This symptom (cyanosis) increases in the third stage, where the influence of the insufficient oxygenization of the blood is more visible in general paleness, bluishness, in sleepiness, in the frequent and irregular pulse, in the cool surface, convulsive twitchings, and loss of consciousness. Unfortunately, the latter symptom is not constant, many children dying with undisturbed intellect. Death is the result of direct suffocation, or the result of a complication of the disease with bronchitis or pneumonia. Medicinal treatment is very unsatisfactory. We seldom succeed in dissolving and removing the membranes. Nitrate-of-silver applications to the larynx have justly been discarded. Inhalation of diluted lime-water through an atomizer or of lactic acid in glycerine and water (1 : 8–10) has proved successful in a few instances. Emetics are of use in such cases *only* where the membranes are known to be partially loosened (peculiar flapping sound in respiration), or when the presence of mucus, in addition to a membrane, proves dangerous. Ice-pills frequently, ice applications to the throat, moist air, 1–2 grains of chlorate of potassa in a teaspoonful of water every ¼–1 hour; inhalations of carbolic acid, either through an atomizer or sprinkled through the room; muriate of ammonia evaporated on a stove or hot coal,—all such means may be tried, but not to such an extent as to interfere with a copious supply of pure air, the effect of which may still be improved by inhalation of oxygen gas. Where the disease runs its course with fever, quinia, seldom aconite or veratrum. Most cases will resist treatment. Twenty or twenty-five per cent. will be saved by tracheotomy, an operation consisting in the artificial opening of the windpipe below the obstructed larynx. This opening in the trachea is kept patent by means of a silver or hard-rubber tube inserted in it until the disease has disappeared from the larynx. The relief given by this operation is surprising, and although the mortality after its performance is still very great, death is almost always easier, resulting more from exhaustion than from suffocation.

ABRAHAM JACOBI.

Crow [Ang.-Sax. *crawe*, so called from the sound produced by the bird], a name popularly applied to several birds of the genus *Corvus*, which includes also the ravens, the rooks, the daws, and some other birds. The carrion crow of Europe is called in England by various names—flesh crow, black crow, etc. Its feathers are very black and glossy, with reflections of green and purple. It is a cautious and intelligent bird, and feeds on flesh.

The common American crow (*Corvus Americanus*) is not so large as the preceding. Its voice is less harsh, and it is somewhat gregarious in its habits. Its color is a glossy blue-black. It inhabits the civilized parts of North America. It is hated and persecuted by farmers for its destruction of Indian corn and the eggs and young of other birds, but has great cunning and tenacity of life. These crows are found more especially in the Northern than the Southern States, as they are unable to contend with the vultures which abound in the latter. Many devices have been employed to exterminate them, without much success. They accomplish some good by devouring the grubs of injurious insects.

The fish crow of the U. S. (*Corvus ossifragus*) is sixteen inches long, black, and resembles the common crow, but is somewhat smaller, and may be distinguished by the naked chin. Other American species are the white-necked crow of Arizona (*Corvus cryptoleucus*) and the fish crow of Puget Sound (*Corvus caurinus*).

The hooded crow of Europe (*Corvus cornix*) resembles the

Hooded Crow of Europe.

others in habits, but is more mischievous. It is of a shiny black, but its neck, back, and under parts are of a smoky gray. It is extremely sagacious; it is found in all parts of Europe.

Crow'der's Mountain, a post-township of Gaston co., N. C. Pop. 1931.

Crown [Lat. *corona*; Fr. *couronne*; Ger. *Krone*], originally a fillet of leaves, and used by the ancients in the observance of religious rites and festive occasions. The Greeks used the crown as a symbol of office and a token of victory. It was not only bestowed on victors in the games, but also on citizens who had rendered great services to the country. The Romans used it as the reward of courage. The *corona obsidionalis* was most highly prized; this was bestowed by a besieged army or town on the general who came to their rescue. The civic crown, made of oak leaves and acorns, was given to any soldier who had saved the life of a citizen. This gave him a place next the senators on public occasions, and he, his father, and grandfather were released from all public burdens. The person whose life he had saved owed to him filial duty ever after. The *corona muralis* was bestowed on the first who entered a beleaguered city. It was a circlet of gold surmounted by turrets. The *corona triumphalis* was of three kinds, and the reward of a victorious general.

The modern crown was introduced by Constantine I. ("the Great"), whose reign began in 306. Crowns were first used by Spanish kings about 580, by the kings of Lombardy about 590, and in France in 768. The papal triple crown was at first a plain pointed cap. Pope Hormisdas added the first crown (523), Boniface VIII. the second (1294–1303), and John XXII. the third (1316–34).

Crown and **Half Crown** were originally English gold coins issued by Henry VIII. in 1527. The first commission for coining them of silver was signed by Edward VI. Oct. 1, 1551. The crown at present is a silver coin worth five shillings sterling—about $1.25 U. S. in silver.

Crown Creek, a township of Stearns co., Minn. Pop. 197.

Crown Glass, the glass usually employed for windows. It is made of a mixture of 100 parts of sand, 35 of soda-ash or potash, and 35 of chalk. It is essentially a silicate of soda (or potash) and lime.

Crown Imperial. See FRITILLARY.

Crown'ingshield (A. S.), U. S. N., born Mar. 14, 1843, in the State of New York, graduated as ensign at the Naval Academy in 1863, became a lieutenant in 1866, and a lieutenant-commander in 1868. He served in the steam-sloop Ticonderoga in both the Fort Fisher fights, and was commended for efficiency by his commanding officer, Capt. Charles Steedman. FOXHALL A. PARKER, U. S. N.

Crown Point, a post-village, capital of Lake co., Ind., on the Pittsburg Cincinnati and St. Louis R. R., 41 miles S. S. E. of Chicago. It has six churches, four graded schools, two banks, and a public library. Two weekly newspapers are published here.

FRANK S. BEDELL, ED. CROWN POINT "REGISTER."

Crown Point, a post-village and township of Essex co., N. Y. The township was first settled by the French, who in 1731 built Fort St. Frederick (the "Crown Point" of history) on a long cape projecting into Lake Champlain, which became the seat of thriving settlements, which were destroyed in 1759, and again in 1777, by the British troops. In 1775 it was surprised and taken by the provincial forces. The British fort at Crown Point, which cost $10,000,000, is now in a ruinous condition. Crown Point has extensive beds of rich iron ore and mineral phosphate of lime. Iron, lumber, and wooden wares are manufactured on an extensive scale. It has a lighthouse. Pop. of township, 2449.

Crown Prince [Ger. *Kron Prinz*], in Prussia, Sweden, and some other European countries, is the title of the heir-apparent to the throne.

Crown, Treaty of the, a treaty made at Vienna Nov. 16, 1700, in which the emperor Leopold recognized the elector Frederick III. as king of Prussia. Frederick engaged to furnish 10,000 men to support Austria in the Diet, and to vote as elector for the descendants of the emperor's son, Joseph, king of the Romans.

Crows, or **Absoro'kas,** a tribe of American Indians inhabiting the northern part of Wyoming Territory and the southern part of Montana. They are divided into "Mountain" and "River Crows," and belong to the great Dakota family.

Crow Wing, a county in N. Central Minnesota. Area, 540 square miles. It is bounded on the N. W. and W. by the Mississippi River, and partly on the E. by Lake Mille Lacs. Capital, Crow Wing. It is intersected by the Northern Pacific R. R. Pop. 200.

Crow Wing, a post-village, capital of the above county, is on the Mississippi River opposite the mouth of a small stream called the Crow Wing, and 120 miles N. W. of St. Paul.

Croy'don, a market-town of England, in the county of Surrey, on the London and Brighton Railway, 10½ miles S. of London Bridge. It has a fine Gothic church. The archbishops of Canterbury had a palace here until 1750. About a mile from Croydon is Addiscombe House, which became a military academy, and is now called the Royal India Military College. Pop. 20,325.

Croy'don, a post-township of Sullivan co., N. H. Pop. 652.

Croyle, a township of Cambria co., Pa. Pop. 886.

Cro'zer Theolog'ical Sem'inary (Baptist) is located at Upland, Pa., 14 miles from Philadelphia, on the Philadelphia Wilmington and Baltimore R. R. It was founded and endowed through the liberality of the members of the Crozer family, residents of Upland and Philadelphia, in 1868. It has (1873) 4 professors, 50 students, an endowment of $230,000, and a seminary building, library building, gymnasium, and three professors' houses, delightfully situated on grounds twenty acres in extent.

Crozet (CLAUDE), an eminent educator, born in France, educated at the Polytechnic School of Paris, became an officer of artillery under Napoleon I. He emigrated to this country in 1816, and was appointed professor of engineering at the U. S. Military Academy at West Point; resigned in 1823, and became a civil engineer. Died in 1863.

Cru'cible [Late Lat. *crucibulum;* see below], a vessel employed by chemists in heating and fusing metallic ores, glass, and other substances. Crucibles are generally made of materials capable of resisting high temperatures, such as fireclay, plumbago, porcelain, platinum, and silver. Crucibles are said to have been so called because they were formerly marked with a cross (Lat. *crux*, gen. *crucis*), which was thought by the alchemists to protect them from evil spirits.

Crucif'eræ [Lat. from *crux* (gen. *crucis*), a "cross," and *fero*, to "bear," alluding to the cross-shaped flowers], a large and well-marked order of exogenous herbs, characterized by flowers with four petals arranged in the form of a cross, and by two long and two short stamens. The seed-vessels are *siliques, silicles, loments*, or nut-like fruits. The juice is usually acrid, but none of the order are poisonous. Among the cultivated Cruciferæ are the cabbage, turnip, rape, and mustard. The wallflower, stock-gilliflower, etc. are valued in ornamental horticulture. The number of genera is about 175, and the known species are over 1600.

Cru'cifix, a cross with an image of Christ upon it, either carved or painted. At first only the naked cross was used; then (in the time of Paulinus of Nola, 353–431 A. D.) the cross with a lamb at its foot to represent Christ. Justin II. (565–578) gave the bishop of Rome a cross with a bust of Christ at the top and bottom, and a lamb in the middle. From about 692 to the twelfth century, Christ was represented as alive and clothed, with his hands extended in prayer. In the twelfth century four nails were used, the feet side by side. From the thirteenth century only three nails were used, and Christ was represented as dead or dying, with only a girdle about his loins.

Crucifix'ion [Lat. *crucifixio*, from *crucifigo, crucifixum*, to "crucify," from *crux, crucis*, a "cross," and *figo, fixum*, to "fix" or "fasten"], literally, "fastening on the cross," a form of capital punishment common among almost all ancient nations, except the Jews, who in their later history probably borrowed it from the Romans. The hanging on a tree spoken of in Deuteronomy xxi. 22 apparently has reference to crucifixion *after death*. Tradition ascribes its invention to Semiramis. It consisted in nailing or binding the criminal to a CROSS (which see), where he was left until dead from hunger or exhaustion. The legs were frequently broken to hasten death; sometimes, however, a fire was lighted under the cross for the same purpose, or wild beasts were let loose upon those crucified. The body was usually left on the cross till destroyed by the action of the elements. Crucifixion was abolished by Constantine the Great, probably in the year 315.

This inhuman form of punishment was visited upon Christ by the Jews, in accordance with the unwilling sentence of Pontius Pilate. In addition to the scourging, which seems to have been a legal part of the punishment, he was forced to wear the crown of thorns, and subjected to other indignities by the brutality of the soldiers and populace. (See the accounts given in the four Gospels.)

Cru'den (ALEXANDER), author of the "Concordance," was born at Aberdeen, in Scotland, May 31, 1700. He was educated for the ministry of the Kirk, but never preached, having had his reason unsettled by disappointment in love. In 1722 he removed to London, and taught the classics, and shortly after to the Isle of Man. In 1732 he returned to London and opened a bookstore. In 1735 he became librarian to Queen Caroline, wife of George II. In 1737 he published his "Complete Concordance of the Old and New Testaments," which is still the best in our language. He was several times an inmate of lunatic asylums, and during all the latter part of his life was flighty and extravagant. He set up as a reformer, calling himself "Alexander the Corrector." He died suddenly at Islington, Nov. 1, 1770.

Cru'ger (**Boscobel Post-office**), a village of Cortland township, Westchester co., N. Y., on the Hudson River and on the Hudson River R. R., 4 miles S. of Peekskill. It has extensive manufactories of brick.

Cruik'shank (GEORGE), an English caricaturist, son of an engraver originally from Scotland, was born in London Sept. 28, 1792. He illustrated William Hone's satirical works. His comic humor and fertile imagination were displayed in illustrations for "The Comic Almanac," "Peter Schlemihl," "Oliver Twist," and "My Sketch-

Book." With his brother ROBERT (1790–1856) he produced "Life in London." In 1848 appeared "The Bottle," eight plates depicting the drunkard's career. He subsequently devoted himself to oil painting.

Cruikshank (WILLIAM), F. R. S. L., a Scottish anatomist, born in Edinburgh in 1746. He became a resident of London, and a partner of Dr. William Hunter. He published, besides other works, "Anatomy of the Absorbent Vessels" (1786). Died June 27, 1800.

Crusade [from the Sp. *cruzada* (from *cruz*, a "cross"); Catalan, *crusada;* Fr. *croisade;* It. *crociata;* Ger. *Kreuzzug*], *i. e.* a war waged for the defence or advancement of the cross, but applied especially to the religious wars carried on by the Christians of the Middle Ages for the recovery of Palestine from the Mohammedans. From a very early period the Christians were in the habit of making pilgrimages to Jerusalem and other parts of Palestine rendered sacred by events connected with the Saviour's life and death. These pilgrimages continued with but little opposition till the year 1065, when Palestine, then governed by the Egyptian caliphs, was overrun and conquered by hordes of Seljook Turks. The accounts (doubtless often exaggerated) of the indignities inflicted on the Christian residents and pilgrims by these barbarians produced a deep and powerful impression in all parts of Christendom. At length, Peter the Hermit, a monk and native of Amiens in France, having visited Palestine and witnessed the cruelty of the Turks, reported what he had seen to Urban II., by whom encouraged, he travelled through Italy and France, and by his zeal and eloquence excited an extraordinary religious enthusiasm among all classes. In 1095, at a council held at Clermont, a crusade was resolved on. On this occasion the pope himself addressed the multitude. Previous to the setting out of the true crusade, four armies, consisting of disorderly multitudes of the very dregs of Christendom, had departed for Palestine. The first consisted of 20,000 foot, commanded by Walter the Penniless. It marched through Hungary, but was almost entirely destroyed by the natives of Bulgaria, a few only escaping to Constantinople. It was followed by a second, consisting of 40,000 men, women, and children, under Peter the Hermit. The two united at Constantinople, crossed the Bosphorus, and encountered the Turks at Nice. They were utterly routed. Another unorganized band of 15,000 Germans was cut to pieces in Hungary, and its fate was shortly shared by an immense mob of 200,000 persons from England, France, Flanders, and Lorraine. It was only now that the true crusaders entered upon the scene. Six armies, embracing all the chivalry of Europe, and led respectively by Godfrey of Bouillon, Hugh the Great (count of Vermandois), Robert Curthose, Count Robert of Flanders, Prince Bohemond of Tarentum (under whom was Tancred), and Count Raymond of Toulouse, set forth for Constantinople. Having united their forces and spent some time at this place, they crossed into Asia Minor Here their first step was the capture of Nice in June, 1097. They also defeated the sultan Soliman at Dorylæum, and took the principality of Edessa. They then marched into Syria, and laid siege to Antioch. After a seven months' siege, during which the crusaders suffered terribly from famine and disease, the city surrendered. The inhabitants were massacred by their captors, who were besieged in their turn by an army of 200,000 Mussulmans. On the 28th of June, 1098, the Mohammedans were put to rout, and the way opened to Jerusalem. In the summer of 1099, 40,000 crusaders, the remnant of a vast host which had comprised not less than 600,000 warriors, laid siege to Jerusalem. The city was taken on the 15th of July, after a siege of somewhat more than five weeks. Eight days later Godfrey of Bouillon was elected king of Jerusalem.

The three Latin principalities of the East (Edessa, Antioch, and Jerusalem) maintained themselves against the attacks of the Mohammedans till the year 1144, when the emir of Mosul conquered Edessa and massacred its Christian inhabitants. His son, Noor-ed-Deen, marched upon Syria and Palestine. A second crusade was preached by Saint Bernard, abbot of Clairvaux, and in 1147 two armies, numbering together 1,200,000 men, set out for Jerusalem. They were commanded by Louis VII., king of France, and Conrad III., emperor of Germany. This expedition utterly failed through the treachery of the Greek emperor, Manuel Comnenus, and neither army ever saw the Holy Land.

In 1187, Salah-ed-Deen (or Saladin), sultan of Egypt, invaded Palestine, and in October of that year took Jerusalem. This event gave rise to a third crusade, under the leadership of Frederick Barbarossa, emperor of Germany, Philippe Auguste, king of France, and Richard Cœur-de-Lion, king of England. Barbarossa was drowned on the way. The crusaders gained some important victories, but they were not united among themselves, and the crusade was closed by a treaty in which Saladin agreed to impose no taxes on Christian pilgrims to Jerusalem. In 1195, Henry VI. of Germany undertook a crusade (sometimes called the fourth), but the death of the emperor caused the project to be abandoned. A fourth crusade, instituted by Pope Innocent III. in 1203, turned from its course to take possession of the Byzantine empire, and never reached Palestine at all.

The Children's Crusade in 1212 (of which an excellent account has been written by the Rev. George Zabriskie Gray, New York, 1870) is one of the strangest episodes in history. An army of unarmed French children, 30,000 strong, headed by a boy named Stephen, set out for the Holy Land by way of Marseilles. A similar army of German children, 20,000 strong, led by a boy named Nicholas, crossed the Alps at Mont Cenis. A second army of German children, numbering nearly 20,000, the name of whose leader is not known, crossed the Alps by a more westerly route, touching the sea at Brindisi. Their idea was, that the Mediterranean would open a path for them to Palestine, and that the Holy Land would be recovered and the Moslems converted by miracles. Some of the children got discouraged and returned to their homes; many stopped by the way; but most of them either perished on the march, were lost at sea, or were sold into slavery.

In 1228, Frederick II. of Germany commanded a fifth crusade, by which he became master of Palestine and was crowned king of Jerusalem.

In 1239, the Turks having again seized upon Jerusalem, a sixth crusade was undertaken, under Thibaud, count of Champagne. A nominal surrender of the Holy Land was the result.

In 1244, Jerusalem was burned and pillaged by a new race of Turks. A seventh crusade, headed by Louis IX. (Saint Louis) of France, set out in 1249. It was badly defeated by the sultan of Egypt, who also made a prisoner of the king. Louis obtained his freedom by the payment of a large ransom.

The eighth and last crusade was also undertaken by Saint Louis in 1270. The king died at Carthage of the plague, and Prince Edward, afterwards Edward I. of England, assumed the command of the army. The expedition accomplished nothing of importance, and in July, 1272, Edward returned to England with the last of the crusaders. The chief result of the Crusades was a better acquaintance of the people of Western Europe with two civilizations more advanced than their own—the Greek and the Saracenic. Thus a powerful impulse was given both to the literature and the commerce of Europe. (See MICHAUD'S "Histoire des Croisades;" HALLAM'S "Middle Ages;" MILMAN'S "Latin Christianity," and WILKEN'S "Geschichte der Kreuzzüge.") REVISED BY R. D. HITCHCOCK.

Cru'senstolpe (MAGNUS JAKOB), a Swedish author, born Mar. 11, 1795. He wrote, besides historical novels, satirical political tracts. His "Positions and Relations" brought upon him a three years' imprisonment. Many of his works are translated into German. Died Jan. 18, 1865.

Crushing Machinery. See GRINDING and CRUSHING MACHINERY, by PROF. R. H. THURSTON, C. E.

Crusta'cea [neut. plu. of *crustaceus*, a Latin adjective signifying "shelly," or "having shells" like those of a lobster, from *crusta*, the "shell of a lobster"], a class of articulate animals considered by Linnæus as insects, but now universally regarded as distinct, though having interesting resemblances to that class. They are usually divided into DECAPODS, TETRADECAPODS, ENTOMOSTRACANS (including CIRRIPEDS), and ROTIFERS (which see).

The decapods (crabs, lobsters, etc.) are at the head of this class, but many of the others are of very different forms and habits. In the most important members of this class the body is somewhat spindle-shaped, and composed of a number of articulated rings, allowing of considerable movement. These divisions are sometimes of almost equal size, having similar appendages. In some cases a few of the segments attain a higher development than the others, and the organs of motion are confined to them, while the appendages of the other segments approach a rudimentary condition; and in the higher forms the anterior segments coalesce into a single mass, called the *cephalothorax*, which bears the mouth and organs of motion. By means of a calcareous secretion the skin is hardened into a skeleton; this protects the soft parts of the body; a thin membrane joins the segments. The animal casts off its shell at certain periods, and a new calcareous secretion is made. The form of the articulated appendages (legs and feet) is various. The nervous system of the Crustacea is formed by a series of ganglia running along the surface of the body, united to each other and to a cephalic ganglion or brain by a pair of nervous filaments, from which nerves proceed to the different organs of the senses, and is situated above the œsophagus. The digestive organs show a high degree

of development. The respiration takes place through branchiæ of different forms. The species are mostly unisexual, and reproduction takes place by ova.

Cruveilhier (JEAN), a French anatomist, born at Limoges Feb. 9, 1791. He obtained in 1835 the chair of pathological anatomy created in Paris by Dupuytren. He published an important work on "The Pathological Anatomy of the Human Body" (2 vols., gr. fol., with 233 plates, 1829–40), and other works. Died Mar. 11, 1874.

Cry'olite [from the Gr. κρύος, "ice," and λίθος, a "stone"] is so named because it melts in the flame of a candle. It is a double fluoride of aluminium and sodium, and is important as a source of the metal aluminium. It is a rather rare mineral, found in Greenland, from which large quantities are imported into Europe and the U. S. for the manufacture of soda. When fused it may be made into table-ware much resembling porcelain, and known as "hot-cast porcelain."

Cryoph'orus [from the Gr. κρύος, "ice," and φέρω, to "bear"], an instrument invented by Wollaston to freeze water by its own evaporation. It consists of a glass tube with a bulb at each end. One bulb contains water. A complete vacuum is produced in the tube and opposite bulb, and the empty bulb being placed in a freezing mixture, the vapor arising from the water is condensed, so that the water soon congeals in the other bulb, though the intervening tube be two or three feet long.

Crypt [from the Gr. κρυπτός, "hidden"], the under or hidden part of a building; a vault under a church, either entirely or partly under ground. Crypts generally do not extend beyond the limits of the choir or chancel, and some are of smaller dimensions. They were sometimes used as places of sepulture, and seem indeed to have been designed at first for the reception of the bodies of saints, martyrs, and the higher dignitaries of the Church. The later Romanesque and the more recent styles of church architecture generally have no crypt. One of the largest crypts in England is that under Canterbury Cathedral.

Crypto-Calvinists, a name applied in the last half of the sixteenth century to the followers of Melanchthon (called also Philippists), who earnestly desired the union of the Lutherans and Calvinists, and were charged with leaning too strongly towards the Calvinistic doctrine of the Lord's Supper.

Cryptog'amous Plants, or **Cryp'togams** [from the Gr. κρυπτός, "hidden," and γάμος, "marriage"], a term applied to flowerless plants, the lower series of plants in the natural system, which have no true flowers, but have, instead of seeds, spores that consist of a single cell and contain no embryo. They have no obvious stamens or pistils. The name "cryptogamous" was first used by Linnæus, and implied that in his opinion they had organs analogous in functions to stamens and pistils, but concealed from view; and the correctness of his surmise is now confirmed. He gave the name Cryptogamia to a distinct class in his artificial system. Many cryptogamous plants have no leaves, some have no root, and those which are lowest in organization consist only of a single cell. Many of them are parasitic. Cryptogamous plants are divided into two principal groups—namely, thallogens, in which the stem and leaf are not distinguishable; and acrogens, in which the stem and leaf are distinguishable. The former group comprises the Fungi, Lichens, Algæ (sea-weeds), and Characeæ, etc.; the latter, Filices (ferns), Musci (mosses), Equisetaceæ, Hepaticæ, club-mosses, etc. The Protophytes, etc. are all cryptogamous, though hardly belonging to either of the above divisions.

Cryptog'raphy [from the Gr. κρυπτός, "hidden," and γράφω, to "write"], the art of writing or telegraphing in cipher, or in such a way that the matter written cannot be read by any one not in possession of the necessary key. Many plans have been devised for this purpose, but almost any person who has taste for the solution of puzzles or enigmas can readily understand most writing of this kind; and it is probable that no kind of cipher could be invented which would be proof against systematic and ingenious decipherers. Military and naval signals resemble cryptographic writing in this respect. Among the learned authors who have discussed this comparatively unimportant subject may be mentioned Lord Bacon, Doctor William Blair, Bishop Wilkins, the marquis of Worcester, and many others.

Crys'tal. See CRYSTALLOGRAPHY, by PROF. THOMAS EGLESTON, A. M., E. M.

Crystal, a township of Hancock co., Ia. Pop. 58.

Crystal, a post-township of Tama co., Ia. Pop. 542.

Crystal, a township of Aroostook co., Me. Pop. 250.

Crystal, a post-twp. of Montcalm co., Mich. P. 746.

Crystal, a township of Oceana co., Mich. Pop. 181.

Crystal Lake, a township of Benzie co., Mich. Pop. 585.

Crystal Falls, a series of cascades of the Cascade Creek, in Montana. The creek flows into the Yellowstone River from the W. side, between its upper and its lower falls. One mile from its mouth occur the principal falls, consisting of three leaps, which together measure 129 feet, perpendicularly. They are remarkably beautiful.

Crystal Lake, a twp. of Hennepin co., Minn. P. 718

Crystal Lake, a twp. of Marquette co., Wis. P. 550.

Crystalline Lens. See EYE.

Crys'talline Rocks, a term applied in geology to such rocks as granite, quartz, and marble, which show by their crystalline structure that they have been brought into their present state by the action of chemical forces. In the early history of geology such rocks were called *primitive,* but they are not limited to any geological age, and it is not improbable that crystalline rocks may be in course of formation at the present time. The greater number of intruded igneous rocks (such as basalt) possess the crystalline structure.

Crystallog'raphy is the science of crystals. It is derived from the Gr. κρύσταλλος, a "crystal," and γράφω, to "describe." A crystal is a natural inorganic solid, bounded by plane surfaces, which are symmetrically arranged around certain imaginary lines called *axes.* Κρύσταλλος originally meant "ice;" it was afterwards applied to the transparent variety of quartz, because it was thought that rock-crystal was water turned into stone; it was subsequently applied indifferently to any solid which assumed a geometrical shape by natural laws.

All crystals may be referred to seven systems, six of which are referred to three axes, and one of them to four. These systems are divided into two classes, according as the axes are or not at right angles. Those which are at right angles are called the *orthometric,* and those which are not are called *clinometric* systems. In each one of them there are three varieties. When all the axes are equal and at right angles, the system is called *isometric.* When only two are equal, but all at right angles, it is called the *tetragonal.* When none of the axes are equal, but all are at right angles, it is called the *orthorhombic.* The *clinometric* systems are called, respectively, the *monoclinic,* the *diclinic,* and the *triclinic,* according as the axes have different inclinations. The single system of four axes is called the *hexagonal.*

In all of these systems one axis is placed upright, and is called the vertical axis. In the isometric, tetragonal, and hexagonal systems the other axes are simply called the basal axes, while in each of the other systems each axis has its own name. The axes always terminate in homologous parts, whether these parts are edges or angles.

The axes form a system of co-ordinates by which the position of any face may be determined. Taking the most general case of three unequal axes, the vertical axis is usually designated by *a;* the one from left to right, *b;* and the one from front to behind, *c.* Starting from the origin, the half-axes are determined as + or − (Figs. 43, 44). The distances on these half-axes, cut off by any crystal face, are called parameters. One of them can always be made equal to unity, so that $ma : nb : c$, with their signs, will always give the position of any crystal face with reference to a given variety of axes. When a face is parallel to an axis, it is said to cut it at a distance equal to infinity, and its coefficient for that axis will be so written, as $\infty a : \infty b : c$. Every face of a crystal which does not cut all the axes must either cut two or be parallel to two of them. According to Weiss, the symbol of *any* face will be $ma : nb : c$. Naumann simplifies it by using two letters, or their numerical values, and writing between them the capital letter which represents the type of the system—O for octahedron, P for pyramid, and R for rhombohedron. The two letters are always written in the same order: m is always equal to, greater or less than unity, and always greater than n, $m \gtreqless 1, m > n$. The coefficient 1 is never written.

Dana's symbols are simply a contraction of Naumann's, in which the letters for the primitive form of the system are left out, and ∞ is written *i.* Thus, mOn becomes mn, and $\infty O\infty$ becomes ii.

In every crystalline system a single form is taken as the base of the system. Any form belonging to the system *may* be taken for this base, but it is generally conceded to adopt pyramids. From this form all the others are derived by three very simple laws: (1) All the similar parts of a crystal may be similarly and simultaneously modified. This gives rise to *holohedral* forms. (2) Half the similar parts may be similarly and simultaneously modified. This gives rise to *hemihedral* forms, which in some of the systems are known as *inclined, parallel,* or *gyroidal* forms.

(3) One quarter of the similar parts may be similarly and simultaneously modified, giving rise to *tetartohedral* forms.

In the isometric system the modifications may be composed of one, two, three or six planes; in the tetragonal and hexagonal, of one and two; in the orthorhombic, monoclinic, diclinic, and triclinic, of only one plane at a time.

ORTHOMETRIC SYSTEMS.

Isometric System.—1. *Holohedral Forms.*

Three axes, a, a, a (Fig. 1), all equal and at right angles. The base of the system is the octahedron.

Octahedron, O.—When the axes a cut in the relation $a:a:a$, the solid is made up of eight faces, which are equilateral triangles (Fig. 2). There can be but one octahedron.

Hexahedron, $\infty O\infty$.—When the solid angles of the octahedron are modified by planes which are parallel to two of the axes, and cut one at a distance equal to unity, the resulting solid will be a cube, and will have the formula $a:\infty a:\infty a$ (Fig. 3).

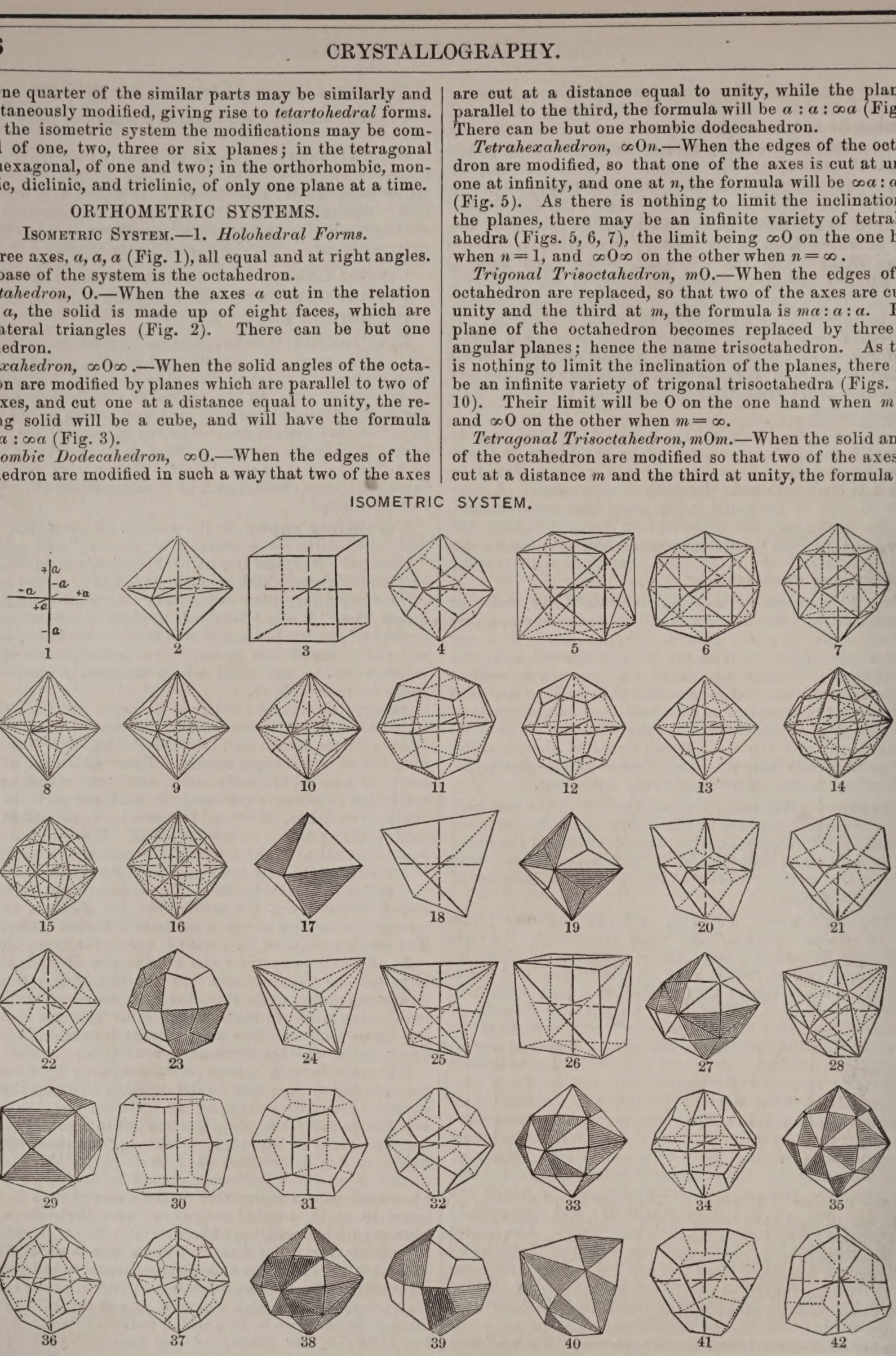
Rhombic Dodecahedron, ∞O.—When the edges of the octahedron are modified in such a way that two of the axes are cut at a distance equal to unity, while the plane is parallel to the third, the formula will be $a:a:\infty a$ (Fig. 4). There can be but one rhombic dodecahedron.

Tetrahexahedron, ∞On.—When the edges of the octahedron are modified, so that one of the axes is cut at unity, one at infinity, and one at n, the formula will be $\infty a:a:na$ (Fig. 5). As there is nothing to limit the inclination of the planes, there may be an infinite variety of tetrahexahedra (Figs. 5, 6, 7), the limit being ∞O on the one hand when $n=1$, and $\infty O\infty$ on the other when $n=\infty$.

Trigonal Trisoctahedron, mO.—When the edges of the octahedron are replaced, so that two of the axes are cut at unity and the third at m, the formula is $ma:a:a$. Each plane of the octahedron becomes replaced by three triangular planes; hence the name trisoctahedron. As there is nothing to limit the inclination of the planes, there may be an infinite variety of trigonal trisoctahedra (Figs. 8, 9, 10). Their limit will be O on the one hand when $m=1$, and ∞O on the other when $m=\infty$.

Tetragonal Trisoctahedron, mOm.—When the solid angles of the octahedron are modified so that two of the axes are cut at a distance m and the third at unity, the formula will

ISOMETRIC SYSTEM.



be $ma:a:ma$. The faces of the octahedron will be replaced by three tetragonal planes. As there is nothing to limit the inclination, there may be an infinite number of tetragonal trisoctahedra (Figs. 11, 12, 13). Their limit will be O on the one hand when $m=1$, and $\infty O\infty$ on the other when $m=\infty$.

Hexoctahedron, mOn.—When the angles of the octahedron are modified so that each axis is cut at a different distance, the formula will be $ma:na:a$. Each plane of the octahedron will be replaced by six triangular planes. As there is nothing to limit the inclination of the planes, there may be an infinite number of hexoctahedra (Figs. 14, 15, 16). This solid is the most interesting of all the solids of the system, for by successively changing the values of m and n all the other forms of the system may be derived from it. They can all be seen upon it in outline.

2. *Hemihedral Forms.*

In the isometric system there are three kinds of hemihedry: (1) *inclined*, (2) *parallel*, and (3) *gyroidal*. (1) The forms are said to be *tetrahedral* or *inclined* when the faces are not parallel. This is produced when all of the modifications are carried out on alternate homologous parts. (2) They are *dodecahedral* or *parallel* when alternate modifications are carried out in the same order on all the homologous parts. (3) *Gyroidal* forms are produced when alternate modifications are carried out alternately on all the homologous parts. The hexoctahedron is the only solid which allows of hemihedral forms according to the three laws.

(1) *Inclined or Tetrahedral Forms.*

Tetrahedron, $\pm\frac{O}{2}$.—When alternate faces of the octahedron are produced to the exclusion of the others (Fig. 17), a tetrahedron (Fig. 18) is formed. There can be but two tetrahedra, which are distinguished as + and −.

Hemi-Trigonal Trisoctahedron, $\pm\frac{mO}{2}$.—When mO is modified by this law, a tetrahedron is produced, each of whose faces is replaced by three tetragonal planes (Figs. 19, 20, 21, 22).

Hemi-Tetragonal Trisoctahedron, $\pm \frac{mOm}{2}$.—When mOm is modified by the same law, a tetrahedron is produced, each one of whose planes is replaced by three triangular planes (Figs. 23, 24, 25, 26).

Hemi-Hexoctahedron Inclined, $\pm \frac{mOn}{2}$.—When mOn is modified by the same law, a tetrahedron is produced, each one of whose faces is replaced by six triangular planes (Figs. 27, 28). The other forms, $\infty O\infty$, ∞O, and ∞On, do not admit of inclined hemihedry.

(2) *Parallel or Dodecahedral Forms.*

Hemi-Tetrahexahedron, ∞On.—When ∞On (Fig. 29) is modified, so that every alternate face is produced, a solid is formed (Figs. 30, 31, 32), which is often called the *pentagonal dodecahedron.*

Hemi-Hexoctahedron Parallel, $\pm \left[\frac{mOn}{2}\right]$.—When mOn is modified so that every other plane is taken in the same order on each face (Fig. 33), a solid (Fig. 34) is produced, which is often called the *diploid.*

3. *Gyroidal Form.*

Gyroid, $\pm \left(\frac{mOn}{2}\right)$.—When mOn is modified in such a way that the faces are taken alternately above and below (Fig. 35), a solid having twenty-four pentagonal faces is produced (Figs. 36, 37). This solid has not been found in nature.

(3) *Tetartohedral Form.*

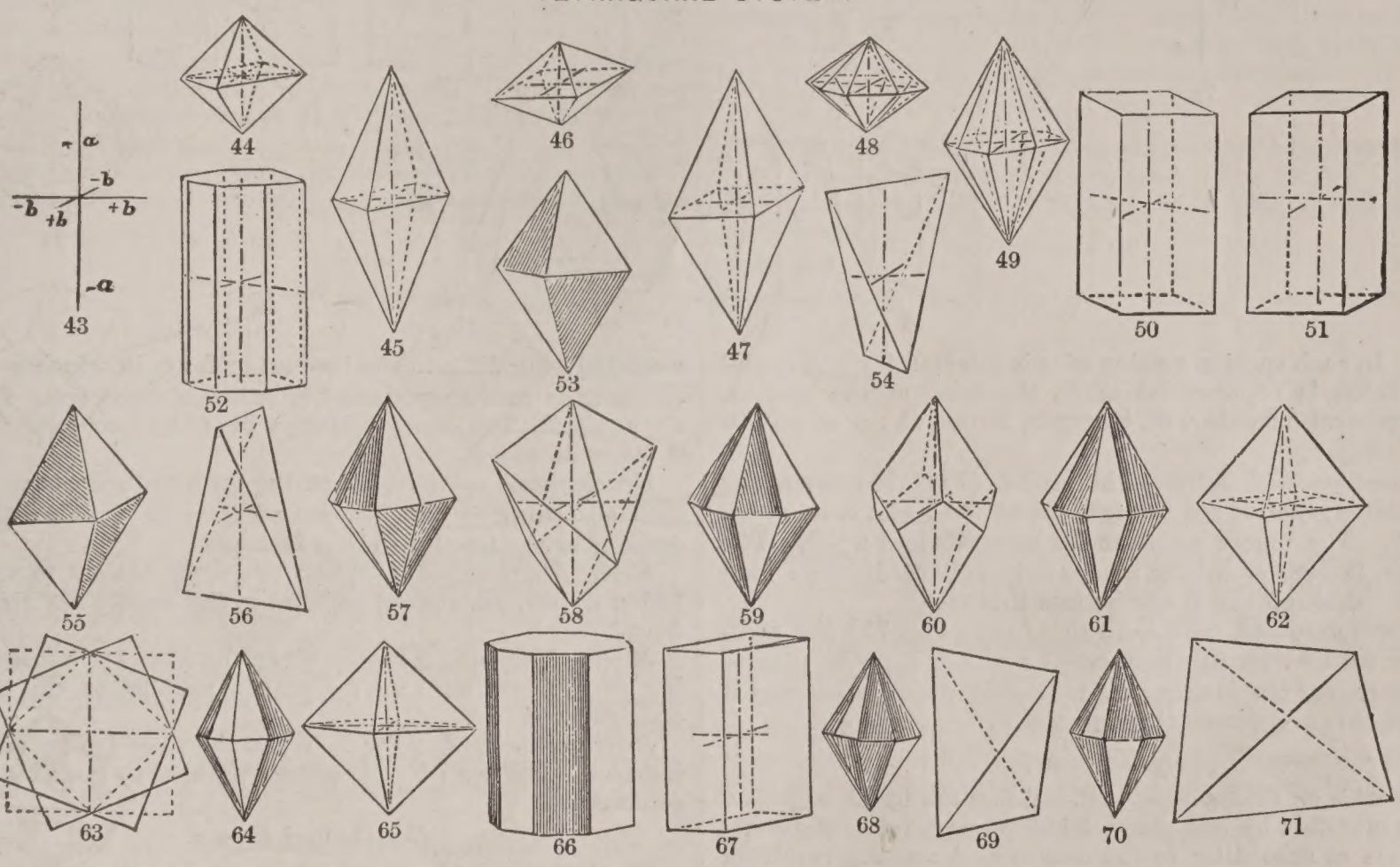
Tetartoid, $\pm rl \frac{mOn}{4}$.—mOn is the only form which allows of the carrying out of this law. When the hexoctahedron, the diploid, or the hemi-hexoctahedron inclined, is modified as shown in (Figs. 38, 39, and 40, Figs. 41 and 42) are produced, and as there are two pairs of these, which are right and left forms, they are distinguished as + and − r and l.

TETRAGONAL SYSTEM.

The axes of this system (Fig. 43) are of two kinds: a, the vertical, being longer or shorter than b, b, which are both equal.

Holohedral Forms.—Closed Forms.

Tetragonal Pyramid of the First Order, P.—When the axes are cut in the relation $a : b : b$, the pyramid of the first order or protopyramid (Figs. 44, 45) is produced. The plane which includes the axes b is a square, and is called the basal plane, and its angles and edges are called basal angles and edges. The planes which include the axes a, b are rhombs, and are called the terminal planes, and their angles and edges terminal angles and planes. The general formula for these pyramids is $ma : b : b$, for which the symbol is mP, in which $m \gtreqless 1$; but in that protopyramid P which is selected for the base of the system the value of m is taken for unity. As m may have any value, there may



be any number of pyramids. They are called acute or obtuse according as the terminal angle is acute or obtuse.

Pyramid of the Second Order, mP∞.—When the terminal edges of the protopyramid are modified by one plane in the relation $ma : \infty b : b$, a solid exactly similar in all respects to the protopyramid is produced, but turned 90°, so that the basal axes terminate in the centre of the basal edges (Figs. 46, 47). As m may be $\leqq 1$, there may be an infinite number of deuteropyramids. The two forms, P∞ and 2P∞, occur where $m = 1$ in the first case, and $m = 2$ in the second.

Ditetragonal Pyramid, mPn.—When the terminal edges of the protopyramid are modified in the relation $ma : nb : b$, a solid is produced in which each plane of the protopyramid is replaced by two planes (Figs. 48, 49). This solid $m \gtreqless 1$, $n > 1 < \infty$; hence there may be any number of ditetragonal pyramids. This solid bears the same relation to this system that the hexoctahedron does to the isometric system.

Open Forms.

Tetragonal Prism of the First Order, ∞P.—When the basal edges of P are modified by one plane, the axes will be cut in the relation $\infty a : b : b$, which produces simply four vertical planes (Fig. 50), which, as they are not closed, produce an open form and is the protoprism.

Tetragonal Prism of the Second Order, ∞P∞.—When the basal angles of the protopyramid are modified by one plane in the relation $\infty a : \infty b : b$, a prism (Fig. 51) is produced similar to the protoprism, but turned 90°.

Ditetragonal Prism, ∞Pn.—When the basal angles of the protopyramid are modified by two planes in the relation $\infty a : nb : b$, a prism (Fig. 52), made up of eight faces, which are parallelograms, is produced.

Basal Pinacoid, oP.—When the axes are cut by planes in the relation $a : \infty b : \infty b$, we have simply a pair of planes parallel to the basal axes.

Pyramidal Hemihedral Forms.

The pyramidal hemihedral forms of the tetragonal system are called (1) *scalenohedral* or *sphenoidal*, (2) *trapezoidal*, (3) *pyramidal.*

(1) *Scalenohedral.*

Sphenoid of the First Order, $\pm \frac{P}{2}$.—When alternate planes of P are produced, a solid resembling a tetrahedron is formed, in which the faces are isosceles triangles (Figs. 53, 54). There will be two of these sphenoids. This solid is named after the mineral *sphene*, in which it frequently occurs.

Sphenoid of the Second Order, $\pm \frac{m\text{P}\infty}{2}$.—When mP∞ is treated by this law, another sphenoid is produced, similar in every respect to the sphenoid of the first order, but turned 90° (Figs. 55 and 56).

Tetragonal Scalenohedron, $\pm \frac{m\text{P}n}{2}$.—When two faces together, taken alternately above and below, of mPn are taken (Fig. 57), the solid resulting is a sphenoid, each of whose faces is replaced by two planes (Fig. 58).

(2) *Trapezoidal.*

Tetragonal Trapezohedron, r or $l\frac{m\mathrm{P}n}{2}$.—When $m\mathrm{P}n$ is modified by taking one plane alternately above and below (Fig. 59), a solid (Fig. 60) is produced; to distinguish them from the other hemihedral forms of $m\mathrm{P}n$, they are called right, *r*, and left, *l*.

(3) *Pyramidal.*

Tetragonal Pyramid of the Third Order, $\frac{r}{l}$ and $\frac{l}{r}\frac{m\mathrm{P}n}{2}$.—When $m\mathrm{P}n$ is modified, by taking one alternate plane, but the same plane above and below (Fig. 61), a pyramid is formed which resembles the other pyramids of this system (Fig. 62). It is, however, turned to one side more or less, depending on the angle of $m\mathrm{P}n$. The relations of the pyramids and prisms of the three orders is illustrated by (Fig. 63). Another pyramid which is purely theoretical is formed as shown in (Figs. 64 and 65).

Prismatic Hemihedral Forms.

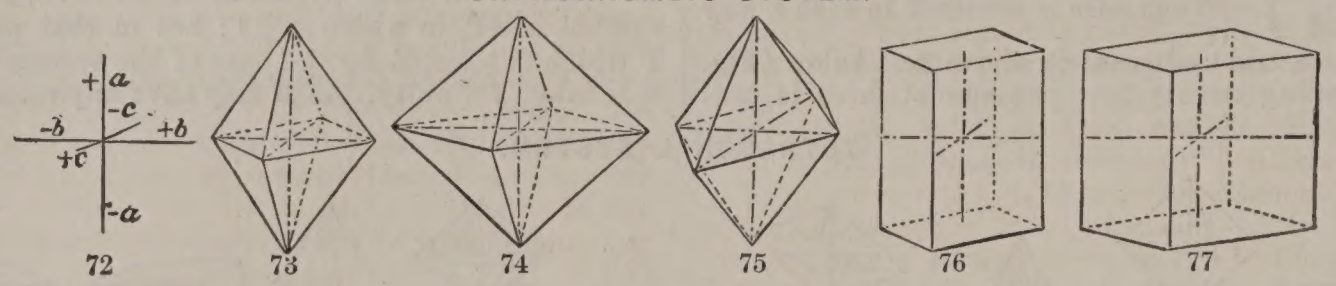
Tetragonal Prism of the Third Order, $\frac{r}{l}$ or $\frac{l}{r}\frac{\infty\mathrm{P}n}{2}$.—When $\infty\mathrm{P}n$ is modified so that only every other plane is taken (Fig. 66), a prism is produced resembling the prism of the second order, except that the basal axes terminate to one side of the centre of the faces of the prism (Fig. 67).

Tetartohedral Forms.—Sphenoidal.

Tetarto-Sphenoid, $\pm\frac{r}{l}\frac{m\mathrm{P}n}{4}$.—When $m\mathrm{P}n$ is modified as shown in Fig. 68, it produces a sphenoid (Fig. 69), called the sphenoid of the third order.

Plagio-Sphenoid.—When $m\mathrm{P}n$ is modified as in (Fig. 70), it produces a sphenoid (Fig. 71), called the sphenoid of the fourth order. It has not been found in nature.

ORTHORHOMBIC SYSTEM.



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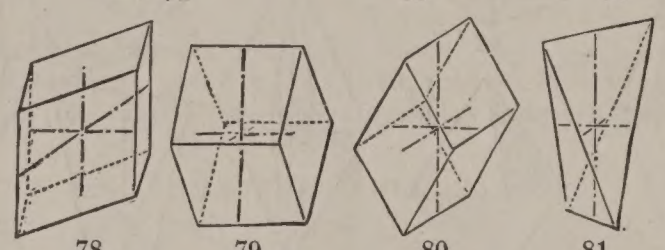

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The axes of this system (Fig. 72), *a*, *b*, *c*, all unequal, but all at right angles.

Holohedral Forms.—Closed Forms.

Rhombic or Protopyramid, P.—When the axes are cut in the relation $a:b:c$, the solid produced is a pyramid, whose faces are scalene triangles (Fig. 73). The planes *ab*, *ac*, and *bc* are rhombs of different values. As the basal axes form the diagonals of the rhombs *bc*, they are called, *b* the *macro* or *longer*, and *c* the *brachy* or *shorter* axis or diagonal. In each species a value of *a* is selected for unity, and this value is represented in P, the base of the system. The general formula will, however, be $ma:b:c$, or $m\mathrm{P}$, in which $m \gtreqless 1$.

Macropyramid, $m\breve{\mathrm{P}}n$.—This solid (Fig. 74) resembles the protopyramid, but the symbol is $ma:nb:c$, in which $m \gtreqless 1$. The macro axis has for its coefficient $n>1$. The planes, therefore, cut the macro axis extended. The long mark ‾ through the P symbolizes this fact.

Brachypyramid, $m\breve{\mathrm{P}}n$.—In this form (Fig. 75) the symbol is $ma:b:nc$, in which $m \gtreqless 1$ and $n>1$. The planes, therefore, cut the brachy axis extended, which is expressed by the curve ⌣ drawn through the P.

Open Forms.

Rhombic or Protoprism, ∞P.—When the basal edges of P are modified by one plane, which is parallel to the vertical axis *a*, according to the law $\infty a:b:$ c, the resulting form is composed of vertical parallelograms (Fig. 76).

Macroprism, $\infty\breve{\mathrm{P}}n$.—When the basal edges of $m\breve{\mathrm{P}}n$ are modified by planes passed according to the law $\infty a:nb:c$, in which $n>1$, the macro axis extended will be cut. The form consists of four vertical parallelograms (Fig. 77).

Brachyprism, $\infty\breve{\mathrm{P}}n$.—When the basal of $m\breve{\mathrm{P}}n$ edges are modified according to the law $\infty a:b:nc$, in which $n>1$ (Fig. 78), the resulting form is a prism, in which the brachy axis extended is cut.

Basal Pinacoid, oP.—When the axes are cut in the relation $a:\infty b:\infty c$, we have simply two pairs of planes.

Macrodome, $m\breve{\mathrm{P}}\infty$.—When the terminal edges of P are modified according to the law $ma:\infty b:c$, in which $m \gtreqless 1$, the form is roof-shaped, and is called a *dome*, from *domus*, a "house." The dome is always over the axis from which it takes its name.

Brachydome, $m\breve{\mathrm{P}}\infty$.—When the terminal edges are modified according to the law $ma:b:\infty c$, in which $m \gtreqless 1$, a dome over the brachy axis is formed.

Basal Pinacoid, oP.—When the axes are cut in the relation $a:\infty b:\infty c$, planes parallel to the basal axes are produced.

Macro Pinacoid, $\infty\breve{\mathrm{P}}\infty$.—When the axes are cut according to the law $\infty a:\infty b:c$, planes parallel to the axis *b* are produced.

Brachy Pinacoid, $\infty\breve{\mathrm{P}}\infty$.—When the axes are cut according to the law $\infty a:b:\infty c$, planes parallel to the axis *c* are produced.

Hemihedral Forms.

The hemihedral forms of this system consist of one solid, the rhombic sphenoid, and pairs of planes or single planes.

Rhombic-Sphenoid, $\pm\frac{m\mathrm{P}}{2}$.—When alternate planes of the protopyramid are taken, a sphenoid is formed whose faces are scalene triangles (Fig. 81).

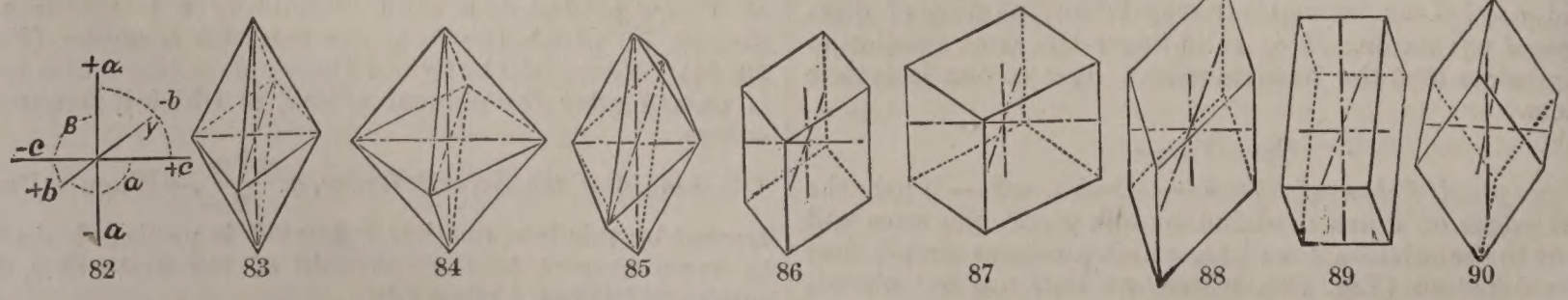
Hemimorphic Forms.

According to the law of symmetry, when a crystal is terminated by modifications at one extremity of an axis, the same planes should be repeated at the other. In this and the hexagonal system there occur crystals where this law does not hold good, and these exceptions are called *hemimorphic* forms.

Limit Forms.

When the protoprism is accompanied by the macro and brachy pinacoids, the prism has a hexagonal section. When the angle of the prism is near 120°, forms are produced which are so similar to hexagonal combinations that it is frequently difficult, without careful measurement or a determination of the optical properties of the mineral, to make the distinction.

MONOCLINIC SYSTEM.



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CLINOMETRIC SYSTEMS.

Monoclinic System.

The axes of this system (Fig. 82) are of three kinds, and have only a single inclination. The angle γ of the plane $ac = 90°$, the angle α of the plane $bc = 90°$, the angle β of the plane $ab \gtrless 90°$. a is called the *vertical*, b the *clino*, and c the *ortho* axis or diagonal. The plane of the basal axes is thus inclined to the vertical axis, while the ortho and clino axes are at right angles to each other.

Holohedral Forms.—Open Forms.

Monoclinic Pyramid, $\pm$ P.—As the axes b and c are of unequal length, and the plane which contains them makes two angles with the vertical axis, the one in front being an obtuse and the one behind making an acute angle, the relation $a : b : c$ will produce only a hemipyramid or a pair of planes, above in front or behind below. The pyramid will be formed by these and the other pair of planes behind above and in front below. The pyramid itself will be $\pm$ P (Fig. 83). The two planes, above in front and below behind, are by convention called $-$ P, and the others $+$ P. When m is not equal to 1, the symbol becomes $\pm m$P.

Orthopyramid, $\pm m\breve{P}n$.—When the axes are cut in the relation $ma : b : nc$, the two forms produce the orthopyramid (Fig. 84).

Clinopyramid, $\pm m\breve{P}n$.—When the axes are cut in the relation $ma : nb : c$, the two forms produce the clinopyramid (Fig. 85).

Protoprism, ∞P.—When the basal edges of the protopyramid are modified, the axes are cut in the relation $\infty a : b : c$. A monoclinic prism (Fig. 86) results.

Orthoprism, $\infty\breve{P}n$.—When the basal edges of the protopyramid are modified by one plane in such a way that the ortho axis extended is cut at a distance n, the relation is $\infty a : b : nc$ (Fig. 87).

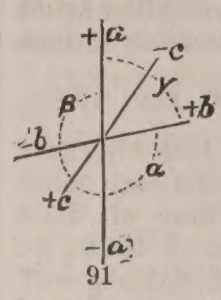
Clinoprism, $\infty\breve{P}n$.—When the orthopyramid is modified so that the clino axis extended is cut at a distance n, the relation is $\infty a : nb : c$ (Fig. 88).

Orthodome, $\pm m\breve{P}\infty$.—As the edges which join the axes a, b are of two kinds, only parallel planes will be produced by a single modification, $ma : b : \infty c$. The orthodome (Fig. 89) will therefore be made up of two hemi-orthodomes. The same convention for the signs $+$ and $-$ is made as for the pyramid.

Clinodome, $m\breve{P}\infty$.—As the edges which join the axes a, c are alike, a dome results from the relation $ma : \infty b : c$ (Fig. 90).

Diclinic System.

DICLINIC SYSTEM.



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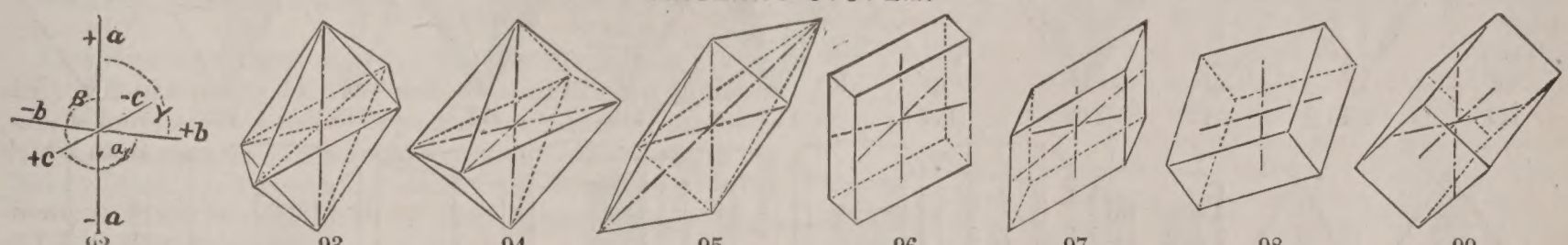
The axes (Fig. 91) of this system are of three kinds, and have two inclinations. The angle γ of the planes $ab \gtrless 90°$, the angle α of the planes $bc = 90°$, the angle β of the planes $ac \gtrless 90°$. The basal axes are thus at right angles to each other, but the plane which contains them has two inclinations to the vertical axis.

Diclinic Pyramid, $\dot{P}$.—As the faces of the pyramid are equal only in pairs, the pyramid is made up of four tetarto pyramids. This system admits of only hemi forms and tetarto forms. a is called the vertical, b the macro, and c the brachy axis. It admits of tetarto, macro, and brachy pyramids and prisms, and tetarto, macro, and brachy domes and the pinacoids. Mitscherlich announced that he had discovered this system in a crystal of hyposulphite of lime, but subsequent crystallographic and optical researches proved that this salt was triclinic; in consequence of which the system was abandoned by most crystallographers. It has, however, the same theoretical basis as any of the other systems, and there does not seem to be any good reason why it should not be preserved.

Triclinic System.

The axes of this system (Fig. 92) are of three kinds and have three inclinations, the angles α, γ, β, are $\gtrless 90°$. The axis a is called the vertical, b the macro, and c the brachy axis.

TRICLINIC SYSTEM.



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Triclinic Pyramid, $\dot{P}'_{,}$.—When the axes (Fig. 92) are cut in the relation $a : b : c$, a pair of planes are produced. The pyramid is made up of four tetarto-pyramids, which are distinguished by accents. P' signifies the planes right above, $\dot{P}$ the planes left above, P, the planes right below, and $\dot{P}_{,}$ the planes left below, with their diagonally opposite planes. The pyramid is $\dot{P}'_{,}$. The protopyramid (Fig. 93) will always be $m\dot{P}'_{,}$, except when m equals one, the macropyramid (Fig. 94) is $m\dot{P}'_{,}n$, and the brachy pyramid (Fig. 95) $m\dot{P}'_{,}n$.

Triclinic Prism, ∞P'.—When the relation $\infty a : b : c$ is carried out, it produces a single pair of planes, whose symbol is ∞P' or ∞P, according as the planes are to the right or the left. Each prism is made up of two hemiprisms. The whole form (Fig. 96) is $\infty\dot{P}$. The brachy prism (Fig. 97) is $\infty\dot{P}'$, and the macro prism $\infty\dot{P}'n$.

Triclinic Domes.—The domes are single pairs of planes, and each dome is made up of two hemidomes. The macrodomes are made up of $m\breve{P}'\infty$ and $m\breve{P}_{,}\infty$ (Fig. 98), and the brachydomes of $m\breve{P}'\infty$ and $m\breve{P}_{,}\infty$ (Fig. 99).

The only other planes are the basal pinacoid, oP, the macro pinacoid, $\infty\breve{P}\infty$, and the brachy pinacoid, $\infty\breve{P}\infty$.

SYSTEM WITH FOUR AXES.

Hexagonal System.

The hexagonal system is referred to four axes. One of these a (Fig. 100) is vertical. It is at right angles to the plane of the basal axes b, which are inclined to each other at an angle of 60°. The vertical is the optical axis, and is consequently the line of greatest physical as well as mathematical importance.

Holohedral Forms.—Closed Forms.

Hexagonal Pyramid, P.—When the axes (Fig. 100) are cut in the relation $a : \infty b : b : c$, the pyramid of the first order (Fig. 101), or protopyramid, is produced. In the form chosen for the base of the system the vertical axis is cut at a distance equal to unity, but it may be cut at other distances, $m \gtrless 1$, so that the general symbol is mP. The pyramids are said to be acute or obtuse according as the terminal angle is acute or obtuse.

Hexagonal Pyramid of the Second Order, mP2.—When the terminal edges of the protoprism are replaced by one plane, so that the axes are cut in the relation $ma : 2b : b : 2b$, another pyramid called the deuteropyramid (Fig. 102), which is similar in all respects to the protopyramid, except that it is turned 30° from it, is produced.

Dihexagonal Pyramid, mPn.—When the terminal edges of the protopyramid are replaced by two planes, all three of the axes b will be cut at unequal distances. If the shortest parameter is called unity or b, and the longest μb, the third parameter will have a value of $\frac{\mu}{\mu-1}b$, and its length will be between 1 and 2. The axes will be in the relation $ma : \mu b : b : \frac{\mu}{\mu-1}b$, or $ma : \mu b : b : nb$, in which $m \gtrless 1$, $\mu \gtrless 2$, and $n = \frac{\mu}{\mu-1}$ (Fig. 103).

Open Forms.

Hexagonal Prism, ∞P.—When the basal edges of the protopyramid are modified by one plane which is parallel to the vertical axes, they are cut in the relation $\infty a : \infty b : b : b$, and the protoprism (Fig. 104) is produced.

Hexagonal Prism of the Second Order, ∞P2.—When the basal edges of the deuteropyramid are modified by one plane parallel to the vertical axis, a deuteroprism is produced (Fig. 105). The axes are cut in the relation $\infty a : 2b : b : 2b$. This prism is in every respect similar to the protoprism, but it is turned 30°.

Dihexagonal Prism, ∞Pn.—When the basal edges of the dihexagonal pyramid are modified by one plane, so that the axes are cut in the relation $\infty a : \mu b : b : \frac{\mu}{\mu-1}b$, a dihexagonal prism (Fig. 106) is produced.

Basal Pinacoid, oP.—When the axes are cut in the relation $a : \infty b : \infty b : \infty b$, the basal pinacoid is produced.

Pyramidal Hemihedral Forms.

This system admits of four different kinds of hemihedral forms, derived from its pyramids, which are called (1) *scalenohedral*, (2) *trapezoidal*, (3) *pyramidal*, and (4) *trigonal hemihedry*.

(1) *Scalenohedral.*

Rhombohedron of the First Order, $\pm \frac{m\mathrm{P}}{2}$.—When mP is modified by producing every alternate plane (Fig. 107), the rhombohedron (Fig. 108) is produced. As there are two of them, they are designated by the signs + and −.

Rhombohedron of the Second Order, $\pm \frac{\infty\mathrm{P2}}{2}$.—When ∞ P2 is modified by the same law (Fig. 109), other rhombohedra (Fig. 110) are produced, similar to those of the first order, but turned 30°. As there is no limit to the angles of the pyramids from which they are produced, there are an infinite variety of rhombohedra. They are called acute or obtuse according as the terminal angle is acute or obtuse.

Hexagonal Scalenohedron, $\pm \frac{m\mathrm{P}n}{2}$.—When the dihexagonal pyramid is modified, so that every two alternate faces above and below are taken (Fig. 111), the scalenohedron (Fig. 112) is produced. There are four of these scalenohedra. In order to get a clear idea of them, we have only to suppose that the terminal or basal edges of the rhombohedra were modified by two or the terminal angles by six planes.

(2) *Trapezoidal Hemihedry.*

Hexagonal Trapezohedron, r or $l \frac{m\mathrm{P}n}{2}$.—When the dihexagonal pyramid is modified by the extension of every alternate plane above and below (Fig. 113), the hexagonal trapezohedron (Fig. 114) is produced. They are distinguished as right and left.

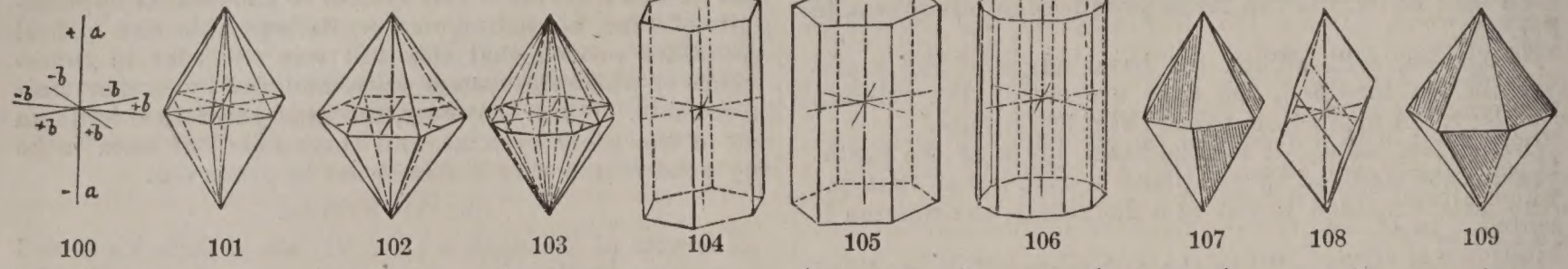
(3) *Pyramidal Hemihedry.*

Hexagonal Pyramid of the Third Order, $\frac{r}{l}$ or $\frac{l}{r} \frac{m\mathrm{P}n}{2}$.—When mPn is modified as in Fig. 115, a hexagonal pyramid, in which the basal axes terminate to one side of the centre of the basal edges, is produced (Fig. 116), which, to distinguish it, is called the pyramid of the third order.

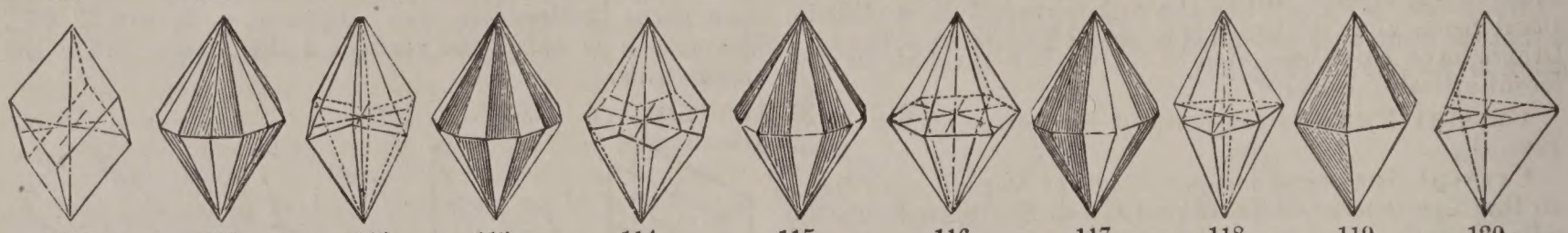
(4) *Trigonal Hemihedry.*

Ditrigonal Pyramid, r or $l \left[\frac{m\mathrm{P}n}{\frac{1}{2}2}\right]$.—When mPn is modified so that every alternate pair of planes, but the same planes above and below, are taken (Fig. 117), a ditrigonal pyramid (Fig. 118) is produced; to distinguish the symbol it is written in brackets.

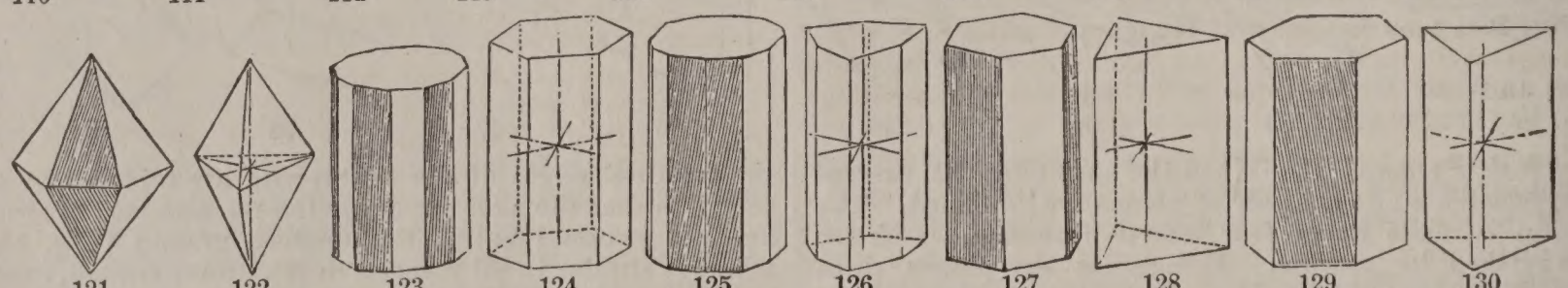
HEXAGONAL SYSTEM.



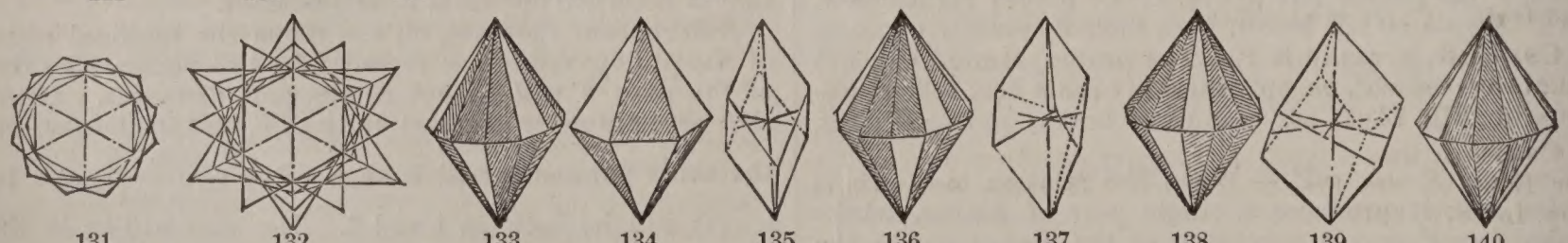
100 101 102 103 104 105 106 107 108 109



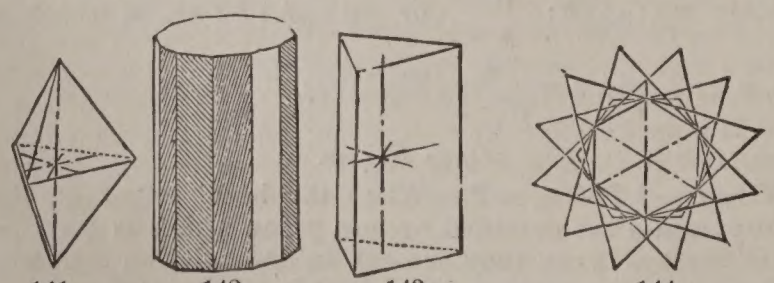
110 111 112 113 114 115 116 117 118 119 120



121 122 123 124 125 126 127 128 129 130



131 132 133 134 135 136 137 138 139 140



141 142 143 144

Trigonal Pyramid of the First Order, r or $l \frac{m\mathrm{P}}{2}$.—When mP (Fig. 119) is modified by extending every other plane, but the same plane above and below, a trigonal pyramid of the first order (Fig. 120) is produced.

Trigonal Pyramid of the Second Order, r or $l \frac{m\mathrm{P2}}{2}$.—When mP2 (Fig. 121) is modified by the same law, a trigonal pyramid is produced.

Prismatic Hemihedral Forms.

Hexagonal Prism of the Third Order, $\frac{r}{l}$ or $\frac{l}{r} \frac{\infty\mathrm{P}n}{2}$.—When ∞Pn is modified by the extension of every alternate plane (Fig. 123), a hexagonal prism of the third order is produced.

Ditrigonal Prism, r or $l \left(\frac{\infty\mathrm{P}n}{2}\right)$.—When ∞Pn is modified by extending pairs of alternate planes (Fig. 125), a ditrigonal prism (Fig. 126) is produced.

Trigonal Prism of the First Order, $\pm \frac{\infty\mathrm{P}}{2}$.—When ∞P is modified by the extension of every other plane (Fig. 127), a trigonal prism of the first order (Fig. 128) is produced.

Trigonal Prism of the Second Order, $\pm \frac{\infty\mathrm{P2}}{2}$.—When ∞ P2 (Fig. 129) is modified by the same law, an obtuse trigonal prism is produced (Fig. 130).

The relation of all these forms to each other is made plain by Figs. 131 and 132. Fig. 131 shows the relative positions of the hexagonal pyramids and prisms of the first, second, and third orders, and the dihexagonal pyramid and prism (Fig. 132) shows the relations of the first, second, and third orders, the scalenohedron, the trigonal and ditrigonal pyramids and prisms.

Pyramidal Tetartohedral Forms.

There are two kinds of pyramidal tetartohedry in the hexagonal system, *rhombohedral* and *trapezoidal.*

Rhombohedral Hemihedry.

Rhombohedron of the Third Order, $\pm \frac{r}{l}$ or $\frac{l}{r} \frac{m\mathrm{P}n}{4}$.—When the dihexagonal pyramid or the hexagonal pyramid of the third order is modified as shown in Figs. 133 and 134, a rhombohedron of the third order (Fig. 135) is produced.

Trapezoidal Hemihedry.

Trigonal Trapezohedron, $\pm r$ or l $\frac{mPn}{4}$.—When mPn is modified as shown in Figs. 136 and 138, the solids (Figs. 137 and 139) are produced. These solids were formerly called plagihedra. They vary in form according as the terminal angle is acute or obtuse.

Trigonal Pyramid of the Third Order, $\pm r$ or l $\left[\frac{mPn}{4}\right]$.—When mPn is modified as shown in Fig. 140, a trigonal pyramid (Fig. 141) is produced.

Prismatic Tetartohedral Form.

Trigonal Prism of the Third Order, $\pm r$ or l $\frac{\infty Pn}{4}$.—When ∞Pn is modified as shown in (Fig. 142), a trigonal prism is produced (Fig. 143). The position of these tetartohedral forms is illustrated in the diagram Fig. 144, which shows the relative position of the hexagonal pyramids of the first and second orders, the dihexagonal pyramid and prism, and the trigonal pyramids and prisms of the third order.

THOMAS EGLESTON.

Crys'tal Pal'ace, a building erected in London in 1851, in which the great World's Fair of that year was held. It was designed by Sir Joseph Paxton, and was composed of glass and iron, excepting the floors, which were of wood. It was 1851 feet in length, and covered an area of twenty-one acres. During the exhibition it was visited by over 6,000,000 persons. The whole structure was removed soon afterwards. A permanent crystal palace was erected in 1854 at Sydenham, eight miles from London. It cost £1,450,000, and contains an extensive museum, in which almost every department of art and science is represented. In 1853 a crystal palace for another universal exhibition was erected in New York, after a design by Messrs. Carstenson and Gildemeister. It was burned in 1858. Others have since been erected for similar purposes in different cities of Europe.

Crystal Peak, a township of Washoe co., Nev. Pop. 120.

Crystal Springs, a post-village of Copiah co., Miss., on the New Orleans Jackson and Great Northern R. R., 25 miles S. W. of Jackson. Pop. 864.

Csa'ba, a market-town of Hungary, 7 miles S. S. W. of Bekes, is well built. It has an extensive trade in grain, wine, and cattle. Previous to 1840 it was but a village. Pop. in 1870, 30,022.

Csa'nád, a county of Hungary, is bounded on the N. by Bekes, on the E. by Arad, on the S. by Torontal, and on the W. by Csongrad. Area, 640 square miles. It consists of a plain, which is very fertile, but the climate and water are unhealthy. The chief products are wheat, wine, tobacco, and fruit. Chief town, Mako. Pop. in 1869, 95,847.

Csanád, a decayed market-town of Hungary, in the county of Csanád, on the Máros, 44 miles N. of Temesvár. Pop. in 1870, 5250.

Cserven'ka, a town of Hungary, in the county of Upper Bács, on the Franzens Canal, 130 miles S. of Pesth. Pop. in 1870, 6877.

Cson'grad, a county of Hungary, is bounded on the N. by Szolnok, on the E. by Bekes and Csanad, on the S. by Torontal, and on the W. by Pesth. Area, 1280 square miles. The soil and products are similar to those of Csanad. It is traversed by the Theiss. Chief town, Szegedin. Pop. in 1869, 207,585.

Csongrad, a market-town of Hungary, in a county of its own name, is at the confluence of the Theiss with the Körös, 70 miles S. E. of Pesth. Pop. in 1870, 17,356.

Cte'noid Fishes [from the Gr. κτείς (gen. κτενός), a "comb," from the comb-like teeth of the scales], an order of fishes (in Agassiz's former classification) characterized by having the skin covered with scales whose margins have notches or spines resembling the teeth of a comb. There are sometimes many rows of teeth or little spines, sometimes but one, the rows wearing off successively as new ones are formed. Living fishes of this order are numerous; among them are the turbot, perch, and flounder. Fossil fishes of this class are comparatively few. The word *ctenoid* is retained, as expressing an important character, but no such order as the above is now recognized.

Cte'sias [Κτησίας], a Greek historian, a native of Cnidos, in Caria, lived about 400 B. C. He passed many years in Persia as physician to King Artaxerxes Mnemon, and afterwards returned to his native place. He wrote a "History of Persia" (Περσικά) and a "Description of India." His reputation for veracity is not high.

Ctesib'ius [Κτησίβιος], a famous Greek mechanician who flourished at Alexandria about 130 B C. He invented the clepsydra, a pump, and other machines. He is said to have been the first who applied the elastic force of air as a motive-power.

Ctes'iphon, an ancient city of Assyria, on the E. bank of the Tigris, 20 miles S. E. of Bagdad, was the capital of the kings of Parthia. Its ruins still attest its former magnificence. The site is now occupied by a village called Modain.

Ctesiphon [Κτησιφῶν], an Athenian who proposed that a crown of gold should be given to Demosthenes for his public services. For this act he was prosecuted by Æschines, and defended with success by Demosthenes in his famous oration "On the Crown," 330 B. C.

Cu'ba, the largest of the Antilles or West Indian Islands, and the most important of all the Spanish colonial possessions, is in the Caribbean Sea, about 130 miles S. of Florida, from which it is separated by the Bahama Channel. It is about 45 miles W. of Hayti, and extends from lon. 74° to 84° 58′ W. It is about 800 miles long E. and W., has a width varying from 130 to 25 miles, and an area of 45,883 square miles. Good harbors occur on the coasts at Havana, Matanzas, and other places. Cuba is traversed lengthwise by a mountain-chain. The highest peak, the Pico Turquinos, rises about 7750 feet above the level of the sea. From the base of the range the country expands into savannas or meadows, sprinkled with lagoons and swampy flats. The rivers are all small, and not navigable except for small boats. Granite, gneiss, and limestone are abundant here. Among the mineral resources of Cuba are copper, coal, silver, iron, and marble. Several productive mines of copper have been opened in the mountains.

The climate is hot and dry nearly all the year, the mean temperature near the sea-coast being about 78° F. In summer the mercury seldom rises above 88°. Earthquakes frequently occur. The vegetation is very luxuriant, and the highlands are covered with forests of mahogany, ebony, cedar, and fustic. The pineapple, orange, banana, lemon, and melon flourish here. The cultivated lands produce abundantly sugar, cotton, coffee, rice, maize, tobacco, and indigo. Sugar is the chief article of export. In 1871 the sugar exported amounted to 1,126,141 boxes (551,896 to the U. S.) of 400 pounds each, and 416,153 casks (376,628 to the U. S.). The export of tobacco from Havana amounted in 1869 to 22,000,000 pounds, exclusive of 179,000,000 cigars. The commerce of Havana embraces about 50 per cent. of the aggregate exports, and 75 per cent. of the imports of the island. The aggregate production is valued at $126,000,000. Of manufactures, the most important are the making of sugar, molasses, and rum, the preparation of coffee, the making of cigars, the bleaching of wax, and the manipulation of the minor staples of the island. Cattle-breeding is increasing, the number being estimated at about 1,300,000 head. The number of vessels entering the port of Havana amounted in 1869 to 1669, of which 721 were from the U. S. The aggregate length of railroads in operation amounted in 1871 to 397 miles. The supreme political and military command is in the hands of a governor captain-general. The island is divided into two departamentos—the western and the eastern. The former is subdivided into two gobiernos (Havana and Matanzas) and twenty tenencias de gobierno; the latter into two gobiernos (Santiago de Cuba and Puerto Principe) and eight tenencias de gobierno. There is a university at Havana with about 400 students. The entire population (except foreign residents) belongs to the Roman Catholic Church, which has an archbishop at Santiago de Cuba and a bishop at Havana. Pop. in 1867, 1,414,508, of whom 370,553 were slaves, 760,612 were white, and 283,343 free colored. Capital, Havana.

History.—This island was discovered in Oct., 1492, by Columbus, who named it Juana; Cuba is the aboriginal name. He found it occupied by a mild and indolent race of aborigines. In 1511 this island was colonized by the Spaniards, who with a few short intervals have retained possession of it ever since that date. The cruel treatment of the Indians under the administration of Hernando greatly injured the prosperity of the island, as in 1553 the entire Indian population had become extinct. In 1534, and again in 1554, Havana was destroyed by the French, but each time it was speedily rebuilt, and in 1584 it was strongly fortified. In 1624 it was taken by the Dutch, but soon restored. In the second half of the seventeenth century the island greatly suffered from the invasion of filibusters, who in 1688 plundered and destroyed the city of Puerto Principe. After the suppression of these bands of robbers the prosperity of the island rapidly increased, and in 1717 the Spanish government monopolized the tobacco trade. In 1762, Havana was taken by the English, who in 1763 restored it in exchange for Florida. The Spanish government now found it necessary to allow the free com-

mercial intercourse of Cuba with Spain. The commercial importance of the island rapidly increased, but it became at the same time the centre of the slave-trade for all Spanish South America. From 1789, in which year the slave-trade was freed from all former restrictions, to 1820, the average number of slaves imported was 7500; from 1820 to 1841, about 13,000. In 1845 the importation of slaves was forbidden, and from 1845 to 1847 the vigilance of Captain-General Concha suppressed the slave-trade almost entirely; after that date it was again revived through the indulgence of the Spanish authorities. The commercial prosperity of the island had, in the mean while, been considerably increased by the decay of Hayti, the abolition of the tobacco monopoly (1816), and the establishment of general freedom of trade (1818). Several insurrections of the negroes, the most important of which were those of 1844 and 1848, were suppressed; in the latter more than 10,000 negroes perished. Since the annexation of Florida to the U. S. the government of Washington has shown a considerable interest in the destiny of Cuba. In 1848, President Polk authorized the American ambassador in Madrid to offer the Spanish government $100,000,000 for the sale of Cuba, but the proposition was promptly rejected. In 1849, Colonel Narciso Lopez and other Cubans unsuccessfully attempted to revolutionize Cuba. In May, 1850, Lopez, who had fled to the U. S., sailed with 600 filibusters from the U. S., and landed at Cardenas, but had immediately to return. In Aug., 1851, another expedition of 500 armed men under Lopez and the American colonel Crittenden landed at Playtas, but did not meet with the expected support on the part of Cubans. Both Lopez and Crittenden were taken prisoners and executed. In 1859, President Fillmore refused to join a treaty proposed by England and France, which was to guarantee the possession of the island to Spain. Hostilities committed by a Spanish man-of-war against the American steamer Black Warrior brought on a serious complication between the U. S. and Spain. In Oct., 1854, three ambassadors of the U. S. at European courts, Buchanan, Soulé, and Mahon signed the Ostend manifesto, which claimed for the U. S., in case of a refusal on the part of Spain to sell the island, the right to take and annex it. The fear which the election of Buchanan as President of the U. S. caused to Spain was, however, not realized. The Spanish revolution of Sept., 1868, led soon to a rising of the friends of Cuban independence. On Oct. 10, Manuel Carlos Cespedes, a lawyer of Bayamo, issued an address to the Cubans, in which he proclaimed the republic and separation from Spain. On Oct. 20 the Cuban insurgents had the first encounter with the Spaniards at Las Tunas. A provisional government, appointed in Bayamo, promised the speedy abolition of slavery. In April, 1869, a constituent assembly proclaimed the republic of Cuba, and elected Cespedes president. The total abolition of slavery and the introduction of freedom of religion were among the measures decreed by the assembly. The war was carried on on both sides, but in particular on that of the Spaniards, with great severity. The Spanish volunteers even went so far as to defy the authority of Captain-General Dulce, who had to return to Spain. His successor, Caballero de Rodas, was equally unsuccessful in suppressing the insurrection, and was, in Dec., 1870, succeeded by Count de Valmaseda. In April, 1874, the insurrection was not yet suppressed. (See Ramon de la Sagra, "Historia fisica, economica, etc. de la isla de Cuba," 1842–45, 11 vols.; Sievers, "Cuba," 1861; La Pezuela, "Historia de la isla de Cuba," 1868–69, 2 vols.)

A. J. Schem.

Cuba, a township and village of Sumter co., Ala., on the Alabama and Chattanooga R. R. Pop. 480.

Cuba, a post-village of Putnam township, Fulton co., Ill., on the Toledo Peoria and Warsaw R. R. Pop. 568.

Cuba, a township and village of Lake co., Ill. P. 970.

Cuba, a post-village and township of Allegany co., N. Y., on the Erie R. R. and Genesee Valley Canal, 12 miles N. E. of Olean. It has manufactures of leather and other goods, a national and a private bank, and a large trade. It has also six churches and a weekly paper. Pop. of township, 2397.

Cu'bature, the measurement of the volume of a solid body. If the equation to the surface enclosing the body be given in rectangular co-ordinates, its volume is expressed by the triple integral $\iiint dx\,dy\,dz$, where the integration is to be extended to all points of the solid, according to the methods explained in all text-books. When the equation to the surface is given in polar co-ordinates, its volume is expressed by the integral $\iiint r^2 \sin\theta\, dr\, d\theta\, d\phi$.

Cubb Creek, a post-township of Jefferson co., Neb. Pop. 261.

Cube [Gr. κύβος, a "die"], in geometry, a solid body contained by six equal squares. It is also called a regular hexahedron, and is one of the five regular solids. It is a form which often occurs in nature, especially among crystals. In arithmetic the cube of a number is its third power, or the product obtained by multiplying that number by its square. The duplication of the cube—that is to say, the finding of a cube having double the volume of a given cube—is one of those problems which admit of no solution by common geometry, on which, as on the quadrature of the circle and the trisection of an angle, a vast amount of ingenuity has been vainly expended in every age since the dawn of mathematical science. The solid contents of a cube may be expressed by the third power of the number which expresses the length of one of its sides.

Cu'beb [Lat. *cubeba;* Fr. *cubèbe;* Ger. *Kubebe;* Arabic, *kabâbeh*], the dried, unripe fruit of the *Cubeba officinalis* (and probably of other species), climbing woody plants belonging to the order Piperaceæ. The cubeb vine resembles that which produces the ordinary black pepper. Cubebs are brought chiefly from Java, Penang, etc., and are used as an aromatic and stimulant diuretic. Their active properties depend on the volatile oil which they contain. They also have a crystallizable principle called "cubebin," and a balsamic resin. The oil, tincture, and extract are used in medicine.

Cube Root. See Radical and Root.

Cu'bic Equation, an equation which involves the cube of the unknown quantity. A *pure* cubic equation contains only two terms; as, *e. g.*, $x^3 = 27$; all others are said to be adfected; as, *e. g.*, $x^3 - 5x^2 + 4x + 7 = 1$.

Cu'bic Ni'tre, a commercial name applied to the nitrate of soda, which is largely obtained from the desert of Atacama in Peru. It is used in the arts and as a manure.

Cu'bit [Lat. *cubitus, i. e.* the "elbow;" Gr. πῆχυς, the "fore arm"], a linear measure of the ancients, equal to the length of a man's arm from the elbow to the tip of the middle finger. It is generally stated to be eighteen English inches. The ancient Egyptian cubit, or "cubit of Memphis," was about 20.7 British inches. The mean of Sir Isaac Newton's determinations, from the careful measurements of the great pyramid by Professor John Greaves (published in 1737), made it 20.672. The mean of still more careful measurement by Professor C. Piazzi Smyth in 1865 made it 20.73. According to Newton, the cubit of Babylon was very nearly 24 British inches; the royal cubit of Persia, 21.195 inches; the cubit of the Romans, 17.406 inches; the cubit of the Greeks, 18.1308 inches; the Egyptian cubit in use in 1737, 21.888 inches; the sacred cubit of Moses he calculates not to have been greater than 24.9389 inches, nor less than 24.7262, and its probable value to have been 24.7552 inches. Prof. Piazzi Smyth thinks that he has proved that the unit of measure employed by the builders of the Great Pyramid in laying out the ground-plan of their work was identical with the sacred cubit of Moses, and that its value was 25.025 British inches; which is, according to the most recent determinations, almost exactly the 10,000,000th part of the earth's polar radius. He supposes, therefore, that this unit of measure, which was divinely given, was made by divine intention to be in this exact decimal relation to the invariable line around which the earth revolves. If the British inch be increased by one-1000th part, its becomes what Professor Smyth calls a "pyramid-inch;" and a pyramid-cubit, or sacred cubit, is 25 pyramid-inches, or one-10,000,000th part of the earth's polar radius. Professor Smyth maintains his hypothesis with much ingenuity, but it has not been generally received with favor.

The value of the biblical "cubit of a man" is extremely uncertain. Dr. William Smith, in his "Dictionary of the Bible," has discussed the question pretty fully, and inclines to regard it as having had a value, deduced by Thenius ("Theologische Studien und Kritiken" for 1846) from the Egyptian cubit measure preserved in the Turin Museum, of 23 digits, each digit being 0.7938 British inch = 18.257 British inches.

F. A. P. Barnard.

Cuck'oo [Lat. *cuculus;* Fr. *coucou;* It. *cucco,* so named from its peculiar note], a name given to many birds of the order Scansores, of the genus *Cuculus* and its allied genera. The common cuckoo of Europe is fourteen inches long, gray, the breast barred with black. It is migratory, and arrives in Europe in the spring. It feeds on worms and insects, builds no nest, but deposits its egg in the nest of another bird, and the proprietor hatches it with her own. The young cuckoo crowds under the other birds, and throws them over the edge to the ground. The great spotted cuckoo (*Cuculus glandarius*) is a native of Northern Africa; it also uses the nests of other birds. It is said that even the hooded crow, a very sagacious bird, is thus deceived by it, and fosters the young cuckoo with care. It

migrates in summer to Southern Europe. The common American cuckoo (*Coccygus Americanus*), sometimes called the yellow-billed cuckoo, is very slender, of a gray-brown color above, a lighter color beneath, and has a greenish

Great Spotted Cuckoo.

lustre. It feeds upon insects and the eggs of small birds. It is a timid bird, and conceals itself in the foliage of trees. Its eggs, from two to four in number, are of a pale blue-green. It does not lay its eggs in the nests of other birds. The black-billed cuckoo (*Coccygus erythrophalmus*) inhabits the same regions as the common American cuckoo. It has a different note, and is less shy; the eggs are of the same color. Other species occur in the U. S.

Cuckoo, a township and post-village of Louisa co., Va. Total pop. 2199.

Cu'cumber [Lat. *cucumis;* Fr. *concombre*], a genus of plants of the order Cucurbitaceæ. The common cucumber (*Cucumis sativus*), a native of Middle and Southern Asia, has heart-shaped leaves, rough with hairs, and oblong fruit. It has been cultivated from the earliest times, and forms an important article of food in Europe and the U. S. Many varieties are cultivated, with fruit from four inches to two feet long. Pickles called gherkins are made from young cucumbers. A sunny exposure and a light, rich soil are best adapted to its culture. Many other species with edible fruit belong to this genus.

Cucumber Tree, the *Magnolia acuminata,* a noble forest tree of the U. S., found from Niagara Falls southward to Georgia, chiefly along the Alleghanies. It is large, tall, and has rich foliage and large, beautiful flowers. Its wood is light, and is prized for making pumps and canoes, and is used in house-joinery. Its cucumber-like fruit is soaked in spirits, and makes a very bitter drink, popularly used as a tonic and anti-rheumatic remedy.

Cucurbita'ceæ [from *Cucurbita* (a "gourd"), one of the most important of its genera], a natural order of exogenous plants, mostly inhabiting the hot countries of both hemispheres, having succulent stems and climbing by lateral tendrils. The fruit (*pepo*) has a thick, fleshy rind, is more or less succulent, and in some species attains a great size. The seeds are flat and ovate, embedded in a pulp, in some kinds dry, and in others juicy. The order contains about 300 species, including the melon, cucumber, gourd, squash, and pumpkin. The roots of some of them, such as the *Momordica dioica* and *Bryonia umbellata* of the East Indies, abound in a bland and edible fecula. The elaterium and the common bryony, however, are remarkable for their acridity, and are sometimes used as drastic purgative medicine. The colocynth, which is valued for its medicinal properties, belongs to this order.

Cud'bear [supposed to be a corruption of *Cuthbert,* from Dr. Cuthbert Gordon, who introduced the manufacture at Leith], a powder obtained from certain lichens by the action of ammoniacal liquids, and used for dyeing various colors. The name of cudbear lichen is often given to one particular species (*Lecanora tartarea*), which abounds on rocks in the Highlands of Scotland, among the Alps, and in the northern parts of Europe. The dyestuff is obtained by macerating this for ten or twelve days in urine with chalk and water. Cudbear does not afford a very permanent color.

Cud'dalore, a maritime town of Hindostan, in Arcot, and on the Coromandel coast, 86 miles S. of Madras. It is one of the most populous towns in the south of India. It has a custom-house, and a port from which cotton goods are exported. It was taken from the English by the French in 1782, but restored to the British in 1795. Pop.

Cud'weed, the name given to many species of the *Gnaphalium, Antennaria,* and *Filago,* belonging to the order Compositæ and sub-order Tubuliflora. The flowers, which are commonly called "life-everlasting," consist mostly of dry involucral scales, and the stems and leaves are more or less covered with white down. The cudweeds are common in Europe and North America, and some of them are used as diaphoretics in domestic medicine.

Cud'worth (Rev. Ralph), D. D., an English philosopher and divine, born at Aller, in Somersetshire, in 1617. His father (also named Ralph Cudworth), a man of genius and learning, was chaplain to James I. He graduated at Emmanuel College, Cambridge; and became master of Clare Hall in 1644, and professor of Hebrew in 1645. In 1654 he was chosen master of Christ's College, and in 1678 was appointed prebendary of Gloucester. He was one of those who were called "Latitudinarians" in theology. His great work, "The True Intellectual System of the Universe" (1678), displays great learning, liberality, and independence of mind. He favored the Platonic philosophy, although in physics he adopted the corpuscular theory. He died July 26, 1688, leaving a "Treatise concerning Eternal and Immutable Morality," published in 1731. A number of his unpublished manuscripts are in the British Museum. His sons appear to have died early. His daughter became Lady Masham and a friend of John Locke. (See Jannet, "De Cudworthii Doctrinâ," 1849; Mackintosh, "View of the Progress of Ethical Philosophy;" Tulloch, "Free Thought in England," vol. ii.)

Cuen'ca, a province of Spain, in New Castile, is drained by the rivers Tagus and Jucar. Area, 6726 square miles. The surface is partly mountainous; coal, copper, iron, and silver are found here. Capital, Cuenca. Pop. 242,231.

Cuenca, a city of Spain, capital of the above province, is picturesquely situated on a rocky eminence on the river Jucar, about 90 miles E. S. E. of Madrid. It has a richly-adorned cathedral, is the seat of a Catholic bishop, and has several convents and hospitals. Here is a fine bridge, erected over the Jucar in 1523. Cuenca was formerly celebrated for its arts, literature, and manufactures. Pop. 7284.

Cuenca, formerly sometimes written **Cuenza,** a city of South America, in Ecuador, the capital of the province of Cuenca, is on table-land 8640 feet above the level of the sea, 189 miles S. of Quito, after which it is the most populous city of Ecuador. It is the seat of a Catholic bishop, and has a cathedral and a university; also several sugar-refineries and potteries. Pop. about 20,000.

Cuesmes, a Belgian town in the province of Hainaut. It has breweries and coal-mines. Pop. 5721.

Cue'vas de Ve'ra, a town of Spain, in Granada, is on the river Almanzor at its entrance into the Mediterranean, 42 miles N. E. of Almería. It owes its thriving condition to recently-opened silver-mines. Pop. 7401.

Cuf'fee (Paul), a negro philanthropist, born in Gosnold, Mass., in 1759. He became a sea-captain, the owner of a vessel, the crew of which was composed of negroes, and acquired a competent fortune. He was deeply interested in the subject of African colonization. Died Sept. 7, 1818.

Cu'fic Wri'ting [so named from the town of Cufa or Koofa, where the transcribing of ancient manuscripts was extensively carried on] was one of the most ancient forms of Arabic writing, and is supposed to have been introduced into Arabia a short time before the period of Mohammed. It was in common use till the tenth century, and afterwards was confined to coins and inscriptions.

Cuichunchulli (*Ionidium parviflorum*), a half-shrubby Peruvian plant of the order Violaceæ, having active emetic and cathartic properties. It is reputed a certain remedy for *elephantiasis tuberculata,* and the same medical

properties are attributed to other species of *Ionidium*. The root of one kind is called white ipecacuanha.

Cuirass' [Fr. *cuirasse*, from *cuir*, "leather"], originally a garment of leather for soldiers, so thick and strong as to be proof against a pistol ball. The term was afterwards applied to a breastplate, or a portion of armor made of metal, consisting of a backplate and breastplate hooked or buckled together. The cuirass is still worn by the British Horse Guards and other bodies of heavy cavalry, called *cuirassiers*.

Cuivre, a township of Audrain co., Mo. Pop. 1480.

Cuivre, a township of Pike co., Mo. Pop. 3271.

Cuja'cius, properly Jacques Cujas, a celebrated French jurist, born at Toulouse in 1522. He learned Greek and Latin without a teacher, studied law at Toulouse, and became in 1555 professor of law at Bourges. His lectures on the "Institutes" attracted students from all the countries of Europe. He developed a reform in modern law inaugurated by Alciat. The Roman law received a thorough interpretation from him, and according to its principles, which had until then been adopted partially as expediency suggested, the doctrine of the law was fundamentally renovated. He had in his library 500 manuscripts of the Justinian laws. His works (1st ed. 1577; complete ed. Fabrot, 1658, 10 vols.) have been often reprinted, lately by Prato (1859). Died Oct. 4, 1590. (See Papire Masson, "Vie de Cujas," 1590; Bernardi, "Éloge de Cujas," 1775; Spangenberg, "J. Cujas und seine Zeitgenossen," 1822.)

Culawhee, a township of Jackson co., N. C. Pop. 520.

Culdees', or **Kildees'** [supposed by some writers to have been derived from the Celtic *cuildich*, a "secluded corner," by others from the Celtic *kelede*, "man of God," and by others from the Lat. *cultores Dei*, "worshippers of God"], were a religious order established in Scotland, England, and Ireland in the latter part of the sixth century. When the monk Augustine had been sent by Gregory, bishop of Rome, as a missionary to the Saxons, he found the northern part of Britain already converted in a great measure to Christianity by the Culdees. Their origin is attributed to Saint Columba, the apostle of Western Scotland, who in 563 founded an institution at Iona, where the order existed as late as 1203. Being invited by Oswald, king of Northumberland, to preach the gospel in England, they sent thither Aidan, whose labors were eminently successful. The Culdee institution at Iona differed essentially from a monastery, though sometimes called by that name. It was rather a place of retirement, where the Culdee fitted himself by study and prayer for missionary labor. Celibacy was not enjoined upon the recluses, they did not acknowledge the papal supremacy, and they were allowed to change their calling for another. "The Culdees," says Ebrard, "read and understood the Scriptures in their original texts. But the Scriptures were more to them than a codex of authoritative doctrines of faith. They were the living word of Christ."

Cul-de-sac [Fr., the "bottom of a bag"], the name given to a street or alley open at one end only, sometimes called a blind alley. Also, in natural history, in buildings, in topography, and in military language, the term is used in an analogous sense for a passage with only one outlet.

Cul'enborg, a Dutch town in the province of Gelderland, 6 miles N. N. W. of Tiel, on the Leck. It is surrounded with a wall. There are manufactures of furniture, stoves, etc., and a trade in corn. Pop. 6192.

Culiacan', a town of Mexico, in the department of Sinaloa, on the river Culiacan, 105 miles S. E. of the city of Sinaloa. It has a seminary and mint. Pop. 10,925.

Culil'awan Bark, called also **Clove Bark,** a valuable aromatic bark, the product of the *Cinnamomum Culilawan*, a tree which grows in the Molucca Islands. It has a pungent taste and an odor resembling that of nutmeg and cloves.

Cul'len, a township of Pulaski co., Mo. Pop. 849.

Cullen (Paul), D. D., Cardinal, born in Dublin April 27, 1803, was educated at Rome, became archbishop of Armagh (1850), archbishop of Dublin (1852), and cardinal-priest in 1866. In his "Pastoral Letters" he opposed the mixed system of education, and he has been the main supporter of the Catholic University of Dublin.

Cullen (William), M. D., a celebrated British physician, born of poor parents in Lanarkshire, Scotland, Dec. 15, 1712. He acquired his profession amid great embarrassments. In 1756 he obtained the chair of chemistry in Edinburgh, where he practised medicine with success. He published "First Lines of the Practice of Physic" (1775), his chief work, in which novel pathological theories are propounded, and which was translated into all European languages; a "Synopsis of Methodical Nosology" (in Latin, 1780), a "Treatise of the Materia Medica," in which numberless errors were dispelled (1789), and other works. Died Feb. 5, 1790. (See Dr. John Thomson, "Life and Writings of William Cullen," 1832. This biography was completed by Dr. Craigie in a second volume, 1859.)

Culle'ra, a fortified seaport-town of Spain, in the province of Valencia, is on the Mediterranean at the mouth of the Jucar, 24 miles S. S. E. of Valencia. Grain, wine, and fruits are exported. Pop. 9814.

Cullo'den, also called **Drummossie Moor,** a battlefield of Scotland, is a desolate table-land, now partly cultivated, in Inverness-shire, 6 miles E. N. E. of Inverness. Here the royal army, commanded by the duke of Cumberland, totally defeated the Young Pretender, April 16, 1746.

Cul'lum (George W.), an American officer, born Feb. 25, 1809, in New York City, graduated at West Point in 1833; colonel of engineers May 7, 1867, and brigadier-general of volunteers Nov. 1, 1861. He served in the construction of Fort Adams, R. I., 1833–34, 1836–38, and 1858–64; as assistant to chief engineer 1834–36; in building pier, dyke, and lighthouse at Goat Island, R. I., 1836–38; in erecting defences of New London harbor, Conn., 1838–55; in constructing sea-walls and fortifications at Boston harbor, Mass., 1846–47; in organizing engineer troops and preparing engineer and ponton equipage for the war with Mexico 1846–47; as instructor of practical military engineering, etc. at the Military Academy 1848–55, except while travelling abroad for recovery of his health; in building New York assay-office 1853–54; in charge of public works in North and South Carolina, particularly the construction of the defences (including Fort Sumter), lighthouses, and channel improvements of Charleston harbor 1855–58; as member of special boards 1858–60; and in charge of sea-board defences from New Bedford, Mass., to Sound entrance to New York harbor, 1858–64. In the civil war he was A. D. C. (rank of colonel) to Lieutenant-General Scott, general-in-chief, 1861; chief of staff and of engineers to Major-General Halleck while commanding the departments of Missouri and Mississippi and general-in-chief of the armies of the U. S. 1861–64; engaged in establishing defensive works, directing at Cairo operations auxiliary to the Western armies in the field, making armed reconnaissances of Columbus, Ky.; as chief of engineers in campaign and siege of Corinth, and fortifying its approach after its evacuation; as member of special and engineer boards, and in organizing the defences of Nashville, Tenn., the great dépôt of supplies for Western armies; and as superintendent of U. S. Military Academy 1864–66; brevet colonel, brigadier-general, and major-general Mar. 13, 1865, for faithful, meritorious, and distinguished services; member of the board of engineers for fortifications since 1866. He is author of a work on "Military Bridges with India-rubber Pontons," 1849; of "Register of the Officers and Graduates of the U. S. Military Academy," 1850; of "Systems of Military Bridges," 1863; of a "Biographical Register of the Officers and Graduates of the U. S. Military Academy," 1868; of various military memoirs, reviews, reports, etc., 1833–73; and translator and editor of Duparcq's "Elements of Military Art and History," 1863. Retired from active service Jan. 13, 1874.

Culm [Lat. *culmus*, "straw"], the botanical name of the peculiar cylindrical hollow and jointed stem of the grasses. Culm is also a popular name given in some parts of England to anthracite coal.

Culm, a town of Prussia, regularly built on an eminence on the Vistula, 23 miles N. N. W. of Thorn. It pursues weaving, corn trade, and shipping. It was a Hanse town. Pop. 8455.

Culmina'tion [from the Lat. *culmen* (gen. *culminis*), a "top"], an astronomical term signifying the passage of a celestial body over the meridian at the upper transit. The sun culminates at noon or midday, and the full moon culminates at midnight, 12 P. M.

Cul'peper, a county in the N. E. of Virginia. Area, 673 square miles. It is bounded on the N. E. by the Rappahannock, and on the S. by the Rapidan River. The surface is pleasantly diversified by hills and dales; the soil is fertile. Wool and grain are staple products. It is intersected by the Orange Alexandria and Manassas R. R. Capital, Fairfax or Culpeper Court-house. Pop. 12,227.

Cul'peper (Thomas), second Lord, was one of the persons to whom Charles II. granted the territory of Virginia in 1673. He was the governor of Virginia from 1680 to 1683. Died in 1719. This name in the baronage of England is written Colepeper.

Culpeper Court-House. See Fairfax.

Culross', a seaport-town of Scotland, in Perthshire, on

the N. shore of the Frith of Forth, 22 miles N. N. W. of Edinburgh. It is a place of great antiquity. The monastery of St. Serf was founded here about the sixth century. It has remains of Culross Abbey, successively the seat of the Bruce and Dundonald families. Pop. 500.

Cul'tivator, an agricultural implement used in England and the U. S. before planting crops, and in the latter country for loosening the earth between rows of plants. American cultivators are either triangular or rectangular frames, with handles like those of a plough, a greater or less number of plough-like teeth, and with their centre-beams projecting in front for the attachment of wheels and draught clevises. Cultivators are very extensively used and manufactured in the U. S. They are of late frequently called horse-hoes.

Cul'verin [Fr. *couleuvrine;* etymology uncertain], a long cannon used from the fourteenth to the sixteenth century, generally carried a shot of eighteen pounds, and weighed about fifty hundredweight. A demi-culverin was a nine-pounder.

Cul'vert [perhaps from the Fr. *couvert,* "covered"], an arched channel of masonry for the purpose of conveying water under ground. It is often built under canals, and in such cases it may be either a siphon or a surface-drain.

Cu'mæ, an ancient and famous Greek city of Campania, situated on the Mediterranean, 11 miles W. of Naples. It was founded conjointly by colonists from Chalcis and Cyme in Asia Minor. According to Strabo, it was the most ancient of the Greek colonies in Italy. It became an opulent commercial city, built several harbors or port-towns, and for a period of 200 years (700–500 B. C.) was the most important city of Southern Italy. The people of Cumæ waged war against the Etruscans, who disputed their supremacy as a maritime power. Cumæ was conquered by the Samnites in 420 B. C., and became a Roman *municipium* in 338. In the second Punic war Hannibal tried to capture it, but failed. Cumæ was famous as the residence of the Sibyl (which see). It was the last stronghold of Italy that held out against the Byzantine army, which captured it from the Goths in 552 A. D. But few remains of Cumæ are now in existence.

Cumaná, a department of Venezuela, is bounded on the N. by the Caribbean Sea and on the S. by the Orinoco. Capital, Cumaná. Pop. 75,828.

Cumaná, a seaport-town of South America, in Venezuela, 1 mile from the Gulf of Cariaco, 180 miles E. of Caraccas; lat. 10° 28′ N., lon. 64° 16′ W. It is the oldest European city in America, having been founded in 1521 by Castellon. It has a good roadstead, and an export trade in cattle, cocoa, smoked meat, etc. It has been nearly destroyed by earthquakes several times. Pop. 6000.

Cum'berland [from Cymry (which see)], the most north-western county of England, is bounded on the N. by Scotland and the Solway Frith, E. by Northumberland and Durham, S. by Westmoreland and Lancashire, and W. by the Irish Sea. Area, 1565 square miles. The surface is mountainous and picturesque. The highest points are Sca Fell, 3100 feet, and Skiddaw, 3022 feet above the sea. The chief rivers are the Esk, Eden, and Derwent. The scenery is adorned by numerous beautiful lakes, including Derwentwater and Ulleswater, the latter of which is 9 miles long. The land is divided into small freeholds. The main crops are wheat, oats, and turnips. Coal, copper, iron, lead, plumbago, limestone, marble, and Silurian slate are found here. The chief town is Carlisle. This county formed part of the ancient Cumbria (which see). Pop. in 1871, 220,245.

Cumberland, a county in the N. W. of Nova Scotia, extends from Northumberland Strait to the Bay of Fundy, and is bounded on the W. by Chignecto Bay. Here are rich coal-mines, and quarries from which good grindstones are exported to the U. S. It is intersected by the Intercolonial R. R. Capital, Amherst. Pop. in 1871, 23,518.

Cumberland, a county in the E. S. E. of Illinois. Area, 310 square miles. It is intersected by the Embarras River. The surface is diversified by prairies and groves; the soil is fertile. Cattle, grain, tobacco, wool, and lumber are important products. The Chicago branch of the Central and the St. Louis Vandalia and Terre Haute R. Rs. pass through this county. Capital, Prairie City or Majority Point. Pop. 12,223.

Cumberland, a county in the S. of Kentucky. Area, 375 square miles. Tobacco, grain, and wool are staple products. It is intersected by the Cumberland River. The surface is partly hilly. Capital, Burkesville. Pop. 7690.

Cumberland, a county in the S. W. of Maine. Area, 990 square miles. It is bounded on the S. E. by the Atlantic Ocean, and on the S. W. partly by the Saco River. It contains Sebago Lake and other smaller ponds. It is traversed by several railroads, which meet at Portland, the capital. The soil is fertile. Cattle, grain, and wool are raised. Manufactures and commerce are extensive, the former embracing carriages, lumber, leather, metallic wares, clothing, saddlery, cooperage, etc. Casco Bay here affords facilities for navigation. Pop. 82,021.

Cumberland, a county in the S. S. W. of New Jersey. Area, 480 square miles. It is bounded on the S. W. by Delaware Bay, and intersected by Maurice River. The surface is nearly level. Grain and wool are staple products. It has manufactures of lumber, iron, copper-wares, etc. It is intersected by the West Jersey and New Jersey Southern R. Rs. Capital, Bridgeton. Pop. 34,665.

Cumberland, a county in S. Central North Carolina. Area, 850 square miles. It is intersected by Cape Fear River. The soil is mostly fertile. Wool and corn are raised. The western part is based on granite. Pine lumber, tar, rosin, and turpentine are exported from this county. Capital, Fayetteville. Pop. 17,035.

Cumberland, a county in the S. of Pennsylvania. Area, 545 square miles. It is bounded on the E. by the Susquehanna River, and on the N. by the Blue Mountain. Between this ridge and the South Mountain lies the fertile Cumberland Valley, of limestone formation. Cattle, grain, and wool are raised. There are manufactures of flour, leather, furniture, carriages, saddlery, clothing, etc. etc. It is intersected by the Cumberland Valley R. R. Capital, Carlisle. Pop. 43,912.

Cumberland, a county in E. Central Tennessee. Area, 550 square miles. It is drained by Daddy's Creek. The surface is hilly or mountainous. Tobacco and wool are staple products. Capital, Crossville. Pop. 3461.

Cumberland, a county in Central Virginia. Area, 310 square miles. It is bounded on the N. by James River, and on the S. E. by the Appomattox. The surface is undulating. Tobacco and grain are staple products. Capital, Cumberland Court-house. Pop. 8142.

Cumberland, a township and village of Clark co., Ill. Total pop. 1469.

Cumberland, a township and post-village of Cumberland co., Me. The village is on the Maine Central R. R., 12 miles N. of Portland. Total pop. 1626.

Cumberland, the county-seat of Allegany co., Md., is romantically situated on the Potomac. In population and commerce it is the second city in the State. It is the head of navigation of the Chesapeake and Ohio Canal (leading to Georgetown, D. C.) and the shipping-point for the semi-bituminous coal produced in the vicinity, and which constitutes the principal traffic of that canal. It is 178 miles W. by N. from Baltimore, and is the point of intersection of the Baltimore and Ohio and Pittsburg and Connellsville R. Rs. The Cumberland and Pennsylvania R. R., with its Eckhart branch, also centres here, and affords an additional outlet to the East and North, *viâ* the Pennsylvania system of railways. Its manufacturing industries comprise extensive rolling-mills for rails and bars and factories for other railroad iron, a factory for the manufacture of steel, foundries, machine-shops, flour and cement mills, and numerous minor enterprises. It has one State and two national banks, and two daily and three weekly newspapers. Its mercantile interests employ a large capital. Its hotels are numerous, the "Queen City Hotel," built by the Baltimore and Ohio R. R., being very large and well furnished. Its churches are also numerous; some of them are fine specimens of architectural beauty. An admirable system of waterworks (on the Holly plan) furnishes an abundance of water and good fire protection. The steadily developing coal-trade and its growing iron industries form the chief sources of its prosperity. Pop. 8056; of Cumberland township (No. 13), 1324; (No. 6), 1272. W. E. Weber, Ed. and Pub. "Alleganian."

Cumberland, a post-village of Spencer township, Guernsey co., O. Pop. 319.

Cumberland, a township of Adams co., Pa. P. 1455.

Cumberland, a township of Greene co., Pa. P. 1768.

Cumberland, a township and village of Providence co., R. I. The village is on the Providence and Worcester R. R., 10 miles N. of Providence. It has one national bank. Total pop. 3882.

Cumberland, a township and village of New Kent co., Va., 20 miles E. of Richmond. Pop. 1249.

Cumberland (William Augustus), Duke of, the third son of George II., king of England, was born April 26, 1721. He commanded the allied army which was defeated by the French at Fontenoy in 1745. He defeated the army of the Pretender at Culloden in April, 1746, and was censured for his cruelty in that battle. During the Seven

Years' war he commanded an English army, which was defeated at Hastembeck in 1757. Died Oct. 31, 1765.

Cumberland and Teviotdale, DUKE OF (Great Britain, 1799), and earl of Armagh (Ireland, 1799), are titles borne by the ex-king of Hanover, who is a prince of the blood in Great Britain, being first cousin to Queen Victoria. His full name is GEORGE FREDERICK ALEXANDER CHARLES ERNEST AUGUSTUS. He was born at Berlin May 27, 1819, and was married Feb. 18, 1843, to the princess Alexandrina Marie of Saxe-Altenburg. He succeeded to the throne of Hanover Nov. 18, 1851, as George V., on the death of his father, Ernest Augustus. He took sides with Austria against Prussia in 1866, and in consequence was deprived of his kingdom, which was annexed to Prussia by decree Sept. 20, 1866. The ex-king is blind, but is a good musician.—His eldest son and the heir to the dukedom is PRINCE ERNEST AUGUSTUS, born Sept. 21, 1845.

Cumberland Court-house, a post-village, capital of Cumberland co., Va.

Cumberland Gap, a narrow pass through the Cumberland Mountains, on the line between Kentucky and Tennessee and at the western extremity of Virginia. It was an important strategic point in the late civil war, and was strongly fortified by the Confederates. It was abandoned by them Jan. 18, 1862, and on the same day was occupied by the national troops under Gen. G. W. Morgan. In Aug., 1862, Gen. E. Kirby Smith outflanked this position by a march through Big Creek Gap, and Gen. G. W. Morgan in consequence was compelled to destroy and evacuate the works. He was hotly pursued northward by a force of Confederates under John H. Morgan. On Sept. 9, 1863, Gen. Frazer, who held the gap with a brigade of Buckner's troops, surrendered after a siege of only four days to Gen. Burnside's troops. The gap itself is a cleft 500 feet deep, and in some places is only wide enough for a road. If well provisioned, it might have been held by a small force against any opposing army.

Cumberland Island, of North America, forms a portion of that coast of Davis Strait which lies between Hudson's Strait and Lancaster Sound.

Cumberland Mountains, a range of the Appalachian system, forming part of the boundary between Virginia and Kentucky. The range extends in a generally S. W. direction across Tennessee, dividing East from Middle Tennessee. These mountains here form an elevated plateau, seldom over 2000 feet high, but at some points nearly 50 miles across. North-eastern Alabama and North-western Georgia are broken by the southernmost extremity of the range. The Cumberland Mountains abound in caves, and in Tennessee they are very rich in coal and iron, containing nearly all the coal this State affords. The range in Tennessee has been described as capable of furnishing "a highway from Kentucky to the Alabama line along its flat top, along which a traveller may pass without once descending, or even without discovering at any time his elevation." On both sides the plateau breaks off in steep sandstone cliffs, the western side much notched, the eastern quite regular. Its immediate sides are from 800 to 1000 feet high on either side. There are places where its upper surface is much broken by ridges and valleys. The iron deposits of this region are very remarkable, and there is every prospect that from the vast mineral wealth, delightful and healthful climate, good soil, and other great natural advantages, the Cumberland Mountain region of Tennessee will become one of the most wealthy and populous regions of the U. S.

Cumberland Presbyterian Church, The, is a growth of the present century. In 1797 a very remarkable revival of religion began to develop itself in South-western Kentucky. The principal minister connected with its early developments was Rev. James McGready. Mr. McGready was a Presbyterian, and was educated in Western Pennsylvania, at what became afterwards Jefferson College, but he commenced his ministry in North Carolina. He was a man of unusual earnestness and power in the pulpit. His earnestness and zeal brought him into collision with the community in which he was laboring. The result was a removal from North Carolina to Kentucky in 1796. He was settled in charge of three congregations—two in Logan co., Ky., Gaspar River and Little Muddy River; and one in Tennessee, Red River, near the dividing-line between the two States.

Mr. McGready's great zeal soon began to show itself in his new field of labor, and in order to bring his people into sympathy and co-operation with him, he proposed to them a written covenant, which they were to subscribe as a pledge of their earnest intention to fulfil its conditions. The measure was an incipient effort towards what was felt to be so necessary—a *great revival of religion.* A copy of this covenant is embodied here, as an illustration of the views and feelings, at the time, of a country pastor and a Christian people, surrounded as they were by a literal and a spiritual wilderness. "When we consider," say the covenanters, "the work and promises of a compassionate God to the poor lost family of Adam, we find the strongest encouragement for Christians to pray in faith—to ask in the name of Jesus for the conversion of their fellow-men. None ever went to Christ, when on earth, with the case of their friends that were denied, and although the days of his humiliation are ended, yet for the encouragement of his people he has left it on record 'that where two or three agree upon earth to ask anything in prayer, believing, it shall be done.' Again, 'Whatsoever ye shall ask the Father in my name, that will I do, that the Father may be glorified in the Son.' With these promises before us we feel encouraged to unite our supplications to a prayer-hearing God for the outpouring of his Spirit, that his people may be quickened and comforted, and that our children, and sinners generally, may be converted. Therefore, we bind ourselves to observe the third Saturday in each month for one year as a day of fasting and prayer for the conversion of sinners in Logan county and throughout the world. We also engage to spend one half hour every Saturday evening, beginning at the setting of the sun, and one half hour every Sabbath morning, beginning at the rising of the sun, in pleading with God to revive his work."

This covenant was evidently not a mere formality. The hearts of the preacher and people were in it. In May of 1797 occurred the first developments of the desired work. It is remarkable, too, that its first appearance was in the case of a female member of the church. She was in full communion, but was led to a re-examination of the ground of her hopes, and the result was a conviction that she "was still in the gall of bitterness and in the bond of iniquity." She sought and found peace and joy in believing. This was a beginning. This occurrence, and a great many like it, made the impression upon the mind of Mr. McGready that a large proportion of the membership of the church were strangers to true religion. This impression gave a coloring to his preaching which it retained as long as he lived. He was terribly severe upon what he regarded as mere formalism. To have a name to *live,* and still to be *dead,* was to him the worst of conditions.

The work advanced slowly until 1799. In this year, at the customary sacramental meeting at Red River in July, there was a great movement. Says Mr. McGready: "Great solemnity pervaded the congregation from first to last, and particularly on Monday the presence of God had an overwhelming influence upon the assembled crowd. The boldest and most daring sinners in the country hid their faces and wept bitterly; and such were the deep impressions made upon their minds that when the congregation was dismissed many remained around the doors of the church, unwilling to retire." They were called back into the house; the preachers encouraged and prayed for them, and many were converted. In the following month, at Gaspar River church, the work went forward in still greater power. The following are specimens: A woman in the assembly in deep distress sent for Mr. McGready, and addressed him thus: "Sir, I was a member of your congregation in North Carolina, and in full communion, but I was deceived; I have no religion, and am going to hell." "An aged man in great distress addressed his wife and children thus: 'We are all going to hell together; we have lived prayerless and ungodly lives; the work for the salvation of our souls is yet to be begun; we must all have religion or we will be damned.'"

In July of 1800 occurred the first camp-meeting that ever was held in Christendom. The plan of the meeting was suggested by the circumstances of the country, and the fact that vast crowds were in the habit of assembling at the sacramental meetings from distances varying from ten to a hundred miles. Great numbers professed religion at the camp-meetings and upon other occasions, and the work spread with wonderful rapidity and power over South-western Kentucky and what was called the Cumberland Country—now Middle Tennessee—lying adjacent.

A large element of the population of these countries was either Scotch-Irish or of Scotch-Irish descent, and the Scotch-Irish are generally Presbyterian in their religious proclivities. It was so in this case. The ministers who co-operated with Mr. McGready were Messrs. William McGee, Samuel McAdoo, William Hodge, John Rankin, Presbyterians, and Mr. John McGee, Methodist. These men were all of Scotch-Irish origin, and had emigrated from North Carolina. It may be mentioned here that when the Cumberland Presbyterian Church came to be fully organized nine-tenths of its ministry, and at least four-fifths of its membership, were of Scotch-Irish descent. This fact is mentioned that the reader may know something of the

material of which this communion was originally composed. Some characteristics are charged upon Cumberland Presbyterians which are in direct conflict with what would be inferred from their paternity. Everybody knows that a Scotch-Irishman is neither a patron of ignorance nor a fanatic in religion. Yet Cumberland Presbyterians have been charged with being fanatical in religion and the patrons of ignorance. Facts, as we shall see, as well as philosophy, vindicate them from the charge. It is utterly without foundation.

The rapid progress and widespread influence of the revival produced the necessity of organizing a great many new congregations; and this, of course, created a necessity for more ministerial laborers. The Presbyterian Church could not supply them in the ordinary way. There were no schools, and if schools had been abundant the congregations could not wait until young men would be able to go through such a course of literary and theological training as is customarily required in the Presbyterian Church preparatory to licensure and ordination. No one complained of the requisition, but its fulfilment seemed impracticable under the circumstances. The patriarch* of Presbyterianism in Kentucky visited the region of the revival, and seeing the necessities of the congregations, advised the ministers and leading laymen of the Church to select such young men as they thought promised usefulness, and direct their attention to the work of the ministry, although they might not be able to obtain what was considered a full ministerial education. The counsel seemed practical, and three young men at first were encouraged to prepare themselves for the work as well as they could. These young men presented themselves to the Transylvania Presbytery in Oct., 1801. The presbytery hesitated, but at length, in Oct., 1802, they were all licensed as probationers for the holy ministry. At the same presbytery two others were received as candidates for the ministry. Opposition, however, at once developed itself. In Oct., 1802, the Transylvania Presbytery was divided, and the Cumberland Presbytery was formed, embracing the more immediate region of the revival. The Cumberland Presbytery from time to time licensed a few others and ordained two or three. These were all what were called uneducated men; they were all, however, men of promise, and some of them became distinguished in subsequent years. The opposition was continued in the new presbytery.

There was difficulty from another source. The revival ministers were warm-hearted, and controlled less by theological and technical than by practical, and what they regarded as spiritual, considerations. The young men, too, had not learned to split all the metaphysical hairs of theology, and there were some expressions in the Confession of Faith which seemed to them to teach the doctrine of fatality. This they could not receive, and were allowed to except to it in their licensure and ordination.

There were thus two subjects of dissension between the parties: one was educational, the other theological. The revival ministers did not object to education for the ministry, but to the rigid application of the rule in the circumstances surrounding them. The young men did not object to the Confession of Faith, but to those expressions in it which seemed to them to imply the doctrine of fatality. Their warm-hearted and liberal fathers thought proper to indulge them in their skepticism on this subject. They adopted the Confession of Faith with the single exception. The difficulties became serious, and were finally brought before the synod of Kentucky. The synod of 1804 appointed a committee to attend a meeting of the Cumberland Presbytery and inquire into the condition of things. None of the committee fulfilled the appointment except one, and he was notoriously a persecutor of the presbytery, and was regarded as a spy. Nothing good, of course, resulted. The synod at its next meeting, in 1805, appointed a commission consisting of fifteen members to visit the region in which the difficulties existed, to confer with the Cumberland Presbytery, and to endeavor to restore quiet and harmony. The commission met on Dec. 3, 1805, at Gaspar River meeting-house, in Logan co., Ky. The first measure of the commission was to require of the presbytery a surrender of all the young men who had been licensed and ordained in what they regarded a questionable manner, for a re-examination by the commission, with a view to a confirmation or an annulling of the proceedings of the presbytery in each particular case. It is to be borne in mind that several of the men thus required to be surrendered to the commission were themselves members of the presbytery. The presbytery declined compliance, upon the ground that the constitution of the Presbyterian Church gives to the presbytery alone the power "to examine and license candidates for the holy ministry; to ordain, install, remove, and judge ministers;" that it gives no such power to a synod, much less to a commission of synod, nor to any other judicature of the Church. The commission then called upon the young men to submit themselves for re-examination; they also declined, whereupon the commission passed the following resolution: "*Resolved*, That as the above-named persons never had regular authority from the presbytery of Cumberland to preach the gospel, etc., the commission of synod prohibit, and they do solemnly prohibit, the said persons from exhorting, preaching, and administering the ordinances, in consequence of any authority which they have received from the Cumberland Presbytery, until they submit to our jurisdiction and undergo the requisite examination."

The names of the persons thus proscribed are omitted as a convenience. Four of them were ordained ministers and members of the presbytery; the others, eight in number, were either licentiates, candidates for the ministry, or exhorters. The presbytery took the ground in the controversy that the proceedings of the commission were unconstitutional, and of course that the proscribing act was unconstitutional and void. Nevertheless, from a general respect to authority, and from an obvious desire to procure a reconciliation, and enjoy peace and quietude as far as possible, both the proscribed members, and those who had promoted their induction into the ministry and sympathized with them, constituting a majority of the presbytery, organized themselves into what they called *a council*, determining in this manner to endeavor to carry forward the work of the revival, to keep the congregations together, but to abstain from all proper presbyterial proceedings, and await what they thought would be a redress of their grievances. The synod of Kentucky at its sessions in 1806 dissolved the Cumberland Presbytery, and annexed the members who had not been placed under the ban of the commission to the Transylvania Presbytery.

The council continued their organization from Dec., 1805, to Feb., 1810. By that time they became satisfied that they had nothing to hope either from the synod or the General Assembly. As a last resort, and in order to save what they represent to the General Assembly as "every respectable congregation in Cumberland and the Barrens of Kentucky," two of the proscribed ministers, Finis Ewing and Samuel King, assisted by Samuel McAdam, one of those who had been placed under an interdict by the commission for his participation in what they denominated the irregularities of the presbytery, reorganized the Cumberland Presbytery at the house of Mr. McAdam, in Dickson co., Tenn., on the 4th of Feb., 1810. It was organized as an independent presbytery. It will be observed that it was a reorganization of a presbytery which had been dissolved, and which had received its name from its locality. The Church which grew up from these beginnings naturally took the name of its first presbytery as a prefix. Hence this Church is called, from the circumstances of its origin, "The Cumberland Presbyterian Church." It extends now from Pennsylvania to the shore of the Pacific, but it originated in what was called, at the time, the "Cumberland Country" and from the Cumberland Presbytery. It is hoped that these details will not be considered useless. They are intended to enable the reader to understand what most readers remote from the scene of the transactions do not understand—that a Church of some extent should be so local in its name. The name suggests nothing connected with the denomination except the locality of its origin, and this was accidental, or rather providential.

The new presbytery immediately set forth a synopsis of its theology and the principles of action by which it proposed to be governed. Its theology was Calvinistic, with the exception of the offensive doctrine of predestination, so expressed as to seem to embody the old pagan dogma of *necessity* or *fatality*. Its rules of action were to be presbyterial.

There is no probability that these good and earnest men had any adequate conception of what became the magnitude of the work upon which they were entering. They hardly thought of anything beyond an organization which would enable them, and perhaps their immediate successors, to labor with greater vigor and efficiency in promoting the work to which they thought God in his providence and by his Spirit had called them. We judge now that they did not think of originating a Church, but simply a presbytery. But God rules, and we have a thousand evidences that he ruled in this case.

The new presbytery held its first adjourned meeting in March, the month following its organization. There were present four ordained ministers, six licentiates, and seven candidates for the ministry. These men constituted really the fathers and founders of the Cumberland Presbyterian Church. At the fourth session of the presbytery, held in Oct., 1811, a committee was appointed to meet committees

* Rev. David Rice.

from two of the neighboring presbyteries of the Presbyterian Church, with a view to "conferring on the subject of a reunion, and other matters relative to that harmony which should exist between the members and people of Jesus Christ." This well-meant measure, however, failed of any good effect. Early in the year 1813 the presbytery had become so large that it divided itself into three presbyteries, and constituted the Cumberland Synod. This synod, at its sessions in 1816, adopted a Confession of Faith, catechism, and system of church order in conformity with the principles avowed upon the organization of the presbytery. The Confession of Faith is really a modification of the Confession of Faith of the Presbyterian Church. It was intended by the framers to exclude only the offensive doctrine which had been a principal cause of all the difficulties. The government is Presbyterian.

In 1826 its first college was organized under the supervision of the Church. It was located at Princeton, Ky. It was a manual-labor school. In 1830 its first paper was published under the patronage of the Church. It was a weekly religious and literary journal, also published at Princeton. In 1828 the Cumberland Synod was divided into three synods, and a General Assembly succeeded. The first meeting of the Assembly was held in May, 1829.

At the last meeting of the General Assembly, which was held in May, 1873, there were reported 24 synods, 100 presbyteries, 1223 ministers, 2212 congregations, 98,408 communicants, 59,932 persons engaged in Sabbath school work, and $475,267 in contributions to church purposes. All these estimates are made from defective reports. The stated clerk of the General Assembly says that they would be increased by full reports. Probably a full estimate would place the membership at 120,000.

The Church has under its patronage three weekly newspapers, one quarterly, and two monthlies—one devoted to the interest of females. It has also under its patronage three chartered universities and several colleges, both male and female and mixed. Two of its universities give instruction to both males and females; the other has regular collegiate, theological, law, and medical departments. Cumberland Presbyterians make no great parade of their character, numbers, or work, but they are willing that the world should know both what they are and what they do.

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Cumberland River, an affluent of the Ohio, rises among the Cumberland Mountains in Kentucky, near the S. E. boundary of that State. It flows nearly westward, crosses the southern boundary of Kentucky, describes an extensive circuit in Middle Tennessee, passes by Nashville, and returns into Kentucky. It afterwards flows northwestward, and enters the Ohio at Smithland. The Cumberland and Tennessee rivers are only about 3 miles apart at a point nearly 20 miles from Smithland. Length, estimated at 650 miles. Steamboats can ascend it to Nashville, about 200 miles from its mouth, and it is navigable above Nashville, at certain seasons, 400 miles.

Cumberland University, at Lebanon, Tenn., belonging to the Cumberland Presbyterians, was founded in 1842. Its presidents have been as follows: F. R. Cossitt, D. D., 1842–44; T. C. Anderson, D. D., 1844–66; B. W. McDonnold, D. D., LL.D., 1867. Its departments are—arts, theology, medicine, natural science, commercial and polytechnic, preparatory. Whole number of graduates, 1260. Amount of "Ball endowment" subscribed, $250,000. Volumes in libraries, 8000. Price of tuition in college, per session, $35. Boarding in clubs, the prevailing method, costs $10 per month. B. W. McDONNOLD.

Cumberland Valley, a post-township of Bedford co., Pa. Pop. 1357.

Cum'bre, La (the summit), a principal pass across the Andes, between Santiago in Chili and Mendoza in the Argentine Republic. Elevation, 12,454 feet above the level of the sea. Men travelling on foot can pass over the Cumbre from May to the end of October.

Cum'bria [named from the CYMRY (which see), its ancient inhabitants], an ancient British principality, comprising Cumberland in England and that part of Scotland which now forms the counties of Ayr, Dumbarton, Dumfries, Lanark, Peebles, Renfrew, and Selkirk. It was ruled by its own kings until about 950 A. D. Scottish Cumbria then became the kingdom of STRATHCLYDE (which see).

Cum'brian Moun'tains, a range or group of mountains in the N. of England, occupying parts of Cumberland, Westmoreland, and Lancashire. This region, called the "English Lake District," is remarkable for its picturesque scenery, and is much frequented by tourists. Here are numerous lakes, the largest of which are Windermere and Ulleswater. These mountains are mostly formed of granite and Silurian rocks. The highest point, Sca Fell Pike, rises 3166 feet above the sea.

Cum'ing, a county in the N. E. of Nebraska. Area, 400 square miles. It is intersected by the Elkhorn River. The surface is undulating; the soil is fertile. Grain and wool are raised. Extensive prairies occur here. It is intersected by the Sioux City and Pacific R. R. Capital, West Point. Pop. 2964.

Cuming City, a post-township of Washington co., Neb. Pop. 543.

Cum'min- (or **Cumin-**) **Seed** [Lat. *cuminum*], the fruit of the *Cuminum Cyminum,* a plant belonging to the order Umbelliferæ. It is the only known species, and is found in Egypt and the adjacent countries. It is an annual with branched stem, thread-like leaves, with umbels of small white or pink flowers. It has been cultivated from remote times for the sake of its seeds, which have an aromatic taste somewhat resembling caraway. In Germany and Holland it is used in cookery. As a medicine it is mostly limited to veterinary practice. It is cultivated in Northern Africa, India, and Southern Europe; but the seed are mostly imported from Sicily and Malta. Oil of cummin is abundantly obtained from the seed. The oil of cummin consists of a mixture of two distinct oils, one called cymene ($C_{20}H_{14}$); the other regarded as a hydride of cumyl ($C_{20}H_{11}O_2.H$). This oil is of a strong bitter, disagreeable taste, with the general properties of the other essential oils.

Cum'ming, a post-village, capital of Forsyth co., Ga., about 40 miles N. N. E. of Atlanta. Gold is found in the vicinity. Pop. 267.

Cumming (ALEXANDER), a Congregational minister, born in Freehold, N. J., in 1729, was ordained to the Presbyterian ministry in New York in 1747, and preached in New York 1750–53, when he was relieved at his own request of his colleague pastorate. In 1761 he was ordained colleague pastor of the Old South church, Boston, Mass., where he thenceforth remained. He died Aug. 25, 1763.

Cumming (ALFRED), a Confederate brigadier-general, was born in Georgia in 1829, graduated at West Point in 1849, became captain in the Tenth U. S. Infantry in 1856, resigned in 1861, entered the Confederate service, and fell at the battle of Jonesboro', Ga., Sept. 1, 1864.

Cumming (JOHN), D. D., F. R. S. E., a popular Scotch preacher, born in Aberdeenshire Nov. 10, 1810. He became in 1833 minister to the Scottish church in Crown court, Covent Garden, London. He has published interpretations of the apocalyptic prophecies, "The Great Tribulation," "The Destiny of Nations," etc. He also is a zealous opponent of the Roman Catholic Church and a defender of the National Church of Scotland.

Cumming (ROUALEYN GORDON), known as the "lion-hunter," was born at Altyre, Scotland, Mar. 15, 1820. He was the son of a baronet, was educated at Addiscombe, and entered a cavalry regiment in the East India service, and afterwards took a commission in the Cape Mounted Rifles in South Africa. While there he distinguished himself by his exploits in killing lions, elephants, and other wild beasts. Of his surprising adventures he wrote an account in book-form, which was highly popular, but after a time fell into a discredit which it hardly deserved. He afterwards became a popular lecturer in Great Britain upon sporting subjects. Died Mar. 24, 1866.

Cumming (WILLIAM), U. S. A., was born in Georgia in 1788, became in 1813 major of the Eighth U. S. Infantry, was wounded at Chrystler's Fields, Nov. 11, 1813, became colonel and adjutant-general in 1814, was wounded a second time at Lundy's Lane, and in 1847 declined a major-generalship. A lawyer by profession, he never practised, being the possessor of a large fortune. In a political contest with George McDuffie of Georgia he was involved in a duel, in which McDuffie was wounded in the shoulder. Died at Augusta, Ga., in Feb., 1863.

Cum'mings, a township of Lycoming co., Pa. P. 277.

Cummings (A. B.), U. S. N., born June 22, 1830, in Pennsylvania, entered the navy as a midshipman April 7, 1847, became a passed midshipman in 1853, a lieutenant in 1855, and a lieutenant-commander in 1862. He served in the steamer Richmond at the passage of Forts Jackson and St. Philip and capture of New Orleans, April 24, 1862, at the passage of Vicksburg, June 28, 1862, and in the engagement with the batteries at Port Hudson, Mar. 14, 1863, where he fell mortally wounded "while he was cheering the men at the guns." The loss which the country and the navy sustained in the death of this gallant officer may be gathered from the following extract from the address of Captain Alden to the officers and crew of the Richmond on Mar. 22, 1863: "With deep sorrow I call you together to announce the death of our late executive officer, Lieutenant-

Commander A. B. Cummings, at New Orleans. It has pleased God to take from among us our gallant friend in the fulness of his energies and usefulness. You all well know the importance of his services in this ship; his conscientious devotion to duty; his justice and even temper in maintaining discipline; his ability in preparing for emergencies, and his coolness in meeting them. All these qualities he brought to his country in the hour of need, and he has sealed his devotion with his life. The fatal cannon-shot struck him when he stood on the bridge, cheering the men at their guns and directing their fire. He was thrown down upon the deck, but his presence of mind still remained. He said, 'Quick, boys! pick me up; put a tourniquet on my leg; send my letters to my wife; tell her I fell in doing my duty.' When below he said to the surgeon, 'If there are others worse hurt, attend to them first. Nolan, are you here, too?' He inquired about Howard, and his thoughts were directly of others and of success in the fight. When told that the noise he heard was from the escape of steam, and that the ship could no longer stem the current, he exclaimed, 'I would rather lose the other leg than go back; can nothing be done? There is a S. wind; where are the sails?'" FOXHALL A. PARKER, U. S. N.

Cummings (JOSEPH), D. D., LL.D., a Methodist Episcopal theologian, was born at Falmouth, Me., Mar. 3, 1817, and graduated at Wesleyan University in 1840, entered the ministry in 1841, became in 1853 professor of theology in the biblical institute at Concord, N. H., was president of Geneva College (1854–57), and in the latter year became president of Wesleyan University, at Middletown, Conn.

Cum'mington, a post-township of Hampshire co., Mass., the birthplace of the poet Bryant, of Hon. H. L. Dawes, of Luther Bradish, and of Dr. Thomas Snell, the historian and divine. It has manufactures of importance. Fine water-power is furnished by the Westfield River. The town has three churches, and an excellent public library, presented to the town by Mr. Bryant. Pop. 1037.

Cum'mins (FRANCIS), D. D., born near Shippensburg, Pa., in 1752, was one of the framers of the Mecklenburg Declaration of Independence (May, 1775), and in 1780 was licensed by the presbytery of Orange, N. C., to preach. For many years he was the honored pastor of Presbyterian churches in the Carolinas and Georgia. Died Feb. 22, 1832, at Greensboro', Ga.

Cummins (GEORGE DAVID), D. D., an American clergyman, was born near Smyrna, Del., Dec. 11, 1822. He was graduated from Dickinson College in 1841, and was a licentiate in the Methodist Episcopal Church for two years. In 1845 he studied for orders in the Protestant Episcopal Church, in October of the same year was ordained a deacon, and in 1847 a presbyter. For six years he was rector of Christ church at Norfolk, Va., and then successively rector of St. James's church, Richmond, Trinity church, Washington, St. Peter's church, Baltimore, and Trinity church, Chicago. In 1866 he was elected assistant bishop of Kentucky. In Nov., 1873, he resigned his position, withdrew from the Protestant Episcopal Church, and founded the Reformed Episcopal Church, of which he was made presiding bishop Dec. 2, 1873.

J. B. BISHOP, *N. Y. "Tribune" Ed. Staff.*

Cummins (MARIA S.), a popular novelist, was born at Salem, Mass., April 10, 1827. Her most successful novels were "The Lamplighter" (1853), "Mabel Vaughan" (1857), and "El Fureidis" (1860). The first mentioned had a sale of 70,000 copies in a single year. Died Oct. 1, 1866.

Cum'ru, a post-township of Berks co., Pa. Pop. 2573.

Cunard' (Sir SAMUEL), BART., was born in Nov., 1787. He was the eldest son of a gentleman in Halifax, Nova Scotia. He became the head of the extensive firm of steamship owners, Cunard & Co. He married a lady of Halifax, and in 1859 was made a baronet. Died April 28, 1865, leaving eight children.—He was succeeded in the baronetcy by his son, Sir EDWARD, who married Miss Mary McEvers of New York. Sir Edward Cunard died April 6, 1869.—Sir BACHE CUNARD, the present baronet, was born May 15, 1851. He resides chiefly in the U. S.

Cunax'a, the ancient name of a place in Babylonia, on the E. bank of the Euphrates, about 45 miles N. of Babylon. In 401 B. C. a battle occurred here between Artaxerxes Mnemon, king of Persia, and his brother Cyrus (the Younger), who was defeated and killed.

Cundinamar'ca, one of the United States of Colombia, separated by the Central Cordilleras from Antioquía and Cáuca on the W., by the Orinoco from Cáuca and Venezuela on the E., and bordering S. on Cáuca, and N. on Boyaca and Antioquía. The climate varies from the *tierra caliente* of the valleys to the *tierra fria* of the high plateaux, and the products are very abundant. The chief exports are tobacco and cinchona. Chief city, Bogotá. P. in 1870, 409,602.

Cunduran'go, or **Condurango,** a twining plant of the order Asclepiadaceæ, apparently belonging to the genus *Nantonia,* though its botanical relations are not well known. It grows in Ecuador, and has been sold in the U. S. and Europe at fabulous prices as a cure for cancer. It has, however, no favorable effect upon that disease, though it probably has active properties. Its name signifies "condor root," and it is believed by the Indians that the condor uses it as a medicine.

Cu'neiform [Lat. *cuneiformis,* from *cuneus,* a "wedge," and *forma,* "form"], having the form of a wedge; applied to one of the bones of the wrist and to three of the tarsus; also to certain wedge-shaped characters found on ancient monuments. (See next article.)

Cu'neiform (or **Arrow-headed**) **Inscrip'tions.** The cuneiform characters used in the Euphrates valley had their origin in a hieroglyphic or picture system of writing. A few inscriptions, in a more primitive style than usual, retain considerable resemblance to the original hieroglyphics, though most of the Assyrian inscriptions preserve very little resemblance to their original pictures. The ordinary characters are made up entirely of wedges, differently arranged, and ranging from a single one to a combination of twenty. Each character is either a syllable or a word, the analysis into consonant and vowel sounds being quite beyond the capacity of the Chaldean scribes. The choice of the wedge as the basis of all the characters is not arbitrary, but results from the employment of soft clay (instead of parchment), which was inscribed with a pointed stylus.

From the earliest historical period, as now, the Euphrates valley has contained races existing side by side, but speaking diverse languages. At present the Persian, the Arabic, and the Turkish represent the three great families of languages, the Indo-Germanic, the Shemitic, and the Turanian; and the same three families are represented by the languages which we find in the early trilingual cuneiform inscriptions—one being in the Turanian Accad language, another in the Shemitic Assyrian, and the third in the Indo-Germanic Persian, or Achæmenian.

The earliest civilization of the Euphrates was Turanian. It is indicated by the genealogy of Genesis x., which represents Asshur as having descended from Cush. This Turanian people, called *Accad,* invented the form of writing which, with the modifications produced by ages of use, was adopted by all the other languages about them. But not being originally an alphabet of simple sounds, but characters representing words, it naturally became encumbered in the transfer with a multiplicity of sounds, which has been a great stumbling-block to those who have not made the language a study.

Thus, for example, in Turanian the word *par* means "the sun," and had its appropriate hieroglyphic, afterwards abbreviated into a conventional character, consisting of one upright wedge with two very short parallel wedges set obliquely by its left side. The meanings "light" and "day" were naturally enough attached to the same character, just as we say that the *sun* is very bright when we mean that its *light* is brilliant, and as an Indian speaks of three *suns* when he means three days. Any other word besides *par,* signifying in Turanian "sun," "light," or "day," was attached to this hieroglyphic as its variant significations and pronunciations. When the character was transferred into the Assyrian language, it kept its significations, but utterly altered its pronunciations. In its sense of "the sun," from *par* it became *samas;* in its sense of "day," it became *imma;* and so with other significations. The same was true in its transfer to the Persian. But another stage of change remains, the syllabic.

It was a very simple step to abbreviate the sound allowed to a character. Thus, in Accad the word *Annap* means God, and is represented by two successive short horizontal wedges followed by a longer upright one. This character was not only employed to represent the idea of God, pronounced *Annap* in an Accad and *Ilu* in an Assyrian inscription, but also to represent the first syllable *an* of *Annap.* In a similar way the character pronounced *pil,* "ear," in Accad, came to represent the simpler syllable *pi.* There were thus as many simple syllables formed as could be made by the combination of twenty consonants with three vowels; it being remembered, however, that when the consonant followed the vowel no distinction was made between the different consonants of a class, whether sibilant, labial, dental, or guttural. Thus *ab* and *ap* are represented by the same character, and so is *us, uz,* and *u* followed by either one of two other sibilants. When these simple syllables were combined to form words, it became necessary to duplicate the vowel sound of a closed syllable, as in the word *habba,* "sea," which is written with the characters pronounced *ha-ab-ba.*

These different stages of writing will be more or less com-

bined in any Assyrian inscription, so that we may have in the same line simple syllables, like those in *ha-ab-ba*, "sea," complex syllables, like those in *gul-lul-tuv*, "curse," and ideographic signs, like that for *rabu*, "great." And a single sign may have several different values; and cases occur in which, by a perversity of the scribes, the same character is used in two successive syllables of the same word with different values, the practice which allows us to pronounce *viz* one way in "vizier," and another in the contraction for "namely," being carried to an extreme extent, so that there are cases of polyphony in which a single character has as many as five or six distinct values.

The complexity of the Assyrian system of writing is so great that there was for a long time much skepticism about the trustworthiness of the decipherment, although there is scarce a feature of the system that is not paralleled in the existing Japanese writing. But the proofs of its correctness are beyond cavil. They are found in trilingual inscriptions of considerable length, where it is easy to compare the Assyrian with the Persian; in some long inscriptions of which we have a large number of copies, and in which the scribes have written the same word in several different ways, more or less contracted; and finally in the extensive syllabaries are grammatical texts of the monuments, which were prepared, as we prepare dictionaries and spelling-books, for the instruction of learners, and which explain the values of the characters. The proof of the correctness of these readings was first given, so as to make it beyond reasonable question, in 1857, when Sir Henry Rawlinson, William H. Fox Talbot, Esq., Rev. E. Hincks, D. D., and Doctor Jules Oppert prepared independent translations from copies of a long inscription of Tiglath-Pileser. These translations were transmitted in sealed packets to a committee of the Royal Asiatic Society, and opened and compared by them. It was found that they were so nearly identical that it was preposterous to suppose that the true foundation had not been laid for the decipherment of the inscriptions. The amount of these inscriptions collected by Botta and Layard is very great, and includes the complete historical annals of several kings, embracing the details of their various campaigns, a very large number of grammatical and lexicographical tablets, legal and commercial documents, such as bills of sale, despatches to the king from the generals in the field, chronological tables, accounts of eclipses and lunar conjunctions, and indeed almost everything that a people greatly given to writing would care to record. The fortunate discovery of libraries or record-chambers of Sennacherib and Assurbanipal has been of incalculable service.

Language.—Its entire vocabulary and its grammar clearly prove that the Assyrian language belongs to the Shemitic family, and to the same branch of it as the Hebrew and Phœnician, rather than to the Aramæan or to the Arabic branch. And yet it preserves many forms which are nearly or quite obsolete in Hebrew, such as the three case-endings of the noun, and the conjugations of the verb formed with *s* and *t*. The Assyrian is peculiar in its exceedingly rare use of the perfect (preterite) tense. So rarely is it used that the French scholars deny its existence entirely. A large majority of the roots are the same as in Hebrew; the sibilants are preserved, and not changed into dentals, as in Aramaic, which is considerably more remote from the Assyrian than is the Arabic.

Mythology.—The chief Assyrian deity was Asshur, called "chief of the gods," and replaced in Babylon by a deity called *Il* or *Ra*. It is remarkable that no temples were built to this tutelary god of Assyria, although the oldest capital of the country, built before Nineveh, and the country itself, bear his name. His emblem was a winged circle enclosing or surmounted by a human bust.

Subordinate to Asshur is the triad of Anu, Bel, and Hea or Ao, also called Sin. Anu was a very old deity, and in later mythology seems to have presided over the lower regions, and perhaps to have ruled Chaos. Bel, the organizer of the world, judging from his Shemitic name, meaning "lord," corresponds to the Roman Jupiter. Hea, or Ao, is the god of wisdom, the Oannes of Berosus. To this trinity succeeds another, consisting of Iva (Bin), the "æther;" Shamas, the sun; and Sin, the moon. The five planets were identified with the gods Ninip (Adar?), Saturn; Merodach, Jupiter; Nergal, Mars; the goddess Ishtar, Venus; and Nebo, Mercury. With most of the gods were connected corresponding female divinities, of whom the best known is Beltis, wife of Bel, who is the Mylitta of Greek writers, in whose temple every Babylonian woman was obliged to prostitute herself once in her life.

The ancient Babylonians were familiar with the story of the Deluge, as is proved by some very curious mythological tablets lately deciphered by Mr. George Smith, and probably reaching back to the extreme antiquity of over 2000 B. C. In this story Sisit (the Xisuthrus of Berosus) takes the place of Noah, and is warned by Hea to build a ship, that he and his family and individuals of all the animals may escape a flood sent to punish the wickedness of men. The vessel is calked with bitumen and roofed with reeds. Its dimensions are missing, but its breadth and height, unlike those of the biblical ark, are equal. Unlike the ark, it has a pilot. The rain lasts but seven days, and the birds sent out are a dove, a swallow, and a raven. The ark rests on the mountains east of Babylon, when the god lets Sisit and the animals out, and he offers a sacrifice. As a reward for his services he receives the gift of immortality. This story of the Deluge is on the eleventh of twelve tablets, of which one was for each month, this being for the "rainy month."

History.—The most important result of the decipherment of the cuneiform inscriptions is the addition of an almost entirely new chapter to the history of the ancient world. The Babylonians and Assyrians, unlike the early Hindoos, were exceedingly careful to preserve their historical records for posterity. Hundreds of copies exist of a single inscription giving an abstract of the victories of Assurnazirbal; and the very bricks of which a palace was built were stamped with the name of the ruling monarch. The fragmentary and contradictory accounts of Berosus, Ctesias, etc. have been supplemented by an immense mass of contemporary records, quite complete in some reigns, from which we can gain a very clear view of the rise and fall of the Assyrian and Babylonian powers.

The earliest dynasty was an indigenous one, called by various authors Accad, Chaldæan, or Cushite. It began about 2200 B. C., and the names of a few kings are preserved, among whom are Ur-hammu (perhaps the Orchamus whom Ovid reports to have been the seventh after Bel), his son Ilgi, Ismidagon, and Hammurabi, extending to the middle of the sixteenth century B. C., when Thothmes III. overran Mesopotamia, and established a line of Egyptian rulers whom Berosus calls Arabian. After two or three centuries, during which the Egyptians were paramount, we meet the name of Assur-bel-nisis as the founder of the first Assyrian dynasty. He was an insignificant ruler, like his immediate successors, and not till Tiglath-ninip I., about 1300 B. C., was Babylon conquered by the king of Nineveh. Of his successors the most powerful was Tiglath-Pileser I., whose history is quite fully given, and who conquered the Moschi of the Black Sea, Armenia, Western Media, the Syrian Hittites, and a portion of the Phœnician coast. He records it as an extraordinary exploit that he entered a vessel of Aradus and killed a dolphin with his own hand. After some reverses in attempting to subdue the revolted city of Babylon, he succeeded in recovering for Nineveh the political supremacy. His third successor, Assur-rabu-amar, was conquered about 1070 B. C. by the Hittites, and lost all his Syrian conquests, thus allowing the development of the Jewish kingdom under David and Solomon.

The earlier kings of a second Assyrian dynasty, beginning with the usurper Beletaras, are obscure, but with one of them, Vul-nirari II., chronology becomes certain, as we have a nearly complete list of the eponyms for each year for some centuries after his reign, with the names of the corresponding kings, the Assyrians having the habit of naming each year after some public functionary, who corresponded in this respect to the Greek archons and the Roman consuls. The first king of note is the great conqueror Assurnazirpal, who carried his arms to the Mediterranean Sea on the west, and into Media and Persia on the east. His son, Shalmaneser II., extended his conquests —or rather his campaigns, which often issued in only a temporary subjection—into regions beyond those visited by his father, but the most interesting are those in which he conquered Benhadad and Hazael, the successive kings of Damascus, the former of whom was aided by 10,000 troops from Ahab, king of Israel, though his successor, Jehu, gave tribute to Shalmaneser, and thus incurred the enmity of Hazael. Of the successors of Shalmaneser, the second, Vul-nirari III., was a great conqueror, and his wife, Sammuramat, is the Semiramis of Herodotus.

The Assyrian annals give no account of the fall of Nineveh under Sardanapalus, and the identification of his name with that of Assur-nirari by the French Assyriologists depends on a very doubtful conjecture that the character read *nirari* by George Smith, and which appears sometimes to be equivalent to *gabal*, may, in a rare inflectional form of that root, have been *tanagbal*. The resulting name, Assur-tanagbal, would readily become Sardanapalus in Greek. Equally obscure is the biblical Pul, king of Assyria, who about this time received tribute from Menahem, king of Israel. Some scholars assume at this time, which closes the first Assyrian empire, a break in the table of eponyms of forty years, which reconciles these annals with the Jewish history. If this break does not occur, the dates

given for the previous kings must be brought down forty years.

In 744 B. C., Tiglath-Pileser II. commenced a new line of Assyrian monarchs, founding the second Assyrian empire. The reconquest of Babylonia occupied the earlier portion of his reign, while the latter portion was taken up with expeditions against Syria, Phœnicia, and Israel. Pekah, king of Israel, was dethroned by him, and Menahem occupied the throne for eight years, until, taking advantage of Tiglath-Pileser's campaign against Armenia, Pekah again recovered his position. This fact, given by the monuments, explains a discrepancy of eight years between the biblical dates of the Jewish and Israelite kings. Ahaz is mentioned, in the Assyrian as in the biblical records, as an ally of Assyria against Israel, and as doing homage with other kings to Tiglath-Pileser at Damascus. His son, Shalmaneser IV., succeeded him, and after a reign of five years was succeeded by his tartan (or general) Sargon in 721 B. C. Sargon was a great conqueror. It was he who carried Samaria captive, though the biblical record has been thought to imply that it was Shalmaneser. He extended his conquests over Syria, Phœnicia, and Palestine, and conquered the army of Egypt that was assisting the Philistine cities. The king of Egypt and the queen of Arabia gave him tribute. He then ravaged Armenia, portions of Media, Parthia, Albania, Cilicia, and Pisidia. When Babylon revolted he subdued it, placing a satrap of his own in command. He even received the submission of Cyprus, as a granite column discovered in Citium contains the cuneiform record and the representation of Sargon. He was assassinated in 704 B. C., and succeeded by his son Sennacherib, also a famous conqueror. We possess long records of his reign, including full accounts of his campaign against all the countries ravaged by his father, among which was Judah, then ruled by Hezekiah. His son Esarhaddon (681–667) was also a warlike king. He had been viceroy of Babylon before his father's assassination, and made that city his place of residence. He increased the Assyrian domain by an expedition into the Arabian peninsula and by the conquest of Egypt. His son Assurbanipal, the Greek Sardanapalus, was equally successful in war, and reconquered the rebellious Egyptians in three successive campaigns. Tyre was forced to yield after a stout siege, and the daughter of King Bahlu and other princesses were taken into the harem of the conqueror, who here first shows his sensuality. Then followed his treaty with Gyges, king of Lydia (of whose relations with the wife of Candaules, Herodotus tells so curious a story), and his war with Elam, concluded about 655 B. C. by the complete submission of Elam. The Assyrian empire had now reached its greatest extent, including all the known world. From this time till his death, in 726 B. C., his task was to retain his unwieldy conquests, and especially to crush the rebellion of his brother, Saul-Mugina, at Babylon, aided by Tammaritu of Elam. Assurbanipal was a munificent patron of learning, and founded large libraries, a large portion of which is now in the British Museum. He also built many temples and palaces. But his reign, which marks the grandest era in Assyrian history, was the immediate precursor of the overthrow of the empire under his successor by the combined armies of Babylon and Media.

In the cuneiform inscriptions we also have full records of the Babylonian monarchy which succeeded the Assyrian. This empire lasted for less than a century, and of the six kings only three have any note—Nabopolassar, its founder, his son Nebuchadnezzar, who raised it to its highest pitch of power, and Nabonidus, under whom it was overthrown. None of these monarchs were remarkable as warriors, although Nebuchadnezzar in the early part of his reign drove an Egyptian army as far as Pelusium, and destroyed Jerusalem and Tyre. His annals are mainly filled with descriptions of the magnificent public buildings which he erected. Of his lycanthropy the inscriptions give no record. About the time of his death (561 B. C.) the Persian power arose, and gradually assumed more threatening dimensions until Nabonidus, as related by the Greek historians, was conquered, and his son Belshazzar—whom the inscriptions mention as regent under him in Babylon—was killed as described by Daniel. The subsequent history of Babylon belongs to Persian and Greek history.

The inscriptions have greatly increased our respect for the historical authority of Herodotus, and especially of Berosus, whose accounts are always confirmed. The same may be said of the biblical records, which receive great light from these historical monuments in confirmation of their general historical accuracy, although such facts as the overthrow of Sennacherib's army and the insanity of Nebuchadnezzar are omitted.

(Of the works which have appeared on this subject since the decipherment of the inscriptions, the most important are the following: Of Assyrian texts, E. Botta and E. Flandin, "Monuments de Ninevé," 5 vols., Paris, 1849–50 (the vols. i., ii., and v. are filled with representations of Assyrian art); A. H. Layard, "Inscriptions in the Cuneiform Character from Assyrian Monuments," British Museum, 1851 (untrustworthy copies); Rawlinson, Fox Talbot, Hincks, and Oppert, "Inscription of Tiglath-Pileser Translated" (translated in 1857, but published in the "Journal of the Royal Assyrian Society," 1860); Rawlinson and Norris, "The Cuneiform Inscriptions of Western Asia," vols. i., ii., iii., London, 1861–66–70 (the most important body of inscriptions, but without translations); Menant, "Inscr. Ass. de Hammourabi," Caen, 1863; Oppert and Menant, "Les Fastes de Sargon" (with translation), Paris, 1863; also "Grande Inscription de Khorsabad" (with translation), 2 vols., Paris, 1865; George Smith, "History of Assurbanipal" (with translation), London, 1871. Of special grammatical and lexicographical value are the following: Rawlinson, "Commentary on the Cuneiform Inscriptions of Babylon and Assyria," London, 1850; "Babylonian Translation of the great Persian Inscription of Behistun," London, 1851; Hincks, "On Assyrian Verbs" (the first successful attempt at Assyrian grammar), in the "Journal of Sacred Literature," 1855–56; also "The Polyphony of the Assyrio-Babylonian Cuneiform Writing" (from the "Atlantis"), 1863, and "Specimen Chapters of an Assyrian Grammar" (of great value), in "Journal R. A. S.," 1866; Oppert, "Éléments de la Grammaire Assyrienne," Paris, 1860 (first attempt at a complete grammar; uses Hebrew type for Assyrian words—an excellent work, and considerably improved in the second edition of 1868); Menant, "Exposé des Éléments de la Grammaire Assyrienne," Paris, 1868 (nearly the same as Oppert's first edition, only using Assyrian type); Norris, "Assyrian Dictionary," vols. i., ii., iii., London, 1868–70–72 (very valuable from the abundance of quotations in Assyrian type); A. H. Sayce, "Assyrian Grammar," London, 1872 (the most comprehensive manual yet published; uses English letters for Assyrian words). Other important works on Assyrian history, mythology, art, etc. are Layard's "Monuments of Nineveh," vols. i., ii., London, 1851–53 (very fine plates); G. Rawlinson, "Herodotus," vol. i., London, 1858 (contains valuable essays by Sir Henry Rawlinson); Oppert, "Expédition Scientifique en Mésopotamie," vols i., ii., Paris, 1863; Lenormant and Chevallier, "Manual of the Ancient History of the East," vol. ii., Philadelphia, 1869 (contains full abstracts, mainly trustworthy, of Assyrian and Babylonian discoveries); E. Schrader, "Die Keilinschriften und das Alte Testament," Giessen, 1872 (goes through the Old Testament, giving whatever illustrations are suggested from cuneiform discoveries); also "Die Assyrisch-Babylonischen Keilinschriften," Leipzig, 1872 (an exhaustive defence of the readings of the inscriptions).)

William H. Ward.

Cu'neo, a province of Northern Italy, forming part of Piedmont. Area, 2755 square miles. One-half of the province is level, the other half hilly. The chief river is the Tanaro. It produces wheat, maize, hemp, rice, and silk. Pop. in 1871, 597,279.

Cun'ningham, a township of Chariton co., Mo. Pop. 761.

Cunningham, a township of Fluvanna co., Va. Pop. 2771.

Cunningham (Allan), a Scottish author, born at Blackwood, Dumfries-shire, Dec. 7, 1785, worked as a stone-mason in his youth. He removed to London in 1810, and began to write for the newspapers. He was employed as foreman in Chantrey's studio from 1814 to 1841. His "Traditional Tales of the English and Scottish Peasantry," "Songs of Scotland," "Life of Wilkie," and "Lives of British Sculptors, Painters, and Architects" are his best known productions, besides some favorite songs. Died Oct. 29, 1842.—His son, Capt. J. D. Cunningham, has written a "History of the Sikhs."—A second son, Alexander Cunningham, born Jan. 23, 1814, major-general in the Bengal Engineers, has published numerous papers on Indian archæology.—Another son, Peter Cunningham, born April 17, 1816, an industrious writer, is known as the editor of Goldsmith and author of lives of Drummond of Hawthornden, Inigo Jones, and Turner (1852).

Cunningham (Samuel B.), M. D., a medical practitioner of East Tennessee, was born there Oct. 9, 1797. He received his degree at Transylvania University, Ky. He served his generation most faithfully at Jonesboro', Tenn., for nearly fifty years, and his loss was mourned as a public calamity, for to the profession he was one of its purest and brightest ornaments. Died Sept. 4, 1867.

Paul F. Eve.

Cun'ningham's, a township of Person co., N. C. Pop. 1119.

Cupar-Fife, a royal burgh of Scotland, the capital of Fifeshire, is in a beautiful vale on the river Eden, 32 miles

N. of Edinburgh. It has a public library, several newspaper-offices, and manufactures of coarse linens, earthenware, etc. A castle or fortress of the Macduffs, thanes of Fife, formerly stood here. Pop. in 1871, 5105.

Cu′pel [Fr. *coupelle*, a "little cup"], a shallow and porous vessel, somewhat cup-shaped, generally made of bone-earth. It is used in the process of assaying gold and silver, which are fused with lead upon a cupel. The lead is oxidized in the process and sinks into the substance of the cupel, leaving the metal pure.

Cupella′tion [for etymology see preceding article] is the process of refining precious metals on a cupel, or the separation of one metal from another by the use of a cupel heated in a muffle furnace. (See ASSAY.)

Cu′pid [Lat. *Cupido*], the Roman name of the god of love, corresponding to the Eros [Ἔρως] of the Greek mythology. He was usually represented as the son of Venus, but ancient authorities differ respecting his paternity. He is represented as a beautiful winged boy, bearing a bow and arrows.

Cu′pids, a post-village of Brigus district, on the N. side of Conception Bay, Newfoundland, 2 miles from Brigus. Farming and cod and salmon fishing are carried on. Pop. 1200.

Cu′pola [Fr. *coupole*], a spherical vault or concave ceiling raised over a building. Cupolas are sometimes hemispherical, and are constructed in various other forms. (See DOME.) Cupola is also the name of one form of blast-furnace for the reduction of metallic ores.

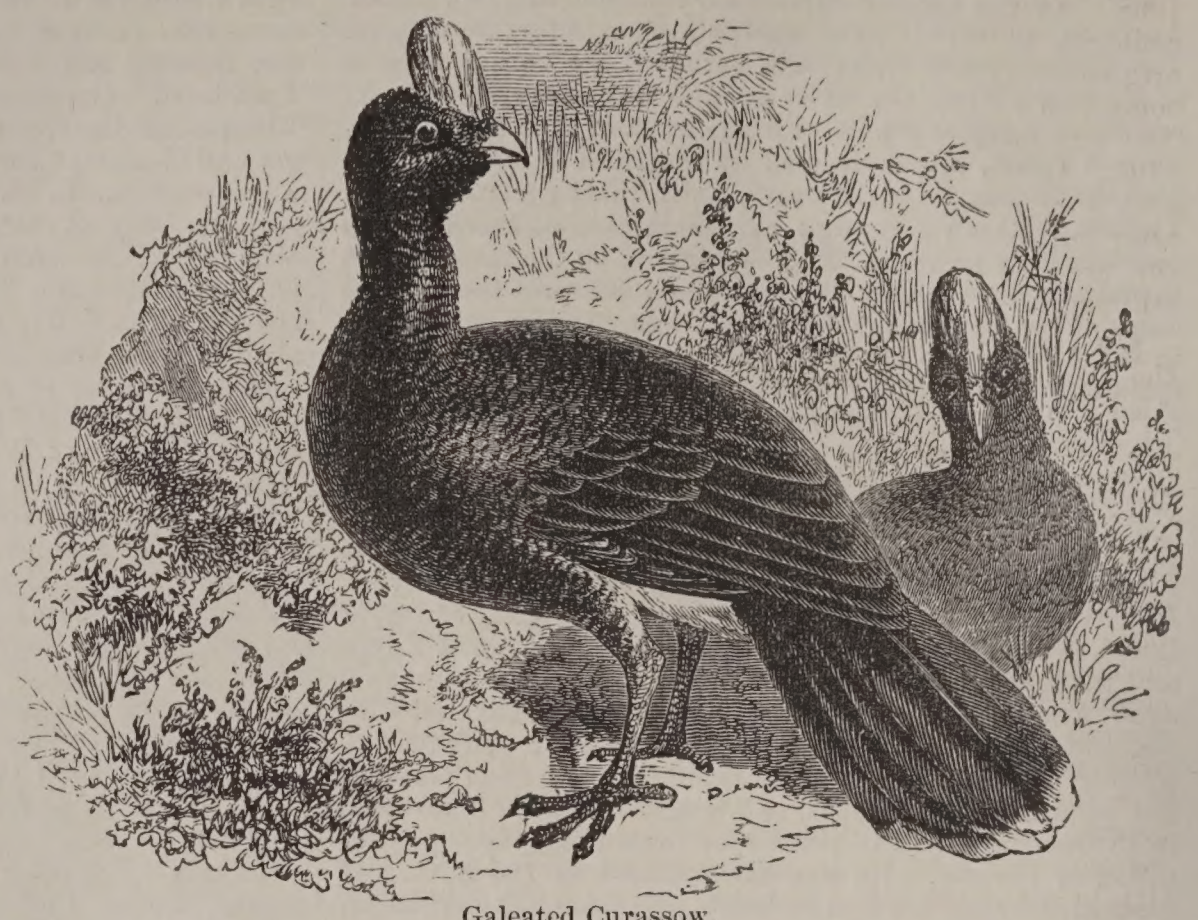
Cup′ping [Lat. *cucurbitatio* (from *cucurbita*, a "gourd" or "cup"); Fr. *la ventouse;* Ger. *Schropfen*], in surgery, the application to the skin of small cups from which the air is partly expelled. If it be designed to withdraw blood from the patient, the skin is first scarified, a partial vacuum is produced in the cup by direct suction or by the flame of alcohol or of burning paper, and the mouth of the cup is applied to the scarified surface. "Dry cupping" is the same process without scarification. In this case no blood is drawn, the object being to stimulate a diseased surface or to produce derivative action.

Curaçoa, or **Curaçao,** ku-ra-sō′, one of the West India Islands, of a like-named group, belonging to the Dutch, is off the N. coast of Venezuela. Area, 164 square miles. Its N. point is in lat. 12° 24′ N. and lon. 69° 17′ W. The chief article of export is salt, and more recently also cochineal. It is governed by a stadtholder and council. Capital, Willemstadt. Pop. in 1870, 21,089.

Curaçoa, a liqueur which is made of Curaçoa oranges or orange peel, by digesting in sweetened spirits along with a little cinnamon, and often a little mace or cloves. The spirits used contain nearly three and a half pounds of sugar to the gallon. It is imported from Holland.

Cura′ri, Woora′li, or **Woora′ra,** a celebrated arrow-poison used by the South American Indians. Its nature and origin are still unknown, but the principal ingredient is believed by some to be the juice of the *Strychnos toxifera*, a woody vine covered with long reddish hairs, having ovate leaves, rough and pointed, and large round fruit. This is not its probable origin. It is, however, a vegetable extract, and not a snake-poison, as many have conjectured. There is more than one variety of the drug. The poison, when it enters the blood through a wound, causes paralysis, with convulsive motions, followed by death. It may be swallowed in considerable doses with impunity. It is regarded as the most powerful of all sedatives, and the employment of it in cases of tetanus and hydrophobia has been suggested. The best means of preventing its deadly effect is found in artificial respiration.

Curas′sow, the name of several species of birds belonging to the order Gallinæ, having a strong bill, surrounded at the base with a skin sometimes of brilliant color, and on the head a crest of feathers which can be raised or lowered at pleasure. The species are found in the warmer parts of South America, Mexico, and Central America, where they congregate in flocks. They are about the size of turkeys, and their flesh is highly esteemed. They are also very easily domesticated and reared, and are common in the poultry-yards of South America. Among the best-known species are the crested curassow (*Crax alector*), the



Galeated Curassow.

red curassow (*Crax rubra*), and the *Ourax pauxi*, or galeated curassow.

Cu′rate [Lat. *curatus* (from *cura*, "care"); Fr. *curé*], one who has the cure of souls. The term has been variously appropriated to different officers of the Church, but since the close of the sixteenth century in England has been restricted to assistant clergy, deputies, or substitutes. The bishop, or some officer having episcopal authority, appoints the curate's salary and grants his license. There are "temporary" and "perpetual" curates. The temporary or *stipendiary* can be removed at the will of the bishop or vicar. Perpetual curates cannot be thus removed. Their salary is paid from tithes established at the foundation of the chapel, and it becomes the duty of the impropriators to support them. The salaries of curates are too often disproportionate to their services, and they are almost destitute of legal rights, being entirely subject to episcopal authority.

Curator. See LAW, CIVIL, by PROF. T. W. DWIGHT.

Curcu′lio [the Latin for "weevil"], a name given to many weevils or coleopterous insects of the family Curculionidæ, but perhaps most frequently applied to the *Conotrachelus nenuphar*, a small dark-brown insect, speckled with yellowish-white and black. In spring and early summer it attacks the young fruit, such as apples, pears, apricots, etc., but its object of special attack is the plum. The female makes a crescent-shaped puncture in which she deposits her egg. The egg soon hatches, and the maggot feeds upon the young plum, which generally falls to the ground in a short time, and the larva burrows in the earth, becoming a perfect insect in about three weeks. Several generations are said to appear in one season. The destruction caused by this insect upon all kinds of smooth-skinned fruits is a very serious loss. Another destructive curculio is the plum-gouger (*Anthonomus prunicida*), which occurs very abundantly in the Western States. It makes a round puncture. It undergoes transformation inside the kernel of the plum. Another insect of this genus makes numerous holes in the apple; still another lays her eggs in the cranberry, and then cuts off the stem. The grape curculio (*Cœliodes inæqualis*) and other species are very destructive to grapes. Fruit trees and grapevines should be frequently shaken in summer, when the falling curculios may be caught upon a sheet and burned. Swine and sheep render great service by devouring the fallen fruit with the larvæ contained in it. Nearly 10,000 species of this family have been described. They are arranged in more than 630 genera.

Curcuma. See TURMERIC.

Curds′ville, a post-township of Buckingham co., Va. Pop. 2101.

Cu′res, an ancient and famous city of Italy, the capital of the Sabines, was near the Tiber, about 25 miles N. N. E. of Rome. The site is occupied by the modern village of Correse. Cures was colonized by Sulla about 100 B. C.

Cur′few Bell, or simply **Curfew** [Fr. *couvre-feu*, *i. e.* "cover the fire" (from *couvrir*, to "cover," and *feu*, "fire")], was a bell rung at eight in the evening as a

signal for extinguishing lights and fires—a practice said to have been introduced into England by William I. in 1068. As the custom existed in France, Spain, and other countries at the same time, it is probable that it was not originated by William I., but the strictness with which he compelled its observance caused it to be attributed to him. The stringency of this law was relaxed by Henry I. in 1103. In the reigns of Edward I. and Edward III. persons were not permitted to be abroad in the city, armed, after curfew. In many parts of England and the U. S. the practice of ringing the bell at eight or nine o'clock still prevails.

Cu'ria (plu. **Curiæ**), the name of the building in which the senate held its sessions in the cities of ancient Italy. Also a subdivision of the Roman patrician tribes, each of which was divided into ten *curiæ*. These tribes were three in number, the Ramnes, Tities, and Luceres, so that there were thirty curiæ. These curiæ contained only the patricians or *populus* proper, but clients were regarded as passive members of the curia of their superior. In early times the curiæ were of the greatest importance. Each curia had its own name, but only a few of these names have come down to us. In later times the curiæ lost their political importance, but long retained their ancient and mysterious religious rites, which were maintained by the priests called *curio* and *flamen curialis*. In still later times even these old offices were sometimes conferred upon plebeians. The curiæ voting together constituted the *comitia curiata*, once a highly important public body with legislative powers; but before the fall of the republic this body had fallen almost into disuse and oblivion, though it still had a formal existence. In it each of the curiæ had one vote, and in each curia each member had one vote. In the language of modern Europe, *curia* is the Latin word for court or place of justice.

Curico', a province of Chili, is bounded on the N. by the province of Colchagua, on the E. by the Andes, on the S. by the province of Talca, and on the W. by the Pacific Ocean. Area, 2948 square miles. The country is mountainous and the soil fertile. Chief town, Curico. Pop. in 1869, 98,859.

Curico, a town of Chili, founded in 1742, is a progressive place, with a college, on the Mataquito. Pop. 5953.

Cur'lew (*Numenius*), a name of a genus of birds of the order Grallatores, natives of Europe and North America. Curlews have long, slender, and curved bills, long legs, and short tails. They frequent the sea-shore and open moorlands, feeding on worms, mollusks, insects, etc. The common curlew of England (*Numenius arquata*) is pursued by sportsmen partly for its flesh, which is delicate and well flavored, and partly because its wild and shy habits render the pursuit exciting. Among the curlews of North America may be mentioned the long-billed curlew (*Numenius longirostris*) of all the temperate parts of North America. It is twenty-five inches long, the wing measuring about eleven inches. The bill is often eight inches long. It is of a pale-reddish color, with ashy tints and brown-black marks, and longitudinal lines of black. The short-billed curlew (*Numenius hudsonicus*) of the Eastern and Western coasts is two-thirds the size of the foregoing, with a bill about four inches long. The Esquimaux curlew (*Numenius borealis*) is still smaller.

Curlew.

Curl'ing, the name of a Scottish game which has been introduced into Canada and other countries where ice can be found of sufficient thickness. It is played with stones weighing from thirty to forty-five pounds, having handles by which they are hurled over the ice. Sides are made up, generally four against four; a length of ice is chosen, from thirty to forty yards long, and eight or nine feet across. At each end of this rink, as it is called, marks are made consisting of several concentric rings called broughs, and a centre called the tee. The object of the player is to hurl his stone towards the tee with strength and precision, and the interest of the game depends on the skill displayed by the players in placing their stones in good positions, and in driving those of their rivals out of such places. At a certain distance from the tees a score is drawn across the ice, and a stone not passing beyond this counts for nothing.

Curling (Thomas Blizard), M. R. C. S., F. R. S., an eminent English surgeon, born in Jan., 1811, became an assistant surgeon in the London Hospital in 1834, lecturer on surgery in 1846, surgeon to the hospital in 1849, examiner in the University of London in 1859, and fellow of the Royal Society in 1850. He wrote a prize treatise on tetanus (1835), "Diseases of the Testis" (1843), and "Diseases of Rectum" (1851.)

Curlls'ville, a post-village of Monroe township, Clarion co., Pa. Pop. 208.

Cur'ran, a township and post-village of Sangamon co., Ill. The village is on the Toledo Wabash and Western R. R., 7 miles S. W. of Springfield. Pop. 1000.

Curran (John Philpot), an Irish orator, born at Newmarket, near Cork, July 24, 1750, was educated at Trinity College, Dublin, studied law in the Middle Temple, London, and was called to the Irish bar in 1775. As a barrister he was very successful, and was distinguished for his humor and sarcastic speech. He became in 1783 a member of Parliament, in which he acted with the opposition party, of which Grattan was the leader. In 1806 he was appointed master of the rolls in Ireland. Died Oct. 14, 1817. (See Charles Phillips, "Curran and his Contemporaries," 1850; T. Davis, "Life of Curran," 1846.)

Cur'rant [from *Corinth*, in Greece, from which port this fruit was formerly exported], a common name of a kind of small raisin (*Uva passula minor*), the dried berry of a seedless variety of grape which is cultivated in the Levant. Currants are exported from Zante and some of the other Ionian Islands, and are used in cookery as an ingredient in cakes and puddings. Attempts to introduce the currant grape into other regions have thus far been unsuccessful.

Currant [so called from its resemblance to the above fruit], the popular name of the berries of certain species of *Ribes*, low shrubs of the order Grossulaceæ, distinguished from the gooseberries by the flowers, which grow in racemes, and by the fact that the currant bush is never thorny. The red currant (*Ribes rubrum*) is a native of Europe, Asia, and North America, is cultivated in gardens for its pleasant acid fruit, and is much used for the table and for jellies, conserves, etc. "Currant wine" is a domestic drink, made of currant juice, sugar, and water, which is allowed to undergo alcoholic fermentation. The black currant (*Ribes nigrum*) is also cultivated, and in France large quantities of *liqueur de cassis*, a very agreeable and popular variety of currant wine, are prepared from it. More than sixty species of currant are described, about two-thirds of which are American. Several are highly ornamental in cultivation. The varieties of fruit-bearing currants in cultivation are very numerous. They are very readily propagated by cuttings, and in ordinary years will, with a little care, yield a large supply of agreeable and useful fruit. If the ground between the rows is ploughed, hoed, and kept clear of weeds, the productiveness and profit, as well as quality of the fruit, will be much increased.

Cur'rency [from the Lat. *curro*, to "run," to "circulate"], any substance generally accepted as a representative of relative values in exchange. The following table exhibits some of the substances that have at various times and in various countries performed the functions of currency:

Date.	Country.	Currency.	Authority.
B. C. 1900....	Palestine	First currency mentioned in history.....	The Scriptures.
.....	Phœnicia.....	Phœnician coins, very ancient.....	
B. C. 1200....	Phrygia	First coins made by queen of Pelops.....	Julius Pollux.
B. C. 1184....	Greece	Brass coins.....	Homer
B. C. 578.....	Rome.....	First copper coins.....L. T.	Dic. of Dates.
B. C. 534–269	"	" brass " ..... "	" "
B. C. 269.....	"	" silver " ..... "	" "
B. C. 206.....	"	" gold " ..... "	" "
B. C. 55.....	"	Tin and brass " ..... "	
.....	Sparta.....	Iron "	Dufresnoy.
B. C.—.....	Carthage.....	Leather currency.....	Anonymous.
.....	Arabia.....	Glass coins.....	N. Y. "Tribune," July 2, 1872.
A. D. 212.....	Rome.....	Lead coins plated with silver.....	Anonymous.
" 808.....	Lombardy.....	BANK CREDITS invented by the Jews.....	Dic. Dates, article *Bank*.
" 1066.....	Britain	Human beings, at about £2 16*s.* 3*d.* per capita, L.T.	Henry, "Hist. G. B.," iv. 243.
" 1160.....	Italy.....	BILLS OF EXCHANGE invented by the Jews.....	Anderson, "Hist. Com."
" 1275.....	China.....	Mulberry bark disks, stamped.....L. T.	Marco Polo.
" 1470.....	Granada.....	Paper as REPRESENTATIVE MONEY.....L. T.	Hunt's Mag., Oct., 1862.
" 1574.....	Holland.....	Pasteboard.....	Putnam's Dictionary of Dates.
Uncertain...	Iceland.....	Dried fish.....	Anonymous.
"	Newfoundland	" "	
"	Norway and Greenland	Seal-skins and blubber.....	
"	Hindostan and Africa..	Cowrie-shells.....	Anonymous.
"	Britain.....	Tin	Dufresnoy.
"	N. American Indians...	Agate, carnelian, jasper, lead, iron, copper, gold, silver, terra cotta, mica, pearl, lignite, coal, bone, shell, chalcedony, wampum, peltry, etc.	Various.
Uncertain...	Africa.....	Bars of iron or *machutes*.....	Montesquieu.
"	Eastern tribes.....	Corn, oxen, camels, etc.....	Anonymous.
"	Abyssinia.....	Salt.....	"
A. D. 16—...	Holland.....	Paper currency.....L. T.	"
" 1631...	Massachusetts.....	Corn, at "market prices" (*sic*) ..... "	Macgreggor.
" 1635...	"	Musket-balls	Anonymous.
" 1690...	"	Paper currency, colonial notes.....L. T.	Macgreggor.
" 1694...	England.....	Bank notes.....	McCulloch.
" 17—...	Sweden.....	Iron and copper currency.....	Voltaire's "Charles XII."
" 1702...	South Carolina.....	Paper currency, colonial notes.....L. T.	Macgreggor.
" 1712...	" "	Bank notes.....	"
" 1716...	France.....	Paper and stocks (interchangeable).....L. T.	Murray.
" 1723...	Pennsylvania.....	Paper currency, colonial notes..... "	Macgreggor.
" 1732...	Maryland.....	Indian corn at 23*d.* per bushel..... "	Anonymous.
" 1732...	"	Tobacco at 1*d.* per pound..... "	"
" 1776...	Scotland.....	Tenpenny nails.....	Adam Smith.
" 1785...	State of Frankland, U.S.	Linen at 3*s.* 6*d.* per yard, whisky at 2*s.* 6*d.* per gallon, and peltry.....L. T.	Wheeler's "History North Carolina," p. 94.
" 1849...	California.....	Gold-dust.....	Anonymous.
" 18—...	Russia	Platina coins.....	"
" 18—...	Mexico, parts of.....	Cocoa beans; at Castle of Perote (1847), soap....	"
" 1863...	North Carolina.....	Tenpenny nails at 5 cents each.....	"
" 1863...	Florence, S. C., camp at.	Potatoes.....	Yorkville "Enquirer."
" 1863...	United States.....	Postage stamps for small change.....	
" 1863...	China and India.....	*Gold refused* as currency, "Econ. of Cap.".....	Patterson, p. 14.
" 1865...	United States.....	Nickel coined into 3-cent pieces.....	Act Mar. 3, 1865.
" 1865...	Philadelphia, Pa.....	Turnips for small change.....	"Ledger," April.
Uncertain...	India.....	Gold, silver, paper, copper, and "shells".....	Patterson, p. 13.
"	China.....	Silver, copper, and "pieces of silk".....	" "
"	Africa.....	Silver, copper, "shells," and "cotton strips"....	" "
"	Not stated.....	Wooden tallies.....	" "
"	Arabia.....	Silver wire about one inch long, called a "larin"	Kelly's "Cambist," ii. 219.

NOTE.—The articles marked L. T. were made a legal tender.

It is evident that these various substances are not equally suitable for the purposes of currency; that as a class metals are more suitable than any other; that among metals silver and gold are most suitable; and that whenever practicable these (the "precious metals") have always been employed for the purpose. The qualities which recommend them are mainly that they will neither decay, corrode, nor rot, are useful in a great variety of the arts, and can be converted to this use and into currency again with slight loss, are of uniform quality, can be divided and reunited without limit or impairment, are of limited and steady supply, are easily worked, transported, or concealed, are difficult to counterfeit or destroy, will resist friction, and are susceptible of being stamped with their weight and fineness, etc. These qualities seem to have been known and appreciated as early as the remotest periods to which authentic history relates; and until political freedom and security had placed commercial credit upon such a footing that paper currency became possible, the fluctuation of the world's available stock of the precious metals marked the phases of its industrial activity and those of the vast train of social phenomena that depend upon it. Even yet, while paper credit has but partially supplanted the precious metals as currency, the supply and consumption of the latter exert the most important influence upon the industrial affairs of the world.

The following tables—the early parts of which rest entirely upon the loose estimates of Jacob in his "History of the Precious Metals," and must be received with caution, while the later parts, without any doubt, approximate, with considerable accuracy, to the truth—show the world's stock of gold and silver currency from the earliest ages for which any data exist to the present time:

Gold and Silver Currency; amounts in Millions; the Pound Sterling reduced to Dollars at the Rate of $4.86\frac{2}{3}$.

Year, A. D.	Amt.	Authority.	Year, A. D.	Amt.	Authority.
14	1742	Jacob.	662	262	Jacob.
50	1568	"	698	235	"
86	1411	"	734	212	"
122	1270	"	770	191	"
158	1143	"	806	172	"
194	1029	"	1066	173	"
230	926	"	1500	170	"
266	833	"	1546	247	"
302	750	"	1600	633	"
338	675	"	1700	1445	"
374	607	"	1700	1318	Tooke.
440	547	"	1809	1687	Gerbow.
446	492	"	1809	1849	Jacob.
482	443	"	1827	1720	Humboldt.
518	399	"	1829	1557	Jacob.
554	359	"	1830	1600	Storch.
590	323	"	1839	1420	"
626	291	"	1860	2800	The writer.

Gold currency only; amounts in Millions; £1 = $5; 1 *fr.* = 0.20.

Year, A. D.	Amt.	Authority.	Year, A. D.	Amt.	Authority.
1848	1200	Chevalier.	1857	1200	Chevalier.
1848	1332	Est. on Newmarch.	1860	1998	Est. on Newmarch.
1848	1090	" " Levasseur.	1860	2209	" " "
1849	1306	Jacob.	1867	2600	Ruggles.
1853	1464	Est. on Waguelin.			

At about the commencement of the Christian era the mines of the world failed, and the currency fell from a sum equal to about $1,742,000,000 ("quadringenties millies"—*Suetonius in Vespasiano*, cap. xvi.) to $172,000,000 at the

time of the Heptarchy in England and Charlemagne in France. The social decadence, wars, political disturbances, poverty, ignorance, superstition, and tyranny that distinguish this period have justly claimed for it the designation of the "Dark Ages." From this time to the discovery of America the currency, except so far as it was affected by the invention and use of bank credits, bills of exchange, and paper money in certain localities, remained absolutely stationary, while relative to population it continued to diminish. This period was marked by the use of "living money" in Britain, the frequent debasement of coins throughout Europe, the search after the philosopher's stone, the transmutation of metals, etc. From the beginning of the fifteenth to the nineteenth century the currency increased from $170,000,000 to $1,849,000,000. This was a period of rising prices, great commercial activity, industrial progress, and political advancement. In the early part of this century the mines partially failed, and the coin currency began to diminish—a fact marked by frequent financial panics and commercial revulsions. In 1848 the California mines were opened, and the precious metals product again increased, so that in 1860 the coin currency was greater than it had ever been before. With this event coincides the most brilliant period of the world's history.

The following tables show the amount of currency in France and England respectively at the periods named:

Currency of France at Various Periods; the Franc at $0.20; *sums in millions of dollars and tenths.*

Year.	Kind of Currency.	Pop.	Amount of Currency.	Authority.
1789	Total currency—all coin	25	$430.0	Necker.
1789	Total currency—all coin	25	355.0	Peuchet.
1790	Total currency—all coin	26	440.0	Arthur Young.
1829	Coin 450, paper 50	32	500.0	Gallatin.
1833	" 525, " 30	33	555.0	Woodbury on Marshall.
1834	" 527, " 30	33	557.0	" Est. on Fr. papers.
1848	Coin and paper	35	400.0	Newmarch.
1848	" " "	35	400.0	Quoted by Carey.
1852	" " "	36	700.0	De Puynode.
1860	" " "	37	900.0	Carey.

Currency of England at Various Periods; the Pound at $4.80; *Sums in Millions of Dollars and Tenths.*

Year.	Kind of Currency.	Pop. of England only.	Amount of Currency.	Currency per capita.	Authority.
			$	$	
1676	Coin	5	28.8	5.8	D'Avenant.
1689	"	5	33.6	6.7	Patterson.
1700	Coin and Paper	5½	62.5	11.4	Patterson, "Econ. of Cap."
1711	" " "	5½	57.6	10.5	D'Avenant.
1750	" " "	6	91.2	15.2	Anon.—Woodbury.
1762	" " "	7	76.8	10.9	Anderson.
1763	" " "	7	114.0	16.3	Chalmers—Adam Smith.
1786	Coin only	.....	115.0	.....	Chalmers—Woodbury
1786	Bank of England notes only	.....	39.3	.....	McCulloch.
1786	Coin only	.....	96.0	.....	Chalmers—Putnam.
1796	" "	.....	101.0	.....	Tooke.
1796	Bank of England notes only	.....	51.5	.....	McCulloch.
1799	Coin 132, paper 115¼	8	247.3	30.9	"Rep. to U. S. Cong.," 1832.
1800	Coin only	.....	177.6	.....	Phillips.
1800	Coin and paper	8	288.0	36.0	Say.
1810	Paper only; of wh., Bk. of Eng., 105½	9	220.3	.....	Gallatin.
1815	Bk. Eng. 129½, Pri. bks. 144, coin 40½	10	314.	31.4	Hopkins and Martin.
1829	Coin 243½, paper 132	12.5	375.5	30.0	Marshall.
1830	" 187½, " 144	12.9	331.5	25.7	White's "Reports," 31, and Woodbury.
1830	Coin only	.....	196.8	.....	Duke of Wellington.
1833	Coin 212, paper 130.	13.5	342.0	25.3	Anon.—Woodbury.
1834	" 214, " 139..	13.7	353.0	25.8	" "
1834	" 158½, " 122½	13.7	281.0	20.5	Marshall.
1839	Coin only.	14.9	240.0	.....	Patterson.
1841	" "	15.	216.0	.....	Putnam.
1848	Coin and paper.	16.5	288.0	17.5	Levasseur.
1849	Coin only.	16.7	175.0	.....	Waguelin.
1856	Coin and paper.	19.	480.0	26.3	Levasseur.
1857	Coin only.	.....	250.	.....	Waguelin.
1860	Coin and paper.	20.	480.0	24.0	Newmarch.
1864	Coin 384, paper 192.	20.8	576.0	27.7	Patterson, p. 19.

The currency statistics of the U. S. are alone sufficiently complete to afford an insight of the laws that regulate its influence upon industrial activity. These statistics are herewith collated and estimated mainly from the treasury reports from 1775 to 1873, inclusive. A portion of these data—a summary from 1834 to 1869, also collated by the writer—was published anonymously in 1869 in the N. Y. "Economist," and afterwards in Grosvenor's work on "Protection."

Currency of the United States from 1775 *to* 1873, *inclusive; sums in Millions of Dollars and Tenths.*

Year.	Coin.	Treasury and U.S. Bank Notes.	State Bank Notes.	Total Paper.	Total Currency.	Pop.	Per capita.	Remarks.
	$	$	$	$	$		$	
1775	6.	.....	.....	5.	11.	2.5	4.40	Lord Sheffield (Seybert, 554) says 9½ coin.
1775–81	.....	.....	.....	.....	.....	.....	.....	Era of Continental money.
1790	16.	2.	1.	3.	19.	3.9	4.87	Repudiation of Continental issues.
1791	16.	.....	.....	9.	25.	4.0	6.25	First Bank United States.
1792	17.	5.	2.	7.	24.	4.1	5.85	
1793	20.	.....	.....	11.	31.	4.3	7.20	
1794	21.5	.....	.....	11.5	33.	4.5	7.40	
1795	19.	.....	.....	11.	30.	4.6	6.50	
1796	16.5	.....	.....	10.5	27.	4.8	5.60	
1797	16.	.....	.....	10.	26.	4.9	5.30	Suspension Bank of England; flux of gold.
1798	14.	.....	.....	9.	23.	5.	4.60	
1799	17.	.....	.....	10.	27.	5.2	5.20	Expiry of charter first Bank U. S.
1800	17.5	.....	.....	10.5	28.	5.3	5.30	
1801	17.	.....	.....	11.	28.	5.5	5.10	
1802	16.5	.....	.....	10.	26.5	5.7	4.70	
1803	16.	.....	.....	11.	27.	5.9	4.60	
1804	17.5	.....	.....	14.	31.5	6.1	5.30	
1805	18.	.....	.....	15.	33.	6.3	5.20	
1806	18.5	.....	.....	17.	35.5	6.5	5.50	
1807	20.	.....	.....	18.	38.	6.7	5.70	Embargo December 22; first steamboat.
1808	20.	.....	.....	22.75	44.7	6.9	6.40	
1809	20.	.....	.....	24.	44.	7.0	6.10	Suspension N. E. Banks. } Drain
1810	19.	.....	.....	26.	45.	7.1	6.10	of
1811	18.	.....	.....	28.	46.	7.3	6.10	Apprehension of war. } specie.
1812	17.	.....	.....	35.	52.	7.6	6.80	War declared.
1813	17.	.....	.....	52.	69.	7.8	8.80	War continued; bank mania.
1814	17.	.....	.....	51.5	69.5	8.	8.70	Aug. and Sept. all except N. E. banks suspend until Jan., 1817; Gold 114@120.
1815	20.	.....	.....	45.5	65.5	8.2	8.00	February, peace; gold 115@102.
1816	24.5	.....	.....	50.	74.5	8.4	8.80	Gold 116@117; gold 107, second Bank U. S.
1817	22.	.....	.....	55.	77.	8.6	8.90	Partial resumption; second Bank U. S.
1818	20.	.....	.....	60.	80.	8.8	9.00	Height of bank mania; drain.
1819	20.	.....	.....	62.5	82.5	9.1	9.20	Revulsion.
1820	26.5	.....	.....	58.	86.	9.4	9.00	Resumption Bank of England; efflux of gold.
1821	23.	.....	.....	65.	88.	9.7	9.10	Spring stricture.
1822	18.	.....	.....	70.	88.	10.	8.80	
1823	17.	.....	.....	76.	93.	10.3	9.00	
1824	18.	.....	.....	78.	96.	10.6	9.10	
1825	19.	.....	.....	81.	100.	10.9	9.20	
1826	20.	.....	.....	80.	100.	11.1	9.00	Temporary bank panic.
1827	22.5	.....	.....	75.	97.5	11.5	8.50	Winter stricture.
1828	27.	.....	.....	68.	95.	11.9	8.00	First railway in U. S.

Currency of the United States from 1775 *to* 1873, *inclusive.*—Continued.

Year.	Coin.	Treasury and U.S. Bank Notes.	State Bank Notes.	Total Paper.	Total Currency.	Pop.	Per capita.	Remarks.
	$	$	$	$	$		$	
1829	31.	12.5	50.	62.5	83.5	12.4	7.50	Temporary bank panics; Pres. Jackson declares against rechartering U. S. Bank.
1830	32.	.....	.....	61.	93.	12.8	7.20	Rep. Cong. com. favoring Bank.
1831	35.	.....	.....	66.	101.	13.2	7.65	Bill introduced to recharter Bank.
1832	39.	.....	.....	71.	110.	13.6	8.10	
1833	42.7	.....	.....	77.	119.7	14.	8.50	Removal of deposits from Bank.
1834	60.	.....	.....	90.	150.0	14.4	10.40	Veto of Bank bill; repudiation by N.Y. Stock Exchange.
1835	80.	.....	.....	103.	183.	14.8	12.40	Great fire in N. Y.; loss $20,000,000.
1836	65.	11.5	128.5	140.	205.	15.3	13.30	Expiry of charter of second Bank U. S.
1837	73.	.....	149.	149.	222.	15.8	14.00	GREAT SUSPENSION.
1838	87.	.....	117.	116.	203.	16.2	12.50	Universal insolvency; general failure of commercial credit; general contraction; fall in prices; stay-laws; bankruptcy laws; liquidation; riots.
1839	87.	.....	135.	135.	222.	16.7	13.40	
1840	83.	.....	107.	107.	190.	17.	11.20	
1841	80.	.....	107.	107.	187.	17.5	10.70	
1842	60.	.....	83.7	83.7	143.7	18.	8.00	Repudiation of the States.
1843	70.	.....	58.5	58.5	128.5	18.6	6.90	Lowest depression; resumption.
1844	100.	.....	75.	75.	175.	19.2	9.10	Increase of currency.
1845	96.	.....	90.	90.	186.	19.8	9.40	
1846	97.	.....	105.5	105.5	202.5	20.4	9.90	
1847	120.	.....	105.5	105.5	225.5	21.	10.70	
1848	112.	.....	128.5	128.5	240.5	21.6	11.10	California mines opened.
1849	120.	.....	114.7	114.7	234.7	22.4	10.50	
1850	154.	.....	131.	131.	285.	23.2	12.20	
1851	186.	.....	155.	155.	341.	24.	14.20	
1852	204.	.....	156.	156.	360.	24.8	14.50	
1853	236.	.....	144.	144.	380.	25.6	14.80	
1854	240.	.....	178.6	178.6	418.6	26.4	15.80	Australian mines.
1855	257.6	.....	187.	187.	444.6	27.1	16.40	
1856	250.2	.....	196.	196.	446.2	27.7	16.10	
1857	259.3	.....	215.	215.	474.3	28.4	16.70	Temporary panic; suspension.
1858	251.6	.....	155.	155.	406.6	29.1	14.00	Resumption.
1859	265.8	.....	193.	193.	458.8	29.7	15.40	
1860	257.0	.....	207.	207.	457.	31.5	14.50	
1861	241.4	.....	202.	202.	443.4	32.3	13.70	Civil war; demand notes issued.
1862	298.5	.....	184.	184.	482.5	22.9	21.00	Suspension; greenbacks "
1863	100.	411.	161.	572.	672.	24.5	27.40	Cir. of State banks supplanted by nat'l. banks.
1864	90.	513.	140.	653.	743.	26.1	28.50	Nat'l. bank notes; highest inflation gold, 285.
1865	85.	604.	65.	669.	754.	30.3	24.90	Peace; gradual contraction.
1866	100.	713.	37.	750.	850.	36.	23.60	Rehabilitation of the South.
1867	140.	704.	nom.	704.	844.	37.	22.80	Extinction of State bank circulation.
1868	140.	699.	"	699.	839.	38.	22.	Contraction continued slowly.
1869	140.	692.	"	692.	832.	39.1	21.20	" " "
1870	152.8	704.	.....	704.	856.8	40.3	21.20	
1871	136.7	723.7	.....	723.7	860.4	41.4	20.80	Great Chicago fire; loss, $150,000,000.
1872	128.1	741.4	.....	741.4	869.5	42.6	20.40	Great Boston fire; loss, $80,000,000.
1873	130.	752.	.....	752.	882.	43.9	20.08	Panic; $20,000,000 clearing-house certificates and $10,000,000 treasury reserve issued as money; gold imported.
1873	140.	762.	20.	782.	922.	43.9	21.00	

These facts establish several important conclusions: 1, that industrial activity is intimately and powerfully connected with fluctuations of the currency; 2, that neither the absolute amount nor the absolute amount per capita of the currency affects industrial activity; 3, but that whether such amounts are increasing or diminishing, and *the rapidity of such movement in time,* are the vital considerations connected with industrial activity and currency.

The following table, based upon the last one, shows the general movement of the currency of the U. S. by periods of time:

Period.	Duration, Years.	Movement.	Industrial phase.
1790—1814	24	Slow crescendo.....	Steady activity.
1814—1817	3	" "	Suspension.
1817—1830	13	Diminuendo.....	Inertia.
1830—1837	7	Rapid crescendo.....	Great activity.
1837—1843	6	Rapid diminuendo.	Great depression.
1843—1857	14	Crescendo.....	Activity.
1857—1861	4	Diminuendo.	Inertia.
1861—1864	3	Rapid crescendo.....	Great activity.
1864—1873	9	Slow diminuendo...	Shrinkage & panic.

(For other facts and considerations relating to this subject, see MONEY, by PRES. F. A. P. BARNARD.) ALEX. DELMAR.

Cur'rent, a township of Dent co., Mo. Pop. 467.

Current River, a township of Randolph co., Ark. Pop. 1378.

Current River, a township of Ripley co., Mo. P. 960.

Current River, a township of Shannon co., Mo. Pop. 325.

Current River, of Missouri and Arkansas, rises in Texas co., Mo., flows south-eastward into Arkansas, and enters the Black River in Randolph co. Length, estimated at 250 miles.

Currents, Electric, etc. See ELECTRICITY, by PRES. HENRY MORTON, PH. D., and MAGNETISM, by PROF. A. M. MAYER, PH. D.

Currents, Marine. The ocean-currents are the great rivers of the sea. They move on steadily, through waters comparatively tranquil, often distinguished by a different color and temperature; but unlike the inland streams, which are but threads on the surface of the continents, they are scores, nay hundreds, of miles broad, and their course, as in the American Gulf Stream, extends over a large portion of the globe. The ocean streams are not only found at the surface, but also in deep waters, where they are often moving in different directions.

The main cause of these vast movements of the ocean is found in the difference of temperature between the polar and tropical regions, which acts directly on the waters, and indirectly on them by the winds.

The cold and heavier waters of the polar regions tend incessantly to flow into, and so to displace, the warm and lighter waters of the tropical zone; when both meet, the cold waters sink and disappear below the warm waters, which return as surface-currents towards the polar regions. Hence two series of currents, the cold from the polar, the warm from the tropical, regions. Both, however, are deflected from their straight course by the steady action of the earth's rotation—the polar currents more and more to the W., the tropical currents more and more to the E. The polar currents unite in the tropical zone, and, aided by the powerful influence of the trade-winds, form the so-called *Great Equatorial Current,* which flows westward around the whole globe. These general currents are further modified by the form of the basins of the three great oceans in which they move, in the following manner.

Currents in the Pacific Ocean.—The vast expanse of the Pacific Ocean gives full sway and great regularity to the course of the main currents.

The *Great Equatorial Current* begins to be felt at a distance from the American continent, and, soon embracing the whole width of the tropical zone, flows majestically, at the rate of two or three miles an hour, across that immense basin, being separated into two branches by a central counter-current flowing eastward. Arrested by the coasts of Asia and Australia, it divides.

The S. branch sends an arm southward along the coast of Australia, the *Australian Current,* while the remainder is broken into numerous irregular currents among the islands of the Eastern Archipelago.

The N. branch, reaching the Philippine Islands and Formosa, bends to the N. and N. E., and becomes the *Japanese Current* (or *Kuro-Sivo*), the Asiatic Gulf Stream. This noble stream, with its vast body of deep blue and warm waters, flows swiftly along the eastern coasts of Japan, and, con-

JOHNSON'S
OCEAN CURRENTS
AND THE
GREAT RIVER BASINS
OF THE WORLD
BY
PROF. A. GUYOT LL.D.

ARCTIC OCEAN
ANTARCTIC OCEAN
NORTH AMERICA
SOUTH AMERICA
EUROPE
ASIA
AFRICA
AUSTRALIA
ATLANTIC OCEAN
PACIFIC OCEAN
INDIAN OCEAN
GREENLAND
Arctic Circle
Tropic of Cancer
EQUATOR
Tropic of Capricorn
Gulf Stream
Drift from the Gulf Stream
Polar Current
Labrador Current
North Pacific Current
North Equatorial Current
Equatorial Counter Current
South Equatorial Current
Brazil Current
Antarctic Current
Antarctic Drift
Cape Horn Current
Mozambique Current
Agulhas Current
Malabar Current
S. Australian Current
W. Australian Current
Kuro Sivo
Oyas Sivo
Sargasso or Sea Weed
Long Kelp
C. Severo
C. of Good Hope
C. Horn
Lena
Amoor
Obi
Yenisei
Euphrates
Danube
Nile
Niger
Ganges
Indus
Yang-tse-kiang
Canton
New York
Washington
Missouri
Mississippi
Amazon
La Plata
Rio Grande
Columbia
Orinoco
Mackenzie
St. Lawrence
Saskatchewan
Connecticut

120 160 160 120 West 80 40 0 Longitude East 40 from Greenwich 80 120 160

80 40 0 40 80

163 123 83 43 3 Longitude East 37 from Washington 77 117 157 163 West 123

COMPARATIVE SURFACE OF BASINS AND LENGTH OF COURSE OF THE PRINCIPAL RIVERS

Basin of River, or Surface drained in Eng. square miles		Length of Course in English miles
10.600	Connecticut	350
240.000	R. Grande del Norte	1500
250.000	San Francisco	1550
298.000	Columbia	1020
340.000	Orinoco	1550
478.000	Saskatchewan	1900
480.000	St Lawrence	2000
590.000	Mackenzie	2300
1.242.000	La Plata	2300
1.244.000	Mississippi	4200
2.275.000	Amazon	3750

Explanation of Colors

Basin of Rivers flowing into the

- *Atlantic Ocean*
- *Arctic Ocean*
- *Pacific Ocean*
- *Indian Ocean*
- *Inland Basins*

Explanation of Currents

- *Indicate Marine Currents, and the Arrows show their Direction.*
- *Warm Current*
- *Cold*
- *Periodical Current*
- *Sea Weed or Sargasso*

Length of Course in English miles		Basin of River, or Surface drained in Eng. square miles
880	Rhine	90.000
1750	Euphrates	255.000
1800	Danube	311.000
1600	Ganges	416.000
2000	Volga	600.000
2700	Lena	800.000
3000	Niger	800.000
3320	Yang tse-kiang	950.000
3400	Yenisei	1.040.000
3000	Obi	1.250.000
4000	Nile	1.425 000

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tinuing its slanting course across the North Pacific, reaches the peninsula of Alaska. Turning thence southward, it glides along the coast of Oregon and California, as a cool current, and leaves again the continent of America to re-enter the Great Equatorial Current. Thus the North Equatorial, the Japanese, and the North Pacific Currents form one immense whirlpool in the North Pacific Ocean.

The polar currents are almost absent in the North Pacific Ocean, owing to the shallowness and narrowness of Behring Straits, which are the only passage open to them; but they are all the more mighty in the South Pacific. Here the broad *Antarctic Drift Current*, obeying the impulse of the prevailing winds of that region, carries the polar waters north-eastward to the W. coast of South America. Striking the continent in the southern part of Chili, it divides. The main branch, called the *Peruvian* or *Humboldt Current*, flows to the N. along the coast of Peru, which it bathes with its cool waters, and leaving the continent at its extreme western projection, Punta Parina, flows thence westward, becoming the main feeder of the South Equatorial Current. The smaller branch, turning S. along the coast of Patagonia, bends around Cape Horn, and enters the Atlantic Ocean.

Currents in the Atlantic Ocean.—Owing to the narrowness and irregularity of the basin of the Atlantic Ocean, the Equatorial Current in it has neither the size nor the symmetry it shows in the Pacific Ocean. The northern branch is less marked, and the equatorial counter-current is well defined only near the coast of Africa. The course of the S. branch, however, is very apparent. Proceeding westward from the coast of Africa, it crosses the basin of the Atlantic to the opposite shore of South America, where, at Cape St. Roque, it divides, one branch flowing southward, forming the *Brazil Current;* another to the N. W., the *Guiana Current.* The Brazil Current proceeds along the coast of South America, but a part of its waters, sweeping back towards the S. and E., forms the *South Connecting Current*, which merges itself in the *South Atlantic Current*, and returns with it along the W. coast of Africa into the Equatorial Current. The Guiana Current runs from Cape St. Roque northward across the mouth of the Amazon, along the coast of Guiana, and, uniting with the waters of the North Equatorial in the Caribbean Sea, enters the Gulf of Mexico.

The Gulf Stream originates in the Gulf of Mexico. It is the outlet of the accumulation of the waters of the Equatorial Current in the Gulf of Mexico. It becomes fully apparent at the N. W. of the island of Cuba, where it proceeds with feeble force to the E. Its course is then changed, by striking against the Bahama Banks, to the N.; and it flows with great rapidity along the coast of the U. S., gradually expanding in volume and diminishing in velocity as it proceeds northward. Reaching the latitude of New York, it gradually turns to the E., and crosses the Atlantic basin to the islands of the Azores. Here it divides; the main branch, bending its course southward, enters the tropical regions on the coast of Africa, and is swept back by the force of the North Equatorial Current to the Gulf of Mexico. Thus a great whirlpool is formed also in the North Atlantic Ocean, in the midst of which is accumulated the vast amount of sea-weed which bears the name of Mar de Sargasso. The northern branch continues its slanting course to the British Isles and Norway, and often carries to their shores the tropical seeds and driftwood coming from the West Indies.

The high temperature of the Gulf Stream, as well as its blue color and motion, distinguishes it from all other portions of the ocean. It carries warmth from the tropics to the W. coast of Europe, and gives to the British Isles the genial climate they enjoy even in the high northern latitude in which they are situated.

The Atlantic Ocean is almost the only outlet of the N. polar waters towards the equatorial regions, as the Pacific is that of the Antarctic waters. Under the influence of the earth's rotation the polar currents all crowd to the W. on the American coast. Two main currents, on each side of Greenland, carry the waters and masses of ice from the Frozen Ocean towards the warmer latitudes; the *Greenland Current* along the eastern coast and the *Labrador Current* on the W. form Baffin's Bay. Joining their waters and their icebergs, they flow to Newfoundland, where they meet the outskirts of the warm waters of the Gulf Stream, and, condensing the moisture of that mild atmosphere, produce the everlasting fogs peculiar to that region. Thence following the coast between it and the Gulf Stream, the Polar Current makes itself felt as far as the latitude of New York, where it sinks under the warm waters of the Gulf Stream.

Currents in the Indian Ocean.—In this ocean, surrounded on three sides by continents, the North Equatorial Current is destroyed by the influence of the season winds, called monsoons, which blow alternately from the S. W. and the N. W., and the waters mostly obey the direction of the winds. But the South Equatorial is quite regular, and extends from Australia to Madagascar, where it divides, one branch passing N. of the island, the other along its eastern coast. The N. branch, uniting with the waters from the N., forms the strong current of Mozambique, with which the eastern branch soon joins, and the united current moves on to the Cape of Good Hope. Here the current, slackened by the earth's rotation and the meeting of the Antarctic waters, turns back and returns with them to the E., and reaching the coast of Australia re-enters northward the Great Equatorial. Thus in the three great oceans is kept up a constant circulation of the marine waters on a scale of magnitude which far transcends all similar movements on the surface of the continents.

ARNOLD GUYOT.

Currer Bell. See BRONTÉ (CHARLOTTE).

Currey (RICHARD O.), M. D., born in Nashville, Tenn., Aug. 28, 1816. He graduated in the University of Nashville, and acquired from the celebrated Dr. Troost a taste for geology, mineralogy, and chemistry. He took the degree of M. D. in the University of Pennsylvania. He was elected professor of chemistry in the University of East Tennessee at Knoxville in 1846; he assisted in founding the Shelby Medical College in Nashville, in which he occupied the chair of chemistry. For six or seven years he was editor of the "Southern Journal of Medicine and Physical Sciences," and in 1859 was ordained a minister in the Presbyterian Church. Dr. Currey was a man wholly devoted to duty, and while in charge of 2000 Federal prisoners, as surgeon in the Confederate army, at Salisbury, N. C., he contracted the disease of which he died (1865), by his devotion to them. The U. S. government ordered all of Dr. Currey's property restored to his family when the war ended.

PAUL F. EVE.

Cur'rituck, a county which forms the N. E. extremity of North Carolina. Area, 200 square miles. It is bounded on the E. by the Atlantic Ocean. The surface is level; the soil sandy. Corn and some wool are produced. Capital, Currituck Court-house. Pop. 5131.

Currituck, a township of Hyde co., N. C. Pop. 1582.

Currituck Court-house, the capital of Currituck co., N. C., is about 200 miles E. N. E. of Raleigh.

Cur'ry, a county which forms the S. W. extremity of Oregon. Area, estimated at 1500 square miles. It is bounded on the W. by the Pacific Ocean, and intersected by Rogue River. The surface is mountainous, but very fertile. Wool is one of the staple products. The mineral wealth of this county is great. Capital, Ellensberg. Pop. 504.

Curry, a township of Sullivan co., Ind. Pop. 2171.

Curry, a township of Putnam co., West Va. Pop. 1162.

Curry (DANIEL), D. D., a Methodist divine and journalist, was born near Peekskill, N. Y., Nov. 26, 1809, graduated at the Wesleyan University, Conn., in 1827, was the same year principal of the Troy Conference Academy, entered the ministry in Georgia in 1841, and occupied pulpits in Athens, Savannah, and Columbus, S. C. He returned to the North after the division of his denomination through the slavery controversy, and joined the New York Conference, had pastoral charge of important churches in New York and other cities, was three years president of the Indiana Wesleyan University, resumed his labors in the East, contributed largely and ably to the periodical literature of his Church, and in 1864 was appointed editor of its chief official journal, "The Christian Advocate," New York City. He is author of a "Life of Wycliff" and "Metropolitan City of America." He has edited Southey's "Life of Wesley." As a journalist he is able and independent.

Curry (JABEZ LAMAR MONROE), D. D., LL.D., born in Lincoln co., Ga., June 5, 1825, graduated at the University of Georgia in 1843 and at Dane Law School (Harvard College) 1845. He served in 1846 as a Texan ranger during the Mexican war. In 1847, 1853, and 1855 he was a member of the legislature of Alabama; in 1856 presidential elector; from 1857 to 1861 member of Congress; in 1861 elected to the Congress of the Confederate States; in 1864 entered the Confederate army, and at the close of the war was in command of a regiment of cavalry. In 1865 he was elected president of Howard College, Ala.; in 1866 ordained to the Baptist ministry; since 1868 professor of the English language and literature in Richmond College, Va. For twenty-five years past Dr. Curry has deservedly held an influential position in the Southern States.

Curso'res [Lat., the "runners"], an order of birds comprising comparatively few species, but these mostly large, with large, strong, and often long legs, and wings not usually enough developed for flight. The bones are nearly

destitute of air-cells, and the breast-bone has little or no trace of a keel. The hinder toe is generally wanting. The running powers of these birds are remarkable. Among these birds are the ostrich, the rhea, the emeu, the cassowary, the apteryx, and the bustards, though these last are by some placed among the waders and by others among the rasores. Unlike the others, the bustards can fly. The fossil cursores include the *Notornis*, the *Æpyornis*, the *Dinornis*, etc., huge birds, which were undoubtedly much larger than the ostrich, which is the largest of living birds.

Cur'tain [Fr. *courtine*], in fortification, that part of the rampart of the body of the place which lies between two bastions and connects their adjacent flanks.

Cur'tin, a township and village of Centre co., Pa., on the Pennsylvania Central R. R., 21 miles S. W. of Lock Haven. Pop. of township, 459.

Curtin (Andrew Gregg), governor of Pennsylvania, born April 22, 1817, was the son of Roland Curtin, one of the earliest iron-manufacturers in Centre co., who came to this country from Ireland in 1793. He studied law in Dickinson College, canvassed the State in 1844 for Henry Clay, was appointed secretary of the commonwealth in 1854, and was elected governor in 1860, in which post he displayed great energy and promptitude when the first call for troops came at the opening of the civil war. In 1863 he was re-elected by a large majority, and in 1869 was appointed minister to St. Petersburg.

Cur'tis, a township of Roane co., West Va. Pop. 580.

Curtis (Benjamin Robbins), LL.D., an American lawyer, born in Watertown, Mass., Nov. 4, 1809, graduated at Harvard in 1829, and was admitted to the bar in 1832, after which he practised law in Boston. He was appointed a judge of the Supreme Court of the U. S. in 1851, but he resigned that office in 1857. He was one of the counsel who defended President Johnson in his trial before the Senate in April, 1868. He is the author of several volumes of legal reports.

Curtis (George Ticknor), an eminent legal writer, a brother of the preceding, was born in Watertown, Mass., Nov. 28, 1812, graduated at Harvard in 1832, was admitted to the bar in 1836, and practised law in Boston. He has published, besides other works, a "Treatise on the Rights and Duties of Merchant Seamen" (1841), a "Treatise on the Law of Copyright" (1847), and a "History of the Origin, Formation, and Adoption of the Constitution of the U. S." (2 vols., 1855–58); also "Life of Daniel Webster" (2 vols. 8vo).

Curtis (George William), LL.D., a popular American author and orator, born at Providence, R. I., Feb. 24, 1824. He visited Europe, studied in the University of Berlin, and made an extensive tour in the Levant, from which he returned home in 1850. He published, besides other works, "Nile Notes of a Howadji" (1851), "The Howadji in Syria" (1852), "Lotus-Eating" (1852), and "The Potiphar Papers" (1854). He has also distinguished himself as a popular lecturer on various subjects, and as an orator of the Republican party. President Grant appointed him chairman of the advisory board of the civil service. He has been editor of "Harper's Weekly" and of the "Easy Chair" in "Harper's Magazine." He is one of the clearest and tersest writers of the day.

Curtis (Joseph Bridgham), second son of George, and Julia Bridgham, Curtis, was born in Providence, R. I., Oct. 25, 1836. He graduated at the Lawrence Scientific School, Cambridge, Mass., in July, 1856. In 1857 he was employed as a civil engineer on the New York Central Park, and on the breaking out of the civil war he was appointed engineer, with the rank of captain, in the Ninth regiment N. Y. S. M., April, 1861. On Sept. 16, 1861, he became second lieutenant of the Fourth regiment Rhode Island Volunteers, and was made first lieutenant of the regiment Oct. 2 of the same year. He served with Burnside in North Carolina, and was made assistant adjutant-general with General Rodman, June 9, 1862. In Aug., 1862, he became lieutenant-colonel of the Fourth regiment Rhode Island Volunteers. He fought at South Mountain and at Antietam, and while in command of his regiment was killed at Fredericksburg Dec. 13, 1862. (For a fuller account see a memoir by his half-brother, George William Curtis, in "Rhode Island in the Rebellion," by J. R. Bartlett.)

Clarence Cook.

Curtis (Samuel Ryan), an American officer, born Feb. 3, 1805, near Champlain, N. Y., graduated at West Point in 1831, serving at Fort Gibson in Seventh Infantry till he resigned June 30, 1832, civil engineer 1836–41; counsellor-at-law 1841–46; adjutant-general of Ohio 1846; and colonel Second Ohio Volunteers in the war with Mexico 1846–48, serving as governor of Camargo, and by his operations against Gen. Urrea opening Gen. Taylor's communications, and after his regiment was disbanded on Brig.-Gen. Wool's staff and governor of Saltillo. Chief-engineer of several important works 1847–55; counsellor-at-law at Keokuk, Ia., 1855–61; and member of Congress 1857–61, being prominent on the committee on military affairs and Pacific R. R., of which he was a warm advocate. In the civil war he promptly resumed his sword to go to the relief of the capital; was subsequently elected colonel Second Iowa Volunteers, and obtained the rank, Mar. 21, 1862, of major-general U. S. volunteers, serving in various capacities in Missouri 1861–62; in command of Army of the Southwest 1862, engaged in driving the enemy from Missouri, battle of Pea Ridge, and numerous actions on his difficult march of over 1000 miles to Helena, Ark.; on leave of absence to attend the Chicago Convention (its president), which inaugurated the Pacific R. R.; in command of the department of Missouri 1862–63; organizing and directing the forces in the field; in command of the department of Kansas 1864–65, engaged against hostile Indians and forcing Gen. Price to the Arkansas; in command of the department of the North-west 1865, and as U. S. commissioner to negotiate Indian treaties 1865, and to examine the Union Pacific R. R. 1865–66, with which, from its first initiation, he had been closely identified, continuing on the same duty, though mustered out of volunteer service April 30, 1866, till he died, Dec. 26, 1866, at Council Bluffs, Ia., aged sixty.

George W. Cullum, U. S. A.

Cur'tius (Ernst), a German Hellenist, born at Lübeck Sept. 2, 1814. In 1837 he visited Athens, where he passed several years. He became, in 1856, professor in Göttingen, and in 1865 in Berlin. He published "The Acropolis of Athens" (1844), "The Peloponnesus" (1852), "Attic Studies," a "History of Greece" (3 vols., 1857–66), translated into English by A. W. Ward (London, 1868–70, 3 vols.), "Seven Maps, illustrating the Topography of Athens" (1868), "Die Gastfreundschaft" (1870), and other works.

Curtius (Georg), a German classical scholar, a brother of the preceding, was born at Lübeck April 16, 1820. He became professor of classical philology at Leipsic in 1862. Among his works are a "Greek Grammar" (1855; 9th ed. 1870), "Grundzüge der Griech. Etymologie" (1862), and "Studies in Greek and Latin Grammar" (3 vols., 1868–71).

Curtius (Marcus), a patriotic Roman youth, who is said to have sacrificed his life for his country about 362 B. C. According to tradition, a chasm opened in the Forum of Rome, which the soothsayers declared could not be filled except by the sacrifice of the chief wealth or strength of the Roman people. Curtius, completely armed, plunged on horseback into the chasm, which immediately closed up.

Curtius (Quintus). See Quintus Curtius.

Cu'rule Chair [Lat. *sella curulis;* the latter word is supposed to be of Etruscan origin], among the ancient Romans, a throne or chair of state, one of the emblems of ancient kingly power, which was retained by the magistrates of the republic. Its use was limited to the consuls, prætors, curule ædiles, censors, the flamen dialis, and to the dictator or his deputies. In later times the emperors, as well as many inferior officers, sat upon it. Curule chairs were at first ornamented with ivory, and later sometimes made of ivory and inlaid with gold.

Curule Magistracies were those of the greatest dignity in ancient Rome, and were so called because the persons who held them enjoyed the privilege of sitting on curule chairs (*sellæ curules*) when engaged in their public duties. (See preceding article.)

Curupaïty, a fort on the left bank of the Paraguay River, in the republic of Paraguay, was in the late war between Paraguay and Brazil, Uruguay, and the Argentine Republic an important position. It was an advanced work of Fort Humaïta, and was only taken by the allies in Mar., 1868, after it had been abandoned by its garrison, and Fort Humaïta had been cut off from the interior.

Curve [from the Lat. *curvus*, "bent"], in geometry, a line which continually changes its direction in accordance with some uniform law, which is expressed by the equation of the curve. In a plane curve all the points lie in the same plane. Other curves are called twisted or curves of double curvature.

Cur'wensville, a post-borough of Pike township, Clearfield co., Pa. It has a national bank, a graded school, several factories, and one weekly newspaper. Iron ore and coal are abundant. Pop. 556.

R. H. Brainard, Ed. Clearfield Co. "Times."

Curzon, de (Paul Alfred), a French landscape-painter, born Sept. 7, 1820, was a pupil of Cabat. He made tours through Southern France, Italy, and Greece, and painted from the sketches collected.

Cusa'nus (Nicholas), Cardinal, an eminent German

scholar, born in 1401, was the son of a boatman of Kues on the Moselle, by name Khrypffs. Doctor of laws from Padua, and early famous for eloquence and erudition, opponent of papal supremacy at the Council of Bâle, then won over to the pope, he was at the head of every progressive movement of the Church. His works appeared at Bâle in 1665; his life by Deux in 1847. Died Aug. 11, 1464.

Cush, the name of a son of Ham; also applied in the Hebrew Scriptures to a country, supposed to be Ethiopia, which is called *Keesh* in the Egyptian inscriptions.

Cush'ing, a post-township of Knox co., Me. Pop. 704.

Cushing (Caleb), LL.D., an able American jurist and scholar, born at Salisbury, Mass., Jan. 17, 1800. He graduated at Harvard College, visited Europe in 1829, and published "Reminiscences of Spain." In 1835 he became a Whig member of Congress, in which he served four consecutive terms. As a political friend of President Tyler he separated from the majority of the Whigs in 1841, and joined the Democratic party. He gained distinction as an eloquent debater. In 1843 he was nominated as secretary of the treasury, but was rejected by the Senate. He was appointed commissioner to China in the same year, and negotiated the first treaty between the U. S. and that empire. Having equipped a regiment at his own expense, he served as colonel in the Mexican war in 1847. He was appointed a justice of the supreme court of Massachusetts in 1852, and was attorney-general of the U. S. in the cabinet of Mr. Pierce from Mar., 1853, to Mar., 1857. He was one of the three lawyers appointed by President Grant to advocate the interests and rights of the Americans before the tribunal of arbitrators who met in Geneva in 1871 for the settlement of the "Alabama claims." Appointed minister to Spain in Dec., 1873, in place of Gen. Daniel E. Sickles, resigned.

Cushing (Luther Stearns), an American jurist, born in Lunenburg, Mass., June 22, 1803. He was reporter to the supreme court of that State, and published eight volumes of reports. He also published a "Manual of Parliamentary Practice" (1845), well known as "Cushing's Manual," and "The Law and Practice of Legislative Assemblies in the U. S." (1855), etc. Died June 22, 1856.

Cushing (Thomas), LL.D., born at Boston, Mass., Mar. 24, 1725, graduated at Harvard in 1744. His father, Thomas, was a prominent and public-spirited citizen. The younger Cushing was Speaker of the Massachusetts house of representatives 1762–74, and a member in 1774 of the provincial and the Philadelphia Congresses. He was regarded in Great Britain as the principal leader of sedition. "One object of the Americans," says Dr. Johnson in "Taxation no Tyranny," "is said to be to adorn the brows of Mr. Cushing with a diadem." He was occupied throughout the Revolution with the affairs of Massachusetts, where he was a judge, and afterwards lieutenant-governor. Died Feb. 28, 1788.

Cushing (William), LL.D., a jurist, born at Scituate, Mass., Mar. 1, 1733. He became chief-justice of the superior court of Massachusetts in 1777, and associate justice of the Supreme Court of the U. S. in 1789. Died Sept. 13, 1810.

Cushing (William B.), U. S. N., born Nov. 4, 1843, in Wisconsin, was appointed to the Naval Academy in 1857, and, being found "deficient in his studies," resigned in 1858. He entered the service as a volunteer officer in 1861, and received a commission as lieutenant in the navy July 16, 1862. He became a lieutenant-commander in 1864, and a commander in 1872. In 1861, Cushing distinguished himself on the Blackwater, in the Sounds of North Carolina, and at New River Inlet; in 1863 he added to his fame by his expedition up the Cape Fear and Little rivers and his brilliant operations on the Nansemond; and in 1864 he covered himself with immortal glory by blowing up the ram Albemarle at Plymouth, N. C. His adventures during the late civil war at Smithfield and Wilmington would alone have sufficed to establish his character for bravery, ability, and sound judgment, while his leading the men of the Monticello in the assault upon Fort Fisher—an act of which any other officer might well be proud—sinks into insignificance compared with his greater and more perilous exploits. Always complimented by his superior officers for his "courage and conduct," several times thanked by the navy department and once by Congress for "distinguished services," Commander Cushing may surely be regarded as the most adventurous of our naval heroes since Decatur died.

Foxhall A. Parker, U. S. N.

Cushing's Island, in the harbor of Portland, Me., 3 miles from the city, has an area of 250 acres. It is a place of summer resort, and has fine sea-bathing.

Cush'man (Charles H.), U. S. N., born Dec. 6, 1831, in Maine, entered the navy as a midshipman Mar. 24, 1849, became a passed midshipman in 1853, a lieutenant in 1856, and a commander in 1866. He served in the Pembina at the battle of Port Royal, Nov. 7, 1861, and in the iron-clad Montauk at the first attack on Fort Sumter April 7, 1863, and in the many fights of that vessel with the defences of Charleston harbor during the summer and fall of 1863. He was at both the Fort Fisher fights, and led one of the storming-parties in the assault on the fort of Jan. 15, 1865, where he was severely wounded. He was recommended for promotion by Rear-Admiral Porter.

Foxhall A. Parker, U. S. N.

Cushman (Charlotte Saunders), a distinguished American actress, born in Boston July 23, 1816. She made her *début* in 1835, and performed with success in tragedy and comedy. She visited England in 1845, and performed there for several years. Her public readings from Shakspeare and other writers, in the large cities of the U. S. in 1872, were highly successful. In the opinion of many critics she is not surpassed in genius and power by any tragedienne of the present day, and she is generally admitted to be the greatest of American actresses.

Cushman (Henry Wyles), born at Bernardston, Mass., Aug. 9, 1805, was educated at Norwich University, Vt., became lieutenant-governor of Massachusetts, 1851, and a member of the constitutional convention, 1853. Died Nov. 21, 1863.

Cushman (Robert), one of the founders of the Plymouth Colony, was born in England about 1580. He emigrated to Plymouth in 1621, and preached in December of that year the first sermon that was ever printed in America. Died in 1625.

Cusk, Tusk, or **Torsk,** popular names of a marine fish of the cod family, and of the genus *Brosmius*. Various species or varieties occur along the European and American coasts.

Cusp [from the Lat. *cuspis*, a "point"], in architecture, is the point formed by the meeting of two small arches or foils, one of the projecting points of the featherings or foliations in Gothic panels, arches, or tracery.

Cusp, in astronomy, is a point or horn of the moon or of one of the inferior planets.

Cusp, in geometry, a point at which two tangents to a curve coincide. The two branches of the curve may either lie on the same side of the tangent, in which case the cusp is called *ramphoid*, or on opposite sides, when the cusp is *ceratoid*. The cissoid of Diocles furnishes an example of a cuspidate curve with a ceratoid cusp; the cusps of the new moon are ramphoid.

Cusset, a town of France, in the department of Allier. It has manufactures of cotton and wool, vineyards, and mineral springs. Pop. 6575.

Cusse'ta, a township and post-village of Chambers co., Ala. Pop. 1205.

Cusseta, a post-village, capital of Chattahoochee co., Ga., about 18 miles S. E. of Columbus. Pop. 216.

Cussewa'go, a township of Crawford co., Pa. Pop. 1674.

Custard Apple. See Anona.

Cus'ter (George A.), an American officer, born in 1840 in Ohio, graduated at West Point in 1861; lieutenant-colonel Seventh Cavalry July 28, 1866, and brigadier-general U. S. volunteers April 15, 1865. He served in the civil war in the Manassas campaign 1861, engaged at Bull Run; in the Virginia Peninsula 1862, engaged at Yorktown, and aide-de-camp to Maj.-Gen. McClellan in the subsequent operations of the campaign; in the Maryland campaign 1862, engaged at South Mountain and Antietam; in the Rappahannock campaign 1863, engaged on "Stoneman's raid" and at Brandy Station; in Pennsylvania campaign 1863, engaged at Gettysburg (brevet major) and various minor actions; in operations in Central Virginia 1863–64, engaged in numerous skirmishes, etc.; in the Richmond campaign 1864, engaged at Wilderness, Todd's Tavern, Yellow Tavern (brevet lieutenant-colonel), Meadow Bridge, Haw's Shop, Cold Harbor, Trevillian Station, etc.; in the Shenandoah campaign 1864–65, engaged at Opequan (brevet colonel), Cedar Creek (brevet brigadier-general U. S. volunteers), and numerous smaller engagements; in command of the cavalry division in the pursuit of Lee's army 1865, engaged at Dinwiddie Court-house, Five Forks (brevet brigadier-general), Sailor's Creek, and Appomattox (brevet major-general); in command of the cavalry division in the military division of the South-west and Gulf 1865; as chief of cavalry in the department of Texas 1865–66. Since the war he has been on Western frontier duty.

George W. Cullum, U. S. A.

Custine, de (Adam Philippe), Count, a French gen-

eral, born at Metz Feb. 4, 1740. He served as colonel at Yorktown, Va., in 1781. He commanded brilliantly an army on the Rhine in 1792. His popularity and talents excited the jealousy of the Jacobins, and he was guillotined Aug. 28, 1793. (See his memoirs by D'Hilliers, 1795.)

Custine, de (Astolph), Marquis, a grandson of the preceding, born in 1793, travelled through England, Scotland, Switzerland, Italy, Spain (1835), and Russia, and died in 1857. His work "La Russie en 1839" (4 vols., 1843) created at the time of its publication a profound sensation, and the Russian government deemed it necessary to have an answer to it published.

Cus'tis (George Washington Parke), an adopted son of Gen. Washington, was born in Maryland April 30, 1781. He was a grandson of Mrs. Martha Washington. He produced several plays and orations, and wrote a volume of "Recollections of Washington," which was published in 1860. Died Oct. 10, 1857.

Cus'tom-house [Fr. *douane*], the office at a port of entry where merchants and others are required to pay duties on imported goods, and where vessels are entered and cleared. They are also established at frontier inland towns. The chief officer connected with the custom-house is called a collector of customs.

Cus'tos Rotulo'rum, a Latin term signifying "keeper of the rolls," is the title given in England to the chief civil officer of a county, who is appointed to keep the county records.

Cüstrin', a fortified town in Prussia, in the province of Brandenburg, at the confluence of the Oder and Warthe, 52 miles E. of Berlin. It is surrounded by marshes. The Oder is crossed by a bridge 900 feet in length. Pop. 10,122.

Cutch, or **Kutch,** a portion of Western Hindostan, on the Indian Ocean, lies between Sind and Guzerat, and is separated from the desert by the Runn of Cutch, 7000 square miles of arid land encrusted with salt. Cutch is under the protection of the British. The natives are hardy sailors. The exports are cotton, glue, and oil. The political system is like feudalism, with a sovereign called a *rao* over about 200 chieftains. Capital, Bhooj.

Cutch, a variety of Catechu (which see). It is used in tanning and in dyeing.

Cutch Gunda'va, the most important province of Beloochistan, between lat. 27° and 29° 50′ N., and lon. 67° 20′ and 69° 15′ E., E. of the Brahooick Mountains. Area, about 10,000 square miles. Surrounded by deserts, it is exceedingly fertile, exporting grain, cotton, and indigo. The inhabitants are Juts, with some Hindoos trading in the towns.

Cutchogue, a post-village of Southold township, Suffolk co., N. Y., is situated on the Long Island R. R., 85 miles E. of New York. It has one weekly newspaper.

Cuthæ'ans, a name given by the Jews to the Samaritans (which see).

Cuth'bert, a post-village, capital of Randolph co., Ga., on the South-western R. R., 118 miles S. W. of Macon. It has two female colleges and a high school. One weekly newspaper is issued here. Pop. 2210.

J. P. Sawtell, Ed. Cuthbert "Appeal."

Cuthbert (illustrious for skill), or **Guthbert** (worthy of God), one of the early English saints, born near Melrose-on-the-Tweed, entered the abbey there in 651, and in 664 became its prior, and afterwards prior of Lindisfarne. He took also the bishopric of Lindisfarne in exchange for that of Hexham, to which he was chosen in 684. He had the credit of working miracles. His life was written by Bede. Died Mar. 20, 687.—Cuthbert, abbot of Jarrow, wrote a moving description of the death of the Venerable Bede, 735. (In Twysden's "Decem Scriptores," 1652.)—Cuthbert, twelfth archbishop of Canterbury (741–758), was a friend of Boniface, and sympathized with Pope Zacharias in his efforts to build up the papacy. His letter to Saint Boniface describing ecclesiastical abuses is in Hussey's Bede's "Historia Ecclesiastica."

Cut'ler, a post-township of Washington co., Me. It has manufactures of lumber and boxes. Pop. 925.

Cutler (Lysander), a native of Maine, became colonel of the Sixth Wisconsin Volunteers in 1861, served with the greatest honor in the Army of the Potomac, where he became a major-general, and was twice wounded. Died at Milwaukee, Wis., July 30, 1866.

Cutler (Manasseh), LL.D., an American botanist and Congregational minister, born at Killingly, Conn., May 3, 1742, graduated at Yale in 1765. He described 350 species of plants indigenous in New England. He was a leader of a party that settled at Marietta, O., in 1788. He was also a lawyer and physician, and was a member of Congress (1800–04). Died July 28, 1823.

Cutler (Timothy), D. D. Oxon., an American clergyman, born in Massachusetts in 1685. He became president of Yale College in 1719, a member of the Episcopal Church in 1722, and rector of a church in Boston in 1723. Died Aug. 17, 1765.

Cut'lery [from the Lat. *cultellus,* diminutive of *culter,* a "knife"], a term used to designate sharp and cutting instruments made of iron or steel. The most primitive cutting instruments were flints, shells, etc., which were succeeded by bronze implements and weapons. These were probably used to some extent by the Romans until about the commencement of the Christian era, as bronze surgical instruments have been found at Pompeii. During the Middle Ages several cities of Spain and Northern Italy were renowned for the manufacture of cutting instruments, especially swords. The cutlery of Sheffield in England has been generally regarded as superior to any other, but other European countries and the U. S. now rival England in the quality of their cutlery. Good table-knives are made of steel and iron welded together; the tang (which goes into the handle) and the shoulder are of iron, and the blade is steel. The blades of knives, razors, etc. are usually forged into shape while attached to the bar; they are smithed—that is, beaten upon an anvil—to condense the metal, and slightly ground on a rough stone to finish the shaping and remove the black oxidized surface, which would interfere with the color of the tempering. Cheap table-knives are made of iron entirely, and the difference of price is owing to the greater facility of working, as well as the cost of the material. In many articles made of steel and iron the saving of steel is not the only advantage, for as steel is more brittle than wrought iron, it is desirable that every part except the cutting edge should be of iron. The great value of steel for all cutting implements or those exposed to wearing friction depends on its property of acquiring a great degree of hardness when heated and suddenly cooled, and of softening again by moderately reheating. The dry-grinding of forks, etc. is very injurious to the health of those engaged in it, owing to the particles of steel causing irritation of the lungs and a disease called "grinders' asthma." Pocket-knives are the work of many hands. There are, besides the blades, the separate pieces of the spring, handle, rivets, etc.; the making of each is a distinct trade. The pieces are all finally fitted and put together by the finisher; a two-bladed knife sometimes passes through his hands from seventy to a hundred times.

Cutt (John), one of the founders of the Cutts families of Maine and New Hampshire, is said to have been a Welshman. He came to America before 1646 with Robert and Richard, his brothers, and became a wealthy merchant of Portsmouth, N. H. His brothers became prominent citizens of Portsmouth and Kittery. John was for a time president of New Hampshire. Died Mar. 27, 1681.

Cut'tack, a city, the capital of a district of like name, is on the Mahanuddee River, 250 miles S. W. of Calcutta. It is healthy, and has a temple and mosques, chapels, and manufactures of shoes, brass, and salt. Pop. about 40,000; of district, 1,984,600.

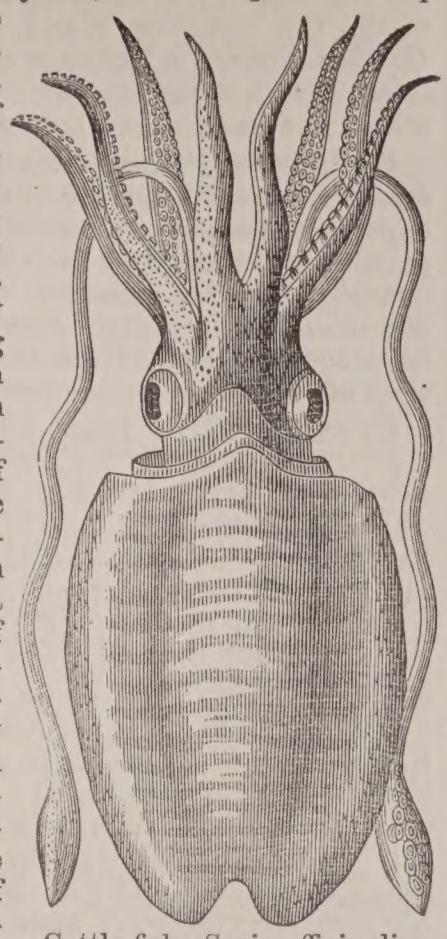
Cut'ter, a small vessel with one mast and a bowsprit, built with especial reference to speed. The distinction between a cutter and a sloop is that in a cutter the jib has no stay to support it. The term "revenue cutters" is applied to those which are employed in the pursuit of smugglers. The cutters belonging to ships of war are clincher-built boats, about twenty-five feet long.

Cut'ting (Francis Brockholst), born in New York City in 1805, graduated at Columbia College in 1825. He was a distinguished lawyer and a prominent Democratic member of Congress in 1853–55. Died June 26, 1870.

Cutting (Sewall Sylvester), D. D., born Jan. 19, 1813, at Windsor, Vt., graduated at the University of Vermont in 1835, ordained pastor of a Baptist church in West Boylston, Mass., 1836, pastor of a Baptist church in Southbridge, Mass., 1837–45, editor of the "New York Recorder" 1845–50 and 1853–55, editor of the "Christian Review" 1850–53, professor of rhetoric and history in the University of Rochester 1855–68, secretary of the American Baptist Educational Commission from 1868 to the present time (1873). He is author of "Historical Vindications of the Baptists," Boston, 1858.

Cut'tings, portions of branches of trees or shrubs employed to produce new plants by the insertion of the lower end into the earth. The willow, currant, and gooseberry are easily propagated in this mode, and many other trees or shrubs will grow from cuttings under favorable circumstances, such as warmth, moisture, and shade. The branches which are young, but not less than a year old, are most adapted for this purpose.

Cut'tle-fish [Ger. *Kuttelfisch ;* Fr. *sèche*], a name applied to many dibranchiate cephalopodous mollusks, especially to those of the family Sepiadæ, the species of which are numerous and almost world-wide in distribution. The term popularly includes nearly all the dibranchiate cephalopods. They are characterized by the presence of an ink-bag filled with black or brown "sepia," a substance which the animal ejects when pursued, so as to conceal itself from view by coloring the waters around it. This substance was formerly much employed in making sepia or India ink (now made of lampblack, etc.). This coloring-matter is so permanent that it has occasionally been prepared from fossil specimens. "Cuttle-fish-bone" is in reality the calcareous internal shell of these animals, especially that of the *Sepia officinalis* of Europe. When powdered it is sold under the name of "pounce," and is used for polishing, for tooth-powder, and in making moulds for delicate castings. It was formerly much used in medicine, but is only valuable for its feebly antacid properties. Cuttle-fish have been found of two tons weight in the tropical seas. They are all marine. Many fossil species occur. Several species are found on the Atlantic coast of the U. S. (See SQUID.)



Cuttle-fish: Sepia officinalis.

Cut'ty-Stool [Scottish, *cutty* or *kittie*, a woman of light or worthless character], or **Creep'ie Chair,** formerly a seat in Scottish churches where offenders against chastity were obliged to sit for three Sundays, and receive a reprimand from the minister.

Cut-Worm, a name given by agriculturists to many larvæ, mostly belonging to lepidopterous insects of the family Noctuælitæ, and especially to those of the genus *Agrotis.* They cut off corn, cabbage, and other plants just below the surface of the ground; and one species at least (*Agrotis Cochrani*) climbs apple and pear trees and destroys the young buds. No effective remedy for their ravages is known.

Cuvier, a township of St. Charles co., Mo. Pop. 3174.

Cuvier (GEORGE CHRÉTIEN LÉOPOLD FRÉDÉRIC DAGOBERT), BARON, a celebrated French naturalist, was born at Montbéliard, then in Wurtemberg, whither the family had removed from Jura in the sixteenth century upon embracing Protestantism, Aug. 23, 1769. His father was an officer in a French regiment of Swiss mercenaries. He studied political science at the Carolinian academy in Stuttgart, through the interest of the duke. He was an enthusiastic student from boyhood, and his passion for natural history showed itself in his thirteenth year. He became in 1788 tutor to the son of Count d'Héricy, who lived in Normandy, and remained in this situation nearly six years, at the same time pursuing his studies. Early in 1795 he removed to Paris, where he associated with Jussieu and Geoffroy Saint-Hilaire. He became in July, 1795, professor of comparative anatomy in the Museum of Natural History, and began to form his great cabinet of comparative anatomy. In 1796 he was admitted into the Institute, then just founded. He displayed his genius for classification in a work called "Tableau Élémentaire des Animaux" (1798), and succeeded Daubenton as professor of natural history in the College of France in 1800. In 1801 he commenced the publication of the important "Leçons d'anatomie comparée" (1801–05, 5 vols.; new ed. 1840). He married Madame Duvaucel, the widow of a farmer-general, and was chosen perpetual secretary of the Academy of Sciences in 1802. In 1808 he was appointed councillor to the Imperial University. He displayed a rare faculty of expressing scientific truths in popular and elegant language in his "Discourse on the Revolutions of the Surface of the Globe," in which he propounds the theory of the correlation of forms in organized beings. He was appointed master of requests by Napoleon in 1813, and councillor of state in 1814. He published in 1817 his celebrated "Animal Kingdom" ("Règne Animal distribué d'après son Organisation," in four volumes; new edition by his pupils, 11 vols., with 993 plates, 1836–49), in which he proposed the arrangement of animals in four divisions—the Vertebrata, Mollusca, Articulata, and Radiata. Soon after the restoration of the Bourbons he was appointed chancellor of the University of Paris by Louis XVIII. He was elected a member of the French Academy in 1818, and received the title of baron in 1820. He wrote many able notices of scientific men for the "Biographie Universelle." Among his other works is an excellent "Natural History of Fishes" (1818–30, with the continuation by Valenciennes, 22 vols.), of which eight volumes were finished during his life. As a professor he was distinguished for facility of elocution, clearness of ideas, and the art of fixing the attention in philosophical or historical digressions. He first applied to zoology the natural method, and founded a system on the basis of the invariable characters of anatomical structure. He is regarded as the founder of the science of comparative anatomy, and his knowledge of that science was such that a bone or small fragment of a fossil animal enabled him to determine the order, and even genus, to which it belonged. During the last twelve years of his life he rendered important services as president of the committee of the interior. He was created a peer of France in 1831. Died May 13, 1832. He had several children, but none of them survived him. His disposition was amiable, and his moral character unimpeachable. (See A. DE CANDOLLE, "Notice sur la Vie et les Ouvrages de G. Cuvier;" R. LEE, "Memoir of Baron Cuvier," 1833; L. DE LOMÉNIE, "G. Cuvier, par un homme de rien," 1841; FLOURENS, "Cuvier, Histoire de ses Travaux," 1845.)—The brother of the naturalist, FRÉDÉRIC CUVIER, born June 28, 1773, published, with Geoffroy St.-Hilaire, "Histoire naturelle des mammifères," interesting accounts of the habits of animals.

Cuvillier-Fleury (ALFRED AUGUSTE), one of the editors of the "Journal des Débats," born in 1802, has published "Portraits politiques et revolutionnaires" (1851), "Études historiques et littéraires" (1854), "Études et portraits" (1865–68), etc.

Cuxha'ven, a town of Germany, is on the left bank of the Elbe, at its entrance into the German Ocean, about 60 miles W. N. W. of Hamburg, to which it belongs. It has a good harbor, and is important as the port whence the Hamburg steamers depart when the Elbe is frozen. Pop. 1698.

Cuya'ba, or **Cuiaba,** a town of Brazil, the capital of the province of Matto Grosso, is on a river of its own name. It is a bishop's seat, and has three churches and an imperial hospital. Gold is found in this district. Pop. 7000.

Cuyahoga, kī-ạ-ho'gạ, a county of Ohio, bordering on Lake Erie. Area, 426 square miles. It is intersected by the Cuyahoga River. The surface is nearly level; the soil is fertile. Cattle, grain, and wool are staple products. The manufactures are very extensive and varied, including iron, machinery, paper, lumber, leather, furniture, and many other articles. It is traversed by several important railroads, which connect it with Cincinnati, Pittsburg, Chicago, etc. Capital, Cleveland. Pop. 132,010.

Cuyahoga Falls, a post-village and township of Summit co., O., on the Cuyahoga River and the Cleveland Mount Vernon and Delaware R. R., 34 miles S. S. E. of Cleveland. The river is here enclosed between rocky walls nearly 200 feet high, and affords abundant water-power, which is employed in several paper-mills, wire-works, rolling-mills, foundry, soap and glue factory, etc. It has one national bank and one weekly newspaper. Pop. of the village, which is coextensive with the township, 1861.

E. D. KNOX, ED. CUYAHOGA FALLS "REPORTER."

Cuyler, kī'lẹr, a township and post-village of Cortland co., N. Y. Pop. 1357.

Cuyler (THEODORE LEDYARD), D. D., born at Aurora, Cayuga co., N. Y., Jan. 10, 1822, graduated at Princeton College in 1841, at Princeton Seminary in 1846, preached three years at Burlington, N. J., was first pastor of the Third Presbyterian church at Trenton, N. J., then pastor of the Market Street Reformed church in New York City, and is now pastor of Lafayette Avenue Presbyterian church, Brooklyn, N. Y., enrolling more members than any other Presbyterian church in the U. S. He is the author of several little works, such as "Cedar Christian," "Empty Crib," "Heart-Life," and "Thought-Hives," all of which have been republished in England. Has also published more than 1500 letters and articles in newspapers and magazines, many of which have been reprinted in Europe.

Cuyp (ALBERT), a Dutch landscape-painter, pupil of his father, Jacob Gerrits Cuyp (1575–1650), was born at Dort in 1606. His works, remarked for atmospheric effects, are many of them in England. Died after 1683.

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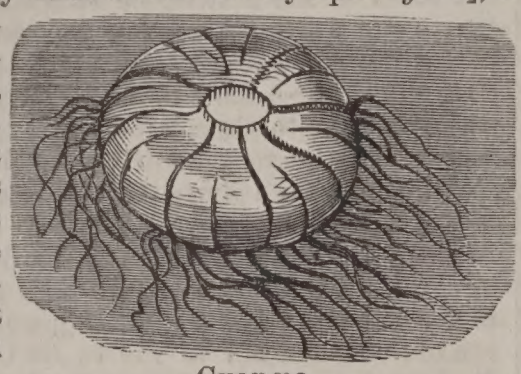
Cuz'co, the most populous department of Peru, is mostly between lat. 13° and 15° S. and lon. 70° and 73° W. Area,

about 45,000 square miles. The surface is mountainous, with extensive table-lands; it is rich in metals, and favorable to grazing and agriculture. Capital, Cuzco. Pop. about 464,000.

Cuzco, a handsome city of Peru, the capital of the above department, is 200 miles N. of Arequipa, and 11,380 feet above the level of the sea; lat. 13° 31′ S., lon. 72° 4′ W. It was formerly the capital of the Incas. It contains a fine cathedral, a university, several convents, and a mint, and is the seat of a bishop. Here are manufactures of cotton and woollen stuffs and jewelry. Massive specimens of ancient Peruvian architecture are visible. Pop. 25,000.

Cyanæ′a [probably named from the nymph *Cyane*], a genus of radiate animals of the class Discophora (jelly-fishes), allied to the Medusæ. The *Cyanæa capillata* is one of the species which are known as sea-nettles. Its severe sting is one of the terrors of sea-bathers at some of the European watering-places.



Cyanæa.

Cy′ane [Gr. Κυανή], the name of a water-nymph of classic mythology, who tried to rescue her playmate Proserpine, and was changed by Pluto into a fountain in Sicily. She is also called the wife of Æolus, god of the winds. The fountain Cyane, near Syracuse, still flows, and gives rise to a considerable river. Here grows the papyrus plant.

Cy′anide, or **Cyan′uret,** a compound of cyanogen with a positive radical. Prussian blue is a cyanide (or rather a ferrocyanide) of iron. The cyanide of potassium is very useful in chemistry and the arts, and is also employed in medicine as a sedative. It is a very active poison.

Cyan′iline ($C_{14}H_{14}N_2$), a direct compound of cyanogen and aniline. It is very unstable, but crystallizes and forms salts with acids.

Cy′anite, or **Kyanite** [from the Gr. κύανος, "blue," and λίθος, a "stone"], a beautiful mineral, sometimes called **Disthene,** is a silicate of alumina. It often occurs crystallized, and generally in broad prisms. It is transparent or translucent, sometimes opalescent, and exhibits various shades of blue. Its formula is $Al_2O_3SiO_2$.

Cy′anogen [from the Gr. κύανος, "blue," and γεννάω, to "produce," referring to "prussian blue," one of its compounds], a compound negative radical composed of two equivalents of carbon with two of nitrogen, represented by the symbol C_2N_2, or, in its capacity of a quasi-element, by Cy. It is a colorless, inflammable, permanent gas, with a specific gravity of 1.806. At the temperature of 45° F., if submitted to the pressure of 3.6 atmospheres, it becomes a transparent, colorless liquid. It has the odor of peach-kernels. Combined with hydrogen, it produces prussic or Hydrocyanic Acid (which see), remarkable for its deadly action upon the animal economy. Cyanogen combines with metals and other positive radicals, and produces a class of compounds known as cyanides, which are analogous in character to the chlorides, iodides, etc. Some of these are of great importance in the arts, as in gilding, electro-plating, photographing, and as tests in the chemical laboratory. Some are used in medicine as sedatives, but they are in general extremely poisonous. Prussian Blue (which see) is one of the most important of the cyanides.

Cyanom′eter [from the Gr. κύανος, "blue," and μέτρον, a "measure"], an instrument for measuring the blueness of the sky. It consists, essentially, of a disk divided into sectors, the several sectors being colored with tints of blue gradually increasing in intensity. Held between the eye and the sky, some sectors will appear deeper, and some lighter in tint than the heavens. That one where the difference is insensible is the measure of the blueness for the time being.

Cyano′sis [from the Gr. κύανος, "blue;" Fr. *cyanose*], also called **Cyanopathi′a** [from κύανος, "blue," and πάθος, "affection"], a condition in which the skin of a newly-born infant is of a blue color. It is the result of various congenital malformations and conditions of imperfect development. Frequently the pulmonary circulation is defective. In some cases the foramen ovale remains open as in the fœtal state. The venous and arterial blood are mingled, as is normal before birth. Cyanosis may prove fatal in a few days after birth, but normal development may take place and recovery follow, or the patient may live for years with this undeveloped condition of the blood-vessels.

Cya′thea [from the Gr. κύαθος, a "cup," alluding to the shape of its indusia], a genus of beautiful tree-ferns of the sub-order Polypodiaceæ, found in the tropical regions of the Old and New World. The species are numerous. *Cyathea arborea,* a native of the West Indies, Mexico, and South America, has bipinnate fronds. *Cyathea medullaris,* a New Zealand species, has edible starchy roots.

Cyathophyl′lum [from the Gr. κύαθος, a "cup," and φύλλον, a "leaf," referring to the shape of the polypidoms], a genus of fossil stony corals having a simple or branched polyparium, internally lamellated, the lamellæ having a quadripartite arrangement. This genus is found in abundance in the Devonian measures, and thirty-six species have been described from them. It disappeared at the close of the carboniferous period.

Cyax′ares [Gr. Κυαξάρης; Old Persian, *Uvakshatara, i. e.* "beautiful-eyed"] **I.,** a king of the Medes, began to reign in 633 B. C. He waged war against the Scythians, who invaded his dominions, and against Alyattes, king of Lydia. A total eclipse of the sun which occurred about 610 B. C. induced Cyaxares and Alyattes to make peace. Cyaxares and the king of Babylon took Nineveh in 625. He died in 593 B. C., and was succeeded by his son Astyages, who reigned from 593 to 569 B. C.

Cyaxares II., a son of Astyages, grandson of Cyaxares I., and uncle of Cyrus the Great. Though not mentioned by Herodotus or Ctesias, he is named by Xenophon as the successor of Astyages in the Median kingdom, and is probably the same as "Darius the Median" spoken of by the prophet Daniel (v. 31). He is supposed to have reigned in Babylon for two years after its conquest by Cyrus in 538 B. C. He came to the throne of Media in 569 B. C.

Cyb′ele [Gr. Κυβέλη or Κυβήλη], called also **Cybe′be** [Gr. Κυβήβη] and **Rhe′a** [Gr. Ῥεία, Ῥέα or Ῥείη], a goddess of classic mythology, received the appellation of "Mother of the Gods" or "Great Mother." She was supposed to be a daughter of Uranus and Terra, the wife of Saturn (Cronos), and the mother of Jupiter. Her priests were called Corybantes (which see). She was sometimes styled the "Berecynthian mother," from the hill Berecynthus, where she had a temple. She is generally represented riding in a chariot drawn by lions, with a diadem of towers upon her head.

Cycada′ceæ, or **Cyca′deæ** [from *Cycas* (gen. *cycadis*), one of the genera], a small natural order of exogenous plants, indigenous in the tropical parts of Asia and America. They are gymnosperms, and nearly related to the Coniferæ, and are distinguished by their simple stems, large pinnate leaves, and antheriferous cones. The stems consist of a mass of pith, traversed by woody bundles. Thus they approach closely to the endogens, and seem to be a link between the latter and the exogens. This curious order comprises about fifty known species, none of which are natives of Europe. Many of them afford starch, which is wholesome and extensively used as food. Sago is obtained in Japan from the interior of the stem of the *Cycas revoluta,* and a similar substance is produced in the Moluccas by the *Cycas circinalis.* The large seeds of *Dion edule,* which grows in Mexico, afford a starchy food. The caffer-bread trees belong to this order. The Coontie (which see) is the only plant of this order in the U. S.

Cy′chla, a genus of fishes of the family Chromidæ, many species of which are found in the tropical parts of America. They have small and crowded teeth, and are remarkable for the beauty of their colors. Some of them are greatly esteemed for the table.

Cyc′lades [from the Gr. κύκλος, a "circle"], a name given to a group of islands in the Ægean, numbering twelve in all, according to Strabo, so called because they surrounded the sacred island of Delos. These islands are Syra, Delos, Andros, Tenos, Mykonos, Naxos, Paros, Antiparos, Siphnos, Seriphos, Kythnos, and Keos. The present nome of the Cyclades (the tenth of fourteen in the kingdom of Greece) includes, in addition to the above, the following eight islands: Melos, Thera, Kimolos, Pholegandros, Sicynos, Ios, Amorgos, and Anaphe. The surface is mountainous, the soil productive. Pop. of the nome in 1871, 123,299. Area, 926 square miles. Syra or Hermopolis is the most important city.

Cyc′lamen [Gr. κυκλάμινος, from κύκλος, "circle," because it was used for garlands], the name of a genus of plants of the natural order Primulaceæ, having a wheel-shaped corolla, with a long reflexed limb, and flower-stalks twisted spirally after flowering. The species are herbaceous perennials, mostly natives of the south of Europe. Some of them are cultivated in gardens for the sake of the flowers, which are beautiful and fragrant. The root or subterranean stem is acrid and drastic. These properties depend on a peculiar principle called cyclamin.

Cy′cle [Gr. κύκλος, a "circle"], a period of time which finishes and recommences perpetually. The term has been

employed for marking the intervals in which two or more periods of unequal length are each completed in a certain number of times, so that both begin again exactly in the same relations as at first. The cycles used in chronology are three: the cycle of the sun, the cycle of the moon (or Metonic cycle), and the cycle of indiction. The cycle of the sun, or solar cycle, is a period of time after which the same days of the week recur on the same days of the year. If the number of days in the year were always the same, this cycle could only contain seven years; but the order is interrupted by the intercalations. In the Julian calendar, the intercalary day returns every fourth year, and the cycle consequently contains twenty-eight years. This cycle is supposed to have been invented about the time of the first Council of Nice (325 A. D.), but the first year of the first cycle is placed nine years before the commencement of the Christian era. Hence the year of the cycle corresponding to any given year in the Julian calendar is found by the following rule: add nine to the date and divide the sum by twenty-eight; the quotient is the number of cycles elapsed, and the remainder is the year of the cycle. Should there be no remainder, the proposed year is the twenty-eighth, or last of the cycle. In the reformed calendar this rule can only apply from century to century, for the order is interrupted by the omission of the intercalary day every hundredth year. (See DOMINICAL LETTER.) The cycle of the moon is a period of nineteen solar years, after which the new and full moons fall on the same days of the year as they did nineteen years before. This cycle was invented by Meton, an Athenian astronomer, and is known as the "Metonic cycle." It contains 8940 days, which exceeds the true length of the nineteen solar years by nine and a half hours, nearly. On the other hand, it exceeds the length of 235 lunations by seven hours and a half only. The framers of the ecclesiastical calendar, in adopting this period, altered the distribution of the lunar months, in order to accommodate them to the Julian intercalation; and the effect of the alteration was that every three periods of 6940 days was followed by one of 6939. The mean length of the cycle was therefore 6939¾ days, which agrees exactly with nineteen Julian years. The number of the year in the cycle is called the GOLDEN NUMBER (which see). The cycle begins with the year in which the new moon falls on the first of January. To find the number of any year in the lunar cycle, or the golden number of that year, we have this rule: add one to the date and divide by nineteen; the quotient is the number of cycles elapsed, and the remainder is the year of the cycle. Should there be no remainder, the proposed year is the last or nineteenth of the cycle.

The cycle of indictions, or Roman indiction, is a period of fifteen years, not astronomical, but entirely arbitrary. Its origin and purpose are alike uncertain, but it is conjectured that it was introduced by Constantine the Great about 312 of the common era, and had reference to certain judicial acts that took place at stated intervals of fifteen years. It is considered as having commenced on the first of Jan., 313. By extending it backward to the beginning of the era, it will be found that the first year of the era corresponded with the fourth of the cycle. In order, therefore, to find the number of any year in the cycle of indiction, we have this rule: add three to the date, divide the sum by fifteen, and the remainder is the year of indiction.

REVISED BY F. A. P. BARNARD.

Cyc'lic Planes of a Cone, the two planes through one of the axes which are parallel to the planes of circular section of the cone. The perpendiculars to the cyclic planes through the vertex are the focal lines of the reciprocal cone. A sphere around the vertex of the cone is cut by the latter, its cyclic planes, and its focal lines respectively, in a sphero-conic, its cyclic arcs, and its foci, and thus the reciprocal properties of cyclic planes and focal lines give rise to properties of sphero-conics, which are in many respects precisely similar to those of plane conics.

Cyc'lic Po'ets [Gr. *οἱ ποιηταὶ κυκλικοί*, the "poets of the cycle" or "routine" of mythology], a name originally given to Homer and certain epic poets who followed him, whose works treated of the mythological and heroic ages of Greece. In the second century B. C. these poems were arranged at Alexandria according to the order of the events they narrated. The whole collection was called the "Epic Cycle." The Homeric poems, though originally comprised in this cycle, are always treated as distinct from it, and the name "cyclic poet" became rather one of reproach, signifying a follower of an established "routine." The principal cyclic poets were Arctinus, Lesches, Agias, Eumelus, Stasinus, and Eugamon. Their extant writings are mere fragments.

Cyc'lifying Line, Plane, and **Surface.** The developable surface which contains a given non-plane curve, and which on being unfolded transforms that curve into a circular arc of a given radius, is called the cyclifying surface, corresponding to that radius. Its tangent planes are the *cyclifying planes* of the curve, and its generators the *cyclifying lines*. The theory of cyclifying surfaces is a generalization of that of the rectifying surface; which latter, in fact, is a cyclifying surface corresponding to the radius infinity. The developable osculatrix of a common helix, or of any curve with constant radius of curvature, is a cyclifying surface.

Cy'cloid [from the Gr. *κύκλος*, a "circle," and *εἶδος*, "form"], a name given to several important plane curves generated by a point in the plane of a circle when the latter is rolled along a straight line. If the generating point is in the circumference of the rolling circle, a "common cycloid" is generated; if the generating point be outside the circle, it marks a "curtate" cycloid; while if it be a point within the circumference, a "prolate" or "inflected" cycloid is the result. That part of the cycloid which is generated in one revolution of the generating circle is called one "branch" of the cycloid. The branches may be infinite in number. That part of the straight line which is traversed in one revolution of the generating circle is the "base" of one branch. A line bisecting the branch of a cycloid and its base is the "axis." The common cycloid is the "line of quickest descent;" that is, if one point be placed above another, but not in the same vertical line, a falling body will move from the higher point to the lower more quickly along the arc of an inverted common cycloid than by any other course, even if that course be a straight line. If a pendulum be made to vibrate in the arc of a common cycloid, no matter what the length of the arc may be, the time will always be the same. In practice, however, this result has never been attained. Experiments show that cog-wheels with teeth bounded by this curve have their friction reduced to the minimum. (See EPICYCLOID and HYPOCYCLOID.)

Cy'cloid, Companion to the, a name given by Roberval to a curve intimately connected with the cycloid, by means of whose properties he succeeded in 1634 in solving the problem of the quadrature of the cycloid. The curve in question may be conceived to be generated by a point which always remains vertically over the point of contact of the rolling circle and its base, and in the same horizontal line as the describing point. Its area is equal to twice that of the rolling circle. The area of the space between the cycloid and its companion is precisely equal to that of the rolling circle, so that the area of the cycloid itself is three times that of the circle.

Cy'clone [from the Gr. *κύκλος*, a "circle"], a rotatory storm or whirlwind occurring in the tropical seas of China and the West Indies, but never on the equator. The diameter is generally about 200 or 300 miles, and sometimes exceeds 500. The centre of the vortex (which is always calm) travels at a rate varying from eleven to thirty miles an hour. Cyclones are perhaps the most destructive of all storms. They rotate from right to left in the northern hemisphere, and from left to right in the southern. According to Humboldt, the velocity of the wind is sometimes from 200 to 300 miles an hour. (See WINDS.)

Cyclopæ'dia [from the Gr. *κύκλος*, a "circle," and *παιδεία*, "instruction," "knowledge"] properly signifies a work which takes in the whole circle of learning. The term is often, though incorrectly, applied to a work treating very fully of some one or two important subjects, as Chambers's "Cyclopædia of English Literature," the "Cyclopædia of Anatomy and Physiology," etc. (See ENCYCLOPÆDIA.)

Cyclo'pean Walls, a term applied to certain huge structures or walls of uncemented stones, the remains of which are found in Greece, Italy, and Asia Minor. These structures were so called because they were supposed to have been built by the Cyclopes of mythology. The architecture is very different from that of the historic period. Some persons believe that they were erected by the Pelasgi, more than 1000 years before the Christian era. The Cyclopean walls at Tiryns in the Peloponnesus are formed of unhewn stones from six to nine feet long, and nearly three feet thick. At Mycenæ are found massive walls of stones, which are more accurately fitted and are specimens of an architecture less rude than that of Tiryns. A more advanced style of architecture appears in some remains of Etruria. In the Etruscan masonry called Cyclopean the stones are hewn or squared and laid in horizontal courses, but are not cemented.

Cy'clopism, that form of monstrosity or malformation of the fœtus in which only one eye is present, usually on the median line of the head. (See TERATOLOGY.)

Cy'clops [Gr. *Κύκλωψ* (*i. e.* "round-eyed"), from *κύκλος*, a "circle," and *ὤψ*, an "eye"], plu. **Cyclo'pes,** in classic

mythology, a race of giants or monsters having each one eye in the middle of the forehead. According to Hesiod, they were the sons of Uranus, and were named Brontes, Arges, and Steropes. Homer represents them as gigantic and lawless shepherds and cannibals who lived in Sicily. The most famous among them was Polyphemus.

Cyclops, a genus of minute entomostracous crustaceans, so named from the supposition that the animal had but one eye. It has since been discovered to have two eyes, forming a single spot in the centre of the forehead. The species of *Cyclops* are numerous, and inhabit both salt and fresh waters. Several species occur in the U. S. Whales devour large numbers of the marine species.

Cyclops.

Cyclo′sis [Gr. κύκλωσις, a "going around," from κύκλος, a "circle"], a movement of elaborated sap, *latex*, or granulated protoplasm within the cells or vessels of plants. It was first observed and described by C. H. Schultz. In the milky or colored latex of some species of the genera *Ficus* and *Euphorbia*, and in the celandine (*Chelidonium majus*), it is easily seen under the microscope, but is nowhere more beautiful than in the elongated cells of *Chara* and some other aquatic plants, especially with a magnifying power of about 1200 diameters. It has been observed in the needle-like hairs of the common nettle. There is usually a regular rotation (whence the name) of the granules in each cell, up one side and down the other, with also smaller partial currents in different directions. Huxley considers the cause of the currents to exist in contractions of the protoplasm, too minute to be discerned except through their effects. (See Schultz, "Die Cyklose, etc. in den Pflanzen," Breslau, 1841.)

Cyd′nus [Gr. Κύδνος], a river of Cilicia, flowing through the city of Tarsus into the Mediterranean. It was celebrated for the clearness and coldness of its water. It was anciently navigable up to Tarsus (12 miles), but its mouth is now obstructed by bars. This river was the scene of Cleopatra's celebrated voyage to meet Antony in 41 B. C.

Cydo′nia, an ancient city of Crete, was on the northwestern coast of the island. It was noted for the production of the quince (*Cydonia*).

Cyg′nus (the "Swan"), a constellation of the northern hemisphere between Lyra and Cassiopeia, comprises several bright stars. The parallax of the binary star 61 Cygni was measured by Bessel, who published in 1839 "Measure of the Distance of the Star 61 in the Constellation of Cygnus." By two distinct methods of observation the distance of this star has been shown to exceed 50,000,000,000,000 miles.

Cyl′inder [Gr. κύλινδρος, from κυλίνδω, to "roll"], the name of a genus of geometrical solid figures of which there may be endless species. The most common kind of cylinder is that which is generated by the revolution of a rectangular parallelogram about one of its sides, which line is called the axis of the cylinder. But in order to embrace all varieties of cylinders we must generalize the mode of generation. A cylinder, then, is a solid generated by a line which moves parallel to itself while one end traces on a plane any curve whatever. When the position of the generating line is at right angles to the plane, the cylinder is *right;* when not, it is *oblique*. If the curve traced is a circle, and the line is perpendicular to the plane, the cylinder is a *right circular cylinder*. In all cases the content of the cylinder is found by multiplying the number of square units in the base by the number of linear units in the altitude. A sphere and a cylinder circumscribed to it have a remarkably simple relation to each other, first discovered by Archimedes, their volumes being as 2 : 3.

Cylle′ne [Κυλλήνη], a mountain of Greece, in the northwestern part of Arcadia, was supposed to be the birthplace of Mercury (Hermes), who was called *Cyllenius*, and had a temple on its summit. Height above the sea, 7788 feet. It is now called *Zyria*.

Cy′ma [Gr. κῦμα, a "wave"], in architecture, a term applied to a moulding, so called because its contour resembles that of a wave, being, for example, hollow in its upper part and swelling below. Of this moulding there are two sorts—the *cyma recta*, just described, and the *cyma reversa*, of which the lower part is hollow.

Cym′bal [Gr. κύμβαλον, from κύμβος, "hollow"], a brass musical instrument of percussion, circular in form and about eight inches in diameter. Cymbals are played in pairs by striking one against the other, and produce a loud, harsh sound of no fixed pitch. The best are those made in China and Turkey. Cymbals are of great antiquity, having been employed by the Greeks in the festivals of Bacchus and Cybele.

Cyme [from the Gr. κῦμα, a "swelling" or a "sprout"], in botany, a form of centrifugal inflorescence consisting of convex or flat-topped clusters of flowers seated on the axils of dichotomous ramifications, as in the elder (*Sambucus*) and several species of *Viburnum*. It differs from the corymb in its centrifugal flowering, and in the fact that its blossoms are from terminal buds, and not from a central axis or flower-stalk.

Cym′ry, the name given by the Welsh to their nation. It is frequently extended to the entire branch of the Celtic race to which the Welsh belong. To this branch also belong the people of Bretagne in France and the ancient races of Cornwall, Cumberland, and Strathclyde. Attempts have been made to prove that the Cimmerii and the Cimbri were of this race, but the evidence fails to establish these points. There is reason to believe that a great part of the ancient British race was Cymric, and many Cymric roots appear to have been found in Gaulish and Belgic names. (See Celts and Wales.)

Cynan′chum [from the Gr. κύων, a "dog," and ἄγχω, to "choke" (*i. e.* "dog-bane")], a genus of plants of the order Asclepiadaceæ. *Cynanchum Monspeliacum*, found on the shores of the Mediterranean, produces the Montpellier scammony. Caoutchouc is obtained to some extent from the *Cynanchum ovalifolium*, a native of Penang. Other species have been used in medicine.

Cyn′ics [Gr. κυνικοί, "dog-like," from κύων, a "dog"], a sect of philosophers among the Greeks, so called from their dog-like temper and their disregard of the conventional usages of society. It is difficult to give any satisfactory account of the tenets of this sect, as during all the period of its existence it was in a state of constant fluctuation. Its professed aim was to inculcate the love of rigid virtue and a contempt of pleasure. On this point the testimony of Horace—himself a zealous adherent of the school of Aristippus, the very opposite of the cynical sect—even were there no other, must be held conclusive; and according to his opinion the aim of the cynical philosophy was to induce every man to become "the guardian of real virtue." Diogenes belonged to this sect. It was founded in the fifth century B. C. by Antisthenes, a disciple of Socrates, who sought to imitate his master in disregard of outward splendor and contempt of riches, but his indifference to these things soon degenerated into an ostentatious display of singularity.

Cynoceph′alus [from the Gr. κύων, a "dog," and κεφαλή, "head"], in Egyptian mythology, a dog-faced baboon. The Egyptians held these animals in great veneration, and professed to discover by their aid the periods of the sun and moon. The name is now applied to a genus of African monkeys. (See Baboon.)

Cynosceph′alæ [from the Gr. κύων, gen. κυνός, "dog," and κεφαλή, a "head"], a locality in Thessaly, was the scene of two important battles. In the first the Thebans defeated the tyrant of Pheræ, in 364 B. C. In the second the Roman general Flamininus defeated Philip of Macedon in 196 B. C.

Cynosu′ra [Gr. κυνοσουρά, from κύων, κυνός, "dog," and οὐρά, "tail," probably because four stars of Ursa Minor, including the North Star, were fancied to resemble a dog's tail; Fr. and Eng. *cynosure*], a nymph of Ida, said to have been one of the nurses of Jupiter, who translated her into the constellation of Ursa Minor, which includes the North Star. In the language of poetry it signifies a "point of attraction."

> "Where perhaps some beauty lies,
> The cynosure of neighboring eyes."—*Milton.*

Cynthian′a, a city, capital of Harrison co., Ky., on the South Fork of the Licking River and on the Kentucky Central R. R., 66 miles S. of Cincinnati. It was first settled in 1780, and was named from Cynthia and Anna Harrison, daughters of one of the early settlers. It has two weekly papers and one national bank. It is noted for the manufacture of "Bourbon" whisky. There are eight churches, a graded free school, a female college, two flouring-mills, and two carriage-factories. It is in a very fertile agricultural district, and is the site of a famous race-course. A Confederate force numbering 2200 men, with artillery, under Gen. J. H. Morgan, attacked the place July 17, 1862, garrisoned by 350 Federal soldiers. The place was surrendered, but not till the ammunition was exhausted. On June 11, 1864, Morgan with a large force attacked the place again, and after two days' fighting captured Gen. Hobson with some 1700 men. On the 14th, Gen. Burbridge, with 7000 men, fell upon Morgan (whose men were out of ammunition and

exhausted), and drove him out of Cynthiana with considerable loss. P. 1771. A. J. Morey, Ed. and Prop. "News."

Cynthiana, a township of Shelby co., O. Pop. 1597.

Cypera'ceæ [from *Cyperus*, one of the genera], popularly called sedges, an order of endogenous plants nearly related to the grasses, and natives of all parts of the world. They are distinguished from the Graminaceæ by having stems which are solid and mostly triangular, not round and fistular, and nearly destitute of joints. They have closed sheaths and spiked, chiefly tri-androus flowers, one in the axil of each of the glume-like imbricated bracts, destitute of any perianth, or with hypogynous bristles or scales in its place. The ovary is 1-celled, and contains a single ovule, which becomes an achenium. This order comprises about 2000 species, which mostly grow in marshy or moist places. Among them are the sedges (see Carex) and papyrus.

Cype'rus [Gr. κύπειρος, the name of a water-plant], a genus of plants of the order Cyperaceæ, distinguished by hermaphrodite flowers and compound spikes of numerous 2-rowed glumes, without bristles. It contains numerous species, many of which are natives of the tropics, and others of the U. S. Some of them have tubers or corms which are mucilaginous and nutritious. The *Cyperus esculentus* (rush-nut), a native of Southern Europe, is cultivated in Italy, Spain, and France, and bears farinaceous tubers which are as large as a hazel-nut, and are called *amande de terre* ("ground almond") by the French. They are eaten as dessert, and are used in making orgeat. The papyrus plant is often referred to this genus, though separated from it by some botanists.

Cypher. See Cipher.

Cy pres, in law, a rule of construction. (See Interpretation and Construction, by Prof. T. W. Dwight, LL.D.)

Cy'press [Gr. κυπάρισσος, perhaps the Hebrew *gopher*], (*Cupressus*), a genus of evergreen trees and shrubs of the natural order Coniferæ, having globular cones, and very small and scale-like or awl-shaped leaves, which are appressed and imbricated. The wood is valuable and exceedingly durable. The common cypress (*Cupressus sempervirens*), a native of the Levant and Northern Africa, is a tree of a conical form, sometimes growing to the height of a hundred feet or more. On account of its dark green leaves and sombre aspect it has from very early times been adopted as an emblem of mourning. The ancient Greeks and Romans planted it in burial-grounds, and the same custom now prevails in Turkey. The wood has a pleasant smell, is not liable to be injured by insects, and is therefore valuable to cabinet-makers. It is compact and durable. Specimens of this wood preserved in museums are said to be several thousand years old. Some critics believe that the kinds of timber called cedar and gopher-wood in Scripture were the wood of the *Cupressus*. Among the other species of this genus are the *Cupressus thurifera* of Mexico, the resin of which is burned for incense, and the *Cupressus thyoides*, which is a native of the U. S., and is commonly called white cedar. (See Cedar.) The popular name American cypress is given to the *Taxodium distichum*, a large and valuable deciduous tree which grows in swamps in the Southern U. S. It sometimes attains a height of 120 feet, and is about ten feet in diameter at the base. This is valuable for timber, and is planted as an ornamental tree. The cypress of the North Pacific coast is *Thuja gigantea*.

Cypress, a post-township of Monroe co., Ark. P. 655.

Cypress, a township of Pulaski co., Ark. Pop. 369.

Cypress, a township of Harrison co., Mo. Pop. 1230.

Cypress, a township of Nansemond co., Va. Pop. 2550.

Cypress Bayou, a township of Arkansas co., Ark. Pop. 318.

Cypress Creek, a twp. of Duplin co., N. C. P. 1024.

Cypress Creek, a township of Franklin co., N. C. Pop. 1087.

Cypress Creek, a township of Jones co., N. C. P. 541.

Cyp'rian, Saint [Lat. *Cyprianus*], or, more fully, **Thas'cius Cæcil'ius Cypria'nus,** a bishop of Carthage and Latin Father of the Church, was born in 200 A. D. at Carthage. He was a teacher of rhetoric before his conversion, which occurred about the year 246, and he was chosen bishop of Carthage in 248 A. D. In 250 he retired into the desert to escape from the persecution which was ordered by the emperor Decius. He returned to Carthage in 251, and then assembled a council on the subject of apostates who had lapsed in consequence of persecution. He judged that these should be treated with moderation and lenity. He emphasized the idea of the Church, insisted upon the three orders of the ministry, and stoutly maintained the parity of bishops against the assumptions of the bishop of Rome. He suffered martyrdom under Valerian in 258 A. D. He was eminent for his learning, eloquence, and zeal, wisely tempered with moderation. His works consist of thirteen treatises, the most important of which is his "De Unitate Ecclesiæ," written in 252, besides eighty-one epistles, including a few addressed to him, all of which have reference to ecclesiastical affairs. (See Gervaise, "Vie de Saint-Cyprien," 1717; Poole, "Life and Times of Saint Cyprian," 1840.)

Cyprin'idæ [from *Cyprinus*, one of the genera], the name of a family of malacopterous fishes, having only the pharynx or hinder part of the mouth furnished with teeth, the gill-rays few, and no adipose fin. They are fresh-water fishes, and are found in lakes and rivers. This order includes the carp, roach, dace, tench, bream, minnow, gold-fish, barbel, etc.

Cyprinodon'tidæ [from *cyprinus*, a "carp," and ὀδούς, ὀδόντος, a "tooth"], a family of malacopterous fishes allied to the Cyprinidæ, but having the jaws more protractile and toothed. They are found in Asia and America, and in both fresh and salt water. The *Anableps* belongs to this order. (See Anableps.)

Cypripe'dium, a genus of plants of the order Orchidaceæ, comprises several species natives of the U. S., and known by the popular names of lady's slipper and moccason flower. They have beautiful flowers of curious structure, in which the lip is a large inflated sac. They possess sedative properties, and are used to some extent in nervous diseases.

Cy'pris, the name of a genus of minute entomostracous crustaceans of the order Branchiopoda, with the body enclosed in a bivalve shell. The antennæ and feet are furnished with fringed bristles, by means of which they swim with ease. Their horny fossil shells are found in the wealden of England, and several species occur in the triassic rocks of the U. S.

Cy'prus [Turk. *Kibris*; Gr. Κύπρος], an island of Asia, in the N. E. corner of the Mediterranean, is 44 miles S. of Cape Anamoor in Anatolia, and about the same distance W. of the coast of Syria. It is about 140 miles long, and 50 miles broad at the widest part. Area, 3678 square miles. Pop. estimated at 200,000. The interior is occupied by a range of mountains, the highest points of which rise nearly 7000 feet above the sea. These mountains are of limestone formation, and are covered with vast forests of walnut, oak, and other good timber. The soil is generally very fertile, but the island is not liberally supplied with water. The staple products are cotton, wheat, tobacco, madder, silk; also grapes and other fruits. Wine of good quality is also made. A large portion of the population are Greeks. Capital, Nicosia. The foreign consuls reside at Larnica. In ancient times Cyprus was devoted to the worship of Aphrodite or Venus, who was fabled to have here risen from the sea. Her temple was at "Old Paphos," now called *Kuklia*. The original occupants of the island were probably the Japhetic Kittim (Gen. x. 4), who left their name in the old capital, Citium. Cyprus, scarcely ever for any great length of time independent, was held by the Phœnicians from about 1100 to 725 B. C.; by the Assyrians from about 700 to 650 B. C.; by the Egyptians from about 550 to 525 B. C.; by the Persians from 525 to 333 B. C.; and then, after 323 B. C., by the Ptolemies till 58 B. C., when it became a Roman province. In 44 A. D. it was visited by Paul in his first missionary tour. The Saracens (from 649 A. D.) took and retook it several times. Wrested from the Saracens by Richard Cœur de Lion in 1191, it was governed by kings of its own from 1192 to 1489, and belonged to Venice from that time till 1573, when it was conquered by the Turks, who still hold it. Perhaps no country on the face of the globe has changed masters so many times, or holds within its bosom the relics of so many civilizations. Discoveries of the greatest interest and importance have recently been made by Gen. di Cesnola, American consul in Cyprus. (See Cesnola; Unger and Kotchy, "Die Insel Cypern," 1865; "Storia dell' Isola di Cipro," narrata da Romualdo Cannonero, Imola, 1870.)

For many years Cyprus has been a hunting-ground for archæologists. The Codex Cyprius, containing the unmutilated Gospels, was found here in the ninth century, and was carried to Paris in 1673. Pococke saw ruins and tombs; the abbé Mariti, who visited the island in the latter part of the last century, describes marbles, coins, medals, idols, and lamps, but the Turks would not permit diggings. Later, a number of silver bowls were found, one of which, now in the collection of the duc de Luynes, closely resembles those found by Layard at Nimroud. In 1845 a bas-relief in black basalt was found at Larnica, upon which is sculptured the figure of Sargon, king of Assyria, father of Sennacherib. This bore the inscription in cuneiform letters, "From the great king Sargon to his vassal friend, the king of Citium." There had, however, been no systematic

researches undertaken in the island until Di Cesnola began those which have resulted in the magnificent find which will for ever be associated with his name. In the article CESNOLA we have given a summary of the contents of the collection now deposited in the Metropolitan Museum of Art in New York. No complete catalogue has as yet been made out, and therefore it is not easy to give more than a general account of the contents of the collection.

Among the coins are some of the best Greek period, good examples of the Roman imperial times, with others belonging to the Alexanders, the Seleucidæ, and the kings of Cyprus. In bronze, the articles are very curious and valuable, though they have all suffered greatly from decomposition. There are several statuettes of Osiris, of Minerva, of Pomona, and one of a mounted warrior, with Greek initials on the pedestal. Besides these artistic objects there are a multitude of implements—bracelets, anklets, rings, amulets, hair-pins, mirrors and mirror-cases, brooches and buckles, strigils, tweezers, pincers, lamps, modelling tools, vases, cups, tripods, an inkstand with the incrusted ink, shields, spears, battle-axes, javelins, arrow-heads, hooks, and nails, and the small toothed sickles, such as are in use to-day in the island. There are many articles in gold and silver, and gems and stones engraved in intaglio and in relief—carnelian, carbuncle, jasper, garnet, onyx and agate, sapphire and amethyst, with some cameos of paste, one a head of a Cæsar, white on a dark-blue ground. The case containing jewelry is of great artistic and archæological value, and the student will do well to compare its contents with those of the precious case belonging to the Abbot Collection of Egyptian Antiquities in the New York Historical Society. The Di Cesnola jewelry consists of rings, earrings, necklaces, amulets, bracelets, beads, buttons, spoons, and two or three collars of uncommon size and importance. Many of these ornaments are of gold alone, wrought with the pincers and the hammer, twisted, granulated, and embossed, showing great skill in execution and resource and freedom in design. The relationship between all this metal-work and that found in the Castellani and Campana collections (the first lately in Rome, but now in the British Museum; the second in the Louvre) is an extremely interesting subject of study. The objects in marble, alabaster, and stone are very numerous. The most interesting and important are the statues, but besides there are heads of animals, plates, tripods, ointment-boxes, tear-bottles, vases, seals, lamps, small altars, and pedestals.

But the objects in glass and terra-cotta are the most numerous of all, and almost exhaust wonder and curiosity. There are 1700 pieces of glass, and between no two pieces is there more than a general resemblance. The cases surrounding one entire room are filled with this glass, the greater part of it probably of Phœnician make, though found in Greek tombs at Idalium (the modern Dali), and supposed to range from 400 B. C. to 100 B. C. It would be impossible within any reasonable limits to give any satisfactory account of this astonishing collection. The objects consist of plates, cups, bottles—these last of all sizes and shapes—vases, buttons, necklaces, and seals, and one spoon—a unique specimen. Much of this glass has been oxidized by the action of time and burial in the earth, and the result is a splendid iridescence, differing greatly in amount in different specimens, and differing too in the chord of color. In general, the surface of these glass objects is little ornamented, but there are notable exceptions, a few being either fluted, ribbed, or decorated with pressed ornaments or crinkled handles, or with twisted patterns in the glass itself, as in some specimens of Venetian glass.

Nor are the objects in terra-cotta less numerous or less interesting. They are of all periods and races, and the visitor will find his interest divided between the Phœnician pottery and the Greek statuettes, lamps, and vases. The examples of Phœnician pottery are in incredible number; they are of every grotesque shape into which man can pinch, turn, or twist clay, but beautiful or graceful forms are rare, and the ornamentation is made up of circles, single or concentric, lines, zigzags, dots, and animals, principally birds, drawn without other skill than that which knows how to keep a sort of symmetry and proportion. The series of lamps begins with the Phœnician, mere clay scoops, modeled from bivalve shells perhaps, as their oldest vases and bowls are from gourds; then come the Egyptian, and then the Greek, these last generally ornamented on the upper surface with figures in relief so spirited in design that one takes the same pleasure in examining them as in looking at Greek coins or gems of the best period.

The statuettes in terra-cotta are of the highest interest. They are in great variety, and many of them are so odd that it is difficult not to believe them caricatures; but probably we are studying the slow development of the art of sculpture in the island. In one of the cases there are ranged in chronological order statuettes of Venus from the earliest time, some of them most amusing in their deformity, but the series culminates in several little figures of the purest Greek type and of the finest execution. Mr. Hitchcock, from whose account of the collection in "Harper's Monthly" for July, 1872—the best that has been written thus far—ours is mainly condensed, says of these statues that "no museum possesses a single statue of a period so remote as many of these, and some of them are by far the oldest known to exist." (Besides the article in "Harper" above mentioned, see "Die Sammlung Cesnola, beschrieben von Johannes Doell," published in the "Memoirs of the St. Petersburg Imperial Academy of Sciences," 1873, with seventeen pages of beautifully executed lithograph illustrations; also, "The Antiquities of Cyprus, photographed by Stephen Thompson, from a selection made by C. T. Newton, M. A., Keeper of Greek and Roman Antiquities at the British Museum, with an Introduction by Sidney Colvin, M. A.," London, 1873.)

REVISED BY CLARENCE COOK.

Cyr, a township of Aroostook co., Me. Pop. 376.

Cyrena'ica [Gr. Κυρηναία], the ancient name of a region of Northern Africa, now known as BARCA (which see). It is also called Pentapolis, from its five cities, Cyrene, Apollonia, Teuchira, Hesperides, Barca; afterwards Cyrene, Apollonia, Ptolemaïs, Arsinoë, Berenice. The principal city was Cyrene, from which the name was derived. Cyrenaica was bounded on the W. by Africa Propria, on the E. by Marmarica, and extended southward as far as Libya Inferior. The original inhabitants, now represented by the Berbers, were probably descendants of Phut, the third son of Ham (Gen. x. 6). The Greeks began to colonize this part of Africa about 631 B. C. Till 430 B. C., Cyrenaica was governed by a dynasty of eight kings, four of whom bore the name of Battus, and four the name of Arcesilaus. A democratic republic was then established. In 332 B. C. the people submitted to Alexander. Under the Ptolemies many Jews settled there. In 75 B. C., Cyrenaica became a Roman province, and afterwards a part of the Byzantine empire. In A. D. 616 it was conquered by the Persian Chosroes (Khosroo), in 647 was overrun by the Arabs, and now is under the rule of the Turks, whose authority, however, is hardly more than nominal. Its climate is delightful, and much of its soil very fertile.

Cyre'ne [Gr. Κυρήνη], the capital of Cyrenaica, was situated about 10 miles from the Mediterranean, and 1800 feet above the level of the sea. It was founded about 631 B. C. by a colony of Greeks. Cyrene carried on an extensive commerce with Egypt and Greece through its port called Apollonia. It was the native place of Aristippus, Eratosthenes, the poet Callimachus, and Carneades. Remains of its former magnificence are still visible. The site is now occupied by a poor town called *Grenne* or *Kooreen*.

Cyre'nius, or **Quiri'nus** (PUBLIUS SULPICIUS), a Roman governor (proconsul) of Syria. Recent investigations have rendered it highly probable that he held that office twice—first, from 4 to 1 B. C., when Christ was born (Luke ii. 2), and again from 6 to 11 A. D. (See ZUMPT, "De Syria Romanorum Provincia," 1854.)

Cyr'il, or **Cyril'lus** [Gr. Κύριλλος], SAINT, bishop of Jerusalem, was born, probably at Jerusalem, in 315 A. D. He was ordained a deacon in 334 or 335, a presbyter in 345, and became bishop of Jerusalem in 350 or 351. Acacius, bishop of Cæsarea, who was an Arian and an enemy of Cyril, caused the latter to be deposed by a council in the year 358. He was restored in 359, again deposed in 360, again restored in 362, deposed the third time in 367, and the third time restored in 368. He is said to have predicted the failure of Julian's attempt to rebuild the Jewish temple in 363. He died in 386. The best editions of his works are by Milles, Oxford, 1703, and by Touttée (Benedictine), Paris, 1720. They consist of eighteen catecheses, addressed, in 347 or 348, to catechumens, five addressed to the newly baptized, a homily on the paralytic man, and a letter to the emperor Constantius, describing a luminous cross which he saw in the sky over Jerusalem in 351. His style is diffuse and inflated. His writings have no great doctrinal weight, but are of great archæological and liturgical value.

Cyril, or **Cyrillus,** SAINT, an intolerant and arrogant prelate, born at Alexandria in Egypt. He became bishop of Alexandria in 412 A. D., persecuted the Jews, and was notorious for his fanatical zeal and turbulence. The cruel murder of the accomplished female philosopher Hypatia in 415 has been laid to his charge, but without proof. He had a long controversy with Nestorius on the subject of the Incarnation, and presided over the Council of Ephesus in 431. Cyril died in 444 A. D. The best edition of his works is by Aubert, Paris, 1638, in seven volumes. His commentaries are worthless. His ablest work is the treatise against Julian, in ten books, written in 433.

Cyril, whose name originally was **Constantine,** son of Leon of Thessalonica, and elder brother of Methodius, was born between 810 and 830 A. D. About 850, Cyril went as a missionary among the Chazars in the Crimea; in 861 Methodius went to Bulgaria; and in 863 the two brothers went together to Moravia. They were the apostles of the Slavic race. Cyril invented the alphabet, and translated into the Slavic language the Psalter and all of the New Testament, except the Apocalypse. In 868 he obeyed the pope's summons to Rome, where he died Feb. 14, 869.

Cyril'la [named in honor of Domenico Cirillo], a genus of evergreen trees and shrubs of the natural order Cyrillaceæ. Several varieties of *Cyrilla racemiflora*, a small tree or shrub, occur in the Southern U. S. The clusters of small white flowers appear in June. In cultivation this is one of our finest native evergreens.

Cyrilla'ceæ, a small natural order of evergreen shrubs and trees, mostly North American, several of which occur in the Southern U. S. This order, which includes the genera *Cyrilla*, *Cliftonia*, *Elliottia*, etc., is kindred to the Ericaceæ, and contains no plants of industrial value.

Cyrillic Alphabet, an alphabet invented about 863 A. D. by Saint Cyril, the apostle of the southern Slavi. It was based upon the older Glagolitic alphabet. Some writers, however, make the Glagolitic to be the invention of Cyril, while the so-called Cyrillic they consider to be the invention of Clement, bishop of Welitza, who died in 916 A. D. The Cyrillic, with a number of modifications, is the alphabet used in Russia and some other Slavic countries.

Cy'rus [Gr. Κῦρος (or Κῦρος ὁ παλαιός, *i. e.* "Cyrus the Elder"); Persian, *Kai-Khosroo;* old (cuneiform) Persian, *Kooroosh*], surnamed THE GREAT, the founder of the Persian empire, and the greatest of the Persian heroes, was the son of Cambyses, a Persian nobleman. His mother was Mandane, a daughter of Astyages, king of Media. According to a tradition which Herodotus adopted, Astyages was alarmed by a dream which portended that the offspring of Mandane would become king or conquer Media, and he commanded an officer named Harpagus to kill Cyrus. Harpagus promised to obey the order, but privily committed the infant to the care of a herdsman, who brought him up with his own children. Cyrus, having discovered the secret of his birth, and having inured himself to the hardy habits of the warlike Persians, incited the latter to revolt against the king of Media. He defeated Astyages in battle, and ascended the throne in 558 B. C. He conquered Crœsus, king of Lydia, in 554, and extended his dominions by the conquest of other states. Among his exploits was the capture of Babylon, by diverting the river Euphrates from its channel, in the year 538, while Belshazzar was feasting. This event was foretold by the prophet Isaiah, who declared: "Thus saith the Lord to his anointed, to Cyrus, whose right hand I have holden to subdue nations before him." (Chap. xlv. 1.) Cyrus issued an edict that the Jewish captives who had been deported to Babylon should return to Jerusalem and rebuild their temple. Herodotus states that he afterwards invaded the country of the Scythian Massagetæ, who were ruled by Queen Tomyris, and that he gained several victories over her, but was drawn into an ambush and killed in 529 B. C. According to Xenophon, Cyrus died a natural death at Pasargadæ. He was succeeded by his son Cambyses. (See XENOPHON, "Cyropædia;" DIODORUS SICULUS, books ii., ix., x., xvii., and xxxi.; SCHUBART, "Programma de Cyro," 1743; WETZKE, "Cyrus der Gründer des Persischen Reiches," 1849; RAWLINSON, "Five Great Monarchies," 2d ed. 1871.)

REVISED BY R. D. HITCHCOCK.

Cyrus the Younger was the second son of Darius Nothus, king of Persia, by whom he was appointed satrap of Lydia and Phrygia in 407 B. C. Having formed a design to dethrone his brother Artaxerxes Mnemon, he hired a large army of Greek mercenaries, of whom Clearchus, a Spartan, was the leader. In the year 401 B. C. he moved his army from Sardis, but kept his soldiers in ignorance of their destination. Xenophon the historian took part in this expedition. Cyrus met the army of Artaxerxes at Cunaxa, where, rashly exposing himself in the front, he was killed about Sept., 401 B. C. His character is praised by Xenophon. (See GROTE, "History of Greece;" XENOPHON, "Anabasis" and "Hellenica.")

Cyst [from the Gr. κύστις, a "bladder"], a word commonly used to designate hollow tumors or pathological structures in the form of a bladder. The name is also applied to hollow organs with thin walls, as the gall and urinary bladders. Pathological cysts are frequently transparent and of great tenuity. They are mostly lined by an epithelium, and are either simple or compound, unilocular or multilocular; sometimes they are small and separate, sometimes very large and complex. They are usually filled with a fluid. Some of them are parasitic and of independent animal nature, as the hydatids.

Cysticer'cus [from the Gr. κύστις, a "cyst," and κέρκος, a "tail" (*i. e.* a "tailed cyst")], a name applied to the scolices or larvæ of certain CESTOID WORMS (which see). They are often found in the flesh of pigs and other animals, and sometimes in the human body, causing the tumors known as hydatids. (See HYDATID.)

Cystic Worms. See CESTOID WORMS.

Cyt'isus [Gr. κύτισος], a genus of plants of the order Leguminosæ, sub-order Papilionaceæ, of which some species are popularly called broom. The common broom of Europe is the *Cytisus Scoparius*. (See BROOM.) The genus comprises many species, some of which have beautiful flowers and are cultivated in gardens.

Cyz'icus, a peninsula of Asia Minor, in Anatolia, extending into the Sea of Marmora, is about 70 miles S. W. of Constantinople. It is connected by a narrow neck with the mainland, and is noted for its picturesque scenery. The ancient Greek city of Cyzicus was on this peninsula and on the Propontis. The site of this splendid city is marked by the ruins of an amphitheatre.

Czar [from the Russian *tsar*, a "king"], the title of the emperors of Russia. As early as the twelfth century this title was given by the Russian annalists to the grand duke Vladimir and his successors, but it was not officially used till the sixteenth century. In the year 1505, Basil Ivanovitch assumed the name of samodershez (autocrat), and his son, Ivan the Terrible, caused himself to be crowned czar in 1547. In 1724, Peter the Great added the title *imperator* to that of czar, an assumption of dignity which some of the European powers refused to acknowledge. The wife of the czar was called czarina; she is now styled *imperatritza*. Among the Russians the czar is popularly termed *hossoodar*.

Czartorys'ki (ADAM GEORGE), PRINCE, a Polish patriot, a son of Prince Adam Casimir, president of the Polish Diet, was born at Warsaw Jan. 14, 1770. He fought against Russia in 1792, was taken to St. Petersburg as a hostage, and gained the favor of the grand duke Alexander, who appointed him assistant minister of foreign affairs in 1802, which position he resigned in 1808. In the revolution of 1830 he supported the Poles against Russia, and was elected president of the new government Jan., 1831, but after the defeat of the Poles in August of that year went into exile. Died in Paris July 16, 1861.

Czas'lau, a town of Bohemia, 45 miles E. S. E. of Prague. Its church, in which the Hussite leader Ziska was buried, is surmounted by a spire said to be the highest in Bohemia. Here Frederick the Great defeated the Austrians May 17, 1742. Pop. in 1871, 5998.

Czeg'led, a market-town of Hungary, is on the railway from Pesth to Temesvàr, about 50 miles S. E. of Pesth. It has some handsome buildings and large breweries; also a trade in red wine. Pop. in 1870, 22,206.

Czensto'chow, a town of Poland, on the river Warthe. Here is a convent which has a dark-colored picture of the Virgin, visited by multitudes of pilgrims, and reputed to have miraculous power. Pop. 14,167.

Czerka'sy, a town of Russia, in the government of Kiev, on the Dnieper, 156 miles E. S. E. from Berditchef, is the seat of the hetman of the Saporoj Cossacks. Pop. 13,311.

Czer'mak (JOHANN NEPOMUK), born at Prague June 17, 1828, became in 1865 professor of physiology at Jena. He published, among other works, "The Laryngoscope, and its Practical Value for Physiology and Medicine" (1860), and "Information from a Physiological Study" (1864). Died Sept. 16, 1873, while professor at Leipsic.

Czer'nowitz, capital of the Austrian duchy of Bukovina, is on a hill near the river Pruth, about 160 miles S. S. E. of Lemberg. It is the seat of a bishop of the Oriental Greek Church, has a Greek theological seminary, a gymnasium, a Realschule, a school of midwifery, a provincial library, a chamber of commerce, and manufactures of clocks, hardware, silver-ware, etc. Pop. in 1870, 33,884.

Czer'ny (GEORGE), or **Kara George** (Black George), a Servian chief, born Dec. 21, 1766, was originally a peasant. He became in 1806 the leader of the Servians, who had revolted against Turkey. He defeated the Turks, captured Belgrade in Dec., 1806, and liberated Servia, secretly aided by Russia. When Russia, invaded by Napoleon, could no longer support him, Czerny was driven out by the Turks in 1813. Having returned to Servia, he was murdered in July, 1817, at the instance of Milosch Obrenovitch.—His second son, ALEXANDER KARAGEORGEVITCH, was prince of Servia from 1842 to 1858.

D.

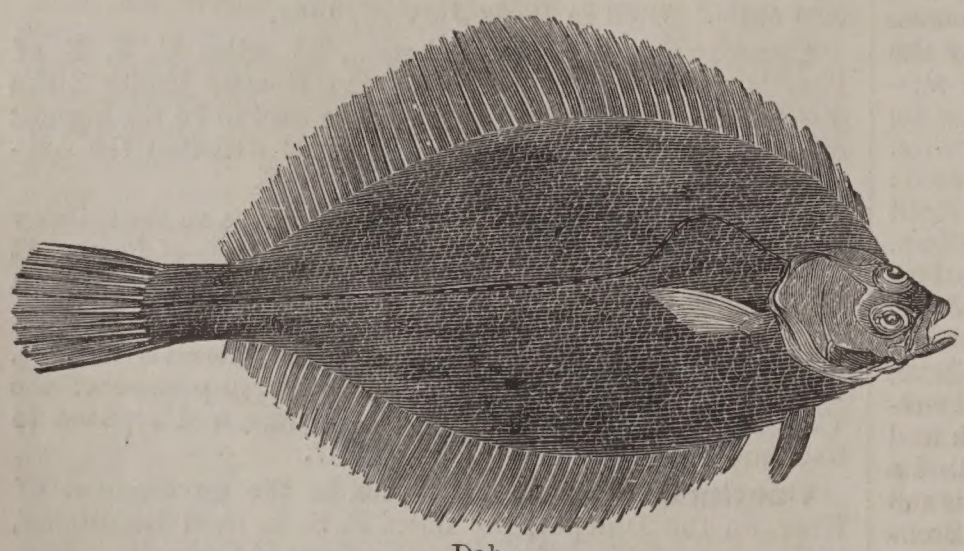
D, the fourth letter of the Phœnician and Hebrew, as well as of the Greek and Roman alphabets. The name in Hebrew (*dâleth*) signifies "door," and the picture of a door was probably its original hieroglyphic form. Some have conjectured that the Greek delta (Δ) derived its form from the triangular door of a tent. The sound of the English *d* is formed by placing the tongue against the gums at the roots of the teeth. But in pronouncing the letter in several other languages (as the Spanish, Arabic, and Persian) the tongue is placed against the teeth themselves, and from this circumstance it is termed a *dental.* In the Sanscrit there are two letters which are represented, though not quite accurately, by the English *d.* The one is truly a dental, being similar to the Spanish *d;* the other is formed by turning the tip of the tongue back against the roof of the mouth, whence it is termed a *palatal,* and sometimes a *cerebral,* letter. *D* is often interchanged with other letters (as *t* and *th* (θ)) of the same class. Hence *burned* becomes *burnt, passed* becomes *past,* and so on; and we have such variations as *burden* and *burthen, murder* and *murther,* though the latter is now obsolete.

The sound of dental *d* often approaches, or is actually changed into, that of *th* in *this.* Thus, in Spanish, *d* when between two vowels or at the end of a word, has almost, if not exactly, the sound of *th* in the English word *smother;* the same is substantially true of the Danish; hence the Danish words for "brother" (*broder*) and "mother" (*moder*) have nearly the same sound as their English equivalents. The delta (δ) of the modern Greeks has exactly the same sound as our *th* in *this.*

D, in music, is the second note in the scale, and is one tone above C. In chemistry D stands for didymium.

Among the ancient Romans, D (capital) stood for 500, or as an abbreviation it stood for *divus* (a title signifying the "godlike"), and *Decimus,* a name. Among the ancient Greeks *delta* with a mark on it (δ′) stood for the number 4.

Dab (*Platessa limanda*), a small, flat fish belonging to the same genus as the flounder. It is common on the more sandy coasts of Great Britain, is found in deeper water than the flounder, and does not enter the mouths of streams. The lemon or smooth dab (*Platessa microcephala*) is a larger species of the same genus, with a smooth body, very small head and mouth, and in color a mixture of brown and yellow shades. The rusty dab (*Platessa ferruginea*) is a rare fish of the New England coast.



Dab.

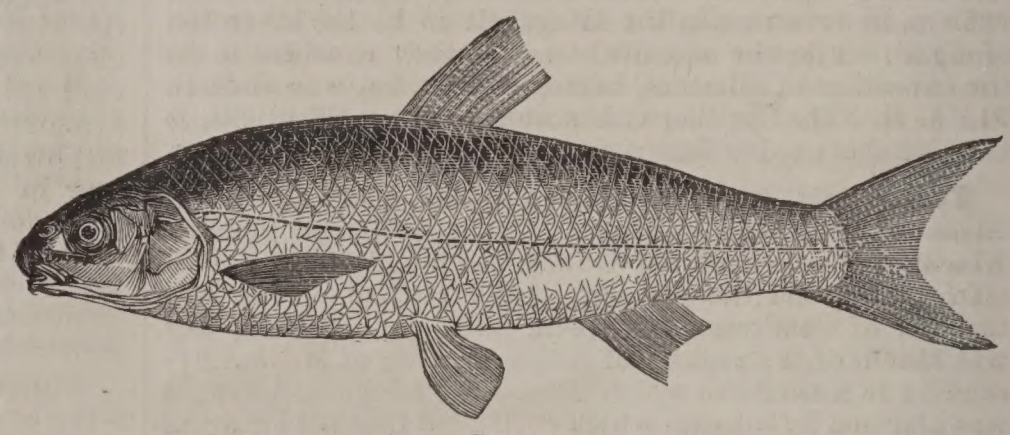
Daboll′ (Nathan), born about 1750, was the author of "Daboll's Arithmetic" (formerly very famous), and also a treatise on navigation. He was a teacher of Connecticut. Died at Groton, Conn., Mar. 9, 1818.—C. L. Daboll, his son, was the inventor of the fog-trumpet. He died Oct. 13, 1866.

Da Ca′po [It., *da,* "from," and *capo,* "head," "beginning"], a musical term, abbreviated thus, D. C., is an instruction to the performer in such airs as end with the first strain to return to the beginning and repeat the first part.

Dac′ca, one of the divisions into which the province of Bengal in British India is divided. Area, 21,418 square miles. Pop. in 1872, 9,317,777. It is divided into five districts, one of which is called Dacca. The district of Dacca forms part of the delta of the Ganges and Brahmapootra. It extends from lat. 23° 12′ to 24° 17′ N., and from lon. 90° 11′ to 90° 58′ E. Area, 2897 square miles. The surface is low and level; the soil is well adapted to the production of rice. Capital, Dacca. Pop. in 1872, 1,853,416.

Dacca, a city, the capital of the above district, is in Bengal, on the Burha Gunga, a navigable stream connected with the Ganges, 127 miles N. E. of Calcutta. It was once a populous city, but its prosperity has declined. It contains several ruined palaces, 180 mosques, 119 pagodas or Hindoo temples, a government college, and several hospitals. Dacca was formerly celebrated for the manufacture of fine muslins, poetically termed "evening dew" and "flowing water." This manufacture is now extinct. Magnificent ruins of palaces, bridges, caravanserais, etc. are visible here. Pop. about 70,000.

Dace, a fish of the family Cyprinidæ, of the same genus (*Leuciscus*) with the roach, and not unlike it in form; the mouth is larger and the scales smaller. The upper parts



Dace.

are dusky blue, shading into white on the belly; the cheek and gill-covers are silvery white. Its flesh is not greatly esteemed. Dace are gregarious, swimming in shoals, and spawning in June. There are several species which inhabit clear, quiet streams, and are found in various parts of Europe and the U. S. Some of the American species are assigned to other allied genera.

Dace′lo [an anagram of *alcedo,* a "kingfisher"], a genus of Australian kingfishers, of which several species have been observed. Of these, the best known is the *Dacelo gigas,* or "laughing jackass," a rather large and handsome bird of New South Wales. It takes its popular name from its harsh, dissonant cry, which greatly resembles the so-called laugh of the hyæna, and is not altogether unlike the bray of the ass. This cry is uttered at early dawn. The bird inhabits hollow trees, and feeds upon fish, reptiles, insects, etc.

Dacelo gigas, or "Laughing jackass."

Da′ci, also called **Ge′tæ,** an ancient barbarous people who inhabited Dacia. They are supposed to have emigrated from Thrace to Dacia before the time of Alexander the Great. Their name, "Getæ," is thought by critics to be identical with "Gothi" or Goths. If this opinion is correct, the Daci were a Germanic people.

Da′cia, a former country of Europe, was occupied by the Daci, a warlike people. It was bounded on the N. by the Carpathian Mountains, and on the S. by the Danube. The Dacians waged against the Romans a long defensive war which began in 10 B. C., when Augustus sent an army to conquer them. In the reign of Domitian they compelled the Romans to pay tribute. Trajan conquered Dacia, and reduced it to a Roman province in 106 A. D. It was formally relinquished by Hadrian (117–138) on his accession to power, and yet remained under Roman masters till the time of Aurelian (270–275), when the Romans finally withdrew within the Danube, leaving the country to the Goths. This province comprised the eastern part of Hungary, Transylvania, Moldavia, and Wallachia.

Dacier (Anne Lefèvre), a learned French lady, the wife of André Dacier, was born at Saumur in Mar., 1654.

She was instructed in Greek and Latin by her father, the learned Tannegui Lefèvre, became a resident of Paris in 1672, and was employed by the duke of Montausier to edit several Latin authors for the use of the dauphin. She was married to André Dacier (1651–1722), librarian of the king, the translator of Plutarch, and editor of the Delphine Horace, etc., in 1683. She produced French translations of Anacreon (1681), of Terence, of Homer's "Iliad" (1699), and of the "Odyssey" (1708). As an enthusiastic admirer of Homer and other ancient poets, she was engaged in a famous controversy with La Mothe, and wrote her "Traité de cause de la corruption du goût." (See BURETTE, "Éloge de Mme. Dacier.") Died Aug. 17, 1720.

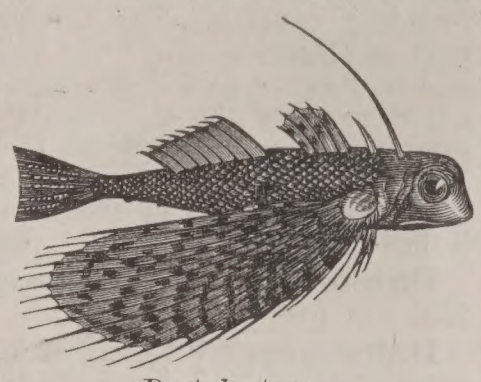
Da Cos'ta (J. M.), M. D., an eminent American physician, was born in the island of St. Thomas, in the West Indies, Feb. 7, 1833, and received his medical education at Philadelphia and in Europe. He became professor of the practice of medicine at the Jefferson College in Philadelphia in 1872. He has published, besides other works, an excellent treatise on "Medical Diagnosis" (3d ed. 1872).

Dacota. See DAKOTA, by L. P. BROCKETT, M. D.

Dac'tyl [from the Gr. δάκτυλος, a "finger," because, like the dactyl, a finger has one longer and two shorter parts], the name of a metrical foot in Greek and Latin poetry, consisting of a long and two short syllables, as *cārmĭnă*. The term is also applied in the English and other languages to a foot or measure consisting of one accented and two unaccented syllables, as *destiny*. In Latin hexameters the next to the last foot is almost always a dactyl.

Dactylology. See DEAF AND DUMB.

Dactylop'terus [from the Gr. δάκτυλος, a "finger," and πτερόν, a "wing"], a genus of acanthopterygian fishes of the family Triglidæ, remarkable for the great development of the pectoral fins. The beautifully-colored species *Dactylopterus orientalis* (commonly known as the Indian flying gurnard) is found throughout the Indian Ocean and Archipelago. It is very striking in form, having large pectoral fins and two curved spines (or filaments) between the head and dorsal fin, the foremost of which is much elongated. Shoals of this fish are often seen flying above the surface of the water, and occasionally touching the summits of the highest waves.



Dactylopterus.

Dac'tylos [Gr. δάκτυλος, a "finger"], a finger's breadth, an ancient Greek measure, equal to 0.7586 inches.

Da'cusville, a post-township of Pickens co., S. C. Pop. 1356.

Dadd (GEORGE H.), M. D., a veterinary surgeon, born in England in 1813, removed to the U. S. in 1839, and became well known as a writer upon veterinary science and kindred topics.

Dade, a county which forms the S. extremity of the mainland of Florida, comprising also a part of the "keys" or islands. Area, 4400 square miles. The surface is low and level, and mostly occupied by the Everglades, in which multitudes of small islands are interspersed in an expanse of shallow water. Capital, Biscayne. Pop. 85.

Dade, a county which forms the N. W. extremity of Georgia. Area, 160 square miles. The surface is finely diversified by valleys, and by mountains called Lookout Mountain and Missionary Ridge. Grain and wool are the chief products. It is intersected by the Alabama and Chattanooga R. R. Capital, Trenton. Pop. 3033.

Dade, a county in the S. W. of Missouri. Area, 498 square miles. It is intersected by Sac River, an affluent of the Osage. The surface is undulating; the soil is fertile. Cattle, grain, tobacco, and wool are produced. Capital, Greenfield. Pop. 8683.

Dadeville, a post-village, capital of Tallapoosa co., Ala., 50 miles N. E. of Montgomery, on the Savannah and Memphis R. R., 30 miles N. W. of Opelika. It has a mineral spring, two weekly newspapers, a female institute, and other schools. Pop. of township, 1266.

J. M. OLIVER, ED. AND PROP. "TALLAPOOSA NEWS."

Da'do, an Italian word signifying a "die," is applied in architecture to the cubic block which forms the body of a pedestal, and is between the base and the cornice. The term is also applied to the wainscoting of a room.

Dæd'alus [Gr. Δαίδαλος], a personage of Greek mythology, was celebrated as an inventor and mechanical genius. He was the reputed inventor of the auger, saw, and other tools. According to tradition, he built the Labyrinth of Crete, the temple of Apollo at Cumæ, and fabricated wings with which he flew from Crete to Sicily. He was the father of ICARUS (which see).

Dædălus of Sicyon, son and pupil of Patrocles, himself a distinguished artist, flourished about 400 B. C. He made for the Eleans, after their victory over the Lacedæmonians, the trophy which they erected in the grove Altis. Besides this he fashioned statues of several athletes, a Victory, and others enumerated by Pausanias.

HENRY DRISLER.

Daet, a town of Luzon, one of the Philippine Islands, capital of the province of North Camarines, is about 140 miles S. E. of Manila. Pop. about 7500.

Daf'fodil [Gr. ἀσφόδελος; Lat. *asphodelus*], the English name of those species of *Narcissus* which have a large bell-shaped corona. The common daffodil (*Narcissus Pseudo-narcissus*) is a native of England, having showy yellow flowers. Another species, called *Narcissus minor*, is cultivated in gardens for the sake of the flowers, which open early in spring.

Dagg (JOHN LEADLEY), D. D., LL.D., born in Middleburg, Va., Feb. 13, 1794, pastor of the Fifth Baptist church, Philadelphia (1825–34), principal of Alabama Female Athenæum (1836–44), president of Mercer University (1844–54), and professor of systematic theology to 1856. He is author of "A Manual of Theology," "Church Order," "Moral Science," used as a text-book in several colleges, "Evidences of Christianity," etc.—all valuable and popular works.

Dag'gett (DAVID), LL.D., an able American lawyer and jurist, born at Attleborough, Mass., Dec. 31, 1764. He was a Senator of the U. S. from 1813 to 1819, and was appointed in 1826 Kent professor of law at Yale College, of which he was a graduate. He became chief-justice of Connecticut in 1832. Died April 12, 1851.

Daggett (OLIVER ELLSWORTH), D. D., an American scholar and divine, son of David, noticed above, born Jan. 14, 1810, at New Haven, Conn., graduated at Yale College (1828), ordained pastor of the South church, Hartford, Conn. (April 12, 1837), pastor of the First Congregational church, Canandaigua, N. Y., nearly twenty-three years, afterwards was professor of divinity in Yale College about three years, and is now pastor of the Second Congregational church, New London, Conn.; author of several printed sermons, of many articles in the "New Englander," and also one of the compilers of the "Connecticut Hymn-Book," issued in 1845.

Daghestan' [from the Persian *dagh*, "mountain," and *stan*, "country"], a province of Russia, extends along the western coast of the Caspian Sea, from lat. 41° to 43° N., and is mostly between lon. 46° and 50° E. It is bounded on the S. W. by the Caucasus Mountains, and the surface is generally mountainous. Area, 11,039 square miles. Chief town, Derbend. The country belonged to Persia until 1812, when it was ceded to Russia, but the Russian rule was not fully established until the submission of Schamyl in 1859. Pop. 449,096.

Dag'obert [Lat. *Dagobertus*] **I.,** king of the Franks, born about 602 A. D., succeeded his father, Clotaire II., in 628. He died in 638, leaving two sons, Sigebert, king of Austrasia, and Clovis II. of Neustria.

Da'göe, or **Da'go,** an island of Russia, in the Baltic Sea, is a part of Esthonia, and is separated from the island of Oesel by the narrow Sele-Sund. It is nearly 34 miles long and 15 miles wide. Area, 234 square miles. Its soil is not fertile. The inhabitants (partly Swedish and partly Esthonian) number about 10,000. There are forests upon the island. The exports are fish, and cattle of a small and peculiar breed.

Da'gon [a diminutive of endearment, and apparently masculine, from the Hebrew *dag*, "a fish"], a Philistine god, human down to the waist, with the tail of a fish; embodying the idea of fertility. The Phœnicians also had a fish-god, Dagon. The identity of the Assyrian Dagan with the Phœnician Dagon, affirmed by some, is denied by others.

Dags'borough, a hundred and post-village of Sussex co., Del. The village is about 12 miles S. E. of Georgetown. Total pop. 2599.

Daguerre (LOUIS JACQUES MANDÉ), the inventor of the daguerreotype, was born at Cormeilles in 1789. He became a skilful scene-painter, and was one of the inventors of the diorama. Daguerre and Niepce (1765–1833) began to make experiments in photography conjointly in 1826. After the death of Niepce, Daguerre succeeded in forming indelible images on metallic plates by the chemical action of light. He continued to make improvements in photography. Died July 12, 1851.

Dagueˊreotype [named from Daguerre, its inventor], the first successful (now obsolete) form of the photograph. A polished plate of silvered metal was exposed in darkness to the vapor of iodine mixed with bromine, or of iodine alone, until it took a reddish-yellow tint. It was then exposed to the luminous image of the camera, and quickly transferred to a dark room. Here the plate (on which no image was visible) was exposed to vapor of mercury, which brought out the figure by blending with that part of the surface which had been affected by the light in the camera. Next the plate was washed in a solution of hyposulphite of soda, which removed the unaltered iodobromide of silver, and left the picture untouched. The principles involved are discussed under PHOTOGRAPHY, by PROF. C. F. CHANDLER, PH. D., LL.D. (which see).

Daguscahonˊda, a post-village of Elk co., Pa., is at the junction of the Daguscahonda R. R. with the Philadelphia and Erie R. R., 5 miles W. of St. Mary's. There are coal-mines in the vicinity.

Dahlˊen, a town of Germany in the Prussian Rhine province, in the circle of Geldern, has extensive manufactures. Pop. in 1871, 6162.

Dahlˊgreen, a township of Carver co., Minn. Pop. 1303.

Dahlˊgren (JOHN A.), U. S. N., born Nov. 13, 1809, in Philadelphia, entered the navy as a midshipman Feb. 1, 1826, became a passed midshipman in 1832, a lieutenant in 1837, a commander in 1855, a captain in 1862, and a rear-admiral in 1863. On the 22d of April, 1861, through the abandonment of his trust by Capt. Franklin Buchanan, Dahlgren, then on ordnance duty, became commandant of the U. S. navy-yard, Washington, and to his firmness and sound judgment at that crisis the government was indebted for the preservation of the yard from falling into the hands of the Confederates. In the fall of 1862 Dahlgren was detached from the navy-yard, and appointed chief of the bureau of ordnance, and in June, 1863, became commander-in-chief of the South Atlantic blockading squadron, relieving Rear-Admiral S. F. Dupont of that command in the harbor of Port Royal, S. C., July 6, 1863. He at once commenced active operations in conjunction with Gen. Gillmore, U. S. A., which speedily resulted in the possession of the greater part of Morris Island and the silencing of Fort Sumter, and secured a safe anchorage for the monitors inside the bar of Charleston, thus effectually putting a stop to the blockade-running which had been before so successfully practised, and reducing Charleston to a place of no importance for the rest of the war. After the fall of Charleston in 1865, Dahlgren resigned his command, and in 1866 was appointed commander-in-chief of the South Pacific squadron, in the discharge of which duty he remained for two years. In 1868 he was a second time appointed chief of the bureau of ordnance, from which station he was relieved at his own request in 1870, and ordered to the command of the navy-yard at Washington, where he died July 12, 1870.

Rear-Admiral Dahlgren was a man of most exemplary character, of great personal bravery, and of rare ability. He is the author of the following works, viz.: "Exercise and Manœuvre for the Boat Howitzer U. S. N." (1852), "System of Boat Armament U. S. N." (1852), "Ordnance Memoranda" (1853), "Shells and Shell-guns" (1856); and it is mainly to his labors that the navy is indebted for the great improvement in its ordnance which has taken place since 1840. The 9-inch and 11-inch Dahlgren "smooth-bores" are still the favorites of American seamen, and for lightness, range, and accuracy combined the Dahlgren howitzer is unsurpassed by any boat-gun in the world.

FOXHALL A. PARKER, U. S. N.

Dahlgren (ULRIC), an American officer, born in 1842, was a son of Rear-Admiral Dahlgren. He was aide-de-camp to Gens. Burnside and Hooker, distinguished himself by several acts of gallantry, and lost a leg at Hagerstown in July, 1863. He commanded a body of cavalry in a raid against Richmond, the outer works of which he assaulted. During the retreat from that city he was killed Mar. 4, 1864.

Dahlˊgren Gun [named from Admiral Dahlgren, its inventor], an improved form of ordnance used for howitzers, heavy artillery, and especially in naval gunnery. It having been demonstrated that in ordinary cast guns the weight of the metal forward is greater than is needed, and that by far the greatest strain in firing is at the breech, Dahlgren greatly increased the relative size and weight of the breech, with the best results. These guns are chiefly used by the U. S. forces.

Dahˊlia [named in honor of Andrew Dahl, a Swedish botanist], a genus of plants of the order Compositæ and sub-order Tubuliforæ. They are natives of Mexico, and the numerous varieties cultivated are chiefly derived from two species—*Dahlia coccinea* and *Dahlia variabilis*. New varieties are easily obtained by the artificial fecundation of one with the pollen of another. Dahlias have recently become very popular, being conspicuous for their varied and exquisite colors and regularity of form. The tuberous roots of these plants, although not agreeable in taste, are used as food in Mexico. A light and moderately rich soil, with plentiful moisture, appears to be best adapted to the cultivation of dahlias.

Dahlˊmann (FRIEDRICH CHRISTOPH), a German historian, born at Wismar May 13, 1785. He became in 1822 professor of history at Kiel, in 1829 professor of political economy in Göttingen, and was in 1837, on account of his protest against the abolition of the fundamental law by King Ernest Augustus, deprived of his chair. In 1842 he was appointed professor of history at Bonn. In 1848 he was one of the leaders of the constitutional party. His chief works are a "History of Denmark" (3 vols., 1840–43), a "History of the English Revolution" (6th ed. 1864), and a "History of the French Revolution" (3d ed. 1864). A biography of Dahlmann has been published by Springer (1870). Died Dec. 5, 1860.

Dahloneˊga, a post-village, capital of Lumpkin co., Ga., is on a hill about 66 miles N. N. E. of Atlanta. Gold-mines have been opened in the vicinity. Here was before the war a branch mint of the U. S.; the building has recently been converted into the North Georgia Agricultural College, attended by 125 students. The village has one weekly newspaper. Pop. 471. The name of Dahlonega is a compound of Indian and English. When gold was first discovered here the Indians flocked in from the surrounding country. The Cherokees then inhabited this part of Georgia. *Nega* was the Indian word for yellow, and they called gold *dalla-nega*, yellow dollar, putting the adjective after the substantive. The village that soon grew up here in the midst of the gold-region took the Indian name of Dalla-nega; the spelling, however, was afterwards changed by the introduction of the *h* and *o*, as it now stands. Pop. 471. ED. "MOUNTAIN SIGNAL."

Dahlonega, a post-township of Wapello co., Ia. Pop. 623.

Dahoˊmey, a kingdom of Western Africa, in Guinea, is bounded on the S. by the Gulf of Guinea, and partly on the W. by the river Volta, which separates it from Ashantee. Its limits are not exactly defined. Area, estimated at about 4000 square miles. The surface is generally level, but the northern part is diversified by hills, which are covered with luxuriant forests. The soil is fertile. Maize, cotton, sugar, yams, tobacco, beans, pease, and manioc are cultivated here. The cocoa-nut tree and other species of palm flourish. Among the wild animals are lions, tigers, and elephants. The people are pagans. The tiger is the principal fetish. The Dahomans are bloodthirsty and abject, but hospitable and courageous. They can only approach their despot by crawling with their faces in the dust. The monarch once a year sprinkles his ancestors' graves with human blood. No one can take a wife except by gift or purchase from the sovereign. At the death of a king the multitude of wives in his seraglio set to butchering one another till checked by the successor. The king has a standing army of about 6000 female warriors. Capital, Abomey. Pop. about 180,000. (See FORBES, "Missions to Dahomey," 1851; BURTON, "A Mission to Dahomey," 1864.)

Daimiel, a town of Spain, in the province of Ciudad Real, 20 miles E. N. E. of the city of Ciudad Real. It has a Gothic church, a town-hall, and a hospital; also manufactures of linen and woollen fabrics and blond lace. Pop. 12,500.

Daimio, dīˊme-o, the title of the feudal lords of Japan. They are 264 in number, and have exercised in their own districts the powers of petty sovereigns. Eighteen of these daimios were virtually independent within their own dominions, and hence arose many impediments to the intercourse of the Japanese with Europeans. The recent revolution in Japan brings this old feudalism to an end. (See JAPAN.)

Daingerfield, a post-village of Titus co., Tex., 17 miles S. E. of Mount Pleasant. It has one weekly and one monthly newspaper. Pop. 272.

Daiˊry [supposed to be derived from an old English word, *dey* or *day*, "milk"], the department of farming which includes the production of milk; also the house or apartment where milk is kept, and where butter, cheese, etc. are manufactured. (See BUTTER, by PROF. C. F. CHANDLER, PH. D., LL.D., and CHEESE.)

Daˊis [Fr. *dais*, a "canopy;" It. *desco;* probably akin to the Ger. *Tisch*, a "table"], in architecture, the platform

at the upper end of a dining-hall where stood the table for distinguished guests; also the canopied seat for those who sat there. Mediæval writers used this word with considerable latitude, one of its significations being a canopy over a shrine or statue.

Dai'sy [from the Anglo-Saxon *dæges-age, i. e.* "day's eye"], a genus (*Bellis*) of small perennial plants of the order Compositæ. The daisy is a native of Europe, and very common in Great Britain, where its delicate crimson-tipped flower has been immortalized by Burns and other poets. The variety called "hen and chickens" has the main flower-heads surrounded by smaller ones, with short stems growing from the summit of the scape. New and very beautiful varieties have lately been introduced by the florists. In Scotland this flower is called gowan. A few species of *Bellis* have been discovered in the S. W. portion of the U. S.

Dako'ta, a Territory of the U. S., in the N. central portion of the Union, lying W. of the Red River of the North, and bisected diagonally by the Missouri River. It lies between the parallels of 41° 40′ and 49° N. lat., and between the meridians of 96° 25′ and 104° W. lon. from Greenwich. The greater part of its southern boundary lies along the parallel of 42° 30′, but at its S. E. extremity it extends southward to the mouth of the Big Sioux River. The Territory is bounded on the N. by British America, and in part by the new province of Manitoba; on the E. by the States of Minnesota and Iowa; on the S. by Nebraska; and on the W. by the Territories of Wyoming and Montana. Its greatest length is 414 miles, and its greatest width 360 miles. Its area is 150,932 square miles, or 96,595,840 acres, including a detached portion, 2000 square miles in area, lying W. of Wyoming Territory.

Face of the Country.—The Missouri River traverses the whole Territory nearly from N. W. to S. E., and with its many tributaries—of which the Big Sioux, Vermilion, and Dakota on the E. side, and the Niobrara, which forms part of the southern boundary, the White (or, as it is sometimes called, the White Earth) River, the Wakpashicha or Bad River, the Big Cheyenne or Good River, the Moreau River, the Ree or Grand River, Heart River, and Little Missouri on the W. side—drains the greater part of the Territory, and furnishes more than 1000 miles of steamboat navigation. The Red River of the North forms the eastern boundary of the Territory for 200 miles, and discharges its waters through Lake Winnipeg into Nelson's River and Hudson's Bay. It has numerous small tributaries in Dakota, but except the Pembina, which drains the north-eastern portion of the Territory, they are mostly small. The only other considerable streams not connected with the Missouri or its affluents are the Little Souris or Mouse River, an inlet or tributary of Souris Lake, and the stream which connects the Turtle Lakes with Minnewakan or Devil's Lake. The whole region E. and N. of the Missouri River is studded with great numbers of small lakes. The largest of these is Minnewakan or the Devil's Lake, the waters of which are brackish, though liked by the buffaloes. It has an area of about 400 square miles. Tchanchikahah, Long Lake, Big Stone Lake, Lake Traverse, Wood Lake, the Turtle Lakes, Lake Kampeshka, and several others are considerable bodies of water. The surface of the Territory is greatly varied. In the south-eastern portion is a plateau or range of highlands which attains at its highest point an elevation of 2046 feet above the sea. This is called the Coteau des Prairies. W. of this, but with a considerable depression between (the valley of the Dakota River), is another range of highlands, known as the Coteau de Missouri. This extends to the banks of the Missouri, which in Central Dakota is 1300 feet or more above the sea. Northward of the Coteau des Prairies extends for 200 miles the valley of the Red River of the North, about forty or fifty miles in width, and sloping northward, from an elevation of about 1000 or 1100 feet at Breckenridge to 700 or 800 feet at Pembina. W. of this, another plateau, somewhat higher and not quite so fertile, extends to the western line of the Territory, and indeed to the foot-hills of the Rocky Mountains in Montana. W. of the Missouri the country rises gradually, and in the S. W. culminates in the Black Hills, an outlying range of the Rocky Mountains, in which, however, there are no considerable summits in the Territory. In the extreme southern and south-western portion lying between the Big Cheyenne and the White River is a large tract extending into N. W. Nebraska, known as Les Mauvaises Terres or the Bad Lands, perfectly sterile, and furrowed and ridged, by the action of water-currents upon the blue clay, into the most fantastic forms.

It will be seen then that nearly the entire surface of the country is composed of plateaus of greater or less elevation, but none of them so high as those of Wyoming and Colorado. Scattered over these plateaus are numerous isolated buttes (peaks or summits), usually not rising more than from 500 to 1500 feet above the plains; these buttes have received the most fanciful names, such as Dog's Ears, Deer's Ears, Eagle's Nest, Bull Butte, Maison du Chien (House of the Dog), Slim Butte, White Clay Butte, etc. etc.

Although a large portion of the surface of this Territory consists of prairie, there is a supply of timber sufficient for the use of settlers in nearly every locality, and the margins of most of the rivers are fringed with a fine growth of different varieties of forest trees. In the neighborhood of the Black Hills extensive forests of excellent pine and other timber are found.

The basin of the Red River of the North consists mostly of open grassy plains, affording an abundant and nutritious pasturage through a great portion of the year, and with little labor and expense an ample supply of food may be secured for the keeping of live-stock during the severe winters of this high northern latitude. This region has long been noted for its extensive fur-trade, and although its agricultural capacities are of the highest order, the aversion of the fur-traders and trappers to the extension of the settlements has hitherto prevented the immigration which would otherwise doubtless have tended towards this favored portion of the Territory.

The climate of Southern Dakota is comparatively mild, but in the northern portions the winters are long and severe. The annual precipitation of moisture is twenty inches, and so distributed throughout the year as to be amply sufficient for the perfect maturity of the crops.

The climate and soil of Dakota are exceedingly favorable to the growth of wheat, corn, and other cereals, while all of the fruits and vegetables raised in the Northern States are here produced in the greatest perfection.

Geology and Mineralogy.—The geology of Dakota is very simple. The greater part of its surface-rocks belong to the cretaceous system and to formations still more recent. The only considerable exceptions are the valley of the Red River of the North, in which salt-springs and streams have been found, indicating that there the Silurian rocks had been reached, as all known salt-springs in the U. S. issue from that formation; and the region of the Black Hills, in which are found gold, silver, copper, coal, iron, salt, and petroleum, showing that it belongs to the earlier systems. Prof. F. V. Hayden in 1867 made a careful survey of these hills, and found that coming from the cretaceous rocks there was, first, a belt of three or four miles in width, surrounding the whole mass of Jurassic rocks; within this a similar belt of carboniferous rocks; then a somewhat narrower belt of granitic and metamorphic rocks; and that the interior mass, a tract forty by sixty-five miles in extent, was wholly, on its surface, of the Potsdam sandstone formation. Some of the summits in this tract attain a height of 6500 feet. The upheaval of the region of which Dakota forms a part began in the N. E., in the valley of the Red River, and continued towards the S. W., though probably the Black Hills emerged from the flood before some of the intervening lands. From the Red River of the North we pass S. W. over a broad cretaceous belt, and enter a newer formation when we cross the Missouri. This is the tertiary, and nearly one-half of Dakota is found to be no older than the tertiary belt along the Atlantic and Gulf, and not so old as most of the Pacific slope. The part known as the Bad Lands, W. of the Missouri and extending into Wyoming, belongs to the tertiary group of the cenozoic system. There is a desolate geological sepulchre. The fossils are most interesting and remarkable. The surface has been cut by aqueous agencies into columns and buttresses, monumental domes, and massive walls with cathedral majesty. These are filled with fossil skulls, jaws, teeth, and thigh-bones of various races of mammals of which scarce a single specimen is familiar to the anatomist of the present day. The region in its other characteristics is forbidding. The water is brackish and very bad. The earth is burned by the sun in summer, arid, ashy, and almost of chalky whiteness. It is a treeless waste, in winter the abode of snow and tireless storms—a domain of death and desolation. About the Yellowstone River was the last of the inland seas to be drained, and the most recent geological formations and fossils are there found. Eastern Dakota belongs mainly to the cretaceous age. At Sioux Falls, however, there is an upheaval of azoic rocks, over which the Sioux River passes, descending 100 feet in about half a mile. This rock is now known under the name of Sioux quartzite. It is very hard, being one of the most perfectly metamorphosed rocks known to science. It is from a rosy to a flesh-red color. At Sioux Falls it is nearly horizontal, dipping at a very slight angle to the S. or S. W. The river at this point flows nearly due N. by a long S-shaped curve. Neither the upper nor lower limit or surface of the rock has been accurately determined,

but the facts known show it to be 400 feet in thickness, and it may be much more. It is also found at the N. W. point of Iowa, and at places E. and N. E. of Sioux Falls. It also appears at intervals W. of these for fifty miles, and is largely exposed on the Dakota River in township 101, of range 58 W. It was metamorphosed from a pure sand by powerful igneous agency. The red pipestone of the Indians was changed at the same time from small pockets or drifts of fine pure clay, lying between the larger masses of sand, and both received their color from iron. A reddish-colored sandstone is found in large amount along the Dakota River for many miles, but does not appear until about twenty-five miles above Yankton. It is abundant, easily quarried and wrought, and very useful for all building purposes. The Sioux quartzite is strictly an unstratified rock, but is divided often quite regularly by transverse lateral and vertical rifts. It breaks by reason of these into rough blocks and slabs, rendering it available for most substantial and enduring building. It cannot be finely dressed, but is proof against time and elemental erosion. In the absence of hard limestones and other stratified economical rocks it must become valuable for foundations, exposed walls, and heavy substructures. Along the Missouri, and particularly at Yankton and above, is the chalk-rock, as it is commonly called. It is a soft, white, or blue-tinted impure carbonate of lime. It has some other alkalies in its composition. It appears in considerable amount in the hills along Clay and Turkey creeks, in the north-eastern parts of Yankton county. When exposed to water and freezing on the surface of the ground it decomposes slowly, and is slaked to a fine impalpable powder, and when wet has a soft and soapy feel. It does not produce good lime. It has, however, been employed considerably in building, and is durable when placed above the ground upon good foundations. Fossil fishes and shells, with sharks' teeth in great numbers, are found in the chalk-rock and the dark-red sandstone on the Dakota River, while the Sioux quartzite is clearly without fossils of any kind. From Sioux Falls to the edge of the chalk-rock, in Yankton county, is not more than fifty miles, while the cretaceous formation extends eastward into Iowa for some distance. Between these is included—in theory at least—the Silurian, Devonian, and carboniferous systems. We are, therefore, not denied the hope of discovering coal. But over the whole area is spread the deep drift formation, with a gently undulating prairie surface, which has no precipitous bluffs or deep ravines to expose the actual succession of rocks. Only in the places mentioned do the rocks named appear at the surface, though search for coal is soon to be made by an organized company at Vermilion. They are preparing for deep boring at different points. It is feared, however, that the coal-bearing rocks are pinched out, as in North-western Iowa, and that coal may be found, if at all, only in detached and isolated outlying pockets. The valley of the Red River of the North is a very rich level or gently undulating region of the highest character for agriculture, and, more than any other part of the Territory, favored with timber and water. With many windings the general course of the river is N., and it receives numerous tributaries from Dakota, several of which are streams of good size. These have pure water, and along all of them are heavy belts of timber of hard varieties.

The mineralogy of Dakota has not been minutely studied. The cretaceous rocks yield most of the forms of hydraulic cement, and when burned make a lime of indifferent quality. The lignite-beds yield a fair quality of coal, though it has not yet been sufficiently tested to determine its relative value. The salt-springs of the Red River region produce a good and very pure salt. The Black Hills region forms a part of the Dakota Indian reservation, and there has been very little opportunity of studying the minerals *in situ*. It is known, however, that the various mineral forms of silver, copper, iron, quartz, and silica are plentiful in that region.

Climate.—The isothermal line of 70° average summer temperature—which is that of Philadelphia, Pittsburg, Chicago, and Southern Minnesota—passes through Central Dakota, crossing in the Territory the parallel of 47° N. lat. The isothermal for the winter temperature of those cities would pass very near the southern line of the Territory. The cold is sometimes severe in winter, but it is dry cold, and is more easily borne than a much higher temperature when damp and chilling. The climate is considerably milder on the same parallels than that of Minnesota, not being affected by the damp atmosphere from the great lakes. In Northern Dakota the winters are long, and there is considerable snowfall, but the spring opens about the 20th of March, and the vegetation comes forward rapidly, and all crops mature except the later and larger varieties of Indian corn. The heats of summer are much moderated by the elevation of the plateaus. Northern Dakota is an excellent resort for invalids not too far reduced. The rainfall does not usually exceed, throughout the Territory, twenty inches per annum, and from sixteen to eighteen inches of this fall during the summer months. Southern Dakota has a fine climate, and on its fruitful soil the cereals, potatoes, and other root crops are as successfully cultivated as anywhere on the continent. Small fruits, as strawberries, raspberries, whortleberries, cranberries, plums, grapes, etc., grow wild in great profusion, and when cultivated yield astonishing crops. The soil of the Red River region is rich and fertile, as is that of Southern Dakota. The Bad Lands are sterile, and, unless they possess mineral wealth, will hardly prove very profitable. There is good land around the Black Hills, as well as in North-western and Central Dakota, but there is a large admixture of gravel with some of it; yet the proportion of land which would yield good crops without irrigation is much larger than in most of the Western Territories.

Zoology, etc.—The wild animals are those of the eastern slope and plateaus E. of the Rocky Mountains generally, but they are found in much greater abundance than in most of the Territories. Dakota is the paradise of the trapper and hunter of furs, and most of the Indian tribes whose home is in the Territory are largely engaged in collecting furs. Pembina, in the extreme N. E. of the Territory, was for many years one of the most important settlements and trading-posts of the Hudson's Bay Company, and vast quantities of furs were shipped from it. The buffalo is now more abundant in Northern Dakota than anywhere else. The musk-ox sometimes, though rarely, appears there. The moose, elk, and one or two species of deer are found there. Of beasts of prey, the bears (both the black and cinnamon species) are plenty; the panther, wild-cat, lynx, wolf, badger, wolverene, pine and stone marten, the skunk, the mink, and several varieties of foxes, are the principal. Among smaller animals, there are the gopher, the prairie-dog, the rabbit, several species, squirrels of several species, and quite an army of the smaller rodents. The birds are essentially those of the Mississippi and Missouri valleys, and include a wide range, from the great eagles and vultures to the tiny humming-birds or the sad-voiced pewit. The rivers and lakes abound with fish, and reptiles are not wanting, though venomous ones are not abundant. The vegetation of Dakota Territory is not remarkable, though it is far from being a treeless region. The valley of the Red River of the North has its forests of hard-wood trees—the oak, hickory, beech, birch, maple, etc.; the other rivers have strips of timber along their banks, though generally of cottonwood or other inferior woods. Around the Black Hills there is a heavy growth of timber, mostly pine, spruce, and fir. In the Bad Lands there is no timber. In S. E. Dakota the settlers are planting many trees, which do well, and will eventually supply that region with abundant and valuable timber.

Agricultural Products—According to the census of 1870, there were in the Territory that year 302,376 acres of land taken up as farms, of which 42,645 were under cultivation and 259,731 used as pasturage or wood lands. The value of these farms was $2,085,265, and of farming implements, $142,612. The value of all farm products that year was $495,657; of animals slaughtered or sold for slaughter, $22,066. Home manufactures are put down at $1677; forest products at $700, market-garden products at $500, and wages paid to farm laborers at $71,156. The amount of wheat grown was 170,662 bushels, all but 202 bushels spring wheat; Indian corn, 133,140 bushels; oats, 114,327 bushels; barley, 4118 bushels; buckwheat, 179 bushels. The number of horses reported was 3243; of neat cattle, 56,724; of sheep, 1901 (evidently an error, as the wool produced the same year was stated at 8810 pounds); of swine, 2033; and the total value of live-stock was stated at $779,952. The amount of hay cured was 13,347 tons; of tobacco, not given; of sorghum syrup, 1230 gallons; of potatoes marketed, 50,177 bushels; peas and beans, 456 bushels; honey, 110 pounds; clover, grass, and flax seed not reported. The dairy products were butter, 209,735 pounds; cheese, 1850 pounds. These statistics represent very inadequately the present agricultural condition of Dakota. The extension of several railroad lines into the Territory has brought in a large influx of immigrants of the agricultural class, and it is safe to say that the agricultural products of 1873 were more than fourfold those of 1870.

Manufacturing Industry.—The report of manufactures in Dakota Territory is obviously very defective. Of fifteen counties, ten are returned as having no manufactures, probably from the negligence of the assistant marshals. The entire number of manufacturing establishments is 17, of which 15 reported an aggregate of 324 horse-power; they employed 91 hands—89 men and 2 boys; the amount of capital was $79,200; of wages paid, $21,106; of raw material used, $105,997; and of annual products, $178,570. Of these manufactories, 10 were saw-mills, employing 68 hands and $37,400 capital, paying $14,256 wages, using $32,772

worth of raw material, and producing $72,280 worth of lumber; 2 were flour or grist mills, employing 5 hands and $13,000 capital, paying $2450 wages, using $60,600 of raw material, and producing flour and meal to the value of $80,990; 2 were breweries, employing 7 hands and $12,000 capital, paying $1700 wages, using $5075 worth of raw material, and producing malt liquors valued at $9500; 2 were tin or sheet-iron ware factories, employing 4 hands and $14,000 capital, paying $900 wages, using $4050 of raw material, and producing goods worth $10,000; and 1 was a wheelwright-shop, employing 7 hands and $2800 capital, paying $1800 wages, using $3500 of raw material, and producing $5800 worth of work. The true report of manufactures in the Territory in 1873 would give nearly ten times these amounts.

Railroads.—It is only within the last two years and a half that any of the numerous projected railroad lines of this region have entered the Territory. There are now (Oct., 1873) three railroads which have penetrated Eastern Dakota—viz. the Northern Pacific, completed as far as Bismarck on the Missouri River, and graded a considerable distance farther. From Fargo, where it enters the Territory, to Bismarck, on the Missouri, is 196 miles nearly due W., and about on the parallel of 46° 52′ N. lat. From the Missouri westward its course will trend slightly to the N., crossing the 47th parallel on the meridian of 102° 30′, and continuing N. of that parallel till it approaches the Yellowstone River. The Dakota division of the Winona and St. Peter's Railway enters the Territory in about lat. 44° 42′, and running about 30 miles N. W., turns suddenly to the W. for 20 miles more to Lake Kampeshka on the Big Sioux River. The region through which it passes in Dakota has very few inhabitants, but it is a fine agricultural section. The Dakota Southern Railway extends from Sioux City, at the mouth of the Big Sioux River, the western terminus of several railways, to Yankton, the capital of Dakota, a distance of 61 miles. There are, then, about 308 miles of completed railway in the Territory. Aside from the farther prosecution of the Northern Pacific, which may be delayed for a time, the St. Paul and Pacific, whose road is now completed to Breckenridge on the Red River of the North, has two branches under way—one continuing up the valley of the Red River to Moorhead; the other in Minnesota to St. Vincent, nearly opposite Pembina. From Yankton railroads are projected in all directions—one to Sioux Falls, and thence into Minnesota; another along the valley of the Dakota River to connect with the Northern Pacific; another along the Missouri Valley to Fort Sully; another due E. into Iowa, and two S. into Nebraska. The sparse population of Dakota will prevent these and some other projected railways from being completed for some years, but eventually this Territory must be gridironed with railways in order to its development.

Finances.—In 1870 the total assessed value of real and personal estate in Dakota Territory was $2,924,489; the actual value, according to the estimates of the U. S. marshal and his deputies, was $5,599,752. That this valuation has greatly increased during the past three and a half years is unquestionable, but there are no existing data to show, accurately, the amount of the increase. The tax of 1870 was $13,867, the greater part a county tax. The debt of the counties was $5761. Since that time Yankton co. alone has bonded itself for $200,000 for the completion of the Southern Dakota Railway.

The *commerce* of Dakota is small, and mostly confined to the shipment of grain and stock by way of the Missouri River and its tributaries and the Southern Dakota Railway. From the Red River region there are shipments of furs to a considerable extent. The opening of the new railroads, and the demands for food, lumber, railroad ties, etc. along their route and by their employés, will develop this commerce healthily.

Banks.—There was in Jan., 1873, one national bank (at Yankton), with a capital of $50,000, and three private banking-houses. There are no savings banks, and no fire or life insurance companies.

Population.—The true population of Dakota, of all races, according to the census of 1870, was 40,501, of whom 12,887 were white, 94 colored, 27,520 Indians, of whom 1200 were out of tribal relations, and 26,320 were nomadic or belonged to various tribes not located. The greater part of these Indians were members of the different bands of the Dakotas or Sioux, the most formidable and warlike of all the northern tribes, though there are a few Mandans, Rees, Gros Ventres, and Assiniboines. The Territory was not organized till 1861, and a considerable portion was cut off in 1868 to aid in forming the Territory of Wyoming. The population of what now constitutes the Territory (except nomadic Indians) in 1860 was 4837. Of the 14,181 inhabitants, not Indians, in 1870, 9366 were natives of the U. S., and 4815 of foreign birth. Of those of foreign birth, 1218 were born in Great Britain and Ireland, 1179 in Norway, 906 in British America, 563 in Germany, 324 in Austria and Bohemia, 380 in Sweden, 115 in Denmark, and the remainder in the various smaller states of Europe and Spanish America. Of the entire population, 8878 were males and 5303 females; of the native population, 5562 were males and 3804 females; of the foreign, 3316 were males and 1499 females. Of the white population, 8255 were males and 4632 females. Of the whole population, 10,640 were over the age of ten years; of these, 7047 were males and 3593 females. Of these, 5887 were engaged in all classes of occupations, of whom 2522 (all males) were engaged in agriculture, 2704 (2562 males and 142 females) in professional and personal services, 204 (all males) in trade and transportation, 457 (439 males and 18 females) in manufacturing, mining, and mechanical industries. The density of the population, including Indians, for the whole Territory, was in 1870 about one person to 3.78 square miles. South-eastern Dakota is, however, settled much more thickly than this.

Education.—Notwithstanding its small and scattered population, Dakota has given much attention to education. In 1871 she had 31 school-houses, 36 schools, 53 teachers, and 1785 pupils, the entire number reported in the census as of school age; and of those of school age (5 to 21), 1767 were enrolled, and 1700 was the average attendance. In 1870 there were 35 educational institutions (34 of them public schools), with 52 teachers (48 of them in the public schools), and 1255 pupils, of whom 1223 were in the public schools. The total income of all the educational institutions was $9284, of which $8684 belonged to the public schools. Of the inhabitants ten years old and over, 1563 could not write, of whom 914 were whites, 31 colored, and 618 Indians. Of the whites, 709 were over twenty-one years of age, 91 from fifteen to twenty-one years, and 114 from ten to fifteen years; 411 of the whole number were females. There is an organized school system under the Territorial school law, with a superintendent and deputy-superintendent of public instruction, and county superintendents in 1872 in seven counties. There was reported in 1870 but one private or parochial school in the Territory, Dakota Hall at Yankton, under the direction of the Episcopal Church. There are no colleges, universities, professional or scientific schools.

Libraries.—In 1870 there were 5 public libraries reported, with 2788 volumes; 14 private libraries, with 6938 volumes; in all, 19 libraries, with 9726 volumes.

Newspapers.—There were in 1870 three weekly newspapers—two political and one miscellaneous—having an aggregate weekly circulation of 1652 copies, and an annual issue of 85,904 copies.

Churches.—In 1870 there were 17 churches of all denominations reported, 10 church edifices, with 2800 sittings, and church property valued at $16,300. The number has materially increased in the three and a half years since the census was taken. In 1870 there were 2 Baptist churches—no particulars reported; at the close of 1872 there was 1 association, 10 churches, 8 ministers, and 170 members. In 1870, 1 Congregational church was reported, 1 church edifice, 200 sittings, $5000 of property; in 1872 there were 9 churches, 5 ministers, 161 members, 380 children in Sabbath schools. In 1870 there were 2 Episcopal churches, 2 church edifices, with 350 sittings, and $4000 worth of church property; in 1872 there were four churches, 6 clergymen, 168 communicants, 99 children in Sabbath schools, 1 parochial school; contributions, $2750. In 1870 there were 3 Lutheran churches, 3 church edifices, 900 sittings, $2100 church property; in 1872 there were 11 churches, 6 ministers, and about 450 communicants. In 1870 there were 5 Methodist churches, 1 church edifice, 500 sittings, and $1200 of church property; in 1872 there were 19 churches, 15 ministers in full connection, 860 members, and church property valued at $7000. In 1870 there were 4 Roman Catholic congregations, 3 church edifices, 850 sittings, $4000 worth of church property; in 1872 there were 4 churches, 5 or 6 stations, 4 church edifices, 6 priests, and about 1500 adherent population.

Constitution, Courts, etc.—The Territorial constitutions are very similar to each other, and are generally intended to be temporary in their character, a convention forming a new constitution when the Territory is ready to become a State. In all cases the Territorial governor and secretary of state are appointed by the President of the U. S., as well as the chief-justice and assistant justices. The auditor, treasurer, and superintendent of public instruction are chosen by the qualified electors. In Dakota every male inhabitant, except Indians not taxed, idiots, and convicts, having attained the age of twenty-one years, and being a resident of the Territory, is entitled to vote and is eligible for office. There is a very good school law, and a militia law passed in 1867, under which a militia force of eight companies has been organized. The judicial power is vested in a supreme

court, district courts, and probate courts. There are three districts. The Territory is entitled to one delegate in Congress, who is elected by the people, and has the right to speak, but not to vote.

Counties.—It is difficult to ascertain how many organized counties there are in the Territory. The latest maps have forty-eight counties or more laid down, with their boundaries defined, but the census of 1870 gives but fourteen, and only thirteen of these voted in 1872. There are some white inhabitants in portions of the Territory not yet organized as counties. The Indian reservations in the Territory, including one which stretches into Montana, occupy 36,203,200 acres, or about three-eighths of the Territory—viz. the Yankton reservation, on the Missouri River, in the S. part of the Territory, 400,000 acres, for the Yankton Sioux; the Sisseton and Wahpeton reservation, of 1,241,600 acres, a triangular tract lying partly on Lake Traverse; another tract, of 345,600 acres, belonging to the same bands of Sioux at Minnewakan or Devil's Lake; a reservation of 25,000,000 for ten bands of Sioux, about 22,000 in all, lying in the S. W. part of the Territory, W. of the Missouri; the Ponca reservation, of 576,000 acres, near the mouth of the Niobrara; and the reservation of the Arickarees, Gros Ventres, and Mandans in the N. W., extending into Montana, and including 8,640,000 acres. The counties named in the census, all of them organized since 1861, were—Bonhomme, 608 inhabitants; Brookings, 163; Buffalo, 246; Charles Mix, 152; Clay, 2621; Deuel, 37; Hutchinson, 37; Jayne, 5; Lincoln, 712; Minnehaha, 355; Pembina, 1213; Todd, 337; Union, 3507; Yankton, 2097. The unorganized portion of the Territory in 1870 contained 2091 inhabitants. Of these counties, Jayne has either been relinquished or its name changed, while Turner, Armstrong, Moody, Richland, and perhaps one or two more, have been organized. The principal towns are Yankton, which has about 1500 inhabitants; Vermilion, Elk Point, Sioux Falls, Canton, Bonhomme, and in the N. Fargo and Pembina. In the unorganized part, Fort Sully and its vicinity, Fort Rice, and Fort Buford, all on the Missouri River, have a considerable population around them.

History.—Dakota is a portion of the old Missouri, or, earlier, the Louisiana Territory, ceded to the U. S. in 1803. It was first organized as a Territory Mar. 2, 1861, and then included the entire territory from the northern boundary of Nebraska, and W. thereof, from the forty-third parallel, to the line of British America, and from the western boundary of Minnesota to the Rocky Mountains. Subsequently (in 1863) the Territory of Idaho (now including both Idaho and Montana) was set off from it, and in 1868, by several exchanges, the present Territory of Wyoming was set off from Dakota. By these exchanges a tract of 2000 square miles, lying W. of Wyoming Territory, and between 44° and 44° 30′ N. lat., came into the possession of Dakota, and still remains a part of her territory, though separated from the remainder by the whole breadth of Wyoming. It is adjacent to the Yellowstone Park region. In 1862 the members of Little Crow's band of Sioux, having undertaken a marauding expedition into Minnesota, attacked Breckenridge in that State, a town at the junction of the Bois de Sioux and the Red River of the North, directly across the river from Fort Abercrombie in Dakota Territory, and having massacred the settlers at Breckenridge, crossed the river and laid siege to Fort Abercrombie, about Aug. 26. Early in September they made two assaults on the fort, but were repulsed with heavy loss, and were finally brought to bay at Wood's Lake, where they were utterly defeated, and many of the worst Indians taken prisoners, of whom thirty-eight were afterwards hung. In 1863 the Indians were again troublesome, and murdered about thirty Minnesota settlers; and it was resolved to punish them so thoroughly that they would not venture again upon such outrages. Accordingly, two expeditions were sent out—one under Gen. Sibley, with between 2000 and 3000 men, by way of Breckenridge and Fort Abercrombie, to Minnewakan or Devil's Lake, where the great body of hostile Indians were said to be gathered; the other, under command of Gen. Sully, to ascend the Missouri River from Sioux City, to cut off the retreat of the Indians whom Gen. Sibley should attack, and finally form a junction with him. Though this result was not accomplished, both expeditions were successful. Gen. Sibley had several engagements with the Indians in the latter part of July, 1863, and defeated and drove them to and across the Missouri. Gen. Sully was detained until the beginning of September from ascending the Missouri, but on the 3d of that month he encountered a large force of Indians at White Stone Hill, 130 miles above the Little Cheyenne River, a part of whom had been at the engagement with Sibley. He defeated them completely with heavy loss, and took 156 prisoners. Since that time the Sioux have been content to remain upon their reservations.

Governors of the Territory.

William Jayne.....1861–63	Andrew J. Faulk.....1866–69
Newton Edmonds.....1863–66	John A. Burbank.....1869–73

As a Territory, Dakota has no electoral vote.

L. P. Brockett.

Dakota, a county in the S. E. of Minnesota. Area, 570 square miles. It is bounded on the N. and N. E. by the Mississippi River, and on the N. W. by the Minnesota. The surface is undulating or nearly level; the soil is very fertile, and based on limestone. Extensive prairies occur here. Grain, wool, hay, butter, etc. are staple products. It is intersected by the Milwaukee and St. Paul and the Hastings and Dakota R. Rs. Capital, Hastings. Pop. 16,312.

Dakota, a county in the extreme N. E. of Nebraska. Area, 350 square miles. It is bounded on the N. and E. by the Missouri River. The surface is diversified by undulating prairies, and by numerous groves of hard timber. The soil is fertile. Cattle, grain, and hay are raised. Capital, Dakota. Pop. 2040.

Dakota, a post-village and township of Stephenson co., Ill. The village is on the Western Union R. R., 7 miles N. E. of Freeport. Pop. of township, 952.

Dakota, a post-village, capital of Humboldt co., Ia., on the Des Moines River, 15 miles N. of Fort Dodge. It has one weekly newspaper, two churches, a court-house, and flour and carriage manufactures. Humboldt College is 1 mile N. of the town. Pop. of village, 162; of Dakota township, 676.

J. Van Meter, Ed. "Independent."

Dakota, a post-twp. of Waushara co., Wis. Pop. 477.

Dakota City, the capital of Dakota co., Neb., is on the W. bank of the Missouri, 5 miles S. of Sioux City, Ia. It is the initial point of the Sioux City and Columbus R. R., and at the crossing of the Omaha and North-western and St. Paul and Northern Nebraska R. Rs. It contains a large brick court-house, the district land-office, two schools, one weekly newspaper, and two churches. Pop. 300; of township, 595. C. F. Bayha, Pub. "Mail."

Dako'ta In'dians, a race or collection of tribes or "bands" of American savages, often called **Sioux,** who inhabit Nebraska, Wyoming, Dakota, etc. Among these tribes are the Santees, Yanktons, Sissetons, Brulés, Minikanyes, Unkpapas, Ogalallahs, and Tetons. They formerly occupied the country as far E. as the Mississippi, which they ceded to the U. S. in 1851. The language of the Dakotas shows them to be of a different stock from most of the Indian tribes. The languages of the Assiniboines, the Pawnees, the Osages, the Comanches, the Crows, and others belong to the same class with the Dakota tongue. The name "Dakota" signifies the "allied." (See Riggs, "Dakota Grammar" and "Dictionary.")

Dakota River, Rivière à Jacques, or **James River,** rises in the N. E. part of Dakota. It flows nearly southward, and enters the Missouri River about 8 miles below Yankton. Its whole length is estimated at 600 miles.

Dal'amow, a city of India, in Oude, on the Ganges, 68 miles above Allahâbâd. It has two antique temples of Siva, and is reputed a holy place. Pop. about 10,000.

Dalaradia. See Dalriada.

Dal'berg, von (Karl Theodor Anton Maria), LL.D., a German prelate and author, born of a noble family at Herrnsheim Feb. 8, 1744. He became in 1802 archbishop of Mentz and arch-chancellor of the empire. Napoleon gave him in 1806 the title of prince-primate of the Confederation of the Rhine. He wrote, besides other works, "Contemplations on the Universe;" but in German literature his name is best known from the liberality he showed towards the young Schiller. Died Feb. 10, 1817.

Dalber'gia [named in honor of Nicholas Dalberg, a Swedish botanist], a genus of trees and shrubs of the order Leguminosæ, having pinnate leaves. The fruit is a flat membranous pod containing one to three seeds. All the species are natives of tropical climates, and several of them afford valuable timber. The wood of the sissoo of Bengal, the *Dalbergia Sissoo,* is extensively used and highly prized in India. The East Indian rosewood is the timber of *Dalbergia latifolia.*

Dale, a county in the S. E. of Alabama. Area, 740 square miles. It is intersected by the Choctawhatchee River. The soil is generally sandy, and covered by forests of pine. Cattle, corn, oats, rice, cotton, tobacco, and wool are produced. Capital, Newton. Pop. 11,325.

Dale, a township of McLean co., Ill. Pop. 1188.

Dale, a township of Chesterfield co., Va. Pop. 1803.

Dale, a township of Outagamie co., Wis. Pop. 991.

Dale (Richard), an American commodore, born near

Norfolk, Va., Nov. 6, 1756, entered the merchant service when only twelve years of age, serving until the commencement of the Revolution, when he was made a lieutenant in the marine service of Virginia. He was shortly after captured by an English vessel, and while confined on prison-ship his old companions, who surrounded him, influenced him to take sides with England, and he actually engaged on board a cruiser against his native State; he was wounded at an early day, and during his convalescence realized the error he had committed, and firmly resolved to stand by his own country in the future. He entered the U. S. navy in 1776 as midshipman, was captured in 1777, and confined in prison in London nearly two years, when he made his escape in disguise. He hastened to France, and embarked with Paul Jones, who soon made him a lieutenant of his own ship, and became much attached to him. In the action with the Serapis he greatly distinguished himself, and was wounded. Returning to this country in 1781, he was appointed a lieutenant in the U. S. navy, and while serving on the Trumbull he received his third wound, and was captured for the fourth time. In 1794 he was made a captain, and a commodore in 1801. He served in command of a squadron during the Tripolitan war, and on his return to the U. S. resigned in 1802. Died at Philadelphia Feb. 24, 1826.

Dalecar'lia (*i. e.* "the land of the men of the dales"), or **Dalarne,** a former province of Sweden, now forming the län or county of Kopparberg. It is famous for its beautiful mountain-scenery, its forests of pine, and its mines of iron and copper. The Dalecarlians are a brave and patriotic people, and as a reward for their fidelity they all have the privilege of taking the hand of the king of Sweden when they meet him. Area, 12,127 square miles. Pop. in 1869, 175,927.

Dale City, called also **Meyer's Mills,** a post-village of Summit township, Somerset co., Pa., 100 miles S. E. of Pittsburg, on the Pittsburg Washington and Baltimore R. R., is on the Casselman River, and contains one iron-foundry, two planing-mills, one flouring-mill, one stoneware manufactory, two newspapers, two banks, six churches, two hotels, furniture-works, etc.

SUHRIE & SMITH, PUBS. OF "INDEPENDENT."

Daleites, a body of Scotch Independents who were Calvinists and followers of David Dale (1739–1806), a benevolent manufacturer, the father-in-law of Robert Owen. The Daleites became affiliated with the Sandemanians for a time, but later were Independents. They never had more than one or two congregations.

Daleville, a post-township of Dale co., Ala. Pop. 997.

Dalf'sen, a town in Holland, on the Vecht, 4 miles E. of Zwolle. Pop. 5549.

Dalhou'sie, a seaport, capital of Restigouche co., New Brunswick, at the mouth of the Restigouche River. It ships large quantities of salmon, lumber, and lobsters. Pop. about 600.

Dalhousie, EARLS OF (1633), Barons Ramsay of Dalhousie (1619) and of Kerington (Scotland, 1633), Barons Panmure (United Kingdom, 1831).—FOX MAULE, eleventh earl, was born April 22, 1801. He became a Whig member of Parliament in 1835, and was secretary at war from July, 1846, to Feb., 1852. In April, 1852, he succeeded his father as Lord Panmure. He was minister of war in the cabinet of Lord Palmerston from 1855 to Feb., 1858. In 1860 he became earl of Dalhousie.

Dalhousie (JAMES ANDREW **Ramsay**), EARL and MARQUIS OF, a British statesman, born near Edinburgh April 22, 1812, was a son of the ninth earl of Dalhousie. He was returned to Parliament for Haddington by the Conservatives in 1837, and succeeded to the earldom on the death of his father in 1838. In 1845 he was appointed president of the board of trade by Sir Robert Peel. He was retained in that office by the Whig prime minister who came into power in 1846, and he became governor-general of India in 1847. His administration was successful, though his somewhat aggressive policy contributed to produce the mutiny of 1857. He annexed Pegu, Oude, the Punjâb, and Berar to the British dominions, and developed the resources of India by canals and other public works. In 1849 he was created marquis of Dalhousie. He returned to England in 1856, and died, without male issue, Dec. 19, 1860. (See ARNOLD, "History of the Marquis of Dalhousie's Administration of British India," 1863–64, 2 vols.)

Da'lias, a town of Spain, province of Almería, is about 4 miles from the sea and 20 miles W. S. W. of the city of Almería. It has mines of lead and antimony. Pop. 9414.

Dal'las, a county in W. Central Alabama. Area, 890 square miles. It is intersected by the navigable Alabama River, which is joined by the Cahawba in this county. The surface is uneven; the soil is fertile. Cotton, corn, rice, and oats are produced. It is traversed by the Alabama Central and the Selma Rome and Dalton R. Rs. Capital, Selma. Pop. 40,705.

Dallas, a county in S. W. Central Arkansas. Area, 850 square miles. It is bounded on the E. by the Saline and on the W. by the Washita River. Salt and other minerals are found. The surface is undulating; the soil is fertile. Cattle, maize, and cotton are produced. Capital, Princeton. Pop. 5707.

Dallas, a county in S. W. Central Iowa. Area, 576 square miles. It is traversed by the Des Moines and Raccoon rivers. The soil is fertile. Cattle, grain, wool, hay, butter, etc. are produced. It is intersected by the Des Moines Valley and the Chicago Rock Island and Pacific R. Rs. Capital, Adel. Pop. 12,019.

Dallas, a county in S. W. Central Missouri. Area, 576 square miles. It is intersected by the Niangua River. The surface is diversified by prairies and forests; the soil is fertile. Grain, tobacco, and wool are staple products. Limestone is found here. Capital, Buffalo. Pop. 8383.

Dallas, a county in the N. of Texas. Area, 900 square miles. It is intersected by the Trinity River, and also drained by the West Fork of that river. The soil is fertile. Cattle, grain, cotton, wool, and fruit are raised. It is intersected by the Houston and Texas Central R. R. Capital, Dallas. Pop. 13,314.

Dallas, a township of Calhoun co., Ark. Pop. 383.

Dallas, a post-village, capital of Polk co., Ark., is about 170 miles W. S. W. of Little Rock.

Dallas, a post-village, capital of Paulding co., Ga., is about 32 miles W. N. W. of Atlanta. Here occurred a battle between Gen. Sherman and Gen. Johnston in May, 1864.

Dallas, a township of Huntington co., Ind. Pop. 1483.

Dallas, a township of Dallas co., Ia. Pop. 338.

Dallas, a post-township of Marion co., Ia. Pop. 1066.

Dallas, a township of Taylor co., Ia. Pop. 604.

Dallas, a township and post-village of Clinton co., Mich., on the Detroit and Milwaukee R. R., 10 miles W. of St. John. Total pop. 1360.

Dallas, a township of De Kalb co., Mo. Pop. 807.

Dallas, a township of Harrison co., Mo. Pop. 551.

Dallas, a township of Holt co., Mo. Pop. 1285.

Dallas, a township and post-village of Webster co., Mo. Pop. 1255.

Dallas, a post-village, capital of Gaston co., N. C., about 170 miles W. by S. from Raleigh. Pop. 299; of township, 4006.

Dallas, a township of Crawford co., O. Pop. 370.

Dallas, a post-village, capital of Polk co., Or., on the Rickreal River, 15 miles W. of Salem. It has a weekly newspaper.

Dallas, a post-township of Luzerne co., Pa. Pop. 985.

Dallas, a city, capital of Dallas co., Tex., on the Trinity River, 3 miles below the mouth of Elm Fork. It is the point of crossing of the Houston and Texas Central and the Texas and Pacific R. Rs., 265 miles N. N. W. of Houston and 186 miles W. of Shreveport, La. It has three weekly and one daily newspaper. A street railway runs from the court-house square to the railroad dépôt. This town was settled in 1841. JOHN W. SWINDELLS, PUB. "HERALD."

Dallas (ALEXANDER JAMES), an American statesman, born in the island of Jamaica June 21, 1759. He emigrated in 1783 to Philadelphia, where he practised law, and published in 1790 "Reports of Cases in the Courts of the United States and Pennsylvania" (4 vols.). In 1801 he was appointed a district attorney of the U. S. He became secretary of the treasury in the cabinet of Madison in Oct., 1814, when the national revenue was insufficient and the public credit was impaired. He wrote an able report to Congress recommending the establishment of a national bank, raised money by a loan, and restored the public credit. He resigned office in Nov., 1816. Died Jan. 16, 1817.

Dallas (GEORGE MIFFLIN), LL.D., an American statesman, a son of the preceding, was born in Philadelphia July 10, 1792. He studied law, and was admitted to the bar in 1813. In 1824 he supported Gen. Jackson as a candidate for the office of President. He was elected in 1831 to the Senate of the U. S. for a short term, which expired in Mar., 1833. He was sent as minister to St. Petersburg in 1837, returned in 1839, and was elected Vice-President of the U. S. in 1844, when Mr. Polk was chosen President. In

1846 he gave his casting vote in the Senate for a revenue tariff bill, which was opposed by the protectionist party. In Feb., 1856, he was appointed minister to England, where he remained until 1861. Died Dec. 31, 1864.

Dallas Centre, a post-village of Adel township, Dallas co., Ia. Pop. 133.

Dallas City, a city of Hancock and Henderson cos., Ill., on the Mississippi, 240 miles above St. Louis and 18 miles N. of Carthage. It has several manufactories and one weekly newspaper.

Dallas Plantation, a township of Franklin co., Me. Pop. 159.

Dalles City, or **The Dalles,** a post-village, capital of Wasco co., Or., is on the S. bank of the Columbia River, about 120 miles by water E. of Portland. It has one weekly newspaper and a large woollen factory. The navigation of the river is here obstructed by rapids. Pop. 942.

W. M. HAND, ED. "MOUNTAINEER."

Dalles of the Columbia, a narrow portion of the Columbia River, 45 miles above the Cascades. The river here rushes violently through a chasm only fifty-eight yards wide, enclosed between steep walls of basaltic rock. *Dalle* is a French word signifying "flag-stone," and also a "spout" for water.

Dalles of the St. Louis, The, a beautiful series of rapids in the St. Louis River, near Duluth, Minn. The river falls 400 feet in four miles over a bed of slate.

Dalling, LORD. See BULWER (HENRY LYTTON).

Dall' Onga'ro (FRANCESCO), an Italian revolutionist and author, born at Odezzo (near Venice) in 1808, became a priest, but was suspended for his independent preaching. He then renounced the Church, and became a revolutionary journalist in Triest, whence he was expelled in 1847. In 1848 he established a journal at Venice called "Fatti, e non Parole." He took an active part in the revolutionary movements of that year, and was compelled to leave Italy. He became a contributor to several journals in Paris. In 1859 he returned to Italy, and became professor of literature at Florence. He has published tales, dramas, and lyric poems.

Dalma'nia, a genus of trilobites which has many species in the Silurian and Devonian rocks of the U. S. Of those the best known is *Dalmania limulurus* of the Niagara limestone.

Dalma'tia, a portion of the ancient Illyricum, now the southernmost province of Cisleithan Austria, is a long, narrow tract bounded on the N. by Croatia, on the N. E. by Herzegovina, and on the S. W. by the Adriatic Sea. It includes a number of islands. Area, 4940 square miles. Pop. in 1869, 456,961. With the exception of about 80,000 Greeks and a few Protestants and Jews, the population belongs to the Roman Catholic Church. About 89 per cent. of the population are Slavic and 10½ per cent. Italian; 28 per cent. of the children attend school. The coast is bold and indented with bays which form good harbors. The surface is diversified with mountains (the Dinaric Alps) of limestone formation, the highest of which, Mount Orien, rises 6332 feet above the level of the sea. The soil in some parts is fertile, and produces wheat, oats, potatoes, maize, wine, and olives. Good timber for shipbuilding is procured on the islands. The chief towns are Zara, Spalato, Ragusa, and Cattaro. Dalmatia was conquered by the Romans in the time of Augustus. In the seventh century it was taken by the Slavonians, who founded in it a kingdom which lasted until 1050. In the Middle Ages it belonged to Hungary. In the fifteenth century it fell under the power of the Venetians, who ceded it to Austria in 1797. In 1805, Napoleon annexed it to the kingdom of Italy, and in 1810 to the kingdom of Illyria. It reverted to Austria in 1814. The district of Cattaro in 1869–70 revolted against Austria, in consequence of changes in their old system of military service. After some concessions to the national pride of the Dalmatians, the revolt was suppressed in the latter year. (See NOË, "Dalmatien," 1870.)

Dalmatia, a township of Halifax co., N. C. P. 2796.

Dalmat'ica, or **Dalmat'ic,** a mantle with long sleeves formerly used in Dalmatia. It was worn by the nations who were called barbarians by the Greeks and Romans. It was afterwards adopted by deacons when assisting the priest at the altar. It is still worn by deacons in the Greek and Roman Catholic churches, though in a different form.

Dalri'ada [a word which appears to have signified the "country of the race of Riada," an Irish chieftain], the ancient name of a region in Ireland now known as the "Route," the northern half of the county of Antrim. Some of the race of Riada are said to have settled in Argyleshire, Scotland, where they founded a petty kingdom called also Dalriada. More than twenty kings of this line in Scotland are mentioned before the Dalriads (or Scots) and the Picts became united under Kenneth MacAlpine, who became the first king of Albany. The region S. of the Irish Dalriada was called DALARADIA, probably from another chieftain who governed it.

Dalrymple. See HAILES, LORD, and STAIR, EARLS OF.

Dalrym'ple (ALEXANDER), a Scotch traveller, a younger brother of Lord Hailes, born July 24, 1737, entered the East India Company's service and explored many islands in the Eastern Archipelago. He was appointed hydrographer to the East India Company in 1779, and to the admiralty in 1795. He wrote several geographical works. Died June 19, 1808.

Dal'ton, a post-village, capital of Whitfield co., Ga., on the Western and Atlantic R. R., 99 miles N. N. W. of Atlanta. It is the S. terminus of the East Tennessee Virginia and Georgia, S. E. terminus of the Nashville and Chattanooga, E. terminus of the Memphis and Charleston, and N. E. terminus of the Selma Rome and Dalton R. Rs. It has one weekly newspaper and a heavy trade in grain. Pop. 1809.

Dalton (Dolten's Station post-office), in Thornton township, Cook co., Ill., is the junction of the Pittsburg Cincinnati and St. Louis and the Chicago Danville and Vincennes R. Rs., 20 miles S. of Chicago.

Dalton, a post-township of Wayne co., Ind. P. 766.

Dalton, a township of Aroostook co., Me. Pop. 445.

Dalton, a township and post-village of Berkshire co., Mass., on the Boston and Albany R. R., 146 miles W. of Boston. Here are important manufactures of paper, machinery, woollens, and cotton goods. Pop. 1252.

Dalton, a township of Muskegon co., Mich. Pop. 401.

Dalton, a township and post-village of Coos co., N. H., on the Boston Concord and Montreal R. R., 112 miles N. of Concord. It has manufactures of starch and lumber. Pop. 773.

Dalton, a post-village of Sugar Creek township, Wayne co., O. Pop. 412.

Dalton (JOHN), F. R. S., an English chemist, the author of the atomic theory, was born at Eaglesfield, in Cumberland, Sept. 5, 1766. He taught and gave lectures on physical science, and resided in Manchester. In 1802 he announced his important theory of the constitution of mixed gases. The development of the laws of combining proportions and the atomic theory he explained in the first volume of his "New System of Chemical Philosophy" (3 vols., 1808–27). (See CHEMISTRY.) He wrote a number of scientific treatises, which were inserted in the "Philosophical Transactions," etc. Died July 27, 1844.

Dalton (JOHN C.), M. D., an eminent physiologist, born at Chelmsford, Mass., Feb. 2, 1825, graduated at Harvard in 1844. He took the degree of M. D. there in 1847. In 1859 he published an excellent "Treatise on Human Physiology," of which the fourth edition, enlarged, appeared in 1867. Among his other works is a "Treatise on Physiology and Hygiene for Schools, Families, and Colleges" (1868). He is professor of physiology and hygiene in the New York College of Physicians and Surgeons. His original observations in embryology and other departments of physiology have given him a wide reputation. He is the author of the article on EMBRYOLOGY in this work.

Dalton City, a post-village of Moultrie co., Ill., on the Paris and Decatur R. R., 29 miles N. W. of Mattoon.

Dalton-in-Fur'ness, a town of England, in Furness, Lancashire, 18 miles W. N. W. of Lancaster, and 3 miles from the sea. Here are iron-works and iron-mines. Near Dalton are the ruins of the splendid Furness Abbey, founded in 1127 by Stephen, who was afterwards king.

Dal'tonism, an inability to distinguish colors, was so called because the celebrated John Dalton and his brothers had a defect in vision in consequence of which red, blue, and green appeared alike. (See COLOR-BLINDNESS.)

Da'ly (CHARLES P.), LL.D., was born of Irish parentage in New York City, Oct. 31, 1816, was admitted to the bar in 1839, became judge of common pleas in that city in 1845, and chief judge in 1857. He was author of articles in the "New American Cyclopædia," lecturer at the Columbia College Law School, published a history of the courts of New York (1855), a memoir of Chancellor Kent, and many papers on banking, law, science, etc. He has been president of the American Geographical and Statistical Society, and a prominent member of the Ethnological Society.

Damages. See MEASURE OF DAMAGES, by PROF. T. W. DWIGHT, LL.D.

Damân′, or **Damaun,** a seaport-town of Hindostan, in Guzerat, is on the Indian Ocean, about 100 miles N. of Bombay. It belongs to the Portuguese. The harbor affords a good shelter from the S. W. monsoon. Shipbuilding is carried on here. Damân is at the mouth of the Damân Gunga or Damân River. Pop. about 7000.

Daman (an animal). See HYRAX.

Damanhoor′ (anc. *Hermopolis Parva*), a town of Lower Egypt, capital of the province of Bahreh, is about 40 miles E. S. E. of Alexandria. It has manufactures of cotton and wool. Pop. 10,000.

Damar′, or **Demar,** a town of Arabia, in Yemen, 60 miles S. S. E. of Sana. It has a citadel, a college, and about 5000 houses.

Damariscot′ta, a township and village of Lincoln co., Me. The village is on the Knox and Lincoln R. R., 20 miles N. E. of Bath, and on the Damariscotta River. It has a national bank, some shipbuilding and other manufactures, and a coasting-trade. Total pop. 1232.

Damasce′nus (JOANNES), a learned theologian, born in Damascus about 700 A. D. About the age of thirty he retired to the monastery of St. Saba, near Jerusalem, where he devoted his time to the study of philosophy and theology and to the composition of religious works. His chief work is "An Accurate Exposition of the Orthodox Faith," which is not so much a well-wrought system of divinity as a digest of the teachings of his predecessors, such as Athanasius, Basil, the Gregories, Chrysostom, and others. He first applied to scholasticism the philosophy of Aristotle. Died between 754 and 787 A. D. He was canonized by the Latin and the Greek churches.

Damascenus (NICOLAUS), a Greek historian and philosopher, born in Damascus in 74 B. C., was a friend of Herod, king of Judæa, at whose court he lived. He wrote, besides other works, a "Universal History," of which fragments are extant.

Damas′cius [Gr. Δαμάσκιος], a pagan philosopher, born in Damascus about 480 A. D. He taught the Neo-Platonic philosophy at Athens, and when Justinian in 529 prohibited the pagans from teaching, he retired to the court of Chosroes, king of Persia. He wrote a work entitled "Doubts and Solutions of the First Principles," which is still extant.

Damas′coville, or **Damascus,** a post-village of Butler township, Columbiana co., O. Pop. 94.

Damas′cus [Arab. *Sham el Kebeer* or *es Shereef* ("the great" or "the holy")], a celebrated city of Asiatic Turkey, in Syria, is situated on a triangular plain at the eastern base of the Anti-Libanus, 58 miles E. S. E. of Beyroot; lat. 33° 27′ N., lon. 36° 25′ E. The plain of Damascus, regarded by the Arabs as the fairest of the four earthly paradises, is about 70 miles in circumference, and extremely fertile, irrigated by the river Barada and other streams, and adorned with gardens and orchards. The magnificent appearance of this city from afar has been celebrated by ancient and modern travellers. Numberless cupolas and minarets are seen clustered about the towering mass of the great mosque. Within, the streets are narrow, and many of them have a gloomy and decayed appearance. The houses are mean in external aspect, and present a dead wall to the street, but the interiors are often elegant and richly furnished. Fine marble-paved courts ornamented with fountains and shrubs, rooms with arabesqued roofs and walls, are the common features of the houses of the rich Damascenes. Damascus continues to be Oriental in all its features and characteristics. The city is oval in form, surrounded by a picturesque wall with stately towers and gates, and intersected by the broad street which the Romans called Via Recta. The great mosque, 650 feet in length and 150 in breadth, was built by the Christians in the form of a cross, but has been occupied by the Mussulmans since 705 A. D. Damascus has 248 mosques, many of them with splendid minarets. The huge quadrangular citadel, with massive towers, forms part of the city wall. No wheeled carriages or vehicles are used in the streets. There are important manufactures of cotton, silk, and woollen fabrics, jewelry, saddlery, glass, and arms. The Damascus blades, for which this city was once famous, have lost their high reputation. The bazaars, said to be finer than those of Cairo or Constantinople, are well supplied with European manufactures, in which Damascus has an extensive trade, carried on by means of camels and caravans, with Bagdad, Bassorah, Persia, etc. Here is assembled annually a large caravan of pilgrims, merchants, and other travellers, sometimes as many as 50,000, destined for Mecca. The date of the foundation of Damascus is not known, but it was a city in the time of the patriarch Abraham. (See Gen. xiv.) During the Hebrew monarchy it was the capital of Syria. It passed afterwards successively under the dominion of the Assyrians (740 B. C.), Babylonians (604 B. C.), Persians (540 B. C.), Macedonians (333 B. C.), Romans (65 B. C.), Saracens (634 A. D.), and was finally captured by the Turks in 1516. Here the apostle Paul was converted and preached the gospel. Damascus is one of the sacred cities of the Mohammedans, and has long been known for the fanaticism of its inhabitants. In 1860 the Druses entered the city and massacred a large number of the Christians. The present population is variously estimated at from 150,000 to 300,000, among whom there are about 15,000 Christians and 6000 Jews. (See PORTER, "Five Years in Damascus.")

REVISED BY A. J. SCHEM.

Damascus, a township and village of Henry co., O. Pop. 1179.

Damascus, a township and post-village of Wayne co., Pa., near the New York and Erie R. R. Pop. 2823.

Damascus Blades, a name given to sword-blades of the highest excellence, formerly made at Damascus in Syria. Since the time of the Crusades they have been famous for their beautifully watered and lined appearance, as well as for their exquisite temper, which enabled them, when skilfully handled, to cut, not only bars of iron, but to divide films of gauze floating in the air. It is said that good blades of this kind can be bent into a hoop, and will fly back to their original shape without injury. The secret of their manufacture is unknown, but it is said that the Russians have recently produced swords which equal the best Damascus blades in beauty and temper.

Dam′ask, the name given to certain rich stuffs of silk and linen because they were first manufactured at Damascus, whence the trade was carried to Venice, Lyons, and Genoa. The cloth is woven with flowers and regular figures, and in modern times is often made of worsted or worsted and cotton mixed. The fashion of wearing it was adopted in England by Henry V. and Edward IV. Damask tablecloths are said to have been first imported from France into England in 1575.

Damaskeen′ing [from *Damascus,* where the art was practised with great success], the ornamenting of steel or iron by inlaying with other metals, such as gold or silver. There are several methods of performing it.

Damas′tes, son of Dioxippus, a Greek historian, was a native of Sigeum. He is called by Suidas a pupil of Hellanicus, and flourished about 440 B. C. Several works are ascribed to him, as "An Account of Events in Greece," "On the Ancestors of those who Warred against Troy" in two books, "A Catalogue of Nations and Cities," and a treatise "Of Poets and Sophists." Besides these, he composed a "Periplus," which is referred to by later geographical writers. Very few fragments remain, collected in MÜLLER'S "Fragm. Histor. Græc.," vol. ii., pp. 64–67.

HENRY DRISLER.

Dam′asus I. [Fr. *Damase*], SAINT, born, some say in Rome, others in Spain, in 306 A. D., was elected bishop of Rome in 366. A rival named Ursinus was at the same time elected by a party, but Damasus was recognized by the emperor Valentinian. Although elected by the Arian faction, he strenuously opposed Arianism. He employed violent methods, but was a man of learning and taste. We are indebted to him for Jerome's new version of the Latin Bible. He improved the church service by introducing the Psalter. He also wrote hymns, two of which are given by Daniel in his "Thesaurus Hymnologicus." He is said to have been the first to employ rhyme. Died Dec. 10, 384 A. D.—DAMASUS II., a German, and probably a Bavarian, was consecrated pope July 17, 1048, and died Aug. 9 of the same year. (See JAFFÉ, "Regesta Pontificum Romanorum.")

Dam′bool′, a village of Ceylon, 45 miles N. W. of Kandy. Here is a mass of rock about 550 feet high, in which are cave-temples devoted to the worship of Booddha, and profusely adorned with sculpture and images. Among these is a colossal image of Booddha, hewn out of the rock. These temples, which are partly artificial, were constructed about 100 B. C.

Dame's Quarter, a post-township of Somerset co., Md. Pop. 1565.

Damia′ni (PIETRO), known as SAINT PETER DAMIAN, an influential Italian prelate, born at Ravenna about 998 A. D. He was appointed cardinal-bishop of Ostia in 1057. He opposed simony and other corrupt practices of the clergy, and was a friend of Pope Gregory VII. He was a voluminous writer, and morally and intellectually one of the first men of his time. He is honored as one of the doctors of the Church. Died Feb. 22, 1072.

Da′mianists, a sect originating in the sixth century, were the followers of Damianus, a Monophysite patriarch

of Alexandria, who taught a novel theory with regard to the Divine essence and the three Persons of the Godhead. They nearly agreed with the Sabellians. They are sometimes called *Angelists*.

Damia'nus, a distinguished Sophist and rhetorician of Ephesus, of whom an account is given by his friend Philostratus in his lives of the Sophists. In his youth Damianus had attended the lectures of Adrianus and Ælius Aristides, and he formed himself after the model of these. He taught rhetoric in his native place with great success. He was a man of wealth and of great liberality, and erected for his fellow-citizens a beautiful portico. He appears to have left no writings. HENRY DRISLER.

Damiet'ta, a town and river-port of Lower Egypt, is on the right bank of the E. mouth of the Nile, about 8 miles from the Mediterranean and 110 miles N. by E. from Cairo; lat. 31° 25′ N., lon. 31° 47′ E. It is meanly built, but has some good mosques and marble baths. The harbor is not good, and a bar at the mouth of the river prevents the entrance of large vessels. The modern town was founded in 1251 a few miles S. of the ancient *Tamiathis*, which in the time of the Crusades was a strong fortress of the Saracens. The cloth known as *dimity* was first manufactured in this town, and received from it its name. Pop. in 1871, 28,913.

Damiron (JEAN PHILIBERT), a French philosopher, born at Belleville (Rhône) May 10, 1794, was a pupil of Cousin. Among his works is an "Essay on the History of Philosophy in France in the Seventeenth Century" (2 vols., 1846). Died in 1862.

Damm (CHRISTIAN TOBIAS), a learned Greek scholar and theologian, was born in 1699 at Geithain, near Leipsic. He was appointed pro-rector in 1742, and afterwards rector of the Kölnisches Real-Gymnasium in Berlin, but was displaced in 1764 on a charge of Socinianism, founded on his translation of the New Testament. He died in 1778. Besides the New Testament, he translated the works of several Greek authors, and published editions of both Greek and Latin writers. His principal work, and that by which he is now known among scholars, was his Homeric and Pindaric Lexicon, Berlin, 1765, 4to, edited by J. M. Duncan, Glasgow, 1824, 4to, and still further improved by Rost, Leipsic, 1836, 4to. HENRY DRISLER.

Dam'mar, or **Dâmar** [from the Hindostanee and Malay *dâmar*, "resin"], the name of a valuable varnish produced by the dammar pine (*Dammara orientalis*), of the natural order Coniferæ. This tree is a native of the Molucca Islands, and is distinguishable from most of the other trees of its order by the broad, lanceolate, leathery leaves. It grows to an immense height, and on its trunk, which is often nine feet in diameter, are many huge knots. The tree is not valuable as timber. The resin is used in varnishes, but not being permanent, it cannot take the place of copal and amber. It is sometimes used in photography. The kauri pine (*Dammara australis*) produces kauri resin or kauri gum. It is a native of New Zealand. Black dammar is obtained from the Molucca Islands; it has a strong resinous odor, and is black when dried; it is used as pitch, and by distillation a kind of turpentine is obtained from it. It is the product of a tree of the natural order Amyridaceæ. *Canarium microcarpum* is of the same order, and is also a native of the East. It yields a substance called dammar, which is used as oakum in shipbuilding. When mixed with chalk and the bark of reeds it becomes hard as stone. Various other trees yield resins called dammar.

Da'mo, daughter of Pythagoras, to whom he left his memoirs (ὑπομνήματα), with strict injunctions not to allow them to pass out of his family. This injunction she obeyed, though in great poverty and tempted with offers of considerable sums of money. She transmitted them to the care of her daughter Bitale. HENRY DRISLER.

Dam'ocles [Gr. Δαμοκλῆς], a Syracusan parasite and courtier who lived at the court of Dionysius the Elder, and was the subject of an experiment recorded by Cicero. As an antidote to his fond admiration of regal luxury and happiness, the tyrant invited him to a sumptuous banquet over which a sword was suspended by a single hair.

Da'mon, a distinguished musician of Athens, celebrated also as a Sophist. Plutarch ascribes to him the invention of one form of the Lydian melody. He taught Pericles music, and was his adviser also in many of his political measures. Plato has spoken highly of the abilities of Damon. Late in life he was banished from Athens, no doubt from the objectionable character of his political opinions. HENRY DRISLER.

Da'mon and **Pyth'ias** (or **Phin'tias**), two Syracusans and disciples of Pythagoras, celebrated for the fidelity of their friendship. Pythias was condemned to death by Dionysius, who kept Damon as a hostage while the former went home to settle his affairs. Pythias returned punctually, to the surprise of the tyrant, who pardoned him, and desired to be a partner in their friendship.

Damoph'ilus of Bithynia, called by Suidas a philosopher and Sophist, was reared by Salvius Julianus, who was consul under Marcus Antoninus. He wrote a number of works, of which Suidas says he found the following in the libraries: "Philobiblus, concerning Books worth Possessing," and "Concerning the Life of the Ancients." (The notices of Damophilus are collected by MÜLLER, "Fragm. Hist. Græc.," vol. iii., p. 656.) HENRY DRISLER.

Dam'ophon, or **Demophon,** a statuary of Messene, flourished about 370 B. C. He adorned Ægium, Messene, and Megalopolis with his works, which were chiefly statues of Parian marble and of wood. Pausanias mentions among the most important of his works a statue of Lucina, one of Æsculapius, of the Mother of the Gods, of Mercury, and of Venus. He was also employed to repair the Olympian Jupiter of Phidias, the ivory of which had become loosened in many places. HENRY DRISLER.

Damoph'yle, one of the large group of Greek lyric female poets who were pupils, companions, and followers of Sappho. She flourished about 610 B. C., and was a Pamphylian by birth, but Pamphylia was largely Greek. Like her mistress Sappho, she instructed other young women. She wrote love-poems, and composed those hymns to Artemis which were sung at Perga. None of her works are now extant, and very few facts with regard to her are known.

Damox'enus, a comic poet of the new Attic comedy, probably reaching back also into the middle. He is referred to by Athenæus, who with Suidas has preserved the titles of two of his comedies, and has given considerable extracts from one of them. All that remains of his writings has been collected by MEINEKE, "Fragm. Comic. Græc.," vol. iv., pp. 529–36. HENRY DRISLER.

Damp'er [from *damp*, to "check," originally to "smother," akin to the Ger. *Dampf*, "vapor," and *dämpfen*, to "suffocate," "smother," or "quench"], a valve used to lessen the aperture of a chimney or air-flue for the purpose of checking combustion by diminishing the quantity of air. In the construction of the pianoforte a damper is used. This consists of a drop cushioned with flannel, which, falling on the string, checks the vibration, and gives distinctness to the passages and clearness to the sound.

Dam'pier (WILLIAM), an English navigator, born in Somersetshire in 1652. He joined in 1679 a party of buccaneers who crossed the Isthmus of Darien, captured several Spanish vessels, and molested the settlements. In 1684 he made a voyage to the East Indies, from which he returned to England in 1691, and published an interesting narrative, entitled "A Voyage Round the World." In the service of the government he conducted in 1699 an expedition to the South Sea, and explored the western coast of Australia, the coast of Papua and other islands. He returned home in 1701, and published a narrative of this voyage.

Dam'pier Archipel'ago is near the N. W. coast of Australia, about lat. 21° S. and lon. 117° E. It comprises Enderby, Depuch, Lewis, and other islands. Dampier Strait, between Papua and Waigeeo, is 35 miles wide.

Dampremy, a town of Belgium, near Chatelet. It has coal-mines and glass-factories. Pop. 5235.

Damps [Ger. *Dampf*, "vapor;" see etymology of DAMPER], the noxious exhalations of mines and excavations. The carburetted hydrogen of coal-mines is called *fire-damp*, and carbonic acid gas mixed with carbonic oxide is termed *choke-damp*.

Dam'son [a contraction of *Damascene*, from Damascus], a variety of the common plum. It is a small, oval fruit, made use of in preserving. In England it is much used as a confection called *damson cheese*. It is cultivated in the U. S.

Dam, Tinker's, is the wall of dough or chewed bread which a tinker puts around the hole which he is stopping, so as to confine the melted solder to that point. After it is once used it of course loses its value, so that its name is often employed in popular slang as a symbol of utter worthlessness.

Damug'go, a populous and dirty town of Africa, in Upper Guinea, on the Niger, in lat. 7° N., lon. 7° 50′ E. The houses are mostly built of mud.

Dan [Heb. דָּן], a son of the Hebrew patriarch Jacob. Also a part of Palestine occupied by the tribe of Dan, and bounded on the W. by the Mediterranean. Joppa was its principal town. Dan (or Laish) was an ancient city in the extreme northern part of the Promised Land.

Dan, a river of Virginia and North Carolina, rises in

the southern part of Virginia, flows in a generally eastward direction, and crosses the boundary between those States five or six times. After a course of about 200 miles, it unites with Staunton River at Clarksville, Va. Below this junction the stream is called the Roanoke.

Da'na, a post-township of Worcester co., Mass., on the Athol and Enfield R. R. Pop. 758.

Dana, a village of Carbon co., Wy., on the Union Pacific R. R., 100 miles N. W. of Laramie.

Dana (Charles Anderson), a journalist, born at Hinsdale, N. H., Aug. 8, 1819, studied two years at Harvard University, did not graduate owing to a disease of the eyes, but received the degree of A. M. He edited the "Harbinger," was a contributor to the Boston "Chronotype," was connected with the New York "Tribune" from 1847–58, and is now editor of the "Sun." He edited "The Household Book of Poetry" (8vo, 1858), and in connection with George Ripley edited "The New American Cyclopædia." He was assistant secretary of war (1863–64).

Dana (Edmund Trowbridge), J. U. D., political economist and publicist, a brother of R. H. Dana, Jr., born at Cambridge, Mass., Aug. 29, 1818, was educated at the University of Vermont, the Cambridge Law School, and the German universities, and published translations of works on public law, etc. Died May 18, 1869.

Dana (Francis), LL.D., an American statesman and jurist, born at Charlestown, Mass., June 13, 1743, was a son of Judge Richard Dana. He was admitted to the bar in 1767, and joined the "Sons of Liberty." In 1776 he was chosen a member of council of Massachusetts, at that time the supreme executive power in the State. He was a delegate to the Congress of 1777, which formed the Confederation, and to the Congress of 1778. In Nov., 1779, he sailed to Europe as secretary to John Adams, who was sent to negotiate a treaty of peace and commerce with Great Britain. In Dec., 1780, Mr. Dana was appointed minister to Russia, in the capital of which he remained nearly two years. Having returned to Boston in 1783, he was appointed a judge of the supreme court of Massachusetts in 1785. He was chosen in 1787 a delegate to the convention which formed the Constitution of the U. S., but his judicial duties and ill-health prevented his attendance. He voted for that Constitution as a member of the State convention convened to ratify it in 1788. He was chief-justice of Massachusetts from 1791 to 1806. In politics he was a Federalist. Died April 25, 1811. He was the father of the poet Richard H. Dana.

Dana (James), D. D., a Congregational theologian, born at Cambridge, Mass., May 11, 1735, graduated at Harvard in 1753, and was pastor of the First church at New Haven, Conn. (1789–1805). He published (1770–73) an "Examination of Edwards on the Will," in which he strongly opposed the doctrine of utilitarian morality, and ably defended the freedom of the will. Died Aug. 18, 1812.

Dana (James Dwight), LL.D., an eminent American naturalist and geologist, born at Utica, N. Y., Feb. 12, 1813, graduated at Yale in 1833. He published a "System of Mineralogy" (1837), of which a new edition, greatly improved, appeared in 1868. He sailed with Capt. Wilkes as geologist of the exploring expedition sent out by the government in 1838. Some results of this exploration appeared in his "Report on Zoophytes" (1846), a "Report on the Geology of the Pacific" (1849), a "Report on the Crustacea" (1852–54), etc. He married a daughter of Prof. Benjamin Silliman, settled at New Haven in 1846, and became one of the editors of the "American Journal of Science." In 1855 he was elected professor of natural history and geology at Yale College. Among his works are an excellent "Manual of Geology" (1862) and "Corals and Coral Islands" (1872). He rejects the Darwinian theory. Prof. Dana combines with the habit of close and accurate observation powers of mind which place him in the very foremost rank of philosophic naturalists.

Dana (James Freeman), M. D., a brother of Dr. S. L. Dana, was born at Amherst, N. H., Sept. 23, 1793, graduated at Harvard in 1813, studied medicine in Boston, and chemistry in London. He subsequently took the degree of M. D. (1817), became professor and lecturer on chemistry, etc. at Harvard, Dartmouth, and the New York College of Physicians and Surgeons. He was the author of "Chemical Philosophy" (1825), and of many scientific papers and other works. Died April 14, 1827.

Dana (Napoleon Jackson Tecumseh), an American officer, born April 15, 1822, in Maine, graduated at West Point in 1842, and May 29, 1862, major-general U. S. volunteers. He served as an infantry officer till 1848, and then as an assistant quartermaster till he resigned, Mar. 1, 1855. He served chiefly at frontier posts 1842–45; in the military occupation of Texas 1845, in the war with Mexico 1846–47, engaged at Fort Brown, Monterey, Vera Cruz, and Cerro Gordo (severely wounded and brevet captain), and on quartermaster duty 1848–55. He was a banker at St. Paul, Minn., till the beginning of the civil war, when he became colonel First Minnesota volunteers, and served in guarding the upper ferries of the Potomac 1861, in Shenandoah Valley 1861–62, in Virginia Peninsula 1862, engaged at Yorktown, West Point, Fair Oaks, Peach Orchard, Savage Station, White Oak Swamp, Glendale, and Malvern Hill; in Maryland campaign 1862, engaged at South Mountain and Antietam (severely wounded); in command of the defences of Philadelphia 1863; in operations in the department of the Gulf 1863–64, engaged at Fordoche Bayou, expedition to the Rio Grande, and the occupation of Matagorda Bay; and in command of the district of Vicksburg and of West Tennessee 1864, and of the department of Mississippi 1864–65. Resigned May 25, 1865, and is now engaged in mining operations in California.

George W. Cullum, U. S. A.

Dana (Richard), an able American lawyer, born at Cambridge, Mass., July 7, 1699, was the father of Francis Dana, noticed above. He graduated at Harvard in 1718, practised law at Boston with success, and was an active promoter of the popular cause in the period which preceded the war of Independence. Died May 17, 1772.

Dana (Richard Henry), a poet, born at Cambridge, Mass., Nov. 15, 1787, a son of Chief-Justice Francis Dana, was educated at Harvard College, studied law, and was admitted to the bar of Boston in 1811. He was one of the editors of the "North American Review" in 1818 and 1819. In 1821 he published "The Dying Raven," a poem. His poem entitled "The Buccaneer" (1827) was praised by Prof. Wilson of "Blackwood's Magazine" in these terms: "We pronounce it by far the most powerful and original of American poetical compositions." He published in 1833 a collection of his poems and prose works, including some essays which originally appeared under the title of "The Idle Man," in 1821–22.

Dana (Richard Henry, Jr.), an eminent American lawyer and author, a son of the preceding, was born at Cambridge Aug. 1, 1815. He entered Harvard College in 1832, but suspended his studies on account of the weakness of his eyes in 1834. He then performed as a common sailor a voyage to California, of which he wrote an interesting and popular narrative entitled "Two Years Before the Mast" (1840). Having graduated at Harvard in 1837, he studied law under Judge Story, and was admitted to the bar in 1840. He published in 1841 "The Seaman's Friend, containing a Treatise on Practical Seamanship," and also an edition of Wheaton's "International Law" in 1865. He was one of the founders of the Free-Soil party in 1848, and an orator of the Republican party in 1856.

Dana (Samuel Luther), M. D., LL.D., an American chemist and writer on agriculture, was born at Groton, Mass., July 11, 1795. He was employed as chemist of the Merrimack Print-Works at Lowell, and invented a method of bleaching cotton goods which was extensively adopted. Among his works are the "Muck Manual" (1842) and an essay on manures (1843). Died Mar. 11, 1868.

Dana (Samuel Whittlesey), son of Dr. James Dana, noticed above, was born at New Haven, Conn., July, 1757, graduated at Yale in 1775, was a member of Congress (1796–1810), and U. S. Senator (1810–21). He was a leading Federalist. Died July 21, 1830.

Dana (William H.), U. S. N., born May 27, 1833, in Athens, O., entered the navy as a midshipman May 1, 1850, became a passed midshipman in 1856, a lieutenant in 1858, a lieutenant-commander in 1862, and a commander in 1869. He served in the North Atlantic blockading squadron and the Western Gulf blockading squadron in 1863 and 1864, participating in the attack on Port Hudson, Mar. 6, 1863, and commanded the gunboat Winona, South Atlantic blockading squadron, from the latter part of 1864 to the close of the civil war. Died at the naval hospital, Chelsea, Mass., Mar. 5, 1872.

Foxhall A. Parker, U. S. N.

Dan'aë [Gr. Δανάη], in classical mythology, was a daughter of Acrisius, king of Argos, who confined her in a brazen tower because an oracle had predicted that her son would kill her father. She became the mother of Perseus, whose father, Jupiter, is said to have obtained access to her in the form of a golden shower.

Dan'aïd [for etymology see below], an ingenious hydraulic machine, consisting essentially of two hollow cylinders, placed one within the other, with a (comparatively) narrow space between; the inner cylinder closed at bottom, the outer having an aperture at the bottom in the centre. Between the two bottoms are partitions radiating from the centre to the circumference, but the annular

cylindrical space is without partitions. The whole is sustained by a vertical axis, about which it turns easily. A jet or stream of water being now admitted into the annular space, as nearly tangential horizontally to the cylindrical surface as possible, sets the machine in motion, at first by mere friction, but presently the living force imparted to the water by revolution, acting on the radial partitions of the base, accelerates the velocity and increases the force. Experiments show that this machine utilizes from 70 to 75 per cent. of the power due to the hydraulic head. The name seems to have been suggested by the fable of the Danaïdes pouring water for ever into a vessel, from which it continually escapes.

Dana'ides [Gr. Δαναΐδες], the fifty daughters of Danaus, a mythical king of Egypt, were married to fifty sons of Ægyptus, their uncle. By order of their father, each of the Danaides, except one, killed her bridegroom on the wedding-night. They were doomed in Tartarus to pour water for ever into a vessel perforated with holes.

Dan'bury, a post-borough and semi-capital of Fairfield co., Conn., is at the northern terminus of the Danbury and Norwalk R. R., which is 23 miles long, and connects with the New York and New Haven R. R. It is 69 miles N. N. E. of New York. It has two national banks, a weekly newspaper, two savings banks, several hat-factories, one sewing-machine factory, one boot-and-shoe factory, two shirt-factories, and one foundry. It has extensive water-works, a town farm for the indigent, and a cemetery of remarkable beauty. It was settled in 1684, and burned by the British in April, 1777. Pop. 6542; of township, 8753.

J. M. Bailey, Ed. "Danbury News."

Danbury, a post-township of Grafton co., N. H., on the Northern R. R., 30 miles N. W. of Concord. It has three churches, and manufactures of shoes and leather. P. 796.

Danbury, a post-village, capital of Stokes co., N. C., about 112 miles W. N. W. of Raleigh. It has one weekly newspaper.

Danbury, a township of Ottawa co., O. Pop. 1252.

Dan'by, a township and post-village of Ionia co., Mich., on the Detroit Lansing and Lake Michigan R. R., 16 miles S. E. of Ionia. Pop. 1176.

Danby, a township and post-village of Tompkins co., N. Y., 8 miles S. of Ithaca. Pop. 2126.

Danby, a township and post-village of Rutland co., Vt., on Otter Creek and the Harlem Extension R. R., 18 miles S. of Rutland. It has a number of stores, one weekly newspaper, and manufactures of lumber, leather, boxes, cheese, and marble. Pop. 1319.

J. C. Williams, Ed. "Otter Creek Valley News."

Danby (Francis), A. R. A., a landscape-painter, born near Wexford, Ireland, Nov. 16, 1793. His works are marked by fine light-effects. Among his works are a "Sunset at Sea after a Storm" (1824), "Christ Walking on the Sea" (1827), "The Embarkation of Cleopatra on the Cydnus" (1827), and "Caius Marius among the Ruins of Carthage" (1848). Died Feb. 17, 1861.

Danby (Thomas **Osborne**), Earl of, marquis of Caermarthen and duke of Leeds, an English Tory statesman, born in 1631. He gained the favor of Charles II., and became in 1673 lord treasurer, and the most powerful of the king's ministers. In 1674 he was created earl of Danby. He was committed to the Tower by the Commons on a charge of treason in 1678, and was confined five years. In 1689 he was appointed president of the council by William III., and in 1694 was created duke of Leeds. Died July 26, 1712.

Dan'by's, a township of Pike co., Ala. Pop. 1743.

Dance of Death [Mediæval Lat. *chorea Machabæorum;* Fr. *la danse Macabre* or *la danse des morts;* Ger. *Todtentanz*], an allegorical representation of the power of Death over all classes and conditions of men. The name "Dance of Death" is derived from the mocking activity usually displayed by the skeleton figure of Death as he leads away his victims. As for the name "Macabre" sometimes given to this subject, it has much puzzled scholars, and has produced many absurd etymologies. The only one of these that needs to be noticed is that which connects the word with the Maccabees of the apocryphal Old Testament. These seven martyrs for the Law were never popular nor much known in the Western Church, and their legend has nothing in it that connects them with this subject. The most reasonable explanation of the origin of the word is that it is derived from the Egyptian anchorite Macarius, one of the most famous of the hermit-saints. His legend connects him directly with warnings of death to the living. Though, as he was a Greek saint, his pictures are rare in the West, yet he is twice represented in the cemetery of Pisa—the Campo Santo—once by Pietro Laurati, and again in the fresco attributed to Orcagna and mentioned below. Vasari expressly tells us that the aged saint who is showing the three dead bodies to the hunting-party was meant for Saint Macarius; and it is possible that his name may in time have come to be applied to the subject of which this fresco is a famous illustration.

Traces of the idea which was the foundation of the mediæval acted dramas and pictured or sculptured representations of this subject are to be found in Italo-Greek and Roman antiquity. Douce says that on a sarcophagus found near Cumæ are sculptured three dancing skeletons, and that the same subject is on a Roman lamp and in a Pompeian fresco. On an antique gem in the Royal Gallery at Florence there is engraved an old man piping to a dancing skeleton; and though the introduction of the skeleton is rare, yet it is common enough to find on the Roman sarcophagi such representations of life interrupted by death as will abundantly connect the moralizing of those times with that of the Middle Ages. Probably the earliest of the modern treatments of this subject were in the form of dramatic representations—moralities—acted in churches. As early as 1453 a Dance of Death is recorded to have been acted in the cathedral of Besançon after mass, and we may suppose that this was not the only instance. Originally, it would seem that the "Dance of Death," which, in the fifteenth and sixteenth centuries, was made to include a considerable number of people, was restricted to a few. As early as the thirteenth century there appeared a French poem called "Li Trois Mors et li Trois Vis;" that is, "Les Trois Morts et les Trois Vifs." "This poem relates that three noble youths when hunting in a forest were intercepted by the like number of hideous spectres or images of Death, from whom they received a terrific lecture on the vanity of human grandeur." (*Douce.*) In 1335, Orcagna painted in the Campo Santo at Pisa his Triumph of Death, one of the earliest pictures of this subject, where three kings, with their ladies, companions, and servants, returning from hunting, come suddenly upon three open coffins containing the bodies of three persons, one of them a king, in various stages of decay. In his "Pardoner's Tale" Chaucer has also introduced a most powerfully imagined variation of the same theme. Death (for so we understand it), under the disguise of an old man, appears to three riotous young men who in their bravado are in search of Death, to destroy him in punishment of his many murders, and directs them to a certain tree in the forest where he says he had left him sitting. They find him there in an unlooked-for fashion.

The "Dance of Death," whether as a series of pictures showing the skeleton conqueror carrying away popes, kings, cardinals, bishops, priests, abbots and abbesses, nuns, queens, ladies, and lords, the bride and the bridegroom, judges and scholars, merchants, warriors, ploughmen, market-women, and little children, or only a selection of a few of these, was painted "not only on the walls, but in the windows of many churches, in the cloisters of monasteries, and even on bridges, especially in Germany and Switzerland. It was sometimes painted on church-screens, and occasionally sculptured on them, as well as on the fronts of domestic dwellings. It occurs in many of the manuscripts and illuminated service-books of the Middle Ages." (*Douce.*) It is also found carved in wood, and made the subject of tapestries; and in one of Holbein's finest drawings in the museum at Bâle it is used to decorate a dagger-sheath. The subject had a wide popularity, and examples abound in England, Germany, and France, but fewer in Italy, and, so far as we know, none in Spain, though mention is made by some writers of an example in the palace of St. Ildefonso. (Qu. *bishop's* palace at Alcala?) Mr. George Street, however, a most careful and accurate observer, in his "Gothic Architecture in Spain" does not mention a single picture or sculpture of this subject. Douce gives a list of places where Dances of Death were painted, and among them we find Paris, Dijon, Bâle, Lübeck, Anneburg, Erfurth, Lucerne, Amiens, Rouen, Fécamp, Strasbourg, London, and Salisbury, with others less important. Most of these have disappeared; the one still to be seen on the old bridge at Lucerne has been very much repainted. Douce considers the oldest mentioned example to be that executed for the church of the Innocents at Paris in 1434. Among the most famous ones was that at Bâle (long erroneously attributed to Holbein, who was not born till near a half century after it was painted) in the cloister of the Dominican monastery. Tradition says that this was made between 1431 and 1443, at the instance of the prelates who assisted at the great Council of Bâle, and in allusion to a plague that raged at one time during its sitting. The monastery, having fallen into decay, was destroyed in 1806 to make room for certain municipal improvements, and the frescoes went with it. But, perhaps, what keeps the name of the Dance of Death most securely

in men's minds is the series of wood-cuts indissolubly connected, whether rightly or wrongly, with the name of Holbein. These cuts originally appeared in a book of which the following is the title: "Les simulachres et | historiées faces | de la mort autant ele | gammēt pourtraictes que artifi | ciellement imaginées. A Lyon Soubz lescu de Cologne | M.D.XXXVIII. 4to;" and at the end, "Excudebant Lugdu | ni Melchior et | Gaspar Trechsel | fratres 1538." In the first edition above cited there were only forty-one cuts; in later editions, which followed one another with great rapidity, they were increased, until in that of 1547, also published at Lyons, there were forty-nine. Holbein's relation to these cuts is still, after much laborious and learned investigation, very obscure: it may be that we owe nothing to him but a more artistic draughtmanship, by which new life was given to the old compositions, and it is at least possible that he had no hand in them whatever. (See PEIGNOT, "Recherches sur les Danses des Morts," Dijon and Paris, 1826; "The Dance of Death," with a Dissertation, etc. etc., by FRANCIS DOUCE, London, 1833; LANGLOIS, "Essai historique, philosophique, et pittoresque sur les Danses des Morts," 2 vols., 50 plates, Rouen, 1852; MASSMANN, "Literatur der Todtentänze," Leipsic, 1841. "La Danse Macabre: Histoire fantastique du XV. Siècle," by PAUL LACROIX, 1832–38, sometimes cited as an authority, is only a romance after the manner of Hugo's "Notre Dame.") CLARENCE COOK.

Dan'cing, a succession of rhythmical movements of the body, often accompanied by music. Dancing is of very early origin. The ancients constituted it a part of their religious observances, and danced before their altars and the images of their gods. The ancient Egyptians ascribed its invention to their god Thoth. All the different passions were expressed in dancing by the Greeks, and the dance of the Eumenides or Furies was so expressive of vengeance that it inspired the beholders with terror. The attitudes of the public dancers were studied by the Greek sculptors in order to delineate the passions. Aristotle ranks dancing with poetry. The Spartans were required to train their children in this art from the age of five. This was publicly done, to train them for the armed dance, and was accompanied by songs or hymns. In ancient times, dancing in private entertainments was performed by professionals. The Romans counted it disgraceful for a free citizen to dance except as a religious rite.

In Egypt there are dancing and singing-girls, who improvise verses and are called *almeh*. In India there are nautch- (nâtch-) girls, who dance on public occasions. Among savages dancing is still used as a religious rite or as a sort of state ceremony on important occasions. Among civilized nations it is a frequent mode of recreation. By many it is believed to have immoral tendencies, and is doubtless liable to serious abuse.

Dancing Ma'nia, an epidemic disorder of the fourteenth, fifteenth, and sixteenth centuries, similar to chorea. It is supposed that much imposture prevailed in many forms of this epidemic, but there were also many cases in which the subject entirely lost control of the will. This disorder is even now known in Abyssinia. Something similar to it in Italy was ascribed to the bite of a spider called the tarantula, but its greatest prevalence was in the cities of Germany during the Middle Ages. At Aix-la-Chapelle, in 1374, there appeared on the streets crowds of dancing men and women, apparently excited thereto by the frantic demonstrations at the festival of St. John. The dancers were said to be unobservant of outward things, but sensible of visions. They appeared to lose all self-control, and would dance till they fell as if dead, and would sometimes beat out their brains upon the ground. The mania extended to the Low Countries, as well as Cologne, Metz, and Strasburg, and caused much demoralization. Exorcism was at first found remedial, and cold water, as applied by Paracelsus in the sixteenth century, was very efficacious. At the beginning of the seventeenth century the St. Vitus's Dance, as the disorder was then called, was abating, and is now almost unknown. The "St. Vitus's Dance" of our day is CHOREA (which see). The excesses of the French "prophets" of the last century and the convulsive disorders sometimes seen in the camp-meetings of our own country are probably of similar character with the dancing mania. (See J. F. C. HECKER, "Tanzwuth," 1833, translated into English by B. G. Babington, M. D.)

Dan'delion [from the Fr. *dent de lion*, "lion's tooth," probably from the shape of its leaves; Ger. *Loewenzahn*], the *Taraxacum dens-leonis*, an herbaceous plant of the natural order Compositæ, with a perennial fusiform root. The leaves spring immediately from the root, are long, feather-shaped, with the divisions toothed, smooth, and of a fine green color. The plant grows spontaneously in most parts of the globe. The leaves when very young are tender, and are often used as a potherb, and it is cultivated and brought to market in considerable quantities for this use. It is a popular remedy with many medical practitioners in this country and Europe, having gentle tonic powers. The root is sometimes prepared and ground with coffee, the taste of which covers that of the dandelion.

Dan'dolo (ENRICO), a celebrated Venetian statesman and general, born in 1108. He was eminent for learning and eloquence. In 1192 he was elected doge of Venice, the maritime power of which he greatly increased. He also extended the bounds of the republic in Dalmatia and Istria. Having formed an alliance with the leaders of the fourth crusade, he furnished vessels to transport their army to the Levant in 1201, and took command of the combined forces. They attacked Constantinople, and took it by storm in 1204. The throne was offered by the crusaders to Dandolo, but he declined it. He was blind in his old age. Died June 1, 1205.

Dan'dridge, a post-village, capital of Jefferson co., Tenn., on the French Broad River, 30 miles E. of Knoxville.

Dane, a county in S. Central Wisconsin. Area, 1235 square miles. It is bounded on the N. W. by the Wisconsin River, and drained by the Catfish, which is the outlet of the Four Lakes. These lakes, the largest of which is 6 miles long, lie near the middle of the county. The surface is finely diversified by hills and prairies; the soil is fertile. Cattle, grain, potatoes, wool, tobacco, hay, butter, etc., are produced. The manufactures include wagons, harnesses, and flour. It is intersected by the Milwaukee and St. Paul and the Chicago and North-western R. Rs. Capital, Madison. Pop. 53,096.

Dane, a township and post-village of Dane co., Wis. Pop. 1043.

Dane (NATHAN), LL.D., an American jurist, born in Ipswich, Mass., Dec. 27, 1752, graduated at Harvard in 1778. He was one of the most able lawyers of New England, and a member of the Continental Congress in 1785–88. In 1787 he framed the ordinance for the government and organization of the North-west Territory, in which he inserted a clause prohibiting slavery. He served in the State senate for several years (1794–98). He published "An Abridgment and Digest of American Law" (9 vols., 1823–29). In 1829 he gave $15,000 to Harvard College, to found the Dane professorship of law. Died Feb. 15, 1835.

Da'negelt, or **Danegold** (*i. e.* "Dane-money" or "Dane-tax"), a tribute of one shilling levied on every hide of land by the Anglo-Saxon kings for the purpose of defending the country against the Danes. It was subsequently increased to two shillings, and was continued to the reign of Stephen.

Da'nelag [an Anglo-Saxon term signifying "Danish law"]. Under the later Saxon and earlier Norman kings of England this name was applied to fifteen or more counties of the north and east of England, where the Danish language and customs prevailed in consequence of the invasions and conquests of that race.

Dan'forth, a township of Washington co., Me. P. 313.

Dan'iel ("God is Judge," or "God will judge"), one of the four greater Hebrew prophets, was a youth when he was carried with many other Jewish captives to Babylon in 605 A. D. Whether he was of royal, or only of noble descent, cannot be determined. He was educated at the court of Nebuchadnezzar, and was eminent for learning and wisdom. His skill in the interpretation of dreams procured for him the favor of the king, who appointed him governor of the province of Babylon and chief of the Magi. He explained the handwriting on the wall at Belshazzar's feast about 538 B. C. After the capture of Babylon by the Medes and Persians, Daniel gained the favor of Darius the Mede, and was the first of three presidents who had authority over the 120 satraps of the empire. He also "prospered in the reign of Cyrus the Persian," and appears to have remained in Babylon when the other Jews returned to Jerusalem. He probably lived to the advanced age of at least ninety years.

Daniel, Book of, an important canonical book of the Old Testament, assigned by some to the prophetic books, and by others to the Hagiographa or *Chetubim*. (See BIBLE.) The book has commonly been divided into two parts, of six chapters each—the first six historical, the last six prophetical. Some recent critics maintain that the first seven chapters treat of the world-power in relation to the kingdom of God; the last five chapters treat of the kingdom of God, and its development in relation to the world-power. The book is remarkable both for its miracles and its prophecies. The close general correspondence of these prophecies with the recorded facts of history has led some writers to the belief that the book is not the work of Daniel,

as it purports to be, but that it was written by some unknown person at a much later period. This view, which is as old as the time of Porphyry, has been revived and maintained by Collins, Semler, De Wette, Ewald, and others. On the other side, the evidence for the genuineness of the book is satisfactory to the representatives of orthodox theology. Among the points in its favor are the following: 1. The New Testament decidedly affirms its authority in many places. 2. The Maccabean literature and the Septuagint translation show that the book was in existence before the date assigned to it by rationalists (175 B. C.). 3. The book was written partly in Hebrew and partly in the older Chaldee, as might naturally occur at the period when it purports to have been written. This point appears decisive in favor of the genuineness of the work. 4. So far is the book from being a copy of history, that even now the historical application of some of its parts is a matter of controversy. 5. It is remarkably free from the characteristic beliefs of the later Judaism. The exegetic and controversial literature upon the book of Daniel is very extensive.

Daniel (Hermann Adalbert), an eminent German divine and geographer, born in 1812, was until 1870 professor in the pedagogium in Halle. His chief theological works are "Thesaurus Hymnologicus" (5 vols., 1841–56) and "Codex Liturgicus Ecclesiæ Universæ," etc. (4 vols., 1847–54); his best geographical works are "Leitfaden für den Unterricht in der Geographie" (68th ed. 1872) and "Handbuch der Geographie" (3d ed., 4 vols., 1870–71). Died Sept. 13, 1871. (See "H. A. Daniel, ein Lebensbild," 1872.)

Daniel (Peter Vyvian), a lawyer, born in Stafford co., Va., in 1785, graduated at Princeton in 1805. He became a member of the privy council in 1812, and was several times re-elected. He became an associate justice of the Supreme Court of the U. S. in 1841. Died May 31, 1860.

Daniel (Samuel), an English poet, born at Taunton in 1562, was educated at Oxford. He lived in London, where he associated with Shakspeare and Marlowe, and was employed as tutor to Anne Clifford, who became countess of Pembroke. In 1603 he was appointed master of the queen's revels. He wrote, besides other poems, "The Tragedy of Cleopatra" (1594), an historical poem "On the Civil Wars of York and Lancaster" (1595), "Musophilus" (1599), and a "History of England" (1613–34). According to Hallam, "his English is pure, free from affectation and pedantic innovation." Died Oct. 14, 1619.

Dan'iell (John Frederick), F. R. S., D. C. L., an English natural philosopher, born in London Mar. 12, 1790. He published "Meteorological Essays" (1823). In 1831 he became professor of chemistry in King's College, London. He was the inventor of the first form of galvanic battery by which it was made possible to maintain a current sensibly constant for a long period of time, and for this most valuable improvement he received the Copley medal in 1837. In 1839 he published an "Introduction to Chemical Philosophy." His is one of the great names of electrical science. Died Mar. 13, 1845.

Dan'ielsonville (West Killingly Post-office), a borough of Killingly and Brooklyn townships, Windham co., Conn., on the Quinebaug River and on the Norwich and Worcester R. R., 26 miles N. N. E. of Norwich. It has two large cotton-mills, several shoe-manufactories, two weekly papers, one bank, five churches, and excellent schools.

J. Q. A. Stone,
Ed. and Prop. of "Windham Co. Transcript."

Dan'ielsville, a post-village, capital of Madison co., Ga., about 85 miles E. N. E. of Atlanta.

Da'nish Language and Literature. The Danish language in its present shape is the result of a long, generally slow, but at certain periods sudden and almost violent, development of the old tongue, which as late as 800 years after Christ was spoken with very slight modifications throughout the whole of Scandinavia, and which still exists as a living language in Iceland. The two most remarkable periods of its development fall in the latter part of the sixteenth and the latter part of the eighteenth century. In the first epoch the Reformation, in the latter the French Revolution, brought the whole mental life of the Danish people in such a commotion that ampler means of expression became necessary. New words burst forth with new ideas; new forms followed the new logic; new phrases blossomed with the new passions. In both cases the German language served as a pattern, but its influence was in both cases legitimate and highly beneficial. The Danish language stands to-day as an original and self-consistent growth, as an independent and well-defined organism. It has a great part of its vocabulary in common with the German language, but the forms of the words are so differently cast that only the scholar can recognize the kindred material. Its grammar and phrases are singularly like those of the English language; a Danish book translated word by word would give readable English, while the same process would produce only nonsense in the German language. Its style is more precise, but less pathetic, than that of the German language; more truthful, but less brilliant, than that of the French; more fanciful, but less sympathetic, than that of the English. It is not a beautiful language, but it is a highly developed one. Its speech has a monotonous sound, its main vowel being a mixture of *a* and *e*, and its most characteristic consonant a weak *d*; but its rhythm is capable of a most delicate and infinitely varied modulation. A foreigner can never learn to speak it with elegance, and even the native who resides for a long time among foreigners loses the most impressive graces of its accent.

The Danish literature began immediately after the Reformation, and began on such a scale as to make the student expect an Elizabethan era. The Bible was translated; the history of the country was written; the old popular songs, which had been composed two or three centuries earlier, and handed down by tradition from generation to generation, and which at this very day constitute an important element of Danish civilization, were collected and printed in a remarkably clever edition. Great scientists whom the world has heard of appeared; Tycho Brahe made his observations, and the tables he left furnished the material from which his disciple Kepler abstracted the famous laws which bear his name; Niels Hemmingsen was a sharp and subtle theologian of a singularly pure and powerful mind. Comedies and tragedies were written both in Latin and Danish, and performed with great splendor in the streets of the great towns by the students of the colleges, to the instruction and amusement of the population. In every field of literature and art there were activity and energy. But this splendid beginning ended in a sudden and utter failure. Niels Hemmingsen was condemned to silence, Tycho Brahe was exiled, the stage grew dumb, and the songs which were gathered from the lips of the people mouldered on the shelves of the library. For two centuries there was no Danish literature, except the king's orders for new taxes and the queen's bill of fare for sumptuous court-dinners; and both were written in German. Now and then a great scientist appeared, as Thomas Bartholinus, the celebrated anatomist, and Ole Rómer, who figured out the velocity of light. Now and then a little song flew out, or an awkward endeavor was made of imitating some classical pattern. But these feeble tokens of life make only the general misery more conspicuous. It was two centuries before literature in Denmark took a new start, but then it did it with success, and Ludwig Holberg (1684–1754) became the founder of a great and noble literature, which has proved a highly beneficial instrument in educating and elevating the Danish people.

Holberg was a Norwegian by birth; his ideas were English and his patterns French, but the materials he used were exclusively Danish, and he handled them with such a penetrating power of understanding, with such a happy talent for interpretation, and with such a superiority of judgment, that it has been said of him, with truth, that if the whole of Denmark were swallowed by the ocean, and nothing left but Holberg's comedies, the world would have a perfectly clear and exhaustive idea of Danish society at that time. It is evident, however, that an author must be possessed of original ideas which take hold of the minds of the people, and original patterns which express the people's taste, if he really shall create a literature, form a literary school, and awaken the slumbering genius of the nation. But with Holberg both ideas and patterns were borrowed, and died out among the Danes with him; and when he, nevertheless, is called the father of the Danish literature, it needs a little explanation. Holberg did not create a literature, but he created a public. He aroused the attention of the people for literary affairs. He taught them how to use a book as a means of education and enjoyment. He wrote exactly what they needed and liked, and whenever the interest slackened a little he whipped them with his satire until their attention was fully awake. There were ten readers in Denmark when he began; there were ten thousand when he finished. Next, he did not call forth new authors, but he made authorship possible. Before his time an author in Denmark was a beggar who tried to win a patron for his book by a high-flown dedication, and who was paid for his work by a miserable alms from the patron. Holberg brought his books to the market through a bookseller, without any patron or dedication, and the immense success with which his courage was rewarded made authorship a profession and bookselling a trade in Denmark. Finally, in his comedies, he gave the Danish literature one of its finest treasures. They are an inexhaustible source of refreshing and invigorating enjoyment. His characters are not deep; they lack psychology; but they are well defined and sharply drawn,

and they carry along with them an historical significance which makes them highly interesting. His expressions are not elegant, but they are exceedingly witty, and they have a fluency and abundance which in the mouth of a well-trained actor make them sound like a merry song. His plots are without interest, considered as pictures of life, but they are eminently well fitted for showing off the character by help of the situation, and peals of laughter always accompany the performance of these plays.

The period following immediately after Holberg's death was very curious—talents which ran wild and passions which fought against their own ideas; great exertions ending with bagatelles, and great energies producing nothing but noise; passionate debates about trifles, and sentimental wailings about nonsense; and all this done in the greatest good earnest, and with the fullest confidence that it was great. But the period is very interesting when viewed as a time of preparation; for so it was. Just with the new century he appeared who in the full sense of the word is the father of the Danish literature—he who truly is the representative of the genius of the Danish people—Adam Oehlensläger (1779–1850). Every one of Oehlensläger's earlier works—when he grew older he repeated himself—became a new influence in the Danish civilization; it opened a new mine, and scientists, poets, and artists gathered to work it. In his great epos, "The Gods of the North," and in several tragedies, "Hakon Jarl," "Palnatoke," "Hagbart and Signe," etc., he gave a sublime and, in an artistic respect, perfect representation of the old pagan Scandinavian civilization, and by these works the study of Scandinavian antiquities became a popular interest, and pictures and ideas from the olden times, when Scandinavia was one, became an essential part of every man's education in Denmark, Norway, and Sweden; nay, they became a passion in every man's heart; and the political world has already heard something about this passion. In his comedy, "The Play of St. Hans' Night," he gave a most lovely and charming picture of life as it is led by the Danish middle class, and Heiberg, Hertz, Overskou, and Hostrup followed the track with such a power and variety of talent that the theatre of Copenhagen during a whole generation exercised an influence on Danish culture hardly surpassed by that of the university. Most deeply, however, Oehlensläger influenced the Danish people by his "Aladdin;" by this work he touched the moral character of the people. "Aladdin" is a kind of drama which in a series of most brilliant pictures shows the contrast between the born genius who enters the world as he would his own house, and the ambitious, restless energy which toils and conquers only to fail at last. It is true that this book extricated Danish character from much narrow pedantry, in which an antiquated education kept it entangled; but it is also true that it allured the youth into a dream of being born geniuses from which it was hard to awaken.

It must be remembered that contemporary with Oehlensläger lived Thorwaldsen, the greatest modern sculptor; Orsted, the discoverer of electro-magnetism; Rask, the founder of comparative philology; Martensen, the leader of the speculative school of theology; Gade, one of the finest and mightiest composers of our time; and that each of these men had a number of pupils, and each of these pupils an audience. Furthermore, it must be remembered that these exertions in science, art, and literature were made by a people comprising only two millions of souls, two-thirds of which—namely, the whole peasantry—lived in utter dulness, and the remaining third was not possessed of any extraordinary wealth. It will then easily be understood that the literary glory of this period was also a danger. Life became a refinement, instead of a development; illusion took the place of reality. But, fortunately, there came a warning. In a long series of very elaborate writings, Sören Kierkegaard (1813–54) gave a sublime but austere exposition of the fundamental ideas of Christianity, and from this standpoint he criticised the life around him with the most biting sarcasm and an awe-inspiring severity. The effect was a painful silence. A feeling of guilt visited many a heart. But help there was none. Sören Kierkegaard's criticism was crushing, and his ideals were too strong. He would, no doubt, have left the whole Danish civilization prostrate and lame for a long time if it had not contained an undercurrent which he did not see, and which lay outside of his criticism.

But there was from the very beginning of the period a spirit at work—awakened by Oehlensläger, yet deeper than he, nursed by all the fruits which science and art presented, but blended with a passionate craving for reality, and supported by an eminently practical talent. Bishop Grundtvig (1784–1871), a great poet, a great scholar, a great preacher, but greatest as a character, was the representative of this spirit. For nearly half a century he and his disciples kept aloof from the general current of events, and lived as an obscure party. But when the day of collapse came, he stood in the gap with the means of reconstruction. He found two powerful allies, kindred natures, though not disciples, in Carl Ploug, Denmark's greatest lyrical poet, and a most eloquent newspaper writer, and Rasmus Nielsen, a thinker of rare acuteness and a most brilliant lecturer. Both these men, like Grundtvig himself, were men not only of literary talents, but of great literary merits; but literature was to them not an aim, but an instrument. The idea was to throw away all finery, all that had not vigor and breadth enough to become public property; to make religion and patriotism the basis of civilization, and living influence and practical consequence the test of all its elements; and then by an extensive scheme of education to lift the whole mass of the people up into this reconstructed civilization. And this idea was accepted with such an enthusiasm, and its realization inaugurated with such success, that the small tablet on which the Danish people records its life, is, in this moment, one of the most interesting parts of the great picture of modern civilization.

CLEMENS PETERSEN.

Dan'ites, among the Mormons of Utah, a secret organization of men who are believed to have taken an oath to support the authority and execute the commands of the leaders of their sect at all hazards. Many massacres, robberies, and murders, committed during the earlier history of Utah, are ascribed to the Danites.

Danka'li, an independent state of Abyssinia, is bounded on the N. E. by the Red Sea, and on the S. W. by a range of mountains. It is about 250 miles long. The climate is very hot; the soil is arid and poor. The inhabitants are ferocious, treacherous, and fanatical Mohammedans. They number about 70,000.

Dan'nebrog [etymology uncertain], the ancient battle-standard of Denmark, bearing the figures of a cross and crown. It was fabled to have fallen from heaven at the battle of Volmar in Esthonia (1219) during a crusade against the heathens. It was twice taken in battle and twice recaptured. In 1500 a mere fragment remained.—The ORDER OF THE DANNEBROG is the second of the Danish orders of knighthood. It is said to have been founded in 1219, but fell into decay, and was restored in 1671.

Dan'necker, von (JOHANN HEINRICH), a German sculptor, pupil of Pajou in Paris and of Canova (1785–90) in Italy, born near Stuttgart Oct. 15, 1758. Having returned to Stuttgart in 1790, he was appointed professor of sculpture. He produced admirable busts of Schiller, Lavater, and other men of his time. He excelled in the expression of individual character. Among the best productions of the Canova classicism are his Ariadne and Sappho, and a colossal statue of Christ. Died Dec. 8, 1841.

Dannelly (JAMES), a minister of the Methodist Episcopal Church South, born in Georgia Feb. 4, 1786. He joined the South Carolina Conference in 1818. He was of the Boanerges type, and labored extensively and successfully in North and South Carolina and Georgia. He died in South Carolina April 28, 1855. T. O. SUMMERS.

Dannemo'ra, a post-township of Clinton co., N. Y. It contains the Clinton State prison, and has mines of iron ore. Pop. 1512.

Dan'nevir'ke (the "Danish Work"), a boundary-wall in Sleswick, built by the Danes against the Franks about 808, from the Baltic to the North Sea. The original line can be traced from the town of Sleswick to Hollingstedt. The line of the Dannevirke was restored in 1848 by a system of strong fortifications known as the "Great" and the "Little Dannevirke." They were evacuated by the Danes Feb. 5, 1864, and destroyed by the allies.

Dan River, a township of Caswell co., N. C. Pop. 1910.

Dan River, a township of Patrick co., Va. Pop. 2778.

Dan River, a township of Pittsylvania co., Va. It contains the city of Danville. Pop. 10,306.

Dans'ville, a post-village of Ingham township, Ingham co., Mich. Pop. 443.

Dansville, the largest town in Livingston co., N. Y., situated at the head of the Genesee Valley, and the present terminus of the Dansville and Avon branch of the Erie R.W. It contains a hygienic institute, eight churches, one seminary, three banks (one national), two weekly newspapers, two paper-mills, mower and reaper works, a woollen mill, a foundry, a pail-factory, and tanneries. P. 3387; of North Dansville township, 4015. F. J. ROBBINS, ED. "EXPRESS."

Dansville, a township of Steuben co., N. Y. P. 1981.

Dan'te Alighie'ri, one of the greatest of poets, was the son of a lawyer in Florence, in which city he was born May 14, 1265. Boccaccio, whose life of Dante, first published in 1477, is the best authority we have on the subject, says that Dante was of Roman origin, of the stock of the Frangi-

pani, one of whom, by the name of Eliseo, came to Florence and settled there, founding the family of the Elisei. A descendant of this founder, named Cacciaguida, married a lady of the Aldighieri family of Ferrara, and giving the name of his wife's family to one of his children, it came about that they substituted it for their own family name. After a time the *d* was dropped, and the name became Alighieri; and Boccaccio says it was spelled so down to his own day. But it has been variously spelled in later times; among the changes that have been rung on the original, that of *Allighieri* is the most common. The arms of the family—a golden wing (*ala*) on an azure field—would seem to be, as is so often the case, a pun upon the name, and to fortify the old spelling. The name of Dante, by which the poet was baptized, is commonly said to be an abbreviation of Durante, but Boccaccio says nothing of this, and at the end of an eloquent enumeration of the gifts Italy had received from Dante, he somewhat obscurely plays upon the name, intimating that no other than that of the "giver" (*dante*) would become him.

Little is known of either the father or mother of Dante. His mother's name is said to have been Bella, and she was his father's second wife. His father died while Dante was yet a child, but he seems to have been carefully instructed, and he had such a leaning to books, and such an aptitude for study, that in the end he became master of all the learning of his time. Among his teachers was Brunetto Latini, a distinguished grammarian and the author of two poems, "Il Tesoro" and "Il Tesoretto," and he is believed to have studied at the universities of Padua and Bologna. He delighted in music and in painting; among his friends were the musician Casella and the painter Giotto, both of whom he celebrates in his great poem; and in the "Vita Nuova" he speaks of himself as on one occasion drawing an angel on a tablet while thinking of Beatrice.

When he was nine years old he first saw Beatrice, the daughter of a wealthy Florentine, Folco Portinari, a child of eight years. Dante has described his mystic love for Beatrice in that most exquisite poem the "Vita Nuova," and she appears again in his "Divine Comedy" as his guide through Paradise. This love never found its earthly close; and there have not been wanting those who declare that it was a purely imaginary worship of an imaginary being, the Beatrice of the "Vita Nuova" and of the "Paradiso" not having been Beatrice Portinari at all. However this may be, Beatrice Portinari married Simone de' Bardi, and died in her twenty-fourth year. Dante himself married, in his twenty-sixth year, Gemma, a lady of the powerful family of the Donati.

Our knowledge of his life is at best but fragmentary. He fought in the battle of Campaldino, in which the Florentines defeated the men of Arezzo, and he was with his countrymen again when they took Caprona from the Pisans. There are traditions that he studied medicine and that he entered the Franciscan order, but there is no certain foundation for these stories, any more than for the many others that have been devised to fill up the gaps in the obscure story of his life. In the great contest between the Guelphs and the Ghibellines, Dante at first sided with the former: he was a Guelph by birth and education, and he had fought on the two occasions we have mentioned with the Guelphic party in Florence against the Ghibellines of other cities.

In 1300, when he was in his thirty-fifth year, he became chief of the Priori—public officers who held office only for two months. While he was in office a local dispute split the Guelph into two subdivisions, calling themselves the Bianchi (*whites*) and the Neri (*blacks*). In the rage of party the Neri proposed to appeal to Charles of Valois, then fighting for the pope against the emperor, but the Bianchi, to which faction Dante belonged, opposed the measure, and he induced the Priors to settle the question by banishing the heads of both parties. Of course this made both factions his enemies; the Bianchi charged him with favoring the Ghibellines, and the Neri with favoring the Bianchi, and it had an ill look for Dante that the Bianchi were allowed to return to Florence before their time of exile had expired. The excuse was, that the place they had been banished to was unwholesome, and, indeed, Dante's friend, Guido Cavalcante, died there; besides, Dante declared that he was no longer in office at the time of the recall.

The demand for the mediation of Charles still being loud, Dante was sent as ambassador to Pope Boniface VIII. to urge him to discountenance the project. But the pope deluded Dante with vague promises, and secretly gave his voice for Charles, so that the Bianchi lost ground. The Neri, gaining power and influence, became masters of the city, and at once proceeded with all the cruelty of party against the absent Dante, denouncing him as a peculator, fining him in a large amount, and banishing him for two years. Later he was condemned to perpetual banishment, and threatened with burning at the stake if he should dare to return to Florence.

After wandering far and wide, destined never again to see his wife, living upon the hard charity of some and the cold hospitality of others, he sought the roof of one who seems to have been a true friend, Guido Novello da Polenta of Ravenna, and, after fifteen years of exile, died there in 1321, on the 14th of September, in his fifty-seventh year. Of his children by Gemma Donati, three sons died young, a daughter entered a convent, and two sons, Jacopo and Piero, followed their father into exile, and gained some reputation as scholars in Ravenna, where the race, according to Leigh Hunt ("Stories from the Italian Poets"), though extinct in the male line, was still surviving in 1846, through a daughter, in the noble house of Serego Alighiari.

In his long and weary exile Dante's steps have been reverently traced through many cities of Italy, and even beyond her boundaries as far as Paris, and even to Oxford. That he ever saw England there is no good reason to believe, and the visit to Paris rests upon the slenderest evidence, though there seems some likelihood that he visited France. He describes the tombs at Arles as if he had seen them, and the dikes of Flanders; and if he really went so far north, he would hardly have failed of Paris, where were those miniature-painters, speaking of whom he says "they call their art 'illuminating' in Paris." In Italy they point out his haunts at Siena, at Arezzo, in Bologna, and doubtfully in other places, and unhappily too truly in Verona, with Can Grande della Scala, and at last in Ravenna, where his bones still repose, though repentant Florence has asked for them again and again in vain. Once in his lifetime she gave him leave to return, on condition of paying a certain sum of money and asking forgiveness—conditions which he justly refused and nobly resented.

From Boccaccio's life of Dante we give a few particulars of the poet's appearance and habits; if we had space we should like to translate also the remarkable story Boccaccio tells illustrative of his power of mental concentration—a match for Alcibiades' famous story of Socrates (Plato, "The Banquet"). Unhappily, no portraits of Dante exist from which we can get an accurate notion of how he looked. The portrait painted by Giotto in the Palazzo dell' Podestà at Florence, in which Dante was represented between Brunetto Latini and Corso Donati, is so defaced that it is virtually lost, nor do any good copies of it exist. In the church of Santa Croce at Florence there is an altar-piece by Giotto, in which is a portrait of Dante, but it is small and so difficult to be seen that its existence is hardly known. The well-known mask of Dante, said to have been taken after death from the poet's face, though it has been the foundation of all the later pictures of Dante, and may well serve as a likeness, since it is every way characteristic, is of doubtful authenticity. Its origin cannot be certainly traced, and it is doubted if the art of casting in plaster was known so early. Perhaps the best portrait of Dante is preserved in the following description by Boccaccio: "Our poet was of middle stature, and after he reached mature age went somewhat stooping. His movements were grave and full of mansuetude. He went always clad in plain garments of such a fashion as became his years. His face was long, with an aquiline nose, and eyes rather large than small; his jaw was large, and the under lip protruded beyond the upper. His complexion was dark, and both his hair and his beard were thick, black, and crisp, and in his aspect he was always melancholy and brooding. By which it came to pass that one day in Verona (the fame of his works, and especially of that part of his Comedy which is called Hell, having gone abroad and become known to many men and women) he was passing before a door where several women were sitting, when one of them in a low voice, yet not so low but that he and those who were with him heard it, said to the other women, 'Look at that man, who goes down to hell, and comes back again when he pleases, and brings news of those who are down there!' To which speech one of the others answered in good faith, 'I believe that what you say is true; don't you see how his hair is crisped and his complexion browned by the heat and the smoke below?' In his eating and drinking he was most temperate, taking food only at the ordinary hours, and then never passing the bounds of necessity, nor showing any excess of liking for one kind more than for another."

Besides the "Vita Nuova" and the "Commedia," to which the epithet of "Divine" was given later by some editor, the title given by Dante being "The Comedy of Dante Alighieri, a Florentine by birth, but not by manners," Dante wrote a treatise on the vernacular tongue, "De Vulgari Eloquio," a commentary on some of his own minor poems, "Il Convito" ("The Banquet"), and a trea-

tise "De Monarchia," in which he eloquently advocates the cause of the empire as against the pope.

Books on Dante and his poem are in such number that the mere mention of their titles would fill pages. At the end of our article on the "Divine Comedy" the reader will find the names of the principal editions and translations. Works more especially relating to Dante himself are Boccaccio's "Vita di Dante," 1544; the notes and appendices to Longfellow's translation of the "Divine Comedy;" Ampère's "Grèce, Rome, et Dante;" Leigh Hunt's "Stories from the Italian Poets;" the introduction to W. M. Rossetti's translation of the "Inferno;" and the introduction to J. A. Carlyle's noble translation of the same; T. Carlyle's "The Hero as Poet" in "Heroes and Hero Worship;" and in French, besides Ampère's interesting essay above mentioned, the sections on Dante in the "Histoire Litteraire de la France au quatorzième siècle, par Victor le Clerc," Paris, 1865, short but full of meat; and, in an entirely different sort, Balzac's "Les Proscrits," of which Dante at Paris disputing with the Churchmen is the hero. But a complete account of Dante's life, or what is known of it, is much wanted in English, nor does it exist in any language.

As we close this article the great work on which Prof. Ferrazzi has been so long engaged is completed, and in it will be found all that is known of Dante and his works, down to the minutest detail—a work in which an Italian worshipper of Dante has labored with a more than German thoroughness and patience. The title is "Enciclopedia Dantesca, di Gius. Jacopo, Prof. Ferrazzi," 4 vols., Bassano, 1871. (See also "Dante secondo la tradizioni e i novellatori," E. Papanti, Livorno, 1873.)

Clarence Cook.

Danton (Georges Jacques), a famous French demagogue, born at Arcis-sur-Aube Oct. 28, 1759. He practised law in Paris before the Revolution. Having a tall stature, a muscular frame, an ardent temperament, and the voice of a Stentor, he was well qualified for a revolutionist and agitator. "Nature has given me," said he, "the athletic form and harsh expression of Liberty." Danton and Marat founded the club of Cordeliers, which equalled or surpassed that of the Jacobins in violence and in hostility to the royalists. In 1791, Danton was appointed *procureur-substitut* for the city of Paris. As a favorite orator of the populace he instigated the bloody insurrection of Aug. 10, 1792, which initiated the Reign of Terror. Danton then became minister of justice, and shared the supreme power with Robespierre and Marat. When the French people were alarmed by the approach of the Prussian invaders, their confidence was restored and their martial ardor excited by a powerful speech which Danton made Sept. 2, 1792, which closed with this phrase: "De l'audace, encore de l'audace, et toujours de l'audace!" Having been elected to the Convention, he resigned the office of minister, and became the leader of the Mountain. He voted for the death of the king, and established in Mar., 1793, the revolutionary tribunal. He co-operated with Robespierre in the destruction of the Girondists, and was a member of the Committee of Public Safety. Robespierre regarded him with jealousy, and resolved to sacrifice him. Danton was aware of, but seemed reckless to his danger. In Mar., 1794, he was arrested and taken before the revolutionary tribunal. When asked his name and residence, he answered, "My name is Danton; my dwelling will soon be in annihilation, but my name will live in the Pantheon of history." He exhibited after his condemnation his usual intrepid demeanor, and was guillotined April 5, 1794. "Nothing," says Lamartine, "was wanting to make Danton a great man except virtue." (See Lamartine, "History of the Girondists;" Thiers, "History of the French Revolution;" Des Jardins, "Vie de Danton," 1851.)

Dant'zic [Ger. *Danzig*], a fortified city and seaport of West Prussia, is on the left bank of the Vistula, 3½ miles from its entrance into the Baltic Sea; lat. 54° 21′ N., lon. 18° 40′ E. It is traversed by the rivers Motlau and Radanne, which here enter the Vistula, and is the terminus of a railway from Berlin, 250 miles to the W. S. W. The mouth of the Vistula is obstructed by sand-bars, which prevent the access of vessels drawing more than nine feet of water. Dantzic is surrounded by walls, and defended by a citadel and outworks. It contains a fine cathedral, commenced in 1343 and finished in 1503; numerous Lutheran and Roman Catholic churches; an exchange; a town-hall; a gymnasium; two grammar-schools; schools of navigation, midwifery, and commerce; a school of arts and trade; an observatory, a public library, a museum, and an arsenal. Excellent timber is exported from this place, and great quantities of wheat out of Poland. The granaries on the Speicher Island, on which fire is prohibited, are capable of storing two to three millions of bushels. Much of this grain comes down the Vistula and Bug on rude floats. The exports amount to $9,500,000 annually. Dantzic was founded in the tenth century or earlier. It was occupied by the Teutonic Knights from 1310 till 1454, when it became a free state under the protection of Poland. It also was for a long time one of the cities of the Hanseatic League. On the partition of Poland in 1793 it was annexed to Prussia. Dantzic has been twice besieged. The first and most famous siege was made by the French in the winter and spring of 1807, after the conquest of Prussia by Napoleon. The remnants of the Prussian army endeavored to defend the strong places of Pomerania. Dantzic was held by 15,000 Prussians and 6000 Russians, provided with 800 pieces of artillery and immense supplies, and commanded by Gen. Kalkreut. The besieging party, commanded by the veteran Marshal Lefebvre, consisted of the tenth army corps and Saxon and Baden troops. The famous engineer Gen. Chasseloup de Laubat directed the siege operations. The investment was completed Mar. 14, 1807. Gen. Kalkreut, after a vigorous defence, during which the allies vainly made attempts to raise the siege, capitulated on the 21st of May to avoid an impending assault. The utmost skill of the French engineer and the science of the French artillerist were illustrated in this siege (carried on over frozen ground, and with the trenches sometimes filled with snow), which sustained and enhanced the reputation they had already acquired throughout Europe. Marshal Lefebvre was created duke of Dantzic; "the French annals had not before furnished an instance of so brilliant a recompense. Napoleon in this followed the example of the ancients, who bestowed upon their generals the names of the places or the nations of which she had made conquest."

The second siege was more properly a blockade made by the allies (Prussians and Russians) in the winter and spring of 1813 after Napoleon's disastrous Russian campaign. Gen. Rapp, commanding the tenth corps, held the place, and brilliantly maintained himself until the cessation of hostilities (June 10) under the armistice concluded between Napoleon, Alexander, and the Prussian king. Pop. in Dec., 1871, 89,121. Revised by J. G. Barnard, U. S. A.

Dan'ube [anc. *Ister* and *Danubius;* Ger. *Donau;* Hun. *Duna*], a river of Europe, inferior in size only to the Volga, is formed from the union of two streams, called the Brigach and Brege, which rise in the eastern part of the Black Forest, in lat. 48° 6′ N. and lon. 8° 9′ E., 2650 feet above the level of the sea. The Danube is from 1750 to 1850 miles long, and drains an area estimated at 300,000 square miles. The average fall of the river is eighteen inches per mile. It is joined in its course by over fifty navigable rivers. Flowing in a north-easterly direction from its source, through Würtemberg and Bavaria, it passes Ulm, where it becomes navigable for vessels of 100 tons. From the S. it receives the Iser and the Lech, flows past Ingolstadt to Ratisbon, then proceeding in a south-easterly direction, enters Austria. In its course eastward to Presburg, the Danube receives from the S. the Inn and the Ens, and from the N. the March. In the neighborhood of Vienna and Linz its waters often divide and form islands, among which are the Great and Little Schütt, sometimes called the Golden Gardens. After leaving Presburg its course changes to the S. E., and passing Pesth it flows directly S., and enters the Hungarian plain, where it is constantly forming new channels. Leaving Orsova, the Danube passes the Iron Gate, a rocky pass 1400 yards wide. This rapid prevented the upward progress of vessels drawing more than two and a half feet of water. The obstruction having been to some extent removed, vessels of eight or nine feet draught can now pass at certain times of the year. The river farther on forms the boundary between Bulgaria and Roumania. Having received the Sereth and Pruth from the N., and after forming several deltoid islands, it flows eastward into the Black Sea. The mouth by which the greater number of ships enter is called the Sulina. Jetees have recently been constructed here for the protection of shipping. In 1871 the number of clearances at the Sulina mouth was 2224, of an aggregate tonnage of 546,510. The Danube is an important commercial highway, and flows through a grand and picturesque country.

Danube, Regulation of, consists essentially in changing the course of the Danube opposite Vienna, by confining its current to a straight, deep channel along a well-constructed quay, thus diverting it from a broad and intricate system of shallow channels, none of which were conveniently available for navigation to the city. A large area of land will be reclaimed for agricultural purposes, and a fine water-front will be secured. The work was commenced in 1869, under a commission appointed by the government, and is expected to cost not less than 30,000,000 florins, equal to about $15,000,000. W. P. Blake.

Dan'ube, a post-township of Herkimer co., N. Y. Pop. 1324.

Dan'vers, a township and post-village of McLean co., Ill. The village is on the Indianapolis Bloomington and Western R. R., 36 miles E. S. E. of Peoria. Total pop. 1760.

Danvers, a post-town of Essex co., Mass., at the intersection of the Newburyport branch of the Boston and Maine and the Lawrence branch of the Eastern R. Rs., 18 miles N. by E. from Boston. It has one national bank, one savings bank, two weekly newspapers, extensive manufactures of shoes, brickyards, lumber and coal wharves on Porter's River at Danvers Port, eight churches, an iron-foundry, a carpet-factory, a new State insane asylum, etc. There are four post-offices and eight railroad stations in the township. Pop. 5600. ED. "MIRROR."

Dan'ville, a post-village of Shipton township, Richmond co., Quebec (Canada), on the Grand Trunk Railway, 87 miles E. by N. of Montreal. It has a weekly newspaper. Pop. about 600.

Danville, a post-township of Morgan co., Ala. Pop. 1159.

Danville, a post-village, the capital of Yell co., Ark., is on the Petit Jean River, about 40 miles from its mouth. It has a church, a school, one flour-mill, and one newspaper. J. B. BEZZO, ED. "ARGUS."

Danville, a city, the capital of Vermilion co., Ill., is situated on the Vermilion River, at the convergence of the Toledo Wabash and Western, the Indianapolis Bloomington and Western, the Chicago Danville and Vincennes, the Paris and Danville, the Evansville Terre Haute and Chicago, and the Danville and Tuscola R. Rs. It has 3 newspapers and 1 magazine, 2 car-shops, 8 hotels, 23 factories, 6 coal-mines, 10 churches, 3 banks (one national), a public park, a free library, and 1 high and 5 graded schools. Pop. 4737; of outside township, 2434. ED. "TIMES."

Danville, a post-village, capital of Hendricks co., Ind., on the Indianapolis and St. Louis R. R., 19 miles W. of Indianapolis. It has one national bank, one private bank, two weekly newspapers, good public buildings, a fine location, and good schools. Pop. 1040.
JOHN N. SCEARCE, ED. "UNION."

Danville, a township and post-village of Des Moines co., Ia., on the Burlington and Missouri River R. R., 13 miles W. N. W. of Burlington. Pop. 1604.

Danville, a post-village, capital of Boyle co., Ky., is on a branch of the Louisville and Nashville R. R., 96 miles S. E. of Louisville. It is the seat of Centre College, the Danville Theological Seminary (Presbyterian), the Southern Collegiate Institute, the Caldwell Female Institute, and a State asylum for the deaf and dumb. It has two national banks and one weekly newspaper. Pop. 2542.
ED. "KENTUCKY ADVOCATE."

Danville, a township of Blue Earth co., Minn. Pop. 557.

Danville, a post-village, capital of Montgomery co., Mo., 80 miles W. of St. Louis. It has one weekly newspaper. Pop. of township, 2254.
L. A. THOMPSON, ED. "THE RAY."

Danville, a post-township of Rockingham co., N. H. It has manufactures of lumber. Pop. 548.

Danville, a post-borough, capital of Montour co., Pa., is on the North Branch of the Susquehanna and on the Lackawanna and Bloomsburg, the Philadelphia and Reading, and the Danville Hazleton and Wilkesbarre R. Rs., 50 miles S. W. of Wilkesbarre and 67 miles N. by E. from Harrisburg. It contains two national banks, one semi-weekly and two weekly newspapers, a large steam printing-office, seven blast-furnaces, six rolling-mills, and numerous other manufactories. Good iron ore, limestone, and anthracite coal are found in the vicinity. Pop. 8436.
BRADLEY & GORDON, PUBS. "MONTOUR AMERICAN."

Danville, a post-village of Caledonia co., Vt., 20 miles E. N. E. of Montpelier, on the Portland and Ogdensburg R. R. It has one national bank, an academy, and a graded school, one weekly newspaper, and manufactures of lumber, woollen goods, and threshing-machines. Owing to its mountain scenery, it is a summer resort. Pop. of Danville township, 2216. N. H. EATON, ED. "NORTH STAR."

Danville, a post-village of Dan River township, Pittsylvania co., Va., on the falls of Dan River, at the terminus of the Lynchburg and Danville R. R., and on the Richmond Danville and Piedmont R. R., 141 miles W. S. W. of Richmond. Leaf tobacco is largely exported. It has one national and two private banks, two weekly newspapers, an iron-foundry, fifteen tobacco-factories, machine-shops, and mills. It is the seat of Roanoke Female College and another female institute. The principal trade is in leaf tobacco. Pop. 3463.
ABNER ANDERSON, ED. "REGISTER."

Daph'ne, a genus of trees and shrubs of the order Thymelaceæ, having a 4-cleft, funnel-shaped perianth, eight stamens, and a 1-seeded succulent fruit. The leaves are sometimes deciduous and sometimes evergreen, and are more or less acrid. The berries are poisonous, but the flowers of some species are beautiful and of exquisite fragrance. The garou bush (*Daphne Gnidium*) of Southern Europe, and the mezereon, both used in medicine, belong to this genus. The spurge laurel (*Daphne Laureola*) is a native of Great Britain. Paper is made in India from the bark of the *Daphne cannabina;* it is called Nepaul paper, and is distinguished for smoothness and durability.

Daphne, a celebrated grove and sanctuary of Apollo, 5 miles S. W. of Antioch in Syria, was frequented by heathen pilgrims and voluptuaries. Here was a temple of Apollo, surrounded by beautiful groves of laurel and cypress trees, gardens, and baths. This place was appropriated to the indulgence of licentious pleasures, and was the scene of an almost perpetual festival of vice.

Daphne [Gr. Δάφνη], in Greek mythology, a nymph beloved by Apollo. To escape from him she besought the aid of the earth, which opened to receive her, and she was transformed into a laurel tree.

Daph'nis [Δάφνις], in Greek mythology, a beautiful youth of Sicily, was the son of Mercury and a nymph of the country. He was reared amid beautiful groves of laurel (δάφνη), whence his name, and was taught by Pan to play on the pipe. He became a herdsman, and tended his herds on Mount Ætna, where he won the love of a naiad, who for his supposed unfaithfulness punished him with blindness. Having prayed his father for relief, Mercury transferred him to heaven. The invention of bucolic poetry was ascribed to him. The story of Daphnis forms the subject of the first idyll of Theocritus, and the name frequently occurs as a character in descriptions of pastoral life.
HENRY DRISLER.

Da Pon'te (LORENZO), an Italian poet, born at Ceneda Mar. 10, 1749. He became Latin secretary to the emperor Joseph II. in Vienna, where he composed several operas. After he had resided for some years in London, he emigrated to New York in 1805. About 1828 he was appointed professor of Italian in Columbia College. He wrote the libretto for Mozart's "Don Giovanni" and other works. Died Aug. 17, 1838.

Dar'abgherd', a town of Persia, in the province of Farsistan, 155 miles S. E. of Sheeraz. It is in an extensive plain, amidst groves of oranges and lemons. It was formerly a large and important city, and now has a population of 10,000 to 15,000.

D'Arblay, MADAME (originally FRANCES **Burney**), an English novelist, born at Lynn-Regis June 13, 1752, was a daughter of Charles Burney, the musician. Burke, Dr. Johnson, Garrick, and other *literati* frequented her father's house and listened to his musical concerts, and in these assemblies she was a silent and diffident spectator. Her first novel, "Evelina," published anonymously in 1778, had a great success. In 1782 she produced "Cecilia." She was second keeper of the robes to Queen Charlotte (1786–91), and wrote an interesting relation of court experience in her "Diary and Letters" (7 vols., 1842–46). In 1793 she was married to Count d'Arblay, a French exile. She died at Bath Jan. 6, 1840.

Darboy (GEORGES), a French ecclesiastic, born Jan. 16, 1813, became in 1839 teacher of philosophy and theology at the seminary of Langres, in 1859 bishop of Nancy, and in 1863 archbishop of Paris. At the Vatican Council he was a decided opponent of papal infallibility, but he recognized it when it was promulgated. On April 5, 1871, he was arrested by the Communists, and when the government troops took the city he was with five others shot at St.-Roquette. Among his prominent works are "Les saintes femmes" (1850), "Les femmes de la Bible" (2 vols., 5th ed. 1859), "La vie de St. Thomas à Becket" (2 vols., 2d ed. 1860).

Dar'by, a township of Madison co., O. Pop. 988.

Darby, a township of Pickaway co., O. Pop. 1548.

Darby, a township of Union co., O. Pop. 1142.

Darby, a post-borough of Delaware co., Pa., on Darby Creek, 7 miles S. W. of Philadelphia, with which it is connected by a horse-railroad. Pop. 1205, or, including Darby township, 2200.

Darby (WILLIAM), an American geographer and statistician, was born in Pennsylvania in 1775. He was an officer under Jackson, serving in Louisiana, and assisted

in the survey of the boundary between the U. S. and Canada. He died at Washington, D. C., Oct. 9, 1854. He was the author of numerous works, among which are a "Geographical Description of Louisiana" (1816), "Geography and History of Florida" (1821), a "Geographical Dictionary," and a number of gazetteers and other works.

Darbyites. See PLYMOUTH BRETHREN.

Darcet (JEAN PIERRE JOSEPH), a French chemist, born Aug. 31, 1777, was the son of Jean Darcet (1727–1801), director of the porcelain manufactory at Sèvres, who established the combustibility of the diamond. He added several useful discoveries to practical chemistry, important improvements in the manufacture of powder and in the composition of bronze and steel, the production of soda from common salt, etc. Died Aug. 2, 1844.

Dardanelle, a post-village of Yell co., Ark., on the Arkansas River, about 80 miles above Little Rock. It has two weekly newspapers, two steam flour-mills, a planing-mill, a steam cotton-gin, four churches, and two public schools. Pop. 926; of township, 1838.

J. B. BEZZO, ED. DANVILLE "ARGUS."

Dar'danelles (anc. *Hellespontus*), called also the **Strait of Gallip'oli,** a narrow channel connecting the Sea of Mármora with the Ægean Sea, and forming a part of the boundary between Europe and Asia. It extends from lat. 40° to 40° 30′ N.; is bounded on the N. W. by Turkey and on the S. E. by Asia Minor, and is about 40 miles long. The width varies from 1 to 4 miles. A rapid current runs from the Sea of Mármora south-westward. The Dardanelles is strongly fortified on both sides by forts and batteries. Two castles on the opposite shores occupy the sites of the ancient Sestos and Abydos. The Hellespont is historically famous for the floating bridges thrown across it by Xerxes the Great. It is scarcely less renowned as the scene of the loves of Leander and Hero, the subject of a famous epic poem by Musæus.

Dar'den (MILES), a person remarkable for his great size, was born in North Carolina in 1798. He was a man of active habits until he was fifty-five years old, when corpulency compelled him to lead a quiet life. He was seven and a half feet high, and weighed at his death over 1000 pounds. Died in Henderson co., Tenn., Jan. 23, 1857.

Dardenne, a township and village of St. Charles co., Mo., on the St. Louis Kansas City and Northern R. R., 30 miles W. N. W. of St. Louis. Pop. 3092.

Dare, a county in the N. E. of North Carolina, bordering on the Atlantic Ocean and Albemarle Sound. It was formed from Currituck, Hyde, and Tyrrel cos. since 1860. Capital, Manteo. Pop. 2778.

Dare (VIRGINIA), the first child born among the English colonists in America, was born at Roanoke (now in North Carolina) in Aug., 1587. She was a granddaughter of the governor, John White. Her fate, like that of all the colony, is unknown.

Da'res, a Trojan, companion of Æneas, distinguished for his skill in boxing. At the games in honor of Anchises in Sicily, Dares challenged all competitors, but was defeated and nearly slain by the aged Entellus.

HENRY DRISLER.

Dares, a priest of Vulcan in Troy, to whom was ascribed an Iliad, written before that of Homer on palm leaves. Ælian states that he knew the work as existing in his own day (150 A. D.), but that work, whatever its character, must have been the production of some post-Homeric writer. There is still extant, under the name of Dares Phrygius, a narrative in prose of the destruction of Troy ("De Excidio Trojæ Historia") in forty-four chapters. A letter prefixed, addressed to the historian Sallust, states that this narrative was translated from the Greek by Cornelius Nepos, who met with the original in Athens. The Latinity shows the production to be of a later age than that of Nepos. It is probably, according to Dederich, a collection of extracts from different sources made in the sixth or seventh century. It was edited, along with "Dictys Cretensis," by Madame Dacier, as one of the volumes of the Delphin classics, Paris, 1680; most recently by Dederich, Bonn, 1835. HENRY DRISLER.

Dar'foor', a country of Central Africa, in the E. part of Soodân, is mostly included between lat. 10° and 16° N. and lon. 26° and 29° E. Its limits are not accurately defined. Area, about 106,000 square miles. The northern part is level, sandy, and nearly destitute of water. A ridge of mountains called Marrah extends through the central part. The soil produces maize, rice, millet, sesame, tobacco, and beans. The rainy season begins in June and continues till September. The people are Mohammedans, a mixture of Arabs and negroes. Darfoor carries on a trade with Egypt by means of caravans, and exports slaves, ivory, copper, hides, and ostrich feathers. Pop. about 4,000,000. It is ruled by a sultan who has despotic power and resides at Tindelly. The chief commercial town is Koffe.

Dar'gan (EDWARD S.), a distinguished lawyer and jurist in Alabama, a native of North Carolina, first taught school, then studied law, and upon being admitted to the bar settled in Mobile. In 1844 he was elected mayor of the city; from 1845 to 1847 he was representative in Congress. He was the first proposer of the line of adjustment finally adopted on the settlement of the Oregon question with the British government. On his return from Congress he was elected judge of the supreme court of Alabama.

Dar'ic [Gr. δαρεικός, said to be derived from Darius], an ancient Persian gold coin, having on the obverse an archer crowned and kneeling, and on the reverse a quadrata incusa or royal palla. Several of these coins are preserved in European collections. The daric is essentially the same coin as the Greek *chrysus* (χρυσοῦς) and *stater* (στατήρ) of gold, and also the Roman *aureus* (which, like χρυσοῦς, signifies "golden"), though the last-named coin appears to have varied more in weight than the Greek stater, averaging about 121 grains. The Daric weighed two Attic drachmæ = 133 grains Troy, or in later times considerably less. It was used in Greece, as well as in Asia. Its value in American gold would be nearly seven dollars, but, owing to the difference of purchasing power in gold at different periods, its true value cannot be accurately stated.

Da'rien, a township and post-village of Fairfield co., Conn., on the New York and New Haven R. R., 35 miles S. W. of New Haven. Total pop. 1808.

Darien, a port of entry and capital of McIntosh co., Ga., is on the Altamaha River, 12 miles from the sea and 60 miles S. S. W. of Savannah. Pine lumber is exported from it. Pop. 547.

Darien, a township and post-village of Genesee co., N. Y., on the Erie R. R., 25 miles E. of Buffalo. Total pop. 2054.

Darien, a township and post-village of Walworth co., Wis., on the Western Union R. R., 50 miles W. of Racine. Pop. 1583.

Darien', Gulf of, a portion of the Caribbean Sea, in the United States of Colombia, is bounded on the W. by the Isthmus of Darien (or Panamá). It receives the river Atrato.

Darien, Isthmus of. See PANAMA.

Darius, eldest son of Artaxerxes Mnemon, was designated by that monarch as his successor to the Persian throne. When Darius was fifty years old, his father, according to custom, asked the king-elect to choose any gift which it was in the father's power to confer. By an established rule such a choice must be complied with at whatever cost. Darius chose Aspasia (or Milto), the beautiful and favorite Greek mistress of his father and of his late uncle, Cyrus the Younger. Though much enraged at this request, the old king promised to leave the matter to the decision of Aspasia, who preferred Darius. The king, however, broke his promise, and devoted the concubine to the service of the gods and to a celibate life. The anger of Darius at this act prompted him to enter into a conspiracy against his father, but the design was discovered and the prince put to death.

Darī'us [Gr. Δαρεῖος; old Egyptian, *Ntreioush;* modern Persian, *Dara* or *Darab;* Heb. *Daryavesh;* old Persian (cuneiform), *Daryuhwsh*] **I.,** or **Darius Hystaspis,** king of Persia, was the son of Hystaspes, a member of the noble family of Achæmenidæ. He was called Gushtâsp in the legends of Persia. He was one of seven noble Persians who conspired against and killed the usurper Smerdis, whom he succeeded in 521 B. C. He married two daughters of Cyrus the Great, and organized the extensive empire which Cyrus and Cambyses had enlarged by conquest. Babylon revolted against him, but was after a long siege reduced to subjection in 516. Soon after this date he conducted a large army against the nomadic Scythians of Europe, whom he was not able to conquer or defeat. He sent a great army to conquer and chastise the Greeks, some of whom had offended him by aiding the Ionians in their revolt against Darius. His army was routed at the great battle of Marathon, 490 B. C. He was preparing to renew the invasion of Greece, when he died in 486 or 485 B. C., and was succeeded by his son Xerxes, who reigned from 486 or 485 to 465 B. C. (See GROTE, "History of Greece.") There is little doubt that at first the name Darius was a title rather than a proper name.

Darius II., called **Darius Ochus,** or **Nothus,** king of Persia, was a natural son of Artaxerxes Longimanus. He married Parysatis, his aunt, a daughter of Xerxes I.

In 424 B. C. he deposed and succeeded the usurper Sogdianus, who had killed Xerxes II., the lawful heir. His reign was ignoble, and disturbed by the rebellions of several satraps. He had sixteen brothers and half-brothers, who were illegitimate sons of Artaxerxes. His character was weak, and he was the slave of the eunuchs of his court. He died in 405 B. C., and was succeeded by his son Artaxerxes Mnemon.

Darius III., surnamed CODOMANNUS, the last king of the ancient Persian monarchy, was a descendant of the preceding. He ascended the throne in 336 B. C., on the death of Arses. In the year 334 his empire was invaded by Alexander the Great of Macedon, who gained a victory at the river Granicus. Darius, commanding in person, was defeated at Issus in 333, and again at Gaugamela, near Arbela, in 331 B. C. He retreated towards Bactriana, pursued by the victorious army, which had nearly overtaken him when he was murdered by Bessus, one of his satraps, in the year 330. The wife and daughters of Darius were captured at the battle of Issus. Alexander married his daughter Statira.

Darius Hystaspis. See DARIUS I.

Darius Ochus. See DARIUS II. (For a good succinct account of these Persian kings, see RAWLINSON, "Manual of Ancient History," 1869.)

Darius the Median. See CYAXARES II.

Darjeel'ing, a sanitary station of British India, in the Sikkim Himalaya, is situated at an elevation of 7400 feet above the level of the sea, on the side of a large basin or hollow in which the river Runjeet flows. It is 308 miles N. of Calcutta, and commands a magnificent view of the snowy ranges of the Himalaya to the N. and W. The climate is salubrious, although the annual rainfall is great—*i. e.* about 120 inches.

Dark Ages, a term somewhat vaguely applied to the period between the fall of the Roman empire and the revival of letters about the thirteenth century. As this revival occurred earlier in Italy than in Northern Europe, the Dark Ages may justly be said to have been of longer duration in the North than in the South. (See MIDDLE AGES.)

Dark Cor'ner, a township of Anderson co., S. C. Pop. 1178.

Darke, a county of Ohio, bordering on Indiana. Area, 609 square miles. It is drained by Greenville and Stillwater creeks. The surface is nearly level; the soil is fertile. Cattle, grain, tobacco, wool, hay, butter, and lumber are produced. Carriages, clothing, saddlery, etc. are manufactured. It is intersected by the Dayton and Union R. R. and the railroad which connects Columbus with Chicago. Capital, Greenville. Pop. 32,278.

Darke (WILLIAM) was born near Philadelphia, Pa., in 1736; removed with his parents to Virginia in 1740; served under Braddock at his defeat in 1755; and served throughout the Revolutionary war in the American army, in the latter part of which he held a colonel's commission. He became an influential citizen and a major-general of Virginia militia, served in Ohio and at St. Clair's defeat (Nov. 4, 1791), acting as lieutenant-colonel of the levies, and fighting with desperate valor against the Miamis. He was dangerously wounded, and his youngest son was killed. Died in Jefferson co., Va., Nov. 26, 1801.

Darkhan', Mount, a lofty granite mountain in Mongolia, in lat. 47° 36′ N., lon. 110° 10′ E., is 140 miles S. E. of Oorga. Here is a monument erected to the memory of Genghis Khan, to honor whom the Mongolians assemble here annually.

Dar'ley (FELIX O. C.), an eminent American designer, born in Philadelphia June 23, 1822. He became a resident of New York City in 1848. He has illustrated the novels of J. Fenimore Cooper, Irving's "Sketch-Book," "Rip Van Winkle," some of the works of Dickens, etc. His outline illustrations of Judd's "Margaret" are among his most remarkable productions.

Dar'ling, a river of Australia, in New South Wales, is formed by numerous branches which rise on the western declivity of the Australian Alps. They converge into a central basin of clay, where their channels unite and separate again into branches in a singular manner. Below the union of these branches the Darling flows south-westward through arid plains, and enters the Murray near lat. 34° S. The main stream is about 600 miles long.

Darling (GRACE), an heroic Englishwoman, born at Bamborough Nov. 24, 1815, was a daughter of the keeper of the Longstone lighthouse, on one of the Farne Islands. She rescued nine persons from the wreck of the steamer Forfarshire, Sept. 7, 1838. A public subscription of about £700 was raised for her. Died Oct. 20, 1842.

Dar'lington, or **Darnton,** a market-town of England, in the county of Durham, on the Skerne, near its junction with the Tees, 18 miles S. of Durham. It has a fine church built in the twelfth century, with a tower 180 feet high. The town is well built, and is connected by railway with Stockton and other places. It has manufactures of Brussels carpets, optical glasses, worsted yarn, and brassware. Pop. in 1871, 27,730.

Darlington, a county in the N. E. of South Carolina. Area, 800 square miles. It is bounded on the N. E. by the Great Pedee River, and intersected by Black Creek. The surface is undulating; the soil is partly sandy, and is fertile near the streams. Cotton, corn, rice, and cattle are raised. It is intersected by the Wilmington Columbia and Augusta R. R. and the Cheraw and Darlington R. R. Capital, Darlington. Pop. 26,243.

Darlington, a post-village of Dublin township, Harford co., Md. Pop. 168.

Darlington, a township and post-village of Beaver co., Pa., 15 miles S. W. of New Castle. Pop. 1811.

Darlington, a post-village, capital of Darlington co., S. C., is on the Cheraw and Darlington R. R., 75 miles E. N. E. of Columbia, and 30 miles S. of Cheraw. One weekly newspaper is published here. It has five churches, a Masonic hall, and two steam-mills.

J. M. BROWN, ED. "SOUTHERNER."

Darlington, a post-village, capital of La Fayette co., Wis., is on the Pecatonica River and on the Mineral Point R. R., about 50 miles S. W. of Madison. It has two weekly newspapers and four churches, good water-power, a large flour-mill, and other manufactures, and is an extensive market for grain and live-stock. Pop. of Darlington township, 2773. J. G. KNIGHT, PUB. "DEMOCRAT."

Darlington (WILLIAM), M. D., LL.D., an American botanist, born in Chester co., Pa., April 28, 1782, practised medicine at West Chester. He was a Democratic member of Congress in 1815–17 and 1819–23. He published a valuable work on the plants of Chester county, entitled "Flora Cestrica" (1837), "Agricultural Botany" (1847), "Memorials of John Bartram and Humphry Marshall" (1849), and several other works. He organized societies for the study of natural history and botany in West Chester, where he was a bank president. He imparted his own enthusiasm for science to others, and did much to develop the literary and social culture of the community. The *Darlingtonia Californica*, a curious sarraceniaceous plant of the Pacific States, was named in his honor. As a botanist his fame was deservedly high, but he was better known in Europe than in his own country. Died April 23, 1863.

Darlingto'nia [named by the late Dr. John Torrey in honor of Dr. William Darlington, noticed above], a genus of herbs of the natural order Sarraceniaceæ, comprising but one known species, the *Darlingtonia Californica*, a perennial plant of California. Its leaves are all radical, and resemble somewhat closely those of the Sarracennias of the Atlantic States, but the size of the leaves of the *Darlingtonia* is much the larger, the length in some instances exceeding two feet. The leaves are hollow and twisted, the upper part being turned over into a hood-like dome or vault, beneath which is the orifice which opens into the cavity or pitcher of the leaf. On either side of the opening two lobes depend, which may be taken to represent the true leaf, in which case the ascidium or pitcher must be considered as representing the petiole or leaf-stalk. Inside the pitcher the remains of insects are often found, their exit being impeded by long slender hairs within the leaf. The flower-stalk is sometimes four feet high, single, and furnished with bracts; the flower regular, nodding, and single, and about two inches across; the calyx straw-colored, of five sepals, all pointed; the five petals are pale purple, the stamens, twelve to fifteen, nearly hidden by the top-shaped ovary, upon which there is a style with a five-parted stigma. The capsule is five-celled, many-seeded, and one inch long. This plant is the representative of the Sarracennias of the Atlantic States, and with them and the *Heliamphora* of South America constitutes the whole natural order as far as it is known at present.

The name *Darlingtonia* was given by De Candolle to a proposed genus of herbs of the order Leguminosæ, but it having been shown that the plants assigned to that genus belonged rather to the genus *Desmanthus*, the name was dropped. The same result followed the attempts of several other botanists thus to honor Dr. Darlington, until at last, by a happy choice, this remarkable plant was selected to bear his name. The genus is well marked, and the name *Darlingtonia* can hardly fail to be a permanent one.

Darm'stadt, a town of Germany, capital of the grand duchy of Hesse-Darmstadt, is on the river Darm and on the Frankfort and Mannheim Railway, 15 miles S. of

Frankfort-on-the-Main. It is at the north-western extremity of the Odenwald. It consists of an old and a new town, both surrounded by walls. The former is ill-built, but the new town has wide and handsome streets. It has five public squares, and two ducal palaces, one of which contains a library of 200,000 volumes and a valuable collection of 700 paintings. One of the Madonnas, supposed to be a copy of a Dresden Holbein, was a few years ago, by competent critics, pronounced a true Holbein, and even a better picture than the Dresden Madonna. Pop. in 1871, 39,584, including the suburb Bessungen.

Dar'nel (*Lolium temulentum*), a grass well known in Europe, and naturalized in the U. S. The glumes are as long as the spikelets, or longer, and the spikelets have five to seven florets which are awned. The seeds of darnel are reputed poisonous, but recent researches are said to have established their harmlessness. It is often infested by ergot, and this may account for its poisonous qualities.

Darnetal, a town of France, department of Seine-Inférieure, on the Aubette, 2½ miles E. of Rouen. It has two Gothic churches, and manufactures of flannels and other woollen goods. Pop. 5909.

Darn'ley, Earls of (1725), Viscounts Darnley (1723) and Barons Clifton (Ireland, 1721), Lords Clifton (England, 1608).—John Stuart Bligh, sixth earl, B. A., born April 16, 1827, succeeded his father Feb. 11, 1835.

Darnley (Henry **Stuart**), Lord, born in England in 1541, was a son of the Scottish earl of Lennox. His mother was a niece of Henry VIII. of England. He had a handsome person, but was profligate and deficient in intellect. In 1565 he married Mary queen of Scots, whom he soon offended by his insolence and other faults. He also procured the assassination of Rizzio, which aroused her deepest indignation. The isolated house in which he lodged was blown up with gunpowder at the instance, it was suspected, of his wife, and he was killed Feb. 9, 1567.

Darrtown, a post-village of Milford township, Butler co., O. Pop. 258.

Dar'ter [so called from their manner of seizing their prey], (*Plotus*), a genus of birds, natives of warm climates,

Darter.

sometimes called snake-birds from the length of the neck. They are nearly allied to the cormorants, but they have a long, slender, straight, and sharp-pointed bill. They devour great numbers of fish. The common darter (*Plotus Anhinga*) is found along the coast of the Southern States.

Dart'ford [Saxon, *Darentford*], a town of England, in Kent, on the river Darent, and on the London and Gravesend Railway, 17 miles by rail E. S. E. of London. It lies in a narrow valley between two steep hills. It has cotton and silk printing-works, large powder-mills, and manufactures of machinery, iron, and paper. Watling Street, an ancient Roman road, crosses the river here. Edward III. held a tournament at Dartford in 1331, and Wat Tyler's insurrection broke out here in 1381. Pop. 5314.

Dartford, a post-village, capital of Green Lake co., Wis., on the outlet of Green Lake, 65 miles N. N. E. of Madison.

Dart'moor, an elevated moor or table-land and royal forest in the south-western part of Devonshire, England, noted for its rugged scenery and its cyclopean relics of prehistoric races. The royal forest and its adjuncts extend about 20 miles from E. to W. and 22 from N. to S., being one-fifth of the whole area of Devonshire, and measuring more than 130,000 acres. Elevated considerably above the surrounding country, it culminates in Yes Tor, 2050 feet above the level of the sea. The geological formation of Dartmoor is chiefly granitic, but large masses of trap occur. Copper, tin, and manganese are found. The soil is mostly peat, which in some places is twenty-five feet deep. The moor affords pasturage. Many of the dells are fertile, and the region abounds with mosses and lichens. Among the antiquities of Dartmoor we may mention the Gray Wethers, a ruin of an ancient circular temple, and the remains of a large pre-historic village at Grimspound. The forest of Dartmoor was granted by Henry III. to his brother Richard, earl of Cornwall, and since 1337 a part of Dartmoor has been annexed to the duchy, but not to the county, of Cornwall. Dartmoor is famous as the seat of a prison, near Prince Town, in which, during the war of 1812–15, a large number of American sailors were confined. Their sufferings were at times very great.

Dart'mouth, a seaport-town of England, in Devonshire, 32 miles S. by W. from Exeter, picturesquely situated on the terraced side of the right bank of the estuary of the Dart, near the ocean. The entrance to the river is defended by a castle and batteries. The chief exports are woollen goods, cider, and barley. Six steamers and about 240 sailing vessels belong to this port, which is a bonded one, its jurisdiction extending about 40 miles along the coast. Here Richard Lion-heart assembled the crusading fleet in the spring of 1190. Dartmouth was incorporated by charter of Edward III. in 1342, was attacked by the French in 1404, was taken by Prince Maurice in 1643, and recaptured in Jan., 1645–46, by Fairfax. Pop. in 1871, 4978.

Dartmouth, a post-village, seaport, and township of Nova Scotia, in Halifax co., is on Halifax harbor, half a mile N. of the city of Halifax. It has a lunatic asylum, a gold-mine, a marine railway, boiler and engine works, foundries, tanneries, etc. P. about 2500.

Dartmouth, a township and post-village of Bristol co., Mass. The village is 6 miles S. W. of New Bedford. The town has fifteen churches, lumber and salt works, and other manufactures, but is chiefly agricultural. It has several good harbors. Total pop. 3367.

Dartmouth College, the fourth of the New England colleges in chronological order—preceded only by Harvard, Yale, and Brown—was an offshoot of Moore's charity school, an institution for the education of Indian youth, established in Lebanon, Conn., in the year 1754, by the Rev. Eleazar Wheelock, D. D. The school was subsequently removed to Hanover, N. H., a charter for a college, to be connected with it, and yet a distinct institution, having been obtained. This charter was issued Dec. 13, 1769, by John Wentworth, the last of the royal governors of New Hampshire. Dr. Wheelock was its first president, and in view of the interest taken in the school by Lord Dartmouth, an English nobleman, and of his benefactions to it, his name was given to the college. One of the most signal events in the history of the institution is the controversy out of which arose the famous Dartmouth College case. The legislature of New Hampshire passed an act in 1616, changing the name of the institution to "Dartmouth University," and embracing other important and undesirable modifications. To this act the trustees were opposed, and with the design of testing its constitutionality, they brought an action before the supreme court of the State. By this tribunal the legislature was sustained, and appeal was taken to the Supreme Court of the U. S., John Marshall being then chief-justice. The cause of the college was there argued by Daniel Webster and other able counsel, and fully sustained by the court. The university organization was dissolved, and the old college board of trustees sustained. This great battle was fought by them not for themselves only; the principles concerned were vital to many other

institutions. Dartmouth, in comparative poverty, was thus instrumental in vindicating and establishing the sacredness of private trusts.

The college has had seven presidents: Eleazar Wheelock, D. D., inaugurated in 1769; John Wheelock, LL.D., in 1779; Francis Brown, D. D., in 1815; Daniel Dana, D. D., in 1820; Bennet Tyler, D. D., in 1822; Nathan Lord, D. D., in 1828; the present incumbent, Asa Dodge Smith, D. D., LL.D., in 1863. The whole number of its alumni, as given in the "Triennial" for 1870, is 3676. Of these, more than 900 have entered the ministry. Perhaps the two professions that have drawn most largely upon the institution have been those of teaching and the law. A single class might be named, one-fourth of whose members have been either college presidents or professors; and it has been stated that at one time there were residing in Boston, Mass., no less than seven sons of the college, including Daniel Webster and Rufus Choate, "who were justly regarded as ranking among the brightest luminaries of the law."

While the institution has aimed from the beginning at a high religious tone, it is not sectarian. Most of the trustees and teachers are of the orthodox Congregational connection. As to methods of teaching, while the college has ever been conservative, it welcomes all real improvements. It holds to a carefully devised curriculum, but has divers options, both as to courses and particular studies. It retains and honors the ancient classics, but it favors science also. Of late much more has been expended on the scientific appointments of the institution than on the classical. The various departments are as follows: 1, the old academic department, with its four years' curriculum; 2, the Chandler scientific department, with a regular course, chronologically parallel to that of the academic; 3, the agricultural department, so called, or "the New Hampshire College of Agriculture and the Mechanic Arts," based on the Congressional land-grant, and having a regular three years' course; 4, the engineering department, or the "Thayer School of Civil Engineering;" 5, the medical department, or the old New Hampshire Medical College. The last catalogue embraces a faculty of instruction thirty-one in number, and in all the courses of study 408 students. Within the last seven years more than $500,000 have been secured for the various departments. Two new college buildings have also been erected, making the whole number eight; the ground has been broken for another, and arrangements are in progress for the erection of a fire-proof library building. The number of volumes in the different libraries has risen to 46,000; large additions have been made to the philosophical and chemical apparatus and the various museums, and the astronomical observatory has been furnished with one of the best telescopes in the country.

A. D. Smith.

Dartmouth, Earls of, and Viscounts Lewisham (Great Britain, 1711), Barons Dartmouth (England, 1682).—William Walter Legge, fifth earl, born in 1823, was M. P. for South Staffordshire 1849–53, and succeeded his father Nov. 22, 1853.

Dar'trey, Earls of (United Kingdom, 1866), Barons Cremorne (Ireland, 1797), Barons Dartrey (United Kingdom, 1847).—Richard Dawson, first earl, K. P., born Sept. 7, 1817, succeeded his father as Baron Cremorne Mar. 21, 1827.

Daru (Napoléon), Count, a son of the following, was born at Paris June 11, 1807, served in the army in his youth, and in 1832 entered the Chamber of Peers. After the accession of Napoleon III. he became a prominent Orleanist. For a short time in 1870 he was minister of foreign affairs under Ollivier, when by his interference in the affairs of the Vatican Council he became very unpopular.

Daru (Pierre Antoine Noël Bruno), Count, a French statesman and author, born at Montpellier Jan. 12, 1767. In the Reign of Terror he was confined in prison, where he translated the odes and epistles of Horace in verse. He became a member of the Tribunate in 1802, a councillor of state in 1805, and intendant-general of the imperial household. In the campaigns against Prussia and Austria (1806–09) he accompanied Napoleon, whom he served with ability as a diplomatist and financier. In 1815 he was elected president of the French Academy. Among his works is a "History of Venice" (1819). Died Sept. 5, 1829. (See Lamartine, "Éloge du Comte Daru.")

D'Arusmont (Madame Frances), a distinguished reformer, better known by her maiden name as Fanny Wright, was born at Dundee, in Scotland, Sept. 6, 1795. At her father's house she came in childhood to be acquainted with Adam Smith, Dr. Cullen, and other distinguished men of that age, so full of new theories for the improvement of the conditions of human life. Hence she drew inspiration and courage for her future career, which, with all its faults, was characterized by benevolence, unselfishness, perfect honesty, and complete fearlessness. In her youth she published a defence of the doctrines of Epicurus, entitled "A Few Days in Athens." She was in the U. S. from 1818 to 1821, and then visited France, but returned in 1825, and purchased land where Memphis, Tenn., now stands for her famous experiment for the instruction and enlightenment of the colored race. After a number of years of expensive and unsuccessful effort, her people were freed and sent to Hayti. She lectured in many parts of the Union on social, religious, and political questions with such freedom as to incur much opposition. She was for a time associated with Robert Owen at New Harmony, Ind., and his son, Robert Dale Owen, went with her to Tennessee to assist in that philanthropic if misdirected effort for the benefit of the slaves to which we have referred. She visited France, and in 1838 married M. d'Arusmont, but the union was unfortunate, and with her daughter she returned to the U. S. She died at Cincinnati, O., Dec. 14, 1852. Besides other works, she published "Views on Society and Manners in America," a tragedy called "Altorf" (1819), and "Lectures on Free Inquiry" (1836). (Her life has been published by J. Windt, 1844, and by A. Gilbert, 1855.)

Dar'villes, a township and village of Dinwiddie co., Va. The village is 25 miles S. W. of Petersburg. Total pop. 3082.

Dar'win, a post-township of Clark co., Ill. Pop. 1012.

Darwin (Charles Robert), F. R. S., an eminent naturalist, a son of Dr. R. W. Darwin, F. R. S., and grandson of Dr. Erasmus Darwin, noticed below, was born at Shrewsbury, in England, Feb. 12, 1809. He was educated in the grammar-school of his native town, at the University of Edinburgh, and at Christ's College, Cambridge, where he took his degree of M. A. in 1831. The same year he sailed with Capt. Fitzroy, of H. M. ship Beagle, as volunteer naturalist in the survey of the coast of South America, etc. After his return, in 1836, from this voyage, in which he sailed round the globe, Mr. Darwin published a "Journal of Researches into the Geology and Natural History," etc. (1839; 2d ed. 1854; New York ed. 1846), which has been pronounced the "most entertaining book of genuine travels ever written." In 1839 he married his cousin, Emma Wedgwood, granddaughter of Josiah Wedgwood. Mr. Darwin published (1840–42) the "Zoology of the Voyage of the Beagle," a treatise on "Coral Reefs" (1842), on "Volcanic Islands" (1844), and "Geological Observations" (1846). His monograph on the Cirripedia (1851–53) would have given him a lasting reputation as a philosophic observer had he never written anything else. In 1859 he published his "Origin of Species by Means of Natural Selection," a work which has gone through many editions at home and abroad, has attracted much attention, and given rise to warm controversy in all civilized countries. It is universally conceded that this treatise displays profound knowledge of the facts of natural science and great powers of generalization. His style is clear and even elegant, his temper is moderate and always courteous, and his statements of fact may be said to be always accurate. He published a work on the "Fertilization of the Orchids" (1862), the "Habits and Movements of Climbing Plants" (1865), "Domesticated Animals and Cultivated Plants" (1867), the "Descent of Man" (1871), which has attracted scarcely less attention than the treatise on the "Origin of Species," and which is indeed a continuation of that work. He has also published "The Expression of the Emotions in Man and Animals" (1872). Mr. Darwin is a member of many learned societies, and has been the recipient of numerous medals and other distinctions. He is perhaps equally eminent in geology, zoology, and botany. (See Darwinism, by Profs. E. L. Youmans and J. H. Seelye; and Evolution, by Prof. H. Hartshorne.) Charles W. Greene.

Darwin (Erasmus), M. D., F. R. S., an English poet and philosopher, born at Elton Dec. 12, 1731. He studied at Cambridge and practised at Lichfield, from which he removed in 1781 to Derby. He gained distinction as a physiologist, and also as a poet. His "Botanic Garden" (1791), formerly very popular, is a poetical treatise on botany, full of extravagant imagery. Among his works are "Zoonomia, or the Laws of Organic Life" (1793), "Phytologia" (1800), and the "Temple of Nature" (1803). Many of his ideas on physiology contained the germs of important truths. Died April 18, 1802.

Dar'winism, a term applied to a particular theory of development originated by Mr. Darwin. Darwinism, while based on the doctrine of evolution, is not identical with it. Darwinism is an attempt to explain the law or manner of evolution. (See Evolution.) It is well known that man can, by pursuing a certain method of breeding or cultivation, improve, and in various ways modify, the character of the different domestic animals and plants. By always selecting the best specimens from which to propa-

gate the race, those features which it is desired to perpetuate become more and more strongly developed, so that what are admitted to be mere varieties sometimes acquire, in the course of successive generations, a character as strikingly distinct, to all appearance, from those of other varieties, as one species is from another species of the same genus. Hence it is inferred that what we call species were originally only varieties. Mr. Darwin maintains that a system of influences, not wholly unlike to those which man brings to bear in the breeding of animals, is found in the circumstances with which they are often surrounded in a state of nature.

Plants and animals in a state of nature are subject to certain external conditions, which influence and limit them in various ways. Among these are climate, station, character of soil, food-supply, and the number and kind of living beings with which a given organism is surrounded. The workings of these conditions of existence are, for the most part, complex and obscure, but enough has been made out to show that where a variety has once appeared, the influence they exert upon it is quite analogous to that exercised by man in selective breeding.

Organized beings, as a rule, are gifted with enormous powers of increase. Wild plants yield their crop of seed annually, and most wild animals bring forth their young yearly, or oftener. Should this process go on unchecked, in a short time the earth would be completely overrun with living beings. It has been calculated that if a plant produces fifty seeds the first year, each of these seeds growing up into a plant which produces fifty seeds, or altogether 2500 seeds, the next year, and so on, it would, under favorable conditions of growth, give rise in nine years to more plants by five hundred trillions than there are square feet of dry land upon the whole surface of the earth. But fifty seeds a year is far below the reproductive capacity of many plants.

The elephant is reckoned the slowest breeder of all known animals, yet Darwin says "that it will be under the mark to assume that it begins breeding when thirty years old, and goes on till ninety, bringing forth three pairs of young in the interval." If this be so, at the end of the fifth century, there would be alive fifteen million elephants, descended from the first pair. Slow-breeding man has been known to double his numbers in twenty-five years, and, according to Euler, this might occur in a little over twelve years. But, assuming the former rate of increase, and taking the population of the United States at thirty millions, in six hundred and eighty-five years their *living* progeny would have each but a square foot to stand upon were they spread over the entire globe, land and water included. Cases could be given of introduced plants which have become common throughout whole islands in a period of less than ten years; and Dr. Falconer states that there are plants which now range in India from Cape Comorin to the Himalayas that were imported into that country from America since its discovery.

It is thus obvious that the rates of reproduction of living beings are by no means adjusted either to the supply of nutriment, or even to the space to be occupied. The room is fixed and the food is limited, while the ratio of increase is so enormous that each species, if unchecked, would ultimately usurp the whole area and monopolize the earth. But millions of species are doing the same thing, so that the inevitable result is conflict, the war of races, destruction of life everywhere, and, as a result, what Mr. Darwin calls *the struggle for existence*. All over the globe, on the land and in the sea, animals and plants, high and low, are driven into this struggle by their ever-increasing numbers and the limited means of subsistence. The warfare is one of life and death; and its result, the perishing of multitudes and the survival of comparatively few—the numbers remaining being in equilibrium with the supply of the means of subsistence.

Now, the result of this strife cannot be a matter of chance. Which shall be destroyed, and which preserved, must depend upon determinate conditions. Obviously, those individuals or varieties having some advantage over their competitors will stand the best chance to live, while those destitute of such advantage will be liable to destruction. Some by superior vigor may be able to withstand a degree of heat or cold, moisture or dryness, which would be fatal to others. Of those that are pursued, the most fleet will escape, while the slower will be captured. Those which from greater strength or agility are best able to supply themselves with food in time of scarcity, or which have superior adaptation to the nature of the food which the locality affords, will be able to displace those lacking these advantages. Briefly, the animals best adapted to the requirements of the situation in which they are placed are the ones that will live and have descendants, while those less in agreement with these surrounding conditions will as certainly disappear. This process of sorting is continually going on. Nature may metaphorically be said to *choose* which shall be preserved and which destroyed; and this is what Mr. Darwin terms "Natural Selection," and what Mr. Herbert Spencer calls the "Survival of the Fittest."

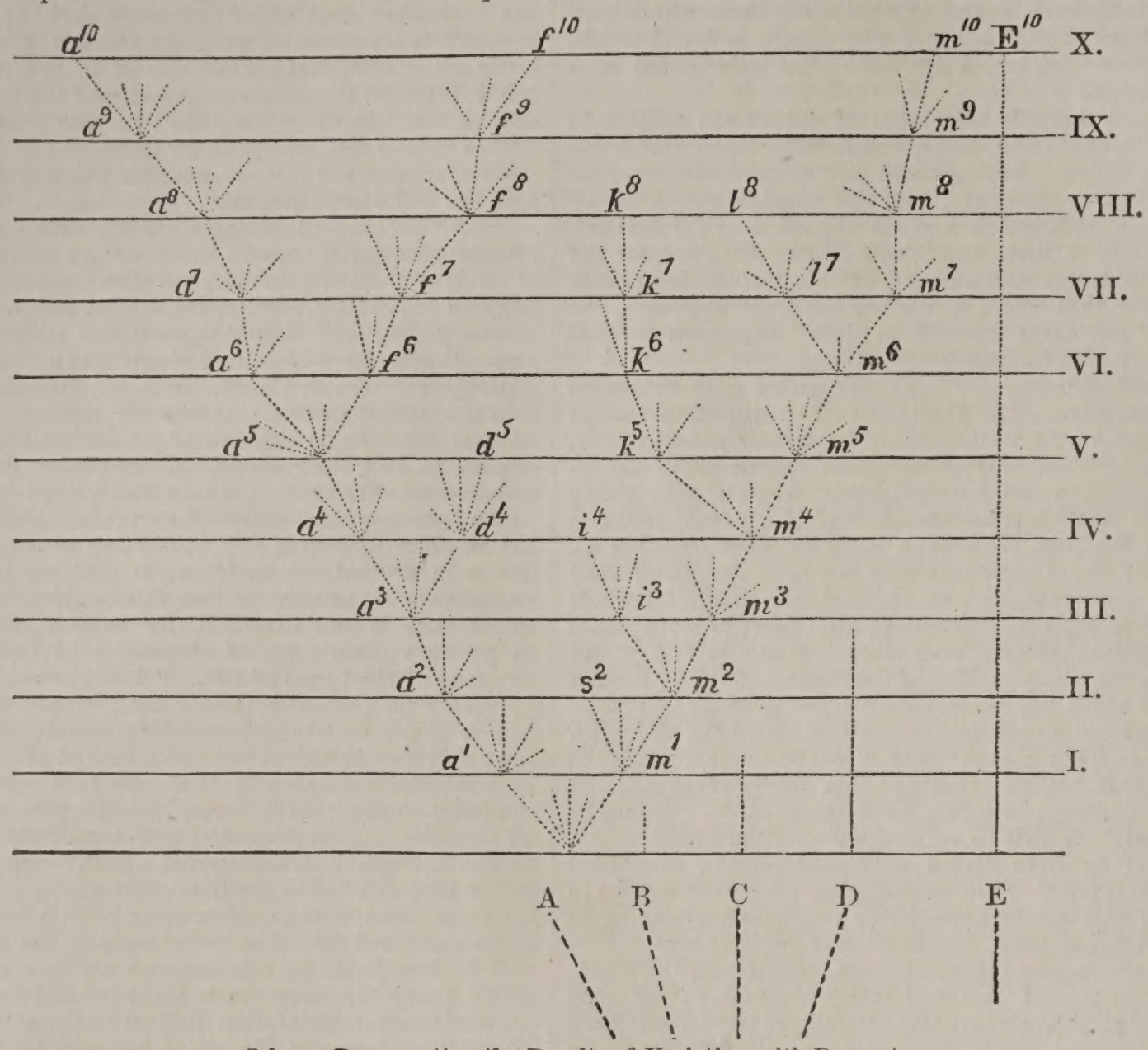
How races continually encroach on each other's areas, the stronger outrunning and extirpating the weaker in the competition of existence, is well shown by the spread of European plants and animals in New Zealand. Doctor Hooker states that the cow-grass has taken possession of the roadsides; dock and water-cress choke the rivers; the sow-thistle is spread all over the country, growing luxuriantly up to 6000 feet; white clover in the mountain-districts displaces the native grasses; and the native (Maori) saying is: "As the white man's rat has driven away the native rat, as the European fly drives away our own, and the clover kills our fern, so will the Maories disappear before the white man himself."

That this kind of struggle among living creatures has always been going on, and must always continue to do so, is obvious; and any one can see that it must be a winnowing and improving process, those least adapted to the situation giving way before those better adapted, while the struggle may be so close and sharp that a very trifling advantage will turn the scale. But Mr. Darwin saw farther into the case than this. It was his merit to discover that natural selection is capable of *producing* fitness between organisms and their circumstances, and of discerning the importance of the consequences that follow.

We have seen that universal variability, small in amount, but in every direction, and fluctuating about a mean condition in normal circumstances, is characteristic of living organisms; let us now see how this tendency may be made to advance in one direction, by natural selection, so as to produce divergence of characters by indefinite modifications of the forms of life. "A soil possessing some ingredients in unusual quantity may supply to a plant an excess of the matter required for a certain class of its tissues, and may cause all the parts formed of such tissues to be abnormally developed. Suppose that among these are the hairs clothing its surfaces, including those which grow on its seeds. Thus furnished with somewhat longer fibres, its seeds, when shed, are carried a little farther by the wind before they fall to the ground. The young plants growing up from them, being rather more widely dispersed than those produced by other individuals of the same species, will be less liable to smother one another, and a greater number may therefore reach maturity and fructify. Supposing the next generation subject to the same peculiarity of nutrition, some of the seeds borne by its members will not simply inherit this increased development of hairs, but will carry it farther; and these, still more advantaged in the same way as before, will, on the average, have still more numerous chances of continuing the race. Thus by the survival, generation after generation, of those possessing these longer hairs, and the inheritance of successive increments of growth in the hairs, there may result a seed deviating greatly from the original. Other individuals of the same species, subject to the different physical conditions of other localities, may develop somewhat thicker or harder coatings to their seeds, so rendering them less digestible by the birds that devour them. Such thick-coated seeds, by escaping undigested more frequently than thinner-coated ones, will have additional chances of growing up and leaving offspring; and this process, acting in a correlative manner through successive years, will produce a seed diverging in another direction from the ancestral type. Again, elsewhere some modification in the physiologic actions of the plant may lead to an unusual secretion of an essential oil in the seeds, which, rendering them unpalatable to creatures that would otherwise feed on them, may diminish the destruction of the seeds, so giving an advantage to the variety in its rate of multiplication; and this incidental peculiarity proving a preservative," will, as before, be gradually increased by natural selection, until it constitutes another divergence. Now, in these and countless analogous cases we see that plants may become better adapted, or re-adapted, to the aggregate of surrounding agencies, not through any *direct* action of such agencies upon them, but through their *indirect* action—through the destruction by them of the individuals which are least congruous with them, and the survival of those that are most congruous with them. All these slight variations of function and structure, arising among the members of a species, serve as so many experiments; the great majority of which fail, but a few of which succeed. Just as we see that each plant bears a multitude of seeds, out of which some two or three happen to fulfil all the conditions required for reaching maturity and continuing the race, so we see that each species is perpetually producing numerous slightly-modified forms deviating in all directions from the average, out of which most fit the surrounding conditions no better than their parents, or not so well, but some few of which fit the

conditions better; and doing so, are enabled the better to preserve themselves, and to produce offspring similarly capable of preserving themselves.

Most naturalists now admit that the principle of adaptive modification or natural selection is potent in the production of *varieties;* yet it seems a tenable position to regard varieties as incipient species. That there is no distinct line of separation between varieties and sub-species, and between sub-species and species, is shown by the inability of naturalists in many cases to distinguish between them. Hundreds of instances might be given where what one naturalist regards as a species, another of equal authority ranks as a variety. Mr. Darwin, therefore, holds that in the past periods of time this principle has played the leading part in producing the diversities of life, and he has constructed a diagram to show how these divergences have



Scheme Representing the Results of Variation with Descent.

arisen. It attempts to represent "the probable action of natural selection through divergence of character, and extinction, on the descendants of a common ancestor."

The letters A to E are intended to represent the species of a genus widely distributed, and as in large genera the species often resemble each other in unequal degrees, this is shown by the letters standing at unequal distances. The species A is supposed to be extensively diffused, so as to embrace a wider diversity of conditions, and to be highly variable. The branching and diverging dotted lines proceeding from A are intended to represent its varying offspring. The variations may be slight, unequal, diverse, appear at different times, and endure for unlike periods. The short intermediate lines represent varieties which become extinct, while the most divergent lines represent those which survive and give rise to new species. That the intermediates should die out and the extremes stand the best chance of living, results from the theory. The more they resemble each other and the parent form, the more restricted will they be to the same set of conditions, and the fiercer will be that struggle for existence which is a cause of the destruction of closely-competing races. On the other hand, the more divergent the descendants of any particular species in structure and habits, the more diverse will be the conditions that they can make available, the less the competition, and the greater the chance of survival.

The intervals between the horizontal lines are each intended to represent a thousand generations. When a dotted line reaches across one of these intervals to a horizontal line, and is there marked by a small numbered letter, it is supposed that a sufficient amount of variation has been accumulated to form a fairly well-marked variety. Now, after a thousand generations, according to the diagram, the species A has produced two such varieties, marked a^1 and m^1. These remaining exposed to the same conditions which made their parents variable, and with a tendency to variability which is itself hereditary, tend to vary in nearly the same manner as their parents varied; also, being but slightly modified, and inheriting those general advantages which made the genus and the parent species large, they in turn are favorably situated for the production of new varieties. Their most divergent variations will generally be preserved during the next thousand generations, and thus is produced variety a^2, which, on the principle of divergence, will differ more from the species A than did variety a^1. From m^1 two varieties, m^2 and s^2, have sprung, which differ from each other, and more considerably from their common parent A. The line of succession is seen to be broken at regular intervals. This is intended to designate when each successive form has become sufficiently distinct to be recorded as a variety; but these breaks are imaginary, and might have been inserted anywhere after intervals long enough to have allowed the accumulation of a considerable amount of divergent variation. At the end of ten thousand generations the species A is supposed to have produced three forms, a^{10}, f^{10}, and m^{10}, which from wide divergence will have come to differ largely from each other, and from their common parent. If the amount of change has been small in the time represented by the space between each horizontal line, these three forms may be only well-marked varieties; if, however, we suppose that each space represents time enough for considerable change to have taken place, they may have reached the position of sub-species, or even, with a still greater amount of change, to that of well-defined species.

The broken lines at the bottom of the diagram are supposed to lead up from an unknown species which was the common ancestor of the several species represented by the capitals. From this unknown ancestor, through variation and the action of natural selection, there descended five species, constituting a separate genus. One of these species is supposed to have been highly variable, and, standing at the extreme of the genus, to have gone on varying and improving without coming in conflict, until it became the parent of several new species. E represents a species which has gone on without change. (See Evolution; also the able article on the "Development Hypothesis," by Prof. Youmans, in the first volume of Johnson's "Natural History.")

E. L. Youmans.

A Criticism on Darwinism.

Transmutation of Species never yet Observed.—Professor Huxley, after having elaborately advocated the Darwinian hypothesis, nevertheless declares it as his "clear conviction that, as the evidence now stands, it is not absolutely proven

that a group of animals, having all the characteristics exhibited by species in nature, has ever been originated by selection, whether artificial or natural."*

It is well to keep this fact in mind. The Darwinian hypothesis, however plausible in its statement or ingenious in its application, is, at the best, only a possible, and wholly wants the evidence which can translate it into the actual, explanation of the facts to which it applies. That species vary, and some of them to a great extent, is admitted by all, but in no recorded observation do they cease to be the same species still. The cable which holds a ship to its moorings may be swayed by the waves and still not snap asunder. The moon varies in the time of her revolution around the earth, in her celestial longitude and latitude, in the motion of her nodes and perigee; and these variations were seriously thought, for a time, to require some new statement for the law of gravitation, until Clairaut demonstrated that these variations furnished a surprising exemplification of the law. Cuvier has shown,† from Egyptian monuments and mummies, that the animals which lived in that country in the earliest records of its civilization are identical in species with those which live there to-day; and Agassiz has shown,‡ from the coral-reefs in Florida, that the animals of the Gulf of Mexico were of the same species 30,000, and probably 200,000, years ago, as in the present time. Though man has been able to secure numerous and often surprising variations within a given species, he has never succeeded in obliterating the original lines of specific distinction, or in bringing out anything more prominent in their place. An Ancon sheep is no less a sheep, however much its legs may be like an otter's. House-pigeons are house-pigeons still, whether carriers, or pouters, or fantails, or tumblers. The racer, the dray-horse, the barb has not changed its one specific characteristic, however different these varieties may be. The dog has been associated in close companionship with man from the earliest history, and, more than any other animal, has been subjected to decisive experiments continued through many generations, in order that every possible variation from the original stock might be secured. The result is apparent. The differences of dogs strike the dullest eye. And yet an authority inferior to none declares that "under the extremest mark of variety so superinduced, the naturalist detects the unmistakable generic and specific characters of the *Canis familiaris*."§ Moreover, the dog himself sees this likeness, notwithstanding the difference. Two dogs of very different varieties treat each other, on meeting, very differently from what either of them would treat or be treated by a wolf or a fox.

The same is the case with all the plants upon which man has made such copious and careful experiment. Not a single instance of one species changing into another has yet been found. The differences have been sufficient to induce some careful naturalists to suppose their *possible* prolongation into difference of species, and some have thus been led to regard this possibility as though it were already translated into an actual fact. But the fact is still wanting, and however plausible as a conjecture, or however accordant with favorite theories of the universe, the Darwinian hypothesis may be, we must not forget that as long as we lack the first fact in its proof, it is a conjecture alone.

Moreover, these variations, which man has secured by "artificial selection," if we look at them closely are not favorable to the conjecture. These deviations from the typical form and state, instead of being improvements out of which superior species may be gained, are monstrosities only kept up by man's care. The species left to itself sloughs them off. As soon as the introduction of merino sheep rendered it no longer an object to raise Ancons, the latter variety disappeared, and for years no remnant of it has been seen.‖ Dogs show a continual tendency to revert to the common type.¶ Prichard has also shown,** in reference to other domestic animals—the hog, the horse, the ass, the sheep, the goat, the cow, the cat, and gallinaceous fowls—originally transported by the Spaniards and others from Europe to this continent, that in instances where they have got out of man's hands and run wild in the woods, they have lost all the most obvious appearances of domestication, and have approximated to the type which may be supposed to have belonged to the species in its original state. Darwin himself declares that in his pigeons, even with breeds of hundreds of years' standing, he was often met by sudden returns in color and other striking appearances to the original type.†† The same is true with our cultivated plants. The extended varieties which man has brought out in some of these—*e. g.*, the cabbage, the turnip, the beet, the potato—and from which he derives such benefit, are only kept up by constant cultivation. The plant left to itself reverts to its wild and, to man, its comparatively useless, state.

Now, while all these things show that the transmutation of species has not a fact which can prove it, and is at the best but a conjecture, they also render most unlikely the conjecture itself. For in the numberless species which have been minutely observed, over a great space and for a long time, if there were such a tendency to transmutation, how is it possible that no actual case of it has ever been found? Why are not cases occurring all the time and before our eyes? Mr. Darwin admits the force of this inquiry, but we cannot yield to the fitness of his reply. He argues that in the struggle for life the improved offspring would exterminate the inferior progenitor, and that thus the old form disappears by the very process of the formation of the new.‡‡ But if this be true, and if the process of formation be going on before our eyes, why not that of disappearance also? In many animals the duration of the individual life is so short, and the succession of generations so rapid, that if this process of transmutation were actually at work, how could it fail to have furnished, thus far, a single instance of its accomplished fruits? Mr. Darwin often speaks of the frequent uncertainty of specific and even of generic distinctions, and these are sometimes so obscure that even the great Cuvier ranked the barnacle as a mollusk, while it is now classed as an articulate and a crustacean. But this uncertainty and liability to error certainly admits a far other interpretation than what Mr. Darwin adduces. If the species be sometimes separated by such narrow and almost indeterminate bounds, how does it happen that we never see these limits passed over, provided the transition be as easy as is claimed? It is hard to say whether certain living things are representatives of vegetable or animal life. Different naturalists make very different divisions of the innumerable protozoa, some calling animals what others name plants; but if the distinction between the two be of such little account, why has no member of the one class ever been seen passing over into the other? How is it that such a phenomenon—*e. g.*, as the growth of the highest *alga* into the lowest *zoophite*—a phenomenon for which sharp eyes have sought, and which is not only natural but inevitable on the Darwinian hypothesis, and whose discovery would make the fame of any observer—has never yet been seen?

Geological Evidence.—If one species springs from another by a long-continued process of slow variation and natural selection, the steps through which a parent has become lost in his descendants are very many—indeed, are practically innumerable. "If my theory be true," says Mr. Darwin,§§ "numberless intermediate varieties, linking most closely all the species of the same group together, must assuredly have existed." Therefore, also, if the theory be true, some evidence of these intermediate varieties must assuredly exist in the geological record. But no such evidence appears. Looking through all the vast cycles of time which geological changes are supposed to imply, we find the same clear distinctions of species as we observe in the historic period. Upon this there is no dispute. Mr. Darwin admits it,‖‖ and so do his disciples.¶¶ This fact is sufficient to startle, if not to stagger, the boldest advocate of the theory. Mr. Darwin acknowledges it to have the gravest force, but its weight is not essentially lessened by his very ingenious attempt to remove it. His explanation rests, in the main, upon the extreme imperfection of the geological record. This record gives us only a few disconnected leaves—and these often wellnigh effaced, and written in a changing dialect—of a great history, in which, if we could only decipher the faded lines and recover the missing parts, we should find the connections which, it must be acknowledged, we now lack. Sir Charles Lyell adds the weight of his high authority to the same scale. "It is scarcely possible," says this eminent geologist, "to exaggerate the defectiveness of our archives."*** "In the solid framework of the globe, a great part of what remains is inaccessible to man, and even of that fraction which is accessible, nine-tenths are to this day unexplored."††† But the facts which the palæontologist offers are neither few nor inconsiderable. There are over 30,000 species of animals already discovered in the different formations. How is it, then, that these 30,000 species have

* "Lay Sermons," p. 295.
† "Récherches sur les Ossemens Fossiles," vol. i., p. 141.
‡ "Contributions to the Natural History of the United States," vol. i., p. 53.
§ Owen, "Classification of Mammalia," p. 100.
‖ Huxley, "Lay Sermons," p. 269; "Philosophical Transactions," 1813, pp. 92, 93.
¶ Prichard, "Natural History of Man," p. 57.
** Ibid., pp. 28–59.
†† "Origin of Species," p. 144; "Variation of Animals and Plants under Domestication," vol. i., pp. 240–249.
‡‡ "Origin of Species," p. 155.
§§ Ibid., p. 161.
‖‖ Ibid., p. 246.
¶¶ Lyell, "Principles of Geology," tenth edition, vol. ii., p. 462.
*** Ibid., p. 463.
††† Ibid., vol. i., p. 306.

been preserved, and are found clearly defined, while not a single individual in a transition state appears? Many of these species are represented in the rocks by thousands of individuals, and if the Darwinian hypothesis be true, and these individuals are only instances of species growing into and out of one another, why are the terminal links of the chain alone preserved? The intermediate links do not differ from these except as would be required by the minutest series of gradations; how, then, if they ever existed, have they now so completely disappeared? The general imperfection of the record is no answer here, for we take the record as it is, and however imperfect, there ought surely to be seen, in the vast number of fossil species actually discovered, some of the missing links, if they ever existed. To Mr. Darwin's explanation of this staggering fact a German professor has applied the calculus of probabilities, with noticeable results.* If we suppose that of each species a hundred individuals have been found, and that between any two species there were only ten intermediate varieties—a number much smaller than Mr. Darwin claims—then the probability against the exclusive appearance of distinct species would be inconceivable millions to one. In exact terms, the probability that out of the millions of fossils which are found, no one should appear from which the process of transmutation could be positively affirmed, is as 1 : 10^{100}; *i. e.*, the exact probability of the Darwinian hypothesis, when judged by the actual facts of palæontology, is no more than 1 : 1 with a hundred ciphers annexed!

But this is not the only bar which geology sets in the way of this hypothesis. Some of the lowest and simplest orders of organized beings—*e. g.* the corals—are found among the first forms of life, and also among the latest. But how should this be? In the struggle for existence they should either tend to develop into something higher or they should not. But in the latter case the very ground of the hypothesis slips from under it, while in the former these lower forms ought long since to have disappeared.

But on the same ground it would seem as if we should find everywhere a law either of deterioration or development, but the facts are otherwise. Take the class of fishes. It is impossible to affirm that the present offers any fuller or more varied development of the entire class than has before been manifested, nor on the other hand that it has degenerated in regard to numbers, powers, bulk, or range of modification.† One consideration, however, seems clear—viz., that those species best adapted to afford mankind wholesome food, such as the cod, the herring, the salmon, the turbot, have greatly predominated at the period immediately preceding and accompanying the advent of man. It is certainly difficult to see what advantages, in the struggle for existence, these possessed above the bony garpikes which they have superseded.

"In the vast physical changes to which the earth has been subjected since the neozoic epoch, no revolutions seem more sudden or more pronounced than that connected with the glacial period. Yet the dicyclotherian mammoth lived before it, and passed through the ordeal of all the hard extremes which it involved, bearing his organs of locomotion and digestion all but unchanged."‡ But how was this possible if species are so unstable and susceptible of such transmutation as the Darwinian hypothesis claims?

Still further: if one species has arisen out of another, all the geological facts indicate that this must have been suddenly and not gradually. For the fact proclaimed by palæontology is that species appear suddenly, and disappear suddenly in successive strata.§ They are as common in the uppermost bed in which they occur as in the lowest or any intermediate bed. They neither increase successively in numbers, nor do they gradually dwindle down; none of the fossil remains, thus far discovered, show signs of a gradual improvement or of a slow decay.‖ Moreover, the origination of varieties, so far as we can observe it, is sudden, and not slow. The first Ancon sheep appears to have been as perfect as any of his descendants. Persons have been born with six fingers on each hand and six toes on each foot, and have propagated this peculiarity to their children and their children's children, but no cause could be seen in any apparent previous preparation for such a phenomenon. A few years ago there were exhibited two dwarf and idiotic children as specimens of the race of the ancient "Aztecs," but these children were found to have been born at San Salvador, dwarfed and of defective brains, of parents who neither in themselves nor in their other children revealed any such deviation from the normal type.

In the oldest fossiliferous rocks we find suddenly appearing, and at the same time, low and also highly organized structures, representing the four great types into which Cuvier has so successfully classified the animal kingdom. Radiates, mollusks, articulates, and vertebrates spring to life simultaneously and suddenly. Below these, absolutely no traces of life appear. If it be said that the lower rocks have been subjected to igneous agency, by which organic existences have totally disappeared, which might otherwise have been found, Agassiz has shown¶ that in the great continent of North America the palæozoic rocks have undergone so little alteration that the remains of the earliest representatives of the animal and vegetable kingdoms are as well preserved as in later formations. If it be said that any one of these types has been developed out of the other, Von Baer has shown** the impossibility of this from the facts of their embryonic growth and structure.

Natural Selection cannot Account for the Changes which it is assumed to Produce.—It is very difficult to see how that gradual development of organs which this hypothesis assumes could have taken place in any such way as Mr. Darwin affirms. If we were presented with a single fact of such development, we should be obliged to assent to it, whether we could explain it or not; but we must remember that not one such fact is furnished, and we must therefore test the doctrine on its intrinsic probabilities. How, then, shall an organ be gradually developed by "natural selection" and in a "struggle for life"? How can the organ give any aid in the struggle for life while it is in a process of formation, and thus how should natural selection have anything to do with its formation? What sort of an agency, *e. g.*, could natural selection have in the formation of mammary glands and their secretions? How do these help the individual in the struggle for life? According to the hypothesis, every new organ must have been in a process of slow growth through many generations, and therefore with numberless individuals which did not need it, and could not use it at all. But the doctrine of natural selection affirms that only those peculiarities which are favorable for the struggle for life would have the advantage to perpetuate themselves; how, then, could organs unformed grow into their perfect form through long-continued generations? The force of this is not weakened by the existence of animals with so-called rudimentary organs. Some insects in deep caves are without eyes; others near the mouth of the cave can see, though indistinctly; while others still, nearly related to these, but living outside the cave, have perfect eyes;†† but instead of inferring that there is a progress here by which no eyes have grown into eyes, it is certainly possible, and it is much more credible, that there is a retrogression, where insects with perfect eyes have lost them because placed where they could not see. The continued disuse of an organ is often followed by its loss, and we can easily see the reason for this; but this does not help us at all in conceiving how an organ which does not exist at all could ever come into existence by any process of natural selection.

Upon this notion of natural selection the facts of reproduction seem absolutely without meaning. It is no advantage to the individual to reproduce its kind. Indeed, with some insects the individual dies in the act of reproduction. The reproductive, which is one of the most pow-

* Pfaff, "Die Neuesten Forschungen und Theorieen auf dem Gebiete der Schöpfungsgeschichte," p. 99.

† Owen, "Palæontology," p. 150.

‡ Falconer, "Palæontological Memoirs," vol. ii., p. 253.

§ Prof. Youmans' explanation of this point (given in Johnson's "Natural History," pp. 33, 34) should be presented here:

"It is alleged that the great geological breaks in the course of past life, and the abrupt appearance of multitudes of new species, disprove their origin by gradual development. But the apparent suddenness of their appearance is, without doubt, illusory. It has been proved that the same effect might be produced by the migration of races from inhabited regions to a continent slowly rising from the sea. The following example will show how such breaks might arise in the regular course of geological change: 'Between England and the United States the ocean-bottom is being covered with a deposit of chalk—a deposit that has been forming, probably, ever since there occurred that great depression of the earth's crust from which the Atlantic resulted in remote geologic times. This chalk consists of minute shells of Foraminifera, sprinkled with remains of small Entomostraca, and probably a few pteropod shells, though the sounding-lines have not yet brought up any of these last. Thus, in so far as all high forms of life are concerned, this new chalk-formation must be a blank. At rare intervals, perhaps, a polar bear, drifted on an iceberg, may have its bones scattered over the bed, or a dead decaying whale may similarly leave traces. But such remains must be so rare that this new chalk-formation, if visible, might be examined for a century before any of them were disclosed. If now, some millions of years hence, the Atlantic bed should be raised, and estuary or shore deposits laid upon it, these deposits would contain remains of a flora or fauna so distinct from anything below them as to appear like a new creation. Thus, along with continuity of life on the earth's surface, there not only *may* be, but there *must* be, great gaps in the series of fossils; and hence the gaps are no evidence against the doctrine of evolution.'"

‖ Agassiz, "Contributions to the Natural History of the United States," vol. iii., p. 91.

¶ Ibid., vol. i., p. 25.

** "Ueber die Entwickelungsgeschichte der Thieren," vol. i., pp. 160 and 224.

†† Pfaff, "Die Neuesten Forschungen u. s. f.," p. 113.

erful of all impulses, is not for the sake of the individual, but for the species. How, then, can "natural selection" have anything to do with it? "If it profit a plant," says Mr. Darwin, "to have its seeds more and more widely disseminated by the wind, I can see no great difficulty in this being effected through natural selection."* But pray what profit is it to the individual plant to have its seeds thus disseminated, and how, therefore, should natural selection, which "*can act only through and for the good of each being*," † effect this? It is the species only that can thus be profited, and hence, if natural selection have any effect, it is for the profit and permanence, and not for the origination, of species.

"It is conceivable," says Mr. Darwin, "that flying-fish, which now glide far through the air, slightly rising and turning by the aid of their fluttering fins, might have been modified into perfectly winged animals." ‡ Such phrases as "it is conceivable," "I see no difficulty in supposing," "I can see no insuperable difficulty in believing," "it seems to me unlikely," etc., are often used by this author to introduce suppositions which he soon employs as though they were actual facts by which his deductions could be proved. But let us look at this supposition of the flying-fish with the sharp eyes of a naturalist not apt to be led away by his fancy. "Some naturalists," says the great Cuvier, "seeing that more or less use of an organ sometimes increases or diminishes its strength and size, have fancied that habits and outward influences, for a long time continued, might gradually change the form of animals to a degree which would ultimately bring out a difference of species. These writers consider the organized body as a plastic material to be moulded as with the fingers. But the moment they carry out their notion into details, they render themselves a laughing-stock. Whoever should venture seriously to suggest that a fish, by means of a dry habitat, might see its scales disparting into feathers and itself becoming a bird, would only prove thereby his most profound ignorance of anatomy. What relation is there between the complicated and admirable organization of the feather, so perfectly adapted to the nature of the bird, and a scale that might be conceived as disparting itself? Moreover, a scale is of such a nature that it would not be disparted by drying; and yet this is but a sample of what these boasted writers propose!" §

The Law of Hybridity.—Mr. Darwin gives much attention to this law, and adduces many and curious instances to show that interbreeding tends to deterioration, that strength comes from crossing, and that varieties of new vigor, which might develop into new species, may come from individuals of different species. But that interbreeding tends, in certain instances, to deterioration and sterility, may, for aught we know, be a natural consequence of the inheritance of disease, which close interbreeding may perpetuate, and which crossing might tend to remove. Now, no well-authenticated cases of perfectly hybrid animals are known. Mr. Darwin himself admits this, ‖ but argues that such cases are intrinsically possible, because we do know of numberless instances where varieties, when crossed, are not only fertile, but their progeny often surpass in fertility their parents. But the true inference from this is not the one he has drawn. These facts teach us rather the real and ineradicable difference between species and varieties. Moreover, the instances which Mr. Darwin adduces furnish themselves the gravest difficulties to his hypothesis. For if close interbreeding tends to sterility, and if somewhat remoter unions diminish this tendency, and if when these unions are of two varieties the cross-breeds are more fertile than either pure stock, and if the difference between varieties and species be only one of degree and not of kind, how does it happen that when the divergence has passed over just that degree which separates the variety from the species, the whole tendency is instantly reversed, and the mongrel, if produced, is sterile? ¶

Gradation not to be Confounded with Progress.—In the organic world an individual passes through stages of growth, each of which, compared with the preceding, marks a grade of progress. This is the individual's development, in which case, however, it is not, strictly speaking, true to say that the higher has been developed out of or by the lower, for the lower and the higher spring alike from a deeper source. They are both the unfolding of what lay mysteriously folded up in the germ before any manifestation of the individual life had appeared. So the facts teach us, and so a sound philosophy would declare. But though we might look upon gradation here as equivalent to progress, this by no means proves that it is such elsewhere. There is a gradation in the colors of the prism, but it would be absurd to call this a progress in any such sense as though one color had grown out of another. In like manner a gradation of species does not involve a progress of species, and we only confuse ourselves if we confound the two. Because a system of nature can be represented, in the contemplation of which we pass, by regular and successive steps, from the lowest and simplest structure to the highest and most complex, it by no means follows that the higher has proceeded from the lower, or that either has been evolved out of the other. Now, we need to remember that in natural history no such gradation can yet be represented. There are broad gaps which require prodigious leaps of the imagination to span. Mr. Darwin urges that these gaps are apparent, but not real. They seem such only to our defective knowledge. If we had the whole field instead of detached portions before us, we should find, he claims, the gaps filled up and the gradation perfect. This we may admit. It seems possible, though as yet far from being proved. The discovery of the intermediate forms between the *Palæotherium* and the hoofed quadrupeds of to-day, which Cuvier desiderated, may no longer be lacking,** but the proof that the *Palæotherium* is the progenitor of our present existing hoofed quadrupeds is not advanced one jot by this discovery. *Palæotherium* and *Equus* remain just exactly as distantly related as before, notwithstanding all the help toward consanguinity which *Paloplotherium, Anchitherium,* and *Hipparion* can furnish. Indeed, the ease with which gradation becomes translated into progress, and the readiness with which this mistake is made to prove the transmutation of species, is somewhat surprising to one who thinks closely. The imagination, not to say the fancy, would seem to have a more prominent part to play in these processes than a faculty of rigorous logic.

In the assignment of the links which are fancied to connect man, through the anthropoid apes, with the orang-outang and gibbon, it is argued that a perfect gradation is a sufficient warrant for the inference that the man has, in process of time, been evolved from the monkey. Now, we should not forget that the postulate here is only a fancy. The gradation is so far from perfect—indeed, is so grossly imperfect except in certain superficial characteristics—that the most accomplished naturalists declare that "man is the sole species of his genus and the sole representative of his order and sub-class." †† While the studies of Duvernoy upon the gorilla, and of Gratiolet and Alix upon the chimpanzee, have shown that a monkey of the highest grade is none the less a monkey and none the more a man than one of the lowest, ‡‡ Pruner-Bey has also shown that in the most salient characteristics of the two there is an inverse order of development, which not only destroys the gradation, but makes it impossible that the higher should ever have descended from the lower. §§ And if we pass from anatomical and physiological qualities to the higher psychological distinctions, we find a difference which cannot be bridged by degrees, though extended to infinity.

But even if there are men so sunk in a savage state that the difference between them and the people of the highest civilization seems greater than that which divides some monkeys from others, we have at least just as good reason for saying that the lowest has degenerated from the highest, as that the highest has been developed from the lowest. The history of men is full of instances of deterioration. If we weigh it simply by number, whether of years or of nations or of individuals, degeneration and decay vastly preponderate. Where is the civilization now of Tyre, and Carthage, and Babylon, and Nineveh? and where are the arts which built the Great Pyramid and Baalbec? All over the world we have evidence of a tendency among nations and men to sink away from civilization into barbarism, but history does not show an instance of a nation rising by its own efforts from barbarism to civilization. "To believe," says Mr. Darwin in his latest book, "that man was aboriginally civilized, and then suffered utter degradation in so many regions, is to take a pitiably low view of human nature." ‖‖ But, alas! this is exactly the view which the sad facts of history oblige us to take, and we must square our views of human nature to the actual facts of the case, whether or not it would better suit our desires and our theories to have them otherwise. The incontestable fact is, that human nature reveals no inherent impulse to improve or perfect itself. History gives unnumbered cases of a downward tendency, but not a single instance of a self-evolved progress. The lamp which lights one nation in its

* "Origin of Species," p. 82.
† Ibid., p. 80.
‡ Ibid., p. 163.
§ "Leçons d'Anatomie Comparée," i., p. 100.
‖ "Origin of Species," p. 224.
¶ "American Journal of Science and Arts," vol. xxxix., p. 178.

** Owen, "Anatomy of Vertebrates," vol. iii., pp. 791, 792.
†† Owen, "Classification of Mammalia," p. 103.
‡‡ Quatrefages, "Rapport sur les Progrès de l'Anthropologie," Paris, 1867, p. 245.
§§ Ibid., p. 247.
‖‖ "Descent of Man," vol. i., p. 176.

advancement has been always lighted by a lamp behind it. Civilization is never indigenous; it is an exotic plant wherever found. This is the simple truth of history, which makes all such discussions as Mr. Darwin's respecting the descent of man as false to fact as they are abhorrent to philosophy.

"By the constant working of his brain," says Carl Vogt, "man gradually emerges from his primitive barbarism."* But, aside from the crude materialism of which this writer is so fond, and which this sentence might illustrate, it is fair, again we say, to ask for some little evidence that this "constant working of the brain" starts from its own accord. We have not a particle of such evidence, and such a supposition is not only unsupported by a single fact, but is contradicted by all the facts of history. (See Prof. SEELYE's argument against Darwinism in Johnson's "Natural History," vol. ii.) J. H. SEELYE.

Dash'iell (ROBERT LAWRENSON), D. D., was born in Salisbury, Md., 1826, graduated with honor at Dickinson College 1846, joined the Methodist Baltimore Conference 1848, and occupied prominent pulpits in the Middle States down to 1868, when he was elected president of Dickinson College, Pa. He was appointed corresponding secretary of the Missionary Society of the Methodist Episcopal Church in 1872.

Dash'kof (EKATERINA ROMANOVNA), PRINCESS, a Russian lady eminent for her talents and learning, was born of a noble family Mar. 28, 1743. She became the wife of Prince Dashkof and a friend of the empress Catharine II. She was one of the chiefs of the conspiracy which dethroned Peter II. Soon after this event she lost the favor of Catharine, and passed several years in a tour through France, Germany, and Italy. Having returned home in 1782, she was appointed president of the Academy of Sciences at St. Petersburg. She was the first president of the Russian Academy, founded in 1784, and she superintended the compilation of a great dictionary of the Russian language. Died Jan. 16, 1810. (See "Autobiographical Memoirs of her Life," published in English in 1840.)

Da'sya [from the Gr. δασύς, "hairy," a term very applicable to some of the species], a genus of red Algæ, of the order Rhodomelaceæ, nine or ten species of which are found in the U. S., and seven species in the British Islands. They have pear-shaped spores, borne in ovate conceptacles upon the smaller branches. The genus includes some of our finest sea-weeds.

Da'syure [from the Gr. δασύς, "hairy," and οὐρά, the "tail"], (*Dasyurus*), a genus of carnivorous marsupial quadrupeds, allied to the opossums, but having only eight incisors in the upper and six in the lower jaw, and only twelve molars in each jaw. They also differ from the opossums in the absence of a hinder thumb, a prehensile tail, and in the want of a cæcum. They are all Australasian. The ursine dasyure (*Dasyurus* or *Diabolus ursinus*), or Tasmanian devil, abounded in Van Diemen's Land when it was first colonized. It is as large as the badger. The tail is half as long as the body, and like it is covered with coarse black hair with white bands. It is very wild, and makes its home in the ground. The spotted dasyure (*Dasyurus macrurus*) is the size of a cat, has a tail as long as the body, and is of a deep brown color, spotted with white. This and a smaller species (*Dasyurus Mangir*), called the wild-cat, are natives of Van Diemen's Land, and both are very destructive to poultry. All the dasyures are fierce nocturnal quadrupeds, and cannot be tamed.

Da'ta (plu.), [from the Lat. *do, datum*, to "give"], signifies "things given" or admitted; quantities and facts given, known, or admitted, by which to find things or results unknown; in geometry, the quantities or conditions which are assumed to be known in any problem. Thus, in the problem, *Given the base, altitude*, and *area, to construct the triangle*, the data are: 1, that the figure is a triangle; 2, that it has a certain straight line for its base; 3, that its vertex is at a known distance from its base; and 4, that its area has a known magnitude.

Dat'ames, fourth century B. C., a Persian general and satrap, born of a Carian father and Scythian mother; his principal fields of action were Asia Minor and Syria. He experienced the fate accorded to many distinguished commanders of antiquity, such as Sertorius, master of Spain eight years in the first century B. C., and Viriathus, second century B. C., and in modern times, Wallenstein and Guise, when they sought to maintain their independence against despotism, or when they became dangerous to royalty. Too strong to be crushed out by force of arms, they were taken off by treachery and assassination, as was Datames about 362 B. C. He is known to modern times only by short notices of Diodorus of Sicily, about 50 B. C., and of Polyen the Macedonian, second century A. D., author of "Strategemata," and through a very interesting account of him by Cornelius Nepos (first century B. C.), who considers him the most valiant and capable of barbarian—that is, foreign—generals, with the exception of the two Carthaginians, Hamilcar and Hannibal; as one who owed his success not to the command of great armies, but to an individual ability almost unequalled. From what is to be gathered from the scanty details furnished, he must, in one respect resembling the greatest of all generals of all times, Hannibal, have been more remarkable for stratagem than strategy, although not deficient either in tactics or strategy. Frontinus, a military writer of consular dignity and Roman commander-in-chief in Britain towards the end of the first century A. D., in his "Strategematica and Strategicon" (Scott's translation, 1811, 185), cites an evidence of his consummate judgment, under fire, so to speak, similar to, but far better than, that which in 1646 distinguished Turenne in respect to the Wennarians when transferring their services to the Swedes. At first very successful in putting down an extensive confederated revolt, and thereupon invested with the command of the army destined to subject insurgent Egypt, Datames fell into disfavor with the Persian monarch Artaxerxes. Finding himself mistrusted and imperilled, he set up for himself, and was victorious over the powerful forces sent against him. Found too great to be conquered, he was betrayed by a friend, and in a conference murdered (exactly like the great Sertorius) about 362 B. C. To few men of whom so little is known has a greater reputation been accorded, demonstrating that Datames made himself felt and obtained a name whose grandeur like a set sun is apparent from the continuing glow beyond the mountains which conceal the orb which irradiates the sky.

J. WATTS DE PEYSTER.

Da'tary [Lat. *datarius*, from *datum*, "given" (usually the first word in the *date* of papal documents; for example, "Datum Romæ apud Sanctum Petrum," etc., "Given at Rome January 1st," etc.)], the chancellor of the pope; a high dignitary of the Roman Catholic Church, who has the power in some cases of granting requests, instead of the pope himself. This arrangement was introduced to relieve the pope from the pressure of unimportant business. The datary is assisted by a pro-datary and a sub-datary.

Date [Fr. *datte;* from the Gr. δάκτυλος (*i. e.* a "finger," and also a "date," so called from its shape); Lat. *dactylus;* Sp. *datil*], the fruit of the date-palm (*Phœnix dactylifera*), a native of the north of Africa and the south-west of Asia. It also grows in Southern Europe, and to some extent in the Southern U. S. The stem grows to the height of thirty to sixty feet, is straight, and crowned with from forty to eighty smooth pinnate leaves or fronds eight to ten feet long, with lanceolate acuminate leaflets. The tree bears many spadices, each of which on the female tree bears from 180 to 200 dates, weighing in the mass from twenty to twenty-five pounds. This tree is one of the most highly prized of all the palms, furnishing food to millions of the human race. On the N. coast of Africa, in Persia, and in Arabia dates form a chief article of food. They contain 58 per cent. of sugar, combined with gum, pectin, etc. They are used both fresh and dried, and are prepared for market by pounding and pressing them into a solid mass. Both wine and vinegar are made from them by fermentation, and in Persia an ardent spirit is distilled from them. At the top of the stem is a soft pith, which, with the young leaves surrounding it, is called "palm cabbage," and is much esteemed as food. The undeveloped panicles of flowers are also eaten, and "palm wine" is made by fermentation of the sap, of which each tree yields from three to four quarts daily for ten days or a fortnight. The roasted seeds are used in North Africa as coffee. These seeds are also ground and an oil expressed from them, the paste which remains being used as food for cattle. Baskets are made from the leaf-stalks, and mats and bags from the leaves. The fibrous parts at the base of the stalks are made into cordage, and the wood is used in the construction of buildings. The toddy-palm (*Phœnix sylvestris*) of India is perhaps a variety of this species. Like several other palms, it yields "jaggery" or palm-sugar.

Date [from the Lat. *datum*, "given," from *do, datum*, to "give," occurring in such phrases as the following: "Given under my hand, this seventh day of April," etc.; see DATARY], a word used to denote the exact time when anything was done. The careful observance of dates is of the utmost importance in the proper writing of history. One of the best works on this subject is "L'Art de vérifier les Dates," written by the Benedictines of St. Maur. (See CHRONOLOGY.)

Date Plum. See DIOSPYROS.

Dath'olite [from the Gr. δάθος, "turbid," and λίθος, a "stone"], a mineral composed of boracic acid, silica, and lime, with a little water. It occurs massive, and also crys-

*"Lectures on Man," p. 468.

tallized in rhombic prisms, the edges and angles of which are cut off by planes. It becomes opaque when heated, hence the name.

Datisca'ceæ [from *Datisca*, one of the genera], a small natural order of plants related to the Begoniaceæ, consisting of trees and herbs, principally native of the milder regions of Europe and Asia. *Datisca cannabina*, which is very similar to hemp in its general features, is a native of Crete, and is valuable as a tonic. An amylaceous substance called *datiscin* is obtained from it. It also yields a yellow dye.

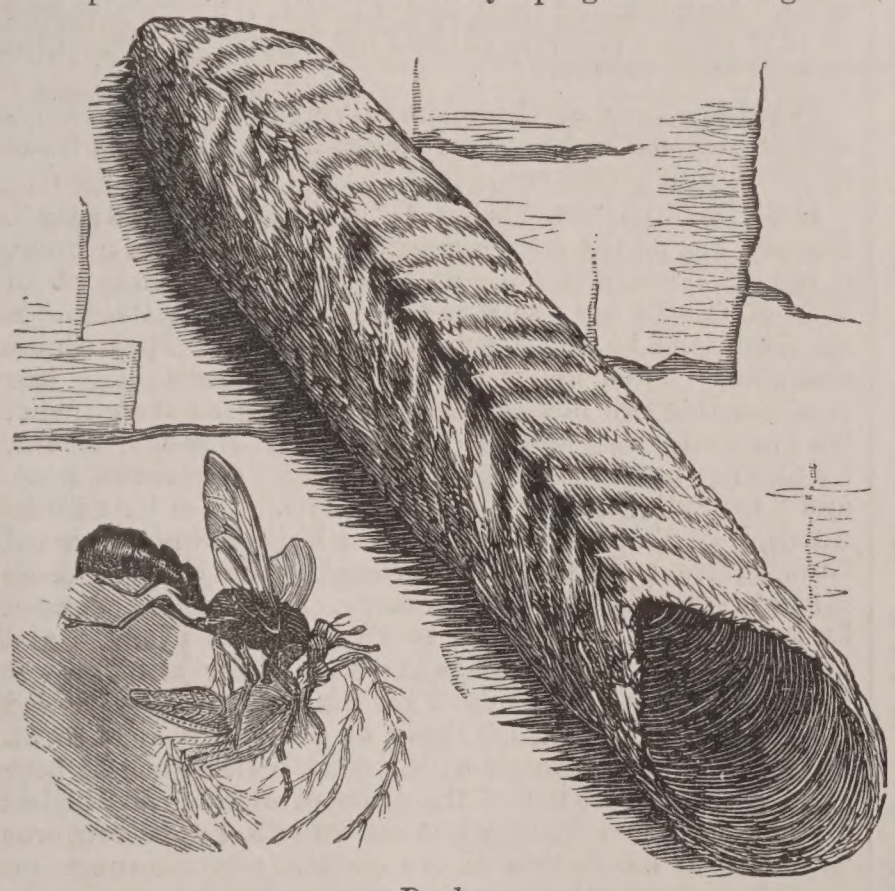
Dative Case. See DECLENSION. By J. THOMAS, M. D., LL.D.

Datu'ra [Arab. *tâṭûrah*], a genus of exogenous herbs of the order Solanaceæ, natives chiefly of warm climates in both hemispheres. The *Datura Stramonium* (thorn-apple, Jamestown or "Jimson" weed of the U. S.) is naturalized in this country, and furnishes the drug STRAMONIUM (which see). Many other species are cultivated in greenhouses for the beauty of their flowers. They all possess narcotic properties similar to those of belladonna.

Daubenton (LOUIS JEAN MARIE), M. D., an eminent French naturalist, born at Montbar May 29, 1716. He studied medicine in Paris, and began in 1742 to assist Buffon in the preparation of his great work on natural history. He was well qualified for this task by his sound judgment, scrupulous accuracy, and patient industry, which enabled him to rectify some of Buffon's errors and hasty theories, and to enrich the work with many new and important facts in the anatomy of animals. In 1745 he was appointed curator and demonstrator of the cabinet of natural history in Paris, of which he had charge for nearly fifty years. He became professor of natural history in the College of France in 1778. He contributed many scientific articles to the first "Encyclopédie," edited by Diderot. Died Jan. 1, 1800. (See CUVIER, "Notice sur la Vie de Daubenton.")

Daubeny (CHARLES GILES BRIDLE), M. D., F. R. S., an English chemist and naturalist, born at Stratton in 1795. He was for many years professor of chemistry, botany, and rural economy in the University of Oxford. He visited the U. S. in 1837. Among his works are a "Description of Active and Extinct Volcanoes, with Remarks on their Origin" (1826), a "Sketch of the Geology of North America," and "Lectures on Agriculture" (1841). Died Dec. 12, 1867.

Dau'ber, a name applied to various mud-wasps, hymenopterous insects of the family Sphigidæ and the genus



Dauber.

Pelopæus, natives of various parts of America, some of the species being quite common in the U. S. This name is given on account of the remarkable nest which the mother-insect constructs, bringing lumps of mud in her mouth, which she arranges into cells, inwardly very smooth and regular, but outwardly looking like masses of clay. In these cells she lays her eggs, one in each cell, and with it she seals up a large number of spiders, alive, but paralyzed by her sting. The eggs hatch, the grub feeds on the spiders, goes into the pupa state, and finally, having burst its cocoon, gnaws through the wall of earth and escapes a perfect insect.

D'Aubigné (JEAN HENRI **Merle**), D. D., an eminent Swiss divine and historian, born at Geneva Aug. 16, 1794. His father's name was Louis Merle. Having been ordained as a Protestant minister, he preached about five years at Hamburg, and removed to Brussels in 1823. He became in 1831 professor of church history in a college at Geneva. His principal work is a "History of the Reformation in the Sixteenth Century" (1835), translations of which have obtained extensive circulation in Great Britain and the U. S. In 1863 he began to publish a "History of the Reformation in Europe in the Time of Calvin." He also published the "Protector (Cromwell), a Vindication" (1848). He is most praised for the vivacity of his style, the fervor of his piety, and the pronounced orthodoxy of his opinions. He died at Geneva Oct. 21, 1872.

D'Aubigné (THÉODORE AGRIPPA). See AUBIGNÉ, D'.

Daubigny (CHARLES FRANÇOIS), a French painter and engraver, born Feb. 15, 1817, studied with his father and Paul de la Roche, and spent three years in Italy. Among his numerous works are "The Harvest," "The Banks of the Eure," etc. His pictures show a careful study of nature. He also made many drawings for books and illustrated newspapers.

Daufus'kie Island, one of the Sea Islands of Beaufort co., S. C., lying S. W. of Hilton Head Island. Its northern point is in lat. 32° 8′ 42″ N., lon. 80° 49′ 58″ W.

Dau'lis, an ancient city of Greece, in Phocis, at the foot of Mount Parnassus. Its position rendered it an important military station. Its site is occupied by the modern village of *Davlia*, 9 miles N. W. of Livadia.

Dau'mer (GEORG FRIEDRICH), a German pantheist, born at Nuremberg Mar. 5, 1800. He published, besides other works, a "System of Speculative Philosophy" (1831) and "Philosophy, Religion, and Antiquity" (1833). Several of his works were noted for his violent attacks upon the Christian religion. In 1858 he joined the Roman Catholic Church, since which time he has published a number of works from a Catholic point of view.

Daun, von (LEOPOLD JOSEPH MARIA), COUNT, an Austrian general, born at Vienna Sept. 25, 1705. He served with distinction against the Turks, and became a field-marshal in 1754. He was commander-in-chief of the imperial army in the Seven Years' war. On June 18, 1757, he defeated Frederick the Great at Kolin, where the loss of the Prussians was very severe. On Oct. 14, 1758, he gained a victory over Frederick at Hochkirchen. On Aug. 15, 1760, he was defeated at Liegnitz, and on Nov. 3, 1761, at Torgau. He was appointed president of the Aulic council in 1762. Died Feb. 5, 1766.

Daunou (PIERRE CLAUDE FRANÇOIS), a French statesman and author, born at Boulogne Aug. 18, 1761. He was elected in 1793 a member of the National Convention, in which he acted with moderation and opposed the proscription of the Girondists. He was the first president of the Council of Five Hundred, and a member of the committee which formed the constitution of the year VIII. (1800). He was editor of the "Journal des Savants" from 1816 to 1838, and became professor of history in the College of France in 1819. He published an "Essay on the Temporal Power of the Pope" (1810) and a "Course of Historical Studies" (20 vols., 1842 *et seq.*). Died June 20, 1840. (See WALCKENAER, "Notice sur la Vie de Daunou," 1841.)

Dau'phin [Lat. *delphinus*], the former title of the eldest son and heir-apparent to the king of France. It was originally the title of the sovereign lords of the province of Dauphiné. In 1349, Humbert, lord of Vienne, dying without issue, bequeathed his possessions to Charles of Valois, on condition that the heir-apparent to the throne of France should bear the title of dauphin of Vienne. This title was abolished at the revolution of 1830.

Dauphin, a county in S. E. Central Pennsylvania. Area, 530 square miles. It is bounded on the W. and S. W. by the Susquehanna River, and intersected by the Swatara. The surface is diversified by parallel mountain-ridges and valleys, among the former of which is the Kittatinny or Blue Mountain. Mines of anthracite coal are worked in the county. Cattle, grain, wool, tobacco, hay, butter, and timber are produced. There are manufactures of iron, leather, furniture, carriages, brick, lime, metallic wares, machinery, and a great variety of other goods. It is intersected by the Northern Central and the Schuylkill and Susquehanna R. Rs. Capital, Harrisburg. Pop. 60,740.

Dauphin, a post-borough of Dauphin co., Pa., on the Northern Central R. R., 8 miles N. W. of Harrisburg, at the S. W. terminus of the Schuylkill and Susquehanna R. R. Pop. 739.

Dauphiné, a former province in the S. E. of France, is now comprised in the departments of Drôme, Hautes-Alpes, and Isère. The chief towns were Grenoble, Vienne, Gap, and Valence. After it had been long governed by counts called *dauphins*, it was ceded to the crown of

France in 1349. It was bounded on the W. by the river Rhone.

Dauw, or **Burchell's Zebra** (*Asinus Burchelli*), a

Dauw.

wild ass of Southern Africa, resembling the true zebra, but not so beautiful, its stripes being far less brilliant, and not distributed over the whole body. It feeds in troops on the plains, while the zebra lives in the mountains. It has been domesticated, and in the Jardin des Plantes at Paris has long been acclimatized.

Dav'enant (Sir William), an English dramatic poet, born at Oxford in 1605. He succeeded Ben Jonson as poet-laureate in 1637. He was a royalist in the civil war, and was confined for two years in the Tower. His principal work is "Gondibert," an epic poem. Died April 17, 1668.

Dav'enport, a city and river-port of Iowa, the capital of Scott co., is pleasantly situated on the Mississippi at the foot of the Upper Rapids, 330 miles above St. Louis and 184 miles W. by S. from Chicago. It is now the most populous city in the State. It occupies the base and higher parts of a bluff which rises gradually and extends along the river three miles. The bluff commands extensive and beautiful views of the river and of the town of Rock Island on the opposite side of the Mississippi. The Chicago Rock Island and Pacific R. R. here crosses the river on a new iron bridge, which cost over $1,200,000. This city is the southern terminus of the Davenport and St. Paul R. R., and is also the terminus of the Chicago and South-western R. R. It contains twenty-five churches, Griswold College, a business college, a city training-school, the largest and most successful system of common schools in Iowa, the Roman Catholic academy of the Immaculate Conception, an opera-house, three national and two savings banks. Three daily (English), four weekly and three monthly, and one daily German paper are issued here. It has manufactures of machinery, woollen goods, farming implements, glue, corn-sugar, furniture, five lumber and fine flouring-mills. Davenport has fine waterworks, which cost $600,000, comprising 20 miles of pipe, and 260 hydrants, horse-railroads, five public parks, a fire department, and gasworks costing $400,000, and is the market of a large farming region. Coal abounds in the vicinity. Large quantities of grain are shipped here. Pop. in 1860, 11,267; in 1870, 20,038; of Davenport township, 3414. Charles H. Playter,
City Ed. of the "Daily Democrat."

Davenport, a township and post-village of Delaware co., N. Y., 18 miles S. of Cooperstown. It has important manufactures. Pop. 2187.

Davenport (Edward L.), an excellent actor, was born in Boston, Mass., in 1816. His *début* was at the Lion Theatre, Providence, R. I., as Passion Will to Booth's Sir Giles Overreach, which last is one of his own best characters. He first appeared in Philadelphia (his present residence, 1873) at the Walnut Street Theatre in 1838. He has played with success in Europe and in the principal American theatres.

Davenport (F. O.), U. S. N., born Oct. 3, 1842, in Michigan, graduated at the Naval Academy in 1860, became a lieutenant in 1862, and a lieutenant-commander in 1866. He served at the naval battery near Alexandria, Va., in the summer of 1861, and on board the gunboat Scioto during the bombardment and passage of Forts Jackson and St. Philip and at the capture of New Orleans, April 24, 1862.
Foxhall A. Parker, U. S. N.

Davenport (Henry K.), U. S. N., born Dec. 10, 1820, in Georgia, entered the navy as a midshipman Feb. 19, 1838, became a passed midshipman in 1844, a lieutenant in 1852, a commander in 1862, and a captain in 1868. He was present at the capture of the "Barrier Forts," China, in 1856, and at the bombardment and capture of Forts Hatteras and Clark, N. C., in 1861. He was in command of the steamer Hetzel, North Atlantic blockading squadron, from the latter part of 1861 to the end of 1864, was in action with gunboats on James River in 1861, and commanded a column of gunboats at the capture of Roanoke Island and Elizabeth City, N. C., in 1862. He was for more than a year senior officer in the sounds of North Carolina, during which period he participated in many battles and skirmishes while co-operating with the army, at one time receiving the thanks of the officer commanding Fort Anderson for saving his troops from capture by a superior force. In 1865–66 he commanded the Lancaster and Powhatan in the Pacific Ocean, and in 1871 was appointed to the command of the frigate Congress, in which service he died Aug. 18, 1872. Captain Davenport was a thorough seaman, and when he died had seen twenty-two years of actual service at sea.
Foxhall A. Parker, U. S. N.

Davenport (John), B. D., an eminent Puritan divine and colonist, was born at Coventry, England, in 1597, was educated at Oxford, and entered the Anglican priesthood. In consequence of his Puritanical principles and practice he was obliged to leave the Established Church in 1635. In 1637 he came to Boston, Massachusetts Bay, and in 1638 became one of the founders of the New Haven colony. In 1639 he became one of the "seven pillars" of the government. He protected Goffe and Whalley, the regicides, and in 1668 became minister of the First church, Boston, where he died Mar. 15, 1670.

David, a town of Colombia, in Veragua, is on the Isthmus of Panama and near the Pacific Ocean. It has a trade in coffee, hides, rice, etc.

Da'vid [Heb. דוד, "beloved;" Gr. Δαβίδ or Δανίδ; Arab. *Dâood*], one of the most remarkable characters in history, a son of Jesse, was born at Bethlehem in Judæa about 1080 B. C. In his youth he followed the occupation of a shepherd, and he appears to have acquired great skill as a musician. When about twenty-two years of age he was received into the household of Saul, king of Israel, who, we are told, was troubled with an "evil spirit." David, by playing upon the harp, soothed and "refreshed" Saul, and "the evil spirit departed from him." Not long afterwards, David slew in single combat a Philistine giant named Goliath, and, according to the promise of the king, received Michal, Saul's daughter, in marriage. But Saul was offended by the praises which David received for his prowess, and not only regarded his son-in-law with bitter jealousy, but made repeated attempts upon his life. David was obliged to fly for safety to Achish, king of Gath. In 1055 B. C., Saul was slain in a battle with the Philistines, after which David was made king of the tribe of Judah, reigning at Hebron for seven years, while Ishbosheth, Saul's son, was in power on the E. side of the Jordan, and for two years was obeyed by all the tribes except Judah. After the murder of Ishbosheth, in 1048 B. C., David became king of the whole nation. He was victorious in all his wars, and under his sway the kingdom of Israel acquired great prosperity and power. One of his sorest trials was the rebellion and death of his favorite son, Absalom. David died in 1015, and Solomon, his son, succeeded to the throne. In David all the feelings and passions appear to have been singularly intense and powerful, and by them he was again and again betrayed into great faults, and even crimes. Yet his character, on the whole, exhibits a rare magnanimity, as shown in his sparing Saul, his bitterest enemy, when that king was completely in his power. (See 1 Sam xxiv.) It should be borne in mind that David was not subjected to the powerful restraints which public opinion exercises in some directions on modern European monarchs. His fear of God and his generous feelings were the only checks to

his mighty passions and that license which long-continued success and a power all but unlimited in his own dominions tended to foster. If we consider these things, we shall probably find few sovereigns, even in the most civilized times, possessing despotic power, whose characters will bear a favorable comparison with that of David. As a writer of religious poetry, and especially of that kind which comes home to the feelings of all sorely-tried hearts, David has no equal among the poets of the human race. He wrote 73 of the 150 lyrics which compose the book of Psalms. Of the many commentaries on the Psalter, some of the ablest and most important are those of Calvin (1578–1610), Hengstenberg (1849–52), Hupfeld (1855), Delitzsch (1860–67), and Perrowne (1864–68; 2d ed. 1870). Of recent English versions, the most noteworthy are those of Noyes (1831; 2d ed. 1846) and Conant (1871). (See Rev. Samuel Chandler's "Critical History of the Life of David," 2 vols. 8vo, 1766, reprinted in one volume in 1853.)

Revised by R. D. Hitchcock.

David I., king of Scotland, the sixth son of Malcolm III., was born about 1080. He married, in 1110, Maud, a great-niece of William the Conqueror. He succeeded his brother, Alexander I., in 1124, and swore to maintain the right of his niece Matilda to the throne of England in case her father, Henry I., left no male issue. Henry died in 1135, and David afterwards waged war against Stephen, who disputed her claim to the throne. David invaded England, and was defeated at Northallerton in 1138. He promoted manufactures, education, and civilization. He died in 1153, and left the throne to his grandson, Malcolm IV.

David II., or **David Bruce,** king of Scotland, born in 1323, was a son of Robert Bruce, whom he succeeded in 1329. His kingdom was invaded in 1332 by Edward Baliol, who defeated the army of David. The latter was expelled, and retired to France, but his subjects continued to fight for him, and he recovered the throne in 1342. Having invaded England in 1346, he was defeated, captured, and detained until 1357. He died in 1370.

David (Félicien-César), a French musician and composer, born at Cadenet (Vaucluse) Mar. 8, 1810. He became about 1832 a disciple of Saint-Simon, and visited the Levant with eleven fellow-disciples, from which he returned to Paris in 1835. He published in that year "Oriental Melodies" for the piano, which were not successful. In 1844 he produced "The Desert," an *ode-symphonie,* which had a great success. Among his other works are "Christopher Columbus," an *ode-symphonie* (1847), "La Perle du Brésil," an opera (1851), and "Herculaneum" (1859).

David (Jacques Louis), a celebrated French historical painter, founder of the French classical school of painting, was born in Paris Aug. 31, 1748. He was a pupil of Vien, with whom he visited Rome in 1775. Having passed several years in Rome and painted the "Triumph of Paulus Æmilius" and other works, he returned to Paris in 1780. He was admitted into the Royal Academy in 1783, revisited Rome in 1784, and painted a picture of the "Horatii," which was greatly admired. He produced the "Death of Socrates" in 1787, and "Brutus Condemning his Sons" in 1789. In the Revolution he was a violent Jacobin. Having been elected to the Convention in 1792, he voted for the death of the king, and was an accomplice or partisan of Robespierre. He was the manager of the national festivals and spectacles during the republic. He painted at this time several pictures relating to the events of the Terror—"The Death of Marat," "The Murder of Pelletier," "The Jeu des Paumes." He was appointed first painter to Napoleon about 1804, and was banished as a regicide in 1815. He afterwards resided at Brussels, where he died Dec. 29, 1825. His body was refused burial in France. "The Rape of the Sabines" is regarded as his masterpiece. (See Miel, "Notice sur J. L. David," 1834; Delécluze, "David et son École," 1855.) Revised by Clarence Cook.

David (Jérôme Frédéric Paul), Baron, a French politician, born in 1823, a grandson of Jacques Louis David, has since 1859 been a member of the Corps Législatif and a leader of the ultra-Bonapartist party; in 1867, and again in 1869, vice-president of the Corps Législatif. After the resignation of the Ollivier ministry (Aug., 1870), he was minister of public works in the short-lived cabinet of Count Palikao. He wrote "Réflexions et discours sur la propriété chez les Arabs" (1862).

David (Pierre Jean), a French sculptor known as **David d'Angers,** born at Angers Mar. 12, 1789. He gained at Paris the first prize (with a pension) in 1811, and then went to Rome to pursue his studies. He formed a friendship with Canova, returned to France in 1816, and produced a statue of the great prince of Condé, by which he acquired a high reputation. In 1826 he became a member of the Institute. Soon after the revolution of 1830 he was employed by the government to adorn the Pantheon with sculptures. Among his works are busts of Washington, La Fayette, Arago, Goethe, and Lamartine, and statues of Cuvier, Racine, and Jefferson. He was a republican member of the National Assembly in 1848. Died Jan. 5, 1856.

Revised by Clarence Cook.

Da'vidists, Da'vid-Geor'gians, or **Jo'rists,** a sect founded by David George or Joris, otherwise called John of Bruges, an Anabaptist leader, who was born at Delft in Holland in 1501 or 1502, and died at Bâle in 1556. He pretended to be the Messiah, denied the resurrection, and held various heretical opinions. The sect existed in Holland nearly a century after his death.

Davids Island [named from a former owner], an island of 100 acres in Long Island Sound, within the township limits of New Rochelle, Westchester co., N. Y. It was purchased in 1867 by the U. S. government for $38,500, to be used for military purposes.

Da'vidson, a county in the S. E. of Dakota Territory. Area, 432 square miles. It is traversed by the Dakota River or Rivière-au-Jacques. This county has been formed since the census of 1870. There are fine intervale or bottom lands along the streams.

Da'vidson, a county in W. Central North Carolina. Area, 620 square miles. It is bounded on the W. by the Yadkin River. The surface is hilly; the soil is mostly fertile. Cattle, grain, tobacco, wool, and hay are raised. It is traversed by the North Carolina R. R. Gold, iron, copper, silver, and lead have been found here. Capital, Lexington. Pop. 17,414.

Davidson, a county of Middle Tennessee. Area, 500 square miles. It is intersected by the Cumberland River, navigable for steamboats. The surface is undulating; the soil is fertile. Grain, tobacco, cotton, wool, hay, etc. are produced, and the manufactures are varied, and embrace machinery, carriages, saddlery, harnesses, metallic wares, etc. Good limestone is abundant here. The Nashville and Chattanooga R. R. connects in this county with the Louisville and Nashville and other railroads. Capital, Nashville. Pop. 62,897.

Davidson, a post-township of Sullivan co., Pa. P. 634.

Davidson (James Wood) was born in 1829 in Newberry district, S. C., and graduated with honors at the South Carolina College in 1852; was professor of Greek in Mount Zion College, Winnsboro', S. C., 1854–59, and has since been an instructor, except while serving in Virginia as an officer of Lee's army. He has published a "School History of South Carolina" and "The Living Writers of the South," besides other valuable works.

Davidson (Lucretia Maria), an American poetess, born at Plattsburg, N. Y., Sept. 27, 1808. She wrote verses in early childhood, and is said to have composed 278 poems. Died Aug. 27, 1825. A collection of her poems was published, with a memoir, by S. F. B. Morse in 1829.

Davidson (Margaret Miller), a poetess, a sister of the preceding, was born Mar. 26, 1823. She was distinguished for her precocity and sensibility. Died Nov. 25, 1838. Her poems were praised by Washington Irving, who wrote a memoir of her life.

Davidson (Robert), D. D., was born at Carlisle, Pa., in 1808. His father was president of Dickinson College. The younger Davidson studied theology at Princeton, became president of Transylvania University, and was for some time superintendent of public instruction in Kentucky. Among his numerous writings are "History of the Presbyterian Church in Kentucky," "The Christ of God," and "Elijah, a Sacred Drama."

Davidson (Thomas), F. R. S., F. G. S., an English palæontologist, born May 17, 1817, at Edinburgh. He has written "British Fossil Brachiopoda" and "Illustrations and History of Silurian Life."

Davidson (Gen. William) was born in Lancaster co., Pa., in 1746. The family was of Irish extraction. In 1750 they removed to Rowan co., N. C. William, the youngest son, was educated at Queen's Museum, afterwards styled Liberty Hall, in Charlotte, the county-seat of Mecklenburg, adjoining Rowan. Old Mecklenburg had blazed out in the sacred cause of freedom long before the sparks were discerned in some other parts of the land. Even her patriotic women formed a solemn league against laggards, the universal sentiment being, "None but the brave deserve the fair." He married a daughter of Mr. John Brevard of Centre, who had seven sons in the American army. Among these was Ephraim Brevard, the distinguished author of the Mecklenburg Declaration of Independence. Our young hero was made major in one of the first regiments organized in North Carolina. He fought at Monmouth, Brandywine, and Germantown, and is said to have

commended himself to the approval of the great and good commander-in-chief himself. For his efficiency and fidelity he was promoted to be lieutenant-colonel, with the command of a regiment. With three years of such campaigning he brought back with him to his loved Carolina much military prestige. In a skirmish at Calson's Mill a ball passed through his body. Upon his recovery he was made brigadier-general. His energy and popularity were made available in his rallying and organizing the militia throughout this region. Days of darkness were now upon us. Lord Cornwallis had broken up camp at Winnsboro', and had resolved to crush Morgan and Greene in succession. He had put himself upon the war-path. The haughty and bloodthirsty Tarleton was detached, and sent forward to take Morgan. He found him at Cowpens, and was signally defeated. Tarleton returned to his master a sadder and a wiser man. There was now an interesting trial of speed for the Catawba. Morgan had a little the start, but his 500 British prisoners were a great clog to him. The Americans' rear crossed at Sherrill's Ford only two hours before the British van came in sight. Morgan's main body moved on towards Salisbury. The prisoners were forwarded to Virginia. It was now sunset, and Cornwallis rested his jaded army that night on the W. bank. He slept secure of his victim, but Providence smiled on the patriot army. That night it rained heavily, and the next day and the next the river was booming. Cornwallis followed the stream in quest of a better crossing. Greene, full of good cheer and of mischief-making, had taken two or three trusty troopers and dashed across the country to Beattie's Ford. There Morgan, Davidson, and Col. Washington met him by previous concert. Going out of camp a little distance, the four held a brief conference, and then each betook himself to his own post. Gen. Davidson, with 250 militia and Capt. Graham's cavalry, was soon *en route* for Cowan's Ford, 4 miles below. This young cavalier was afterwards Gen. Graham, worthy father of a worthy son, ex-Gov. William A. Graham. As they rode along together, Gen. Davidson remarked to Graham that though Greene saw the Catawba for the first time that day, he seemed to be more familiar with it than those who had been reared on its banks. The little band reached their destination about dusk. They could scarcely be expected to do more than mask the retreat of our little army, or at best hold Cornwallis in temporary check. It was of course uncertain where his lordship would choose to cross. He made a feint of so doing at Beattie's Ford, whilst the main body of his army had, after midnight, been marched down to Cowan's. This being a more private and dangerous crossing, he had hoped it might escape the attention of his adversary. The camp-fires on shore convinced him of his miscalculation. Though the swollen waters had only partially subsided, his destiny seemed to urge him onward. In the bold Britons plunged, and on they pressed. Owing to the dense fog which hung over the river, Lieut. Thomas Davidson's picket stationed at the "wagon ford" did not discover them at once, but soon opened fire on them. The cavalry came to their aid. The general had encamped opposite the island, a quarter of a mile below, where the "horse ford" comes out. This ford begins where the other does, but then takes down stream and across the island, very much as at present. The wagon ford is very jagged and rough, bearing obliquely up. It is said that the reason they did not take the horse ford was that their guide abandoned them in mid-stream, and that they, not knowing the ford, bore right across. By the time the general reached the spot with the main force and took position, some of the British sections had gained the shore and commenced firing. It is not surprising that a few well-directed volleys from the British made his lordship master of the situation. The casualties on their side were thirty-one killed, among whom was a brave officer of the Guards, Col. Hall, and thirty-five wounded. We lost four killed, all privates, except the gallant Gen. Davidson, who, pierced through the breast with a rifle-ball, fell from his horse and expired without a struggle. He thus sealed with his life-blood his devotion to the cause so dear to his heart. By referring to the date, Feb. 1, 1781, we see that he was taken away in the full flush of manhood and of his usefulness. He sleeps in the quiet cemetery of Hopewell church. His sword hangs in Chambers Hall at Davidson College. This flourishing institution received from him its name, and we fondly trust it will help to perpetuate his memory as effectually as the sculptured marble voted, but never erected over him, by a not the less grateful and appreciative Congress.

W. G. Richardson.

Davidson College, Mecklenburg co., N. C., was founded in 1837. The name was given in honor of Gen. William Davidson, a Revolutionary officer who fell at Cowan's Ford on the Catawba River, not far from where the college is situated. It had its origin in an hereditary thirst for sound learning and pure religion which characterized the people of Western North Carolina from a very early period. As early as 1770 they obtained a charter from the colonial legislature to incorporate "Queen's Museum" at Charlotte in Mecklenburg county, which was the first college ever attempted in the State. This charter was repealed by royal proclamation, but the institution was not abandoned. In 1777 it was rechartered, as "Liberty Hall," and continued its operations until 1780, when it was closed by the progress of the Revolution. Again, in 1820, earnest efforts were made in Western North Carolina to establish an institution of high grade, to be called "Western College." This also failed. The next movement began in 1835 in Concord Presbytery. This led to the establishment of Davidson College in 1837, for which a charter was obtained in 1838. Thus it appears that Queen's Museum, Liberty Hall, Western College, and finally Davidson College, have been so many successive efforts to embody in a practical, working form the intellectual and religious life of Western North Carolina. In all these efforts the Scotch-Irish Presbyterian element was predominant; and Davidson College, while its charter distinctly announces that its object is "to educate youth of all classes, without any regard to the distinction of religious denominations," is under the government and control of Presbyterians exclusively. All the presbyteries of North Carolina and Bethel Presbytery in South Carolina are now represented in its board of trustees.

The institution at the beginning received a valuable landed estate from William Lee Davidson, Esq., the son of Gen. Davidson. Upon this land the college buildings were erected. A small endowment was obtained by contributions from friends and patrons and by the sale of scholarships, but the college did not attain to its present efficient equipment until after the munificent bequest of $258,000 by Mr. Maxwell Chambers of Salisbury, N. C. It lost much of its endowment by the late war; but its buildings, libraries, cabinets, apparatus, etc. are ample. It has seven professors and two organized courses of instruction —the one literary, and the other scientific. It has graduated 352 students, and of those who have gone out from its halls, about 100 have entered the gospel ministry.

The Rev. R. H. Morrison, D. D., to whose enlightened Christian zeal and well-directed energy Davidson College owes its existence and much of its prosperity, was its first president. He was succeeded by the Rev. Samuel Williamson, D. D., in 1841; the Rev. Drury Lacy, D. D., became president in 1854, the Rev. J. L. Kirkpatrick, D. D., in 1860, and the Rev. G. Wilson McPhail, D. D., LL.D., in 1866. In 1871, when the presidency again became vacant by the death of Dr. McPhail, the trustees determined to substitute the office of chairman for the presidency of the college, and Prof. J. R. Blake was elected to the new office.

J. R. Blake.

Davidson's, a township of Iredell co., N. C. Pop. 1540.

Da'vie, a county in W. Central North Carolina. Area, 300 square miles. It is bounded on the E. by the Yadkin River. The surface is uneven. Tobacco, grain, and wool are staple products. Iron ores and limestone are found. Capital, Mocksville. Pop. 9620.

Da'vie (William Richardson), General, was born in England June 20, 1756, and emigrated to America in early youth. He graduated at Princeton in 1776, served as colonel in the Revolutionary war, and was a delegate from North Carolina to the convention which formed the Federal Constitution in 1787. In 1799 he was chosen governor of North Carolina. Died Nov. 8, 1820.

Da'vies (Charles), LL.D., an American officer and mathematician, born Jan. 22, 1798, in Washington, Conn., graduated at West Point in 1815. After a year in garrison at New England posts, he resigned Dec. 1, 1816, and was attached to the Military Academy as assistant professor till May 1, 1823, when he was appointed professor of mathematics, holding this position till May 31, 1837, when he again resigned for a like position in Trinity College, Hartford, Conn. He was appointed paymaster U. S. A. Nov. 17, 1841, holding office till Sept. 30, 1845, and was subsequently professor of mathematics and philosophy in the University of New York 1848–49, and of higher mathematics in Columbia College, New York City, 1857–65. After leaving West Point in 1837 he devoted most of his time and talents to the preparation of a complete series of mathematical text-books, adopted largely in public schools. He is a member of several scientific and educational associations.

George W. Cullum, U. S. A.

Davies (Henry E., Jr.), an American lawyer and general, born in New York July 2, 1836, educated at Harvard, Williams, and Columbia Colleges, studied law, and was admitted to the bar in 1857. In April, 1861, he en-

tered the army as captain Fifth New York Volunteers—was transferred July, 1861, as major to the Second New York Cavalry, of which regiment he subsequently became colonel, remaining in command till Sept., 1863, when he was commissioned a brigadier-general of volunteers, and assigned to a command in the cavalry corps of the Army of the Potomac, serving with distinction till the close of the war (brevet major-general of volunteers Oct., 1864). In June, 1865, he was made a major-general, and assigned to the command of the middle district of Alabama, which he held till Jan. 1, 1866, when he resigned. He was public administrator of the city of New York from Jan., 1866, to Jan., 1869, and assistant district attorney of the southern district of New York from July 20, 1870, to Dec. 31, 1872. G. C. SIMMONS, *Clerk Board of Eng'rs.*

Davies (Sir JOHN), an English poet and judge, born in Wiltshire in 1570, was educated at Oxford. He was appointed solicitor-general of Ireland in 1603, and published in 1612 an able work on the political state of Ireland. In 1620 he was elected a member of the English Parliament. His chief poem is entitled "Nosce Teipsum" (1599). He became lord chief-justice in 1626, and died Dec. 7, in the same year.

Davies (SAMUEL), D. D., a Presbyterian divine and eminent pulpit-orator of Welsh descent, was born near Summit Ridge, Newcastle co., Del., Nov. 3, 1723. He spent some years as a sort of missionary in Hanover co., Va. He was one of the founders of the College of New Jersey, and succeeded Jonathan Edwards as president of it in 1759, and died Feb. 4, 1761. A collection of his sermons was published in London soon after his death. The last American edition, in three volumes (1849), which claims to be complete, contains an essay on the life and times of the author by Rev. Albert Barnes. President Davies takes rank among the greatest of pulpit orators.

Davies (THOMAS), famous as the author of the "Life of David Garrick" (1780), was born probably in 1712, studied at Edinburgh, and became an unsuccessful actor in London, where he was also a bookseller and publisher. He was a friend of Dr. Samuel Johnson, who was warmly attached to him. Attacked by Churchill in the "Rosciad," he was compelled by ridicule to leave the stage. Besides the work above mentioned, which brought him fame and profit, he published several other works, chiefly biographical. Died in 1785. (See BOSWELL'S "Life of Johnson.")

Davies (THOMAS A.), an American officer and merchant, born in 1809 in St. Lawrence co., N. Y., graduated at West Point in 1829. He served as lieutenant of infantry on garrison duty till he resigned Oct. 31, 1831; civil engineer on the Croton Aqueduct, New York, 1831–33 and 1840–41; and merchant in New York City 1833–39 and 1841–61. At the beginning of the civil war he resumed the military profession as colonel of Sixteenth New York volunteers, was appointed brigadier-general U. S. volunteers May 7, 1862, and served in Manassas campaign 1861, engaged at Bull Run; in Mississippi campaign 1862, engaged in the siege of Corinth; in Northern Mississippi 1862, engaged in the battle of Corinth, and command of various districts 1862–65. Brevet major-general U. S. volunteers July 11, 1865, for gallant and meritorious services, and mustered out of service Aug. 24, 1865.

GEORGE W. CULLUM, U. S. A.

Da'viess, a county in the S. W. of Indiana. Area, 423 square miles. It is bounded on the S. and W. by the East Fork and West Fork of White River, which unite at the south-western extremity of the county. The soil is mostly fertile. Coal is found. Cattle, grain, tobacco, wool, and lumber are produced; carriages, wagons, etc. are manufactured. It is intersected by the Ohio and Mississippi R. R. Capital, Washington. Pop. 16,747.

Daviess, a county in the N. W. of Kentucky. Area, 550 square miles. It is bounded on the N. by the Ohio River, and on the S. and W. by Green River. The surface is nearly level; the soil is fertile. Coal is found here. Tobacco, cattle, grain, and lumber are produced. It is intersected by the Owensboro' and Russellville R. R. Capital, Owensboro'. Pop. 20,714.

Daviess, a county in the N. W. of Missouri. Area, 576 square miles. It is intersected by Grand River. The surface is undulating; the soil is fertile. Cattle, grain, tobacco, and wool are staple products. It is traversed by a branch of the St. Louis Kansas City and Northern R. R., and by the South-western branch of the Chicago Rock Island and Pacific R. R. Capital, Gallatin. Pop. 14,410.

Daviess (JOSEPH H.), an American lawyer and patriot, born in Bedford co., Va., Mar. 4, 1774, studied law and attained a high position in his profession, was U. S. attorney for the district of Kentucky, and vigorously opposed Aaron Burr in 1806. He was mortally wounded at the battle of Tippecanoe Nov. 7, and died Nov. 8, 1811. Several counties in the U. S. were named in his honor.

Da'vila (ENRICO CATERINA), an Italian historian, born at Sacco, near Padua, Oct. 30, 1576. He was educated at Paris, and entered the service of Henry IV. of France, and about 1606 the service of the Venetian republic, and commanded with success in several actions. He published in 1630 a "History of the Civil Wars of France from 1559 to 1598" ("Historia della Guerre Civili," etc.). Died in July, 1631.

Da'vis, a county in the S. S. E. of Iowa. Area, 480 square miles. It is intersected by Fox River. The surface is undulating; the soil is fertile and well watered. Cattle, grain, wool, hay, butter, and timber are staple products. It is traversed by a branch of the St. Louis Kansas City and Northern, by the Burlington and South-western, and by the South-western branch of the Chicago Rock Island and Pacific R. Rs. Capital, Bloomfield. Pop. 15,565.

Davis, a county in N. E. Central Kansas. Area, 386 square miles. It is intersected by the Kansas River, and also drained by the Republican River. The surface is undulating; the soil is fertile. Grain, hay, butter, etc. are staple products. It is traversed by the Kansas Pacific and the Missouri Kansas and Texas R. Rs. The greater part of the county is prairie. Capital, Junction City. P. 5226.

Davis, a county in the N. E. of Texas. Area, 927 square miles. It is bounded on the N. by Sulphur Fork of Red River. The soil is fertile, and heavily timbered. Cotton, wool, corn, rice, and fruit are raised. Iron ore abounds. Lumber, flour, pig iron, and copperas are manufactured. Capital, Linden. Pop. 8875. This county was originally called CASS, but it was changed to Davis, and is so called in the U. S. census of 1870. In 1871 the name was again changed to CASS.

Davis, a county in the N. of Utah, is bounded on the W. by the Great Salt Lake. It is intersected by the Utah Central R. R. Grain and wool are raised. Capital, Farmington. Pop. 4459.

Davis, a township of Grant co., Ark. Pop. 578.

Davis, a township of Van Buren co., Ark. Pop. 488.

Davis, or **Davisville,** a post-village of Yolo co., Cal., at the junction of the Marysville branch with the Central Pacific R. R., 13 miles W. by S. of Sacramento.

Davis, a post-village of Rock Run township, Stephenson co., Ill., on the Western Union R. R., 13 miles N. W. of Freeport. It has one weekly newspaper.

Davis, a township of Fountain co., Ind. Pop. 663.

Davis, a township and village of Starke co., Ind. P. 244.

Davis, a township of Davis co., Kan. Pop. 2748.

Davis, a township of Caldwell co., Mo. Pop. 573.

Davis, a township of Lafayette co., Mo. Pop. 1723.

Davis, a township of Shenandoah co., Va. Pop. 2293.

Davis (ANDREW JACKSON), a clairvoyant and prominent Spiritualist, was born Aug. 11, 1826, at Blooming Grove, Orange co., N. Y. His first work, "The Principles of Nature, her Divine Revelations," etc. (1845), professes to have been dictated by him under spiritual influence, at a time when he had received almost no education. He has since published a number of other works, of which the principal is "The Great Harmonia" (5 vols., 1850–59). (See "The Magic Staff, an Autobiography of A. J. Davis," 1857.)

Davis (BENJAMIN F.), an American officer, born in Alabama in 1832, graduated at West Point in 1854, and served with distinction in the infantry and dragoons in New Mexico. In 1862 he became colonel of the Eighth New York Cavalry, and while leading a brigade to the charge was instantly killed, June 9, 1863, at the combat of Beverly Ford, Va.

Davis (CHARLES A.), an able Methodist Episcopal preacher, born Oct. 7, 1802, was admitted to preach in the Baltimore Conference in 1824. He occupied several of the most important pulpits of his denomination. After the division of his Church into two bodies he joined the Methodist Episcopal Church South. Becoming a post-chaplain of the U. S. navy, he advocated the national cause during the civil war, and united again with the Methodist Episcopal Church. He died at the Naval Hospital, Norfolk, Va., Feb. 20, 1867.

Davis (CHARLES HENRY), LL.D., U. S. N., born Jan. 16, 1807, in Boston, Mass., entered the navy as midshipman Aug. 12, 1823, became passed midshipman in 1829, lieutenant in 1834, commander in 1854, captain in 1861, commodore in 1862, and rear-admiral in 1863. In 1859, Davis was appointed superintendent of the American "Nautical

Almanac." In 1861 we find him a member of a board of officers assembled at Washington to inquire into and report upon the condition of the Southern coast, its harbors and inlets, with a view to offensive operations on the part of the government. This led to the organization of the expedition against Port Royal, in which Davis bore a conspicuous part as chief of staff. His services prior to and at the capture of Port Royal may be best gathered from Flag-Officer Dupont's official report of Nov. 11, 1861, in which, referring to Charles H. Davis, he says: "I have yet to speak of the chief of my staff and fleet-captain, Commander Davis. In the organization of our large fleet before sailing, and in the preparation and systematic arrangement of the details of our contemplated work—in short, in all the duties pertaining to the flag-officer—I received his most valuable assistance. He possesses the rare quality of being a man of science and a practical officer, keeping the love of science subordinate to the regular duties of his profession. During the action he watched over the movements of the fleet, kept the official minutes, and evinced that calmness in danger which, to my knowledge for thirty years, has been a conspicuous trait in his character." On the 9th of May, 1862, Davis relieved Flag-Officer Foote of the command of the Western flotilla off Fort Pillow, and on the following day beat off a squadron of eight iron-clads, which had steamed up the Mississippi and attacked him. The vessels with Davis at the time were seven in number. The action was a spirited one, and lasted nearly an hour; three of the hostile gunboats were disabled, but, taking refuge under the guns of Fort Pillow, could not be captured. On the 5th of June Fort Pillow was abandoned by the Confederates, and on the 8th Davis fell in with their iron-clads and rams opposite the city of Memphis. A running fight ensued, resulting in the capture of all the Confederate vessels but one, and the surrender of Memphis. For his services during the civil war Davis received the thanks of Congress and was made a rear-admiral. On his return from the Mississippi he was appointed chief of the bureau of navigation, and in 1865 superintendent of the Naval Observatory, in which capacity he served for two years, when he was detailed as commander-in-chief of our squadron on the coast of Brazil, where he remained until 1869. On his return to the U. S. he was ordered to Washington on special duty, and in 1870 was appointed to the command of the U. S. navy-yard at Norfolk, Va., where he now is (1873).

FOXHALL A. PARKER, U. S. N.

Davis (DANIEL), an American lawyer, the father of Admiral C. H. Davis, was born at Barnstable, Mass., May 8, 1762, settled at Portland, Me. (then called Falmouth), in 1782, and held many prominent offices in Massachusetts, of which Maine was then a part. In 1804 he removed to Boston, and in 1832 to Cambridge, Mass., where he died Oct. 27, 1835. He was the author of several legal works.

Davis (DAVID), LL.D., an American jurist, born in Cecil co., Md., Mar. 9, 1815, educated at Kenyon College, O., studied law with Judge Bishop in Lenox, Mass., and in the Law School at New Haven, Conn. In 1836 he settled in Bloomington, Ill., where he continues to reside; he was elected to the lower house of the Illinois legislature 1844–45, to the constitutional convention which framed a new constitution for the State 1847; elected judge of the eighth judicial circuit of Illinois in 1848, re-elected in 1855, and again in 1861. While serving this last term he was appointed by President Lincoln an associate justice of the Supreme Court of the U. S. Oct., 1862, which position he still holds. He was nominated by the Labor Reform party in 1872 as a candidate for the presidency.

Davis (EDWIN HAMILTON), M. D., an American archæologist, born in Ross co., O., Jan. 22, 1811, graduated at Kenyon College in 1833. He became professor of materia medica and therapeutics in the New York Medical College in 1850. He wrote "Monuments of the Mississippi Valley" (in vol. i. of the "Smithsonian Contributions") and other works.

Davis (EMERSON), D. D., a Congregational divine and author, born at Ware, Mass., July 15, 1798, and graduated at Williams College in 1821, was for some time tutor in that college and preceptor in the academy at Westfield, Mass. He became in 1836 pastor of the First Congregational church in the latter town, where he remained for life, greatly honored and beloved, and exerting a wide and very useful influence, especially in educational affairs. In 1847 he received the degree of D. D. from Harvard College. He was vice-president of Williams College from 1861 to 1868. He published "The Teacher Taught" (1839), "History of Westfield" (1826), "The Half Century" (1852), and various minor essays, sermons, etc., besides five manuscript volumes of biographical writings, as yet unpublished. Died at Westfield, Mass., June 8, 1866.

Davis (GARRET), born in Mount Sterling, Ky., Sept. 10, 1801, was admitted to the bar in 1823, became a Whig member of Congress (1839–47), and a Democratic U. S. Senator from Kentucky (1861–72). He was very active in preventing the secession of his native State in 1861. Died in Sept., 1872.

Davis (GEORGE LEONARD), U. S. N., born Aug. 10, 1833, in Massachusetts, entered the navy as a paymaster April 16, 1861, and commanded the powder division of the steam-sloop Pensacola at the passage of Forts St. Philip and Jackson and capture of New Orleans in 1862. His services on that occasion are thus honorably mentioned in the official report of the executive officer of the Pensacola to Capt. Henry W. Morris of April 30, 1862: "The powder division was *perfectly* served under the command of Paymaster George L. Davis. Its good order and efficiency are worthy of special notice."

FOXHALL A. PARKER, U. S. N.

Davis (GEORGE T.), U. S. N., born May 20, 1844, in Massachusetts, graduated at the Naval Academy as ensign in 1863, became a master in 1866, a lieutenant in 1867, and a lieutenant-commander in 1868. He was attached to the iron-clad steamer New Ironsides in 1863–64, during her various engagements with the forts and batteries in Charleston harbor, and was in both attacks on Fort Fisher in 1865.

FOXHALL A. PARKER, U. S. N.

Davis (GEORGE T.) was born in Sandwich, Mass., Jan. 12, 1810, graduated at Harvard College in 1829, was admitted to the bar in 1832, was a State senator in Massachusetts several terms, and a representative in Congress (1851–53).

Davis (HENRY), D. D., an American Presbyterian divine, was born at East Hampton, N. Y., Sept. 15, 1771, and graduated at Yale in 1796. He was for seven years a tutor in Williams and Yale Colleges; professor of Greek at Union College, Schenectady, N. Y., 1806–09; president of Middlebury College, Vt., 1809–17; president of Hamilton College, Clinton, N. Y., 1817–33. He was a preacher of very eminent ability, one of the founders of Auburn Theological Seminary, and an active friend of foreign missions. Died at Clinton, N. Y., Mar. 8, 1852.

Davis (HENRY WINTER), LL.D., an American statesman, born at Annapolis, Md., Aug. 16, 1817. He was elected a member of Congress by the voters of Baltimore in 1854 and 1856. He was an eloquent speaker, and acted with the "American" party. In 1858 he was re-elected. Soon after the civil war began he became a radical Republican. He was chairman of the committee of foreign affairs in the Thirty-eighth Congress (1863–65). Died Dec. 30, 1865.

Davis (ISAAC), LL.D., born in Northboro', Worcester co., Mass., June 2, 1799, and graduated at Brown University (of which he is now one of the fellows) in 1822. He had an extensive and lucrative legal practice in Worcester, Mass., where he still resides. He was president of the Massachusetts Baptist State Convention 1833–40, president of board of trustees of Worcester Academy 1833–73, Democratic candidate for governor of Massachusetts in 1845, 1846, and 1861, mayor of Worcester in 1856, 1858, 1861, member of the State senate in 1843–54, member of governor's council 1851, member of the house of representatives (State) and chairman of committee on judiciary in 1852, member of the Massachusetts constitutional convention in 1853, and member of the Massachusetts board of education in 1852–60. Mr. Davis has been a liberal and judicious patron of education, and is one of the most respected and influential citizens of Massachusetts. His "Addresses, Speeches, and Historical Discourses" have been published.

Davis (Rev. JAMES), an English dissenter, born in Kent June 1, 1812, graduated at Cheshunt College, became a preacher of London, and has been for many years secretary of the British branch of the Evangelical Alliance. He was a delegate of the Alliance at its meeting in New York in 1873.

Davis (JEFFERSON), LL.D., an officer and statesman, born June 3, 1808, in Christian co., Ky., graduated at West Point 1828, served as lieutenant of infantry at Western posts 1828–33, of First Dragoons as adjutant 1833–34, and on frontier service 1834. After resigning June 30, 1835, he became a cotton planter in Warren co., Miss., 1835–46, presidential elector from Mississippi 1844, member U. S. House of Representatives 1845–46, colonel First Mississippi Rifle Volunteers in the war with Mexico 1846–47, engaged at Monterey and Buena Vista (severely wounded), member of the U. S. Senate 1847–51, and chairman of the committee on military affairs 1849–51, secretary of war in President Pierce's cabinet 1853–57, member of the U. S. Senate and chairman committee on military affairs 1857–61, President of the Southern Confederacy Feb. 4, till captured May 10, 1865, at Irwinville, Ga., prisoner of war 1865–67 at Fort

Monroe, Va., and now president of Carolina Life Insurance Company. GEORGE W. CULLUM, U. S. A.

Davis (JEFFERSON C.), an American general, born in Clarke co., Ind., Mar. 2, 1828. He was one of the garrison of Fort Sumter when it was bombarded by the insurgents in April, 1861. He commanded a division at the battle of Stone River, which ended Jan. 2, 1863, and a corps of the army of Gen. Sherman in the march from Atlanta to the sea, in Nov. and Dec., 1864.

Davis (JOHN), a prominent minister of the Methodist Episcopal Church, was born in Northumberland co., Va., Oct. 30, 1787, and became an itinerant preacher in 1810. For over forty years he was one of the leaders of his Church, an admirable presiding elder, and a very powerful and influential preacher. He died in Hillsborough, Va., Aug. 13, 1853.

Davis (JOHN), LL.D., born in Plymouth, Mass., Jan. 25, 1761, graduated at Harvard in 1781, became a lawyer of Plymouth in 1786. After holding other important offices, he became in 1795 comptroller of the U. S. treasury, in 1796 Massachusetts district attorney, and in 1801 U. S. district judge for Massachusetts. He was an eminent antiquary and a learned scientist. Died at Boston, Mass., Jan. 14, 1847. He was a prominent member of many learned societies, and published several addresses and papers, chiefly upon scientific and historical subjects.

Davis (JOHN), LL.D., an American Senator, was born in Northborough, Mass., Jan. 13, 1787, and graduated at Yale in 1812. He was elected a member of Congress in 1824, and governor of Massachusetts 1833–35 and 1840–41. In 1835 he was chosen a Senator of the U. S. for six years by the Whigs, and again elected in 1845. He advocated a protective tariff. He was often called "Honest John Davis." Died April 19, 1854.

Davis (JOHN A. G.), an able jurist of Albemarle co., Va., was born in 1801 in Middlesex co., Va., and graduated at William and Mary College, where he was a law professor 1830–40; he was also a practising lawyer, and for some time a journalist at Charlottesville. He wrote a number of valuable legal works. Died Nov. 14, 1840, from the effects of a shot fired at him by a student.

Davis (JOHN CHANDLER BANCROFT), an American lawyer, born at Worcester, Mass., Dec. 29, 1822, educated at Harvard College, studied law and followed the practice of his profession. In 1849 he was appointed secretary of legation at London, but returned to the U. S. in 1852, and resumed his profession. He was assistant secretary of state 1869–71, agent of the U. S. at Geneva during the meeting of the tribunal of arbitration for the settlement of all points of difference between the U. S. and Great Britain 1871–72, and since 1873 has been assistant secretary of state.

Davis (Sir JOHN FRANCIS), BART., K. C. B., an English officer and Orientalist, was born in London in 1795. He first went to China in 1816. He was chief superintendent at Canton, and in 1841–48 governor of Hong Kong. Among his works is "The Chinese, a General Description of China and its Inhabitants" (2 vols., 1836), which is highly esteemed. He has written several works upon Chinese literature, with which his acquaintance is remarkable.

Davis (JOHN LEE), U. S. N., born Sept. 3, 1825, at Carlisle, Sullivan co., Ind., entered the navy as a midshipman Jan. 9, 1841, became a passed midshipman in 1847, a lieutenant in 1855, a lieutenant-commander in 1862, a commander in 1866, and a captain in 1873. In Nov., 1849, Davis, with one of the boats of the Preble, carrying two officers and twelve men, boarded and captured a piratical Chinese junk off Macao, killing three of her crew and taking the rest prisoners. He was the executive officer of the Waterwitch in her engagement (Oct. 12, 1861) with the Confederate ram Manassas, and afterwards with a squadron off Pilot Town, at the mouth of the Mississippi. He commanded the gun-boat Wissahickon in the fights with Fort McAllister of Nov. 19, 1862, and of Jan. 27, Feb. 1, and Feb. 28, 1863. On Mar. 9, 1863, off Charleston he sunk the blockade-runner Georgiana, and on June 5, 1863, chased the Isaac Smith ashore off Fort Moultrie, where she was destroyed. In command of the iron-clad Montauk he participated in all the battles of the summer and fall of 1863 in Charleston harbor with Forts Sumter, Gregg, Moultrie, and Wagner and Batteries Bee and Cumming's Point. In command of the Sassacus he took part in the Fort Fisher fights, and was recommended for promotion by Admiral Porter. Since the war he has been constantly employed, either afloat or ashore, and was one of the members of the board of 1866–67 appointed to examine volunteer officers for admission into the navy.

FOXHALL A. PARKER, U. S. N.

Davis (JOHN W.), M. D., a politician, was born in 1799 in Lancaster, Pa., completed his medical studies at Baltimore, and in 1823 became a resident of Indiana, where he was soon chosen to fill responsible public offices. He was elected a surrogate, was twice Speaker of the Indiana house of representatives, a commissioner to treat with the Indians, was a Democratic member of Congress, elected in 1835, in 1839, and in 1843, when he was chosen Speaker of the House of Representatives at Washington. In 1848 he became U. S. commissioner to China, was governor of Oregon Territory (1853–54), and in 1852 was president of the convention at Baltimore which nominated Franklin Pierce for President. Died at Carlisle, Ind., Aug. 22, 1859.

Davis (MATTHEW L.), an American writer, born in New York in 1766, was an intimate friend of Aaron Burr. His chief work is "Memoirs of the Life of Aaron Burr" (2 vols., 1836–37). Died June 21, 1850.

Davis (NATHAN SMITH), M. D., was born at Greene, Chenango co., N. Y., Jan. 9, 1817, and received his medical education at Geneva, N. Y. He was in 1848 editor of the "Annalist" in New York City. Since 1849 he has been a resident of Chicago. He was editor of the "Chicago Medical Journal" (1849–59), and in 1860 became editor of the "Chicago Medical Examiner." He has published a volume on "Agriculture," a "History of Medical Education," "Clinical Lectures" (1873), and other works. He is professor of the principles and practice of medicine in Chicago Medical College.

Davis (NATHANIEL), of Limestone, Ala., served in the house and senate of that State from 1840 to 1852. He was uneducated, but not without considerable natural gifts. He died in 1853.

Davis (NICHOLAS), a Virginian who settled in Limestone, Ala., was a representative in the first legislature held in Alabama, and served subsequently in the senate from 1820 to 1828.

Davis (NOAH), a Baptist divine, born near Salisbury, Mass., July 28, 1802, entered the ministry in Norfolk, Va. He was one of the founders of the Baptist General Tract Society (established in 1824, afterwards the American Baptist Publication Society), of which he became the manager. He removed to Philadelphia, where he fulfilled his duties in the Tract Society with great energy and success. Died July 30, 1830.

Davis (NOAH), an American jurist, born at Haverhill, N. H., Sept. 10, 1818, attended the district school at Albion, N. Y., whither his parents had removed in 1825, then the seminary at Lima, and was admitted to the bar in 1841. In 1844 he entered into partnership with Sanford E. Church, afterwards judge of the court of appeals, with whom he practised law in Albion for about fourteen years. He was appointed a justice of the supreme court of New York upon the resignation of Hon. James Mullet, in which dignity he continued through the two terms succeeding, until in 1864 he resigned in order to take a seat in Congress. He commenced the practice of law in New York City in 1869, and the same year again took a seat in Congress, resigning in 1870 in order to assume the duties of U. S. attorney for the southern district of New York, and was elected judge of the supreme court of the same district in 1873. Soon after taking his seat on the bench there devolved upon him the conduct of the important trials of Edward Stokes for the murder of Fisk and of William M. Tweed for malfeasance in office.

Davis (REUBEN), a native of Tennessee, was born Jan. 18, 1813. He was a physician, and afterwards a lawyer and judge in Mississippi, serving on the bench of the high court of errors and appeals, was for a time colonel of Mississippi Rifles in the Mexican war, and was twice elected to Congress from Mississippi before the late civil war, during which he favored the Confederate cause.

Davis (THOMAS T.) was born at Middlebury, Vt., Aug. 22, 1810, graduated at Hamilton College, Clinton, N. Y., in 1831, and was admitted to the bar in 1833. In 1862 and 1864 he was elected a representative to Congress from New York. He is well known as a manufacturer, and is connected with coal-mining and railroad interests.

Davis (TIMOTHY) was born in Gloucester, Mass., April 12, 1821, learned the printer's trade, and was afterwards a merchant of Boston, Mass. He was elected in 1854 and 1856 to Congress from the Gloucester district of Massachusetts, and in 1861 was appointed to a position in the Boston custom-house by President Lincoln.

Davis's Strait [named in honor of Capt. John Davis, noticed above] connects Baffin's Bay with the Atlantic Ocean, and lies between Greenland and British North America. It is about 160 miles wide at the narrowest part. A constant current runs southward through this strait from the circumpolar regions. Davis's Strait is frequented by many whaling ships.

Da'vison, a township of Genesee co., Mich. Pop. 1124.

Da'viston, a township of Tallapoosa co., Ala. P. 1578.

Da'vits (plu.), [etymology uncertain], the wooden or iron frame used for hoisting and lowering boats on shipboard. The "fish-davit" is a gaff used in fishing the anchor. Boat-davits have been to some extent superseded by ingenious BOAT-LOWERING APPARATUS (which see).

Da'vors (Jo.), author of a work, now rare and valuable, called "The Secrets of Angling" (London, 1613). This work is quoted by Walton, and the writer's name is doubtless a fictitious one. The authorship has been ascribed to John Donne, John Davisson, John Davies, and other writers of that day.

Davoud Pasha, a Turkish minister, born in Mar., 1816, is a Catholic Armenian. He studied at Berlin, and became professor at the military college at Constantinople. He afterwards was secretary of the embassy at Berlin, became director of the construction of telegraphs, and in 1861 was appointed governor of Lebanon during the strife between the Druses and the Maronites, which post he resigned in 1868, becoming minister of public works.

Davout, or **Davoust** (LOUIS NICOLAS), duke of Auerstadt and prince of Eckmühl, an able French marshal, born near Noyers (Yonne) May 10, 1770. He was a fellow-student of Bonaparte at Brienne, and entered the army in early youth. In 1793 he gained the rank of general of brigade, and in 1798 went with Bonaparte to Egypt. He became a general of division in 1800, and commanded the cavalry of the army of Italy in that year. Having received a marshal's baton in 1804, he led the right wing at Austerlitz in Dec., 1805, and defeated the Prussians at the battle of Auerstadt, Oct. 14, 1806. For his services at Eckmühl he was created prince of Eckmühl in 1809. He took part in the Russian campaign of 1812, and was wounded at Borodino. He was afterwards governor of the Hanse Towns, and defended Hamburg for several months against the allies. During the Hundred Days (1815) he was Napoleon's minister of war. He was commander-in-chief of the French armies in 1815, after the battle of Waterloo. Died June 4, 1823. (See CHÉNIER, "Vie du Maréchal Davout," 1866.)

Da'vy (Sir HUMPHRY), BART., F. R. S., a celebrated English chemist, was born Dec. 17, 1778, at Penzance, Cornwall. At an early age he displayed a taste for fiction and poetry, and when eleven years old is said to have composed part of an epic of which the hero was Diomede, son of Tydeus. Even in this work he manifested great powers of imagination and invention. He has left some respectable fugitive poems of a later date. His father died when he was sixteen, and shortly after this event Gregory Watt, son of the inventor James Watt, took lodgings at his mother's house. The young men were congenial in tastes, and a warm intimacy grew up between them, which seems to have played an important part in determining the studies and directing the genius of young Davy. But to Mr. Davies Gilbert the cause of science is still more indebted for the encouragement which he early gave to Davy, and finally for presenting him to the notice of the Royal Institution in London. He was associated in 1798 with Doctor Beddoes at Bristol in the Pneumatic Institution founded by that gentleman. The next year appeared his first contribution to science, under the name of "Essays on Heat and Light, with a New Theory of Respiration," which formed part of a volume published by Doctor Beddoes. In 1800 his "Researches, Chemical and Philosophical, chiefly concerning Nitrous Oxide and its Respiration," attracted much attention among scientists. These "Researches" made known his discovery of the peculiar intoxicating or exhilarating properties of nitrous oxide gas, and contain, besides, the results of interesting and dangerous experiments on the respiration of nitrogen, hydrogen, carburetted hydrogen, carbonic acid, and nitrous gases. In 1801 he lectured for the first time before the Royal Institution, in which he was made a professor in 1802. He was pre-eminently successful as a lecturer. In 1807 he delivered before the Royal Society his second Bakerian lecture, in which he gave an account of the decomposition by galvanism of the fixed alkalies, his great achievement, by which he proved that these alkalies are merely metallic oxides. It has been justly said that since the time of Sir Isaac Newton no contribution has been made to the "Philosophical Transactions" equal in importance to Davy's account of this great discovery. It is lamentable that one whose intellectual gifts were of so high an order should not have been above the intoxication of fame. Yet it is true that after Davy's rapid rise to fame he was sometimes guilty of an overbearing spirit, especially in his relation to younger seekers for distinction, a circumstance the less justifiable when we consider how much he himself owed to the kindness and generosity of scientific men. He was knighted in 1812, and not long afterwards he married a widow (Mrs. Apreece) of accomplishments and fortune. He was made a baronet in 1818. One of the most important of his inventions is the safety-lamp (1815–17). He became president of the Royal Society in 1820, and was elected to that office for seven succeeding years. In 1827 his failing health compelled him to resign. He died May 28, 1829, at Geneva.

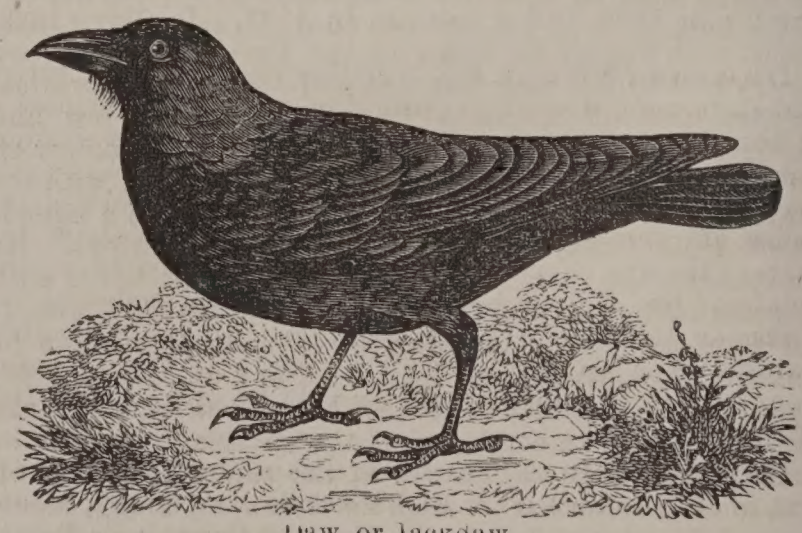
The following are a few of his many important works: "Elements of Chemical Philosophy" (1812); "Elements of Agricultural Chemistry" (1813); papers concerning "Fire-Damp," etc. and accounts of his researches relating to "Oxymuriatic Acid" and "Fluoric Compounds." After his death were published his "Consolations in Travel," consisting principally of reflections and speculations of a religious nature. Davy appears to have been endowed to the fullest extent with all those gifts necessary to a profound student of the laws of nature. His intellect was at once comprehensive and penetrating, and he possessed, in addition, an inexhaustible invention and fertility in resources, joined to an enthusiasm which no difficulties could discourage. (See "Life of Sir Humphry Davy," by DR. J. A. PARIS, 1831; "Memoirs of the Life of Sir Humphry Davy," by his brother, DR. JOHN DAVY, 1836.)

REVISED BY J. THOMAS.

Davy (JOHN), M. D., a brother of Sir Humphry Davy, was born at Penzance, Cornwall, May 24, 1791, received his medical education at Edinburgh, graduating in 1814; entered the British army service, and was on duty chiefly in foreign parts. He published various professional and other works, of which the best known is a "Life" of his illustrious brother. He was himself an able scientific observer. Died April 24, 1868.

Davy's Safety-Lamp, invented by Sir Humphry Davy (1815–17), consists of a common oil lamp surrounded by wire gauze of 400 meshes to the square inch. It is used in coal-mines where fire-damp abounds. The explosion of fire-damp was formerly a very frequent cause of the destruction of life and property. This loss has been materially diminished by the safety-lamp. The principle is as follows: When fire-damp (light carburetted hydrogen gas mixed with air) is touched by a flame it explodes with great violence, but its flame cannot pass through fine wire netting, because the wire conducts away the heat, leaving the gas on the outside too cold to take fire, for it happily requires an intense heat to inflame the fire-damp. The space within the wire netting sometimes becomes filled with the flame. It is customary in well-regulated mines for the workmen to withdraw at such times until after good ventilation has been restored. The safety-lamp is unfortunately no protection against the very explosive "white-damp," which is charged with sulphuretted hydrogen. This gas is readily detected by its smell, which resembles that of rotten eggs. It is fatally poisonous to miners even when much diluted with air. Latterly, various other safety-lamps have been invented, but thus far there is no absolute protection against the explosion of gases in coal-mines. Vigilance in observing the signs of the presence of dangerous gases, and in securing good ventilation, is indispensable to safety. Recent observations appear to show that terrestrial magnetism has a certain influence, as yet unexplained, upon the generation of these gases.

Daw, or **Jackdaw,** the *Corvus monedula,* a bird of the crow family, found in Europe, Asia, and Africa, fourteen inches long, black, with a smoky-gray neck. Daws



Daw, or Jackdaw.

are very cunning, social, and active birds, often nesting in church-towers and old castles. They build a nest of sticks, of which they sometimes collect a large quantity. They frequent large towns.

Dawes (HENRY LAURENS), an American lawyer and statesman, born at Cummington, Mass., Oct. 30, 1816, graduated at Yale in 1839, was newspaper editor, and studied and practised law. He was a member of both

houses of the legislature of Massachusetts, district attorney, and has been a member of Congress since 1857, and occupied a prominent position as chairman of the committee on appropriations and that of ways and means.

Dawison (Bogumil), a German actor, born at Warsaw May 18, 1818, of Jewish stock. From 1852 to 1866 he was engaged at the royal theatre in Dresden, where his renderings of Shakspeare's, Goethe's, and Schiller's characters were much admired. From 1866 to 1868 he was in America. Died Feb. 2, 1872.

Daw'son, a county in the N. of Georgia. Area, 200 square miles. It is drained by the Etowah River. The surface is hilly; the soil is partly fertile. Corn, cotton, wool, and tobacco are raised. Capital, Dawsonville. Pop. 4369.

Dawson, a county in the N. E. of Montana Territory. Area, 30,390 square miles. It is drained by the Missouri and Milk Rivers. Pop. 177.

Dawson, a county in Central Nebraska. Area, 1008 square miles. It is intersected by the Union Pacific R. R. and the Platte River. The surface is nearly level. Capital, Plum Creek. Pop. 103.

Dawson, a post-village, capital of Terrell co., Ga., on the South-western R. R., 98 miles S. S. W. of Macon. It has one weekly newspaper and a car-factory. It contains the South Georgia Male Institute. Pop. 1099.

Weston & Combs, Props. "Journal."

Dawson (Henry Barton), an historian, was born at Gosberton, Lincolnshire, England, June 8, 1821, and with his parents came to the U. S. in 1834. In 1845 he became a temperance journalist in New York. He has published several historical and antiquarian works, chiefly relating to the Revolutionary period in the U. S. He has been a Democratic editor in Yonkers, N. Y. (1855–66), and in the latter year became editor of the "Historical Magazine."

Dawson (John William), LL.D., F. R. S., an eminent geologist, born at Pictou, Nova Scotia, Oct., 1820. He was educated at the University of Edinburgh. Under the direction of Sir Charles Lyell he made explorations in the province of Nova Scotia in 1841, and gave an account of its geology in the "Proceedings of the Geological Society of London." He was appointed superintendent of education in Nova Scotia in 1850, and principal of McGill College at Montreal 1855, which position he still holds (1873). In 1848 he published a "Handbook of the Geography and Natural History of Nova Scotia," "Hints to the Farmers of Nova Scotia" (1853), "Acadian Geology" (1855; enlarged ed. 1868), "Archaia, or Studies of the Cosmogony and Natural History of the Hebrew Scriptures" (1859); also an excellent popular treatise on geology, published serially in the "Leisure Hour" (1871–72), republished (1873) under the title "The Story of the Earth and Man." He has contributed numerous geological memoirs and articles to the "Proceedings of the Geological Society of London," "The Canadian Naturalist," "Silliman's Journal," and other periodicals. He is author of the admirable article on Geology published in this work.

Dawson (Lucien L.), U. S. M. C., born Feb. 5, 1837, in Kentucky, entered the marine corps as second lieutenant Jan. 13, 1859, became a first lieutenant early in 1861, and a captain Nov. 23 of the same year. He was brevetted major for gallant and meritorious services at the assault on Fort Fisher on Jan. 15, 1865, where he led the marines of the fleet.

Foxhall A. Parker, U. S. N.

Dawson (William C.), a distinguished lawyer, jurist, and statesman of Georgia, born Jan. 4, 1798, was educated at the university of the State, graduated in 1816, studied law at Litchfield, Conn., and settled at Greensboro', Ga., in his native county. For twelve years he was clerk of the house of representatives of the general assembly of the State. He was several times a member of the house and senate of the State legislature. He was a member of the House in the Federal Congress from 1837 to 1842; afterwards he was judge of the superior courts in his State, and from 1849 to 1855 he was a Senator in Congress. He died May 5, 1856.

Daw'sonville, a post-village, capital of Dawson co., Ga., about 50 miles N. N. E. of Atlanta.

Dax (anc. *Aquæ Augustæ*), a town of France, department of Landes, is pleasantly situated on the Adour, 25 miles N. E. of Bayonne. It has a cathedral, a bishop's palace, and some manufactures of earthenware, brandy, leather, etc. Here are hot saline springs, which were used for bathing by the ancient Romans, and are still frequented by invalids. Pop. 9469.

Day [Lat. *dies*; Fr. *jour*; Ger. *Tag*], a word signifying either the interval of time during which the sun is above the horizon, or the time occupied by a complete revolution of the earth with reference to other celestial bodies. In the latter sense it denotes intervals of different duration, according as the body with which the revolution is compared is fixed or movable.

The astronomical or solar day, also designated the apparent day, is the time which elapses between two consecutive returns of the same terrestrial meridian to the centre of the sun. Astronomical days are of unequal length, for two reasons: 1, the unequal velocity of the earth in its orbit, which results in a greater apparent daily motion of the sun in winter than in summer; 2, the obliquity of the ecliptic, which causes the sun's apparent daily motion in right ascension (or in the plane of the earth's equator) to be less at the equinoxes than at the solstices. The astronomical day is computed from noon to noon.

The civil day, or mean solar day, is the time occupied by the earth in one revolution on its axis as compared with the sun. It is supposed to move at a *mean* rate in its orbit, and to make 365.2425 revolutions in a mean Gregorian year. This mode of measuring time makes the days all of equal length, and any special hour of the civil day sometimes precedes, and sometimes succeeds, the corresponding hour of the astronomical day. Most nations agree in fixing the beginning and end of the civil day at midnight.

The sidereal day is that portion of time which elapses between two successive culminations of the same star. Owing to the great distance of the stars, and their apparent fixedness in space, it is not perceptibly affected by the earth's orbital revolution, as is proved by all known astronomical observations. A sidereal day contains twenty-four hours fifty-six minutes four seconds of mean solar time. It is divided into twenty-four sidereal hours, which are subdivided into sidereal minutes and seconds. This is the universal mode of computing time among astronomers.

In most languages the word equivalent to our "day" is also used in a much more extended sense to denote an indefinite period of time. We speak of events which have transpired "in our own day." This figure of speech is especially common in Oriental languages, and is frequently found in the Bible.

Day, a township of Montcalm co., Mich. Pop. 510.

Day, a post-township of Saratoga co., N. Y. Pop. 1127.

Day (Benjamin F.), U. S. N., born Jan. 16, 1841, in Ohio, graduated at the Naval Academy as ensign in 1861, became a lieutenant in 1862, and a lieutenant-commander in 1866. He was attached to the steamer New London, West Gulf blockading squadron, in 1862–63, and was wounded in a night engagement on the Mississippi July 9, 1863. His services on this occasion are thus highly spoken of by his commanding officer, Lieut.-Com. George H. Perkins, in his report to Rear-Admiral Farragut of July 13, 1863: "The conduct of Lieutenant Day, my executive officer, deserves particular attention, who, after being wounded in the head, remained at his post and rendered valuable service, encouraging the men by his bravery and coolness." He was in the engagement with Howlett House batteries on James River in 1864, and in both attacks on Fort Fisher in 1865.

Foxhall A. Parker, U. S. N.

Day (George Edward), D. D., was born at Pittsfield, Mass., Mar. 19, 1815, graduated at Yale (1833) and at the Yale Theological Seminary (1838), was assistant instructor in sacred literature there from 1838 to 1840, was twice settled in the ministry, from 1840–47 in Marlboro', Mass., and from 1848 to 1851 in Northampton, Mass., from 1851 to 1866 was professor of biblical literature in Lane Theological Seminary, and since 1866 has been professor of the Hebrew language and literature and biblical theology in the theological department of Yale College. He has taken great interest in the instruction of the deaf and dumb, and has published (1845–61) two reports on the subject. From 1863 he edited the "Theological Eclectic" till 1871, when it was united with the "Bibliotheca Sacra." He translated and edited Van Oostersee's "Titus" in Lange's "Commentary," and has also translated (1871) Van Oostersee's "Biblical Theology of the New Testament." He was one of the contributors to Smith's "Bible Dictionary," and has published numerous articles in several leading reviews.

Day (Rev. Henry Noble), an author and educator, was born at New Preston, Conn., Aug. 4, 1808, graduated at Yale in 1828, was ordained to the Congregational ministry at Waterbury, Conn., in 1836, became professor of sacred rhetoric at the Western Reserve College, O., in 1840. He was a railroad president for many years, and president of the Ohio Female College (1858–64). Among his numerous educational works are "The Art of Elocution," "Elements of Logic," and "The Science of Æsthetics." He is now a resident of New Haven, Conn.

Day (JEREMIAH), D. D., LL.D., an American mathematician, born in New Preston, Conn., Aug. 3, 1773, graduated at Yale College in 1795, became in 1801 professor of mathematics and natural philosophy in that college, and was president of the same (1822–1846). Among his works are an "Introduction to Algebra" (1814) and "Navigation and Surveying" (1817). Died Aug. 22, 1867.

Day (THOMAS), an English author, born in London June 22, 1748, became heir to an ample fortune. He sympathized with the American patriots, and wrote two poems, entitled "The Devoted Legions" (1776) and "The Desolation of America" (1777). He selected from a foundling hospital two girls, whom he educated according to the system of Rousseau, with an intention to marry one of them, but he was disappointed by the ill-success of his experiment, and married Esther Milnes in 1778. His chief work is "Sandford and Merton" (1783–89), a popular juvenile tale of great merit. He was killed by the kick of a horse Sept. 28, 1789.

Day'ansville, a manufacturing village of New Bremen township, Lewis co., N. Y.

Day-Lil'y (*Hemerocallis*), a genus of liliaceous plants having a perianth with bell-shaped limb and sub-cylindrical tube, and globose seeds. Several varieties are cultivated in gardens; among these is the fragrant yellow day-lily (*Hemerocallis flava*). It is a native of Northern China, Siberia, and Hungary; it has been accounted good food for cattle, but another species, the *Hemerocallis fulva*, has more profuse foliage and is equally acceptable to cattle.

Days'man, a name used in England in former times, and sometimes now used in the northern counties, to signify an umpire or elected judge. Its use dates from the Middle Ages, when the word "day" was specially employed in judicial proceedings to denote the day assigned for the hearing of a cause. This word is also used in Scripture: "Neither is there any *daysman* betwixt us, that might lay his hand upon us both." (Job ix. 33.)

Day'ton, a township and post-village of Marengo co., Ala. The village is 38 miles W. of Selma. Total pop. 6731.

Dayton, a post-township of La Salle co., Ill. Pop. 653.

Dayton, a post-village of Sheffield township, Tippecanoe co., Ind. Pop. 385.

Dayton, a township of Adair co., Ia. Pop. 139.

Dayton, a township of Bremer co., Ia. Pop. 419.

Dayton, a township of Butler co., Ia. Pop. 383.

Dayton, a township of Cedar co., Ia. Pop. 1546.

Dayton, a township of Chickasaw co., Ia. Pop. 543.

Dayton, a township of Iowa co., Ia. Pop. 939.

Dayton, a township of Webster co., Ia. Pop. 975.

Dayton, a post-township of York co., Me. Pop. 611.

Dayton, a township of Newaygo co., Mich. Pop. 771.

Dayton, a township of Tuscola co., Mich. Pop. 660.

Dayton, a post-township of Hennepin co., Minn. Pop. 951.

Dayton, a post-village, capital of Lyon co., Nev., is on Carson River, 12 miles E. S. E. of Virginia City. Silver-mines have been opened in the vicinity. Here are several quartz-mills. Pop. of township, 918.

Dayton, a township and post-village of Cattaraugus co., N. Y., on the Erie R. R., 22 miles E. S. E. of Dunkirk. It has three cheese-factories and several lumber-mills. Total pop. 1267.

Dayton, a handsome city, capital of Montgomery co., O., on the left (E.) bank of the Great Miami, at the mouth of the Mad River, 60 miles N. N. E. of Cincinnati, and 67 miles W. by S. of Columbus; lat. 39° 44′ N., lon. 84° 11′ W. It is the terminus of the Atlantic and Great Western, the Cincinnati Hamilton and Dayton, the Dayton and Michigan, and the Dayton and Union R. Rs., all connecting. The Pittsburg St. Louis and Cincinnati and the Short Line from Cincinnati pass through it, and also the Miami Canal, connecting the Ohio with Lake Erie. The granite court-house, designed after the Parthenon, is 167 feet long and 62 wide. There are forty-five churches, among which the First Presbyterian and Grace (M. E.), built of Dayton granite, are fine specimens of architecture. The city has eight public schools, a high school, the Cooper Seminary for girls, and St. Mary's (Catholic) Institute for boys. It has a public library of 3500 volumes, 3 national and 4 private banks, 8 local insurance companies, 2 daily, 2 weekly, 1 tri-weekly and 2 weekly (German), and 2 weekly religious papers; also 3 semi-monthly and 5 monthly publications. There is a large water-power. A very extensive manufactory of railroad cars, a number of large agricultural implement works, employing as many as 5000 hands, six large breweries, two distilleries, factories of stoves, paper, cotton, and woollens, and extensive limestone quarries, which have furnished the materials for many buildings in Cincinnati, are among the industries of Dayton. Here is the National Soldiers' Home for disabled soldiers and sailors, on whose roll are the names of 2000 veterans. It has an admirable hospital, a library of 4000 volumes, and extensive grounds—600 acres. The resident manager is Hon. Lewis B. Gunckel, M. C. for the Dayton district. The tax-duplicate of Dayton is $25,000,000. The streets of Dayton, some of them 133 feet wide, cross each other at right angles, and twenty-six macadamized pikes radiate from the city. It is the heart of the Miami Valley, a beautiful and productive region. Pop. in 1860, 20,081; in 1870, 30,473.

W. D. BICKHAM, ED. DAYTON "JOURNAL."

Dayton, a township of Richland co., Wis. Pop. 968.

Dayton, a township of Waupacca co., Wis. Pop. 871.

Dayton (ELIAS), an American general, born in New Jersey in 1735. He became a colonel about 1777, and served at the battles of Brandywine, Germantown, and Monmouth. He was a member of Congress (1787–88). Died July, 1807.

Dayton (JONATHAN), LL.D., an American statesman, son of the preceding, born at Elizabethtown, N. J., Oct. 16, 1760. He served with distinction in the Revolutionary war, and was a delegate from New Jersey to the convention which framed the Federal Constitution in 1787. In 1791 he was elected a member of Congress, in which he acted with the Federal party. He was Speaker of the House of Representatives for two terms (1793–97), and was chosen a Senator of the U. S. in 1799. Died Oct. 9, 1824.

Dayton (WILLIAM LEWIS), LL.D., an American statesman, nephew of the preceding, born in Somerset co., N. J., Feb. 17, 1807. He studied law, was admitted to the bar in 1830, and practised at Trenton. In 1842 he was appointed a Senator of the U. S. to fill a vacancy, and in 1845 he was elected to the national Senate by the legislature of New Jersey for a term of six years. He voted with the Whigs, and opposed the extension of slavery. In 1856 he was nominated as the Republican candidate for Vice-President. Fremont and Dayton received 114 electoral votes, but they were not elected. Mr. Dayton was appointed minister to France early in 1861. Died in Paris Dec. 1, 1864.

De, a Latin particle, commonly signifying "down" or "from;" it is often *intensive*, and sometimes *privative* or *negative*, having occasionally nearly the force of the English particle *un*; *e. g. descendo* (from *de*, and *scando*, to "climb"), literally, to "climb down;" *decoquo*, to "boil down," to "boil thoroughly;" *deform* (from *forma*, "form," "beauty," "grace"), to "deprive of grace or beauty;" *decompose*, to "*un*-compound." *De* is also a preposition, signifying "concerning," also "from" or "down from."

Dea'con [from the Gr. διάκονος, a "servant;" Ger. and Lat. *diaconus*], in early times an officer of a church, whose duty it was to collect and dispense alms. According to an opinion generally prevailing among Protestants, the office was at first secular, although it is evident that deacons frequently exercised spiritual functions. The church at Jerusalem first chose seven deacons, who taught and baptized, as is shown by the example of Philip the deacon. In the second and third centuries the duties of deacons were increased, and it subsequently became expedient to divide their functions among the archdeacons, deacons, and sub-deacons. The offices of archdeacon and deacon were counted among the higher clerical orders (*ordines majores*); and after the twelfth century that of sub-deacon was so reckoned. In the Greek, Roman Catholic, Anglican, and Methodist Episcopal churches deacons are clergymen inferior in rank to ministers or priests, and are usually probationers for the latter office. In the Roman Catholic Church the peculiar robes of a deacon are the dalmatica and the stole. At Rome there are eighteen cardinal deacons, of whom the celebrated Antonelli is one. In Protestant churches the position of deacons is various. The Baptists and Congregationalists have deacons as superintendents of the temporal affairs of the church, and also as assistants in the administration of the sacraments. Among Presbyterians their place is often supplied by the ruling elders, but in the Free Church of Scotland and in some other Presbyterian bodies there are regularly ordained deacons.

Dea'coness [Gr. ἡ διάκονος; Lat. *ancilla, ministra, diaconissa*], the title of a rank of female officers in the apostolic and early Christian Church. They assisted in the care of the poor, especially of their own sex, gave instruction to the younger catechumens, arranged the agapæ or love-feasts, and took care of the sick. Until the fourth century, the deaconess was required to be a maiden, or

widow but once married, and sixty years of age, but the age was fixed at forty by the Council of Chalcedon (451 A. D.). She was assisted by the sub-deaconess. The office gradually died out, but sooner in the Latin than in the Greek Church. Several Western councils in the fifth and sixth centuries forbade the consecration of deaconesses, although the office appears not to have been wholly extinct till the tenth or eleventh century. At Constantinople there were deaconesses as late as the beginning of the thirteenth century, with no trace of them anywhere else in the East. In monasteries, nuns who take charge of the altar are called deaconesses. The Sisters of Charity and other like organizations perform a work analogous to that of ancient deaconesses. There is a movement for the resumption of the office in the Anglican and some other Protestant churches. Among the German Protestants the experiment has been successfully tried. A large and excellent Protestant school for deaconesses was established in 1835 at Kaiserswerth, Prussia, and many similar institutions have since sprung up in Europe.

Dead Color. In painting, a color is said to be dead when it has no gloss upon it. This is effected by the use of less oil and more turpentine than in ordinary paints.

Dead'head, the extra length of metal given to a cast gun. It serves to receive the dross (Lat. *caput mortuum*, literally, "dead head") which rises to the top of the liquefied metal, and which, were it not for the deadhead, would form the muzzle of the gun. When cooled and solid the deadhead is cut off.

In popular language "dead-head" is used to denote a person who travels on a railroad or enters a place of amusement, etc. without paying.

Dead-Letter Office, in the U. S. postal department, is the place where unclaimed letters are sent. After remaining one month at the post-office to which they are directed, "dead" or unclaimed letters are sent to Washington, and are opened in the dead-letter office. When the writer's name and address can be ascertained the letter is returned to him; otherwise the letter is destroyed. In 1872 nearly 3,000,000 letters went to the dead-letter office. They are partly classified as follows: 58,000 letters had no county or State direction; more than 400,000 lacked stamps, and 3000 were posted without any address at all. The sum of $92,000 in cash, and more than $3,000,000 in drafts, checks, etc., were found in these letters. It appears that on an average every letter that is misdirected, or that goes to the dead-letter office from any cause, contains one dollar.

Deadly Nightshade. See BELLADONNA.

Dead Net'tle (*Lamium*), a genus of plants of the order Labiatæ, with a 5-toothed calyx and 2-lipped corolla, the upper lip arched, the lower trifid. The genera *Galeopsis* and *Galeobdolon*, resembling the *Lamium*, are often called by this name. *Lamium purpureum* and other species are common weeds in Great Britain, and are naturalized in the U. S. There is an old belief that the touch of the dead nettle causes an irritation which may end in death; hence the name. It appears, however, to be quite harmless.

Dead Reck'oning, a term used in navigation, signifies the calculation of a ship's place at sea without taking observation of the heavenly bodies. The chief elements from which the reckoning is made are the point of departure (*i. e.* the latitude and longitude of the place from which she sailed), the course or direction of her movement (ascertained by the compass), the rate of sailing, measured from time to time by the log, and the time that has elapsed. The data are liable to errors and uncertainties, in consequence of currents, changes of the wind, etc. (See NAVIGATION, by LIEUT.-COMMANDER ALEX. H. MCCORMICK, U. S. N.)

Dead River Plan'tation, a township of Somerset co., Me. Pop. 100.

Dead Sea, or **Sea of Sodom** [Arab. *Bahr Loot*, "Sea of Lot;" anc. *Lacus Asphaltites*], called in Scripture the **Salt Sea,** a celebrated lake in the southern part of Palestine. Its northern end is about 20 miles E. of Jerusalem. Its length, as determined by Lieut. Lynch in 1848, is 40 geographical miles, and its breadth from 9 to $9\frac{3}{4}$ geographical miles. The greatest depth, according to Lieut. Dale (1848), is 1308 feet; according to Lieut. Symonds (1841), 1350 feet. Its depression below the Mediterranean, as measured by Lieut. Dale, is 1316.7 feet, and its bed is accordingly by far the deepest known fissure on the surface of the earth. The Dead Sea is fed by the Jordan and other streams, but has no apparent outlet, and the surplus water is carried off by evaporation. It is enclosed between naked cliffs of limestone, which on the eastern side rise 2000 feet or more above the water. The shores present a scene of desolation and solitude encompassed with deserts and dreary salt-hills. On the southern shore is a remarkable mass of rock-salt called *Usdum* (Sodom), which is supposed to indicate the site of the ancient city of Sodom. Large quantities of asphaltum were thrown up to the surface of the lake by the earthquakes of 1834 and 1837. The water of this lake is remarkable for its great specific gravity (which is 1.25, or one-fourth greater than pure water) and its intense saltness, nearly seven times that of the sea, but varying considerably at different seasons. About 25 per cent. is the average proportion of saline matter by weight. The chlorides of sodium, magnesium, and calcium are the most abundant salts dissolved in it. Ducks have been seen swimming on its surface. The bed occupied by this lake is part of a long and narrow depression or fissure which extends from the Lake of Galilee southward, and is nearly 200 miles in length. The adjacent table-land is more than 3000 feet above the Mediterranean, so that the fissure is nearly 6000 feet deep. It is supposed that all of this depression was formerly covered with sea-water. (See LIEUTENANT LYNCH, "Narrative of the U. S. Expedition to the River Jordan and the Dead Sea," 1849.)

REVISED BY R. D. HITCHCOCK.

Deaf and Dumb, or **Deaf-Mutes** [Fr. *sourds-muets*]. Those born deaf are dumb, because they cannot learn to speak without the guidance of the sense of hearing, which enables them to imitate sounds. The same is true of those made deaf by disease or accident in early infancy. After learning to speak, the occurrence of deafness does not greatly impair the speech, although persons becoming deaf during childhood sometimes retain throughout life the childish tone which they have learned. The average number of deaf-mutes in Europe in 1830 was about 1 in 1500 of the total population; in 1850, according to the investigations of Dr. Peet, 1 in 1360. In the U. S. the census of 1870 gives the whole number of deaf-mutes as 16,205, or over 1 to every 2379 inhabitants. Very possibly these returns are only approximative, parents being often reluctant to acknowledge this defect in their children, and census marshals negligent.

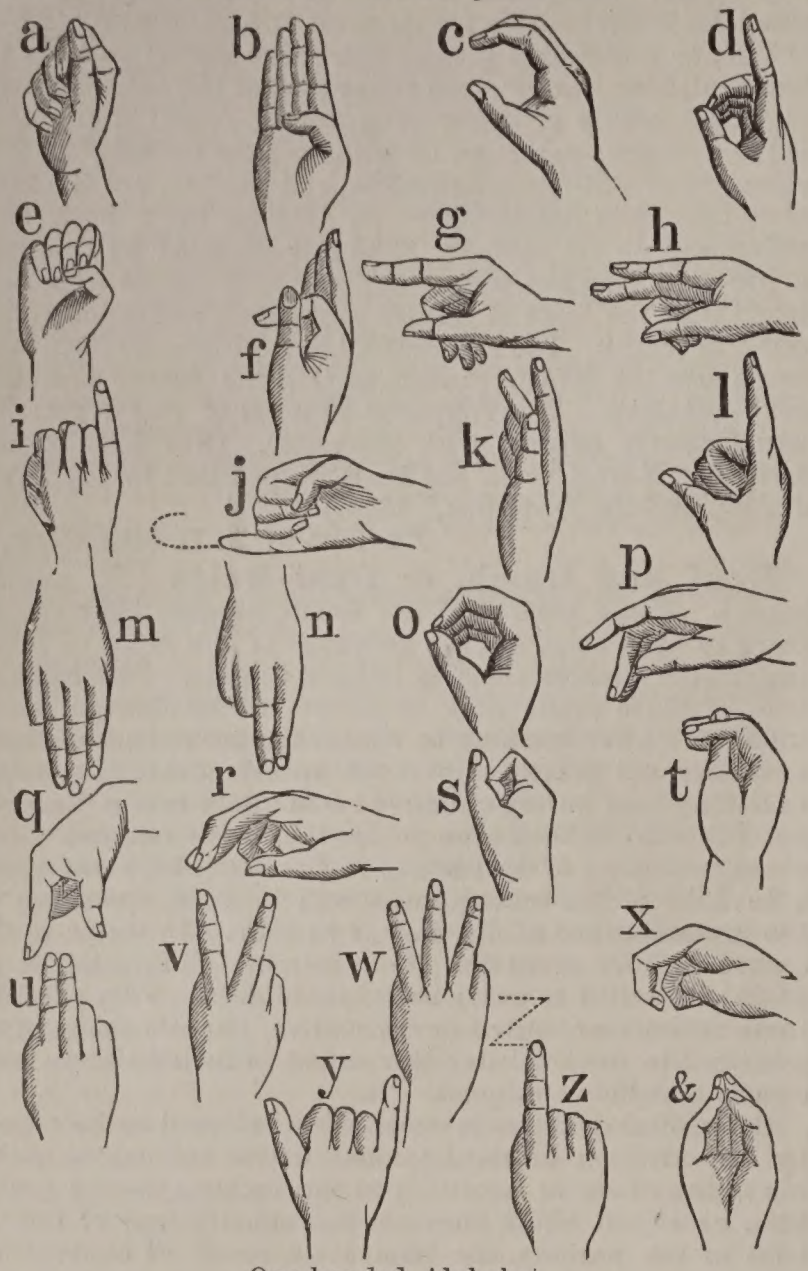
Congenital deafness is reasonably believed to be caused by imperfection of development under influences which lower the grade of nutrition in the embryo during gestation, or which affect, through the constitution of one or both of the parents, the immediate result of conception. Among these influences the most marked appear to be intemperance, marriages between those nearly related, syphilis, and scrofula. Boudin asserts that in France nearly 25 per cent. of deaf-mutes are the offspring of marriages of consanguinity; and somewhat similar estimates have been obtained by Drs. Howe and Bemiss in their statistical inquiries upon the effects of such marriages in the U. S.

On account of the comparative helplessness of deaf-mutes they were placed, in the code of Justinian, among persons incapable of the legal management of their affairs. During the Middle Ages they were deprived of the right of feudal succession. Yet in all times they have occasionally shown considerable capacity for culture. Pliny mentions Quintus Pedius, a deaf-mute, related to the emperor Augustus, as a successful painter at Rome; and in later times the uncle of one of the kings of Sardinia, notwithstanding the same defect, acquired a good education. The earliest account of a deaf-mute being taught to speak is ascribed to Bede, about 700 A. D. Rodolph Agricola of Groningen, who died in 1485, first mentioned an instructed deaf-mute. Jerome Cardan, half a century later, wrote philosophically on the principles involved in such instruction. Ponce de Leon, a Spanish monk, who died in 1584, and Pasch, a clergyman of Brandenburg, were the first teachers of whom we have any account. Juan Pablo Bonet published, at Madrid, the earliest known treatise on deaf-mute instruction. He gave a manual alphabet quite different from those which Bede has preserved as used by the ancients. About 1660 to 1700 Dr. John Wallis of Oxford and John Conrad Amman of Holland published remarkable treatises on this art.

In England the first manual alphabet was published by George Dalgarno, by birth a Scotchman, but residing for a long time at Oxford. He died in 1687. The first school for deaf-mutes in Great Britain was established in Edinburgh in 1760 by Thomas Braidwood. Some years afterwards it was removed to the neighborhood of London, and thus no doubt suggested the origination of an asylum in London in 1792, of which Dr. Joseph Watson was the first principal. The first public establishment in the world for the instruction of deaf-mutes was founded at Leipsic in 1778 by the elector of Saxony, under the directorship of Samuel Heinecke.

The credit of systematizing the instruction of the deaf and dumb in France is ascribed "to the abbé Charles Michel de l'Épée of Paris," but greater success was in some individual cases attained by a Spaniard, Jacob Rodriguez Pereira, whose school was conducted at Bordeaux. These men undoubtedly both contributed to the work; as did also Sicard, the successor of the abbé de l'Épée, and Itard. In the U. S. the system matured by the experience of

the French was brought over in 1816 by the late Doctor Thomas H. Gallaudet, with the personal aid of Laurent



One-handed Alphabet.

Clerc, an educated deaf-mute. Other names especially associated with useful labors on behalf of the same class are those of Dr. F. A. P. Barnard, Lewis Weld, and William W. Turner, of the Hartford Institution; H. P. Peet, LL.D.,

Two-handed Alphabet.

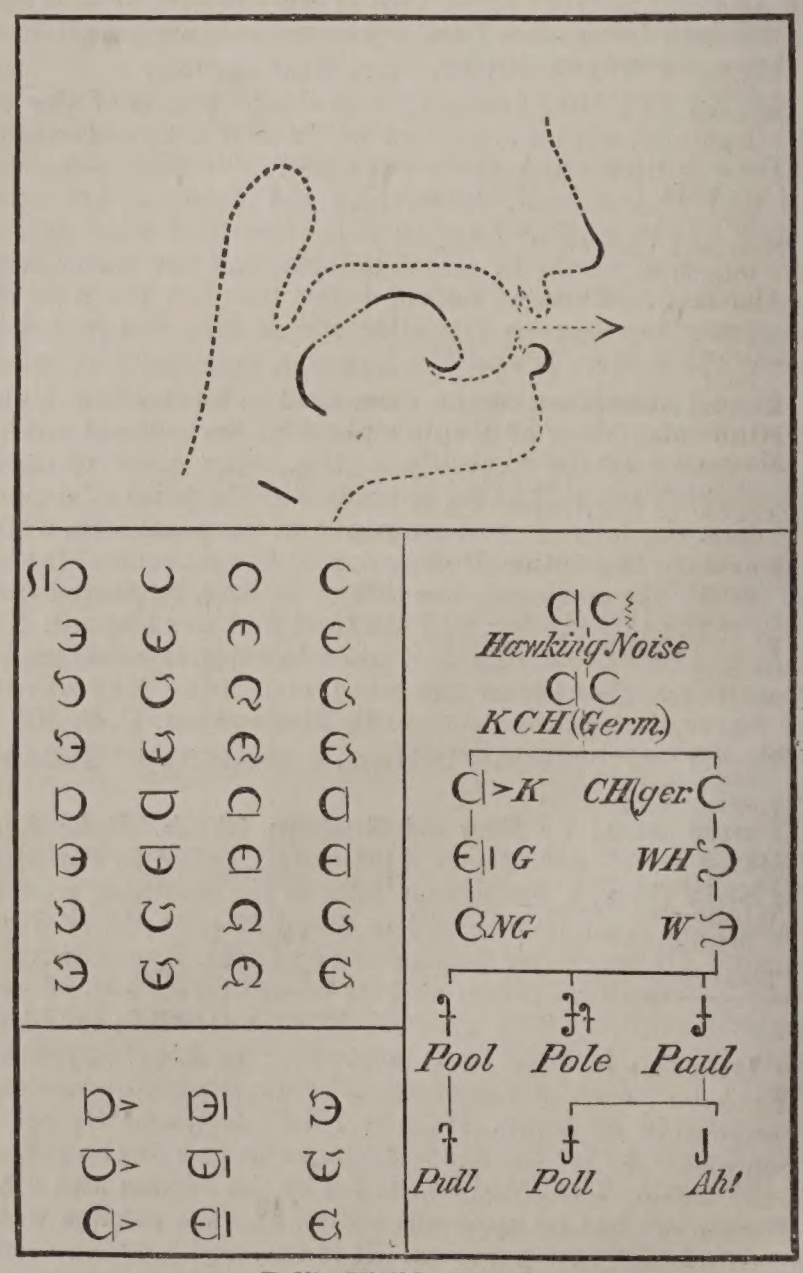
of New York; Abraham B. Walton of Philadelphia, J. A. Jacobs of Kentucky, and the two sons of Thomas H. Gallaudet (Thomas and E. M.), and Doctor S. G. Howe of Boston.

The most remarkable instance on record, perhaps, is that of the instruction, under the care of Doctor Howe, of Laura Bridgman, who was born blind as well as deaf-mute. By attracting her attention through the sense of touch, it was found possible to develop to a considerable degree her intelligence and capacity for communication with others. A similar example occurred earlier in Julia Brace in the Hartford Asylum, while under the charge of the Rev. Thomas H. Gallaudet.

The two principal modes of conveying instruction to the deaf and dumb are by the manual *sign-language*, and by the pupils watching the lips of the teacher during articulation. Real objects and models, pictures, etc. can of course also be used. The sign-language is much the most easily and rapidly acquired, and is more generally employed in Europe, as well as in this country. It is largely in use among the American Indians, and by means of it natives of the most distant portions of the continent can understand each other. It is said that a party of Indians present in London at an exhibition of performances by deaf-mutes were delighted to find themselves able to converse with the latter by signs.

The method of teaching by *articulation*, the pupil learning to recognize words (and, in time, to utter them) by closely watching the motions of the lips and tongue in speech, is not favored by all experienced instructors. Except in very few cases it has not been adopted in the Hartford Asylum. The argument urged against it is, that the great length of time required for its acquisition can be better employed in obtaining knowledge according to the sign-method. Yet it has sometimes proved very successful, as in the private school of Miss Rogers at Chelmsford, Massachusetts. In Christiania, Norway, in 1872, a deaf-mute was, by instruction in this way, prepared creditably to enter the university as a student. Some have supposed that by means of lip-teaching intelligent deaf-mutes might become pupils in the common schools. Itard, and his successor Blanchet, in France, and the Abbé Carton, founder of an institution for the deaf and dumb in Bruges, Belgium, are amongst those who have especially labored on behalf of the method of teaching by articulation. This method was at first employed at the Clarke Institution at Northampton, Massachusetts, but has now given place to the Bell system.

A new method of teaching articulation has recently been brought into notice in this country. It is called *visible*



Bell's Visible Speech.

speech, and was invented by A. Melville Bell, a professor of vocal physiology in England, about 1848. It consists of a species of phonetic writing, based not upon sounds, but on the action of the vocal organs in producing them.

The characters of this universal alphabet, as matured in 1864, reveal to the eye the position of those organs in the formation of any sound which the human mouth can utter. In 1869 the first attempt was made in England to apply this alphabet in the instruction of deaf-mutes; and in 1872 it was introduced by Mr. Abraham Bell, the son of the inventor, into the Clarke Institution at Northampton, where it has superseded the old method of imitation, and is the only method of teaching articulation used. It is now (1873) used in the American asylum, with a limited number of both congenital and semi-mute pupils, with success. Its practical value as a means of instruction with all classes of deaf-mutes has not been as yet sufficiently tested. Mr. Abraham Bell has opened a school for instructing teachers in this system in Boston.

Of institutions for the education of deaf-mutes there were in 1870 about 80 in Germany, 45 in France, 22 in Great Britain, and 36 in the United States. The largest in Europe is that in London, with 300 pupils. The largest in America, and probably in the world, is in New York—588 pupils. This was founded in 1818, that at Hartford in 1817, and the asylum in Philadelphia in 1820.

Institutions for the Deaf and Dumb in the United States, 1872.

Name and Location.	Opened.	Pupils.			Teachers.		
		Male.	Female.	Total.	Male.	Female.	Total.
American Asylum, Hartford, Conn	1817	179	111	290	10	7	17
New York Institution, City.	1818	349	239	588	19	11	30
Pennsylvania " Philada	1820	137	125	262	11	3	14
Kentucky " Danville	1823	54	43	97	4	1	5
Ohio " Columbus	1829	225	163	388	8	14	22
Virginia " Staunton	1830	47	42	89	7	...	7
Indiana " Indianap.	1834	167	137	304	8	6	14
Tennessee " Knoxville	1845	59	44	103	8	...	8
North Carolina " Raleigh	1845	67	52	119	7	2	9
Illinois Institution, Jacksonville	1846	165	144	309	16	9	25
Georgia Institution, Cave Spring	1846	27	34	61	4	1	5
South Carolina Institution, Cedar Spring	1849	11	11	22	2	1	3
Missouri Institution, Fulton	1851	90	96	186	4	4	8
Louisiana " Baton Rouge	1852	34	20	54	4	...	4
Wisconsin Institution, Delavan	1852	92	72	164	8	2	10
Michigan Institution, Flint.	1854	87	72	159	9	2	11
Iowa Institution, Council Bluffs	1855	72	59	131	5	2	7
Mississippi Institution, Jackson	1856	25	17	42	3	...	3
Texas Institution, Austin	1857	20	10	30	2	1	3
Columbia " Washington, D. C.	1857	34	16	50	2	1	3
National College, Washington, D. C.	1864	67	...	67	8	...	8
Alabama Institution, Talladega	1858	19	40	59	3	1	4
California Institution, Oakland	1860	35	25	60	4	...	4
Kansas Institution, Olathe	1862	43	26	69	4	1	5
Minnesota " Faribault	1863	36	24	60	3	2	5
Massachusetts (Clarke) Institution, Northampton	1867	32	28	60	...	5	5
Arkansas Institution, Little Rock	1867	87	31	68	2	3	5
Maryland Institution, Frederick City	1868	65	37	102	5	4	9
Nebraska Institution, Omaha	1869	12	14	26	1	2	3
West Virginia " Romney	1870	35	21	56	2	2	4
Oregon " Salem	1870	13	11	24	1	1	2
St. Bridget " (Catholic), St. Louis, Mo	1860	...	11	11	...	2	2
St. Mary Institution (Catholic), Buffalo, N. Y.	1862	27	31	58	1	5	6
Institution for Improved Instruction, N. Y. City	1867	38	42	80	1	6	7
Day School, Pittsburg, Pa.	1869	23	20	43	1	1	2
Day School, Boston, Mass.	1869	22	33	55	...	4	4
Whipple's Home School, Mystic, Conn	1869	2	2	4			
Total in 36 Institutions, 1872		2447	1903	4350	171	105	276

Revised by Henry Barnard.

Deafness [Lat. *surditas;* Fr. *sourdité;* Ger. *Taubheit*], loss or imperfection of hearing, may be congenital or acquired, permanent or temporary, complete or incomplete. It may be (1), "nervous"—that is, caused by organic or functional disease of the auditory nerve or of the brain itself. Deafness of this kind is sometimes curable, but frequently it is permanent. It may be (2), the result of local disease or accident. Disease of the structures of the ear frequently follows scarlet fever, and is often of a scrofulous character. When such disease leads to organic changes, even if they be slight, permanent and perhaps complete deafness may result. (3), Cerumen (ear-wax) frequently fills the passage of the ear. In such cases oil should be dropped into the ear, and a gentle flow of warm water from a syringe will generally remove the obstruction. (4), When the *membrana tympani* (ear-drum) is accidentally perforated, much good is often done by the use of Toynbee's artificial ear-drum. (5), The Eustachian tube may be the seat of mucous inflammation, and may require surgical treatment. Counter-irritation behind the ears, the use of general tonics, etc. may be beneficial; and this is more especially true of the deafness of aged people. (See Toynbee on "Diseases of the Ear," 1860; Roosa, "On Diseases of the Ear," new ed. 1874.)

Since the year 1844, when the attention of physicians was first called to the subject, the growth of minute fungi (*Aspergillus*, etc.) in the ear has been reported to be a common cause of disease of that part. The meatus and tympanum are sometimes covered with the growth, in the form of white or yellow mould on their surfaces. Tinnitus, inflammation, and the accumulation of wax are attendant symptoms, and the treatment consists in the application of a solution of carbolic acid, five grains to the ounce of water. The fungi are perhaps the effects of disease rather than the cause. Revised by Willard Parker.

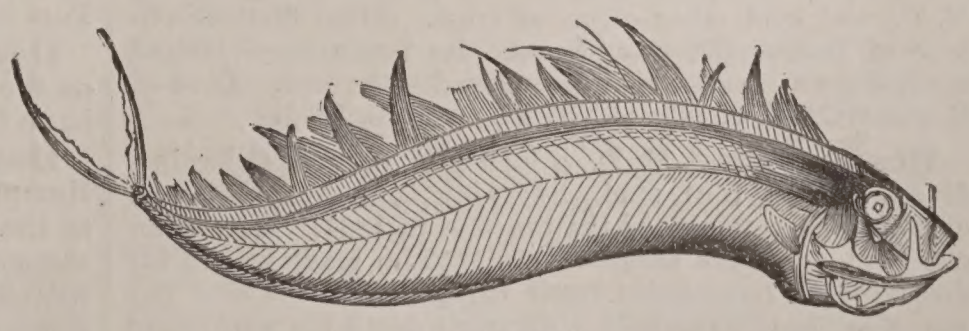
Deák (Francis), an eminent Hungarian statesman and orator, born at Kehida in the county of Zala (Szalad) Oct. 17, 1803. He studied law, which he practised in his youth, was elected to the National Diet in 1832, and became the leader of the liberal party. Soon after the revolution of Mar., 1848, he became minister of justice, and projected important reforms in that department. He resigned office when Kossuth obtained power in Sept., 1848. On the defeat of the Hungarian patriots in battle in 1849, he quitted public life and retired to his estate. Having been elected to the Diet in 1861, he became the leader of the moderate party and the most popular man in Hungary. He was the author of the address sent by the Diet to the emperor, and of the protest against the imperial rescript in 1861. Deák is regarded as the master-spirit of the movement by which the constitutional autonomy of Hungary was restored in 1867, and large concessions to civil and religious liberty were extorted from the emperor. He has ever since remained the recognized leader of the liberal party, which is commonly called, after him, the "Deákist," and which has had without interruption a majority of the Hungarian Diet. He has refused all offers of a place in the ministry, but no change in the ministry has been made without his consent.

Deal [from the Ang.-Sax. *dael*, a "portion," akin to the Ger. *Theil*, "part" or "piece," originally a piece of any kind of timber, afterwards applied particularly to fir or pine], the commercial name used especially in Great Britain for boards exceeding six feet in length and seven inches wide. Smaller boards are called battens. Deals are generally three inches in thickness; when thinner, they are usually called planks, but thin boards are often called deals. They are imported into Great Britain chiefly from Sweden, Norway, and British America, and are sawed into thinner pieces for use.

Deal, a maritime town and bathing-place of England, in Kent, is on an open beach of the North Sea, near the S. extremity of the Downs, 8 miles N. N. E. of Dover. It has been one of the Cinque Ports since the early part of the thirteenth century. A good anchorage extends between Deal and Goodwin Sands, 8 miles distant. The place is defended by Deal Castle, Sandown Castle, and Walmar Castle, in the last of which the duke of Wellington died in 1852. Cæsar landed near Deal in 55 B. C. The castle was built by Henry VIII. in 1539. Its roadstead is famous as a resort for shipping. Here passengers and mails are landed, though less frequently than in former years. Its trade is small, and its manufactures are not important. Pop. in 1871, 8004.

Deal, a post-village of Ocean township, Monmouth co., N. J., 5 miles S. of Long Branch. It is a place of summer resort, being more retired and quiet than Long Branch.

Deal Fish [so called because its thin and wide body



The Deal Fish.

somewhat resembles a *deal* or plank], the *Gynetrus arcticus*, a fish of the family Cepolidæ, is from four to six feet long, eight inches broad, and one inch thick, and is found in high northern latitudes.

Dean [Lat. *decanus*, from *decem*, "ten," because the dean anciently presided over ten canons], an ecclesiastical title applied to officers of several different kinds. In some of the Anglican churches deans are dignitaries next in rank to the bishops. They preside over the chapters of canons and prebendaries, and in the old dioceses nominally elect the bishops. In England they are attached to each diocese. Rural deans are inspectors of parishes, who make report of their visitations to the bishop. Deans of college faculties are the presiding or executive officers. Various chapels in England and the chapel-royal of Scotland have deans attached to them. The three Scottish deans are Presbyterians of the national Church.

Dean (Amos), LL.D., was born at Barnard, Vt., Jan. 16, 1803, graduated at Union College in 1822, became an eminent lawyer, and was a professor of medical jurisprudence in the medical school and of law in the law school at Albany, N. Y. Died Jan. 26, 1868. He was the author of many valuable law treatises, and also published "Philosophy of Human Life" (1839), "Medical Jurisprudence" (1854), and other works. Since his death his "History of Civilization" (7 vols. 8vo) has been published (1868–69).

Dean (James), LL.D., was born at Windsor, Vt., Nov. 26, 1776, graduated at Dartmouth in 1800, was tutor in the University of Vermont (1807–09), and professor of mathematics there (1809–14, 1821–24). He published a "Gazetteer of Vermont" (1808). Died Jan. 20, 1849.

Dean (John Ward), an antiquary, was born at Wiscasset, Me., Mar. 13, 1815. He published a "Memoir of Rev. Nathaniel Ward" (1868), "Memoir of Rev. Michael Wigglesworth" (1871), and a great number of accurate and valuable papers upon history, biography, and genealogy.

Dean (Julia), a beautiful and talented actress, was born at Pleasant Valley, N. Y., July 22, 1830. Her grandfather and father (Samuel and Edwin Dean) were actors of repute. Her mother was the actress Julia Drake. She married a Mr. Hayne in 1855, was divorced in 1866, and married a Mr. Cooper soon after. She had great popularity in the West and South. Died Mar. 6, 1868.

Dean (Rev. Paul), a distinguished minister of the Universalist and Unitarian denominations, was born in Barnard, Vt., in 1789. He held the doctrine of the so-called Restorationists, and was pastor of churches in Boston and in Easton, Mass. He published numerous sermons, etc. Died at Framingham, Mass., Oct. 1, 1860.

Dean (William), D. D., a Baptist missionary, born at Morrisville, N. Y., June 21, 1807, and in 1834 became a missionary of the society now known as the American Baptist Missionary Union. His labors have been devoted to the Chinese in their native country, and also in Siam, where they are very numerous. He is the author of several religious works in the Chinese language, into which he has translated parts of the Bible.—Mrs. Theodosia A. B. Dean, his second wife, died in 1843. A memoir of her life has been published.

Deane (Charles), LL.D., was born at Biddeford, Me., Nov. 10, 1813, and became a merchant in Boston. He is the author of numerous historical papers of value, among which are "Notices of Samuel Gorton" (1850), "Memoir of George Livermore" (1869), and "The Forms of Issuing Letters-Patent by the Crown of England" (1870).

Deane (James), a judge and missionary to the Indians of New York State, was born at Groton, Conn., Aug. 20, 1748, and graduated at Dartmouth College in 1773. At the age of twelve he became associated with the Rev. Mr. Mosely, a missionary to the Six Nations. After graduating from college he went as missionary to the Canadian Indians, and was employed by Congress to pacificate the northern Indians. He was commissioned as a major, and served in the Revolutionary war as an interpreter at Fort Stanwix. He was taken prisoner by the savages, but his life was saved by the efforts of some of their women. He was afterwards, for a long time, a judge in Oneida co., N. Y., and held other offices of trust. From him the village of Deanesville was named. He wrote upon Indian mythology a paper which is believed to be lost. Died at Westmoreland, Oneida co., N. Y., Sept. 10, 1823.

Deane (James), M. D., a geologist, born at Coleraine, Mass., Feb. 24, 1801, studied first law, and then medicine, of which he commenced the practice in 1831. He was an excellent operative surgeon. In 1835 he made known his discovery of remarkable fossil footprints in the new red sandstone near Greenfield. After his death his work upon these footprints was published by the Smithsonian Institution. He was the author of a valuable report "On the Hygienic Condition of the Survivors of Ovariotomy," and other papers. Died June 8, 1858.

Deane (John), an English seaman, born about 1679, who while in command of the Nottingham galley was wrecked in 1710 on Boon Island, off the coast of Maine. Here the crew remained twenty-one days, and having eaten the body of one of their number who had died, they were finally rescued. Deane published an account of this affair (Boston, 1711; 5th ed. 1762), appended to a sermon on the event by Cotton Mather, but his mate and others of the crew published a different statement (London, 1711). Deane was (1714–20) a naval officer under Peter the Great, but was banished to Kasan. He was afterwards a long time British consul at Ostend. His name is appended to a "Letter" (1699) from Moscow to the marquis of Caermarthen regarding the state of the Russian navy. Died at Wilford, Notts, Aug. 19, 1761.

Deane (Samuel), D. D., a poet, born at Dedham, Mass., July 30, 1733, graduated at Harvard College in 1760, and was librarian and tutor there for several years. He was pastor of the Congregational church at Falmouth, afterwards called Portland, Me. (1764–1814), author of "Pitchwood Hill" and other poems, a "Georgical Dictionary" (1790), and other works. Died Nov. 12, 1814.

Deane (Samuel), a divine, poet, and historian, was born Mar. 30, 1784, at Mansfield, Mass., and graduated at Brown University, Providence, R. I., in 1805. In 1810 he became pastor of the Second Congregational church in Scituate, Mass., where he remained for life. He published an excellent history of that town in 1831, besides several poems, sermons, etc. Died Aug. 9, 1834.

Deane (Silas), an American diplomatist, born at Groton, Conn., Dec. 24, 1737. He graduated at Yale College in 1758. He was a member of the Continental Congress in 1774, and was sent to France in 1776 as a political and financial agent. He was recalled in 1777, charged with having deviated from his instructions by making extravagant contracts, and by profuse promises to many French officers whom he persuaded to enter the service of the U. S. There is, however, very little doubt that Deane was a thoroughly able and honest man, as well as a zealous patriot. He was the victim of the unhappy jealousy of unworthy men, who wrought his social and financial ruin. Died in England Aug. 23, 1789. In 1842 too tardy justice was done his memory by Congress, which after careful examination of his accounts found that a large sum was due to his heirs, which sum was paid fifty-three years after his death as a poor man in a land of strangers and enemies.

Deane (William Reed), a genealogist, was born at Mansfield, Mass., Aug. 21, 1809. He was a nephew of Samuel Deane, the historian of Scituate. He was a large and able contributor to periodical literature, writing chiefly upon antiquarian subjects, genealogy, and the early New England history. Died June 16, 1871.

Dean, Forest of, in Gloucestershire, England, is a picturesque hilly tract, having an area of 22,000 acres, between the Severn and the Wye. It is mostly the property of the Crown, and nearly half of it is enclosed for the growth of timber for the navy. Here are forests of oak, beech, and other trees, coal and iron mines, and stone-quarries. This forest was formerly notorious for the debased moral and social condition of its inhabitants, who have been largely reclaimed by the influence of religious instruction.

Dean's, a township of Edgefield co., S. C. Pop. 1320.

Deans'ville, a post-village of Marshall and Kirkland townships, Oneida co., N. Y., on the Utica division of the New York and Oswego Midland R. R., 4 miles S. W. by S. of Clinton. It has an academy and two churches. P. 195.

Dear'born, a county in the S. E. of Indiana, bordering on the Ohio River. Area, 291 square miles. It is drained by the Whitewater River. The surface is partly hilly; the soil is fertile, and is based on limestone. Dairy products, grain, wool, and hay are the staples. It is intersected by the Ohio and Mississippi R. R. and the Indianapolis and Cincinnati R. R. Capital, Lawrenceburg. Pop. 24,116.

Dearborn, a township and village of Wayne co., Mich., on the Michigan Central R. R., 10 miles W. of Detroit. It has a U. S. arsenal. Pop. of village, 530; of township, 2302.

Dearborn (Henry), an American general, born in Hampton, N. H., Feb. 23, 1751. He served as captain at the battle of Bunker Hill, 1775, and as major in the campaign against Burgoyne in 1777. In 1778 he fought with distinction at Monmouth. He was a member of Congress from Massachusetts (1793–97), and secretary of war under Jefferson (1801–09). Having obtained the rank of

major-general, he captured York (now Toronto) in Canada April 27, 1813. He was U. S. minister to Portugal (1822–24). Died June 6, 1829.

Dearborn (Henry Alexander Scammell), a son of the preceding, was born at Exeter, N. H., Mar. 3, 1783, graduated at William and Mary College in 1803, became a lawyer in Massachusetts, was a brigadier-general of militia for the defence of Boston in 1812, was a member of Congress (1831–33), and as adjutant-general of Massachusetts loaned arms to Rhode Island during "Dorr's rebellion" (1843), for which act he was removed. He was the author of several biographical and commercial treatises. Died July 29, 1851.

Deas (Charles), an American painter, born in Philadelphia, Pa., in 1818. He was a grandson of Ralph Izard, the patriot of South Carolina, and was a pupil of John Sanderson. The best known of his pictures were Indian and prairie scenes from the far West. He became insane and died in ——.

Deasy (Rickard), LL.D., an Irish Roman Catholic statesman and jurist, born in 1812 and educated at the University of Dublin (Trinity College), was called to the bar in 1835, became queen's counsel in 1849, a serjeant-at-law in 1858, solicitor-general for Ireland in 1859, attorney-general in 1860, and a baron of the Irish exchequer in 1861. From 1855 to 1861 he was in Parliament, belonging to the "moderate Catholic" party, and representing the county of Cork.

Death [Gr. *θάνατος*; Lat. *mors, mortis*; Fr. *mort*; Ger. *Tod*], the cessation of vital functions in animals and plants. The active phenomena observed after death, such as material decay and loss of heat, are merely continuations of processes which have been going on through life. The corresponding operations of repair having ceased, the destructive processes become manifest. In a short time, however, in ordinary conditions, new and much more rapid destructive changes are induced. (See Decay.)

Local or partial death of an animal is called mortification, gangrene, or sphacelus; if in a bone, it is necrosis. Molecular death of animal tissue is called ulceration, except in bony tissues, when it has the name of caries. Systemic death is said by Bichat to be either—1, by "syncope," or fainting, when the heart's action fails from lack of its usual stimulus; 2, by "asphyxia,"* when suffocation occurs or the lungs cease to act; or, 3, by "coma," when death begins at the brain. Other authorities add to these forms death by (4) "anæmia," or deficiency of the blood, by (5) "asthenia," or weakness, and (6) by starvation; but these may be regarded as varieties of the first form, or syncope. Still others reckon as distinct forms of death (7) that by paralysis—which is indeed one of the causes of the second form—that produced by asphyxia, or apnœa. An eighth form, "necræmia," or death by the blood, when the latter element is poisoned or changed in character by disease, is mentioned by writers. It would be difficult to assign some instances (such as instantaneous death from an injury) to any one of these categories. It is asserted by many careful observers that death is usually painless, and that the apparent agony or struggle so often observed is automatic. Cases are on record of burial after apparent death. Such terrible mistakes may be prevented by observing the rule of preserving bodies until unequivocal signs of decay are observed.

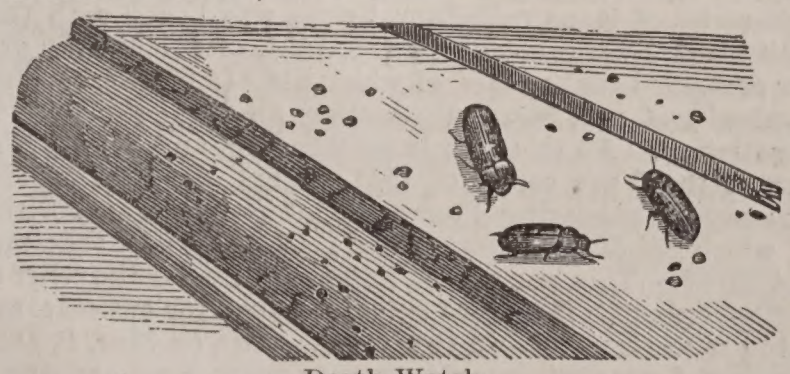
Revised by Willard Parker.

Death Adder. See Acanthophis.

Death, Brothers of, a name sometimes given to the monks of the order of St. Paul the Hermit, which was suppressed by Pope Urban VIII. about 1630. They always carried with them a death's head to remind them continually of death.

Death, Punishment of. See Capital Punishment, by Rev. Abel Stevens, A. M., LL.D.

Death-Watch, the name of certain small beetles inhabiting human dwellings, and producing a sound like the ticking of a watch. This sound being more readily heard in the stillness attending sickness, it has given rise to the superstitious belief that it prognosticates death; hence the name, "death-watch." The noise is produced by the insect beating its head against the wood in which it is concealed. It is supposed to be the call of the male to its mate. The common death-watch (*Anobium*) is a species of borer. It is about a quarter of an inch in length, and of a dusky-brown color. A number of species are found both in Europe and the U. S. The *Artropos pulsatorius*, a very different insect, is called in England by the same popular name, and for the same reason.



Death-Watch.

De Augmentis, or, more fully, **De Augmentis Scientiarum** (*i. e.* "On the Advancement of the Sciences," or, as Bacon himself renders it, ["On] the Advancement of Learning," employing this word in a somewhat wider signification than is usual at the present time), a celebrated treatise written by Lord Bacon, and forming the opening chapter of his great work, the "Instauratio Magna." It is next to the "Novum Organum" Bacon's most important philosophical treatise.

Débâcle, a French word signifying "the breaking up of ice" in a river or harbor. The term is used by geologists to denote a sudden rush or flood of water, which breaks down all opposing barriers, and leaves its path covered with scattered fragments of rock and other *débris*.

De Bas'trop, a township of Ashley co., Ark. P. 1386.

Deba'table Land, a tract of country on the western border of Scotland and England, lying between the Esk and Sark. It was for a long time a cause of contention between the two countries, and even after its division by royal commissioners in 1542, continued to be a refuge for outlaws. It was divided by a line drawn from E. to W. between the rivers, the eastern part being adjudged to England, and the western half to Scotland.

Deben'ture [from the Lat. *debentur*, "they (*i. e.* debts) are owing" (from *debeo*, to "owe")], a term applied to different documents or writings acknowledging a debt, as the acknowledgments given by railroad companies for special loans; also an instrument or writing by which government is charged to pay to a creditor or his assigns sums found due. The term is particularly applied to custom-house certificates, entitling the exporter of goods to a drawback or bounty.

De'bir (*i. e.* a "sanctuary"), a city of the tribe of Judah several times mentioned in the Bible, was situated W. of Hebron in the hill-country, and in a dry and arid place. It was captured by Joshua, or rather by Othniel, was inhabited by the Anakim, and had a Canaanitish king. It was afterwards given to the priests of the Hebrews. It was also called Kirjath-sepher and Kirjath-sannah. Its site is not at present accurately known. There was also a place of this name near Jericho, and probably another belonging to the tribe of Gad, E. of the river Jordan.

Déblai [supposed to be derived from the Low Latin *deblado*, to "take away grain," or perhaps anything of a granular or crumbling nature], in fortification, is any hollow place or excavation in the ground made during the construction of a parapet or siege-work. The earth taken from the cavity is the remblai.

De Blaquiere, Barons, a noble family of Ireland, received the baronetcy in 1784 and entered the baronage in 1800.—Sir William Bernard de Blaquiere, fifth Lord de Blaquiere, was born in 1814, and succeeded his brother in 1871. He is an officer of the royal navy, though now on the retired list.

Deblois, a post-township of Washington co., Me. P. 139.

Deb'orah, a Hebrew prophetess and judge, the wife of Lapidoth, gained celebrity by her successful efforts to liberate the Israelites from Jabin, king of Canaan. (See Judges iv.) She is supposed to have composed the spirited and beautiful lyric which forms the fifth chapter of Judges.

Débouch [from the Fr. *déboucher*, to "pass out," to "empty itself," as a river], a military term, signifying to march out from a wood, defile, or other confined place into open ground; also an outlet or available issue by which an army can march out.

De Bow (James Dunwoody Brownson), an American writer on commerce and statistics, was born at Charleston, S. C., July 10, 1820. He studied law, and was admitted to the bar in 1844. In 1845 he removed to New Orleans and founded "De Bow's Commercial Review," which he edited for many years. He became in 1847 professor of political economy in the University of Louisiana. Died at Elizabeth, N. J., Feb. 27, 1867.

Debrec'zin, a royal free town of Hungary, capital of the county of Bihar, is on an extensive sandy plain 116 miles E. of Pesth. The houses are mostly but one story

*This use of the word "asphyxia" (which literally means "lack of pulse") is most unfortunate, though sanctioned by usage. A better word is "apnœa"—*i. e.* "failure of breath."

high; the streets are unpaved and dirty. It contains a handsome town-hall, several hospitals, and a Calvinistic college with twenty-four professors and a library of 20,000 volumes. It has manufactures of earthenware, combs, soap, and tobacco-pipes. Here are extensive markets for cattle and swine. A large majority of the inhabitants are Protestants and Magyars. It is connected with Pesth by a railway. Pop. in 1869, 46,111.

Debt, in law, means a sum of money due which is certain in amount or capable of being reduced to certainty. Such an indebtedness may arise either as the result of a judgment of a court of justice, or on a sealed instrument (specialty), or on an unsealed instrument, or on a mere oral contract. Debts are thus distinguished into such as are of record, or of special contract or simple contract. They may arise either on an express or implied promise. Debts may be collected by an action of debt, or in some instances by an action of covenant. The last action is resorted to when the duty to pay is derived from a contract under seal. The form of action called *indebitatus assumpsit* ("being indebted, he promised") may also be used where the indebtedness is incurred by reason of a simple contract. A debt may be discharged in various ways, as by ACCORD AND SATISFACTION, RELEASE, PAYMENT, NOVATION, etc. The statute of limitations will be a bar to an action. The time within which the action must be brought under such a statute varies in the different States. (See LIMITATIONS, STATUTE OF, by PROF. T. W. DWIGHT, LL.D.)

ACTION OF DEBT is a common-law action brought to collect a debt. It is also used to collect a penalty given by statute. When an action of debt is brought on a written instrument, the defendant may deny its existence. If he asserts that there is no such record as the plaintiff alleges, his plea is called *nul tiel record;* if he claims that a sealed instrument which is set up as the foundation of an indebtedness was never executed, his plea is *non est factum.* These pleas merely deny the *existence* of the judgment or specialty. If he has any other defence, he should disclose it by specially setting it forth. So he may deny the existence of a simple contract debt, or may set up in his pleadings any special facts which, while they admit the existence of the debt, show that the plaintiff has no right to recover. A judgment in the action for the recovery of a debt itself constitutes a new debt, on which another action may be brought, and so on, unless there be some statutory restriction of the right to bring an action upon a judgment, as there is in some of the American States. Under the codes of procedure of some of the States the technical action of debt no longer exists, as there is but one civil action. The same remedy may be had in substance under a complaint setting forth the facts constituting the cause of action.

T. W. DWIGHT.

Debt, National, of the U. S. The national debt of the U. S., as it existed at the commencement of the year 1873, consisted almost entirely of obligations incurred or accruing since the beginning of 1861, and, as usually stated in official reports, it was, on Jan. 1, 1873, $2,162,252,338. But this sum embraces all known liabilities of the government, including the entire amount of currency outstanding issued by the treasury directly, with various items of old debts long unclaimed, and probably obsolete, though still necessarily carried on the books of the treasury. The following is the official summary statement for Jan. 1, 1873:

Debt bearing interest in coin:			
Bonds at 6 per cent	$1,342,084,150		
Bonds at 5 per cent	414,567,300		
	$1,756,651,450	Interest,	$40,040,292
Debt bearing interest in lawful money:			
Certificates of indebtedness at 4 per cent	678,000		
Certificates at 3 per cent	2,780,000		
Navy pension fund, at 3 per cent	14,000,000		
	$17,458,000	Interest,	264,273
Debt on which interest has ceased since maturity	4,084,220	Interest,	345,991
Debt bearing no interest:			
Legal-tender notes	357,500,000		
Old demand notes	1,142,294		
Fractional currency	45,722,062		
Certificates of deposit	25,370,000		
Coin certificates	23,263,000		
	$452,997,356		
Unclaimed interest			16,605
	$2,231,191,026		$40,667,161
Total debt			$2,271,858,187
Cash in treasury, coin	$74,359,276		
" " currency	9,876,574		
Deposit held to redeem certificates	25,370,000		109,605,849
Total debt, less cash in the treasury			$2,162,252,338
Bonds issued to Pacific Railway companies			$64,623,512

This repetition of the official statement is required to show that the debt proper is substantially little more than the first two items, of five and six per cent. gold-bearing bonds named above; the remaining items being nominal or contingent, at least as regards demands for interest or for repayment. The certificates of indebtedness are all to be retired; and the navy pension fund is a sum nominally reserved, by act of July 1, 1864, to secure the annual interest of $420,000 required to pay pensions in the navy. The certificates of deposit and coin certificates represent or are exchangeable for cash in the treasury; and the currency, amounting to $403,232,062—exclusive of demand notes probably in greater part lost—is not likely to be retired or put in interest-bearing bonds.

The six per cent. bonds, which constitute the bulk of the debt, are in rapid progress of cancellation by purchase in extinguishment of the debt, and also by substitution of new bonds at 5 per cent. interest. The total amount of such bonds purchased and cancelled from May, 1869, to Jan. 1, 1873, is $299,901,100; and the amount exchanged for 5 per cent. bonds under authority of the act of July 11, 1870, is $200,000,000. The act of Jan. 20, 1871, authorizes a further issue of $300,000,000 of such 5 per cent. bonds, to be applied exclusively to the cancellation of other bonds bearing 6 per cent. interest; and a contract for the exchange of this entire sum has been completed, $100,000,000 of the 6 per cents. being already notified as called in for redemption, and subscriptions having been received for a like sum of 5 per cent. bonds to replace them. On the completion of these exchanges the debt bearing 5 per cent. interest will be about $715,000,000, and that at 6 per cent. $1,042,000,000, should no other reductions take place. The reduction of the debt began in April, 1869; in the last nine months of that year it was reduced $71,903,524; in 1870 it was reduced $119,251,240; in 1871, $88,229,382; and in 1872, $82,075,152. By various acts in 1870–72 large reductions were made in the leading sources of revenue, the customs and internal revenue, and it is probable that the monthly reductions will be less in 1873 than in either of the three previous years, and possibly not more than is required by the sinking fund act, or about $32,000,000.

Of the entire outstanding obligations of the U. S. government there are the following items long remaining unpaid, and of which most of the vouchers are probably lost; but some portion may possibly be claimed:

Old debt, prior to 1800, with items of 1812, and others to 1837	$57,665
Treasury notes, 1837–46, balance outstanding	82,575
Treasury notes of 1846	6,000
Mexican indemnity stock	1,105
Treasury notes of 1847	950
Loan of 1847	1,650
Bounty land-scrip, Feb. 11, 1847	3,900
Loan of Mar. 31, 1848	5,500
Texas indemnity stock, Sept. 19, 1850	174,000
Treasury notes of 1857	2,000
	$335,345

On the bonded items of this debt there is also an account of $75,596 accrued interest, constituting a nominal rather than a real charge, but entering into the aggregate of debt, as before stated. Of all the large creations of debt at the formation of the government, and again in 1813–15, 1837–45, and 1846–50, the small items above named alone remain. In 1858 a loan of $20,000,000 at 5 per cent. was issued, which is part of the existing debt, but the loan of $21,000,000 in 1860 is practically extinguished. With 1861 the issue of the great existing loans began, and the following is a condensed account of the acts of authority, the issues, and the outstanding amounts of all the present debt.

By the act of June 14, 1858, a loan of $20,000,000 at 5 per cent. was authorized, to run fifteen years, all of which was issued, and is still outstanding, redeemable after Jan. 1, 1874. By act of June 22, 1860, a loan of $21,000,000 at 6 per cent., for twenty years, was authorized, $7,022,000 only being issued, of which $10,000 only is outstanding. The series of loans called for by the war began with that authorized by the act of Feb. 8, 1861, of $25,000,000 at 6 per cent. for twenty years, of which $18,415,000 were issued, nominally at par, but really costing about 1¼ per cent. in negotiation. All this loan is outstanding, and is known as part of the 6 per cents. of 1881. Next, on Mar. 2, 1861, treasury notes bearing 6 per cent. interest were authorized, of which $35,364,450 were issued; all being now redeemed but $3150. This was a most important act for the relief of the government, the notes being received for customs, and being redeemable within two years. Also on Mar. 2, 1861, bonds at 6 per cent., running twenty years, were authorized for the Oregon war debt; $1,095,850 being issued, of which $945,000 remain out, falling due in 1881. On July 17, 1861, $250,000,000 of 7 per cent. bonds, to run twenty years, were authorized, with authority to issue any part of this amount

in the form of treasury notes, running three years, at 7 3/10 per cent. interest, or notes not bearing interest payable on demand, or treasury notes for one year at 3 65/100 per cent. interest, exchangeable for 7.30 notes; but the whole amount of demand notes not at interest shall not exceed $50,000,000. An act of Aug. 5, 1861, authorized the issue of bonds at 6 per cent. interest, running twenty years, to exchange for the one-year and three-year notes before authorized, with accumulated interest, at any time before or at their maturity; and the demand notes were declared receivable for all public dues. These acts were most wisely designed and signally successful; the demand notes, though at first rejected by the banks, before the close of the year were at a premium; and the interest-bearing notes became very acceptable, and were readily converted, with their accumulated interest, into the permanent 6 per cent. bonds. The current of public preference was then changed in favor of the government issues, which at first were received with aversion, particularly by the banks. A very large issue of these notes took place, the 7.30 notes reaching $140,094,750, and the 3.65 one-year notes a large sum, with the full $50,000,000 of demand notes. Of the 6 per cent. twenty-year bonds issued in redemption of the one- and three-year notes, there were $189,321,200, all being now outstanding, and due in 1881. On Feb. 12, 1862, $10,000,000 more of demand notes were issued, of which $88,296 remain outstanding; also $20,000 of the 7.30 notes are still out, both being probably lost.

The preceding very successful issues laid the basis for the first great popular loan, authorized Feb. 25, 1862, of $500,000,000 of 6 per cent. bonds, redeemable after five and payable after twenty years—the standard 5.20s of the stock list. A large subscription was at once made, and the full $500,000,000 were issued. The acts of Mar. 3, 1864, and Jan. 28, 1865, added $15,000,000 more to the authorization. Being redeemable after five years, a large amount of these have been called in, only $267,289,400 remaining out Jan. 1, 1873. By this act of Feb. 25, 1862, $150,000,000 of circulating notes were authorized and made a legal tender; $50,000,000 to be in place of the demand notes of July 17, 1861. On July 11, 1862, $150,000,000 more were authorized, and on Mar. 3, 1863, $150,000,000 more—$450,000,000 in all. The whole amount was issued, and formed the great volume of currency known as *greenbacks*. Of this issue $400,000,000 was made permanent, but contractions in 1868 and 1869 reduced the amount, and $358,557,907 only remained out Jan. 1, 1873. The act of Feb. 25, 1862, also authorized the acceptance of $25,000,000 of deposits at 5 per cent. interest; this authorization was increased to $50,000,000 Mar. 17, 1862, and to $100,000,000 July 11, 1862. On June 30, 1864, a further sum of $50,000,000 was added, this to pay 6 per cent. interest; all this, described as temporary loan, was to be repaid on ten days' notice, and was so repaid in 1865 and 1866, except $78,560 unclaimed. This temporary loan was very advantageous to both citizens and the government; the full amount authorized in each case was promptly offered, and the repayment reluctantly accepted when the necessities of the government no longer required the money.

The act of Mar. 1, 1862, authorized the issue of certificates of indebtedness to public creditors in adjustment of any claims, such certificates to bear 6 per cent. interest, and to run one year. The sum of $561,753,241 of such certificates was issued, all of which were redeemed in 1863, 1864, and 1865, except $5000. A most important service was rendered by these certificates, particularly in obtaining war-supplies. They were readily taken, and facilitated the funding of general indebtedness as they matured. The act of July 17, 1862, authorized the issue of postage stamps as currency, and made them receivable in payments to the U. S. in sums less than five dollars. An act of Mar. 3, 1863, authorized the use of fractional notes (parts of a dollar) in place of postal currency, limiting the amount to $50,000,000; which authorization was confirmed by the act of June 30, 1864. This issue was promptly called for to the extent of $30,000,000, and it has varied from that sum to the present amount of $45,722,061, outstanding Jan. 1, 1873. So much time has elapsed since the issue of the legal-tender notes and the smaller notes here described that it is safe to assume that without important changes in the general financial policy they are likely to remain as they are—nominal rather than real debt. No substitute for either can at present be found or appears to be desired.

By act of Mar. 3, 1863, a loan of $900,000,000 was authorized at 6 per cent. for ten or forty years, principal and interest payable in coin; of which $75,000,000 only was issued, and taken at a premium of 3½ to 4 per cent.; preference being given because of a possible distinction existing adverse to the payment of the principal of the 5.20s in coin. This act was repealed June 30, 1864, but the $75,000,000 remain outstanding. The same act, Mar. 3, 1863, also authorized $400,000,000 of one-, two-, and three-year treasury notes, at not over 6 per cent. interest, to be a legal tender for their face-value, principal and interest payable in lawful money. Of these there were—

One-year notes, issued.....	$44,520,000, at 5 per cent.	$93,795	out.
Two-year notes, "	166,480,000, at 5 "	62,350	"
Three-year notes (comp'd)...	266,595,440, at 6 "	532,920	"

This act authorized the exchange of new treasury notes for any of these issues outstanding at any time; and provided for $150,000,000 more of currency, not at interest, to facilitate such exchange. In all, $477,595,440 of these treasury notes of 1863 were issued; all of which, with the exception above stated, were cancelled or exchanged before May 15, 1868. It will be seen that but a small amount of permanent loan was created in 1863, treasury notes being largely used. The loans of 1864 began with an issue of $200,000,000, authorized Mar. 2, 1864, at 5 or 6 per cent., principal and interest payable in coin; $196,117,300 was issued at 5 per cent., to run forty years—10.40s of 1864—and $3,882,500 at 6 per cent. Most of the 5 per cents. brought a premium of from 1 to 7 per cent., and $194,567,300 remain out, with $2,298,000 of the 6 per cents. On June 30, 1864, another loan of $400,000,000 was authorized, at 6 per cent—5.20s of 1864—$125,561,300 being issued, and $68,974,680 remaining out Jan. 1, 1873. But the demand was enormous at this time; and the loans not being fully taken, the act of June 30, 1864, authorized the issue of $200,000,000 of 7.30 treasury notes, to run three years; which authority was extended by act of Mar. 3, 1865, to embrace $600,000,000 more. Under this authority $829,992,500 of 7.30 interest-bearing notes were issued, all of which were duly redeemed or exchanged before the 15th of July, 1868, except the sum of $303,900, not presented, and in part probably lost. On July 1, 1864, the secretary of the treasury was directed to invest a part of the sum accruing from naval captures as a navy pension fund, in registered securities bearing 3 per cent. interest in currency; which was done to the extent of $14,000,000; but this is a nominal or contingent liability only, so far as the capital is concerned.

The loans of 1865 began with the authorization of $600,000,000 of 6 per cent. 5.20 bonds by act of Mar. 3, to be applied only to the reimbursement of treasury notes or other outstanding obligations of the government. Two issues were made—on July 1, 1865, $322,998,950, and on Nov. 1, 1865, $203,327,250; of which issues $365,328,350 were out on Jan. 1, 1873. By authority of the same act, as construed by act of April 12, 1866, a further issue was made in July, 1867, of $379,616,050, and of $42,539,350 on July 1, 1868; these sums being employed to retire treasury notes and other obligations, but not to increase the public debt. Most of these last issues remain out—viz. $315,874,000 of 1867, and $38,638,400 of 1868. They are described as consols of 1865, 1867, and 1868. By act of Mar. 3, 1867, $50,000,000 of temporary loan certificates of deposit were authorized, bearing 3 per cent. interest, to be used to redeem compound-interest notes; and the act of July 25, 1868, authorized $25,000,000 more. Under both acts $85,150,000 of such certificates were issued, of which $2,780,000 were outstanding Jan. 1, 1873.

On July 8, 1870, certain war-claims of Maine and Massachusetts were adjusted by the issue of $678,362 of certificates bearing 4 per cent. interest in currency; $678,000 of which yet remain out. By act of July 14, 1870, $200,000,000 at 5 per cent., $300,000,000 at 4½ per cent., and $1,000,000,000 at 4 per cent. of new thirty-year bonds, principal and interest payable in coin, were authorized, to be used solely to retire 6 per cent. or other bonds of earlier issues. No action was taken until after the act of Jan. 20, 1871, which increased the 5 per cents. to $500,000,000, with interest payable quarterly. On May 1, 1871, $200,000,000 were issued, and exchanged for 6 per cents. at par; and on Feb. 1, 1873, $300,000,000 more were contracted to be so exchanged, on the same terms as in 1871. No increase of the debt was authorized, but a sum of advance interest was granted on the new issues for three months, to cover all the costs of negotiation and exchange. The full sum of $100,000,000 first offered to subscribers under the last negotiation was taken promptly, on being offered, before Feb. 20, 1873.

By acts of July 1, 1862, and July 2, 1864, bonds guaranteed by the U. S., and bearing 6 per cent. interest, to run thirty years, were authorized to be issued to the several Pacific Railway companies, on the completion and acceptance of finished portions of the several roads. During 1868 and 1869, chiefly, sums of $25,885,120 to the Central Pacific, of $27,236,512 to the Union Pacific, of $6,303,000 to the Kansas Pacific, with $5,198,880 to certain branch roads, were duly issued. For the present the interest on these bonds has been paid by the U. S., but they are secured by mortgage on the entire lines of the roads, of which they represent but one-half the capital stock.

The mere numerical statement of the vast transactions

through which the present debt was created almost precludes explanation of the not less remarkable circumstances transpiring in connection with these movements. The magnitude of these transactions is without a parallel in history, and the wholly unexpected power developed in 1862 to conclude great loans without resort to European markets produced a profound effect on both the government and the people. The popular loan of $515,000,000 in 1862 was the most remarkable of these events in its magnitude and its entire success; but subsequently a long period elapsed in 1863 and 1864 during which a permanent funded loan could with difficulty be placed. Very heavy issues of treasury notes and currency became necessary, with all the aid derivable from temporary loans, certificates of indebtedness, and compound-interest notes. At this time the severest trial of the credit and resources of the government took place. Gold rose in Sept., 1864, to 250 or more, and although many favorable results in practical business ensued from this high price of gold, investers in permanent securities were alarmed, and many looked forward to a necessity that might compel the scaling of the existing debt and a funding at gold values, for the purpose of creating a stock certain to be reimbursed, principal and interest, in gold. Heavy holders relieved themselves as far as practicable, and no opening appeared to place new loans advantageously. But at the close of 1864 a favorable reaction took place: great profits had been realized on produce-shipments outward during the year; gold declined rapidly, and the basis of its highest advance was shown to have been in part fraudulent as well as simply speculative; confidence was restored, and the coming close of the war reassured the country as to future increase of the debt. So large a share of treasury notes and certificates bore interest as also to render claimants and holders easy until a proper opportunity should be afforded to consolidate this floating debt, and the apprehended decline of securities was, for these reasons, almost wholly averted.

At this time the first material attempts at placing securities abroad began, the German market being first opened, though leading bankers still refused to quote them at all.* In England an attempt to place the small sum of $10,000,000 in Mar., 1863, on government account, wholly failed, and the bonds, which were 5.20s of 1862, were returned to the treasury. Great as was the profit of purchasing 6 per cent. gold-bearing securities at the low price they bore in gold in London, there was absolutely no investment in them, and only long afterward were any considerable numbers taken.

This adverse opinion in Europe was not, on the whole, unfavorable to American interests, since the appreciation of values occurring at and after the close of the war was felt almost wholly by our own people. So strong had the people become through the self-reliance imposed by these trials that the productive force of the country was at its highest point, and profits were realized so largely as to render all alike indifferent to the standing our credit might have in any foreign market. Subsequent to the close of the war the securities of undoubted position as regards payment of the principal in gold began to go abroad quite as freely as the public interests demanded. While discussions were pending in 1868 and 1869 as to the legal position of the principal of the 5.20s of 1862 and other like issues, the market for these continued to be confined to the U. S., but no necessity at any time existed for enlarging it, and no public interest has been prejudiced by the general restriction of sales abroad. Active as the discussion was in 1868 and 1869 as to the ultimate redemption of the issues referred to, it had immediate good effects in favoring the acceptance of the consols of 1867 and 1868, which were specifically pledged to be reimbursed in coin; and it ended in a general acquiescence in the view that sound policy required that no distinction should be recognized in the basis of these great loans, and that they all could be and would be reimbursed in coin. The practical point was fully turned by the Funding act of July, 1870, under which $500,000,000 of stocks fully pledged as payable in coin are taking the place of a like capital sum of 6 per cents. of the earlier issues, covering nearly all upon which doubt was at any time raised.

The conspicuous measures of wise legislation through which such vast sums have been raised and expended within the brief period of ten or twelve years have in part been indicated in the course of the above citation of events. They were, briefly, the demand and interest-bearing notes of July, 1861, the popular loan of May, 1862, and the legal-tender issues of Feb. and July, 1862, and Mar., 1863. The National bank system was also important, together with the large issues of treasury notes, temporary loans, etc. in 1864. After the close of the war it became easy to fund all these temporary securities without loss to the government or its creditors. The full effect of these beneficial measures was seen in the unexampled prosperity of the country, not only while the debt was accumulating and prices were high—even inordinately so—but also through the entire period of gradual return to normal prices in 1869. At this time a great and steady reduction of the debt began, sustained by full or increasing revenues and reduced expenditures, for nearly four years to the close of 1872; the total cancellation of 6 per cent. bonds being $299,891,100, and the total reduction of debt $363,697,000. The monthly interest charge is reduced one-fifth, being $8,516,808, as compared with $10,532,462 on Mar. 1, 1869. With the retirement of $300,000,000 of 6 per cents., and the substitution of a like sum of 5 per cents., as now provided, a further reduction of $250,000 will take place in the monthly interest charge, or over $3,000,000 yearly.

The several issues of bonds constituting the body of the funded debt have always borne a premium in lawful money, and have steadily appreciated in value as measured in gold. At the time of the first purchases in extinguishment of the principal, in May, 1869, the net cost of the bonds in gold was 83 per cent. of the par value; rising to 93.5 per cent. Jan. 5, 1870; to 97 per cent. Jan. 4, 1871, and to 99.99 per cent., or par, Jan. 4, 1872, and so remaining. The value of these securities is thus at par in gold for those liable to recall and cancellation, while all not so liable have always borne a large premium in currency, and usually a small premium in gold, being quoted in currency at 16 to 18 and sometimes 20 per cent. premium when gold was 12 to 14 per cent., or 2 to 5 per cent. above par. The steady maintenance, for the entire period since their issue, of a premium on all the permanent securities constituting the debt, is a remarkable proof of the stability of the public credit.

By act of Feb. 25, 1862, an amount of the gold receipts from customs sufficient to pay, in each fiscal year, 1 per cent. of the entire debt of the U. S. was set apart as a sinking fund for its redemption; but the pressure of current demands on the treasury prevented any action under this law until May, 1869; since which date, up to June 30, 1872, there have been purchased $99,397,600 of bonds of the various issues known as 5.20s, at a net cost in currency of $110,997,186. The interest of the bonds or debt so purchased being also set apart for the same purpose, the sinking fund became, by act of July 14, 1870, a cumulative appropriation in extinguishment of the debt, though not distinguished in operation from the regular mode of monthly purchase then begun with surplus funds of the treasury. Thus, though the general debt was less in 1872 than in 1870, the 1 per cent of the sinking fund, with its accumulated interest, gave the sum of $32,679,553 to be applied to such purpose in the latter year, as compared with $27,660,879 in 1870. The maintenance of the sinking fund as a practical agency for paying the debt of course depends on the continuance of surplus revenues. If so continued, the debt will be rapidly paid; but the reduction of leading items of customs and internal revenue charges made in 1870 and 1872 renders it doubtful whether more than the stipulated sums of the sinking fund will, at least for 1873, be available for the purpose. By direction of the act of July 14, 1870, the bonds purchased for the sinking fund, with all others purchased in extinguishment of the debt, were cancelled and destroyed, and the sinking fund was made a permanent annual appropriation from the customs revenues.

The history of former loans of the U. S. government, as well as those of the last decade, shows that only small reductions of their nominal or face-value have been suffered in negotiation, and that all obligations have been paid in full. By various small loans and issues of treasury notes $21,820,000 was borrowed from 1791 to 1800; the principal of debt remaining under the consolidation in 1791 being $75,463,476. Before the year 1810 this was reduced to $45,209,737, nothing having been borrowed from 1800 to 1810. In 1810, $2,750,000 was borrowed; and in 1812–17, $107,511,234 was realized from various loans, an aggregate discount of $6,169,681 being submitted to in their negotiation—nearly 6 per cent. In 1820 and 1821 the sum of $8,000,000 more was borrowed, without discount; and in 1824 and 1825, $10,000,000 more, also at par. But the debt was rapidly reduced, and wholly paid before the end of the year 1835; a large surplus revenue accumulating in 1836, which was distributed to the several States in 1837. In the same year loans again began, and the sum of $67,981,573 was realized from such loans from 1837 to 1844, much loss being incurred. The debt was reduced in the two following years, standing at $15,550,000 in 1846; in 1847, 1848, and 1849 large loans were made, realizing $82,967,200. Large

* Among the efforts made to avert the danger and discouragements that appeared imminent in the latter part of 1864 was the preparation and publication of a statement of the national resources, issued under the auspices of the treasury department, and very largely distributed by that department, by the secretary of state to representatives of the government abroad, and by loyal associations in various States.

receipts of revenue served to reduce this debt to less than $30,000,000 in 1857, to which $20,000,000 of bonds was added in 1858, with some treasury notes, giving $60,000,000 of debt at the commencement of the late war. At one period only (in 1835) was the debt wholly paid off.

Comparatively little has been written in permanent form on the subject of the national debt of the United States, other than the official reports of the secretaries of the treasury, entitled the "Finance Reports," 1861 to 1872. In these the principles and policy of the government are clearly elucidated, and the history of the several issues, withdrawals, and cancellations is fully given. The principal publications referring to the subject are J. G. GIBBONS, "On the Public Debt of the United States" (1867); "How the National Debt can be Paid," by William Elder (1867); "Is our Prosperity a Delusion?" (1868); "The Science of Wealth," by Amasa Walker (1867–72); BAXTER, "On the National Debt of England and the United States" (1872), with various pamphlets, speeches, reports, etc. by other authors. During the war many pamphlets were published by individuals, proposing plans for the liquidation or extinguishment of the public debt, or in opposition to specified measures of the government, but few were of great importance or of permanent value. The measures actually adopted were, on the whole, wisely framed and singularly successful in their operation. The difficulties temporarily existing, or feared by some, disappeared with the lapse of time, and the public acquiescence became universal. It is not easy now to see what one of the great measures actually inaugurated could have been spared from the list of enactments necessary to sustain the country in the peculiar exigencies arising during the last twelve years.

LORIN BLODGET.

Dec'agon [from the Gr. *δέκα*, "ten," and *γωνία*, an "angle"], a plane geometrical figure having ten sides and ten angles. If the sides and angles are all equal, the figure is a regular decagon, and inscribable in a circle. A regular decagon may be formed from a regular pentagon by describing a circle round the latter, bisecting the arcs between its angular points, and drawing lines joining the angular points to the points of the intermediate section.

Decalitre [Fr.], a measure equivalent to ten litres. (See LITRE.)

Dec'alogue [Heb. עשרת הדברם; Gr. *δεκάλογος*, or *οἱ δέκα λόγοι*, "the ten words"], called also the **Ten Commandments**, and often spoken of as the "moral law," in distinction from the ceremonial law of the Jews, is that part of the law of Moses contained in Exodus xx. 3–17 and repeated in a hortatory form in Deuteronomy v. 7–21. It was originally written upon two tablets of stone (Ex. xxx., etc.), which were placed within the ark of the covenant. The text of Scripture (Ex. xxxiv. 28) appears to fix the number of these commandments at ten, but various opinions exist as to the manner of dividing them. The arrangement recognized by the Greek Church and most Protestants, called the Origenian division, is that which was approved, though not originated, by Origen. It had been approved by Philo and Josephus, and was generally adopted by the Christian Church. But in the West it faded out, and was revived by Leo Judæ (1482–1542) in his catechism, 1534, and by Calvin, 1536. The Roman Catholics, at least in their catechisms, unite into one what most Protestants consider the first and second commandments, and divide the tenth Origenian commandment into two. This was Luther's arrangement, and is generally, though not universally, followed by the Lutheran Church. It is called the first Masoretic arrangement. The modern Jews adopt what is called the Talmudical arrangement, which gives as the first commandment the words contained in Ex. xx. 2, and has for its second commandment the first and second of the Origenian arrangement. The second Masoretic, adopted by English Roman Catholics, differs from the first Masoretic only in inverting the order of the ninth and tenth commandments. The ten commandments, with the exception of the two regarding the Sabbath and reverence to parents, are negative ones, forbidding certain actions, and leaving positive precepts to other laws or to the individual conscience. The Decalogue is generally regarded as a moral code, binding from its own nature. It is, however, admitted that the fourth (or Sabbath) commandment has a positive as well as a moral element in it. Christ reduced the ten commandments to two.

REVISED BY R. D. HITCHCOCK.

Decam'eron [It. *Decamerone*, from the Gr. *δέκα*, "ten," and *ἡμέρα*, a "day"], the name given by Boccaccio to his celebrated collection of tales, which are supposed to be narrated in turn during ten days by a party of guests assembled at a villa to escape from the plague, which raged at Florence in 1348.

De Camp (JOHN C.), U. S. N., born Oct. 5, 1812, in New Jersey, entered the navy as a midshipman Oct. 1, 1827, became a passed midshipman in 1833, a lieutenant in 1838, a commander in 1855, a captain in 1862, a commodore in 1866, and a rear-admiral (retired list) in 1870. He commanded the Iroquois at the passage of Forts St. Philip and Jackson and capture of New Orleans, and, in short, in every action on the Mississippi under Farragut, to and including Vicksburg, in all of which he was conspicuous for gallant bearing.

FOXHALL A. PARKER, U. S. N.

Decamps (ALEXANDRE GABRIEL), a celebrated French painter of history and landscapes, was born in Paris Mar. 3, 1803. He visited the Levant about 1827, and painted mostly Oriental scenes with striking light-effects. He painted history, landscapes, genre, and animals, all with success. Among his works are the "Defeat of the Cimbri" (1834), a "Souvenir of Turkey in Asia," and "Les Singes Experts." His historical works are commended for grandeur of conception and a bold and free style of treatment. At the Exposition of 1855 his pictures divided the public attention with those of Ingres, Delacroix, and Vernet. Died at Fontainebleau Aug. 22, 1860. (THÉOPHILE SILVESTRE, "Histoire des Artistes Vivants," Paris, 1856.)

De Candolle (AUGUSTIN PYRAME), M. D., an eminent botanist of French extraction, born at Geneva Feb. 4, 1778. He studied at Geneva, and in 1796 he removed to Paris, where he studied chemistry and medicine, and became a pupil of the botanist Desfontaines and enjoyed the friendship of Cuvier and Humboldt. He published a "History of Succulent Plants" (1799–1803). In 1804 he graduated with an "Essay on the Medicinal Properties of Plants." Lamarck's "Flora of France," the first volume of which appeared in 1804, was prepared by him. He became in 1808 professor of botany at Montpellier, and published in 1813 his "Elementary Theory of Botany," a profound work, in which he developed his new system of classification according to the natural method. In 1816 he removed to Geneva. He projected a great work which should give a description of all known plants, and published two volumes (1818–21), with the title "Regni Vegetabilis Systema Naturale." Perceiving that the life of one man was not adequate to complete the work on so vast a scale, he modified his plan, and undertook to present a methodical arrangement of all known plants by orders, genera, and species in his "Prodromus Systematis Naturalis Regni Vegetabilis" (10 vols., 1824–46), which he did not live to finish. This is a very important book of reference for working botanists. Among his other works is "Organographie Végétale" (1827). Died at Geneva Sept. 9, 1841.—His son, ALPHONSE LOUIS PIERRE DE CANDOLLE, born Oct. 28, 1806, has written several botanical works, published his father's "Mémoires et Souvenirs" (1862), and continued the "Prodromus." (See FLOURENS, "Éloge historique de P. de Candolle," 1842; DELARIVE, "A. P. Decandolle, sa Vie et ses Travaux," 1851.)

Decanta'tion [from the Fr. *décanter* (It. *decantare*), to "pour"], the act of decanting; the pouring off a clear liquid from its sediment or subsidence. Chemists often resort to this process instead of filtration to separate the clear supernatant liquid from precipitates, and they sometimes perform the decantation by means of a siphon.

Decapita'tion [Late Latin *decapitatio*, from Lat. *de*, "from," "off," and *caput* (gen. *capitis*), a "head"], a form of CAPITAL PUNISHMENT (which see) in which the head is severed from the body by an executioner. Under the English government hanging has taken the place of decapitation, the last instance of the latter having occurred in 1745. This mode of punishment is still used in some of the German states and in France. In France the GUILLOTINE (which see) is still used. Decapitation is of very ancient origin. It is a frequent punishment among Oriental nations.

Dec'apod [from the Gr. *δέκα*, "ten," and *πούς* (gen. *ποδός*), a "foot"], a name applied by Cuvier to an order of crustaceans, comprehending those which have ten thoracic feet. The same name is also applied to a tribe of cephalopods, including those which have ten locomotive and prehensile appendages proceeding from the head, two of which are longer than the rest, and called tentacles. Decapod crustaceans are usually divided into three sub-orders—the long-tailed, the irregularly-tailed, and the short-tailed decapods. Shrimps, prawns, lobsters, and crawfish are examples of the first sub-order; the other two sub-orders contain the numerous species of crab.

Decap'olis [from the Gr. *δέκα*, "ten," and *πόλις*, a "city"], a district containing ten cities of Palestine and Syria, founded principally by veterans from the army of Alexander, but recolonized and endowed with special privileges after the Roman conquest of Syria (65 B. C.). Ancient writers are not agreed in regard to the names of these cities. According to Pliny, they were Damascus, Phila-

delphia, Raphana, Scythopolis, Canatha, Dion, Gadara, Gerasa, Pella, and Hippos. All, except Scythopolis, were on the E. side of the Jordan.

Deca'tur, a county which forms the S. W. extremity of Georgia. Area, 1062 square miles. It is bounded on the W. by the Chattahoochee, and intersected by the Flint River. The soil is generally fertile. Rice, maize, oats, tobacco, cotton, and wool are the chief products. It is partly traversed by the Atlantic and Gulf R. R. Capital, Bainbridge. Pop. 15,183.

Decatur, a county in the S. E. of Indiana. Area, 372 square miles. It is drained by Clifty and Sand creeks. The surface is undulating; the soil is based on limestone, and is fertile. Cattle, grain, wool, hay, and dairy products are raised. The most numerous manufactories are those of saddlery and harness. It is intersected by the Indianapolis and Cincinnati R. R. Capital, Greensburg. Pop. 19,053.

Decatur, a county in the S. of Iowa. Area, 528 square miles. It is intersected by the Crooked Fork of Grand River. The surface is mostly undulating prairie; the soil is fertile. Cattle, grain, wool, hay, butter, and lumber are produced. Capital, Leon. Pop. 12,018.

Decatur, a county in W. Central Tennessee. Area, 325 square miles. It is bounded on the E. by the Tennessee River. The soil is mostly fertile. Cattle, grain, tobacco, cotton, and wool are raised. Capital, Decaturville. Pop. 7772.

Decatur, a post-village of Morgan co., Ala., on the Tennessee River and the Memphis and Charleston R. R., which here connects with the Nashville and Decatur R. R., 122 miles S. of Nashville (Tenn.). It has two weekly newspapers. Pop. of Decatur township, 2821.

Decatur, the capital of De Kalb co., Ga., is finely situated on the Georgia R. R., 6 miles E. N. E. of Atlanta. Pop. 401.

Decatur, a city, capital of Macon co., Ill., is about 1 mile N. of the Sangamon River, and on the Central R. R. where it crosses the Toledo Wabash and Western R. R., 39 miles E. of Springfield, the terminus of the Paris and Decatur, Mattoon Sullivan and Decatur, Decatur and East St. Louis, Pekin Lincoln and Decatur, Decatur and State Line, Indiana and Illinois Central, running to Indianapolis, Champaign Monticello and Decatur, and Peoria Atlanta and Decatur R. Rs., making nine railroads centering at this point. It has about four miles of street railway. It has twelve churches, one national bank, one rolling-mill, and several factories. One daily and five weekly newspapers are issued here. Decatur has increased rapidly in the last decade. Pop. 7161; of township, 1337.

MILLER & ADDIS, PUBS. "MAGNET."

Decatur, a post-village, capital of Adams co., Ind., on the St. Mary's River and on the Cincinnati Richmond and Fort Wayne R. R., 21 miles S. S. E. of Fort Wayne. It manufactures wagon material and stoves. It has one weekly newspaper. Pop. 858. ED. "EAGLE."

Decatur, a township of Marion co., Ind. Pop. 1559.

Decatur, a post-township of Decatur co., Ia. P. 1046.

Decatur, a post-village of Van Buren co., Mich., on the Michigan Central R. R., 116 miles E. by N. of Chicago. It has a national bank and one weekly newspaper. Pop. 1420; of Decatur township, 2512.

Decatur, a post-township of Burt co., Neb. Pop. 614.

Decatur, a post-township of Otsego co., N. Y. P. 802.

Decatur, a post-village of Byrd township, Brown co., O. Pop. 204.

Decatur, a township of Lawrence co., O. Pop. 1761.

Decatur, a township of Washington co., O. P. 1437.

Decatur, a township of Clearfield co., Pa. Pop. 1461.

Decatur, a post-township of Mifflin co., Pa. Pop. 1171.

Decatur, a post-village, capital of Meigs co., Tenn., on the Tennessee River, 140 miles E. S. E. of Nashville. P. 99.

Decatur, a post-village, capital of Wise co., Tex., is 200 miles N. of Austin City, on a beautiful eminence. It has one weekly newspaper.

Decatur, a township of Green co., Wis. Pop. 2459.

Decatur (STEPHEN), a famous American commodore, was born at Sinnepuxent, Md., Jan. 5, 1779, and entered the navy in 1798. In Feb., 1804, he led a small party which burned in the harbor of Tripoli the American frigate Philadelphia after she had been captured. For this gallant exploit he was raised to the rank of captain. Having taken command of the frigate United States, he captured the British frigate Macedonian Oct. 25, 1812. A gold medal was voted to him by Congress for this victory. He was blockaded by a superior force in the harbor of New London in 1813–14. In May, 1815, he was appointed commander of a squadron of three frigates and seven smaller vessels, which was sent to chastise the Algerines. He captured two Algerine vessels of war June 17 of that year, and compelled the dey of Algiers to sue for peace. He was killed in a duel by Commodore James Barron Mar. 22, 1820. He was noted for his resolute spirit and cool intrepidity. (See his life, in SPARKS's "Am. Biography.")

Deca'turville, a post-village, capital of Decatur co., Tenn., 6 miles from the W. bank of the Tennessee River, 100 miles W. S. W. of Nashville. Pop. 188.

Decay' [remotely from the Lat. *decado,* to "fall"] is the comparatively slow oxidation or burning which moist organic matter undergoes when exposed to air. It is not usually accompanied by perceptible increase of heat, unless putrefaction or fermentation is associated with it. Substances rich in nitrogen are especially liable to decay; consequently, most animal substances decay more rapidly than any vegetable matters except the softest and most nitrogenous. The decay of animal substances after death is, according to the observations of Duvernoy, probably but the continuation of the normal disassimilation which goes on throughout life; but as the corresponding processes of repair have ceased, the decay becomes apparent for the first time after death. The decay of nitrogenous matters in the proper circumstances is accompanied by certain processes known as putrefaction and fermentation—processes which are accompanied by the growth of fungi, often microscopical, and by complex chemical changes which materially hasten the process of destruction.

Decazes (ÉLIE), DUC, a French minister, born Sept. 28, 1780. He was appointed minister of police in place of Fouché by Louis XVIII. in 1815, then minister of the interior, and prime minister in 1819. He resigned in Feb., 1820, when accused of connivance with the assassination of the duke of Berry. Decazes still retained the favor of the king, who sent him ambassador to London, and gave him the title of duke. Died Oct. 25, 1860.

Decazeville, a town of France, department of Aveyron, about 20 miles N. E. of Villefranche. It has extensive blast-furnaces and iron-forges. Coal-mines are worked in the vicinity. Pop. 7106.

Dec'can [Sanscrit, *Dacshina,* "the south"], a term formerly applied to the whole of Hindostan S. of the Nerbudda River or Vindhya Mountains, but now usually limited to the country between the Nerbudda and the Kistnah. It comprises Aurungâbâd, Beeder, Berar, Bejapoor, Candeish, Gundwana, Northern Circars, and Orissa.

Decem'ber [Fr. *Décembre,* from the Lat. *decem,* "ten"], the twelfth and last month of the year, is so called because in the ancient Roman calendar it was the tenth month of the year.

Decem'viri (sing. **Decemvir**), [Lat., from *decem,* "ten," and *vir* (plu. *viri*), a "man"], a name applicable to ten persons appointed for particular purposes, but more especially applied to the ten magistrates elected from the Roman patricians to draw up a code of laws founded on the more approved institutions of Greece; they were also invested with supreme authority to govern the state. The experiment proved entirely successful; their laws were approved by the senate and engraven on ten metal tablets; and their official duties were discharged with so much satisfaction that, at the expiration of their year of office, it was resolved, as their work was not completed, to continue the same form of government. A new commission, invested with the same power, was appointed for the next year, to which the plebeians were admitted, the result of which was two additional tablets, thus completing the famous Twelve Tables which in subsequent times became the foundation of all Roman law. The new decemviri, however, proceeded to the most violent acts of despotism, perpetrating various outrages on the persons and families of the plebeians, which so exasperated the people that an insurrection broke forth; the decemviri were driven from office, and the ordinary magistrates were re-established.

The *decemviri litibus judicandis* ("ten men for settling lawsuits") formed a kind of court for trying civil cases, and, later, for matters involving life and death. The *decemviri sacris faciundis* (the "ten men for performing sacred duties"), first instituted about 367 B. C., were five patricians and five plebeians who had charge of the Sibylline books until the time of Cicero, when they were made fifteen in number. They were considered sacred to Apollo. There were also decemviri for dividing the public lands.

Decen'nial [from the Lat. *decennium,* a "period of ten years" (from *decem,* "ten," and *annus,* a "year")], occurring every ten years. For example, the U. S. census is decennial. The decennial games (*decennia* or *decennalia*) among the later Romans were celebrated in consequence

of the fact that the emperor Augustus pretended to refuse the empire for life, choosing to be elected to it for a period of ten years, at the end of which time he accepted it for ten years more, and so on till the end of his life. The fiction was kept up till the last days of the empire by the observance of the decennial games.

Dechant (Rev. Jacob William) was born at Kreuznach, in the Palatinate, Feb. 18, 1784, and emigrated to America in 1805. He was ordained to the ministry of the German Reformed Church in 1808. He labored with success as a missionary among the Germans of Ohio and Pennsylvania, and instructed numbers of theological students. Died of cholera Oct. 5, 1832.

De Charms (Richard), an American Swedenborgian minister and writer, born in Philadelphia Oct. 17, 1796, graduated at Yale College in 1826. He published "The New Churchman Extra," and several volumes of sermons. Died Mar. 20, 1864.

Decherd', a post-village of Franklin co., Tenn., is the E. terminus of the Winchester and Alabama R. R., and is also a station of the Nashville and Chattanooga R. R., 82 miles from Nashville.

Decid'uous [Lat. *deciduus*, from *de*, "down," and *cado*, to "fall"] **Trees** are trees whose leaves fall off in autumn and are annually renewed in the spring. The greater part of the trees and shrubs of temperate climates are deciduous, but in tropical countries the forest trees maintain generally a perennial verdure, except where the diversities caused by the wet and dry seasons are extreme. Trees that are not deciduous are called evergreen.

Deciduous Teeth, called also, in mammals, temporary or milk teeth, are the teeth which appear in infancy, and which after a time fall out, and are succeeded by the permanent teeth. In children there are twenty such teeth, ten in each jaw—four molar, two canine, and four incisor teeth. In reptiles and fishes all teeth are deciduous, being continually cast out and renewed.

Dec'imal [from the Lat. *decimus*, "tenth" (from *decem*, "ten")], a number written in the scale of tens. The name is especially applied to a Decimal Fraction (which see).

Decimal Fraction is a fraction whose denominator is a decimal number or power of ten. Thus, $\frac{1234}{100}$ is a decimal fraction. It may be decomposed into the sum $\frac{1000}{100} + \frac{200}{100} + \frac{30}{100} + \frac{4}{100} = 10 + 2 + \frac{3}{10} + \frac{4}{100}$. By an obvious extension of the method of local values, where each digit has ten times the value of the like digit which immediately follows it, the above decimal fraction may be, and usually is, written thus: 12.34, where the decimal point after the 2 merely serves to indicate which digit represents *units*. In this form a decimal fraction is termed a *decimal*.

For the purpose of indicating the units' place the method of Sir Isaac Newton, of using a point placed for distinction near the top of the figures, is frequently used. The operations of addition, subtraction, multiplication, and division may be applied to decimals in exactly the same manner as to integers. The only additional rules in decimals refer to the position of the decimal point.

In their abbreviated form, decimal fractions are now extensively employed in arithmetical calculations. A subdivision of weights and measures on the principle of decimal division was introduced into France at the time of the Revolution, and has since been adopted by a large portion of the civilized world.

Decima'tion [Lat. *decimatio*, from *decem*, "ten"], in Roman history, the selection by lot of one man out of every ten, who was put to death in cases of mutiny or other grave offence committed by a body of troops. Decimation has seldom been practised in modern times. Blücher decimated a body of mutinous troops before the battle of Waterloo.

Decimi, dā'che-mee [from the Lat. *decimus*, "tenth"], an Italian term used in music, signifying an interval of ten diatonic degrees, as from C to E, or third above the octave, as which it is always treated in harmony. In double counterpoint, where a necessary difference has to be made, it is treated differently from the third, although the same harmonic rules obtain; also in thorough-bass, where the figure 9 rises a degree to 10, instead of falling a degree to 8.

De'cius (Caius Messius Quintus Trajanus), a Roman emperor, born in Pannonia about 200 A. D. He became a general in the service of the emperor Philip, and had command of an army which revolted against Philip and proclaimed Decius. In the battle that ensued Philip was defeated and killed in 249 A. D. A severe persecution of the Christians occurred in the reign of Decius, who was killed in battle by the Goths in Nov., 251 A. D.

Decius Mus (Publius), a Roman consul and patriot who obtained celebrity by devoting himself to the Dii Manes as a sacrifice. In a battle against the Latins (337 B. C.) he rushed into the midst of the enemy and was killed. His son, P. Decius Mus, imitated his example in 296 B. C., when he commanded against the Gauls.

Deck [from the Ang.-Sax. *decan*, to "cover," and allied to the Lat. *tectum*, a "covering" or "roof" (from *tego*, *tectum*, to "cover"); Fr. *pont* or *tillac*], a planked flooring, forming also a covering or division to a ship. In large vessels there are several decks, as the upper, main, lower, and orlop decks. Smaller ships have two whole and one half deck, and still smaller only one of each.

Deck'er, a township of Richland co., Ill. Pop. 971.

Decker, a township of Knox co., Ind. Pop. 837.

Decker (Thomas), an English dramatist, born before 1600. He wrote several plays in partnership with Ford and Rowley. His principal works are "Fortunatus, or the Wishing-Cap," "The Honest Whore," and the "Gull's Horn-Book." Died about 1638.

Deck'ertown, a post-village of Wantage township, Sussex co., N. J., on the New York and Oswego Midland R. R., 66 miles N. W. of Jersey City. It has one national bank and one weekly newspaper.

Declara'tion [Lat. *declaratio*, from *declaro*, to "make clear"], an affirmation; the act of declaring; a public announcement; a public expression of facts or opinions; a proclamation. Among the most memorable of all political documents is the American Declaration of Independence (which see). The first Colonial Congress passed an important "Declaration of Rights" at Philadelphia on the 14th of Oct., 1774. Though less famous than the Declaration of Independence, it is of scarcely less importance in the history of our country. (See Gillet's "Federal Government," 1871, pp. 17–27.) A "Declaration of the Rights of Man" was adopted by the National Assembly at Paris Aug. 18, 1789. The "Declaration of Thorn" (Lat. *declaratio Thorunensis*) was a confession of faith drawn up at Thorn, in Poland, in 1645, for the use of the Reformed churches, the design being to settle controverted points.

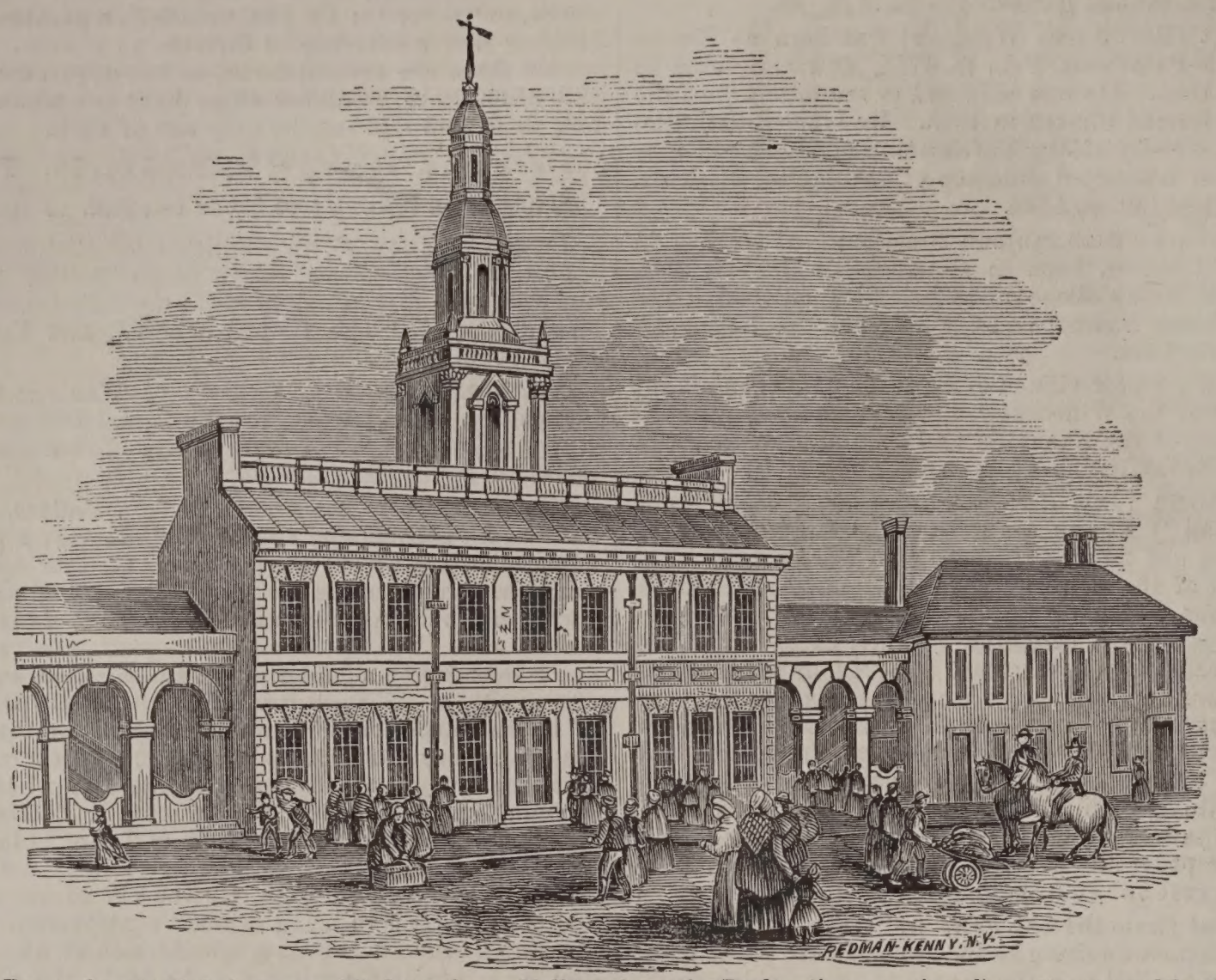
Declaration, in law, is a specification of a cause of action by a plaintiff against a defendant; the pleading in which a plaintiff sets forth his case against the defendant. It contains certain formal or substantial parts, such as the title, venue, the cause of action, and the conclusion. If the plaintiff fails to declare within a certain time, the defendant may obtain judgment of *non pros.* The term is used in other significations in other branches of the law—*e. g.* declaration of trust, declaration of uses, declaration in evidence, etc.

Declaration of War, the formal announcement by a government of its intention to wage war against another, is a proceeding which is observed among all civilized nations, though instances have frequently occurred where *de facto* wars have been carried on without such notification, as between the English and Spanish at sea at various times during the reigns of Elizabeth and James I. of England. Powerful nations have also sometimes, without any such declaration, attacked the weak, designing a breach of international law. In the U. S. the declaration of war is a power exercised by Congress alone. During the age of chivalry, a herald made declaration of war at the enemy's court, his tabard on his arm. No offence was taken at his defiance, which was frequently rewarded by gifts of money from the party defied. (See International Law No. II., by Pres. T. D. Woolsey, S. T. D., LL.D.

Declaration of Independence.* The first Congress of the thirteen British colonies, which led to their ultimate union in resistance to the British crown, and their jointly throwing off their allegiance to the same, as well as their ultimate union as the United States of America, met in Philadelphia on the 5th of Sept., 1774. The immediate cause of this assemblage was what was called "the Boston Port Bill;" that is, an act of Parliament by which the port of Boston was closed and the custom-house removed to Salem, because of the destruction of the tea at the former place. This was looked upon by the friends of constitutional liberty in all the colonies as a direct attack by usurpation upon the chartered rights of Massachusetts. If they should silently permit this gross outrage to be perpetrated upon a sister colony, they saw no security against similar outrages being perpetrated in turn upon their own chartered or constitutional rights. It was now that the cry of "The cause of Boston is the cause of us all" was raised in Virginia, and extended from the Penobscot to the Altamaha. The result was the call of a general Congress of all the colonies, to meet, by deputies, at the time and place stated, for joint consultation and joint action in maintenance of principles essential to the preservation of the rights and liberties of all. The idea of independence or

*By Hon. Alex. H. Stephens.

separation was at this time entertained by no one. Upon the assembling of this Congress, Peyton Randolph of Virginia was chosen the president of it, and Charles Thompson secretary. In all the deliberations of this body each colony stood upon an equal footing with the others, without regard to population, wealth, or the number of delegates sent. All questions were decided by the colonies present, each having one vote only. They urged several measures upon the consideration of their constituents as proper means for obtaining a general redress of grievances, and



Old Pennsylvania State-house, or "Independence Hall" (where the Declaration was signed), as it appeared in 1776.

also prepared and published a declaration of what they considered the indefeasible rights of all the colonies under the British constitution. They adjourned on the 26th of Oct., 1774, with a recommendation to the colonies to meet in Congress again, by deputies, on the 10th of May, 1775.

In speaking of the papers issued by this assemblage, Lord Chatham said in the British Parliament that, though he had studied and admired the free states of antiquity, the master-spirits of the world, yet for solidity of reasoning, force of sagacity, and wisdom of conclusion no body of men could stand in preference to this Congress. All this, however, incensed rather than appeased the ministry. On the 1st of April, 1775, they had 3000 troops in Boston for the purpose of enforcing their iniquitous measures at the point of the bayonet. Hostilities soon ensued. The battles of Concord and Lexington were fought. Engagements also took place at Ticonderoga, Crown Point, and Skenesborough in New York.

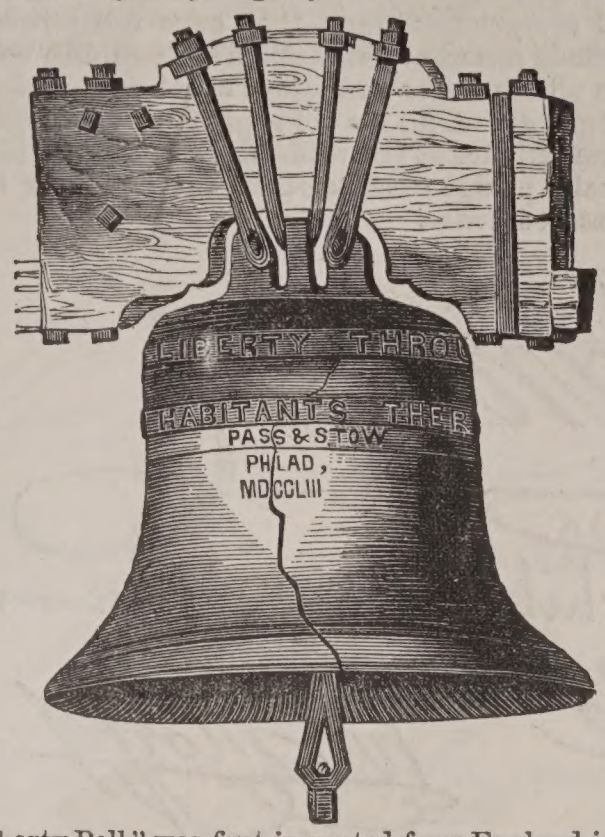
It was in this state of things that the second Congress of the colonies assembled at Philadelphia on the 10th of May, 1775, according to the recommendation of its predecessor. Peyton Randolph of Virginia was again chosen president, but soon being called home on urgent business, John Hancock of Massachusetts was, on the 24th of May, chosen president of the Congress in his stead. The crisis was now becoming not only serious, but alarming. The purpose of Great Britain to reduce the colonies to absolute subjection without any redress of grievances seemed to be evident. The Congress, with firmness and without hesitation, determined to resist force by force. Troops were raised for the purpose. In setting forth the reasons for their action in thus defending themselves and their constituents, they declared that they had "no wish to separate from the mother-country, but only to maintain their chartered rights." "In our native land," said they, "and in defence of the freedom which is our birthright, and which we have ever enjoyed till the late violation of it, for the protection of our property, acquired solely by the honest industry of our forefathers and ourselves, against violence actually offered, we have taken up arms. We shall lay them down when hostilities shall cease on the part of the aggressors, and all danger of their being renewed shall be removed, and not before."

On the 14th of June, 1775, at the instance of Massachusetts, George Washington, one of the delegates of Virginia, was unanimously appointed commander-in-chief of all the colonial forces. He was commissioned in the name of the united colonies, the name of each colony present by its deputies being set forth in the commission. This office he accepted on the condition that he should receive no salary except the payment of his actual expenses.

Three days afterwards the battle of Bunker Hill was fought. Washington did not reach the vicinity of Boston until the 12th of July, 1775, when he assumed the command of the colonial army assembled there. It was not until the early part of the year 1776 that the public mind throughout the colonies began generally and seriously to consider the question of independence, though a portion of the people of North Carolina had taken this view of the subject almost from the beginning of the recent troubles. As early as the 20th of May, 1775, their celebrated Mecklenburg convention assembled and announced their famous declaration, severing for ever themselves from all their allegiance to the crown of Great Britain.

In Jan., 1776, Massachusetts instructed her delegates in the Congress of the colonies at Philadelphia to vote for independence. South Carolina gave similar instructions to her delegates in March. Georgia and North Carolina did the same in April. In May, Gen. Washington wrote from the head of the army, then at New York, "A reconciliation with Great Britain is impossible. . . . When I took command of the army I abhorred the idea of independence; but I am now fully satisfied that nothing else will save us." In the same month Virginia instructed her delegates in Congress to vote for independence. New Hampshire, New Jersey, and Maryland followed in giving similar instructions to their delegates early in June. Pennsylvania and New York delayed action, still indulging hopes of an adjustment of the controversy. The general instructions of the colonies to their delegates were to renounce all allegiance to the British crown, and to form a confederation among themselves as independent States. On the 7th of June, Richard Henry Lee, a delegate from Virginia, moved a resolution in Congress that "these united colonies are, and of right ought to be, free and independent States, ... and that a plan of confederation be prepared and transmitted to the respective colonies for their consideration and approbation." This resolution was adopted on the 11th of June. Two committees were appointed under it—one to prepare a Declaration of Independence, and the other to prepare Articles of Union or Confederation. The committee to prepare the Declaration of Independence consisted of Thomas Jefferson of Virginia, John Adams of Massachusetts, Benjamin Franklin of Pennsylvania, Roger Sherman of Connecticut, and Robert R. Livingston of New York. They reported on the 28th of June, but action on the report was deferred for some days for the delegates from Pennsylvania and New York to receive their instructions

and powers to vote for the Declaration. This celebrated paper was drawn up by Mr. Jefferson, the chairman of the committee, being only slightly modified in some parts, as



The "Liberty Bell" was first imported from England in 1753. It was cracked at the first ringing after its arrival, and recast in Philadelphia in the same year. Upon the fillets around it were cast (twenty-three years before the Declaration of Independence) the prophetic words, "Proclaim liberty throughout all the land, unto all the inhabitants thereof." After the first reading of the Declaration it was rung for more than two hours, with the firing of cannon and the beating of drums. The bell has been broken for many years. It now stands in the hall of the old State-House, Philadelphia.

it now stands, at the suggestion of other members. It came up for final action on the 4th day of July, when it received the unanimous vote, not only of all the colonies, but of all their delegates in Congress. It was voted upon by colonies as separate and distinct political bodies, and as it stands on the journal is in these words:

IN CONGRESS, July 4, 1776.

THE UNANIMOUS DECLARATION OF THE THIRTEEN UNITED STATES OF AMERICA.

When, in the course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume, among the powers of the earth, the separate and equal station to which the laws of nature and of nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation.

We hold these truths to be self-evident, that all men are created equal; that they are endowed by their Creator with certain unalienable rights; that among these are life, liberty, and the pursuit of happiness. That to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed; that whenever any form of government becomes destructive of these ends, it is the right of the people to alter or to abolish it, and to institute a new government, laying its foundation on such principles, and organizing its powers in such form, as to them shall seem most likely to effect their safety and happiness. Prudence, indeed, will dictate that governments long established, should not be changed for light and transient causes; and accordingly, all experience hath shown, that mankind are more disposed to suffer, while evils are sufferable, than to right themselves by abolishing the forms to which they are accustomed. But when a long train of abuses and usurpations, pursuing invariably the same object, evinces a design to reduce them under absolute despotism, it is their right, it is their duty, to throw off such government, and to provide new guards for their future security. Such has been the patient sufferance of these Colonies, and such is now the necessity which constrains them to alter their former systems of government. The history of the present king of Great Britain is a history of repeated injuries and usurpations, all having, in direct object, the establishment of an absolute tyranny over these States. To prove this, let facts be submitted to a candid world:

He has refused his assent to laws the most wholesome and necessary for the public good.

He has forbidden his Governors to pass laws of immediate and pressing importance, unless suspended in their operation till his assent should be obtained; and, when so suspended, he has utterly neglected to attend to them.

He has refused to pass other laws for the accommodation of large districts of people, unless those people would relinquish the right of representation in the Legislature; a right inestimable to them, and formidable to tyrants only.

He has called together legislative bodies at places unusual, uncomfortable, and distant from the depository of their public records, for the sole purpose of fatiguing them into compliance with his measures.

He has dissolved representative houses repeatedly, for opposing, with manly firmness, his invasions on the rights of the people.

He has refused, for a long time after such dissolutions, to cause others to be elected; whereby the legislative powers, incapable of annihilation, have returned to the people at large for their exercise; the State remaining, in the mean time, exposed to all the danger of invasion from without, and convulsions within.

He has endeavored to prevent the population of these States; for that purpose, obstructing the laws for the naturalization of foreigners; refusing to pass others to encourage their migration hither, and raising the conditions of new appropriations of lands.

He has obstructed the administration of justice, by refusing his assent to laws for establishing judiciary powers.

He has made judges dependent on his will alone, for the tenure of their offices, and the amount and payment of their salaries.

He has erected a multitude of new offices, and sent hither swarms of officers to harass our people and eat out their substance.

He has kept among us, in times of peace, standing armies, without the consent of our legislature.

He has affected to render the military independent of, and superior to, the civil power.

He has combined, with others, to subject us to a jurisdiction foreign to our constitution, and unacknowledged by our laws; giving his assent to their acts of pretended legislation.

For quartering large bodies of armed troops among us:

For protecting them, by a mock trial, from punishment, for any murders which they should commit on the inhabitants of these States:

For cutting off our trade with all parts of the world:

For imposing taxes on us without our consent;

For depriving us, in many cases, of the benefits of trial by jury:

For transporting us beyond seas to be tried for pretended offences:

For abolishing the free system of English laws, in a neighboring province, establishing therein an arbitrary government, and enlarging its boundaries, so as to render it at once an example and fit instrument for introducing the same absolute rule into these Colonies:

For taking away our charters, abolishing our most valuable laws, and altering, fundamentally, the powers of our governments:

For suspending our own legislatures, and declaring themselves invested with power to legislate for us in all cases whatsoever.

He has abdicated government here, by declaring us out of his protection, and waging war against us.

He has plundered our seas, ravaged our coasts, burnt our towns, and destroyed the lives of our people.

He is, at this time, transporting large armies of foreign mercenaries to complete the works of death, desolation, and tyranny, already begun, with circumstances of cruelty and perfidy scarcely paralleled in the most barbarous ages, and totally unworthy the head of a civilized nation.

He has constrained our fellow-citizens, taken captive on the high seas, to bear arms against their country, to become the executioners of their friends and brethren, or to fall themselves by their hands.

He has excited domestic insurrections among us, and has endeavored to bring on the inhabitants of our frontiers, the merciless Indian savages, whose known rule of warfare is an undistinguished destruction of all ages, sexes, and conditions.

In every stage of these oppressions, we have petitioned for redress in the most humble terms; our repeated petitions have been answered only by repeated injury. A prince, whose character is thus marked by every act which may define a tyrant, is unfit to be the ruler of a free people.

Nor have we been wanting in attention to our British brethren. We have warned them, from time to time, of attempts made by their legislature to extend an unwarrantable jurisdiction over us. We have reminded them of the circumstances of our emigration and settlement here. We have appealed to their native justice and magnanimity, and we have conjured them, by the ties of our common kindred, to disavow these usurpations, which would inevitably interrupt our connections and correspondence. They, too, have been deaf to the voice of justice and consan-

guinity. We must, therefore, acquiesce in the necessity which denounces our separation, and hold them, as we hold the rest of mankind, enemies in war, in peace friends.

We, therefore, the Representatives of the United States of America, in General Congress assembled, appealing to the Supreme Judge of the world for the rectitude of our intentions, do, in the name and by the authority of the good people of these Colonies, solemnly publish and declare, That these United Colonies are, and, of right, ought to be, *free and independent States;* that they are absolved from all allegiance to the British crown, and that all political connection between them and the State of Great Britain is, and ought to be, totally dissolved; and that, as *free and independent States*, they have full power to levy war, conclude peace, contract alliances, establish commerce, and to do all other acts and things which *independent States* may of right do. And, for the support of this Declaration, with a firm reliance on the protection of Divine Providence, we mutually pledge to each other, our lives, our fortunes, and our sacred honor.

John Hancock

Sam[l] Adams — Phil. Livingston

Rob[t] Frean[s] Paine — Fra[s] Lewis

John Adams — Nath[l] Folsom

Elbridge Gerry — Step[n] Hopkins

Josiah Bartlett — Wm Whipple

Sam[l] Huntington — Matthew Thornton

Wm Williams — Geo. Read

Oliver Wolcott — Tho[s] M'Kean

Tim[y] Pickering — Wm Floyd

Henry Wisner — Phil. Livingston

Abra Clark — Lewis Morris

John Morton — Richard Stockton

Geo. Clymer — Jno Witherspoon

Jas Smith — Fra[s] Hopkinson

Geo. Taylor — John Hart

James Wilson — Abra Clark

Geo. Ross — Josiah Bartlett

Caesar Rodney — Wm Whipple

Geo. Read — Saml Adams

Tho[s] M'Kean — John Adams

Robt Morris — Robt Treat Paine

Benjamin Rush — Elbridge Gerry

Benj[a] Franklin — Step[n] Hopkins

John Morton — William Ellery

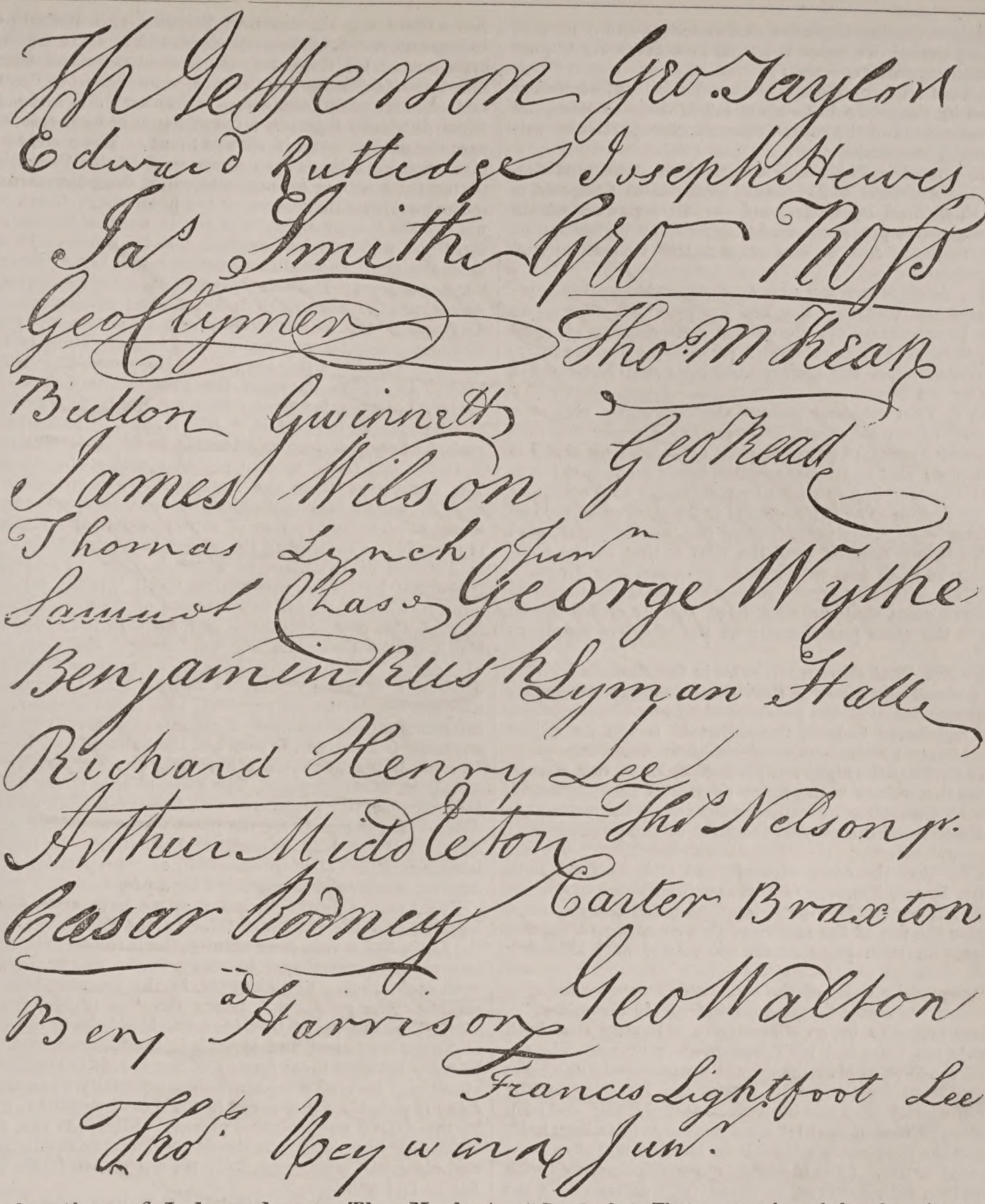
Geo. Clymer — Roger Sherman

Jas Smith — Sam[l] Huntington

Geo. Taylor — Wm Williams

James Wilson — Oliver Wolcott

Geo. Ross — Matthew Thornton



Declaration of Independence, The Mecklenburg. More than thirteen months before the adoption of the Declaration, above given, by the Continental Congress, a series of resolutions embodying a similar declaration had been adopted by the citizens of Mecklenburg co., N. C., at a public meeting holden at Charlotte, the seat of justice of the county. Of this important historical incident different accounts are given. According to the statement generally received in North Carolina, the meeting above referred to was held on the 20th day of May, 1775, and the document itself was in the words following:

"*Resolved*, 1. That whoever directly or indirectly abetted, or in any way, form, or manner, countenanced the unchartered and dangerous invasion of our rights, as claimed by Great Britain, is an enemy to this country—to America—and to the inherent and inalienable rights of man.

"*Resolved*, 2. That we, the citizens of Mecklenburg county, do hereby dissolve the political bands which have connected us to the mother-country, and hereby absolve ourselves from all allegiance to the British crown, and abjure all political connection, contract, or association with that nation, who have wantonly trampled on our rights and liberties, and inhumanly shed the blood of American patriots at Lexington.

"*Resolved*, 3. That we do hereby declare ourselves a free and independent people; are, and of right ought to be, a sovereign and self-governing association, under the control of no power other than that of our God and the general government of the Congress; to the maintenance of which independence we solemnly pledge to each other our mutual co-operation, our lives, our fortunes, and our most sacred honor.

"*Resolved*, 4. That as we acknowledge the existence and control of no law or legal officer, civil or military, within this county, we do hereby ordain and adopt as a rule of life, all, each, and every of our former laws; wherein, nevertheless, the crown of Great Britain can never be considered as holding rights, privileges, immunities, or authority therein.

"*Resolved*, 5. That it is also further decreed that all, each, and every military officer in this county is hereby retained in his former command and authority, he acting conformably to these regulations. And that every member present of this delegation shall henceforth be a civil officer—viz. a justice of the peace in the character of a '*committee-man*,' to issue process, hear and determine all matters of controversy, according to said adopted laws, and to preserve peace and union and harmony in said county; and to use every exertion to spread the love of country and fire of freedom throughout America until a more general organized government be established in this province."

Other accounts give May 31, 1775, as the date of the meeting; and make the declaration to consist of a preamble and twenty resolutions, of which twelve (the fourth to the fifteenth inclusive) make provision for the military organization of the male population and for the administration of justice, and the rest, with the preamble, are as follows:

"*Whereas*, By an address presented to His Majesty by both houses of Parliament in February last, the American colonies are declared in a state of actual rebellion, we conceive that all laws and commissions confirmed or derived from the authority of the king and Parliament are annulled and vacated, and the former civil constitutions of these colonies for the present wholly suspended. To provide in

some degree for the exigencies of this county in the present alarming period, we deem it proper and necessary to pass the following resolves—viz.:

"I. That all commissions, civil and military, heretofore granted by the crown to be exercised in these colonies, are null and void, and the constitution of each particular colony wholly suspended.

"II. That the Provincial Congress of each province, under the direction of the great Continental Congress, is invested with all legislative and executive powers within their respective provinces, and that no other legislative or executive power does or can exist at this time in any of these colonies.

"III. As all former laws are now suspended in this province, and the Congress has not yet provided others, we judge it necessary, for the better preservation of good order, to form certain rules and regulations for the internal government of this county until laws shall be provided for us by the Congress. . . .

"XVI. *That whatever person shall hereafter receive a commission from the crown, or attempt to exercise any such commission heretofore received, shall be deemed an enemy to his country;* and upon confirmation being made to the captain of the company in which he resides, the said company shall cause him to be apprehended and conveyed before two selectmen, who, upon proof of the fact, shall commit said offender to safe custody until the next sitting of the committee, who shall deal with him as prudence may direct.

"XVII. That any person refusing to yield obedience to the above rules shall be considered equally criminal and liable to the same punishments as the offenders last mentioned.

"XVIII. That these resolves be in full force and virtue until instructions from the Provincial Congress regulating the jurisprudence of the province shall provide otherwise, or the legislative body of Great Britain resign its unjust and arbitrary pretensions with respect to America.

"XIX. That the eight militia companies of this county provide themselves with proper arms and accoutrements, and hold themselves in readiness to execute the commands and direction of the general Congress of the province and this committee.

"XX. That the committee appoint Col. Thomas Polk and Dr. Joseph Kennedy to purchase three hundred pounds of powder, six hundred pounds of lead, and one thousand flints for the use of the militia of this county, and deposit the same in such place as the committee may hereafter direct.

"Signed by order of the committee,

"JOSEPH BREVARD, *Clerk of the Committee.*"

There seems to be no difficulty in believing that both accounts are true, and both documents genuine. The action of the 20th of May must have necessitated some more full provision for the public safety and for securing the order of society than had been made at that time; and such a meeting as that of the 31st must doubtless have been held, whether the previously adopted declaration had then been reiterated or not. (The historical questions connected with this matter, will, however, be found fully discussed by the Hon. William A. Graham of North Carolina, under the title MECKLENBURG, which see.)

F. A. P. BARNARD.

Declaration of Rights, a state paper presented to the prince and princess of Orange (afterwards William III. and Mary II.) at the time the crown was tendered to them (Feb. 13, 1689). The declaration had been drawn up by the Convention-Parliament, and complained of the following grievances which England had endured during the reign of James II.: The exercise of the dispensing power, the establishment of illegal ecclesiastic tribunals, unlawful taxation, the unlawful maintenance of the army, interference with the courts and the elections, the levying of excessive bail, the infliction of barbarous punishments, and the refusal to hear petitions. The declaration then asserted the rights which had been thus violated, and claimed various privileges for the nation. The substance of this declaration became the "Bill of Rights," passed in the second session of the first Parliament under William and Mary.

Declen'sion [Fr. *déclinaison;* Lat. *declinatio,* from *declino, declinatum,* to "bend aside," to "inflect"], a term applied in grammar to the inflection of nouns, adjectives, and pronouns according to their different cases. Such inflections in English are limited to three cases—the nominative, the genitive or possessive, and the accusative or objective. Thus, the personal pronoun *he* is declined as follows: nom. *he,* gen. *his,* acc. *him,* etc. But this regular inflection is limited in our language to pronouns. Our substantives have ordinarily but one change of case inflection, which occurs in the genitive, and is formed by the addition of *s,* with an apostrophe, to the nominative. In Latin there are six cases, in Greek five, in German four, in Russian seven, in Sanscrit eight, and in some languages even more. Of the cases, the first is the nominative or name-case (from the Lat. *nomino, nominatum.* to "name," and more remotely from *nomen,* a "name"). It is that form which is usually found in a list of nouns or names, in which case the subject-noun is always found. The genitive case (Lat. *casus genitivus,* from *gigno, genitum,* to "beget," implying the origin or source), also called the possessive case, indicates either the source or the possessor. Thus, when we say the "sun's light," the sun is not the possessor of the light which it has emitted, but its source. In some cases the genitive implies a relation which is neither origin nor possession. Thus we speak of "Cæsar's enemies," in which case the possession is formal, and not logical. The dative case (Lat. *casus dativus,* from *do, datum,* to "give") frequently denotes attribution or giving. Thus, in Latin we say "*Dedit mihi librum,*" "He gave (to) *me* the book;" in which example the pronoun is dative. The dative, however, frequently does not imply any giving or attribution; as in the Lat. "*Diis invisus,*" "hateful to the gods," where a certain relationship is implied. The dative in Greek and Latin seldom signifies motion to any place. The accusative (from the Lat. *accuso, accusatum,* to "accuse"), called also the objective case, is frequently the object of an active verb or of a preposition, and in general is regarded as indicating the object towards which motion is directed or the place at which it ends. The vocative (from the Lat. *voco, vocatum,* to "call") is the form of a noun in which a person is addressed or apostrophized. In English this case is identical in form with the nominative. The ablative (from the Lat. *ab,* "away," and *fero, latum,* to "carry") is properly the case of a noun from which something is taken or carried away. The Latin ablative also represents the instrumental and locative cases. The instrumental case properly designates the means by which anything is done, and is found in the Sanscrit and Russian. In most languages some other case, or a preposition with its object, takes its place. The locative case (from the Lat. *loco, locatum,* to "place") is that form of a noun which indicates that it stands for the place where anything is, or is done. It is used in Sanscrit and Russian. In the latter language it is called *predlozhnii,* or "prepositional," because it is always accompanied by a preposition.

The Latin ablative includes, as we have seen, also the locative and the instrumental. In the Sanscrit, to which the Latin has a very near affinity, the instrumental, dative, and ablative plural are, in many words, almost identical with each other. For example, in the Sanscrit *bhūs* (signifying "the producer," hence the "earth," and also a "cow")—akin to the Lat. *bos*—has *bhūbhyăs* in the dative and ablative plural, and *bhūbhĭs* in the instrumental. The likeness between these forms and the Lat. *būbus* (dative and ablative of *bos*) is very remarkable, especially when we consider that *bos* in all its cases has a short penultima, except in the dative and ablative plural; while *bhūs* has also a short penultima except in the dative, locative, instrumental, and ablative plural cases, fully represented in Latin by the dative and ablative.

Certain particular methods of inflecting words are also called declensions. Thus, declinable words are in some languages classified in groups according to the various methods in which their cases are formed. These groups are called the "first declension," "second declension," etc.

J. THOMAS.

Declina'tion [Lat. *declinatio,* from *declino,* to "bend downward or deviate"], in astronomy, the angular distance of a celestial body from the celestial equator, measured along a great circle passing through the centre of the body and the poles of the heavens; or it may be defined to be the arc of a circle of declination passing through the place of the heavenly body, intercepted between that place and the celestial equator. The place of a star in the heavens is determined by means of its right ascension and declination, which correspond to longitude and latitude on the surface of the earth.

Declination of the Magnet'ic Nee'dle is the deviation of the axis of a magnetic needle (that is, the straight line which joins its poles) from the astronomical meridian. This declination is sometimes towards the W. and sometimes towards the E. From a table of observations made at Paris, it appears that since 1580 the declination has varied more than 31 degrees. In 1663 it vanished. From the date of the first observations till 1820 it advanced progressively westward, but since that time it has assumed a retrograde movement towards the E. The declination of the magnetic needle at London in 1865 was 20° 30′ At present it is scarcely perceptible at Cape Hatteras. To the W. of that point it is easterly, and to the E. the variation is westerly. (See MAGNETISM, by PROF. A. M. MAYER, PH. D.)

Declinom'eter [a word improperly formed from the Lat. *declinatio*, "declination," and the Gr. μέτρον, a "measure"], an apparatus for measuring the declination of the magnetic needle, or the force of terrestrial magnetism in the plane of the horizon.

Decomposi'tion [from the Lat. *de*, "from," "un," and *compono, compositum*, to "put together"], a term used in chemistry to signify the separation of compound substances into their elementary parts. When compounds are resolved into their elements, or when the chemical constitution of substances is altered, they are said to be decomposed; and when in this operation new products are formed, such products are called the results of decomposition. Thus, ammonia is the result of the decomposition of certain animal substances; carburetted hydrogen gas is the result of the decomposition of pit-coal, etc. Chemists use the terms simple and compound, or single and double decomposition, to distinguish between the less and more complicated cases. When a compound of two substances is decomposed by the intervention of a third, which is itself simple or which acts as such, the case is one of simple decomposition; water, for instance, is a compound of oxygen and hydrogen. When the metal potassium, which is a simple body, is thrown into it, it is decomposed; the hydrogen is liberated in the form of gas, and the oxygen combines with the potassium to form potassa.

Deco'rah, a city of the second class, capital of Winneshiek co., Ia., situated on the Upper Iowa River, is the terminus of the Decorah branch of the Milwaukee and St. Paul R. R. It contains the Norwegian Lutheran College, an excellent graded public school, three banks, two weekly newspapers, two semi-monthlies (printed in Norwegian), two woollen-mills, one paper-mill, two foundries, four flour-mills, three wagon manufactories, and other industries. Pop. 2110; according to State census 1873, 2232; of township, 3723. A. K. Bailey & Bro., Eds. "Republican."

Dec'orate [from the Lat. *decoro, decoratum*, to "adorn"], to adorn, embellish; to cover with external ornaments. To decorate graves is to garnish them with flowers. The anniversary on which flowers are placed on soldiers' graves in the U. S. is called Decoration Day, and is observed on May 30th.

Deco'ria, a post-township of Blue Earth co., Minn. Pop. 262.

Decorated Style, in architecture, is also known as the "Middle Pointed" or pure Gothic style. It succeeded the First Pointed or Early English (1189–1272) by a transition so gradual that its origin in England is variously assigned to dates between 1272 and 1307, although in Germany and France it was considerably earlier. It finally passed by an equally gradual transition into the Perpendicular Gothic of the fifteenth century. The Decorated Style is regarded as the perfect flower of Gothic architecture. It is marked by geometrical window-tracery, richly ornamented doorways, delicate mouldings, and elaborately carved imitations of leaves, as of the vine and oak, often conventionalized, but not unfrequently copied from nature.

Decoy' [from *de*, "away," and the old English verb *coy*, to "entice"], to entice; to lead by artifice into a snare or into danger; to entrap by insidious means. As a substantive it signifies any object or thing by which persons or animals are enticed and lured into danger, etc.; a device by which aquatic birds, chiefly ducks, are enticed from a lake or river into a narrow winding canal or ditch, which, gradually becoming narrower, at last terminates under a cover of network several yards long. To draw the birds into this snare a tame duck called a decoy-duck is sometimes employed.

Decrescen'do, in music, is a gradual diminishing of sound, the reverse of Crescendo (which see). It is marked thus .

Decre'tal [from the Lat. *decretum*, a "decree"], a decree of the pope, having the same authority in canon law as the decrees in civil. The body of the canon law consists—1st, of the *Decretalium*, a collection made by Gratian, a Benedictine monk, after 1150, and drawn from the opinions of the fathers, popes, and councils; 2d, of the *Decretalia*, collected by Pope Gregory IX. (1227–41) from the decretal rescripts or epistles of the popes. A *liber sextus* was added by Boniface VIII. (1294–1303), and other additions were made by succeeding popes.

Decretals, False, otherwise called the **Pseu'do-Isido'rian Can'ons,** the name of one of the most remarkable literary forgeries of which we have any record. It designates a collection of papal letters, canons, etc., partly genuine, but mostly spurious. The name of the author is unknown, but they are ascribed in the preface to one Isidorus Mercator (or, according to some MSS., Peccator), and hence they were long believed to be the work of St. Isidore of Seville. They date from the first half of the ninth century. Their spuriousness was first established by German Protestant critics in the sixteenth century, and is now admitted by all Roman Catholic writers. It appears to have been the object of the author of this great fraud to assist in freeing the Church from secular domination. It is maintained by some Protestant historians that the primacy of the popes is mainly based upon the false decretals; but while it cannot be denied that certain popes used them freely for their own advantage, there is no evidence of intentional fraud on the part of the popes, for the decretals were generally received as genuine; and it is maintained by Roman Catholic writers that the influence of the false decretals was small.

Decu'rion [Lat. *decurio*], the leader of a *decuria*, or body of ten men, in the Roman cavalry. Three *decuriæ* constituted a *turma*, or body of thirty men, and the name decurio was afterwards given to the commander of the larger body. In Roman law it was the name given to senators in the colonial governments.

Decussa'tion [from the Lat. *decussis*, a Roman coin valued at ten *asses* (see As), and represented by the letter X], in anatomy, a crossing of nervous filaments, so called from a fancied resemblance to the letter X. The innermost fibres of the anterior pyramids and lateral columns of the *medulla oblongata* decussate freely from side to side; so that disease in one side of the brain frequently leads to paralysis of the opposite side of the body. Another decussation occurs between the optic nerves; this is often called the *chiasma*, also from its resemblance to the letter X (the Greek *chi*). The crossing of rays of light, etc. is also called decussation.

Ded'ham, a post-township of Hancock co., Me. P. 448.

Dedham, the shire-town of Norfolk co., Mass., is situated on Charles River and on two branches of the Boston and Providence R. R., and is 10 miles S. W. of the State-house in Boston. It has a granite court-house, jail, house of correction, and town-hall, two insurance companies, a national bank, a savings bank, one weekly newspaper, eight churches—two Unitarian, two Baptist, one Orthodox Congregational, one Methodist Episcopal, one Protestant Episcopal, and one Roman Catholic. Dedham has two large woollen-mills, one extensive brush manufactory, one pianoforte manufactory, and one foundry. The New York and New England R. R. passes through a section of the town, and it has also a branch connecting the town with Norwood. The town has a large Roman Catholic institution under the care of the Sisters of Charity, and a home for fallen women, which receives the assistance of the State and of many philanthropic people. Pop. of township, 7342. S. H. Cox, Ed. of "Dedham Transcript."

Dedica'tion [Lat. *dedicatio*, from *dedico, dedicatum*, to "dedicate"], a complimentary address to a particular person, prefixed by an author to his work. This custom was in use at a very early period. Horace, Virgil, Cicero, and Lucretius were among the number of those who practised it. At the period of the revival of letters in Europe few works were published without dedications. Many of these are remarkable for their elegance and purity of style, and, from the matter which they contain, are of more value than the treatises to which they are prefixed. But the practice became perverted, and many authors of the succeeding generations employ them chiefly with the view of securing the patronage of the great. Dedications were most abused in France under Louis XIV., and in England from 1670 to the accession of George III. Dryden was a great dedicator, and Johnson wrote dedications for money. Corneille got 1000 louisd'ors for the dedication of "Cinna." Some of the most beautiful dedications are those prefixed to the different volumes of the "Spectator" by Addison, and in more recent times those with which each canto of Sir Walter Scott's "Marmion" is prefaced. A complete history of dedications would be of great value, as throwing light upon the history and character of many distinguished persons, which are now involved in obscurity.

Dedication, in law. See Hereditaments Incorporeal, by Prof. T. W. Dwight, LL.D.

Deduc'tion [from the Lat. *de*, "from," and *duco, ductum*, to "draw"] is the mental operation which consists in drawing a particular truth from a general principle already known. It is opposed to *induction*, which consists in rising from particular truths to the determination of a general principle. The syllogism is the form of deduction. (See Syllogism.) Before we can deduce a particular truth we must be in possession of the general truth. The mathematical and metaphysical sciences are founded on deduction; the physical sciences rest on Induction (which see).

Deed [from the Ang.-Sax. *dæd*, "done;" hence, as a noun, "something done" or "executed"], a writing on

paper or parchment, sealed and delivered. This is its most general signification. In a restricted sense it means an instrument for the conveyance of real estate. According to Lord Coke, it should possess the following requisites: writing, parchment or paper, a person able to contract, a sufficient name, a person able to be contracted with, a sufficient name, a thing to be contracted for, apt words required by law, sealing, and delivery. Deeds pursue a regular form—containing the premises, *habendum*, *tenendum*, *reddendum*, conditions, warranty, covenants, and conclusion. The premises express the names of the parties, the consideration to be paid for the conveyance, and a description of the property conveyed. This should be minute and accurate. The "habendum" expresses the interest which the grantee is to have, whether it be an estate in fee, for life, or an inferior estate. The "tenendum" refers to the tenure upon which the land is to be held, and is at present of no practical performance. The "condition," "warranty," and "covenants" are not found in all deeds. They may be inserted whenever required to carry out the intention of the parties. When a condition is resorted to, it may be either precedent or subsequent. (See CONDITIONS.) The covenants vary with the nature of the conveyance. In a conveyance in fee six covenants may be inserted (see COVENANTS); and in such case the instrument is called a deed with full covenants. In some instances the single covenant of warranty is introduced, when it is ordinarily termed a warranty deed. In many cases there are no covenants at all, the object of the transaction being only to convey whatever interest the grantor may have. It is a rule of the common law that some words in a conveyance used by a grantor will imply a covenant. This doctrine tends to mislead grantors who are not familiar with the rules of law, and it has been abrogated in some of the States—*e. g.* New York. There is, however, an important rule that a promise may be implied on the part of the grantee from his acceptance of an instrument containing words purporting to create a personal liability. Thus, if there are words to the effect that the grantee assumes the payment of a certain specified mortgage, he becomes liable by his acceptance, though he does not execute the instrument. Whether he is liable upon an implied *covenant*, or only upon a promise, is not clear upon the authorities.

A deed may be either an indenture or a deed poll. The leading distinction between these terms is, that an indenture purports to be the act of both parties, a deed poll of only one. An indenture commences with the third person, a deed poll with the first. In an indenture the date is found at the beginning of the instrument, in a deed poll at the end. An instrument in the form of a deed poll may be in substance an indenture if there be acts to be done by both parties. Between a strict deed poll and an indenture there is claimed to be an important difference in the construction of doubtful or ambiguous words. In the former these are interpreted against the grantor; the grantee may take the construction most favorable to himself if the words will reasonably bear it. To an indenture the rule has no application, and it is not regarded in any case with as much favor in modern law as formerly. In a country like our own, where many men not lawyers undertake to draw their own deeds, questions frequently arise as to the effect of omissions or insertions by mistake, or of alterations or erasions. These occur in many instances through mere inexperience, and without any evil intent. In the case of an omission or insertion of a clause by mutual mistake, an application may be made to a court of equity (see EQUITY) to rectify the conveyance and make it what the parties intended it should be. The case of an alteration by one of the parties creates more difficulty. One of the most perplexing questions presented is, whether the fact of an erasure or other alteration raises any presumption that it was made after execution, or whether the opposite view should be taken, that there can be no presumption which would lead to the conclusion that the grantee has committed a wrong. The better view would seem to be that the attendant circumstances should go to a jury, without any presumption either way, and should be passed upon as a matter of fact. A fraudulent alteration would in general vitiate the instrument, though it would not divest a title to land which had already become the property of the grantee. As to all instruments which did not confer an estate, but only created an easement or conferred a right of action, the alteration would be fatal. Conveyances in the U. S. are in general registered or recorded, their execution for that purpose being attended with prescribed formalities. (See REGISTRATION and RECORDING.) The instrument is in general valid between the parties without registration, its object being to protect subsequent purchasers or incumbrances. The requisites and validity of a deed of land in any particular State depend upon the law of the place where the land is situated, though the question concerning them be raised in the courts of another State. (See also WARRANTY, QUIT CLAIM, COVENANT, BARGAIN AND SALE.)

T. W. DWIGHT.

Deems (CHARLES F.), D. D., was born in Baltimore, Md., in 1820, graduated at Dickinson College, served in the Methodist ministry of the South during several years, and has been professor in the University of North Carolina and in Randolph-Macon College, and president of Greensboro' and Centenary Colleges. He is now (1873) the successful pastor of the Church of the Strangers, New York City. He has been an abundant and able contributor to the "Southern Methodist Quarterly Review," and is the author of a volume of sermons, a "Life of Dr. Clark," "Devotional Melodies," "Home Atlas," a volume of poems entitled "Triumphs of Peace," and a "Life of Christ."

Deem'ster, or **Doomster,** formerly an officer in Scotland who read the sentence of condemned persons in open court. Deemsters in the Isle of Man and Jersey are judges who give decisions without writings or process. In the former island the two deemsters are the chief magistrates.

Deep Bottom, a point on the N. side of James River, in Henrico co., Va., about 12 miles by land and 20 miles by water below Richmond, opposite the peninsula of Jones' Neck, and between Three- and Four-Mile creeks, and near the battle-ground of Malvern Hill. It was occupied by part of the troops of Gen. B. F. Butler, June 20, 1864, and a pontoon bridge was thrown across the river. Near this point several important actions were fought during Aug. and Sept., 1864, the general result being favorable to the Union forces. Deep Bottom remained an important strategic point until after the fall of Richmond.

Deep Creek, a township of Clinton co., Ia. P. 1081.

Deep Creek, a township of Edgecombe co., N. C. Pop. 1706.

Deep Creek, a township of Jackson co., N. C. P. 553.

Deep Creek, a township of Yadkin co., N. C. P. 1236.

Deep Creek, a post-township of Norfolk co., Va. Pop. 2202.

Deep River [Indian, *Sapponah*], a river of North Carolina, flows south-eastward through Randolph co., and nearly eastward through Chatham co., until it enters the Cape Fear River at Haywood. Coal abounds on its banks. Length, estimated at 120 miles.

Deep River, a post-village of Saybrook township, in Middlesex co., Conn., on the Connecticut River and Connecticut Valley R. R., 34 miles S. S. E. of Hartford. It has a national and a savings bank.

Deep River, a post-township of Poweshiek co., Ia. Pop. 799.

Deep River, a post-township of Guilford co., N. C. Pop. 1071.

Deep River Coal-Beds, a tract of coal-bearing lands in Chatham and Moore cos., N. C., in the valley of the Deep River, above noticed. They are probably of triassic, and certainly not of the true carboniferous, age. The area of the productive basin is over forty square miles, though the beds can be traced through Granville and Wake counties, in a southward and westward direction, almost across the State, and extending a few miles into South Carolina. Indeed, the Dan River coal-beds of Rockingham and Stokes counties are believed to be the same beds, though detached from the larger area. The quality of the coal is always good, though variable, some being an excellent and highly bituminous gas-coal, some good semi-bituminous coal, and some anthracite; while some is metamorphosed into graphite. The total amount of available coal in the Deep River field proper has been estimated at 240,000,000 tons. These coals have hardly been disturbed as yet, though they have been known for over 100 years. They have additional value from the fact that good iron and copper ores exist near them, the iron being often found in the same mines with the coal. By a system of slack-water navigation on the Deep and Cape Fear rivers the coal could be cheaply transported to Fayetteville, the present head of steamboat navigation on the latter river. With this point Wilmington, N. C., is connected by steamers; so that the Deep River beds might easily supply that city and her steam marine with excellent coal at a very low price.

The bituminous coal of this field is clean and does not soil the fingers. It is a caking coal, makes an excellent coke for manufacturing purposes, is free from sulphur, yields an abundant illuminating gas of good quality, and is useful for the blacksmith's forge, for the generation of steam, and for domestic uses.

Deep-Sea Dredging. The use of iron dredges for procuring oysters, etc. in shallow or moderately deep water has long been known to the fishermen of all civilized countries.

The instrument used for this purpose is large and heavy, usually consisting of a stout iron frame, several feet across, with one scraping edge, which acts something like a hoe; the arms to which the drag-rope is fastened are usually rigid, and behind the frame there is a net with large meshes of twine or wirework. This instrument is very efficient for dredging large objects, like oysters, etc., for which alone it is intended; but for scientific purposes it would be of little use, for all the small kinds of animals, which constitute the greater part of the animal life of the ocean, would pass through the coarse meshes and be lost. Moreover, in sinking such a dredge in very deep water the chances are that it would frequently fall wrong side up, and thus the time and labor would be lost. Consequently, various modifications of this primitive form of the dredge have been devised by naturalists, in order to obtain a complete knowledge of the life of the bottom of the ocean at all depths, and several forms have been used with wonderful success. The two main points to be observed are: 1st, to have a net or bag of a texture open enough to let the water pass through freely, but fine enough to retain even the smallest animals sought for; and 2d, to have the dredge provided with two scraping edges, so that it will work equally well either side up.

The naturalist's dredge was first systematically used, if not invented, by Otho Frederick Müller, previous to 1780, on the coasts of Norway and Denmark. This dredge appears to have been square, with four scraping edges, but otherwise similar to those still in use. Some naturalists have used a triangular form with three scraping edges, but, like those with a square frame, this form gives too wide a mouth, so that the contents are liable to wash out, though it is still advantageously used for some purposes.

The dredge now generally used by naturalists, even for the deepest work, consists of a narrow rectangular frame, with two somewhat flaring scraping edges, the ends of the frame being of round iron, and each supporting a forked iron arm, each fork being bent around the end-piece of the frame at the corners, so as to turn freely upon it. The other end of each arm is furnished with a ring or eye, to which the drag-rope is attached. To the back of the rectangular frame a bag-like net of stout twine, with small meshes, or else a bag of some kind of stout open cloth, is securely attached, either directly by means of holes drilled through the back part of the scrapers near the edge, or to small iron rings inserted into such holes. For dredging in shallow water or on rocky bottoms it is usual to protect the inner net or bag with an outside bottomless bag of stout canvas or some similar material, otherwise the rocks will quickly destroy the net. To prevent the net from twisting or turning over the mouth of the dredge during its descent, a transverse bar of wood or iron, a little longer than the dredge-frame, is sometimes attached across the bottom of the outer bag; others use a U-shaped loop of stout wire, with an eye at each end by which to tie it to the middle of each end of the dredge-frame, the loop passing down into the net. The drag-rope is usually attached securely to one of the arms of the dredge, while the other arm is tied to it by a smaller rope or by spun-yarn, so that in case the dredge becomes wedged between or under rocks the strain upon it may break away the weaker fastening, allowing the frame to straighten out and thus free itself. One or more weights are usually attached to the rope at a short distance in front of the dredge, partly to help sink the rope, partly to keep the edge of the dredge down upon the bottom in its proper position; the amount of weight must be varied according to the depth of water, velocity of currents, character of bottom, size of boat or vessel, weight of dredge, and size of the rope. In very deep water several hundred pounds are sometimes used, attached several hundred feet from the dredge. The size and weight of the dredges vary greatly, according to the depth of water, size of the vessel employed, and means of hoisting.

A dredge suitable for use on board an ordinary sailboat or small steamer, when the hoisting is done by hand, which has done good service at all depths down to 430 fathoms, has the following dimensions: length of frame, 20 inches; width across back, 8 inches; across front or outer edge of the scrapers, 9 inches; length of arms, 14 inches; width of sides or scrapers, 2.5 inches; thickness of scrapers at back, .5 of an inch; holes for attachment of net, 1 inch apart; the ends of the dredge-frame are of five-eighth-inch round iron; the arms, half-inch round iron. All parts should be of the strongest bar iron. The net for the dredge just described is of stout twine, three feet deep, and just large enough at the mouth to go around the outside of the dredge-frame without stretching. Its meshes are a quarter of an inch on the sides of the net, but smaller towards the end. The outer bag is of stout canvas, and a little longer than the inner one. The drag-rope is of the best hemp, 1.75 inches in circumference. For shallow water a smaller rope would do, especially if used with a sailboat; and manila rope can also be used, though it is not so suitable for deep water, on account of its buoyancy and greater liability to kink.

For the deep-sea dredging, and also for shallow water when large vessels are employed and steam-power used for hoisting, much larger and heavier dredges can be used. The English expedition on the Porcupine used a dredge with a frame 4 feet 6 inches long, and 6 inches wide at the back, weighing 225 pounds. Weights amounting to two hundredweight were attached to the drag-rope at 500 fathoms from the dredge. But Dr. Wyville Thomson, who had charge of the dredging in the deepest water (2435 fathoms), thinks that this dredge was too heavy.

In all cases the dredge must be drawn very slowly over the bottom, either by the "drifting" of the boat or vessel by the force of the tide, or by the wind without sails, or by an occasional turn of the wheels of a steamer. With a small boat or vessel, when there is but little wind or tide, a small amount of sail is often necessary.

The writer in 1871 introduced a new form of dredge, known as the "rake-dredge," for use on muddy and sandy bottoms to procure burrowing animals. This has two stout iron bars, each provided with several thin, sharp teeth, 6 or 8 inches long, arranged like those of a rake; these bars are bolted, back to back, to the lower ends of the side-pieces of a stout A-shaped iron frame; the drag-rope is attached to a ring at the apex of the A-shaped frame; following the rake, at the distance of two or three feet, is a large but light rectangular frame of half-inch round iron, a little larger than the rake; to this frame a net is attached, as to the frame of the ordinary dredge. This has been used very successfully for the special purposes for which it was designed.

The English deep-sea dredging expeditions introduced the use of "tangles" in connection with the dredge, and these proved to be very valuable adjuncts. The "tangles" consist of pieces of frayed-out hemp rope, a few feet long, tied together at one end, so as to form large brushes. They generally fastened these to the iron rod attached across the end of the dredge-bag, so that they dragged over the bottom behind the dredge, and caught up all objects having rough or spiny surfaces; but many of the objects thus caught had been already broken or injured by the dredge. The writer has devised some improved forms of the tangles, and used them successfully during the summer of 1871 and '72 in connection with the U. S. Fish Commission. In these the tangles were used independently of the dredge, and in the best form the frayed-out ropes were attached along several small iron chains, which were fastened by one end to an iron bar; and the latter was raised from the bottom by being bolted to the legs of the A-shaped frame already mentioned, at about a foot from the lower end of the side-pieces. This form of apparatus can be used on very rough and rocky bottoms, where the ordinary dredge cannot be safely employed. It is very useful for procuring star-fishes, echini, corals, sponges, etc., but cannot be depended upon for shells.

During the past twenty-five years dredging has been extensively carried on along nearly all parts of the European and North American coasts, and in many other parts of the world, in waters of moderate depth, or from the shore to 50 or 100 fathoms, and in some few regions down to 200 or 300 fathoms, or even somewhat more. But within the past five or six years these investigations of the life of the bottom have been carried on successfully at far greater depths, both on the American and European sides of the Atlantic Ocean. On the coast of Norway and at the Lofoden Islands extensive collections were made at depths between 250 and 450 fathoms by Dr. G. O. Sars, and in 1868 his father, Prof. M. Sars, published a list of 427 species of animals living at those depths. In the year 1867 extensive deep-sea dredgings were commenced by Mr. L. F. de Pourtales of the U. S. Coast Survey in the Gulf Stream between Florida and Cuba. The important results of this expedition were published in December, 1867. In 1868 and 1869 these investigations were continued in that region by Mr. de Pourtales with great success and very important results. In these explorations dredgings were made on several lines across the Straits of Florida, from the shores to the deepest waters, but seldom in more than 600 fathoms. Large collections, including many novelties, were made at all depths, and have been in part described in the publications of the Museum of Comparative Zoology. In 1868 the English government fitted out the steamer Lightning, under the scientific direction of Dr. William B. Carpenter and Dr. Wyville Thomson, for the purpose of deep-sea dredging. They dredged between Scotland and the Faröe Islands, and to the south-west of those islands, at various depths down to 650 fathoms, with very interesting results, for life was found to be abundant at the greatest depths, and many new and remarkable forms were discovered. In 1869 the Porcupine was fitted out for the same service, and made three cruises—first, off the W.

coast of Ireland, under the scientific direction of Mr. Gwyn Jeffreys, during which dredgings were made down to 1470 fathoms; second, under Dr. Thomson, off the S. W. of Ireland to a point off the Bay of Biscay, where dredgings were made in 2090 and 2435 fathoms; third, under Dr. Carpenter, between the Faröe Islands and the Shetland Islands, and N. of Scotland, where numerous dredgings were made at various depths to 767 fathoms. Large numbers of animals were obtained in all these dredgings, many of them new and remarkable. In 1870 the same vessel made a cruise to the Straits of Gibraltar under the scientific direction of Mr. Jeffreys, which was afterwards continued in the Mediterranean under Dr. Carpenter. On the first part of this cruise dredgings were carried down to 1095 fathoms off the coast of Portugal, and in the Mediterranean to 1412 fathoms. In 1870, Mr. Marshall Hall dredged in deep water off the coasts of Spain and Portugal in his yacht Norna, with valuable results. In 1869, Dr. F. A. Smitt and Dr. A. Ljungman, naturalist of the Swedish frigate Josephine, dredged at many localities on both sides of the Atlantic, and especially off the Azores, and made important discoveries. In 1871–72 the late Dr. William Stimson dredged in the Gulf of Mexico on board the U. S. Coast Survey steamer Bache, and in 1872, Mr. S. I. Smith and O. Harger, on board the same steamer, made the deepest dredgings yet accomplished off the northern coast of the U. S. This was in 430 fathoms, off St. George's Bank. In 1871–72, Mr. J. F. Whiteaves dredged in the deepest parts of the Gulf of St. Lawrence down to 310 fathoms, and made some interesting discoveries. Other dredgings have also been made in deep water within two or three years past, of which the results have not yet been published. In fresh-water lakes comparatively little dredging has been done. The most important are the dredgings in Lake Michigan by Dr. William Stimson and others in 1870, and those in Lake Superior accomplished by Mr. S. I. Smith in 1871, in connection with the U. S. Lake Survey, on the steamer Search. Mr. Smith made numerous dredgings from shallow water down to 169 fathoms, which is the deepest water in the lake. Numerous interesting animals, mostly of small size, were found at all depths. Much more work of this kind should be done in our great lakes, as well as on our coasts. (See DREDGING, by GEN. Q. A. GILLMORE, U. S. A.)

A. E. VERRILL.

Deep-Sea Soundings. It is difficult to define precisely what is to be understood by the expression "deep-sea soundings." There are places in the ocean very near to the most frequented shores, like the Gulf Stream off Cape Hatteras, where it has been found difficult, if not impracticable, to determine the depth of the water with certainty, owing to the rapidity of the current, combined with the great depth; or the same stream within a few miles of the N. shore of Cuba, where the depth of less than 1000 fathoms, combined with the strength of the current, for a long time baffled the skill of the best officers of the American navy in their efforts to obtain a section across the straits between Cuba and Key West. And on the other hand, there are areas extending hundreds of miles seaward from the coasts of continents, like the plateau off the coast of Ireland, where the depth hardly exceeds 500 fathoms, and soundings are so easily made that they would be classed in hydrographic work as "off-shore soundings." Other portions of the sea-bed, again, deepen gradually from the shores outward, and it would be difficult to say where off-shore soundings end and *deep-sea soundings* begin.

The precise definition is of little importance, however, at the present time; but it may be said that in the early attempts to determine depths of the ocean out of sight of land a depth of 1000 fathoms (or 6000 feet) was considered a deep-sea sounding. It is believed that there is no record of any successful effort having been made to determine depths greater than 1000 fathoms previous to that of Capt. James Ross in the year 1840. Up to that time navigators had been engrossed in geographical explorations, and had contented themselves with regarding the ocean as practically unfathomable beyond a very narrow belt along the shores of continents. Capt. James Ross of the English navy was the first explorer who dispelled this idea by a successful effort to sound in what was evidently very deep water. In the year 1840, while off the western coast of Africa, he prepared several miles of sounding-line upon a reel, and having attached a weight of 540 pounds to the end of the line, this weight was allowed to descend to the bottom of the sea. A sudden cessation of the descending motion indicated that the bottom was reached, and it was found that the length of line run out was 2677 fathoms. In a subsequent attempt during the same voyage 4000 fathoms of line were run out without finding bottom, and the line finally broke. The first sounding was doubtless as nearly correct as most of the soundings since made at the same depth by other explorers.

Another attempt made in 1843 by officers of the English navy, in the Southern Ocean, proved a failure, no bottom having been reached with 4000 fathoms of line out. In 1847 another sounding was made by Capt. Stanley, midway between the coasts of Africa and South America, bottom having been reported at 2600 fathoms, but the result was doubtful.

These are the only recorded soundings made by the English navy before the problem was taken up by the American navy. In 1843, Lieut.-Commander (now Admiral) Davis, who was then attached to the U. S. Coast Survey, made several successful soundings off Block Island, in water a little less than 2000 fathoms' depth. A cup for bringing up specimens of the bottom was attached to the lead, and for the first time a portion of the deep-sea mud was brought to light from these depths. Deep-sea explorations became from that time invested with a special interest, from the discovery of the existence of animal life or the remains of minute animals in every specimen of the bottom brought to the surface.

During a period of ten years subsequent to the explorations of Commander Davis, deep-sea soundings were continued off the Atlantic coast by officers of the U. S. navy under the direction of Prof. Bache, superintendent of the U. S. Coast Survey, in a series of sections run perpendicular to the coast, made with a view of tracing the form of the bottom along the course of the Gulf Stream. The temperature of the waters of the Gulf Stream, taken beneath the surface at various depths, indicated, by successive bands of cool and warm water, the probable existence of submarine ranges of mountains having courses coincident with these bands, and the sections determined confirmed this idea wherever the depths could be determined. During the progress of these explorations the U. S. navy department, through the efforts of Lieut. Maury, undertook an extensive series of deep-sea soundings in various parts of the Atlantic, but as the observations were scattered and not confined to systematic lines, and were, moreover, made by a method which had in it great elements of uncertainty, the results, so far as the extension of exact knowledge in regard to the form of the ocean-bed was concerned, were very meagre. The explorations, however, served to prepare for this kind of service officers who subsequently did important work. Among these was Lieut. Berryman, who afterwards ran the first line of soundings across the Northern Atlantic Ocean. The invention of the apparatus for detaching the heavy lead at the bottom, thus enabling a small line to be used for bringing up specimens of the bottom, was also one of the fruits of these explorations. Brooke's lead, or detaching apparatus, became, both in the American and in foreign explorations, the most important feature of sounding-instruments.

The first lines of sounding which were carried across the Atlantic were run by Lieut. Berryman of the U. S. navy, for the purpose of ascertaining the practicability of laying a submarine cable. Upon the favorable report of his soundings it was determined definitely to undertake this work. Lieut. Berryman was followed in this field of exploration by Lieut. Dayman of the royal navy, whose results were confirmatory of those of Lieut. Berryman.

The depths obtained by both these officers appeared, however, to have large probable errors, and the small number of observations made for so long a line rendered it impossible to construct a profile of the bottom of positive accuracy. The actual laying of the telegraph cables furnished the only convincing and satisfactory evidence of the existence of the conditions favorable to such an enterprise.

After the laying of the Atlantic cable the English admiralty took up the question of deep-sea explorations in a thorough manner, and the field seems to have been abandoned by the American navy altogether.

Under the English admiralty the Mediterranean Sea has been explored; several new lines have been run across the North Atlantic; the banks off the coast of Ireland have been mapped out; lines have been run and submarine telegraphs established eastward from the Red Sea to China; and more recently a line of soundings has been carried from the Cape of Good Hope through the midst of the Southern Atlantic northward to the English Channel.

All these results, however, constitute only a beginning of the work of deep-sea explorations. The deepest parts of the ocean have probably not been sounded, and there are not yet sufficient results to determine with any degree of certainty the features of any considerable portion of the bottom of the sea. The general features, as thus far determined, seem to be as follows: The North Atlantic is a comparatively shallow basin, having, however, a deep valley or depression on the W. from Baffin's Bay southward. Near Cape Sable, and within thirty miles of it, the depth is nearly 3000 fathoms. How far this deep valley continues towards the tropics is not known. On the E. side a deep valley is also found extending from the latitude of the

British Channel to the tropics. Between these two great depressions the North Atlantic presents depths considerably less, and irregularities have been detected which indicate that the configuration of the bottom presents features corresponding to those of the surfaces of continents. The South Atlantic basin has not been explored.

In the Indian Ocean, along the lines of the telegraph across the Persian Gulf and Bay of Bengal, the depths increase gradually from the shores to a little over 2000 fathoms along both lines—one from the Malay Peninsula to Hindostan, and the other from Hindostan to the Red Sea.

In the vicinity of the equator, in the South Atlantic Ocean, Capt. Shortland found a plateau extending about 3000 miles in a N. and S. direction, on which are found the islands of St. Paul, Ascension, and the other well-known islands of this region. The depth on this plateau is about 1500 fathoms. Its extent in an E. and W. direction is not known. The Southern and Pacific oceans have not been explored.

In no instance yet recorded has a depth been reached exceeding 3000 fathoms, but this is to be considered as owing to the failure of attempts made in greater depths, and is not to be taken as evidence that no greater depths exist. It is presumed, on the contrary, by those who have given attention to the subject, that vastly greater depths are of frequent occurrence in many parts of the sea.

Methods of Sounding.—In ordinary depths the process of sounding is to attach a "lead" to the end of a small line, drop the lead into the sea, and allow it to sink to the bottom, the line being drawn down after the lead. If there is no current in the water nor drifting of the vessel or boat, and if the instant when the lead strikes the bottom can be distinctly noted, the length of line paid out will indicate the depth. As the depth increases, however, the friction of the line in the water becomes a strong resistance, requiring a very heavy lead to impart any considerable velocity to the descending plummet and line. This circumstance doubtless prevented the earlier attempts to sound from being successful.

Capt. Ross, in his first deep-sea sounding, employed a quarter of a ton weight as a sinker. A new difficulty, however, presented itself—namely, the difficulty of noting the instant when the weight struck bottom. In water nearly 3000 fathoms deep, whatever be the amount of the sinking weight, the downward motion became very slow, and it was only by noting the rate of descent by a watch that the instant the weight struck bottom was noted. It became customary afterwards, in all deep soundings, to note the time of running out of each successive 100 fathoms of line, and when the rate of descent became irregular or indeterminate it was taken for granted that the bottom was reached.

This practice introduced a delusive test of reaching bottom, which rendered useless many subsequent laborious and earnest efforts. It was not until Davis introduced the practice of bringing up specimens of the bottom, and Brooke invented his detaching apparatus, that any element of certainty attended deep-sea explorations.

There still remained two great difficulties to contend with—the drifting of the vessel from which soundings were taken, and the currents of the sea. Both of these occurrences rendered the measurements inaccurate, and in extreme cases, such as the rapid flow of the Gulf Stream along the coast of America, this method proved a failure. Many attempts have been made to sound the Gulf Stream N. of Cape Hatteras, but thus far without success.

Lieut. Walsh and Commander Wainwright used small wires for sounding-lines, but without advantage. At a certain depth the wire ran out of its own weight, and it was difficult to determine when the weight struck bottom. In the Gulf Stream the current carried away the line so rapidly that it was found impracticable to reach bottom.

The uncertainties and errors of these methods led to the invention of a recording apparatus, which was attached to the plummet in such a manner that the register, with the cup or tube for bringing up specimens of the bottom, was recovered, while the weight was detached and left at the bottom. The registers employed were generally revolving helices, which turned during the descent, the revolutions being recorded on wheel-work. Pressure-gauges were also tried, but owing to various causes of failure these devices have been generally abandoned. The revolving helices were found to require a constant velocity for perfect results, and the slowness of the motion at great depths caused an error in the recording. Pressure-gauges failed, mainly on account of the change of temperature and the very great pressure to which they were subjected.

The method still most commonly employed is that instituted by Capt. Ross, with the addition of Brooke's detaching apparatus. This method, however, has not thus far proved available for the deepest parts of the ocean. Among the devices which have been suggested for this difficult problem may be mentioned that of the late Mr. Sidney E. Morse, in which no line was to be employed. A pressure-gauge was to be carried to the bottom by weights; the weights becoming detached, the gauge and part of the apparatus with which it was connected were brought back to the surface by the buoyancy of hollow spheres of glass.

Another process, suggested by the writer of this article, may be termed the electric method. It consists in coiling a fine insulated wire within a hollow tube attached to the weight, the wire being paid out from the tube as the weight descends. There being no motion of the line in the water, friction is thus avoided, and the plummet will descend with a sensibly uniform velocity (or at least with a velocity which will vary according to a known law). By connecting the wire with a battery on board the vessel, and making the shock of the weight on the bottom "make" the galvanic circuit, the *time* of descent can be exactly determined. Knowing the *rate of descent* and the *time*, the depth can easily be ascertained. This device seems to be better calculated for reaching the depths which have not heretofore been reached than any other. It would not be necessary or advisable to attempt to recover the wire, but it would probably be less expensive to take a new wire at each cast. The time of making a deep sounding would thus be greatly shortened.

For further researches in determining depths of the ocean there is needed an apparatus which can be more frequently applied, so as to multiply soundings, and one which will attain the greatest depths with certainty of results.

WILLIAM P. TROWBRIDGE.

Deep Water, a township of Henry co., Mo. P. 2055.

Deer [etymologically related to the Gr. θήρ; Ger. *Thier*, a "beast"], the name given to ruminating quadrupeds with deciduous horns or antlers, which form the essential character of the Linnæan genus *Cervus*, to which all these animals belong. Deer are distinguished from other ruminants by the absence of a gall-bladder. The species of deer may be divided into two groups, of which one includes those with antlers more or less flattened; the other those with rounded antlers. The elk or moose (*Cervus alces*) is the most characteristic species of the first group, and forms the type of the genus *Alces* of modern systems. It sometimes exceeds the horse in bulk; has a short body, with a still shorter neck. In the lower jaw it has eight cutting teeth, none in the upper. The muzzle is long, broad, and overhangs the mouth like a square lapel; it is very muscular, and of service to the animal in gathering its food. The antlers of the elk appear first in the form of pointed stems; these are followed by a stem bearing a few short branches. At five years he puts up antlers in the form of a triangular plate, supported on a stem and notched along the outer margin. Subsequently this plate becomes more expanded, and the points between the notches are developed into long branches or *snags*, of which a single antler sometimes has as many as fourteen; and the pair will then weigh about fifty pounds.

The European fallow-deer (*Dama vulgaris*), called by the ancients *Platyceros*, is a species of deer belonging to the flat-horned group. The male is known as a *buck*, the female as a *doe*, and the young as a *fawn*.

The red-deer (*Cervus elaphus*) and the roebuck (*Capreolus capræa*) are European species, of which the stem of the antler shows a rounded form in section. The *hart* and *hind* are the male and female of the red-deer. The antlers are shed soon after pairing, and at this period the hart retires to the most unfrequented part of the grove. New antlers begin to grow very soon after the old ones are shed, and are completed in August. The skin which protects the vascular periosteum during the growth of the antlers now dries, and is rubbed off against any resisting object.

The roebuck (*Capreolus capræa*) is the smallest species of European deer; the male is monogamous, and the female brings forth two fawns. This deer is found in Asia and wild parts of Europe, such as the Scottish mountains. The common American deer (*Cariacus Virginianus*), called by the name of roebuck, jumping deer, etc., is about the size of the European fallow-deer, and resembles it in temper and character. Color, brown in summer, and gray-brown in winter; the fawns are spotted with white. Its food varies with the season; in winter, buds of shrubs; in spring and summer, grass, grain, berries, and the like. This species is now rare in New England. In the Alleghany Mountains, from Northern New York to Georgia, it is still common. In Texas, Florida, and Mexico it is abundant.

The mule-deer (*Cervus macrotis*) is between the common deer and the American elk in size. Its horns are round and twice forked; its ears long, giving its name from their resemblance to those of the mule. It is confined mostly to the eastern slope of the Rocky Mountains, from lat. 54° to 30°. The black-tailed deer (*Cervus Richardsonii*), some-

what larger than the common deer, but smaller than the mule-deer, is found in the Pacific States and Rocky Mountain region. The long-tailed deer (*Cervus leucurus*), so called on account of its long tail, which sometimes measures seventeen inches, is common on the Columbia River. The American elk or wapiti (*Cervus Canadensis*) is a large species resembling the European red-deer. It has tall branching horns, sometimes six feet high, which are shed in February or March. The animal is common in the North-western States. Its flesh is coarse, though the skins are much prized. Many other species of deer exist in South America, Africa, and especially in Asia and its islands. (See Reindeer, Caribou, Elk, and Moose.)

Revised by C. W. Greene.

Mule Deer.

Deer Creek, a post-township of Tazewell co., Ill. Pop. 763.

Deer Creek, a post-township of Carroll co., Ind. P. 3458.

Deer Creek, a township of Cass co., Ind. Pop. 1271.

Deer Creek, a township of Miami co., Ind. P. 1173.

Deer Creek, a township of Webster co., Ia. P. 266.

Deer Creek, a township of Allen co., Kan. P. 614.

Deer Creek, a township of Bates co., Mo. P. 1057.

Deer Creek, a township of Madison co., O. P. 823.

Deer Creek, a post-township of Pickaway co., O. Pop. 1458.

Deer Creek, a township of Mercer co., Pa. P. 579.

Deer Creek, a township of Outagamie co., Wis. Pop. 134.

Deer'field, a township of Fulton co., Ill. Pop. 907.

Deerfield, a post-township of Lake co., Ill. P. 1525.

Deerfield, a post-township of Chickasaw co., Ia. P. 599.

Deerfield, a township and post-village of Franklin co., Mass., on the Connecticut River R. R., 33 miles N. of Springfield. The township contains the important manufacturing village of South Deerfield. This township was the scene of several contests with the Indians in colonial times. Among these may be mentioned the "Bloody Brook massacre" (1675); and the burning of the village by the French and Indians under De Rouville (1703). Deerfield has many points of interest to the tourist: the North and South Sugar Loaf Mountains, the latter rising 500 feet from the plain, and affording from its summit a most beautiful view of Mounts Holyoke, Tom, and Mettawampe, with the fertile Connecticut Valley; Arthur's Seat in the N. W.; the village of Old Deerfield, with its wide streets finely shaded with elms; and Deerfield Meadows, celebrated for its fine crops of tobacco. Old Deerfield has a beautiful soldiers' monument, and there is at South Deerfield a marble monument commemorative of the Bloody Brook disaster. Deerfield has a very fertile soil, an academy, two high schools, six churches, and is the birthplace of many distinguished men. It was the favorite summer residence of the late Prof. Agassiz. Pop. 3632.

Deerfield, a township of Lapeer co., Mich. Pop. 419.

Deerfield, a township and post-village of Lenawee co., Mich., on the Lake Shore and Michigan Southern R. R., 60 miles S. W. of Detroit. Pop. 1234.

Deerfield, a township of Livingston co., Mich. Pop. 1128.

Deerfield, a township and village of Mecosta co., Mich., on the Chicago and Michigan R. R., about 15 miles S. of Big Rapids. Pop. 564.

Deerfield, a township of Van Buren co., Mich. Pop. 677.

Deerfield, a township and post-village of Steele co., Minn. Pop. 438.

Deerfield, a township and post-village of Vernon co., Mo., on the Missouri Kansas and Texas R. R., 288 miles W. S. W. of St. Louis. Pop. 506.

Deerfield, a post-township of Rockingham co., N. H. It has manufactures of lumber, tubs, pails, doors, sash and blinds, boots and shoes, etc. Pop. 1768.

Deerfield, a township of Cumberland co., N. J. Pop. 1518.

Deerfield, a post-township of Oneida co., N. Y. Pop. 2045.

Deerfield, a township of Morgan co., O. Pop. 981.

Deerfield, a post-township of Portage co., O. Pop. 1025.

Deerfield, a township of Ross co., O. Pop. 1223.

Deerfield, a township of Warren co., O. Pop. 1965.

Deerfield, a post-village of Warren co., O. Pop. 274.

Deerfield, a township of Tioga co., Pa. Pop. 665.

Deerfield, a township of Warren co., Pa. Pop. 2324.

Deerfield, a post-township of Dane co., Wis. P. 1040.

Deerfield, a township of Waushara co., Wis. P. 234.

Deer Grass (*Rhexia*), a genus of plants of the order Melastomaceæ. Eight species are natives of the U. S. They have brilliant rosy-purple flowers.

Deer'ing, a post-township of Hillsborough co., N. H. It has an academy and manufactures of boots, shoes, and lumber. Pop. 722.

Deer Island, an island of Charlotte co., New Brunswick, at the entrance to the Bay of Fundy, inhabited by fishermen and farmers. Pop. about 1000.

Deer Island, in the harbor of Boston, Mass., containing the city almshouse, a house of industry, and other charitable institutions. Pop. 1001.

Deer Isle, a post-township of Hancock co., Me. It includes Great and Little Deer Isles and Ile au Haut, besides smaller islands, and has important fisheries. Lobsters are here canned for market. By steamer it is 130 miles from Portland. There are four churches. P. 3414.

Deer Lodge, a county in the W. of Montana. Area, 11,732 square miles. Is drained by the sources of Clarke's River. The surface is mountainous. Gold is found here. There is considerable timber upon the mountains, and many of the valleys are exceedingly fertile, though generally requiring irrigation. Grain, hay, and dairy products are raised. Capital, Deer Lodge City. Pop. 4367.

Deer Lodge City, capital of the above county, situated on Deer Lodge River, in Deer Lodge Valley, is 45 miles N. of the Deer Lodge Pass. It has two weekly newspapers, a graded school, a national bank, a hospital in charge of the Sisters of Mercy, a Catholic and a Presbyterian church, and contains the Territorial penitentiary.

Kerley Smith, McQuaid & Co., Props. "Independent."

Deer'mouse, or **Jump'ing Mouse** (*Meriones*), a genus of rodents allied to the mouse and jerboa families, are natives of America. One species, the Labrador jumping mouse, is found far N. The Canada jumping mouse (*Meriones Canadensis*) is an active and beautiful animal, having long, slender hind legs and a very long tail. It can leap to the distance of four yards. It remains dormant during the winter.

Deer Park, a post-township of La Salle co., Ill. P. 894.

Deer Park, a township of Orange co., N. Y., 36 miles W. of Newburg. It is traversed by the Erie R. R., and contains the village of Port Jervis. Pop. 9387.

De Fac'to, a Latin legal phrase, signifies "in fact," "in reality," and is used to denote actual possession, however acquired. A person who usurps a throne to which he has no title is king *de facto*, but the legitimate claimant is king *de jure*, "of right." An officer *de facto* is one who performs the duties of an office with apparent rights and under claim and color of appointment to such office, but without being actually qualified by law to act as an officer.

Defamation. See LIBEL, by PROF. T. W. DWIGHT.

Default' [Fr. *défaut*, from *de*, intensive, and *faillir*, to "fail;" It. *diffalta*], in law, is, in a general sense, the omission of any act which a party ought to perform in order to entitle himself to a legal remedy. Such is, for example, non-appearance in court on a day assigned. If a plaintiff in an action make default, he is non-suited; if a defendant, judgment by default is passed against him. Judgment by default is not necessarily final.

Default'er, a person who fails to perform a public duty; an officeholder who embezzles public money, or fails to account for money entrusted to his keeping. His offence is called *defalcation*.

Defeas'ance [Norman Fr. *défesance*, from *de*, negative, and *faire*, to "do or perform"], in law, a collateral deed made at the same time with a deed of conveyance, containing conditions on the performance of which the estate thus created may be defeated; also a defeasance as to a bond or recognizance is a condition contained in or endorsed on the instrument, which when performed defeats it.

Defen'dant [Fr. *défendeur*], in law, the party against whom a claim is made in an action or suit. The rule is now held to be that in personal actions *ex contractu* the action is to be brought against the person who either expressly or implicitly made the contract; in personal actions *ex delicto*, against the person who either actually committed the injury or aided in committing it.

Defender of the Faith [Lat. *Fidei Defensor*], a title given Oct. 11, 1521, by Pope Leo X. to Henry VIII. of England, on the publication of his writings against Luther. When the king suppressed the monasteries and convents the pope recalled the title. It was, however, confirmed by Parliament in the thirty-fifth year of his reign, and has since been assumed by the sovereigns of England.

Def'erent [from the Lat. *defero*, to "carry away" (from *de*, "from," and *fero*, to "carry")], a term used in the Ptolemaic system of astronomy, according to which the planets move in small circular orbits, the centres of which are carried round in the circumference of other larger circles having the sun for their common centre. These principal circles are called the *deferents*, as carrying the orbits, those in which the planets move being called epicycles.

"Deferent nerves" are those which convey impressions from the brain to the periphery or to the muscles. They are otherwise called motor nerves. In point of fact, most nerves contain both deferent and afferent (or sensitive) filaments.

Deffand, du (MARIE DE VICHY-CHAMROUD), MARQUISE, a French literary lady, born in 1697. She was beautiful, witty, and accomplished, but was a skeptic and egotist. Her house in Paris was frequented by many eminent authors and statesmen. She corresponded with Voltaire, Horace Walpole, and D'Alembert, and wrote letters which are commended for style. Died Sept. 23, 1780.

Defiance, a county of Ohio, bordering on Indiana. Area, 414 square miles. It is intersected by the Maumee River, and partly drained by the Auglaize. The surface is nearly level; the soil is fertile. Lumber, dairy products, cattle, grain, tobacco, wool, and hay are staple productions. It is traversed by the Toledo Wabash and Western R. R. and the Wabash and Erie Canal. Capital, Defiance. Pop. 15,719.

Defiance, a post-village, capital of the above county, is on the Maumee River at the mouth of the Auglaize, and on the Toledo Wabash and Western R. R., 50 miles W. S. W. of Toledo. It has six churches, two weekly newspapers, and a national bank. Pop. 2750; of Defiance township, 3615.

Defi'cient Num'ber, in arithmetic, is one which exceeds the sum of its aliquot parts. Thus 8 is a deficient number, since the sum of its aliquot parts, 1, 2, 4, only amounts to 7.

Defilade [Fr. *défilade*, from the Lat. *de*, "away," and *filum*, a "line," referring to fortified lines]. Defilading, in fortification, is—1, so arranging the height of a work that the enemy cannot see into it; or, 2, so directing its faces that the enemy can neither enfilade them nor take them in reverse.

Defile [Fr. *défile*, etymologically related to DEFILADE (which see), in military language, a narrow place or passage through which troops can pass only in file or in a column with a narrow front. Wherever free lateral movement is obstructed is a defile. If the defile cannot be avoided without making a long circuit, it is called a "pass." *To defile* is to march off by file.

Definite Proportionals, in chemistry. See CHEMISTRY, by PROF. G. F. BARKER, M.D.

Defini'tion [Lat. *definitio*, from *de*, intensive, and *finio*, *finitum*, to "mark limits" (from *finis*, an "end," a "limit")] is a proposition explanatory of the meaning of a word; a setting forth of a thing by its properties. In logic, definition signifies "an expression which explains any term so as to *separate* it from everything else, as a boundary separates fields." (See LOGIC.) A good definition must be—1st. Adequate—that is, neither so narrow as to explain a part instead of the whole, nor so extensive as to explain the whole instead of a part. 2d. It should be clearer (*i. e.* be composed of ideas less complex) than the thing defined. 3d. It should be expressed in just a sufficient number of proper words. Metaphorical words are indefinite, and should not be used. (See FLEMING, "Vocabulary of Philosophy.")

Deflec'tion [Lat. *deflexio*, from *de*, "from" or "down," and *flecto*, *flexum*, to "bend"], in architecture, the change of form produced in a beam when its upper surface becomes depressed below its original level line, whether caused by an extraneous weight or merely by that of the unsupported portion of the beam itself. The laws which regulate the deflection of beams have been thus stated by Coulomb: 1. The deflection below the natural level is proportional to the weight; 2. The weight required to produce depression is proportional to the width of the bar, but in the ratio of the cube of the depth; 3. It is in the inverse ratio of the cube of the length.

DEFLECTION of a projectile is its perpendicular distance at any point of its flight, measured horizontally at that point, from a vertical plane passing through the prolongation of the axis of the piece from which it is fired.

DEFLECTION, in optics. See DIFFRACTION.

De Foe (DANIEL), an English writer, born in London in 1661, was a son of James Foe, a butcher and non-conformist. In 1685 he joined the rebellion of the duke of Monmouth, after whose defeat he became a tradesman. He produced in 1701 "The True-born Englishman," a satirical poem designed to vindicate King William III., and was very successful. In 1702 he wrote an ironical pamphlet entitled "The Shortest Way with Dissenters," for which the House of Commons punished him with the pillory, a fine, and imprisonment for two years. He advocated the principles of the Whigs and dissenters in several political works. In 1706 the ministers employed him as one of the staff of commissioners sent to Scotland to promote the union of the two countries. He published a "History of the Union" (1709). In 1713 he was again fined and imprisoned for one of his political writings. His most popular work is "The Adventures of Robinson Crusoe" (1719). He wrote, besides numerous other works, a "Journal of the Plague" (1722), "The Adventures of Roxana" (1724), and "Memoirs of a Cavalier," all of which produce a vivid impression of reality. He died April 24, 1731. He was a pithy and vigorous writer, distinguished for his versatility of mind and fertility of invention. (See W. HAZLITT, "Memoirs of De Foe," 1843; Sir WALTER SCOTT, "Life of De Foe," prefixed to De Foe's works; WILLIAM LEE, "Life of Daniel Defoe," 3 vols., 1869.)

De Forest (JOHN WILLIAM), an American author, born in Seymour, then part of Derby, Conn., Mar. 31, 1826. In his early life he spent two years in travelling in the Levant and four years in Europe. He is the author of "Oriental Sketches" and "European Acquaintances," light sketches of travels, and "Seacliff," "Miss Ravenel," "Overland," "Kate Beaumont," and "The Wetherel Affair," all novels. In the civil war he was three years in active service as captain of volunteers, was brevetted major, and commanded a Freedman's Bureau district three years more, and afterwards resided in New Haven.

Def'ter-Dar (literally, "bookkeeper"), the title given

by the Turks to the minister of finance, who sits in the divan and disposes of all the public money. The title is of Persian origin, and is conferred upon certain officials in that country.

De'ger (Ernst), a German historical painter of the Düsseldorf school, was born near Hildesheim in 1809. He became a professor of fine arts at Munich.

Deg'gendorf, a town of Lower Bavaria, on the Danube, 28 miles N. W. of Passau. The town has a considerable trade in wood, etc. Pop. in 1871, 5452.

Dego'nia, a township of Jackson co., Ill. Pop. 470.

De Graff, a post-village of Miami township, Logan co., O. It is on the Cleveland Columbus Cincinnati and Indianapolis R. R., 9 miles S. W. of Bellefontaine. It has one weekly newspaper. Pop. 624.

Degree' [from the Lat. *de*, "intensive," and *gradus*, a "step" or "degree"], the 360th part of the circumference of a circle. (See below, Degree in Trigonometry.)

Degree in Algebra, the magnitude of the greatest sum that can be formed by adding together the exponents of the facients or variables which occur in any single term of an equation or expression. The terms *degree* and *order* are frequently used synonymously in algebra, but have distinct meanings when applied to differential equations.

Degree in Trigonometry is the angle subtended at the centre of any circle by an arc equal to the 360th part of its circumference; it is the 90th part of a right angle. A degree is subdivided into sixty minutes, and each minute into sixty seconds. The notation employed for an angle of six degrees fifty-two minutes and sixteen seconds is 6° 52′ 16″. The above division of the circle is of very remote origin. It is not certainly known what gave occasion to the adoption of the arbitrary number 360, but it probably had reference to the space described by the sun in one day in performing his annual revolution in the ecliptic, the number 360 being taken instead of 365, as being more convenient for arithmetical operations on account of its containing a great number of divisors. The Chinese divide the circle into 365¼ equal parts, so that the sun describes daily an arc of one Chinese degree. An attempt was made by the French philosophers, at the period of the Revolution, to introduce into works of science a division of the circle better adapted to our decimal arithmetic (the quadrant or right angle being divided into 100 degrees, the degrees into 100 minutes, etc.); but though the system was adopted by some writers of the first order of merit (as by Laplace in the "Mécanique Céleste"), and extensive tables were computed for the purposes of astronomical calculations, it never came into general use. A division of this sort was recommended long ago by some of the most eminent mathematicians. (See F. A. P. Barnard, "Metric System," 1872, pp. 84–86.)

Degree, as a Scholastic Distinction, is the grade or rank to which scholars are admitted, in recognition of their attainments, by a college or university. Collegiate degrees, *in course*, are given, or should be given, only upon examination. *Honorary* degrees are sometimes conferred without examination. The pope and the archbishop of Canterbury also confer scholastic degrees, especially the doctorate. (See Arts, Degrees in.)

Degree in Music, one of the small intervals of which the concords or harmonical intervals are composed; the difference of position or elevation of the notes on the lines and spaces. When notes are on the same line or space, they are on the same degree, even though one of the notes should be raised by a sharp or lowered by a flat.

Degrees of Latitude and Longitude. The distance from the equator to the poles, along a meridian, is called *latitude*, or width; the distance from an assumed prime meridian, along a parallel, in the direction of the earth's rotation, is called *longitude*, or length. These expressions have been handed down to us by the ancients, who used them because the world known to them was really more extensive, or long, from east to west, than wide, from north to south. The degrees of latitude are counted from the equator as zero, both north and south, making ninety degrees each way to the poles. It would be most desirable that all civilized nations should also agree on a prime meridian from which the degrees of longitude should be uniformly counted; but it is not so. The English count 180 degrees east and 180 degrees west from the meridian passing through their national observatory at Greenwich, near London; the French start from the meridian of their observatory at Paris; the Germans often take the meridian of Ferro, the most western of the Canary Islands, because it leaves all the lands of the Old World to the east, and those of the New World to the west; the Americans often use the meridian of the National Observatory at Washington. Therefore, when the longitude of a place is mentioned, the prime meridian from which it is reckoned must be indicated. The seafaring nations mostly use Greenwich longitude; the nations on the continent of Europe, Paris and Ferro.

The relative position of these prime meridians is such that, Paris being zero, Greenwich is 2° 20′ 22″ W., and Ferro is assumed to be 20° W. from the Paris meridian. Washington is 79° 23′ 28″ W. from Paris, and 77° 3′ 6″ from Greenwich. The latitude and longitude of a point being known, it is evident that its true position on the surface of the globe is fully determined.

The meridians being all great circles, the length of their degrees, or of the degrees of latitude, is about uniform; they only show slight elongation towards the poles, due to the polar compression. But the degrees of the parallels which mark the longitudes are rapidly decreasing with the circumference of the circles from the equator to the poles, as shown in the following table:

Length of Degrees of Longitude in Different Latitudes, in English Miles.

Degrees of latitude.	Length of degrees.	Circumf. of parallel.	Degrees of latitude.	Length of degrees.	Circumf. of parallel.
Equator	69.16	24,899	50°	45.55	16,037
5°	68.90	24,805	55	39.76	14,314
10	68.12	24,523	60	34.67	12,482
15	66.82	24,056	65	29.31	10,553
20	65.02	23,407	70	23.73	8,542
25	62.72	22,580	75	17.96	6,466
30	59.95	21,581	80	12.05	4,339
35	56.72	20,419	85	6.84	2,464
40	53.06	19,101	90	0.00	Pole.
45	48.99	17,636			

The length of a minute of a degree of the equator is called a *geographical* mile, of which, therefore, there are sixty in one degree. This is the same as the nautical mile, used by all mariners in computing distances at sea. One degree of the equator contains 69.16 English statute miles.

Finding the Difference of Longitude between Two Places.—As the earth revolves on its axis, each meridian is carried over 360 degrees in twenty-four hours, or 1440 minutes, and over one degree in four minutes, whatever be the length of the degree. The difference in longitude of two places can therefore be expressed by the difference in time of their meridians. That difference of four minutes for each degree is uniformly the same in all latitudes. A traveller going westward one degree of longitude with a good watch, will find it four minutes ahead of the time of the place; when travelling eastward, four minutes behind. When leaving New York, for example, and arriving at London, if we find the watch to be four hours and fifty-six minutes, or 296 minutes, behind the London—or, rather, the Greenwich—time, we conclude that the difference of longitude between the two places is $\frac{296}{4}$, or 74 degrees. Leaving New York for the Pacific coast, if we find that the time-keeper, which brings the true time of that place, marks 3h. 14m. P. M. when it is noon at San Francisco, we again conclude that the difference of longitude between the two places is 194 minutes of time, which, divided by 4, makes 48° 30′ W. of New York, and 122° 30′ W. from Greenwich.

Arnold Guyot.

De Grey, Earl. See Ripon, Marquis of.

De Haas (Maurice F. H.), born at Rotterdam, in the Netherlands, about 1830, was a pupil of Louis Meyer and other eminent artists. He gave much attention to marine painting, in which he early acquired distinction. In 1857 he was appointed artist to the Dutch navy. In 1859 he came to New York, where he has since occupied a high position as a painter. Most of his earlier pictures are from the British Channel and French coast, and are marked by vigorous and effective drawing and by fidelity to nature. His "Farragut passing the Forts" is his best-known American work.

De Ha'ven (Edwin J.), an American naval officer, born in Philadelphia in 1819. He conducted an expedition sent from New York in search of Sir John Franklin in 1850. Died in Philadelphia May 9, 1865.

De'i Grat'ia, a Latin formula, signifying "by the grace (or favor) of God," originally used by the clergy, but afterwards inserted in the ceremonial description of the title of a sovereign.

De'ists [from the Lat. *Deus*, "God"], a name assumed in France and Italy about the middle of the sixteenth century by those who acknowledged the existence of a God, but rejected the Bible. Among the earliest advocates of these opinions in England was Lord Herbert of Cherbury, whose work, "De Veritate," was published at Paris in 1624. Hobbes, Blount, Bolingbroke, Shaftesbury, Hume, Toland, and Anthony Collins are among the principal English deistical writers. As several of the early deists (including Bolingbroke) were men of more than doubtful

moral character, the word came to be used in an unfavorable sense, not implied in the etymology of the word (signifying simply a "believer in God"), and a sense which does not attach to the term *theist*, which originally meant the same. (See LECHLER, "Geschichte des Englischen Deismus," 1841.) In France deistical views were advocated by many of the prominent free-thinkers, and in Germany by a large number of rationalists. The term theist, which etymologically means the same, has now an entirely different meaning. (See FREE-THINKERS, by REV. O. B. FROTHINGHAM.)

Dejani'ra, or **Deianeira** [Gr. Δηϊάνειρα or Δηάνειρα], in Greek mythology, a daughter of Œneus, king of Ætolia, was the wife of Hercules. She preserved some blood of the centaur Nessus as a love-charm, and saturated with it a tunic of Hercules, who was poisoned by it.

De Jure, "of right." See DE FACTO.

De Kalb, a county in the N. E. of Alabama. Area, 750 square miles. It is drained by Wills Creek and Town Creek. It is partly occupied by Lookout Mountain and Sand Mountain, between which is a long and fertile valley. Grain, tobacco, cotton, and wool are raised. It is intersected by the Alabama and Chattanooga R. R. Bituminous coal is mined. Capital, Lebanon. Pop. 7126.

De Kalb, a county in N. W. Central Georgia. Area, 350 square miles. It is bounded on the N. by Chattahoochee River. The surface is undulating. A granite rock rises in this county about 2200 feet above the sea. Corn, cotton, wool, and tobacco are raised. It is intersected by the Georgia R. R. Capital, Decatur. Pop. 10,014.

De Kalb, a county in the N. of Illinois. Area, 648 square miles. It is drained by Sycamore and Indian creeks. The surface is undulating; the soil fertile. The greater part of it is prairie. Butter, cheese, cattle, grain, wool, and hay are largely raised. There are manufactures of carriages, wagons, etc. It is intersected by the Chicago and North-western and Chicago and Iowa R. Rs. Capital, Sycamore. Pop. 23,265.

De Kalb, a county of Indiana, bordering on Ohio. Area, 346 square miles. It is drained by the St. Joseph's River, a branch of the Maumee. The soil is fertile. Cattle, dairy products, lumber, wool, hay, and grain are the chief staples. It is intersected by the Fort Wayne Jackson and Saginaw R. R., and the Lake Shore and Michigan Southern R. R. Capital, Auburn. Pop. 17,167.

De Kalb, a county in the N. W. of Missouri. Area, 440 square miles. It is drained by several small affluents of the Platte, and by Blue Creek, an affluent of Grand River. The surface is diversified by prairies and forests; the soil is productive. Cattle, grain, tobacco, and wool are raised. Capital, Maysville. Pop. 9858.

De Kalb, a county of Middle Tennessee. Area, 300 square miles. It is intersected by Caney Fork, an affluent of the Cumberland River. The soil is fertile. Cattle, grain, tobacco, and wool are raised. Capital, Smithville. Pop. 11,425.

De Kalb, a township of Grant co., Ark. Pop. 529.

De Kalb, a township and village of De Kalb co., Ill., on the Chicago and North-western R. R., 58 miles W. of Chicago. It has a graded school, one weekly newspaper, and an artesian well. P. 2164. L. H. POST, ED. "NEWS."

De Kalb, a post-village, capital of Kemper co., Miss.

De Kalb, a post-village and township of St. Lawrence co., N. Y., on the Rome Watertown and Ogdensburg R. R., at the junction of branches from Potsdam and Ogdensburg. The town has five churches, extensive dairies, and manufactures of lime. Pop. 3116.

De Kalb, a township of Kershaw co., S. C. Pop. 2578.

De Kalb, a township of Scott co., Va. Pop. 1975.

De Kalb, a township of Gilmer co., West Va. Pop. 848.

De Kalb (JOHN), BARON, a German general, born in Bavaria June 29, 1721, served first in the French army. He came to the U. S. with La Fayette in 1777, and was appointed a major-general by Congress in the same year. He served under Washington in Pennsylvania and New Jersey until the spring of 1780, and then became the second in command in the army of Gen. Gates. He was mortally wounded at the battle of Camden, S. C., and died Aug. 19, 1780. (See KAPP, "Leben des Amerikan. Generals, Joh. Kalb," 1862.).

De Kay (JAMES E.), M. D., an eminent zoologist, born in New York in 1792, published, besides other works, "Sketches of Turkey," and 5 vols. 4to on the existing fauna in the "Report of the New York State Survey" (1842). Died Nov. 21, 1851.

Dekor'ra, a post-township of Columbia co., Wis. Pop. 1397.

Del (*Artocarpus pubescens*), a tree of the same genus as the bread-fruit, is indigenous in the forests of Ceylon, and is valuable for its timber, which is used as a material for houses and for ships.

De la Beche (Sir HENRY THOMAS), F. R. S., an English geologist, born near London in 1796. Among his works are a "Geological Manual" (1832) and the "Geological Observer" (1851). Died April 13, 1855.

Delacroix (FERDINAND VICTOR EUGÈNE), an eminent French historical painter, born at Charenton, near Paris, April 26, 1799. He was a pupil of P. Guèrin, but did not adopt his classical style. In 1822 he produced a picture of "Dante and Virgil," which attracted much attention. His "Massacre of Scio" (1824) was generally admired. He soon became recognized as the chief of the romantic school, and displayed remarkable versatility of talent on a great variety of subjects. Among his best works are "Mephistopheles appearing to Faust" (1827), "The Death of Sardanapalus" (1827), "The Women of Algiers" (1834), "The Prisoner of Chillon" (1835), "Medea" (1838), "The Death of Marcus Aurelius" (1845), and "The Farewell of Romeo and Juliet" (1846). He was admitted into the Institute in 1857. He has a high reputation as a colorist, but he does not excel in correctness of drawing. Died at Paris Aug. 13, 1863. (THÉO. SILVESTRE, "Histoire des Artistes Vivants," Paris, 1856; "Catalogue raisonné de l'œuvre d'Eugène Delacroix," par M. A. MOREAU, Paris, 1873.)

Del'afield, a post-twp. of Waukesha co., Wis. P. 1364.

Delafield (RICHARD), an American officer, born Sept. 1, 1798, in New York City, graduated at West Point in 1818, chief of engineers April 22, 1864, with the rank of brigadier-general. He served on the northern boundary survey of the U. S. under the treaty of Ghent 1818; in building fortifications, improvement of rivers and harbors, constructing roads and canals, 1819–38 and 1846–64; as superintendent of the Military Academy 1838–45 and 1856–61; as member of boards of engineers 1845–64; as president of military commission to the Crimea and theatre of war in Europe 1854–56 (report thereon published by Congress 1860); on the staff of Gov. Morgan of New York to reorganize and equip State forces for service in the civil war 1861–63; in command of corps of engineers and in charge of engineer bureau, Washington, D. C., 1864–66; as inspector of Military Academy 1864–66; as member of lighthouse board and of commission for the improvement of Boston harbor 1864–70; and as regent of Smithsonian Institution 1865–70. Brevet major-general U. S. A. Mar. 13, 1865, for faithful, meritorious, and distinguished service in the engineer department; and retired from active service Aug. 8, 1866. Died Nov. 5, 1873.

GEORGE W. CULLUM, U. S. A.

Dela'goa Bay (*i. e.* "water bay"), an inlet of the Indian Ocean, in South-eastern Africa, is 55 miles long and about 20 miles wide. It is about lat. 26° S. and lon. 33° E. The shores are flat, marshy, and unhealthy, but the bay is commodious and safe. It is visited by many whaling-ships. Several rivers, one of which is the Delagoa, enter this bay.

Delambre (JEAN BAPTIST JOSEPH), a French astronomer, born at Amiens Sept. 29, 1749, studied under Lalande. He produced "Tables of the Orbit of Uranus" in 1790, and in 1792 "Tables of Jupiter's Satellites." In the service of the government, Delambre and Méchain spent about seven years (1792–99) in the measurement of the arc of the meridian from Dunkirk to Barcelona. Delambre published the result of this operation in his "Base du Système Métrique Decimal" (1806–10). He was admitted into the Institute in 1795, became perpetual secretary of the Academy of Sciences in 1803, and professor of astronomy in the College of France in 1807. Among his numerous and able works are "Theoretical and Practical Astronomy" (1814), a "History of Ancient Astronomy" (1817), a "History of Mediæval Astronomy" (1819), and a "History of Modern Astronomy" (1821). Died Aug. 19, 1822. (See FOURIER, "Éloge de Delambre.")

De Lan'cey (JAMES), an American jurist, born in New York in 1703, was the son of a Huguenot from Normandy. He was educated at Cambridge, England, returned to New York in 1729, became a justice in the supreme court of the province, and in 1733 its chief-justice. He was one of the founders of King's (now Columbia) College, and was lieutenant-governor for several years. Died Aug. 2, 1760. He was a man of great talents, wealth, and learning, but is said to have been unprincipled and intriguing. Several members of the De Lancey family were prominent and bitter Tories during the Revolutionary war, but they were generally men of remarkable talents.

De Lancey (WILLIAM HEATHCOTE), D. D., LL.D., D. C. L. OXON., a Protestant Episcopalian bishop, born at

Mamaroneck, N. Y., Oct. 8, 1797, graduated at Yale in 1817, was ordained deacon in 1819, priest in 1822, was provost of the University of Pennsylvania (1825–30), and was consecrated bishop of Western New York in 1839. Died at Geneva, N. Y., April 5, 1865.

Dela'ney (Patrick), an Anglican theologian, born in Ireland in 1686, was educated at Dublin University. He published (1732–36) a work entitled "Revelation Examined with Candor," a treatise which is still highly valued. Some of his other works, among which is a "Life of David" (1740), exhibit learning and ingenuity, without great excellence in other respects. Died in 1768.

Delangle (Claude Alphonse), a French statesman, born at Varzy April 6, 1797, was advocate-general at the court of cassation from 1840 to 1846. In Dec., 1852, he became first president of the imperial court of justice, later was made a senator, was minister of the interior in 1858, minister of justice (1859 to 1863), and became in 1863 vice-president of the senate. Died in Paris Dec. 26, 1869.

Del'ano, a township of Humboldt co., Ia. Pop. 145.

Delano, a post-village of Wright co., Minn., on the St. Paul and Pacific R. R., 40 miles W. by N. of St. Paul. It has one weekly newspaper.

Delano (Columbus), an American lawyer, born in Shoreham, Vt., in 1809, removed in his early youth to Ohio. He practised law with distinction, and was chosen a member of Congress in 1844. Having joined the Republican party, he was again elected to Congress in 1864. He became commissioner of internal revenue in Mar., 1869, and secretary of the interior in the cabinet of General Grant in Oct., 1870.

Delan'ti, a village of Stockton township, Chautauqua co., N. Y., has three churches and some manufactures. Pop. 245.

Delaroche (Paul), a French historical painter, the chief of the modern eclectic school, was born in Paris July 17, 1797. He was a pupil of Baron Gros, and adopted a style by which he endeavored to unite the dignity of the classic with the picturesqueness of the romantic school. In 1824 he exhibited "Joan of Arc Interrogated in Prison." His reputation was increased by the "Death of Queen Elizabeth" (1827) and "The Children of Edward IV. in the Tower of London" (1831). He was admitted into the Institute in 1832, and married a daughter of Horace Vernet. Among his masterpieces are "Cromwell Gazing on the Corpse of Charles I." (1832), "Napoleon at Saint-Bernard" (1850), and "The Girondists in Prison" (1855). He adorned the semicircular saloon of the Palais des Beaux-Arts with an admirable composition, which represents the artists of all ages, and contains about seventy figures. Died Nov. 4, 1856.

De la Rue (Warren), Ph. D., F. R. S., an English physicist and inventor, born about 1815, was educated in Paris, and afterwards followed his father's employment as wholesale stationer and manufacturer of card-paper. He has invented processes for photographing the heavenly bodies, improvements in color-printing, in envelope-folding machines, in oil-refining, etc., and has published important reports of original observations in chemistry, astronomy, and physics.

Dela'tor (plu. **Delato'res**), [from the Lat. *defero, delatum*, to "carry off"], a Latin word, literally meaning "carrier," came to be applied to the carriers of evil reports, informers, or public spies. Under the Roman emperors the delatores were a class of men who gained their living by informing against their fellow-citizens. They constantly brought false charges forward to gratify the jealousy or avarice of the different emperors, and were generally paid according to the apparent consequence of the information they gave, although in some cases the law specified the sums which were to be given to informers. Thus, if a murder had been committed in a family, and any slaves ran away before inquest (*quæstio*) had been made, whoever apprehended such slaves received for each one so apprehended five pieces of gold from the estate of the deceased, or, if the estate could not pay it, the government gave the reward. At various times attempts were made to regulate the pay of public spies and informers, who at last became so numerous, and gave rise to so much trouble in society, that the emperors were obliged to expel and variously punish great numbers of them.

Delaunay (Charles Eugène), F. R. S. L., a French mathematician and astronomer, born April 9, 1816, was educated at the Polytechnic School, where he graduated in 1836 with the highest honors. He was subsequently appointed principal engineer of mines of the first class, and professor of mechanics in the Polytechnic School and in the Faculty of Sciences. He was also an officer of the Legion of Honor, a member of the Institute, and was the recipient of numerous native and foreign honors and distinctions. He became a member of the Academy in 1855, of the bureau of longitude in 1862, and director of the Parisian Observatory in 1870. He has written, among other works, "Traité de Mécanique Rationelle" (3d ed. 1862), "Théorie de la Lune" (1866), "Rapport sur le Progrès de l'Astronomie" (1867). He was drowned at Cherbourg Aug. 5, 1872.

Del'avan, a post-village of Tazewell co., Ill., on the Chicago and Alton R. R. and the Pekin branch of the Toledo Wabash and Western R. R., 157 miles S. W. of Chicago. It has two weekly newspapers, a library, two banks, two manufactories, a park, and a high school. Pop. of Delavan township, 1957. Ed. "Independent."

Delavan, a post-village of Faribault co., Minn., on the Southern Minnesota R. R., 162 miles W. of La Crosse. It has one weekly newspaper.

Delavan, a post-village of Walworth co., Wis., on Turtle Creek and the Western Union R. R., 58 miles S. W. of Milwaukee. It has a national bank, the State institution for the deaf and dumb, five churches, a foundry, a cheese-factory, one graded school, and one weekly newspaper. Pop. 1688; of Delavan township, 2509. Ed. "Republican."

Delavan (Edward C.), an American temperance reformer, born in Schenectady co., N. Y., in 1793, accumulated by industry and economy a large amount of property at Albany, N. Y. Here he erected the "Delavan House," which was for a long time a famous temperance hotel. He became a distinguished editor and speaker upon temperance, and expended a large amount of money in the cause. Died Jan. 15, 1871, after losing a large part of his property.

Delavigne (Jean François Casimir), a French dramatist, was born April 4, 1793, at Havre. After the Restoration he wrote a series of patriotic lyrics called "Messéniennes," which were received with favor. The dramas "The Sicilian Vespers" (1819), "The Comedians" (1820), and "The Pariah" (1821) increased his fame. In 1830 he wrote "La Parisienne" and other revolutionary songs. Delavigne occupies an intermediate position between the classical and romantic school. There are more piquancy and realistic sentences in his delineations of characters than in those of Voltaire, but less passion and fire of imagination than in those of Victor Hugo. He died Dec. 11, 1843.—His brother, Germain Delavigne (born 1790), wrote with Casimir the words to Halévy's opera of "Charles VI.," and in collaboration with Scribe "Le Vieux Garçon" and other vaudevilles. Died in 1868.

Del'aware [named in honor of Lord Delaware, second governor of Virginia], a river of the U. S., rises in New York, and is formed by the Coquago and the Popacton, which unite at Hancock on the boundary between New York and Pennsylvania. It flows south-eastward to Port Jervis on the Erie R. R., and reaches the northern extremity of New Jersey. Below this point it forms the boundary between Pennsylvania and New Jersey, and runs south-westward to the Delaware Water Gap, where the river passes through a picturesque gorge in the Kittatinny Mountain. Thence it flows southward to the northern extremity of Bucks county, and south-eastward to Trenton, where it meets tide-water. Below Bordentown it flows south-westward until it enters Delaware Bay, about 40 miles below Philadelphia. Its whole length is about 300 miles. It is navigable for steamboats to Trenton, and ships of the largest size can ascend to Philadelphia, where it is nearly one mile wide. It is connected with the Hudson River by the Morris Canal and the Delaware and Hudson Canal. Large numbers of shad are caught in the Delaware.

Delaware, one of the Middle States of the Atlantic coast, and one of the original thirteen which united in the war of Independence. It is situated between the parallels of 38° 28′ and 39° 50′ N. lat., and between the meridians of 75° and 75° 46′ W. lon. from Greenwich. It has a length of 96 miles from N. to S., and a breadth ranging from 9 to 12 miles in the N. to 36 or 37 miles on or near its S. line; and is bounded on the N. and N. N. W. by Pennsylvania, on the E. by Delaware River and bay and the Atlantic Ocean, on the S. and W. by Maryland. Its area is 2120 square miles, or 1,356,800 acres, being, with the exception of Rhode Island, the smallest State in the Union in territory.

Face of the Country.—The peninsula lying between the Chesapeake and Delaware bays and the Atlantic Ocean, of which Delaware forms the N. E. portion, is for the most part nearly level, and, except on the shores of the Delaware River and bay, very generally sandy. There are no mountains, though in the northern portion of the State, which is somewhat assimilated to the character of the Pennsylvania lands, there is some fine rolling country, with pleasant hills and dales; but below New Castle the only variation from an absolute level is a sandy and somewhat marshy ridge,

nowhere exceeding 60 or 70 feet in height, running southward near the western boundary of the State, and forming the backbone of the peninsula. From the marshes of this ridge most of the streams which drain the State take their rise. Of these the affluents of the Pocomoke, the Nanti-

Delaware Seal.

coke, the Choptank, the Chester, and the Elk rivers flow into Chesapeake Bay, while the Brandywine, White Clay Creek, Christiana Creek, Appoquinimink, Duck Creek, Murderkill, Mispillion River, Broadkill, Indian, and other rivers and creeks are tributaries of the Delaware River and bay, or discharge their waters into the Atlantic. There are no considerable indentations of the coast except below Cape Henlopen, where the surf has thrown up long spits of sand enclosing the shallow but landlocked sounds known as Rehoboth Bay, Indian River Bay, and the northern portion of St. Martin's Bay. Most of the larger streams are navigable for coasters and fishing-vessels of light draught for a short distance, but Christiana Creek is the only one navigable for merchant-ships. Rehoboth Bay admits vessels drawing six feet of water. Delaware Bay, which for more than half of its course along the eastern shore of the State is rather an estuary than a bay, is a fine body of water, with a deep though tortuous channel, having from 35 to 75 feet of water; but along the Delaware shore it is at most points much silted up and its banks are marshy and low. The only good harbors in the State are those of Wilmington on Christiana Creek, New Castle, and Lewes, just inside of the Breakwater.

Geology.—The northern portion of the State, including nearly one-half of New Castle county, belongs to the same group of cretaceous rocks with the West Jersey marls and greensand; from this point down to the banks of Murderkill the tertiary formations predominate; the southern portion is wholly alluvial. In the extreme southern part of the State is the Cypress Swamp, a morass 12 miles long and 6 miles wide, containing a dense growth of cypress and other evergreens and shrubs, and abounding in noxious reptiles. The soil for eight or ten miles inward from Delaware Bay is for the most part a rich clayey loam, but W. of this it is sandy, and unless constantly enriched yields but light crops. Of minerals, the most important are bog-iron ore, found in all the swamps, shell marl in the greensand region, and kaolin or porcelain clay, also found abundantly and of good quality in the northern part of the State. The *climate* is mild and favorable to agricultural pursuits. In the N. the air is pure and healthy; in the S. the presence of swamps causes the prevalence of intermittent and remittent fevers to some extent. The natural vegetation does not differ from that of the more level portions of the Middle States generally. Except in the swampy districts, there are no extensive forests, the land being generally under cultivation. In the swamps the trees are largely of a sub-tropical character. There are few wild animals in the State, though in the Cypress Swamp, as well as in other swamps, there is no lack of formidable reptiles. The shores of Delaware Bay are frequented in their season by immense flocks of ducks and teal, and at times by wild-geese. The other birds of the State are those common to the Middle States lying on or near the Atlantic.

Agricultural Products.—Delaware is eminently a fruit-growing State. Her peaches and apples and her small fruits are in demand in the markets of Philadelphia and New York, and, in connection with New Jersey and Maryland, almost completely supply the ever-increasing demand for these products. According to the census of 1870, 1,052,322 acres, or ten-thirteenths of her entire area, was in farms, and of this amount 698,115 acres were under cultivation, while 354,207 acres were either woodland or otherwise unimproved. The average size of her farms was 138 acres; the value of her farms was set down at $46,712,870, or an average of $45 per acre; the value of farming implements, $1,201,644; the value of all farm products, $8,171,667; of animals slaughtered, etc., $997,403; of home manufactures, $33,070; of forest products, $111,810; of market-garden products, $198,075 (evidently an under-estimate); of orchard products, $1,226,893 (this is also understated); of wages paid to farm hands, $1,696,571; wheat harvested, 895,477 bushels; rye, 10,222 bushels; Indian corn, 3,010,390 bushels; oats, 554,388; barley, 1799; buckwheat, 1349; flax, 878 pounds; wool, 58,316 pounds; hay, 41,890 tons; hops, 800 pounds; tobacco, 250 pounds; sorghum molasses, 65,908 gallons; common potatoes (*Solanum tuberosum*), 362,724 bushels; sweet potatoes (*Batatus edulis*), 85,309; peas and beans, 3123 bushels; beeswax, 800 pounds; honey, 33,151 pounds; domestic wine, 1552 gallons; cloverseed, 2228 bushels; flaxseed, 356 bushels; grass-seed, 60 bushels. Of some of these items we have later statistics in the careful estimates of the agricultural department; these gave for the crop of 1871 (two years later than that of the census), Indian corn, 3,575,000, an average of 22 bushels to the acre, and worth $2,145,000; wheat, 688,000 bushels, 11.5 bushels to the acre, and valued at $1,045,760; rye, 10,100 bushels, an average of but 5 bushels to the acre, worth $7575; oats, 398,000 bushels, an average yield of 20 bushels to the acre, worth $163,180; barley, 1700 bushels, 17 bushels to the acre, worth $1360; buckwheat, 1100 bushels, 12.5 bushels to the acre, worth $847; potatoes (common), 238,000 bushels, 120 bushels to the acre, worth $119,000; hay, 33,000 tons, 1.25 tons to the acre, worth $577,500. The estimated amount of live-stock in the State in Feb., 1872, was—horses, 20,000, valued at $1,516,400; mules, 4000, valued at $455,960; oxen and other cattle, 33,400, valued at $606,544; milch cows, 26,000, valued at $832,000; sheep, 25,300, valued at $101,200; hogs, 46,000, valued at $230,000. The peach crop of Delaware ranges from 3,300,000 to 3,800,000 baskets, or even more in favorable years, representing a value of $1,300,000 to $3,000,000; while the apples, pears, and small fruits are worth more than as much more. In 1872, 3,472,000 quarts of strawberries were shipped in twenty-five days, yielding nearly $250,000.

Manufacturing and Mining Industry.—According to the census of 1870, there were in the State 800 manufacturing establishments, having for motive-power 164 steam-engines of 4313 horse-power, and 234 water-wheels of 4220 horse-power, employing 9710 hands—viz. 7705 adult males, 1199 adult females, and 806 children; having a capital of $10,839,093; paying wages to the amount of $3,692,195; using raw materials valued at $10,206,397; and producing goods and wares annually worth $16,791,382. That the manufacturing industry of the State is greatly understated in this report (doubtless from the carelessness or incompetency of the census marshals) appears from the fact that a very careful census of the manufacturing establishments of the city of Wilmington alone, taken in Oct., 1872, gives capital invested in that city in manufactures, $12,275,000, and value of manufactured products for the year preceding, $20,125,000, or $3,334,000 more than the product of the whole State in 1870. Wilmington is unquestionably the largest manufacturing town or city in the State, but it does not monopolize more than three-fourths of the manufacturing of the State. The most important manufactures of the State are—the various departments of iron manufacture, which produce annually about $3,000,000; flour and flouring-mill products, about $2,500,000; morocco and other leather, tanned, curried, and enamelled, $2,500,000 ($2,000,000 worth of morocco alone is made in Wilmington); shipbuilding, iron and wood, $1,600,000; machinery, car-wheels, etc., $2,600,000; railroad and horse-railroad cars, $1,900,000; cotton goods, $1,600,000; paper, $1,400,000; powder and chemicals, $1,450,000; carriages and wagons, $1,500,000; tobacco, cigars, and snuff, $1,000,000; woollen goods, $800,000; boots, shoes, and findings, $650,000.

Railroads.—There are now completed in Delaware about 383 miles of railroad, belonging to thirteen different lines, the greater part of them leased to the Philadelphia Wilmington and Baltimore Railway, which by these leases controls most of the travel between New England, New York, and Philadelphia, and Norfolk and other Southern cities. A ship-canal is in progress between Bombay Hook and the Sassafras River, connecting the Chesapeake and Delaware bays.

Finances.—The State debt of Delaware Dec. 15, 1872, was $1,325,000. She had investments in dividend-paying stocks to the amount of $471,800, besides her school fund, which amounted to $452,410. The receipts of the State treasurer for the year ending Dec. 15, 1872, were $204,708.17, and the expenditures for the same time, $186,311.61. In Jan., 1873, the State had to her credit $171,286.88. In 1870 the assessed valuation of real and personal estate was

$64,787,223; the estimated true value was $97,180,833. In 1872 the valuation of the city of Wilmington alone was $43,000,000. The total taxation, State, county, and city, in 1870 was $418,092.

Commerce.—Until within the past two or three years the commerce of the State has been conducted almost entirely through Philadelphia and Baltimore, but recently Wilmington has begun to develop a commercial spirit, and now has a line of steamers plying to New York and numerous coasting-vessels running to various ports. The extensive interest in shipbuilding, especially of iron ships, of that city, has tended to increase her commercial activity. The commerce of the State consists mainly in the shipping to other States and cities of its agricultural and manufacturing products, and bringing in, in return, the raw materials and goods necessary for its own consumption. Its amount cannot be definitely ascertained.

Banks.—The State had in June, 1873, 11 national banks, with an aggregate capital of $1,528,185; 5 State banks, with an aggregate capital of $780,000; no savings banks, and two private banking-houses.

Insurance Companies.—There were on the 1st of July, 1873, 4 fire insurance companies, 3 of them at Wilmington and 1 at Dover, 1 a joint-stock company, with $100,000 capital, and 3 mutual companies, the whole reporting assets of $1,696,000. There is one mutual life insurance company at Wilmington, organized in 1867, with a capital of $100,000, and assets in April, 1873, of $153,431.

Population.—At the time of the Revolutionary war Delaware had probably not much more than 30,000 inhabitants. Her progress since the first decennial census is seen in the following table:

Census.	Whites.	Free Col'd	Slaves.	Males.	Females.	Total.	Density
1790	46,310	3,899	8,887	30,314	28,772	59,094	27.87
1800	49,852	8,268	6,153	32,243	32,070	64,273	30.31
1810	55,361	13,136	4,177	36,662	36,012	72,674	34.23
1820	55,282	12,958	4,509	36,939	35,810	72,749	34.31
1830	57,601	15,855	3,292	38,533	38,215	76,748	36.20
1840	58,561	16,919	2,605	39,256	38,829	78,085	36.83
1850	71,169	18,073	2,290	45,955	45,577	91,532	43.18
1860	90,589	19,829	1,798	56,689	55,527	112,216	52.93
1870	102,221	22,794	.....	62,628	62,387	125,015	58.97

According to the census of 1870, 115,879 of the inhabitants of Delaware were natives of the U. S., and 9136 were foreign born. Of the latter, 5907 were born in Ireland, 1421 in England, 1142 in Germany, 229 in Scotland, 112 in British America, 127 in France, and 208 in other countries. Of foreigners over ten years of age, 2469 could not read or write, and 20,631 natives above ten years of age were equally illiterate. Of these, 11,280 were whites and 9351 colored. Of the whites, 1878 (1035 males and 833 females) were between ten and fifteen years of age, 1370 (718 males and 652 females) were between fifteen and twenty-one years, and 8032 (3466 males and 4566 females) were twenty-one years of age and over. Of the colored illiterates, 1785 (925 males and 860 females) were from ten to fifteen years of age, 2065 (1054 males and 1011 females) were between fifteen and twenty-one years, and 7970 (3765 males and 4205 females) were over twenty-one years old.

Education.—Public school education in Delaware, except in the city of Wilmington, is not in so prosperous a condition as it should be. In 1871 there were 383 school districts and 421 public schools in the State, 19,018 scholars in attendance, and $144,509.08 was received and expended for public school purposes, $94,781.93 of it in New Castle co. All the schools for colored children are supported by voluntary contributions, except that an appropriation of $1000 was made by the Wilmington board of education to the Howard School of that city. In 1870, according to the ninth census, there were 326 public schools, with 388 teachers (107 male and 281 female) and 16,385 pupils (7694 male and 9141 female), and an income of $127,729 for their support, of which $120,429 was derived from taxation and $7300 from tuition and other sources. There were 9 academies, with 48 teachers (25 male and 23 female) and 722 pupils (463 male and 259 female), having a total income of $35,200, derived from tuition and other sources; there were also 14 private (day and boarding) schools, with 24 teachers (4 male and 20 female) and 482 scholars (223 male and 259 female), with a total income of $11,572, derived from tuition and other sources. There are in the State two colleges—Delaware College, at Newark, founded in 1867, a State institution, having 10 instructors and professors and 105 students, 93 of them (45 males and 48 females) in the preparatory department, and 12 (all male) in the collegiate department, and 6000 volumes in its libraries; and the Wesleyan Female College, at Wilmington, founded in 1839 and chartered in 1851, an institution under the direction of the Methodist Episcopal Church, having 12 professors and instructors (5 male and 7 female), 132 students (all female), and 3500 volumes in its libraries.

Libraries.—There were 252 public libraries in the State in 1870, containing 92,275 volumes, and 221 private libraries, containing 91,148 volumes. The State Library at Dover has, it is said, 30,000 volumes; the Wilmington Institute Library, 11,000 volumes, and the library of the Newcastle Library Company, 6254.

Newspapers and Periodicals.—There were, according to the census of 1870, 17 periodicals and newspapers issued in the State, having an aggregate circulation of 20,860, and issuing annually 1,607,840 copies. Of these, 1 was a daily paper, having a circulation of 1600 copies; 3 semi-weekly, with a circulation of 3660; 12 were weekly, having an aggregate circulation of 13,600; 1 was a monthly, with 2000 circulation. Of these, 2 were literary and miscellaneous, with 1500 circulation; 14 were political, with 17,360 circulation; 1 (monthly) religious, with 2000 circulation.

Churches.—In 1870 there were in the State, according to the census, 267 churches of all denominations, with 252 church edifices, 87,899 sittings, and church property valued at $1,823,950. Of these, there were Baptist churches, 8; church edifices, 7; sittings, 2950; church property, $131,000 (according to the "Baptist Year-Book" for 1873, there were in the State in 1872, 9 Baptist churches, 6 ordained ministers, 770 members, 104 Sunday school teachers, and 1206 Sunday school scholars). In 1870 there were 29 Protestant Episcopal parishes, 27 church edifices, 8975 sittings, and $246,850 of church property. (The "Episcopal Almanac" for 1873 gives the number of clergymen as 22, with 1 bishop and 1 episcopal diocese, 1641 communicants, 280 Sunday school teachers, 2412 Sunday school scholars, and $38,186 of benevolent contributions.) In 1870 there were 8 societies of Friends, with 8 meeting-houses, 3425 sittings, and $64,600 of meeting-house property; 1 Lutheran church, 1 church edifice, 300 sittings, and $5000 of church property; 173 Methodist churches, 166 church edifices, 51,924 sittings, and $781,000 of church property; in 1872 there were 53 travelling and 163 local preachers, 157 churches, 11,269 members, 954 probationers, and $141,013 of church property. In 1870 there was 1 New Jerusalem (Swedenborgian) church, 1 church edifice, 300 sittings, and $20,000 of church property. The same year there were 32 Presbyterian churches, 32 church edifices, 13,375 sittings, and $384,500 of church property. There were in 1870, 13 Roman Catholic churches, 8 church edifices, 6000 sittings, and $170,000 of church property; in 1873 the Roman Catholic diocese of Wilmington, comprising the State of Delaware and the Eastern Shores of Maryland and Virginia, had 1 bishop and 1 vicar-general, and in Delaware 11 churches, 10 clergymen, 4 parochial schools, with 1210 pupils, and 3 institutions. The adherent Catholic population is estimated (rather loosely) at about 15,000. There was 1 Unitarian church, 1 church edifice, 300 sittings, and $17,000 of church property; one Universalist society, with 1 church edifice, 350 sittings, and $4000 of church property.

Constitution, Courts, etc.—The constitution of Delaware has not been materially changed since 1833. It gives the elective franchise to every free white male citizen of the age of twenty-two years who has resided for one year in the State and the last month thereof in the county, and who has within two years paid a county tax assessed at least six months before the election; but every free white male citizen over twenty-one and under twenty-two years may vote without paying any tax. Idiots, insane persons, paupers, and felons are excluded from voting, and the legislature may impose forfeiture of the right of suffrage as punishment for crime. Under the operation of the fifteenth amendment of the Constitution of the U. S., colored men are allowed to vote, subject to the above restrictions. The governor is elected by the people for a term of four years; he must be thirty years of age and have resided in the State for six years next before the election. The secretary of state is appointed by the governor, and serves for four years. The State treasurer and auditor are elected by the legislature for two years. The attorney-general is appointed by the governor, and holds office for five years. The legislature consists of a senate of nine members (three from each county), chosen for four years, and a house of representatives of twenty-one members (seven from each county), chosen for two years. The sessions of the legislature are biennial. As New Castle county now contains double the population of the other counties, this mode of representation is manifestly unjust, and its influence is felt on many of the topics of legislation. The judicial power of the State is vested in a court of errors and appeals, superior court, court of chancery, orphans' court, court of oyer and terminer, court of general sessions of the peace and jail delivery, register's court, and justices of the peace.

These courts are presided over by five judges—viz. the chancellor of the State, who is president of the orphans' court of the respective counties, and who sits in that court with the associate judge of the county; the chief-justice and three associate judges, one for each county, who, sitting together, form the court of errors and appeals; and the chief-justice and two of his associates constitute the superior court and court of general sessions. The court of oyer and terminer, like the court of errors, comprises the whole bench, except the chancellor. Judges are appointed by the governor, and hold office during good behavior. Probate courts are held by registers of wills, with appeal to the superior court. The chancellor holds a court of chancery in each county of the State. The sheriff of each county is elected by the people every two years. The clerks of the courts and registers of wills are appointed by the governor for the term of five years. In some of her penal enactments Delaware is rather antiquated. She has maintained public whipping at the whipping-post as a punishment for larceny and other minor offences up to the present time (Oct., 1873). These offenders receive from twenty-five to sixty lashes on the bare back, and are also exposed in the pillory for an hour or more. The State is entitled to two Senators and one Representative in Congress.

Counties.—There are three counties in the State. Their population at each census was as follows:

Counties.	1790.	1800.	1810.	1820.	1830.	1840.	1850.	1860.	1870.	Remarks.
Kent	18,920	19,554	20,495	20,793	19,913	19,872	22,816	27,804	29,804	Central county.
New Castle	19,686	25,361	24,429	27,899	29,720	33,120	42,780	54,797	63,515	Northern county.
Sussex	20,488	19,358	27,750	24,057	27,115	25,093	25,936	29,615	31,696	Southern county.

Principal Towns.—Wilmington, situated on Christiana and Brandywine creeks, is the most populous and important city in the State. It is largely engaged in manufacturing. Its population in 1870 was 30,841, and is now (Oct., 1873) estimated at 37,000. Dover, the capital of the State and of Kent co., has a population of 1906 in the town, and of 6394 in the hundred or township in which it is situated. The other towns of 2000 inhabitants or more are New Castle and Smyrna. North Milford, Seaford, Lewes, Laurel, Delaware City, South Milford, and Georgetown are also thriving towns. The divisions of the counties, which in most of the States are called townships, are in this State denominated *hundreds*.

History.—Delaware takes its name from the bay and river, which were so called from the lord de la Warr, governor of Virginia, who entered the bay in 1610, though both bay and river had been explored by Hendrick Hudson in 1609. The first attempt at settlement was made by the Dutch, under De Vries, with thirty colonists, in 1630, in the vicinity of Lewes, Sussex co., but this colony was destroyed by the Indians in 1633. In 1637 a colony of Swedes and Finns, sent out by the Swedish West India Company, purchased the land from Cape Henlopen to Trenton Falls, erected a fort at the mouth of Christiana Creek, and called the country New Sweden. Soon after, they erected another fort on Tinicum Island, a few miles below Philadelphia. The Dutch colony at New Amsterdam (now New York) protested against this invasion of their territory, and built Fort Cassimir, now New Castle, 5 miles S. of Fort Christiana. In 1654 the Swedes captured this fort, but in 1655 the Dutch attacked and captured all the Swedish forts, and sent back to Europe those colonists who would not swear allegiance to Holland. In 1664, when New Netherlands was conquered by the English, the duke of York claimed these settlements on the Delaware as belonging to him. Lord Baltimore also claimed them as being within his grant, but without avail. In 1682, William Penn bought from the duke of York his claims, and, after some litigation with Lord Baltimore, established his right to the territory in 1685. The present State was called in the colonial records of Pennsylvania, "the territories, or the three lower counties on the Delaware." For twenty years they were considered a part of the colony of Pennsylvania, and sent eighteen delegates, six from each county, to the colonial assembly. In 1703 they obtained liberty to secede and establish a distinct legislature for themselves, but until the Revolution they were under the same governor as Pennsylvania, and the proprietary, on the ground of purchase, claimed all his rights. The colony suffered less from wars with Indians or foreign powers than most of the other colonies. In the French war, which terminated in 1763, she furnished her full quota of troops, who distinguished themselves for bravery and zeal; and in the Revolutionary war "the Blue Hen's chickens," as the Delaware soldiers were called from their flag, were second to none in efficiency. In 1776 the people of Delaware proclaimed themselves free and independent, and formed a constitution, Sept. 20, 1776. They came heartily into the old Confederation, and ratified the Constitution of the U. S. Dec. 7, 1787. In 1792 a second State constitution was adopted, which, with some amendments, is still the organic law of the State. The subsequent career of the State has been for the most part quiet, but prosperous. It has lacked in enterprise, in the advancement of education, and in the development of its resources, but up to the commencement of the late civil war the State had had no debt and had levied no general tax on its landed property. At the beginning of the civil war, though a majority of its citizens were in favor of maintaining the Union and sustaining the U. S. government, a large minority sympathized with the Southern Confederacy, as was to be expected, the State having been in all its past history a slaveholding State. Still, it contributed seven regiments of infantry, a battalion of cavalry, and two or three batteries of artillery, in all about 10,000 men, to the war. Yet its general position was for years one of steady but passive hostility to the general government and to the amendments to the Constitution of the U. S., which drew upon it in two or three instances the interference of the government, but never led to any active resistance. The governor and legislature protested against negro suffrage, and obstructed it as far as possible, but finally submitted to it as inevitable. Of late, wiser counsels seem to prevail, and there is reason to believe that the gallant little State will become distinguished, as of old, for her patriotism, loyalty, and fidelity to truth and right, and place herself in the front rank in education, enterprise, and social and moral progress.

Governors of the State.—In the period between the Declaration of Independence in 1776 and the adoption of the Constitution of the U. S. at the close of 1787, Delaware had for its chief magistrates, under the title of president, at least two distinguished citizens of Pennsylvania, who were chief magistrates also of that colony—viz. John Dickinson and Thomas McKean—thus maintaining, in effect, the previous custom of having the two colonies ruled by the same governor; but in 1789 the first of the governors of the State of Delaware was inaugurated, and the succession from that time has been as follows:

Joshua Clayton	1789–96
Gunning Bedford	1796–97
Daniel Rogers	1797–98
Richard Bassett	1798–1801
James Sykes (acting)	1801–02
David Hall	1802–05
Nathaniel Mitchell	1805–08
George Truett	1808–11
Joseph Haslett	1811–14
Daniel Rodney	1814–17
John Clarke	1817–20
Jacob Stout (acting)	1820–21
John Collins	1821–22
Caleb Rodney (acting)	1822–23
Joseph Haslett	1823–24
Samuel Paynter	1824–27
George Poindexter	1827–30
David Hazzard	1830–33
Caleb P. Bennett	1833–37
Cornelius P. Comegys	1837–40
William B. Cooper	1840–44
Thomas Stockton	1844–46
Joseph Maul (acting)	1846–46
William Temple	1846–46
William Thorp	1846–51
William H. Ross	1851–55
Peter F. Cansey	1855–59
William Burton	1859–63
William Cannon	1863–65
Gove Saulsbury	1865–69
James Ponder	1869–71
James Ponder	1871–

Electoral and Popular Vote at Presidential Elections: 1. *Electoral Vote for President and Vice-President.*

Election.	Year.	Candidates Voted for.	No. of votes.
1st	1788	George Washington, scattering	3
2d	1792	George Washington and John Adams	3
3d	1796	John Adams and Thomas Pinckney	3
4th	1800	John Adams and Charles C. Pinckney	3
5th	1804	Charles C. Pinckney and Rufus King	3
6th	1808	Charles C. Pinckney and Rufus King	3
7th	1812	De Witt Clinton and Jared Ingersoll	4
8th	1816	Rufus King and Robert G. Harper	3
9th	1820	James Monroe and Daniel Rodney	4
10th	1824	John Q. Adams and John C. Calhoun	1
		W. H. Crawford and Henry Clay	2
11th	1828	John Q. Adams and Richard Rush	3
12th	1832	Henry Clay and John Sergeant	3
13th	1836	Wm. H. Harrison and Francis Granger	3
14th	1840	Wm. H. Harrison and John Tyler	3
15th	1844	Henry Clay and Theo. Frelinghuysen	3
16th	1848	Zachary Taylor and Millard Fillmore	3
17th	1852	Franklin Pierce and William R. King	3
18th	1856	Jas. Buchanan and John C. Breckenridge	3
19th	1860	John C. Breckenridge and Joseph Lane	3
20th	1864	Geo. B. McClellan and Geo. H. Pendleton	3
21st	1868	Horatio Seymour and F. P. Blair, Jr	3
22d	1872	U. S. Grant and Henry Wilson	3

2. *Popular Vote for President.*—Until the election of 1828 the vote for electors in Delaware was cast by the legislature; since that time it has been as follows:

Election.	Year.	Candidate.	Popular Vote.	Candidate.	Popular Vote.	Candidate.	Popular Vote.	Candidate.	Popular Vote.
11th.....	1828	Adams.....	4,769	Jackson.....	4,349				
12th.....	1832	Clay.....	4,276	Jackson.....	4,110				
13th.....	1836	Harrison.....	4,738	Van Buren.....	4,155				
14th.....	1840	Harrison.....	5,967	Van Buren.....	4,884				
15th.....	1844	Clay.....	6,278	Polk	5,996				
16th.....	1848	Taylor	6,421	Cass.....	5,898	Van Buren.....	80		
17th.....	1852	Scott.....	6,293	Pierce.....	6,318	Hale	62		
18th.....	1856	Buchanan.....	8,004	Fillmore	6,175	Fremont.....	308		
19th.....	1860	Breckenridge....	7,347	Bell.....	3,864	Lincoln	3815	Douglas.....	1023
20th.....	1864	McClellan.....	8,767	Lincoln	8,155				
21st.....	1868	Seymour	10,980	Grant.....	7,623				
22d.....	1872	Grant.....	11,115	Greeley	10,206				

L. P. BROCKETT.

Delaware, a county in the E. of Indiana. Area, 400 square miles. It is intersected by the White and Mississinewa rivers. The surface is nearly level; the soil is mostly fertile. Cattle, dairy products, wool, and grain are raised. Flour is the chief article of manufacture. It is traversed by the Fort Wayne Muncie and Cincinnati R. R. and another railroad called the Bee Line. Capital, Muncie. Pop. 19,030.

Delaware, a county in the E. N. E. of Iowa. Area, 576 square miles. It is intersected by the Makoqueta River. The surface is uneven; the soil productive. Cattle, dairy products, grain, hay, and wool are staples. The most numerous manufactories are of wagons, etc. The railroad which connects Dubuque with Sioux City passes through it. Capital, Delhi. Pop. 17,432.

Delaware, a county in the S. S. E. of New York. Area, 1580 square miles. It is bounded on the N. W. by the East Branch of the Susquehanna, and on the S. W. by the Delaware. It is drained by the Coquago and Popacton. The surface is hilly; the soil of the valleys is fertile. Cattle, grain, wool, hay, and potatoes are largely raised, but dairying is the principal industry. There are manufactures of lumber, leather, furniture, cooperage, harness, metallic wares, etc., but, though the water-power is very great, manufactures are not yet extensive. It is intersected by the New York and Oswego Midland R. R., and the Erie R. R. passes along the south-western border. Capital, Delhi. Pop. 42,972.

Delaware, a county in Central Ohio. Area, 478 square miles. It is intersected by the Scioto and Olentangy rivers. The surface is nearly level; the soil is fertile. Cattle, grain, wool, hay, potatoes, and dairy products are the staples. Among the manufactures are carriages, brick, and saddlery. It is traversed by the Cleveland Columbus and Cincinnati R. R. Capital, Delaware. Pop. 25,175.

Delaware, a county which forms the S. E. extremity of Pennsylvania. Area, 180 square miles. It is bounded on the S. E. by the Delaware River and on the W. by Brandywine Creek. The surface is mostly undulating or hilly; the soil is fertile, and is adapted to pasture. Many dairies are kept here, and grain, potatoes, and hay are raised. There are manufactures of flour, lumber, carriages, cotton and woollen goods, and many other articles. It is intersected by the Pennsylvania R. R., and by several railroads connecting Philadelphia with Baltimore and West Chester. Capital, Media. Pop. 39,403.

Delaware, a post-township of Yell co., Ark. P. 550.

Delaware, a township of Delaware co., Ind. P. 1210.

Delaware, a township of Hamilton co., Ind. P. 1434.

Delaware, a township and post-village of Ripley co., Ind., on the Ohio and Mississippi R. R., 47 miles W. of Cincinnati. Pop. 1559.

Delaware, a township and post-village of Delaware co., Ia., on the Davenport and St. Paul and the Dubuque and Sioux City R. Rs., 41 miles W. of Dubuque. P. 2727.

Delaware, a township of Polk co., Ia. Pop. 865, exclusive of the city of Des Moines.

Delaware, a twp. of Leavenworth co., Kan. Pop. 1641.

Delaware, a township of Wyandotte co., Kan. P. 926.

Delaware, a township of Sanilac co., Mich. P. 741.

Delaware, a township of Shannon co., Mo. P. 198.

Delaware, a township of Otoe co., Neb. Pop. 597.

Delaware, a township of Camden co., N. J. P. 1625.

Delaware, a township of Hunterdon co., N. J. P. 2959.

Delaware, a township of Sullivan co., N. Y. P. 1998.

Delaware, a township of Defiance co., O. Pop. 1160.

Delaware, a city, capital of Delaware co., O., on the Olentangy River and the Cleveland Columbus and Cincinnati R. R., 24 miles N. of Columbus. It is the seat of Ohio Wesleyan University and Ohio Wesleyan Female College. It has thirteen churches, good schools, three banks, a semi-monthly and three weekly newspapers, large railroad repair-shops, two foundries, two flouring and one oil mill, a woollen-factory, and manufactures of bagging, chairs, iron fences, carriages, lumber, beer, and other goods. It is handsomely situated and well built. There are valuable medicinal springs in Delaware and vicinity. Pop. 5641; of Delaware township, 6861. A. THOMSON, ED. "GAZETTE."

Delaware, a township of Hancock co., O. Pop. 1280.

Delaware, a township of Juniata co., Pa. Pop. 1079.

Delaware, a township of Mercer co., Pa. Pop. 1703.

Delaware, a twp. of Northumberland co., Pa. P. 1879.

Delaware, a post-township of Pike co., Pa. P. 758.

Delaware, or more correctly, **Delawarr** (THOMAS **West**), LORD, the twelfth baron of that title, the second governor and first captain-general of Virginia, was a descendant by the female line of an old and noble family, which derived its name, according to some authorities, from an estate called La Warre (or Warwick) in Gloucestershire, England. He took his title in 1602. He was named captain-general of Virginia (which comprehended nearly all the present eastern coast of the U. S.) in a charter dated May 23, 1609. He visited the colony in 1610, and returned in the following year to England. He expended large sums of money in establishing the colony of Virginia. He died at sea, "not without suspicion of poison," June 7, 1618, while on his second voyage to America. He appears to have been a noble and philanthropic man.

Delaware Bay, a wide estuary between the mouth of the Delaware River and the Atlantic Ocean, separates the State of Delaware from the southern part of New Jersey. The entrance between Capes May and Henlopen is 13 miles wide; the greatest breadth of the bay is about 25 miles. A safe and capacious harbor has been formed in this bay by the construction of a BREAKWATER (which see, by GEN. J. G. BARNARD, U. S. A.) near Lewes. This structure is in lat. 38° 59′ 07″ N., lon. 75° 6′ 9″ W. The western part of the bay is generally shallow, but it has a deep though not very direct channel for shipping.

Delaware City, a post-borough of New Castle co., Del., on the Delaware River, about 40 miles below Philadelphia. It is the eastern terminus of the Chesapeake and Delaware Canal. It has five churches and one national bank. Pop. 1059.

Del'aware In'dians, a tribe belonging to the Algonquin family, called in their own language LENNI-LENAPE, lived originally on the banks of the Delaware and Schuylkill, but are now mostly found in the Indian Territory, in the valley of the Verdigris. They were, according to tradition, a bold and powerful race, but were overcome by the Iroquois, who compelled them in 1744 to leave their original settlement. Some of them removed to Ohio about 1780. They were friendly towards the U. S., and formed several treaties with them. They next crossed the Mississippi and settled in Kansas, where their number in 1869 was 1005. They were in 1870 for the most part removed to their new lands in the Indian Territory, and in part incorporated with the Cherokees. They have a few schools, and carry on farming and cattle-raising to some extent, but their chief occupation is hunting and fishing. They are generally good trappers, brave, and comparatively intelligent.

Delaware Water Gap, a summer resort of Monroe co., Pa., on the Delaware River where it passes through the Kittatinny Mountain, and on the Delaware Lackawanna and Western R. R., 108 miles N. of Philadelphia and 92 miles W. of New York. The river here flows through a narrow gorge between steep rocky banks, which rise nearly 1200 feet above the water.

De la Warr, Earls, and Viscounts Cantalupe (Great Britain, 1761), Barons de la Warr (1209), Barons West (1343), Barons de la Warr (England, 1579, by patent).—Charles Richard Sackville West, sixth earl, major-general, born Nov. 13, 1815, succeeded his father Feb. 23, 1869.

Del Cred'ere [from the It. *credere*, to "trust" or "credit"] **Commis'sion,** in mercantile law, signifies an additional premium charged by a factor or commission-merchant on the price of goods consigned to him when he guarantees the solvency of the purchaser who buys them on credit. Thus, if the percentage for effecting the sale is 2½, he might charge 2½ per cent. more for the guarantee.

De'le [imperative sing. of the Lat. *deleo*, to "blot out," to "destroy"], in printing, a direction inscribed on the margin of an article to remove something which has been put in type; it is usually thus expressed, δ.

Dele'gate [from the Lat. *de*, "away," and *lego*, *legatum*, to "send as an ambassador"], a person appointed and sent with powers to transact business for the party who sends him; a representative, a deputy. This term is applied in the U. S. to the members of political and constitutional conventions chosen by the people. The representatives sent to the first Continental Congress in 1774 were called *delegates*. Members of Congress from the Territories are still called delegates.

Delegates, Court of, formerly the highest ecclesiastical court of appeal in England. Its members were appointed by the king's commission to represent his royal person and to hear all appeals to him, by virtue of the statute 25 Henry VIII., c. 9. Appointments to this commission were made from the lords spiritual and temporal, and from the judges and doctors of civil law. This court was abolished by 2 and 3 Will. IV., c. 92, and its jurisdiction was transferred to the privy council.

Delega'tion [Lat. *delegatio*], the appointment of a delegate; also a number of delegates or persons deputed to act for a party or represent a constituency. In civil law, delegation is the act by which the debtor, with the assent of the creditor, substitutes another debtor in his place, and becomes himself discharged from the debt. There is necessary to the validity of such an act the concurrence of three parties—that of the original debtor, that of the substituted debtor, as well as that of the creditor who consents to the discharge and substitution. The substitute may himself owe the original debtor, but this is not an essential element in the case. The case sometimes assumes a more complicated form, and the substituted debtor is made liable to pay a fourth person pointed out by the creditor, instead of himself. (For a more full discussion of the whole subject, see Novation; also consult Domat on "Civil Law," title *Delegation*.)

Delegation [It. *delegazione*], the name of former provinces or divisions of Lombardy, Venetia, and the Papal States. An officer called a delegate presided over the government of each delegation. In the Papal States the delegate was always a prelate. If he was a cardinal, he was called a legate, and his province was a legation.

Delegation, in the Austro-Hungarian monarchy, the name of the deputies who are chosen by the Cisleithan and Transleithan parliaments for taking action on those questions which are counted among the common affairs of the empire. (See Austro-Hungarian Monarchy, by Prof. A. J. Schem.)

Delescluze (Louis Charles), a French politician, born Oct. 2, 1809, took part in 1830 in the republican movement, was, after the revolution of 1848, for a short time commissioner-general in the departments Du Nord and Pas de Calais, published then several ultra-radical papers in Paris, was in 1857 deported to Cayenne. During the reign of the Commune, of which he was the leading spirit, he was at the head of the war commission with almost unlimited powers, and issued the notorious incendiary orders. His fall, on the 28th of May, 1871, on the barricade in the Rue de Angoulême, ended the resistance of the Commune to the troops of the government.

Delfi'co (Melchior), an Italian political economist, born in the Abruzzo Aug. 1, 1744. He became councillor of state at Naples in 1806. Among his works are an "Essay in Favor of Free Trade" and "Thoughts on the Uncertainty and Inutility of History" (1806). Died at Teramo June 21, 1835.

Delft, a town of the Netherlands, province of South Holland, is on the railway from Rotterdam to The Hague, 4 miles S. E. of the latter. It is well built of brick, and clean, and is intersected by a number of canals. It has a richly-adorned town-hall, and a Gothic church containing a magnificent monument to William prince of Orange, who was assassinated here in 1584. Delft was formerly noted for glazed earthenware, which throughout Holland came to have the name of delft-ware. The same kind of pottery, now mostly made in England, is still called *delf*. Here are manufactures of carpets, woollen cloths, soap, etc. Pop. in 1870, 22,909.

Delfts'haven, the port of the above place, is on the river Meuse, 2 miles S. W. of Rotterdam. It has a handsome church. The inhabitants are partly employed in shipbuilding, iron-foundries, and distilleries. Pop. in 1868, 7288.

Delf'zijl, a fortified seaport in the Netherlands, in the province of Groningen, on the Dollart, is the key of Groningen and Friesland. Pop. 5476.

Delga'da, or **Ponta Delgada,** a city of the Azores, is on the S. side of the island of St. Michael, and is the capital of that island and of St. Mary; lat. 37° 45′ N., lon. 25° 40′ W. It has considerable trade in fruit, grain, and orchil. The government is here constructing a breakwater and docks for shipping. Pop. 15,885.

Del'hi, a district of India, includes a small portion of the former province of Delhi. Area, 4057 square miles. The southern part is rocky and barren; the northern and north-western parts are watered by the Jumna, and are more fertile. Delhi is one of the administrative divisions of the North-west Provinces. Capital, Delhi. Pop. 1,328,650.

Delhi [Sanscrit, *Indraprastha*], a celebrated city of Hindostan, called by the Mohammedans **Shahjehanâbâd,** is situated on the Jumna, about 790 miles N. W. of Calcutta; lat. 28° 40′ N., lon. 77° 18′ E. It was formerly the capital of the Mogul empire, and was the largest city of Hindostan, having a population of 2,000,000. An extensive tract, covered with the ruins of palaces, pavilions, baths, and mausoleums, marks the dimensions of the ancient metropolis of the Mogul empire. The modern city, which was founded by Shah Jehan in 1631, has a circumference of seven miles, and is surrounded by walls of red sandstone thirty feet high. It has seven colossal arched gates, defended by round bulwarks. The streets are mostly narrow, but one of the main avenues is 120 feet wide. The palace of the Great Mogul, built by Shah Jehan, is the most magnificent in India. Its stupendous towers, surmounted by elegant pavilions, its marble domes and gilded minarets, present a very imposing appearance. Among the other remarkable edifices is the Jamma mosque, a splendid structure in the Byzantine style, built of white marble and red sandstone. Delhi has about forty mosques, many of which have lofty minarets and gilded domes. Here is Delhi College, which was founded in 1792, and has a separate department for each of these languages—Arabic, English, Persian, and Sanscrit. The goldsmiths of Delhi are famous for the beauty of their work. Many Cashmere shawls are here embroidered with silk and gold. The city, which has been frequently captured by hostile armies, was taken by the British general Lord Lake in 1803, and it has continued under British domination ever since that time. In May, 1857, Delhi was occupied by the mutinous Sepoys, who here murdered a number of English people. A British army commenced the siege of this place in June, and took it by assault, after a severe fight of seven days, in Sept., 1857. Pop. in 1870, 154,417.

Delhi, a township and post-village, capital of Delaware co., Ia., near the Maquoketa River, about 40 miles W. of Dubuque. It is on the Davenport and St. Paul R. R., and has several fine stone-quarries, two flouring-mills, a fine school building, several nurseries, etc. It has one weekly newspaper. Total pop. 1174; of village, 413.

J. B. Swinburne, Ed. "Monitor."

Delhi, a post-village of Richland co., La., on the North Louisiana and Texas R. R., 35 miles W. by N. of Vicksburg. It has one weekly newspaper. Pop. 186.

Delhi, a township and village of Ingham co., Mich., on the Michigan Central R. R., 33 miles N. of Jackson. Pop. 1259.

Delhi, a post-village, capital of Delaware co., N. Y., on the N. bank of the Delaware River (W. branch) and on a branch of the Midland R. R. It has a court-house, jail, county poor-house, an academy, four churches, a woollen mill, two national banks, and three weekly papers. Pop. 1223; of Delhi township, 2920.

Delhi, a post-township of Hamilton co., O. Pop. 2620.

Delille (Jacques), L'Abbé, a French didactic poet, born at Aigueperse, in Auvergne, June 22, 1738. He was educated at a college in Paris, and became professor of humanities at Amiens. His reputation was established by a translation of Virgil's "Georgics" (1769). In 1780 he published "Les Jardins." He translated into French verse Virgil's "Æneid" (1804) and Milton's "Paradise Lost."

(1805). His version of the "Æneid" is considered the best in the language. Among his works is a poem entitled "Imagination" (1806), which is highly commended. Died May 1, 1813. (See CAMPENON, "Eloge de Delille.")

Delir'ium [Lat. from *deliro*, to "be insane," which is said by some to be from *de*, "from," and *lira*, a "ridge," or "furrow;" thus an insane person was likened to one ploughing out of the proper line], a condition in which the ideas of a sick person are in a confused, wild, or wandering state. It differs from insanity in being a symptom of acute disease, like fever, while insanity is an evidence of chronic disease.

Delir'ium Tre'mens (*i. e.* "trembling delirium"), a morbid affection caused by the action of alcoholic drinks, and often afflicting hard drinkers after severe accidents or attacks of acute disease. Delirium, trembling and subsultus of the muscles and tendons, wakefulness, and rapid pulse, are characteristic symptoms. The patient sometimes suffers extremely from the most frightful apprehensions, and frequently thinks he sees grotesque and horrible objects. The tongue has a thick furry coat, the skin is generally cool and covered with sweat, and the patient gives forth a characteristic saccharine odor. The blood and fluids of the brain are loaded with alcohol, and often (especially in old patients) there are abundant degenerative changes in the brain, lungs, liver, etc. Death occurs in about one-sixth of the cases. The mortality appears to have been formerly much greater than at present. The treatment is various. Sleep may be induced by the use of chloral or bromide of potassium, and in long-continued cases opiates may be cautiously administered with the happiest results. Patients nearly always call for alcohol in some form, but this desire should not, as a general rule, be gratified. The strength should be kept up by beef-tea, milk, raw eggs, etc.

REVISED BY WILLARD PARKER.

Delisle (GUILLAUME), an eminent French geographer, born in Paris Feb. 28, 1675. He reformed the system of geography, and published in 1700 a map of the world and celestial and terrestrial globes. He wrote several memoirs on geography, and produced maps of ancient and modern countries. Died Jan. 25, 1726.—His brother, JOSEPH NICHOLAS DELISLE (born April 4, 1688), founded a school of astronomy at St. Petersburg, and wrote an account of the Russian search for a passage from the South Sea to the north of America. In Delisle's thermometer, used in Russia, the boiling-point of water is zero, and the freezing-point is 150°. Died Sept. 11, 1768.

De'litzsch, a town of Prussian Saxony, the capital of a circle, is on the river Lober, and on a railway, 15 miles N. of Leipsic. It has three churches, a castle, and manufactures of woollen hosiery and gloves. Pop. 8112.

Delitzsch (FRANZ), a German theologian, was born at Leipsic Feb. 23, 1813, of Jewish parents, and was educated at Leipsic. In 1846 he became professor of theology at Rostock, in 1850 at Erlangen, and in 1867 at Leipsic. He is a master of biblical exegesis and of the immense Jewish literature. He has published numerous devotional and theological works, among which are "The House of God" (1848), "History of Jewish Poetry" (1836), "Biblico-Prophetic Theology" (1845), "Biblical Psychology" (1855), "Christian Apologetics" (1869), "A Day in Capernaum" (1871), and many valuable commentaries.

De'lius (NIKOLAUS), a German scholar, well known as a writer on Shakspeare, was born at Bremen in 1813, and became in 1855 professor of Sanscrit and of the Romance and English literature at Bonn. He has published a critical edition of the works of Shakspeare (2d ed. 1863–64; supplement 1865), the "Mythus of William Shakspeare" (1851), "Shakspeare Lexicon" (1852), "The English Theatre in Shakspeare's Time" (1852), and works on Provençal and Pracrit literature.

Del'la Crus'ca (*i. e.* "of the straw or chaff,"* so called because its chief aim or office was the winnowing or purifying of the national language), the name of a celebrated academy founded at Florence in 1582 for the purpose of establishing a standard of the Italian tongue. This academy published a dictionary, which became a great authority in relation to classical purity of language. The Della Cruscan Academy was afterwards incorporated with the FLORENTINE ACADEMY (which see).

Del'la Cruscan School, a name derived from the celebrated academy Della Crusca of Florence (see preceding article), and applied to certain affected English writers residing at Florence in 1785. Gifford satirized their absurdities with scathing severity in his "Baviad" and "Mæviad," and "completely killed this school." Among the Della Cruscans were Bertie Greathead, Robert Merry, Mrs. Thrale Piozzi, and William Parsons.

Dellet (JAMES) was born in South Carolina, but settled at Claiborne, Ala. He was returned to the first legislature under the State government in 1819, and to Congress in 1837. He died in 1849.

Dell Prairie, a post-twp. of Adams co., Wis. P. 534.

Dell Rapids, a post-village of Minnehaha co., Dak., on the Big Sioux River. It has one weekly newspaper.

Del'mar, a post-village of Sussex co., Del., on the Maryland line, is the S. terminus of the Delaware R. R. and the N. terminus of the Eastern Shore R. R.

Delmar, a post-village of Bloomfield township, Clinton co., Ia., at the junction of the Davenport and St. Paul, the Iowa Midland, and the Sabula Ackley and Dakota R. Rs. It has one weekly newspaper.

Delmar, a township of Tioga co., Pa. Pop. 18.

Delmar (ALEXANDER), a political economist of Spanish extraction, was born in New York City Aug. 9, 1836. He was editor of the "Social Science Review" (1864–66), organized the U. S. bureau of statistics (1866), and was its director (1867–68). He has published, besides other works, "Gold Money and Paper Money" (1862), "Essays on Political Economy" (1865), the "International Almanac" (1866), "What is Free Trade?" (1868), "Letter on the Finances" (1868), and "The Suppressed Report" (1869).

Del Nor'te, a county which forms the N. W. extremity of California, is bounded on the W. by the Pacific Ocean. Area, 1500 square miles. It is partly drained by the Klamath River. The surface is mountainous, and is diversified by prairies and forests of redwood and spruce. Gold and copper are found here. Cattle, wheat, barley, and wool are raised. Capital, Crescent City. Pop. 2022.

Del Norte, a post-village of Saguache co., Col., on the Rio Grande, 144 miles S. of Pueblo.

De Lolme (JOHN LOUIS), a Swiss lawyer, born at Geneva in 1740. He emigrated in his youth to England, where he was reduced to indigence. In 1771 he published "The Constitution of England" (in French), which he translated into English (4th ed. 1784; new ed., with life, 1853). He returned to Switzerland in 1775. Died July 16, 1806.

Delo'na, a post-township of Sauk co., Wis. Pop. 536.

Delorme (PHILIBERT), a French architect, born at Lyons in 1515, studied at Rome. He planned the Tuileries, begun in 1564 for Catharine de Medici, and built the Château de Meudon. He wrote "Nouvelles Inventions pour bien bâtir" and a treatise on architecture. Died in 1577.

De'los [Gr. Δῆλος], also called **Orty'gia,** a small island in the Ægean Sea, belonging to the group of Cyclades, was celebrated in ancient times as the birthplace of Apollo and Diana. According to tradition, it was originally a floating island, and was rendered immovable by Jupiter, in order that it might be a place of refuge for Latona. It was the site of a famous temple and oracle of Apollo, and was the centre of a great periodical festival in honor of him. In 426 B. C., Delos was purified by the Athenians, who removed all the tombs, and enacted a law to prevent it from being polluted by births or deaths. It was reputed one of the holiest places in Hellas. On the formation of the confederacy in 477 B. C. for the purpose of resisting the Persian invaders, Delos was chosen as the common treasury of the Greek allies. After the fall of Corinth (146 B. C.), Delos, which had a good harbor, was the centre of an extensive commerce. Here was a town of the same name, which is now a mass of ruins. Shiploads of columns and other remains have been carried away to Venice and Constantinople. The island has an area of 32 square miles, and is at present not inhabited.

Del'phi [Gr. Δελφοί], an ancient town of Phocis, and one of the most celebrated places in the Hellenic world, on account of its oracle of Apollo. It was situated at the southern base of Mount Parnassus, in the narrow vale of the Pleistus, amidst sublime and beautiful scenery. It occupied the central area of a great natural theatre or semicircular recess, partly enclosed by stupendous rocky barriers. The original or proper name of the oracle was *Pytho*. The name Delphi does not occur in the poems of Homer, who mentions that Agamemnon consulted the oracle at Pytho. The Pythian games were celebrated here every four years, the first celebration occurring in 586 B. C. Delphi became an opulent city and independent state, deriving its riches and importance from its oracle, which was the most famous of all the oracles. In the eighth century B. C. its reputation extended not only throughout Hellas, but also among foreign nations. Crœsus, king of Lydia,

* Hallam calls attention to the fact that the Italian academies of that period were remarkable for "names humorously quaint." One (that of Viterbo) was called the academy of "the Obstinates," another (that of Sienna), of "the Blockheads."

gave rich presents to the Pythian Apollo. The oracles were uttered by a female called Pythia, who sat on a tripod placed over the mouth of a cavern. She is said to have breathed an intoxicating exhalation of vapor which issued from this cavern or chasm, and was supposed to inspire her with the gift of prophecy. The fountain of Castalia, issuing near the base of Parnassus, supplied holy water for the temple of Apollo, which was one of the largest and most beautiful in Greece, and had a front of Parian marble. In 480 B. C., Xerxes sent a detachment of his army to plunder this temple, which contained a large amount of treasure. As the Persians were climbing up the rugged path to the shrine, on a sudden thunder was heard to roll, the war-shout sounded from the temple of Athena, and two huge crags rolled down the mountain, crushing many to death. The surviving Persians were seized with a panic, and retreated without having effected their object. In 357 B. C. the Phocians seized the temple, and thus provoked the Sacred war, during which a portion of the treasures was expended in paying the troops of Phocis. Delphi was attacked in 279 B. C. by Brennus and an army of Gauls, who, it is said, were repulsed by the same supernatural agency as the Persians. The Delphic oracle was finally silenced by the emperor Theodosius. The site of Delphi is occupied by the modern town of Castri or Kastri. Pop. about 600.

Delphi, the capital of Carroll co., Ind., on the Wabash River and the Toledo Wabash and Western R. R. and the Indianapolis Delphi and Chicago R. R. It has six churches, a fine court-house, two weekly newspapers, two paper-mills, two planing-mills, excellent water-power, and one national bank. The Wabash and Erie Canal passes through it. Pop. 1614.

H. C. Craft, Ed. "Journal."

Del'phin Classics, an edition of the principal Roman classics prepared by thirty-nine of the best scholars of the time for the use of the dauphin of France (*in usum delphini*). Their work was superintended by Bossuet and Huet, preceptors to the dauphin, who was a son of Louis XIV.

Delphin'ium [so called from the resemblance of the nectary to the form of the dolphin], the name of a genus of poisonous herbs of the natural order Ranunculaceæ, commonly called larkspurs. The seeds of *Delphinium Staphisagria* and *Delphinium consolida* have powerful cathartic properties, and the alkaloid (*delphinia*) is recommended for paralysis and rheumatism. Both the annual and perennial kinds are favorite garden flowers; the double rocket larkspurs are especially rich and varied in color, and resemble hyacinths in their regular clusters. The genus *Delphinium* is closely allied to the aconites. Several species are natives of Europe, the U. S., and Mexico.

Delphi'nus [the Lat. term for dolphin], the name of one of the constellations of the northern hemisphere.

Delphi'nus, in zoology, a term limited to the species of Cetacea, having teeth simple and almost all conical in both jaws. They live in communities, and are the most carnivorous of the whole order. The Linnæan genus *Delphinus* is subdivided into *Delphinus* proper, *Phocæna*, the common porpoise, *Delphinopterus*, represented by the Beluga, and *Hyperoodon*, of which the bottle-nosed dolphin is the type. (See Dolphin.)

Del'phos, a post-village of Allen and Van Wert cos., O., on the Miami Extension Canal and on the Pittsburg Fort Wayne and Chicago R. R., 45 miles E. of Fort Wayne. It has a national and a savings bank, one newspaper, two building and loan associations, and good water-power, while fifteen smokestacks attest its industrial importance. Pop. 1667. D. H. Tolan, Ed. "Herald."

Del'ta [so named from their resemblance in form to the fourth letter (Δ) of the Greek alphabet], the triangular expanses of alluvial deposit formed at the mouths of certain rivers. They commence at the point where waters laden with mud first meet the sea, and from the constant mud-deposits gradually widen, until some, like the deltas of the Mississippi and the Nile, advance many miles beyond the coast-line. Deltas occur not only in the sea where fresh water meets the salt and is checked by the tides, but also in lakes, the accumulation projecting in the form of a tongue beyond the point at which the river enters the lake. The delta of the Ganges is the largest in the world. It is estimated that its head commences 220 miles from the sea, and its base-line measures about 200 miles.

Del'ta, a county of Michigan, in the S. part of the Upper Peninsula, is bounded on the S. by Lake Michigan. Area, 1100 square miles. The largest crop is of oats. It is intersected by the Escanawba and other small rivers, also by the Peninsular R. R. Capital, Escanawba. Pop. 2542.

Delta, a county in the N. E. of Texas, organized since the census of 1870. Area, about 350 square miles. It is very fertile and well timbered, and is a good region for grain, cotton, and stock-raising. Capital, Cooper.

Delta, a township of Clay co., Ala. Pop. 924.

Delta, a post-village, capital of Madison parish, La., on the Mississippi opposite Vicksburg, Miss., with which it is connected by ferry. It is the E. terminus of the North Louisiana and Texas R. R. It has one weekly newspaper.

Ed. "Madison Journal."

Delta, a township and post-village of Eaton co., Mich. Pop. 1154.

Delta, a post-village of Lee and Western townships, Oneida co., N. Y., has a tannery and a foundry. P. 270.

Delta, a post-village of Fulton co., O., on the Lake Shore and Michigan Southern R. R., 25 miles W. by S. from Toledo. It has one newspaper-office. Pop. 753.

Del'ton, a township of Delta co., Mich. Pop. 833.

Deluc (Jean André), F. R. S., a Swiss geologist and natural philosopher, born at Geneva Feb. 8, 1727. He invented a portable barometer, and published in 1772 "Researches on the Modifications of the Atmosphere." Soon after that date he removed to England, was chosen a fellow of the Royal Society, and became reader to the queen. He published in 1778 "Letters, Physical and Moral, on the History of the Earth and Man," in which he defended the cosmogony of the Bible, and ascribed the formation of the present continents to a great and violent revolution which occurred about 4500 years ago. He wrote several other works in French. He became a professor in Göttingen in 1798, but subsequently returned to England, and died at Windsor Nov. 8, 1817.

Del'uge [Lat. *diluvium*, from *di* (for *dis*), "apart," and *luo*, to "wash"], an inundation or overflow of land by water, a term especially applied to the flood in the time of Noah, an account of which is given in Genesis vi., vii., and viii. It is often estimated to have occurred B. C. 2516, but its date may have been much earlier. Traditions of the Flood occur in many countries. Among the more important of these is the Chaldæan account preserved in a fragment of Berosus, and somewhat resembling that given in the Bible. Mr. George Smith has published (1872), from the cuneiform inscriptions, a very remarkable account of the Flood, corresponding in many particulars with those of Moses and Berosus. Bunsen states that no trace of Noah's deluge is found in the Chinese traditions, but missionaries, both Protestant and Roman Catholic, assert that the Chinese have a story remarkably like that contained in the Bible. The Mahâbhârata of the Hindoos contains still another tradition of the same event. The ancient Mexicans and many other tribes of American Indians have similar accounts. The same is true of the ancient Phœnicians, Greeks, and many other nations, ancient and modern. The Egyptian monuments appear to have no account of a general flood.

It is now generally held by Christian scholars that the flood recorded in the Bible was local, and not universal. The language of the original account does not necessarily imply more than this.

Delusion. See Insanity, by W. A. Hammond, M. D.

Del'vino, a fortified town of European Turkey, in Albania, is situated on a hillside covered with olive and orange groves, 47 miles W. N. W. of Yánina. It has a trade in olive oil. Pop. about 10,000.

Dema'des [Gr. Δημάδης], an Athenian orator and demagogue, who was a violent opponent of Demosthenes. He was witty, eloquent, and profligate, and acquired great political influence. He fought against Philip of Macedon at Chæronea, 338 B. C., but afterwards took a bribe from that king, and favored the interest of Philip and his son Alexander. He was put to death by order of Antipater (or Cassander) in 318 B. C.

Demand and Supply. See Political Economy.

Demarca'tion, or **Demarkation,** a line or boundary by which one object is separated or marked off from another; a limit ascertained and marked, or the act of ascertaining and marking a limit; the "dead line" between two armies. The "line of demarcation" is a name given especially to an imaginary N. and S. line drawn by Pope Alexander VI., 360 miles W. of the Azores, all newly-discovered lands to the eastward being granted by him to Portugal, and all westward to Spain (1494).

Demavend', a volcanic mountain of Persia, about 45 miles N. E. of Teherân, is the highest peak of the Elburz chain, which separates the low shores of the Caspian Sea from the high table-land of Persia. It has a conical form and a crater-shaped summit, which is covered with a large

deposit of sulphur. Its height is about 21,000 feet, as recently determined by the Russian survey. An Englishman (William T. Thompson) ascended to the top of Demavend in 1837. As it is a conspicuous object from the great trade-route between India and Western Asia, it is connected with the early Persian legends as Etna with those of the Greeks. It is classed among extinct volcanoes.

Dem'bea, or **Tzana,** a lake of Abyssinia, in lat. 12° N. and lon. 37° 15′ E., is 40 miles long, and has an average width of 25 miles. It occupies part of a fertile plain, and is 6108 feet above the level of the sea. A branch of the Blue Niles issues from this lake.

Dembin'ski (Henry), a Polish general, born in the palatinate of Cracow Jan. 16, 1791. He fought against Russia in the revolution of 1830, and made a masterly retreat from Lithuania in July, 1831. He afterwards passed many years in exile, and was appointed commander-in-chief of the Hungarian army by Kossuth in Feb., 1849. His success was hindered by the enmity of Görgei, who refused to serve under him. Dembinski soon resigned the command, and fled to Turkey. Died June 13, 1864.

Dement, a township of Ogle co., Ill. Pop. 1120.

Demen'tia [from the Lat. *de*, priv., and *mens*, "mind"], a form of insanity characterized by gradual extinction of all the mental powers. It is one of the most hopeless forms of mental disease.

Demera'ra, a small river of South America, in British Guiana, flows northward, and enters the Atlantic Ocean near lat. 6° 50′ N. and lon. 58° 20′ W.

Demerara is also the name of a county in British Guiana, intersected by the above river. Its inhabitants are Europeans, Indians, coolies, and negroes. Capital, Georgetown. Pop. about 80,000.

Demesne, de-mēn′, or **Demain,** in law, originally that portion of the lands belonging to a lord which was held in his own occupation or reserved for his immediate use. Hence it is sometimes used to denote those parts of a manor which the lord has in his own hands. In the present day it may be defined as the right which the owner in possession of lands in fee simple has in his estate.

Demeter. See Ceres.

Deme'trias [Gr. Δημητριάς], a city of Thessaly, at the head of the Pagasæan Gulf, founded about 290 B. C. by Demetrius Poliorcetes, became a favorite residence of the Macedonian kings. Its remains are still visible.

Deme'trius, an architect who is said to have completed, in conjunction with Pæonius the Ephesian, the temple of Diana at Ephesus. His period and country are not certainly known. Henry Drisler.

Deme'trius, probably of Alopece in Attica, a statuary who flourished, according to Sillig in his "Dictionary of Artists," about B. C. 440. He imitated nature so closely in his works that he reproduced imperfections as well as beauties, for which he is censured by Quintilian. Among his productions are a statue of Lysimache, priestess of Minerva, one of Minerva *Musica*, so called from the serpents of the Gorgon on it emitting a musical sound when struck, and an equestrian statue of Simon, the first writer on horsemanship. Henry Drisler.

Deme'trius, a silversmith of Ephesus, who made silver shrines for Diana. When Saint Paul was in Ephesus, gaining many, both Jews and Greeks, to the true faith, this man excited a tumult against him among his fellow-craftsmen. Henry Drisler.

Deme'trius [Russian, *Dmitri*], czar of Russia, usually called the False Demetrius. He pretended to be a son of Ivan IV., who at his death in 1584 left two sons, Feodor and Demetrius. The latter probably died in 1591. The subject of this article raised an army of Poles in 1603, invaded Russia, and defeated Boris in battle. He began to reign in Moscow in 1605, but his partiality to the Poles offended the Russians, who revolted and killed him May 28, 1606. He was succeeded by Basil III., or Shuisky.

Deme'trius Phale'reus, an eminent Grecian orator and philosopher, born at Phalerum in Attica about 345 B. C. He was a disciple of Theophrastus the philosopher. He was appointed governor of Athens by Cassander in 317 B. C., and held that office ten years. His administration was so prosperous and popular that the Athenians erected to him, it is said, 360 statues. He escaped to Egypt when Athens was taken by Demetrius Poliorcetes in the year 306. He was the author of many historical and philosophical works, which, with the exception of fragments, are not extant. Died in Egypt about 284 B. C.

Demetrius Poliorce'tes [Gr. Δημήτριος Πολιορκητής (*i. e.* "Demetrius the besieger of cities")], a king of Macedon, born about 335 B. C., was a son of Antigonus, king of Asia. He was surnamed Poliorcetes, "besieger of cities," on account of his success as a general. He fought for his father against Ptolemy of Egypt in Syria. In 306 B. C. he captured Athens from Cassander, and defeated Ptolemy in a naval battle near Cyprus. He gave proof of superior military skill in a long siege of Rhodes, but he failed to take that city. After the death of Antigonus (299 B. C.) he formed an alliance with Seleucus. He usurped the throne of Macedon in 294, but was driven out by Pyrrhus and Lysimachus. Died about 283 B. C. (See Plutarch, "Life of Demetrius.")

Demetrius of Byzan'tium, a Peripatetic philosopher—probably the same, Westermann thinks, with the Demetrius who sought to dissuade Cato from suicide at Utica. Athenæus quotes a work of his by the title "περὶ ποιητῶν," and sometimes by that of "περὶ ποιημάτων," but they are no doubt the same work. Some fragments of this writer have been found in manuscripts discovered at Herculaneum. Henry Drisler.

Demetrius of Su'nium, a distinguished Cynic philosopher, enjoyed a high reputation for correctness of life and firmness of principle. He lived at Rome under the emperors from Caligula to Domitian, and was the friend of Thraseas Pætus and of Seneca. Living with the greatest strictness himself, he did not hesitate to censure even those in high position, for which freedom of speech he was banished. He is probably the same philosopher as the Demetrius of Corinth mentioned by Philostratus, according to Ritter, who gives a summary of his doctrines in his "History of Philosophy," vol. iv., p. 168, English translation. He left no writings. Henry Drisler.

Demetrius of Scep'sis, a Greek grammarian, flourished about 210 B. C. From Strabo and Athenæus we learn that he composed an extensive work in at least twenty-six books, full of historical and geographical information about the places mentioned in the catalogue of ships in the second book of the "Iliad" ("Τρωϊκὸς διάκοσμος"). The fragments are indicated in Müller's "Fragm. Hist. Græc.," vol. iv., p. 382. Henry Drisler.

Deme'trius So'ter [Gr. Δημήτριος Σωτήρ (*i. e.* "Demetrius the Preserver"), so called by the Babylonians because he freed them from their tyrants], a king of Syria, born about 185 B. C., was a son of Seleucus Philopator. He was a hostage at Rome when his father died in 175 B. C., and his uncle, Antiochus Epiphanes, obtained the throne. Having escaped from Rome in 161, he was proclaimed king by the Syrians. He waged war against the Maccabees. Syria was invaded by Alexander Balas, by whose army Demetrius was defeated and killed in 150 B. C. His son, Demetrius Nicator, eventually became king of Syria.

Demetrius the [Second] **False,** another pretender to the throne of Russia, began to urge his claim in 1607. He affirmed that he was Demetrius, the son of Ivan IV., and was supported by many partisans. He was killed by a Tartar chief in 1610.

Deme'trius Triclin'ius, a Greek scholiast who flourished in the fifteenth century. He is known for a recension of the text of Sophocles, which long served as a basis of subsequent revisions. He also composed scholia on Sophocles, first published by Turnebus in his edition, and two other works on the same poet, the one on the metres (περὶ μέτρων), the other on the figures (περὶ σχημάτων), which, however, are of no great value. He compiled scholia also on Hesiod, Pindar, and Aristophanes.

Henry Drisler.

Deme'trius Ze'nus, of Zacynthus, about 1530 A. D. translated the "Batrachomyomachia" into modern Greek in the so-called στίχοι πολιτικοί (popular verses). This is printed in Ilgen's edition of the "Homeric Hymns," pp. 123–139, with a Latin translation by M. Crusius. The best edition is that of Müllach, Berlin, 1837. He composed a poem in the same measure on Alexander the Great, printed at Venice, 1829. Henry Drisler.

Demetz (Frédéric Auguste), a French philanthropist and judge, born May 12, 1796. He visited the U. S. in 1836, for the purpose of examining the prisons. About 1840 he founded at Mettray, near Tours, an institution for the reformation of juvenile offenders, which was successful. His system has been adopted in England. Died Nov., 1873.

Dem'i, a prefix derived through the French from the Lat. *dimidium*, "half" (from *di*, "through," and *medium*, the "middle"), denoting a division into two parts; thus a demi-lune is a half moon; a demi-god is a half-divine being, etc.

Dem'i-Bast'ion, in fortification, a half bastion, which frequently terminates the branches of a crown-work or horn-work, and is occasionally used in other places.

Demi-god [Gr. ἡμίθεος; Lat. *semideus*; Fr. *demi-dieu*;

Ger. *Halbgott*], literally, "half-god," the name given to certain fabulous heroes of the Greek and Roman mythologies. They were sometimes deified heroes, and sometimes the offspring of a divinity and a mortal.

Demi-Lune [a Fr. term signifying "half-moon," so called because it is somewhat crescent-shaped], in fortification, is a work constructed to cover or defend the curtain or wall of a place and the shoulders of the adjoining bastions. It is composed of two faces, forming a salient angle towards the outside.

Demi-Monde [Fr.], the "half-world," a name applied originally to those classes in large cities who, with neither wealth, rank, nor culture, adopt a fashionable mode of living. Of late it designates that class of Parisian women who, while they are leaders of fashion, are excluded from the best society on account of their doubtful reputation.

Dem'ing (Henry C.), born at Middle Haddam, Conn., in 1815, graduated at Yale in 1836 and at Harvard Law School in 1838. He translated some of Eugene Sue's novels, but was better known as an able lawyer and Democratic politician of Hartford, Conn. He held many prominent State offices. In 1861 he became colonel of the Twelfth Connecticut Volunteers, serving in Louisiana, and was mayor of New Orleans (1862–63). He was a Republican member of Congress from Connecticut (1864–68). Died at Hartford, Conn., Oct. 9, 1872.

Demir-Hissar ("iron castle"), a town of European Turkey, province of Room-Elee, on the river Struma, 13 miles N. N. W. of Seres. It is defended by an old castle. Pop. about 8000.

Demiur'gus, or **Dem'iurge** [from the Gr. δημιουργός, "working for the people," from δῆμος, the "people," and ἔργον, "work"], a word originally applied to an artisan or workman, afterwards used by Plato, and especially by the Neo-Platonists and the Gnostics, to designate the Creator of the world, who was conceived by the Gnostics to be a being inferior to the Supreme Deity. The name was also given to the highest magistrate in some of the Grecian cities.

Demmin', a town of Prussia, in Pomerania, on the river Peene, about 75 miles W. N. W. of Stettin. It is very old, and was formerly fortified. It has manufactures of hats, woollen and linen fabrics, hosiery, etc. Pop. 9050.

Dem'mit, a county in the S. of Texas. Area, 1050 square miles. It is intersected by the Nueces. Wood and water are scarce, but the pasturage is fine. Pop. 109.

Democe'des [Gr. Δημοκήδης], an eminent Greek physician of Crotona, was born about 550 B. C. He was taken prisoner by the Persians, and carried to the court of Darius I., to whom he gave medical advice. The queen Atossa, whose favor Democedes had gained, persuaded Darius to send him to Greece with a small party of Persians on a secret mission. Democedes escaped from them and returned to Crotona.

Democh'ares [Gr. Δημοχάρης], an Athenian orator, a nephew of Demosthenes, was a leader of the anti-Macedonian party. He was banished about 295 B. C., but returned in 287 or 286, after which he rendered important service as minister of finance. Died after 280 B. C.

De'mocles (Δημοκλῆς), an Attic orator trained in the school of Theophrastus, was a contemporary and opponent of Demochares (which see). He is believed to have left written orations, since Dionysius of Halicarnassus attributes to him an oration previously ascribed to Dinarchus. Dionysius and Suidas call him Democlides.

Democ'racy [Gr. δημοκρατία, from δῆμος, "the people," and κρατέω, to "rule"]. A state in which the people at large possess the whole sovereignty is rightly denominated a democracy. At most, there are but three clearly distinguishable methods of government—the monarchical, the aristocratic, and the democratic; that is to say, the rule of one, of a number, or of the whole. The first two are of like nature, and might properly be treated as one; the last is altogether antagonistic to both of the others. The prefixes despotic, hereditary, and elective merely describe varieties of the first; an oligarchy is only a particular kind of the second; and such terms as republic and commonwealth import little that is distinctive as to political structure. Statesmen and philosophical writers apply them indiscriminately to states which differ greatly in the principles of their respective governments.

Of sovereignty in other forms there has been ample experience, but governments based exclusively upon the democratic principle, without any admixture of other elements, have not been known until a recent period on any considerable scale. Consequently, the true nature and tendency of that principle form an interesting theme.

A pure or simple democracy may conveniently regulate a prescribed portion of the civil authority within a subordinate district; and perhaps it is competent to the exercise of supreme power in an independent state of slight extent; opinions concur in denouncing it as impracticable in a large one. Deciding questions of policy by direct vote is a practice of this nature, but when performed by ballot it is subject to serious objections. If the entire elective body could meet at the same time and place, and in such a way as to admit of deliberate conference and consultation, the judgment of a majority might be esteemed valid. This, however, is not possible; nor can its place be supplied by discussion in partial assemblies, much less by the essays of a various press, each addressing its own narrow circle, and mainly unread beyond.

The representative form may therefore be regarded as the only practicable method of administering government on the democratic principle. Consistently with it political power may be denied to some members of the state, who are nevertheless entitled to protection and such privileges as are suitable to their condition. Age, sex, or ascertained unfitness may form grounds of exclusion; so in respect to a distinct race very inferior in numbers, as, for instance, the whites of Hayti. The right to exclude criminals after their guilt has been ascertained is indispensable to the preservation of social order—and, practically, it may be aimed against a class, as in the known instance of certain polygamists—but it should never operate otherwise than upon the offending individual as a consequence of his personal delinquency. Even in this case, pernicious opinions cannot properly be held to impair the citizen-right, though foreigners known to entertain them may be denied naturalization or hospitality in any form. With this qualification, it may be broadly asserted that democracy, as a principle, entitles each citizen, in common with every other, to an equal interest in the state. A government based upon it can acknowledge no conflicting interests among the people to be favored or opposed. All its legitimate ends are accomplished when public safety and individual liberty are maintained. Restraining the turbulent and disorderly by a just administration of general laws, and providing food, raiment, and asylum for the impotent, it should leave all others in the quiet enjoyment of such social conditions as they may have created for themselves or derived from the ordinary incidents of life. In the main, it should be unfelt and unseen, or at least unperceived; the citizen should have no more vivid consciousness of the power which guards his civil rights than of the agencies whence flow his physical health or content of mind. Where the voice of the people is actually sovereign this must ever be the fact, for it is an irresistible deduction of reason that the supreme will never can intentionally enact a law which is not required, or, in other words, lay upon its own freedom any needless restraint. Hence the axiom, that in a democracy every positive regulation, not actually indispensable to the public and general welfare, which restrains, or even indirectly tends to restrain, individual liberty in any degree, however slight, so far violates the spirit of the constitution. It is an infraction of popular rights, and may justly be denounced as the offspring of unlawful force or of fraud. These agencies cannot be wholly expelled from any sphere; but it is the office of democracy to restrain their influence in official action within the narrowest limits. A contrast with its rivals will afford the best means of illustrating its tendency and usefulness.

The investiture of individuals with permanent political power by a title derived from personal descent is the primary element in monarchical and aristocratic states, as the absence of any such practice is the distinguishing feature of a democracy. An inequality of civil or political rights among those who were alike in all other respects could never have been deduced from the ancestry of individuals but for the assumed sacredness of office. At the outset the monarch could have been no more than the first officer of the state; the incipient aristocracy must have been composed of his subordinates; and it was not until offices became hereditary that the state was divided into two permanent classes, the rulers and the ruled. The existence of these two classes is the very essence of monarchy. Their interests are necessarily adverse—a circumstance enforcing upon the former a general activity in support of their preeminence. In states actually or approximately despotic standing armies and frequent wars are the forces for this purpose; where a nominal place is assigned to the democratic principle, permanent political parties might serve in lieu of the soldier to uphold the political machinery, but, in general, they only supplement him. The measure of governmental activity in monarchical states has varied from the grinding tyranny prefigured by Nimrod the man-hunter down to that modern crown which is a mere bauble, absolutely inert, save so far as it involves expense and a consequent burden upon labor. From the earliest times wars have been found necessary, not only to give employment to the state

officers—*i. e.* the king and his nobles—but also to color the pretence of their usefulness, and through military discipline to organize in their hands a power adequate to support their authority. Thus, in great monarchies the so-styled common people have always been oppressed by enormous establishments, military or naval, or both. These are easily justified to unreflecting observers on the score of necessity, for aggressive wars by monarchs in furtherance of ambitious designs being of constant recurrence, armed organization for defence seems a requisite. War, with its inherent rapine and cruelty, is not, indeed, due to the crimes of any one monarch; but the fact remains patent that it is an evil founded in the principle of monarchy, and inseparable from it. The active and enterprising spirits of every clime and age have found seductive occupation in these war-establishments, and through their agency large portions of society have always been withdrawn from useful employments to feed upon the labor of the rest. The desolation produced by foreign wars, and the internal oppression resulting in time of peace from war-establishments and their adjuncts, are both due to the vices of the ruling classes. In this self-evident proposition effectual reforms must long since have taken root but for the natural tendency to accuse our neighbors instead of correcting our own faults, and the difficulty of the latter task in any one of many neighboring independent states.

The annals of government are consequently little else than a recital of the devices by which from the beginning every civil society has been preyed upon by its own official corps. This is easily effected wherever monarchy or aristocracy prevails. Democracy, being based upon absolute equality, admits of no governing class, nor of any interest adverse to the people in those who conduct the public business. But by artifice and irregular methods the latter may become a class, may grasp powers incompatible with the nature of the government, and may involve their country in all the evils incident to hereditary rule. Persecution for moral non-conformity, so grateful to the ill-regulated mind, may be from time to time practised until resistance is provoked and a color afforded for war. To this condition the grandly patriotic spirit engendered by free institutions gives great force and breadth; the entire people at once rush to arms, and public debt is incurred at a pace twenty-fold more rapid than would be tolerated under the cautiously regulated corruption of monarchies. These are abuses, and are deviations from the democratic principle. Their prevention is the duty of every good citizen.

Unmixed democracy is the principle of government recognized in Switzerland and in various portions of the American continent. In the U. S. of America it nominally exists, and upon the grandest scale. They therefore present the best practical illustration of what it is in its present stage of development. Any shortcomings in practice there discernible may serve to indicate the advisable line of progress in endeavoring to perfect its machinery; and what many other nations seem inclined to imitate ought to be freed, if possible, from existing defects.

The founders of the American Union recognized not only the ineptitude of monarchy and aristocracy, but the necessity of repressing in the newly conceived system their most conspicuous abuses. Standing armies were denounced as dangerous to liberty; wars for the extension of territory were regarded as unjust, foreign alliances as inexpedient, and public debt as mischievous; but, strangely enough, no barriers whatever were instituted against any of these practices. On the contrary, powers to introduce and foster the most dangerous of them were expressly delegated, in the name of the people, to their public agents. The natural ill-effects were foreseen; but they were deemed susceptible of being kept within endurable bounds. Monarchy and aristocracy were indeed effectually repudiated for the time. Neither could long exist without hereditary distinctions, nor could these be upheld where commerce in land was free, and inheritances were equally partible by compulsion or from social habit; so primogeniture and the accustomed contrivances for rendering estates permanently inalienable were extirpated. This was effected by laws harmonizing so perfectly with the common instincts of humanity as to seem proof against repeal. In view of these things, and of the advances attained in civilization and power of thought, the most despondent do not anticipate that distinct ranks in society can ever be re-established. Americans therefore regard monarchy and aristocracy as utterly and irrevocably banished from their country, and consequently suppose that in the U. S., and for those countries which may reconstruct their political fabrics upon the American model, democracy has fulfilled its mission. Yet perhaps this great and just principle has not yet accomplished more than a modification of the social evils initiated, nurtured, and brought to maturity in the Old World by its opposites, monarchy and aristocracy.

In framing every government hitherto instituted amongst men, one of the aims was to enable the rulers—by which is meant the office-holders—to gratify their ambition or their avarice, or both, at the expense of the ruled—that is to say, the mass of the people. The former, as military or political leaders, have always laid the foundations, and have anticipated, at the least, employment in superintending the structure. Purity of motive may be admitted in many cases, so far as individual consciousness is concerned; but self-love is both inherent and blind. The founder, while conscious of no object but the public good, has always had an eye to his own gratification, and his work has invariably been in some respects accommodated to that end. This infirmity tainted the most ancient political structures, and has in some degree affected all their successors. Organizing places and public employments has ever received an attention not measured by necessity, or, in other words, by the interests of the people. We have seen, accordingly, that whilst ostracising monarchy the founders of the American Union invested it with most of the powers by which the few had oppressed the many in all previous times.

The State governments were framed in the same way. The powers of government in common use, originally designed by the office-holding aristocracy to create or uphold their own interests against the governed mass, were all sanctioned. Under the vicious and unjust systems previously existing they were no doubt indispensable; they were therefore assumed to be necessary, even in a representative democracy. Conceding all these functions to be thus inseparable from regular government in any of its forms was the error of that day. Assuming this, the manifest and undeniable tendency to abuse furnished no support to any useful argument. It only led to further error. It was thought to prove the necessity of devising various new artificial checks. And in compliance with this reasoning there was generated, in the councils of a simple and frugal people, a government which, though based upon a single principle, and that of the simplest nature, was without a parallel in the multitude of its offices, in the multifariousness of its forms, and in its general complexity. As the checks and balances of the mixed system existing in England had developed the best administration then known, it was thought that, monarchy and all hereditary distinctions being excluded, complexity would afford adequate preventives of official malversation. The same example induced a reliance upon the free action of political parties as a motive-power to keep the official counterchecks in healthy action. Obvious distinctions between the old and the new governments seem to have been overlooked. In the former permanently antagonistical interests were legalized, and so commingled in the political constitution as to induce and necessitate continual conflict as a duty. Each of the three estates was there obliged to maintain a constant contention with the others, in order to protect its own peculiar and rightful privileges; whilst in the U. S. there were to be no classes, no separate estates, and no peculiar privileges. Everything was reduced to the dead level of absolute equality; there was nothing fundamental that needed a check or requiring to be balanced; peace and tranquillity were the spirit and nature of the government adopted. The practicability of a government amongst frail mortals with objects and leading to results so grandly beneficent was, however, an untried experiment. Those who inaugurated it did well; their achievements were creditable, even though perfection may not have been attained. Progress in modes of enforcing the principle instituted was, doubtless, the patriotic expectation of those who, while dreading the powers created, found themselves unable, from want of apposite precedents or experience, to construct at that time a more perfect system. Oppression by a permanently privileged class had theretofore been the grievance of nations. Such a contradiction in terms, and apparently in fact, as oppression of the people by themselves was not anticipated; to their virtue and intelligence it was therefore committed to carry the experiment to its full fruition, with an admonitory warning that perpetual vigilance was the price of liberty. The extent to which popular vigilance could be kept in beneficial action was then a problem; in some respects it is still so.

In a great and prosperous state the private interests of business or pleasure afford engrossing employments. Minds fully occupied with such subjects cannot be at the same time employed on large conceptions of governmental policy and in devising plans for their execution. This is more especially true in respect to that portion of the citizens who are most favored by fortune or have enjoyed the highest advantages of education and culture. It is eminently true of those in affluence. An active attention to great political interests by the latter is a rare phenomenon. The wealthy who are unsatisfied and still thirsting for

more are equally regardless of governmental action, unless led to seek aid for their private enterprises through official favoritism. The necessary, and of course quite excusable, pre-occupation of the citizens in their private affairs, not lack of judgment or intelligence, will be found, on a careful scrutiny, to be the great impediment to wise and just administration in representative democracies. There is much injustice on both sides in the mutual criminations which disfigured the early debates of parties in America on this topic. It was never a fact that one party distrusted the popular judgment, or that the other relied upon it. All the leaders well knew that, as the political system was arranged, the people could never act directly on public affairs, and those leaders failed to devise an effectual method of securing in permanence the choice of desirable legislators. It is a delusion to suppose that in a representative democracy popular attention can be kept riveted on public affairs by the contentions of party. In mixed governments this may be possible. There antagonistical parties are supposed to be founded on conflicting ideas or principles expressed in intelligible maxims, and the original faith of each party, together with the social and political condition in which it originated, is consequently perpetuated in the same lines from generation to generation. It may thus acquire a fixed place in the mind and heart, and may become an active moral sentiment. In a representative democracy there is no legitimate basis for just and honorable antagonisms of this permanent character. During the brief period of unsettled opinion whilst the constitution is being constructed and put into operation there may be aliment for such parties, but fundamental differences of political sentiment must soon disappear. The citizens then find themselves blended together as one class, and occupying without distinction the same unalterable plane of absolute equality. Honest and intelligent political contention in the true sense of the expression must then cease. Thenceforth democrats are the only legitimate party; if any other can be supposed to exist, its members are foes to the constitution. It was only prior to and during the first decade of their constitutional union, if ever, that a monarchical party existed in the American States. During that brief period pure and honorable minds might have hoped for the re-establishment of ancient principles. When that hope perished a great change commenced. As in the nature of things was inevitable, the so-called political parties have ever since been gradually losing their hold upon distinctive opinions, and tending to a unity of views and purposes in which principles have little part. With such a unity parties can be nothing more than bands of rival leaders, keeping on foot, and employed as their respective forces, bodies of traders in the business or occupation of manipulating the masses, the ballots, or the returns. A government carried on by such agencies must at last attain a worse perfection than any which could exist under monarchical forms. According to these, the king and his nobles, as ruling officers, have a permanent interest in the state descendible to their heirs. For the protection of that inheritance and for the benefit of their posterity they will take some care of the state. In a representative democracy the office-holders of the hour are the rulers of the hour; their term is brief, and if corrupt they will, like the similarly situated pashas of Turkey, make haste to grow rich, for their positions are soon to be surrendered to others.

It is not through parties contending for control of the government that the benefits of democracy can be realized. The principle itself must be placed beyond the power of such parties. Permanent barriers, like those devised against monarchy, must be introduced, which shall absolutely restrain governmental agents—that is to say, the office-holders—from any action not indispensably necessary to the common weal. Public offices and employments must be thus rendered undesirable to the indolent and the avaricious. If this can be effected under any form, it is possible in a representative democracy. The other principles are directly opposed to it, and wholly incompatible with it. Its practicability in the former depends upon the question whether a persistently active and capable supervision of the ruling office-holder can be established among those who neither hold nor expect office—that is to say, among the burden-bearing multitude who support the official corps. The last requisite is thus pointedly defined for the purpose of excluding from reliance in their assumed office as "sentinels on the watch-tower of liberty" the organized class of office-seekers, constituting, in partisan phraseology, the opposition. In effect, and quite consciously too during advanced stages of political degradation, these will actually become allies of the party in power. Their function is to perpetuate among the people a delusive reliance upon that pretended but unreal conflict concerning principles which traders in politics always affect. Through the ordinary revolutions of the political lottery such contestants divide between themselves, and alternately enjoy, all that through the forms of law can be wrung from the multitude. They have been known to concert in perfect harmony before elections the means of accomplishing a prearranged result.

Democracy, regarded as a principle, plainly indicates the means of instituting this needful supervision. On public emergencies the heroic virtues do indeed exhibit themselves in acts of great disinterestedness, but there is very little of this spirit displayed whilst nations are in their normal condition. In an exceedingly small or greatly impoverished country the vices natural to rulers may, indeed, be without opportunities; but in a great and prosperous state there is no possible safeguard against robbery by those who control the machinery of government, if the machinery be, in itself, adequate to effect that object when pushed to its utmost capacity. Those who enact the laws and administer them will always promote their private interests at the public cost if vested with sufficient power. Such is human nature, no matter what form or name the government may adopt. Democracy accepts this as an indisputable truth, and, distrusting all rulers, it gives to none of them any power that can safely be withheld. The policy of instituting checks upon power unavoidably granted, though not to be absolutely repudiated, is of little value. Appointing one set of official persons to watch another is a bootless contrivance. The remedy really aggravates the disease; it fosters the primary evil of government—a multiplication of public agents. The watcher and the watched soon learn to co-operate for joint benefit in the work of deluding the mass, whom it is the interest of both to circumvent. The judiciary may form an exception. The ancient practice of assigning reasons for the judgment pronounced still exists, and the duty is regarded as unavoidable. This, with the institution of review on appeal, does afford a protection of some strength. Besides, for the honor of our common nature let it be said, as it is true, that the habitual study of justice tends to create a sincere love of it.

The inherent vice of all governments is a tendency amongst the official rulers to devour the people's substance, and the only remedy is in a strict application of the democratic principle. All powers which can be dispensed with should be withheld from the government, and numerous vicious methods now in the highest favor should be suppressed. Permitting revenue or the means of defraying public expenditures to be drawn from duties, imposts, excises, loans, or any source whatever other than immediate taxation, enables those who control the administration to conceal their waste of the people's wealth, and protects them from any effective supervision. Compelling them to procure all revenue from the last-named source would obviate both of these evils.

This assertion may require proof. It has been shown that the whole electoral body cannot directly govern. Even were the electors composed only of the most learned and enlightened of the non-office-holders, they could afford neither the time nor leisure to govern directly by their own act, or to watch the machinery of government in its varied details, and by that sort of guardianship prevent abuse. They could not even study, in this extended sphere, the character and capacity of their representatives. To hope for any of these things were idle and visionary. There is just one thing tending to secure good government, and one only that the mass can do. Each citizen can for himself—and if suitably spurred to the duty he will—give attention to preventing exactions from his own private purse, made directly before his eyes by government officials. From this tendency of the human mind a supervisory spirit among the tax-paying electors may be evoked. In great emergencies patriotic zeal may be relied upon, but the needs of every-day life can be supplied in no other way than by thus appealing to the common and constantly active impulses of mere individual self-interest. The difficulty of inducing the citizen to pay taxes directly must be admitted. The very quality of mind which is relied upon for thus utilizing public expenditure, and consequent taxation, creates an aversion to this duty. The evil art of the politician who calls himself a statesman consists in perceiving and acting upon the absurd preference for being robbed extensively through the secret and unfelt instrumentality of duties, excises, and the like, rather than paying directly moderate exactions in the form of taxes. This weakness of the citizen forms the strength of those evil counsellors who misgovern the state. It must be corrected, or intolerable evils will ensue. In the action of Congress, of the State legislatures, and of the municipalities official extravagance has been fostered to a shocking extent by allowing these unfelt methods of raising revenue, borrowing money for long terms on the public credit being the most promi-

nent. Unless the numerous governments intertwined in the American system can be checked in this career, the system itself must ere long perish. This cannot be accomplished otherwise than by absolutely forbidding all methods of obtaining revenue or funds for outlay other than immediate taxation. The use of those other methods is the root of every avoidable governmental abuse that exists in the U. S., or that, in the nature of things, can exist in any country blessed with a democratic constitution. If taxes form the only allowed sources of expenditure, frugality will ensue, and under the shadow of frugality serious mischiefs can scarcely prevail. Though labor may ultimately sustain it, simple taxation must always be paid, in the first instance, by those who possess property. A policy which would draw directly at the moment of need, and from the pockets of this class, through the immediate agency of the tax-gatherer, the whole supply for public expenditure, would keep its members, from a regard to their own private interests, under the pressure of a constant and potent stimulus to restrain injudicious enterprises in war or peace. Such a policy would induce effective attention to the election of inexpensive legislators. It would form a double goad, prompting the constituent to vigilance on this one point in the choice of his representative, and coercing the latter to frugality. A more extensive sphere than this will never be acted on by any beneficial vigilance of the elector: the unalterable constitution of human nature forbids it.

Perhaps the class referred to will never consent to place themselves under this incitement to diligence. If so, the great North American republic should not be adopted as a model by revolutionists, for ere long, in closing its career as a democracy, it may extinguish the last hope of good government, and confirm views expressed by a philosophical historian two thousand years ago. "From the despotism," says he, "in which it naturally begins, every human society passes through a succession of governments, each more liberal than its immediate predecessor, but each in its turn decaying from internal abuses, until at last, having reached the loosest or most liberal form attainable, a refuge from intolerable evils is found by completing the circuit and returning to that arbitrary rule under which it commenced. Thus it has ever been and ever will be with human governments." This prediction may not be verified if the Americans will expunge from their fundamental law the powers which are foreign to its nature and fatal to its usefulness. The changes needed are not organic except in form; they involve no departure from any principles adopted or sanctioned by the fathers; they only remove the seeds of decay inadvertently sown by copying administrative rules from monarchical precedents. The most important of these changes has been stated; some further illustration may be proper.

The creation of public debt diminishes present drafts upon the people, as duties, excises, and the like expedients conceal them. Both, consequently, facilitate wars and needless public works. War delights inconsiderate youth by its excitements and grasping age by its tender of the most desirable investments. Thus, the greatest of evils is hailed as a blessing, and profligate expenditure for purposes civil and military made easy. If, on the contrary, every governmental outlay were immediately defrayed by the taxpayers, very different results would ensue. The most wary and influential of the citizens, instead of being tempted to foster expense, would find in the shadow of the approaching tax-gatherer a potent stimulus to labor for its prevention. The consequent diminution of government jobs would relieve from public employ the multitudes whom corrupt officials now drive to the polls as cattle to the shambles. Free trade would follow as an inevitable consequence, and the enormous patronage of the custom-house would cease, together with a multitude of connected abuses and oppressions. The rapine and favoritism displayed in taxing all others for the means to confer a bounty upon manufacturers would likewise disappear. The prevalent weakness before adverted to is exhibited in advocating a tariff reduced to the revenue standard. Obtaining revenue in this secret or unfelt method, independently of its keeping up a costly and vicious establishment, is in itself a positive evil. A sensibly felt pressure, in the form of taxation, is an indispensable provocative to that vigilance among the tax-paying electors which cannot be dispensed with. Indeed the only political evil to be apprehended from the extensive reforms suggested in this article is that the expenses of government might become so reduced that taxation to defray them would cease to be felt, and consequently cease to spur the elector to care in the choice of his representatives.

There should be no governmental authority over the coinage, over any currency of commerce, or to issue paper for circulation as money. No revenue or income should be derived from the public domain, nor should any gifts be made therefrom, unless in limited portions and for the encouragement of actual settlers.

By means of general laws admitting of no favoritism or partiality all requisite facilities, through corporate forms or otherwise, should be afforded to individuals for conducting every description of lawful business. This should include banking, insurance, establishing roads, canals, docks, fairs, or markets, and furnishing supplies of every description, and like objects. Under this head there is the greatest room for progress in effectively applying the democratic principle, so as to prevent any needless action by the government, or the employment of its officers in any affairs that experience might show could be safely committed to individuals as a business. Regulation by general laws being sufficient for all useful ends in that connection, no power should exist to create, repeal, or alter any private corporation. Monopolies and fraudulent or extortionate rivalries in trade should be alike prohibited, as well as all power of enacting private laws. A general structural law for each kind of civil division, say counties, towns, cities, and villages, should be adopted, subject to alteration only by amendments likewise general in their application. This would at once reduce the volume of statute law, simplify its form, conduce to its intelligibility, diminish litigation, and restrain corrupt practices. Under a system of which this affords a specimen, laws might become few, simple, and easily understood. We should not behold in one single State of the Union a legislative body sitting for four months of each year, surrounded by a hired lobby, and engaged in confounding the courts and the people with two thousand pages of additional legislation, most of it hurriedly passed during the last week of the session in such confusion and disorder that the clerks, if disposed, can make alterations in bills after their passage and before their formal engrossment or authentication as laws.

The power to declare and wage war cannot be withheld, but it should be as much restricted as possible. Perhaps withholding power to borrow money is alone sufficient for this purpose. Some ingenuity might be required in framing inhibitions of other devices for the creation of public debt, but absolute prevention is not impossible, and is imperatively necessary. The power to borrow money, if it exist at all, cannot be limited or duly guarded. In a great and populous state, separated by a wide ocean from any powerful rival or enemy, armies, navies, forts, arsenals, military schools, and standing armies or navies of any description, however slight, might safely be dispensed with. Until a period quite recent, agriculture, manufactures, and commerce were degrading employments; no occupation was honorable except that of a soldier. This distinction might ere long be precisely reversed, and military service, as the adopted pursuit of a lifetime, be entirely unknown. Even before the telegraphic current had traversed the ocean the diplomatic corps was useless; it should be abolished. These alterations, besides reducing the cost of government, would leave unemployed a large amount of public property which might be judiciously applied to the reduction of existing debts. Dispensing with all preparation for public defence, and trusting for the safety of the state in every emergency to the means which might then be brought together, would not be hazardous. The history of our race affords abundant proof that in populous countries the spirit which rejoices in any opportunity to make war has always exceeded the necessity for its employment. Loyalty might imagine a danger to government from lack of power to suppress rebellion, but the policy suggested would render formidable rebellions impossible. Besides, wars are becoming disfavored even in monarchical states. The light of sound morality is penetrating even the dark jungle of hereditary domination, and creating a general repugnance to this mischief.

Little progress has been made in practically applying the democratic principle since its adoption. Few of the steps hitherto taken or as yet proposed by parties with that professed object are of a beneficial tendency. It might excusably have been imagined, though quite false in fact, that in the great exemplar of Americans, the aristocratic *quasi* republic of Great Britain, election by ballot would be a boon to the miserable mine-laborer or cottier. In free, fertile, and prosperous America it was wholly needless; its acceptance was a reproach to the poorer citizen and a scandalous acknowledgment of timidity in the rich. It opened the door to frauds innumerable. Its inutility to the dependent poor has been demonstrated. The governing faction of a city that employs in public works one-tenth of its electoral body has sent its workman to the poll in charge of a whipper-in, who, when near the ballot-box, furnished him with the favored ticket, and thence until its delivery to the official receiver watched the hand in which it had been placed. After the ballot there came, by degrees, direct election to a very great multitude of offices. This

folly has reached its climax. In New York, the greatest of the States, not one of the best-informed, most active-minded, and experienced citizens has within a quarter of a century exercised an intelligent choice in selecting the numerous ballots required at an annual election. The thing is absolutely impossible, unless submitting to the dictation of a caucus composed of politicians by trade can be deemed an intelligent act of the will and judgment. Knowledge as to the capacity or fitness of the nominees for the various stations to be filled could not exist in any instance, and consequently there could not be an enlightened choice. No people can ever sustain the burden of directly choosing numerous administrative officers. The popular voice should not be called into action except in selecting a very moderate number of officers, say the chief executive and the legislature. The fallacy of presidential electors should of course be abolished. The existing embarrassments under this head are about to be carried to the last measure of complication which perverse ingenuity is supposed to be capable of devising. The conception called cumulative voting is susceptible of being embodied in forms of innumerable variety. It demands a measure of skill, intelligence, care, and attention in the ordinary citizen which Newton or La Place could scarcely have commanded and brought into efficient action under the pressure of such disturbing influences as are necessarily attendant upon a popular election of the horde annually chosen. Indeed, the pursuits of the gambler would afford the best apprenticeship for the elector under such a system. In respect to all three of these devices, the ballot, the direct choice of administrative officers, and cumulative voting, candid and thoughtful minds can hardly differ. The tendency of each and all of them is undeniably to establish on a permanent basis the trade of politics.

The unsound conceptions which gave rise to the ballot are precisely paralleled in the recent laws limiting the hours of labor on public works. That law indicates among Americans a preparedness for servile dependence. A freeman should submit to no law on such a subject; his own voluntary contract should alone control.

Ancestral memories amongst Americans have consecrated religious liberty, and it has hitherto been maintained; but reformatory progress threatens to extinguish it by a political recognition of dogmas in Christian theology. The citizens who are not Christians, and at least one-fifth of those who are, would thus be rendered non-conformists, and might be made liable to disabilities, if not to pains and penalties, for their disloyalty to the orthodox constitution. The advocates of this measure may not be very powerful as yet, but among them are persons of high position and wide influence. This same pernicious conception may ultimately prevail in another form. The revolting sons of the early colonists were without adequate means of educating the young. Many of the race born in the city of New York during the present century attained full age without learning to read. A State school system was deemed judicious, and doubtless was so. Medicine is properly applied by charity or bounty to remove disease. This system, wherever applied, had, in its early stages, a beneficial effect. It dispelled that low grade of ignorance which was the only evil under this head demanding strong measures. But in process of time the trading politician seized upon State education, and rendered it, to a considerable extent, another foster-parent of the jobbery and electioneering abuses incident to a loose administration. It is in some places enormously expensive, a means of official patronage, and a football to be tossed to and fro in factious contentions. It seems a favorite design of many to render the education of children under State regulations compulsory upon their parents, notwithstanding that those regulations should require the use of particular religious books, and the consequent inculcation of theological opinions which may be disbelieved by the latter and not sought by the former. This would be a plain infraction of religious liberty. Religion can exist only as a conviction deeply seated in the individual mind, and it is believed to be essential in forming good citizens; yet from the variety of its forms non-interference with it by government is a fixed democratic dogma. Theoretically, there seems an inconsistency in these propositions, but practically they are found to harmonize. Religious convictions bring into full action the voluntary principle, and divine worship is nowhere more amply provided for than in the U. S. The differences of opinion constituting what is called sectarianism, apart from which religion is unknown, form the precise objection to governmental interference with religious worship hitherto relied upon. The education of youth in a method which should studiously exclude religious, or what, as has been seen, is the same thing, sectarian ideas, would be pernicious, as tending necessarily to form bad citizens. This would seem to show conclusively that in the present advanced state of American social life education of the young, like religious worship for the mature, should be left to the voluntary principle. To perfect the policy which from the first forbade governments to interfere with the latter, they should now be commanded to withdraw from control of the latter.

There is room for the introduction of many real reforms. Short terms and frequent elections are no doubt necessary as to the chief executive and the legislative bodies. Due responsibility to the real sovereignty—*i. e.* the people—cannot otherwise be maintained; but as to all other officers removals should be for cause only—that is to say, fault or incapacity. Rotation in respect to public agents of any kind is a mistake in doctrine. Faithful service and proved capacity are singular grounds of disqualification. It must be admitted, however, that no absolute right of the citizen is invaded by introducing certain limits to eligibility; and expediency may require it in respect to one office. Indeed, it can hardly be doubted that a long quarantine should be required between exercising military command and aspiring to the chief magistracy.

To guard against fraud, registry laws are expedient in densely-peopled districts. A considerable period should elapse between the registry and the vote, without allowing exceptions on account of intermediate changes in residence. The more fixed and permanent the elector's habits, the better his duties will be performed. No public interest is subserved by a multitudinous or floating constituency; it is enough if the electoral body be sufficiently large to secure efficient supervision in the choice of representatives. It would be expedient to exclude from the elective franchise all officers and employés receiving pay from the public. Vast benefits would result from this measure, and also from denouncing severe penalties against compelling this class to contribute towards the expense of elections.

The Federal government was designed as an organ of limited powers, yet it has exhibited ample capacity to crush or modify at will not only State institutions, but the States themselves. Practically considered, the latter exist merely by sufferance, holding, as it respects the essentials of political power, no higher relation to the central authority than towns or counties do to the States in which they are situated. As bulwarks of liberty or constitutional rights they are nearly if not entirely powerless. But while thus superannuated and rendered ineffectual for the high purposes of the founders, they exercise a power which tends to serious mischiefs. Through their conflicting legislation, enforced by independent judiciaries, they may ultimately derange the laws concerning trade, contracts, and some other subjects of general concern. By the identity of their language, moral ideas, and social habits, and by their essential proximity effected through railroads and telegraphs, Americans have become commercially and socially one nation. Conflicting laws and a jarring jurisprudence amongst them should be prevented, if prevention be practicable. A court of ultimate appeal, as well from the States as from the Federal tribunals, composed of judges selected by the States, and neither subject to official interference nor possessing coercive machinery of its own, might preserve this desirable unity of jurisprudence throughout the whole country. The want of such an institution has been keenly felt by the confederate cantons of Switzerland. A precedent may be found in that modern tribunal at Lübeck which reviewed the judicial action of four perfectly independent republics. Probably the Amphictyonic Council of ancient times had its origin in similar objects. Such a court might defend the political autonomy of the States against encroachments; and the Federal government could neither forbid appeals, nor force a judicial sanction of its own unauthorized acts by increasing the number of judges or otherwise. Indeed, the existing Supreme Court, which is enfeebled by its liability to such coercive measures, might then be dispensed with.

The course of reform suggested would eventually mature the democratic system by securing to all citizens the utmost measure of freedom, affording material progress every aid to its most perfect development which an equal and impartial government can bestow, and terminating official misrule. Its aim is to break the sceptre of the trading politician, and thus, at last, to establish liberty on the only reliable basis—a popular censorship on democratic principles, perpetually stimulated to its duty by the simple operation of intelligent self-interest.

CHARLES O'CONOR.

Dem'ocrat, a township of Carroll co., Ind. Pop. 1122.

Democ'rătes (Δημοκράτης), a supposed Pythagorean philosopher, under whose name a collection of moral sayings called the "Golden Maxims" (γνῶμαι χρυσαῖ) has come down to our time. These are written in the Ionic dialect, and are remarkable for their simple and correct character. The author is otherwise unknown, and the age of the col-

lection is not determined. They are printed along with the collection of DEMOPHILUS (which see).

HENRY DRISLER.

Democrătes, an Attic orator of the time of Demosthenes, was an opponent of the Macedonian party. He is mentioned in the Decrees in the oration of Demosthenes, "De Corona," as serving with Demosthenes on two embassies—the one to Philip to receive the oaths, the other to the Thebans to enlist them on the side of Athens against Philip. HENRY DRISLER.

Democ'ritus [Gr. Δημόκριτος], a celebrated and profound Greek philosopher, born at Abdera, in Thrace, about 460, or, some say, 469 B. C. He is supposed to have been a disciple of Leucippus, and to have received lessons from some Chaldæan magi. He inherited, it is said, from his father, a fortune of one hundred talents. In early life he travelled in pursuit of knowledge in Egypt, Greece, Persia, and India, and continued his travels until he had spent nearly all his patrimony. Having returned to Abdera, he declined political honors and employment, preferring to pass his life in study and retirement. He had a high reputation for virtue as well as learning. He appears to have been versed in geometry, physics, natural history, and ethics, on which subjects he wrote numerous works, but none of them are now extant. According to the later biographers he was called the "laughing philosopher," from his habit of laughing at the follies of mankind. He was a man of noble, pure, and diligent life. It appears that he admitted the existence of law in nature, but not that of design. He died 357 B. C. His system of philosophy is known as the atomic system. He taught that matter is eternal, and that the universe is composed of empty space and indivisible atoms which are infinite in number. To these atoms he attributes a primary motion, which brings them into contact and forms innumerable combinations, the result of which is seen in the multifarious productions and phenomena of nature. He imagined that the soul or thought is produced by the motion of round fiery atoms. Many of his ideas and theories were adopted by Epicurus, and explained by Lucretius in his poem "De Rerum Naturâ." Of his works only the smallest fragments have been preserved. (See G. H. LEWES, "Biographical History of Philosophy;" RITTER, "History of Philosophy.")

Democritus (Δημόκριτος), a statuary of Sicyon (whence his name appears also in the Doric form Damocritus), flourished B. C. 380. Pliny says that he made statues of several philosophers, and Pausanias assigns to him statues of victors in the games. HENRY DRISLER.

Demod'ŏcus (Δημόδοκος), the celebrated bard of the Phæacians, who is represented in the "Odyssey" as singing at the banquet of Alcinous the battles and the fate of the Greeks who went to Troy, with the conquest and destruction of that city, and also the loves of Mars and Venus. Later writers, who regarded him as an historical personage, represent him as an old and blind musician and poet of Corcyra, who composed a poem on the destruction of Troy (Ἰλίου ἄλωσις), and another on the loves of Mars and Venus. HENRY DRISLER.

Demogor'gon [from the Gr. δαίμων, a "divinity," and γοργός, "terrible"], a dreadful and mysterious being alluded to by some of the later classical writers, and by Boccaccio, Ariosto, Spenser, Milton, Shelley, and others. In Shelley's "Prometheus Unbound" he is the conqueror of Jupiter. The ancients dreaded the very mention of his name.

Demoiselle [a French word signifying "young lady"], the name of a genus of birds (*Anthropoidea*) belonging to the family Gruidæ, remarkable for their grace and symmetry of form. (See CRANE.) None of them occur in North America.

De'mon, or **Dæ'mon** [Gr. δαίμων or δαιμόνιον; Lat. *dæmon*], a term of Greek origin, used in classical writers primarily for the Supreme Divinity, sometimes as a synonym for θεός, a "god;" and later more especially as a tutelary or guardian divinity which was supposed to attend upon men. Thus, Socrates is commonly said to have been attended by a beneficent dæmon. It may well be doubted, however, whether such an idea is justified by the language of Xenophon (see "Memorabilia," I., 2 *et seq.*) or Plato ("Apol. Socr."). Socrates appears to have meant simply that a divine influence or intimation of some kind within him, a sign or voice (σημεῖον, φωνή, in Plato), controlled his actions. (See SOCRATES.) According to Plato, "Every dæmon is a middle being between God and man." "Intercourse between gods and men is carried on by dæmons." He further says, "The poets speak excellently when they say that when good men die . . . they become dæmons." These ideas were greatly amplified by the Neo-Platonists, who divided the dæmons into good and bad. The dread of evil dæmons became so great that in time the word came to be almost always used in a bad sense. In the Greek New Testament evil spirits are often called dæmons (δαιμόνια, commonly translated "devils"), and Beelzebub is spoken of as the prince of dæmons (ὁ ἄρχων τῶν δαιμονίων).

Demon (Δήμων), an Attic orator, was a nephew of Demosthenes, and belonged to the party opposed to the Macedonians. After the death of Alexander, Demon proposed a decree, which was passed, for recalling Demosthenes from exile. HENRY DRISLER.

Demon (Δήμων), a Greek writer, author of an "Atthis," or "History of Attica," flourished about 280 B. C. His writings were regarded as of no great authority. He is also the author, according to Schneidewin and Müller, of a work on proverbs (περὶ παροιμιῶν). Of both these works some fragments still exist. Those of the proverbs have been inserted in the "Parœmiographi Græci" of Schneidewin and Leutsch, and all the extant remains have been collected by Siebelis, "Phanodemi, Demonis, etc. Ἀτθίδων Fragm.," Leipsic, 1802, and by Müller, "Hist. Græc. Fragm.," vol. i., pp. 378–383. HENRY DRISLER.

Demo'nax [Δημώναξ], a celebrated Cynic philosopher who lived and taught at Athens in the second century A. D. His claim to distinction, however, is not so much that of a teacher of philosophy as of a model Cynic, and in this character he is depicted in Lucian's treatise called after his name. Though a native of Cyprus, he passed most of his life in Athens, where he was greatly honored while living, and when dead he was buried by the public with great magnificence. An outline of his doctrines will be found in RITTER'S "History of Philosophy" (English translation), vol. iv., p. 169, and several of his apothegms are given in ORELLI'S "Opuscula Græc. vet. Sententiosa," vol. ii., pp. 144 *seq.* HENRY DRISLER.

Demo'niac [Gr. δαιμονιζόμενος; Lat. *dæmoniacus*], a person possessed of or controlled by evil spirits. The New Testament abounds in narratives of demoniacal possession, and various opinions are entertained in regard to the character of this affliction.

Demonol'ogy [from the Gr. δαίμων, a "dæmon," and λόγος, a "treatise"], a treatise upon evil spirits; also the doctrine or science treating of the nature or character of evil spirits. Many works have been written on this subject. One of the most popular is Sir Walter Scott's "Letters on Demonology and Witchcraft."

Demonstra'tion [Lat. *demonstratio*, from *de*, intensive, and *monstro*, *monstratum*, to "show"], in mathematics, is an indubitable proof of a proposition. The term was used by old writers to signify any manner of showing either the connection of a conclusion with its premisses or that of a phenomenon with its asserted cause; but it now signifies in philosophical language only that process by which a result is shown to be a necessary consequence of the premisses from which it is asserted to follow. In common language it signifies an exhibition or display.

DEMONSTRATION, in military operations, is a movement or manœuvre, the chief object of which is to deceive the enemy, and to induce him to divide his force or divert his attention from the real point of attack.

Demoph'ilus [Δημόφιλος], a philosopher of the new Pythagorean school, whose age is not certainly known. He was the author of a work entitled βίου θεραπεία, from which there is still extant a collection of moral precepts entitled γνωμικὰ ὁμοιώματα, which are edited, along with the "Golden Maxims" of Democrates, by SCHIER, Leipsic, 1754, and which are printed also in ORELLI'S "Opuscula Græc. vet. Sententiosa," vol. i., p. 1 *seq.*

HENRY DRISLER.

Demoph'oön, or **Dem'ophon** [Δημοφόων, or Δημοφῶν], in Grecian mythology, a king of Athens, son of Theseus and Phædra, who is said to have accompanied the Greeks on their expedition against Troy, whence he rescued his grandmother Æthra. When Diomed, on his return from Troy with his Argives, ran in by night to the coast of Attica, and began to plunder it, Demophon attacked him and carried off the Palladium. Demophon is said also to have assisted the Heraclidæ against Eurystheus, who was slain in the battle that took place, and to have received Orestes when, after his mother's murder, he sought refuge at Athens. HENRY DRISLER.

Demop'olis, a township and post-village, capital of Marengo co., Ala., on the Tombigbee River just below the mouth of the Black Warrior, and on the Alabama Central R. R., 50 miles W. of Selma. It has four white and two colored churches and one weekly newspaper, a cotton and woollen factory and a private bank; also an active trade in cotton, which is shipped here. Pop. including the township, 4245; of village, 1539.

M. C. BURKE, ED. "BIGBEE NEWS."

De Mor'gan (Augustus), an English mathematician, born in the isle of Madura, near Java, in June, 1806, was educated at Cambridge. He was for many years professor of mathematics in University College, London. He wrote numerous works, among which are "Elements of Algebra" (1835), an "Essay on Probabilities" (1838), and "Formal Logic, or the Calculus of Inference, Necessary and Probable" (1847), and contributed largely to the "Penny Cyclopædia." Died Mar. 18, 1871.

De'mos [Gr. δῆμος, the "people"], the name given to the smaller divisions of the Attic tribes, somewhat similar to the townships into which counties are divided. When Clisthenes broke up the four old Attic tribes into ten new ones, Herodotus states that he subdivided these into 100 demes, but as there is no other authority for such statement, and the number of demes was actually 173 or 174, different explanations have been attempted of the passage in Herodotus. The demes were local divisions, in the registers of which the citizens had to enrol their names for political and other purposes. These demes were named sometimes after places, sometimes after persons, and those of the same tribe were not always adjacent, but might be in quite different parts of Attica. They had each its own presiding officer (δήμαρχος), treasurer, and other officers, and its own assembly, in which the business of the deme was transacted. Lists of the names of the demes under their proper tribes are given by K. F. Hermann, "Griech. Alterth.," anhang iv., by Leake, in his "Demes of Attica," and by Müller, "Hist. Græc. Fragm.," vol. ii., pp. 357–359.

Revised by Henry Drisler.

Demos'thenes [Gr. Δημοσθένης], the most eminent orator of antiquity, and probably the greatest of whom history gives any account, was born in Attica, in the demos of Pæania, near Athens, about 382, or, according to some authorities, in 385 B. C. His father (also named Demosthenes) was a cutler and maker of furniture. He died when his son was seven years of age, leaving fifteen talents (more than $15,000) to be divided between the young Demosthenes and his sister. The guardians converted a large part of this money to their own use. Demosthenes studied rhetoric with Isæus, and philosophy, according to some authorities, with Plato. Cicero states that he was instructed in oratory by Isocrates, but the fact is not established. Demosthenes, when about eighteen years old, prosecuted his guardians, pleading his own cause, but though the case was decided in his favor, he received only a part of his dues. Before this time it is said that he had resolved to devote his whole attention to oratory, from witnessing the forensic triumphs of Callistratus. But his health was feeble, his manners ungraceful, his breath short, and voice stammering and indistinct. In order to remedy these defects we are told that he adopted the practice of speaking with pebbles in his mouth; that he was wont to declaim upon the sea-shore, so as to be able to be heard in the tumult of popular assemblies; and that he often practised before a mirror, so as to observe and rectify any awkwardness of gesture. Nevertheless, his first appearance before a popular assembly was, according to Plutarch, a failure, exciting only the laughter of the multitude. But encouraged by Satyrus, an actor, who gave him useful instruction, he devoted himself with the utmost diligence to his task. We are told that he shaved one side of his head, that it might be absolutely impossible for him to go into society. He made the writings of Thucydides his model for style, and it is said that he transcribed the writings of that historian no less than eight times. In 355 B. C. he delivered his oration against Leptines, with complete success. Soon after this he entered upon his great though unsuccessful life-work, the defence of Grecian liberty against the designs of Philip of Macedon. Between the years 352 and 340 B. C. he pronounced eleven or perhaps twelve orations against Philip. Four of these are especially denominated "Philippics." He took part in 338 B. C. in the disastrous battle of Chæronea. It having been proposed by Ctesiphon that the Athenian state should bestow upon Demosthenes a golden crown as reward for his services, there followed a contest of several years with his rival Æschines, which was triumphantly closed in 330 B. C. by the delivery of Demosthenes' celebrated oration "On the Crown," which is generally regarded as his finest effort. Demosthenes was afterwards accused of having received a bribe from the Macedonians, and though, in the opinion of the best historians, the accusation was entirely unjust, he was sentenced to pay a heavy fine, and left the country. He returned after the death of Alexander, but having been condemned to death by Antipater, he took poison and died in 322 B. C. Sixty extant orations and many fragments are ascribed to Demosthenes, but several of these are regarded as spurious.

Demosthenes appears to have been extremely averse to extemporaneous speaking, although we are told that his unpremeditated speeches were superior to his more elaborate efforts. The success of his oratory was due in a very great degree to the steadfastness with which he kept the attention of his hearers riveted on the one great object in view. Nothing superfluous, nothing which did not contribute to that object, was admitted into his discourse. "He uses language," says Fénelon, "as a modest man uses his dress—simply to cover him. We think not of his words; we think only of the things which he says. He lightens, he thunders, he is a torrent which sweeps everything before it. We can neither criticise nor admire, because we have not the command of our own faculties." "His style," observes Hume, "is rapid harmony exactly adjusted to the sense; it is vehement reasoning without any appearance of art; it is disdain, anger, boldness, freedom, involved in a continued stream of argument; and of all human productions his orations present the models which approach the nearest to perfection." "Such was the first of orators," says Lord Brougham: "at the head of all the mighty masters of speech, the adoration of ages has consecrated his place, and the loss of the noble instrument [the Greek language] with which he forged and launched his thunders is sure to maintain it unapproachable for ever." (See Grote, "History of Greece," vol. xi., ch. lxxxvii.; Thirlwall, "History of Greece;" Brougham, "Dissertation on the Eloquence of the Ancients;" Schäfer, "Demosthenes und seine Zeit," 3 vols., 1856–58.) One of the best editions of his works is that of W. Dindorf, with copious notes and the Greek scholia, Oxford, 1846–51, 9 vols. 8vo.

Revised by J. Thomas.

Demos'thenes, an Athenian general who acted a prominent part in the Peloponnesian war. He and Eurymedon jointly commanded an army sent in 413 B. C. to reinforce Nicias at Syracuse. After the Athenians had been defeated he surrendered, and was put to death by the victors in 413 B. C.

Demot'ica (anc. *Didymotichos*), a town of European Turkey, in Room-Elee, on the river Maritza, 25 miles S. of Adrianople. It is defended by a citadel or castle, and has several Greek churches; also manufactures of silk and woollen goods and pottery. Here Charles XII. of Sweden lived as a prisoner about 1712. Pop. about 8000.

Demotic Characters. See Enchorial Writing.

Demp'ster (John), D. D., an eminent Methodist preacher, born at Florida, N. Y., Jan. 2, 1794, was the son of the Rev. James Dempster, a Scottish Presbyterian, who had been a Wesleyan preacher. The younger Dempster entered the itinerant ministry in 1816, and became a master of pulpit oratory. From 1836 to 1841 he was a missionary in Buenos Ayres. From 1845 to 1863 he was a professor in the biblical institutes at Newbury, Vt., Concord, N. H., and Evanston, Ill. The success of these schools was largely owing to his energetic labors. Died at Chicago Nov. 28, 1863. (See Stevens, "History of the Methodist Episcopal Church," vol. iii.)

Dempster (Thomas), a learned Scottish writer, born at Muiresk Aug. 23, 1579. He studied at Cambridge, went to France to finish his education, and became regent of a college in Paris. He had a quarrelsome temper, which involved him in violent brawls. He was afterwards professor at Pisa and Bologna. He wrote "Historia Gentis Scotorum," reprinted in 1829. Died at Bologna Sept. 6, 1625.

Demul'cent [Lat. *demulcens*, present participle of *demulceo*, to "soothe," to "soften"], a name applied to medicines of a mucilaginous or oily consistency, such as starch, gum, etc., which are given for the purpose of soothing irritation of the mucous membrane and promoting the increase of the secretions. They are also used as poultices, etc.

Demur'rage, in mercantile law, is an allowance made to the master or owners of a ship by the merchant or freighter when he detains the ship in port beyond the time specified in the charter-party. It is usually stipulated in the charter-party or agreement that if delay occurs in loading or unloading the vessel, the merchant who charters and freights her shall pay a certain sum per diem for the extra time. The rule is, that during the loading and unloading the merchant runs all the risk of interruptions, even from necessary and accidental causes. But no demurrage can be claimed for the delay caused by the detention of a ship by a public enemy, or for delay caused by the fault of the master, owners, or crew. The word *demurrage* is also employed to mean the delay itself.

Demur'rer, in law, is a suspension of action in a cause until the determination of some point by the court. In a pleading in equity, as well as at law, it raises a question as to the sufficiency in law of the case as stated by the opposite party. There may also be a demurrer to evidence, on

the ground that the testimony offered by a party in a cause is insufficient to maintain or overthrow the issue.

Denain, a town of France, department of Nord, on the Scheldt, and on a railway, 5 miles W. of Valenciennes. It is in an extensive coal-field, and has iron-works and manufactures of beet-root sugar. Pop. 11,022.

Dena'rius [a Lat. term, from *deni*, "ten"], a Roman silver coin, originally equal to ten asses, was first coined 269 B. C. Its weight varied at different periods, and its value was afterwards equivalent to sixteen asses, or about 8*d.* of English money.

Den'bigh, a county of North Wales, bounded on the N. by the Irish Sea and on the W. by the river Conway. Area, 603 square miles. The surface is mostly rugged and mountainous, but fertile and beautiful valleys occur. Coal, copper, iron, lead, limestone, and slate are found in this county. The chief towns are Denbigh, Wrexham, Abergele, Llangollen, and Ruthin. Pop. in 1871, 104,266.

Denbigh, a town of Wales, the capital of the above county, is in the Vale of Clwyd, 22 miles W. of Chester. It stands on the sides and at the base of a steep limestone hill, crowned by the imposing ruins of a castle built in 1284, and has many handsome antique houses. Pop. in 1871, 6322.

Denbigh, a township of Warwick co., Va. Pop. 391.

Denbigh, Earls of (1622), Viscounts and Barons Fielding (1620), Barons St. Liz (England, 1664), earls of Desmond (1622), Viscounts Callan and Barons Fielding (Ireland, 1619).—Rudolph William Basil Fielding, eighth earl, M. A., born April 9, 1823, succeeded his father June 25, 1865.

Den'derah (anc. *Tentyra*, probably taken from *Tei n Athor*, "abode of Athor"), a town of Upper Egypt, near the left bank of the Nile, in lat. 26° 13′ N., lon. 32° 40′ E., and opposite Keneh. Here are the ruins of a celebrated temple, one of the most imposing and best-preserved of the ancient monuments of Egypt. It is 220 feet long, and has a portico supported by twenty-four columns. The columns and walls are covered with carved figures and hieroglyphics. On the ceiling of the portico of this temple is one of the famous zodiacs discovered by the French in 1799. On the exterior wall are figures of Cleopatra and her son, probably meant for portraits.

Dendermon'de, or **Termon'de,** a fortified town of Belgium, in East Flanders, is at the confluence of the Dender and the Scheldt, and on the railway from Mechlin to Ostend, 16 miles E. of Ghent. It has a town-house, and a very old church called Notre Dame; also manufactures of lace, cotton yarn, and woollen goods. Pop. 8300.

Den'drite [perhaps a corruption of *dendrolite*, from the Gr. δένδρον, a "tree," and λίθος, a "stone"], the name of a peculiar mineral, containing internally, or having its surface covered with, filamentary forms resembling moss, ferns, trees, etc. Moss agate and Mocha stone are examples.

Dendro'bium [from δένδρον, a "tree," and βιόω, to "live," so called because they live on trees], a genus of epiphytic orchids, mostly natives of the tropical parts of Asia and Australia. They have flowers of great beauty and fragrance, sometimes also remarkable for grotesqueness of form.

Den'drolites [from the Gr. δένδρον, a "tree," and λίθος, a "stone"], the name given to petrifactions found in secondary and coal formations. They consist of plants and fragments of trees, having, generally, nothing in common with those now growing in the same regions. They are mostly cycads, tree-ferns, conifers, etc.

Den'drophis [from the Gr. δένδρον, a "tree," and ὄφις, a "serpent"], a genus of serpents belonging to the Colubridæ. They are distinguished for their brilliant colors and very slender forms, live among branches of trees, feed upon insects, and have large and prominent eyes. They are natives of the warm parts of Asia, America, etc., none being found in Europe.

Dengue,* dĕng'gā, a disease known by the names of dunga, dandy, breakbone fever, etc., an epidemic, seldom fatal, which has prevailed at different times in the southern parts of the U. S. and in the East and West Indies. Its symptoms are headache, fever, pain and swelling of the smaller joints, an eruption of the skin, and gouty pains which often cause lameness for a considerable time. It appears to be of a rheumatic character.

Revised by Willard Parker.

Den'ham (Col. Dixon), an English traveller, born in London Jan. 1, 1786. He accompanied Clapperton and Oudney on an expedition to Timbuctoo in 1821. They proceeded to Kooka on Lake Tchad in 1823, and there Denham parted from his companions. He afterwards visited Mandara, and returned to England in June, 1825. He published a narrative of his journey. Having been appointed vice-governor of Sierra Leone, he died there May 9, 1828.

Denham (Sir John), an English poet, born in Dublin in 1615. He graduated at Trinity College, Cambridge, in 1634, and studied law. He wrote "Sophy" (1641), a tragedy, and a poem entitled "Cooper's Hill" (1643). He was a royalist in the civil war, and fled to France in 1648, but returned in 1652. Died in Mar., 1668. "Denham," says Dr. Johnson, "is deservedly considered as one of the fathers of English poetry."

Deni'na (Giacommaria Carlo), an Italian historian, born at Revello, in Piedmont, Feb. 28, 1731. He published "The Vicissitudes of Literature" ("Vicende della Letteratura," 1760). His principal work is a "History of the Revolutions of Italy" ("Istoria delle Rivoluzioni d'Italia," 3 vols., 1769–70). Having been invited by Frederick the Great, he removed to Berlin in 1782. In 1804 he was appointed by Napoleon imperial librarian at Paris. Among his works is a "History of Western Italy" (1809). Died in Paris Dec. 5, 1813. (See Carlo G. Reina, "Vita di C. Denina," 1820.)

Deni'o (Hiram), an American jurist, born in Rome, N. Y., May 21, 1799, began the practice of law in 1821, was circuit judge (1834–38), judge of the court of appeals (1853–66), and author of several important legal works. Died at Utica, N. Y., Nov. 5, 1871.

Denis (James Ferdinand), a French traveller, born Aug. 13, 1798, has published multitudinous books, the fruits of journeys in South America, Spain, and the East.

Denis, Saint [Lat. *Dionysius*], the patron saint of France and first bishop of Paris. According to Gregory of Tours (540–594 A. D.), he was one of seven missionaries sent from Rome about 250 A. D. to preach the gospel to the Gauls, and after he had converted great multitudes suffered martyrdom in 272, or, as some say, 290 A. D. His festival is on Oct. 9.

Den'ison, a township of Lawrence co., Ill. Pop. 1668.

Denison, a post-village, capital of Crawford co., Ia., on Boyer River and on a branch of the Chicago and Northwestern R. R., 64 miles N. N. E. of Council Bluffs. It has one weekly newspaper. Pop. of Denison township, 633; of village, 326.

Denison (Rev. Charles Wheeler), born in New London co., Conn., in 1809, has been a large contributor to periodical literature, and has published a volume of poems, several works of fiction, etc. He was an early abolitionist and a temperance writer, and was editorially connected with the "Emancipator" and the "Olive Branch," both in their time widely-known journals. He has resided in England, and was for a time an editor in London. He has been a U. S. consul in British Guiana, and wrote a popular life of Gen. U. S. Grant.

Denison (John Evelyn), Lord Ossington, an English statesman, born in 1800, was elected a member of Parliament in 1823, and acted with the Liberal party. He was chosen Speaker of the House of Commons in 1857, in 1859, in 1866, and in 1868, and became Viscount Ossington in 1872. Died Mar. 8, 1873.

Denison (Mary Andrews), wife of Rev. C. W. Denison, was born in 1826 in Cambridge, Mass. She is the author of numerous works, chiefly tales of a domestic character and designed for the young. These books have been quite successful.

Denison City, a post-village of Grayson co., Tex., at the junction of the Missouri Kansas and Texas and the Houston and Texas Central R. Rs., 150 miles S. of Parsons City, Kan. It has a national bank, one daily and two weekly newspapers.

Denison University, formerly Granville College, at Granville, Licking co., O., was established and located at Granville by a vote of the Ohio Baptist Education Society May, 1831. It was at first intended for a manual-labor school, and hence located on a 200-acre farm, a mile and a half W. of the town. As a manual-labor school it was, like most others of the time, a failure—as a school of instruction, a success. It was incorporated by the Ohio legislature Feb. 3, 1832, under the name of the "Granville Literary and Theological Institution." The name was changed in 1845 to "Granville College," and this again under the general law of Ohio was changed, June, 1856, to the name it now bears. Instruction was commenced in Dec., 1831, the principal and sole teacher being Prof. John Pratt, who brought to the position the reputation of an enthusiastic and accomplished teacher, and fully sustained it.

* *Dengue* is the Spanish for "dandy" or "fop," and is applied to this disease on account of the remarkable stiffness of the patient's motions.

The number of students the first quarter was thirty-seven. It was the day of small things, the beginning of greater. In thoroughness of instruction, from the beginning till now, no institution W. of the Alleghanies has been its superior. It had alternations of prosperity and decline. The great want was a living endowment. It was removed from the farm, and in Sept., 1856, instruction was commenced on the new site. Since that date it has been advancing in every element of prosperity, and now stands in the foremost rank of Western colleges.

The buildings are situated on a hill N. of the town, less than half a mile from the public square. The site contains twenty-four acres, nearly half of it, in the rear, being covered with a grove of old forest trees. The buildings are three, containing dormitories and study-rooms for 178 students, besides a fine chapel, natural history room, two society halls and libraries, college library (with over 11,000 volumes), lecture-rooms, recitation-rooms, etc.

The university is a proper college, furnishing the regular four years' course in classical, scientific, and philosophical studies, similar to the best American colleges; embracing also, under the same government, a preparatory department, classical, with a two years' course as a feeder to the regular course, and English, to fit for business, school-teaching, or the scientific course. The scientific embraces most of the studies of the regular college course, except the Latin and Greek languages, but in the mathematics and the natural sciences it is more extensive. Those who complete this course are entitled to a diploma and the degree of bachelor of sciences. For the last four years the whole number of full-course college students has been 49, 56, 58, and 67, and the entire number, including preparatory, etc., 175, 202, 191, and 190.

The board of instruction, as now constituted, consists of six professors (including the president), one principal of the preparatory department, and two tutors—nine in all; and all the nine fully employed in the business of instruction. There have been five presidents. The name and time of entering upon office of each are as follows: Rev. John Pratt, A. M., 1831; Rev. Jonathan Going, D. D., 1837; Rev. Silas Bailey, D. D., 1847; Rev. Jeremiah Hall, D. D., 1853; Rev. Samson Talbot, D. D., 1863. Dr. Going died in Nov., 1844, after which there was a vacancy of over two years. Dr. Talbot died June 29th of this year (1873); his successor is not yet appointed. The fixed property of the university, in ground, buildings, etc., is estimated at $80,000, and the productive endowment is $190,000, making a total of $270,000.

Denison, though one among some forty universities and colleges in Ohio, anticipates a prosperous future.

J. Stevens.

Den'izen [etymology doubtful], in English law, an alien who has received from the sovereign letters patent to make him an English subject. He may take lands by purchase and devise, but cannot inherit nor enjoy offices of trust or receive a grant of land from the Crown.

Deniz'li, or **Degnizli,** a town of Asia Minor, in Anatolia, 53 miles S. E. of Alashehr. It is surrounded by mountains or hills, and has a castle and several mosques. Leather is made here. It is stated that 12,000 of its inhabitants were killed by an earthquake in 1715. Pop. about 20,000.

Den'man (Thomas), first Lord Denman, an English judge, born in London Feb. 23, 1779. He was called to the bar in 1806, and elected to Parliament in 1818. In politics he was a liberal. He became attorney-general in 1830, and chief-justice of the king's bench in 1832. In 1834 he was raised to the peerage. Died Sept. 22, 1854.

Den'mark, a kingdom of Northern Europe, consists of the peninsula of Jutland and several adjacent islands of the Baltic Sea—viz. Seeland, Fünen, Falster, Laaland, Samsöe, Bornholm, Langeland, and Möen. Area, 14,753 square miles. Pop. in 1870, 1,784,741. Besides Denmark proper, the Danish monarchy possesses Greenland, Iceland, the Färöe Islands, and the West India islands of Santa Cruz, St. Thomas, and St. John. Area of the colonies, 87,258 square miles. Pop. in 1870, 127,401. Jutland is bounded on the N. by the Skager-Rack, on the E. by the Cattegat, and on the W. by the North Sea. Its surface is low and level, and was formerly covered by forests of beech, birch, oak, etc. The coasts are indented with numerous bays or *fiords*, and extensive marshes occur in various parts of the peninsula and the islands. Denmark has no considerable river. Seeland is separated from Sweden by the Sound, and from the island of Fünen by a channel called the Great Belt.

Climate, Soil, etc.—The climate is humid, and is modified by the proximity of the sea, so that the winter is milder than that of Northern Germany. The mean annual temperature is about 46° F. The weather is changeable, and the transition from winter to summer is more sudden than in some other countries. In spring and summer the W. wind prevails. The soil is generally productive, and alluvial or sandy. The marshy districts produce good pasture. Denmark is said to be pre-eminently an agricultural country. The staple productions are barley, oats, wheat, rye, buckwheat, potatoes, beans, peas, and flax. The Danish farmers derive a large part of their revenue from cattle, horses, and the products of the dairy. The chief articles of export are cereal grains, butter, horses, hides, and fish. The fiords abound in salmon, cod, herring, and other fish. Denmark is very deficient in mines and mineral resources, and, in consequence of the lack of coal, metals, and water-power, has comparatively few important manufactures. The peasants and people of the rural districts weave at their homes linen and woollen stuffs for the use of their families. There are in the kingdom numerous iron-foundries, sugar-refineries, paper-mills, and distilleries.

Commerce, Revenue, etc.—The commerce of Denmark is carried on mainly with Great Britain, Germany, and Sweden. The Danish official returns do not give the value of exports or imports, but only the weight of the same. The exports from Denmark to Great Britain in 1870 were valued at £3,053,425. The total exports for the year 1870–71 weighed 10,360,000 quintals, and the imports for the same year amounted to 19,770,000 quintals. (A quintal = about 112 pounds.) The revenue for 1870–71 was 23,419,623 rigsdalers, and the expenditure was 21,904,003 rigsdalers. In Mar., 1871, the public debt was 117,058,367 rigsdalers. The movement of shipping for the year 1870–71 was as follows: inland passages, 46,061 vessels, of 615,892 tons; outward passages, 36,755 vessels, of 1,092,742 tons. The merchant navy on Mar. 31, 1871 (exclusive of vessels of less than four tons), consisted of 2735 vessels, of 181,494 tons; this number includes 87 steamers, of 11,979 tons. The aggregate length of railroads which were in operation on Jan. 1, 1871, was 763.5 kilometers; the aggregate length of telegraph-lines was 1962.30 kilometers; the length of telegraph-wires 5096.67 kilometers. (See later statistics in "Almanach de Gotha" for 1873.)

Religion and Education.—The established religion is Lutheran, to which 99 per cent. of the population belong, and the king must be a member of the Lutheran Church. Other sects are tolerated. This kingdom has a good system of education, which is generally diffused among the people. All children between the ages of seven and fourteen are compelled to attend school. All the educational institutions are managed by a royal college or board, consisting of three assessors and a president. Education is given gratuitously in the public schools to children whose parents are too poor to pay for it. Of higher schools, Denmark has a good university at Copenhagen, several academies, twenty-two gymnasia, and seven seminaries.

Government.—The government is a hereditary constitutional monarchy. The present constitution is embodied in the charter of June 5, 1849, according to which the executive power belongs to the king, and the legislative power is vested in the king and diet (*Rigsdag*) jointly. The Rigsdag is composed of two houses, called the Landsthing and the Folkething. The latter, which is the lower house, consists of about one hundred members, elected by universal suffrage for a term of three years. Capital, Copenhagen. Military service begins with the age of twenty-two, and lasts for the line and the reserve ("first call") eight years; the "second call" is liable to military service to the age of thirty-eight. The first call comprises 37,000 men; the second call, 15,600; total strength of the army on the war-footing, 52,600 men. The war navy consists of twenty-nine steamers (among which are seven iron-clads), bearing 287 guns.

History.—Denmark is one of the three Scandinavian kingdoms. (See Scandinavia.) On the decline of the Roman empire the Scandinavians, under the name of Northmen or Normans, became a formidable and aggressive race, much addicted to piracy and maritime enterprises. The Danes invaded England with success in the ninth century, and completed the conquest of it about 1016, in the reign of Canute or Knud, who was perhaps the most powerful monarch of his time. He reigned over Denmark as well as England, and is said to have introduced Christianity into his dominions. Margaret, queen of Denmark and Norway, conquered Sweden in 1388, and procured the adoption of the "Union of Calmar" (1397), by which the three Scandinavian kingdoms were united, and her nephew Eric was appointed her heir. At her death (1411) each kingdom chose its separate ruler. In 1448 the Danes elected Christian I., count of Oldenburg, who was the founder of the royal family that has continued to reign to the present time. The monarchy was elective until 1660, when the clergy and people, impelled by enmity to the nobility, or-

dained that the power of the king should be hereditary and absolute. As an ally of Napoleon, Denmark was involved in a war against England and Russia, and suffered great disasters. The British fleet bombarded Copenhagen in Sept., 1807. Denmark was compelled to cede Norway to Sweden in 1814. Christian VIII., by the "Open Letter" of 1846, declared his intention to extend the law of succession of Denmark proper to the duchies of Sleswick-Holstein, the inhabitants of which are mostly Germans, in order to secure in this way the indivisibility of the Danish monarchy. When Frederic VII. in 1848 proclaimed the incorporation of Sleswick with Denmark, a three years' war ensued, which was ended by the intervention of Austria and Prussia (Jan., 1851). In the mean while the non-German great powers and Sweden had agreed (June, 1850) to declare the indivisibility of Denmark, and Austria soon after (Aug., 1850) acceded to this declaration. On June 5, 1851, Prince Christian of Sleswick-Holstein was designated in the "protocol of Warsaw" as heir to the throne, and on May 8, 1852, he was recognized as such by the great powers and Sweden. In 1849, Denmark had obtained an extremely liberal constitution, which secured the most entire civil liberty and universal right of suffrage. The duchies, however, had no part in this constitution. A second constitution (1855), which divided the council of the kingdom into two chambers (Landsthing and Folkething), subjected the duchies to a Danish majority. In Nov., 1858, the king abolished the joint constitution of the Danish state for Holstein and Lauenburg, and restored absolute monarchy in these countries. By a proclamation of Mar., 1863, Denmark treated the duchies of Holstein and Lauenburg as tributary appendages, while, on the other hand, a new fundamental law was prepared for Denmark and Sleswick. War with Germany broke out soon after, and was terminated by the peace of Vienna (Oct., 1864), and Denmark was compelled to renounce all claim on Sleswick-Holstein. (See SLESWICK-HOLSTEIN.) On Nov. 2, 1867, Denmark sold the West India islands of St. Thomas and St. John to the U. S., but the treaty did not receive the sanction of the U. S., and was therefore not carried into effect. (See ALLEN, "Haandbog i Fädrelandets Historie," 6th ed. 1863; DAHLMANN, "Geschichte von Dänemark," 3 vols., 1840–43.) A. J. SCHEM.

Den'mark, a post-township of Lee co., Ia. Pop. 1011.

Denmark, a post-township of Oxford co., Me. It has four churches, and manufactures of furniture, etc. Pop. 1069.

Denmark, a post-township of Tuscola co., Mich. Pop. 816.

Denmark, a township of Washington co., Minn. Pop. 824.

Denmark, a post-township of Lewis co., N. Y., on the Utica and Black River R. R. It has seven cheese-factories, and manufactures of various kinds. Pop. 2109.

Denmark, a post-township of Ashtabula co., O. Pop. 544.

Den'ner (BALTHASAR), a German portrait-painter, born at Hamburg in 1685. His works are remarkable for minuteness of finish. Died in 1747.

Dennery (ADOLPHE PHILIPPE), a French dramatist, born in Paris June 17, 1811, of Jewish parents. He first essayed art, then journalism, and then produced numerous dramas, comic operas, and vaudevilles, among them "The Market of London" and "The Bohemians of Paris."

Den'newitz, a village of Prussia, province of Brandenburg, 42 miles S. S. W. of Berlin. Here the Prussians defeated a large French army commanded by Marshal Ney on Sept. 6, 1813, after a very obstinate fight. The French lost about 15,000, killed, wounded, and prisoners.

Den'nie (JOSEPH), an American author and critic, born at Boston Aug. 30, 1768. He studied law, which, however, he did not practise. Having removed to Philadelphia in 1799, he founded the "Portfolio," a literary magazine, which he edited with ability from 1801 till 1812. Among his writings is "The Lay Preacher," which first appeared in the "Farmer's Museum." Died Jan. 7, 1812.

Den'ning, a post-township of Ulster co., N. Y. It has manufactures of lumber. Pop. 1044.

Den'nis, a township of Somerset co., Me. Pop. 37.

Dennis, a township of Wicomico co., Md. Pop. 683.

Dennis, a post-township of Barnstable co., Mass., on the Cape Cod R. R. The township extends across Cape Cod, has extensive fisheries, produces large crops of cranberries, and has manufactures of salt. There are four churches, five post-offices, fifteen schools, a free library, and many small but beautiful lakes. Pop. 3269.

Dennis, a township of Cape May co., N. J. Pop. 1640.

Dennis (JOHN), an English dramatist and writer of satires and pamphlets, was born in London in 1657. He produced dramas called "Liberty Asserted" and "A Plot and No Plot." His temper was quarrelsome, and he provoked the enmity of many persons by his libels. He was lampooned by Swift, and satirized by Pope in the "Dunciad." Died Jan. 6, 1733.

Den'nison, a post-village of Tuscarawas co., O. Pop. 828.

Dennison, a township of Luzerne co., Pa. Pop. 972.

Dennison (WILLIAM), a statesman, born in Cincinnati, O., Nov. 23, 1815, graduated at Miami University in 1835, became a lawyer, a railroad and bank president, and a leading Republican politician, was governor of Ohio (1860–62), and was postmaster-general (1864–66).

Den'nysville, a post-township of Washington co., Me. It has manufactures of lumber, etc. Pop. 488.

Denomi'nator [a Lat. term, from *denomino, denominatum,* to "name" or "designate"], literally, "that which designates," in arithmetic, is the number placed below the line in fractions, giving its name to the fraction, and showing the number of parts into which the integer is divided.

Denon (DOMINIQUE VIVANT), BARON, a skilful French artist and author, born at Châlons-sur-Sâone Jan. 4, 1747. He became chargé d'affaires at Naples in 1782, and a member of the Royal Academy in 1787, after which he devoted himself to art, and gained distinction as an art-critic. He accompanied Bonaparte to Egypt in 1798, and in 1802 he published an admirably illustrated work entitled "Travels in Upper and Lower Egypt." He died April 27, 1825, leaving an unfinished "History of Art."

Dens (PETER), a Flemish Roman Catholic theologian, born near Antwerp in 1690. He published a systematic exposition and defence of the Roman Catholic doctrines in his "Theologia Moralis et Dogmatica," which has been extensively used as a text-book. Died Feb. 15, 1775.

Den'sity [Lat. *densitas,* from *densus,* "thick"], a term used in physics to denote the quantity of matter which a body contains in a given or determinate space; for example, a cubic foot. The quantity of matter in any body is called its *mass,* and is measured by the weight of the body, to which it is always proportional. Hence, the density of any body is great in proportion as its weight is great and its volume small; or the density of bodies is directly as their mass and inversely as their volume. It follows that if two bodies have the same volume, their densities are directly as their masses or weights; and if two bodies have the same mass or weight, their densities are respectively in the inverse ratio of their volumes. The term is often used as synonymous with *specific gravity.*

Density of the Earth is the ratio of the mass of the earth to that of the same bulk of water. The data of astronomy, in conjunction with the laws of gravitation, give the proportion of the mass of the earth to the masses of the sun and the principal planets; and thus the determination of the absolute mass of the earth will determine the absolute masses of the sun and planets; and then their density can be found. Experiments have been devised for determining the earth's density by observations upon the attraction of a mountain, and have been tried in the Schehallion experiment by Maskelyne, James, and others. The direction of gravity changes very nearly one second of angle for every 100 feet of horizontal distance. Suppose that two stations were taken on a mountain—one on the N. and the other on the S. side—and that their distance apart was 4000 feet. If the direction of gravity had not been influenced by the mountain, the inclination of the plumb-line at these two places would have been about forty seconds. Suppose, on applying the zenith sector, the inclination was found to be fifty-two seconds. The difference, or twelve seconds, could only be explained by the attraction of the mountain, which, combined with the natural direction of gravity, produced directions inclined to these natural directions. In the Schehallien experiment a calculation was made of what would have been the disturbing effect of the mountain if it had been as dense as the interior of the earth, showing that it would have been about twenty-seven seconds. The disturbance proved to be only twelve seconds, and therefore the density of the mountain to that of the earth was as 12 to 27. It follows from this that the mean specific gravity of the earth would be nearly five times that of water. The effect produced by the attraction of a mountain on the direction of a plumb-line was observed by Bouguer at Chimborazo in 1738. Col. James, by observations on Arthur's Seat near Edinburgh, has deduced a mean density of 5.316.

In 1826, Prof. Airy suggested the solving of the problem by pendulum experiments at the top and bottom of a deep mine. Suppose a spheroid concentric with the external

spheroid of the earth to pass through the lower station in the mine. The attraction of the shell included between these has the same effect at the upper station as if all its matter were collected at the earth's centre. At the lower station there is the attraction of the interior mass only; at the upper station that of the interior mass and the shell. By making the proportion of these theoretical attractions equal to the proportion observed by means of the pendulum, we have the elements for finding the proportion of the shell's attraction to the mass's attraction. The mean density is found from these data. The astronomer-royal having twice tried the experiment and failed, the attempt was renewed in 1854 at a colliery near South Shields, England, where the depth was reputed to be 1260 feet. A place was chosen for two stations in the same vertical. An invariable pendulum was mounted in each station, vibrating by means of a knife-edge upon plates of agate. Behind it was a clock, and before it a telescope so mounted that coincidences of the pendulum of the clock might be observed through a slit. The acceleration of the pendulum at the depth of 1260 feet was two and a quarter seconds a day. Taking into account the configuration and nature of the surrounding mass, Airy estimated the earth's density at 6.565.

Two leaden globes, 174 pounds in weight each, are supported six feet apart, by a horizontal frame capable of rotation. Above the centre is suspended horizontally, within a narrow glazed box, by a delicate wire forty inches long, a slender deal rod, carrying at its extremities two equal leaden balls one one-hundredth part as heavy as the globes. The rod being at rest, the globes are brought as near to the balls as the dimensions of the protecting box will allow, their separate attractions tending to turn the rod in the same direction. The amount of torsion produced is observed from a distance with a telescope. By rotation the disturbing force of the globes is then brought to act in the opposite direction, and the torsion is once more observed. Cavendish concluded that the force of mutual attraction between the globes and balls, the distance between their centres being 8.85 inches, was $\frac{1}{4300}$ of a grain; whence he deduced the total mass of the earth, and (its bulk being known) its mean specific gravity also, which he put at 5.480. The experiments of Reich give 5.438, and those of Baily, 5.660. The mean of all the results obtained is 5.639. It may, then, be assumed that the earth's mean density is not very far from 5.6 times that of water. Combining this result with what is known with respect to the dimensions of the earth, we find that its weight in tons is roughly expressed by 6,000,000,000,000,000,000,000.

Dent, a county in the S. E. of Missouri. Area, 700 square miles. It is partly drained by the Maramec River, which rises in it, and partly by the head-streams of the Current River. The surface is diversified by hills and valleys; the soil of the latter is fertile. Grain, tobacco, and wool are raised. Capital, Salem, or Dent Court-house. Pop. 6357.

Dent, a township of San Joaquin co., Cal. Pop. 1115.

Dent, a township of Iron co., Mo. Pop. 417.

Dent (Dennis) was born in Maryland. He served in the Indian war in Florida as a major-general, and removed to Tuscaloosa, Ala., in whose legislature he served from 1838 to 1850. He died in 1860.

Dent (John Herbert), an American naval officer, born in Maryland in 1782. He commanded a vessel in the war against Tripoli in 1804, and gained the rank of captain in 1811. Died July 31, 1823.

Denta'lium [from the Lat. *dens*, a "tooth," alluding to the shape of the shell], a genus of gasteropodous marine carnivorous mollusks, called tooth-shells, from their curved, tubular shape. The shells are open at each end. There are many living and fossil species, of which the *Dentalium elephantinum*, or elephant's tooth, is the best known.

Denta'tus (Manius Curius), a Roman plebeian consul noted for his martial exploits, frugality, and integrity, is said to have been born with teeth; hence the surname. He defeated the Samnites in 290 B. C., and gained a decisive victory over Pyrrhus near Beneventum in 275. He was consul for the third time in 274, and censor in 272 B. C. During his censorship he constructed an aqueduct which conveyed water from the Anio to Rome. Died in 265 B. C.

Dentalium elephantinum.

Den'tex [perhaps derived from the Lat. *dens*, on account of their numerous teeth], a genus of acanthopterous fishes belonging to the Sparidæ, resembling the perch in form, with a deep compressed body, scaly cheeks, a single dorsal fin, and numerous small teeth, with four large canine teeth curved inward in each jaw. The *Dentex vulgaris*, sometimes called the four-toothed sparus, is found in great numbers in the Mediterranean, and sometimes on the southern coasts of Great Britain. It is of large size, often three feet long, and is an important article of commerce.

Den'tifrice [Lat. *dentifricium*, from *dens*, a "tooth," and *frico*, to "rub"], the name given to powders and washes of various kinds used for cleaning the teeth. Among the substances employed are charcoal, chalk, common salt, myrrh, catechu, cinchona, phosphate of soda, and cream of tartar.

Den'tils [from the Lat. *dens* (gen. *dentis*), a "tooth"], in architecture, square blocks or projections in the bed-mouldings of the cornices of the Corinthian, Ionic, and composite orders. The term is also applied to ornaments in cornices of rooms which are founded on the same style of decoration.

Dentin, or **Dentine.** See Teeth.

Dentiros'tres [from the Lat. *dens* (gen. *dentis*), a "tooth," and *rostrum*, a "beak"], a tribe of birds of the order Insessores, characterized by a notch or toothlike process on each side of the margin of the upper mandible. These birds have rapacious habits, and prey on smaller birds as well as insects. The butcher-bird is an example of this tribe.

Dent'istry [from *dentist* (from the Lat. *dens, dentis*, a "tooth"), and *ry*, a suffix denoting "art," "profession," etc.]. In every age and country, even among the rudest and most barbarous nations, the teeth as useful and beautiful organs have attracted attention, and been regarded as of great importance in giving beauty and symmetry to the face. Lord Chesterfield says that "fine and clean teeth are among the first recommendations to be met with in the common intercourse of society." Lavater, the learned physiognomist, remarks that "the countenance is the theatre on which the soul exhibits itself," and adds, "as are the teeth of man, so is his taste." "White, clean, and well-arranged teeth, visible as soon as the mouth opens, but not projecting nor always entirely seen, I have never met with," says he, "except in good, acute, honest, candid, and faithful men;" that "short, broad teeth, standing close to each other, show tranquil, firm strength; and that melancholy persons seldom have well-arranged, clean, and white teeth."

By the ancients, white and well-formed teeth were considered as characteristics of beauty. Jacob, in blessing Judah, says, "His teeth shall be white with milk." Joseph Murphy, in his "Natural History of the Human Teeth," states that the Brahmans are extremely delicate in every point relating to their teeth. Every morning when they rise they rub them for upwards of an hour with a twig from a racemiferous fig tree, at the same time addressing their prayers to the sun, and calling down the blessings of Heaven on themselves and their families. As this practice is prescribed in their most ancient books of law and divinity, we imagine it coeval with the date of their religion and government. These people also separated their teeth with a file as soon as the second set was perfectly formed, which was doubtless done for the purpose of ensuring cleanliness and preventing decay.

The inhabitants of many Oriental countries stain their teeth. Many women in Sumatra have their teeth filed to points, removing the enamel from the surface that they may be more easily dyed black. The Abyssinians and other African nations file their teeth to points, and thus increase the savageness of their aspect. Whether this custom was followed as a matter of ornament or fashion, it doubtless had its origin in the fact that teeth with sufficient space between their edges to prevent the accumulation of food were much less liable to be affected by caries.

In the time of Herodotus the art of dentistry appears to have been practised in Egypt, as was also the treatment of diseases of the eye and the ear. In the ancient tombs of this people artificial teeth of ivory or wood were found by Belzoni and others, some of which were fastened on gold plates; it is stated that the teeth of mummies have been found filled with gold, and others with a white cement.

To what extent the Greeks or Egyptians practised dental surgery as a specialty before the Christian era, there is but little upon record that gives us any definite knowledge. The essays or books upon the subject, if there were any, are lost. The only writings of ancient times extant, where dentistry is spoken of as an art, are those of Galen, who wrote in the second century after Christ; and from then until Ambrose Paré wrote his celebrated work on surgery there was but little to improve the practice or satisfy the

student in dental surgery. During the sixteenth century, from 1550 to 1580, there were published six essays or dissertations upon the anatomy, treatment, and preservation of the teeth. The seventeenth century was more favored; from 1614 to 1690 there were forty dissertations on toothache, teething, diseases of the teeth, etc. During the eighteenth century, from 1702 to 1799, there were one hundred and thirty such volumes and essays, many of them works of merit, and the result of the labors of such as Hunter, Jourdain, Lécluze, Blake, etc.

In the present century, from 1800 to 1830, sixty-eight volumes were added to the literature of dental surgery. Among the more prominent authors of these were Bell, Baumé, Duval, Rousseau, Delabarre, Laforgue, Fox, Maury, Murphy, Parmly, Fitch, and Gardette. The last three were American practitioners as well as writers. From 1830 to 1873 there have been contributed near forty volumes. Among the more prominent authors of these are Robinson and Tomes of London; Goddard, Harris, Taft, Arthur, Garretson, Richardson, and J. W. White of the U. S.

During the eighteenth century dental surgery became a subject of more critical inquiry and thorough investigation. Men of education and talent devoted themselves to it exclusively, and from that period it has progressed rapidly in importance. But not until within the last few years has it been enabled to claim a recognition from its sister professions of medicine and surgery. Until the latter part of the eighteenth century any advance in dentistry was confined to Europe. Dr. Harris, in his work on the "Principles and Practice of Dental Surgery," gives the following account of its introduction into the U. S. He says: "It was during our Revolutionary struggle for independence that the first knowledge of dental surgery was introduced into this country, and the first dentist in the U. S. of whom we have any account was a man by the name of Le Mair, who accompanied the French army which came over to our aid during that period. Soon after the arrival of Le Mair a dentist by the name of Whitlock came over from England, and from him and Le Mair dental surgery may be said to have had its origin in the U. S. With regard to the professional ability of these gentlemen little is known, but it is probable that it was limited, and that their practice consisted chiefly in the carving of artificial teeth from blocks of ivory and extracting and cleaning natural teeth.

"Mr. John Greenwood, however, I believe, was the first native American dentist, and he commenced practice in New York about the year 1788, and is said to have been the only dentist in that city in the year 1790. It was in this year he constructed an entire denture for General Washington, and in 1795 another, which for neatness of execution was unsurpassed by any of the European artificial teeth at that period. They were carved from ivory, and secured in the mouth with spiral springs."

About the year 1792, Dr. Spence, who had received some instructions from Le Mair, commenced practice in Philadelphia; soon afterwards he was joined by Dr. Gardette, who came from France, where he had previously received instruction. He soon acquired a reputation which he enjoyed through life. Dr. Hudson of Dublin soon followed Gardette to Philadelphia, and from his previous education and skill became the most prominent dentist in this country.

In the year 1800, Dr. H. H. Hayden commenced the practice of dental surgery in Baltimore; in 1807 he was joined by Dr. Koecker of London, who, after practising a few years in Baltimore, removed to Philadelphia. From this time until 1820 the ranks received accessions from Europe, with many in this country—some few with previous education, but others entirely deficient in theoretical or practical knowledge—so that the number of dental practitioners in the U. S. was now little more than one hundred. The next decade had increased them to three hundred, and in ten years more they had been quadrupled; while the next twenty years gave us at least five thousand in 1860, and in 1873 the dentists in the U. S. numbered ten thousand, while those in other countries combined do not exceed five thousand.

With this great increase in the number of dental practitioners the progress of dentistry as a science has been very marked. From the more simple and comparatively not difficult operations of cleansing, extracting, and filling small and superficial cavities, it has extended to a thorough and scientific treatment of the mouth, with the view not only of saving teeth but slightly decayed, but all teeth, and also of anticipating decay by such operations as shall make it possible for the patient to keep the mouth thoroughly cleansed, and the teeth free from the deleterious effects of the fermentation of portions of food or other substances in the mouth. Cleanliness is indispensable to sound teeth, and the most fruitful source of decay is admitted to be the presence of decomposing portions of food lodged between them and in the interstices of the crown. In view of these facts all dentists urge the importance of children acquiring the habit of brushing their teeth daily.

In the successful treatment of teeth where the nerve or pulp is exposed, much credit is due to Dr. Spooner of Montreal, who in 1838 first recommended the use of arsenic for the purpose of destroying the vitality of the nerve. This substance has been used since in combination with sulphate of morphine and tannin, with creosote sufficient to form a thick paste; and though many teeth were saved for years by the use of this escharotic, yet for some time the course was unscientific and far from satisfactory; for when the vitality of the pulp was destroyed and the tooth filled without removing the devitalized tissue, it invariably resulted in a fistulous opening being established in the gum opposite the apex of the root or fang, through which was a constant discharge of pus. The difficulty is invariably removed by opening into the tooth, cleansing out the fang, and injecting creasote until its presence is recognized at the fistulous opening in the gum.

The last ten years have been replete with various expedients by capping to preserve the vitality of the pulp, even though exposed; and the efforts have been crowned with such a degree of success that there is reason to hope the day is not distant when such teeth will be saved, and their vitality and lifelike appearance also preserved. The preparations which have been used for capping are lead, tin, asbestos, gutta-percha, Hill's stopping (made of gutta-percha and felspar pulverized), clarified quill, and oxychloride; the latter, made of oxide of zinc and dilute deliquescent chloride of zinc, is the most in favor for the purpose, and offers much the larger proportion of successful results.

The various materials used for filling or stopping teeth are gold, tin, amalgam, chloride of zinc (or oxychloride, as it is more frequently called), Hill's stopping, and gutta-percha. The requirements for a filling are ability to withstand the mechanical influences of mastication; resistance to chemical agents; non-susceptibility to thermal changes; qualities to admit of ease of introduction into a cavity and consolidation; harmony in color; and the absence of properties injurious to the structure of the tooth or to the system at large. Of such materials, the very best as a permanent filling is gold; after this amalgam and tin, the other agents being employed chiefly for temporary purposes.

Of the instruments used in filling teeth, the variety is numberless, so far as excavators and ordinary pluggers are concerned; the last few years have given us a number for condensing the gold, representing the mallet in modified forms. The small mallet was used some forty years since for a time to a limited extent; the last decade has again brought it generally into favor. It is made either of steel, ivory, vulcanized rubber, lead, or hard wood. In addition to these, there are much in use two automatic mallets, besides Bonwill's electric mallet. The last year has also given to the profession several drills for the preparation of cavities and the finishing of fillings; three of them have the motive-power of a foot-lathe, while one has that of a galvanic battery. All are arranged with a mandrel, into which fit burr and chisel drills of various sizes.

The "rubber dam" given to the profession by Dr. Barnum, as also the steel clamps for holding it in place around the neck of the tooth intended to be protected, is one of the most valuable acquisitions given to the dental practitioner.

The want of matrices in the construction of a temporary wall for the conversion of approximal cavities into simple holes had long been felt. A matrix invented by Dr. Louis Jack, and given to the profession, has attained a most deserved popularity. In addition to these, the small corundum wheel invented by Dr. Arthur (rapidly taking the place of the file in both separating teeth and finishing fillings) is considered a not less important acquisition in dentistry.

The great progress made in the dental profession has been contributed to and stimulated not a little by the organization of colleges, formation of societies, and publication of journals. An important event in the history of dental surgery in this country was the establishment of the "American Journal and Library of Dental Science" in Baltimore in 1839. The scattered members of the profession, who had long toiled in comparative obscurity, almost unknown to each other and the world, found through this journal an appropriate medium through which to communicate with each other. Several other important journals devoted to the interests of dentistry have since been established in the U. S. and Canada.

The formation of the "American Society of Dental Surgeons" soon followed the establishment of the above journal; and at its second annual meeting an arrangement was made with the publishers by which it became both the property and organ of the association. Two years afterwards another society of dentists like that of Baltimore was organized at Richmond, Va., and in Aug., 1844, a third was formed at Cincinnati, O., styled the "Mississippi Val-

ley Association of Dental Surgeons." In Aug., 1850, the National Convention of Dentists was formed, and its first annual meeting was held in Philadelphia. Just previous to this the Pennsylvania Association of Dental Surgeons was organized, and some years subsequent, in 1863, the Odontographic Society of Philadelphia. In addition to these, there are throughout the country fifty-five other State and county societies, the latter holding meetings generally monthly. In 1839 the legislature of Maryland chartered the "Baltimore College of Dental Surgery." It was the first dental college in the country. It held its thirty-third annual commencement this year (1873), and in the graduating class receiving the honors of the institution was one lady, she being its first female graduate. Its alumni number over 700.

The "Ohio College of Dental Surgery" was chartered in 1845. It is located in Cincinnati. Its alumni number about 250. It has for the last fifteen years admitted ladies equally with gentlemen, and several have taken their degree. The "Pennsylvania College of Dental Surgery" was chartered in 1856; it is located in Philadelphia. It held its seventeenth annual commencement in 1873. Its alumni numbered 488, of which 443 were regular graduates, 10 honorary, and 35 received the degree after a satisfactory examination, they having been in practice some years previous to the establishment of dental colleges. Among the graduates was one lady, now practising in Berlin; she received the degree in 1869. The "Philadelphia Dental College" was chartered in 1863; its alumni number 260. The "New York College of Dentistry" was chartered in 1865, and established in New York City. Its alumni number 68. The "Missouri Dental College," chartered in 1866, is in St. Louis, Mo.; its alumni number about 50. The "New Orleans Dental College," in New Orleans, La., was chartered in 1867; its alumni number about 30. The "Boston Dental College" and the "Dental School of Harvard University" were both chartered in 1868. They held their fifth annual commencement in 1873. The alumni of the latter number about 35.

A growing desire on the part of the liberal and educated men in the profession that their specialty should be raised above a mere mechanical trade has created an interest in the education of dental students, and a corresponding desire for a more extended and liberal curriculum in the colleges, many of the best men in the profession believing that a thorough medical education, preparatory to studying the specialty of dentistry, would make more efficient and useful practitioners; so that a patient with an oral disease of any complexity, trusting himself to the average dentist, would not meet with disaster because of the absence of surgical knowledge and skill; in fact, that dentistry should be practised as a specialty of medicine; that the practitioner should understand that the welfare of the teeth is intimately connected with that of the general system; and that a knowledge of the diseases whose effects may reach these organs is essential to the scientific dentist. His knowledge of anatomy should not be confined to the structure of the tooth, to the pulp which fills its internal cavity, to the position of the nerves which communicate its complaints to the brain, nor to the manner in which it is held fast in its socket; but his education should embrace a thorough acquaintance with the anatomical and sympathetic relations of the organs of the mouth with all parts of the system.

From what was originally called dentistry there have very naturally and almost without an effort been evolved two widely different occupations. They may properly be termed operative dentistry, or dental surgery, and mechanical dentistry; and as competition necessitates and stimulates proficiency, more distinctly marked must this division become. The artisan who works in his laboratory making casts, swedging plates, grinding and filing down teeth, and finally soldering them to the plate, and finishing the whole as neatly as a piece of jewelry-work, cannot keep his hands in a condition to successfully perform the delicate manipulative operations required in treating the natural teeth. Delicacy of touch is indispensable in a skilled operator, and one who does not possess it proportionally fails just where it is most essential his operations should be perfect.

Mechanical dentistry has again been relieved of a portion of the labors originally performed by the dentist—that of carving or moulding the teeth used. The early dentists carved from ivory the teeth and plate in one piece, and if a partial set was inserted, the teeth were fastened to the adjoining natural ones by means of ligatures; if a full set was required, springs were used. Ivory and natural teeth were objectionable from their liability to be acted upon by the fluids of the mouth. Absorbing as they do these secretions, they soon become offensive, and often rapidly decay. Porcelain teeth, well named incorruptible, perfectly resist the destructive action of these fluids; and as they are made nearly perfect in color and shape, they are not easily detected. Though of French origin, they owe the perfection to which they have been brought to the energy and ingenuity of the American manufacturer.

Mr. Charles W. Peale of Philadelphia has the reputation of making in 1807 the first manufactured in the U. S. He made a set for his son, Rembrandt Peale, in 1808, and gave instruction in his methods to Mr. Barabino, a dentist then practising in Philadelphia. The first regular manufacturers were Greenwood, Woffendale, and Parkhurst, who were engaged in the business in 1825. The manufacture of mineral teeth for the supply of dentists was first undertaken by Samuel W. Stockton in Philadelphia about the year 1835, and to him, together with Neal and Acock, is due the credit of establishing this branch of business in the U. S. The present perfection in moulding and enamelling the teeth was not attained for some years afterwards, nor was the color so life-like or the shades so varied. For many years the coloring was put on in the shape of paint. The teeth were moulded and partially burned, when they were subjected to the process of painting, and again placed in the furnace. Much of the improvement made between 1840 and 1849 in the transparency of the tooth, the granulated appearance of the gum enamel, and the almost unlimited variety of shades, was due to the persistent and untiring experiments of Dr. Elias Wildman of Philadelphia. The use of the purple of Cassius, or oxide of gold, now so generally used in gum-color, was brought to its present state of perfection through his untiring efforts.

An artificial tooth must possess certain qualities apart from size, shape, and color—a front surface which must closely resemble the enamel or external covering of the natural tooth, and a body having the toughness which allows the vigorous use of the hammer in riveting without fracture, and the use of the blowpipe in soldering without liability to crack. If the tooth were one homogeneous mass, the requisite amount of vitrifaction necessary to imitate the enamel would render it brittle; but a proper amount of translucency must be preserved, or there will be the opaque, clay-colored tooth, which proclaims its artificial character to the most casual glance; so that a nice calculation is necessary not to sacrifice beauty to strength. There must also be the distinctly-marked clear cutting edge of enamel projecting beyond the body of the tooth, and contrasting, as in Nature's work, with the yellow or brown base, and yet this depth of color in the body and translucency of the point must be so nicely blended that the line of union cannot be determined. These and many other valuable results have been secured by patience of research and skill in application.

The principal materials entering into the composition of mineral teeth are felspar, silex (flint), and kaolin (clay), with various fluxes, so known in chemistry, more familiarly characterized as *glasses*, used to determine the point of fusion desired, of different parts of the tooth. The general tone or tint of these materials is white or dusky yellow, so that coloring forms a prime adjunct in the process.

The chief coloring substances are titanium for yellow, platina sponge for gray, oxide of cobalt for bright blue, and oxide of gold for red. These, with others in varying combinations, are used to color the body, point, and outside enamels. There are more than forty shades of color in the bodies used, and an equal number in the point and outside enamels. Thus, starting with the lightest shade of body known as "A," forty different grades may be produced by using a different point-enamel, and on each of these a different effect by the use of various outside enamels, so that with a single body of any one color one may produce 64,000 varieties or gradations of color; and as there are thirty-nine other bodies, a smart calculator can determine the many changes of which they are capable. Some idea may be formed of the need of variety by the fact that out of innumerable trials in the way of combinations, 130 standard shades are made, duly arranged, and classified by numbers, forming a gradual but quite perceptible progression from the most delicate blue-white to the dark tobacco-stain. For the production of these colors one is not to think of a dyer's vat, but to remember that their bath is a glowing muffle at incandescent heat.

Many teeth, good in themselves, have an artificial appearance in the mouth, simply because the dentist, though an excellent mechanic, has lacked the perception to discover the shade made necessary by the complexion, hair, and eyes of the wearer.

One establishment in Philadelphia turns out 400,000 teeth per month, about half what are made in Europe and America. In Europe a substance resembling Wedgwood ware is of late much used for artificial teeth, and its toughness and durability are admirable.

In fitting artificial teeth it is very important to take a good impression of the shape of the mouth. Various sub-

stances have been used for the purpose, such as wax (either pure or mixed with paraffin, gutta-percha, or other materials); gutta-percha alone or combined; plaster of Paris alone. These substances have each their merits, and the choice for any particular case is to be determined by experience. The two materials principally employed in making the plate upon which the teeth are fastened are gold and vulcanized rubber. The principal advantage of the latter material is its cheapness, which is more than counterbalanced by its clumsiness, fragility, and its irritating effect on the mouth. C. NEWLIN PIERCE.

Dentition. See TEETH.

Den'ton, a county in the N. of Texas. Area, 900 square miles. It is intersected by several branches of Trinity River, one of which is called Denton Fork. The surface is diversified by prairies and extensive forests; the soil is fertile. Wheat, corn, cotton, cattle, swine, tobacco, and wool are raised. Capital, Denton. Pop. 7251.

Denton, a township and post-village, capital of Caroline co., Md., on the E. bank of the Choptank River, 65 miles E. of Annapolis. It has two weekly newspapers, one iron-foundry, one academy, five churches, and two churches for the colored people. The river on which it is situated is famous for shad and herring. Total pop. 475.

WM. HENRY LEGG, ED. "JOURNAL."

Denton, a post-village, capital of Denton co., Tex., on the Texas Pacific R. R., 45 miles S. W. of Sherman. It has one weekly newspaper. Pop. 361.

C. W. GEERS, ED. "MONITOR."

Denuda'tion [from the Lat. *denudo, denudatum,* to "lay bare"], in geology, is defined by Lyell as "the removal of solid matter by water in motion, whether of rivers or of the waves and currents of the sea, and the consequent laying bare of some inferior rock. This operation has exerted an influence on the structure of the earth's crust as universal and important as sedimentary deposition itself; for denudation is the necessary antecedent of the production of all new strata of mechanical origin. The formation of every new deposit by the transport of sediment and pebbles necessarily implies that there has been somewhere else a grinding down of rock into rounded fragments, sand, or mud equal in quantity to the new strata." Denudation may be divided into *subaërial,* which is effected by the action of wind, rain, and rivers, and *submarine,* which is caused by tides and currents of the sea. In many instances deep and wide channels or valleys have been excavated in rocky strata by the long-continued action of rivers; and these are called *valleys of denudation.* As the strata exposed on the sides of these valleys correspond to each other, both in composition and order of position, it is evident that they were originally continuous. "The larger part of the valleys of the world," says Dana, "are formed entirely by running water. . . . Many examples are on record of gorges hundreds of feet deep cut out of the solid rock by two or three centuries only of work."

Den'ver, a handsome city of Colorado, the capital of the Territory and of Arapahoe co., is beautifully situated on the South Platte River, 15 miles E. of the base of the Rocky Mountains and 5375 feet above the level of the sea; lat. 39° 47′ N., lon. 105° W. It is the western terminus of the Kansas Pacific R. R., and the northern terminus of the Denver and Rio Grande R. R. The Denver Pacific R. R., 106 miles long, extends from Denver northward to Cheyenne. Denver is the commercial centre and most populous city of Colorado. It commands a magnificent view of mountain-scenery and of several peaks covered with eternal snow. The climate is peculiarly serene, healthy, and delightful. The city occupies a series of plateaus rising as they recede from the river by gentle ascents. It contains a U. S. branch mint, three seminaries, and three national and four private banks. Exchange drawn in 1872, $21,000,000. Eight weekly, one semi-weekly, two monthly, and three daily newspapers are published here. The Colorado Central R. R. connects this place with Golden City, 17 miles distant. The Denver and Boulder Valley Railway, 44 miles long, was completed in Sept., 1873, to Boulder City. The Denver South Park and Pacific is a new narrow-gauge railway; making altogether six railroads diverging from Denver. The value of the goods sold here in 1872 was estimated at $18,000,000. Denver was first settled in 1858. There are eighteen churches, numerous manufactories, water and gas-works, and street railways. P. 4759.

WILLIAM N. BYERS, ED. "ROCKY MOUNTAIN NEWS."

Denver, a township of Richland co., Ill. Pop. 952.

Denver, a post-township of Newaygo co., Mich. Pop. 777.

Denver (JAMES W.), an American general, born at Winchester, Va., in 1818. He removed to California, was elected a member of Congress in 1854, and was governor of Kansas from Dec., 1857, to the autumn of 1858. He became a brigadier-general of Union volunteers in 1861.

Den'verton, a post-township of Solano co., Cal. P. 470.

De'odand [Lat. *deodandum,* from *Deo* (dative of *Deus,* "God"), and *dandum,* future passive participle from *do,* to "give;" literally, that which is "to be given or dedicated to God"], in English law, a name applied to any personal chattel which had caused the death of a human being, and for that reason was applied to pious uses, or, as the term implies, given to God. It was, in fact, forfeited to the king, and distributed in alms by his high almoner. The law of deodand is now abolished in England, and is unknown in American law.

Deodar. See CEDAR.

Deo'datus, or **Deus'dedit,** SAINT, pope, succeeded Boniface IV. in 615, died Nov. 9, 618, and was succeeded by Boniface V. He is regarded as a worker of miracles.

Deodorizers. See DISINFECTION, by PROF. HENRY HARTSHORNE, M. D.

Deoxida'tion [Lat. *deoxidatio,* from *de,* priv., and *oxygen*], the chemical process by which oxygen is abstracted from a compound. This term when applied to metals is synonymous with *reduction.* A compound of a metal with oxygen may in many cases be reduced or deoxidized by heating it with carbon or in a stream of hydrogen gas.

Depart'ment [Fr. *département,* from *departir,* to "divide"], literally, a "division;" a portion; a distinct province; a territorial division; a principal division of executive government. In the U. S. each of the secretaries and other functionaries who form the cabinet is the head of a department. These are called the departments of agriculture, education, interior, justice, navy, post-office, state, treasury, and war. A department is not defined by the Constitution, but is recognized and mentioned several times in that instrument. It is a division of government business over which the head, by law, exercises exclusive control, subject only to the supervision and direction of the President. The attorney-general is the head of the department of justice, established in 1870. Portions of the duties of several departments are allotted to bureaus, but there are no separate bureaus in the department of state or that of the post-office. The term department is also applied to the three principal branches or co-ordinate powers of the republic. "Under the Federal Constitution," says Gillet, "the national government is composed of three distinct and independent departments—the *legislative,* the *judicial,* and the *executive.*" The whole territory of the U. S. is divided into military departments, each under a general officer.

DEPARTMENT, in geography, a primary division of France. In 1790 the old divisions called provinces were abolished, and the country was divided into eighty-three departments, most of which were designated by the names of French rivers or mountains. During the first empire the number increased to 130, including Belgium, portions of Italy, etc. At the beginning of the German war in 1870 the number of departments was eighty-nine. In 1871, France ceded to the German empire the whole of Bas-Rhin, a large part of Haut-Rhin, nearly all of Moselle, a small part of the department of Vosges, and a part of Meurthe. Each department is divided into arrondissements, and is governed by a prefect (*préfet*). The principal divisions of Bolivia, Peru, and some other South American republics are also called departments.

Departure, in navigation. See NAVIGATION, by LIEUT.-COM. A. H. MCCORMICK, U. S. N.

Depau'ville, a post-village of Clayton township, Jefferson co., N. Y., at the head of navigation of Chaumont River. Pop. 235.

De Pere, a township of Brown co., Wis., containing the villages of De Pere and West De Pere, situated on opposite sides of the Fox River. They are connected by a bridge 1500 feet in length, and contain, together, eight churches, three public and one private school, four smelting-furnaces, one large railroad car-shop and iron-works, a foundry, machine-shop, and hub- and spoke-factory, three flouring, two wooden-ware, three shingle, and four saw mills, five wagon-shops, besides various other industries. The Milwaukee and Northern Railway runs on the river bank through De Pere, and the Chicago and North-western dépôt is in West De Pere. The Goodrich line of steamers makes regular trips to Chicago, and the Buffalo line takes freight from the wharves to Buffalo and intermediate ports. It has one weekly newspaper. The water-power is made by the first dam on the Fox River of the Green Bay and Mississippi Canal Company. Pop. of township, 2800; of De Pere, 1372; of West De Pere, 875.

P. R. PROCTOR, ED. "NEWS."

De Peys'ter, a post-village and fertile township of St. Lawrence co., N. Y., named after Frederic (I.) de Peyster, bounded on the W. by Black Lake, and intersected by the Oswegatchie River. Pop. 1138.

De Peyster (J. Watts), born Mar. 9, 1821, is of the seventh generation residing or born in the first ward of the city of New York. The first of the name in America, Johannes, of Huguenot extraction, a person of property, came from Holland, was schepen in 1656, etc., alderman in 1666, etc., burgomaster in 1673, and then deputy-mayor in 1677, of New York, refusing the mayoralty because he could not speak English. He had an opportunity for displaying his patriotism and firmness (1673) in one of the most trying crises of the Dutch colony. His eldest son, Abraham (I.), was a man of very great ability and most genial nature. He was acting governor and president of the council in 1700; chief-justice, 1700–01; colonel commanding the colonial militia of the city and county of New York, and treasurer for many years of the colonies of New York and New Jersey. His eldest son, Abraham (II.), succeeded him as treasurer in 1721, and continued in office during his lifetime (1767). James (I.), his eldest son, was a merchant of great note and of much benevolence. In this generation, Arent Schuyler de Peyster, the grandson of Abraham (I.), ultimately colonel B. A., and commanding the Eighth or King's regiment of foot, exercised a vast command and influence in the N. W. with his head-quarters at Michilimacinac, but will be better known by his literary connection with the poet Burns—a private in the Dumfries Volunteers, of which de Peyster was colonel—who dedicated to his military superior his "Poem on Life." The nephew of the preceding, bearing the same name, was a fearless navigator, and has left a memorial in the de Peyster Islands, a group of seventeen in the South Pacific (Mulgrave Archipelago), discovered by him in 1819. The three sons of James (I.), Abraham (III.), Frederic (I.), James (II.), were officers in the British service. Abraham (III.) was second in command in the battle of King's Mountain (1780), and after displaying great valor, severely wounded at the conclusion of this contest, the most desperate and sanguinary at the South. In this battle British troops (and perhaps any troops in the field) were first armed with breech-loading rifles, the invention of Patrick Ferguson, major B. A., and colonel and acting brigadier in America, chief in command of the royal forces in this decisive collision. Frederic (I.) was also severely wounded in the Carolinas, and James (II.), captain-lieutenant in America, and subsequently lieutenant in the Royal Artillery, one of the handsomest men in the British army, was killed under the most extraordinary circumstances at the assault of the French lines of Menin, in Flanders (1793), having been previously buried alive by the explosion of a mine at the siege of Valenciennes, and brought back to light and life almost by a miracle. (See "Gentleman's Magazine," 1793.) Frederic (II.), third son of Frederic (I.), president of the New York Historical Society and prominent member of a number of literary and charitable institutions, is the author of a number of able pamphlets, denoting great knowledge, research, ability, and influence.—J. Watts de Peyster has published a number of military, historical, and ethnological, etc. works, of which the most prominent are biographies of the Swedish field-marshal Torstenson (seventeenth century); of Major-General Philip Kearny; of Coehorn, "prince of engineers;" of Carausius; of the History of the Third Corps of the Army of the Potomac; of the decisive conflicts of the great American civil war, and of the Last Campaign of the Army of the Potomac, etc. etc. etc. For the first work he was the recipient of three splendid medals, etc. from Oscar I., king of Sweden, and, for valuable services, of the only brevet major-generalship ever conferred, after debate, by a special law or concurrent resolution of his native, or of any other, State. His writings have won for him the endorsement of a number of our most distinguished generals as "the foremost military writer of the country." He was the first to urge in a series of reports, made in 1852–53, the advantages of a paid fire department for this city, in conjunction with steam as applied to the means of combating fire. His three sons, J. Watts de Peyster, Jr., Frederic, Jr., and Johnston L., were respectively brevetted colonel, major, and lieutenant-colonel U. S. volunteers, and all three colonels N. Y. volunteers, for gallant and meritorious services during the great American conflict. Charles W. Greene.

De Peyster (J. Watts, Jr.), born Dec. 2, 1841, displayed in early age great decision of character, power of command, laborious research, and practical power of application. In Mar., 1862, he left the Law School of Columbia College, N. Y., joined his cousin, Maj.-Gen. Philip Kearny, as volunteer aid, and was greatly distinguished for gallantry and good conduct in the battle of Williamsburg. Promoted to a lieutenancy, and while commanding a company of New York volunteer cavalry, he won the respect and esteem of his colonel, a man of great culture and observation, who testified "that with experience (which he was rapidly acquiring) he would have been one of the best of cavalry officers." Again promoted major of the First New York Volunteer Artillery, he returned to the Peninsula, and, attached to the staff of Maj.-Gen. Peck, acquired the respect, the regard, and good-will, not only of his immediate commander, but of every general with whom he was brought in contact or with whom he served in the course of most varied duties. Prostrated by James River fever, after many months' struggle between life and death he hastened back to the field in the winter of 1863, and, although pronounced by medical examiners as unfit for active duty, he displayed a zeal, capacity, and energy in the campaign of Chancellorsville which elicited the most remarkable commendations from the commander-in-chief, the magnificent hero of the "battle above the clouds," Joseph Hooker, who recommended Maj. de Peyster for brevet as eminently deserving, having been no less remarked for his coolness and courage at Fredericksburg than at Williamsburg; likewise from his immediate superior, Gen. Albion P. Howe.

Maj., Brevet Col. de Peyster, continued to command a brigade of artillery until midsummer, 1863, when the consequences of his faithful service in such a deteriorated sanitary condition developed diseases which neither science nor time could alleviate; and although he survived until 13th April, 1873, this whole period was one long, hopeless struggle of unyielding constancy against the unrelaxing siege of death. Charles W. Greene.

Depil'atory [Lat. *depilatorius*, from *de*, priv., and *pilus*, the "hair"], a name given to applications used to remove hair from any part of the body. A thin paste of powdered quicklime and water applied to any part until a burning sensation is produced, and then wiped off with a wet sponge, will generally remove hair.

Deploy' [Fr. *déployer*, to "unfold," to "spread"], a military term, signifies to open or extend troops from column into line; to spread out a body of troops so as to present a wider front. To reverse this movement is to *ploy*.

Deporta'tion [from the Lat. *de*, "from," and *porto*, *portatum*, to "carry"], a compulsory removal from one country to another; a banishment. The kings of ancient Assyria attempted to secure their conquests by the deportation of a large part of the native population, as in the case of the Jews, who were carried as captives to Babylon. In French law, deportation is a punishment equivalent to transportation in English. It is ranked as third in degree after capital punishment, the second being condemnation to the galleys or hard labor for life. Deportation has often been inflicted in France as a punishment for political offences since the revolution of 1789.

Depos'it [Fr. *dépôt;* from the Lat. *depono*, *depositum*, to "lay down"], any matter laid down; that which is thrown down from a liquid in which it has been suspended. In geology, a bed or stratum of rock formed of matter that has settled from suspension in water. Deposits are characterized, according to the conditions under which they were formed, as marine, lacustrine, or fluviatile.

Depos'it, a post-village situated partly in Broome and partly in Delaware co., N. Y., on the Erie R. R. where it crosses the Delaware River, 177 miles N. W. of New York. It has a national bank, a newspaper, an academy, stock-yards, a planing-mill, a flouring mill, etc. Pop. 1286, of which 496 are in Delaware county. Ed. "Courier."

Deposi'tion [Lat. *depositio*, from *de*, "down," and *pono*, *positum*, to "put"], in law, the testimony of a witness set down in writing in answer to interrogatories legally exhibited. Depositions are taken either by a judge or a commissioner specially appointed for that purpose. The questions to which the depositions are answers are usually put by the parties to the suit or their legal representatives, under the control of the court by whose authority the commission to take the testimony issues. Such depositions form an established medium of proof in the English court of chancery. It is a rule in the law of evidence that a deposition cannot be read where the witness himself might be produced, because his oral testimony is the most satisfactory medium of proof.

Deposition, in geology, the process by which sedimentary deposits or strata are formed. The greater portions of the strata of sandstone, limestone, and slate are the result of deposition. During the process of deposition each separate layer was once the uppermost, and was in contact with water, as is proved by the numerous fossils of marine animals found in it. "By attending," says Lyell, "to the

nature of these remains, we are often enabled to determine whether the deposition was slow or rapid, and whether it took place in a deep or shallow sea."

Depot [Fr. *dépôt*, dā′po′, from the Lat. *de*, "down," and *pono, positum*, to "put" or "place"], a storehouse or place for the reception of goods for safe keeping;* a military station, where supplies are kept, recruits received and trained, and the needs of soldiers provided for. The term is also applied to that portion of a battalion remaining when the rest are ordered upon foreign service. The combining of several battalions of depots forms a depot battalion. In America the name depot is popularly and somewhat incorrectly given to railroad stations.

Dep′ping (George Bernard), a *littérateur*, born at Münster May 11, 1784, removed in early life to Paris. He wrote "The Maritime Expeditions of the Normans in the Tenth Century" (1826), "History of Normandy" (1835), and other works. Died Sept. 5, 1853.

Depres′sion of Equa′tions, in algebra, the derivation from a given equation of another lower in degree, whose roots are related in a known way to those of the first. This reduction can always be effected by simple division when one or more of the roots are known; but without knowing the roots beforehand the equation may be depressed—1st, when some particular relation subsists between two (or more) of the roots; for example, if an equation contain equal roots, these may be found and the equation reduced by as many dimensions as there are equal roots; 2d, if two roots of an equation be equal in magnitude, but opposite in sign; and 3d, if the equation be a reciprocal one—that is to say, such that its form is not changed by changing x into $\frac{1}{x}$. (See Equation, by Pres. F. A. P. Barnard, S. T. D., LL.D., L. H. D.)

Dept′ford, a town and naval port of England, is on the Thames, 4 miles below London Bridge, and is separated from Greenwich by the Ravensbourne, which here enters the Thames. It is partly in Kent and partly in Surrey. It contains a large naval arsenal and dockyard. Here are extensive market-gardens. Pop. 45,973.

Deptford, a township of Gloucester co., N. J. Pop. 4663.

Dep′uty [Fr. *député*, from the Lat. *deputo*, to "judge," to "destine," to "appoint"], a person appointed to act for another as representative, lieutenant, viceroy, or agent; a delegate; a legislator chosen to represent his constituents. One of the legislative bodies of France under the monarchy (1814–48) was called the Chambre des Députés, and the term *député* is now applied to the members of the French National Assembly. In the kingdom of Italy the lower house is called Camera de' Deputati, "Chamber of Deputies." It consists of about 508 deputies, elected by the people who pay taxes.

De Quin′cey (Thomas), an English author, born in Manchester Aug. 15, 1785. He was a younger son of a wealthy merchant. He once ran away from school and went to London, where he passed nearly two months in extreme want and strange adventures. He entered the University of Oxford in 1803, and there contracted a habit of using opium. In 1808 he quitted the university, became a friend and associate of Coleridge, Southey, and Wordsworth, and began to reside at Grasmere in the Lake district. He married in 1816, devoted his time chiefly to literature, made good translations from Lessing and Jean Paul Richter, and contributed articles on biography, philosophy, and other subjects to "Blackwood's Magazine." When in the prime of life he reformed the habit of the excessive use of opium, and in 1821 he published "Confessions of an English Opium-Eater." He removed to Scotland in 1843, and passed the later years of his life near Edinburgh. He was one of the most brilliant magazine-writers of his time, and wrote on a great variety of subjects, but his works are mostly fragmentary. The first edition of his collected works was published by Ticknor & Fields, Boston (18 vols., 1851–58). He died in Edinburgh Dec. 8, 1859.

Der′a Ghazee′ Khan, a town of Afghanistan, hard by the river Indus and 65 miles N. W. of Bhawlpoor. It is advantageously situated for trade, and has manufactures of silk and cotton goods and cutlery. Pop. estimated at 25,000.

Derah [Arab. *deraa*], the unit measure of length in Egypt. The subdivisions are the *kadam* = one-half of a derah, the *abdat* = one-sixth of a derah, and the *kerat* = one-twenty-fourth of a derah. Several derahs are in use—viz. the common derah of Egypt = 22.37 British inches; the derah Hendazeh, by which dry goods are sold = 25.5 British inches; the derah Istambouli (Constantinopolitan derah), used for European dry goods = 66.34 British inches; and the ancient derah of the Nile or of Memphis = 20.699 British inches. The first three values above are given on the authority of the "Report of the International Conference on Moneys, Weights, and Measures," Paris, 1867; and the last on that of Prof. Piazzi Smyth. This measure has some interest, in consequence of its connection with recent discussions concerning the Great Pyramid of Egypt, and the purpose of its construction.

Der′a Isma′eel′ Khan, a town of Afghanistan, in Derajat, on the Indus, 17 miles N. N. W. of Bukkur. It has an active trade and manufactures of cotton cloth. Pop. about 8000.

Derayeh, El, a town of Arabia, in Nedjed, about 430 miles N. E. of Mecca, was formerly the capital of the Wahabees. It has a beautiful situation, with gardens and fertile fields in the environs. It was once a populous town, and contained about thirty mosques, but it was taken and partly destroyed by Ibrâhim Pasha in 1819. Pop. about 15,000.

Der′bend′, a fortified maritime town of Russia, capital of Daghestan, is on the W. shore of the Caspian Sea; lat. 42° N., lon. 48° 15′ E. It is situated at the foot of a mountain, and at the entrance of a defile called by the ancients *Albaniæ Pylæ*, and now the Pass of Derbend. It is enclosed by walls which are supposed to be 1000 years old or more, and are eight feet thick and twenty-six feet high. The harbor is poor, and accessible only to small boats. Derbend was taken from Persia by the Russians in 1795. Pop. in 1869, 15,739.

Der′by, an inland county of England, bounded on the N. by Yorkshire, has an area of 1030 square miles. It is drained by the rivers Trent and Derwent. This county is remarkable for the variety of its scenery, and is partly occupied by the Penine chain, formed of carboniferous limestone, which abounds in precipices, caverns, and rocking-stones. The Peak, the highest hill in Derbyshire, has an altitude of 2000 feet. This county is rich in minerals—viz. coal, copper, iron, lead, zinc, marble, fluor-spar, etc. Here are important manufactures of cotton, silk, and worsted goods, metallic wares, and porcelain. It is traversed by several canals and railways. Capital, Derby. Pop. in 1871, 380,538.

Derby, a manufacturing town of England, capital of the above county, is on the river Derwent, at the junction of the main branches of the Midland Railway, 119 miles N. N. W. of London and 35 miles N. N. E. of Birmingham. The private houses are mostly built of brick. Here is a free grammar school founded in 1162. Derby has manufactures of silk, cotton, lace, hosiery, porcelain of great beauty, jewelry, and ornaments of fluor-spar; also iron-foundries, rolling-mills, and tanneries. The staple manufacture is throwing silk, introduced early in the eighteenth century. Pop. in 1871, 49,793.

Derby, or **Derby Narrows,** a post-village of New Haven co., Conn., is at the confluence of the Naugatuck with the Housatonic River, and on the Naugatuck and the New Haven and Derby R. Rs., 10 miles W. of New Haven. A bridge over the river connects it with Birmingham. It has extensive and varied manufactures, and a savings bank. Pop. 3168; of township, including Derby Village, Ansonia, and Birmingham, 8020.

Derby, a post-township of Orleans co., Vt. It is the seat of an academy. It has five churches, manufactures of lumber, starch, and woollen goods, and a national bank, the latter at Derby Line, on the Canada frontier. North Derby is the junction of the Connecticut and Passumpsic Rivers R. R. with the Massawippi Valley R. R. and the Stanstead branch. The town lies on the E. side of Lake Memphremagog. Pop. 2039.

Derby (Edward Geoffrey **Smith-Stanley**), fourteenth earl of, an English statesman, was born in Lancashire Mar. 29, 1799. He was educated at Oxford, was elected to Parliament in 1820, and represented successively Preston, Windsor, and North Lancashire. In 1825 he married a daughter of Lord Skelmersdale. He supported the Reform bill, and became chief secretary for Ireland in 1830. In 1833 he entered the Whig ministry as secretary for the colonies, but he resigned office in 1834, and joined the conservative party. He was secretary for the colonies in the cabinet of Sir Robert Peel from 1841 to 1845. Having been created Baron Stanley in 1844, he then passed into the House of Lords. He resigned office in 1845, because he was opposed to the repeal of the Corn laws, and soon after this date began to be regarded as the leader of the conservatives and protectionist party. He stood in the foremost rank as a parliamentary debater. On the death of his

* The original idea of *depot* is that of a place where something is "put down" for a short time, to be taken up again. *Repository* (from *re*, "back," and *pono*, to "put") is a place where something is put back (out of the way), to be kept a long time.

father, in 1851, he succeeded him as earl of Derby. He was prime minister from Feb. to Dec., 1852, and was then succeeded by Lord Aberdeen. He was the leader of the opposition during the administration of Lord Palmerston, who resigned in Feb., 1858. Lord Derby then formed a new ministry, in which he was first lord of the treasury (premier). He introduced a bill for electoral reform, but the House adopted an amendment offered by Lord John Russell. Lord Derby therefore dissolved Parliament and appealed to the country, but the liberals obtained a majority in the new House of Commons which met in June, 1859, and Lord Derby then resigned office. He produced a translation of Homer's "Iliad" into blank verse (1865), which is highly commended. Russell and Gladstone, whose Reform bill had been rejected by the House of Commons, retired from power in June, 1866, and Lord Derby was then requested by the queen to form a new ministry. He failed in his effort to draw several Whig or liberal leaders into a coalition. His principal colleague was Disraeli, who prepared a new Reform bill, passed in 1867, extending the right of suffrage to great numbers of the middle class. He resigned in Feb., 1868, and was succeeded by Disraeli. Died Oct. 23, 1869.

Derby, Earls of (England, 1485), Barons Stanley (United Kingdom, 1832), and baronets (1627). The kings of Man were of this line from 1406 till 1505, when they took the title of lords of that island. The lordship of Man passed from the Derby family in 1735.—Edward Henry Smith-Stanley, fifteenth earl, P. C., D. C. L., was born at Knowsley Park July 21, 1826. He was formerly styled Lord Stanley. He was educated at Trinity College, Cambridge, where he graduated as first class in classics in 1848, and was elected to Parliament in the same year. He was one of the most liberal members of the conservative party. In Feb., 1858, he entered the cabinet as secretary for the colonies, and in the ensuing May he became commissioner for the affairs of India. He retired from office when the liberals came into power, in June, 1859. On the formation of a conservative ministry by his father in June, 1866, he was appointed secretary for foreign affairs. He presided over the conference of the European powers which was held in London in May, 1867. He resigned with his colleagues in Dec., 1868, and inherited the title of earl of Derby in Oct., 1869.

Derby (Elias Hasket), a merchant, born at Salem, Mass., Aug. 16, 1739, was a distinguished ship-owner, and in the Revolutionary war engaged extensively and successfully in privateering upon British commerce. He afterwards established the American China and East India trade. Died at Salem, Mass., Sept. 8, 1799.—General Elias Hasket Derby, born at Salem Jan. 10, 1766, was also one of the founders of the India trade. He also began the manufacture of American broadcloth, and is believed to have been the first importer of merino sheep. Died Sept. 16, 1826.—Elias Hasket Derby, a son of the preceding, born Sept. 24, 1803, graduated at Harvard in 1824, became an eminent lawyer and railroad president, and is well known for his contributions to the "Atlantic Monthly," "Edinburgh Review," etc. He labored with zeal in the construction of iron-clad vessels during the civil war.

Derby (George H.), an American officer and humorist, born in 1823 in Norfolk co., Mass., graduated at West Point in 1846, and July 1, 1860, captain of topographical engineers. He served in the war with Mexico 1846–47, engaged at Vera Cruz and Cerro Gordo (severely wounded and brevet first lieutenant); on various surveys and explorations 1846–52; on improvement of San Diego harbor, Cal., 1853–54; on staff of commanding general and in charge of military roads department of the Pacific 1854–56; on coast survey 1856; and lighthouse engineer 1857–59. Under the *nom-de-plume* of "John Phœnix" he was author of "Phœnixiana, or Sketches and Burlesques," 1860, of "Squibob Papers," 1860, and of numerous humorous effusions. Died May 15, 1861, at New York City, aged thirty-eight. George W. Cullum, U. S. A.

Derbyshire Spar, a name given to the fluoride of calcium or Fluor-Spar (which see).

Dercyl'lidas [Δερκυλλίδας], a Spartan commander sent to aid the Asiatic Greeks in their resistance to the Persian forces under Pharnabazus and Tissaphernes, B. C. 399. He captured a number of cities in Asia Minor, and built a wall to protect the Greeks of the Chersonesus against the Thracians. He was superseded by Agesilaus, B. C. 396.
Henry Drisler.

Derecske, a town of Hungary, in the county of Bihar, 12 miles S. of Debreczin. Near it are several small lakes, in one of which pearls are found. Pop. about 6000.

Derg, Lough ("Red Lake"), a small lake of Ireland between Donegal county and Tyrone. It encloses an isle called St. Patrick's Purgatory, which is visited annually by nearly 12,000 devotees, and is the most celebrated place of pilgrimage in Ireland.

Derin'da, a post-township of Jo Daviess co., Ill. P. 804.

Derived Func'tion, or **Derivative,** a term first used by Lagrange in his "Calcul des Fonctions" to indicate the coefficient of h in the development of a function $F(x+h)$ according to powers of h. It is itself a function of x, and is usually represented by the symbol $F'(x)$. In a similar manner the derived function of $F'(x)$ is termed the second derived function of $F(x)$, and is denoted by the symbol $F''(x)$. By allowing h to diminish indefinitely, the identity of the derived function and the differential coefficient $\frac{dF(x)}{dx}$ is at once seen. (See Differential Coefficient, by Pres. F. A. P. Barnard, S. T. D., LL.D., L. H. D.)

Der'matophytes [from the Gr. δέρμα (gen. δέρματος), the "skin," and φύτον, a "plant"], a term applied to cryptogamic vegetable growths which inhabit the cuticle or epidermis, and give rise to certain skin-diseases, such as favus, ringworm, etc. It is held that the various forms of these plants are in many cases transmutable into each other. For example, the favus plant, the barber's-itch plant (*Achorion*), and the chloasma plant (*Microsporon*) are only forms of the yeast plant (*Torula* or *Cryptococcus cerevisiæ*).

Dermop'tera [from the Gr. δέρμα, "skin," and πτερόν, a "wing" or "fin"], an order of cartilaginous fishes characterized by the absence of pectoral and ventral fins. The rays of the vertical fins are soft and delicate, or imperceptible. The lancelet and lampreys are of this order.

Der'moskel'eton [from the Gr. δέρμα, "skin," and σκελετόν, a "skeleton"], a term applied to the crustaceous, testaceous, or osseous integument which covers many invertebrate animals, as the beetle and lobster; also some vertebrate animals, as the tortoise. It serves to protect the soft parts of the body, and affords points of attachment for the organs of locomotion.

Der'ne, Der'na, or **Bel'ed-al-Soor** (anc. *Darnis*), a seaport-town of Northern Africa, in Barca, is 1 mile from the Mediterranean; lat. 32° 46′ N., lon. 22° 41′ E. Its harbor is insecure. During the hostilities between the U. S. and Tripoli this town was taken in 1805 by the American forces under Gen. Eaton. Pop. about 6000.

Der'num, a township of Randolph co., Ark. Pop. 1764.

De Rosset (John Armand), M. D., of Wilmington, N. C., was one of the most remarkable men of the medical profession of the U. S. Born in 1767 in North Carolina, of Huguenot descent, he graduated in Princeton College, studied under Dr. Rush (receiving the highest mark of distinction), practised his profession sixty-nine years, and died in the ninety-second year of his age. When eighty years old he said, "I have prescribed for six generations in one family." His grandfather, father, himself and two sons have all practised medicine in Wilmington, N. C. Of him it has been said, "In every respect he was a model of the Christian and gentleman." Paul F. Eve.

Der'rick [said to be the name of a celebrated hangman at Tyburn in the seventeenth century; hence, literally, a "hanger"], a mechanical invention used for lifting machinery, raising wrecks and other great weights, and transporting them from one place to another. A floating derrick or crane consists of an iron pontoon, divided into several watertight compartments, from the centre of which rises a tripod mast. Across the mast turns a boom of great strength: one arm of the boom is furnished with fourfold blocks, through which pass the chains intended to hoist the weight; the chains pass over the top of the mast to the opposite end of the boom, and thence descend to the side of the vessel, where they are connected with steam-engines in the pontoon. Water is admitted into the compartments of the pontoon as a counterpoise to the weight suspended.

Der'ry, a township of Pike co., Ill. Pop. 1327.

Derry, a township and post-village of Rockingham co., N. H. The village is on the Manchester and Lawrence R. R., 11 miles S. E. of Manchester. It is the seat of Pinkerton Academy and of Adams Female Seminary (East Derry). It has a national bank, and manufactures of lumber, boots and shoes, edge-tools, etc. Pop. of township, 1809.

Derry, a township and borough of Dauphin co., Pa., on the Philadelphia and Reading R. R., 13½ miles E. of Harrisburg. Pop. of township, 1824; of borough, 216.

Derry, a township of Mifflin co., Pa. Pop. 1901.

Derry, a township of Montour co., Pa. Pop. 888.

Derry, a township and village of Westmoreland co., Pa., on the Pennsylvania R. R., 46 miles E. S. E. of Pittsburg. Pop. 5170.

Derrynane, a township of Le Sueur co., Minn. P. 759.

De Russy (René Edward), an American officer, born in 1791 in New York City, graduated at West Point in 1812, colonel of engineers Mar. 3, 1863. In the war of 1812–15 with Great Britain he was engaged on the Canadian frontier in the repulse of the British flotilla at French Creek 1813, battle of Chrystler's Field 1813, attack on La Cote Mill 1814, battle of Plattsburg 1814, and after Gov. Provost's defeat was chief engineer of Gen. Macomb's division. He served in the construction of fortifications 1816–33; as superintendent of the Military Academy 1833–38; in building coast defences and improving harbors and rivers 1838–65; as member of various boards of engineers 1848–64; and in command of corps of engineers 1858–61. Brevet brigadier-general, Mar. 13, 1865, for long and faithful service. Died Nov. 23, 1865, at San Francisco, Cal., aged seventy-five. George W. Cullum, U. S. A.

De Ruyter, a post-village of Madison co., N. Y., on the Auburn branch of the New York and Oswego Midland R. R., about 25 miles S. S. E. of Syracuse. It has one newspaper, is the seat of the De Ruyter Institute, and is in a good hop and dairy section. Pop. 605; of De Ruyter township, 2009. John R. Beden, Pub. "New Era."

Der'vish [from *darvêsh* or *darwêsh*, a Persian word signifying "poor;" also a "mendicant"], a name applied to the orders of Mohammedan monks in Persia, India, and Turkey. Some belong to communities, and reside partly in monasteries and partly outside; others wander solitarily through the land, living on alms and professing abstinence and holiness, but belonging to no particular sect. Their worship consists in prayers, mortifications, and religious dances. Dervishism is supposed to have taken its rise in Persian Soofeeism.

Der'wentwater, also called **Keswick Lake,** a beautiful lake of England, in Cumberland, is an expansion of the river Derwent. It extends southward from Keswick, is 3 or 4 miles long and 1½ miles wide. Its banks are rocky, abrupt, and picturesque. On this lake is a remarkable floating island, covered with vegetation and full of air-bubbles, which render it buoyant.

Derwentwater (James **Ratcliffe**), Earl of, an English Catholic and Jacobite, born in Northumberland June 28, 1689. He inherited the earldom from his father in 1705. In 1715 he raised a small body of his retainers to fight for the Pretender. He was one of the leaders of the army that was defeated at Preston (Nov. 13), and was taken prisoner. He was convicted of treason, and beheaded Feb. 24, 1716. His estates were given to Greenwich Hospital.

Derzha'vin, written also **Derzavin** or **Derjavine** (Gabriel Romanovitch), a celebrated Russian lyric poet, born at Kazan July 3, 1743. He entered the army in 1760, and was raised to the rank of colonel. Having gained the favor of the empress Catharine, he was appointed secretary of state in 1791. He became a senator in 1793, imperial treasurer in 1800, and minister of justice in 1802. In 1810 he published four volumes of poems, remarkable for originality, sublimity, and for purity of sentiment. His most popular poem is an "Ode to the Deity" ("Oda Bogu"), which has been translated into English, Chinese, and other languages. Died July 6, 1816.

Desaguade'ro (*i. e.* the "outlet"), a river of Bolivia, issues from Lake Titicaca, of which it is the only outlet. It flows southward about 190 miles and enters Lake Aullagas. It is the highest considerable river in America, for the elevation of its source is 12,846 feet, and that of its mouth is not much less.

Desaguadero, a vast table-land in Bolivia and Peru, between two ranges of the Andes. It extends from Potosí to the peak of Vilcañota, and is about 400 miles long. Area, estimated at 150,000 square miles. It contains the great lake Titicaca, 12,846 feet above the level of the sea, and Lake Aullagas, which has no outlet.

Desaix de Veygoux (Louis Charles Antoine), an able French general, born near Riom, in Auvergne, Aug. 17, 1768. He served with distinction in several campaigns of the army of the Rhine, and was rapidly promoted to the rank of general. In 1798 he took part in the expedition to Egypt. He gained a victory at Sidiman in October of that year, and completed the conquest of Upper Egypt in 1769. He afterwards governed that province with such moderation and justice that the natives called him "The Just Sultan." In May, 1800, he returned to France, and hastened to join the army in Italy. The French were about to retreat at Marengo, when Desaix arrived with a reserve, and converted defeat into a decisive victory, but he was killed in this action, June 14, 1800. (See J. Lavallée, "Éloge historique du Général Desaix;" Thiers, "History of the Consulate."

De Sanctis (Luigi), a leader of the Protestant movement in Italy, born Dec. 31, 1808, was for some years a priest and professor of theology in Rome, became a Protestant in 1847, established the Protestant periodical "Eco della Verità," and was in 1868 appointed professor of theology at the Waldensian Seminary in Florence. He wrote a number of treatises against the Roman Catholic Church which have been translated into several languages. Died Dec. 31, 1869.

Des Arc, a township of White co., Ark. Des Arc post-office is in Prairie co., and has one weekly newspaper. Pop. of township, 861.

Desaugiers (Marc Antoine Madeleine), a French song-writer, born at Frejus Nov. 17, 1772. He produced many popular songs and comedies or vaudevilles. He taught pianoforte-playing for some years in the U. S. Died Aug. 9, 1827.

Desault (Pierre Joseph), an eminent French surgeon, born Feb. 6, 1744, was a pupil of Antoine Petit. He was considered the most skilful French surgeon of his time, and had a very large practice. Died June 1, 1795. His doctrines were published in the "Surgical Works" of his scholar, Bichat. (See Petit, "Éloge de Desault," 1795.)

Descartes (René), [Lat. *Renatus Cartesius*], an illustrious French philosopher and mathematician, born at La Haye, in Touraine, Mar. 31, 1596. He was educated at the college of La Flèche, where he acquired great proficiency in mathematics and astronomy, and formed an intimate friendship with Mersenne. He left college in 1612, dissatisfied with the method and doctrines which were then in vogue. He resolved to efface from his mind all scholastic dogmas and the prejudices of his education, to reject the authority of books, and to admit only that which was confirmed by reason and experiment. He entered the Dutch army in 1616, and that of the duke of Bavaria in 1619, but he renounced the military profession in 1621. In pursuit of knowledge he travelled for several years in Italy, France, and other countries. He settled in Holland in 1629, in order to devote himself to the study of mathematics, astronomy, metaphysics, etc. He made important discoveries in algebra and geometry, which he announced in his "Discourse on the Method of Reasoning Well and of Investigating Scientific Truth," 1637 ("Discours sur la Méthode pour bien conduire sa Raison," etc.). This work comprises treatises on metaphysics, dioptrics, and geometry. He was the first who introduced exponents or applied the notation of indices to algebraic powers, and he gave a new and ingenious solution of equations of the fourth degree.

He published in 1641 "Meditationes de Prima Philosophia," which gave a wonderful impulse to philosophical inquiry. He founded the superstructure of all positive knowledge on the basis of self-consciousness, or the relation between consciousness and existence, which he expressed in this phrase: "Cogito, ergo sum"—"I think, therefore I exist." He worked a greater change in metaphysical thought than any modern philosopher. The innovations and paradoxes of the Cartesian philosophy excited much hostility among the theologians and the disciples of Aristotle. His book was condemned by the college of cardinals at Rome. Among his other works is "Principles of Philosophy" ("Principia Philosophiæ," 1644), in which he propounds his theory of the world—that the sun is the centre of a *vortex* of an ethereal fluid, whose whirling motion produces the revolution of the planets and other phenomena. The French court granted him a pension of 3000 livres in 1647. Having been invited to her court by Christina, queen of Sweden, he went to Stockholm in 1649, where he died next year from a cold he caught by standing in shoes and silk stockings on the cold marble floor, to teach philosophy early in the morning to the queen, still in bed. Complete editions of his works were published in 1690 and 1824. (See G. H. Lewes, "Biographical History of Philosophy;" Adrien Baillet, "Vie de Descartes," 2 vols., 1691; Thomas, "Éloge de Descartes," 1765; G. H. Gaillard, "Éloge de Descartes," 1765; Millet, "Descartes, sa Vie, etc.," 1869.)

Descartes' Rule of Signs, a theorem by means of which the maximum number of positive or negative roots of an equation can be ascertained by inspection. The theory reduces itself essentially to this: The number of positive roots of an equation cannot exceed the number of variations in the signs of its coefficients, considered in their proper order. As an illustration, take the cubic equation $F(x) = 3x^3 - 7x^2 + 11x + 4 = 0$. Inasmuch as there are but two variations of signs on passing from one extreme term to the other, through the intermediate ones, we conclude that the cubic cannot have more than two positive roots. To ascertain the maximum number of negative roots, it is merely necessary to apply the same theorem to the equation which is obtained from the original by chang-

ing x into $-x$. Thus the positive roots $F(-x) = -3x^3 - 7x^2 - 11x + 4 = 0$ are negative roots of the original cubic, and by Descartes' rule their number cannot exceed one. This rule is a particular case of Fourier's theorem.

Descent', in law, is the succession to landed estate after the owner's death, in cases where he has not made previous disposition of the estate. The rule of descent among the ancient Greeks was that the sons shared alike, and the daughters were dependent upon the bounty of their brothers. Among the Hebrews the eldest son had a double portion. With the ancient Romans sons and daughters shared alike. The former English law was very complicated, but has of late received important modifications. The law of primogeniture prevails as to males, while several females of equal degree claim as one heir.

The subject of descent is regulated by positive rules in the U. S., and but few of general application can be stated. The following may be referred to as either of common recognition or having some peculiarity worthy of notice:

1. Title by descent depends upon a rule of law. The person from whom the land descends is termed an ancestor; the one to whom it passes is called an heir, who has no volition in the matter. The estate is cast upon him, at the death of the ancestor, even against his consent.

2. The persons to whom land descends are specifically designated by positive rule, and may be grouped as follows: (1) Lineal descendants. These, if of equal degree, take equally undivided shares or are "tenants in common." If of unequal degree, those who are more remote take the share that would have belonged to their parent if living. Thus, if the ancestor had left a son A, and C, D, E, children of a deceased son B, the grandchildren taken together would have the share of B. Those who inherit on equal terms are said to take *per capita;* those who take the shares of deceased persons, as above illustrated, are said to take *per stirpes.* (2) Where there are no descendants, the next claimants would regularly be the parents (the father being frequently preferred to the mother), as they are removed but one degree from the intestate, while the nearest collateral relatives (brothers and sisters), reckoning according to the methods of the civil law (see CONSANGUINITY), are two degrees. Still, if the estate descended to the intestate from maternal relatives, there are cogent reasons for preferring the brothers and sisters to the father, and the same reasons for preferring them to the mother where the land came from paternal relatives. Under these circumstances the law of some of the States gives the land to the father or mother for life only, as the case may be, and the estate itself to the brothers and sisters. (3) If there be no father or mother or descendants, the land will descend to the brothers and sisters equally, with the same distinctions as to taking *per capita* and *per stirpes* as noticed under subdivision (1). (4) The next claimants are either grandparents, or, if these be passed over, as may be the case, uncles and aunts and their descendants. In the instance of uncles, etc. the law of some of the States distinguishes between the case where the intestate acquired the estate by his own act and where he obtained it by inheritance. In the former instance the descent would take place to maternal and paternal uncles and aunts and their descendants, without discrimination; in the latter, the uncles, etc. belonging to that branch of the family from which the estate was derived would have the preference. More remote claimants need not here be noticed. (5) Distinctions sometimes are recognized between relatives of the whole blood and those of the half blood, so that the latter are excluded from inheriting. An illustration is found in the law of New York, under which, for example, a brother of the half blood on the maternal side (*frater uterinus*) cannot inherit land from a brother having a different father, which land such brother had inherited from his father, as the claimant is not in that case of the blood of the immediate ancestor from whom the estate was derived by the brother from whom inheritance is claimed. (*Wheeler* vs. *Clutterbuch*, 52 New York Reports 67, 1873.) (6) Posthumous children inherit as if they had been born during the life of the ancestor. They must be born alive, and of such a state of development that by the laws of physiology they are capable of living. (7) The English common law will prevail unless abrogated by statute. Thus, in New York, where the special cases referred to in the statute of descents do not occur, primogeniture still is recognized.

3. Illegitimate relatives cannot in general inherit, though in a number of the States they may under certain qualifications, particularly from the mother and maternal relatives.

4. The law of the State where the land is situate governs descent, without reference to the law prevailing where the owner resides.

5. In general, all interests in and rights to land are governed by the rules of descent. Thus, should the intestate have only a right of action, or be the owner of a future estate, or have simply a beneficial ownership, such as an estate held in trust, his rights and qualified estates of this nature will be transmitted under the same general rules as if he were legal owner in possession. This proposition is in some respects in marked contrast with the doctrines of the common law. This system required the ancestor to have been at some time seized or to have an estate of which seizin could be affirmed. (See SEIZIN.) Accordingly, if he had acquired only a right of action, this could not descend from him, nor could in general an estate of which he had acquired the ownership, subject to a life estate in another. Still, if he had once been seized, the unlawful deprivation of his seizin would not prevent the operation of the law of descent.

6. In a number of the States aliens cannot inherit. This is a rule of the English common law. In other States it has been abrogated.

(Accurate knowledge of the law of descents in any State can only be acquired by an examination of its statutes. See also WASHBURN "On Real Property," and BLACKSTONE'S and KENT'S "Commentaries.") T. W. DWIGHT.

Deschambault, a post-village of Portneuf co., Quebec (Canada), on the N. side of the St. Lawrence River, 45 miles above Quebec. It has a convent of Sisters of Charity. Pop. about 500.

Deschamps (ÉMILE), a French poet and dramatist, born at Bourges Feb. 20, 1791. He produced in 1818 two successful comedies, entitled "Selmours et Florian" and "Le Tour de Faveur." In 1828 he published a volume of poems called "French and Foreign Studies." He contributed to the journals some prose tales. Died April, 1871.

Deschanel (MARTIN), a French author, born at Paris Nov. 14, 1819, published in 1850 "Catholicisme et Socialisme," and articles for the republican press which caused his banishment. Returning in 1859, he became an editor of the "Journal des Débats." He printed "Les Courtesanes de la Grèce" (1854), "Histoire de la Conversation" (1858), "Physiologie des écrivains et des artistes" (1864), and "Études sur Aristophane" (1867).

Descrip'tive Geom'etry is a branch of practical mathematics, the object of which is to obtain representations on plane surfaces of accurately-defined bodies in space, for the investigation of their metrical as well as descriptive properties. It differs from ordinary perspective, inasmuch as by the latter method the actual dimensions of a body cannot be ascertained from its representation. In descriptive geometry points in space are represented by their orthographical projections on two planes at right angles to each other, called the planes of projection. It is usual to suppose one of the planes of projection to be horizontal, in which case the other is vertical; and the projections are called horizontal or vertical according as they are on the one or the other of these planes. Any curve in space will be represented by two curves in the horizontal and vertical planes, and a curved surface by the corresponding representations of certain points and curves on that surface. Thus, a plane would be completely defined by its intersections with the planes of projection. The intersections of a line or surface with the planes of projection are called its traces. Again, a sphere may be represented by the projections of its horizontal (or vertical) great circle; a cylindrical surface by its trace on one of the planes of projection, and the projection of any generator on the other; a cone by the projections of its vertex, and by one of its traces, etc. Although applicable to sculpture and all mechanical arts, it is especially useful to civil and military engineering. Among the best works on the subject are those of Monge, Hachette, Lacroix, and Leroy.

Des'eret, a name given by the Mormons to the Territory of UTAH (which see). The Mormons claim that in the language of their sacred books this word means "honey-bee."

Des'ert [from the Lat. *deserta,* neut. plu. of *desertus,* passive part. from *desero, desertum,* to "forsake," "forsaken" places], a term generally used to designate a barren or uninhabited place, but applied more particularly to the vast sandy and stony plains of Africa and Asia. In every region of the globe plains are to be found which, though resembling each other in their grand outlines, exhibit, with the different latitudes in which they are placed, a corresponding variety of character. There are considerable tracts of desert land in Nevada, Arizona, and other parts of the U. S. Such are the "Bad Lands" E. of the Rocky Mountains; these are not plains, but are generally peculiarly broken and rocky surfaces. The principal desert of South America is the nearly rainless Atacama region. The most striking feature of North Africa is its immense deserts; of these the chief is the Sahara, or *The Desert,* so called by way of eminence.

The great deserts of Africa are separated from those of Asia only by the valley of the Nile and the Red Sea, the sandy zone extending throughout the breadth of the old continent from Western Africa to 120° E. longitude.

In many parts the dreary waste of loose and hardened sand is broken by low hills of naked sandstone or by tracts of arid clay, and occasionally it is enlivened by verdant isles or oases, which serve as resting-places for caravans. It has been computed to cover an area of 6,500,000 square miles, but the Asiatic portion of this tract includes many chains of mountains and fertile valleys. It is characterized by arid wastes of sand or clay, sometimes with saline incrustations on the surface. Except the Nile, the Euphrates, the Indus, and the Oxus, there are no large rivers in a region which embraces almost a fourth part of both Africa and Asia. This portion of Central Asia forms a series of elevated plains 6000 miles in length from E. to W. "Some of these plains," says Humboldt, "are covered with herbage; others produce only evergreen saliferous plants; but a great number glitter from afar with a saline efflorescence that crystallizes in the semblance of lichens, and covers the clayey soil with patches like new-fallen snow."

In the Old Testament four words are employed, all of which are sometimes, not uniformly, rendered in our English version "desert," but no one of them denotes a sandy waste. Desert, in the Hebrew sense, is simply untilled pasture-land, which may be covered with a luxuriant vegetation. In the New Testament, ἐρῆμος has the same sense, which of course is quite at variance with classic usage.

REVISED BY R. D. HITCHCOCK.

Deser'ter [for etymology see preceding article], a soldier or seaman who abandons the public service without permission. In England this crime was formerly punished by death, but is now left to the discretion of a court-martial. In time of war in the U. S. deserters from the army and navy may be sentenced to death, or otherwise punished as a court-martial may decide. For desertion in times of peace the punishment is much less severe.

Desfontaines (RENÉ LOUICHE), a French botanist, born in Feb., 1752. In 1798 he published "Flora Atlantica" (2 vols. 4to), which treats of the plants of Africa. He discovered the difference in the growth and structure of endogenous and exogenous plants. Died Nov. 16, 1833. (See A. P. DE CANDOLLE, "Notice Historique sur la Vie de M. Desfontaines," 1834.)

Desgenettes (NICOLAS RENÉ DUFRICHE), M. D., BARON, a French physician, born at Alençon May 23, 1762. He was chief physician of the army of Italy in 1795–96, and was physician to the grand army during the empire. He wrote several medical works. Died Feb. 3, 1837.

Deshā', a county in the S. E. of Arkansas. Area, 750 square miles. It is bounded on the E. by the Mississippi River, and intersected by the Arkansas and White rivers. The surface is an alluvial plain, partly liable to inundation; the soil is fertile. Cotton is the chief crop. Capital, Napoleon. Pop. 6125.

Deshoulières (ANTOINETTE DU LIGIER DE LA GARDE), a French poetess, was born in Paris about 1634. She was distinguished for wit and beauty, and was married in 1651 to an officer named Deshoulières. Among her works are "Les Moutons," an idyl, eclogues, odes, "Moral Reflections," and a tragedy called "Genseric." Died Feb. 17, 1694.

Des'iccant [Lat. *desiccans*, from *de*, intensive, and *siccans*, pres. part. of *sicco*, *siccatum*, to "dry"], in medicine, an application used to check the secretion of a membrane or ulcer.

Desicca'tion [Lat. *desiccatio*, from *de*, intensive, and *sicco*, *siccatum*, to "dry"] is a process of extracting moisture by chemical agency or by the use of air and heat. Chloride of calcium, quicklime, fused carbonate of potash, and oil of vitriol are used for this purpose.

Design' [Fr. *dessin*, from the Lat. *designo*, to "mark out"], a plan or scheme formed in the mind; an intention, purpose, or project. In the fine arts, the idea formed in the mind of an artist on any particular subject; a preliminary work, either in outline or color, in which the conception of the artist is indicated and partly expressed. The design ought to exhibit the whole composition and drawing of the work, though the last only in a general way. The design ought thus to be a correct, though not a complete, representation of the future work. A sketch differs from a design in that the former is usually applied to a first drawing of an object placed before an artist; the latter to a first drawing of an object or subject which he has imagined or modified by his faculty of invention. Unity of design, combined with variety of form and embellishment, is essential to a perfect work of art. In architecture, the term design is applied to a drawing mathematically correct, but in which the effects which will ultimately be produced by distance and by light and shade are altogether ignored. Design is also an important term in philosophy, and is used as synonymous with *final* cause.

Design, Schools of, are institutions where ornamental artistic or mechanical drawing is taught. The most perfect institutions of the kind are in Europe, but most of our large cities have similar schools. Massachusetts gives free instruction in these branches. One of the largest schools of design is in the Cooper Union building in New York. The "National Academy of Design" is a beautiful building in the Venetian style, at the corner of Fourth Avenue and Twenty-third street, New York. This academy was founded in 1828, and the present building (which cost $150,000) was completed in 1864. There is in it an annual exhibition (from April to July) of paintings by artists connected with the institution.

Desima, a Japanese island in the Bay of Nangasaki, contains the factories of the Dutch.

Desmidia'ceæ [from *Desmidium*, one of the genera], an order of the green Algæ, closely approaching the Diatomaceæ, but differing by the absence of siliceous frustules and also by their green endochrome. These plants consist of connected joints, and they are increased by the addition of two half-joints in the centre. It is said fecundation sometimes takes place by the conjugation of two plants by means of simple contact. The spores take a variety of forms, and from them the new plant is produced by the formation of a vertical partition in the centre, and the subsequent growth of two new half-joints. The Desmidiaceæ are abundantly found in limpid fresh water, causing a green scum, which under the microscope presents an astonishing variety of beautiful forms. The late Prof. J. W. Bailey of West Point made them a subject of special observation. The number of species is very great.

Des Moines, de-moin', a river of the U. S., and the largest that traverses the State of Iowa, rises in the S. W. part of Minnesota. It flows in a S. S. E. direction to the capital city of Des Moines, below which it runs nearly south-eastward until it enters the Mississippi River at the S. E. extremity of Iowa, about 4 miles below Keokuk. Length, estimated at 500 miles. It flows through fertile undulating prairies, and through a large field of bituminous coal.

Des Moines, a county in the S. E. of Iowa. Area, 408 square miles. It is bounded on the E. by the Mississippi River, and on the S. W. by the Skunk River. The surface is diversified by woodlands and fertile undulating prairies. Cattle, grain, wool, hay, and dairy products are extensively raised. Of manufactories those of wagons are most numerous. Coal and limestone are abundant here. It is intersected by the Burlington and Missouri River R. R. and the Burlington Cedar Rapids and Minnesota R. R. Capital, Burlington. Pop. 27,256.

Des Moines, a township of Boone co., Ia. Pop. 5241.

Des Moines, a township of Dallas co., Ia. Pop. 802.

Des Moines, a township of Jasper co., Ia. Pop. 2105.

Des Moines, a township of Jefferson co., Ia. Pop. 1280.

Des Moines, a township of Lee co., Ia. Pop. 1104.

Des Moines, a township of Mahaska co., Ia. Pop. 1101.

Des Moines, a township of Pocahontas co., Ia. Pop. 256.

Des Moines, the capital of Iowa and seat of justice for Polk co., is situated on the Des Moines River at the mouth of the Raccoon, on the Chicago Rock Island and Pacific R. R., 357 miles W. of Chicago, 174 miles W. of Davenport, and 138 miles E. of Omaha, on the Des Moines Valley R. R., connecting it with Keokuk and Fort Dodge, on the Des Moines and Indianola R. R., on the Des Moines and Winterset R. R., and on the Des Moines and Minnesota Narrow-gauge Railway. The State capital was removed in 1855 to this place, at that time called Fort Des Moines. A new State-house is now in the process of erection, the estimated cost of which is $3,000,000. The State library contains some 20,000 volumes. The State arsenal, a large building, contains, besides military equipments for the State, the tattered flags of all Iowa regiments engaged in the war of 1861–65, and numberless other trophies and valuables of interest. The city has twenty or more churches; three national and three private banks; a U. S. court-house and post-office, built of marble and costing $250,000; and a large county court-house; and it has complete gasworks, a street railroad, the Holly system of waterworks, numerous handsome residences, and other public improvements necessary in first-class modern cities. Three daily, seven weekly, and three monthly papers are published here. Mines of excellent coal are extensively worked. There is

plenty of water, plenty of timber, and plenty of coal. Numbers of manufactories of various kinds are in operation. Des Moines has increased rapidly during the last decade, and is the largest city in the interior of the State. Pop. in 1860, 3965; in 1870, 12,035.

R. P. CLARKSON, ED. "IOWA STATE REGISTER."

New State Capitol (Des Moines, Iowa).

Des Moines, a township of Van Buren co., Ia. P. 1078.

Des Moines, a township of Jackson co., Minn. P. 548.

Des Moines, a township of Clarke co., Mo. Pop. 1235.

De Soto, a township and post-village of Jackson co., Ill., on the Illinois Central R. R., 63 miles N. of Cairo. P. 1433.

De Soto, a post-village of Dallas co., Ia., on the Chicago Rock Island and Pacific R. R., 22 miles W. by S. of Des Moines.

De So'to, a parish in the N. W. of Louisiana. Area, 910 square miles. It is bounded on the S. W. by the Sabine River. The soil is fertile. Cotton and corn are raised. Capital, Mansfield. Pop. 14,962.

De Soto, a county in the N. W. of Mississippi. Area, 900 square miles. It is drained by the Coldwater Creek. The surface is nearly level; the soil is fertile. Cotton is the staple product, but corn, cattle, wool, and tobacco are raised. It is intersected by the Mississippi and Tennessee R. R. Capital, Hernando. Pop. 32,021.

De Soto, a post-village of Jefferson co., Mo., on the St. Louis and Iron Mountain R. R., 43 miles S. W. of St. Louis. It has one weekly newspaper.

De Soto, a post-village of Washington co., Neb., is on the Missouri River and the Omaha and North-western R. R., 26 miles N. N. W. of Omaha. It is on the site of a former Mormon settlement. Pop. of township, 288.

De Soto, a post-village of Vernon co., Wis., on the Mississippi River halfway between La Crosse and Prairie du Chien. It has one weekly newspaper.

De So'to (HERNANDO), a Spanish explorer, born in Estremadura in 1500. He explored in early youth the coasts of Guatemala and Yucatan. Having a high command under Pizarro, he contributed largely to the conquest of Peru. He conducted an expedition from Spain to Florida in 1539, and discovered the Mississippi River. He died in Louisiana June 5, 1542.

Des'sau, a town of Germany, capital of the duchy of Anhalt, is on the Mulde near its entrance into the Elbe, 80 miles by railway S. W. of Berlin. It is well built, and contains a fine ducal palace, a town-hall, a theatre, a college, and a normal school. Here are many paintings of the early German masters. It has manufactures of woollen cloth, hosiery, hats, tobacco, etc. Pop. in 1871, 17,464.

De Staël-Holstein (ANNE LOUISE GERMAINE). See STAËL, DE.

Dester'ro, or **Nos'sa Senho'ra do Dester'ro** (*i. e.* "Our Lady of Desterro"), a seaport of Brazil, capital of the province of Santa Catharina, is on the island of Santa Catharina, 460 miles S. W. of Rio Janeiro. It has a trade in feathers and artificial flowers; is defended by several forts, and has a good harbor; lat. 27° 36′ S., lon. 48° 40′ W. Pop. 8000.

Deter'minant. This term is used to express a certain symmetrical algebraic function of n^2 quantities of very frequent recurrence in the theory of equations, and still more in the higher geometry. A definition of the term, with a statement of a few of the elementary properties of determinants, and of some of their most simple applications, is all that can be attempted here.

If we take the product $a_1b_2c_3...n_n$ of n factors, and permute the subscript indices in every possible way, we shall have 1.2.3....n products. If now we give to each one of these several products a *plus* sign whenever the number of interchanges of indices necessary to produce it from the above product is *even*, and a *minus* sign when the number of interchanges is *odd*, and add the results, we have the *determinant* of the n^2 quantities a_1, b_1, c_1, ...n_1, a_2, b_2, c_2, ...n_2, a_3, b_3, etc. etc.

The determinant is usually written thus:

$$\begin{vmatrix} a_1 & b_1 & c_1 & \dots & n_1 \\ a_2 & b_2 & c_2 & \dots & n_2 \\ a_3 & b_3 & c_3 & \dots & n_3 \\ \dots & \dots & \dots & \dots & \dots \\ a_n & b_n & c_n & \dots & n_n \end{vmatrix}$$

but it is also sometimes written $\Sigma\pm(a_1b_2c_3...n_n)$, where the

product written in the parenthesis is that of the letters along the diagonal of the matrix, beginning at the upper left corner.

The following equations and propositions will serve to illustrate the definition. Most of them may be verified by inspection, or by actual expansion according to the rule:

1. $\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix} = \Sigma\pm(a_1 b_2) = a_1 b_2 - a_2 b_1.$

2. $$\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = \Sigma\pm(a_1 b_2 c_3).$$
$$= a_1 \begin{vmatrix} b_2 & c_2 \\ b_3 & c_3 \end{vmatrix} - a_2 \begin{vmatrix} b_1 & c_1 \\ b_3 & c_3 \end{vmatrix} + a_3 \begin{vmatrix} b_1 & c_1 \\ b_2 & c_2 \end{vmatrix}$$
$$= a_1 b_2 c_3 - a_1 b_3 c_2 + a_2 b_3 c_1 - a_2 b_1 c_3 + a_3 b_1 c_2 - a_3 b_2 c_1.$$

3. $$\begin{vmatrix} a_1 & b_1 & c_1 & d_1 \\ a_2 & b_2 & c_2 & d_2 \\ a_3 & b_3 & c_3 & d_3 \\ a_4 & b_4 & c_4 & d_4 \end{vmatrix} = \Sigma\pm(a_1 b_2 c_3 d_4).$$
$$= a_1 \begin{vmatrix} b_2 & c_2 & d_2 \\ b_3 & c_3 & d_3 \\ b_4 & c_4 & d_4 \end{vmatrix} - a^2 \begin{vmatrix} b_1 & c_1 & d_1 \\ b_3 & c_3 & d_3 \\ b_4 & c_4 & d_4 \end{vmatrix} + a_3 \begin{vmatrix} b_1 & c_1 & d_1 \\ b_2 & c_2 & d_2 \\ b_4 & c_4 & d_4 \end{vmatrix} - a_4 \begin{vmatrix} b_1 & c_1 & d_1 \\ b_2 & c_2 & d_2 \\ b_3 & c_2 & d_3 \end{vmatrix}$$
$$= a_1 b_2 c_3 d_4 - a_1 b_2 c_4 d_3 + a_1 b_3 c_4 d_2 - a_1 b_3 c_2 d_4 + a_1 b_4 c_2 d_3 - a_1 b_4 c_3 d_2$$
$$- a_2 b_1 c_3 d_4 + a_2 b_1 c_4 d_3 - a_2 b_3 c_4 d_1 + a_2 b_3 c_1 d_4 - a_2 b_4 c_1 d_3 + a_2 b_4 c_3 d_1$$
$$+ a_3 b_1 c_2 d_4 - a_3 b_1 c_4 d_2 + a_3 b_2 c_4 d_1 - a_3 b_2 c_1 d_4 + a_3 b_4 c_1 d_2 - a_3 b_4 c_2 d_1$$
$$- a_4 b_1 c_2 d_3 + a_4 b_1 c_3 d_2 - a_4 b_2 c_3 d_1 + a_4 b_2 c_1 d_3 - a_4 b_3 c_1 d_2 + a_4 b_3 c_2 d_1$$

4. The determinant is a linear function of each element.

5. A single interchange of two adjacent rows, or two adjacent columns, changes the sign of the determinant. Two such interchanges leave the determinant unaltered.

6. The value of a determinant is not affected by changing the rows into columns and the columns into rows.

7. The determinant is zero when two columns are equal, or when two rows are equal.

8. The product of two determinants is a determinant.

9. The differential co-efficient of a determinant with respect to any element is a determinant.

An idea of the use of determinants in the theory of equations and in geometry may be formed from the statement of a few propositions:

1. If $a_1x+b_1y+c_1z=d_1$, $a_2x+b_2y+c_2z=d_2$, and $a_3x+b_3y+c_3z=d_3$, then $x=\dfrac{\Sigma\pm(d_1 b_2 c_3)}{\Sigma\pm(a_1 b_2 c_3)}$, $y=\dfrac{\Sigma\pm(a_1 d_2 c_3)}{\Sigma\pm(a_1 b_2 c_3)}$, and $z=\dfrac{\Sigma\pm(a_1 b_2 d_3)}{\Sigma\pm(a_1 b_2 c_3)}$.

2. Similar values are obtained for n unknown quantities from n linear equations.

3. Three straight lines whose equations are of the form $ax+by+c=0$ intersect in one point if $\begin{vmatrix} a & b & c \\ a' & b' & c' \\ a'' & b'' & c'' \end{vmatrix} = 0.$

4. The area of a triangle, the rectangular co-ordinates of whose angles are $x_1\,y_1$, $x_2\,y_2$, $x_3\,y_3$, is one-half of $\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$.

5. These three points of No. 4 are in a straight line when the determinant is zero. Hence, the equation of a line passing through two given points is $\begin{vmatrix} x & y & 1 \\ x' & y' & 1 \\ x'' & y'' & 1 \end{vmatrix} = 0.$

6. The volume of a pyramid in terms of the rectangular co-ordinates of its four summits is one-sixth of the determinant $\begin{vmatrix} x_1 & y_1 & z_1 & 1 \\ x_2 & y_2 & z_2 & 1 \\ x_3 & y_3 & z_3 & 1 \\ x_4 & y_4 & z_4 & 1 \end{vmatrix}$.

7. The equation of a plane passing through three given points is $\begin{vmatrix} x & y & z & 1 \\ x' & y' & z' & 1 \\ x'' & y'' & z'' & 1 \\ x''' & y''' & z''' & 1 \end{vmatrix} = 0.$

There is in all parts of the mathematics, but especially in higher geometry, a frequent recurrence of symmetrical forms which may be written as determinants. Hence, great importance attaches to all propositions respecting them. There is an elementary explanation of determinants in the last three chapters of Todhunter's "Theory of Equations." Their properties and use in plane geometry are developed in full in Whitworth's "Trilinear Co-ordinates." In Salmon's "Higher Algebra" there is an introduction to the theory of linear transformations, a large department of mathematical science which has been created within the past few years. H. A. Newton.

Deter'minate Prob'lem, a problem in geometry which admits of a limited number of solutions, an indeterminate problem being one which admits of an indefinite number of solutions. Thus, the problem, "Given the base, perimeter, and area, to construct the triangle," is determinate, there being in general but four solutions. By omitting one of the three data, however, the problem becomes indeterminate. For instance, an infinite number of triangles having the same perimeter can be constructed on a given base. The problem, however, is not *perfectly* indeterminate, for the vertices of all such triangles are restricted to a certain locus—*i. e.* the ellipse whose foci are the extremities of the given base. In general, the omission of one of the conditions or data which render a problem determinate leads to a local problem.

Det'inue [an Old Fr. word, from *detenir*, to "detain," literally, that which is "detained"], in law, an action for the recovery of a personal chattel wrongfully detained, or its value, with damages and costs. The action is for the recovery of a specified article; the chattel therefore must be of such a character that it can be distinguished from others, as a horse. The plaintiff must have an absolute or special property in the article at the time he brings the action. The defendant must have had possession at some time, which should have been acquired in some lawful manner, as by contract or finding. The nature of the possession must also continue. As if a finder should sell the thing found before action, the proper remedy would be an action for conversion, though if he had not sold there might be a case of detinue.

Det'mold, a town of Germany, capital of the principality of Lippe-Detmold, on the Werra, 42 miles S. W. of Hanover. It has a fine castellated palace, a theatre, a public library, and a celebrated teachers' seminary; also manufactures of linen and woollen goods. Its people are remarkable for culture and taste. Near this town is the battlefield where Hermann destroyed the Roman army of Varus in 9 A. D. Pop. in 1871, 6469.

De Tocqueville (Alexis Charles Henri Clerel), a renowned French statesman and political economist, was born in Paris July 29, 1805. He studied law, and in 1827 became judge-auditor at the tribunal of Versailles. In 1831 he was commissioned to investigate the penitentiary systems of the U. S., which he visited in company with Gustave de Beaumont. In 1832, having returned from the U. S., he resigned his office, and in 1835 he gave to the public the first volume of his work "De la Démocratie en Amérique" ("On Democracy in America," 4 vols., 1835–40), which met with a brilliant success. About this time he married Mary Mottly, an English lady. De Tocqueville, though himself opposed to democracy, foretold its rapid growth in the world. In 1838 he was made a member of the Academy of Moral and Political Sciences, and in 1839 he was elected to the Chamber of Deputies. He became a member of the French Academy in 1841. In 1848, having been elected to the Constituent Assembly, he lent his support to the cause of order. In 1849 he was minister of foreign affairs from June 2 to Oct. 31. The coup-d'état of Dec. 2, 1851, drove him from the public service. He published in 1856 his "L'ancien Régime et la Révolution" ("The Old Régime and the Revolution"), a very excellent work. Died at Cannes April 15, 1859.

Detona'tion [from the Lat. *detono, detonatum*, to "thunder"], combustion with explosive rapidity, accompanied with sound and light, as in the case of gunpowder, percussion-caps, and fulminating-powder. When a mixture of oxygen and hydrogen is inflamed by the electric spark, it is said to *detonate*. Detonation is due either to the sudden liberation and expansion of large volumes of gases, or to the sudden contraction of gaseous matter and its reduction to a liquid or solid state.

Detri'tus [from the Lat. *de*, "down" or "off," and *tero, tritum*, to "rub"], literally, that which is rubbed or worn off, a geological term applied to material composed of small portions of a rock or a deposit which have been detached and removed to a distance by the action of any abrading power.

De Trobriand (Philip Regis), an officer of the U. S. army, born in Tours, France, June 4, 1816, and a French baron by inheritance; "Bachelier-ès-lettres" (University of Orleans), "Licencié-en-droit" (legal faculty of Poitiers). During the recent civil war he entered the service as colonel of the Fifty-fifth New York Volunteers, July, 1861; commanding brigade (Third corps) 1862–63; appointed brigadier-general volunteers Jan., 1864; commanded defences of New York May, 1864; commanded brigade (Second corps) July, 1864; brevet major-general volunteers commanding division (Second corps) April, 1865; appointed colonel Thirty-first Infantry U. S. A., July, 1866; brevet brigadier-general U. S. A., Mar., 1867; commanding the district of Dakota Aug., 1867; colonel Thirteenth Infantry U. S. A., and commanding the district of Montana, Mar., 1869; Camp Douglass 1870; Fort Steele 1871; now in command of the district of Green River. Author of "Les Gentilshommes de l'Ouest," Paris, 1841; "Quatre

ans de Campagnes à l'armée du Potomac," Paris et Bruxelles, 1867; editor and publisher of the "Revue du nouveau-monde," New York, 1849–50; editor of the "Courrier des États-Unis," New York, 1854–61.

Detroit′, a post-township of Pike co., Ill. Pop. 1056.

Detroit, a post-village of Dickinson co., Kan., on the Kansas Pacific R. R., 19 miles S. W. of Junction City.

Detroit, a township and post-village of Somerset co., Me., on the Maine Central R. R., 30 miles W. of Bangor. It has three churches and manufactures of leather and lumber. Pop. 690.

Detroit [Fr. *Détroit*, "the strait"], the metropolis of Michigan, and capital of Wayne co., is situated on the W. bank of the Detroit River, 18 miles from Lake Erie and 7 miles from Lake St. Clair, in lat. 42° 19′ 53″ N., lon. 82° 58′ W. The Detroit River, forming the boundary-line between the U. S. and Canada, is of varying width, being half a mile broad opposite the city, and of great depth, forming the most perfect harbor on the whole chain of lakes.

Detroit is the centre of the Michigan system of railroads, being the terminus of the Michigan Central and its branches, also of the Lake Shore and Michigan Southern, the Detroit Eel River and Illinois, the Detroit Lansing and Lake Michigan, the Detroit and Milwaukee, the Detroit and Bay City, the Grand Trunk of Canada, the Great Western of Canada, and the Canada Southern, which crosses the river at Trenton, a few miles below, and has a branch running to the city. The site upon which the city is built rises from the edge of the river, the inclination being gradual, at the rate of about 58 feet per mile, affording the most perfect drainage, which has been taken advantage of by the building of a system of sewers over eighty miles in length, costing $1,264,890, and permeating every quarter of the city.

The city is abundantly supplied with water, there being 151 miles of pipe laid up to the close of 1872, at which period the aggregate cost of construction of the water-works amounted to $1,338,047. It was found that the increase of population was so rapid as to give promise of presently exceeding the capacity of the works, and the legislature of 1873 authorized the loan of $1,000,000 for the purpose of extending them. Plans for this have been completed, and the work is in progress. The city has a perfectly disciplined paid fire department, with steam apparatus, etc., costing $243,479, and also a fire-alarm telegraph. The annual expense of the department is a little over $72,000. The city has a uniformed metropolitan police force, with a central and two sub-stations in communication with all quarters of the town by means of a police telegraph. The expenses of the force for 1872 were $92,000. There are 25 public school buildings, valued at $547,410, with 138 separate schools of all grades, 177 teachers, and an enrolment of 11,764 pupils. The annual expenses of the schools are $170,228. There are, besides, 3 seminaries, 27 Roman Catholic parish schools, 9 German Lutheran schools, and a large number of private institutions, including 3 commercial colleges. The assessed valuation of the real and personal property of the city in 1872 was $23,615,674; the cash valuation for the same year $78,718,913. Since then an additional ward has been added, and the valuation has risen to $86,743,947. There are two gas companies which supply the city, and the number of street lamps at the close of 1872 was 1137. There are eight handsome public drinking-fountains, but the principal work of art adorning the city is the Michigan Soldiers' and Sailors' Monument, designed by Randolph Rogers, and built of bronze and granite at a cost of $58,000. The structure is fifty-five feet high, surmounted with a colossal bronze allegorical statue of "Michigan." The chief public building is the city hall, situated on the Campus Martius and facing upon four streets, being in length 200 feet, in width 90. The style is Italian, with mansard roof, and a central tower 180 feet high. The walls are built of Amherst sandstone. The whole cost of the building, regarded as one of the finest in the West, was $600,000. The house of correction is also a very fine building, and has attained a national and European reputation. The value of it is fixed at upwards of $300,000, and it has a capacity for 450 prisoners. The county jail is a substantial structure. There are eight lines of street railway in operation, and two lines of transit railway and one of street railway in process of construction. The public library contains 22,136 volumes, the bar library 3280 volumes, the mechanics' library 4000, and the Young Men's library 12,000. There are 2 medical colleges, 4 public hospitals, 4 orphan asylums, 2 foundling and women's hospitals, 1 insane asylum, a house of shelter for magdalens, 1 industrial school, and 1 old ladies' home. There are 59 churches and 4 chapels. Some of these church edifices are noble specimens of architecture. The city contains 3 national, 5 savings, and 16 other banks. It is the seat of the U. S. circuit court for the sixth circuit, and the U. S. district court for the eastern district of Michigan, the Wayne county circuit court, the superior court, the recorder's and the probate court of Wayne county. The U. S. custom-house for the port of Detroit and the internal revenue office are located here, as are also the principal office of the U. S. lake survey, the department in charge of the lake lighthouses, and the head-quarters of the military department of the lakes. Fort Wayne, designed to be the most extensive American fortification on the northern frontier, is located just below the city, commanding both it and the river. Though in an incomplete state, it includes a series of batteries protected by earthworks, and is garrisoned by a force of infantry and artillery. There are eight cemeteries—two, Woodmere and Elmwood, being upon locations of great natural beauty, are also embellished by skilful landscape gardening and monuments of taste.

The manufacturing advantages of the city are great, and these have been taken advantage of by the establishment of many foundries, blast-furnaces, copper-smelting works, locomotive and car works, shipyards, drydocks, iron-bridge works, safe manufactories, furniture and other establishments using wood as the chief material, and the most extensive tobacco and cigar factories in America, producing each year goods worth many millions of dollars. There are a number of pork-packing establishments, and the shipping trade of the city in produce and manufactures is very large. There are 8 daily papers published in the city, 3 being in the German language, 3 tri-weeklies, 11 weeklies, and 4 monthlies.

The present site of the city was occupied by Indian villages at the period of the discovery of the country. In 1610 it was first visited by the French, and remained under their dominion until 1762. The first legitimate settlement was made in 1701, at which time a fort was erected called Ponchartrain, the first governor being the Sieur de la Motte Cadillac; and from time to time emigrants were sent here by the French government. In 1763 the British assumed possession, erecting fifteen years later a fort. In 1787 its government was assumed by the U. S., Gen. Arthur St. Clair being the first governor. In 1812 it was surrendered to the British, and was retaken in 1813. The history of Detroit is intimately connected with the history of the whole Northwest. Three different sovereigns have claimed its allegiance, and since the U. S. have held it thrice has its government been transferred. It has twice been besieged by Indians, once captured in war, and once totally consumed by fire. It has been the scene of one surrender, fifty pitched battles, and twelve bloody massacres. For the rest, the streets are broad and well paved, handsomely embellished with shade trees, and ornamented with beautiful private residences, while the business quarters are well built up with lofty, substantial, and beautiful structures. Pop. 79,577.

W. E. Quimby, Managing Ed. "Free Press."

Detroit, a post-village of Becker co., Minn., on Detroit Lake and the Northern Pacific R. R., 206 miles W. of Duluth. It has one weekly newspaper.

Detroit River issues from Lake St. Clair, flows nearly southward, forms part of the boundary between Michigan and Canada, and enters Lake Erie. It is about 24 miles long, and from half a mile to one mile wide. It is navigable for vessels of the largest size.

Dett′va, a town of Hungary, in the county of Sohl, 20 miles E. of Altsohl. Pop. in 1869, 10,035.

Deuca′lion [Gr. Δευκαλίων], a personage of the Greek mythology, was a son of Prometheus and the husband of Pyrrha, and was the father of Amphictyon and Hellen. According to tradition, he saved himself and his wife from a deluge by building a ship or ark, which, when the water subsided, rested on Mount Parnassus. They threw stones behind them, which were transformed into men and women.

Deu′el, a county in the E. of Dakota, is partly bounded on the E. by Big Stone Lake. The surface is elevated; part of the soil is fertile. This county contains a part of the Coteau des Prairies. Pop. 37.

De′us ex Mach′inâ [a Latin phrase, signifying a "god from a machine," alluding to the machinery of the theatrical stage], an expression borrowed from the classic stage. The poets of Greece often had recourse to the intervention of a god, who descended by stage machinery, and brought about a speedy dénouement of the plot. The proverb has also been applied to savants or philosophers who, unable to explain facts by known laws, have had recourse to the aid of a supernatural power.

Deuteron′omy [Lat. *Deuteronomium;* Septuagint Gr. Δευτερονόμιον, the "duplicate law," from δεύτερος, "second," and νόμος, "law"], the last book of the Pentateuch, consisting, in part, of a restatement of the law, as given in

Exodus, Leviticus, and Numbers, and containing also, besides special commands and admonitions not previously given, an account of the death of Moses. The authorship of this book has been traditionally assigned to Moses, but of course the part relating to his death is not supposed to have been written by himself, and indeed the last four chapters may have been added by another hand. Of late years much critical labor has been bestowed upon the book, and its Mosaic authorship has been both assailed and defended with great learning and ability.

Deutz (anc. *Tuitium*), a fortified town of Prussia, on the right bank of the Rhine, opposite COLOGNE (which see). It is the terminus of a railway extending to Minden. Pop. in 1871, 11,881.

Deut'zia [named in honor of Deutz, a botanist], a genus of shrubs belonging to the order Saxifragaceæ, and indigenous in Northern India, China, and Japan. *Deutzia scabra* has leaves very rough, with siliceous hairs, which are used in Japan for polishing wood, and which are most beautiful objects under the microscope. *Deutza gracilis*, a hardy shrub with elegant white flowers, is much cultivated in American gardens.

Deux Ponts. See ZWEIBRÜCKEN.

Dev, or **Dew,** a Persian word, akin to the Sanscrit *dêva* (a "god"), but applied in the system of Zoroaster to a class of demons supposed to be servants of Ahriman. (See ZOROASTER, RELIGION OF.)

Dêva, dā'va, a Sanscrit word signifying "god," and forming a part of many names in Hindoo mythology, as Kamadêva ("the god of love"), Mahadêva (the "great god"), a name of SIVA (which see).

Devall's Bluff, a post-village, capital of Prairie co., Ark., on White River and the Memphis and Little Rock R. R., 48 miles E. of Little Rock. It has one weekly newspaper and two schools, and is situated in a cotton and corn-growing region.

JAMES H. BALDING, ED. WHITE RIVER "JOURNAL."

Devanagari. See SANSCRIT, by PROF. W. D. WHITNEY, PH. D., LL.D.

Devapraya'ga, a town of Northern Hindostan, in Gurwhal, in lat. 30° 8′ N., lon. 78° 39′ E., is at the junction of the Alakananda and Bhagirathi, which unite to form the Ganges. As the origin of that sacred river, it is considered a holy place by the Hindoos, and is visited by multitudes of pilgrims. Here are two ancient temples. The permanent population consists of about 1000 Brahmans.

Dev'asaw, a township of Grant co., Ark. Pop. 357.

Devel'op [Fr. *développer*], in algebra, to expand an expression by writing out in full the operations previously indicated by symbols. In geometry to develop a curve or a curved surface is to find an equivalent straight line or plane surface, by rolling the former on the latter. The equivalent straight line or plane surface thus formed is called the *development* of the curve or curved surface rolled.

Development. See EVOLUTION, by PROF. H. HARTSHORNE; also DARWINISM, by PROFS. YOUMANS and SEELYE.

Development of the Embryo. See EMBRYOLOGY, by PROF. J. C. DALTON, M. D.

Dev'ens (CHARLES, JR.), an American jurist, born in Charlestown, Mass., April 4, 1820, graduated at Harvard in 1838, and was admitted to the bar in 1841; member of the Massachusetts State senate 1848–49; U. S. marshal for the district of Massachusetts 1849–53. On the outbreak of the recent civil war he entered the service as major of the third battalion of Rifles Massachusetts volunteers, was appointed colonel Fifteenth Massachusetts Aug., 1861, and was promoted brigadier-general April 15, 1862; brevet major-general U. S. volunteers for gallant and meritorious conduct at the capture of Richmond, April 3, 1865; military governor East district of South Carolina Sept., 1865, to June, 1866, when he was mustered out of the service; wounded at Ball's Bluff, Fair Oaks, Chancellorsville, and Cold Harbor. Throughout the war Gen. Devens was conspicuous for gallantry and ability, from the early engagement at Ball's Bluff till the closing scenes at Appomattox Court-house. He was appointed associate justice of the superior court of Massachusetts in 1867, which position he retained until Oct., 1873, when he was appointed associate justice of the supreme court of Massachusetts, which office he now holds.

Dev'enter [Lat. *Daventria*], a fortified city of Holland, in the province of Overyssel, is on the river Yssel, about 60 miles E. by S. from Amsterdam. It is surrounded by walls or ramparts, and has a good harbor. It contains a large town-house, a court-house, five or more churches, and several hospitals. It is the seat of an old Catholic (Jansenist) bishopric. About 600,000 pounds of butter are annually exported from this place. It has manufactures of carpets, hosiery, etc., and iron-foundries. Pop. 18,218.

De Vere (MAXIMILIAN SCHELE), LL.D., a writer, born in Sweden Nov. 1, 1820, emigrated to the U. S., and became in 1844 professor of modern languages and belles-lettres in the University of Virginia. Among his works are "Outlines of Comparative Philology" (1853) and "Stray Leaves from the Book of Nature" (1856).

Devereaux, a township of Washington co., Me. P. 8.

De Vesci, VISCOUNTS (1776), Barons Knapton (1750, Ireland), and baronets (1698).—THOMAS VESEY, third viscount, born Sept. 21, 1803, elected a representative peer for Ireland in 1857, was M. P. for Queen's county 1835–37 and 1841–52, and succeeded his father Oct. 19, 1855.

Dêvî, a Sanscrit word signifying "goddess," but applied *par excellence* as a surname to PÂRVATÎ (which see).

Devia'tion of the Compass is the variation of a ship's compass from the true magnetic meridian, caused by the proximity of iron. In iron ships it depends upon the direction, with regard to the magnetic meridian, in which the ship was built. It is least when the ship has been built with her head to the south. Armor-plated ships should be plated with the head in the opposite direction to that in which they are built. Two methods are employed by which this variation is attempted to be neutralized: the first is by ascertaining the actual variation in every position of the ship with regard to the magnetic meridian, and working by a table of errors; the other is by introducing on board ship masses of iron and magnets to neutralize exactly the action of the ship's magnetism. The latter method is now very generally employed. It is very important that the ship should not be hurried out immediately for a long voyage, and that her compasses should be readjusted before sailing.

Deviation of the Plumb-Line has been especially observed near mountains, in which case it is evident that the attraction of the mountain has drawn the line out of the perpendicular. Maskelyne took advantage of this fact in his experiments to determine the density of the earth. (See DENSITY OF THE EARTH.) The same phenomenon has been observed on plains, and is probably caused either by great caves under ground, or by large masses of matter near the surface greatly surpassing in density the average of the earth near the point of observation.

De View, a post-township of Woodruff co., Ark. Pop. 1204.

De Vigny (ALFRED VICTOR), COMTE, a distinguished French author, was born at the castle Loches Mar. 27, 1799. In 1828 he published a collection of poems called "Poëmes antiques et modernes." He also produced (1826) "Cinq-Mars, or a Conspiracy under Louis XIII.," which was very favorably received; "Stella, or the Blue Devils," a narrative; and the tragedy of "Chatterton" (1835). Died Sept. 18, 1863.

Dev'il [Persian *dev* or *dew*, a "demon;" Ger. *Teufel;* Gr. διάβολος (*i. e.* "accuser" or "slanderer"); Lat. *diabolus;* Fr. *diable*], the name among Christians of any evil spirit, but especially of the chief of evil spirits, nearly corresponding in the latter sense to the Hebrew Satan and the Mohammedan Iblis or Shytân. It is proposed in this article to limit ourselves chiefly to a notice of the popular and prevailing notions entertained of the devil in Europe during the Middle Ages and later; referring the reader to the article SATAN for a consideration of those graver questions respecting the character of the great Enemy of mankind which may be said to belong more properly to theology. The Greek for devil appears to be derived from the character of Satan as presented in the book of Job—that of a fault-finder or slanderer. In the Middle Ages, and even later, the devil was supposed to possess in the highest perfection every kind of skill and knowledge—a skill and knowledge resembling that of man, indeed, but immeasurably surpassing it in degree. The devil was believed to possess transcendent skill in all the magic arts, and when a man of genius had accomplished some wonderful feat which seemed clearly above the unassisted powers of the human mind, it was commonly supposed (especially if he was not pre-eminently a religious man) that he had been either assisted by the devil, or that the latter had performed for him the entire work; in which case, of course, some promise (such as the final surrender of the soul of the assisted party) or reward had to be given as an equivalent for his services. This idea, once almost universal in Europe, furnished the basis of the legend respecting Dr. Faustus.

It would seem probable that the prevailing superstitions of the Middle Ages respecting the devil might have been considerably influenced by the notions entertained of the character of Loki, the god of evil in the Norse mythology. As Loki is said to have taken various forms—sometimes

of a woman and sometimes of one of the lower animals—in order more successfully to deceive, so the devil was supposed to assume at one time the appearance of a most beautiful woman to mislead and ruin the souls of men, at another time to take the form of a hunted animal to draw the too eager pursuer into danger and death; but all his wiles were of course lost upon those who looked to Heaven for help, and called upon the protecting saints.

J. THOMAS.

Devil's Dust. See SHODDY.

Devil-worshippers, or **Yezidees,** a sect of religionists, founded by one Yezeed, and living in Armenia, Koordistan, etc. They number more than 200,000. They treat the devil with great respect, because they believe he will be restored to heaven, where they wish him to be their friend. There are various other sects of devil-worshippers. One in Southern India pays especial reverence to a malignant being called Sattan.

Devi'zes, a parliamentary borough of England, in Wiltshire, on the Avon and Kennet Canal, 22 miles N. N. W. of Salisbury. It stands on an eminence near the northern limit of Salisbury Plain. It has two old churches, a large corn exchange, silk-throwing mills, and manufactures of snuff and malt. Here are ruins of a castle of the time of Henry I. Pop. in 1871, 6840.

Dev'on [Lat. *Devonia*], a county of England, is bounded on the N. by the Bristol Channel, and on the S. by the English Channel. Area, 2590 square miles. The surface is mostly hilly, and in some parts rocky. The highest point, called Yes Tor, has an altitude of 2050 feet. Granite, magnesian limestone, Devonian and Silurian rocks occur here; also copper and tin. It is drained by the rivers Exe, Dart, Tamar, and Torridge, the estuaries of which form good harbors. The climate of the S. coast is mild; the soil is generally fertile. This county produces good apples, and is famous for cider. The Red Devon breed of cattle is highly esteemed. The chief exports are butter, cheese, cattle, and sheep. The largest towns are Exeter (the capital), Plymouth, Devonport, Tiverton, Tavistock, and Dartmouth. Pop. in 1871, 600,814.

Devo'nian Age [named by Murchison from Devonshire, England, where rocks of this age abound], in geology, the time succeeding the Silurian and preceding the carboniferous age. The American Devonian rocks are assigned to five divisions or periods of time, known as the Oriskany (the oldest), the Corniferous, the Hamilton, the Chemung, and the Catskill periods. The Devonian strata of Europe are variously divided in different countries. The old red sandstone of Scotland and Herefordshire was for some time described by English geologists as the only group of rocks separating the Silurian system from the carboniferous. The discovery made by Murchison and Sedgwick, that the calcareous slates and limestones of Devonshire were contemporaneous with the old red sandstone and with the Eifel series, was a great step in advance, and tended to fix important positions in geological classification. Normandy presents Devonian rocks in a characteristic state. The system is also largely developed in Russia, as well as in Western New York, Pennsylvania, Ohio, Michigan, Indiana, etc. The Devonian rocks of the U. S. are rich in fossil shells of mollusks and in fishes. "In the Devonian age," says Dana, "the fishes are the dominant type." (See GEOLOGY, by PROF. J. W. DAWSON, LL.D., F. R. S.)

Dev'onport (before 1824 called PLYMOUTH DOCK), a maritime and fortified town of England, is in Devonshire, on the E. shore of the estuary of the Tamar (called the Hamoaze), 2 miles W. N. W. of Plymouth. It occupies high ground, and has ramparts defended by batteries. It derives its importance from the dockyard and naval arsenal, which is perhaps the largest in Great Britain. The national works occupy about 350 acres, and the dockyard comprises six building-slips for vessels of various rates. Here are also five docks, and manufactures of sails, ropes, anchors, soap, etc. Devonport has a residence for the port-admiral, a military hospital, and a large barrack. It returns two members to Parliament. Pop. of municipal borough in 1871, 50,094; of parliamentary borough, 64,684.

Dew [Sax. *deaw;* Ger. *Thau*], moisture deposited during the night on the surfaces of bodies exposed in the open air. Dew is produced by the condensation of watery vapor from the atmosphere. Its deposition is, however, unaccompanied by the appearance of any visible mist. Such mist appears when the condensation takes place within the body of the air itself, and is then called "fog" in the lower regions of the atmosphere, and "cloud" in the higher. Dew occurs only at the surfaces of contact with solids, the air above remaining clear. The deposit of dew is caused by the cooling of the bodies bedewed, and this takes place in consequence of the radiation of heat into open space, without any equivalent return. Experiments on vaporization have shown that when a liquid is exposed in a confined space to a constant temperature, vapor will be formed from it until the density reaches a certain determinate limit, invariable for the temperature, but greater as the temperature is higher, after which evaporation will cease. This maximum density is called the density of saturation, or the density due to the temperature. Air is said to be saturated with vapor when the density of the vapor in it is the density due to its temperature. Should the temperature of a body of air in this condition be in the slightest degree depressed, the air will be supersaturated, and some of the vapor will be condensed, forming a visible cloud. But if, the temperature remaining the same, a body colder than the air be immersed in it, condensation will occur on the surface of that body only, and the air itself will remain clear. If, as is usual in the atmosphere, the air contain vapor without being saturated, it may be brought by cooling to a temperature at which it will be saturated, and then any further cooling will produce precipitation, as in the case before supposed. Or if the temperature of air in this condition remain unchanged, a body colder than the air immersed in it may produce condensation, provided its temperature be as low as the point of saturation, or lower, but not otherwise. This point is called the dew-point. (See DEW-POINT.)

During the day the loss of heat by bodies on the earth, in consequence of radiation, is more than compensated by the amount received directly or indirectly from the sun. After sunset all such bodies begin to cool, but they cool with unequal rapidity, because of their different relations to heat. The atmosphere cools very slowly. Badly conducting solids cool rapidly. Good conductors, if in contact with the earth, cool much less rapidly, because the heat they lose by radiation is, to an extent proportioned to their conducting power, restored by conduction from the earth beneath. If of small mass, however, and insulated by bad conductors, their temperature falls much more rapidly. So soon as the cooling process has depressed the temperature of any object down to the point of saturation for the vapor present in the air, dew will begin to form upon it. Some bodies are bedewed very soon, others more tardily, and some occasionally escape altogether. Grass, which radiates well and conducts ill, is in the first class; wool and woollen stuffs, cotton, linen, silk, wood, earth, gravel, stone, and metals contract dew with less and less facility, nearly in this order. Polished metallic surfaces often remain untarnished by moisture throughout the night. In clear nights the difference of temperature shown by two thermometers, one lying on the grass and the other suspended in the open air a few feet above, is often 8° or 10° F., and is sometimes much greater. In one instance, Mr. Glaisher (*Phil. Trans.*, 1847) observed a difference as great as 28½° F., the lower thermometer lying on raw wool.

Clouds check the formation of dew by obstructing radiation, or restoring by counter-radiation some of the heat lost. When the sky is wholly overcast no dew is formed. Neither is any dew formed beneath an open shed or shelter, though the earth around may be so distinctly wet as to leave the form of the roof distinctly marked on the ground. Facts of this kind were long supposed to prove that the dew descends like rain—a belief of which the trace is still preserved in the expression "the falling of the dew." Even a very slight screen, as a sheet of paper or a cambric handkerchief, spread out above an object exposed in the open air, will protect it perfectly against moisture from dew. Wind also prevents the formation of dew, by continually changing the strata of air in contact with the colder solids. The nights most favorable to the deposit of dew are those in which the sky is quite clear and the air quite motionless. The profuseness of the deposit will depend, however, upon the hygrometric state of the atmosphere.

Very various and very absurd notions prevailed among the ancients in regard to the dew. By some it was supposed to descend from the stars, and to be possessed of wonderful virtues. The Roman ladies were accustomed to use it as a cosmetic, supposing it superior to all other applications for the improvement of the complexion. If the cosmetics of those days were no better than those in use at present, their opinion was doubtless correct, though the grounds of it were mistaken. The true theory of dew was first clearly set forth by William Charles Wells, a physician of London, in his famous "Essay on Dew," first published in 1814. This has been many times reprinted, and still continues to be the standard authority on the subject.

F. A. P. BARNARD.

Dew (THOMAS R.), an American writer, born in Virginia Dec. 5, 1802. He became professor of political economy and history in William and Mary College in 1827, and president of that institution in 1836. He published, besides

other works, an "Essay in Favor of Slavery" (1832), and a "Digest of the Laws, Customs, etc. of Ancient and Modern Nations" (1853). Died in Paris, France, Aug. 6, 1846.

Dewees' (William Potts), M. D., an American physician, born at Pottsgrove, Pa., May 5, 1768. He practised in Philadelphia, and became in 1834 professor of obstetrics in the University of Pennsylvania. He published, besides other works, an excellent "System of Midwifery" (1825). Died May 20, 1841.

Deweese, a twp. of Mecklenburg co., N. C. P. 1606.

De Wet'te (Dr. Wilhelm Martin Leberecht), an eminent German biblical critic, born at Ulla, near Weimar, Jan. 14, 1780. In 1810 he became professor of divinity at Berlin, and as a preacher and writer he soon won a wide fame. He was a moderate rationalist in his opinions. In 1821 he was called to the chair of divinity at Bâle, where he died June 16, 1849. Among his works are a "Commentary on the Psalms" (1811), "Jewish Archæology" (1814), "Christian Dogmatics" (1813–16), "Introduction to the Old and New Testaments" (1817–26), translated by Theodore Parker and Frederick Frothingham (1843–58), "Lessons on Morality" (1824). (See accounts of De Wette by Schenkel (1849), Hagenbach (1849), and Lücke (1850).)

Dew'ey, a township of La Porte co., Ind. Pop. 202.

Dewey (Charles Augustus), LL.D., was born at Williamstown, Mass., Mar. 13, 1793, and graduated at Williams College in 1811. He began the practice of law in his native town in 1814, and removed to Northampton about 1826. He became judge of the Massachusetts supreme court in 1837, and retained the office till he died, Aug. 22, 1866.

Dewey (Chester), D. D., LL.D., an American botanist and teacher, born at Sheffield, Mass., Oct. 25, 1781. He was for many years professor of natural philosophy at Williams College, became principal of the Collegiate Institute at Rochester, N. Y., in 1836, and in 1850 professor of chemistry in the University of Rochester. He wrote many excellent monographs on the Carices of North America, etc. for the "American Journal of Science" and other publications. Died Dec. 15, 1867.

Dewey (George), U. S. N., born Dec. 26, 1837, in Vermont, graduated at the Naval Academy in 1858, became a lieutenant in 1861, a lieutenant-commander in 1865, and a commander in 1872. He served on board the steamer Mississippi at the passage of Forts Jackson and St. Philip and capture of New Orleans, April 24, 1862, and is thus handsomely spoken of in the official report of his commanding officer, Commander Melanchthon Smith: "I have much pleasure in mentioning the efficient service rendered by Executive Officer George Dewey, who kept the vessel in her station during the engagement, a task exceedingly difficult from the darkness and the thick smoke that enveloped us from the fire of our vessel and the burning gunboats." He was on board the Mississippi when she was lost in attempting to pass the batteries at Port Hudson, Mar. 14, 1863, and gained the commendation of his commander a second time by his "coolness" on this trying occasion. Foxhall A. Parker, U. S. N.

Dewey (Orville), D. D., LL.D., an eminent Unitarian minister, born in Sheffield, Mass., Mar. 28, 1794. He graduated at Williams College in 1814, and preached in the pulpit of Dr. Channing as his assistant for nearly two years. He was pastor at New Bedford from 1823 to 1833, after which he preached about fourteen years in the city of New York. In 1858 he became minister of the New South church in Boston. He is an original thinker and an impressive pulpit-orator. He has produced, besides other works, "The Unitarian Belief" and "The Education of the Human Race." His lectures before the Lowell Institute, on "The Problem of Human Destiny," embrace a very able discussion of profoundly interesting questions.

De Wint (Peter), an English painter in water-color, born in 1783. He was the son of Harry De Wint, an American who went to England and married. He was a distinguished member of the Old Water-color Society, and was formed by the influences that produced Turner, D. Cox, Stanfield, and Prout. His subjects were usually of a very simple character, but treated in a large and masterly style. He died in 1849. Clarence Cook.

De Witt, a county in Central Illinois. Area, 450 square miles. It is drained by Salt Creek. The surface is nearly level, and is diversified by prairies and forests; the soil is fertile. Grain, cattle, wool, and dairy products are raised. The most numerous manufactories are those of wagons and carriages. Coal is found here. The county is intersected by the Illinois Central and the Gilman Clinton and Springfield R. Rs. Capital, Clinton. Pop. 14,768.

De Witt, a county in S. Central Texas. Area, 898 square miles. It is intersected by the Guadalupe River. The surface is one half prairie; the soil is generally fertile. Cattle, corn, cotton, wool, pork, and tobacco are raised. Capital, Clinton. Pop. 6443.

De Witt, a post-village, capital of Arkansas co., Ark., on the left bank of the Arkansas River, about 70 miles S. E. of Little Rock. It has one weekly newspaper.

De Witt, a township and post-village of De Witt co., Ill., on the Gilman Clinton and Springfield R. R., 53 miles N. E. of Springfield. Pop. 1061.

De Witt, a post-village in Clinton co., Ia., on the Davenport and St. Paul R. R. where it crosses the Chicago and North-western R. R., 25 miles N. of Davenport. It has one weekly newspaper, two banks, and some manufactures. Pop. 1749; of De Witt township, 3186.

Ed. "Observer."

De Witt, a post-township of Clinton co., Mich. P. 1306.

De Witt, a post-village of Grand River township, Carroll co., Mo. Pop. 317.

De Witt, a post-township of Onondaga co., N. Y. It contains several mineral springs and caves, and has a number of manufacturing villages and five churches. Pop. 3105.

De Witt (Cornelius), a Dutch naval officer and statesman, born at Dort June 23, 1623, was an elder brother of John, noticed below. He had a high command under De Ruyter in 1666, when he burned the English shipping in the Thames. He distinguished himself in the naval battle of Solebay in 1672. In the same year he was falsely accused of complicity in a plot to poison the prince of Orange. He was imprisoned, tried, and acquitted, but was murdered by a mob (Aug. 20, 1672) as he was coming out of prison.

De Witt (John), an eminent Dutch statesman and republican, born at Dort Sept. 25, 1625. He was a leader of the party which was hostile to the House of Orange, or wished to reduce the power of the prince of Orange, who was supported by the populace and clergy. De Witt, who opposed the war against England, was elected grand pensionary of Holland in 1653. He had the chief control of the government during the minority of William, prince of Orange (who was afterwards king of England). In 1654 he negotiated with Cromwell a treaty of peace, in which a secret article stipulated that no member of the Orange family should ever be stadtholder. He was re-elected grand pensionary for a term of five years in 1658, and again in 1663. In 1665, Charles II. of England declared war against the Dutch, whose fleet entered the Thames and burned some shipping at Chatham. De Witt conducted this war with ability, and it was terminated by a treaty of peace in July, 1667. He joined England and Sweden in a triple alliance against Louis XIV. of France, but the latter soon seduced Charles II. to become his ally, and he invaded Holland with a large army. De Witt being unable to repel the enemy, who captured several towns, was blamed for these misfortunes, and lost his popularity. William of Orange was chosen general-in-chief and stadtholder. De Witt went to a prison to visit his brother Cornelius, who had been tried and acquitted. They were both murdered by the populace at the prison Aug. 20, 1672. (See P. Simon, "J. de Witt en Zijn Tijd," 3 vols., 1832–35; Macaulay, "History of England," vol. i., ch. ii.)

De Witt'ville, a post-village of Chautauqua township, Chautauqua co., N. Y. Pop. 262.

Dew-point, the temperature at which watery vapor in the air begins to be condensed. Its determination is of great importance to the meteorologist, as by comparing it with the actual temperature he can tell the relative humidity of the air. He knows that at the actual temperature the air would be saturated if it contained a certain quantity of moisture; and also that the actual quantity present is only such as would suffice to saturate air at the observed dew-point; the ratio of this last quantity to the former expresses the relation between the actual humidity of the air and the humidity of saturation at the observed temperature. The dew-point in the evening further shows the temperature near which the minimum during the night is likely to be. When the temperature has fallen to the dew-point, the vapor in the air will be condensed, and an amount of heat will be set free which will raise the temperature of the air. The temperature will again sink by radiation somewhat below the dew-point; dew will be formed, and the temperature again be raised.

Dews'bury, a manufacturing town of England, in the West Riding of Yorkshire, on the river Calder, 8 miles S. S. W. of Leeds. It is on the Lancashire and Yorkshire Railway, and is connected with London by another railway. It has manufactures of blankets, carpets, and coarse woollen goods made from shoddy (*i. e.* refuse rags worked over). There are collieries and iron-works in the vicinity. Pop. in 1871, 24,773. It is 1 mile S. of Batley, which has

extensive manufactures of army cloths and coarse woollen goods. Pop. of Batley in 1871, 20,868.

Dex'ter, a post-village of Dallas co., Ia., on the Chicago Rock Island and Pacific R. R., 35 miles W. by S. of Des Moines. It has one weekly newspaper.

Dexter, a post-village of Penobscot co., Me., on a branch of the Maine Central R. R., 70 miles N. E. by N. from Augusta. It has manufactures of woollen goods, and several mills. It has one weekly newspaper. Pop. of Dexter township, 2875. R. O. ROBBINS, PROP. "GAZETTE."

Dexter, a township of Washtenaw co., Mich. Pop. 889.

Dexter, a post-village of Scio township, Washtenaw co., Mich., on the Huron River and the Michigan Central R. R., 47 miles W. of Detroit. It has one weekly newspaper, two flouring-mills, a woollen-mill, planing-mill, and car-works. Pop. 1161. A. MCMILLAN, ED. "LEADER."

Dexter, a township of Mower co., Minn. Pop. 120.

Dexter (FRANKLIN), LL.D., a son of Samuel Dexter, noticed below, was born at Charlestown, Mass., Nov. 5, 1793, and graduated at Harvard in 1812. He practised law in Boston with marked success. He was a member of the State legislature and senate, and in 1849 was appointed U. S. district attorney for Massachusetts. In 1830 he was opposed to Daniel Webster in the famous murder trial of the Knapps. Died Aug. 14, 1857.

Dexter (HENRY), a successful sculptor, born in New York, was originally a blacksmith in Connecticut. Among his productions are "The Young Naturalist," "The First Lesson," and others, besides many excellent portrait-busts. Mr. Dexter resides at Cambridge, Mass.

Dexter (HENRY MARTYN), D. D., an eminent Congregational minister, was born at Plympton, Mass., Aug. 13, 1821, graduated at Yale in 1840, and at Andover in 1844, was pastor in Manchester, N. H. (1844–49), and of the present Berkeley street church, Boston (1849–67). From 1859 to 1865 he was one of the editors of the "Congregational Quarterly," and in 1867 became editor-in-chief of the "Congregationalist." He is the author of "Street Thoughts" (1859), "Twelve Discourses" (1860), and of several other works, the most important of which is his "Congregationalism," a work of high authority, which reached a second edition in 1871. He has made the Massachusetts "Pilgrims" his special study, and is now (1873) preparing an elaborate "History of the Plymouth Colony."

Dexter (SAMUEL), LL.D., an American jurist and statesman, born in Boston May 14, 1761. He was admitted to the bar in 1784, attached himself to the Federal party, and was elected a Senator of the U. S. in 1798. He was appointed secretary of war in 1800 by John Adams, and became secretary of the treasury early in 1801. When the executive power was transferred to Jefferson in 1801, Dexter retired from the public service and resumed the practice of law in Boston. He had no superior and few equals as an advocate before the Supreme Court in Washington. As a supporter of the war against England, he separated from the Federalist party in 1812. Died May 4, 1816.

Dexter (TIMOTHY), an eccentric American merchant, born at Malden, Mass., Jan. 22, 1747. He rose from poverty to affluence, and assumed the title of "Lord Timothy Dexter," by which name he is generally known. Many traditions with regard to his life are current in New England. Died at Newburyport Oct. 22, 1806. (See his Life by S. L. KNAPP, 1823.)

Dex'trine [from the Lat. *dexter*, the "right hand"], ($C_6H_{10}O_5$), **British Gum, Alsace Gum, Gom'meline,** or **Lei'ocome,** a gum-like substance produced from starch by the action of heat, dilute acids or alkalies, diastase, saliva, bile, blood serum, pancreatic juice, etc., and by the action of sunlight on starch paste. It is soluble in water, and its solution turns the plane of polarization of a luminous ray to the right; hence the name *dextrine*. It is prepared from starch (potato starch is preferred on account of its cheapness and purity) by several processes: (1) By heating it in sheet-iron trays to a temperature of 300° F., by which it is changed into semi-transparent, yellowish-brown lumps, which are converted into a pale yellow powder by grinding between millstones. It is sometimes roasted in iron or copper cylinders or coffee-drums. (2) By the action of nitric acid (Payen's process): 1000 parts of starch are mixed with 2 parts of nitric acid (specific gravity, 1.4), diluted with 300 parts of water, and the mixture is carefully dried, the temperature being finally raised to between 230° and 250° F. The transformation is completed in about an hour and a half. (3) By carefully boiling starch with dilute acids: the operation must be discontinued as soon as the starch has all disappeared, which is shown by the failure to obtain the blue coloration characteristic of starch on adding iodine solution to a portion of the liquid. For 100 parts of starch, 25 of sulphuric acid and 280 of water may be used; the mixture to be heated to about 194° F. When the reaction is complete, the acid is neutralized with chalk, the insoluble gypsum separated by filtration, and the solution concentrated to a syrup or to a semi-solid mass, which can be transferred to a hot-air chamber and completely dried. Thus prepared, it contains a little gypsum. This impurity is avoided by using 300 parts of starch, 1500 of water, and 8 of oxalic acid, heating over a water-bath till all the starch has disappeared, neutralizing with carbonate of lime, filtering after two days' standing, and evaporating. (4) By the action of the diastase of malt: 80 parts of water are heated with 1 part of ground malt to 167° F., and 125 parts of starch are added in small portions. As soon as the starch has all passed into dextrine the solution is boiled to arrest the action of the diastase, which would otherwise change the dextrine to glucose. The solution is filtered and concentrated.

Cellulose is changed by the action of strong sulphuric acid into a substance resembling dextrine, but which rotates the plane of polarization to the left. Commercial dextrine always contains some glucose (grape-sugar), and generally some unchanged starch. It may be purified from the latter by solution in cold water and filtration; from the former, by repeated precipitation from its solution by alcohol or by dialysis.

Dextrine occurs in old potatoes and in young wheat plants in very small quantity. In the sprouting of seeds and buds it is produced from starch; hence it occurs in malt and malt liquors. In the baking of bread it is formed from the starch of the flour, and often constitutes 10 per cent. of the loaf. The glazing on the crust is chiefly a coating of dextrine. Limpricht found four-tenths of 1 per cent. of dextrine in the flesh of a horse.

Dextrine is an uncrystallizable, translucent solid, resembling gum-arabic. It is soluble in water and in dilute alcohol, but insoluble in absolute alcohol. Its aqueous solution is clear and limpid when dilute, but adhesive, viscid, and gummy when concentrated; it rotates the plane of polarization to the right, while the natural gums rotate to the left. It is not colored blue by iodine. By boiling with dilute acids or caustic alkalies it is converted into glucose. It is precipitated from its solution by an excess of strong alcohol. It has the same percentage composition as starch and cellulose. Dextrine is extensively used as a substitute for gum-arabic and other gums in stiffening, sizing, and glazing calicoes, nets, crapes, laces, silks, papers, cards, etc., as mucilage on every office-table, and for the adhesive layer on the back of postage stamps and on self-sealing envelopes. (Interesting observations on the transformation of starch into dextrine are recorded in the annual volumes of WAGNER'S "Jahresbericht der Chemischen Technologie.")

C. F. CHANDLER.

Dextrog'yrate [from the Lat. *dexter*, the "right hand," and *gyro*, to "turn"], a term applied in optics to crystals which have the power to rotate a plane of polarization of a plane polarized ray towards the right. It is opposed to *lævogyrate*, which expresses the power to rotate the plane in like manner towards the left.

Dey, dā [etymology doubtful], a Turkish title of dignity given formerly to the governors of Algiers (before the French conquest), and still given to the chief ruler of Tripoli. Tunis was governed by a dey at one period, but this title in the latter country has long been supplanted by that of bey.

Dezfool', a town of Persia, in the province of Khoozistan, on the Dezfool River, here crossed by a fine bridge of twenty-two arches, 28 miles W. N. W. of Shooster. It is the chief mart of Khoozistan. Ancient ruins and mounds, evidently of Sassanian origin, are found in the vicinity. Pop. estimated at 15,000.

Dhar, a decayed town of Central Hindostan, in Malwa, the capital of a protected state of the same name, 32 miles W. S. W. of Indore. It has two large mosques of red stone, and other traces of former magnificence.

Dhawalaghi'ri, a lofty peak of the Himalaya Mountains, in Northern Hindostan, was formerly supposed to be the highest mountain of the earth. It is in Nepaul, in lat. 28° 42′ N., lon. 82° 32′ E. Its altitude is 26,826 feet.

Dhole, dōl (*Canis scylax*), a wild dog found in the Western Ghauts and other mountainous parts of India. It is of a light-bay color, with a sharp muzzle, large and pointed ears, and in size is somewhat less than a wolf. This species is remarkable for fierceness and courage, and for hostility to tigers and other feline races.

Dhōl'ka, a town of British India, in the presidency of Bombay, 22 miles S. W. of Ahmedâbâd. It is in the midst of ruined palaces, mosques, mausoleums, and spacious tanks lined with masonry. It is enclosed by a mud wall. Pop. about 25,000.

Dhōl′poor, a town of Hindostan, on the Chumbul, 34 miles S. of Agra, is the capital of a protected state. Here are some old freestone mosques and mausoleums.

Dhubboree′, a decayed town of Hindostan, in Guzerat, 78 miles N. E. of Surat. It has a ruined rampart two miles in circuit, and numerous Brahmanical temples built of hewn stone and adorned with sculptures.

Dhun′chee, or **Dhanchi,** a plant of the natural order Leguminosæ, of the genus *Sesbania,* having an extended loment with many seeds. It is an annual plant, cultivated extensively in some parts of India for its fibre, which is used in the manufacture of paper, cordage, canvas, and cloth. The plant has a slender stem about eight feet high.

Dia [διά], a Greek preposition and particle signifying "through," "apart," implying "separation" and "distinction;" "across," "between," implying mutuality. (For examples or illustrations, see DIAGONAL, DIAMAGNETISM, and DIALOGUE.)

Diabe′tes [Gr. διαβήτης, from διά, "through," and βαίνω, to "go"], the name of two diseases characterized by the excessive excretion of urine; whence the name. *Diabetes insipidus* (now called POLYURIA, which see) is distinguished from the other much more dangerous disease by the fact that the urine consists chiefly of water. It is neither frequent nor formidable. But *Diabetes mellitus,* "sweet" or "honeyed diabetes" (*Mellituria*), is one of the most incurable and serious of diseases. The urine has its specific gravity greatly increased by the presence of diabetic sugar, a substance believed to be identical (in most cases) with liver-sugar, and very closely approaching grape-sugar in its composition and reactions. In some cases it appears to be muscle-sugar (*inosite*). The disease is further characterized by indigestion, intense thirst, wasting, prostration of mind and body, and in many cases by degenerative changes in the tissues. Its causes are obscure and its treatment not well understood. Some cases are greatly benefited by opium and the use of strictly nitrogenous food, like gluten bread and skim-milk. Temporary diabetes has been observed after the administration of woorari poison and other drugs.

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Diadel′phia [from δίς, "twice," and ἀδελφος, a "brother"], in botany, the seventeenth class of the Linnæan artificial system. It comprises plants of which the filaments are united in two sets or brotherhoods. These are called *diadelphous.* Many plants of the natural order Leguminosæ and a few other plants belong to this class.

Di′adem [Gr. διάδημα; Lat. *diadema*], the symbol of royalty among several Oriental nations, was originally a fillet wound round the forehead and temples. The diadem of the Egyptian goddesses and kings bore the symbol of the serpent. Among the Persians the diadem was bound round the tiara or turban, and was of a blue color. Diocletian was the first Roman emperor who wore a diadem. After his time it was adorned with a single or double row of pearls or precious stones. Diadem is sometimes used as synonymous with crown.

Diagno′sis [Gr. διάγνωσις, from διά, "apart," and γιγνώσκω, to "know"], the discovery of the nature and seat of disease, one of the most difficult and important branches of medicine and surgery. Diagnosis is based upon "physical signs and rational symptoms;" "signs" being appreciable by the senses, and "symptoms" arrived at by the educated judgment. Both, however, are popularly known as symptoms. Diagnosis is best learned at the bedside, under the guidance of good instructors. The stethoscope, thermometer, laryngoscope, etc. furnish important aid in this branch of medical practice. The term is often used by naturalists for the discrimination of species of animals, plants, or minerals.

Diagom′eter [from the Gr. διάγω, to "conduct," and μέτρον, a "measure"], an electric instrument for determining the conducting power of fixed oils, invented by M. Rousseau. It consists of a dry pile, by means of which a current is passed through the oil, and the strength of the current determined by a magnetized needle. It is used especially for the detection of the adulteration of olive oil, which is said to have the lowest conducting power of such oils.

Diag′onal [Lat. *diagonalis;* Gr. διαγώνιος, from διά, "through," and γωνία, an "angle"], a straight line drawn through a figure, joining two opposite angles. The term is chiefly used in geometry in speaking of four-sided figures, but it is also properly applied with reference to all polygons of which the number of sides is not less than four. Euclid uses the term *diameter* in the same sense, but modern geometers use diameter only when speaking of curved lines. and diagonal when speaking of angular figures.

Diag′oras [Διαγόρας], a Greek poet and philosopher, born in the island of Melos, lived about 425 B. C., and is said to have been a disciple of Democritus of Abdera. He was a citizen or resident of Athens. As he rejected or doubted the popular religion and polytheism, he was stigmatized as an atheist. He fled from Athens in 411 B. C., or, as some say, was banished for impiety. He appears to have been a witty and fearless man of good moral character. His works are not extant. (See REUTHEN, "De Atheismo Diagoræ," 1812.)

Di′al [from the Lat. *dialis,* belonging to the day; Lat. *solarium*], an instrument which shows the hour of the day by the shadow of a gnomon or style cast by the sun on a graduated arc; it is also called **Sun-Dial.** The invention is of great antiquity, the Greeks having, it is said, learned its use from the Chaldæans. In the construction of a dial the object is to find the sun's distance from the meridian by means of the shadow. When this is known, the hour also is known, provided we suppose the sun's apparent motion to be uniform, and that it moves in a circle parallel to the equator during the whole day. In point of fact, neither of these conditions is fulfilled, but the error arising from this is of small amount. Although dials have many different constructions, the general principles are the same. The style, gnomon, or axis of the dial is either a cylindrical rod or the edge of a thin plate of metal. It must be parallel to the earth's axis, and thus it may be considered, on account of the smallness of the earth's diameter compared with the distance of the sun, as coinciding with the axis of the diurnal rotation; consequently the plane which passes through the centre of the sun, and the style will coincide with the shadow, and will turn with the sun, as the sun turns round the style, by the effect of the diurnal motion. Dials are horizontal, vertical, or inclined, according to the position of the plane of the dial with respect to the horizon of the place. The essential principle of the dial is, that the rod shall point to the pole of the heavens.

Dial, a township of Laurens co., S. C. Pop. 2529.

Di′al, The, a literary journal, the organ of the so-called "New England Transcendentalists," was founded in 1840 under the editorship of Margaret Fuller, assisted by George Ripley and R. W. Emerson. After a time, Mr. Emerson became its sole editor. It was published only four years, but was noted for the unusual number of persons of genius who contributed to it.

Di′alect [Gr. διάλεκτος, from διά, "apart," implying "difference," and λέγω, to "speak;" Lat. *dialectus*], a provincial form or manner of speaking or writing a language. The four Greek dialects, Attic, Doric, Ionic, and Æolic, were the four written varieties of the language, each having a literature of its own. No cultivated modern tongue resembles the Greek in this respect, as in all one dialect has been adopted as the standard of literature and polite society. In almost all languages there are still dialectic variations, in so far as colloquial discourse is concerned. English is a notorious example.

Dialectic [Gr. διαλεκτική, from διαλὲγομαι, "I converse"] is a technical expression much used both in the Greek and German philosophy, but of a somewhat vague signification. In the Greek philosophy it may be best explained by considering it in its relation to logic. Logic was the science of the forms of thinking, the science of conclusion and evidence; it taught the manner by which to arrive at truth. Dialectic treated of the truths arrived at; it was the science of expressing and setting forth ideas, the science of definition. With an idealistic thinker like Plato, with whom truth is an intuition and the idea an inspiration, dialectic, the science of definition, the art of defining, means the highest function of science—science itself. With a realistic thinker like Aristotle, with whom truth is the result of induction and deduction, and the idea an evidence, dialectic means only a part, and even an inferior one, of logic. Hence the multitude of contradictions which invests this word all around. In the German philosophy it may be best explained by considering it in its relation to the expression "dogmatical." Dogmatical is applied to a definition when it excludes absolutely the opposite; "dialectical," when it combines the opposites as correlatives. According to the dogmatical definition, everything is either good or bad; and if it is good, it is not bad; if it is bad, it is not good. According to the dialectical definition, anything which is essentially good may have some bad in it, and anything which is essentially bad may have some good in it. According as the object passes under different views, the different constituents of the idea shift place and importance in the definition; relativity is the character of the actual world, relativity must be the character of the world of thought. Both in the Greek and German philosophy the word *dialectic* is sometimes used to signify a mere word-fence.

CLEMENS PETERSEN.

Di′alogue [Gr. διάλογος, from διά, "between," or

"among," and λόγος, a "discourse"], originally a discourse between two or more persons. In literature, a composition in the form of a conversation between two or more individuals. The dialogue was the form most generally adopted by the ancients for the conveyance of instruction, and was considered applicable to the gravest and most philosophical subjects. It was adopted by Plato, Cicero, and Lucian with great success. The philosophical dialogue has also been employed by several eminent modern writers, as Fénelon, Fontenelle, Macchiavelli, Berkeley, Lessing, and Herder. In the drama, dialogue is combined with action, and those dramas which are not written for the stage differ from the dialogue chiefly in having a plot and a dénouement, while the dialogue is more strictly didactic.

Dial'ysis [Gr. διάλυσις, a "separation;" from διά, "apart," and λύω, to "loose"], the separation of certain substances by means of liquid diffusion. The dialyzer is usually a hoop of wood, gutta-percha, or metal on a low broad glass bell-jar, open above as well as below. A piece of wet parchment paper is stretched over the hoop and securely tied in place. The fluid to be dialyzed is poured into the hoop to the depth of half an inch, and the whole is floated on distilled water. Crystallizable bodies, as common salt, nitrate of potassa, etc., and bodies closely allied to them, such as hydrochloric acid and alcohol, pass rapidly through the membrane into the water; while bodies which do not crystallize, but are inclined to assume the gelatinous form, such as silicic acid, hydrated alumina, starch, gum, caramel, tannin, albumen, gelatine, and extractive matters, diffuse with extreme slowness. Such bodies are called *colloid*, from κόλλη, "glue." When a mixture of sugar and gum was placed in the dialyzer, three-quarters of the sugar passed through in twenty-four hours, without a trace of the gum. On treating silicate of soda (soluble glass), acidulated with hydrochloric acid, in the same way, seven-eighths of the silicic acid was left in the dialyzer at the end of five days, without a trace of hydrochloric acid or chloride of sodium. Urine dialyzed for twenty-four hours gave a liquid so free from mucous and gelatinous matter that on evaporating to dryness and extracting with alcohol a solution was obtained which gave pure urea in crystalline tufts.

The purification of soluble colloids is best effected by dialysis; they are thus completely freed from crystalloids. A solution of pure hydrated alumina is obtained by dialyzing its solution in the chloride or acetate. In a similar manner may be obtained, *in solution*, hydrated sesquioxide of iron and of chromium; Prussian blue from its solution in oxalatic acid; an aqueous solution of silicic acid from silicate of soda and hydrochloric acid; pure albumen from albumen and acetic acid; pure gummic acid from gum-arabic (gummate of calcium) and hydrochloric acid. Mr. Whitelaw was granted a patent for the application of dialysis to brine from salted and corned meats. The salt and nitre pass rapidly through the parchment paper, while the nutritious extractive matters dissolved out of the meats are retained, and may be used for soup. (For the application of dialysis to the purification of beet-molasses, see ENDOSMOSE.)

Dialysis is specially useful in examining animal fluids for poisons where the presence of the colloids interferes with the ordinary tests. Arsenious acid may be readily separated in twenty-four hours from the contents of a stomach in sufficient purity to be immediately recognized by the usual tests. Tartar emetic, morphine, strychnine, and, in fact, almost all soluble poisons, may be thus separated.

Decompositions are also effected by dialysis. Bisulphate of potassa is partially separated into neutral sulphate and hydrated sulphuric acid; alum is partially separated into sulphate of alumina and sulphate of potassa; sulphate of potassa and lime-water yield considerable hydrate of potassa and sulphate of lime. Separations and decompositions of this kind undoubtedly occur in plants and animals, and in the soil; and dialysis is probably one of the most common processes in nature. (See WATTS'S "Dictionary of Chemistry," under "Liquids, Diffusion of;" also the original papers of PROF. GRAHAM, who minutely investigated this subject, in the "Philosophical Transactions" for 1850 and 1862, and in the "Journal Chem. Soc.," iii. 60, 257; iv. 83; xv. 216.) C. F. CHANDLER.

Diamagnetic. See DIAMAGNETISM, by PROF. ALFRED M. MAYER, PH. D.

Diamagnetic Polarity. It is well known (see ELECTRO-MAGNETISM) that if a bar of iron be placed in a helix or spool of copper wire, through which circulates a current of electricity, the bar will be magnetized; and if we look at the end of the bar round which the current passes in the same direction as the motion of the hands of a watch, this end will be a south magnetic pole. When a bar of bismuth replaces the bar of iron, we find that the end above spoken of is a north magnetic pole in the bismuth; that is, bismuth has its poles the reverse of iron when it is placed in the same conditions of magnetization. Weber held to the opinion of the reversed polarity of bismuth, but Faraday denied any such condition. Tyndall settled the question by a series of experiments of great delicacy made with an apparatus designed for that purpose by Weber, and proved conclusively the existence of reversed polarity, not only in bismuth, but also in other diamagnetic solids and liquids. (By the author of the following article.)

Diamag'netism [for etymology see below]. The line joining the two opposite poles of a horseshoe magnet is called the *axial* line, while a line bisecting at right angles this axial line is called the *equatorial* line of the magnet. The space included between the opposite polar surfaces of the magnet is called *the magnetic field*.

When small bars of iron, nickel, cobalt, manganese, etc. are suspended between the poles of a magnet, they place their lengths in the axial line. Substances taking the above position are called magnetic substances, or, as Faraday termed them, *paramagnetic* substances. The majority of bodies, however (*e. g.* bismuth, antimony, phosphorus, heavy glass, wood, water, blood, bread, hydrogen, and ammonia), when delicately suspended in the magnetic field, place their lengths equatorially, and to distinguish them from magnetic substances they were called *diamagnetic* (διά, "across," and μάγνης, the "magnet") by Faraday, who in Dec., 1845, gave the discovery of diamagnetism to the world in a paper read before the Royal Society of London.

The difference in the behavior of magnetic and diamagnetic substances in the magnetic field was thus concisely stated by Faraday: Magnetic substances tend to go from weaker to stronger places of magnetic action, while diamagnetic bodies tend to go from stronger to weaker places in the magnetic field.

Faraday found that not only solids, but also liquids and gases, possessed magnetic and diamagnetic properties. In experimenting with these bodies he enclosed them in glass tubes, whose magnetic behavior was determined before they were filled with the liquids or gases to be examined, and the previously determined action of the magnet on the empty tube was deducted from the resultant magnetic effect on both the tube and its contained liquid or gas. Or two tubes of exactly the same size and material were hung opposite each other from the ends of a short piece of light wood, which was then placed across the end of a longer wooden rod, and the latter was suspended by silk fibres or by a fine silver wire. The two tubes hung on opposite sides of the axial line of the magnet, and with their centres equidistant from it. By this ingenious arrangement it is evident that the actions exerted by the magnet on the glass tubes neutralized each other, and whatever motion he observed was due to the difference in the action of the magnet on the two substances they contained. By filling one of the tubes with water or air, and the other successively with different liquids and gases, he determined *the specific magnetism* of these substances relatively to water or air taken as unity. Further experiments on the action of the magnetic field on water and air enclosed in a vacuum gave the data for reducing all of his measures to what he would have found had all the substances been suspended *in vacuo* between the poles of the magnet. Plücker in Germany and E. Becquerel in France also made very refined measures of these actions.

In the following table are contained the results of Faraday's measures of the actions of attraction or repulsion of magnetism on various substances, determined by means of a delicate torsion balance. In the comparisons equal volumes of the substance were used, and the action on water taken as the unity of intensity. The sign + indicates that the substance is magnetic, while — shows that it is diamagnetic:

Table of Specific Magnetism.

Substances.	Powers.	Substances.	Powers.
Iron	+ 2,500,000	Absolute alcohol	— 0.815
Protochloride of iron (saturated solution)	+ 62.	Essence of citron	— 0.828
		Camphor	— 0.855
		Camphine	— 0.859
Protoammoniuret of copper	+ 1.390	Linseed oil	— 0.886
		Olive oil	— 0.886
Perammoniuret of copper	+ 1.240	Wax	— 0.887
		Nitric acid	— 0.911
Oxygen	+ 0.181	Liquid ammonia	— 1.010
Air	+ 0.035	Bisulphide of carbon	— 1.031
Olefiant gas	+ 0.006	Nitrate of potassa (saturated solution)	— 1.036
Nitrogen	+ 0.003		
Carbonic acid	0.000	Sulphuric acid	— 1.081
Hydrogen	— 0.001	Sulphur	— 1.221
Ammonia (gas)	— 0.005	Chloride of arsenic	— 1.260
Cyanogen	— 0.009	Borate of lead	— 1.413
Glass	— 0.188	Bismuth	— 20.369
Zinc	— 0.772		
Ether	— 0.797		

The general law of these actions was discovered by Faraday, and Becquerel has formally stated them as follows: If we place in the neighborhood of a magnetic pole a fixed vessel filled with a fluid, the latter will experience no motion. Imagine any portion of the interior of the fluid mass isolated; it is solicited, according as it is magnetic or diamagnetic, by a force f, positive or negative; and as it is not displaced, the medium which surrounds it must necessarily exert on it an equal and contrary pressure equal to $-f$; this is to say, that the principle of Archimedes applies as well to these forces as to gravity. Replace now the mass of the fluid we supposed isolated from the same fluid surrounding it by another which is bounded by the same surface as the former, but of a different magnetic nature; it will receive from the magnet a different action f^1, positive or negative, and from the surrounding fluid the same action as above, f; the resultant action on the new substance will be f^1-f. Consequently, the action which the pole of a magnet exerts on any body whatever, plunged in a fluid medium, is equal to the difference of the actions which it exerts separately on this body and on the fluid in which it is suspended.

From these considerations the following consequences result: When the medium is magnetic, f is positive, and f^1-f is negative; consequently, any body whatsoever tends to become diamagnetic in a magnetic fluid or medium. Conversely, in a diamagnetic medium f is negative, and $-f$ is positive; and the substance may act as though it were magnetic, even when it really is not when tested in a vacuum, and will become more diamagnetic when it really is diamagnetic when suspended in a vacuum between the poles of the magnet.

Faraday beautifully illustrated the above principle by the following ingenious experiments: He filled glass tubes with solutions of sulphate of iron (a magnetic substance) of different degrees of strength, and suspended them between the poles of his magnet in similar solutions, also of different degrees of strength. When the solution in the tube was stronger, or contained *more* iron, than that in the solution in which it was suspended, it pointed *axially;* when it was weaker, or contained *less* iron, than that in the surrounding liquid, it pointed *equatorially;* and when the solution in the tube and outside of the tube were of the same degree of strength, the tube was indifferent.

In Sept., 1847, Bancalari of Italy discovered that when the flame of a candle was placed between the poles of an electro-magnet, it was deflected into the equatorial line the moment the iron of the magnet was magnetized, and the flame returned to its first position when the magnet was demagnetized. Faraday repeated these experiments with the powerful magnet of the Royal Institution, and greatly extended these observations by his discovery of the magnetic character of oxygen, olefiant gas, and nitrogen, when these gases were contained in tubes and placed in a vacuum in the magnetic field; and observed that hydrogen, cyanogen, and ammonia were diamagnetic when placed in similar conditions. Faraday made many important experiments on the effects of the change of temperature and pressure in modifying the magnetic conditions of gases, and found that the action in the magnetic field on these bodies diminished with an elevation of their temperature and a diminution of their density. Thus, hot air is shown to be diamagnetic when allowed to ascend through cold air between the poles of the magnet. This and other similar facts he showed by causing the currents of gas in their progress towards the magnetic field to pass over pieces of paper saturated with chlorhydric acid, while between, around, and above the poles were placed little tubes moistened with ammonia. When the gases entered one of these tubes the fact was known by the formation in it of white fumes of chloride of ammonium. He thus found that the heated air on reaching the magnetic field was repelled from the poles, while a descending current of cold air was attracted towards the poles.

The writer of this article has recently devised a superior method of observing these phenomena, by passing through the gases, as they ascend or descend or pass between the poles, a strong diverging beam from an electric or calcium light. The difference in refracting power of the hot or cold gas currents and the surrounding air causes shadows of the currents to be projected on a screen placed on the side of the magnet opposite the light; and thus can be seen at once all the parts of the phenomena; and he has thus been able to draw and even to photograph them. In these experiments the writer used the powerful electro-magnet of the Stevens Institute of Technology. With this magnet the experiments of Bancalari are very remarkable. On bringing the flame of a candle slowly upward between the poles of the magnet, the top of the flame is first depressed and spread out equatorially in the magnetic field; as we elevate the flame it spreads out yet more, and often takes the form of an oval-shaped vase flattened equatorially, with an interior depression extending down nearly to the base of the wick. A larger flame becomes compressed into a flattened elliptical dish, with two curved arms or handles projected upward.

After Faraday had discovered the magnetic properties of oxygen, he experimentally determined that one cubic metre of this gas equalled in magnetic effect fifty-four centigrammes of iron, and hence that the whole atmosphere acted as would a layer of iron which enveloped the earth and had a thickness of one-tenth of a millimetre. Parts of this gaseous magnetic shell are successively heated—and therefore weakened in magnetic intensity—by the sun in his apparent daily and yearly changes of position; and hence Faraday reasoned that here was certainly a true, and probably a sufficient, cause of the diurnal variation of the needle. (*Phil. Trans. R. S.*, Nov., 1850.)

Faraday, in the course of his experiments on bars of bismuth, met with the following anomalous actions. He found that some cast bars of bismuth pointed axially, others equatorially, while yet other bars took intermediate positions of rest. These extraordinary phenomena both he and Plücker of Germany endeavored to explain, and they both observed that there was some relation between the positions of crystals in the magnetic field and their crystalline forms. The phenomena received their full explanation at the hands of Tyndall, whose subtile examination and lucid explanation of these phenomena—though not popularly known—we think form his greatest claim to illustrious distinction as a man of science.

We can best make clear Tyndall's discoveries by quoting from his paper "On Diamagnetism and Magne-crystallic Action" (*L., E., and D. Phil. Mag.*, July, 1850) the following experiments, and then give in his own words the law which embraces their characteristic phenomena: "If we take a slice of apple about the same size as a penny, but somewhat thicker, and pierce it through with short bits of iron wire in a direction perpendicular to its flat surface, such a disk, suspended in the magnetic field, will, on the evolution of the magnetic force, recede from the poles and set its horizontal diameter strongly equatorial; *not* by repulsion, but by the attraction of the iron wires passing through it. If, instead of iron, we use bismuth wire, the disk, on exciting the magnet, will turn into the axial position; *not* by attraction, but by the repulsion of the bismuth wires passing through it.

"If we suppose the slice of apple to be replaced by a little cake made of a mixture of flour and iron filings, the bits of wire running through this will assert their predominance as before; for, though the whole is strongly magnetic, the superior energy of action along the wire will determine the position of the mass. If the bismuth wire, instead of piercing the apple, pierce a little cake made of flour and bismuth filings, the cake will stand between the poles as the apple stood; for though the whole is diamagnetic, the stronger action along the wire will be the ruling energy as regards position.

"Is it not possible to conceive an arrangement among the particles of a magnetic or diamagnetic crystal capable of producing a visible result similar to that here described? If, in a magnetic or diamagnetic mass, two directions exist, in one of which the contact of the particles is closer than in the other, may we not fairly conclude that the strongest exhibition of force will be in the former line, which therefore will signalize itself between the poles in a manner similar to the bismuth or iron wire? . . .

"If analogic proof be of any value, we have it here of the very strongest description. For example: bismuth is a brittle metal, and can readily be reduced to a fine powder in a mortar. Let a teaspoonful of the powdered metal be wetted with gum-water, kneaded into a paste, and made into a little roll, say an inch long and a quarter of an inch across. Hung between the excited poles, it will set itself like a little bar of bismuth—equatorial. Place the roll, protected by bits of pasteboard, within the jaws of a vice, squeeze it flat, and suspend the plate thus formed between the poles. On exciting the magnet the plate will turn, with the energy of a magnetic substance, into the axial position, though its length may be ten times its breadth.

"Pound a piece of carbonate of iron into fine powder, and form it into a roll in the manner described. Hung between the excited poles, it will stand as an ordinary magnetic substance—axial. Squeeze it in the vice and suspend it edgeways, its position will be immediately reversed. On the development of the magnetic force the plate thus formed will recoil from the poles *as if violently repelled*, and take up the equatorial position.

"We have here 'approach' and 'recession,' but the cause is evident. The line of closest contact is perpendicular in each case to the surface of the plate—a consequence of the pressure which the particles have undergone in this direc-

tion; and this perpendicular stands axial or equatorial according as the plate is magnetic or diamagnetic."

Prof. Tyndall thus sums up the law which rules all of these actions: "If the arrangement of the component particles of any body be such as to present different degrees of proximity in different directions, then the line of closest proximity, other circumstances being equal, will be that chosen by the respective forces for the exhibition of their greatest energy. If the mass be magnetic, this line will stand axial; if diamagnetic, equatorial."

The above law explains clearly the anomalous actions Faraday observed in his bars of bismuth. Bismuth is a crystallized body, and the lines of greatest proximity of its particles are in the direction of its cleavage planes. Therefore, this line of greatest condensation will always place itself equatorially in the magnetic field. In other words, the planes of cleavage will take an equatorial direction. But in casting bars of bismuth, these planes may, on the solidification of the bismuth, take various positions in reference to the length of the bars; hence the anomalous actions which are sometimes observed in these bars.

When the crystal cleaves equally easy in two planes, the lines of greatest compression will be parallel to both of these planes, and therefore the intersections of these planes will determine the position the crystal takes in the magnetic field. This is confirmed by experiment.

If there are three cleavage planes, perpendicular to each other, as in rock-salt, or if there are none, as in quartz, there will be no line of elective polarity, and the body will act as though it were not crystallized.

Finally, when three planes of cleavage are not perpendicular, there is generally one direction of greatest compression, which is found—for example, in calc-spar—parallel to the axis of crystallization; this line will place itself axially if the crystal is magnetic, and equatorially if it is diamagnetic. This deduction is confirmed by experiment.

ALFRED M. MAYER.

Diamanti'na (formerly **Tejuco**), a city of Brazil, in the province of Minas Geraes, is the chief town in a diamond and gold mining district, and is situated in a valley between high mountains, 220 miles N. N. E. of Ouro Preto. It is 5700 feet above the level of the sea. It is the seat of a bishop, and is a handsome and wealthy place. Diamantina became a city in 1831. Pop. about 12,000.

Diam'eter [from the Gr. διά, "through," and μέτρον, a "measure;" Fr. *diamètre*], a right line drawn through the centre of a circle, and terminated on both sides by the circumference. Diameter in architecture is the measure across the lower part of the shaft of a column, which is usually divided into sixty minutes, and forms a scale for the measurement of all the parts. In astronomy the apparent diameter of a celestial body is the angle which the latter subtends at the eye, and is measured by the micrometer. The distance of the body in question from the earth, when multiplied by the sine of this angle, gives the real diameter of the body. In elementary geometry, diameter is any right line through the centre of a figure. In conics a diameter always bisects a system of parallel chords. Newton showed that the centres of mean distances upon a system of parallel lines, of the n intersections of each with a curve of any order, always lie on a right line, which may be called a diameter. A diameter of any curve is simply the polar line with respect to the curve of an infinitely distant point. The rth diameter is the rth polar of an infinitely distant point, and consequently a curve of the $(n-r)^{th}$ order. The $(n-2)^{th}$ diameter is called the diametral conic, the $(n-3)^{th}$ the diametral cubic, etc. The same extension is applicable to surfaces. When the primitive surface is of the second order, there is but one diametral surface, and that is the diametral plane which bisects a system of parallel chords. Three diametral planes so situated with respect to each other that each bisects all chords parallel to the intersection of the other two, constitute a system of conjugate diametral planes, and intersect each other in conjugate diameters.

Di'amond [Fr. *diamant;* Ger. *Diamant* or *Demant*, a corruption of ADAMANT (which see)], the most valuable of precious stones and the hardest of known substances, consists of pure carbon. The primary form of the diamond is a regular octahedron, but it often occurs in cubes and rhomboidal dodecahedrons, and sometimes in twin crystals; the faces are frequently convex. The finest diamonds are transparent and colorless, but those which are of decided tints of pink, green, or blue are prized, while those which are slightly colored are held in least estimation. They are found in alluvial deposits, from which they are extracted by washing. The most celebrated mines are those of India. In 1728 diamonds were found in Brazil, and since that time the mines of Minas Geraes have produced most of the diamonds of commerce until quite recently. At present there is a considerable importation from Southern Africa, where they were first discovered in 1870. They have also been brought from Siberia, Borneo, and other countries. The largest known diamond is probably that mentioned by Tavernier as belonging to the Great Mogul. It was found in Golconda in 1550, and it is said to have weighed in its original state 900 carats. Among the crown-jewels of Russia is a diamond weighing 194 carats; it is of the size of a pigeon's egg, and was stolen from a Brahmanical idol by a French soldier. It was ultimately bought by Catharine of Russia for about $450,000 and an annuity of $20,000. One of the most perfect diamonds was brought from India by a gentleman named Pitt, who sold it to the regent-duke of Orleans for about $625,000. The celebrated Koh-i-noor (the "mountain of light") became the property of Queen Victoria on the annexation of the Punjâb by the East India Company in 1850. It is mentioned by Tavernier in 1665 as the property of the Mogul emperor, and, together with the Dŭriya-i-noor ("sea of light"), formed part of the plunder seized by Nadir Shah at the taking of Delhi in 1739. It weighed originally $186\frac{1}{16}$ carats, but it has been recut and reduced to $103\frac{3}{4}$ carats, and it is greatly improved in appearance. The diamond was first proved to be combustible in 1694 by the Florentine academicians, who found that when exposed to the heat of the sun in the focus of a large lens it burnt away with a blue lambent flame. The products of its combustion were first examined by Lavoisier in 1772, who showed that when burnt in air or oxygen it produced carbonic acid. Subsequent experiments have demonstrated that nothing but carbonic acid is thus formed. Diamonds of inferior quality have extensive employment in the diamond-drill (see BLASTING, by GEN. J. G. FOSTER), and in machines for sawing stone, dressing mill-stones, etc. (See also GEMS, by PROF. H. B. CORNWALL, E. M.) Attempts have been made to produce true diamonds by the crystallization of carbon, but thus far without success.

REVISED BY C. W. GREENE.

Diamond, in printing, a very small type, less than pearl, and next larger than brilliant.

Diamond Beetle (*Curculio*), a coleopterous insect belonging to the weevil tribe, remarkable for the splendor of its colors. It is golden-green, with two black bands on the thorax; on the wing-covers are rows of depressed spots of a sparkling green color, with intervals of black.

Diamond Bluff, a post-township of Pierce co., Wis. Pop. 475.

Diamond City, a post-village, capital of Meagher co., Mon., about 32 miles E. by N. from Helena. Gold is found in the vicinity.

Diamond Creek, a township of Chase co., Kan. P. 469.

Diamond Harbor, in British India, the port of Calcutta for large ships, is in the river Hoogly, 34 miles below that city, with which it is connected by an excellent road. The adjacent country is so swampy and unhealthy that few Europeans reside here.

Diamond Hill, a township of Abbeville co., S. C. Pop. 1760.

Diamond Necklace, a celebrated necklace containing 500 diamonds, and valued at 1,800,000 livres (about $400,000), made in 1773–75 by order of Louis XV. for Madame du Barry, his mistress; but before it was finished the king died, and Du Barry was excluded from court. In the years 1783–84 the prince-cardinal de Rohan was persuaded by the so-called countess Jeanne de Lamotte-Valois, an unscrupulous adventurer, that the queen Marie Antoinette regarded him with interest, which would be increased if he would assist her in buying the diamond necklace by becoming her surety for the payment of its price to the makers of the ornament, MM. Boehmer and Bassanges. The next steps in the affair are involved in some mystery. The count Cagliostro was probably one of the participants in the plot. The queen was believed (unjustly, as it is thought) to have been also involved in it. Certain it is that the cardinal agreed to stand surety for the payment—that the necklace was delivered to him, was stolen from him, was broken up, and sold in pieces. The jewellers, not having received their pay, went to court and made complaint. Cagliostro, the cardinal, and others were thrown into the Bastile. The trial in 1785–86 proved the guilt of no one but the countess Lamotte, who, with her husband, was branded on each shoulder and sentenced to a life imprisonment, from which she shortly afterwards escaped to London, where she died Aug. 23, 1791, having fallen from a window as she was trying to hide from her creditors. There is little doubt that the pretended signatures of the queen upon the papers and agreements made respecting this affair were clever forgeries.

Diamond Spring, a post-township of El Dorado co., Cal. Pop. 1055.

Dian'a, an ancient Italian divinity worshipped by the Romans as the goddess of light. She was identified by the later Romans with the Artemis of the Greeks, who was often called Delia, from her native island, Delos. She was supposed to be the daughter of Jupiter and Latona, and the sister of Apollo, with whom she shared his attributes of destruction and healing. She was represented as a virgin armed with bow and arrows, and was regarded as the patroness of chastity. As the goddess of the moon she was often called Selene and Phœbe.

Diana, a post-township of Lewis co., N. Y. It has iron mines and furnaces and many rare minerals. Joseph Bonaparte once had a summer residence here. The township contains several manufacturing villages and four churches. Pop. 1778.

Diana, Temple of, at Ephesus, one of the Seven Wonders of the World, built at the common charge of all the Asiatic states. The chief architect was Chersiphron; and Pliny says that 220 years were employed in completing this temple, whose riches were immense. It was 425 feet long, 225 broad, and was supported by 127 columns of Parian marble (60 feet high, each weighing 150 tons), furnished by so many kings. It was set on fire on the night of Alexander's nativity by an obscure individual named Erostratus, who confessed on the rack that the sole motive which had prompted him to destroy so magnificent an edifice was the desire of transmitting his name to future ages (356 B. C.). The temple was rebuilt, and again burned by the Goths in their naval invasion (A. D. 256).

Diane de Poitiers, a beautiful French lady, born Sept. 3, 1499, was married at the age of thirteen to Louis de Brézé. After his death (1531) she became a favorite of the king's son, who in 1547 ascended the throne as Henry II., and created her duchess of Valentinois in 1548. She had great influence over the king, who permitted her to exercise royal power and control his foreign policy. She maintained her ascendency until the death of Henry in 1559. Died April 22, 1566.

Dianthus. See PINK.

Diapa'son [Gr. διά, "through," and πασῶν (genitive plural feminine of πᾶς, "all")], in music, a term by which the ancient Greeks designated the octave. In modern music, diapason is used to denote the range or compass of the voice or of an instrument. The French use the term as equivalent to pitch, and apply it also to the steel instrument commonly called "tuning-fork" in English, which is employed to give a certain pitch. Diapason is also the name given by organ-builders to certain stops of pipes in the organ of eight feet pitch. (See ORGAN.)

Di'aper [Fr. *diapre*, a corruption of d'Ypres, a town of Flanders, where it was first manufactured], a linen fabric woven in flowers or regular patterns, chiefly used for napkins, table-cloths, etc. Diaper is also made in Scotland, Ireland, and Germany.

Diaph'anous [Gr. διαφανής, "transparent," from διά, "through," and φαίνω, "to shine"], a term nearly synonymous with *translucent,* is applied to bodies which like porcelain, permit light to pass through their substance. The term transparent is applied when the distinct forms of objects can be seen through the body.

Diaphore'sis [Gr. διαφόρησις, from διά, "through," and φέρω, to "carry"], the excretion of sweat from the skin without perceptible moisture; insensible perspiration. Medicines promoting this excretion are called "diaphoretics," while those producing perceptible wetness of the skin are called "sudorifics." Of late, however, the terms "diaphoretic" and "diaphoresis" are frequently applied to both the sensible and insensible perspiration.

Diaphragm [Gr. φρήν or διάφραγμα, from διά, "apart," and φράγνυμι (φράσσω), to "fence," to "enclose"], or **Mid'riff** [from the Ang.-Sax. *mid,* "middle," and *hrif,* the "abdomen"], a thin musculo-aponeurotic septum which in mammals separates the abdominal cavity from the thorax. Its centre in man is occupied by the cordiform tendon or trifolium (trefoil), so called from its shape, which roughly resembles a clover-leaf (Lat. *trifolium*). The diaphragm is attached to the vertebral column by two muscular buttresses or pillars called, in the plural, *crura.* These crura bear the names "right" and "left crus" (Lat. *crus, cruris,* a "leg," so called from their shape and position). The diaphragm is traversed by the phrenic (internal respiratory) nerves, and is, like the other respiratory muscles, partly involuntary. In forcible inspiration it is drawn down like the piston of an air-pump. It is one of the principal agents in the various expulsive acts, and also in sneezing, coughing, and laughing. Hiccough (Lat. *singultus*) is a clonic spasm of the diaphragm.

The term diaphragm is frequently applied by mechanics and others to a thin layer of leather, metal, or other material stretched across a cavity, after the manner of the above muscle.

Diarbekîr' [Turkish, *Kara-Amid*], a town of Asiatic Turkey, capital of a pashalic of its own name, is situated on the right bank of the Tigris, near its source, and about 200 miles N. E. of Aleppo; lat. 37° 55′ N., lon. 39° 52′ E. It is enclosed by a high, strong stone wall flanked with towers. It is the seat of a Nestorian and a Jacobite patriarch, and of a Catholic and an Armenian bishop. It has numerous handsome mosques, bazaars, and khans. It was formerly a more populous city, and had extensive manufactures of silk and cotton, but these have declined. The manufacture of silk is still carried on here. Pop. 45,000.

Diarrhœ'a [Gr. διάῤῥοια, from διά, "through," and ῥέω, to "flow"], a disease characterized by frequent soft alvine discharges; acute or chronic intestinal catarrh. Many writers have drawn nice distinctions between the various assumed varieties of this disease, which indeed is very frequently a symptom rather than a distinct disease; but nearly every case is in reality due to inflammation or irritation of some part of the intestinal canal. Diarrhœa as a symptom of cholera, dysentery, typhoid fever, pulmonary consumption, and some forms of peritonitis, is treated of under these respective heads. When resulting from local or general disease of the alimentary canal, its symptoms and treatment vary greatly according to the age of the patient. In infants both its acute and chronic forms are very frequent and fatal. These cases often depend on improper food and clothing—less frequently upon disturbances caused by dentition than is generally supposed. These cases require, first, a careful attention to hygienic conditions. Flannels should be worn next to the skin. If a milk diet should disagree, as it often does, finely-cut raw beef or strong broth may be given to the child. Medication should generally be cautious, but active. Many children suffer or die from over-medication, and still more probably from lack of active treatment. If scybalous masses of fæcal matter exist in the bowels, they should be cleared out by cathartics, such as rhubarb, etc., with aromatics, or castor oil. The proper use of astringents, tonics, and opiates in infantile diarrhœa is a matter requiring much discrimination. Chronic diarrhœa in the adult is an obstinate and rather common disease. A certain proportion of the cases are improved by iron, quinia, salicine, and other tonics. Change of climate, visits to mild saline chalybeate springs, sea-bathing, etc. are useful in many instances. Balsam of copaiba relieves some patients with surprising readiness. Astringent remedies and opiates have much value as palliative, and sometimes as curative, agents. In the simple acute diarrhœa of temperate climates, adults previously well are in general promptly cured by these agents, judiciously administered.

REVISED BY WILLARD PARKER.

Di'astase [Gr. διάστασις, "division," "separation," from διά, "apart," and ἵστημι, to "stand"], a name given to the constituent of malt (germinated barley) which changes starch to dextrine and glucose (grape-sugar). Diastase may be extracted from ground malt by treating it with tepid water (80° F.), heating the solution to 160° F. to coagulate the albumen, filtering, and precipitating the diastase by absolute alcohol. It is purified by redissolving in water and reprecipitating by alcohol. Malt does not yield more than 0.002 to 0.003 per cent. of diastase. Thus obtained, diastase is a white amorphous substance, soluble in water and in dilute alcohol. It has not been obtained sufficiently pure for analysis. It is supposed to be a nitrogenous body. Mulder believes it to be a group of bodies, not a single, well-defined compound. Its most characteristic property is its action upon starch. At a temperature of 158° F. it rapidly changes this substance to a mixture of dextrine and glucose. Payen and Persoz say 1 part of diastase will change 2000 parts of starch. It was at first supposed that the starch was first changed to dextrine, and the dextrine then changed to glucose. Musculus claimed to have proved that the two products resulted simultaneously from the starch, in the ratio of 1 equivalent of glucose to 2 of dextrine, and that diastase would not change dextrine to glucose. Payen proved that diastase does change dextrine to sugar, but that the process is interrupted by the presence of a certain percentage of glucose, to be resumed when this glucose has been destroyed by fermentation. Schultz and Märker confirm to a certain extent the observations of Musculus; they claim to have proved the simultaneous formation of both products, and propose the following expression for the reaction:

Starch. Water. Dextrine. Glucose.

$$2C_6H_{10}O_5 + H_2O = C_6H_{10}O_5 + C_6H_{12}O_6.$$

Before Payen and Persoz discovered diastase, Saussure obtained a substance from malt which changed starch to

dextrine and glucose, for which he proposed the name *mucin*. This name having been previously applied to a substance obtained from animal mucus, Ritthausen changed it to *mucidin*. Mucidin is probably identical with diastase. Dubrunfaut has obtained a body from malt which he calls *maltin*. It is precipitated from malt extract by tannin. He describes it as "a diastase of a true platonic character." The action of diastase on starch is prevented by nitric, sulphuric, hydrochloric, phosphoric, oxalic, tartaric, or citric acids; also by caustic potassa, soda, or lime, sulphate or acetate of copper, corrosive sublimate, nitrate of silver, alum, copperas, and borax. It is retarded by formic acid, arsenious acid, magnesia, ammonia, and alkaline carbonates; slightly by acetic acid, hydrocyanic acid, strychnine, quinine, morphine, and their salts. Essential oils, creosote, alcohol, and ether do not interfere with its action. Starch is also changed to dextrine and glucose by dilute acids, putrid flesh, yeast, gastric juice, by animal membranes, and in fact by all albuminoids in a certain stage of decomposition. (See STARCH, DEXTRINE, GLUCOSE, FERMENTATION.)

It is probable therefore that diastase is not a definite compound, but a certain condition of albuminous matter. Diastase plays a very important part in the germination of seeds and the sprouting of buds in tubers and stems containing starch. It serves to render the starch and albumen soluble, and thus facilitates their circulation and assimilation. (See GERMINATION.) In the manufacture of beer and spirits the diastase changes the starch into dextrine and glucose, and thus makes fermentation possible. (See BEER, ALCOHOL, WHISKY.) (The investigations with regard to the nature and action of diastase are recorded in LIEBIG and KOPP'S "Jahresbericht," and WAGNER'S "Jahresbericht.")

C. F. CHANDLER.

Diath'esis [Gr. διάθεσις, from διά, "apart," and τίθημι, to "place;" Lat. *dispositio*], in medicine, a predisposition; a constitution of body tending towards some particular disease. Writers mention the strumous, cancerous, scorbutic, rheumatic, gouty, hæmorrhagic, and other diatheses. These tendencies exercise a most powerful influence upon life and health, and their detection and treatment are matters of great practical importance.

Diatoma'ceæ [named from *Diatoma*, one of the genera], an order of microscopic plants which are usually referred to the class Algæ. Owing chiefly to the curious movements which the Diatomaceæ exhibit, they have been by some few naturalists considered as animals, and by others as belonging to a class of organisms intermediate between the animal and vegetable kingdoms; but movements like those of the Diatomaceæ are by no means absent from the higher vegetable world, and are especially frequent among the Protophytes; while it is certain that the organisms we are considering are closely akin to the Desmidiaceæ, which are confessedly of vegetable nature. They also contain endochrome (chlorophyll), which, however, is, during life, of a brown color, owing to the presence of iron.

Each diatom consists essentially of a single cell, and the wall of each cell is a layer (frustule) of silex, interpenetrated by organic matter chemically identical with the cellulose of higher plants. Each frustule is curiously marked with lines or dots, often of the most beautiful characters when seen under a powerful microscope. The interior contains endochrome and often oil-globules. Many diatoms have a protoplasmic layer outside the frustule, and it is upon contractions of this layer that the motions above alluded to are supposed to depend. Many of the most interesting diatoms are strung together in filaments; others are agglutinated in masses. Their reproduction is not well understood, but it is certain that they increase by the conjugation of cells, and also by fission.

The Diatomaceæ are found fossil in vast deposits. Bergmehl, tripoli, flint, and rotten-stone consist principally of these fossils. Bog-iron ore consists chiefly of these plants, which in some of the species incorporate large proportions of iron into their frustules. Diatoms are found in guano and in fresh and salt water, in some cases attached by stalks to fixed objects, and in other cases floating in the water in such numbers as to color it with their characteristic brown tint. They are eaten by the minute animals which form so large a part of the food of the whale. They abound especially in polar regions, some species ranging from Spitzbergen in the N. to Mount Erebus in the farthest S. A stratum eighteen feet thick of their fossil frustules underlies the city of Richmond, Va. On the Columbia River there is a mass of these fossils 500 feet thick. Living specimens are extensively found in soils and in the mud of many salt-water inlets and harbors. The ice in both polar regions is often colored with them; they also occur alive in springs whose water is near the boiling-point. (See CARPENTER on "The Microscope," and the articles of Prof. BAILEY and others upon this subject in the "American Naturalist," vol. i. *et seq.*)

CHAS. W. GREENE.

Diaton'ic Scale of Col'ors, the spaces occupied by the seven primary colors in the solar spectrum, and supposed by Newton to be exactly proportional to the length of strings that sound the seven notes in the diatonic scale of music. It is now known, however, that this theory is not well founded, although there is an analogy between the pitch of sounds and the color of bodies.

Diaz (BARTOLOMEU), a Portuguese navigator, eminent for his learning, talents, and enterprise. He commanded an expedition sent in 1486 to explore the western coast of Africa. He sailed or was driven by the wind around the southern extremity of Africa, to the mouth of the Great Fish River. Returning homeward, he discovered the cape which he had previously doubled unawares, and called it Tormentoso, which was soon exchanged for the name of Cape of Good Hope (Cabo de Buena Esperanza). He was captain of one of the ships in the fleet of Cabral, which sailed for India in 1500, and he perished by shipwreck May 29 of that year.

Diaz de la Peña (NARCISSE-VIRGILE), a French painter, born at Bordeaux Aug. 20, 1809. He began as a landscape-painter, but later he occupied himself with subjects of pure fancy, filling a crowd of small canvases with nymphs and cupids, and with boys and girls dressed in costumes that might pass for Eastern, but in which no attempt at faithfulness to details is allowed to interfere with the effects of color, which is all the artist aims at, and which he is often successful in obtaining. At one time the pictures of Diaz fetched high prices, and when he first made a name it was by work that showed an original vein; but he has greatly deteriorated, and by flooding the market with pictures merely made to sell, he has nearly lost all reputation. He obtained a third-class medal in 1844, a second-class in 1846, and the first-class in 1848.—He has a son, M. EUGÈNE DIAZ, who has some local repute as a musical composer.

CLARENCE COOK.

Dib'din (CHARLES), an English musician and writer of songs, was born at Southampton in 1745. He composed over 1000 sea-songs, among them "Tom Bowling" and other favorites of the English tars. Died July 24, 1814.—His son, THOMAS DIBDIN, born in 1771, was an actor and author of innumerable melodramas, farces, etc., of which the best known is "The Cabinet." Died Sept. 16, 1842.

Dibdin (THOMAS FROGNALL), D. D., an English bibliographer, born in Calcutta in 1776, was a nephew of Charles, noticed above. He took orders as a priest in 1804. He published, besides other works, "Bibliomania" (1809); a new edition of Ames's "Typographical Antiquities of Great Britain" (4 vols., 1810–19); "Bibliographical Decameron, or Ten Days' Pleasant Discourse over Illuminated MSS." (1817); and "Reminiscences of a Literary Life" (2 vols., 1836). Died Nov. 18, 1847.

Dibrell (ANTHONY), a minister of the Methodist Episcopal Church South, born in Virginia Aug. 19, 1805. He was educated at the University of North Carolina, studied law, entered on the practice of his profession at Lynchburg, abandoned it for the ministry, and in 1830 joined the Virginia Conference, in which he became eminent for piety, talents, and zeal. Died in Norfolk, Va., of yellow fever, Sept. 1, 1855.

T. O. SUMMERS.

Dicæ'um [from the Gr. δίκαιος, "decent," "well-ordered," alluding to the habits of these birds], a genus of tenuirostral birds remarkable for their beauty, their rapid flight, and the sweetness of their long-continued though very soft notes. They are of small size, and inhabit the highest trees. They weave a purse-shaped nest from the down found about the seeds of many plants. The best known species are the Australian dicæum (*Dicæum hirundinaceum*) and the *Dicæum cruentatum* of India.

Australian Dicæum.

Di'cast [Gr. δικαστής, from δίκη, "justice"], a name for a body of Athenian citizens, consisting of 6000, who were chosen yearly by lot from the body of freemen for the purpose of assisting in the administration of justice. They were divided into ten sections, generally about 500 each, before which causes were tried. The leading points of law and evidence were previously ascertained

before a magistrate, and the conflicting issues were reduced to a formal statement called the anakrisis. This was carried for decision before a section of the dicasts, who were supreme judges of the law and the fact. They were kept in ignorance of the cause which was to come before them, and each dicast was sworn to vote according to the law and justice. The analogies of the system to jury trial are obvious, as are also the differences between the two systems.

The word *dicasterion* was used to denote both the whole body of the dicasts and the place where their session was held.

Dice (plu. of **Die**), [Lat. *alea* and *tessera*; Gr. βολίς; Fr. *dé*; It., Sp., and Port. *dado*; Ger. *Würfel*], small cubes used in playing certain games of chance. They are made of bone, ivory, or close-grained wood, having their six sides marked with black dots from one up to six. These dots are so arranged that the numbers on two opposite sides taken together always count seven. The dice are shaken in a box called a dice-box, and then thrown on a board or table, and the number of dots on the upper faces decides the game. The invention of dice is very ancient, and is variously ascribed to the Greeks and Egyptians, and by Herodotus to the Lydians. Dice similar to those of our day have been found in Thebes. The Greeks gave the names of their gods and heroes to the different throws. The game of dice was popular among the Romans, and it is said that during the decline of the empire wealthy Romans not unfrequently staked their whole fortunes on a single throw. Gamblers resort to the practice of loading dice by adding lead to them on one side, so that the higher numbers are almost sure to turn up. When this trick is suspected, the thrower should turn down the mouth of the box abruptly, and this will prevent the dice from rolling and arranging themselves unjustly.

Dicen'tra [from the Gr. δίς, "twice," or "two," and κέντρον, a "spur," a term descriptive of the blossom of these plants], a genus of herbaceous perennials belonging to the order Fumariaceæ. They are found in moist, rich woodlands, and flower in spring. Among the species native in the U. S. are *Dicentra Cucullaria* (commonly called Dutchman's breeches), *Dicentra Canadensis* (squirrel corn), and *Dicentra eximia*. *Dicentra chrysantha*, found in California, has large golden-yellow flowers. *Dicentra spectabilis*, introduced from Japan about 1846, grows sometimes to the height of three feet, and produces long racemes of rosy blossoms of great beauty.

Dichlamyd'eous [from the Gr. δις, "twice" or "two," and χλαμύς, a "short cloak"], a botanical term applied to flowers or plants having both calyx and corolla. In the system of Decandolle exogenous plants are divided into *dichlamydeous* and *monochlamydeous*.

Dichot'omous [from the Gr. δίχα, "double," and τέμνω, "to cut"], two-forked, a term in botany, is applied to branches or stems which bifurcate, and are repeatedly divided into pairs. The stems of some ferns, the fronds of some algæ, and the stems of several phænerogamous plants are dichotomously branched.

Dichot'omy [for etymology see Dichotomous], an artificial system for the arrangement of natural objects, based upon principles of binary distinction.

In logic, the division of a class into two sub-classes, which are opposed to each other by contradiction.

In anthropology, the recognition of two factors, and only two, in man—the physical and the spiritual—contrasted with trichotomy, which recognizes in man three factors—viz. body, soul, and spirit. (See Dr. Boardman's articles in "Baptist Quarterly," vol. i.)

Di'chroism [from the Gr. δίς, "twice," and χρώς, "color"], the property possessed by some crystallized bodies of showing two different colors, according to the direction in which rays of light pass through them. The crystals of the double chloride of palladium and potassium appear deep red along the axis, and vivid green in a transverse direction.

Di'chroite [etymology same as for Dichroism], also called **I'olite**, a mineral so called from the different colors it exhibits, is a silicate of magnesia, iron, and alumina. It is found in prisms belonging to the trimetric system, and is sometimes used as a gem.

Dick (James T.), an artist born in New York City in 1834, was a son of A. L. Dick, an engraver of good reputation. The younger Dick gained several prizes at the age of fourteen, and was one of the founders of the Brooklyn Art School and of the Academy of Design. Died Jan. 19, 1868.

Dick (Thomas), LL.D., a Scottish author, born near Dundee Nov. 24, 1774, was educated for the ministry in connection with the Secession Church. He taught school for many years at Perth, and wrote numerous popular scientific and religious works, among which are "The Christian Philosopher" (1823), "The Philosophy of Religion" (1825), "The Philosophy of a Future State" (1828), "Celestial Scenery" (1838), and the "Sidereal Heavens" (1840). Died July 29, 1857.

Dick'ens (Charles), one of the greatest novelists that England has produced, was born at Landport, Portsmouth, on Feb. 7, 1812. His father was John Dickens, who held a position in the navy pay department, and who afterwards became parliamentary reporter for one of the London daily papers. After studying in a college near Rochester, young Dickens was placed in an attorney's office to learn the profession of the law. This pursuit proving uncongenial to his taste, he left it and obtained a position as reporter on the staff of the "Morning Chronicle." In this paper appeared the first efforts of his genius, his "Sketches of Life and Character," which in 1836 were collected and published in two volumes under the title "Sketches by Boz." The public gave these a favorable reception, and in 1837 they were followed by "The Posthumous Papers of the Pickwick Club," which first appeared as a serial in monthly parts. The work had an immediate and almost unparalleled success, and raised its author at once to the first rank among the popular writers of the day. In its peculiar vein of humor it has never been equalled in English literature. He was married in 1838 to the daughter of George Hogarth, a musical critic, and in the same year appeared "Oliver Twist," a novel in three volumes. This was followed by "The Life and Adventures of Nicholas Nickleby" (3 vols., 1839), "Master Humphrey's Clock" (1840–41), and "Barnaby Rudge" (1841). In 1841 he visited the U. S., and in the following year appeared his "American Notes for General Circulation," in which American life and character were somewhat severely satirized. The "Notes" were followed in 1843–44 by the "Life and Adventures of Martin Chuzzlewit" (3 vols.), a work which reflected still more on the faults and foibles of our countrymen.

In 1844, Mr. Dickens went to Italy, whence he returned in 1845, and towards the end of that year he assumed the chief editorship of the "Daily News," a Liberal journal then just established. He soon, however, resigned this position. In 1847–48 appeared his "Dombey & Son," which, in some of its passages at least, is not surpassed by any of his works either in power or pathos. It was followed in 1850 by "The Personal History of David Copperfield," which is regarded by many as the best of all his novels. Certainly in none other is the interest more intense or better sustained from the beginning to the end. It is commonly understood that in the story of "David Copperfield" the novelist has introduced many of the incidents or circumstances of his own life, without, however, following so closely the real history as in any way to compromise the characters of those with whom he associated. Among his other works may be mentioned "Bleak House" (1852), "Hard Times" (1854), "Little Dorrit" (1857), "A Tale of Two Cities" (1860), "Great Expectations" (1862), "Our Mutual Friend" (1864–65), and "The Mystery of Edwin Drood," left unfinished at his death. "Household Words," a weekly periodical originated by him in 1850, had a very extensive circulation. He afterwards in 1859 started another weekly journal entitled "All the Year Round." In 1867 he made a second visit to the U. S., and met everywhere with a cordial and even enthusiastic reception. He gave in the principal cities public readings from his own works, which were attended by crowded audiences. He returned to his native country in the spring of 1868, and died at Gad's Hill June 9, 1870. J. Thomas.

Dick'eyville, a post-township of Aroostook co., Me. It has a high school and some manufactures. Pop. 1851.

Dick'ins (John), a Methodist Episcopal preacher, born in London in 1746, studied at Eton, and came to America before the Revolutionary war. In 1774 he became a Methodist, and soon began to preach. He was one of the ablest preachers of his day, and contributed much to the foundation of Cokesbury College and the Methodist Book Concern. Died of yellow fever in 1798.

Dick'inson, a county in the N. W. of Iowa. Area, 430 square miles. It is drained by the Okoboji River, and contains several lakes, one of which is called Spirit Lake. The soil is mostly fertile, and grain is produced. Capital, Spirit Lake. Pop. 1389.

Dickinson, a county in E. Central Kansas. Area, 846 square miles. It is intersected by the Kansas River. The surface is partly occupied by extensive prairies; the soil is fertile. Cattle, grain, hay, butter, etc. are produced. It is traversed by the Kansas Pacific R. R. Capital, Abilene. Pop. 3043.

Dickinson, a post-township of Franklin co., N. Y. Pop. 1990.

Dickinson, a post-township of Cumberland co., Pa. Pop. 1617.

Dickinson (Anna Elizabeth), an American reformer and popular public speaker, was born of Quaker parents at Philadelphia Oct. 28, 1842. Her father died when she was but two years old, and her early years were spent in poverty. She was educated in the Friends' free schools. Her first public speech was delivered in Jan., 1860, at a meeting for the discussion of women's rights, and at once established her reputation. During the civil war she delivered many patriotic and political addresses, and since that time she has spoken much upon labor reform, woman's suffrage, etc. She published in 1868 "What Answer?" a novel.

Dickinson (Daniel Stevens), LL.D., an American Senator and lawyer, born in Goshen, Conn., Sept. 11, 1800. He was elected as a Democrat to the senate of New York in 1836, and became lieutenant-governor of that State in 1842. In 1844 he was chosen a Senator of the U. S. for six years. He was distinguished as a debater, and was the leader of the conservative ("Hunker") Democrats of New York. After he retired from the Senate he practised law at Binghamton, with a high reputation. In 1861 he was elected attorney-general of New York. During the civil war he zealously supported the cause of the Union by public speeches. He was appointed district attorney for the southern district of New York in the spring of 1865. Died April 12, 1866. (See "Life and Works of D. S. Dickinson," by his brother, 2 vols., 1867.)

Dickinson (Edward), LL.D., an American lawyer, was born at Amherst, Mass., Jan. 1, 1803, graduated at Yale with the highest honors in 1823, studied at the Law School of Northampton, Mass., and in 1826 became a lawyer of his native town, where he has since resided. He became treasurer of Amherst College in 1835, holding that position nearly forty years, greatly to the advantage of the college. In 1838, 1839, and 1873 he was chosen representative to the general court of Massachusetts, was State senator 1842–43, State councillor 1845–46, and a Whig member of Congress 1854–55, having declined other important public trusts. He is a prominent supporter of the railroad interests of his town and State, and is distinguished for integrity, public spirit, and professional success.

Dickinson (John), LL.D., an American statesman and lawyer, born in Maryland Nov. 13, 1732. He received his legal education in London, practised law with success in Philadelphia, and was a deputy to the first Colonial Congress in 1765. He was a member of the Continental Congress in 1774, and wrote for that body several important state papers, among which was a "Declaration to the Armies." He was an eloquent and ready debater. In 1776 he spoke against the Declaration of Independence, which he regarded as premature, and he was one of the few members of Congress who did not sign that declaration. He consequently became unpopular, and was defeated in the next election, but he served as a private soldier in the war of Independence. In 1779 he represented Delaware in Congress. He was president of Pennsylvania in 1782–85. He wrote numerous political essays, and had a high reputation for learning. In 1783 he founded and endowed Dickinson College at Carlisle, Pa. Died Feb. 14, 1808.

Dickinson (Rev. Jonathan), a Presbyterian theologian, born at Hatfield, Mass., April 22, 1688, graduated at Yale College in 1706. He preached at Elizabethtown, N. J., for more than thirty years, and was elected president of the College of New Jersey in 1746. He wrote several works on theology. Died Oct. 7, 1747.

Dickinson College, next to the University of Pennsylvania, is the oldest college in the State; the former was founded in 1753, the latter in 1783. As to its establishment and its location in Carlisle, the board of trustees in 1784 set forth the following: "The fitness of the situation, not only central to the State, but to the several States of the Union, the healthfulness and beauty of the country around, recommend the fitness of the situation. The great embarrassments learning lay under during the war pointed it out as a virtue peculiarly commendable to use our endeavors to revive the drooping sciences. Gratitude to God for the prosperous conclusion of the war laid us under obligation, our new relations to the other nations of the world, and especially the important interests of religion and virtue in this growing empire." In consequence of the valuable gifts to, and personal interest in, the college of Hon. John Dickinson, "president of Pennsylvania," the institution received his name. The first president was Charles Nisbet, D. D., a native of Scotland, and minister at Montrose. During the Revolutionary war his voice was in favor of the colonies. The college has had eleven presidents: Charles Nisbet, D. D., elected 1784; Robert Davidson, D. D., in 1804; Jeremiah Atwater, D. D., in 1809; John M. Mason, D. D., in 1821; William Neill, D. D., in 1824; Samuel B. How, in 1830; John P. Durbin, D. D., in 1833; Robert Emory, D. D., in 1845; Jesse T. Peck, D. D., in 1848; Charles Collins, D. D., in 1852; Herman M. Johnson, D. D., in 1860; Robert L. Dashiell, D. D., in 1868; James A. McAuley, D. D., in 1872.

The institution is denominational. Until 1833 it was under Presbyterian control, but the division of that Church into the old and new branches brought the college under grave embarrassments. The Old School kept the educational funds; the New School had a majority of the board of trustees, but, being without funds, transferred the college to the Methodist denomination, under whose care it now remains. At the breaking out of the late civil war it had many students from the Southern States; these left, others were called to the battle-field, and the college suffered in its finances until the year of the centenary of Methodism, when its endowment fund was increased $100,000.

The course of study retains the old classical course, but allows a divergence in the junior and senior years from the ancient languages in two directions—one in favor of the Hebrew language and literature, to accommodate those studying for the ministry; and the other in favor of natural science. The old prominence of the ancient classics has yielded much in favor of modern languages, literature, and the natural sciences.

The buildings are three in number. The libraries contain 26,000 volumes; the scientific apparatus is very extensive and valuable. S. D. Hillman.

Dickinson's Landing, a port of entry of Osnabruck township, Stormont co., Ontario (Canada), on the N. side of the St. Lawrence River, at the head of the Cornwall Canal, 96 miles from Kingston. It has a lighthouse. Pop. about 300.

Dick Johnson, a township of Clay co., Ind. P. 868.

Dick'son, a county in the N. of Tennessee. Area, 600 square miles. It is partly bounded on the N. E. by the Cumberland River, and drained by the Harpeth. The surface is undulating; the soil is productive. Tobacco, wool, cattle, and grain are staple products. It is intersected by the Nashville and North-western R. R. Capital, Charlotte. P. 9340.

Dickson, a township of Edwards co., Ill. Pop. 526.

Dickson, a township of Lewis co., Mo. Pop. 204.

Dickson, a borough of Luzerne co., Pa. Pop. 391.

Dickson (Samuel Henry), M. D., LL.D., was born of Scottish parentage at Charleston, S. C., Sept. 20, 1798, graduated at Yale in 1814, and received the degree of M. D. at the University of Pennsylvania in 1819. In 1824 he became professor of the institutes and practice of medicine at Charleston medical school (S. C.), was professor of practice in the University of New York (1847–50), and again in Charleston. In 1858 he was called to the chair of practice at Jefferson College, Philadelphia, which he filled with great ability. He was the author of several valuable works and numerous brochures upon medicine and other subjects. Died Mar. 31, 1872.

Dicotyled'onous [from the Gr. δί (for δίς), "twice" or "double," and κοτυληδών, a "cotyledon"] **Plants,** the name given to plants which have the embryo furnished with two, or more than two, Cotyledons (which see). More than two are of rare occurrence, but are found in the fir, larch, spruce, etc. of the Coniferæ. As a general rule, exogens are dicotyledonous, while endogens are almost always monocotyledonous. (See Exogenous Plants.)

Dicta'tor [Fr. *dictateur*, from the Lat. *dicto, dictatum*, to "say often," to "dictate"], the title of an extraordinary magistrate in the republic of ancient Rome, who was invested with nearly absolute power for a period of six months, and was irresponsible. Dictators were appointed when the republic was in danger, or when an important crisis demanded the prompt decision and vigorous action of a single executive chief. The first dictator, according to some authorities, was Titus Lartius, who was appointed 501 B. C.; the last, Marcus Junius Pera (216 B. C.). In general, no one could be made dictator who had not previously been consul. It is doubtful whether election by the curiæ was necessary to his appointment, but the nomination by the consul was indispensable. The dictator appointed a *magister equitum* ("master of the horsemen"), who in his absence acted as his deputy or lieutenant. The office of dictator was at first confined to patricians, and the first plebeian dictator was C. Marcius Rutilus, appointed in 356 B. C. The power of the dictators was subject to these limitations: they could not touch the treasury, they were not permitted to leave Italy, nor to ride through Rome on horseback without the consent of the people. The dictatorships of Sulla and Cæsar, both of whom transcended their limitations, were irregular and illegal, entirely different from the former dictatorships.

Dic'tionary [Modern Latin, *dictionarium*, from *dictio*, a "word," and *-arium*, a suffix, denoting a "place where things are kept;" Fr. *dictionnaire;* It. *dizionario;* Sp. *diccionario*], a book giving the words of a language in alphabetical order, and explaining their meaning. It is also a general term for works on science, literature, and art, giving information under separate classified heads, and in modern times under heads alphabetically arranged. The multiplication of books upon history, science, and literature has made it necessary to reduce the body of knowledge in specific branches of inquiry to the form of dictionaries, with the topics alphabetically arranged for convenience of reference. The earliest work of the kind is in the Chinese language, compiled about 1100 B. C. One of the first lexicographers among classic writers was M. T. Varro (128–116 B. C.), but the most celebrated dictionary of antiquity is the "Onomasticon" of Julius Pollux, completed early in the third century. In modern times the first Latin dictionary was published by Balbi of Genoa (1460). Sebastian Münster's "Chaldee Dictionary" appeared in 1527; Pagninus's "Lexicon of the Hebrew Language" (1529); Stephens's "Thesaurus" (1535); Erpenius's "Arabic Dictionary" (1613); Schindler's "Lexicon Pentaglottum" (1612); Castell's "Lexicon Heptaglotton" (1669); Moreri's "Dictionnaire" (1673); Bayle's "Historical and Critical Dictionary" and the "Dictionary of the French Academy" (1694); Dr. Johnson's "English Dictionary" (1755); Grose's "Dictionary of the Vulgar Tongue" (1785); Walker's "Dictionary" (1791); Webster's (1806); Webster's "American Dictionary" (1828); revised edition, unabridged (1864); Richardson's "Dictionary of the English Language" (1835–37; reissued with a supplement in 1856); Worcester's (1830–60); J. L. Grimm's "German Dictionary" ("Deutches Wörterbuch," begun in 1852; still unfinished). Among works of the kind may also be mentioned Wm. Smith's "Dictionary of Antiquities" (1842), "Dictionary of Biography" (1849), and his "Dictionary of Ancient Geography" (1857). His "Bible Dictionary" (1860–63) and his Latin Dictionaries (1855 and 1870) are valuable. Littré's "Dictionnaire de la Langue Française" (1863–73); the Greek-German Lexicon of Passow, translated into Greek-English by Liddell and Scott, and enlarged by Drisler; Yonge's English-Greek Lexicon, greatly enlarged by Drisler; Barretti's Italian Dictionary; Adler's German and English Dictionary (1848), and Sophocles' Dictionary of Byzantine Greek (1860), are among the best works of the kind. E. A. Andrews's Latin Dictionary, based upon that of Freund, and the lexicographic works of the late Prof. Anthon, are of much value. Quite recently much attention has been given in the U. S. to the compilation of dictionaries of the aboriginal languages of the country—a task upon which much valuable labor has been bestowed.

Dic'tyogens [from the Gr. δίκτυον, a "net" or "network"], a name proposed by Lindley for a sub-class of plants included by other botanists among endogenous plants. While they agree with endogens in the structure of the embryo, they are distinguished by having net-veined instead of parallel-veined leaves, and the growth of their stems appears to be partly exogenous and partly endogenous. The most important natural orders referred to this class are Dioscoreaceæ and Smilaceæ, and among the plants are the different species of yam and sarsaparilla.

Dicyn'odon [from the Gr. δί (for δίς), "twice" or "two," κύων, a "dog," and ὀδούς (gen. ὀδόντος), a "tooth"], literally, having two tusks or canine teeth, the name applied to a genus of fossil reptiles whose remains have been found in South Africa. Animals of this genus united in their structure the characteristics of different reptiles. The closed orbits and sharp, compressed jaws covered with a horny plate ally it closely to the tortoise, but it also has affinities with the lizard and crocodile. It takes its name from a pair of sharp-pointed tusks growing downward, one from each side of the upper jaw. The articulating surfaces of the vertebræ being hollow, it may be supposed these reptiles were good swimmers; and if they were inhabitants of the water, the construction of the bony passages of the nostrils proves that they must have come to the surface to breathe air.

Didac'tic [Gr. διδακτικός, from διδάσκω, to "teach"], a word signifying skilled in teaching, imparting instruction.

Didactic Poetry, a term applied to that poetry the chief object of which is to teach some art, science, or system of philosophy. Among the most remarkable examples of ancient didactic poems are the following: Lucretius's "De Rerum Naturâ" (designed to explain and defend the philosophy of Epicurus), which Macaulay pronounces "the finest didactic poem in any language;" Virgil's "Georgics" (a treatise on agriculture); and Horace's "De Arte Poeticâ" ("On the Poetic Art"). Many fine didactic poems have also been written in modern times. Among the principal of these are Vida's "Art of Poetry" ("De Arte Poeticâ"); Boileau's "Art of Poetry" ("L'Art poétique"); Pope's "Essay on Criticism" and "Essay on Man;" Darwin's "Botanic Garden;" and most of Cowper's longer poems.

Didelphys. See Opossum.

Diderot (Denis), a French philosopher, born at Langres Oct. 5, 1713, and educated by the Jesuits, was destined for the Church, and later for the law, but eagerly embraced the study of literature. His father, a prosperous cutler of stern character, withdrew from him all support upon his refusal to pursue his professional studies. Among his first writings were "Essai sur le Mérite et sur la Vertu" and "Lettre sur les Aveugles" (1749), which last established his reputation, but cost him a year's imprisonment. His earlier works were all written under the duress of poverty. His reputation is founded chiefly on the "Encyclopædia" ("Encyclopédie, ou Dictionnaire raisonnée des Sciences, des Arts et Métiers"), of which he and D'Alembert were joint editors. He wrote the articles on ancient philosophy, history, and on the arts and trades, and supervised other parts of the work. He expended many years on this arduous labor, for which he was qualified by great quickness of intellect and extent of information. Grimm expressed the opinion that he had perhaps the most encyclopedic head that ever existed. The first volume of this work was published in 1751. The government suspended the publication, because it advocated infidel doctrines, but it was finished in 1765. Catharine II. of Russia granted him a pension in 1765, and invited him to St. Petersburg, whither he went in 1773, but he soon returned to France. Among his works are novels entitled "The Nun" and "Jacques the Fatalist." He is considered as the chief of the skeptical philosophers called Encyclopedists. Died in Paris July 30, 1784. His complete works were published by Naigron (15 vols., 1798; new ed., 22 vols., 1821). (See Damiron, "Mémoire sur Diderot," 1852; Carlyle, "Essay on Diderot;" Rosenkranz, "Leben und Werke Diderots," 2 vols., 1866.)

Did'ius (Salvius Julianus), a Roman emperor, born at Milan in 133 A. D. He had a high command in the army, and was chosen consul with Pertinax, after whose death (193 A. D.) the prætorians offered the empire at public auction to the highest bidder. Didius, who was very rich, gave 6250 drachmas to each soldier, and was proclaimed emperor. After he had reigned nearly two months he was killed (June 1, 193) in his palace by his soldiers. He was succeeded by Severus.

Di'do ("the fugitive"), [Gr. Διδώ], whose real name was **Elissa** or **Elisa,** a daughter of the Tyrian king Matgen, after whose death she and her younger brother Pygmalion (Piimelium) were to reign conjointly. But Pygmalion, aided by democratic partisans, usurped the whole authority, and procured the assassination of her husband, Zicharbaal (the Sichæus of Virgil). She then fled with many Tyrians by sea, and founded Carthage about 870–860 B. C. Virgil has been charged with committing an anachronism in representing her as contemporary with Æneas. (See Virgil, "Æneid," i., ii., and iv.)

Didot (François), born at Paris in 1689, was the founder of a famous house of printers and type-founders in Paris. Died Nov. 1, 1757. The business was carried on by his sons, François Ambroise (born in 1730, died July 10, 1804), who made improvements in the printing-press and paper manufacture, and Pierre François. Of the sons of the former, Pierre (born 1760, died Dec. 31, 1853, leaving as his successor his son Jules) took charge of the printing-house in 1789, and published magnificent folio editions of Virgil, Horace, Racine, and other classic authors; and Firmin (born 1764, died April 24, 1836) took charge of the type-foundry, improved the art of stereotyping, and became known also as an author and translator. His business was inherited by his sons, Ambroise Firmin (born Dec. 20, 1790) and Hyacinthe Firmin (born Mar. 11, 1794).

Didron (Adolphe Napoléon), a French archæologist, born at Hautvillers (Marne) Mar. 13, 1806. He began in 1844 to publish "Annales Archéologiques," devoted to mediæval art and antiquities. His chief work is "Christian Iconography" (1843). Died Nov. 13, 1867.

Didym'ium [from the Gr. δίδυμος, a "twin"], a rare metal, so named from its resemblance to lanthanum, and the difficulty of separating the two. It is a dyad, its symbol D; atomic weight, 96. It forms a protoxide (D_2O), which is a powerful base, and forms with acids rose- or violet-colored salts. It was discovered in 1841 by Mosander.

Did'ymus [Gr. Δίδυμος], a grammarian of Alexandria in Egypt, was born about 62 B. C., and was surnamed

CHALCENTERUS. He was noted for his fecundity as a writer, and is said to have written nearly 4000 treatises, mostly frivolous, on various subjects. All of his works have perished.

Didymus (THE BLIND), one of the most learned men of his age, was born at Alexandria A. D. 308, became blind in his fifth year, and was at the head of the theological school in Alexandria from 390 to 395, the year in which he died. His most important extant works are a treatise upon the "Spirit" and a treatise upon the "Trinity."

Die (anc. *Dea Vocontiorum*), a walled town of France, department of Drôme, on the river Drôme, 26 miles E. S. E. of Valence. It has manufactures of silk and paper, and is the seat of a Catholic bishop. Pop. in 1866, 3762.

Die (plu. **Dies**), in coinage, the instrument by which impressions are stamped upon coins. The intended device is first engraved upon a plug of forged steel, which, when complete, is hardened, and is called a *matrix*. From this, by means of a powerful fly-press, an impression in *relief* is taken upon another piece of soft steel, which, when duly shaped and hardened, is called the *punch*. From this again indented impressions upon pieces of steel are taken, which, being shaped in the lathe and tempered, are the *dies*. A good pair of dies will sometimes yield from two to three hundred thousand impressions before they become too much worn for use.

Die-sinking has acquired increased importance on account of the great extension of the process of stamping metal. Many kinds of work formerly made by the hammer and punch are now shaped by a few blows between suitable dies. As examples of these we may mention the ornamental work of gas-fittings, buttons, common jewelry, ornamental trays, dishes, boxes, small parts of firearms, etc. For such purposes a pair of dies is required—one in relief, the other in intaglio—and the metal is pressed between them. The astonishing cheapness of many of the metallic wares is mainly due to the use of dies for doing by a single blow the work that formerly required long and tedious manipulation.

DIE, in architecture, is that part of a pedestal which lies between its base and its cornice.

DIE (plu. DICE). See DICE.

Die'bitsch, surnamed SABALKANSKI (HANS KARL FRIEDRICH ANTON), COUNT, a Russian general, born in Silesia May 13, 1785. He served at the battle of Austerlitz, 1805, and became a major-general in 1812. Having distinguished himself at the battles of Lützen, Dresden, and Leipsic, he was raised to the rank of lieutenant-general in 1813. He was appointed chief of the imperial staff about 1820. Having obtained command of an army in the war against the Turks, he took Varna in 1828, and became general-in-chief in 1829. He defeated the Turks and crossed the Balkan, hence his title SABALKANSKI ("Trans-Balkanian"). He was raised to the rank of field-marshal, and in Jan., 1831, took command of an army sent to subdue the Polish insurgents. After the indecisive battles of Praga and Ostrolenka, he died of cholera June 10, 1831. (See BELMONT, "Graf Diebitsch," 1830.)

Die'denhofen, a fortified town in Elsass-Lothringen, on the left bank of the Moselle, 14 miles below Metz. Pop. 7155.

Dief'fenbach (JOHANN FRIEDRICH), a skilful Prussian surgeon, born in Königsberg Feb. 1, 1794. He graduated in 1822, and began to practise in Berlin, where he gained a high reputation. He was a professor in the University of Berlin, and wrote, besides other works, "Die Operative Chirurgie" (12 vols., 1844–48). He made improvements in plastic surgery. Died Nov. 11, 1847.

Dielec'tric [from the Gr. διά, "between," and *electricity*], a non-conducting body which permits the force of electricity to act through it. For example, the interposition of thin glass plates does not prevent electric induction from taking place; hence glass is dielectric.

Die'men, van (ANTHONY), a Dutch naval officer, born at Kuilenburg in 1593. He served for many years in the East Indies, and became an admiral. He was appointed governor-general of the Dutch East Indies in 1636, and sent out in 1642 an exploring expedition under Abel Tasman, who discovered Van Diemen's Land. Died at Batavia April 19, 1645.

Die'penbeck, van, written also **Diepenbeke** (ABRAHAM), an eminent Dutch historical painter, born at Bois-le-Duc in 1607, was a pupil of Rubens. In 1641 he was chosen director of the Academy of Antwerp. He painted with facility on glass and tapestry, imitated Rubens with great freedom, and gained a high reputation by his skill in composition and coloring. Among his works is a series of fifty-eight designs called "The Temple of the Muses." Died in 1675.

Dieppe, a seaport-town of France, in the department of Seine-Inférieure, is on the English Channel at the mouth of the river Arques, and at the northern terminus of the Rouen and Dieppe Railway, 33 miles N. of Rouen, and 143 miles by rail N. W. of Paris; lat. 49° 55′ N., lon. 1° 5′ E. It stands between two high ranges of chalk-cliffs, and is defended by a wall and a castle built on a high cliff. Vessels of 500 tons can enter the harbor at high water, but at low tide the harbor is nearly dry. Dieppe has a town-hall, theatre, and public library; also manufactures of watches, lace, fine linen, paper, and ivory wares. It was formerly the principal port of France, and is now one of the most fashionable watering-places of that country. Dieppe is a favorite landing-place of English tourists visiting France. Pop. 19,946.

Di'es I'ræ, a Latin hymn written about the year 1250 by a Franciscan friar, Thomas da Celano, commencing—

"Dies Iræ, dies illa,
Solvet sæclum in favilla,
Teste David cum Sibylla."

Day of Wrath! On that dread day
In ashes earth shall pass away,
Attest the King's, the Sibyl's, lay.

The Western Church soon gave it a place in its offices as the "Sequence for the Dead," so called because in the Roman mass it is sung between the Epistle and the Gospel, following immediately after the Gradual Hymn, when that is sung. In an English form it has also been adopted into the hymn-books of the Church of England, and into the new Hymnal of the Protestant Episcopal Church of our country. It is chief among the "Seven great Hymns of the Mediæval Church," among which are "Jerusalem the Golden," "Come, Holy Ghost" (*Veni Sancte Spiritus*), etc. Of all these sacred lyrics none can compare in point of sublimity or touching pathos with the "Dies Iræ." For centuries it has been the favorite alike of Roman and Protestant Christendom. The most renowned of modern poets, composers, and divines have bent in admiration at its shrine, and multitudes have essayed in vain to transfer its force and beauty to their own language. (*Am. Ch. Rev.*)

The composition is evidently suggested by the words of Zephaniah, in the Vulgate: "*That Day, a Day of Wrath,* a day of trouble and distress, a day of wasteness and desolation, a day of darkness and gloominess, a day of clouds and thick darkness, a day of the trumpet and alarm against the fenced cities and against the high towers!" which the opening stanza, already quoted, coupled with the third stanza—

"Tuba mirum spargens sonum,
Per sepulcra regionum,
Coget omnes ante thronum"—

forcibly renders, though, with poetical license, the *last* trumpet "*scattering* a wondrous sound" through "earth's sepulchres," and "*compelling* all before the throne" for judgment, is substituted for the battle-trumpet which "alarms" the "fenced cities." The translations and versions of this hymn in modern languages are numbered by scores, perhaps by hundreds; but the Latin verse of the Franciscan monk, simple and easy as it appears at the first glance, has in it a secret force which baffles the ingenuity and skill of translators. "After a close scrutiny, we must confess (says the "Amer. Church Review") that the version of Dr. Irons (the one adopted in 'Hymns Ancient and Modern,' 'The People's Hymnal,' and our new Hymnal) expresses most clearly the language and force of the original. The second best (which many rank as *the best*) has an historic interest attached to it; for it was the work of our own Christian soldier and statesman, Major-General John A. Dix, now governor of the State of New York, while in command of Fortress Monroe during the war with the South. As when, in the early days of the Christian Church, the Vandal legions encompassed his beloved city and diocese of Hippo, the holy Augustine found time and opportunity to compose his immortal 'City of God,' so, in the darkest days of a cruel war, the rhythms of Thomas da Celano found a fitting exponent in the person of one who was alike true to his country and faithful to his God." (*Amer. Church Review*, April, 1873.) The third best English translation is, according to the same authority, one by Dr. Abraham Coles, an American who has made thirteen excellent versions. The words of the "Dies Iræ" constitute the principal subject of the music of the famous "Requiem" of Mozart, to which, from the circumstances under which it was composed, a mysterious interest is attached.

J. G. BARNARD, U. S. A.

Di'esis [Gr. δίεσις, a "gradation," from διά, "through," and ἵημι, to "send"], in music, an interval less than a comma. The harmonical diesis is the difference between the small and the great semitone, as from C to C sharp, and from C to D flat.

Dies'kau, von (Ludwig August), a German officer, born in 1701, entered the French service. He commanded a force which marched from Canada in 1755, and attacked Fort Edward in New York. Here he was wounded and taken prisoner by the British. Died near Paris Sept. 8, 1767.

Diest, a town of Belgium, in the province of South Brabant, on the river Demer, 17 miles N. E. of Louvain, is strongly fortified. It has manufactures of hosiery and woollen goods, and exports much good beer. It was taken by Marlborough in 1705. Pop. 7561.

Dies'terweg (Friedrich Adolph Wilhelm), an eminent German teacher and writer, born at Siegen Oct. 29, 1790. He taught in Berlin, and published numerous educational works. Died July 7, 1866.

Di'et [from the Gr. *δίαιτα*, "manner of living," "maintenance;" Lat. *dixta*], a term signifying in its popular sense the food and drink which are taken to maintain life. Originally, however, the term included all the conditions of living, such as clothing, shelter, and exercise. (See Food, by Edward Smith, M. D., LL.B., F. R. S., London.)

Di'et [Lat. *dixta;* from the Gr. *διαιτάω*, to "govern"], the name of the assembly of the German states, which, originating at a very remote period, was reconstituted by the emperor Charles IV. in 1356. The sessions were made permanent at Ratisbon in 1663, and were removed to Frankfort by the Confederation of the Rhine in 1806.

Dietary, Military. See Subsistence of Armies.

Diet'erichs (Joachim Friedrich Christian), a German veterinary surgeon and writer, born at Stendal in 1792. He published, besides several professional works, a treatise "On the Education of Horses" (1825) and a "Manual of the Practical Knowledge of Horses" (1834).

Dieteri'ci (Karl Friedrich Wilhelm), a Prussian political economist, born in Berlin Aug. 23, 1790. He became professor of political economy at Berlin in 1834, director of the national bureau of statistics in 1844, and member of the Berlin Academy. He published, besides other works, "Public Welfare in the Prussian States" (1846) and "Manual of the Statistics of the Prussian State," continued by his son (1858–61). Died July 29, 1859.—His son, Friedrich Dieterici, has published an Arabic grammar and edited Arabic writings. He was born July 6, 1821, and became professor at Berlin in 1850.

Dietet'ics [from the Gr. *δίαιτα*, "manner of living"], that branch of medicine which treats of food and drink. In a wider sense it may treat of the recovery or maintenance of health by means of correct habits with regard to eating, drinking, exercise, the wearing of proper clothes, etc. (See Hygiene, by Prof. Henry Hartshorne.)

Die'trich, or **Dietricy** (Christian Wilhelm Ernst), a German painter and engraver, born at Weimar Oct. 30, 1712. Among his works is an "Adoration of the Magi." Died April 24, 1774. (See monograph on his works, in German, by J. F. Linck, Berlin, 8vo, 1846.)

Dieu et mon Droit [Fr.], ("God and my right"), the motto of the royal arms of England. It was the parole given by Richard I. at the battle of Gisors in 1198, and was assumed by him and his successors, but it did not appear on the broad seal until the time of Henry VIII. Queen Anne substituted "Semper eadem" for the old motto, but the latter was restored by George I.

Diez (Friedrich Christian), Ph. D., a German philologist, was born at Giessen Mar. 15, 1794. He was appointed professor of modern literature at Bonn in 1830. He published "The Life and Works of the Troubadours" (1829), a "Grammar of the Romance Languages" (1842; entirely new ed., 3 vols., 1850–60), and an "Etymological Dictionary of the Romance Languages" (1853; 3d ed. 1869).

Dif'ference [Lat. *differentia*, from *dif* (for *dis*), "apart," and *fero*, to "bear"], in arithmetic and algebra, is the excess of one quantity over another, or the result of the operation of subtraction.

Difference, in logic, is that quality which distinguishes the species from its genus, and is said logically to be part of the essence of the object; *e. g.* to the genus "animal" add the difference "having the power of articulate speech," and we obtain the species "man"—a species distinguished from all other animals by that peculiarity.

Diff'erence Engine, the name given to calculating-machines which operate by the method of differences. Such are the calculating-machines of Babbage and Scheutz. (See Calculating-Machines.)

Differences, Method of, in algebra, a method of finding any distant term of a series, or the sum of a definite number of terms, by means of the differences between the initial terms, the differences of their differences, and so on. A *first order of differences* is found by taking each term of the series from the next term following. Thus, if the series be a, b, c, d, etc., the first order of differences is $b-a$, $c-b$, $d-c$, etc.; and the *first* of these $(b-a)$ may be indicated by d_1. The *second order of differences* will be found by taking each first difference from the next following first difference, and the *first* of the second differences may be indicated by d_2. In like manner are found d_3, d_4, etc. If the law of the series be expressed by a formula in which the indices of the powers of the variable are integral, or which is capable of being transformed into such an one, the differences of the order denoted by the highest power of the variable will be equal, and those of higher orders will be zero. Thus, if this highest power be the m^{th}, there will be m orders of differences. Then, putting T for the n^{th} term after the first, or the $(n+1)^{\text{th}}$ of the series,

$$T = a + nd_1 + \frac{n(n-1)}{1.2}d_2 + \frac{n(n-1)(n-2)}{1.2.3}d_3 \ldots\ldots + \frac{n(n-1)\ldots\ldots(n-m+1)}{1.2.3\ldots\ldots m}dm.$$

To find the sum of n terms of the given series, a, b, c, d, etc., prefix zero to this series, and form a new series, of which each succeeding term shall be the sum of all the terms of the given series up to the term of the same name; as 0, a, $a+b$, $a+b+c$, etc. It is evident that the terms a, b, c, d, etc. of the given series form the first order of differences of the new; the first order of differences of the given series, the second order of the new, and so on. The $(n+1)^{\text{th}}$ term of this new series will therefore be the sum of n terms of the given series; and representing this sum by S, we shall have,

$$S = na + \frac{n(n-1)}{1.2}d_1 + \frac{n(n-1)(n-2)}{1.2.3}d_2 \ldots\ldots + \frac{n(n-1)\ldots\ldots(n-m)}{1.2.3\ldots\ldots(m+1)}dm.$$

F. A. P. Barnard.

Differen'tial, a term belonging to mathematical analysis. When a variable quantity, as x, is taken in two states indefinitely near to each other, as x and $x+h$, the infinitely small difference, h, is called the differential of the variable, and is written in analysis, dx. If the given quantity is not x itself, but a function of x, say $F(x)$, then, when x becomes $x+h$, $F(x)$ becomes $F(x+h)$, and the differential is $F(x+h)-F(x)$, which may be written $F'(x,h)$. The analytic method which is founded on differentials is called the differential calculus. (See Calculus.)

Differential Calculus. See Calculus, by Gen. J. G. Barnard, U. S. A.

Differen'tial Coeffic'ient, in the calculus, is the value of $F'(x,h)$ as defined in the last article, divided by $h=dx$, the differential of the variable. Putting u for $F(x)$, and u' for $F(x+h)$, then the differential of $F(x)$, which is $F(x+h)-F(x)=u'-u$, and is written du. Hence, $\frac{du}{dx}=\frac{F'(x,h)}{h}$ is the only quite general expression for the differential coefficient of a function. But if the function is purely algebraic, more explicit forms may be found. Thus, let $F(x)=x^m$. And in the expression for the differential of $F(x)$, viz. $du=F(x+h)-F(x)=(x+h)^m-x^m$, develop the first expression, and we shall have, $du=x^m+mx^{m-1}, h+m.\frac{m-1}{2}x^{m-2}, h^2+\ldots\ldots h^m-x^m$.

Substituting dx for h, and then dividing by the same, *i. e.* dx, there results,

$$\frac{du}{dx}=m.x^{m-1}+m.\frac{m-1}{2}x^{m-2}dx+m.\frac{m-1}{2}\cdot\frac{m-2}{3}x^{m-3}dx^2+\ldots\ldots dx^{m-1};$$

in which all the terms multiplied by the infinitely small factor dx and its powers are of no appreciable value compared with mx^{m-1}, the first term. Consequently, $\frac{du}{dx}=mx^{m-1}$, or the differential coefficient of any power of a single variable, is found by multiplying the given expression by the exponent of the power, and then diminishing this exponent by unity. The differential coefficient of an algebraic function consisting of more terms than one is the sum of the differential coefficients of the several terms. The differential coefficient of any algebraic function is identical with the *derivative* of that function. (See Derived Function.) F. A. P. Barnard.

Differen'tial Resol'vent, a certain linear differential equation of the $(n-1)^{\text{th}}$ order which is satisfied by each of the roots of an equation of the n^{th} degree, whose coefficients are functions of a single parameter.

Differen'tial Thermom'eter is a thermometer for indicating very slight variations of temperature. The instrument as here described was invented by Sir John Les-

lie. It consists of two glass bulbs connected by a narrow tube, which is usually bent in the form of a U. The bulbs are uppermost, and are filled with air, while the tube contains a column of mercury or sulphuric acid. The measurement is effected by the expansion of the air in one of the bulbs. This instrument is far more sensitive than mercurial and most other thermometers, owing to the greater expansive power of gases. It is estimated that a change not greater than the 6000th part of a degree Fahrenheit can be indicated by it. The differential thermometer has of late in a great measure been superseded for delicate measurements of temperature by the THERMOPILE (which see).

Differentia'tion is the operation in mathematics by which the differential of a function is determined. The allied operation, which leads to the determination of the derived function (or differential coefficient), is usually termed derivation. The partial differentiation of a function of two or more independent variables is the differentiation of that function, on the hypothesis that one only of these variables suffers change. "Finite differentiation" is the operation by which the difference of a function corresponding to a finite difference of the variable is determined. The term is also used to denote the process of development in plants and animals from simple to complex organizations.

Diffrac'tion [from the Lat. *dif* (for *dis*), "apart," and *frango, fractum*, to "break"], in optics, a deviation or deflection which the rays of light undergo in passing very near any opaque body. It had been observed by Grimaldi, but Newton first explained its cause. Let a beam of solar light, reflected horizontally, be admitted into a dark chamber through a small round hole, and received on a white screen. If the hole have a sensible diameter, the image of the sun on the screen will suffer no sensible alteration of color; but if we place in the axis of the beam, and at a distance of five or six feet from the hole through which it is admitted, a metallic plate having a very fine puncture, and intercepting all other light than that which passes through the puncture, the appearance on the wall will be surrounded with several concentric colored rings, covering a space far exceeding in extent that which the solar beam would have occupied if its rays had followed their rectilinear direction. By substituting a very narrow slit for the puncture in the plate, or several punctures or slits close to each other, very beautiful phenomena are produced. (See OPTICS.)

Diffusion of Gases. See GAS.

Diffusion of Useful Knowledge, Society for, was organized in London in 1827.

Digam'ma [Gr. δίγαμμα, "double gamma," from δι, for δίς, "double," and γάμμα, "gamma" (the third letter (Γ) in the Greek alphabet), so called from its shape (Ϝ)], an ancient aspirate or consonantal Greek letter, chiefly found in the Æolic dialect. It does not occur in extant literature, various substitutes having been employed for it, but its form and name have been preserved by the scholiasts. In many instances it disappeared altogether from the words where it was anciently employed; in others it became β, φ, υ, or ο, or took the form of a simple rough breathing. In Latin and in the Teutonic languages we find abundant traces of the Greek digamma. Thus, the old Æolic pronoun Ϝοι (the Attic οἵ) is the Latin *qui;* the Latin name for the city *Velia* is given in the Greek as Ὑέλη, Βέλεα, and Ἕλεα; the Greek οἶκος is the Latin *vicus;* οἶνος is *vinum;* and the digamma lost from the Greek ναῦς reappears in the Latin *navis*. The digamma is not found in the Homeric writings, but its influence is perceptible in the metre, as was first shown by Bentley. The Æolians called the digamma Fau (the Hebrew Vau), and it was used in Bœotian monumental inscriptions as late as 200 B. C. (See HEYNE, "Homer's Iliad" (1802), HERMANN'S "Review of Heyne" (1803), BOECKH, "On the Versification of Pindar" (1809), and the Greek grammars of BUTTMANN, KÜHNER, and VALPY.)

Dig'by, a county in the W. of Nova Scotia, bordering on the Atlantic. The surface is hilly. Copper is found here. Capital, Digby. Pop. in 1871, 17,037.

Digby, a seaport-town, capital of the above county, is on the Bay of Fundy and on Digby Neck, about 110 miles W. of Halifax. It is the seat of an academy. Mackerel and herrings of good quality are exported from this place. Shipbuilding and the lumber-trade are largely carried on. Pop. about 1300.

Digby (GEORGE), earl of Bristol, an English royalist noted for his instability and inconsistency in politics, was born in Madrid in 1612. Having been exiled during the civil war, he went to France and became a Catholic. He returned home in 1660, and rashly impeached Lord Clarendon in 1663. He was the author of "Elvira," a comedy. Died Mar. 20, 1677.

Digby (Sir KENELM), F. R. S., a learned English author, a son of SIR EVERARD (born in 1581, and executed Jan. 30, 1606, for abetting the Gunpowder Plot), was born June 11, 1603. He was a gentleman of the bedchamber at the court of Charles I., and was a royalist in the civil war. In 1636 he was converted to the Catholic Church. He passed much time in France, and was an associate of Descartes. His wife was Venetia Anastasia Stanley, a well-known beauty. He wrote, besides other works, a "Treatise on the Nature of Bodies" (1644), "The Body and Soul of Man," "Chemical Secrets," a famous treatise on sympathetic cures, and "Private Memoirs of Sir Kenelm Digby" (1827). Died in London June 11, 1665.

Digby (KENELM HENRY), M. P., was born in Ireland in 1800, was educated at Cambridge, and, having become a Roman Catholic, devoted himself to scholastic theology and mediæval antiquities. He published "The Broad Stone of Honor" (1829), "Mores Catholici" (1840), "Compitum" (1851), and other works, which have many warm admirers, and are imbued by the nobler characteristics of Middle Age thought.

Digest, in legal terminology, is a condensation or systematic arrangement of laws, statutes, or decisions. The name is sometimes applied to the Pandects of Justinian.

Digester, Papin's [named from Denis Papin, a French savant, who invented it in 1681], an invention by which bodies may be subjected to the action of high-pressure steam or water raised above its ordinary boiling temperature to 400° F., and sometimes higher. The digester is a strong boiler made of copper or iron, with a tightly-adjusted cover furnished with a safety-valve. It has the power of dissolving even bones, and has been employed in France to a considerable extent in preparing soup from bones.

Diges'tion [Lat. *digestio*, from *di* (for *dis*), "apart," and *gero, gestum*, to "carry" (*digero*, the compound verb, often means to "distribute," to "dissolve"); Ger. *Verdauung*], a physiological process observable in all animals (with the exception of certain entozoa, which appear to have this work performed by proxy), and which constitutes one of the distinguishing marks of the animal kingdom. It is believed that vegetables absorb their nourishment without any process analogous to digestion; while it is regarded as certain that every animal requires to have its food undergo digestion—that is, a mechanical and chemical change, effected by the agency of the animal economy, preparatory to absorption and conversion into nutritive material. This process, in man and the higher animals, seems to commence before the food is swallowed. During mastication the saliva becomes mixed with the food, and immediately begins to convert the starchy parts into grape-sugar, a step preliminary to its absorption into the blood. This process is further carried on by the other secretions of the alimentary canal; and the sugar thus produced, together with that eaten in the form of sugar, is absorbed by the mucous membranes, and passes directly into the blood without change, except that cane-sugar and milk-sugar are changed (probably for the most part in the intestines) into grape-sugar before absorption.

The action of the stomach upon food is partly mechanical, partly solvent, and partly chemical. The chemical action is to some extent catalytic—*i. e.* not explicable by ordinary theories of chemical reaction. The gastric juice, the principal secretion of the stomach, contains two active elements—free acid (chiefly lactic acid) and pepsin. The most important part of their action is the solution of the nitrogenous parts of the food, and their conversion into albuminose (peptone). The albuminose is absorbed by the coats of the stomach, and passes directly into the portal circulation, while the sugar, much of the starch, and probably all of the fat, pass on to be subjected to the action of the pancreatic juice, the bile, and the intestinal fluids. The pancreatic juice has the power of digesting fats by converting them into a fine emulsion, which is absorbed to some extent by the veins, but principally by the lacteals. It also converts cane-sugar and starch into grape-sugar, which is rapidly absorbed by the intestinal veins. The pancreatic juice probably completes the digestion of such albuminous matters as have escaped digestion in the stomach, being assisted in this work by the intestinal secretion. The bile is believed to be auxiliary to the other secretions in the intestinal digestion, but its part in the process is by no means well ascertained. C. W. GREENE.

Digges, an English family, several members of which attained note as scholars and writers.—LEONARD, born at Barham, was educated at Oxford, and died about 1573. He wrote "Tectonicon: Measuring of Land," etc. (1556), an arithmetic, and a military treatise entitled "Stratonicos," which was enlarged by his son THOMAS (died 1596), who edited his father's works and published "Celestial Orbs," "Pantometria," a geometrical work, etc.—SIR DUDLEY, son of

the last named (1583–1639), was the author of "Right and Privileges of the Subject" (1642) and the "Compleat Ambassador" (1655).—His son DUDLEY published "Unlawfulness of Subjects Taking up Arms against their Sovereign" (1643). Died in 1642.

Digh'ton, a township and post-village of Bristol co., Mass., on the Old Colony and Newport R. R., 6 miles S. of Taunton. It gives its name to the Dighton Rock, a stone bearing a rude inscription, which has been by some attributed to the Northmen. This rock is in the adjoining town of Berkley. Dighton has important fisheries, and manufactures of cotton, shoddy, paper, white lead, and iron. It has seven churches, and is extensively engaged in the raising of strawberries. Pop. 1817.

Dig'it [Fr. *doigt*, from the Lat. *digitus*, a "finger"], in arithmetic, one of the ten symbols, 0, 1, 2, 3, etc., by which all numbers are expressed. In astronomy the term is used in speaking of eclipses to denote the twelfth part of the diameter of the sun or moon. Thus the eclipse is said to be of ten digits if ten parts of twelve of the disk are concealed. It is also a measure of dimension equal to the breadth of a finger, and estimated at about three-fourths of an inch.

Digita'lis [from the Lat. *digitale*, the "finger of a glove;" Fr. *digitale;* Ger. *Fingerhut*], a genus of plants belonging to the order Scrophulariaceæ. With the exception of the common foxglove (*Digitalis purpurea*), which is a native of Great Britain, the species are mostly found in Southern Europe and different parts of Asia. *Digitalis purpurea* has narcotic and poisonous leaves and seeds, which are valued for their medicinal properties. The fresh leaves are cathartic and emetic, and when dried are administered in diseases of the heart, brain, and nervous system, in which they act as a powerful sedative. They contain a crystalline principle called digitalin. Several of the species are cultivated in gardens.

Dig'itate [Lat. *digitatus*, from *digitus*, a "finger"], a botanical term applied to compound leaves, the leaflets of which are all borne on the apex or tip of the petiole, as the clover and horse-chestnut. Such leaves are also called *palmate*.

Digitigra'da, or **Dig'itigrades** [from the Lat. *digitus*, a "finger," and *gradior*, to "walk"], a term applied to those carnivorous quadrupeds that walk on their toes. A group of Carnivora is so called in the system of Cuvier. Among the Digitigrada are included the cat, the dog, the hyæna, weasel, etc.

Digna'no, a town in Austria, province of Triest, in a fertile region. Pop. 6405.

Digne (anc. *Dinia*), a town of France, capital of the department of Basses-Alpes, on the river Bléone, 60 miles N. E. of Marseilles. It has a cathedral, a public library, and several tanneries; also a trade in almonds, prunes, grain, honey, wax, and hemp. It has given title to a bishop since 340 A. D. Pop. 7002.

Dig'nitary [from the Lat. *dignitas*, "dignity" or "worth"]. In the canon law, this term signified originally an ecclesiastic of higher rank than an ordinary priest. To this class exclusively belonged all bishops, deans, and archdeacons, but it now includes also prebendaries and canons. Any officer of high rank may be called a dignitary.

Digres'sion [Lat. *digressio*, a "stepping aside," from *di*, "apart," and *gradior, gressus*, to "go," to "step"], the act of deviating or wandering from the main subject or argument in writing or oral discourse; in astronomy, the apparent distance of the inferior planets, Mercury and Venus, from the sun. Mercury is never seen at a greater distance than about 28° from the sun; this is called its greatest digression.

Dihong', also called **Sanpoo',** a large river of Asia, rises on the N. side of the Himalayas, traverses part of Thibet, and bursts through that mountain-chain near lat. 28° 15′ N. It unites with another river to form the Brahmapootra.

Dijon (anc. *Dibio*), a handsome town of France, capital of the department of Côte-d'Or, is delightfully situated in a plain on the river Ouche, about 175 miles S. E. of Paris and 120 miles N. of Lyons, with both of which it is connected by a railway. Its environs are remarkably beautiful. Dijon was formerly the capital of Burgundy. It is well built, has spacious and clean streets, and is enclosed by ramparts. Among the principal public edifices are the palace of the princes of Condé; the cathedral, a Gothic structure founded in the thirteenth century; the noble Gothic church of Notre Dame; a theatre and town-hall. Dijon has a large public library, a botanic garden, and an *académie universitaire;* also manufactures of woollen cloth, blankets, hosiery, chemical products, and cotton fabrics. Its prosperity is largely derived from the trade in Burgundy wines. Pop. 39,193.

Dike [Dutch, *dyk;* Ger. *Deich;* Fr. *digue* or *levée*], an embankment or mound erected on the shore of the sea or of a river in order to prevent inundation. Such embankments raised along the Mississippi River are called levées. The coasts of Holland are protected against the encroachments of the sea by dikes constructed on a grand scale and in a systematic manner. A large part of that country is so low that it would be overflowed by the sea during high tides if it were not protected, partly by natural sandhills or dunes and partly by artificial dikes. The latter are also raised on the banks of the Rhine, Waal, and other rivers near their mouths. The dikes are broad at the base, and are usually of such magnitude that there is room on the top for a public road. The fabric is strengthened by willows, either growing or interwoven as wicker-work on the sides of the dike, which should present a very gradual slope towards the sea or river. The *Ammophila* and other creeping grasses are carefully cultivated on some of the dykes, and contribute much to their security. The base is often faced with masonry, and protected by vast heaps of stones (usually brought from Norway), and by rows of piles projecting six or seven feet above ground, connected by timber, and filled in with fascines weighted with stones. The most stupendous of these embankments are the dykes of the Helder and of West Kappel, at the W. extremity of the island of Walcheren. The term dike, as the equivalent of the Fr. *digue*, is also applicable to BREAKWATERS, JETTIES (which see), and also the stupendous *dams* of Holland constructed for engineering purposes, the most remarkable of which is the recent work by which the Y is isolated from the Zuyder Zee (see CANAL), and also that by which one of the outlets of the Maas has been obstructed. (See "Prof. Papers Corps of Engineers," No. 22.)

REVISED BY J. G. BARNARD, U. S. A.

Dilapida'tion [Lat. *dilapidatio*, from *di* (for *dis*), "apart," and *lapis* (gen. *lapidis*), a "stone"], originally the falling apart of the stones in a building, is used in ecclesiastical law where an incumbent of a benefice suffers the parsonage-house or outhouses to fall down or decay for the want of necessary repairs, or commits any wilful waste of the inheritance of the Church.

Dilem'ma [Gr. δίλημμα, from δί (for δίς), "twice," "double," and the verbal noun λῆμμα, an "assumption," from λαμβάνω, to "take;" Lat. *dilemma*] is a syllogism with a conditional premiss, used to prove the absurdity or falsehood of some assertion. A conditional proposition is assumed, of which the antecedent is the assertion to be disproved, and the consequent is a disjunctive proposition setting forth the supposition on which the assertion can be true. If the supposition be denied, the assertion must also be denied. Thus, if A is B, either C is D or E is F; but C is not D, and E is not F; therefore A is not B. The dilemma was called the *syllogismus cornutus* ("horned syllogism"), the two members of the consequent being the "horns of the dilemma," on which the adversary is caught. Since there may be more than two horns to the dilemma (giving us a trilemma, tetralemma, or polylemma), Hamilton proposes the term hypothetica-disjunctive.

Dilettan'te [from the Lat. *diligo, dilectum*, to "love"], an Italian term naturalized in England, France, and Germany, was originally synonymous with an *amateur* or lover of the fine arts. It is sometimes applied to a person who pursues an art without serious purpose or for mere amusement, and is often used as a term of reproach for one whose knowledge is superficial and affected.

Dilettan'ti Soci'ety, The, was established in Great Britain in 1760 to encourage a taste for the fine arts. They sent an expedition to the East in 1764, and published in 1769 the first part of the "Ionian Antiquities," the third part of which appeared in 1840. Chandler's "Travels in Asia Minor" came out in 1775, and his "Travels in Greece" in 1776. The "Unedited Antiquities of Attica" appeared in 1817, and "Antique Sculpture" in 1835. The society consists of fifty members.

Diligence [a Fr. word signifying "diligence," "speed," "promptness"], a four-wheeled public vehicle used in Europe. The French diligence is very strongly built, and drawn by four or six horses at the rate of six miles an hour. The front, called the *coupé*, holds three persons, the second compartment (the *intérieur*) six, and the *rotonde*, entered from behind, also holds six. Diligences are also used in Germany, Italy, Spain, and Russia; the German diligence (Eilwagen and Postwagen) is attached to the post-office. Diligences are much less used than formerly, owing to the facilities of railway travel.

Dilke (CHARLES WENTWORTH), an English editor, born Dec. 8, 1789. He purchased in 1830 "The Athenæum,"

which he edited with ability and success until 1846. He was afterwards editor of the "Daily News," a liberal journal. Died in 1864.

Dilke (Sir Charles Wentworth), Bart., an English republican politician, is the grandson of the preceding, and son of Sir Charles Wentworth Dilke, M. P., editor of the "Athenæum," who was actively connected with the exhibitions of 1851 and 1862. He was born Sept. 4, 1843, educated at Cambridge, and called to the bar in 1866. He travelled through the U. S., and on his return published "Greater Britain, a Record of Travel in English-Speaking Countries during 1866–67" (1868), which speedily passed through several editions, and procured the author's election to Parliament for Chelsea. He is a recognized leader of the republicans in England. He is the proprietor and editor of the "Athenæum."

Dill, a plant of the order Umbelliferæ, having compound umbels, yellow involute petals, dorsally compressed lenticular fruit, and the border of the calyx minute and five-toothed. The common dill (*Anethum graveolens*), an annual or biennial plant, is a native of Southern Europe and Asia, and has long been cultivated for its stimulant and carminative seeds. It is also highly aromatic, and the leaves are used to flavor sauces, etc. Dill-seed is administered in the form of dill-water, obtained from oil of dill, a pale-yellow essential oil. The fruit of the *Anethum Sowa*, which grows in the East Indies, is used for flavoring and medicine.

Dil'lard's, a township of Etowah co., Ala. Pop. 962.

Dil'len [Lat. *Dillenius*], (Johann Jakob), M. D., a German botanist, born at Darmstadt in 1687. In 1721 he removed to London, where he edited Ray's "Synopsis of Plants" (1724). He obtained in 1728 the chair of botany founded by Sherard at Oxford. He published "Hortus Elthamensis" (1732) and a good "History of Mosses" (1741). Died April 2, 1747.

Dillenia'ceæ [from *Dillenia*, one of its genera, named after the above], a natural order of plants containing about 200 species, allied to the Ranunculaceæ and Magnoliaceæ. They are mostly trees or shrubs, and natives of tropical countries. They have thick, leathery leaves, without stipules, and generally alternate; flowers sometimes in racemes, sometimes solitary, with five persistent sepals and five deciduous petals; numerous stamens; fruit consisting of two to five carpels, and the seeds have an aril. They are generally astringent, and several species are valued as medicine, while others are excellent as timber. Many of the Dillenias are conspicuous for the beauty of their flower and foliage.

Dil'lingen, a town of Bavaria, in the circle of Suabia, on the Danube, 24 miles N. W. of Augsburg. It is enclosed by old walls, has a palace, three Catholic churches, a gymnasium, and a Catholic institution for deaf and dumb girls, with which is also connected, since 1869, an institution for cretins. The university, which was established in 1554, and was a chief seat of the Jesuits, was suppressed in 1809. The town has also manufactures of cutlery. Pop. 5220.

Dil'lingham (Paul) was born in Shutesbury, Mass., in 1800, removed with his father to Waterbury, Vt., in 1805, was admitted to the bar in 1824, was a member of Congress (1843–47), and was governor of Vermont (1865–67).

Dill'mann (Christian Friedrich August), a German theologian and Orientalist, born in 1823, became professor of exegetical theology at Tübingen in 1853, of Oriental languages at Kiel in 1854, of exegetical theology at Giessen in 1861, and at Berlin in 1869. He chiefly distinguished himself by his works on the Ethiopic language, among the most important of which are "Grammatik der Æthiopischen Sprache" (1857), "Chrestomathia Æthiopica" (1866), "Lexicon linguæ Æthiopicæ" (3 parts, 1862–65), an edition of the old Ethiopic version of the Bible (1855–73) and of the apocryphal book of Enoch (1851), and author of the able article on the Ethiopic Language in the present work.

Dil'lon, a post-village of Bolton township, Brome co., Quebec (Canada), has important copper-mines. Pop. about 400.

Dillon, a township of Klamath co., Cal. Pop. exclusive of Indians, 79.

Dillon, a post-township of Tazewell co., Ill. P. 1126.

Dillon (John B.), an American author, born in Brooke co., Va., about 1807. His parents removed to Ohio in his infancy. He became a printer in his youth, and contributed poetical articles to various journals. In 1834 he removed to Indiana, where he became well known as a lawyer, a writer, and a friend of education. He published "Historical Notes" (1842) and a "History of Indiana" (1859).

Dillon, Viscounts (Ireland, 1622).—Theobald Dominick Geoffrey Dillon Lee, fifteenth viscount, born April 5, 1811, succeeded his brother in 1865.

Dills'burg, a post-borough of York co., Pa. Pop. 281.

Dilman', a town of Persia, in the province of Azerbijan, 50 miles N. N. W. of Ooroomeeyah. It is about 4 miles E. of an old ruined town of the same name. It is surrounded by gardens and orchards. Pop. about 15,000.

Dilu'vial [from the Lat. *diluvium*, a "deluge"], a geological term applied to deposits that are the result of a flood, or accumulations of gravel and angular stones which have been produced by a sudden and extraordinary rush of water.

Dilu'vium, a Latin word signifying Deluge (which see). This term was applied by the older geologists to certain gravels and comparatively recent deposits which appear to be the result of a deluge, in order to distinguish them from the fine sand and mud which is washed down by rivers, and is called *alluvium*. The term diluvium is now chiefly used to designate the gravels of one geological period—namely, that of the boulder clay.

Di'ma, a large town of Abyssinia, in Amhara, 150 miles S. E. of Gondar. It has a large church and many stone houses.

Di'man (Rev. Jeremiah Lewis), D. D., was born at Bristol, R. I., May 1, 1831, graduated at Brown University, 1851, and at Andover Theological Seminary, 1856, spending in the mean time two years in study abroad. He was settled over the First Congregational church in Fall River, Mass., in 1856, and over the Harvard church in Brookline, Mass., in 1860. In 1864 he was elected professor of history and political economy in Brown University. He has published numerous addresses and articles in the leading reviews, and takes high rank as an accomplished scholar and orator.

Dime [from the Fr. *disme*, the "tenth part," a "tithe" (from the Lat. *decimus*, "tenth")], a silver coin of the U. S. equivalent to ten cents or one-tenth of a dollar. It was formerly written *disme*.

Dimen'sion [Lat. *dimensio*, from *di*, "apart," and *metior, mensus*, to "measure"], measure in a single line, extension. Dimensions, in the plural, signifies length, breadth, and thickness. In geometry, a line, whether straight or curved, has only one dimension—namely, length; a surface has two—length and breadth; and a solid has three dimensions—length, breadth, and thickness. In algebra, the term dimension is applied in nearly the same sense as *degree*, to express the number of literal factors that enter into a term.

Dim'ick (Justin), an American officer, born Aug. 5, 1800, in Connecticut, graduated at West Point in 1819; colonel First Artillery Oct. 26, 1861. He served chiefly at seaboard posts 1819–59; at the Military Academy 1822; on ordnance duty 1834–35; in Florida war 1836 (brevet major), where he killed two Seminole savages in personal encounter; in suppressing Canada border disturbances 1838–39; in military occupation of Texas 1845–46; in the war with Mexico 1846–48, engaged at Palo Alto, Resaca de la Palma, La Hoya, Contreras, and Churubusco (brevet lieutenant-colonel), Chapultepec (brevet colonel), and the city of Mexico; in the Florida hostilities 1849–50 and 1856–57; on the Western frontier 1859; in command of the artillery school for practice 1859–61; in charge of Fort Warren dépôt of prisoners 1861–64; and governor of "Soldiers' Home," near Washington, 1864–68. Brevet brigadier-general U. S. A. Mar. 13, 1865, for long, gallant, and faithful services to his country, and retired from active service Aug. 1, 1863. Died Oct. 13, 1871, at Philadelphia, Pa., aged 71. George W. Cullum, U. S. A.

Dimid'iate [from the Lat. *dimidius*, "half," from *di*, "through," and *medium*, the "middle"], divided into halves. In botany, a leaf which has only one side developed, and a stamen which has only one lobe, are called *dimidiate*.

Diminuen'do [the It. gerund of *diminuire*, to "diminish"], the same as Decrescendo (which see).

Diminu'tion [Lat. *diminutio*, from *minuo, minutum*, to "lessen"], the act of making or becoming less; decrease; in architecture, the gradual decrease in the diameter of a column from the base to the upper end. In heraldry, the word diminutions is sometimes used for differences, marks of cadency, and brisures indifferently.

Dimin'utive [Lat. *diminutivus*, from *di*, intensive, and *minuo*, to "lessen;" Fr. *diminutif;* It. *diminutivo*], a term applied to a derivative word, formed by the addition of one or more syllables in such a way as to soften its meaning or diminish its original force. All languages are susceptible of diminutives, but the Italian surpasses all others, both ancient and modern, in this respect.

Dim'ity [from Damietta in Egypt, where it was formerly manufactured], a cotton fabric of thick texture, and generally figured or striped. It was formerly much used for bed-hangings and window-curtains. The figure or stripe is raised on one side and depressed on the other, so that the two faces present reversed patterns.

Dim'mick, a township of La Salle co., Ill. Pop. 1222.

Dim'ock, a post-township of Susquehanna co., Pa. Pop. 1124.

Dimor'phism [from the Gr. δίς, "twice" or "two," and μορφή, a "form"], the property of assuming two distinct crystalline forms. (See DIMORPHOUS.)

Dimor'phous, a term applied to a body which has the property of crystallizing in two distinct forms, as, for example, sulphur and some other solids. Sulphur, as found crystallized, naturally presents itself in crystals of the form of octahedra with a rhombic base, and thus belongs to the prismatic system; but when sulphur is heated to fusion, and then slowly cooled, prismatic crystals are obtained which belong to the oblique system. The latter form of sulphur is not permanent. Carbon affords another example of dimorphism.

Di'naburg, a strongly fortified town of Russia, is in the government of Vitebsk, on the river Düna, where it is crossed by the railway from Warsaw to St. Petersburg, about 120 miles S. E. of Riga. Another railway connects Dinaburg with Riga. It is an important military position, and has an active trade. Pop. in 1869, 29,613.

Dinagepoor', a district of British India, province of Bengal, has an area of 3820 square miles. The surface is nearly level. Rice is the staple product of the soil. Pop. in 1872, 1,501,924.

Dinagepoor, a city of India, the capital of the above district, 250 miles N. of Calcutta. It is meanly built. Pop. about 30,000.

Dinan, an old town of France, department of Côtes-du-Nord, on the river Rance, 30 miles N. W. of Rennes. It stands on a hill of granite about 250 feet above the river, is enclosed by walls and defended by a castle. It has a handsome cathedral, a public library, a college, and a town-hall. Here are manufactures of linen and cotton fabrics, sailcloth, hats, beet-root sugar, etc. The Rance is navigable from its mouth to Dinan. Pop. 8510.

Dinant' [Lat. *Dinantium*], a town of Belgium, province of Namur, is on the river Meuse, 15 miles S. of Namur. It is on the declivity of a rocky hill, and is surrounded by picturesque scenery. It has a Gothic cathedral, a town-house, and two hospitals; also manufactures of cutlery, paper, woollen goods, hats, and leather. Dinant was founded in the sixth century, was strongly fortified as early as the twelfth century, and has suffered much from sieges. Pop. 7208.

Dinapoor', a town and important military station of British India, province of Bengal, on the right bank of the Ganges, about 12 miles above Patna. Here are spacious barracks, and about 3200 houses, mostly of mud.

Dinar'ic Alps [Lat. *Alpes Dinaricæ*], the portion of the Alpine system which connects the Julian Alps with the western ranges of the Balkan, and occupies part of Croatia, Dalmatia, and Herzegovina. The highest summits are Mount Dinara and Mount Prolok, the former of which rises about 6000 feet above the sea. The rocks of this range are mostly limestone.

Dindigul', a town of India, in the British district of Madura and presidency of Madras, 259 miles S. W. of the city of Madras. Here is a fort on a naked steep rock which rises 280 feet. Pop. 9000.

Din'dorf (WILHELM), a German philologist, born at Leipsic Jan. 21, 1802. He became professor of history and literature in Leipsic in 1828, but resigned in 1833 in order to devote himself to the publication of a new edition of the "Thesaurus" of Stephanus, which his brother Ludwig Dindorf and Hase had begun in Paris. He also wrote commentaries on Æschylus, Sophocles, and Euripides, and prepared an edition of Demosthenes for the University of Oxford (1849).

Ding'elstedt, von (FRANZ), a German poet, born at Halsdorf, in Hesse, Jan. 30, 1814. He wrote popular political poems entitled "Songs of a Cosmopolitan Night-Watch" (1840). He was appointed librarian to the king at Stuttgart in 1843, intendant of the royal theatre of Munich in 1850, director of the court opera at Vienna in 1867, and director of the burg theatre of Vienna in 1871. Among his works are "The House of Barneveldt," a tragedy (1850), and a poem called "Night and Morning" (1851).

Ding'man, a township of Pike co., Pa. Pop. 519.

Din'go, an Australian dog, supposed to be a distinct species by some naturalists. It is sometimes found domesticated. The wild dingo is somewhat larger than a shepherd's dog, of a tawny color, with a large head, ears short and erect, and tail bushy. In its wild state it does not bark.

Dingo.

Dinich'thys [Gr. δεινός, "terrible," and ἰχθύς, "fish"], a remarkable placoderm fish found in the upper Devonian rocks of Ohio, and described by Prof. Newberry. It was allied to *Coccosteus,* but was very much larger; the head was three feet in length, the lower jaws two feet long and very massive, the central dorsal shield two feet in diameter, etc. One species was without proper teeth, but the jaws played on each other like huge shears.

Dink'elsbühl, a walled town of Bavaria, district of Middle Franconia, on the river Wernitz, 44 miles S. W. of Nuremberg, was formerly a free city of the empire. It has a Latin school, and manufactures of hosiery, coarse linen, paper, gloves, etc. Pop. in 1871, 5213.

Dinor'nis [from the Gr. δεινός, "terrible," and ὄρνις, a "bird"], an extinct genus of gigantic birds of the tribe

Dinornis (restored).

Brevipennes, of which the bones have been found in the most recent deposits of New Zealand. In the traditions of that country these birds are known by the name of moa. They are said to have been much esteemed, both

for their flesh and gaudy plumage, and are described as fat and stupid birds, incapable of flying, but feeding on vegetable food, and living in forests. Their bones, which appear to confirm this description, are not properly fossil or mineralized, but retain a great part of their animal matter. It is perhaps not impossible that some of the smaller species of dinornis may still exist, but the larger ones are undoubtedly extinct. Some of the bones of these birds are at least twice the size of those of the ostrich. The framework of the leg is the most massive of any in the class of birds, and the bones are remarkable for their solidity, the toe-bones of *Dinornis elephantopes* almost rivalling those of the elephant. The bones of several species of dinornis have been described.

Dinosau'ria [Gr. δεινός, "terrible" or "wonderful," and σαῦρος, a "lizard"], the name of an order of extinct saurians found in the oolite, lias, and wealden. Their structure resembled the mammalian type more than others of their kind. They had four strong limbs, and the sacrum was composed of five amalgamated vertebræ. The *Megalosaurus*, *Iguanodon*, and *Hylæosaurus* are the principal genera of this order.

Dinothe'rium [Gr. δεινός, "terrible," and θερίον, a "beast"], an extinct animal, the remains of which have been found in the miocene formations of France and Germany. It had long tusks like the elephant and walrus; these projected from the end of the lower jaw, which was bent downward at a right angle to the body of the jaw. Besides the two tusks, it had five double-ridged grinders on each side of both jaws, and the nasal cavity was large. As no bones of the body or limbs have been found corresponding with those of the skull, the position of the dinotherium has not been determined. De Blainville supposed it to be a herbivorous cetacean, while Cuvier regarded it as allied to the tapir, and others to the dugong.

Dins'moor (Gen. Samuel) was born at Londonderry, N. H., July 1, 1766, and graduated at Dartmouth in 1789. He was for many years general of militia and judge of probate, was a member of Congress (1811–13), and governor of New Hampshire (1831–34). Died at Keene Mar. 15, 1835.

Dinsmoor (Samuel), LL.D., a son of the foregoing, was born at Keene, N. H., May 8, 1799, graduated at Dartmouth in 1814, and became a lawyer. He was governor of New Hampshire (1849–53). Died Feb. 24, 1869.

Dins'more, a post-township of Shelby co., O. Pop. 1700.

Dinwid'die, a county in the S. E. of Virginia. Area, 540 square miles. It is bounded on the N. by the Appomattox River, and on the S. W. by the Nottoway. The surface is undulating. Wool, grain, and tobacco are raised, and tobacco is manufactured here. The Southside R. R. and the railroad which connects Petersburg with Weldon pass through this county. Capital, Dinwiddie Court-house. Pop. 30,702.

Dinwiddie (Robert) was born in Scotland about 1690. He was appointed governor of Virginia in 1752, and filled that office until 1758, when he returned to England. Died in Clifton, England, Aug. 1, 1770.

Dinwiddie Court-house, a post-village, capital of Dinwiddie co., Va., is on Stony Creek, 35 miles S. by W. from Richmond.

Di'ocese [from the Gr. δί (for διά), "through," and οἰκέω, to "manage a household"), the name given to the district under the ecclesiastical jurisdiction of a bishop, was formerly used to designate the collection of churches under the care of an archbishop. Under Constantine the Great the Roman empire was divided into thirteen civil territories called dioceses, which were again subdivided into 120 provinces. These dioceses were governed either by prefects, proconsuls, or vicars, and the provinces by rectors. Before 400 B. C. the Church had a similar division, the dioceses being what are now termed patriarchates.

Diocle'tian [Lat. *Diocletianus*], or, more fully, **Caius Valerius Aurelius Diocletianus,** a Roman emperor, born of humble parentage in Dalmatia in 245 A. D. He served with distinction in the army under Aurelian and Probus. On the death of Numerianus, in 284, he was proclaimed emperor by the army at Chalcedon. In the year 286 he adopted Maximian as his colleague in the empire, which was disturbed by incursions of barbarians and menaced by the Persians. They suppressed revolts in Gaul, and in order to divide the labor of ruling so vast an empire chose Galerius and Constantius Chlorus as their assistants in 292 A. D., and gave them the title of cæsar. This was the beginning of the division of the empire into Eastern and Western. Diocletian reserved to himself Asia and Egypt; Maximian received power over Italy and Africa; Thrace and Illyricum were assigned to Galerius; and Gaul and Spain to Constantius Chlorus. The supremacy of Diocletian (whose court was at Nicomedia) was acknowledged by the other three. After this distribution of power the Roman armies gained successes in Egypt, Persia, and Britain. Diocletian protected or omitted to persecute the Christians until 303 A. D., when a persecution was commenced at the instigation of Galerius. Diocletian abdicated the throne in 305 A. D. in favor of Galerius, and retired to Salona, in Dalmatia, where he devoted his time to horticulture. Died in 313 A. D. He was a ruler of superior talents. (See Gibbon, "Decline and Fall of the Roman Empire;" Tillemont, "Histoire des Empereurs;" Vogel, "Der Kaiser Diocletian," 1857.)

Diocletian Era (called also the **Era of Martyrs,** on account of the persecution in Diocletian's reign) was used by Christian writers until the introduction of the Christian era in the sixth century, and is still employed by the Abyssinians and Copts. It dates from the day on which Diocletian was proclaimed emperor at Chalcedon, Aug. 29, 284 A. D.

Dioda'ti (John), a Calvinistic theologian, born of an Italian family at Geneva June 6, 1576. He was appointed professor of Hebrew at his native place in 1597, and became professor of theology there in 1609. In 1618 he represented the church of Geneva in the Synod of Dort, where his reputation was so high that he was one of the persons appointed to write the articles of faith. He produced Italian and French translations of the Bible, and wrote several treatises against the doctrines of the Roman Catholic Church. Died Oct. 3, 1649.

Di'odon [from the Gr. δι (for δίς), "double," and ὀδούς (gen. ὀδόντος), "tooth," because all the teeth of each jaw are united into one], the name of a genus of marine fishes of the order Plectognathes, without distinct teeth, but having the jaws covered with an ivory-like substance, which is formed by the blending of the teeth into one. Some of them have the power of filling their stomachs with air and assuming a globular form, whence they are called globe-fish; others are designated porcupine-fish from their numerous spines, which stand out like those of a hedge-hog. Most of the diodons of our Atlantic waters are called balloon-fish. They are of several species.

Diodo'rus Sic'ulus, a Greek historian, born at Agyrium in Sicily, flourished about 50–20 B. C. He travelled in Europe and Asia in order to collect materials for a universal history, and afterwards became a resident of Rome. He expended many years in the composition of his history, which is entitled "Historical Library" ("Βιβλιοθήκη ἱστορική"), in forty books. It is a history of the world from the earliest times to 60 B. C. As an historian he is deficient in critical judgment and other qualifications, but he has preserved important facts. Fifteen entire books of his work, and some fragments of the others, are extant. Among the best editions of his works are those by Bekker (4 vols., 1853–54) and by L. Dindorf (5 vols., 1867–68).

Dioġ'enes [Gr. Διογένης], a famous Cynic philosopher, born at Sinope in Asia Minor, flourished about 400–330 B. C. He was a pupil of Antisthenes at Athens. His habits were austere, eccentric, and frugal. He inured himself to extreme privations, and manifested or affected a contempt for the comforts of life, as well as for the customs of the world. According to tradition, he usually lodged in a cask or tub. He was a severe and caustic censor of the follies and vices of the Athenians, who allowed him a great latitude of comment and reproof. He was renowned for his witty and sarcastic sayings. He once received a visit from Alexander the Great, who inquired, "What can I do for you?" Diogenes replied, "Cease to stand between me and the sun." Having been captured by pirates, who offered him for sale in a slave-market of Crete, he was asked what he could do, and replied, "I can govern men; therefore sell me to some man who needs a master." He was purchased by Xeniades, a citizen of Corinth, who was a kind master, and soon liberated him and employed him as tutor of his children. Diogenes died about 323 B. C. (See Ritter, "History of Philosophy;" Grimaldi, "Vita di Diogene Cynico," 1777.)

Dioġenes Laer'tius [Gr. Διογένης ὁ Λαέρτιος], a Greek compiler, born at Laertes in Cilicia. The period in which he lived is not known, nor is anything known of his personal history, except that he compiled "The Lives and Doctrines of the Ancient Philosophers." It contains interesting information and anecdotes, with extracts from lost works, but is destitute of critical merit, and is not well planned nor well digested. Among the best editions of it is that published by Hübner (Leipsic, 4 vols., 1828–33).

Dioġenes of Apollonia, an ancient Greek philosopher, born in Crete, was a disciple of Anaximenes. He lived about 470 B. C., and taught philosophy at Athens.

He regarded air as the first principle of all things, and wrote a work on nature or cosmology, which is not extant.

Diomedea. See ALBATROSS.

Di'omede Islands, a group of three small islands in the middle of Behring's Strait, midway between Asia and America.

Diome'des, often anglicised **Di'omede** or **Di'omed** [Gr. Διομήδης], a brave Greek warrior and king of Argos, celebrated in the ancient legends as a son of Tydeus (hence he was called TYDIDES), and a favorite of Minerva. He fought with distinction at the siege of Troy, and, according to Homer, ventured to attack Mars, who defended the Trojans. Diomedes and Ulysses are said to have carried away the Palladium of Troy. Some writers relate that after the capture of Troy he settled in Italy.

Diomedes, a king of the Bistones in Thrace, is fabled to have fed his horses on human flesh. He was slain by Hercules.

Di'on [Gr. Δίων], an eminent statesman of Syracuse, born about 410 B. C., inherited an ample fortune from his father. He acquired great influence at the court of Dionysius the Elder, who had married Aristomache, a sister of Dion. He was a pupil and intimate friend of Plato, who taught at Syracuse. After the accession of Dionysius the Younger, Dion persuaded him to invite Plato to return to Syracuse. The virtue and austere morals of Dion rendered him obnoxious to the dissolute tyrant and his courtiers. He was banished, and took refuge at Athens, leaving at Syracuse his wife Arete, who was compelled to marry another man. In order to revenge himself and liberate his country, he raised a small body of troops in 357 B. C., and attacked Syracuse, which he occupied without much resistance. He expelled Dionysius, but was soon deprived of power by the intrigues of Heraclides. Dion was recalled by the people, but he was assassinated by Calippus about 354 B. C. (See "Life of Dion," by PLUTARCH, who compares him to Marcus Brutus; CORNELIUS NEPOS, "Dion.")

Dion, or **Dio,** surnamed CHRYSOSTOM ("golden-mouthed"), a Greek sophist or rhetorician, born at Prusa in Bithynia about 50 A. D. He received a liberal education, which was perfected by travel. He became a resident of Rome in 96 A. D., and gained the favor of Nerva and Trajan. The latter esteemed him so highly that he permitted him to ride in the imperial chariot. Dion died about 117 A. D., and left numerous orations, of which eighty are extant. They are remarkable for beauty of style and Attic purity of language. Best edition by Emperius, Bruns., 1844.

Dionæ'a [a name of Venus], a genus of plants of the natural order Droseraceæ, having five petals, calyx 5-partite, from ten to twenty stamens, and one style, with five united stigmas. One species only is known, *Dionæa muscipula,* commonly called Venus's flytrap. It grows in marshy ground in the southern parts of North America as far N. as the Carolinas. The plant is perennial, with a rosette of root-leaves, from the midst of which a scape about six inches high arises, terminating in a corymb of white flowers. It derives its popular name from the singular irritability of its leaves. The elongated leaf-stalk is winged, and bears an orbicular leaf at its extremity, having the margin set round with long bristly hairs. On its upper surface are many small glands, and three slender irritable hairs on each side, so that an insect can hardly cross the leaf without touching one of them, when the two sides of the leaf instantly close together, the marginal bristles crossing each other, and thus preventing any possibility of escape. The leaf remains closed until the insect is dead. Insects appear to be attracted by the juice from the glands. That the plant derives nourishment from the bodies of the insects has been conjectured, but not proved.

Dionœa: Venus's Flytrap.

Di'on Cas'sius, Dio Cassius, or, more fully, **Cassius Dion Cocceia'nus,** an eminent historian, born at Nicæa in Bithynia about 155 A. D., was descended from Dion Chrysostom. He became a Roman senator in the reign of Commodus, and was chosen consul in the year 229, through the influence of the emperor Alexander Severus. He wrote in Greek a "History of Rome" in eighty books, from the arrival of Æneas to 229 A. D. Only eighteen books (from 36 to 54) have been preserved entire. As a historian he is commended for accuracy in dates, diligence in research, and elegance of style. Among the best editions of Dion Cassius are those of Bekker (2 vols., 1849) and L. Dindorf (5 vols., 1863–65).

Dionys'ia [Gr. Διονύσια] were great annual festivals in honor of Dionysus (Bacchus), and are said to have been introduced into Greece from Egypt in 1415 B. C. They were of four kinds—the rural or lesser, the Lenæan, the Anthesterian, and the great Dionysia. They were chiefly celebrated at Athens. (See BOECKH, "Abhandlung Berliner Akademie," 1816–17, pp. 47–124.)

Dionys'ius Exig'uus, a learned monk, born in Scythia, was a friend of Cassiodorus. He lived at Rome, and wrote several works, among which is a collection of apostolical canons and decisions of councils. He fixed the year of the Incarnation as coincident with the year 753 of Rome. He was the first who computed the Christian era from the birth of Christ, instead of his death. His name Exiguus, "the little," refers to his small stature. Died about 556.

Dionys'ius of Halicarnas'sus [Gr. Διονύσιος ὁ Ἁλικαρνασσεύς], an eminent Greek historian and critic, born at Halicarnassus in Caria about 70 B. C. From his own writings we learn that he removed to Rome in 30 B. C., and passed more than twenty years in that capital in the study of Latin and in the composition of a history (in Greek) entitled "Roman Antiquities" ("Ῥωμαϊκὴ Ἀρχαιολογία"), in twenty books. Nine entire books, and fragments of the others, are extant. This work includes the period from the origin of Rome to 265 B. C. He is not considered a high authority as an historian, but he has a good reputation as a critic. Among his critical works are a "Treatise on Rhetoric" and "De Compositione Verborum." Died about 6 B. C. The best edition of his works is that of Reiske, 6 vols., Leips., 1774–77; text of Rom. Antiq. by Kiessling (4 vols., 1860–70.)

Dionysius, SAINT, a native of Alexandria, was a disciple of Origen. He became patriarch of Alexandria in 248 A. D., and was driven out of that city by severe persecution in 250. In 257 A. D. the persecution was renewed, and Dionysius was banished to Libya, but he was restored in the year 260. He wrote many letters and religious treatises, which are not extant. Died in 265 A. D.

Dionysius the Areop'agite is mentioned in the Acts of the Apostles (chap. xvii. 34) as one of the persons converted at Athens by the apostle Paul. He is supposed to have been a member of the court of the Areopagus when Paul appeared before that tribunal. According to an early tradition, he was the first bishop of Athens, and, according to a later tradition, suffered martyrdom there. In France he has been confounded with the Dionysius who went as missionary bishop to Paris about the middle of the third century. The spurious mystical writings which bear his name appear to have had their origin in Egypt during the fifth century. In the ninth century they were brought into Western Europe, and translated into Latin by Scotus Erigena.

Dionysius [Gr. Διονύσιος] **the Elder,** a celebrated tyrant of Syracuse, born about 430 B. C. He was in his youth an obscure private citizen, and became a general in the service of the republic of Syracuse when Sicily was invaded by the Carthaginians. In the year 405 he usurped the supreme power in Syracuse, which then ceased to be a republic. He suppressed several insurrections of his subjects, and in 397 B. C. commenced or renewed hostilities against the Carthaginians, who then held some towns in Sicily. His fleet was defeated by the Carthaginians, who besieged Syracuse, but their success was hindered by a pestilence, and Dionysius gained a decisive victory over them after they had lost great numbers by disease. He also captured several towns in Sicily, and made conquests on the Italian peninsula. He was an able ruler, displayed superior political talents, and was one of the most powerful princes of his time. At the request of Dion he invited Plato to his court, but the lectures of that philosopher offended the tyrant, who ordered the captain of a ship to take Plato away and sell him as a slave. He was ambitious of literary fame, and wrote poems and tragedies, some of which he sent to the Olympic games, but he failed to obtain a prize. It is stated that in the latter part of his life he was very suspicious, and took many precautions against the traitors and conspirators who (he imagined) intended to kill him. He died in 367 B. C., and was succeeded by his son Dionysius. (See GROTE, "History of

Greece," part ii., chaps. lxxxi.–lxxxiii.; THORKIL BADEN, "Res Gestæ Dionysii Syracusii recognitæ," 1795.)

Dionysius the Younger, tyrant of Syracuse, was a son of the preceding, whom he succeeded in 367 B. C. He was indolent, dissolute, and inferior to his father in political talents. He was persuaded by Dion to invite Plato to his court, but the eloquence and wisdom of that philosopher were unavailing to reform him. Dionysius banished Dion, who in 357 B. C. returned with a small army and expelled the tyrant. The latter fled to Locri, and became the despotic ruler of that city. He recovered power in Syracuse about the year 346, soon after which the oppressed Syracusans applied for aid to the Corinthians, who sent Timoleon with an army in 344 B. C. Dionysius was then deposed, and went as an exile to Corinth, where he is said to have taught school. (See GROTE, "History of Greece," part ii., chaps. lxxxiv., lxxxv.)

Diony'sus [Gr. Διόννσος or Διώννσος], the original Greek name of the god of wine. (See BACCHUS.)

Diophan'tine [from DIOPHANTUS (which see)] **Anal'ysis,** a branch of algebra not reducible to systematic rule, which treats of indeterminate problems, principally such as involve square or cube numbers, or the relations of the parts of right-angled triangles; and in which integral or commensurable values are found for the indeterminates by means of artifices suggested by the nature or conditions of the problems themselves. Success in this rather fascinating but not particularly useful branch of investigation depends very much upon the ingenuity of the investigator. An example of a Diophantine problem is the following: To find three numbers such that the sum of their squares shall be a square. The numbers are 2, 3, and 6, or any equimultiples of these.

Diophan'tus [Gr. Διόφαντος], a Greek mathematician who lived at Alexandria, probably between 200 and 400 A. D. He is the author of the most ancient extant treatise on algebra, and is the reputed inventor of algebra, according to Lagrange and others. He wrote an important work called "Arithmetica," in thirteen books, of which only six are extant.

Diop'sis [from the Gr. διά, "through" or "across," also "apart," and ὄψις, "vision"], the name of a genus of dipterous insects remarkable for having the eyes and antennæ at the end of long, horny stalks growing from the sides of the head. In some instances the distance of the eyes from the head is almost as great as the length of the wings.

Diop'trics [from the Gr. δίοπτρον, "anything which one looks through," a "transparent substance" (from διά, "through," and the obsolete verb ὄπτω, to "see")], that branch of geometrical optics which treats of the refraction of light, or of the changes which take place in the direction of rays transmitted from one medium to another (as from air to water, etc.), or through media of varying density. It is applied chiefly in the construction of telescopes, microscopes, and other instruments requiring the use of refracting lenses. (See OPTICS and LENS.) (See LITTROW, "Dioptrik," 1830; PRECHTE, "Practische Dioptrik," 1828.)

Dioptric System, an arrangement of lenses for condensing light in lighthouses, devised by Fresnel about 1819, based on the discoveries of Buffon, Condorcet, Brewster, and others. (See LIGHTHOUSES, by PROF. JOSEPH HENRY, LL.D.)

Diora'ma [from the Gr. δί (for διά), "through," and ὅραμα, "that which is seen" (from ὁράω, to "see")], a mode of scenic display invented by Daguerre and Bouton, and first exhibited in Paris in 1822. The painting is viewed through a large aperture or proscenium, beyond which it is placed at such a distance that the light is thrown upon it at a proper angle from the roof, which is glazed with ground glass, and cannot be seen by the spectator, who is in comparative darkness, receiving no other light than what is reflected from the painting itself. By means of shutters or curtains the light may be diminished or increased at pleasure; and some parts of the picture being transparent, light may be admitted through it—an artifice which secures the advantages of painting in transparency without its defects.

Dioscorea'ceæ [from *Dioscorea*, one of the genera], a natural order of plants, ranked by Lindley among the DICTYOGENS (which see), mostly natives of tropical countries. They are classed among endogenous plants by most botanists. They are twining shrubs with large tubers either above or under ground. The most important plants of the order are the species of *Dioscorea* or YAM (which see). The order comprises one British plant, the black bryony, and the *Dioscorea villosa*, which grows in many parts of the U. S.

Dioscor'ides Peda'nius [Διοσκουρίδης Πεδάνιος], a Greek botanist, born at Anazarba in Cilicia, lived between 50 and 200 A. D. He travelled in Asia Minor, Greece, and Italy to procure information about plants, and wrote a celebrated work on materia medica (in Greek), in which he describes or names more than 500 plants. This work was regarded as the highest authority for fifteen centuries or more, and was universally used by medical and botanical students. Best edition by Sprengel, 2 vols., Leips., 1829–30.

Dioscu'ri [Gr. Διόσκουροι], (*i. e.* "sons of Jupiter"), a name given to CASTOR AND POLLUX (which see).

Dios'ma [from the Gr. δίοσμος, "transmitting smell," or perhaps "having a strong smell" (from διά, "through," and ὀσμή, "smell")], a genus of plants of the natural order Rutaceæ and Linnæan class Pentandria. The buchu leaves are obtained from the *Diosma crenata* and other species.

Diospy'ros [probably the διόσπυρον of Theophrastus, a name signifying in Greek the "wheat" or "bread of Zeus"], a large genus of trees of the ebony family, comprising about one hundred species, mostly natives of the tropical parts of the Old World. They generally have hard wood, and many of them yield edible fruits.

The persimmon tree of the Atlantic States and Mississippi Valley (*Diospyros Virginiana*) is well known for its fruit, which becomes edible late in autumn, and for its wood, which is used by makers of lasts for shoes. It is represented in Texas, California, etc. by the *Diospyros Texana* (persimmon, ebony, or japote).

The pishamin or date-plum (*Diospyros Lotus*) grows in Europe as far N. as London, and its fruit is made into preserves or eaten without cooking. Other species are prized for their fruit in China, Africa, and Japan. The CALAMANDER-WOOD (which see) and several other Diospyri of Asia are greatly valued for their timber. Among these is the true ebony (*Diospyros Ebenum*), which grows principally in Ceylon. (See EBONY.) Remains of many fossil species are found in the eocene of the U. S.

Dioszeg, a town of Hungary, in the county of Bihar, on the Er. It exports wine and tobacco. Pop. 5774.

Dip and Strike. In geology, the angle of inclination of a stratum to the horizon is called its *dip* or *pitch*. Strata presenting this inclination must cut the surface in a line, and this line, called the *outcrop* of the rocks, has a definite direction, which in geological language is called the *strike* (from the German *streichen*, to "reach," to "extend"). The strike of rocks is therefore the compass direction of the intersection of their plane of stratification with the plane of the horizon. When strata are moderately regular, the line of strike is a very useful fact to determine, as it enables the geologist to follow the same bed, and when concealed, suggests the place where he should seek for it. The dip must be at right angles to the strike, for that is the direction in which the plane of the bed dips down towards the interior of the earth. Beds dipping at a high angle are soon lost sight of, being covered up with other deposits of newer date. In the direction opposite to that of the dip beds of older date come up from below, or "crop out." The amount of inclination as required for practical purposes can be measured by a simple instrument, the clinometer.

Diphthe'ria [from the Gr. διφθέρα, the "skin" of an animal, in allusion to the false membrane described below], an acute disease, characterized by inflammation of the mucous membrane of the pharynx, attended by an exudation of lymph, often assuming the character of a false membrane, which may extend into the larynx and air-passages, into the œsophagus, and into the mouth, occasionally also appearing upon raw or mucous surfaces of other parts of the body; it is also attended by prostration and albuminuria, which may or may not be persistent. Diphtheria is not a new disease, but its nature having been investigated by Bretonneau (who gave it the name *diphtheritis*), it has of late received much attention, more especially from its present frequency and the terrible fatality which distinguishes it. Its duration and symptoms are variable, and the distinctive exudation is by no means of uniform appearance. In general, the mucous membrane is dark and congested, and the exudation growing from one or more centres if torn away leaves a bleeding and sensitive surface. The membrane itself frequently is the seat of a microscopic vegetable growth (*oïdium*), believed by some to be an essential part of the disease itself. The prognosis is always grave, no case being free from danger. The mildest attack may be followed by paralysis or by fatal prostration. No routine treatment can be laid down for this disease. In mild cases it is permissible to use detergent chlorinated washes for the mouth, and the general treatment may be mainly expectant, provided the pulse is firm. Sulphate of quinia has the happiest effects upon many cases. The inhalation of vaporized water is an excellent measure. The

treatment of the various sequelæ of diphtheria requires the careful use of tonics, such as strychnia and iron, with the best hygienic conditions.

REVISED BY WILLARD PARKER.

Diph'thong [Gr. δίφθογγος, from δί (for δίς), "double," and φθόγγος, "voice," "sound;" Lat. *diphthongus*] is the union of two vowels pronounced together in one syllable. A proper diphthong is one in which both vowels are sounded, as in *boil, out.* An improper diphthong is one in which only one vowel is sounded, as in *Cæsar, beat.*

Diplacan'thus [from the Gr. διπλός, "double," and ἄκανθα, a "thorn" or "spine"], the name of a genus of ganoid fishes found only in the old red sandstone. They have small scales on the body, a large head, wide mouth, and two dorsal fins with a strong spine in front.

Diplograp'sus [from the Gr. διπλός, "double," and γράφω, to "mark" or "write"], a genus of zoophytes existing in great numbers in the anthracite shales of the Silurian formation. They are marked with a double series of cells.

Diplo'ma [Gr. δίπλωμα, from διπλόω, to "double," or "fold;" Lat. *diploma*], a term formerly applied to every sort of royal charter or letter-patent. These were so called because under the Roman emperors charters were inscribed on two tablets of copper, joined together so as to fold in the form of a book. The charter by which a physician or surgeon is declared qualified to practise his profession is called a diploma. The term is also applied to the certificate of graduation given to every one who has taken a degree in a college or university.

Diplo'macy [from *diploma*, originally signifying "credentials" or "letters-patent" (see DIPLOMA)] is the art of conducting the official intercourse between foreign states, and is generally managed by ambassadors instructed in the policy to be pursued. The negotiation of treaties forms an important part of the duties of these envoys, but frequently they exercise a delicate and yet profound influence over the nation with which they are sent to deal. In receiving his instructions, much must sometimes be left to the discretion of the diplomatist. Very early in history heralds and ambassadors are found bearing messages from one power to another. Generally these messages were special. It is only in modern times that diplomatists are established permanently in foreign courts to watch the interests of their own governments. From the very necessities of the case, ambassadors have been held personally sacred, since, were it not so, it would be impossible for them to venture into unfriendly states. Even among barbarians their privileges were respected; and in our own times they are not subject to the municipal laws of the states in which they reside, but can be sent home for punishment if they offend those laws. When resident ambassadors first came to be employed they were looked on as spies, but as the usage became general its advantages were made manifest. It tends to bring nations nearer together, and to make them respect one another, when there are representatives of foreign states in each country; the community of nations is more vividly felt. Ambassadors become acquainted with the laws, institutions, and history of the land where they reside; they protect their countrymen who are there as travellers or residents; they foresee difficulties and are able to prevent them; they put their countries on their guard against the preparations for war of other states; and when they withdraw on account of war their absence causes the separation of the two countries to make more impression. Even the exchange of compliments, the opportunity of representing their country in expressions of friendship at public and festive gatherings, as well as by condolence and forms of sympathy,—these minor uses of resident ministers will not be despised by those who rightly estimate the effect of such things on national feeling.

The highest diplomatic office is that of ambassador. In the Roman Catholic states of Europe the legates and nuncios of the pope take rank with the highest class. The second grade includes ministers plenipotentiary, the internuncios of the pope, envoys ordinary and extraordinary, and all agents accredited directly to sovereigns. The third order are chargés-d'affaires, who are generally accredited to the department of foreign affairs. The appointment of diplomatic agents in the U. S. belongs to the President, but his choice must be confirmed by the Senate. The secretary of state superintends our diplomatic relations.

REVISED BY T. D. WOOLSEY.

Diplomat'ics [from the Gr. δίπλωμα, "something folded;" see DIPLOMA], originally the science of deciphering ancient writings. Previous to the fifth century writing was done extensively on papyrus. In that century parchment appears to have been generally used, and the oldest documents in our possession bearing the character of diplomas have no higher antiquity. The science of diplomatics teaches the different styles and forms adopted in ancient public documents, the titles, rank, etc. of public officers whose names are subscribed to them, etc. Its origin is attributed to a Jesuit of Antwerp named Papebroeck, who about 1675 applied himself to the exposition of old diplomas. Mabillon, however, whose work "De Re Diplomaticâ" came out in 1681, was the first who established it on a sure foundation. The principles laid down in this work were more fully developed in the "Nouveau Traité de Diplomatique," by Toussaint and Tassin (1765). Among other valuable works on this subject may be named De Vainer's "Dictionnaire Raisonnée de Diplomatique" (Paris, 1774) and Gatterer's "Abriss der Diplomatik" (Göttingen, 1798).

Diplop'terus [from the Gr. διπλός, "double," and πτερόν, a "wing" or fin"], a genus of ganoid fishes of the palæozoic age, having double dorsal and anal fins, heterocercal tails, scales perforated with small foramina, and a large and flattened head.

Dip of the Horizon, in navigation, is the difference between the altitude of a heavenly body, as observed from the deck of a ship, and the altitude of the same body observed from the level of the sea. If the height of the spectator above the surface of the sea be a feet, then the correction for dip $= 1.063\sqrt{a}$. Experiments, however, seem to show that refraction diminishes the amount of dip by about three-fortieths of itself; hence the common table of dip used in navigation may be computed from the formula $= \text{dip}\ \frac{37}{40} \times 1.063 \times \sqrt{a} = 984\sqrt{a}$.

Dip'per (*Cinclus*), a genus of birds of the ouzel family (Cinclidæ), found in Europe, Asia, and America. They feed chiefly on mollusks and on aquatic insects and their larvæ, which they seek in clear lakes and streams, frequently diving with great facility, and moving about under water by means of their wings. They resemble the wren in their manner of dipping the head, accompanied with an upward jerking of the tail. The dippers build very curious nests of interwoven moss, having the entrance in one side.

Dipping Needle. When a magnetic needle is hung within a stirrup so as to move freely in a vertical direction, and the whole system is suspended by a thread, it will adjust itself in the magnetic meridian, and its pole will dip towards the north pole of the earth. Such a needle is called a *dipping needle,* and its deviation from the horizontal line is its *inclination.* When the needle is carried nearer the magnetic pole, the inclination increases. Sir James Ross in 1832 saw the dipping needle stand within one minute of a degree of the vertical position near Baffin's Bay. Approaching the equator, it becomes less and less inclined, until a point is reached at which it is quite horizontal. This point will be in the *magnetic equator,* or line of no dip, which is near, but not coincident with, the equator of the earth. When tracing the lines of equal dip on a Mercator's map, we find that they coincide in a remarkable manner with the isothermals or lines of equal mean temperature, indicating a close connection of the distribution of heat with that of magnetism, and seemingly a common cause for both.

The inclination, like the declination, is subject to periodic and secular variations. The last is shown in the following table:

Inclinations observed in Paris.

Year.	Inclination.	Year.	Inclination.
1671	75° 00′	1820	68° 20′
1780	71 48	1825	68 00
1798	69 51	1831	67 40
1814	68 36	1853	66 28

It appears from the table that since the year 1671 the inclination has steadily diminished at the rate of about three to five minutes a year. ARNOLD GUYOT.

Dipsa'ceæ [from *Dipsacus,* one of the genera], a natural order of herbaceous exogenous plants, mostly natives of the south of Europe. They are nearly allied to Compositæ, from which they differ by having the stamens distinct. Among the plants of this order is the *Dipsacus fullonum* (fullers' teazel). (See TEAZEL.)

Dip'sas [Gr. διψάς, the name of a venomous snake whose bite caused intense thirst, from δίψα, "thirst"], a genus of non-venomous serpents belonging to the Colubridæ. They are tree-snakes, greatly elongated in form, and having a broad, thick head. They are natives of the warmer parts of America and Asia. Some of them are of large size. Like many other modern scientific names, the designation of this genus is etymologically inappropriate.

Dipsoma'nia [from the Gr. δίψα, "thirst," and μανία, "frenzy"] is a term sometimes applied to DELIRIUM TRE-

MENS (which see), but of late more especially used to designate a morbid craving for alcoholic drinks, sometimes called methomania. Of late, this craving is looked upon as a disease, and it has been very successfully treated in "inebriate asylums" in various countries.

Dip'tera [Gr. δί (for δίς), "twice" or "two," and πτερόν, a "wing"], an order of insects having for their distinguishing characteristic two wings only, corresponding to the anterior pair, instead of four. In addition they have two short clubbed appendages, called "halters" or balancers, probably rudiments of the posterior pair in four-winged insects. They are marked also by having the mouth in the form of a sucker, constructed of from two to six lancet-shaped, elongated scales, enveloping a canal upon the upper surface of a fleshy proboscis. The larvæ or maggots of dipterans generally have a membranous head, and always have the stigmata, or breathing-pores, placed in the second and terminal segments of the body. In some species of these insects the eggs are hatched within the body of the parent—for instance, the blow-fly; in others, as the forest-fly, the larvæ are metamorphosed in the parent's body, and the young are excluded as pupæ.

Dipterocarpa'ceæ, or **Diptera'ceæ** [from *Dipterocarpus*, one of the genera], a natural order of exogenous trees, indigenous only in the East Indies. It comprises about fifty known species, mostly beautiful and majestic trees, some of which are valuable for timber. They have simple, alternate leaves, with large stipules, and 1-celled, 1-seeded fruits. They abound in balsamic resin and resinous products, among which are camphor, copal, and dammar. The sal, one of the best timber trees in India, belongs to this order. (See DIPTEROCARPUS.)

Dipterocar'pus [from the Gr. δίπτερος, "two-winged," and καρπός, "fruit"], a genus of plants of the order Dipteraceæ, comprises several species of the noblest trees of India. They bear clusters of large fragrant flowers, and abound in a resinous juice which is used medicinally and for burning in torches. The fruit is furnished with two membranes like wings. The *Dipterocarpus turbinatus*, or goorjun tree, often attains a height of 200 feet, and has no branches except near the summit. The wood is hard, close-grained, and durable. From the trunk exudes a fragrant oil which is valuable for varnish, for an ingredient of paint, and for medicine.

Dip'terus [from the Gr. δίπτερος, "having two wings" or "fins"], a genus of ganoid fishes, two species of which are found in the old red sandstone. They have a large and flattened head, and double anal and dorsal fins, opposite to each other.

Dip'tych [Lat. *diptychum*, from the Gr. δίς, "twice," and πτύξ (gen. πτυχός), "fold" or "tablet"], a register used by the ancients at an early period. It consisted of two tablets of ivory or wood, covered with wax. Diptychs were of two kinds, sacred and profane, the latter being the more ancient form. The profane diptychs contained the name and titles of the consul, and were distributed by him among his friends on entering his office. On one side of the sacred diptych were inscribed the names of living, and on the other those of deceased, ecclesiastics and benefactors of the clergy, which were read during service by the deacon. They were often decorated with scenes from biblical history. Diptychs are still used in the Eastern churches.

Diræ. See EUMENIDES.

Direct'or [from the Lat. *dirigo, directum*, to "arrange" or "direct;" Fr. *directeur*], literally, "one who directs or manages," usually applied to one of a number of individuals whose duty it is to conduct the affairs of certain enterprises, such as banks, railways, insurance companies, etc. Directors are usually elected by the stockholders from their own number; they have the right of supplying casual vacancies, and may delegate their powers to committees of such number as they may judge expedient. The title is also usually given to the chief officer or superintendent of an astronomical or physical observatory.

Direc'tory [Fr. *Directoire*], in French history, the name given by the constitution of 1795 to the executive body of the French republic. It consisted of five persons called Directors (*Directeurs*), who were selected by the Council of Elders from a list of candidates presented by the Council of Five Hundred. Their names were Barras, Carnot, Laréveillère-Lépaux, Letourneur, and Rewbell. One of them retired every year, and was succeeded by another chosen in the same way. They came into power at a time when France was involved in war against nearly all Europe, and was distracted by domestic factions. The French armies gained many victories under this *régime*, but the home policy of the Directory was unpopular. The Directory was divided into two parties, and the majority, consisting of Barras, Laréveillère-Lépaux, and Rewbell, removed their adversaries by the *coup-d'état* of the 18th Fructidor (Sept. 4, 1797). In 1797 the directors were Barras, Ducos, Gohier, Moulins, and Sieyès. The Directory was abolished by the *coup-d'état* of the 18th Brumaire (Nov. 9, 1799), in which Bonaparte and Sieyès were the prominent actors. (See BARANTE, "Histoire du Directoire," 1855.)

Directory, a book containing the names of the inhabitants of a city arranged in alphabetical order, together with the numbers of the houses in which they reside. The first London directory, "A Collection of the Names of Merchants, etc.," came out in 1677. In the U. S. every town of importance has its own directory. In several States there are also published "State directories." In New York City the earliest published was in 1786—a small volume of 82 pages, printed by Shepherd Kollock, Wall street. The names of the individuals and firms include about 900, and occupy 33 pages, the remainder being filled with general statistics of the city, U. S. government, post-office regulations, etc. In his address the editor states that it was the "first directory ever attempted in this country." The New York Historical Society possesses a complete set from its first publication.

Direc'trix, plu. Direc'trices [the feminine of the Lat. *director*, a "guide"], a term in geometry applied to a line which serves for the description of a curve or surface. The directrix of a conic is a right line perpendicular to the axis, whose distance from any point on the curve bears a constant ratio to the distance of the same point from the focus. Quadric surfaces have also directrices possessing analogous properties. When a surface is conceived to be generated by the motion of a line, right or curved, which always rests on other fixed lines, the latter are sometimes called directrices, but more frequently directing lines or directors, the former being distinguished as the generator.

Dirge [a contraction of the first word of an ancient Latin funeral hymn, "*Dirige gressus meos*"—"Direct my steps;" the word *dirge* is written "dirige" in old books], a hymn of a mournful character sung at funerals, much used in the services of the Roman Catholic Church. "Dirge" is used also by poets to characterize sad verses on the dead.

Dir'schau, a town of Prussia, in the province of Prussia, on the river Vistula, and on the railway from Berlin to Dantzic, 20 miles S. S. E. of Dantzic. It has machine-works, tanneries, etc., an enormous railroad bridge 2843 feet in length, and a transit trade by the river. Pop. in 1871, 7761.

Dirt-Bed, a name given to deposits of dark-brown or black earthy lignite situated in the lower Purbeck series in Europe, near the top of the middle secondary or mesozoic rocks. Through the beds, which are from twelve to eighteen inches thick, are distributed stones from three to nine inches in diameter, also the silicified trunks of cycadaceous trees like *Zamia*. For many miles this black earth may be traced, containing fragments of fossil wood. The name "dirt-bed" is also given by geologists to the strata in the carboniferous rocks, etc. in which fossil roots of trees are found *in situ*.

Dis [contracted from the Lat. *dives*, "rich"], a name of Pluto, sometimes applied to the infernal regions. (See PLUTO.)

Dis, or **Di,** a Latin particle signifying "apart" or "off," usually implying separation, as in "dismiss," "disjoin." It is sometimes equivalent to "un," being negative or privative, as in "displease," "disorder." The Greek particle δίς or δί usually means "twice" or "double."

Disabil'ity, in law, signifies a state which renders a person incapable of enjoying certain legal benefits or disables him from doing a legal act. The disability is either absolute, as in the case of outlawry or attainder, or it is partial, as in the case of infancy and coverture. It may arise from the act of God, of the law, of the person himself, or of his ancestor. (See CAPACITY, by PROF. T. W. DWIGHT.)

Disband'ing is the breaking up of a military organization and the discharge of soldiers from military duty.

Disbar', a term applied in England to barristers, who, in accordance with authority reposed in the benchers of the four inns of court, subject to an appeal to the common-law judges, may be expelled from the bar.

Disc. See DISK.

Discharge, from military service, is sometimes honorably obtained by non-commissioned officers and privates with the consent of the commanding officer; sometimes on a surgeon's certificate of disability. Soldiers are also discharged with ignominy for great offences, being in some cases stripped of their decorations and drummed out of the regiment.

Disciples of Christ, or, as they generally call themselves, **Christians** or **Church of Christ,** a body of

Christians frequently called **Campbellites,** taking the latter name from Alexander Campbell (see CAMPBELL, ALEXANDER), one of their most distinguished elders, and from his father, Rev. Thomas Campbell, a Scotch-Irish "Seceder," who came to the U. S. in 1807, and with his son began to labor in Western Pennsylvania for the restoration of Christianity to apostolic practice. In 1811 they organized the Brush Run church in Washington co., Pa. In 1812 this church adopted Baptist views, and in 1815 they, with other sister congregations, joined a Baptist association. But as the principles and practice of the Campbells and their followers were distasteful to many Baptists, much agitation followed, and in 1827 the Baptist churches generally withdrew from fellowship with the reformers, who consequently organized themselves anew, professing to reject all creeds, and to receive the Bible alone as their authority in faith and practice. They, however, though rejecting the Trinitarian terminology, are, in fact, in essential agreement with other evangelical Christians in their opinions with regard to the person and work of Christ and the future resurrection and judgment. They celebrate the Lord's Supper weekly, hold that repentance and faith should precede baptism, though, from the importance they attach to the latter ordinance, they are often charged with holding to baptismal regeneration. On all other points they allow and encourage independence of individual opinion. Their church organization is congregational. Their officers are of three classes: (1) elders, called also bishops, pastors, and presbyters; (2) deacons; and (3) evangelists, who are itinerants supported by the free offerings of the congregations. This denomination is distinguished for its efforts in behalf of education. They hold that the laborer is worthy of his hire, and teach the duty of the Church to provide amply for its ministers' support. They sustain several religious quarterly and monthly reviews and many weekly periodicals in the U. S., and several in Great Britain and her colonies. Among their numerous institutions of learning are Bethany College, in West Va., Hiram College, Hiram, O., the Northwestern Christian University, Indianapolis, Ind., Eureka College, Ill., Kentucky University, Lexington, Ky., and Oskaloosa College, Oskaloosa, Ia., besides a large number of seminaries and schools of a high grade.

REVISED BY B. A. HINSDALE.

Dis'cipline [Lat. *disciplina,* from *discipulus,* a "scholar"], education, training; the treatment suited to a learner or disciple; subjection to rules and regulations. It sometimes signifies punishment or chastisement. The term is applied figuratively to a peculiar mode of life in accordance with the rules of some profession or society.

DISCIPLINE, in military and naval affairs, is a general name for the rules and regulations prescribed and enforced for the proper conduct and subordination of the soldiers, etc.

DISCIPLINE, ECCLESIASTICAL, is a term used to designate the means employed by churches to maintain correctness of life among their members, orderly government in church affairs, and to prevent the spread of heresy in their ranks. In the Middle Ages discipline was either penitential (that is, inflicted on those who confessed their sin; see PENANCE) or punitive, which was, in theory at least, frequently administered by the civil power.

Discipline, First Book of, an important document in the ecclesiastical history of Scotland. It was drawn up in 1560 by John Knox and four others. It lays down rules for the election of ministers and other officers, but deals more especially with ecclesiastical discipline. Though subscribed to by many of the nobles, it was never acknowledged by an act of Parliament. The "Second Book of Discipline" was drawn up by a committee of the General Assembly in 1578. Andrew Melville took a leading part in preparing it.

The "Discipline" of the Methodist Episcopal Church is a volume containing all the doctrines, administrations, and ritual forms of that denomination, and is revised every four years, so as to include changes made by the quadrennial or General Conference.

Disclaim'er, in law, a plea containing an express denial or renunciation of some claim alleged to have been made by the party pleading. This term is also applied to the act of one who renounces or refuses to accept a gift or devise made to him of land or other property, and generally to the waiver of any claim. In the law of landlord and tenant it means a denial by the tenant of the landlord's title, in such a way as to cause a forfeiture of the tenant's estate.

Discob'oli (plu. of **Discob'olus**), [Gr. δισκόβολος, from δίσκος, a "disk" or "quoit," and βάλλω, to "throw," also to "put" or "place," so called in allusion to the habit of the fish of placing its disk on some firm body], the name of a family of malacopterous fishes, having the ventral fins united to form a sucking disk on the under surface of the body, by which the animal is enabled to firmly attach itself to a rock or other fixed body in order to obtain food. To this family belongs the lumpsucker (*Cyclopterus lumpus*).

Discontin'uous Funct'ion, in mathematics, is a function which does not continuously increase or diminish when the independent variable increases uniformly. The function *tan.* x is discontinuous; for though the arc x increases uniformly from 0° to 360°, *tan.* x changes abruptly from $+\infty$ to $-\infty$ at $x = 90°$ and $x = 270°$.

Discord [Lat. *discordia*], want of concord; dissension, strife; a combination of sounds which have no harmonical relation. In music, a combination of notes more or less disagreeable to the ear. Discords are largely employed in musical compositions, being introduced by way of transition between successive concords, of which they serve, by contrast, to heighten the pleasing effect. They are, therefore, indispensable to the highest order of musical expression. The concord preceding a purposely introduced discord is called the *preparation,* and that which follows, the *resolution.*

Discount [from *dis,* "un" or "off," and *count*], an allowance or deduction made for cash or advanced payments. Thus, in mercantile transactions a bill purchased may amount to $250. The seller allows the purchaser a discount of 15 per cent. for prompt or advanced payment, making the amount paid $212.50; in other words, $250 − 15 per cent. = $212.50. Discount is a form of interest. To borrow $100 at 6 per cent. for four months, and paying $102 at the expiration of the time stated, is *interest,* but does not differ materially from taking $98 at once, under promise to pay $100 at the end of four months; this latter method is called *discounting.* The *rate* of discount is usually agreed upon by the parties directly interested.

Discourse [Lat. *discursus*], conversation, talk; the expression of ideas; a formal treatise or dissertation; in rhetoric, a series of sentences and arguments arranged according to the rules of art. In logic, this term is applied to the operation of the mind commonly called *reasoning.*

Discovery, in equity jurisprudence (see EQUITY), the act of disclosure by a defendant of facts to which he is required to answer by reason of a "bill of discovery" which has been filed against him. The court entertains such a bill to secure the due administration of justice. There must be an interest on the part of the plaintiff in the subject to which the discovery refers, and the information sought must appear to be material either to the prosecution of the suit or of some other suit or action then pending or which may be commenced. The defendant will not be compelled to make the discovery when disclosure would subject him to criminal proceedings or to a forfeiture. (The works on equity jurisprudence should be consulted for more full information: STORY, "On Equity;" ADAMS, on the same; SPENCE, "Equitable Jurisdiction," etc.) In a number of the American States, following the lead of the New York code of procedure, the bill for discovery is abolished. Either party to an action under that system may obtain an order from a judge to examine a party to an action before trial. The mode of examination is regulated by rule of court. This proceeding is a substitute for the former bill of discovery.

T. W. DWIGHT.

Discovery, of countries. See INTERNATIONAL LAW No. I., by PRES. T. D. WOOLSEY, S. T. D., LL.D.)

Discussion of a problem or formula in mathematics, is the process of assigning to the arbitrary quantities which enter into it every reasonable value, and especially limiting values and interpreting the results.

Disease [from the Fr. *dés,* negative, and *aise,* "ease;" Lat. *morbus;* Fr. *maladie;* Ger. *Krankheit*], a deviation from a state of health, consisting in most cases (if not in all) in some change, palpable or impalpable, of some one or more of the tissues, rendering such tissue (or the organ containing it) incapable of performing its proper part in the economy of the organism to which it belongs. In a less general sense, a particular form of ill-health is called a disease. Diseases are either *diathetic* (arising from the diathesis or predisposition of the patient) or *enthetic* (arising from without the patient). It is at present a favorite theory with many that enthetic diseases arise from minute organisms or disease-germs. (See GERM-THEORY.)

Diseases, Distribution of. See GEOGRAPHICAL DISTRIBUTION OF DISEASES.

Disfran'chisement, the act of depriving a person of any privilege, liberty, franchise, or immunity—such as depriving a member of a corporation of his corporate rights. It is distinguished in this case from "amotion," which refers to the removal of an officer of the corporation from office, without affecting his membership. Another instance is the act of depriving a person of the rights and privileges of citizenship. This term is often applied to the act of de-

priving a person of the right to vote, and in England to the act which deprives a borough of the right of returning a member to Parliament.

Dishon'or [from the Lat. *dis*, "un," and *honor*, "honor"], in mercantile language, signifies to refuse or neglect to pay (or to accept) a draft or a bill of exchange. The act of drawing or indorsing such a bill or draft involves the drawer and indorser in an obligation to pay it in case the drawee dishonors the same. In order that the person in whose favor it is drawn may have recourse against the drawer and indorser, it is necessary that notice of the dishonor shall be given to these parties without unreasonable delay.

Disinfec'tion [from the Lat. *dis*, "un," and *inficio*, *infectum*, to "stain," to "taint," to "poison"] is the destruction or removal of the causes of disease present in any locality or material. It may be applied therefore to the atmosphere, to sewage or other liquid or solid filth, to ships, houses, clothing, merchandise, etc. Cologne-water and other merely odorous substances, while they may disguise foulness of the air, do not really disinfect. The power of the substances commonly used for this purpose has been overrated; they seldom destroy the contagious or infectious materials which produce diseases, yet they often do good by removing the conditions which favor their increase and dissemination. Cheapest among disinfectants are dry earth, lime, charcoal, and tar; and they are all positively useful. Earth immediately destroys the odor of excrement covered by it, and prevents unwholesome emanations. The same is true also of lime. Charcoal is a very powerful absorbent of gases and purifier of liquid and semi-liquid substances. Common wood-tar has similar properties to a less degree, but its partial volatility enables it to act more favorably upon an impure atmosphere. Chlorine is probably equal to any other substance in destroying in the air morbific materials of organic origin. It is usually employed as it is given off from chloride of lime (bleaching-powder) or chloride of soda solution (Labarraque's liquid). Chloride of zinc, dissolved in water (Burnett's liquid), and proto- or sesquichloride of iron are serviceable for the disinfection of privies, sewers, etc. Solution of nitrate of lead (Ledoyen's liquid), by the affinity of lead for sulphur, decomposes sulphuretted hydrogen, the most common noxious ingredient in foul atmospheres. Protosulphate of iron is much used for the disinfection of sewage and of privies. Permanganate of potassa (Condy's liquid) as an oxidizing agent has analogous utility, but is more expensive. The crude permanganate will answer very well for this purpose. Sulphurous acid and nitrous or hyponitric acid, both gaseous, are available for the fumigation of unoccupied rooms; they are irrespirable. Iodine (solid) and bromine (liquid) have both been found practically similar, and perhaps equal, to chlorine for the disinfection of wards of hospitals. Carbolic acid (phenic acid or carbol) has of late years been the most popular of all disinfectants. It is obtained, along with cresylic acid, in the distillation of coal-tar. More than any other of the substances named, it is believed to have the power of destroying minute living vegetable and animal organisms in the air or elsewhere. Ozone is asserted by some experimenters to be a valuable disinfectant, but it has not yet been much employed for that purpose. Chloralum (chloride of aluminum) and bromo-chloralum have been recently introduced, and are under trial, with somewhat conflicting reports concerning their value.

The modes of action of the above-named disinfectant substances may be classified as follows: 1. By absorbing gases and preventing their emanation—dry earth, lime, charcoal. 2. Neutralizing sulphuretted hydrogen gas—nitrate of lead. 3. Decomposing sulphuretted hydrogen and dead organic matter—chlorine (by its affinity for hydrogen, setting oxygen free), iodine, bromine, permanganate of potassa. 4. Arresting decay and putrefaction (*i. e.* by antiseptic action) in vegetable and animal materials—sulphurous and hyponitric acid gases, chloride of zinc, protosulphate, protochloride, and sesquichloride of iron, wood-tar, coal-tar, carbolic acid (by its affinity for water, and by combining with and fixing albumen and similar principles). 5. Destroying minute organisms, vegetable or animal (disease-germs), in the atmosphere—carbolic acid; *perhaps* chlorine, iodine, and bromine.

Quantities of disinfectants for use may be thus stated. For privies or sewers, a pound of sulphate or chloride of iron or chloride of lime, diffused in a gallon of water, will answer for a very large amount of foul material. Burnett's liquid contains twenty-five grains of chloride of zinc in each fluiddrachm of water. A pint of this in a gallon of water will be strong enough for use. For water-closets or bed-pans, Labarraque's solution of chloride of soda, a fluid-ounce in a quart of water; or permanganate of potassa, ten grains to a quart of water; or carbolic acid, twenty grains to a pint. A 70-per-cent. solution of this last substance is often used also. Drinking-water is best purified by filtration through charcoal, but it may be improved, when containing an excess of organic matter, by a small amount of permanganate of potassa, enough to make it very slightly pink in color in a strong light. Articles of clothing may be disinfected by boiling them in a solution of the permanganate, an ounce to three gallons of water. Greatly contaminated garments or bedding, as from smallpox patients, should be burned. Occupied rooms may be disinfected by fresh chloride of lime, placed about in saucers in convenient places to give off chlorine.

Ledoyen's liquid is made by dissolving a pound of litharge in seven ounces of nitric acid and two gallons of water. Ridgewood's disinfectant consists principally of carbolic acid, lime, and fuller's earth. McDougall's (much used in England and India) contains the sulphites of magnesia and lime and carbolate of lime.

But the most effective, indeed the only certain, disinfectant agencies are *cold* and *heat*. Malaria (the local cause of ague and remittent fever) is disarmed of its noxious power by a single hard frost; and the same is true of the infection of yellow fever. Cholera disappears almost always in temperate climates with the approach of winter. The continuance, and even increase, of smallpox, typhus, and some other contagious diseases during cold weather is due to the closing up of houses to keep them warm, thus diminishing ventilation and concentrating the morbid poison. Yet no considerable use can be practically made of the disinfectant action of low temperature, on account of the difficulty of producing it at will on a sufficiently large scale.

Heat was known by the ancients to exert an influence antagonistic to infection. Fires were in early times burned in the streets of cities to dissipate the plague. Pliny wrote, "Est in ipsis ignibus medica vis"—"There is in fire itself a medicating power." Yet only latterly has this been clearly verified by science. Dr. Henry of Manchester, England, in 1824, performed a series of experiments, by which he proved that the contagious property of smallpox and of vaccine virus, and that of typhus and scarlet fever, are destroyed by a temperature of from 140° to 200° F., and that such a heat does not injure such fabrics as are commonly used for clothing. In 1851, Dr. von Busch of Berlin made a trial of this agent in a large lying-in hospital, in the wards of which puerperal fever had been very destructive. After all ordinary methods of fumigation and disinfection had failed to eradicate the disease, he had all the patients removed and the wards heated by stoves, for two days, up to the temperature of 150° F. The same class of patients being then reintroduced, not a single case of the fever followed. Dr. W. Ferguson, inspector-general of the British navy, and Dr. A. N. Bell of Brooklyn, N. Y., have reported equally satisfactory success in extirpating yellow fever from large vessels at sea or in port. Dr. Bell and Dr. E. Harris of New York also made use of superheated steam as a disinfectant, with good effect, in New York City during the cholera season of 1866. It is probably one of the most efficacious of all the means yet employed for this purpose.

HENRY HARTSHORNE.

Disintegra'tion [from the Lat. *dis*, negative, and *integer*, "entire"], the separation of the integrant particles of a body; the destruction of cohesion; in geology, the gradual wearing away of a rock by ordinary atmospheric action, etc.; the process by which a solid rock is reduced and comminuted to sand, gravel, or soil. Soil or arable land is formed and prepared by the disintegration of rocks. The action of the weather is helped by frequent alternations of temperature above and below the point at which water attains its greatest density—*i. e.* 39° F.

Disk, or **Disc** [from the Lat. *discus* (Gr. δίσκος), a "disk" or "quoit"], in astronomy, the face of the sun, moon, or a planet, such as it appears to us projected on the sky. The forms of the celestial bodies being nearly spherical, their projections are circular planes. The fixed stars, when viewed through a telescope, present *spurious disks*, in consequence of the diffraction of light.

DISK, or DISC, in botany, is a fleshy expansion of the receptacle of the flower; a part of the receptacle, or a growth from it enlarged under and around the pistil; also the central part of a head of flowers of the order Compositæ, as the *Coreopsis*.

Disloca'tion [from the Lat. *dis*, "apart," and *loco*, *locatum*, to "place"], otherwise called **Luxa'tion** [from the Lat. *luxo*, *luxatum*, to "loosen"], in surgery, is the displacement of a bone from its proper relation to another bone with which it is articulated. A "complicated" dislocation is the displacement of a bone, accompanied by a severe local lesion of the soft parts, or fracture of a bone.

"Congenital" dislocations are those which occur before birth. The restitution of a dislocated bone is called its "reduction." Reduction of recent luxations is usually a comparatively easy task to those who have the requisite knowledge and experience, but in old and long-neglected cases it is frequently a most formidable operation, and is liable to be followed by bad consequences to the patient.

REVISED BY WILLARD PARKER.

Dis'mal, a post-township of Sampson co., N. C. Pop. 746.

Dismal Swamp, a great morass in the counties of Nansemond and Norfolk in Virginia, and in Gates, Camden, and Pasquotank counties in North Carolina, is about 30 miles long and 10 miles wide. A large portion of it is covered with dense forests of juniper, cypress, white cedar, and gum trees, from which lumber is exported. Near the middle of the swamp is Lake Drummond, which has an area of about 6 square miles, and abounds with fish. A canal through the Dismal Swamp opens steam communication between Chesapeake Bay and Albemarle Sound. The Dismal Swamp is remarkable for its considerable elevation above the surrounding country. The water of this swamp, known as "juniper water," is of a dark reddish color, and is carried in large quantities to Norfolk and Hampton Roads for shipping purposes. It is highly prized for its excellent quality, and is not liable to become corrupt by keeping.

Dis'part [etymology uncertain], in gunnery, half the difference between the diameter of the base-ring at the breech of a gun and that of the swell of the muzzle.

Dispen'sary [from the Lat. *dispendo, dispensum,* to "distribute" (from *dis,* "apart," and *pendo,* to "weigh")], a charitable institution in which medical and surgical aid is gratuitously furnished to the poor. During the Middle Ages dispensaries were set up in the houses of the wealthy and in monasteries, and towards the end of the eighteenth century were established in their present form. They now are established in most or all large cities. The oldest in the U. S. was founded in 1795 in New York. The poor receive treatment and medicine in them free of charge.

Dispensa'tion [Lat. *dispensatio,* perhaps from *dis,* "apart," and *penso,* to "judge," frequentative of *pendo,* to "weigh"], in the Roman Catholic Church, is an exemption from some canon or other law. Bishops and priests grant dispensations in some cases, but the pope alone has the power of giving them in the more important ones. Papal dispensations were first granted in 1200 by Innocent III. After the English Reformation the dispensing power was assumed by the kings, but it was abolished by the Bill of Rights (1689). (See PARDON.)

Dispen'satory [for etymology see DISPENSARY], a book containing an account of the physical qualities and medicinal powers of different drugs, with their natural and commercial history, and their preparation and combinations. One of the most complete works of the kind is the "United States Dispensatory," by Wood and Bache (1833; 13th ed. 1870).

Disper'sion [Lat. *dispersio,* from *dis,* "apart," and *spargo, sparsum,* to "scatter"], in optics, is the angular separation of the constituent rays of light when decomposed by the prism. Owing to the unequal refrangibility of the rays of different colors, a beam of light admitted through a small aperture in the shutter of a darkened room, and refracted by passing through a prism, forms an elongated image or spectrum; the red rays, which are the least refracted, occupying one end of the spectrum, and the violet rays, which have the greatest refraction, the other end. The rays after refraction are no longer parallel, so that the index of refraction (the ratio of the sine of incidence to the sine of refraction) is different for each ray; and the difference of the indices for the extreme rays is called the dispersion of the light. It had been supposed by Sir Isaac Newton that the dispersion was proportioned to the refraction, but it was soon found that although the colors in spectra formed by prisms of different substances are always arranged in the same order, they do not occupy the same relative amount of space; a prism of flint-glass giving, in proportion, less red and more violet than a prism of crown-glass, and that substances for which the index of refraction of the middle ray of the spectrum is nearly the same, produce spectra of different lengths.

Disposi''tion [Lat. *dispositio,* from *dispono, dispositum,* to "dispose," to "put in order," to "arrange"], in architecture, one of the six essentials of the art. It is the arrangement of the whole design by means of the ichnography (plan), orthography (section and elevation), and scenography (perspective view), and differs from *distribution,* which signifies the particular arrangement of the internal parts of a building.

DISPOSITION, a musical term employed in organ-building, and referring to the combination and arrangement of the stops on the rows of keys and pedals, with the pitch of each stop or length of the lowest CC pipe.

Disra'eli (Rt. Hon. BENJAMIN), D. C. L., an eminent English statesman and novelist of Jewish extraction, was born in London Dec. 21, 1805. He published novels entitled "Vivian Grey" (1826), "The Young Duke" (1830), "Contarini Fleming" (1832), and "Henrietta Temple," some of which were successful. He began his political career as a radical, and offered himself as a candidate for Parliament in 1831, but was defeated. Having become a Tory, he was again repulsed by the electors of Taunton in 1835, but was elected a member of Parliament for Maidstone in 1837. His maiden speech was so pretentious, and uttered with gestures so extravagant, that he excited the laughter of the House, and closed abruptly, saying, "I shall sit down now, but the time will come when you will hear me." He married in 1839 the widow of Wyndham Lewis. Having gradually acquired skill as a debater, he became about 1842 the leader of the "Young England party" and an opponent of Sir Robert Peel, whom he denounced with unsparing invective because Peel advocated the repeal of the Corn laws. In 1844 he produced "Coningsby," a political novel, which was much admired. In 1846 he was returned to Parliament for Buckinghamshire, which he represented for many years. He succeeded Lord Bentinck, who died in 1848, as leader of the protectionist party in the House of Commons. He was chancellor of the exchequer in the conservative ministry of Lord Derby for nearly nine months in 1852. About the end of that year he resumed the post of leader of the opposition in the House of Commons. Early in 1858 he was again appointed chancellor of the exchequer in the new conservative Derby-Disraeli ministry. In 1859 he introduced a bill for parliamentary reform, which was rejected by a majority of the House of Commons. He therefore resigned with his colleagues in June of that year. He opposed the electoral Reform bill of Russell and Gladstone, which was defeated in June, 1866. The liberal ministers then resigned, and the conservatives formed a new cabinet, in which Disraeli was chancellor of the exchequer. He also became the leader of the House of Commons, and the most prominent minister except the premier, Lord Derby. He was the principal author and manager of the Reform bill which became a law in Aug., 1867, and extended the right of suffrage to every householder in a borough. This bill enfranchised nearly a million of men, mostly workingmen, and was considered a dangerous innovation by the conservatives. Disraeli succeeded Lord Derby, who resigned the place of prime minister in Feb., 1868. He opposed the resolutions or bill which Mr. Gladstone introduced to disestablish the Irish (Episcopal) Church. After a long debate, Mr. Gladstone's resolutions were adopted by the House of Commons on the 1st of May, 1868, by a majority of 64. Disraeli, though defeated on this important question, resolved not to resign office, but to wait for the result of the general election which occurred in the next November. The liberal party having secured a large majority in the new Parliament, he and his colleagues resigned Dec. 2, 1868, and Mr. Gladstone then became prime minister. An early poetical work, entitled "A Revolutionary Epic," was republished in 1864. As Mr. Disraeli declined a seat in the House of Lords which was offered to him, his wife, in acknowledgment of her husband's official services, was raised to the peerage of the United Kingdom as Viscountess Beaconsfield, Nov. 28, 1868. Among the works published by Mr. Disraeli since his entrance on political life are (besides "Coningsby") "Sybil," "Tancred," "A Vindication of the English Constitution," "A Biography of Lord J. Bentinck," and "Lothair," a novel published in 1870. He was chosen regent of the University of Glasgow, 1873, and became prime minister again in 1874.

REVISED BY A. J. SCHEM.

Disraeli (ISAAC), D. C. L., an English *littérateur,* the father of the preceding, was born at Enfield in May, 1766. He studied in Amsterdam and Leyden, and spent some years in France. Inheriting a fortune from his father, a Hebrew merchant originally from Venice, and belonging to one of the Jewish families who escaped to Venice from the Inquisition in Spain in the fifteenth century, he devoted himself to the study of literary history. His principal works are "Curiosities of Literature" (1790), "Calamities of Authors" (1812), and "Amenities of Literature" (1841). Died Jan. 19, 1848.

Disrup'tion [from the Lat. *dis,* "apart," and *rumpo, ruptum,* to "break"], a term generally applied to the schism in the Church of Scotland which occurred in 1843. (See FREE CHURCH OF SCOTLAND, by DAVID INGLIS, LL.D.)

Dissen'ters [from the Lat. *dis,* "apart" (or "differ-

ently"), and *sentio*, to "think"], or **Non-Conformists,** the name given to English Protestants who differ in their views from the Church of England. After the act of Uniformity was passed (1662), about two thousand clergymen seceded, and were called Dissenters. All who refused to take the oaths of allegiance and supremacy, and the Eucharist according to the rites of the Established Church, were excluded by the Test act (1673) from government employment. By the Toleration act (1689), Dissenters obtained legal security in celebrating their worship, and the Corporation and Test Repeal act (1828) enabled them to accept public employment without taking the Eucharist. In 1836 they were first authorized to solemnize marriages in their own places of worship or at a registrar's office. The "General Body of Protestant Dissenting Ministers of the Three Denominations" is the official name of the union of the three boards of Presbyterian, Independent, and Baptist ministers resident in and about the cities of London and Westminster. This union was organized July 11, 1727, and has always taken a leading part in the struggle for the disestablishment of the Church of England. In some European countries Dissenters are called Dissidents. (See also NON-CONFORMISTS, by REV. BEVERLY R. BETTS.)

Dissei'zin [from *dis*, "un," and *seizin*], in law, a term signifying an unlawful ejection of one who is seized of a freehold in lands, so as to deprive him of the seizin and place it in another. The modern equivalent for this word is "adverse possession." There is also "disseizin by election," where a person chooses to consider himself disseized, though he is not so in fact, in order to avail himself of legal remedies applicable to a true disseizin. (See SEIZIN, by PROF. T. W. DWIGHT, LL.D.)

Dissep'iment [Lat. *dissepimentum*, from *dis*, "apart," and *sepio*, to "hedge," to "enclose"], a botanical term applied to the partitions that are formed in the ovary by the united sides of the cohering carpels. Sometimes dissepiments meet in the centre, and divide the ovary or fruit into cells; in other cases they are partial, and leave the ovary one-celled.

Dissidents. See DISSENTERS.

Dissocia'tion, or **Disassocia'tion** [*dis*, "apart," and *socius*, "a companion"], in chemistry, is applied to the investigation of the influence of heat and pressure on chemical action. The word was first introduced into chemical nomenclature by Henry St. Claire Deville, who presented a paper to the French Institute Nov. 23, 1857, "On the Dissociation or Spontaneous Decomposition of Bodies under the Influence of Heat." Deville says in this paper: "When heat acts upon any body it produces an expansion which we attribute to a force called the repulsive force of heat. By selecting a proper compound and heating it sufficiently, the distance between the molecules can be increased to such an extent that they will separate into their elementary condition. This is a spontaneous decomposition, not determined by any chemical action. I propose to call it the *dissociation* of compound bodies."

The decomposition of water by fused platinum in the celebrated experiment of Grove, performed in 1846, was attributed by Berzelius to the catalytic action of the metal; this phenomenon is now explained on the principle of dissociation. Deville repeated Graham's experiment on a large scale by pouring melted platinum into water, and obtained an explosive mixture of hydrogen and oxygen disproportionate to the theoretical quantity; from which he concluded that the molecules recombined on cooling in the water. He believes that at the temperature of melted silver, water is dissociated into its constituent elements.

The next step in the literature of the subject was the publication, Mar. 18, 1861, of a series of researches upon the influence exerted by certain porous vessels upon the composition of the gases that pass through them. Although outside of the line of his studies, yet under the advice of M. Jamin, Deville concluded to publish these researches. A porous porcelain tube was placed in the interior of a large glass tube, and each was provided with separate escape-tubes. On causing hydrogen to pass through the interior tube, and carbonic acid gas through the outer space, the two gases were found to exchange places, and an inflammable gas was given off at the end of the carbonic acid tube. It thus appeared that the hydrogen passed through the pores of the porcelain tube and was replaced by the carbonic acid. There was nothing new in this experiment, as the principle is described in Gmelin's "Chemistry" under the head of adhesion, and the subject was familiar to Priestley. Gmelin says if gas be evolved in an earthen retort or conducted through an earthen tube, a portion of it escapes through the tube, and is replaced by the external air or by nitrogen, or carbonic acid if the vessels be in a fire. He further describes an experiment made by Priestley when an earthen retort is placed under a bell-jar over mercury and heated by a burning glass. If the outer bell-jar contains hydrogen, and the retort atmospheric air and water, the hydrogen will be found to pass through the pores into the retort, and air and water will collect over the mercury under the bell-jar. This was the celebrated experiment of Dr. Priestley, made in the days of phlogiston, and is essentially the same as that described by Deville. Similar experiments were made by Pfaff in 1816, which are reported in Schweigger's "Journal," vol. xviii., page 80. But in the next paper published by Deville, Feb. 2, 1863, he carries the research further than it was done by any other philosopher, and brings it within the domain of dissociation.

The previous experiment of hydrogen and carbonic acid was repeated with steam. In a furnace fed with very compact coal, capable of producing a heat of 1100° to 1300° C., he placed two tubes; through the interior tube, made of porous clay, he forced a gentle current of steam, and through the annular space of the outer tube a stream of carbonic acid gas. A part of the vapor of water is decomposed spontaneously or dissociated in the tube of porous clay; the hydrogen is filtered through to the annular space (as in the previous experiment with carbonic acid and pure hydrogen), and the oxygen remains in the inner tube mixed with a considerable quantity of carbonic acid. Deville obtained in this way one centimètre cube of gas to one gramme of water. The separation of the oxygen is thus accomplished by physical agency. The free hydrogen at this high temperature reduces some of the carbonic acid to carbonic oxide, producing water. There is thus a loss of hydrogen in this experiment, so that the oxygen is always in excess of the quantity demanded by the formula of water. The carbonic acid also brings with it a small quantity of nitrogen of the air. The explosive gas obtained had the following composition:

	I.	II.
Oxygen	55.7	48.6
Hydrogen	24.3	13.1
Carbonic oxide	0.0	25.3
Nitrogen	20.0	13.0
	100.0	100.0

It will thus be seen that Deville was able to dissociate the oxygen and hydrogen of water, and to obtain these gases in a separate condition. His experiment indicates a method for the accomplishment of this desirable result in an economical manner. By employing the carbonic acid resulting from the fire used to generate the steam, we can conceive of a simple system of tubes that would enable us to dissociate water in a way that would yield hydrogen and oxygen for light and heat.

Deville published an account of another series of experiments Feb. 13, 1865. He conducted these upon a somewhat different plan. He had early observed that although compounds were dissociated at high temperatures, yet on cooling the elements recombined before they could be collected; it therefore became necessary for him to devise some plan to obviate this difficulty. He hit upon the following expedient: Through the centre of the system of tubes he arranged a tube for conducting a constant stream of cold water. While the outer vessel was raised to the highest temperature of the furnace, the inside was cold, and thus two surfaces were exposed to the gas—one for dissociating it, the other for condensing one of the constituents before it could recombine. In this way he succeeded in dissociating sulphurous acid at 1200° C. into sulphur and anhydrous sulphuric acid; hydrochloric acid into hydrogen and chlorine; carbonic oxide into carbon and carbonic acid; and carbonic acid into carbonic oxide. In discussing these experiments, Deville uses the phrase *tension of dissociation*, just as we have long employed the expression "tension of vapors," and he says this tension for hydrochloric acid at 1500° C. is very feeble.

In a subsequent article, Jan. 14, 1867, Deville gives a more full development of his theory of dissociation, and furnishes extended tables of the tension of dissociation for a large number of substances. He endeavors to show that it will be possible to accurately ascertain the exact point of dissociation for many bodies now only obscurely understood; and when this point is settled we shall have a new method for the decomposition of compound substances.

A Dutch physicist, Van der Kolk, published a long article in 1866, in which he tried to refute the arguments advanced by Deville in support of his theory, and also criticised many points in Deville's mathematical calculations; but as he repeated none of the experiments, and the errors in the tables were accidental, and corrected by Deville himself before the appearance of the criticism, the value of Van der Kolk's article is chiefly confined to the analysis he gives of the researches of Deville and the meaning to

be attached to the word *dissociation*. According to Van der Kolk, the new theory can be summed up as follows:

"1. From the heat of combustion of two gases and the specific heat of the compound the temperature of the flame can be calculated. The calculated temperature of the oxy-hydrogen flame is 6880° C. Deville believes, however, that the decomposition of water vapor takes place at 2500° C., and that the temperature of decomposition of all gases is below the calculated temperature of its flame.

"2. The temperature of decomposition changes according to pressure, and is in this particular analogous to the temperature of condensation of vapors.

"3. The temperature under one atmosphere for water vapor being taken $v = t$, the temperature of condensation in this case is equal to 100° C. Deville assumes that at $t°$ the vapor of water is partially decomposed into explosive gas; it is then in the condition of dissociation or state of partial decomposition.

"4. The degree of dissociation is expressed in numbers which, in analogy with the expansion of vapors, is called the tension of dissociation. There is a perfect analogy between condensation and chemical union."

Several recent writers have had recourse to Deville's theory of dissociation in explanation of the origin of rocks and the action of forces in primeval chemistry. Among these may be mentioned Fournet and the distinguished American geologist, Sterry Hunt.

Debray, in some researches on dissociation, shows that the law holds good with reference to solids formed by the direct union of a fixed and volatile body. His experiments were made upon Iceland spar heated in mercury vapor 350° C., sulphur 440° C., cadmium 860° C., zinc 1040° C.

Lamy has applied these results to the construction of a pyrometer for the measurement of high temperatures. The instrument consists of a porcelain tube glazed within and without, filled with pure carbonate of lime, closed at one end, and connected at the other with a manometer. By reading the volume of the gas in the pressure-gauge, and consulting the tables of tension, the temperature is determined.

A very full discussion of the subject of dissociation by Mène may be found in the "Revue Hebdomadaire de Chimie," vol. iii., 1871. See also the researches of Graham, Debray, Grove, Regnault, Lamy, Isambert, Frankland, and Clausius. CHARLES A. JOY.

Dissolu'tion [from the Lat. *dis*, "apart," and *solvo, solutum*, to "loosen"], literally, the act or process of dissolving; the separation of any substance into its component parts; the liquefaction of a solid body in a menstruum. The term is also applied to the breaking up of a partnership or of a political or legislative assembly. Thus we speak of the dissolution of Parliament when the members are dispersed without the Parliament being regularly adjourned.

Dissol'ving Views are the enlarged images of transparent pictures thrown upon a screen by means of two magic lanterns placed side by side, with their lens tubes a little convergent, so that the projected images may be superposed. By means of mechanical contrivances, which differ in different forms of the apparatus, one of the images is gradually extinguished while the other is similarly developed. At the middle point the two are confusedly intermingled, and afterwards one seems to swallow up the other. (See MAGIC LANTERN.)

Dis'sonance [from the Lat. *dis*, negative, and *sono*, to "sound"] is the opposite of *consonance*, and is applied to those intervals in music whose relative proportions are unsatisfactory to the ear. In a special sense, the term is applied to a dissonant interval purposely introduced by the addition of a dissonant note to a concord, or by the substitution of a dissonant for a concordant note. The foundation of dissonance is generally allowed to be more æsthetical than intellectual. Dissonance is not a necessity of musical composition, and persistent dissonance would be a blemish; but its introduction transitionally, in passing from concord to concord, is a source of richer and more pleasing effects than could be produced by any succession of perfect harmonies. (See DISCORD.)

Dis'taff [Ang-Sax. *distæf*], an implement formerly used in spinning flax or wool, which was fastened on a staff from which the thread was drawn by the fingers. The Fates are represented as spinning the thread of life from the distaff. The distaff is at present not much used except in rude and barbarous countries; but no spinning-wheel, much less any machinery driven by water or steam, has ever produced work which can compare in delicacy with the finest products of the distaff.

Distance, in music, is the interval between two notes. In astronomy, "real distance" is an interval between two heavenly bodies expressed in terrestrial measures, as miles, métres, etc.; "mean distance" is a mean between the perihelion and the aphelion; "curtate distance" of a planet is the distance from the sun or earth to that point where a perpendicular let fall from the planet meets with the ecliptic. "Line of distance" in perspective is a straight line from the eye to the principal point of the plane. The "point of distance" is that point in the horizontal line which is at the same distance from the principal point as the eye is from the same. "Distance" in navigation is the number of miles from point to point in a ship's course. The arc of a rhumb line between two places is the "nautical distance." "Distance" in horse-racing is the last 250 yards of the course. Any horse not reaching the distance-post before the winning horse has reached the end of the course is said to be distanced.

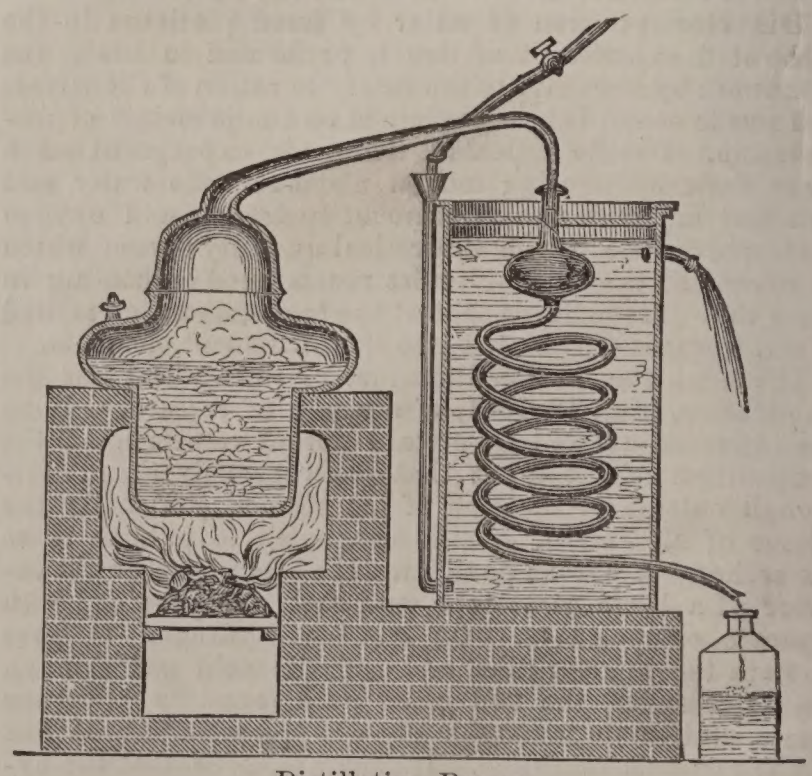
Distem'per [Fr. *détrempe;* It. *tempera*], a method of painting in which the pigments are ground up with size and water, with gum-water, or similar vehicles. It is employed in scene-painting and in the preparation of wall-paper. Distemper was the ordinary method of painting in the higher departments of art before the invention of painting in oil. The rapidity with which the vehicle dries renders it difficult to blend the tints in distemper.

DISTEMPER, the name of certain diseases of animals. (See DOG DISTEMPER and HORSE DISTEMPER.)

Dis'tich [Gr. δίστιχος, from δί (for δίς), "twice" or "two," and στίχος, a "row," a "verse"], a couplet of verses. In the Greek and Latin languages this term is applied to a poetical sentence consisting of two lines in hexameter and pentameter verse. The distich was much used by the Greeks and Romans in the expression of single thoughts and sentiments, and in the composition of epigrams.

Distilla'tion [from *dis*, "apart," "one by one," and *stillo, stillatum*, to "drop"], in chemistry and the arts, a process by which substances which are vaporized at different temperatures are separated from each other, or substances which can be vaporized are separated from those which cannot. When the vaporized substance assumes a solid form after distillation, the process is called "sublimation." Distillation is usually performed by means of a boiler for raising the vapor, and a condenser for reducing the vapor to a liquid or solid form. The condenser is often a spiral tube or "worm," which is kept cool by water while in use. Various instruments for distilling are used in the laboratory of the chemist. "Dry" or "destructive" distillation is the production of new compounds by submitting substances of organic origin to a high but carefully regulated heat. These products are often complex, but sometimes perfectly definite. "Fractional" distillation is the separation of one volatile substance from another, by keeping the mixture at that temperature at which the most volatile will pass over into the condenser.

To produce spirits two distinct operations are required: one to convert vegetable principles into alcohol; the other the separating of the alcohol from the several substances with which it is united while being produced. Sugar is the



Distillation Process.

principle which is necessary to the formation of alcohol, and is used *directly* when molasses and similar saccharine products are submitted to quick fermentation; and *indirectly* when sugar is produced from the starch which certain grains contain, and afterwards converted into alcohol. The latter method is commonly employed in distilleries, and grains of various kinds, generally with some malt, are *mashed*. To accomplish this, a mixture is made of the ground grain and crushed malt, and infusion made in hot

water, constantly shaken, in the mash-tun, after which the wort is run off and water added until the soluble matter of the grain is extracted. While in process of mashing, sugar is formed from the starch, and changes into alcohol while fermenting; the mash gradually becomes thinner in consequence, and as soon as the proper state is reached, which the hydrometer determines, in order to prevent acetic fermentation it should be distilled.

Much skill and care in mashing, fermentation, and distilling is necessary to the successful production of the greatest possible amount of alcohol from a given quantity of grain, fruit, or other raw material. According to Hermstadt, about 51 pounds of alcohol and 49 of carbonic acid may be obtained from 100 pounds of sugar: 100 pounds of starch yield 35 pounds of alcohol, and the same quantity of the following grains yields a spirit containing 45 per cent. of alcohol—namely, wheat, 40 to 45 pounds; rye, 36 to 42; barley, 40; oats, 36; buckwheat, 40; maize, 40.

REVISED BY CHARLES W. GREENE.

Distilled Water (*aqua destillata*) is the condensed product obtained by the distillation of water, which separates from it all saline matter and impurities, and also most of the air which it had previously contained. On this account it is flat and vapid to the taste. It is much used in chemical and pharmaceutical operations. In some points on the Gulf Coast of the U. S., as at Brazos Santiago, Tex., where streams are unknown and springs scarcely exist, water is procured for drinking and other economical purposes by distillation from the sea. On some sea-going steamers the product of the condensers of the low-pressure engines is utilized for cooking, washing, etc., and is used for drinking to some extent.

Distillery, an establishment fitted up with the necessary apparatus for the distillation of spirits. (See DISTILLATION.)

Distress′, or **Distrain′,** in English law, is the taking of a personal chattel without process of law out of the possession of a wrong-doer, by way of pledge for redress of an injury or for the performance of a duty, as for non-payment of rent or taxes, etc.

Distribution of Species. See GEOGRAPHICAL DISTRIBUTION OF SPECIES.

Dis′trict, a township of Berks co., Pa. Pop. 724.

Dis′trict [from the Lat. *distringo, districtum,* to "bind;" also to "divide"], a territorial division; a defined portion of a state or city, which is divided into districts for judicial, fiscal, or elective purposes. In the U. S. each State is divided into Congressional districts, which are nearly equal in population, and elect each one member of Congress. Every State is also divided into senatorial districts, each of which sends a member to the senate of that State. Townships in many parts of the U. S. are divided into school districts, each of which maintains and manages one or more public schools. There are also military and other districts.

District Attorneys of the United States. The name of these officers does not indicate their duties or the extent of their official jurisdiction. Formerly, in England, and now in some of the American States, a district of country embracing several counties was assigned to a judge, in which he held criminal courts called Oyer and Terminer—to "hear and determine." An attorney to represent the Crown or State was necessary to enter upon trials. As he was selected to proceed through the whole district, he received the appellation of "district attorney." In the Federal courts, and in many of the States, the duties of this officer have become local, confined to a particular county or place of holding a single court. But the name of the officer continues the same as formerly, when there was reason for its application to him. District attorneys represent the U. S. in all their business in the circuit and district courts, both civil and criminal. In civil suits they stand in the same relation to the government that other attorneys do to their clients. They also represent the U. S. in the prosecution of all crimes and misdemeanors. This office is one largely sought for by lawyers. The position is considered highly respectable, and is often exceedingly profitable. The district attorneys receive a nominal salary of two hundred dollars, and the residue of their compensation is mainly derived from fees prescribed by an act of Congress. When they defend officers and others at the instance of the government, their remuneration is not regulated by law, but depends upon agreement. The district attorneys are required by law to report to the attorney-general an account of their official proceedings, and the state and condition of their offices, at such time and in such manner as he may direct. (See "Federal Government," by R. H. GILLET.)

District Courts of the United States. See COURTS, by GEORGE CHASE, LL.B.

District of Columbia, a tract of territory lying on the Potomac River, about 300 miles from the ocean by that river and the Chesapeake Bay, between the parallels of 38° 51′ and 39° N. lat., and the meridians of 76° 58′ and 77° 06′ of W. lon. from Greenwich. The exact latitude and longitude of the "Observatory," which is our national prime meridian, is lat. 38° 53′ 39″ 25‴ N., and lon. 77° 2′ 48″ W. from Greenwich. It is bounded N., N. W., E., and S. E. by Maryland, and W. and S. W. by the Potomac River. Its present area is 64 square miles. Originally its area was 100 miles, consisting of a square tract lying on both sides of the Potomac, and measuring ten miles on each side. The portion E. of the Potomac, containing 64 square miles, was ceded to the general government by the State of Maryland, and that W. of the river, containing 36 square miles, by the State of Virginia in 1788–89, was accepted in 1790, and since 1800 has been used as the seat of government of the U. S. In 1846 a desire having been expressed, both by the inhabitants of the portion of the District W. of the Potomac and the State of Virginia, that that portion (which included the city of Alexandria) should be retroceded to Virginia, a resolution was passed in Congress July 9, 1846, consenting to the retrocession, upon condition of the approval of the citizens residing in that part of the District. On the 1st and 2d of September of the same year a vote was taken, and the retrocession was desired by a vote of 763 in its favor, and 222 against it. The President issued his proclamation ratifying the transfer Sept. 7, 1846. The present District therefore includes only the territory originally ceded by Maryland. This territory is about 10 miles long from N. W. to S. E., and forms the county of Washington, containing the two cities of Washington and Georgetown, and a tract of about 37 or 38 square miles outside of the cities. The surface is rolling and diversified, some of the hills being 200 or 300 feet in height. The sites of Columbian University and the University of Georgetown are both considerably elevated, and the Capitol and the President's Mansion are on high land overlooking the other portions of the city of Washington. The soil is a light, rather sandy, but tolerably fertile loam, easily tilled. The District is well watered. The Potomac, which washes its western and south-western borders, is navigable for the largest class of vessels as far as Greenleaf's Point, the southern extremity of the city of Washington, and for smaller vessels to Georgetown. Tidewater ceases at Little Falls, 3 miles above Georgetown. The Eastern Branch of the Potomac, called also Anacostia Creek or River, is a large and navigable stream for vessels of large draught as far as the navy-yard, and for coasting-vessels nearly to Bladensburg, and forms the S. E. boundary of the city of Washington. It has the U. S. navy-yard on its banks. There are nine or ten small creeks falling into the Potomac within the limits of the District, one of them, Rock Creek, though not navigable, being a considerable stream. The whole of the present territory of the District belongs, so far as superficial rocks are concerned, to that extensive cretaceous formation which extends in a belt from five to fifteen miles in width from Staten Island to Fort Washington opposite Alexandria, Va. Through West New Jersey, Northern Delaware, and Central Maryland, as well as in the District, it is characterized by large deposits of marl, and forms the basis of a soil which furnishes the means of its own renewal. It is underlaid by gneiss, the trend of which is nearly E. and W., and which comes to the surface, across the Potomac, in that part of Virginia which originally appertained to it. A considerable portion of the District is covered, above the cretaceous rocks, by drift, consisting of sandstone, limestone, jasper rocks, quartz in boulders, pebbles, gravel, sand, clay, and loam. The mixture of clay and loam abounds in a peculiar state of aggregation, as if it had been at first separate, and then conglomerated in masses of considerable size. Some of this conglomerate, having, however, a large mixture of pebbles and jasper rock, has been taken from the bed of the Potomac and cut and polished for use in pillars for the interior of the Capitol, for which purpose it is regarded as superior to breccia. The simpler forms of the conglomerate are well adapted to brickmaking. The minerals are those usually occurring in cretaceous deposits, and possess little special interest. Gold has been discovered in small quantities at the Great Falls of the Potomac.

Zoology.—In so limited and, for the most part, densely populated a tract as the District of Columbia it is not to be expected that there should be any great number of wild animals. The fauna of the district is generally identical with that of Maryland and Eastern Virginia. There are a few deer, and foxes of two species, the red and gray; rabbits, field-mice, muskrats, and squirrels are abundant. The otter, though now rare, is occasionally met with along the Potomac. The skunk, secure in his powers of offence and defence, is sufficiently plentiful, while the raccoon and opos-

sum, the mink, a species of weasel said to be identical with the English stoat or ermine, though not assuming the white coat, five species of squirrel, the wood-chuck, four species of wild rat, three of shrew-mice, the jumping mouse, two species of long-tailed wild mice, six species of bats, the common and star-nosed mole, make up the quadrupeds of the District. Of birds there have been 236 species collected within the District. There are included in these the numerous swimmers and waders which frequent Chesapeake Bay and the adjacent rivers, as well as the great variety of song-birds which abounds throughout the Middle States. Of the reptiles, 52 species have been collected, though some of them are very rare. Among these there are nine species of turtles and terrapin, three species of true lizards, twenty-one species of serpents, of which only the copperhead (*Ancistrodon contortrix*) is venomous, nine species of frogs and toads, and ten species of salamanders or water-lizards. The following fish are brought into market from the Potomac within the bounds of the District: Shad and herring (the Potomac herring is regarded as greatly superior to all others, and is taken in immense quantities), cat-fish, chub, eel, gar-fish, white and yellow perch, pike, rock-fish, sturgeon (of enormous size), sun-fish, suckers, and black and other bass.

Vegetation.—There are fifteen species of oak, of which the scrub or bear oak, the laurel oak, and Bartram's oak are the most common. The other forest trees are the chestnut, two or three species of hickory, black walnut, butternut, yellow pine, and, less abundant, the American elm, linden, and rarely the tulip tree and red maple. On the old fields the dwarf pine, Virginia cedar, and sassafras grow where other vegetation fails. Most of the forest trees are of the second or third growth.

Climate.—The temperature of the District has a wide annual range—from 105° F. (in the shade) to −12° F. But these are extremes rarely reached. The mean temperature of January, the coldest month, is about 32°, and of July, the warmest, about 77°. The mean temperature of the year is about 56°. The worst feature of the climate is one common to a large section of the Middle States—the sudden falling of the temperature to the extent of thirty degrees or more in the course of a few hours. These sudden changes come oftenest in winter, and are usually accompanied with a N. W. wind. The low grounds in the river-bottom are decidedly miasmatic, and bilious and remittent fevers and bilious pneumonia are very prevalent at that season. Of late years the winters have been much more moderate than they were in the early history of the District. The river is usually closed by ice in the early part of January, but of late years there has been no crossing of heavy teams on the ice, as was the case forty to sixty years ago. The prevailing wind in winter is from the W. or N. W., and in summer from the S. The average annual fall of rain is forty inches, the larger portion falling in the summer months. The range of the barometer is nearly or quite two inches. Storms seldom last so long as twenty-four hours, and foul weather usually commences about 4 A. M. or 3 P. M.

Agricultural Products.—The area of the District comprises 40,960 acres, but of this a considerable portion is water, and the cities of Washington and Georgetown occupy nearly 8000 acres. There were in 1870 only 11,677 acres reported as farms in the District (the market-gardens do not seem to have been reported); of these, 3411 were either woodland or other unimproved lands. The whole number of farms was 209, ranging from 3 acres to 100 or more. The value of the farms was stated at $3,800,230, an average of about $325 to the acre. The value of farming implements, etc. was $39,450; wages paid, $124,338; value of farming products for the year, $319,517; produce of market-gardens, $112,034; of orchard products, $6781. The staple products were—40 bushels of peas and beans; 27,367 bushels of Irish potatoes (*Solanum tuberosum*) and 5790 bushels of sweet potatoes (*Batatus edulis*); 900 gallons of wine; 4495 pounds of butter; 126,077 gallons of milk sold; 2019 tons of hay.

Manufactures.—According to the census of 1870 there were in the District 952 manufacturing establishments, the motive-power of which was 54 steam-engines of 789 horse-power and 15 water-wheels of 1100 horse-power. These establishments employed 4685 hands—viz. 4333 men, 216 women, and 136 children. The capital invested was estimated at $5,021,925; the wages annually paid at $2,007,600; the raw material used at $4,754,883; the annual product at $9,292,173. The manufacture of largest aggregate amount was of flour and grist-mill products (the flouring-mills of Georgetown having a national reputation); there are nine of these mills, and their annual product is reported at $1,543,576. Next to this is carpentering and building, in which 68 establishments, employing 506 men, report an annual product of $1,195,728; printing and publishing produced $688,605; bread, crackers, etc., $550,943; the manufacture of gas (two establishments), $550,760; men's clothing, $442,020; boots and shoes, $291,136; tin, copper, and sheet-iron ware (44 establishments), $246,157; plumbing and gas-fitting, $177,155; painting and paper-hanging, $245,305; brick, $257,800; lumber, $207,000; liquors, $168,950; marble and stone-work, including monuments, $241,050; carriages and wagons, $248,897; leather, tanning and dressing, $146,475; iron and iron castings, $146,695; blacksmithing, $151,258; masonry, brick and stone, $128,730; confectionery, $112,664; butchering and meat products, $124,372; sash, doors, and blinds, $109,000.

Railroads.—The territory of the District is so small that there is little room for railroad extension. It has, however, two lines of railway connecting it with Baltimore; a metropolitan branch railway, extending to Rockville; a line extending across the Potomac, and there connecting with the Washington and Ohio, the Orange and Alexandria, and other Southern R. Rs.; and several street railways. The entire length of railway track in the District is probably not far from 42 miles, of which all except the metropolitan and street railways is controlled by companies outside of the District.

Finances.—The valuation of real estate (except that of the U. S.) in the District for the year 1873 is $95,500,000. The real estate belonging to the government in the District is estimated at $104,500,000. There is no valuation of personal property by the District authorities. The "true" valuation reported by the U. S. marshal in 1870, of real and personal estate, was $126,873,618. The bonded debt of the District Nov. 1, 1873, was $9,902,251.18. How much floating debt there was aside from this at that date does not appear. The income from taxes (2 per cent.) for the year ending June 30, 1874, was estimated at $1,910,000; from other sources, $300,000; total, $2,210,000; the estimated expenditure, $2,224,907.46. To meet this excess there were arrears of taxes from previous years amounting in all to several hundred thousand dollars. Large sums had been expended by the board of city works in grading, paving, sewering, and improving the broad streets of the city of Washington, as well as in building drives and boulevards into the adjacent country, and the debt created for these purposes was large for the amount of property subject to taxation. The U. S. government has, however, made very liberal grants in aid of the District, as indeed it was in duty bound to do, from the large amount of government property in the District. The internal revenue receipts from the District for the year ending June 30, 1873, were $133,424.58.

Commerce.—Georgetown has a considerable coasting-trade, which has been steadily maintained for nearly eighty years. The city is a port of entry, and includes in its territory the whole District of Columbia. The imports at the port for the year ending June 30, 1873, were $18,867, and the exports $10,688. The amount of coastwise tonnage entered at the port in the year ending June 30, 1871, was 280 vessels (184 steam and 27 sailing). Their aggregate tonnage was 104,858 tons, and the crews numbered 3662 men and boys. The clearances for the same year were 158 (84 steam and 74 sailing) vessels, having an aggregate tonnage of 66,359 tons, and crews numbering 2219 men and boys. The monthly returns for 1873 indicate about the same number of vessels, etc.

Banks.—There were in 1871 six national banks in the District, but of that number two have since failed, and one has gone into liquidation. The capital of the remaining national banks is $650,000. There are two other banks of discount and deposit—the Farmers' and Mechanics' Bank of Georgetown, capital $300,000, and the Washington Bank, with $279,000 capital. There are also two savings banks—the Washington City Savings Bank and the Freedmen's Savings and Trust Company. There are also six or eight large private banking-houses.

Insurance.—There were July 1, 1873, seven fire insurance companies in the District, having an aggregate capital of $900,000, and assets reported at $2,265,000. There was one life insurance company—the National Life Insurance Company of the United States, capital $1,000,000, reported assets $2,563,912.

Population.—The population of the District in 1800 was 14,093; in 1810, 15,471; in 1820, 23,841; in 1830, 30,261; in 1840, 33,745; in 1850, 51,687; in 1860, 75,080; in 1867, the census of the educational department, 126,990; in 1870, 131,700; estimated population in Nov., 1873, 169,000. Of the population in 1870, 115,446 were natives of the country, 16,254 foreign born, 34,106 had one or both parents foreigners, 29,183 had both parents foreigners. Of the native population 72,107 were whites and 43,325 colored; of the entire population, 62,192 were males, 69,508 females; of the native population, 54,159 were males and 61,287 females; of the white population, 42,980 were males and

45,298 females; of the colored population, 19,197 were males and 24,207 females. There were 3 Chinese and 15 Indians among the inhabitants. Of the total male population, 26,824 were of military age—*i. e.* between eighteen and forty-five years; 33,329 were twenty-one years and upwards, of whom 31,622 were citizens. Of the entire population, 16,954 males and 18,615 females were of school age, or between five and eighteen years. The District in 1870 had 78 blind persons (43 males and 35 females), 134 deaf-mutes (92 males and 42 females), 479 insane persons (341 males and 138 females), and 50 idiotic persons (38 males and 12 females). It should be remarked in relation to the deaf-mutes and the insane, that there is a national institute and college for the former, and a national asylum for the latter, and to both large numbers are admitted who do not belong in the District. The area of the District is so small, and so much of it is covered by cities, that the density of the population is eleven times greater than that of any of the States or Territories. In the census of 1870 it is stated at 2057.81 per square mile.

Education.—Of the 35,569 children of school age in the District in 1870, only 19,941 were reported as attending school. Of these, 5122 were colored and 14,819 whites; 22,845 persons of ten years old and over could not read, and 28,719 could not write. The report of the commissioner of education for 1872 gives the following statistics of education for the year ending Aug. 31, 1872: school population (by the laws of the District between six and seventeen years), 31,671; pupils enrolled in 1872, 15,555; pupils in private schools, 5882; making in all 21,437 under instruction; 14,063 seats provided in the public schools; 263 teachers; amount of school-tax and other income for public schools in 1872, $355,640.07; total payments for public school purposes in 1872, $479,995.94; value of public school property, $951,700. The colored public schools of Washington and Georgetown are remarkably well conducted. There are nine school-houses, several of them very elegant and commodious buildings; 4661 children are enrolled, full one half of the school population; the average attendance is 3261; there are 4259 sittings in the school-houses, and in all 75 schools for the colored children; 84 teachers, all females, and the average salaries of the teachers $756 per year. The number of private schools in Washington and Georgetown in 1872 was 122, with an attendance of 6217. The colleges, etc. are—the Georgetown College or University, situated on the heights of Georgetown, founded in 1789, under the control of the Jesuits, having classical, law, and medical departments. The classical department has 21 professors and 179 students; the medical department has 10 instructors and 62 students; and the law department, 4 professors and 46 students. The library contains 22,000 volumes. It is liberally endowed. Columbian University, formerly Columbian College, on the heights overlooking Washington, established in 1814 and opened for students in 1822, has three departments, academic, medical, and law, and through the liberality of W. W. Corcoran, Esq., and other friends of the university, is now organizing scientific and art departments, for which the capital affords extraordinary advantages. It has 8 professors and 120 students in the academic department, 3 professors and 150 students in the law school, and 8 or 10 professors and 53 students in the medical school. Its library contains about 8000 volumes, and the students have access to the Library of Congress, the largest in the U. S., as well as to other local libraries. Howard University, incorporated in 1867, and intended to have preparatory, normal, academic, theological, medical, law, and agricultural departments, was founded mainly for colored men, though there is no restriction of race or sex in its act of incorporation. It has now in operation a normal school with 180 students, a preparatory with 60, and another with 30 pupils; a collegiate department with 32 students, a law department with 71, a commercial with 30, a medical with 37, and a theological with 26 students. There are 22 professors. The university is insufficiently endowed. It has a library of about 7000 volumes. The National Deaf-Mute College, in connection with the Columbia Institution for the Deaf and Dumb, is the only college for deaf-mutes in the world. It has 8 professors and 66 students. The course does not differ materially from that in other colleges. Gonzaga College is an institution in Washington under the direction of the Jesuit Fathers, and, though possessing a college charter, is rather a collegiate school than a college. It has 7 instructors and about 150 students. Wayland Seminary, a collegiate, theological, and normal institute for the training of freedmen as teachers and preachers, is under the control of the Baptists, and has 3 instructors and 85 students. There are besides these a business college with 160 students, the law college of the (projected) National University, with 3 professors and about 70 students, and a National College of Pharmacy, recently organized. There are also the Smithsonian Institution, with its magnificent collections from the government expeditions; the museums of the several departments, agricultural, naval, medical and surgical, etc.; the Library of Congress and numerous other public libraries; the Naval Observatory, etc. etc. There are in the District 5 hospitals (including one for the insane), 8 homes and asylums for different classes, 5 orphan asylums, and 4 industrial and reform schools. There were in 1870, 127 public libraries in the District, having an aggregate of 409,936 bound volumes, and 569 private libraries, with an aggregate of 383,766 volumes. The Library of Congress alone had 266,000 volumes in 1873, besides 45,000 pamphlets. The District in 1870 had 22 newspapers, with an annual issue of 10,092,800, and a circulation of 81,400 copies. Of these, 3, with a circulation of 24,000, were dailies; 1 tri-weekly, with 2000 circulation; 12 weekly, with 41,900 circulation; 6 monthly, with 13,500 circulation; 1 quarterly, with 3000.

Churches.—In 1873 there were 84 churches in Washington, and about 120 in the District. Of these, 21 were Baptist, with 18 ordained ministers and 7410 members, 22 Sunday schools, 387 teachers, and 2954 scholars; 1 Christian, with 400 sittings and $5000 church property; 2 Congregational, with 1800 sittings and $115,000 church property (in 1873 there was but 1 Congregational church, with 1000 sittings, an average congregation of 800, church property valued at $125,000; the membership was 338; there were 16 ordained ministers, besides the pastor (one since dead), and 2 licentiates; 1187 children in Sunday schools, and annual contributions $9873). In 1870 there were 16 Episcopal parishes, with 16 church edifices, having 6680 sittings, and church property valued at $563,500 (in 1873 there were 16 parishes, 24 clergymen, and an assistant bishop, residing at Bladensburg). The district is in the Protestant Episcopal diocese of Maryland, and its statistics cannot be separated from those of the diocese. The Evangelical Association is reported in 1870 as having 1 congregation, 1 church edifice, 800 sittings, and $20,000 worth of church property. The Friends had in 1870 and in 1873, 1 Orthodox and 1 Hicksite meeting, 2 meeting-houses, about 250 sittings, and not far from $30,000 worth of meeting-house property. There were 2 Jewish synagogues in 1873, 1 claiming to be Orthodox, with about 800 sittings and $30,000 of synagogue property. There were 10 Lutheran congregations in 1870, with 10 church edifices (7 of them in Washington), 3700 sittings, and $223,000 worth of church property. In 1870 there were reported 33 Methodist churches, 36 church edifices, 20,860 sittings, and the value of the church property $815,600. This included at that time the Methodist Episcopal Church, the Methodist Episcopal Church South, and the Protestant Methodists (in 1873 there were 21 of these churches in Washington and Georgetown). The number has somewhat increased in the District, but owing to the Methodist Episcopal division of their churches into several districts, and to the different denominations which claim the name, it is impossible to say just how much. There is 1 New Jerusalem (Swedenborgian) society and 1 church edifice, with 480 sittings and $15,000 property. In 1870 there were 13 Presbyterian churches and 15 church edifices, with 9250 sittings and $405,500 of church property. The number has since increased, and there are now 11 Presbyterian churches in Washington alone, and certainly 7 or 8 in the remainder of the District. There was 1 German Reformed church in 1873, with 1 church edifice, 300 sittings, and about $10,000 of church property. In 1870 there were 11 Roman Catholic congregations and the same number of church edifices, with 9250 sittings, with $886,000 worth of church property (in 1873 there were 14 congregations and the same number of churches and chapels, 22 clergymen, besides a number of professors in Georgetown and Gonzaga Colleges). The church property has also increased in value. There is also a Second Advent church, of which there are no published statistics, and 1 Unitarian society, with 1 church edifice, having 400 sittings and $30,000 worth of church property; one Universalist society, with 1 church edifice (hired); and one Christadelphian synagogue, particulars unknown.

Constitution, Courts, etc.—The District, as such, was an unorganized territory under the sole government of Congress from its first purchase by the U. S. government to Feb., 1871. It had indeed a county organization, and the cities of Washington and Georgetown had charters for their local government; but there was no territorial government; the citizens had no vote, either in District or national affairs, and were not represented in Congress by a delegate, as even the newest and least populous Territories were. Of all the inhabitants of the U. S., the inhabitants of the Federal District, as it was called, alone had no national citizenship. A committee of Congress at each session recommended such legislation and appropria-

tions as were deemed needful for them, but this committee were not, of course, citizens of the District, nor specially interested in its growth and prosperity. As the District increased in population, and came to have more inhabitants than most of the Territories, this condition of affairs naturally induced great discontent, and in the first session of the Forty-second Congress an act was passed organizing a Territorial government for the District of Columbia. This act was approved Feb. 21, 1871. Of course, a Territorial government was the only one possible for it, as it was selected as the site of the capital of the U. S. on the distinctly avowed principle that all interference with the national government by the influence of any State should be avoided. This organic act directed that the government thus created should be known by the name of "The District of Columbia;" that it should be constituted a body corporate with the usual privileges, have a seal, and exercise all other powers of a municipal corporation not inconsistent with the Constitution and laws of the U. S. and the provisions of the organic act. The act provided that the executive power and authority in and over the District should be vested in a governor, appointed by the President of the U. S. with the advice and consent of the Senate, to serve for four years and until his successor was appointed and qualified. The governor must be a citizen of the District, and have resided there for twelve months prior to his appointment. The governor was to have power to grant pardons and respites, commission officers, take care that the laws were faithfully executed, and possess a veto power on all bills passed by the District legislature, which could only be overcome by a two-third vote of both houses, taken by yeas and nays. The secretary of the District was also to be appointed by the President, to serve for four years, and to act as governor in case of death, resignation, disability, or absence of the governor. The legislature was to consist of a council and a house of delegates; the council to consist of eleven members, of whom two should be residents of Georgetown, two of the county outside of Washington and Georgetown, and seven from the city of Washington, all to be appointed by the President by and with the advice and consent of the Senate. They were to hold office for two years, but so classified that five were appointed one year and six the next. The District was apportioned into eleven districts for the appointment of the council. The house of delegates was to consist of twenty-two members, elected by the people by districts, each delegate to be an inhabitant of the district from which he was elected. Twenty-two districts were apportioned for this purpose. The delegates hold office for one year. The sessions of the legislature were annual, and were limited to sixty days, except the first, which might be one hundred days. The portions of the county outside of the cities might be laid out in townships not exceeding three in number, and township officers, to be elected by the people, be prescribed. Suffrage was declared to be universal to all male citizens of the U. S. of twenty-one years or over, except those who were *non compos mentis*, or convicted of infamous crimes. Defaulters, bribe-takers, perjurers, or persons convicted of infamous crimes were not to be eligible to the legislature nor to any office of profit or trust. Members of the legislature were required to take a very stringent oath both as to allegiance and to their not taking any bribes or presents to influence their action. The powers of the legislature were restricted in certain directions in accordance with the Constitution of the U. S. and the peculiar situation and circumstances of the District. A system of free schools was ordered to be established.

The courts of the District remain as established by Congress before the Territorial organization. They are—a supreme court of the District of Columbia, consisting of a chief-justice and four associate justices, having general jurisdiction in law and equity, and possessing also the powers formerly exercised by the judges of the orphans' courts; and a police court, presided over by a single judge. The justices of the peace are deprived of police jurisdiction, but have authority in all civil causes where less than $100 is involved, and to bind over persons arrested for crime to the supreme court. A board of health and a board of public works were to be constituted, the members of both to be appointed by the President of the U. S. and confirmed by the Senate. Of the latter board the governor was to be *ex officio* a member. The salary of the governor to be $3000 per annum; of the secretary of the District, $2000; of the members of the legislative assembly $4 a day, and of the presiding officer of each house $8 a day; the other officers of each house to receive the same pay as members. A delegate in Congress was to be elected by the people in the same way as in the Territories, and for the same time. The members of the board of public works receive a salary of $2500 each, and of the board of health a salary of $2000 each, paid by Congress, except that the governor receives no additional salary as a member of the board of public works, and that any army officer who may be a member of said board cannot receive any increase of pay for his services.

Counties and Principal Towns.—Since the retrocession of Alexandria county and the trans-Potomac portion of the District to Virginia in 1846, there has been but one county in the District, that of Washington. Its population in 1850 was 51,687; in 1860, 75,080; in 1870, 131,700. The only towns or cities in the county of considerable size are Washington and Georgetown. The population of Washington in 1870 was 109,199; of Georgetown, 11,384; and that of the remainder of the District, 11,117.

History.—That portion of the District comprised in the present site of the city of Washington was originally a favorite camping-ground and place of council for the Indian tribes inhabiting the shores of the Potomac (or "River of Swans," as they called it) and its vicinity. Here were held also their war-dances when they were preparing for a hostile expedition against any of the adjacent tribes. Not far from 1660 an English gentleman by the name of Pope, who was somewhat eccentric, purchased a considerable tract of land here, gave to a creek which flowed through his lands the name of Tiber, which it still bears; to the adjacent hill, on which now stands the Capitol, that of Capitoline Hill, and to the whole tract the name of Rome; and amused himself by drawing a plot of a city to be built on his lands, to which he affixed the names of the streets and public places of ancient Rome. He gravely signed his letters and documents "Pope of Rome." In 1718, George Boone, an English gentleman, grandfather of the celebrated pioneer, Daniel Boone, purchased several tracts of land in Berks co., Pa., Maryland, and Virginia, and among them that part of what was afterwards the District of Columbia which Georgetown and its vicinity now occupies. Here he laid out a town, which he named after himself, Georgetown, and which had in the next eighty years attained a considerable growth. The first idea of selecting a portion of territory for the seat of government seems to have been suggested by an insult offered to Congress in 1783, while in session in Philadelphia, by a mob of mutineers which the city authorities could not break up, and which compelled Congress to adjourn to Princeton, N. J. Elbridge Gerry, afterwards Vice-President, offered a resolution that a district should be selected on the banks of the Delaware, and also at the Falls of the Potomac, near Georgetown, for the seat of government. This resolution was adopted, but afterwards repealed. It contemplated two capitals, which was thought objectionable. An attempt was subsequently made to fix upon a site at the Falls of the Delaware near Lamberton, N. J., and commissioners were appointed for the purpose, but failed, and the matter rested till Sept., 1787, when a provision was inserted in the Constitution of the U. S., drawn by the Federal Convention, authorizing the legislature of the U. S. "to provide for the establishment of a seat of government not exceeding — miles square, in which they shall have exclusive jurisdiction." This was ratified by the requisite number of States, and at the first session of Congress under the new Constitution, in 1789, the subject was earnestly debated, offers of cession of territory not exceeding ten miles square being made by Pennsylvania, Virginia, and Maryland. The "act for establishing the temporary and permanent seat of the government of the U. S.," was finally approved July 16, 1790, and provided that the seat of government should be and remain in Philadelphia from Dec., 1790, to Dec., 1800, when it should be removed to "a district of territory not exceeding ten miles square located on the river Potomac between the mouths of the Eastern Branch and Conogocheague," and three commissioners were appointed to perfect the purchase and transfer of the territory and the cession of jurisdiction, and to "provide suitable buildings for the accommodation of Congress and the President, and for the public offices of the government of the U. S." President Washington, after a careful examination of the region, issued his proclamation Jan. 24, 1791, directing the commissioners to locate a part of the district within certain described lines, and submitted to Congress certain questions in regard to the location of the remainder. By another proclamation, Mar. 30, 1791, President Washington declared the entire district located. The commissioners appointed by him subsequently (July 22, 1791) to secure the title to the soil and its proper transfer, as well as a cession of jurisdiction, were Thomas Johnson, Daniel Carroll of Maryland, and David Stewart of Virginia. The land was mostly held by eighteen or nineteen proprietors, who sold it to the government at an agreed price, reserving to themselves rights to their buildings, graveyards, timber, and wood, except where they interfered with the plan for the Federal city. The small remainder of lands, whether owned by small proprietors or minor heirs, etc., were by an act of the Maryland legislature condemned

and appraised, and sold to the government on a fair valuation. The Federal city, afterwards called Washington, was laid out from a plan furnished by Major L'Enfant, and the buildings necessary for the accommodation of Congress and the government were erected and completed before Dec., 1800. Presidents Jefferson and Madison did much to ornament and beautify it. In the summer of 1814 it was occupied by the British naval and land forces, who wantonly set fire to the Capitol, the President's House, the public offices, navy-yard, and printing-offices, destroying property to the amount of nearly $2,000,000. These were all rebuilt on a larger scale, and some of them have been since that time again reconstructed, in accordance with the demand for greater room and accommodations. In 1846 the Virginia portion of the District was retroceded to Virginia.

During the late war the city and District were for a few days in April, 1861, isolated from the North by the destruction of the railroads between Baltimore and Washington. It was more than once in some danger of capture, and was protected by strong forts and earthworks manned by large bodies of troops. There were more than twenty of these fortifications within the boundaries of the District in 1863. There were also during the war many large hospitals for the sick and wounded soldiers in the vicinity of Washington and Georgetown. Since the war the District has made rapid progress in population and wealth, and every year adds largely to its resources for intellectual and æsthetic culture.

Governors.—Since its organization in Feb., 1871, the District of Columbia has had two governors—viz. Henry D. Cooke, from 1871 to 1873, and Alexander R. Shepherd, from 1873 to ——. Its citizens have no vote for President.

(For many interesting facts and statistics of this article, as well as for the complete account of its Territorial organization, finances, etc., we are indebted to His Excellency Gov. Shepherd, and his very thoughtful and courteous private secretary, William Tindall, Esq.)

L. P. Brockett.

District Schools. See Common Schools, by Rev. John G. Baird, Asst. Sec. Conn. State Board of Education.

Ditch, or **Fosse** [Lat. *fossa*], in fortification, a deep trench or excavation around a fort, serving as an obstacle to the enemy and supplying earth for the parapet or rampart. It is generally dry, but is sometimes filled with water. In permanent works, such as the regular fortifications of a town, the rampart and ditch are the most important; the former being inside the latter, and formed of earth excavated from it. The ditch is often 100 feet wide, and twelve feet deep below the natural level of the ground.

Dith'yramb [Lat. *dithyrambus;* Gr. διθύραμβος; etymology doubtful], a kind of lyric poem sung in honor of Bacchus. It was of a lofty but often inflated style; hence the term *dithyramb* is frequently applied to any lyric of a wild and boisterous character, such as might be supposed to be composed in a state of intoxication.

Dit'marsch, North and **South** [Ger. *Norder* and *Süder Ditmarschen*], a portion of the duchy of Holstein between the Elbe and the Eider. Area, about 500 square miles. The people of this district have preserved in a remarkable degree the peculiarities of the ancient Germans and the distinctive features of the old Teutonic character. Ditmarsch has its own code or collection of laws, adopted in 1321. Pop. in 1871, 75,193.

Dit'tany [from the Gr. δίκταμνος; Lat. *dictamnus,* so named from Mount Dicte in Crete, where it grew in abundance], a genus of plants belonging to the order Rutaceæ, with the calyx 5-partite, five petals, unequal, ten stamens, and five one to three-seeded follicular capsules. The *Dictamnus Fraxinella* (*ruber* or *albus*) is a perennial indigenous in Southern Europe, and is often cultivated in gardens. It has red or white flowers, of a powerful spicy fragrance. In the U. S. the name of dittany is given to the *Cunila Mariana,* of the order Labiatæ. It is probable that the dictamnus of the ancients was the *Origanum Dictamnus,* a labiate plant to which the old authors ascribe the most marvellous powers.

Dittee'ah, or **Duttee'ah,** a town of Hindostan, in Bundelcund, 125 miles S. E. of Agra. It is enclosed by a stone wall thirty feet high. It is the capital of a rajahship of its own name. Pop. about 50,000.

Dit'ton (Humphrey), an English mathematician, born at Salisbury May 29, 1675, was minister of a dissenting church at Tunbridge. He was befriended by Sir Isaac Newton, who procured his appointment as mathematical master of Christ's Hospital. He wrote able works entitled "Laws of Nature and Motion" (1705), a "Treatise on Fluxions" (1706), and "Synopsis Algebraica" (1709). Died Oct. 15, 1715.

Di'u, a fortified seaport of Hindostan, on the Arabian Sea, and on an island of its own name near the coast of Guzerat. It has a tolerably safe harbor, and the remains of a famous Hindoo temple. It has been possessed by the Portuguese since 1515. Area of the island, 64 square miles. Pop. in 1864, 12,303.

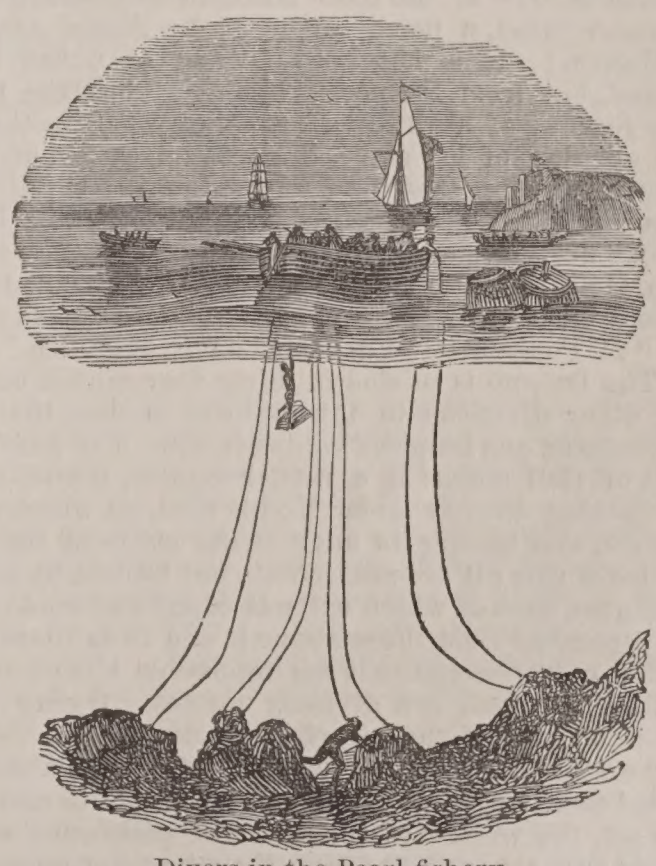
Diur'nal [from the Lat. *diurnus,* "daily," from *dies,* a "day"], as an adjective, is employed either to designate that which pertains to the day as opposed to the night (thus, "diurnal insects" are those which are abroad in the day, while "nocturnal" ones fly by night), or more frequently it is applied to events which occur every day of twenty-four hours. "Diurnal" is also a name sometimes given to the Roman Catholic breviary.

Divan, de-van' [Persian *divân* or *diwân;* Fr. *divan;* Ger. *Divan;* It. *divano;* Sp. *divan*], a word common to several Oriental languages. It is employed by the Persians to denote a collection of poems by one author, as the divân of Saadi and the divân of Hafiz. The term is also applied to a muster-roll or military day-book. The Turkish divan is the great council of the empire or supreme judicial tribunal. The word *divân* is also among the Turks a common appellation for a saloon or hall which serves for the reception of company. Along the sides of this saloon are arranged low cushioned seats or sofas; hence the name has been given in Western Europe to a kind of sofa.

Di'ver (*Colymbus*), a genus of birds belonging to the family Colymbidæ. The bill is straight, strong, and pointed, tail and wings short, and the toes webbed. They dive with great facility, and pursue the fish on which they live under the water. The principal species are the loon or great northern diver (*Colymbus glacialis*), the black-throated diver (*Colymbus arcticus*), and the red-throated diver (*Colymbus septentrionalis*).

Divergent (or **Diverging**) **Series,** in mathematics, a series in which each succeeding term is greater than the term before it. Thus, a series constructed on the formula $x^2 + 2x$, by substituting for x each of the natural numbers in their order, increasing successively, which would give 3, 8, 15, 24, 35, etc., is a diverging series.

Di'vers (in the pearl-fishery) descend through the water



Divers in the Pearl-fishery.

to the bank round which the oysters are clustered, placing their feet, to secure greater rapidity, on a stone attached to the end of a rope, the other end of which is made fast to the boat. They carry with them another rope, the extremity of which is held by two men in the boat, while to the lower part, that descends with the diver, there is fastened a net or basket. Besides these, every diver is furnished with a strong knife to detach the oysters or serve as a defensive weapon in case he should be attacked by a shark. As soon as the diver touches bottom, he gathers the oysters with all possible speed, and having filled his net or basket, he quits his hold of the rope with the stone, pulls the rope which is held by the sailors in the boat, and rapidly ascends to the surface of the sea. Sponges are obtained by a similar process. (*Johnson's Natural History,* vol. ii., p. 525.)

Divertimen'to [an Italian word signifying a "diversion"], or **Divertissement** [Fr. for the same], a kind of musical composition arranged for one or more instruments. It has generally no fixed character, and may be classed between the *étude* and the *capriccioso.* The term is also

applied to a ballet, or songs introduced between the acts of an opera.

Div'idend [Fr. *dividende*, from the Lat. *divido*, to "divide"], in arithmetic, the number or quantity given to be divided; also the sum apportioned to creditors from the realized assets of a bankrupt's estate. The term dividend is also applied to the annual or half-yearly interest on the public funds or national debt, and to the distributed profits of joint-stock companies, which are paid annually or half-yearly to each stockholder.

Divi'ders are instruments for "dividing" or marking off distances, or for drawing circles, ellipses, and other curves. They sometimes consist of two or even three bars or legs, joined at one end by a hinge. Sometimes two movable points are arranged to slide along a "beam" or straight bar. "Proportional dividers" are made of bars crossing each other and pointed at both ends. By means of a sliding joint at the point of union, dimensions included between one of the pairs of points may be made greater or less than those included between the other at the same time in any proportion.

Dividing Engine, a machine for marking the divisions of scales of measurement in scientific, mathematical, and astronomical instruments. Scales for mechanics' work were formerly divided by hand, but it is impossible to attain accurate results by such methods, while by a carefully made engine a most surprising degree of precision is reached. The engines are of various kinds. Their success depends upon the skill, patience, and mathematical knowledge of the constructor. Test-plates for the microscope have been ruled by Mr. F. Nobert of Barth, Pomerania, with divisions only $\frac{1}{240000}$ of a French inch asunder.

Di'vi-di'vi (*Cæsalpinia Coriaria*), a leguminous shrub of tropical America, is valued for its pods, which contain tannin and gallic acid. It grows to the height of twenty feet, and the pod is three inches long. It is used principally for tanning leather and dyeing cloth, and large quantities are exported from Savanilla, Rio Hache, and Maracaibo.

Divi'na Comme'dia [It.], or **Divine Comedy,** the name of one of the most remarkable productions of the human mind, a poem composed by Dante Alighieri. (See DANTE.) It is not known when or where it was composed, but from the poet's having given "the middle of the journey of his life" (*i. e.* about 1300) as the date of the opening of his story, there can be no doubt that it was written after that time, and in all probability after his banishment, which occurred in 1302. The "Divine Comedy" describes a vision in which Dante visits in succession Hell, Purgatory, and Paradise. The structure of the poem consists of three great divisions—"L'Inferno," Hell; "Il Purgatorio," Purgatory; "Il Paradiso," Paradise. The Inferno is related in thirty-four cantos, but each of the other divisions in thirty-three, so that the whole poem contains one hundred cantos in all. The poet's conception of Hell makes it a vast, irregular, funnel-shaped abyss opening directly under Mount Sion, on which stands Jerusalem, and having its apex at the centre of the earth. The sides of this pit are not smooth, but broken by terraces or platforms, each of which extends round the whole circle, and is separated from those above it and from those below it, so that entrance and exit are impossible except to those who, like the poet, are divinely guided. Owing to the funnel-like shape of the pit, these circles necessarily grow smaller and smaller as they descend. Commentators have exercised their ingenuity in calculating the width and depth of the pit, the widths of the different platforms, and the distances that separate one from the other, but no common reckoning has been arrived at. We must imagine the platforms, or "circles," as they are usually called, to be not narrow ledges or steps, but regions of vast extent, and varying greatly in character. In one the ground, or at least a part of it, is covered with fresh, green grass; in another there is no footing, but Dante and his guide look out from the edge of the abyss to where the spirits are whirled about in air dark as pitch, like troops of starlings before the wind: another circle welters in darkness and cold, with hail and mud and snow, and the earth gives out a stench; another is a marsh, in which the sinners are immersed, and through it runs a river on whose opposite bank rises the city of Dis. In other circles are rivers of blood; here is a vast plain filled with tombs like those of the cemeteries at Arles and Pola; in another is a lake of pitch, and in another a vast forest where the trees contain the souls of sinners. In one place the ground is covered with hot sand, while a continual rain of fire falls upon those who tramp wearily along; in another the plain is honeycombed with pits, into which the sinners are plunged head-foremost; and in another still they are frozen in a lake of ice.

It seems obvious that we must argue from the implied vastness of the circles to the dimensions of the whole funnel-pit of the Hell, and not, by limiting ourselves to certain measurements of the breadth and depth of the pit, run the risk of belittling the platforms themselves. Yet this is what naturally results from the measurements given by the commentators, for we are told that "the latest calculation gives 245 miles as the diameter of the abyss at its opening, which reduces the different platforms to a size comparatively small." But no one can read the poem and think of the platforms as anything but vast, and any reasoning that ends by making them small must be wrong reasoning.

Dante is conducted through the Hell and through the Purgatory by the poet Virgil (representing human wisdom), who has been sent to his aid by Beatrice (representing heavenly wisdom), she herself having been despatched to Virgil with this commission by Lucia (enlightening grace), who had been sent by a gentle lady (Divine Mercy) to the aid of Dante, lost in a dark wood in the middle of his life's journey, and terrified by the aspect of threatening wild beasts. Under Virgil's guidance he begins his memorable journey. The events we have thus hinted at occupy the first and second cantos, which are merely introductory. In the third, after passing through the gate of Hell, Dante and his guide find themselves in a region where are the souls of those who, when on the earth, lived for themselves alone. They were mixed with the angels who in the war with Satan stood for neither side—hateful to God and to his enemies. "Do not let us talk about them," said Virgil, "but look at them, and pass on." They then come to the river Acheron, over which we are to infer that Charon ferries them, since Dante says that he fell asleep after a discussion with the grim ferryman as to his right to pass over with the condemned souls, and that when he awoke he was with Virgil in the First Circle. In this First Circle, however, it is not sinners who are punished, but the whole world of the unbaptized and of those who lived before the birth of Christ. This is the Limbo into which the legends make Christ to have descended, and from which he released certain souls. The doom of these is sorrow without torment; Dante hears no lamentations, but only sighs, with which the air trembles. With the Second Circle and the fifth canto begin the true punishments of sinners, the sins deepening in guiltiness as the pit descends, and the punishment growing more intense, painful, and horrible as the circles decrease in size. All the circles, beginning with the second, are included in three great divisions, each set of circles separated from the others by wide spaces. These divisions, to name them after the sins punished in them, are I. Incontinence; II. Malice; III. Bestiality. The sinners whose punishments are included in the first of these great divisions, that of INCONTINENCE, are—1. The carnal; 2. The gluttonous; 3. The avaricious and prodigal; 4. The angry and the sullen. In the circle of the sullen are included the heretics. The second division, that of MALICE, includes—1. The violent against their neighbors; 2. The violent against themselves; 3. The violent against God, or against Nature, the daughter of God, or against Art, the daughter of Nature. The third division, of BESTIALITY, has two subdivisions. In the first are seducers, flatterers, demoniacs, soothsayers, barrators, hypocrites, thieves, evil-counsellors, schismatics, falsifiers. In the second are traitors to their kindred, traitors to their country, traitors to their friends, traitors to their lords and benefactors. (*Longfellow*, "*The Divine Comedy*," vol. i., p. 170.) On reaching the bottom of the pit Satan is found, a monster with three heads and champing a sinner in each bloody mouth. These sinners are the three arch-traitors, Judas Iscariot, who betrayed his God, and Brutus and Cassius, who betrayed Rome. Satan is plunged up to his middle in the vortex of the pit, and the two poets, Virgil leading, climb down his shaggy body, holding by his fell of hair, until they reach the monster's haunches, when they turn and climb up the legs, until at length they find themselves at the foot of a gloomy cavern up whose sides they mount with difficulty, and emerge at the foot of the Mount of Purgatory, a lofty cone that rises in the exact antipodes of Mount Sion on an island in the Southern Ocean. Around it are seven terraces, on which are punished those who have committed the seven mortal sins. These are pride, envy, anger, sloth, avarice and prodigality, gluttony, and lust. From the first canto to the ninth the action is outside the entrance to Purgatory. From the ninth canto to the twenty-eighth the seven circles are described, and from the twenty-ninth to the end the Terrestrial Paradise at the summit of the Mount of Purgatory. When the poets have reached the summit of the mountain they are met by Beatrice, who has descended from Heaven for the purpose, and returning draws Dante after her. The Paradise or Heaven is founded upon the Ptolemaic system, which was the one accepted in Dante's time. Beatrice leads Dante in succession to the seven planets—namely, the Moon, Mer-

cury, Venus, the Sun, Mars, Jupiter, and Saturn. From thence they mount to the sphere of the fixed stars, then to the primum mobile, and finally to the empyrean, where, after a vision of Christ and the Virgin, the poet has a glimpse of the Creator, and the poem closes.

This is the bare skeleton of a work which holds an eternal place in the heart, the intellect, and the conscience of the world, and which numbers now more students and admirers than in any preceding time. It must be closely read and studied to be in any degree understood, and no abstract, or even analysis, of it would be of much service to a person who had not read with deliberate care the whole poem from beginning to end.

The name "Comedy" was given to the poem by Dante himself. In a letter which he wrote to Can Grande, and of which an abstract and partial translation is given by Dr. J. A. Carlyle in the introduction to his admirable prose translation of the Inferno, we find that he says: The title of this work is, "Begins the Comedy of Dante Alighieri, a Florentine by birth, but not by manners" (Incipit Comœdia Dantis Allagherii, Florentini natione, non moribus). He then gives the definition of the words Comedy and Tragedy from their supposed etymologies, and says that Tragedy "speaks in a style elate and sublime, and at the beginning is admirable and quiet—at the end or exit fetid and horrible; while Comedy begins with the asperity of a subject, and ends prosperously, and speaks in a remiss and humble style;" from which he concludes it will be easy to see why the present work is called a comedy. For if we consider the subject thereof, at the beginning it is horrible and fetid, being Hell; at the end prosperous, desirable, and grateful, being Paradise. And if we consider the style of speech, that style is remiss and humble, being the vulgar speech, in which even the women talk with one another. Wherefore it is evident why the work is called a Comedy. As for the word "Divine" prefixed to the title, it is not known just when it began to be used. The first printed edition with the title "Divina Commedia" is said to be the one printed at Venice in 1516 by Bernardino Stagnino de Monferra. Dr. Carlyle says that this edition being very scarce he has not been able to verify this assertion, but he finds the title "Divina Commedia" in the edition printed by Gabriel Giolito di Ferrarii in Venice in 1555. Whoever may be responsible for the word, it is so appropriate, both from the argument of the poem and from its beautiful style, that it can never be separated from the title.

The "Divine Comedy" exists in a great number of manuscripts. Of these the most are in Italy, but there are several in England, and others in France and Germany. There have been over 300 editions printed, and it has been translated into every European language. The earliest printed edition is that of Johanni Numeister, Fuligno, 1472. Dr. Carlyle, in speaking of the edition of Vendelin da Spira, printed at Venice in 1477, says that in some verses at the end is found the epithet "Divine" applied to Dante (*divo* dante alleghieri Fiorentina poeta), and that "later editions speak of the *excelso, glorioso, divino,* or *venerabile* poeta Fiorentino long before they begin to apply the title of Divine to the poem itself." The earliest Florentine edition is that of 1481, to which was added the commentary of Christoforo Landino. Leaving these earliest editions, we find others following in an irregular way, of which Dr. Carlyle gives this brief summary: "Fifteen authentic editions, besides five of doubtful authenticity, were printed within the last thirty years of the fifteenth century; forty-two in the sixteenth; four in the seventeenth, or poorest century of Italian literature; forty in the eighteenth; and in the present century more than one hundred and fifty." The earliest of all the many commentaries upon the poem is that of Jacopo, Dante's son, written in the year 1328. Later came the comment called generally the Ottimo or Best, but also the Anonimo, Buono, Antico; then the comment attributed to Pietro, another of Dante's sons. This was first published by Lord Vernon in sumptuous style, at his own expense, at Florence in 1845. It was written in 1340. In Aug., 1373, the republic of Florence established a professorship of Dante, and Boccaccio was the first lecturer. The salary was 100 gold florins. He began his lectures in the church of San Stefano in Oct., 1373, and continued them till his death in 1375. Other valuable comments are those of Benvenuto da Imola, Boccaccio's pupil and friend; of Landino, one of the successors of Boccaccio, who lectured on Dante from the year 1457; Bernardino Daniello of Lucca, printed at Venice in 1568—this last especially well spoken of by Dr. Carlyle. Merely to name the translations of the "Divine Comedy" would overrun the limits of our article. The best are in England, Germany, and America. In England, Cary's translation of the whole poem is reckoned the standard one; Wright's is also a valuable translation. W. M. Rossetti has published a good translation of the Hell, but by far the best translation is that of Dr. J. A. Carlyle, which unfortunately is only of the Hell, though it has been reported that the other parts are to be translated by the same hand. This version is in prose, but prose so strong, so idiomatic, and so choice that it seems to give back the original almost in its own noble music. The introduction and notes, too, are almost models of what such illustrations should be.

In speaking of the comments upon Dante, we should have mentioned the "Commento Analitico" of the late Gabriele Rossetti, professor of the Italian language and literature in King's College, London. In this comment, and in his book "The Antipapal Spirit of Dante," the author endeavors to prove that Dante's poem was purely allegorical, and intended as a masked attack upon the Romish Church. Professor Rossetti was the father of the W. M. Rossetti mentioned above; and a daughter has recently published a useful guide to the study of the "Divine Comedy," called "A Shadow of Dante."

In Germany there are excellent translations and several editions of value. Kaunegiesser's translation is praised (3 vols., Leipsic, 1814–21); so is that of A. Kopisch (1 vol., Berlin, 1842). The first is a remarkable piece of work in the measure and rhyme of the original; the second is in blank verse, following the Italian line for line. But by far the best German translation is that by the late King John of Saxony, just dead in 1873. He translated the Inferno in 1839; the Paradise did not appear until ten years later (1849). His translation appeared with the *nom-de-plume* "Philalethes." The best German edition is that of Karl Witte; it was published in Berlin in 1862.

In America the "Divina Commedia" has been translated by H. W. Longfellow, and the Hell by Dr. T. W. Parsons, who is intending, however, to translate the whole, and has in fact nearly completed it.

It may not be amiss to mention the fact that illustrations of Dante's poem have been published by John Flaxman, William Blake, and in our own day by Gustave Doré. (See Batini's "Bibliografia Dantesca," Prato, 2 vols., 1845–48; also "Bibliographia Dantea ab anno 1865, inchoata. Edidit Julius Petzholdt, Dresdæ," 1872; Leigh Hunt, "Stories from the Italian Poets," a useful sketch, but injured by much childish animadversion.) Clarence Cook.

Divina'tion [Lat. *divinatio,* from *divino, divinatum,* to "foretell," to "divine"], the art of foretelling future events by superstitious experiments, etc., by observing the flight of birds, the planets, clouds, and also by the alleged influence of spirits. Among the ancient Romans divination was practised in various forms, and is supposed to have originated among the Etruscans. The Israelites were forbidden by the law of Moses from performing divination of any kind. Among the ancient Greeks divination was extensively practised, but it flourished especially in Chaldæa and Egypt.

Divine Right (of Kings), a term used to express the doctrine, probably of very ancient origin, that a monarch was the immediate representative of Deity, by whom alone he could be held responsible for his actions. It would appear that the idea was never clearly developed and systematically advocated till the early part of the seventeenth century, when the great controversies arose in England between the royalists and the parliamentary or commonwealth parties. The doctrine was maintained by Hobbes, Sir Robert Filmer, and others; it was opposed by Milton and Algernon Sydney.

Diving Bell, a hollow, bell-shaped chamber, open at the bottom, used by divers to descend into deep water for the purpose of conducting various subaqueous works or explorations. A kind of kettle is said to have been used by divers in the time of Aristotle. John Taisnier (born 1509) makes in his works the earliest mention of the practical use of the diving bell in Europe. In 1665 it was used to raise portions of the Spanish Armada. Though of clumsy dimensions and imperfect in the manner of supplying air, it was similar in construction to those of the present day. Dr. Halley's plan for supplying fresh air was introduced about 1715. His diving bell consisted of a wooden chamber open at the bottom, where it was loaded with lead to keep it perpendicular in its descent. Light was admitted through glass set in the upper part. Air was supplied by means of a hose attached to casks filled with air and weighted with lead, which were let down lower than the bell. In the year 1779, Smeaton first applied the diving bell to engineering purposes, and in 1788 he contrived to supply it with air by the use of the force-pump. He constructed a diving bell of cast iron, its greatest thickness being at the lower part, that it might not overturn. It sinks by its own weight. In shape it resembles a square chest, and it affords room for two men, being four and a half feet long, the same in height, and three feet wide. This construction of the diving bell gives those within it

no power to raise or sink it. The blows of a hammer on the inside of the bell can be heard by those above the water, and in this manner the divers communicate with the assistants by a series of concerted signals. On account of the cumbrousness of this apparatus, it is little used except for heavy works of subaqueous engineering. For most operations carried on beneath the water a "submarine armor" or diving dress is employed, described in the following article.

Diving Dress, the name applied to a waterproof dress worn by divers, enabling them to walk and work under water. An aquatic armor, consisting of a leather dress and a helmet, is described in Schott's "Technica Curiosa," published in 1664. An India-rubber cloth diving dress has been more recently used, with a metal helmet having in front pieces of plate glass. Attached to the helmet are two tubes—one to admit fresh air in the same manner as for the diving bell, the other to carry off the waste air. Leaden weights are attached to the diver, enabling him to descend and walk about. Communication can be carried on with those above by means of a cord running between the diver and the attendants. The diving dresses in use at present make the diver independent of any connection with persons above the water. They are elastic and hermetically closed. The diver carries upon his back a reservoir containing air compressed to thirty or forty atmospheres, which is supplied to him for breathing by a self-regulating apparatus at a pressure corresponding to his depth. When he wishes to ascend, he simply inflates his dress from this reservoir. Still other forms of diving dress are in use. (For full information on the subject of this article and the preceding, see PRES. BARNARD'S "Report on the Paris Exposition of 1867.")

Divi'ning Rod [Lat. *virgula divina*], a forked branch of wood used for discovering mines, treasures, or water under ground. This use of the divining rod is a superstition of very great antiquity. In Europe it is usually a forked branch of the rowan tree. The favorite in the U. S. appears to be the witch-hazel.

Divinity. See THEOLOGY, by PRES. E. G. ROBINSON, D. D., LL.D.

Divisibil'ity [from the Lat. *divido, divisum,* to "divide"] is that quality of bodies through which they may be separated into parts. The question whether matter can be infinitely divided or not has often been discussed by philosophers. The subdivision of matter in nature is beyond calculation, nor can it be appreciated by our senses. A tube of glass has been drawn out by the blowpipe to the fineness of a silk fibre, still preserving the form of a tube. In the gilding of buttons five grains of gold, applied as an amalgam with mercury, are allowed to each gross, so that the coating left must amount to the 110,000th part of an inch in thickness. A single grain of blue vitriol will tinge five gallons of water. The divisibility of matter is best illustrated in the case of odors. The particles which impress the sense of smell must fill the whole atmosphere for hundreds of cubic feet, and yet a grain of musk may perfume a large apartment for years with scarcely a sensible loss of weight.

Divis'ion [Lat. *divisio,* from *divido, divisum,* to "divide"], one of the four fundamental rules of arithmetic, its object being to find out how often one number is contained in another. The dividend is the number to be divided; the divisor, the number of parts into which it is to be divided; and the value of one of these parts is the quotient; or the divisor may be one of these parts, and the quotient the number of them in the dividend. Division is an inverse process, whose effect is annulled by the direct operation of multiplication. It is necessary in dividing a number to have recourse to tentative processes, suggested by previous knowledge, and the accuracy of the procedure may be tested by multiplication.

DIVISION in logic is the enumeration of the species which make up a given genus; thus tree is divided into oak, elm, etc.

DIVISION in military language signifies—1, two or more brigades under a general officer; 2, two guns of a battery of artillery, with their equipment, etc.; 3, two companies of a battalion arranged in column of two companies.

DIVISION in music is the separation of the interval of an octave into a number of lesser intervals.

Division of Labor, in political economy, designates the plan by which a mechanic or laborer, instead of finishing the whole of any piece of work, is kept employed upon one special department of that work. Many persons are in some trades employed in turning out a piece of work which would formerly have been finished by one man. The first result of the division of labor is the great increase of production, for ten men, each employed upon a special branch of work, will turn out more and much better work than the same ten men would do if each began and finished an entire piece of mechanism. It is objected, on the other hand, to the division of labor that it tends to diminish the versatility and excellence of individual workmen; and this objection is not without force. Division of labor is extending with the advance of civilization. Even the learned professions are influenced by it. Lawyers more and more devote themselves to particular departments of their professional work. Medicine is becoming divided into specialties. No one man is equally expert in every branch of a great science like chemistry, some giving their attention, for example, to organic chemistry, some to toxicology, others to analysis, etc. The general result will undoubtedly be beneficial to society.

Divorce [Lat. *divortium,* from *di,* "apart," "away," and *vorto,* an old form of *verto,* to "turn"] is the dissolution of a marriage by a court of law, or, in some cases, by a legislative or parliamentary act. In heathen nations divorces have generally taken place at the will of the parties concerned, and even the ancient Romans, during the later period of the republic and under the emperors, allowed the greatest license in this respect. Divorce existed to some extent among the Greeks, more especially at Athens. Easy divorce, which had prevailed among the Hebrews, was restrained and discouraged, though not done away with, by the laws of Moses. Among Christian nations marriage is for the most part looked upon as possessing at once a religious and a civil importance. The Roman Catholic Church denies the possibility of divorce, although there are cases in which, according to the canon law, the union is declared to have been illegal from the first, and in reality never to have existed at all. In English law, the word divorce has been applied to two distinct classes of cases—one where the marriage is by competent authority declared to be void from the beginning; the other, where it is conceded to have been valid in its origin, but for some cause subsequently arising it is dissolved or suspended. The first instance is sometimes termed a case of nullity—the second, a case of dissolution or of judicial separation. Sentences of nullity and of judicial separation, not amounting to dissolution, might take place in the ecclesiastical courts. A marriage could only be dissolved by act of Parliament. In the year 1857 an act was passed establishing the "Court for Divorce and Matrimonial Causes," in which was vested the power previously exercised by the ecclesiastical courts as well as by Parliament. In the U. S., as there are no ecclesiastical courts in the English sense, matrimonial jurisdiction is established by statutes in the different States, enumerating the causes of divorce, which are by no means uniform. These, as a rule, are more numerous in the Western States than in the Eastern. The power to grant divorces is in general exercised by courts having equity jurisdiction, though it exists in the legislature, unless taken away by the State constitution. This is the case in a number of the States, and among them New York.

REVISED BY T. W. DWIGHT.

Dix, a township of Ford co., Ill. Pop. 782.

Dix, a township of Schuyler co., N. Y. It contains the greater part of Watkins, the county-seat, as well as other villages. "Watkins Glen," in this township, is a favorite place of summer resort. Pop. 4282.

Dix (DOROTHEA LYNDE), an American philanthropist, born at Worcester, Mass., about 1794, was a school-teacher in her youth. She devoted much time to the work of ameliorating the condition and treatment of prisoners, lunatics, and paupers, for which purpose she visited nearly every State of the Union. She efficiently promoted the establishment of lunatic asylums in New York, Pennsylvania, North Carolina, Illinois, Indiana, and other States. She published several books for children and tracts for prisoners. By petitions to Congress she induced that body in 1854 to appropriate 10,000,000 acres of public land in order to endow hospitals for the insane, but President Pierce vetoed the bill.

Dix (JOHN ADAMS), LL.D., an American statesman and general, born at Boscawen, N. H., July 24, 1798. He entered the army in 1812, and became a captain in 1825, but soon resigned and studied law. He removed to Cooperstown, N. Y., joined the Democratic party, and was elected secretary of state in 1833. After he had passed several years in private life, he was elected to the Senate of the U. S. in 1845, to fill a vacancy. He advocated in the Senate the principles of the Free-Soil Democrats, whose candidate for governor he was in 1848. He was chairman of the Senate committee on commerce. His term expired in Mar., 1849, and he was then succeeded by Mr. Seward. Having visited various countries of Europe, he published a "Summer in Spain and Florence" (1855). He was secretary of the treasury of the U. S. for two or three months from Jan.

to Mar., 1861, and as such issued this famous order: "If any man attempts to haul down the American flag, shoot him on the spot!" In May, 1861, he became a major-general of volunteers, and in July, 1862, he took command of Fortress Monroe. He was appointed commander of an army corps in Sept., 1862, and ascending York River in June, 1863, cut Gen. Lee's communications. He was minister to France in 1867–68, and was chosen president of the Union Pacific R. R. In 1872 he was elected governor of New York by the Republicans.

Dix (Morgan), S. T. D., a son of General J. A. Dix, noticed above, an Episcopalian divine, was born in New York City Nov. 1, 1827, and educated at Columbia College. He became in 1862 rector of Trinity church, New York; he is also president of the standing committee of the diocese of New York, vice-president of the New York Protestant Episcopal public school, and holds various other offices. Among his works are "Commentaries on Romans, Galatians, and Colossians," "Lectures on Pantheism," "Lectures on the Two Estates," a brochure on "Christian Art," and numerous sermons, pamphlets, etc.

Dix'field, a post-township of Oxford co., Me. It has manufactures of lumber and carriages. Pop. 1049.

Dix'ie, a name popularly applied to the Southern States of the Union. The name originated from a well-known song in praise of the charms of "Dixie's Land," a Utopian region so named, it is said, by slaves in honor of a gentleman named Dixie, who was celebrated for his kindness to his servants.

Dix Island, 10 miles S. by E. from Rockland, Me., contains about 55 acres, not of land but of rock, the very best of granite. The Treasury building at Washington was built of this stone. The U. S. post-office and court-house building now in process of erection in the City Hall Park, New York, at a cost of over $5,000,000, is built of granite obtained on this island; the stones are all fitted and marked for their place, and are made ready before they are sent. Each stone, large or small, has its own history; *e. g.* "first story, ornamented column, 15 feet 7 inches long. Time expended on it, 127½ days. Total cost, $745.11." The exact cost for one blacksmith, one cutter, one carpenter, and teaming is stated. It is the same with every stone in that immense structure. There are about 1200 men on the island, besides about 100 women and children. There are three large boarding-houses, besides some sixteen other houses; one school of thirty children; forty workshops, in which some 800 men are employed finishing the stone, and sixty forges for sharpening tools.—*Manuf. and Builder.*

Dix'mont, a post-township of Penobscot co., Me. It has manufactures of lumber, carriages, etc. Pop. 1309.

Dix'on, a county in the N. E. of Nebraska. Area, 550 square miles. It is bounded on the N. by the Missouri River. The surface is undulating; the soil is fertile. Grain is the chief product. Capital, Ponca. Pop. 1345.

Dixon, a post-village of Silveyville township, Solano co., Cal., on the California Pacific R. R., 21 miles W. by S. of Sacramento. Pop. 317.

Dixon, a city, capital of Lee co., Ill., on Rock River, and on the Illinois Central R. R. where it crosses the Chicago and North-western R. R., 98 miles W. of Chicago and 40 miles E. of Clinton, Ia. It has a seminary, seven churches, two national banks, and two weekly and one monthly newspaper, and has good water-power with flouring-mills, four plough and other factories. Pop. 4055; of Dixon township, 4687. Ed. "Telegraph."

Dixon, a post-village, capital of Webster co., Ky., about 62 miles E. N. E. of Paducah. It has one weekly newspaper. Pop. 330.

Dixon, a township of Preble co., O. Pop. 1123.

Dixon (James), D. D., an English Methodist minister distinguished as a preacher and thinker. He occupied important pulpits in his denomination, was the president of its conference in 1841, and its delegate to the American Methodist General Conference in 1848. He wrote, besides other works, "Methodism, its Origin, Economy, and Present Position," and a "Tour in America." Died in 1872.

Dixon (James), an American statesman, born at Enfield, Conn., Aug. 5, 1814, graduated at Williams College in 1834, became a lawyer, was a member of Congress from Connecticut (1845–49), and U. S. Senator (1857–69). Died at Hartford, Conn., Mar. 27, 1873.

Dixon (Joseph), an eminent inventor, born about 1798, was a printer in his youth, and afterwards a wood-engraver. He made important improvements in photography, lithography, banknote-printing, lens-grinding, steel-refining, etc. Died at Jersey City, N. J., June 14, 1869.

Dixon (William Hepworth), an English author and critic, born in Yorkshire June 30, 1821, of dissenting parents, commenced life in a counting-house. He settled in London in 1846, and contributed to the "Daily News." His articles on "London Prisons," which subsequently appeared, revised and enlarged, in book form, in 1850, were the precursors of Mayhew's inquiries into the condition of the London poor. In 1849 he published a "Life of John Howard," which was successful. His reputation was established by "William Penn, an Historical Biography" (1851), in which he set right the mistaken animadversions of Macaulay on the character of the philanthropical Quaker. He became the chief editor of the "Athenæum" in 1853, and vacated the editorial chair in 1869. Among his other works are a "Personal History of Lord Bacon" (1861), "The Holy Land" (1865), "New America" (1867), "Spiritual Wives" (1868), "Her Majesty's Tower," "Free Russia" (2 vols., 1870), and "The Switzers" (1872).

Dixon Mills, a post-township of Marengo co., Ala. Pop. 1000.

Dixon's, a township of Pike co., Ala. Pop. 2240.

Dixon's Entrance, a strait on the W. coast of North America, is 100 miles long. It separates Queen Charlotte Island from the Prince of Wales Archipelago.

Dixon's Tavern, a township of Queen Anne co., Md. Pop. 3626.

Dix'well (John), one of the famous English regicides, was a wealthy gentleman of Folkestone, Kent, born about 1608. He was an active Parliamentarian, and a colonel under Cromwell. Having been a member of the high court which condemned Charles I., he fled, after the Restoration, to Germany, but finally became a resident of New Haven colony in New England, where he died Mar. 18, 1689.

Djemil Pasha, or **Jemeel Pasha,** a Turkish statesman, born at Constantinople in 1827, was the eldest son of the late Resheed Pasha. He was educated at Paris and London, and has for many years been a public officer, especially in diplomatic affairs. In 1866 he was appointed ambassador to Paris.

Dmit'rof, a town of Russia, in the government of Moscow, 40 miles N. of Moscow. It has seven churches, one college, and manufactures of cotton and silk goods. Pop. 8042.

Dmitrovsk', a town in Russia, in the government of Orel, 28 miles S. W. of Orel. It has various manufactures. Pop. 7603.

Dniep'er (anc. *Borysthenes*), a river of Russia, rises in the government of Smolensk. It flows nearly southward to Kief, below which its direction is south-eastward to Ekaterinoslaf. It afterwards runs south-westward, and enters the Black Sea on the N. side. Its length, including windings, is about 1170 miles. The greater part of it is navigable, but numerous rocky rapids occur below Ekaterinoslaf. These obstructions have been partly removed by blasting. The Borysthenes was known to the ancient Greeks, who regarded it as the greatest river of the globe, next to the Nile.

Dnies'ter (anc. *Tyras*, afterwards *Danaster*), a river of Europe, rises in the Carpathian Mountains in Galicia, and flows south-eastward into Russia. It forms the boundary between Bessarabia on the right and Podolia and Kherson on the left, and enters the Black Sea near Akerman, about 30 miles S. of Odessa. Its total length is about 760 miles. The chief towns on its banks are Mohilef, Bender, and Akerman. The navigation of it is difficult.

Doâb' (*i. e.* "two waters"), a name applied in Hindostan to a tract between two rivers, and especially to that between the Ganges and the Jumna. This doâb extends from Allahâbâd to the base of the Himalayas, a distance of 500 miles or more.

Doane (George Washington), D. D., LL.D., an American bishop and poet, born at Trenton, N. J., May 27, 1799. He graduated at Union College in 1818, was ordained as an Episcopalian clergyman in 1821, preached in New York City, and was chosen bishop of New Jersey in 1832. He published a volume of poems (1824) and several works on theology. Died April 27, 1859.—One of his sons, William Creswell Doane, was on Feb. 2, 1869, consecrated bishop of Albany.—A second son, George H. Doane, is a Roman Catholic priest, and was in 1873 appointed vicar-general of the diocese of Newark.

Dob'bin (James Cochrane), an American politician, born at Fayetteville, N. C., in 1814. He became a member of Congress in 1845, and was appointed secretary of the navy by President Pierce in 1853. Died Aug. 4, 1857.

Dobbs Ferry, a post-village of Greenburg township, Westchester co., N. Y., on the Hudson River and on the Hudson River R. R., 20 miles N. of New York. It is a place of summer residence, and has four churches and re-

mains of the military works erected during the Revolutionary war.

Dobell' (Sydney), an English poet, born at Peckham Rye in 1824, was a son of a wine-merchant. He began his literary career by "The Roman," a poem (1850). Among his other works are "Balder" (1854), "England in Time of War" (1856), and "England's Day" (1871). His poems exhibit a mixture of the philosophical and poetical spirit.

Dö'beln, a town of Saxony, on the Mulde, a railway station, 36 miles S. E. of Leipsic. It has a hospital, a realschule, and manufactures. Pop. in 1871, 10,078.

Do'brizhof'fer (Martin), a Jesuit, born at Gratz, in Styria, in 1717. He went as a missionary to Paraguay in 1749, and published at Vienna in Latin a "History of the Abipones" (3 vols., 1784), which was translated into English by Sara Coleridge. Died July 17, 1791.

Dobrow'ski (Joseph), a Bohemian author and philologist, born near Raab Aug. 17, 1753. He was liberally educated, joined the Jesuits, and distinguished himself by his researches into the language and literature of the Slavonic nations. His most important works are a "Grammar of the Bohemian Language," a "History of the Bohemian Language and Literature" (1792), and a "German and Bohemian Dictionary" (2 vols., 1802–21). Died Jan. 6, 1829.

Dobrud'scha, or **Dobrujda,** a name given to the N. E. portion of Bulgaria, which is separated from Moldavia and Wallachia by the Danube. It is bounded on the E. by the Black Sea.

Dob'son, a post-village, capital of Surrey co., N. C., about 55 miles W. N. W. of Greensborough. Pop. of Dobson township, 1255.

Dobson (William), an English painter of portraits and history, was born in London in 1610. He succeeded Van Dyck as court-painter to Charles I. He was reputed the best English portrait-painter of his time. Died in 1646.

Do'ce, Rio (*i. e.* "sweet river"), a river of Brazil, rises in Minas Geraes, flows north-eastward, and enters the Atlantic 60 miles N. of Victoria. Length, including windings, about 500 miles. Its navigation is obstructed by rapids.

Doce'tæ [from the Gr. δοκέω, "to appear," to "seem"], an heretical sect which arose in the first century, denying the incarnation of God in Christ. Some of the Docetæ affirmed the body of Christ to be a mere deceptive appearance; others only denied its fleshly character. Docetism was a form of Gnosticism (which see).

Doç'imacy [Fr. *docimasie;* Gr. δοκιμασία, from δοκιμάξω, to "test," to "examine" or "prove"], or **Docimastic Art,** the art of assaying minerals or ores with a view of determining the quantity of metal they contain.

Dock, a perennial herbaceous plant of the order Polygonaceæ and genus *Rumex,* found chiefly in temperate climates. They have large ovate or lanceolate leaves, and greenish flowers in panicles. They increase rapidly from the seed, and having long tap-roots become very troublesome as weeds. The roots of several species are valued in medicine for their astringent properties; they are also used in dyeing. The yellow dock (*Rumex crispus*) is esteemed in the U. S. as an alterative.

Dockery (Gen. Alfred), born in North Carolina Dec. 11, 1791, was many years a prominent Whig politician and office-holder in his native State, from which he was elected to Congress in 1845 and 1851. He opposed the Democratic party after the close of the civil war. Died in Richmond co., N. C., Dec. 4, 1873.

Dock'et [from *dock,* to "cut off"], a summary, an abridged entry of a proceeding on a piece of paper or parchment. Exemplifications of decrees in chancery, fiats in bankruptcy, and other instruments are thus *docketed* for purposes of reference. The word docket is frequently employed to designate an abridged entry in a book, as in the case of judgments of courts, in order to make them a lien upon land. Docket also denotes a list or calendar of causes ready for hearing or trial, prepared for the use of courts.

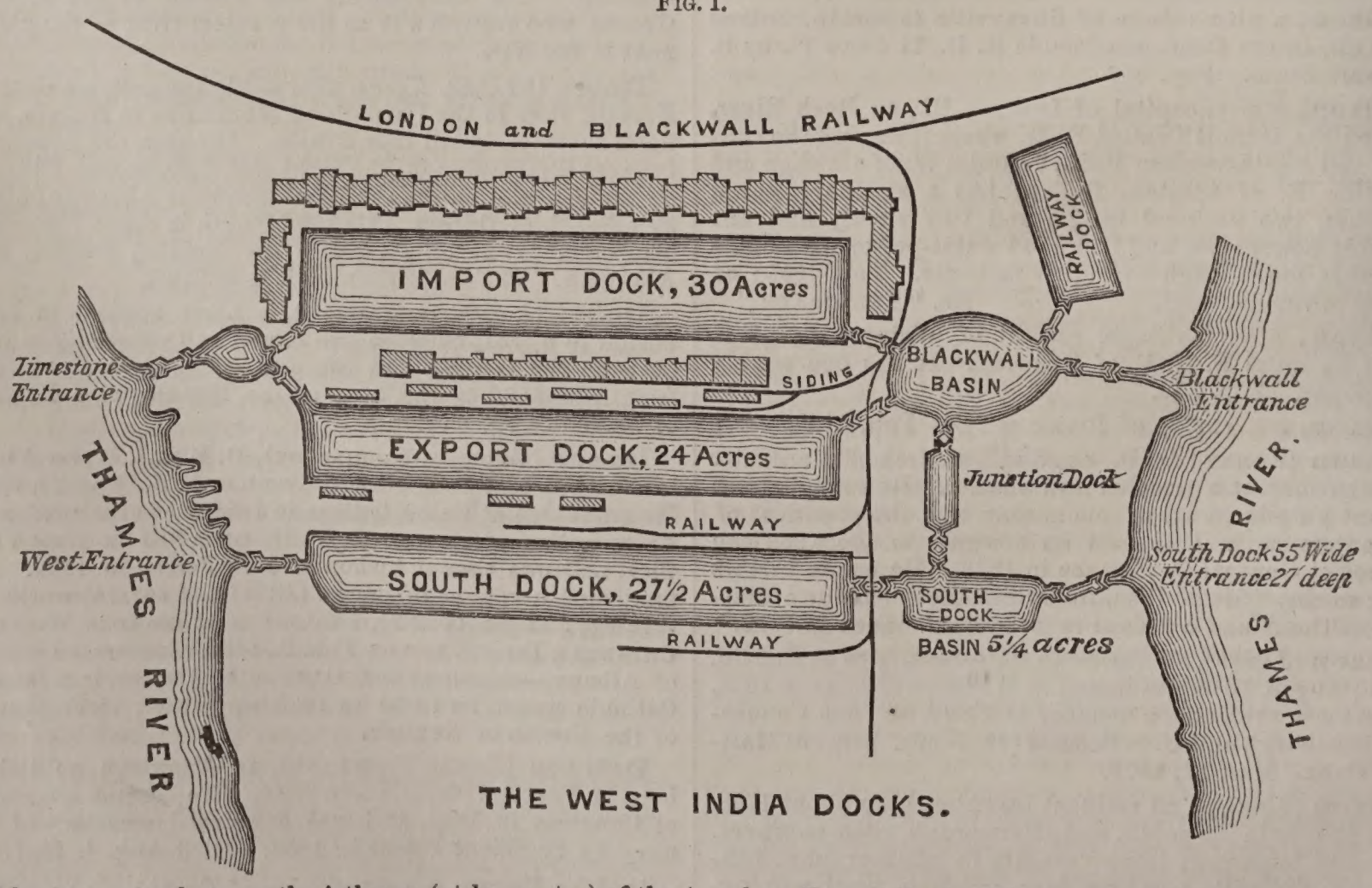
Docks are artificial basins for the reception of ships, and are of two kinds, wet and dry. *A wet dock* is a large basin in which the water is kept at a certain level by means of walls, so as to be unaffected by tidal changes, in order to facilitate the loading and unloading of cargoes. *A dry dock* is intended for the repairing and examination of ships, the water, after the entrance of the vessel, being removed by pumps or other means.

In ports where vessels would be naturally much exposed during rough weather, or where the changes in the tide are very great, the necessity of secure and well-sheltered docks or artificial basins, in which ships may be safely moored and kept at one level, is especially manifest. In the northern parts of Europe the rise and fall of the tides are so great that every port which has any pretensions to a first-class mercantile harbor is necessarily supplied with one or more wet docks; at most of the ports of England, and especially at those of Liverpool and London, docks have been constructed on a truly magnificent scale.

Notwithstanding the obvious importance of wet docks to the vast trade of London, it was not until a few years previous to the beginning of the nineteenth century that plans for docks on anything like an adequate scale were, at the request of a parliamentary committee, submitted by Messrs. Telford and Douglas, among other plans for the improvement of the port of London. The act authorizing the construction of the West India Docks was passed in 1799; work was begun in Feb., 1800, and in 1802 they were so far completed that a homeward-bound vessel entered them.

These, the first docks of London, with their entrances

Fig. 1.



THE WEST INDIA DOCKS.

and basins, extend across the isthmus (at low water) of the island formed by the Thames on the Middlesex side of the river, and called the "Isle of Dogs." They originally consisted of an Import Dock containing an area of 30 acres, and an Export Dock with an area of 24 acres; connecting at both ends by basins and locks with the Thames. They were constructed of brickwork and timber. There was a canal on the S. side of the docks which has recently been

converted into a new dock called the South Dock. The retaining walls of this new dock, which is one of the finest basins of the West India Docks, are 34 feet 10½ inches in height from the bottom of the dock to the top of the coping, where the width is 11½ feet, spreading downward with a batter of 1 in 24; the face and back of the wall are of brick, the former 3 feet 4½ inches, the latter 18 inches thick, connected by vertical transverse walls 2 feet 3 inches in thickness, and placed 10 feet apart, the pockets thus formed being filled with concrete; upon a foundation of which, 3¼ feet in thickness, the wall stands. The bottom of the dock is covered throughout with a layer of puddle 18 inches in thickness. On the N. side are sixteen jetties, projecting into the dock, of timber, 130 feet in length, furnishing accommodations for thirty-two vessels, and opposite each jetty is a buoy for mooring vessels. The area of the South Dock is 27½ acres.

The general plan of these docks, with their entrances and connections, entrance-basins, locks, warehouses, railway connections, etc., is shown in the figure. The cost of the South Dock, with the machinery, railway extension, dock-basins, warehouses, etc., was $2,850,000. It will be seen from the plan that an incoming vessel can pass directly into the Import Dock, unload her cargo, and then, without being locked out into the Thames, when the tide permits may pass into the Export Dock to receive her outward-bound cargo.

The West India Docks proved a very successful undertaking; all West India vessels frequenting the Thames were, for twenty years after their completion, obliged to use them. After declaring annually a dividend of 10 per cent. they had in 1819 an accumulated fund of $2,500,000. Since then their monopoly has expired, and their dock-rates have been reduced from time to time, so that their profit has been greatly diminished.

The East India Docks, which are a short distance to the eastward of the above, were at first intended exclusively for ships in the East India trade, but are now open to vessels from all parts. Their area is 27 acres, exclusive of entrance-basins, and their depth of water is never less than 23 feet. They belong now to the same company as the West India Docks, and have attached to them magnificent warehouses for tea, indigo, drugs, spices, etc.

The London, the St. Katherine, and the Victoria London Docks, also on the N. side of the Thames, are under the control of one company. The London Docks have a water-area of 34 acres, the St. Katherine Docks a water-area of 11 acres, and the Victoria London Docks, situated immediately below the East India Docks, have an area of 74 acres in the inner dock alone, exclusive of 16 acres in the tidal basin. The depth of water in the inner dock varies from 24½ feet to 26½ feet. The entrance to this dock from the Thames is by means of a lock 320 feet in length, 80 feet in width, and with a depth of water on the sill of 28 feet. The jetties, with the sides of the dock and of the basin, provide a length available for quay-room of nearly 3 miles.

On the Isle of Dogs, S. of the West India Docks, are the Millwall Docks, recently constructed, and comprising two basins, one having a water-area of 25 acres, the other of 10½ acres. The Surrey Commercial Docks, intended for ships with bulky commodities, are upon the S. side of the Thames, and have a water-area of 176 acres.

The warehouses belonging to the different dock establishments are of immense size; that of the London Docks, intended for the storage of tobacco, is one of the largest, best-arranged, and finest buildings of its kind in the world. It will contain 24,000 hogsheads of tobacco, and covers nearly 5 acres; the vaults under this and the other warehouses of these docks have an area of 18¼ acres of storage space. On five of the jetties of the Victoria Dock are extensive warehouses, and on the N. side of the dock are several large ones, one of which has an area of 4 acres of flooring. In some cases the warehouses are built close to the water's edge, so that goods may be hoisted into them direct from the hold of the vessel; while generally railway connections are made with the dock, so that goods may be taken to any part of the kingdom without change of carriage. The docks are also provided with cranes and other appliances, worked by steam or hydraulic power, for the rapid transfer of cargoes.

The dock establishments of Liverpool are not excelled in extent and arrangement by those of any port throughout the world. Though the number of vessels belonging to this port is less than that of London, yet the fact that they cannot lie with safety or ease in the Mersey on account of its rapid current and exposed situation, and the great rise and fall of the tides (21 feet at neap and 31 feet at spring tides), require the dock accommodations to be of sufficient extent for the entire trade of the port; while at London the Thames affords a secure and convenient berth for a great number of vessels.

The Liverpool docks have, on the side next the river, a sea-wall of 5 miles in extent, which, when considered in connection with the obstacles to be overcome, is one of the greatest works of modern times. In most cases docks are formed by excavations made on the bank of the river, but at Liverpool they have been formed in the river itself by enclosing, within the wall referred to, a portion of the beach of the Mersey, and afterwards excavating the part thus reclaimed to a proper depth. The wall is 11 feet in thickness and 40 feet in height from the foundation, the more modern parts being faced with granite. There are between thirty and forty docks, having a water-area of 239 acres, exclusive of 19 acres of entrance-basins. The quay-space is over 18 miles. Most of the docks have a separate entrance from the Mersey, and communicate with each other, so that ships may pass from one to another without the necessity of being locked out into the river and back again into the docks. They are also connected with the different railways entering the town, and by a series of locks with the Leeds and Liverpool Canal.

The whole of this immense dock estate is vested in the Mersey Docks and Harbor Board, who enforce strict rules for the maintenance of good order and prevention of fire and depredation. Every precaution is taken to prevent the injury of the docks from the accumulation of mud, by the use of steam dredging-machines. The income of the Mersey Docks and Harbor Board for 1867 was $4,430,000. The revenue of this board, after paying expenses and interest on money borrowed, is applied to the reduction of the dock rates.

The present importance of the port of Liverpool may be said to be chiefly owing to these magnificent docks; for, though it is the emporium of a district rapidly increasing in manufactures and population, the advantages given to commerce and navigation by them have brought to it the greater part of its business and wealth.

Birkenhead, on the Mersey, directly opposite to Liverpool, has a water-area of 165 acres of docks and subsidiary basins; among them are two large docks, one of 52, the other of 59 acres. The quay-space is between 10 and 11 miles in length. Here are also warehouses with their appurtenances, planned on the most approved principles, for loading and unloading ships, safe storage of cargoes, etc. At Bristol about three miles of the old channel of the river was converted into a dock, about 55 acres of which are available for large vessels. Hull has five docks with a water-area of 49¼ acres. Grimsby, Lincoln county, has, in addition to the old works, a new dock of 25 acres, with a tidal basin of 15 acres; the new dock is entered from the basin by two locks of massive masonry, furnished with double sets of gates for ebb and flood tides, the largest of which is constructed to admit the largest class of war-steamers. At Southampton there are docks surrounded by quays, and bonded warehouses, and provided with powerful shears for shifting boilers, heavy machinery, masts, etc. Among other ports of the British Islands which possess large docks may be named Glasgow, Leith, Newcastle-on-Tyne, Tyne, Cardiff, Belfast, and many more.

At Havre, where the rise of the tides is from 20 to 27 feet, there are capacious docks. At Antwerp, where in 1803 Napoleon I., who intended to make it a great naval establishment, undertook the construction of docks on a grand scale, new and convenient ones with warehouses have been opened. At Bremen and Amsterdam docks have been constructed and recently improved.

To give an idea of the importance attached in England to dock accommodations may be mentioned the Barrow Docks at Barrow-in-Furness, a town of 20,000 inhabitants, on the sea-coast opposite the Isle of Man. These docks, opened in 1867, comprise 1½ miles in length of stone quays and 100 acres of wharf-area. The entrance-basin is closed by gates in the usual manner, while the dock is closed by a caisson placed across the entrance and held by a groove in the masonry on both sides. The caisson, when filled with water to the higher water-level, remains standing upon the dock-sill and closes the passage, but when water is allowed to escape from the caisson, so as to fall to the lower level, it floats, and can be drawn to one side, so as to leave the entrance clear. The water maintained in the dock is 22 feet above the dock-sill, the tide outside varying from 25½ feet at spring tides to 18 feet at neap tides.

The new Hendon Dock at Sunderland has been constructed on land wholly reclaimed from the sea; and from the exposed character of the coast, great depth below the surrounding works, the great head of water constantly standing in the old docks in close proximity to the new works, and the exceedingly porous nature of the strata, the difficulties presented to the engineer were of unusual magnitude. The work was enclosed in sections, with barriers formed of timber planking and piling filled with well-puddled clay, and protected with heavy limestone blocks.

The rock was porous and crumbling, and the greatest care was necessary to prevent the water from penetrating and impoverishing the masonry before it set. In the case of the entrances the whole surface of the rock was covered with a watertight platform of brickwork set in the best Roman cement, filling up every crevice in the rock; and upon this the masonry of the walls and sills was laid.

This new dock is 11 acres in extent; the entrance is provided with two pairs of gates, and is crossed by a wrought-iron railway bridge, balanced and turned upon a water-centre, the usual rollers and turntable being entirely dispensed with. The gates and sluices are worked by hydraulic machinery, and there are hydraulic pumps to remove the water between the two pairs of gates, so as to maintain a head of water upon the outer or sea gates during stormy weather, and thus prevent their movement. The entrance is further protected at such periods by booms reaching from side to side, which, by means of a crane fixed on the pier-heads, are dropped into grooves in the masonry fitted for their reception. The walls of the entrance are faced with large blocks of freestone, ashlar masonry, none of the courses of which are less than 2 feet in thickness, backed up by rubble masonry composed of large flat-bedded stones built in the best blue lias pozzuolana. The width of the entrance is 60 feet, and the depth of water above the sills at high water of spring tides is 26½ feet.

In many ports throughout the world—such, for example, as that of New York, where the harbor is naturally protected, and as also in the Mediterranean, where the rise and fall of the tides is so small as not to obstruct the loading and unloading of ships—wet docks are not an absolute necessity to commerce, though there is no doubt that the excellent appendages which are attached to them, such as the wharf-room, the magnificent quays and warehouses, the railway connections, cranes, etc. of the docks of Liverpool and London, and, by no means least of all, the excellent police arrangements for effecting order and safety from fire and depredation, would most certainly greatly promote the commercial prosperity of any port.

But, though in many cases wet docks may be dispensed with, all first-class ports need dry docks for the examination and repair of those parts of a ship which are usually immersed in water. Dry docks may be separated into two classes—the *stationary dry dock*, to which the name *graving dock* is generally applied; and *the floating dock*, of which there are several varieties, to be described hereafter.

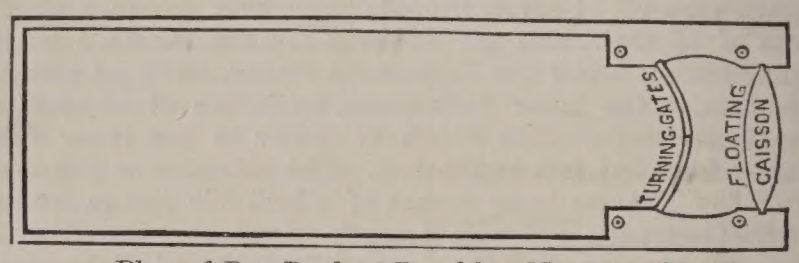
In ancient times, where there was no rise and fall of the tides, vessels were hauled up on the beach and "careened;" where the tides permitted they were grounded at high water, so as to be exposed at low. Sometimes the heaving-down plan was adopted; this was to attach ropes to the heads of the masts of the vessel and to the mooring rings of a quay, or to the deck of another vessel, so as to haul the ship over into a nearly horizontal position on the water, the ballast or weights being removed or shifted. It was while undergoing this very dangerous operation that the Royal George foundered at Spithead in 1782, with 600 persons on board.

This method was supplanted by the *graving dock*, generally constructed of stone, though sometimes of timber, and usually of such dimensions as to contain only one vessel at a time. The sides are formed in steps or altars, so that the form of the dock is somewhat similar to that of the vessel which it is to contain, but sufficient space is left around it to enable the workmen to get at every part of the bottom of the vessel, and to afford sufficient light for their work. The entrance is closed by gates, which open sideways, like a lock or fall, upon the bed of the entrance, or by caissons; the latter, since the introduction of iron for shipbuilding purposes admits of their being made of that material, are almost universally adopted for large docks, and have the advantage of affording the means of retaining the water inside the dock, as well as of keeping it out; which is of importance, where the tide is ebbing rapidly, in allowing time to adjust the vessel before it settles down on the keel-blocks. The vessel is floated into the dock at high water, the gates closed, the sluices opened, and the water allowed to run out with the ebb of the tide, or, where the fall of the tide will not permit, is pumped out, leaving the dock perfectly dry; the vessel being supported on timber struts and shores resting upon the steps already mentioned as forming the sides of the dock.

The U. S. naval graving dock at the Brooklyn navy-yard is, in its dimensions and workmanship, one of the finest in the world. It also possesses many features and improvements that at the time of its construction were unequalled by any other graving dock. Owing to the nature of the soil selected for its site, the excavation for the foundation was attended with many obstacles, and afforded opportunity for the display of great engineering skill. This lower soil was an almost impalpable quicksand, becoming semi-fluid when saturated with water; and before the required level for the foundation had been reached springs coming from a great depth burst up through it, rendering necessary measures to overcome it. This was finally done by driving piles into the cavities formed by the springs, on which a flooring of plank was laid; upon this bricks were laid in hydraulic cement, and upon the brick floor concrete masonry; the whole being done with the greatest despatch; vent-holes for the water were left until the permanent foundations were completed, but in this manner the flow of sand was checked.

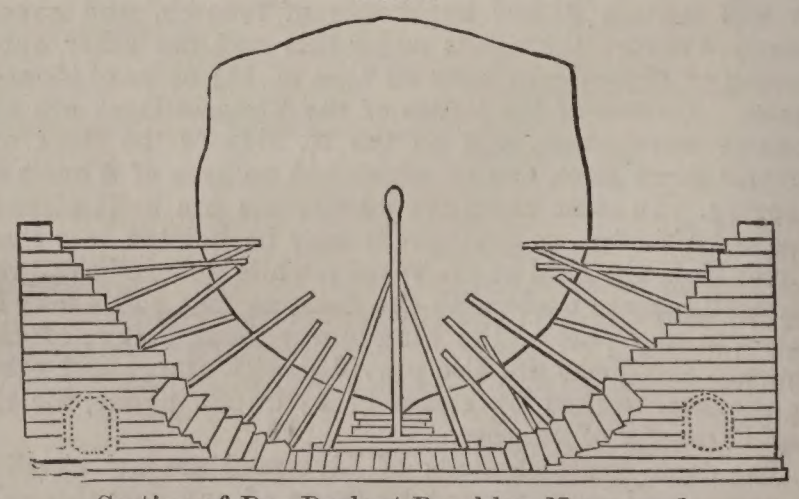
The floor, from 4 feet to 6 feet in depth, is an inverted stone arch, to strengthen it against the pressure of water from below. The masonry foundations are 400 feet in length and 120 feet in breadth. The facing of the masonry is of granite, the side walls being laid up with English bond—that is, alternate courses of headers and stretchers; the courses are generally 2 feet thick, a few near the bottom being 27 inches. The facing stones, averaging 6000 pounds in weight, were backed up with a course of scabbled stone, the interior and rear of the walls being laid up with coursed rubble. The mitre-sills and the keystone are massive granite blocks. The whole was laid in mortar made of the best hydraulic cement and sand. The gates, of iron, are supported on friction rollers, and, with the machinery for turning them, weigh near 200 tons. The caisson is an iron vessel, with keel and stems made to fit the grooves in the masonry at the entrance of the dock. It is 50 feet in length at the keel, and 68 feet 8 inches in length at the rail; its breadth at the centre of the top is 16 feet, at the keel 7 feet. The grooves in the masonry, in which the stems and keel of the caisson fit, are 26 inches in width and 12 inches in depth, from the top to the bottom of the side walls and in the floor. By admitting water into the chambers of the caisson it settles into these grooves and closes the entrance; it is removed by pumping out sufficient water to float it clear of the grooves. Its weight is nearly 218 tons, exclusive of ballast. It is used when greater length of dock may be required, when the turning-gates need repair, or to partially relieve the strain upon them. The engine and pumps are of very large capacity, and will relieve the dock of water in about two hours. In order that the bottom may be dry and free from water, there is a slight inclination in the bottom of the dock, and a gutter is carried across at the lower end, leading into a culvert which passes entirely around the dock, from which the water is constantly pumped. Several flights of steps are provided in the different parts of the dock for the use of the workmen, by which they are enabled to reach any part of the vessel with great facility. The main chamber of the dock is 286 feet in length and 30 feet in breadth at the bottom; 307 feet in length and 98 feet in breadth at the top; by using the caisson an additional length of 52 feet may be obtained, giving a total length of 359 feet. The height of the walls is 36 feet, and the sills are 26 feet below high water. The total cost, including all machinery and appurtenances, was about $2,000,000; the work was completed in 1851.

FIG. 2.



Plan of Dry Dock at Brooklyn Navy-yard.

FIG. 3.



Section of Dry Dock at Brooklyn Navy-yard.

The naval graving dock at Boston, built of granite and completed in 1833, is 253 feet in length and 86 feet in width inside the chamber; the turning-gates and the caisson are

of timber and composition fastened with copper bolts; the caisson being 60 feet in length, 30 feet in height, and 16 feet in width amidships. The total cost of this dock was about $700,000. The naval graving dock at Norfolk is almost precisely similar in style and dimensions to that at Boston, and cost about $950,000.

The cost of the construction of graving docks depends greatly upon the situation selected. In some places they are simple to construct and maintain, as at Birkenhead, where they are hewn out of the solid rock, a red sandstone, which is sufficiently hard and homogeneous to support the heavy weights, and at the same time soft enough to be worked. At this place (Birkenhead) five graving docks, having an aggregate length of 1690 feet, were hewn out of the rock at a cost of $430,000. The materials of which the docks are constructed also affect the cost; most of those belonging to the governments of different countries being made of finely-dressed ashlar masonry in a manner involving a considerable expense, while many of the most successful docks on the Thames have been built of timber and brick at a cost which is trifling by comparison. A heavy item of expense in those places where the fall of the tide is not sufficient to empty the dock is the cost of the large engines and pumps needed to remove the water.

In addition to her magnificent wet docks, Liverpool possesses a large number of graving docks, there being on the side of the Mersey on which that city is situated no less than sixteen, having an aggregate length of over 1½ miles; of these, the Sandon Graving Docks, six in number, are each 540 feet in length at the bottom, with entrances of from 45 feet to 70 feet in width. On the Birkenhead side are six docks, of which four belong to Laird Brothers.

Among the largest graving docks are the double dock at Brest, 721 feet in length, 92 feet in width, with a depth of 55 feet of water over the sill; and the double dock at Portsmouth, England, 644 feet in length by 80 feet in breadth. Portsmouth has besides nine single graving docks, the largest of which is 406 feet in length at the bottom. Devonport has five, Cherbourg eight, Sheerness five, Toulon six, Brest four. There are several on the Thames, and many other ports have one or more. Southampton has three; one of which, the Eastern Dock, is 425 feet in length, with a width of entrance of 80 feet, made in 1854 of brickwork with Portland copings, and is stated to have cost $260,000.

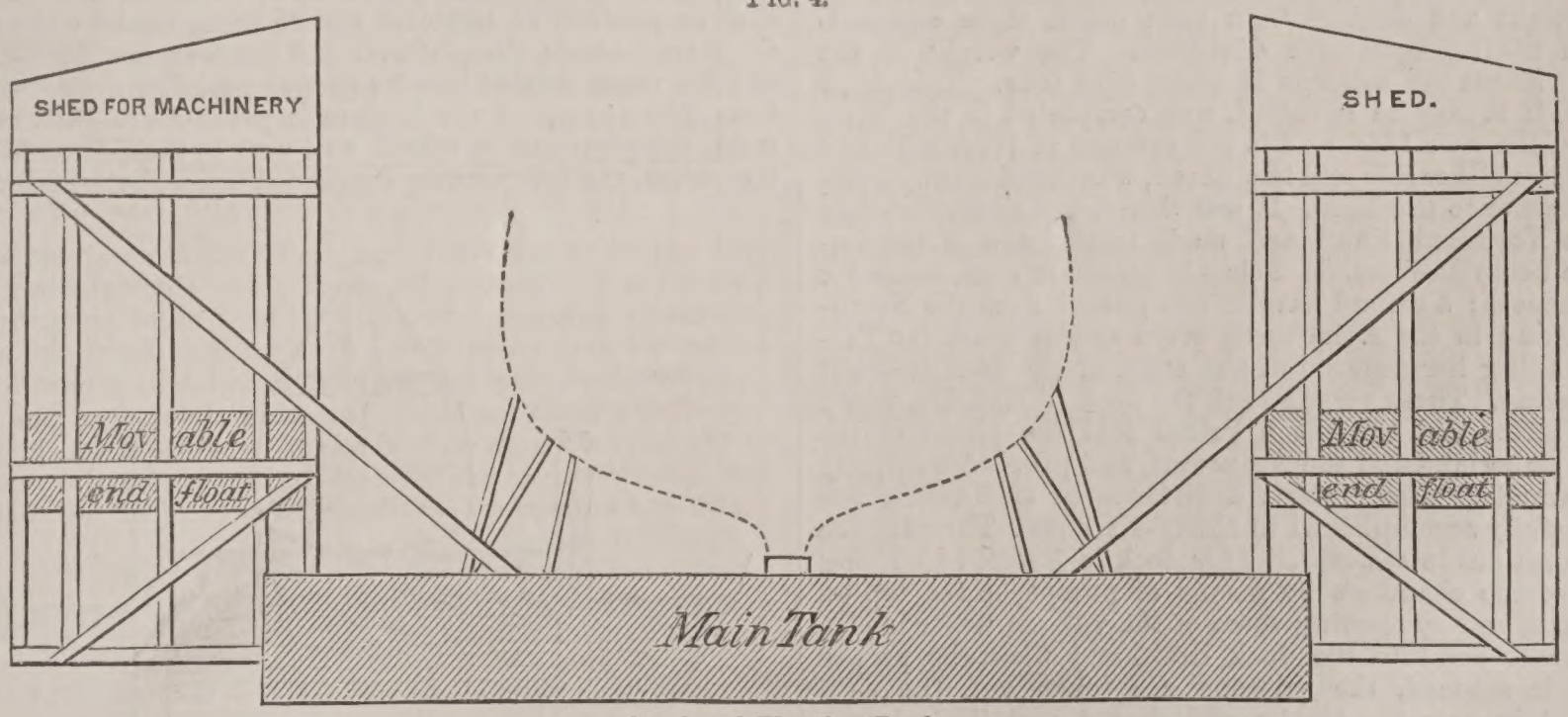
At the Southampton Docks, 693 vessels were docked during the seven years ending in 1867, average tonnage being 1400 tons per ship. The cost of docking, including pumping, labor, and repairs to the docks, was, on an average, $65 per ship, while the average sum paid for each vessel, for docking and for the use of the dock during the time it remained in it, was $275. Total amount earned during the seven years, about $192,000; expenses, $39,000. The capital of the Graving Dock Establishment at Southampton has been taken at $750,000, but this sum is considerably over the cost of the docks. As regards speed of working at Southampton, on one occasion three large ships of more than 2000 tons required to be docked in a hurry; two were docked and undocked, and the third docked and placed on the blocks, between daylight and dark.

One of the largest and deepest single graving docks is the Somerset Dock, constructed by the British government at Malta. The length on the floor is 428 feet, at the coping line 468 feet; the width of the floor is 42½ feet, and between the copings the width is 104 feet; the width of the entrance is 80 feet; the length of the entrance from the caisson in the centre is 256 feet; the depth of the entrance and floor is 33½ feet below the average sea-level. The caisson is 83 feet in length on the deck, 41 feet in height, and 12¼ feet in width. The upper deck forms a roadway between the two sides of the dock-entrance, and the caisson is arranged to go into a camber when the entrance is to be opened. The caisson differs from those previously constructed in the fact that it is worked by steam, and not by hand. In excavating for this dock it was found necessary to cut a tunnel through the solid rock 230 feet in length, for the purpose of removing the excavated material. During the work fissures were met with discharging into the excavation large quantities of water charged with black mud, which gave great trouble. The inner or exposed lining was formed of ashlar masonry of the hard crystalline limestone of the Maltese Islands; the backing was from an inferior quality of the same rock, some of which came from the excavation. There being but little change in the tides, the dock is emptied by large pumps worked by two powerful engines. The engines and pumps are placed in a cast-iron tank sunk in the rock.

Of the floating dock there are several distinct varieties: *the sectional dock*, such as is in use in the Philadelphia and San Francisco navy-yards; *the Gilbert balance dock*, in use in the Portsmouth and Pensacola navy-yards; the *iron floating dock* of the Bermuda dock pattern; *G. B. Rennie's patent iron floating dock*, of which the Cartagena dock is an example; and *Edwin Clark's hydraulic lift dock*, in use in the Victoria London Docks.

The sectional floating dock in the Philadelphia navy-

FIG. 4.



Sectional Floating Dock.

yard is made in nine separate and independent sections, differing only in their widths. Each section consists of a pontoon or tank, watertight, 105 feet in length, 30 or 32 feet in width, and 11 feet in depth; two end-frames, and two end-floats. Together, the sections form a floor of over 300 feet in length and 105 feet in width. At each end of each section is an open frame in which is a float, connected with the four posts of the framework, which is raised and lowered by machinery—raised to assist in sinking the main tank to the depth required, or lowered into the water to give it greater buoyancy.

When the dock is to be used a sufficient number of these sections are joined together to give the length required, and firmly connected by beams so arranged that they may be placed from 6 inches to 6 feet apart, though they are not generally farther apart than 3 feet. They are then connected by means of shafting with the engines, of which there are four. At each end of each section are three pumps. When the vessel is ready to be docked the main tanks or pontoons are filled with water, the end-floats raised by machinery upon the end-frames until the dock is sunk to the proper depth. The ship is then hauled over the dock, and the end-floats depressed into the water until its keel has a bearing upon the keel-blocks; the shores or supports for the vessel are then adjusted, and the water is pumped from the tanks, the end-floats being used, if necessary, to preserve the proper equilibrium.

This dock, as well as Gilbert's balance dock, is used in connection with a basin and railways. The basin in the Philadelphia navy-yard is 350 feet in length by 226 feet in width. The floor, of granite 10 inches in thickness, is laid upon a pile and concrete foundation, and is perfectly level; on three sides of this floor are granite walls 14½ feet in height. The "bed-ways" are two, and each consists of three "ways"—one to support the keel, and two to support the bilges; each is 350 feet in length and 26 feet in

width. The basin and "ways" are used thus: the dock, with the ship upon it, drawing from 8 feet to 10 feet of water, is hauled into the basin by means of capstans; the line of the ship's keel is brought into the line of the "bed-ways," water is admitted to the tanks, and the dock settled firmly upon the stone platform of the basin. The vessel, by means of hydraulic power and a cradle, is slid upon the bed-ways, and the dock may be immediately used for another vessel. The dock without the basin may be used for repairing a vessel. This dock was completed in 1851 at a total cost of about $814,000. Its lifting power is near 6000 tons.

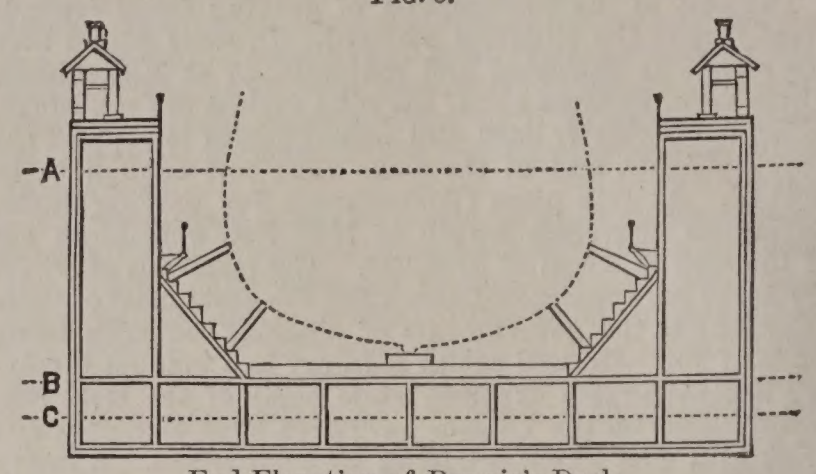
The California sectional dock is composed of ten sections, 100 feet in length, 32 feet in breadth, and 11 feet 9 inches in depth.

The balance floating dock was invented by Mr. John S. Gilbert of New York City. Like the sectional dock, it is constructed of timber, and consists of a pontoon bottom with two side walls, possessing sufficient displacement to carry the whole weight of the dock and the vessel to be raised. The side walls are hollow and of considerable width, serving, like the floats in the sectional dock, to preserve its stability in rising and sinking. The outside of these walls is vertical, while the inside is sloping, so as to conform to a certain extent to the shape of the ship. Port-holes are made in the walls for ventilation. The walls also afford the means of shoring up the ship, as in a stone dock; on the top are the engine-house, pumps, and working platform. There are sometimes gates at the ends for enclosing the dock, which are used only when vessels of great weight are to be lifted. Of this description is the Portsmouth navy-yard dock, which is 350 feet in length, 38 feet in depth, and 90 feet in inside width. This dock, with the basin and railways, cost $733,000. The Pensacola dock, which is similar, cost $923,000. There are also balance docks at New York, Charleston, Savannah, Mobile, and New Orleans. Mr. Gilbert constructed a balance dock for the Austrian government at Pola, a naval station on the Adriatic, with a width inside of 211½ feet, and a length of 311½ feet. There are also a basin and two railways for hauling vessels upon, each of 700 feet in length.

The iron Bermuda dock (or iron camel, as it is sometimes called) is made of wrought iron; the transverse section is U-shaped; the bottom and sides are hollow, and 20 feet through; the ends are closed by caissons 25½ feet through; the length of the dock over all is 381 feet, between the caissons, 330 feet; breadth over all, 124 feet, inside of the dock, 84 feet; depth over all, 72 feet. It is divided into six longitudinal compartments or chambers, watertight and distinct from each other, these compartments having transverse divisions. The weight of the dock without the caissons is about 8200 tons. This huge vessel, if it may be so called, was completed in the latter part of the year 1868, and in the summer of 1869, with two vessels on either side and two ahead, was towed down Sheerness harbor to the Nore. It was then taken under the stern of the Northumberland, and made fast to one of the immense hemp hawsers, 30 inches in circumference, made for the purpose; a second hawser was passed from the Northumberland to the Agincourt's stern and secured, the Terrible taking her position at the stern of the dock to assist in steering. These vessels took the dock to Madeira, where the Warrior and the Black Prince took the places of the Northumberland and the Agincourt, and proceeded directly to Bermuda. The voyage, a distance of 4000 miles, was successfully accomplished in thirty-six days. The caissons were sent out in sections. This dock is lowered by filling some of the chambers by means of pumps on the top of the dock, and by opening some of the valves; water is also allowed to run into the dock itself, and when the proper depth is reached, the caissons are taken out, the ship brought in over the blocks and shored, and the caissons put in place; the water in the dock is then allowed to run into some of the chambers, which have been kept empty; in which state the dock remains until the vessel is ready for undocking. By means of the admission or exclusion of water into or from the different chambers, the dock can be balanced in any position, and even be heeled over on one side, so as to expose the bottom for examination and repair. This dock is capable, without the caissons, of taking in the largest vessel afloat except the Great Eastern, and can lift and lay completely dry a vessel weighing 8000 tons.

An iron floating dock, after the patent of Mr. G. B. Rennie, an English naval architect, has been constructed for the Spanish naval yard at Cartagena; it is 320 feet in length; 105 feet in breadth outside; breadth inside, 79 feet; height outside, 48 feet; height inside, 36½ feet; weight, 4400 tons. This dock, possessing many points of resemblance to Gilbert's balance dock, may be described as an oblong rectangular box or trough, without top or ends; walls and bottom hollow, and divided into several independent chambers; the side walls act as floats to prevent the dock from sinking too rapidly, and eventually from being entirely submerged. The operation of docking is performed thus: Water is admitted to the base compart-

FIG. 5.



End Elevation of Rennie's Dock.

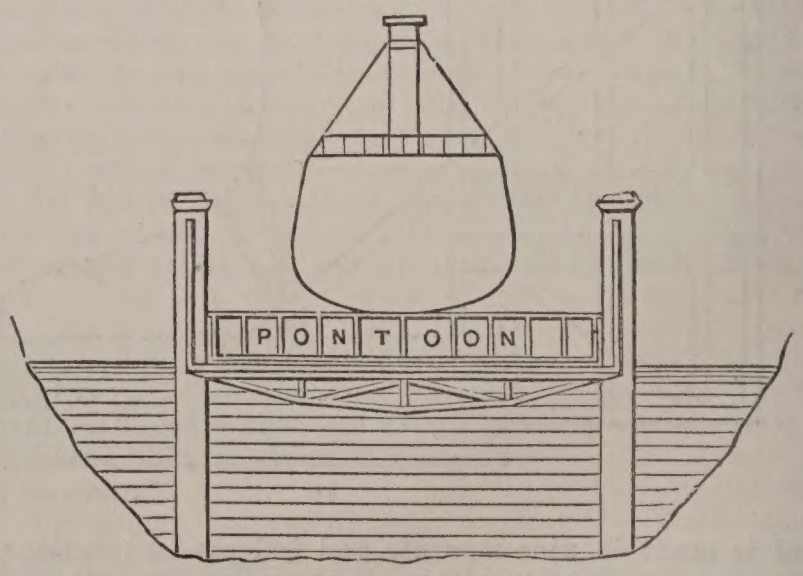
A. Level of water when ready to receive a ship.
B. " " with ship docked.
C. " " when light.

ments by sluices and pipes; the dock gradually sinks to a depth sufficient to admit the vessel, which is then hauled in and shored in the usual manner; the engines and pumps then discharge the water from the base compartments until the floor of the dock is out of water.

Among the largest vessels which this dock has lifted is the Spanish iron-clad Numancia, of 21¼ feet draught and weighing 5600 tons. This vessel remained supported eighty days without damaging or straining the dock. The draught of water of the dock, with the Numancia in, and with 800 tons of water in the chambers, was 11¼ feet; without a load the draught of the dock is 4 feet 7 inches. Mr. Rennie has also constructed at Cartagena a basin and railways similar to those used with the American floating docks.

Clark's Hydraulic Lift Dock.—This style of dock was first constructed by Mr. Edwin Clark at the Victoria Docks. The vessel to be docked is raised by hydraulic power, the dock (or rather the "lift") being formed of two rows of cast-iron columns placed at a sufficient distance apart to admit a vessel between them. Each column encloses a hydraulic press, the ram of which is connected by chains with a transverse beam extending to the opposite column. These transverse beams form a platform, upon which is floated a shallow pontoon of sufficient size to accommodate the vessel to be docked; the platform and pontoon are then sunk, and the vessel floated into its proper position over the latter. The pumps of the hydraulic presses are then set to work, the platform is raised, and with it the pontoon and the vessel, the latter being supported upon the keel-blocks

FIG. 6.



Clark's Hydraulic Lift Dock.

and the sliding bilge-blocks, which are hauled into their places by chains. When the pontoon is lifted clear of the water, the latter flows out through the valves in the bottom, these being closed when the pontoon is emptied; the platform is then lowered until the pontoon, with the vessel upon it, is afloat. Thus in about thirty minutes a vessel drawing 20 feet of water is left afloat on a shallow pontoon drawing only 4 or 6 feet, and may be taken into the shallow dock prepared for its reception. These docks are surrounded by workshops and tools, with shelter for the men close up to the bulwarks of the ship. The vessel is, in fact, brought bodily into the centre of a convenient workshop. It is taken to the smiths', the carpenters', or the machine shops, according to the nature of the repairs required, and is moved easily from one to the other. In the

Victoria Docks the shallow berths to which the pontoons are floated are only 6 feet in depth; there are in all eight berths, each 60 feet in width, and from 300 to 400 feet in length.

The pontoons are very shallow, and, being open-topped, do not possess any great amount of rigidity, but Mr. Clark considers this flexibility an advantage; and from the results of the practice at the Victoria Docks it certainly seems that it is not so excessive in amount as to do any harm. One great advantage of Mr. Clark's plan is, that by a single lift, in connection with a great number of pontoons, an equal number of vessels can be floated in shallow water at a comparatively slight expense. It seems particularly applicable to situations which are sheltered, where the tidal changes are not great, and where a foundation can be readily obtained for the columns. A dock on this plan has been recently constructed by Mr. Clark at Malta.

A plan has been proposed by a Mr. Zanicki before the French Society of Engineers for a floating dock composed of a number of pontoons from which the water is driven by compressed air; stability being given to the pontoons by lateral moving floats. SAMUEL H. SHREVE.

Dock-yards in Great Britain are government establishments corresponding to the U. S. navy-yards. There are dock-yards at Portsmouth, Devonport, Sheerness, Chatham, Woolwich, Deptford, Plymouth, Pembroke, Haulbowline, Gosport, etc.

Doc'tor [Lat. *doctor*, a "teacher," from *doceo, doctum*, to "teach"], a title of honor which was applied in early times to teachers of doctrine in the churches, and in more recent times conferred by universities; at first as the equivalent of "master" (*magister*), and afterwards as a still higher degree. Four of the Greek Fathers (Athanasius, Basil, Nazianzen, and Chrysostom), and three Latin Fathers (Jerome, Augustine, and Gregory the Great), were distinguished as "doctors of the Church." Thomas Aquinas, Bernard of Clairvaux, Bonaventura, and others bore the same title in later days. The distinction is usually conferred after death. The title "doctor" was given later in the Western Church to prominent teachers of scholastic theology. Many of these titles were conferred by their followers, and had an additional epithet, designed to be expressive of some special excellence. Thus, William Hales was called "Doctor Irrefragabilis"—the "irrefutable doctor;" William Ockham was called by his admirers "Doctor Singularis"—the "pre-eminent doctor," a title given to several others. Doctor of laws, LL.D., or J. U. D. (*doctor utriusque juris*, "teacher of both laws," *i. e.* the civil and the canon law), was the first title of the kind conferred by the universities. Bologna appears to have been the place where this title was first conferred, but the University of Paris soon followed, first giving this degree in 1145. Doctors of laws (except when bearing a merely honorary title) long had a certain jurisdiction in the courts, which is even now scarcely extinct in England. (See article DOCTORS' COMMONS, and also Shakspeare's "Merchant of Venice," act iv., scene i.) In the English universities the doctorate in law is given in course at Oxford under the form D. C. L., and at Cambridge and London under the form LL.D. At the two former universities it is occasionally conferred as honorary. The degree of S. T. D. (*Sacrosanctæ Theologiæ Doctor, i. e.* "Teacher of Sacred Theology"), or D. D. (Doctor of Divinity), otherwise written T. D. (Doctor of Theology), is still given at all the European universities after examination in the regular university course. It is also conferred in many cases as an honorary title. The popes and archbishops of Canterbury have long claimed and exercised the right of conferring the doctorate both in law and divinity. The degree of doctor in medicine has been traced back to 1384, and that of doctor of music is nearly or quite as old. Ph. D. (Doctor of Philosophy) is the title conferred at German and other European universities after examination by the faculty of philosophy, chiefly on students of philology. It is also conferred at several American colleges. The doctorate of literature, or of letters (*literarum humaniorum doctor*), written L. H. D., is conferred by the regents of the University of the State of New York, at Albany, as their highest honor. Besides the above there are several other doctorates, mostly of recent origin. (See ARTS, DEGREES IN.)

The word "doctor" as used in the New Testament is taken in its primitive Latin meaning, "teacher," and corresponds to the Hebrew word *mori* ("teacher") or to the title *rabbi* ("master"), which was conferred during the centuries immediately preceding and following the birth of Christ by the "nasi," the chief of the Sanhedrim, accompanied by the ceremony of the laying on of hands. At present, the Jewish doctorate is conferred by the universities.

Doc'tors' Com'mons, the popular name for the courts and offices once occupied by the body incorporated in 1768 under the title of "The College of Doctors of Law exercent in the Ecclesiastical and Admiralty Courts." These courts were on the S. side of St. Paul's churchyard. The college consists of a president (the dean of the arches for the time being) and of those doctors of law who, having regularly taken that degree in either of the Universities of Oxford or Cambridge, and having been admitted advocates in pursuance of the rescript of the archbishop of Canterbury, have been elected fellows of the college in the manner prescribed by the charter. But the practical functions of this body of lawyers have been materially diminished, and the college has been empowered to sell its property and surrender its charter.

Doctors of the Church (see DOCTOR), in the Roman Catholic Church, are certain saints who after death receive this title on account of their superior wisdom and excellence. They are at present seventeen in number, viz.: Sts. Hilary of Poitiers (died 367 A. D.), Athanasius (373), Basil (379), Gregory Nazianzen (389), John Chrysostom (407), Jerome (420), Augustine (430), Peter Chrysologus (450), Leo (460), Gregory (604), Isidore (636), Peter Damian (1072), Anselm (1109), Bernard of Citeaux (1153), Thomas Aquinas (1274), Bonaventura (1274), and Alphonsus of Liguori (1787). The last-mentioned saint first received this honor Mar. 23, 1871, by decree of Pius IX. Outside the Roman Catholic Church the seven Christian Fathers mentioned in the article "Doctor" are more especially designated by the title "Doctors of the Church."

Doctrinaire, a French term, originally applied to a party of politicians who just after the restoration of 1815 occupied in the Chamber of Deputies a place between the Centre and the extreme Left. The chief men of this party were systematic writers and speakers on government, who wished to establish a form of constitution somewhat resembling that of England, and supported scientific doctrines of constitutional liberty against the arbitrary will of the king. The word *doctrinaire* was used by their opponents to stigmatize them as pedantic and unpractical theorists. The leaders of the Doctrinaires were Royer-Collard, Guizot, the duc de Broglie, and Decazes.

Doctrine. See THEOLOGY, by PRES. E. G. ROBINSON, D. D., LL.D.

Doc'ument [Lat. *documentum*, from *doceo*, to "teach," to "furnish information"], an original or official paper or writing relied on as the basis or proof of something; in law, a written instrument adduced for the purpose of evidence.

Dod (ALBERT BALDWIN), D. D., an American scholar and teacher, born in Mendham, N. J., Mar. 24, 1805, graduated at the College of New Jersey in 1822. Though licensed to preach, he was never a pastor. In 1830 he was chosen professor of mathematics in the College of New Jersey, discharging the duties of the office with signal ability till his death, Nov. 20, 1845. He contributed largely to the "Princeton Review." The family to which he belonged has for several generations been remarkable both for mathematical taste and talent.

Dod (DANIEL), an American machinist, born in Virginia in 1788, was the father of the preceding. He constructed the engine of the Savannah, the first steamboat that crossed the Atlantic. He was killed by the explosion of a boiler near New York in 1823.

Dodd (CHARLES), the assumed name of HUGH or RICHARD TOOTLE, a Roman Catholic priest of England who died about 1745. He was the author of Dodd's "Church History of England" (3 vols. folio, 1737–42), and of several other works, chiefly polemical. His history was a reply to that of Burnet, and has been in part republished (1839–43). Its value is regarded as considerable, though it is characterized by severity and unfairness.

Dodd (JAMES B.), an American mathematician, was born in Virginia in 1807. In 1841 he was chosen professor of mathematics, astronomy, etc. in Centenary College, Miss., and in 1846 became a professor in Transylvania University, of which institution he was acting president (1849–55). He has published several mathematical text-books, besides reviews, etc.

Dodd (MARY ANN HANMER), born at Hartford, Conn., Mar. 5, 1813, is the author of many poetical productions of unusual merit, printed chiefly in periodicals. A volume of her poems appeared in 1843.

Dodd (RALPH), an English engineer, born in Northumberland about 1756. He was the first projector of the Thames Tunnel, and he planned the Surrey Canal. He wrote, besides other works, an "Account of the Principal Canals of the World" (1795). Died April 11, 1822.

Dodd (WILLIAM), LL.D., an English clergyman, born at Bourne, in Lincolnshire, in 1729. He was ordained in 1753, and became a popular preacher in London. He was

also chaplain to the king, and preceptor to Philip Stanhope, earl of Chesterfield. Among his works are "Reflections on Death," "The Visitor," and "Sermons." In 1777 he was convicted of forging the signature of the earl of Chesterfield to a bond for £4000, and was put to death June 22 of the same year.

Dod'der [Ger. *Dotter*, signifying the "yolk of an egg," so called from the color], (*Cuscuta, Engelmannia*, etc.), leafless parasitical plants, generally placed by botanists in the order Convolvulaceæ, but sometimes made a distinct order called Cuscutaceæ. They have twining thread-like stems of an orange-yellow, and flowers in thick clusters. They are found native in the Old and New Worlds, and are sometimes injurious to crops by smothering the plants. The dodders are remarkable for having seeds without cotyledons. The vine grows up from the ground, and having attached itself as a climbing parasite to herbs and shrubs, the proper root dies, leaving the vine to subsist upon the juices of the plant which supports it. This it does by means of papillæ, which penetrate the bark of the plant on which it lives. Huge dodders in Afghanistan grow upon the trees, and even prey upon themselves. The dodders of the U. S. are quite numerous, and have been especially studied by the botanist Engelmann of St. Louis.

Dodder-laurels (Cassythaceæ), an order of parasitic plants having the habit and appearance of dodders, but in other respects resembling the laurels, to which they are generally referred. They replace the dodders in hot regions, where alone they grow. The U. S. have but one known species, the *Cassytha filiformis* of Florida.

Dod'dridge, a county of the N. part of West Virginia. Area, 300 square miles. It is drained by the Hughes River and Middle Island Creek. The surface is hilly; the soil is good for pasture. Grain, tobacco, and wool are raised. Coal and iron are produced. It is intersected by the Baltimore and Ohio R. R. Capital, West Union. Pop. 7076.

Dod'dridge (Philip), D. D., an eminent English preacher and author, was born in London June 26, 1702. He became pastor of a dissenting congregation at Kibworth in 1723, and removed in 1729 to Northampton, where he was principal of a theological seminary, and at the same time pastor of a large congregation. In 1730 he married Mrs. Mercy Maris. He was an earnest and devout preacher, and acquired a high reputation as a writer. His most important works are "The Rise and Progress of Religion in the Soul" (1745) and "The Family Expositor" (2 vols. 4to, 1739–40). He wrote 374 hymns, some of which are admirable. He died at Lisbon (whither he had gone for his health) Oct. 26, 1751. (See Job Orton, "Life of Doddridge," 1766.)

Dodec'agon [from the Gr. δώδεκα, "twelve," and γωνία, "angle"], a regular polygon of twelve equal sides and twelve equal angles.

Dodecahe'dron [from the Gr. δώδεκα, "twelve," and ἕδρα, a "base"], one of the five Platonic bodies or regular solids, is bounded by twelve equal and regular pentagons, has thirty equal edges and twenty equal solid angles, each formed by the meeting of three equal plane angles. Its volume is nearly 7.66312 times that of the cube of one of its sides.

Dodecan'dria [from the Gr. δώδεκα, "twelve," and ἀνήρ (gen. ἀνδρός), a "man or male"], the eleventh class of plants in the artificial system of Linnæus, characterized by the presence of twelve stamens; but as the number of plants so characterized is small, it was made to include all plants with more than ten and less than twenty stamens.

Dodeca'theon [from the Gr. δώδεκα, "twelve," and θέοι, "gods," probably an allusion to its curious nodding flowers, about twelve in number], a genus of plants of the order Primulaceæ. The *Dodecatheon Meadia* of the U. S. is an elegant plant called American cowslip, pride of Ohio, or shooting star. In cultivation it is very fine.

Dö'derlein (Ludwig), a German philologist, born at Jena Dec. 19, 1791. He was appointed professor of philology at Erlangen in 1827. Among his works are "Latin Synonyms and Etymologies" (6 vols., 1826–38) and "Homerisches Glossarium," 3 pts. (1850–58). Died Nov. 9, 1863.

Dodge, a county in S. Central Georgia, formed since the census of 1870. It is in the fertile valley of the river Altamaha, which bounds it on the S. W. The county is traversed by the Macon and Brunswick R. R. Capital, Eartmon.

Dodge, a county in the S. E. of Minnesota. Area, 432 square miles. It is partly drained by the S. branch of the Zumbro River. The surface is undulating or nearly level; the soil is calcareous and fertile. Grain, wool, hay, and dairy products are raised. This county contains extensive prairies. It is intersected by the Winona and St. Peter R. R. Capital, Mantorville. Pop. 8598.

Dodge, a county in the E. of Nebraska. Area, 600 square miles. It is bounded on the S. by the Platte River and intersected by the Elkhorn. The surface is undulating; the soil is based on limestone and is fertile. Grain is the chief product. The Union Pacific R. R. passes through the southern part of this county, and it is intersected by the Sioux City and Pacific R. R. Capital, Fremont. Pop. 4212.

Dodge, a county in S. E. Central Wisconsin. Area, 930 square miles. It is intersected by Rock River and by Crawfish and Beaver Dam creeks. The surface is diversified by prairies, forests, and oak-openings; the soil is very fertile. Grain, cattle, wool, hay, and dairy products are raised. The manufactures include furniture, wagons, cooperage, saddlery, brick, flour, etc. Limestone and iron ore are found here. It is intersected by the Chicago and Northwestern R. R. and by the Milwaukee and St. Paul R. R. Capital, Juneau. Pop. 47,035.

Dodge, a township of Boone co., Ia. Pop. 1297.

Dodge, a township of Dubuque co., Ia. Pop. 979.

Dodge, a post-township of Guthrie co., Ia. Pop. 293.

Dodge, a township of Union co., Ia. Pop. 229.

Dodge (Ebenezer), D. D., LL.D., an American Baptist divine and scholar, was born at Salem, Mass., April 22, 1819, graduated at Brown University in 1840, and at Newton Theological Institution in 1845; was instructor in Hebrew at Covington Theological School (1845–46), professor in the theological department of Madison University, Hamilton, N. Y. (1853–68), and president of the university from 1868 till the present time (1874). He has published "Evidences of Christianity," several able reviews, etc.

Dodge (Grenville M.), an American general, born at Danvers, Mass., April 12, 1831. He commanded a brigade at Pea Ridge in Mar., 1862, and became a major-general of Union volunteers in June, 1864. He directed a corps of Gen. Sherman's army in the campaign against Atlanta (May to Sept., 1864), and succeeded Rosecrans as commander of the department of Missouri in December of that year. He represented a district of Iowa as a member of Congress in 1867–69.

Dodge (Henry), General, was born at Vincennes, Ind., Oct. 12, 1782. He served with distinction in the war of 1812 and in various Indian wars, was governor of Wisconsin Territory (1836–41 and 1845–48), a delegate to Congress (1841–45), and U. S. Senator from Wisconsin (1849–57). Died at Burlington, Ia., June 19, 1867.

Dodge (Mary Abigail), a popular American writer, whose assumed name is Gail Hamilton, was born in Hamilton, Mass., about 1830. She was a school-teacher in her youth. Among her works are "Country Living and Country Thinking" (1862), "Gala Days" (1863), "Woman's Wrongs, a Counter-Irritant" (1868), "Skirmishes and Sketches," and "The Battle of the Books" (1870). She has contributed to the "Atlantic Monthly."

Dodge (William E.), an American philanthropist, born in Hartford, Conn., Sept. 4, 1805, removed to New York in his thirteenth year. At the age of twenty-one he went into business on his own account, and became an extensive importer and manufacturer. He is an active member of many benevolent and religious societies, was a member of the peace convention of 1861, and a Republican member of Congress 1866–67.

Dodgeville, a post-village, capital of Iowa co., Wis., 45 miles W. by S. from Madison. It has six churches. Mines of lead and copper have been opened in the vicinity. It has one weekly newspaper. Pop. 1407; of Dodgeville township, 3708.

Dod'ington (George Bubb), Lord Melcombe, an English politician, born in 1691. He was elected to Parliament in 1715, and became a lord of the treasury in 1724. He was long a partisan of Walpole, but he turned against him in 1740. He was notorious for his venality and intrigues. He died July 28, 1762, and left a "Diary," which was published in 1784.

Do'do (*Didus*), an extinct genus of birds, usually classed among the Brevipennes or struthious birds, but by many authorities referred to the Columbidæ (pigeons), and peculiarly interesting from the fact that its extinction has but recently taken place—the *Didus ineptus* having been in existence less than three hundred years ago. The dodo was an inhabitant of the islands of Bourbon and Mauritius, and possibly of Madagascar. When Mauritius was first visited by voyagers, the dodo was very abundant, and running slowly and being wholly unable to fly, was easily killed. It is described as larger than a swan; of a clumsy form, with a large head and enormous bill, the upper mandible being the longer and hooked at the point; short, thick legs, covered with scales; four rather short toes, three before and

one behind; and a plumage of grayish down. The flesh, though tough, was eatable. In several works of the seventeenth century are rude representations of the dodo, the best being one in Bontius, edited by Piso, who calls the

Dodo.

bird doronte or dodaers. There is also a painting perfectly corresponding with this in the British Museum, and in Savery's picture of "Orpheus and the Beasts" at The Hague, Prof. Owen discovered what he considers a study of the bird from nature. A foot of the dodo is preserved in the British Museum, and a head and foot in the Ashmolean Museum at Oxford.

Dodo'na [Gr. Δωδώνη], an ancient city of Epirus, the seat of a celebrated oracle and temple of Jupiter. This was the most famous oracle of Greece except those of Delos and Delphi. Its origin was attributed to Deucalion. This oracle was consulted by the Athenians, Spartans, and other nations, and its responses were delivered from an oak tree. The temple of Dodona was destroyed by the Ætolians in 219 B. C. Its site has not been accurately identified.

Dods'ley (Robert), an English bookseller and author, born near Mansfield in 1703. He opened a bookstore in London, and became a friend of Pope, and prospered in business. He produced in 1737 a farce called "The King and the Miller of Mansfield," which was successful. His tragedy of "Cleone" (1758) was performed with great applause. He purchased Dr. Johnson's "London" for ten guineas, and his "Vanity of Human Wishes" for fifteen guineas. He published a "Select Collection of Old Plays" (12 vols. 8vo, 1780) and other works. Died Sept. 25, 1764.

Dod'son, a township of Highland co., O. Pop. 1710.

Dod'son's, a township of Tuscaloosa co., Ala. Pop. 924.

Dod'well (Col. Edward), an English antiquary and artist who left college in 1800. He afterwards passed many years on the continent of Europe, and published a valuable illustrated work called "Classical and Topographical Tour through Greece" (1818), also "Thirty Views in Greece" (1821), and other works. Died at Rome May 14, 1832.

Dodwell (Henry), a chronologist, born in Dublin, Ireland, in 1641. He became professor of history at Oxford in 1688, but was soon deprived of that chair because he refused to take the oath of allegiance to William III. Died June 7, 1711.—His oldest son, of the same name, who died in 1763, wrote a book covertly attacking Christianity.

Doe (John), the fictitious plaintiff in ejectment. (See Ejectment, by Prof. T W. Dwight, LL.D.)

Dof'fer, that part of a carding-machine which takes the cotton from the cylinder when it is carded.

Dog, the *Canis familiaris* of the naturalists, a carnivorous mammal of the family Canidæ, nearly related to the wolf and the fox, is one of the most remarkable of all brutes, being possessed of sagacity, acute senses, and instincts often exceeding reason. He seeks the society of man, and makes himself a trusty servant, putting at man's disposal all the faculties which nature has given him. It is the opinion of some naturalists that the various kinds of dog are specifically identical with the wolf and the jackal.

The more important varieties of dog have been arranged in three classes, as follows:

I. Those having the parietal bones of the skull widest at the base and gradually approaching each other as they ascend, the condyles of the lower jaw being on the same line with the upper molar teeth. The Danish dog, the dingo, and the greyhound belong to this class.

II. Those having the head moderately elongated, and the parietals diverging from each other as they rise upon the side of the head, enlarging the cerebral cavity and the frontal sinus. The most valuable dogs, such as the spaniel, setter, pointer, Newfoundland dog, Esquimaux, etc., belong to this class.

III. Those having the muzzle more or less shortened, the frontal sinus enlarged, the cranium elevated and diminished in capacity. To this class belong the bulldog, the mastiff, some of the terriers, etc. The greyhound (*Canis familiaris leporarius*) is a variety of which there are many kinds, all characterized by a small head, slender limbs, and a gaunt form. In hunting they usually follow by sight, not by scent. They are not intelligent, nor are they distinguished by attachment to their masters. Some are favorites because of their swiftness, others for the extreme elegance of their shape. The Mount St. Bernard dog, often called the Alpine spaniel (*Canis familiaris montanus*), is one of the most celebrated of the shaggy or woolly breeds. It is peculiar to the Alps, and is noted for its sagacity, strength, and fidelity in saving the lives of travellers. The Newfoundland dog (*Canis familiaris Terræ Novæ*) originated in the island which gives it its name, and is probably derived from a cross of a dog carried thither by English settlers and a native breed. It is of large size, and is valuable and useful, remarkably docile, and obedient and very serviceable. The shepherd's dog is one of the most interesting and useful of the species. The hunting-dogs, hounds, and spaniels are generally of medium size, the ears are long and pendent, the scent acute, and intelligence great. In general the covering is smooth, though instances of rough hair occur.

The spaniel is probably of Spanish origin, hence his name. The ears are large and pendent, the tail elevated, the fur of a different length in different parts of the body, but longest about the ears, under the neck, behind the thighs, and on the tail, varying in color, but most commonly white with brown or black patches.

The dingo of Australia has an elongated head, flat forehead, and short and erect ears. Two kinds of hair thickly cover the body—one woolly and gray, the other silky and yellow. In form and proportions the dingo resembles the shepherd's dog. He very seldom barks, but whines and growls, like most wild dogs. These animals were formerly numerous in Australia, but are now rare.

Revised by C. W. Greene.

Doga'na (*i. e.* the house (*casa*) of the *doge*, who as head of the republic had charge of the customs), the common name in Italian of a custom-house. It originated with the Venetians, who were long the chief commercial power of Europe. From dogana comes the French *douane*, having the same signification.

Dog'bane (*Apocynum*), a genus of plants of the natural order Apocynaceæ, having bell-shaped flowers, no style, and the fruit a long linear follicle. Some of the species are herbaceous, others shrubby, and some are found in colder climates than is usual for plants of this order. The dogbane of North America (*Apocynum androsæmifolium*) is a perennial herbaceous plant about four feet high, with smooth stem, milky juice, smooth ovate leaves, and light pink flowers. It grows in open, barren places from Canada to Georgia, and is valued for the medicinal properties of the bark of the root, which is emetic, diaphoretic, and in small doses tonic. The *Apocynum cannabinum* of the U. S. is also useful in medicine.

Dog Bluff, a township of Horry co., S. C. Pop. 789.

Dog Days, or **Canic'ular Days,** the name given to the forty days between July 3 and Aug. 11. Canicular is derived from *Canicula*, the Latin name of Sirius, the dog-star, which rose heliacally near the 1st of July. The ancients ascribed the great heat of summer to the influence of this star, but it was by accident only that its rising coincided with the warmest season. The time of its rising depends on the latitude of the country, and, owing to precession, is later every year.

Dog Distem'per, a disorder common among young dogs, is considered to be of a catarrhal character. A general running from the nose and eyes is a leading symptom, together with a short dry cough, succeeded by loss of strength and wasting of the body. The flow from the nose, at first watery, in a little time becomes mucous and purulent, filling the eyes and choking up the nostrils, attended by fits, with symptoms of an affection of the brain, appear when the disease becomes malignant. At such a time the sight of another dog

often brings on a fit, which may be somewhat checked by fondling. The fits usually prove fatal if they continue to increase in violence and frequency. A frequent consequence of the distemper is inflammation of the lungs and a dysenteric discharge, indicating ulceration of the intestines.

The leading remedies, which must be applied in the early stage of the disease, are laxatives, emetics, occasional bleeding, etc. Astringents should be used to check the diarrhœa, and the violence of the fits may be quelled by warm baths and anodynes.

Doge, dōj [It. pron. do′jà, a modification of *duce* (from the Lat. *dux*), "duke"], the title of the chief magistrate in the republics of Venice, Amalfi, and Genoa. The origin of the office in Venice dates as far back as 697. Previously Venice had been governed by seven tribunes, but the intrigues consequent on their election, and the rising power of the republic, made it expedient to concentrate the power of the government. The first doge was Paoluccio Anapeste. The doges were elected by the people, and were invested with almost absolute power till 1177, when the legislative power was placed in the hands of a great council of 470 members. This council elected twenty-four of their members, who in turn elected twelve of their own number, upon whom the choice of the doge devolved. The first doge elected in this manner was Sebastiano Ziani, who, on the occasion of his installation in office, scattered money among the people to compensate them for the loss of their rights —a custom which was followed by his successors. This doge also introduced the custom of wedding the Adriatic Sea. This was a marriage ceremony which took place on Ascension Day, and which typified the absolute dominion which the Venetians claimed over that sea. On these occasions a ring was thrown into the sea from the ship Bucentaur. From this time the council gradually narrowed the powers of the doge, till in 1628 the offices of commander-in-chief of the army and high-admiral of the navy ceased to belong to the dogate (or dogado, as the dignity was called), unless by a special decree of the Council of Forty, a high court of justice composed of forty members. In the fourteenth century the Council of Ten was established, and vested with the highest power in the state, which entitled it to pass judgment even upon the doge himself. About this time the powers of the doge became so restricted as to be little more than nominal, and the constant espionage to which he was subjected made the office no longer an object of ambition. In 1339 it was found necessary to pass a law prohibiting a doge who had been elected from resigning his place. The office disappeared with the fall of the Venetian republic in 1797. Lodovico Manin, elected in 1788, was the seventy-third and last doge of Venice.

The first doge of Genoa was Simon Boccanera, elected by the people in 1339. Like that of the doge of Venice, his office was originally for life. His powers were shared, though not restricted, by twelve aldermen. In 1528 the Genoese framed a new constitution, by which the doge was to be re-elected every two years, and the powers of the office were restricted by two councils, of which one comprised 300 and the other 100 members. In 1797, when the French occupied Genoa, the office of doge ceased to exist. In 1802 it was restored with the restoration of the republic, but it finally disappeared in 1804. The republic of Amalfi in 897 A. D. exchanged its government by annually chosen consuls for the dogate, which was held for life; but its republican government ceased in 1350.

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Dog-Fish, the name of several small species of shark belonging to the genera *Scyllium, Spinax, Mustelus,* etc., so named probably from their pursuing their prey like dogs hunting. They have five gill-openings on each side, the tail fin is longer than it is broad, and they have spout-holes. The spotted dog-fishes (*Scyllium canicula* and *Scyllium catulus*) are common on the British coast. The *Acanthias vulgaris,* or common dog-fish, is found in great quantities on the coasts of the Hebrides and Orkneys, where it is used as food. This fierce and greedy fish is abundant along the New England coasts, and is caught for its excellent oil. Other species occur on the American coast. Their bite is much dreaded by sailors. A sort of shagreen is made of their skins. The dog-fish of the Western States is the AMIA CALVA (which see).

Dog-Fox, the name of a small animal found in Asia and Africa, belonging to the family Canidæ, and of the genus *Cynalopex.* They have erect pointed ears, a sharp muzzle, somewhat resembling that of a greyhound, and a bushy tail.

Dog′ger [Dutch *dogger,* "cod-fish"], a two-masted fishing-boat of the ketch build, with bluff bows. It is used by the Dutch for the Doggerbank fishery.

Dog′gerbank, an extensive sandbank in the middle of the German Ocean, between England and Denmark. It extends from lat. 54° 10′ to 57° 24′ N., and from lon. 1° to 6° 7′ E. Length, about 320 miles; average width, 40 miles. In some parts it is covered with only nine fathoms of water. Here are important cod-fisheries. An indecisive battle was fought here between the Dutch and English fleets in Aug., 1781.

Dog′gett (DAVID SETH), D. D., a bishop of the Methodist Episcopal Church South, was born in Virginia in 1810. He was educated at the University of Virginia, and entered the itinerant ministry in the Virginia Conference of the Methodist Episcopal Church in 1829. He was professor in Randolph-Macon College, Va., for several years, and was consecrated bishop in 1866, since which time his residence has been in Richmond, Va. He is a learned and eloquent divine, and is very efficient in the exercise of his episcopal functions.

Dog Island Light, on the S. coast of Florida, is a revolving light 45 feet above the water; lat. 29° 46′ 51″ N., lon. 84° 38′ 37″ W. The island is 30 miles E. of Appalachicola, and the light is 1 mile E. of its W. end.

Dog′ma [Gr. δόγμα, from δοκέω, to "seem," "that which seems true;" Fr. *dogme;* It. *domma;* Sp. *dogma*], originally an opinion, afterwards an article of belief derived from authority. The term is sometimes applied to what are regarded as the essential doctrines of Christianity, as contained in the Scriptures or the writings of the Fathers of the Church. The study or science of dogmas (Dogmatik) has a separate professorship in the Protestant universities of Germany. The term "doctrine" is a preferable one, as "dogma" is coming more and more to be used in an unfavorable sense.

Dog's-Tail Grass (*Eleusine*), a genus of grasses, the species of which are found native in Europe and Asia. The crested dog's-tail grass (*Eleusine cristata*) is much prized in England for lawns and sheep-pastures. The *Eleusine Indica* is extensively naturalized in the U. S.

Dog Star, a popular name of Sirius, a star of the first magnitude in the constellation Canis Major, and the brightest fixed star in the firmament.

Dog′tooth, a township of Alexander co., Ill. P. 301.

Dogtooth Spar, a name given to certain pointed crystals of calcareous spar, from their fancied resemblance to the tooth of a dog.

Dog Watch, on shipboard, a short watch of two hours. There are two dog watches — the first usually from 4 to 6 o'clock P. M., and the second from 6 to 8 P. M.

Dog′wood, a township of White co., Ark. Pop. 513.

Dogwood, a name given in the U. S. to several small trees, especially to the *Cornus florida* and others of its genus, which contains also the cornel trees or dogwoods of Europe. The larger species are characterized by their hard wood, which is useful in turnery, and by their bitter tonic bark. The *Cornus florida* is well known for its white, showy involucral blossoms, appearing in May and June. In the West Indies, etc. various other trees are known as "dogwoods." One of these, the *Piscidia Erythrina,* or Jamaica dogwood, a small leguminous tree, found also in Florida, has a valuable and very hard timber. Its bark is a powerful narcotic and anodyne poison.

The "poisonous dogwood" or "poison sumach" (*Rhus venenata*) of the U. S. is probably much the most poisonous to the touch of all our native plants. It closely resembles the *Rhus Vernix* or varnish tree of Japan, and may be distinguished from the harmless sumachs by its panicles, which are loose (not thyrsoid or closely clustered in a spike, like the harmless ones), and which are axillary, while those of the harmless species are terminal. (See RHUS.)

Dogwood Neck, a township of Horry co., S. C. Pop. 573.

Dohud, a town of Upper India, on the boundary between Malwah and Guzerat; lat. 22° 55′ N., lon. 74° 20′ E. It is on the road to the Gulf of Cambay, and is much visited by merchants.

Doit [said to be derived from the Fr. *d'huit,* "of eight," it being the eighth part of a penny or stiver], the name of a small Dutch coin used in Scotland during the reign of the Stuarts, supposed to be worth about half a farthing.

Do′kos, a dwarfish race of negroes, inhabiting a region of Africa S. of Abyssinia, and living in a perfectly wild state. They are captured in large numbers by the slave-dealers.

Dolabel′la (PUBLIUS CORNELIUS), a profligate Roman patrician, born about 70 B. C., married Cicero's daughter Tullia. He fought for Cæsar at Pharsalia in 48 B. C., and became consul about the year 44. He was afterwards a partisan of Antony, was defeated by Cassius in Syria, and killed himself in 43 B. C.

Do'lan, a township of Cass co., Mo. Pop. 1475.

Dolan's Ranche, a township of Ellis co., Kan. P. 17.

Dol'ci (Carlo), an Italian painter, born at Florence May 25, 1616, was a pupil of Jacopo Vignali. His works, which are numerous and scattered over all Europe, are very finely finished. Died Jan. 17, 1686.

Dol'cinites, or **Dul'cinists,** a sect founded by Dolcino, an Italian born at Novara in the thirteenth century. They opposed the popes, and, according to Milman, held kindred tenets with the Fraticelli or Spiritual Franciscans, with some leaven of the old doctrines of the Patarines (Puritans) of Lombardy. Dolcino and some of his followers were burned alive in 1307.

Dole [Ang.-Sax. *dælan;* Dutch *deelen;* Ger. *theilen,* to "distribute," "deal out in small quantities"], a gift of food or money to the poor at funerals. The custom was formerly very prevalent in Great Britain and Ireland.

Dôle [Lat. *Dola* or *Tollium*], a town of France, department of Jura, is at the base of a vineclad hill on the river Doubs, about 30 miles S. E. of Dijon. It is connected by railway with Dijon and Lyons. It has a large cathedral, a court-house, a theatre, and a public library; also manufactures of hardware, pottery, straw hats, and chemical products. Dôle was formerly the capital of Franche-Comté. It is supposed to occupy the site of the ancient Roman *Dola Sequanorum.* Pop. 11,093.

Dolet (Étienne), a learned French writer, born at Orleans in 1509. He lived at Lyons, where he established a printing-press and published able works on theology and other subjects. His writings were burned by order of Parliament as heretical in 1543. He translated some works of Plato and Cicero, and wrote a "Commentary on the Latin Language" (1536). He was burned at the stake in Paris on a false charge of atheism Aug. 3, 1546.

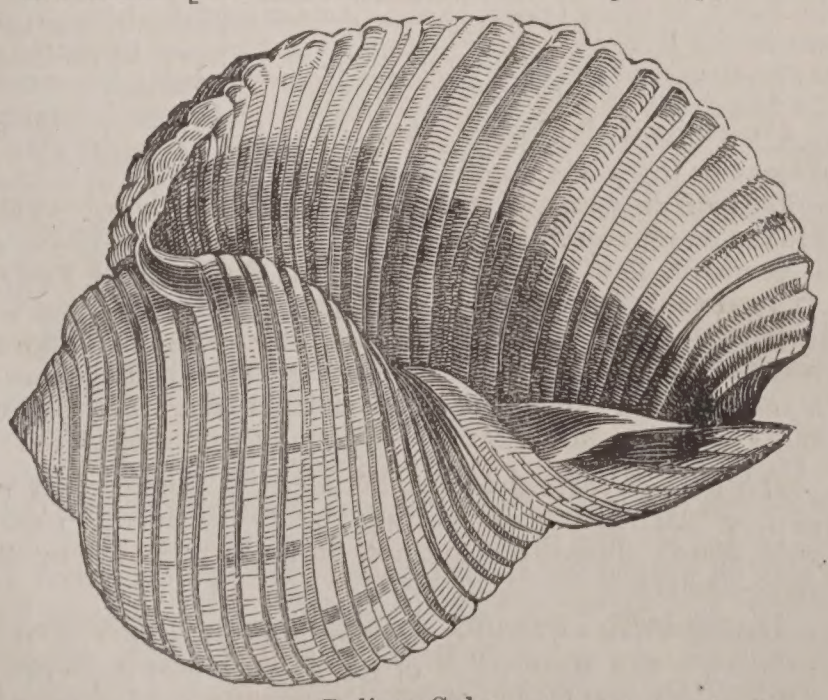
Dolgelly, a market-town of Wales, capital of the county of Merioneth, on the Mynach, here crossed by a bridge, 46 miles W. of Shrewsbury. It is in a rich valley at the foot of Cader Idris, and is surrounded by beautiful scenery. It has manufactures of coarse woollens called webs.

Dolichocephal'ic [from the Gr. δολιχός, "long," and κεφαλή, the "head"], a term applied to human skulls which have the occipito-frontal diameter (that from the back to the front) much in excess of the transverse diameter. The native Australians and West African races afford extreme examples of this form of skull. Those skulls which have a relatively short occipito-frontal diameter are called *brachycephalic—i. e.* "short-headed." Examples of both forms here noted are found among the remains of the prehistoric races of Europe. Which of the two types belong to the earliest period is an unsettled question. Among the historic peoples of Europe the dolichocephalic form prevails among the Indo-European varieties, and the brachycephalic among the Finnic. (See Wilson, "Pre-historic Annals of Scotland," and Lubbock, "Pre-historic Races," pp. 90–116.)

Dol'ichos [Gr. δολιχός, "long," so called from the length of its pods], a genus of leguminous plants, allied to *Phaseolus.* They are natives of the East and West Indies, where the pods and seeds are used as food. The Chinese sauce called soy is made from the *Dolichos Soya,* or soy bean, and the tuberous roots of some species are eaten in China. Other species are cultivated for the beauty of their flowers.

Doli'na, a town of Austrian Galicia, about 75 miles S. of Lemberg. It has extensive salt-mines. Pop. 6200.

Do'lium [Gr. a "cask," from the hooped appearance



Dolium Galea.

of the shell], a genus of gasteropod mollusks of the whelk family, having spirally furrowed shells. Some fourteen living species are found in the warm seas of the Eastern hemisphere, and seven fossil ones, mostly from the tertiary.

Doll [Fr. *poupée;* Ger. *Puppe;* perhaps a contraction of *Dorothy,* but supposed by some to be an abbreviation of *idol, i. e.* an "image"], a toy of wax, wood, or plaster, made like the image of a child, and used as a plaything. Dolls were in use in the earliest times, and those of the Greek and Roman children were buried with them when they died. Great Britain was formerly supplied with these toys principally from the Netherlands, but there are now many extensive manufactories of them in London and other English towns. Many of those which come to the U. S. are manufactured in Nuremberg, Germany.

Dol'lar [Ger. *Thaler;* Dan. *Daler;* see below], a gold or silver coin of different values current in the U. S. and several countries of Europe. Its name is derived from Joachim's Thal (Joachim's Valley) in Bohemia, where dollars were first coined (1518). The dollar is the unit of account in the monetary system of the U. S. It was coined in silver only until 1849, when a coinage was authorized of dollars in gold. Its value was originally the same as that of the Spanish piastre of eight reals, but is now somewhat below. The weight of the silver dollar was fixed by law in 1837 at 412½ Troy grains. The U. S. dollar is not now represented by any silver coin. The silver half-dollar weighs 12½ grammes, or two silver half-dollars 25 grammes. (Act of Congress, approved Feb. 12, 1873.) The act referred to created also a silver "trade dollar," weighing 420 grains, for use in commercial transactions in the East. The gold dollar weighs 25.8 grains = 1.672 grammes, exceeding 1⅔ grammes, or 5 ter-grammes, by only six one-thousandths of a gramme. The standard fineness of both silver and gold for coinage is nine-tenths (*i. e.* one-tenth of it is alloy). The British standard of fineness is eleven-twelfths for gold, and thirty-seven-fortieths for silver. Half-dollars, quarter-dollars, and dimes are coined in silver. A silver half-dime was also coined before 1873. The half-dollar (since 1873) weighs twelve and a half metric grammes—the smaller coins proportionately less. The actual value of the U. S. gold dollar, in British currency, is 4*s.* 1⅓*d.* The gold coins of the U. S. are legal tenders for all sums; the silver coins are legal tenders only for sums not exceeding five dollars. Accounts in dollars and cents are written thus: $13.78 = thirteen dollars and seventy-eight cents. The coins are double-eagles, eagles, half-eagles and quarter-eagles, valued at twenty, ten, five, and two and a half dollars; also, three-dollar and one-dollar pieces. The German thaler has different values. The most current, that of Prussia, is worth seventy-one cents. (See Rixdollar; also Coinage, by E. B. Elliott.)

F. A. P. Barnard.

Dol'lart, The, a gulf of the German Ocean, at the mouth of the river Ems, between Hanover and Holland. It is 10 miles long and 7 miles wide. It was formed by an inundation in 1276.

Döl'linger (Johann Joseph Ignaz), D. C. L., an eminent German divine and leader of the "Old Catholic" movement, was born at Bamberg, in Bavaria, Feb. 28, 1799. He received priestly orders in 1822, and almost immediately after became chaplain to the diocese of Bamberg. "The Doctrine of the Eucharist during the First Three Centuries" was published by him in 1826, and he was invited the same year to lecture on the history of the Church before the University of Munich. The substance of these lectures appeared in 1828 in his "Manual of the History of the Church," and again, more extended, in his "Treatise on the History of the Church" (1838). He turned his attention to politics in 1845, and represented the University of Munich in the Bavarian Parliament. In 1849, when a delegate to the Diet of Frankfort, he voted for the absolute separation of the Church from the State. He delivered in 1861 lectures advocating the abandonment of the temporal power by the Holy See. He published "Origins of Christianity" (1833–35), "The Religion of Mohammed" (1838), "The Reformation, its Interior Development and its Effects" (3 vols., 1846–48), "A Sketch of Luther" (1851), "Hippolytus and Callistus, or the Roman Church in the First Half of the Third Century" (1854), "Paganism and Judaism" (1857), "Christianity and the Church" (1860; 2d ed. 1868), "The Church and the Churches, or the Papacy and the Temporal Power" (1861), a translation of which appeared in 1862, "Papal Legends of the Middle Ages" (1863), and a "History of the Religious Sects of the Middle Ages" (3 vols., 1870). Dr. Döllinger has in particular obtained wide fame by his opposition to the decrees of the Vatican Council, and particularly to that one declaring the infallibility of the pope when addressing the Church *ex cathedrâ* on questions of faith and morals. He published on this subject the pamphlets "A Few Words on the Infallibility Address" and "The New By-Laws of the

Council" (1870), and he was commonly believed to be one of the authors of the "Janus," one of the most important works published against Papal infallibility. As he emphatically declined to submit to the decrees of the Vatican Council, he was, on April 17, 1871, formally excommunicated by the archbishop of Munich. On July 29, 1871, he was elected rector of the University of Munich, receiving 54 out of 63 votes cast. He took a leading part in the Old Catholic congresses of Munich (1871) and Cologne (1872). In the former he showed himself opposed to the measures adopted by the majority for effecting a permanent ecclesiastical organization of the Old Catholics; in the latter he was elected chairman of a special committee on the reunion of the Christian churches, a subject to which he has for years devoted a special attention. He has been for years a member of the first chamber of the Bavarian Diet.

Dol'lond (JOHN), F. R. S., an English optician well versed in mathematics, was born in London June 10, 1706. He was a silk-weaver in his youth, and employed his leisure hours in the study of sciences and languages. In 1752 he became a partner of his son PETER (born 1730, died July 2, 1820) in the business of optician. They fabricated telescopes of superior quality. John Dollond invented the achromatic telescope, for which he received the Copley medal of the Royal Society in 1758. Died Sept. 30, 1761.

Dol'men, a word of Cymric origin, nearly synonymous with CROMLECH (which see). The proper dolmen consists of one large unhewn stone, resting on two or more unhewn stones placed erect in the ground. The term is sometimes applied to structures where several blocks are raised on pillars so as to form a sort of gallery. Near Saumur in France is a dolmen called *Pierre Couvert*, which is sixty-four feet long and fifteen feet wide. Such structures are now generally referred to pre-historic races.

Do'lo, a town of Italy, in Venetia, on the river Brenta, 12 miles W. of Venice, on the railway to Padua. Here are many fine villas of the Venetian nobility. Pop. 5523.

Dolomieu, de (DÉODAT GUI SYLVAIN TANCRÈDE DE GRATET), a French geologist and mineralogist, born at Dolomieu, in Dauphiny, June 24, 1750. He joined the order of the Knights of Malta in his youth, and having returned to France in 1791, he explored the geology of that country, and wrote several geological treatises, which were inserted in the "Journal de Physique." He was one of the savants who accompanied Bonaparte to Egypt in 1798. He was thrown into a prison by the Neapolitans in 1799, and released the following year; he was appointed professor of mineralogy in the Museum of Natural History. He died Nov. 26, 1801. (See LACÉPÈDE, "Notice historique sur la Vie de Dolomieu," 1802.)

Dol'omite [named in honor of the savant Dolomieu], or **Magnesian Limestone,** a mineral consisting of carbonate of lime and carbonate of magnesia in variable proportions, which are sometimes nearly equal. Its crystals are usually rhomboidal. Dolomite is extensively used as a building-stone, and is converted into good lime by burning. The new British houses of Parliament are built of this stone. In England, fossiliferous dolomites form the greater part of the Permian limestones from Durham to Nottinghamshire. Large mountain-masses of crystalline dolomite occur in the Tyrol. It is also abundant in the eastern parts of New York, Pennsylvania, Maryland, and other States.

Dol'phin [Gr. δελφίν; Lat. *delphinus;* Fr. *dauphin*] is properly the name of a cetaceous mammal of the Mediterranean (*Delphinus delphis*), the dolphin of the classic poets. It is six or eight feet in length, and very active in its habits. There are many similar species known as dolphins in various parts of the ocean. The dolphin of modern sailors, the beauty of whose colors when dying is so celebrated, is a true fish, the *Coryphæna hippuris*, abounding in the warmer parts of the Atlantic, where it wages incessant warfare against the flying-fish and other inhabitants of the sea. It is often eaten, and is very palatable, but its flesh is said to be sometimes poisonous. The colors of the dying dolphin appear to be owing to the gradual evaporation of the water retained between the scales of the fish (which are translucent, while the body is white), causing the irised appearance seen in soap-bubbles, and known as the "colors of thin plates." The beauty, which is very real, has been much exaggerated by poets who have never personally observed it.

Dol'son, a township and post-village of Clark co., Ill. Pop. 1221.

Dom, or **Don** [from the Lat. *dominus*, a "lord"], a title originally assumed in the Middle Ages by the popes. It was afterwards borne by bishops, and sometimes given to monks, as Dom Calmet and Dom Mabillon. In Portugal the title *dom* is confined to the king and his family. The Spanish *don* was formerly a title confined to noblemen, but is given by courtesy as indiscriminately as the English *Mr.* In the U. S., Roman Catholic dignitaries of German origin have the title *dom.*

Domain' [Fr. *domaine;* Lat. *dominium*, from *dominus*, a "lord"], empire, authority; the territory over which authority is exercised; landed estate; an estate which a person has in his own right; that portion of the territorial possessions of a lord which he retains in his own occupation, sometimes called DEMESNE (which see). The term *domaine* is applied in France to public property in general. The public land belonging to the government or people of the U. S. is often called the public or national domain.

Domain, Eminent. See EMINENT DOMAIN, by PROF. T. W. DWIGHT, LL.D.

Domat (JEAN), a French jurist, born at Clermont, in Auvergne, Nov. 30, 1625. He was a friend of Pascal and other recluses of Port Royal. He officiated for many years as king's advocate at Clermont, and published an important systematic work entitled "The Civil Laws in their Natural Order" (1689). Died in Paris Mar. 14, 1696. (See E. CAUCHY, "Études sur Domat," 1852.)

Dom-boc, or **Doom Book** (*Liber Judicialis*), the name of a code of laws compiled by King Alfred, partly from the Kentish collection of Ethelbert and the Mercian laws of Offa, but chiefly from the laws made by his own ancestor, Ina. Alfred made few original laws, but restored and renovated those already existing. The laws of England, up to the time of the Norman Conquest, were administered in the vernacular speech of the people. Alfred's Christian character is clearly indicated in his code, which commences thus: "The Lord spake all these words, saying, 'I am the Lord, thy God.'" Then followed the ten commandments, a part of the Mosaic law, and passages from the New Testament, including the Golden Rule. The code was ratified by the Witan, as Alfred informs us.

Dombrow'ski (JOHN HENRY), a Polish general, born in the palatinate of Cracow Aug. 29, 1755. He fought against Russia in the war of 1792–94, during which he obtained the rank of general. In 1795 he entered the French service, and in 1797 passed into that of the Cisalpine republic as commander of a Polish legion. In 1806 he raised an army of 30,000 Poles to fight for Napoleon. He gained a victory at Dirschau in 1809, and took part in the Russian campaign of 1812. Died June 6, 1818.

Dombrowsky (JAROSLAV), a Polish revolutionist, born at Cracow in 1826, served first in the Russian army, and was in 1862 compelled to flee in consequence of having participated in the Polish insurrection. He is also accused of having been a counterfeiter and a traitor to the Poles. He formed in the beginning of the French-German war a Polish legion, was on April 8, 1871, appointed to the command of the insurgent troops at Asniers, and on May 9 succeeded Rossel as commander-in-chief of all the forces of the Paris Commune. On May 22 he was mortally wounded, and died on May 23.

Dome [It. *duomo*, originally the "house (*domus*) of God," afterwards applied in Italian to a cathedral, of which a *dome* in the common English sense of this word is one of the most remarkable features]. This word, though used often to signify a cupola, means, strictly, the outer part of a spherical roof, of which the cupola is the inner part. In Italy, however, it has a wider significance, being used to designate the chief church of a town. As all the chief churches were roofed in this way, the name of the church was applied to the kind or species of roof. The origin of the dome is often traced to the Eastern empire, because it was in the Byzantine provinces that it was first applied to ecclesiastical building. But the Romans really invented the dome, and originated all applications of the semicircular arch. The dome of the Pantheon is one of the most magnificent in the world, and domes of smaller size are in the temples of Bacchus, Vesta, Hercules, Romulus, etc. The three most renowned modern domes are those of St. Peter's at Rome, St. Paul's in London, and the Pantheon at Paris.

The dome of the Capitol at Washington is the finest in America. It is made of cast iron, and is surmounted by a bronze statue of Liberty twenty feet high, designed by Crawford. The dome is considered the finest iron structure in the world.

Domenichi'no, an Italian painter, whose proper name was DOMENICO ZAMPIERI, was born at Bologna Oct. 21, 1581. He was a pupil of Annibal Caracci at Rome, where he worked for several years. He was employed as painter and architect by Pope Gregory XV. Among his masterpieces are "The Communion of St. Jerome" (in the Vatican), "The Martyrdom of St. Agnes," and the "Cure of the Demoniac Boy." In the latter part of his life he worked in Naples, where he died April 15, 1641. (See LECARPENTIER, "Notice sur D. Zampieri," 1812.)

Domesday Book. See DOOMSDAY BOOK.

Domestic Animals are such as are reared by man for his own use, and at the same time tamed or familiarized to some extent to man's presence; for bees, silkworms, and a few other insects reared by man are never really tamed, though modified in many cases in form by the influence of man. A great many animals may be tamed, and yet not truly domesticated, for true domestication implies a course of breeding for many generations.

The more important domestic animals are the ox, buffalo, yak, sheep, goat, reindeer, camel, llama, alpaca (ruminants), the horse, ass, elephant, swine (pachyderms), rabbit, guinea-pig (rodents), dog, cat, ferret (carnivores), and of birds, the hen, turkey, peacock, guinea-fowl, pheasant (gallinaceous birds), goose, duck, etc. (natatores), besides the pigeons and various song-birds. The breeding of fishes for food is not true domestication.

The wonderful changes of form, habit, and temper observed in various breeds of the dog, and the still more remarkable variations in the form of pigeons, have suggested to many naturalists the idea of the mutability of species. (For a discussion of the question in this aspect, see DARWIN "On Domestic Animals and Cultivated Plants," 1867, and the articles EVOLUTION, by PROF. HENRY HARTSHORNE, and DARWINISM, by PROFS. YOUMANS and SEELYE.)

Dom'icile [Lat. *domicilium*, from *domus*, a "house;" Fr. *domicile*], a mansion; a place of permanent residence; in law, the place where a person has his home or his legal place of abode.

A distinction must be taken between residence and domicile. A person may have two or more residences, but can have only one domicile. A domicile may be said to be the place where a person has his true fixed and permanent home and principal establishment, and to which, whenever he is absent, he has the intention of returning. A domicile may be acquired in three ways—by birth, by choice, or by operation of law. Domicile acquired in the first mode is frequently called "domicile of origin." When of choice, it must consist both of an act and an intent. A mere intent to acquire a domicile will have no effect. Nor will a prolonged residence in a particular place constitute a domicile, unless accompanied by an intent to acquire it. Domicile is acquired by operation of law when it is a consequence of certain legal relations, as in the instance of a wife. The rules affecting domicile have much importance in international law, whether public or private, and for this purpose it may be distinguished into domestic and national. Questions concerning the validity of marriages and divorces, the execution and construction of wills, and succession to estates, frequently depend on the law of domicile.

The leading rules governing domicile are these: 1. The domicile of origin continues until a new one is acquired. The same rule of continuance applies to successive domiciles. 2. A person having legal capacity may, in general, change his domicile at will. Persons under legal disability, such as minors and lunatics, have no such power. The domicile of a minor is in general that of his parent or guardian. 3. The law in some cases fixes the domicile of a person at the place where the person is under a duty to reside. Under this rule the holder of an office may be domiciled at a place where official duty requires him to reside. On the same principle the wife's domicile follows that of the husband, though this rule is modified in matters of divorce. 4. To change one's domicile there must be both an intent and an act. The intent may be inferred from a variety of circumstances, and in some instances the inquiry ranges over a period of many years. Under this rule an enforced sojourn in a place will not in general constitute a domicile. (See INTERNATIONAL LAW, PRIVATE, by PRES. T. D. WOOLSEY, S. T. D., LL.D.) T. W. DWIGHT.

Dom'inant [Lat. *dominans*, present part. from *dominor*, to "rule," to "prevail"], in music, the fifth tone of the scale, agreeing with the note G. The dominant is the ruling tone of the key, and next in importance to the first tone of the gamut.

Domingo, Santo. See SANTO DOMINGO.

Domingo, Santo, Projects of Annexation to the U. S. Investigations and negotiations looking towards the annexation of the republic of Santo Domingo, or the cession of valuable parts of it, to the U. S. extend over a period of nearly thirty years. The series of Democratic administrations between 1844 and 1860 had constantly in view the policy of the acquisition of territory in the West Indies, and made several investigations within the territory of the Dominican republic. That this did not end in annexation was evidently due not so much to the opposition of the Dominicans as to the half-heartedness of influential American politicians, arising from the peculiar condition of parties in the U. S. The statesmen of the slave-holding States and their allies from the free States were then in power at Washington. They felt the need of additional slave States in the West Indies to balance the inevitable increase of free States in the North, but they evidently dreaded to add a republic in which the blacks were free and their equality recognized by law and custom.

The first negotiation seems to have been made in 1845, when President Polk sent Mr. Hogan as commissioner to the island. His reports were favorable, and during the next year Lieut. D. D. Porter, now (1874) admiral of the navy, was sent to make an additional investigation of the resources and condition of the country. His examination was thorough and his report favorable. But the difficulty arising from negro freedom and equality in the island was revealed as fully as its material wealth, and nothing was done.

The Taylor-Fillmore administration paid little if any attention to this subject, but one of the first acts of the succeeding administration, that of Pierce, was to send Capt. (since Maj.-Gen.) G. B. McClellan to make a more thorough survey than had been made, especially of the Bay of Samana. Capt. McClellan visited the island in 1854. His survey was made with great care, and he reported strongly in favor of the acquisition of at least a portion of the Samana peninsula as a naval station for the U. S. His only error seems to be in overrating the mineral wealth of Samana; the want of thorough geological knowledge caused him to mistake beds of lignite for beds of coal. But into this mistake even so eminent an authority as Sir Robert Schomburgk had fallen before him, and this error was persisted in until geologists connected with the commission of 1871 made thorough examination; it detracts, however, very little from the general value of McClellan's conclusions.

Another negotiation looking towards the acquisition of territory followed, but with no result. The struggle during the great civil war in the U. S. seems to have diverted thought in Washington from any efforts in the West Indies likely to arouse the ill-feeling of European powers. But hardly was that contest ended when the subject came up again. The necessity of an American naval station in the West Indies had been brought home to the administration by difficulties in dealing with blockade-runners during the civil war, and in 1867, Mr. Seward, the secretary of state, with a considerable retinue of officials, visited the Dominican capital, and had an interview with the authorities. But other projects of annexation were preferred by the Johnson administration, and this was postponed. Shortly after the accession of Gen. Grant to the presidency the subject was again brought up by overtures from the Baez government, then in control of the Dominican republic. For some time nothing was done. A reaction against the extension of territory had set in. There was a general feeling that the recently acquired territory of Alaska had cost more than its value, and this feeling was strengthened by the news of the St. Thomas earthquakes, which contributed so much to the failure of the attempt to acquire that island.

The early communications by President Baez were received with distrust at Washington, but at last a communication was received from him to the effect that the difficulties of the Dominican republic had become so great that if it could not make terms with the U. S., self-preservation would force it to do so with some other nation. In view of this, President Grant sent Gen. O. E. Babcock on a confidential mission to the Baez government. Gen. Babcock made two visits to the island, and the result was the project of a treaty signed by the Dominican government on the one hand, and afterwards ratified by the Dominican people; and on the other hand signed by the Washington administration, awaiting ratification by the Senate. The main points in the treaty were that the Dominican republic was to come under the government of the U. S. as a Territory, receiving $1,500,000 in order to extinguish her debt; and as security for such application of funds the U. S. was to have a lien on all the lands of the republic. It was also stipulated that no further grant or concession should be made by the Dominican government, and no further debts contracted, after the execution of the treaty. In addition to the annexation treaty, having reference to the entire territory of the republic, there was prepared a convention for the lease of Samana Bay to the U. S. for fifty years, the annual rental to be $150,000, and the first instalment to be paid at once. If the treaty for the acquisition of the island should be ratified, this first annual payment was to be deducted from the million and a half to be paid under that treaty. A clause in the treaty required it to be ratified by a popular vote of the Dominican people. This took place in Feb., 1870, the official returns showing for the measure over 15,000 votes, and against it less than 400.

The treaty having been sent to the Senate, a very strong opposition was developed, and in consequence it lingered

until it expired by its own limitation on May 29. On May 31 the treaty was renewed, and the debate upon it was one of the most earnest and brilliant in American annals. The leaders against the treaty were Senators Sumner and Schurz, and the leaders in its support Senators Morton and Conkling.

While the measure was pending, circumstances occurred which greatly embittered the whole question. A petition was received from one Davis Hatch, a citizen of Connecticut, claiming that he had been arrested and condemned to death by the Dominican government, and that, although the penalty in his case had been changed to banishment, he had been detained in prison longer than he would otherwise have been, by the machinations of the American negotiator of the treaty, Gen. Babcock. The cause alleged for this was fear lest Mr. Hatch should return to the U. S. and denounce the treaty before its publication. A special committee of the Senate, appointed to investigate this case, presented a majority report, very voluminous, declaring the charges against Gen. Babcock "totally unfounded," and that "his whole conduct had been marked by honor, truth, and fidelity, and the evidence leaves him without a stain."

An additional difficulty was caused by the dealings with the republic of Hayti, adjoining the Dominican republic. A war had been going on for nearly thirty years between the two republics, and a bitterly hostile feeling was the result. The efforts of the Haytians to overthrow the Baez government, and so prevent the treaty with the U. S., led to the sending of some American armed vessels upon the Haytian coast while the treaty was pending, and into the Haytian harbors; and it was charged that some of the American officers assumed too dictatorial a tone with the officials of the Haytian republic. The result was that the treaty was finally rejected.

In his message at the beginning of the next Congress, in view of the many charges which had been preferred, the President recommended the appointment of a commission to proceed to the island and make a thorough investigation of the important points that had been raised in the debates. A second struggle followed, more bitter than the first. The opponents of the administration were not less vigorous in opposing the investigation than they had been in opposing the treaty. But the measure was finally carried by an overwhelming vote in both Houses. The commissioners appointed were Benjamin F. Wade of Ohio, Andrew D. White of New York, and Samuel G. Howe of Massachusetts. To them were attached Judge Burton, formerly minister to Bogota, as secretary, and Frederick Douglass and Gen. Franz Sigel as assistant secretaries. In view of the fact that several of the questions to which answers were required by Congress demanded scientific investigation, a number of scientific gentlemen of eminence were attached. The commission sailed from New York Jan. 17, 1871, and reached Samana Bay the following week.

The work before them was carried out with great care. Expeditions were sent through various parts of the island. Full testimony was taken regarding the purchases or leases of land by Americans, the mineral wealth and agricultural capabilities, the fisheries, and the condition of the country as regards health. Botanists were also employed to examine into the production of choice woods, and agriculturists of experience to examine as to the capabilities of the soil. Besides this, a very careful investigation was made as to the general condition of the people, and their feelings regarding the annexation and the ratification of the treaty with the U. S., and especially to find whether the popular vote was fairly taken. In accomplishing this the commission took testimony at all important points in the republic. Dr. Howe made an extended journey from E. to W., and Mr. White crossed the island, passing from Santo Domingo City through the great valleys and over the mountains of the Cibao to the leading commercial city of Puerto Plata on the N. side of the island, making examinations at the intervening towns. Besides this, fourteen expeditions, provided with careful instructions and full schedules of questions to ensure careful investigation, were sent into the various parts of the republic; so that, with the exception of the extreme western part, overrun by Haytian troops, every part of the country was very thoroughly examined.

The report of the commission, with the accompanying testimony, has since been published by Congress. As to the condition of the country, the commission finds "that there is no opponent of the present administration of that republic who has now, or who ever has had, any claim to the chief magistracy by a title superior to that of the present incumbent." It condemns the factions seeking to overthrow the existing government, and submits proofs that they are inspired by the government of Hayti. It calls attention to the fact that, in spite of the sad condition of the republic, some local liberties have been preserved which show capacity for self-government. It also shows the reason why the Spanish government, after being called to the island, was necessarily expelled. Very thorough statements are made regarding the desire for annexation by the people. The commission found that everywhere this desire was most earnestly manifested. They attribute this feeling in part to ideas which have come from American colored colonists, but far more to the absolute necessity of some refuge from the constant war with Hayti, and the anarchy resulting from the cabals of military leaders. The commission found a remarkable absence of prejudice regarding class, race, and color. Also that there is no intolerance towards the small number of Protestants—that there is very little education, but considerable desire to obtain it. As to population, they set it down at about 150,000. As to race, they say: "White blood preponderates largely in Santo Domingo, but pure whites, in the popular sense of the word, are not numerous. The majority are of a mixed race, nearer white than black." As to mineral products, the geologists report the existence of iron, copper, gold, lignite, rock-salt, and petroleum. Iron ore is especially abundant. As to the soil, they find the eastern districts of the republic rich and fertile, but some of the western part arid; and sum up by saying that this is naturally the richest of the West Indian islands. The portion of the report devoted to agricultural products and forest products, and that regarding the fisheries, are very carefully given. As regards climate and health, the commissioners come to the conclusion that with care life is as safe in Santo Domingo as in the Northern States of the U. S., and that no more die of malignant fevers in Santo Domingo than of pulmonary complaints in New England. Much stress is laid upon the value of the Bay of Samana as a naval port. The public debt is shown to be about $1,500,000; the income of the government about $800,000. They find that the Dominicans do not at all expect to enter into the Union as a State. Much stress is laid upon the influence which the acquisition of Santo Domingo would have in breaking down slavery in the adjoining islands of Cuba and Porto Rico, as all duties on products would be a discrimination against slave-labor.

The commission also visited the capital city of Hayti, and made investigations there which confirm them in the opinion that the Haytian government, instead of being injured by the Dominican republic, is constantly provoking civil war within the boundaries of Santo Domingo.

The commission arrived in Washington early in April. On receiving their report, the President sent it with a message to Congress, stating that although it confirmed him in his opinions as to the desirableness of the island and the advantage to result from a treaty, he left it now entirely to the American people without any recommendation. No action resulted, and the matter was indefinitely postponed.

As it became evident that governmental action, even if it ever came, was to be long delayed, there was formed in New York "The Samana Bay Company," which leased from the Baez government the peninsula and adjacent waters of Samana, and obtained large privileges for trade at an annual rental of $150,000. This company, up to this day (1874), seems not to have met its own anticipations, and recent communications from the Dominican government are given urging upon the U. S. to take some final step in the matter, but so far nothing appears to be done in regard to it.

A. D. WHITE.

Dom'inic [Sp. *Domingo de Guzman*], SAINT, the founder of the order of Dominicans, was born at Calahorra, in Old Castile, in 1170. He gained distinction as a preacher and as a persecutor. He was one of the instigators of the crusade against the Albigenses in 1208. In 1215 he founded the order of Preaching Friars or Dominican monks, which was approved by the pope in 1216. (See DOMINICANS.) Dominic was the first general of the order. He died Aug. 6, 1221, and was canonized by Pope Gregory IX. in 1234. He was a canon, a priest, and an archdeacon successively.

Domin'ica ("Sunday Island"), discovered by Columbus on Sunday, Nov. 3, 1493, a British West India island, is 22 miles N. of Martinique; lat. 15° 18′ N., lon. 61° 24′ W. It is 29 miles long, and has an area of 291 square miles. It is of volcanic origin, and is the highest of the Lesser Antilles, the summit having an altitude of 5314 feet. The soil of the valleys is fertile. The staple productions are coffee, sugar, cotton, tobacco, cocoa, copper ore, rum, and timber. The abolition of slavery increased the prosperity of this island. Dominica was ceded to Great Britain by France in 1763. The public revenue in 1870 amounted to £15,721; the expenditure to £15,248; the public debt to £7230. The total tonnage of vessels entered and cleared (exclusive of coasting-trade) was 19,160; the total value of imports, £60,278. Pop. in 1870, 28,517.

Domin'ical [from the Lat. *dominica*, the "Lord's day"]

Letter. The Romans used the first eight letters of the alphabet (A to H) to mark the consecutive days of their recurring nundinal period. The early Christians adopted the same plan for marking the days of the week, dropping the last one (H) as unnecessary. In the Church calendar A has always stood for the first day of January, B for the second, and so on. G therefore marks the seventh day, and the cycle begins again with A on the eighth. A returns in like manner on the 15th, the 22d, and so on. Each day in the year has thus its calendar letter; and the letter which falls on Sunday is called the *dominical letter* of the year. The 28th of February has always the letter C, and the 1st of March has always the letter D. The 29th day of February in leap-year has therefore no letter provided for it; and this makes a change in the Sunday letter after February; so that in leap-year there are two dominical letters. As the common year contains fifty-two weeks and one day, the dominical letter changes from year to year, going backward one place for every common year, and two places every leap-year. This mode of representing the days of the week has been uninterruptedly employed in the calendar of the Church throughout the world from the earliest ages of Christianity. F. A. P. BARNARD.

Domin'icans, an order of mendicant friars founded by Saint Dominic at Toulouse, was confirmed by Pope Innocent III. in 1216. They were called Black Friars in England, and Jacobins in France, from the Rue St. Jacques (Jacobus), where they first established themselves. In 1216, Honorius III. constituted the order under the rules of Saint Augustine, which enjoined almost continual fasts, perpetual silence, and other mortifications. In 1221 the order was introduced into England, and their first establishment made at Oxford. In 1276 the corporation of London granted the order two lanes near the Thames, where a monastery was erected, the neighborhood of which is still called Blackfriars. The order of Dominican nuns was founded in 1206.

Among the men of genius and eminent scholars belonging to this order were Thomas Aquinas and Albertus Magnus. The reputation of the Dominicans in history, however, is stained by their cruel persecution of the Albigenses and the prominent part they took in the establishment and administration of the Inquisition. Their principal rivals were the Franciscans, and the two orders for a long time divided between them the control of the Church, and frequently of the Catholic states of Christendom. The Jesuits in the sixteenth century gradually took possession of the power formerly exercised by the Dominicans. Dominican monks and nuns are, however, still found in most countries. In the U. S. their numbers are increasing.

Dominion of Canada. See CANADA, DOMINION OF, by PROF. A. J. SCHEM.

Dom'inis, de (MARCANTONIO), an Italian theologian, born in the isle of Arba, near Dalmatia, in 1566. He became professor of philosophy at Padua, and wrote a curious treatise on light entitled "De Radiis Visus et Lucis in Vitris Perspectivis et Iride" (1611), in which the phenomena of the rainbow were explained for the first time. After he had been appointed archbishop of Spalatro he went to England in 1616, and became a Protestant. He wrote "De Republicâ Ecclesiasticâ" ("On the Ecclesiastical Republic," 1617). In 1622 he returned to Italy, and relapsed into the Roman Catholic Church. Died Sept., 1624.

Domin'ium [from *dominus*, a "master," a "lord"], a legal term of the Romans, signifying a full legal right in and to an object, but which could not be conferred by actual possession alone unless such possession had endured for the period of legal prescription.

Dom'ino, an Italian word, is the name of a long loose cloak of black silk, furnished with a hood, worn at masquerades by persons of both sexes.

Dom'inoes, a game played by two or more persons with twenty-eight pieces of ivory or bone variously dotted. It is said to have been first introduced into France from Italy, and soon became popular throughout Europe. Various games are played with dominoes.

Domi''tian [Lat. *Domitianus*], or, more fully, **Titus Flavius Domitianus,** a Roman emperor, born in 51 A. D., was the second son of Vespasian. He succeeded his brother Titus in the year 81, and began his reign with moderation and apparent respect for justice. In the year 87 he was defeated by the Dacians, who compelled him to pay tribute. He afterwards became extremely cruel and suspicious, and caused many innocent persons to be put to death. He banished a number of eminent men and philosophers, including Epictetus. He was assassinated by conspirators in his palace in 96 A. D., and was succeeded by Nerva. (See SUETONIUS, "Domitianus.")

Don. See DOM.

Don (anc. *Tanais*), a river of Russia, rises in the government of Tula, and flows in a general S. E. direction to Katschalinsk. Below the town it runs nearly south-westward, and enters the N. E. part of the Sea of Azof near the town of Azof. Its total length is about 950 miles. The navigation of it is difficult during low water, but when the water is high (*i. e.* in April and May) vessels can ascend about 600 miles from its mouth. The Don is connected by a canal with the Volga.

Don, a river of Scotland, in Aberdeenshire, rises in Ben Aven, and enters the North Sea 1 mile from Old Aberdeen. Its general direction is eastward, and its length, including windings, 78 miles. Nearly a mile from its mouth it is crossed by the "Brig o' Balgownie."

Doña Aña, or **Don'na An'na,** a county in the S. E. of New Mexico, is bounded on the W. by the Rio Grande del Norte. The surface is partly mountainous. The soil in some places is fertile. Wheat, corn, and wool are raised. Silver is found. Salt lakes occur in some parts. Capital, Mesilla. Pop. 5864.

Doña Aña, a post-village of the above county, is on the Rio Grande, about 50 miles N. W. of El Paso (Texas).

Donaghadee', a seaport of Ireland, in the county of Down, and on the Irish Channel, 18 miles E. N. E. of Belfast. It has a good harbor, and trade in cattle, grain, etc. The embroidery of muslin is carried on here. Pop. in 1871, 2664.

Don'ahue, a village of Sonoma co., Cal., on San Pablo Bay, 35 miles N. of San Francisco. It is the southern terminus of the San Francisco and North Pacific R. R., and is connected with San Francisco by steamboats.

Don'aldson (EDWARD), U. S. N., born Nov. 17, 1816, in Maryland, entered the navy as a midshipman July 21, 1835, became a passed midshipman in 1841, a lieutenant in 1847, a commander in 1862, a captain in 1866, and a commodore in 1871. He commanded the steam-gunboat Scioto at the passage of Forts Jackson and St. Philip and capture of New Orleans April 24, 1862, and at the passage of the Vicksburg batteries June 28, 1862. Referring to the former battles, Commodore Henry H. Bell, Farragut's fleet-captain, writes: "Throughout the trying scenes of this dashing expedition, which is second to none on record, Captain Donaldson, his officers, and crew were conspicuous for their coolness, intrepidity, and good conduct." And in his report of the Vicksburg fight Rear-Admiral Farragut says: "It gives me great pleasure to mention that the officers and men of the ships which accompanied me up the river behaved with the same ability and steadiness on this occasion as in passing Forts Jackson and St. Philip." He commanded the steamer Seminole at the battle of Mobile Bay, and for his services on this occasion is thus highly complimented by Captain John B. Marchand in his official despatch of Aug. 7, 1864: "Commander Edward Donaldson, commanding the Seminole, which was lashed alongside of this ship, rendered most efficient service by his coolness and judgment in piloting both vessels until passing Fort Morgan, the regular pilot being sick. My additional thanks are due him and all his officers and men for volunteering to aid in manning the guns of the Lackawanna, and the continuous fire which they kept up whilst their guns could bear upon the enemy."

FOXHALL A. PARKER, U. S. N.

Donaldson (JAMES LOWRY), an American officer, born Mar. 17, 1814, at Baltimore, Md., graduated at West Point 1836, and July 28, 1866, assistant quartermaster-general U. S. A. (rank of colonel). He served in the artillery till Mar. 3, 1847, and subsequently in the quartermaster's department; on topographical duty 1836; in Florida war 1836–38; in emigrating Cherokees to the West 1838; on Maine frontier pending boundary controversy 1840–42; on the north-eastern boundary survey 1844–45; in the military occupation of Texas 1846; in the war with Mexico 1846–48, engaged at Monterey (brevet captain) and Buena Vista (brevet major); on quartermaster duty at various posts 1848–58; and chief of quartermaster's department of New Mexico 1858–62. He served in the civil war in command of the district of Santa Fé, N. M., 1861–62, engaged at Valverde; as quartermaster at Pittsburg, Pa., 1862–63; as chief quartermaster of the middle department 1863; as supervising quartermaster of the department of the Cumberland 1864–65, being in command of quartermaster's forces at the battle of Nashville; and as chief quartermaster of the middle division of the Tennessee 1865–66; of the department of the Tennessee 1866; of the military division of the Missouri 1866–69. Brevet colonel and brigadier-general Sept. 17, 1864, for distinguished services in the Atlanta campaign, and major-general U. S. A. Mar. 13, 1865, and major-general U. S. volunteers June 20, 1865, for faithful and meritorious services; and retired from active service Mar. 15, 1869. He

is author of "Sergeant Atkins," a tale of adventures in the Florida war, 1871. GEORGE W. CULLUM, U. S. A.

Donaldson (JOHN WILLIAM), D. D., an English philologist, born in London in 1811. He published, besides other works, "The New Cratylus" (1839, enlarged in 1859), a Greek grammar and a Latin grammar. He was a fellow of Trinity College, Cambridge. Died Feb. 10, 1861.

Donaldson (THOMAS LEVERTON), PH. D., an English architect, born in 1795, studied architecture in Italy and in Greece. He was long the professor of architecture in University College, London, from which he retired in 1864. He has published works upon ancient and modern art, and designed many fine buildings in London and its vicinity.

Don'aldsonville, a post-village, capital of Ascension parish, La., is on the Mississippi River at the origin of the Bayou Lafourche, 82 miles above New Orleans. It was formerly the capital of the State. Pop. 1573.

Dona'ti's Com'et was first discovered in June, 1858, became distinctly visible in September, reached its perihelion about Oct. 1, and arrived at its nearest point to the earth Oct. 10, when its apparent length was 51,000,000 miles. It afforded a most magnificent spectacle. Its return to the solar system is expected after about 1950 years. Its aphelion distance is computed at 15,000,000,000 miles. The discoverer lived at Bologna, and died of cholera, which attacked him while visiting the Vienna Exposition in 1873.

Do'natists, in ecclesiastical history, a party in the North African Church which effected a schism that lasted from 311 A. D. till the sixth century. They took their name from Donatus the Great, who was their bishop after Majorinus, from 315 to 348. The early history of this deeply interesting movement is obscure and complicated. A powerful exciting cause of the schism was the question as to the mild or severe discipline of Christians who left the faith in times of persecution, the Donatists advocating rigorous measures; but there were numerous other questions involved in the controversy, the most important being that of the union of the whole people within the Church (as maintained by the Catholic party), while Donatus demanded the separation of the Church from the world. Early in his reign Constantine the Great excluded the Donatists from the privileges conferred upon the Church, and in 316 A. D. he issued penal edicts against them. A fierce persecution ensued, lasting till 321, when the emperor granted them liberty of conscience. After his death the penal laws against them were revived, but they defended themselves with much spirit until, in 361 A. D., Julian (the so-called Apostate) restored to them their full freedom. Prosperity followed, and they boasted at one time of having 400 bishops in Africa; but controversies sprang up with each other and with the Catholic party, and in 415 their assemblies were forbidden on pain of death, Augustine himself joining in the persecution. Donatism, as well as the African Church in general, was overwhelmed by the Vandal conquest (428 A. D.), yet it survived in a feeble condition for many years.

The Donatists are held by many historians to have erred by excessive fanaticism and a schismatical spirit, while it is generally conceded that the treatment they received from the state Church was severe and injudicious. In doctrine they were essentially orthodox, and the charges of immorality brought against them appear to have been the inventions of their enemies. There were doubtless errors on both sides, but the general position of the Donatist party appears to have been in accord with that now taken by those Protestant churches which demand a personal experience of regeneration, as separating their membership from the world at large. (See SCHAFF, "History of the Christian Church;" NEANDER, "Church History.")

REVISED BY R. D. HITCHCOCK.

Dona'to, or **Donatello,** called **Donato di Niccolò di Betto Bardi,** a distinguished sculptor. (DONATELLO is simply a diminutive.) He was born in Florence, probably in 1386, and died in that city, according to Vasari, on the 13th Dec., 1466, but according to Palmieri in 1468. His first work of importance was a beautiful bas-relief of the Annunciation in the church of Sta. Croce. On the campanile of the cathedral of Florence are statues of Saint Matthew and Saint Mark (on the western face). That of Saint Matthew has a bald head, and from the resemblance of this to a gourd the Florentines nicknamed it Il Zuccône, or the "great gourd." This, of all his works, was Donatello's favorite, and he was so pleased with the life he had been able to impart to his statue, that, as the story goes, while he was working at it he would strike it impatiently, crying, "Why don't you speak, then?" He also used, says Vasari, to express the confidence he had in anything by the expression, "By the faith I have in my Zuccône." Donatello was a prolific worker, and much of his work remains in good condition to attest his vividness of conception, his noble strong ideal, and his beautiful execution. His most famous work is the statue of Saint George, the patron saint of the sword-makers and armorers, which he made for that guild, and which was placed in a niche designed for it on the outer wall of the church of San Michele, under which was a bas-relief representing the fight of the saint with the dragon. To protect it from the action of the weather, the statue has been removed to another niche on the opposite side of the building.

Vasari makes Donatello one of the three successful competitors for the gates of the Baptistery—he and Brunelleschi withdrawing in favor of Ghiberti. Another famous work of this master is the bronze equestrian statue of Gattamelata (Erasmo da Narni, called Gattamelata, a *condottiere* (leader) of the Venetian troops), made at the command of the Signoria of Venice for the city of Padua. It stands on the platform of the church of Saint Antony. Donatello made a bronze statue of David, which is now in the Museo Nazionale (Bargello); a statue in wood of Mary Magdalen for the Baptistery, where it is still to be seen; and a statue of Judith, in a niche over one of the arches of the Poggia dei Lanzi, with a crowd of other works, no one of which is without interest.

Donatello's life has been very entertainingly written by Vasari. (See also PERKINS's "Italian Sculptors," and LUBKE, "History of Sculpture," a superficial book, but useful. DR. HANS SEMPER began in A. Von Zahn's now discontinued "Jahrbücher für Kunstwissenschaft," 3d year, 1870, Part 1, a valuable series of articles: "Donatello, seine Zeit und Schule." Of this only the first part, "Erster Abschnitt: Die Vorläufer Donatello's," has appeared.)

CLARENCE COOK.

Dona'tus, bishop of Casæ Nigræ in Numidia, an early leader in the Donatistic schism, but not to be confounded with Donatus the Great, a much abler man, who was the second schismatic bishop, as noticed above.

Donatus (ÆLIUS), an eminent Latin grammarian, born about 333 A. D., taught rhetoric at Rome. He was the teacher of Saint Jerome, who expressed a high opinion of his talents. He wrote a work on grammar, which was commonly used in the schools of the Middle Ages. The word Donat became synonymous with *grammar*.

Do'nauwörth, a walled town of Bavaria, on the Danube, at the mouth of the Wernitz, 25 miles N. N. W. of Augsburg. It was formerly a free town of the empire, but has declined in importance. It has several churches and hospitals. Here Marlborough defeated the Bavarians in 1704, and here the French general Soult gained a victory over the Austrian general Mack Oct. 6, 1805. Pop. 3559.

Do'nax [from the Gr. δόναξ, a kind of fish], a genus of bivalve mollusks of triangular form, belonging to the Tellinidæ. There are forty-five living European and tropical species, and thirty fossil ones from the eocene of Europe and the U. S. Donax is also the specific name of a reed or grass (*Arundo Donax*) found in the south of Europe, used for fishing-rods and other purposes.

Don Beni'to, a town of Spain, in the province of Badajoz, near the river Guadiana, 55 miles E. of Badajoz. It has manufactures of woollen goods, wine, and oil. Pop. about 14,800.

Don'caster (anc. *Danum*), a market-town of England, in the West Riding of Yorkshire, and on the river Don, 35 miles S. of York. It is pleasantly situated and well built. The Don is here crossed by two stone bridges. Doncaster has a fine parish church, a public library, and a theatre. It was burned by lightning in 759 A. D. It is famous for its annual horse-races. Colonel St. Leger founded in 1776 the stakes, for which the best horses of England annually contend. Pop. in 1871, 18,758.

Don'dra Head, the most southern extremity of Ceylon, is in lat. 5° 55′ N., lon. 80° 38′ E.

Donegal', a county in the extreme N. W. part of Ireland, province of Ulster, is bounded on the N. and W. by the Atlantic Ocean. Area, 1859 square miles. The coastline is 395 miles long, and is deeply indented by many bays and loughs. The surface is mountainous, moory, and boggy. About one-third of it is arable. Granite, Devonian rocks, and carboniferous limestone are found here. This county has some manufactures of linen and worsted hose. Capital, Lifford. Pop. in 1871, 217,992.

Donegal, a seaport of Ireland, in the above county, on Donegal Bay, at the mouth of the Eske, 11 miles N. N. E. of Ballyshannon. It has a harbor for vessels which draw twelve feet of water. Lat. 54° 39′ N., lon. 8° 6′ W.

Donegal, a township of Butler co., Pa. Pop. 852.

Donegal, a township of Washington co., Pa. Pop. 2068.

Donegal, a post-township of Westmoreland co., Pa. Pop. 1304.

Donegal, MARQUESSES OF (1791), earls of Donegal (1647), earls of Belfast (1791), Viscounts Chichester and Barons Belfast (Ireland, 1625), Barons Fisherwick (Great Britain, 1798), Barons Ennishowen and Carrickfergus (United Kingdom, 1841).—GEORGE HAMILTON CHICHESTER, third marquess, K. P., G. C. H., F. R. S., aide-de-camp of the queen, born Feb. 10, 1798, succeeded his father in 1844.

Don'elson (ANDREW JACKSON), LL.D., an American officer and diplomatist, born Aug. 25, 1800, near Nashville, Tenn., graduated at West Point in 1820. He served (1821–22) as lieutenant of engineers and as aide-de-camp to his uncle, Maj.-Gen. Jackson, when governor of Florida, just acquired from Spain. He resigned from the army Feb. 1, 1822, studied law, and became a cotton-planter near Nashville, Tenn. During President Jackson's administration (1829–33) he was his efficient private secretary; chargé d'affaires to Texas 1844–45, negotiating its annexation to the U. S.; and U. S. minister plenipotentiary to Prussia 1846–49; and to the federal government of Germany 1848–49. Soon after his return from Europe he became enlisted in efforts to secure the settlement of the slavery agitation growing out of the acquisition of territory from Mexico. With strong national views he became editor of the "Washington Union" 1851–52, and in 1856 the American candidate for Vice-President of the U. S. After his defeat he retired altogether from public life, and devoted his time to planting interests in Mississippi, till he died June 26, 1871, at Memphis, Tenn., aged seventy-one.

GEORGE W. CULLUM, U. S. A.

Donelson, Fort, a strong position on the W. bank of the Cumberland River, in Stewart co., Tenn., 2 miles below Dover, and 12 miles E. of Fort Henry. In the early part of the late civil war it was strongly fortified by the Confederates. On Feb. 14, 1862, this position, being held by Gen. J. B. Floyd with 15,000 men, was attacked by a fleet of gunboats under Commodore Foote, who was repulsed with considerable loss. Meanwhile, the army of Gen. Grant, advancing from the capture of Fort Henry, successfully fought the Confederates outside their works. Floyd and a large part of his force escaped by means of rafts. On the morning of the 16th, Gen. Buckner, in command of the remaining Confederates, proposed terms. Grant replied, "No terms except immediate and unconditional surrender will be accepted. I propose to move immediately upon your works." On the same day the fort was surrendered, with 8000 prisoners.

Doneraile, VISCOUNTS (1785), and Barons Doneraile (Ireland, 1786).—HAYES ST. LEGER, fourth viscount, born Oct. 1, 1818, and elected a representative peer for Ireland in 1855, succeeded his father in 1854.

Do'nets, a river of Southern Russia, the chief affluent of the Don, rises in the government of Koorsk. It flows nearly south-eastward, and enters the Don 40 miles N. E. of Novo-Tcherkask. Length, about 400 miles.

Dong-nai, a river of Anam, enters the China Sea about 40 miles below the city of Saigon. It is navigable for large ships to Saigon.

Dong-nai, a town on an affluent of the above river, is about 25 miles N. E. of Saigon.

Don'gola, a province of Upper Nubia, is mostly included between lat. 18° and 19° 30′ N., and is about 150 miles long. It is a narrow plain intersected by the river Nile.

Dongola, New, also called **Mara'ka,** a town of Nubia, the capital of the above province, is on the left bank of the Nile, in lat. 19° 10′ N., lon. 30° 22′ E. It is important as a military dépôt and as a place of trade. Here is an indigo-factory. Pop. estimated at 20,000.

Dongola, Old, a ruined town of Nubia, on the Nile, 75 miles S. S. E. of New Dongola.

Dongo'la, a township and post-village of Union co., Ill., on the Illinois Central R. R., 26 miles N. of Cairo. Pop. 3095.

Don'iphan, a county which forms the N. E. extremity of Kansas. Area, 391 square miles. It is bounded on the N. E. and E. by the Missouri River. The surface is diversified by river "bottoms" and undulating prairies; the soil is fertile. Cattle, grain, and lumber are produced. It is intersected by the St. Joseph and Denver City and the Atchison and Nebraska R. Rs. Coal abounds here. Capital, Troy. Pop. 13,969.

Doniphan, a post-village of Wayne township in Doniphan co., Kan., on the Atchison and Nebraska R. R. and the Missouri River, 6 miles N. E. of Atchison. Pop. 528.

Doniphan, a post-village, capital of Ripley co., Mo., on the Current River, about 150 miles S. by W. of St. Louis. Pop. 146.

Donizet'ti (GAETANO), a famous Italian composer, born at Bérgamo Sept. 25, 1798. He served for several years in the Austrian army, which he left about 1822. He composed numerous operas which had little success. His opera "Anna Bolena" (1830) was received with more favor. He afterwards produced numerous popular operas, among which are "Lucrezia Borgia" (1833), "Marino Faliero," "Lucia di Lammermoor" (1835), and "Linda di Chamouni" (1842). He became chapel-master and composer to the court at Vienna. Died April 8, 1848.

Don'jon, or **Dun'geon** [from the Celtic *dun,* a "height" or "hill"], the central building, tower, or keep of an ancient castle or fortress of the Middle Ages. It was often erected on a natural or artificial elevation. The lower story of the donjon was used as a prison.

Don Juan, a mythical personage, was, according to Spanish tradition, a profligate nobleman who killed in a duel the father of a lady he had attempted to seduce. Having afterwards invited to a feast the statue erected to his victim, he challenges the spirit, whose existence he denies, to manifest itself to him. The spirit thereupon proves its power, and condemns him to perdition. This story was dramatized by Tirso de Molina; it also forms the subject of one of Molière's comedies and Mozart's celebrated opera, and gives name to one of Byron's most famous poems.

Donkey. See Ass.

Donkey-Engine, a small auxiliary engine used on shipboard, in factories, etc. for hoisting and lowering goods, for working the ship's rigging, raising anchors, etc.

Don'naldsville, a post-township of Abbeville co., S. C. Pop. 1155.

Donne (JOHN), D. D., an English poet, born in London in 1573. He married a niece of Lord Chancellor Egerton, and became a priest of the Anglican Church, although of Roman Catholic parentage. Having gained distinction as an eloquent preacher, he was appointed dean of St. Paul's, London, in 1621. He wrote elegies, satires, and other poems, and belonged to the school called "Metaphysical Poets," whose works abound in forced conceits. Some of his early poems are very licentious, but many have great poetic merits. His sermons are justly admired. The first complete edition of his poems was issued in 2 vols., London, 1872. Died Mar. 31, 1631. (See IZAAK WALTON, "Life of J. Donne," 1640; H. ALFORD, "Life of Donne," 1839.)

Don'ner Lake, a small lake in Nevada co., Cal., near the Central Pacific R. R., 154 miles from Sacramento. It is a place of summer resort. It takes its name from the tragical fate of a party of overland emigrants, led by a man named Donner, who in the winter of 1846 were snow-bound at this point, and nearly all starved to death, the survivors having eaten the flesh of their dead comrades.

Don'nybrook, a parish and village of Ireland, in the county of Dublin. The village is about 2 miles S. E. of Dublin. It has a magdalen asylum, a dispensary, a hospital for incurables, and a lunatic asylum, called the Bloomfield Retreat, established by the Society of Friends. Here is a famous annual fair, held during the week commencing Aug. 26. Pop. in 1861, 1892.

Dono'so Cortés (JUAN), MARQUIS DE VALDEGAMAS, a Spanish writer and diplomatist, born in Estremadura May 6, 1809. He opposed Don Carlos, and became secretary to Queen Isabella in 1844. In 1848 he was sent as ambassador to Berlin. He was conservative in politics, and defended the Roman Catholic religion in his "Essay on Catholicism, Liberalism, and Socialism" (1851). He died May 3, 1853, in Paris, whither he had been sent as minister.

Donoughmore, EARLS OF, and Viscounts Suirdale (1800), Barons Donoughmore (Ireland, 1783), Viscounts Hutchinson (United Kingdom, 1821).—JOHN LUKE GEORGE HELY HUTCHINSON, fifth earl, born Mar. 2, 1848, succeeded his father Feb. 22, 1866.

Don Quixo'te de la Man'cha is the title of a well-known work by the celebrated Cervantes (first published 1605–15). "Don Quixote," says Hallam, "is the only book in the Spanish language which can now be said to possess much of a European reputation. . . . It is to Europe in general what Ariosto is to Italy, and Shakspeare to England—the one book to which the slightest allusions may be made without affectation, but not missed without discredit. Numerous translations and countless editions of them, in every language, bespeak its adaptation to mankind; and no critic has been found paradoxical enough to withhold his admiration. . . . Few books of moral philosophy display as deep an insight into the mechanism of the mind as 'Don Quixote.' And when we look also at the fertility of invention, the general probability of the events, and the

great simplicity of the story, we shall think Cervantes fully deserving of the glory that attends this monument of his genius."

Doo (GEORGE THOMAS), F. R. S., a skillful English historical engraver, born in Surrey Jan. 6, 1800. He became historical engraver to Queen Victoria in 1842, and was elected a Royal Academician in 1856. Among his works are "Ecce Homo," after Correggio; "Knox Preaching," after Wilkie; and "Pilgrims Coming in Sight of Rome," after Eastlake. He exhibited at the Great Exposition of Paris in 1867 his engraving of "Saint Augustine and Saint Monica," after Scheffer.

Doobov'ka, a town of European Russia, government of Saratof, on the river Volga, 180 miles S. S. W. of Saratof. It has an active trade by the river. Pop. in 1867, 13,676.

Doo'little (JAMES ROOD), LL.D., born Jan. 3, 1815, at Hampton, Washington co., N. Y., graduated at Hobart College in 1834, was elected U. S. Senator from Wisconsin in 1857, and re-elected in 1863. Mr. Doolittle resides at Racine, Wis., though in legal partnership with his son in Chicago.

Doo'ly, a county in S. W. Central Georgia. Area, 800 square miles. It is bounded on the W. by the Flint River. The surface is level; the soil is mostly fertile. Cotton, corn, and wool are raised. Capital, Vienna. Pop. 9790.

Dooly (JOHN M.), a lawyer and judge of Georgia, greatly distinguished in his day, and the most famous wit ever produced in the State. His sayings and repartees have formed the staple of the raciest bar anecdotes throughout the commonwealth for the last half century, and are likely to be transmitted in legendary tradition, within the same sphere, to many generations hereafter. Born in 1772, and died in 1827.

Doom [probably allied to the verb "deem," to "think," to "judge"], the name formerly given to the Last Judgment, and to representations of it in churches by painting or otherwise. Most of these were obliterated in the time of Edward VI., but a fine one still exists in the church of the Holy Trinity at Coventry.

Doom (or **Dum**) **Palm** (*Hyphæne Thebaica*), a native of Upper Egypt and Central Africa, where it sometimes forms forests, growing even in the deserts. The lower part of the stem is single, and invariably divides at a certain height into two branches, each of these again being bifurcated, always in two sets. The wood is tougher than that of most other palm trees. It has fan-shaped leaves, elongated fruit about the size of an orange, with the outer skin red, enclosing a thick, spongy substance which resembles gingerbread. From this substance, which forms an article of food, it has been called the gingerbread tree. Ornaments are made from the hard, semi-transparent kernel of the fruit. This tree produces the gum resin called Egyptian bdellium, and its fibre is made into ropes which are dyed black.

Dooms'day Book, or **Domesday Book,** often called simply **Domesday,** the name of an ancient record of England containing a statistical account of the state of that country, made by William the Conqueror in the year 1086. Several of the northern counties were not included in this account. The origin of the name is not precisely known, but it seems to indicate the absolute authority of the book in doom or decision on matters of which it treats. The original record, in two parts, the "Great" and "Little Domesday," is still preserved at Westminster. It was also known as the *Liber Regis,* or the "King's Book;" the *Scriptura Thesauri Regis,* or "Record of the King's Treasury;" the *Liber Censualis Angliæ,* or "Rate Book of England," etc. This work is very comprehensive and minute, and forms the basis of all historical accounts of those times. It was the first great English record published at the cost of the nation, and appeared in two folios, printed with types cast for the purpose. It was ten years in passing through the press, being completed in 1783; and later supplementary records have been since published. Several other ancient English records are known as *Domesdays.* For example, the registers of the visitations and inquisitions made by the dean and chapter of St. Paul's, London (1181–1222), were published in 1857 by the Camden Society as the "Domesday of St. Paul's."

Doon, a river of Scotland, rises in Ayrshire, flows nearly north-westward, and enters the Frith of Clyde 2 miles S. of Ayr. It is 30 miles long, and passes through picturesque scenery. The Doon has been immortalized by the poet Burns. Loch Doon, an expansion of this river, is 5 miles long, and is enclosed by mountains.

Doon, a post-village of Lyon co., Ia. It has one weekly newspaper.

Door [a word etymologically related to the Dutch *door,* "through," the prominent idea being that of a "place to go through"], the panel of wood or other material by which the entrance of a house, etc. is opened or closed. Doors are of different kinds, the most common being made to move on hinges. Others, called sliding doors, are moved on rollers. A trap-door opens vertically over a hole in a roof or floor, while a jib-door is made even with the wall, and concealed as nearly as possible. Doors are also made of bronze, iron, and stone.

In architecture, great attention has been paid to the ornamentation of doors. Perhaps the finest example in the U. S. of ornate doors is afforded in the bronze doors of the old Representatives' Hall in the Capitol at Washington, which were cast in Munich, and are covered with beautiful historical and emblematic figures.

Door, a county in the N. E. of Wisconsin, is a narrow peninsula between Lake Michigan and Green Bay, and is surrounded by water on all sides except the S. Area, 400 square miles. Grain and wool are the chief products. Capital, Sturgeon Bay. Pop. 4919.

Doo'ra, or **Dhurra,** called also **Indian Millet** (*Sorghum vulgare*), a kind of grain much cultivated in Asia, Africa, and Southern Europe. The genus differs from *Andropogon* in having hermaphrodite spikelets and glumes, with three small teeth at the end. The species are mostly tall, broad-leaved annual grasses, with large panicles, and strong culms containing a sweet and juicy pith. The doora (sometimes called jowaree in India) has grain somewhat larger than mustard-seed; it yields abundant crops, and the stalks and leaves are food for cattle and horses. The sugar-grass or Chinese sugar-cane (*Sorghum saccharatum*), a sugar-producing plant, has been introduced into the U. S. and cultivated with success. The Caffer corn (*Sorghum Caffrorum*) is chiefly valued as food for horses. The doora grows well in the U. S., but has not been found profitable for culture.

Doorak', a town of Persia, in Khoozistan, at the confluence of the Doorak and Jerahi rivers, is about 200 miles S. W. of Ispahan. It has manufactures of silk handkerchiefs. Pop. about 8000.

Doorkeeper of the House of Representatives of the U. S. At the commencement of each Congress a doorkeeper is elected *vivâ voce,* and he continues in office until a successor is qualified. He takes the usual oath of office, with the addition that he will keep the secrets of the House. His general duties are those described as appertaining to the same officer in the Senate. He keeps hung up at each entrance-door of the Representatives' chamber printed lists of those entitled to enter, so that visitors may understand his duties and their privileges. The galleries of both houses are open to all orderly people; the diplomatic corps, the reporters, the ladies, and gentlemen without them, having separate entrances and divisions assigned them. His salary is $2592. (See GILLET, "Federal Government," 1872.)

Doorkeeper of the Senate of the U. S. The sergeant-at-arms of the Senate is, *ex officio,* doorkeeper to that body, having an assistant doorkeeper to aid him in performing his duties, and who, in fact, acts as doorkeeper. He keeps the doors of the Senate, and announces from them messages from the President and House of Representatives. As doorkeeper he appoints superintendents of the folding-room and document-room, messengers, pages, folders, and laborers, and discharges various duties not enumerated in the rules. He folds and distributes extra documents, furnishes members with printed bills, reports, and other documents, conveys messages for members, and keeps the hall, galleries, and committee-rooms in order. The assistant doorkeeper's salary is $2592. (See GILLET, "Federal Government," 1872.)

Doorn'boom ("thorn tree," *Acacia horrida*), a tree growing abundantly in South Africa, so named by the Dutch on account of its sharp and numerous spines. Its usual height is about thirty feet, and the wood is valued for building.

Doos'tee, a river of Beloochistan, enters the Arabian Sea in lat. 25° 15′ N., lon. 61° 50′ E. It is nearly 900 miles long, but is shallow in all parts of its course.

Dore, Mont, a group of high mountains in Auvergne, France, in the department of Puy de Dôme. They are of volcanic formation. The highest summit is the Pic de Sancy, which has an altitude of 6190 feet.

Do'ra, a township of Moultrie co., Ill. Pop. 924.

Do'ra Balte'a (anc. *Duria Major*), a river of Italy, in Piedmont, rises at the foot of the Little St. Bernard, and enters the Po near Crescentino. Length, about 90 miles.

Dora'ma, a town of Arabia, in Nedjed, 30 miles N. E. of Derayeh. The caravans moving between Persia and

Mecca halt here to obtain supplies. It was taken in 1818 by Ibrahim Pasha, who killed nearly all the inhabitants. Pop. about 8000.

Dor'cas Soci'ety, a benevolent association of ladies, usually of the same congregation, for the purpose of providing the poor with clothing. It is so called from Acts ix. 39: "And all the widows stood by him weeping, and showing the coats and garments which Dorcas made while she was with them."

Dor'chester (anc. *Durnovaria* and *Durinum*), a town and parliamentary borough of England, the capital of Dorsetshire, is on the river Frome and on the South Downs, 115 miles W. S. W. of London and 7 miles from the English Channel. It sends two members to Parliament. The South-western Railway connects it with London on the one hand and Weymouth on the other. Here are the remains of the most perfect Roman amphitheatre in England, 218 feet long and 163 feet wide. Pop. in 1871, 6915.

Dorchester, a county of Canada, in the E. part of Quebec, bordering on the State of Maine. It is partly drained by the Chaudière River. Pop. in 1871, 17,779.

Dorchester, a river-port and capital of Westmoreland co., New Brunswick, is on the Memracook River, near its mouth, and on the Intercolonial Railway, 115 miles E. N. E. of St. John. Large ships can ascend from the Bay of Fundy to this place, which has an active trade. Gas-coal and building-stone are largely exported. It has a court-house, jail, and many fine buildings. Pop. including Dorchester township, 5617.

Dorchester, a county in the S. E. of Maryland. Area, about 770 square miles. It is bounded on the W. by the Chesapeake Bay, on the N. by the Choptank River, and on the S. E. by the Nanticoke. Both of these rivers are navigable. The surface is level; the soil productive. Wheat, corn, fruit, timber, fish, and oysters are exported. Capital, Cambridge. Pop. 19,458.

Dorchester, a former town of Norfolk co., Mass., on Massachusetts Bay, 4 miles S. of Boston. It was annexed in 1869 to the city of Boston, of which it forms the sixteenth ward. It contains a national bank, and several paper-mills, iron-foundries, and other manufactories.

Dorchester, a post-township of Grafton co., N. H. It has manufactures of lumber and furniture. Pop. 689.

Dordogne, a department in the S. W. part of France, has an area of 3545 square miles. It is drained by the river Dordogne. The surface is diversified by hills, marshes, and fertile valleys. The soil is generally sandy. Chestnuts and wine are among the staple productions. Here are mines of coal, copper, and iron, and quarries of marble and alabaster. It has manufactures of paper, brandy, hosiery, and iron. Capital, Périgueux. Pop. in 1872, 480,141.

Dordogne, a river rising in the S. central part of France, flows nearly westward through the departments of Corrèze, Lot, and Dordogne, and enters the Garonne 13 miles N. of Bordeaux. It is about 220 miles long, and is navigable for 150 miles.

Dordrecht. See Dort.

Doré (Paul Gustave), a French painter and designer, born at Strasburg Jan. 6, 1833. He was educated at Paris, and in 1848 made his first public appearance as an artist with some pen-and-ink drawings sent to the Salon. His first successes were obtained by his paintings, chiefly of landscape subjects, but in 1854 he illustrated an edition of "Rabelais," and in 1856 published a series of designs illustrating the story of the Wandering Jew, by which performances the public attention was strongly directed towards him. In the same year (1856) he illustrated an edition of Balzac's "Contes Drolatiques," which is the work that shows all his powers in their fullest and freest exercise. One would say that the stories were written for the designs, so perfectly do these follow and reflect the audacious indecencies of that most libertine of books. Meanwhile, Doré was making himself known in a wider and happier circle with his designs for Perrault's "Fairy Tales" (1861), "Don Quixote" (1863), the "Travels in the Pyrenees" of Taine (1859), which has just been translated and published with Doré's designs in New York (1873), and the "Fables" of La Fontaine (1867). These works were suited to the artist's talent, but he overleaped the saddle when his ambition led him to try to illustrate Dante and the Bible. Though his designs for these works created a wide interest, and it was felt that he showed a great deal of facility and felicity in his inventions, yet it was also felt that they were wholly inadequate, and they have failed of any lasting success. Indeed, they were mere publishers' ventures, and of late years Doré has come to be a mere hack worker. His "Rabelais," however, published in 1873, an enlarged issue of his early work, shows him more at home in his proper field. In 1866–68 he was laid hold of by English publishers, who persuaded him to illustrate Tennyson's "Idyls," a work of whose very existence, and naturally, the Frenchman was ignorant, and into the spirit of which he was powerless to enter. The work was an unhappy failure. Doré is one of the most prolific designers that ever lived, but it would be unfair to conceal the fact that he owes much of his success to the admirable wood-engravers who have translated him to the public. In these successive publications Pisan and Dumont and Gauchard have created a new era in the art of engraving on wood. Clarence Cook.

Dorée [Fr. *dorée*, "gilded"], the name of several species of fish of the genus *Zeus*. The one most common on the British coasts is *Zeus faber*, commonly called john dory, a corruption of the French *jaune dorée* (golden-yellow). Its color is dusky-green, tinged with gold; the head is large, and on each side of its body is a dark oval spot. It is highly prized by epicures.

Do'ria, the name of one of the four most noble and powerful families of Genoa. It was attached to the Ghibelline party. In 1339 the families of Doria, Spinola, Grimaldi, and Fieschi, which had by their rivalry long troubled the republic, were exiled.—Paganino Doria, a famous Genoese admiral, gained a naval victory over the Venetian admiral Pisani in 1352.

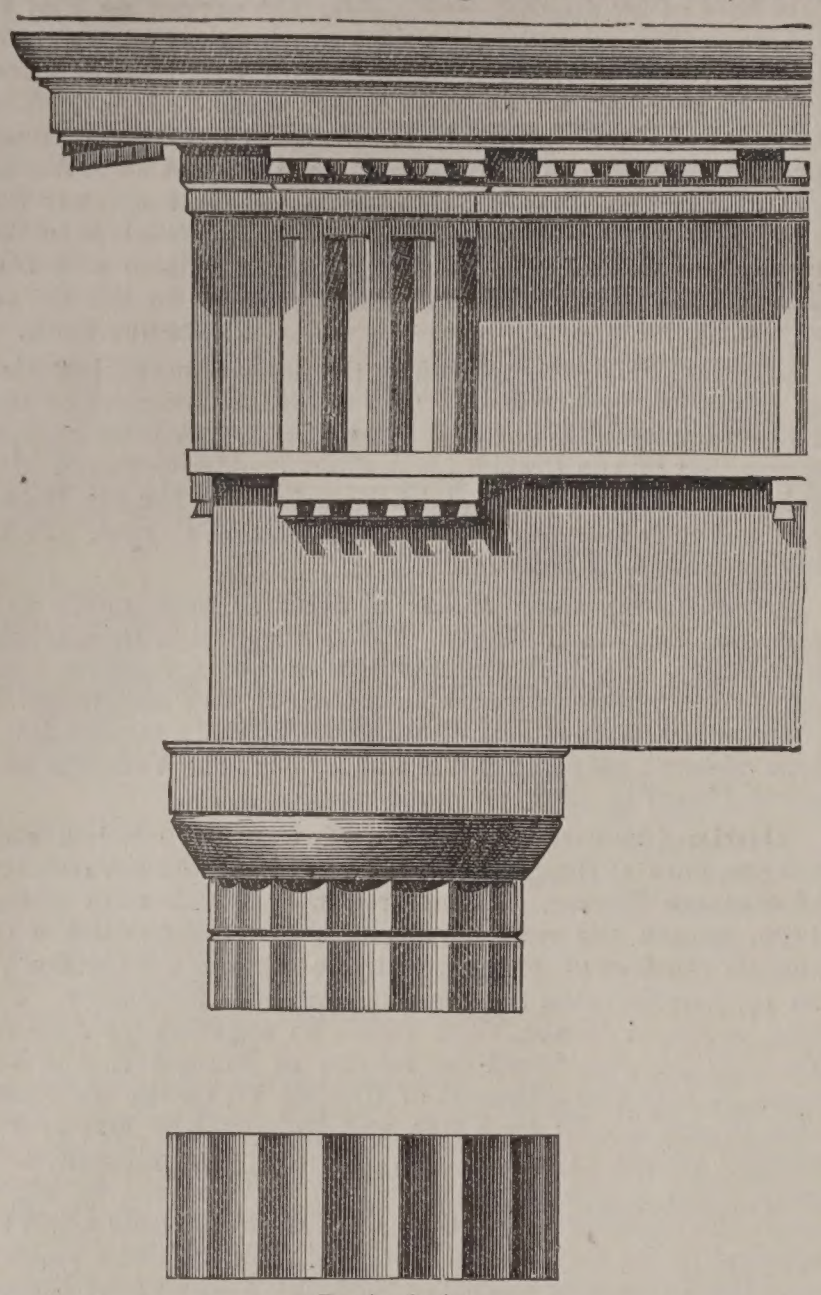
Doria (Andrea), a celebrated Genoese admiral and patriot, born at Oneglia Nov. 30, 1468, is called the restorer of Genoese liberty. He entered the French navy about 1490, gained the rank of admiral, and commanded with success the fleet of Francis I. in the war against Charles V. In 1524 he defeated the imperial fleet near Marseilles. He also captured Genoa, from which he expelled the Adorni. In 1528 he abandoned the service of Francis I., and became an ally and adherent of Charles V., on the condition that Genoa should be a free and independent state. He entered Genoa in 1529, was welcomed by the citizens, and gave them a free constitution, which remained in vigor until the republic ceased to exist. He afterwards acted as admiral in the service of the emperor, and gained a victory over the Turks near Patras in 1532. In 1535 he contributed greatly to the conquest of Tunis. Charles V. gave him the title of prince of Melfi. Doria died without issue at Genoa Nov. 15, 1560. (See Carlo Sigonio, "De Vita et Gestis A. Doriæ," 1586; Richer, "Vie d'André Doria," 1789.)

Do'rians [Gr. Δωριεῖς], one of the four principal branches or tribes of the ancient Hellenic people, claimed that they were descended from Dorus, a son of Hellen. They are supposed to have originally lived in Doris, from which they migrated to the Peloponnesus, where they founded Sparta, Argos, and Messenia. The migration of the Dorians to the Peloponnesus, which is called the return of the Heraclidæ, and forms a celebrated epoch in ancient chronology, is said to have occurred soon after the siege of Troy, in 1104 B. C. Dorian colonies were planted in Crete, Sicily, and Asia Minor. The Dorians were the most powerful and warlike of the Hellenic tribes. They used a peculiar dialect, called the Doric. They surpassed the Ionians in solidity and earnestness of character, but were less refined and ingenious. (See K. O. Müller, "Die Dorier," 2 vols., 1824; 3d ed. 3 vols., 1844; Curtius, "History of Greece.")

Dor'ic Di'alect, one of the principal dialects of the ancient Greek language, took its name from the Dorians, among whom it was the principal dialect used. It was distinguished by its strength and the broadness of its sounds, and was much less finished than the Attic and Ionic.

Doric Order, one of the orders of classic architecture, takes its name from the Dorians, its possible inventors. It is popularly considered the oldest of the Greek orders, but Fergusson, Viollet-le-Duc, and other scholars think the Ionic or Ionian style was brought earlier from Asia into Greece. However it may have been—whether the earlier buildings were built of wood and so perished, or whether the style was simply abandoned for the severer Doric—it is certain that the Greeks showed a marked preference for the Doric, and used it in all the buildings of which we have any knowledge from their remains, until the time of the Roman conquest. The order is characterized by an air of dignity and strength. The true Doric column rests upon a stylobate of three courses, together equal to one inferior diameter of the shaft, which is itself from four to six diameters in height. Its superior diameter is three-fourths of the inferior, the latter being the unit of measure. This diminution is reached by an entasis or slight curve. Doric columns generally have twenty shallow flutes, separated by a sharp edge. The capital is about half a diameter in height, composed of an abacus, resting upon an echinus

of variable proportions. The columns incline slightly inwards towards the main building. The architrave, frieze,



Doric Order.

and cornice were ornamented with simple yet beautiful mouldings of various forms.

REVISED BY CLARENCE COOK.

Do'ris [from the Gr. Δωρίς, the name of a daughter of Nereus], a genus of marine gasteropodous mollusks belonging to the section Nudibranchiata. They are found mostly in southern seas, but several species are native on northern coasts. They have an oval body; the mouth is a proboscis with two tentacula, and the vent is encircled by branched gills. They are sometimes called sea-lemons.

Do'ris [Δωρίς], a small district of ancient Greece, was bounded on the N. by Thessaly, and on the other sides by Locris, Phocis, and Ætolia. The surface is mountainous. The people were called DORIANS (which see). Doris is now an eparchy in the government of Phocis.—The name DORIS is also given by some ancient writers to that part of Caria which was occupied by Dorian colonists and their descendants.

Dor'mant [present part. of the Fr. *dormir*, to "sleep"], in heraldry, a sleeping animal, with its head resting on its fore paws, as a lion *dormant*.

Dormant Animals. See HYBERNATION.

Dor'mer [probably from the Fr. *dormir* (Lat. *dormio, dormire*), to "sleep," because it lighted sleeping apartments], or **Dormer Window,** also written **Dorment** or **Dormar,** a window inserted on the inclined plane of the roof of a house, the frame being placed nearly vertically with the rafters. It is often used for the purpose of lighting the attic or garret of modern dwelling-houses.

Dor'mouse [a contraction of *dormant mouse*, because the animal is dormant in winter], a small rodent animal of the genus *Myoxis*, regarded as a connecting link between the Sciuridæ (squirrels) and the Muridæ (mice, etc.). Each jaw contains four molar teeth on each side; there are no cheek-pouches; each of the fore paws has four toes and a rudimentary thumb, and they have five toes on the hind feet. They have ears like mice; their fur is soft and fine, and the tail long. They are mostly natives of Southern Europe. The muscardine or red dormouse (*Myoxis avellanarius*) is the only British species. The fat dormouse (*Myoxis glis*) is about the size of a rat, of a brown-gray color, with a bushy tail. It is prized as food by the Italians. The garden dormouse (*Myoxis nitela*) is found in the central parts of Europe. It is often injurious to fruit trees. They all remain dormant the greater part of the winter.

Dorn (JOHANN ALBRECHT BERNHARD), a German Orientalist, born in Saxe-Coburg Mar. 11, 1805. He became in 1843 the chief librarian of the imperial library at St. Petersburg.

Dorn'birn, a town of Austria, in Tyrol, about 7 miles S. of Bregenz, which is on Lake Constance. The men are mostly carpenters, employed in the construction of wooden houses, which are exported. It has manufactures of cotton fabrics. Pop. in 1869, 8486.

Dor'ner (ISAAC AUGUST), D. D., an eminent Protestant theologian, born in Würtemberg June 20, 1809. He was educated at Tübingen, and became professor of theology at Tübingen (1838), Kiel (1839), Königsberg (1840), Bonn in 1847, and at Berlin in 1857. He wrote, besides other works, a "History of the Development of the Doctrine of the Person of Christ" (1839), and an able work entitled "History of Protestant Theology, especially in Germany" (1867). He visited the U. S. in 1873 as a delegate to the meeting of the Evangelical Alliance.

Dor'nic, Dornick, or **Dor'nock** [from *Doornik*, Flemish for Tournay], the name of a kind of figured linen of coarse qualiiy, originally made at Tournay.

Dor'noch, a royal burgh of Scotland, capital of the county of Sutherland, is on an inlet of the sea called Dornoch Frith, 14 miles N. of Cromarty. It has an old cathedral, which was restored by the duchess of Sutherland in 1837. Pop. in 1871, 625.

Do'rogoboozh', a town of Russia, in the government of Smolensk, on the river Dnieper, about 55 miles E. N. E. of Smolensk. The Russians here defeated the French in Oct., 1812. Pop. 7865.

Dorosma, a town of Central Hungary, in Little Cumania, 6 miles W. N. W. of Szeged. Pop. in 1870, 9688.

Dorp, a town of Prussia, in the Rhine province, on the Wupper, has iron, steel, and paper factories. Pop. in 1871, 10,690.

Dor'pat, or **Derpt** [Russ. *Yoorief*], a town of Russia, in the government of Livonia, is on the river Embach, 138 miles N. E. of Riga. It is well built, and has a stone bridge across the river. The old ramparts have been converted into gardens and public promenades. Here Gustavus Adolphus founded in 1632 a university which became a large and celebrated institution. Nearly all the lectures at the university are given in the German language, but the Russian government is making great efforts to substitute the Russian for the German. Struve and Mädler have successively directed the astronomical observatory of Dorpat, which their labors have made famous. The town has a gymnasium. Dorpat was founded in 1030, became an important town, sank into decay, but revived at the beginning of the last century. It was captured by the Swedes in 1625, and by the Russians in 1704. Pop. 20,780.

Dorr, a township of McHenry co., Ill. Pop. 2681.

Dorr, a township and post-village of Allegan co., Mich., on the Kalamazoo Allegan and Grand Rapids R. R., 18 miles S. of Grand Rapids. Total pop. 1518.

Dorr (BENJAMIN), D. D., was born at Salisbury, Mass., Mar. 22, 1796, graduated at Dartmouth in 1817, studied law and then theology, was ordained to the Protestant Episcopal ministry in 1820, was a rector in Lansingburg, Waterford, and Utica, N. Y., general agent for the domestic committee of the Board of Missions (1835–37), and afterwards rector of Christ Church, Philadelphia. He published, besides other works, "The Churchman's Manual," "Recognition of Friends in Another World," "Travels in Egypt, the Holy Land," etc. Died Sept. 18, 1869.

Dorr (THOMAS WILLIAM), born at Providence, R. I., Nov. 5, 1805, graduated at Harvard in 1823, was a Democrat and a leader of the suffrage party. Under the old charter the right to vote was limited to men who possessed a certain amount of real estate, and to their eldest sons. In 1841 the suffrage party formed a new constitution, and chose Mr. Dorr governor of the State. His official action was resisted in May, 1842, by the government chosen according to the old charter. Dorr was arrested, convicted of treason, and sentenced to imprisonment for life, but he was pardoned in 1847. Died Dec. 27, 1854.

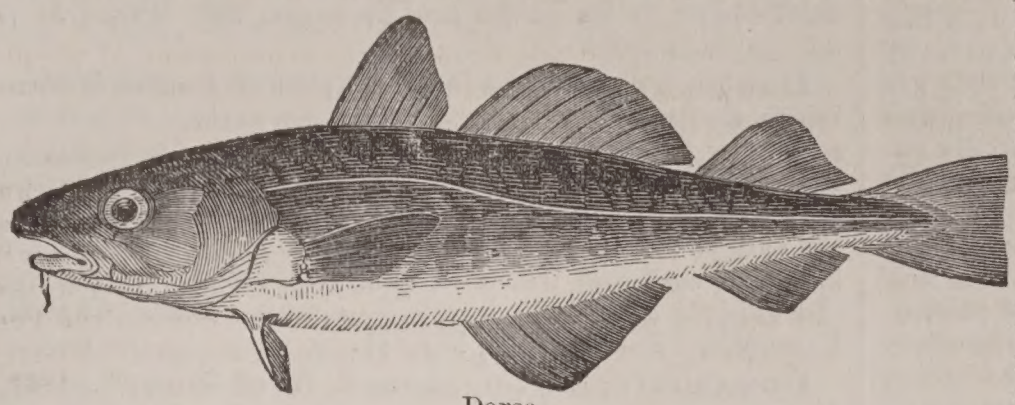
Dor'rance, a post-township of Luzerne co., Pa. Pop. 646.

Dor'relites, the followers of a man named Dorrel, who lived in Leyden, Mass., and who claimed to be equal to Christ and invulnerable; but having been soundly beaten by one of his hearers, his congregation was at once dispersed.

D'Orsay (ALFRED GUILLAUME GABRIEL), COUNT, a French artist and leader of fashion, was born at Paris in 1798. He married a daughter of Lord Blessington in 1827, but subsequently separated from her, and became

the intimate friend of Lady Blessington. His wit, manners, amiability, and brilliant talents made him very popular in the society of London. Died at Paris Aug. 4, 1852.

Dorse (*Morrhua callarias*), a fish sometimes called



Dorse.

Baltic Cod, from the great numbers found in the northern seas. It is less in size than the cod, and differs from it also in having a longer upper jaw.

Dor'set, a county in the S. part of England, is bounded on the N. by Somerset and Wiltshire, on the E. by Hampshire, on the S. by the English Channel, and on the W. by Devonshire. Area, 988 square miles. The surface is partly hilly and occupied by chalk-downs. The chief rivers are the Frome and the Stour. Among the mineral resources are chalk, china clay, and the celebrated Portland building-stone. The chalk-downs or hills produce fine pasture, on which vast numbers of Southdown sheep feed. Dorset is mainly a pastoral county, and exports cattle, sheep, butter, and cheese. The chief towns are Dorchester (the capital), Poole, Bridport, Weymouth, and Shaftesbury. Pop. in 1871, 195,544.

Dorset, a post-township of Ashtabula co., O. Pop. 372.

Dorset, a post-township of Bennington co., Vt., on the Harlem Extension R. R., 22 miles S. of Rutland. It has manufactures of lumber, marble, leather, boxes, tubs, etc. Pop. 2195.

Dorset (Charles **Sackville**), K. G., sixth earl of, an English courtier and wit, born in 1637, was a son of Richard, the fifth earl of Dorset. He was brave, witty, and generous, and had superior talents, but was indolent and unambitious. His popular qualities rendered him a general favorite. He was distinguished as a patron of literary men, and bestowed his bounty with equal judgment and liberality. Dryden was one of the authors who enjoyed his bounty. Lord Dorset was appointed lord chamberlain by William III. in 1689. He wrote several admired satires and songs. Died Jan. 16, 1706.

Dorset (Thomas **Sackville**), K. G., first earl of, an English statesman and poet, born in 1536. He wrote a tragedy entitled "Gorboduc, or Ferrex and Porrex" (1561), which was praised by Sir Philip Sidney, and also the "Induction to the Mirror for Magistrates." He received the title of Lord Buckhurst in 1566, and was sent as minister to France in 1570. In 1599 he succeeded Lord Burleigh as lord treasurer of England. He was afterwards created earl of Dorset by James I. He died April 19, 1608, and was succeeded by his son Robert.

Dor'sey (John Syng), M. D., an American physician, born in Philadelphia Dec. 23, 1783, was a nephew of Dr. Physick. He studied in London and Paris, and became in 1813 professor of materia medica in the University of Pennsylvania. He published "Elements of Surgery" (1813), which was highly esteemed. Died Nov. 12, 1818.

Dort, also called **Dor'drecht** [Lat. *Dordracum*], a fortified town of the Netherlands, in South Holland, is on an island in the Meuse, 10 miles S. E. of Rotterdam. It is traversed by canals, is accessible to large ships, and has an active trade in grain, flax, timber, and salt fish. Here are shipbuilding docks, sugar-refineries, saw-mills, and manufactures of tobacco, white lead, etc. In 1421 a terrible inundation destroyed seventy villages, and converted the ground where Dort stands into an island. The Synod of Dort met here in 1618, and condemned the doctrines of Arminius. Pop. in 1870, 25,359.

Dort'mund, a walled town of Prussia, in Westphalia, on the Embscher and on the Cologne and Minden Railway, 47 miles N. N. E. of Cologne. It has several fine churches, three hospitals, a Protestant gymnasium, and a realschule; also manufactures of cotton, linen and woollen fabrics, cutlery, and nails. It was a city of the Hanseatic League, and was the chief seat of the Vehmic Court. Its trade was nearly ruined by the Thirty Years' war. Dortmund was ceded to Prussia by the Congress of Vienna in 1815. Pop. in 1871, 44,454.

Dort, Synod of [Lat. *Synodus Dordracena*], a great synod of the Dutch national Church, convened at Dort from Nov. 13, 1618, to May 9, 1619, consisting of 39 ministers, 18 ruling elders, and 5 professors, deputies from the several states of the Netherlands, besides 24 foreign deputies representing the Anglican and most of the Calvinistic churches. The synod was convoked by the States-General on account of the controversies between the Gomarists (Calvinists) and Remonstrants (Arminians). The synod was convened in the Calvinistic interest, and there has been much difference of opinion as to the fairness of its proceedings. The principal work of the synod was the preparation of canons setting forth the Calvinistic doctrines, and the publication of an Ecclesiastical Censure against the Remonstrants, calling upon the civil power to enforce the decrees of the synod by banishment, imprisonment, or fines imposed upon the refractory. The canons are ably drawn up, and were officially received by the Reformed churches of the Low Countries, France, Switzerland, and the Palatinate, but were some years later rejected by the Church of England. (See the official "Acta Synodi," 4to, 1620.)

Dosith'eans, the name of a Samaritan sect founded by Dositheus in the first century after Christ. In the fourth century there still remained a few Dositheans, who believed their master to have been the true Messiah.

Dotis, or **Totis,** a market-town of Western Hungary, in the county of Comorn, 37 miles W. N. W. of Pesth. It has several Roman Catholic churches, a synagogue, and a gymnasium. Here is a splendid château of the Esterhazy family, with extensive wine-vaults. Pop. in 1869, 9855.

Douai [Lat. *Duacum*], a fortified town of France, department of the Nord, on the river Scarpe and on the Railway du Nord, about 21 miles S. of Lille. It is well built, has several fine churches and hospitals, a theatre, an arsenal, a botanic garden, a national college, and a Roman Catholic college for the education of British Roman Catholics. Here are manufactures of cotton stuffs, lace, gauze, paper, glass, pottery, and soap. Douai existed in the time of Cæsar. It has often been besieged and taken by the French and Flemings. Pop. 24,195.

Douai Bible, The, was translated by English Roman Catholic divines connected first with the college at Rheims, and afterwards with the college at Douai. According to Dodd, the translators were Gregory, Martin, William Allen, Richard Bristow, John Reynolds, and others. The New Testament was published at Rheims in 1582. The Old Testament, then already translated, was published at Douai in 1609–10. Both Testaments were translated from the Vulgate. The annotations were quite copious, and intensely Roman Catholic. Numerous editions have appeared, which greatly vary both in the text and in the notes. An exact reprint of the original Rheims New Testament was published in New York in 1833. Of the original Douai Old Testament there has been no exact modern reprint. (See Cotton, "Rhemes and Doway," Oxford, 1855.)

Douarnenez, a town of France, in the department of Finistère, 14 miles W. N. W. of Quimper. It has large fisheries and a considerable coasting-trade. Pop. 5434.

Douay (Charles Abel), a French general, born in 1809, served in Algeria, in the Crimean war, and in 1859 in Italy, where he distinguished himself at Solferino, became in 1866 general of division, and 1869 inspector of the military academy at St. Cyr. In the French-German war he commanded the second division under MacMahon, and was killed on Aug. 4, 1870, in the battle of Weissenburg.

Douay (Felix), a French general, a brother of the preceding, born in 1816, served in Algeria, the Crimea, in the Italian war, and as general of division in 1862 in Mexico. In the war against Germany he commanded the seventh army corps, was taken prisoner at Sedan, and having returned to France in 1871, organized an army against the insurgents in Paris. He was the first one to enter Paris on the 22d of May. After the restoration of order he was appointed to the command of the fourth army corps.

Doub (Peter), D. D., an eminent minister of the Methodist Episcopal Church South, born in North Carolina Mar. 12, 1796. He joined the Virginia Conference in 1818. He performed an immense amount of service in Virginia and North Carolina. Many thousands were brought into the Church by his ministry. He was a polemic of great power. He was for three years before his death professor of biblical literature in Trinity College, N. C. He died in Greensboro', N. C., Aug. 24, 1869. T. O. Summers.

Double-acting Pump, a pump that lifts and forces water alternately on each side of the course by means of a solid piston or plunger, and an entrance and exit valve

communicating with each side. (See PUMP, by PRES. F. A. P. BARNARD, S. T. D., LL.D., L. H. D.)

Double Consciousness, sometimes called **Double Personality,** is a form of mental disease involving confusion in the idea of personal identity. Persons with this disorder are variously affected; some conceive that parts of their frame belong to another person; others that they are inhabited by another entity in addition to their own, and which opposes itself to their will and interests; others appear to be possessed at one time of one personality, at another of another, according to the mental or physical conditions under which they are placed. In the last-named form of the phenomenon neither consciousness has any knowledge of the other, nor can the person affected remember in one state the events which happened during the other. The phenomena of double consciousness have never received a satisfactory explanation. (For some striking examples of the last-named variety, see WAYLAND, "Intellectual Philosophy.")

Doub'le Dag'ger, in printing, a character marked thus, ‡, used as a reference to marginal notes.

Doub'leday (ABNER), an American general, born in Saratoga co., N. Y., June 26, 1819, graduated at West Point in 1842. He became a captain in 1855, and was one of the garrison of Fort Sumter in April, 1861. It is stated that he fired the first gun for the Union (April 12). He commanded a division at Antietam, Sept. 17, 1862, and obtained the rank of major-general of volunteers in November of that year. He served at Gettysburg, July 2 and 3, 1863.

Double-Eagle, a gold coin of the U. S. bearing the figure of an eagle, and equivalent to twenty dollars in value.

Double Refrac'tion, a phenomenon exhibited by Iceland spar and several other crystals. A ray of common light passing through them is divided into two polarized rays, which take different directions and are refracted according to different laws. (See REFRACTION and POLARIZATION.)

Double Shoal, a post-township of Cleveland co., N. C. Pop. 1410.

Double Stars, or **Binary Stars.** It was announced in 1803 by Sir William Herschel that there exist sidereal systems composed of two stars, one revolving around the other, or both about a common centre. Subsequent observations have confirmed this discovery, and in some instances the periods of revolution have been determined. Some of these binary systems have periods of great length. The period of 61 Cygni is supposed to be about 500 years, but others have much shorter periods, and have been observed through their entire orbits. The remarkable double star called Castor, or α Geminorum, is easily separated by a moderately good telescope. Sir J. Herschel computed its period at 252 years. The star η Coronæ completes a revolution in about forty-three years. Some of the binary systems afford curious instances of contrasted colors, the color of the smaller star being complementary to that of the larger. In such instances the larger star is usually red or orange, and the smaller star blue or green. "It may be easier suggested in words," says Sir J. Herschel, "than conceived in imagination, what variety of illumination *two suns*—a red and a green, or a yellow and a blue one—must afford a planet circulating round either." Catalogues containing several thousand binary stars have been published by Struve and others.

Doub'ling Gap Springs, in Cumberland co., Pa., 30 miles W. of Harrisburg, are 8 miles from Newville, on the Cumberland Valley R. R. A part of the springs have carbonated saline chalybeate waters, and others are saline sulphur springs. They are useful in a wide range of chronic disease.

Doub'ling the Cube, a geometrical problem of great antiquity, the object of which was to find the side of a cube containing twice as much as another given cube. Many ancient geometers attempted its solution without success. The problem was shown in its true light by the analytical method introduced by Descartes. It is only a special case of the solution of a cubic equation—a solution impossible by the use of the circle and straight line, though it may be represented by the intersection of two conic sections, one of which may be a circle. Descartes made use of the parabola with the circle, which is the simplest method. With numbers, the problem is only one of the extraction of the cube root. If the side of a cube is one foot, its solid content = 1 cubic foot. The side of a cube containing two cubic feet is $\sqrt[3]{2} = 1.259921$.

Doubloon' [Fr. *doublon;* Sp. *doblon,* from *doblar,* to "double"], a Spanish gold coin nearly equivalent to sixteen dollars. It is the double of a pistole.

Doubs (anc. *Dubis*), a river of France, rises in the Jura Mountains, flows nearly south-westward through the departments of Doubs and Jura, and enters the Saône at Verdun-sur-Saône. Total length, about 250 miles. The chief towns on its banks are Besançon and Dôle. It is navigable to Dôle.

Doubs, a department in the E. part of France, bordering on Switzerland. Area, 2018 square miles. It is intersected by the river Doubs. The surface is traversed by several ridges of the Jura Mountains, which are covered with forests of pine, walnut, and other trees. The soil of the valleys is fertile, and produces good pasture. Here are mines of coal and iron and quarries of marble. Among the exports are cattle, horses, iron, and butter. Capital, Besançon. Pop. in 1872, 291,251.

Dough'erty, a county in the S. W. of Georgia. Area, 300 square miles. It is intersected by the Flint River. The surface is nearly level; the soil is fertile. Cotton, corn, and wool are the chief products. It is traversed by a branch of the Atlantic and Gulf R. R. Capital, Albany. Pop. 11,517.

Doug'las, a seaport and the principal town of the Isle of Man, is on the E. coast, 80 miles N. W. of Liverpool. It stands on a picturesque bay, and has a harbor which will admit vessels drawing ten or twelve feet of water. It contains a custom-house, handsome villas, good hotels, and baths. The excellence of its sea-bathing renders this an important watering-place. Pop. 9894.

Douglas, a county in the E. of Colorado. Area, 5500 square miles. It is partly drained by the South Fork of the Platte and by Beaver Creek. The surface in the western part is mountainous. Copper, iron, lead, and coal are found here. It is intersected by the Kansas Pacific and the Denver and Rio Grande R. Rs. It has great quantities of pine timber. Grain, cattle, butter, and timber are produced extensively. Capital, Franktown. Pop. 1388.

Douglas, a county in the E. of Illinois. Area, 375 square miles. It is intersected by the Embarras and Kaskaskia rivers. The surface is nearly level; the soil is fertile. Cattle, grain, and wool are raised. It is traversed by the Chicago branch of the Illinois Central R. R. Capital, Tuscola. Pop. 13,484.

Douglas, a county in the E. part of Kansas, has an area of 470 square miles. It is bounded on the N. by the Kansas River and intersected by the Wakarusa. The surface is undulating; the soil is fertile. Cattle, grain, tobacco, wool, dairy products, hay, and potatoes are raised. Limestone abounds here. This county contains large prairies. It is traversed by the Leavenworth Lawrence and Galveston, and other railroads. Capital, Lawrence. Pop. 20,592.

Douglas, a county in the W. of Minnesota. Area, 720 square miles. It contains numerous small lakes, the outlet of which is Long Prairie River. The surface is pleasantly diversified by prairies and groves. Grain, hay, and dairy products are raised. Capital, Alexandria. Pop. 4239.

Douglas, a county in the S. of Missouri. Area, 648 square miles. It is drained by Bryant's Fork and the North Fork of White River. The surface is partly hilly. Lead is found here. Grain, tobacco, and wool are the chief products. Capital, Arno. Pop. 3915.

Douglas, a county in the E. of Nebraska. Area, 350 square miles. It is bounded on the E. by the Missouri River, on the W. by the Platte, and intersected by the Elkhorn River. The surface is undulating; the soil is very fertile. Wheat, corn, and hay are important crops. The manufacturing interests are important and varied. Manufactories of clothing, jewelry, and bread were the most numerous, according to the census of 1870. Limestone abounds in it, and the scenery is very beautiful. It is traversed by the Union Pacific R. R. Capital, Omaha. Pop. 19,982.

Douglas, a county in the W. of Nevada, is bounded on the W. by Lake Tahoe, which separates it from California. The surface is mountainous, and a granite mountain called Job's Peak rises here about 6000 feet. Gold and silver are found. The county contains much good land. Grain, hay, and stock are raised, and timber is sawed. Capital, Genoa. Pop. 1215.

Douglas, a county in the S. W. of Oregon, is partly bounded on the W. by the Pacific Ocean. It is intersected by the Umpqua River and its forks. The Cascade Range extends along the eastern border of this county, the surface of which is mostly mountainous. The long valley of the Umpqua is fertile, and is enclosed by ranges of grassy hills which produce good pasture. Cattle, grain, fruit, hay, wool, and dairy products are raised. It is intersected by the Oregon and California R. R. Capital, Roseburg. Pop. 6066.

Douglas, a county which forms the N. W. extremity of Wisconsin. Area, 1350 square miles. It is bounded on the N. by Lake Superior, and drained by the St. Croix, which rises in it. The surface is hilly, and extensively covered with forests of pine, oak, etc. Copper is found here. Capital, Superior City. Pop. 1122.

Douglas, a township of Arkansas co., Ark. Pop. 760.

Douglas, a township of San Joaquin co., Cal. P. 1751.

Douglas, a post-village, capital of Coffee co., Ga., about 120 miles W. S. W. of Savannah.

Douglas, a township of Clark co., Ill. Pop. 555.

Douglas, a township of Effingham co., Ill. Pop. 3222.

Douglas, a township of Iroquois co., Ill. Pop. 2399.

Douglas, a township of Saline co., Ill. Pop. 1437.

Douglas, a township of Adams co., Ia. Pop. 333.

Douglas, a township of Appanoose co., Ia. Pop. 590.

Douglas, a township of Boone co., Ia. Pop. 879.

Douglas, a township of Bremer co., Ia. Pop. 587.

Douglas, a township of Clay co., Ia. Pop. 320.

Douglas, a township of Harrison co., Ia. Pop. 185.

Douglas, a township of Ida co., Ia. Pop. 61.

Douglas, a township of Madison co., Ia. Pop. 938.

Douglas, a township of Mitchell co., Ia. Pop. 282.

Douglas, a township of Montgomery co., Ia. P. 467.

Douglas, a township of Page co., Ia. Pop. 503.

Douglas, a township of Polk co., Ia. Pop. 613.

Douglas, a township of Sac co., Ia. Pop. 358.

Douglas, a township of Union co., Ia. Pop. 824.

Douglas, a township of Webster co., Ia. Pop. 513.

Douglas, a township of Jackson co., Kan. Pop. 1760.

Douglas, a township and post-village of Worcester co., Mass., on the Boston Hartford and Erie R. R., 48 miles S. W. of Boston. It has stone-quarries, a public library, a weekly newspaper, five churches, and good water-power. At East Douglas axes and edge-tools are extensively manufactured. Total pop. 2182.

Douglas, a township of Montcalm co., Mich. P. 215.

Douglas, a township of Dakota co., Minn. Pop. 707.

Douglas, a township of Douglas co., Neb. Pop. 174.

Douglas, a township of Nemaha co., Neb. Pop. 393.

Douglas, a township of Berks co., Pa. Pop. 1072.

Douglas, a post-township of Montgomery co., Pa. Pop. 1604.

Douglas, a township of Clarendon co., S. C. Pop. 310.

Douglas, a township of Marquette co., Wis. Pop. 616.

Douglas, the name of an ancient noble family of Scotland which has produced many eminent men. The first member of the family who appears on record was William of Douglas, who lived about 1175–1200, and was succeeded by his son Sir Archibald. Sir William, a grandson of Sir Archibald, was a turbulent subject and the possessor of extensive estates. He fought under Sir William Wallace against the English in 1297. He was succeeded by his more famous son, Sir James the Good, who is called the hero of seventy fights, and was Robert Bruce's greatest captain. He commanded a wing at Bannockburn in 1314. During a journey to Palestine, to which he was carrying the heart of Robert Bruce, he was killed by the Saracens in Spain in 1331. His estate was inherited by his brothers, Hugh and Archibald, the latter of whom was slain at the battle of Halidon Hill in 1333. He left a son, Sir William, who, having fought with distinction at Poitiers and other places, was created earl of Douglas in 1357. He was a competitor for the crown, but he agreed to recognize his rival, Robert II., on the condition that his son James should marry a daughter of that king. He had a second son, George, earl of Angus. The earl of Douglas died in 1384, and was succeeded by his son James, earl of Douglas and Mar, who had married Margaret, a daughter of Robert II. He was a renowned warrior, and was killed at the battle of Otterburn in 1388. As he left no lawful issue, Archibald the Grim, a natural son of Sir James the Good, became the third earl of Douglas. He died in 1400, leaving a son, Archibald, the fourth earl, who married a daughter of King Robert III. Douglas fought at Shrewsbury (1403), where he is said to have unhorsed King Henry IV., and was killed at Verneuil in France in 1424. He was succeeded by his son Archibald, the fifth earl, who was also duke of Touraine (France). Died in 1439. His son and heir, William, the sixth earl, was born about 1422. His power and foreign possessions rendered him an object of fear and suspicion to the court. He was beheaded after a hasty trial, Nov. 24, 1440, and left no issue. The earldom was then given to his grand-uncle James, who died in 1443, and was succeeded by his son William, the eighth earl, a powerful and turbulent person. He was appointed lieutenant-general of the kingdom by James II., but soon lost the royal favor. He was killed by that king Feb. 22, 1452, and was succeeded by his brother James, ninth earl of Douglas, who waged open war against King James II. in 1454. He was defeated and taken prisoner in 1484, and died in 1488, when that branch of the Douglas family became extinct. The earls of Angus and earls of Morton, besides other noble lines, belonged to the family of Douglas, which is now represented in the peerage by the earls of Selkirk. WILLIAM JACOBS.

Douglas (ARCHIBALD), fifth earl of Angus, surnamed BELL THE CAT, was a son of George, the fourth earl, who died in 1462. He (the son) was a powerful and ambitious subject, and held the highest offices in the state. He was the father of Gawin Douglas, the poet, and of other sons. Died in 1514. His grandson Archibald became the sixth earl of Angus, and married in 1514 Margaret, who was a sister of Henry VIII. of England and widow of James IV. of Scotland. He had a daughter, who became the wife of the earl of Lennox and the mother of Lord Darnley. The sixth earl died about 1660, and his title was inherited by his nephew George, who was a brother of Regent Morton. The eleventh earl of Angus was created marquis of Douglas in 1633. (See DAVID HUME, "History of the Houses of Douglas and Angus," 1644.)

Douglas (DAVID), a Scottish botanist, born at Scone, in Perthshire, in 1798. As an agent of the London Horticultural Society he visited the U. S. in 1823 to collect botanical specimens. He returned to England in 1827, and afterwards went on a scientific excursion to the Sandwich Islands, where he was killed by a wild bull July 12, 1834.

Douglas (GAWIN), a Scottish poet, born in 1474, was the third son of Archibald, fifth earl of Angus. He was educated for the Church, and became bishop of Dunkeld in 1515. His most remarkable production is a translation of Virgil's "Æneid" into Scottish verse (1513), which is highly commended. His chief original poem is "The Palace of Honor." Died in 1522.

Douglas (Sir HOWARD), BART., D. C. L., G. C. B., a British general, born at Gosport, in Hampshire, July 1, 1776, was a son of an admiral. He served in the Peninsular war (1808–12), was governor of New Brunswick (1823–29), and a member of Parliament for Liverpool (1842–47). In 1851 he was raised to the rank of general. He wrote, besides other works, a "Treatise on Naval Gunnery" (1819), which is regarded as a standard authority in foreign countries as well as in England. Died Nov. 8, 1861.

Douglas (STEPHEN ARNOLD), one of the most eminent of American statesmen in his day, was born at Brandon, Rutland co., Vt., April 23, 1813. He was of poor but respectable parentage. His father was a practising physician, with prospects of success, but died suddenly of apoplexy soon after the birth of the subject of this notice. His mother, with another infant, a daughter, not yet two years old, was thus left a widow, with means, in addition to her own exertions, barely sufficient to support herself and her two orphan children, without being able to give them more than the rudiments of a good English education. At the age of fifteen the son, with the consent of his mother, engaged himself to work in the cabinetmaking business for the purpose of raising means to carry him through college. After a few years of labor in this trade he was able to enter upon an academical course, first at Brandon, Vt., and then at Canandaigua, N. Y. At the latter place he remained until 1833, and took up the study of the law at the office of the Messrs. Hubbel, and prosecuted this in connection with his academic course. Early in 1833, before he was twenty, his funds running low, he determined to abandon further attempts at education, and to enter at once into the conflicts of life with such acquisitions of knowledge as he had then obtained and might be enabled afterwards to obtain. After some wanderings in the Western States in quest of a new home where his fortunes were to be tried, he took up his abode at Jacksonville, Ill., where, after teaching school for three months, he was admitted to the bar, and opened an office in 1834. He rapidly rose in his profession. Within a year from the time that he received his license to practise he was elected attorney-general of the State. Having been reared in the Jeffersonian school of politics, Mr. Douglas zealously espoused the Democratic side on all public questions then agitated, and soon became one of the most popular orators of his party in Illinois. He was, at an early day in his political life, styled "The Little Giant," in allusion to his diminutive stature in contrast with the extent and comprehensiveness of his intellectual powers. In 1835 he resigned his position as attorney-general upon his being elected a member of the

State legislature. In 1841 he was chosen one of the judges of the supreme court of the State. This position he resigned in 1843 to take a seat in the House of Representatives of the Congress of the U. S. His *début* on this elevated arena was upon the bill to refund to Gen. Jackson the fine of $1000 imposed by Judge Hall in New Orleans during the war of 1812. His first speech placed him high in the ranks of the most promising young men of mark of that period. On all questions of constitutional law he at once took position among the ablest members of the House, in which then figured, as they had for years before, such men as Daniel D. Barnard, Alexander Dromgoole, Joseph R. and Charles J. Ingersoll, Garrett Davis, Robert C. Winthrop, R. Barnwell Rhett, Henry A. Wise, and John Quincy Adams, to say nothing of many others of the illustrious compeers of these acknowledged leaders, who were then making such a deep impress upon the history of the country. Mr. Douglas was among the most zealous, as well as the most efficient, advocates of the admission of Texas as a State into the Union by joint resolution of both houses of Congress. He sustained the constitutionality of the measure in a speech of great power and effect. He defended that feature of the resolutions known as the extension of the line of the "Missouri Compromise," simply as a pledge of his adherence to the principle of a division of the public domain between the two great sections of the country, North and South, as it had been tendered by the North and accepted by the South in 1820. As an original question Mr. Douglas did not believe that Congress had any rightful power to impose an anti-slavery restriction upon any of the Territories or States of the Union; but being willing to abide by the principle of division as established in 1820 as to the Louisiana acquisition, he was for its reaffirmance in 1845 as to the new acquisition then to be made on the acceptance by Texas of the terms proposed for her admission into the Union. He was also one of the ablest supporters of the administration of President Polk during the war which ensued with Mexico.

When Mr. David Wilmot of Pennsylvania, in Aug., 1846, moved his celebrated "Proviso" for slavery restriction to any new territory that might be acquired from Mexico in a treaty of peace, Mr. Douglas was one of five only in the House, from the entire North, who took decided position against that measure. He did it for the same reason and upon the same principles that Mr. Jefferson acted on when, though then in private life, he spoke and wrote against a like restriction upon the Louisiana Territory, when it was proposed in Congress in 1818–19. Mr. Douglas, like Mr. Jefferson, was opposed to African slavery, but, like him, he maintained that the Congress had no constitutional power to impose the restriction. The internal polity and domestic institutions of the several States composing the Union were subjects, in his judgment, over which the Federal legislative authority did not extend under the limitations of the Constitution. He was still willing to abide by a further extension of the "Missouri Compromise" line, so called, and in many speeches, with most patriotic fervor, urged the adoption of this policy.

In all the subsequent agitation of this question the speeches of Mr. Douglas, while he remained in the House, were clear, earnest, and masterly. In 1847 he was elected to the Senate for a full term of six years. In that body he was no less distinguished than he had been in the House. No man in the Senate, not excepting Mr. Clay or Mr. Webster, acted a more conspicuous part than he did in what is known as the "Compromise" or adjustment of the sectional questions of 1850. While the success of this compromise is generally attributed to the lead and auspices of Mr. Clay, yet it is due to Mr. Douglas to state that Mr. Clay's celebrated "Omnibus Bill," so called, which provided for the settlement of the five great questions of discontent, as stated by him, was made up of several distinct bills on the same subject previously introduced by Mr. Douglas. The full and minute history or nature of that compromise it is not proposed to give in this connection: suffice it to say that no one acted a more important and efficient part in effecting it than did Mr. Douglas, and that it was based throughout upon what he had ever maintained to be the true constitutional principles of the government. In 1852 he was again elected to the Senate for another full term. In 1854, when, as chairman of the committee on territories, he introduced bills for the organization of governments in the Territories of Kansas and Nebraska, the whole subject of slavery agitation in the Territories was again renewed, and with increased fierceness. The policy and provisions of these bills, he maintained by argument and eloquence seldom surpassed, were in strict accordance with the principles established by the territorial policy adopted in 1850. Under his lead the Kansas-Nebraska bill was triumphantly carried in the Senate, on the grounds that the principle of a division of the public domain between the sections by the Missouri or any other line had been totally abandoned by the adjustment of 1850, and the principle of non-intervention by Congress anywhere in the Territories substituted in its stead. On the like ground it was triumphantly carried in the House, and constitutes what is known as the "Territorial legislation of 1854." Mr. Douglas's views of the rights of the people of a Territory under the Constitution of the U. S. gave rise to what is styled the doctrine of "squatter sovereignty," for which he was assailed quite as bitterly at the South as at the North. It is not the purpose of this notice to go into any elaboration on this point. His doctrine, briefly stated, was, that the inestimable right of local self-government was the seminal principle from which all American free institutions sprung; it was on this that each of the original thirteen colonies had been planted; and that it was for the maintenance of this sovereign right on the part of the peoples of the several States of the Union that their independence had been declared and their first confederation entered into. With Mr. Jefferson and all strict constructionists, Mr. Douglas held that the Federal government possessed no inherent powers, and could exercise none except those delegated by the States; that the delegated powers are specific and enumerated in the Constitution; and that Congress cannot rightfully exercise any power which is not thus enumerated or incident to some or more which are. The power conferred upon Congress in the Constitution, "to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the U. S.," he, with the Jeffersonian school generally, maintained referred to the territory as land or public domain only, and carried with it no power whatever for the government of the inhabitants thereof. The Territories, with their inhabitants, politically considered, he regarded as inchoate States, and bearing towards the government of the Union a relation not unlike, in many respects, that which the colonies bore towards the mother-country. The great right of local self-government belonged equally to both. This is a brief outline of what he styled popular sovereignty in the Territories. His views at large upon it are to be found, not only in numerous speeches in the House and Senate during a period of many years, but in a very compact and condensed form in "Harper's Magazine" of Sept., 1859. This article was republished in pamphlet form, and extensively circulated. It consisted of forty pages, and, however it may have been regarded by extreme partisans of either side at the period of its publication, it unquestionably presents an argument which every student of American history may read with both interest and profit. Among American state papers it is entitled to rank with Madison's celebrated report on the Virginia resolutions of 1799. In 1858, Mr. Douglas was again re-elected to the Senate for another full term, after one of the fiercest and bitterest contests ever before waged in the U. S. for a similar position. At this time he successfully breasted all the combined powers of the opposing party, then styled Republican, under the lead of Mr. Lincoln, his competitor, and that of the Democratic administration at Washington, under the patronage of Mr. Buchanan, the President.

As early as 1852 the name of Mr. Douglas had been brought prominently before the Democratic nominating convention at Baltimore as a candidate for the presidency, but, at his own instance, was not pressed by his friends. In 1856, it was again, in like manner, presented to the Cincinnati Convention, but as soon as he discovered that Mr. Buchanan had a majority in that body he gave positive instructions to his friends in that convention, by telegram from Washington, to withdraw his name, and not to allow it to be used in any contest for the nomination under the two-thirds rule. The platform of political principles which had been adopted there before the subject of nominating candidates had been taken up was just such as had governed the whole of his public life, and he gave Mr. Buchanan a cordial support upon his endorsement of them. In 1860, after his triumphant return to the Senate at his last election, he was the most prominent candidate of the Democracy of the U. S. for the presidential nomination at the convention held that year in Charleston, S. C., and very probably would have received it by a two-thirds vote but for the withdrawal of the delegates of the States of Alabama, Arkansas, Florida, Louisiana, Mississippi, South Carolina, and a majority of those from Georgia. On the withdrawal of these delegations the friends of Mr. Douglas moved and carried an adjournment of the convention, to reassemble at Baltimore on a subsequent day. This was done with a view that the Democratic party, in the mean time, in the several States, might fill the seats made vacant in the convention by the withdrawing delegates. The object failed of accomplishment. On the reassembling of the convention another withdrawal of delegations took place. These now met in

another part of the city and put in nomination for the presidency John C. Breckenridge of Kentucky. The Democratic party of the Union was thus irreconcilably torn asunder. Those who adhered to the regularly called convention, which had first met at Charleston, and had adjourned to Baltimore, constituted the larger portion. This body now unanimously put the name of Mr. Douglas in nomination for the presidency, though against what was known to be his wishes. The presidential canvass this year was perhaps the most exciting that had ever occurred since that between Mr. Jefferson and the elder Adams in 1800. Four tickets for President and Vice-President were in the field —Lincoln and Hamlin, supported by the Republicans; Bell and Everett, supported by those styling themselves the American party; Douglas and Johnson, supported by one wing of the Democracy, and Breckenridge and Lane, supported by the other. The chief objection to Mr. Douglas on the part of his former Democratic associates, who refused to support him, was what was called his squatter-sovereignty doctrine. The result of the election, by the popular vote, was, for Lincoln and Hamlin, 1,857,610; for Douglas and Johnson, 1,365,976; for Breckenridge and Lane, 847,953; and for Bell and Everett, 590,631. The result by the college of electors, however, was very different. By this Messrs. Lincoln and Hamlin received 180 votes; Messrs. Breckenridge and Lane, 72; Messrs. Bell and Everett, 39; Messrs. Douglas and Johnson received 12 only.

The great events of 1861 followed in rapid succession. Mr. Douglas was spared their full development. He died after a short illness, at his residence in Chicago, on the 3d of June, 1861, soon after reaching the 48th year of his age. On the 15th of March, a little over two months before his death, and after seven of the Southern States had passed their ordinances of secession, in view of the then threatening prospect of affairs, he spoke, in the Senate, at great length on the general state of the country, and in the course of his remarks used these words in addressing the Republican side: "In my opinion, we must choose, and that promptly, between one of three lines of policy: 1. The restoration and preservation of the Union by such amendments of the Constitution as will ensure the domestic tranquillity, safety, and equality of all the States, and thus restore peace, unity, and fraternity to the whole country. 2. A peaceful dissolution of the Union by recognizing the independence of such States as refuse to remain in the Union without such constitutional amendments, and the establishment of a liberal system of commercial and social intercourse with them by treaties of commerce and amity. 3. War, with a view to the subjugation and military occupation of those States which have seceded or may secede from the Union. I repeat, that in my opinion you must adopt and pursue one of these three lines of policy. The sooner you choose between them, and proclaim your choice to the country, the better for you, the better for us, the better for every friend of liberty and constitutional government throughout the world. In my opinion, the first proposition is the best, and the last the worst."

Soon after the fleet sailed from New York to provision the garrison in Fort Sumter, "peaceably if possible, but forcibly if necessary." After the fall of that garrison, Mr. Douglas, in Springfield, Ill., and at other places, made speeches in which he sustained Mr. Lincoln's call for 75,000 troops to defend the Federal Capital. The last intelligible words uttered by him were a message to his sons, Robert and Stephen, then at college, "to obey the laws and support the Constitution of the U. S."

Mr. Douglas was twice married. His first wife was Miss Martin of North Carolina. She was the mother of his two sons referred to, who were his only surviving children. His second wife was Miss Cutts, a most beautiful and accomplished lady of Washington City. By her he left no child. As a debater Mr. Douglas was never overmatched, either in the House or Senate. His death at the time was regarded in all sections as a great public calamity. However widely many differed with him on some questions, all acknowledged his very great ability, while very few, if any, seriously questioned either his integrity or patriotism.

ALEXANDER H. STEPHENS.

Doug'lass, a county in the N. W. of Georgia, constituted since the census of 1870. It contains about 450 square miles, and is bounded on the S. E. by the Chattahoochee River. Capital, Douglassville.

Douglass (DAVID BATES), an eminent American civil and military engineer, born at Pompton, N. J., Mar. 21, 1790, graduated at Yale College Sept. 18, 1813, and Oct. 1, 1813, was appointed a second lieutenant in the corps of engineers U. S. A. He entered upon duty at West Point as commander of sappers and miners, and was later commander of the post. In the war with Great Britain he commanded in 1814 his company of sappers and miners on the northern frontier; participated in the battle of Niagara and siege of Fort Erie, followed by the memorable sortie from that work Sept. 17, 1814, breaking the enemy's lines and compelling him to retire. For "distinguished and meritorious services in superintending the construction of defensive works, in command of battery, etc.," on this occasion, he was promoted first lieutenant and brevet captain. On the close of the war he returned to West Point, 1815, and during the subsequent fifteen years was variously engaged as professor of natural and experimental philosophy, of mathematics, and of engineering till 1831, when he resigned to enter upon the profession of civil engineering. During these years he was engaged upon important inspections, surveys, and estimates for important canals and other works of internal improvement. He was also astronomical surveyor of the commission for determining the U. S. boundary from Niagara to Detroit in 1819; was consulting engineer of the board of commissioners of internal improvements of Pennsylvania. Having become greatly interested in the introduction of inclined planes into operation in place of locks for canal navigation, and having accepted from the Morris Canal Company the appointment of chief engineer of the same, which duty he found required all his time, his sense of duty led him to resign his position in the army Mar. 1, 1831; he was at once appointed chief engineer of the Morris Canal Co., and devoted himself entirely to the improvement with which he had become identified. The inclined plane proved a success. In Oct., 1830, a trial of the plane at Montville was made, and in six minutes and a half a boat containing 200 persons passed a plane 1040 feet long, with a descent of 70 feet, and advancing 770 feet. The canal was carried forward to a successful completion in 1832. During this year he was appointed professor of natural philosophy and civil engineering in the University of the City of New York, but relinquished this position in 1833, though his name was continued on the rolls of the college as professor of civil engineering and architecture till 1840. In 1833 he surveyed the Brooklyn and Jamaica R. R., Long Island; was one of the engineers of the Croton Aqueduct from 1833 to 1835, during which time he made the surveys, plans, and estimates for supplying the city of New York with water from the Croton River, the entire duty falling upon him in consequence of other professional engagements which occupied the entire time of the engineer named in connection with Major Douglass. His report showed so clearly the practicability of the project that the necessary legislation to procure its execution was obtained in May, 1834, and Major Douglass as chief engineer completed his plans and laid out the line of the aqueduct until Oct., 1836, at which date, owing to difference of views which existed between himself and the board of commissioners, he was removed; but his reports and surveys were adopted and followed in the construction of that important work. From 1837 to 1840, in addition to other duties, he was chief engineer of Greenwood Cemetery, which he planned and the location of which he selected; his engineering ability as well as his artistic taste and skill are shown in the present development of that beautiful city of the dead. In 1840 he resigned his superintendence of Greenwood to accept the presidency of Kenyon College, O., with which institution he remained till 1844, when he returned to New York, and was engaged until 1848 as chief engineer to plan and lay out the Albany and Quebec cemeteries; in important engineering work at Brooklyn, such as providing for a supporting wall for Brooklyn Heights, the supplying of that city with water, etc., and in developing the landscape features of Staten Island. In 1848 he accepted a call from Geneva College, N. Y., as professor of mathematics, which position he retained during the remainder of his life. Died at Geneva, N. Y., Oct. 9, 1849. At the request of the cemetery board his remains were removed to Greenwood Cemetery. G. C. SIMMONS, *Clerk Board of Engineers.*

Douglass (FREDERICK), an American orator, originally a slave, was born in Talbot co., Md., about 1817. He learned to read and write by stealth, ran away from his master in 1838, and became a resident of New Bedford, Mass. In 1841 he began to give public lectures against slavery. He gained distinction as a public speaker, published his "Autobiography" in 1845, and visited England, where he made eloquent anti-slavery speeches. He afterwards became the editor of the "North Star," a journal published at Rochester, N. Y. In 1870 he began to edit the "National Era." In 1872 he was the first in the list of presidential electors chosen by the Republican party of the State of New York.

Doug'lassville, a post-village, capital of Douglass co., Ga., about 30 miles W. of Atlanta.

Doug'lastown, a port and post-village of Northumber-

land co., New Brunswick, on the N. bank of the Miramichi, 3 miles above Chatham and 3 miles below Newcastle. It saws and ships large amounts of lumber. Pop. about 400.

Dour, a town of Belgium, department of Hainaut, 9 miles W. S. W. of Mons. It derives its prosperity from mines of coal and iron, iron-works, weaving, and bleaching. Pop. 8501.

Dou'ro [Sp. *Duero;* anc. *Durius*], a large river of Spain and Portugal, rises in Old Castile, in the province of Soria. It flows generally westward through the provinces of Valladolid and Zamora until it touches the N. E. extremity of Portugal. It next runs south-westward, and forms part of the boundary between Spain and Portugal. Resuming a westward direction, it traverses the northern part of Portugal, and enters the Atlantic 3 miles below Oporto. Its total length is nearly 500 miles. Rocks, sand-banks, and the rapid current render its navigation difficult.

Dove (in natural history). See PIGEON.

Dove [supposed to be derived from a root akin to "dive;" Lat. *columba;* Ger. *Taube*]. The dove in Christian art is used as a symbol of purity and an emblem of the Holy Spirit. Issuing from the lips of dying saints and martyrs, it represents the soul purified by suffering. Holding in its mouth an olive branch, it is the emblem of peace. In Catholic churches the pyx or ciborium containing the Host is sometimes in the form of a dove.

Do've (HEINRICH WILHELM), an eminent German physicist, born at Liegnitz, in Silesia, Oct. 6, 1803, graduated at the University of Berlin in 1826. He became professor of physics in that university in 1829, after which he made researches into the laws of climate and atmospheric phenomena. He published, besides other works on meteorology, electricity, etc., "Meteorological Researches" (1837), "On Electricity" (1848), and a "Treatise on the Distribution of Heat on the Surface of the Globe," which was published in 1853 by the British Association.

Dove (RICHARD WILHELM), an eminent German jurist, son of the preceding, born in Berlin in 1833, became in 1859 privatdocent at the University of Berlin, in 1862 professor at the University of Tübingen, in 1865 at Kiel, and at 1868 at Göttingen. In 1871 he was elected to the German Reichsrath, where he votes with the national liberal party. He began in 1860 the publication of the "Zeitschrift für Kirchenrecht," the leading periodical in Europe on all questions relating to church law, of which he has ever since remained the chief editor.

Do'ver (anc. *Dubris*), a city and seaport of England, in the county of Kent, on Dover Strait, 66 miles E. S. E. of London and 27 miles from Calais, in France. It is the point in England that is nearest to the Continent, and is the terminus of the South-eastern Railway. It stands at the entrance of a deep depression in an amphitheatre of chalk-hills and cliffs. This city is defended by Dover Castle, which is built on chalk-cliffs 320 feet high, and is a fortress of great strength and extent. This castle is said to have been founded by the ancient Romans. Dover contains a custom-house, a town-hall, a theatre, and a military hospital. The harbor is protected by a stone pier built of solid masonry, 60 feet wide, and extending about 1800 feet into the sea. Dover is the chief port of communication between England and France, and is only 21 miles distant from the nearest part of the Continent. Steamers ply daily between this port and Boulogne and Calais. Dover returns two members to Parliament, and is one of the Cinque Ports. A submarine cable was laid from Dover to Calais in 1850. Pop. in 1871, 28,270. (See BREAKWATER, by GEN. J. G. BARNARD, U. S. A.)

Dover, a post-township and village, capital of Pope co., Ark, about 90 miles N. W. of Little Rock. Pop. of township, 1063.

Dover, the capital of the State of Delaware and seat of justice of Kent co., is on the Delaware R. R., 48 miles S. of Wilmington and about 5 miles W. of Delaware Bay. It has a State-house, with a State library containing 30,000 volumes, 6 churches, 1 national bank, 1 State bank, 1 weekly newspaper, 2 fruit-packing houses, 2 steam saw-mills, 1 large water and steam flouring-mill, sash and fruit-crate factory, gasworks, 1 foundry, 1 carriage manufactory, 2 public schools, 3 select schools, and 1 Methodist Episcopal academy for boys. It is the centre of a great fruit-growing section. Pop. 1906; of Dover hundred, 6394.

ED. "DELAWAREAN."

Dover, a post-township of Bureau co., Ill. Pop. 1402.

Dover, a township of Fayette co., Ia. Pop. 1150.

Dover, a post-township of Shawnee co., Kan. Pop. 611.

Dover, a post-village of Mason co., Ky., 12 miles below Maysville. A large quantity of tobacco and hemp is exported from this place. Pop. 532.

Dover, a post-village, capital of Piscataquis co., Me., on the Piscataquis River and the Bangor and Piscataquis R. R., 53 miles N. W. of Bangor. It has one weekly newspaper, a heavy trade, and manufactures of woollens. Pop. of Dover township, 1983.

Dover, a township and post-village of Norfolk co., Mass. Here are three churches and a paper-mill. Pop. of township, 645.

Dover, a township and village of Lenawee co., Mich., on the Lake Shore and Michigan Southern R. R., 5 miles W. of Adrian. Pop. 1494.

Dover, a township of Monongalia co., Minn. Pop. 266.

Dover, a township and village of Olmsted co., Minn. Pop. 822.

Dover, a post-township of Lafayette co., Mo. Pop. 2251.

Dover, a handsome town, capital of Strafford co., N. H., is on Cocheco River and on the Boston and Maine R. R., 68 miles N. of Boston and 12 miles N. W. of Portsmouth. The Dover and Winnipiseogee R. R. connects it with Alton Bay, and the Dover and Portsmouth R. R. connects it with the last-named place. It is at the head of sloop-navigation and at the lower falls of the river, which has here a fall of thirty-two feet and affords abundant water-power. It contains a city-hall, ten or more churches, three national banks, one daily and four weekly newspapers, and one monthly publication. The printing establishment of the Free Baptist denomination is also located here, which issues two semi-monthly juvenile papers, denominational and Sunday-school books, etc. It has an efficient public high school, a flourishing private academy, and a city library of considerable value. Here are four large cotton-mills and an extensive printery belonging to the Cocheco Manufacturing Company. Dover has also manufactures of shoes, woollen cloths, flannels, oil-cloths, glue, etc. It was founded in 1623, and is the oldest town in the State. Pop. 9294. GEORGE T. DAY, ED. "MORNING STAR."

Dover, a post-village of Morris co., N. J., on the Morris Canal, the Rockaway River, and the Morris and Essex R. R., 33 miles W. N. W. of Newark. It has several iron-forges, iron-foundries, steel-works, spike-factories, and rolling-mills; also one weekly newspaper, and one national bank.

Dover, a township of Ocean co., N. J. It contains Tom's River, the capital of the county. Pop. 3044.

Dover, or **Dover Plains,** a post-village of Dutchess co., N. Y., on the New York and Harlem R. R., 78 miles N. N. E. of New York. It has a national bank and one weekly newspaper. The township has five churches, marble-quarries, iron-mines, and much fine scenery. Pop. of Dover township, 2279.

Dover, a township and post-village of Craven co., N. C., on the Atlantic and North Carolina R. R., 24 miles W. of Newbern. Pop. 2206.

Dover, a township of Athens co., O. Pop. 1697.

Dover, a township and post-village of Cuyahoga co., O. Pop. 1445.

Dover, a township of Fulton co., O. Pop. 930.

Dover, a township of Tuscarawas co., O., contains the village of CANAL DOVER (which see). Pop. of township, 3515.

Dover, a township of Union co., O. Pop. 929.

Dover, a township and post-borough of York co., Pa. Pop. of township, 2281; of borough, 418.

Dover, a post-village, capital of Stewart co., Tenn., on the Cumberland River, 75 miles W. by N. from Nashville, and 1 mile E. of Fort Donelson. It has one weekly newspaper, and a national cemetery a quarter of a mile W. of Dover. Pop. 430. JAMES P. FLOOD, ED. "WEEKLY RECORD."

Dover, a post-township of Windham co., Vt. It has manufactures of lumber, tubs, kegs, etc. Pop. 635.

Dover, a township of Goochland co., Va. Pop. 3667.

Dover, a township and village of Racine co., Wis., on the Western Union R. R., 21 miles W. of Racine. P. 1047.

Dover Hill, a post-village, capital of Martin co., Ind., 92 miles S. S. W. of Indianapolis.

Do'ver's Pow'der [named from Dr. Dover, its inventor, an English physician], (*Pulvis Ipecacuanhæ et Opii*), consists of ipecacuanha and opium in fine powder, sixty grains each; sulphate of potassa, a troy ounce: rubbed together to a very fine powder. Dover's powder acts as a sudorific, and where the brain is unaffected and the tongue and skin moist, is of great service. Its composition now differs considerably from that given in Dover's formula.

Dover, Strait of [Fr. *Pas de Calais;* Lat. *Fretum Gallicum*], the strait which separates England from France, and connects the English Channel with the North Sea. It

is about twenty miles wide at the narrowest part. The depth varies from six to twenty-nine fathoms. The English side of the strait is bordered by chalk-cliffs, some of which are about 600 feet high. Chalk-cliffs also occur on the French shore.

Dov'refield, a mountainous plateau in Norway, forming the northern end of the central mass of the Scandinavian system. It extends along the N. side of the Rauma Valley, which separates it from the Langfjeld plateau, to the sources of the Lougen, and thence N. E. to those of the Glommen. Its highest peak is the Sneehættan, 7613 English feet, formerly considered the highest in Scandinavia.

Dow, or **Douw** (GERARD), a celebrated Dutch painter, born at Leyden April 17, 1613, was a pupil of Rembrandt. He excelled in chiaroscuro and in technical skill, and finished his works with excessive delicacy. Among his works, which are small in dimensions, are "The Charlatan," "The Dropsical Woman," "The Dentist," and "The Village Grocer." He died in Feb., 1675.

Dow (LORENZO), an eccentric Methodist preacher, born in Coventry, Conn., Oct. 16, 1777. He labored in many States of the Union, and also in England and Ireland. He was distinguished for his courage and zeal, and for some singularities in his habits. Died Feb. 2, 1834.

Dow (NEAL), a reformer, born at Portland, Me., in 1803. As a member of the legislature of that State he procured in 1851 the passage of a law to prohibit the sale of ardent spirits, which is called the "Maine law." He became a brigadier-general of Union volunteers early in 1862, and was taken prisoner near Port Hudson in July, 1863.

Dow'ager [Fr. *douairière*, from *douaire*, a "dower"], a widow endowed; that is, who either enjoys a dower from her deceased husband, or has property of her own brought by her to her husband on marriage, and settled on herself after his decease. This is called her dowry. In England the queen-dowager, as the widow of the king, enjoys most of the privileges which belonged to her as queen-consort, but no man can marry a queen-dowager without special license from the king. A queen-dowager does not lose her regal title when she marries a subject.

Dowa'giac, a post-village of Cass co., Mich., on the Dowagiac River and the Michigan Central R. R., 105 miles E. of Chicago. It has one national bank and one weekly newspaper. Pop. 1932.

Dow'el, a name given to a pin used horizontally for joining two pieces of material in a building, the dowel being inserted in its socket in the one piece before the other substance with its socket is forced into its place.

Dow'er [from the Fr. *douer*, to "endow"], in the common law of England, is an estate for life which a widow has in one-third part of all the lands and tenements of which her husband was seized beneficially, or of an estate of inheritance at any time during the marriage.

1. *The Nature of the Estate.*—Dower passes through three stages. While the husband lives it is but an inchoate right and incapable of enforcement. Should the husband sell to a stranger and leave her destitute, she would have no claim to the land while the husband lived. On her husband's death, and before dower is assigned, she has a right of action. After dower is assigned she has an estate in the land. The rights of dower depend upon a rule of law which is founded on public policy. The law of the place where the land is situated governs it.

2. *The Requisites of Dower.*—These are threefold—marriage, seizin of the husband, and his death. The leading questions on this subject concern seizin. By this is meant beneficial ownership of a present estate of freehold, which may descend to the husband's heirs. There can be no dower in an estate for years, however long it may last. Nor can there be in a reversionary estate which is preceded by a prior estate of freehold or for life owned by another person, though there may be where the prior estate is for years. The widow of a trustee cannot be endowed, as he is not a beneficial owner. This proposition would be applied to the widow of a deceased partner, who could only be endowed subject to the adjustment of the affairs of the partnership. Formerly, the trust estate itself was not the subject of dower. This rule does not prevail in the U. S., and dower may sometimes be had in money, which by a legal fiction is a substitute for land. Whenever the husband's estate is defeated by a superior title, dower falls with it.

3. *Assignment of Dower.*—As dower is one-third part of the husband's estate, it must be assigned either by the parties or by act of the law. Certain legal rules must regularly be followed, when dower is said to be assigned of common right. These may be relaxed by agreement under seal, when the assignment is said to be against common right.

4. *Barring of Dower.*—The right cannot be destroyed by the mere act of the husband. Creditors also take subject to this claim. It can in general be barred only by the wife's own act, as by joining in a conveyance with the husband, or by a jointure settled before marriage. The husband often in his will, either expressly or by implication, gives his wife property in lieu of dower. In this case she may, after his death, elect to take such property or her dower, but cannot take both.

This right occasioned much inconvenience in England by impeding the conveyance of property. For this reason, by the Dower act of Aug. 29, 1833, the right of dower was virtually placed entirely in the hands of the husband in the case of all marriages contracted after Jan. 1, 1834. The husband may now dispose of his lands by will or otherwise, free from any claim of dower on the part of his wife. If, however, he dies intestate, his widow, under the statute of distribution, receives not merely for life, but absolutely, one-third of his personal estate. In the U. S. the general rules of the English common law still prevail. As a general rule, also at least one-third of the husband's personal estate is given to the wife, as by the English statute of distribution. T. W. DWIGHT.

Dow'las [supposed to be derived from *Doullens* in France, which was noted for its manufacture], a strong, coarse linen fabric much used by the working class, is manufactured in the north of England and in Scotland.

Dow'latâbâd, a fortified and decayed town of Hindostan, in the Nizam's dominions, 10 miles N. W. of Aurungâbâd. It is defended by a rock-fortress which occupies the summit of an isolated rock about 500 feet high. The lowest third of this rock is perpendicular, so that the summit is accessible only by a passage excavated in the interior. Near this town are the cave-temples of Elora.

Dow'ler (BENNET), M. D., born at Elizabethtown (now Moundsville), Ohio co., Va., April 16, 1797, was educated at the University of Maryland, and has long been a leading physician of New Orleans. He has published many valuable contributions to the periodical literature of the profession, and is the author of a "Tableau of the Yellow Fever of 1853," etc. (1854). He is editor of the "New Orleans Medical and Surgical Journal," and a member of many American and European scientific associations. He founded the New Orleans Academy of Sciences.

Dow'ling (JOHN), D. D., was born in the county of Sussex, England, May 12, 1807, and became a resident of the U. S. in 1832, and an eminently successful writer and Baptist preacher of New York City. He has published a "Vindication of the Baptists," "Defence of the Protestant Scriptures" (1843), "History of Romanism" (1845), and other works.

Down, or **Dune** [Fr. *dune*, from the Celtic *dun*, a "hill"], a name of the sandbanks or sandhills which the sea gathers and forms along its shores. The term *down* is also applied in England to large tracts of poor hilly land which is covered with short grass and appropriated to pasturage. It is specially applied to two broad ridges of undulating chalk-hills S. of the Thames. From the middle of Hampshire these extend eastward—the one (the North Downs), through Surrey and Kent, to Dover, and the other (the South Downs), through the south-eastern part of Hampshire, to Beachy Head. Between the two ridges, the former of which is nearly 120 miles long, lies the valley of the Weald, from which the chalk strata are supposed to have been removed by denudation. The highest point of the down is 880 feet above the level of the sea. These uplands produce fine aromatic grass, on which the famous South Down sheep are pastured.

Down, a county in the N. E. part of Ireland, in Ulster, is partly bounded on the N. by Belfast Lough and on the E. and S. E. by the Irish Sea. Area, 954 square miles. The chief rivers are the Bann and the Lagan. The surface is mostly hilly or undulating, and the southern part is occupied by the Mourne Mountains, the highest peak of which is 2796 feet high. The soil of many parts is fertile. The chief articles of export are linen fabrics, hosiery, grain, butter, pork, and hides. Capital, Downpatrick. Pop. in 1871, 277,775.

Down'cast is a name which is sometimes given in mines to the shaft through which air for ventilation descends. A fire is kept up at the bottom of a flue or "upcast," and the impure air ascends through this flue, while a fresh supply of air descends through the "downcast." In other mines various forms of the blowing-machine are used to secure ventilation.

Downe, a township of Cumberland co., N. J., on Delaware Bay. Pop. 3385.

Downe, VISCOUNTS (Ireland, 1680).—HUGH RICHARD DAWNAY, eighth viscount, born July 20, 1804, succeeded his father in 1857.

Down'er's Grove, a township and post-village of Du Page co., Ill., on the Chicago Burlington and Quincy R. R., 22 miles W. by S. of Chicago. Pop. 2518.

Downes (JOHN), an American naval officer, born at Canton, Mass., in 1784, entered the navy in 1802. He served as lieutenant of the Essex, under Capt. Porter, against the British (1812–14). He captured an Algerine frigate in 1815, and became a captain in 1817. Having taken command of a squadron in the Pacific in 1832, he chastised the people of Quallah Batoo in Sumatra for outrages on American seamen. Died Aug. 11, 1854.

Downes (JOHN), U. S. N., born Aug. 25, 1822, in Massachusetts, entered the navy as a midshipman Sept. 4, 1837, became a passed midshipman in 1843, a lieutenant in 1851, and a commander in 1862. He commanded the iron-clad Nahant at the bombardment of Fort McAlister, Mar. 3, 1863, and in the first attack upon Fort Sumter of April 7, 1863, and is mentioned in Rear-Admiral Dupont's "detailed report" of the latter fight as one of those "who did everything that the utmost gallantry and skill could accomplish in the management of their untried vessels." He participated in the capture of the Confederate iron-clad Atlanta, and is thus spoken of in Rear-Admiral Dupont's report of that affair, dated June 19, 1863: "Commander Downes, with his usual gallantry, moved as rapidly as possible towards the enemy, reserving his fire until he could get into close action, but lost the opportunity, from the brief nature of the engagement, of using his battery." Died Sept. 21, 1865. FOXHALL A. PARKER, U. S. N.

Dow'nieville, a post-village, capital of Sierra co., Cal., is on the North Yuba River, 62 miles N. E. of Marysville. It is surrounded by high mountains, and has deep gravel, hydraulic, placer, and quartz mines in its immediate vicinity. It contains a court-house, foundry, a graded school, waterworks, and one weekly newspaper. Altitude, 3000 feet. P. 704. J. A. VAUGHAN, ED. "MOUNTAIN MESSENGER."

Downieville Butte, a mountain-peak in Sierra co., Cal., about 12 miles E. N. E. of Downieville. Altitude, about 8800 feet above the sea.

Down'ing (ANDREW JACKSON), an American landscape-gardener and pomologist, born at Newburg, N. Y., Oct. 31, 1815. He was almost entirely self-taught. In 1841 he published an excellent "Treatise on the Theory and Practice of Landscape Gardening." His "Fruit and Fruit Trees of America" (1845) is highly esteemed, and has passed through many editions. He began in 1846 to edit the "Horticulturist," published monthly at Albany. Among his other works is "Cottage Residences" (1842). He was a man of fine taste, and had a high reputation as a landscape-gardener. He was drowned in the Hudson River July 28, 1852, when the steamboat Henry Clay, on which he was a passenger, was burned. (See GEORGE W. CURTIS, "Memoir of A. J. Downing," prefixed to a volume of "Rural Essays," edited by Mr. Curtis after Downing's death.)

Down'ingtown, a town of Chester co., Pa., in Chester Valley, on the Pennsylvania Central R. R., at the junction of the Waynesburg branch railroad, 32 miles W. of Philadelphia. It is the western terminus of the Chester Valley R. R. It has one national bank and one weekly newspaper, waterworks, a carriage and a shoe factory, a limestone quarry, a young ladies' academy, and the Chester Valley Academy for young men and boys. Pop. 1077.

J. S. CORDERY, ED. "INDEPENDENT."

Downpat'rick, or **Down,** a seaport of Ireland, the capital of the county of Down, is near the mouth of the Quoyle (which enters Lough Strangford), 21 miles S. S. E. of Belfast. It has a cathedral, a court-house, and a hospital; also manufactures of linen, soap, and leather. It is said to be the oldest city in Ireland, and was burned by Edward Bruce in 1315. The see of Down was united with that of Connor in 1442, and with that of Dromore in 1842. Pop. 3685.

Downs, a township and village of McLean co., Ill. Pop. 1196.

Downs, The, a portion of the North Sea off the S. E. coast of Kent, England, between the North and South Forelands, is important as a shelter for shipping, which is protected by Goodwin Sands, a natural breakwater. This large natural harbor of refuge is 8 miles long and 6 miles wide, having an anchorage which varies from four to twelve fathoms in depth. It is safe except during a S. wind. In time of war it is a place of rendezvous for the royal navy.

Down'shire, MARQUESSES OF (1789), earls of Hillsborough (1751), Viscounts Hillsborough (1717), Viscounts Kilwarlin (1751), Barons Hill (Ireland, 1717), earls of Hillsborough and Viscounts Fairford (1772), and Barons Harwich (Great Britain, 1756).—ARTHUR WILLS BLUNDELL TRUMBULL SANDYS RODEN HILL, fifth marquess, born Dec. 24, 1844, succeeded his father Aug. 6, 1868.

Dow'ry [from the Fr. *douer,* to "endow;" Lat. *dos;* Fr. *dot*], the marriage portion brought by a wife to her husband. This term is often confounded with *dower,* but it has a different signification.

Doxol'ogy [Gr. δοξολογία, from δόξα, "praise," and λόγος, a "word," "expression"], a form of praise said or sung in divine service, commonly at the close of a prayer. The Great Doxology, as it is called, is an expansion of the angelic hymn, and is sung in the Roman Catholic Church at the celebration of the Eucharist. It begins with the words "Gloria in excelsis Deo." The Lesser Doxology is the "Gloria Patri," the substance of which appears in the metrical doxologies in use amongst Protestants generally.

Doyle, a township of Clarke co., Ia. Pop. 965.

Doyle, a post-township of Marion co., Kan. Pop. 124.

Doyle (RICHARD), an English artist and caricaturist, born in London in 1826, was a son of John Doyle, a popular artist, whose political sketches were signed "H. B." He contributed satirical designs to the London "Punch." Since 1850 he has been employed in the illustration of books.

Doylesport, a post-township of Barton co., Mo. P. 385.

Doylestown, a post-borough, the capital of Bucks co., Pa., on a branch of the North Pennsylvania R. R., 25 miles N. of Philadelphia, has waterworks built in 1869, gasworks, a public library founded in 1856, two private academies, and five weekly newspapers. It is much frequented by summer visitors from Philadelphia, and its situation is elevated and healthy. It has one national bank. Pop. of borough, 1601; of township, 1954.

H. T. DARLINGTON, ED. "BUCKS CO. INTELLIGENCER."

Do'zy (REINHART), a Dutch Orientalist, born at Leyden Feb. 21, 1820, graduated in the university of that city in 1844. In 1850 he became professor of history at Leyden. Among his works is "Researches into the Political and Literary History of Spain during the Middle Ages" (1849; 2d ed. 1860).

Dracæ'na Dra'co, or **Dragon Tree,** a tree belonging to the order Liliaceæ, some examples of which grow to prodigious size in the Canaries and India. The height is not proportioned to the thickness of the stem, and the head is crowned with short branches having tufts of sword-shaped leaves. It produces a part of the resin called DRAGON'S BLOOD (which see). A specimen in the island of Teneriffe is described by Humboldt as having a stem about forty-five feet in circumference in 1799. It had the same measurement in 1402. It was worshipped by the Guanches, and its hollow trunk was converted by their conquerors into a chapel. This extremely old tree has been lately reported to have fallen.

Drach'enfels (*i. e.* "dragon's rock"), a mountain-peak in Rhenish Prussia, on the Rhine, about 8 miles S. E. of Bonn, has an altitude of 1056 feet. It rises abruptly from the river, and is renowned in Byron's verses commencing—

> "The castled crag of Drachenfels
> Frowns o'er the wide and winding Rhine."

Its summit, crowned by a ruined castle, commands a beautiful prospect.

Drachm, or **Dram** [Gr. δραχμή; Fr. *drachme;* Lat. *drachma;* see below]. There are two drachms in our system of weights—namely, the avoirdupois drachm, which is one-sixteenth part of an avoirdupois ounce; and the apothecaries' drachm, which is the eighth part of a troy ounce. The orthography *dram* is commonly employed in avoirdupois weight, and *drachm* in apothecaries' weight. In apothecaries' measure a fluiddrachm is one-eighth of a fluidounce. Drachma was also the name of a silver coin, the unit of the monetary system of ancient Greece. The Athenian drachma was equivalent to six oboli, or nearly twenty cents, and weighed from sixty-three to sixty-six grains. Other Greek states had drachmas of different values.

Dra'co [Δράκων], a Greek physician, son of the celebrated physician Hippocrates, to whom some of the writings that pass under the name of the latter are ascribed.

HENRY DRISLER.

Dra'co, or **Dra'con** [Gr. Δράκων], an Athenian legislator who was archon in 624 B. C., and was the author or compiler of the first written laws among the Athenians. This code was extremely severe and sanguinary, and made even petty larceny a capital crime. It remained in force until the time of Solon, who substituted milder penalties. The term *draconic* is sometimes applied to laws which are excessively severe.

Draco, or **The Dragon,** a constellation of the northern hemisphere. It was from observations upon the star γ Draconis that Bradley was led to his brilliant discovery of the aberration of light. It is a star nearly in the solstitial colure, and consequently the minor axis of the small ellipse

which its apparent place describes in the heavens lies in the meridian at its transit.

Draco [Δράκων], of Stratonicea, in Caria, a Greek grammarian, of whose life few traces are found, but who flourished probably about 125 A. D. Suidas and Eudocia assign to Draco a great number of works on grammar, on metre, and on the poems of Pindar and Alcæus, which have all, with one exception, perished. There is extant a treatise on Greek metres (*περὶ μέτρων ποιητικῶν*), which Hermann considers an epitome of Draco's work, with numerous interpolations from other quarters by a later hand. This was edited by Hermann, Leipsic, 1812.

HENRY DRISLER.

Dracon'tium [Gr. *δρακόντιον*, a "little dragon," probably from the burning taste of some species], a genus of plants of the natural order Araceæ. The *Dracontium polyphyllum*, a native of Guiana, India, and Japan, has a powerful action on the nervous system, and is used as a remedy for asthma. The flower emits an intolerable stench when it first opens. The *Dracontium* of the U. S. Pharmacopœia is the skunk-cabbage (*Symplocarpus fœtidus*), which has similar medical properties. It is kindred to the true *Dracontium*, and like it has a strong offensive odor.

Dracon'tius, a Christian poet of Spain who lived under Theodosius II., about 431 A. D. Isidorus ascribes to him a poem in hexameter verse entitled "Hexaëmeron," which is a poetical narration of the six days of Creation. This poem was somewhat changed and enlarged by an account of the seventh day by Eugenius, bishop of Toledo, in the seventh century. A supplement to his work was written by the author in elegiac verse, addressed to the younger Theodosius. Both works are contained in the edition of Carpzov, Helmstädt, 1794. (For further information consult BÄHR's "History of the Christian Poets of Rome," vol. i., p. 59.) HENRY DRISLER.

Dra'cut, a post-village of Middlesex co., Mass., on the Merrimack River opposite Lowell. It has large woollen and paper mills, and is in a good agricultural township. Pop. of Dracut township, 2078.

Draft [originally *draught;* Ang.-Sax. *drôht*, past part. of *dragan*, to "draw;" literally, "something drawn," hence a "drawing"], a bill of exchange; an order for the payment of money drawn by one person upon another.

Drag [Ang.-Sax. *dreage*, from *dragan*, to "drag," allied to the Ger. *träge*, "slothful," "slow"], the name given to inventions used for the purpose of slackening the speed of vehicles. It consists of a mechanical combination of rods and levers, which may be operated upon by the driver without leaving his seat. By means of a handle a species of shoe is pressed against one of the wheels with sufficient force to retard the motion. It is more frequently called a brake.

Drag'oman [Fr. *drogman;* It. *dragomano*, a corruption of the Arabic *tarjumân*, "interpreter"], a name given in the Levant to an interpreter or guide for foreigners. The ordinary dragoman corresponds to the Italian *cicerone*. The dragoman of the Sublime Porte is an important Turkish officer, who forms the medium of communication between his own government and foreign ambassadors. The term is also applied to the interpreters attached to European embassies and consulates in the Levant. They are usually natives of Italian extraction. They and their families are not subject to the Turkish laws, but are under the protection of the embassies which they serve.

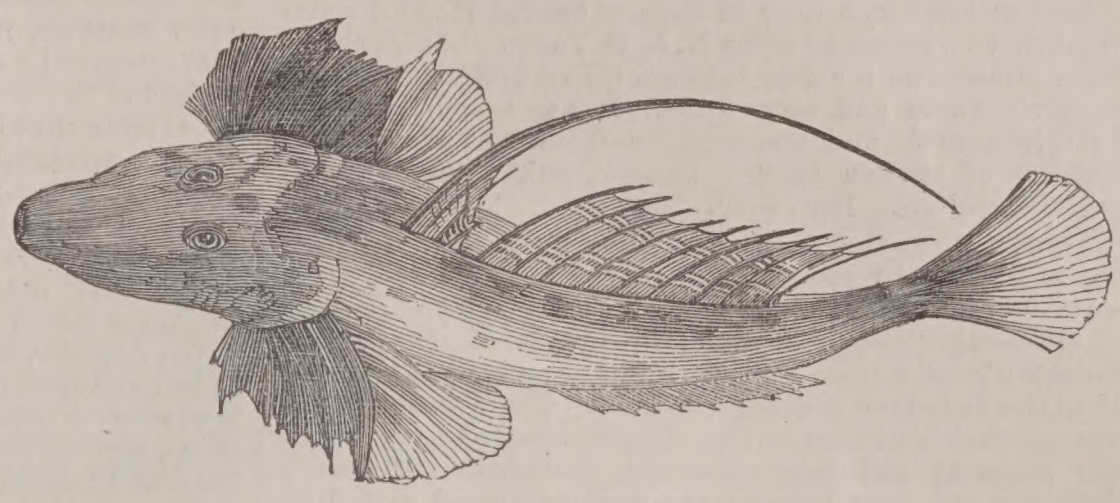
Drag'on [from the Gr. *δράκων*, a "serpent," a "dragon;" Lat. *draco;* Fr. *dragon;* Ger. *Drachen*], small, inoffensive East Indian lizards of the genus *Draco*, called winged dragon, or flying dragon (*Draco fimbriatus* and *volans*), remarkable for an expansion of the skin on each side, forming a kind of wing, which sustains the animal like a parachute. Other species, the dragon lizards (*Ada*), belonging to the Tegidæ, are natives of America only. They have the tongue forked like a serpent, back and tail crested, and are sometimes six feet long. They have no parachute; they are bold and resolute in self-defence.

Flying Dragon: *Draco volans.*

The name DRAGON has also been given to a fabulous monster, represented in the mythology of many nations as a huge winged serpent. In the New Testament the word is used for the personification of sin, and in Christian art it is the type of sin and idolatry. Hercules, Perseus, and Apollo in Greek mythology, and Thor in the Scandinavian, were renowned as dragon-slayers, as was Saint George in the early Christian legends. The dragon is still an heraldic bearing in Europe.

Among the Chinese the dragon was believed to be a being of superhuman power, a sort of deity; and hence became a symbol of divinity. According to Chinese tradition, some of the earliest emperors of that country are represented as having the form of flying dragons, and representations of such dragons belong to the heraldry of the imperial coat-of-arms.

Drag'onet (*Callionymus*), a genus of fishes belonging to the Gobiadæ, or goby family. They have no air-bladder, the ventral fins are larger than the pectorals and placed under the throat, and the gill-openings are reduced to a small hole on each side of the nape. One of the finest species is the gemmeous dragonet (*Callionymus lyra*), of a golden color, variegated with sapphire-blue. They are found on the European coasts.



Gemmeous Dragonet.

Dragon-Fly [Fr. *démoiselle;* Ger. *Stechfliege*], the popular name of a family (the Libellulidæ) which includes an immense number of species of neuropterous insects. They have large globular heads, strong mandibles, eyes lateral, large, and projecting, antennæ short, four narrow, gauze-like wings, strongly reticulated, and the abdomen often remarkably slender. They are found in northern countries, but they are most common in the warmer climates, and frequent marshes, lakes, and rivers. Their food is insects, which they devour with great voracity. They are sometimes known as "devil's darning-needles," and are often regarded by the ignorant with groundless dread.

The Virgin Dragon-Fly: *Libellula virgo.*

Dragonnade, a name of the persecutions which the French Protestants suffered in the reign of Louis XIV., which were so called because dragoons (Fr. *dragons*) were employed as instruments of the persecution. A body of

dragoons led by a bishop and intendant marched through the provinces, requiring the Protestants to abjure their religion, and persecuting those who refused.

Dragon's Blood, or **Gum Dragon** [Lat. *sanguis draconis*], a resin obtained from various trees growing in warm climates. Among these are the DRACÆNA DRACO (which see), the red sandal-wood (*Pterocarpus Santalinus*) of the East Indies, the *Pterocarpus Draco*, a leguminous tree of South America, and the *Calamus Draco*, an East Indian rattan palm. The dragon's blood of commerce is of a dark reddish-brown color, smooth, and brittle, and dissolves in oil, alcohol, and ether. The solution is used for staining leather, wood, and even marble. The resin is also an ingredient of some varnishes and lacquers. It comes from the Moluccas, Socotra, Brazil, and Teneriffe.

Dragoon. See MOUNTED TROOPS, by GEN. J. WATTS DE PEYSTER.

Draguignan, a town of France, capital of the department of Var, about 40 miles N. E. of Toulon. It is charmingly situated in a valley between hills which are covered with vineyards and olive trees. It has a court-house, a botanic garden, and many public fountains; also manufactures of woollen fabrics, hosiery, silk stuffs, brandy, pottery, and oil. Pop. 9819.

Drain'age, the removal of the excess of water from the soil, either by means of canals and open ditches, or by underground sewers, pipes, and hollow tiles. The drainage of cities is noticed under SEWER (which see). No part of farm-husbandry pays a larger profit upon capital invested than the judicious drainage of land. There is very little ground that is not too wet in rainy weather and too dry in our frequent and long-continued droughts. Thorough drainage not only relieves the first-mentioned evil, but, strange as it at first appears, it greatly mitigates the bad effects of dry weather. When soil is drenched with water and dried by evaporation, it becomes hard, especially if it be argillaceous; land that is dried by drainage is porous and permeable to the dews and showers; while the soil deepened by drainage permits growing crops to put forth longer roots, and thus become secured against drought.

It appears also that good drainage diminishes the relative number of fevers, especially those of a malarial origin, while it is almost certain that excessive moisture in the soil is a fruitful cause of consumption. So important is this subject considered in England that Parliament in 1846 offered in the Drainage act to advance money on easy terms to landholders for the purpose of improving the drainage of land. The act has proved a very great blessing to the country.

Underground drainage is the best for land that is not decidedly marshy; and of all underground drains those made with tiles (hollow cylinders of porous burned clay) are the most effective. The tiles should be laid near enough to the surface to effect a thorough drying after rains, and deep enough to escape the plough. It is very important to avoid curves and angles in the vertical plane of drains, because any earth which may enter the tiles will be sure to lodge at depressed points, and spoil the drains.

Draining lakes and marshes is a matter requiring great capital and much engineering skill, but it is sure to become a very important question in our Southern and Western States. In Holland, steam-pumps, wind-mills, and tide-gates are used extensively. The great Haarlemer-meer was drained and is kept drained by steam-power.

Drainage of Cities. See SEWERS AND DRAINS, by E. S. CHESBROUGH, C. E.

Drake (BENJAMIN M.), D. D., a distinguished minister of the Methodist Episcopal Church South, born in North Carolina Sept. 11, 1800. He joined the Tennessee Conference in 1820, but the next year was transferred to the Mississippi Conference, in which he rose to an imperial position. He built the first Methodist church in New Orleans, was president of Elizabeth Female Academy (the first Methodist school established in Mississippi), and was president of Centenary College. He was greatly loved and revered. He died in Mississippi in 1860. T. O. SUMMERS.

Drake (CHARLES D.), a jurist, a son of Dr. Daniel Drake, was born at Cincinnati, O., April 11, 1811. He served as midshipman in the navy (1827–30), and was admitted to the Ohio bar in 1833. In 1834 he removed to St. Louis, where he became eminent as a lawyer and politician, was U. S. Senator (1867–71), and was appointed chief-justice of the U. S. court of claims in 1871. He has published "Law of Attachments" (1854) and "Life of Dr. Daniel Drake" (1871).

Drake (DANIEL), M. D., born at Plainfield, N. J., Oct. 20, 1785. In infancy he was brought to Kentucky, then almost a wilderness, and received a very limited preparatory education. At fifteen he was apprenticed to Dr. Goforth, and attended lectures in the University of Pennsylvania, where he took the degree in medicine in 1815. Soon after this he accepted a professorship in the University of Transylvania at Lexington, Ky.; in 1819 he founded the Medical College of Ohio at Cincinnati; then filled a chair in the Jefferson Medical College, Philadelphia; was called twice to the school in Louisville, and finally returned to Cincinnati, where he died. He had an intense love for the great West, especially for Cincinnati; was ever active in the profession, establishing journals, sustaining hospitals, blind asylums, the temperance cause, and doing all he could for Church and State. Dr. Drake was a true philanthropist, a noble patriot, a sincere Christian. Among his works is a "Systematic Treatise on the Principal Diseases of the Interior Valley of North America, etc." (2 vols., 1850–54). Died Nov. 6, 1852. PAUL F. EVE.

Drake (Sir FRANCIS), an English navigator, born in Devonshire about 1540. He served as a captain under Sir John Hawkins in his expedition to the Spanish Main in 1567, obtained a commission from Queen Elizabeth in 1570, cruised in the West Indies, and enriched himself by plunder taken from the Spaniards. He conducted in 1572 an expedition against the Spanish in America, captured valuable prizes, and saw the Pacific from the Isthmus of Darien. He sailed in 1557 with five vessels on a marauding expepedition against the Spaniards. He entered the Pacific, sacked several towns of Chili and Peru, and captured a galleon laden with silver. Hoping to find another passage to the Atlantic, he sailed northward to lat. 48° N., but he failed, and took shelter in the Bay of San Francisco. He next steered to the Moluccas, returned by the Cape of Good Hope, and arrived at Plymouth in Sept., 1559. He was the first Englishman who circumnavigated the globe. The queen rewarded him with knighthood. He was appointed commander of a fleet in 1587, when Spain was preparing the Armada. He entered the harbor of Cadiz, where he destroyed nearly one hundred vessels and captured immense booty. The exploit was called "singeing the king of Spain's beard." He was vice-admiral of the fleet which in 1588 opposed the Invincible Armada. In 1592 he was elected to Parliament. He died near Puerto Bello Dec. 27, 1595.

Drake (FRANCIS SAMUEL), an American author, born at Northwood, N. H., Feb. 22, 1828, is a son of the well-known antiquary and historian, S. G. Drake, noticed below. He has published a valuable "Dictionary of American Biography" (1872), the most complete work that has been published on the subject, and has prepared a volume of memorials for the Massachusetts Society of the Cincinnati, and a "Life of General Henry Knox" (1873).

Dra'ke (FRIEDRICH), a German sculptor, born at Pyrmont June 23, 1805, was a pupil of Rauch. He gained a high reputation by statues and busts of many eminent Germans of the present century, including the Humboldts, Rauch, and Oken, and two colossal statues of King Frederick William III. Among his other works is an allegorical group of the "Eight Provinces of Prussia" (1844), in the castle of Berlin.

Drake (JOSEPH RODMAN), an American poet, born in the city of New York Aug. 7, 1795. He studied medicine, graduated about 1815, and married in 1816 a daughter of Henry Eckford, a noted naval architect. He became an intimate friend of Fitz-Greene Halleck. Among his works are "The Culprit Fay" and verses on the American flag, which are greatly admired. Died Sept. 21, 1820.

Drake (SAMUEL GARDNER), an historical writer, born at Pittsfield, N. H., Oct. 11, 1798. He opened an antiquarian bookstore in Boston in 1828. He published, besides other works, "Indian Biography" (1832), "The Book of the Indians" (1833), "History and Antiquities of Boston" (1856), and "Annals of Witchcraft in the U. S." (1869).

Drakeville, a township and post-village of Davis co., Ia., on the Chicago Rock Island and Pacific R. R., 137 miles S. W. of Davenport. Pop. 534.

Dram. See DRACHM.

Dram'a [Gr. δρᾶμα, from δράω, to "do," to "act;" literally, an "acting," a "performance;" Fr. *drame;* Ger., Dutch, Dan., Sp., and Port. *drama;* It. *dramma;* Sw. *dram*] signified originally the exhibition of human actions (especially those which reveal the feelings and passions) upon the stage. The ancient Greek drama, comedy as well as tragedy, had its origin in the worship of Bacchus (Dionysus). The Dionysian dithyrambs sung at the festivals of Bacchus sometimes expressed wild and boisterous gayety, at other times passionate sorrow. From the former was at length developed the old Greek comedy, which may be said to have attained its highest perfection in the plays of ARISTOPHANES (which see); from the latter arose the Greek

tragedy, which found its most perfect expression in the immortal works of Æschylus, Sophocles, and Euripides.

The Roman drama was derived from the Greek, to which, in the opinion of all the most distinguished critics, it was much inferior. The most celebrated Roman dramatic poets were Plautus and Terence, who appear to have taken Menander and Philemon (of the New Greek comedy) as their models, and whose productions have exercised considerable influence on the modern comedy. In tragedy ancient Rome produced one truly great poet, Seneca.

The Hindoo drama, quite independent in its origin of the drama of Europe, has produced some works of great merit, the most celebrated of which is the "Sakoontalâ, or the Lost Ring," of Kâlidâsa (who is supposed to have lived about 50 B. C.)—a work which has received the highest commendation from some of the most eminent critics of modern Europe, and has been pronounced not unworthy of the genius of Shakspeare. This remarkable production, instead of being divided into five acts, like the classic and modern drama, consists of seven acts.

The Chinese also have a drama, but greatly differing in some respects from that of the Western nations; a single piece, it is said, being often extended through no inconsiderable portions of several successive days.

In modern times the drama has been cultivated with success, it may be said, by all the principal European nations, but more especially by the Italians, the Spaniards, the French, the English, and the Germans. For a long period the French were generally supposed to surpass all other nations in the genius and skill of their dramatic writers, as well as in the admirable performance of their actors. The French critics usually insisted on the strictest adherence to the rules of the classic drama, and particularly to what are commonly termed "the three unities." Until the time of Lessing the German theatre was scarcely more than a reflection of that of Paris, but that great author and critic taught his countrymen to throw off the trammels and affectations of a foreign school, and to give entire freedom to the cultivation of the national genius. Since that time the German authors, taking the English for their models rather than the French, but without servilely following any, have produced the finest dramatic works that have appeared in Europe since the time of Shakspeare. Among the German dramatic writers, Goethe and Schiller, by universal consent, occupy the foremost rank. Denmark has also produced some eminent dramatic writers, among whom Œhlenschläger (which see) is the most celebrated. Italy can scarcely be said to have produced any dramatic poets of the highest order; among her best are perhaps Goldoni in comedy, and Alfieri, Manzoni, and Silvio Pellico in tragedy. The Spanish drama has given to the world many productions displaying rare genius, but none that are worthy to be placed by the side of the greatest dramatic works of Greece, England, Germany, or France. The most celebrated names in Spanish dramatic literature are those of Lope de Vega and Calderon; the former surpassing all that is recorded in the history of the human mind in the marvellous fertility of his genius; the latter pre-eminent for the brilliancy of his imagination, as well as for the fertility of his invention, but neither of them producing any work of the very highest order.

The French drama justly holds a very high place in European literature. It is not too much to say that in comedy the writers of no other nation, either in ancient or modern times, have equalled the French. The best plays of Molière may be said to be not only unrivalled, but unapproached, by those of any other author, Shakspeare alone excepted. In tragedy, Corneille, Racine, and Voltaire all exhibit genius of the very highest order, but Racine, in the natural, graceful simplicity, as well as in the exquisite finish, of his productions, is generally admitted to have approached most nearly to the most perfect specimens of the ancient Greek tragedy.

Though the dramatic literature of England presents us with fewer writers of the highest order than that of France, the former can boast of one whose dramatic genius surpasses everything to be found in ancient or in modern times. While in his best comedies Shakspeare is perhaps not inferior to Molière, in his tragedies, not merely in the exhibition of the conflict of the mightiest human passions, but also in his representation of the workings of the most intricate and subtlest of human motives, he has no equal nor second among the sons of men.

In the opinion of many critics the highest exhibition of poetic genius is to be found in the tragic drama, which naturally combines the fire and passion of lyric inspiration with that representation of outward circumstances, conduct, and events which belongs to epic poetry. It thus unites every advantage for the exhibition of human character. It not only shows us the external conduct, but in the various soliloquies and discourses of the *dramatis personæ* it reveals to us the hidden thoughts and passions of the soul. In this last respect, it has a great superiority over epic poetry, in which, though the expression of feeling occasionally occurs, it is always made subordinate to the events of the story. J. Thomas.

Dram'atis Perso'næ, a Latin term signifying the characters or persons represented in a drama.

Dram'burg, a town of Prussia, in the province of Pomerania, 53 miles E. of Stettin, has a normal school and large woollen factories. Pop. in 1871, 5473.

Dram'men, a seaport-town of Norway, in Aggershuus, on both sides of the river Drammen, near its entrance into the Christiania Fiord, about 24 miles S. W. of Christiania. It has a college, and manufactures of sailcloth, ropes, etc. Large quantities of timber are exported from this port. Pop. in 1870, 15,458.

Dranesville, a post-village and township of Fairfax co., Va., 17 miles W. by N. of Washington, was the scene of a very spirited engagement and Federal victory Dec. 20, 1861. Pop. of township, 2055.

Dra'per (John William), M. D., LL.D.; a distinguished chemist and writer, born near Liverpool, England, May 5, 1811, was educated at the University of London, and emigrated to the U. S. in 1833. He graduated as M. D. in the University of Pennsylvania in 1836, was professor of chemistry and physiology at Hampden-Sidney College (1836–39), and became professor of chemistry in the University of New York in 1839. In 1841 he was appointed professor of chemistry in the newly-founded medical department of that university. In 1839 he took the first photographic portrait ever taken from the life. He discovered many of the fundamental facts of spectrum analysis, and published them (1841–50). He published, besides other works, "Human Physiology, Statistical and Dynamical, of the Conditions and Course of Life in Man" (1856), a "History of the Intellectual Development of Europe" (1863), and a "History of the American Civil War" (3 vols., 1867–68), and numerous monographs on mathematics, chemistry, and optics.

Draper (Lyman C.), an author, was born near Buffalo, N. Y., Sept. 4, 1815. Since 1833 he has edited four volumes of the Wisconsin Historical Society's "Collections," and has written much upon the history and biography of the West. He published in 1857 an account of Madison, the capital of Wisconsin.

Draper (Simeon) was born in 1804, and became a merchant in New York. He was the active political friend of W. H. Seward, fulfilled for many years important public duties, was appointed provost-marshal of New York in 1862, and collector of the port in 1864. Died Nov. 6, 1866. He was a man of ability, generosity, and integrity.

Dra'pery [Fr. *draperie*, from *drap*, "cloth"], cloth or woollen stuffs, clothing, or apparel. The dealers in such commodities are called *drapers* in England. Drapery in painting and sculpture is the clothing applied to the human figure, the various costumes and modes of dress used by different nations and classes of people. The ancient Greeks, although they often executed nude statues of heroes and gods, surpassed all other artists in the representation of drapery and costume. The art of disposing the folds of drapery forms a considerable part of the painter's and sculptor's study, and requires good taste and judgment.

Dra'pier Let'ters, The, were written under the signature of "M. B. Drapier" by Dean Swift. They attacked the government for granting a patent in 1722 to a man named Wood, in order to supply a deficiency of £108,000 in the copper coinage of Ireland. They created an almost unparalleled sensation in Ireland on their first appearance in 1723. Harding, their printer, though prosecuted and imprisoned by the Crown, refused to betray the author. The patent was abandoned after £40,000 in halfpence had been coined, and Wood was compelled by the popular indignation to leave the country.

Draught, or **Draught of Water,** a nautical term for the depth a ship sinks in water when afloat. The draught is marked from the keel upward—on the stem and on the stern-post.

Draughts [probably because a move was formerly called a "draught;" Fr. *le jeu de dames;* It. *dama;* Ger. *Damen*, probably from *dameh*, the Egyptian name of the game], commonly called **Checkers** in America, a game played by two persons upon a board divided into sixty-four squares of alternate colors, each person having twelve pieces or counters, distinguished by their color from those of the opposite party. The success of the game depends upon the skill of either party in capturing all the pieces of an adversary, or hemming them in so that no further move can be made. The counters of each player are placed before

him upon the first three lines of squares of the same color, and each piece is moved diagonally forward one square to the right or left. It is the duty of each player to take the piece of the other when a vacant square is found behind it, which is done by jumping over into that square, and removing the piece "jumped" or passed over. Several pieces may be jumped at one time when the diagonals forward are exposed, and the taking piece is placed upon the square behind the one taken last. When the last row on the opposite side of a board is reached, the piece is called a king, and is crowned by placing one of the counters before captured upon it; and this king can then be moved diagonally forward or backward, one square only at a time. If a piece is touched it must be moved if possible. The piece exposed must be taken by the player having the move; in case he neglects to do so, his adversary may remove the piece which should have made the capture. When lots are drawn for the first move, he who gains the choice may move or require his adversary to do so. The game is supposed to have originated more than 2000 years B. C., and to have preceded chess. It was introduced into Europe from Egypt three or four centuries ago.

Draughts'man, a person who draws pictures, plans, or maps; one who delineates or draws a sketch or design. The term is not usually applied to those who produce original designs.

Drave [anc. *Dravus;* Ger. *Drau;* Slavonic *Drava*], a river of Europe, rises in the Tyrol, and flows nearly eastward, through Carinthia and Styria, to the western frontier of Hungary. It afterwards runs south-eastward, and forms the boundary between Hungary on the left and Croatia and Slavonia on the right, until it enters the Danube 14 miles E. of Essek. Its total length is nearly 400 miles. It is navigable for 200 miles or more.

Draw'back, a loss of advantage, success, profit, or value; anything that deducts from a step gained; a discouragement or hindrance. Commercially, an allowance made by the government to merchants on the re-exportation of certain imported goods liable to duties; also a repayment or remission of a duty laid on any article produced in a country and suitable for the foreign market, when such article is entered for exportation. In some cases this allowance or remission consists of the whole of the customs or excise duties; in others, of a part only. In the U. S. drawback has been regulated by various acts of Congress. Such duties are, of course, an enhancement of the natural price of the commodity on which they are imposed. The object of the allowance or remission is to establish or stimulate a trade with foreign countries in the commodity. Adam Smith, in his "Wealth of Nations," thus speaks of the remission or repayment of the latter form of duty: "To allow," he says, "the merchant to draw back, upon exportation, either the whole or a part of whatever excise or inland duty is imposed upon domestic industry, can never occasion the exportation of a greater quantity of goods than what would have been exported had no duty been imposed. Such encouragements do not tend to turn towards any particular employment a greater share of the capital of the country than what would go to that employment of its own accord, but only to hinder the duty from driving away any part of that share to other employments. They tend not to overturn that balance which naturally establishes itself among all the various employments of the society, but to hinder it being overturned by the duty; they tend not to destroy, but to preserve what it is in most cases advantageous to preserve, the natural division and distribution of labor in the society." These remarks are subject to this qualification: provided the drawback is equally applicable to all domestic productions that are sought to be exported. It might, perhaps, be shown also, by experience, that the practice of giving drawbacks is liable to abuse; for, supposing a great fall in the value of some excisable article, it may be exported with a view, partly or entirely, to get the drawback. An important species of commerce would thus be fostered. Of course the government must guard against deceptions by exercising an oversight of the packing, weighing, tying, and sealing of such goods, of their ownership, of the time when such goods were charged with the duties, and of the exportation; and in some particulars it requires a verification by oath.

REVISED BY T. D. WOOLSEY.

Draw'bridge, the name applied to the whole or part of a bridge which may be moved to admit or hinder communication. There are several varieties of these structures. They are respectively known as bascules or lifting bridges, from their turning vertically on a hinge; swivel or swing bridges, from moving horizontally on a pivot; and rolling bridges, from being propelled on friction rollers. They are principally used on navigable streams to permit vessels to pass.

Drawbridge, a post-township of Dorchester co., Md. Pop. 1087.

Draw'ing, in the fine arts, is the delineation of form in contradistinction to color, light, and shade, and, as it includes a knowledge of anatomy, proportion, and perspective, is the foundation of everything in art, and the most important feature of a finished painting. In power and beauty of drawing the Italian and Flemish schools stand pre-eminent. At the period when Greek art had attained its highest perfection drawing was a regular branch of education, as it is at present in the public schools of Germany, Switzerland, and other European nations. In Massachusetts drawing is taught in the public schools of the larger towns, and artisans, mechanics, and others who may desire it receive gratuitous instruction in free-hand as well as mechanical drawing in the evening schools. Similar instruction is given in several of the larger cities of other States.

Draw-plate, a metal plate placed before or over a fireplace, for the purpose of forcing the air through the fire; also a steel plate with graduated orifices, through which metals are drawn into bars or wires.

Dray'ton, a post-village of Wellington co., Ontario, Canada, on the Guelph branch of the Great Western Railway. It has some manufactures and one weekly newspaper. Pop. about 500.

Drayton (MICHAEL), an English poet, born in Warwickshire in 1563. Few events of his life have been recorded. His chief work is "Poly-Olbion" (1613), a poetical description of the mountains, rivers, valleys, and forests of Great Britain, with the traditions connected with them. Drayton was appointed poet-laureate in 1626. Among his numerous works are "The Barons' Wars" (1596) and "Nymphidia," a fairy poem (1627). Died in 1631.

Drayton (PERCIVAL), U. S. N., born Aug. 25, 1812, in South Carolina, entered the navy as a midshipman Dec. 1, 1827, became a passed midshipman in 1832, a lieutenant in 1833, a commander in 1855, and a captain in 1862. He served in the South Atlantic squadron from the fall of 1861 to the summer of 1863, commanding the steamer Pocahontas at the battle of Port Royal, and the iron-clad Passaic during the bombardment of Fort McAlister of Mar. 3, 1863, and at the first attack upon Fort Sumter of April 3 of the same year. He is handsomely mentioned in several of the official despatches of Rear-Admiral Dupont, who in his last report speaks of him as an officer "of the highest professional capacity and courage." He commanded the Hartford at the great battle of Mobile Bay, Aug. 5, 1864, and is thus commended by Farragut in his detailed report of the events of that glorious day: "The Hartford, my flag-ship, was commanded by Captain Percival Drayton, who exhibited throughout that coolness and ability for which he has been long known to his brother-officers. But I must speak of that officer in a double capacity. He is the fleet-captain of my squadron, and one of more determined energy, untiring devotion to duty, and zeal for the service, tempered by great calmness, I do not think adorns any navy. I desire to call your attention to this officer, though well aware that in thus speaking of his high qualities I am only communicating officially to the department that which it knew full well before." Early in 1865, Drayton was appointed chief of the bureau of navigation, in the discharge of which high office he died (Aug. 4, 1865), universally regretted. FOXHALL A. PARKER, U. S. N.

Drayton (WILLIAM), an American officer, the father of the preceding, was born in St. Augustine, Fla., Dec. 30, 1776. He served as colonel in the war of 1812, became a member of Congress in 1825, and was a leader of the Union party of South Carolina in 1830. He was chosen president of the U. S. Bank in 1839, as the successor of Nicholas Biddle. Died May 24, 1846.

Drayton (WILLIAM HENRY), an American patriot, born in South Carolina Sept., 1742. He wrote political works, was chosen chief-justice of South Carolina in 1776, and president of that State in 1777. In 1778 he became a member of the Continental Congress. He died Sept. 3, 1779, leaving in MS. a "History of the Revolution," which was published by his son (2 vols., 1821).

Dray'ton-in-Hales, or **Market-Drayton,** a town of England in Shropshire, on the Tern, 19 miles N. N. E. of Shrewsbury. It has manufactures of paper and of hair seats for chairs. Here the partisans of the house of York defeated the Lancastrians in 1459. Pop. 5242.

Dray'tonsville, a township of Union co., S. C. Pop. 1864.

Dream [Lat. *somnium;* Fr. *songe* and *rêve;* Gr. *Traum*], a series of thoughts, feelings, and acts of the imagination occurring in sleep. In some cases the reasoning powers are abnormally active in dreams, but in general the mental action is incongruous. Dreams usually are evidence of im-

perfect sleep. They take their character from some preceding state of the mind, and are often modified by the conditions of the health. The Bible speaks of dreams as being sometimes prophetic or suggestive of future events. This belief has prevailed in all ages and countries, and there are numerous modern examples, apparently well authenticated, which would appear to favor this hypothesis. The interpretation of dreams was a part of the business of the soothsayers at the royal courts of Egypt, Babylon, and other ancient nations.

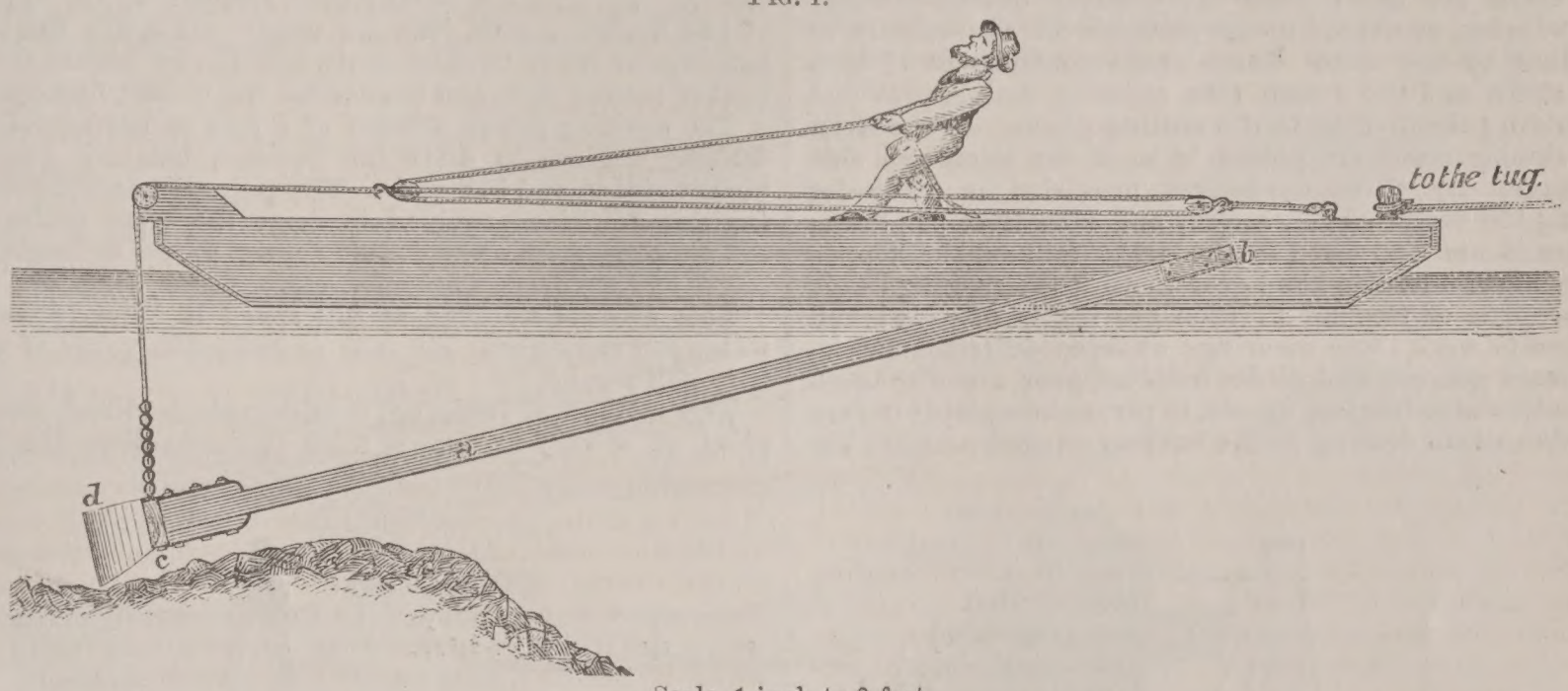
Dreb'bel, van (Cornelis), a Dutch philosopher, born at Alkmaar in 1572. He removed to England about 1620, and was patronized by James I. He invented several curious machines, and wrote two works entitled "On the Nature of the Elements" and "Quintessence" (1621). He is said to have invented the thermometer, but the statement has been disputed. Died in London in 1634.

Dredging and **Scouring,** terms applied to those processes by which materials are removed from the bottom of ship-channels and harbors, and the navigable depth of water increased thereby. By *dredging* is meant more particularly the raising of the materials to the surface by mechanical appliances, and their transportation and deposition elsewhere, while *scouring* implies their gradual and progressive removal by the force of the current. In order to increase the effective scouring-power of streams it is customary to narrow and straighten their natural waterway by bulkheads, jetties, and other works of improvement; and sometimes the drainage waters in inland, and the ebb flow in tidal streams, are held back by gates, and let out through the channel at stated periods with great violence. This method of scouring, called *flashing* or *flushing,* is a very efficient mode of dredging in the few locations favorable for its application. At Ramsgate, Dover, and other places in England large scouring-basins or reservoirs to retain the water have been constructed. To facilitate the scouring, the bottom may be loosened up by dragging heavy rakes over it during the period of strongest current. The oldest dredging-machines were probably of this character, and were used in Holland. They consisted of floating frames, with teeth or bars projecting down to the bottom from the under side, which stirred up the sand and mud as the machine was floated along by the current.

Where bars are short, with deep water on either side, or where the bottom is lumpy, scrapers have been advantageously employed to smooth off the bottom. The material scraped from the shoal places subsides in deep water, and the available depth is thereby increased. The scrapers may be attached to a tug moving up and down the channel, or to a scow towed by a tug. Fig. 1 shows a side view of a scow and scraper designed and used by Major Houston, U. S. corps of engineers. On each side of the scow there is a long arm *a* pivoted at *b*, and connected at the lower end by a crossbar *c*, to which the scrapers *d*, three in number, are attached side by side. Each scraper is a semicylinder of ¼-inch boiler iron, 3 feet in diameter and about 2¼ feet long on the longest side, open at both ends, the lower end terminating obliquely to the axis, like a scoop.

The effective velocities of currents in moving materials

Fig. 1.



Scale, 1 inch to 8 feet.

of various kinds and sizes, as established by different observers, are as follows:

0.170 miles per hour will just begin to work on fine clay.
0.340 " " " will lift fine sand.
0.454 " " " will lift sand.
0.682 " " " will sweep along fine gravel.
1.364 " " " will roll along round pebbles nearly one inch in diameter.
2.045 " " " will move slippery, angular stones the size of a hen's egg.

Sir John Leslie gives the formula $V = 4\sqrt{a}$ for finding the velocity required to move rounded stones or shingle, in which V denotes the velocity of the water in miles per hour, and *a* the edge of the stone if a cube, or the mean diameter if a rounded stone or boulder.

The mode of deepening channels by stirring up the bottom in streams where there are effective currents in one, or alternately in both directions, has been successfully followed at the mouth of the Mississippi River. The apparatus used was a large double-ender dredge-boat, of like shape and construction at both ends, provided with two strongly built, four-bladed propellers, one at each end, on separate shafts, powerfully driven by separate engines, and with water compartments or tanks, such that when they are empty and the coal-bunkers full, the boat will draw fourteen feet, and when full twenty-two feet. The blades of the propellers extend about two feet below the vessel's keel. When operating, the boat is sunk by means of her tanks to a draught fully equal to and generally exceeding the soundings on the bar; she then steams alternately up and down the channel, cutting her way through and stirring up the bottom with the propellers. The material thrown into suspension is carried off by the current and subsides in deep water. In exceptional cases the boat, when drawing fifteen feet, has cut her way through where there were but ten feet of water. The up-stream or stern end of the boat has a deflector a few feet in rear of the propeller. When steaming down stream on an ebb current, the effect of this deflector is to carry upward into the upper and stronger current the backwater from the propeller, and consequently the solid material with which it is charged. Upon one occasion the amount excavated by this dredge-boat in four days, working twenty-eight and a quarter hours, was upwards of 22,000 cubic yards, but this is considerably in excess of the average results. Auxiliary scrapers are also used with this boat to stir up the bottom on each side of the propellers. To guard against stoppage from accidents, two boats are deemed necessary to maintain a constant depth of twenty feet at low tide. (See Fig. 2.)

In tidal streams the inward and outward flow of the tidal wave is a most efficient scouring agent for maintaining the channel at the greatest practicable depth of which it is capable; and a judicious regulation and control of the tidal currents, by giving uniformity in depth and width to the channel, and straightening it wherever practicable, has in many instances converted a narrow, crooked, and shallow stream into a deep and navigable channel. A recognized principle in hydraulic engineering is that the flow of the tidal wave should be *facilitated,* and not *obstructed;* hence a deepening of the water-way should always accompany a reduction in width. The tidal wave is propagated with greater velocity in deep than in shallow channels, the ratio of velocities for different depths being approximately as the square roots of those depths.

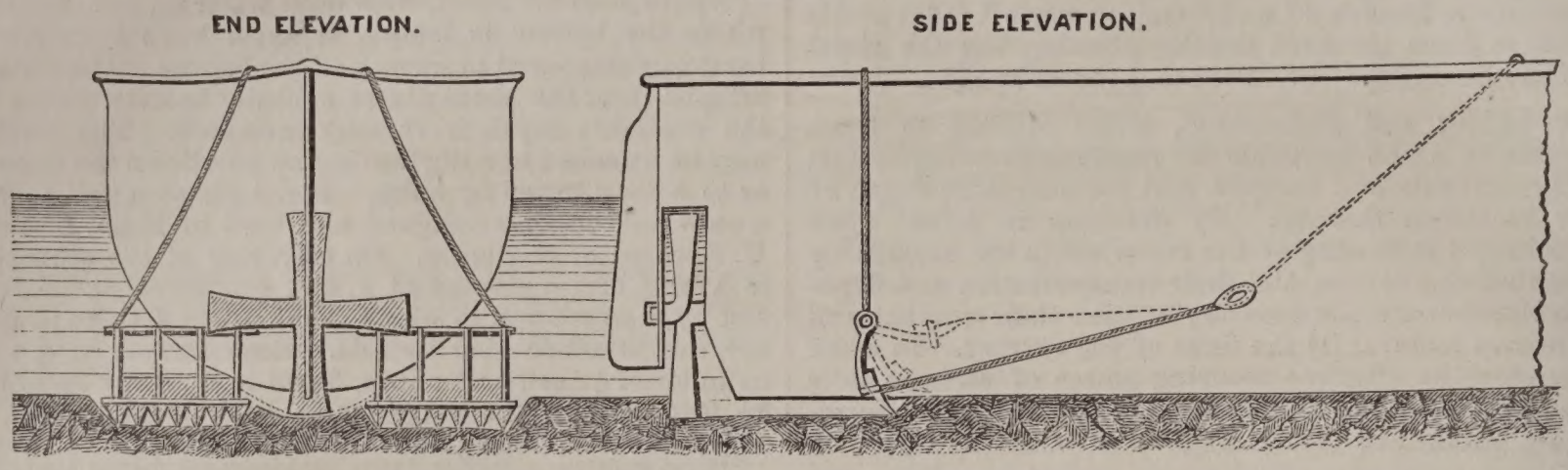
Scoops of various forms, filled by drawing them along the bottom, and then raising them to the surface and emptying them into scows, have been used in many places—a device which was afterwards extended by attaching a series of scoops or buckets to an endless belt or chain attached to the side of the vessel, or over an opening amidships, and working over pulleys or wheels so arranged that the chain can be lowered or raised to suit various depths of water.

The buckets descend empty, fill themselves at the bottom, and when they rise over the upper wheel discharge into troughs leading to scows alongside.

Fig. 3 shows a longitudinal section, and Fig. 3*a* an enlarged view of buckets and lower wheel, of a powerful steam-dredger used on the river Clyde, Scotland. The hull is of boiler plates and angle iron, being 161 feet long, 29 feet breadth of beam, and 10 feet greatest depth of hold. An endless band, carrying 40 dredge-buckets of nearly 14 cubic feet capacity each, works through a well amidships, passing over two wheels, one at either end of an iron bucket-girder 90 feet long, and weighing 125 tons when working, inclusive of the contents of the ascending buckets and hoisting chains. The axis of the upper wheel is stationary at the height of about 30 feet above the water, and the girder revolves about this axis sufficiently, by raising and lowering the submerged end, to allow the dredging to be carried on at any depth from 6 feet to 30 feet. One man by means of a lever on deck has complete control of raising and lowering the bucket-girder. The main frame carrying the girder and its gear is well secured and braced, so as to distribute the strain it has to bear over a large portion of the hull.

The dredged material is delivered, after passing over the upper wheel, into inclined shoots at either side of the vessel, with suitable arrangements, worked by steam, for closing

FIG. 2.



one shoot and opening the other simultaneously. At the bow there are three large independent double-powered crab winches, combined in one machine for convenience in handling by one man. These crabs control one 1¼-inch head chain and two ¾-inch side mooring chains, provided for guiding the dredger to the cutting place. At the stern four similar crabs are placed to work the stern and side moorings. By these appliances provision is made for moving the vessel ahead, astern, and athwartship. Surging heads are also fitted to the crabs to haul the hopper barges alongside, also hand gear to work the surging heads independent of steam. Friction gearing is provided and adapted to work these moorings at three different speeds. The main gearing and girder hoisting gear are also fitted with adjustable friction-wheels, to prevent accidents in case of undue strain coming on the buckets or girder. Steel has been used in various parts of the machinery of this dredger, such as the dead-eye brackets for suspending the top end of the bucket girder, bars for upper and lower tumblers, bearings of lower tumbler shaft, spindles of bucket rollers, bucket cutting lips, and bushes for the bucket link-eyes.

The working power consists of a pair of horizontal condensing engines to drive the buckets, hoisting gear for bucket girder, and bow crabs. Two pairs of non-condensing engines are also provided to drive the stern crabs, side shoots, etc. A donkey double-acting pump connected to bilges and sea feeds the boiler, etc.

This dredger working at full speed in 10 or 15 feet of water can raise about 500 tons or 380 cubic yards of ordinary soil per hour.

This method of dredging, considerably modified, was applied on a very extensive scale in excavating the Suez

FIG. 3.

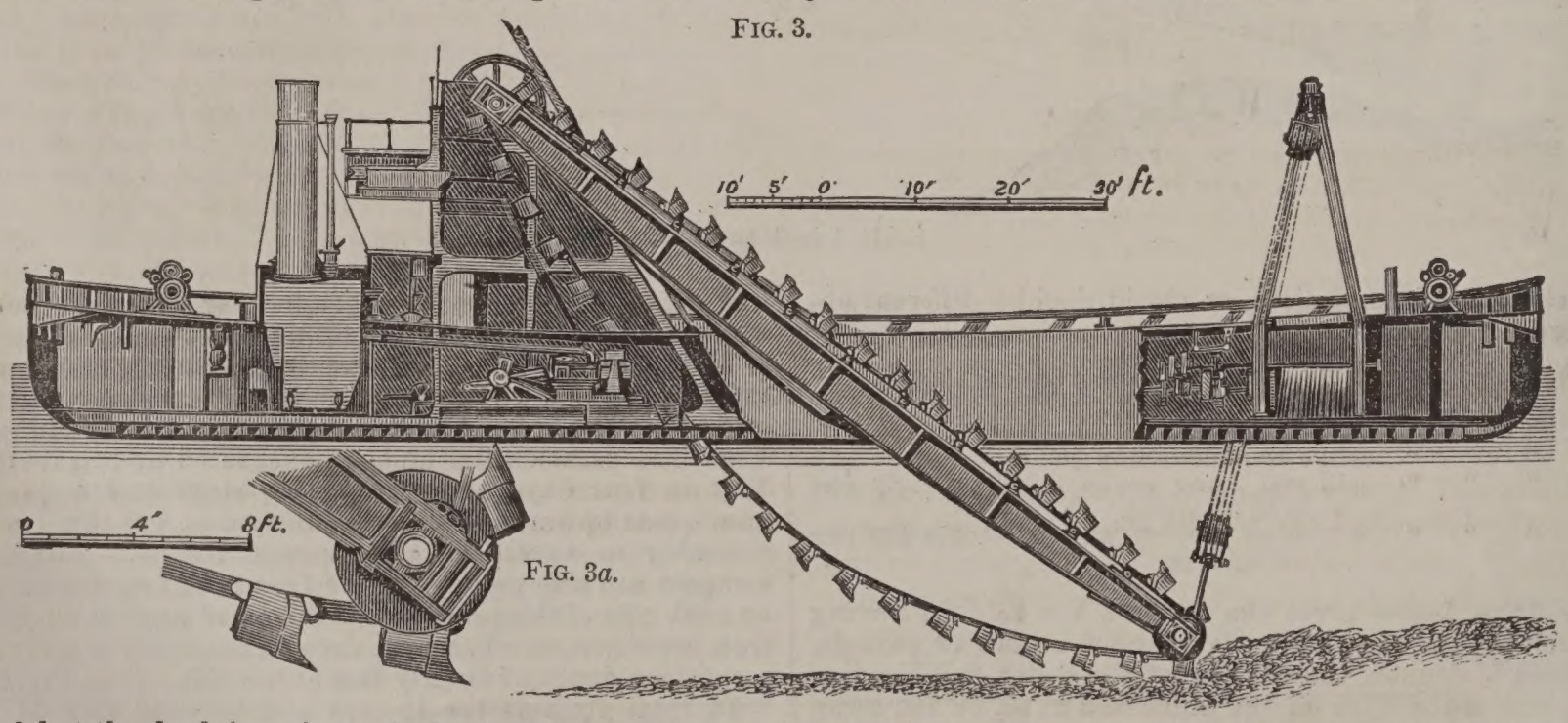


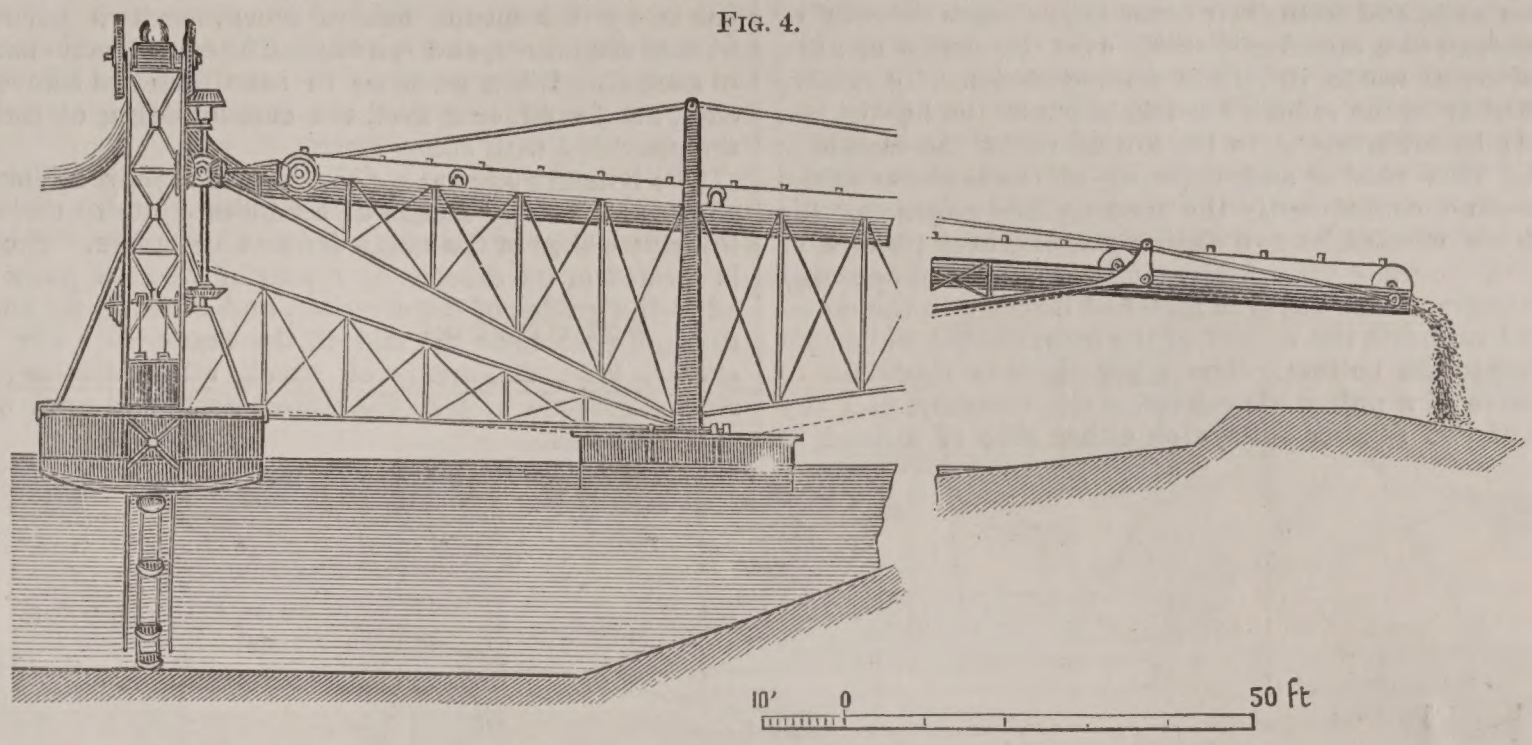
FIG. 3*a*.

Canal, but the dredgings, instead of being always delivered into scows alongside, were generally deposited on the banks of the canal through long shoots having but a slight inclination. The dredge-boats were built of boiler iron, and the largest ones were 108 feet long, 27 feet broad, and 10¼ feet deep in the hold, with 5 feet draught of water. The engine was vertical, direct acting, and condensing, with two cylinders, and nominally 35 horse-power, the boiler heating surface being 1163 superficial feet. The capacity of some of the dredge-buckets was 10.6 cubic feet, and others 14.74 cubic feet. The upper rollers, over which the endless chain carrying the buckets passed, were in some dredges 37 feet 5 inches above the water, and in others 48 feet. For the former the shoots to deliver the materials on the canal banks were 195 feet long, and for the latter 227½ feet long. The shoots are not supported by the dredger, but are constructed each upon a separate barge, and are sustained by a lattice girder resting upon the barge on telescopic supports, so that it can be raised and lowered by a hydraulic hoist and set at different angles of inclination. To accommodate the changes of inclination, the attachment of the shoot to the dredger is made by means of a horizontal joint, and the lattice girder can also be revolved horizontally on its supports, so that it can be turned parallel to the sides of the barge and of the canal when moving it from place to place. The shoot is semi-elliptical in cross section, being 1 foot 11½ inches deep and 5 feet 11 inches wide. To aid the flow and discharge of the dredgings, a stream of water is thrown into the upper end of the shoot by two rotary pumps placed upon the dredge; and in case this supply is insufficient a portable engine located on the barge supporting the shoot, and working a pump capable of throwing 5000 cubic feet of water per hour, is set in motion. This pump delivers its water along the entire length of the shoot, through a pipe pierced with holes at short intervals. The shoot is further provided with an endless chain, carrying scrapers which move along in the bottom whenever the dredgings are not voided freely by water alone. Fine sand confined within a channel will descend rapidly on an inclination of 4 to 5 feet in 100, when washed with half its bulk of water. For clays a descent of not less than 6 to 8 feet in 100 is necessary, but less water is required.

Fig. 4 shows a section of dredge with long shoot. A

portion of the shoot and supporting girder, about 73 feet in length, is omitted for want of space. Where the banks of the canal were too high to use the long-shoot dredger, an elevating apparatus was employed, consisting of a portable tramway supported by two parallel lattice girders, the lower end, about 10 feet above the water, resting upon a barge in the canal, and the shore end, 45 feet above the water, upon a truck running upon a railway laid along the bank of the canal. In operating this apparatus the dredgings are first delivered from the dredge into boxes arranged

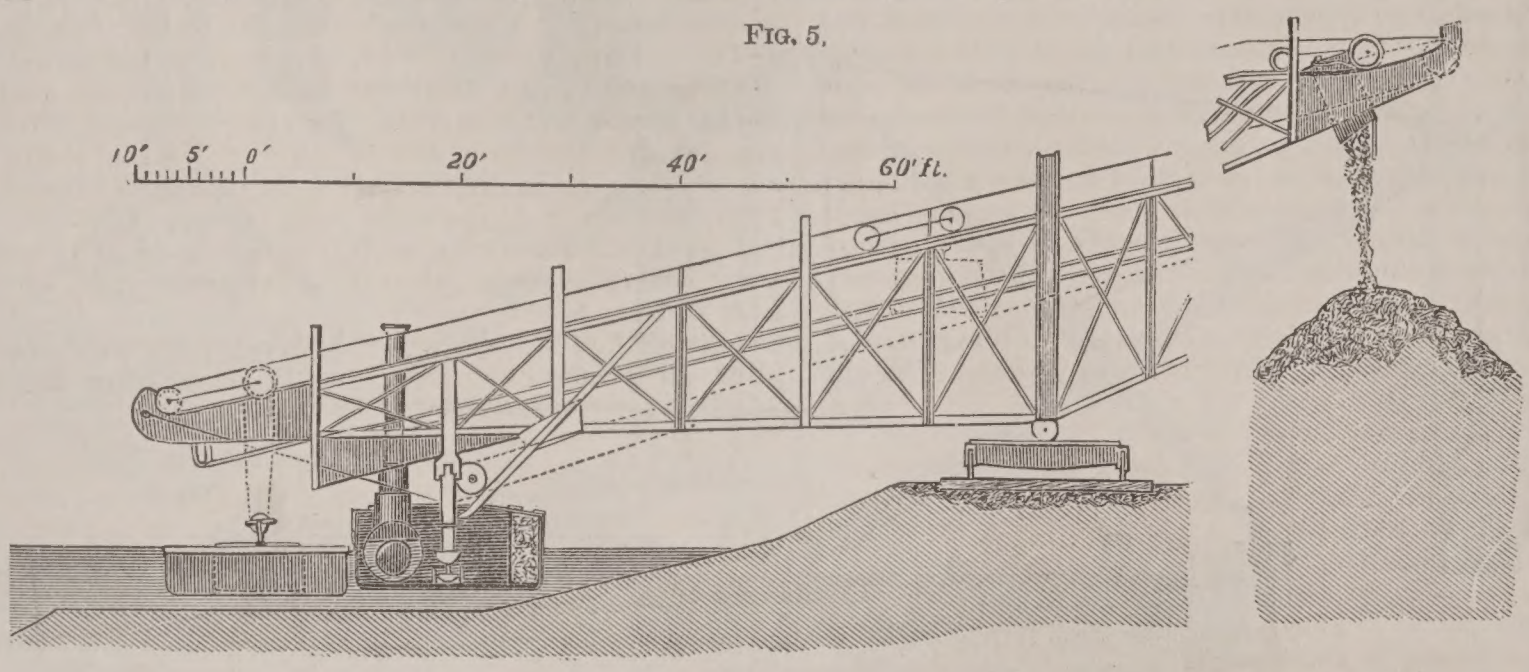
FIG. 4.



side by side upon a raft or float; the raft is then floated under the lower end of the tramway, and the boxes are hooked on, one after another, to the lower side of the tramway truck, and conveyed to the upper end of the tramway and tipped by steam-power. This arrangement is shown at Fig. 5, a portion of the shore end being omitted for want of room. The tipping is effected by two wheels attached to the lower rear edge of the box which run up a steep incline at the upper end of the tramway.

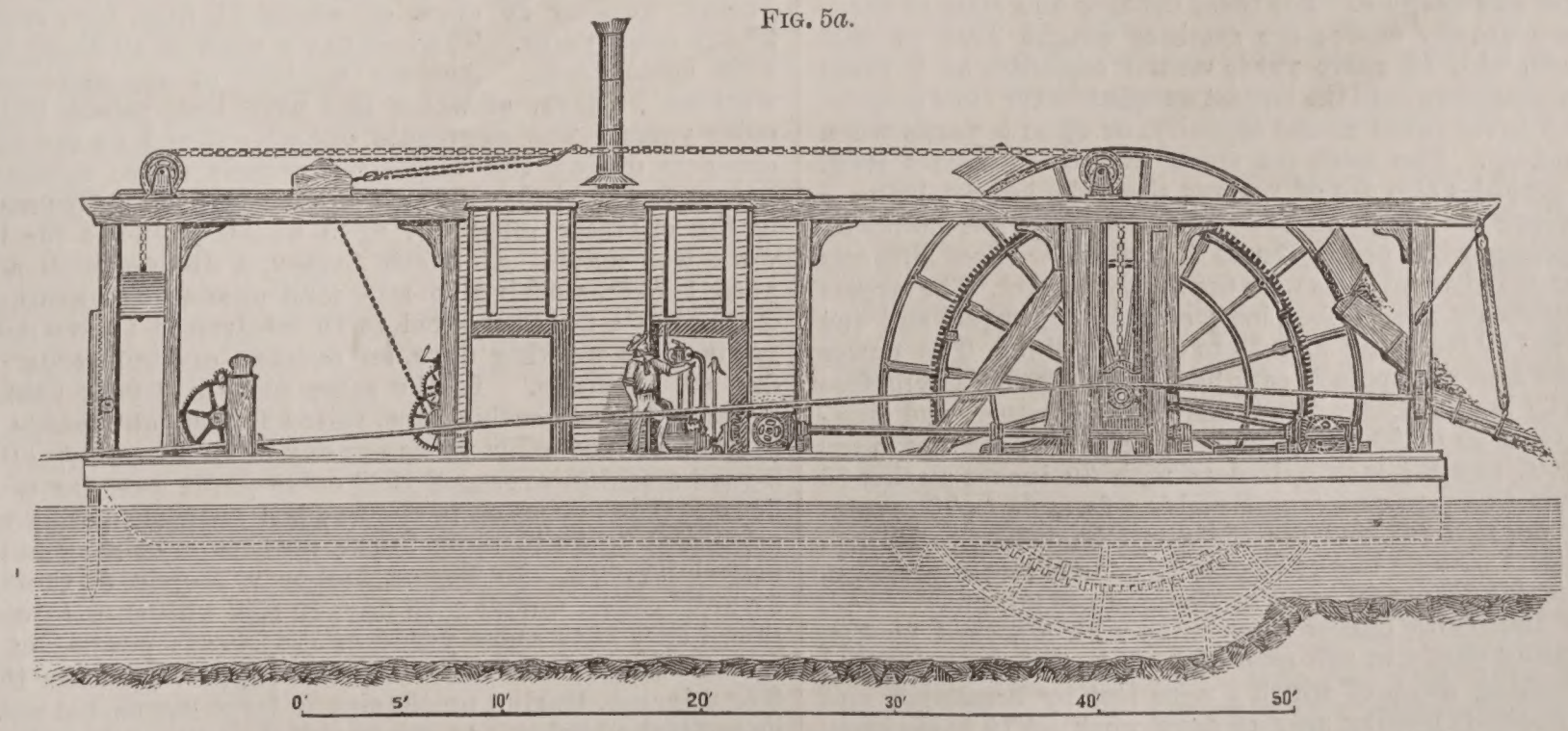
Wheel Dredgers.—Instead of an endless chain to carry

FIG. 5.



the buckets, these are sometimes placed upon the perimeter of a wheel 25 to 30 feet in diameter, or larger according to the depth to be dredged. This wheel is set in a well in the boat, its axle or shaft working in boxes that can be lowered or raised by suitable machinery as the depth requires. As the wheel revolves the buckets scoop themselves full at the bottom, and in ascending lift in succession the upper end of a shoot adjusted against the perimeter of the wheel, which, falling back to its place, causes the bottom of the bucket to unlatch, and the contents to be discharged into the shoot, and thence into a scow alongside. The dredge-boat is drawn along by a cable leading to the engine at the precise rate which the progress of the excavation requires. Under favorable circumstances a 24-foot wheel carrying four buckets has been known to excavate 1200 cubic yards in ten working hours. (See Fig. 5*a*.)

FIG. 5*a*.



Clam-shell Dredgers.—Each dredge-boat operates but one bucket, which is in two parts hinged together horizontally, something like a clam shell, with arrangements by which it is opened and closed by the same power which lowers and raises it through the water. The bucket being open and suspended from the end of a crane-jib, descends vertically through the water until it rests on the bottom. It is then filled by closing together the two parts, when it takes the

form of a short horizontal trough or hollow semi-cylinder closed at the ends. It is then raised out of the water, swung round over a scow, opened and emptied.

The two parts of the bucket—each being a quarter of a hollow cylinder with closed ends—are hinged along their common axis, and from their outer upper edges tie-rods or links extend to a crossbar directly over the centre or axis. This crossbar works in guides up and down. By raising the crossbar in the guides the two parts of the bucket are opened; by lowering it to its lowest point the bucket is closed. This raising and lowering of the crossbar in the guides—and consequently the opening and closing of the bucket—is effected by two chains passing over pulleys at the end of the crane-jib and down to separate drums operated by the engine. One chain is attached directly to the crossbar, and supports the weight of the open bucket whilst descending to the bottom. The other chain is made fast to the groove of a pulley placed below the crossbar, and (by means of two smaller pulleys on either side of it fixed to the same shaft) working on the principle of the wheel and axle, transmits its leverage (by means of chains fastened to the grooves of the smaller pulleys) to the under side of the crossbar. The strain being brought upon this last-mentioned chain after the bucket reaches the bottom, the crossbar is by this means hauled down, the two parts of the bucket are closed, and the bucket filled before it commences to ascend. When working in hard material like compact clay, hard sand, or gravel, the cutting edges of the bucket are provided with sharp teeth.

The hoisting apparatus consists of a pair of horizontal engines, which by means of a friction-clutch can be made to drive either of the chain drums at pleasure. The bucket is guided in its descent by a pair of wooden poles attached to the guides of the crossbar, and working up and down through eyes near the end of the crane-jib. For raising stones, logs, fragments of wreck after blasting, etc., a strong grapple with steel-pointed prongs is used in place of the bucket.

FIG. 8.

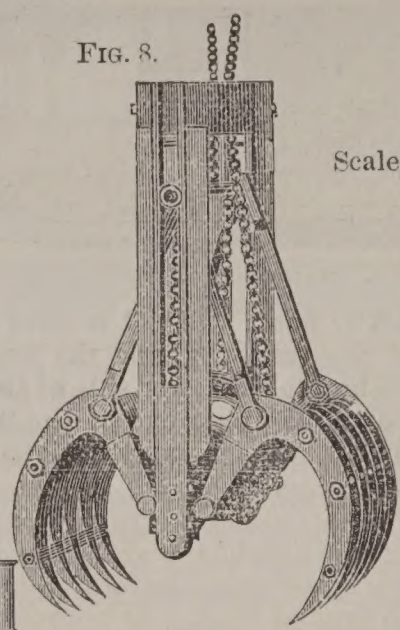


FIG. 7.
Scale, 1 inch to 5 feet.

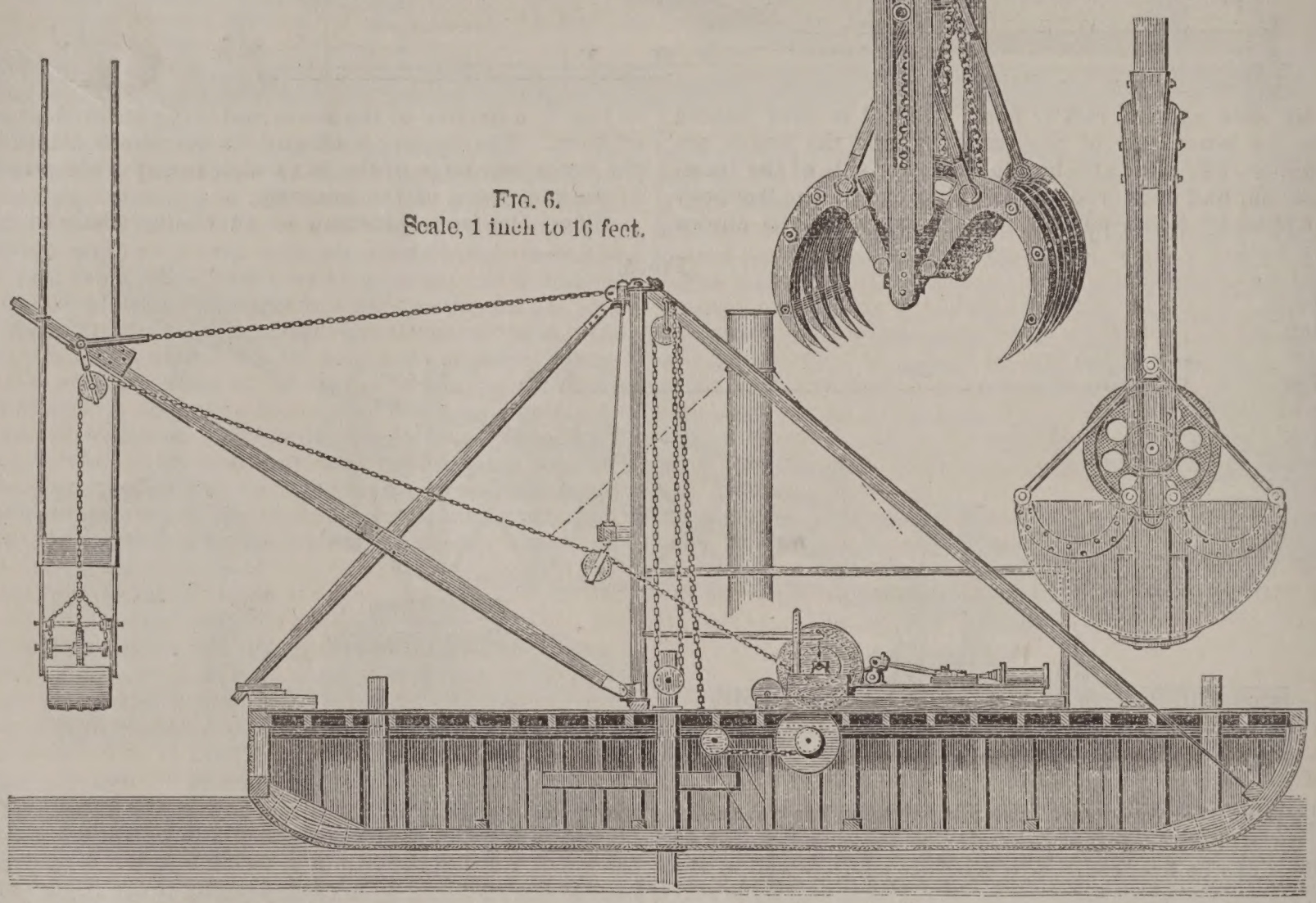


FIG. 6.
Scale, 1 inch to 16 feet.

Perhaps the best type of the clam-shell dredger is that manufactured by Messrs. Morris & Cuming of New York City. Fig. 6 is a longitudinal section of their dredger above described; Figs. 7 and 8 give enlarged views of the bucket and grapple. For these dredges two sizes of buckets are usually made; the smallest weighs 3500 to 4000 pounds, with 1½ cubic yards actual capacity, or 2 yards when heaped up, and the largest weighs 6500 or 7000 pounds, with 3 cubic yards actual capacity, or 4½ to 5 yards when heaped up. The teeth are made from 6 to 9 inches long. The grapples also are of various sizes, the largest being 5 feet along the hinge, and 8 feet wide between the points of the prongs when open. In 25 feet of water three lifts can be made in two minutes with the 3-yard bucket. The largest dredge-boats are 80 feet long and 30 feet wide, and the smallest 60 feet long and 25 to 30 feet wide. The power for the heavy grapple is supplied by two 20-inch cylinders with 20 inches stroke, 45 pounds steam-pressure, and making from 40 to 60 revolutions per minute; for the large buckets, two 12½-inch cylinders with 30 inches stroke, 75 pounds steam-pressure, and making from 60 to 70 revolutions per minute; and for the small buckets, two 10-inch cylinders with 24 inches stroke, 75 pounds steam-pressure, and making from 60 to 70 revolutions per minute.

In Baltimore harbor a machine with a 3-yard bucket, operating partly in soft mud and partly in oyster shells, in 26 working days, of which 7 were lost by breakages and bad weather, leaving only 19 days' work of 10 hours each, raised 26,334 cubic yards, or a daily average of 1386 cubic yards. The best day's work was 1980 cubic yards. The average depth of water-way was 21 feet, with occasional lumps with 16 feet soundings. The depth to be attained was 24 feet. Another machine with bucket of the same size, in 26 days, of which two were lost, raised 48,800 cubic yards. In the same harbor, operating in soft mud in a 16-feet channel, to make it 24 feet deep, a machine with a 1½-yard bucket, working 26 days, of which 7½ were lost, raised 23,310 cubic yards. The best day's work of 10 hours was 1665 cubic yards. Another machine of the same size, working 21 days, of which two were lost, raised 19,109 cubic yards. The aggregate quantity raised by the four dredgers during the respective periods above specified, agreed to within about 150 cubic yards with the return made by the engineer inspector, upon which payment for the work was made. At South Amboy, a dredger with a 3-yard bucket, working in stiff mud mixed with sand, in deepening a 9-feet channel to 15 feet, raised 73,000 cubic yards in 35 working days, an average of 2085 yards per day of 10 hours. In the same place a 3-yard bucket, working 12 consecutive days, raised 19,200 cubic yards, an average of 1600 cubic yards per day of 10 hours. Another 3-yard machine averaged 1383 cubic yards per day of 10 hours. The falling off in the two last-mentioned cases was attributed to an increase in the proportion of sand in the material raised. In Boston harbor a Morris & Cuming 3-yard bucket, working 26 days in stiff whitish-gray clay, raised only 3335 cubic yards, or 128¼ yards per day of 10 hours. In this case the teeth did not penetrate more than 8 or 9 inches, tearing up the clay in large lumps, but not so as to fill the bucket. At the foot of Pike street, New York, a 1½-yard bucket, working 6 days in mud, gravel, and cobble-stones, raised 4075 cubic yards, or 679 cubic yards per day of 10 hours.

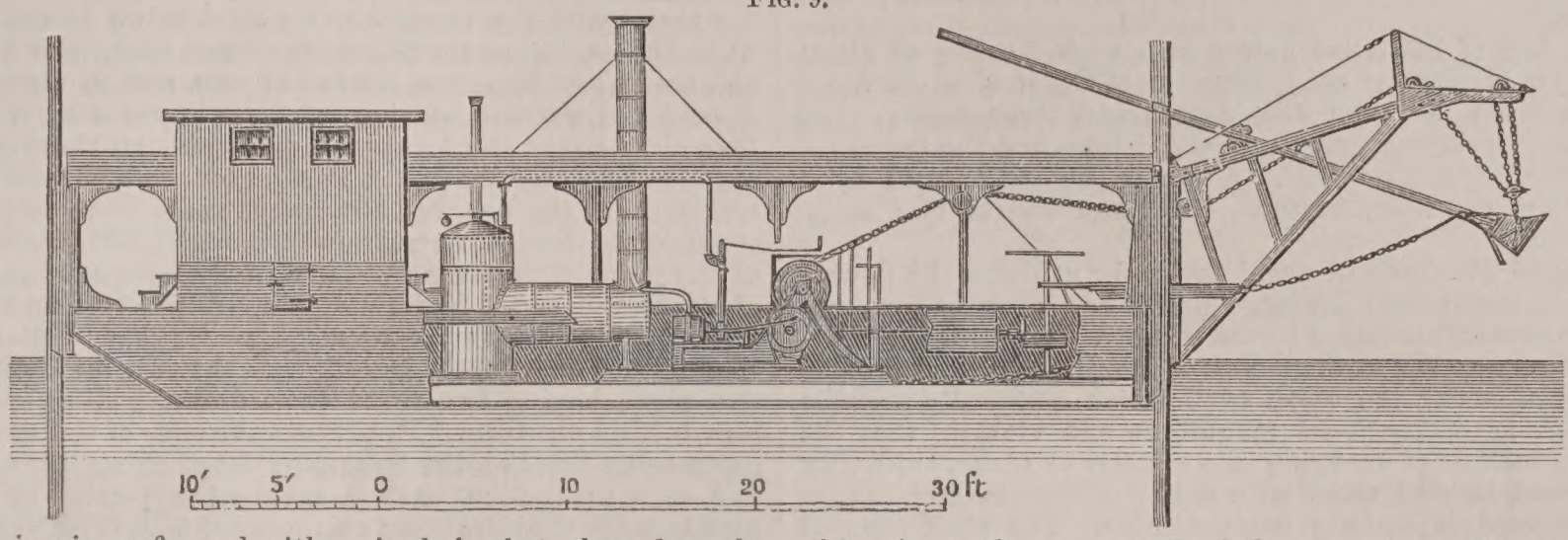
In making shallow cuts much time is lost in moving

the dredger forward. A small Morris & Cuming dredger with a 1-yard bucket, working in a mixture of soft mud and sand in the Savannah River, to deepen a 10-feet channel to 12½ feet, had to be moved for every 15 yards raised. In 11 working days of 8 hours 4054 cubic yards were raised, or 369 yards per day. Only one scow could be kept alongside, in consequence of the tide. The actual time lost in fleeting and changing scows was 4 hours out of 8. The dredger working from a fixed position would therefore have doubled the amount of work actually performed.

The crew required for working the small dredger consists of captain, who handles the levers; engineer, who tends to the fire and machinery; and five deck-hands; on board the larger dredgers about eight deck-hands are required. When the dredged material has to be deposited at any considerable distance, it has been found that with a tow of from one to one and a half miles, one tug and two scows will keep a dredger in constant work. When the tow is increased to 7 or 8 miles, two or three tugs with seven or eight scows are required. The power of the tugs varies from 50 to 100 horse-power, and the sizes of their cylinders range from 16 to 30 inches diameter. The crew of a tug-boat consists usually of captain, engineer, fireman, cook, mate, and two or three deck-hands. Each scow has also one man constantly on board to attend the doors.

Single-Scoop Dredgers (Fig. 9).—By these machines

Fig. 9.



dredging is performed with a single bucket, shaped, as the name implies, like a scoop or dipper, having a swinging door closing with a catch at its back, by which it is emptied. This bucket is fixed to a beam or handle of a length suitable for any depth of water in which the dredger is intended to work. The bucket with its handle is worked from a crane, which has its post set on a movable platform placed in the centre of the bow of the dredge-boat. The crane-post, jib, and stay are each built of two parallel timbers, secured to one another at the foot of the stay, neck of the post, and end of the jib. The bucket handle works in the space left between these parallel timbers. This beam or handle is slotted for the greater portion of its length, and on the back, on either side of the slot, has two racks working on pinions whose shaft is fixed upon the crane-jib about one-third its length from the post. These racks are kept in contact with their pinions by a friction-roller pressing on the front of the handle, and made fast by a link passing through the slot to the shaft of the pinions. When digging, in order to prevent the handle rising on its pinions when the hoisting chain is lifting the bucket through its cut, a hand-lever, worked by the crane-man and connected with the pinions by an endless chain passing round a rag wheel on the pinion shaft, stops their motion, and consequently the rising of the handle, and compels the bucket to describe an arc of a circle with the pinion shaft as its centre. Immediately the bucket has made its cut the leverage is taken off and the handle rises on its pinions. The hoisting chain is fastened near the nose of the bucket, passes over a shive at the outer end of the crane-jib, returns through a pulley on the bucket, is carried over a second shive at the end of the crane-jib, and, guided by pulleys through the centre of the swinging points of the crane, is then carried to the hoisting drum operated by the engine. Another chain, called the backing chain, is fastened to the lower part of the handle near the bucket, and is carried to the backing drum. The backing chain is used for bringing the bucket back from its centre of gravity to any point near the bow of the dredge-boat where the cut is to be commenced. The bucket and handle are lowered by their own weight, regulated by the hoisting chain, and placed in position by the backing chain. The hoisting apparatus consists of a pair of horizontal engines, which by means of clutches or friction bands move either the hoisting or backing drums independently of one another.

An improvement on the ordinary crane, which had a radius of about nineteen feet, has been lately applied to the scoop machine manufactured by Messrs. Osgood of Troy—namely, an extension of the end of the crane-jib, by which a longer cut ahead can be made by the bucket and a greater width of bottom covered by the swing of the crane, thus saving time which would otherwise be lost in moving the machine. The extension of the jib is carried out nearly horizontally, the bucket being suspended as before described, with the exception that the outer shive at the end of the jib becomes a travelling one, with a tendency to keep a position directly over the bucket. In making a cut, therefore, the outer shive, starting from the inner edge of the horizontal extension, follows the bucket in its cut, which is not immediately the arc of a circle with the pinion as a centre, but a continual forward thrust until the travelling shive is at the outer end of the extension, and not until then does the pinion become the centre from which the arc is described for the remainder of the cut. When the extension is used, the strain is carried from its outer end to the neck of the crane-post by tie-rods, as shown in the drawing. In machines with the larger-sized buckets the cranes have a counterpoise attached. In very hard ground the bucket is taken off and a pick or plough attached, with which the ground is broken up, to be afterwards picked up with the bucket. The method of operating is as follows: the bucket, being clear of the water, is drawn back by the backing chain, at the same time descending by the slackening of the hoisting chain and its own weight; as it strikes the water and is drawn back, the pressure closes the swinging door or back of the bucket, when it is immediately caught and held fast by the catch. Having reached the bottom, the strain is brought upon the hoisting chain, and the backing chain slackened. The bucket then travels forward as before described, the racks and pinions being stopped at the proper time by the lever applied by the crane-man. The bucket having passed through its cut, the leverage is taken off, the bucket and handle raised, and the crane on its movable platform swung to either side as desired. A line attached to the catch of the swing door at the back of the bucket, which by the raising has come to be the under side, is then pulled by the crane-man, the back opened, and the bucket emptied.

These machines are made of various sizes, those most commonly built having buckets of 3, 1¾, and 1½ cubic yards capacity. The dimensions of boat for the larger machines are about 65 feet length, 26 feet beam, and 6½ feet depth of hold, and having a hoisting chain of 1¼ inches. Their power is derived from a pair of 15-inch cylinders with 12 inches stroke. The dimensions of boat for the smaller machines are somewhat less, being about 60 feet length, 24 feet beam, and 5 feet depth of hold, the power being derived from 7 to 10 inch cylinders, with from 12 to 15 inches stroke.

The larger machines of this pattern, with 3 yards capacity of bucket, when working in soft mud under the most favorable circumstances—that is to say, from a fixed position—will average in 20 feet of water about 2000 cubic yards per day of 10 hours. Under ordinary circumstances it may be expected, in a series of working days of 10 hours each, to average about 1300 cubic yards of soft mud or 800 cubic yards of gravel and sand.

In the slips of New York a machine with a bucket of 1½ cubic yards capacity, 7-inch cylinders with 12 inches stroke, a steam-pressure of 60 pounds, and with 200 revolutions, working in soft mud, in 12 days of 10 hours lifted 10,302 cubic yards, or 859 yards per day. The best day's work was 968 yards. The same machine working in soft mud at Wallabout, Brooklyn, with a cut of from 2 feet above to 10 feet below low water, in 131 working days of 10 hours lifted 72,621 cubic yards, or nearly 555 yards per day of 10 hours. At the same place the same machine, working in gravel and sand, with a cut of from 15 to 22 feet below low water, in 14 days lifted 5591 cubic yards, or nearly 399 yards per day of 10 hours.

Another machine, with a 1¾-yard bucket, and with cyl-

inders of 10 inches diameter and 15 inches stroke, cutting to a depth of 10 feet through a meadow at the junction of the Delaware and Schuylkill rivers, the material seemingly consolidated mud, in 26 working days of 10 hours lifted 12,532 cubic yards, an average of 482 yards per day. The same machine, near Philadelphia, working from a fixed position, picking up soft mud which had been dumped under it from scows, and loading into cars, lifted 1000 cubic yards in 10 hours; its average, however, was about 800 yards per day. These working days include the time lost in repairing chains and other slight damages incidental to the best running machines.

The crew of one of these dredgers consists of engineer, fireman, and two or three deck-hands, including craneman.

A tug of 100-horse power can, with 4 scows of about 150 yards capacity each, keep one of the smaller machines busy when the tow does not exceed three miles. The smaller dredger consumes about 1¼ tons, and the tug about 1½ tons, of coal per day. A tug is usually manned by a captain, engineer, fireman, cook, and one or two deck-hands.

Pump Dredger.—A novel device for utilizing the powers of the centrifugal drainage pump has recently been put in successful operation by the writer in deepening the channel over the bar at the mouth of the St. John's River, Fla. Upon this bar the ocean swell which constantly prevails is of such exceptional magnitude and violence that the usual method of dredging into lighters or scows, ordinarily pursued in still water with either of the dredgers above mentioned, is entirely impracticable. The plan adopted was to provide a suitable steamer by charter, and fit her out with a 9-inch centrifugal drainage pump, two branches of 6-inch suction pipe, and timber bins on deck for holding the sand pumped up from the bottom; the pump engine to be driven by steam from the steamer's boiler, and the sand to be discharged overboard at selected points by flooding the bins with clear water from the pump.

The steamer is 132 feet long on the keel, 24½ feet broad on the beam, and when ballasted to an even keel draws about 5½ feet of water. She was modelled with a view to speed, and carries only 100 tons on a draught of 7 feet, is strongly built with side wheels and short guards, has one low-pressure engine of 120-horse power, and ample boiler capacity. A boat with more beam and a fuller model fore and aft under the water-line would have been better.

The Pump.—A No. 9 centrifugal drainage pump of the Andrews patent is located on the main deck aft, about 35 feet from the stern-post. Its suction and discharge openings are each 9 inches in diameter. To the suction opening there are connected, by a 2-way branch-pipe, two 6-inch suction-pipes, instead of one 9-inch, as usual, the object being not only to work on both sides of the boat simultaneously, but to render the necessary handling of the pipes as easy and prompt as possible. There is, on the other hand, considerable disadvantage in working with two suction-pipes instead of one, on account of a greater amount of friction for an equivalent suction capacity; for while a 9-inch pipe has an area of 81 circular inches, two 6-inch pipes have an aggregate area of only 72 circular inches. The friction surface is therefore increased as 27 to 36, making the disadvantage from or loss by friction from this cause as 2 to 3. As a partial compensation for this increased amount of friction, an increased velocity is given to water in suction-pipes of less aggregate area than the discharge-pipe, and a larger proportion of sand is thereby carried up.

It was necessary also to encounter another disadvantage by using several bends, of which there were two in each of the suction-pipes and one in the discharge-pipe, those in the suction being each one-eighth of a circle, and that in the discharge-pipe one-fourth of a circle. These bends reduce the delivery at the rate of 10 per cent. for each turn of 90°, and about 6 per cent. for each turn of 45°, the reductions in each case being calculated upon the quantity passing the preceding bend. Thus, the first one-eighth bend in the suction reduces the quantity to 94 per cent., the second to 88 per cent., and the one-fourth bend in the discharge to 79 per cent. The disadvantages, therefore, under which the apparatus labored may be briefly summed up as follows: 1. The loss by friction due to the use of two 6-inch, instead of one 9-inch, suction-pipe is increased 50 per cent.; 2. The unestimated loss by friction due to the use of suction-pipes three times as long as the height to which the material is to raised; 3. The loss of 21 per cent. by bends in the suction and discharge-pipes.

The *engine* used to drive the pump consists of two cylinders connected upon one crank at right angles to one another, and 10 inches in diameter by 10-inch stroke each. Steam is conveyed from the steamer's boiler to the pump-engine through a 3-inch iron pipe, the usual pressure carried upon the boiler being about 25 pounds to the square inch. This pressure develops about 26 useful horse-power (after deducting 25 per cent. for friction of engines and difference of pressure in the cylinder and boiler), and gives a speed of about 180 revolutions per minute to the engine shaft. On this shaft is a pulley 42 inches in diameter, carrying a rubber belt 12 inches wide, communicating the power to the pump-shaft through a pulley 24 inches in diameter, thus giving the pump-disk and wings about 315 revolutions per minute. This speed in the No. 9 pump is equal to the work of raising 3000 gallons of clear water per minute 30 feet high through a 9-inch straight vertical pipe. The actual height raised above the water on the St. John's bar varies with the amount of sand taken on board, from 10 to 11 feet, but as the pipes are 50 feet long, with bends, and are in two branches instead of one, and as a mixture of sand and water is heavier and more impeded by friction than clear water, the loss by friction from all these causes combined reduces the useful working of the pumps considerably below the average attainable under more favorable conditions. For these reasons, although 200 revolutions of the pump-disk per minute will easily raise 3000 gallons of clear water 12 feet high through a straight vertical 9-inch pipe, 300 revolutions are required to raise 2500 gallons of sand and water 11 feet high through the two inclined suction-pipes having two turns each, discharged through a pipe having one turn. To prevent the ends of the suction-pipes being lifted off the bottom by the pitching of the boat, and as a precaution against accident, a portion of each pipe is made flexible, being composed of 6-inch rubber hose stretched over a coil of wire. In addition the ends are loaded with an iron frame or drag, each weighing about 250 pounds, which is intended to move flat along the bottom during the operation of dredging. To the under surface of this frame, directly below the mouth of the pipe, a number of teeth or knives are attached to stir up the sand and aid its entrance into the pipes. A chain attached to each drag, and leading to the deck of the steamer on either side, takes the strain from the pipe when the drag is down and the steamer in motion. Tackles are arranged for lifting the pipes from the bottom when not dredging, or when pumping clear water to discharge the sand from the bins.

For receiving the sand, bins are located along the main deck, fore and aft, on each side of the steamer's engine, each bin being provided with a sliding gate over the steamer's side, which can be opened and closed at pleasure. The bottom of the bins slopes downward towards the gates. They are filled from two open troughs, one from each branch of the discharge-pipe, provided at suitable intervals with valves or gates, so that the load can be distributed to the bins wherever desired.

The proportion of sand that can be pumped depends greatly upon its specific gravity and fineness. The calcareous and argillaceous sands flow more freely than the silicious, and fine sands are less liable to choke the pipe than those that are coarse. When working at high speed, 50 to 55 per cent. of sand can easily be raised through a straight vertical pipe, giving for every 10 cubic yards of material discharged 5 to 5½ cubic yards of compact sand. With the appliances used on the St. John's bar the proportion of sand seldom exceeded 45 per cent., generally ranging from 30 to 35 per cent. when working under the most favorable conditions. In pumping 2500 gallons, or 12.6 cubic yards, of sand and water per minute, we would therefore get from 3.7 to 4.3 cubic yards of sand. During the early stages of the work, before the teeth under the drag had been properly arranged to aid the flow of sand into the pipes, the yield was considerably below this average, not often exceeding, and frequently falling below, 2 cubic yards of sand per minute during the time actually employed in pumping.

The manner of conducting the dredging may be briefly described as follows: The steamer, with the suction-pipes up, first crosses the bar to the outside, then turns around and steams slowly over the bar with just sufficient speed to maintain steerage-way, lowering the pipes and starting the pump as soon as the outer edge of the bar is reached. Arriving at the inside, the pump is stopped, the pipes raised, and the steamer turned round again. She then crosses slowly to the outside, pumping as before; and the quantity of sand discharged into the bins during these two passages over the bar is a load, whether great or small. While the steamer is turning around on the outside, preparatory to taking in another load, the side gates of the bins are opened, the suction-pipes are raised from the bottom, and the pump is run at full speed on clear water. By this means, assisted to some extent when necessary by men in the bins with hoes, the sand is all discharged into deep water by the time the steamer has again reached the outer edge of the bar, when the dredging is resumed. The time

required to turn the steamer twice is 12 to 13 minutes, one half of which, or the time occupied in making the turn on the inside, is lost, as neither the work of dredging the sand nor discharging it from the bins is in progress during that interval.

The last work carried on with this dredger was during the first few months of the fiscal year ending June 30, 1873, for a period of 74 days, of which 23 days were lost by bad weather. The expenses were the same as for working days, the boat being under charter.

The average time worked per day was 6 hours; the average quantity of sand removed per hour was 78 cubic yards; the average quantity of sand removed per day was 468 cubic yards, the total quantity in 51 working days being 23,868 cubic yards; the average cost for the entire period was $31\frac{1}{18}$ cents per cubic yard. The least cost during any one month for dredging and dumping the sand was in July, 1872, when it amounted to $23\frac{1}{2}$ cents per cubic yard; the least cost during any one week was $19\frac{1}{2}$ cents per cubic yard; the least cost during any one day was 15 cents per cubic yard.

With a centrifugal drainage pump sand can be easily discharged at a height of 30 feet above the level of the water; and when the distance to which it has to be conveyed is so great that open troughs from the discharge-pipe to the dumping-ground cannot have sufficient inclination to secure a free flow of the sand and water, it would be necessary to make the discharge through pipes, increasing the power expended in proportion to their length, so as to ensure a velocity that will transport the sand and prevent choking. The pump itself should in all cases be placed as low as possible, and it would generally be practicable to locate it from three to five feet above the surface of the water.

The first or contractor's cost of dredging under these circumstances, with a 9-inch pump, would probably not exceed 8 or 9 cents per cubic yard, inclusive of running expenses, wear and tear of machinery, and all stoppages for repairs and other contingencies. Indeed, assuming the pump on St. John's bar to have worked continuously in raising sand 10 hours per day, except Sundays, during the month of May, 1872, with the same average results per hour actually attained while pumping, thus charging the six working days of each week with the expense of seven, the cost of raising the sand into the bins would have been only $8\frac{6}{10}$ cents per cubic yard, and if it could at the same time have also been continuously discharged to the dumping-ground through either open troughs or pipes, no additional expense, except a trifle for increased power, would have been incurred. There were, moreover, constant losses encountered on the bar while actually pumping which would not occur in still water, and of which no account has been taken, due to the pitching of the boat, which frequently lifted the ends of the suction-pipes from the bottom. It is therefore considered safe to estimate the contractor's cost of removing sand at 9 cents per cubic yard when the conditions are such that the work of raising the sand and discharging it to the dumping-ground can be carried on simultaneously and continuously. (See DEEP-SEA DREDGING, by PROF. A. E. VERRILL.)

Q. A. GILLMORE, U. S. A.

Dred Scott Case (the case of Scott *v.* Sandford in the Supreme Court of the U. S. in 1856, 19 Howard R., 393). A slave named Dred Scott was carried by his master (Sandford) from Missouri into Illinois and Wisconsin, and thence back to Missouri. Scott was descended from African ancestors, who were slaves. He brought an action in the circuit court of the U. S. to assert his title to freedom. The judgment of that tribunal was carried by writ of error to the Supreme Court. It was there decided by a majority of the court that if Scott were assumed to be free, he was not a "citizen of a State," so as to bring the action; and further that he was still a slave. Accordingly, the case was dismissed for want of jurisdiction on the part of the circuit court. In reaching the conclusion that he was still a slave, the court held that the act of Congress which prohibited a citizen from holding slaves in the Territories of the U. S. north of thirty-six degrees and thirty minutes N. latitude was unconstitutional and void. The action of the court has been severely criticised in respect to this last point, as being unwarranted after the decision was made that Scott, considered as a freeman, was not a citizen. It is maintained, on the other hand, that both questions under the pleadings were properly decided. Some recent information as to the circumstances under which the decision was rendered will be found in letters of Justices Campbell and Nelson in Tyler's "Life of Chief-Justice Taney," pp. 382–385. The chief-justice, when delivering the opinion of the court, made an historical survey of the public opinion of the civilized world, at the time of the formation of the American Constitution, concerning the African race. Among other things he said: "They (the Africans) had for more than a century before been regarded as beings of an inferior order, and altogether unfit to associate with the white race, either in social or political relations, and so far inferior that they had no rights which the white man was bound to respect." Much injustice has been done him by an erroneous statement, still occasionally repeated, that the chief-justice had himself affirmed that the negro had "no rights which the white man was bound to respect." T. W. DWIGHT.

Dreisse'na [named in honor of Dr. Dreyssen, a Belgian naturalist], a genus of fresh-water lamellibranchiate mollusks of the mussel family (Mytilidæ), differing, however, from the true mussel in having the mantle closed except at the branchial and anal slits. *Dreissena polymorpha*, a Russian species, is remarkable for its recent arrival into English waters, where it has invaded even the water-pipes of London. Ten species are fossil in Europe.

Drelincourt (CHARLES), a French Protestant minister, born at Sedan July 10, 1595. He preached at Charenton near Paris, and gained great popularity. He was also distinguished as a writer of polemical theology. Among his very numerous works was "Consolations against the Fear of Death" (1651), which was translated into English, and passed through many editions. Died in Paris Nov. 3, 1669. —His son, CHARLES DRELINCOURT (1633–97), physician to William III. and Queen Mary, was the author of numerous medical works.

Drenthe, a province of the Netherlands bordering on Prussia, has an area of 1032 square miles. The surface is level, and partly occupied by marshes. A large portion of the soil is poor. The rearing of cattle is the principal branch of industry. Pop. in 1870, 108,056. Capital, Assen.

Drepa'nius (LATINUS PACATUS), a Gallic rhetorician, born in Aquitania, in the south of Gaul, is classed among the Latin Panegyrists. He attained the rank of proconsul A. D. 390, and under this title was addressed by Ausonius in one of his poems, in which he pays a high tribute to the poetical abilities of Drepanius. Of his poetry nothing remains, but the panegyric which he delivered in the presence of the emperor Theodosius in 389 A. D., when he was sent to congratulate the conqueror on the overthrow of Maximus, is extant, and is contained in the collection entitled "Panegyrici Veteres," edited by Jaeger, Nuremberg, 1799, 2 vols. 8vo. It is published separately also by Arntzen, 1753, 4to, Amsterdam. HENRY DRISLER.

Dres'bach, a post-township of Winona co., Minn. Pop. 311.

Dres'den, the capital of the kingdom of Saxony, is situated in a beautiful valley on both sides of the river Elbe, 116 miles by railway S. of Berlin and 62 miles E. S. E. of Leipsic; lat. 51° 3′ 16″ N., lon. 13° 44′ E. It is divided by the Elbe into the old town and new town, the latter of which is on the right bank of the river, here crossed by a fine stone bridge. Railways extending in several directions connect Dresden with Berlin, Leipsic, Prague, and other cities. The Altstadt has narrow streets bordered by high houses. The most remarkable public edifices are the royal palace, founded in 1534; the prince's palace; the Japanese palace or Augusteum; the Brühl terrace; a handsome church called Frauenkirche, which has a tower 355 feet high; the Roman Catholic church, with a tower 378 feet high; and the Sophienkirche. Dresden has a royal public library containing over 300,000 volumes; an academy of art; a museum of natural history; an opera-house; a theatre; a mint; two gymnasia; a polytechnic school, realschulen, two normal schools, one female high school, two schools of commerce and veterinary medicine, and asylums for the blind and for the deaf and dumb; and a celebrated picture-gallery, which is considered the richest collection in Germany. It contains nearly 1500 paintings, mostly by Italian and Flemish masters. In the royal palace are the celebrated "Green Vaults," containing a very large and valuable collection of gems, articles of vertu, etc. This city has manufactures of silk and woollen stuffs, jewelry, porcelain, silver-ware, gloves, carpets, musical instruments, chemical products, and painters' canvas. Steamboats navigate the Elbe between this place and the sea. The environs of Dresden are delightful, and are furnished with fine gardens and promenades. The city was founded about the eleventh century, and became the capital of Saxony in 1270. It was fortified in 1510, and suffered severely in the Thirty Years' war, and also in 1813, when it was the head-quarters of Napoleon's army. (See DRESDEN, BATTLE OF.) Pop. in 1871, 177,089.

Dresden, a township of Chickasaw co., Ia. Pop. 535.

Dresden, a township and post-village of Lincoln co., Me., on the Maine Central R. R., about 20 miles S. of Augusta. Pop. 990.

Dresden, a post-village of Elk Fork township, Pettis co., Mo., on the Missouri Pacific R. R., 70 miles W. by N. of Jefferson City. Pop. 348.

Dresden, a township of Washington co., N. Y. P. 684.

Dresden, a post-village of Torrey township, Yates co., N. Y. It is situated on Seneca Lake, at the terminus of Crooked Lake Canal, and has a steamboat landing.

Dresden, a post-village of Muskingum co., O., at the head of navigation of the Muskingum River, is the northern terminus of the Cincinnati and Muskingum Valley R. R., 14 miles N. of Zanesville, and is on the Pittsburg Cincinnati and St. Louis R. R. Coal is mined in the vicinity. It has one weekly newspaper. Pop. 1156.

Dresden, a post-village, capital of Weakley co., Tenn., on the Nashville and North-western R. R. It has two churches, a high school, and one weekly newspaper. Cotton and corn are the chief exports. Pop. 355.

T. H. Baker, "West Tennessee Democrat."

Dresden, Battle of. Dresden was occupied by a French army of 30,000 men, when, on the 23d of Aug., 1813, the army of the allies appeared before it. Napoleon, with the main army, came to relieve it, and entered the city on the 26th of the same month. Schwarzenberg, the commander of the allied army, immediately assaulted and bombarded the city. Having been repulsed by a sally of the French guard on the 26th, he renewed the attack on the 27th, when a great pitched battle was fought, Napoleon gaining the victory.

Dress [from the Fr. *dresser*, to "make straight," to "adjust"], the general name for the artificial vesture worn more or less by nearly all the human race. Among savage nations such coverings were originally made of the skins of animals, the inner bark of plants, etc., and were worn sometimes for protection against the weather, and sometimes from a desire of ornament. As civilization advances these primitive coverings give place to manufactured fabrics of silk, wool, cotton, and flax. Profane history has no mention of a time when clothes were unknown to the human race; and the distinction between the dresses of the different sexes appears to have been observed from immemorial time. Homer mentions the "trailing robes" of the Trojan ladies, and the oldest sculptures seem to confirm this view.

Dres'sing, a term applied to gum, starch, and other substances used to stiffen and prepare linen, cotton, and similar fabrics.

Dressings, in architecture, mouldings and simple sculptured decorations around doors and windows.

Dreux (anc. *Durocasses*), a town of France, department of Eure-et-Loir, on the river Blaise, about 50 miles W. S. W. of Paris and 22 miles N. of Chartres. It has a fine Gothic church, a town-hall, and a theatre; also manufactures of serge, woollen hosiery, hats, etc. Here the Catholic army led by Constable Montmorenci defeated the prince of Condé and the Huguenots in 1562. Pop. 7237.

Drew, a county in the S. E. of Arkansas. Area, 900 square miles. It is partly drained by Bayou Bartholomew, and the Saline River forms part of the western boundary. The soil is fertile. The surface is level, partly timbered and partly prairie. Corn and cotton are raised. Capital, Monticello. Pop. 9960.

Drew (Daniel), a noted New York capitalist, was born in Carmel, Putnam co., N. Y., in 1797, commenced active life as a cattle-drover, became conspicuous in the steamboat business, still later in that of railroads, especially in the fortunes and misfortunes of the Erie road, and at last was recognized as a chieftain in the stock speculations of Wall street. He has also been distinguished by liberality to certain educational interests of the Methodist Episcopal Church, having founded the Drew Ladies' Seminary at Carmel, N. Y., and the Drew Theological Seminary at Madison, N. J.

Drew (Samuel), a noted Wesleyan theologian and metaphysician, was born at St. Anstell in 1765, settled in London in 1819, and died at Helston in 1833. He was an intimate friend of the famous Dr. Adam Clark, and of Dr. Thomas Coke, the first American Methodist bishop, whose "Life" he wrote. Among his other works, the principal are "Essay on the Immateriality and Immortality of the Soul" (1802), "Essay on the Identity and General Resurrection of the Human Body" (1809), and "History of Cornwall" (1820–24). "His theological writings, though showing more of ingenious subtlety than of logic, are surprising examples of intellectual power in a special direction, and have given him a widespread, if not a permanent, fame." (*Stevens's History of Methodism.*)

Drew Plantation, a township of Penobscot co., Me. Pop. 85.

Drew'rysville, a post-township of Southampton co., Va. Pop. 1811.

Drew Theological Seminary was founded in 1868 at Madison, N. J., by a donation of about half a million dollars from Daniel Drew. (See above.) It was organized chiefly by the Rev. Dr. J. McClintock, who became its first president. (See McClintock.) Its real estate and buildings are ample and beautifully located, and its faculty effective. It has (in 1873) about a hundred students. It is under the control of the Methodist Episcopal Church.

Drey'se, von (Johann Nikolaus), the inventor of the "needle-gun," was born at Sömmerda, in Prussia, Nov. 20, 1787. He was the son of a locksmith, worked from 1809 to 1814 in a Paris gun-factory, established after his return to Germany, in his native town, an iron-ware factory, and devoted his attention chiefly to the improvement of fire-arms. After several attempts, he perfected the famous Needle-Gun (which see) in 1836. It was introduced into the Prussian army in 1840. In 1841 he established an extensive gun and ammunition-factory. He died Dec. 9, 1867. —His son, Franz von Dreyse, born Mar. 2, 1822, has considerably enlarged the establishment.

Drift, in geology (more fully **Glacial Drift**), is a term applied to boulder clay and collections of stones and earth formed in the tertiary period by the agency of glaciers. Some geologists limit the term *drift* to material that has been recently moved by water, thus including sands, marls, and gravels, stratified and unstratified. Such deposits are sometimes called *diluvium*. They include the remains of animals that have recently inhabited the earth, and of some species which are now extinct. Human remains have also been found in these drift deposits in sufficient abundance to render it probable that the human race existed contemporaneously with the elephants, rhinoceroses, and gigantic deer of the tertiary period. These remains render the drift one of the most interesting of deposits. (See Geology, by Prof. J. W. Dawson, LL.D., F. R. S., and Glacial Period.)

Drift, in navigation, signifies the deviation in a ship's course caused by the action of a contrary wind, or the angle which the line of a ship's course makes with the meridian when she is driven by the wind or waves, and is not governed by the helm.

Drift'way, a small subterranean gallery driven in advance of a tunnel, is the first operation in tunnelling, and everything depends on its being correctly planned and located.

Drift'wood, a township of Jackson co., Ind. Pop. 922.

Drill, or **Drilling** [Ger. *Drillich*], a strong and fine linen fabric of a satin-like finish, used for summer clothing for gentlemen. Ordinary plain drills are worked with five shafts.

Drill. See Blasting, by Gen. J. G. Foster, U. S. A.

Drill, an old English word for an ape, is supposed by Huxley to be the source of the name *mandrill* (*i. e.* a "man-like ape"), but the latter word appears to be the original one. (See Mandrill.) The term drill is now applied especially to the *Cynocephalus leucophæus*, a baboon of Africa.

Drill, in agriculture, the sowing of crops in rows by means of various machines of comparatively recent invention. The advantage of this mode of cultivation is, that it admits of destroying the weeds and stirring the soil between the rows of plants. Wheat is cultivated in drills in parts of Europe with great success.

Drill, Military, the name given to the instruction of soldiers and the exercises through which they are required to pass. There are many varieties of drill, that of the cavalry, infantry, and artillery being all different. The battalion-drill, company-drill, squad-drill, and skirmish-drill likewise vary in the routine of exercises. In the navy, also, the drilling of seamen is different, according to their duties.

Drip, in architecture, the same as Corona (which see).

Dris'ler (Henry), LL.D., an American scholar, born Dec. 27, 1818, graduated at Columbia College in 1839, was classical instructor in its grammar-school for several years, appointed tutor of the Greek and Latin languages in the college (1843), adjunct professor in the same department (1845), professor of Latin (1857), and transferred to the chair of Greek on the death of Dr. Anthon, in 1867; in the same year was acting president of the college during President Barnard's absence as a commissioner to the Exposition Universelle in Paris. For several years after leaving college he was engaged with Dr. Anthon on his series of classical text-books, etc. Besides several pamphlets and school-books, his contributions to classical learning are an enlarged edition of Liddell and Scott's translation of Passow's "Greek Lexicon" (1846), and a revised and

greatly enlarged edition of Yonge's "English-Greek Lexicon" (1870).

Dri'ver, also called the **Spanker,** in navigation, is a large quadrilateral sail hoisted on the mizzen gaff, and extended at the bottom by a boom called the *driver-boom.* It is the principal "fore-and-aft" sail, and is very important in an adverse wind.

Dri'ving Wheel. In machinery, this term is applied to the wheel which communicates the motion to the pinion, or the second wheel deriving its motion from the first, which may be either a multiplying or diminishing wheel. The large wheels of locomotive engines are also called driving wheels.

Drogheda', a seaport-town of Ireland, in Leinster, on the boundary between the counties of Louth and Meath, and on the river Boyne, 4 miles from its entrance into the sea, and 25 miles N. of Dublin; lat. 53° 44′ N., lon. 6° 12′ W. The Dublin and Belfast Railway here crosses the Boyne by a viaduct ninety-five feet high. It has a Roman Catholic cathedral, a custom-house, and several convents; also manufactures of cotton and linen fabrics, steam-engines, etc. Vessels of 400 tons can ascend the river to this port, from which grain, cattle, linen, hides, butter, and ale are exported, mostly to Liverpool. Pop. in 1871, 16,135.

Drogheda, Marquesses of (1791), earls of Drogheda (1661), Viscounts Moore (1621), Barons Moore (Ireland, 1616), Barons Moore of Moore Place, Kent (United Kingdom, 1801).—Henry Francis Seymour Moore, third marquess, K. P., P. C., born Aug. 14, 1825, succeeded his uncle in 1837.

Drohobicz, a town of Austria, in Galicia, is on a tributary of the Dneister, 18 miles S. E. of Sambor. It has a castle, two handsome churches, a monastery, and extensive salt-works. Pop. in 1869, 16,884.

Droit'wich (anc. *Salinæ*), a town of England, in Worcestershire, on the Bristol and Birmingham Railway, 7 miles N. N. E. of Worcester. It derives its prosperity chiefly from its trade in salt, for which it has been famous from remote times. Here are brine-springs rising from a depth of 200 feet through new red sandstone, and yielding annually about 100,000 tons of salt, said to be the best in Europe. Pop. in 1871, 3504.

Drôme, a department in the S. E. part of France, has an area of 2519 square miles. It is bounded on the W. by the river Rhone, and drained by the Drôme. The surface is partly hilly and mountainous. Coal, copper, iron, lead, and marble are found here. The highlands are covered with forests of oak, pine, beech, and chestnut. Among the staple productions are grapes, olives, chestnuts, silk, and wine of excellent quality. The wine called L'Hermitage is celebrated. Drôme is intersected by the Lyons and Avignon Railway. Capital, Valence. Pop. in 1872, 320,417.

Drom'edary [from the Gr. δρόμος, a "running," so named from its swiftness], (*Camelus dromedarius*), the name given to the Arabian and African camel, a species differing from the Bactrian camel in having only one hump on the back. It has also more slenderness and symmetry of form. Its usual pace is a trot, which it often maintains for many hours together at the rate of nine miles an hour. The dromedary surpasses other camels in speed, and can travel several days without drink. It is extensively used as a beast of burden in the deserts of Africa and Arabia. (See Camel.)

Dropping Tube, in chemistry, a slender tapering tube open at both ends, but terminating at the lower in a narrow orifice, used to supply liquids in delicate experiments, drop by drop. A bulb to hold the liquid is blown near the upper extremity. The flow is regulated by placing the finger on the open upper end, so as partially or entirely to close it.

Drop'sy [a corruption of the old English *hydropsy;* Gr. ὕδρωψ, from ὕδωρ, "water;" Lat. *hydropisis;* Fr. *hydropisie;* Ger. *Wassersucht* (*i. e.* "water-sickness")], a disease characterized by excess of the natural secretion of fluid in any of the serous cavities of the body or in the areolar tissue. If the cerebro-spinal fluid be increased, it constitutes *hydrocephalus,* or "water on the brain." If the excessive secretion (exudation) takes place from the pleura, it is called *hydrothorax,* or "dropsy of the chest." If the fluid collect in the abdominal cavity, the disease is called *ascites* (from the Gr. ἀσκός, a "skin" or leathern bag for water or wine, alluding to the form of the patient's body), a disease which may arise without assignable cause, but which most frequently comes from cirrhosis of the liver, a contracted, hardened condition of that organ, mechanically obstructing the portal circulation, and thus leading to transudation of serum from the blood-vessels. Habitual intemperance is its most frequent cause. General dropsy of the serous and areolar tissues is called *anasarca* (from the Gr. ἀνά, "throughout," and σάρξ (gen. σαρκός), the "flesh"). Obstructive organic disease of the heart and degenerative diseases of the kidneys are the most frequent causes of general dropsy, which is therefore a very important symptom. *Hydropericardium,* or "water on the heart," *hydrarthrus,* or effusion into a joint, *hydrorachis,* which is seated in the spinal canal, and *hydrocele,* in the scrotum, are forms of dropsy. Ovarian dropsy or ovarian tumor is a fluid collection occurring in ovarian cysts, which may be unilocular (of one sac) or multilocular (composed of many aggregated cysts), the whole frequently forming a mass of enormous size. Thus far, its only successful treatment consists in the removal of the cysts by excision, one of the boldest, and, on the whole, one of the best, of the more recent surgical operations.

Revised by Willard Parker.

Dros'era [from the Gr. δροσερός, "dewy"], a genus of perennial herbaceous plants of the order Droseraceæ, popularly called sun-dew, several species of which are natives of the U. S. and of England. From the glands of the leaves exude drops of a clear fluid glittering like dewdrops; hence the name. The flower opens only in sunshine.

Drosera'ceæ [from *Drosera,* one of the genera], a natural order of herbaceous exogenous plants which grow in bogs or marshy places in many parts of the world. They mostly have glandular hairs, and hypogynous, pentamerous flowers. The fruit is a 1-celled pod or capsule. This order comprises the Venus's flytrap (see Dionæa) and the *Drosera* (sun-dew), several species of which are natives of the U. S.

Drosom'eter [Gr. δρόσος, "dew," and μέτρον, "measure"], an instrument for measuring the quantity of dew which falls upon the surface of an exposed body. It is in the form of a balance; the body under observation is supported by one arm, while the weights are placed in a scale-pan attached to the other, and protected from the dew.

Dros'sen, a town of Prussia, in the province of Brandenburg, has a normal school, tanneries, cloth-factories, and important cattle-markets. Pop. in 1871, 5231.

Dros'te zu Visch'ering, von (Clemens August), Freiherr, a German archbishop, born Jan. 22, 1773, became vicar-general in 1805, assistant bishop of the diocese of Münster in 1825, and archbishop of Cologne in 1835. In consequence of difficulties with the Prussian government in regard to mixed marriages, which the archbishop forbade the priests to solemnize unless they received the promise that all the children would be brought up in the Catholic religion, he was imprisoned in the fortress Minden in 1837, but was released in 1841, and died Oct. 19, 1845. His imprisonment called forth an extraordinary excitement in Germany, and greatly strengthened the influence of the Catholic Church.

Drouyn de Lhuys (Édouard), a French diplomatist, born at Paris Nov. 19, 1805. He was appointed director of the commercial bureau in the ministry of foreign affairs in 1840. Having voted in the Chamber of Deputies against the ministry, he was removed from office in 1845. He was minister of foreign affairs in the first cabinet of Louis Napoleon in 1848, was sent as minister to London in 1849, and was a conservative member of the National Assembly in 1851. He was appointed minister of foreign affairs in July, 1852, resigned in 1855, and was restored to that position in Oct., 1862. He again resigned office in 1866.

Drown'ing, death by long-continued submersion in water. The recovery of persons after apparent death from drowning is a very important subject. The following rules are derived from the experience of the best physicians: (1) It is necessary in all cases to keep the body cool until respiration be re-established, since the application of warmth (both in frozen and nearly drowned persons) seems to arouse those dormant energies that absolutely require the aëration of the blood, which failing, death ensues. (2) Respiration must be artificially established, either by direct inflation of the lungs by the breath or the bellows, or, much better, by the "Marshall Hall method" or some of its modifications. The patient being in a horizontal position to facilitate the exit of water from the lungs, and the head being slightly raised, the lungs are alternately inflated and compressed by gently rolling the body from a prone to a half-prone position (upon one side), and reversing the process. The lungs may also be inflated by retracting the arms with some force, and by pressure upon the thorax. (3) Expose the face and chest to the air, unless the weather be very cold. (4) Rub the limbs upward, and as soon as dry clothing can be procured put it upon the patient. (5) Avoid the use of the galvanic battery, which is always dangerous, even in experienced hands. (6) Continue these operations until, if possible, natural respiration be re-established. Cases are reported where artificial respiration had to be kept up

for hours before signs of life appeared. Similar treatment should be employed in all cases of so-called "asphyxia" from whatever cause.

REVISED BY WILLARD PARKER.

DROWNING, as a capital punishment, was formerly practised in various parts of the Old World. In the Anglo-Saxon codes women convicted of theft were condemned to be drowned. The ancient Burgundians condemned a faithless wife to be smothered in mud. This form of punishment was common in the Middle Ages, and seems to have been principally inflicted upon women. It was not abolished in Scotland till 1685, and in Austria it lasted till 1776.

Droyls'den, a village of England, in Lancashire, on the Lancashire and Yorkshire Railway, 4 miles E. of Manchester. It has extensive manufactures of cotton and several dye-works. It has increased rapidly in recent times. Pop. 5980.

Droy'sen (JOHANN GUSTAV), a German historian, born at Trepton July 6, 1808. He became in 1833 lecturer on history in the University of Berlin, in 1840 professor at Kiel, in 1851 at Jena, and in 1859 at Berlin. He published, besides other works, a "History of Alexander the Great" (1833), a "History of Hellenism" (2 vols., 1836–43), a "Life of Field-marshal Count Tork von Wartenburg" (4th ed. 1863), and an "Outline of the Science of History" (3d ed. 1869). His "History of Prussian Politics" (vol. i.–iv., 1855–70) is called his most important work.

Droz (FRANÇOIS XAVIER JOSEPH), a French author and moralist, born at Besançon Oct. 31, 1773. He produced in 1806 an "Essay on Happiness," and gained the Montyon prize in 1824 for his treatise "On Moral Philosophy." His reputation is founded chiefly on his "History of the Reign of Louis XVI." (3 vols., 1839–42). Died Nov. 4, 1850.

Druey (CHARLES), a Swiss politician, born in 1799, was a leader of the liberal party. He was president of the provisional government formed in 1845, and was an opponent of the Sonderbund. He promoted the adoption of the new constitution in 1848, and was president of the federal council in 1850. Died Mar. 29, 1855.

Drug [Fr. *drogue;* It. *droga*], any substance used in the preparation of medicine. In commerce, the term includes also dyestuffs, chemicals, varnishes, etc.

Drug'get, a coarse woollen fabric used for covering carpets or as a substitute for carpets. It was formerly used for clothing by the women of the lower classes.

Dru'ids [Gr. δρυίδαι; Lat. *druidæ*, thought by some to be derived from the Celtic *deru;* Gr. δρῦς, an "oak," a tree which they revered, but perhaps from the Celtic *de-rouyd*, "God's speaker"], the priests of the ancient Celtic religion. In Cæsar's time they formed an exclusive class, which shared with the nobility and the knights the rule over the people, and were free from taxes and from military service. They presided at the sacrifices, instructed the youth, and guarded the secret doctrines of religion. They acted as judges in the difficulties between different tribes, and exercised the art of prophecy and of sacred minstrelsy. They were also skilled in medicine, in astrology, the division of time, and other branches of knowledge, which were kept secret from the masses of the people. They practised the sacrifice of human beings, recognized a ruling destiny and the immortality of the soul, and reverenced the oak and mistletoe as sacred. Their political importance ceased on the subjection of Gaul to the Romans, and their religious service was abolished by a decree of the emperor Claudius. There were also druidesses of several ranks. Of the druidical doctrines little is known.

Druids, Orders of. In London in 1781 a club of "Druids" was founded for mutual entertainment. The society thus begun gradually extended, forming an organization for reciprocal assistance in cases of sickness or death. A system of ceremonies was adopted similar to that of the Freemasons, but professedly based on traditions handed down from the ancient Druids. As the society extended, many changes were introduced, and the original organization in course of time was divided into a great number of independent "Orders of Druids." The oldest branch of the society holds its sessions in London. Another branch, calling itself the "Order of Druids in England," is very numerous in that country; in 1870 it numbered 1022 lodges, with 52,946 members. The whole number of members belonging to the different orders in Great Britain, Australia, and the U. S. is estimated at above 100,000. The first lodge in the U. S. was founded in New York in 1833. The society continued to extend, and at length arose the "Grand Grove of the U. S. of the United Ancient Order of the Druids," under whose auspices there had been established in 1870, 149 "groves," numbering in all about 15,000 members. Of latter time different degrees have been instituted. In America, besides the degree conferred at the first entrance, there are five others. Degrees have also been instituted in England, but they are different from those used in the U. S. Though of purely English origin, the German element in the orders of Druids has of late obtained a decided preponderance in the U. S., so that nearly if not quite two-thirds of the "groves" conduct their proceedings in the German language.

Drum [Fr. *tambour;* Ger. *Trommel*], a martial musical instrument, is a hollow cylinder of wood or metal having skin or parchment stretched across one or both ends, on which the drummer beats with a wooden stick called a *drum-stick*. The military drum is used to give various signals, as well as for music. There are three kinds of drums—the *side* drum, the big or *bass* drum, and the *kettle* drum. The first of these is suspended at the side of the drummer, who beats on one end of it only. Strings of catgut, called *snares*, are stretched across the other end; hence it is often called a *snare* drum. The bass drum is beaten on both ends. The kettle drum is of hemispherical form, and has but one head or parchment. It was formerly used in martial music, but is now confined to the orchestra.

DRUM, in architecture, the upright part of a cupola above or below a dome. The term is generally applied to the lower part. The solid part or vase of a Corinthian or Composite capital beneath the acanthus leaves is called a drum. The term drum is applied in machinery to a hollow cylinder fixed upon a shaft for the purpose of driving another cylinder by a band.

DRUM, the name given in the eighteenth century to a crowded fashionable assembly, so styled, says Smollett, "from the noise and emptiness of the entertainment." A large assembly of the kind was called a "drum-major."

Drum (SIMON H.), an American officer, born in 1807 in Pennsylvania, graduated at West Point in 1830, and Aug. 18, 1846, captain Fourth Artillery. He served at the Military Academy as assistant instructor 1830–32; on Black Hawk expedition 1832; chiefly at sea-board posts 1833–36; in Florida war 1836–37 and 1838–39; removing Cherokees to the West 1838; suppressing Canada border disturbances 1839–41; as assistant quartermaster 1846; in the military occupation of Texas 1846; and in the war with Mexico 1846–47, engaged at Vera Cruz, Cerro Gordo, Contreras (recaptured Capt. O'Brien's guns lost without dishonor at Buena Vista), Molino del Rey, Chapultepec, and assault of the city of Mexico, where, after entering the Belen Gate, and while directing the fire of a captured 9-pounder (added to the battery commanded by him) with consummate skill, indomitable energy, and most conspicuous gallantry, he was killed Sept. 13, 1847, aged forty.

GEORGE W. CULLUM, U. S. A.

Dru'mann (KARL WILHELM), a German historian, born near Halberstadt June 11, 1786. He obtained the chair of philology at Königsberg in 1817. His most important work is a "History of Rome" (6 vols., 1834–44), which is highly esteemed. Died July 29, 1861.

Drum'fish (*Pogonias chromis*), a marine fish of the U. S. coasts, found as far S. as Florida. It derives its name from the peculiar sound it emits, somewhat resembling the beat of a drum. It produces this sound after it is caught as well as when in the water. It is caught in great numbers on the south shore of Long Island, and when young is delicate eating. It sometimes reaches eighty pounds in weight. The *Pogonias fasciatus* of the American Atlantic coasts emits the same sounds. These fishes are of the family Scienidæ, many members of which can produce remarkable sounds.

Drum'mer, a person who beats on a drum. Each company of U. S. infantry has one fifer and one drummer, who rank as privates. They execute signals, perform at parades, drills, and reviews, and attend the wounded on the battle-field. The drummers and fifers collectively constitute the regimental music or drum-corps, and are under a principal musician, sometimes called a drum-major.

Drum'mond, a county of Canada, in Quebec, has an area of about 600 square miles. It is intersected by the river St. Francis. Capital, Drummondville. Pop. in 1871, 14,281.

Drummond (THOMAS), CAPTAIN R. E., a Scottish engineer, was born in Edinburgh in Oct., 1797. He was well versed in mathematics and skilful in mechanics. He was one of the royal military engineers employed in the trigonometrical survey of Scotland. In 1825, while engaged in this operation, he made successful experiments with incandescent lime to render distant objects visible. (See DRUMMOND LIGHT.) He was appointed under-secretary for Ireland in 1835. Died April 15, 1840.

Drummond (WILLIAM) **of Hawthornden,** a Scottish poet, born of a noble family, Dec. 13, 1585, was liberally educated. He studied law in France, from which he re-

turned in 1609. He resided on his beautiful paternal estate of Hawthornden, where he passed his life in retirement and in literary pursuits. He married Elizabeth Logan about 1630. In 1619, Ben Jonson travelled several hundred miles in order to visit Drummond, who wrote "Notes of Ben Jonson's Conversation" on this occasion. These notes are among his most interesting productions. He was author of sonnets, and a poem called "The River Forth Feasting." Died Dec. 4, 1649.

Drummond Grove, a township of Ford co., Ill. P. 568.

Drummond Island, in Lake Huron, is the most western of the Manitoulin Islands, and belongs to Michigan. It is 20 miles long and 10 miles wide.

Drummond Light [named from Thomas Drummond, its inventor], also called **Lime Light, Calcium Light,** etc., an intense light produced by throwing the oxyhydrogen blowpipe flame upon a pencil of lime, which is thereby raised to very vivid incandescence. If magnesia or metallic magnesium be used instead of lime, the light is very rich in actinic rays, and hence is useful in photography. Zirconia is often employed instead of lime, on account of its non-volatility.

Drum'mondville East, a post-village, capital of Drummond co., Quebec (Canada), in Grantham township, and on the St. Francis River, 24 miles from Melbourne. Pop. about 400.

Drummondville West, a post-village of Stanford township, Welland co., Ontario (Canada), half a mile from Niagara Falls, has two observatories, each 74 feet high, which afford a fine view of the Falls and the surrounding region. Pop. about 1000.

Dru'more, a township of Lancaster co., Pa., on the E. shore of the Susquehanna. Pop. 3061.

Drunkenness. See DIPSOMANIA and INTEMPERANCE.

Drupa'ceæ [from DRUPE, which see], a natural order of plants, regarded by some botanists as a sub-order of the Rosaceæ. It is characterized by polypetalous regular flowers, a solitary carpel, the style of which proceeds from the apex, and a drupaceous fruit. The peach, apricot, plum, and cherry are examples.

Drupe [Lat. *drupa;* Gr. δρύππα (from δρυπετής, "overripe," "ready to fall from the tree")], in botany, a 1-celled, superior indehiscent fruit, having a single seed or kernel, usually enclosed in a hard and bony *endocarp* called a stone, as a peach or a plum. The outer part of the fruit, which is succulent or fleshy, is called the *sarcocarp* or *mesocarp.* The term *putamen* is applied to the hard, stony substance which encloses the kernel.

Dru'ry, a post-township of Rock Island co., Ill. P. 1331.

Dru'ses, written also **Druzes** and **Droozes** [from *El Dorazy,* a Persian and minister of state to El Hakem, sixth Fatimite caliph in Egypt; Ger. *Drusen*], a people of mixed race (largely Persian and Arab), almost limited to the Lebanon, Wady-el-Teim, and the Hauran, speaking the Arabic language, and professing a religion of which until quite recently almost nothing was known. They number, some say, nearly 100,000; others say, only about 50,000. They are industrious, hospitable, and very proud of their birth and pedigree. Their chief business is the production and manufacture of silk. For about 800 years they have maintained a distinct religion and an independent nationality. El Dorazy, who was the first to assert the divinity of El Hakem, is now repudiated by the Druses, who honor Hamzeh-ibn-Ahmed, another Persian, as the real founder of their religion, which dates from the early part of the eleventh century. They emphasize the unity of God, successive manifestations of God, and the transmigration of souls. A terribly bloody war between them and the Maronites led, in 1860, to European intervention on behalf of the Christians. (See MARONITES. See also the EARL OF CARNARVON'S "Druses of the Lebanon," 1860; REV. JOHN WORTABET, "Researches into the Religions of Syria," 1860.)

Dru'sus (CLAUDIUS NERO), a Roman general, born in 38 B. C., was a younger brother of the emperor Tiberius. His mother Livia was a wife of the emperor Augustus. He married Antonia, a daughter of Mark Antony. In 13 B. C. he defeated the Germans near the Rhine. Having conquered the Sicambri and Frisii, he extended the Roman empire to the German Ocean and to the river Elbe. For these victories he received the surname of GERMANICUS. He died in 9 B. C., leaving two sons, Germanicus and Claudius, the latter of whom became emperor.

Drusus (MARCUS LIVIUS), a Roman orator and politician, who became tribune of the people in 122 B. C. as a colleague of Caius Gracchus. He supported the cause of the senate and optimates, opposed the policy of Gracchus, and gained popularity by planting colonies. He was elected consul for 112 B. C.

Drusus (MARCUS LIVIUS), called DRUSUS JUNIOR, was a son of the preceding and an uncle of Cato Uticensis. He is said to have been ambitious, proud, and arrogant, and a champion of the senate or aristocratic party. Having been chosen tribune of the people for 91 B. C., he courted the popular favor by passing an agrarian law. He formed a design to admit the Italiotes to the right of citizenship. His official conduct was condemned by the senate. He died in 91 B. C.

Dry'ad [Gr. δρυάς, plu. δρυάδες (from δρῦς, an "oak" or any tree); Lat. *dryades*]. In Greek mythology, the dryads were nymphs or goddesses supposed to preside over woods and groves.

Dry Bank Light, on the Florida Reef, stands on Sombrero Shoal, near Dry Bank, Coffin's Patches, and Sombrero Key, in lat. 24° 37′ 36″ N., lon. 81° 6′ 43″ W. It is an open framework of iron 149 feet high, with a fixed white dioptric light of the first class.

Dry Creek, a township of Blount co., Ala. Pop. 442.

Dry Creek, a township of Sacramento co., Cal. P. 603.

Dry Creek, a township of Howell co., Mo. Pop. 177.

Dry Creek, a township of Maries co., Mo. Pop. 422.

Dry'den, a post-township of Lapeer co., Mich. Pop. 1695.

Dryden, a township of Sibley co., Minn. Pop. 443.

Dryden, a township and post-village of Tompkins co., N. Y., on the Southern Central R. R., 32 miles N. of Owego. It has one weekly newspaper, one large woollen-factory, a tannery, a graded school, and a magnetic spring. Here is the Dryden Spring Place, a resort for invalids. Total pop. 4818; of village, 672. W. E. ORUM, PUB. "HERALD."

Dryden (JOHN), an eminent English poet, born at Aldwinckle, Northamptonshire, on the 9th of Aug., 1631, was a grandson of Sir Erasmus Driden, created a baronet in 1619. He was a pupil of Dr. Busby, and entered Trinity College, Cambridge, in 1650. Having graduated as master of arts in 1657, he became a resident of London. He wrote "Heroic Stanzas on the Death of Cromwell" (1658), and celebrated the restoration of Charles II. in 1660 by a poem entitled "Astræa Redux." His first drama was the "Wild Gallant" (1662). He married Lady Howard, a daughter of the earl of Berkshire, in 1663, and produced in 1667 a poem called "Annus Mirabilis, or Year of Wonders." In 1668 he was appointed poet-laureate, with a salary of £200 annually. He afterwards wrote numerous comedies and tragedies, among which are "Marriage à la Mode," "All for Love" (1678), and "Aurungzebe." His political and poetical satire of "Absalom and Achitophel" (1681) is a very famous and brilliant production directed against the party of which Lord Shaftesbury and the dukes of Buckingham and Monmouth were the leaders. He announced his conversion to the Roman Catholic religion by his allegorical poem called "The Hind and the Panther" (1687). He produced in 1696 a metrical translation of Virgil, which Pope commended as "the most noble and spirited translation I know in any language." It is, however, deficient in fidelity. Among his other works are an excellent prose "Essay on Dramatic Poesy" (1660) and an "Ode for Saint Cecilia's Day." He died May 1, 1700, and was buried in Westminster Abbey. His later works exhibit a purer taste and a more natural style than his dramas.

Dry Dock. See DOCKS, by S. H. SHREVE, C. E.

Dry Fork, a township of Randolph co., West Va. Pop. 659.

Dry Grove, a township of McLean co., Ill. Pop. 1267.

Drying Machine, a term applied to various inventions for extracting the moisture from fabrics. A machine most commonly used by dyers and large laundry establishments, called an "extractor," consists of two cylinders, one within the other. The inner one is the receptacle for the goods, and is made to revolve with great rapidity, expelling the water through perforations made in the sides. The outer cylinder receives the water, and from thence it is carried off by means of a pipe. By this process the drying is not quite complete, but what remains is expelled by drying in a hot chamber or in the open air. A more simple drying machine for domestic use is constructed of two wooden or India-rubber rollers mounted one above the other. They are parallel, and arranged in such a manner that the distance between them can be varied at will. The end of the goods being inserted between the rollers, one is turned by a handle, causing both to revolve and the clothes to pass between, thus extracting the moisture by pressure.

Drying Oil, the name given to linseed and several other seed-oils used in painting, and which have the property of drying quickly. The process of drying is hastened by heating the oil with oxide of lead.

Dryobalanops. See CAMPHOR.

Dry'ophis [from δρῦς, a "tree," an "oak," and ὄφις, a "serpent"], a genus of snakes belonging to the Colubridæ, are natives of tropical America and the East Indies. Like the *Dendrophis*, to which they are allied, they have elongated forms and live on trees.

Dry Pile, a kind of voltaic pile or battery, constructed without liquids, and furnishing a feeble electric current. The dry piles of Zamboni and De Luc consist of disks of copper and zinc papers placed in pairs back to back and piled up or packed in glass tubes, with the copper surfaces all in the same direction.

Dry Point, a sharp etching-needle used by engravers to incise fine lines in a copper plate which is not covered with etching-ground. No acid is applied to eat the lines made by the dry point, which produces very delicate work.

Dry Point, a township of Shelby co., Ill. Pop. 1671.

Dry Process. See PHOTOGRAPHY, by PROF. C. F. CHANDLER, PH. D., LL.D.

Dry Rot, called also **Sap Rot,** is a diseased state incident to timber, which reduces its substance to a mass of dry dust by decomposing the fibres. It is caused by various species of fungi, among which are *Merulius lachrymans* and *Polyporus destructor*. In the navy-yards of Great Britain great ravages have been ascribed to some species of *Sporotrichum*. The ends of the timber are generally affected by this disease, and the decay often makes great progress without being suspected. The chief causes of dry rot are stagnation of air, as under the floor of a building or behind a wainscot, and imperfect drying of the timber. That which is well seasoned will resist the fungi for many centuries, as is shown by wood brought from the frieze of the Parthenon, which had been placed there more than 2300 years ago. Various substances have been used for the prevention of dry rot, one of the most successful of which is a solution of corrosive sublimate introduced into the pores of the wood by an air-pump.

Dry'-stove, a glazed structure designed for the protection of the plants of dry, arid climates; a hot-house in which the air is kept less moist than in the bark stove. It is particularly adapted to succulent plants. The temperature should be higher than that of a green-house.

Dry Tortu'gas [Sp. *tortuga*, a "tortoise"], a group of ten small, low, barren islands belonging to Monroe co., Fla., situated over 40 miles W. of the most western of the Florida Keys proper. On the south-westernmost island, called Loggerhead Key, stands a brick lighthouse 150 feet high, with a fixed white dioptric light of the first order; lat. 24° 38′ 5″ N., lon. 82° 52′ 53″ W. There is also a smaller light for Dry Tortugas Harbor (lat. 24° 37′ 47″ N., lon. 82° 52′ 53″ W.). This lighthouse stands inside Fort Jefferson, an important fortification on Garden Key. The Dry Tortugas served as a place of imprisonment for persons under sentence by courts-martial during the late civil war. Several criminals concerned in the conspiracy in which President Lincoln was murdered were confined here.

Dry'town, a post-township of Amador co., Cal. P. 853.

Dry'wood, a township of Bourbon co., Kan. P. 1199.

Drywood, a post-township of Vernon co., Mo. P. 475.

Du'alin [so called because it is a mixture of two different substances], an explosive compound introduced in 1868 by Dittmar, is composed of NITRO-GLYCERINE (which see) mixed with saw-dust, or wood-pulp such as is used in paper-mills; the latter being first treated with nitric and sulphuric acids. The object of the mixture is to diminish the danger connected with the storage and transportation of nitro-glycerine. (See EXPLOSIVES, by GEN. H. L. ABBOT, U. S. A.)

Du'alism [from the Lat. *dualis*, "containing two"], in metaphysics, the doctrine that the universe exists by the concurrence of two principles, the spiritual and the material, each necessarily independent and eternal. The "dualism" of Zoroaster belongs rather to religion than to philosophy. It assumed two independent principles—one good, the other evil—through the collision of which was explained the disorder, moral and physical, of the world. The Gnostics in the second century adopted these views in a greater or less degree. The Greek philosophers are called dualists, inasmuch as the most of them held to the belief that matter and spirit were each self-existent and independent in origin. Their statements of the doctrine differ from each other, and are vague and indistinct. But the Stoical doctrine of a soul of the world, contradistinguished from matter without qualities (ἄποιος ὕλη), represents the general drift of the Greek thought. The prevailing mode of thought among Christian theists recognizes the real being of mind and matter in the constitution of man and the order of the universe, while it attributes self-existence and creative power solely to the Supreme Mind. In connection with theories of perception the term Dualism has been used to denote the soul and the modes of matter in relation and opposition while the mind is in the act of acquiring knowledge of the external world. (See HAMILTON'S ed. of Reid, p. 817.)

REVISED BY M. B. ANDERSON.

Du'al Num'ber, in grammar, is that form of the noun, adjective, or verb denoting in some languages the number two. For example, in the ancient Greek there were three numbers in grammar, the singular, the dual, and the plural; but the dual was not very often used, and is never found in Æolic or in Hellenistic Greek. It occurred most frequently in the Attic dialect.

Duane, a post-township of Franklin co., N. Y. It has beds of magnetic iron ore. Pop. 234.

Duane, du-ān′ (JAMES), a mayor of New York, was born in that city Feb. 6, 1733. He became a lawyer and a leading revolutionist in the war of Independence, was a member of Congress (1774–77 and 1780–82), was the first mayor of New York in 1784, and U. S. district judge (1789–94). Died at Duanesburg, his patrimonial estate, Feb. 1, 1797.

Duane (JAMES C.), an American officer, born in 1824 in New York, graduated at West Point in 1848, and Mar. 7, 1867, lieutenant-colonel of engineers. He served at the Military Academy with engineer troops and as assistant instructor 1848–54; in the construction of fortifications 1849–56; as lighthouse engineer 1856–58; on Utah expedition 1858; at the Military Academy as instructor of practical engineering, etc., 1858–61. In the civil war he served in defence of Fort Pickens, Fla., 1861; in the defences of Washington, organizing engineer troops and equipage, 1861–62; in the Virginia Peninsula 1862, engaged in command of engineer battalion at Yorktown, Gaines's Mill, and construction of field-works, roads, and bridges; in the Maryland campaign as chief engineer of the Army of the Potomac 1862, engaged at South Mountain, Antietam, and several skirmishes; as chief engineer of the department of the South 1862–63, engaged in the attack on Fort McAllister, Ga., and operations against Charleston, S. C.; as chief engineer of the Army of the Potomac 1863–65, engaged at Manassas Gap, Rappahannock Station, Robertson's Tavern, Wilderness, Spottsylvania, Cold Harbor, Petersburg, Hatcher's Run, and Appomattox Court-house. (Brevet lieutenant-colonel and colonel for meritorious and faithful services in the Richmond campaign, and brigadier-general for gallant and meritorious services in the siege of Petersburg and subsequent operations.) He has served since in the construction of the defences of the eastern entrance to New York harbor 1865–68; member of engineer boards 1867–73; and is now lighthouse engineer of the N. E. Atlantic coast and superintendent of the fortifications in Maine and New Hampshire. Author of "A Manual for Engineer Troops," 1862.

GEORGE W. CULLUM, U. S. A.

Duane (WILLIAM), an American politician and printer, was born near Lake Champlain, N. Y., in 1760. He passed some years in India and in England, from which he returned to the U. S. in 1795. He then became the editor of the "Aurora," which was published at Philadelphia, and was the influential organ of the Democratic party. He served in the war of 1812 as adjutant-general with the rank of colonel, and published a "Military Dictionary" (1810), besides numerous other works, chiefly upon military subjects. Died Nov. 25, 1835.

Duane (WILLIAM JOHN), an able lawyer and statesman, born at Clonmel, Ireland, in 1780, was a son of the preceding. He practised law in Philadelphia, and published, besides other works, "The Law of Nations Investigated in a Popular Manner" (1809). He was appointed secretary of the treasury of the U. S. early in 1833, but was dismissed from office in September of that year by President Jackson, because he refused to remove the deposits of public money from the Bank of the U. S. Died Sept. 27, 1865.

Duanesburg, a township and post-village of Schenectady co., N. Y., on the Albany and Susquehanna R. R., 24 miles N. W. of Albany. A branch railroad extends to Schenectady. Pop. 3042.

Duban (JACQUES FÉLIX), a French architect, born in Paris Oct. 14, 1797. He completed the Palace of the Fine Arts, and became a member of the Institute and commander of the Legion of Honor (1868).

Dubhoy', a town of the East Indies, in the dominion of the Guicowar, 38 miles N. E. of Baroach. It was once strongly fortified. It contains handsome gates and a splendid temple. In the last century it had 40,000 inhabitants.

Dubic'za, a fortified town of European Turkey, is on

the northern frontier of Bosnia, and on the river Unna about 10 miles from its entrance into the Save, and 23 miles W. of Gradiska. Pop. 6000. On the opposite bank of the Unna is Austrian Dubicza, which is a fortified town.

Dub'lin, a county of Ireland in Leinster, has an area of 354 square miles. It is bounded on the E. by the Irish Sea, and is intersected by the river Liffey, which flows into Dublin Bay. The surface is nearly level; the soil is productive and well cultivated. Granite, copper, lead, and carboniferous limestone occur here. Chief town, Dublin. Pop. in 1871, 405,625.

Dublin [said to be derived from the Irish *dabh-linn, i. e.* "black pool;" anc. *Eblana*], the capital of Ireland, is in the above county, on the river Liffey at its entrance into Dublin Bay, 66 miles W. of Holyhead and 135 miles W. of Liverpool; lat. 53° 20′ 38″ N., lon. 6° 17′ 30″ W. Mean annual temperature, 49° F. The river, which runs eastward, divides the city into two nearly equal parts, which are connected by seven stone and two iron bridges. In the north-eastern and south-eastern parts are many beautiful squares, streets, and terraces, occupied by the aristocratic class. The mercantile business is mostly transacted in the central and north-western portions, where are many residences of the middle class. The city is surrounded by the Circular Road, nearly 9 miles long, which is a favorite drive and promenade of the citizens. The most imposing street of Dublin is Sackville street, which is 120 feet wide and nearly 700 yards long. Among the numerous squares is Stephen's Green, having an area of nearly twenty acres. The most remarkable public buildings are the Bank of Ireland (formerly the Parliament House), Trinity College, the custom-house, the Four Courts, Dublin Castle, occupied by the lord lieutenant, and St. George's church with a steeple 200 feet high. Near the N. end of Sackville street is a monument to Lord Nelson, which is 134 feet high. Among the literary and scientific institutions are the University (see DUBLIN, UNIVERSITY OF), the Royal College of Science, the Roman Catholic University, the College of Surgeons, the Royal Dublin Society, the Royal Irish Academy, the Hibernian Academy for Paintings, and the National Gallery. Dublin is the seat of a Protestant Episcopal and a Roman Catholic archbishop. In the environs of Dublin, which are remarkably beautiful, is Glasnevin, once the favorite residence of Addison, Steele, Swift, and Sheridan; and Phœnix Park, which contains nearly 2000 acres, and is frequented by great numbers of persons for recreation. The fine scenery of this noble park, the massive public buildings, the spacious squares, the clean granite quays which line the river, and the beauty of the bay which expands before the city, render Dublin one of the most beautiful and agreeable capitals of Europe. Railways extending in several directions connect this place with the chief towns of Ireland. It is the eastern terminus of the Grand and Royal Canals, and has a good harbor, which has been improved by the construction of two breakwaters. Vessels of 900 tons can come up to the wharves and docks. This city has several glass-works, foundries, and distilleries; also manufactures of poplin, which is much celebrated. Dublin returns two members to Parliament, besides two who represent the university. It is a very old town, and occupies the site of the *Eblana* of Ptolemy. It was captured by the Danes in the ninth century. Pop. in 1871, 246,326, of whom 195,180 were Roman Catholics, and 39,897 Protestant Episcopalians. REVISED BY A. J. SCHEM.

Dublin, a township of Dallas co., Ala. Pop. 707.

Dublin, a post-village, capital of Laurens co., Ga., is near the Oconee River, and 120 miles W. by N. from Savannah.

Dublin, a post-village of Wayne co., Ind., on the Pittsburg Cincinnati and St. Louis R. R., 17 miles W. of Richmond. Pop. 1076.

Dublin, a post-village and township of Harford co., Md. Pop. of village, 123; of township, 3862.

Dublin, a township of Somerset co., Md. Pop. 1454.

Dublin, a post-township of Cheshire co., N. H. P. 930.

Dublin, a township of Mercer co., O. Pop. 1599.

Dublin, a township of Fulton co., Pa. Pop. 879.

Dublin, a township of Huntingdon co., Pa. Pop. 984.

Dublin, a township and post-village of Pulaski co., Va., on the Atlantic Mississippi and Ohio R. R., 104 miles W. S. W. of Lynchburg. Total pop. 2722.

Dublin, University of, otherwise called **Trinity College, Dublin,** is said to have been founded in 1320, but having gone to decay, was re-established in 1593 by Queen Elizabeth. It was endowed by the corporation of Dublin and by private gifts, and still further by grants of James I., who in 1613 gave it representation in Parliament, which it still possesses, sending since 1832 two members to the House of Commons. Its government is modelled upon that of the English universities, but its fellows (since 1840) are at liberty to marry. It has a very full corps of professors in all departments of knowledge, who, like the fellows, are liberally supported from the income of the college. The students are of four classes: (1) Noblemen, baronets, and the sons of noblemen, who have peculiar privileges, and, with the exception of baronets, obtain the degree of B. A. without examination. They pay about $500 a year in fees. (2) Fellow-commoners, who dine with the fellows, and have one less examination than the third class, at about one-half the cost in fees of the preceding. (3) Pensioners, to which class most of the students belong. Their fees are little more than half as great as those of the second class. (4) Sizars, thirty in number, who pay a nominal fee. Each of the ranks wears a distinctive dress. The examination on entrance is thorough. It is possible to obtain degrees without great exertion, but the honors can be obtained only by severe study. No restriction is made with regard to the admission of those who are not members of the Anglican Church. The fees for graduation are much higher than in American colleges. Dublin University occupies a high rank among European institutions of learning. It has special departments for the study of medicine, divinity, and engineering. Among the eminent graduates were Berkeley, Ussher, Swift, Burke, Goldsmith, and Sheridan. An unsuccessful attempt made Mar. 11, 1873, in the British Parliament to unite the Catholic University, Magee College, Belfast, and the Queen's Colleges of Cork and Belfast to the University of Dublin, and to abolish the Queen's College at Galway, led to the temporary disruption of the Gladstone ministry.

Düb'ner (FRIEDRICH), a French philologist, born at Hörselgau, in Germany, Dec. 21, 1802. He was from 1826 to 1831 professor at the gymnasium of Gotha, and after 1831 lived in Paris, where he at first took an active part in Didot's new edition of the "Thesaurus" of Stephanus, and was subsequently one of the editors of the "Bibliotheca Græca" of the same publishers. Besides editions of a number of Latin and Greek classics, he published a Greek grammar (1855) and a French-Greek Lexicon (1860). Died Aug. 16, 1867.

Dubnit'za, a town of European Turkey, province of Room-Elee, on the river Djerma, 22 miles S. of Sophia. It has extensive iron-works. Pop. about 7000.

Dub'no, a town of Russia, in Volhynia, is on the small river Irwa, 32 miles W. of Ostrog. It has several Greek and Roman Catholic churches. The houses are mostly built of wood. Pop. 7628.

Dubois', a county in the S. W. of Indiana. Area, 420 square miles. It is intersected by the Patoka River, and partly bounded on the N. by the East Fork of White River. The surface is nearly level; the soil is fertile. Coal is found here. Tobacco, wool, cattle, and grain are raised. Capital, Jasper. Pop. 12,597.

Dubois (GUILLAUME), a French cardinal and prime minister, born at Brives-la-Gaillarde Sept. 6, 1656. He was preceptor to the duc de Chartres, who became duke of Orleans and regent of France in 1715. Having gained the favor of this prince by pandering to his vices, he was appointed a councillor of state. He exhibited much political cunning and talent for intrigue. Among his important diplomatic acts was the treaty between France, England, and Holland called the Triple Alliance (Jan., 1717). He became about 1718 minister of foreign affairs, and, though his morals were depraved, archbishop of Cambray in 1720. He was appointed prime minister in 1722, and retained power until he died, Aug. 10, 1723.

Dubois (JEAN ANTOINE), ABBÉ, a French missionary, born in Ardèche in 1765. He spent many years in India, and wrote in English a valuable work on "The Character, Manners, Customs, and Institutions of the People of India" (1816). Died in Paris Feb. 7, 1848.

Dubois (PAUL FRANÇOIS), a French politician, born June 2, 1795, at Rennes, became professor of rhetoric at the Lyceum Charlemagne in Paris in 1814. As one of the founders of the "Globe," he contested the restoration of the Bourbons. In 1840 he succeeded Cousin as director of the Normal School, and for many years took a prominent part in public instruction.

Du Bois-Reymond (EMIL), a German physiologist, born Nov. 7, 1818, succeeded in 1858 his teacher, Johannes Müller, as professor at the University of Berlin, and became a member of the Academy of Sciences, of which he has been secretary since 1867. He is regarded as one of the foremost writers on physiology, his chief work being "Researches on Animal Electricity" (1857).

Dubossa'ry, a town of Russia, in the government of

Kherson, on the Dniester, 85 miles N. E. of Odessa, has several factories. Pop. 5547.

Dubuat (The Chevalier), an eminent French experimentalist and writer on hydraulics. He may be said to have laid the foundations of hydro-dynamics, being the first who succeeded in ascribing to the different forces, friction, cohesion, etc., which act on fluids in a state of uniform motion, their effective share in determining their velocity. He was the first to ascertain and measure by striking and original observations (long neglected, but which have since claimed attention) the effect of the cohesion and inertia of the air in retarding the motions of the pendulum. His most important work is entitled "Principles d'Hydraulique et de Pyrodynamique," Paris, 1816; the latter subject being the action of heat upon matter in its different states of solid, fluid, and vapor. He was an officer of the "corps du génie" (engineers), in which he became a colonel—subsequently engineer in ordinary to the king.

Dubufe (Claude Marie), a French painter of history and portraits, was born in Paris in 1790. He was a fashionable portrait-painter. Died April 21, 1864.

Dubufe (Édouard), a portrait-painter, a son of the preceding, was born in Paris about 1818. He painted portraits of several eminent persons with success.

Dubuque, du-būk′, a county in the E. of Iowa. Area, 600 square miles. It is bounded on the N. E. by the Mississippi River. The surface is undulating; the soil is fertile. Cattle, grain, wool, hay, potatoes, and dairy-products are raised. Carriages, beer, clothing, and flour are among the chief articles of manufacture. Limestone occurs here as a surface-rock. This county has rich mines of lead. It is intersected by the Dubuque and Sioux City R. R. and other railroads. Capital, Dubuque. Pop. 38,969.

Dubuque, a city of Iowa, capital of the above county, occupying 13 square miles of plateau and bluff on the W. bank of the Mississippi River, 470 miles N. of St. Louis, 321 miles S. of St. Paul, and 199 miles W. of Chicago. It is the centre of a large and ever-widening railroad system, and during the season of navigation has two lines of steamers plying to St. Louis and St. Paul. It is distinguished for the excellence of its educational institutions. It is the seat of the Iowa Institute of Science and Arts, a widely known and very useful institution. Dubuque is opposite the point where the line between Wisconsin and Illinois reaches the Mississippi, and is in one of the richest lead-regions known. It was in 1870 the largest city in the State except Davenport. Dubuque is the terminus of a railroad which extends westward 327 miles to Sioux City. The Chicago Dubuque and Minnesota R. R. extends from this place to La Crescent in Minnesota. This city is also the north-eastern terminus of the Dubuque and Southwestern R. R. It is the chief dépôt of the lead region of Iowa. It is the seat of a Roman Catholic and a Protestant Episcopal bishop. It contains a large cathedral, a city-hall, a custom-house, three national banks, a German Presbyterian theological school, and an Episcopal seminary. It has large and increasing manufactures of shot, steam-engines, farming-implements, machinery, brick, white lead, leather, wooden ware, etc. Three daily and six weekly papers are published here. Dubuque is connected with Dunleith (Ill.) by a noble railway iron bridge, which is a "marvel of lightness and strength," and cost several millions of dollars. This bridge belongs to the Illinois Central R. R. This city was named in honor of Julien Dubuque, a French trader who, with ten others, settled here in 1788 to mine the ores of lead. This was the first settlement in what is now the State of Iowa. The settlement was abandoned after Dubuque's death in 1810, and the site was not again occupied till 1833. This last was the first permanent settlement in Iowa. It is the entrepôt of a very extensive trade, both by rail and river. Pop. in 1860, 13,000; in 1870, 18,434.

S. W. Russell, formerly Asso. Ed. of "Herald."

Du Cange (Charles du Fresne), a French historical writer, born at Amiens Dec. 18, 1610. He was liberally educated and studied law. Among his most important works are a "History of the Empire of Constantinople under the French Emperors" (1657), a "Glossarium ad Scriptores Mediæ et Infimæ Græcitatis" (2 vols. folio, 1688), and a "Glossarium ad Scriptores Mediæ et Infimæ Latinitatis" (3 vols. folio, 1678, enlarged to 6 vols. folio in 1733–36, and reissued with additions, in 7 vols. quarto, in 1840–50). He passed many years of his mature life in Paris, where he died Oct. 23, 1688.

Du′cas (Michael), [Gr. Μιχαὴλ ὁ Δοῦκας], a Byzantine historian who flourished about 1450, was related to the imperial family of Constantinople. He wrote a "History of the Decadence of the Byzantine Empire, 1355–1453." This work is a part of the collection called "Historia Byzantina." He retired to Lesbos when the Turks captured Constantinople in 1453. Died after 1463.

Duc′at [from the Lat. *dux* (gen. *ducis*), a "leader" or "duke," because it was first coined by Italian dukes; It. *ducato;* Sp. *ducado*], a name of a gold coin which originated in Italy, and was afterwards coined in several countries of Europe. In 1559 the ducat was adopted as a legal coin of the German empire. There was much difference in the value of the ducats which circulated in various countries. Those of Austria, Holland, and Hamburg contain about 52.8 grains of pure gold, and are nearly equivalent to two dollars of our coin. The Spanish silver ducat (*ducado*) is worth about one dollar. The ducat is said to have been first struck in the sixth century by Longinus, duke or *duca* of Ravenna, but Gibbon attributes its origin to the dukes of Milan.

Du Chaillu (Paul Belloni), a French traveller, born about 1830, the son of a French merchant in Equatorial Africa, was naturalized as a citizen of the U. S. He explored the Gaboon region, etc., and published, besides other works, "Explorations and Adventures in Equatorial Africa" (1861), "A Journey to Ashango Land" (1867), and "My Apingi Kingdom" (1871). He was one of the first travellers who described the gorilla.

Duchâtel (Charles Marie Tanguy), Comte, a French politician, born in Paris Feb. 19, 1803. He became a political friend of Guizot, and minister of finance in Sept., 1836. He resigned in April, 1837, and was minister of the interior from Oct., 1840, until Feb., 1848. Died Nov. 5, 1867.

Duchâtel (Pierre), [Lat. *Castellanus*], a liberal French prelate who was born in Burgundy about 1500. He became a thorough Greek scholar, assisted Erasmus, was a proof-reader at Bâle, studied at Rome, travelled in the East, was made bishop of Tulle by Francis I. (1539), bishop of Mâcon (1544), bishop of Orleans (1551), grand almoner of France (1547), and died at Orleans Feb. 2, 1552. He was a zealous advocate of the interests of the Gallican Church.

Duché (Jacob), D. D., an American Episcopal clergyman, born in Philadelphia in 1739. He gained distinction as an eloquent preacher, and was chosen chaplain to the first Continental Congress in 1774. He served as chaplain to several successive Congresses, but after the British occupied Philadelphia he abandoned the popular cause, and wrote to Washington a letter in which he urged him to submit and become a Tory. Duché soon fled to England, but he returned to Philadelphia in 1790. Died Jan. 3, 1798.

Duchesne (André), a learned French historian, born in Touraine in May, 1584. He became geographer and historiographer to the king. He wrote many valuable works, among which are "Ancient Historians of the Normans" ("Historiæ Normanorum Scriptores Antiqui," 1619) and "Contemporary Writers of the History of the Franks" (in Latin, 5 vols., 1636–41). Died May 30, 1640.

Duch′ess [Fr. *duchesse*], the title given to the wife of a duke or the female possessor of a duchy in her own right.

Duchobor′zi (*i. e.* "champions of the Spirit"), a sort of Quaker sect among the peasantry of Russia. They seceded from the Molokan sect in the eighteenth century, and are at present not very numerous. The sect was founded by one Ilarion Pobirochin, who taught the Trinity and the transmigration of souls, forbade his followers from serving in the army, and considered himself, it is said, to be the son of God. They were banished in consequence to the regions near the Sea of Azof. In 1839 they were banished to the Trans-Caucasus, where they are now chiefly found, though they probably still exist in small numbers in other parts of Russia.

Duchonquet, a township of Auglaize co., O. It contains the village of Wapakoneta (which see), the capital of the county. Pop. of township, 3959.

Du′cie, Earls of (United Kingdom, 1837), Barons Ducie (England, 1763), Barons Moreton (United Kingdom, 1837). —Henry John Reynolds Moreton, third earl, P. C., F. R. S., born July 26, 1827, was M. P. for Stroud 1852–53, and succeeded his father in 1853.

Duck [from the verb *duck*, to "dive;" Lat. *anas;* Ger. *Ente;* Fr. *canard*), a name applied to many swimming birds of the family Anatidæ, belonging to the old genus *Anas*, which is now divided into many smaller genera. The true ducks, or Anatinæ, frequent fresh water, feeding on both animal and vegetable matter. They are grega-

rious, and the males are larger and handsomer than the females. They are shot for food and for sport, and in Europe they are caught in great numbers by nets. The common domesticated duck is a descendant of the mallard (*Anas boschas*), which is found wild in Europe, Asia, and America. Eight genera of true ducks are found in North America, and several species are common to the Old and New Worlds. The sea-ducks (Fuligulininæ) differ from the foregoing in having a large flap or lobe under the hind toe. The eider-duck, the canvas-back, and the surf-duck are well-known examples of this sub-family. There are also tree-ducks, which approach the character of geese. The more important birds of this numerous group are described under their alphabetical heads.

The different breeds of domesticated ducks, with the probable exception of certain varieties in China and the neighboring countries, are all descended from the mallard, as above stated; but in domestication the ducks become polygamous, although they always live in pairs when wild. The male also ceases to care for his offspring; and even the females are sometimes not good mothers, so that it is always better to hatch ducks' eggs under a hen. The eggs, from their somewhat rank taste, are less prized than those of the hen; but the flesh of some breeds, such as the Aylesbury duck, is considered a great delicacy. Young ducks should be allowed free access to the water.

Duck [from the Dutch *dock*, "coarse linen cloth," "canvas," akin to the Ger. *Tuch*, "cloth"], a name given to a coarse, heavy linen fabric, highly glazed, which is used as a material for clothing by sailors, men employed in smelting-furnaces, and others. Duck is also a heavy cotton or linen fabric used for sailcloth, water-hose, etc.

Duck-bill, the English name of the *Ornithorhynchus paradoxus*, a monotrematous mammal found in Van Die-

Duck-bill: *Ornithorhynchus.*

men's Land and Australia. In its bill-like jaws, its spurs, its monotrematous character, its non-placental development, and its anatomy, it appears to be a connecting link between birds and mammals.

The duck-bill is the only animal of its genus. It is about fifteen inches long, with a brown fur. It has a sort of horny tooth near the base of each jaw or mandible, and the males have spurs on the hind legs. The female has no nipple, but the young (which are at first very slightly developed) draw the milk through a slit-like opening.

This animal inhabits ponds and quiet streams, where it swims about on the surface of the water with its head somewhat elevated, often diving for its food, which consists of insects and other small aquatic animals. It climbs trees with facility, and is sometimes seen in small parties on the limbs of trees near the water. It digs a burrow, often thirty feet long, in the river-bank, with one opening above and another below water.

Duck Creek, a hundred of Kent co., Del. Pop. 4279.

Duck Creek, a township of Madison co., Ind. P. 789.

Duck Creek, a township of Stoddard co., Mo. P. 781.

Ducking-Stool, a contrivance formerly used in Great Britain and in some parts of the U. S. for the punishment of scolds. The most common form seems to have been that of a strong wooden chair attached to one end of a beam, which pivoted midway on a post planted in the ground at the edge of a pond or stream. The woman having been secured in the chair, the beam was worked up and down by a chain at the other end, and she was thus plunged into the water or "ducked." The practice of ducking originated towards the close of the fifteenth century, and very generally prevailed until the early part of the eighteenth, and in some places to a later date. At Leominster, England, a ducking-stool was in use as late as 1809.

Duck River, of Tennessee, rises in Coffee co., flows nearly westward through Middle Tennessee, and enters the Tennessee River in Humphries co. Length, about 250 miles.

Duck Spring, a township of Etowah co., Ala. P. 372.

Duck'town, a post-village of Polk co., Tenn. It is in the S. E. corner of the State, about 60 miles E. of Chattanooga. It has remarkable copper-mines.

Duck'water, a township of Nye co., Nev. Pop. 145.

Duck-weed (*Lemna*), a genus of endogenous plants placed by some botanists in the natural order Lemnaceæ, while others refer them to the order Araceæ. They are mostly floating plants, with unisexual flowers, without calyx or corolla, and with loose hanging roots. They are widely distributed over the world, and several species are found in the U. S., covering the surface of stagnant waters with their flat green fronds.

Duclos (Charles Pineau), a witty French writer, born at Dinan Feb. 12, 1704. Having written several successful romances, he was admitted into the French Academy in 1747. He was appointed historiographer of France in 1753. Among his works are moral essays entitled "Considérations sur les Mœurs de ce Siècle" (1750) and "Secret Memoirs of the Reigns of Louis XIV. and Louis XV." Died Mar. 26, 1772.

Ducrot (Étienne), a French general, born in 1817, commanded a brigade in the Italian campaign, and the first division of the first army corps in the German-French war; was taken prisoner of war at Sedan, but escaped to Paris, where he took a prominent part in the defence of that city. After the capitulation he was elected a delegate to the National Assembly.

Ductil'ity [Lat. *ductilitas*, from *ductilis*, "easy to be drawn" (from *duco, ductum*, to "draw")], a capability of being drawn out into a long and slender form without a breach of continuity. This term is applied almost exclusively to that property of certain metals which enables them to be elongated or drawn out into wire. The metals having the greatest ductility are gold, silver, platinum, and iron. A grain of gold may be drawn into 500 feet of wire, and a wire of platinum not exceeding a 30,000th of an inch in diameter has been obtained by placing a fine wire of platinum in the axis of a larger silver wire, then drawing the compound wire in the usual mode, and finally dissolving the silver by nitric acid. The ductility of glass (when melted or heated to a red heat) is almost unlimited. The ductility of many bodies is modified by temperature.

Dudevant, Madame. See Sand, George.

Dud'ley, a parliamentary borough of England, is a part of Worcestershire, surrounded by the county of Stafford, 9 miles W. N. W. of Birmingham. It is well built, and is one of the chief seats of the iron-trade. Here are manufactures of glass, grates, fire-irons, nails, vices, chain-cables, etc. Near Dudley are the ruins of Dudley Castle, founded in 760 A. D. by Dudo, a Saxon prince. Mines of coal and iron and quarries of Silurian limestone are worked in the vicinity. Dudley returns one member to Parliament. Pop. of municipal borough in 1871, 43,781.

Dudley, a township of Henry co., Ind. Pop. 1339.

Dudley, a post-township of Worcester co., Mass., on the

Norwich and Worcester and a branch of the New York and New England R. R. It is the site of Nichols Academy, and has woollen, linen, and jute mills. Pop. 2388.

Dudley, a township of Hardin co., O. Pop. 1008.

Dudley, a post-village of Huntingdon co., Pa., is the E. terminus of the Broad Top City branch of the Huntingdon and Broad Top R. R.

Dudley (Benjamin Winslow), M. D., LL.D., was born in Virginia in 1785. Receiving an imperfect preliminary education, he commenced the study of medicine in Lexington, Ky., and took his degree in the University of Pennsylvania in 1806. He went to Europe in 1810, and during his four years of absence studied with Sir Astley Cooper, Abernethy, Cline, Larrey, Dubois, Boyer, Marjolin, and others. In 1817, in conjunction with Blythe, Caldwell, Brown, Richardson, Drake, etc., he organized the medical department of the University of Transylvania, which was long the leading school of medicine in the West. In all its changes Dr. Dudley ever was emphatically its head; he occupied the professorships of anatomy and surgery, which required him to lecture nine times every week. He never had his equal W. of the mountains, and probably but one in America—viz. Valentine Mott. Few surgeons operated more cautiously, although Dr. Physick may have done so. None ever prepared his patients more thoroughly, none did more with the roller, prescribed simpler diet or fewer medicines than he. A distinguished English surgeon in London declared him to be "*the* lithotomist of the nineteenth century." It has been published that he cut a hundred times in succession for stone in the bladder, without a death or failure. The last report of his lithotomy cases—and they were all carefully selected—numbered 225, with an admission of some six deaths; unfortunately, however, the important particulars in regard to age, sex, when and where operated upon, condition of patient, etc. etc., are generally omitted. Nevertheless, this report is a wonderful one. Dr. Dudley performed the lateral operation exclusively, and almost always with the gorget, an instrument now becoming obsolete. He was a small man, very active in his movements, strictly temperate, using cold bathing every morning, and is said never to have worn gloves or used an overcoat until injured by a fall on the ice in the streets of Lexington. He died Jan. 20, 1870. Paul F. Eve.

Dudley (Charles Edward), a Senator, born in Staffordshire, England, May 23, 1780, emigrated to the U. S. in 1794. He was elected mayor of Albany in 1821, and a Senator of the U. S. for an unexpired term of four years in 1829. He founded at Albany the Dudley Observatory, to which his widow gave $70,000. Died Jan. 23, 1841.

Dudley (Joseph) was born in Roxbury, Mass., July 23, 1647. He was appointed chief-justice of Massachusetts in 1686, chief-justice of New York in 1690, and was governor of his native province from 1702 to 1715. Died April 2, 1720.

Dudley (Paul), F. R. S., a lawyer, a son of the preceding, was born Sept. 3, 1675. He was distinguished for his eloquence and talents, became attorney-general of Massachusetts in 1702, and chief justice of that province in 1745. Died Jan. 25, 1751.

Dudley (Thomas), born at Northampton, England, in 1576, served in Holland in Queen Elizabeth's army, and in 1630 came to Boston as deputy-governor of Massachusetts Bay under his son-in-law, Governor Bradstreet. He held the office twelve years. He was governor of the colony in 1634, '40, '45, and '50, and became major-general in 1644. Died July 31, 1653, at Roxbury, where he left an estate long held by his descendants.

Dudley Lake, a township of Jefferson co., Ark. P. 292.

Dud'leyville, a twp. of Tallapoosa co., Ala. Pop. 1600.

Dud'weiler, a town of Prussia, in the Rhine province, has several large coal-mines. Pop. in 1871, 8920.

Dueast's', a township of Cabarrus co., N. C. P. 1015.

Du'el [Lat. *duellum* (perhaps a contraction of *duorum bellum*, a "war of two"); Fr. *duel;* Ger. *Duell* and *Zweikampf;* It. and Port. *duello;* Sp. *duelo*] appears to have signified originally a trial by battle resorted to by two individuals, either for the purpose of determining the guilt or innocence of a person charged with a crime, or of deciding a disputed right. In more recent times it is used to denote a hostile meeting between two persons in consequence of an affront given by one to the other, and for the purpose of affording satisfaction to the injured party.

The practice of fighting duels as a means of deciding private differences seems to be of comparatively recent date. That it originated with the feudal system is sufficiently clear. We should not, however, confound two very different institutions—the appeal to arms as an alternative for the trial by ordeal, and the voluntary challenges or defiances resorted to for the purpose of settling disputes supposed to involve the honor of gentlemen. This last custom was first elevated to the dignity of an established institution by Philip le Bel of France (1308).

In England, duelling does not appear to have prevailed until the latter part of the reign of Queen Elizabeth. At this period appeared the famous "Treatise of Honor" by Vincentio Saviolo, a fierce and punctilious Italian. He was a fencing-master by profession. His work, published in 1594—now little known—appears to have been adopted as a standard book of reference in cases of supposed insult. Saviolo resolves all quarrels into the *lie*—that is, he supposes the original insult to be followed by a regular series of replies and retorts, until one of the parties is reduced to give the lie direct; which, like the phrase "stupid youth" in some German universities, was immediately followed by the appeal to arms.

Henry II. of France issued an edict in 1547 prohibiting the public or judicial combat. This decree was caused by the death of his favorite La Chataigneraye from wounds received in the lists. The public duel survived longer in Italy. Its abolition in France was not followed by the good effects which the statesmen of those days probably anticipated from it. Private duels, conducted with a sanguinary spirit before unheard of, became very prevalent. Brantôme gives instances of duellists who prided themselves on advantages which they had taken of their opponents, and were not less esteemed in society for having done so; there were said to be regiments in the same service, the officers of which were bound to fight one another whenever they met. Lord Herbert of Cherbury mentions the honor in which the French ladies held the brave Balagny, a man with neither wit, figure, nor fortune, but whose merit consisted in the fact that he had killed eight or nine of his friends in single combat.

In the reign of Henry III. the custom of the seconds taking part in the quarrels of their principals seems first to have been established—a custom which did not cease till the beginning of the last century. When such practices were rife in all parts of France we can scarcely doubt the extraordinary assertions of writers of those times—that 120 gentlemen were killed in duels in a single province in six months; that in the reign of Henry IV. 4000 fell in two years; and that this mania cost France more gentle blood than thirty years of civil war. Henry IV. issued edicts against duelling; Louis XIII. proceeded against it with such severity that it is said wounded duellists were dragged from the field to the gibbet; but this extreme severity, as usual in such cases, appears to have had no good effect. In the minority of Louis XIV. the duke de Nemours, a prince of the blood, fell, with two of his seconds, in a quarrel with another grandee. Soon after this many noblemen and gentlemen of undoubted courage made a voluntary compact to abstain from duelling. This resolution was seconded by Louis XIV. when of age, in several edicts. It should be remembered to the honor of that monarch that he labored during his whole life to correct this abuse, and with considerable success. One of his expedients was the establishment of a court of chivalry, the members of which were the marshals of France, which was to decide on all questions in which a gentleman might conceive his honor to be involved. Killing in duels in France is now punishable as homicide, and a civil action lies on behalf of the friends of the man who has been slain.

The first attempt made in England to introduce legislative enactments for the suppression of duels is said to have taken place in 1713, when, after the famous duel of Duke Hamilton with Lord Mohun, a bill for that purpose was brought into the Commons, but lost on the third reading. A challenge to fight is now a high misdemeanor. In Scotland as late, it would appear, as the middle of the sixteenth century, licenses for duelling were granted by the Crown, and formed a source of revenue; killing in a duel without license was murder. The new codes of Bavaria and Prussia contain a number of provisions against duels, challenges, etc. In no country were duels more prevalent formerly than in Ireland. In France the period of the restored monarchy (1815–48) was one of those in which duels were most rife, not only among the military, but among civilians; but since 1848 they have greatly diminished. In Great Britain a heavy blow was aimed at duelling in the army by the new article of war of 1844, rendering it an offence punishable by cashiering. For some years duels, either military or civil, have been comparatively rare.

In America the practice of fighting duels was formerly very common. But in more recent times duelling in any part of the U. S. is rarely heard of. It is not only made illegal by statute, but is forbidden in the army and navy by the Articles of War.

Revised by J. Thomas.

Duen'na [Sp. *dueña*], the chief lady-in-waiting on the queen of Spain. In a more general sense it is applied to a

woman holding a middle station between a governess and a companion, and appointed to take charge of young ladies.

Du'er (John), LL.D., an able American jurist and legal writer, born at Albany, N. Y., Oct. 7, 1782, was a son of Col. William Duer. He practised law in New York City, whither he removed in 1820, and was elected a judge of the superior court of that city in 1849. Among his works is "The Law and Practice of Marine Insurance" (2 vols. 8vo, 1845–46). He succeeded Oakley as chief-justice of the superior court in 1857. Died Aug. 8, 1858.

Duer (William Alexander), a jurist, born in Dutchess co., N. Y., Sept. 8, 1780, was a brother of the preceding. His mother was a daughter of Lord Stirling. He was admitted to the bar in 1802, and became a partner of Edward Livingston in New Orleans, but returned to the city of New York about 1812. He was a judge of the supreme court of New York from 1822 to 1829. In the latter year he was chosen president of Columbia College. He was the author of a "Treatise on the Constitutional Jurisprudence of the U. S." (1856). Died May 30, 1858.

Duet' [It. *duetto* (from the Lat. *duo*, "two"); Fr. *duo*], a piece of music composed for two performers, either vocal or instrumental.

Due West, a post-village and township in Abbeville co., S. C. It is distinguished chiefly as a seat of learning. Erskine College and Erskine Theological Seminary, under the control of the Associate Reformed Presbyterians, are located here, as well as a female college. There are five public libraries in the town, and one weekly paper. Pop. 400; of Due West township, 1030.

J. I. Bonner, Pub. "Associate Ref. Presbyterian."

Dufau (Pierre Armand), a French author, born at Bordeaux in 1795. He wrote several works on political economy and French history, and was an editor of several liberal journals of Paris, and is the author of several works on the education of the blind.

Dufaure (Jules Armand Stanislas), a French orator and statesman, born at Saujon, in Charente-Inférieure, Dec. 4, 1798. He practised law at Bordeaux, and was elected to the Chamber of Deputies in 1834. He became an influential leader of the liberal party. After the formation of the republic in 1848 he was a moderate republican member of the Assembly, and was minister of the interior for about two months ending in December of that year. He filled the same office from June to Oct., 1849, and was driven from the public service by the *coup-d'état* of Dec., 1851, after which he gained great eminence at the bar. He was appointed minister of justice by Thiers in Feb., 1871.

Dufay (Charles François de Cisternay), a French savant, born in Paris Sept. 14, 1698. He was the author of the theory of two kinds of electricity, vitreous and resinous. He wrote treatises on chemistry and other sciences. Died July 16, 1739.

Duff (Alexander), D. D., LL.D., a Scottish Presbyterian missionary, born in Perthshire in 1806 or 1808. He was educated at St. Andrew's. He went to India in 1830, and labored there with great zeal and success for many years as a missionary. In 1839 he published a work "On India and the Missions." After the disruption of the Scottish Church in 1843 he was the chief agent of the mission which the Free Church maintains at Calcutta. He visited the U. S. in 1854, returned to India in 1855, and remained there until 1863. After his return to Scotland he became professor of evangelistic theology in the theological schools of the Free Church.

Duf'ferin, Earls of (United Kingdom, 1871), Barons Dufferin and Clanderboye (Ireland, 1800), Viscounts Clanderboye (1871), Barons Clanderboye of Clanderboye (United Kingdom, 1850).—Frederick Temple Blackwood, first earl, K. P., K. C. B., born in June, 1826, was under-secretary of state for India 1864–66, and for war 1866, and succeeded his father in 1841. He became in 1872 governor-general of Canada.

Duf'field, a post-township of Charles co., Md. Pop. 3485.

Duffield (George), D. D., was born at Strasburg, Lancaster co., Pa., July 4, 1794, and was educated at the University of Pennsylvania. He was for many years a pastor of Presbyterian churches in Philadelphia, New York, and Detroit. He was an active leader of the "New School" movement. Died at Detroit, Mich., June 26, 1869.

Duf'fy's, a township of Tallapoosa co., Ala. Pop. 1273.

Dufour (Guillaume Henri), an able Swiss general, born at Constance Sept. 15, 1787. He entered the French army in 1809, and became a captain in the Swiss service about 1815. In 1847 he was chosen commander-in-chief of the federal army raised to defend the integrity of the republic against the Roman Catholic Sonderbund. He quickly quelled the rebellion. In 1864 he was president of the Geneva convention. He published, besides other works on tactics, etc., a "Memoir upon Ancient and Mediæval Artillery" (1840) and "Permanent Fortification" (1850).

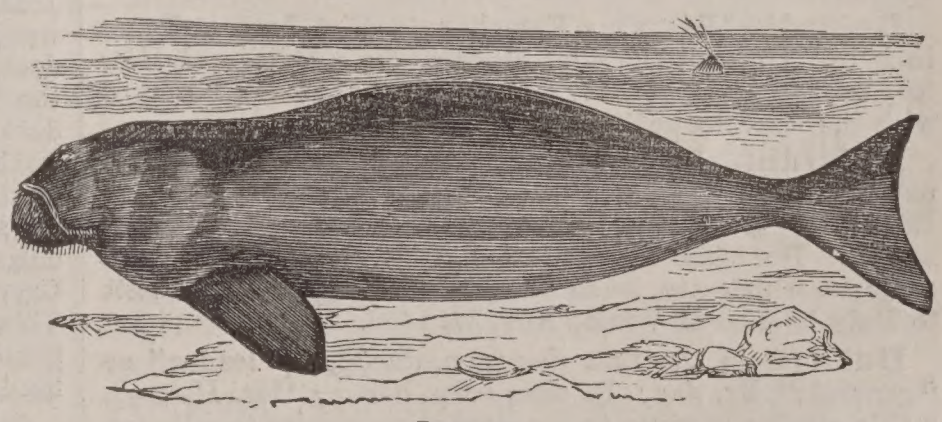
Duganne (Augustine Joseph Hickey), an American poet and novelist, born in Boston in 1823. He published a volume of poems in 1856, and a prose work entitled a "Class-Book of Governments and Civil Society" (1859). Among his poems are "The Iron Harp" (1847) and "The Mission of Intellect" (1852).

Dugas (Louis Alexander), M. D., LL.D., was born in Washington, Wilkes co., Ga., Jan. 3, 1806, received his medical education at the University of Maryland and in Europe, and was one of the original founders of the Medical College of Georgia (1832), in which he still is professor of surgery (1874). He has published many contributions in professional periodicals, was many years editor of the "Southern Medical and Surgical Journal" (Athens, Ga.), and is the author of a "New Principle of Diagnosis of Dislocations of the Shoulder-Joint" (1857).

Dug'dale (Sir William), an English antiquary, born in Warwickshire Sept. 12, 1605. He was appointed blanchlyon pursuivant-extraordinary in 1638, rouge-croix pursuivant-in-ordinary in 1640, became Chester herald in 1644, was a royalist in the civil war, and became Norroy king of arms in 1660, after the restoration of Charles II., and Garter king of arms in 1677. Dugdale and Dodsworth published an important work on English monasteries entitled "Monasticon Anglicanum" (3 vols., 1655–73). Among his other works are "Antiquities of Warwickshire" (1656), which is highly esteemed, and "Origines Juridiciales" (1666). Died Feb. 10, 1686. (See "Life and Diary of Sir W. Dugdale," edited by Hamper, 1827.)

Dughet (Gaspard), called Caspar Poussin, a painter of French extraction, was born at Rome in 1613, and studied under his brother-in-law, Nicolas Poussin, whom he followed as a painter of the heroic landscape, excelling him in the grandeur of his distances, his development of the middle ground, rich foliage masses agitated by the wind, and the bold treatment of landscapes. His chief works are in Rome, where he died in 1675.

Du'gong [a word of Malay origin], a marine animal of the genus *Halicore*, belonging to the Sirenia. The dugong of the Indian seas is generally from eight to twelve feet long, though it is said to attain sometimes the length of twenty-five feet. The upper lip is thick and fleshy, and forms a kind of snout; the upper jaw bends downward almost at a right angle; the eyes are very small, with a nictitating membrane; the skin thick and smooth. In its internal structure it has considerable resemblance to the pachyderms, and it feeds chiefly on algæ. It is also remarkable for the ventricles of the heart being entirely detached from each other. Its flesh is said to resemble beef, and is prized as food. The oil is recommended as a substitute for cod-liver oil. Various species occur in the Indian Ocean, the Red Sea, etc.



Dugong.

Duguay-Trouin (René), a celebrated French admiral, born at Saint Malo June 10, 1673. As captain of a privateer frigate he cruised about the high seas, and took many prizes from the English between 1690 and 1697. In the latter year he entered the royal marine with the rank of captain. He served with distinction in the war of the Spanish succession, which began in 1702. In 1707 he captured three English ships of war and about sixty transports of merchant vessels. Among his famous exploits was the capture of Rio Janeiro in 1711. He was raised to the rank of lieutenant-general in 1728. Died Sept. 27, 1736. (See his autobiographic "Memoirs," 1740, and English translation, 1742.)

Du Guesclin (Bertrand), the greatest French general of his time, was born near Rennes about 1314. He fought against the English, who occupied many places in France, and he defeated the duke of Lancaster at Rennes

in 1356. In 1366 he commanded an army which fought for Henry de Trastamare against Peter the Cruel of Castile. He gained a victory over Peter, but he was defeated and taken prisoner by the English Black Prince in 1367. He paid a large ransom, and was soon released. Having been appointed constable of France in 1369, he defended the country against the English invaders, whom he expelled from nearly every province of France before 1375. Died July 13, 1380. (See FROISSART, "Chronicles;" JAMISON, "Life of Duguesclin," 1864.)

Duhamel du Monceau (HENRI LOUIS), an eminent French botanist and rural economist, born in Paris in 1700. Among his numerous useful works are a "Treatise on the Culture of Land" (1751), a treatise on the structure and physiology of plants entitled "De la Physique des Arbres" (1758), and "Elements of Agriculture" (1762). He was a member of the Academy of Sciences. Died Aug. 23, 1782.

Duil'ius, or **Duil'lius** (CAIUS), a Roman general who became consul in 260 B. C., during the first Punic war. He built ships of war after the model of one taken from the enemy, and was the first Roman who gained a naval victory over the Carthaginians, whom he defeated in the year 260 near the Lipari Islands.

Duil'lian Col'umn, the *Columna Rostrata* which was erected in the forum at Rome (as Quintilian states) to commemorate the naval victory of C. Duillius. (See DUILIUS.) Columns of this kind were called *rostratæ*, from having the beaks of ships (*rostra*) projecting on each side. The restoration of the Duillian column by Michael Angelo is now preserved in the Palazzo de' Conservatori on the Capitoline Hill, retaining in the pedestal a portion of the original inscription in archaic Latin. The inscription has been copied and printed, and may be found at the end of the fourth book of Duker's "Florus."

HENRY DRISLER.

Duis'burg, a town of Rhenish Prussia, on the Ruhr and near the Rhine, 16 miles N. of Düsseldorf. It is an old town, and has a church founded in 1187. Here is a gymnasium, with a realschule and a female high school; and there are also manufactures of cotton and woollen fabrics, hosiery, porcelain, soap, etc. In the thirteenth century it was a city of the Hanseatic League. The railway which connects Cologne with Minden passes through this place, which has been declared a free port. Pop. in 1871, 30,520.

Dujardin (FÉLIX), a French naturalist, born at Tours in 1801. He wrote, besides other works, a "Natural History of Infusoria" (1841) and a "Manual of the Observer with the Microscope" (1843). Died in 1860.

Dujardin, or **De Jardyn** (KAREL), a skilful Dutch painter, born in Amsterdam about 1640, was a pupil of Berghem. He studied in Rome and painted pastoral landscapes. He made also a series of fifty etchings of rural subjects, which are much sought. During a second visit to Italy he died at Venice Nov. 20, 1678.

Duke [from the Lat. *dux* (gen. *ducis*), a "leader" or "general;" Fr. *duc;* It. *duca;* Sp. *duque;* Ger. *Herzog*], a title originally given in the Byzantine empire to military governors of provinces, and previous to the time of Theodosius regarded as inferior to that of count. Dukes in Germany became in course of time the chief princes of the empire. In France and Italy dukes form the second rank in the nobility, being next below princes; in England they are first. The title was introduced in the reign of Edward III., whose eldest son, the Black Prince, was made duke of Cornwall. In 1351, Henry Plantagenet, earl of Lancaster, became duke of Lancaster. The dignity thus created in these instances was not a dukedom by tenure; it has always remained a personal title only, hereditary according to the limitations of the patent. The Austrian archdukes and the Russian grand dukes are princes of the blood. The princes of the royal house of Saxony also have the title of duke. In Bavaria and Würtemberg the side branches of the reigning family are called dukes in Bavaria and dukes of Würtemberg. In Prussia the title was conferred in 1840 upon the Prince Hohenlohe Waldenburg Schillingsfürst (duke of Ratibor), and in 1861 upon Prince Hohenlohe Ochringen (duke of Ujest). Several reigning sovereigns of German states have the title of duke (Anhalt, Brunswick, Saxe-Coburg, Saxe-Meiningen, Saxe-Altenburg) or of grand duke (Baden, Hesse, Oldenburg, Saxe-Weimar, Mecklenburg-Schwerin, and Mecklenburg-Strelitz). Royal dukes in Great Britain are princes of the blood. British dukes have no territorial jurisdiction. The English dukes are next to the peers of the royal blood and the two archbishops of Canterbury and York, the first peers of the realm. There were in 1873 twenty dukes in England (exclusive of the duchess of Inverness, the widow of the duke of Sussex), namely: Norfolk (title created in 1483), Somerset (1547), Richmond (1675), Grafton (1675), Beaufort (1862), St. Alban's (1684), Leeds (1694), Bedford (1694), Devonshire (1694), Marlborough (1702), Rutland (1703), Brandon (duke of Hamilton, 1711), Portland (1716), Manchester (1719), Newcastle (1756), Northumberland (1766), Wellington (1814), Buckingham and Chandos (1822), Sutherland (1833), Cleveland (1833). There are also seven Scotch and one Irish duke, who, however, do not sit in the imperial Parliament as dukes, but as marquesses, earls, viscounts, or barons.

REVISED BY A. J. SCHEM.

Dukes, a county of Massachusetts, consisting of Martha's Vineyard and other smaller islands in the Atlantic Ocean, has an area of about 118 square miles. The largest of these islands is about 5 miles from the mainland. Many of the inhabitants are employed in fisheries. The soil is partly fertile. Some iron ore is found, and salt is made from the sea. Wool is the chief agricultural product. Capital, Edgartown. Pop. 3787.

This county (officially called "the county of Dukes county") was named from the fact that, with the province of New York, it was under the government of the duke of York (King James II.). It became a part of Massachusetts in 1692.

Dulci'gno [anc. *Olcinium;* Turk. *Olgoon*], a town and seaport of European Turkey, lat. 41° 54′ N., lon. 19° 12′ E., is in Albania, on the Adriatic Sea, 14 miles W. S. W. of Scutari. It is the seat of a Catholic bishop, and has a trade in timber and oil. Pop. 7000.

Dul'cimer [Sp. *dulcemele,* from the Lat. *dulcis,* "sweet," and *melos,* "music"], the name of a musical instrument shaped like a triangle, and having brass wire strings, set in motion by rods of wood or iron. The form and nature of the instrument called by this name in the Bible are not known.

Dül'ken, a town in Germany, in the Rhine Province, 8 miles S. S. E. of Kempen. It has manufactures of cotton, silk, thread, ribbons, linens, and wire. Flax is extensively cultivated. Pop. 5816.

Dulong (PIERRE LOUIS), a French chemist and savant, born at Rouen Feb. 12, 1785. He discovered the chloride of nitrogen in 1812, and became an associate of Berzelius in chemical researches. In 1823 he was chosen a member of the Academy of Sciences. He wrote treatises on the theory of heat and on gases. Died at Paris July 19, 1838.

Dulse, the name given to many of the red-spored seaweeds. The *Rhodomenia palmata,* belonging to the Rhodomeniaceæ, grows on rocks on the coasts of Great Britain, the U. S., and other regions. It has sessile fronds of a dark-red or purple color, irregularly notched, and of a leathery texture. It is an important article of food in Iceland, where it is dried and stored in casks. It is abundant on all the British coasts, and is sometimes used as food, either raw or cooked. The *Schyzimenia edulis,* of the order Cryptonemiaceæ, is also called dulse, and is used as food. This also occurs in the U. S. "Pepper dulse," of the genus *Laurentia* and order Laurentiaceæ, is eaten in Scotland. It grows on our Pacific coasts.

Duluth′, a city, capital of St. Louis co., Minn., is situated at the W. extremity of Lake Superior, 155 miles N. N. E. of St. Paul. It is the eastern terminus of the Northern Pacific R. R., now (1874) running 452 miles westward to the Missouri River, and the northern terminus of the Lake Superior and Mississippi R. R., running from St. Paul. It has 12 church-edifices—1 Catholic, 1 Episcopal, 2 Presbyterian, 1 Methodist Episcopal, 1 Congregational, 1 Swedish Methodist, 1 Swedish Lutheran, 1 Norwegian Lutheran, 1 German Evangelical, 1 Union or Universal, and 1 Baptist; two grain elevators, a custom-house, and a weather-signal office. The Northern Pacific R. R. has in construction some of the largest private docks in the U. S. The harbor, entered by a ship-canal 250 feet wide, is landlocked, being formed by Minnesota and Rice's Points; the former is a scythe-shaped natural breakwater running out 7 miles into the lake. The harbor has been improved by the construction of several docks and piers, independent of the railroad company's works. The outer harbor is protected by a partially constructed breakwater, on which has been expended $150,000; two-thirds of this sum by the government. Duluth has a large stove-factory, machine and car-building works, and other manufactories. In May, 1869, the site of the city was a forest—the *old* Duluth, at that time situated on Minnesota Point, consisted of a few cabins. The place is named after Capt. John Duluth, a French traveller, who visited the country and built a hut in 1760. The town has five newspapers, two of them daily. Large quantities of wheat and flour are shipped from here, principally to Buffalo, N. Y. It has one national bank. Pop. in 1869, 38; in 1870, 3131.

R. D'UNGER, ED. "HERALD."

Dul'wich, a suburb of London, England, in Surrey, 5 miles S. of London. It is pleasantly situated near Sydenham, and has numerous handsome villas and mansions. Here is Dulwich College, founded in 1619 by Edward Alleyne, a tragic actor, and a picture-gallery.

Dumangas, a town in Panay, one of the Philippine Islands, is near the sea. Rice abounds here. Pop. about 25,000.

Dumas (Alexandre), a popular French novelist and dramatist, born at Villers-Cotterets (Aisne) July 24, 1803. He was not liberally educated. He went to Paris in 1823 to seek his fortune. In 1828 he produced "Henri III.," a drama, which was very successful. He was a writer of the romantic school, and was remarkable for literary fecundity. Dumas displayed much skill in the construction of plots. Among his novels are "The Three Musketeers" (30 vols., 1844–45) and "The Count of Monte-Christo" (12 vols., 1845). It appears that a large part of the works published in his name were written by other men. Died at Puys, near Dieppe, Dec. 5, 1870.

Dumas (Alexandre), a novelist and comic writer, a son of the preceding, was born in Paris July 28, 1824. Abandoning the imaginative romance of his father, he applied himself to the study of society, and sought by verisimilitude to make good his deficiency in dramatic construction. His works treat mostly of the equivocal aspects of French life. His first novels, "La Dame aux Camélias" (1848), "Diane de Lys" (1851), etc., were attended with great success, as also the plays which afterwards chiefly employed his pen. In 1872, in "L'Homme-Femme," a social tract, he attacked the French marriage system.

Dumas (Alexandre Davy de la Pailleterie), a French general, born in St. Domingo Mar. 25, 1762, was the father of Alexandre Dumas (1803–70). His mother was a negress. He became a general of division in 1793, and defeated the Austrian general Wurmser at Mantua in 1796. He commanded the cavalry in Egypt in 1798. Died in 1807.

Dumas (Jean Baptiste), a French chemist and writer, born at Alais (Gard) in 1800. He became a resident of Paris, and married a daughter of the well-known chemist A. Brongniart. He acquired a European reputation by his discoveries in organic chemistry, isomerism, the law of substitutions, and other parts of chemical philosophy. In 1832 he was admitted into the Institute, and in 1834 he became professor of organic chemistry in the School of Medicine. His chief work is a "Treatise on Chemistry Applied to the Arts" (8 vols., 1828–45). He was minister of agriculture and commerce from Oct., 1849, to Jan., 1851, after which he became a senator.

Dumas (Mathieu), Count, a French general, born at Montpellier Dec. 23, 1753. He fought for the U. S. in 1780–82, and was a moderate member of the Legislative Assembly in 1791. In the Reign of Terror he was condemned to death, but he escaped and went into exile. He became a general of division in 1805, and served at Ulm and Austerlitz. In 1812 he was intendant-general of the grand army in Russia. He wrote a narrative of the French campaigns from 1798 to 1807, entitled "Précis des Evénements Militaires" (19 vols., 1816–26), and "Souvenirs," an account of his career. Died Oct. 16, 1837.

Dumbar'ton, a county of Scotland, has an area of 297 square miles. It consists of two detached parts, one of them bounded on the E. by Loch Lomond, on the S. by the estuary of the Clyde, and on the W. by Loch Long; the other, much smaller, portion lying on both sides of the Forth and Clyde Canal. The surface is mountainous, and presents much picturesque scenery. Here are mines of coal and iron and quarries of limestone and slate. Capital, Dumbarton. Pop. in 1871, 58,839.

Dumbarton, a seaport of Scotland, the capital of the above county, is on the river Leven near its entrance into the Clyde, 13 miles N. W. of Glasgow. Steamboats ply regularly between this port and Glasgow. It has manufactures of glass, machinery, and ropes. Here, on a steep, rugged basaltic rock, rising to the height of 560 feet, stands the famous Dumbarton Castle, which has been a stronghold for many centuries. Pop. of parliamentary borough in 1871, 11,414.

Dumb Cane (*Dieffenbachia Seguina*), a West Indian shrub, so named from its acrid juice causing the tongue to swell. It belongs to the order Araceæ. The root and the juice have medicinal properties, and are used in sugar-refining.

Dumb'ness, when associated with deafness, is usually the result of that deafness; the child being unable to hear, of course is unable to learn to talk; but there are at least two important varieties of dumbness which are the direct results of disease. The first of these is what physicians call aphonia, a loss of voice which may be transient or permanent, functional or structural. Diseases of the larynx or of the nerves supplying it are frequent causes. A much more formidable disease or symptom is aphasia, which is a loss of language rather than of speech. It is a symptom of brain disease, the patient having the power to articulate, and even to think, but not to express his thoughts. (See Deaf and Dumb, revised by Hon. Henry Barnard, LL.D.; also Aphasia and Aphonia.)

Dum'dum, a town of British India, in Bengal, 8 miles N. E. of Calcutta. Here are a cantonment and a cannon-foundry.

Dumfries', a county in the S. of Scotland, is bounded on the S. by Solway Frith, on the E. by Cumberland, on the N. by Roxburgh, Selkirk, Peebles, and Lanark, and on the W. by Ayr and Kirkcudbright. Area, 1129 square miles. It is drained by the Annan, the Esk, and the Nith rivers. The surface is mountainous in the N. and undulating in the S. The valleys of the Annan, Esk, and Nith are fertile. Among the minerals of this county are coal, lead, silver, limestone, and new red sandstone. It is traversed by two railways extending to Edinburgh and Glasgow. The chief towns are Dumfries, Annan, Moffat, and Sanquhar. Pop. in 1871, 74,794.

Dumfries, a seaport of Scotland, the capital of the above county, is on the river Nith 9 miles from its entrance into Solway Firth, and 64 miles S. by W. from Edinburgh; lat. of Solway Frith light, 54° 48′ N., lon. 3° 32′ W. It is well built of red freestone, and is regarded as the capital of the south of Scotland. Two bridges across the river connect it with Maxwelltown. The high tides of Solway Frith bring vessels of sixty tons to the town, and larger vessels to the river quays near Dumfries. Here are manufactures of woollen cloths (tweeds), hosiery, hats, etc. Among the notable objects of the place is the tomb of Burns, who here officiated as exciseman. Pop. in 1871, 15,435.

Dumfries, a post-township of Prince William co., Va. Pop. 844.

Dü'michen (Johannes), a German Egyptologist, born Oct. 15, 1833, studied at Berlin, and passed many years in archæological research in the Valley of the Nile. He has written several treatises on Egyptian inscriptions.

Dum'mer, a township of Coos co., N. H. It has manufactures of lumber, etc. Pop. 317.

Dummer (Dr. Jeremiah) was born at Boston, Mass., and graduated at Harvard in 1699, afterwards studying at Utrecht, where he obtained his doctor's degree. Unsuccessful as a preacher, he became the agent of Massachusetts in England (1710–21). He wrote with great ability in defence of colonial rights, and presented 800 volumes to Yale College. Died in England May 19, 1739.—His brother, Lieutenant-Governor William Dummer (1677–1761), founded Dummer Academy at Newbury, Mass. (opened in 1763).

Dum'merston, a township and post-village of Windham co., Vt., on the Vermont Valley R. R., 5 miles N. of Brattleboro'. Pop. 916.

Dumont' (Ebenezer), an American general and lawyer, born at Vevay, Ind., Nov. 23, 1814. He became a brigadier-general of Union volunteers in Sept., 1861, and defeated the Confederates at Lebanon, Ky., in May, 1862. Having resigned his commission early in 1863, he was a Republican member of Congress for two terms (1863–67). Died April 16, 1871.

Dumont (Pierre Étienne Louis), a Swiss author, born at Geneva July 18, 1759. He was a Protestant minister, and emigrated in 1782 to St. Petersburg, where he preached eighteen months. In 1785 he removed to England, and became tutor to the sons of Lord Shelburne. He was intimate with Sir Samuel Romilly and Jeremy Bentham. He passed the years 1790 and 1791 mostly in Paris, where he associated with Mirabeau, whom he aided in composing his speeches and reports. Having returned to England in 1792, he edited and popularized Bentham's works on legislation—namely, "Traités de Législation" (1802) and "Théories des Peines et Récompenses" (1810). He died at Milan Sept. 29, 1829, leaving "Souvenirs sur Mirabeau" (1832). (See A. P. de Candolle, "Notice sur la Vie et les Écrits de M. Dumont," 1829.)

Dumont d'Urville (Jules Sébastien César), a French navigator, born in Normandy May 23, 1790. He commanded an expedition sent in 1826 to obtain tidings of La Pérouse and to survey the coasts of New Zealand, New Guinea, etc. His discoveries were published in a work called "Voyage of Discovery Around the World" (22 vols., 1832–34). In 1837 he conducted an exploring expedition to the Antarctic regions. He discovered land, which he called Terre Adélie, in lat. 66° 30′ S.; returned in 1840, and became a rear-admiral. Died May 8, 1842.

Dumoulin [Lat. *Molinæus*], (CHARLES), an able French jurist, born in Paris in 1500. He was a Protestant, and was often persecuted for his religion. He wrote several legal works which were highly esteemed, and a book against the acts of the Council of Trent (published in 1564). Died in 1566.

Dumouriez (CHARLES FRANÇOIS), a French general, born at Cambrai Jan. 25, 1739. He served as an officer in the Seven Years' war, was quartermaster-general in Corsica in 1768, and was employed in a secret mission to Poland by the duke of Choiseul in 1770. Between 1776 and 1787 he was commandant at Cherbourg, where he planned and directed great naval works. In the Revolution he acted with the Girondists. He was appointed minister of foreign affairs in Mar., 1792, and acquired the confidence of the king. War having broken out between France and Austria, he resigned office in June, 1792, in order to take command of the army; invaded Flanders in Oct., 1792, and defeated the Austrians at Jemmapes in November, and conquered Belgium. According to Lamartine, he was at this period the virtual dictator of all parties. Instead of prosecuting the war with vigor, he plotted a counter-revolution, and negotiated secretly with the Austrians. The Convention, suspecting his design, sent four commissioners in April, 1793, to summon him to Paris. Dumouriez refused to obey the Convention, and when the commissioners ordered the soldiers to arrest him he sent them as prisoners to the Austrian camp. His army refused to support him in this defection, and he became a fugitive and exile. He died in England Mar. 14, 1823. (See "Mémoires de Dumouriez," by himself, 2 vols., 1794.)

Dumpy Level, a levelling instrument with a short telescope of large aperture, and compass-box beneath.

Dun, a Celtic or Gothic word signifying a "hill" or "height." It is the root of the names of many places (often modified into *Dum* or *Don*), as Dunkirk, Dumbarton, Donegal, etc.

Duna Földvar, a town of Hungary, in the county of Tolna, 28 miles N. of Tolna, on the Danube. Here is a Franciscan cloister and two match-factories. Pop. 12,382.

Dunbar', a royal burgh and seaport of Scotland, in Haddingtonshire, is at the mouth of the Frith of Forth, 27 miles E. N. E. of Edinburgh; lat. 56° N., lon. 2° 29′ W. The harbor will admit vessels of 300 tons. Dunbar is a fine old town, containing the remains of Dunbar Castle, which was the scene of many historical events. Dunbar has valuable herring-fisheries. Cromwell gained near this town a decisive victory over the royalists, Sept. 3, 1650. Pop. in 1871, 3311.

Dunbar, a township of Faribault co., Minn. P. 203.

Dunbar, a township and post-village of Fayette co., Pa., on the Pittsburg Washington and Baltimore R. R., 4 miles S. of Connellsville. Pop. 2972.

Dunbar (WILLIAM), an eminent Scottish poet, born at Salton about 1460. He was a Franciscan friar and itinerant preacher in his youth. He was employed by James IV. as clerk of embassy. Among his works are "The Thistle and the Rose" (1503), an allegory in honor of the marriage of James IV., and "The Merle and Nightingale," poems showing a rich fancy. Died about 1530.

Dunbar'ton, a post-township of Merrimack co., N. H. It has manufactures of lumber. Pop. 778.

Dunc'an, a post-township of Monroe co., Ark. Pop. 1334.

Duncan, a township of Mercer co., Ill. Pop. 974.

Duncan, a township of Cheboygan co., Mich. P. 831.

Duncan, a township of Sullivan co., Mo. Pop. 1064.

Duncan (ADAM), VISCOUNT DUNCAN OF CAMPERDOWN, a British admiral, born at Dundee July 1, 1731. He entered the navy in 1746, and became a post-captain in 1761. In 1789 he obtained the rank of rear-admiral of the blue. With the rank of vice-admiral he was appointed commander of a fleet in the North Sea in 1795, and waged war against the Dutch. Many of his men mutinied and deserted in 1797, but finally returned to their duty. He defeated the Dutch near Camperdown in Oct., 1797, and was raised to the peerage for that service. Died Aug. 4, 1804.

Duncan (JAMES), an American officer, born in Sept., 1810, at Cornwall, N. Y., graduated at West Point 1834, and inspector-general U. S. A. Jan. 26, 1849, to which date he served in the artillery. He served chiefly at seaboard posts 1834–45; as assistant professor at the Military Academy 1855; in Florida war 1855–56, engaged at Camp Izard (wounded) and Olaklikaha; in removing Cherokees to the West 1838; in suppressing Canada border disturbances 1838–41; in the military occupation of Texas 1845–46; in the war with Mexico 1846–48, engaged at Palo Alto (brevet major), Resaca de la Palma (brevet lieutenant-colonel), Monterey (brevet colonel), Vera Cruz, Cerro Gordo, Amazoque, San Antonio, Churubusco, Molino del Rey, Chapultepec, and the city of Mexico; and on inspection duties 1849. Died July 3, 1849, at Mobile, Ala., aged thirty-six.

GEORGE W. CULLUM, U. S. A.

Duncan (JAMES HENRY), LL.D., born at Haverhill, Mass., Dec. 5, 1793, graduated at Phillips (Exeter) Academy and Harvard College 1812, admitted to Essex bar 1815, and entered upon the practice of law in Haverhill, Mass., where he resided till his death, Feb. 8, 1868. He was a member of the Massachusetts general court 1827–28, 1837–38, and 1857; member of governor's council 1839–40; from 1848 to 1852 member of Congress from the Essex district, Mass.; for many years chairman of the board of managers of the American Baptist Missionary Union, a trustee of Newton Theological Institution, and a fellow of Brown University. He was active and influential in all that concerned the welfare of his town, his Church, and the general interests of humanity.

Duncan (JOHNSON K.), a general, born in Pennsylvania in 1826, graduated at West Point in 1849. He entered the service of the Confederate States in 1861, and took command of Forts Jackson and St. Philip, on the Mississippi below New Orleans. After the fleet of Farragut had passed these forts Duncan surrendered them, April 29, 1862. Died in Jan., 1863.

Duncan (JOSEPH), an American legislator, born in Kentucky about 1790. He served in the war of 1812, after which he removed to Illinois. As a member of the senate of Illinois he originated a law establishing common schools. He was chosen a member of Congress in 1827, and governor of Illinois in 1834. Died Jan. 15, 1844.

Duncan (THOMAS), A. R. A., a Scottish painter, born in Perthshire in 1807. He painted portraits and historical and fancy subjects with success. He was elected an associate of the Royal Academy of London in 1843. His works are mostly illustrative of Scottish history, life, and character. Died in 1845.

Duncan (WILLIAM CECIL), D. D., was born in New York City Jan. 24, 1824, graduated at Columbia College in 1843, and studied at Hamilton Theological Seminary. He was ordained to the Baptist ministry in 1848. He was for some time editor of the "South-western Baptist Chronicle," and for three years professor of Greek and Latin in the University of Louisiana. During his pastorate over the Coliseum place Baptist church, New Orleans, he was compelled (1861) to leave the South for a considerable time. He was the author of several volumes of religious and denominational literature. Died May 1, 1864.

Duncan and Hinton Creek, a township of Cleaveland co., N. C. Pop. 1242.

Duncan'non, a post-village of Penn township, Perry co., Pa., on the W. bank of the Susquehanna, and on the Pennsylvania R. R., 16 miles N. by W. of Harrisburg. It has important iron-works and one weekly newspaper.

Dun'cansby Head (anc. *Berubium*), a promontory forming the N. E. extremity of Scotland and of Caithness, is 1½ miles E. of John o' Groat's House; lat. 58° 40′ N., lon. 3° 8′ W.

Dun'can's Creek, a post-township of Rutherford co., N. C. Pop. 999.

Dun'ciad, The, a keen poetical satire, written by Alexander Pope, and published complete in four books (1742). It is a fierce onslaught on his numerous detractors, who have thereby obtained an unenviable immortality.

Dunck'er (MAXIMILIAN WOLFGANG), a German historian, born in Berlin in 1812. He became professor of history at Halle in 1842, a member of the German national assembly in 1848, professor at Tübingen in 1857, and received an appointment in the Prussian ministry in 1861. Among his works are "Origines Germanicæ" (1840) and a "History of Antiquity" (1852).

Dun'combe (THOMAS SLINGSBY), an English radical, born in 1797, was elected to Parliament in 1826. He represented Finsbury from 1834 to 1861, advocated the vote by ballot, extension of suffrage, and other reforms. He was a witty, fluent, and popular speaker. He made in 1858 a motion which resulted in the relief of the Jews from political disabilities. Died Nov. 13, 1861.

Dun'daff, a post-borough of Clifford township, Susquehanna co., Pa. Pop. 187.

Dundalk', a seaport-town of Ireland, the capital of the county of Louth, is at the mouth of Castleton River and on Dundalk Bay, 50 miles N. of Dublin, with which it is connected by railway. It has a safe harbor, which admits vessels drawing sixteen feet of water. The chief articles of export are linen, timber, iron, dairy products,

and live-stock. Here are manufactures of soap, pins, leather, starch, etc. Edward Bruce took Dundalk in 1315, and held his court here until he was killed in 1318. Pop. in 1871, 10,893.

Dundas′, a county in Ontario, Dominion of Canada, is bounded on the S. E. by the river St. Lawrence, and intersected by the Grand Trunk R. R. Pop. in 1871, 18,777.

Dundas, a post-town of Wentworth co., Ontario, Dominion of Canada, is at the W. end of Lake Ontario, and at the head of the Desjardins Canal, on the Great Western R. R., 7 miles W. of Hamilton. It has one weekly newspaper, and manufactures of machinery, axes, combs, woollens, castings, soap, etc. It has many fine buildings. Pop. in 1871, 3135.

Dundas (Henry), Viscount Melville, a Scottish lawyer and statesman, born about 1741 of a family distinguished for forensic ability through several generations, the son of Robert Dundas, Lord Arniston (1685–1753), who was lord advocate of Scotland (1720–25), was admitted to the bar in 1763. He became lord advocate of Scotland in 1775, and a member of Parliament, in which he promoted the war against the U. S. He joined the party of Pitt, who appointed him president of the board of control in 1784, after which he was a constant supporter of that minister. In 1791 he was appointed secretary of state for the home department, and in 1794 he became secretary at war. He resigned in 1801, received the title of Viscount Melville in 1802, and was appointed first lord of the admiralty in 1804. In 1805 he was impeached for malversation, but he was acquitted by the Peers. Died May 27, 1811.—His son, Admiral Richard Saunders Dundas, born April 11, 1802, commanded a fleet in the Baltic in Feb., 1855, which bombarded Sweaborg. Died June 3, 1861.

Dundas (Sir James Whitley Deans), a British admiral, born Dec. 4, 1785. He commanded a fleet in the Black Sea in 1854, during the war against Russia. Died Oct. 3, 1862.

Dundas' Strait, Northern Australia, separates Melville Island from Coburg Peninsula, and is 18 miles wide.

Dundee′ [Lat. *Taodunum*], a royal burgh and seaport of Scotland, in the county of Forfar, is finely situated on the N. side of the wide estuary of the Tay, 10 miles from the sea and 50 miles by water N. N. E. of Edinburgh; lat. 56° 27′ 36″ N., lon. 2° 57′ 45″ W. The principal public edifices are the royal exchange, opened in 1856; the corn exchange; St. Paul's church, with a tower and spire 217 feet high; the infirmary and town-hall. Here is a remarkable tower 156 feet high, built in the twelfth century, to which three parochial churches under one roof have been annexed. Dundee has a theatre, a public library, and an asylum for the insane. It is the chief seat in Great Britain of the manufacture of coarse linen fabrics—namely, osnaburgs, sheetings, ducks, dowlas, drills, and canvas. It has also manufactures of jute, confectionery, and machinery. The annual value of the flax, hemp, and jute manufactures of Dundee is about £3,000,000. Dundee has an excellent harbor, and extensive docks which cost £600,000. It is connected with Edinburgh by a railway, the passengers of which cross the Friths of Tay and Forth by large steamboats. Here are a number of shipbuilding yards. Pop. in 1871, 118,974.

Dundee, a post-village of Kane co., Ill., on Fox River, 48 miles by railroad W. N. W. of Chicago. Pop. of Dundee township, 2079.

Dundee, a post-township of Monroe co., Mich. It has four churches, two schools, and one newspaper, a bank, one paper and two planing mills. Pop. 2384.

John Cheever, Pub. "Enterprise."

Dundee, a post-village of Starkey township, Yates co., N. Y., about 12 miles from Watkins and 32 miles N. by W. from Elmira. It has one weekly newspaper, four churches, a bank, an academy, two furnaces, mills, etc. Pop. 730.

J. M. Wescott, Ed. "Record."

Dundon′ald, Earls of (1669), Barons Cochrane (Scotland, 1647).—Thomas Barnes Cochrane, eleventh earl, born April 18, 1814, succeeded his father in 1860.

Dundonald (Thomas **Cochrane**), tenth earl of, an able British admiral, born Dec. 14, 1775, was a son of the ninth earl. He entered the navy in 1793, captured many prizes from the French, and became a post-captain in 1801. In April, 1809, he was selected for the daring and perilous service of burning the French fleet in Basque Roads, and he successfully performed that exploit. Before this date he had been elected to Parliament by the Whig voters of Westminster. In 1814 he was accused of complicity in fraudulent stock-jobbing transactions, and of spreading a false rumor of the fall of Napoleon to raise the price of stocks. He was unjustly convicted, fined £1000, dismissed from the service, and imprisoned. His constituents re-elected him to Parliament, and he escaped from jail to reappear in the House. He commanded the fleet of Chili (1818–22), and fought for the Greeks against Turkey in 1827. He succeeded to the earldom in 1831, was restored to his rank in the navy in 1833, and was appointed a vice-admiral in 1841. He died Oct. 30, 1860, leaving "The Autobiography of a Seaman" (1859–60).

Dune [from Ang.-Sax. *dūn*, a "hill"], the name given to low mounds of movable sand which are found on the coasts of Great Britain and the continent of Europe. They are formed by deposits of fine sand borne forward by the wind till it is obstructed by large stones or other obstacles, around which it accumulates. Dunes often cause great damage by their inroads upon the country, the department of Landes in France having been nearly overwhelmed by them. The annual inland progress of the sand is estimated at seventy-two feet. Trees and shrubs planted close together have been found to be the best protection against the encroachments of the dunes. (See Down.)

Duned′in, a seaport-town of New Zealand, the capital of the province of Otago, is on the S. E. coast of the Middle Isle; lat. 45° 50′ S., lon. 170° 36′ E. It was founded in 1848, since which it has increased rapidly. It is the seat of a Protestant Episcopal bishop. The chief product is wool, of which 900,000 pounds were exported in 1859. Pop. in 1871, 14,857.

Dunel′len, a post-village of Piscataway township, Middlesex co., N. J., on the Central R. R. of New Jersey, 14 miles S. W. of Elizabeth.

Dunferm′line, a handsome royal burgh of Scotland, in Fifeshire, is on a long ridge 3 miles from the Frith of Forth and 15 miles N. W. of Edinburgh. It derives its prosperity chiefly from manufactures of linen, cotton, worsted, iron, etc., and is said to be unrivalled by any British town in the manufacture of damask linen. Here are also several iron-foundries, collieries, dye-works, and bleaching-works. Dunfermline was a town as early as 1100 A. D. Malcolm Canmore founded here about 1080 a Benedictine abbey, of which some ruins are still visible. Here was also a regal palace of the Stuarts, now ruined. Robert Bruce was buried at Dunfermline. Pop. in 1871, 14,958.

Dun′fish, in the U. S. a name given to codfish cured in such a manner as to give them a "dun" color. Fish for "dunning" are caught in February or in early spring. The fish are taken in deep water, are split and incompletely salted, then laid in a pile for two or three months in a dark place, and covered with salt hay, eel-grass, etc., and pressed by some weight. They are then uncovered and closely packed for several months, when they are ready for use. They acquire a peculiar flavor, which is greatly liked by many. The Isles of Shoals (Me. and N. H.) are a principal seat of this method of curing.

Dungar′van, a seaport and bathing-place of Ireland, in the county of Waterford, is on Dungarvan Bay, 40 miles E. N. E. of Cork. Its harbor admits only small vessels. It has three convents, and an old castle now used as a barrack. Pop. in 1871, 7700.

Dung Beetle, a name given to many coleopterous insects of the family Scarabæidæ and of the genera *Copris*, *Phaneus*, *Aphodius*, *Geotrupes*, *Bolbocerus*, *Trox*, and others. Some of these insects enclose their eggs in pellets or globes of manure. There are many species in America, Europe, Asia, and Africa. The sacred scarabæus of the Egyptians was a true dung beetle, the *Ateuchus sacer* of the Old World.

Dun′geon (originally Donjon, which see), a prison; a dark and subterraneous cell or place of confinement.

Dung′lison (Robley), M. D., LL.D., was born at Keswick, England, Jan. 4, 1798, received his medical education at London and Erlangen, was professor of medicine in the University of Virginia (1824–33), of therapeutics in the University of Maryland (1833–36), and of the institutes of medicine (1836–68) in the Jefferson Medical College, Philadelphia. He published about twenty volumes, among which are "Human Physiology" (1832), a "Medical Dictionary" (1833), a work of vast erudition and great value, "Therapeutics and Materia Medica" (1836), and a dictionary for the blind. Died April 1, 1869.

Dun′ham, a township of McHenry co., Ill. Pop. 999.

Dunham, a post-township of Washington co., O. P. 755.

Dun′kard, a post-township of Greene co., Pa. P. 1520.

Dunkeld′, a small town of Scotland, in Perthshire, is on the Tay, 15 miles N. N. W. of Perth. It is in a vale enclosed by mountains. A cathedral was built here in 1330, several centuries after the foundation of Dunkeld, which became the seat of a bishop in 1127. Here is the mansion of the duke of Athole, with the largest and finest park in Scotland, including twenty square miles of larch woods.

Dunk′ers, Dunk′ards, or **Tunk′ers** [from the Ger.

tunken, to "dip"], a sect of German American Baptists, called by themselves **Brethren,** said to have been founded at Schwarzenau in Westphalia by one Alexander Mack in 1708, and named from their manner of baptism by trine immersion of believers. Having been driven from Germany by persecution between 1719 and 1729, they settled in Pennsylvania, and subsequently in Ohio, Indiana, Maryland, Virginia, and several other States. Their doctrines are similar to those of the Mennonites, and in the simplicity of their dress and speech they somewhat resemble the Society of Friends. They use the kiss of charity, love-feasts, feet-washing, laying on of hands, anointing with oil, etc. They have bishops, elders, teachers, and deacons. They condemn war and will not engage in lawsuits. They hold an annual meeting about Whitsuntide, which is attended by the bishops, teachers, and representatives chosen by the congregations. The belief in universal redemption, though not an article of faith, is commonly held by them. They are opposed to statistics, which they believe to savor of pride, and trustworthy statements of their number can, therefore, not be given. The entire population connected with the denomination is estimated at about 100,000. They have a monthly publication called the "Gospel Visitor." From the Dunkers as a sect must be distinguished the Seventh-Day Dunkers, commonly called GERMAN SEVENTH-DAY BAPTISTS (which see), who are sometimes confounded with them.

Dun'kirk [Fr. *Dunkerque*], a fortified seaport-town in the extreme northern part of France, is in the department of Nord, and on the Strait of Dover, about 40 miles N. W. of Lille and 46 miles E. of Dover; lat. 51° 3′ N., lon. 2° 22′ E. It is the northern terminus of the Railway du Nord. It is well built, with wide and well-paved streets, and is defended by a citadel and ramparts. The harbor is shallow, but the roadstead is large and safe. Dunkirk has several fine churches, a college, a theatre, a public library, and a town-hall; also manufactures of soap, starch, cordage, and leather, with metal-foundries and shipbuilding yards. It became a free port in 1826, since which it has an active trade in wines, liqueurs, etc. A church is said to have been built here in the seventh century among the sandhills or dunes, and hence its name, which signifies "church of the dunes." Dunkirk was taken by the English in 1658, but was sold to the French king by Charles II. in 1662. Pop. 33,083.

Dunkirk, a post-village and port of entry of Chautauqua co., N. Y., is on Lake Erie and on the Lake Shore and Michigan Southern R. R., 40 miles S. W. of Buffalo. It is the western terminus of the Erie R. R., which connects it with New York City, 459 miles distant, and the northern terminus of the Dunkirk Alleghany Valley and Pittsburg R. R. It has a good harbor and an advantageous position for trade. It has two banks, locomotive-works employing 600 men, a foundry, a coal and grain elevator, and various mills and factories. The village is lighted by gas, and supplied with water from Lake Erie by the Holly system, and has nine churches, a horse railroad, an orphan asylum, an opera-house, a library and free reading-room, etc. Two weekly newspapers are published here. Pop. 5231; of Dunkirk township, 6912.

MONROE T. CUSHING, ED. "ADVERTISER AND UNION."

Dunkirk, a post-village of Blanchard township, Hardin co., O., on the Pittsburg Fort Wayne and Chicago R. R., 84 miles E. by S. of Fort Wayne, Ind.

Dunkirk, a post-township of Dane co., Wis. P. 2179.

Dunk'lin, a county in the S. E. of Missouri. Area, 525 square miles. It is bounded on the W. by the St. Francis River. The surface is nearly level; the soil is fertile, but partly subject to inundation. Grain, tobacco, and wool are raised. Capital, Kennett. Pop. 5982.

Dunklin, a township of Greenville co., S. C. P. 1457.

Dunlap, a post-village of Harrison co., Ia., on the Chicago and North-western R. R. It has one weekly newspaper. It is a flourishing place, with an active trade.

L. F. COOK, ED. AND PROP. "REPORTER."

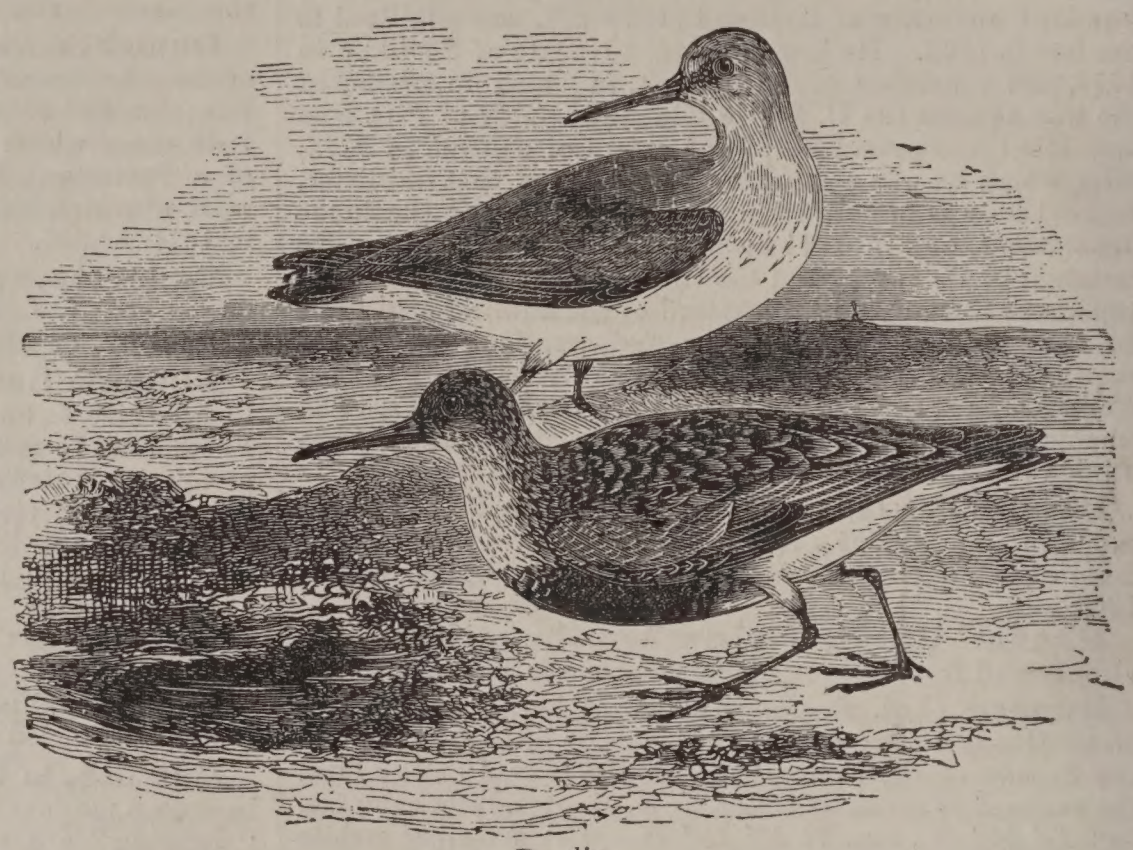
Dunlap, a post-village, capital of Sequatchie co., Tenn., on the Sequatchie River, about 94 miles S. E. of Nashville.

Dunlap (WILLIAM), an American painter and writer, born at Perth Amboy, N. J., Feb. 19, 1766. Among his paintings are "Christ Rejected" (1821) and "Calvary" (1828). He wrote, besides other works, a "Life of Charles Brockden Brown" (1827), "History of the Rise and Progress of the Arts of Design in the U. S." (1834), and a "History of the American Theatre" (1833). Died Sept. 28, 1839.

Dunleith', a city of Jo Daviess co., Ill., on the Mississippi River opposite Dubuque, and 16 miles N. W. of Galena, at the N. W. corner of the State. It is on the Illinois Central R. R., which here crosses the Mississippi by a noble bridge. The town has manufactures of machinery, castings, agricultural implements, beer, etc., and has a trade in grain. Pop. including Dunleith township, 1352.

Dun-le-Roi, a town of France, department of Cher, 16 miles S. E. of Bourges. It is an iron-mining district. Pop. 5454.

Dun'lin, called also **Sea Snipe** and **Oxbird** (*Tringa variabilis*), is a species of sandpiper found in most parts of North America and Europe. It is eight inches long, of



Dunlin.

a black, rufous, and gray color on the back, and black and white beneath. Audubon calls it the red-backed sandpiper (*Tringa alpina*).

Dun'more, a post-borough of Luzerne co., Pa., 2 miles N. E. of Scranton. It derives its prosperity chiefly from coal-mines which are worked in the vicinity. Pop. 4311.

Dunmore, EARLS OF (1686), Viscounts Fincastle and Lords Murray (Scotland, 1686), Barons Dunmore (United Kingdom, 1831).—CHARLES ADOLPHUS MURRAY, seventh earl, born Mar. 24, 1841, succeeded his father in 1845.

Dunn, a county in the W. of Wisconsin. Area, 864 square miles. It is intersected by the Red Cedar River, which enters the Chippewa River in the southern part of the county. The surface is diversified by forests and prairies; the soil is productive. Lumber, dairy products, grain, wool, and hay are the staples. It is traversed by the West Wisconsin R. R. Capital, Menomonee. Pop. 9488.

Dunn, a township of Dane co., Wis. Pop. 1172.

Dunn, a township of Dunn co., Wis. Pop. 990.

Dun'nage [etymology uncertain], on shipboard, the name given to the loose wood, fagots, and rubbish placed on the bottom of the hold to raise the cargo, either to keep it dry or to keep the ship in trim.

Dun'net Head, a rocky peninsula of Scotland, 100 to 600 feet high, in Caithness, is the most northern point of Great Britain. Here is a lighthouse 340 feet above the sea.

Dun'ning (JOHN), LORD ASHBURTON, an eminent English lawyer, born at Ashburton Oct. 18, 1731. He was called to the bar in 1756, was appointed solicitor-general in 1767, and became a Whig member of Parliament in 1768. He was a witty and sarcastic speaker, and stood in the foremost rank among English advocates. He married Elizabeth Baring in 1780, and received the title of Baron Ashburton in 1782. Died Aug. 18, 1783.

Dunn's, a township of Tuscaloosa co., Ala. Pop. 556.

Dunn's, a township of Franklin co., N. C. Pop. 838.

Dunn's Rock, a post-township of Transylvania co., N. C. Pop. 420.

Dunn'ville, a post-village of Monck co., Ontario, Can-

ada, is on Grand River and the Grand Trunk R. R., 38 miles W. of Buffalo. One weekly newspaper is published here. Steamboats can ascend the river from Lake Erie to this place, which has a large trade, a fine water-power, and considerable manufactures. Pop. 1452.

Dunra'ven and Mount Earl, EARLS OF (1822), Viscounts Mount Earl (1816), Viscounts Adare (1822), Barons Adare (Ireland, 1800), Barons Kenry (United Kingdom, 1866), and baronets (1781).—WINDHAM THOMAS WINDHAM QUIN, fourth earl, born Feb. 12, 1841, succeeded his father in 1871.

Duns Sco'tus (JOHN), surnamed THE SUBTLE DOCTOR, a celebrated theologian and scholastic philosopher, was born about 1265. He is claimed as their countryman by the Scots, the English, and the Irish. He was of gentle blood, studied at Oxford, became a Franciscan friar, and in 1301 professor of theology at that place. In 1304 he removed to Paris, where he taught theology with great distinction. He wrote many works on theology and metaphysics, and was a realist in philosophy. He affirmed, against Thomas Aquinas, that the individuality of the soul is independent of its union with the body; that the will is free; and that the faculties of the soul are not subjectively distinct from each other, but are constant modes of action of a unit of existence. In theology he favored the doctrine of the immaculate conception of the Virgin Mary. He was the founder of a school called Scotists, who maintained for several centuries a controversy with the Thomists (*i. e.* the disciples of Aquinas). He died at Cologne in 1308.

Dun'stable, a township and post-village of Middlesex co., Mass. Dunstable Station is on the Boston Lowell and Nashua R. R., 33 miles N. W. of Boston. Pop. 471.

Dunstable, a township of Clinton co., Pa. Pop. 515.

Dun'stan, SAINT, an English prelate, born at Glastonbury in 925 A. D. He was a man of extraordinary abilities, and gained renown by his ascetic piety. He acquired the favor of Edred, who began to reign in 946 A. D., and he took a prominent part in the government during his reign. He was banished by Edwy, but obtained the chief power under Edgar, who became king in 959, and appointed Dunstan archbishop of Canterbury. Dunstan promoted the papal supremacy, enriched and exalted the monks, and compelled the clergy to practise celibacy. He was deprived of power on the accession of Ethelred in 978. Died May 19, 988 A. D.

Dun'ster (HENRY), the first president of Harvard College, was born in Lancashire, England, and educated at Magdalen College, Cambridge. He came to New England in 1640, and entered upon his presidency Aug. 27th of that year. In 1654 he was compelled to resign, in consequence of having borne public testimony against the baptism of infants, for which offence he was afterwards tried by a jury and placed under bonds. Still later, he was again presented by the grand jury for neglect to have one of his children baptized. He was esteemed for learning and piety. He assisted in the preparation of the "New England Psalm-book" (1640). Died at Scituate, Mass., Feb. 27, 1659. (See "Life of Dunster," by J. CHAPLIN, D. D., 1872.)

Dun'ton (JOHN), an eccentric English writer and dissenter, born at Graffham May 4, 1659. He opened a bookstore in London about 1685, but failed in business. He wrote, besides other works, "The Athenian Mercury" (20 vols., 1690–96), the "Dublin Scuffle" (1699), and "The Life and Errors of John Dunton, with the Lives and Characters of a Thousand Persons," containing an account of a visit to Boston and Salem, and sketches of ministers and prominent citizens of New England in 1685 (1705; new ed. 1818). Died in 1733.

Dunwody (SAMUEL), a minister of the Methodist Episcopal Church South, born in Pennsylvania Aug. 3, 1780. He was forty-eight years a minister in the South Carolina Conference, which extended into North Carolina and Georgia. He was a bold pioneer of Methodism, a powerful controvertist, an original thinker, and a successful preacher. He organized the first Methodist church in Savannah, Ga., in 1807. He died in South Carolina July 8, 1854. T. O. SUMMERS.

Duodeç'imals [from the Lat. *duodecim*, "twelve"], called also **Cross-Multiplication,** is the name given to a method by which the area of a rectangular surface is calculated when the length and breadth are stated in feet, inches, and lines. It is principally used by artificers in finding the contents of their work. The operation is performed by substituting the duodecimal scale of notation for the decimal.

The DUODECIMAL SCALE is the scale of notation obtained by the division of unity into twelve equal parts. Computation in this manner has some advantages, as 12 may be divided into so many equal parts—viz. 2, 3, 4, and 6; but the decimal scale, which coincides with our system of notation, is now universally preferred.

Duodeç'imo [from the Lat. *duodecim*, "twelve"], a term signifying "twelfth," is applied to a book when every sheet being six times folded forms twelve leaves. It is usually abbreviated into 12mo.

Duode'num [from the Lat. *duodeni*, "twelve," because it is about twelve finger-breadths long in man], that part of the small intestine which is nearest the stomach. In man it is eight or ten inches in length. It is the widest, shortest, and most fixed part of the small intestine, having no mesentery. It is somewhat horseshoe-like in form, the convexity to the right. It receives the secretions of the liver and the pancreas. Its muscular fibres are more numerous than in the rest of the small intestine.

Du Page, a county in the N. E. of Illinois. Area, 340 square miles. It is drained by the branches of the Du Page River. The surface is nearly level; the soil is fertile. Cattle, grain, wool, hay, and dairy products are the staples. The most numerous manufactories are those of carriages. It is intersected by the Chicago Burlington and Quincy R. R. and the Chicago and North-western R. R. Capital, Wheaton. Pop. 16,685.

Du Page, a post-township of Will co., Ill. Pop. 1118.

Dupanloup (FÉLIX ANTOINE PHILIBERT), a French bishop, born at Saint-Félix, in Savoy, Jan. 3, 1802. He became bishop of Orleans in 1849, and was admitted into the French Academy in 1854. He wrote, besides other works, a popular treatise on education (3 vols., 1855–57). In 1871 he was elected a member of the National Assembly. He was nominated archbishop of Paris in 1871, but declined that office.

Duperré (VICTOR GUY), BARON, a French admiral, born at La Rochelle Feb. 20, 1775. He gained the rank of vice-admiral in 1826, and commanded the fleet which aided the army to conquer Algiers in 1830, and was made admiral. Died Nov. 2, 1846.

Duperrey (LOUIS ISIDORE), a French navigator and hydrographer, born in Paris in 1786. He conducted an exploring expedition in 1822 to the islands of the Pacific. He surveyed the coasts of New Zealand and parts of Australia, returned in 1825, and published a "Voyage Round the World in the Corvette La Coquille" (1826–30).

Dupetit-Thouars (ABEL AUBERT), a French admiral, born Aug. 3, 1793, was the son of ABEL AUBERT DUPETIT-THOUARS, captain of the ship Le Tonnant, destroyed in the battle of Aboukir, and nephew of LOUIS MARIE AUBERT DUPETIT-THOUARS, botanist (born Nov. 11, 1758, died in 1831), who explored the botany of Africa, Madagascar, etc. He was appointed commander of the naval forces in the Pacific Ocean, and seized the island of Tahiti in 1842, but this act was disavowed by his government. He published a "Voyage Round the World" (10 vols., 1841–49). Died Mar. 17, 1864.

Dupin (ANDRÉ MARIE JEAN JACQUES), a French lawyer and statesman, born at Varzy, in Nièvre, Feb. 1, 1783. He gained distinction as the advocate of Marshal Ney, Béranger, and other persons tried for political offences. In 1826 he was elected a member of the Chamber of Deputies, in which he acted with the liberals. He promoted the revolution of 1830 and the accession of Louis Philippe. He was chosen president of the Chamber of Deputies eight times between 1832 and 1848, and was admitted into the French Academy in 1832. In Feb., 1848, he supported the count of Paris as the successor to Louis Philippe, but he recognized the republic which was then formed. He was a prominent member of the Constituent Assembly, and was president of the Legislative Assembly in 1849. In 1857 he was appointed procureur-général of France. He published, besides other works, "Mémoires et Plaidoyeurs" (20 vols., 1806–30). Died Nov. 10, 1865.

Dupin (FRANÇOIS PIERRE CHARLES), BARON, a French geometer, a brother of the preceding, was born at Varzy Oct. 6, 1784. He visited England in 1816, and published "Travels in Great Britain" (6 vols., 1820–24). He became professor of mechanics at the Conservatoire des Arts et Métiers in 1810. He wrote on geometry and mechanics, and did much to advance the useful arts and improve the condition of the laboring people. In the legislature his labors were extensive. He was an Orleanist. Died Jan. 18, 1873.

Duplain', a post-township of Clinton co., Mich. Pop. 1493.

Dupleix (JOSEPH), MARQUIS, a French governor, born about 1695. He amassed a fortune by commercial operations in India, and in 1742 was appointed governor of Pondicherry and all the French possessions in India. He formed the project of founding a European empire in that

country, and soon made himself master of the Carnatic, partly by fighting and partly by political intrigues. He was opposed by the English general Clive, who defeated the French in several battles. Dupleix was removed from the command in 1754, and returned to France, where he died in 1763.

Duplicate Ratio, the ratio of squares. Thus, the simple ratio of 2 to 4 is $\frac{2}{4}=\frac{1}{2}$; the duplicate ratio is $2^2:4^2=\frac{4}{16}=\frac{1}{4}$.

Du'plin, a county in the S. E. of North Carolina. Area, 660 square miles. It is intersected by the North Branch of Cape Fear River. The surface is level; the soil is mostly sandy, and is partly covered with forests of pine. Cotton, corn, rice, wool, and cattle are raised. It is traversed by the Wilmington and Weldon R. R. Capital, Kenansville. Pop. 15,542.

Dupon'ceau (Peter S.), LL.D., a French lawyer and scholar, born in the island of Rhé June 3, 1760. He emigrated to the U. S. in 1777, and served in the army as aide-de-camp to Baron Steuben. He practised law in Philadelphia with distinction, and was president of the American Philosophical Society. He wrote on philosophy and other subjects. In 1838 he published a work on Indian languages. Died April 1, 1844.

Dupont', a post-township of Waupacca co., Wis. Pop. 150.

Dupont (Pierre), a popular French song-writer, born at Lyons April 23, 1821. He composed the words and airs to his poems at the same time. Among his works are "The Two Angels," a poem (1842), the "Song of Bread," and the "Song of the Workers." Died at Lyons July 25, 1870.

Du Pont (Samuel Francis), U. S. N., born of French descent Sept. 27, 1803, at Bergen Point, N. J., entered the navy as a midshipman Dec. 19, 1815, became a lieutenant in 1826, a commander in 1842, a captain in 1855, and a rear-admiral in 1862. To attempt to give even a brief outline of the services of one whose naval life of fifty years was but a record of constant and continuous devotion to the navy and the country, within the limits assigned in this volume to biography, would indeed be vain. The writer must therefore restrict himself to saying that while in command of the Cyane on the W. coast of Mexico during our war with that republic, Du Pont added to a name already distinguished a reputation for ability, sound judgment, discreetness, and daring which all his after service tended greatly to strengthen; so that when the first act of the drama of the civil war opened with the fall of Fort Sumter, Du Pont stood prominently forward, by the side of Farragut and Foote, as one to whom might safely be entrusted the honor and welfare of his country in this her hour of need. So soon, therefore, as the government had decided "to seize and occupy one or more important points on our Southern coast," it confided to his care that part of the joint army and navy expedition organized for this purpose, upon which the success of the whole depended; and when he unfurled his flag from the masthead of the Wabash, the desk of the secretary of the navy was filled with applications from officers asking to serve under him; for all were anxious to *follow* whithersoever Du Pont might choose to *lead*. How well founded their confidence the result shows; for on the evening of the ninth day after sailing from Hampton Roads, Du Pont, with his fleet of fifteen vessels, was in possession of Port Royal Bay, one of the finest and largest harbors of the South, after a brilliant and successful engagement of four hours with two strong forts splendidly garrisoned and mounting forty-three guns, all but four of which were of heavy calibre. He now established a rigid blockade of the coast, pushed his vessels into almost every bay, inlet, and river of South Carolina, Georgia, and Florida, and took possession of several strong places which served as *points d'appui* for the army.

On the 7th of April, 1863, at 3 P. M., he engaged Fort Sumter with eight iron-clads, and, not having silenced the fort at 4.30 P. M., made signal then "to withdraw from action," intending to renew the engagement on the following morning; but, finding that many of his vessels were injured, and one, the Keokuk, sunk, he became convinced that to do so would be "to convert failure into disaster," and abandoned his design, expressing to the department his opinion that Charleston could not be taken "by a purely naval attack"—a judgment that the events of the next two years amply vindicated and sustained. In July, 1863, being relieved from the command of the South Atlantic fleet, he returned to his home, where he died on the 23d of June, 1865, sincerely regretted by the whole navy.

A thorough seaman, an accomplished officer, a Christian gentleman, he was beloved by all who came in contact with him, and best by those who knew him best. His mind, like his stature, was above that of ordinary men, his person graceful and commanding, his countenance handsome, thoughtful, and interesting; and "in looking upon him," as Tacitus says of the wise and virtuous Agricola, "you would have been easily convinced that he was a good man, and you would have been willing to believe him a great one." Foxhall A. Parker, U. S. N.

Dupont de l'Étang (Pierre), a French general, born at Chabannais July 14, 1765. He served with distinction at Jena (1806) and Friedland (1807). Having obtained the command of an army in Spain, he was defeated at Baylen in June, 1808, by De Castaños, who took from him 18,000 prisoners. For this ill-success he was disgraced and imprisoned. Died Feb. 16, 1838.

Dupont de l'Eure (Jacques Charles), a French judge and legislator, born in 1767. He was liberal in politics, and represented his native department (L'Eure) in the Chamber of Deputies (1817–48). He was chosen president of the provisional government in Feb., 1848. Died in 1855.

Dupont de Nemours (Pierre Samuel), a French economist, born in Paris Dec. 14, 1739. He became a member of the National Assembly in 1790, and of the Council of Ancients in 1795. In 1795 he was admitted into the Institute. He refused to take office under Napoleon, and emigrated to Delaware in 1815. He wrote several treatises on political economy and natural history, and "Philosophie de l'Univers" (1796). Died Aug. 6, 1817.

Dupré (Giovanni), an Italian sculptor, born at Sienna Mar. 1, 1817, first practised his father's trade of wood-carving. His works treat mostly of religious subjects; among them are "Abel" and a "Pietà." Died Sept., 1869.

Dupré (Jules), a French landscape-painter of the realistic school, born at Nantes in 1812, was the son of a maker of porcelain, in which occupation he first engaged. He first exhibited in 1831.

Dupuis (Charles François), a French philosopher, born at Trie-le-Château (Oise) Oct. 16, 1742. He became professor of rhetoric in the College of Lisieux in 1766, and was a friend and pupil of Lalande the astronomer. His "Origine de tous les Cultes, ou la Religion Universelle" (12 vols., 1794), contained bold speculations on religion. Died Sept. 29, 1809.

Dupuytren (Guillaume), Baron, a French surgeon and anatomist, born Oct. 6, 1777, became professor of surgery in Paris in 1811. He was reputed the most skilful French surgeon of his time, made important discoveries in morbid anatomy, and invented several useful instruments. Died Feb. 8, 1835. (See Cruveilhier, "Vie de Dupuytren," 1841.)

Duquesne, du-kain', a former borough of Alleghany co., Pa., on the right bank of the Alleghany River. It has been annexed to Allegheny City, of which it forms the eighth ward.

Duquesne (Abraham), Marquis, a famous French naval commander, born at Dieppe in 1610. He served with distinction against the Spaniards at Tarragona in 1641. In 1643 he defeated the Danes near Gothenburg, and compelled them to make peace. He defeated the Spanish and Dutch fleet under De Ruyter in the Mediterranean, near Catania, in April, 1676. Died at Paris Feb. 2, 1688. (See André Richer, "Vie du Marquis Duquesne," 1783.)

Duquesnoy (François), called Il Fiammingo, a sculptor, born at Brussels in 1594, was a friend of N. Poussin, and a rival of Bernini at Rome. Died in 1646.

Duquoin, a city of Perry co., Ill., on the Illinois Central R. R., 76 miles N. of Cairo, at its junction with the St. Louis and Southern Illinois R. R. It has four churches, one graded school, a park and public library, a foundry and machine-shops, salt-works, two flouring-mills, stave-factory, and twelve coal-mines. It has one weekly newspaper. Pop. 2212. R. Berrey & Co., Props. "Tribune."

Du'ra Ma'ter [the Lat. for "hard" or "unyielding mother," so named because it is more unyielding than the "pia mater"], the outermost of the three meninges or membranes enveloping the brain and spinal cord in vertebrate animals. Within the skull it is so completely joined to the bones that it may be regarded as their endosteum. Its inner surface is covered with pavement epithelium, and perhaps by the parietal layer of the arachnoid membrane, but this is denied by Kölliker. The dura mater sends out sheaths for the nerves as they go through their foramina. It is usually studded, except in infancy, by numerous small whitish masses called the Pacchionian bodies, whose use is not understood. The tentorium and the falces (*falx cerebri* and *falx cerebelli*) are induplications of the dura mater sent into the cavity of the skull. Within the spinal canal the dura mater becomes a fibrous tube, separated from the vertebræ (which have an endosteum) by a loose areolar

fatty tissue and a plexus of veins. It is much larger than the spinal cord, the space between being filled by the other meninges and by the cerebro-spinal fluid.

Dura'men [from *duro*, to "harden"], a Latin word signifying a "hardening," is a term applied in botany to the hardened and matured central layers of exogenous trees, commonly called "heart-wood." It is more dense, compact, and durable than the alburnum or sap-wood, and its tubes are filled with the peculiar secretions of the tree, so that the sap no longer circulates freely through them. In many species it is of a darker color than the alburnum. The duramen is the most valuable part of the tree for timber and for the use of the cabinet-maker.

Durance [Lat. *Druentia*], a river in the S. E. part of France, rises among the Cottian Alps in the department of Hautes-Alpes. Its general direction is nearly southwestward. It flows through the department of Basses-Alpes, forms the south-western boundary of Vaucluse, and enters the Rhone 3 miles below Avignon. Its total length is nearly 200 miles. Marseilles is supplied with water from this river by an aqueduct 51 miles long.

Durand', a township and village of Winnebago co., Ill., on the Western Union R. R. Pop. 1578.

Durand, a post-village, capital of Pepin co., Wis., is in Durand township and on the Chippewa River, about 20 miles N. of Wabashaw (Minn.). It has one weekly newspaper. Pop. of township, 917.

S. A. Foster, Ed. "Times."

Durand (Asher Brown), an eminent American painter and engraver, born at Jefferson, N. J., Aug. 21, 1796. He engraved several portraits for the "National Portrait Gallery," also Trumbull's "Declaration of Independence." After 1835 he devoted himself almost exclusively to painting, and gained brilliant fame as a landscape-painter. Among his paintings are "The Capture of Major André," "The Wrath of Peter Stuyvesant," "A Primeval Forest," "Franconia Mountains," and "The Rainbow."

Durand (Guillaume) **de Saint-Pourçain,** known as the "Most Resolute Doctor," a scholastic divine, born at St.-Pourçain, Auvergne, about 1280. He was a Dominican friar in his youth. In 1318 he became bishop of Puy, and bishop of Meaux in 1326. He died about 1332. He was a decided nominalist, and by his independent thinking is believed to have contributed to the rise of the Reformation. His best-known writings are commentaries on Peter Lombard, and a work on the canon law ("De Origine Jurisdictionum"). In his treatise "On the State of the Pious Dead" he attacked the opinions of Pope John XXII.

Duran'do (Giacomo), an Italian general, born at Mondovi in 1807. He printed in 1847 a brochure in favor of Italian unity under a constitutional government, which had an extensive influence. He was minister of war at Turin in 1854–55, and became a senator in 1860. In 1862–63 he was minister of foreign affairs in the cabinet of Ratazzi.

Duran'go, a state of Mexico, bounded on the N. by Chihuahua, on the E. by Cohahuila, on the S. by Xalisco, and on the W. by Cinaloa. The surface is mostly mountainous. It belongs to the N. part of the table-land of Anahuac. Area, 42,645 square miles. Gold and silver are found here. Capital, Durango. Pop. in 1871, 185,077.

Durango, or **Guadiana,** a town of Mexico, capital of the above state, is about 150 miles N. W. of Zacatecas; lat. 24° 2′ N., lon. 103° 34′ W. It is nearly 7000 feet above the level of the sea. It is the seat of a bishop, and has a cathedral, a college, a mint, several convents, and a theatre; also manufactures of tobacco and iron. Pop. in 1868, 12,449.

Durant', a post-village of Farmington township, Cedar co., Ia., on the Chicago Rock Island and Pacific R. R. Pop. 373.

Durant, a post-village of Holmes co., Miss., on the Mississippi Central R. R., 59 miles N. by E. of Jackson. Pop. 375.

Duran'te (Francesco), an Italian composer, born Mar. 15, 1684, studied music at Naples under Gaetano Greco and under Scarlatti, and in 1742 became director of the conservatory of Sta. Maria di Loreto at Naples. His compositions consist solely of church music, and are marked by loftiness and purity of style. Died Aug. 13, 1755.

Dura'zzo [Turkish *Drasch;* anc. *Epidamnus*, afterwards *Dyrrhachium*], a fortified maritime town of European Turkey, in Albania, is on the Adriatic; lat. 41° 18′ N., lon. 19° 28′ E. It is the seat of a Roman Catholic archbishop. It has a safe harbor and an active trade. Grain, tobacco, and olive oil are exported from it. The ancient *Epidamnus* was a populous city. The expulsion of its aristocracy in 436 B. C. was the origin of the Peloponnesian war. The Romans changed the name to Dyrrhachium (which see). It was captured by the Norman chief Robert Guiscard in 1082, and by the Venetians in 1205. Pop. about 8000.

Dur'bin (John Price), D. D., an American Methodist preacher, born in Bourbon co., Ky., in 1800, was educated at Miami University and Cincinnati College, and entered the ministry in 1819. He became president of Dickinson College in Pennsylvania in 1834. Having visited Europe and the Levant, he published "Observations in Europe, principally in France and Great Britain" (2 vols., 1844), and "Observations in Egypt, Palestine, etc." (2 vols., 1845). For many years he was secretary of the Methodist Episcopal Church, and displayed great eloquence and administrative ability in its affairs. He resigned the presidency of Dickinson College in 1845. He has furnished many contributions to periodicals, etc.

Dü'ren, or **Mark Düren** (anc. *Marcodurum*), a town of Rhenish Prussia, on the river Roer and on the Cologne and Aix-la-Chapelle Railway, 18 miles E. of Aix-la-Chapelle. It has a Catholic gymnasium, a high-school, a female high-school, an asylum for the blind, several fine churches, and manufactures of woollen cloth, carpets, cotton goods, etc. It was besieged and taken by Charles V. in 1543. Charlemagne held diets here in 775 and 779 A. D. Pop. in 1871, 12,850.

Dü'rer (Albrecht), a celebrated German painter and engraver, born at Nuremberg in 1471. The day of his birth is uncertain, owing to the way in which it is inserted in his father's diary, but it was probably May 21st. He was a pupil of Michael Wohlgemuth, with whom he studied and worked three years (1486–89). He afterwards passed four years in travel, visiting various parts of Germany, and returned to Nuremberg in 1494. In the same year he married Agnes Frey, with whom he is said to have lived unhappily, though there is no good authority for the widespread belief. He visited Venice in 1505, and while there painted a picture for the Tedeschi, or guild of German merchants, which was probably "The Feast of the Rose Garlands," now in the monastery of Strahow at Prague. This was his first picture of importance. In 1520 he went to the Netherlands, accompanied by his wife; and during his journey, the object of which is not known, he kept a minute diary, which was first published in Von Murr's "Journal zur Kunstgeschichte" (1775–88). This curious and interesting record of early travel has been several times translated into English. Dürer returned home in 1521, and continued to live in his native town until his death, April 6, 1528. Dürer's works consist of paintings in oil and engravings on wood and copper. He has also left a number of etchings; and over 500 of his drawings in pen and ink, water-color, chalk, charcoal, India-ink, and with the silver point, exist in public and private collections. These drawings and sketches are remarkable for their precision, delicacy, and firmness of touch, and for the power of observation and patient study they reveal in the master. The finest collections are in the British Museum, the Albertina Gallery at Vienna, and the Uffizi at Florence. His most celebrated paintings are "The Four Apostles," originally presented by him to the city of Nuremberg, but now in Munich; his own portrait in the Uffizi Gallery at Florence; and an "Adoration of the Magi," a most beautiful picture, well worthy of the place it occupies in the tribune. His best wood-cuts are the four series "The Apocalypse," "The Great Passion," "The Little Passion," and "The Life of the Virgin," but there are many fine single cuts. Dürer is not believed to have engraved all the wood-cuts that bear his monogram, but only to have made the designs. Perhaps the works by which Dürer is most widely known are his engravings on copper. Of these the most famous are the "Adam and Eve," the "Melancholia," the "Knight, Death, and the Devil," the "Saint Eustache," "Saint Jerome in his Study," and "The Great Fortune." These are all large, but many among the smaller engravings are equal miracles of execution. Dürer was much beloved by the emperor Maximilian I. and by many of the most distinguished men of his time—by Luther, by Melanchthon, by Erasmus, as well as by lesser men, such as Camerarius and Pirkheimer. When in Venice he received much kindness from Bellini, and Raphael and he exchanged specimens of their work. Dürer has left us valuable portraits of Melanchthon, Erasmus, Pirkheimer, and many other notables of his time. He was the author of several treatises—"The Art of Fortification," "Instruction in the Art of Mensuration with the Rule and Compass," with one on "The Proportions of the Human Body," published after his death. A work on the "Proportions of the Horse" is now lost, as is also one on "The Art of Fencing," with perhaps some others whose names are not known. (See J. Heller, "Das Leben und die Werke A. Dürers," 1827–31; only the second volume of this valuable work ever appeared. See also lives of

Dürer by Roth, Nagler, Von Eye, in German, Charles Narrey in French, and in English by Mrs. C. Heaton, 1869, and W. B. Scott, 1869.) Of late years a great interest has been felt in Dürer, and many important publications relating to him have appeared in Germany. A photo-lithographic imitation of his "Little Passion," in thirty-seven sheets, was published by J. W. Bouton in 1868, and copies of his copper-plates by J. R. Osgood, Boston, in 1872. Clarence Cook.

Du'ress [Lat. *duritia*, "hardship"], in law, is either of the person or of goods. 1. *Of the Person.*—This is exercised in two modes, either by threats or by imprisonment. Duress by threats (*per minas*), according to the older authorities, occurred where a person entered into a contract or performed some other act through fear of loss of life or limbs, or grievous bodily harm. It was even an excuse for some crimes, but not for those of the graver class, such as the killing of an innocent person. The modern cases do not take quite so technical a view of the subject, and the tendency is to make the presence of duress turn on positive inquiry whether the threat was of a kind calculated to overcome the will of a person of ordinary firmness and prudence. In equity jurisprudence the word is used in a broader sense than in the courts of common law, and includes cases where a party is in extreme necessity and distress; and duress may be exercised not only towards the person who makes a contract, but in certain cases towards one standing in confidential relations with him. Thus, a threat to prosecute criminally a son, whereby a father is induced to execute a deed in order to save him from arrest, is sufficient duress in equity to furnish a basis to set the conveyance aside. A contract executed under duress is not void, but only voidable at the election of the injured party. Duress of imprisonment can only be affirmed of the case of unlawful restraint.

2. *Duress of Goods.*—This phrase refers to a case where a person having goods illegally detained pays money to obtain their release. If such payment is made under protest, the money may be recovered back, as being paid under compulsion. An instance is an exaction of unauthorized duties upon goods by the collector of a port. The mode of making the protest in this special case is regulated in the U. S. by act of Congress.

The question has been raised whether the doctrine of duress can be applied in international law to relieve a nation from the obligations of a treaty of peace. The answer must in general be in the negative, as the terms of peace, however humiliating, are the chances of war to which the parties have appealed. T. W. Dwight.

Duret (Francisque Joseph), a French sculptor, born Oct. 19, 1804, studied with his father, with Bosio, and at Rome. His works, among them "Fisher-boy Dancing" (1833), "Vintager" (1839), and statues of Molière and Chateaubriand, are noble compositions of great spirit and correctness. Died in May, 1865.

Dur'fee (Job), LL.D., an American jurist, born at Tiverton, R. I., Sept. 20, 1790, graduated at Brown University in 1813, became a member of Congress in 1820, and chief-justice of Rhode Island in 1835. He wrote, besides other works, "What Cheer?" a poem on the adventures of Roger Williams (1832). His life and writings were published by his son (1849). Died July 26, 1847.

D'Ur'fey (Thomas), an English dramatist, born at Exeter, gained the favor of Charles II. He wrote successful comedies, popular songs, and odes. Died in 1723.

Durgâ, or **Dourga,** a Sanscrit word signifying "difficult of access," and forming one of the many names of Pârvatî (which see).

Dur'ham, a county in the N. part of England, is bounded on the N. by the river Tyne, on the E. by the German Ocean, and on the S. by the river Tees. Area, 973 square miles. The surface is hilly, but the greater part of the land is arable. The rocks which underlie it are new red sandstone, carboniferous limestone, and magnesian limestone. Among its mineral resources are coal, iron, lead, and marble. The collieries of Durham are the most extensive and valuable in England. Durham produces a celebrated breed of short-horned cattle. The chief towns are Durham, Sunderland, Darlington, South Shields, and Gateshead. Durham is one of the three counties palatine of England. Pop. in 1871, 685,045.

Durham [Sax. *Dunholme*, from *dun*, a "hill," and *holme*, a "river"], an episcopal city of England, the capital of the above county, is on the river Wear, 14 miles S. of Newcastle. It is built around a steep rocky hill, the top of which is occupied by a castle and cathedral. It is connected by railways with Newcastle and other towns. It sends two members to Parliament. Here is a castle founded by William the Conqueror about 1072. The magnificent cathedral of Durham was founded in 1093, and is a Norman structure 507 feet long by 200 wide, with a central tower 214 feet high. This cathedral contains the tombs of Saints Cuthbert and Bede. The see of Durham was long the richest bishopric in England. This city is the seat of the University of Durham, which was opened in 1833. Pop. in 1871, 14,406.

Durham, a county of Ontario, Dominion of Canada. Area, 620 square miles. It is bounded on the S. by Lake Ontario, and intersected by the Grand Trunk R. R. and the Midland Railway of Canada. Capital, Port Hope. Pop. in 1871, 37,381.

Durham, a post-village of Gray co., Ontario. It has a weekly newspaper and important manufactures. Pop. about 2500.

Durham, a post-township of Middlesex co., Conn. It is the seat of an academy. Pop. 1086.

Durham, a post-township of Hancock co., Ill. Pop. 1019.

Durham, a post-township of Androscoggin co., Me. It has manufactures of carriages and cooperage. Pop. 1350.

Durham, a township and post-village of Strafford co., N. H., on the Boston and Maine R. R., 6 miles S. of Dover. It has manufactures of brick, wall-paper, etc. Pop. 1298.

Durham, a post-township of Greene co., N. Y. It has several tanneries and mills. Pop. 2257.

Durham, a township and post-village of Orange co., N. C., on the North Carolina R. R., 25 miles N. W. of Raleigh. It has manufactures of tobacco. One weekly newspaper is published here. The surrender of Gen. J. E. Johnston, April 25, 1865, took place near by. Pop. 2323.

Durham, a post-township of Bucks co., Pa. P. 1209.

Durham, Earls of, and Viscounts Lambton (1833), Barons Durham (United Kingdom, 1828).—George Frederick D'Arcy Lambton, second earl, born Sept. 5, 1828, succeeded his father in 1840.

Durham (John George **Lambton**), Earl of, an English statesman, born in the county of Durham April 12, 1792. He was elected to Parliament by the Whigs in 1813, and was an advanced liberal. He was created Baron Durham in 1828, became lord privy seal in the cabinet of Earl Grey in Nov., 1830, and was one of the four persons who prepared the Reform bill of 1831, which he supported in the House of Lords. In 1833 he resigned the office of lord privy seal and received the title of earl. He was sent as ambassador to Russia in 1835, and was appointed governor-general of Canada in 1838, but returned suddenly in Dec., 1839. Died July 28, 1840.

Durham Breed of Cattle. See Short Horns.

Dur'hamville, a post-village of Verona township, Oneida co., and of Lenox township, Madison co., N. Y., is on the New York and Oswego Midland R. R., 55 miles S. E. of Oswego, and on the Erie Canal. It has manufactures of glass, leather, and castings. Pop. 859.

Du'rian, or **Durion** (*Durio Zibethinus*), a tree of the order Sterculiaceæ, a native of the Malay peninsula, cultivated by the Malays for its delicious fruit, which forms a great part of their food. It is a lofty tree, with simple leaves and large clusters of pale yellow flowers. The fruit is globular or oval, about ten inches in diameter, and has a hard, thick, prickly rind enclosing a creamy pulp and about ten seeds, which are eaten roasted. It combines the most delicious flavor with a very offensive odor, and brings a higher price than any other fruit.

Durivage (Francis Alexander), was born in Boston, Mass., in 1814. He published a "Cyclopædia of History," "Stray Subjects," and other works, including popular tales, poems, and plays.

Dur'kee (Charles), a politician, was born at Royalton, Vt., Dec. 5, 1807, removed to Wisconsin Territory in 1830, was a Free-Soil member of Congress (1849–55), U. S. Senator (1855–61), and governor of Utah (1865–70). Died Jan. 14, 1870.

Durk'heim, a town of Bavaria, on the Isenach, 20 miles N. of Landau. It has a castle, a hospital, and manufactures of paper and glass. It is surrounded by beautiful scenery, and is a resort of invalids. It has an active trade in wine. Pop. in 1871, 5572.

Dur'lach, a town of Germany, in Baden, on the river Pfinz, and on a railway, 3 miles E. of Carlsruhe. It is at the base of the Thurmberg, a hill the top of which is occupied by a ruined castle. Pop. in 1871, 6327.

Duroc (Gérard Christophe Michel), duke of Friuli, a French general and diplomatist, born at Pont-à-Mousson Oct. 25, 1772. He became in 1796 aide-de-camp to Bonaparte, whom he accompanied to Egypt in 1798. During

the consulate and empire he was sent on diplomatic missions to Berlin, Vienna, and other courts. He was a favorite officer of Napoleon, whom he attended in the campaigns of 1806 and 1807. He was killed at Markersdorf, in Saxony, May 23, 1813.

Duruy (Victor), a French historian, born in Paris Sept. 11, 1811. He published many popular and excellent historical and geographical works, some of which were designed for schools. He was minister of public instruction from June, 1863, to July, 1869, and made important changes in the educational system of France.

Dushore, a post-borough of Sullivan co., Pa., on the Sullivan and Erie R. R., about 35 miles N. W. of Wilkesbarre. It has one weekly newspaper. Pop. 376.

Dusky Bay, of New Zealand, is a large inlet on the S. W. coast of the Middle Island. It affords good anchorage. Lat. 45° 40′ S., lon. 166° 20′ E.

Düs'seldorf, a town of Rhenish Prussia, the former capital of the duchy of Berg, is finely situated on the right bank of the Rhine, at the mouth of the river Düssel, 17 miles N. N. W. of Cologne; lat. 51° 13′ N., lon. 6° 45′ E. It is connected by railways with Cologne, Elberfeld, and other towns. The Rhine is here crossed by a bridge of boats. Düsseldorf is mostly built of brick, and has wide and regular streets. It contains an old electoral palace, a gymnasium, a realschule, a town-hall, a public library, a theatre, an observatory, and several fine churches. Here are manufactures of woollen and cotton fabrics, jewelry, hats, leather, carpets, etc. Its prosperity is derived partly from trade and the navigation of the Rhine. Here is a fine public garden called the Hofgarten, and a celebrated academy of art. This town became a free port in 1829. It has increased rapidly in recent times. Pop. in 1871, 69,351.

Düsseldorf School of Painting. The Düsseldorf Academy, founded in 1767 by Prince Charles Theodore, led a languishing life until, under the patronage of Frederick William III., Cornelius was appointed director, which position he continued to fill until his removal to Munich in 1826. A man of such ability and force naturally quickened the growth of art, and the academy soon became the centre of a new life. On the departure of Cornelius, William von Schadow was made director, and his great skill as a teacher, added to his proficiency in his art, increased the reputation of the academy as a school, and drew to it more and more of the rising, undeveloped talent of Young Germany. The names that make this period in the history of German art, in the eyes of Germans at least, a modern Renaissance — Koch, Overbeck, Veit, Schnorr, Von Schwind—are most widely known by the frescoes with which they adorned so many palaces, villas, churches, and public buildings in Rome, Munich, and Berlin; but the artists of the Düsseldorf School have spread the name of their Alma Mater far and wide by means of their easel-pictures. Their chief influence outside of Germany has been in America, where many of their best works have been exhibited and sold, and whither several artists, mostly of American birth, have brought the doctrines they learned at Düsseldorf, either in the academy or in the studios of German artists residing there, and have gained much influence and a widespread reputation at home and abroad by putting them in practice. In 1853 an exhibition of Düsseldorf pictures, belonging to Mr. Boker, was opened in the city of New York, and long continued one of the principal attractions of the town. It made Americans familiar with the names of Lessing, Hübner, Karl Sohn, Hildebrand, Steinbrück, Andreas Achenbach, Hasenclever, and Preyer; and as the specimens of their work contained in this gallery were of the best, there came nearer to being a real enthusiasm on the subject of art awakened in our Eastern States than was ever before, or than has since, been possible. A group of Americans, Eastman Johnson, George H. Hall, W. Whittredge, were somewhat influenced by their studies at Düsseldorf, but fortunately for his country other and larger influences saved the first of these from being spoiled by the teachings of the academy, and preserved to us one of the best of our painters. But we were not so fortunate in the cases of Leutze and Bierstadt, two artists of considerable native ability, who were fatally overmastered by the Düsseldorf Academy, and whose influence in this country has set art back for fifty years. While it would not be fair to compare their works with those of the more famous members of the school in Europe, it cannot be denied that their pictures were the direct outcome of the system taught at Düsseldorf, though it must be admitted that the system was unfortunate in its representatives—men of small culture, and working in a community where art was necessarily little understood.

The school at Düsseldorf was early divided into two parties—the Catholic and the Protestant, the former seeking to restore the ancient exclusive devotion of art, as in the Old Cologne School, to religious, chiefly Roman Catholic, subjects; the other, of which Lessing was the acknowledged head, refusing to be shut up in such narrow limits, and painting all subjects—landscape, genre, historical, and religious—having, however, a strong leaning to the Protestant side. The harm the Düsseldorf School has done is not perhaps greater than has been done by the schools of Berlin and Munich: it seems greater to an American, because we have suffered so much from it. It inculcates the fatal doctrines that art can be taught, and that its ministry is that of a preacher of doctrines or a narrator of anecdotes, religious, historical, domestic. It confounds art with science, and dissects where it ought to create. But in their own narrow, pedantic field here were men of sense, talent, learning, industry—everything but genius; the men of genius in Germany, as everywhere, have grown up and worked outside of all schools—and they have had the reward that always awaits the commonplace and the practical. They have been extremely popular, they have stimulated a great number of kindred minds, and they have more than supplied the demand for works of art that everybody can understand. Clarence Cook.

Dutch Creek, a post-township of Yell co., Ark. Pop. 466.

Dutch Creek, a post-township of Washington co., Ia. Pop. 1228.

Dutch'ess, a county in the E. S. E. of New York. Area, 810 square miles. It is bounded on the W. by the Hudson River, and is drained by Fishkill River. The surface is hilly; the soil is generally fertile. Cattle, grain, tobacco, wool, potatoes, hay, butter, and milk are largely produced. The manufacturing interests are varied and quite extensive, embracing iron, metallic wares, clothing, flour, cooperage, sash, doors, and blinds, carriages, etc. Limestone, marble, iron, and lead are found here. It is intersected by the Hudson River R. R., the Harlem R. R., and the Dutchess and Columbia R. R. Capital, Poughkeepsie. Pop. 74,041.

Dutch Flat, a mountain-village of Placer co., Cal., on the Central Pacific R. R., 67 miles from Sacramento. It has productive hydraulic gold-mines. Pop. about 2000.

Dutch Fork, a township of Lexington co., S. C. Pop. 1352.

Dutch Gap Canal, a cut through the narrow isthmus of a peninsula known as Farrar's Island, in the James River, about 5 miles below Richmond, Va., designed to afford the national vessels a nearer approach to the Confederate works, to avoid the great obstructions which had been placed in the curve of the river, and to outflank the heavy Howlett House batteries. It was executed under Major P. S. Michie, by order of Gen. B. F. Butler. The work was undertaken Aug. 15, 1864, and finished Jan. 1, 1865; but a large part of the bulkhead of clay which was blown out by powder on that occasion fell back, so as to obstruct navigation for the time. It was of no service to either side during the war, but has since shortened the navigation of the river to Richmond some seven miles.

Dutch Gold, an alloy of copper and zinc, closely resembling common brass, but having rather less zinc in its composition than brass generally has. It is used for beating into thin plates, resembling gold-leaf in appearance when new, and used for ornamentation instead of gold-leaf. It tarnishes readily, and may be tested by the application of strong nitric acid, which will not injure gold-leaf, but which readily dissolves the imitation.

Dutch Guiana. See Guiana.

Dutch Language and Literature. The Dutch is the language spoken by the inhabitants of the Netherlands. It is so closely allied to the Flemish that in their earlier forms, at least, the two may be considered as one and the same tongue. The Dutch belongs to the Aryan (otherwise called the Indo-European) family of languages, and to the Teutonic subdivision of that great family. The study of the Dutch language is of especial interest to the student of English, as well as to the general philologist, as presenting one of the most important links that connect our tongue with the German, and also as bearing a very close relationship to the Lowland Scotch.

The Dutch alphabet consists of the same letters as our own. The vowels *a, e, i, o, u* are essentially the same in sound as in French; but *u*, followed by a consonant in the same syllable, is pronounced nearly like short *u* in English. *Y* (now mostly replaced by *ij*) has the sound of the long *i* (*ī*) in English. A long vowel sound before a consonant in the same syllable is usually indicated by doubling the vowel, as *laat* ("late"), *been* ("bone"), *zoon* ("son"), *duur* ("duration"). *Ae* is equivalent to long *a;* it is now replaced in spelling by *aa*. *Ei* or *ey* sounds like long *i* in Eng-

lish; *eu* is like *eu* in French; *ie* like our *ee*. *Ij*, as already intimated, is pronounced like our long *i*. *Oe* sounds like our *oo; ui* or *uy* like *oi*. The consonants *b, c, f, h, k, l, m, n, p, r, s, t, x*, and *z* are essentially the same in sound as in English. *D* at the beginning or in the middle of a word is pronounced like the English *d*, but at the end of a word sounds like *t; g* has nearly the sound of the German *ch* in *ach; v* at the beginning of a word has a sound intermediate between our *f* and *v; w* sounds almost as in English; *ch* is pronounced like *ch* in German; *sch*, however, has not, as in German, the sound of our *sh*, but preserves that of the guttural *ch*, with the pure sound of *s*, being pronounced somewhat like *sk*.

The Dutch nearly resembles the German in the inflections of the nouns and verbs, and in the construction of the sentences, as well as in many of its words, as may be seen from the following examples:

SINGULAR.

	Dutch.	(*German.*)
Nominative,	*de koning*	(*der König*), the king.
Genitive,	*des konings**	(*des Königes* or *Königs*), of the king.
Dative,	*den koning*	(*dem Könige*), to the king.
Accusative,	*den koning*	(*den König*), the king.

PLURAL.

Nom.	*de koningen*	(*die Könige*), the kings.
Gen.	*der koningen**	(*der Könige*), of the kings.
Dat.	*den koningen*	(*den Königen*), to the kings.
Acc.	*de koningen*	(*die Könige*), the kings.

The following is an example of the article with an adjective and substantive:

SINGULAR.

Dutch.	(*German.*)
Nom. *de goede vriend*	(*der gute Freund*), the good friend.
Gen. *des goeden vriends**	(*des guten Freundes*), of the good friend.
Dat. *den goeden vriend*	(*dem guten Freunde*), to the good friend.
Acc. *den goeden vriend*	(*den guten Freund*), the good friend.

PLURAL.

Nom. *de goede vrienden*	(*die guten Freunde*), the good friends.
Gen. *der goede vrienden**	(*der guten Freunde*), of the good friends.
Dat. *den goeden vrienden*	(*den guten Freunden*), to the good friends.
Acc. *de goede vrienden*	(*die guten Freunde*), the good friends.

The plural of the nouns is generally formed by adding *en* or *n* to the singular, as *een boom* (masc.), "a tree," *boomen*, "trees;" *eene kerk* (fem.), "a church," *kerken*, "churches;" *een hofd* (neut.), "a head," *hofden*, "heads;" *bede*, a "prayer," *beden*, "prayers." *Kind*, a "child," is an exception; it takes the addition of *eren* to form the plural, like our word child, which originally made the plural in the same way, *child-eren*, afterwards contracted into *children*. Many nouns change the final consonant of the singular into another of the same class, as *dief*, "thief," *dieven*, "thieves;" *huis*, "house," *huizen*, "houses," etc.: often a double vowel in the singular is changed to a single one in the plural, as *maan*, "moon," *manen*, "moons;" *zoon*, "son," *zonen*, "sons," etc.; not unfrequently both vowels and consonants are changed, as *baas*, "master," *bazen*, "masters;" *graaf*, "count," *graven*, "counts," etc. Nouns ending in *r, l, en*, and *em* frequently form the plural by simply adding *s*, as *broeder*, "brother," *broeders*, "brothers" (also formed by adding *en*, as *broederen*); *moeder*, "mother," *moeders*, "mothers;" *appel*, "apple," *appels*, "apples;" *bessem*, "broom" or "besom," *bessems*, "brooms;" *kindeken*, a "little child," *kinderkens*, "little children."

The Dutch numerals are as follow:

1, een.	18, achttien.
2, twee.	19, negentien.
3, drij.	20, twintig.
4, vier.	21, een en twintig.
5, vijf.	22, twee en twintig.
6, zes.	23, drij en twintig, and so on.
7, zeven.	30, dertig.
8, acht.	40, veertig.
9, negen.	50, vijftig.
10, tien.	60, zestig.
11, elf.	70, zeventig.
12, twaalf.	80, tachtig.
13, dertien.	90, negentig.
14, veertien.	100, honderd.
15, vijftien.	200, twee honderd.
16, zestien.	1,000, duizend.
17, zeventien.	1,000,000, millioen.

ORDINAL NUMBERS.

de eerste, the first.	de dertiende, the thirteenth.
de tweede, the second.	de veertiende, the fourteenth.
de derde, the third.	de twintigste, the twentieth.
de vierde, the fourth.	de een en twintigste, the twenty-first.
de vijfde, the fifth.	de dertigste, the thirtieth.
de zesde, the sixth.	de veertigste, the fortieth.
de zevende, the seventh.	de vijftigste, the fiftieth.
de achtste, the eighth.	de zestigste, the sixtieth.
de negende, the ninth.	de zeventigste, the seventieth.
de tiende, the tenth.	de tachtigste, the eightieth.
de elfde, the eleventh.	de negentigste, the ninetieth.
de twaalfde, the twelfth.	de honderdste, the one hundredth.

*It is proper to observe that instead of the forms *des konings, der koningen, des goeden vriends*, we may also use *van den koning, van de koningen, van den goeden vriend*, etc.

The principal Dutch pronouns are declined as follows:

	SINGULAR. (*German.*)	PLURAL. (*German.*)
Nom.	*ik* (*ich*),	*wij* (*wir*), we.
Gen.	*mijner* (*meiner*),	*onzer* (*unser* or *onser*), our.
Dat.	*mij* (*mir*),	*ons* (*uns*), to us.
Acc.	*mij* (*mich*),	*ons* (*uns*), us.

PLURAL.*

		(*German.*)
Nom.	*gij* (or *gijlieden*)	(*ihr*), ye, you.
Gen.	*van u* (or *uwer*)	(*euer*), your.
Dat.	*u* (or *ulieden*)	(*euch*), to you.
Acc.	*u* (or *ulieden*)	(*euch*), you.

SINGULAR.

Nom. *hij*	(*er*), he.
Gen. *van hem*, or *zijns*	(*seiner*), his, or of him.
Dat. *hem*	(*ihm*), to him.
Acc. *hem*	(*ihn*), him.

PLURAL.

Nom. *zij*	(*sie*), they.
Gen. *hunner* (or *van hen*)	(*ihrer*), them.
Dat. *hun* (or *aan hen*)	(*ihnen*), to them.
Acc. *hen* (or *ze*)	(*sie*), them.

SINGULAR. (*German.*)		PLURAL. (*German.*)	
Nom. *zij*	(*sie*), she.	*zij*	(*sie*).
Gen. *harer*	(*ihrer*), her or hers.	*harer*	(*ihrer*).
Dat. *haar*	(*ihr*), to her.	*haar*	(*ihnen*).
Acc. *haar* and *ze*	(*sie*), her.	*haar* and *ze*	(*sie*).

Het, "it," has no inflections, the cases being formed by prefixing prepositions, as *van het*, "of it," *aan het*, "to hit," etc. The plural is like the plural of *zij*, except that it does not take *ze* in the accusative. *Zich* (like the German *sich*, to which it corresponds exactly in pronunciation as well as signification) signifies "himself," "herself," "itself," "themselves;" it is only found in the oblique cases, never in the nominative.

The Dutch pronominal adjectives are—

SINGULAR.

Masculine.	*Feminine.*	*Neuter.*
Nom. *de mijne*,	*de mijne*,	*het mijne*, mine.
Gen. *des mijnen*,	*der mijne*,	*des mijnen*, of mine.
Dat. *den mijnen*,	*der mijne*,	*den mijnen*, to mine.
Acc. *den mijnen*,	*de mijne*,	*het mijne*, mine.

PLURAL.

Masculine.	*Feminine.*	*Neuter.*
Nom. *de mijnen*,	*de mijnen*,	*de mijnen.*
Gen. *der mijnen*,	*der mijnen*,	*der mijnen.*
Dat. *den mijnen*,	*der mijnen*,	*den mijnen.*
Acc. *de mijnen*,	*de mijnen*,	*de mijnen.*

De onze, "ours," *de uwe*, "yours," *de zijne*, "his," *de hare*, "hers," etc., are declined in a similar manner.

The demonstrative adjectives (otherwise called demonstrative pronouns) are *deze* (masc. and fem.), and *dit* (neut.), "this;" in the plural *deze* ("these") for all three genders: and *gene*† (masc. and fem.) and *geen* (neut.), "that." The latter is often compounded with the definite article, as *degene* (masc. and fem.), *hetgene* (neut.), "that;" *degene*, "those," forming the plural for all three genders; and with *die, dat*, as *diegene* (masc. and fem.), *datgene* (neut.), "that;" plural, for the three genders, *diegene*, "those."

The relatives are—

SINGULAR.

Masculine.	*Feminine.*	*Neuter.*
Nom. *die*, who;	*die*, who;	*dat*, which.
Gen. *diens*, whose;	*dier*, whose;	*diens*, of which.
Dat. *dien*, to whom;	*dier*, to whom:	*dien*, to which.
Acc. *dien*, whom;	*die*, whom;	*dat*, which.

PLURAL.

Nom. *die*,	*die*,	*die.*
Gen. *dier*,	*dier*,	*dier.*
Dat. *dien*,	*dier*,	*dien.*
Acc. *die*,	*die*,	*die.*

Welke (masc. and fem.), "who," and *welk* (neut.), "which," are also used as relatives, especially in elevated discourse.

The interrogative *wie* (masc. and fem.), "who," and *wat* (neut.), "what," are declined like *die, dat*, as given above.

The following are the principal tenses, etc. of the verb *zijn*, to "be:"

INDICATIVE MOOD.

Present Tense.

Dutch.	(*German.*)
ik ben	(*ich bin*), I am.
gij zijt	(*ihr seid*), you are (or thou art).
hij is	(*er ist*), he is.
wij zijn	(*wir sind*), we are.
gij (or *gijlieden*) *zijt*	(*ihr seyd*), you are.
zij zijn	(*sie sind*), they are.

*The Dutch may be said to have, properly speaking, no second person singular; but *gij* is always used, even in Scripture, for the singular as well as the plural.

† Cognate with the German *jener, jene*, etc., which in a similar manner is compounded with the article, as *derjenige, dasjenige*, etc.

Imperfect.

ik was	(*ich war*), I was, etc.
gij waart	(*ihr waret*).
hij was	(*er war*).
wij waren	(*wir waren*).
gij waart	(*ihr waret*).
zij waren	(*sie waren*).

Perfect.

ik ben geweest	(*ich bin gewesen*), I have been, etc.
gij zijt geweest	(*ihr seyd gewesen*).
hij is geweest	(*er ist gewesen*), etc.

In the future the Dutch use the auxiliary *zal, zult, zal, zullen, zult, zullen*, as *ik zal zijn* ("I shall be"), *gij zult zijn*, etc. (the Germans use *werde, wirst, wird, werden*, etc.).

Zoude ("should"), *zoudet, zoude, zouden, zoudet, zouden*, is used to form the conditional (instead of which the Germans use *würde*, etc.).

PARTICIPLES.

	(*German.*)
Present, *zynde*	(*seyend*).
Past, *geweest*	(*gewesen*).

The regular active verb *hooren*, to "hear," is conjugated as follows:

Indicative Present.	*Imperfect.*	*Perfect.*
ik hoor, I hear.	*ik hoorde.*	*ik heb gehoord*, I have heard, etc.
gij hoort, you hear.	*gij hoordet.*	*gij hebt gehoord.*
hij hoort, he hears.	*hij hoorde.*	*hij heeft gehoord.*
wij hooren, we hear.	*wij hoorden.*	*wij hebben gehoord.*
gij hoort, you hear.	*gij hoordet.*	*gij hebt gehoord.*
zij hooren, they hear.	*zij hoorden.*	*zij hebben gehoord.*

Pluperfect.	*Future.*	*Conditional.*
ik had gehoord.	*ik zal hooren.*	*ik zoude hooren.*
gij hadt gehoord.		
hij had gehoord.		
wij hadden gehoord.		
gij hadt gehoord.		
zij hadden gehoord.		

IMPERATIVE MOOD.

hoor, hear thou.
laat hem (or *hij*) *hooren*, let him hear.
laat ons (or *laten wij*) *hooren*, let us hear.
hooret, hear ye.
laat hen (or *laten zij*) *hooren*, let them hear.

The subjunctive mood is omitted here, as presenting nothing especially remarkable.

The present participle is *hoorende*, "hearing;" the future, *zullende hooren*, "going to hear," literally, equivalent to "shalling to hear," or, as the Greek neatly expresses it, μέλλων ἀκούειν.

The passive voice of verbs is formed with the auxiliary *worden* (imperfect, *werd* or *wierd*), to "be" or "become," thus:

Indicative Present.

	(*German.*)
ik word gehoord	(*ich werde gehört*), I am heard,
gij wordt gehoord	(*du wirst gehört*) [etc.
hij wordt gehoord	(*er wird gehört*).
wij worden gehoord	(*wir werden gehört*).
gij wordt gehoord	(*ihr werdet gehört*).
zij worden gehoord	(*sie werden gehört*).

Imperfect.

ik werd (or *wierd*) *gehoord*	(*ich wurde* (or *ward*) *gehört*), I was
gij werdt (or *wierdt*) *gehoord*	(*du wurdest gehört*). [heard, etc.
hij werd (or *wierd*) *gehoord*	(*er wurde gehört*).
wij werden (or *wierden*) *gehoord*	(*wir wurden gehört*).
gij werdt (or *wierdt*) *gehoord*	(*ihr wurdet gehört*).
zij werden (or *wierden*) *gehoord*	(*sie wurden gehört*).

Perfect.

ik ben gehoord worden (*ich bin gehört worden*), I have been heard, etc.

Pluperfect.

ik was gehoord worden (*ich war gehört worden*), I had been heard, etc.

First Future.

ik zal gehoord worden (*ich werde gehört werden*), I shall be heard, etc.

Second Future.

ik zal gehoord worden zijn (*ich werde gehört worden seyn*), I shall have been heard, etc.

Essential Resemblance between Dutch and German Words.—This resemblance is often much greater in reality than appears to the eye. Thus, the Dutch *zijn* and the German *seyn* (to "be"), so different in appearance, have not only the same meaning, but precisely the same pronunciation. The same is also true of several other parts of the above-named verb; for example, in the subjunctive mood the Dutch *zij, zijt*, and *zijn*, and the German *sey, seyd*, and *sey'n* (for *seyen*), are pronounced exactly alike. So *buigen* and *beugen* (to "bend"), *lesen* and *lezen* (to "read"), *meel* and *Mehl* ("meal"), *meer* and *mehr* ("more"), *mijn* and *mein* ("my" or "mine"), *nemen* and *nehmen* (to "take"), *prijzen* and *preisen* (to "praise"), *zijn* and *sein* ("his"), *bloed* and *Blut* ("blood"), *bloem* and *Blum'* (for *Blume*, "flower"), *broeder* and *Bruder* ("brother"), *hoed* and *Hut* ("hat"), *hoef* and *Huf* ("hoof"), *hoen* and *Huhn* ("fowl," "hen"), *koe* and *Kuh* ("cow"), *moed* and *Muth* ("spirit, "courage"), *moes* and *Mus* ("pap," "sauce"), *roem* and *Ruhm* ("fame," "glory"), *brood* and *Brōd* ("bread"), *hoon* and *Hohn* ("insult"), *nood* and *Noth* ("need," "necessity"), *rood* and *roth* ("red"), *stroo* and *Stroh* ("straw"), *troon* and *Thrōn* ("throne"), *troost* and *Trōst* ("comfort"), *zaat* and *Saat* ("seed"), *zacht* and *sacht* ("soft," "gentle"), *zand* and *Sand* ("sand"), *zeer* and *sehr* ("very"), *zegen* and *Segen* ("blessing"), *zijde* and *Seide* ("silk"), *zin* and *Sinn* ("sense"), *zo* and *so* ("thus," "also," "as"), *zoon* and *Sohn* ("son"), etc.

A great multitude of instances might be cited in which the meaning is the same, and the pronunciation nearly the same, or the difference, at most, is between letters of the same class, as *d* and *t*, *b* and *v*, *p* and *f*, or *v* and *f*, *ch* and *k*, etc.; as *blijven* and *bleiben* (to "remain"), *doen* and *thun* (to "do"), *dood* and *Tōd* ("death"), *dood* and *tōdt* ("dead"), *dragen* and *tragen* (to "bear"), and the past tense of the same, *droeg* and *trug* ("bore"), *rijden* and *reiten* (to "ride"), *roepen* and *rufen* (to "call"), *strijden* and *streiten* (to "fight," to "strive"), *treden* and *treten* (to "tread"), *vallen* and *fallen* (to "fall"), *vechten* and *fechten* (to "fight"), *vinden* and *finden* (to "find"), *voor* and *vōr* ("before"), *vraag* and *Frag'* (for *Frage*, a "question"), *werpen* and *werfen* (to "throw"), *wijken* and *weichen* (to "retire," to "yield"), *wijzen* and *weisen* (to "show"), *zoeken* and *suchen* (to "seek"), *zwijgen* and *schweigen* (to "be silent"), etc.

There are, in regard to certain letters, changes that very frequently if not invariably take place when a word passes, so to speak, from the German to the Dutch. The following changes take place in diphthongs and vowels: (1.) The German *au* usually becomes *o* or *oo* in Dutch; for example, *auf* ("on," "up") is changed to *op* (for the change of *f* to *p*, and that of other consonants, see below); *Baum* ("tree") to *boom; Haufe* ("heap") to *hoop; Haupt* ("head") to *hoofd; kaufen* (to "buy") to *koopen; Lauf* (a "running") and *laufen* (to "run") to *loop* and *loopen; Raub** ("prey," "plunder"), *Rauber* (a "robber") and *Rauben* (to "rob") to *roof, roover*, and *rooven; Rauch* ("smoke") and *rauchen* (to "smoke") to *rook* and *rooken; Saum* (a "hem," "seam") to *zoom; taub* ("deaf") to *toof; tauf'* or *taufe* ("dipping," "baptism") to *doop; Traum* ("dream") to *droom*. (2.) The German *au* also not unfrequently becomes *ui* in Dutch, as *aus* ("out"), *uit; Bauch* ("belly"), *buik; braun* ("brown"), *bruin; Braut* ("bride"), *bruid; Daum* ("thumb"), *duim; faul* ("foul"), *vuil; Faust* ("fist") *vuist; Haus* ("house"), *huis; Laus* ("louse"), *luis; Maus* ("mouse"), *muis; Raum* ("space," "room"), *ruim; rauschen* (to "rush," to "roar"), *ruischen; sauber* ("clean," "pure"), *zuiver; saufen* (to "drink," to "tipple"), *zuipen; Staub* ("dust"), *stuif; Strauch* ("shrub"), *struik; Strauss* ("ostrich"), *struis; Taube* ("dove," "pigeon"), *duif; Traube* ("grape"), *druif; Zaun* ("hedge" or "fence"), *tuin*. (3.) *Ei* in German frequently becomes *ee* in Dutch, as *allein* ("alone"), *alleen; Bein* ("leg," "bone"), *been; Eich* (an "oak"), *eek; ein* ("one"), *een; kein* ("no," as an adjective), *geen; Stein* (a "stone"), *steen*, etc. (4.) But *ei*, as well as *ey*, is often changed to *ij*, as *preisen* (to "praise") to *prijzen; sein* ("his") and *seyn* (to "be") to *zijn*, etc., etc. (5.) *Eu* and its equivalent *äu*, commonly become *ui*, having essentially the same sound, as *beugen* (to "bend"), *buigen; Beule* (a "boil"), *buil; keusch* ("chaste"), *kuisch; säugen* (to "suckle"), *zuigen; säumen* (to "delay"), *zuimen; Zeug* ("stuff," "materials," "tools"), *tuig*, etc., etc. (6.) *Oe* or *ö* in German often becomes *oo* in Dutch, as *böse, boos* ("bad," "evil"); *blöde, bloo* or *bloode* ("bashful"); *hören, hooren* (to "hear"); *schön, schoon* ("beautiful"); *schönheit, schoonheid* ("beauty"), etc. (7.) *Ue* or *ü* in German often becomes *u* in Dutch, the latter being the natural equivalent of the former; as *Brücke, brug* ("bridge"); *bücken, bukken* (to "stoop," to "bow"); *Bürger, burger* ("citizen"); *dünken, dunken* (to "seem"). The German *mich dünkt*, and Dutch *mij dunkt*, explains the origin of our phrase *methinks* (*i. e.* "it seems to me").

In the first paragraph treating of the resemblance between Dutch and German, the reader will see numerous examples of the correspondence of the German long *o* with the Dutch *oo* (as *Sohn* and *zoon*, etc.), and the German *u* with the Dutch *oe* (as *gut* and *goed*, etc.), precisely the same sound being represented by the corresponding words. The German *u*, however, often becomes *o* in Dutch, as *Bund, bond* (a "covenant"); *Bundel, bondel* ("bundle"); *bunt, bont* ("variegated"); *Grund, grond* ("bottom," "ground"); *Hund, hond* ("dog"); *Krumm, krom* ("crooked"), etc., etc.

Of the consonants (1), *f* in German commonly becomes *p* in Dutch,* as may be seen in the following verbs: *helfen* (to "help"), *helpen; hoffen* (to "hope"), *hopen; reifen* (to "ripen"), *rijpen; rufen* (to "call"), *roepen; werfen* (to "throw"), *werpen*. In like manner from the German *Dorf* ("village"), *Harfe* ("harp"), *reif* ("ripe"), *Schiff*

*In a few instances the reverse occurs; that is, the sound of *p* in German is changed to *f* in Dutch; as *Haupt, hoofd* ("head"); *Dieb* (pronounced as if written *diep*), *dief* ("thief"); *Raub* (pronounced as if written *raup*), *roof* ("plunder"), etc.

("ship"), *Waffe* ("weapon"), etc., we have in Dutch, *dorp, harp, rijp, schip, wapen*, etc. (2.) *B* is usually changed to *v*, as shown in the following examples: *bleiben, blijven* (to "remain"); *schreiben, schrijven* (to "write"); *sterben, sterven* (to "die"). (3.) *S* initial or medial in German becomes *z* in Dutch; for example, *seyn, zijn* (to "be"); *lesen, lezen* (to "read"), etc. (4.) The German *s* terminal generally becomes *t* in Dutch, as *blōss, bloot* ("mere," "naked"); *Fūss, voet* ("foot"); *grōss, groot* ("great"); *Maas, maat* ("measure"); *Schloss, slot* ("lock," "castle"). To which may be added *es, het* ("it"); *das, dat* ("that"); *was, wat* ("what"). (5.) *Z* initial is usually changed to *t*, as *Zahl, tal* ("number"); *zählen, tellen* (to "tell"); *bezahlen, betalen* (to "pay"); *Zaum, toom* ("bridle"); *Zeichen, teeken* ("sign," "token"); *Zeit, tijd* ("time"); *Ziegel, tegel* (a "tile"); *Zimmer, timmer* (a "room," also "timber"); *Zinne, tinne* ("pinnacle"); *Zins, tins* ("rent"); *zu, toe* ("to"); *zwei, twee* ("two"); *Zweifel, twijfel* ("doubt"); *Zweig, twijg* (a "branch" or "twig"); *zwelf, twaalf* ("twelve"); *Zunge, tong* ("tongue"); *zwanzig, twintig* ("twenty"); *Zwist, twist* ("strife," "discord"). (6.) *Ch* in German is often changed to *k* in Dutch, as *Būch, boek* ("book"); *fluchen, vloeken* (to "curse"), and *Fluch, vloek* (a "curse"); *suchen, zoeken* (to "seek"), etc.; but this is very far from being always the case. The most numerous class of exceptions consists of words beginning with *sch*—*e. g.* German *Schaf*, Dutch *schaap* ("sheep"); German *Schiff*, Dutch *schip* ("ship"), etc.

It will be observed from the foregoing examples that almost invariably where the Dutch consonant differs from the German it corresponds to the English whenever there is any English word at all resembling either; compare, for example, the German *Zeit*, the Dutch *tijd*, and the Old English *tide*, in the sense of "time"; German *Zeichen*, Dutch *teeken*, English *token*, etc.

It has seemed proper to explain somewhat fully the principles of such changes from the one tongue to the other as would be likely to escape the notice of those who should make only a cursory examination of the two languages. But it has not been deemed necessary to dwell at length upon the more obvious correspondences between them. It may not, however, be without interest to present some examples of such correspondences: *Band, band* (a "band"); *Berg, berg* ("mountain"); *bersten, bersten* (to "burst"); *bergen, bergen* (to "conceal;") *Bescheid, bescheid* ("information"); *bescheiden, bescheiden* ("modest," "discreet"); *bescheiden, bescheiden* (to "appoint"); *Brand, brand* (a "burning"); *branden, branden* (to "rage"); *Hand, hand* ("hand"); *Handel, handel* ("trade"); *hangen, hangen* (to "hang"); *Helm, helm* ("helm" or "helmet"); *Hemd, hemd* ("shirt"); *Kind, kind* ("child"); *klein, klein* ("small"); *krank, krank* ("sick"); *Kunst, kunst* ("art"); *Land, land* ("land"); *lang, lang* ("long"); *Last, last* (a "burden"); *leider, leider* ("alas!"); *Leder, leder* ("leather"); *licht, licht* ("light"); *lichten, lichten* (to "lighten," to "illuminate"); *Linde, linde* (a "linden tree"); *List, list* ("cunning," "craft"); *listig, listig* ("crafty," "cunning"); *Lust, lust* ("pleasure"); *Markt, markt* ("market"); *Mast, mast* ("mast"); *Merk, merk* ("mark"); *merken, merken* (to "mark"); *Minne, minne* ("love"); *Morgen, morgen* ("morning"); *Nacht, nacht* ("night"); *Nagel, nagel* (a "nail"); *nimmer, nimmer* ("never"); *Rad, rad* (a "wheel"); *Rand, rand* ("margin," "border"); *Rede, rede* ("speech"); *Regen, regen* ("rain"); *rein, rein* ("clear," "pure"); *Rente, rente* ("rent"); *Spiegel, spiegel* (a "mirror"); *Vogel, vogel* ("bird," "fowl"); *Wacht, wacht* ("watch"); *Wagen, wagen* ("wagon," "carriage"); *wegen, wegen* (to "weigh"); *Werk, werk* ("work"); *Winter, winter* ("winter").

The character of Dutch literature may be said to correspond, to a great extent, to the national character, which has been formed in a constant conflict with the most formidable and most unconquerable of all the elements. "The Dutch have taken their possessions from the dominion of the deep; and the exercise of the perpetual thought, care, and industry necessary first to raise and then to keep up such mighty embankments as defend them from their constant assailant, the raging sea, has educated a people adventurous, brave, and cautious." (*Bosworth's Anglo-Saxon Dictionary*, p. xcii.) The spirit of industry and energy thus acquired may be said to pervade their literature, which is characterized rather by solid strength than by a versatile fancy or soaring imagination. Much of the Dutch poetry, however, is not without the charm of unaffected simplicity and great expressiveness of language. In fact, the distinguishing characteristics of the Dutch language may be said to be directness of expression and descriptive energy. In simplicity and directness indeed it bears a near resemblance to the English, over which its greater fulness of inflections gives it some decided advantages, especially on the score of variety and flexibility. In another respect, also, it is on some accounts superior to our tongue. We allude to the facilities it possesses for forming compound words. Many technical terms which the English borrow from the Latin or Greek are formed by the Dutch from their own indigenous roots. In this respect the Dutch even surpasses the German. Thus, for astronomy they have *sterrekunde* ("star-knowledge"), a word which explains itself without the necessity of having recourse to a Greek etymology. Such Dutch terms are usually much more euphonious than their literal English equivalents, because they generally employ connecting vowels, thus rendering the sound much softer, instead of running the terminal and initial consonants together, as is continually done in English in the formation of compound words; thus, we say *end*LESS, but the Dutch say *eind*ELOOS; the same may be seen in the above-cited *sterrekunde*, and in numerous other compound words.

It may be proper to remark here that the Dutch having been pre-eminently a commercial and maritime nation long before England could boast of being the mistress of the sea, from them have been derived many of our nautical terms and phrases, such as *boom*, literally, "tree or beam;" *skipper* (Dutch *schipper*, the *ch* being hard), literally, a "shipper;" *schooner*, etc.

Some of the oldest extant specimens of the Dutch language are supposed to date as far back as the ninth century. They bear a near resemblance to the Low German. All the earlier specimens, indeed, of the Teutonic dialects prove, by the remarkable affinities which they bear to each other, that they originated from a common source. We have already spoken of the essential identity of the Dutch and Flemish, the difference between these two languages being scarcely more than a difference of pronunciation and orthography. The celebrated poem called "Reinaert de Vos" ("Reynard the Fox"), the first part of which was written originally in the old Flemish dialect about 1150, affords one of the finest of the early specimens of the Flemish or Dutch language. From it was made a free translation into Low Saxon, "Reineke Vos," under which form it became widely known and very popular.

Jacob van Maerlant is regarded as the father of Dutch poetry. He was born at Damme, in Flanders, in 1235, and died in 1300. He made various translations into Dutch poetry, of which the following may suffice as a specimen:

"Diese bloemen hebben wi besocht,
En uten Latine in Dietche brocht,
Ute Aristotiles boeken."

Translated literally:

"These flowers (beauties) have we sought,
And out of Latin into Dutch brought,
From Aristotle's books."

Perhaps his most celebrated work is his "Spiegel Historiael" ("Historic Mirror"). The "Rijmkronik" ("Chronicle" in verse) of Melis Stoke was written about 1290. The following is an interesting sample of that early rhyme:

"Dese pine ende dit ghepens
send ic u Heer Grave Florens
Dat ghi moget sien ende horen
Wanen dat ghi sijt geboren,
Ende bi wat redenen ghi in hant
Hebbet Zeelant ende Hollant;
Ende bi wat redenen dat ghi soect
Vrieslant dat u so sere vloect."

Literally translated:

"These labors (pains) and these thoughts
send I to you, Sir Count Florens,
that you may see and hear (learn)
whence [it is] that you are born
(descended), and by what right
(reasons) you have Zealand and
Holland in hand (in your possession),
and by what right you seek
Friesland, that curses you so sorely."

Jan van Heelu, the contemporary of Stoke, also wrote chronicles in verse ("Rijmkronik"), which display considerable poetic spirit.

The culture and development of what may be strictly termed Dutch literature, as distinguished from the Flemish, may be said to date from the establishment at Amsterdam (about 1570) of a sort of literary academy called *Rederijkskamer* ("Chamber of Rhetoric"), under the auspices of Coornhert, Spiegel, and Visscher. Somewhat later appeared Peter Kornelius Hooft, whom Vondel calls, playing upon his name (signifying "head"), "Dat doorluchtig Hooft der Hollandsche poeten"—"That illustrious head of the Dutch poets." The merits of Hooft are so great that he has been styled the creator of Dutch literature. He imparted a sweetness and harmony to the poetry of his native language unknown before his time, and not surpassed by any later author. He also excelled as a writer of history. Jacob Cats (1577–1660), or Father Cats, as his countrymen in their affection delighted to call him, was emphatically the poet of the people, and his productions are still admired and loved by all classes. Joost van den Vondel (1587–

1679) is one of the greatest names in Dutch literature. He excelled in satirical and lyric poetry, and also in tragedy. About the end of the seventeenth century there was a decline in Dutch poetry, caused in part by the influence of the French school of criticism, but a new poetical era commenced in the latter half of the next century, introduced by J. Bellamy (about 1770), whose ballad of "Rosje" is regarded as the most beautiful in the language. In touching simplicity it reminds us of some of the finest of the Scottish ballads. Bilderdijk (1756–1831) was not only one of the greatest of Dutch poets, but was distinguished in almost every department of literature. Tollens (1780–1856) is perhaps the most popular of recent Dutch poets. Among his most celebrated productions are "De Overwintering op Nova Zembla" ("The Wintering on Nova Zembla"), a narrative poem giving an account of the famous expedition of Barentz (1594–96), and his splendid war-lyric entitled "Wapencreet" ("Call to Arms").

In classical learning the Dutch have taken a high place among the nations of Europe. Among the most distinguished of their scholars are Erasmus, Lipsius, Daniel and Nicholas Heinsius, Grotius, Gronovius, Vossius (Gerard de Vos), Hemsterhuis, etc. In science they have had Huygens, Leewenhoek, Ruysch, and Swammerdam. In theology they can boast of Arminius, besides many others. In philosophy there is perhaps no greater name in modern times than Spinoza; and in medicine few, if any, more illustrious than those of Boerhaave and Van der Kolk.

J. THOMAS.

Dutch Liquid, or **Eth'ene Chlo'ride,** received its first name because it was first discovered by Dutch chemists in 1795. It is a combination of ethene (olefiant gas, C_2H_4) with chlorine, and its formula is $C_2H_4Cl_2$. It is a thin, inflammable, colorless liquid of an agreeable fragrance and pleasant taste, somewhat resembling chloroform. Like chloroform, it has great anæsthetic powers when its vapor is inhaled, but the medical profession are not satisfied of its safety. Modifications of this compound (such as C_2H_3Cl, $C_2H_3Cl_3$, and $C_2H_2Cl_2$) are also sometimes called Dutch liquids, and the whole are known as the "Dutch liquid series."

Dutch Reformed Church. See REFORMED CHURCH IN AMERICA.

Dutch'ville, a post-township of Granville co., N. C. Pop. 1752.

Dutens (JOSEPH MICHEL), a French political economist, born at Tours Oct. 15, 1765. He published "The Philosophy of Political Economy" (2 vols., 1835) and other works. Died Aug. 6, 1848.—His uncle, LOUIS DUTENS, F. R. S., born at Tours Oct. 15, 1765, removed to England, where he obtained from the duke of Northumberland the lucrative living of Elsdon. He wrote a treatise maintaining the antiquity of many discoveries, numismatical treatises, and "Mémoires d'un Voyageur qui se repose" (Paris, 1806). Died May 23, 1812.

Du'ties [from *due, i. e.* "something owed;" Fr. *douane*], in their general sense, are those things which a man is, by any natural, moral, or legal obligation, bound to do or to refrain from doing. The word is also used commercially, and then, in its most enlarged sense, is nearly equivalent to taxes, embracing all impositions or charges levied on persons or things; but in its more restricted sense it is often used as equivalent to customs or imposts, being those taxes which are payable upon goods and merchandise imported or exported. (See the Constitution of the U. S., Art. I., s. 8, n. 1, and Art. I., s. 10, n. 2.) The import duty is held to be a personal debt, chargeable upon the importer, as well as a lien on the goods themselves.

As used in the U. S., the term duties does not include the taxes on property, real or personal, nor the poll-tax; nor, in its popular sense, does it include the excise. In the U. S. there is no duty on exportation, nor is any State allowed to collect duties or imposts.

Dutrochet (RENÉ JOACHIM HENRI), M. D., a French physiologist, born in Poitou Nov. 14, 1776. He graduated as M. D. in 1806, and devoted his time chiefly to the study of natural history and physiology. He published "Researches in Endosmosis and Exosmosis" (1828), and "Mémoires pour servir à l'Histoire anatomique et physiologique des Végétaux et Animaux" (1837). Died Feb. 4, 1847.

Dut'ton (ARTHUR H.), an American officer, born at Wallingford, Conn., in 1839, graduated at West Point, and was appointed brevet second lieutenant in the corps of engineers June 24, 1861; promoted to be first lieutenant of engineers Mar., 1863, and captain Oct., 1863. During the civil war he served on staff and engineer duty from July, 1861, to July, 1862, being assistant engineer on the defences of Washington and in the Florida expedition with Gen. H. G. Wright. He was appointed Sept., 1862, colonel of the Twenty-first Connecticut Volunteers, which regiment he led at Antietam and Fredericksburg; commanded a brigade in the Ninth army corps at Newport News and about Suffolk, Va., Feb. to Aug., 1863; was chief of staff to Major-General Peck, in command of the district of North Carolina; during the operations of the Army of the James at Bermuda Hundred, Va., 1864, he commanded his regiment, distinguishing himself at the battle of Drury's Bluff, May 16; and while reconnoitering the Confederate works May 26 was mortally wounded. Died at Baltimore, Md., June 5, 1864. Brevet major Dec., 1862, lieutenant-colonel May, 1863, colonel and brigadier-general May, 1864, for gallant and meritorious services.

Dutton (HENRY), LL.D., a jurist, was born at Plymouth, Conn., Feb. 12, 1796, and graduated at Yale in 1818, was professor of law in Yale (1847–55), became governor of Connecticut in 1854, and was a judge of the superior court and court of errors (1861–66). He prepared several digests, compilations of State statutes, etc. Died April 26, 1869.

Du'ty, a township in Lawrence co., Ark. Pop. 573.

Duum'viri, or **Duo'viri** [Lat., the plural of *duumvir*, from *duo*, "two," and *vir* (plu. *viri*), a "man" (*i. e.* the "two men")], the title of various magistrates of ancient Rome and her colonies. Two men jointly held the office, whence the name. The duumviri, "*juri dicundo*" ("for pronouncing judgment"), were chief magistrates in municipal towns. Naval duumviri were occasionally appointed to equip fleets. Duumviri "*perduellionis*" were appointed to try cases of treason (*perduellio*) and parricide. Quinquennial duumviri were the censors of municipal towns, and were chosen every five years, hence called *quinquennales* (from *quinque, annus*), but the duties of the office occupied only one year. The position was one of great dignity. Sacred duumviri were sometimes appointed to erect temples. There were also duumviri for performing other minor duties.

Duval', a county in the N. E. of Florida. Area, 860 square miles. It is bounded on the E. by the Atlantic Ocean, and is intersected by the St. John's River. The surface is low and nearly level. Lumber, market vegetables, and rice are the most important products. It is traversed by the Florida R. R. and the Jacksonville Pensacola and Mobile R.R. Capital, Jacksonville. Pop. 11,921.

Duval, a county in the S. of Texas, partly drained by the Nueces River. Area, 1650 square miles. Wood and water are scarce, but the pasturage is good. Cattle and wool are the chief products. Pop. 1083.

Duval, a township of Lincoln co., W. Va. Pop. 604.

Duval (ALEXANDRE), born April 6, 1767, served in the American Revolution on a French vessel, was then engineer, architect, and, after 1792, devoted himself to dramatic composition. He succeeded in mingling comic traits with serious action, and many of his pieces have kept the stage. Died Jan. 10, 1842.—His brother, AMAURY DUVAL, born Jan. 28, 1760, acquired note by treatises upon antiquities. Died Nov. 12, 1838.

Duvaucel (ALFRED), a French naturalist, born in Paris in 1792, was a stepson and pupil of the celebrated Cuvier. He passed nearly six years in the exploration of the natural history of India, to which he went in 1818. He died near Madras in Aug., 1824.

Duvergier de Hauranne (PROSPER), a French statesman, born at Rouen in 1798. He was elected to the Chamber of Deputies in 1831, acted with the Doctrinaires, and advocated electoral reform. He was a conservative member of the National Assembly in 1848. He wrote a "History of Parliamentary Government in France" (2 vols., 1857), and "On the Principles of Representative Government, and on their Application" (1838), which is full of admiration of English institutions.

Duvernoy (GEORGES LOUIS), M. D., a French zoologist and anatomist, born at Montbéliard Aug. 6, 1777. He edited Cuvier's "Lectures on Comparative Anatomy" (1805) at his request. He succeeded Cuvier in 1837 as professor in the College of France, and became in 1850 professor of comparative anatomy. Among his important works is "Lectures on Organic Bodies" (1842). Died Mar. 1, 1855.

Duveyrier (HENRI), a French traveller, born Feb. 28, 1840, was the son of Charles Duveyrier, a political and dramatic writer, and nephew of Anne Joseph Duveyrier, who, under the pseudonym of Mélesville, wrote a great number of theatrical pieces in collaboration with Scribe and others. He has published "Exploration of Sahara" (vol. i., 1864), and numerous papers in geographical periodicals which contribute much to a knowledge of Northern Africa and the Great Desert. He travelled two years in

the interior, and under the protection of the Tuarick chiefs penetrated to the centre of Soodan.

Dux'bury, a township and post-village of Plymouth co., Mass., on the South Shore R. R., 5 miles N. of Plymouth. It is the seat of an academy. Here the French Atlantic telegraph terminates. Duxbury has an iron lighthouse; lat. 41° 59′ N., lon. 70° 38′ W. It has also four churches, a soldiers' monument, and a monument to Miles Standish. Pop. 2341.

Duxbury, a township of Washington co., Vt. It contains the Camel's Rump Mountain, and has manufactures of lumber. Pop. 893.

Duȳc'kinck (Evert Augustus), an American editor and essayist, born in the city of New York Nov. 23, 1816, and graduated at Columbia College in 1835. He was the founder and editor of the "Literary World." With the aid of his brother George he published a "Cyclopædia of American Literature" (2 vols., 1856), which is highly esteemed. Among his works is a "History of the War for the Union" (3 vols., 1861–65).

Duyckinck (George Long), a brother of the preceding, was born in New York Oct. 17, 1823, graduated at the University of New York in 1843. He was joint-author of the "Cyclopædia of American Literature" (1856), and published several biographies, among which was a "Life of George Herbert" (1858). Died Mar. 30, 1863.

Dwara'ca, or **Dwarka,** a maritime town of India, in Guzerat, is on the Arabian Sea a few miles S. of the Gulf of Cutch, 95 miles N. W. of Joonaghur. Here is a temple of Krishna, which is annually visited by multitudes of pilgrims. The great temple is an ancient sculptured stone structure, with a massy gate and a long flight of steps. In front is a sacred stream.

Dwarf [Ang.-Sax. *dveorg;* Ger. *Zwerg;* Swedish and Dutch, *dwerg*], the name given to any animal or plant greatly below the usual size of its kind, particularly a human being of small dimensions. In ancient times dwarfs were kept by persons of rank for their amusement, and the Roman ladies employed them as domestics. In Europe the passion for dwarfs reached its height under the reigns of Francis I. and Henry II. of France. Among the most celebrated dwarfs were the following: Philetus of Cos, a philosopher and poet, who lived about 330–285 B. C.; Geoffrey Hudson, born in 1619, who was three feet nine inches high; Joseph Borowlawski, born in 1739, who attained the height of thirty-nine inches, and was remarkable for acute intellect; and Nicolas Ferry or Bébé (thirty-three inches high), who was a favorite of Stanislas, king of Poland. In recent times Tom Thumb (Charles S. Stratton), born at Bridgeport, Conn., in 1837, is the most celebrated, and his performances as an actor have been received with applause both in Europe and America.

The dwarfs of Scandinavian mythology are represented as deformed and crafty elves, distinguished for their skill in magic and the working of metals.

Dwarfed Trees may be produced in three different ways—by grafting on dwarf slow-growing stocks, as, for example, the pear on the quince; by planting in small pots filled with poor soil, by which the plant is starved and stunted; and by causing a portion of the extremity of a branch to produce roots, and then cutting it off and planting it in a pot with poor soil. The last is the Chinese method, and is thus performed: The extremity of a branch two or three feet long in a fruit- or flower-bearing state is selected, and a ring of bark is taken off at the point where it is desired that roots should be produced. The part thus denuded of bark is covered with a ball of clay, kept moist with the frequent application of water. After the roots have grown out the branch is cut off, planted in a pot of poor soil, and sparingly supplied with water. The dwarf tree will remain nearly of the same size for years. The pear tree especially is often dwarfed, because in this condition it will produce fruit while still very young. Some varieties of pear may remain unfruitful for many years unless dwarfed.

Dwight, a post-village of Livingston co., Ill., on the Chicago and Alton R. R., 72 miles S. W. of Chicago. It has one weekly newspaper. It is a terminus of the western division of the same railroad. Pop. 1044; of Dwight township, 1804. Ed. "Star."

Dwight, a township of Huron co., Mich. Pop. 335.

Dwight (Benjamin Woodbridge), Ph. D., born at New Haven, Conn., April 5, 1816, and graduated at Hamilton College, N. Y., in 1835, was principal and proprietor of a high school for boys in Brooklyn and New York City for many years. He is the author of "The Higher Christian Education," "Modern Philology, First and Second Series," "The History of the Strong Family," 2 vols., and also of "The History of the Dwight Family in America," 2 vols., "Woman's Higher Culture," and "The True Doctrine of Divine Providence." He resides now (1874) at Clinton, Oneida co., N. Y., where he is engaged in literary labor.

Dwight (Edmund), a merchant, born at Springfield, Mass., Nov. 28, 1780. He graduated at Yale in 1799. He was a member of business firms which established cotton-mills at Chicopee and Holyoke. He gave $10,000 to support normal schools in Massachusetts. Died April 1, 1849.

Dwight (Francis), born at Springfield, Mass., Mar. 14, 1808, graduated at Harvard College in 1827, and at the Law School in 1830, travelled extensively in Europe, and afterwards practised law for a few years (1834–38), but in 1838 turned the whole force of his strong nature towards the promotion of common-school education in our country, and established at Albany, N. Y., in 1840, "The District School Journal," under State patronage. Here he had full scope for his fine, highly-cultured faculties of mind and his glowing zeal in behalf of the most improved style of popular education. His name stands, for honor, by the side of that of Horace Mann in the thoughts of those who know how the present superior style of public instruction has been reached in those parts of the land where it is highest in its form. He died in the fulness of his influence for good, Dec. 15, 1845.

Dwight (Rev. Harrison Gray Otis), D. D., born at Conway, Mass., Nov. 22, 1803, graduated at Hamilton College, N. Y., in 1825, and became a missionary of the A. B. C. F. M. in 1830 to the Armenians, making Constantinople the centre of his field of operations. He was abundant in his labors with tongue and pen, and is one of the most noted of all American missionaries hitherto for his great skill and success in his work. He published in America and England several volumes at different times, as "Researches of Smith and Dwight in Armenia," "Memoir of Mrs. Elizabeth B. Dwight," "Christianity Revived in the East," "A Complete Catalogue of Literature in Armenia," etc. He composed also several books and tracts in the native languages of the East. He was killed suddenly, when on a brief visit to his native land, by an accident on the Troy and Bennington R. R., Jan. 25, 1862.

Dwight (John) graduated at Oxford University, England, in 1682, was secretary to three successive bishops of Chester, England (Walton, Ferne, and Hall). He established in 1684, at Fulham, "a manufactory of white gorges, marbled porcelain ware, statues, and vessels never before made in England, and also of China and Persian wares, and the Cologne and Hessian wares." He invented moulds and models and processes of his own, and manufactured the only porcelain that was made in England in his day. His inventive talents are described in leading English works on pottery and porcelain ware as having been of the very highest order. The great potteries at Fulham, Chelsea, etc. are ascribed to him as their real founder.

Dwight (John Sullivan), a musical critic, born in Boston May 13, 1813, graduated at Harvard in 1832. He studied divinity, entered the Unitarian ministry, and preached about six years. In 1842 he joined the Brook Farm enterprise at West Roxbury, Mass., where he remained until the institution was broken up. In 1852 he established "Dwight's Musical Journal," an excellent periodical, of which he is still the editor. Mr. Dwight has also published many admirable reviews, lectures, etc., and is the author of the song "God Save the State" (1844).

Dwight (Joseph), Brigadier-General, born at Hatfield, Mass., Oct. 16, 1703, graduated at Harvard University in 1722, was judge of the court of common pleas of Hampshire co., Mass., and afterwards of Berkshire county, and judge of probate. He was eminent both as a judge and a soldier. He commanded the Massachusetts artillery at the reduction of Louisburg in 1745 with distinction, and led a brigade at Lake Champlain in the second French war in 1756. He was also for eleven years member of the general council of Massachusetts. Died in 1765.

Dwight (Rev. Nathaniel), M. D., brother to Dr. Timothy Dwight of Yale College, born Jan. 31, 1770, at Northampton, Mass., prepared and published the first school geography ever issued in this country. It was in the form of questions and answers, and was extensively used. He was also the author of "The Great Question Answered," and of "A Compendious History of the Signers of the Declaration of Independence." He resided chiefly at Wethersfield, Conn. Died June 11, 1831, at Oswego, N. Y.

Dwight (Samuel), M. D., of Fulham, England, graduated at Oxford University (son of John Dwight of Fulham, the great inventor and first manufacturer of porcelain ware in England), was the author of three different medical works—viz. "De Vomitione" (London, 1722), "De Hydropibus" (1725), and "De Febribus" (1731).

Dwight (Sereno Edwards), D. D., an American divine, born at Greenfield Hill, Conn., May 18, 1786, was a son of Timothy Dwight, noticed below. He graduated at Yale in 1803, and practised law with success (1810–16). He was afterwards pastor of Park street church, Boston (1817–26), and was president of Hamilton College (1833–35). He wrote, besides other works, "The Hebrew Wife" and a "Life of Jonathan Edwards," and edited the works of the same author (10 vols. 8vo). Died Nov. 30, 1850.

Dwight (Theodore), an able journalist, an uncle of the preceding, was born at Northampton, Mass., Dec. 15, 1764. He was a member of Congress (1806–07). He practised law with distinction, and was a leader of the Federalist party. He was secretary of the Hartford Convention in 1814. His mother was a daughter of Jonathan Edwards. In 1817 he founded the "New York Daily Advertiser," which he edited until 1835. He published "The Life and Character of Thomas Jefferson" and "The History of the Hartford Convention." He was a brilliant political writer. Died July 12, 1846.

Dwight (Theodore), an author, a son of the preceding, was born at Hartford, Conn., Mar. 3, 1796, and graduated at Yale in 1814. He wrote, besides other works, a "Tour of Italy" (1824), a "History of Connecticut" (1841), a "Life of Garibaldi" (1859), "A School Dictionary of Roots and Derivatives," "The Northern Traveller," "The Tour of New England," "The Father's Book," "First Lessons in Modern Greek," "The Roman Republic of 1849," and "The Kansas War." Died Oct. 16, 1866.

Dwight (Theodore William), LL.D., an American jurist, professor, and editor, born July 18, 1822, at Catskill, N. Y., graduated at Hamilton College, N. Y., in 1840, and studied his profession at Yale Law School, under the late distinguished Judge Hitchcock. In 1846 he was elected Maynard professor of law in Hamilton College, and there established a law school. In 1858 he was chosen professor of municipal law in Columbia College, N. Y. His inaugural address was published. He was soon made warden of the law school, a department of the college organized under his direction, and now (1874) numbering 425 students, drawn from all parts of the U. S. He received the degree of doctor of laws from Rutgers College, N. J. (1859), and from Columbia College (1860). He published an "Argument in Rose Will and Charity Cases" (1863), and other arguments in leading law cases. In association with Dr. E. C. Wines he published "Prisons and Reformatories in the U. S." He edited "Maine's Ancient Law." As associate editor of the "American Law Register" he has written articles which have been separately published, as "Trial by Impeachment," etc. He was elected non-resident professor of constitutional law in Cornell University, N. Y. (1868), and lecturer in Amherst College, Mass., on the same subject (1869). He was a member of the New York constitutional convention of 1867, and early in 1873 was vice-president of the New York board of State commissioners of public charities, president of the New York prison association, and an active member of the well-known "committee of seventy" of the city of New York. In Jan., 1874, he was appointed by Governor Dix of New York a judge of the commission of appeals, a court sharing the duties of the court of appeals.

Dwight (Timothy), D. D., LL.D., an eminent American divine and scholar, born at Northampton, Mass., on the 14th of May, 1752. His mother was Mary, daughter of Jonathan Edwards. He graduated at Yale College in 1769, after which he was a tutor in that institution for six years. In 1777 he married Mary Woolsey. Between 1778 and 1782 he was a chaplain in the army, or lived with his mother at Northampton; in 1783 he became minister of a church at Greenfield, Conn., where also he was principal of a flourishing academy. In 1795 he was elected president of Yale College, in which he also became professor of theology at the same time. He was an able preacher, and was eminently qualified as an instructor of young men. He continued to be president of Yale College until his death. His chief works are "The Conquest of Canaan," an epic poem (1785), "Theology Explained and Defended in a Series of 173 Sermons" (5 vols., 1818), often reprinted, and "Travels in New England and New York" (4 vols., 1821). Died at New Haven Jan. 11, 1817. (See W. B. Sprague, "Life of T. Dwight," in Sparks's "American Biography," vol. iv., second series; also Sprague's "Annals of the American Pulpit," vol. ii., pp. 152–165.)

Dwight (Wilder), an American officer, born in Springfield, Mass., in 1833, graduated at Harvard College in 1853, entered the army as major of the Second Massachusetts regiment of volunteers, and served in the Shenandoah campaign under Gen. Banks, displaying great bravery during the famous retreat. He was engaged at the battle of Antietam Sept. 17, 1862, where he was mortally wounded, but survived till the 19th, when he expired in hospital at Boonesville. At the time of his death he was lieutenant-colonel of his regiment. G. C. Simmons, *Clerk Board of Eng'rs.*

Dwight (Rev. William Theodore), D. D., son of President Timothy Dwight of Yale College, Conn., born June 15, 1795, at Greenfield Hill, Conn., graduated at Yale in 1813, practised law in Philadelphia for ten years (1821–31), when he entered the ministry, and was settled as a Congregational clergyman at Portland, Me., where he remained for thirty-two years (1832–64), when he resigned his pastorate on account of poor health. His ministry was one of great success, and his influence as a thinker, preacher, superior platform-speaker, and presiding officer in ecclesiastical councils and conventions was very great, not only throughout his adopted State, but also throughout the Congregational denomination at large. He was several times invited and urged to accept of other positions of honor and influence, and was solicited in vain by three different theological seminaries to take the chair of doctrinal theology in them. He excelled alike in the art of fine rhetorical composition and of easy and effective extempore speaking. His personal appearance was—like that of his father and of his brother, Dr. Sereno E. Dwight—fine and commanding. He died at Andover, Mass., Oct. 22, 1865.

Dwi'na, or **Duna** (anc. *Turunthus*), a river of Russia, rises in the government of Tver, near the source of the Volga. Its general direction is nearly north-westward. It forms the boundary between Livonia and Courland, and enters the Gulf of Riga 7 miles below the town of Riga. Length, about 600 miles. The navigation is obstructed by rocks and sandbanks, but during the floods of spring and autumn it is easily navigated.

Dwina, or **Northern Dwina,** a large river of Russia, is formed by the confluence of the Sookhona and Vitchegda, which unite in the government of Vologda. It flows nearly north-westward through Archangel, and enters the White Sea 20 miles below Archangel. Its length, excluding the branches above named, is estimated at 450 miles. It is navigable, and is an important channel of trade, but there are shoals at its mouth which obstruct the entrance of vessels drawing more than fourteen feet of water.

Dyaks, the aborigines of Borneo (which see, revised by Prof. A. J. Schem).

Dy'berry, a post-township of Wayne co., Pa. P. 1196.

Dyce (Rev. Alexander), a critic and divine, born in Edinburgh June 30, 1797, was educated at Edinburgh and Oxford. He removed to London in 1827, and edited several old English dramatists and other writers, including Beaumont, Fletcher, and Marlowe. In 1858 he published a good edition of Shakspeare (6 vols.), which displays much critical ability. Died May 15, 1869.

Dyce (William), a painter of eminence, was born in 1806 at Aberdeen, Scotland. He studied at Rome, and practised his art in Scotland and in London, where he was head-master of the school of design, 1838–43, and was employed upon works for Buckingham Palace. In 1845 he painted the "Baptism of Ethelbert" for the House of Lords. He painted various scriptural and ecclesiastical scenes, and gained distinction by his frescoes. Died Sept. 14, 1864.

Dyck, van (Anthony). See Vandyke.

Dyeing [Lat. *tinctura;* Fr. *teinture;* Ger. *Färben* or *Färbekunst*], the art of coloring yarn or cloth, has been practised from the most remote antiquity. The fibres and fabrics usually dyed are either cotton, linen, silk, or wool. (See Textile Fabrics.) The coloring-matters employed are either the natural products of animals or plants, or are the results of chemical processes. (See Dyestuffs.) Thorough cleansing of the fibres is an almost indispensable preliminary to dyeing. Resinous and oily matters must be removed to give the dye liquors free access to the fabrics, and natural coloring-matters must be destroyed in order to secure the brightest and clearest tints of the dyes. Cotton is successively boiled with lime, soda-ash, and rosin; it is then soured with dilute sulphuric acid, and finally treated with hypochlorite of lime (bleaching-powder). Linen is subjected to repeated treatment with water, alkalies, acids, and hypochlorite of lime, alternating with exposure on the grass to air and sunlight. Silk is boiled in a solution of fine soap to remove the gelatinous, resinous, and fatty matters which make up a large proportion of its weight. Wool is thoroughly cleansed by washing in weak soap or soda-lye, putrid urine, or weak ammonia. (For the details of these operations see Bleaching.)

The dyeing is usually effected while the fibres are in the yarn, although the woven cloth is dyed in some cases. The special operations of dyeing vary with the fabric and the coloring-matters employed. Some colors combine with the fibres very readily as soon as they are immersed in their solutions; such colors have been called *substantive.* Silk and wool take colors much more readily than cotton and

linen; many dyes are therefore substantive for these animal fibres. Nearly all the aniline colors belong to this class. With such colors the operations of dyeing are very simple. They consist in the mere immersion of the yarn or cloth in cold or hot solutions of the dye, with sufficient handling to secure the even distribution of the color. Agents are often added to fix or set the color, such as acids, alkalies, tin salt, alum, etc. A few colors are substantive for cotton and linen, as the safflower pink.

For dyes which will not unite directly with the fibres, called *adjective*, the aid of *mordants* is necessary. Mordants are bodies which possess an affinity for the colors, and which can be fixed in an insoluble condition on or within the fibres. Some are metallic oxides or salts, as alumina, oxide of iron, oxide of tin, tannate of tin, soap, etc.; others, as albumen, gluten, caseine, tannin, acids, etc., are of a different character. The mode of applying the mordant depends on the fabric, as well as on the character of the mordant itself. Silk and wool, when immersed in a solution of alum, take up a considerable quantity of the salt without decomposing it. The acetates of alumina and iron are easily decomposed, with the liberation of a portion of the acetic acid and the formation of an insoluble basic acetate. By boiling cotton in their solutions the fibres become thoroughly impregnated with the insoluble compounds, and when the yarn is transferred to the solution of the dyestuff, the color unites with the mordant, forming insoluble colored bodies in or upon the fibres which are called LAKES (which see). The goods thus become permanently dyed. The same decomposition of the aluminous or ferrous salt occurs if the goods are simply immersed and then hung up in the air. Chloride of tin is decomposed by boiling its dilute solution, with the liberation of hydrochloric acid and the formation of insoluble oxide of tin. Sometimes the insoluble oxide or salt is produced by first immersing the goods in a soluble salt, and then passing them through a second solution of another agent. Exposing fabrics to an iron salt, and then to an alkaline lye, fixes oxide of iron. A lead salt and an alkaline lye fix oxide of lead. Stannate of soda, followed by a solution of nutgalls, sumach, etc., fixes tannate of tin in the fibres.

In some cases the mordant is mixed with the color, and both are applied simultaneously, to be subsequently fixed. Thus, aniline colors are mixed with albumen, applied to the cloth, and fixed by steaming, which coagulates the albumen, rendering it insoluble. Mixtures of the acetates of alumina and iron, of the chloride of tin, etc. with colors, are also fixed by steaming. This method of fixing colors is extensively practised in CALICO-PRINTING (which see), as it renders it possible to produce patterns by applying the colors to certain portions of the cloth, or by applying different colors to different portions. Mordants often affect the natural tints of the dyes, thus enabling the dyer to produce a variety of shades with the same dye. Oxide of iron is most remarkable in this respect; it changes the red color of madder, logwood, Brazil-wood, etc. to shades of purple, lilac, chocolate, and even black, according to the proportions in which it is employed. The most durable blacks are obtained with oxide of iron, combined with logwood, sumach, catechu, etc. The oxide of tin tends to brighten the shades, while alumina fixes them in their natural tints. This is a very important circumstance in calico-printing, as it enables the dyer to produce several colors on the same cloth by one operation of dyeing; the mordants, acetate of alumina, acetate of iron, and mixtures of the two salts in varying proportions, being printed on the cloth. The oxides are rendered insoluble by hanging the cloth in the air (*ageing*), and by washing in alkaline solutions of silicate, arseniate, or phosphate of soda (*dunging*). On passing the mordanted cloth through a mixture of madder-root, Brazil-wood, etc. in warm water, patterns in pink, red, purple, lilac, chocolate, and black are produced. Metallic pigments are often produced in the yarn or cloth by the successive application of the agents necessary for their production. Thus, when cloth mordanted with oxide of iron is passed into an acidulated solution of ferrocyanide of potassium, an insoluble Prussian blue is at once produced. Goods impregnated with oxide of lead by immersion in acetate of lead become bright yellow in a solution of bichromate of potash, owing to the formation in the fibres of insoluble chromate of lead. By subsequently boiling with lime-water the yellow is changed to orange basic chromate. Pigments are also fixed upon the cloth by albumen; this is specially the case in the application of the chromates of lead, ultramarine, and Guignet's green in calico-printing. Indigo blue is produced in cotton by immersion in a solution of colorless reduced indigo (the indigo vat) and exposure to the air, when the indigo blue is regenerated by oxidation in an insoluble form. The following are a few of the principal methods of dyeing; more detailed statements are given under the different dyestuffs:

REDS.

On Cotton.—(1) Mordant with sumach, then with red spirits (a solution of 2 oz. of tin in 3 oz. hydrochloric acid, 1 oz. nitric acid, and 1 oz. water); then dye in a mixture of Lima-wood and fustic. (2) The most beautiful red on cotton, Turkey red, is produced by boiling the cloth in a mixture of oil and a little carbonate of soda. It is then dried, freed from the excess of oil by pearlash, passed through a bath of nutgalls and alum; then through hot water holding chalk in suspension. It is then ready to be dyed in a boiling bath of madder. It is then washed, and the treatment with galls and alum, chalk and madder repeated. It is then cleared or brightened by boiling in soap and pearlash, then in soap and protochloride of tin; finally, it is immersed in a bath of sour bran. (3) Aniline reds and pinks on cotton mordanted in nutgalls or sumach, followed by perchloride of tin.

On Wool.—(4) Mordant with alum and bichromate of potash, and dye with peach and Lima-wood, with alum. (5) *Scarlet.* Cochineal, with cream of tartar, sumach, and fustic. (6) *Crimson.* Cochineal, with cream of tartar and protochloride of tin. (7) *Pink.* Cochineal, tartar, alum, and red spirits. (8) Aniline shades are fixed on wool without mordants.

On Silk.—(9) Peach-wood and fustic, followed by red spirits, with annatto for scarlets, cochineal and safflower for finer tints. (10) *Pink.* Safflower, with sulphuric acid and cream of tartar. (11) Beautiful tints have been obtained from lac-dye. (12) Anilines are applied to silk in a warm bath, slightly acidulated with acetic, tartaric, or sulphuric acid.

BLUES.

On Cotton.—(13) Prussian blue produced by an iron mordant, followed by ferrocyanide of potassium. (14) Indigo vat, a solution of reduced indigo. (15) *Aniline blues.* Mordant with soap, then sumach, the protochloride of tin; dye in warm bath.

On Wool.—(16) Prussian blue, as for cotton. (17) Indigo extract, with argol and alum. (18) Aniline blue, with starch, sulphuric acid, and gum-arabic.

On Silk.—(19) Prussian blue, as for cotton. (20) Indigo extract and alum. (21) Anilines, with soap and sulphuric acid.

YELLOWS AND ORANGES.

On Cotton.—(22) Chromate of lead, produced by bath of acetate of lead, followed by bichromate of potassa, deepened by the addition of annatto. (23) The chrome yellow is deepened to orange by boiling in lime-water. (24) Mordant in acetate of alumina and dye in yellow weed (weld). (25) Mordant in weak protochloride of tin; dye in quercitron bark, fix with protochloride of tin. (26) *Coralline orange.* Mordant with stannate of soda, then with sumach.

On Wool.—(27) Mordant in tartar and alum; dye in mixture of quercitron, sumach, fustic, and red spirits. (28) Weld, with alum and tartar. (29) Picric acid. (30) Aniline yellow. (31) Naphthaline yellow. (32) *Orange.* Sumach, with cochineal, fustic, tartar, and red spirits. (33) Aniline orange.

On Silk.—(34) *Yellow to orange.* Annatto, with alum and white soap. (35) Weld, with alum and tartar. (36) Picric acid. (37) Aniline yellow or orange. (38) Naphthaline yellow.

GREENS.

On Cotton.—(39) Dye blue, then yellow with fustic or quercitron bark. (40) Aniline green, on cotton mordanted with sumach; brighten the tint with picric acid.

On Wool.—(41) Dye yellow with fustic and alum, then blue with indigo. (42) For olive, use fustic with logwood, madder and peach-wood; following with copperas. (43) Aniline green. (44) Picric acid and indigo carmine.

On Silk.—(45) Fustic, with sulphate of indigo and alum, using logwood and copperas to darken shades. (46) Lakao, or Chinese green, gives beautiful shades. (47) Aniline green, with sulphuric acid or cream of tartar. (48) Picric acid and indigo carmine.

PURPLES, VIOLETS, AND LILACS.

On Cotton.—(49) Mordant with red spirits, and dye with logwood, to which a little red spirits and acetate of alumina have been added. (50) Dye light blue, then redden in logwood with alum. (51) Mordant in sumach, then in red spirits, and dye in logwood. (52) *Safflower lavender.* Dye light blue, then cover with safflower pink. (53) Dye madder on a mordant of alumina and oxide of iron. (54) *Aniline colors.* Mordant with perchloride of tin or with sumach, followed by perchloride of tin or tartar emetic; fix with gelatine or albumen.

On Wool.—(55) Cudbear, logwood, barwood, camwood, or peach-wood, with alum. (56) Murexide, fixed by corrosive sublimate, acetate of soda, and acetic acid. (57) Anilines.

On Silk.—(58) Archil or cudbear. (59) Murexide, as for wool. (60) Anilines.

BLACKS.

On Cotton.—(61) Sumach, followed by copperas, then by logwood, then by weak copperas; the color is improved by adding fustic and replacing the second copperas bath by acetate of iron. (62) For blue-black precede 61 by the indigo vat. (63) Aniline black is not available for dyeing, although the best black for many styles of calico-printing.

On Wool.—(64) Camwood, followed by copperas, then logwood, finally copperas. (65) Mordant in bichromate of potassa, with alum and fustic; hang in the air; dye in logwood, barwood, and fustic; finish in copperas.

On Silk.—(66) Copperas and logwood, repeated; the addition of nitrate of iron and fustic improves. (67) For blue-black, dye in Prussian blue and follow with 66.

DRABS.

On Cotton.—(68) Sumach, followed by weak copperas, then fustic, Lima-wood, and logwood; raised with alum.

On Wool.—(69) Madder, peach-wood, logwood, fustic, with alum and copperas.

On Silk.—(70) Sumach, fustic, and logwood, with copperas.

BROWNS.

On Cotton.—(71) Dye yellow, then with Lima and logwood, and fix with alum. (72) *Catechu brown.* Boil in catechu, pass through hot bichromate of potassa, wash in hot water containing a little soap. (73) *Chocolate or French brown.* Dye in spirit yellow, 25, then in logwood, and raise with acetate of alumina.

On Wool.—(74) Pass through a bath of fustic, madder, peach, and logwood; then through dilute copperas. (75) Bath of bichromate of potassa, argol, and alum; then of madder, peach, and logwood. (76) Aniline brown.

On Silk.—(77) First orange, with annatto, then pass through copperas, then bath of fustic, logwood, archil, and alum; modify with fustic for yellowish, peach for reddish, logwood for bluish brown. (78) Aniline brown.

(For special works on dyeing, see article on CALICO-PRINTING.) C. F. CHANDLER.

Dy'er, a county in the W. of Tennessee. Area, 650 square miles. It is bounded on the W. by the Mississippi River and intersected by the Obion River. The surface is level, the soil fertile. Lumber (mostly of the poplar or tulip tree) is exported from this county. Cattle, grain, wool, cotton, and tobacco are raised. Capital, Dyersburg. Pop. 13,706.

Dyer, a township of Saline co., Ark. Pop. 512.

Dyer, a township of Washington co., Me. Pop. 24.

Dyer (ALEXANDER B.), an American officer, born in 1817 in Virginia, graduated at West Point in 1837, and Sept. 12, 1864, chief of ordnance with the rank of brigadier-general. He served in the artillery at Fortress Monroe, Va., and in the Florida war 1837–38, and in the ordnance at various arsenals 1838–46; as chief of ordnance of the army invading New Mexico 1846–48, engaged at Canada, Taos (brevet first lieutenant), and Santa Cruz de Rosales, Mexico (brevet captain); on ordnance duty and in command of various arsenals 1848–61; and member of ordnance board 1859. He served in the civil war in command of Springfield Armory 1861–64, largely extending the manufacture of small-arms; as member of ordnance board 1860–63; and as chief of ordnance and in charge of ordnance bureau at Washington, D. C., since 1864. Brevet major-general Mar. 13, 1865, for faithful, meritorious, and distinguished services. GEORGE W. CULLUM, U. S. A.

Dyer (Rev. GEORGE), an English antiquary and scholar, born in London Mar. 15, 1755. He was educated at Cambridge, became a Baptist minister, and preached for some years at Oxford, from which he removed to London in 1792. He edited Valpy's Classics, and wrote, besides other works, a "History of the University of Cambridge" (2 vols., 1814). Died Mar. 2, 1841.

Dyer (Rev. JOHN), an English poet, born in Carmarthenshire in 1700. He was originally a painter, and studied art in Italy. He published in 1728 a poem entitled "Grongar Hill." Having taken holy orders, he obtained the livings of Calthorpe, Coningsby, and Bedford. Among his works are the "Ruins of Rome" (1740), and "The Fleece," a didactic poem (1754). Died July 24, 1758.

Dyer, or **Dyre** (Mrs. MARY), a member of the Society of Friends who suffered death for her religion. She was hanged on Boston Common, a willing martyr, June 1, 1660. (See HILDRETH, "History of the U. S.," vol. i.)

Dyer (N. MAYO), U. S. N., born Feb. 19, 1839, in Massachusetts, appointed a master's mate in the volunteer navy May 2, 1862, became an acting ensign in 1863, an acting master in 1864, and an acting lieutenant in 1865. He received a commission as lieutenant-commander in the regular navy Dec. 18, 1868. On the night of May 18, 1862, Master's Mate Dyer, in charge of the second cutter of the steamer R. R. Cuyler, off Mobile, boarded a blockade-runner which had accidentally grounded within 200 yards of Fort Morgan, and captured her officers and crew. Then, observing that a gunboat was coming towards him, Dyer set fire to the vessel, which, being filled with cotton, was soon destroyed, and made his way in safety with his prisoners to the Cuyler. He served on board the Metacomet at the battle of Mobile Bay, Aug. 5, 1864, and is thus honorably mentioned by his commanding officer, Lieutenant-Commander James E. Jowett, in his official report to Rear-Admiral Farragut of the part taken by the Metacomet in the action: "For the efficient handling of the vessel I am much indebted to Acting Master N. M. Dyer, who had permission to go North on leave, but volunteered to remain to assist in the attack upon the forts."

FOXHALL A. PARKER, U. S. N.

Dyer (Rev. SIDNEY), a Baptist minister and author, was born at White Creek, Washington co., N. Y., in 1814. He became a soldier of the U. S. army in 1831, and remained in the service nearly ten years. In 1842, after laborious study, he was ordained, and afterwards was a missionary to the Choctaws. In 1852 he became pastor of a church in Indianapolis, and in 1859 one of the secretaries of the Baptist Publication Society in Philadelphia. He has published "Voices of Nature," "Songs and Ballads," many of them very popular, "Winter's Evening Entertainment," "Great Wonders in Little Things," and other works.

Dyers' Broom, called also **Woadwaxen, Dyers' Green-Weed,** and **Whin,** a low shrub with yellow flowers and simple leaves. It is the *Genista tinctoria,* a European leguminous plant now thoroughly naturalized in New England. It is said to be the *genêt,* the bush which gave its name to the Plantagenet family. It was introduced into this country for garden cultivation, for its tops were formerly used to make a yellow dye for domestic purposes. It is used in Russia as a preventive to hydrophobia, but it appears to be simply a hydragogue cathartic of no great value.

Dy'ersburg, a post-village, capital of Dyer co., Tenn., on Forked Deer River, about 160 miles W. of Nashville. Two weekly newspapers are issued here. Pop. 683.

Dyersville, a city of Dubuque co., Ia., on the Illinois Central R. R., 29 miles W. of Dubuque. It has four churches, a flour-mill, two breweries, two schools, and one weekly newspaper. ROSE & SON, PUBS. "COMMERCIAL."

Dyers' Weed or **Weld,** also called **Woold** and **Rocket,** the *Reseda Luteola,* a European herb of the order Resedaceæ, naturalized about New York. It considerably resembles its congener, the mignonette. It is extensively cultivated in Holland and France, and to some extent in England, and is a valuable yellow dyestuff. Its quality is much improved by cultivation. It was formerly used in medicine as a sedative, diaphoretic, and diuretic.

Dyestuffs. The bodies used to impart color to textile fibres and fabrics are either derived from the animal or vegetable kingdom, or are prepared artificially, either from mineral or vegetable products. Many colors exist already formed in plants; others are produced from colorless bodies by oxidation or other processes. Lakes are compounds of coloring-matters with metallic oxides, such as alumina, the oxides of tin, lead, antimony, and barium. They are generally prepared from cochineal, madder, weld, Brazil-wood, coralline, aniline colors, etc. (See LAKES.) The following are some of the most important dyestuffs:

I. ANIMAL DYES.—*Cochineal,* the female insect of the species *Coccus cacti,* is by far the most important. Its coloring principle is carminic acid. It produces scarlets and crimsons of great brilliancy on silk and wool. Carmine is nearly pure carminic acid. *Kermes, kermes grains, alkermes* is the insect *Coccus ilicis,* one of the most ancient dyes for red shades on silk. *Lac* is the *Coccus laceæ,* a similar insect. The *Tyrian purple* was obtained from mollusks: it is no longer used. *Galls* are excrescences produced on the leaves and leaf-stalks of the oak by punctures of the gall-wasp, made for the purpose of depositing her eggs. Their characteristic constituent is tannic acid, which produces drabs and blacks with iron salts. They also serve as a mordant for some aniline colors, and are the basis of most writing inks. *Sepia* is the fluid of cuttle-fish; it is not used as a dye, but as a water-color by artists. *Murexide* is a purple compound produced by the action of nitric acid and ammonia on uric acid from guano; it is no longer used.

II. VEGETABLE DYES.—These are extremely numerous, although only a few are in general use. They are derived from different parts of plants: (1) From roots the most important is *madder* (*Rubia tinctorum*), which contains two

principles, alizarine and purpurine. These bodies produce on cotton the most permanent reds, purples, and chocolates, which makes them specially applicable for calico-printing. Madder appears in commerce in the form of ground root; flowers of madder, the ground root washed and fermented; garancine, the ground root boiled with sulphuric acid and washed; and extract, a tolerably pure alizarine. Recently the alizarine has been manufactured artificially from the anthracene of coal-tar, and there is reason to believe that the artificial product will almost entirely supersede the natural root. *Munjeet* is the Indian madder. *Alkanet* is the *Anchusa tinctoria*, formerly used for lilac, lavender, and purple on silk. Its colors were always fugitive. *Barberry* produces a yellow of little importance. *Turmeric*, or Indian saffron, produces a fugitive yellow. It is now chiefly used for yellow lacquers, as a test for alkalies, for mixing with curry-powder and with mustard. *Soorangee* is a yellow much used in India. (2) Among the more important woods are *logwood*, containing hæmatoxylin, extensively used for reds, purples, violets, blues, and blacks; *Brazil-wood*, comprising several species of *Cæsalpinia*, found in Central and South America and in Japan, known as "Lima," "Pernambuco," "Santa Martha," "Peach," "Nicaragua," "Sapan" or "Japan," etc. It yields a coloring-matter known as brazilin, which produces rich reds. *Sandal-wood* from Ceylon, and *cam* and *bar wood* from Africa, contain santalin, which gives reds, violets, and scarlets. *Fustic*, or "yellow wood," is the *Morus tinctoria* from the West Indies. *Fustet*, "young fustic," or "Hungarian yellow wood," is the *Rhus Cotinus*. (3) The only bark of special importance is the *quercitron*, which produces a rich yellow, and greens when combined with blue. *Lo-kao*, or *Chinese green*, is a green lake prepared by the Chinese from the bark of a species of *Rhamnus*, or buckthorn. (4) Leaves of the *Rhus Cotinus* are known as *sumach;* they produce a yellow, but are generally used, on account of the tannic acid they contain, either as a mordant or to produce blacks, etc. with iron salts. *Chica*, which gives an orange on cotton, consists of the leaves of *Bignonia Chica*. (5) *Flowers*. The petals of *Carthamus tinctorius* constitute "safflower." They contain a useless yellow coloring-matter, soluble in water, and a beautiful pink (*carthamin*), soluble in alkalies, which is used for red on silk and cotton. This is the material used for dyeing *red tape* and for preparing *red saucers*. *Saffron*, a beautiful yellow dye, consists of the stigmas of *Crocus sativus*. (6) *Fruit*. "Persian," "French," "Turkey," etc. berries are derived from several species of *Rhamnus*. They contain a beautiful yellow dye (*chrysorhamnine*) and olive-yellow (*xanthorhamnine*). They are used in calico-printing, for paper pulp, and for lakes. *Annatto* or *annotto* is an extract of the seed-pellicles of *Bixa Orellana*. It is used for yellows, oranges, and with reds for scarlet. It is also employed for coloring butter and cheese. *Divi-divi* is the pod of the *Cæsalpinia Coriaria*. It contains tannic acid. *Catechu, terra japonica*, and *gambir* are the extracts prepared from the fruit, wood, twigs, and unripe pods of several plants growing in India. Their active principle, as well as that of *divi-divi*, is tannic acid. They are used as mordants, with iron salts for drabs and blacks, and in tanning skins. (7) *Entire plants*. *Indigo* from various species of the *Indigofera*, and *woad* from the *Isatis tinctoria*, contain a glucoside (*indican*) which by fermentation yields indigo blue (*indigotine*). This color has long been used as one of the most permanent blue dyes. Several preparations are employed by the dyer: (*a*) solution of colorless or reduced indigo, with which the cloth or yarn is impregnated, and from which the insoluble blue indigotine is precipitated on exposure to the air; (*b*) in solution in sulphuric acid as sulpho-purpuric acid, purple blue, or as sulpho-indigotic acid, deep blue; (*c*) as carmine of indigo, the soda compounds of the above-mentioned acids. It is used for cotton, silk, and wool, and in calico-printing. *Lichens*. A variety of lichens yield, by a kind of fermentation, a series of products known as *archil* or *orseille*, *cudbear* or *persio*, and *litmus*. The weeds (from the Canaries, the Pyrenees, etc.) are pulverized and moistened with urine, when certain acids they contain are changed to the coloring-matter *orcein*. Archil appears in commerce as a purple paste, cudbear as a red powder, litmus as a blue lake. Before the introduction of the aniline colors the most beautiful purples for silk were obtained from archil. *Weld*, the *Reseda Luteola*, contains lutioline, which yields a rich but fugitive yellow.

III. Artificial or Chemical Colors.—(1) Pigments are insoluble metallic compounds, either produced in the yarn or cloth by successively applying the necessary reagents, or attached mechanically to the surface by albumen or other adhesive substances. *Prussian blue* is a ferrocyanide of iron; *chrome yellow* and *orange* are chromates of lead; *Schweinfurt green* is the aceto-arsenite of copper; *Guignet's green* is a hydrated oxide of chromium; *ultramarine* is a compound of alumina, silica, soda, and sulphur. (2) *Coal-tar colors*. Within the past few years a revolution has taken place in silk and wool dyeing, and even cotton-dyeing and calico-printing have been very considerably involved. An entirely new class of dyestuffs has been created by modern chemistry, all of which are derived from the refuse tar produced in gas-works from bituminous coal. These colors belong to four distinct series: (*a*) The aniline series, including the red rosaniline salts, the purple, violet, and blue substitution products derived from them, the greens, yellows, browns, black, and pinks, all of which are described under Aniline Colors (which see). (*b*) The phenol or carbolic acid series, including picric acid (yellow), pheniciene, coralline (red and orange), and azuline or phenyl blue. (See Phenol Colors.) (*c*) The naphthaline series; Martin's yellow, dinitronaphthol yellow, Magdala red, and violet and blue substitution products derived from it. (See Naphthaline Colors.) (*d*) Anthracene series, of which artificial alizarine and anthrapurpurine are the representatives. (See Anthracene, Alizarine, and Madder.)

All the important animal and vegetable dyestuffs above mentioned are described more fully under their respective titles. (For fuller information consult the works on dyeing mentioned in the article Calico-Printing.)

C. F. Chandler.

Dy'ing Declara'tion, in law, is a statement made by a person in the prospect of impending death with regard to the method of his death. In most countries such statements cannot be received in civil cases as evidence, and in criminal cases only when the manner of death of the deceased is the subject of the charge. They must be made with full knowledge of approaching death, must relate to facts only, must be complete and unqualified, and must be freely made. They are further subject to the ordinary rules of evidence. The theory is, that the knowledge of the approach of death creates an obligation at least equal to that of a judicial oath.

Dyke, or **Dike** [from the Dutch *dijk*, a "dike" or "wall;" Fr. *digue*], a term applied by geologists to the molten material filling a wide fissure or rent in rocks, such as often occurs in volcanic formations. This molten matter on cooling was solidified, so as to form a wall separating the edges of the disjointed strata. Such walls of intruded matter occur in stratified rocks of all ages, are usually nearly vertical, and are supposed to have been caused by volcanic eruptions. A dyke differs from a *fault* in not involving a shifting of the opposite sides of the fissure. The material with which the fissure is filled is often crystalline and porphyritic. In many cases the dyke is composed of lava, greenstone, or trap. Trap-dykes often project above the surface of the ground in consequence of the abrasion or denudation of the softer rock which was contiguous, and they form prominent objects in the landscape.

Dyke, a rampart against the encroachments of the sea. (See Dike, revised by Gen. J. G. Barnard, U. S. A.)

Dy'mond (Jonathan), an English moralist and writer, born at Exeter in 1796, was a member of the Society of Friends and a linen-draper. He wrote an able work entitled an "Inquiry into the Accordancy of War with the Principles of Christianity" (1823), and "Essays on the Principles of Morality, and on the Private and Political Rights and Obligations of Mankind" (1829), which are highly esteemed and have often been reprinted. Died May 6, 1828.

Dynam'eter [from the Gr. δύναμις, "power," and μέτρον, a "measure"] is an instrument for determining the magnifying power of a telescope. This power is the ratio of the solar focal distance of the object-glass to the focal distance of the eye-piece, considered as a single lens; and this ratio being the same as the ratio of the effective diameter of the object-glass of the telescope to the diameter of the image of the same formed at the solar focus and seen through the eye-piece, the object of the instrument is to measure the exact diameter of this image, which can be either projected on mother-of-pearl or measured by optical means. Ramsden proposed for this purpose the double-image dynameter, or micrometer, which is formed by dividing the eye-lens of a positive eye-piece into two equal parts, and mounting them so that the divided edges are made to slide along each other by means of a fine screw apparatus. Each semi-lens gives a separate image; and the distance of the two centres, measured by the revolutions of the screw when the borders of the two images are brought into contact, gives the distance of the centres of the images or the diameter of one of them.

Dynam'ics. The term *dynamics*, in its literal signification, as well as in its more modern acceptation, relates to or designates the science which has for its object the in-

vestigation of the laws and principles which govern the action of forces. The science of dynamics may be divided into various branches, each embracing the principles applicable to some special conditions of the action of forces or of the bodies acted on, such as the subject of *statics*, or the equilibrium of forces; the subject of *kinetics*, the action of forces in connection with the motions and changes which they produce; and the special applications of both these subjects to bodies in the *solid* and *fluid* states.

The abstract idea of force is derived from our knowledge and experience in regard to the forces of nature—gravitation, inertia, friction, molecular force, muscular force, etc. These forces are so far similar and identical in their effects as to admit of a common measure, and of being subjected to the same laws and principles. In general they arise from the action of one body on another, in such a manner that this action is distributed among all the particles or is exerted through a surface. But it is nearly always possible to assume a single force acting through a definite point and in a particular direction, which shall be equivalent, in its effects, to such combined or distributed forces. The force of gravity, for instance, is an attractive influence exerted between two bodies, which can only be supposed to be exerted by the separate particles or molecules of each, and yet a single force equivalent to the sum of the attraction of all the particles of a body, and acting through its centre of gravity, is usually assumed to represent this attraction. A force may thus be regarded as an influence or action which requires three elements for its determination—its *line of action*, its *point of application*, and its *magnitude*.

This abstract idea is applicable to all forces, and furnishes the starting-point or basis of the system of principles which constitutes the science of force. These principles depend also on certain axioms of physical science derived from a consideration of the nature of forces and their effects; and also upon certain geometrical laws involving the relation between the magnitudes of forces and motions, and their equivalent components. To compare the magnitudes of forces a standard unit or measure must be adopted which is applicable to all forces under all ordinary conditions. As all standards of measure are arbitrary, such a unit of measure may be found in the effects which a given force will produce under conditions which permit of the effect being measured by some other known standard of measure.

To explain the standard or unit of force adopted in dynamical science, it will be necessary to explain just what is understood by the mass of a body. If we suppose (*for the purpose of this explanation only*) that the ultimate particles or molecules of all substances are the same, and that we may designate by the term *density* the degree of proximity of the particles of any body to each other, then the number of particles in a given *volume* may be taken to denote the mass of the body; *i. e.* this number would represent the *quantity of matter in the body*. This quantity of matter or mass has important properties as regards force. First, the action of the force of gravity upon the body is directly proportional to the mass; and this mass possesses a peculiar power of resistance to any force which acts to change its condition in respect to motion. It is inert as regards any power in itself to change, but a force of resistance is developed with the action of an impressed force. The truth of this principle is so well established that the following relation between an impressed force, the mass of a body free to move without resistance (other than its inertia), and the velocity which is produced in a unit of time, has the force of a scientific axiom. This relation may be stated as follows: *The velocity produced in a body free to move without resistance in a unit of time will be directly proportional to the intensity or amount of the impressed force, and inversely proportional to the mass of the body.* In algebraic symbols, if v be the velocity, F the force, and M the mass, the relation will be expressed by the equation $v = \frac{F}{M}$. From this is determined the value of the force $F = Mv$. If the mass M be that of a given volume of some substance assumed as a standard, the unit of force may be assumed to be that force which will produce a given velocity—the unit of velocity, for instance—in a unit of time. This is an *absolute unit of force*, and serves as a universal measure. Another measure adopted is more specific, but not an invariable standard. It is, however, that in most common use, and is perhaps the most universally understood as the standard of measure for forces. If the force F, instead of being any force, be taken as the force of gravitation, the total attraction of the earth at a given place on the mass M will be what is commonly called the weight of the body; representing this by W, we shall have $W = Mv$. If the same standard mass be chosen as before, the weight of this mass may be taken as the unit of force. Such a unit has been generally adopted for different national standards. For English measures the mass M is that of a piece of platinum carefully preserved, the weight of which is called 1, or one pound. This weight will differ for different latitudes, because the force of attraction of the earth varies with the latitude, and hence this measure is not absolute in its character, but it is convenient for use, and is universally employed. If any mass be allowed to fall under the influence of gravity, the velocity generated in one second may be determined experimentally, and the equation $W = Mv$ will give the relation between the weight, mass, and velocity under these circumstances. In the latitude of London this velocity is 32.2 feet, approximately; so that $\frac{W}{32.2} = M$. The mass of a body is thus found by dividing the weight by 32.2. The unit of force, for British measures, may therefore be said to be *one pound avoirdupois*, and the mass of a body may be found by dividing the weight by the number 32.2; these quantities representing British measures referred to the latitude of London. The corresponding French unit of force is 1 kilogramme, equivalent to about 2.2 British units.

A force being fully represented by its *magnitude, direction*, and *point of application*, the first problems in order in the action of impressed force, relate to the laws of equilibrium, or the rules for finding the resultant of any number of forces acting on a body. If the lines of direction of the forces all pass through the same point, the resultant may be found by the application of the geometrical theorem called the parallelogram of forces. If two forces act upon one point, and portions of their lines of direction be taken to represent the magnitude of the forces, their resultant, or a single force equivalent to the action of the two, will be represented by the diagonal of the parallelogram constructed on the lines of the other two. By counting the forces which act on a point two and two, and repeating the process, a single resultant for all may be found. Or, to determine graphically the resultant, from the extremity of the line representing one of the forces draw a line parallel to the direction of any other force, of a length representing the magnitude of this force; then from the extremity of this last line draw another, parallel to and equivalent to another force, and so on; the final resultant will be a line drawn from the extremity of the last line to the origin, or point of application; if this line is zero, then the forces are in equilibrium. If the forces do not all act on one point in the body, the conditions of equilibrium require that the action of the forces shall be such that they not only produce no motion of the body in a straight line, but there must be no unbalanced effort to turn the body about any line as an axis.

The *moment of a force* in reference to an axis is the product of the intensity of the force into the perpendicular distance of its line of action from that axis.

Several special cases may be considered as leading to the most general case of the equilibrium of any number of forces acting upon a rigid body in any direction.

1st. To find the resultant of two parallel forces acting in the same direction, divide any line across their common direction into parts inversely proportional to the magnitudes of the forces; the point of application of the resultant may thus be found, and its magnitude will be equal to the sum of the magnitudes of the two forces. A third force equal and opposed to this resultant will produce equilibrium.

2d. The resultant of any number of parallel forces acting in one plane and in the same direction may be found by first finding the resultant of two, then the resultant of this with a third, and so on.

3d. For any number of parallel forces not in one plane, the conditions of equilibrium require that the algebraic sum of the forces shall be equal to zero, and the algebraic sum of the moments of the forces in reference to any two rectangular axes in the plane; that is, the combined action of the forces must produce neither a motion of translation nor of rotation. The resultant of such a system, if there be a resultant, may be a single force, or two forces forming what is called a couple.

4th. Two equal parallel and contrary forces not acting on the same point produce a couple which has no single resultant.

5th. When a system of forces act in various directions and on various points of a rigid body, if their axes be assumed at right angles to each other, each of the forces may be replaced by three component forces in the direction of these axes. The components of each force being found by multiplying the magnitude of the force by the cosine of the angle which its line of action makes with the direction of the component (a process which depends on the theorem of the parallelogram of forces), then the conditions of equi-

librium of the system are that the algebraic sums of the components in the directions of the three axes shall be zero, and also the algebraic sums of the moments of the forces in reference to these axes must be zero.

The application of these principles to find the centres of gravity of various lines, surfaces, and solids is made by supposing the body to be divided into small elementary portions, and these portions to be acted on by the parallel forces of gravity acting on each. In a corresponding manner the centre of pressure of fluids resting upon surfaces may be found.

The various cases of equilibrium when no other forces act on a body than the force of gravity, and the pressure between the body and fixed supports, constitute a large class of problems which occur in the applications of dynamics to engineering; the stresses and strains which are produced in the pieces of a structure being the principal objects for calculation. In the action of forces where motion is produced, the elements of time, space, and velocity enter into the discussion, as well as the mass of the body acted on.

The three fundamental axioms or truths on which the science of dynamics principally rests are—

1st. Every body continues in its state of rest or of uniform motion until compelled by impressed forces to change its state.

2d. Change of motion is proportional to the resultant of the impressed forces, and takes place in the direction of the straight line in which that force acts.

3d. There can be no action of a force without a contrary and equal reaction.

The *work* of a force is the product obtained by multiplying the intensity of the force by the space passed over by its point of application.

According to the above axioms or fundamental principles, the effort of any force must be opposed by an equal and contrary effort from some other force. In cases of bodies free to move under the influence of any force, a portion of the resistance to the external force is always supplied by the inertia of the body. If no other force acts upon the body than the force which produces the motion, the whole of the resistance will be supplied by inertia, and the expression which has been employed, $F = Mv$, gives the relation between the force and the resistance in terms of the mass and velocity. The quantity Mv, called by some writers quantity of motion, and by others momentum, may be interpreted as implying that this is *the measure of a force* which, acting for a unit of time, generates the velocity v. If the force continue to act on the body so as to accelerate the velocity, the *work* of the impressed force must be equivalent to the work of the resistance during any given time or through any given space. A body moving, for instance, with a velocity v, and having by the action of an impressed force its velocity changed to v', the change of momentum will be $M.(v-v')$. The force necessary to produce this change in the time t will be $F = M.\frac{v-v'}{t}$. If during this time we suppose the body to have passed with a uniformly accelerated velocity over the space s, the *work* of the force F will be Fs. But the space s is equal to the mean velocity multiplied by the time, or equal to $\frac{v+v'}{2}t$, and we have

$$F \times s = M\frac{v-v'}{t}.\times\frac{v+v'}{2}.t = M.\left(\frac{v^2-v'^2}{2}\right).$$

If the body start from rest, the initial velocity will be 0, and we shall have

$$F \times s. = \frac{Mv'^2}{2}.$$

The same may be proved whether the impressed force is constant or variable; and the important principle is thus established that the product of the mass of a body multiplied by half the square of the velocity with which the body is moving, is equivalent to the *work* of the *impressed force* which produces this velocity in the body. And generally a change in the value of $\frac{Mv^2}{2}$ is always equivalent to the *work* of the force which produces the change. The quantity $\frac{Mv^2}{2}$ is called *living force*, and sometimes *actual energy* of the body, because a body moving with the velocity v will always require the expenditure of the work represented by $\frac{Mv^2}{2}$ to bring it to rest.

In cases where external resistances act on the body in opposition to the impressed force, the work of the resistance, added to the work of inertia, will be equivalent to the work of the impressed force. This gives rise to a very simple enumeration of the laws of all machines—viz. the work of the effort or prime mover must always, during any interval of time, be equal to the total work of the resistances added to the actual energy or living force accumulated in the moving pieces. If during a given period the living force of any piece is alternately increased and diminished, the quantities of energy stored and re-stored may just equalize each other; and such a piece may be employed simply for the purpose of storing up and restoring work, as a regulator. The common fly-wheel is such a piece in machinery.

If a body has a rotary motion about any axis, the actual energy or living force due to the rotation is expressed in terms of the angular velocity and the moment of inertia of the body with reference to the axis. If the angular velocity be represented by a, the actual energy due to rotation will be $\frac{a^2}{2g}I$; the moment of inertia I being found by means of what is called the radius of gyration, which is that radius or distance in a rotating body the square of which is the mean of the squares of the distances of the particles of the body from the axes. It is found by geometrical solution. For the fly-wheel this radius is approximately equal to the mean radius of the rim.

When a body in motion is constrained to move in a curve, the force which causes it to deviate at each instant from the tangent is found by multiplying the mass by the square of the velocity, and dividing by the radius of curvature. The deviating force is equal and opposite to the influence which tends to draw the body away from the axis, the centrifugal force, and hence the *centrifugal* force is always proportional to the square of the velocity, and inversely as the radius of curvature.

In the application of the laws of dynamics to fluids the principle of living force holds true as for solids. Every fluid mass in motion has a living force proportional to the mass, multiplied by the square of the velocity.

The force of heat is derived from the same general dynamical law. It has been demonstrated that the molecules of all bodies have a constant vibratory motion, and these molecules having weight, the energy exerted when a body is cooled is equivalent to the expenditure or change of living force; and when a body is heated, the vibratory motion of the particles being increased in velocity, living force or actual energy is stored.

The property of matter which is called inertia, by virtue of which masses in motion possess a force which is appropriately called *living* force, is of great importance in the economy of machines, and of special importance also to living beings. In nearly all motions of animals this principle acts to aid the muscles in the execution of particular movements, which would otherwise be accomplished by fatiguing exertions, and would often be otherwise impracticable.

The demonstrations and applications of the various principles which have been enunciated, with their secondary consequences, usually occupy entire volumes. Works of this character have generally been entitled works on mechanics, and are often divided into two subjects or parts, *statics* and *dynamics*, but the tendency of modern writers is to exclude the word *mechanics* from definitions connected with *abstract* science, and to employ the term *dynamics* to designate the whole science of force. W. P. Trowbridge.

Dynamic Units are units for measuring forces and their effects. The simple *unit of force* has been defined under Dynamics. A *unit of work* combines two elements—viz., force acting, and space through which it acts; and is the product of a unit of force and a unit of distance. Such is the foot-pound, which is the work done in raising one pound one foot; or the kilogrammètre, the work done in raising one kilogramme one mètre. A *unit of power*, or of *rate of working*, involves the additional consideration of time. It is a definite amount of work conventionally fixed upon for purposes of comparison as the work of a unit of time. Thus, the horse-power, the unit of rate commonly used in this country in estimating the performance of machines, is 550 foot-pounds per second, or 33,000 per minute. The *cheval-vapeur* (French horse-power) is 75 kilogrammètres per second, or 4500 per minute; equal to 542½ foot-pounds per second, or 32,550 per minute, nearly —a little less than the former. W. P. Trowbridge.

Dynamite. See Explosives, by Gen. H. L. Abbot, U. S. A.

Dynamom'eter [from the Gr. δύναμις, "force," and μέτρον, a "measure"], an instrument or apparatus for measuring energy exerted or work performed. Any contrivance may be so called which indicates the intensity of a force used to produce motion. The work done is found by multiplying the *mean* effort thus indicated into the space passed over by the point where the force is applied. A dynamometer may record only the intensities of the force, space being ascertained independently; or it may

record both force and distance traversed. A spring attached to a plough-beam may, by suitable mechanism, be made to record the varying force of traction, and thus become a dynamometer. The mean force shown by it, multiplied into the length of the furrow, will give the work of the animals drawing the plough. Prony's friction dynamometer is the form most easily applied to revolving shafts. A flexible band, enveloping either the shaft or a drum turning with it, resists the driving force by its friction. The resistance is measured by the weight required to keep the band from turning with the shaft; and this weight, multiplied by the distance it would have been carried in a given time if it had revolved with the shaft, gives the work of the prime-mover. Hirn's torsion dynamometer measures the force applied to a shaft, by the torsion caused by such force in the shaft itself. The torsion dynamometer and the spring dynamometer are best suited to measure variable forces; but there are instruments of this class in which force is measured by the resistance of fluids driven through small apertures. For measuring the work of fluid pressure, the steam-engine indicator is the dynamometer in common use. In this, the pressure of the fluid upon a small piston is resisted by a spiral spring. A pencil which moves with the piston traces upon a moving slip of paper a curve, of which the ordinates give the pressure, while a straight line perpendicular to these shows the distance passed by the surface pressed. The mean pressure multiplied by this distance gives the work done. (For Brewster's chromatic dynamometer see POLARIZATION OF LIGHT.)

W. P. TROWBRIDGE.

Dy'nasty [Gr. *δυναστεία*, from *δυνάστης*, a "lord;" Fr. *dynastie*], a family of sovereigns or rulers reigning by hereditary succession; a series of kings of the same family.

Dyrrha'chium. See DURAZZO.

Dy'sart, a royal burgh and seaport of Scotland, in Fifeshire, on the Frith of Forth, 12 miles N. N. E. of Edinburgh. The High street is lined with many antique houses. Dysart has manufactures of damasks and ticking; also shipbuilding yards. Coal-mines are worked in the vicinity. Pop. in 1871, 8920.

Dy'sartsville, a township of McDowell co., N.C. P. 767.

Dyscra'sia [from the Gr. *δυς*, "evil," and *κρᾶσις*, a "composition," a "mixture"], in medical terminology, a diathesis, a tendency towards a particular disease, a constitutional peculiarity which gives character to all attacks of disease from which a patient may suffer. The word is also used to designate a depraved and dangerous condition of the system, not constitutional, but accidental. The term is a vague one, and is not much employed.

Dys'entery [Gr. *δυσεντερία*, from *δυς*, "ill," "painful," and *ἔντερα*, "intestines"], a febrile disease, characterized by paroxysms of pain in the bowels, and by scanty though often frequent bloody, mucous stools. The glands and tissue of the large intestine are inflamed, and sometimes, though rarely, the small intestine shares the disorder. It may be acute or chronic, and is a frequent and formidable disease, especially in hot climates. It is sometimes epidemic, and then is peculiarly fatal among children. Many times it attacks and decimates armies. Sporadic cases in civil practice usually recover with little treatment. Pain is relieved by opium or Dover's powder. Gentle purgatives are extremely useful. Enemata of warm water will often relieve tenesmus. Astringents, copaiba, opiated starch injections, etc., are useful adjuvants in some cases.

Niemeyer regards epidemic dysentery as a disease distinct from the common or sporadic disease. He considers it truly infectious. The severer cases of this disease are not much benefited by treatment. Even the mild cases are apt to assume a chronic form, which may prove fatal. This disease is akin to cholera, and perhaps to intermittent fever. It is endemic in Southern Europe. The endemic dysentery of Egypt is a distinct disease, caused by the presence of a trematode worm (the *Bilharzia hæmatobia*) in the walls of the intestine.

REVISED BY WILLARD PARKER.

Dysmenorrhœ'a [from the Gr. *δυς*, "ill," *μήν*, a "month," and *ῥέω*, to "flow"], painful and difficult menstruation, is sometimes caused (1) by flexion or displacement of the uterus, in which case the proper treatment is the restitution of that organ to its normal position; (2) by an excessively or morbidly excitable nervous condition, best relieved by sedatives at the time of attack, and by supporting treatment and correct hygienic regimen; (3) it is said to be caused by uterine rheumatism, in which case it may require the treatment appropriate to rheumatism; (4) when associated with endocervicitis or endometritis it is often benefited by local treatment with caustics, etc.; (5) a variety of other local troubles may cause it, and may require special treatment.

Dyspep'sia [Gr. *δυσπεψία*, from *δυς*, "difficult," and *πέπτω*, to "digest"], a disordered functional state of the stomach without appreciable organic disease; indigestion of food, with the resulting symptoms, such as flatulence, pyrosis, pain, etc. Dyspepsia may be the forerunner or concomitant of consumption or of Bright's disease, but it is much more frequently the result of improper habits with regard to food, exercise, etc. Its treatment is important and difficult. In cases where the coats of the stomach are irritable, bismuth is a standard, safe, and useful remedy. The mineral acids, as the nitro-muriatic, are believed to correct depraved secretions. The hyposulphites are sometimes useful where microscopic plants (*Sarcina* and *Torula*) exist in the stomach. Rhubarb with alkalies, followed by sulphate of quinia, is frequently beneficial. The bitter tonics tend to correct gastric atony. In all cases the patient should have the best hygienic conditions.

When there is no gastric catarrh or ulceration there is great, and often complete, relief obtained by sea-bathing, nutritious food, and the administration of iron. Dyspepsia with depression of spirits and a red uric-acid deposit in the urine is often cured by water-treatment, with visits to saline mineral springs. In short, there is no disease with a greater variety of causes and symptoms, or which requires more judgment and skill in treatment. Neglected dyspepsia must be placed in the numerous class of causes which tend, by impairing nutrition and depressing the tone of the system, to prepare the way for pulmonary consumption.

REVISED BY WILLARD PARKER.

Dyspha'gia [from the Gr. *δυς*, "difficult," and *φαγεῖν*, "to eat"], a difficulty in swallowing, caused by paralysis, disease of the muscles of the throat, quinsy, œsophagitis, carcinoma, stricture, or spasm of the œsophagus; or it may be a symptom of hysteria, tetanus, or hydrophobia. Its treatment is various, according to the disease of which it is a symptom.

Dyspho'nia [from the Gr. *δυς*, "difficult," and *φωνέω*, to "speak"], a difficulty in speaking. The most common variety is the *dysphonia clericorum*, or "clergyman's sore throat," a follicular inflammation of the pharynx, accompanied by huskiness of the voice, with more or less coughing, hawking, and expectoration. The follicles of the fauces and the pharynx are larger or more apparent than in health. The follicles occasionally discharge hard or elastic lumps of mucus, greatly to the alarm of the patient. Ulceration may supervene, and the patient may be constantly inclined to swallow. Time, rest, muscular exercise, tonics, travelling by sea or land, are all useful in the treatment.

Dyspnœ'a [Gr. *δύσπνοια*, from *δυς*, "difficult," and *πνέω*, to "breathe"], a difficulty in breathing, a common symptom in most diseases of the heart or lungs. If the difficulty is increased by lying down, so that the patient can only breathe with any comfort when erect, it is called *orthopnœa*. Dyspnœa is sometimes the result of some functional or organic nervous disease, as hysteria. It is then relieved in most cases by diffusible stimulants. In other cases the character of the dyspnœa is remarkably varied, and the treatment is as various; belladonna, stramonium, cannabis, chloral, ipecac, and many other remedies are often useful. Strict temperance in eating and drinking should always be observed.

Dytis'cidæ [from *Dytiscus* (the diminutive of the Gr. *δύτης*, a "diver"), one of the genera], a family of aquatic coleopterous insects formed from the Linnæan genus *Dytiscus*, now divided into several genera. There are many species, of which the largest attain a length of nearly two inches. The general form is oval and the surface smooth. They are pentamerous—that is, have all the tarsi five-jointed. They are remarkable for the oar-like shape of their swimming-legs. All the species are found in marshes, lakes, and the still parts of rivers. When they come to the surface to breathe, they rest with the back downward and the extremity of the abdomen exposed to the air, the organs of respiration being in the last segment. They feed voraciously upon all kinds of animal food. They fly well, and often leave the water by night. Before changing into pupæ the larvæ secrete themselves in the earth. The larvæ are called "water-tigers," from their habit of attacking and devouring insects, tadpoles, and even fishes.

Dziggetai, or **Koulan** (*Asinus Onager*), a species of wild ass abounding in Eastern Turkey, Persia, Afghanistan, and the Punjâb. It is one of the swiftest of quadrupeds, and cannot ordinarily be overtaken, even by the Arabian horse, and the greyhound can follow it successfully only on the open plains. These animals live in troops, under a leader who rules them despotically. They are extremely wild, for they are much hunted, not only for their excellent flesh, but for the great difficulty and excitement of the chase. They are pursued by falconry, but are more frequently shot with the rifle. They are of a brown color, with a black stripe along the back.

E.

E (pron. *ee*), the fifth letter and second vowel of the Roman and of most modern alphabets. The Greeks had two vowels represented by the Latin *e*—the one short (ε, *epsilon*), the other long (η, *eta*); ε stood for the number 5, η usually represented 8. The Sanscrit has only one *e;* this is always long (see SANSCRIT), and is usually represented in the Western languages by *e* circumflexed (*ê*). In the Arabic and Persian the vowel *fatha* (see ARABIAN LANGUAGE), being a somewhat obscure sound, is often represented in the European languages by *ĕ* (short), though it properly corresponds to short *ă;* thus we may write *el-Korân* or *al-Korân* for "the Koran," *er-rasheed* (rashîd) or *ar-rasheed*, the surname of Haroon (Haroun), the celebrated caliph of Bagdad. In like manner, the Arabian prophet's name may be written either Mŏhammed or Mohammad. The Arabs have no vowel sound corresponding to long *ē* (*ê*), although this frequently occurs in the Persian.

In most of the modern European languages *e* occurs more frequently than any other letter. This remark is especially true of the French and English. One reason of this is that *e* (mute) in these languages usually replaces the terminal letter or letters of Latin or Greek words, as in the following nouns: *fame*, from the Latin *fama*; *muse* (Lat. *musa*; Gr. μοῦσα); *plume* (Lat. *pluma*); *bile* (Lat. *bilis*); *cone* (Lat. *conus*; Gr. κῶνος); *face* (Lat. *facies*); so also in adjectives, as *prone* (Lat. *pronus*); *pure* (Lat. *purus*); *vile* (Lat. *vilis*), etc. All the foregoing derivative words are French as well as English. In a few instances the final *e*, though found in English, is omitted in French; as *pine* (Lat. *pinus*; Fr. *pin*); *wine* (Lat. *vinum*; Fr. *vin*), etc.; but more frequently the reverse occurs, particularly in adjectives; thus we have *arid* (Lat. *aridus*; Fr. *aride*); *avid* (Lat. *avidus*; Fr. *avide*); *livid* (Lat. *lividus*; Fr. *livide*), etc., etc. (For the different sounds of our *e*, see PRONUNCIATION OF THE ENGLISH LANGUAGE.)

E in music is the third note in the diatonic natural scale. As a Latin preposition, *e* is put for *ex* by way of euphony, both as a separate word and in composition.

Each'ard (JOHN), D. D., an English clergyman, born in Suffolk in 1636. He became a fellow of Catherine Hall, Cambridge, in 1658. He wrote "The Ground and Occasions of the Contempt of the Clergy and Religion inquired into" (1670), and a "Dialogue on Hobbes' State of Nature" (1672). He was a writer of considerable humor, but of no great ability. Died July 7, 1697.

Ea'die (JOHN), D.D., LL.D., a divine of the Scottish United Presbyterian Church, was born at Alva, Stirlingshire, May 9, 1814, and was educated at Glasgow University. He published a "Biblical Cyclopædia," "Life of Kitto," a "Condensed Concordance to the Scriptures," etc.

Ead'mer, or **Edmer,** an English historian and monk. He entered in his youth the Benedictine monastery at Canterbury, and became a friend of Saint Anselm. He was elected bishop of St. Andrew's in 1120, but the Scottish king would not allow him to be consecrated by the archbishop of Canterbury, and he soon returned to his monastery. He wrote in Latin a "Life of Saint Anselm," and a "History of [his own] Times," from 1066 to 1122, which was printed by Selden in 1623. These, and some other writings of his, are published with the works of Anselm. Died Jan., 1124.

Eagle [Lat. *aquila;* Fr. *aigle;* Ger. *Adler*], the name of several species of rapacious birds of the order Raptores and family Falconidæ. They belong to the genera *Aquila*, *Haliaëtus*, etc., and are characterized by hooked beaks and sharp, powerful claws. About seventy species are known. They have great powers of flight and of vision, are diurnal and solitary in their habits, and use their claws in killing their prey. The eagle was regarded by the ancients as a symbol of royalty, and has the proverbial distinction of being the king of birds. Large specimens of the eagle measure three and a half feet in length, and nine feet from tip to tip of the expanded wings. These birds usually breed in mountainous districts or forests, remote from human habitations. They are all monogamous, and it is said that a pair will live together in perfect harmony until death separates them. They build their nests on a high tree, a ledge of rock, or on some inaccessible cliff. The nest is inartistically constructed of sticks, which are rudely arranged. The eagle is supposed to live to a great age, more than one hundred years.

The golden eagle (*Aquila chrysaëtos*) is a magnificent bird found in Europe, Asia, and North America, deriving its name from the golden-red color of the feathers which cover its head and neck. The plumage of the body is a rich dark-brown. This species is the largest of the European eagles. It feeds on hares, lambs, pigs, fish, etc., which it carries to its nest. When in pursuit of its prey it is very audacious, and has been seen to carry off a hare before the noses of a pack of hounds.

It is stated that the golden eagle can be tamed, and has been trained to catch game for its master. The flight of this bird is very graceful, and presents an interesting spectacle. It sweeps through the air in a series of spiral curves, rising with every spire, and making no perceptible effort or motion with its wings. According to Ruskin, "the projection of the brow is the essential point in an eagle's head. To keep the sunshine above from teasing it, the eye is put under a triangular pent-house, which is precisely the most characteristic thing in the bird's whole aspect." The imperial eagle (*Aquila imperialis*), which inhabits Asia and Southern Europe, is nearly as large as the golden eagle, and is similar in appearance. It may be distinguished from the other species by the white patch on its scapularies. Its head and neck are covered with feathers of a deep fawn-color. It generally builds on lofty trees.

The national bird of the U. S. is the bald eagle (*Haliaëtus leucocephalus*), which has a white head, neck, and tail. It is said to lay its eggs in the same nest year after year. It is fond of fish, which it generally steals from the osprey. Its habit is to watch near a river or other water until an osprey has caught a fish, which the eagle snatches in the air or catches as it falls from the claws of the osprey. The bald eagle is widely distributed through different regions of North America, and frequents the sea-coasts, lakes, and large rivers. It measures from thirty-five to forty inches in length. (See BALD EAGLE.)

Harpy Eagle.

The genus *Harpyia* includes a single species, the harpy eagle (*Harpyia thrasaëtos*), a fierce and powerful bird of Mexico and of Central and South America. A single stroke of its bill has been known to break a man's skull.

Eagle, a gold coin of the U. S., is equivalent to ten dollars, and bears the figure of an eagle. The largest gold-piece coined in the U. S. is a double-eagle = $20. The eagle weighs 258 grains Troy, and being nine-tenths fine, contains $232\frac{2}{10}$ grains pure gold.

Eagle is also the name of an ancient coin of Ireland, current in the thirteenth century.

Eagle, in heraldry, a bearing of frequent occurrence, and often assumed by sovereigns as the emblem of empire, from having been borne on the legionary standard of the ancient Romans. The eagle of Russia is *or*, with two heads displayed, sable, each ducally crowned of the field; the whole imperially crowned, beaked, and membered gules. The eagle of Austria is also displayed with two heads. The Prussian eagle has only one head. The U. S. adopted (1785) the bald eagle, his wings displayed, proper, as the national emblem.

The eagle was also one of the most ancient Roman military standards. In 104 B. C. it became the distinctive ensign of the Roman legions. It was made of bronze or silver, and was carried upon a short staff. An eagle of gold was the royal emblem of ancient Persia.

Ea'gle, a township of Bradley co., Ark. Pop. 255.

Eagle, a township of Pulaski co., Ark. Pop. 889.

Eagle, a township of La Salle co., Ill. Pop. 870.

Eagle, a township of Monroe co., Ill. Pop. 2388.

Eagle, a township of Boone co., Ind. Pop. 2327.

Eagle, a township of Black Hawk co., Ia. Pop. 507.

Eagle, a township and post-village of Clinton co., Mich. Pop. 1008.

Eagle, a post-township of Wyoming co., N. Y. It has three cheese-factories. Pop. of village, 110; of twp., 1040.

Eagle, a township of Brown co., Ohio. Pop. 1166.

Eagle, a township of Hancock co., Ohio. Pop. 1330.

Eagle, a township of Vinton co., Ohio. Pop. 681.

Eagle, a township of Harrison co., W. Va. Pop. 1560.

Eagle, a township of Richland co., Wis. Pop. 1083.

Eagle, a post-village and township of Waukesha co., Wis., at the junction of the Western Union and the Prairie du Chien division of the Chicago Milwaukee and St. Paul R. Rs. Pop. of township, 1256.

Eagle (HENRY), U. S. N., born April 7, 1801, in the city of New York, entered the navy as a midshipman Jan. 1, 1818, became a lieutenant in 1827, a commander in 1844, a captain in 1855, and a commodore in 1862. He commanded the bomb-vessel Ætna at the siege of Vera Cruz, and was civil and military governor of the province of Tobasco, Mexico (1847–48). He commanded the Monticello at the attack on Sewell's Point Battery, Va., May 19, 1861, and from June, 1861, to July, 1862, commanded the frigate Santee of the Gulf blockading squadron, during which service a boat-expedition from the Santee captured and destroyed the privateer Royal Yacht in the harbor of Galveston, Texas. FOXHALL A. PARKER, U. S. N.

Eagle, Bald. See BALD EAGLE.

Eagle Bridge, a post-village of Hoosick township, Rensselaer co., N. Y., on the Hoosick River and on the line of White Creek township, Washington co. It is at the junction of the Troy and Boston R. R. with a branch of the Rensselaer and Saratoga R. R., 24 miles N. E. of Troy.

Eagle Creek, a township of Lake co., Ind. Pop. 737.

Eagle Creek, a township of Scott co., Minn. Pop. 1120.

Eagle Grove, a post-township of Wright co., Ia. Pop. 195.

Eagle Harbor, a post-township of Keweenaw co., Mich. It contains the port of Eagle Harbor, whence copper is shipped. Pop. of village, 233; of township, 778.

Eagle Harbor, a post-village of Gaines and Barre townships, Orleans co., N. Y., on the Erie Canal, has a number of manufacturing establishments. Pop. 315.

Eagle Hawk (*Morphuus*), a name given to several species of birds of prey of the family Falconidæ, similar in form to the eagle, but inferior in size. They are natives of South America, the East Indies, and Africa. They have short wings and long legs. Some of them are beautiful.

Eagle Isle, a township of Hancock co., Me. Pop. 30.

Eagle Lake, a township of Otter Tail co., Minn. Pop. 80.

Eagle Lake Plantation, a township of Aroostook co., Me. Pop. 143.

Eagle Mills, a post-township of Iredell co., N. C. Pop. 1090.

Eagle Pass, a post-village, capital of Maverick co., Tex., on the Rio Grande, about 450 miles S. W. of Austin City. During the civil war it had a large trade with Mexico.

Eagle Point, a post-township of Ogle co., Ill. Pop. 777.

Eagle Point, a township of Chippewa co., Wis. Pop. 1667.

Eagle River, a post-village, capital of Keweenaw co., Mich., on Lake Superior, about 195 miles E. N. E. of Duluth. Copper is mined in the vicinity and shipped here.

Eagle Wood, the fragrant wood of *Aloexylon Agallochum* or *Aquilaria ovata*, a tree of the order Aquilariaceæ, indigenous in the tropical parts of Asia. It is used for burning as incense.

Ea'gre [probably from the sea-jotun ŒGIR (which see)], a Norse word used to express the sudden rise of the tide in the mouth or estuary of a river. It is often called the BORE (which see, by PROF. ARNOLD GUYOT, PH. D., LL.D.).

Eames (CHARLES), an eminent lawyer and journalist, born at New Braintree, Mass., Mar. 20, 1812, graduated at Harvard in 1831 and studied law. In 1845 he took a situation in the navy department at Washington, and soon became an editor of the Washington "Union." He was sent by President Polk as commissioner to the Sandwich Islands, whence he returned in 1850. After several years of journalism he became U. S. minister to Venezuela under President Pierce. After his return, in 1858, he attained high reputation as an admiralty lawyer. Died at Washington, D. C., Mar. 16, 1867.

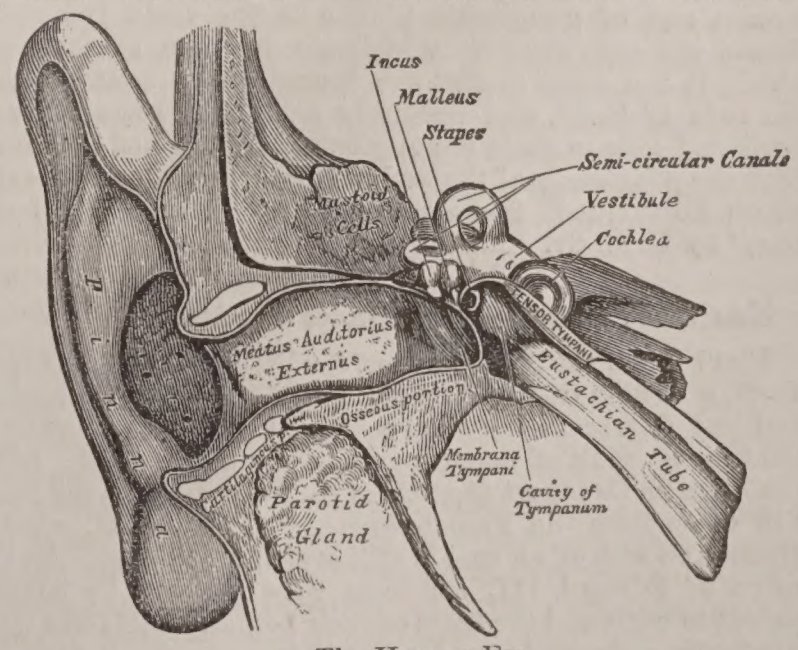
Ear, Anatomy of the. For the perception of sound the essential structure is a nerve capable of receiving and transmitting sonorous vibrations. Some animals (as spiders), possessing no special organ of hearing, nevertheless show a distinct recognition of sounds. The lowest animals, Protozoa, have no specialized organs of sensation. In some of the Acalephæ (belonging to the Radiata of Cuvier), as *Medusa*, small sacs arranged around the margin of the disk appear to represent the ear in a rudimentary form. Many of the Mollusca have auditory organs. In Gasteropoda (*e. g.* snails) these are connected with the pedal ganglia, seeming thus to aid directly in the guidance of locomotion. Cephalopoda, the highest of the Mollusca, have the organs of hearing connected with the head, as they are in Vertebrata. Worms also often have auditory vesicles in the head, connected with the œsophageal nervous ring. Grasshoppers and locusts have similar organs, either at the sides of the first abdominal segment or on the main segments of the anterior legs. In the lobster and other large Crustacea they are placed in the basal joints of the first pair of antennæ. Probably they have a similar situation in some insects, which appear to find each other by hearing sounds, made especially by those of the male sex.

All vertebrate animals, except *Amphioxus*, have distinct organs of hearing. They differ much, however, in the different classes. Fishes have no external or middle ear, and no cochlea in the internal ear. Amphibia also are without a cochlea; some have a tympanum, others none. Reptiles, except the crocodile, are quite destitute of external ears. All of them except serpents have a tympanum, and several an externally visible membrana tympani. The columella in them is either one small bone or a row of bones in the tympanic cavity. It is homologous with the stapes or stirrup-bone of mammals. Comparative anatomists generally consider the other tympanic bones (incus and malleus) to be homologous with the "quadrate" and "jugal" bones, which support the jaws in birds, reptiles, and fishes; being thus, in all of these animals, outside of the ear. Some anatomists, however, assert the existence within the tympanum of reptiles of a rudimentary incus and a cartilaginous malleus. No *external* ear exists in any fish or reptile. Birds, especially owls, present it in the form of a circular arrangement of feathers. In birds the middle ear (tympanum) contains only a single bone, the columella, with processes of cartilage representing the other bones. The cochlea of the internal ear is, in birds, a conical, slightly twisted double canal; the semicircular canals in them are large.

Mammals always have the internal and middle ear complete, and mostly also an external ear. This is slight, however, in diving quadrupeds, as the otter and beaver, and wanting altogether in the whale, seal, mole, ornithorhynchus, and armadillo. Several aquatic animals have a valve near the entrance of the external meatus or canal of the outer ear, which closes when they are under water, protecting the membrana tympani against excessive pressure. The elephant also is provided with a sort of valve or ear-flap. Bats are endowed with very large and sensitive external ears. Many quadrupeds (*e. g.* the horse and dog) have considerable muscular power over their ears, by which they can turn them so as to receive sound from different directions. Man has three *rudimentary* muscles of the same kind, but they are commonly powerless and without use.

The Human Ear.—This consists of three distinct, though connected, parts—the *external ear*, the *middle ear* or tympanum, and the *internal ear* or labyrinth.

Of the *outer ear*, the expanded part is the pinna; its prominent rim or margin is the helix. The ridge next within this is called the anti-helix; it divides above. Its lower and front part encircles a cavity, the concha, below which are two opposite prominences, tragus and anti-tragus. The lowest, soft, flexible part is the lobule. The whole external ear, except the lobule (which is formed of fat and connective tissue), is composed of cartilage covered with skin, well supplied, however, with nerves as well as blood-vessels. The entrance to the ear is the meatus auditorius



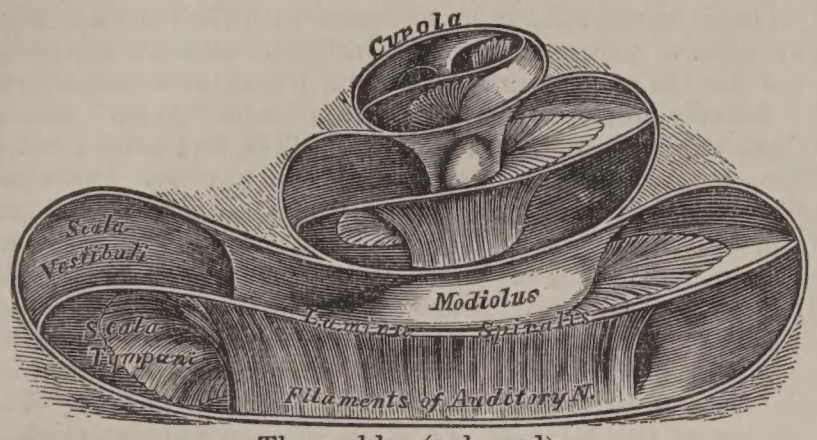
The Human Ear.

externus. It is about an inch and a quarter long, directed forward and inward, slightly curved. Near its orifice are

the ceruminous glands, secreting the ear-wax. At the bottom of the meatus is the membrana tympani.

The *middle ear*, or tympanum, is a sort of drum or hollow organ, containing air, and through its middle a small chain of bones—the malleus, or hammer-bone, the incus, or anvil, and the stapes, or stirrup. The tympanum communicates with the throat (pharynx) by means of the Eustachian tube. The fenestra ovalis, or round window of the tympanum, is a membranous partition between the internal part of the tympanic cavity and the vestibule of the labyrinth or internal ear. The fenestra rotunda is a round membranous "window" between the tympanum and the cochlea of the labyrinth. Three muscles are asserted by most anatomists to exist in the tympanum—the tensor tympani, luxator tympani, and stapedius. The second of these is considered by some to be only a ligament.

The *internal ear* is composed of the vestibule, cochlea, and three semicircular canals. The vestibule is the middle portion, the cochlea is anterior, and the three canals are above and behind the vestibule. Within the latter are two small bodies, the otoliths, or ear-stones, composed of carbonate and phosphate of lime. The semicircular canals always differ definitely in their direction, two being vertical and



The cochlea (enlarged).

one horizontal. The cochlea is shaped somewhat like a snail-shell. In its centre is a conical bony axis, the modiolus. Around this is a spiral canal, within which is the lamina spiralis, partly composed of bone and partly membranous. This divides the canal into two passages or scalæ—the upper, communicating with the vestibule, scala vestibuli, and the lower, communicating through the fenestra rotunda with the tympanum, scala tympani. The bony part of the lamina spiralis has a grooved margin, the uppermost edge of which, towards the scala vestibuli, supports a finely-toothed membrane, lamina denticulata. From each of these margins of the lamina spiralis is given off a fine periosteal layer—the upper one the membrane of Corti, the lower the basilar layer. Between these is a space called by Kölliker the scala media. Within this space are arranged two sets of minute rod-like bodies, parallel to each other, radiating from the axis of the cochlea, those of the two sets being inclined towards each other above. These are the rods of Corti. Looked at in a certain direction with the aid of a lens, they resemble somewhat the keys of a piano.

The whole inner surface of the bony labyrinth is lined by a fibro-serous periosteal tissue. This secretes a thin fluid, the perilymph. The membranous inner labyrinth, which duplicates, as it were, the osseous wall of the vestibule and semicircular canals, secretes a similar liquid, the endolymph. The auditory nerve (portio mollis of the "seventh pair" of cephalic nerves, according to anatomists) is subdivided into branches which are distributed to all the parts of the internal ear. Those filaments which enter the cochlea form a sort of ganglionic plexus in the scala tympani; thence proceed some very delicate nervous extremities, which, in the scala media, are brought into relation with the rods of Corti, and probably also with certain large nucleated cells in their vicinity called the cells of Claudius. (For the *physiology* of the auditory apparatus, see the article on Acoustics.) See also "Treatise on Diseases of the Ear," by D. B. St. John Roosa, New York, 1873.

Henry Hartshorne.

Ear'bus, a township of Sumter co., Ala. Pop. 520.

Earl [from the Ang.-Sax. *eorl*, "hero," "chief;" Norse, *Jarl*], a British title of nobility, next in rank to a marquis, and one degree higher than a viscount. It was formerly the highest rank of hereditary nobility of England. After the Norman Conquest the title of earl was used by the English to express the French *comte*, "count" (Lat. *comes*). Hence the wife of an earl is still styled a countess. In the reign of Edward III. earldoms were granted by letters-patent to earls and the heirs of their bodies. Earldoms were gradually converted from territorial into merely titular honors. The earl's coronet is a circle of gold rising at intervals into eight pyramidal points or spikes, each tipped with a pearl. The style of an earl is "right honorable."

Earl, a post-township of La Salle co., Ill. Pop. 2129.

Earl, a township of Berks co., Pa. Pop. 1622.

Earl, a township of Lancaster co., Pa. Pop. 2975.

Earle (Pliny), an American inventor, born at Leicester, Mass., Dec. 17, 1762. He invented a machine for making cards for carding cotton and wool. Died Nov. 29, 1832.

Earle (Pliny), M. D., was born at Leicester, Mass., Dec. 31, 1809. He was a son of Pliny Earle, the inventor. He was educated at the Friends' school at Providence, R. I., and graduated as M. D. in 1837. He was resident physician of the insane asylum at Frankford near Philadelphia (1840–42), physician in the Bloomingdale asylum, N. Y. (1844–49), and has long been superintendent of the insane asylum at Northampton, Mass. He has published many valuable reports and papers on the treatment of the insane.

Earle (Thomas), a lawyer, a brother of the preceding, was born at Leicester, Mass., April 21, 1796. He practised law in Philadelphia, was distinguished as an opponent of slavery, and was a member of the constitutional convention of 1837. In 1840 he was nominated for the office of Vice-President of the U. S. by the Liberty party. Died July 14, 1849. He published several legal and other works.

Ear'ley, a post-village of Fox township, Elk co., Pa., is the southern terminus of the Daguscahonda R. R. There are coal-mines in the vicinity.

Earl'ham, a post-village of Madison township, Madison co., Ia., on the Chicago Rock Island and Pacific R. R., 30 miles W. by S. of Des Moines. Pop. 222.

Earlham College was chartered in 1859. The president's chair was not filled for a few years at the first. The first president was Prof. Barnabas C. Hobbs, A. M. The chair for five years past has been occupied by Joseph Moore, A. M. Both sexes are admitted. There is a preparatory department, with a two years' course of study, two college courses, a classical and a scientific, of four years each. In the department of instruction there are six professors and three preparatory teachers. Number of students the past year, 220; number in the collegiate department, 70. The government is designed to be as nearly as possible that of a well-ordered family. A majority of the students board at a general dining-hall, where a superintendent and matron preside. An endowment fund of $50,000, together with the proceeds of a farm of 160 acres, very materially lessens the general expenses of the students. The libraries contain 3500 volumes. A large reading-room is furnished with the best magazines and periodicals of the times. The college is healthfully located about 1 mile W. of Richmond, Ind. The play-grounds, walks, groves, and lawns are ample. Joseph Moore.

Earl Marshal, of England, one of the great officers of state who regulates ceremonies, is the head of the college of arms, takes cognizance of all matters relating to honor, arms, and pedigrees, and superintends the proclamation of war or peace. This office is at present hereditary in the family of Howard, and is enjoyed by its head, the duke of Norfolk.

Earl'ville, an incorporated town in La Salle co., Ill., on the Chicago Burlington and Quincy R. R., 73 miles W. S. W. of Chicago. It has two manufactories, a steam-mill, and two newspapers. Ed. "Gazette."

Earlville, a post-village of Oneida township, Delaware co., Ia., on the Dubuque and Sioux City R. R., 37 miles W. of Dubuque.

Earlville, a post-village of Hamilton township, Madison co., and of Sherburne township, Chenango co., N. Y., on the Midland R. R. at the junction of the Syracuse and Chenango Valley R. R., and very near the Delaware Lackawanna and Western R. R. Pop. 399.

Ear'ly, a county in the S. W. of Georgia. Area, 500 square miles. It is bounded on the W. by the Chattahoochee River. The surface is level; the soil is fertile. It is partly covered with forests of pine. Rice, cotton, corn, and wool are raised. Capital, Blakely. Pop. 6998.

Early (John), D. D., bishop of the Methodist Episcopal Church South, was born in Bedford co., Va., in 1786, joined the Virginia Methodist conference in 1807, was one of the chief founders of Randolph-Macon College, Va., and was a laborious and eminently successful preacher of Methodism in his native and adjacent States. He took a prominent part in the proceedings which in 1844 divided his denomination into Northern and Southern sections, was elected first book-agent of the Southern division, and in 1854 was ordained as one of its bishops. He was distinguished by long public services, administrative ability, and great energy of character. Died Nov. 5, 1873.

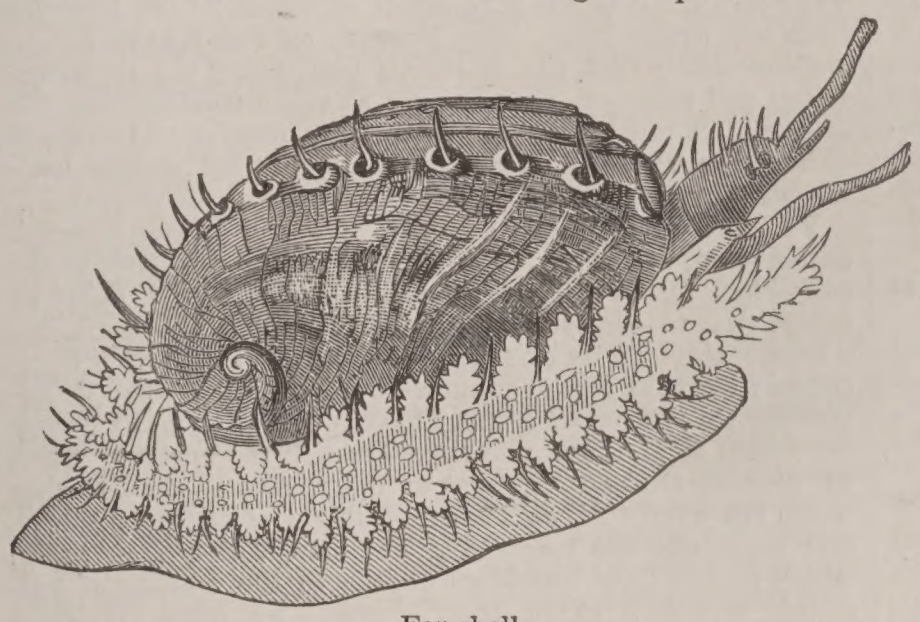
Early (Jubal A.), an American general and lawyer, born in Virginia about 1818, graduated at West Point in 1837. He afterwards studied law, and served in the Mexican war as a major. He joined the Confederate army, was

a major-general at Gettysburg in July, 1863, and commanded an army which invaded Maryland in July, 1864. He was defeated by Gen. Sheridan near Winchester, and at Fisher's Hill in Virginia, on the 19th and 20th of September. On the 19th of Oct., 1864, he attacked the Union army at Cedar Creek, Va., in the absence of Gen. Sheridan, who arrived in time to rally his retreating army and to gain a decisive victory. After the war he returned to the practice of law in Richmond, Va.

Ear'nest, the payment of money, the delivery of a part of any goods sold, or the performance of a simple ceremony to "bind a bargain." The performance of ancient and now meaningless ceremonies as a pledge of good faith is lawful earnest in Scotland and some other countries, but money or goods only are held to constitute earnest in England and the U. S. The seller cannot sell to a third party that for which earnest has been paid. A party who has paid earnest can demand the goods, but the seller is not obliged to deliver them till the whole price is paid. If the buyer fail to demand and pay for his goods, the seller, after due notice, can sell again and keep his earnest. In some countries a party who fails to keep a contract loses his earnest, and may be compelled to fulfil his contract besides.

Earring. See JEWELRY.

Ear-shell, the shell of various gasteropods of the



Ear-shell.

Haliotidæ family. Of these, the *Haliotis tuberculata,* a mollusk of Europe and the tropics, is edible. The genera and species, living and fossil, of this family are numerous and widely distributed. Some of the shells are used in inlaying, and resemble MOTHER-OF-PEARL (which see).

Earth, The, is the dwelling-place of man; the noble garden given him by his Creator to cultivate and to enjoy; the scene of his activity, the means of his development, and the theatre of his history. As such it cannot fail to become one of the most prominent objects of his study.

I. *The Earth in the Universe and the Solar System.*—The earth is a star among the innumerable stars which float in the boundless space of the heavens. Unlike those bright bodies, however, the existence of which is revealed to us only by the rays of light which they send to our eyes, it is not self-luminous; it possesses no other light than the feeble reflected rays which it borrows from the splendor of a mighty neighbor. The earth is one of the more modest members of a small family of similar stars, clustered and revolving around the central luminous orb of the sun, with which they form the SOLAR SYSTEM (which see).

The arrangement of the members of the solar system shows law and order everywhere, and strongly favors the idea, suggested by the celebrated astronomer Laplace, of a common origin, which makes it really a *family* of stars, whose parent is the sun.

The planets, in their order of distance from the sun, are Mercury, Venus, the Earth, and Mars, all of small size, which form a first group; then comes the cluster of the asteroids, followed by another group of four large planets—Jupiter, Saturn, Uranus, and Neptune—whose orbit forms the extreme boundary of the solar system.

In the first group, that of the small planets nearer the sun, no satellites are found except one, the moon, which graces the earth. In the second, that of the large planets, they are numerous. Jupiter has four. Saturn's heaven presents the glorious spectacle of eight moons, accompanied by the phenomenon, unique in the solar system, of a broad, flat, luminous double ring, revolving, like its satellites, around the body of the planet. Uranus has four, and perhaps more; Neptune, as yet, is known to have but one.

The distances of the planets from the sun are not equal. They gradually increase from Mercury to Neptune, so that the distance from the orbit of Mercury to that of each following planet is nearly double the distance from Mercury to the preceding one. That ratio fails, however, in the case of Neptune. For each planet one revolution around the sun is a year; one rotation on its axis, marked by a succession of light and darkness, is a day.

The velocity of these motions is also subject to law. The rapidity of revolution around the sun is greatest in Mercury, and gradually diminishes in the other planets, as their distance from the sun increases, to Neptune, in which it is slowest. The velocity of rotation, on the contrary, is greatest in the large planets more distant from the sun, Jupiter and Saturn turning upon themselves in about ten hours, while the four smaller planets have, like the earth, a day of about twenty-four hours.

The density of the planets, again, varies with their distance from the sun. Mercury is the most dense, and has a specific gravity of about eight times that of water, which is a little more than that of iron; the earth five and a half, and the other small planets nearly the same; while the specific weight of Jupiter is one and a third, or little more than that of water; and that of Saturn, the lightest of all the planets, is only seven-tenths, or less than water, which makes it comparable to a similar volume of cork or light wood.

Thus, in all respects, the earth occupies a happy intermediate position. By its size it belongs to the group of the small planets, but it is the largest of them. Its distance from the sun makes it equally free from the intense glare and the burning heat which prevail on Mercury, and from the dimness of light and the cold which probably are the share of the mighty sister planets, Jupiter and Saturn. The relative length of its day, seasons, and year establishes harmonious relations between them, such as cannot exist in the outer planets, owing to the great disproportion between the excessive shortness of their days compared with the great length of their year.

The earth thus seems to be better fitted than any other member of the solar system for sustaining that noble world of living forms, vegetable, animal, and human, which adorn its surface and give to our globe its highest value. Nay, whatever be the past or future destinies of the other planets in this respect, it may be doubted whether any of them possesses, at present, the physical conditions without which a life-system at all similar to our own cannot be conceived as possible.

II. *The Earth considered in itself,* as a great individual organization, can be studied under two aspects—either in its past or its present condition. A close examination of the earth's crust and its organic contents shows that the terrestrial globe, like every individual body in nature, large or small, had its period of gradual growth before its present perfect state. The very structure of the rocks proves a gradual formation. The continents emerged by successive steps from the bosom of the ocean; their surface was wrinkled by mountain-chains rising one after the other; tribes of plants and minerals, different from the existing ones, succeeded each other during untold ages. These great phases of the existence of the earth, geology studies and describes. (See GEOLOGY.) Physical geography considers the globe in its present condition, as the full-grown earth, with man upon it, in its state of highest perfection.

III. *General Form and Dimensions.*—The general form of the earth, like that of most of the heavenly bodies floating in space, is a sphere, on which, for the sake of convenience, we may distinguish the *poles,* or the two extremities of the axis of its rotation; and the *equator,* which is a great circle traced midway between the two poles, the plane of which passes through the centre of the sphere, cutting its axis into two equal parts. The mean diameter of the earth, given by the great geodetic measurements, by which the true form and dimensions of the globe have been ascertained, is about 7916 English statute miles. The equatorial diameter, however, which measures 7925½ miles, exceeds the length of the polar diameter, or the length of the axis, which is only 7899, by about twenty-six and a half miles, so that a point on the surface of the polar region is over thirteen miles nearer the centre of the globe than a point on the surface of the equatorial regions. This proves that the earth is not a perfect sphere, but a sphere-like body, or spheroid, slightly compressed about the poles and bulging about the equator. That form is accounted for by the effect of the rotation of the earth, which causes a tendency of the matter to fly off and to recede from the poles, where the velocity of rotation is but slight, towards the equator, where the velocity is greatest. That small deviation from the regular spherical form is in itself of little importance, but it teaches us that at some former period the earth must have been in a semi-fluid state, after which it was consolidated in its present shape.

The most recent and accurate measurements seem to indicate some other irregularities in the figure of various

parts of the globe, which, however, are not yet sufficiently determined to be mentioned here.

The following table gives the principal dimensions of the earth in English statute miles:

Dimensions of the Earth.

Equatorial diameter	7925.65	Radius	3962.82 miles.
Polar diameter	7899.17	Radius	3949.58 "
Difference	26.48	Difference	13.24 "
Mean diameter	7916.17	Radius	3968 "
Circumference at the equator	24,899 miles.		
Surface of the globe	196,900,278 miles.		
Contents or bulk	260,000 millions of cubic miles.		

In round numbers easily remembered: diameter, 8000; radius, 4000; circumference, 25,000 miles; surface, 197,000,000 square miles.

IV. *The Globe and its Circles.*—The representation of the earth most true to nature is the artificial globe, which, however, looks like a perfect sphere, for the polar compression is too small to be visible to the eye. On a globe of twelve inches the difference between the polar and equatorial diameters would amount only to a twenty-fifth of an inch. The outlines of the continents and oceans, the course of rivers, and other geographical features of the surface can be drawn correctly on the globe, while on flat maps there can be only an approximation to their true form.

On the globe are seen several sets of circles not belonging to the natural features of the surface, the object of which will be easily understood.

Parallels and Meridians.—In order to find out the precise location of a place or of any point on the face of the earth, two sets of circles are traced—one in the same direction as the equator, the other at right angles, passing through both poles. The first are called *parallels*, because they are parallel to the equator and to one another. The last are called *meridians* (from the Latin *meridies*, "noon"), because all places situated on such a circle have mid-day at the same time.

All the parallels except the equator are small circles—that is, smaller than the greatest circumference. All the meridians are great circles which intersect each other at the poles, and the planes of which pass through the axis of the earth.

All these circles, great or small, are divided into 360 equal parts, or degrees, each degree into sixty minutes, and each minute into sixty seconds; further subdivisions are given in decimal parts of a second. The mode of expressing these divisions in writing is seen in the following figures: 20° 32′ 5″.9$_{///}$, which mean twenty degrees, thirty-two minutes, five seconds, and nine-tenths of a second. (See DEGREES OF LATITUDE and LONGITUDE.)

Climatic Zones.—There are four parallels, usually made prominent in globes and maps, which are peculiar limits in the distribution of light on the surface of the earth. Two are traced at the distance of about 23½° on each side of the equator, and are called on the north the *Tropic of Cancer*, and on the south the *Tropic of Capricorn*. The other two, 23½° from either pole, are the *North Polar* and the *South Polar Circles*, also called the *Arctic* and *Antarctic Circles*. The two tropics mark the extreme limits of the central region where the sun, in its yearly course, can be seen vertical, the sun being vertical on these parallels on the longest days of the year—viz., the 21st of June in the northern, and the 21st of December in the southern hemisphere. The polar circles are the parallels on which the longest day is twenty-four hours, and mark the limits of the circular area around the poles within which the summer sun does not set every day. The globe is thus divided into six bands, or *zones*, in three groups, which, from the general character of their temperature, are termed the warm or *torrid*, the *temperate*, and the *frigid* zones. The portion of the earth's surface occupied by each of the zones is very unequal. Their comparative area, in English square miles, is as follows:

North tropical zone	39,109,628	Warm regions	78,219,256
South tropical "	39,109,628		
North temperate zone	51,110,763	Temperate regions	102,221,526
South temperate "	51,110,763		
North polar "	8,229,748	Cold regions	16,459,496
South polar "	8,229,748		
The whole globe	196,900,278 English square miles.		

It is thus seen that, by a wise arrangement of Providence, the temperate regions, most favorable to man's development, are the most extensive; next are the warm regions; while the frigid zones, unfit for man's progress, cover but an inconsiderable portion of the earth's surface.

Ecliptic.—A last great circle is to be noted, which intersects the equator at an angle of about 23½°, and touches the two tropics. When the axis is inclined 23½° from the perpendicular position, the plane of this circle is horizontal, representing the plane of the orbit in which the earth moves around the sun. This circle is the line through which the plane of the orbit cuts the surface of the earth, and marks the apparent course of the sun from one tropic to the other during the seasons. It is called *ecliptic* because eclipses happen only when the moon is in the same plane, or very near it.

V. *Density and Weight of the Earth.*—To find out the absolute and specific weight of the enormous mass of the earth, and by it that of all the bodies of the solar system and of the sun itself, seems so bold an undertaking for man's littleness as to savor of rashness. Still, it has been done quite satisfactorily by physicists and astronomers.

If we weigh equal volumes of pure water, stone, iron, lead, gold, and other substances, their weights are found greatly to differ. A cubic foot of stone weighs as much as two cubic feet and a half of water; one of iron, as much as seven and a half; of lead, as eleven and a half; of gold, as nineteen. That is to say, that, under the same volume, the last substances contain as many times more matter than water, and their *density*, or *specific weight*, is greater in the same proportion. By three different methods, the results of which very nearly agree, the average density of the earth has been found to be five and two-thirds times as great as that of water. In other words, it would require five and two-thirds globes of water of equal bulk to balance the globe of the earth. The volume of the earth being known, as well as its density, its absolute weight may be computed, which is about 5852 trillions of tons—a number which we can write down, but of the magnitude of which we can scarcely form any conception. (See DENSITY OF THE EARTH.)

Considering that the materials composing the surface—water and rocks—have a density so much smaller than the average, we must surmise that in the interior of the globe either the metallic substances greatly prevail, or that matter is in a state of very great compression.

VI. *The Earth's Internal Temperature.*—We are so much accustomed, at the surface which we inhabit, to look to the sun—that is, to an outside source—for all the heat we enjoy, that we almost forget to ask whether the earth has a temperature of its own, independent of that which it receives from that great common reservoir. But when we remember that the warm springs around which so many gather for health or pleasure rise from beneath the surface; when we observe the greater heat of the waters of the Artesian wells, the even and warm temperatures of the deep mines, and especially the torrents of hot steam, of molten rocks, which ascend from unknown depths to the mouths of volcanoes and flow along their slopes,—we must recognize that the interior mass of the globe has a higher temperature than that of its surface, the source of which is in itself. The earth, like the sun, is a warm body in the midst of the cold space of the heavens.

But if so, can we form an idea of the amount of that proper heat? To do this, we must try to establish the law of its increase from the surface downward.

Warm or Thermal Springs.—The temperature of the innumerable springs which bring back to the surface the rain-waters absorbed by the earth-crust, feed the brooks and rivers, and minister to the wants of life, vegetable and animal, is generally about equal to the mean annual temperature of the air and the ground at the places where they issue. It is nearly the same in all seasons, so that spring-water appears cold in summer and warm in winter. But while spring-water is scarcely ever cooler than the mean temperature of the surface-ground, it is often found to possess a much higher temperature, ranging even to that of boiling water. These springs, warmer than the average, are termed *thermal* springs, even though their temperature be but a little superior to that of ordinary springs.

It is believed that this higher temperature is imparted to the spring-water by the deep-seated layers of rock among which it circulates. The deeper the rain-water penetrates into the earth's strata the warmer it becomes. This view is sustained by the fact that the thermal springs most abound in the mountains and in all the regions where the earth's strata are most disturbed, broken, and creviced, as in the volcanic districts. (See THERMAL SPRINGS.)

The famous Geysers (or spouting springs) of Iceland, which, volcano-like, throw out at intervals, with tremendous force, from a vertical chimney, a column of boiling water sometimes ten feet in diameter, and reaching often over 100 feet in height, give us a magnificent as well as instructive exhibition of the power of steam generated and gradually accumulated in a heated volcanic soil. Similar spouting springs, on a still grander scale, are found at the head-waters of the Yellowstone, Madison, and Snake rivers in the Rocky Mountains. (See YELLOWSTONE VALLEY.) The temperature of the water in the Geysers is fully 212° F., and even higher a few feet down in the shaft. Thermal springs of all grades of temperature are abundant in all parts of the globe.

The phenomenon of the warm springs is thus too general to be attributed to local or accidental causes. It proves that at no great depth below the surface a temperature exists which is not inferior to that of boiling water; but as

we do not know from what depth these warm waters come, they do not afford the means of ascertaining the law of its distribution. This we have to learn from observations made at known depths in Artesian wells and in mines.

Careful observations, made by sending down self-registering thermometers to different depths in Artesian wells, give us a clue as to the temperature of the strata in which the water is contained, and the law of its distribution. In order, however, to obtain the true rate of increase, we must start from the mean annual temperature of the ground, which is not always found at the surface. The surface layers are affected by the heat of the seasons, and are warmer in summer and colder in winter. But these variations gradually diminish downward to a depth at which they become insensible, and where the degree of heat is constant, and equal to the average annual temperature of the air above. It is evident that the greater the extremes of heat and cold, the deeper will they be felt below the surface. In our latitude the layer of invariable temperature reaches the depth of from sixty to eighty feet; while in the equatorial regions, where the temperature is nearly the same the whole year, it is found at a few feet, and grows gradually deeper towards the colder and more variable latitudes. From this invariable layer the increase downward has to be reckoned.

Among the most remarkable of the Artesian wells in which such observations have been made are those named in the following table, which gives the temperature observed in these wells at these various depths:

	Depth in feet.	Temperature, Fahr.	Number of feet for increase of 1° Fahr.
Grenelle	1798	82.4	58
Neu Salzwerk	2288	92.5	55
Mouillelonge	2677	101.0	51
St. Louis, Mo	2199	79.2	88
Louisville, Ky.	2086	82.5	67
Columbus, Ohio	2775	88.0	73

This shows that the temperature invariably increases from the surface downward, but also that temperature at the same depth is different in different wells, and therefore the rate of increase greater in some places than in others.

Temperature in Mines.—Observations of temperature made in deep mines, first in France in the middle of the last century, and since in all parts of Europe, give similar results. The increase of heat downward is constant, but the rate of increase often differs widely, even in mines situated at no great distance from each other, according to the nature of rocks and their power to transmit heat. In the Prussian mines, where a long series of investigations have been made with the greatest care, the most rapid rate is 1° Fahrenheit for every 27 feet; the slowest, 1° for every 197 feet—the average 1° for 92 feet. In the mines of Saxony the average is 1° for 72 feet. Six of the largest mines in England give 1° for 44 feet; Dalcoath mine, in Cornwall, 1° for 75 feet. In America, the Virginia coal-mines show an increase of 1° for 60 feet. Even the frozen soil of the middle Siberian plains, which has a thickness of nearly 600 feet, and near the surface a temperature of only 10° Fahrenheit, shows a steady increase down to the depth at which the temperature reaches the melting-point.

The average of all known observations, made in various parts of the globe, both in Artesian wells and mines, gives an increase of heat towards the interior of about one degree of Fahrenheit for every fifty-five feet—a very rapid rate indeed, which leads to an important conclusion.

Conclusion.—If this universally increasing temperature in the interior of our earth continues in a regular progression downward, the temperature of boiling water will be reached at 9000 feet, or less than two miles from the surface—a distance only equivalent to a moderate-sized mountain. At thirty miles the heat would be sufficient to melt all the rocks and metals contained in the earth's crust. But as we have some reason to believe that the progression becomes gradually slower, we may admit as probable that the solid, unmelted crust has a greater thickness, reaching, perhaps, if not exceeding, 100 miles.

Startling as this result may be, it is the hypothesis which best accounts for the facts just mentioned, and for the phenomena of geology.

Volcanoes.—Artesian wells and thermal springs prove an internal temperature reaching the boiling-point of water; but volcanoes, and the torrents of melted, fiery lava, which escape from their open mouths, demonstrate the existence in the bowels of our planet of extreme temperatures, which tell us that the above conclusion is not a mere fancy, for the volcanic phenomena are too general, and too much connected with the great fractures of the earth's surface, to be accounted for, as has been tried, by mere local chemical causes. (See VOLCANOES.)

Arrangement of Volcanoes on the Earth's Surface.—While the reader is referred to the article VOLCANOES for a particular description of them, it seems proper to offer here some remarks on their general distribution, as forming one of the most remarkable features of the earth's surface. Though volcanoes are but local and apparently independent accumulations of ejected materials, they are mostly arranged in long, straight lines, more or less interrupted. Humboldt was the first to show that the six volcanoes of Mexico, among which the noble Orizaba and Popocatepetl are kings, are on a straight line which stretches across the continent, and, when prolonged beyond in the Pacific, strikes the volcanic islands of Revillagigedo. He draws from that fact the plausible inference that they have all issued from one long fissure extending across the body of the table-land. The volcanoes of South America are all on the long line of the Andes; those of North America on the line of the Sierra Nevada and Cascade ranges. On a similar line are also the numerous volcanoes of Sumatra, those of Java, and many others along the coast of the Asiatic continent.

Other volcanoes seem more isolated, or form groups composed of a central volcano surrounded by secondary ones. Vesuvius and Etna in Europe; the Canary Islands, the Azores, and Iceland in the Atlantic; the Sandwich Islands and the numerous groups of Polynesia in the Pacific, and many more in the Indian Ocean, are usually considered as examples of this class.

Linear and Central Volcanoes.—The celebrated geologist L. von Buch first called attention to this difference, and accordingly divided volcanoes into linear and central. The first class he conceived as raised on a single fissure; the second, on a number of crevices radiating from a centre, as if the result of a violent vertical upheaval. This classification, however, has hardly the importance which has been attached to it, for the groups of the so-called central volcanoes are mostly arranged on a line or zone; and even in many groups, as in Iceland and the Sandwich Islands, the disposition of the single volcanoes in parallel lines is unmistakable.

Distribution of Volcanoes.—Though volcanoes are found in every continent and ocean, and in all latitudes, they are not equally distributed on the surface of the globe. They follow certain lines and cluster in distinct groups. The most important feature of their distribution is, that nearly all are situated along the mountain-chains and rows of islands which border the shores of the continents, while the interior of these great land-masses is nearly free from them. Leaving out a few extinct volcanoes, the only well authenticated exception to that rule is the existence of a few volcanic centres around the Thian-Shan Mountains, in the very heart of the continent of Asia, midway between the Arctic and Indian oceans, nearly two thousand miles from the sea in every direction—the volcano Bo-Shan, with lava streams; that of Turfan; the Solfatara of Ourumtzi, which sometimes emits ashes.

The number of volcanoes, extinct and active, is variously estimated. Humboldt, in "Cosmos," counted 407. More recently, Dr. Fuchs enumerates 672, of which 270 are still in a state of undoubted activity. Of these 270, 175 are on islands, and 95 on the continents, but again mostly on the sea-shore. This uniform proximity of volcanoes to the sea has caused a prevalent belief that sea-water is a necessary condition of their existence. It will be seen, however, that this may perhaps be a hasty conclusion.

Two Great Volcanic Zones.—There are two great terrestrial zones in which are found, arranged in long lines or isolated groups, nearly all the volcanoes of the globe.

The first zone is the vast circle of mountain-chains, peninsulas, and rows of islands which surround the Pacific Ocean and girdle it with a belt of burning mountains. Beginning at the extreme point of South America, in Terra del Fuego, with the somewhat doubtful volcano of Sarmiento, it extends along the Andes, in which are found three of the most remarkable series of volcanoes, separated by intervals of hundreds of miles, those of Chili, Bolivia, and Ecuador counting together sixty-seven volcanoes, twenty-seven of which are still active. Then follows the rich group of Central America, with fifty-seven volcanoes, twenty-two being active. The series of Mexico has six active volcanoes, besides full as many extinct ones. In North America, the series of the Sierra Nevada and Cascade Mountains, the group of Alaska, and the long series of the Aleutian Islands, have together over eighty volcanoes, half of which are active, mostly in the Aleutian Islands. Passing to the Asiatic continent, we find the series of Kamtchatka peninsula, with not less than thirty-eight volcanoes, twelve of which are active; the line of the Koorile Islands with twenty volcanoes, half of which are now extinct; the group of the Japan Islands, which numbers forty-six volcanoes, with only seven active. Between Japan and the Philippine Isles twenty-three volcanoes may be counted, of which seven are active; in the Philippine and Molucca Isles, thirty-one, most of which are in a state of activity. At last the Australian

line: New Guinea, with three active; New Britain, with two active and one extinct; New Hebrides, with two; New Zealand, with seven extinct and two active volcanic cones, terminate that brilliant girdle of fiery beacons around the Great Ocean. Including those which are extinct, the number of volcanoes in that zone reaches 392.

The second volcanic zone, though less continuous, is hardly less remarkable. It is a belt of broken lands, islands, peninsulas, and inland seas, which runs in a slanting direction around the globe, separating the northern from the southern continents. Starting from Central America, with its isthmus full of volcanoes, its landlocked seas, its peninsulas and islands, and the volcanic series of the Lesser Antilles, it passes through the volcanic groups of the Azores and Canary Islands to the Mediterranean and its peninsulas, including the active volcanoes of Europe—Vesuvius, Etna, the Lipari Islands, and Santorin. Entering Asia Minor, with its numerous extinct volcanoes, it passes through Arabia, the Red Sea, the Persian Gulf, and the two peninsulas of India, all rich in traces of the activity of the internal fires. Thence crossing the East Indian Archipelago and its hundreds of burning mountains, it reaches those of the Friendly Isles, and running through all the Polynesian volcanic groups, meets again the great isthmus of Central America. Including those of the latter region, we find in this zone 168 volcanoes.

The two zones just described contain therefore, together, no less than 560, or five-sixths of all the existing volcanoes.

Where the two zones intersect each other, in Central America and in the East Indian Archipelago, the volcanic forces also display their greatest intensity. Central America, with Mexico and the Antilles, has eighty-five volcanoes. In the East Indian Archipelago, the long line of the Sunda Islands alone possesses eighty, and those of the Philippine Islands with the Moluccas, and of New Guinea with New Britain, swell the number to 117. Thus in these two regions are crowded over 200, or nearly one-third of all which are known.

The remaining volcanoes not included in these two great belts are either scattered in the midst of the oceans, as the Sandwich Islands group in the Pacific; Bourbon and Mauritius in the Indian; Cape Verde Islands, Ascension, St. Helena, Tristan da Cunha in the Atlantic Ocean; or in the broken polar lands, like Iceland and Jan Mayen Island in the Arctic; Erebus and Terror in the Antarctic Ocean.

Height of Volcanoes.—Volcanoes are of all heights, from the submarine cones which do not reach the surface of the ocean to that of Sahama in Bolivia, the highest of the known volcanoes, which rises to 23,000 feet above it. Nay, if we accept as probable the idea that such volcanoes as Mauna Loa, nearly 14,000 feet high, have their base at the bottom of the deep ocean which surrounds them, the total elevation of such a structure may even reach that of the highest mountains of the globe.

The peculiar distribution of volcanoes on the surface of the globe, described above, may help us to understand the nature and the causes of volcanic action, which are not to be confounded with the more general force which has upheaved the continents and sunk the basins of the oceans. Three facts are here prominent and significant: 1st. Nearly all volcanoes are either along the highest edge of the continents, or in the great central zone of fracture. 2d. Most of them affect a linear arrangement. 3d. The agent at work in these mighty engines is mainly vapor of water, or steam-power.

If we admit, as we have every reason to do, that the interior of the earth is a fiery mass, this must be considered the primary source of volcanic action. Its effect will be most intense in the deep fissures which establish a ready communication with the surface. Nowhere are the earth's strata more deeply broken than on the very edge of the continents; and geology demonstrates that it is on the mighty chasms caused by the upheaval of these vast bodies of land that mountain-chains like the Andes, the Sierra Nevada, and the other mountains encircling the basin of the Pacific Ocean have been raised. There also the volcanic vents abound in long lines, following either the top or the foot of the mountain-chains. The same may be said of the central zone of fracture.

It is not, however, to the heat of this fiery interior mass, but to its slow cooling, and the contraction which is the consequence, that we must ascribe the wrinkling and breaking up of the solid exterior crust, and the formation of those grand features of the surface of our planet which add so much to its beauty and usefulness.

In this view, volcanic action is not the cause, but a consequence, of the upheaval of mountain-chains and continents, and the frequent proximity of volcanoes to the sea does not imply the necessity of sea-water for their formation. Rain-water and Artesian waters also, which, instead of reappearing on the surface in the form of springs, penetrate a few miles deep in these subterranean cavities, may become so overheated, under high pressure, as to explain the usual volcanic phenomena. If so, the lavas flowing from a volcanic chimney may not necessarily be connected with the great reservoir of the melted interior. There can be no doubt that a close connection exists between the phenomena of volcanoes and those of earthquakes. (See EARTHQUAKES.)

VII. *Terrestrial Magnetism.*—The earth exerts a directing force upon the magnetic needle, acting like a magnet. (See MAGNETISM.) In whatever portion of the globe—on the ocean or on land, on mountains or deep valleys—a magnetic needle, freely suspended so as to move easily in every direction, no matter how it is placed, will always turn in a definite direction, one pole pointing towards the north, and the other towards the south pole of the earth. The pole of the needle directed by the north pole of the earth, being of contrary magnetism, is the south pole of the needle, but for convenience is marked *north* on the compass, because it points towards the geographical north.

The magnetic poles, however, do not coincide with the geographical poles, but are found to be more than 20° from them; nor do the magnetic meridians passing through the poles of the needle, and the magnetic poles of the earth, coincide with the geographical meridians. The needle, therefore, seldom points to the true north, but usually to the east or west of it. The difference between the magnetic and the true north is called *magnetic variation* or *declination.* This declination may be either east or west of the true north; but there will be also a line where the needle points to the true north, and which is the line of no declination, from which the variation has to be counted. By connecting together all points which have equal declination we obtain a system of lines which show at a glance, as in Map No. II., the direction of the needle in all parts of the world. On the map the eastern declination is distinguished by dotted lines and a light-brown color, and the western by full lines and blue color, the line of no declination between being heavier.

Secular Variation.—It is found that the declination does not remain the same at any one place, but the magnetic poles with their system of meridians are gradually travelling from west to east and from east to west; and as these oscillations take centuries to complete their course, this is called *secular variation.* A map of the lines of declination must therefore refer to a particular date. The one here given shows the declinations as observed in the year 1858. It will be seen that the line of no declination in the Western World passes through Rio de Janeiro, the mouth of the Amazon, somewhat west of Washington, through Lake Huron, and the magnetic pole as found by Sir James Ross in Boothia Felix, under the 70th degree of N. lat. In the Eastern World it passes through the western part of Australia, west of the peninsula of India, and through the Caspian and White seas. A region of abnormal declinations in Central Siberia seems to indicate the existence of a secondary magnetic pole in that part of the world.

The map shows that when crossing the Atlantic from Liverpool to New York the voyager will find the variation of the compass, which in Liverpool is about 25° west, increasing to 30° in mid-ocean, and then rapidly diminishing from Newfoundland to New York, where it is only about 7°. Beyond the line of no variation, passing near Washington and the great lakes, the needle points east of the true north, and continues so across all the continent and the Pacific Ocean, where it again begins to point west before reaching the islands and the coast of Asia. It is evident that both the traveller on land and the mariner have to correct the indications of the needle for variation to get the true points of the compass. The amount of declination can easily be found by comparing the direction of the needle with the north star.

The following table of the declinations observed in Paris since 1580 will show the course of the secular variation in the northern hemisphere:

Declinations observed in Paris.

Year.	Declination.	Year.	Declination.
1580	11° 30′ east.	1816	22° 25′ west.
1618	8 "	1817	22 19 "
1663	0 "	1823	22 23 "
1678	1 30 west.	1827	22 20 "
1700	8 10 "	1828	22 5 "
1780	19 55 "	1829	22 12 "
1805	22 5 "	1835	22 4 "
1814	22 34 "	1854	22 10 "

This table shows that—

1st. The extent of the variation was over 31°.

2d. In 1663 the declination was zero, the needle pointing due north.

3d. From 1580 until 1814 the needle moved towards the west.

No II

JOHNSON'S WORLD, SHOWING THE LINES OF EQUAL MAGNETIC DECLINATION.

EPOCH 1858

By Prof. A. Guyot.

The figure near each line indicates, in degrees, the variation of the Magnetic needle from the true North, at the places situated on that line.

Longitude from Greenwich: 180 West, 120, 60, 0, 60 East

ARCTIC OCEAN

ARCTIC O.

Spitzbergen

Magn. Pole

Siberia

Arctic Circle

Lena R.

Yenisei R.

Yakutsk

Okhotsk

L. Baikal

Amoor R.

Japan

Peking

China

Nanking

Tropic of Cancer

Philippine Is.

EQUATOR

Borneo

Java

Sunda Islands

N. Guinea

Solomon Is.

Caroline Is.

Marshall Is.

Sandwich Is.

Feejee Is.

Society Is.

Raupertu Is.

PACIFIC OCEAN

NORTH AMERICA

Aleutian Is.

Prince of Wales

Mackenzie R.

Fuca Str.

Missouri R.

Mississippi R.

S. Francisco

Washington

New Orleans

Mexico

Boston

New York

New Foundland

Iceland

C. Farewell

ATLANTIC OCEAN

Azores

Lisbon

Canary Is.

C. Verd Is.

C. Verd

Cayenne

Quito

Amazon R.

SOUTH AMERICA

Lima

Bahia

Rio Janeiro

Pitcairn I.

Santiago

Buenos Ayres

Monteviddo

Falkland Isl.

C. Horn

St. Helena

Cape Town

Madagascar

AFRICA

Niger R.

Nile R.

Algiers

Mediterranean Sea

Marseilles

Paris

Berlin

Denmark

St. Petersburg

Volga R.

Odessa

Black Sea

Smyrna

Aegean Sea

Teheran

Suez

Mecca

Muscat

India

Calcutta

INDIAN OCEAN

EUROPE

ASIA

North C.

Obi R.

Yenisei R.

Yakutsk

Lena R.

L. Baikal

Peking

China

Nanking

Borneo

Java

Sunda Islands

Perth

AUSTRALIA

Tropic of Capricorn

Perth

Adelaide

Sydney

Melbourne

Tasmania

New Zealand

ANTARCTIC OCEAN

Longitude from Washington: 163 West, 123, 83, 43, 3, 37, 77, 117, 157, 163 East

Entered according to Act of Congress in the Year 1870 by A. J. Johnson in the Clerks Office of the District Court of the United States for the Southern District of New York.

4th. Since 1814 it has moved backward towards the east.

5th. The rate of this movement is not uniform, but is greater near the minimum, and least near the maximum point of declination.

There are minor variations in the declination which follow the periods of the day and of the year, and seem to be in close connection with the temperature of the atmosphere and the position of the sun.

The mariner's compass is but a needle attached to a circular sheet of talc moving freely on a pivot, on which is marked the direction of the winds according to thirty-two points of the compass. The whole is placed in a box with double suspension, so as to keep it horizontal even amid the motion of the waves.

Magnetic Inclination.—A magnetic needle so suspended as to move freely in a vertical direction will adjust itself in the magnetic meridian, and in each hemisphere one of its poles will *dip* towards the pole of the earth. This is called the *Magnetic Inclination*, and the needle itself is called a *dipping needle*. (See DIPPING NEEDLE.) At the magnetic pole the needle stands vertical; at the magnetic equator, horizontal; between these extremes it takes all intermediate positions. The inclination, like the declination, is subject to periodic and secular variation. In Paris, as will be seen in the table below, it was 75° in 1671, while in 1853 it was only 66° 28′.

Sir James Ross in 1832 saw the dipping needle stand within one minute of a degree of the vertical position near Baffin's Bay. When tracing the lines of equal dip on a Mercator's map, we find that they coincide in a remarkable manner with the isothermals or lines of equal mean temperature, indicating a close connection of the distribution of heat with that of magnetism, and seemingly a common cause for both.

The inclination, like the declination, is subject to periodic and secular variations. The last is shown in the following table:

Inclinations observed in Paris.

Year.	Inclination.	Year.	Inclination.
1671	75° 00′	1820	68° 20′
1780	71 48	1825	68 00
1798	69 51	1831	67 40
1814	68 36	1853	66 28

It appears from the table that since the year 1671 the inclination has steadily diminished at the rate of about three to five minutes a year.

Magnetic Intensity.—The intensity of magnetic force can be measured by causing a dipping needle to oscillate, and counting the number of its oscillations in a given time. The greater the number of oscillations in a minute of time, the more intense is the attractive force. The lines of equal magnetic force, though not identical with, are very similar to, those of equal inclination.

Modern science is inclined more and more to consider magnetism as but a form of electric activity, for every electrical current causes a magnetic current moving at right angles to it. If we admit, with the learned Ampère, that electrical currents caused by the action of the sun on the revolving earth are constantly moving from east to west around the globe, we must expect a magnetic current at right angles which will make our earth a magnet.

If the earth is a magnet, so are, no doubt, all the other planets, and the sun itself; and our globe is but a link in a great chain of heavenly magnets bound together by mutual attraction and comprising the whole solar system.

VIII. *The Surface of the Earth.*—The surface of the earth, as stated before, measures 197,000,000 of English square miles. Nearly three-quarters of it are covered by the waters of the sea, one-quarter only of the solid crust rising above them. Both dry land and water are surrounded by the atmosphere as by a common garment.

The solid land, the liquid surface, and their gaseous envelope are the three geographical elements which, under the influence of the sun, support life, vegetable and animal, and the mutual play of which it is the province of physical geography to consider. As the extent and forms of the land-masses and oceans, and their relative situation, deeply modify the nature of the climate and regulate the distribution of life, the study of their general arrangement is of primary importance.

General Arrangement of Land and Water.—The principal facts in this respect are the following:

1. The solid land is not gathered together in a single large mass, nor is it uniformly scattered over the sea in fragments of about equal size, but forms a few large bodies, called continents, and a multitude of much smaller fragments, called islands, which surround the coasts of the continents and dot the broad expanse of the oceans. This peculiar division into individual bodies favors diversity of climate and richness of development in the domain of life.

The relative amount of land and water on the surface of the globe is made clear to the eye in the following diagram, in which the large square is the surface of the globe; the inner squares, the area of the continents and islands; and the surrounding area, the water-surface. The figures indicate the areas in English square miles:

FIG. 1.—*Relative Area of Land and Water, in English Square Miles.*

2. Looking on the artificial globe from above, we see the masses of land crowded around the North Pole to about the 70th degree of latitude, and from there extending towards the South Pole in three directions, dividing into three bands of land, which taper as they advance, and terminate in three points—South America, Africa, and Australia, far away from the Antarctic Pole. Looking on the globe from the opposite side, we see the broad sea surrounding the South Pole, and sending three great arms between the bands of land, the Pacific, Atlantic, and Indian oceans. The North Pole might be called the *Continental;* the South Pole, the *Oceanic Pole.*

3. We observe, further, that each of these main bands of land is cut transversely in two by a region of inland seas and broken lands, isthmuses, peninsulas, and islands; the Gulf of Mexico and the Caribbean Sea, with the great isthmus of Central America and the Antilles, separating as well as uniting North and South America; the Mediterranean Sea, with its peninsulas and islands, lying between Europe and Africa; and the Malayan Archipelago, with its lines of islands and landlocked seas, between Asia and Australia.

These regions are parts of a broad transverse band, whose position can be traced from Behring Straits as a centre, with

a meridian arc of 80° as a radius, and which we would call the *central zone of fracture*. This disposition is shown in the accompanying map on a polar projection, in which the zone of fracture is marked by a circle passing through the middle of it.

4. As the lands are nearer the North Pole, and expand

FIG. 2.—*Radiating Arrangement of the Land Masses.*

to the north while they taper to the south, the northern hemisphere contains nearly three times as much land as the southern hemisphere, in which water correspondingly predominates, as shown in fig. 3.

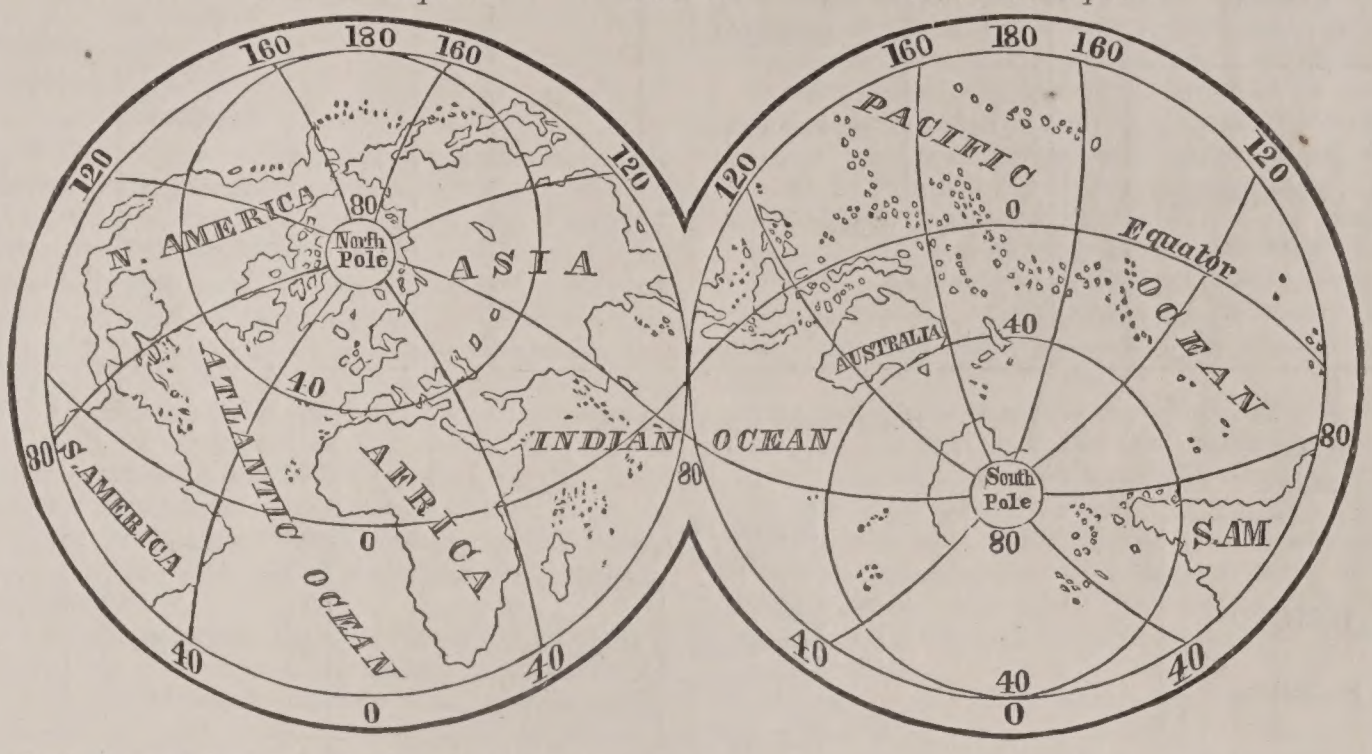
Northern Hemisphere. FIG. 3. *Southern Hemisphere.*

Western Hemisphere. FIG. 4. *Eastern Hemisphere.*

The New World. *The Old World.*

5. As the lands are crowded on the north and east sides of our planet, the north-eastern hemisphere contains more land and the south-western hemisphere more water than any other we can devise. They are therefore contrasted by the celebrated Carl Ritter as the Land and Water Hemispheres. In the land hemisphere are gathered together the largest parts of all the great continents, making over six-sevenths of all the land, and occupying only a little less than one-half of the surface. In the water hemisphere, Australia, the smallest of the continents, stands alone, with only the southern points of Asia and South America, making less than one-seventh of the land, and leaving twelve-thirteenths of the surface to the water. The centre of the land hemisphere is about London; that of the water hemisphere at some point in the ocean south of New Zealand.

Land Hemisphere. FIG. 5. *Water Hemisphere.*



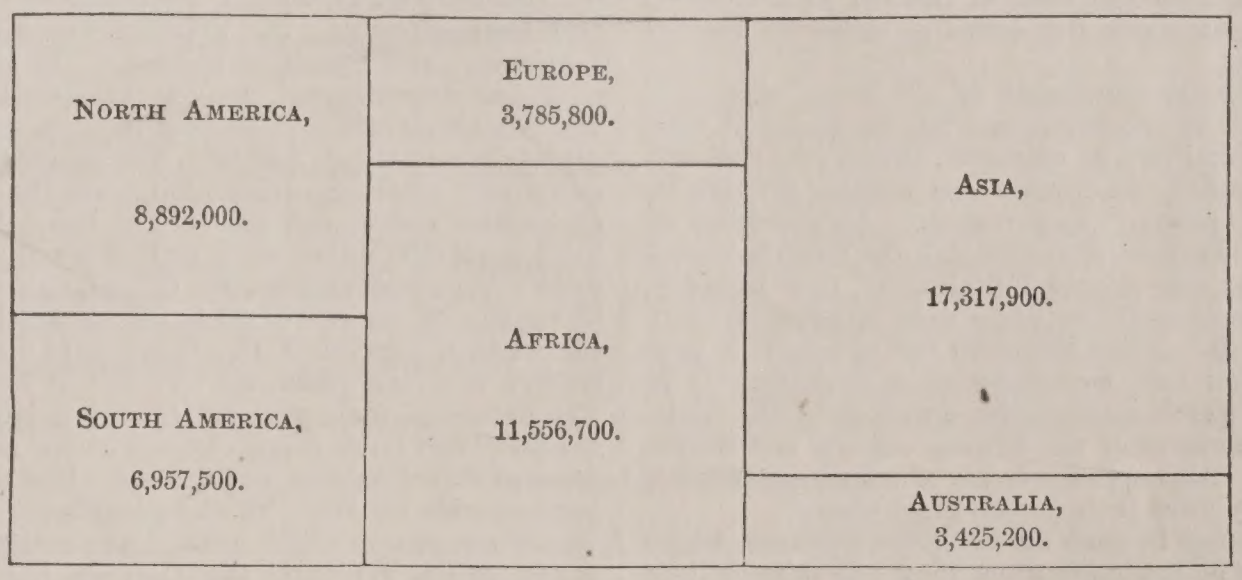
6. The central zone of fracture divides the land masses into three northern and three southern continents, which form two groups of a very different nature, the northern continents being mostly situated in the temperate and the southern in the tropical regions.

The relative extent of the various groups just mentioned are here tabulated for convenient reference, and the areas given in English square miles:

Land and Water.

	Land.	Water.	Total.
The earth	52,900,000	144,000,000	196,900,000
North hemisphere	38,780,000	59,670,000	98,450,000
Southern hemisphere	13,965,000	84,485,000	98,450,000
Eastern hemisphere	36,100,000	62,350,000	98,450,000
Western hemisphere	15,900,000	82,550,000	98,450,000
Land hemisphere	45,000,000	53,450,000	98,450,000
Water hemisphere	7,000,000	91,450,000	98,450,000

FIG. 6.—*The Areas of Continents compared in English Square Miles.*



The general distribution of land and water, just considered, and the extent and relative position of the great land masses among themselves, are of the utmost importance. The action and reaction of land and water upon each other greatly modify the distribution of heat and moisture, due to the general laws arising, as we shall see, from the spherical form of the globe. Land absorbs and radiates heat more readily than water, and thus causes extreme temperatures, which never occur on the surface of the ocean. Similar extremes of moisture and dryness are found only on the continents. As heat and moisture essentially regulate the development of organic life, the final character and value of each part of the globe, in this respect, are determined by the size, form, and grouping of the bodies of land in the midst of the oceans. We have now, therefore, to turn our attention to the specific forms of the continents and oceans, on which so much depends.

Land and its Configuration.—The portion of the solid crust of the earth rising above the surface of the ocean is divided, as we have seen, into six great bodies, the *continents*, besides innumerable smaller ones, the *islands*. In both we must notice the *horizontal forms*, or the line of contact of land and water as shown in the maps, and the *vertical forms*, the elevations and depressions, the mountains and plains, or the forms of relief. (See CONTINENT.)

The amount of indentation in each continent is shown in the following diagram (fig. 7), in which the inner square represents the line enclosing the unindented area, without the islands; the outer line, the actual length of the coast with its windings. The difference between the two gives the true measure of the indentation. It is easy to perceive at a glance how much the northern continents differ from the southern in this respect:

It is a fact full of meaning that the indented, well articulated continents are also, and have always been, the abode of the most civilized nations. The unindented ones, shut up in themselves, and less accessible from without, have played no important part in the drama of history. We must remember, however, that the variety of contours is but the expression of a more complicated inner structure, which, together with the climatic situation of the northern continents in the temperate regions of our globe, has a large share in this remarkable result.

The following table gives the length of the coast lines of the six continents compared with their area, without the islands, in English miles:

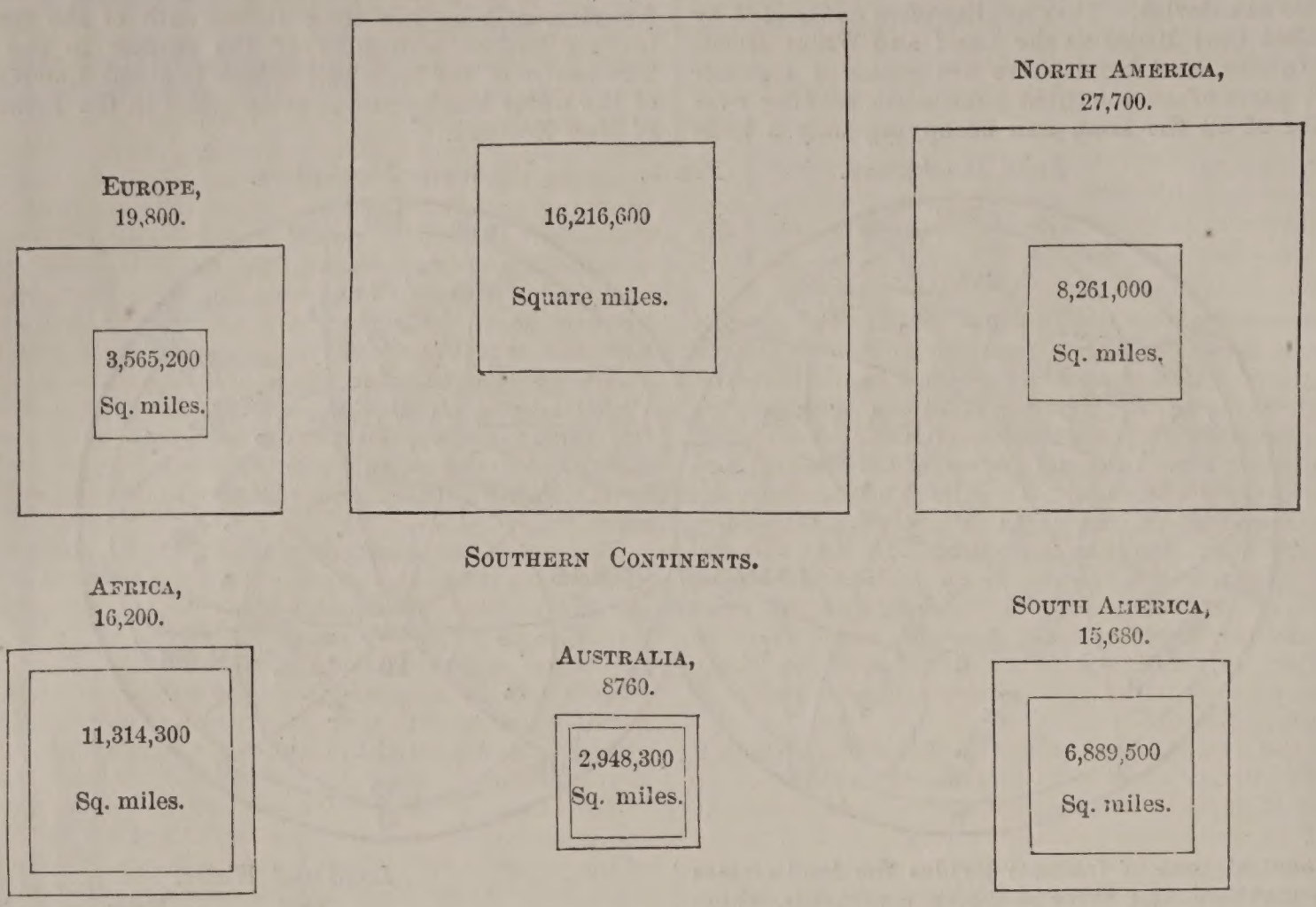
Area and Length of the Real Coast Line of each Continent.

	Area.	Length of coast line.
Europe	3,565,200 sq. miles	19,800 miles.
Asia	16,216,600 "	35,500 "
North America	8,261,000 "	27,700 "
Africa	11,314,300 "	16,200 "
Australia	2,948,300 "	8,760 "
South America	6,889,500 "	15,700 "

The table shows that Europe has 4000 miles of coast more than Africa, which is three times larger; and that North America, which is only little larger than South America, has 12,000 miles more of coast.

We have thus far taken a view of the outward forms of the masses of land as bounded by the waters of the ocean.

FIG. 7.—*Length of the Coast Line in each Continent, compared with the Line Enclosing its Area.*



To complete our view we must consider them as solid bodies, and study their vertical forms.

Vertical Forms, or Relief.—The configuration of their surface, as diversified by plains, highlands, mountains, and valleys, constitutes the *relief* of the continents, the characteristic features of which reveal their internal structure.

The elevation of a place above the level of the sea is usually reckoned from the level of the sea as a common base, and its height above the ocean is called its *absolute height* or *altitude*.

Though the loftiest mountains of the globe, compared with the diameter of the earth, are but as grains of sand on a globe of several feet in diameter, this element of altitude acts so powerfully on climate and organic life that its knowledge is of primary importance. An elevation of level of 350 feet is sufficient to diminish the mean temperature of a place by one degree Fahrenheit; that is to say, the effect is the same as if the place were situated seventy miles farther north. A few thousand feet of height change entirely the aspect and usefulness of a country. It is, again, the relief which controls the drainage of the continents, directs the course of the flowing waters, and shapes the river-basins. Although the forms of relief are infinitely varied, we may refer them to two great classes:

1st. The elevations in mass and by great surfaces, which are called plains or lowlands when they are only a little elevated above the level of the ocean, and plateaus or table-lands when their elevation is more considerable and presents a solid platform, a basis of great thickness.

2d. The linear elevations or chains of mountains, which are distributed on the borders of the plains and table-lands, or, more rarely, scattered in isolated groups. To the mountain-chains the valleys correspond, as the low plains to the plateaus.

Plains and Lowlands.—The lowlands and plains occupy nearly one-half of the surface of the continents. They are most extensive and unbroken on the Arctic slopes of the three continents of the north, and on the eastern or Atlantic side of the New World. The great Siberian plains extend from the north-eastern part of Asia to the Ural Mountains and the Caspian Sea, and continue through Russia and Northern Germany to the low land of Holland. In North America we find extensive lowlands marked by the valley of the Mackenzie River and the plains of the Mississippi Valley. In South America, the Llanos or plains of the Orinoco, the Selvas or plains of the Amazon, the Pampas or plains of the La Plata basin, form an uninterrupted series of lowlands which continue through the Patagonian plains to the extremity of the continent, along a line of 3500 miles. We may mention, again, among the large plains of the world, the interior of the Australian continent. The historical plains of China, Hindostan, and the Euphrates in Asia, celebrated and useful as they always have been, are smaller and of a more local character.

The nature of the surface in the lowlands is extremely variable. The vast alluvial plains, almost perfectly level, which are the work of the present rivers, and are formed along the great streams and in the deltas formed at their mouths, correspond best with the idea of a low plain. Such are the plains of the delta of the Mississippi, including the flat bottom, from thirty to eighty miles, comprised between the bluffs of the river; the plains of the Amazon; those of the Orinoco and La Plata; the plains of the lower Ganges and Brahmapootra; the delta of the Nile; the plain of Lombardy, and others of less note. In all these the view stretches unobstructed, as on the broad ocean, without meeting an elevation deserving the name of a hill. Other plains, like those of Northern Germany, the Caspian Sea, and a part of the Siberian plains, are the sandy bottom of an ancient ocean, and offer slight inequalities incident to local accumulation of sand drifted by the currents, or to some other accidental cause. Others, again, are undulating, like many of the vast treeless plains which cover most of the western portion of the Mississippi basin, or, like the eastern Siberian plain, are diversified by numerous hills. The nature of their surface is not less varied. In the Siberian plains large tracts called Tundra are endless frozen swamps full of mosses and lichens, while the hilly parts are covered with forests. To the south-west stretch immense grassy steppes, in which roam the nomadic Kirgheez. Salt sandy plains surround the Caspian Sea. Dense forests cover Central Russia, open treeless but fertile prairies its more southern plains. In North America, the wet, alluvial plain of the Mississippi delta, the open and fertile prairies of the upper Mississippi, the barren and, in part, salt plains of the far West, are very distinct types, with a value to man not less different. In South America, the Llanos of the Orinoco, a burnt waste one half the year, a rich pasturage the other half; the plains of the Amazon, covered with a luxuriant forest of over a million of square miles; and the treeless Pampas, with their tall grass and forests of thistles, are all forms which exhibit the endless variety of nature.

The low plains may be counted among the most valuable portions of our globe. There the waters, rushing down the slopes of the continents, meet, and bringing with them the spoils of the uplands, accumulate the rich alluvial soil on which at all times men have gathered by millions. There civilization began and developed, and an inexhaustible fertility supplied all the wants of the full-grown nations. China, India, Babylonia, and Egypt had their heart and centre in the alluvial plains, fertilized by the mighty rivers which traverse them.

The altitude of these useful basins is remarkably small. The central part of each of those just mentioned does not average 500 feet above the sea-level. The Mississippi at St. Louis, 1000 miles from the sea, is hardly 400 feet above it. The Amazon, at a similar distance inland, does not reach 250 feet of altitude. The Siberian plains, those of the Ganges, Euphrates, and the valley of the Nile, have all

altitudes of the same order. It would require, therefore, but a slight depression of the continents to cover all these rich countries with the waters of the ocean.

The following table shows the approximate area covered by the lowlands in each continent, in English square miles, with the proportion to the whole surface:

	Lowlands.	Proportion.
Asia	7,116,000 square miles	$\frac{3}{7}$
Europe	2,541,000 "	$\frac{2}{3}$
Africa	3,614,000 "	$\frac{3}{10}$
North America	3,840,000 "	$\frac{2}{5}$
South America	5,417,000 "	$\frac{4}{5}$
Australia	2,551,000 "	$\frac{6}{7}$

Plateaus and Highlands.—The name of plateau is usually applied to elevations in mass, or surface elevations, the absolute height of which exceeds a thousand feet. Plateaus, or table-lands, are swelled portions of the continents, often raised to a great height between two chains of mountains, which form their margin, as the plateau of the Great American Basin between the chains of the Rocky Mountains and the Sierra Nevada, and that of Thibet between the snowy chains of the Himalaya and Kuen-Lun. Or they descend by a series of terraces to the sea, as the plateau of Mexico, or, again, slope gradually into the lowlands, as the great plains of the far West in North America, which from an altitude of five or six thousand feet at the foot of the Rocky Mountains, pass by imperceptible steps into the centre of the Mississippi Basin.

Though the name plateau rather implies a flat surface, it may also be hilly, or even mountainous, but in all cases the lowest part of it still remains thousands of feet above the ocean. If no well defined limit can be given at which a rising surface begins to deserve the name of plateau, striking differences in the climate and the vegetable and animal life distinguish the table-lands as one of the main types of geographical forms.

The plateaus most remarkable for their elevation are the elongated, valley-like highlands situated between the two chains of the Andes in South America, which have an altitude of from 10,000 to 13,000 feet, and those of Thibet between the Himalaya and the Kuen-Lun, which average from 10,000 to 16,000 feet. These may be called plateaus of the first order. The plateaus of a second order, though less elevated, averaging from 4000 to 7000 feet, are the most extensive, such as those of East Toorkestan and Mongolia in Central Asia; of Iran in Western Asia; the vast plateau which extends over all the southern half of Africa and Abyssinia; the long and broad swell which fills the western half of North America with a continuous mass of highlands from Alaska to Mexico. Plateaus of a third order, with from 2000 to 3000 feet altitude, occupy the large peninsulas of Deccan in India, of Arabia, Asia Minor, and Spain. The central part of France, Switzerland, and Bavaria, at the north foot of the Alps, and Transylvania, are plateaus of the same order.

The plateaus, together with accompanying mountain-chains, form the backbone, or kernel, of almost every continent, determining its general shape, and to a great extent its drainage and water-courses. But they are in nearly all the least fertile and useful portions of the surface.

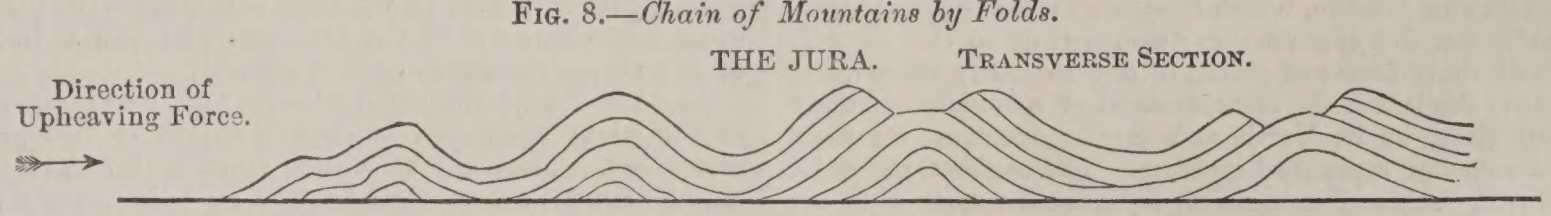
Mountains and Valleys.—Unlike the broad, elevated surfaces just described, the mountains rise in long and comparatively narrow lines or ridges, the tops of which are often deeply indented, offering to the eye a series of peaks apparently detached from each other. Each of these peaks or distinct elevations being often called a mountain, and receiving a special name, the appearance suggests for such a structure the usual name of a *chain* of mountains.

A mountain-chain, therefore, is not to be considered as a necklace of isolated mountains, touching each other only by their base, but rather as a solid prism, with a broad base and two opposite slopes, of which the upper edge is either nearly even, as in the middle Appalachian chains in Pennsylvania, or indented, as in the Rocky Mountains and the Alps. These indentations, however, even in extreme cases, as in the Alps, do not reach lower than half the height, leaving the larger part an unbroken, continuous mass.

The top of the chain from which the waters flow on opposite sides is the *crest*, and the notches between the peaks are the *passes*, from which usually descend transverse valleys, like deep furrows along the slopes. The mountain-ridges are seldom isolated, but usually united into *systems of mountains*, composed of a large number of more or less parallel chains with their intervening valleys. The Alleghanies, the Alps, and the Andes are such systems, and not simple chains.

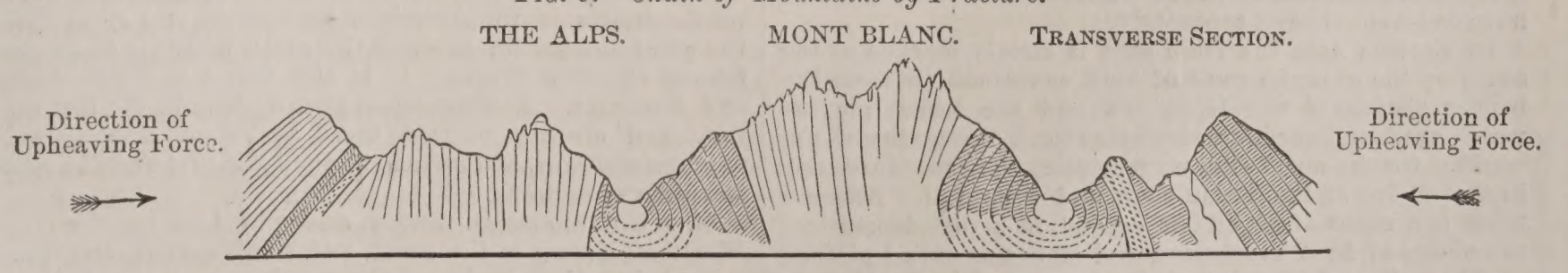
Formation of Mountains.—Geology demonstrates that the mountain-chains are mostly formed by the uplifting of the layers of rock which compose the earth's crust. (See GEOLOGY.) These rocks having been deposited at the bottom of the ocean, as is proved by their texture and the abundant marine shells which they contain, were originally in a horizontal position, and are still so in the plains at the foot of the mountains. In the mountain-chains, however, the same are found in all degrees of inclination, up to a vertical position, the marine shells and pebbles in them standing on their edges, thus testifying that they have been disturbed since their materials were deposited. Indeed, most of the mountain-chains seem to have been produced by tremendous lateral compressions in the crust of the earth, which caused either a series of long folds, as in the Appalachians, or, when the action was more violent, deep fissures, whose upturned edges rose into high ridges, as in the Rocky and Sierra Nevada Mountains, the broken strata forming ragged peaks. There are, accordingly, two main types of mountain-chains, very distinct from each other. One we call *mountains by folds*, which are generally of moderate elevation; and the other, *mountains by fracture*, to which belong the highest of the globe. The Appalachian system in North America and the Jura Mountains in Switzerland are examples of the first; the Rocky Mountains, the Alps, and the Himalaya, of the second.

FIG. 8.—*Chain of Mountains by Folds.*



In the Appalachian and the Jura the mountains are curved into arches, either entire or broken on the top, forming a system of long, straight parallel ridges of about equal height, with intervening trough-like valleys, justifying a comparison to the folds of a garment. The crest of the ridges, seen at the horizon, appears like a uniform unindented line without sharp peaks or deep passes. The main valleys are longitudinal, the transverse valleys being few and unimportant. Here and there, however, deep gaps cut the chains transversely to their base, allowing the rivers to escape from one valley to the other. In systems by fracture, like the Rocky Mountains and the Alps, there is one main central with lower subordinate chains. The parallel chains and the longitudinal valleys which separate them have not the same regularity. The crests are deeply indented, and cut down, to one-third or one-half of their height, into isolated mountain-peaks and passes, presenting to the eye the appearance of a saw, or in Spanish *sierra*, in Portuguese *serra*, which names are applied to mountain-chains of this description. The longitudinal valleys, though sometimes of considerable size, are few, the transverse valleys numerous, with bald picturesque outlines and a series of fertile basins united by deep gorges and defiles. These systems of mountains are not to be conceived as one single chain; they are large mountainous zones, several hundred miles broad, whose general slopes, therefore, average but a few degrees. It is the peculiar combination of mountain-systems with plateaus and plains which constitutes the distinctive forms of relief of each continent, and also determines its general contours.

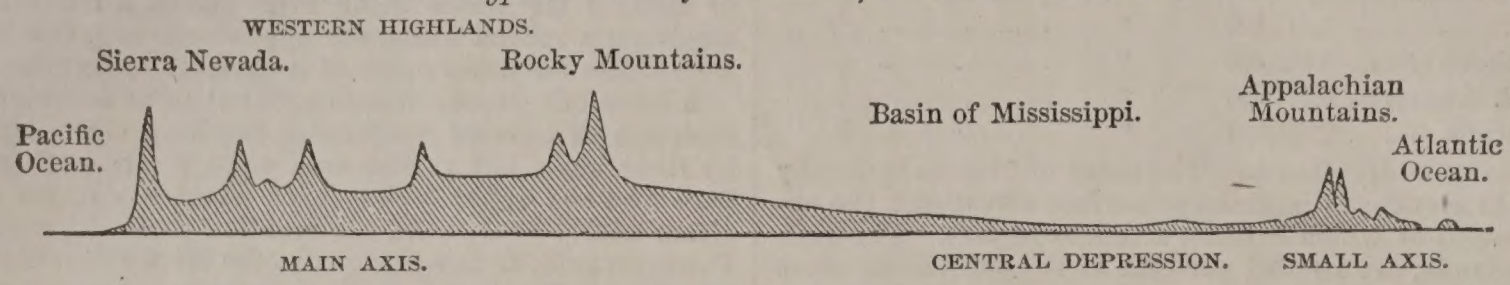
FIG. 9.—*Chain of Mountains by Fracture.*



General Laws of Relief.—The examination of the general vertical forms of the masses of dry land leads to a recognition of certain great laws of relief which apply to every continent, or to certain groups of continents, or to the whole earth.

1st. Each continent has on one side a large system of highlands, plateaus, and mountain-chains which constitutes the principal feature of its structure, and may be called its main axis. On the other side, along the opposite shore, is found a similar system, but diminutive in all its dimensions, extending over only a part of the continent, and forming a secondary axis. Between the two a general depression or low plain fills the interior. The direction of these two fundamental lines of highlands is not parallel, but converging, which gives to all continents the triangular form mentioned in the article CONTINENT (which see).

FIG. 10.—*Typical Form of Continents, shown in North America.*



A large swell on one side, a smaller converging one on the other, and a depression between the two, is the *typical* form of a continent. An island, however large, is never more than a part of it.

This typical structure can be traced in all continents, but in none more clearly than in North America. Here the main axis is formed by the large swell of the western highlands, stretching from the north-west to the south-east, without interruption, for 4500 miles, steadily growing in height from the shores of Alaska to the south end of Mexico, and filling from one-third to one-half of the width of the continent. The plateaus contained between the border chains of the Sierra Nevada and the Rocky Mountains average full 4000 feet, and reach in Mexico double that altitude, the high peaks of the mountain-ranges reaching from 12,000 to 15,000 feet. The secondary axis is the Appalachian system, extending from Nova Scotia to Alabama, in a south-westerly direction, for 1500 miles. Its average width is hardly one-fifth, and its elevation, plateaus, and peaks not one-half, that of the western highlands; but still it determines the trend of the Atlantic coast. Between the two axes the lowlands of British America and the vast plains of the Mississippi Basin stretch for 3000 miles from the Arctic shores to the Gulf of Mexico, hardly interrupted by a slight central swell of 1000 or 1600 feet in the region of the sources of the Mississippi.

In the sister continent of South America the same normal structure is evident. On the extreme western margin the high and massive swell which bears the peaks of the Andes, the highest of the New World, rises from the Pacific shores as a continuous wall of 4500 miles from the Isthmus of Panamá to Cape Horn. Opposite this main axis, on the Atlantic side, the Brazilian plateau, with its border chains 2000 miles long and from 3500 to 9000 feet high, forms the secondary axis. In the interior, 4000 miles of low plains extend without interruption along the eastern foot of the Andes, from the Llanos of Venezuela to the southern extremity of Patagonia.

In Asia and Europe, which together form one great continental mass, the typical structure, owing to the complication of their forms of relief, is not so easily traced, but it is none the less real. Here, instead of a continuous body of highlands, as in North and South America, we meet with a series of separated systems. The highest and most prominent chains of mountains, forming the main axis, are all nearer the southern edge—the Himalaya, the Caucasus, the Alps, and the Pyrenees. The low and extensive plains are all on the north, and about the centre lines of lower mountains mark the smaller axis. Asia-Europe, however, is divided into three distinct parts, each of which is almost a continent, Eastern and Western Asia and Europe, which have to be considered separately.

In Eastern Asia the main axis is clearly marked at the south by the gigantic swell of land contained between the border chains of the Himalaya and the Kuen-Lun, in which are found the highest plateaus and mountains of the world. On the north side we recognize the secondary axis in the chains of the Thian-shan and the Altai. Between these two zones of highlands extend, in a vast depression, the plains of East Toorkestan and of the so-called plateau of Mongolia, which, though having an altitude of from 2000 to 4000 feet, lie full 10,000 feet lower than the neighboring plateaus of Thibet. In Western Asia the plateau of Iran has its main swell on the south border, in the high mountains of Koordistan and the Taurus, and in the eastern half the river Ilmend marks the direction of a central depression which sinks from 4000 to 5000 feet below the surrounding plains.

In Europe, the highest chains, the Pyrenees, the Alps, and the Balkans, which form the main axis, are all on the southern edge of the continental triangle, separating the three Mediterranean peninsulas from the main body. In the centre, a slanting line of lower chains, the Carpathian and the Sudetic Mountains, the Riesengebirge, and the chains bordering the low plains of Northern Germany, form the minor axis. Between the two lie the low plains of Wallachia and Hungary and the numerous basins of Central Germany.

Africa has a double structure. The northern half conforms to Asia-Europe, its mountain-chains and plateaus running east and west, which explains its projection far into the Atlantic. The highlands of the Atlas along the Mediterranean, and the Kong Mountains on the Sea of Guinea, are two border swells, between which stretch the vast plains of the Sahara, whose average altitude does not much exceed 1500 feet. The southern half, as ascertained by Dr. Livingstone, is an unbroken plateau with two border swells running from north to south, as in North and South America, the higher one on the east, the smaller one, hardly less elevated, on the west, and a depression two or three thousand feet lower in the centre.

Australia has also a main swell on the east, with plateaus of 3000 feet and mountains of over 7000 feet; and a lower one in the west, extensive plains filling the centre between the two. It has, therefore, the real continental structure, and cannot be counted, as it sometimes erroneously is, among the islands.

2d. From this peculiar structure of the continents results the fact that in all the line of greatest elevation is placed out of the centre, on one of the sides, at an unequal distance from the shores of the seas. Hence arise two slopes, unequal in length and inclination. In North America, for example, the Rocky Mountains, which divide the Pacific and Atlantic slopes, are 800 miles from the Pacific shore, and over 2000 miles from the Atlantic, the western slope being less than one-third of the eastern. In South America the inequality is still greater. The Amazon takes its rise hardly more than a hundred miles from the Pacific, and its waters reach the Atlantic 2000 miles farther east, making the eastern slope twenty times longer than the western. This peculiarity has, as we shall see, the greatest influence upon the character of the drainage and the arrangement of the river-systems in each continent.

3d. All the prominent plateaus and mountain-systems of the globe are found to stretch chiefly in two principal directions. They extend either from east to west, with a slight deviation towards the north, on a line nearly parallel to the ecliptic, or else from north to south, slightly deviating to the east or west, and thus on a line at right angles with the first. The direction east and west predominates in the Old World, and controls the high ranges and plateaus which form the main body of the continents of Asia, Europe, and North Africa. The direction north and south predominates in the American continents, and gives them the great elongation towards the south which is characteristic of the New World. It is also found in South Africa and Australia. Distinguished geographers in the last century had already noticed these prevalent directions in mountain-chains, and called one class *parallel* and the other *meridian* mountains.

4th. The mountain-ranges and plateaus in the New World all belong to the north-and-south system, the transverse being almost absent; hence the great simplicity of structure and of outlines which characterizes the American continent. In Asia and Europe the two intersect each other. Though the main body is due to the chains and plateaus of the east-and-west system, it is crossed at right angles by numerous chains of the second system, which greatly diversify the surface and divide it into distinct regions, and, projecting far into the sea, form the beautiful peninsulas which so much vary their contours and enrich these continents. The high Bolor and the Ural Mountains in the interior of Asia, the chains which fill the peninsulas

JOHNSON'S PHYSICAL MAP

SHOWING THE PRINCIPAL MOUNTAINS, PLATEAUS & PLAINS OF

THE WORLD

BY

PROF. A. GUYOT LL.D.

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Nº 1

Explanation.
Lowlands.
Highlands.
Highest Lands.
In the profiles, blue marks the perpetual snow.

COMPARATIVE ALTITUDE OF THE PRINCIPAL MOUNTAINS AND TABLELANDS OF THE WORLD.

of Kamtchatka, Corea, and of Indo-China, the Ghauts of India, the mountains of the Hellenic peninsula, the Apennines, the Scandinavian Alps, all belong to the north-and-south system. The same can be said of the southern half of Africa and Australia.

5th. The altitude of both the surface elevations and the mountain-peaks gradually increases along the axes of the continents to a maximum which is placed beyond the centre, towards one end, from which the heights rapidly decrease. Here also, as in the transverse sections of the continents, there is a long and a short slope. The following table of altitudes will exhibit this law, and also show that the two Americas form together one system of increasing heights from north to south, interrupted only by the zone of broken and sunken lands in Central America, and that Europe and Asia form another, increasing from west to east. Volcanoes, being but exceptions in the general relief, are omitted, unless they owe their altitude to the elevation of the base on which they stand. (See profile in Map I.)

New World.

North America — Western Highlands.

Surface Elevations.	Eng. feet.	Mountains.	Eng. feet.
Plains of Alaska	800	Northern Rocky M'tns	4,000
Pelly Banks, Upper Yukon	1400	Mt. Murchison, Brit. Col.	14,431
Central Plateau of British Columbia	2000	Mt. Hood, Oregon	11,225
Great Plains of the Columbia	2000	Mt. Shasta, California	14,440
Great Basin, Utah, average	4500	Fremont Peak, Wyoming Territory	13,576
Great Salt Lake, "	4236	Gray's Peak, Col. Terr.	14,290
Colorado Plateau, "	6000	Pike's Peak, Col. Terr.	14,000
Plateau of Mexico, "	8000	Mt. Whitney, Sierra Nevada	15,000
City of Mexico, "	7473	Popocatepetl, Mexico	17,784
City of Toluca, "	8818	Orizaba	17,879

South America — Andes.

Surface Elevations.	Eng. feet.	Mountains.	Eng. feet.
City of Bogotá, New Gran.	8,655	Tolima, New Granada	18,360
City of Quito, Ecuador	9,520	Cayambe, Ecuador	19,386
City of Cuzco, Peru	11,500	Chimborazo, "	21,414
Lake Titicaca, Bolivia	12,800	Ilhampu, or Nevada de Sorata, Bolivia	25,000
City of La Paz, "	12,230	Illimani, "	24,155
City of Potosí, "	13,330	Aconcagua, Chili	22,422
Plateau of Catamarca, Argentine Republic	12,000	Yanteles, Patagonia	8,030
Valley of Tenuyan, Andes of Chili	7,500	Sarmiento, Terra del Fuego	6,910

Thus the highest lands of the New World, surface elevations, and mountains are found in the plateau of Bolivia, around Lake Titicaca, and the heights steadily increase from the shores of the Arctic Ocean to that point for 7500 miles, while the line of descent to the Southern Ocean is only 2500 miles.

The same law is shown in the smaller axes, along the Atlantic in both continents, with some modification in the Appalachian system. Here the lowest part is a little above the middle point, about New York and New Jersey. Thence the heights increase towards the north and the south, but more gradually and to a greater altitude in the southern half, as shown in the following table:

Appalachian Mountains — Northern half, from South to North.

Eastern Chain.	Eng. feet.	Green Mountains.	Eng. feet.
Mt. Wachusett, Mass.	2018	North Beacon, Highlands	1471
Grand Monadnock, N. H.	3718	Greylock, Mass	3505
Moosehillock, N. H	4790	Killington Peak, Vt	4221
Mt. Lafayette, W. Mts., N.H.	5290	Mansfield Mt	4389
Mt. Washington, " "	6288	Mt. Marcy, Adirond'k Mts.	5370

Southern half, from North to South.

The Great Central Valley.	Eng. feet.	Mountains.	Eng. feet.
Easton, Pa	165	Blue Ridge, N. J	1500
Harrisburg, Pa	328	Peaks of Otter, Va	3993
Salem, Upper Roanoke	1014	White Top, Va	5530
Mt. Airy, Va	2595	Black Dome, or Mitchell's High Peak, N. C	6707
Bristol, Va	1678	Clingman Mt., N. C	6660
Knoxville, Tenn	900	Great Frog Mount'n, Tenn.	4226

In South America the Atlantic border of the Brazilian highlands rises to an altitude of about 3000 feet in the north, 4000 in the centre, and culminates with 9500 in the Serra Mantiqueira, south-west of Rio de Janeiro.

Old World.

Europe and Asia, from West to East.

Surface Elevations.	Eng. feet.	Mountains.	Eng. feet.
Plateau of Spain	2,300	Pyrenees, Pic Anethou	11,168
" " Bavaria	1,800	Alps, Mt. Blanc	15,781
" " Asia Minor	3,000	Caucasus, Mt. Elboorz	18,572
" " Armenia	4,500	Hindoo-Koosh Chain	20,000
" " West Iran, Persia	4,000	Karakorum Chain, Mt. Dapsang	28,278
" " East Iran, Afghanistan	6,000	Dhawalagiri, Himalaya	26,826
" " West'n Thibet	15,000	Gaurisankar, or Mt. Everest	29,002
" " East'n Thibet	11,000	Chamalari, Bhootan	23,944

In the smaller axis in Europe also the heights are steadily increasing from north-west to south-east. The Weser Mountains only average 1500 feet; the Thuringian Forest, 3000; the highest peak in the Riesengebirge rises to 5254; the culminating point in the Tatra, or High Carpathian Mountains, has an altitude of 8685 feet.

In the smaller Asiatic axis the Altai Mountains, which average about 5000 feet, culminate in the Bielucha, 11,000 feet, and the Sajan Mountains, 11,452 feet, in the west, and decrease towards the north-east.

In the New World, therefore, the highest lands are piled up in the south-west; in the Old World, in the south-east. In Africa, also, the land-masses increase in altitude from west to east and from north to south. The western systems, the Kong Mountains and the Atlas, are plateaus of from 2000 to 3000 feet in altitude, with mountain-chains in the latter of from 7000 to 11,000 feet. The volcanic group of the Cameroons, near the Gulf of Guinea, reaches 13,000 feet. The eastern swell rises to plateaus of 6000 to 8000 feet in Abyssinia, with mountain-peaks of 16,000 feet. The course of the Nile marks a long slope running up from the Mediterranean to the highlands of Abyssinia; and far beyond, on the same line, under the equatorial sun, the snowy peaks of Kenia and Kilimandjaro rise to 20,000 feet, and mark the culminating points of the whole continent. In the southern half also the two border swells unite into the high plateau of 5000 feet which fills the broad and massive point of the continent in the territory of the Cape Colony.

In Australia the same tendency is observed; the lands rise towards the south-east corner, and culminate there in the Australian Alps, where Mt. Hotham exceeds 7000 feet.

6th. On the whole, the reliefs begin with the vast low plains around the polar circle, and go on increasing from the shores of the Arctic Ocean towards the tropical regions. The highest elevations, however, are not found at the equator, but north of the Tropic of Cancer in the Old World, in the Himalayas, 28° N. lat.; and north of the Tropic of Capricorn in the New World, in the Andes of Bolivia, 16° S. lat. The effect of this law is to temper the burning heat of the tropical regions, and give them a variety of climate which seems not to belong to these countries. If this order were reversed, and the elevation of land went on increasing towards the north, the now most civilized part of the globe would become a frozen and uninhabited desert.

7th. The distribution of low plains, plateaus, and mountains is far from being uniform. Not only has each continent a different share, but also one or the other form of relief so predominates as to give it a special character, which has the greatest influence upon its climate and functions, both in nature and in man's history. The large, fertile basins of the Mississippi and Amazon are the most valuable and characteristic parts of the American continents; they are the continents of low plains. Africa has no low plain of any great extent, but is filled with vast table-lands; it is the continent of plateaus. Europe in its western and most important half is but a network of mountain-chains without high plateaus, and is the continent of mountains. Asia, as the common root of all, has all the forms of relief on the grandest scale and in equal proportion; the most extensive plains in the north, the largest plateaus in its centre, the highest mountains on its border, with the greatest variety in their combination. It is the master continent, the full type of all the others.

8th. All that has just been said of the general reliefs of the globe is summed up in a single great fact which can be thus expressed:

All the long, gentle slopes descend towards the Atlantic and its prolongation, the Arctic Ocean, while all short and rapid slopes are directed towards the Pacific and its dependant, the Indian Ocean.

Formation of the Relief.—These general laws which regulate the inequalities of our globe seem to point to a common geological cause, which may perhaps be found in the gradual cooling of our planet. We may conceive that owing to the contraction of the interior the hard crust, having become too large for its contents, shrunk and shriveled. Vast portions of its surface subsided, and formed the oceans where the waters are gathered together. Between these sinking areas the other portions of the crust were forced up in large swells, wrinkled into folds, or broken into high mountain-ranges, and formed between the Pacific and the Atlantic the American continents on one side, Europe and Asia on the other; between the Indian Ocean and the Atlantic, South Africa; between the same and the Pacific, Australia. This view is confirmed by the fact, pertinently pointed out by Prof. Dana, that the height of the border mountains and plateaus is in proportion to the width of the oceans which bathe their feet. The Pacific, which is the larger ocean, has on its border the high chains of the Andes and Sierra Nevada, and the short slopes;

while the Atlantic has the Brazilian and the Appalachian Mountains, and the long slopes; and a similar arrangement is found in the other continents. The interior, more remote from the seat of the upheaving force, remains depressed. The cause of the typical structure of all continents above described therefore becomes evident. Thus the almost infinite variety of the inequalities of the earth's surface is actually subject to a general law. Here, as elsewhere, everything has been made with order and measure, and no doubt with regard to a final aim, which it is for science to discover by patient and intelligent research.

Islands.—The innumerable smaller bodies of land called islands form only one-seventeenth of the total surface of the dry land. They are of two classes—the *Continental* and the *Pelagic* (or oceanic) islands.

The continental islands are mere fragments of the continental structures, situated by the side of them or not far away, as the British Isles; or in lines parallel to their coasts, as the Japanese and Australian islands and the West Indies; or forming a continuation into the ocean of their chains of mountains, only partially submerged, as the long line of the Sunda Islands. They have the same kind of rocks and of mountain forms, the same variety of plants and large animals, as the neighboring coasts of the continents to which they belong. They vary in size, from a mere isolated rock to such large bodies as the British Isles, the Japanese Islands, Madagascar, Sumatra, and the most extensive of all (if we exclude Greenland), Papua and Borneo, whose area exceeds 2,000,000 square miles.

The pelagic (or oceanic) islands are scattered, far away from the continents, in the midst of the oceans to which they belong. Their size is always small. Though sometimes found in lines, they are oftener arranged in groups. Navigators distinguish among them two classes, the *high* and the *low* islands, which are found actually to correspond to two natural groups, distinct in their forms, geological nature, and mode of growth. The high islands are volcanic cones with craters, many of them still active. The low islands are all of a coralline nature, and are the tops of submarine coral reefs.

Volcanic Islands.—It is a remarkable geological fact that the rocks which make up the body of the continents, such as sandstones, slate, granite, and the various metamorphic rocks, are entirely absent in the oceanic islands. We cannot therefore expect here the variety of mountain forms, hills, and valleys which diversifies the surface of the continents. The volcanic islands being the tops of volcanic cones rising above the surface of the ocean, the more or less circular form of their outlines, their elevation and rapid slopes, and their moderate size are easily understood. Some hardly reach the surface, their crater being filled by the water of the sea, as in Barren Island; others rise to alpine heights, as the peaks of Hawaii in the Sandwich Islands, reaching nearly 14,000 feet, the Pico de Teyde, over 12,000 feet, in the Canary Islands, and Tahiti, over 7000. Sometimes two or more volcanoes clustered together form a single island, which may then have a larger size and more irregular outlines.

Coral Islands and their Formation.—The coral islands are among the most striking phenomena of the tropical seas. (For description, see CORAL ISLANDS.)

IX. *Water.*—Water is the second great geographical element to be considered. It is the universal solvent which, by disintegrating and rearranging the materials of the earth's crust, was in geological times the principal agent in forming what is now the solid land. It is equally indispensable in fertilizing the soil and carrying on the process of animal and vegetable life.

The common reservoir of water is the sea, which, as we have seen, covers nearly three-quarters of the surface of the globe. By slow but constant evaporation it is carried into the atmosphere in the shape of invisible vapors, which, borne by the winds over the continents, are condensed and fall in beneficent rains. A portion of the rain-water evaporates again in the atmosphere, another sinks into the ground, through which it percolates, and reappears at the surface in the form of springs, or fills the quiet sheets of water which feed the Artesian wells. The remainder flows over the surface in rivulets and brooks, which unite, and, receiving new accessions at every step, form the mighty rivers which carry the surplus water back to the ocean from whence it came.

Thus is produced the vast network of streams which, like the arteries of the human system, convey the life-giving element to all parts of the globe.

Surface depressions filled by streams or springs form the numerous lakes spread over the continents.

In this ceaseless circulation we have to consider the oceanic, the atmospheric, and the inland waters (for which see OCEAN, RIVER, LAKE, RAINS). ARNOLD GUYOT.

Earth-closet, a form of close-stool, designed to take the place, to some extent, of the water-closet, and frequently made portable for convenience. It is well known that dry soils have wonderful disinfecting powers, owing to their property of absorbing ammonia and other gases. It is upon this absorbent quality that the usefulness of manures, when applied to soil, depends. Advantage is taken of this absorption in the construction of the earth-closet. The fæces are covered by a small quantity of thoroughly dried soil or peat, which completely absorbs all unpleasant and injurious vapors, and after a time the mass becomes perfectly inodorous. It is found that the same earth may, if necessary, be used over and over again, and that finally, when it has become thoroughly charged with excrementitious principles, it is one of the best forms of concentrated fertilizing material known. Considering the increasing value of commercial manures, and the serious prevalence in country as well as city, and in winter as well as in summer, of diseases caused by defective sewerage, it may be readily seen that the earth-closet question may become one of much importance. (See WARING, "Earth-Closets and Earth-Sewage.")

Earth Currents. See MAGNETISM, TERRESTRIAL.

Earth'enware, a general term for all wares made of earth, and afterwards baked. (See POTTERY, by PROF. C. F. CHANDLER, PH. D., LL.D.)

Earth House, or **Eird House,** the name given in Ireland and Scotland to a building under ground anciently used as a place of retreat for the people in time of war. It consisted generally of one chamber from twenty to sixty feet long, from four to ten in width, and from four to seven in height. It was built of unhewn stones, and entered from the top by an opening admitting only one at a time. They are sometimes called Picts' houses. They were mostly built on hillsides and other dry places. In the moor of Clova, in Aberdeenshire, more than forty of these houses are found near together. Bronze swords, earthen vessels, and implements of various kinds have been found in them.

Earth Nut, a popular name given to the tubers or subterranean stems of several plants—viz. the *Bunium flexuosum,* an umbelliferous plant which grows in Europe; the *Cyperus rotundus,* a native of Egypt; and the *Arachis hypogæa,* a leguminous plant often called *peanut.* The tubers of the *Bunium,* which resemble chestnuts, and are sometimes called *earth chestnuts,* are extensively used for food.

Earthquakes. We are accustomed to consider the ground on which we live as *terra firma,* a solid foundation for our heaviest structures. The earthquakes teach us, however, to our dismay, that it is by no means absolutely so.

These movements of the earth's crust are of all degrees of intensity, from the almost imperceptible vibration to the most violent convulsions, which change the face of the ground, and reduce the most substantial works of human handicraft to a mass of ruins.

The appalling nature of these commotions, and the phenomena attending them, were fully exhibited in the remarkable and oft-described earthquake at Lisbon, Portugal, on the morning of Nov. 1, 1755, the great festival of All Saints. The churches of the city were full to overflowing, when at forty minutes after nine a rumbling noise was heard like distant thunder, which gradually increased until it resembled the sound of heavy artillery. A faint shock was followed by a more terrific one, which levelled to the ground a greater part of the city, and in the space of six minutes 30,000 persons were buried under the ruins of the churches and other edifices, and 30,000 more perished before the end of the catastrophe. The ground seemed to undulate like the waves of the sea, the surrounding mountains of Arrabida and Estrella were seen rocking violently on their base, and broad chasms were opened in the earth and shut again. More than 3000 persons had taken refuge on a broad marble quay just constructed on the banks of the Tagus, when the sea, which had before retreated, came back with fury in a wave forty feet high, and swallowed up that unfortunate multitude, of which not one was ever seen again; then, rushing against the doomed city, continued its work of devastation. These oscillations of the sea were repeated several times, and on the spot occupied by that massive structure several hundred feet of water were found. Fires, kindled in the fallen dwellings, soon spread their flames over this scene of desolation, and the mass of burning ruins presented at night the spectacle of a vast conflagration, which finished the work of destruction. After this catastrophe the commotion of the ground continued for several weeks, and a very severe shock was experienced in December.

One of the notable features of the earthquake of Lisbon is the great extent of country over which it was felt. On land it was not confined to the Spanish Peninsula, but shook all Western Europe, pervading France, Northern

Italy, Switzerland, Germany, the British Isles, reaching as far as Scandinavia. The northern coast of Africa suffered considerably; nearly all the cities in Morocco were destroyed; the earth was rent asunder, letting out streams of water. The ocean was hardly less disturbed. An English ship, the Nancy, when 100 miles west of Cape St. Vincent, in Portugal, experienced a shock from below so violent that the men on the deck were thrown over a foot from the floor. It was supposed that the ship had run against a rock and touched bottom, while the sounding-lead indicated deep water all around, proving that the solid floor of the ocean had been shaken and the commotion transmitted through the water. Huge waves, raised by these oscillations of the earth's crust above and below the level of the sea, were hurled on the shores of the continents. In Cadiz a monstrous wave sixty feet high was seen to come from the high sea and dash against the city. In Tangiers, on the African coast, the sea rose and fell eighteen times, and fifteen times in Funchal on the island of Madeira. These commotions of the sea crossed even the Atlantic. In some of the Lesser Antilles the sea rose to twenty feet, and similar waves were observed in the harbors of New York and Boston.

The immediate area of concussion, including the portion of the Atlantic affected by it, comprised a surface as large as the continent of Europe. If we add the extensive area covered by the earthquake waves which brought to the American shores the tidings of these convulsions, and that of the American coast which experienced slight shocks during the same period, the surface disturbed by the earthquake of Lisbon amounts, according to Humboldt, to four times that of the European continent. The propagation of the movement seems to have been such that Lisbon was the centre of a system of undulations or earthquake waves, decreasing in violence with their distance from that centre.

Another earthquake, not less celebrated in the annals of science on account of the thoroughness with which its phenomena were studied and recorded, is that which occurred in Calabria in the year 1783. Like that of Lisbon, it was a central earthquake, but its area did not much exceed 500 square miles. The violence of the convulsions, however, and the variety of their effects, were perhaps still more remarkable. On the 5th of Feb., 1783, the first shock threw down, in two minutes, most of the houses of the numerous cities and villages in a radius of fourteen miles around the city of Oppido, which seems to have been the centre of the earthquake. The undulations were so great that tall trees, bent to the earth, were seen touching the ground with their tops alternately on each side of the wave. The surrounding mountains were all in motion. Some of them seemed to jump up and down, and the shape of their summits was permanently changed. Houses were thrown up bodily, as by the power of an exploding mine, and placed on higher ground. Deep chasms opened and shut again; others remained gaping; land-slides obstructed the rivers, the courses of which were altered; and the surface of the country changed its aspect.

Three Kinds of Motions.—The Italians long ago distinguished three kinds of earthquake motions. The first is the *undulatory* or *wave-like* motion, which is the most common and the least destructive. The waves travel either in one direction, like the waves of the sea, or from a centre in somewhat concentric lines.

The second kind of motion is the *vertical*, acting from beneath, as the explosion of a subterranean mine. When violent, no human structure can resist its action. This kind, as well as the first, was repeatedly exhibited in the earthquake of Calabria. In the catastrophe which in 1797 destroyed the city of Riobamba in the Andes of Quito, says Humboldt, many corpses of the inhabitants were thrown several hundred feet high, on a hill beyond the brook Lican. A similar occurrence is recorded in the terrific earthquake of 1868. In the cemetery of Arica, on the coast of Peru, a large number of skeletons were disinterred and spread on the surface of the earth. The earthquake of the 18th of Sept., 1828, in Calcutta, owed its destructiveness to the fact that the main shock was a vertical one. Another one in Murcia, Spain, in 1829, destroyed or severely injured more than 3500 houses.

The third kind of motion is what is termed the *whirling* motion, the most dangerous, but also the rarest of all. It is thought to be proved by facts observed in the earthquake of Calabria, such as the twisted position of the several stones composing the two obelisks placed in the façade of the convent of St. Bruno in the small town of Stefano del Bosco. In the formidable earthquake of 1692 in Jamaica the surface of the ground was so agitated and broken up that some fields planted in different crops changed places, and were found as if twisted into each other.

The normal motion, however, is the wave-like, and it is possible that the other kinds are but the effect of various systems of waves intersecting each other.

The *propagation* of these undulations takes place either in a linear direction, along the mountain-chains, the undulations being then at a right angle with them, as in most of the earthquakes of the Andes; or from a centre, forming a series of concentric waves diminishing in intensity and gradually dying out, as in the earthquakes of Lisbon and Calabria. The first are *linear*, the second *central* earthquakes.

Velocity of the Earthquake Waves.—The velocity with which the earthquake waves move is variable, according to circumstances. Humboldt seems to assume, as an average between extreme cases, a velocity of twenty-three to thirty-two English miles in a minute, and this estimate does not seem far from the truth.

Duration of Earthquakes.—Though slight concussions or single vibrations of the ground often occur isolated, the great earthquakes hardly ever consist of one single shock, but of a series of successive shocks, some of which are of exceptional violence. These convulsions of the ground may be repeated at longer or shorter intervals during a period of several days and weeks, or even of several months and years, before the earthquake is at an end. The earthquake of Calabria was in this respect also remarkable. A careful and intelligent local observer, Dr. Pignataro, counted 949 shocks in the year 1783, 501 of which were of the first magnitude; and 151 in 1784, of which 90 were classified by him as of the first degree of force. Nearly four years elapsed before these oscillations ceased entirely and the earth came again to a state of complete rest. During the terrific earthquake of Cumana on the coast of Venezuela, which began on the 21st of Oct., 1766, destroying the city in a few minutes, the earth continued to be shaken almost every hour during fourteen months, and it was only when the commotions occurred once a month that the unhappy inhabitants dared to begin rebuilding their houses. After the earthquake which laid the beautiful city of Messina in ruins, the ground continued to be convulsed almost daily for ten years, which caused a feeling of insecurity of life which had the worst effect on the moral condition of the inhabitants. In the appalling catastrophe which destroyed the city of Lima and its harbor, Callao, in Peru, in Oct., 1746, the shocks were repeated every seven or eight minutes, and over 200 of the most violent kind were counted within twenty-four hours. In the great earthquake of Caraccas on the 26th of Mar., 1812, fifteen shocks were felt on the first day, and they continued numerous every day until the 5th of April.

The general character of earthquakes seems to have been the same in all times. The descriptions of the most ancient on record and the most recent offer a striking coincidence. All the phenomena above described have been repeated in the latest of the great earthquakes, that which shook the western coast of South America and the mountain region of the Andes from Chili to Ecuador, on a line of over 1000 miles, in Aug., 1868. The flourishing city of Arica in Peru, the main harbor of commerce for Bolivia, was obliterated in a few moments. The beautiful city of Arequipa, in the Andes of Peru, was levelled to the ground, and its 50,000 inhabitants left houseless, and soon starving in the midst of its ruins. In the Andes of Ecuador the city of Catocachy disappeared, and a lake covers the spot where it once stood. The cities of Ibarra, Ottavalla, and others were swallowed up, and not one of their 10,000 inhabitants was ever seen again. Over 300,000 people were left houseless, and the whole number of victims of that awful catastrophe is yet to be counted. The movements of the sea were not less striking. In Arica the sea retreated from the shore, carrying with it five ships which were in the harbor, and returning in a high and furious wave dashed to pieces four of them, and carried the fifth, the U. S. steamer Wateree, two miles inland. Similar motions were observed on the coast of Chili and of Peru, and an immense earthquake wave is said to have crossed the Pacific Ocean, striking in its course the Polynesian Islands, and reaching the Australian shores.

None of the natural phenomena are so immediately destructive of human life as earthquakes, as the recent examples just quoted suffice to show. These are equalled, and even surpassed, by some of older times. In the earthquake of Sicily in 1693 over 60,000 people perished. History has recorded an earthquake in the year 19 after Christ, at the time of the emperor Tiberius, which destroyed 120,000 lives. Another in 526, in the reign of the emperor Justin, which destroyed a number of large cities in Syria, among which was Antioch, cost the lives of over 200,000 human beings. Considering the greatness of the danger, the suddenness of action, the sense of perfect helplessness and insecurity it engenders, and all the appalling circumstances connected with an earthquake, no one can wonder that the feeling of terror which it inspires is one which increases with every new experience.

The number of earthquakes is much greater than is generally supposed. Carefully prepared catalogues of all recorded cases, such as those of Perrey, Kluge, and others, swell their number to several thousands. Indeed, the record of the last century, which, owing to the increased attention bestowed on natural events, is certainly more complete, shows that we may place earthquakes among the regular and continuous terrestrial phenomena; for though the great catastrophes may be rare, a week scarcely elapses without a commotion of the ground worthy of notice taking place somewhere on the surface of the globe.

Connection with Volcanic Eruptions.—The immediate connection of earthquakes with volcanic eruptions is evident in many instances, but these are of a special kind. On the other hand, volcanic eruptions take place without earthquakes, as in the Sandwich Islands; and even in volcanic districts the most extensive earthquakes bear apparently no relation to the surrounding volcanoes, while a considerable number of severe and extensive ones occur in regions far removed from any active volcano, or even deprived of all volcanic rocks. Though the two phenomena may have a common cause or condition, they cannot be confounded in the same class.

Connection with the State of the Atmosphere.—The common belief is that earthquakes are accompanied by some extraordinary condition of the atmosphere, such as a very low or high barometric pressure, profound calm or high wind, sultry and damp weather, a prolonged drought, or peculiar electrical or magnetic disturbances; all of which have been considered as warnings of the coming event. But a careful scrutiny of the cases leaves this matter at present doubtful.

Influence of the Seasons and the Hour of the Day.—The dependence of earthquakes upon the seasons is more decided. Their number seems to be greater about the time of the equinoxes, especially the September equinox, than at any other. In the Molucca Islands during these periods, which are marked by the tempests accompanying the change of monsoon, the inhabitants do not dare to remain in their houses, but spend the season under tents. According to the records, a greater number of earthquakes occur in winter than in summer, which is the reverse of what is observed in volcanic eruptions. They seem also to be more frequent at night than in the daytime.

Astronomical Influences.—By comparing 7000 observations, Perrey found that the number of earthquakes is greater at the time of the syzygies, when the attractions of the sun and moon are combined and the moon is nearest to the earth, than at the time of the quadratures, when the moon is more distant; and also that the shocks are more frequent at the places where the moon is in the meridian. Wolf finds a coincidence with the periodicity of the sun's spots, the years in which the spots are most numerous being also those in which the earthquakes more frequently occur.

Distribution of Earthquakes.—The law of the distribution of earthquakes on the surface of the globe is of paramount importance for the explanation of these mysterious phenomena. The most general facts in this respect are the following:

1. There is no part of the globe absolutely free from earthquakes; the phenomenon is general.

2. There are circumscribed regions in which the surface is liable to be shaken simultaneously; such a region is an earthquake area.

3. A very significant fact, however, is that the most extensive of these areas of concussion, and those in which the earthquakes are the most numerous and violent, are situated within the two great zones of broken lands described above—the border zone around the Pacific Ocean, and the central zone separating the northern from the southern continents. In the first are found the celebrated earthquake areas of the Andes, that of the western coast of North America, and those of Kamtchatka, Japan, and New Zealand. In the second we meet with the great Mediterranean area from Spain to Syria, with Italy, Greece, Asia Minor, and North Africa. The Arabian and Indian areas are in the same zone; and the two regions of the earth most convulsed by these terrific shocks, the earthquake areas of Central America with the Antilles, and that of the East Indian Archipelago, the really classic soil of earthquakes, are situated at the intersection of the two zones. Outside of these two zones only a few more large areas are found like that of which Iceland is the centre, and which extends to Scotland and Scandinavia, and another in Central Asia.

The analogy of this distribution with that of volcanoes is evident, but the domain of earthquakes, as remarked above, extends far beyond that of volcanoes. Both are most intense in their action along the great fractures of our planet, but it would be rash to infer from this fact that one is the cause of the other; they only require similar conditions for their manifestation.

Theory of Earthquakes.—Many explanations of the phenomenon of earthquakes have been proposed, but science must confess its inability to give, at present, a satisfactory one. Earthquakes are obviously due to various causes. Those preceding or accompanying a volcanic eruption must be, no doubt, referred to the action of the volcano; but the extensive earthquakes disturbing areas of hundreds of thousands of miles, and those which take place outside of volcanic districts, require a more general cause. Perhaps this may be found, which is also the opinion of Prof. Dana, in the increasing tension produced in the earth strata by the steady contraction of our cooling planet. To this cause geology refers the rising of mountain-chains on long fissures in the hard terrestrial crust, in the form of prisms with inclined planes, or of a succession of folds with large internal cavities. The settling under their own weight of these vast structures, and the lateral tensions thus engendered, coming from time to time to a paroxysm, might perhaps explain these crackings of the ground and convulsions along the mountain-chains and in the broken parts of the earth. In this view every difference of pressure, atmospheric or astronomical, from lunar and solar attraction, may have a share of influence in the phenomenon.

As to the influence of the seasons, the time of the day, of electricity, magnetism, and the solar spots, they show once more, if finally proved, how intimate are the relations of all physical agencies with each other, and how close an analysis is required to understand so complex a phenomenon. ARNOLD GUYOT.

Earths, in chemistry, a term applied to compounds consisting each of a metal combined with oxygen. The earths proper are the dyad-oxides, glucina, thoria, didymia, lanthana, yttria, and erbia. They and their carbonates are insoluble in water. Alumina, zirconia, and ceria (tetrads) are of the same general character, and are properly called earths. Magnesia, baryta, lime, and strontia are called alkaline earths, because they are less soluble in water than true alkalies, though they exhibit alkaline reactions.

Earth-shine, a reflection of the sun's light from the earth to the moon, and back to the earth again. This phenomenon is often seen when the moon is very old or very new, the outlines of the full moon being rendered visible by the reflection.

Earth'works, a military term applied to fortifications or constructions, whether for attack or defence, in which earth is the principal material employed. (See FORTIFICATIONS, by COL. A. H. BRIALMONT, Belgium.)

Earth'worm (*Lumbricus*), the popular name of a genus of Annelida of the order Terricolæ. The species are numerous, and they are found wherever the soil contains sufficient moisture to sustain their life. The earthworm has no head distinct from its body. It is composed of a succession of rings, sometimes amounting to 120 in number; it is without eyes or other external organs, excepting that on each ring it has eight short bristles pointing backward, which it uses in locomotion as the snake uses its scales. The mouth consists of two lips, the upper one being elongated; it has no teeth, and subsists by swallowing particles of earth, which, after the digestible matter has been extracted, is voided often on the surface of the ground in small intestine-shaped masses called *worm-casts*. It respires through pores which communicate with little sacs. It is hermaphrodite, but mutual fecundation takes place. The eggs often contain two embryos. The earthworm is covered with mucus, which enables it to glide through the ground without retaining a particle of the soil. Large specimens attain a length of nearly a foot.

Eart'mon, a post-village, capital of Dodge co., Ga., on the Macon and Brunswick R. R., 56 miles S. S. E. of Macon.

Ear Trumpet, an instrument for the relief of defective hearing. Ear trumpets are of a great variety of forms, but they all depend upon the same principle—that of collecting and condensing the sound waves, and thereby intensifying the impression made upon the ear. It is found in practice that a nice adjustment of parts is not necessary; sound being readily reflected along conical tubes, either straight or coiled, with great facility. Cases of comparatively slight deafness are aided by the wearing of "cornets," or small ear trumpets attached by a spring to the ear, and concealed by the hair of the wearer.

Ear Wax. See CERUMEN.

Ear'wig [Ang.-Sax. *eor-wicga*, literally, "ear-beetle;" Fr. *perce-oreille;* Ger. *Ohrwurm*], (Forficulariæ), a family of insects, so named from the popular delusion that they have a propensity to creep into the ear. They form a connecting link between the Coleoptera and the true Orthoptera. They have a narrow body, strong and horny mandibles, long antennæ, and a pair of forceps at the extremity of the abdomen.

Easely, a township of Pickens co., S. C. Pop. 1089.

Easement, a legal term denoting, in its most comprehensive sense, the right which the public or an individual has in the lands of another, not inconsistent with a general property in the latter. It is in the nature of a charge or burden upon land. It is called a *dominant right,* while the land burdened is termed the *servient estate.* Easements may be mere personal rights, when they are said to be *in gross,* or they may be connected with the ownership of land. The latter only will be considered. 1. They are incorporeal. 2. They are imposed on corporeal property. 3. They confer no right to the substance of the land. 4. There must be two distinct estates—the dominant, to which the right belongs; and the servient, upon which the obligation rests. They are affirmative or negative. Affirmative, when the owner of the dominant estate may do some act on the servient; and negative, when the owner of the servient estate must refrain from doing some act, otherwise lawful, on his land. The most important instances are the right of way (the right of the owner of one piece of land to pass over the land of another), of water (the right of the owner of the dominant estate to receive water from or discharge it across the servient estate), of support of the soil or of the buildings of the dominant estate by the adjacent soil or buildings of the servient estate.

Easements exist at common law, and may be created by statute. Common-law easements may arise in various modes. 1. By nature. This is a brief form of expression of a legal rule, that the owners of adjoining parcels of land may have a burden imposed upon them not to disturb the natural state of things. Thus, where a natural stream of water flows from the land of one owner through the land of another, the former cannot divert or diminish the quantity of water which would otherwise descend to the proprietor below, nor can the latter prevent the stream from discharging its water across his land. Each has an easement "by nature" in the land of the other. 2. By dedication. This means an appropriation of land by its owner to a public use; *e. g.* as a street or park or public landing-place. The legal title to the land dedicated is not changed, but the public acquires a right to use it for the special purpose to which it is dedicated. These easements are sustained in law on the doctrine of estoppel, although there is no specific grantee. No particular form or ceremony is necessary to constitute a dedication. It is sufficient if the intention to dedicate appear, either by positive acts of the owner or long-continued acquiescence, and the public act accordingly. 3. By actual grant. In this case the nature and extent of the easement are determined by the words of the instrument creating it, which must be sealed. 4. By implied grant. An easement is created by implied grant when it is necessary for the enjoyment of that which is expressly granted or reserved. Thus, if A is the owner of two lots, the first of which can be approached only over the second, and conveys either to B, the owner of the back lot has by implication a right of way across the front lot. 5. By prescription. This is the enjoyment of the right or privilege for so long a time as to raise the presumption of a grant. The length of time necessary to raise this presumption varies in different States, but, after the analogy of the statute barring disputed claims to land, it is usually twenty years. To obtain by prescription an easement in the land of another its enjoyment must have been uninterrupted for the required number of years, adverse to the owner of such land, and exercised under a claim of right. It must be open, so that the owner may be presumed to know of it. In England it is held to be a rule of the common law that the right to light may be obtained by prescription. This is called the doctrine of "ancient lights." It would take place where the owner of one lot of land had windows opening on the vacant lot of another for twenty years. He would acquire such a right that buildings could not be constructed on the vacant lot so as to shut out the light from his windows. But in the U. S. this rule has frequently been repudiated by the courts as inapplicable to our rapidly growing and rapidly changing condition; and in a number of States an easement of light can be acquired only by express or implied grant.

Easements may be extinguished by a release given by the owner of the dominant to the owner of the servient estate, or by abandonment. The failure to make use of an easement (technically called non-user) for twenty years is strong evidence of abandonment if the easement was acquired by prescription, although the presumption may be rebutted; but if the easement were acquired by actual grant, no length of mere non-user would operate as an abandonment. In that case there must be acts inconsistent with the existence of the easement. An easement may also be extinguished by a union of the two estates in the same person. This is technically called "merger."

T. W. DWIGHT.

East, a township of Monroe co., Ala. Pop. 859.

East, a township of Carroll co., O. Pop. 827.

East Ab'ington, a post-village and the principal division of Abington township, Plymouth co., Mass., 20 miles S. by E. of Boston, on the Old Colony R. R. It has a savings bank, a newspaper, three churches, and is well supplied with stores. It has large manufactures of boots and shoes. Pop. about 4500. (See new town of ROCKLAND.) J. S. SMITH, ED. "STANDARD."

Eastaboga, a post-twp. of Talladega co., Ala. P. 973.

East Al'bany is the N. part of Greenbush village, Rensselaer co., N. Y. It is on the Hudson River, directly opposite Albany, with which it is connected by bridges. It has extensive freight-houses and machine-shops.

East Al'len, a twp. of Northampton co., Pa. P. 1180.

East Alli'ance, a post-village of Smith township, Mahoning co., O., is a suburb of ALLIANCE (which see).

Eastaloe, a post-twp. of Pickens co., S. C. P. 1099.

East Am'well, a twp. of Hunterdon co., N. J. P. 1802.

East An'dover, a post-village of Andover township, Merrimack co., N. H., 25 miles N. W. of Concord, on the Northern R. R. It has manufactures of hosiery, lasts, lumber, and woollens.

East Ar'lington, a post-village of Arlington township, Bennington co., Vt. It has manufactures of wooden ware.

Eastatoee, a twp. of Transylvania co., N. C. P. 351.

East Auro'ra, a post-village of Aurora township, Erie co., N. Y., is beautifully situated on the Buffalo New York and Philadelphia R. R., 17 miles S. E. of Buffalo. It has a weekly newspaper, an academy, six churches, five hotels, a foundry, numerous stores and shops, and is the business centre of a wealthy farming region. The above description includes the neighboring village of Willink. East Aurora was once the residence of ex-President Fillmore.

C. C. BOWSFIELD, ED. AND PROP. "ERIE CO. ADVERTISER."

East Baton Rouge, a parish in the S. E. of Louisiana. Area, 500 sq. m. It is bounded on the E. by the Amite, and on the W. by the Mississippi. The surface is level; the soil fertile. Corn, cotton, sugar, and molasses are produced. Pop. 17,816. Capital, Baton Rouge.

East Bay, a twp. of Grand Traverse co., Mich. P. 466.

East Bear River, a twp. of Yuba co., Cal. Pop. 603.

East Bend, a twp. of Champaign co., Ill. Pop. 643.

East Bend, a post-township of Yadkin co., N. C. Has an academy. Pop. 1353.

East Beth'lehem, a post-township of Washington co., Pa. Pop. 1621.

East Bir'mingham, a borough of Alleghany co., Pa., on the Monongahela River, about 2 miles S. E. of Pittsburg. Has one weekly newspaper. Pop. 9488.

East Bloom'field, a post-twp. and village of Ontario co., N. Y., has an academy. Pop. 2250; of village, 320.

East'bourne, a watering-place of Sussex, England, 3 miles N. N. E. of Beachy Head, in a chasm between two cliffs, has a martello tower, a fort, and a chalybeate spring. P. 5795.

East Boy'er, a township of Crawford co., Ia. P. 231.

East Brad'ford, a twp. of Chester co., Pa. P. 1033.

East Bra'dy, a post-borough of Clarion co., Pa., is situated about 70 miles N. of Pittsburg, on the Alleghany River. It has had a remarkably rapid growth, having attained its present population (about 3000) in four years. The iron-works of the Brady's Bend Iron Company are located on the opposite bank of the river, and give employment to 1500 persons. East Brady is but 7 miles distant from the Butler county oil-regions, and to this place much of the oil produced is run in pipe-lines, whence it is shipped to Pittsburg and other markets. It contains the usual number of schools, churches, business houses, etc., and one weekly newspaper. Pop. in 1870, 728.

SAMUEL YOUNG, ED. AND PROP. OF "INDEPENDENT."

East Bran'dywine, a twp. of Chester co., Pa. P. 1011.

East Bridgewater, a post-township of Plymouth co., Mass., on the Old Colony and Newport R. R., 25 miles S. E. of Boston. It has valuable water-power, and large manufactures of brick, lumber, cotton-gins, iron, chains, nails, boots, shoes, and other goods. There are five churches, a savings bank, good schools, and one weekly newspaper. Pop. 3017. ED. OF "NEWS."

East Brook, a twp. of Hancock co., Me. Pop. 187.

East Brook'field, a thriving post-village of Brookfield township, Worcester co., Mass.

East Bruns'wick, a township of Middlesex co., N. J. Its inhabitants are extensively engaged in fruit-culture for the New York market. Pop. 2861.

East Brunswick, a twp. of Schuylkill co., Pa. P. 1661.

East Buf'falo, a twp. of Union co., Pa. Pop. 1011.

East'burn (JAMES WALLIS) was born in London, England, Sept. 26, 1797, and graduated at Columbia College in 1816. He was ordained deacon Oct. 20, 1818, by Bishop Hobart in Trinity church, New York, and soon after became rector of St. George's, Accomac, Va. He wrote an admirable Trinity hymn, besides versions of some of the Psalms. In 1817–18 he and his friend Robert C. Sands produced a poem called "Yamoyden." He died at sea Dec. 2, 1819.

Eastburn (MANTON), D. D., a Protestant Episcopal bishop, a brother of the preceding, was born in England Feb. 9, 1801. He came to New York, graduated at Columbia College in 1816, was ordained in 1822, became rector of the church of the Ascension in New York in 1827, and bishop of Mass. in 1843. He published lectures and addresses, "Lectures on the Epistle to the Philippians" (1833), and other works. Died Sept. 12, 1872.

East Caln, a township of Chester co., Pa. Pop. 1309.

East Canaan, a post-village of Grafton co., N. H., on the Northern R. R., 52 miles N. of Concord. It has five churches, one newspaper, two steam-mills, and numerous stores and shops. Principal business, farming and the manufacture of lumber. C. O. BARNEY, ED. "REPORTER."

East Chatham, a post-village of Chatham township, Columbia co., N. Y., on the Boston and Albany R. R., 29 miles S. E. from Albany, has a number of manufactories.

East Chester, a post-township of Westchester co., N. Y. It contains Mt. Vernon and numerous other suburban villages near New York City. Pop. 7491.

East Chester, a twp. of Chester co., S. C. Pop. 732.

East Chi'na, a twp. of St. Clair co., Mich. Pop. 297.

East Cleveland, a p.-twp. of Cuyahoga co., O. P. 5050.

East Cocal'ico, a twp. of Lancaster co., Pa. P. 1992.

East Conemaugh, borough, Cambria co., Pa. P. 381.

East Cov'entry, a p.-twp. of Chester co., Pa. P. 1318.

East Deer, a township of Alleghany co., Pa. P. 1390.

East Don'egal, a twp. of Lancaster co., Pa. P. 3254.

East Dorset, a post-village of Dorset township, Bennington co., Vt., on the Harlem Extension R. R., 25 miles S. of Rutland. It has marble-quarries of great value.

East Douglas, a post-village of Douglas township, Worcester co., Mass., on the Boston Hartford and Erie R. R., 16 miles S. S. E. of Worcester and 46 miles S. W. of Boston. The extensive works of the Douglas Axe Co. are here. Pop. about 1500. SPENCER BROTHERS,
PUBS. OF THE "WORCESTER SOUTH COMPENDIUM."

East Earl, a township of Lancaster co., Pa. Pop. 2310.

East Eden, Me. See EDEN.

East Elma, a post-village of Elma township, Erie co., N. Y. Pop. 112.

Eas'ter [Ger. *Oster;* Gr. *πάσχα*; Lat. *pas'cha;* Fr. *pâques;* etymology doubtful], the principal festival of the Christian year, observed in commemoration of the resurrection of our blessed Lord. The returns of this anniversary were originally regulated, and in imitation of this early usage have always continued to be, by the calendar of Judea, in which the months were conterminous with the revolutions of the moon. A mean lunation being, roughly, twenty-nine and a half days long, twelve lunar months, or a lunar year, fall short of a solar year by about eleven days. The beginning of the Jewish year therefore goes backward on the natural year eleven days annually, requiring an intercalary month to be introduced in the third year, and again in the sixth, ninth, eleventh, fourteenth, and so on. Any anniversary regulated by such a calendar as this is consequently *movable* in reference to a calendar regulated by the sun. The Resurrection took place just after the Jewish feast of the Passover, which was held on the fourteenth day of Nisan, the first month of the year—that is to say, the fourteenth day of the moon, or not far from the time of full moon. The Christians of Jerusalem, and after them those of the Asiatic churches generally, were accustomed to hold the feast of Easter on this same day or simultaneously with the Jewish Passover. This usage was unacceptable to the Gentile churches in Italy and the West generally, which preferred to celebrate Easter on the Sunday following the fourteenth day of the moon; and the difference of practice in this particular led to grave dissensions between the East and West, which were at length pacified by the agreement reached in the Council of Nicæa (A. D. 325), to make the Western usage universal. Since this early period Easter has always been observed throughout the world on the Sunday following the fourteenth of that lunation of which this fourteenth day falls on the 21st of March or next later. In order to find the time of Easter for any given year, it would seem that we should calculate the exact time of the new moon in that year for March, and try whether the fourteenth day of that moon (the day of new moon itself being counted the *first*) would fall not earlier than the 21st; in which case the Sunday following this fourteenth day might be presumed to be Easter. But should this fourteenth day fall earlier than the 21st of March, we should conclude that the new moon of April must be taken. The ecclesiastical calendar, however, is only nominally dependent on the moon in the heavens, the true moon and the calendar moon sometimes differing in their age more than two days. The practical reason for this is, that if the astronomical time of new moon is taken, this time will not be the same in the local times of different longitudes; so that a meridian may always be assigned such that the same new moon may fall on different calendar days on different sides of it. And if the calculation is very nicely made, when new moon happens exactly at midnight of Saturday or Sunday in the middle of a large city like London, the east and west halves of the city may have their Easter upon two very different days. The ecclesiastical moon is therefore an ideal or artificial moon; and in determining the beginning and end of each lunation no account is taken of any differences smaller than a day. In order to divest the ecclesiastical calendar as much as possible of complexity, advantage is taken of the fact discovered by Meton, an Athenian astronomer in the fifth century before our era, that in a period of nineteen solar years the sun and the moon return almost exactly to the same relative positions which they occupied at the beginning of this period, the difference amounting to little more than the space the moon would move over in two hours. The calendar therefore assumes that the moons determining Easter will recur in the same order every nineteen years throughout an entire century, and sometimes throughout two or three centuries. The Easters themselves do not therefore necessarily recur on the same days of the month of March or April in each of these successive series of nineteen years, but would do so if the same days of the week always corresponded to the same days of the month. This, however, is not usually the case; and as Easter must be Sunday, it is necessary, in order to fix definitely the date of Easter in any given year, to know both the place of the year in the series of nineteen (or in the Metonic cycle) and also the day of the week on which the year began, or (what is practically the same thing) the dominical letter for the year. Various methods have been given for finding Easter, but all of them commence, expressly or implicitly, with the determination of these two elements. The rules given by Prof. de Morgan in the "Companion to the British Almanac" for 1845 occupy about a page. The formulæ of Delambre, in the first volume of his "History of Modern Astronomy," and those of Gauss, given in the first volume of the "Theoretical and Practical Astronomy" of the same writer, though concise as mathematical expressions, involve much laborious computation in their practical application. The following rules, however, originally devised by the writer of the present article, are very simple and easy. It is to be observed, first, that the fourteenth day of the Easter moon, being approximately the time of full moon, is called the *paschal full moon.* The number of the year in the lunar cycle is also called the Golden Number. (See GOLDEN NUMBER.) Then, supposing that we know the golden number and the dominical letter, we find, for the present century, the paschal full moon as follows:

If the golden number is *odd:* To four times the golden number add *ten;* and

If the golden number is *even:* To four times the golden number add *twenty-five.*

The result, in either case, if greater than twenty and less than fifty, is the date of paschal full moon, *considered as a day of March* (that is to say, if it happens to be, say, thirty-three, it is the thirty-third of March = the second of April, and so on). If not greater than twenty and less than fifty, add *thirty,* or subtract *thirty,* or *twice thirty,* if necessary to make it so, and the result is once more paschal full moon.

Then, to find Easter: To the constant number *eighteen* add the numerical value of the dominical letter (*i. e.* A = 1; B = 2; C = 3, etc.), and the sum, if greater than the value of paschal full moon just found, is the date of Easter; but if not, add *seven,* or *twice seven,* or *three times seven,* and so on till a total is obtained which exceeds that value; and this total is the date of Easter considered as a day of March.

To find the golden number and the dominical letter: In either case first separate the hundreds in the number expressing the given year of our Lord from the years less than a hundred, and treat the parts independently of each other. First, for the dominical letter: If the hundreds be divided by *four,* the remainder from the division will have

one or other of the following values—viz., 0, 1, 2, 3. And the dominical letters belonging to the hundreds which give these remainders respectively will be A, C, E, G = 1, 3, 5, 7. These, for convenience, call *centurials*. Then for the *years* take half the largest number divisible by *four*—*i. e.* half the number of the latest leap-year—increase this by *seven*, and subtract the excess of fours (*i. e.* the remainder left in the previous division by four). To this result add the centurial, and the excess of sevens in the sum will be the value of the dominical letter; it being observed that if there is no excess the dominical letter has the value of seven itself, or is G. Leap-years have two dominical letters—one for January and February; the other, which is less than the former by a unit, for the remainder of the year. This last, which only is used in finding Easter, is that given by the rule.

To find the dominical letter for *Old Style* the process is the same except as to the centurial. The centurial for old style is found by adding *three* to the number of *hundreds*, and suppressing *sevens*. Thus, if the hundreds be *fifteen*, we have $15 + 3 = 18$. And 18 with seven dropped as often as possible, leaves 4, which is the old style centurial. If there is *no* excess of sevens, the centurial is seven itself.

Secondly, for the golden number: Add a unit to the number expressive of the given year; then divide the *years* by *twenty*, and add the quotient to the remainder. Next divide the centuries by *four*, and add the quotient to *five times* the remainder. Finally, add the two results, and the sum, if nineteen or less, is the golden number. If it exceeds nineteen, drop nineteen, or, if necessary, twice nineteen, and the number left, being not greater than nineteen, will be the golden number.

Take, as an example, the year 1873. For the dominical letter: $18 \div 4$ gives 2 remainder, and the *centurial* is accordingly 5. The number of the largest leap-year in 73 is 72, and the half of this is 36. Then $36 + 7 = 43$, and $43 - 1 = 42$. Finally, $42 + 5$, with the sevens suppressed, is evidently $5 = E$, which is the dominical letter of 1873.

For the golden number: $1873 + 1 = 1874$. Then, $74 \div 20 = 3$, with 14 remainder, and $14 + 3 = 17$. Also, $18 \div 4 = 4$, with 2 remainder, and $2 \times 5 + 4 = 14$. Then, $17 + 14 = 31$, and $31 - 19 = 12$, the golden number for 1873.

For Easter in 1873: $12 \times 4 + 25 = 73$. Then $73 - 30 = 43$, or paschal full moon is the 43d day of March. To 18 add 5, the value of the dominical letter, and the result, 23, is smaller than the date of paschal full moon. But $23 + 7 + 7 + 7 = 44$, which is greater than that date (43), and Easter is the 44th day of March, or the 13th day of April.

There is one case not provided for in the foregoing. If in finding paschal full moon we obtain a result which is *exactly twenty* or *exactly fifty*, adding or subtracting thirty will not bring it between those limits. In this case paschal full moon must be taken at 49. There is also an irregularity arbitrarily introduced by the mathematicians of Pope Gregory XIII., by whom the calendar was regulated, which is this: Should the rules above laid down give *forty-nine* directly as the date of paschal full moon, *this must be reduced to forty-eight in case the golden number is* 12 *or upward;* not otherwise.

For centuries earlier or later than the present, the rules are the same, except that the numerical terms *ten* and *twenty-five* used in finding paschal full moon are liable to variation (but do not always vary) in passing from century to century. The second of these terms always exceeds the first by *fifteen*. The first may be found for any century up to the forty-second by the following rule: From the number of the centuries take its fourth part and its third part (disregarding fractions in both cases), and increase the result by *two*. Thus, for the twentieth century we have $20 - 5 - 6 + 2 = 11$. Hence, these numerical terms for the next century will be 11 and 26. In *old style* dates these numerical terms are invariable, and are always *two* for odd golden numbers and *seventeen* for even. For more complete information on this subject the reader is referred to the essay above mentioned. The author of this article has also designed an instrumental contrivance for finding Easter by inspection, for any year from the beginning of the Christian era down to the end of hundredth century, in old style or new. This is constructed of card-board, and a facsimile of it, reduced in size, is given below. In the centre is a rotary disk, on the lower border or limb of which are inscribed the numbers below 100 which consist of even *twenties*, and also the zero. These are called *vigesimals*. On the upper limb appear all the numbers less than twenty, called *residuals*, the leap-year numbers being written twice. Around this disk is a fixed ring, bearing the dominical letters above and the centurial numbers below—the new style centurials being on the left, and the old style centurials on the right. The centurial numbers here employed are simply the remainders left in dividing the hundreds by 4 for new style and by 7 for old style. To use this for finding the dominical letter, turn the disk till the proper vigesimal of the given year stands opposite the proper centurial; then opposite the proper residual will be found the dominical letter (or letters) of the year. In case of leap-years there will be found two such letters, of which the lesser or right-hand one is the Easter dominical letter.

Around the fixed ring here described is a rotary ring bearing the numbers from 1 to 19 (the golden numbers), twice repeated, and at the left of these the vigesimals, arranged in regular order. Outside of this rotary ring is a second fixed ring, which bears on the left the numbers 0 to 19, arranged *en échelon*, so as to allow the natural sequence to be observed. These are called the centurials of the lunar cycle, and are simply what remains after suppressing the *nineteens* out of the hundreds in the given year of our Lord. Thus, in the year 4173 there are *forty-one* hundreds, from which, if we suppress $19 \times 2 = 38$, there will remain 3, which is the centurial for the forty-second century. On the right the same fixed ring bears the residuals, or excesses of twenties in the years of the incomplete century, in which it is not necessary to duplicate the leap-year numbers. When the movable ring is turned so that the proper vigesimal stands opposite the proper centurial, the golden number for the year will be found opposite the proper residual.

On this same fixed ring, outside of the numbers already mentioned, is an annular row of figures distributed without any obvious order, which embraces all the possible golden numbers from 1 to 19, each entered twice. Of these, all up to 11 are printed in full face; all from 12 to 19 inclusive in outline. Their use will presently appear.

Around this second fixed ring is a second rotary ring, on which are inscribed all the days of March and April on which paschal full moon or Easter can fall; together with the calendar letters belonging to them severally. From the 17th to the 25th of April the day numbers and letters are entered twice, the second or inner series being advanced beyond the outer by a single place. This same rotary ring also bears an arrow, which is designed to be used as an index. Finally, surrounding this rotary ring there is another fixed ring, in the several divisions of which are written the centuries from 15 up to 100, none below 15 being necessary, as the new style, or Gregorian reckoning, began in 1582. The use of the last-mentioned rotary ring is to find, first, the date of paschal full moon, and subsequently, by consequence, the date of Easter. In employing it, the ring is turned until the arrow points to the golden number for the year, when the date of paschal full moon will be found opposite the proper centurial number in the outer fixed ring. Then, looking along the series of letters to the right of the date of the paschal moon, Easter will be found immediately over the next succeeding dominical letter for the year. If the time of Easter for years before 1582 is sought, the paschal moon will be found, not opposite the century, but opposite the words "Old Style" written in one of the compartments into which the outer fixed ring is divided, and Easter will be opposite the proper dominical letter next following, as before.

As it is arbitrarily ruled that the paschal full moon shall never fall later than April 18th, and as a consistent method of computation or of instrumental determination would make it sometimes fall on the 19th, the double series of days and letters is introduced at the end of April in the outer revolving ring to meet this case. When, therefore, in the use of the instrument, paschal full moon would seem to fall on the 19th of April by the series of outer, full-faced figures, we must pass to the inner series of figures printed in outline, which will give paschal full moon on the 18th. Also, if the outer series of full-faced figures should at any time directly give paschal full moon on the 18th, we must pass to the inner series again, and make paschal full moon the 17th, *provided the arrow stands opposite a golden number printed in outline*, but not otherwise. When the light-faced numbers are thus used instead of the full-faced for the paschal moon, the light-faced letters must of course also be used in finding Easter.

The table in the figure is adjusted for the Easter of 1873. In 73 the vigesimal is 60 and the residual is 13. For 18 (centuries) the centurial is 2, and the Easter sought belongs to new style. It is seen that, 60 being opposite 2, the residual, 13, is opposite E; which is the dominical letter of 1873. In the first rotary ring the same vigesimal, 60, is opposite the golden number centurial, which is 18; and under the residual 13 we have 12, the golden number for 1873. Bringing, finally, the arrow of the outer rotary ring opposite to the golden number, 12, we find under 18 in the outer row of centuries, the 12th of April, which is the date of paschal full moon for 1873; and opposite E, the dominical letter of the year next following the date of the paschal full moon thus found, we have April 13th for the date of Easter.

This little instrument is useful in the solution of many questions connected with chronology and the calendar, besides that for which it was expressly constructed. Any person possessed of a little mechanical skill can construct a working instrument of this kind for himself, by copying this diagram on a scale about one-fourth larger.

The Churchman's Companion to the Calendar.

BY PRESIDENT BARNARD.

The principal festivals and fasts of the Church dependent for the time of their celebration upon Easter are Septuagesima Sunday, nine weeks before Easter; Ash Wednesday, which is the Wednesday of the seventh week before Easter; Good Friday, which is the Friday next before Easter; Ascension Day, which is the Thursday of the sixth week after Easter; Whitsun Day, the seventh Sunday after Easter; and Trinity Sunday, the eighth Sunday after Easter.

F. A. P. BARNARD, *Columbia College.*

Eas'ter Island, a small island of volcanic origin in the Pacific Ocean, is in lat. 27° 6′ S., lon. 109° 30′ W., and is 12 miles long and 4 miles wide. It rises 1200 feet above the level of the sea, and is scantily supplied with water. It is the easternmost inhabited Polynesian island. Its people are cannibals. They have traditions of their ancestors having come from the island of Oparo, 1900 miles distant. The island has wonderful colossal statues in stone, but the natives have no account of their sculptors.

Eas'tern Archipel'ago, The, also called **The Malay Archipelago** and **Australasia,** comprises all those islands which lie in the north-eastern part of the Indian Ocean. Area, about 650,000 square miles. They are divided, according to their position, into three groups. The first group comprises the Molucca Islands, the Spice Islands, Banda, Amboina, Ternate, and the Philippines; the second group consists of Sumatra, Java, and the small Sunda Islands east of Java, from Bali to Timorlaut; and the third comprises Borneo and Celebes, together with a large number of smaller islands, as Billiton, Banca, Singapore, etc. In its position this archipelago forms the connection between Asia and Australia. The soil is very fertile, and resembles in its products that of the neighboring countries of Asia. It has therefore attracted at all ages almost every nation. The original inhabitants consisted of many tribes, but all belonged to one race called the MALAY RACE (which see). At a later age the Arabs came to these islands, and as a consequence Mohammedanism gained a good many followers. At last, the Europeans came, and subjugated almost the entire archipelago, and especially the Dutch have become masters of the greatest number of islands; while the Spaniards have only the Philippines; the Portuguese, Dilli and part of Timor; and the British, Singapore and Labuan. Besides these races, a large number of Chinese are found throughout the islands. The total population is estimated at 22,829,000.

Eastern Churches is a title given to certain bodies of Christians of Western Asia, Eastern Europe, and of Africa. These are the Greek, the Armenian, the Jacobite (or Syrian), the Nestorian, the Coptic, and the Abyssinian Church, and the Christians of St. Thomas. The entire population connected with the Eastern churches may be estimated at about 76,500,000, of whom 70,000,000 are of the Greek Church, 3,000,000 are Armenians, 3,000,000 Abyssinians, and the remainder belong to the other communions.

Eastern Empire. See BYZANTINE EMPIRE.

Eastern Question, in European diplomacy, signifies the problem of the future of Turkey, especially of the European portion; and in a more extended sense expresses those difficulties which have from time to time arisen with regard to the relations of Turkey to Russia, Austria-Hungary, Greece, and Egypt; the affairs of the Danubian provinces; the navigation of the Black Sea; the supposed ambitious designs of Russia; and the difficulties between Christians and Mohammedans in Palestine, Crete, and other parts of the East. These questions have led to some of the most serious complications which have happened in

Europe during the last one hundred years. (See TURKEY, RUSSIA, CRIMEAN WAR.)

Eastern Rite, or **Oriental Rite.** Those branches of the Roman Catholic Church which acknowledge the supremacy of the pope, but which do not employ the Latin ritual, are said to be of the Eastern rite. In fact, they employ several different rituals. According to the "Roman Almanac" for 1872 ("La Gerarchia Cattolica"), there were bishoprics of the following rites: I. Armenian; II. Coptic (1, Egyptian; 2, Ethiopian or Abyssinian); III. Greek (1, Roumanian; 2, Ruthenian; 3, Bulgarian; 4, Melchite); IV. Syrian (1, Syrian; 2, Syro-Chaldæan; 3, Maronite). The aggregate number of episcopal sees, according to the same authority, in 1872, was 78; of which five were patriarchal and twenty-six archiepiscopal. The United Christians of St. Thomas have no bishop of their own, but are under the vicar-apostolic of Verapoli, who is of the Latin rite, but the people and clergy use, in part, a modified Syrian rite.

The Eastern rite differs from the Latin, not only in the languages employed in the service (Greek, Slavic, Armenian, Syriac, Ethiopic, Coptic), but generally also in the use of both elements for the laity in the Eucharist, and in the permission of marriage to the lower clergy.

Eastern Shore, a name given to those parts of Maryland and Virginia which are E. of Chesapeake Bay, and sometimes applied to the whole peninsula, including, in addition, the entire State of Delaware. The Eastern Shore has been proverbial for its conservatism, and from the character of its inhabitants claimed the title of "the land of gentlemen;" but it is now traversed by railroads, and the excellence of its soil and climate for peach-culture and market-gardening has caused the development of much industrial enterprise. Its western side is remarkably indented by navigable rivers and creeks, affording great commercial advantages. The waters on both sides abound in oysters, which are a source of great wealth. The fisheries are also extensive. Most of the surface is low and level, but healthy. Malarial fevers are endemic at some places. The climate is singularly mild. Bog-iron ore of fine quality is extensively mined in some parts. Kaolin is found in the extreme N. Oak timber is cut in some parts for market. The Eastern Shore was the scene of many of the labors and triumphs of Asbury and the early Methodists, and it is still one of the strongholds of their faith. Its people are famed for hospitality and generosity.

East Ev'ans, a post-village of Evans township, Erie co., N. Y., 4 miles from Angola Station, on the Lake Shore R. R. Pop. 100.

East Fair'field, a twp. of Crawford co., Pa. P. 741.

East Fal'lowfield, a township of Chester co., Pa. It is traversed by the Wilmington and Reading R. R. Pop. 1291.

East Fallowfield, a township of Crawford co., Pa. It is traversed by the Franklin branch of the Atlantic and Great Western R. R. Pop. 1167.

East Felician'a, a parish in the E. of Louisiana. Area, 480 square miles. The Mississippi River touches the S. W. extremity of this parish, which is bounded on the E. by the Amite. The surface is undulating; the soil is fertile. It is traversed by the Clinton and Port Hudson R. R. Corn and cotton are the chief products. Capital, Clinton. Pop. 13,499.

East Fin'ley, a post-village and township of Washington co., Pa., 17 miles S. S. W. of Washington, the county-seat. Pop. 1186.

East Fish'kill, a post-township of Dutchess co., N. Y., on the New York Boston and Northern R. R. Pop. 2306.

East'ford, a post-township of Windham co., Conn. Eastford Village is 11 miles W. of Putnam, a station on the Norwich and Worcester R. R. It has a savings bank. Pop. 984.

East Fork, a township of Conway co., Ark. Pop. 410.

East Fork, a post-township of Montgomery co., Ill. It is 11 miles E. of Hillsborough, a station on the St. Louis Alton and Terre Haute R. R. Pop. 1421.

East Fork, a township of Barton co., Mo. Pop. 452.

East Fork, a township of Douglas co., Nev. Pop. 132.

East Fork, a township of Haywood co., N. C. P. 286.

East Fox'borough, a post-village of Foxborough township, Norfolk co., Mass., 22 miles S. S. W. of Boston, on the Boston and Providence R. R.

East Frank'lin, a township of Armstrong co., Pa. Pop. 1451.

East Gale'na, a twp. of Jo Daviess co., Ill. P. 856.

East Ger'mantown, a post-village of Jackson township, Wayne co., Ind. Pop. 536.

East Glouc'ester, a post-village of Gloucester township, Essex co., Mass., on the seashore, 2 miles from Gloucester. It is a fashionable summer resort, and has a fine soldiers' monument.

East Go'shen, a township of Chester co., Pa. P. 696.

East Gran'by, a post-township of Hartford co., Conn. Pop. 853. It is 3 miles E. of Granby Station, which is on the New Haven and Northampton R. R.

East Green'bush, a post-township of Rensselaer co., N. Y. Pop. 1845.

East Green'wich, a post-village and township, capital of Kent co., R. I., is on Narragansett Bay and on the Providence and Stonington R. R., 14 miles from Providence. It has a national bank, a savings bank, an academy (under the supervision of the Boston University), a weekly newspaper, two cotton-mills, one woollen-mill, print-works, free library, six churches (one of them built and supported by a single individual), three hotels, a court-house and jail, and a good harbor. It is one of the healthiest places on the seaboard. Incorporated Oct. 31, 1677. Pop. of township, 2660.

W. N. SHERMAN, ED. "R. I. PENDULUM."

East Grove, a township of Lee co., Ill. Pop. 765.

East Had'dam, a post-township of Middlesex co., Conn. It has one national bank, manufactures of various kinds of goods, and a brisk trade. The town lies on the E. bank of the Connecticut River, 30 miles below Hartford. Pop. 2951.

East'ham, a post-township of Barnstable co., Mass., on the Cape Cod R. R., 24 miles from Barnstable. Pop. 668.

East Ham'burg, a post-township of Erie co., N. Y. It has five churches, and is the seat of "East Hamburg Friends' Institute." It is 7 miles E. of Hamburg Station, which is on the Lake Shore R. R. Pop. 2270.

East Ham'ilton, a post-village of Hamilton township, Madison co., N. Y. It is on the Utica division of the Delaware Lackawanna and Western R. R. Pop. 53.

East Hamp'ton, a post-village of Chatham township, Middlesex co., Conn., on the New Haven Middletown and Willimantic R. R.

East Hampton, a post-village of Hampshire co., Mass., on the New Haven and Northampton R. R., 5 miles S. W. of Northampton, and on a branch of the Connecticut River R. R. It has a national and a savings bank, and manufactures of suspenders, pumps, thread, vulcanized rubber, buttons, etc., and is the seat of Williston Seminary, an excellent school for young men. It has four churches, a public library, a fine town-hall, a fire department, and fifteen public schools. Pop. of East Hampton township, 3620.

East Hampton, a post-township of Suffolk co., N. Y. Pop. 2372. At the beach of East Hampton is very fine surf-bathing. The township is the easternmost part of Long Island.

East Han'over, a twp. of Dauphin co., Pa. P. 1723.

East Hanover, a post-township of Lebanon co., Pa. Pop. 1737.

East Hard'wick, a post-village of Hardwick township, Caledonia co., Vt., on the Portland and Ogdensburg R. R., 31 miles N. W. of St. Johnsbury. It has one weekly newspaper.

East Hart'ford, a post-township of Hartford co., Conn., on the Connecticut River opposite Hartford, with which it is connected by a bridge, and by the Hartford Providence and Fishkill R. R. Pop. 3007.

East Ha'ven, a post-township of New Haven co., Conn. It is on the Shore Line R. R. and on Long Island Sound, 4 miles E. of New Haven. Here is Saltonstall Lake, which affords large quantities of ice. Copper-smelting is largely carried on here. Pop. 2714.

East Haven, a post-township of Essex co., Vt. P. 191.

East Hat'ley (called also **Hatley** and **Charleston-Hatley**), a post-village of Hatley township, Stanstead co., Quebec, Canada, 2½ miles from Massawippi Station, is the seat of Charleston Academy, and has a large cheese-factory. Pop. about 300.

East Ha'verhill, a post-village of Haverhill township, Grafton co., N. H., on the Boston Concord and Montreal R. R., 5 miles E. of Haverhill. It has manufactures of lumber, charcoal, and starch. Here is the Owl's Head, a lofty cliff of rock. The village stands at the base of Moose Hillock Mountain.

East Hemp'field, a post-township of Lancaster co., Pa. It is on the Lancaster branch of the Reading and Columbia R. R. (Petersburg Station). Pop. 2602.

East Henriet'ta, a village of Henrietta township, Monroe co., N. Y., is the seat of Monroe Academy.

East Humboldt Mountains, a lofty range in Elko co., Nev., some of whose peaks exceed 15,000 feet in height. Secret Valley and Fremont Pass cut the range, which is in parts well timbered with pines and firs, affording lumber. Its snows feed the springs by which Lakes Franklin and Ruby are supplied. Silver is reported to exist in the mountains.

East Hunt'ingdon, a township of Westmoreland co., Pa. Pop. 2134.

East In'dia Com'pany, a famous joint-stock trading company formed in England to carry on commerce with the East Indies. In 1600 a royal charter was granted to a number of London merchants under the title of "The Governor and Company of Merchants of London trading to the East Indies." This charter gave them an exclusive right to trade for fifteen years within certain limits, which were of immense extent. They established factories at Surat, Cambay, and other places in India about 1612. The charter was renewed from time to time. Madras was founded in 1639, and Calcutta in 1645. In 1698 the king granted a charter to a rival company, but the two companies were united in 1702 under a new charter, with the title of "The United Company of Merchants trading to the East Indies." Every person who held £500 of the company's stock became a member of the court of proprietors, who annually chose a court of directors composed of twenty-four members, each of whom must own £2000 of the stock. The executive power of the company was vested in this court of directors, each of whom retained his office for four years.

In 1708, Parliament granted the company the exclusive privilege of trading to all places eastward of the Cape of Good Hope to the Strait of Magellan. The monopoly of the China trade was abolished in 1833, and the company was then deprived of its original character as a commercial association. Many years before this date the company had become a great territorial power, and had laid the foundation of the British empire in India. By conquest and other means the company obtained sovereign power over vast regions of Hindostan. This region was coveted by the company not only as a source of commercial profit, but as a field in which their relatives might enrich and distinguish themselves by political and military enterprises. By the act 3 and 4 William IV. the functions of the East India Company were rendered merely political. It was to continue to govern India, with the concurrence and under the supervision of the board of control. All the real and personal property belonging to the company on April 22, 1834, was vested in the Crown, and to be held or managed by the company in trust for the same; and the stockholders were to receive an annual dividend of 10½ per cent. on a capital of £6,000,000 out of the revenues of India. The Sepoy mutiny of 1857, which was repressed with a great expenditure of life and treasure, combined with other causes, induced Parliament to transfer the dominion of India to the Crown. This change was effected, after strenuous opposition from the company, in 1858. (See INDIA.) The political affairs of British India are now managed by a minister, who is styled secretary of state for India, and a council of fifteen members.

The Scottish East India Company was formed in 1695, but soon met a calamitous fate.

The Danish East India Company was first organized in 1618. It was dissolved in 1634 and reorganized in 1670. A new company was formed in 1686, and a fourth in 1731. The king purchased the rights of the company in 1777. The charter was renewed in 1792, but the company has long since ceased to exist.

The Dutch company was formed in 1595, and several companies of the kind were united into one in 1602.

The French company was established in 1664, and dissolved by Louis XV. in 1770. A new one was formed in 1785, and dissolved in 1790.

A Swedish company was formed in 1741, and reorganized in 1806.

The Ostend India Company was created in 1718. In 1721 all Dutchmen were prohibited from supporting it, on pain of death. The emperor Charles VI. dissolved it in 1731.

East In'dies [Fr. *Les Indes Orientales*], a collective term vaguely applied to Hindostan, Farther India, and the Malay Archipelago. (See INDIA.)

East Ir'ving, a village of Iowa township, Benton co., Ia. Pop. 84.

East Jaf'frey, a post-village of Jaffrey township, Cheshire co., N. H., on the Monadnock R. R., 10 miles N. of Winchendon, Mass. It has a national and a savings bank, three churches, and manufactures of wooden-ware, shoes, boxes, and cotton drillings.

East Kings'ton, a post-township of Rockingham co., N. H., on the Boston and Maine R. R. It has manufactures of shoes, etc. Pop. 553.

East Lackawan'nock, a township of Mercer co., Pa. Pop. 672.

East Lake, a township of Dare co., N. C. Pop. 251.

East'lake (Sir CHARLES LOCK), F. R. S., D. C. L., an English historical painter, born at Plymouth Nov. 17, 1793. He visited Italy in 1817, and passed about nine years in Rome (1820–29). In 1828 he exhibited an admired picture of "Pilgrims to Rome Coming in Sight of the Holy City." He was chosen a Royal Academician in 1830, and became president of the Royal Academy in 1850. Among his works are "Christ Weeping over Jerusalem" (1841), "Helena" (1849), "Violante" (1853), and "Beatrice" (1855). He was appointed director of the National Gallery in 1855, and wrote "Materials for a History of Oil Painting" (1847), "Contributions to the Literature of the Fine Arts," and other works. He translated Goethe's "Farbenlehre" and Kugler's "History of Painting." Died Dec. 23, 1865. A biography of Eastlake was published by his widow, Lady Eastlake (born Elizabeth Rigby), in the second series of the "Contributions to the Literature of the Fine Arts" (1870).

East Lam'peter, a township of Lancaster co., Pa. Pop. 2263.

East Lan'caster, a village of Berne township, Fairfield co., O. Pop. 566.

East'land, a county in N. Central Texas, has an area of 790 square miles. It is drained by the sources of Leon River. The eastern part is densely timbered with oak. A part of the county is rocky and hilly, but there are fine level plains which are fertile. Pop. 88.

Eastland, a village of Eastland co., Tex. Pop. 88.

East Lew'istown, a post-village of Beaver township, Mahoning co., O., 5 miles N. of Columbiana, which is a station on the Pittsburg Fort Wayne and Chicago R. R. Pop. 105.

East Liberty, a suburb of Pittsburg, Pa. (Allegheny co.), 5 miles E. of the city, on the Pennsylvania R. R., is the seat of the Western Pennsylvania Hospital, and has many fine residences.

East Lin'coln, a twp. of Logan co., Ill. Pop. 3397.

East Liv'ermore, a post-township of Androscoggin co., Me., on the Androscoggin R. R. and River, 71 miles N. of Portland. It has manufactures of lumber, condensed milk, clothing, carriages, needles, ploughs, etc. Pop. 1004.

East Liv'erpool, a post-village of Columbiana co., O., on the Ohio River and the Cleveland and Pittsburg R. R., 44 miles W. N. W. of Pittsburg. It has extensive potteries and manufactures of stone-ware, and two weekly newspapers. Pop. 2105.

East Lyme, a post-township of New London co., Conn. Pop. 1506.

East Machi'as, a post-township of Washington co., Me., 4 miles N. of Machias Port. It has an academy, three churches, and extensive manufactures of lumber, carriages, etc. Pop. 2017.

East Maho'ning, a twp. of Indiana co., Pa. P. 1139.

East'man, a post-twp. of Crawford co., Wis. P. 1214.

East'man (CHARLES GAMAGE), an American poet and journalist, born at Fryeburg, Me., June 1, 1816. He edited the "Spirit of the Age" and the "Vermont Patriot," which latter was published at Montpelier. He has also been connected with various other journals and contributed much to periodical literature. In 1848 he produced a volume of poems.

Eastman (MARY HENDERSON) was born in Warrenton, Va., in 1818. Her father was Dr. Thomas Henderson, and in 1835 she married Captain Seth Eastman of the U. S. army, and long resided on the frontier. She has published many works illustrative of Indian character, among which are the following: "Dahcotah" (1849), "Romance of Indian Life" (1852), "Chicora" (1854), and also "Aunt Phillis's Cabin" (1852), a reply to "Uncle Tom's Cabin." This work had a very large sale.

Eastman (PHILIP), LL.D., born in Chatham, N. H., Feb., 1799, graduated at Bowdoin College in 1820, became a lawyer, and practised at North Yarmouth, Harrison, and Saco, Me. Died Aug. 7, 1869. He was one of the editors of the "General Statutes of Maine" (1840), and published a "Digest" of Maine law reports (1849).

Eastman (SETH), an army officer, born in Brunswick, Me., Jan. 24, 1808, graduated at West Point in 1829. He entered the infantry, and was teacher of drawing at West Point (1833–40). He published a "Treatise on Topographical Drawing" (1837) and a "History, etc. of the Indian

Tribes" (1850–57). In 1863 he was retired with the rank of lieutenant-colonel and brevet brigadier-general.

East'mann, a township of Pulaski co., Ark. P. 1731.

East Marl'borough, a twp. of Chester co., Pa. P. 1401.

East Mauch Chunk, a post-borough of Carbon co., Pa., on the Lehigh River opposite Mauch Chunk, and on the Lehigh and Susquehanna R. R. Pop. 1585.

East Monroe, a post-village of Fairfield township, Highland co., O., on the Marietta and Cincinnati R. R. (Monroe Station). Pop. 163.

East Montpe'lier, a post-township of Washington co., Vt. It has manufactures of woollen goods and musical instruments, and produces much maple-sugar. Pop. 1130.

East Morrisa'nia, a village of Morrisania township, Westchester co., N. Y., has an academy and a convent of Ursuline nuns.

East Mor'row, a village of Salem township, Warren co., O., is a suburb of MORROW (which see). Pop. 262.

East Mount Ver'non, a village of East Chester township, Westchester co., N. Y. Pop. 500.

East Nant'meal, a twp. of Chester co., Pa. P. 920.

East Nas'sau, a post-village of Nassau township, Rensselaer co., N. Y. Pop. 192.

East Nel'son, a twp. of Moultrie co., Ill. Pop. 1021.

East New Mar'ket, a post-township of Dorchester co., Md. Pop. 2347.

East New York, a post-village of New Lots township, Kings co., N. Y., on the Brooklyn Central branch of the Long Island R. R., 6 miles S. E. of New York City. It has two weekly newspapers and manufactures of shoes, etc. It is connected with the Brooklyn ferries by horse-railroad.

East Norwe'gian, a twp. of Schuylkill co., Pa. P. 983.

East Not'tingham, a twp. of Chester co., Pa. P. 1400.

East Oak'land, a twp. of Coles co., Ill. Pop. 1500.

Eas'ton, a post-twp. of Fairfield co., Conn. P. 1288.

Easton, a post-twp. of Leavenworth co., Kan. P. 1169.

Easton, a post-village, capital of Talbot co., Md., is on Tred Haven Creek, a navigable branch of the Great Choptank River, 16 miles from Chesapeake Bay and 35 miles E. S. E. of Annapolis, and on the Maryland and Delaware R. R., 42 miles from Clayton, Del., in a fine peach-growing region. It has a good trade, a national bank, a building association, a peach-canning establishment, a fruit-drying house, and manufactures of lumber, sash, castings, and farming implements. It has six churches, an orphan asylum, gas-works, and a high school. It is the seat of a Protestant Episcopal bishop, and has the schools of the diocese of Easton. It has three weekly newspapers. Pop. 2110; of Easton district, 4637. THOMAS K. ROBSON, ED. "STAR."

Easton, a post-township of Bristol co., Mass. Here are extensive shops for the manufacture of spades and shovels. It has a national bank, a savings bank, cotton-mills, a free library, and manufactures of boots, shoes, castings, etc. Pop. 3668.

Easton, a post-township of Ionia co., Mich. P. 1401.

Easton, a post-village of Marion township, Buchanan co., Mo., on the Hannibal and St. Joseph R. R. Pop. 318.

Easton, a post-township of Washington co., N. Y. Pop. 3072. It is the seat of Marshall Seminary, and has important manufactures. Excellent limestone abounds.

Easton, a city, the capital of Northampton co., Pa., is situated at the confluence of the Delaware and Lehigh rivers, the scene of the famous treaty with the Five Nations, recorded as having taken place at the Forks of the Delaware. It is 75 miles from New York by the Central R. R. of New Jersey and the Morris and Essex R. R., and 60 miles from Philadelphia by the Belvidere Delaware R. R. The Lehigh Valley and the Lehigh and Susquehanna R. Rs. traverse the coal-regions and connect it with the North and West, and the unfinished Easton and Amboy R. R. will extend to New York Bay. Easton is the seat of Lafayette College, and has numerous churches, a fine opera-house, gas and water works, two national and two savings banks, three street railways, two daily and four weekly newspapers, etc. Its vicinity abounds in rolling-mills, furnaces, and other manufactories. Pop., exclusive of its extensive suburbs, 10,987. COLE & MORWITZ, PUBS. "ARGUS."

Easton, a post-township of Adams co., Wis. Pop. 338.

Easton (Col. JAMES), a Revolutionary officer, born at Hartford, Conn. He became a resident of Pittsfield, Mass., in 1763. He raised a Berkshire regiment in 1775, served at Ticonderoga, and in Canada under Montgomery, expending his whole fortune in the service. In 1776, after receiving the thanks of Congress, he was obliged by his enemy, Benedict Arnold, to leave the army, and died at Pittsfield, Mass., in poverty.

Easton (NICHOLAS), born about 1593, emigrated from Wales to Ipswich (Mass.) in 1634, and afterwards lived in Newbury, Mass., and Hampton, N. H. Having had trouble with the officials, he removed to Rhode Island in 1638, and built the first house in Newport. He was governor of the United Colonies (Rhode Island, Providence, etc.) 1650–52. Died Aug. 15, 1675.—His son, JOHN EASTON, was governor of Rhode Island (1690–95), and wrote a "Narrative of the Causes which led to Philip's Indian War," which was published in 1858.

East Or'ange, a pleasant post-township of Essex co., N. J., on the Morris and Essex R. R., 12 miles from New York. It has fine suburban residences. Pop. 4315.

East Ot'to, a post-township of Cattaraugus co., N. Y. It has four churches and five cheese-factories. Pop. 1164.

East Pal'estine, a post-village of Unity township, Columbiana co., O. (Palestine R. R. Station), on the Pittsburg Fort Wayne and Chicago R. R.

East Par'is, a village of Bourbon co., Ky. (See PARIS.) Pop. 212.

East Pem'broke, a post-village of Pembroke and Batavia townships, Genesee co., N. Y., is the seat of an academy. Pop. 156.

East Penn, a township of Carbon co., Pa. Pop. 862.

East Penns'borough, a township of Cumberland co., Pa. Pop. 2719.

East Pikeland, a township of Chester co., Pa. P. 826.

East Pike Run, a twp. of Washington co., Pa. P. 817.

East Point, a post-village of Fulton co., Ga., 6 miles from Atlanta, at the junction of the Atlanta and West Point and the Macon and Western R. Rs.

East'port, a port of entry of Washington co., Me., is on Moose Island in Passamaquoddy Bay, at the extreme eastern point of the territory of the U. S. It has a good harbor, in which the tide rises twenty-five feet; also a national bank, seven churches, a savings bank, a fire insurance company, and a newspaper. Its prosperity is mostly derived from the lumber-trade and fisheries. It is a place of great natural beauty. Steamers ply to Boston, Portland, Calais, and St. John, N. B. Pop. of township, 3736.

Eastport, a village of Mill township, Tuscarawas co., O. Pop. 25.

Eastport, a village of Southampton township, Suffolk co., N. Y. Pop. 135.

East Port'land, a post-village of Multnomah co., Or. Pop. 830.

East Prov'idence, a twp. of Bedford co., Pa. P. 1274.

East Providence, a post-township of Providence co., R. I., on a branch of the Boston and Providence R. R., 4 miles E. of Providence. The township is traversed also by the Providence Warren and Bristol R. R., and is on the E. bank of Providence River. Pop. 2668.

East Ran'dolph, a post-village of Randolph township, Cattaraugus co., N. Y., contains several manufactories and has a weekly newspaper.

East River, a post-village of New Haven co., Conn., on the East River, a stream flowing into Long Island Sound, and on the Shore Line R. R., 18 miles E. of New Haven.

East Riv'er, of New York, is a strait connecting Long Island Sound with New York Bay, and separating the city of New York from Brooklyn, which is about three-fourths of a mile distant. It is nearly 20 miles long, and is navigable by large vessels. A bridge is now (1874) in course of construction across this strait at New York. About 7 miles from that city, on this strait, is a narrow and formerly dangerous pass called HELL GATE (which see), from which the obstructions are being removed. The East River is an important arm of New York harbor, and for miles its shores are lined with piers and slips for shipping. Its tides are higher and somewhat later than those which enter the harbor through the Narrows. Hence the phenomenon of double tides often observed in the North River.

East River, a township of Page co., Ia. Pop. 977.

East River, a twp. of Mercer co., W. Va. Pop. 1419.

East River Bridge, a structure now (1874) in process of construction over the East River, for the purpose of connecting the cities of New York and Brooklyn. Mr. John A. Roebling, of Trenton, N. J., was at first the chief engineer for its construction. He had already built two of the finest bridges of this kind in the world—that at Niagara Falls and that at Cincinnati, both of which will be far surpassed in dimensions by the East River suspension

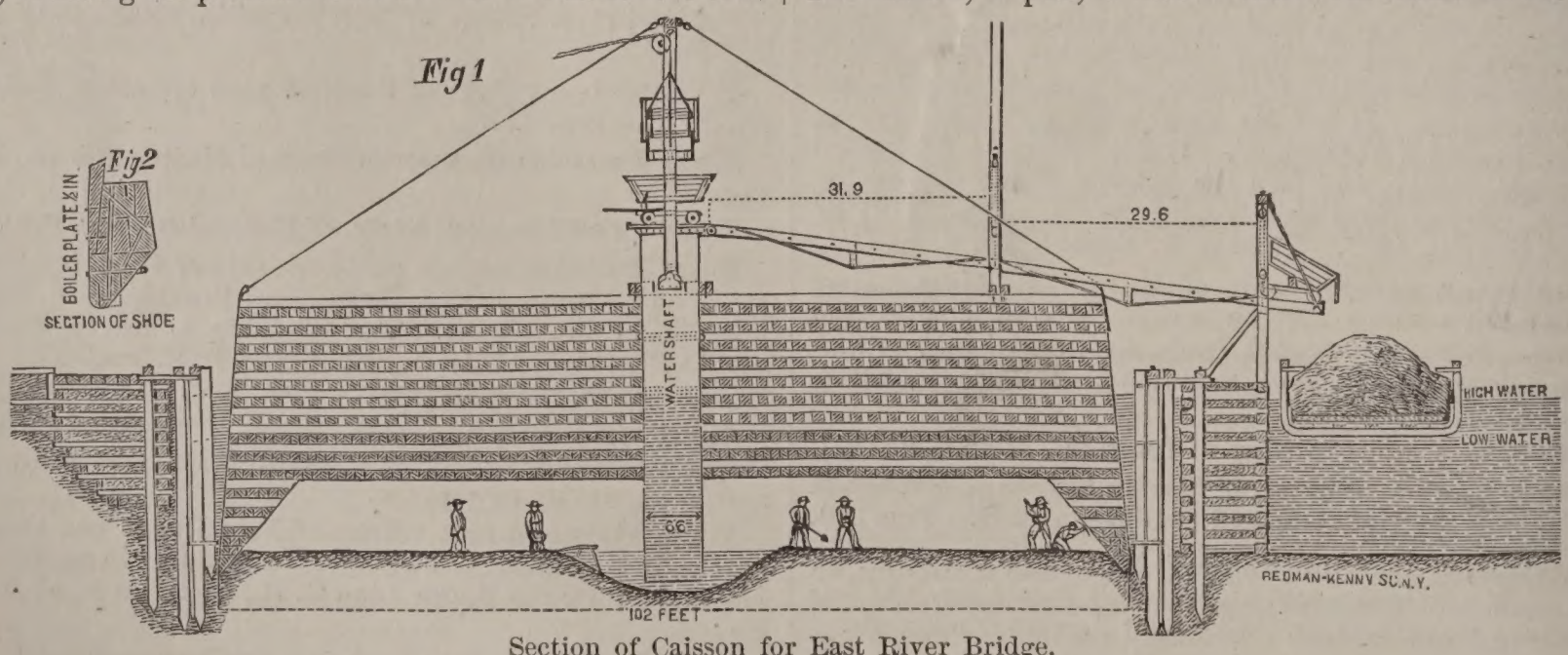
bridge. Including its approaches, it will be over one mile long, and the bottom will be, in clear height, 130 feet over the channel of the river. Mr. Roebling was spared long enough to complete the plans for this colossal work, the execution of which is, since his death, entrusted to his son, Col. W. A. Roebling.

East River Bridge.

The bridge will have only two piers, situated on the shores, thus not in any way obstructing navigation. They are 1620 feet apart, and 280 feet in height—higher than the cross on the spire of Trinity church, the highest in New York. The base of these piers, at the water-line, is 134 feet long and 56 feet wide; their height, 130 feet below the floor and 150 above it, not including balustrade and ornamental blocks. In each pier are two arches for entrances to the bridge; each archway, being 32 feet wide, gives passage to a railroad-track, a carriage-way, and a sidewalk. These openings, or archways, are intended to be 120 feet high. The piers are built wholly of granite, and hollow; each will contain over 900,000 cubic feet of stone, and weigh over 70,000 tons. The bridge will weigh 3600 tons; its maximum transitory weight by crowds of people, railway-trains, carriages, and horses being 1400 tons, gives together 5000 tons. As the base of each pier is nearly 5000 square feet, there is a weight of about 17 tons per foot, which cannot be safely constructed without enlarging the foundation considerably. At the lower part of the foundation, therefore, the surface will be 17,000 square feet, reducing the pressure from 17 tons to a little over four tons per square foot, which is perfectly safe, especially in view of the considerable depth to which the foundation will be laid, the nature of the compact, gravelly sand on the Brooklyn side, and the rock which probably will be reached on the New York side.

The whole bridge will be supported by four cables, consisting of parallel steel wires, stretched in a bundle nearly one foot thick. These cables are anchored in solid walls, 1337 feet from the pier on the New York side, and 837 feet from the pier on the Brooklyn side. The real span of the suspension bridge, from anchor-wall to anchor-wall, is thus 1337 + 1620 + 837, or 3794 feet. The approaches beyond these points are of arched masonry, thrown, like the half-spans between anchorage and piers, over houses and streets.

Each of the four cables enters the anchor-walls through the masonry to a distance of twenty feet, where it connects with the anchor-chains, composed of ten links, each 12 feet or more in length, together measuring 130 feet, and forming a downward curve of a quarter of a circle, in order to convert a portion of the tension into downward pressure—a plan always followed in the anchorage of suspension bridges. The tension, or pull, of each of these four cables on the anchorage will be 5600 tons, which is only about one-tenth of the breaking strain of the structure.



Section of Caisson for East River Bridge.

The cables have, however, not to support the whole bridge. It is also secured by straight stays running from the top of each pier towards the bottom of the bridge, as seen in the engraving. Mr. Roebling asserts that the bridge would not fall even if the cables were removed, the stays being sufficient to hold it—only it would sag in the middle. The cables have, therefore, only to sustain a portion of the weight and to give stiffness to the bridge, so that it will not be swayed by heavy gales. A simple arrangement of the cables increases this stiffness against side pressure. The outside cables are much farther apart at the piers than the width of the bridge, and approach each other; while with the two middle cables the reverse is the case. They are near together at the piers, where they pass over the middle between the two arches, and widen towards the middle of the bridge.

The bridge will commence in New York City at the City Hall Park, at the foot of Chatham street. Slowly rising 3½ feet in 100, it will cross William street and Franklin Square, so high that no interruption of street travel will result. It will be supported by arches, girders, and trusses till it arrives at the anchorage of the chains, 90 feet above high tide, located in the block bounded by Cherry, Water, and Dover streets, where the suspension commences; and the whole structure runs over all the houses to the pier at the river-side, a distance of 1337 feet. Here the full sweep of the cables, passing over the top of the piers, 260 feet high, descends 130 feet below that point, and rises to the same height on the Brooklyn pier, to descend to the Brooklyn anchorage, situated in James street; and, beyond that, by an archway of masonry and trusses, to extend to the junction of Fulton and Sand streets, almost on a level with Brooklyn Heights.

Having thus given a general description of the bridge as a whole, we will proceed to the details of construction. The first step is, of course, the laying of the foundation for the piers. The labor on the Brooklyn pier was commenced Jan. 3, 1870, and was afterwards continued by means of dredging-machines, etc., preparatory to sinking the colossal caisson.

A caisson is literally a chest. Applied to bridge-building, the term signifies a wooden box or frame of strong timbers, used for laying the foundations of a bridge in situations where the coffer-dam cannot be employed. In the present instance there having been no suitable rock foundation found on the Brooklyn shore, the caisson itself was made part of the foundation, as we shall show. The system

adopted involves also the principle of the pneumatic pile, which is usually a tubular pile or cylinder of large dimensions forced down by atmospheric pressure. In this case, however, the atmospheric pressure was assisted by the continual excavation of material beneath the mass. In fact, there was also something of the diving-bell in this apparatus.

The caisson proper, or chamber within which the work of excavation was carried on, was rectangular in shape, 168 feet long and 102 wide on the outside, and about 15 feet high. The sides were wedge-shaped in section, the lower edge being eight inches, and the upper eight feet three inches thick. The roof resting on these sides was five feet thick, leaving a working-chamber (the dimensions of roof and sides being allowed for) 166 by 98 feet in ground-area, and 9 feet in height. The whole was constructed of yellow-pine timbers a foot square; the seams were payed with a vegetable tar, to render them impervious to water; and between the outside layers of timber was a sheathing of tin between two of felt, intended to prevent air from leaking through. As the sharp lower edges were intended to facilitate the sinking of the caisson, they were made very strong. The first course of timber was oak; to this was bolted a cast-iron shoe, eight inches wide and oval on its face, being three inches thick in the centre. Around the shoe was placed an armor of boiler-iron, extending three feet above, on both sides of the wall, the whole being strengthened by heavy interior angle-irons. Especial pains were taken to prevent the corners at the bottom from "spreading" under the great pressure to which they were subjected. At each corner in the second course was inserted a knee of hard-wood timber, extending twenty feet each way. The timbers of the caisson were all bolted together vertically, horizontally, and diagonally, with 1¼-inch bolts, varying in length from two to seven feet. The bolts were, on an average, eighteen inches—none more than two feet eight inches—apart throughout the whole structure; and the heads and nuts were made air-tight by rubber washers.

As this huge frame was sunk to its desired position, thirty feet below low tide, additional courses of timber were laid on the top to the height of fifteen feet, and filled in with concrete; and when the whole mass had become fixed in its final resting-place, the tower was built on the solid foundation thus obtained.

Six shafts, lined with half-inch boiler-iron, passed through the roof of the caisson. The two outside ones were rectangular, and 6 feet 6 inches by 7 feet in size. These were the water-shafts, in which the water collecting in the caisson rose by the atmospheric pressure to the height of the tide outside. Next to these were the two man-shafts or supply-shafts, circular in form. Through these the workmen could pass and the earth be hoisted. The last pair were the air-shafts, also circular, and 42 inches in diameter. The shafts were made in couples, both for convenience and for safety. Through the air-shafts large air-pumps forced air into the caisson, expelling the water, and enabling the workmen to descend and work upon the bottom. The earth excavated was deposited around the square water-shafts; and a Cummings dredging-machine lifted the mud and dumped it into scows. Gas was introduced for lighting the caisson. The following figures will give some idea of the size and importance of this construction: Length of caisson, 168 feet; width, 102 feet; height, 15 feet; height, including superincumbent timber and concrete, 30 feet; timber in caisson, 1,500,000 feet (105,000 cubic feet); weight of caisson, 2500 to 3000 tons; wrought iron employed in bolts, angle-irons and plates, 100 tons; lumber in launching-frames and ways, 127,000 feet.—*Manuf. and Build.*, N. Y. (See BRIDGE, by GEN. J. G. BARNARD, U. S. A.)

East Rush'ville, a village (Rushville P. O.) of Richland township, Fairfield co., O., on the Cleveland Columbus Cincinnati and Indianapolis R. R. Pop. 221.

East Sag'inaw, a city of Saginaw co., Mich., on the navigable Saginaw River, 17 miles from its mouth, and on the Flint and Père Marquette, the Jackson and Saginaw, the Saginaw and St. Clair, and the Saginaw Valley and St. Louis R. Rs. It is well laid out and substantially built, has Holly waterworks, two horse-railroads, and a good system of public schools. It has a large trade by lake and rail in lumber and salt, having seventeen saw-mills, capable of producing 135,000,000 feet of lumber per annum, and eleven salt-manufactories, which can produce nearly 200,000 barrels of salt in a year. The assessed valuation in 1873 was $3,304,663. In that year $1,000,000 were expended in erecting buildings, of which five alone cost $400,000. The surrounding country is very fertile, but manufacturing is the chief pursuit. It is a very thriving and enterprising town, the increase in population being some 40 per cent. per annum. It has the car-shops of the Flint and Père Marquette R. R., six large machine-shops, three national banks, a library association, eleven fine churches, two daily and three weekly newspapers, and is the base of supplies for a large lumber-region. It is nearly opposite the city of Saginaw. Pop. 11,350.

E. COWLES, ED. "COURIER."

East Salaman'ca, a post-village of Salamanca township, Cattaraugus co., N. Y., at the junction of the Erie and the Atlantic and Great Western R. Rs., 413 miles from New York. It has large repair-shops and manufactures of leather and lumber.

East Spring'field, a post-village of Springfield township, Otsego co., N. Y., is the seat of a seminary.

East Springfield, a post-village of Salem township, Jefferson co., O. Pop. 170.

East St. Lou'is, a post-village of St. Clair co., Ill., on the Mississippi River opposite St. Louis. It is the terminus of several railroads. It is the seat of a Roman Catholic college. Two weekly newspapers are issued here. Pop. 5644.

East Stough'ton, a thriving post-village of Stoughton township, Norfolk co., Mass., on the Old Colony R. R., 17 miles S. of Boston. It has extensive manufactures of boots.

East Strouds'burg, a post-village of Monroe co., Pa., on the Delaware Lackawanna and Western R. R., 1 mile N. of Stroudsburg, the county-seat. Stroudsburg R. R. Station is at this point.

East Taunton, Mass. See TAUNTON.

East Ta'was, a post-village of Iosco co., Mich., on Tawas Bay, Lake Huron, 2 miles E. of Tawas City, the county-seat.

East Tem'pleton, a post-village of Templeton township, Worcester co., Mass. It has manufactures of chairs.

East Tennessee University. In 1806 the U. S. ceded to the State of Tennessee certain public lands, upon condition that Tennessee should appropriate 100,000 acres of land for the use of two colleges, "one in East Tennessee and one in West Tennessee." In 1807 the State established East Tennessee College at Knoxville, as one of the beneficiaries of this endowment. The legislature, however, failed to fulfil its trust concerning the appropriated lands, and the college languished for many years. Blount College was incorporated in 1792, while Tennessee was yet the "Territory south of the river Ohio." By consent of its trustees its charter was annulled, and its small property transferred to East Tennessee College. In 1838 the legislature partially remunerated the college for the almost total loss of its original endowment by appropriating to it a half township of land in the "Ocoee District." With the fund derived from that source the college entered upon a period of comparative prosperity. In 1840 it obtained a university charter. Owing to several causes, the institution began to decline a few years later, and from 1850 until 1858 was in a very depressed condition. It then revived, but the war intervened, and from 1862 to 1866 it was entirely suspended. Its buildings were seriously injured by the U. S. army, which occupied them for nearly two years, and its cabinets, apparatus, and library were nearly or altogether destroyed.

In these circumstances, and with little available pecuniary means in the hands of the trustees, the prospect in 1866 was discouraging. To add to the difficulties of the situation, education in the State, especially because of its long interruption by the war, had fallen into an extremely low condition, and but few youth could be found able and willing to enter college classes. Notwithstanding, the college was reopened, and the work of instruction began with a crude mass of pupils in the preparatory department. At length higher classes were formed, and in 1871, 1872, and 1873 students were graduated. In 1869 the legislature appropriated to East Tennessee University the proceeds of the land script received by the State from the U. S. under the law of Congress approved July 2, 1862, for the maintenance of a college. The trustees accepted the trust with its conditions, and proceeded to establish the Tennessee Agricultural College, in which three courses of study are provided. Each succeeding year it increases in usefulness. The number of students entered in 1872–73 was 271, of whom 187 were appointed by the State.

The names of the presidents of East Tennessee College (now University) from its foundation are as follows, viz.: Rev. Samuel Carrick, A. M., from 1808 to 1809; Rev. David Sherman, A. M., from 1820 to 1825; Rev. Charles Coffin, D. D., from 1827 to 1832; James H. Piper, A. M., from 1833 to 1834; Joseph Estabrook, A. M., from 1834 to 1850; Hon. Wm. B. Reese, LL.D., from 1850 to 1853; Rev. George Cooke, A. M., from 1853 to 1857; Rev. Wm. D. Carnes, A. M., from 1858 to 1860; Rev. Joseph I. Ridley, D. D., from 1860 to 1862; Rev. Thomas W. Humes, S. T. D., from 1865 to ——.

T. O. SUMMERS.

East Toledo, O. See TOLEDO.

East'town, a township of Chester co., Pa. Pop. 736.

East Troy, a post-township of Walworth co., Wis. Pop. 1431.

East U'nion, a village of Stock township, Noble co., O. Pop. 857.

East Union, a post-township of Wayne co., O. Pop. 1865.

East Union, a township of Schuylkill co., Pa. Pop. 614.

East'ville, a post-village, capital of Northampton co., Va., is on a narrow peninsula, "the Eastern Shore," between the Atlantic Ocean and Chesapeake Bay, about 4 miles E. of the latter and 180 miles by water E. of Richmond. Pop. of Eastville township, 3395.

East Vin'cent, a post-township of Chester co., Pa. Pop. 1961.

East Wa'co, a village of McLennan co., Tex. P. 612.

East Wa'terloo, a township of Black Hawk co., Ia. Pop. 913.

East Wal'lingford, a post village of Wallingford township, Rutland co., Vt., on the Central Vermont R. R. (Rutland division), 13 miles S. S. E. of Rutland. (See WALLINGFORD.)

East Wey'mouth, a post-village of Weymouth township, Norfolk co., Mass., on the South Shore R. R., 14½ miles S. of Boston. It has important manufactures of boots, nails, etc. (See WEYMOUTH.)

East Wheat'field, a township of Indiana co., Pa. Pop. 1104.

East Whiteland, a township of Chester co., Pa. Pop. 1222.

East'wick (EDWARD B.), an English Orientalist, born in 1814, entered the service of the East India Company, became in 1845 professor of Hindostanee and Teloogoo, and 1850 librarian at the college of the company in Haileybury. He published a "Vocabulary of the Sindhi Language" (1843), a "Grammar of the Hindoostanee Language" (1847), Sadi's "Gulistan" and a translation of it (1850), and several Indian works.

East Wil'ton, a post-village of Wilton township, Franklin co., Me., near the Androscoggin R. R., 5 miles S. of Farmington. It has manufactures of scythes, pegs, lumber, and other goods. (See WILTON.)

East Wind'sor, a post-township of Hartford co., Conn. Pop. 2882.

East Windsor, a township of Mercer co., N. J. Pop. 2383.

Eat'on, a county in S. Central Michigan. Area, 576 square miles. It is intersected by Grand River, and also drained by Battle Creek. The surface is undulating; the soil is fertile and deep. Lumber, cattle, grain, wool, potatoes, hay, and butter are produced. It is traversed by the Grand River Valley R. R. and the Peninsular R. R. Capital, Charlotte. Pop. 25,171.

Eaton, a township of Aroostook co., Me. Pop. 522.

Eaton, a post-township of Eaton co., Mich. Pop. 2035.

Eaton, a post-township of Carroll co., N. H. Pop. 657.

Eaton, a post-township of Madison co., N. Y., contains Morrisville, the county-seat, and several canal reservoirs. Eaton Village has the county poor-house, a bank, a tannery, a distillery, a woollen-mill, a forge, and other manufacturing interests. Pop. of township, 3690.

Eaton, a township of Lorain co., O. Pop. 1052.

Eaton, a post-village, capital of Preble co., O., on Seven-Mile Creek and the Cincinnati Richmond and Chicago R. R., 53 miles N. of Cincinnati. It has one national and one independent bank, three newspapers, five churches, two school-houses, one grist-mill, three saw-mills, several stores, two machine-shops, one school-seat factory, three benevolent societies, and is surrounded by a fine farming country. Pop. 1748.

W. F. ALBRIGHT & Co., PUBS. OF "REGISTER."

Eaton, a post-township of Wyoming co., Pa. Pop. 830.

Eaton, a township of Brown co., Wis. Pop. 358.

Eaton, a township of Clarke co., Wis. Pop. 316.

Eaton, a post-township of Manitowoc co., Wis. Pop. 1468.

Eaton, a township of Monroe co., Wis. Pop. 392.

Eaton (AMOS), an American botanist, born in Chatham, N. Y., in 1776, graduated at Williams College in 1799. He studied law and was admitted to the bar. In 1828 he became principal and senior professor of Rensselaer Institute at Troy. He published, besides other works, a "Manual of the Botany of North America" (1833). Died May 6, 1842.

Eaton (AMOS B.), an American officer, born in 1806 in New York, graduated at West Point in 1826, and June 29, 1864, commissary-general of subsistence U. S. A., rank of brigadier-general. He served as infantry officer, chiefly on the Northern frontier, till July 7, 1838, when he was transferred to the subsistence department, and served as commissary in the Florida war 1837–41, during Canada border disturbances, and in New York City 1841–46; as chief commissariat of Major-General Taylor's army in Mexico 1847–48, engaged at Buena Vista (brevet major), of the department of the Pacific 1851–55, and at New York City 1855–61. In the civil war was dépôt commissary at New York City, and purchasing commissary for the armies in the field 1861–64; and since June 28, 1864, has been in charge of the commissary bureau at Washington, D. C. (Brevet major-general U. S. A. for faithful, meritorious, and distinguished services.)

GEORGE W. CULLUM, U. S. A.

Eaton (DANIEL CADY), an American botanist, was born at Fort Gratiot, Mich., Sept. 12, 1834, graduated at Yale in 1857, and at Lawrence Scientific School (Harvard) in 1860. He became professor of botany at Yale in 1864. He is the author of that part of Chapman's "Flora of the Southern States" (1860) which treats of the Ferns, and the corresponding part of "Gray's Manual" (5th ed. 1867), and has published various scientific papers.—His cousin, DANIEL CADY EATON, is professor of the history and criticism of art in Yale College.

Eaton (GEORGE W.), D. D., LL.D., an American scholar and Baptist minister, was born at Henderson, Huntingdon co., Pa., July 3, 1804, and was educated at Ohio University and Union College, Schenectady, N.Y.; he was a fellow and tutor in Union College (1829–30), professor of ancient languages in Georgetown College, Ky. (1831–33), professor of mathematics and natural philosophy (1833–37) and ecclesiastical and civil history (1837–50) at the Literary and Theological Institution, Hamilton, N. Y., and professor of systematic theology at the same place (1850–61), president of Madison University (1856–68), president of Hamilton Theological Seminary and professor of homiletics (1861–71). Died Aug. 3, 1872.

Eaton (HORACE), M. D., was born at Barnard, Vt., June 22, 1804, graduated at Middlebury in 1825, graduated in medicine in 1828, was professor of chemistry and natural philosophy at Middlebury College (1848–54), and governor of Vermont (1846–48). Died July 4, 1855.

Eaton (JOHN, JR.), PH. D., an American educator, born Dec. 5, 1829, at Sutton, N. H., graduated at Dartmouth in 1854, was superintendent of public schools, Toledo, O. (1856–59), studied theology at Andover (Mass.) Theological Seminary (1859–61), ordained by the Maumee (O.) Presbytery (1861), commissioned chaplain of the Twenty-seventh Ohio Volunteers (Aug. 15, 1861), appointed superintendent of contrabands (Nov. 14, 1862) by General Grant, general superintendent of freedmen for Mississippi, Arkansas, West Tennessee, and North Louisiana (Dec. 15, 1862), and served as such till May 27, 1865, commissioned colonel of the Sixty-third U. S. colored troops (Oct. 2, 1863), brevetted brigadier-general of volunteers (Mar. 13, 1865), assistant commissioner of the bureau of refugees, freedmen, and abandoned lands (May 27, 1865), established and edited the "Daily Post" at Memphis, Tenn. (1866–70), State superintendent of public instruction for Tennessee (1867–69), secretary of the board of visitors to the West Point Military Academy (1869), and was appointed U. S. commissioner of education (Mar. 17, 1870), which position he still occupies. He has published many addresses and reports, chiefly upon education and the public affairs with which he has been connected.

Eaton (JOHN HENRY), politician, was born in Tennessee about 1790, and represented that State in the U. S. Senate (1818–29), was secretary of war under his friend Gen. Jackson (1821–31), governor of Florida Territory (1834–36), and U. S. minister to Spain (1836–40). He published a "Life of Jackson" (1824). Died Nov. 17, 1856.

Eaton (Gov. THEOPHILUS) was born in Stony Stratford, England, about 1591, and was the son of a clergyman. He was for a time English agent at the Danish court, and afterwards was a reputable merchant of London. He came to Massachusetts in 1637, and was chosen a magistrate. He went to New Haven in 1638, and was the first governor of the New Haven colony (1638–57). Died Jan. 7, 1657.

Eaton (WILLIAM), GENERAL, an American officer, born at Woodstock, Conn., Feb. 23, 1764, was educated at Dartmouth College, and entered the army in 1792. He became consul at Tunis in 1799, and displayed courage and enterprise in a successful expedition which he conducted against Derne. He was about to attack Tripoli, when his opera-

tions were suspended by a treaty of peace between the U. S. and Tripoli in 1805. The Massachusetts legislature granted him 10,000 acres of land in Maine as a reward for his valor. Died June 1, 1811.

Ea'ton Cor'ner, a post-village of Eaton township, Compton co., Quebec, Canada, is the seat of an academy. Pop. about 200.

Eat'on Rap'ids, a post-village of Eaton co., Mich., on Grand River and the Grand River Valley R. R., 24 miles N. N. W. of Jackson. It is noted for its mineral magnetic springs, which are visited annually by thousands, and has one weekly newspaper. Pop. 1221; of Eaton Rapids township, 3636.

Eat'onton, a post-village, capital of Putnam co., Ga., on a branch of the Central Georgia R. R., 21 miles N. N. W. of Milledgeville, has one weekly newspaper. Pop. 1240.

Eat'ontown, a post-village of Monmouth co., N. J., on the New Jersey Southern R. R., 4 miles S. of Long Branch.

Eau Claire, ō klair', a county in the W. of Wisconsin. Area, 648 square miles. It is partly drained by the Eau Claire River, an affluent of the Chippewa, which flows through the north-western part of the county. The soil is mostly fertile. Grain, wool, and lumber are produced. It is intersected by the West Wisconsin R. R. Pop. 10,769. Capital, Eau Claire.

Eau Claire, a city, capital of Eau Claire co., Wis., at the junction of Eau Claire and Chippewa rivers, and on the West Wisconsin R. R. and head of navigation on Chippewa River, has a national bank, a bank of deposit, one daily and two weekly newspapers in English, and one in German, two foundries, thirteen saw-mills, three planing-mills, four grist-mills, three graded schools and one common school, a Wesleyan seminary, two parks, six hotels, ten churches, carriage and railroad bridge over the Chippewa, two carriage and railroad bridges over the Eau Claire, and a large number of stores and wagon and boiler shops. The principal business is lumbering, over 150,000,000 feet being manufactured in the vicinity yearly, and over 250,000 feet in the city and its immediate vicinity. It is the chief commercial city of N. W. Wisconsin. The improvements during the past four years in the city have cost $1,694,000. Pop. in 1870, 1476.

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Eau Claire City, a village of Eau Claire co., Wis., is near the Chippewa River, 1 or 2 miles W. of Eau Claire, the county-town. It has many steam saw-mills and an active trade in lumber. Pop. 2293.

Eau de Cologne, ō dẹh ko-lōn' (Fr. pron. ō dẹh ko'-loñ'), or **Cologne Water,** a celebrated liquid perfume invented by Farina of Cologne, where large quantities of it are prepared. It is also made in France and almost all other countries. The following recipe affords a good imitation of the original article: Take of alcohol 1 pint; of the oils of bergamot, orange peel, and rosemary, each 1 drachm; of bruised cardamom seeds, 1 drachm; orange-flower water, 1 pint: distil one pint from a water-bath.

The secret of the composition of true cologne has been carefully preserved by the Farina family, and the different business-houses of Cologne bearing the name of Farina prepare perfumes which are by no means identical in odor. One of the family is reported to have published in 1863 the following as the formula for genuine eau de cologne: Take of oil of lavender 4 ounces; purified benzoin, oil of rosemary, each 2 ounces; strong alcohol, 9 gallons: dissolve the oil and benzoin in the alcohol, and to the solution add successively oil of neroli, oil of young orange (*huile des petits grains*), oil of lemon, each 10.4 ounces; oil of sweet orange, oil of lime-peel, oil of bergamot, each 20.8 ounces; tincture of rose-geranium flowers, a sufficient quantity. Macerate for several weeks, and then bottle the mixture. There are hundreds of recipes, many of which are vouched for as the genuine, but all, no matter how complicated the formula, are simply aromatized alcohol. It is essential that the alcohol be perfectly deodorized and freed from fusel oil before use.

There is a class of cologne-water obtained by macerating aromatic substances in alcohol for some time, and then distilling the whole. But these waters require to be allowed a few months of rest to develop their better qualities. It is probable that the original article was of this class. Good colognes have a rich and permanent odor, not clearly alcoholic. Not one of the essential oils employed should be recognizable by the sense of smell. The best brands have long borne the name of Jean Maria Farina, and there are many claimants to the original proprietorship of the name. In Cologne all children who can lawfully bear that name are promptly baptized with it.

Eau de Javelle, or **Javelle's Solution,** a chlorinated solution of potash, analogous to Labarraque's solution of soda. It has bleaching and disinfecting properties, and is employed in removing fruit-stains, etc. from linen. When swallowed in considerable quantity it has remarkably poisonous effects.

Eau de Luce (*Aqua luciæ*), a soapy liniment made of ammonia-water mixed with tincture of oil of amber, mastic, and sometimes Mecca balsam. It is employed in Europe and the East as a remedy for the bites of snakes and insects.

Eau de Vie, the French for BRANDY (which see).

Eau Galle, a post-township of Dunn co., Wis. P. 978.

Eau Galle, a township of St. Croix co., Wis. P. 535.

Eau Pleine, a post-twp of Portage co., Wis. P. 333.

Eaux Bonnes, ō bon (*i. e.* "good waters"), a fashionable resort of France, department of Basses-Pyrénées, 22 miles S. of Pau. Here are warm sulphur-springs, which are efficacious for affections of the lungs and chest, the skin, etc.

Eaux Chaudes, Les, lāz ō shōd, a village of France, 2 or 3 miles S. W. of Eaux Bonnes, has warm medicinal springs. The waters have a wide range of usefulness in the diseases of the lungs, joints, and skin.

Eaux Vives, a town of Switzerland, canton of Geneva, near the city of Geneva. Pop. in 1870, 5875.

Eaves [Ang.-Sax. *efese*, "brim," "brink," "eaves"], in architecture, the lowest edges of the inclined sides of a roof, which project beyond the face of the wall, so as to throw off the water from the roof. The eaves are sometimes provided with a semicircular cast-iron gutter and a down-pipe; at other times they discharge the water directly on the ground.

Eb'bert (ISAAC), D. D., a minister of the Methodist Episcopal Church South, born at Ellicott's Mills, Md., Mar. 2, 1817. He graduated at Augusta College, and joined the Ohio Conference in 1840. At the division of the Church he joined the Kentucky Conference, the Memphis Conference in 1858, and in 1870 the Little Rock Conference. He died in Paducah, Ky., in 1872. T. O. SUMMERS.

E'bel (HERMANN WILHELM), one of the most prominent writers on Celtic language and literature, born in 1820, became in 1858 professor at the gymnasium in Schneidemühl. He published, among other works, a new edition of Zeuss's "Grammatica Celtica" (1871), and many essays in the "Zeitschrift für vergleichende Sprachforschung," and in Kuhn's and Schleicher's "Beiträge zur vergleichenden Sprachforschung," some of which have been translated into English under the title "Celtic Studies" (1863).

Ebe'lians [called in Germany, *Mucker*, "hypocrites"], a sect of religionists, taking their name from Johann Wilhelm Ebel (1784–1861), one of their founders. Ebel, a preacher of Königsberg, was a follower of Schönherr the theosophist. Teaching the doctrine that the relation of the sexes is a symbol of the relation between the spiritual and material principles, he was joined by many even of the upper classes, and his followers are accused of making this doctrine a pretext for immorality.

Ebena'ceæ [from the Lat. *eb'enus*, the "ebon tree" (see EBONY)], a natural order of exogenous plants (trees or shrubs), mostly natives of tropical countries. They are allied to Oleaceæ and to Aquifoliaceæ. They have alternate entire leaves and axillary flowers, which are monopetalous and usually unisexual. Some species of this order are remarkable for the hardness and blackness of their wood, as the ebony. This order comprises the American persimmon (*Diospyros Virginiana*) and the Chinese kaki, the fruit of which is edible, like that of many other species. There are eight or ten genera and numerous species, of which a large majority are tropical.

Ebene'zer, a post-village of West Seneca township, Erie co., N. Y. Pop. 449.

Ebenezer, a township of York co., S. C. Pop. 2157.

Eb'ensburg, a post-borough, capital of Cambria co., Pa., is on the Ebensburg and Cresson branch of the Central R. R., 26 miles W. of Altoona. It has two weekly newspapers and one monthly publication. Pop. 1240.

E'ber [Lat. *Ebe'rus*], (PAUL), a German Protestant theologian, born at Ritzingen Nov. 8, 1511. He became professor of Hebrew at Wittenberg in 1556. Among his works are an "Exposition of the Gospels" and a "History of the Jews" (1561). He was a friend of Melanchthon. Died Dec. 10, 1569.

Eb'erhard (JOHANN AUGUST), D. D., a German philosopher, born at Halberstadt Aug. 31, 1739, studied theology at Halle. He gained distinction as an elegant writer, and became professor of philosophy at Halle in 1778. He was a rationalist in theology, and an adversary of Kant in philosophy. Among his best works are an "Apology for Socrates" (1772), a "Theory of the Fine Arts and Sci-

ences" (1783), a "General History of Philosophy" (1788), and an excellent "Dictionary of German Synonyms" (6 vols., 1793–1802). Died Jan. 6, 1809.

Eberhard (KONRAD), a German sculptor and painter, born in Bavaria Nov. 25, 1768. He became professor of sculpture in the Academy of Munich in 1816. Among his works are statues of St. George and St. Michael. His best works are in Munich. Died Mar. 12, 1859.

Eberhard im Bart, the first duke of Würtemberg, born in 1445, became count of Würtemberg when only fourteen years old, and led a wild and dissipated life, but reformed after a voyage to Palestine, and became one of the most popular princes of Germany. Having consolidated his part of Würtemberg with that of his cousin, the emperor created him in 1495, in consequence of his services to the empire, duke of Würtemberg. Died in 1496. (See PFISTER, "Eberhard im Bart, erster Herzog in Würtemberg," 1822.)

Eb'erle (JOHN), M.D., an American medical writer, born in Hagerstown, Md., Dec. 10, 1787. He was professor in Jefferson Medical College, Philadelphia, and other medical colleges, and published a "Treatise on Therapeutics" and other works. Died at Lexington, Ky., Feb. 2, 1838.

E'berling (CHRISTOPH DANIEL), a German scholar and writer, born at Hildesheim Nov. 20, 1741. He devoted himself chiefly to geographical studies, and for his great work, "Geography and History of North America" (Hamburg, 5 vols., 1793–99), he was thanked by the Congress of the U. S. His valuable collection of books and maps relating to this subject was purchased in 1818 by Israel Thorndike, and presented to Harvard College. Died June 30, 1817.

E'bernburg, a small town of Bavaria, on the river Nahe, 20 miles S. W. of Mentz. Here is an old ruined castle which belonged to Franz von Sickingen, and was used as a place of refuge by Melanchthon and other Reformers.

E'bers (GEORG MORITZ), an eminent Orientalist, born in 1837, lectured since 1865 in Jena on the language, history, and monuments of ancient Egypt, and became in 1870 professor of Egyptian archæology in Leipsic. His chief work is a "Commentary on the Books of Moses" ("Die Bücher Moses. Sachlicher Commentar zu Genesis und Exodus," vol. i., 1868). He also published a novel, "The Daughter of an Egyptian King" (3d ed. 1873), which was translated into English, both in London and in the U. S.; an essay in Virchow and Von Holtzendorf's collection, "Hieroglyphisches Schriftsystem" (1871), and "Through Goshen to Sinai," an account of his travels in Palestine (1872). In this work he agrees with Lepsius, and differs with Robinson, in making Serbal the mountain of the Law.

E'bert (FRIEDRICH ADOLPH), a German bibliographer, born near Leipsic July 9, 1791. He became chief librarian of the royal library at Dresden in 1828. He published, besides other works, a "Universal Bibliographic Dictionary" (2 vols., 1821–30). Died Nov. 13, 1834.

Ebert (JOHANN ARNOLD), a German poet, born at Hamburg in 1723. He translated Young's "Night Thoughts" into German, and wrote several original poems. Died Mar. 19, 1795.

Eberus. See EBER.

E'bingen, a town of Würtemberg, 39 miles S. W. of Stuttgart, has large velvet, hat, and shoe factories. Pop. in 1871, 5029.

E'bionites [Heb. *ebion*, "poor"], a name given at first to all Christians, on account of their poverty; then given by Gentile Christians to Jewish Christians; and finally restricted to heretical Jewish Christians. Irenæus (between 182–188 A. D.) is the first to mention the Ebionites by name, though they are thought to be the "heretics" spoken of by Hegesippus some years earlier. The Pharisaic Ebionites rejected the writings of Paul, insisted upon the observance of the Mosaic ritual, and were humanitarians and millenarians. The Essenic Ebionites were more speculative and ascetic. Ebionism dates, according to Gieseler, from about 107 A. D., and in the fifth century had wholly disappeared.

Eblana. See DUBLIN.

E'boli, or **Evoli** (anc. *Eburi*), a town of Italy, province of Salerno, about 16 miles E. S. E. of Salerno. It has an annual fair. Pop. in 1861, 6946.

Eb'oli (AÑA DE MENDOZA), PRINCESS OF, a Spanish lady, born in 1535, became the wife of the prince of Eboli. She was a mistress of Philip II. of Spain, and was accused of complicity in the assassination of Escovedo. Schiller has idealized her character in his "Don Carlos."

Eb'onite [named from its resemblance to ebony], a hard black compound obtained by blending caoutchouc with variable proportions of sulphur, generally about half its weight. It is called vulcanite in the U. S.

Eb'ony [Lat. *eb'enum;* Fr. *ebène*], a very hard, heavy wood of a deep black color, is the duramen or heart-wood of several species of *Diospy'ros*, a tree of the natural order Ebenaceæ. It is heavier than water, takes a good polish, and emits an aromatic odor when burned. Ebony of excellent quality is obtained from the *Diospy'ros eb'enum*, which abounds in Ceylon and attains a large size. The ebony which comes from Mauritius and Madagascar is the produce of the *Diospy'ros reticula'ta*. Another species of *Diospyros* produces the beautiful wood called CALAMANDER (which see). Ebony is also obtained from the *Diospyros tomento'sa*, which grows in India. This wood is mentioned by Virgil as coming from India: "Sola India nigrum fert ebenum." (*Georgics*, book ii. 116.) It is used by cabinet-makers. Ebony is produced in Texas, Mexico, and California from the japote or persimmon (*Diospyros Texana*).

Eboulemens, a post-village of Charlevoix co., Quebec, Canada, on the N. shore of the St. Lawrence River, 69 miles below Quebec. Pop. about 2400.

E'brard (JOHANN HEINRICH AUGUST), a German Protestant theologian, born at Erlangen Jan. 18, 1818. He obtained the chair of theology at Erlangen in 1847, became in 1853 consistorial councillor in Spires, and resigned in 1861. He is a prominent representative of the orthodox school. Among his works are "Christian Dogmatics" (2 vols., 1852), "The Divine and Human in Christianity" (1844), and a "Manual of the History of the Christian Church and Doctrines" (4 vols., 1864–66).

E'bro [anc. *Ibe'rus;* Fr. *Èbre*], a river of Spain, rises in the Cantabrian Mountains near the northern boundary of the province of Burgos. It flows nearly south-eastward through the provinces of Navarre and Saragossa, forms the boundary between Huesca and Teruel, and enters the Mediterranean 22 miles E. of Tortosa. The chief towns on its banks are Logroño, Tudela, Saragossa, and Tortosa. Its whole length is about 350 miles. Its navigation is rendered difficult by rapids and rocks. A canal nearly 100 miles long has been cut along the Ebro below Tudela.

Ebul'lioscope [from the Lat. *ebul'lio*, to "boil," to "bubble," and the Gr. σκοπέω, to "see"], an instrument for ascertaining the strength of alcohol or other distilled liquids by observing the boiling-point and the barometrical pressure at the time of the experiment. These instruments are of various kinds; those of Vidal and of Conatty are the best known.

Ebulli'tion [from the Lat. *ebullio*, to "boil"], boiling; the violent agitation into which liquids are thrown by the rapid escape of their vapor when sufficiently heated. Before ebullition begins, if sufficient heat is applied, the temperature of the liquid continually rises; but when the liquid reaches the "boiling-point"—the point at which ebullition is seen—the temperature is constant. Ebullition is caused by the rapid escape of vapor. (See BOILING-POINT.)

Eburi. See EBOLI.

Eburovices. See IVIÇA.

Ecbat'ana, or **Agbatana** [Fr. *Ecbatane*], a celebrated ancient city, the capital of Media, was situated near the base of Mount Orontes (*Elwend*), about 165 miles S. W. of Teheran. Its foundation is attributed by tradition to Semiramis, but according to Herodotus it was founded by Deïoces (708 B. C.). It stood on a conical hill, and was surrounded by seven concentric walls, each of which was higher than the next outer one. It was the favorite summer residence of the kings of Media and Persia, who had here a magnificent palace and a citadel of immense strength. Alexander the Great captured it in 331 B. C., and obtained a very large booty. This city is called *Achmetha* in the book of Ezra. Some recent writers believe it to be the modern HAMADÂN (which see). Rawlinson attempts to identify it with the ruined *Takht-i-Soleimân*.

Eccaleo'bion [from the Gr. ἐκκαλέω βίον, "I call out life"], a mechanical contrivance for hatching eggs by artificial heat. It consists of an oven with shelves, on which the eggs are placed, ranged one above the other. The temperature is kept of uniform warmth by steam or hot water conveyed in pipes. A somewhat similar machine has long been employed in Egypt with success.

Ec'ce Ho'mo [Lat., meaning "Behold the Man!"], the words uttered by Pilate (John xix. 5) when he brought Jesus forth to the people. Monkish tradition points out the spot, now marked by an arch called *Ecce Homo*, only the piers of which appear to be ancient. It spans the *Via Dolorosa* at its highest point, and has "a narrow gallery or chamber on the top." "Ecce Homo" is the name given to pictures of Christ crowned with thorns. Correggio's, in the National Gallery, London, is generally considered the best.

In 1864, Prof. Seeley, then of London, now of Cambridge, England, published a book entitled "Ecce Homo," which made a great stir.

Eccen'tric [from the Gr. ἐκ, "out of," and κέντρον (Lat. *cen'trum*), a "point," a "centre"], in machinery, a device by which circular motion gives rise to "to-and-fro" motion. In one of the forms of the eccentric a disk is made to revolve around a point not in its centre. The disk turns in a metallic collar, which is thrown back and forth by the revolutions, and to the collar a rod is attached which receives the required to-and-fro motion. This arrangement is often used to give motion to sliding valves in steam-engines.

Ecchelensis. See ECHELLENSIS.

Ec'cles (HENRY), Q. C., a Canadian barrister, born at Bath, England, in 1817, was educated by his father, an accomplished army officer, long resident in Canada. He was called to the bar in 1842, became queen's counsel in 1856, and attained the highest rank in his profession. Died at Toronto Nov. 22, 1863.

Ec'clesfield, a parish of England, in the West Riding of Yorkshire, 5 miles N. of Sheffield. It has manufactures of cutlery, linen, and nails. Coal mines are worked in the vicinity.

Eccle'sia [Gr. ἐκκλησία, an "assembly," from ἐκ, "out," and καλέω, to "call"], the Latin name for CHURCH (which see).

Ecclesia [for etymology see above], the great assembly of the Athenians, in which every free citizen might vote. Although possessing supreme authority in the state from a very remote period, it was after a time seldom convened, so that the management of the state fell into the hands of the archons, who were elected from the nobles. Solon afterwards appointed it to meet four times every thirty-five days, besides extraordinary occasions on which it might be assembled. The subjects discussed in the ecclesia were restricted by Solon to such as had passed through the senate of five hundred, but this rule was not strictly observed. The magistrates who managed these assemblies were the prytanes, prohedri, and epistates; the first convened the people, the second proposed the subjects on which they were to decide, the third presided over the whole. The name ecclesia was afterwards given generally to any public assembly regularly convoked.

Ecclesias'tes [Septuagint Gr. Ἐκκλησιαστής, the "preacher," from ἐκκλησία, an "assembly;" Hebrew *Koheleth*, a noun feminine in form, meaning "preacher" or "gatherer"], a canonical book of the Old Testament. Its author is called "Koheleth" (*i. e.* the "preacher"), and he is described as king in Jerusalem and son of David—*i. e.* Solomon. Since the time of Grotius (1644) the Solomonic origin of the book has been denied by continental critics generally, even by orthodox writers like Hengstenberg, Keil, and Delitzsch, the dates assigned ranging from 536 to 150 B. C. Its post-Solomonic origin has been argued (1) from the Aramaic and other foreign words which occur in it; (2) from the sentiments expressed. On the other hand, the old traditional ascription of the book to Solomon has been defended by such scholars as Schelling, Van Essen, Hahn, Pusey, Wordsworth, and Tayler Lewis. The two leading ideas of the Preacher are the vanity of earthly good and the certainty of judgment. The alleged epicureanism of several passages, so much emphasized by some critics, is thought by others to be simply ironical.

Ecclesias'tical Commissioners, in England and Wales, are the archbishops, bishops, the principal deans, several of the principal judges, the chief baron of the exchequer, the master of the rolls, and twelve lay members, all churchmen, who are appointed for the purpose of examining the state of dioceses and the episcopal revenues, of uniting or dividing parishes (when expedient), and of carrying out other measures for the benefit of the Established Church. Much popular indignation has been excited by their large expenditures of money in renewing and improving the bishops' palaces; and it is evident, whatever may be the good or evil they have accomplished, that there is a large possibility that their powers may be misused. The commission was established in 1835.

Ecclesiastical Courts, in England and Wales, until 1857, had important jurisdiction not only in marriage and divorce cases and the probate of wills, but in some cases they could exercise the discipline of the Church for heresy, incontinence, defamation, and other faults, though in more recent times the latter duties were exercised only in cases where clergymen were accused. It is said that the publication of Dickens's novel "David Copperfield" hastened the transfer of non-ecclesiastical business from these courts to those of the civil law. There are (1) "peculiar courts" of many grades, from the royal to the parochial; (2) archdeacons' courts; (3) commissaries' courts; (4) diocesan courts; and (5) provincial courts at London and York. (See ARCHES, COURT OF; DELEGATES, COURT OF; and DOCTORS' COMMONS.) In civil causes their jurisdiction is virtually at an end.

Ecclesiastical History. I. *Nature and Object.*—Ecclesiastical history or church history is one of the four divisions of theological science—viz., exegetical (or biblical), historical, systematic (or philosophical), and practical (homiletical and pastoral) theology. Of these divisions the historical is the most extensive in bulk, and furnishes material to all the rest. In importance it yields only to exegetical theology, which has to do with the interpretation of the Holy Scriptures. Historical theology begins with the creation of man in the image, and for the glory, of God, and comes down to the present as its relative goal, but will go on till the general judgment or the final settlement of all the affairs of men. It embraces within these limits all that belongs to the religious development of the race within the line of revelation—the origin, progress, and fortunes of the kingdom of God, and its relations to the kingdoms of this world. Since the fall of man it has assumed the character of a history of redemption (and is so represented, for instance, by Jonathan Edwards in his well-known popular book). In a narrower sense, church history is the history of Christianity from the birth of Christ, or, according to others, from the day of Pentecost (A. D. 30), when Christianity first assumed an organized form distinct from Judaism, down to the present time.

II. *Church History and Secular History.*—They differ as Church and State, as Christianity and humanity, as the order of grace and the order of nature. Yet they are inseparably connected and interwoven, and the one cannot be understood without the other. Among the Jews the spiritual and secular history together form one history of theocracy. Both currents intermingle in the old Byzantine empire, in the European states and the Latin Church during the Middle Ages, in the period of the Reformation, during the colonial period of America, and in all countries where Church and State are united. Gibbon's "History of the Decline and Fall of the Roman Empire" is in great part also a "History of the Rise and Progress of Christianity," which survived the fall of the Old and New Rome, and went forth to conquer the barbarian conquerors by Christianizing and civilizing them. Every history of the papacy is also a history of the German empire, and *vice versâ*. No history of the sixteenth century can be written without constant reference to the Protestant Reformation and the Roman Catholic reaction. (Compare, *e. g.*, Hume, Macaulay, and Burnet for England; Ranke for Germany; Motley for Holland.) The Puritan settlements of New England are the beginning alike of the ecclesiastical and secular history of North America. In modern times the tendency is more and more towards separation of the spiritual and temporal, the ecclesiastical and civil powers; nevertheless, the Church will always be more or less influenced by the surrounding state of civil society, and must adapt itself to the wants of the age and progress of events; while, on the other hand, the world will always feel the moral influence, the restraining, ennobling, stimulating, purifying, and sanctifying power of Christianity, which works like a leaven from within upon all ramifications of society.

III. *Periods and Epochs.*—These represent the different stages in the religious development of the race, and must not be arbitrarily made according to a mechanical scheme (such as the centurial division adhered to by Mosheim), but taken from the actual stops or starting-points (ἐποχή) and circuits (περίοδος) of the history itself. The following are the natural divisions:

A. *Sacred* or *Biblical History,* the history of the Divine revelation from the creation to the close of the apostolic age, running parallel with the Scriptures from Genesis to Revelation. Here we must distinguish the dispensation of the Law and the dispensation of the Gospel, or the history of the Old Testament religion and of that of the New Testament religion.

(*a*) Under the *Old Dispensation,* from the creation down to John the Baptist. Subdivisions: The antediluvian period; the patriarchal period; the Mosaic period (the establishment of the Jewish theocracy); the period of the Jewish monarchy and prophecy; the period of the Babylonian exile; the period of the restoration, the Maccabees, the Roman rule till Herod the Great (or down to the destruction of Jerusalem).

(*b*) Under the *New Dispensation.* Christ and the apostles, or primitive and normative Christianity in its divine-human founder and inspired organs. Subdivisions: The preparatory mission of John the Baptist; the life of Christ; the founding of the Church by the apostles; the labors of Peter, Paul, and John.

B. *Christian History,* or *Church History* proper, from the close of the apostolic age to modern times. Subdivisions:

(*a*) History of *Ancient* Christianity, embracing the first six centuries to Gregory I. (590): Græco-Latin, patristic, Catholic, the common stock from which the Greek, the Roman, and the Protestant churches have sprung. Subdivisions: (1) The apostolic age (see A *b*); (2) the age of persecution to Constantine the Great and the Council of Nicæa (325); (3) the age of patriarchs, Christian emperors, and œcumenical councils (to 590). Some historians carry the age of ancient Christianity down to Charlemagne, A. D. 800 (so as to include John of Damascus, the last of the Greek Fathers), and the beginning of the German Roman empire and the temporal power of the papacy. In this case we have a fourth subdivision, from Gregory I. to Charlemagne (A. D. 590 to 800).

(*b*) History of *Mediæval* Christianity, from the close of the sixth to the beginning of the sixteenth century, or from Gregory I. (A. D. 590), the first mediæval pope, to Luther (A. D. 1517). Character: The Greek and Roman churches, divided, pursue their independent course; the Latin Church extending west among the Celtic and Germanic races, the Greek north-east among the Slavonians (in Russia); conversion of the barbarians; conflicts with Mohammedanism; the Crusades; rise and progress of the papacy, scholasticism, mysticism; the reformatory councils of Pisa, Constance, and Bâle; revival of letters; invention of printing; discovery of America; biblical theology; forerunners of Protestantism (Wycliffe in England, Huss in Bohemia, Savonarola in Italy, Wessel in Holland, etc.). Subdivisions: (1) The missionary period of the Middle Ages, from Gregory I. to Hildebrand or Gregory VII. (590 to 1049); (2) the palmy period of the papacy, from Gregory VII. to Boniface VIII. (1049 to 1294); (3) the decay of the mediæval papacy and scholasticism, and the preparation for the Reformation, from Boniface VIII. to Leo X. or Martin Luther (1294–1517).

(*c*) History of *Modern* Christianity, from the Reformation of the sixteenth century to the present time. Protestantism and Romanism; founding of the various evangelical churches, the Lutheran, Calvinistic, Anglican, etc.; progress of Christianity among the Teutonic races; restoration of Romanism; Jesuitism; Jansenism; Puritanism and Methodism in England; Pietism and the Moravians in Germany; settlements in North America; growth of the Greek Church in Russia, and of the Protestant in the United States; revival and triumph of ultramontane Romanism; conflict of faith with modern rationalism and infidelity; immense activity in theology, literature, missions, and all forms of Christian philanthropy. Subdivisions: (1) The age of the Protestant Reformation and the Roman Catholic counter-reformation or reaction (from 1517 to 1600, perhaps better to 1648); (2) the age of scholastic and polemic confessionalism in conflict with non-conformity and subjective piety (from the middle of the seventeenth to the middle of the eighteenth century); (3) the age of revolution and revival, and conflict between Christianity and various forms of skepticism and secularism (from deism in England and the French Revolution to our time).

IV. *Sources.*—They are mostly written, in part unwritten. The *written* sources include (*a*) the official documents of ecclesiastical and civil authorities, such as acts of councils, creeds, liturgies, hymn-books, church laws, papal bulls and encyclicals; (*b*) the writings of the personal actors in the history, and contemporary observers and reporters, such as the Fathers for ancient Christianity, the Schoolmen for mediæval, the Reformers and their opponents for the Reformation period; (*c*) inscriptions on walls, pictures, churches, tombstones, and other monuments.

The *unwritten* sources are works of Christian art, as churches, chapels, pictures, sculptures, crosses, crucifixes, relics, and other remains which symbolize and embody the spirit of Christianity in different epochs and phases. Thus, the Roman catacombs, with their vast extent, their solemn darkness, their labyrinthine mystery, their rude epitaphs and sculptures, their symbols of faith and their relics of martyrdom, give us a lifelike idea of the Church in the period of persecution, its trials and sufferings, its faith and hope, its simple worship and devoted piety. "He who is thoroughly steeped in the imagery of the catacombs will be nearer to the thoughts of the early Church than he who has learned by heart the most elaborate treatises of Tertullian or Origen." The basilicas are characteristic of the Nicene, the Byzantine churches of the Byzantine age, the Gothic cathedrals of the palmy days of the Middle Ages, the Renaissance style of the revival of letters. Even now most churches and sects can be best appreciated in the localities and in view of the monuments and the people where they originated or have their centre of life and action.

V. *Duty of the Historian.*—He must (1) master the sources in the original languages in which they were written (Greek, Latin, and the modern languages of Europe); separating the genuine from the spurious, the original from corruptions and interpolations; sifting the truth from falsehood, the facts from fiction and partisan judgment; comparing the accounts of all actors, friend and foe, narrator, eulogist, advocate, and antagonist, whether orthodox or heretic, whether Christian, Jew, or Gentile; aiming in all this laborious investigation at "the truth, the whole truth, and nothing but the truth." (2) He must then reproduce the clearly ascertained facts and results of his investigation in a faithful and lifelike narrative, so as to present the objective course of history itself as it were in a miniature photograph. The genuine writer of history differs as much from the dry chronicler of isolated facts and dates as from the novelist; history has a body and a living soul, and its facts are animated by thoughts and principles. The historian must exhibit both; he must be able to particularize and to generalize, to descend into minute details, and to take a comprehensive bird's-eye view of whole ages and periods. He must have a judicial mind, which deals impartially with all persons and events coming before his tribunal, and is swayed by no consideration but that of strict justice. This aim should be constantly kept in view, although in the limited and imperfect state of our information, and the inability to emancipate one's self from all the influences of education and prevailing opinions and prejudices, we can expect no more than an approximate solution of the difficult task. It is the exclusive privilege of the Divine Mind to view all things *sub specie eternitatis*, to see the end from the beginning. We can only know things consecutively and in fragments. But history is its own best interpreter, and the farther it advances the more we are able to understand and appreciate the past.

VI. *Value.*—The study of history enables us to understand the present, which is the fruit of the past and the germ of the future. It is the richest storehouse of wisdom and experience. It is the best commentary of Christianity. It is full of comfort and encouragement. It verifies on every page the promise of the Saviour to be with his people always, and to build his Church on a rock against which the gates of hell cannot prevail. It exhibits the life and power of Christ in all its forms and phases, and the triumphant march of his kingdom from land to land and generation to generation. Earthly empires, systems of philosophy have their day, human institutions decay, all things of this world bloom and fade away like the grass of the field; but the Christian religion has the dew of perennial youth, survives all changes, makes steady progress from age to age, overcomes all persecution from without and corruption from within, is now stronger and more widely spread than ever before, directs the course of civilization, and bears the hopes of the human race. The history of the world is governed in the interest and for the ultimate triumph of Christianity. The experience of the past is a sure guarantee of the future.

VII. *Literature.*—(1) Works on *General Church History:* Eusebius (died 340), "Church History," from the birth of Christ to Constantine the Great (324). His successors in the Greek Church: Socrates, Sozomen, Theodoret. The "Magdeburg Centuries," by Matthias Flacius (died 1575) and other Lutheran divines of Germany (Bâle, 1559–74), covering thirteen Christian centuries in as many volumes, the first history from a Protestant point of view in opposition to the claims of Romanism. The "Ecclesiastical Annals" of Cæsar Baronius (died 1607), in 12 folio volumes, published at Rome, 1588 *sqq.*, to which were added the continuations of Raynaldus, Spondanus, and others—a work of astounding learning and industry, but altogether in the interest of the papacy. Tillemont (died 1698), in his invaluable "Mémoires" (Paris, 1693–1712, 16 vols.), wrote the history of the first six centuries from the sources, in biographical style and in the spirit of the more liberal Gallican Catholicism. Gottfried Arnold (died 1714), of the Pietistic school of Spener, in his "Impartial History of the Church and of Heretics" (Frankfort, 1699 *sqq.*, 4 vols. fol., to A. D. 1688), advocated the interests of practical piety and the claims of heretics and schismatics and all who suffered persecution from an intolerant hierarchy and orthodoxy. J. L. Mosheim (died 1755) wrote his "Institutes of Ecclesiastical History" (in Latin, Helmstädt, 1755, and often since in several translations) in the spirit of a moderate Lutheran orthodoxy, with solid learning and impartiality, in clear style, after the centurial arrangement of Flacius, and furnished a convenient text-book which (especially in Murdock's translation) has continued in use in England and America even to this day. Schroeckh's "Christian Church History" (Leipsic, 1768–1810, in 45 vols.) is a far more extensive and far less readable work, but invaluable for reference, full of reliable information from the sources; it forsakes the mechanical centurial division, and substitutes for it the periodic arrangement. Henke (died 1809) followed with a thoroughly rationalistic work in 9 vols. (1788–1810). Neander (professor of church history in Berlin, died 1850) marks an epoch in this branch of theological literature, and

by his truly Christian, conscientious, impartial, truth-loving, just, liberal, and withal thoroughly learned and profound spirit and method, he earned the title of "father of church history." His "General History of the Christian Religion and Church" (Hamburg, 1825–52, 11 vols.), though incomplete (it stops with the Council of Bâle, 1430) and somewhat diffuse and monotonous in style, is an immortal monument of genius and learning; it pays special attention to the development of Christian life and doctrine, and is edifying as well as instructive. It has been naturalized in England and America by the translation of Prof. Torrey (Boston, 1847–52, 5 vols.; 12th ed. 1872), and will long be studied with profit. Equally valuable, though of an altogether different plan and spirit, is the "Church History" of GIESELER (Bonn, 1824–56), translated from the German first by Cunningham in Philadelphia (1846), then by Davidson and Hull in England, and revised by H. B. Smith of New York (1857 *sqq.*). The text is merely a meagre skeleton of facts and dates, but the body of the work consists in carefully selected extracts and proof-texts from the sources, which furnish the data for an independent judgment. BAUR'S "Church History" (partly published after his death, Tübingen, 1861, in 5 vols.) is distinguished for philosophic grasp, critical combinations, and bold conjectures, especially in the treatment of the ancient heresies and systems of doctrine. HAGENBACH'S "Church History" (now completed in 7 vols., Leipsic, 1873) is an admirable digest of the vast material for the lay reader. SCHAFF'S "History of the Christian Church" (New York, 1859–67, in 3 vols.; German ed. Leipsic, 1868) is the first general church history prepared on American soil, but not yet completed (two more volumes are in course of preparation). Of English church historians, WADDINGTON represents the general history in six volumes to the Reformation, inclusive (1835 *sqq.*); ROBERTSON in three (1854 *sqq.*) to the close of the Middle Ages. The older work of MILNER (died 1797) is written in popular style for edification. Of the numerous compends of church history in one or more volumes, we mention those of DÖLLINGER, MÖHLER, RITTER, ALZOG, among Roman Catholics; HASE, NIEDNER, GUERICKE, KURTZ, EBRARD, among Protestants: all in German, some also translated into English.

(2) Works on *special departments* of church history. On Old Testament history: MILMAN ("History of the Jews"), EWALD ("History of Israel," 7 vols., translated by Russell Martineau), STANLEY ("History of the Jewish Church"). Life of Christ: NEANDER (German and English), LANGE (German and English, 6 vols.), PRESSENSÉ (French and English), ELLICOTT, ANDREWS, EWALD, RIGGENBACH, SEPP (R. C.), PAULUS (rationalistic), STRAUSS (mythical theory), RENAN (legendary theory). History of the Apostolic Church from A. D. 30 to 100: NEANDER, LANGE, THIERSCH, SCHAFF, REUSS, CONYBEARE and HOWSON (on St. Paul). History of Christian Doctrines, or Dogmatic History: PETAVIUS (R. C.), MÜNSCHER, BAUMGARTEN CRUSIUS (2 vols.), HAGENBACH (translated by Buch, revised by H. B. Smith, New York, 1861, 2 vols.), NEANDER (1 vol., posthumous), BAUR (Leipsic, 1867, posthumous, 3 vols.; also a compend in 1 vol.), SHEDD (New York, 1863, 2 vols.), BECK, SCHWANE (R. C.); "History of Protestant Theology," by DORNER (Munich, 1867; also in English, Edinburgh, 1871); "History of Roman Catholic Theology," by WERNER (Munich, 1866). History of special doctrines: BAUR on the "Trinity and Incarnation" (3 vols.), on the "Atonement" (1 vol.); DORNER on "Christology" (2 vols.; also in English); EBRARD on the "Lord's Supper." History of Councils: MANSI, HARDOUIN, WALCH, FUCHS, HEFELE. History of Church Polity: PLANCK, RITSCHL, SUGENHEIM, GREENWOOD. History of Missions: BLUMHARDT, WIGGERS, and numerous monographs. Patrology and Patristics: the Benedictine editions, and large collections of the works of the Fathers by GALLANDI, MIGNE, etc. The biographical and literary works on the Fathers, by TILLEMONT, DU PIN, CEILLIER, CAVE, LUMPER, MÖHLER, FESSLER, ALZOG, BÖHRINGER. Separate biographies of Tertullian and Chrysostom, by NEANDER; Justin Martyr, by SEMISCH; Origen, by THOMASIUS; Augustine, by BINDEMANN; Jerome, by ZÖCKLER. Ecclesiastical Antiquities, by BINGHAM, AUGUSTI, SIEGEL, COLEMAN. On Ancient Christianity: MOSHEIM, MILMAN, SCHAFF, PRESSENSÉ; "History of the Greek (Eastern) Church," by DEAN STANLEY (London and New York, 1862); "History of Latin Christianity," by DEAN MILMAN (to the Pontificate of Nicholas V., London and New York, 1860 *sqq.*); "History of the Crusades," by MICHAUD, WILKEN, SPITTLER. The Papacy: WALCH, PLANCK, SPITTLER, GREENWOOD ("Cathedra Petri"), RIDDLE, BAUER, WYLIE; also many monographs on single popes, as VOIGT on Gregory VII., HURTER on Innocent III. (4 vols.), REUTER on Alexander III. (3 vols.). Scholasticism and Mysticism of the Middle Ages: STÖCKL ("History of the Philosophy of the Middle Ages," Mayence, 1864 *sqq.*, 3 vols.); GÖRRES ("History of Christian Mysticism," 1836–42, 4 vols.); and the monographs of HASSE on Anselm of Canterbury, WERNER and VAUGHAN on Thomas Aquinas, NEANDER and MORISON on St. Bernard, CHRISTLIEB on Scotus Erigena, LIEBNER on Hugo of St. Victor. History of Monasticism: SPITTLER, MÜNCH, DÖRING, MONTALEMBERT, and especially the colossal biographical work of the Jesuits, "Acta Sanctorum" (for every day in the year, not yet completed). Revival of Letters and Forerunners of the Reformation: ULLMANN on the "Reformers before the Reformation" (2 vols., Hamburg, 1841); VAUGHAN on John Wycliffe (London, 1854); LECHLER on Wycliffe (Leipsic, 1873, 2 vols.); HELFERT and GILETTE on Huss and Jerome of Prague; MEIER, RUDELBACH, PERRENS, MADDEN on Savonarola; MÜLLER on Erasmus; STRAUSS on Ulrich von Hutten; SEEBOHM on "The Oxford Reformers, John Colet, Erasmus, and Thomas More" (London, 1869). "History of the Reformation," by MARHEINEKE, NEUDECKER, RANKE, MERLE D'AUBIGNÉ, DÖLLINGER (R. C.), FISHER (just published, New York, 1873), KAHNIS (1873); not to mention the numerous monographs on Luther, Melanchthon, Zwingli, Calvin. On the English Reformation in particular: STRYPE ("Ecclesiastical Memorials and Annals of the Reformation;" also his "Memorials of Cranmer, Parker, Grindal, Whitgift," etc.); BURNET, COLLIER (non-juror), DODD (R. C.), CARDWELL, FULLER, SOAMES, FROUDE (from the fall of Wolsey to the death of Elizabeth). On the Reformation in Scotland: BUCHANAN ("Rerum Scoticarum Historia"), J. KNOX (till 1567), CALDERWOOD, ROBERTSON, M'CRIE ("Life of John Knox"), HETHERINGTON, RUDLOFF. On the literature of the modern history of the principal churches and sects see the respective articles.

PHILIP SCHAFF.

Ecclesiastical Law. See CANON LAW.

Ecclesias'ticus [Gr. ἐκκλησιαστικός, probably meaning the "church-book," because anciently read in "church" (ἐκκλησία)], or **the Wisdom of Jesus the Son of Sirach,** a book considered apocryphal by Jews and Protestants, and received as canonical by the Roman Catholic and Greek churches. By the Anglican Articles it is recommended to be read for edification. It appears to have been written in Hebrew by one Jesus (Joshua), the son of Sirach, at Jerusalem, at an uncertain date.

Ecclesiol'ogy [Gr. ἐκκλησία, "church," and λόγος, "treatise"], a word denoting properly the doctrine of the Church and its government, but commonly applied to the building and furnishing of church edifices. The subject has attracted much attention in Great Britain of late years. There are societies for promoting the study, a journal ("The Ecclesiologist") is published, and there is "A Handbook of English Ecclesiology" (London, 1847).

Echellen'sis (ABRAHAM), a learned Maronite, born at Eckel in Syria. He was professor of Arabic and Syriac at Rome, and removed about 1630 to Paris, where he assisted in the edition of Le Jay's polyglot Bible. He was the author of an "Oriental Chronicle." Died in Italy in 1664.

Échelon [a French word signifying the "round" of a ladder], a military term applied to a certain arrangement of troops when several divisions are drawn up in parallel lines, each to the right or the left of the one preceding it, like "steps" or the rounds of a ladder, so that no two are on the same alignment. Each division by marching directly forward can form a line with that which is in advance of it. There are two sorts of échelon, *direct* and *oblique*, the former of which is used in an attack or a retreat.

Échevin [Lat. *scabinus*] in France from the time of Charlemagne to the Revolution (1789), a royal officer of justice and of finance, whose duties were various in different periods. For the last six hundred years of the duration of the office it was chiefly exercised in the cities. The échevins of Paris were assessors, and had authority as magistrates in some kinds of civil business.

Echid'na [Gr. Ἔχιδνα], in Greek mythology, a monster, half serpent and half woman, supposed to be the daughter of Tartarus, and the mother of Cerberus and the Chimæra.

Echidna, a genus of Australian quadrupeds belonging to the order Monotremata. The *Echidna* is covered with spines, and is nearly as large as a hedgehog. It deviates in a remarkable manner from the typical structure of the Mammalia in the organization of the generative and osseous systems. The muzzle is elongated and slender, and the mouth destitute of teeth. The feet are armed with claws, which enable the *Echidna* to burrow with great rapidity. It feeds on ants, which it catches by means of a long adhesive tongue.

Echi'mys [from the Gr. ἐχῖνος, a "hedgehog," and μῦς, a "mouse"], a South American genus of rodent mammals called "spiny rats." They are about the size of large rats, and have numerous spines scattered through their hair. They are of six or eight species, and are a kind of link between the rats and the true porcupines.

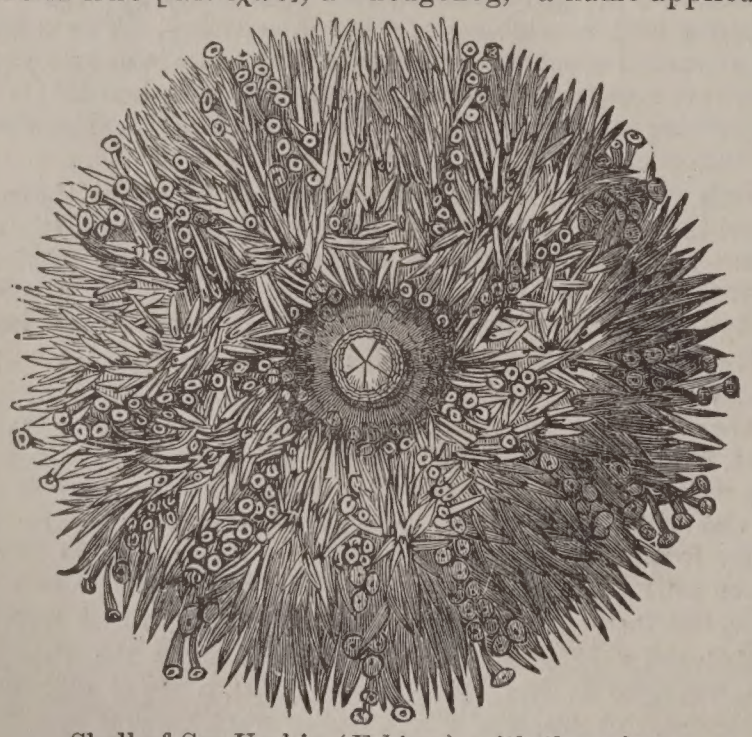
Echin'ades [Gr. Ἐχινάδες, from ἐχῖνος, a "hedgehog," alluding to their irregular, sharp outlines], the ancient Greek name of a group of islands of the Ionian Sea, off the mouth of the Achelous. Some of the ancient islands have been joined to the mainland by alluvial deposits. The islands are small, rocky, and unimportant. Seventeen of these islands have names, but only nine are cultivated. They are now called Kurtzelari Islands, and the largest is named Petalá; but Oxiá, Makrí, and Vrómona are the most important. Lat. of the S. end of Oxiá, 38° 17′ N., lon. 21° 6′ E.

Ech'inate [from the Gr. ἐχῖνος, a "hedgehog"], in botany, furnished with rigid hairs or prickles, as the husk of the chestnut.

Echin'ida [named from *Echi'nus*, one of the genera], called also **Ech'inoids** or **Sea Ur'chins** (urchin being the old English for hedgehog), an order of echinoderms with calcareous shells more or less globular, and composed of symmetrically-arranged plates, bearing tubercles armed with movable spines. They have no arms like star fishes, but the five radiations are distinctly marked by holes, through which the ambulacra are protruded. These holes occur in the alternate plates. These animals are divided into regular sea urchins (Cidaridæ), often spherical or oval, and irregular sea urchins, of which there are several families. Many species of echinoids occur in the American seas.

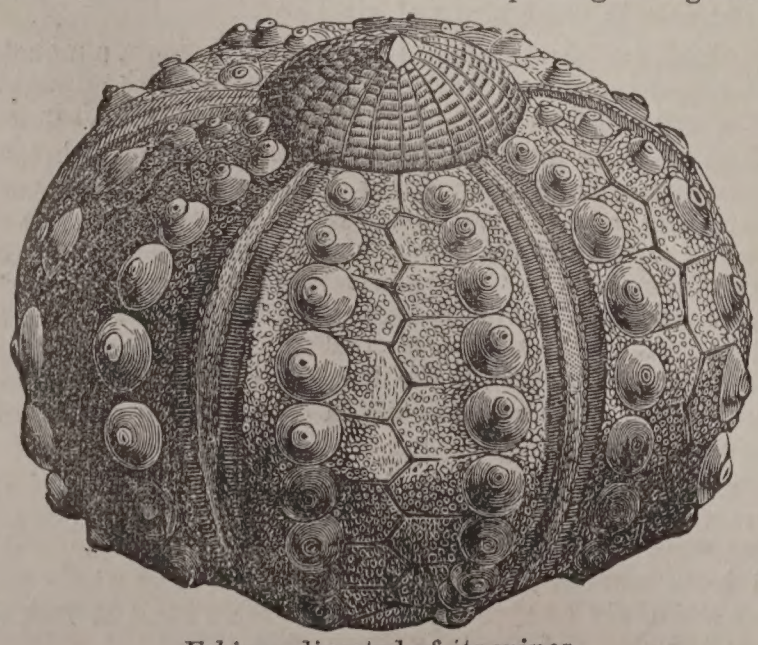
Echinoder'mata (plu.), or **Ech'inoderms** [from the Gr. ἐχῖνος, a "hedgehog," and δέρμα, a "skin"], the highest class of animals of the Cuvierian sub-kingdom Radiata, having a tough covering, containing more or less calcareous matter, or composed of pieces which are either movable or bound together and covered with spines (whence the name); the body divided into two parts, the actinal (or oral) and the abactinal portion. Along certain of the rays are regular rows of tube-like suckers (ambulacra) used in locomotion. The muscular system is well developed. The internal vessels, etc. have walls of their own. The principal nerve-centre is a peri-œsophageal ring; all are oviparous. Echinoderms have their parts in multiples of five. The living species are all marine. They are divided into five orders—the holothurians, the sea urchins (echinoids), the star fishes (asteroids), the ophiuroids, and the crinoids. To these some append the siphunculoids as a sixth order.

Echi'nus [Gr. ἐχῖνος, a "hedgehog," a name applied to



Shell of Sea Urchin (*Echinus*), with the spines.

this genus on account of its spines], a genus of Echinodermata, of the family Cidaridæ, comprising a large number of European sea-urchins, several species of which are used as food. Forbes counted on one of these animals more than 300 polygonal plates, over 4000 spines, and nearly 1900 suckers.



Echinus, divested of its spines.

Echinus, in architecture, a moulding consisting of a series of egg-shaped or alternately egg- and anchor-shaped ornaments. It especially appears as an ornament of the Doric capital or cushion, and is one of the characteristic decorations of early Greek art. It is said to have taken its original form and its name from the chestnut and its spiny burr.

Echmiedzin', or **Eschmiazin,** a celebrated Armenian monastery in the province of Erivan, in Asiatic Russia, 15 miles W. of Erivan. It is the residence of the catholicos or head of the entire Armenian Church. Twelve archbishops and bishops, four vartabeds, about sixty clerical and five hundred lay monks live in the monastery, the archbishops, bishops, and vartabeds constituting the synod of the catholicos, which must be consulted on all important occasions. The monastery was founded in 524.

Ech'o [Gr. Ἠχώ], in classic mythology, was a nymph who aided Jupiter in escaping the watchfulness of Juno, by detaining the latter with her amusing talkativeness; but that goddess, discovering the deception, ordained that she should not be able to speak until some person had spoken to her, nor to be silent after any one had spoken to her. Cherishing for Narcissus a passion which was not requited, she pined away until nothing remained of her but her voice.

Echo [for etymology see preceding article], the reflection of sound from a distant surface. Several conditions must be fulfilled before an echo can be produced. The ear must be situated in the line of the reflection; and in order that the person who emits the sound may himself hear the echo, this line must be perpendicular to the reflecting surface, but if there are several such surfaces the sound may be brought back by a series of successive reflections. The opposing surface must be at a certain distance from the ear, for if the direct and reflected sounds succeed each other with great rapidity, they are confounded. Thus, vaulted caves and large rooms have a strong resonance, but produce no echo.

Sound passes through the atmosphere at the rate of about 1125 feet in a second; hence, a person placed at half that distance would hear the echo exactly one second after the sound was emitted by him. The least distance of the reflecting surface from the point whence the sound is emitted must be about fifty feet.

Unless the surface reflecting the sound is of considerable extent, the echo will be too feeble to be heard. Some concavity in the surface by which diverging rays of sound are concentrated at the point where the echo is audible, is favorable, if not absolutely essential, to the production of echoes. It is a property of the ellipse that every sound proceeding from one of its foci and impinging against the curve is reflected into the other focus; whence two persons placed in the two foci of an elliptic chamber may converse with each other in a whisper, and not be heard by those who are in the other parts of the room. Thus, walls or buildings approaching the elliptic form return sounds with great force and distinctness. The faintest sound is conveyed from one side of the "whispering gallery" of St. Paul's, London, to the other, but is not heard at any intermediate point. Some echoes are remarkable for their frequency of repetition. An echo in Woodstock Park, England, repeats seventeen syllables by day and twenty by night. An echo in the Simonetta palace, near Milan, is said to repeat the report of a pistol sixty times.

Echo, in music, is the repetition of a musical phrase often written for the organ, by the stops of which it can be produced with facility.

Ech'o, a township of Dale co., Ala. Pop. 950.

Ech'o Cañ'on, Utah Territory, is a remarkable ravine or defile visible to passengers on the Union Pacific R. R., 975 miles from Omaha. It is in Summit co., and is enclosed between high vertical walls of rock. The scenery is of surprising grandeur and beauty.

Ech'o Cit'y, a post-village of Summit co., Ut., on the Union Pacific R. R., 39 miles S. E. of Ogden. It is picturesquely situated more than 5000 feet above the sea.

Ech'ols, a county in the S. of Georgia. Area, 400 square miles. It is intersected by the Allapaha River. The surface is level; the soil sandy. Corn, rice, and wool are raised. It is traversed by a branch of the Atlantic and Gulf R. R. Capital, Statenville. Pop. 1978.

Ecija, å'the-hå (anc. *As'tigi*), a city of Spain, in Andalusia, on the river Genil, about 50 miles E. N. E. of Seville. It is well built, and has numerous churches, convents, and hospitals; also manufactures of linens and coarse woollen

fabrics. On the border of the river is an *alameda* (promenade) adorned with statues and fountains. Many Roman remains are found here. The climate is so hot that Ecija is called "the frying-pan of Andalusia." The ancient *Astigi* was one of the chief towns of Hispania Bætica. Pop. in 1860, 27,216.

Eck, von (JOHANN **Mayr**), [Lat. *Eck'ius*, or *Ec'cius*], D. D., a German theologian and able adversary of Luther, was born at Eck, in Suabia, Nov. 13, 1486. He was a professor in the University of Ingolstadt, and was noted for his skill in disputation. He went to Rome in 1520, and instigated the pope to persecute Luther. At the Diet of Augsburg held in 1530 he controverted the Lutheran confession of faith. Among his works is a "Manual of Controversy." Died Feb. 10, 1543.

Eck'art, the greatest among the mystic writers of Germany during the Middle Ages, was vicar of the Dominican order in Erfurt, then vicar-general in Bohemia, and in 1327 provincial in Cologne. He introduced many reforms into the monasteries, attracted great attention by his sermons in the German language, and was connected with the Brethren of the Free Spirit. A papal bull issued soon after his death condemned twenty-eight sentences in his sermons. He has been called the "father of modern pantheism," and is regarded as one of the greatest men of the German race, and one of the deepest thinkers of all ages. Died in 1329, near the beginning of the year. A collection of his writings, as far as they have been preserved, has been published by Pfeiffer in the second volume of "Deutsche Mystiker" (1857).

Eck'ert (THOMAS THOMPSON), born in St. Clairsville, O., April 23, 1824. In 1849 he was appointed postmaster at Wooster, and placed in charge of the telegraph-office there; in 1852 he was appointed superintendent of telegraph, which position he held till 1859, when he accepted the management of a gold-mining company in North Carolina, which he retained till the spring of 1861, when on the outbreak of war he was compelled to abandon all he possessed. He reached Cincinnati nearly destitute. His information of the condition of affairs in the South was valuable, and he was invited to Washington by the authorities for consultation. He was at once placed in charge of the military telegraph-office at the head-quarters of Gen. McClellan. In 1862 he accompanied the Army of the Potomac as superintendent of military telegraph, with the rank of captain and acting quartermaster. In Sept., 1862, he was called to Washington to establish the head-quarters of the military telegraph at the war department, with the rank of major. His service in organizing and conducting the immense system was freely acknowledged, and he enjoyed the confidence of both President Lincoln and Secretary Stanton. In the latter part of 1864 he was made assistant secretary of war, which office he retained till Aug., 1866. (Brevet lieutenant-colonel 1864, brevet brigadier-general 1865.) Immediately after his retirement from the war department he accepted the general superintendence of the Western Union Telegraph in the East; which position he now holds, performing the duties of his office with great ability, and securing valuable results both to the public and the telegraph service, and to himself a high reputation as a telegraph manager.

G. C. SIMMONS, *Clerk Board of Engineers.*

Eck'ford, a township of Calhoun co., Mich. Pop. 1011.

Eckford (HENRY), born in Scotland Mar. 12, 1775, removed to the city of New York in 1796. During the war of 1812–14 he was employed by the U. S. to build fleets for the lakes. He also built ships of war for foreign nations. His ships were remarkable for strength and speed. In 1831 he entered the service of the Turks as naval constructor. Died at Constantinople Nov. 12, 1832.

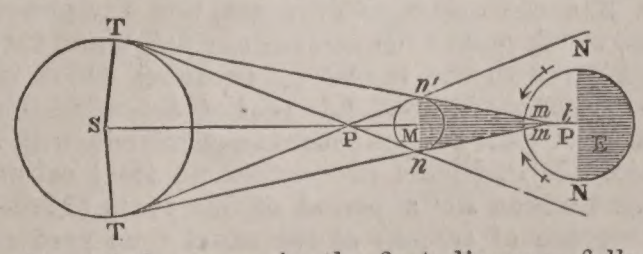
Eckley, a post-village of Foster township, Luzerne co., Pa., on a branch of the Lehigh Valley R. R. It has productive mines of excellent anthracite coal.

Eck'mühl [Ger. *Eggmühl*], a village of Bavaria, 13 miles S. S. E. of Ratisbon. Here on the 22d of April, 1809, Napoleon defeated the Austrian archduke Charles, who lost 5000, killed and wounded, besides 7000 prisoners. Davoust received the title of prince of Eckmühl for his conduct in this battle.

Eclec'tic [Gr. ἐκλεκτικός, from ἐκ, "out," and λέγω, to "choose;" Lat. *eclec'ticus;* Fr. *éclectique*], selected or chosen from several others. This term was applied to philosophers who endeavored to select from the systems of various schools the true or most probable doctrines, and to combine these into a harmonious system. An eclectic spirit, it is evident, can only exist or prevail at a period of some maturity in philosophical speculation. In one sense of the word, Plato and Aristotle may be regarded as eclectics, for they both availed themselves largely of the doctrines of preceding philosophers. But in the hands of these great thinkers the *discerpta membra* are endued with a principle of vitality, and reunited as coherent parts of a harmonious system. The term eclectic is especially applied to philosophers of a later age and inferior order. Among these may be classed Epictetus, Potamon, Plutarch, and Plotinus. Plutarch, a man of great and various endowments, may be taken as an example of false eclecticism. His great object seems to have been to reconcile the profound speculations and pure morality of the philosophers with the fanciful inventions and gross mythology of the poets and priests. Plotinus and others endeavored to reconcile Neo-Platonism with Christianity. Among the most eminent modern eclectics Victor Cousin, the French translator and interpreter of Hegel, affords a favorable specimen of the eclectic spirit. He was perhaps the most ingenious thinker of modern France. (See his "Lectures on the History of Philosophy.")

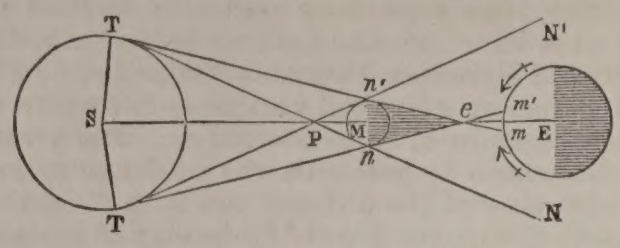
Eclipse [Gr. ἔκλειψις, from ἐκλείπω, "to fail;" Lat. *defectus*], in astronomy, the obscuration of a celestial body by another. Eclipses are divisible into three classes, viz.: 1, the obscuration of the sun by the moon, which is called a *solar eclipse;* 2, the obscuration of the moon by the shadow of the earth, which is a *lunar eclipse;* and 3, the obscuration of a satellite of a planet by the shadow of the primary, which is called the *eclipse of a satellite,* as distinguished from an occultation of the satellite, by which is to be understood the disappearance of the satellite behind the body of the primary. The most interesting of these phenomena are the eclipses of the sun and moon. The earth and the moon cast their shadows in a direction opposite to the sun; and as the earth and moon are nearly spherical, and the sun is larger than either, it is evident that these shadows must be nearly conical in form. The moon is eclipsed when it enters the shadow of the earth; in other words, when the earth is interposed between it and the sun. This can occur only at the time of full moon, or when the moon is in opposition to the sun, and when both bodies are at the same time near one of the moon's nodes; that is to say, near to the points in which her orbit intersects the plane of the ecliptic. When at the time of mean full moon the difference of the mean longitude of the moon and of her node is greater than 13° 21′, there cannot be an eclipse; when less than this, there may be; and when less than 7° 41′, there must be. These distances are called the *lunar ecliptic limits.* If only part of the moon's disk enters the earth's shadow, the eclipse is called partial; but if the whole disk is involved in the shadow, it is total. The orbit of the moon is inclined about 5° to the plane of the ecliptic, and this is the reason why eclipses do not happen every full moon. The moon cannot be eclipsed more than twice during the year, and it may escape eclipse for an entire year altogether. Lunar eclipses are visible to all parts of the earth at which the body is above the horizon at the time of their occurrence.

Solar eclipses occur at the time of new moon, or when the moon is between the sun and the earth. If at the time of mean new moon the difference between the mean longitudes of the sun or moon and the node is greater than 19° 44′, there cannot be an eclipse; if less than this, there may be; and if less than 13° 33′, there must be. These distances are called the *solar ecliptic limits.* They are greater than the lunar ecliptic limits; and hence eclipses of the sun are more frequent than those of the moon. To all parts of the earth on which the moon's true shadow or *umbra* falls, the eclipse is total; to those from which only a portion of the solar disk is concealed, it is partial; and the diminution of the sun's light over these regions defines what is called the *penumbra* or partial shadow. The greatest breadth of the moon's true shadow on the earth's surface never exceeds 127 miles; the breadth of the penumbra may reach 4900 miles. At the time of new moon, or when the moon is between the sun and the earth, her shadow or penumbra may fall on a part of the disk of the earth, and produce the phenomenon of a total or partial eclipse of the sun, which is limited to the portions of the earth on which the moon's shadow or penumbra happens to fall. The shadow of the moon does not always extend so far as the earth. In the two following diagrams the former represents the case in which the shadow does reach, and the latter illustrates the case in which it does not reach, the surface of the earth.



The shadow of the moon in the first diagram falls upon a portion of the earth between *m* and *m′*, and the inhabitants of that portion will witness a *total eclipse of the sun.* But in the second diagram, where the shadow of the moon does

not reach the earth, if we suppose the dark conical shadow *n n'* to be produced into the small opposite cone *m m'*,



meeting the surface of the earth, it will be obvious that to any spectator within this latter cone, or any inhabitant of the portion *m m'* of the earth, the central part of the sun's disk will be covered or obscured by the moon, and the unobscured part of the sun will present the appearance of a beautiful luminous ring or *annulus*. This phenomenon is an *annular eclipse* of the sun. In other cases, the moon's penumbra N N' is projected against a portion of the earth's surface, so as to cause a partial eclipse. The diagram, owing to the disproportion between the relative distances and magnitudes of the bodies, exaggerates the extent of the penumbra, which is never large enough to cover the entire disk of the earth.

The largest number of eclipses of both sun and moon which can occur in any one year is seven, of which five will be of the sun and two of the moon. The smallest number possible in one year is two, both of which will be of the sun. The sun passes each of the moon's nodes once only in a year, unless the first passage occurs near the first of January, in which case, owing to the retrogradation of the nodal points, it may pass one node twice and the other once. Two solar eclipses may then occur in January, two in midsummer, and one in December, making five in all. But owing to the limited extent of the earth's surface to which solar eclipses are visible, they are less frequently observed at the same place than lunar. The eclipses of Jupiter's satellites, which can be calculated long beforehand, afford a convenient method of determining longitude.

The *duration* of an eclipse is the time between the immersion and the emersion. Immersion signifies the moment when the luminary begins to be obscured, and emersion is the reappearance of the luminary from behind the body by which it has been obscured. The term *digit* is used to denote one-twelfth part of the diameter of the sun's disk, and the eclipse is said to be of ten digits if ten out of twelve parts of its diameter are obscured when the phase is maximum. A total eclipse of the sun is an impressive phenomenon, and was regarded by the ancients as a very portentous, supernatural, and alarming event. The Christians of the Dark Ages offered formal prayers in order to avert the recurrence of eclipses. Even brute animals are filled with dismay by the lurid gloom or peculiar twilight of a total eclipse, during which the temperature of the air sinks rapidly. The duration of such an eclipse is usually only about three or four minutes, but may extend to eight. A total eclipse of the sun was visible in some parts of the U. S. Aug. 7, 1869, when the duration of totality was two minutes and forty-two seconds. The corona of this eclipse is thus described by a person who observed it: "On looking up, one of the grandest spectacles met the eye of which it is possible to conceive. Surrounding the dark body of the moon was a crown of light, with rays shooting out in five great sheaths to a distance equal to the sun's diameter, or nearly a million of miles. We gazed for eight or ten seconds with astonishment at this magnificent spectacle. No painting can represent it, and no pen can describe it." "The peculiar phenomena which have attracted so much attention in solar eclipses are only visible during the brief period of totality. The difficulty of observing them lies in this exceeding brevity, and in the fact that however much the observer may have studied the experiences of others, the phenomena come upon him as a complete surprise. The moment that the last ray of light disappears with the extinguishment of Bailly's beads there bursts upon him a vision so marvellously beautiful, so startling by its novelty, that his self-possession and self-control desert him." "No one," he adds, "who has not seen a total eclipse can fully appreciate the grandeur of the occasion. As the light, ray by ray, is cut off, a strange and ghastly darkness comes down upon us; not like the darkness of night, but a violet-colored darkness, which makes the faces of our neighbors turn ashy pale, and gives to the landscape the hues which it takes in a stereoscopic picture." (*Annual of Scientific Discovery for* 1870.) A total eclipse occurs very infrequently at any one place. J. P. Nichol states that no total eclipse was visible at London for a period of 575 years (1140–1715). The occurrence of eclipses at the exact time predicted by astronomers is a signal demonstration of the constancy of the laws of Nature, and of the undeviating punctuality with which her grand operations are performed.

Great importance has heretofore been attached to spectroscopic and polariscopic observations of the sun's envelopes and coronal appendages during solar eclipses. Recently, however, it has been found practicable to make such observations quite as satisfactorily when the body is entirely unobscured. These observations have already added much to our knowledge of the physical condition and chemical constitution of our great central luminary; and there is reason to expect that in coming years they will be still more fruitful in interesting discovery. (See SUN and CORONA.)

Eclip'tic [so called because eclipses can only occur when the moon is on or very near its plane], in astronomy, the great circle of the heavens which the sun appears to describe in his annual revolution. It is the circle to which longitudes and latitudes in the heavens are referred. From time immemorial the ecliptic has been divided into twelve equal parts, called signs of the zodiac—Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, and Pisces. These signs, however, do not coincide with the constellations of the same names. but are merely arcs of thirty degrees reckoned from the intersection of the ecliptic and equator, which is not a fixed point, so that they are carried backward by the precession of the equinoxes. The sign Aries is now in the constellation Pisces. The angle which the plane of the ecliptic makes with the plane of the equator is called the obliquity of the ecliptic, which is a variable quantity—about 23° 27′ 30″. The change of seasons is the result of this angle.

Eclogue, ĕk'log [Lat. *ec'loga;* Gr. ἐκλογή, a "selection"], originally the select pieces of an author. The word usually signifies a pastoral poem, the main and proper subjects of which are the loves of shepherds or their adventures. These shepherds, however, are mostly imaginary personages, whose sentiments and circumstances belong rather to an ideal golden age than to the realities of common life. The "Bucolics" of Virgil are often called *eclogues*, but they have not all the true pastoral character, some of them being occasional poems on events of the day, only slightly enveloped in the pastoral costume. Spenser and Philips are among the eminent English pastoral poets. It is worthy of notice that this species of composition is now nearly obsolete.

École Polytechnique. See POLYTECHNIC SCHOOL.

Econom'ic Geol'ogy, also called **Practical Geology,** is that branch of the science which relates to the distribution, modes of occurrence, properties, and uses of minerals employed by man. The applications of geology are—1, to agriculture, in the knowledge it conveys of the composition, structure, and origin of soils, the distribution and properties of mineral fertilizers, etc.; 2, to architecture, in materials for construction; 3, to engineering, in drainage, excavations, and construction; 4, to manufactures, in its revelations of the distribution, properties, and uses of ores, fuels, clays, oils, asphalts, gems, and other minerals employed in the arts. It also includes the theory and practice of mining. By its investigations into the structure and resources of the earth, economic geology may have an important bearing upon the health, wealth, occupations, and history of every community and nation.

Econ'omy [Lat. *œcono'mia;* Fr. *économie*, from the Gr. οἶκος, a "house," and νόμος, "law" or "regulation"], the regulation and government of a household or family; a frugal and prudent use of money or commodities; prudent management of affairs; sometimes the regular operations of nature in the reproduction, nutrition, and preservation of animals and plants. Rural economy is nearly synonymous with agriculture and the pursuits of farmers.

Econ'omy, a post-village of Beaver co., Pa., on the Ohio River and on the Pittsburg Fort Wayne and Chicago R. R., 18 miles N. W. of Pittsburg. It was settled by German socialists called the Harmony Society. It has manufactures of cotton and wool. Pop. of Economy township, 1324. (See HARMONISTS.)

Economy, Political. See POLITICAL ECONOMY.

Ecora Fabra, a township of Ouachita co., Ark. Pop. 2325.

Écorché, å'kor'shå' [a French word, past part. of *écorcher*, to "flay," to "skin"], is a figure used as a model by artists, in which the muscles are represented deprived of the skin. In a portion of the figure the upper muscles are also removed, so that those lying below them may be seen. The écorché is sometimes represented in action. This was first done by the French artist and anatomist Salvage.

Ecorse, a post-township of Wayne co., Mich. P. 2211.

Écoutes, å'koot' [a French word from *écouter*, to "listen"], in military engineering, are small galleries excavated at regular intervals beyond the glacis and towards the enemy's works, whose mining operations may by this means be heard and estimated.

Écraseur, ā-krå′zŭr [Fr., signifying "crusher," from *écraser*, to "crush"], a surgical instrument for performing amputation, invented by Chassaignac of Paris. The cutting is done by a small but very strong steel chain, a loop of which is passed around the tumor or other part to be removed. The two ends of the chain run through a steel tube, and in operation are drawn through the tube by an endless screw with a lever handle, which puts the ends of the chain into tension, diminishing the size of the loop and very slowly but irresistibly tearing away the enclosed substance. Its use is always to be preceded by an anæsthetic. Its advantages are that the hæmorrhage following its judicious use is usually slight, and that healing takes place rapidly, with comparatively little suppuration. The shock is also comparatively slight; but it can never be used where nice dissection and skilful operation are required; and it is also somewhat unmanageable in its effects. Its use is becoming limited to a small and peculiar class of operations, chiefly upon mucous surfaces; in these cases its value is great.

Ectozo′on (plu. **Ectozo′a**), [from the Gr. ἐκτός, "without," "outside," and ζωόν, an "animal"], a term used in contradistinction to Entozoa [ἐντός, "within," and ζωόν, an "animal"], to indicate parasitic animals which live upon the outside of other animals, such as lice and ticks, and the crustaceans found upon fishes and whales. A more common name for these creatures is Epizoa (which see).

Ecuador, ĕk-wå-dōr′ [Fr. *L'Équateur;* Port. *Equador*], (*i. e.* "equator"), a republic of South America, so called because it is situated under the equator. It extends from lat. 1° 35′ N. to 5° 50′ S., and is about 800 miles long from E. to W. Area, estimated at 250,000 square miles; Guyot says 206,692. It is bounded on the N. by Colombia, on the E. by Brazil, on the S. by Peru, from which it is separated by the river Amazon, and on the W. by the Pacific Ocean. Its limits are nearly the same as those of the former Spanish province of Quito.

Physical Features and Climate.—This region presents a great variety of surface and climate in its lofty mountains, elevated valleys or plateaus, and low tracts called *tierras calientes*, the temperature of which is intensely hot. The surface is mostly mountainous, except the plains called *Llanos* in the eastern part. Ecuador is traversed by two Cordilleras of the Andes, many peaks of which, called *nevados*, rise above the limit of perpetual snow. About sixteen active volcanoes occur in this republic, one of which, Cotopaxi, is 18,875 feet high, and is remarkable for its symmetrical form, resembling a truncated cone. The highest peak in Ecuador is Chimborazo, which rises 21,424 feet above the level of the sea, and belongs to the western range. The culminating points of the Eastern Cordillera are Cayambe, 19,535 feet, and Antisana, 19,137 feet high. Between these two cordilleras is the long valley or table-land of Quito, which is 9543 feet above the level of the sea, and enjoys a temperate and very equable climate. Here and in the high valleys of Cuenca and Hambato prevails delightful weather, like perpetual spring. Winter is only distinguishable from summer by a greater quantity of rain. Copious rains often fall at Quito, and a regular rainy season prevails in the vicinity of Guayaquil on the coast, where the temperature is often above 100° Fahrenheit. Ecuador is subject to frequent earthquakes.

The chief rivers are the Amazon (here called the Marañon) and its tributaries, the Napo, Tigre, Pastaza, and Putumayo or Içа. The last of these forms the north-eastern boundary of the republic. They flow in a south-east direction, except the Marañon, which flows nearly eastward. They are navigable for steamboats in the lower part of their course. The Putumayo and Napo are said to be navigable for 500 miles or more.

Minerals, Animals, and Plants.—Granite, syenite, trachyte, and porphyry abound in the Andes of Ecuador. Among its mineral resources are gold, silver, mercury, copper, antimony, lead, iron, zinc, and salt. The forests are infested with the cougar (*Felis concolor*), the jaguar or American tiger, the panther, the bear, and the ounce. The tapir, armadillo, vicuña, guanaco, monkey, sloth, llama, and antelope are also found here. Large numbers of wild horses and cattle roam over the plains or *llanos*. Noxious reptiles and insects are very numerous and troublesome in some parts of the country. Ecuador is partly covered with extensive forests of large timber, and is said to surpass most other countries in trees suitable for shipbuilding and cabinet-work. The cinchona abounds here. Among the vegetable productions are vanilla, cocoa, balsam of tolu, caoutchouc, croton oil, the orange, cherimoya, pineapple, and many other tropical fruits. Cotton, sugar-cane, rice, pepper, coffee, and the banana are cultivated in the lowlands, and maize, wheat, and barley flourish in the high table-lands of Quito.

Divisions, Towns, Population, Religion, Education.—Ecuador is divided into three departments—viz., Assuay, Pichincha, and Guayas, which, after their capitals, are also called Cuenca, Quito, and Guayaquil. The departments are subdivided into provinces, the department of Quito containing the provinces of Pichincha, Imbabura, Leon, Chimborazo, Esmeraldas, and Oriente; the department of Guayaquil, the provinces of Guayaquil and Manane; and the department of Cuenca, the provinces of Cuenca and Loja. The chief towns are Quito (which is the capital), Cuenca, Riobamba, Guayaquil, and Loja. Guayaquil is the principal seaport of the republic. According to Villavicencio ("Geografia de la Republica del Ecuador," 1858), the population amounted in 1858 to 1,108,082, exclusive of 200,000 uncivilized Indians. Wappäus ("Geograph. Handbuch," new ed. 1871) estimates it, on the basis of an official census of 1856, at 881,943, exclusive of 150,000 uncivilized Indians. About 600,000 inhabitants are of Spanish or European extraction; the remainder, with the exception of a small number of negroes (about 8000) and mestizoes (about 36,000), are Indians. All the races enjoy political equality. The entire population, except the uncivilized Indians, belong to the Roman Catholic Church, and the public exercise of any other form of religion is forbidden. The Roman Catholic Church has in Ecuador the archdiocese of Quito and the dioceses of Cuenca, Guayaquil, Riobamba, Ibarra, Loja, and Puerto Viejo, the last four of which have been established by Pius IX. The republic has a university at Quito (established in 1684), four colleges, eleven other high schools, several seminaries, and about 290 primary schools, of which only thirty are for girls. The Indian population grows up almost entirely without education. In accordance with the concordat of 1863, the entire public instruction is in agreement with the Catholic Church.

Government, Finances, Commerce, Army, and Navy.—The constitution of Ecuador, which is democratic and republican, was adopted in 1845, and amended in 1852 and 1853. The executive power is vested in the president, and in case of a vacancy of the presidential chair, in the vice-president. According to a law passed in 1869, the minister of the interior is at the same time vice-president of the republic. The legislative power is vested in a congress, consisting of a senate of eighteen members and a house of representatives consisting of thirty members. Congress assembles annually at Quito on Sept. 15, without being convoked by the president. The revenue of the republic amounted in 1870 to 1,813,870 piastres (1 piastre = 1 dollar), the chief source of the revenue (more than two-thirds) being duties on imports. The expenditures amount to about 1,400,000 piastres. The home debt was, in 1865, 9,390,554 piastres; the foreign debt, 3,692,955 piastres. Nearly the whole foreign trade passes through the port of Guayaquil, the ports of Manta and Esmeraldas being as yet of only small importance. The aggregate value of the exports from Guayaquil during the year 1871 amounted to 3,807,105 piastres, exclusive of precious metals, the exports of which in 1870 amounted to 1,135,467 piastres. The most important articles of export are cacao (2,134,000 piastres), gum (867,000 piastres), straw hats (93,000 piastres), cinchona bark (115,000 piastres), cotton (38,000 piastres). The total number of vessels entering the port of Guayaquil in 1870 was 125 (among which were 72 English and 18 German), of an aggregate tonnage of 55,310. The army consists of one regiment of artillery, four battalions of infantry, and three regiments of cavalry; in all, 3151 men. The navy is composed of only two steamers and one pilot-boat. The roads throughout the republic are in a shocking condition, and at the close of the year 1872 no beginning had been made yet with the construction of either railroad or telegraph.

According to the traditions of the Indians, Ecuador was anciently a mighty kingdom, consisting of fifty provinces, and probably much larger than it is at present. The name of the kingdom was Quito, and that of its inhabitants Quitoos or Quichoos. About the tenth century a strange people called Cara, who had come from the coast, conquered the Quitoos, and reigned for about 500 years. In 1475 the nation was conquered by the inca Huayana-Capac, called the "Great," who divided his dominions between his two sons, Huascar and Atahuallpa. Huascar became inca of Peru, and Atahuallpa king of Quito. Dissensions between the two brothers ultimately led to war, and in 1530 Huascar was conquered and kept a prisoner in his own capital. Atahuallpa thus became ruler of the whole empire of the incas, but in the war against the Spaniards he lost his throne and his life. (See Peru.) The Spaniards, after subduing the entire country, made Quito a presidency in the vice-kingdom of New Spain, which for nearly three centuries yielded to Spain large quantities of gold and silver, and was at one time its richest and most profitable colony. In some of its districts, however, the mines were utterly destroyed by the Indians, who by Spanish despotism were driven to desperation.

The first attempt to establish their independence was

made by the colonists in 1809, but it was unsuccessful. A second attempt in 1812 had the same fate. More successful was the revolution which in 1820 began at Guayaquil under the leadership of Bolivar. Two years later, Ecuador joined the republic of Colombia, which had been formed by New Granada and Venezuela, and in Dec., 1824, the battle of Ayacucho for ever overthrew the Spanish rule. In 1831, Ecuador separated from Colombia and became an independent republic, of which General Juan José de Flores, the companion of Bolivar, was the first president. Since then the history of Ecuador has been an almost uninterrupted series of revolutions and wars with neighboring republics. Flores remained at the head of the republic, either as president or as general-in-chief, until 1845, when he was forced to sign an agreement that he would leave the country. An insurrection attempted by the party of Flores in Oct., 1846, against the new president, Vicente Roca, was unsuccessful. In 1850 the candidate of the clerical party, Noboa, was elected president, but as early as July, 1851, he was deposed and exiled. President Urbina (1851–56) was a representative of the ultra-democratic party. During the administration of his successor, General Francisco Robles (1856–59), the French decimal system of currency, weights, and measures was adopted. A war with Peru led to the blockade of the port of Guayaquil, and was terminated by a convention concluded between Gen. Guillermo Franco, the commander of Guayaquil, and the commander of the Peruvian squadron. President Robles refused to ratify the convention, resigned, and went to Chili. In Jan., 1861, a national convention elected Dr. Garcia Moreno, the leader of the conservative and clerical party, president, while Flores was appointed governor of Guayaquil. Two wars with New Granada, which were carried on during the administration of Moreno, ended unfortunately for Ecuador. Moreno resigned in 1865; a defensive and offensive alliance which he had arranged with Chili was rejected by congress during the administration of his successor, Geronimo Carrion, but on Jan. 30, 1866, Ecuador joined the alliance of Chili, Peru, and Bolivia against Spain. Carrion, who resigned in Nov., 1867, was succeeded by Dr. Espinosa. In Aug., 1868, the country severely suffered from a terrible earthquake, by which more than 3000 persons perished. In Jan., 1869, a revolution, headed by Moreno, overthrew the administration of Espinosa. Moreno was for a short time dictator, until in May a national convention elected Dr. Carvajal provisional president. At the new presidential election Moreno was again elected president. In 1872 an insurrection of the Indians took place, which was not suppressed until many farms had been laid waste. In June, 1872, a large college, embracing schools of art, a polytechnic school, and an astronomical observatory, was opened at Quito under the direction of European professors.

A. J. Schem.

Ecumen'ical [Lat. *œcumen'icus;* Fr. *œcuménique* or *écuménique*, from the Gr. *οἰκουμένη*, the "habitable world"], a term signifying universal, applied to councils of the Christian Church in which all parts of the world are represented. (See Council, Œcumenical.) The latest of the councils called ecumenical (the Roman Catholic Council of the Vatican, 1869–70) proclaimed the infallibility of the pope.

Ecusson. See Escutcheon.

Ec'zema [Gr. *ἔκζεμα*, an "eruption," from *ἐκ*, "out," and *ζέω*, to "boil"], commonly called **Salt Rheum,** a vesicular disease of the skin, characterized by watery blisters smaller than those of herpes and larger than ordinary sudamina, such as are sometimes seen in the difficulty known as "prickly heat." Eczema is often accompanied by intense itching, and is frequently transformed into a pustular or scabbing disease. It is generally chronic. Its treatment is both local and general. The local treatment, when the epidermis is thickened, is by alkaline applications with or without tarry or astringent admixtures. The "benzoated ointment of oxide of zinc" is an excellent application. If the system has received a specific taint, the iodides, with mercury judiciously used, are indispensable, and produce the happiest results. Arsenic in small doses is an extremely useful tonic in many cases. Change of air and visits to thermal and other springs and baths, though not strictly curative, often appear to be wonderfully palliative.

Edam' [Lat. *Eda'mum*], a town of Holland, province of North Holland, has a port on the Zuyder Zee, 12 miles N. N. E. of Amsterdam. It derives its prosperity from shipbuilding and a trade in cheese and wood. Pop. in 1867, 5267.

Ed'da [Norse for "great-grandmother," so named by Bishop Sveinsson, either on account of its great age, or, according to some, as being a compilation of "grandmothers' tales"], a collection of ancient Scandinavian poems and tales illustrating the mythology of the Northern nations. It consists of two parts—(1) the poetic, old, or Sæmundic Edda, named from its compiler, Sæmund Sigfusson Frodi (1054–1133), who was a priest in Iceland: this was first published by Sveinsson in 1643; (2) the prose, or New Edda, called also "Snorro's Edda," which is the work of several writers, though ascribed to Snorro Sturleson (1178–1241). Editions of the older Edda are those of Rask (1818), Munch (1847), and Möbius (1859). The edition of Rask includes the prose Edda also. The extreme antiquity of the Eddas has been called in question by some German critics, but in arguments which have attracted very little attention.

Ed'dington, a post-township of Penobscot co., Me. Pop. 776.

Eddy (Samuel), LL.D., jurist, was born at Johnston, R. I., Mar. 31, 1769, and graduated at Brown University in 1787, became a lawyer, was clerk of the supreme court of Rhode Island (1790–93), secretary of state (1798–1819), member of Congress (1819–25), and chief-justice of the supreme court of Rhode Island (1827–35). Died at Providence Feb. 2, 1839. He published a volume of "Antiquities" and valuable historical papers.

Eddy (Thomas M.), D. D., an eloquent Methodist divine, was born Sept. 7, 1823, in Hamilton co., O., studied in the classical seminary of Greensboro', Ind., joined the Indiana conference in 1842, was editor of the "Northwestern Christian Advocate" from 1856 to 1868, served as pastor in Baltimore three years, was appointed to the Metropolitan church, Washington, D. C., in 1872, and elected the same year corresponding secretary of the Methodist Missionary Society. He was pre-eminent as a journalist, and is author of a "History of Illinois during the Civil War," 2 vols. 8vo.

Eddy (Zachary), D. D., son of the Rev. Isaac Eddy, and the seventh in descent from the Rev. William Eddy, vicar of Cranbrook, Kent, England, was born at Stockbridge, Vt., Dec. 19, 1815, was ordained by the (Cumberland Presbyterian) presbytery of Pennsylvania in 1835, was for several years a home missionary in Western New York and Wisconsin, was pastor of the Congregational church at Warsaw, N. Y., from 1850 to 1855, of the First church at Northampton, Mass., from 1857 to 1867, of the Reformed (Dutch) church on the Heights in Brooklyn, N. Y., from 1867 to 1871, and was then settled over the Central Congregational church in Chelsea, Mass. Besides occasional sermons and pamphlets, he has published "Immanuel, or the Life of Jesus Christ," 1868, and was the principal compiler of "Hymns of the Church" (Reformed), 1869.

Ed'dystone Lighthouse is in the English Channel, 14 miles S. S. W. of Plymouth Breakwater, and 9 miles from the coast of Cornwall; lat. 50° 10′ 54″ N., lon. 4° 15′ 53″ E. It stands on the Eddystone Rocks, which are daily submerged by the tide, and it rises about eighty-five feet above the high-water mark in the form of a circular tower, which gradually decreases in diameter, with a curved outline resembling the trunk of a tree, from the bottom to the top. It was erected in 1757–59 by Mr. Smeaton. (See Lighthouse.) The material is Portland limestone. It has a fixed light seventy-two feet high, visible at a distance of 13 miles. The first lighthouse here (1699–1703) was destroyed by a storm. The second was burned in 1755.

Ed'dytown, a post-village of Starkey township, Yates co., N. Y., is the seat of Starkey Seminary, under the patronage of the Christian denomination.

Ed'dyville, a post-village of Wapello co., Ia., on the river Des Moines and the Central Iowa R. R. where it connects with the Des Moines Valley R. R., 16 miles N. W. of Ottumwa, has one weekly newspaper. Pop. 1212.

Eddyville, a post-village, capital of Lyon co., Ky., on the Cumberland River, near the Elizabethtown and Paducah R. R., about 36 miles E. by S. from Paducah. Pop. 386.

Eddyville, a village of Kingston township, Ulster co., N. Y., on Rondout Creek, 2½ miles above Rondout, is the terminus of the Delaware and Hudson Canal, and has a cement-factory.

Ede, a town of the Netherlands, in the province of Gueldern, 24 miles E. of Utrecht. Pop. in 1867, 10,452.

Ed'elinck (Gerard), an excellent Flemish engraver, born at Antwerp in 1649. He worked for many years in Paris, and was patronized by the French court and Louis XIV. He engraved portraits of many eminent persons, the "Holy Family," after Raphael, the "Virgin," after Guido, and several works of Lebrun. His engravings are commended for fidelity of design, freedom of touch, and harmony. He carried what is called color in engraving to greater perfection than any artist before his time. He is ranked among engravers of the first order. Died April 2, 1707.

E′den [a Hebrew term signifying "delight"], the name given in Genesis to the region including the garden where at first dwelt Adam and Eve, the first parents of mankind, and from which they were expelled in consequence of disobedience. Much discussion has prevailed among critics as to the country where this early paradise was situated. Ceylon, the Vale of Cashmere, the lower, middle, and upper regions of the Euphrates, the Caucasus, Toorkistan, and other regions, have been named. At present our choice appears to lie between Armenia and Babylonia, with a preponderance of argument and authority in favor of the latter. The difficulty consists in identifying the four rivers mentioned in the biblical narrative. Some commentators believe the story of Eden to be allegorical.

E′den, a township of Alameda co., Cal. Pop. 3341.

Eden, a township of La Salle co., Ill. Pop. 1523.

Eden, a township of La Grange co., Ind. Pop. 930.

Eden, a township of Benton co., Ia. Pop. 804.

Eden, a township of Clinton co., Ia. Pop. 985.

Eden, a township of Decatur co., Ia. Pop. 1065.

Eden, a post-township of Fayette co., Ia. Pop. 927.

Eden, a post-township of Marshall co., Ia. Pop. 649.

Eden, a post-township of Hancock co., Me., on Mount Desert Island, is famous for its beautiful scenery, and is a place of summer resort. It has fourteen hotels, and manufactures of lumber. Pop. 1195.

Eden, a post-township of Erie co., N. Y. Pop. 2270.

Eden, a village of Brown township, Delaware co., O., on the Cleveland Columbus and Cincinnati R. R. (P. O. name, LEONARDSBURG.) Pop. 191.

Eden, a township of Licking co., O. Pop. 782.

Eden, a township of Seneca co., O. Pop. 1483.

Eden, a township of Wyandot co., O. Pop. 1423.

Eden, a township of Lancaster co., Pa. Pop. 1075.

Eden, a post-township of Lamoille co., Vt. It has manufactures of lumber and starch. Pop. 958.

Eden, a post-twp. of Fond du Lac co., Wis. Pop. 1448.

E′denburg, a post-village of Shenandoah co., Va., on the Manassas division of the Washington City Virginia Midland and Great Southern R. R., 106 miles W. of Alexandria. Pop. 452.

E′denkoben, a town of Bavaria, in the circle of Pfalz, is on a railway, 7 miles N. of Landau. It has mineral springs and manufactures of firearms. Pop. 5103.

Eden Lake, a township of Stearns co., Minn. P. 244.

Eden Prairie, a post-twp. of Hennepin co., Minn. P. 576.

Edenta′ta (plu.), [from the Lat. *e*, privative, and *dens, dentis*, a "tooth"], an order of mammals named by Cuvier from the fact that they are either without teeth, or in other cases without incisors. Wagner and others extend the order so as to include the MONOTREMATA (which see), but the arrangement which places the latter animals below the marsupials is the more philosophical. Indeed, the Monotremata among non-placental appear to represent the Edendata among placental mammals. The order includes the sloths, the armadilloes, the true ant-eaters, etc., mostly natives of the warm parts of the southern hemisphere. The fossil bones of the *Megatherium, Glyptodon*, etc., which are found in Brazil and other countries, show that animals of this order were once large and numerous.

E′denton, a port of entry and the capital of Chowan co., N. C., is on Edenton Bay, which opens into Albemarle Sound, and about 150 miles E. of Raleigh. It has a newspaper office. Pop. 1243; of Edenton township, 3664.

Edes (BENJAMIN), a Revolutionary journalist, was born at Charlestown, Mass., Oct. 14, 1732. With John Gill he began in 1755 to publish the "Boston Gazette and Country Journal," a newspaper zealously advocating the cause of liberty, and which he continued to edit for forty-three years. Died Dec. 11, 1803.

Edes′sa [Fr. *Édesse*], or **Callirrhoe,** an ancient city of Mesopotamia, supposed to be on or near the site of Ur of the Chaldees, mentioned in Genesis xi. The extreme antiquity of its origin is undoubted. It was 78 miles S. W. of Diarbekir. It became the capital of an independent kingdom in 137 B. C., and was tributary to Rome in the reign of Trajan. In 216 A. D. it became a Roman military colony. It was an important place in the early history of the Christian Church, contained numerous monasteries, and was the residence of Ephraem Syrus. For many years it was the principal centre of Oriental learning. Baldwin, a leader of the crusaders, and afterwards king of Jerusalem, became prince or count of Edessa in 1097 A. D., and made it the capital of a Latin principality. This city was captured about 1144 by the Saracen chief Noor-ed-Deen, who massacred the inhabitants. It was afterwards possessed successively by the Byzantine emperors, the Mongols, Persians, and Turks. The site is occupied by the modern town of OORFA (which see).

Edessa, the ancient capital of Macedonia, about 46 miles N. W. of Salonica (*Thessalonica*). It continued to be the burial-place of the Macedonian kings after the court was removed to Pella. Philip, father of Alexander the Great, was killed here. This site is occupied by *Vodina*.

Edesville, a post-township of Kent co., Md. P. 3343.

Ed′foo, or **Edfou** [anc. *Apollinopolis Magna;* Coptic, *Atbo*], a small town of Upper Egypt, on the W. bank of the Nile, about 60 miles above Thebes. It has two temples, the larger one of which, recently cleared out by Mariette, is on a grand scale, and being in excellent preservation gives a good idea of the Egyptian temples in their glory. It was built chiefly by Ptolemy Philometor (181–145 B. C.), the last king of Egypt who is noticed in sacred history. Its entire length (including court and temple) is 405 feet. On each side of the entrance is a pyramidal tower 108 feet 2½ inches high, adorned with gigantic sculptures. The town has manufactures of blue cotton cloth and earthenware, and is noted for the importunity and insolence of its beggars. Pop. 2000.

Ed′ford, a township of Henry co., Ill. Pop. 948.

Ed′gar, a county of Illinois, bordering on Indiana. Area, 600 square miles. It is partly drained by Little Embarras River. The surface is nearly level, the soil fertile. Grain, cattle, wool, hay, butter, etc. are produced. Carriages, saddlery, etc. are among its most important manufactures. A large part of the county is prairie. It is intersected by the Indianapolis and St. Louis, the Paris and Decatur, and the Paris and Danville R. Rs. Pop. 21,450. Capital, Paris.

Edgar, a township of Edgar co., Ill. Pop. 1617.

Edgar, a post-village, capital of the parish of St. John the Baptist, La., is situated on the W. bank of the Mississippi River. It has a court-house, two Catholic and two Protestant churches, sugar-mills, one steam rice-mill, a number of stores, and two newspapers.

DUMEZ & BELLOW, EDS. OF "THE MESCHACÉBÉ."

Ed′gartown, a port of entry and the capital of Dukes co., Mass., is on the E. shore of the island of Martha's Vineyard, 30 miles from New Bedford. It is a much-frequented watering-place, containing the noted camp-meeting grounds of Oak Bluffs. It has a national bank, a savings bank, a newspaper, three churches, good schools, and numerous hotels. It has a small but safe harbor, and a pier on which is a fixed light 37 feet high, in lat. 41° 23′ 25″ N., lon. 70° 29′ 51″ W. This place formerly sent out many whaling-ships, but that business has of late declined. Edgartown has communication by steamboat with the mainland. Pop. of Edgartown township, 1516.

E. MARCHANT, ED. "VINEYARD GAZETTE."

Edgecomb, a post-twp. of Lincoln co., Me. P. 1056.

Edgecombe, a county in the N. E. of North Carolina. Area, 600 square miles. It is intersected by the Tar River. The surface is nearly level; the soil is mostly sandy. Cotton, rice, and corn are raised. The Wilmington and Weldon R. R. passes through the western part of the county. Capital, Tarborough. Pop. 22,970.

Edgefield, a county in the W. of South Carolina. Area, 1540 square miles. It is bounded on the N. by the Saluda River and on the S. W. by the Savannah. The surface is diversified by hills of moderate height; the soil is fertile. Grain, cattle, cotton, wool, and lumber are produced. It is intersected by the Charlotte Columbia and Augusta R. R. and the South Carolina R. R. Pop. 42,486. Capital, Edgefield Court-house. Since the census of 1870 a part of this county has been included in the new county of Aiken.

Edgefield, a village of Davidson co., Tenn., on the right bank of the Cumberland River, opposite Nashville, with which it is connected by a suspension bridge. Pop. 4389.

Edgefield Court-house, a post-village, the capital of Edgefield co., S. C., is about 24 miles N. of Augusta, Ga. It has three or four churches and one weekly newspaper. Pop. 846.

Edgehill, a ridge in England, in Warwickshire, 7 miles N. W. of Banbury, was the scene of the first great battle of the civil war, which occurred Oct. 23, 1642. The royalist army was commanded by Charles I., and that of the Parliament by the earl of Essex. Prince Rupert, by a charge of cavalry, broke the left wing of the Parliamentarians, whom he pursued to Keinton, while the right wing of Essex's army defeated the royalists.

Edgemont, a post-twp. of Delaware co., Pa. Pop. 678.

Edg'erton, a post-village of St. Joseph's township, Williams co., O. Pop. 690.

Edgerton, a post-village of Rock co., Wis., on the Milwaukee and St. Paul R. R., 25 miles S. E. of Madison. Good cream-colored bricks are made here.

Edgewater, a post-village of Middletown and Southfield townships, Richmond co., N. Y. It is on Staten Island, and is inhabited chiefly by New York business-men and their families.

Edgewater, a borough of Allegheny co., Pa. Pop. 380.

Edgeworth (Maria), a popular English authoress, born near Reading Jan. 1, 1767. She removed with her father, Richard Lovell Edgeworth, to Edgeworthstown, in Ireland, in 1782. She assisted him in the composition of a "Treatise on Practical Education" (1798) and in an "Essay on Irish Bulls" (1802). In 1801 she produced "Castle Rackrent," the first of a series of novels, which have a good moral tendency, are pervaded with agreeable humor and sound sense, and give a graphic delineation of character. Among these novels, which obtained a durable popularity, are "Belinda" (1803), "Leonora" (1806), "Patronage" (1814), "Ormond" (1817), and "Helen" (1834). She also published "Popular Tales" (1804) and "Tales of Fashionable Life" (1809–12). Died May 21, 1849. "The writings of Miss Edgeworth," says Lord Jeffrey, "exhibit a singular union of sober sense and inexhaustible invention, and a minute knowledge of all that distinguishes manners or touches on happiness in every condition of human fortune." (See "Edinburgh Review" for July, 1809, July, 1812, and Aug., 1817; also Sir Walter Scott's critique in the "Edinburgh Review" for Jan., 1814.)

Edgeworth (Richard Lovell), F. R. S., an English writer and philosopher, the father of the preceding, was born at Bath in 1744. He inherited from his father an estate at Edgeworthstown, in county Longford, Ireland. He married a Miss Elers about 1764, after which he resided in Berkshire, England, where he associated intimately with Dr. Darwin and Thomas Day. In 1782 he removed to Edgeworthstown. Among his works are "Professional Education," a "Treatise on Practical Education" (1798), "Irish Bulls" (1802), and autobiographic memoirs. He was a man of genial temper and versatile talents. Died June 13, 1817.

Edg'ington, a post-township of Rock Island co., Ill. Pop. 1106.

E'dict [Lat. *edic'tum;* Fr. *édit*], a public decree or proclamation issued by a sovereign or other potentate; an instrument signed and sealed as a law. In ancient Rome the power of making edicts was principally exercised by the *prætor urbanus* and the *prætor peregrinus,* who on coming to office published rules for regulating the practice of their courts, etc. The edicts of a prætor were not binding on his successor, but if confirmed by the latter they were called *edicta vetera* (old edicts), as distinguished from the *edicta nova* (new edicts) framed by himself. A digest of the best decisions of the prætors was made under the emperor Hadrian by Sylvius Julianus. It was called "Edictum Perpetuum," and made the invariable standard of civil jurisprudence. The "Edict of Milan" was issued, after the conquest of Italy, by Constantine (313 A. D.), to secure to Christians their civil and religious rights.

Edict of Nantes, one of the most famous edicts of history, was issued by Henry IV. of France in 1598, to secure to the Protestants the free exercise of their religion. This act was repealed by Louis XIV. in 1685, and its revocation led to a renewal of the bloody scenes which before the issuing of this edict had been carried on against the Huguenots. The depopulation caused by the sword was also increased by emigration. Above half a million of her most useful and industrious subjects deserted France, and exported, together with immense sums of money, those arts and manufactures which had chiefly tended to enrich the kingdom. About 50,000 refugees passed over into England, and many more into Germany and America; and there can be little doubt that the cruelties perpetrated by the king of France tended to excite the suspicion of the English against their own Roman Catholic sovereign, and accelerated the revolution of 1688.

Edi'na, the county-seat of Knox co., Mo., 40 miles N. W. of Quincy, Ill., on the Quincy Missouri and Pacific R. R. It has two newspapers, five churches, a public school building completed at a cost of $10,000, and two hotels. Pop. 807.

James C. Claypool, Ed. of "Sentinel."

Ed'inboro, a post-borough of Erie co., Pa. It is the seat of a State normal school. Pop. 801.

Edinburg, a post-village of Johnson co., Ind., on the Blue River and Indianapolis and Louisville R. R., 29 miles S. of Indianapolis. It has one bank, three churches, a high school, two hominy-mills, a starch-factory, good water-power, and one newspaper. Pop. 1799.

A. M. Ernsberger, Ed. "Watchman."

Edinburg, a township of Penobscot co., Me. Pop. 55.

Edinburg, a post-village, capital of Hidalgo co., Tex., on the Rio Grande, about 50 miles above Brownsville. It has a custom-house.

Ed'inburgh, capital of Scotland and of Edinburghshire or Mid-Lothian, is picturesquely situated about 1 mile S. of the Frith of Forth, 399 miles by railway N. N. W. of London; lat. 55° 57′ N., lon. 3° 12′ W. It is divided into the Old and New Town, the former of which occupies the middle and highest of three ridges extending E. and W. The Old Town is separated by a narrow hollow or ravine from the New Town, which is built on a broader ridge with more gently sloping sides. Edinburgh is remarkable for the elegance and solidity of its buildings, which are all of stone. The adjacent country is pleasantly diversified with hills and plains. On the south-eastern border of the city a hill called Arthur's Seat rises to the height of 822 feet, and about 4 miles S. W. of Edinburgh is the range of the Pentland Hills.

The principal street of the Old Town is that which extends along the crest of the ridge, bearing in different parts the names of Canongate, High street, Lawn Market, and Castle Hill. It is more than a mile long, and rises with a regular but rather steep acclivity from the palace of Holyrood, which is at its eastern end, to the huge rock on which stands Edinburgh Castle, 443 feet above the level of the sea. This street is lined with lofty and antique residences, many of which have seven or more stories. The houses of the New Town are built of a fine white freestone quarried in the vicinity, and are remarkably handsome. Here are three parallel avenues called Queen street, George street, and Prince's street, the last of which extends along the S. side of the New Town, close to the hollow which separates it from the Old. Prince's street is the most agreeable promenade in the city, and as it is lined with houses only along its northern side, it commands a fine view of the Old Town with its lordly castle and of the intervening valley adorned with public gardens. At the eastern end of this street is a rocky eminence called Calton Hill, the broad verdant summit of which commands a beautiful view of the Frith of Forth, here about 6 miles wide. Arthur's Hill and another high hill called Salisbury Crags afford prospects of almost unrivalled beauty and magnificence.

The most remarkable public edifices and monuments are the castle, which is a large fortress capable of accommodating 2000 men, and is one of the oldest structures in the city; the royal palace of Holyrood, or Holyrood House, the oldest part of which was built about 1528: this palace is quadrangular in form, with a central court 94 feet square, and is famous as the residence of Mary queen of Scots; the cathedral of St. Giles, a large and ancient edifice of unknown date, in the later Gothic style; Victoria Hall, or Assembly Hall, a magnificent structure, which stands at the head of High street, has a spire 241 feet high, and is the place where the General Assembly of the Church of Scotland annually meets; the Parliament House, now a hall connected with the courts of law; and the admirable monument erected to Sir Walter Scott, which stands on Prince's street, is 200 feet high, and is unequalled among the monuments of this metropolis for artistic beauty. Among the other objects of interest are the old Tron church; the Free St. George's church; the Free High church; the university buildings; the observatory; the National Gallery of Art; the Royal Institution, a beautiful Grecian edifice containing the apartments of the Royal Society; a chapel belonging to the ruined abbey of Holyrood, founded by David I. about 1128; the theatre; and the National Monument (an imitation of the Parthenon) on Calton Hill.

In 1861, Edinburgh contained 115 churches and chapels, classified as follows: Free Church, 31; Church of Scotland, 26; United Presbyterian, 18; other Presbyterian, 3; Episcopal, 13; Baptist, 7; Congregational, 3; Roman Catholic, 3; Methodist and Evangelical, 4; Unitarian, 1; other bodies, 6. It is the seat of a bishop of the Episcopal Church and of a Roman Catholic vicar-apostolic. It has numerous large and richly endowed hospitals and charitable institutions, among which is Heriot's Hospital, founded for the education and maintenance of poor boys. This city is important as a centre of learning, and is distinguished for the number and excellence of its literary, scientific, and educational institutions. The aristocracy, the literati, and professional men form an unusually large proportion of its population, which is extensively engaged in the business of printing and publishing books. Edinburgh is the head-quarters of the book-

trade in Scotland, and as a literary mart is second only to London among British cities. Here is the celebrated University of Edinburgh, founded by James VI. in 1582, which has a library of about 140,000 volumes. (See separate article.) The other chief educational institutions are the High School, which occupies a handsome Doric edifice 270 feet long; the New Academy (or college) of the Free Church; the Royal College of Surgeons; the medical school; the Royal Academy of Fine Arts, and the Royal Society. The Advocates' Library has the largest and most valuable collection of books in Scotland—about 170,000 volumes.

Edinburgh is the seat of the supreme courts of Scotland, the principal of which is the court of session, composed of thirteen judges. This court tries all civil causes, and decides not only on the law of the case, but also in questions of equity. This city returns two members to Parliament. By virtue of ancient charters and modern acts of Parliament it is a royal burgh, governed by a town council elected by popular vote, and by a lord provost, who is elected by this town council. It is the terminus of important railways—viz., the North British, the Edinburgh and Glasgow, and the Caledonian Railway. This city has two ports on the Frith of Forth—Leith and Granton, the former of which is 2 miles from the Cross of Edinburgh. Pop. in 1871, 196,500.

History.—This place was recognized as a burgh by David I. in 1128, and a Parliament was held here in 1215. It became the capital of Scotland about 1436, when its castle was selected as the only place of safety for the royal household and the Parliament. It was enclosed by walls in the fifteenth century, and for a long period was confined to the central ridge. The hollow between this and the northern ridge was filled with water, called the North Loch. The New Town originated about 1765, when a bridge was erected across that loch to connect the Old Town with the New. Here occurred in May, 1843, the disruption of the Established Church, from the General Assembly of which 203 members seceded and organized the Free Church. Sir Walter Scott and Lord Brougham were born here.

Edinburgh, a post-village of Grundy co., Mo., is the seat of Grand River College, founded in 1858.

Edinburgh, a post-township of Saratoga co., N. Y. It has manufactures of lumber. Pop. 1405.

Edinburgh, a post-township of Portage co., O. P. 929.

Edinburgh (Alfred Ernest Albert), Duke of, second son of Victoria, queen of Great Britain, was born at Windsor Castle Aug. 6, 1844. He was educated chiefly by private tutors. He entered the British navy in 1858, and served chiefly on foreign stations. In 1862 he declined the crown of Greece, which was offered him, and in 1866 took a seat in the House of Peers by his present title. In 1867 he set sail in command of the frigate Galatea, visiting Australia, Japan, China, India, etc. At a picnic at Clontarf, New South Wales, Mar. 12, 1868, he was slightly wounded by a pistol-shot fired by a Fenian named O'Farrell. The latter was soon afterwards executed. The full title of this prince is, "His Royal Highness Prince Alfred Ernest Albert, Duke of Edinburgh, Earl of Kent, and Earl of Ulster, K. G., K. P." He is also a duke of Saxony and prince of Saxe-Coburg-Gotha.

Edinburgh Review, a celebrated critical journal founded at Edinburgh in 1802, is the oldest of the great British quarterly reviews. Francis Jeffrey, Sydney Smith, Henry Brougham, and Francis Horner were the founders and first contributors of this review, which was a strenuous advocate of Whig principles. Sydney Smith edited the first number, of which 750 copies were printed. Mr. Constable was the original publisher. Lord Jeffrey became its editor in 1803, and conducted it with great ability and success for twenty-six years. The brilliant wit, the critical keenness, the eloquent style, and the extensive knowledge displayed by the contributors produced a great sensation in the literary world. Its circulation had risen to 9000 in 1808, and 12,000 or more in 1813. Among the eminent men who contributed largely to this review were Macaulay, Carlyle, Lord Brougham, Sir J. Mackintosh, and Henry Rogers. Macvey Napier succeeded Lord Jeffrey as editor in 1829. The price paid to contributors was at first ten guineas a sheet, but it was soon raised to sixteen guineas.

Ed'inburghshire, or **Mid-Lothian,** a county in the S. E. part of Scotland, has an area of 397 square miles. It is bounded on the N. by the Frith of Forth. The surface is diversified by plains and high ridges, among which are the Moorfoot Hills and the Pentland Hills, composed of porphyry. The highest point of the Pentland Hills rises 1839 feet. The rocks of this county belong mostly to the carboniferous and Silurian formations. Valuable coal mines are worked in the valley of the Esk. The soil is generally fertile and well cultivated. Near the metropolis are many nurseries, dairy pastures and vegetable gardens. It is traversed by five great railways. Pop. in 1871, 328,335. Capital, Edinburgh.

Edinburgh, University of, was founded by James VI. of Scotland in 1582. In 1600 the senatus academicus consisted of a principal and four regents. The first chair of theology was founded in 1642, and the first professor of medicine was appointed in 1685. In 1760 the senatus academicus consisted of a principal and eighteen professors. Since that date ten chairs have been added. In 1858 its constitution was changed by an act of Parliament, which took the government out of the hands of the lord provost and town council of Edinburgh, and gave it to the senatus academicus and a university court. The patronage of the chairs was then transferred to seven curators, three of whom are nominated by the university court and four by the town council. The university consists of the faculties of arts, medicine, theology, and law. The faculty of arts comprises the chairs of humanity, Greek, mathematics, logic and metaphysics, moral philosophy, natural philosophy, rhetoric and belles-lettres, universal history, astronomy, agriculture, and music. Connected with this university are a large library, a museum of natural history, and a botanic garden.

Ed'isto, a river of South Carolina, is formed by the North and South Edisto, which unite at Edisto, a station on the South Carolina R. R. The North Edisto is the boundary between Barnwell and Orangeburg counties. The main stream flows south-eastward and southward through Colleton county, and enters the Atlantic Ocean by two channels, called the North and South Edisto Inlets, between which is Edisto Island.

Edisto Island, one of the most important of the Sea Island group, is in Charleston co., S. C., between the North and South Edisto Inlets. It produces sea-island cotton. It has a post-office of the same name. Pop. 2762.

Ed'meston, a post-twp. of Otsego co., N. Y. P. 1744.

Ed'monds (Francis W.), an American painter, born at Hudson, N. Y., Nov. 22, 1806. He visited Rome in 1840, before which date he had exhibited, besides other works, "The City and Country Beaux" and "Dominie Sampson." Died about 1860.

Edmonds (John Worth), an eminent American jurist, was born at Hudson, N. Y., Mar. 13, 1799, and graduated at Union College (now Union University) at Schenectady, N. Y., in 1816. In 1819 he was admitted to the bar, and in 1820 commenced the successful practice of law in his native town. In 1831 he entered the New York legislature as a member of the Assembly, and in 1832 became a State senator. In 1836 he was appointed a U. S. Indian agent. He retained the position for two years, and became familiar with several Indian languages. In 1841 he re-entered upon the practice of law, and opened an office in New York City, which was from that time his home. In 1843 he was appointed one of the State prison inspectors, and labored with zeal and success in introducing reforms in prison discipline. In 1845 he was appointed a circuit judge, and in 1847 became one of the judges of the supreme court, New York. In 1852 he was appointed to the bench of the court of appeals, from which in 1853 he retired to the private practice of law, in which he was after a time a partner with Hon. William H. Field. In 1851, Judge Edmonds became a convert to the doctrines of Spiritualism, and in 1853 openly avowed and defended his belief of that unpopular faith by the publication of a work entitled "Spiritualism." He subsequently published many other writings in favor of his belief, of which he became one of the leading champions. He also became an active medium, and believed himself to be in almost constant communication with departed spirits. There can be no doubt that his advocacy of Spiritualism cost him his place on the bench. Judge Edmonds was a man of cultivated mind and of singularly pure and amiable character. In public and private life alike he was honorable and universally respected. As a lawyer he was able and learned. As a judge he was sound, wise, and above any suspicion of wrong-doing. He avowed his peculiar religious views with the greatest courage and persistency, and there can be no question that he was fully convinced of the truth of what he professed. During the latter part of his life he suffered much from a severe chronic disease, but his legal advice was much sought in difficult cases to the last. He died April 5, 1874, an unwavering believer in the truth of Spiritualism.

Ed'mondson, a county in S. W. Central Kentucky. Area, 230 square miles. It is intersected by Green River. The surface is undulating or hilly; the soil fertile. Tobacco and grain are staple crops. Beds of coal and cavernous limestone underlie this county, in which the celebrated Mammoth Cave is situated. Capital, Brownsville. P. 4459.

Ed'monson, a township of Crittenden co., Ark. Pop. 160.

Ed'monton, a post-village, capital of Metcalfe co., Ky., about 50 miles E. of Bowling Green. Pop. 146.

Ed'mund I., king of the Anglo-Saxons, born about 922 A. D., was a son of Edward the Elder and a grandson of Alfred the Great. He became king in 941, and conquered the Britons of Cumbria. He is said to have been a brave and prudent ruler. He was assassinated by Liof May 26, 946, and was succeeded by his brother Edred.

Edmund II., surnamed IRONSIDE, king of England, born in 989 A. D., was a son of Ethelred II. At the death of the latter, in 1016, the Danes possessed the greater part of England. Edmund, who was renowned for courage, waged war against Canute the Dane, and gained several victories, but was defeated at Assandun. The two rivals then agreed to divide the kingdom, of which Edmund received the southern part. He died Nov. 30, 1016, and Canute then became sole king.

Ed'munds, a township of Washington co., Me. P. 448.

Ed'munds (GEORGE F.), an American lawyer and Senator, born at Richmond, Vt., Feb. 1, 1828. He was chosen in 1854 a member of the legislature of his native State, which in 1865 elected him to the Senate of the U. S. He was re-elected as a Republican for a term of six years (1869–75). In Dec., 1872, he was appointed chairman of the committee on the judiciary.

Ed'na, a post-township of Cass co., Ia. Pop. 367.

Ed'neyville, a post-township of Henderson co., N. C. Pop. 1125.

Edom, a name of ESAU (which see).

Edom, a country of Asia. See IDUMÆA.

Ed'red, king of the Anglo-Saxons, was a son of Edward the Elder. He succeeded his elder brother, Edmund I., in 946 A. D. Saint Dunstan acquired an ascendency over Edred, and was his most powerful minister. Edred died Nov. 23, 955, and was succeeded by his nephew Edwy.

Ed'riophthal'ma [from the Gr. ἑδραῖος, "fixed," and ὀφθαλμός, "eye"] are a group of crustaceans called the sessile-eyed Crustacea, because their eyes are placed directly upon the shell, instead of being mounted upon footstalks. They have the organs of respiration connected with the organs of locomotion. None of the Edriophthalma attain more than an inch and a half in length. They are generally marine, though some of them of the order Amphipoda inhabit fresh water, and a few, belonging to the Isopoda, such as the wood-louse, are terrestrial, but inhabit damp places. To the Amphipoda belong the common sand-hoppers, which are found in myriads along sandy shores. Some of the Edriophthalma are parasitic on other marine animals.

Edrî'sî, or **Edree'see,** an eminent Arabian geographer, was born at Ceuta, in Africa, about 1100. He was descended from the royal family of Edrisites. He travelled extensively in Europe and Asia, and passed many years at the court of Roger II., king of Sicily, by whom he was liberally patronized. Edrisi made for this prince a silver terrestrial globe, and wrote a large book on geography, which was long a standard work. M. Jaubert published a French translation of it in 1836. Died about 1175.

Ed'son, a township of Chippewa co., Wis. Pop. 231.

Educa'tion [Lat. *educatio*]. The word *educate* signifies "to lead out," or, as applied to the human mind or body, to draw forth its faculties into vigorous action. Education may be defined, *the process of developing and training the powers and capacities of human beings.* It pertains not to any part, as the mind in distinction from the body or the moral faculty, but in its widest and truest sense it relates to the whole of man. The education of any part exclusively or unduly results in disproportion or distortion in development, and destroys harmony and symmetry in mind and character.

In determining beforehand what course of education shall be adopted, it is essential to have a definite conception of *the object* to be attained. Different opinions as to the proper object to be sought will lead to the choice of different courses and methods. Each enlightened nation of both ancient and modern times has had its own general theory of the purpose of education, and has made its practice conform thereto. The object, and therefore the method, of education in ancient Greece and ancient Rome were essentially unlike. And so the several nations of modern Europe have differed in their views on this subject, and have illustrated their differences in their educational systems. In the U. S. there has prevailed an ideal, and a corresponding practice, unlike those of any other country. Different sections or states in the same nation have also had their peculiar views and usages. Ancient Athens and Sparta had very little resemblance, though both were prominent cities in the same country.

Without attempting to give even an outline of the various theories as to the object of education, and of the systems based upon them, the following is suggested as a supreme object which can hardly fail to commend itself to candid and thoughtful persons. Education, wisely directed, should aim to accomplish three things: (1) the imparting and acquiring of knowledge as extensive, various, and comprehensive, and also as thorough and complete, as practicable; (2) the training, discipline, and culture of all the faculties, physical, intellectual, social, and moral, to as high a degree of effectiveness for their several functions as opportunities and circumstances permit; and (3) the elevation of the whole man to as high and worthy a character as can be attained. To lead men to know, to do, and to become—these three results education should achieve.

1. The imparting and acquiring of knowledge. This is the first step in human development. The mind of a newborn child is an utter blank. The miniature man contains the germs and possibilities of all that he may afterwards become. The body has the organs of sense, by which its indwelling soul is to communicate with the outward world, and the soul has those latent susceptibilities and faculties and tendencies which will be disclosed as development and education draw them forth into activity. The theory of "innate ideas" has also strong claims to be recognized as true. The opposite theory, that all knowledge is derived from communication between the soul and the visible world through the senses, is manifestly not true. But education, while it should recognize the reality and high importance of these "innate ideas"—*e. g.* those of right and justice, of extension and duration—is mainly concerned, at first, with the giving and receiving of knowledge respecting those objects which come within the range of the child's observation. The aspects and qualities of any object are new and strange and wonderful to the infant's opening mind. He is perpetually investigating and examining and inquiring, and thus gathering up new truths. The ceaseless inquisitiveness of children is sometimes sharply rebuked. Doubtless, it is somewhat annoying, but it is inevitable. The little world in which they live is, for them, full of wonders and mysteries, and their minds crave knowledge as eagerly as their bodies crave food. A healthy mind healthily trained never loses this instinctive longing for new truth. The sources and objects of knowledge are innumerable. The material world gives rise to the ever-increasing number of sciences, or rather branches of science, for every science is connected, nearly or remotely, with every other. The human body is itself a most interesting and important subject of study. But careful thought respecting the body naturally suggests further inquiry as to the nature and source of the life that dwells within it, and this leads by easy transition to the discussion of the nature and the faculties of the human soul, or from material to mental science. Then the pursuit of this latter science leads upward from man to higher beings, even to the Highest of all. Thus, the acquirement of knowledge is, in point of time, the beginning of education, though it may also continue through all subsequent life.

2. The discipline, culture, and training of the several faculties. The mere acquisition of knowledge is not education. In early childhood it is doubtless the most important part, and almost the only part that is practicable. But it calls into exercise chiefly the observing or perceptive powers and the memory; the latter faculty being employed, at that stage of education, in storing up an ever-growing multitude of facts. But the development of memory alone is not education. Knowledge is the food of the mind. In order that food may strengthen the body, it must be duly digested and assimilated. And so knowledge must be not merely grasped, in its rudiments, by the indiscriminating memory, but must be comprehended, and, so to speak, digested, in order that it may nurture the mind. The body is of more worth than the food that sustains it; the mind is of more value than all the knowledge it can acquire. In the process of mastering that knowledge it puts its powers into exercise, and thus learns how to use them. Knowledge is good in itself, and may wisely be sought for its own sake. But the immense majority of mankind can spend but a very small part of their lives in acquiring it. Necessity demands of them to make some practical use of their powers, both of body and mind. Their education must not be for the gratification of taste nor for display, but must fit them for some active service in the world. It is a common error to suppose that the ability to excite astonishment by the array of learning is proof of thorough education. But he who, in mastering knowledge, acquires full mastery of himself, and is thus able to employ any faculty as duty or inclination may require, is most truly educated. Power is what men instinctively desire. They can gain it by so training their faculties as to have them always at command. To know how to use

the mind or the body is to have given it a real education. It is well known that great scholars are often men of little practical efficiency. Cloistered students, who seldom mingle with the world, are more useful to it than is generally believed, but not many can thus serve their generation. The education demanded is one that shall train the faculties, by exercising them, for wielding power. The body, the intellect, the conscience, the affections, the will, *the whole man*, is to be disciplined and cultured to labor in and for the world.

3. But the *kind* of power which a man shall wield is even more important than the degree. The *quantity* of power in any man depends upon his natural gifts, and his acquired ability to use them effectively; the *quality* of his power is determined by his *character*. The world is unhappily too familiar with those who have used great power in doing great harm. Selfishness, ambition, greed of gain, indifference to the rights and the sufferings of others, have characterized multitudes of the world's great men. Any person, whether his power be great or small, is a blessing or a curse to his generation and to the world, according as his character is good or evil. The *moral* element of education determines its quality. The spirit of gentleness, kindness and beneficence invariably carries joy and gladness wherever it goes; the opposite spirit as invariably produces pain and grief. Character determines what kind of exertion any one shall put forth, and what direction shall be given to it. A noble character is the grandest and most permanent result of education. Knowledge is at the best partial and fragmentary. Only an infinitesimal part of the universe of truth can be grasped by any mind. Human wisdom or power, however great, is weakness itself when compared with the boundless physical power that is latent in nature, and is nothing in comparison with the wisdom and might of the Infinite One. Let knowledge be increased. Let discipline and culture be carried upward to the highest attainable point. But, especially, let education be directed towards the building up of strong, symmetrical, well-balanced, pure, exalted, perfect character. Learning is good, power is good, culture is good, but character is more important than all of them. Knowledge and culture are *in* the man, but character *is* the man. Education should regard what he is to *know*, and what he shall be able to *do*, but, above all, what he is to *become*. It should develop and train him with continual reference to the destiny that awaits him as heir to an endless, God-like existence.

Since the object to be sought by education is nothing less than the perfecting of human character and the exaltation of human nature, the next point to be considered is, *How may this be most surely accomplished?* The difference between a human being at the beginning of his existence, and that which he may become when ennobled, by means of education, to the highest conceivable perfection, is almost infinite. The process of thus lifting him up ever higher and higher cannot be an easy nor a sudden one. The work is so great, and the difficulties so many; the workers, the instruments, and the material wrought upon are so imperfect; and the time requisite for completing the work is so long, that the perfected result must come, if at all, in the far-off future. But a high ideal is of great worth, even though it be far beyond present attainment.

Any process of education, to be successful, must conform to the natural order of human development. There is a regular fixed succession in the growth of the human soul, as in the growth of the body.

1. *Physical education* demands the earliest care. This includes the observance of the laws of health in respect to food, clothing, cleanliness, pure air, and exercise and rest in due measure and alternation. Soon comes the period for practising and training the various members of the body, to strengthen them, and to give the will perfect control over them, so that they shall perform their several functions accurately, vigorously, and promptly. The habits of the body as regards its modes of action are acquired very early. The flexible limbs of children may readily be trained to easy, graceful motions. Those persons whose earliest years are passed in cultivated society acquire almost unconsciously an ease and freedom of manner which no later training could impart. The impressions which the human body receives and the lessons which it learns in its infancy can never afterwards be effaced. Children instinctively imitate older persons, even in trifling particulars. The importance of good models and correct examples is therefore obvious. Education in manners, though it may seem to be merely superficial, has a closer connection with character than is often believed.

2. The *intellect* is the part of man most commonly considered in education. In the process of intellectual education a careful observance of the mind's natural order of development is indispensable. The mental faculties are developed in an unvarying order. (*a*) The *perceptive* powers are first called into activity. There is an exact adaptation of these powers to the phenomena of the visible world. The newly-awakening senses observe these phenomena, curiosity is excited, and ideas of form, size, color, space, and distance are acquired. Especially does a young child learn very early to read human character, and to interpret with accuracy the meaning of tones of voice and expressions of countenance. Beauty and brightness attract him, and he distinctly reveals his preference for gentleness and kindness. A very few years are past ere he has gained complete use of his bodily senses, and of the perceptive powers that are so intimately connected with them. The other mental faculties await their time while these powers are unfolding. Their office is to ascertain facts, and to report them to the memory, which holds them in readiness for subsequent use. (*b*) Next appears in activity the power of *expressing the ideas* that have been acquired; in other words, the use of language. The learning of a language requires the recollection of a large number of words and of their several meanings. A child's memory is adapted to this kind of recollection. It lays hold of particulars, and retains them singly, while he is not yet able to grasp their connections. So readily do children acquire language that many cases have been known of their learning simultaneously to talk in two or more languages, and to use each correctly in conversing with those unacquainted with the others, passing readily from one to another in addressing different persons. But for the great majority a single language suffices. Those early years are the time when it should be learned correctly. Vicious habits of speech commonly result from incorrect early training, and, like other lessons of early childhood, they are seldom perfectly unlearned. Children have also a strong propensity to copy visible objects. Next to a living animal itself, they admire a picture of it, and they soon desire to make such a picture. Their first efforts of this kind are necessarily crude and unsuccessful, but the disposition to make such efforts is a clear indication, in the order of mental development, that education at that period should be directed to training the eye and the hand in the useful arts of writing and drawing. Working with Nature, and at the time which she indicates as the best, will be most successful. (*c*) A little later in the process of intellectual development comes *the power of perceiving the connections of truths*. The understanding is developed, and facts acquire new meaning as their relations and combinations are understood. There is a unifying of the knowledge previously gained, and principles are recollected instead of isolated facts. This perception of the logical relations of truths enables the learner to think consecutively and to reason correctly. He can advance into new regions of thought and master new truths, acquainting himself with them not in their isolation, but as parts of a harmonious system. The man who has not learned to think logically may accumulate in memory vast numbers of facts, but he cannot use them; they are a burden and a hindrance to further mental growth. He cannot be a man of power, for he has not learned to use his acquisitions. (*d*) But logical power is not the highest development of the mind. Logic arranges knowledge and makes it available. Higher than mere logic is the *reason*. This faculty connects man most nearly with his Maker. It rests not upon the opinions and deductions of men; it is not dependent upon the processes of logic; but it summons all human thoughts and opinions before its tribunal, and pronounces upon them in accordance with the eternal principles of right and truth. It takes cognizance of truths and laws of which the senses can give no evidence, and perceives a unity where the multiplicity of facts tends to produce confusion. It leads up from all visible things, and from the phenomena of the self-conscious soul, to the invisible and almighty Author of all.

3. The *moral faculty* of the soul also requires education. The development of this faculty and of the intellect advance simultaneously. *Moral education is the training of the will to act firmly in accordance with the dictates of conscience.* This training should begin with infancy. Intellectual training culminates in the development and supremacy of reason; moral training, in the complete subordination of all propensities and desires to the control of conscience. Every child has an inborn perception of the distinction between right and wrong, but experience abundantly proves that the tendency to disregard the inward command to do right is universal. There is from the outset a necessity for strengthening the moral faculty, and for educating the young to obey its commands. The inclination to disobey or disregard it tends to weaken it, and to detract from the clearness of its perceptions and the force of its mandates. This tendency must be resisted and overcome by education. At first, this education must involve *obedience to authority*. A command is to be given in accordance

with the right, and absolute submission to such command must be enforced. Afterwards the right and wrong of proposed conduct must be shown, and the child trained to do the right because it is right. When he does this voluntarily, he has begun to submit his will to his conscience. By constant, careful, and persistent training, with judicious encouragement and aid, or, if necessary, with occasional severity, he learns self-control. Moral education must lead to the *voluntary* doing of the right and rejection of the wrong. The decision for the right must be reached in spite of temptations and inclinations to the contrary. The most weighty reason for choosing the right is that it conforms to the will of the Supreme Author and Controller of human destiny. Perfected moral education results in entire conformity to that Will which is in supreme accord with Right.

Physical, intellectual, and moral education includes all the powers and capacities of man. To train all these aright is to fit him for his duties and his destiny—to make him, ultimately, the wise, exalted, and happy being that he is fitted to become. But the relations in which men stand to each other and to Him who made them may properly receive a brief consideration. From the first-named relation certain duties result, for which preparation is requisite. This preparation may be termed—

4. *Social or Political Education.*—Social education is acquired chiefly by intercourse with mankind. It is largely the result of the incidental connection of people with each other in the ordinary transactions of life. But an essential part of a right social education is a careful regard for the rights of others, and a manifest desire to promote their enjoyment. This connects it closely with moral education. There is a social training which is wholly superficial, which is profuse in *professions* of interest and good-will, but deficient in *proof* of them. There is another kind which unduly neglects to *manifest* interest and regard that are really felt. Both the feeling and the manifestation, in due measure, are requisite to a symmetrical social education. *Political education* concerns the relations of the citizen to the government. In a nation where the government is "of the people, by the people, and for the people," the necessity and importance of this education are obvious. The rights and duties of citizens; their obligation of obedience to law; of seeing that good laws are enacted and enforced; that the weak and helpless are protected; that the grasping and unjust are restrained and evil-doers punished; that the enacting, explaining, and enforcing of laws are entrusted to competent and trustworthy men; that the rights of both labor and capital are duly protected; that the nature and rights of property are understood; and that all necessary burdens of taxation are equitably adjusted, and all productive industries properly encouraged,—these are some of the lessons included in political education.

5. The relation of man to his Maker necessitates *religious education.* This explains the intuitive conceptions and feelings of the soul with regard to what it recognizes as good and right, and teaches that the Author of the soul is supremely just and good. It shows in what way his will is made known, and what are the proofs that he has revealed himself to man. It declares his earnest desire that all shall be perfect in rightness and happiness, and shall attain to the Godlike nobility and glory for which they are to be qualified by being made "partakers of the Divine nature." Especially, it declares his inconceivable gentleness, goodness, and condescension, and his boundless compassion and helpfulness for those who struggle upward towards the good, in opposition to downward tendencies, both without and within. It tells of an endless future destiny, and of the divine Deliverer from evil and Redeemer unto purity and nobleness of life, the climax of which shall be another life, whose enjoyment and progress and duration shall have no limit. Religious teaching, like all other, should have careful regard to the natural order of intellectual and moral development. It should begin at a very early period of life, and should be adapted to the advancement of the child in knowledge and character. It should continue not through childhood only, but through life. No part of education, whether of body, mind, or conscience, is ever absolutely completed, but religious education, as it has the widest scope and pertains to the most enduring interests, should continue to the end of life.

Having thus considered the *object* of education, and the *mode of accomplishing* that object, the way is prepared for answering the inquiry, *By whom* shall education be conducted? In other words, Who shall make sure that the benefits of education are shared as generally and as completely as possible? Preliminary to the determining of this question, two others arise—viz., *How many* shall be educated? and, *to what extent?* The answer to these questions is near at hand: *all* should receive at least the rudiments of education, and in each case the training should be as complete and thorough as practicable. As regards the education of *children*—to which this part of the discussion will be mostly restricted—all must be done *for* them. They are not competent to know what they need, much less to devise the means for gaining it. When a person has passed beyond childhood, and is fitted by maturity of mind and knowledge of himself to decide what his future training shall be, he may safely be left to himself and to such advisers as are within his reach. *Professional* education is of this kind, and therefore is not here to be discussed. The extent and completeness of that kind of education must be decided in each case by the inclination, the opportunity, or the resources of the student. But for securing ordinary and general education some provision must be made. Who shall make that provision? and who shall see that it is sufficient and well directed?

1. In the order of nature the earliest teachers are *the parents.* The instinctive love of parents for their children leads them naturally to do what they can for their dependent little ones. Bodily care and training devolve by nature upon parents alone. The duty of providing for the intellectual and moral education of children is also the untransferable duty of parents. The development of an infant's mind, the gradual manifestation of consciousness, observation, perception, and knowledge, cannot but interest profoundly every parent's heart. And when there comes at length the necessity for imparting instruction, the mother is the person designated by the law of nature to perform that service. But the time arrives when the teaching of a household would require more time and thought and labor than this first and natural teacher can bestow. Successful teaching is an art, to be acquired, like any other art, by study and labor. In every country where education has been duly regarded, persons have devoted themselves to the distinctive work of teaching. Families or communities depute this work to persons believed to be fitted for performing it. But who shall select teachers? and who shall decide upon their qualifications? Primarily, this is the duty of parents, and their responsibility for it can never be transferred. But if the children of several families are to be educated together, some agreement for this purpose must be made between the parents. In this way a *school* comes into existence. But if it is actually established in this manner, some part, and possibly the larger part, of the children may not be reached by it. Social or class prejudices, or the poverty of some parents, or the indifference of others, or family feuds, or other causes, may effectively shut out multitudes of the young from all opportunity of education. This is not mere theory. In thousands of cases precisely this result has been witnessed. How shall these neglected multitudes be reached? The gifts of the benevolent have been profusely bestowed to remedy the evil, and it has thus been much diminished. But such gifts can benefit only particular places, which will naturally be those where wealth most abounds and where education is appreciated. The communities most destitute of educational opportunities are those last reached by the occasional beneficence of individuals. Excellent as the schools thus founded may be, they cannot be extended into a complete system; they cannot fully supply the imperative want of the entire country. There is need of some agency that shall be felt everywhere and shall reach every part of the land. This agency some would find in an organization which exists in all Christian countries, and this organization is—

2. *The Church.*—The earliest endeavors to educate all the people originated in the Christian Church. Through all the centuries of Christianity the great power of the Church has been generally in favor of education, though corruptions within it have at times given it the opposite tendency. The church schools of the early centuries were designed especially to give instruction in Christian doctrines, and the same class of schools in later times have usually the same object. If this kind of instruction satisfies the wants of the people, and if they are substantially of one mind in regard to accepting it, it may for the time suffice. But where there is freedom of religious thought, different sects will spring up, each strenuous for its own particular tenets. No one party in the Church can then claim the right to control the instruction of all the people. If such a claim were made it would be strenuously resisted by all other parties. Not even a majority may rightfully compel the whole to accept what education the stronger party may choose. But why not permit each sect to have its own schools and to educate its own children? This would draw the lines of sectarian division deeper than they now are, and would aggravate an evil already too great. Some sects are wealthy, others comparatively poor; some zealous for education, others comparatively indifferent. There are also large numbers not belonging to any sect. For these the scheme now under consideration would make no provision. Furthermore, in small communities

several feeble schools might be established where a much smaller number would better serve the people. Then, again, the day for church dogmas as the staple of education is past. Religion is not less esteemed, but intelligent people wish their children to be taught something more closely connected with the active business of life than the ancient church dogmas. In whatever way the subject is regarded, the theory that the Church, or any part of it, shall control education is at variance with the spirit of the age and the necessities of the times.

3. But if *parental* control alone, or when supplemented by the liberality of the benevolent, cannot cover the whole ground, and if *church* control will not meet the emergency, where shall the direction of education be placed? There is need of an agency coextensive with the entire community, and equally concerned with all classes of people. This agency may be found in the *civil government*. There are three institutions which exist by the same divine authority—the Family, the Church, and the State. The necessary and intimate relations of the first of these to education has already been pointed out. The historical connection of the second with the instruction of the people has been recognized, and its duty to teach them religion is undeniable. But that is its controlling object. It would train only *one part* of the human being, and thus destroy the harmony which should prevail between the several parts. The State has the same kind and degree of connection with men of all sects and parties. It can therefore act impartially towards them all. It aims to promote their welfare in all their relations. Especially, it must protect itself from the perils inseparable from widely prevailing ignorance. It must recognize the need of both intelligence and good morals to its safety and perpetuity. It must accordingly provide that the schools under its control give attention to the morality as well as the intelligence of their pupils. It may even provide for instruction in the *general principles* of religious truth, giving no place to sectarian peculiarities. The control of education by the civil authority is no mere theory. It has been tried for centuries, and is successfully operating to-day in the best-educated nations of the world. Other nations are adopting it, and it bids fair to prevail at last in every enlightened part of the world.

Thus have been considered in succession the *object*, the *method*, and the *agency* of universal education. The world has much yet to learn upon this subject. A few years may bring changes of opinions and of systems, but education in the future will certainly be more general and more complete than in the past.

JOHN G. BAIRD,
Asst. Sec. Conn. Board of Education.

Educational Reform in Japan and China. The first full annual report of the new educational department of Japan has lately been received in this country. The plans which it unfolds are surprisingly liberal, comprehensive, and wise. If once thoroughly carried out, they will in due time work a marvellous transformation of the nation. Japan has at one bound jumped from the fifteenth to the nineteenth century. The material, intellectual, and moral advancement has been truly marvellous, but of all her progressive movements her educational plans are the most significant and prophetic. Recognizing the fact that ignorance has proved to them a source of waste and weakness, the Japanese have already demonstrated that knowledge is power. They fully appreciate the bearing of popular education on national industry, thrift, and prosperity.

Schools are no new thing in Japan. They have long existed, and education is far more general than in any other country of the East. The following are the more prominent features of the newly adopted system: 1. It is to embrace youth of all classes, without distinction of caste or rank, so that education shall become truly universal throughout the empire. 2. The new system is to be uniform throughout the whole country, and to incorporate and remodel all the existing schools and educational institutions. 3. Its administration will be national rather than provincial, and will be under the charge of the central educational department. 4. The whole empire is divided into eight collegiate departments, and in each a college is to be organized. 5. Each collegiate division is to contain thirty-two academies or high schools, making 256 academies in all. 6. Each academic division is to contain on an average 210 schools, making 53,760 schools in all. 7. Attendance is to be compulsory for children over six years of age. 8. Female education having hitherto been less cared for, provision is to be made for the education of girls as well as boys. 9. Teachers are to be selected irrespective of sex. 10. Normal schools are to be established. 11. Charity schools, evening schools, and schools for the trades are to be encouraged. 12. Technical institutions for applying science to industrial pursuits are to be established. 13. An educational report is to be published annually by the department of education. 14. The number of government students to be sent abroad annually is 180. 15. At home promotion is to be made from grade to grade solely on the ground of merit. 16. "Foreign students" are to be selected by competitive examination—thirty from the colleges, who are to be allowed each $1600 annually, and 150 from the secondary schools, who are to receive each $1000 per year. Students under fourteen years of age will be allowed $800 a year. All these sums are paid in gold. 17. Scholarships and other rewards will be offered to the most meritorious in the schools at home. 18. In the primary schools no foreign language will be taught. 19. In the higher schools students can pursue any three modern languages they may select.

The above outline is enough to show that the new system of the Japanese is neither American nor European. It is not a mere copy or imitation of any foreign system. After studying all other improved plans, they have wisely constructed one for themselves, fitted to their exigencies, in some measure built upon old foundations, so as to introduce innovations without doing violence to cherished traditions. The fact that it is thus a truly Japanese system, both in its nature and origin, is one of its characteristic excellences. Obviously, no foreigner could get up a system "ready made" that would "fit." It could not be "made to order" without the most intimate knowledge of the Japanese, such as they only can have. The plan for this empire, therefore, should not be the Swiss, German, English, or American. It should not seem exotic. If not indigenous in origin, it must be grafted on a native stock, and become thoroughly acclimated.

The most important institution yet organized in Japan is the Imperial College of Yedo (or Tokei, as it is now called). Five years ago this institution, though a college in name, was little more than a large school, especially of foreign languages, and English and other foreign clerks, bartenders, and even sailors, were tried as teachers. Fortunately, a scholarly American missionary of the Dutch Reformed Church, Rev. Guido F. Verbeck, was called to preside over this institution. He found in it 1100 pupils and 77 teachers, seventeen of whom were foreigners. A native of Holland, educated in the U. S., well versed in the Japanese language and familiar with Japanese character, from a twelve years' missionary service there, he has rare qualifications for his important post. He has won the confidence both of the government and the people, has thoroughly reorganized the college, reduced the number about one-half, "relieved" the incompetent teachers, and selected with care able and cultured assistants from abroad. The new instructors well merit the name of a faculty.

The present is a critical time in the history of the Japanese. They have been the victims of frauds and spoliations by foreign traders and contractors. Enormous outlays have been made in the grand system of internal improvements now so rapidly progressing. A debt for $140,000,000 has been contracted, besides a large amount of paper currency now in circulation. Until the renewal of the treaties with the other powers, they are debarred the privilege of a proper and remunerative tariff, for in some cases the customs have little more than paid the expense of their collection; yet Japan is, and still more is to be, a country of vast resources, mineral, agricultural, and manufacturing. When the new tariff is established, and their mines and varied industries fully developed, their means will be ample.

The educational system outlined above is prospective; as yet it is a plan on paper. Even such a grand ideal will be an inspiration to the nation. Ardent, hopeful, and enthusiastic, perhaps the Japanese consider less the obstacles to be overcome than the advantages to follow the introduction of a system of universal education.

NEW EDUCATIONAL MOVEMENTS IN CHINA.—The present educational movement of China is justly regarded as a new departure for the oldest and largest nation of the globe. If wisely managed at the outset, it will expand into broad agencies and vast results. This scheme originated with Mr. Yung-Wing, whose peculiar history evinces his special fitness for this work. He graduated at Yale College in 1854, where he took high rank as a scholar, and won prizes even for English composition. He has since gained still higher eminence and influence in his native country. Eight years ago he was sent to America to secure the most improved modern inventions and machinery of various kinds, but especially for the manufacture of firearms. The models which he took home, the large and successful arsenals since established, and the other new or improved manufactures thus introduced, demonstrated the superiority of our inventions, applied science, and mechanic arts. The success of the new arsenals, now manned by Chinese engineers and artisans, has produced a profound impression. There are made the best of breech-loading rifles and

"repeaters." There their gunboats, iron-clads, and forts are supplied with light and heavy ordnance. The result has verified the remark which Yung-Wing made soon after his graduation: "By introducing the practical and material advantages of modern science, I can accomplish more for the improvement of my country and the introduction of Western culture than by direct missionary service." New ideas of growth and power now pervade the land. New methods of developing the mineral wealth and exhaustless resources of that vast country are introduced and are highly appreciated.

The great material progress already made is, however, only a preparation for higher intellectual and moral achievements in the future. "The wall" of exclusiveness is broken down and prejudice is yielding. An American missionary, Rev. Dr. Martin, presides in the new Imperial College at Peking, and now Chinese youth are sent by their government to America for a thorough course of education. The present educational mission to this country is the result of plans of Mr. Yung-Wing, formed years ago, and steadily pursued in the face of many obstacles. It is a striking feature of this movement that it is wholly Chinese in its origin. Other schemes for national improvement or for the increase of international intercourse and influence have been prompted, if not pushed, by foreigners, but in this case the Chinese element predominates. No outside pressure has been used to induce the government to take this step. The plan is Chinese in its execution as well as its origin. This plan contemplates the thorough education of 120 Chinese students in this country. They are to remain fifteen years, so as to allow time for a complete course of study, academic, collegiate, and professional. Four Chinese commissioners come to supervise this movement. Under their direction one hour a day is devoted to the study of the writings of Confucius and Chinese language and literature generally. As these youth are preparing for positions of responsibility at home, the knowledge of their vernacular and history should be kept up and enlarged. The thirty-two of these boys who have been in Connecticut and Massachusetts nearly one year are models of studiousness and good deportment. Thirty others have since arrived, and at once begin their course of study. They are evidently "picked specimens." Having been invited by the commissioners to aid in the organization of this plan, the writer has been highly gratified by the remarkable progress of these students. They are contented and happy, as well as studious and exemplary. The hope that they may become the exponents of our culture, science, and civilization, and thus the benefactors of their country, is already an inspiration to these ambitious youth. Filial piety and patriotism are carefully inculcated. Love of country is manifestly a strong incentive to them, and to a rare degree they appreciate their privileges and responsibilities. Sixty other boys will in due time follow the students now here, and it is not improbable that soon, like the Japanese students, they will come by hundreds.

Nothing should be omitted on our part to give efficiency and success to this comprehensive scheme. The movement is most significant and prophetic. It is already seen and felt that the education of the boys will necessitate the higher culture of the girls. Those who here learn the refinements and amenities of our best society will need companions of kindred taste and culture.

B. G. NORTHROP, *Sec. Conn. Board of Education.*

Education, Commissioner of. By act of March 2, 1867, the Congress of the U. S. established a department of education, consisting of a commissioner and three clerks. The commissioner of education is appointed by the President, subject to confirmation by the Senate. His duties are "to collect such statistics and facts as shall show the condition and progress of education in the several States and Territories;" to diffuse such "information respecting the organization and management of schools and school systems and methods of teaching as shall aid the people . . . in the maintenance of efficient school systems, and otherwise promote the cause of education;" . . . and also "to present annually to Congress a report embodying the result of his investigations and labors, together with a statement of such facts and recommendations as will in his judgment subserve the purpose for which the department is established." In 1868 the department was abolished, and the commissioner of education became an officer of the department of the interior, but his duties remain substantially as before.

Edward, surnamed THE CONFESSOR, an Anglo-Saxon king of England, was born at Islip in 1004. He was a son of Ethelred II. After the death of Ethelred, in 1016, Canute the Dane became master of the kingdom, and married Emma, the mother of Edward. The latter succeeded his half-brother, Hardicanute, in 1042. He married Editha, a daughter of Earl Godwin, but did not permit her to share his bed, and for this ascetic virtue was surnamed "the Confessor." He died Jan. 5, 1066, and was succeeded by his wife's brother, Harold. Edward the Confessor is honored as a saint in the Roman Catholic Church.

Edward I., surnamed LONGSHANKS, king of England, the eldest son of Henry III. and his wife Eleanor, was born at Westminster in 1239. He fought for his father against the barons in the war which began in 1263. In 1265 he gained a decisive victory at Evesham. He took part in a crusade to Palestine in 1271, and returned to England and took his deceased father's throne in 1274. The conquest of Wales he completed in 1282, after a war of several years. In 1291 several competitors for the crown of Scotland recognized Edward as lord-paramount, and chose him as umpire. He decided in favor of John Baliol, who took the oath of fealty to the English king. The Scots took arms to maintain their independence. In 1296, Edward invaded Scotland, dethroned Baliol, and made himself master of the kingdom. The national cause was bravely defended by Sir William Wallace, who gained a victory at Stirling in 1297. Edward invaded Scotland in 1303, and captured Wallace, who was hanged as a traitor in 1305. The English king was marching against Robert Bruce, who had renewed the contest, when he died near Carlisle July 7, 1307. Edward was an ambitious and able ruler, having great political talents as well as military genius. He greatly promoted the improvement of law and the reformation of civil abuses. Among the important events of his reign was the institution of the House of Commons. He was succeeded by his son, Edward II. (1284–1327), a feeble prince.

Edward III., king of England, the eldest son of Edward II., was born at Windsor Nov. 13, 1312. He ascended the throne Jan. 24, 1327, but during his minority the royal power was exercised by the queen-mother and Roger de Mortimer. Edward married Philippa of Hainault in 1328. In 1330, Mortimer was arrested, tried, and executed by the order of the young king, who then assumed the royal power. To support Edward Baliol, who claimed the Scottish throne at the death of Robert Bruce, Edward invaded Scotland, and defeated the Scotch at Halidon Hill in 1333. The Scottish people generally refused to recognize Baliol, and although the English army ravaged their country in several campaigns, they again and again rallied and fought resolutely for independence. When his uncle, Charles IV. of France, died without male issue, Edward claimed the throne of France, but Philip of Valois was recognized by the French people. The English king began war in 1339, but hostilities were several times suspended by truce. In 1346, Edward, with his son, the Black Prince, invaded France, marched to the gates of Paris, and gained a complete victory at Crécy (Aug. 26). He took Calais after a siege of several months in 1347, and a long truce was then concluded between the two powers. The war having been renewed in 1356, the Black Prince defeated the French at the great battle of Poitiers, Sept. 19th of that year, and took King John prisoner. In 1360 the war was suspended by a treaty, in accordance with which Edward retained the French provinces which he had conquered. King John's successor, Charles V., renewed the war in 1370, gained a series of victories, and recovered nearly all the French territory which the English had occupied. Edward died June 21, 1377, and was succeeded by his grandson, Richard II. He was popular, and left a high reputation for ability.

Edward IV., king of England, born at Rouen in 1441, was a son of Richard, duke of York. After the death of his father, in 1460, Edward was the head of the house of York, then waging a civil war against the Lancastrians, who fought for Henry VI. Edward gained a victory at Mortimer's Cross, near Hereford, entered London in February, and was proclaimed king Mar. 4, 1461. His courage, handsome person, and other popular qualities rendered him a favorite of the people of London. The cause of the Lancastrians was supported by Margaret of Anjou, the ambitious queen of Henry VI., whose army was defeated at Towton in Mar., 1461. Edward gained another victory at Hexham in 1464, and took Henry VI. a prisoner. By his marriage with Elizabeth Woodville (1464), Edward offended the earl of Warwick, the most powerful of his subjects. Warwick expelled Edward from the country in 1470; but the latter returned in 1471, defeated Warwick at Barnet (April 14), and recovered the throne. On May 4, 1471, he gained a decisive victory at Tewkesbury, which ended the War of the Roses. He died April 9, 1483.

Edward V., king of England, born in Westminster Nov. 4, 1470, was the eldest son of Edward IV., whom he succeeded April 9, 1483. His uncle Richard, duke of Gloucester, then became protector of the kingdom, and obtained possession of the person of Edward V. The young king

and his brother disappeared in June, 1483, and were probably murdered in the Tower by the order of Richard, who then usurped the throne.

Edward VI., king of England, a son of Henry VIII. and Jane Seymour, was born at Hampton Court Oct. 12, 1537, and succeeded his father Jan. 28, 1547. His uncle, Edward Seymour, earl of Hertford (afterwards duke of Somerset), acted as regent with the title of lord protector. The latter promoted the Protestant cause. During this reign the images were removed from the churches, the articles known as the "Bloody Statute" were repealed, and the Reformation made great progress in England. Somerset invaded Scotland, because the Scottish government refused to form a matrimonial alliance between Mary Stuart and Edward VI. He defeated the Scots at Pinkie in 1547. Somerset's enemy, John Dudley, earl of Warwick, obtained the ascendency in 1550, and caused him to be executed. Dudley persuaded the young king to exclude the princesses Mary and Elizabeth from the throne, and to appoint Lady Jane Grey as his successor. Edward died July 6, 1553. (See SHARON TURNER, "History of the Reigns of Edward VI., Mary, and Elizabeth," 1829.)

Edward, prince of Wales, called the **Black Prince** (from the color of his armor), born June 15, 1330, was the eldest son of Edward III. of England. He commanded a part of his father's army at the battle of Crécy (1346), and then adopted the crest of ostrich feathers and the motto *Ich dien* ("I serve"). This crest and motto had been borne by John, king of Bohemia, who was slain at that battle. Ever since it has been borne by the princes of Wales. He gained in 1356 a brilliant victory over the French at Poitiers, and took their king, John, a prisoner. In 1361 he married his cousin Joanna, a daughter of the earl of Kent, and received from his father the title of prince of Aquitaine. He defeated Henry de Transtamare in battle, and in 1367 restored Henry's rival, Peter the Cruel, to the throne of Castile. He died June 8, 1376, leaving a son, who became king as Richard II. The Black Prince was a splendid example of the virtues and qualities fostered by the spirit of chivalry.

Ed'wardes (Sir HERBERT BENJAMIN), K. C. B., an English officer, born in Shropshire Jan. 17, 1820. He entered the army of the East India Company in 1840, and defeated the Dewan Moolraj near Chenab in 1848. In 1851 he published "A Year on the Punjaub Frontier, 1848–49." He was appointed commissioner of Peshawur in 1853. Died Dec. 23, 1868.

Ed'wards, a county in E. S. E. Illinois. Area, 200 square miles. It is partly drained by the Little Wabash River, an affluent of the Wabash, which latter touches the S. E. corner of the county. The soil is fertile. Cattle, grain, tobacco, and wool are raised. Capital, Albion. Pop. 7565.

Edwards, a county in the S. W. of Texas. Area, 1225 square miles. It is partly drained by the East Fork of the Rio Nueces. It is a rocky region, and has forests of cedar.

Edwards, a post-township of St. Lawrence co., N. Y. Pop. 1076.

Edwards, a township of Wilks co., N. C. Pop. 1556.

Ed'wards (ARTHUR), an able Methodist journalist, was born in Ohio in 1834, graduated at Ohio Wesleyan University in 1858, entered the ministry in the Detroit conference in 1858, during the civil war was chaplain in the army for two years and a half, and served for some years as assistant editor of the "North-western Christian Advocate," the official organ of his denomination in that part of the country. His superior editorial ability led, in 1872, to his election as editor-in-chief of that journal.

Edwards (BELA BATES), D. D., an American theologian, born in Southampton, Mass., July 4, 1802, graduated at Amherst College in 1824. In 1833 he founded the "American Quarterly Observer." He became editor of the "Biblical Repository" in 1835, professor of Hebrew at Andover in 1837, and editor of the "Bibliotheca Sacra" in 1844. In 1848 he obtained the chair of biblical literature at Andover Seminary. He was equally distinguished for the exactness of his scholarship and for the modesty and beauty of his character. He published a "Life of Elias Cornelius" (1842), a work on the Epistle to the Galatians, and other works. Two volumes of his sermons, addresses, etc., with a memoir of his life by Prof. E. A. Park, were published in 1853. Died April 20, 1852.

Edwards (BRYAN), an English writer, born at Westbury May 21, 1743, passed many years in Jamaica, where he became a wealthy planter. He wrote an interesting "History of the British Colonies in the West Indies" (1793), which was highly esteemed, and an "Historical Survey of St. Domingo" (1797). He died in England July 15, 1800.

Edwards (GEORGE), F. R. S., an English naturalist, born in Essex April 3, 1694. He travelled on the Continent, and acquired skill in drawing and coloring figures of animals. He published a good "Natural History of Birds," with colored plates (1743), and "Gleanings of Natural History" (1763). Died July 23, 1773.

Edwards (HENRI MILNE). See MILNE-EDWARDS.

Edwards (HENRY WAGGAMAN), LL.D., born in New Haven, Conn., in 1779, was a grandson of Jonathan Edwards. He graduated at Princeton in 1797, and studied at Litchfield law-school, was a member of Congress from Connecticut (1819–23), U. S. Senator (1823–27), Speaker of the House in the State legislature (1830), and governor (1833 and 1835–38), besides holding other important offices. Died at New Haven July 22, 1847.

Edwards (JONATHAN), a celebrated divine and metaphysician, born at East Windsor, Conn., Oct. 5, 1703. His father, Timothy Edwards, a man of talents and of uncommon learning for those times, was settled as minister at East Windsor. Jonathan is said to have commenced the study of Latin when only six years old. When he was ten years of age he composed an essay in which he ridiculed the idea, which some one had recently put forth, of the materiality of the human soul. In 1716 he entered Yale College, and graduated in 1720. Strong religious impressions appear to have been made on his mind in early childhood, but he dated his "conversion" from about his seventeenth year, after which all nature seemed changed in his view, everything revealing to his purified understanding the wisdom, glory, and love of God. In 1723 he took at Yale the degree of master of arts. He was tutor at Yale two years (1724–26). In the early part of 1727 he was settled as pastor of a church at Northampton. He was soon after married to Miss Sarah Pierrepont of New Haven, who in the sweetness and purity of her spirit, in the elevation of her character, and in her entire devotion to duty, may be said to have greatly resembled him. After some years of comparative peace and happiness, a difficulty arose in his congregation which put his firmness and conscientiousness to a severe test. It had become a custom in the church to admit to the communion-table all who professed with the congregation, without any inquiry as to whether they had been truly converted, or whether their spirit and life were consistent with their external profession. Jonathan Edwards believed that it was his duty to adopt a higher and purer standard. But his attempted reform caused great dissatisfaction, and he was at length driven forth from his congregation, not knowing whither to go and without any means of support for his family. Not long afterwards, however, he was offered the situation of missionary at Stockbridge, among the Housatonic Indians. About this time he wrote out his celebrated treatise on the "Freedom of the Will," the plan of which had been matured, it is said, while he was still a student at college. In 1757 he was appointed president of Princeton College in New Jersey, where he died March 22, 1758.

As a close and subtle reasoner Edwards has no superior, perhaps no equal, among those who have written in the English language. But he has a still higher claim to our respect and admiration—the spotless purity of his character and the faultless consistency of his Christian life.

Among his various writings are a "Treatise concerning the Religious Affections" (1746), and "An Inquiry into the Qualifications for Full Communion in the Church" (1749); his great work, "An Inquiry into the Modern Prevailing Notions respecting that Freedom of the Will which is supposed to be Essential to Moral Agency" (1754); "The Great Christian Doctrine of Original Sin Defended" (1757); "The History of Redemption," etc. His works were published at Worcester, Mass., in 1809, in eight volumes; and again, including much new material, in 1829, in ten volumes. A work of his, entitled "Charity and its Fruits," was published in 1852 for the first time. (See S. EDWARDS DWIGHT, "Life of Jonathan Edwards," 1830; SAMUEL HOPKINS, "Life of Jonathan Edwards;" and his life in SPARKS's "American Biography," written by SAMUEL MILLER; also THOMAS's "Dictionary of Biography and Mythology.")

Edwards (JONATHAN), D. D., a son of the preceding, was born at Northampton, Mass., May 26, 1745, and graduated at Princeton in 1765. He was minister of a church at White Haven, near New Haven, Conn., from 1769 to 1795, and was dismissed for his religious opinions. He became president of Union College, Schenectady, in 1799, and published several sermons and theological treatises. He is commonly known as "the younger Edwards." Died Aug. 1, 1801.

Edwards (JONATHAN W.), a lawyer, a son of the preceding, was born at New Haven, Conn., Jan. 5, 1772, and graduated at Yale with distinction in 1789. He practised law at Hartford. Died April 3, 1831.

Edwards (Justin), D. D., an American clergyman and writer, born at Westhampton, Mass., April 25, 1787. He graduated at Williams College in 1810, and for fifteen years was pastor of a Congregational church at Andover. He removed to Boston, where he preached for two years more. He resigned on account of failing health, and became secretary of the American Temperance Society, of which he was the originator. While in this office he prepared the "Temperance Manual," of which nearly 200,000 copies have been printed. He was one of the founders of the Tract Society at Boston. Of his "Sabbath Manual" over 500,000 copies have been printed. Died at Virginia Springs July 23, 1853.

Edwards (Ninian), an American lawyer and Senator, born in Montgomery co., Md., in Mar., 1775. In 1808 he became chief-justice of the State of Kentucky, and in 1809 governor of Illinois. He was U. S. Senator from Illinois (1818–24), and governor (1826–30). Died July 20, 1833. His wife was a sister of Mrs. Abraham Lincoln.

Edwards (Ogden), a son of Pierrepont Edwards, was born in Connecticut in 1781. He became a prominent member of the New York bar, and, besides holding other public offices, was a circuit judge (1821–41) of the first judicial district. Died at Staten Island April 1, 1862.

Edwards (Pierrepont), a lawyer, and son of Jonathan Edwards, born April 8, 1750. He commenced practice in New Haven in 1771. He served in the Revolutionary army, and was a member of the old Congress (1787–88). At the time of his death he was judge of the U. S. district court of Connecticut. Died April 14, 1826.

Edwards (Tryon), D. D., great-grandson of Jonathan Edwards, was born at Hartford, Conn., Aug. 7, 1809, and graduated at Yale in 1828. He has been pastor of churches at Rochester, N. Y., and at New London, Conn. He has published memoirs of Bellamy and of the younger Jonathan Edwards, "The World's Laconics" (1852), "Wonders of the World" (1853), and numerous other works, chiefly of a religious character.

Edwards (William), an American inventor, born Nov. 11, 1770, at Elizabethtown, N. J. His father was a son of Rev. Jonathan Edwards, president of the college at Princeton, N. J., in 1755, and his mother was a sister of Aaron Ogden, a governor of New Jersey. William Edwards introduced the system now employed in nearly all American tanneries by which leather is made in about one-fourth of the time required by the old European process. His first tannery was built at Northampton, Mass., and the first leather made in it was sent to Boston in 1794. The supply of hemlock bark having failed in the valley of the Connecticut, he turned his eyes towards the vast hemlock forests on the Catskill Mountains; and in 1817 he removed to Hunter, Greene co., N. Y., and erected on the Schoharie Creek his model tannery, which was capable of converting imported hides into sole leather with marvellous rapidity. From this establishment about 10,000 sides of sole leather were sent to the city of New York annually. He not only invented several machines, but he adapted many devices previously used for other purposes to the art of tanning, and thus he was enabled to make water-power take the place of manual labor to a great extent. The success which has attended the manufacture of leather in the U. S. must be ascribed not only to the plentiful supply of tanning material, but also to the improved methods first employed by Edwards. Died Dec. 1, 1851, at Brooklyn, N. Y. Samuel D. Tillman.

Edwardsburg, a post-village of Ontwa township, Cass co., Mich., on the Peninsular R. R. Pop. 297.

Ed'wardsport, a village of Vigo township, Knox co., Ind., on the Indianapolis and Vincennes R. R., 20 miles N. E. of Vincennes, and on the West Fork of the White River. Here are mines of excellent coal.

Ed'wardsville, a post-village, cap. of Cleburne co., Ala.

Edwardsville, a post-village, capital of Madison co., Ill., on Cahokia Creek and the Toledo Wabash and Western R. R., 19 miles N. E. of St. Louis, Mo. It has three weekly newspapers. Pop. 2193.

Eeck'hout, van den (Gerbrand), an eminent Dutch painter, born at Amsterdam Aug. 19, 1621, was a pupil of Rembrandt, whom he imitated with success. He excelled in history and portraits, and was very skilful in the expression of character. Among his masterpieces is "Christ in the midst of the Doctors." Died July 22, 1674.

Eeckhout (Jacob Joseph), one of the most prominent Dutch painters of the nineteenth century, born in 1793, was first jeweller, then sculptor, and, after his twenty-eighth year, painter. He published in 1822 a lithographic collection of 60 portraits of Dutch masters.

Ee'cloo, or **Eccloo,** a town of Belgium, province of East Flanders, 11 miles N. W. of Ghent. It has a town-hall, a convent, and several churches; also salt-refineries, oil-mills, and manufactures of cotton and woollen fabrics, hats, soap, tobacco, etc. Here is a large weekly market for grain. Pop. in 1866, 9564.

Eel [Lat. *anguilla;* Fr. *anguille;* Ger. *Aal;* Ang.-Sax. *æl*], a name applied to many fishes of elongated and more or less serpentine shape, but properly belonging to the Anguillidæ, a family of apodal malacopterygians, of which the type is the common fresh and salt water eel (*Anguilla vulgaris*), having in Europe and America many varieties, which by most writers are considered distinct species. The Conger (which see), the *Gymnotus* (see Electrical Fishes), and the *Muræna* are among the most remarkable eels. The sand-eels, or launces (*Ammodytes*), have a very long dorsal, a long anal, and a forked caudal fin. They are all marine, and bury themselves in the sand.

Eel, a township of Cass co., Ind. Pop. 160.

Ee'lee, Ele, Ili, or **Gooldja,** a fortified city formerly in the Chinese empire, now (1874) in the newly formed empire of Jakoob Kushbegi, on the river Eelee. It was a place of banishment for Chinese criminals, is enclosed by a stone wall, and contains barracks, forts, granaries, many mosques and Chinese temples, etc. It is one of the most important commercial towns of Central Asia. It is about lat. 43° 46′ N., lon. 82° 30′ E. Pop. 80,000.

Eelee, a river of Central Asia, rises on the N. side of the Thian-shan Mountains, flows through a part of Chinese Tartary (the new Kushbegi empire), and empties itself, after a course of 600 miles, into Lake Balkash. At various times the valley of the Eelee has been the course of Oriental nations who have invaded Europe, while at present the Russians make it their course for approaching China.

Eel Riv'er, of Indiana, rises in Allen co., flows southwestward, and enters the Wabash at Logansport. It affords abundant water-power. Length, about 100 miles. Another Eel River rises in Boone co., Ind., and after a course of nearly 100 miles enters the West Fork of White River, in Greene co.

Eel River, a post-twp. of Humboldt co., Cal. P. 827.

Eel River, a post-township of Allen co., Ind. P. 1217.

Eel River, a township of Greene co., Ind. Pop. 501.

Eel River, a township of Hendricks co., Ind. P. 1676.

Effect' [Lat. *effectus,* from *efficio, effectum,* to "accomplish," "effect," or "bring to pass;" Fr. *effet*], that which is produced by a cause or agent; a result of causation; a consequence; validity, reality. Cause and effect are correlative terms in natural science. In the plural, effects signifies goods, chattels, or personal property. In the fine arts, effect is that quality whose tendency is to give particular efficacy to other qualities, so as to attract the eye of the spectator, or the impression which a picture produces when seen at a distance so great as to render the details invisible.

Ef'fen, van (Justus), a popular Dutch writer, born at Utrecht in 1684. He was the chief editor of an able review called "The Literary Journal," published in French at The Hague (1715–18). He published in Dutch the "Hollandsche Spectator" (1731–35), which was formed on the model of Addison's "Spectator," and obtained a durable popularity. He passed several years in London as secretary of embassy. Died in Bois-le-Duc Sept. 18, 1735.

Efferves'cence [from the Lat. *effervesco,* to "boil over"], the agitation caused by the sudden escape of gas when certain substances are mixed or combined; the escape of gaseous matter from liquids. An example of effervescence is seen when carbonate of lime is put into dilute muriatic acid. All liquids from which bubbles of gas escape rapidly are said to *effervesce.*

Effervescing Powders, in medicines, are of various kinds, usually put up in two papers—one containing an alkaline bicarbonate, and the other citric or tartaric acid. After dissolving and mixing the solutions, carbonic acid escapes with effervescence. These powders are useful refrigerants, and are gently laxative. Rochelle salts are often added to increase the laxative effect, constituting what are called Seidlitz powders.

Ef'figy [Lat. *effigies,* from *effingo,* to "form," to "fashion"], a representation of a person; sometimes applied to a portrait, but more usually to a sculptured figure on a monument, and to the heads of monarchs, etc. stamped on coins and medals. (See Brasses, Monumental.)

Ef'fingham, a county in the E. of Georgia. Area, 480 square miles. It is bounded on the E. by the Savannah River and on the W. by the Ogeechee. The surface is nearly level; the soil is sandy. Rice and corn are staple products. It is intersected by the Central Georgia R. R Capital, Springfield. Pop. 4214.

Effingham, a county in S. E. Central Illinois. Area, 500 square miles. It is intersected by the Little Wabash River. The surface is nearly level; the soil is fertile. Lumber, grain, cattle, wool, hay, butter, etc. are produced. A large part of it is prairie. It is traversed by the Chicago division of the Illinois Central R. R., and by the St. Louis Vandalia and Terre Haute R. R. Capital, Effingham. Pop. 15,653.

Effingham, a post-village, capital of the above county, is on the Chicago division of the Central R. R. where it crosses the St. Louis Vandalia and Terre Haute R. R., 98 miles E. N. E. of St. Louis, and 199 miles S. by W. from Chicago. It has two weekly newspapers and extensive manufactures of bricks. Pop. 2383.

Effingham, a post-township of Carroll co., N. H. It has six churches, a literary institute, and manufactures of baskets, spools, rakes, etc. Pop. 904.

Efflores'cence [from the Lat. *effloresco* (*ef* (for *ex*), "out," and *floresco*, to "bloom"), to "flower" or "bloom"], in botany, the expansion of the flower-buds, or the time of flowering; in chemistry, the spontaneous conversion of transparent or saline crystals to powder, in consequence of the loss of their water of crystallization.

Efflu'vium (plu. **Efflu'via**), a Latin word signifying a "flowing out" [from *effluo*, to "flow out"], is applied to vapors or exhalations arising from putrefying matter, especially to vapors of a morbific quality.

Eft, or **Ev'et,** the popular name of many small lizards and of several tailed batrachians. One of the best known is the common red salamander (*Salamandra rubra*), a batrachian of the U. S. There are numerous allied species, which are incorrectly believed by many to be venomous.

Effu'sion [Lat. *effusio*], the act of pouring out or shedding, as effusion of blood; the escape of any liquid out of its natural vessel or viscus into another cavity or into the cellular texture; also openness of heart or exuberance of sympathy.

Égalité [Fr. for "equality"], one of the popular watchwords of the first French revolution—"Liberté, égalité, fraternité" ("Liberty, equality, fraternity"). The duke of Orleans (1747–93) assumed in 1792 the name of "Citizen Égalité." (See ORLEANS, LOUIS PHILIPPE JOSEPH, DUKE OF.)

E'gan, a township of Dakota co., Minn. Pop. 670.

Egan (PIERCE), an author, artist, and journalist, born in London, of Irish descent, in 1815. He has published more than twenty novels, among which are "Robin Hood," "The Flower of the Flock," and "The Poor Girl." He has furnished many excellent designs on wood for the "Illustrated London News," and was long an editor in London. He has contributed largely to English and American journals.

Eg'bert, surnamed THE GREAT, a Saxon king of England, was a descendant of Cerdic. He passed many of his early years at the court of Charlemagne, and began to reign in 800 A. D. At this date England was divided into three separate kingdoms, Mercia, Northumbria, and Wessex. He defeated the Mercians at Ellandune in 823, soon after which he completed the conquest of Mercia and Northumbria, ruled over all the states of the Heptarchy, and gave the name of England to the whole. In 835 he defeated an army of Danes who had invaded England. He died in 836 A. D., and was succeeded by his son Ethelwulf. (See LAPPENBERG'S "History of England under the Anglo-Saxon Kings," translated by Thorpe, 1845.)

Eg'ede (HANS), a Danish missionary, born at Harstad, Norway, Jan. 31, 1686. He became pastor of the church of Vaagen in 1707, and went in 1721 to Greenland, where he founded a mission for the conversion of the natives. He labored in Greenland about fifteen years, and endured great privations. His wife, who had accompanied him, died in 1735, and he then returned to Copenhagen, where he was appointed a bishop in 1740. He wrote an account of his missionary labors (1738), and a "Description of Greenland" (1741–44). Died Nov. 5, 1758. (See RUDELBACH, "Christl. Biographie," part vi.) His son PAUL, born in 1708, went with his parents to Greenland in 1721. He assisted Hans in the work of converting and teaching the heathen, and remained there until 1740. He became bishop of Greenland in 1776. He published a valuable dictionary (1754) and grammar (1760) of the Esquimaux; and also "Information on Greenland" (1789), besides other works. Died June 3, 1789.

Eg'er, a river of Bohemia, rises near the town of Eger, and enters the Elbe 33 miles N. N. W. of Prague, after a course of about 125 miles.

Eger, a town of Bohemia, on the river Eger, 92 miles W. of Prague, was formerly fortified. It is situated at the junction of six railroad lines. It is built on a rock, and was an important fortress. Here are the ruins of a citadel or castle formerly the residence of kings and emperors. Eger has seven churches, a fine town-hall, and two monasteries; also manufactures of broadcloth, cotton goods, chintz, and soap. Wallenstein was assassinated here in 1634. Near it is the watering-place Franzensbad, with five springs. Pop. in 1869, 13,441.

Eger, in Hungary. See ERLAU.

Ege'ria [Fr. *Égérie*], a nymph who, according to the Roman mythology, was one of the Camenæ, and was a prophetic divinity from whom Numa derived religious inspiration and directions respecting the forms of worship. The poets feigned that Numa had interviews with her in a grove, and that when he died she melted away in tears, which became a fountain.

Egeria, one of the asteroids of the solar system, was discovered at Naples in Nov., 1850, by De Gasparis.

Egerton (FRANCIS HENRY). See BRIDGEWATER, EARL OF.

Eg'erton (FRANCIS LEVESON **Gower**), EARL OF ELLESMERE, an English author and patron of art, was born in London Jan. 1, 1800. He was the second son of the first duke of Sutherland, and his original name was Francis Leveson Gower, but he assumed the name of Egerton in 1833, when he inherited the estate of the last duke of Bridgewater. He entered the House of Commons in 1820, became chief secretary for Ireland in 1828, and was secretary at war for several months in 1830. Among his works is a poem called "The Camp of Wallenstein." He was created earl of Ellesmere in 1846. His gallery of paintings was one of the most valuable collections in England. Died Feb. 18, 1857.

Egg [Lat. *o'vum;* Fr. *œuf;* Ger. *Ei*] is properly the name of the ovum of certain animals (birds, reptiles, fishes, insects, etc.) which discharge the embryo with its envelopes before the development of the organism. The name is frequently used in an extended sense to include all ova. The most perfect examples of the egg are those of birds and the higher reptiles. These eggs consist of a shell (*puta'men*) consisting of carbonate of lime, a little animal matter, and traces of magnesia, phosphorus, iron, and sulphur. Lining the inside of the shell, we find the tough shell-membrane. The albumen, or white of egg, differs from the albumen of the blood in some of its chemical reactions, and is distinctively known as egg-albumen. It is of great importance in the arts, chiefly in the preparation of albumenized paper for photographers' use. In medicine it is used as an antidote for poisoning by corrosive sublimate and sulphate of copper, with which it forms insoluble compounds. The yolk (*vitellus*) is a highly nutritious substance, containing large proportions of nitrogenous and fatty matter. The structure and development of the different parts of the egg are described under EMBRYOLOGY (which see).

Egg, or **Eigg,** an island of Scotland, is 8 miles S. W. of Skye, and 12 miles from the W. coast of Inverness-shire. Length, 4½ miles. Here are some remarkable cliffs of trap or basalt, and columns of pitchstone nearly two feet in diameter.

Egg (AUGUSTUS), an English painter, born in London May 2, 1816. He was elected an associate of the Royal Academy in 1848. Among his works are illustrations of comic scenes in Shakspeare's plays, and "The Life and Death of Buckingham." Died at Algiers Mar. 26, 1863.

Eg'ga, a populous town of Africa, in Guinea, on the right bank of the Niger, in lat. 8° 42′ N. and lon. 6° 20′ E. It extends nearly 2 miles along the river. The houses are mostly small huts of clay. Narrow cotton cloth is manufactured here in large quantities. Egga has an active trade in corn, yams, calabashes, dried fish, etc.

Egg Bird, or **Soot'y Tern** (*Sterna fuliginosa*), the name of a bird belonging to the gull family, and having the back and wings sooty black and the under parts white. The wings and tail are long and pointed, the latter deeply forked. It abounds in the West Indian seas and in Florida. It lays its eggs in a small excavation in the sand. Its flesh is said to be very delicious, and is much sought after.

Eg'ger (ÉMILE), DR. LIT., was born of German descent, in Paris July 13, 1813, and received his degree in letters in 1833. He has held various professorships of ancient languages in Paris, and is well known for his editions of the less known Latin writers. He is a member of the Institute and of the Academy, and an officer of the Legion of Honor. He has published "Latini Sermonis Vetustioris Reliquæ Selectæ" (1843), "Notions Élémentaires de Grammaire Comparée" (1852), "Mémoires d'Histoire Ancienne et de Philologie" (1863), and numerous other works.

Egg Har'bor, a township of Atlantic co., N. J. Pop. 3585.

Egg Harbor, or **Egg Harbor City,** a post-villa-

of Galloway township, in Atlantic co., N. J., on the Camden and Atlantic R. R. The large majority of the inhabitants are Germans. It has one English and two German weekly newspapers, and four German churches. Pop. 1311.

Egg Harbor, a post-township of Door co., Wis. Pop. 165.

Eg′gleston, a township of Muskegon co., Mich. Pop. 233.

Eggleston (EDWARD), D. D., a distinguished Methodist divine and author, was born in Vevay, Ind., in 1837, joined the Methodist ministry in his nineteenth year, and preached during ten years in Minnesota. He began his literary career in 1866 as editor of "The Little Corporal," commenced in 1867 the "Sunday-School Teacher," in 1870 went to New York City and became editor of "The Independent," was some time editor of "Hearth and Home," and contributor to "Scribner's Monthly." His tales commanded immediate and general interest, and his success led him to retire from editorial life and devote his time exclusively to authorship. In 1871 appeared his "Hoosier Schoolmaster," the remarkable excellences of which immediately determined his rank as among the first of American novelists; it has been extensively reproduced in translations in Europe. In 1872 was published his "End of the World," and in 1873 "The Mystery of Metropolisville."

Egg Plant (*Sola′num Melonge′na*), an annual herbaceous plant of the same genus as the potato and nightshade, is a native of India and Northern Africa. The fruit is a globose or egg-shaped berry about four inches in diameter, but the size varies much according to the quality of the soil and climate. It is cultivated for food in India, the U. S., and various warm climates, and is cooked before it is eaten. This plant flourishes in New Jersey, but not so well in the more northern States of the Union. The seeds should be sown in a hot-bed in April, and transplanted in May or June. There are several varieties of this plant, which produce respectively purple, white, and red fruits. In some countries it is called auberjine or aubergine.

Eg′ham, a village of England, in Surrey, on the Thames, 18 miles W. of London and 3 miles E. of Windsor. Here is the field of Runnymede, where King John and the barons held a conference which resulted in the signing of Magna Charta in 1215. Egham is near Cooper's Hill, which was the subject of one of Denham's poems.

Egidistadt. See NAGY ENYED.

Egina. See ÆGINA.

Eginhard, or **Eginard,** a French historian, was born in Austrasia, and was a pupil of Alcuin. He gained the confidence of Charlemagne, who appointed him his secretary. He accompanied that emperor in his journeys and military expeditions. After the death of Charlemagne he passed into the service of Louis le Débonnaire. According to a doubtful tradition, he married Emma, a daughter of Charlemagne. His chief works are a "Life of Charlemagne" (in Latin), which Parke Godwin characterizes as "a neat and lively specimen of biography," and "Annals of the French Kings from 741 to 829;" best edition of both in Pertz, "Monumenta Germaniæ Historica," vols. i. and ii. Died in 844 A. D.

Eg′lantine [Fr. *églantine*, probably akin to the Fr. *aiguille*, a "needle," so called on account of its prickles], a name of the *Ro′sa rubigino′sa*, a species of rose sometimes called sweetbrier. It is a native of Europe, and is naturalized in the U. S. The flower is single and fragrant. The leaves also emit a peculiar fragrant odor from their russet-colored glands. This plant sometimes attains the height of eight feet, and is often found in fields and roadsides.

Eg′linton Cas′tle, in Ayrshire, Scotland, 2 miles N. of Irvine, is a magnificent Gothic structure, surrounded by a park of 1200 acres. (See next article.)

Eg′linton and Win′ton (ARCHIBALD WILLIAM MONTGOMERIE), EARL OF, a British peer, born Sept. 29, 1812. He succeeded the fourteenth earl of Eglinton in 1819. In politics he was a conservative. He was appointed lord lieutenant of Ireland in 1852 and in 1858. A famous tournament occurred at his castle (above noticed) in 1839, and was attended by Louis Napoleon, afterwards emperor. Died in Oct., 1861.

Eg′mont or **Egmond** (LAMORAL), COUNT OF, and PRINCE DE GAVRE, an eminent Flemish nobleman and general, born in 1522. He was descended from the dukes of Gelderland, and married Sabina, duchess of Bavaria, about 1545. He served in the armies of Charles V., who created him a knight of the Golden Fleece in 1546. In 1557 he commanded the cavalry of the Spanish army, and defeated the French at Saint-Quentin. He gained a decisive victory at Gravelines in 1558, and acquired much popularity. As an associate of William, prince of Orange, he opposed the intolerant and despotic policy of Philip II., but he constantly adhered to the Catholic Church. He was appointed a member of the council of state in 1559. He ceased to act with the popular party after they revolted against the Spanish king, but the latter regarded him with jealousy and hatred, and sent the duke of Alva to Flanders with viceregal power in 1567. Alva was a bitter enemy of Egmont, and is said to have brought his death-warrant from Philip. Egmont and Count Horn were arrested, tried for treason, and executed June 5, 1568, at Brussels. This cruel act provoked a general revolt against Philip II. The story of Egmont is the subject of a tragedy by Goethe. (See MOTLEY, "Rise of the Dutch Republic," chap. ii., part 3; BRUNELLE, "Éloge du Comte Egmont," 1820.)

Eg′mont, Mount, an active volcano of New Zealand, is in the northern island or New Ulster, 18 miles S. of New Plymouth. It rises 8840 feet above the level of the sea.

Egmont, Port, is on the N. coast of West Falkland Island, between Keppel and Saunders islands. It affords good anchorage and fresh water, but the adjacent shore is nearly destitute of wood.

Eg′remont, a township of Berkshire co., Mass. Pop. 931.

E′gret, or **Aigret** [the diminutive of the provincial Fr. *égron* or *aigron*, a "heron"], a name applied to several species of heron. The egret is a handsome bird with soft flowing plumage, pure white excepting the train, which has a creamy tinge. The plumes are much used for ornamental purposes, particularly those of the little egret (*Ardea garzetta*). The egret frequents low, marshy grounds, and subsists on fish, frogs, snakes, lizards, etc.

Egripo, or **Egripos,** a town of Greece. See CHALCIS.

E′gypt [Gr. Αἴγυπτος; Lat. *Ægyp′tus;* Heb. *Mizr* or *Mizraim;* Fr. *Égypte;* Ger. *Aegypten;* Coptic, *Cham* or *Khem;* It. *Egitto;* Arab. *Misr* or *Musr*], a country in the N. E. part of Africa, is bounded on the N. by the Mediterranean Sea, on the E. by the Red Sea, on the S. by Nubia, and on the W. by the Great Desert. Being isolated on several sides by seas and sandy deserts, its limits have remained nearly the same in all the successive periods of its history. It extends from lat. 24° 2′ to 31° 37′ N., and is about 525 miles long N. and S. It comprises the lower portion of the valley of the Nile, from the cataract of Asswan to the mouth of the river. This region is unique in several respects, and is renowned as the home of the first civilized nation of the world—the foremost pioneers in the march of human progress. When Plato was born the monuments of Egypt had stood for many centuries, and they still exist. The area of Egypt Proper is estimated, in the official "Guide Général d'Egypte" (Alexandria, 1870), at 216,200 square miles, of which only 9737 are under cultivation, and only 2040 square miles more are adapted for cultivation. But the rulers of Egypt also claim jurisdiction over all the Soodan, embracing all Nubia, Sennaar, Dongola, Taka, Fazogloo, Kordofan, the provinces of the White Nile, and Khartoom. In this wider sense the area of Egypt is generally estimated at about 659,000 square miles; but E. de Regny, in his "Statistique de l'Égypte d'après des documents officiels" (Alexandria, 1872), claims 927,000.

Besides the Delta and several oases in the Desert, Egypt Proper is a valley about 500 miles long, confined between two ridges or continuous chains of barren limestone hills. Anciently, the desert east of the Nile supported a considerable population, chiefly pastoral. The altitude of the highest hills is not much over 1200 feet. The average breadth of the valley is about seven miles. The fertility and verdure of this narrow tract present a remarkable contrast to the aridity and desolation that prevail on either side. The most important physical feature of Egypt is its great and unique river, the Nile, which in the last 1300 miles of its course receives no tributary stream, and is the source of all the country's fertility. The periodical overflow of this once mysterious river is among the most remarkable instances of the stability of the laws of nature. For several thousand years the average height and duration of the inundation have continued nearly the same. The ordinary rise of the water at Thebes is about thirty-six feet, and at Cairo about twenty-five feet. The average rate of addition to the soil is about four and a half inches in a century. About 100 miles from the sea the Nile divides into several channels, and its narrow valley expands into the vast level and alluvial plain of the Delta. According to Herodotus, the Nile had seven mouths in ancient times, but at present there are only two large navigable channels—namely, the Damietta and the Rosetta mouths. This country is divided into three primary divisions—the Said or Upper Egypt, the Vostani or Middle Egypt, and the Delta or Lower Egypt. The term Delta, however, is some-

times restricted to the triangular tract enclosed between the two main channels of the Nile.

The great Libyan desert lying W. of the Nile is diversified by several fertile *oases*. The Great Oasis, situated near the W. border of Upper Egypt, is nearly 100 miles long. The oasis of Seewah (anc. *Ammonium*) is about 300 miles W. of Cairo. Here was the site of the famous temple of Jupiter Ammon. The date-palm, grapevine, and fig tree flourish in this oasis, but all the divisions of Egypt are destitute of forests and deficient in timber. But forests have been planted by the khedive in the Delta, and it is asserted that the annual rainfall has already been greatly increased thereby. It appears that all the ancient temples were built to shed rain. The climate is remarkably dry, serene, and equable. Rain seldom falls in Upper Egypt. In the Delta the mean temperature of winter is about 54° Fahrenheit, and that of summer 82°. A hot and pernicious south wind called khamseen or simoom prevails for nearly two months in spring. During eight months in the year the north wind blows, and favors those who wish to sail up the river. The Nile, replenished by the annual rains which fall on the highlands of Abyssinia, begins to overflow in July, and continues to rise until September. The inundation reaches its maximum near the autumnal equinox. The water, in which fertilizing mud and slime are suspended, is distributed over the valley by numerous canals, for the purpose of irrigating the land in summer. In October the country resembles a sea, in which the towns and villages appear as islands. After the inundation has subsided, grain and seeds are sown, and the earth is rapidly covered with verdure, so that nature here displays the brightest green in the winter months of December and January. The chief productions are wheat, barley, maize, cotton, tobacco, sugar, beans, millet, durrah (*Sorghum vulgare*), indigo, hemp, flax, onions, clover, oranges, figs, and grapes. Two crops are raised in a year on the same piece of land. The wheat harvest comes in April, or earlier in some parts of Egypt. The soil in the Delta is said to be fifteen feet deep.

Minerals, Animals, etc.—Limestone, sandstone, and red granite or syenite are abundant here. The last is found in the southern part, at Asswan, the ancient *Syene*, from the cliffs of which were obtained the material for the obelisks and other colossal monolithic monuments of ancient Egypt. Between Asswan and Esneh is an extensive sandstone formation, which supplied material for the great temples at Thebes and other ancient cities. The Pyramids are built of limestone quarried in their vicinity. In the Jebel Mokattem, between the Nile and Suez, is a tract covered with the silicified trunks of trees. A similar phenomenon of a petrified forest occurs also in the desert of the natron lakes near the western border of the Delta. The soil of Lower Egypt is an alluvium deposited by successive inundations, and consists of a dark-brown mould or argillaceous loam mixed with sand. This delta has increased enormously within the historic period. Among the minerals of Egypt are alabaster, porphyry, and emeralds. The principal wild animals are the wolf, hyæna, jackal, antelope, crocodile, and jerboa. The hippopotamus was formerly found here. The domestic animals of Egypt are camels, horses, horned cattle, asses, sheep, etc. Among the birds are the vulture and the ibis, the latter reputed sacred by the ancient Egyptians. The flora of Egypt abounds in dicotyledonous plants armed with thorns and bearing pale-green leaves, as the acacia. The principal trees are the date-palm (which is commonly cultivated), the doum-palm, the sycamore, the cypress, and the tamarisk. Among the indigenous plants are the papyrus, the lotus, a species of water-lily, and the *Acacia vera* (or *nilotica*), from which gum-arabic is obtained.

The Turks have been the ruling class in Egypt since they conquered the country, and they still occupy most of the high places in the civil administration as well as in the army. The ruling dynasty is descended from them, but of late has begun to favor the Arabic element of the population in preference to the Turkish. The Bedouins, whose number is officially estimated at about 400,000, are the unmixed descendants of the Arabs; while the Arabs of the towns and the Fellahs, the peasants and laborers, are believed to descend from a mixture of the ancient Arabs and the ancient Egyptians. The COPTS (which see) are the unmixed descendants of the ancient Egyptians. Nominally, Egypt is still a pashalic of Turkey, but in 1841 a hattisherif made the rule over it hereditary in the family of Mehemet Alee, the oldest living male member of the family being entitled to succession in accordance with the law which also predominates at Constantinople. In 1866 the sultan, at the request of Ismaeel Pasha, changed the law of succession so as to make the pashalic hereditary in the direct male line of the ruling prince. At the head of the administration are a council of state, established in 1852, and consisting in 1872 of the eldest son of the khedive as president, of a son-in-law of the khedive, and five of the most prominent statesmen; and of a state ministry, which in 1872 was divided into seven departments—namely, justice and grace, foreign affairs, finances, interior, public instruction and public works, war, and navy. An assembly of deputies was for the first time convoked by the khedive on Nov. 27, 1866, and has since met annually. It is to control the administration of the country and to fix the budget. For administrative purposes Egypt Proper is divided into fourteen provinces, at the head of each of which is a governor called moodeer. The cities of Cairo, Alexandria, Suez, Port Saeed, Damietta, Rosetta, and Cossaieer do not belong to any of the provinces, but have their special governors. The provinces are subdivided into districts, and these into cantons. Special governors have also been appointed at Massowah and Sooakin, who are dependent upon the governor-general of the Soodan, who resides at Khartoom. A large majority of the inhabitants are Mohammedans of the Sunnite sect. The supreme authority for all matters of religious law is the council of ulemas at Cairo, consisting of the heads of each of the four orthodox rites of the Sunnites, of the head of the Cairo University, of the chief kadi of Cairo, and the nakees or chiefs of the descendants of the Prophet. Among the Mohammedan high schools, the one which is connected with the Mosque al Azhar at Cairo, often called the University of Cairo, is the most celebrated. It was formerly one of the chief seats of Arabic learning, and had sometimes as many as 20,000 students; and even at present it attracts students from all parts of the Mohammedan world. A great progress in the cause of education was made by the establishment in 1868 of government schools in the large towns of the countries. These schools numbered in 1870 about 4000 pupils, and embrace both primary and secondary instruction. In the latter department a number of special schools, as a polytechnic school, a law school, a philological school, an art school, a medical school, a naval academy, are included, and more recently Prof. Brugsch of the University of Göttingen has received and accepted a call from the Egyptian government to organize an academy of Egyptian archæology. The periodical press is still in its infancy. In 1870 there was only one weekly newspaper published in the Arabic language; all the other papers appeared in the French, Italian, or Greek language.

The population of Egypt Proper was in Mar., 1871, officially estimated at 5,203,405; inclusive of the Soodan, it was believed to amount to 8,000,000. The number of foreign residents was 90,000, embracing 34,000 Greeks, 24,000 Italians, 17,000 Frenchmen, 6000 Austrians, 6000 Englishmen, and 1100 Germans. The two largest cities are Cairo, the capital, and Alexandria. The revenue in the budget for the year Sept., 1871, to Sept., 1872, was estimated at 1,458,729 purses (1 purse = $20); the expenditures, at 1,283,830 purses; the surplus, at 174,900 purses. The public debt in Jan., 1872, amounted to £40,550,000. The value of the imports of Alexandria in 1871 was 560,900,000 piastres, that of exports, 999,500,000; in the same year, 2921 vessels entered the port of that city, and 2787 were cleared. The army, which is recruited by conscription, numbers about 14,000 men, and the navy consists of twelve steamers. A ship-canal connecting the Mediterranean with the Red Sea has been cut through the Isthmus of Suez under the direction of M. de Lesseps. It was opened on the 17th of Nov., 1869; it is about 100 miles long, 25 feet deep, and 71 feet wide at the bottom. The receipts during the year 1871 were 13,276,674 francs; the expenditures, 15,918,579 francs. In 1871 the canal was traversed by 765 vessels, of 761,467 tons; during the first nine months of 1872, by 827 vessels, of 880,096 tons. In Jan., 1872, Egypt had 711 English miles of railroad in operation; the aggregate length of telegraph lines was 3904 miles, and of telegraph wires, 8292 miles.

Ancient History and Monuments.—"Egypt," says Bunsen, "is the monumental land of the earth, as the Egyptians are the monumental people of history." The same writer calls the Egyptians "the chronometers of universal history." The sacred history of the Hebrews informs us that the Egyptians were descendants of Ham. The other chief authorities in relation to the antiquities and chronology of Egypt are Bunsen, Champollion, Lepsius, Wilkinson, Sharpe, and Poole, who differ widely in their computations. The first mortal who is recorded to have reigned over all Egypt was Menes, the founder of the first of thirty dynasties. His epoch is fixed by Bunsen at 3643, by Lepsius at 3892, and by Poole at 2717 B. C. Before Menes, Egypt was perhaps divided into two or more independent kingdoms. Menes is said to have founded Memphis, but no contemporary monuments of his reign exist. The great pyramid of Cheops is supposed to have been built by a king of the fourth dynasty, and is among the oldest Egyptian monuments that are extant. According to a somewhat doubtful tradition,

Cheops, who reigned nearly 500 years after Menes, oppressed his subjects with forced labor in the construction of this

Sphinx and Pyramid.

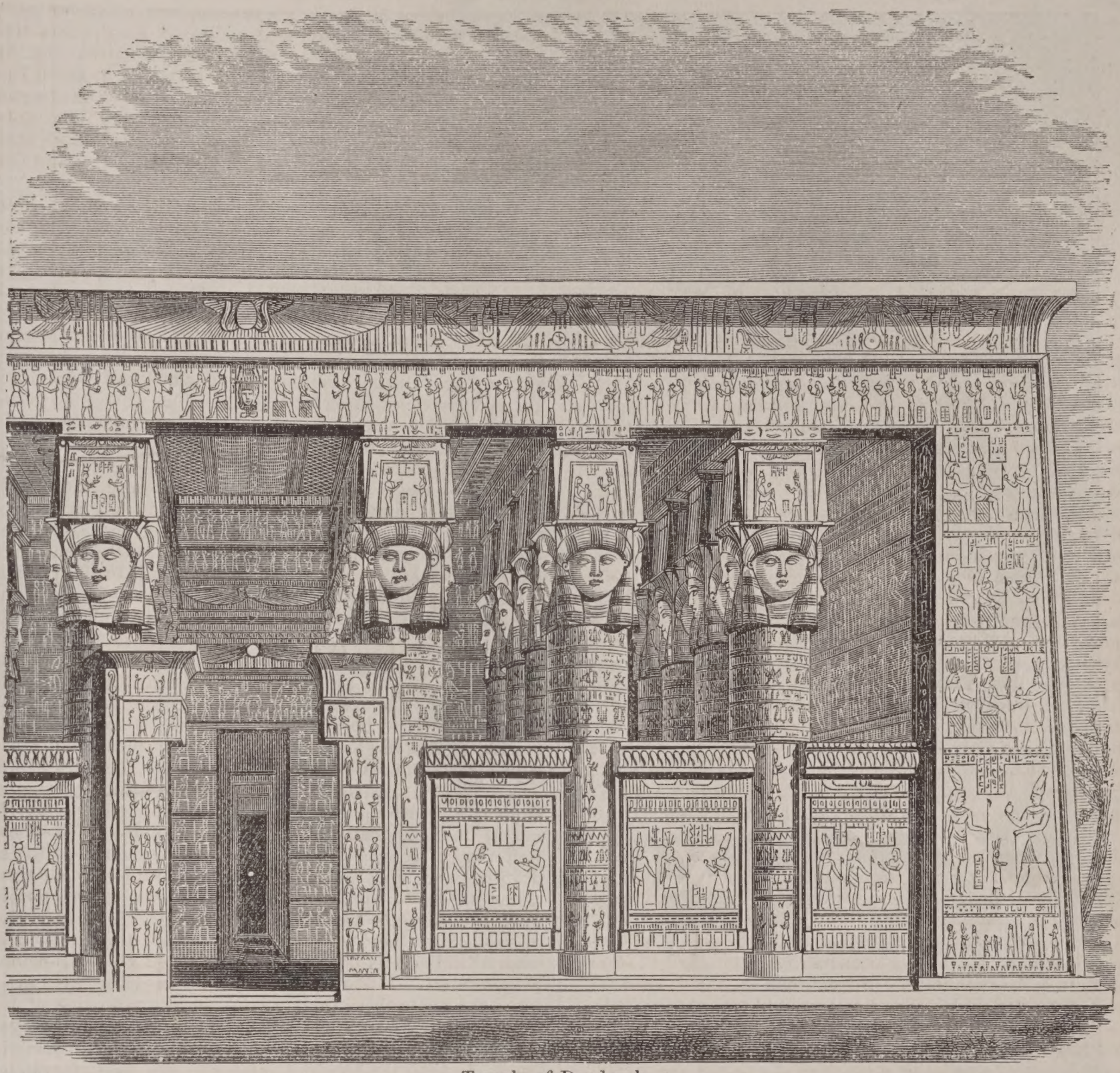
pyramid. Memphis was the capital of many of the kings who reigned before the time of the eleventh dynasty. Each king appears to have founded a pyramid as a memorial of his reign or as a monument for himself. Among the oldest cities of Egypt was Thebes (*Dios'polis*, called *No* or *No-Ammon* in the Bible), the temples and palaces of which are at this day the most magnificent ruins on the globe. Before the foundation of Carthage and Rome, Egypt was the central point of the civilization of the world. Among the famous kings of the twelfth dynasty was the warlike Osirtesen I., who is supposed to have been the Sesostris of the Greeks. An obelisk which he erected at Heliopolis is still standing. Amenemha, a king of the twelfth dynasty, excavated Lake Mœris, and constructed the famous Labyrinth, which Bunsen describes as "the most gorgeous edifice on the globe." It contained twelve palaces and 3000 saloons. (See LABYRINTH.) After the fourteenth dynasty the Hyksos or "shepherd kings," who were of foreign origin, ruled over Lower Egypt for several centuries. According to some writers, the Hyksos invaded Egypt about 2200 B. C. With the eighteenth dynasty, about 1525 B. C., commences the most brilliant period of Egyptian history and the greatness of Thebes. Among the most famous of the Theban kings were Amenoph I., Thothmes I., Thothmes III., Amenoph II. and III., and Horus, of the eighteenth dynasty, and Sethos and Rameses II. of the nineteenth. These kings builded the grand temples and palaces of Karnak and Luxor. Their conquests and victories over the Assyrians, Ethiopians, and other nations are recorded on obelisks, temples, and tombs with elaborate art and very copious details. "The most splendid period of the empire of Thebes," says Heeren, "must have occurred between 1800 B. C. and 1300 B. C." Probably no ancient nation has worked with such assiduity and ingenuity to perpetuate the record of its life and actions, and to eternize the memory of its ideas and institutions. In consequence of the peculiarly dry and equable climate and the solidity of Egyptian architecture, the monuments of this country have surpassed all others in durability. The permanence of the institutions of Egypt was doubtless promoted by the sight of public monuments which had defied the corroding power of time. "No people, ancient or modern," says Champollion, "has conceived the art of architecture on a scale so sublime, broad, and *grandiose* as the ancient Egyptians." "In ancient art," says the "Encyclopædia Britannica," "the Egyptian has the highest place with respect to intention, and equals that of Greece and Assyria in the excellence with which that intention has been carried out." According to Bunsen, the "Egyptians left imperishable monuments of deep ethical thought, of high artistic instincts, and of noble institutions."

A king of the twenty-second dynasty, called Shishak in the Bible, captured Jerusalem in the reign of Rehoboam, about 972 B. C. The Hebrew writers employ the name of Pharaoh as a general title of the kings of Egypt. Among the notable kings of the twenty-sixth dynasty was Psammetichus, who began to reign about 670 B. C., and favored the immigration of the Greeks into Egypt. A revival of art occurred in his long reign, which was an important epoch. His son and successor, Necho, defeated Josiah, king of Judah, at Megiddo. Egypt was conquered about 525 B. C. by Cambyses, king of Persia, but regained its independence under Amyrtæus, a king of the twenty-eighth dynasty. In the year 350 B. C., Egypt was again conquered, by the army of Darius Ochus, king of Persia, and Nectanebus II., the last king of the thirty dynasties, ceased to reign. The succession of Egyptian monarchs, embracing a period of 3553 years, is unexampled in history. In 332 B. C., Alexander the Great invaded Egypt, which became an easy conquest, as the natives refused to fight for their Persian masters. He founded Alexandria, and partially Hellenized the country, but the Egyptians continued to be governed by their own laws. The regulations which he made for the government of Egypt were equally wise and popular. The privileges of the priests were secured to them, but the Greeks became the dominant class. Egypt continued to be a prosperous and powerful kingdom under several Grecian or Macedonian kings named Ptolemy. Under the rule of the Ptolemies, and of the Romans, who became masters of Egypt about 30 B. C., Alexandria was a famous centre of learning and philosophy, as well as a great commercial emporium. According to some Egyptologists, the first seventeen dynasties were not consecutive, but some of them were contemporaneous, and two kings reigned at the same time over different portions of the country. (Some notice of the ancient monuments of Egypt may be found under the heads of THEBES, EDFOO, KARNAK, PYRAMID, and OBELISK.)

Among the peculiarities of this nation was the hieroglyphic mode of writing, and the practice of covering their obelisks and the outer and inner walls of temples and palaces with sculptured bas-reliefs and hieroglyphic symbols, which not only recorded historical events, but also represented in copious detail their social customs and private life. They lavished labor and expense on temples and tombs, while their private houses were plain and inexpensive. The priests were the ruling class, and were distinguished by their superior science, which they kept secret. The government was a limited hereditary monarchy. The priests were in ordinary times the real governing body. They were the sole depositaries of learning and science. The chief priests were the judges of the land, the councillors of the sovereign, the legislators, and the guardians of the great mysteries. The king himself was anciently a priest. Nowhere in the ancient world was the number of temples so great as in Egypt; nowhere was ordinary life so intimately blended with religion. The ancient Egyptians were people of a devout, serious, and contemplative disposition. They believed in the immortality of the soul, and apparently also in the resurrection of the body, but they worshipped beasts, reptiles, and even vegetables, probably as symbols. They were brave in war, and less cruel than the Assyrians. They excelled in magic arts, and had made much progress in various sciences before the time of Moses, who was "learned in all the wisdom of the Egyptians." They calculated solar and lunar eclipses, and carried astronomy to the highest point it could attain without the aid of modern instruments. They appear to have been well versed in geometry, arithmetic, mechanics, and hydraulics, and must have had a considerable knowledge of chemistry. Herodotus and Cicero concur in the opinion that they were the most learned and accurate of all nations in relation to their native annals. More than 1000 years before Phidias was born they had attained great proficiency in sculpture. Champollion, in a letter dated at Thebes, says: "I write these lines almost in the presence of bas-reliefs which the Egyptians executed with the most elegant delicacy of workmanship 1700 years before the Christian era." In their temples and palaces we see massive grandeur of form, noble taste in design, exquisite finish in decoration, and a pervading expression of repose which is one of the highest results of art. Among the arts in which they acquired skill was music, and it appears that they played on the harp, lyre, and sistrum during the twelfth dynasty or earlier. The Greeks attributed to them the invention of the lyre and flute. They also fabricated glass bottles and beads, some of which are marked with symbols indicating a date of 1500 B. C. Women enjoyed nearly equal rights, and were so well treated that their condition was more favorable in Egypt than in other ancient nations. Several women, among whom was Nitocris, a queen of the sixth dynasty, inherited the throne and exercised royal power. The soldiers, who were all landholders, constituted the highest class except the hereditary priesthood. According to Strabo, there were only three castes—priests, soldiers, and husbandmen (farmers). The stamp of caste was not indelible. The land was divided into three unequal portions, of which one belonged nominally to the king, and was held by tenants, who paid a low rent or one-fifth of the crop; another portion was possessed by the priests, who paid no rent or tax; the third part was held by the military class or order, who amounted to 410,000 men, and had six acres each, for which they paid no rent, but they were bound to serve in the army in time of war. They used many war-chariots, which appear to have been introduced about the time of the eighteenth dynasty. The ancient Egyptians carried on an extensive commerce, for which their position was very advantageous. The navigation of the Nile (the longest inland navigation known to the ancients) and the Red Sea enabled them to command the trade of several foreign countries. The rich products of India and Arabia have in almost all ages passed through Egypt on their way to Europe. Necho, the Nekao II. of Manetho, and the Pharaoh-Necho of Scripture (611–595 B. C.),

of the twenty-sixth dynasty, is said to have been the first of their kings who had a navy of war-vessels. His navy was built by Phœnicians in the Red Sea, and having sailed around Africa, entered through the Strait of Gibraltar into the Mediterranean. This statement is doubted by some writers. Diodorus states that the population amounted to 7,000,000 in the Pharaonic era.

The style of architecture and decorative art which prevailed in ancient Egypt was one of the characteristic and almost unchangeable peculiarities of the race. For example,

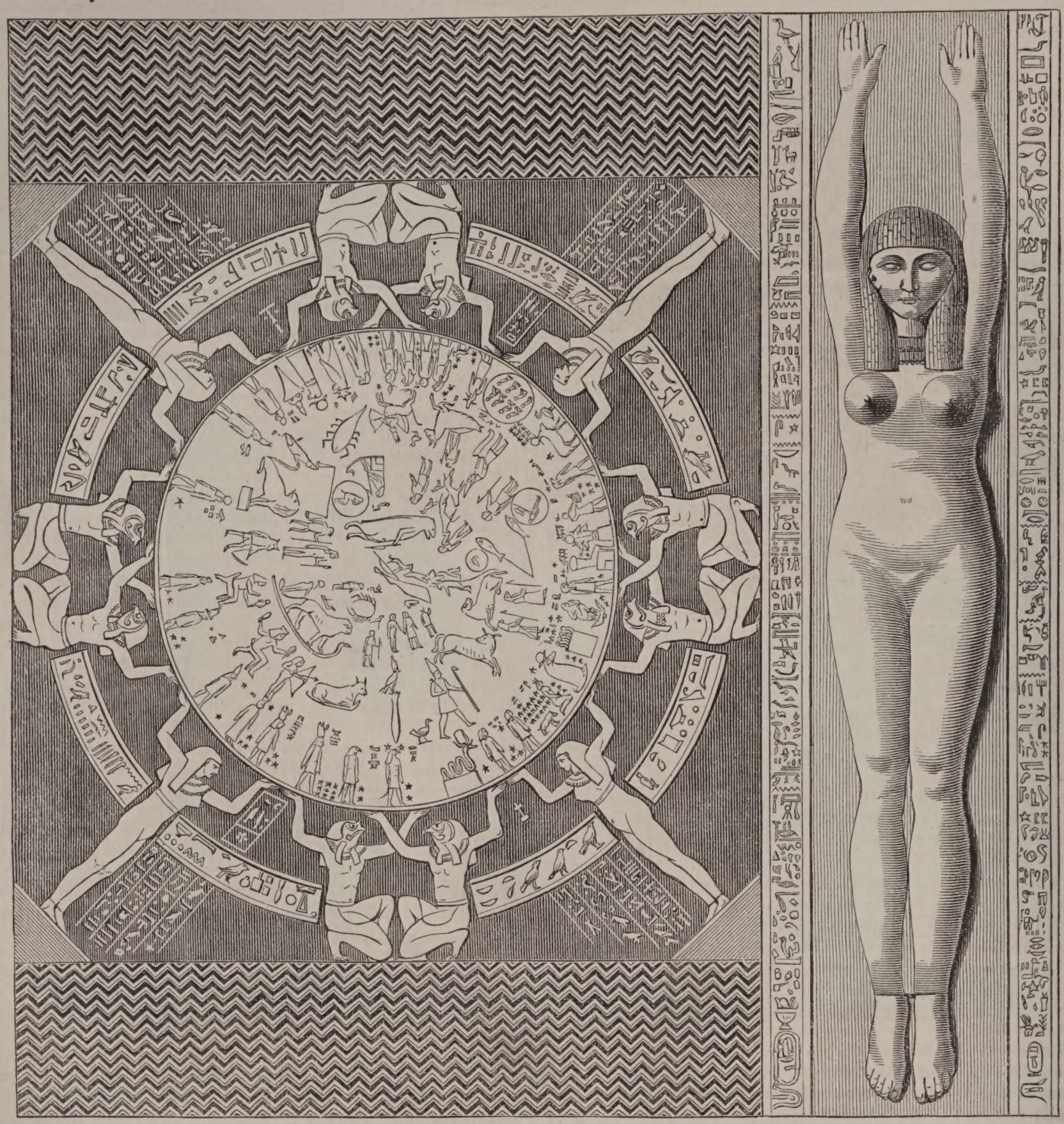


Temple of Denderah.

the celebrated temple of Denderah has been assigned to a date of the most extreme antiquity, though it is now generally referred to the early Roman period. The ceiling of this temple is adorned with figures arranged in the style of a zodiac, and well known as "the Zodiac of Denderah;" but some recent writers deny that it has any astronomical significance. The temple itself is believed to have been dedicated to the service of the goddess Athor, the Egyptian Venus.

Modern History.—When the Roman empire was divided, on the death of Theodosius in 395 A. D., Egypt became a part of the dominions of Arcadius, emperor of the East. For several centuries after the time of Constantine the Great (306–337 A. D.), Egypt was greatly disturbed by religious controversies and violent tumults between the different sects or parties of Christians, who were very numerous there. The Arians and orthodox shed torrents of blood in Egypt. In 640 A. D. the Arabs, led by Amroo, a general of the caliph Omar, invaded Egypt. The oppressed Egyptians, being disaffected to the emperor Heraclius, and having no strong motive to fight, offered little resistance, and the conquest of the country was easily effected in December, 640. Amroo wrote to Omar that "he had taken a city [Alexandria] which beggared all description, in which he found 4000 palaces, 400 theatres," etc. Greek civilization and literature, which had flourished in this country for 900 years, then came to an end, and Egypt became a part of the kingdom of the caliphs who reigned at Damascus and afterwards at Bagdad. About 970 A. D., Egypt was conquered by the Fatimite dynasty, under which Cairo was founded and became the capital. Saladin, the famous adversary of the crusaders, obtained the sovereign power as sultan of Egypt about 1170. He died in 1193, leaving several sons, among whom his extensive empire was divided. Louis IX. of France conducted a crusade against Egypt in 1248, but was defeated and taken prisoner by the Saracens. In 1250 the government was revolutionized by the Mamelukes (slaves of Turkish or Caucasian origin), who deposed the sultan and usurped the chief power. This country was conquered in 1517 by the Ottoman sultan, Selim I., who reduced it to a Turkish province. The turbulent Mamelukes afterwards filled the country with disorder for more than two centuries, and it was under their domination when it was invaded by the French in 1798. A French army of about 35,000 men, commanded by Bonaparte, was conveyed to Egypt by a fleet, and arrived at Alexandria in July, 1798. This expedition was accompanied by a large number of savants and artists, among whom were Berthollet, Monge, and Denon. Bonaparte defeated the Mamelukes at the battle of the Pyramids, July 23d, and took Cairo on the 24th. The conquest of Egypt was soon completed. The French savants and artists explored the topography, natural history, and antiquities of Egypt, and obtained materials for a great descriptive work, which was published by the government under the title of "Description de l'Égypte, etc.," with more than 900 engravings (25 vols., 1826). In Aug., 1799, Bonaparte returned to France, leaving his army, under the command of Gen. Kleber, to contend against the combined forces of Great Britain and the Turkish sultan. After several battles at Heliopolis, Aboukeer, etc., the French were expelled from Egypt in 1801. Mehemet Alee was appointed pasha of Cairo in 1804, and massacred a large number of the Mamelukes in 1811. He founded colleges and schools, promoted commerce and manufactures, and introduced European civilization. As viceroy of Egypt he was nominally a vassal of the Turkish sultan, but his power was nearly absolute. In 1830 he invaded and conquered Syria. He afterwards revolted against the

sultan, whose army he defeated at Nizeeb in Syria in June, 1839, soon after which the great powers of Europe intervened to check his victorious progress. Peace was restored in 1841 by a treaty which made the viceroyalty hereditary in the family of Mehemet Alee. When Mehemet Alee became imbecile (he died Aug. 2, 1849) the Turkish government in July, 1848, appointed his adopted son Ibraheem, and after Ibraheem's death (Nov. 10, 1848) a grandson of Mehemet Alee, Abbas Pasha, regent of Egypt, who showed himself a fanatical Mohammedan, and repealed many of



Zodiac of Denderah.

the reforms which had been introduced by his predecessors. His successor was Saeed Pasha, a younger son of Mehemet Alee, who reigned from 1854 to Jan., 1863, and was succeeded by Ismaeel Pasha, a son of Ibraheem, who in 1867 received from the Turkish government the title of khedive. (See BUNSEN, "Aegyptens Stelle in der Weltgeschichte," 5 vols. 8vo, 1845–57, and English translation of the same; LEPSIUS, "Denkmäler aus Aegypten und Aethiopien," 12 vols. folio, 1849–59; WILKINSON, "Manners and Customs of the Ancient Egyptians," 6 vols. 8vo, 1840–47; SHARPE, "History of Egypt," 2 vols., 1838; 5th ed. 1870; LANE, "Modern Egyptians," 2 vols. 8vo, 1842; MARIETTE-BEY, "Aperçu de l'Histoire d'Egypte," 2d ed. 1870; STEPHAN, "Das heutige Aegypten," 1872; REGNY, "Statistique de l'Egypte d'après des documents officiels," published annually since 1870.) REVISED BY A. J. SCHEM.

E'gypt, a township of Ashley co., Ark. Pop. 513.

Egypt, a township of Yancey co., N. C. Pop. 781.

Egyptian Architecture is characterized by an almost monotonous simplicity, and a wonderful solidity and heaviness of structure. It has been assumed, perhaps too hastily, that the sloping walls and ponderous, almost imperishable, structure of the Egyptian temples was an imitation of the caverns or of the excavations in which its inhabitants are assumed to have dwelt in primitive times; and facts are not wanting which would appear to confirm the opinion that the pre-historic Egyptians were troglodytes or cave-dwellers.

The pyramid, though not peculiar to Egyptian architecture, seems to have lent its solidity to all the important buildings, the walls of which generally incline inward, and are never more than one story high. The use of columns, often monolithic, far exceeded the requirements of safety or strength, the shafts being very large and short, and set very near each other. The form of many is suggestive of that of the date-palm with its crown of leaves. They are sometimes polygonal. Burnt or sun-dried brick, granite, limestone, marble, syenite, and a great variety of materials were employed. The roof of important buildings was of great masses of stone, requiring the use of numerous interior columns. The roofs, though flat, are said to be always inclined, so as to shed rain. All buildings, with scarcely an exception, were rectangular.

The decorations were chiefly of a hieroglyphic character; and those which were not hieroglyphic had to a great extent, it is believed, an emblematic purpose. Many other decorations were illustrative of the daily life and industries of the people. The vastness, darkness, and enduring character of these prodigious structures were well calculated to impress the mind with feelings of the mystery and dignity of the religious system which so completely pervaded the social life of ancient Egypt. The palm-branch, the lotus, the vulture's wings, the human head, and various emblems from animal and vegetable life, adorn the capitals of columns.

Whether the Egyptians invented the arch is not known, but it was used, it is said, as early as the eleventh dynasty, but at no period was it very freely employed. It is still a great mystery how the ancient Egyptian builders could have raised to position the prodigious blocks of stone which they employed in building.

Egyptian (or **Maltese**) **Vulture,** called also **Pharaoh's Hen** (*Neophron percnopterus*), a small vulture of Southern Europe, Northern Africa, and of Asia, having

Egyptian Vulture.

almost perfectly white plumage with black quill-feathers. These birds are protected by law and custom, and are valuable scavengers, and consequently are half domesticated.

Ehninger (John Whetton), an American artist, born in New York July 22, 1827. He graduated at Columbia College, and studied art in Europe, was a pupil of Couture in Paris, and was much in Düsseldorf and the great European capitals. His pictures have merit, but he is best known by his illustrative drawings and etchings, several series of which have been published and gained a wide popularity.

Ehrenberg, a post-village, capital of Yuma co., Ara., 7 miles S. of La Paz, on the Colorado.

Eh'renberg (Christian Gottfried), M. D., an eminent German naturalist and microscopist, born at Delitzsch, in Prussian Saxony, April 19, 1795. He studied medicine at Leipsic, and graduated as M. D. in 1818. Among his favorite studies was botany, on which he wrote several treatises in his youth. In company with Dr. Hemprich, he visited Egypt, Arabia, and Syria, and spent about six years (1820–26) in the exploration of the natural history of those countries. Having returned to Berlin, he obtained in 1826 a chair of medicine in the university of that city. He published in 1828 "Scientific Travels through Northern Africa and Western Asia," and "Physical Symbols of Birds, Insects, etc." (in Latin). In 1829, Humboldt and Ehrenberg performed together an excursion to the Ural and Altai mountains. Ehrenberg afterwards made interesting discoveries with the microscope, and published important works entitled "The Infusoria as Perfect Organisms" (1838) and "Mikro-Geologie" (1854–56). He discovered that cretaceous and other strata of great extent are composed of microscopic organisms. His reputation as an observer is justly great, while the conclusions he has drawn from his observations are frequently faulty.

Ehrenbreitstein, ā'ren-brīt'stīn (*i. e.* "honor's broad stone"), a fortified town of Rhenish Prussia, is picturesquely situated on the E. bank of the Rhine, opposite Coblentz, with which it is connected by a bridge of boats. It stands at the base of a rocky hill. On the summit of this hill stands the citadel of Ehrenbreitstein, situated on a rocky promontory which rises 400 feet above the water, inaccessible on three sides, and defended on the N. and only attackable front by a double intrenchment. It contains casemates for the whole garrison, artillery, and stores, and forms the key of the whole fortified position of Coblentz. It has been a fortress from time immemorial, the first origin of it dating from the time of Drusus, when the Romans erected various castles and strongholds on the Rhine, and a stone bridge over that river at Engers, between Coblentz and Neuwied, where Cæsar is also supposed to have constructed his first bridge. It was besieged without success in 1688 by the French, who took it after a long siege in 1799. The citadel was rebuilt in 1815 by the Prussian general Aster, the projector of all the works at Coblentz. The present improved construction has been by some military writers regarded as impregnable except to famine, as the old castle sustained a siege of eleven months with a small garrison; but modern developments of artillery-power furnish new elements which may have some influence in forming a present judgment on this point. The artillery is mostly in casemates, of which there are 181, and the English colonel Humfreys states that "with sufficient artillery a battalion (say 1000 or 1200 in all) could hold the position" against an attack in force. Pop. in 1871 (without the garrison), 2504.

J. G. Barnard.

Eibenstock, ī'ben-stock, a town of Saxony, 16 miles S. S. E. of Zwickau. It has manufactures of muslin, lace, chemical products, and tinware. Tin-mines have been opened in the vicinity. Pop. in 1871, 6362.

Eibergen, a town of the Netherlands, in Gelderland. It has calico-factories. Pop. 5324.

Eich'berg (Julius), a musical director, was born in Germany in 1825, and was educated at the Conservatory of Brussels, where he received several first prizes for excellence. He was afterwards musical director in Germany and Switzerland, and in 1856 established a conservatory of music at Boston, Mass., where for some years he has been principal music-teacher in the public schools. He was one of the directors in the Peace Jubilee of 1872 at Boston, and is the author of successful operas, etc., such as "The Doctor of Alcantara," "The Rose of the Tyrol," etc.

Eichhoff (Frederic Gustave), a philologist, born at Havre Aug. 17, 1799, was the son of a merchant formerly of Hamburg. He devoted himself at Paris to Oriental languages, and established his reputation by his "Parallèle des Langues" (1836). He has written on the Indic origin of the Slavic tongues, the mythology of the Edda, the roots of the German language, the poetry of the Hindoos, and a "Grammaire Générale Indo-Européenne" (1867).

Eich'horn (Johann Gottfried), an eminent German scholar and biblical critic, was born at Dörenzimmern Oct. 16, 1752. He was educated at Göttingen, and became professor of Oriental languages at Jena in 1775. In 1788 he obtained the chair of Oriental and biblical literature at Göttingen, which he filled nearly thirty-eight years. He edited the "General Repository of Biblical Literature" (10 vols., 1787–1801), and wrote numerous works, which display an almost unequalled knowledge of Oriental and biblical antiquities. As a biblical critic he belongs to the rationalistic school. Among his principal works are an "Introduction to the Old Testament" (3 vols., 1783), an "Introduction to the New Testament" (2 vols., 1804–10), "Primitive History" ("Urgeschichte," 3 vols., 1790–93), a "Universal History" (5 vols., 1799), and a "History of Literature from its Origin to the Most Recent Times" (6 vols., 1806–12). Died June 25, 1827.

Eichhorn (Karl Friedrich), a jurist and historian, a son of the preceding, was born at Jena Nov. 20, 1781. He was professor of German law at Göttingen from 1817 to 1828. He published, besides other works, a "German Political and Legal History" (4 vols., 1808–23; 5th ed. 1843–45). Died in July, 1854.

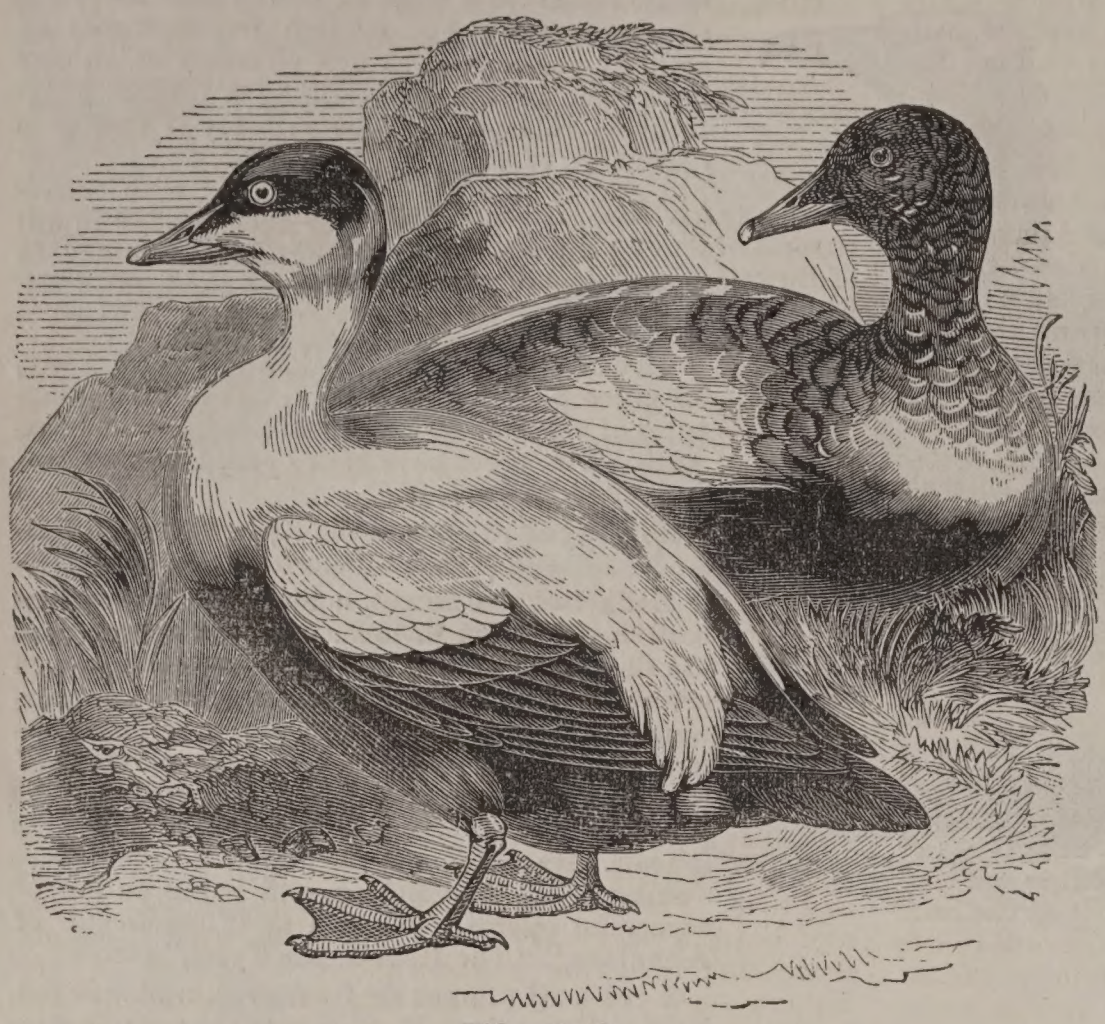
Eichstädt, īk'stĕt, or **Aichstädt** [Lat. *Aurea'tum* or *Dryop'olis*], a town of Bavaria, on the river Altmühl, about 42 miles W. S. W. of Ratisbon. It has a Gothic cathedral founded in 1259, a ducal palace once belonging to Eugene de Beauharnais, a public library, a museum, and the castle of St. Wilibald, now used as a barrack; also manufactures of hardware, cotton and woollen fabrics, stoneware, etc. A bishopric was founded here about 745 A. D. Eichstädt was given to Prince Eugene de Beauharnais in 1817. Pop. in 1871, 7011.

Eich'wald (Edward), an eminent Russian naturalist of German extraction, was born at Mitau in 1795. He visited the Caspian Sea and Persia, and became professor of mineralogy and zoology at St. Petersburg in 1838, after which he made scientific excursions to several parts of Russia and Italy. Among his works are "Travels to the Caspian Sea and the Caucasus" (1834), "Fauna Caspio-Caucasia" (1841), "The Primitive World in Russia" ("Die Urwelt Russlands," 4 vols., 1840–47), and "The Palæontology of Russia" (1851).

Eider, ī'der [Lat. *Eidera*], a river of Germany, forming the boundary between Sleswick and Holstein, rises about 10 miles S. W. of Kiel, flows nearly westward, and enters the German Ocean at Tönning. It is about 90 miles long, and is navigable from its mouth to Rendsburg. A

canal cut from Rendsburg to Kielfiord opens a communication from the Baltic to the North Sea.

Ei'der Duck [so named, it is supposed, because often



Eider Ducks.

found on the river Eider; see preceding article], (*Somateria*), a genus of sea-ducks, natives of the northern parts of Europe and America. They are somewhat larger than the common duck, and the color of the plumage in the male varies with the changing seasons. The female is of a light reddish-brown color, transversely marked with darker shades. They construct their nests of fine mosses and seaweeds, and their eggs, from five to seven in number, are about three inches long and two broad, and of a light green color. During incubation the female deposits in the nest the down which she plucks from her breast. When this is removed by the hunters she furnishes another supply, and if this is taken the male contributes down from his breast. This down is of the finest quality, and is an important article of commerce. The eggs also are highly prized as food. The king eider (*Somateria spectabilis*) is found in great numbers on the coasts of Nova Zembla, Greenland, Spitzbergen, etc., but is rarely seen in Britain.

Eight-hour Law, a measure to provide for the improvement of the condition of the laboring classes which has been agitated in the U. S. since 1866. A law of this name, adopted by Congress in 1868, and by the legislatures of New York, Pennsylvania, Illinois, Ohio, and Iowa in 1868 and 1869, provides that all government work is to be performed in eight hours' work per day; and when the government officials gave this law the interpretation that the laborers should only receive four-fifths of their former wages when they worked ten hours per day, President Grant decided that they should receive their full pay; which decision was sustained by both houses of Congress. The object of the workingmen's associations throughout the country is to reduce the length of a working day to eight hours, with the same or very nearly the same wages. This question was first agitated in England, where it was decided by parliamentary investigation that a legal restriction of laboring time was necessary for the preservation of society; because otherwise, through the weakness of the laborers in their opposition to capital, they are overworked, their health ruined, their mean length of life reduced from fifteen to twenty-five years, their moral education neglected, their capability for self-help and self-rule destroyed; whence great dangers for the state and for the community may arise. Since 1840 a number of laws have been passed reducing the length of a working day from sixteen or twenty hours, which had been not uncommon as a day's work up to that time for adult persons, and very little less for children, first to twelve, then to eleven, and at last to ten, and for children to eight hours. The reports of the government inspectors of factories, as well as those of physicians, state that these laws will produce the most beneficial effects upon both laborers and employers. How, indeed, some occupations, like that of farmers, with whom longer hours of labor are necessary at some times, will fare under the eight-hour law, only the future can determine. A. J. Schem.

Eight Mile Grove, a p.-twp. of Cass co., Neb. P. 480.

Ei'kon Basil'ike, or **I'con Basil'ice** [Gr. εἰκὼν βασιλική, "the royal likeness"], a famous book descriptive of the sufferings of King Charles I. of England, was long believed by the royalists to have been written by the king himself, but most critics now believe that it was composed by Bishop Gauden (1605–62).

Eilenburg, ī'lẹn-boorg', a town of Prussian Saxony, on an island in the river Mulde, 27 miles E. N. E. of Merseburg. It is enclosed by walls, and has an old castle and two bridges; also manufactures of calico, woollen yarn, brandy, starch, and tobacco. Pop. in 1871, 10,135.

Eim'beck, or **Einbeck,** a town of Germany, in the Prussian province of Hanover, is on the river Ilme, about 40 miles S. S. E. of the city of Hanover. It is enclosed by old ruinous walls, and is less important than it was in the fifteenth century. It has three churches; also manufactures of cotton and woollen goods and chemical products. Pop. in 1871, 6189.

Ei'meo, one of the Society Islands, in the Pacific Ocean, about 30 miles N. W. of Tahiti. Taloo Harbor is in lat. 17° 30′ S., lon. 149° 47′ W. Eimeo is 9 miles long and 5 miles wide. The surface is diversified by valleys and hills, which produce excellent timber. Here is a missionary station connected with the London Missionary Society.

Einsiedeln, īn'see-dẹln, a town of Switzerland, in the canton of Schwytz, about 24 miles S. S. E. of Zurich. Here is a famous Benedictine abbey, containing a black image of the Virgin Mary, which is visited annually by about 150,000 pilgrims. An abbey was built here in the ninth century, but the present edifice was erected about the year 1720. It contains a library of 28,000 volumes. Zwingle the Reformer was curate of Einsiedeln in 1516. Pop. in 1870, 7633.

Eisenach, ī'zẹ-nȧk, a town of Germany, in Saxe-Weimar, is finely situated amid wooded hills on the river Hörsel and on the railway from Leipsic to Cassel, about 48 miles W. of Weimar. It is well built, with wide and clean streets, is enclosed by walls, and has a handsome ducal palace, several churches, and a school of design. It is the chief town in the Thuringian Forest. Here are manufactures of cotton and woollen fabrics, carpets, soap, white lead, etc. In close proximity to this town is the castle of Wartburg, formerly a residence of the landgraves of Thuringia, and memorable as the place of refuge in which Luther remained secreted ten months (1521–22), having been carried thither for safety by his friend the elector of Saxony. Pop. in 1871, 13,967.

Ei'senberg, a town of Germany, in Saxe-Altenburg, is near the Saale, 26 miles E. of Weimar. It has a castle, an observatory, and a town-house; also manufactures of porcelain and woollen stuffs. Pop. in 1871, 5261.

Ei'senburg [Hun. *Vas*], a county of South-western Hungary, is bounded on the N. by Odenburg, on the E. by Veszprem, on the S. by Zala, and on the W. by Styria. Area, 1945 square miles. The soil is very fertile. The chief products are grain, tobacco, flax, wine, and fruit. Pop. in 1869, 331,602.

Eisenerz, ī'zẹn-ȇrts' (*i. e.* "iron ore"), also called **Innerberg,** a town of Austria, in Styria, is at the base of the Erzberg, 20 miles W. N. W. of Bruck. The Erzberg, which is 2800 feet high, is a solid mass of iron ore of rich quality. Mines have been worked here for 1000 years. Eisenerz has twelve smelting-furnaces. Pop. in 1869, 3841.

Ei'senstadt [Hung. *Kis Márton*], a royal free town of Hungary, is near the W. bank of Lake Neusiedl, 12 miles N. N. W. of Œdenburg. Here is a palace of Prince Esterhazy, having 200 chambers for guests. Connected with this palace is a zoological garden, an orangery, and a conservatory containing 70,000 exotic plants. P. in 1869, 2476.

Eis'leben, a town of Prussian Saxony, about 20 miles W. of Halle, with which it is connected by a railway. It is divided into the old and the new town, the former of which is enclosed by walls. It has an old castle and a gymnasium, also manufactures of potash and tobacco. Copper and silver are mined in the vicinity. Martin Luther was born here in 1483, and died here in 1546. Pop. in 1871, 13,434.

Eit'elberger von E'delberg (Rudolf), a German art-historian, born in 1817, became in 1852 professor of art-his-

tory at the University of Vienna, and has contributed much to the improvement of Austrian industry and art. He wrote, among other works, "Die Reform des Kunstunterrichts" (1848), "Mittelalterliche Kunstdenkmale des Oesterreichischen Kaiserstaats" (2 vols., 1858–60), and "Quellenschriften zur Geschichte der Kunst des Mittelalters und der Renaissance" (1871).

Eject'ment [Lat. *ejec'tio fir'mæ*, from *ejic'io*, *ejec'tum*, to "cast out"], in law, is a *mixed* action, as it is resorted to in order to recover the possession of land, and damages for the wrongful withholding of it, though the damages are nominal. Originally, it was a "possessory" action—that is, adapted to the recovery of the possession of land. By a series of fictions it finally came to be a convenient means of testing the title. The substance of the fiction was a supposition that a lease for a certain number of years had been made to a tenant, John Doe, who had entered into possession, and had then been ejected by a person supposed to represent the party to be ultimately made defendant. This person was termed "a casual ejector," and was usually represented as Richard Roe. An action was then brought substantially under the following title: "Doe, as tenant of Edwards (claiming the land), against Roe." A written notice was thereupon sent in the name of Roe by Edwards's attorney to the opposing claimant (Archer), who is the party in possession. By this notice Archer was advised to defend the action, otherwise Roe would allow judgment to be taken against him and the possession would be lost. Archer, on making application to be made defendant, was allowed to defend upon condition that he would admit the validity of the fictitious portion of these proceedings; so that the matter was narrowed down to a trial of the merits of the case. The action was now deemed really to be between Edwards and Archer, though Doe still remained plaintiff on the records of the court. It is a well-settled rule in this action that the plaintiff can only recover upon a *legal* title, as distinguished from a title in a court of equity. He can succeed only upon the validity of his own title, and not upon the weakness of that of his adversary. He must also have, in legal phrase, a "right of entry." Where that does not exist, another form of action must be adopted. There was one serious practical inconvenience following this method of procedure. There was no limit in law to the number of successive actions of ejectment that could be brought by a plaintiff, although he had been worsted. He had only to substitute another fictitious tenant in the place of Doe, and all the proceedings might be gone through with again. The only check upon repeated actions of this kind was a resort to a court of equity for an injunction to prevent harassing, and perhaps exhausting, litigation. The fictitious portion of the proceeding was abolished in England by the Common-Law Procedure act of 1852, and the action placed upon satisfactory grounds. The same result had been accomplished as early as 1830 in New York.

Should the plaintiff succeed in his action, he has also an independent cause of action for the loss of profits sustained by reason of the defendant's wrongful possession. This is known as an action of trespass for *mesne* (intermediate) profits. In some of the American States—*e. g.* New York—this cause of action may be united with the action of ejectment. The recovery would, by the statute of limitations, commonly be limited to the mesne profits for the last six years.

T. W. DWIGHT.

Ejutla, å-HOOT'lå, a town of Mexico, in the province of Oajaca, about 250 miles S. S. E. of the city of Mexico. Pop. about 7000.

Ekaterinburg, a town of Russia, in the government of Perm, 160 miles S. E. of Perm. It was founded in 1722, has straight broad streets, many churches, a government mint for copper coins, is the principal city of the mining district in the Ural Mountains, and is surrounded by mountains on every side. Pop. in 1867, 24,508.

Ekaterinoslav, a government of South-western Russia, is bounded on the N. by Kharkof and Poltawa, on the E. by the country of the Cossacks of the Don, on the S. by Tauria and the Sea of Azof, and on the W. by Kherson. Area, 13,758 square miles. It is traversed by the Dnieper, the Samara, and the Waltschija, and consists almost entirely of large steppes. The soil is fertile. Pop. in 1867, 1,281,482.

Ekaterinoslav, a city of Russia, capital of the above government, 115 miles S. W. of Kharkof, on the Dnieper. It has a monument of Catherine II., a large cloth factory, and many other manufactures. Pop. in 1867, 22,548.

Ek'ron, an important city of the ancient Philistines, was in Judea, about 25 miles W. by N. from Jerusalem. Its site is identified with the modern *Akir* or *Akree*.

El is the Arabic definite article, often spelled *al*, the vowel employed in Arabic being the short, obscure *a*, whose sound approaches that of our short *e*. *El* is also the masculine article in Spanish. *El* occurs frequently as an initial or as a final syllable in Hebrew proper names. It is one of the Hebrew names of God.

E'la, a post-township of Lake co., Ill. Pop. 1277.

Ela (JACOB H.) was born in Rochester, N. H., July 18, 1820. He became a printer, was an editor of Free-Soil Democratic journals, holding several important public offices. He was U. S. marshal for New Hampshire (1861–66), and member of Congress (1867–69) from New Hampshire.

Elæagna'ceæ [from *Elæag'nus*, one of the genera], a natural order of exogenous plants (trees or shrubs), natives of Europe, North America, and other parts of the northern hemisphere, being rare south of the equator. They have entire leprous or scurfy leaves, superior ovary, and apetalous flowers. Several species indigenous in Persia and Nepaul bear edible berries. This order also comprises the *Shepher'dia argen'tea* or buffalo berry, which grows near the upper Missouri River, and bears a pleasant acid fruit; this and the *Shepherdia Canadensis* and the *Elæagnus argentea* (silver berry of the North-west) are the only known North American species. The oleaster (*Elæag'nus angustifo'lia*) is a native of the Levant and Southern Europe. This tree is often planted in shrubberies for the sake of its fragrant yellow flowers and its silvery white foliage. It attains a height of nearly twenty feet.

Elæagnus. See ELÆAGNACEÆ.

Elæ'is [from the Gr. ἔλαιον, "oil"], a genus of trees of the natural order Palmaceæ. The *Elæ'is Guineen'sis*, or oil-palm, a native of Western Africa, produces the palm oil which is extensively used in the manufacture of candles and soap. This tree abounds in the tropical parts of Africa, and bears a very large quantity of fruit, from the outer fleshy rind or coating of which the oil is obtained by boiling in water. This oil is made into soap more readily than any other known oil. A still further supply of oil can be obtained from the fruit by treatment of the boiled fruit. This is called "palm-nut oil." This species and others of the genus have been naturalized to some extent in tropical America, where they are cultivated for their oil. They also yield a pleasant alcoholic drink.

Elæocarpa'ceæ [from *Elæocar'pus*, one of the genera (from the Gr. ἔλαιον, "oil," and καρπός, "fruit")], an order of exogenous plants allied to the Tiliaceæ, are mostly natives of the East Indies. Several species produce edible fruit.

Elæococ'ca [from the Gr. ἔλαιον, "oil," and κόκκος, a "berry"], a genus of plants of the natural order Euphorbiaceæ. Useful oil is obtained from the seeds of several species. A tree called *Elæococ'ca verruco'sa* is cultivated in Mauritius and Japan for its oil, which is used for burning. One or more species in China yield drying oils, used in that country for preparing varnishes and paints. These oils have acrid properties.

Elæoden'dron [from the Gr. ἔλαιον, "oil," and δένδρον, a "tree"], a genus of trees belonging to the order Celastraceæ. *Elæodendron croceum*, commonly called saffron-wood, grows near the Cape of Good Hope, where it is prized for building and cabinet-work. *Elæodendron glaucum*, found in Southern India, is called the Ceylon tea tree. Some of the species yield a fixed oil resembling oil of olives.

Elæop'ten [from the Gr. ἔλαιον, "oil," and πτηνός, "flying," hence "volatile"], the liquid portion of certain volatile oils when separated from the concrete part, which is called *stearopten*.

Elagaba'lus, or **Heliogaba'lus** [Fr. *Élagabale* or *Héliogabale*], (MARCUS AURELIUS ANTONINUS), a Roman emperor, born at Antioch in 204 A. D. His original name was VARIUS AVITUS BASSIANUS, but on being appointed a priest of the god whom the Syrians called Elagabal, he assumed that name. On the death of Caracalla, in 218 A. D., he was proclaimed emperor by the army, through the intrigues of his grandmother Julia. He was cruel, and indulged in excessive debauchery. He was assassinated by his soldiers in 222 A. D., and was succeeded by Alexander Severus. Elagabalus was one of the most infamous of all the Roman emperors.

El Ahsa. See LAHSA.

Ela'in [from the Gr. ἔλαιον, "oil"], that portion of oil or fat which remains liquid at ordinary temperatures; the oily principle of solid fats. It is generally called olein, and is not of invariable composition; but in all cases it consists of oleic acid, or of some acid homologous with the oleic, combined in various definite proportions with glycerin. Drying oils and volatile oils do not contain elain. The elain of commerce is chiefly a crude oleic acid prepared from palm oil in the British candle-factories. "Lard oil" is a similar product derived from lard in the U. S. Both are now chiefly used for oiling machinery.

E'lam, the name given in the Bible and in the cuneiform inscriptions to that part of the ancient Persian empire called Susiana and Cissia by the Greeks; for the Elymais of the Greeks appears to have been only that part of Susiana next the Persian Gulf. Shushan or Susa was its chief city. The ancient, like the modern, people were chiefly nomadic. The northern part is mountainous, the southern flat, the gulf coast marshy and unproductive.

E'land [the Dutch name for the elk, incorrectly applied

Eland.

to this animal], (*Antilope*, or *Boselaphus oreas*), a species of African antelope, the largest of the family. It is about the size of a horse, measuring five feet high at the shoulder, with two horns, nearly straight, about a foot and a half long and turned backward. In form it somewhat resembles the ox tribe, being much less slender in the body and limbs than other antelopes. It also has a large protuberance on the larynx, like that of the elk. The elands are gregarious, and are found in large herds in South Africa. A variety has been discovered by Dr. Livingstone marked with narrow white bands across the body. The flesh of the eland is highly prized. The eland has been bred in England with complete success. His flesh is considered equal to the best beef, and has considerably less bone than that of the ox. The eland is a great eater, and hence his domestication may prove unprofitable. His flesh is remarkably tender. It is asserted by the best authorities that the eland never drinks, even upon his dry native plains. He is always fat, and hence is so unable to run that he falls an easy prey to the hunter. The eland is called *impoofo* or *pohu* by the natives. There are several varieties, besides the bastard eland (*Boselaphus Canna*), which is generally regarded as a distinct species. It is somewhat smaller than the true eland, but much resembles it.

Elanet (*Elanus*), a genus of birds of the kite kind, but differing from them in having the claws, except that of the middle toe, rounded, and the tarsi partly covered with feathers. The black-shouldered hawk (*Elanus dispar*) is found in the U. S., and *Elanus melanopterus* is a native of Africa and India, and is found in Europe, and even in Australia. The elanet is a bold and active little bird, feeding mostly on insects, but often capturing snakes, and more rarely mice and birds. Several other species of the genus are described.

E'laps [Lat. *elaps;* Gr. ἔλοψ; originally the name of a harmless serpent], a genus of mostly venomous snakes, natives of tropical America, Australia, etc. Three species are found in the U. S. They are very slender in form, often brilliant in color, and feed chiefly on other reptiles. The *Elapes* of the U. S. are scarcely venomous. The best known of them is the *Elaps fulvius*, or bead snake, which is often dug up in sweet-potato fields in the Southern States. It is one of the handsomest snakes known, having bands of jet black, carmine red, and golden yellow. It has erect poison-fangs, but is never known to use them. It may be handled without fear, since it is of very gentle disposition. The Labarri snake of South America (*Elaps lemniscatus*) is a large, fierce, and mortally poisonous reptile. The same is true of *Elaps lubricus* of that continent.

El Araiseh, called **Carache,** or **Larache,** a fortified town of Morocco, in the province of Aygar, at the mouth of the Luccos, which forms an excellent but shallow harbor. It is 15 leagues S. W. of Tangier. The surroundings are covered with olive groves and rich pomegranate and orange orchards, but they are unhealthy. It has a fine old mosque and market-place. The exports of corn, cork, wool, and beans are considerable. Lat. 36° 13′ N., lon. 6° 9′ W. The name signifies "The Garden of Enjoyment." Pop. 4000.

El Arish (anc. *Rhinocolura*), a walled town of Egypt, on the confines of Palestine, near the "river of Egypt" (Wady el Arish). It is situated on an eminence half a mile from the Mediterranean, in lat. 31° 6′ N., lon. 33° 56′ E., 195 miles N. E. of Cairo, and 52 miles S. of Gaza. It has a few remains of the Roman period. Pop. in 1871, 2255.

The ancient *Rhinocolura* or *Rhinocorura* is said to have taken its name (signifying "the cutting off of the nose") from the fact that King Actisanes of Æthiopia founded it as a penal colony, and the convicts sent thither had their noses cut off. Before the rise of Alexandria it was a great emporium of the Red Sea trade.

The Wady el Arish is supposed to be the "river of Egypt" mentioned in the Bible (in Num. xxxiv. 5 and elsewhere). It drains the central part of the peninsula of Sinai, and empties into the Mediterranean at El Arish. It is a small brook, which dries up in the summer.

Elas'tic Curve, in mechanics, is defined by James Bernoulli as the figure which would be assumed by a thin horizontal elastic plate if one end were fixed and the other loaded with a weight. The equation of the curve to rectangular co-ordinates, of which the origin is at the fixed extremity and the abscissa axis horizontal, is $y = b\ (3ax^2 - x^3)$, where b is a small quantity depending on the ratio of the attached weight to the elastic force of the plate, whose length is a.

Elastic'ity [from the Gr. ἐλαστής, "that which drives or strikes," from ἐλαύνω, to "drive," to "strike," and hence to "strike back," as a spring] is that property in physics possessed by certain bodies of recovering their original form and size after the external force is withdrawn by which they have been compressed. Matter is believed to be composed of molecules or small particles, acted upon by attractive and repulsive forces; and from the combined action of these forces result the various forms and properties of matter. According to this view, molecules are not in contact, but at an infinitesimal distance from each other, which, however, may be increased or diminished. When the body is at rest the opposite forces which any of its molecules exercise on each other are in equilibrium. If the distance between the molecules be increased within the limits of the action of the forces, both forces are diminished; and if the distance is lessened, both are increased, but not in the same proportion. Solid bodies are imperfectly elastic, and do not entirely recover their form when the disturbing force is removed; but there seems to be no limit to the elasticity of gases. The phenomena of elastic bodies are—1, That a perfectly elastic body exerts the same force in restoring itself as that with which it was compressed; 2, The force of elastic bodies is exerted equally in all directions, but the effect takes place chiefly on the side where the resistance is least; 3, When a solid elastic body is made to vibrate by a sudden stroke, the vibrations are made in equal times to whatever part of the body the stroke may be communicated. No theory of elasticity founded on any assumed hypothesis as to the molecular constitution of matter has as yet been found satisfactory when applied to solids. In this case, therefore, the theory of elasticity is best investigated without resorting to any such hypotheses.

Elas'tic Tis'sue, a form of fibrous tissue sometimes called **Yellow Fibrous Tissue,** is so named from its peculiar property of allowing its fibres to be drawn out to twice their original length, and returning again to the same. It is found in the membranes which connect the cartilaginous rings of the trachea and various other structures of the animal body requiring elasticity. In the human body perhaps the most remarkable example of the elastic tissue is seen in the *ligamenta subflava*, or intervertebral ligaments. Almost all other ligaments are unyielding and inelastic, but these are extremely elastic. Their action is to help restore the spinal column to its vertical position when it has been deflected by muscular action. In some of the lower animals the *ligamentum nuchæ*, the great ligament of the nape of the neck, is highly elastic, and serves to maintain the proper equilibrium between the muscles that erect and those that depress the head, as when the animal is grazing.

El'ater [Gr. ἐλατήρ, a "driver"], a Linnæan genus of coleopterous insects, now the type of a very large and distinct family of the serricorn Coleoptera, called Elateridæ. They have a narrow, elongated body, and are distinguished by the presence of a strong spine projecting from the posterior margin of the prosternum, and a groove or socket fitted for the reception of the spine. If they fall on their back, they recover their feet by a violent muscular effort, which throws them into the air with a jerk and a clicking

sound. Hence they are called click-beetle, snap-bug, etc. This movement is the rebound caused by the sudden disengagement of the spine from its socket. The wireworms of the U. S. are larvæ of the Elateridæ, and are very destructive to growing crops. The elaters feed on flowers, leaves, and other soft parts of plants. The firefly of tropical America is the *Elater* or *Pyrophorus noctilucus*, and it has been discovered that the larvæ of at least one North American species of *Melanactes* are luminous.

Elate′rium [Gr. ἐλατήριον, a "cathartic," from ἐλαύνω, to "force"], a drug obtained from the *Ecbalium agreste*, or wild cucumber, called also squirting cucumber. It is an annual belonging to the order Cucurbitaceæ, with a trailing stem, heart-shaped leaves, lobed and toothed, yellow flowers, axillary; fruit grayish-green, about an inch and a half long, covered with soft prickles. The fruit in parting from its stalk expels the seeds, along with a mucus, through the opening in which the stalk was inserted. Elaterium is contained in the thick green mucus surrounding the seeds. It is a powerful and dangerous cathartic, and is very irritating to the eyes and skin. The active principle called elaterin is obtained from it. Elaterium is sometimes used in dropsy.

E′lath [Heb. *Eloth*, "trees;" Lat. *Æla′na* or *Ela′na*], a town several times mentioned in the Bible, was built at the foot of the valley El Ghor in Idumæa, and at the head of the Elanitic arm of the Red Sea (now known as the Gulf of Akabah), near lat. 29° 30′ N., lon. 30° E., ten miles E. of Petra. It was conquered by King David, and under Solomon became an important commercial emporium. It continued to be a seaport of importance under the Romans. It was twice taken by the Crusaders (1116 and 1182 A. D.), but after their time fell into decay. It stood on or near the spot now occupied by the fortress of Akabah, which is held by a small garrison of Egyptian troops. Extensive ruins are found there.

El′ba [Fr. *Elbe;* anc. *Il′va* and *Ætha′lia;* Gr. Αἰθαλία], an island of Italy, is in the Mediterranean Sea, between Corsica and Tuscany, from which latter it is separated by a channel about five miles wide. It is about 18 miles long, and varies in width from 2½ to 10 miles. The coasts are bold, and deeply indented by several gulfs which form good harbors. The surface is mountainous, and the highest point has an altitude of about 3500 feet. Among the productions are iron, good wine, wheat, olives, and various fruits. Pop. in 1862, 20,340. Capital, Porto-Ferraio. By the treaty of Paris this island was designated as the residence of Napoleon I., who removed to it in May, 1814, and escaped in Feb., 1815.

El′ba, a post-village, capital of Coffee co., Ala., on Pea River, about 75 miles S. by E. from Montgomery.

Elba, a township of Knox co., Ill. Pop. 1045.

Elba, a township of Gratiot co., Mich. Pop. 323.

Elba, a township of Lapeer co., Mich. Pop. 1001.

Elba, a post-township of Winona co., Minn. Pop. 681.

Elba, a township of Genesee co., N. Y. Pop. 1905.

Elba, a township of Dodge co., Wis. Pop. 1496.

El Bacharieh (anc. *Oasis Trinytheos*), one of the Libyan oases, N. of El Khargeh, about lat. 28° N. It yields fruit and alum, and is chiefly remarkable for its ancient Artesian wells. It has ruins, principally of the Roman period.

Elbe [anc. *Al′bis;* Bohemian, *La′be;* Dutch, *El′ve*], an important river of Germany, rises in the N. E. part of Bohemia, among the mountains called Riesengebirge. One of its sources is about 4500 feet above the level of the sea. It flows generally in a north-western direction, drains the northern part of Bohemia, intersects Saxony and Prussia, and enters the German Ocean near Cuxhaven. It drains an area of 59,000 square miles. Its total length is about 700 miles. This river is several miles wide at every point between its mouth and Altona, a distance of nearly seventy miles. Its principal affluents are the Havel, the Moldau, the Saale, and the Eger. The chief towns on its banks are Dresden, Magdeburg, Hamburg, and Altona. Between Dresden and Aussig it flows between high rocky banks like natural battlements, and presents very picturesque scenery. Vessels drawing fourteen feet of water can ascend at all times to Hamburg. Small steamboats navigate the Elbe between Hamburg and Magdeburg, and between Meissen and the mouth of the Moldau.

El′berfeld, an important manufacturing town of Rhenish Prussia, is on the Wipper, 16 miles E. of Dusseldorf, with which it is connected by a railway. It is irregular in plan, and is several miles long. The newer streets are well paved. Barmen, a rich and prosperous town, is contiguous to the eastern part of Elberfeld, which has a gymnasium, a museum, a public library, and a school of manufactures. Here are extensive manufactures of silk stuffs, velvets, cotton fabrics, merinoes, ribbons, and tapes. Elberfeld has about seventy dyeing establishments, ten bleaching-grounds, and several print-works. It is famous for the dyeing of Turkey red, and this dye is said to be imparted here at a cheaper rate and with more firmness of color than at any other town in Europe. Pop. in 1871, 71,394.

El′bert, a county in the E. N. E. of Georgia. Area, 420 square miles. It is bounded on the N. E. by the Savannah River, and on the S. by the Broad River. The surface is hilly; the soil is partly fertile. Corn, cotton, and wool are staple products. Capital, Elberton. Pop. 9249.

Elbert (Samuel), a Revolutionary officer, born in South Carolina in 1743. He distinguished himself as colonel in the war for independence. In 1785 he became governor of Georgia. At the time of his death he was major-general of militia. Died Nov. 2, 1788.

Elberton, a post-village, capital of Elbert co., Ga., lies near the Savannah River, 78 miles N. W. of Augusta. It has four churches, one male and one female academy, one newspaper, one hotel, one mill, and a number of stores, all of which are sustained by the cotton-trade.

J. T. McCarty, Ed. "Gazette."

Elbeuf, or **Elbœuf,** a town of France, department of Seine-Inférieure, is beautifully situated on the left bank of the Seine, 12 miles above Rouen and 75 miles N. W. of Paris. Several of the newer and finer streets converge to a spacious open area called the Champ de Foire. It has eight artesian wells and six public fountains, and is lighted with gas. Among the finest edifices are the churches of St. Étienne and St. Jean Baptiste. Steamers ply daily between this place and Paris and Havre. It has important manufactures of fine flannels, billiard-table covers, habit cloths, chequered stuffs, woollen fabrics, chemical products, machinery, etc. Pop. 21,784.

El′bing [Lat. *Elbinga*], a fortified town and river-port of Prussia, is on the navigable river Elbing, 5 miles from its entrance into the Frische Haff, and about 40 miles E. S. E. of Dantzic. It has eight or more Protestant churches, a gymnasium founded in 1536, and a large public library also manufactures of cotton and linen fabrics, sailcloth, soap, tobacco, leather, etc. Here are a number of iron-foundries, dye-works, print-works, sugar-refineries, and breweries. Nearly 500 vessels are employed in the trade of Elbing, which is connected by a railway with Berlin and other towns. Pop. in 1871, 31,162.

El′bridge, a post-township of Edgar co., Ill. Pop. 1807.

Elbridge, a township of Oceana co., Mich. Pop. 524.

Elbridge, a township and post-village of Onondaga co., N. Y. The village is nearly 2 miles from the Central R. R., and 16 miles W. of Syracuse. Chairs, buckets, etc. are made here. It is the seat of a collegiate institute with a very fine building. Pop. of village, 463. The township contains several other villages. Total pop. 3796.

Elbrooz′, Elbruz, or **Elburz,** a range of high mountains in Asia, in the northern part of Persia, forming the connecting chain between the Anti-Taurus and the Kuen-Lun. The Elboorz extends nearly parallel with the S. shore of the Caspian Sea, and forms the southern boundary of the basin of that sea. The highest point of this range is the volcanic peak of Demavend, which rises 20,000 feet or more above the level of the sea. This name is also applied to the loftiest range and summit in the Caucasus, between the Black and Caspian seas. Mount Elboorz is situated in lat. 43° 20′ N., lon. 60° E.; its altitude is 18,526 English feet.

Elces′aites, or **Elkesaites** [a name said to be derived from *Elxai*, their pretended founder, though it is believed by some that the name is derived from *Elkesi*, a village of Galilee, while others say it is from *Elxai*, a book which was their great authority in doctrine], a sect of Essenian Ebionites, or of Jewish Christians who mingled Judaism and Christianity in their doctrines, adding to them certain pagan or Gnostic views and magical practices. This sect appears to have originated in the early part of the second century, and probably lasted till the fourth century.

El′che (anc. *Il′ici* or *Il′lice*), a town of Spain, in the province of Alicante, about 6 miles from the sea and 15 miles S. W. of the city of Alicante, is enclosed by walls. It is situated on both sides of a steep ravine, which is crossed by a handsome bridge. It has an Oriental aspect, being built in the Moorish style and surrounded by large groves of date-palms. Among the remarkable edifices are an old castle, and a church which has a majestic dome and a famous organ. It has manufactures of cotton and linen stuffs,

brandy, wine, cigars, and soap. Many dates are exported hence. Pop. about 18,000.

El'chingen, a village of Bavaria, on the left bank of the Danube, 8 miles N. E. of Ulm. Here the French marshal Ney defeated the Austrians on the 13th of Oct., 1805.

El'cho (Francis **Wemyss-Charteris**), Lord, eldest son of the earl of Wemyss, was born in Edinburgh, Scotland, in 1818, and was educated at Oxford. He became a conservative member of the House of Commons in 1841, and a lord of the treasury in 1853. He took a prominent part in the formation of the national rifle association in 1860. In 1866 he opposed the Reform bill of Russell and Gladstone, and was connected with the party called "Adullamites." He represented Haddingtonshire in Parliament for twenty years or more.

El Dakkel (anc. *Oasis Minor*), the third of the five Egyptian or Libyan oases, situated in lat. 29° 10′ N. It is well watered and has warm springs. It anciently yielded much wheat, and now furnishes dates, olives, etc.

El'der [Fr. *sureau;* Ger. *Holunder*], (*Sambu'cus*), a genus of shrubby plants belonging to the order Caprifoliaceæ. The common elder (*Sambucus nigra*) is indigenous to Europe and parts of Asia and Northern Africa. It sometimes attains the size of a small tree, having pinnate leaves, terminal cymes of creamy white flowers, and small black berries, 3-seeded. The young shoots contain a great deal of pith. The common elder (*Sambucus Canadensis*) of North America grows from five to ten feet high. Another American species is the red-berried elder (*Sambucus pubens*), which is found in rocky woods and among mountains. The *Sambucus glauca* grows in the West. There is also a scarlet-fruited elder (*Sambucus racemosa*) found in some parts of Europe, which is prized as an ornamental shrub in Great Britain. The dwarf elder or danewort (*Sambucus Ebulus*) is seen occasionally in Great Britain. It was formerly believed to have sprung from the blood of Danes killed in the Anglo-Saxon wars. The flowers of the elder are used in medicine, and elder-flower water, employed in perfumery, is distilled from them. Wine is also made from the berries.

Elder [Heb. *zaken,* "an old man;" Gr. πρεσβύτερος, "senior"], a term in use among the Hebrews and other ancient nations, originally indicative of age, but acquiring in time a secondary official sense. Each Hebrew town had its senate of elders, who administered justice. (Deut. xix. 12.) Commonly, each synagogue had also its board of elders, although in smaller towns there was often but a single rabbi. The early Christian Church is believed by many to have borrowed its eldership from the Jewish synagogue. In the New Testament elder and bishop are thought by many Christians to be identical, but opinion on this point is by no means uniform. But at least as early as the second century (in the Ignatian Epistles) we find the three orders of bishops, presbyters (or elders), and deacons. Presbyterians have both "teaching" and "ruling" (or lay) elders, but whether this distinction existed in the apostolic age is still a mooted question.

El'don (John **Scott**), Earl of, lord chancellor of England, was born at Newcastle June 4, 1751. He was educated at Oxford, where he gained in 1771 a prize of £20 for an English prose essay. In 1772 he contracted a clandestine marriage with a lady named Elizabeth Surtees, and by this act forfeited a fellowship which he had obtained in the college. He studied law in the Middle Temple, was called to the bar in 1776, inherited £3000 from his father in that year, and began to practise in the northern circuit. After four years of moderate success, he gained great distinction, and rose rapidly to fame and affluence. He became in 1783 a member of Parliament, in which he supported Mr. Pitt, and showed himself an able debater. He was appointed solicitor-general in 1788, and attorney-general in 1793. During the excitement of the French revolution he prosecuted Horne Tooke and others who were accused of treason, but they were defended by Erskine and acquitted. In 1799 he became chief-justice of the court of common pleas, was created Baron Eldon, and entered the House of Peers. On the formation of a new ministry by Mr. Addington in 1801, Lord Eldon was appointed lord chancellor. He appears to have owed this promotion to the favor of the king. He continued to fill that high office under several successive administrations for a period of twenty-six years, except an interval of nearly a year in 1806–07. His reputation as a judge was very high, but as a statesman his merit was not great. He was an enemy of religious liberty, and opposed the abolition of the slave-trade and parliamentary reform. He received the title of earl in 1821, and was compelled to resign the great seal when Canning became prime minister in 1827. He died Jan. 13, 1838. His brother William was an eminent judge, and bore the title of Lord Stowell. (See Twiss, "The Public and Private Life of Lord Eldon," 3 vols., 1844; Lord Campbell, "Lives of the Lord Chancellors."

Eldo'ra, a post-village, capital of Hardin co., Ia., on the Iowa River and the Central R. R. of Iowa, about 66 miles N. N. E. of Des Moines. It has two newspaper-offices. It has a State reform school. Pop. 1268; of Eldora twp., 2070.

Eldora, a township of Surry co., N. C. Pop. 858.

El Dora'do, a Spanish term signifying "golden" region, was the name given by the Spaniards in the sixteenth century to a country supposed to be situated in South America between the rivers Amazon and Orinoco. By fabulous reports, which were generally credited, this region was represented as abounding in gold and precious stones, and surpassing Peru in riches and splendor. Expeditions were conducted by Sir Walter Raleigh and others to discover this imaginary paradise of gold-seekers, but they were not successful. The term El Dorado has passed into the language of poetry, in which it is used to express a land of boundless wealth, or a region in which riches and pleasure are as abundant as they were supposed to have been in the Elysium of the Greeks and in the primeval golden age.

El Dora'do, a county of California. Area, estimated at 1800 square miles. It is drained by the Middle and South Forks of the American River, and bounded on the N. E. by Lake Tahoe. The eastern part is occupied by the high mountains of the Sierra Nevada, and is covered with forests from which good pine and oak timber is procured. Rich gold-mines have been opened here. Cattle, wheat, barley, fruit, wine, wool, butter, etc. are produced. Capital, Placerville. Pop. 10,309.

El Dorado, a post-village, capital of Union co., Ark., about 145 miles S. by W. from Little Rock. It has two newspaper-offices. Pop. of El Dorado township, 2349.

Eldorado, a twp. of McDonough co., Ill. Pop. 1105.

El Dorado, a post-township of Saline co., Ill. Here the Cairo and Vincennes R. R. crosses the St. Louis and South-eastern R. R., 76 miles N. E. of Cairo. Pop. 1691.

Eldorado, a township of Benton co., Ia. Pop. 777.

El Dorado, the capital of Butler co., Kan., on Walnut River, has a national bank, a newspaper, an academy, two churches, a flouring-mill, three hotels, and good water-power. It is in a fine agricultural region. Pop. of township, 797.

T. B. Murdock, Ed. and Prop. "Times."

Eldorado, a twp. of Montgomery co., N. C. Pop. 887.

Eldorado, a post-twp. of Fond du Lac co., Wis. P. 1674.

El'dred, a township of Jefferson co., Pa. Pop. 832.

Eldred, a township of Lycoming co., Pa. Pop. 739.

Eldred, a township of McKean co., Pa. Pop. 897.

Eldred, a township of Monroe co., Pa. Pop. 937.

Eldred, a township of Schuylkill co., Pa. Pop. 968.

Eldred, a township of Warren co., Pa. Pop. 557.

E'lea, or **Ve'lia,** an ancient Greek city of Southern Italy, in Lucania, on the Mediterranean Sea. It was the native place of Parmenides and Zeno. (See Eleatic School.)

Eleanor (el'ẹ-nọr) [Fr. *Éléonore*] of Guienne, queen of France, and subsequently queen of England, was born about 1122. She was the daughter and heiress of the last duke of Aquitaine, and was married in 1137 to Louis VII. of France, with whom she went to the Holy Land in 1147. She was divorced from Louis in 1152, and was soon married to Henry II. of England. It appears that she instigated her sons to rebel against their father (Henry II.), who imprisoned her for fifteen years. She acted as regent while her son, Richard I., conducted a crusade to Palestine. Died in 1203.

Eleat'ic School, a system of philosophy founded by Xenophanes of Elea, who flourished about 530 B. C. While the Ionic school gave their attention to outward nature, and investigated the laws which regulate its progress, the Eleatic philosophers directed their speculations to the idea of Being in itself, which they conceived to be the only object of real knowledge. They regarded as vain and illusory the world of change and succession, which they designated τὸ γιγνομένον ("that which becomes or happens," as by accident). Time, space, and motion they considered as phantasms, caused by the deceiving senses, and incapable of scientific explanation. They distinguished between the pure reason, the correlative of being, and opinion or common understanding, which judges according to the impressions of sense. Parmenides and Zeno were the most celebrated disciples of Xenophanes; the former was the author of an epic poem on the Eleatic and Ionic systems.

Elecampane (*In'ula*), a genus of plants belonging to the order Compositæ. The common elecampane (*Inula Helenium*) is indigenous to Middle and Southern Europe, and grows in various parts of the U. S. The root somewhat resembles camphor in taste, and has sudorific and diuretic properties. It contains the principles *helenin* or elecampane camphor, and *inulin,* which resembles starch.

Elec'tion [Lat. *elec'tio*, from *elec'tum* (from *e*, "out," and *le'go*, to "gather"), to "choose," to "read"], in law. The law frequently imposes upon a party the duty to choose between two inconsistent or alternative rights or claims. This obligation may present itself in all branches of the law, and often occurs as a rule of practice. In a court of law, as distinguished from equity, there may be a case of election where a contract is to be performed in the alternative, as where an insurance company stipulates that in case of loss of a building by fire it may either pay its value or rebuild. In such a case, should the company elect to rebuild, its election would be irrevocable. It may also happen that a creditor will have a right, from the circumstances of the case, to elect one of two persons as his debtor. A case of this kind occurs in the law of agency, when an agent purchases goods on credit for an undisclosed principal; the seller, on subsequently discovering the principal, may elect to regard the sale as having been made to him or to the agent, as he may see fit. An instance of election in the case of real estate is that of dower in land which the husband exchanged for other land. The widow has her choice to take dower in either parcel, but she cannot take it in both.

In courts of equity the doctrine of election assumes great importance. The case may occur where alternative benefits may be presented to a person by a will or other legal instrument, or more generally he may be required to choose between a gift made to him and something to which he is already entitled. The duty to choose in such a case is not a positive rule of law, but a matter of equity practice, and is not imperative when this artificial doctrine is not known to be a legal rule by the party to whom the gift is made. The fact of election must be shown by some positive act; and if a party who ought to elect holds two estates under inconsistent titles, there is no evidence of an election having been made. A person under a duty to elect between the retention of his own property and the gift of another, may retain his own without forfeiting the gift, but must make due compensation. Thus, if a testator devises an owner of property land of his own, and then assumes to dispose of the property of the devisee, and the latter elects to retain his own property, he does not forfeit the devise, but is required to make compensation to the testator's estate equivalent in amount to the property retained by him. Election in procedure may take place in the choice of remedies; as where an owner has been wrongfully deprived of a chattel, he may elect to sue for its value or for the chattel itself. A court will in some cases require a party to an action to elect as between inconsistent allegations as to the cause of action.

T. W. Dwight.

Election, in politics, is the choice of public officers by those persons who possess the right of suffrage, as distinguished from "appointment," which is such choice made by superior officers. Popular elections were held in ancient times, as, for example, in the Roman *comitia* and the Athenian popular assemblies; but soon after the establishment of the Roman empire elections, outside the Christian Church, became obsolete. Elections reappear in mediæval Europe in the choice of representative burgesses, who stood for the third estate. Certain monarchs, as the German emperors and the kings of Poland, were also elected to their place, but not as popular representatives. In no other European country did the election of representatives become so important in the Middle Ages as in England; and the representative systems of other nations have been chiefly imitations of, and in some cases improvements upon, the English system. Especially is this the case in the U. S. (See Representative System.) Elections are called *direct* when officers are chosen by a direct vote of their constituency; *indirect*, when electors are chosen for the purpose of designating the persons who shall exercise official powers.

With regard to the officers voted for, political elections are distinguished into *local* or *municipal elections*, at which officers for some particular town or locality are chosen; *general* or *State elections*, at which officers for the whole of a commonwealth are elected (the most important of which are the gubernatorial and presidential elections for filling the places of governor and President); and *congressional* or *legislative elections*, at which members of Congress or legislatures are voted for. Vacancies in offices are sometimes filled, and the acceptance or rejection of particular laws is decided, by *special* or *supplementary elections*. All questions relating to political elections must be fully provided for in the election laws of the State. The great interests which are frequently at stake at elections naturally tempt bad men to *election frauds*, which have assumed in some countries, and in particular in some parts of the U. S., the most alarming dimensions. In view of them honest statesmen consider it their duty to improve, as much as possible, the existing election laws. Special attention has been given for that purpose to stringent registration laws, requiring every voter to register his name some time before the day of election, in order to enable the authorities to verify his claim to taking part in the election. *The inspectors of elections*, whether appointed or elected, are generally taken from the different political parties which engage in the contest. The excitement which often prevails at political elections is apt to lead to *election riots*. These are of frequent occurrence in England, Ireland, and Greece, and have also of late caused considerable trouble in the U. S.; they are almost unknown in France and Germany. As in most cases the instigators and leaders of election riots are acting under the influence of intoxicating liquors, many States have provided by law that on election days all liquor-stores must be closed. When the defeated party believes or claims that the declared majority owes its success to election frauds, the elections are likely to be contested. At elections to legislative assemblies these assemblies decide finally on the claims of rival candidates; in most other cases the decision rests with the courts. If a presidential election is contested in republics, there is danger of civil war, of which, in particular, the republics of South and Central America furnish many examples. Of still more frequent occurrence have been, in consequence of the weakness of the federal authority, the civil wars in the particular states constituting these federal republics in case the election for governor is contested. The U. S., which, on the whole, have been free from the sad experience of the South and Central American republics, had in 1873 a conspicuous instance of a contested gubernatorial election and its disastrous consequences in Louisiana, where for several months two rival governors claimed each to be the lawful executive of the State, and tried to enforce his claim, until on May 22, 1873, the President of the U. S. interfered by a proclamation in favor of one. (See also Nomination, Plébiscite, Representative System, Suffrage, and Vote.)

Election, in theology. See Calvinism, by Prof. A. A. Hodge, S. T. D.

Elec'tive Gov'ernments are those in which the rulers and public functionaries are chosen by popular vote or by the votes of a privileged class. The republics of ancient Athens and Rome were elective governments.

Elec'tor [Fr. *électeur;* Ger. *Kurfürst;* Lat. *elec'tor*, from *el'igo*, *elec'tum*, to "choose"], a title of those German princes who had the right or privilege of electing the emperor of Germany. There were originally (1256 A. D.) seven—namely, the electors of Cologne, Mentz, Treves, Bohemia, Brandenburg, Saxony, and the elector Palatine. The first three were archbishops of Cologne, Mentz, and Treves. The electors had several important privileges, and a very peculiar position in the empire. They usually chose the heir or near relative of the preceding emperor. As the electoral dignity of the Palatine had been transferred to the dukes of Bavaria, an eighth electorate was established by the peace of Westphalia in 1648 for the Palatine, which ceased in 1777, when the House of Bavaria became extinct. In 1692 the electorate or dignity of elector was conferred on the dukes of Brunswick-Lüneburg, who were afterwards styled electors of Hanover. The electors were entitled to all royal dignities and honors except the title of majesty. In 1803 the duke of Würtemberg, the margrave of Baden, the landgrave of Hesse-Cassel, and the archbishop of Salzburg were made electors in the place of the electorates of Cologne and Treves, which were abolished. On the dissolution of the German empire in 1806, the office became obsolete, but the title was retained by the rulers of Hesse-Cassel until 1866, when that state was united to Prussia.

Elec'toral Crown, or **Cap,** was a scarlet cap worn by the electors of the German empire. It was surmounted with a golden demicircle, which was ornamented with pearls and a golden cross at the top.

Elec'tors, in the political system of the U. S., is the title of the persons who are chosen by the people of the several States to elect the President and Vice-President. Each State chooses a number of electors equal to the whole number of members it sends to both houses of Congress. No Senator or Representative, or person holding an office of profit or trust under the U. S., can be appointed an elector. The electors must be chosen on the same day in all the States—that is, on the Tuesday next after the first Monday in November. The Constitution ordains that the electors shall meet in their respective States on the first Wednesday in December, and vote by ballot for President and Vice-President, one of whom at least shall not be an inhabitant of the same State with themselves; and they shall make distinct lists of all persons voted for as President, etc., and of the number of votes for each; which lists they shall sign and certify, and transmit sealed to the seat of government of the U. S., directed to the president of the Senate. The electors of all the States constitute the electoral college. A majority of the whole number of electoral votes is necessary to elect the President and Vice-President. In 1872 the whole num-

ber of electors was 366. They meet at the capitals of their respective States. The electoral votes are opened and counted on the second Wednesday of February by both houses of Congress, which meet in the chamber of the Representatives. In the actual mode of performing their duty the electors do not exercise any judgment or discretionary power in the choice of President and Vice-President, but cast their votes for the candidates previously nominated by their party, usually in a national convention. If no candidate has a majority of all the votes, the House of Representatives has a right to choose either of the three persons having the highest number of votes.

Elec'tra [Gr. Ἠλέκτρα], a daughter of Agamemnon, king of Mycenæ, was sister of Orestes and wife of Pylades. She was sometimes called Laodice. Her story is the subject of dramas written by Æschylus, Euripides, Sophocles, and Racine. The most perfect of the ancient tragedies of "Electra" is that of Sophocles; in this she stimulates her brother Orestes (whose life she has saved from the violence of her father's murderers) to avenge the death of that parent. This he accordingly does, with the aid of Apollo.

No less than five other persons of this name occur in the Greek mythology.

Elec'trical Fishes are remarkable as being probably the only animals having the power to give sensible shocks of electricity. Nine or more species of very diverse character are known to have this power. Three species of *Torpe'do* (of the ray family), one of which is occasionally found on our Atlantic coast, are among the best known electric fishes. The *Trichiu'rus*, a sword-fish of the Indian seas, and the *Tetra'odon*, a balloon-fish of the Comoro Islands, have not been as well studied. The *Gymno'tus elec'tricus*, a fresh-water eel of South America, sometimes twenty feet long, has the power of overcoming men, and even horses, by its tremendous shocks. Two species of *Malapteru'rus* (*Silu'rus*) of the African rivers are also electric. Faraday observes that the *Gymnotus* may produce a shock equal to that of fifteen Leyden jars, containing in all 3500 square inches, charged to the highest degree. The force is ordinary static electricity, and readily affords a spark. The *Torpedo* and *Gymnotus* have electric organs intimately connected with the nervous system, consisting of a series of highly vascular cells or hollow prisms containing a watery fluid. Other electric fishes have a less definite apparatus for this function. It is not known that this remarkable power is of any service to these fishes, except in self-protection.

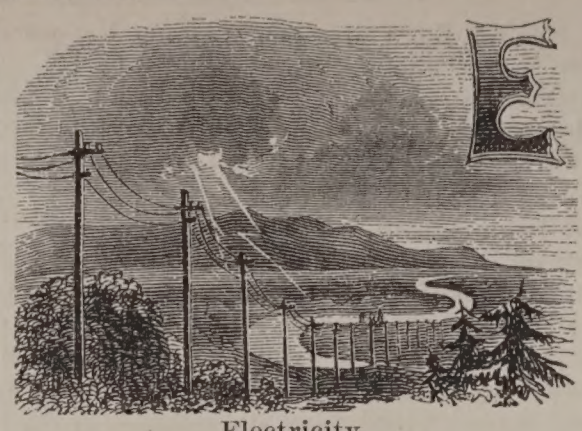
Elec'tric Clocks are of several kinds, but are nearly all constructed on one of the two following principles: (1) electricity is the motive-power which propels the machinery of the clock; or (2) power is obtained from weights or springs, and electricity is used for controlling or regulating the motion.

In some electric clocks there is an electro-magnet, which attracts a soft iron keeper whenever a current passes through it. The keeper gives motion to the clock-hands by an extremely simple arrangement of levers and wheels. The current is made and interrupted by the vibrations of a standard clock, which may serve to give time to any number of secondary electric clocks, even if they are at a great distance from each other.

Bain's clock has a soft, hollow electro-magnet for a pendulum, swinging between the like poles of two permanent magnets, the current in the pendulum being broken and reversed in every swing, so that it is forcibly repelled from each magnet.

Electric clocks are capable of running a long time without attention, but when moved by electricity alone are not very regular in their motion, owing to slight irregularities in the electric currents; but when electricity is used as a regulating power, it is capable of rendering important services in making ordinary clocks do accurate work. For example, an astronomical clock of great precision is connected in the proper manner by telegraph wires with a great number of common clocks, in such a way that signals are sent at given intervals. Now, suppose that any one of the common clocks has gained or lost a small interval of time between two signals, the electric current is found in practice to retard or accelerate the motion just enough to correct the work, and to impart to all the common clocks the precision of the astronomical clock. In these cases the common clocks are often fitted with a Bain's pendulum, but there are other successful modes of attaining the same result.

Elec'tric Col'umn, an instrument formed of numerous alternating disks of zinc-leaf, silver-leaf, and paper, was invented by De Luc. It is generally called a "dry battery" or "dry voltaic pile." The moisture of the air is an essential element in the operation of the "dry pile;" for if the apparatus be placed in an artificially dried atmosphere, it ceases to work, while in ordinary air it will act for years, with a somewhat feeble current.



Electricity.

lectriç'ity. 1. The science of electricity owes its name to an observation attributed by Diogenes Laertius to Thales, one of the Seven Wise Men, who about the year 500 B. C. flourished, like his remote successor, Franklin, as a statesman and natural philosopher. The observation in question was, that when amber had been rubbed it acquired the property of attracting light bodies, and from the Greek name of amber (ἤλεκτρον) comes our term Electricity.

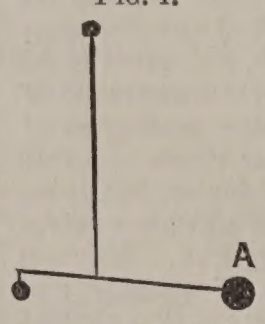
As knowledge was extended, however, it was found that many effects, such as those produced by magnets and by chemical action upon certain metals, which had at first sight no relation to this property of amber, were nevertheless due to the same force; and thus the title "electricity" in its widest sense comes to include the science relating to all those actions depending upon the force first seen in the amber, and must be divided into Statical or frictional, Dynamic or galvanic, and Magnetic electricity.

Of these we will first consider the one first named—STATICAL ELECTRICITY.

2. The observation of Thales may be well regarded as one of the fundamental facts of the science, and as extended and modified by subsequent observers may be thus described:

If a light body A, such as a pith-ball, is attached to the end of a thread of shellac, a straw, or other light rod, suspended in the manner shown in the accompanying figure (Fig. 1), it will form a very sensitive means of recognizing the existence of forces of attraction or repulsion. If, then, a piece of amber, rosin, sulphur, glass, or the like is rubbed or beaten with a woollen cloth, silk handkerchief, piece of fur, or any similar material, and brought near to the pith-ball A, it will be found that this moves towards it, giving evidence of attraction.

FIG. 1.



3. A piece of metal held in the hand and similarly treated will fail to produce any such effect, but if supported on a rod of glass, or cut off from contact with the body by any of the above-mentioned substances, it will act as well as the others; and in fact we shall find that if the proper precautions are taken, not amber alone, but all bodies, can exhibit this power of attraction after friction.

We see, however, already, that this action is due to something which is carried off and lost by metals and the human body, but retained by glass, rosin, etc. We are therefore led at once to divide substances into electric "conductors," or those which will transmit this influence from one place to another, and "non-conductors," which refuse so to do. A wider experience, however, shows us that this is only a question of degree, the best conductor offering some obstacle or "resistance" to the transfer of electric force through it, and the worst conductor allowing some to pass; and that, moreover, every degree of transmitting power can be found in some substance or other—from silver, which is the best conductor, to dry air or other gas, which is perhaps the worst.

4. Returning to our first experiment, if we allow the ball A, when attracted by the rubbed or "excited" amber or other like body, to touch it, we shall find that the conditions are now reversed, and that in place of being attracted by the "excited" substance, it is repelled. This at once seems to indicate that whatever caused the excitement of the amber and its attractive action is self-repellent in its nature, since a portion of it, communicated by contact to the pith-ball, and reacting with the remainder in the amber, has overcome the attraction before exhibited and substituted a repulsion. If, again, while the pith-ball is still in this new (or, as we call it, "charged") state, we bring near it the "rubber" (*i. e.* woollen cloth or other substance with which the excitement was produced), the ball will be very powerfully attracted. Care, of course, must be taken that the "excitement" in this as in the previous case is not lost by contact with the hand or other conductor.

This last experiment teaches us that there is something developed in the "rubber" opposite in character to that found in the amber, since where the latter repels, it attracts.

Again, if we take a rod of glass and a silk handkerchief, and rub them together, and then, while the ball is still in the condition which causes it to fly from the amber, approach it with the excited glass, we shall find that the

glass attracts it as did the woollen cloth, while at the same time the silk handkerchief repels it as did the amber.

We thus learn that the cause of the opposite excitements first noticed in the amber and cloth did not lie in the fact of one being the rubber and the other being rubbed, but in the nature of the substances themselves.

5. Similar experiments repeated with a great number of bodies will show us that this ability to secure one or other of these sorts of excitement is not of essence, but of degree; so that if all bodies were arranged in a list according to this ability, any one when rubbed with a substance above it would acquire one kind, and with one below it the other kind of excitement.

These kinds of excitement are for distinction called positive and negative, the kind produced in glass when it is rubbed with silk being positive, and that developed in amber when rubbed with wool, negative. These contrary terms are only employed to distinguish, and not to describe, the states, the negative being just as active, powerful, and efficacious for practical purposes as the positive.

A few familiar bodies are arranged in accordance with this view in the following table:

Most Positive.—	Wood,
Catskin,	Sealing-wax,
Diamond,	Rosin,
Flannel,	Amber,
Ivory,	Sulphur,
Rock-crystal,	India-rubber,
Wool,	Gutta-percha,
Glass,	Prepared paper (*i. e.* parchment paper),
Cotton,	Collodion,
Linen cloth,	Gun-cotton.—*Most Negative.*
White silk,	
The dry hand,	

(*De la Rive, "Traité d'Électricité,"* tome ii., p. 549.)

6. To take an example from the foregoing table: Suppose a fragment of rock-crystal to be rubbed against some ivory; the crystal would acquire negative excitement, but if it were rubbed with wool it would be positive. Of course the most powerful effect would be obtained by selecting the substances at the extremities of the table, but the question of convenience from a mechanical point of view will here have great weight.

Another table frequently quoted gives the following order of many substances not included in the foregoing:

Positive.—Fur,	Paper,
Smooth glass,	Silk,
Woollen cloth,	Lac,
Feathers,	Rough glass,
Wood,	Sulphur.—*Negative.*

The difference between the positions of smooth and rough glass will indicate the cause of the great deterioration which the plate of an electrical machine suffers when it gets scratched to any considerable extent. Of course, all substances in nature might be arranged in such a table, but these brief lists will answer as a scaffolding into which we may fit such other members as we may from time to time wish to locate.

7. With the few simple facts which have been so far stated we can now proceed to an intelligible explanation of the electrical theories generally in use; which, however, are regarded rather as convenient means of associating and remembering the facts of the subject than as philosophical explanation of their ultimate cause.

The theory which owes its origin to Franklin, and is also called the single-fluid theory; assumes that all matter in its normal condition contains an imponderable fluid which attracts matter generally, but is self-repellent. Friction of dissimilar substances causes this substance to accumulate in one at the expense of another. Thus, the surcharged body attracts unexcited bodies generally, and repels others like itself, while the bodies more or less emptied of electricity are likewise attracted by unexcited matter, by reason of the reduction of repellent force between their fluid and that of the normal substances. The repulsion of negatively excited substances is due likewise to the superior attraction of surrounding matter generally, aided by certain actions called induction, to be presently explained. Conduction would on this theory be simply the flow of this fluid, and its tendency to pass from a positive to a negatively excited substance resemble the rush of air from a compressed reservoir into a vacuum.

8. The theory of double fluid, due to Dufay, assumes the existence of two fluids, alike in certain properties, but opposite in what we regard as their electric actions. These, in a proportionate mixture, exist in all substances without affording any indication of their presence. Friction of unlike materials separates them, and each being self-repellent, but attractive of the other, all the phenomena of attraction and repulsion already mentioned are equally well accounted for on this hypothesis.

9. Other theories, such as a dynamical theory, which represents the positive and negative states as vibrations of an opposite character, have also been proposed, but these, while deficient in that fulness and precision which can entitle them to confidence, are far less effective than the old ones as mnemonic aids, and have therefore, we think, deservedly failed to replace the former in the language of science or in works of reference and general treatises on this subject.

As regards the former (or fluid) theories, no facts now known to science are fatal to either of them; and though the general tendency of discovery in cognate subjects leads us to feel that the true theory is something else than either of these, we do not believe that this "true" theory has been as yet developed.

Minutely to discuss the merits of the two theories would be here out of place; suffice it to say that either will serve, and that the experiments regarded at one time as fatal to the first have been proved not to be so, and that it is rather gaining than losing ground at the present day.

As, however, the double-fluid theory furnishes us with the simplest and most direct expression for the co-ordination of facts, and is to be more generally encountered in works of reference, we shall adopt it in the present exposition as a matter of convenience.

The Double-fluid Theory.—10. According, then, to this view, a non-excited body contains equal or equivalent quantities of the two opposite fluids, which we may well designate by the signs + and —. When two such bodies are excited by friction, some of the positive fluid goes out of one into the other, being replaced at the instant by an equal amount of negative fluid leaving the second. Excitement therefore does not imply a change in the total amount of the fluids in a body, but only in the proportion of the mixture, the interchange being invariably reciprocal, as above stated. Thus, A being a normal or unexcited

A.	B.	C.
− + − + − + −	+ + − + − + +	− − − + − − −
+ − + − + − +	+ + + − + + +	− − + − + − −
− + − + − + −	+ + − + − + +	− − − + − − −
10 +	16 +	4 +
11 −	5 −	17 −

body, with about equal numbers of positive and negative units, B would be the same, positively charged, in which 6 positive units had been substituted for 6 of the negative ones; while C would represent the same in an equal negative state, having 6 negative units more than A. To introduce a single positive or negative unit without abstracting a corresponding one of the opposite kind in each case, is to be regarded as, in the nature of things, impossible. Every transfer is an interchange.

11. Remembering the self-repellent character of each fluid, it will be easily understood that in charged bodies the particles of the fluid in excess, flying as far as possible from each other, will accumulate on the surface, and especially on points and edges.

If B and C were brought into contact, the excess of positive fluid in B would go to C, receiving in exchange the excess of negative from this last; and so both would be left in the condition of A.

The amounts of the fluids which we can displace in bodies it must, however, be remembered, are very small as compared with the total quantities which they contain.

12. Some bodies allow the electric fluids to pass freely from particle to particle, while others resist their transfer, and allow them to move from one to another only when a certain change or "polarization" (to be more fully considered under "Induction") has reached a high degree of intensity.

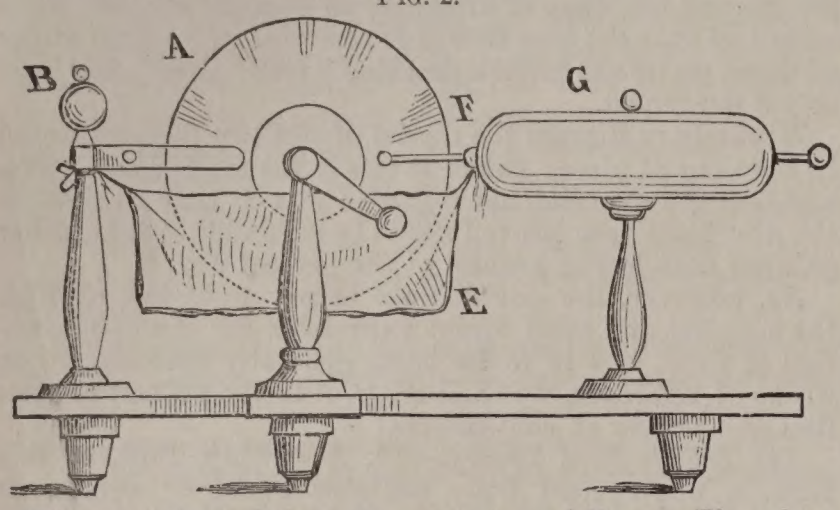
Bodies of the first class are called conductors, and of the latter, non-conductors or insulators. This, however, is a distinction of degree, since no known body is either a "perfect" conductor or insulator, while every degree of perfection in one property or the other may be found among existing substances.

13. When the electric fluids, by reason of excessive accumulation of single kinds at certain points, acquire power enough to force their way through a resisting material, their passage through is always accompanied by an evolution of light and heat. This is not the result of the mingling of the opposite fluids, but of the resistance offered to their mutual approach.

Sources of Electricity.—14. Friction, as we have already seen, is the most evident source of electric action; and in order that it should be developed by this means with the greatest facility certain *electrical machines* have been from time to time devised. We will select typical forms of the most important classes.

The Plate Electrical Machine.—This consists, in the first place, of a glass disk A mounted on an axle and turned by a handle. Against this is caused to press a "rubber" (below and to the right of B), which is made of two brass plates covered on their faces with leather sprinkled with "mosaic gold" (bisulphide of tin), and held against the opposite sides of the plate by a stiff brass spring sustained by the column under B. At F are two brass rods, armed on their inner sides with points, which are turned towards the surfaces of the plate rotating between them. These are supported from the end of a metal cylinder G, resting on a glass column, and called the prime conductor.

FIG. 2.

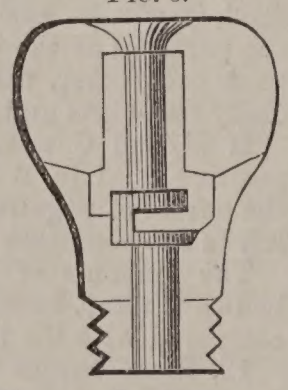


The operation of the apparatus is as follows: The glass plate, by friction, takes positive fluid from the rubbers, giving them negative in exchange, and passes in the direction BEF inside of a silk bag or apron. When the plate comes between the points attached to F, it gives to them positive fluid, receiving negative at the same time until it has been restored nearly to a normal state. The positive fluid thus brought to F passes into G, and is diffused generally over it. If B were allowed to remain insulated, of course the amount of positive electricity which it could give up would be soon exhausted; we therefore connect it by a chain or wire with the ground, which is best done by passing the chain over a gas or water pipe. If we desire to collect negative electricity, we connect the "prime conductor" G with the ground, in place of B, and then get our supply of negative fluid from B.

A cylinder of glass is sometimes used in place of the disk, but the principle and mode of action are identical in the two cases.

The Hydro-Electrical Machine.—15. An accidental observation with a leaking boiler, followed up by Armstrong, led to the construction of this curious machine. (*Phil. Mag.*, 1840, vol. xvii., pp. 370–452, etc.) It was afterwards thoroughly investigated by Faraday (*Phil. Trans.*, 1843, p. 17), who showed the true source of the very powerful effects which it develops. It consists essentially of a steam-boiler placed on insulated supports, and provided with a series of outlets or jets, by which wet steam (*i. e.* steam carrying particles of water) may be made to escape with much friction. Fig. 3 shows the structure of the individual jets. The particles of water carried by the steam play the part of the glass plate in the ordinary machine, while the metal surfaces of the jets act as the rubber. The jets and boiler thus become negatively charged, while the water-spray is positive, and will communicate that electricity to a set of points presented to it.

FIG. 3.



16. The electrophorus and its development, the Holtz machine, will be explained under "Induction," as this action is essentially involved in their operation; and the induction coil will be fully described after the points in galvanism and electro-magnetism necessary for its explanation have been handled.

17. Not only does actual friction tend to develop electricity, but anything resembling friction, such as the splitting or fracturing of crystals, or the act of solidifying in certain instances. So likewise does a change of temperature in some crystals, such as the tourmaline. Chemical action, as we shall presently see in connection with galvanism or dynamic electricity, is another fertile source.

18. All are familiar with the existence of electrical disturbances in the atmosphere, but their cause is rather a subject of conjecture than knowledge. (*De la Rive, "Électricité,"* Walker's translation, vol. iii., p. 116.)

By attaching to an arrow a fine wire whose farther end terminated in an instrument for measuring electricity, Becquerel showed that positive tension was manifested when the arrow was shot up, but none appeared when it was shot in a horizontal direction.

The connection which, in the opinion of many, has been shown between the auroral displays and solar disturbances gives a cosmical interest to this special portion of our atmospheric excitement.

Animal electricity is noticed under "Galvanism," farther on.

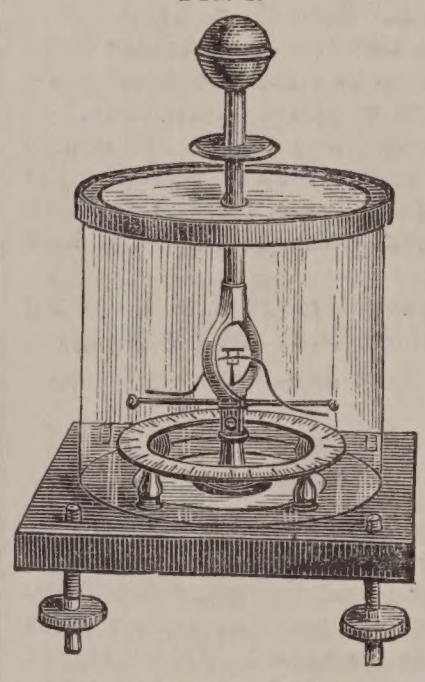
APPARATUS FOR THE RECOGNITION AND MEASUREMENT OF ELECTRICITY.—19. The gold-leaf electroscope is one of the simplest of these, and consists of two strips of gold-leaf hung side by side from an insulated metallic support within a cylinder of glass, on whose inner surface are attached strips of tin-foil. When an excited body is brought in contact with the metallic support, the fluid, entering both strips of gold-leaf alike, causes them to recede from each other; and lest they should be in danger of touching and clinging to the glass, the strips of tin-foil are placed there to discharge them and make them fall back.

20. In the modification known as Bohnenberger's electroscope a single strip hangs between two plates which form the terminals of a "dry pile" (see farther on, under "Galvanic Batteries"), and are therefore feebly and constantly charged in opposite senses. If, then, the leaf receives any charge, it will strongly incline towards the plate of the opposite kind.

21. The electrometer of Coulomb consists of a light rod carrying pith-balls at each end, or one ball with a counterweight suspended by a silk thread within a glass case. A rod with brass balls at each end enters through the side of the case. This being charged, attracts one of the pith-balls, or after contact repels it, the force being measured by the amount of twist necessary to give the thread in order to keep the ball at a certain distance. This instrument was much improved by Snow Harris.

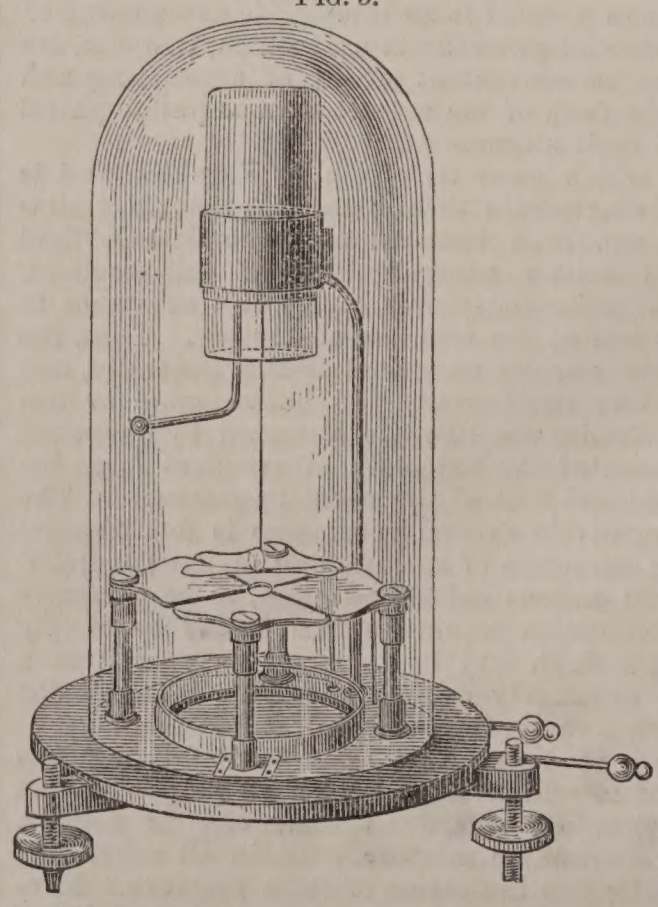
22. Peltier's electrometer, shown in the figure, consists of a convenient support, etc. carrying a light bent rod of aluminum turning on a pivot, and having a small compass-needle attached to it. The needle gives it a delicate directive force, and a charge communicated to the central part, which is insulated, will cause the aluminum rod to be repelled from the heavier brass one. The amount of displacement is read directly on the graduated circle.

FIG. 4.



23. Thomson's quadrant electrometer consists of four metallic segments supported in the same plane, but not in contact. They are connected alternately with the two projecting rods and balls at the right. Over these hangs a piece of aluminum by a fine wire from the inside of a Leyden jar feebly charged. If, now, one pair of sectors are charged, while the others are connected with the earth, the strip will move towards them if the charge is opposite to that of the jar; or away from them and over the others if the charge is the same in kind as that of the jar. To give directive force a small magnet is attached with the aluminum strip, and for measurement a minute mirror (*a*) is also fastened above it, and a ray of light reflected by this upon a scale. A much more delicate and elaborate instrument is described by Sir W. Thomson in the "British Association Reports" for 1867, part i., p. 489.

FIG. 5.



INDUCTION.—24. Next in importance to the simple yet fundamental facts of attraction and repulsion between electrically excited bodies, or, in the words of theory, between bodies containing excess of the positive or negative fluids, we come to the action of induction.

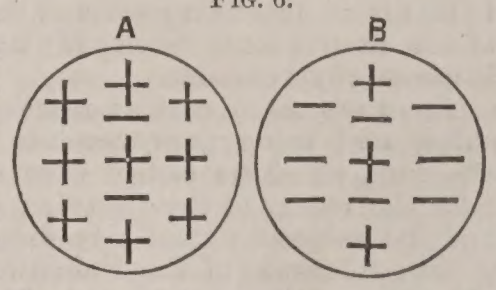
Induction is the general term used to designate the mutual or reciprocal action of the electric fluids in adjacent but electrically separated bodies, and is sometimes described as "action at a distance" or "excitement by influence." All the effects produced by this means are called inductive. This force is not like that of gravity, unaffected by the interposed material, but acts with different amounts of energy through different substances. This difference in the power of transmitting this influence is designated as specific inductive capacity; and by Faraday and Harris the following values have been assigned to different substances:

Air	1.00	Wax	1.86
Spermaceti	1.45	Glass	1.90
Resin	1.76	Shellac	2.00
Pitch	1.80	Sulphur	2.24

The higher the inductive capacity of a substance, the greater will be the action which it transmits.

25. Passing now to a study of the action of induction, we will at once take an illustration, as an example will be worth more than any amount of general definition in such a case. Let A and B be metal spheres suspended by silk threads or sustained by any other non-conducting supports, and let A be positively charged (*i. e.* have some of its normal negative electricity replaced by positive). Let B, however, be in its normal state, or charged with equal quantities of both fluids. We know that the positive fluid in A will strongly attract the negative in B, and as strongly repel its positive; hence, we may well figure B as having all its negative on its left, and all its positive on its right side. This representation must not carry us too far, however, and make us think that these exact locations have any special meaning; rather we should regard the positive fluid as put in the condition of trying to escape, and the negative as so contracted or drawn together as to allow room for more. The mode of representation used is, however, convenient for expression.

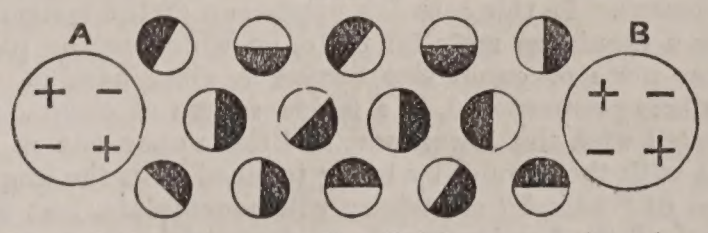
FIG. 6.



Let us now suppose that for a moment B is put in connection with the earth, a practically infinite reservoir of both electricities. Evidently, the repelled positive fluid will escape, and its place will be supplied by negative, and the body B will be now negatively charged. But will its condition be exactly that of a single body with a negative charge? The negative fluid added to B was brought there solely by the mastering attraction in A, and if it had had any power of repulsion under that influence, it could not have been forced against its nature to enter with the negative fluid already in B. It is simply because it has been seized, captured, and bound by the positive A that it is now in B, and therefore cannot, while under this influence, exert its natural powers like a free agent. If, however, A is removed, then B will become in all respects a body negatively charged, and capable of giving out its excess of negative fluid, and influencing other bodies in its turn. The negative fluid in it, however, while A is present, is very appropriately called "bound electricity."

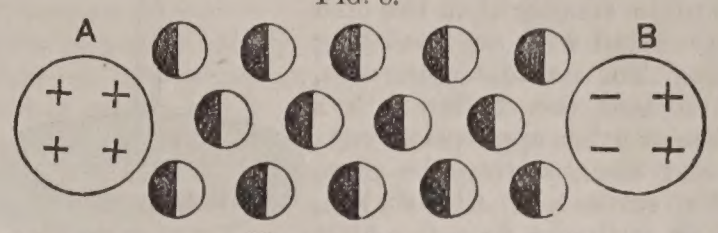
26. The subject of induction owes its thorough exposition to Faraday, according to whose view it is an action propagated or conveyed through the substance separating the bodies under consideration by successive polarization or forcible rearrangement of its particles. Thus, in the case just given the attractive and repellent influence of the fluid in A is transmitted to B by a successive change in the particles of the intervening air. This change might be considered as identical in character with that already described in B before it was connected with the ground, though it is usual to associate it with a change of position or polarization in the material particles. Thus, if the little circles in Figs. 7 and 8 represent the atoms of air, and

FIG. 7.



their black halves the negative fluid, we may imagine them when between two normal bodies, as in Fig. 7, to have these negative sides turned in all directions. If, however, as in Fig. 8, A is positively charged, then in the adjacent particles the negative sides or negative fluids will be turned towards A by reason of their attraction for the positive fluid in it, and, as a consequence, their positive sides will

FIG. 8.



face the other way. The positive fluid in these will then exert a similar influence upon the next row of particles, and so on. This change, it should be remembered, may be regarded either as a rotation of the particles, with fixed positions for their fluids, which is the stricter idea of polarity, or as a shifting of the fluids in the particles, exactly as in the case of B in Fig. 6.

27. When this action has reached a certain intensity, a transfer of the fluids occurs bodily from one particle to another, and this is conduction; the difference between good and bad conductors consisting simply in this, that in the former but little inductive excitement is needed to bring about the transfer, while in the latter this must reach a high degree of intensity, and a large amount of the opposite fluids must be brought to the adjacent surfaces of the particles before this transfer or discharge can take place.

28. Induction plays an important part in almost every action connected with electricity, and, simple as it is in principle, develops some complex results. We will briefly consider a few of the more important cases, beginning with the simplest.

Induction concerned in Simple Illustrations of Attraction and Repulsion.—When an excited body is brought near to a neutral one, the unlike fluid of the latter is drawn near, and its like fluid repelled, and even expelled if any outlet is available; and thus the effectiveness of the attractive force is increased. Moreover, the "induced" excitement of the second body will react upon the "mixed" fluids which still exist, as we have before mentioned, in even the most powerfully charged object, and by separating them in the same manner as its own were before separated will yet further intensify the action.

29. It is in consequence of this reaction or reinforcement of action that the attractive forces in excited bodies do not always vary, like those of gravitation, light, heat, etc., inversely as the squares of the distances, but according to laws which depend upon the conditions by which this reinforcement or the reverse action is controlled. Thus, as has been shown by Snow Harris, if a small surface which is maintained at a constant degree of charge is caused to act with another which is insulated, so that its repelled electricity cannot escape, the force of attraction will vary inversely as the square roots of the distances. (*Phil. Trans.*, 1834, part ii., p. 213.) If, however, the charge of the first surface could be kept constant, while the other was allowed to give up its repelled fluid and take the opposite, but not to cause a rise of charge by reaction in the first, the attraction would vary inversely with the squares of the distances. Again, if the reaction, as well as action, were allowed full play, the force would vary inversely with the cube of the distance. These last points have been developed, and Harris's results in the same connection corrected, by Sir William Thomson. (See "Phil. Mag.," 1854, vol. viii., p. 42.)

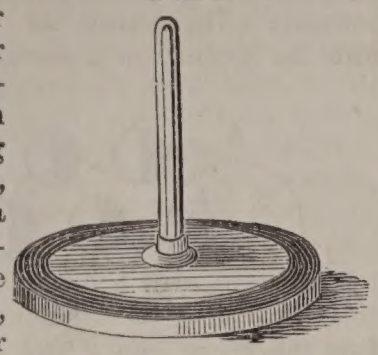
The same laws hold good with reference to repulsion, although much greater difficulties are experienced in making the measurements. If an excited ball were placed in the centre of a hollow sphere, its inductive force would be equally distributed on all sides, and would decrease outward as the square of the distance increased; but if the ball be made to approach one side of the globe, almost the entire inductive force will be concentrated on that point, to the neglect of the other and more distant parts.

As we have already noticed, a large part of the apparent repulsion exhibited by excited bodies is due to the attraction of surrounding objects excited by induction. This is well shown by the following familiar experiment: To an ordinary electrical machine is attached a doll's head covered with long hair; on working the machine the individual hairs stand out in every direction by their mutual repulsion. If now the hand or any other conductor connected with the ground is brought near, all the hairs in its vicinity turn towards it, and even crowd upon each other to approach it. The same actions of induction, and consequent exhibitions of attraction and repulsion, are illustrated in the numerous electrical toys with which most collections of apparatus are profusely furnished, such as the chime of bells, the sportsman and birds, dancing figures, dancing pith-balls, etc.

The Electrophorus.—30. One of the most important in-

struments in which induction is largely involved is the electrophorus. This consists of a metal dish filled with rosin or shellac, or similar non-conductor easily excited, and also of a metallic plate smaller than the dish and provided with an insulating handle. To use this apparatus, we first beat the shellac with a cat skin or other appropriate rubber, and then, setting the plate on the surface of the shellac, touch it with the finger. After this, if the plate is lifted up by its insulated handle, it will be found to have acquired a positive charge.

FIG. 9.



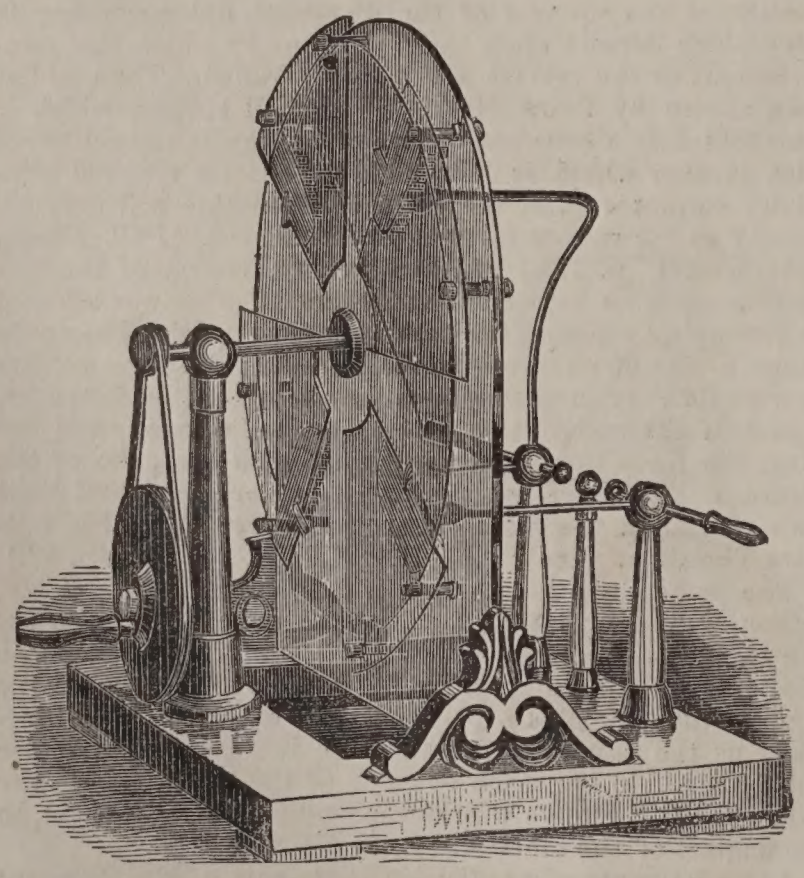
31. The theory of its operation is as follows: The friction with the fur excites in the shellac negative electricity. When the metal plate rests upon it the repulsion existing between the negative electricities causes that of the brass plate to be repelled, and to escape in part when the plate is touched with the finger, its place being supplied by an equal amount of positive entering from the hand at the same time. This, however, as long as the plate is near the shellac, is "bound," exactly as was the case in the first instance of induction, which we illustrated with the bodies A and B in Fig. 6. But when we raise the plate by its handle, the restraining force is escaped as the plate recedes from the shellac, and the lately "bound" fluid exhibits its properties as free positive electricity.

As often as we please we can discharge the movable plate, and by merely placing it on the shellac and touching it can restore its charge; for, taking nothing from the shellac, it in no way exhausts its charge. The plate is of course attracted by the shellac, and the force expended in pulling it away is the full mechanical equivalent of the electric action developed.

32. A pretty application of the electrophorus is found in the many effective and artistic contrivances for lighting gas by its means which have been devised by Mr. Robert E. Cornelius of Philadelphia; and a development of the same principle, which is one of the most striking discoveries in connection with this subject, is exhibited in the Holtz machine, which may be well defined as a *continuous electrophorus*.

A convenient form of this machine is that shown in the figure, which represents a modification devised and con-

FIG. 10.



structed by Mr. E. S. Ritchie of Boston. In this a large vertical plate of glass serves as the support for the various parts of the machine. From its edges are sustained four glass sectors, and between these and the plate is a glass disk capable of rapid rotation, and driven by the pulley seen at the left. Between this disk and the large plate, moreover, are four combs, corresponding to the sectors, and connected with the discharging posts by wires piercing the plate. On one edge of each sector is a narrow strip of varnished paper with a projecting point.

33. The action of the machine is briefly as follows: We set the disk in rotation, and at the same time hold an excited body, such as the plate of an electrophorus, a piece of charged vulcanite, or the like, against one of the paper slips. This gives the paper a charge—let us say, of positive electricity; this, acting upon the disk, repels the positive electricity from the corresponding part of its farther surface into the metallic combs which are there located. If the disk stood still, this would happen, once for all, at a single point; but as the disk rotates, every point is in succession brought under the same influence. The portions of the plate passing away from this place as it rotates are therefore negatively charged, having lost some of their positive, and therefore having acquired a corresponding amount of negative fluid. As soon, however, as they pass the farther edge of the first sector, or that one on whose edge was the paper we began with, they experience the following action with the point attached to the paper of the next sector: Being negatively charged, they tend to repel negative electricity, and thus this negative charge, being on the farther side of the disk, repels some negative from the nearer side, and drives it into the paper strip, so making it negative. Thus, while the first paper was positive, the second will be negative; hence it will tend to drive out of the rotating disk into the second comb exactly that negative fluid which had been drawn from the first comb; and so, the first comb being made positive, this will be negative.

Exactly the same action will be observed in the case of the other sectors, which will be successively positive and negative, and each will feed the paper strip of its successor, so that the action being once started will continue indefinitely without further assistance. Here, however, as in the case of the electrophorus, the reacting bodies attract, and the force required to maintain the motion in opposition to this is an exact expression of the mechanical equivalent of the electric force developed; not all of which, however, is necessarily available.

There are many curious reactions involved in this machine, and many improvements or modifications in its structure, which we cannot even enumerate here, but will refer the reader to the following papers, in which he will find the subjects extensively discussed: "Cosmos," 1865, p. 689; "Journal of the Franklin Institute," vol. lii., pp. 281–420; vol. liii., pp. 36, 119, 121, 253, 255, 344; vol. lvii., p. 335; vol. lviii., p. 32; vol. lx., pp. 58, 117. Also to Poggendorff's "Annalen," vol. cxxv., p. 469; vol. cxxvi., p. 157; vol. cxxvii., pp. 177 and 320; vol. cxxx., pp. 287 and 518; vol. cxxxi., pp. 215 and 495; vol. cxxxv., p. 120; vol. cxl., pp. 168, 276, and 560; vol. cxliii., p. 285; vol. cxlv., pp. 1 and 333; vol. cxlvi., p. 288. Also Ganot, "Traité de Physique," edition of 1870.

34. The next application of induction is found in the Leyden jar. This consists of a glass jar coated inside and out to within a few inches of its edge with tin-foil, and having a wooden cover, through which passes a metallic rod terminating above in a knob or ball, and below being in connection with the inner lining of tin-foil. Suppose this jar to stand on a table and within a short distance of an electric machine, so that a spark might go to its knob. If a spark of positive electricity enter, it will diffuse itself over the inner surface of the glass by aid of the conducting power of the tin-foil, and by induction it will draw into the outer coating and surface of the glass a nearly equal quantity of negative fluid. The mutual attraction of these, acting through the glass, will cause each to bind the other to a great extent, and thus the original positive charge, in place of having a tendency to escape to surrounding objects, is largely confined by this attractive action to the inner surface of the glass.

FIG. 11.

In acting through the glass a certain resistance is encountered, and thus the charge drawn to the outside must be always less than that drawing it; and again, this exterior charge will lose some of its power in transmission. If, for example, this difference amounts in all to one-tenth, then evidently nine-tenths of the interior charge will be bound, and only one-tenth will be free. The tendency to escape and resistance to the entrance of additional fluid depends only on the free electricity; therefore in such a case ten times as much electricity can be stored in a given space as if no such action were made available.

The form of a jar is of course in no way essential for the principle here stated, and in fact plates of non-conductors coated with tin-foil are largely used when we want to store electricity in a small space for any purpose.

35. The same principle of induction is similarly involved in the case of that attachment to an electroscope known as a condenser. In this case the upper cap of the instrument carries a varnished metallic plate, on which can be placed another plate of equal size having a glass handle. The plates being superposed, if a feeble source of electricity is connected with the lower one, and the upper one is connected with the ground by being touched with the finger, a charge of "bound" electricity will accumulate, just as in the case of the Leyden jar above described. On removing the upper plate this charge will be set free, and will produce its effect upon the indicating parts of the instrument.

Sir William Thomson has devised a number of beautiful applications of induction as a means of developing electrical charge, such as a series of drops of water falling within a cylinder, a flame similarly placed, copper filings running from one vessel to another, and various more complex instruments. (See "Proc. Roy. Soc.," June 20, 1867; "Phil. Mag.," Jan., 1868.)

TRANSFER OF ELECTRICITY.—36. There are three methods by which electricity may pass from place to place—namely, Conduction, Convection, and Discharge.

Conduction has already been discussed to some extent (see §§ 3 and 27); and in addition we may say that it might be defined as the passage of electricity between particles sensibly in contact.

When the conducting substance is of such a nature and amount as to carry the electric force without much resistance, no visible effect is produced; but if this is not the case, striking phenomena of heat and light may be exhibited. Thus, if the united charge of several Leyden jars is caused to traverse a strip of gold-leaf enclosed between slips of glass, the gold will be fused into the glass, causing a purple stain, and a flash of light will at the same moment be seen. Fine wires similarly treated may be fused, and the effects of lightning on bell-wires and other small conductors illustrate the same thing.

Different substances possess this property of conduction in the most various degree, but this action will be more fully discussed under "Galvanism," or dynamical electricity, where the means for its accurate measurement will be described.

37. The velocity with which an intense charge of electricity travels in a good conductor under certain conditions was shown by Wheatstone (*Phil. Trans.*, 1834, p. 589) to be 288,000 miles in a second. His method, which was a very beautiful one and most fruitful in applications, consisted in viewing in a rapidly rotating mirror the images of three sparks taken at the ends and in the centre of a long line. The displacement of any image as compared with the others gave a means of finding the time of its occurrence when the velocity of the mirror was known. It was shown by Faraday that the velocity of conduction varied with the intensity of the charge and with the nature of the conductor.

38. *Convection* is the transfer of electricity from one body to another by moving particles of an interposed fluid. Thus, if a charged conductor stands exposed in the air, particles of that fluid touch it, are charged, are repelled, and travel off to distant objects, to which they give up their charge, and then are ready to return for more. This action can be well illustrated by holding a candle near a point projecting from an electrical machine. The flame will be almost blown out by the current of charged particles flying away.

39. *Discharge*, which may be of various kinds, consists in general of the simultaneous transfer of the electricity developed by induction along a line of resisting particles between two conductors, and is always accompanied by some development of light and heat. The passage of the fluids may be variously resisted, and thus the character of the discharge be modified to any extent; but we may conveniently divide discharges into two kinds—the flash, spark, or disruptive discharge, and the flame, or diffused discharge.

40. *The spark discharge* is illustrated in its simpler form by the flash which passes from the prime conductor of an electrical machine to the hand or any other conductor brought suddenly near to it. It then appears, through persistence of vision, as a blue, irregular line. When a greater amount of electricity is accumulated, as in the Leyden jar, the spark or flash looks whiter. By modifications of Wheatstone's revolving mirror and other methods its character, duration, and composition have been studied by Feddersen (*Pogg. Ann.*, vol. ciii., p. 69) and Prof. O. N. Rood. The last-named physicist, who has carried out his researches in a most complete manner, has proved that the discharge of a jar charged by an induction coil consists of a series of acts whose total duration varies with the area of coated surface, the distance of the electrodes, etc., but that the first and brightest portion does not last, with a jar having a surface of 114.4 square inches, more than the 175-billionth of a second. Prof. Rood has also proved that with a jar having a surface of 11 square inches, the duration was only 40-billionths of a second. The successive discharges or other steps involved in this act have been made the subject of extended investigations by Prof. Rood, published with the above in the "Amer. Jour. of Science" for 1872, vol. iv., pp. 249 and 371; 1869, vol. xlviii., p. 153; also 1871, vol. ii., p. 160, and 1872, vol. iv., p. 249.

41. The spark is in all cases found to carry away with it minute particles of the bodies between which it leaps, which are intensely heated by the action; and it has thus become a very useful means for the spectroscopic study of certain substances. (See Huggins, "Phil. Trans.," 1864, part ii., p. 139.) By taking the spark between a platinum wire and the surface of a solution, metallic elements present in the solution may in many cases be recognized by the aid of the spectroscope.

With powerful sources of electricity, such as the Holtz machine or the induction coil, which will be subsequently described, many beautiful illustrations of spark discharge may be exhibited. Thus, if the terminals of a large coil are brought near the extremities of a long sheet of metallic paper, such as is often used for enveloping tea and coffee, and whose surface has been broken by rumpling, at each discharge brilliant flashes of light will stream across in lightning-like paths. Again, narrow strips of tin-foil having been attached in a convoluted but continuous line to a plate of glass, a knife is drawn across them at points corresponding to the outlines of some design, such as a bird or flower. When this is made the line of a series of discharges, the design appears pricked out in stars of light.

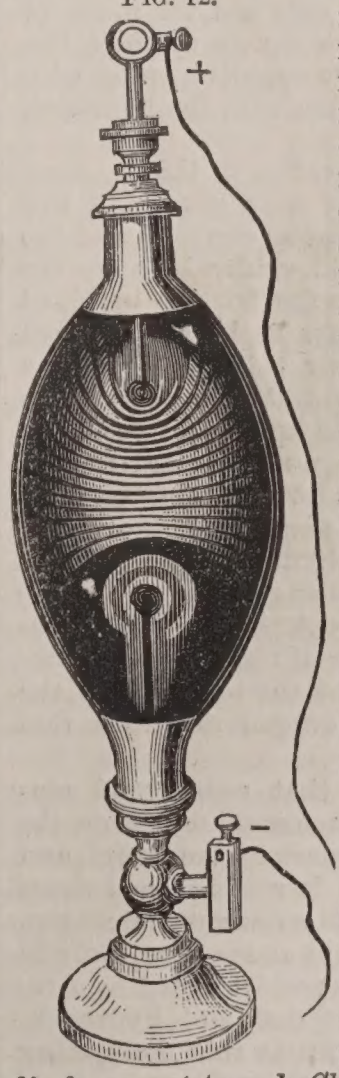
42. Besides the influence on the duration of the spark exerted by the size of the charged surface, as shown by Rood, an effect is produced by the nature of the transmitting material. Thus, the spark from a Leyden jar carried directly to points immersed in loose gunpowder will scatter the powder without igniting it; but if part of the circuit consists of a wet string or like imperfect conductor, the spark will pass more slowly, and will ignite the powder.

43. The most magnificent display of the disruptive discharge is, however, furnished in the lightning. Here flashes occur as much as three miles in length. The failure of some attempts to measure their duration has occasioned a general impression that they are exceedingly brief. Faraday, however, in 1857 noticed that some flashes seemed to him fully as long in duration as one second, and Prof. O. N. Rood, with a very efficient form of apparatus, has extensively investigated the subject, with the following result: He finds that lightning-flashes generally consist of several acts, varying individually in duration from less than one one-thousandth of a second to more than one-twentieth of a second; even these extreme varieties being found at times in a single flash, whose total duration may be fully one second.* The cause of this great duration is probably to be found in the extent and character of the electric distribution in the cloud.

The brush and glow discharges are simply aggregations of numerous and very minute sparks. The glow sometimes seen on the spars of vessels, and called Saint Elmo's fire, is of this character.†

44. While air at its normal density and temperature offers so great a resistance to the passage of electricity, it is found that when highly rarefied its power of transmission is greatly increased, and that under these conditions the discharge passes in a diffused and flame-like form. To exhibit the characteristics of this discharge in various gases and at various degrees of rarefaction, we employ glass vessels, either of an egg shape or globular form, provided with metallic caps securely cemented to their ends, and sliding rods, stopcocks, etc. These may be exhausted with the air-pump, and the flashes of a coil being passed through, the appearances of the discharge may be studied. Under these conditions we find that the color of the discharge varies in different parts, being usually blue near the negative pole, and pinkish near the positive, and variously tinted, moreover, according to the degree of the rarefaction and the nature of the gas. Thus, under certain states of rarefaction, nitrogen gas gives a light of a pink-purple, carbonic acid of a green, hydrogen of a violet, and oxygen of a peach-blossom tint.

FIG. 12.



45. Moreover, at a certain degree of exhaustion the discharge is seen to be crossed by dark layers or strata, as shown in Fig. 12. These have been elaborately studied by De la Rive, who considers them to be due to variations in density produced in the rarefied gas by the electric force prior to the actual passage of the discharge. (*Ann. de Chem. et de Phys.*, Aug., 1866, vol. viii.,

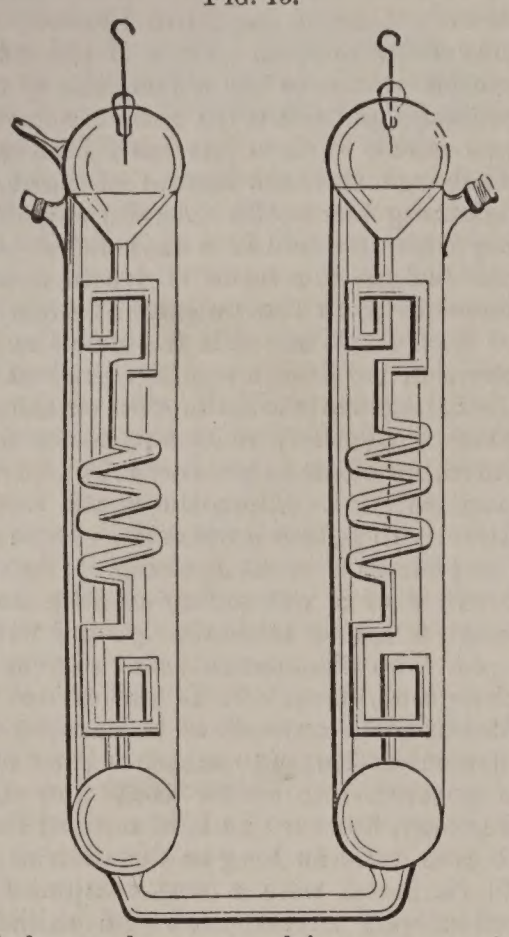
* "American Journal of Science," 1873, vol. v., p. 163.

† "Spectrum of Glow," "Am. Jour. of Science," 1867, vol. xliii., p. 394.

p. 437.) Plucker found that these strata, and also the streams and glows of the discharge, obeyed magnetic influences in a remarkable way. (*Phil. Mag.*, 1858, p. 119.) These discharges were also studied by Gassiot, and produced by a galvanic battery, as well as by other forms of electrical generators. (*Proc. Roy. Soc.*, 1859, p. 36.)

46. Geissler, a very skilful glassblower in Bonn, was employed by Plucker to make some permanently exhausted tubes for such experiments, and, enlarging on the idea, has developed one of the most beautiful illustrations in the whole range of the subject. These instruments, called "Geissler tubes," are of an infinite variety in pattern, containing different gases variously rarefied, thereby giving every imaginable tint. They are also often made of fluorescent glass, or are surrounded with glass jackets (as in Fig. 13), which are filled with fluorescent solutions, thereby yet further increasing the brightness and beauty of their appearance.

FIG. 13.



DYNAMIC ELECTRICITY, OR GALVANISM.—47. To the accidental observation that a frog's leg made a convulsive movement when brought in contact with two dissimilar metals, this subject owes its introduction into the world of science, and from Galvani, professor of physics at Padua, by whom the observation was made and followed up, it has derived its name. Without following the history of the steps by which the true nature of the action observed by Galvani, and soon afterwards much further developed by Volta, has been elucidated, we will pass at once to a consideration of this as a condition of those electric fluids which we have already assumed as the cause of electric phenomena in general.

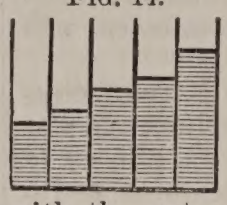
48. If a plate of zinc, or other metal having a strong affinity for oxygen, is immersed in some such liquid as water, which contains oxygen and is capable of being decomposed, the metal will, by reason of its superior chemical attraction, take a certain portion of oxygen to itself, so liberating a corresponding amount of hydrogen. In this act of separation, however, not only are the material particles of the oxygen and hydrogen drawn asunder, but the electric fluids also are divided, the negative going with the oxygen to the zinc, and the positive with the hydrogen being repelled.

49. We may make a material illustration of this by comparing the water to a mixed mass of spun glass and silk fibres. If the silk could be pulled out at one side and the glass threads at the other, we should evidently have the silk powerfully excited negatively by the friction involved in this act of separation, and the glass as highly charged with positive fluid. Returning to our actual case of the water, the force which was able to separate the electricities would evidently be able to keep them apart, but yet there would be a strong tendency towards a return and recombination, and this would render it more and more difficult for the zinc to decompose successive portions of the water, since it would be obliged to force the hydrogen and positive fluid into a surrounding region, getting more and more highly charged with this same fluid. A point would therefore soon be reached where the power of the zinc to decompose more water would be annulled by the tendency of the positively charged and liberated hydrogen to return into combination.

Under these conditions, suppose that some good conductor which is entirely without chemical action on the solution is introduced in some other part of the vessel, and connected by a wire with the zinc. It will at once share with the zinc its negative charge, and so become as attractive to the hydrogen and positive fluid as the zinc, but will be without any of that chemical force which acted as a repellent influence in the case of the zinc and hydrogen. The freed hydrogen will therefore run to this conducting plate with its negative fluid, discharge itself, and relieve the tension in the liquid, so that the action of the zinc upon the water may go on freely again. The power of separating the electricities of the water possessed by the zinc or other active metal constitutes what is called the "electro-motive force" of the system. This evidently is due to the difference between the attractive energies of the zinc and the hydrogen of the water for the oxygen; they pull against each other, and the resulting available force is simply their difference. To this we can even give a numerical expression in any case; thus, the total mechanical equivalent of zinc being 42.575 units per atom, and that of hydrogen being 33.808, the available energy, or "electro-motive force," would be 8.767, or, in other words, about one-fifth of the total amount residing in the metal consumed. The electro-motive force would of course vary with the nature of the liquid and active element used, depending upon the relation of their attractive forces.

50. The above considerations will show us at the outset what is the relation between the conditions of the present subject and of that before discussed. We have here the fluids separated by a relatively feeble power of dissociation, but in quantities which will be very great if the resistance opposed to their reunion is slight. To give a physical illustration, we may regard this action of the metal on the liquid with reference to either of the electric fluids as a power of raising its level. Thus, suppose that a sieve placed vertically in a trough of water had the power of pushing the water towards one end, and so raising the level a very little on one side. When the water had reached the full height at which the power of the sieve would maintain it, all further action would cease; but if we now made a communication by which the water from the higher side could run around to the lower, then the sieve would continue to keep up the head, and a constant current would result. Again, if several sieves were placed in series, then each in turn starting with the water which had been raised by its predecessor, and raising it higher, the level at the end of the tank would be as much higher as the sieves were more numerous.

FIG. 14.



This is not, of course, intended to be a statement of fact about sieves and water, but to be a purely imaginary illustration, which may aid us in remembering the general fact that the nature of the action of the elements in a galvanic couple on the electric fluids is to accumulate, each one slightly on opposite sides; in consequence of which they act in all respects as would material liquids in whose level a similar slight change had been effected. It will, in fact, be found to be of the greatest convenience to acquire the habit of thinking of the electricities developed in galvanic actions as fluids with certain "levels," which give the corresponding tendencies to flow.

51. Carrying this view back into our former subject, we would regard the fluids in charged bodies as having a great "head" or high level. It will be evident on this view that a sufficient number of galvanic elements in series (as illustrated above by the succession of sieves) should give us a "head" equal to that of a statically charged body. In fact, Gassiot, with a battery of 3400 pairs of zinc and copper plates in distilled water, produced all the effects of attraction, repulsion, discharge, etc. which are obtained from bodies excited by friction (*Phil. Trans.*, 1844, p. 39), and the present writer, with a series of 15,000 such cells, made by Mr. Charles T. Chester of New York, has obtained similar results in a yet more striking manner. Indeed, with the delicate instruments now at command we can readily exhibit the actions of attraction and repulsion with the electricity set free by a single galvanic couple of the simplest description, thus proving the identity in nature of the two actions of frictional and chemical "excitement."

52. Such being a general view of the condition of galvanic electricity, we will next pass to the methods used for its development. We have above spoken only of a metal (say zinc) and water as the active agents; but in fact there would be practical difficulties in using these alone, among which we will first consider only the fact that the oxide of the metal would soon cover its surface and cut off all action. For this reason, as well as others, we introduce with the water, some acid capable of dissolving the metallic oxide, but not able to attack the other conductor. This introduces another element. The solution of the oxide in the acid furnishes another source of force, and our numerical relation of energies thus takes a new shape, which is well expressed by Rankine as follows:

Total "equivalent" due to oxidation of zinc and solution in sulphuric acid and water	3006
Total "equivalent" consumed in liberating hydrogen from the dilute acid	2106
Total "equivalent" of force developed	900

These numbers, expressing "British thermal units," we can easily reduce at once to a practical expression, and say that the total force which can be developed by a pound of zinc in such a combination would be $900 \times 722 = 694{,}800$ foot-pounds, or about one-sixteenth of that developed by burn-

ing a pound of pure coal or carbon. We of course have neglected all causes of loss in both cases, but this is the highest result possible with all causes of loss excluded.

53. There are evidently two directions in which this result can be improved: 1st. By increasing the relative attraction between the active element and the liquid which is the first cause of the action; 2d. By reducing the attraction to be overcome in separating the expelled element from the liquid.

For the first object we may use in place of zinc some more chemically active body, such as magnesium or sodium, or substitute some other fluid for water. But in practice it has been found that no substance which by reason of its cost or other considerations is available will give us better results than zinc and water acidulated with sulphuric acid.

With reference to the second point, however, much may be done. Thus, if sulphate of copper were mixed with the acidulated water, that compound would as a final result be decomposed, its copper being deposited on the inactive element as a substitute for the hydrogen. Now, the expulsion of copper from this compound does not require as much force as does the liberation of hydrogen from water, and thus we get an obvious increase of effect, as follows:

Total equivalent of combination of zinc with oxygen, sulphuric acid, and water	3006
Total equivalent consumed in expelling copper from solution of sulphate	1587
Total equivalent of force developed	1419

$1419 \times 722 = 1{,}095{,}468$ foot-pounds per pound of zinc;

which is, however, less than one-tenth of the total force developed by the combustion of a pound of pure coal or carbon.

54. The decomposition of nitric and chromic acids requires still less force than does that of sulphate of copper, and thus by substituting these still better results may be obtained; but we must not forget that the upper limit, or *highest attainment of theoretical perfection*, would be to gain the whole 3006 units due to the combination and solution of the zinc, which would, after all, amount to but one-fourth the total energy developed by a pound of pure coal.

Passing from these general considerations to questions of detail, we notice, in the first place, that if in the simplest form of galvanic apparatus we employ a plate of ordinary zinc and one of copper immersed in a vessel of diluted sulphuric acid, as was at first done, several difficulties are encountered.

55. In the first place, impurities, in the shape of specks of iron, cadmium, etc., scattered through the zinc, impair the action by establishing "local circuits," in which the impurity acts as the second element, and sends a part of the current back to the zinc without traversing the connecting conductor, so causing it to elude our use. This difficulty is remedied by coating the zinc with mercury. This substance dissolves a portion of the zinc and forms a sort of metallic varnish, which is of course perfectly homogeneous and covers up all irregularities. The mercury does not dissolve in the acid, but yields the zinc, itself dissolving a fresh supply as fast as it is required.

56. Secondly, the hydrogen going to the copper plate collects on it in a layer of bubbles, by which the contact with the liquid is diminished, and which, moreover, by reason of its strong negative condition, tends to combine with oxygen and reverse the battery action. (See "Gas Battery," farther on.) To remedy this difficulty, Smee proposed the use of platinum plates covered with fine particles of platinum, obtained by electric decomposition (see "Electrolysis," farther on), which "shed" the hydrogen bubbles. He also used silver plates coated with platinum, or plates of lead first silvered and then coated with platinum. The silver plates in time become brittle, and the others lose their coating; and this has led to the adoption of plates of compact carbon, made from the graphitic deposit found in coal-gas retorts. These are also platinized by painting them with a solution of platinic chloride, and then immersing them in their own solutions, with the circuit closed for a few minutes.

57. The present writer has used with good effect, where a continuous, uninterrupted action for a limited time was required, and where the first cost of the apparatus was important, a combination of zinc and sheet-iron plates in acidulated water. A battery of this sort, having a zinc surface of about 240 square feet, was used on several occasions for twelve hours at a time, with a very satisfactory result.

58. The employment of sulphate of copper was first introduced by Prof. Daniell, and in order to prevent the copper from depositing on the zinc, and thus establishing local circuits which would soon have interfered with the useful action of the battery, he divided the vessel into two parts by a porous partition made of parchment, bladder, leather, or porous earthenware. In one part was placed the zinc surrounded by acidulated water, and in the other a copper plate immersed in solution of sulphate of copper. We may here explain that it is not supposed, when a molecule of water is decomposed by the action of the zinc, that its hydrogen atom travels bodily across to the other plate, but that it simply displaces the hydrogen in the next molecule of water, and this in turn acts on the next, and so on. Thus, in the Daniell battery the liberated hydrogen travels by such successive displacements through the acidulated water, with which the porous partition also is soaked; and when the copper solution is reached, the displacement of a copper atom is substituted for that of hydrogen, the hydrogen atom taking at its entrance oxygen from a molecule of oxide of copper, and so setting free the copper atom, which is thenceforth "exchanged" on, until the last in the series is reached, when a particle of the metal is thrown down on the copper plate.

59. This form of battery has many advantages, but is open to two serious objections: the porous cell or other partition, while allowing the transfer of elements to take place through it, does not do so without offering a considerable resistance; and again, the copper is liable to deposit in its metallic state in the porous part, so closing it, and finally, getting upon the zinc, destroys its efficiency by local circuits or local action. To remedy these defects a great variety of modifications have been adopted, which may be called as a rule gravity batteries. These depend upon the difference in density of the solutions, to maintain their separation. Thus, the first of the class, invented by Meidinger, consisted of a plate of copper attached to an insulated wire and placed at the bottom of the jar; upon this was thrown a quantity of sulphate of copper. The jar was then filled up with water, with a little sulphate of zinc to give it conducting power, and in this was hung the zinc. The superior weight of the sulphate of copper solution was relied upon to keep it away from the zinc. This was much modified in detail, and was in many cases effective, so that such batteries could be left in closed circuit for months without getting out of order.

60. A recent modification of this gravity battery, known as the Lockwood battery, seeming to involve some action which has not yet been fully determined, appears to be wonderfully efficient in practice.

61. When nitric acid was introduced by Grove, a porous cell of earthenware became absolutely requisite, and a plate of platinum for the negative element. For this last, Bunsen substituted gas carbon to diminish the expenss; then Poggendorff proposed a mixture containing free chromic acid to replace the nitric. This mixture is obtained by mixing 1 part by weight of bichromate of potash with 10 of water and 3 of common oil of vitriol. This has the advantage of cheapness, and also of avoiding fumes, as chromic acid reduces to a solid sesquioxide of chromium, which of course remains in the solution. Its disadvantage is that it is less efficient than the nitric acid, and soon loses effect in closed circuit through the accumulation of sesquioxide of chromium upon the negative element, this body requiring time to dissolve. This difficulty has been met by the addition of nitric acid to the solution. In this case the nitric acid first loses its oxygen, but immediately takes it again from the chromic acid; thus, while no fumes of nitrous acid are developed, the action on the chromic acid is diffused more generally, and we have the quickness of the nitric acid, combined with the good qualities of the other material.

62. The above chromic-acid mixture, without nitric acid, may be used in a battery of zinc and carbon plates, provided these be only immersed when in use. The convenient "French flask batteries" are thus made, and for use with the large electro-magnet of the Stevens Institute of Technology, and his own induction coil, where great power in a compact form is needed for a short time, the present writer caused to be constructed four sets, of three cells each, on the same general principle. These expose surfaces of about five square feet of zinc in each cell, or sixty feet in the aggregate. During three years' constant use they have given entire satisfaction for the purposes named.

63. A battery of zinc and carbon, in which the exciting fluid is a strong solution or paste of acid sulphate of mercury, is very convenient for medical use. The present writer pointed out some years ago that this substance could be replaced with advantage by a mixture of glauber salt and chloride of mercury, and that even glauber salt, a harmless and non-corrosive substance, would in many cases answer very well alone. (*Jour. of the Franklin Institute*, vol. l., p. 68, 1865.)

64. The Maynooth battery, in which the elements are zinc and cast iron, the iron being in contact with a mixture of strong sulphuric and nitric acids, makes a very powerful combination, but the fumes evolved in filling and emptying it are very objectionable.

65. For running electric clocks and such work, not re-

quiring much force, the Leclanche battery is found to be very convenient. This consists of a square-shaped glass vessel, within which is set a porous cylinder containing a plate of carbon, and small fragments of black oxide of manganese packed tightly around it. In one corner of the square vessel is placed a rod of zinc, and the vessel is partly filled with a strong solution of sal-ammoniac. (*Les Mondes*, 1868, vol. xvi., p. 532.) Chloride of zinc is formed in this battery, and the hydrogen liberated is taken up by oxygen of the oxide of manganese, or escapes.

Dry Piles.—66. The slight amount of moisture which even ordinary paper will retain is sufficient to produce a galvanic action with dissimilar metals, and this may become quite appreciable if a sufficient number of elements are used. Thus, if we take silver paper and paint one side with a mixture of black oxide of manganese and gum, and when dry fold it up and with a wad-cutter strike out many thousand disks, these, placed in a tube to keep them in position, will exhibit opposite electric excitement at their opposite ends. This arrangement was devised by Zamboni, who found that such an arrangement, containing some 20,000 disks of paper, would keep a light ball in motion between brass balls connected with its poles for years. A thorough drying caused all action to cease, but exposure to moist air restored it. As before mentioned, a dry pile is used in Bohnenberger's electroscope.

Grove's Gas Battery.—67. We have already mentioned that a plate of platinum covered with hydrogen was strongly positive, and, following out this principle, Grove constructs what has been called a gas battery. In this a number of vessels are provided each with two platinum strips. The vessels contain acidulated water, and the strips, partly immersed in this, are covered with bell jars, one containing oxygen, the other hydrogen. Under these conditions the hydrogen in contact with the platinum acts like zinc, and combines with some of the oxygen of the water, setting free other hydrogen, which, passing to the other strip, there combines with some of the free oxygen.

68. On a principle suggested by this action and some of its relations are constructed what are called *Secondary Piles*. If, for example, we immerse two or more plates of lead in a solution of glauber salt, and pass the current of a small battery for some time between the plates, there will be formed on one plate a film of oxide of lead, while the other will acquire a layer of excited hydrogen. If the charging battery be now removed, and the terminals of the other arrangement brought together, a brief but very powerful current will be developed by the combination of the hydrogen at one side and the oxygen at the other.

(For a very full discussion of this subject, see J. Thomson, "Pogg. Ann.," 1865, vol. cxxiv., p. 498, and of an improved form by G. Plaute, "Phil. Mag.," 1868, vol. xxxvi., p. 159.)

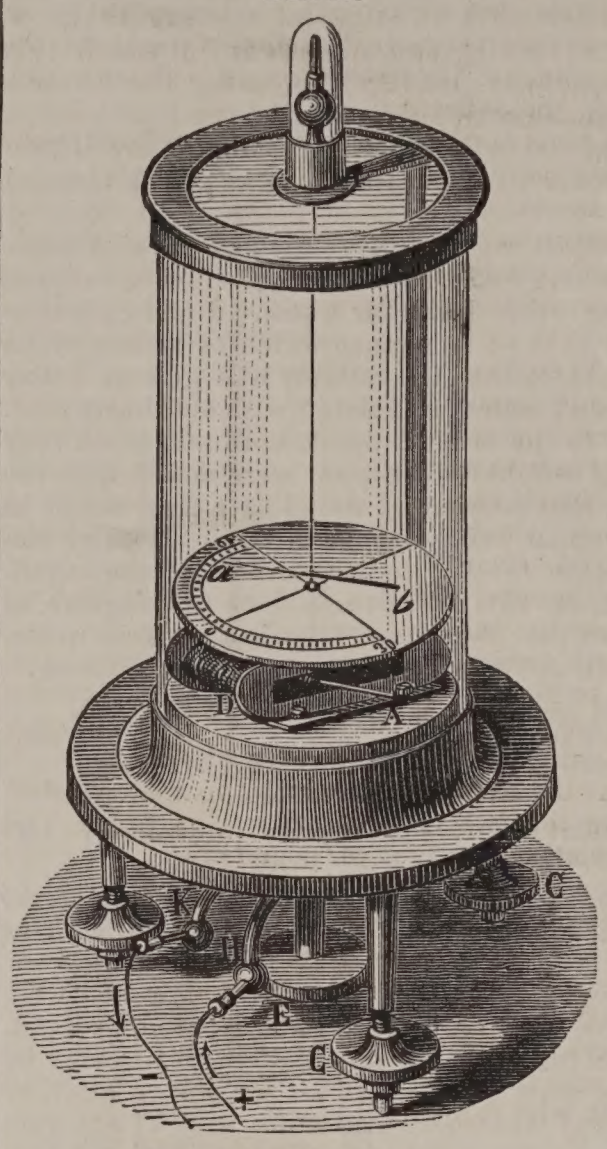
Instruments for the Measurement of the Galvanic Current.

The Voltameter.—69. This instrument is based upon the principle that a current can only pass through such a substance as water by decomposing it, and that thus the amount of water decomposed or of gas liberated will afford a true indication of the amount of electricity which has been transmitted. For all practical purposes this is strictly true, whatever may be thought as to the absolute accuracy of the statement. We have therefore, for this purpose, a vessel with two strips of platinum entering it from below, partly filled with slightly acidulated water, and a graduated bell-jar or closed tube filled with water placed over them. When a current passes, bubbles of oxygen and hydrogen gases will rise, and the quantity collected in a minute will give us an indication of the amount of the electric current that has passed. The amount of force required to carry an electric current through the resisting liquid is, however, very great, and thus for very many purposes this instrument would not be available.

70. In 1820, Œrsted discovered that when a galvanic current was passing through a wire a magnetic needle tended to set itself at right angles to the wire. The direction in which the needle turned from a position parallel to the wire depended upon the direction of the current and upon the location of the wire (*i. e.* whether it was above or below the needle). It thus came about that if a needle was suspended in a coil, the parts of the coil above and below would reinforce each other in their action on the needle, and that a reversal in the direction of the current would be indicated by a reversal in the position of the needle. Moreover, certain relations may be established between the amount of angular deflection of the needle and the quantity of the current by means of which this last may be determined.

A galvanometer, then, in general consists of a magnetic needle suspended in a coil of wire, which is placed in the magnetic meridian (*i. e.* N. and S.), or in the same direction as the needle. To the needle is attached a pointer, by which the angular displacement which it suffers may be read off on a divided circle.

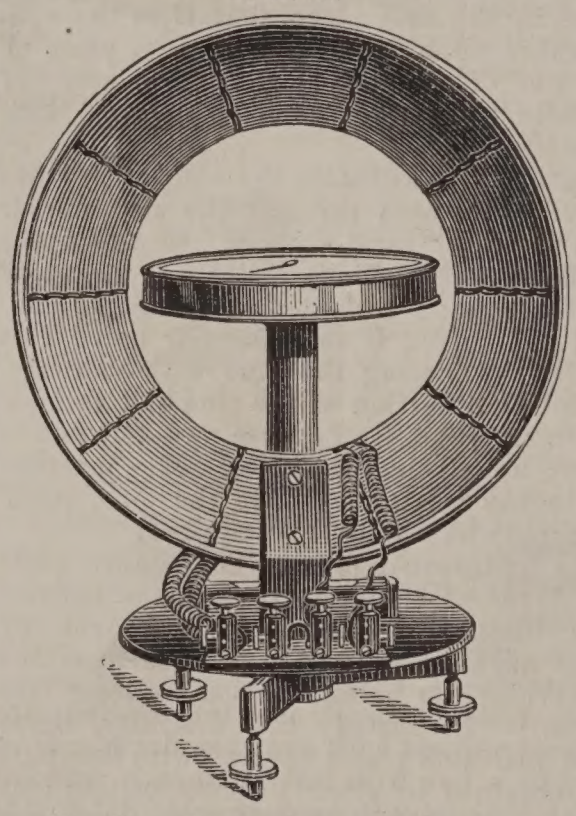
FIG. 15.



For various uses different forms and combinations are adopted, of which we shall mention the principal.

The Tangent Galvanometer.—71. A simple trigonometrical discussion (see Sabine on the "Electric Telegraph," p. 237) will show that if the needle is very small in comparison with the size of the coil—say, one-fifteenth of its diameter—the force of the current will vary as the tangent of the angle of deflection for small displacements. With a coil so distant from the needle as this condition involves it would only be possible to measure very powerful currents in this way; but Gangain has shown that if the coil be wound in the surface of a frustum of a cone whose apex passes through the centre of the needle, the same relation between the current and deflection will be maintained, even when the diameter of the coil is but five or six times the length of the needle. For certain purposes the coil in this instrument is made in two equal parts, so that either half or all of it may be used at pleasure. Fig. 16 shows one of these instruments, as made by Messrs. Knox & Shain of Philadelphia.

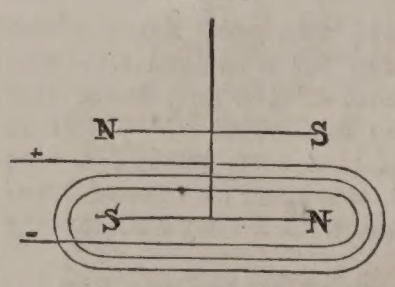
FIG. 16.



The Sine Galvanometer.—72. In this instrument the coil is movable, and in making observations it is rotated until its plane coincides in direction with the needle. Under these circumstances it may be shown that the force of the current varies with the sine of the angle of deflection. (See Sabine on the "Electric Telegraph," p. 241.)

The Astatic Galvanometer.—73. Yet further to increase the delicacy of this instrument we diminish the directive force of the needle without diminishing the influence of the coil upon it, by uniting two needles rigidly, but at a distance, one over the other, with their poles reversed. By this means, if the needles were absolutely equal they would stand E. and W.; and if not absolutely equal, they take some intermediate position between this and the magnetic meridian, with a directive force which is diminished as their complete equality is approached. The astatic combination is then so introduced in the coil that one of the needles is inside, and the other outside. If we now bear in mind that the direction in which the needle tends to

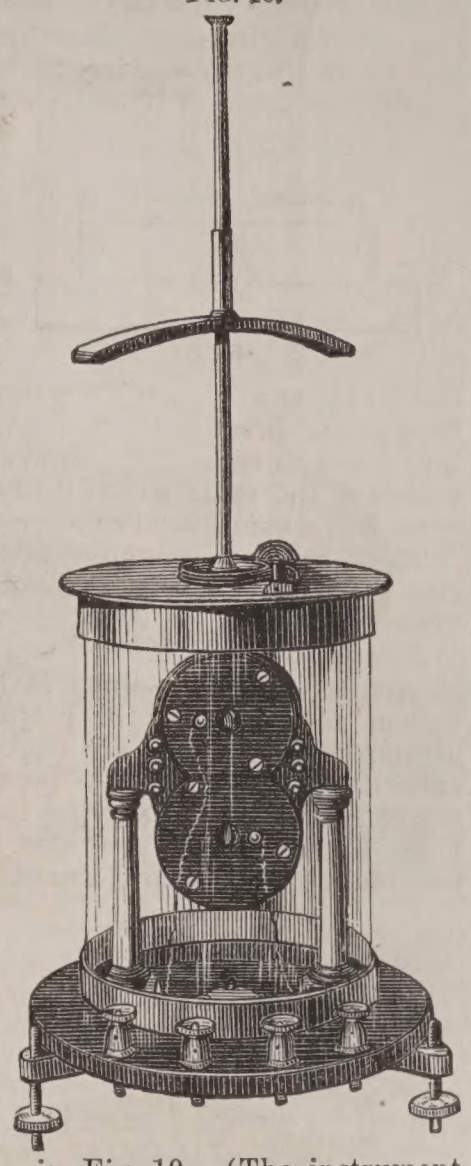
FIG. 17.



move is reversed—1st, by a reversal of the current; 2d, by a reversal of the magnet in relation to it; and 3d, by reversal of its relation with reference to being above or below—we will see that the action of the currents on the two needles will coincide in direction, and so assist each other in producing the deflection.

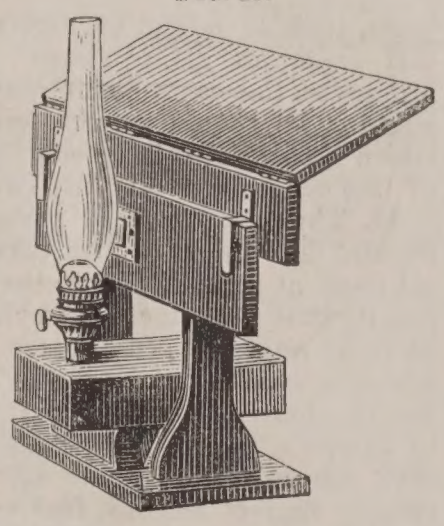
74. One of the most complete instruments of this type is Sir W. Thomson's double coil astatic galvanometer. In this instrument we have two coils, which are exactly equal in resistance and in their effect upon the included magnets. These two magnets are rigidly connected with reversed poles, and the upper one carries a small mirror. Above them is a bar magnet, which serves to regulate their sensitiveness by counteracting more or less the influence of the earth's magnetism, and also to give us a means of bringing them to a fixed position. The binding screws at the base allow us to bring the two coils into any relation we please, either to use them in combination or opposed to each other. The instrument here represented has its coils composed of very fine wire in very many turns, but it is also made with a short thick wire for other purposes.

Fig. 18.



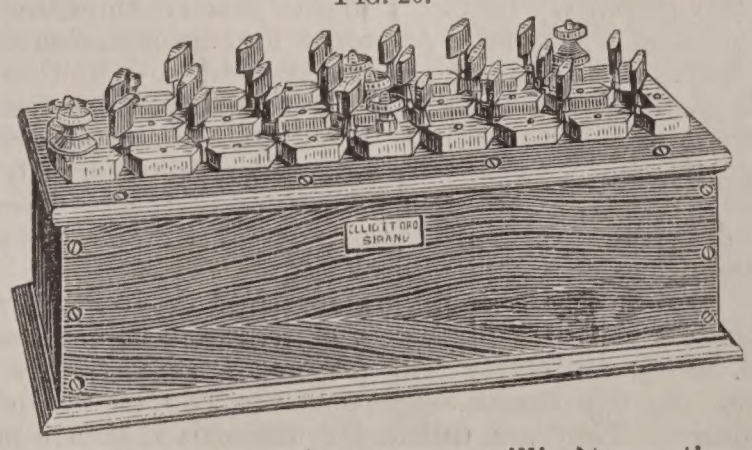
The movements of the astatic combination of needles is read in the following manner: At a distance of about two feet in front of the instrument is placed the frame and lamp shown in Fig. 19. (The instrument would be to the right, as this is shown in the cut.) The light from the lamp, passing through the vertical slit in the frame, falls on the mirror in the upper part of the galvanometer, which is curved so as to throw an image of the flame back upon a scale attached to the other side of the frame. The motion of this image indicates the movement of the needles.

Fig. 19.



Resistance Coils.—75. For use with these various instruments we have sets of "known resistances," consisting of bobbins of insulated German silver wire, carefully graduated to correspond with fixed standards. These bobbins are placed in a box with their terminals attached to a series of heavy brass pieces, between which fit conical plugs. When these plugs are in place they form with the brass pieces a conductor of inappreciable resistance, but by taking out any one, the current is obliged to pass through the corresponding coil, and so experience its resistance. These resistances are expressed in units called "ohms." Of these there are two standards, slightly differing—one, known as Siemen's unit, defined to be the resistance of a

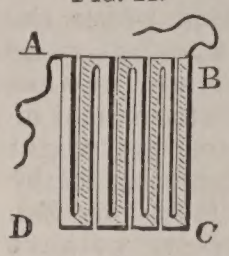
Fig. 20.



prism of pure mercury of one square millimètre section, and one mètre long, at 0° C.; the other, known as the British Association unit, or B. A. unit, is founded on an absolute determination of the relation of resistance to work or energy through the production of heat. The unit first obtained, and known as the $\frac{\text{metre}}{\text{second}}$ unit, when raised to the seventh power, gives us the B. A. unit, or ohm, whose relation to Siemen's ohm is as 1.0456 to 1. One million of ohms make a megohm; one-millionth of an ohm is a microhm.

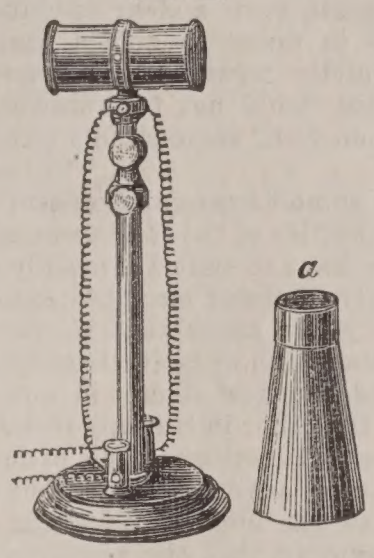
Thermo-electric Couples.—76. A separation of the electricities similar in character to that which we have just described as accomplished by chemical force is brought about by the direct action of heat on dissimilar conductors in contact. Thus, if we have a series of bars of antimony and bismuth united at their alternate ends, as shown in Fig. 21, and heat one side, DC, while the other, AB, is either exposed to the air or otherwise cooled, a separation of the electric fluids will be effected, and one extremity of the series will acquire a positive, while the other gains a negative, charge. As can easily be imagined, the electro-motive force is very feeble in this case, and thus very delicate instruments are required to recognize the effect. Moreover, the internal resistance of the system will be very small, since it consists entirely of conductors, and we must therefore employ low-resistance circuits for the measuring instruments to be used with it.

Fig. 21.



By uniting a large number of minute bars of antimony and bismuth in the manner indicated into a square prism, a "thermo-electric pile" is formed. This is generally enclosed in a brass case, provided with hollow conical reflectors, such as *a*, for its ends, and supported on a stand. It then forms with an astatic galvanometer (see § 73) the most delicate means we possess of indicating changes in temperature, the change in temperature being estimated from the effect of the electric action which it produces. Many experiments have been made by Becquerel, Bunsen, Marcus, and others on the development of this source of electric force. (See "Phil. Mag.," 1865, vol. xxix., pp. 159, 406; also vol. xxx., p. 77; likewise "Jour. of Fr. Inst.," vol. xlix., p. 420.) Much also has been done in this line by Moses G. Farmer of Boston.

Fig. 22.



Animal Electricity.—77. It has been shown that pieces of muscular tissue from animals recently killed will develop actions identical in character with those produced by chemical or heat forces, as before described, and moreover that certain animals, notably the torpedo and electric eel, have the power of giving at pleasure heavy discharges by means of a special apparatus which resembles in its structure a series of galvanic couples. (*Faraday, Phil. Trans.*, 1839, part i., p. 1.) It has been shown by Matteucci that in living animals an electric current is perpetually circulating between the internal and external portions of the muscles. This no doubt derives its source from the chemical actions constantly in progress in connection with the vital processes.

Other, and what may be called secondary, methods of exciting galvanic electricity, such as that of induction from another current or from a magnet, will be given farther on, after the subject of induction itself has been discussed.

Mechanical Effects of Electric Currents.—78. Our consideration of that form of electrical development known as galvanic or dynamic has led us thus far rather to notice its close resemblance to, or rather general identity with, the statical or frictional form of the same action; but while there is this exceedingly close relation between the two—while, in fact, they only differ in the degree of some of their conditions—it is yet true that this amount of difference is great enough to warrant the division of the subject which exists, and to make two classes of phenomena, which, while equally *existing* in both, are each of them pre-eminent in one of the two subjects, and practically inappreciable in the other.

These marked differences are in the quantity and intensity of the electric disturbances. In the case of the simple galvanic couple already described the amount of the fluids which can be separated is immense, but the separating force is so deficient in intensity that it can accomplish no condensation of the fluid in an insulated conductor, but can only do its work when the fluids are allowed to flow round and unite as fast as they are developed. It is like

one of the great wheels used in draining the Haarlem Lake, which by rotating in a broad canal pushed the whole body of water along, and raised it only a few inches. It could produce the current as of a river through a nearly level channel, but for producing a "head" of water or high pressure it was all but powerless.

On the other hand, the frictional methods of excitement give us a means of packing away or condensing the fluid to any extent, but are able to put but little in motion at a time. To carry out our former illustration, they might be compared to the pumps of hydrostatic presses, which can produce a tremendous "head" of water, but deliver only a few ounces at each stroke.

The great self-repellent force of each fluid makes the condensation of even a small amount into a limited space a work requiring great intensity of power, while the want of weight in the electric substance makes the movement of great quantities a matter dependent simply on what might be called frictional resistance (*i. e.* the obstacle offered by the transmitting material or conductor to their passage). It thus comes that while in statical electricity we have chiefly to do with what we may consider highly compressed fluids forcibly accumulated in different bodies, in dynamical electricity we have to consider the flow of large volumes of the same fluids but little compressed, and thus having little mutual repulsion or tendency to diverge. Thus, it comes that in the first case we can only have marked results as a rule from the properties these fluids possess when at rest. There will not be volume enough to produce any effect if let out as a current. It would be like letting out the water from a hydraulic press against a mill-wheel. And so, on the other hand, we must have a clear circuit and free passage for the fluids in order to obtain the dynamical phenomena. The quietly flowing river can swing round a hundred wheels, but would not push down a handful of earth that fenced it off from some child's excavation in its beach.

While, therefore, there *are* tension and accumulation and every effect resulting from the properties of the fluids when at rest, in dynamic electricity; we have to consider mainly the effects of currents flowing easily in closed circuits. According to our double-fluid theory, we know that if the positive fluid is moved into one body, the negative equally goes into the other, and that thus the flow of one in one direction will involve the flow of the other in the opposite. It therefore becomes an unnecessary repetition to go over each description a second time, simply reversing the order, and we therefore commonly confine our descriptions to the motions of the positive fluid, assuming that the negative follows the same track, "the other way round."

Attractions and Repulsions of Electric Currents.—79. The attraction for light bodies exhibited by those excited by friction evidently depends upon the accumulation of one or the other fluid in the excited body; but nothing like this can exist with a current, which being, as we have seen, duplex in its character (*i. e.* an equal flow of positive in one direction and negative in the other), can have no accumulation or charge of either fluid at any point. Thus, no phenomena of attraction and repulsion are to be expected from closed circuits upon light bodies.

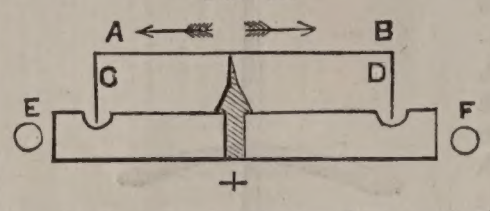
We may, however, expect that two currents, or the conductors carrying two currents, should attract or repel each other, and that this attraction and repulsion should depend upon the relation of their directions. This is indeed found to be the case. If two currents flow in parallel wires in the same direction, the wires tend to approach; if the directions are opposite, they tend to recede. This fact may be illustrated in a variety of ways, but perhaps that which is at once the simplest and most striking is to have two pieces of wire bent so as each to form three sides of a square; then so to weight these by rods rigidly attached that they will stand on their ends. Four slight hollows containing mercury are then so arranged as to receive the ends of these wires when they stand close together and parallel. If, then, the mercury cups are so connected that a current from a battery will traverse the two wires successively in the same direction, they will be seen to approach; if in opposite directions, they will recede.

80. If straight conductors carrying currents are so placed as to form an angle with each other, they will attract if both currents go towards or from the apex of the angle, but will repel if one approaches and the other recedes. This is, however, a direct consequence of the former law. The action of a sinuous current is equal to that of a rectilinear one equal to its length in projection.

81. From the law of angular currents we easily derive the law regarding currents at right angles to each other—one in a fixed conductor and the other movable round an axis or in any direction parallel with itself. If the current in the movable conductor approaches the fixed one, then it will cause the movable conductor to advance in a line parallel to that of the fixed conductor, in a direction opposite to that of its current, and in the same direction as this current if the direction of the current in the movable wire be away from the fixed one. Consequently, a vertical rectangle or circle carrying a current will tend to assume a position parallel to a horizontal conductor, and so as to bring the horizontal currents of both into the same direction.

82. Again, as a direct consequence of the reactions of angular currents not in the same plane, we will see that a current in a wire occupying the relation of a radius to the line around which it is free to move will tend to perform a continuous rotation if acted upon by a current in a tangent or circumferential conductor in or parallel to its plane of motion. A current in a wire perpendicular to this same plane would be similarly affected.

FIG. 23.



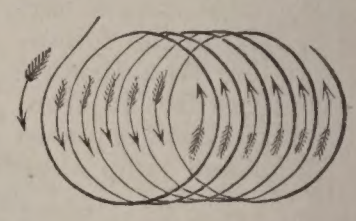
Thus, if a current is made to pass up through a central column, and then divide in opposite directions through wires A B, then descending into a trough of mercury while another current or a continuation of the same passes through a surrounding ring of wire, EF, a continuous rotation will be maintained.

These are some of the results of the simple general law that currents in the same direction attract, and in opposite directions repel.

Relations between Magnets and Currents.—83. The theory of Ampère, fully explained in another place (see "Magnetism"), develops all the properties of magnets, from the assumption that they are equivalent to spirals carrying currents, or are made up of particles, each of which has in it a closed circuit, all moving in the same direction. (See Figs. 24 and 25.) From this it would naturally follow that mutual actions would exist between magnets and currents, such as might be derived from the elementary law and examples given above. Such is indeed the case. Moreover, the earth itself playing the part of a powerful magnet, we should expect certain relations to subsist between its directive force or polar action and the movements of free conductors carrying currents. These also we find.

FIG. 24.

FIG. 25.



84. Thus, we have, as perhaps first in importance, the fruitful fact discovered by Œrsted that a magnet tended to set itself at right angles to the line of a current, and reciprocally that a conductor carrying a current would set itself at right angles to a magnet. Regarding the magnet simply as a series of currents in planes perpendicular to its length, these actions are simply examples of the tendency of currents to get into parallel planes, resulting from the frrst simple law of their attraction and repulsion. For exactly similar reasons, free conductors carrying currents place themselves at right angles to the magnetic meridian.

85. The rotations of magnets around conductors and conductors around magnets, which flow from this same relation, are as numerous as their explanation, by reference to the above general considerations, is obvious. For an extended discussion of these the reader is referred to De la Rive's "Traité d'Électricité," tom. i., chap. 2.

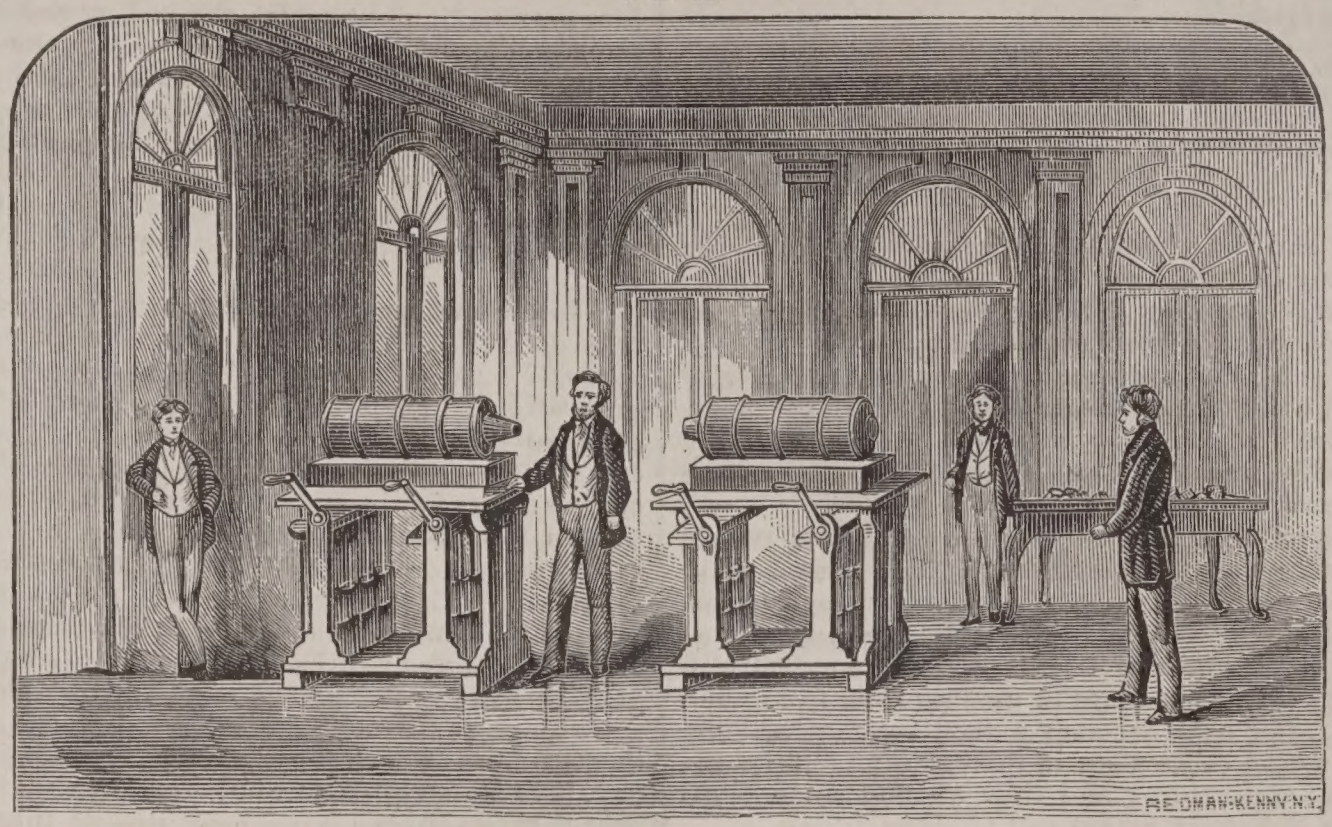
86. A solenoid is a helix or spiral, with the wire of which it is formed returned along its axis. When therefore a current traverses it the longitudinal effect of the spiral is counterbalanced by that of the return wire, and it becomes in all respects equivalent to a series of equal and parallel circular currents. In fact, it fulfils exactly Ampère's description of a magnet. As might be expected, therefore, it behaves in all respects exactly like one.

Magnetization by Currents.—87. If a bar of soft iron is inserted in a solenoid, it is found to become powerfully magnetic as long as the wire is traversed by a current, the order of the poles being as follows: if the current passes round in the direction of the hands of a watch, the pole on the near side will be a south pole.

If in place of a solenoid, we surround the iron bar with a multiple coil of many layers of insulated wire, the current acting repeatedly will produce a greatly-increased effect. By this means magnets of the greatest power are produced. They are called, for distinction, electro-magnets, and, as has been already remarked, lose their power practically with the cessation of the current.

The largest and most efficient electro-magnet yet constructed is one built, after the designs prepared by Prof. A. M. Mayer and the present writer, by Mr. William Wallace of Ansonia, Conn., for the Stevens Institute of Technology. It weighs with its armatures about 1800 pounds, has cores of soft iron six inches in diameter and three feet three inches each in length, and surpasses any similar instrument in the intensity of its effects.

FIG. 26.



On the peculiar properties of the electro-magnet was founded the invention of the electro-magnetic telegraph. (See TELEGRAPH.)

88. The great power which an electro-magnet exerts on a body near it has led many to attempt the application of this as a motor in driving machinery. A consideration of the numerical results given at §§ 52 and 53, in connection with the explanation of the origin of the galvanic force, will, however, show us that zinc consumed in one of the forms of galvanic battery which does not involve the use of some other very expensive material will yield us but about one-tenth to one-sixteenth the force produced by coal in its combustion; and even if made perfectly available by some discovery not yet even hinted at, would be but one-fourth as effective as coal. The price of zinc is moreover at present about forty times that of coal. Our present steam-engines give us about five per cent., or one-twentieth, of the total force evolved by their fuel; so that with an absolutely perfect battery and electro-motor the economic relation would be eight times in favor of the steam-engine with such batteries as could be used—twenty and thirty-two times if the engine were absolutely perfect; but with the best form of engine yet devised it would be 100 to 160 times more expensive to obtain power by a galvanic motor than by a steam-engine.

Laws of Electro-Magnetism.—89. It has been shown by Lenz and Jacobi that with an uniform current—1st, Magnetism in any given bar is directly proportional to the number of coils which act upon it. 2d, The diameter of the coils has no effect, the greater length of the larger coil exactly compensating for its greater distance. 3d, The thickness of the wire has no effect, the condition first named of a constant current being maintained. Of course, with the same battery the amount of the current will be largely influenced by the size and consequent resistance of the wire. 4th, The strength of the magnetism is proportional to the quantity of the current. This and certain other relations, it will be readily seen, have a limit in the capacity of a bar of iron to receive a magnetic charge. 5th, The attractive power of the electro-magnet for a saturated steel bar varies with the inverse square of the distance, but for a bar of soft iron, where induction comes in, with some function approaching the inverse cube of the distance. 6th, The retentive power varies with the square of the charge or of the quantity of current. 7th, The amount of magnetism developed is largely influenced by the surface of the iron, though not depending only on that; so that a tube whose thickness is about one-sixth its diameter would be equivalent to a solid bar of the same diameter. 8th, The length of the bar has no effect on its magnetic force, beyond that of diminishing the interfering action of the opposite poles by separating them. 9th, The position of the bar in the helix, whether in or out of its axis, is immaterial.

An excellent research on several of these points, involving a very beautiful and accurate method for comparison of magnetic forces, was published by Prof. A. M. Mayer in the "Am. Jour. of Science" for Sept., 1870.

Electrolysis, or Chemical Action of an Electric Current.—90. As a chemical combination is on the one hand an effective source of the electric current, so on the other side this current may expend itself in reversing this action, or in decomposing such compounds as in their formation gave it birth. Thus, if the current from a series of galvanic elements be made to pass through a solution of sulphate of zinc, the oxide of zinc will be decomposed, metallic zinc appearing at one side, and oxygen gas being given off at the other. So with the sulphate of copper and other salts not too difficult to decompose; and in such cases it is found that if the conductor to which the oxygen goes is of a metal, such as copper, iron, zinc, etc., which can combine readily with that element, an oxide will be formed and dissolved by the liberated acid.

On this fact are founded the various processes of electro-plating, of electrotyping, and the like.

A conducting matrix or mould or object is suspended in a solution of the metal to be deposited, in connection with the zinc or negative pole of the battery, and a plate of the same metal is suspended in the same liquid and in connection with copper, carbon, or other positive pole of the battery. The metal is then deposited gradually on every portion of the mould or object, and may either be left there, as in plating, gilding, etc., or stripped off, as in electrotyping, where it becomes the cast or duplicate original which is to be used.

91. The firmer the union of the elements or compounds the more difficult it is to separate them. Thus, if such a salt as sulphate of soda is placed in solution between the poles of a moderate battery, we can readily separate the acid from the base, but not the elements of the base. For this a very powerful combination is required, such as was used by Davy when he first separated, and so discovered, the metallic elements of the alkalies and earths. The elements of water are not very difficult thus to dissociate, and this has been adopted as a convenient means for measuring the quantity of the current. By employing the most intense means at our command, we can even act upon the elementary gases, so as to effect a possible separation of these. (See OZONE.)

92. A fluid state, as might naturally be expected, allowing of motion among the particles, seems to be essential to electrolysis, and we obtain this either by solution or fusion where it does not exist already; and we find that in all cases the most electro-negative element or component of the compound collects on the zinc pole, and the more positive on the other.

TRANSFER OF DYNAMIC ELECTRICITY—*Conduction.*—93. Conduction in dynamic electricity resembles in all respects the same action in the statical condition of the fluids. It varies in the same way with different substances, but can be more readily studied and measured. Moreover, on account of the inappreciable "condensation" of a current, the conductor does not act mainly by its surface, but by its entire section. The following list will give some idea of the relation of a few substances in this respect.

Silver	100.
Copper, pure	99.9
" best commercial	85–95.
" ordinary "	40–70.
Brass	20.
Zinc	29.
Steel	about 16.

Iron	about 15.
German silver	12–16.
Lead	8.3
Platinum	6.9
Mercury	1.6
Pure graphite	0.069,3
Coke, or coal-gas graphite	0.038,6
Tellurium	0.000,77
Red phosphorus	0.000,001,23
Solution of sulphate of copper, saturated	0.000,000,005,4
Sulphuric acid and water, 1–11 vols	0.000,000,088
Sulphate of zinc, saturated solution	0.000,000,005,7
" " " half saturated	0.000,000,007
" " " quarter "	0.000,000,005,4

From this table will be noticed the great effect which the presence of any impurity has upon the conducting power of a metal, and the very inferior conducting power of alloys as compared with their constituents.

Again, we see the vast difference between the conductivity of metals and that of non-metallic bodies and solutions, and that, moreover, in some solutions the conductivity reaches a maximum at a certain strength, and declines either by concentration or dilution.

94. It is observed, moreover, that in the case of metals the conductivity varies inversely with the temperature, while the non-metallic ones rise in conductivity as the temperature is elevated. Thus, in gutta-percha used to insulate cables for submarine telegraphy, the conductivity increases about thirty-six times in passing from 32° to 90° F. Glass at a red heat becomes a good conductor. The same general action takes place in liquids, conductivity increasing with temperature; and thus we find a moderate heat favorable to battery-action and to electrolysis.

95. Gases under ordinary circumstances are almost perfect insulators, but it has been shown by Andrews, Hankel, E. Becquerel, and Buff that some slight indications of conduction could be obtained, and Magnus found that hydrogen exceeded other gases in this respect. When intensely heated, however, as in certain spectrum or Geissler tubes, gases seem to conduct with a sensible facility; possibly also in the electric arc.

Heating and Luminous Effects.—96. When a galvanic current passes through a conductor, heat is developed to a degree varying with the amount of the current and the resistance of the wire. Other things being equal, an increase of resistance will diminish the amount of the current, but if we keep the current constant by adding to the electromotive forces urging the current, then we shall find the heat developed increase with the resistance. If the quantity of the current is increased, the heat will increase as the square of this quantity. In ordinary experiments it is more easy to increase the amount of the current transmitted by decreasing the length of the resistance, and thus obtaining a greater development of heat in a part of the line. Thus, if we have a platinum wire stretched between two rods or posts, and, connecting one of them with one pole of a powerful battery, draw the other terminal along the wire, beginning with the farther end, the heat in the wire will increase as the part through which the current passes decreases in length, until, if the battery is sufficiently powerful, the wire is at last even fused. Again, if a wire of some length is kept at a red heat by a battery, we may make one part glow much more brightly by cooling another with cold water. The reason is, that by cooling we increase the conducting power or diminish the resistance of that part, and so allow more current to be forced through the remaining portion. Many similar examples might be cited did space permit.

97. The interesting conclusion has been reached by Favre (*Comptes Rendus*, vol. lv., p. 56) that the total amount of heat generated by the solution of a given quantity of zinc in galvanic circuit is constant, being diminished in the battery as it is increased in the exterior circuit; and moreover that heat is lost when motion is produced just in the proportion that Joul's theory and equivalent would require.

98. From what has been said above, we see that if electric fluid could be forced in any amount through a non-conducting substance, very intense effects of heat and light ought to be produced. This is in fact observed in the case of the statical discharge in air, which affords us the most intense exhibition of these forces with which we are acquainted. With galvanic electricity it is, however, under ordinary conditions, impossible to obtain sufficient concentration to rupture the resistance of air. If, however, the poles of a powerful battery of, say, forty or fifty Grove or Bunsen elements are brought into contact, and then slightly separated, a bridge of particles torn off from the positive and hurled upon the negative pole is formed, and maintains the connection. Resistance enough, however, is offered to develop a light of the most dazzling brightness.

It is found most convenient to make the terminals in this case from a very dense and, in an ordinary sense, incombustible carbon or "coal-gas graphite" (such as is used for elements in the battery cells, except that a finer and purer preparation is here essential). Even this material is slowly dissipated in the intense heat of the electric arc, and various forms of self-adjusting regulators have therefore been devised by which the carbon points are made to approach each other as they are consumed.

99. If the lower carbon is hollowed into a cup, various substances, such as the metals and salts, can be placed in it, and converted into incandescent vapor by the action of the discharge. By this means the peculiar colored lights which they emit may be analyzed with a prism and projected as "spectra" on a screen with a very beautiful effect.

While, as we have already shown (§ 88), a galvanic current derived from chemical actions involving the use of zinc and other expensive materials is not at all able to compete with the coal-consuming engine as a source of mechanical power, yet by reversing the order of conversions and employing the cheap mechanical power of the steam-engine to develop a galvanic current (see § 104), and using this to produce light as above, something useful may be accomplished. In an interesting paper on the cost of the electric light (*Am. Jour. of Science*, 1868, vol. xlv., p. 113), Moses G. Farmer has shown that where a light of about 1000 candles was required it could in this way be produced at one-tenth the cost of the same amount of gas-light.

Galvanic or Dynamic Induction.—100. This action, whose theoretical explanation has defied the insight even of Faraday, is in its simplest form of exhibition as follows: Suppose that two wires are arranged side by side, but mutually insulated for some length, and that one of them is connected in closed circuit with a delicate galvanometer, while the other may be made at will the path of a current from a galvanic battery. If this connection is made, we will notice an instantaneous movement of the needle in the galvanometer, indicating a momentary current in the opposite direction to that of the battery. While this battery flows all is absolutely at rest, but the moment that an interruption occurs, another instantaneous current is shown by the galvanometer, but now in the same direction as the battery current followed. These momentary currents are called secondary or induced currents, and that producing them is called the "primary" current.

If the two wires, in place of being in parallel straight lines, had been wound each in a flat spiral, and these spirals had been in close proximity, the effect would have been the same. In this case, moreover, if instead of causing the primary current to start and stop, we allowed it to flow continuously, but brought the spirals quickly together and then as quickly separated them, the same induced currents would have been generated as before.

Bearing in mind, as has been already stated, that a magnet represents in all respects a spiral carrying a current, it is evident that the mutual approach and separation of magnets and helices should produce secondary currents in the latter, and so likewise the charging and discharging of electro-magnets in the presence of spirals or other conducting circuits.

101. Again, this "induced current" may be developed in the primary circuit or wire itself. It is then called the extra current. Also, as Prof. J. Henry has shown, the secondary current may in its turn be made to develop another, and this again a fourth, and so on to an indefinite limit.

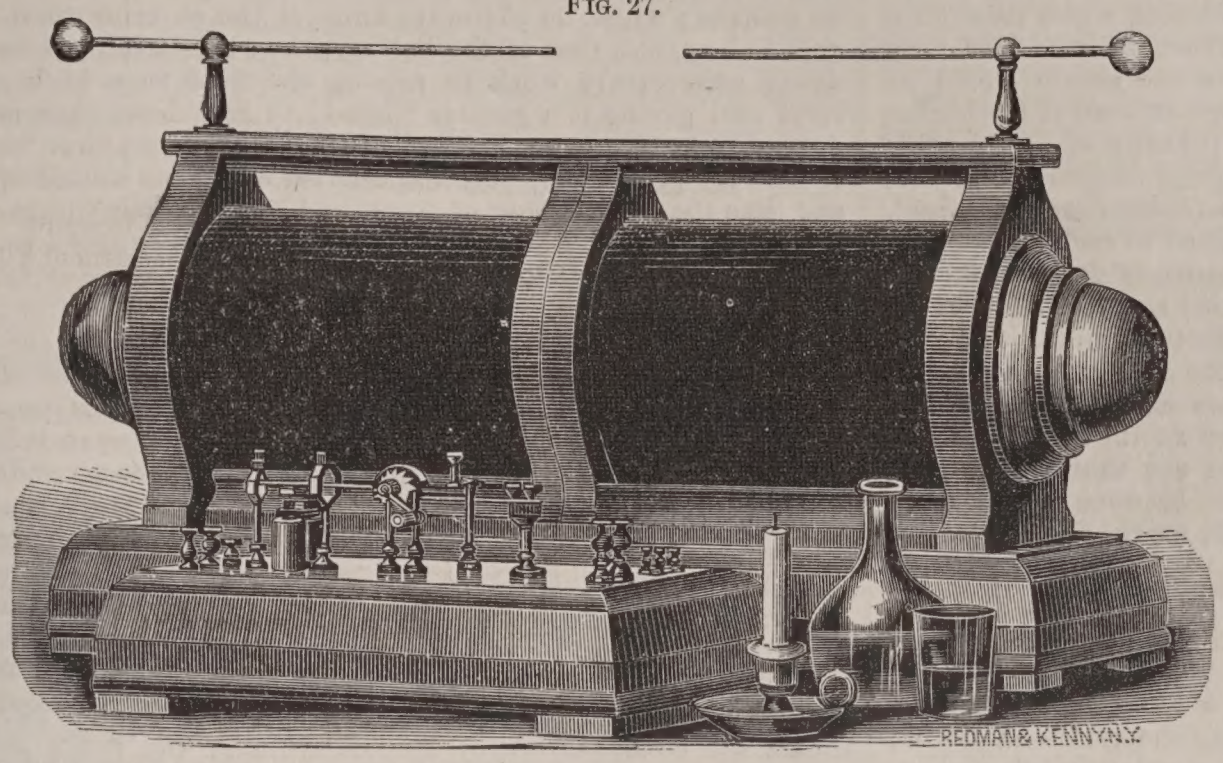
In addition to their great scientific interest, these actions above briefly noticed have developed two of the most remarkable instruments for the production of electric phenomena, the induction coil and the magneto-electric machine.

102. The induction coil consists of a thick wire wound into a spiral around a bundle of soft iron needles. This receives, through a "break-piece" or "interrupter," either automatic or moved by hand, a discontinuous current from a galvanic battery. Around this primary spiral, but most thoroughly insulated from it, even by a heavy glass jar, is another or secondary spiral of very fine wire and of great length. The terminals of this furnish the positive and negative fluids. To do away with the interfering action of the "extra current," a condenser is connected with the primary circuit at either side of the break-piece. This condenser is equivalent to a Leyden jar of great surface, and is made of tin-foil separated by oil-silk.

The battery connections being made, and the interrupter put in action, at each break of circuit flashes of electricity pass between the terminals with a length and brilliancy depending upon the size and perfection of the instrument. One of these coils, built for the present writer by Mr. E. S. Ritchie of Boston, to whom the instrument owes its efficient and practical development (*Jour. of the Franklin Institute*, vol. xl., p. 64), is shown in the accom-

panying cut. (See Fig. 27.) The outer or secondary coil of this instrument contains fifty miles of wire, .007 inch in diameter, covered with silk; the primary wire is 200 feet

FIG. 27.

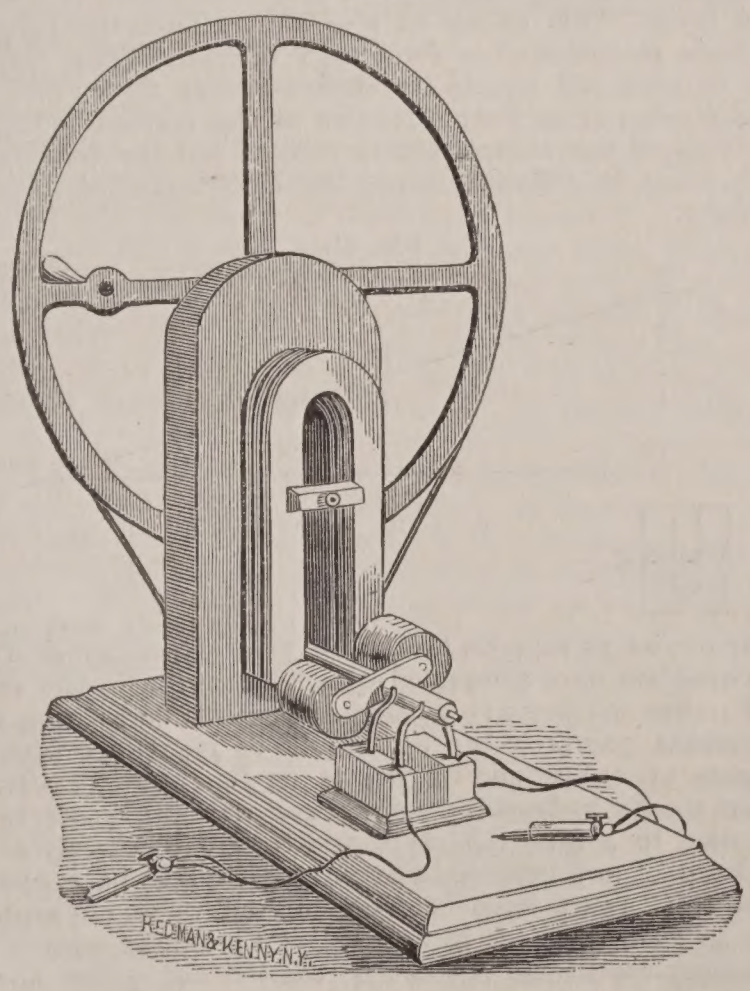


long and 0.1655, or about one-sixth of an inch, thick. The condenser contains 325 square feet of coated surface. With three cells of battery, each having in use, when freshly charged, not more than half a square foot of active surface, this instrument throws sparks in the air through a distance of twenty-one inches, and pierces solid blocks of glass three inches thick. When connected with a large Leyden jar the sound of its discharge is painful.

103. In addition to its numerous applications in scientific connections, this instrument has been used with great success as a means of lighting instantaneously the numerous gas-burners in public buildings, such as theatres. Many of these buildings in Boston, New York, and Philadelphia are so lit up. It is also employed in the Lenoir gas-engine to ignite the mixture of gas and air in the cylinder.

Magneto-Electric Machines.—104. If a coil of wire is rapidly caused to approach and recede from a permanent magnet, a series of induced currents will be developed in it. An easy way of securing this approach and withdrawal is to make several such coils rotate in front of large magnets in the manner shown in the cut. (See Fig. 28.) If bars of soft iron are fixed in the coils, they will receive and

FIG. 28.



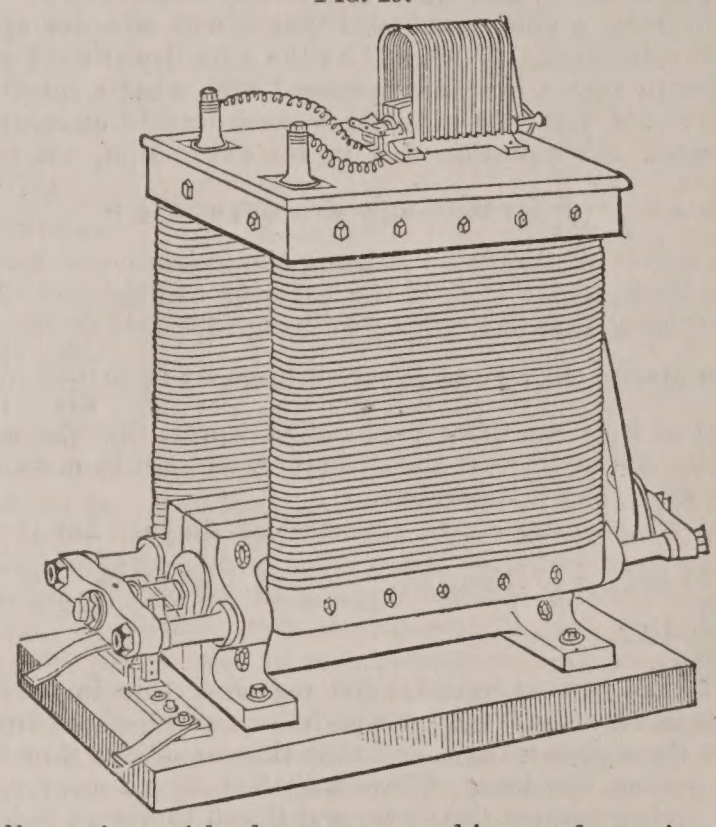
lose their charge, and so greatly add to the effect. Thus, then, such a machine may be constructed, and by terminating the coils in plates on opposite sides of the axis, which thus will alternately touch springs resting against it on either side, we may correct the reversal of the currents, and get them from these springs in a constant direction. This machine has received a great number of modifications, of which the important ones are Siemen's armature and Wilde's application of cumulative action.

105. Siemen's armature consists of a small cylinder of iron having two deep grooves cut along its length on opposite sides. In these grooves the wire is wound, and by this means the whole piece can be placed between the poles of a series of horseshoe magnets, or otherwise in a very intense field of force. It is moreover in a form admirably adapted for rapid rotation.

106. Wilde was the first to apply the discovery that the current developed by one magneto-electric machine could charge electro-magnets with a far greater force than existed in the magnets of the first machine. Thus, by having one machine to charge the electro-magnets of another, a very great electric current could be readily produced. This plan was adopted in the machine shown in the accompanying cut. (See Fig. 29.) A number of permanent magnets placed above produce in the armature rotating between them a current which charges the large electro-magnets below, and the armature rotating within these electro-magnets yields a current of great power.

107. Ladd of London has carried this idea yet farther

FIG. 29.



by dispensing with the upper machine, and causing part of the current developed by the large armature to circulate in the magnets around it. Some trace of magnetism will be found in any piece of iron, and this is enough to start the action, which, reacting on itself, soon brings the machine to its maximum energy of action.

108. These developments of electric action are not obtained without corresponding expenditure of force. The armatures are powerfully attracted by the magnets, and must be forcibly pulled away. Indeed, one of Wilde's machines when producing a very intense electric light requires about five horse-power to drive it.*

109. Not only do magnets develop currents of electricity in coils of wire, but also in any moving conductors, and the currents so produced react upon the magnets, and also in passing through the conductors themselves develop heat. Thus, if a copper disk or tube is rotated in a powerful magnetic field, it will become very hot; indeed, fusible metal placed in such a tube may even be melted. So, again, a disk of copper rotated under a magnetic needle will cause this to be displaced. The magnet induces currents in the rotating disk, and these in turn affect the magnet.

ELECTRICAL MEASUREMENTS.—*General Considerations and Definitions.*—110. We have already at the outset, when considering the source of galvanic electricity, pretty fully discussed the meaning of electro-motive force, and have shown that it means simply the power of separating

* These machines are now employed with entire success to deposit copper for electrotyping, as at the establishment of Mr. L. L. Smith, 135 West Twenty-fifth street, New York, and for some lighthouses. An account of the magneto-electric machine of M. Gramme, in the London "Standard" of April 9, 1873, confirmed by other information, leads to the belief that a decided improvement has been made in these machines.

the electric fluids resulting from a difference in chemical attractions under certain conditions. We have compared this power, with reference to each of the fluids considered separately, to an imaginary property which we might suppose some substance to possess of forcing water through it in one direction until a slight difference in level had been established on opposite sides, when the action would be restrained by the hydrostatic pressure or head of the higher level. Now, it is evident that the quantity of liquid made to pass by such an action would depend on two things—on the intensity of the moving force (electro-motive force), and on the total resistance experienced to such motion, including both the resistance in the source of force itself (the sieve, for instance, in our illustration) and the channel by which the liquid could descend again to its first level.

Clearly, if the propelling force were constant the amount of liquid moved (there being in this case no question of inertia) would be so much the more as the resistance was less, and *vice versâ*. We therefore see that this simple equation will express the relation between these three things; Q being the quantity of fluid moved, E the electro-motive force, and R the resistance: $Q = \frac{E}{R}$. This is the famous law of Ohm, on which is founded the whole science of electrical measurement.

111. We will now consider a few cases in detail as a means of more clearly understanding the relations of this principle. Suppose that we have a number of electro-motive elements, such as galvanic battery couples, and arrange them in series (*i. e.* each one working into the next, as it were), and have an outside connection so short and of such a good conductor that it will offer no appreciable resistance. What will be the quantity of fluid set in motion in such a case, as compared with what a single element would yield with the same good outside connection? To make our equation full in its expression, we would have $Q = \frac{E}{R + r}$ for the single element, and $Q' = \frac{nE}{nR + r}$ for the number of elements; R being the resistance of the element itself, and r that of the exterior connection. Now, it is evident that if $r = 0$, as we have supposed in the case taken above, the second equation becomes $Q' = \frac{nE}{nR} = \frac{E}{R}$, or identical with the first; or, in other words, that the series of cells, however great their number, will set in motion no more fluid than a single one.

Let us give the above a numerical shape. Let $E = 50$, $R = 20$ and $n = 10$; then $Q = \frac{50}{20 + 0} = 2.5$, and $Q' = \frac{10 \times 50}{10 \times 20 + 0} = \frac{500}{200} = 2.5$.

112. Let us now consider the reason of this in the light of our illustration. Suppose we have a single sieve forcing water through a trough, and that this water can flow back with perfect freedom. There will then be no appreciable head acting against the sieve, and it will therefore force all the water that it is capable of transmitting. Now, suppose another sieve to take the water which has passed through the first; it will simply transmit it as did the other, without giving it any head or otherwise affecting it; for it must be borne in mind that we are not dealing with a dense material, which can acquire momentum, but with an imponderable fluid.

But now let us suppose that the exterior resistance was considerable—that, for example, the water raised to one side in the trough could only flow out by a narrow tube. Then clearly the sieve would produce a difference of level approaching that which was its maximum, and could then only pass on more water as the pipe allowed the accumulated quantity to flow back.* If, now, a second sieve were added to the first, it would take the water at the height to which the first sieve had raised it, and would raise it just as much higher, so giving it twice the head to force it through the pipe; and for a fluid without weight this would cause a double flow. Returning to our equation, we would then have this case expressed as follows, making r no longer equal to 0, but, say, to 30: $Q = \frac{E}{R + r}$ and $Q'' = \frac{nE}{nR + r}$; $Q = \frac{50}{20 + 30} = 1$ and $Q'' = \frac{10 \times 50}{10 \times 20 + 30} = \frac{500}{230} = 2.17$. In other words, in place of having the same quantity in both cases, as before, we now have more than twice as much in the one instance as in the other. It thus becomes evident that to obtain the best effect a certain proportion ought to exist between the exterior resistance and that of the electro-motor or battery, and our illustration will give us an easy way of seeing what this must be.

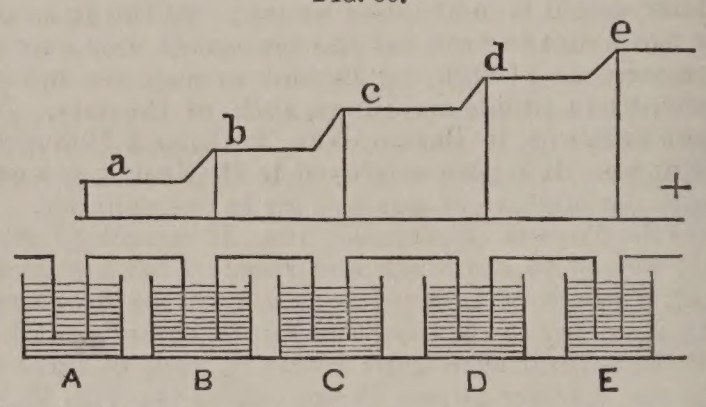
* Moreover, this flow would evidently depend for its quantity on the amount of head propelling it.

113. It is, in the first place, evident that if the resistance of the exterior circuit is greater than that of the battery, the latter will "pump up" the fluid faster than it can come down again, and that so its whole capacity will not be utilized; while, on the other hand, if the exterior resistance is less than that of the battery, then the latter will be doing unnecessary work in raising the fluid to a higher level and giving it a greater "head" to flow down than is needed to keep up the supply; or, in other words, that we could very greatly decrease the number of active elements, and thus the expenditure of force, and yet but little diminish the amount of fluid put in motion. Thus, suppose we have 30 elements, each with an electro-motive force of 12 and a resistance of 2, and have an exterior resistance of 40; then $Q = \frac{nE}{nR + r} = \frac{30 \times 12}{30 \times 2 + 40} = \frac{360}{100} = 3.6$. If we now take away 10 elements, or diminish the expenditure of material by one-third, we will have $Q' = \frac{nE}{nR + r} = \frac{20 \times 12}{20 \times 2 + 40} = \frac{240}{80} = 3$, or a diminution in the current of only .6, or one-sixth of its former amount.

These examples, with the foregoing definitions, render the meaning of electro-motive force and Ohm's law sufficiently clear; and we will therefore pass to the next point, or the meaning of the terms—

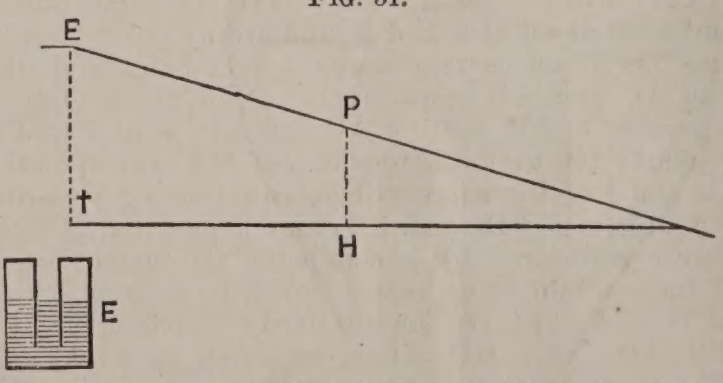
Tension or Potential.—114. These terms are used to indicate the condensation or accumulation of the fluids at any points, as compared with some standard assumed constant for the time being; or, turning to our former and convenient illustration, the tension or potential of any part of a circuit is the "head" or "hydrostatic column" of fluid at that point. Thus, suppose that A, B, C, D, E represented a series of galvanic elements or cells, with their negative pole connected with the ground at N, and the positive pole

FIG. 30.



insulated; then the successive levels a, b, c, d, e would indicate the + tensions of the various points, the relative tensions being expressed by vertical lines drawn to a common level. This shows us also at a glance the relation between electro-motive force and tension. The tension due to each cell equals its electro-motive force, and the total tension or maximum tension of the series is equal to the sum of the electro-motive forces; but the tension of each point is different, while the electro-motive force is uniform.

FIG. 31.



Again, let us suppose that the + pole of battery E of the last diagram were connected by a long wire with the earth at F; then the positive tension at F would be nothing, and at various points in the line would be represented by the heights of corresponding points on the line eF. Or, to revert to our hydrostatic comparison, suppose water to be supplied to a pipe GF at G, and to run out freely at F, the head at any intermediate point, H, might be supposed to be HI. As we have before remarked, we do not propose this as an illustration in hydraulics, though by adding the necessary conditions it could be carried out in that shape, but simply as giving a physical shape to the idea of the electric state, which may render it more easy to handle.

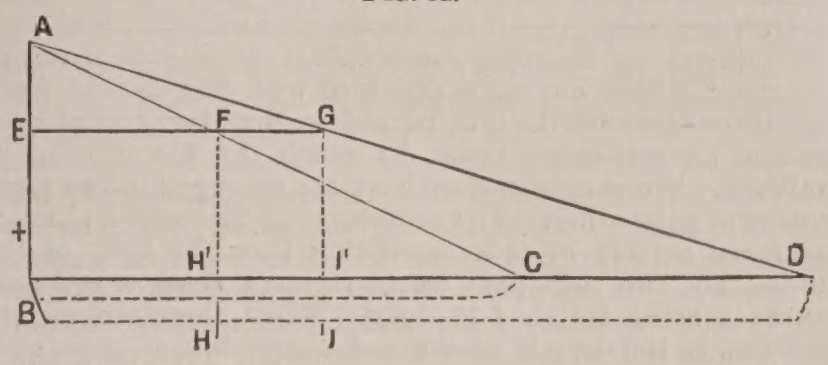
Derived Circuits.—115. When more than one passage is presented to an electric fluid, it will divide itself between them in proportion to the ease of passage, or inversely to the resistance. Thus, suppose two circuits open to the current, one offering a resistance of 9 and the other of 1 unit. Then one-tenth of the current will flow through the first, and nine-tenths through the second; and whatever be the

number, and however great the difference of the circuits, this rule will be rigorously carried out. Again, if two separate circuits have resistances of 2 in one case and 9 in another, and we wish to find what their resistance would amount to when they both acted together as parallel roads for the fluid, we easily derive it in this manner. If their resistances are 9 and 2 respectively, their conducting powers will be one-ninth and one-half, or the reciprocals of their resistances. Now, the sum of these, which would evidently be their united conducting power, would be $\frac{1}{9}+\frac{1}{2}=\frac{2+9}{9\times 2}$; but this being the conducting power, the resistance is its reciprocal, or $\frac{9\times 2}{2+9}=\frac{18}{11}=1\frac{7}{11}$. But from the above example we can derive the rule—namely, the resistance of a compound of two parallel circuits is the product of the resistances divided by their sum.

116. One of the applications of this principle is in the use of what are called shunts. These are resistances bearing some convenient relation to that of the galvanometer used, and therefore diverting a proportional amount of the current, so that we can measure with an instrument a current which would otherwise be much too powerful. Suppose, for example, that we have a coiled wire whose resistance is to that of the galvanometer as 1 to 9; then the total amount of current transmitted will be that due to their "combined" resistance when they form parallel connections. Thus, $\frac{9\times 1}{9+1}=\frac{9}{10}$ will be the resistance of this "combined circuit," and hence its transmitting power will be $\frac{10}{9}$; while the galvanometer resistance being 9, its transmitting power will be $\frac{1}{9}$, or one-tenth of this; hence, with this shunt in action, the force measured by the galvanometer will be one-tenth of the total amount passing, and hence all its indications should be multiplied by ten. In the same way we may use shunts whose resistances are to those of the galvanometers as 1:99 or 1:999, and so measure the one one-hundredths and one one-thousandths of the current.

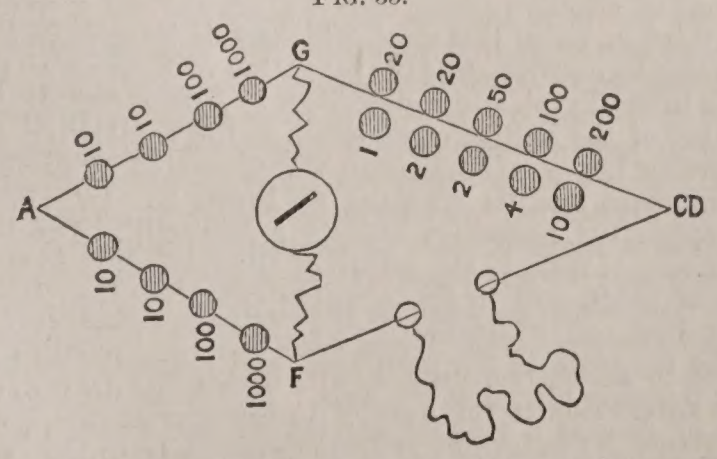
Measurement of Resistances.—"*Wheatstone's Bridge.*"—117. Suppose that the positive pole of a battery, with a

Fig. 32.



tension represented by the height AB, is connected at B to two wires, BC and BD, whose resistances are represented by the lengths of those lines, and that these lines are both connected with the earth at their ends, C and D respectively. They will then of necessity have the same tension at B, and none at all at C and D, and at any point between their tensions would be represented by the heights of lines drawn to AC and AD respectively. Now, if any line be drawn parallel to BD, cutting AC and AD, as at F and G, it is evident—1st, that the tensions of the corresponding points H and I of the wires will be equal, being measured by the equal lines FH′ and GI′, and hence that if these points were connected by a conductor no current would pass, as there would be no reason for it to go from F to G or from G to F. 2d, By the similarity of triangles ACD and AFG, AG : AF :: GD : FC, from which we would conclude that if we unite two points in two circuits, so that the four segments are proportional in their resistance, no

Fig. 33.



current will pass. We have only considered the one fluid, the positive, but of course the same reasoning would apply to the negative, and being true for each would be true for both.

Let us now consider an application of this general principle. Suppose that we have adjustable and known resistances so arranged that a battery current entering at A divides on AG and AF; that from G to CD are arranged other known resistances, while between F and CD we introduce some unknown resistance which we wish to measure. The points G and F are connected through a galvanometer.

118. Suppose, then, that we make the adjustable resistance on AG 10, and that on AF 100, and then introduce resistances on G–CD until the galvanometer ceases to show any current. We will then know that AG : AF :: G–CD : F–CD, or x. If therefore we had found it necessary to introduce resistances of 173 at G–CD, we would have 10 : 100 :: 173 : x, $x=1730$. This method, which admits of a very wide range of application, is perhaps more extensively used than any other.

With a double-coil galvanometer we may measure resistances by making the current divide and pass in opposite senses through the two coils. If each branch has an equal resistance, the two currents will be exactly equal, and their effects upon the needle or needles will neutralize each other. The unknown resistance being introduced in the one branch, we place known resistances in the other until a balance is obtained, and then know that the resistance so introduced equals the unknown one. Where the resistance is too great for our standards, we can, by introducing shunts on that side, increase their value 10, 100, or 1000 times. For resistances higher than can be measured in this way we note the deflection produced by the current, and compare it with that obtained with known resistances, either with or without shunts.

Induction.—119. This action in the case of insulated wires is exactly the same as that already discussed in the Leyden jar. It is measured by noting the deflection produced by charging and discharging the insulated wire immersed all but its ends in water connected with the other pole, and comparing this deflection with that obtained by like treatment with condensers of known capacity. The unit here used is the *farad*, for whose relations to other measures see "Electrical Units."

Resistance of Batteries.—120. With a double-coil galvanometer this measurement presents little difficulty. We connect one or more cells of the battery with a set of adjustable resistances, and pass the current through one coil of the galvanometer, introducing as much resistance as is necessary to bring the deflection to a sensitive point. We note this effect, and then know that it or $Q=\frac{E}{R+r+r'}$; R being the battery resistance, r the resistance of the galvanometer, and r' the additional resistance which we have introduced. We now pass the current through both coils in the same direction, and add resistance until we get the same deflection as before. We then know that since by passing twice as often round the needle the electro-motive force has been doubled in efficiency, and yet has only produced an equal effect, the resistances must all have been doubled. Now, r is doubled by the use of the second coil, and we know the amount of r', which is what we added to regulate the deflection; therefore any additional quantity which we have employed must be the duplicate of R, the battery resistance.

121. To compare the electro-motive force of batteries, we first determine their resistance, and then, connecting them successively to the same galvanometer, add resistances till they all make the same deflection; then their electro-motive forces will be inversely as the total resistances in the several cases, including those of the batteries themselves.

122. We have here given all the fundamental processes of measurement, but there are of course countless modifications which cannot be even named within our present brief limits. For these we must refer the reader to the works of Sabine, Clark, and Culley on this special subject, and to the numerous papers in the "Reports of the British Association" and in the scientific journals.

123. As a matter of interest to the general reader, we may mention that the location of faults in submerged cables is accomplished by the application in some modified form of one or other of the methods already described, according to the nature of the fault. Thus, if the fault is an entire rupture, it is located by comparing the resistance of the piece left with that of known lengths of the same wire. If the conductor is fractured inside of its insulating sheath, the inductive charge is measured, and we thus know how much wire remains on the nearer side of the break. Of course complicated cases require special treatment.

Electrical Units.—*The unit of resistance* or *ohm* has been already given at § 75.

The unit of tension or electro-motive force, or *volt*, does not differ much from that of a Daniell's cell. One million volts make a megavolt, and one-millionth of a volt is a

microvolt. Sir W. Thomson makes the volt equal to .9268; the electro-motive force of a Daniell's cell or the Daniell = 1.079 volts.

The unit of quantity is a farad, the megafarad and microfarad bearing the same proportion of a million times and a millionth as with the ohms and volts. The farad is that quantity of electricity which with an electro-motive force of one volt would flow through the resistance of one megohm in one second. *The British Association unit of current* is a current of one farad per second.

The Electro-chemical Unit.—Experiment shows that a unit current decomposes in one second .143 grains of water, or liberates 1.02 cubic inches of mixed gas.

HENRY MORTON.

Electricity, Animal. See ELECTRICITY, § 77, p. 1511, by PRES. HENRY MORTON, PH. D.

Electric Light is the result of heat produced by the force of electricity, which is usually evoked by the chemical reaction of a metal and an acid. This combination is termed a battery, and from its opposite ends the opposite kinds of electricity are conducted by wires, terminating in pencils of hard coke. These pencils being brought into contact and then separated, the opposing electric currents rush together to form again neutral electricity, and this act gives rise to a very great amount of heat. This heat will ignite the intermediate stratum of air to a point at which it evolves light, but this amount of light is small compared with that given out by the ignited ends of the coke pencils and the particles of carbon thrown off by these pencils. The most beautiful of all artificial lights is produced in this way.

In using the electric light it is found that the carbon points waste rapidly, the positive point especially so. One of the best methods of keeping the light constant is a device by Duboscq, whereby clockwork is made to move the points slowly towards each other—the positive at about twice the rate of the negative point. In order to prevent the points from striking each other the current is made to pass through a coil around an electro-magnet, which attracts a keeper, thus stopping the clock; but when the points are burned away the clock is started by the falling of the keeper, and the current is so quickly renewed (if the apparatus be good) that no sensible disturbance of the light takes place. This light is much employed for experimental purposes, and has been used with success in lighthouses.

Electric Telegraph. See TELEGRAPH, by PROF. A. M. MAYER, PH. D.

Elec'trodes (plu.), [from *electricity* and the Gr. ὁδός, a "way"], the surfaces by which electricity passes into and out of different media. The poles of the voltaic battery or pile are especially termed *electrodes*. The so-called positive electrode is the "anode," and the negative is the "cathode."

Electro-dynamic Engine, a form of engine in which electro-magnetism is the motive-power. Immediately after the invention of the electro-magnet in 1827 by Prof. Henry, the instantaneousness with which, in this contrivance, force may be developed, destroyed, or reversed, led many persons of an inventive turn to attempt its application to some useful purpose in the arts. Many forms of vibrating and rotating apparatus were constructed by Prof. Henry and others to illustrate the principle; but the first electro-dynamic engine, properly so called, was the invention of Thomas Davenport of Vermont, by whom it was exhibited to Prof. Henry in 1835, and brought out publicly in New York a year or two later. In this machine a number of fixed electro-magnets were arranged, with poles presented inward, upon the circumference of a horizontal circle, within which an equal number, V-shaped in form, with their branches in the direction of radii, revolved. By a system of pole-changing thimbles the battery current in the revolving magnets was reversed at the moment of nearest approach of the fixed and movable poles, so that during approach they were attracted towards each other, and after the passage repelled. The success of a small machine of this construction was such as to encourage Mr. Davenport to attempt one on a scale sufficiently large, by calculation, to drive a power-printing-press; but this last proved a complete failure, and the engine was heard of no more. The discrepancy in this case, as in many others where similar disappointment has been encountered, between calculation and experimental results, was in great part owing to the fact that moving magnets, whether permanent or temporary, always generate, in closed conducting circuits in their neighborhood, secondary or induced electric currents, which act in opposition to the primary currents, and tend in all electro-dynamic engines to diminish the effective energy of the magnets, whether they act by attraction or by repulsion. But had not this difficulty existed, the engine would hardly have been an economical success, since the materials consumed in the battery, metallic zinc and acids or salts, are products of industry prepared by the aid of heat; and the heat necessary for such preparation is capable, if directly applied to the production of steam, of performing a larger amount of work than would be derived from the electro-dynamic engine, even were it not subject to the disadvantage above mentioned. Indeed, it has long since been regarded as settled that motive-power derived from electro-magnetic combinations can only be secured at an expense which forbids its employment upon a large scale; but for many minor purposes, in which the consideration of cost is unimportant, the convenience of application of this power has secured for it an acceptance which in France and England is becoming every year more general.

The extensive introduction into families of the sewing-machine has created a special demand for small powers; and it is here that the electro-magnetic engine finds a field of usefulness to which it is peculiarly adapted. An engine of this kind, the invention of Mr. J. H. Cazal of Paris, was exhibited in the Universal Exposition of 1867, and received from the jury the distinction of an honorable mention. This is exceedingly compact, and as the driving machinery takes the place and has the appearance of the fly-wheel of the common sewing-machine, it adds nothing to the weight or to the seeming complication. It is formed of a thick disk of soft iron cut into the shape of a gear-wheel, a deep groove being afterwards cut down in the middle of the circumference, which is wound with insulated wire. The ends of the wire are soldered to insulated thimbles, which, by means of tangent-springs, introduce the battery current in the usual way. Surrounding this magnetic wheel is a heavy iron ring, indented on its interior surface in a manner to present elevations corresponding to the teeth or salient points of the wheel. This ring is fixed, and the whole apparatus is more or less concealed by a neat annular metallic envelope. When the teeth of the wheel pass before the prominent parts of the surrounding ring, there is a near approach to contact, and the attraction is strong. When these teeth are halfway between those points, the opposite attractions are balanced. At the moment of nearest approach the current is arrested; it is renewed again at the intermediate position. In the interval, while the current is not flowing, the magnetic wheel maintains the motion in the manner of a fly-wheel.

Another engine was exhibited in the same exposition by a company calling itself the Birmingham Electro-Magnetic Manufacturing Company, established at Birmingham in England. This engine is provided with four sets of fixed electro-magnets of the U or horseshoe form, two sets at each end of an oscillating beam, by which the power is to be utilized. The magnets of each set are arranged in two tiers, one above the other. The armatures of these several magnets are carried by rods depending from the ends of the beam, but the rods pass freely through these armatures, without being fastened to them. When, therefore, an armature, in the descent of the rod, comes into contact with the magnet to which it belongs, the rod continues its motion, and leaves the armature resting there. In the return motion the rod lifts the armature again by means of a collar or enlargement which has been given to it at the place intended. Each armature has thus its collar, and these several collars have been so fixed upon the suspended rods that the armatures reach the faces of their respective magnets successively, and no two at the same time. In the action of the machine the battery current actuates the magnets on the side of the descent, while on the other side the current is cut off. The machine acts therefore only by attraction. The armatures are of soft iron. As these armatures approach their magnets successively, it will happen that whenever one becomes inefficient, by coming into contact with its magnet, the next will be in position to exert a very high attractive force. And this force increases until this next makes contact with its magnet in like manner. The arrangements of this machine, though extremely simple, are not unfavorable to the object of securing the largest amount of effective power from a given battery current.

A third motor of this class, which made its appearance at the same Exposition, was the invention of Kravogl of Innsbruck in the Tyrol, and is described by Robert Sabine, Esq., member of the British commission to the Exposition, to be "a hollow heavy wrought-iron wheel, rotated by means of a permanent magnet creeping up inside it. In principle, the apparatus resembles exactly a treadmill. Inside the outer case of iron, in the centre of the section, is a circular tube of brass, and in the annular space between the two tubes three coils of insulated wire are wound at right angles to the tangents of the periphery, and connected with contacts properly placed at the axis. Inside the interior brass tube or ring is a magnet carried on anti-friction wheels, and occupying perhaps one-third of the whole circle. When a current is sent through the wire surrounding the magnet, the latter is deflected, or creeps up the ring on one side or

the other according to the direction of the current, and by doing so displaces the centre of gravity of the whole system towards that side. In consequence, the wheel must turn slightly on its axis to compensate this displacement. But while it does so the magnet creeps up still farther, so that the wheel acquires a continuous rotatory motion. There is very little friction in this machine, and it is probably one of those in which the equivalent of mechanical force, gained by an expenditure of a unit of current, would be found the highest. This is not saying much, however, for in the best constructed machine this found value must fall far short of the theoretical equivalent." From this statement it appears that, whatever may be the coefficient of effective force in the machine described, the absolute amount of work which it is capable of performing must always be extremely limited, since at maximum it cannot exceed the weight of the magnet lifted through a space equal to that described by a point in the periphery of the wheel, taken at the mean distance of the magnet from the centre of motion. In the machine exhibited the magnet, though of course concealed from observation, could not, from the visible dimensions of the apparatus, have exceeded a pound or two in weight. To construct a machine on this principle of any considerable power it would be necessary very greatly to enlarge these dimensions.

Many other inventions of this kind might be enumerated, but the foregoing will suffice to show the principles on which they must all depend. F. A. P. BARNARD.

Elec'tro-Dynam'ics is the science which treats of the phenomena of electric currents. (See ELECTRICITY, by PRES. HENRY MORTON, PH. D.)

Electrol'ysis [from *electricity* and the Gr. λύω, to "set free"], the chemical decomposition of a substance by means of electricity. If the poles of a galvanic battery are terminated by slips of platinum, and these are immersed in water slightly acidulated with sulphuric acid, they will immediately become covered with bubbles of gas, which soon begin to rise through the water, and these gases will be found to be oxygen and hydrogen, the two components of water; the oxygen rising from the positive and the hydrogen from the negative pole. This process can only take place when the substance to be decomposed is in the liquid state; for it includes, if it does not wholly depend on, a convective action, during which the parts of the body are transferred, one to one side, the other to the other; and it therefore requires the free mobility of the liquid form. During electrolysis the components of the electrolyte are resolved into two groups, one of which goes to the positive pole, and the other to the negative pole; and the electrolytic action of the current is the same at all parts of the circuit. The quantity of the electrolyte decomposed in a given time is in simple proportion to the strength of the current; and the same quantity of electricity decomposes chemically equivalent quantities of different electrolytes. When several electrolytes are mixed, a strong current will generally act a little on all of them, and the quantity in which the elementary-bodies appear will depend upon the quantities of the compounds in the mixture, and on the relative ease with which they yield to decomposition.

Electro-Magnetism. See ELECTRICITY, by PRES. HENRY MORTON, PH. D.

Electro-Metallurgy. See ELECTROTYPE.

Electrom'eter [from *electricity* and the Gr. μέτρον, a "measure"] is sometimes used as the name of an instrument employed in detecting electric excitation, but more commonly called electroscope; but the term properly designates those instruments by which the attempt is made to measure the amount of the electric force. Coulomb's electrometer measures this force by the amount of twist it will give to a silken thread; others measure the arc through which a suspended pith ball is repelled by electricity.

Electroph'orus [from *electricity* and the Gr. φέρω, to "produce"] is an instrument for obtaining electricity by means of induction. A shallow brass or tin tray, called the form, is filled with a compound of equal parts of shell-lac, resin, and Venetian turpentine. A tin plate with well-rounded edges and a glass handle is made to cover the resinous plate very nearly, without approaching too closely to the edges of the form. The resinous plate is then struck or rubbed with warm and dry catskin or flannel, and thus becomes negatively electrified. The tin plate is placed on the resin and touched by the finger, which conducts off a certain amount of the natural negative electricity of the tin plate; the latter has therefore become positively electrified, and on withdrawing the finger and raising it will furnish a positive spark. As the negative electricity of the resin acts only inductively, the process may be repeated indefinitely.

Electro-plating is the covering of the surface of articles formed of the cheaper metals with gold, silver, platinum, nickel, copper, or other costly metal by means of the electric current, on the same principle as that which is employed in electrotyping. German silver is one of the best substances to receive an electro-plate, though copper and its alloys are excellent. If iron, zinc, or pewter are to be used, they are first plated with copper, and they then readily take the electro-plate of gold or silver. All articles to be plated are most carefully cleaned and scoured. They are then dipped in a solution of nitrate of mercury, and receive therefrom a thin film of mercury, which causes the plate to adhere firmly. The bath of silver, gold, or platinum contains 100 parts of water, 10 of potassium cyanide, and 1 of the cyanide of the precious metal to be employed. The articles to be plated are suspended in this bath, and treated as described in the article ELECTROTYPE (which see). After removal, they are brushed and burnished. The above account is necessarily very general, for though the principle is simple, there are in practice many details which require careful attention in order to secure success. This process is of great importance in the arts, one of its latest applications being the operation of NICKEL-PLATING (which see.)

Elec'troscope [from *electricity* and the Gr. σκοπέω, to "see"], an instrument for the detection of the presence of electricity. Suspended balls of pith or slips of gold-leaf, from their extreme lightness, will readily diverge from each other; and this, or some similar device, is the essential element of most electroscopes. They depend for their action on the elementary law, that bodies charged with like electricity repel, while those charged with unlike electricity attract each other. The electroscope most used is Bennet's gold-leaf electroscope. This consists of a glass shade with a wide mouth, which is closed by a wooden stopper which can be taken out and replaced at pleasure. A glass tube passes vertically through the centre of the wooden stopper, while a metallic rod is fixed in the centre of the glass tube. The lower end of the rod terminates in a small flat plate, to the sides of which two narrow strips of gold-leaf are soldered, and are thus attached opposite each other; and the upper end of the rod is furnished either with a circular horizontal plate or with a brass knob. If an electrified body be brought near to the top of the instrument, the top becomes electrified oppositely to the body presented, and the gold leaves similarly. As they are both charged with the same kind of electricity, they repel each other, and diverge more or less in proportion to the strength of the charge and to the nearness of the electrified body; and thus show us the presence of free electricity. Besides Bennet's electroscope, there are the single gold-leaf electroscope, Volta's condensing electroscope, and Bohnenberger's electroscope.

Elec'trotint, an art by which drawings are made with any substance insoluble in the solution of sulphate of copper. When the design is completed the plate is immersed in the solution, and a reverse made by the electro-coppering process, called electrotype or voltatype.

Elec'trotype [from *electricity* and *type*] is the name given to the cast of an object procured by the gradual deposition of a metal from a solution by means of a current of electricity. When two pieces of clean platinum are put into a solution of sulphate of copper, no change takes place. But if an electric current is transmitted through the solution by means of these platinum plates, copper is at once precipitated upon the platinum, which forms the cathode, the anode remaining clean. If the current be reversed, the copper will be transferred from the platinum plate on which it had been deposited to the clean plate. By thus reversing the direction of the current the copper may be sent backward and forward, being always deposited upon the negative pole, or that surface by which the electric current leaves the electrolyte or solution that is undergoing decomposition. By continuing the electric currents, and keeping up the strength of the solution by adding fresh portions of the salt of copper, the metallic film on the cathode may be made of any required thickness, and afterwards peeled off the platinum surface. The texture of the copper deposited varies with the battery-power employed and with the strength and temperature of the solution, and may be hard, brittle, and crystalline, or tough and malleable, according to the management of the operator. A current of low intensity, a moderately strong solution of sulphate of copper acidulated with sulphuric acid, and a temperature not below 60°, are the most favorable circumstances for obtaining the best deposit of copper. When the negative pole or cathode is irregular (like a coin or medal), instead of being a plane surface of platinum, an exact impression of the device may be taken off on the precipitated copper. Gold and other metals may be substituted for copper by proper management, or if the pre-

cipitated metal be left upon the surface on which it is thrown down, gilding, silvering, etc. may be done extensively and with fine effect. This art is called electro-plating. Proficiency in electrotyping or the galvano-plastic art requires but little apparatus, and involves no great expense. A medal may be either copied directly, and an inverted impression obtained from which a second electrotype can be taken, or a cast of the medal may be first made in stearin or plaster. In the latter operation, which is the most generally used, the mould, if of plaster, must be first soaked in oil, tallow, or melted spermaceti, so as to render it impervious to water. It must then be made a conductor of the current, and this is done by thoroughly brushing black lead over the surface which is to be reproduced. In case the medal itself is used, in order to prevent the deposition of copper which would take place upon the edges and upon the reverse of the medal, those parts should be covered with sealing-wax, varnish, or shell-lac. The introduction of this valuable art has been ascribed to different persons. Daniell is said to have been the first to notice the deposition of metallic copper by electricity while working with his battery; Jacobi of St. Petersburg first published in 1839 a practical application of this fact, which publication called out announcements from Spencer and Jordan, two Englishmen, who were both working independently at the same object as Jacobi. Messrs. Elkington soon after applied the process to the gilding and plating of goods on a large scale. Electrotyping has to some extent superseded the old stereotype process for making plates for printers' use, especially for the reproduction of engravings and where large numbers are to be printed. In large electrotyping establishments, gutta percha moulds are almost exclusively employed at present, and in place of galvanic batteries magneto-electrical machines driven by steam are used.

Elec'trum, the Latin name of AMBER (which see); also a natural alloy of gold and silver, in the proportion of two of gold and one of silver. It is found in Siberia, Norway, and California, and occurs in tabular crystals or imperfect cubes of a silver-white color.

Elec'tuary [Lat. *electua'rium,* from the Gr. ἐκ, "out," and λείχω, to "lick," because designed to be licked with the tongue from the spoon], in pharmacy, a variety of confection thinner than a conserve, and composed of powdered drugs mingled with honey, syrup, glycerin, or other vehicle. Electuaries are not now recognized in the U. S. and British pharmacopœias.

El'egy [Lat. *elegia;* Gr. ἐλεγεία; Fr. *élégie;* Ger. *Elegie*], the name given by the ancient Greeks and Romans to poems of various kinds, being applied to the martial lyrics of Tyrtæus, the aphorisms of Theognis and Solon, the melancholy effusions of Mimnermus, and the erotic poems of Ovid, Catullus, and Tibullus. In modern times the name is applied chiefly to poetical compositions of a melancholy character.

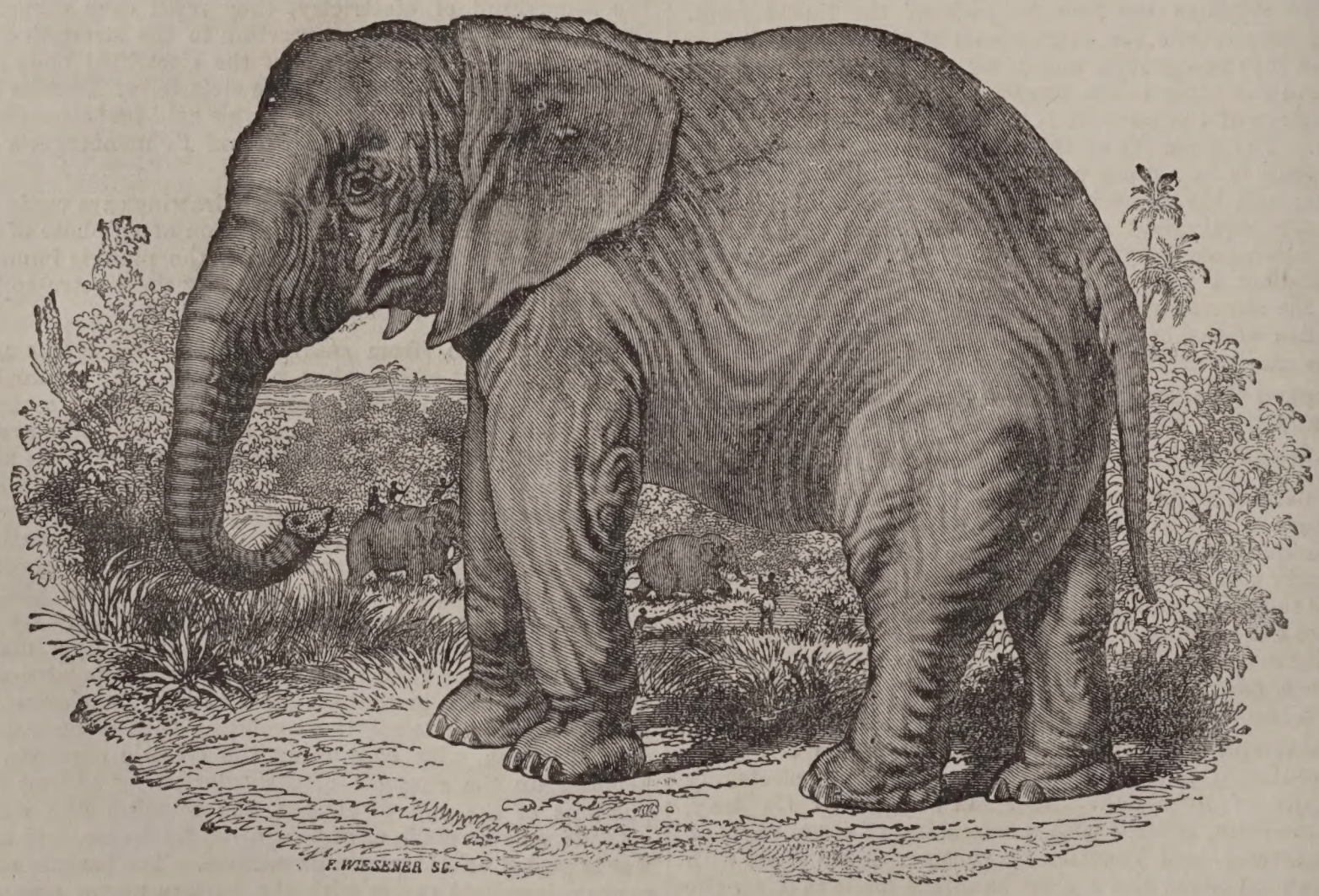
El'ement [Lat. *elemen'tum;* Fr. *élément*], a term used in various senses; a first principle; a rudiment; a constituent part of a compound; sometimes the proper state or sphere of a person or an animal. In the plural, the first principles or rules of a science or art; also the bread and wine in the Eucharist. Ancient philosophers applied this term to fire, air, earth, and water, each of which, in their several systems, was supposed to be the first principle of all things. The elements of the alchemists were sulphur, mercury, and salt. As a modern scientific term, *element* signifies a simple substance, or one which chemists have not yet decomposed.

ELEMENTS, in astronomy, are the data required in order to compute the place of a planet, satellite, or comet; those numerical quantities, etc. which are employed in the construction of tables exhibiting the motions of the moon and planets. They comprise the greatest, least, and mean distances of the planets from the sun, the eccentricity of their orbits, their mean motions, daily and annual, their masses, densities, etc.

Elements, Chemical. See CHEMISTRY, by PROF. GEORGE F. BARKER, M. D.

El'emi, the name of a fragrant resinous substance procured from several species of trees of the natural order Amyridaceæ. It exudes from incisions made in the bark, is at first soft, but becomes hard and brittle. It is generally pale yellow, semi-transparent, and soluble in alcohol except a residue called *elemin.* It is obtained from the *Icica Icicariba,* which grows in Brazil; from *Elaphrium elemiferum,* of Mexico; and from *Canarium commune,* of Manila. Elemi is used in the preparation of ointments and plasters.

El'ephant [Gr. ἐλέφας; Lat. *elephas,* gen. *elephantis*],



African Elephant.

a gigantic animal of the order Proboscidea, is the largest and heaviest of existing quadrupeds, and is celebrated for sagacity and docility. The genus is characterized by having grinders composed of alternating vertical plates of ivory, enamel, and cæmentum; and two ivory tusks in the upper jaw. Elephants are the only living Mammalia that have a proboscis or trunk longer than the head. Cuvier included the genus *Elephas* and the extinct mastodon in a family of pachyderms, which he called Proboscidians. The proboscis is a very remarkable feature, and presents an astonishing combination of flexibility and strength. It is an organ of touch, is four or five feet long, has neither bone nor cartilage; and this constitutes the peculiarity of its mechanism. Two tubes or canals, which are prolongations of the nostrils, extend through its whole length. The mechanism of the trunk is unique among animal structures, and renders it capable of performing operations as different as picking up a pin and tearing up a tree by its roots. The animal uses his trunk to convey food and drink into his mouth, but he rarely uses it as a weapon. As an organ of touch the trunk is exquisitely fine. The elephant has so high an opinion of the importance of its trunk that when

attacked by a tiger or exposed to other danger he carries it high in the air. The tusks, which correspond to the canine teeth of other quadrupeds, sometimes measure nine feet in length and weigh 150 pounds each, but the average weight is not over 100 pounds. The tusks are formidable defensive and offensive weapons. The curvature of the tusks is subject to great variations. Some of the Indian elephants have their tusks varying from a projecting horizontal but rather elevated curve to a form almost straight. Others resemble in shape the letter S. Although the substance of which they are composed, called ivory, is different from the bone of other teeth, it is formed, like other teeth, by successive secretions from a pulpy root. The tusk has no adhesion to this root, but is held in its alveole (socket) as a nail is held in a plank. The elephant feeds on vegetable food exclusively, and the construction of its grinding teeth is a striking example of the adaptation of the teeth of every animal to its peculiar mode of subsistence. The duration of the teeth of quadrupeds is in proportion to their ordinary term of existence. To an animal that feeds on grass, leaves, etc. the destruction of the teeth involves a speedy death. Each grinder is composed of vertical laminæ covered with enamel, and joined together by a substance like ivory. This latter, being much softer than the enamel, wears away faster, so that the enamel remains higher, and the surface of each grinder always presents several ridges. Thus, by the renewal of the grinding surface the teeth of the elephant will last 100 years or more. According to Pliny and Aristotle, the elephant is capable of living 200 years.

Besides many species which are extinct, the genus *Elephas* comprises only two species now living—namely, the Asiatic or Indian elephant (*El'ephas In'dicus*) and the African (*El'ephas Africa'nus*). The former has small ears and a concave forehead, and its skull is higher in proportion to its other dimensions. The forehead of the African species is somewhat convex, and it has enormous ears, which cover the shoulders. The ear is the most conspicuous external character by which the two species may be distinguished. The height of the Indian elephant from the ground to the top of the shoulder seldom exceeds ten feet. The African is larger, and sometimes measures twelve feet high. F. Cuvier and others regard it as of a distinct genus, and name it *Loxodonta Africana*. There is a skeleton of an elephant in the Museum of St. Petersburg which measures sixteen and a half feet in height.

A large elephant weighs about 7000 pounds. The ordinary period of gestation is twenty months and some days; only one calf is produced at a birth. The quantity of food consumed daily by a full-grown elephant is enormous, probably not less than 300 pounds. The skin is hard, thick, and nearly naked, or furnished with a few scattered hairs.

The Asiatic species is found in all the southern countries of Asia and in the adjacent islands. The African abounds in nearly all parts of the continent S. of the Desert of Sahara. Both species live in large herds, reigning the almost exclusive occupants of immense forests, and marshy plains covered with long grass and jungle. Their favorite habitat is in well-watered regions and plains or lowlands where the vegetation is luxuriant. It is stated that more than 1000 have been seen in one herd. "A herd of elephants," says Pringle, "browsing in majestic tranquillity amidst the wild magnificence of an African landscape, is a very noble sight." The people of Africa do not tame the elephant or use it as a beast of burden, but they kill great numbers for the sake of the ivory, which they sell, and the flesh, which they esteem as food. "There were periods in the history of the refined nations of antiquity when the destruction of the elephant was as great as in modern times; when Africa yielded her tribute of elephants' teeth to the kings of Persia; when the people of Judæa built ivory palaces (Psalm xiv. 8); when the Etruscan attributes of royalty were sceptres and thrones of ivory; when the ancient kings and magistrates of Rome sat in ivory seats (*sellæ curules*); and when colossal ivory statues of their gods were raised by the Greeks of the age of Pericles." (*Library of Entertaining Knowledge.*) The ancient Carthaginians and other nations employed elephants in war, not only as beasts of burden, but as combatants. These animals formed part of the army which Hannibal led across the Alps, and they are said to have decided the victory at the battle of Trebia. For a long period the elephant was as important an arm of war as the artillery of modern nations. The Asiatic species was also employed for this purpose, and Seleucus is said to have had more than 100 elephants at the battle of Ipsus.

The African hunters shoot them in the head or heart with rifles, and sometimes disable them by cutting the hamstring or tendon of the hind leg with a sword. Two hunters, naked, mounted on the back of the same horse, will approach an elephant, and when he assumes the offensive will retreat in a circuitous course with many devious turns. At length, one of the men, armed with a sword, alights on the ground near the elephant, and while the horseman occupies his attention in front the footman cuts the tendon just above the heel. At this critical moment the horseman wheels, takes his companion up behind him, and rescues him from the enraged animal by riding off at full speed. The chase of the elephant is attended with great danger, and many hunters have been killed in it. It appears that no people of Africa now capture elephants alive, or avail themselves of their services in a domesticated state, but in Asia large numbers of them are caught and tamed. The various modes of capturing wild elephants in India have prevailed without much change for centuries, and are practised in several Asiatic countries where elephants are required to maintain the splendor of Oriental luxury and figure in the pomp and pageantry of monarchs. In 1794 the nabob of Oude went upon a hunting expedition with 1000 elephants. The rudest mode of capturing them is by digging a pit which is covered with loose boards or with boughs and grass, and a tame elephant decoys a herd of them to tread on the trap. Pliny, who mentions the taking of elephants in pits, says the companions of one who has been thus entrapped will endeavor to liberate him by throwing materials into the pit. In other methods of capturing them man avails himself of the docility of tame female elephants, who serve as decoys and display a treacherous ingenuity as well as a desire to assist their masters in this business. While the female by her caresses diverts the attention of a wild animal, one hunter fetters his fore legs with a strong rope, and another ties his hind leg to a tree. If no tree is near in the first instance, they fasten to his leg a long cable, which trails behind him when he moves, until he comes near a large tree, to which he is secured. He is kept bound in that position until his rage is exhausted, and he is left to the further operation of hunger until he is subdued into docility. Among the animals which will attack an elephant are the tiger and rhinoceros. The animals to which the elephant is most nearly allied are the horse, pig, and rhinoceros.

According to Pliny, it was not uncommon at Rome to see tame elephants hurl javelins in the air and catch them with their trunks, and then execute a pyrrhic dance. They also danced upon a rope. This feat of dancing or walking on a rope is confirmed by other ancient writers. One of the strongest instincts of the elephant is that which impels him to try the stability and strength of any structure or surface which he is required to cross, before he will expose himself to the risk of breaking it down with his weight.

Remains of extinct species of elephant have been found in many parts of Europe, North America, and Siberia. Among them is the mammoth (*Elephas primigenius*), which occurs in the post-pliocene deposits. An entire specimen was discovered in 1799 in the frozen soil at the mouth of the river Lena in Siberia. (See MAMMOTH.) In the cave of Kirkdale, Yorkshire, England, the bones of elephants were found by Prof. Buckland, mixed with those of the rhinoceros and hyæna. Many of these fossils have also been dug up in the U. S., near the Ohio River and at other places. "There is not a canton in Siberia," says Pallas, "which does not possess fossil bones of elephants." Their tusks are there so abundant as to be an important article of commerce. WILLIAM JACOBS.

Elephan'ta, an island of British India, in the harbor of Bombay, 7 miles from that city, derived its name from a gigantic stone figure of an elephant which formerly stood on the shore. The island is 6 miles in circumference. Here are several remarkable ancient cave-temples excavated out of the native rock, and adorned with numerous sculptured figures of the Hindoo mythology. The largest of these cave-temples is about 133 feet long, and is supported by twenty-six pillars.

Elephant Bay, an inlet of the Atlantic, in Benguela, Africa, is in lat. 13° 14′ S., lon. 12° 33′ E. It affords good anchorage, but no fresh water.

Elephanti'asis [from the Gr. ἐλέφας, an "elephant," because it was fancied that the legs of those who suffered with it resembled those of an elephant], as at present used, designates the disease anciently known as *elephantiasis Arabum*, the "elephantiasis of the Arabians," so called to distinguish it from the *elephantiasis Græcorum*, the "elephantiasis of the Greeks," which was probably identical with leprosy. Elephantiasis is rare in Europe and North America, though not unknown in either. It is endemic in the Levant and the East and West Indies. The foot and leg, or sometimes other parts, become greatly enlarged and enormously increased in density and hardness, the skin assuming a remarkable roughness and usually a darkness of hue. The prognosis is usually grave, very few cases recovering, though many cases remain completely station-

ary after the disease is once established. In fatal cases suppuration and erysipelas are the active symptoms. The treatment is thus far unsatisfactory. The use of iron, iodine and quinia, with bandaging, is recommended.

Elephan'tine, an island of the river Nile, on the boundary between Egypt and Nubia, is opposite to Asswân (the ancient *Syene*). It is 1 mile long, and is partly occupied by gardens and houses interspersed among ruins of ancient temples erected by the Pharaohs. Among its monuments is the Nilometer mentioned by Strabo, and designed to record the height of the inundations of the Nile. Here are quarries of syenite, a variety of granite. This island was garrisoned by the ancient Persians and Romans. It is now inhabited by Nubians.

Elephant Seal (*Macrorhinus proboscideus*), sometimes called the **Proboscis Seal** and **Sea Elephant,** is by far the largest of the Phocidæ or seal family, being sometimes thirty feet in length, and having a circumference at the thickest part of nearly eighteen feet. The color is generally bluish-gray, but occasionally dark brown. Its body is unevenly covered with short hair, the tail not more than six inches long, the swimming paws very large and strong, and having five nails; the hind paws, which are constructed like the webbed foot of a bird, are without even the rudiments of nails. The head is large, the eyes large and prominent, and there are no external ears. The canine teeth resemble tusks in their size and massiveness; the nose of the male is prolonged into a proboscis about a foot long, which, however, does not serve the same purpose as that of the elephant. The skin is very thick and strong, and is of great value for harness-making; the flesh is dark and unwholesome, the tongue only being prized as food. These seals are found in the Falkland Islands, South Georgia, Kerguelen's Land, etc. They are hunted to a great extent for their oil, which is of excellent quality and yielded in great quantity, one seal sometimes affording seventy gallons. They migrate to the south early in the summer, and northward in the beginning of winter. They feed chiefly on cuttlefish and other cephalopods.

Elephant's Foot (*Testudinaria elephantipes*), a plant sometimes called "Hottentots' bread," belongs to the order Dioscoriaceæ, having a large, fleshy root-stock, abruptly truncated at the end. This root-stock is eaten by the Hottentots. It is covered with a soft, rough bark, from which springs a climbing stem, bearing the leaves and flowers. The same name is also given to a genus of the order Compositæ (*Elephantopus*), of which two species are found in the southern Atlantic States.

Eletz, a town of Russia, in the government of Orel, 220 miles S. S. E. of Moscow, on the Sosna. It has many factories, and has a large trade in wheat flour. Pop. in 1867, 30,182.

Eleusi'ne, a genus of grasses (Graminaceæ), comprises several species which are natives of India and other warm climates, and are cultivated for food. *Elusine Coracana* is extensively cultivated for its large farinaceous grain in India, China, and Japan. The grain called *tocusso* in Abyssinia is produced by the *Elusine Tocusso*. The *Elusine Indica* is naturalized about dooryards, etc. in the U. S.

Eleusin'ia, or **Eleusin'ian Mys'teries** [Gr. Ἐλευσίνια], an annual festival celebrated in ancient Greece in honor of Demeter (Ceres) and Persephone (Proserpine). The worship of Demeter originally took place at Eleusis only, but after the conquest of that city by the Athenians feasts were celebrated in her honor in various Grecian cities. The origin of these mysteries is uncertain, but the popular tradition was that Demeter herself, while searching for her daughter Persephone, came to Attica, where she taught the inhabitants the use of corn and instituted the mysteries. The festival consisted of the greater and the lesser mysteries. The lesser feast was held in the month of Anthesterion at Agræ, on the Ilissus, and was only a preparation for the real or greater mysteries. The latter took place in the month of Boëdromion, beginning on the 15th and ending on the 23d. On the first day, called ἀγυρμός (the "assembling"), the mystæ—*i. e.* those who had been initiated in the lesser Eleusinia—assembled at Athens. On the second they walked to the sea in procession and were purified. The third day appears to have been a day of fasting, and, according to some authorities, sacrifices of fish and cakes of barley from the Rarian plain were offered. On the fourth day the procession of the sacred basket (κάλαθος κάθοδος) took place. This basket contained pomegranates and poppy-seeds, and was drawn on a cart by oxen, and followed by women bearing mystic cases. The fifth day appears to have been known as the torch-day, and probably symbolized the search of Demeter for Persephone. The mystæ walked with torches to the temple of Demeter at Eleusis, where they seem to have remained all night. The sixth day, called Iakchos, from a son of Demeter, was the most solemn of all. A decorated statue of Iakchos was carried from Athens to Eleusis, where the votaries again passed the night and were initiated into the last mysteries. Under an awful oath of secresy they were admitted into the inner sanctuary, where they were allowed to see the sacred things, after which they were called *epoptæ—i. e.* "contemplators." On the seventh day they returned to Athens with jests and music, resting at the bridge over the Cephisus, where they ridiculed all who passed. The eighth day is supposed to have been added to the original number, so that those might be initiated who had been unable to attend on the sixth day. On the ninth and last day two vessels filled with wine or water were emptied—one towards the east, the other towards the west—by the priests, who at the same time uttered some mystical words. Besides these ceremonies there were several others, of which the Eleusinian games, supposed to have taken place on the seventh day, and to have been the most ancient in Greece, were the chief. Nothing certain is known respecting the doctrines revealed to the initiated, but they are supposed to have contained comforting assurances with regard to a future state. Distinctions of class were abolished at the Eleusinia, and with this view Lycurgus forbade any woman to ride in the procession in a chariot, under penalty of a heavy fine.

Eleu'sis [Gr. Ἐλευσίς or Ἐλευσίν], an ancient and celebrated city of Greece, was situated in Attica, near the northern shore of the Gulf of Salamis, and about 12 miles N. W. of Athens. It was the chief seat of the worship of Ceres, whose mystic rites, called ELEUSINIAN MYSTERIES (which see), were here performed annually with great pomp. Here was a large temple of Ceres. The site of Eleusis was near the modern village of Levsina. (See WORDSWORTH, "Greece," 1853.)

Eleu'thera, one of the Bahama Islands, in the Atlantic Ocean, is about 50 miles N. E. of New Providence. It is 80 miles long and about 10 miles wide. The soil is rather fertile, and produces pineapples, oranges, cascarilla bark, etc. Lat. of the northern point, 25° 34′ N., lon. 76° 43′ W.

Eleuthe'ria [from the Gr. Ἐλεύθερος, "free"], a national festival of the ancient Greeks, instituted in 479 B. C. to commemorate their deliverance from the Persian armies which had invaded Greece. It was celebrated annually at Platæa in the early part of autumn.

Eleva'tion [Lat. *eleva'tio,* from *el'evo, eleva'tum,* to "lift up" or "raise"], the act of raising to a higher level or place; the act of exalting in rank; altitude; height above the surface; sometimes exaltation of mind or style; a hill or elevated ground. In engineering and architecture, a geometrical representation of a building or other object, as if *projected* (hence also styled a *projection*) upon a vertical plane by perpendicular lines drawn through its defining lines or points. It differs from a true *pictorial* representation or perspective view in this, that the projecting lines in the latter converge to the eye, as do visual rays; from a *section,* in that the latter represents, instead of the *visible exterior,* what would be exposed to the eye were all that part of the object *in front* of an intersecting vertical plane removed.

ELEVATION, in astronomy, the angular height or the altitude of a celestial object above the horizon, measured by the arc of a vertical circle passing through it and the zenith. Thus, the elevation of the pole denotes the arc of the meridian intercepted between the pole and the horizon, and is always equal to the latitude of the observer. The greatest elevation of a star occurs when that star is on the meridian.

ELEVATION in gunnery is the inclination of the axis of the cannon or gun above the object aimed at, to counteract the effect which the force of gravity causes. It varies with the range.

Eleva'tion, a township of Johnston co., N. C. Pop. 1459.

Elevation of the Host (*eleva'tio hos'tiæ*), in the Roman Catholic ritual of the mass, is the lifting up of the elements after consecration for the adoration of the people.

Elf, plu. **Elves** [Ang.-Sax. *ælf;* Ger. *El'fe;* Swed. *elf;* Dan. *alf*]. Elves are a class of imaginary beings whose existence is especially believed in among the peasantry of Scandinavia and North-western Europe, in whose mythology they had a prominent place. They were of two kinds, the good and bad elves, and their exploits gave origin to a great number of marvellous tales. It appears that the elves were celebrated among Germanic peoples, and especially among the Norse, while fairies were described in Celtic legends; but in England, at least, the names were confounded.

Elf Ar'row-heads, called also **Elf Stones,** etc., the popular name in Great Britain of the flint arrow-heads which were used by the pre-historic inhabitants. Accord-

ing to a prevailing superstition, they were shot at human beings and cattle by the fairies or elves. These stones are worn as a talisman against witchcraft and poison.

El'gin, a royal burgh of Scotland, the capital of the county of Moray or Elgin, is on the river Lossie, 5 miles from the sea and 118 miles N. of Edinburgh, with which it is connected by a railway. It is beautifully situated in a fertile valley, has ten churches, a hospital, and an institution which Gen. Anderson endowed with £70,000 for the education of orphans. Elgin has the ruins of a cathedral founded in 1224. These are the most extensive and beautiful of ancient Scottish remains. Here are the ruins of a castle which was the residence of the earls of Moray. Elgin has iron-foundries and woollen-factories. Pop of parliamentary burgh in 1871, 7339.

El'gin, a county of Ontario, Dominion of Canada, has an area of about 700 square miles. It is bounded on the S. by Lake Erie, and partly drained by the river Thames. The soil is productive. It is intersected by the London and Port Stanley R. R. Capital, St. Thomas. Pop. 33,666.

Elgin, a city of Kane co., Ill., on Fox River, 36 miles W. by N. from Chicago, has a fine water-power and more than twenty manufacturing concerns, including a large woollen-mill, mower-and-reaper manufactory, engine and boiler works, and a wringer-factory. It is the seat of the National watch-factory, employing 1000 skilled operators, the Northern Insane Asylum, costing $500,000, and the Borden milk-condensing factory. It has an excellent academy and several fine churches. One of the chief industries is cheese and butter making in factories. Has two national banks and three newspapers, one monthly. Three railroads pass through the city—the Chicago and North-western, the Chicago and Pacific, and the Fox River R. Rs. Pop. 5441; of Elgin township, exclusive of the city, 1298.

S. L. Taylor, Ed. and Prop. "Advocate."

Elgin, a township of Plymouth co., Ia. Pop. 429.

Elgin, a post-township of Wabashaw co., Minn. Pop. 878.

Elgin (James **Bruce**), eighth earl of, born in London July 20, 1811, was educated at Oxford. He succeeded his father in 1841. This earldom was a Scottish peerage, which did not admit him into the House of Lords. He became governor of Jamaica in 1842, and of Canada in 1846. Canada prospered under his administration, which lasted eight years. He was created a peer of the United Kingdom in 1849, was sent on a mission to China in 1857, and negotiated the treaty of Tien-Tsien (1858). In 1859 he was postmaster-general, and in 1861 was appointed governor-general of India. Died Nov. 20, 1863.

Elgin (Thomas **Bruce**), seventh earl of, the father of the preceding, was born in Scotland in 1766. He obtained the rank of general in the army, and was sent as envoy extraordinary to Berlin in 1795. In 1799 he was appointed ambassador to Constantinople. He expended a large sum of money (about £50,000) in the removal of statues, bas-reliefs, and other remains of ancient art from the Parthenon and Acropolis of Athens to England. (See Elgin Marbles.) Died Nov., 1841.

Elgin Marbles, a collection of sculptures taken from the Acropolis, mainly from the Parthenon at Athens. They are so called from the earl of Elgin, who, by permission of the Porte, brought them to England, from 1808 to 1812. The government bought them in 1816 for £35,000, a little more than two-thirds of the cost of excavating and transporting them. They consist of colossal statues and pieces of statues, bas-reliefs, caryatides, bits of column, urns, etc. The marbles from the Parthenon exhibit Greek art in its highest perfection. Their influence on English art has been very great. The students of art in America have them in the form of casts. Lovers of plastic art are grateful to Lord Elgin, instead of indignant with him, for bringing within their reach these masterpieces of beauty. (See Lyon, "Outlines of the Elgin Marbles," 1816; "The Elgin Marbles from the Temple of Minerva at Athens," 1816; Lawrence, "Elgin Marbles from the Parthenon at Athens," 1818; and Ellis, "The Elgin and Phigalian Marbles," 2 vols., 1836.)

El'ginshire, a county of Scotland, is bounded on the N. by the German Ocean, on the E. by Banffshire, on the S. by Inverness, and on the W. by Nairn. Area, 473 square miles. It is divided into two separate parts by a part of Inverness-shire. The climate is mild and dry, and the soil open, sandy, and gravelly, and very fertile in the N. The chief products are wheat, oats, and other kinds of grain. It was formerly called the granary of Scotland. Here are some manufactories of woollen goods. The chief articles of export are cattle, salmon, grain, and timber. It sends, together with Nairnshire, one member to Parliament. Pop. in 1871, 43,598. Chief town, Elgin.

Elia. See Lamb (Charles).

Eli'as Levi'ta, a learned Jewish rabbi, born in 1472, was probably a native of Italy. He taught Hebrew at Rome and Venice, was distinguished as a grammarian, and published numerous works, among which are a "Hebrew Grammar," a "Chaldaic, Talmudic, and Rabbinical Lexicon," and "Massorah," containing critical notes on the text of the Bible. Died at Venice in 1549.

Eli'da, a post-village of Winnebago township, Winnebago co., Ill. Pop. 468.

Elida, a post-village of German township, Allen co., O. Pop. 533.

Élie de Beaumont (Jean Baptiste Armand Louis Léonce), a French geologist, born at Canon (Calvados) in 1798. He was educated in the Polytechnic School, and became professor of geology in the College of France in 1832, chief engineer of mines in 1833, and a member of the Institute in 1835. In conjunction with Dufrénoy he prepared a geological map of France (1841). Among his works are "Lectures on Geology" (3 vols., 1845 *et seq.*) and a "Treatise on the Mountain Systems," giving his theories on the elevation of mountain-ranges (1852). He succeeded Arago as perpetual secretary of the Academy of Sciences in 1853.

Elimina'tion [from the Lat. *elim'ino, elimina'tum,* to "send out" (from *e,* "out" or "out from," and *li'men, li'minis,* a "threshold" or "limit")], in mathematics, is the process of causing a quantity or letter which is common to two or more equations to disappear by framing out of the two a new equation in such a way as to omit the quantity in question. In other kinds of reasoning, not mathematical, elimination "is the extrusion of that which is superfluous or irrelevant." The term "to eliminate" is frequently but incorrectly used in the sense of "to elicit."

El'iot (Andrew), D. D., was born Dec. 28, 1718, and graduated at Harvard in 1737. He became pastor of the New North church, Boston, Mass., in 1742, and filled that position till his death, Sept. 13, 1778. He was elected president of Harvard University, but declined the honor.

Eliot (Charles William), LL.D., born Mar. 20, 1834, at Boston, Mass., educated at the Boston Public Latin School (1844–49) and at Harvard College (1849–53), was tutor in mathematics at Harvard College (1854–58), assistant professor of mathematics and chemistry (1858–61), of chemistry (1861–63), professor of chemistry in the Massachusetts Institute of Technology (1865–69), became president of Harvard College (May 19, 1869). He has published, with F. H. Storer, sundry chemical investigations, a manual of chemistry, and a manual of qualitative chemical analysis.

Eliot (George). See Evans (Marian C.).

Eliot (Jared), an American divine and naturalist, grandson of John Eliot, was born at Killingworth, Conn., Nov. 7, 1685, and graduated at Yale in 1706. He was also a successful physician. He introduced the silkworm into Connecticut, and published several sermons, etc. Died April 28, 1763.

Eliot (John), a minister of Roxbury, Mass., called "the apostle to the Indians," was born in England in 1604. He was educated at Cambridge, and came to Boston in 1631. He acquired the language of the Indians, and from 1646 he devoted himself to improving their condition and converting them to Christianity. He travelled extensively among them, enduring great privations and passing through many dangers. He succeeded in acquiring great influence over them, and many of them embraced the Christian faith. He translated the Bible into the Indian tongue (1661–63), published an Indian grammar (1666), and a number of other works, mostly relating to his missionary labors. Died May 20, 1690.

Eliot (John), D. D., an American preacher and biographer, born in Boston May 31, 1754, graduated at Harvard in 1772. With Jeremy Belknap, he founded the Massachusetts Historical Society. He was the author of a "New England Biographical Dictionary" (1809) and other works. Died Feb. 14, 1813.

Eliot (Samuel), LL.D., an American historian, born in Boston Dec. 22, 1821, graduated at Harvard in 1839. Having visited Rome and travelled in Europe, he projected a "History of Liberty," a part of which he published in 1849, two volumes, entitled "The Liberty of Rome." "The Early Christians" (2 vols., 1858) is the second part of the same work. Among his writings is a "Manual of United States History from 1492 to 1850" (1856). He was president of Trinity College, Hartford, in 1860–64.

Eliot (Samuel Atkins), a merchant of Boston, was born Mar. 5, 1798, and graduated at Harvard in 1817. He was father of President C. W. Eliot of Harvard College, was mayor of Boston (1837–39), a prominent State politician, member of Congress (1850–51), and was treasurer of Harvard College. Died Jan. 29, 1862.

Eliot (THOMAS D.), born in Boston, Mass., Mar. 20, 1808, graduated with honors at Columbian College, D. C., in 1825, and was admitted to the bar. He was a Republican member of Congress (1854–69), and took a prominent part in "reconstruction" and in business relative to the freedmen after the late civil war. Died June 12, 1870.

E'lis [Gr. Ἦλις; Fr. *L'Élide*], a small state of ancient Greece in the N. W. part of the Peloponnesus, was bounded on the N. by Achaia, on the E. by Arcadia, on the S. by Messenia, and on the W. by the Ionian Sea. It is intersected by the rivers Alpheus (now *Rouphia*) and Peneus (*Gastuni*). The surface is diversified by hills and fertile plains and valleys. Elis was divided into three districts—Hollow Elis, Pisatis, and Triphylia. The chief towns were Elis, Cyllene, Pylos, and Olympia. The Olympic games, the greatest national festival of the Greeks, were celebrated at Olympia. Elis now forms with Achaia a nomarchy of the kingdom of Greece.

Elis, an ancient city, the capital of the above state, was on the river Peneus, about 10 miles from its mouth. It is mentioned as a town of the Epeii by Homer ("Iliad," ii.). It had an acropolis on a hill nearly 500 feet high, and was the only fortified town in the country. It contained several fine temples, a theatre, and the largest gymnasium in Greece. All the athletes who contended at the Olympic games were required to undergo one month's previous training in this gymnasium. When Pausanias visited Elis (about 175 A. D.) it was one of the most splendid and populous cities of Greece. The site is occupied by the modern *Paléopoli* or *Kaloscopi*.

Eli'sors. These are persons named by the court to return a jury when the sheriff and coroners are incompetent. They are two in number, and, according to Lord Coke, are named from the fact that they are *chosen* by the court (*ab eligando*). Against their return no challenge can be taken to the array of jurors, though there may be a challenge to individual jurors or to the polls.

Eli'za, a post-township of Mercer co., Ill. Pop. 767.

Eliz'abeth, a post-twp. of Jo Daviess co., Ill. P. 1618.

Elizabeth, a post-village of Posey township, Harrison co., Ind. Pop. 216.

Elizabeth, the capital of Union co., N. J., is situated on Staten Island Sound and Elizabeth River. It has communication with New York, distant 14 miles, by three railroads—the Pennsylvania, the New Jersey Central, and the Newark and New York, which last has a branch extending to Elizabeth. It has also a line of steamboats running thither, making several trips a day. It has a horse-railroad which is about 4 miles in length. Elizabeth contains twenty-five churches, two national and four savings banks, an orphan asylum, costing $60,000, besides several other public institutions. It has three daily, one semi-weekly, and two weekly newspapers. It is remarkable for the number of New York business-men who reside here with their families, having nearly a thousand commuters who regularly travel over the roads to and from New York. Elizabeth is celebrated for the beauty of its situation and the number of its paved streets. The city, though not largely engaged in manufactures, has a number of such, which is every year increasing, the most notable of which is Singer's Sewing-machine Company, which employs 1200 hands. There are, besides, extensive oil-cloth factories and several foundries. The city has an electric fire-alarm telegraph, several parks, and is surrounded by some of the finest and richest farming country in the State. Elizabeth was formerly the capital of New Jersey, and ceased to be such in 1790. Pop. 20,832. F. W. FOOTE, ED. "DAILY JOURNAL."

Elizabeth, N. C. See ELIZABETHTOWN.

Elizabeth, a township of Lawrence co., O. Pop. 3357.

Elizabeth, a township of Miami co., O. Pop. 1236.

Elizabeth, a village of Centre township, Morgan co., O. Pop. 1325.

Elizabeth, a post-borough of Allegheny co., Pa., on the right (E.) bank of the Monongahela River, 16 miles S. by E. from Pittsburg. Pop. 1196; of township, 2937.

Elizabeth, a township of Lancaster co., Pa. P. 955.

Elizabeth, a township of Wirt co., West Va. P. 804.

Elizabeth, from 1558 to 1603 the ruler of England, and the last sovereign of the House of Tudor, was born at Greenwich on the 7th of Sept., 1533. She was a daughter of Henry VIII. and Anne Boleyn. Her childhood was passed in comparative retirement, and she was educated by persons who favored the Reformed religion. She learned the Latin, Greek, French, and Italian languages of the famous Roger Ascham. In 1554 she was confined in the Tower by order of Queen Mary, who regarded her with jealousy because she was the favorite of the Protestant party. It appears that Elizabeth narrowly escaped death, and that some of the bishops and courtiers advised Mary to order her execution. After she had passed several months in the Tower, she was removed to Woodstock, and appeased Mary by professing to be a Roman Catholic.

On the death of Queen Mary (Nov. 17, 1558) Elizabeth ascended the throne, and the majority of the people rejoiced at her accession. She appointed William Cecil secretary of state, and Nicholas Bacon keeper of the great seal. She retained several Roman Catholics in her privy council, but she refused to hear mass in the royal chapel. The Protestants were the majority in the Parliament which met in 1559, abolished the mass, adopted the Thirty-nine Articles as the religion of the state, and recognized the queen as the head of the Church. "Thus," says Hume, "in one session, without any violence or tumult, was the whole system of religion altered by the will of a young woman." She declined an offer of marriage made to her by Philip II. of Spain. Her foreign policy was pacific. She waged no war for conquest, but to promote the stability of her throne she aided the Protestant insurgents in Scotland, France, and the Netherlands with money and troops. In 1563 the Parliament, anxious that she should have an heir, entreated her to marry, but she returned an evasive answer, and would neither accept the hand of any of her suitors nor decide in favor of any claimant of the throne. Among her suitors were the French duke of Anjou, the archduke Charles of Austria, and Robert Dudley, earl of Leicester, who was for many years her chief favorite. William Cecil, Lord Burleigh, was her prime minister and most trusted adviser during the greater part of her reign, the prosperity of which is ascribed to his prudence and influence.

Mary queen of Scots, fleeing from her rebellious subjects, took refuge in England in 1568, and was detained as a prisoner by Elizabeth. The latter regarded Mary as a dangerous rival, because the English Catholics wished to raise her to the throne of England, and formed several plots and conspiracies for that object. (See MARY STUART.) Mary was beheaded Feb. 8, 1587. Philip II. of Spain had long meditated a hostile enterprise against Queen Elizabeth, who had offended him by aiding his revolted Dutch subjects and by persecuting the English Catholics. For the invasion of England he fitted out the Invincible Armada, which consisted of about 140 vessels, carrying nearly 30,000 men, and sailed in May, 1588. A violent storm dispersed the Spanish ships, many of which were wrecked, and the rest were encountered by the English fleet, mostly consisting of small but excellently equipped vessels, under Admiral Howard, and thoroughly beaten, Aug. 8, 1588. The disastrous failure of this expedition did not terminate hostilities between England and Spain. An English fleet took Cadiz in 1596. After the earl of Leicester died (1588) the earl of Essex was the queen's favorite courtier. The Puritans were severely persecuted in the latter part of her reign. She died Mar. 24, 1603, and was succeeded by James VI. of Scotland, who became James I. of England. Her reign is considered one of the most prosperous and glorious in English history, and she displayed superior abilities as a ruler, but her personal character is deformed by serious faults. She was vain and selfish, and was more feared than loved by her attendants. The Elizabethan age was almost unequalled in literature, and was illustrated by the genius of Shakspeare, Spenser, Bacon, Sidney, and Raleigh. (See FROUDE, "History of England," vols. vii. to x.; HUME, "History of England;" CAMDEN, "History of Queen Elizabeth," 1625; DR. THOMAS BIRCH, "Memoirs of the Reign of Queen Elizabeth," 1754.)

Elizabeth (PHILIPPINE MARIE HÉLÈNE), a French princess, a sister of Louis XVI., was born in 1764. She was commonly styled Madame Élisabeth. In the Reign of Terror she was exposed to dangers and sufferings which she endured with fortitude. She was imprisoned in Aug., 1792, and guillotined in May, 1794.

Elizabeth'an Arch'itecture, a term applied to a style of architecture which appeared in England on the decline of the Gothic, and mostly prevailed during the reigns of Elizabeth and James I. It is sometimes called the *Tudor* style, a name more correctly applied to the Latest Gothic. It is characterized by a rich but cumbrous style of ornament, both within and without, by apartments and galleries of vast extent, and by enormous square windows. It is regarded as a debased style, and was chiefly employed in domestic architecture. Its later form is called Jacobean.

Elizabeth Christi'na, queen of Prussia, born at Brunswick Nov. 8, 1715, was a daughter of the duke of Brunswick-Wolfenbüttel. She was married to Frederick the Great in 1732. She had a high reputation for virtue and piety. Died Nov. 13, 1797.

Elizabeth City, a county in the S. E. of Virginia, at the extremity of a peninsula formed by James and York rivers. Area, about 50 square miles. It is bounded on the E. by Chesapeake Bay, and on the S. by Hampton Roads. Grain, sweet potatoes, etc. are produced. Capital, Hampton. Pop. 8303.

Elizabeth City, the capital of Pasquotank co., N. C., is situated 20 miles W. of the Atlantic, on the Pasquotank River. It has a fine harbor, safe and sufficiently deep for large vessels. A large portion of the inhabitants are of Northern origin. It has 5 churches, 2 banks, 2 hotels, 1 newspaper, 2 steam grist-mills, 4 steam saw-mills, 2 shingle-factories, and 1 planing-mill. It is surrounded by a cotton, corn, and wheat growing country, and is 50 miles S. of Norfolk, Va., with which it communicates by the Dismal Swamp Canal. It is partly in Elizabeth City and partly in Nixonton townships. Pop. 930.

PALEMON JOHN, ED. & PROP. OF "NORTH CAROLINIAN."

Elizabeth City, a post-township of Pasquotank co., N. C. Pop. 2006.

Elizabethgrad, a town of Russia, in the government of Kherson, 160 miles N. E. of Odessa. It is a military settlement, with 31,968 inhabitants.

Elizabethine Nuns, a congregation of monastic women in the Roman Catholic Church, belonging to the third order of St. Francis. The name Elizabethines was at first applied to voluntary associations of women who imitated the zeal of Saint Elizabeth of Hungary, without taking monastic vows or retiring from the world. But from the tradition that Saint Elizabeth belonged to the third order of Saint Francis, the name is sometimes given to Franciscan nuns. It is probable, however, that the Franciscan nuns of the third order were not established till 1395, long after Saint Elizabeth's death, and that their foundress was Angelina, the widow of the count de Civitelle. From 1428 to 1459 they were an independent congregation, but in the latter year were placed under the general of the Observantine Franciscans.

Elizabeth Islands, a group of sixteen small islands belonging to Dukes co., Mass., lying between Vineyard Sound and Buzzard's Bay. They constitute since 1864 the township of Gosnold. Pop. 99, principally on Cuttyhunk. The islands were once densely populated. Cuttyhunk was the seat of Bartholomew Gosnold's first colony in "Virginia," founded in 1602, but abandoned the same year, on account of troubles of the colonists with each other and with the Indians. The islands are a favorite resort for fishing and yachting. The islands, in the order of their size, are Naushon, Nashawena, Pasque, Cuttyhunk, Nonamesset, Uncatena, Penikese, and several small islets. Cuttyhunk Light, near the southern point of this group, is in lat. 41° 24.8′ N., lon. 70° 56.7′ W. One of the islands, Penikese or Pune, was presented in Mar., 1873, by John Anderson of New York, to Prof. Agassiz, for the purpose of establishing a school of natural history upon it. Mr. Anderson also gave $50,000 in money towards the endowment of the school, which is indirectly connected with the Museum of Comparative Zoology at Cambridge, Mass. The school was opened in the summer of 1873. The island contains 100 acres of land.

Elizabeth Petrov'na, empress of Russia, born in Dec., 1709, was a daughter of Peter the Great and Catherine I. She was dissolute in morals, and appears to have been unambitious, as she made little effort to obtain the throne. Ivan, an infant, was proclaimed emperor in 1740, but the French surgeon Lestocq and other partisans of Elizabeth conspired against Ivan with success, and she became empress in 1741. As an ally of Austria and France, she waged war against Frederick the Great in the Seven Years' war. Her army gained a victory at Kunersdorf, and entered Berlin in 1760. She had several children by Count Rasumovski, who was first her servant, subsequently her chamberlain, and was at length secretly married to her. She died Jan. 5, 1762, and was succeeded by her nephew, Peter III.

Elizabeth Port, a post-office in the city of Elizabeth, Union co., N. J., on Staten Island Sound, and a station on the Central New Jersey R. R., 7 miles S. of Newark and 12 miles W. S. W. of New York. It has several iron-foundries and factories, and is an important point for the shipping of coal.

Elizabeth, SAINT, of Hungary, a daughter of Andrew II., king of Hungary, was born at Presburg in 1207. She became in 1221 the wife of Louis, landgrave of Thuringia, who died in 1227 at Otranto, on his way to the Holy Land (the third crusade). His eldest brother (Henry) seized his possessions, and banished his widow and children. The knights of Thuringia restored her son Herman to the throne, and Elizabeth received as a dower the city of Marburg, where she retired with her daughters, and spent the remainder of her life in what became one continued penance. "Of all" (says Mrs. Jameson) "the glorified—victims must I call them, or martyrs?—of that terrible but poetical fanaticism of the thirteenth century, she was one of the most remarkable; and of the sacred legends of the Middle Ages hers is one of the most interesting and most instructive." She died Nov. 19, 1231. (See CHARLES DE MONTALEMBERT, "Vie de S. Elizabeth de Hongrie," 1836, which has been translated into English; also CHARLES KINGSLEY'S "Saint's Tragedy.")

Elizabeth Stuart, queen of Bohemia, a daughter of James I. of England, was born Aug. 19, 1596. She was married in 1613 to Frederick V., elector palatine, who was chosen king of Bohemia in 1619 by the Protestant party. She is said to have been beautiful, and is considered a heroine. Her husband was defeated in battle in 1620, and she passed the remainder of her life in exile and adversity. She was the mother of the famous Prince Rupert and numerous other children. Died Feb. 13, 1662. George I. of England was her grandson. (See MISS BENGER, "Memoirs of Elizabeth Stuart," 1825.)

Eliz'abethton, a post-village, capital of Carter co., Tenn., on the Watauga River, about 300 miles E. of Nashvile. Pop. 321.

Eliz'abethtown, a post-village, capital of Hardin co., Ill., on the Ohio River, 90 miles above Cairo, has one newspaper-office. There are rich lead-mines in the vicinity.

Elizabethtown, a post-village of Sand Creek township, Bartholomew co., Ind., on the Jeffersonville Madison and Indianapolis R. R. (Madison division). Pop. 294.

Elizabethtown, a post-village, capital of Hardin co., Ky., on the Louisville and Nashville and Great Southern R. Rs., 42 miles S. by W. from Louisville. It is the eastern terminus of the Elizabethtown and Paducah R. R. It has one bank, eight churches, two hotels, two mills, and one newspaper. Pop. 1743.

RICHARD LA RUE, ED. AND PROP. OF "NEWS."

Elizabethtown, a post-village of Colfax co., N. M., 92 miles N. of Santa Fé.

Elizabethtown, a post-village, capital of Essex co., N. Y., on Bouquet River, about 125 miles N. of Albany. It has a court-house, jail, and weekly newspaper, and the township has extensive iron-mines and iron-works. Pop. of Elizabethtown township, 1488.

Elizabethtown, a post-village, capital of Bladen co., N. C., on Cape Fear River, 50 miles above Wilmington. Pop. 62; of Elizabethtown township, 1904.

Elizabethtown, a village of Wills township, Guernsey co., O. Pop. 44.

Elizabethtown, a village of Perry township, Licking co., O. (P. O. name, PERRYTON.) Pop. 113.

Elizabethtown, a post-borough of Lancaster co., Pa., 18 miles N. W. of Lancaster City, the county-seat, on the line of the Pennsylvania R. R., is at equal distance, 18 miles, from the county-seats of four counties—Lancaster, Dauphin, Lebanon, and York. It has 1 newspaper, 1 national bank, 4 hotels, 5 churches, a farming-implement manufactory, and a machine-shop. Principal business is farming and storekeeping. Pop. 858.

JOHN G. WESTAFER, ED. "CHRONICLE."

Elizabeto'pol, a government of Transcaucasia, is bounded on the N. by Tiflis, on the E. by Baku, on the S. by Persia, and on the W. by Erivan. Area, 17,038 square miles. The government consists in the W. of high mountains, while the E. is more level. It is drained by the Kur and numerous other small streams. Chief town, Elizabetopol. Pop. 503,282.

Elizabetopol, or **Gandscha,** the capital of the government of the same name, in Russian Transcaucasia, is situated 90 miles S. E. of Tiflis. It has a number of churches, mosques, and fruit-gardens. Silkworms are raised here. Pop. 14,971.

Eli'zaville, a post-village of Fleming co., Ky. P. 180.

Elizay, a township of Macon co., N. C. Pop. 525.

Elk (*Alces malchis*), a species of deer, is a native of the northern parts of Asia and Europe. It is one of the largest animals of the deer family or Cervidæ, is about six feet high, and sometimes weighs 1200 pounds. It has a short, compact body raised on long, stilt-like legs, a short, thick neck, and a large, narrow head, nearly two feet long. The neck is covered with a short thick mane. The antlers of the full-grown elk are flattened, displaying a broad blade with numerous snags on each horn. The tail is only four or five inches long. The color of its hair is brownish black. Elks can run with great speed. They frequent marshy districts and swampy forests, feeding on lichens, leaves, and branches of trees. Their flesh is esteemed for food.

The true American elk, commonly called the moose (*Alces Americanus*), so closely resembles the above species that

Elk or Moose.

some writers regard them as identical. But the differences are now generally considered sufficiently great to justify the opinion that the two are specifically distinct. The moose is still found in Maine and Northern New York, and north-westward. It is much hunted for its flesh and skin in winter, when the frozen crust of the snow, not strong enough to bear the animal's weight, seriously impedes its progress, its great speed at other times making its capture difficult. When brought to bay, a blow with its fore foot or horns is a serious matter for the huntsman. It is the largest known animal of the deer family now existing.

The beast generally known in America as the elk is the wapiti (*Cervus Canadensis*), an animal nearly as large as the moose. It goes in large herds, and is hunted for its flesh, and especially for its skin, which is highly prized. Several other large species of deer (as in Ceylon) or of antelope (as in South Africa) are known locally as elks. The true elks have a broad hairy muzzle, with a bald spot between the nostrils, horns large and palmated, with no basal snag; true deer have a basal snag, and more or less rounded horns; the muzzle is bare and moist.

Elk, Irish (*Megaceros Hibernicus*), the name given to a fossil deer found in the pleistocene strata, distinguished from other deer by the great size and peculiar form of its antlers. The beam of the antler is wide and flattened into a palm, and in one specimen the distance between the extreme tips was nearly eleven feet. There is a brow snag, as in the fallow deer, and also a back snag. The weight of the antlers in one specimen was eighty-one pounds. These fossils, though most abundant in Ireland, are met with in England and on the Continent.

Elk, a county in N. W. Central Pennsylvania. Area, 600 square miles. It is partly drained by Clarion River and its branches. The surface is hilly, and mostly covered with forests. Bituminous coal is found here. Lumber, grain, and wool are produced. This county is intersected by the Philadelphia and Erie R. R. Capital, Ridgeway. Pop. 8488.

Elk, a township of Clayton co., Ia. Pop. 901.

Elk, a township of Delaware co., Ia. Pop. 927.

Elk, a township of Cloud co., Kan. Pop. 561.

Elk, a township of Sanilac co., Mich. Pop. 633.

Elk, a township of McDonald co., Mo. Pop. 941.

Elk, a township of Stoddard co., Mo. Pop. 621.

Elk, a township of Wilkes co., N. C. Pop. 675.

Elk, a township of Noble co., O. Pop. 1655.

Elk, a township of Vinton co., O. Pop. 2063.

Elk, a township of Chester co., Pa. Pop. 839.

Elk, a township of Clarion co., Pa. Pop. 1055.

Elk, a township of Tioga co., Pa. Pop. 172.

Elk, a township of Warren co., Pa. Pop. 469.

Elk, a township of Barbour co., W. Va. Pop. 1010.

Elk, a township of Harrison co., W. Va. Pop. 1361.

Elk, a township of Kanawha co., W. Va. Pop. 2451.

Elk, a township of Mineral co., W. Va. Pop. 423.

El Ka'der, a post-village, capital of Clayton co., Ia., on Turkey River, about 50 miles N. W. of Dubuque. It has two newspaper-offices and a national bank. Pop. 697.

Elk City, a post-village of Montgomery co., Kan.

Elk Creek, a township of Jasper co., Ia. Pop. 1180.

Elk Creek, a township of Watauga co., N. C. Pop. 265.

Elk Creek, a post-township of Erie co., Pa. Pop. 1462.

Elk Creek, a post-township of Grayson co., Va. Pop. 4116.

Elk Falls, a post-village, capital of Howard co., Kan., about 130 miles S. by W. from Topeka. Pop. of Elk Falls township, 1160.

Elk Fork, a township of Pettis co., Mo. Pop. 2404.

Elk Garden, a township of Russell co., Va. Pop. 2023.

Elk Grove, a post-township of Cook co., Ill. P. 1120.

Elk Grove, a post-township of La Fayette co., Wis. Pop. 1377.

El Khar'geh, a town of Upper Egypt, capital of the Great Oasis; lat. 25° 28′ N., lon. 30° 40′ E. Here are ruins of a temple and an ancient necropolis. El Khargeh is also the name of the Great Oasis itself, which is 80 miles long and 10 miles broad, and was anciently larger than at present. It abounds in acacia and doum-palm trees, and has many ruins, chiefly Macedonian and Roman. There are many warm and cold springs and a stream of water; and rice is here cultivated.

Elk'hart, a county in the N. of Indiana. Area, 467 square miles. It is drained by the Elkhart and St. Joseph's rivers, which here unite. The surface is undulating, the soil fertile. Cattle, grain, wool, hay, butter, etc. are produced, and flour, lumber, furniture, carriages, cooperage, etc. are manufactured. It is intersected by two divisions of the Lake Shore and Michigan Southern R. R. Capital, Goshen. Pop. 26,026.

Elkhart, a post-village and township of Logan co., Ill. Total pop. 1325; of village, 378.

Elkhart, a city of Elkhart co., Ind., on the Elkhart River, at the junction of the old and the air-line divisions of the Lake Shore and Michigan Southern R. R., 100 miles E. by S. from Chicago. It contains a large T-rail rolling-mill, a machine-shop, and a round-house of the railroad company. In the works are employed more than 800 men. Here are also two paper-mills, two machine-shops, three flour and two starch mills, besides other factories. The combined water-power is estimated at 8300 horse-power. The town has two banks, a school-house which cost $50,000, and four newspapers, one of which is a daily. Pop. 3265.

CHASE & KENT, PROPS. "EVENING REVIEW."

Elkhart, a post-township of Elkhart co., Ind. Pop., exclusive of the city of Goshen, 1477.

Elkhart, a township of Noble co., Ind. Pop. 1541.

Elkhart, a post-township of Polk co., Ia. Pop. 744.

Elk'horn, a township of San Joaquin co., Cal. P. 1428.

Elkhorn, a township of Brown co., Ill. Pop. 1150.

Elkhorn, a township of Warren co., Mo. Pop. 2479.

Elkhorn, a post-village of Douglas co., Neb., on the Union Pacific R. R. and on the Elkhorn River, 29 miles W. of Omaha. It is a shipping-point for grain. Pop. of township, 296.

Elkhorn, a township of McDowell co., W. Va. P. 416.

Elkhorn, a post-village, capital of Walworth co., Wis., 65 miles due N. W. from Chicago, Ill., and 45 miles S. W. from Milwaukee, is on the Western Union R. R., which connects here with the St. Paul R. R. It has a court-house, a national bank, a newspaper, a beautiful park of six acres of large oaks, 5 churches, 1 fine Union school-building, 2 hotels, and 30 stores. It is in one of the richest farming districts in the State. Pop. 1205. FRANK LELAND,

ED. AND PUB. OF "WALWORTH CO. INDEPENDENT."

Elkhorn Grove, a post-township of Carroll co., Ill. Pop. 662.

Elkhorn River, Nebraska, rises in the N. E. part of the State, flows nearly south-eastward through the counties of Madison, Stanton, Cuming, Dodge, and Douglas, and enters the Platte in the western part of Sarpy county. Length, estimated at 250 miles.

El'kins, a township of Clarke co., Ark. Pop. 584.

Elk'land, a post-township of Tuscola co., Mich. Pop. 511.

Elkland, a township of Sullivan co., Pa. Pop. 705.

Elkland, a post-borough of Tioga co., Pa. Pop. 332.

Elk Lick, a post-township of Somerset co., Pa. It includes the borough of Salisbury, on Casselman's River, the terminus of the Salisbury and Baltimore R. R. It is 25 miles N. W. of Cumberland, Md., and is the centre of the Salisbury coal-basin. It is on the proposed Transalleghany Canal, has a weekly newspaper, four churches, a shook-shop, iron-foundry, planing-mill, etc. (P. O. Elk Lick.) Pop. of Salisbury, 291; of Elk Lick township, 1012. SUHRIE & SMITH, EDS. "VALLEY INDEPENDENT."

Elk Mound, a township of Dunn co., Wis. Pop. 433.

El'ko, a county in the N. E. of Nevada, bordering on Idaho and Utah, is drained by Humboldt River. The surface is partly mountainous; the soil in some places is fertile. Silver is found here, and some grain and cattle are raised. It is intersected by the Central Pacific R. R. Capital, Elko. Pop. 3447.

Elko, a post-village, capital of the above county, is on Humboldt River and the Central Pacific R. R., 603 miles N. E. of San Francisco. It has two newspaper-offices, three large freight dépôts, a good hotel, and numerous stores; also silver-smelting works and manufactures of farming tools. Here are hot mineral springs of great value for bathing purposes. Pop. of Elko township in 1870, 1160, but the population has increased largely since that time.

Elk Point, a post-village, capital of Union co., Dak., on the Missouri River, about 30 miles S. W. of Sioux City (Ia.).

Elk Prairie, a township of Jackson co., Ill. Pop. 1354.

Elk Rap'ids, a post-village, capital of Antrim co., Mich., on the east arm of Grand Traverse Bay, about 18 miles N. E. of Grand Traverse City. It has one newspaper-office. Pop. of township, 370.

Elk Riv'er, of West Virginia, flows nearly westward through Braxton and Clay counties, and enters the Great Kanawha at Charleston. Length, nearly 150 miles.

Elk River, a post-township of Clinton co., Ia. Pop. 1296.

Elk River, a village (Elk River Station P. O.) in Sherburne co., Minn., 38 miles N. W. from the capital of the State, and situated on the Mississippi and Elk rivers, with the St. Paul and Pacific R. R. running through the town. It has one newspaper, a number of stores and manufactories, a large brick school-house capable of holding 500 scholars, and four different grades of schools. Principal business, lumber, grain, and stock. It is in a good farming-region. Pop. of Elk River township, 537.

JOHN M. THOMSON, ED. "SHERBURNE CO. NEWS."

Elk Run, a township of Columbiana co., O. Pop. 1335.

Elk Run, a township of Rockingham co., Va. Pop. 2341.

Elk'ton, a post-village, capital of Todd co., Ky., about 50 miles N. W. of Nashville (Tenn.). It has three or four churches.

Elkton, a village of Washington co., Ill. Pop. 160.

Elkton, a post-village, capital of Cecil co., Md., on the Philadelphia Wilmington and Baltimore R. R., 52 miles E. N. E. from Baltimore, and at the head of navigation on the Elk River. It has a national bank, six churches, an academy and a public school, two weekly newspapers, and four hotels. There are flour, iron, and paper mills in the vicinity. Elkton was settled by the Swedes in 1694. Pop. 1797; of Elkton township, 4170.

R. C. MACKALL, ED. "DEMOCRAT."

Ell [Lat. *ulna;* Fr. *aune;* Ger. *Elle;* Dutch *eln*], a measure of length adopted from the length of a man's fore arm. The English ell is 3 feet 9 inches, and the Flemish is equal to 27 inches, or three-fourths of a yard.

Ellag'ĝic Acid, a constituent of certain animal concretions, as the bezoar-stones of the antelope; also produced by the decomposition of gallic acid.

El'laville, a post-village, capital of Schley co., Ga., about 44 miles E. S. E. of Columbus. Pop. 157.

Ellaville, a post-village of Madison co., Fla., at the junction of the Ocopilco and Suwanee rivers, has very extensive saw-mills, with a railroad several miles long extending into the forests to supply rough timber for the mills. The village is on the Jacksonville Pensacola and Mobile R. R., 95 miles W. of Jacksonville.

El'lenboro, a post-township of Grant co., Wis. Pop. 803.

El'lenborough (EDWARD **Law**), LORD, an able English lawyer, born in Cumberland Nov. 16, 1750. He was engaged in 1785 as the leading counsel for the defence in the trial of Warren Hastings, for whom he pleaded with success. He became attorney-general in 1801, and lord chief-justice of the king's bench in 1802. In the same year he was created Baron Ellenborough. He was a Tory in politics. Died Dec. 13, 1818.

Ellenborough (EDWARD **Law**), EARL OF, a statesman, a son of the preceding, was born Sept. 8, 1790, and succeeded his father as baron in 1818. He was lord privy seal in 1828–29, and gained distinction as an orator in the House of Lords. In 1841 he was appointed governor-general of India, but he was recalled in 1844 by the East India Company, and then received the title of earl and viscount. He was first lord of the admiralty in 1846 for a short time in the cabinet of Peel. On the formation of a new Tory ministry in Feb., 1858, he became president of the board of control. One of his despatches censuring Viscount Canning for his conduct in India offended the public, and caused such an outcry that he had to resign in 1858. Died Dec. 22, 1871. By his death the earldom and viscounty became extinct.

El'lenburgh, a post-village and township of Clinton co., N. Y., on the railroad from Ogdensburg to Rouse's Point. The township has four churches, and manufactures of lumber, starch, leather, etc. Pop. of township, 3042.

El'len Creek, a township of Martin co., Minn. Pop. 188.

El'lendale, a township of Alexander co., N. C. Pop. 908.

El'lensburg, a post-village, capital of Curry co., Or., on the Pacific Ocean at the mouth of Rogue River, about 200 miles S. by W. of Salem.

Ellenville, a post-village of Wawarsing township, Ulster co., N. Y., 30 miles W. of the Hudson River, on the Delaware and Hudson Canal. It is the terminus of the Ellenville branch of the Midland R. R., and is situated in a beautiful and fertile valley at the foot of the Shawangunk Mountains. It is a very beautiful and thriving place. Its streets are shaded with maples. Its sidewalks are flagged at a cost of $50,000; its waterworks cost $40,000; it has many handsome public and private buildings, six churches, three weekly newspapers, graded public schools, one savings and two national banks, a glass-manufactory, cutlery-works, stoneware pottery, bluestone quarries, and manufactories of leather and boats. It has superior hotels, is a favorite summer resort, and is the seat of Ulster Seminary.

S. M. TAYLOR, ED. "JOURNAL."

El'lery, a post-township of Chautauqua co., N. Y., on Chautauqua Lake. Pop. 1616.

Ellery (WILLIAM), an American patriot, born at Newport, R. I., Dec. 22, 1727. He was a merchant in his youth, and began to practise law in 1770 at Newport. Having gained a high reputation for integrity and wisdom, he was chosen a delegate from Rhode Island to the national Congress of 1776, in which he signed the Declaration of Independence. He was re-elected, and remained in Congress until 1785. In 1790 he was appointed collector of Newport. He supported the Federal party. Died Feb. 15, 1820.

El'let (CHARLES), an American engineer, born at Penn's Manor, in Bucks co., Pa., Jan. 1, 1810. Destined by his father to the life of a farmer, his own strong brain led him to mathematical and engineering pursuits. First as a rodman, then as a voluntary, and subsequently as a paid assistant, on that great work of early American engineering, the Chesapeake and Ohio Canal, he acquired knowledge and pecuniary means to visit Europe and complete his self-education in Paris, following the course of the École Polytechnique. Subsequently an engineer on the Utica and Schenectady Railroad, then on the Erie, then chief engineer of the James River and Kanawha Canal, he was author of an "Essay on the Laws of Trade" (devoted to works of internal improvement in the U. S.) and of other works of a similar character. He shares with Roebling the honor of being a pioneer of wire suspension bridges, building in 1842 the bridge across the Schuylkill at Fairmount (on the site of the famous "colossus" wooden bridge destroyed in 1838 by fire), "the first structure of its kind in this country, and considered at the time a triumph of engineering skill." In 1845 he affirmed that a bridge might be built across the Niagara below the Falls, secure and fitted for railroad uses; and he was in 1847 the designing and constructing engineer of the preliminary wire suspension bridge (a light foot-bridge), intended as a service bridge for the construction of the main work. Among his most noteworthy labors was his investigation of the hydraulics of the Ohio and Mississippi rivers, and his work, published by the Smithsonian Institution, he regarded as "the crowning conception of his professional career." He was among the first to advocate the use of "steam-rams," suggesting a plan to the Russian government by which to destroy the allied fleet before Sebastopol, and soon after urging the matter upon our government. He was unheeded until the event of the famous Monitor and Merrimack battle in Hampton Roads, when he was commissioned by the war department to do what he could to protect the Mississippi gun-boat squadron against a fleet of hostile rams understood to be coming up the river. He hastily equipped a fleet of nine river steamboats as "rams," of which he was given the command. In a subsequent battle (June 6, 1862), terminating in a decisive defeat of the Confederate squadron, three of their vessels were sunk outright by two of his

rams; but he received a wound, from which his already enfeebled frame rapidly gave way, and he died at Cairo, Ill., on the 21st of June. A great engineer, his power as such was worthily devoted to the maintenance of the integrity of his country, and with it his life; thus in his death uniting in one, the engineer, the soldier, the patriot.

J. G. BARNARD, U. S: A.

Ellet (CHARLES RIVERS), M. D., son of the above, was born at Philadelphia in 1841. When the civil war broke out he entered the army as a surgeon, became colonel, and commanded with success a marine brigade of steam "rams," etc. on the Mississippi. Died Oct. 29, 1863.

Ellet (ELIZABETH FRIES), an American authoress, born at Sodus Point, N. Y., in Oct., 1818. Her maiden name was LUMMIS. She produced a volume of poems (1835), "Women of the American Revolution" (1848), "Summer Rambles in the West" (1853), "Queens of American Society" (1865), and numerous other works.

Ellet (WILLIAM HENRY), M. D., an American chemist, born in New York about 1804, was the husband of the preceding. He obtained a chair in Columbia College (of which he was a graduate) in 1832, and became professor of chemistry in South Carolina College in 1835. He invented a method of preparing gun-cotton. Died Jan. 26, 1859.

El'lettsville, a post-village of Richland township, Monroe co., Ind., 7 miles N. W. of Bloomington, on the Louisville New Albany and Chicago R. R. It has one private bank, two flouring-mills, one woollen-mill, four churches, two hotels, and one newspaper.

H. L. MCCOLLOUGH, ED. "REPUBLICAN."

Ellezelles, ĕl'zel', a town of Belgium, in the province of Hainaut, 16 miles N. E. of Tournay. It has manufactures of linen, a salt refinery, and breweries. Pop. 5527.

El'licott, a township of Chautauqua co., N. Y. It includes Jamestown and other villages. Pop. 6679.

Ellicott (ANDREW), an American civil engineer, born in Bucks co., Pa., Jan. 24, 1754. He founded Ellicott's Mills in Maryland, and removed to Baltimore. He was a friend of Dr. Franklin and of Washington. In 1790 he was employed by the Federal government to survey and lay out the capital of the U. S. He was appointed surveyor-general of the U. S. in 1792, and became professor of mathematics and engineering at West Point in 1812. Died at West Point Aug. 29, 1820.

Ellicott (CHARLES JOHN), D. D., since 1863 bishop of Gloucester and Bristol, was born at Whitwell, near Stamford, England, in 1819. In 1859 he was appointed Hulsean lecturer, and in 1860 Hulsean professor of divinity, at Cambridge. His commentaries on the Epistles of Saint Paul, which began to appear in 1854, have put him into the front rank of biblical scholars. His "Historical Lectures on the Life of Our Lord Jesus Christ" (1860) were the Hulsean Lectures for 1859. His first work was a "Treatise on Analytical Statics," 1842.

Ellicott City, capital of Howard co., Md., situated on the Patapsco River and the Baltimore and Ohio R. R., 10 miles from Baltimore and 31 miles from Washington. It has two newspapers, two cotton-factories, one flouring-mill, turning out 400 barrels of flour per day, one large barrel-factory, machine-shop and foundry, six churches, and three colleges, one of which is for females. Pop. 1722.

I. WOLFERSBERGER, ED. OF "PROGRESS."

El'licottville, a post-village of Cattaraugus co., N. Y., is on the Great Valley Creek, about 44 miles S. by E. from Buffalo. It has a large steam saw-mill and flouring-mill, an exchange and banking-office, two hotels, a large union school, four or more churches, and one newspaper-office. Pop. 579; of Ellicottville township, 1833.

ED. "CATTARAUGUS UNION."

El'lijay, a post-village, capital of Gilmer co., Ga., on Ellijay River, about 75 miles N. of Atlanta.

El'lington, a post-twp. of Tolland co., Conn. P. 1452.

Ellington, a township of Adams co., Ill. Pop. 2298.

Ellington, a township and post-village of Hancock co., Ia. Pop. 342.

Ellington, a post-twp. of Tuscola co., Mich. Pop. 452.

Ellington, a post-township of Dodge co., Minn. P. 258.

Ellington, a township and post-village of Chautauqua co., N. Y. Pop. of village, 314; total pop. 1556.

Ellington, a township of Outagamie co., Wis. P. 1248.

El'liot, a post-township of York co., Me., on the Portsmouth Saco and Portland R. R. It has a fire insurance company. Pop. 1769.

Elliot (WASHINGTON L.), GENERAL, a native of Pennsylvania, became an officer in the U. S. army in 1846, served on the frontiers with honor, became in 1861 colonel of the First Iowa Cavalry, and in 1862 a brigadier-general of volunteers, served in the West and in Virginia under Pope, was wounded at the second battle of Bull Run, was chief of cavalry in the army of the Cumberland, and afterwards a division commander in the Fourth Corps. He received a brevet of major-general U. S. A. in 1865. He published a manual for cavalry.

El'liott, a county of Kentucky, in the N. E. part of the State. Its surface is mountainous. It is traversed by several small streams, the head-waters of the Little Sandy River. Area, about 150 square miles. Grain and tobacco are the chief products. Capital, Sandy Hook. Pop. 4433.

Elliott, a post-township of San Joaquin co., Cal. P. 954.

Elliott, a township of Louisa co., Ia. Pop. 370.

Elliott (CHARLES), D. D., LL.D., a Methodist minister, born in the county of Donegal, Ireland, May 16, 1792. He emigrated to Ohio, where he edited the "Western Christian Advocate" and other journals. He was a professor of languages at Madison College, Uniontown, Pa. (1827–31), and was president of Iowa Wesleyan University (1856–60 and 1864–67). He was the author of "A Treatise on Baptism," "Life of Bishop Roberts," "Delineation of Roman Catholicism," 2 vols. 8vo; "Sinfulness of American Slavery," "History of the Great Secession," "The Bible and Slavery," etc. Died Jan. 3, 1869.

Elliott (CHARLES LORING), an American portrait-painter, born in Scipio, N. Y., in Dec., 1812. He worked in the city of New York, and painted the portraits of several eminent men. His works are commended for fidelity of likeness. Died in Albany, N. Y., Aug. 25, 1868.

Elliott (CHARLES WYLLYS), descended from John Eliot, "the apostle of the Indians," was born in Guilford, Conn., May 27, 1817. He was author of "St. Domingo" (1855), a "History of New England from the Discovery of the Continent by the Northmen in 986 to 1776" (1857), besides other works.

Elliott (CHARLOTTE), sister to the author of the "Horæ Apocalypticæ." She has written many excellent hymns; amongst others, "Just as I am, without one plea."

Elliott (EBENEZER), an English poet, called the "Corn-law Rhymer," was born near Rotherham, Yorkshire, Mar. 17, 1781. He was not liberally educated, and was considered a dull boy at school. In early youth he worked in an iron-foundry, in which his father had been employed. He produced in 1798 "The Vernal Walk," a poem. After he had worked for many years in the foundry, he married, and removed in 1821 to Sheffield, where he engaged in the iron-trade on his own account, and was successful. His most popular poems are "The Corn-law Rhymes," which promoted the repeal of the corn laws, and were much admired. He afterwards wrote "The Village Patriarch" (1829), "Byron and Napoleon" (1831), "Love," and other poems. His works are commended for their energy and the sympathy with the poor which they exhibit. Died Dec. 1, 1849.

Elliott (EDWARD BISHOP), an English clergyman, was born about 1795, and educated at Cambridge. He is best known as author of the "Horæ Apocalypticæ," 4th ed. 1851; 5th ed. 1862.

Elliott (EZEKIEL BROWN) was born in Sweden, Monroe co., N. Y., July 16, 1823, and graduated at Hamilton College in 1844. He was for some years a teacher, and afterwards was for a time superintendent of certain telegraph lines, and later (1855–56) an actuary in a life insurance company in Boston, Mass. In 1861 he became actuary of the U. S. Sanitary Commission. In 1863 was a member of the International Statistical Congress at Berlin. In 1865 he became secretary of the commission for revising the U. S. revenue laws. In 1871 he entered the civil service reform commission. Mr. Elliott is the author of a number of important papers, among which are the following: Life, annuity, and other useful tables involving quantities depending on the duration of life, with discussions of the principles underlying different methods of construction, based on Prussian, English, Belgian, Massachusetts, and other data, and published with the proceedings of the American Association for the Advancement of Science at its sessions in Albany, 1856, and in Montreal, 1867; a statistical report to the Sanitary Commission, made in 1862, on the mortality and sickness of the U. S. volunteers; a memoir on the "Military Statistics of the United States," published in connection with the proceedings of the International Statistical Congress at its fifth session, held at Berlin in 1863; a second table of Prussian mortality, prepared in 1864 and published in the "Zeitschrift" of the Royal Statistical Bureau of Prussia; "Tables of the Money, Weight, and Measure of the Principal Commercial Countries in the World," published in the appendix to "Webster's Counting-house Dictionary," ed. 1868; "Letters to the Secretary of the Treas-

ury on the Credit of the U. S. Government, as indicated by the Market-prices of its Securities," published in 1871 and 1872; life and annuity tables, based on the returns of the U. S. census of 1870, in comparison with corresponding data for other countries, with an analysis of the method of construction, prepared for the superintendent of the census, and published in the second volume of his report—that on vital statistics.

Among other papers prepared by Mr. Elliott may be named: in 1850, a demonstration of the principle that from a single voltaic battery may be simultaneously supplied, without sensible interference, the voltaic current for several telegraphic conducting wires; in 1860, a discussion, by quaternions, of the law which governs mutual action of elements of electric currents, resulting in a modification of the usually accepted formula of Ampère; in the same year, a memoir on the calculus of affected quantities of the second order (qnaternions); several communications, in 1869, 1870, and 1871, on the simplification of international coinage; and one, in 1872, on the relation obtaining between the frequency of auroras and the periodical lengthening and shortening of the sun's radius-vector.

Elliott (Jesse Duncan), an American commodore, born in Maryland July 14, 1782. He gained the rank of lieutenant in 1810, and was second in command under Com. Perry at the battle of Lake Erie, in Sept., 1813. Congress voted him a gold medal for his conduct in this action. He became a captain in 1818. Died Dec. 10, 1845.

Elliott (Jonathan) was born in England in 1784, emigrated to the U. S. about 1802, and fought in New Granada under Bolivar. In 1814 he went to Washington, where he was for thirteen years editor of the "Washington Gazette." He was author of "The American Diplomatic Code" (1827) and other works. Died Mar. 12, 1846.

Elliott (Stephen), LL.D., an American naturalist, born at Beaufort, S. C., Nov. 11, 1771, graduated at Yale College in 1791. He was professor of natural history in the medical college at Charleston, and president of the Bank of South Carolina. He wrote for the "Southern Review," and published "The Botany of South Carolina and Georgia" (2 vols., 1821–24), a work of merit. Died Mar. 28, 1830.

Elliott (Stephen), D. D., son of the preceding, and professor of sacred literature in South Carolina College, was born at Beaufort, S. C., Nov. 13, 1805. He became bishop of Georgia in 1841. Died Dec. 21, 1866.

Elliott (Stephen, Jr.), a brigadier-general in the Confederate army, born at Beaufort, S. C., 1832. On the outbreak of the civil war he organized and equipped the battery known as the Beaufort Artillery. He commanded at Pinckney Island Aug., 1862, and was promoted for gallant conduct; was in command of Fort Sumter during the protracted bombardment to which it was subjected; and in 1864 was severely wounded by the mine explosion near Petersburg, which incapacitated him from further active service for the remainder of the war. In 1865 he subscribed to the oath requiring him to support the Constitution of the U. S. and his own State. Received the nomination for Congress. Died at Aiken, S. C., Mar. 21, 1866.

Elliott (William) was born at Beaufort, S. C., April 27, 1788. He was a member of the legislature of that State, and opposed nullification in 1832. He wrote against secession about 1851, and was the author of "Fiesco," a tragedy (1850). Died in Feb., 1863.

El'liottsville, a township of Shelby co., Ala. P. 501.

Elliottsville Plantation, a township of Piscataquis co., Me. Pop. 42.

Ellipse [Gr. ἔλλειψις, "omission" or "defect," so called because the square of the ordinate is less than, or differs in defect from, the rectangle under the parameter and abscissa], a hypotrochoid curve of the second order, one of the conic sections, found by cutting a cone by a plane passing obliquely through the opposite side of the cone. If two fixed points be taken in a plane, and a third point be conceived to move around the two fixed points in such a way that the sum of the distances of the moving point from the fixed point shall always be the same, the moving point will describe an ellipse. The fixed points are the foci of the ellipse, and a point in the same straight line with the foci, and equally distant from each, is the centre. That axis of the ellipse which passes through the foci is the transverse or major axis; an axis perpendicular to the transverse is the conjugate or minor axis.

If a moving circle roll along the concavity of the circumference of a fixed circle in the same plane, the radius of the former circle being half that of the latter, any given point in the plane of the rolling circle, within or without, will describe an ellipse. Various instruments for marking the ellipse have been devised on this principle.

El'lis, a county in W. Central Kansas. Area, 900 square miles. It is intersected by Saline and Smoky Hill rivers, branches of the Kansas. The surface is nearly level, and is mostly prairie-land, well suited for stock-raising. It is traversed by the Kansas Pacific R. R. Capital, Hays City. Pop. 1336.

Ellis, a county in N. Central Texas. Area, 1000 square miles. It is bounded on the N. E. by the Trinity River. It contains fertile rolling prairies and forests of hard timber. Cattle, fruit, wool, corn, cotton, and swine are raised. It is intersected by the Houston and Texas Central R. R. Capital, Waxahachie. Pop. 7514.

Ellis, a township of Hardin co., Ia. Pop 518.

Ellis (George Edward), D. D., a Unitarian minister and author, born in Boston Aug. 8, 1814, graduated at Harvard in 1833. He was ordained pastor at Charlestown about 1838. He wrote for Sparks's "American Biography" lives of William Penn and others. In 1857 he became professor of theology in the Divinity School at Cambridge. Among his works is a "Half Century of the Unitarian Controversy" (1857).

Ellis (Harvey W.) was born in Kentucky. He settled in Tuscaloosa, Ala., where he was repeatedly elected to the legislature of that State. He died in 1842.

El'lisburgh, a post-village and township of Jefferson co., N. Y. The township is on Lake Ontario, is traversed by the Rome Watertown and Ogdensburg R. R., and has some manufactures. There is an academy at Belleville. This township is one of the wealthiest in the State. There was an engagement here in 1814 between the Americans and a superior British force. The latter were defeated. Pop. of township, 4822.

El'lison, a post-township of Warren co., Ill. P. 1258.

El'lis Station, a post-township of Ellis co., Kan. Pop. 120.

El'lisville, a post-township of Fulton co., Ill. Pop. 657.

Ellisville, a post-village, capital of Jones co., Miss., on the Tallahalla River, 144 miles S. E. of Jackson.

Ellore, ĕl'lōr', a town of India, presidency of Madras, 38 miles N. of Masulipatam, is a British military station. It is reported to be populous. The climate is unhealthy.

Ellora, Hindostan. See Elora.

Ells'worth, a county in Central Kansas. Area, 720 square miles. It is intersected by the Smoky Hill Fork of the Kansas River. The surface is nearly level, and is generally fertile. Cattle and grain are raised and coal is found. It is traversed by the Kansas Pacific R. R. Capital, Ellsworth. Pop. 1185.

Ellsworth, a township of Emmet co., Ia. Pop. 98.

Ellsworth, a township of Hamilton co., Ia. Pop. 186.

Ellsworth, a post-village, capital of Ellsworth co., Kan., is on the Kansas Pacific R. R., 223 miles from Kansas City and 415 miles from Denver. It is one of the leading markets for Texas cattle in the State, not less than 150,000 head being distributed from this point every year. It has a bank, a newspaper, five hotels, and a brick schoolhouse costing $20,000. The country adjoining is unsurpassed for grazing. Pop. of Ellsworth township, 448.

G. A. Atwood, Ed. "Reporter."

Ellsworth, a port of entry and capital of Hancock co., Me., on the navigable Union River, 2 miles from its mouth and 30 miles S. E. of Bangor. Several bridges cross the river here. Its trade is considerable, and its main industries are lumbering, shipbuilding, and cooperage. It has fifteen saw-mills, two steam-mills, a savings-bank, five churches, a public library, and one newspaper. Pop. of township, 5257.

A. T. Drinkwater, Ed. "American."

Ellsworth, a township of Meeker co., Minn. P. 270.

Ellsworth, a post-township of Nye co., Nev. P. 54.

Ellsworth, a post-twp. of Grafton co., N. H. Pop. 193.

Ellsworth, a post-village of Pierrepont township, St. Lawrence co., N. Y., on Racket River. Called also East Pierrepont. Pop. 179.

Ellsworth, a post-twp. of Mahoning co., O. Pop. 652.

Ellsworth, a township of Tyler co., W. Va. P. 1890.

Ellsworth, a post-village, capital of Pierce co., Wis., 40 miles S. E. of St. Paul, Minn., has a steam saw-mill, stave-mill, three hotels, and one newspaper. Pop. of township, 747. M. B. Kimball, Ed. "Herald."

Ellsworth (Ephraim Elmer), an American officer, born in Mechanicsville, Saratoga co., N. Y., April 23, 1837, became a resident of Chicago. He organized a well-disciplined body of Zouaves before the civil war, and in Mar.,

1861, he escorted President Lincoln to Washington. In April he became colonel of a Zouave regiment of New York firemen. When the government troops (May 24, 1861) took possession of the shores of the Potomac (including the city of Alexandria) opposite Washington, to Col. Ellsworth's regiment was assigned the seizure and occupation of that city. Observing a secessionist flag flying over the "Marshall House" (a hotel kept by one Jackson), he ascended to the roof himself and took it down. Descending with it in his hand, he was met and shot dead by the innkeeper, who immediately encountered a similar fate from the attendant soldiers.

Ellsworth (HENRY LEAVITT), born at Windsor, Conn., Nov. 10, 1791, graduated at Yale in 1810, and studied law at Litchfield. He resided mostly in Connecticut, but was for some time a resident commissioner of the U. S. with the South-western Indians, and from 1845 to 1857 lived in Lafayette, Ind. He was (1836–45) U. S. commissioner of patents. He published a series of valuable agricultural reports from the patent office; also a "Digest of Patents" (1840). Died Dec. 27, 1858.

Ellsworth (OLIVER), LL.D., chief-justice of the U. S., was born in Windsor, Conn., April 29, 1745, and graduated at Princeton in 1766. He studied law, was admitted to the bar in 1771, and elected a delegate to the Continental Congress in 1777. In 1784 he was appointed a judge of the superior court, and in 1787 was a member of the convention which framed the Federal Constitution. Having joined the Federal party, he was elected in 1789 to the Senate of the U. S., in which he gained distinction as a debater and supported Washington's administration. He was appointed chief-justice of the Supreme Court by Washington in 1796. In 1799 he was sent as envoy extraordinary to Paris, where he and his colleagues negotiated a treaty with France. He resigned the office of chief-justice in 1800. Died Nov. 26, 1807.

Ellsworth (WILLIAM WOLCOTT), LL.D., was born at Windsor, Conn., Nov. 10, 1791, and graduated at Yale in 1810, became a lawyer, was professor of law in Trinity College, Hartford, Conn. (1827–68), member of Congress (1829–33), governor of Connecticut (1838–42), and a justice of the State supreme court (1847–61). Died at Hartford Jan. 15, 1868.

Ell'wangen, a town of Würtemberg, on the Jaxt, 45 miles E. N. E. of Stuttgart. It has a cathedral, a castle, a hospital, and a gymnasium; also tanneries and bleachworks. Pop. in 1867, 3895.

Ell'wood (THOMAS), an English writer, born in Oxfordshire in 1639, was a minister of the Society of Friends. His friend Isaac Penington procured for him in 1662 the position of reader to the poet Milton, who was then blind and lived in London. "I went," says Ellwood, "every day in the afternoon (except on the first days of the week), and sitting by him in his dining-room, read to him in such books in the Latin tongue as he pleased to hear." After he had passed six weeks in this occupation, Ellwood went to the country for the sake of his health, which was impaired. He visited Milton at Giles-Chalfont in 1665, when the poet showed him the manuscript of "Paradise Lost," and requested him to take it home and read it. On returning the manuscript, Ellwood suggested to Milton the idea of "Paradise Regained," by asking, "What hast thou to say of Paradise Found? He made no answer, but sat some time in muse." Among Ellwood's works are a "Sacred History" (1705), a poem called "Davideis" (1712), and "Memoirs of his own Life" (1714). Died Mar. 1, 1713.

Elm [Lat. *ul'mus;* Ger. *Ul'me;* Fr. *orme*], a genus of trees of the order Ulmaceæ, natives of Europe and North America, with alternate serrate leaves, which are oblique or unequally heart-shaped at the base. The ovary is 2-celled, with a single anatropous ovule. The fruit is a 1-celled membranaceous samara, winged all round. This genus comprises numerous species, five or more of which are indigenous in the U. S. The most remarkable of these is the *Ul'mus America'na* (white or American elm), a large ornamental tree, usually with spreading branches and drooping, pendulous boughs. It grows rapidly, often attains the height of 100 feet, and is considered one of our most noble and beautiful forest trees. Its favorite habitat is in moist woods where the soil is rich, and in the vicinity of rivers and creeks. The trunk sometimes ascends without branches fifty or sixty feet, and then separates into a few primary limbs, which gradually diverge and present long arched pendulous branches floating in the air. The wood of this tree is used for making hubs of wheels. Another species native of the U. S. is the slippery elm (*Ul'mus ful'va*), a smaller tree with a very mucilaginous inner bark, which is used in medicine as a demulcent. Among the important trees of this genus is the common English elm (*Ulmus campestris*), which grows in many parts of Europe, and is extensively planted in Great Britain. It is one of the chief ornaments of English scenery. The wood of this tree is compact, fine-grained, very durable in water, and is used for various purposes by wheelwrights, machinists, joiners, and shipbuilders. It has a mucilaginous bark, which is esteemed as a medicine. The *Ul'mus monta'na,* or wych elm, is a native of Scotland, and a tree of rapid growth, valuable for timber, which is used for the same purposes as the English elm. Europe also produces the cork-barked elm (*Ul'mus subero'sa*), a tall tree extensively planted in England, and named with reference to the corky ridges or wings on its branches. A valuable fine-grained wood is obtained from the *Ul'mus ala'ta,* winged elm or wahoo, which grows wild in the Southern U. S., and has corky-winged branches.

Elm, a township of Wayne co., Ill. Pop. 968.

Elm, a township of Putnam co., Mo. Pop. 1640.

El'ma, a township and post-village of Erie co., N. Y. It has important manufactures. P. 165; of township, 2827.

Elm Creek, a township of Saline co., Kan. Pop. 2027.

Elmendaro, a post-township of Lyon co., Kan. P. 533.

El'mer, a post-village of Pittsgrove township, Salem co., N. J. It is a station on the West Jersey R. R., 26 miles S. of Philadelphia, and at the junction of the branch railroad to Salem, N. J. Pop. 347.

Elmer (LUCIUS Q. C.), LL.D., born at Bridgeton, N. J., in 1793, graduated at Princeton in 1824, was a prominent lawyer and State politician, a member of Congress from New Jersey (1843–45), attorney-general of the State (1850–52), and a judge of the State supreme court (1852–59). He published a "Digest" of New Jersey laws (1838).

Elm Grove, a township of Tazewell co., Ill. P. 1072.

Elm Grove, a township of Louisa co., Ia. Pop. 701.

Elmi'na, a fortified town and seaport of Africa, the former capital of the Dutch possessions on the Guinea coast, is in lat. 5° 5′ N., and lon. 1° 23′ W. It is defended by a strong fort. Elmina was taken from the Portuguese by the Dutch in 1637. Pop. estimated at 15,000. On April 6, 1872, it was ceded, with the Dutch possessions in Guinea, to Great Britain. In 1873 it was burned by the British troops on account of its sympathy with Ashantee.

Elmi'ra, a post-village of Woolwich twp., Waterloo co., Ontario, Canada, 12 miles from Berlin, the county-seat. It has factories and mills, and one weekly newspaper. P. 850.

Elmira, a post-township of Stark co., Ill. Pop. 1108.

Elmira, a township of Olmsted co., Minn. Pop. 1055.

Elmira, a city, the capital of Chemung co., N. Y., at the crossing of the Erie and Northern Central R. Rs., 274 miles by rail N. W. by W. of New York. The Chemung Canal extends to Seneca Lake, and the Junction Canal connects Elmira with the interior of Pennsylvania. It is on the Chemung River, and is the largest city in that part of the State. There is one rolling-mill and one blast-furnace, each with $1,500,000 capital, and in full operation; one woollen-mill, ten shoe-and-boot factories, three iron-foundries, a manufactory of steam fire-engines, besides machine-shops and other like industries, including the large shop of the Pullman Car Company for the manufacture and repair of cars. The large shops of the Erie R. R. and the principal shops of the Northern Central R. R. are situated here. There are 19 churches—5 Roman Catholic, 2 Episcopal, 2 Presbyterian, 3 Baptist, 3 Methodist, 1 Congregational, and 3 colored. The State Reformatory, now in process of erection, will be an imposing structure. The Elmira Female College (Presbyterian) is large and well endowed. The public-school system is excellent. Many of the school-houses are very fine. Eldridge Park, containing over 300 acres, was established by private enterprise, and is finely laid out. The city has a fine court-house, a jail, a water-cure, a surgical institute, an orphans' home, etc. There are two State, one national, one private, and one savings bank, two daily and two weekly newspapers, a steam fire department, street railways, and water-works with a storing reservoir holding 120,000,000 gallons of water. The future of the city is full of promise. Its trade with the surrounding country is very extensive. The township, outside of the city, is very fertile and has several stone-quarries. The city was incorporated in 1865. It was during the late civil war a great recruiting rendezvous, and immense barracks were erected here, which have since been removed. It was also the site of a military prison, where many Confederate prisoners were confined. Pop. of city, 15,873; of township, exclusive of city, 1190.

AUSBURN TOWNER, LOCAL ED. "ELMIRA ADVERTISER."

El Mon'te, a township of Los Angeles co., Cal. P. 1254.

El'more, a county in E. Central Alabama. Area, 775 square miles. It is bounded on the E. and S. by the Tallapoosa River, and intersected by the Coosa. These rivers

unite on the southern border of this county to form the Alabama River. The soil is productive. Grain, cotton, and wool are raised. The S. and N. Alabama R. R. passes through the south-western part. Cap. Wetumpka. P. 14,477.

Elmore, a township of Daviess co., Ind. Pop. 865.

Elmore, a post-township of Faribault co., Minn. P. 470.

Elmore, a post-village of Harris township, Ottawa co., O., on Portage River, 20 miles from Lake Erie, and on the southern division of the Lake Shore and Michigan Southern R. R., 16 miles S. E. of Toledo. It has one bank, eight churches, two hotels, and one newspaper. Pop. 1131.

J. E. CROFOOT, ED. "COURIER."

Elmore, a post-township of Lamoille co., Vt. It has manufactures of lumber and starch. Pop. 637.

Elmore (FRANKLIN HARPER), an American lawyer and financier, born in South Carolina in 1799. He became a member of Congress in 1837, and president of the Bank of the State of South Carolina in 1840. He was elected to the U. S. Senate in 1850, and died May 29 of the same year.

Elmore (RUSH), a son of Gen. John Elmore, was educated for the bar, served in the Mexican war, and was, in 1854, by President Pierce, appointed a judge of the U. S. court in Kansas. He died during the war.

El'mo's Fire, Saint [*Elmo* is an Italian form of the name *Elijah*], an electrical light which at sea sometimes attaches itself to the ends of masts and spars. When two such lights are seen it is called Castor and Pollux, and is considered by sailors a sign of fair weather and good luck; one ball of light, called Helena, is regarded as a bad omen.

Elms'horn, a town of Germany, in the Prussian province of Sleswick-Holstein, on the river Krückau and on the Kiel and Altona Railway, about 22 miles N. W. of Hamburg. It has an active trade in grain and manufactures of shoes, etc. Pop. in 1871, 4832.

Elm Spring, a township of Washington co., Ark. P. 1071.

Elm'wood, a post-village of Peoria co., Ill., on a branch of the Chicago Burlington and Quincy R. R., 163 miles S. W. of Chicago. It has one newspaper office. Pop. 1476; of Elmwood township, including village, 2410.

Elmwood, a township of Leelenaw co., Mich. P. 535.

Elmwood, a township of Tuscola co., Mich. P. 369.

Elmwood, a post-township of Saline co., Mo. P. 1538.

Elmwood, a post-township of Cass co., Neb. P. 317.

Éloge, å'lozh', a French term signifying "eulogy," is applied in France to the panegyrical orations pronounced in honor of eminent deceased persons, and particularly of members of the French Academy and Institute. The duty is now performed by the new member elected as the successor of the deceased. Fontenelle was one of the first who excelled in this species of composition.

E'lon, a township of Amherst co., Va. Pop. 3193.

Elonga'tion [from the Lat *e,* "out," and *lon'gus,* "long"], in astronomy, is the apparent angular distance of a planet from the sun. The greatest elongation of Mercury amounts to about 28° 30', that of Venus to about 47° 48', and that of the superior planets may have any value up to 180°.

El'oquence [Lat. *eloquen'tia;* for etymology see ELOCUTION] is the expression of thought or emotion in such a manner as to produce conviction or corresponding emotion in others. The term was originally applied to public speaking alone, but the rules for that art being generally applicable to writing, it was used in a wider sense. In Greece in the age succeeding Pericles arose a school of rhetoricians, who sought to graft upon eloquence the subtleties of logic. Gorgias and Isocrates belonged to this school, and in this age Grecian eloquence attained its highest perfection in Demosthenes. Soon after this it declined rapidly, and the names of Athenæus and several others have been preserved from oblivion chiefly by the writings of Longinus. When the liberal arts began to flourish at Rome by the exertions of Greeks, the senate in the year of the city 592 decreed the banishment of all rhetoricians. But the Romans a few years later were so charmed with the eloquence of Carneades, Diogenes, and Critolaus, the ambassadors from Athens to Rome, that they made the study of oratory part of a liberal education. It made the most rapid progress, and was at last crowned by the appearance of Cicero. From his writings we learn that many great orators existed at Rome before the age of Augustus. The despotic character of the government in succeeding ages checked the growth of the art, which quickly declined. The history of eloquence in England records the names of Pitt, Burke, Fox, Sheridan, and others of the first eminence. The statesmen of Ireland have as a class been remarkable for their excellent oratory. In Germany there has been so little opportunity for the display of forensic or senatorial eloquence that its growth has been in a measure checked; and the same may be said of Spain, Italy, and Portugal, which, however, have been rich in pulpit eloquence. The French language is essentially a colloquial one, but the great names of Bossuet, Bourdaloue, Massillon, Lacordaire, Lamennais, and Hyacinthe illustrate its capabilities for pulpit oratory, while the Revolution brought out many powerful public speakers in politics. Of these Mirabeau is the most celebrated. In the U. S. public speaking is one of the great social powers, and it is accordingly cultivated with assiduity and success.

Of the earlier American orators, Fisher Ames was perhaps the most finished. The "great triumvirate," Webster, Clay, and Calhoun, in public affairs, Wirt and Choate at the bar, and Samuel Davies, John Mason, and not a few other pulpit-orators, have attained great eminence. The names of Everett and Wendell Phillips also deserve mention.

Elo'ra, or **Ellora,** a decayed town of Hindostan, near Dowlatâbâd; lat. 20° 5' N., lon. 75° 13' E. Here are numerous remarkable cave-temples, which surpass in magnitude all others in India, and are adorned with statues and other sculptures. Besides the cave-temples hewn out in the slope of a rocky hill, there are vast edifices or pagodas carved out of solid granite hills, so as to form magnificent monoliths, having an exterior as well as interior architecture, richly decorated. They are among the most stupendous monuments ever raised by man. The most remarkable of these is the temple called *Kailasa,* which is about 145 feet long and 100 feet high, and is supported by four rows of pilasters with colossal elephants beneath. In the court which surrounds the temple of Kailasa are several obelisks, sphinxes, and colonnades. Many mythological figures are carved on the walls. The date of the construction of these temples is not known. According to Mr. Fergusson, they were executed not later than 200 B. C. (See FERGUSSON, "Handbook of Architecture.")

Elo'ra, a post-village of Ontario, Dominion of Canada, in Wellington county and on Grand River at its falls, 12 miles N. W. of Guelph, on the Wellington Grey and Bruce Railway. It has two newspapers, a large trade, and extensive manufactures. Pop. in 1871, 1498.

El Pa'so, ĕl på'so (*i. e.* "the passage" or "gap"), a county in the central part of Colorado, has an area of about 2600 square miles. It is drained by several small affluents of the Arkansas River. The western part is mountainous, the eastern a broken plain. The highest point of this county is Pike's Peak, which rises 11,497 feet above the level of the sea. It abounds in grand scenery. Stock-raising and lumber-cutting are the chief industrial pursuits. Grain, wool, and dairy products are the agricultural staples. It is intersected by the Denver and Rio Grande R. R. Capital, Colorado City. Pop. 987.

El Paso, a county which forms the W. extremity of Texas, is bounded on the S. W. by the Rio Grande, which separates it from Mexico. The surface is mostly sandy plains, but some parts are very mountainous. There are several salt-lakes with no outlets. Wine, salt, and fine onions are exported. Silver ore abounds. The county contains many Mexicans and Pueblo Indians. Area, 9450 square miles. Capital, El Paso. Pop. 3671.

El Paso, a city of Woodford co., Ill., on the Illinois Central R. R. where it crosses the Toledo Peoria and Warsaw R. R., 17 miles N. of Bloomington and 33 miles E. of Peoria. It has one newspaper-office. A coal-shaft is now going down. Two large mills, five grain-elevators, one carriage-manufactory, and two agricultural-implement works are among the business industries of the place. Pop. 1564, or, including El Paso township, 2416.

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El Paso, a post-village, capital of El Paso co., Tex., on the Rio Grande, near lat. 31° 42' N. Near this place the river passes through a gap or gorge in a mountain called El Paso del Norte ("North Pass"), which is the chief thoroughfare between Mexico and New Mexico.

El Paso, a post-township of Pierce co., Wis. Pop. 248.

El Pa'so del Nor'te ("the pass of the north"), a fertile valley in the Mexican state of Chihuahua, on the Rio Grande, about 350 miles S. by W. from Santa Fé. Here are produced wine and brandy, which are called Pass wine and Pass brandy.

Elphinstone (Hon. MOUNTSTUART), a British historian, born in 1778, was a younger son of Lord Elphinstone. He was sent as ambassador to the court of Cabool in 1808, and became governor of Bombay in 1819. Bishop Heber expressed the opinion that he was "in every respect an extraordinary man," and that his Indian policy was wise and liberal. Mr. Elphinstone resigned in 1827, and returned to

England. He published an "Account of the Kingdom of Cabool" (1815) and a "History of India: the Hindoo and Mohammedan Periods" (2 vols., 1841), both of which are highly esteemed. Died Nov. 20, 1859.

El Rosar'io, a town of the Mexican state of Cinaloa, 55 miles E. of Mazatlan. Here were rich gold-mines, which are no longer worked. It is an entrepôt of trade between Mazatlan and the interior. Pop. 5000.

Elroy, a post-village of Juneau co., Wis. It is the S. E. terminus of the West Wisconsin R. R., at its junction with the Chicago and North-western R. R., 210 miles N. E. of Chicago. It has a weekly newspaper.

Elsass [*i. e.* "the country of the 'Sassen' (settlers) on the Ill;" Lat. *Alsatia;* Fr. *Alsace*], a German country, bounded on the E. by the Rhine, on the S. by Switzerland, and on the W. by the Vosges Mountains, which separate it from France. Area, about 3350 square miles. It was ceded to France by the emperor of Austria in 1648, and became a province of that country. After the division of France into departments, about 1790, it formed the departments of Haut Rhin and Bas Rhin (Upper and Lower Rhine), which in 1866 contained a population of 1,119,255. Chief towns, Strasburg, Colmar, and Mülhausen. After the German armies had defeated and captured Napoleon III. in 1870, Bismarck and his king insisted on the annexation of Elsass to Germany as one of the conditions of peace. The French therefore continued to fight for it, but at last they were compelled to cede it (with the exception of the fortress Belfort and its *rayon*) by the treaty of May 10, 1871. The total population, according to the census of 1871, was 1,059,279, a decrease of about 60,000 since 1866.

Elsasser (F. A.), a German landscape-painter, born in 1810, went to Italy in 1832, where he lived chiefly in Rome. Italian history and scenery form the subjects of his most celebrated works, among which are "The Campo Santo near Pisa by Moonlight," "The Siren Grotto in Tivoli," and "The Imperial Palace in Rome." Died in 1845.

Elsass-Lothringen [Fr. *Alsace-Lorraine*], the name of a new German country formed of those portions of Alsace and Lorraine which in 1870 were ceded by France to Germany. It has not been annexed to any particular German state, but it is a Reichsland (imperial land), immediately subject to the emperor. Area, 5596 square miles. It is divided into three districts (Bezirke)—Ober-Elsass, Unter-Elsass, and Lothringen. The first corresponds to the former French department of Haut Rhin, the second to the former French department of Bas Rhin, while the third contains all the territory which has been ceded of the French departments of Moselle, Meurthe, and Vosges. The districts have been subdivided into circles (Kreise), which in extent do not correspond to the former French arrondissements. Ober-Elsass contains seven, Unter-Elsass eight, and Lothringen eight circles. Pop. 1,549,459.

It is estimated that about six-sevenths of the population (about 1,340,000) speak the German language, and 210,000 French. Of the latter, 180,000 belong to Lothringen, and 15,000 to Ober-Elsass and Unter-Elsass each. About 81 per cent. of the population belongs to the Roman Catholic religion, which in Elsass-Lothringen is more predominant than in any other German state; Bavaria, the next in order, numbering only 71 per cent. of Catholics. The legislative functions are exercised by the German Reichstag, in which Elsass-Lothringen will, until Jan. 1874, not be represented. At the head of the administration is an Oberpräsident, who is subordinate to the imperial chancellor; the imperial chancery has a special division for the affairs of Elsass-Lothringen. The revenue and expenditure amounted for 1872 to 45,142,991 francs each. The new country is as yet without a public debt. At the time when the country was ceded to Germany 770 kilometers (1 kilometer = 0.62 English miles) of railroads were in operation, which, with a few exceptions, belonged to the Société des Chemins de Fer de l'Est, from which the German empire bought them for 325,000,000 francs. The navigable rivers are the Rhine, Ill, Moder, Saar, and Moselle. The soil is fertile, and rich in mines of iron, copper, and coal. The chief productions of the soil are grain, wine, beet-root, tobacco, madder, and linseed. Mülhausen (Mulhouse) is the seat of important manufactures of cotton prints, muslins, flowered silk stuffs, linen damasks, etc. Capital, Strasburg.

El-Seewah (anc. *Ammonium*), the most northerly of the five Egyptian oases, about 440 miles W. N.W. of ancient Thebes. It is six miles long and three broad. The oasis abounds in salt and alum, which were anciently exported in great amount. Dates, pomegranates, and other fruits are produced in surprising quantities. Sheep and cattle are bred in great numbers. It abounds in fresh-water springs, and is in part rather marshy. The ruins of the temple of Ammon and of other ancient buildings are still in existence. Pop. about 8000. Chief town, Kebir.

Els'heimer (Adam), a skilful German landscape-painter, born at Frankfort-on-the-Main in 1574, was called Il Tedesco (*i. e.* "the German") by the Italians. He worked in Rome, where he died in 1620. His works are highly finished. He excelled in chiaroscuro.

El'sie, a post-village of Clinton co., Mich., has one monthly publication.

El'sinborough, a township of Salem co., N. J. Pop. 700.

Elsinore [Dan. *Helsingör*], an old and interesting town and seaport of Denmark, is on the island of Seeland and on the western shore of the Sound (here only 2½ miles wide), 24 miles N. by E. of Copenhagen; lat. 56° 2′ N., lon. 12° 37′ E. It is defended by the castle of Kronborg, which commands the Sound at its narrowest part. It has a cathedral, a custom-house, and a royal palace called Marienlist, from which is obtained a magnificent view of the Sound and of Helsingborg in Sweden. At Elsinore the Sound dues were formerly collected from foreign vessels navigating the Sound. It has an active trade, and some manufactures of arms, brandy, hats, etc. Here was laid the scene of Shakspeare's "Hamlet." Pop. in 1870, 8891.

Elsinore, a post-township of Allen co., Kan. P. 452.

El'ssler (Fanny), a German dancer, born at Vienna in 1811. She performed with success in Berlin, Paris, and London. In company with her sister Therese, who was also a danseuse, she visited the U. S. in 1841. She retired from the stage with a large fortune in 1851. Her sister Therese was united in morganatic marriage with Prince Adalbert of Prussia in 1850, and was made Freifrau von Barnim by the king in the same year.

El'ster, Black, a river of Germany, rises in Saxony, flows north-westward, and enters the Elbe 8 miles E. of Wittenberg. Length, 105 miles.

Elster, White, a river of Germany, rises near the north-western frontier of Bohemia, flows northward, and after a course of 110 miles enters the Saale 3 miles S. of Halle (Prussia).

Elton', a shallow saline lake of Russia in the basin of the Caspian, government of Astrachan, about 49° 15′ N. lat., and 46° 30′ E. lon., 150 miles S. S. E. of the town of Saratof. It is 14 miles long, and has an area of 78 square miles. About 100,000 tons of salt are annually procured from it. In the summer it presents an appearance as if it were covered with snow.

El'ton (Romeo), D. D., LL.D., was born at Bristol, Conn., in 1790, and graduated at Brown University in 1813. He was ordained as a Baptist minister in 1817, and was (1825–43) professor of ancient languages in Brown University. He resided for a time in England (1845–69). He published sermons, biographical works, etc. Died Feb. 5, 1870, leaving $20,000 to Brown University, and the same amount to Columbian College, D. C.

Elutria'tion [from the Lat. *elu'trio, elutria'tum,* to "cleanse"], the process of preparing earths and pigments by washing them in large quantities of water, so that the heavier particles sink to the bottom, and the finer particles, remaining longer suspended, are gradually deposited. This operation is a very important one in preparing clay for the porcelain manufacture and some ores of iron and other metals for the furnace. The apparatus used for this purpose is a vat in which grinding wheels revolve, and into which a stream of water flows, but there are many special adaptations of the process.

El'vas [Sp. *Helves* or *Yelves*], a fortified frontier city of Portugal, in the province of Alemtejo, is about 125 miles E. of Lisbon and 12 miles W. of Badajos (Spain). It stands on a steep hill, is enclosed by walls, and is said to be the strongest fortress in Portugal. It contains many antique Moorish buildings, also a cathedral, several convents, a theatre, an arsenal, and a college. Elvas is supplied with water by a large Moorish aqueduct with several tiers of arches rising to the height of 250 feet. Its bishop is a suffragan of the archbishop of Evora. Pop. 11,088.

Elves. See Elf.

Elvira, a post-township of Johnson co., Ill. Pop. 1268.

El'wood, a township of Vermilion co., Ill. Pop. 1987.

Elwood, a post-village of Pipe Creek township, Madison co., Ind., on the Columbus Chicago and Indiana Central R. R. It is called also Quincy and Duck Creek. Pop. 310.

Ely, ee'le, an episcopal city or cathedral town of England, is in the country of Cambridge, and on the river Ouse, 72 miles N. N. E. of London and 16 miles N. N. E. of Cam-

bridge. It is situated in the fen country called the Isle of Ely. A monastery was founded here about 673 A. D. Here is a fine cathedral which is 535 feet long by 190 feet wide, and exhibits a combination of Early Norman and Gothic styles. It was commenced about 1080, and additions were made in the twelfth and fourteenth centuries. Ely became a bishop's see in 1107. It contains Trinity church, a handsome structure founded in 1321. Pop. in 1871, 8098.

Ely, Isle of, a level, fenny tract of England, in Cambridgeshire, is the southern part of the Bedford Level. It is bounded on the S. by the river Ouse. It was formerly in great part covered with water, but has been drained and reclaimed by numerous canals and ditches. Aquatic birds and marsh plants abound here. The soil is fertile, and produces good crops of hemp, flax, wheat, oats, etc.

Elyria, the capital of Lorain co., O., is beautifully situated at the confluence of the E. and W. branches of Black River, 25 miles W. of Cleveland and 7 miles S. of Lake Erie, at the junction of the Lake Shore and Michigan Southern and Lake Shore and Tuscarawas Valley R. Rs. It has a national bank, savings bank, three newspapers, a public library, telegraph college, seven churches, a gas-factory, and some of the finest business-houses in the State. It has valuable water-power. The manufacturing and sale of cheese, grindstones, building-stone, tobacco, confectionery, and screws are the chief businesses. The place has a rapid growth. Pop. in 1870, 3038; of Elyria township, including village, 4076. F. S. Reefy,
Ed. "Lorain Constitution" and "Elyria Volksfreund."

Elys'ian, a post-township of Le Sueur co., Minn. P. 852.

Elys'ium, or **The Elys'ian Fields** [Gr. *ἠλύσιον πεδίον*; Fr. *Élysée* or *Champs Élysées*], in classic mythology, the place to which the souls of the virtuous were supposed to be transported after death. Elysium was variously represented as a part of Hades or as an island in the Western Ocean. Some of the ancients imagined that the kingdom of Pluto was divided into two regions—Tartarus, in which the wicked were punished, and Elysium, the abode of the good.

Elysville (P. O. name, Alberton), a village of Howard co., Md., on the Baltimore and Ohio R. R. Pop. 302.

E'lyton, a post-village, capital of Jefferson co., Ala., on the Alabama and Chattanooga R. R., 54 miles N. E. of Tuscaloosa. It has one weekly newspaper. There are extensive iron-works in the vicinity.

El'ze (Karl Friedrich), a German philologist, born in 1821, became professor at the gymnasium in Dessau. He wrote, among other works, "The English Language and Literature in Germany" (1864), "Sir Walter Scott" (1864), "Lord Byron" (1867), and published editions of English and American authors. He also edits (since 1868) the "Yearbook" of the German Shakspeare Society.

El'zevir, or **Elzevier,** the name of a family of Dutch printers who lived at Amsterdam, Leyden, and other places, and were celebrated for the accuracy and beauty of their typography. They published excellent editions of several classic authors between 1583 and 1681. The first eminent printer of the family was Lewis or Lodewijk, who was born about 1540. He lived at Leyden, and died about 1617, leaving four sons—Matthew, Lewis, Gilles (or Ægidius), and Bonaventure, who were all publishers. The business was continued by Abraham, a son of Matthew, and his partner Bonaventure, who published duodecimo editions of the classics which are still highly prized for their beauty and correctness. The Greek New Testament is among their masterpieces. A press was established in Amsterdam in 1638 by Lewis Elzevir (a grandson of Lewis first mentioned), who published good editions of numerous authors. Several other members of the family were distinguished printers.

Emana'tion [from the Lat. *e*, "out," and *ma'no, mana'tum*, to "flow"], in the religions of India, of ancient Persia, in Neo-Platonism, and in Gnosticism, a theory of ontology and of cosmogony which ascribes the origin of the universe and of all inferior beings to an outflow from the Deity. The name has also been applied to the good and evil influences which the heavenly bodies were formerly believed to send forth, and which were thought to determine the destinies of men.

Emancipa'tion [from the Lat. *eman'cipo, emancipa'tum*, to "liberate" (from *e*, "from," and *mancip'ium*, a "slave")], the act of freeing from subjection of any kind. In Roman law a son was regarded as the slave of his father, and could by a fiction of that law be freed by being sold (*mancipatus*) three times by the father. This enfranchisement was termed emancipation. Different modes of emancipation were afterwards recognized by Roman jurisprudence. In countries where that law prevails the word signifies the exemption of the son from the power of the father, either by express act or implication of law. By the civil law of France, majority (and emancipation) are attained at twenty-one, and a minor is emancipated by marriage. The word emancipation is used in a general sense to signify the liberation of a slave, or the admission of certain classes to the enjoyment of civil rights, as Catholic Emancipation (which see).

Emancipation, Proclamation of, the most important document ever issued by a President of the U. S., was issued by President Lincoln Sept. 22, 1862, as a notice to the Confederates to return to their allegiance, emancipation being proclaimed as a result which would follow their failure so to return. The real Proclamation of Emancipation was the supplementary document of Jan. 1, 1863. This act was simply a war-measure, based solely upon the President's authority as commander-in-chief of the army and navy.

Proclamation of Emancipation.

I, Abraham Lincoln, President of the United States, and Commander-in-chief of the Army and Navy thereof, do hereby proclaim and declare that hereafter, as heretofore, the war will be prosecuted for the object of practically restoring the constitutional relation between the United States and the people thereof in those States in which that relation is, or may be, suspended or disturbed; that it is my purpose upon the next meeting of Congress to again recommend the adoption of a practical measure tendering pecuniary aid to the free acceptance or rejection of all the Slave States, so called, the people whereof may not then be in rebellion against the United States, and which States may then have voluntarily adopted, or thereafter may voluntarily adopt, the immediate or gradual abolishment of Slavery within their respective limits, and that the effort to colonize persons of African descent, with their consent, upon the continent or elsewhere, with the previously obtained consent of the government existing there, will be continued; that on the first day of January, in the year of our Lord one thousand eight hundred and sixty-three, all persons held as slaves within any State, or any designated part of a State, the people whereof shall then be in rebellion against the United States, shall be then, thenceforward, and for ever free; and the military and naval authority thereof will recognize and maintain the freedom of such persons, and will do no act or acts to repress such persons, or any of them, in any efforts they may make for actual freedom; that the Executive will, on the first day of January aforesaid, by proclamation, designate the States and parts of States, if any, in which the people thereof respectively shall then be in rebellion against the United States; and the fact that any State, or the people thereof, shall on that day be in good faith represented in the Congress of the United States by members chosen thereto, at elections wherein a majority of the qualified voters of such State shall have participated, shall, in the absence of strong countervailing testimony, be deemed conclusive evidence that such State and the people thereof have not been in rebellion against the United States.

That attention is hereby called to an act of Congress entitled "An act to make an additional article of war," approved March 13, 1862, and which act is in the words and figures following:

"Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled, That hereafter the following shall be promulgated as an additional article of war for the government of the Army of the United States, and shall be observed and obeyed as such:

"Article —. All officers or persons of the military or naval service of the United States are prohibited from employing any of the forces under their respective commands for the purpose of returning fugitives from service or labor who may have escaped from any persons to whom such service or labor is claimed to be due; and any officer who shall be found guilty by a court-martial of violating this article, shall be dismissed from the service.

"Sec. 2. And be it further enacted, that this act shall take effect from and after its passage."

Also to the ninth and tenth sections of an act entitled "An act to suppress insurrection, to punish treason and rebellion, to seize and confiscate property of Rebels, and for other purposes," approved July 17, 1862, and which sections are in the words and figures following:

"Sec. 9. And be it further enacted, that all slaves of persons who shall hereafter be engaged in rebellion against the Government of the United States, or who shall in any way give aid or comfort thereto, escaping from such persons and taking refuge within the lines of the army; and all slaves captured from such persons or deserted by them, and coming under the control of the government of the United States, and all slaves of such persons found on (or being within) any place occupied by Rebel forces and afterwards

occupied by the forces of the United States, shall be deemed captives of war, and shall be for ever free of their servitude and not again held as slaves.

"SEC. 10. And be it further enacted, that no slave escaping into any State, Territory, or the District of Columbia, from any of the States, shall be delivered up, or in any way impeded or hindered of his liberty, except for crime or some offence against the laws, unless the person claiming said fugitive shall first make oath that the person to whom the labor or service of such fugitive is alleged to be due, is his lawful owner, and has not been in arms against the United States in the present rebellion, nor in any way given aid or comfort thereto; and no person engaged in the military or naval service of the United States shall, under any pretence whatever, assume to decide on the validity of the claim of any person to the service or labor of any other person, or surrender up any such person to the claimant, on pain of being dismissed from the service."

And I do hereby enjoin upon, and order all persons engaged in the military and naval service of the United States to observe, obey, and enforce within their respective spheres of service the act and sections above recited.

And the Executive will, in due time, recommend that all citizens of the United States who shall have remained loyal thereto throughout the rebellion, shall (upon the restoration of the constitutional relation between the United States and their respective States and people, if the relation shall have been suspended or disturbed) be compensated for all losses by acts of the United States, including the loss of slaves.

In witness whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

Done at the city of Washington, this twenty-second day of September, in the year of our Lord one thousand eight hundred and sixty-two, and of the Independence of the United States the eighty-seventh.

By the President: ABRAHAM LINCOLN.
WM. H. SEWARD, Secretary of State.

SUPPLEMENTARY PROCLAMATION.

Whereas, On the twenty-second day of September, in the year of our Lord one thousand eight hundred and sixty-two, a proclamation was issued by the President of the United States, containing among other things the following, to wit:

That on the first day of January, in the year of our Lord one thousand eight hundred and sixty-three, all persons held as slaves within any State, or any designated part of a State, the people whereof shall then be in rebellion against the United States, shall be thenceforward and for ever free, and the Executive Government of the United States, including the military and naval authority thereof, will recognize and maintain the freedom of such persons, and will do no act or acts to repress such persons, or any of them, in any efforts they may make for their actual freedom:

That the Executive will, on the first day of January aforesaid, by proclamation, designate the States and parts of States, if any, in which the people thereof respectively shall then be in rebellion against the United States, and the fact that any State, or the people thereof, shall on that day be in good faith represented in the Congress of the United States by members chosen thereto at elections wherein a majority of the qualified voters of such State shall have participated, shall, in the absence of strong countervailing testimony, be deemed conclusive evidence that such State and the people thereof are not then in rebellion against the United States:

Now, therefore, I, Abraham Lincoln, President of the United States, by virtue of the power in me vested as Commander-in-chief of the Army and Navy of the United States, in time of actual armed rebellion against the authority and Government of the United States, and as a fit and necessary war-measure for repressing said rebellion, do, on this first day of January, in the year of our Lord one thousand eight hundred and sixty-three, and in accordance with my purpose so to do, publicly proclaim for the full period of one hundred days from the day of the first above-mentioned order, and designate, as the States and parts of States wherein the people thereof respectively are this day in rebellion against the United States, the following, to wit: Arkansas, Texas, Louisiana, except the parishes of St. Bernard, Plaquemine, Jefferson, St. John, St. Charles, St. James, Ascension, Assumption, Terre Bonne, Lafourche, St. Mary, St. Martin, and Orleans, including the city of New Orleans, Mississippi, Alabama, Florida, Georgia, South Carolina, North Carolina, and Virginia, except the forty-eight counties designated as West Virginia, and also the counties of Berkeley, Accomac, Northampton, Elizabeth City, York, Princess Ann, and Norfolk, including the cities of Norfolk and Portsmouth, and which excepted parts are, for the present, left precisely as if this proclamation were not issued.

And by virtue of the power and for the purpose aforesaid, I do order and declare that all persons held as slaves within said designated States and parts of States are, and henceforward shall be, free; and that the Executive Government of the United States, including the military and naval authorities thereof, will recognize and maintain the freedom of said persons.

And I hereby enjoin upon the people so declared to be free, to abstain from all violence, unless in necessary self-defence, and I recommend to them, that in all cases, when allowed, they labor faithfully for reasonable wages.

And I further declare and make known that such persons of suitable condition will be received into the armed service of the United States to garrison forts, positions, stations, and other places, and to man vessels of all sorts in said service.

And upon this, sincerely believed to be an act of justice, warranted by the Constitution, upon military necessity, I invoke the considerate judgment of mankind and the gracious favor of Almighty God.

In witness whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

Done at the city of Washington, this first day of January, in the year of our Lord one thousand eight hundred and sixty-three, and of the Independence of the United States of America the eighty-seventh.

[L. S.]

By the President: ABRAHAM LINCOLN.
WILLIAM H. SEWARD, Secretary of State.

Eman'uel, a county in the E. S. E. of Georgia. Area, 1000 square miles. It is bounded on the N. E. by the Ogeechee River and intersected by the Great Ohoopee. The surface is nearly level. Cattle, corn, rice, oats, tobacco, cotton and wool are raised. Capital, Swainsboro'. Pop. 6134

Emar'ginate [from the Lat. *emar'gino, emargina'tum,* to "take away the edge"], a botanical term applied to leaves which are notched or indented at the apex.

Em'aus, a post-village of Salisbury township, Lehigh co., Pa. Pop. 477.

Em'ba, or **Jem,** a river of Asia, in Toorkistan or the Kirgheez territory. It flows south-westward, and enters the Caspian Sea. Length, about 250 miles.

Embalm'ing [remotely from the Gr. ἐν, "in," and βάλσαμον, "balm," "resin," alluding to the ancient process], the preservation of dead bodies from decay by the application of antiseptic drugs or of suitable chemical reagents. This art early attained great perfection in Egypt. It appears to have arisen from belief in a future life and in the resurrection of the body. It was practised in various ways. In the most expensive method the brain and viscera were removed, their places being filled with bitumen and aromatic substances; the body was washed in the oil or tar of cedar, bound up in linen smeared with spices, asphalt, and various gums; and the whole was placed in a solution of natron (saltpetre or sodium nitrate) for seventy days. This process cost a silver talent, nearly $2000. The cheap methods dispensed with the evisceration, and yet many mummies (embalmed bodies) are found completely preserved by the inferior methods. It appears also that salt was freely used; and some authors believe that heat was also employed in the process. Embalming was also practised to some extent by the Jews, Assyrians, and ancient Persians, as also by the early Christians, who embalmed the bodies of some of the martyrs, probably by the simple application of aromatics. Throughout mediæval Europe rude embalming was practised upon the bodies of princes, and during the present century many improvements have been made in the process, which no longer aims at rendering bodies imperishable, but merely preserves them indefinitely. Various methods are now used. In some, arsenical liquids are injected into the blood-vessels. The chlorides of zinc, mercury, and aluminium, various other salts of aluminium, solutions of creasote from wood-tar, preparations of phenol or carbolic acid and of cresol or cresylic acid from coal-tar, etc., are successfully employed. Some of the very best methods are said to be secret.

Embank'ment, a mound of earth for a pier or quay, for defence against the sea or streams, or for carrying a roadway. In building embankments the slopes should be of a permanent nature, and the weight of the bank should not be so great as to force out the foot. The materials should be placed according to that angle at which they would begin to move if left to themselves. Gravel or hard stone may be laid at 34°, while clay is liable to slip if the materials are dressed to an angle of more than 26°. If required to resist the pressure of water on one side, the slope towards the water had better be 34°, and that towards the country 26°. The tendency of the subsoil of an embankment to be compressed under the load brought upon it

may be resisted by filling the core with light materials and by widening the base. The best way to counteract this tendency is to isolate the foundation by driving piles.

Care should be taken to free the seating of an embankment from any water that may filter through it. Covering the slopes with turf is a useful precaution, but this cannot be done when the bank is formed of gravel.

Among the greatest embankments of modern times are one of 1,750,000 yards on the Ulm and Augsburg Railway, and the Oberhäuser embankment of 2,500,000 yards cube on the Augsburg and Lindau line.

Embar'go [a Spanish word signifying "arrest," "impediment"], a restraint or prohibition imposed by the government of a country on merchant-vessels or other vessels to prevent their leaving its ports. Embargoes are usually imposed in time of war, or when war is believed to be impending. They may sometimes prohibit the arrival as well as the departure of vessels. In Dec., 1807, the Congress of the U. S., at the request of President Jefferson, laid an embargo as an offset or retaliation against the British "Orders in Council." This embargo was repealed by Congress in Feb., 1809. (See INTERNATIONAL LAW No. II., by PRES. T. D. WOOLSEY, S. T. D., LL.D.)

Embarras, a township of Edgar co., Ill. Pop. 1280.

Embassador. See AMBASSADOR.

Em'bassy [for etymology see AMBASSADOR; Fr. *ambassade;* Ger. *Gesandschaft;* Lat. *legatio*], a diplomatic mission; the function of an ambassador. In a technical or limited application, embassy signifies a mission presided over by an ambassador; that is, a diplomatic agent of the highest rank. The term is sometimes applied to a company of persons sent on a mission, including one or more envoys, secretaries, etc.

Emb'den, a post-township of Somerset co., Me. P. 803.

Em'berton, a post-borough of Venango co., Pa. Pop. 488.

Em'ber Week [Lat. *qua'tuor tem'pora,* the "four seasons" (from this the English is probably a corruption); Fr. *quatre-temps;* Ger. *Quatember;* Dutch *temper*], a name given in the calendars of the Anglican and Roman Catholic churches (1) to the week after the first Sunday in Lent; (2) to the week after Whitsunday; (3) to that after the 14th of September; and (4) to that after the 13th of December. The Wednesday, Friday, and Saturday of these weeks are "ember days," fasts for imploring the Divine blessing on the fruits of the earth and upon the ordinations which are performed at these times. The fasts are said to have been instituted by Pope Calixtus I. in 229 A. D., but the times were fixed by Gregory VII., and confirmed by the Council of Placentia (1095).

Embez'zlement, in criminal law, is the act of fraudulently appropriating to one's own use property held under some fiduciary relation, such as that of clerk or servant. It is not to be confounded with larceny. The definition of this offence is rigid, so that this branch of the criminal law is entangled with perplexing distinctions. Larceny is defined to be "the felonious taking and carrying away the personal property of another." The word "taking," as here employed, has been closely interpreted by the courts, and generally considered not to include the case of property held in trust, particularly where it came into the possession of the trustee without first having passed into the possession of the real owner. There must have been a taking equivalent to a trespass. It became a maxim that without a trespass there could be no theft or larceny. So refined a distinction as the following has been maintained: Should a clerk or servant authorized to sell goods actually sell them, and, having received the price, convert the money to his own use, there is no larceny, because the master never had the *possession of the money,* and so the clerk could not be said to have "taken" it from him. On the other hand, if the clerk had put the money received on the sale into the master's money-drawer, and had afterwards fraudulently abstracted it, he would have committed larceny, for the act of depositing the money in the drawer would have placed it *constructively* in the master's possession. The moral quality of the two acts is substantially the same, yet by the common law the one is a crime, and the other is a simple breach of trust, for which the servant is responsible in a mere action for damages.

This imperfection in the law led, many years ago, to a statute in England, which created a new form of crime called "embezzlement." The early English statutes only included the case of misappropriation by clerks or servants of individuals or private corporations. This form of legislation was copied in this country. There is now in England a much more comprehensive scheme. (See 24 and 25 Vict., c. 96.) The present act not only includes the former cases, but embraces a great variety of cases of breach of trust, such as that by factors, brokers, agents, trustees of charitable societies, officers of cities, and public servants generally. The range of each enactment of this kind is very comprehensive, including not only positive wrongs, but all forms of wilful or fraudulent neglect of duty. It is by no means necessary under this legislation that the officer should appropriate the funds of a city to his own use. It is enough if he fraudulently appropriates or permits them to be appropriated to *any other use* than that to which they rightfully belong. The punishment is severe. The crime is made a felony, punishable by not more than fourteen nor less than three years of penal servitude, or else by imprisonment at hard labor for a fixed period. In the civil law embezzlement is recognized as a wrong, subjecting him who commits it to an action for damages or other proceeding by way of reparation. A salvor may forfeit his share of salvage compensation by "embezzlement;" the forfeited share accrues, not to the other members of his class, but to the owner of the property saved. T. W. DWIGHT.

Embla'zonry, pictures or figures on shields and coats-of-arms. Emblazoning is the art of adorning with ensigns armorial. (See BLAZONRY.)

Em'blem [Gr. ἔμβλημα (from ἐν, "in," and βάλλω, to "cast," to "put"), literally, "something inserted;" Lat. *emble'ma;* Fr. *emblème,* probably applied originally to a symbolical figure inserted in a shield or coat-of-arms], a figurative representation which by the power of association suggests to the mind some idea not expressed to the eye; a symbol; a type; thus, a balance is an emblem of justice. In bibliography, the term "book of emblems" is applied to a book containing a series of plates or pictures of emblematic subjects, with explanations, as the poems of Jacob Cats.

Em'blements [Norman Fr., probably from the Fr. *blé,* "grain," with the particle *en,* "in" or "on," prefixed], a term applied to the growing crops of cereal grains and vegetables raised by a tenant. By the law of England a tenant for life, whose estate depends on an uncertain event, or other tenant is entitled to the emblements, although his lease may terminate before harvest-time. If a tenant for life die, his personal representatives may after his death claim the products of his labor. But if a term be brought to a close by the voluntary act of the tenant, he is not entitled to the emblements.

Em'blica Officina'lis [the generic name is of Malay origin], a species of trees of the natural order Euphorbiaceæ, is a native of India and the Malay Archipelago. It produces a small round fruit, which is very acid, has medicinal properties, and is used to make pickles. The wood is hard and valuable. The bark is used for tanning and for dyeing cotton black.

Em'bolism [Gr. ἐμβολισμός, from ἐν, "in," and βάλλω, to "throw"], in the calendar, is an intercalation of a day, as the 29th of February in leap-year, or of a lunar month, as in the Greek and Hebrew calendars.

EMBOLISM, in pathology, is the presence of a clot (*em'bolus*) in the arteries or veins. Some writers also apply the name to the fixed venous clot (*thrombus*). Embolism in the brain is a recognized cause of apoplexy. An extensive embolism of the lungs may lead to sudden death; a smaller one may lead to local pneumonia, abscess, pyæmia, or gangrene. Embolism, though frequently fatal, is sometimes followed by recovery. The best treatment is the frequent administration of concentrated food and stimulants, keeping the patient in fresh air, and allaying irritation by opiates. Besides the above, some emboli appear to originate from a precipitation of pigmentary matter. Such cases are the result of disease.

Embolite, a chloro-bromide of silver, found in the silver ores of Mexico and Chili.

Embos'sing [from *boss,* a "protuberance"], in sculpture, carving, and architecture, is the forming in relief of any figure. The figures are said to be in high, middle, or low relief (*alto, mezzo,* or *basso rilievo*).

Embouchure [Fr., from *emboucher,* to "empty," literally, to "put into the mouth" or to "put the mouth to"], the mouth of a river; also that part of a wind musical instrument to which the lips of the performer are applied.

Embra'cery, in law, the offence of endeavoring to corrupt or bribe a jury or to influence a jury by any corrupt motive. To use indirect means to cause one's self to be chosen a juryman is also embracery. This offence is punishable by fine and imprisonment.

Embra'sure [etymology doubtful], in fortification, an opening made in the parapet of a fortified place or the breastwork of a battery through which the guns are pointed. The embrasures are usually made about two feet wide at the interior extremity or neck, and half as thick as the

parapet at the exterior crest. The sole or lower surface is at the height of about two and a half feet above the platform on which the carriage of the gun is placed.

Em′bro, a post-village of West Zorra township, Oxford co., Ontario, Canada, 10 miles from Woodstock, the county-town, has two weekly papers and about 600 inhabitants.

Embroi′dery [from the Fr. *broder,* to "embroider," probably from the Gaelic *brod,* a "goad," "something pointed"] is the art of working figures with a needle and thread on muslin and other fabrics. Embroidery on heavy materials is generally executed with silk, wool, or gold and silver thread, and is used for banners, church vestments, furniture covers, etc. Muslin embroidery is performed mostly with cotton, and employed for collars, caps, and various other articles of apparel. Embroidery with the common needle consists usually of a combination of ordinary stitches. A machine has recently been introduced into England and the Continent by which the most complicated patterns can be accurately executed by one person with 130 needles, all moving at once. One of these machines performs daily the work of fifteen hand-embroiderers. Several kinds of sewing-machines can be used for embroidering. The art of embroidery is of very ancient origin, and was brought to great perfection by the women of Greece and Sidon. It was extensively practised in mediæval times in Europe. The women of some barbarous races, like the North American Indians, often exhibit a marked degree of skill in embroidery.

Em′bryo [Gr. ἔμβρυος, "budding inwardly," from ἐν, "within," and βρύω, to "swell like a bud" before blooming], in animal anatomy and physiology, is the immature germ of the future organism; an account of the development of which is given in the article EMBRYOLOGY.

In botany, the embryo is the rudimentary plant found in the seed of phænerogamous plants. It consists of a radicle or undeveloped stem; of one, two, or more cotyledons or future seed-leaves; and the plumule, an incipient leaf or bud at the summit of the radicle. The dodders, and perhaps a few other dicotyledonous (or more strictly exogenous) plants, have no cotyledons, but only a spirally coiled, thread-like embryo inside the albumen, with sometimes a few plumule scales.

Embryol′ogy [from the Gr. ἔμβρυον, "something that grows or sprouts internally," and λόγος, a "discourse"], the history of the development of the young animal before birth. Embryology proper includes the description of all the changes, both anatomical and physiological, which take place in the body of the imperfect young, within either the uterus or the egg, in all classes of animals. The present article, however, will be devoted more especially to the embryology of the Vertebrata, or those animals having a bony skeleton, since the general plan of development is the same throughout this class, and is particularly important as illustrating the development of the embryo in the human species.

In all cases the development of the young animal begins from an *ovum,* or egg. The ova exist originally in the interior of the body of the female parent, where they are produced in certain organs contained in the cavity of the abdomen, termed *ovaries.* The ovaries, containing ova, are thus characteristic of the female organization, and form an essential part of its original structure. The ova, after being produced in the ovaries, at a certain period arrive at maturity, and are spontaneously discharged. If fecundated at this time by the influence of the male, they become developed into embryos; if not, they lose their vitality after a short period and perish. Thus the production of the embryo depends upon the concourse or combination of two sexual elements—namely, the ovum produced by the female, and the fecundating material or sperm produced by the male.

In some kinds of animals, such as birds, batrachians, and most of the reptiles and fishes, the egg is first discharged from the body of the female, and the development of the embryo takes place within it subsequently, the young animal being at last hatched from the egg externally; such animals are called *oviparous,* or egg-laying animals. In other instances, as in some fishes and reptiles, all the true quadrupeds, and the human species, the ova are retained within the body of the female while the development of the embryo is going on; so that at last the fully formed embryo is produced alive; such animals are called *viviparous,* because they produce living young, instead of laying eggs like the former. Nevertheless, the process is essentially the same in both cases, and differs only in the time during which the ovum is retained within the body of the female parent.

The ovum in its simplest form consists of a globular mass of albuminous matter mixed with oleaginous granules, and invested by a transparent, colorless, homogeneous membrane. The oleo-albuminous mass is termed the *vitellus,* or yolk; the investing layer is called the *vitelline membrane.* Of these two, the vitellus is the essential part of the ovum. It is that which yields the material for the first formation of the body of the embryo. The vitelline membrane is simply a covering intended to protect the vitellus, to maintain its shape, and to regulate for a short time the absorption of fluids. The vitellus, while still remaining in the ovary, contains a delicate, transparent vesicle, termed the "germinative vesicle," marked with a minute dot, called the "germinative spot." These names have been given to the bodies in question from the idea that they might have something to do with the commencement of growth or germination of the embryo, but it is doubtful whether they have any such significance; and it is generally believed that they are rather connected with the growth and maturity of the ovum itself before impregnation has occurred.

In the human species and in the quadrupeds generally the ovum, as above described, forms a little sphere about $\frac{1}{120}$ of an inch in diameter. It is therefore nearly invisible to the naked eye, and requires examination by the microscope in order to distinguish its characters.

FIG. 1.

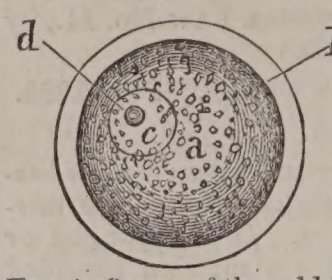


FIG. 1. Ovum of the rabbit, from the ovary, magnified 90 diameters: *a,* vitellus; *b,* vitelline membrane; *c,* germinative vesicle; *d,* germinative spot.

In the quadrupeds this minute form and simple structure are amply sufficient, since the impregnated ovum is retained within the body of the female during the development of the embryo, and abundantly supplied with nourishment from the parent organism. But in the oviparous classes, where the development of the embryo takes place outside the body of the parent, the egg is larger in size and more complicated in structure, and contains a store of nutritious material, as well as certain additional protective envelopes. In the common fowl, for example, the vitellus or yolk, which is the only part of the egg produced in the ovary, is nearly an inch in diameter, and contains a great abundance of oleaginous as well as albuminous material. After its discharge from the ovary, and during its downward passage through the generative canal, the size of the egg is still further increased by the deposit around the yolk of a layer of pure albumen, secreted by the lining membrane of the canal, and forming the so-called "white of egg." In the lower portion of the generative passage there are added to the outside of the albumen two fibrous membranes, called the "shell-membranes;" and lastly. the calcareous shell, formed of a consolidated layer of the salts of lime. These fibrous and calcareous envelopes serve to protect the embryo, while the albumen and the yolk supply it with the requisite nourishment during its formation in the egg.

FIG. 2.

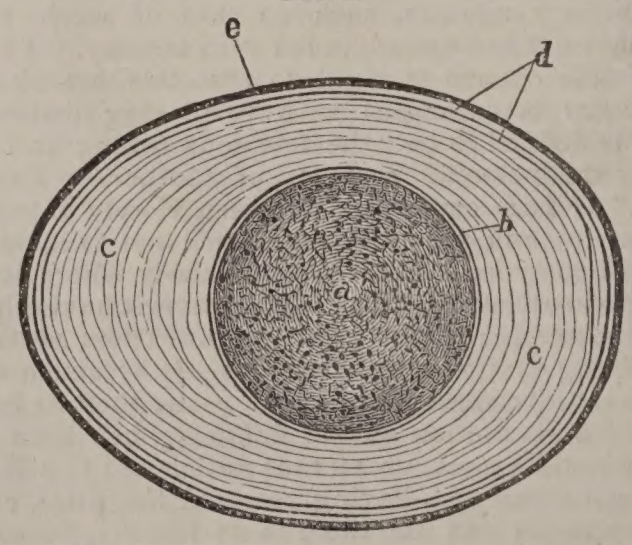


FIG. 2. *a,* yolk; *b,* vitelline membrane; *c,* albumen; *d,* shell-membranes; *e,* egg-shell.

In all instances, without exception, the first indication of the commencing formation of the embryo in the ovum is what is called the spontaneous division or *segmentation* of the vitellus. This process consists in the separation of the globular vitellus into two smaller globules or hemispheres by the appearance of a furrow running round the vitellus like an equator, which gradually deepens until it has completely separated the two hemispheres from each other. At the same time, or a little later, a second furrow, placed at right angles to the first, runs round the vitellus in another direction; and thus the two secondary globules are divided into four. By a repetition of this process the vitellus, which had originally the form of a simple sphere, becomes converted into a mulberry-shaped mass of minute globules, called the "vitelline spheres." These globules become condensed into the form of organized cells; and from these cells, in the simplest cases, the body of the embryo is directly formed, without the production of any accessory organs.

In the vertebrate animals the vitelline spheres, resulting from the segmentation of the vitellus, when converted into organized cells, form a cellular layer or continuous membrane upon the surface of the impregnated ovum. This membrane, formed exclusively of similar flattened cells, adherent to each other by their edges, is called the *blastodermic membrane*. It is the first appearance of a truly organized structure in the interior of the impregnated ovum, and forms the basis for the formation of the body of the embryo. In some instances, in the lower orders of the vertebrate class, where the impregnated eggs are laid in the water, and where an abundance of warmth, oxygen, and nutritious fluid is supplied by the surrounding medium—as, for example, in the frog—the subsequent process is very simple, or at least is not complicated with the formation of any accessory organs. In these cases the whole of the vitellus, and consequently the whole of the blastodermic membrane, is directly converted into the body of the embryo. The plan upon which this development takes place is as follows:

FIG. 3.

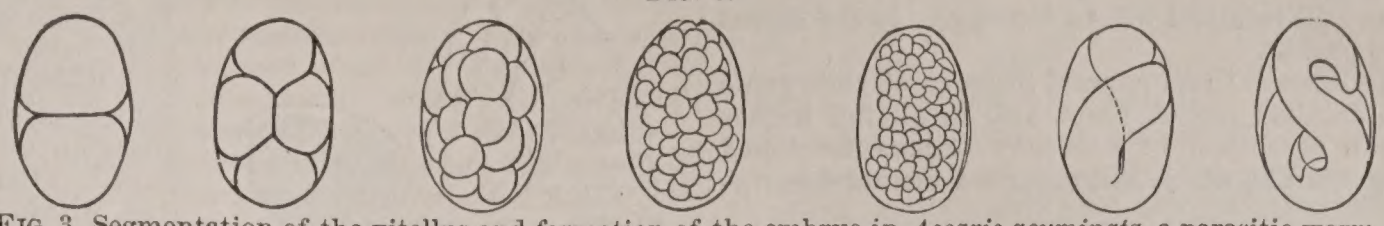


FIG. 3. Segmentation of the vitellus and formation of the embryo in *Ascaris acuminata*, a parasitic worm.

An elongated oval spot appears upon a certain part of the blastodermic membrane, where the tissue of the membrane is thicker, denser, and more opaque than elsewhere. This spot, which is the first sketch of the actual form of the future embryo, is called the *embryonic spot*. Its anterior extremity will subsequently become the head, and its posterior extremity the tail. As the cells of the embryonic spot become more numerous, smaller, and more closely amalgamated, its appearance changes towards its central portions, where, instead of being opaque, it becomes homogeneous and pellucid in appearance. The central area or space in which this change occurs is called the *area pellucida;* and finally there appears, in the middle of this transparent space, a longitudinal line or trace, indicating the position of the future spinal column, and known by the designation of the *primitive trace*.

FIG. 4.

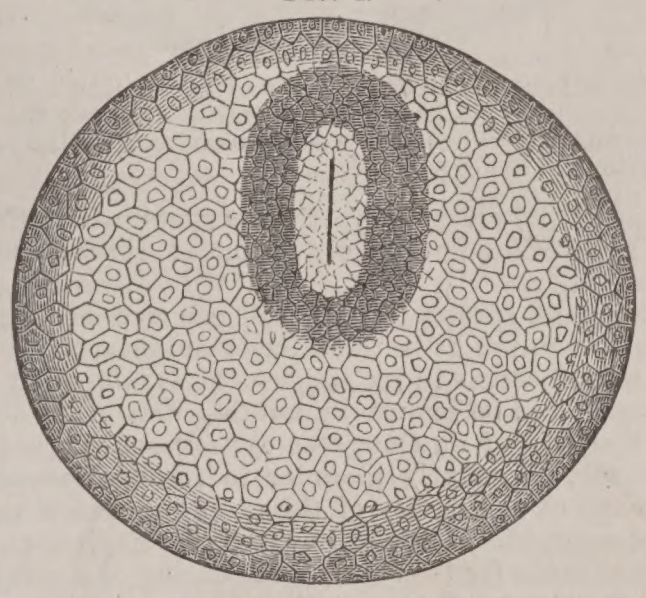


FIG. 4. Impregnated ovum of the rabbit, showing the blastodermic membrane formed of cells, the embryonic spot, the area pellucida, and the primitive trace.

In this way is determined the location of the fundamental part of the structure of the vertebrate animal, for the spinal column is the most important portion of the whole skeleton, and the formation of all the remaining parts of the body takes place with reference to it.

In every vertebrate animal the subsequent development of the body goes on simultaneously in two different directions—namely, from before backward, and from behind forward. From the edges of the primitive trace, on the right and left sides, the substance of the blastodermic membrane becomes thickened and elevated into two longitudinal and parallel ridges, which of course include between them a longitudinal furrow. These ridges are called the *dorsal plates*. As they increase in growth their upper edges approach each other, and the furrow between them becomes deeper and more like a canal. In this canal, which is still open along the back, are formed the spinal cord and the brain. But the dorsal plates, constantly approaching each other, at last meet, and unite by their edges along the median line of the back; thus converting the furrow which existed between them into a closed cavity, in which are now contained the brain and spinal cord. Thus, the dorsal plates, by their union with each other along the median line, complete the formation of the external parts of the body in a posterior direction, and the brain and spinal cord are enclosed in an elongated cavity situated behind the column of the bodies of the vertebræ.

At the same time a similar condensation and growth extends from the edges of the primitive trace in a direction outward and forward. These growing portions are called the *abdominal plates* of the blastodermic membrane; and they continue to extend forward until they embrace the abdominal cavity in front, just as the dorsal plates embraced the spinal canal behind. At last they also unite with each other by their edges, and the external parts of the body are then cicatrized and consolidated upon the median line, both anteriorly and posteriorly. The alimentary canal and its accessory organs are thus enclosed by the abdominal plates in an abdominal cavity, situated in front of the column of the bodies of the vertebræ.

As thus far described, the process of development relates to the growth of the external portions of the body, and that part of the nervous system which corresponds with them—namely, the brain and spinal cord, and the nerves derived therefrom. The dorsal and abdominal plates, as they grow thicker and more condensed, begin to show in their substance the distinction of the various tissues. The external integument, the tissue of the voluntary muscles, the cartilages and bones, the organs of special sense, the nerves of sensation and voluntary motion, and the white and gray matter of the brain and spinal cord, are thus formed in the substance of the growing material. All the organs and tissues just enumerated, notwithstanding their different functions, are closely related to each other in one respect; that is, they are destined to bring the animal body into relation with the external world by means of sensation, consciousness, volition, voluntary movement, and the mechanical reception and expulsion of nutritious or effete materials. They are accordingly known as the "organs of animal life;" and they are all formed from the original cells of the *external layer* of the blastodermic membrane.

There is also, however, an *internal layer* of the blastodermic membrane; and from this layer are formed the alimentary canal and its glandular appendages, or the organs in which digestion, absorption, and secretion are to be carried on, and in which the muscular actions are involuntary and unconscious. They may, therefore, be regarded as the "organs of vegetative life." The alimentary canal is at first an oval sac, enclosed on all sides by the external abdominal walls. But subsequently two openings are formed, one at its anterior and one at its posterior extremity—namely, the mouth and the anus; and the original sac is thus converted into a true canal, open at both ends. At the same time the alimentary canal grows very rapidly in the direction of its length, thus becoming converted into a comparatively long, narrow, and convoluted tube, and afterwards showing the distinctions between the œsophagus, the stomach, and the different parts of the small and large intestine.

These are the general features of the development of the embryo in all vertebrated animals. There are other details which relate to the special growth of particular parts, and to the so-called metamorphoses or transformations which take place in particular species, and which are nothing more than the successive appearance and disappearance of particular organs, which are adapted to the life of the animal at different stages of growth. Thus, in the young tadpole, when first hatched from the egg, the mouth is a round orifice provided with a suctorial apparatus and adapted for feeding on vegetable matters; respiration is entirely aquatic, and is performed by means of gills; there are no limbs, but voluntary movement is accomplished by a large and muscular tail, the animal living altogether under the surface of the water. Afterwards the mouth enlarges into a wide transverse opening, adapted for the seizure of living prey; the gills disappear and lungs are developed, while the mode of respiration changes from aquatic to aërial; and finally, anterior and posterior legs grow from the corresponding parts of the body, becoming powerful organs for both swimming and leaping, while the tail ceases to grow, becomes atrophied, and disappears. Thus, the tadpole grad-

ually acquires the organs and the appearance of a perfect frog. This change, in the case of the tadpole, is called a "transformation," because it happens after the young animal has escaped from the egg; but equally important changes take place in the embryo of the higher animals while they are still retained within the egg or in the uterus of the female parent.

Besides the essential and general features of embryonic development detailed above, there are, in all the higher classes, certain secondary or accessory organs developed during embryonic life, which will require a further description.

The first of these is known as the *umbilical vesicle*. In the process of development, as already described, the abdominal walls, growing together upon the median line, enclose directly the whole of the vitelline cavity, which subsequently, of course, becomes the cavity of the intestine. But in many of the fishes and reptiles, and in all birds and quadrupeds, the abdominal walls approach each other before they have embraced the whole of the vitellus, so that the vitelline cavity is thus separated, by a kind of constriction, into two parts. The internal part, which is fully embraced by the abdominal walls, is, as before mentioned, the cavity of the intestine; but the external part, which is left by this constriction outside the abdomen, is the umbilical vesicle. This name is given to it because it is really a vesicle, containing some of the remains of the vitellus, and because it still communicates with the cavity of the intestine through the umbilicus or navel. This communication is at first short and wide; but as development proceeds, the umbilical vesicle gradually retreats farther from the abdomen, while the passage of communication becomes converted into a comparatively long and narrow canal. In many of the quadrupeds and in the human species the walls of this canal even coalesce with each other at an early period, so that the umbilical vesicle then forms a separate cavity or sac, connected with the abdomen only by a slender solid pedicle. One or two minute blood-vessels run out along this pedicle, and ramify upon the surface of the umbilical vesicle. The umbilical vesicle is undoubtedly at first a reservoir of nutritious material, and remains so throughout embryonic life in all those species where the vitellus was originally of large size; but in the quadrupeds it very early loses its importance, and is superseded by other sources of nourishment. In the human subject it is difficult to distinguish it after the third month of embryonic existence.

The next accessory organ of the embryo is the *amnion*. This is a delicate and transparent membrane, which turns up from the edges of the abdominal walls over the back of the embryo, and thus envelops it in a secondary cavity. This is called the "cavity of the amnion;" the albuminous liquid which it contains, and in which the embryo is bathed, is called the "amniotic fluid." The amnion is accordingly an extension of the outer layer of the blastodermic membrane, and is continuous with the integument of the embryo. In other words, the external layer of the blastodermic membrane in these cases is developed into two different parts. That which immediately invests the body of the embryo is its integument, and part of its permanent structure; that which turns backward at the edges of the abdominal opening is the amnion, and an organ of embryonic life. The amnion at first closely embraces the body of the embryo, but afterwards it expands more rapidly, and the amniotic fluid increases in quantity, so that the young animal may move freely within its cavity when the muscular system begins to exhibit signs of activity.

The third and last accessory embryonic organ is the *allantois*. It is so called from the Greek ἀλλᾶς, ἀλλᾶντος, a "sausage," because in many cases it is a sac or bag of an elongated cylindrical form. In all instances it is an outgrowth from the lower part of the intestine. It shows itself at first as a small bud or diverticulum, shaped somewhat like the finger of a glove, which protrudes from the abdominal opening in front, and then rapidly expands in every direction until it has entirely enveloped the embryo, as well as the amnion, in a second exterior covering. Its walls are exceedingly vascular, their vessels being derived from those of the intestine, of which the allantois itself is an offshoot. Thus, when the allantois has become completely formed, the external surface of the embryonic mass is a continuous vascular membrane, in which the blood-vessels of the embryo ramify in great abundance.

This anatomical feature will serve to indicate the usefulness and the function of the allantois. It is the organ of nourishment and respiration for the embryo. In the fowl's egg, the allantois, which is placed immediately underneath the calcareous shell and shell-membranes, is very active during the latter half of the period of incubation. It absorbs oxygen from the external air through the porous egg-shell, and exhales carbonic acid, thus serving to renovate and arterialize the blood, as the lungs will do in the young chick after being hatched. In the viviparous animals, as the quadrupeds, the action of the allantois is still more important. The ovum in these animals being of minute size, without any abundant store of nutritious material, and being retained, after fecundation, within the body of the female parent, the young embryo is entirely dependent upon the maternal system both for respiration and nourishment. The vascular allantois here, enveloping the embryo, comes in contact with the vascular lining membrane of the uterus, and thus the blood-vessels of the embryo constantly absorb from the blood-vessels of the mother the substances requisite for its nourishment and growth. In many kinds of animals the allantois even contracts a more or less intimate adhesion with the lining membrane of the uterus at particular spots, where the process of absorption and transudation is carried on with greater rapidity.

FIG. 5.

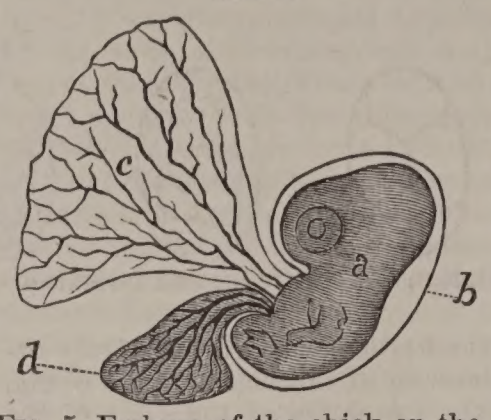


FIG. 5. Embryo of the chick on the seventh day of incubation: *a*, body of the embryo; *b*, amnion; *c*, a portion of the umbilical vesicle; *d*, commencing growth of the allantois.

FIG. 6.

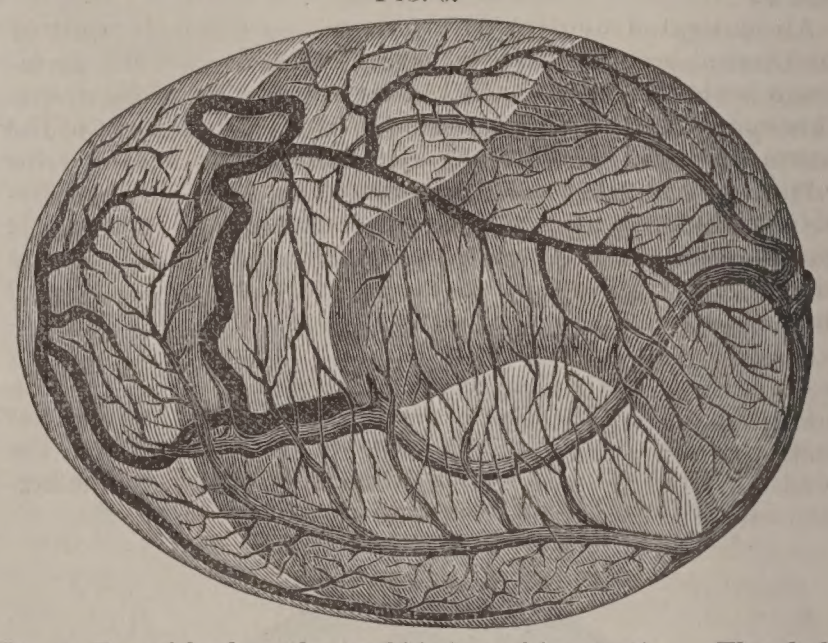


FIG. 6. Egg of fowl on the twelfth day of incubation. The shell and shell-membranes have been removed, showing the vascular allantois, which has grown so as to envelop all the remaining portions of the egg.

In the human species the allantois commences its growth in the same manner as in the inferior animals, but exhibits certain modifications in its subsequent development which have caused it to be known by another name. It does not present the form of an elongated cylindrical sac, but is, on the contrary, irregularly globular in form, corresponding to the shape of the cavity of the uterus in which the embryo is developed. It forms, however, a complete envelope or external tunic for the embryo, consisting of a continuous vascular membrane of more or less fibrous consistency and texture. It has accordingly received the name of the *chorion*. The human embryo, therefore, is enveloped in two distinct membranes—namely, the chorion externally and the amnion internally. Both these membranes are vascular, but the blood-vessels of the amnion are derived from the integument of the embryo, those of the chorion from the intestinal canal.

Another important modification of the human chorion is that at an early period it becomes shaggy or velvety by the growth of a multitude of minute filamentous projections or "villosities" upon its outer surface. These villosities become branched and divided, forming so many tufted filaments, by which the power and activity of absorption by the chorion is greatly augmented. Soon after the first month, however, these villosities cease their growth over about three-quarters of the surface of the chorion, which thus becomes smooth and bald, while over the remaining quarter they grow more rapidly than before, become excessively developed both in numbers and in ramification and vascularity, so that the chorion here becomes converted into a thickened and spongy mass of villosities, which are penetrated everywhere with an abundance of looped and ramifying blood-vessels. When this portion of the chorion is fully developed, it forms a distinct organ, which is known by the name of the *placenta*. The placenta, accordingly, in the human species, is the especial organ of nourishment for the embryo. It has become well developed, and easily

distinguishable from the remaining portions of the chorion, by the end of the third month of embryonic life.

The amnion and the chorion, therefore, although they are termed the "membranes" and the "appendages," are in reality a part of the body of the embryo—as much so as any other of its external or internal organs. The placenta, however, includes also a portion of the tissues of the mother; for at the same time that the chorion is becoming excessively shaggy and vascular at the spot which is afterwards to be the placenta, the lining membrane of the uterus also assumes, at the corresponding point, a similar increased development. In both cases it is the blood-vessels which preponderate over the remaining tissues, becoming adherent to each other, and mutually interpenetrating through the entire thickness of the organ. Thus, the placenta, when fully formed, is a double organ, containing both embryonic and maternal vessels, and presenting an extensive vascular surface for reciprocal absorption and exudation. There is at no time any actual communication between the cavities of the two sets of vessels, but the nutritious materials transude through the thin vascular walls, and in this way supply to the embryo everything essential to its growth.

When the development of the embryo is complete the muscular walls of the uterus contract, the membranes are ruptured, the placenta is separated from its attachments, and the whole expelled from the uterine cavity. The placenta is then no longer available as an organ of nourishment, and is cast off as a useless appendage. But in the mean time the lungs and the alimentary canal have been gradually becoming developed by internal growth, and are now capable of performing their natural functions. After birth, accordingly, the act of respiration and the absorption of nourishment are accomplished in the young infant independently by the aid of internal organs, while during embryonic life they were performed by the placenta, supplied in great part for this purpose by the blood of the mother.

J. C. Dalton.

Em'bury (Emma Catherine), an American writer whose maiden name was Manley, was born in New York in 1806, and was married in 1828 to Daniel Embury, Esq., of Brooklyn. Among her works are "Guido and other Poems," "Constance Latimer, or the Blind Girl," and "Nature's Gems, or American Wild Flowers." Died Feb. 10, 1863.

Embury (Philip), recognized as the "founder of American Methodism," was born at Ballygarane, Ireland, in 1728. He became a member and "local preacher" of Wesley's society at Court-Mattress, Ireland. In 1760 he emigrated to New York. He began to preach there in 1766 in his own house, mostly to his own countrymen. Later he preached in an old rigging-loft, and at last succeeded in erecting "Old John street church." Embury, being a carpenter, worked on it himself. He built with his own hands its pulpit, and on the 30th of Oct., 1768, preached from it the dedicatory sermon of the humble structure—the first Methodist chapel of the New World. Embury afterwards settled in Salem, N. Y., where also he founded his denomination, and where it grew into the prosperous Troy conference, and where he died in 1775. His church commemorates these by a monument.

Em'den, or **Emb'den,** a fortified seaport-town of Prussia, in the former kingdom of Hanover, is on the N. shore of the Dollart, near the mouth of the Ems, about 70 miles W. N. W. of Bremen; lat. 53° 22′ N., lon. 7° 12′ 38″ E. It is intersected by several canals, which are crossed by about thirty bridges. It is well built, and contains a handsome town-hall, an exchange, a custom-house, a gymnasium, a school of navigation, and a deaf and dumb asylum. Here are manufactures of linen fabrics, hosiery, hats, sailcloth, starch, soap, etc. The port of Emden has shallow harbors, outer and inner, but the roadstead is deep enough for large ships Pop. in 1871, 12,588.

Em'erald [Gr. σμάραγδος; Fr. *émeraude;* Sp. *esmeralda;* Ger. *Sma'ragd*], a beautiful green precious stone, a variety of beryl, a silicate of alumina and glucina. It occurs in six-sided prisms, which are highly prized as ornamental gems. Its color, which is perhaps the most beautiful of all the varieties of green, is ascribed to the oxide of chromium that it contains. It is stated that a perfect specimen of this gem has been sold for $5000. Its value depends chiefly on its color. The largest emeralds occur in Siberia on the river Tokowoia; one in the Royal collection weighs sixteen and three-fourths pounds Troy, another six pounds. The finest modern emeralds are found in South America, especially at Muzo in Colombia. Emeralds of inferior quality are procured at Canjargum in Hindostan, and in the Henbach Valley near Salzburg. F. Cailliaud rediscovered (about 1818), in Mount Zabarah in Upper Egypt, the emerald-mines from which the ancients obtained many emeralds. A rare green variety of sapphire is sometimes called Oriental emerald. Emerald copper is a synonym of dioptase; emerald nickel for zaratite, a compound of carbonate and hydrate of nickel, found at the chrome-mines of Texas, Pa.

Emerald, a township of Faribault co., Minn. Pop. 748.

Emerald, a township of Paulding co., O. Pop. 717.

Emerald, a township of St. Croix co., Wis. Pop. 206.

Emerald Bird of Paradise (*Paradis'ea ap'oda*), [that is, the "footless," so called from the old fable that the

Emerald Bird of Paradise.

bird of paradise has no feet, but always flies without resting], the best known and most elegant of the birds of paradise, is a native of New Guinea (Papua), where it is killed in great numbers for its beautiful plumage, which brings a high price in the market.

The skins with the plumage are used in the East for ornamenting turbans, and in Europe and America for adorning ladies' head-dresses. About 1500 or 2000 are annually imported into Europe, chiefly by way of Batavia. The back part of the neck is of a pale gold color, the throat and fore part of the richest changeable golden green, the breast a deep purple, the body and tail a fine chestnut. The body feathers are frequently dyed to improve the natural tint. The female is said to furnish the most highly prized feathers, though during life, at least, it appears that the male is by far the more splendid bird, being provided with conspicuous floating plumes of astonishing beauty.

Emer'sion [Lat. *emer'sio,* from *emer'go, emer'sum,* to "emerge or rise into view"], in astronomy, is the reappearance of the sun, moon, planet, or star from behind the celestial body by which it was hidden in an eclipse or occultation. The phenomena of immersion and emersion are useful in determining the longitude of places.

Em'erson, a township of Gratiot co., Mich. Pop. 590.

Emerson (George Barrell), LL.D., an American teacher and writer, born in Kennebunk, Me., Sept. 12, 1797. He lived in Boston for many years, and was president of the Boston Society of Natural History. He was the first head-master (1821–23) of the Boston English High School for boys. Among his works are "Lectures on Education" and a "Report on the Trees and Shrubs growing naturally in the Forests of Massachusetts" (1846).

Emerson (Rev. John S.), missionary, was born at Chester, N. H., in 1801, graduated at Dartmouth in 1826, and at Andover in 1830. He went to the Sandwich Islands, and aided in preparing an "English Hawaian Dictionary." Died Mar. 28, 1867.

Emerson (Ralph Waldo), LL.D., an American poet and essayist. Lord Clarendon said of Lord Falkland, secretary of state to Charles I., that, as his house was within ten miles of Oxford, "the most polite and accurate men of that university frequently resorted and dwelt with him, as in a college situated in purer air; so that his house was a university in less volume, whither they came not so much for repose as study."

There seems still to be some benignant Fate which provides suitably for the suburbs of university towns. Within ten miles of Harvard College there has been for many years one modest roof which has afforded to "the most polite and accurate men" of that university some such "college in purer air;" for it has been the residence of Ralph Waldo Emerson.

Mr. Emerson was born in Boston, Mass., May 25, 1803, and was the son of Rev. William Emerson and Ruth (Haskins) Emerson. He had a minister for an ancestor in every generation for eight generations back, either on the paternal or maternal side. He was fitted for college at the public schools of Boston, and graduated at Harvard College in

1821. He was not among the very highest scholars of his class, but in his junior year won a "Bowdoin prize" for a dissertation on the "Character of Socrates," and another in his senior year for an essay on "The Present State of Ethical Philosophy." He also won a "Boylston prize" for declamation, and he was "class poet." For five years after leaving college he taught school, chiefly in Boston, where he assisted his elder brother, William, in conducting a successful school for girls. In 1826 he was "approbated to preach," though his name does not appear among the graduates of the Harvard Theological School. In March, 1829, he was ordained as colleague to Rev. Henry Ware of the Second Unitarian church in Boston. In 1832 he resigned his pastoral charge, having announced in a sermon his unwillingness longer to administer the rite of the Lord's Supper. This sermon was never published, but copies of it exist in manuscript. In Dec., 1832, he sailed for Europe, remaining absent nearly a year. Soon after returning he began his career as a lecturer before the Boston Mechanics' Institute, his subject being "Water." He gave also three other lectures—two on "Italy," and one on the "Relation of Man to the Globe." In 1834 he gave in Boston a series of biographical lectures on Michael Angelo, Milton, Luther, George Fox, and Edmund Burke; the first two of which were published in the "North American Review." Since that time he has given many courses of lectures in Boston, and has been one of the best-known lecturers throughout the United States. Perhaps no other man has rendered such continued service in this field. It is said that he lectured for forty successive seasons before the Salem (Mass.) Lyceum. He has also made repeated lecturing tours in the Western States, and has even lectured in California and in England.

In 1835, Mr. Emerson took up his residence in Concord, Mass., and published in the following year a thin volume called "Nature." It marked a new era in American thought—was received with sharp criticism from many quarters, and with corresponding enthusiasm by a small circle of admirers. It took twelve years to sell five hundred copies. This was followed by several orations before literary societies on such themes as "The Method of Nature," "Man Thinking," and "Literary Ethics." More important even than these was his remarkable "Address before the Senior Class at Divinity College, Cambridge," delivered July 15, 1838. From these various addresses and publications may be dated the intellectual movement then vaguely stigmatized as "Transcendentalism." This was a reaction against formalism and tradition, and brought together a variety of minds, some profoundly mystical, others full of projects for action. It led to some excesses and affectations, but was on the whole a valuable impulse towards many good things. The four volumes of "The Dial" contain a lasting memorial of that important seed-time of thought.

Mr. Emerson's two volumes of "Essays" were collected and published in 1841 and 1844, and his "Poems" in 1846. His miscellaneous addresses remained uncollected till 1849, in America, though they had been reprinted collectively in England in 1844. Visiting the mother-country in 1847, Mr. Emerson found awaiting him a large circle of admirers, whose allegiance he has always retained. In 1850 he published "Representative Men," given previously as a course of lectures in Boston. In 1852 he took part in preparing the memoirs of Margaret Fuller Ossoli. His "English Traits" appeared in 1856, "The Conduct of Life" in 1860, and "May-Day and other Poems" and "Society and Solitude" in 1869.

Though Mr. Emerson is often assigned to the class of metaphysicians or "philosophers," yet the actual traits of his intellect clearly rank him rather among poets or literary men. All his methods are literary rather than scientific, although he has won some of his warmest admirers among scientific men, as in the case of Professor Tyndall. His statements are sometimes subtle, sometimes profound, sometimes noble and heroic, but scarcely ever systematic. He rests in his intuitions, rarely attempts even the rudiments of method, but constantly recognizes, in his own words, "the opposite negations between which, as with cords, our being is swung." But it is claimed by his admirers that (quoting his words again) "We are too young by some ages yet to form a creed," and that, while not aiming at the kind of work done by Herbert Spencer, for instance, Emerson often gives in some single phrase an illumination that seems to extinguish Herbert Spencer's lights, as a sunbeam makes gas-lamps superfluous.

In viewing Mr. Emerson simply as a literary artist, the reader must still complain of this tantalizing fragmentariness, this disregard of all the unities, this structural defect. Even in his poems his genius is like an æolian harp, that now gives, now wilfully withholds, its music; while some of his essays seem merely accidental collections of loose leaves from a note-book. Yet as one makes this criticism, one is shamed into silence by remembering many a passage of prose and verse so majestic in thought and rhythm, of quality so rare and utterance so delicious, as to form a permanent addition to the highest literature of the human race.

Mr. Emerson wrote in 1844 that all our books were European, that we were "sent to a feudal school to learn democracy;" and demanded that Americans should "advance out of all hearing of others' censures, out of all regrets of their own, into a new and more excellent social state." More than any previous literary man among us, he set the example of ignoring European traditions, methods, and literary properties wherever these could be better superseded by our own. He drew his habitual illustrations from American society and manners, and was more ready to write of the pine woods and the humble-bee than of the nightingale and asphodel. It seems hardly credible that this should have been ridiculed by the critics as "a foolish affectation of the familiar;" but the fact of the ridicule shows the need of the innovation. If that state of things has now passed by, and if our literature is no longer provincial, it is to Mr. Emerson that we are most indebted.

It is well known that his position on religious questions has been that of a philosophical radical, and that he has been quite detached from the church organizations of the time. He took this position, once for all, in a sentence which attracted much attention in his "Divinity Hall Address:" "The assumption that the age of inspiration is past, that the Bible is closed, the fear of degrading the character of Jesus by representing him as a man, indicate with sufficient clearness the falsehood of our theology." His precise attitude as to the conception of a Deity and the belief in personal immortality might be harder to define. He declares eloquently, however, in one of his orations, that "there is a sublime and friendly Destiny by which the human race is guided—the race never dying, the individual never spared—to results affecting masses and ages."

Though Mr. Emerson is, like Goethe, a prophet of Self-Culture, he has never held himself aloof, like Goethe, from the immediate public agitations of his time, but has always practically recognized the truth of his own formula, "To-day is a king in disguise." He has always lent his voice in behalf of any momentous public interest. He was always frankly identified with the anti-slavery movement, and, though averse to extemporaneous speech, and ill at ease in that form of service, he often took part in the meetings of the abolitionists. In 1844 he gave an elaborate and remarkable address on the anniversary of emancipation in the British West Indies. He signed, with his wife, the call for the first "National Woman's Rights Convention" in 1850. He is a vice-president of the Free Religious Association, and has several times addressed its conventions. He is also an overseer of Harvard University, and received from that institution the degree of doctor of laws in 1866. He is a member of the American Academy of Arts and Sciences, of the American Philosophical Society, and of the Massachusetts Historical Society.

Mr. Emerson has been twice married—once, in 1830, to Ellen Louisa Tucker of Boston, who died the following year; and again, in 1835, to Lidian Jackson of Plymouth. He has three children, two daughters and one son. The son, Edward Waldo, graduated at Harvard College in 1866, and has since pursued the study of medicine. Of the daughters, the elder, Ellen, is unmarried; the younger, Edith, is the wife of William H. Forbes, Esq., of Milton, Mass., and has several children. Mr. Emerson has just returned with his elder daughter from Europe, reaching home May 27, 1873. On his arrival at the Concord station he found all the children of the public schools drawn up to receive him, accompanied by many citizens and by a band of music. They all escorted him in a procession to his house, which had been destroyed by fire just before his departure from home, and was rebuilt in his absence. A triumphal arch, decorated with flowers and bearing the word "Welcome," had been placed before it. Beneath this, and between two lines of children, Mr. Emerson and his daughter entered their home. It was a spontaneous tribute to the love and reverence won for this eminent author in his own village by his gracious manners and his simple and noble life.

T. W. Higginson.

Emerson (Rev. William), the father of Ralph Waldo Emerson, was born at Concord, Mass., May 6, 1769. His grandfather, Rev. Joseph Emerson, was minister of Malden, and his father, Rev. William Emerson, died a chaplain in the Revolutionary army in 1766. The younger William Emerson graduated at Harvard College in 1789. He was the first minister of Harvard, Mass., and afterwards (1799–1811) pastor of the First church (Unitarian) of Boston, Mass. He published various discourses, a "Selection of Psalms and Hymns" (1808), and wrote a "History of the First Church of Boston," which was published in 1812. He was an accomplished writer, and one of the best orators of his day. Died May 12, 1811.

Emery, one of the hardest minerals known, ranking next to the diamond in its power of cutting or abrading hard substances. It is a variety of the species corundum or sapphire, of a dark reddish-brown, black, or gray color, and consists of nearly pure alumina and oxide of iron. It is found in large masses, and much resembles fine-grained iron ore, for which it has often been mistaken. It is obtained chiefly from Asia Minor and the island of Naxos in the Grecian Archipelago. At Naxos 60,000 quintals are sold annually at from twelve to fourteen drachmæ (about thirteen francs) the quintal. Nearly half of the quantity is exported to England, generally as ballast in homeward-bound vessels, where it is used chiefly in grinding glass. It has also been found at Chester, Mass., in a vein with magnetic iron, from which considerable quantities have been extracted. It was discovered at Chester by Dr. Charles T. Jackson of Boston, and in Asia Minor, near Ephesus, by Dr. J. Lawrence Smith, an American mineralogist in the service of the Turkish government. Both discoveries are good examples of the value of accurate mineralogical knowledge.

Emery is scarcely inferior to the sapphire or ruby in hardness, and it will not only cut the hardest steel or chilled castings, but will wear away quartz, agate, topaz, and other gems, being for the last-named purpose the chief reliance of the lapidary. It was used by the ancients for cutting gems. Dioscorides mentions it under the name of *smyris* as the stone with which engraved gems are polished; and there is even a rabbinical tradition which indicates that the "smyris" was used for gem-engraving in the time of Moses. How far it was known and used in pre-historic times must be left to conjecture, but the many neatly cut and polished stone implements and ornaments indicate the use of a material not less hard than emery. Theophrastus mentions whetstones made of the mineral used to engrave gems, and cites Armenia as furnishing the best kind. Naxian whetstones are also mentioned by ancient authors, and Pliny speaks of polishing marble statues and *filing down* gems. The backs of antique intagli have deep furrows upon them, indicating that they were *filed* into shape by rubbing with an emery-stone. It is thus probable that the massive emery was extensively used as a tool, and that it was employed for the sculpture of hard rocks, not only by the Romans, but by the ancient Egyptians.

It is now used in the arts in a pulverized form, being obtained in grains or in powders of various degrees of fineness by crushing and sifting or by elutriation. The lumps, as they come from the mine, are broken in a breaker or under stamps, and the fragments are sifted through sieves or wire-cloth having from sixty to ninety wires to the inch, by which the grades of the emery are determined. Thus, a sieve of sixty wires to the inch gives a No. 60 grade. The numbers range as high as 120, or "flour emery." These higher numbers are obtained by washing, or by collecting the fine dust which floats in the air of the crushing-rooms and settles on the beams and shelves.

There is considerable difference in the effective abrasive power of commercial emery from different localities. It varies according to the composition, the state of aggregation, and the purity. The better qualities of crystalline corundum are believed to be superior to emery in abrasive powers, and powdered sapphire to be superior to corundum. But the experiments which are cited in support of this are by no means as complete and conclusive as they should be. The following shows the relative abrasive powers, as usually stated, of the sapphire, of corundum, and of emery from some of the principal localities: sapphire from India, 100; ruby, India, 90; corundum, Asia Minor, 77; emery, Kulali, 40 to 57; of Samos, 56; of Nicaria, 50; of Gumuch, 42 to 47; of Naxos, 46; of Chester, Mass., 43 to 45.

Sapphire contains 97½ per cent. of alumina, and corundum about 92 per cent. The percentage in emery ranges from 60 to 78, with 25 to 35 per cent. of oxide of iron, a few per cent. of silica and of water.

The methods of application are various. Lapidaries sprinkle it with water or oil on their lead-wheels. Mixed with glue or other adhesive substances, it is spread in a thin layer upon wood, leather, paper, or cloth, or it is moulded into solid blocks or wheels. It is in the latter form, known as "solid emery-wheels," that the mineral has the widest application and its greatest utility.

Emery-wheels.—Solid wheels, consisting of a mixture of powdered emery with shellac, fused and rolled upon a stick, appear to have originated with the lapidaries of India. Small wheels of a few inches only in diameter have been in common use for many years, especially by dentists for shaping hard porcelain teeth, but they are now made by improved methods from one to thirty-six inches in diameter, and from one quarter of an inch to four inches in thickness. When carefully mounted upon a mandril and run at a high speed, the abrading power of such wheels is wonderful. They will instantly take the teeth off the hardest file and reduce it to a plane, smooth surface, or will cut away parts of chilled castings that a file will not touch. Such wheels are shaping-tools of the first order, as far exceeding files in efficacy as the emery exceeds steel in hardness, and as the velocity of a wheel exceeds the velocity of a file upon the work. A file in the hands of an expert workman moves, say, 60 feet in a minute, but the proper velocity of an emery-wheel at its cutting surface is 5500 feet in a minute. It is evident that such wheels are destined to replace files wherever they can be brought to bear upon the work. The grains of emery are the cutting points or teeth, and do not grow dull although brought into contact with metal hard enough to turn the teeth of a file at one stroke.

The rapidity of abrasion depends not only on the velocity of movement, but upon the size of the grains of emery. For very heavy work, such as taking the rough edges off castings, very coarse emery is used, while the finer sorts are made into wheels for fine grinding and surface-work on brass or steel. The following table shows approximately the cuts of emery as compared with files. The numbers represent the standard grades of emery:

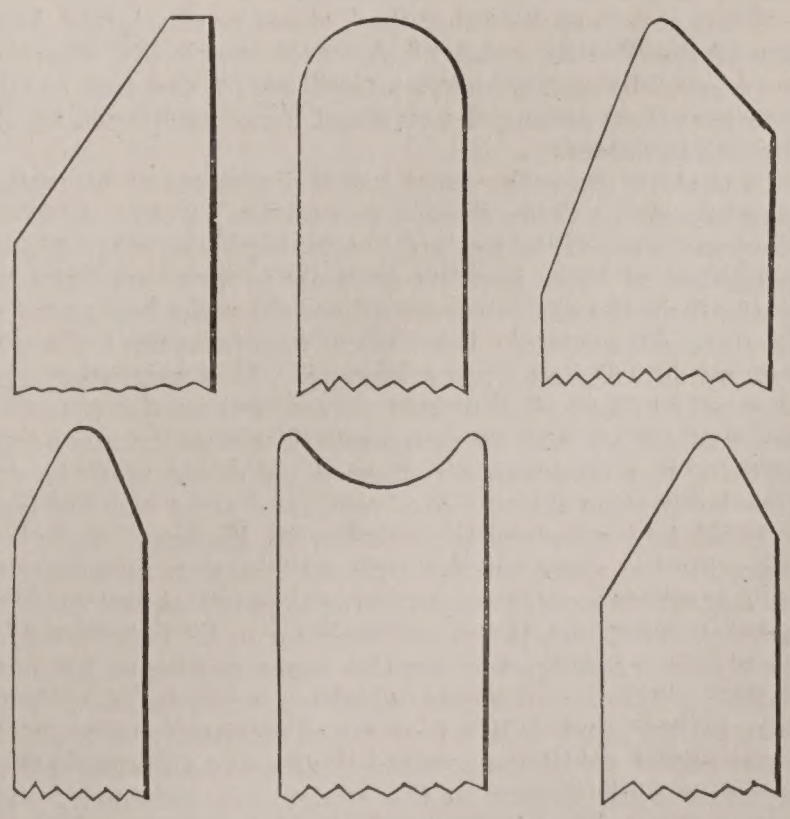
Nos. of Emery.				
8–10	represents	the	cut of a	wood rasp.
16–20	"	"	"	rough file.
24–30	"	"	"	middle-cut file.
36–40	"	"	"	bastard file.
46–60	"	"	"	second-cut file.
70–80	"	"	"	smooth file.
90–100	"	"	"	superfine file.
120–flour emery		"	"	dead-smooth file.

The Tanite Company make five general classes of wheels: Class No. 1, coarse-hard; Class No. 2, medium-hard; Class No. 3, medium-soft; Class No. 4, fine-hard; Class No. 5, fine-soft.

In using emery-wheels care must be taken to maintain the proper speed, and not to press the work too strongly against the surface. If too much pressure is used, the wheels will not cut so fast, and are liable to wear away unequally and to get out of true. A rest should always be used to support the work and prevent it from vibrating upon the wheel. The bearings should be kept in good order and well lubricated.

Much attention is now given to the manufacture of machines for mounting emery-wheels. The mandrils are made of steel very carefully turned and fitted to the boxes, and frequently two or more wheels are mounted on the same mandril. The edges of the wheels are variously shaped to suit the work for which they are designed. Manufacturers now use them not only for trimming and shaping castings, but for shaping and sharpening hardened steel tools, such as the knives of planes and of wood-moulding machines, and for gumming saws. For the latter purpose they are particularly well adapted, and save time, labor, and files.

The following are outlines of some of the forms of the faces of emery-wheels:



Good emery-wheels are uniform in texture. The material with which the emery is combined must have great cohesive strength to resist the tendency of the wheels to fly asunder when revolving at high speed, and to retain the grains of emery firmly, and yet wear away evenly, leaving the cutting angles exposed, and not glaze or "gum up." It must not soften or melt under the heat generated

by the friction in cutting the work, and must be free from noxious qualities. As such wheels are run at high velocities, they require to be very carefully and exactly hung, and to be kept perfectly true so as to prevent vibrations. They should not "wedge" upon the mandril, or even fit it closely, for expansion by heat might burst the wheel, and the flanges at the side should not be too strongly screwed up. A wheel thirty-six inches in diameter may have 611 revolutions per minute, and one of twelve inches, 1800 revolutions. Athough the emery is so extremely hard, diamonds will cut the wheels, and this gem in its crude or rough form is used as a tool to turn them true or to cut their faces into any desired form. W. P. BLAKE.

Emet'ic [Gr. ἐμετικός, from ἐμέω, to "vomit"], a medicine capable of causing the stomach to contract and discharge its contents through the œsophagus. Emetics are of two classes: (1) those which appear to stimulate the action of the muscular coat of the stomach directly by their presence, such as alum, cupric sulphate (blue vitriol), and zinc sulphate (white vitriol): they act promptly, and are hence very useful in some cases of poisoning; (2) those which enter the circulation, and cause emetic action by their operation upon the nervous centres. To this class belong ipecacuanha, tartar emetic, lobelia, bloodroot, and many others. They are in general arterial sedatives, and may cause profound and even dangerous disturbances if unskilfully used.

Emeu. See EMU.

Emigra'tion [Lat. *emigratio*, from *e*, "out," and *migro*, to "remove," to "change one's abode"], the voluntary removal of inhabitants from one country to another with the object of permanent residence. For the purpose of distinguishing inward from outward migration, the term *emigration* has been restricted by modern authors to the latter use, and *immigration* employed for the former. The obvious convenience of this arrangement is procuring its general adoption. (The annual movement of birds and other animals from one climate to another is treated under the head MIGRATION, and the systematic deportation of criminals under TRANSPORTATION. See also EXILE, EXODUS, and SLAVERY.)

The earliest historical and one of the most remarkable examples of migration is that recorded in Exodus. Another remarkable example is what is commonly known as the Indo-Germanic migration. It seems probable, both from ethnographical and philological evidence, that Northern Europe was peopled from Asia. The topographical peculiarity of the temperate zones of these continents also favors this view. The boundless plains of Asia are prolonged through Russia, Poland, Germany, and Holland. A man may walk from the Pacific to the Atlantic Ocean, a distance of over 6000 miles, without encountering any elevation of more than a few hundred feet or any water-course difficult to ford. There is also evidence that Asia has undergone a slow upward movement, resulting in the drying of her ancient water-courses, and necessarily compelling migrations of her people to the lower levels of Europe.

It has also been held that the Toltecs or aboriginal Aztec race of the Pacific coast of America originally migrated from some distant country, a tradition of the sort having been prevalent among the civilized tribes conquered by the Spanish invaders.

In modern times the most noted instances of migration have been those from Europe to various parts of America. The population of the western hemisphere is now 84,524,000. Nearly all of these persons or their progenitors have migrated from the eastern hemisphere since the beginning of the sixteenth century; the whites, who form the main portion, voluntarily and from Europe. This migration, due originally to love of conquest, adventure, or the pious desire, real or affected, to propagate Christianity among the heathen, was afterwards sustained by other motives, and America became the refuge of races and sects who fled from political and religious persecution in Europe. Religious toleration has since become common in almost all countries, yet migration continues, and is due to political and economical considerations, the stream flowing in all directions, but mainly from countries where the common people, by being denied political and social equality, are reduced to hardship, penury, and military or other servitude, to countries where social privileges, conceded alike to all, enable them to secure a fair chance in the struggle for existence. The main course of migration has been from Northern Europe, principally from Ireland and Germany, to the United States and Canada; another important flow has been from England to Australia; a third from China and British India to the British colonies, Spanish America, and the United States; and a fourth from Southern Europe, principally from Italy and Spain, to South America.

The statistics of early migration to this country are shrouded in considerable doubt. From a comparison of Blodget, Seybert, and Bromwell, the best authorities on the subject, it seems probable that the following numbers fairly represent the immigration by sea into the British colonies of North America, afterwards the United States, from 1776 to the date of the establishment of official returns under the act of 1819. The periods are so divided as to be susceptible of comparison with other estimates:

1776 to 1783, inclusive	8	years		25,000
1784 to 1790, "	7	"		28,000
1791 to 1800, "	10	"		50,000
1801 to 1810, "	9	"		70,000
1811 to 1819, "	9	"		105,615
Total				278,615

The following are the official returns: the year ends Sept. 30, up to and including 1850; afterwards Dec. 31:

1820	8,385	
1821 to 1830	143,439	
1831 to 1840	599,125	
1841 to 1850	1,713,251	
1851 to 1860	2,598,214	
1861 to 1870	2,491,451	
1871	346,938	
1872	443,892	8,344,695
Total		8,623,310

Up to 1867, when the immigration returns were first collated by the bureau of statistics, they were vitiated by many irregularities, and the above figures are only approximate. They include large numbers of persons not intending to settle in the U. S., or who have been here before, estimated in the census of 1860 as high as 14½ per cent. of the whole; they omit the Canadian overland immigration, and contain other important errors. The chief countries from which the immigrants have come are, approximately, as follows: England, 662,000; Wales, 16,000; Ireland, 2,846,000; Scotland, 114,000; United Kingdom not specified, 563,000; total, United Kingdom, 4,201,000; British America (so far as reported), 380,000; total, Great Britain, 4,581,000; North Germany, 2,624,000; France, 259,000; Denmark, Sweden, and Norway, 242,000; China, 125,000; Switzerland, 69,000; Austria, 21,000; Russia, including Poland, 10,000; all other countries, 184,000; countries not specified, 508,000; grand total, 8,623,000. About five-eighths of the whole number were males. An equal proportion of the whole number stated or had no occupation, this class comprising most of the women and nearly all of the children. Of the males, about 1,500,000 were laborers, 1,000,000 farmers, and 750,000 mechanics. According to the immigration returns, the immigrants have consisted mainly of farmers and farm-laborers, and persons healthy and in the prime of life. The census returns prove that they settle mainly in cities, and die much faster than the native population.

Seven-eighths of the entire immigration have come from Ireland, Germany, and England. Formerly, Ireland sent the bulk of emigrants. This was owing to the operation of the "Encumbered Estates bill," which in 1841–51 destroyed 355,689 "fourth-class" (one-room) mud cabins, and evicted their miserable tenants; and to the famine of 1847. Since 1854, Germany has sent the most. This migration was greatest during the years 1852–54, and next greatest in the year 1867, and is attributed to political disturbances in Europe and the fear of conscription in Germany at those periods. Irish and German migration is subsiding, and English and Scandinavian increasing. The influence of high prices and ample room in attracting immigrants to America, though not without importance, seems to have been much exaggerated, the immigrants coming chiefly from countries like England, where prices are highest, instead of those like Thuringia, where they are lowest. (*Commercial Relations*, 1871, p. 395.) It is also observable that the German immigrants are generally from the most thinly populated agricultural sections of their own country, in no part of which has the capacity of the natural resources to subsist a population been tested to one-half the extent found to be amply sufficient in Che-Kiang, An-Hwuy, and other parts of China. (*Ibid.*, p. 73.) But 10,000 persons have emigrated to this country from Russia, including Poland. This is due to the severe laws of that country interdicting emigration, banishment to Siberia being the punishment for an attempt to leave the country, or for attempting to induce another to leave it, without official permission—a thing rarely granted. On the other hand, Russia, ever since the reign of Peter the Great, has warmly encouraged immigrants to settle within her own borders.

In most European countries a formal relinquishment of the rights and duties of citizenship by the emigrant and the government respectively is necessary in order to render emigration lawful. The official practice with regard to the change of allegiance by the emigrant varies in different

countries, and is not definitely settled in any; the general rule being to disregard such change, and hold the subject "always a subject." The policy of the U. S. with regard to the right of self-expatriation seems equally unsettled, the government having strenuously maintained it in the Koszta case in 1853, but virtually abandoned it in the case of the Prussian enlistment of American naturalized citizens in 1858.

Although the attention of Congress was directed over fifty years ago to the subject of overcrowding in immigrant vessels, and resulted in the passage of the act of March 2, 1819, which provided for adequate space, rations, and attendance on board ship, but little reform has been effected. Additional legislation on the same subject was provided in 1847–49; and on March 3, 1855, a very comprehensive law was passed, superseding all former legislation, and requiring ample space, rations, ventilation, hospitals, booby-hatches, cabooses, closets, disinfectants, discipline, and reports. To this a supplemental act was passed in 1860 for the protection of female passengers. Yet the Federal commissioner of immigration reported (Feb. 28, 1866) "that of the ships which had arrived at New York since the existence of his (the deputy commissioner's) office, there were none which had not violated the act of 1860," and the Federal director of statistics reported in 1868 that the most deplorable abuses existed in defiance of the act of 1855, and had resulted in many cases of pestilence and a high rate of mortality. Many of these abuses have disappeared with the substitution of steam for sailing vessels that has taken place during the past few years. The voyage is now much shorter, and the steerage passengers are better cared for.

The subject of criminal and pauper emigrants has been frequently debated in Congress. Before the American Revolution, England used to send large numbers of these classes of persons to America. To guard against the continuance of this practice, most of the States have enacted severe laws. In Georgia, an alien felon is punishable with banishment, and for a second offence "he shall suffer death without benefit of clergy." In Massachusetts, a town rendered liable for the expense of supporting or burying any pauper immigrant may maintain an action of debt for the same against the master of the vessel who brought him in. In Rhode Island, the importation of "any person of a notoriously dissolute, infamous, and abandoned life and character" is punishable with heavy fines. In the States of New York, New Hampshire, Maine, Maryland, Louisiana, and Texas, the shipmaster must indemnify the State against the expense of maintaining any pauper immigrants he may bring in. Commutation-money may in certain cases be substituted. This is the practice in New York. The shipping of criminals and paupers to this country is still continued by some of the continental nations, and elicited severe comments in the Senate debates of Mar. 19, 1866, and Jan. 3, 1867.

Immigration has always been encouraged by the Federal and State governments of this country, and by many of the latter the inducements held out to the settlers are very attractive. The Federal Homestead act of May 20, 1862, however, continues to remain the most substantial provision of this sort. It secures to every actual settler, the head of a family, 160 acres of public lands, substantially gratis, in absolute fee simple. A fact likely to prove of considerable importance to the future history of this country is the disposition of migrators to confine themselves to isothermal lines. Our immigrants from the United Kingdom and Germany will be found settled mainly in the same latitudes they left—viz., on the Ohio, Northern Mississippi, and Missouri rivers and their affluents, and on the shores of the great lakes. The Scandinavians settle in the most northern States. The Southern States are almost destitute of foreign population, migrators from Italy and Spain going chiefly to South America. This may be due to language or religion, but is mainly to be attributed to climate and the similarity of agricultural productions, the staples of our Southern States, cotton and tobacco, being unfamiliar to the peasants of Southern Europe. These facts would indicate a serious diminution of immigration whenever the causes that now superinduce it from Northern Europe to this country shall cease to prevail.

Attempts have frequently been made to estimate the capital brought into this country by immigrants. So far as money is concerned, these attempts are fully stated in the first volume of the census of 1860. The total capital—money, clothing, tools, and furniture—has been roundly estimated at $250 for each person, but such computations are essentially vitiated by the consideration that sometimes the passage-money, and always the cost of subsistence after landing, and until the immigrant reaches his final destination and is engaged in remunerative production, should be deducted. Equally defective are all computations of the "capitalized value" of immigrants to a country: this, if indeed it has any existence at all beyond the sphere of taxation and military responsibility, being chiefly due to moral and social considerations insusceptible of pecuniary calculation. Besides the Federal bureau of immigration, which has its chief office in the department of state at Washington, and a branch office at New York, most of the States of the Union have established local bureaux of immigration, that of the State of New York, located in the city of New York, being the most important. These bureaux assume charge of the immigrants on their arrival in the country, furnish them with information, and direct them to their destinations.

The foreign-born population of the United States was as follows at the dates mentioned:

1850	2,244,602
1860	4,138,697
1870	5,566,546

In 1870 there were in the United States 10,892,015 persons having one or both parents foreign; 10,521,233 having a foreign father; 10,105,627 having a foreign mother; and 9,734,845 having a foreign father and mother.

The British account of emigration from the United Kingdom to Canada is as follows:

1815 to 1820	70,438	1851 to 1860	235,285
1821 to 1830	139,269	1861 to 1870	195,250
1831 to 1840	322,485	1871	32,671
1841 to 1850	429,044		

These numbers include foreigners as well as natives of the United Kingdom. A portion of these emigrants are believed to have subsequently emigrated to the United States.

The Norwegian account of the total emigration, and the emigration to America, from Sweden and Norway since 1856, is as follows:

	Total.			To America.		
	Sweden.	Norway.	Together.	Sweden.	Norway.	Together.
1856–60	3,500	831	4,331	3,160	743	3,903
1861–65	5,200	3,963	9,163	4,710	1,884	6,594
1866	16,050	7,206	23,256	15,455	4,466	19,921
1867	13,328	9,334	22,662	12,828	5,893	18,721
1868	13,934	27,024	40,958	13,209	21,472	34,681
1869	18,762	39,064	57,826	18,055	32,050	50,105

The British account of emigration from the United Kingdom to the Australian colonies and New Zealand is as follows: 1841–50, 127,124; 1851–60, 506,802; 1861–70, 280,198; 1871, 12,227. This emigration reached its culminating point in 1852–54, and has since greatly declined. The colonial account of immigration from, and emigration to, all countries, at Victoria, is as follows:

	Immigration.	Emigration.
1836–55	428,219	156,682
1856	41,594	21,187
1857	74,255	20,471
1858	56,168	25,882
1859	32,735	19,615
1860	29,037	21,689
1861	26,912	35,898
1862	37,836	38,203
1863	38,983	34,800
1864	36,156	21,779
1865	30,976	25,292
1866	32,178	27,629
1867	27,242	25,142

A system of "free and assisted" emigration has been established between England and her several colonies of Victoria, New South Wales, Queensland, South Australia, Cape of Good Hope, Natal, Tasmania, and some of the provinces of New Zealand. Under this system, 144,362 of the immigrants into Victoria up to 1865 were assisted. The total number of "assisted" emigrants from England to all her colonies named was, from 1853 to 1865, inclusive, 276,837. This system has become unpopular in the colonies, and has been refused further support.

The total emigration from the United Kingdom to all countries during the fifty-seven years from 1815 to 1871 was 7,266,072 persons, but a small portion of whom were foreigners.

Emigration from China has already assumed considerable proportions, as many as 200,000 emigrants per annum having embarked for foreign countries. The better class of these emigrants go to Manila, the Straits, and California; the remainder to various colonial possessions, the Sandwich Islands, etc. They generally emigrate voluntarily, though many of them are kidnapped by the Chinese *sew-choo-tsy*, or itinerant coolie-brokers. They are shipped under contracts, made through Chinese agents, to be held to service for a term of years. These contracts fetch from $150 to $400 in the colonies. The coolies require an advance of passage-money and sufficient to sustain their families until they can support them out of their earnings. Strictly speaking, the coolies do not emigrate. They go abroad temporarily to better their condition, and invariably with the intention to return—an intention almost certain to be carried out if the emigrants' lives and health are spared. The

success that generally attends their pilgrimage is attested by the fact that most of those who go to the shipping-ports in sailing junks return in steamers. The high mortality that has attended them, and the outrages of the coolie-brokers, which, though punishable with death, are often committed, have rendered coolie emigration odious to the Chinese authorities and people, and every impediment has been placed in its way, mainly through regulations approved by the prince of Kung, Mar. 5, 1866. This has caused a great diminution in the emigration from Chinese ports, and confined it to Hong Kong, Macao, etc. An act was passed by the United States Congress Feb. 19, 1862, prohibiting the transportation of coolies in American vessels, unless they were accompanied by certificates setting forth the fact of their "voluntary emigration," and extending to them the benefits of the passenger acts.

The coolie emigration from British India sprang up in 1834 upon the passage of the act of (negro) emancipation. The manifest indisposition of the newly-made freedmen to work rendered it necessary for the preservation of the valuable estates in the British Colonies to substitute for negro labor that of apprentices from India. The government offered no obstacle to the project, and imposed no restrictions as to numbers. The coolies were obtained in Bengal, Madras, and Bombay, and shipped to Mauritius, the West Indies, Reunion and Natal, and British Guiana; mainly to the two former places. The statistics of emigration exhibit a constant outward and return flow of coolies, the movement possessing much the same features as the Chinese emigration. The British Indian account gives the total number of emigrants since 1857 from British India to all the colonies named above, as follows:

1857	12,555	1862	31,358
1858	20,758	1863	12,490
1859	45,025	1864	10,258
1860	41,777	1865	21,545
1861	21,872	1866	27,779

The immigration into the Argentine Republic (Buenos Ayres) has been as follows for the years named:

1858	4654	1863	10,258
1859	4735	1864	11,682
1860	5656	1867	17,000
1861	6301	1870	41,058
1862	6716	1872 (first six months)	38,000

Of the numbers reported in 1870, there were 23,814 Italian, 5748 Spanish, 4105 French, 2053 Swiss, 821 English, 411 German, and 4105 from other countries. About two-thirds of the whole number were male adults, and about three-fourths were agriculturists and laborers. The immigration into this country of Italian and Spanish peasants is the only considerable instance of the kind, and for this reason possesses much interest in connection with the question of the possible future immigration of Europeans into the southern portions of the United States.

Emigration between other countries than those specified in this article has been conducted upon an exceedingly limited scale, and is not deemed worthy of notice in this connection. ALEX. DELMAR.

Emil'ia [Lat. *Æmilia*, called after the celebrated Via Æmilia of the Romans], the ancient name of that part of Northern Italy which contains the larger part of the former duchies of Parma and Módena and the papal delegations of the Romagna, or the present Italian provinces of Parma, Piacenza, Módena, Reggio, Bologna, Ferrara, Forlí, Ravenna, and Massa-Carrara. The name was officially revived in 1859. Area, 8604 square miles. Pop. 2,273,812.

Eminence, a post-twp. of Logan co., Ill. Pop. 1362.

Eminence, a post-village of Henry co., Ky., on the Louisville Cincinnati and Lexington R. R., 26 miles W. of Frankfort. It has a woollen and a flouring mill, three churches (one colored), a bank of deposit, two colleges open to both sexes, two hotels, and one newspaper. The principal business is farming and stock-raising. The location is healthy, surrounded by a beautiful blue-grass region. There is a valuable mineral spring in the vicinity.

W. A. HOLLAND, ED. "CONSTITUTIONALIST."

Eminence, a post-village, capital of Shannon co., Mo., on Current River, about 120 miles S. W. of St. Louis.

Em'inent Domain'. Domain is the territory under the jurisdiction of a sovereign, and *eminent domain* the inherent sovereign power which the people or government retain over the estates or private property of individuals to resume or appropriate the same for public uses, and for public uses only. The difference between the power of taxation and the right of eminent domain should be carefully noted. Taxation proceeds upon the notion of contribution; it falls upon a class of persons, and is apportioned among them by rule. In the exercise of the right of eminent domain the state takes from an individual his property without reference to a burden imposed upon any other person. The right can be exercised in this country either by a State or by the United States. The power to decide whether the property should be taken for any public use rests with the legislature, and its discretion is not reviewable by the courts, though it is conceived that the judicial power has the right to determine whether the use itself is public rather than private. Were this not so, the legislature might, under the pretence of taking property for public uses, transfer one man's property to another.

It is not necessary, however, that the exercise of the power should benefit the entire public. It is enough if it promotes the industrial capacity or resources of a considerable number of inhabitants, or in any manner indirectly contributes to the general welfare. It is not necessary that the State should act directly. The power may be delegated to a municipal body or to a private corporation. A State may delegate it to the United States. The mode of exercising it is regulated by constitutional provisions and by statutes. In some cases only an easement in land is acquired; at other times the entire fee is appropriated. The constitutional prohibition (U. S. Constitution, Amendments, Art. V.) against taking private property for public use without just compensation is a limitation on the power of the Federal government, and not on that of the States. There are similar provisions in the State constitutions binding the State legislatures. The compensation includes not only the property actually taken, but consequential damages to adjoining property. This has recently been carried so far in England by the House of Lords as to hold that a riparian owner on the banks of a navigable stream (the Thames) is entitled to compensation for the act of cutting off his approach to the river, on the ground that the right of access to a tide-water stream is a legal right, which would justify an action by the owner against one who interfered with it, unless Parliament had sanctioned the interference. (*Case of the Duke of Buccleuch, Law Reports, 5, House of Lords' Cases,* 478, A. D. 1872.) Still, if *no* property is taken, a claim cannot be made for consequential damages. The same right to compensation as is secured in this country by constitutional provisions is recognized generally among civilized nations, and may be considered as a general rule in jurisprudence. T. W. DWIGHT.

E'mir, or **Emeer'** (written also **Amîr** and **Ameer**), an Arabic word signifying "chief" or "ruler." The caliphs took the title of emir-al-Mumenin, "chief or commander of the faithful." The title is now given by prescriptive usage to those who are the real or reputed descendants of Mohammed through his daughter Fatima. Many independent chiefs of Northern Africa assume the title of emir. The word emir, joined to another word, occurs in several official titles, as emir-al-Omrah, formerly the title of the first minister of the caliphs and moguls, and at present sometimes the title of the pashas of large Turkish provinces.

Em'lenton, a post-village of Venango co., Pa., has one weekly newspaper.

Em'ly, a small town of Ireland, in the county of Tipperary, was formerly a bishop's see, which was united to Cashel in 1568.

Emman'uel [Port. *Manoel*], surnamed THE GREAT, king of Portugal, was born in May, 1469. He succeeded John II. May 3, 1495, and married Isabella, a daughter of Ferdinand and Isabella of Castile. He promoted education, maritime enterprise, and commerce. During his prosperous reign the power and glory of Portugal were increased by the discoveries and victories of Vasco da Gama, Albuquerque, and Almeida in India and Brazil. Portugal was probably the greatest naval power of the world in his reign, which constitutes the golden age of Portuguese history. His power and renown were greater than any Portuguese monarch ever possessed, either before or since his time; but he greatly injured his country by the banishment of all Jews and the enforced conversion of their young children. His third wife was Eleonore, a sister of the emperor Charles V., whom he married in 1519. He died Dec. 13, 1521, and was succeeded by his son, John III.

Em'men, a town of Holland, in the province of Drenthe, 31 miles S. E. of Groningen. Pop. in 1867, 5437.

Emmerich, ĕm'mer-rĭk', a walled town of Prussia, is on the right bank of the Rhine, about 50 miles N. N. W. of Düsseldorf and 20 miles S. E. of Arnheim, with both of which it is connected by a railway. It has a custom-house, gymnasium, and several churches; also manufactures of woollen cloth, linens, hosiery, etc. P. in 1871, 7817.

Emmet, a post-township of St. Clair co., Mich. P. 960.

Em'met (ROBERT), an Irish patriot and orator, born in Cork in 1780. He was devoted to the independence of Ireland, and was a leader of the United Irishmen, who desired to liberate their country from British domination. Having secretly collected arms and powder in Dublin and formed a conspiracy, he and his friends revolted in July, 1803.

The insurgents killed the chief-justice, Lord Kilwarden, but were soon dispersed by a party of soldiers. Emmet was arrested and tried for treason. He pleaded his own cause in a long and very eloquent speech, which has been preserved, but he was convicted and executed Sept. 20, 1803. His fate and his affection for Miss Curran are the subjects of two of Moore's "Irish Melodies."

Emmet (THOMAS ADDIS), LL.D., an Irish lawyer, a brother of the preceding, was born in Cork in 1764. He was a leader of the United Irishmen, and as such was arrested in 1798, and confined in prison for nearly three years. His sentence was commuted into exile, and he emigrated in 1804 to New York City, where he practised law with distinction. He was elected attorney-general of the State of New York in 1812. He was an eloquent advocate, and had great qualities as an orator. Died in New York Nov. 14, 1827.

Emmett, a county in the N. N. W. of Iowa. Area, 450 square miles. It is intersected by the West Fork of the Des Moines River, and contains several small lakes. Grain and wool are raised. Capital, Estherville. Pop. 1392.

Emmett, a county of Michigan, which forms the extreme northern part of the Lower Peninsula. It is bounded on the N. W. by Lake Michigan, from which Little Traverse Bay extends into the southern part of the county. Grain and potatoes are staple products. Capital, Little Traverse. Pop. 1211.

Emmett, a township of McDonough co., Ill. P. 957.

Emmett, a post-township of Emmett co., Ia. P. 232.

Emmett, a township of Calhoun co., Mich. Pop. 1309.

Emmett, a township of Dodge co., Wis. Pop. 1375.

Emmettsburg, a post-village, capital of Palo Alto co., Ia., on the Des Moines River, 55 miles N. N. W. of Fort Dodge and 25 miles W. of Algona. It is the only village in the county, and is a thrifty business-place. It has a saw-mill and a flouring-mill, and is the proposed junction of the McGregor and Missouri River R. R. with the Des Moines Valley R. R. Both are surveyed, and have land-grants through the county, and considerable grading has been done on the former. It has one weekly newspaper. Pop. in 1870 of village, 44; of township, 316.

ED. "ADVANCE."

Emmettsville, a village of Greene township, Randolph co., Ind. Pop. 67.

Emmittsburg, a post-village of Frederick co., Md., 8 miles N. of Mechanicstown, 1 mile from Mason and Dixon's Line, and 10 miles from Gettysburg, Pa. It was laid out by William Emmitt, its founder, about the year 1773. The original population were Scotch and Irish. Mount St. Mary's College was established near it in 1809 by Rev. John Dubois, late bishop of New York; it is a Roman Catholic institution, one of the largest in the U. S. There are 200 students at present in attendance. Rev. John McCloskey (brother of the present bishop of New York) is the president of the institution. St. Joseph's Academy, about half a mile from town, was established in 1810, by Mrs. Eliza Ann Seton of New York. It is the mother-house of the Sisters of Charity in the U. S., and numbers 2000 members, and has the largest educational building in Maryland, perhaps in the U. S. There are $1,500,000 surplus in the treasury. There are five churches in the village. Pop. 706; of township, 3168.

WM. NEED, ED. "CATOCTIN CLARION."

Emmon's, a township of Davidson co., N. C. P. 941.

Em'mons (EBENEZER), M. D., an American geologist, born at Middlefield, Mass., May 16, 1799. He became in 1833 professor of natural history in Williams College. He was one of the geologists selected by the governor of New York in 1836 to make a geological survey of that State. In 1838 he became professor of chemistry in the Albany Medical College. In 1856 he became State geologist for North Carolina, where he remained until his death. He wrote several reports, which were published in the "Natural History of New York;" also a report of the quadrupeds of Massachusetts, three reports of the geology of North Carolina, and several text-books on mineralogy and geology. Died Oct. 1, 1863.

Emmons (GEORGE F.), U. S. N., born Aug. 23, 1811, at Clarendon, Rutland co., Vt., entered the navy as a midshipman April 1, 1828, became a passed midshipman in 1834, a lieutenant in 1841, a commander in 1856, a captain in 1863, a commodore in 1868, and a rear-admiral in 1872. He served in the South Sea exploring expedition from 1838 to 1842, and on the west coast of Mexico during the war with that country. In the early part of our civil war he was in command of various vessels of the Gulf blockading squadron and Admiral Dahlgren's fleet, and was captain for some months in 1863 during the operations against Fort Sumter. From 1864 to the close of the war he commanded a division of the blockading fleet in the Gulf of Mexico.

FOXHALL A. PARKER, U. S. N.

Emmons (NATHANAEL), D. D., one of the most eminent of American theologians, was born April 20 (O. S.), 1745, at East Haddam, Conn., and graduated with honor at Yale in 1797. He was ordained pastor of the Congregational church in Franklin, Mass., in 1773, and was its pastor until his death, and its sole pastor for fifty-four years. In addition to his pastoral labors he trained nearly one hundred young men for the ministry, many of them afterwards eminent. He was also a prominent advocate of foreign missions and of the anti-slavery cause. His theological views were nearly those of his friend Dr. Samuel Hopkins, and his sermons, distinguished by logical thought and by dignity and power of style, were in many instances characterized by ingenious efforts at solving the problems suggested by the doctrines of the Divine government and the freedom of the human will. Died Sept. 23, 1840. His works (sermons, essays, etc.), published at different times during his life, were after his death published (1842) in seven and afterwards (1861) in six volumes octavo, with memoirs of his life, in the first edition by J. Ide, D. D., and in the second by Prof. E. A. Park.

Em'ory, a township of Stanislaus co., Cal. Pop. 843.

Emory, a post-village, capital of Rains co., Tex. It is very near the geographical centre of the county.

Emory, a post-village of Washington co., Va., on the Atlantic Mississippi and Ohio R. R., 10 miles E. of Abingdon. It has one newspaper, and is the seat of Emory and Henry College, which is sustained by the Methodist Episcopal Church South. There are two hotels and five or six churches in the immediate vicinity.

C. M. BROWN, ED. "BANNER."

Emory (JOHN), D. D., an eminent writer and bishop of the Methodist Episcopal Church, born in Queen Anne co., Md., April 11, 1789, was educated a lawyer, became a Methodist preacher in 1810, preached extensively for many years through the Middle States, and was sent as delegate of his denomination, in 1820, to the British Wesleyan conference. He was appointed in 1824 book agent at New York, and elected bishop in 1832. Died Dec. 16, 1835. In 1817 he had a pamphlet controversy with Bishop White of Philadelphia. He was author of "The Divinity of Christ Vindicated," "Defence of Our Fathers," and other publications, which show much logical ability and a pure and vigorous style.

Emory (ROBERT), D. D., son of the preceding, an eminent divine and educator of the Methodist Episcopal Church, born in Philadelphia July 29, 1814, was president of Dickinson College, Carlisle, Pa., and author of the "Life of Bishop Emory" and "History of the Discipline of the Methodist Episcopal Church." Died May 18, 1848.

Emory (WILLIAM H.), an American officer, born in 1811 in Queen Anne's co., Md., graduated at West Point in 1831, colonel Fifth Cavalry Oct. 27, 1863, and Sept. 25, 1865, major-general U. S. Volunteers. He served as lieutenant of artillery and of mounted rangers till he resigned, Sept. 30, 1836; chiefly at sea-board posts, 1831–36; in Charleston harbor, 1832–33, during the threatened nullification of South Carolina; and in the Creek nation, 1836–38. He was appointed first-lieutenant topographical engineers, July 7, 1838, and major of cavalry Mar. 13, 1865, serving on Delaware river improvements and in topographical bureau, 1839–44; on north-east boundary survey, 1844–46; in the war with Mexico, 1846–48, on the staff of Brigadier-General Kearny; engaged in the actions on his march to California (captain and brevet major); as lieutenant-colonel Maryland and District of Columbia Volunteers; as astronomer of boundary between California and Mexico, 1848–53, and commissioner and astronomer, 1854–57 (brevet lieutenant-colonel); in suppressing Kansas disturbances and on Utah expedition, 1858, and on frontier, board, and inspection duties, 1858–61. He resigned May 9, 1861, and was reappointed May 14, 1861. He was lieutenant-colonel of Sixth Cavalry, serving in Virginia peninsula, 1862; engaged at Yorktown, Williamsburg, and Hanover Court-house (brevet colonel); in department of the Gulf, 1862–63, engaged at Port Hudson, Camp Bisland, Lafourche Crossing, and Donaldsonville; in Red River campaign, 1863–64; engaged at Sabine Cross-roads, Pleasant Hill, and Cane River; in command of Nineteenth Corps, 1864–66; engaged at Marksville, defence of Washington, D. C., Opequan, Fisher's Hill (brevet brigadier-general), Cedar Creek (brevet major-general), and in command (1865–66) of the department of West Virginia; in command of department of Washington 1869–71, and department of the Gulf since 1871.

GEORGE W. CULLUM, U. S. A.

Emory College is in Oxford, Newton co., Ga., 40 miles E. of Atlanta, and 1 mile from the Georgia R. R. Its literary, social, and religious advantages are of the highest order. It was chartered in 1837, and was opened to students in 1838, under the presidency of Rev. Ignatius A. Few, D. D., LL.D. It is under the control of the Methodist Episcopal Church South. The sons of itinerant preachers in the States of Georgia and Florida are educated free of tuition fees. The curriculum of study embraces Latin, Greek, mathematics, natural science, with mental and moral science, evidences of Christianity, belles lettres, and the English Bible. There is also a scientific course, which embraces all of these branches except Latin and Greek. The number of graduates from July, 1841, when the first class graduated, to July, 1873, is over 500, about 20 per cent. of whom are ministers of the gospel, and a still larger percentage has been devoted to the work of teaching. The faculty of the college embraces six professors, and it has the usual appliances for thorough and efficient instruction, such as library, cabinet, philosophical and chemical apparatus. The literary societies have good halls, well furnished, and good libraries and reading-rooms. The college has been under the presidency of the following named gentlemen: Rev. Ignatius A. Few, D. D., LL.D., Rev. A. B. Longstreet, LL.D., Rev. Bishop George F. Pierce, D. D., LL.D., Rev. A. Means, D. D., LL.D., Rev. J. R. Thomas, D. D., Rev. Luther M. Smith, D. D., and Rev. O. L. Smith, D. D. The trustees of the college are now erecting new lecture-rooms and a new and commodious chapel, proposing to afford advantages equal in all respects to those of any institution of like grade in the land. The average number of students for the last few years has been about 200. Two hundred and fifty dollars per annum will cover all expenses of board, tuition, and books. O. L. Smith.

Emo'tion [from the Lat. *e*, "out," and *moveo, motum*, to "move," hence to "feel"] is a psychological term which may be most easily explained by its relation to that of *sensation*. A *sensation* is simply the consciousness of a peculiar state of the body, pleasurable or painful; which consciousness reacts on the body purposing to continue or discontinue its present state. When, for some reason or other, no such reaction takes place, but the consciousness of a certain state of the body flows over into the imagination, the *sensation* becomes an *emotion;* when it passes into the intellect, it becomes a *cognition*.

Empan'nel, or **Impannel,** to enrol a list of jurors; to write a list of the names of men who shall serve as jurors in any trial. The sheriff summons a number of persons, and prepares lists called the panels of the jury.

Emped'ocles [Gr. Ἐμπεδοκλῆς], a celebrated Greek philosopher, born at Agrigentum in Sicily, lived about 450 B. C. He acquired great fame and influence by his talents and varied attainments in science. It is said that his fellow-citizens offered him the crown, but he declined it, and used his influence to found a republic in his native state. He was regarded as a public benefactor, a great poet, and a predicter of futurity. He maintained the theory that the world is developed or compounded from four primary elements, fire, air, earth, and water. He wrote, besides other works, a poem on "Nature," of which fragments are extant. It appears that he accepted the doctrine that the souls of some men, at least, are destined to migrate through animal or vegetable bodies in order to purify them. The tradition that he threw himself into the crater of Mt. Etna to immortalize his name is not generally credited. He was admired by Aristotle and Lucretius, the latter of whom eulogizes him in his poem "De Rerum Naturâ." The fragments of Empedocles have been edited by Stein (1852) and others. (See Ritter, "History of Philosophy;" Gladisch, "Empedocles und die Aegypter," 1858.)

Em'peror [Lat. *impera'tor*, from *im'pero*, to "command;" Fr. *empereur;* Ger. *Kai'ser*], the sovereign who rules over an empire. The title *imperator* was conferred by the ancient Romans on their consuls in their military capacity, after this authority had been confirmed to them by the *comitia curiata*. The signification of imperator depended on that of *imperium*, which was the name given to the supreme power of the senate and people of Rome over the city and subject provinces. An officer clothed with authority by law exercised this imperium within the limits and time of his command. After any great victory the soldiers were accustomed to salute their commander as imperator as a compliment, though, as exercising the imperium attached to his command, he was already such in fact. He might be a consul or a proconsul, and the imperium was as necessary for a governor of a province as for a general who merely commanded an army. Under the republic there might be many *imperatores* at one time. On the subversion of the republic the title was conferred on Augustus for life. The authority of the Roman emperors was acquired by the combination of the chief offices of the former republic in a single person; besides which, some extraordinary powers were granted or usurped. Thus, Octavius held the title of imperator and the office of consul by successive elections. He was made tribune, which gave inviolability to his person, and pontifex maximus and censor, which gave him control of religion and morals. He was also invested with perpetual proconsular authority, which gave him supreme control in all the provinces, and declared chief (*princeps*) of the senate, and Augustus, which last designation was assumed by his successors. The title imperator was assumed by the emperors on the occasion of victories of themselves or their armies. Aurelius is represented on a coin as imperator for the eighth time. With the early Roman emperors the term imperator did not denote the sovereign power. It is not easy to determine at what time the word came to be used in the modern sense of emperor as the proper name for the sovereign of the Roman state. The term *princeps* was used as a convertible term with it. The Roman emperors appointed their own successors, who received the title of cæsar during the life of the emperor who appointed them. After the court was removed to Constantinople, the old titles and forms of the republic gradually vanished, and the emperors assumed the style of Oriental princes. The title of emperor of the Romans was conferred on Charlemagne by Pope Leo III. in 800 A. D., and was borne by his successors until the dissolution of the Holy Roman Empire in 1806.

On the 18th of Jan., 1871, King William I. of Prussia assumed the title of emperor of Germany at the request of all the German princes. Napoleon I. assumed the imperial style in 1804, and Napoleon III. in 1852. The latter was deposed after the battle of Sedan on the 2d of Sept., 1870. After the Greek empire had been divided into two parts in 1204, the rulers of both parts continued to bear the title of emperor, the Latin emperor residing at Constantinople, and the Greek emperor at Nicæa. In 1263 the two parts were reunited, and in 1328 the Greek empire was again divided into the empire of Constantinople and that of Trebizond. After the Turks had conquered these empires, the sultans assumed the title of emperor, which was recognized by the European powers in 1606. Czar Peter I. of Russia assumed the imperial title in 1721. After the dissolution of the Holy Roman empire in 1806 the rulers of Austria assumed the title of emperor of Austria. Outside of Europe there is at present only the empire of Brazil, though the British possessions in Asia constitute the "Indian empire," and the sovereign of Great Britain has the title of emperor of India. Several attempts have been made to establish other empires in America, but all have failed. In Mexico, Iturbide assumed the title of emperor in 1822, and Maximilian of Austria in 1864. In Hayti the negroes Christophe in 1811, and Soulouque in 1849, reigned for a short time as emperors, but were soon deposed. The rulers of Morocco, China, and Japan are also sometimes called emperors. The modern idea of an empire in general seems to be a union of states, each with a local government, under the protection or political preponderance of one powerful state. The personal sovereign of such a state may by conquest or election become the emperor, sustaining a special governing relation to his own hereditary dominions, and a general control as emperor over the confederated, yet subordinate, states of the empire. But there is a tendency towards a looser use of the term as a mere title of the head of a kingdom.

Emperor Moth (*Saturnia pavonia minor*), the largest British lepidopterous insect, is allied to the silkworm moth, and belongs to the Bombycidæ. Its wings when expanded measure three and a half inches, each wing having a large transparent spot. The peacock moth (*Saturnia pavonia major*) is five inches across the wings, being the largest species in Europe. Silk is obtained from cocoons of certain species of this genus.

Em'phasis [Gr. ἔμφασις, a "setting forth," from ἐμφαίνω, to "show;" Fr. *emphase*], in elocution, the stress laid on particular words or syllables in a sentence in order to express or enforce an idea or a meaning; sometimes a peculiar impressiveness or earnestness of expression.

Emphyse'ma [from the Gr. ἐν, "in," and φυσάω, to "flow," to "puff up"], in pathology, an inflation produced by air or gas in the cellular tissue. Emphysema of the lungs is owing to dilatation of the air-vesicles.

Emphyteu'sis [Gr., from ἐν, "in," and φυτεύω, to "plant" or "graft"] is a contract in civil law by which lands or tenements are given to be possessed for a long term or for ever, and an annual rent (*canon emphyteuticus*) in money, grain, etc. reserved and made payable to the grantor, in recognition of his paramount title. The grantee acquires the *dominium utile* or usufruct, while the grantor reserves the *dominium directum*. The Scottish grant in feu-farm is

similar to the emphyteusis. The word fief is supposed to have been derived from emphyteusis.

Empire. See EMPEROR.

Em′pire, a township of Stanislaus co., Cal. Pop. 2993.

Empire, a township of McLean co., Ill. Pop. 2133.

Empire, a post-township of Leelenaw co., Mich. Pop. 450.

Empire, a post-township of Dakota co., Minn. P. 995.

Empire, a post-township of Fond du Lac co., Wis. Pop. 1055.

Em′pire Cit′y, a post-village of Clear Creek co., Col., is on Clear Creek, about 48 miles W. of Denver. It is surrounded by high mountains. Here are gold and silver mines.

Empire City, a post-township of Ormsby co., Nev. Pop. 626.

Empire City, a thriving post-village, capital of Coos co., Or., is on Coos Bay, 130 miles S. S. W. of Salem. Excellent lignitic coal is exported.

Empir′ic [Gr. *ἐμπειρικός*, "experienced;" Lat. *empiricus;* Fr. *empirique*], one whose knowledge or skill is founded on experience or experiment. In the time of Celsus and Galen there was a medical sect called *Empirici*, supposed to have originated with Philinus of Cos and Serapion. These empirics were opposed to the *Dogmatic* sect or school, and considered that medical science should be based on experience rather than theory. They became so notorious for ignorance that the term empiric is now generally applied to quacks and practitioners who are ignorant of medical science. In its application to philosophy empiric denotes one who depends for truth entirely upon sensual experience, independent of those limitations of the mind's constitution which condition and supplement it. Empiricism is a name applied by many of the German schools of philosophy to the system which may be called that of observation and induction, relying upon phenomena which are made evident in consciousness. They apply the term to the methods of Locke, Reid, and Stewart, without properly discriminating them from the materialists, to whom the term, in both ancient and modern times, has been legitimately applied.

Empir′ical Laws are expressions which set forth a general relationship in any class of phenomena, without attempting to explain the principle underlying that relationship. The underlying principle may, in fact, be unknown, as in the case of BODE'S LAW (which see). Bode's law is one of the most remarkable of all the empirical formulas known to science.

Empiricus. See SEXTUS EMPIRICUS.

Em′poli, a town of Italy, in the province of Florence, is on the river Arno, 16 miles W. of Florence, with which it is connected by a railway. It is in a beautiful and fertile district, is well built, and has an interesting church, which was founded in 1093, and is adorned with paintings by Giotto. Here are manufactures of cotton fabrics, straw hats, etc. Pop. in 1861, 5805.

Empo′ria, a post-village, capital of Lyon co., Kan., near the Atchison Topeka and Santa Fé R. R. where it crosses the Missouri Kansas and Texas R. R., 61 miles S. S. W. of Topeka. It is between the Neosho and Cottonwood rivers, 6 miles above their junction, in a fine agricultural and stock-raising region. It has a large trade, and is one of the best-built towns in the State. It is the seat of the State normal school, with a fine large building and 250 students. It has a court-house, two national, one private bank, two newspapers, flouring-mill, furniture, soap, and carriage factory. Pop. 2168; of Emporia township, 1182. JACOB STOTLER, ED. "EMPORIA NEWS."

Emporium, a post-village, capital of Cameron co., Pa., at the junction of the Buffalo New York and Philadelphia R. R. with the Philadelphia and Erie R. R., 99 miles W. N. W. of Williamsport. It has three newspaper offices and an important lumber-trade. Valuable salt-wells abound in the vicinity. Pop. 898.

Empyreu′ma [Gr. *ἐμπύρευμα*, from *εμπυρεύω*, to "kindle"], the odor emitted by animal and vegetable substances when they are burned or decomposed by a strong heat. The oils obtained by the destructive distillation of organic substances at high temperatures are called *empyreumatic oils.*

Ems (anc. *Ami′sia* or *Ami′sius*), a river of Germany, rises in Prussian Westphalia, near Paderborn. Its general direction is northward. After a course of about 200 miles it enters the Dollart, an inlet of the North Sea, near the town of Emden. It is connected by a canal with the Lippe.

Ems, or **Bad-Ems** (*i. e.* "bath of Ems"), a celebrated watering-place of Germany, in the Prussian province of Hesse Nassau, on the river Lahn, about 7 miles S. E. of Coblentz. It is surrounded by picturesque scenery, and is situated in a beautiful valley among wooded hills. Here are warm mineral saline springs, the temperature of which varies from 93° to 135° Fahrenheit. It has good hotels, and is frequented by many visitors, including English and other foreigners. Pop. in 1871, 5458. In 1785 the archbishops of Treves, Mayence, Cologne, and Salzburg formed an agreement here, called the "Punctation of Ems," in which they demanded in twenty-three articles the change of several papal privileges in favor of the German archbishops. The real object, however, was the establishment of a national German Church. But in consequence of the opposition of their own bishops and the firmness of the pope, they were compelled to submit to the authority of the pope within a year. On July 13, 1870, the French ambassador, Count Benedetti, had at Ems the famous interview with King William of Prussia which precipitated the outbreak of the great war between France and Germany.

Em′ser (HIERONYMUS), a German Catholic theologian and adversary of Luther, born at Ulm Mar. 26, 1477. He was secretary to George, duke of Saxony. He issued (1527) a translation of the New Testament, which he called his own, but which is only a copy of Luther's, with some unimportant verbal alterations. Died Nov. 8, 1527.

E′mu, or **E′meu** (*Dromaius Novæ Hollandiæ*), a large Australian bird, belonging to the Struthionidæ and allied to the ostrich and cassowary. It differs from the latter in being taller, having the bill horizontally depressed, and in being destitute of the bony crest and pendent wattles. When full-grown it is of a brown color, mottled with gray. It has only rudimentary wings, but is exceedingly fleet in running. The eggs are dark green, and about seven in number. Both the eggs and flesh are esteemed excellent for the table. Its plumage is long and almost hair-like. The plumes are readily dyed of various colors, and appear to some extent in commerce as a substitute for ostrich feathers. It has become rare in the more settled parts of Australia, having been hunted for the sake of its oil, which the skin contains in large quantities. It feeds mostly on fruit, herbage, etc., and is easily domesticated.

Emu.

Emu Wren (*Stipiturus malachurus*), a passerine bird of Australia, nearly allied to the wrens of Europe and Amer-

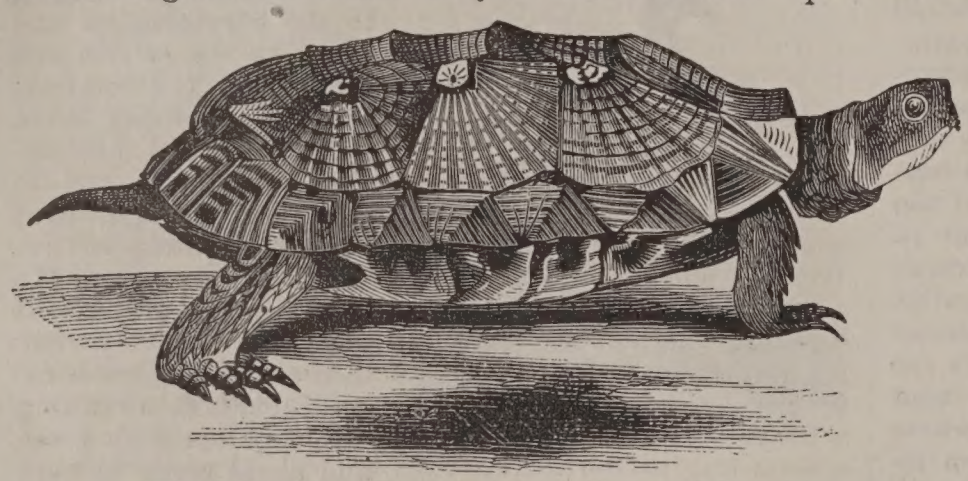
Emu Wren.

ica. The genus includes about a dozen Australian species. This bird haunts marshy districts, never alighting on high trees, and seldom taking to flight, but running rapidly about the grass with its long tail-feathers erect. It takes its name from these feathers, which are six in number, and have a real or fancied resemblance to the feathers of the emeu.

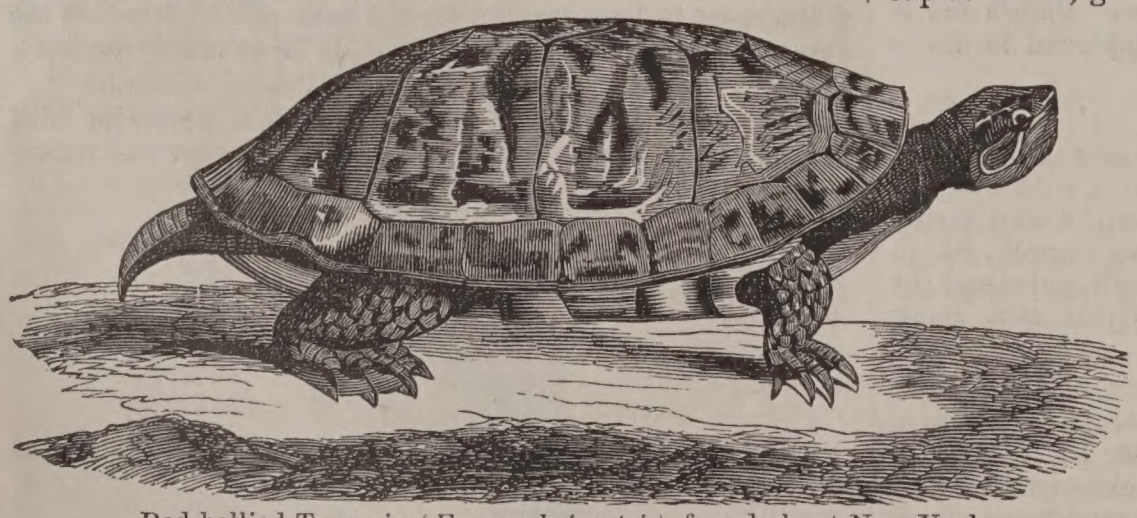
Emul'sin (*Synaptase*), an albuminous substance found in almonds, which acts as a ferment upon the glucoside amygdalin of bitter almonds, transforming it into bitter almond oil (hydride of benzoyl), hydrocyanic (prussic) acid, and glucose (grape sugar).

Emul'sion [from the Lat. *emul'geo*, to "milk"], the name of a liquid preparation resembling milk in color and consistence, and obtained by mixing oil and water by means of some other substance, mucilaginous or saccharine. Emulsions are useful in pharmacy.

E'mys [Gr.], a genus of chelonians or fresh-water tortoises. They differ from land-tortoises in having the feet more webbed and expanded, and the shell of the back more flattened. The painted tortoise (*Emys picta*) and alligator tortoise (*Emysaura serpentina*) are abundant in North America. Several species are natives of Southern Europe. DeKay makes the genus to include nearly all the fresh-water species in America, including fifteen or twenty in the U. S. They are generally known as terrapins, and many of them are prized for the table. Fossil remains of the genus are found in the eocene.

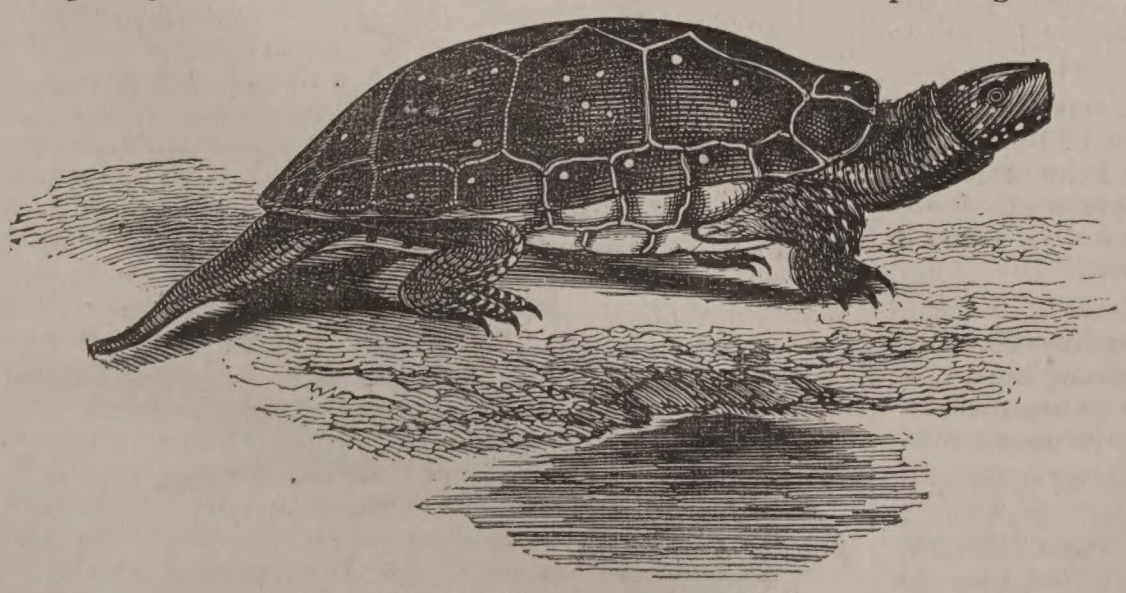


Wood Terrapin (*Emys insculpta*), U. S. and Canada.



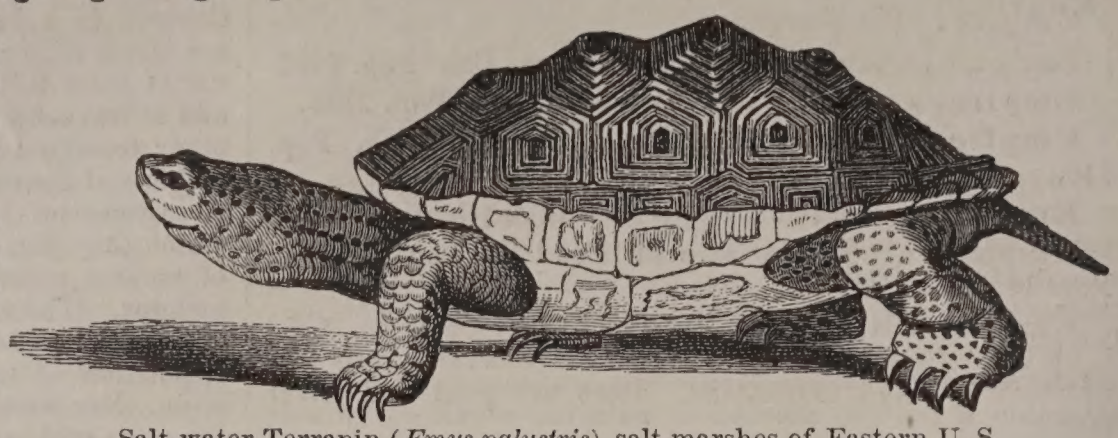
Red-bellied Terrapin (*Emys rubriventris*), found about New York.

The wood terrapin (*Emys insculpta*), found in the U. S. and Canada, is eleven inches long, of a reddish-brown color, with radiating lines of yellow. It is found in fresh waters, but perhaps oftener in fields and woods.



Spotted Tortoise (*Emys guttata*), U. S.

The red-bellied terrapin, common in the New York markets, is from ten to seventeen inches long, dusky in color, with reddish marks, and is red beneath. Its flesh is very good.



Salt-water Terrapin (*Emys palustris*), salt marshes of Eastern U. S.

The little spotted tortoise (*Emys guttata*), from five to nine inches long, is found throughout a great part of the U. S., is black, with roundish speckles or spots above, and is black and yellow beneath. It is sometimes caught on the land.

The salt-water terrapin (*Emys palustris*) is from five to seven inches long, being found in brackish tidal waters and salt marshes of our Atlantic coast, especially northward. It is one of the most highly prized of the terrapins. It is dug out of the mud in winter, when it is very fat, and marketed in considerable numbers for table use. Many other terrapins are known in the U. S., especially southward and westward.

Enaliosau'rians [from the Gr. ἐνάλιος, "marine" (ἐν, "in," and ἅλς, the "sea"), and σαῦρος, a "lizard"], a group of extinct saurians having paddles for swimming instead of true feet, and having crocodilian teeth and biconcave vertebræ like those of fishes. Their remains first appear in the carboniferous rocks, and disappear in the cretaceous, being most numerous in the Jurassic strata. They appear to have been mostly or all marine. *Ichthyosaurus* is one of the most important of the genera.

Enam'el [Fr. *émail*, from the Late Lat. *smal'tum*, "smalt," the blue color of enamel], a name given to various opaque or semi-opaque glasses used in glazing or finishing the surface of pottery, iron, and jewelry. Common glass fused with oxide of antimony or tin becomes a white enamel; oxide of cobalt produces a deep blue; manganese, an amethyst; cuprous oxide, a ruby-red; cupric oxide, green, etc. The hard external layer of the teeth is called "the enamel;" it contains a large percentage of oxide of lime.

Enamelled Leather, leather the surface of which is rendered glossy by successive coats of linseed oil, and finally of a varnish of copal and asphaltum. (See LEATHER.)

Enamel Painting, the art of applying artistic painting to glass, pottery, or the metals, most glass-staining at present being simply enamel painting. The various colors (chiefly oxides of lead, platinum, gold, titanium, uranium, chromium, etc.) are mixed with some glass or "flux," ground, made into a paint with oil of spike or some other volatile oil, and then applied with a soft brush, the outline being usually first applied, and then burnt in at a great heat in a glowing muffle. Afterwards the outlines are filled up by repeated paintings and burnings, different colors requiring different treatment. Some faint idea of the needed skill may be formed from the fact that the painter has to work not with actual colors, but with substances which he knows will produce these colors after firing. Nevertheless, delicate shades and shadows can be thus produced, and there have been many famous and accurate enamellers of portraits. This art was well known in ancient Egypt and Etruria, and in mediæval times its use, derived from Byzantine and Moorish workmen, became common in France and Italy.

Enara, or **Enare,** a large lake of Russia, in Lapland, about lat. 69° N. and lon. 28° E. Area, 1050 square miles.

Enarea, a country of Africa, in Abyssinia, lies S. W. of Shoa. Its limits have not been accurately ascertained. It is mostly included between lat. 7° and 9° N., and is inhabited by Gougas. The chief exports are ivory, slaves, and

coffee, the last of which is cultivated extensively. Capital, Sakka.

Enarthro'sis, the name given in anatomy to that kind of articulation which permits the widest range of motion. It is known as the ball-and-socket joint, and is formed by inserting the round end of one bone in the cavity of another, as in the hip and shoulder.

Encamp'ment [Fr. *campement*], the position occupied by an army or body of troops, having pitched tents or erected huts for temporary lodgings; sometimes the act of pitching tents or encamping. Also a name used for the divisions of certain secret societies, as the so-called "Knights Templar."

Encaus'tic [Gr. ἐγκαυστική, from καῦσις, a "burning"], a durable species or method of painting which was practised by the ancient Greeks, and was so called from the process of burning the picture when completed. It was not developed until the later or more perfect period of Greek art. The pictures were executed with wax colors (*ceræ*), and finished by the application of a hot iron. The effect of an encaustic picture was probably similar to that of an ordinary *tempera* or water-color painting. Both tempera and water-color pictures were polished with a wax or encaustic varnish. Encaustic painting has not been practised with much success or to much extent by the moderns.

Encaustic Tiles, a variety of tiles used for the flooring of halls, churches, and public and private buildings. They were extensively made in the Middle Ages, and were then frequently employed for the ornamentation of walls. At present figured tiles are also extensively used in making flower-boxes for window culture. Encaustic tiles are plain or ornamented. Plain tiles are white or colored, and are sometimes glazed. They are made by pressing dry clay into a mould by powerful hydraulic presses, and afterward burning them. Figured tiles are moulded from moist clay, and the figures are added to the surface before burning. These tiles constitute an excellent though expensive material for floors. Fine examples of figured tile floors are to be seen in the Capitol at Washington. Holland and Belgium had anciently famous manufactures of tiles, but at present they are chiefly made in England.

Enceinte [Fr., from *enceindre*, to "gird about," to "enclose"], in fortification, signifies the main enclosure or the (generally) continuous enclosing line of wall and parapet of a fort or fortress. It is the inner boundary of the main ditch, and, according to its "trace" or "system," upon which its contour is broken, it distinguishes the character of the work as "bastioned," "polygonal," "tenaillé," etc. (See FORTIFICATION, by COL. A. H. BRIALMONT, Belgium.)

Enchirid'ion [Gr. ἐγχειρίδιον, from ἐν, "in," and χείρ, the "hand"], in literature, a brief and useful compilation; a manual. An ethical treatise of Epictetus is termed his "Enchiridion."

Encho'rial [Gr. ἐγχώριος, from ἐν, "in," and χώρα, "country;" that is, belonging to the country, not foreign], or **Demotic Writing,** a cursive or short-hand alphabet used in ancient Egypt. It was an abbreviation of the hieratic writing, which was itself an abridged form of the true hieroglyphics. Its remains are difficult to decipher. It began to come into use about the origin of the twenty-sixth dynasty (672–525 B. C.), and was still used in 200 A. D. It contained forty-two letters and forty-eight syllabic characters. It appears on the Rosetta Stone, and was extensively employed even in public documents. Remnants of this alphabet appear in the Coptic.

Encina. See ENZINA, DE LA (JUAN).

Enck'e (JOHANN FRANZ), a German astronomer, born at Hamburg Sept. 23, 1791. He received a prize for his determination of the orbit of the comet of 1680 (called Halley's comet), and published a work entitled "The Distance of the Sun" (2 vols., 1822–24). In 1825 he was appointed director of the Royal Observatory at Berlin and secretary of the Academy of Sciences. He investigated the orbit and movements of the comet which Pons discovered in 1818, and which is now designated Encke's comet. In 1830 he began to edit the "Astronomische Jahrbücher." Died Aug. 26, 1865.

Enck'e's Com'et was observed by Pons Nov. 26, 1818. In 1819, Encke first demonstrated that the same comet had been seen as early as 1786, and several times subsequently. He also found that its period was about 1200 days (3.303 years), its successive returns being accelerated and its period shortened by a minute interval of time. It has the shortest period and the least aphelion distance of all the known comets.

Enclaves [from the Lat. *clavis*, a "key"] are small parts of one country which are entirely surrounded by another country.

Encore, a French word signifying "again" or "more," is commonly used in English theatres and opera-houses as an expression of applause, and as a request that the actor or vocalist will repeat a part of the performance. The French express a similar desire by exclaiming *bis* (twice).

En'cratites [Gr. Ἐγκρατῖται, the "self-restraining," the "continent"], a name applied by the Church Fathers to a supposed Gnostic sect; though, in the opinion of most modern critics, the title belongs collectively to many Gnostics, but not to any particular sect, representing a principle, rather than a community or organization. The Encratites were dualistic, and in some instances were hardly Christian, so peculiar were their doctrines and practices. They contributed much to the spread of asceticism in the Church. Tatian, Marcion, Cassian, Saturninus, and other prominent men were reckoned as Encratites. They forbade marriage, the eating of flesh, the drinking of wine, and in some cases substituted water for wine in the Eucharist.

En'crinal Limestone, a name given by geologists to any limestone which is largely composed of the remains of crinoids, but more specifically applied to certain beds in the Helderberg and Hamilton groups in New York.

En'crinites ("stone lilies"), the popular name for crinoids, radiated animals which form an order in the class Echinodermata. The encrinites form many genera and species, nearly all of which are fossil. They abound in the palæozoic rocks, and are quite numerous in the mesozoic formations. In the present seas they are exceedingly rare, until recently only one species (*Pentacrinus caput Medusæ* of the West Indian seas) being known. The late deep-sea dredging expeditions have brought to light two or three more. *Comatula* in its early stage of existence so much resembles the encrinites that it was described as a crinoid (*Pentacrinus Europæus*), but in *Comatula* the stem is temporary, in the crinoids permanent. The stem consists of disks like button-moulds in form, set in a pile together, and in the living animal has some flexibility. It is mostly round or pentagonal, and is often finely sculptured on the articulating surfaces. Each joint of the arms is furnished with two cirri or appendages, which the animal uses in capturing its prey. The number of joints in the *Pentacrinus Briareus* is, according to Buckland, about 150,000. Immense numbers of these animals lived in the seas of the palæozoic ages. "We may judge," says Dr. Buckland, "of the degree to which the individual crinoids multiplied among the first inhabitants of the sea from the countless myriads of their petrified remains which fill so many limestone beds of the older formations."

Encum'brance, or **Incumbrance,** a burden, impediment, a hindrance; in law, a legal claim on an estate, for the discharge of which the estate is liable. The term is a general name for liabilities by which an estate in lands and hereditaments may be burdened, such as mortgages and annuities.

Encyclopæ'dia [Gr. ἐγκυκλοπαιδεία, the "cycle of learning," for ἐγκύκλιος παιδεία, a "curriculum" or "course of education"], or **Cyclopædia,** a treatise containing not only definitions, but also some account or description, of the principal terms and objects of interest in all departments of science, literature, and art. These accounts are sometimes placed alphabetically, the more usual arrangement (alphabetical encyclopædias), or the articles are arranged according to subjects (systematic or real encyclopedias). A work of this kind which extends over only one department of learning is a special encyclopedia. Among remarkable works of this class may be mentioned the ancient Greek work of Speusippus, the "Antiquitates" of Varro, the works of Al Farabi of Bagdad (died 950 A. D.), Vincent de Beauvais's (1268) "Speculum Majus" (published 1473–76), Alsted's (the first German) "Encyclopædia" (1620), the great French "Encyclopédie" of Diderot and D'Alembert (1751–72, 28 vols. folio), a classified work excluding history and biography; the "Deutsche Encyclopædia" of Köster and Roos (1778–1804), the "Encyclopædia Britannica" (1771, 3 vols.; 8th ed. 1853–60, 21 vols.), the "Edinburgh Encyclopædia" (18 vols., 1810–30), the "Encyclopædia Metropolitana" (1815–45, 25 vols.), the "Allgemeine Encyclopädie der Wissenschaften und Kunste," begun in 1818 by Ersch and Gruber (of which up to 1873 160 volumes had been published), the "Penny Cyclopædia" (1833–43, 27 vols.), the German "Conversationslexikon" of Brockhaus (11th ed. 1864–69, 15 vols.), Pierer (5th ed. 1867 seq., 19 vols.), and Meyer (1839–52; 1st part, 23 vols.; 2d part, 15 vols.). "Chambers's Encyclopædia" (1861–68, 10 vols.) was published in Scotland and the U. S. In the U. S. an American edition of the "Dictionary of Arts and Sciences" (1815–16, 3 vols.) was the first encyclopædia published. The first important American encyclopædia was the "Encyclopædia Americana" of Lieber (1829–32,

13 vols.); next appeared the "New American Cyclopædia" (1858–63). Besides these there were published the "Popular Encyclopædia (1869, 50 parts), "Allibone's Dictionary of American and British Authors" (1870, 3 vols.), McClintock and Strong's "Cyclopædia of Biblical, Theological, and Ecclesiastical Literature" (1st vol. 1867), Schem's "German-American Encyclopædia," commenced in 1869, to be completed in 11 vols., and "Johnson's New Illustrated Universal Cyclopædia," and other works of the kind.

Encyclopæ'dists [Fr. *Encyclopédistes*], a term applied to the French philosophers and skeptics who wrote for the famous "Encyclopédie" which Diderot and D'Alembert edited (28 vols., 1751–72). Among these eminent writers were, besides the two editors, Voltaire, Rousseau, Grimm, and Helvetius. They were liberal and revolutionary in political principles, exercised an immense influence on public opinion, and gave a great impulse to the French revolution.

Endec'agon, or properly, **Hendec'agon** [from the Gr. ἕν, "one," δέκα, "ten," and γωνία, an "angle"], a plane rectilineal figure of eleven sides. The area of a regular or equilateral endecagon is very nearly equal to 9.36564 times that of the square of one of its sides.

Endem'ic [from the Gr. ἐν, "in" or "within," also "among," and δῆμος, a "people"]. A disease is called endemic when it is either peculiar to some locality, or, much more frequently, when it often occurs in a particular region. "Epidemics" visit a community for a time, and then disappear. "Endemics" are diseases which are very frequent in a community, and which do not disappear after running their course. Thus, cholera is epidemic in Europe and the U. S., while it is endemic along the lower Ganges.

Endemic influences are receiving profound study from students of medicine and social science. The investigations deal with climate, topography, geology, water supply, personal habits and character, moral, religious, and political conditions, and (since the origin of the germ-theory of disease) with the study of minute animal and vegetable organisms. The study of endemic influences has given rise to the new science of medical geography. (See MÜHRY, "Noso-Geographie," 2 vols.; BOUDIN, "Traité de Géographie et de Statistique Médicales, et de Maladies Endémiques," 2 vols., 1857; SIR RANALD MARTIN, "On the Influence of Tropical Climate;" the "British Army Medical Reports," annual since 1859.)

En'derby Land, a portion of land discovered by Biscoe in 1831 in the Antarctic Ocean; lat. 67° 30′ S., lon. 50° E.

Ender'mic [from the Gr. ἐν, "in," and δέρμα, the "skin"] **Meth'od,** a manner of administering medicines formerly sometimes employed, by which the skin was made to absorb the remedy used. In some instances a blister was raised, and the medicine—for example, sulphate of morphia—was applied to the blistered surface. This plan, though often surprisingly effective, has been superseded by the hypodermic method, in which the medicine is introduced under the skin by a small needle-pointed syringe.

En'dicott (JOHN), colonial governor of Massachusetts, was born at Dorchester, England, in 1589. He came to America in 1628, and was chosen governor of Massachusetts colony in 1644, again in 1649, and was re-elected to the same office every year from 1650 to 1665, except in 1654. He was a bold and energetic man, a zealous Puritan, and intolerant of whatever he considered wrong. Under his administration, from 1659 to 1661, four Quakers who refused to obey the laws, which banished them from the colony, under pain of death if they returned, were executed in Boston. He died Mar. 15, 1665.

En'dive [Lat. *intu'bum* or *intybum*], (*Cicho'rium Endi'via*), a biennial herbaceous plant of the order Compositæ, cultivated in the gardens of Europe and naturalized in the East. Its blanched radical leaves are used as a salad. The varieties which have the leaves much curled are preferred. It is a native of Eastern Asia.

End'less Screw, a piece of mechanism formed by combining the screw with a cog-wheel, or by making a screw act on the threads of a female screw sunk in the edge of a wheel. The axis of the screw may be either in the plane of the wheel or at right angles to it; in the latter case it is called the American endless screw. In its mechanical principle the endless screw is a combination of the inclined plane and the lever.

End'licher (STEPHEN LADISLAUS), an eminent botanist and linguist, born at Presburg, in Hungary, June 24, 1804. He studied several Oriental languages and the natural sciences. In 1828 he became director of the Imperial Library of Vienna. He obtained in 1840 the chair of botany in the university of that city. He published several works on botany, which were splendidly illustrated. Among his numerous works are "Genera of Plants, arranged according to the Natural Order" (in Latin, 1836–40), "Iconographia Generum Plantarum" (1838), and "Rudiments of Chinese Grammar" (1845). He favored the popular cause in the revolutionary movement of 1848. Died Mar. 28, 1849.

Endocardi'tis [from *endocardium* and the termination *-itis*, denoting "inflammation"], an inflammation of the endocardium. It is generally of rheumatic character, and, though not often immediately fatal, it is a frequent cause of organic disease and deformity of the heart and its valves. It is frequently associated with pericarditis, and its occurrence is one of the results always to be feared in rheumatic fever. It is usually attended by pain or discomfort about the heart, and is detected by auscultation. It produces peculiar murmurs in the heart, the significance of which can only be appreciated by the trained physician. The disease is very intractable. Sedatives, such as hydrocyanic acid, belladonna, aconite, and digitalis, may be useful in acute stages. The alkaline treatment for rheumatism is often advantageous. Patients sometimes, though not very frequently, entirely recover.

Endocar'dium [from the Gr. ἔνδον, "within," and καρδία, the "heart"], a name applied to the serous membrane lining the chambers and valves of the heart.

En'docarp [from the Gr. ἔνδον, "within," and καρπός, "fruit"], a botanical term applied to the inner coat or layer of a fruit, as the stone of the cherry and peach.

En'dochrome [from the Gr. ἔνδον, "within," and χρῶμα, "color"], the coloring-matter of plants, especially of the lower classes of plants. In the higher classes of plants it is called chlorophyll when green, and various modifications of it are believed to produce the colors of flowers, of autumn leaves, etc. Several theories have been proposed to account for these various colors, but none are quite satisfactory. The endochrome of the lowest plants has been pronounced by some chemists to be identical with chlorophyll, except when stained by the presence of iron, etc., as in diatoms.

En'dogens, or **Endog'enous Plants** [from the Gr. ἔνδον, "within," and γένω, to "be born," to "grow"], one of the primary classes of plants, are sometimes called **Monocotyledonous.** All flowering or phænogamous plants are divided into two classes, the endogens and the exogens. The former are so called because their stems grow by additions to the inside, so that the outer part is the oldest and hardest. The stems present no manifest distinction into bark, wood, and pith, but the woody fibre and vessels are in bundles which are irregularly imbedded in the cellular tissue. They have no true medullary rays, nor proper bark, nor concentric annual rings. The leaves are mostly parallel-veined, and sheathing at the base. The stems of most endogens produce terminal buds, but no lateral buds, and therefore are unbranched. The stem generally ceases to increase in thickness at an early stage of its growth, long before it attains its full height. In many of the grasses the stem is hollow or fistular. The endogens of temperate and cold climates are mostly small herbaceous plants, as grasses, lilies, and rushes; but in warm climates occur numerous endogenous trees, as the palm and pandanus or screw-pine. The embryo of all endogens has a single cotyledon, and the plumule has alternate leaves. Most endogens have the parts of the flower in threes, and the leaves in the vast majority are parallel-veined.

En'dor, an ancient village of Palestine, on the northern declivity of Little Mount Hermon, 18 miles S. E. of Acre.

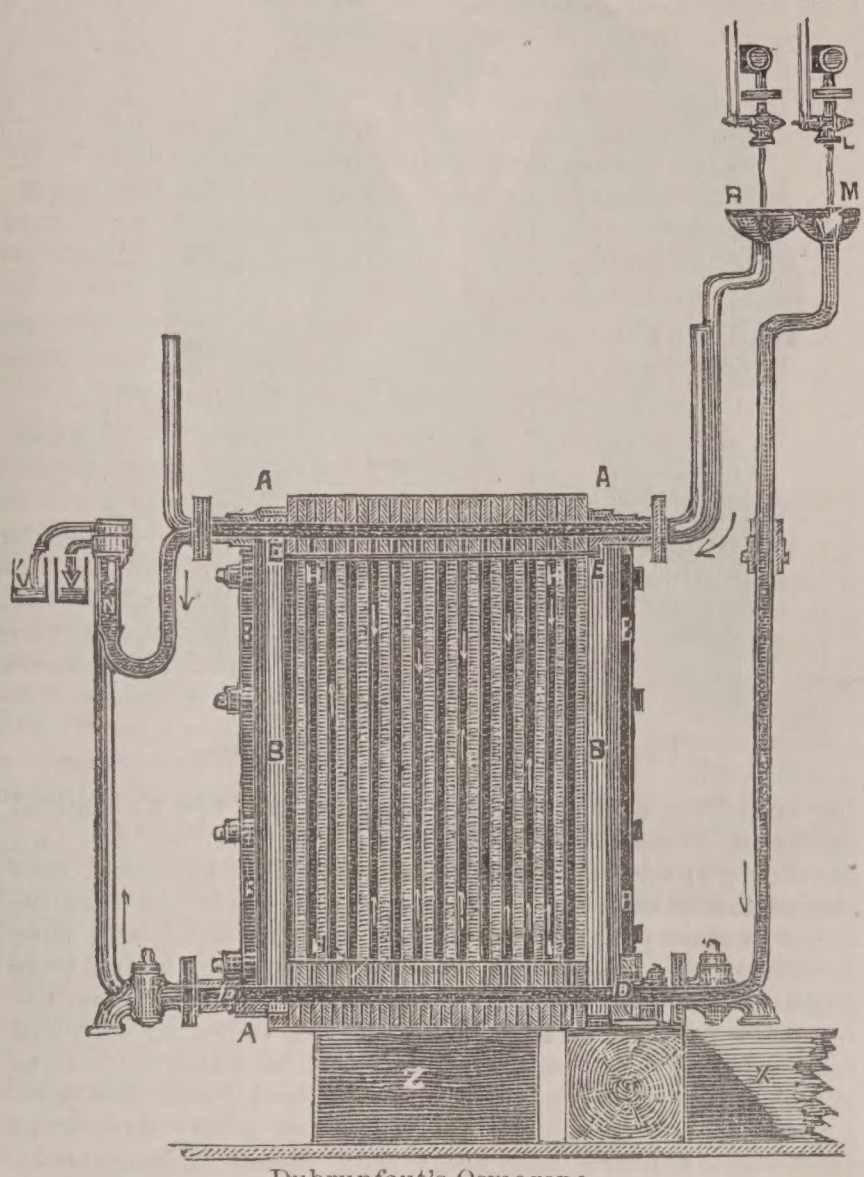
Endorse [from the Lat. *in*, "on," and *dor'sum*, "the back"], in heraldry, the smallest diminutive of the pale; an ordinary containing the fourth part of a pale.

Endorse, or **Indorse,** to write on the back of a promissory note or other written instrument; to sanction; to become responsible for (a bill or note). The party who endorses is called the *endorser*. Each endorser is liable for the payment of a bill or note in case the drawee or acceptor fails to pay, as the case may be, provided that protest is legally made in time.

En'dosmose, or **Endosmo'sis** [from the Gr. ἔνδον, "within," and ὠθέω, to "impel"], and **Exosmose,** together called **Liquid Diffusion, Osmose** or **Osmotic Action,** are properties of animal and vegetable membranes first observed by Dutrochet (*Ann. Chim. Phys.*, xxxvii. 191), and subsequently investigated very fully by Graham. If two different liquids or gases which are capable of mixing with each other, as water and alcohol, are separated from each other by such a membrane as paper, caoutchouc, or a bladder, the one liquid being suspended in a bladder in the other, the liquid in the bladder will pass through the bladder into the other (exosmose), or the liquid without will pass into the bladder (endosmose), or both endosmose and exosmose will take place at the same time; and in this case the

current continues until there is an equal proportion of both liquids on either side of the bladder. These phenomena are due to the attraction which the two liquids have for each other and for the diaphragm separating them. These phenomena are essential to organic life, and perform important parts in many physiological acts. Advantage is taken of them in dialysis and many other operations of the chemist.

Diffusion is applied in France and Germany to the extraction of the saccharine juice from beets and to the separation of alkaline salts from beet molasses. For the latter purpose the "osmogene" was devised by Dubrunfaut. (*Comptes Rendus*, lxv. 692. See also WALKHOFF's "Rüben-



Dubrunfaut's Osmogene.

zucker-fabrikant.") The osmogene consists of a box (B B) containing sheets of parchment paper (H H) held in a vertical position by wooden frames with rubber padding (A A). A stream of water (M V) flows through the box, filling half the spaces between the diaphragms. At the same time a stream of molasses (R V′) flows through, filling the alternate spaces. The alkaline salts diffuse through the parchment, purifying the molasses to such an extent that the process is a profitable one for the manufacturer.

Endow′ment, the act of appropriating a fund for the support of a charitable institution, a professorship, or a college; also the fund or revenue devoted to such a purpose or permanently appropriated to any object; sometimes a gift of nature, an innate faculty or quality.

Endröd, a village of Hungary, in the county of Bekes-Csanad, on the river Körös, 90 miles E. S. E. of Pesth. Pop. in 1869, 8714.

Endym′ion [Gr. Ἐνδυμίων], in the Greek mythology, a beautiful youth beloved by Diana (Selene), who cast him into an everlasting sleep. One tradition represents him as a son of Zeus (Jupiter), who gave him immortality and perpetual sleep. Some persons suppose that Endymion is a personification of the sun or of the plunge of the setting sun into the sea.

En′ema [from the Gr. ἐνίημι, to "send in"], a liquid substance thrown into the rectum by injection, either as medicine or nourishment.

En′emy [from the Lat. *in*, negative, and *ami′cus*, a "friend;" Fr. *ennemi;* Ger. *Feind*], one hostile to another; a foe, an adversary, an antagonist; applicable to an individual or a nation. Also one who dislikes any individual or cause; a hostile army or force. In international law, the enemy is one who has publicly declared war against us, or against whom we have made such a declaration. This declaration must be made by a duly organized state or kingdom, for such a declaration by any turbulent body of men is not sufficient. Hostilities having been formally declared, every subject or citizen of the hostile nations becomes an enemy of the opposing state, and all intercourse or communication between the citizens of one hostile state and those of the other is unlawful. An enemy cannot, as a general rule, enter into any contract which can be enforced in the courts of law; except, for example, when a state permits expressly its own citizens to trade with the enemy; and perhaps a contract for necessaries or for money to enable the individual to get home might be enforced. An alien enemy cannot, in general, sue during the war a citizen of the U. S., either in the courts of the U. S. or those of the several States. The word *enemy*, in a still more extended sense, includes any of the subjects or citizens of a state in amity with the U. S. who have commenced, or who have made preparations for commencing, hostilities against the U. S.; and also the citizens or subjects of a state in amity with the U. S. who are in the service of a state at war with them. The Latins had a particular term (*hostis*) to denote a public enemy, and distinguished from him a private enemy by the term *inimi′cus*. In our language we have but one word for these two classes of persons. (See CONTRABAND, EMBARGO, PIRACY, and WAR.)

En′ergy [Gr. ἐνέργεια, from ἐν, "within," and ἔργον, "work"], in physics, the capability of effecting physical changes; that is, of doing work or overcoming resistances. It is called *actual energy* in reference to the work it is doing, and *potential energy* in reference to that which it is capable of doing, but has not yet done. A bent spring possesses *potential energy;* the same spring set free exerts *actual energy*. Energy is called *visible* when motion is directly perceptible in the moving body; it is called *molecular* energy when the motion occurs among the particles of a substance, and is not directly perceptible. Visible energy is called *kinetic* when it is due to visible motion; the kinetic energy of a moving body is equal to the weight in pounds multiplied by the square of the velocity, and divided by twice the acceleration due to gravity. When a body moves to the highest point in its course, its kinetic energy is exhausted, or rather converted into *potential* energy, which is due entirely to advantage of position. As kinetic energy decreases, potential energy increases, and the sum of the two in any moving body is always the same. Molecular energy is due to heat, actinism, chemism, electricity, etc. Various machines, such as the steam-engine, the telegraph apparatus, etc., depend for their action upon the conversion of molecular into kinetic energy. (See CORRELATION OF FORCES.)

Enfantin (BARTHÉLEMI PROSPER), a French socialist and leader of the Saint-Simonians, was born in Paris Feb. 8, 1796. He became in 1825 a disciple of Saint-Simon, after whose death he and Amand Bazard were the chief priests of the sect. They formed in 1830 an association of Saint-Simonians, who had their property in common, but they soon disagreed and ceased to co-operate. Enfantin assumed the name of the "Living Law and the Messiah." He wrote several socialist works and advocated "free love." In 1832 he was imprisoned on a charge of corrupting public morals. Died May 31, 1864.

En′field, a town of England, in Middlesex, on the London and Cambridge Railway, 10 miles N. of London. Here is a large manufactory of small-arms belonging to the government. Pop. 16,053.

Enfield, a post-township of Hartford co., Conn. It contains a settlement of Shakers, and has important manufactures. Pop. 6322.

Enfield, a post-township of White co., Ill., at the crossing of the Springfield and Illinois South-eastern and the St. Louis and South-eastern R. Rs. Pop. 2426.

Enfield, a post-township of Penobscot co., Me., on the European and North American R. R., 35 miles from Bangor. Pop. 545.

Enfield, a post-village and township of Hampshire co., Mass. It has important manufactures. It is on Swift River and on the Athol and Enfield R. R. Pop. 1023.

Enfield, a post-township of Grafton co., N. H., 42 miles N. W. of Concord, is on the Northern R. R. The United Society of Shakers occupy a portion of the town; they manufacture brooms, tubs, and pails, and raise garden-seeds. The three lakes in the town and the beautiful scenery around them make this one of the most delightful summer resorts in New Hampshire. There are two hotels, two woollen-mills, five churches, and one monthly medical journal. It has also manufactures of furniture, flannels, leather, lumber, knit goods, carriages, etc. Pop. 1662.
ELI G. JONES, M. D., ED. "N. E. E. MEDICAL JOURNAL."

Enfield, a post-township of Tompkins co., N. Y. Enfield Falls, 230 feet high, are on Ten-mile Creek, and are very beautiful. Pop. 1693.

Enfield, a post-village of Halifax co., N. C., is on the Wilmington and Weldon R. R., 18 miles from Weldon and 144 from Wilmington. It contains several steam saw-mills

and one steam grist-mill. It has one newspaper. There is a large wine-manufactory in the vicinity. The principal export is cotton; it ships annually 5000 bales of cotton, 15,000,000 feet of lumber, 500,000 staves, 3000 bushels of early peaches, besides shingles, wine, and brick. A gold-mine is worked in the neighborhood. Pop. about 500.

DANIEL BOND, ED. "TIMES."

Enfield (WILLIAM), LL.D., an English dissenter and writer, born at Sudbury in 1741. He preached in the Unitarian churches of Liverpool, Warrington, and Norwich, and published several volumes of sermons and a "Preacher's Directory" which is highly commended. Amongst his other works is a "History of Philosophy" (1791), abridged from Brucker's history. Died Nov. 3, 1797.

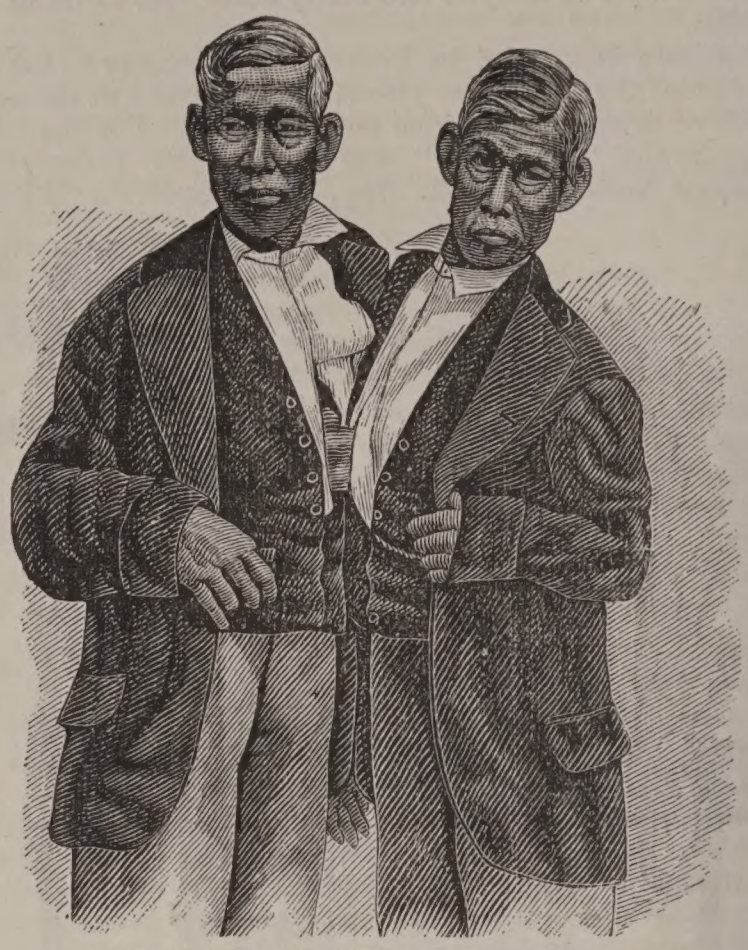
Enfield Rifle-Musket, a variety of small-arms manufactured at Enfield, England, at the royal small-arms factories. During the late civil war the U. S. government and the Confederates each purchased large quantities of these and other European arms, on account of the difficulty of supplying the large numbers of troops with the necessary weapons. The Enfield rifle, though a very serviceable weapon, much better than the Belgian and Austrian arms then imported, was in almost every respect inferior to the old Springfield (U. S.) rifle-musket, which it much resembles. All these weapons have now given place to various breech-loading arms.

Enfilade [Fr.], a discharge of musketry or artillery made in a direction parallel to the length of a line of troops or of a line of rampart, so that the shot rakes the whole line. A trench or parapet is said to be *enfiladed* when guns are so placed that the shot can be fired into it in a direction coincident with its length.

Engadine, or **Engadin,** an extensive valley in Switzerland, canton of Grisons, is about 45 miles long, and has an average width of 1½ miles. The noble Bernina Mountains separate this valley from the Valtelline. It is the upper part of the valley of the river Inn, which runs along it in a north-east direction between two chains of the Alps. The highest part of the valley is 5900 feet above the level of the sea. The climate is very cold, and snow and frost occur even in July. The valley is divided into the Upper and Lower Engadine. There are several glaciers and a number of valuable mineral springs. The inhabitants number about 12,000, and speak a peculiar Romanic dialect, called Ladin. The people are mostly Protestants. The valley is very beautiful, and affords much timber and pasturage. The Lower Engadine is well cultivated, but less beautiful than the upper valley. The people are a pious, simple class of peasantry. The young men are known throughout Europe as good confectioners and coffee-house keepers. They usually amass a competence, and return to enjoy their small fortunes in their native valley. The government is a pure democracy. The noble Cembra pines which adorn this valley are of great value.

Eng ("right") and **Chang** ("left"), the Siamese Twins. They were born at Bangesau, Siam, April 15, 1811, of a Chinese father and a Chino-Siamese mother, and brought to the U. S. in 1829. Since that time they have been on exhibition in America and Europe a number of times, and died, after having lived, as Eng and Chang Bunker, about twenty years in the neighborhood of Mount Airy, N. C., in Jan., 1874, the death of Chang preceding that of Eng a few hours. They differed in appearance, character, and strength more than average twins, performed their physical functions separately, and were addicted to different habits, Chang being intemperate and irritable, Eng sober and patient. Both were married and had large families of children, a number of whom died young, but none exhibited any malformation. Chang received a paralytic stroke in Aug., 1870. He died unexpectedly while his brother was asleep, after having been affected with an inflammatory disease of the respiratory organs. Eng died a few hours afterwards, probably chiefly from the influence of the nervous shock on learning the sudden death of his brother. They are the best known of the "double monsters" on record, none others of whom ever lived to the advanced age of sixty-three. The "Hungarian Sisters," Judith and Helena, who were born in 1701, and connected at their sacral regions, lived up to twenty-one years of age, and the "Two-headed Nightingale," two mulatto girls of North Carolina, born in 1851.

The connection of the Siamese Twins took place in their epigastric regions, between the navel, which was common to both, and the ensiform processes, which were bent out in a forward direction and met very closely, held together by a ligamentous apparatus. The connecting band was a few inches long, after having elongated a little during the long life of the twins, and eight inches in circumference (two and a half in diameter). It was covered with skin, which in the median line had a narrow zone with common sensitiveness. Inside the skin there was normal subcutaneous and muscular tissue, portions of the muscles of one crossing those of the other. The interior was occupied by the prolongation of the peritoneum in such a manner that at the post-mortem examination a hand introduced into the abdomen of Chang entered two pouches reach-



Eng and Chang (the Siamese Twins).

ing into Eng, and a hand introduced into the abdominal cavity of Eng entered one pouch (lying between the two of Chang's) which was long enough to be extended into the abdomen of Chang. The livers of the twins were located in close proximity to the connecting band, and connected with each other by small blood-vessels, which were lined with a thin layer of genuine liver tissue. Thus, the question whether a separation of the twins by surgical means would have been possible, must be answered negatively. The severing knife would have injured the peritoneum of both brothers, and resulted in a very dangerous (although perhaps not necessarily fatal) inflammation. The greatest danger would have resulted, however, from the lesion of the short connecting blood-vessels, particularly the vein, and the accompanying liver tissue. Two separations, by surgical interference, of "double monsters" are on record: one is reported by König in 1689, one by Boehm in 1866. (*Virchow's Archiv.*) The latter operated on his own twin daughters in 1861; one died after three days, the other was alive in 1866, at the age of five years. In both cases the connection of the twins took place in the exact place where the Siamese Twins were attached to each other, but the connection was confined to the skin and subcutaneous tissue only.

A. JACOBI.

Engano, an island of the Malay Archipelago, is near the S. W. coast of Sumatra. It is over 30 miles in circuit, and is rather high and well wooded. Area, 400 square miles. The people are of Malay race, and are independent. The island has a good harbor, but is mostly surrounded by coral-reefs. Lat. 5° 21′ S., lon. 102° 20′ E.

En-gedi [Heb. *Eyn Gedi*, the "kid's fountain;" the modern *Ain Jidy* of the Arabs], a town several times mentioned in the Bible, and also called *Hazezon-tamar,* alluding to its palm trees, which have now disappeared. It stood on the W. side of the Dead Sea, at a point about equally distant from its N. and S. extremities. Here are found some ruins of the old town, which stood in a very fertile spot near the fine fountain which gave it a name. There are numerous caves in the vicinity. These served as hiding-places for King David and his followers in the days of their outlawry during the reign of Saul.

Eng′el (ERNST), a very prominent German statistician, born in 1821, became in 1860 director of the statistical bureau in Berlin, and presided in 1863 in the International Statistical Congress in Berlin. He published the "Zeitschrift des statistischen Bureau" (since 1860), the "Jahrbuch für die amtliche Statistik des Preussischen Staates" (since 1863), and "Preussische Statistik" (since 1866).

Engel (JOHANN JAKOB), a German author of much merit, was born at Parchim Sept. 11, 1741. He became professor of belles lettres in Berlin in 1776. Among his works are "Ideen zu einer Mimic" (2 vols., 1785), and "Lorenz Stark" (1795), a romance which was very popular. His

works are characterized by a refined taste and great elegance of diction. Died June 28, 1802.

Engel (JOSEPH), a German anatomist, born in 1816, became professor of descriptive anatomy at the University of Zurich in 1844, professor of pathological anatomy in Prague in 1849, and of descriptive anatomy at the Joseph Academy in Vienna in 1854. He published, among other works, "Specielle pathologische Anatomie" (1856), "Das Knochengerüst des Menschlichen Antlitzes" (1850), and "Compendium der topographischen Anatomie" (1859).

Eng'elberg, a village in a valley of the same name, in the canton of Unterwalden, Switzerland, at the foot of Mount Titlis. It is famous for its school, which is connected with a stately Benedictine abbey, *Mons Angelorum*, founded by Pope Calixtus II. in 1120, and rebuilt in 1729. It has a good old library and some valuable paintings. Here is also a famous cheese-cellar of great extent.

Engelbert, a voluminous old Benedictine author, was abbot of Admont in Styria, and died in 1331. He was of noble birth. Of his numerous works the most important was a Roman history, "De ortu, progressu et fine imperii Romani," published in 1553 and 1603. Several theological tractates of his production have been published by Pez, with a biography and a full list of his works.

Engelbert, SAINT, a son of Engelbert, count of Berg-Geldern, was born in 1185. He became in 1215 elector of the empire and archbishop of Cologne, having when twenty-two years old declined the bishopric of Münster. He paid off the debt of the electorate, enlarged its territories, and reformed its administration. When the emperor Frederick II. went to Italy, Engelbert was the principal regent in Germany. He reformed the corrupt clergy, checked the power of the nobles, and zealously advanced that of the Church. His energy and rigor made many enemies, and he was murdered by his own nephew Nov. 7, 1225. The murderer, Count von Isenburg, was broken on the wheel, and his accomplices, the bishops of Osnabrück and Münster received excommunication. Saint Engelbert is one of the characteristic figures of German mediæval history, recalling Saints Dunstan and Thomas à Becket, but he seems to have possessed more zeal for the purity of the Church than they showed, and an energy equal to theirs in extending its power. His life was written by Cæsar of Heisterbach, and in recent times by Ficker.

Engelbrecht (JOHANN), a German enthusiast, born at Brunswick in 1599. He was a tailor's son, and worked at his father's trade until his health failed. He was liable to cataleptic attacks, during which he went for many days without food or drink. In 1622 he set himself up for a prophet, in all sincerity regarding himself as a divinely-inspired teacher. His writings have been in part translated into English. Though he was quite unlettered, some of Engelbrecht's books, like his addresses, display considerable power and an insight into spiritual things. After suffering imprisonment and enduring much obloquy, he retired from public life and died in 1642.

Eng'elmann (GEORGE), M. D., a German botanist and physician, born at Frankfort-on-the-Main Feb. 2, 1809, was educated at Frankfort, Berlin, and Heidelberg, removed to the U. S. in 1832, and settled at St. Louis in 1835. He founded there a journal called "Das Westland." He is especially eminent for his researches in the Cactaceæ, the dodders, the euphorbias, junci, conifers, and other difficult departments of botany. He has published various monographs on botany and meteorology.

Eng'elstöft (CHRISTIAN THORNING), a Danish theologian, born in 1805, became in 1845 professor of theology at the University of Copenhagen, and in 1851 bishop of Fühnen. He wrote, among other works, a "Manual of Church History" (1845).

Enghien, a town of Belgium, province of Hainaut, about 20 miles S. W. of Brussels, with which it is connected by railway. It has a superb château of the Aremberg family, and manufactures of cotton and linen fabrics. The family of Bourbon-Condé derived from it the title of duke. Pop. in 1866, 3852. The great Condé was styled in his youth Duc d'Enghien.

Enghien, d' (LOUIS ANTOINE HENRI DE BOURBON), DUC, a French prince, born at Chantilly Aug. 2, 1772, was the eldest son of the duke of Bourbon. He became an *émigré* in 1789, and joined in 1792 the army of the prince of Condé, who was his grandfather. He fought against the French republic until 1799. In 1804 he married the princess Charlotte of Rohan-Rochefort, and became a resident of Ettenheim in Baden. Here he was seized by the order of Bonaparte, carried to Vincennes, tried by a military court, and shot Mar. 21, 1804, on the pretext that he was an accomplice of Cadoudal in a conspiracy against Bonaparte. This act excited great indignation, as it is generally believed that D'Enghien was not guilty.

En'gine [probably from the Latin *ingenium*, "natural capacity," "invention"], a name given to a variety of mechanical contrivances designed to apply the forces of nature in performing useful work. In a general sense, the word is often applied to any powerful machine, but its use in industry is restricted to prime movers. Here also a distinction is to be observed. Prime movers of great simplicity, like windmills and water-wheels, are not called engines. Something implying the exercise of ingenuity (*ingenium*) in the combination of parts and the adaptation of means to ends is necessary to entitle a machine to be ranked in this class.

The forces which engines are employed to apply and utilize are principally heat, gravity, and electricity. Those in which the efficient force is heat, called in general thermodynamic engines, occupy the first rank as it respects their industrial value; and among these the class of engines in which steam is the vehicle employed to utilize the heat are the most important of all. The varieties of steam-engines are almost as numerous as the uses to which they are applied; but in most the elastic force of the steam is employed to impart, by direct pressure, a reciprocating rectilinear motion to a piston within a cylinder, this motion being usually converted into a rotary motion by means of a crank. Such is the principle of all the large stationary engines used to drive the machinery of factories, foundries, etc., and generally of those employed to propel vessels on inland waters or on the ocean, or to drag trains upon railways. Such also is the principle of most of the steam-engines used in the minor industries, and of the portable engines (called by the French *locomobiles*) employed in agriculture and for miscellaneous purposes.

The real or supposed disadvantages attendant on the use of crank motion have led many inventors to seek a form of construction for the engine in which rotary motion should be produced by the direct action of steam. Hence there has sprung up a very numerous tribe of "rotary engines;" none of which, however, have secured a very general acceptance. (See ROTARY STEAM-ENGINE.) A plan of marine engine has also been proposed, and perhaps constructed, in which the rotary and reciprocating motions are in a certain sense combined, the piston being a plane passing through the axis of the cylinder, around which (axis) it vibrates through a considerable arc. The object in this case is to economize space, and to keep the heavy parts of the engine as low down in the ship as possible. Finally, Bishop's disk engine, another marine engine intended for driving propeller screws, employs as a piston a disk, which, moving in what may be called an equatorial spherical sector upon a ball-and-socket joint at the centre of the sphere, gives to the polar axis a motion of nutation by which the crank is driven. This construction is said to have been very successful.

The first application of steam to produce a useful effect was made by Captain Thomas Savery, a British engineer, in a contrivance for the drainage of mines or the elevation of water generally, of which he exhibited a model in 1669 to the Royal Society of London—a contrivance usually but improperly called Savery's *engine*. This consisted of a vessel, or pair of vessels, of metal, ellipsoidal in form, called receivers, connected at the bottom by a tube having a valve opening upward with the water to be raised, and having a pipe descending to the bottom of the receiver within, but furnished with a stop-cock at top, which communicates upward with the level at which the discharge is to take place. In this apparatus, the cock being open, the air is first expelled by steam introduced from a boiler; the cock being then closed, the steam is condensed by means of cold water applied to the surface of the receiver; into the vacuum formed by this condensation the water then enters by force of atmospheric pressure, lifting the valve; the receiver being full, the cock is once more opened, the valve closing spontaneously, and steam is introduced at the highest point of the vessel, pressing on the surface of the water, and driving it upward through the discharge-pipe. Owing to the small conducting power of fluids for heat downward, the temperature of the water is very little raised during this operation, and that only near the surface. This contrivance, though very wasteful of heat, came into quite general use in England. One of the first uses to which the inventor himself applied it was for the raising of water to be used by its fall to turn a mill-wheel; and it is said (*Encycl. Brit.*, art. "Steam-Engine") that several engines of this kind were erected at Manchester to impel the machinery of some of the earliest cotton-mills and manufactories of that district. It should be here observed that the marquis of Worcester, in his "Century of Inventions," published in 1663, described a machine identical in principle with that of Savery, which he asserts

that he actually constructed and operated successfully; but as no evidence of this remains but his own record, the statement is to be received with some hesitation.

In 1690, Denis Papin, a French physicist (at that time, however, curator of the Royal Society of London), devised a project—or rather, it may be said, suggested the possibility—of an engine in which the efficient power should be the pressure of the atmosphere; this to be brought into play by creating a vacuum beneath a piston in a cylinder by the explosion of gunpowder or by the condensation of steam. Dr. Papin, however, did not follow out his idea. It was taken up by two common mechanics, Newcomen and Cawley of Dartford, who some years later (the precise date of the invention is not preserved) produced a machine having a real industrial value, which, under the name of Newcomen's engine, continued to be used, chiefly in the drainage of mines, for nearly a century. In this engine a vacuum was produced beneath a piston in an upright open cylinder by first filling the cylinder with steam, and then condensing the steam by the application of cold water to the exterior. The downward pressure of the atmosphere—about fifteen pounds to the square inch, or a ton to the square foot—then caused the piston to descend, dragging after it the working-beam of the engine or (in raising water) the handle of the pump. Two important improvements were made soon after the introduction of this engine. The first was the condensation of the steam by means of a jet of cold water thrown into the interior of the cylinder, instead of applying water to the surface. The discovery of the superior efficacy of this method was the result of an accidental leakage, through the piston, of the cold water always kept on top to prevent the entrance of air, in consequence of the imperfect fitting of the piston to the cylinder. The sudden descent of the piston on the occurrence of a free influx of water thus occasioned suggested an arrangement for the purposed introduction of the jet at the proper instant, whereby the movements of the engine were greatly accelerated. The second improvement consisted in attaching rods to the working-beam, so connected with the cocks by which the steam and condensation water were alternately admitted to the cylinder as to cause those cocks to be opened and closed at the proper moments by the action of the machine itself. The engine thus became automatic; and this most valuable addition to its capabilities of usefulness is said to have been made by a boy named Humphrey Potter, employed to tend the engine, and charged with the monotonous duty of opening and closing these cocks by hand. Observing that the opening of one of the cocks was necessary at the beginning of the stroke, and that of the other at the end, also that when one was opened the other must be closed, he attached strings to the handles of the cocks, and so connected them with the beam as to produce the desired effects in their proper order. In planning and successfully executing this contrivance the youthful inventor had not particularly in view the benefit to the world it was capable of yielding, but only his own personal relief from an irksome task. He designed, therefore, to keep it a secret, in order that he might enjoy the liberty it secured him. But the very excellence of his invention betrayed him. The engine provided with his attachments immediately began to work with a uniformity and regularity unknown before, exciting the curiosity of the attendants to discover the cause; so that the secret was brought to light. The name given to Newcomen's engine was not "the steam-engine," but "the atmospheric fire-engine."

In 1725 appears to have been produced the first engine (for the machine of Savery was not properly an engine) in which the direct pressure of steam was employed as a motive-power. This was invented by one Jacob Leupold, whose contrivance embraced a piston in an open cylinder, like Newcomen's, but employed high-pressure steam, not only to balance the pressure of the atmosphere, but to drive at the same time the piston of a force-pump elevating a column of water.

This was the state of things in regard to thermo-dynamic engines when in 1765 the attention of James Watt, a mathematical instrument maker of Glasgow, was called to the subject, in consequence of his having been called upon to make some repairs upon a model Newcomen engine used to illustrate the physical lectures of the university of that city. In the hands of Watt this contrivance completely changed its character, and became, in the proper sense of the word, a steam-engine. (For the further history of this most important of the mechanical aids to the industrial progress of the world, for a description of the variety of forms which have been given to it, and of the accessory apparatus by which its efficiency has been improved, and for an account of the physical and mathematical theories of its action, we must refer the reader to the proper heads, STEAM-ENGINE and HEAT.)

Thermo-dynamic engines have been proposed, in which ammoniacal gas or the vapor of ether or that of some other volatile liquid should be made the vehicle of the thermal force. These have been in some instances actually tested, but they have never gained a general acceptance. The argument urged in their favor has been of course economy, but the basis of this economical argument has been greatly narrowed by the recognition of the doctrine of the conservation of force as one of the fundamental truths of physical science. There remain, nevertheless, certain questions relative to this point still open, which will be found briefly discussed in the article HEAT. Other forms of thermo-dynamic engines, which have secured to themselves a place among the aids to industry, are those which employ as a direct or indirect source of motive-power the explosive force of combustible gases when inflamed in mixture with atmospheric air, and those in which the elastic force of heated air itself is used to drive a piston. (For descriptions and theories of these, see HEAT, HOT-AIR ENGINE, and INFLAMMABLE-GAS ENGINE.)

The attempt to make electricity subservient as a motive-power to the uses of the arts has been many times made, but never with a high degree of success. There is no difficulty whatever about the undertaking, considering it merely as a mechanical problem. From the point of view of economy, however, such attempts will always be failures, unless there should be discovered some source of electro-motive force less expensive than any now known. (For information on this subject, see ELECTRO-DYNAMIC ENGINES.)

Hydro-dynamic engines are those in which water is employed not simply to produce motion by its own gravity, as in falling upon an overshot or breast wheel, or by its moment, as in driving an undershot or flutter wheel, but by the hydrostatic pressure of a natural head, or of what may be called an artificial head, produced by confining a large volume of water in a strong cylinder, and compressing it by means of a heavily loaded piston in the cylinder. Such engines are usually of small dimensions, but work under a very high pressure—a pressure sometimes of three or four hundred atmospheres. They were originally introduced by Sir William Armstrong to control the heavy cranes and other lifting machinery used in foundries and were first publicly exhibited by him in the great International Exposition of 1851, held in London. In the management of the ponderous "converters" used in Bessemer steel-works they may be said to be indispensable. (See on this subject the article HYDRO-DYNAMIC ENGINES.)

F. A. P. BARNARD.

Engineering. "The engineer is he who, by art and science, makes the mechanical properties of matter serve the ends of man. In the widest sense, almost every man is more or less an engineer. The first man who bridged a torrent with a fallen tree had in him something of the engineer; the first man who dug a new channel for a brook, the first man who cleared a pathway in the forest, had in him something of the engineer; but the title of engineer is more properly restricted to those who make the useful application of mechanical science their peculiar study and profession."*

Hence, engineering is the art and science by which "the mechanical properties of matter are made to serve the ends of man," or, as otherwise defined, it is "the useful application of mechanical science" to those ends.

The branches of science which are applicable to the engineer, says the same eminent authority, "fall under the general head of *mechanics;* but they are distinct in method and application (though not in principle) from astronomical mechanics, which treats of the motion of the stars, and from those parts of physical mechanics which relate to such subjects as the transmission of sound and light. They are also so far to be kept distinct from *pure* or *abstract* mechanics that, in treating specially of mechanics as applied to engineering, certain fundamental principles are to be taken for granted, the demonstration of which forms part of the course of natural philosophy. To that course also must be left all mechanical problems which are interesting in a scientific point of view only, and not practically useful.

"The objects to which the science of the engineer relates are divided under two heads—viz., *Structures* and *Machines.*

"Strictly speaking, all machines are structures, though all structures are not machines; but it is convenient to limit the term *structures* to those combinations of solid materials whose parts are not intended to have relative motion, and which are thus to be distinguished from *machines,* whose parts are intended to have relative motion and to perform work.

"The theory of structures is founded on the principle of statics, or the science of equilibrium. It is divided into two parts, relating respectively to the two requisites of a struc-

* The late W. J. Macquorn Rankine on "The Science of the Engineer."

ture, stability and strength—stability being the power of resisting forces tending to overthrow the structure, or to derange the parts of which it is made from their proper relative positions; and strength, the power of resisting forces tending to alter the figures of those parts or to break them in pieces.

"For example, in a bridge, stability requires certain relations to exist between the distribution of the load, the figure of the arch, and the dimensions of the abutments, in order to prevent the dislocation of the arch-stones or the overthrow of the abutments; and strength requires the arch to be of a thickness sufficient to resist the tendency to crush it.

"In applying the principles of stability and strength to structures, regard must be had to the special properties of the materials employed, whether earth, stone, bricks, cement, timber, iron or other metals, as well as to the kind of workmanship to which each material is subjected, and the forms in which it is used.

"The end to be aimed at in every scientifically designed structure is to adjust exactly the position, form, and size of the whole, and of each part, to the forces which it has to sustain. The more nearly this end is attained, the better will the structure be, not only in efficiency, durability, and economy, but also in beauty. This, independently of ornament, is the fundamental principle of beauty in architecture as well as in engineering.

"The theory of machines is founded on the principles of cinematics, or the science of motion considered in itself, and on those of dynamatics, or the science of the relations between motion and force.

"Pure mechanism is the name which has been given to the cinematical part of the theory of machines, or that which takes into consideration their action in transmitting and modifying motion only, without regard to the force which is at the same time transmitted. As examples of its application may be cited parallel motion, the arrangement and proportioning of wheels, and the correct shaping of their teeth. The science of pure mechanism has of late been brought to a very complete state, and reduced entirely to the consequences of one general principle.

"The dynamical part of the theory of machines considers them as transmitting at once both motion and force, or performing *work*. It treats of the resistances, whether from solids or fluids, which impede the action of machines, the means of regulating that action, and the nature of the sources of motive-power, whether animal strength, the gravitation of water, the currents of the air, or the mechanical action of heat. The entire theory of the work of machines is founded on one principle, that of the *conservation of energy*.

"Machines have further to be considered with reference to their strength, or capacity for sustaining without injury the forces which they transmit.

"The term *civil engineering* is applied to a wide and somewhat indefinite range of subjects, but it may be defined as embracing those applications of mechanics, and of the arts of construction generally, which belong to lines of transport for goods and passengers, whether roads, railways, canals, or navigable rivers; to works for the conveyance of water, whether for drainage or water-supply; to harbors and works for the protection of the coast. All these kinds of works are combinations of structures and machines; they comprise *structures*—in earthwork, as cuttings, embankments, and reservoirs; in masonry, timber, and iron, as bridges, viaducts, aqueducts, locks, basins, piers, and breakwaters; they comprise *machines*—such as carriages and locomotive engines, lock-gates, sluices, and valves, pumping steam-engines, and dredging-machines. Their principles, therefore, consist to a great extent of the general principles of construction and machinery, combined and adapted to suit the circumstances of each kind of work.

"But civil engineering has besides some principles peculiar to itself. It involves the art of laying out lines of transport and selecting the sites for works in the best manner possible with reference to the features of the country, so as to secure economy in execution and working. Hydraulic engineering involves the laws of rainfall and of the supply and the flow of streams; and the engineering of coast-works requires a knowledge of the action of the waves and tides."

In addition to the above, geology and mineralogy, chemistry in so far as it relates to the treatment of metals and of building materials, botany and vegetable physiology with special reference to timber trees, are indicated as departments of science which every engineer would do well to study.

An art or science which makes the mechanical properties of matter serve the ends of man embraces also military engineering, of which the object is the application of these properties to the operations of war. In a technical sense, military engineering is more restricted, and embraces fortification, whether permanent or temporary, and its auxiliaries, such as floating obstructions and torpedoes for harbor defence; the works of attack or defence of fortresses, or, in other words, sieges, both active and passive; the construction and the laying of military bridges; reconnaissances and surveys for military purposes, including the operations of armies in the field; the works of field fortification, whether lines for the holding of extensive areas of the theatre of war, or those transient works (*fortifications improvisées*) by which troops are protected in line of battle; and in general, if we make the distinction which has already been made in another place, it embraces the *constructions* for military purposes as distinguished from warlike *machines*, though perhaps the line is not so sharply drawn as in civil engineering. Military engineering, among all the great military powers of the world at the present day, is made the special subject of study, as distinct from other branches of the art of war; but the exercise of its functions is committed to special military organizations called "corps of engineers," or its equivalent. (For more particular information on this subject consult "The Royal Engineer," by Sir Francis B. Head; Heydt, "Recherches sur l'organisation du Corps du Génie en Europe;" and Allent, "Histoire du Corps du Génie.")

In a more general sense, military engineering embraces also artillery, gunnery, military pyrotechny, transportation, including vehicles, railways (especially their repair and preservation, and the renewal of destroyed bridges in war), and in general all those branches of civil engineering which are involved in the foregoing.

Another great department of engineering science is that which relates to the extraction of metallic ores, coal, and other valuable minerals from the earth. Its general principles are those of civil engineering, but the circumstances under which they are applied impose the necessity of materially modifying the methods. Mining engineering may be said, then, to embrace the methods of underground surveys, which in many respects differ from those on the surface; the proper modes of reconnoitering, reaching, and attacking mineral deposits; drifting galleries, sinking shafts, and timbering and walling the same; the ways and means of interior transportation; methods of hoisting in shafts or slopes; the construction of engines for lifting minerals or miners, and of pumps for the extraction of mine water; and, finally, the proper ventilation of underground works. It describes the miner's methods of attack in detail, the dangers which he has to encounter, and his means of precaution and defence; and further treats of the mechanical preparation or milling of ores, and of those constructions in the open air which are part of the plant of a mine, but which are operations referable to civil engineering and building.

(For more particular information in regard to special branches of engineering science, see Aqueduct, Artillery, Breakwater, Bridge, Dock, Dynamics, Fortification, Gunnery, Harbor, Hydro-dynamics, Jetty, Lighthouse, Machinery, Mensuration, Mining, Navigation (Inland), Ocean Navigation, Railway, Road, Shipbuilding, Thermo-dynamics, Tunnel.)

J. G. Barnard, U. S. A.

Engineers, Corps of. Among all modern nations assuming to be military powers, the engineering service is organized into separate corps (see Engineering), and for the training of *éleves* for service in them, special military schools are generally provided. (For information as to the organization of these corps see Heydt, "Recherches sur l'organisation du Corps du Génie en Europe.") In the U. S. the existing Corps of Engineers owes its origin to the act of Congress of Mar. 16, 1802, by which the President was authorized to organize and establish a Corps of Engineers, which was (ultimately) to consist of 1 colonel, 1 lieutenant-colonel, 2 majors, 4 captains, 4 first lieutenants, 4 second lieutenants, and a limited number of cadets (*i. e.* the *total* number not to exceed 20); and it was further provided, that the said corps, when so organized, shall be stationed at West Point in the State of New York, and shall constitute a Military Academy; and the engineers, assistant engineers, and the cadets of the said corps shall be subject at all times to do duty in such places and on such service as the President of the U. S. shall direct. Thus, by their common organic law the Corps of Engineers and the Military Academy were *identical*. The 63d Article of War (April 10, 1806) says: "The functions of the engineers being generally confined to the most elevated branch of military science, they are not to assume, nor are they subject to be ordered on, any duty beyond the line of their immediate profession, except by the special order of the President of the U. S.," etc.

Most of the officers of the newly-created Corps were soon called to duties along the seaboard in constructing our for-

tifications, while, as the wants of the service and of the Academy have become more clearly recognized, the number of cadets has been increased, to supply not only the Engineers and Artillery, but officers of all arms of the service; and the various professorships and departments of instruction now existing have been established at the Academy.

In 1838 (July 5) the Corps was increased to number forty-seven officers, and at the same time a corps of Topographical Engineers of about the same number (engineers under the designation having been before authorized) was organized. In 1846 (May 15) a company of "sappers, miners, and pontoneers" was authorized to be "attached to and compose a part of the Corps of Engineers, and be officered by officers of that corps, as at present organized; they shall be instructed in and perform all the duties of sappers, miners, and pontoneers, and shall aid in giving practical instructions in these branches at the Military Academy," etc. With some slight changes these corps were thus constituted at the commencement of the civil war. In 1861 three additional companies of engineer soldiers were authorized by Congress, which, with that already existing, were styled the "battalion of engineers;" and a company was also organized for the Corps of Topographical Engineers. In 1863 the latter corps was abolished, and its officers merged with the Corps of Engineers, the organization of which, as confirmed by the peace establishment of 1866, is one Chief of Engineers, with the rank, pay, and emoluments of a brigadier-general; six colonels, twelve lieutenant-colonels, twenty-four majors, thirty captains, and twenty-six first and ten second lieutenants. Under this organization the Corps of Engineers, embracing its commissioned officers and companies of sappers, miners, and pontoneers, constitutes a special arm of the service, and is charged with all duties relating to the selection, purchase, and survey of the sites, and the plan, construction, and repair of all fortifications, whether permanent or temporary, and their care when not garrisoned; with all channel and river obstructions, including torpedoes, required for coast defence; with all works for the attack and defence of places; with all fixed and movable bridges for the passage of rivers; with all lines, redoubts, intrenched camps, bridge-heads, etc. required for the movements and operations of armies in the field; and with making such reconnaissances and surveys as may be required for these objects. It is also charged with the survey, plan, and construction of harbor and river improvements; with military and geographical explorations, reconnaissances, and surveys, including the geodetic survey of the lakes; and with all engineer duties, confided to other departments than that of war, which may be specially assigned to the corps by acts of Congress or orders of the President of the United States.

By act of Congress of July 12, 1866, the Superintendency of the Military Academy, which had still been confined to the corps, was opened to all arms of the service; and at that date the intimate connection between the academy and the corps with which it was originally identified may be said to have terminated. The Corps of Engineers may truthfully be said to have made a record worthy of its title. As the Military Academy, it has been the "nursing father" of the U. S. army. Among its chiefs and superintendents we find in Williams, Swift, Armistead, Macomb, Totten, Thayer, etc. names identified with our military history, and conspicuous for their services in the field as well as in peace. During the Mexican war its officers rendered conspicuous services, recognized and mentioned by Generals Scott and Taylor, while in our civil war the names of Meade, McClellan, Halleck, McPherson (killed), Humphreys, Rosecrans, Meigs, Gillmore, Cullum, Benham, Warren, Woodbury, Tower, Wright, Newton, Alexander, Foster, Morton (killed), Franklin, W. F. Smith, Michler, Parke, Abbot, Poe, Duane, Comstock, Weitzel, Reese, Babcock, Cross (killed), O'Rorke (killed), John R. Meigs (killed), Michie, etc. stood conspicuous; and some of the ablest of the Confederate officers, Lee, Beauregard, J. E. Johnston, etc., had been officers of the corps. In its services to science it claims the Academy, the *great* superintendent of which, Sylvanus Thayer (recently deceased), is with justice styled the "father of the Military Academy." The names of Bache, Bailey, Davies, Bartlett, Church, Mahan, Webster, Mitchell, Norton, F. H. Smith, Ewell, etc. are evidences of its influences upon science and educational institutions. In the development of the country by works of civil engineering it has had no insignificant share, and the names of J. G. Swift, Long, McNeill, W. H. Swift, Totten, Abert, Douglass, Turnbull, etc. are among those of the fathers of American engineering. Finally, in its own peculiar sphere, the devising and constructing of our great system of sea-coast defences (of which it may be said to be the first to lay down principles, as distinct from those of the somewhat pedantic art of "fortification" of the text-books), and in its numerous works of harbor and river improvement and in the Delaware Breakwater, it has erected enduring monuments of its services.

J. G. Barnard, U. S. A.

Engineers in the U. S. Navy are non-combatant commissioned officers who have charge of the machinery of steam vessels. Engineers are not only required to be practically acquainted with the management of nautical steam-machinery, but they must be good mechanics, capable of superintending necessary repairs; and they are further required to have acquaintance with the physical properties and powers of steam, and with the collateral departments of science. There are first and second assistant engineers, who are also commissioned officers.

England [Lat. *Anglia;* Fr. *Angleterre;* Ger. *England*], the southern and larger division of the island of Great Britain, and the principal member of the United Kingdom of Great Britain and Ireland. All that belongs to the United Kingdom at large, its geography and statistics, as well as its history from the time when the permanent union of Scotland with England and Ireland united the three countries into one empire, will be treated of under the head of Great Britain, while in this article we shall confine ourselves to what is peculiar to England and to its history up to the time of the union.

England is bounded on the N. by Scotland, E. by the German Ocean, S. by the Straits of Dover and the English Channel, S. W. by the Atlantic, and W. by St. George's Channel and the Irish Sea. It is situated between lat. 49° 57′ 30″ and 55° 47′ N., and lon. 1° 46′ E. and 5° 41′ W., the greatest length N. and S. being 400 miles, and the greatest breadth 280 miles. In shape it resembles a triangle, of which Berwick may be considered the apex, and a line from the Land's End to the North Foreland the base. The sea-coast, if measured from one headland to another, is about 1200 miles; if the principal indentations are followed, about 2000 miles. The area amounts to 58,320 square miles, of which 7397.6 belong to Wales and 50,922.4 to England proper. Taken by themselves, England and Wales are more densely populated than any other European country except Belgium, the average population of a square mile amounting to 389. Since the beginning of the present century the population has increased about 150 per cent. It amounted in 1801 to 8,892,536, in 1831 to 13,896,797, and in 1871 to 22,704,108. Since the days of the great Alfred the country has been divided into counties or shires, and these again generally into hundreds, and always into parishes. The northern counties are divided into wards, instead of hundreds; Kent and Lincoln, into lathes and sokes; and York, into ridings, each of which is regarded as a county by itself. The following table exhibits the area in statute acres (640 acres = 1 square mile) and the population of each of the fifty-two counties at the date of the census of 1871:

England.			England.		
Counties or Shires.	Acres.	Pop. in 1871.	Counties or Shires.	Acres.	Pop. in 1871.
Bedford.....	295,582	146,256	Suffolk.....	947,681	348,479
Berks.....	451,210	196,445	Surrey.....	478,792	1,090,270
Buck'gham.	466,932	175,870	Sussex.....	936,911	417,407
Cambridge.	525,182	186,363	Warwick ...	563,946	633,902
Chester.....	707,078	561,131	Westmore-land.....	485,432	65,005
Cornwall....	873,600	362,098	Wilts.....	865,092	257,202
Cumb'land.	1,001,273	220,245	Worcester...	472,165	338,848
Derby.....	658,803	380,538	York (East		
Devon.....	1,657,180	600,814	Riding)	768,419	269,505
Dorset.....	632,025	195,544	" (City)	2,720	43,796
Durham	622,476	685,045	" (North		
Essex.....	1,060,549	466,427	Riding)	1,350,121	291,589
Gloucester..	805,102	534,320	" (West		
Hereford.....	534,823	125,364	Riding)	1,709,307	1,831,223
Hertford....	391,141	192,725	Tot. of Eng..	32,590,397	21,487,688
Hunt'gdon..	229,544	63,672			
Kent.	1,039,419	847,507	Wales.		
Lancaster...	1,219,221	2,318,904			
Leicester....	514,164	268,764	Anglesey. ...	193,453	50,919
Lincoln.....	1,775,457	436,163	Brecon.....	460,158	59,904
Middlesex...	180,136	2,538,882	Cardigan	443,387	73,488
Monmouth.	368,399	195,391	Carmarthen	606,331	116,944
Norfolk.....	1,354,301	438,511	Carnarvon..	370,273	106,122
N'thampton	630,358	243,896	Denbigh.....	386,052	104,266
Northum-berland....	1,249,299	386,959	Flint.....	184,905	76,245
Nottingham	526,076	319,956	Glamorgan.	547,494	396,010
Oxford.....	472,717	177,956	Merioneth...	385,291	47,369
Rutland.....	95,805	22,070	M'tgomery..	483,323	67,789
Salop.....	826,055	248,064	Pembroke...	401,691	91,936
Somerset.....	1,047,220	463,412	Radnor	272,128	25,428
S'thampton.	1,070,216	543,837	Total Wales	4,734,486	1,216,420
Stafford.....	728,468	857,333			
Total of England and Wales.....				37,324,883	22,704,108

During the last twenty years the urban districts have grown much more rapidly in population than the country districts; and while in 1851 the population of 141 districts and 57 sub-districts, which included the chief towns, was 9,155,964 to 8,771,645 of the rural districts, which contained the small towns and the rural parishes, the population of the former had in 1871 risen to 12,900,297, against only

9,803,811 of the latter. No country of Europe has so large a number of populous cities as England. London, with its more than 3,000,000 inhabitants, contains one-fourth of the entire urban population of the country, which, besides, had in 1871 eleven other towns with a population of upwards of 100,000 inhabitants—namely, Liverpool, Manchester, Birmingham, Leeds, Sheffield, Bristol, Bradford, Newcastle-on-Tyne, Salford, Hull, and Portsmouth. The number of births in 1871 was 797,143; of deaths, 515,000; of marriages, 190,000. The proportion of male to female children born is as 104,811 to 100,000; the equilibrium between the sexes is restored about the tenth year of life, and is finally changed, by emigration, war, and perilous male occupations, to the extent that there are in all about 100,000 women to 95,000 men in England and Wales.

England and Wales have their own State Church, which is different from the State Church of Scotland, while Ireland at present has no State Church at all. The sovereign of England is by law the supreme governor of the Church of England, possessing the right to nominate or to appoint to the vacant archbishoprics and bishoprics. The Church has in England 2 archbishops, 26 bishops, and about 12,000 parishes. No information concerning the membership of the Church of England, or any other religious denomination of England, is given in the official censuses of 1861 and 1871. The estimates of the population connected with the Established Church differ from 12,700,000 (MARTIN, "Statesman's Manual" for 1873) to 17,781,000 (RAVENSTEIN, "Denominational Statistics of England and Wales," London, 1870). The number of Roman Catholics is estimated at from 2,000,000 (Martin) to 1,058,000 (Ravenstein). The entire number of sects having places registered for the performance of divine worship was, on Oct. 1, 1872, 125, and the entire number of registered places of worship, 18,996.

History.—England was undoubtedly known to the Phœnicians, Carthaginians, and Massilians, all of whom are supposed to have traded with it; but its real history does not begin until the establishment of the Roman rule by Cæsar in 55 B. C. The rule of the Romans, who called the present island of Great Britain *Britannia*, lasted till the beginning of the fifth century, when they withdrew. (See BRITANNIA.) In consequence of the inroads of the Picts and Scots from the north, and the quarrels of the British chiefs among themselves, the country appears to have soon become a prey to complete anarchy. A British prince of Kent, Vortigern (Gwrtheyrn), is said to have been the first to secure the aid of two Saxon chiefs, commonly called Hengist and Horsa, in his struggles against the northern invaders. The statements as to the first appearance of the Saxons in England are conflicting and untrustworthy, and even the names of their leaders are considered by some historians as fabulous. Certain it is, that in the course of about 130 years the Saxons, Jutes, and Angles completed the conquest of the greater part of England, establishing three Saxon kingdoms (Sussex, Wessex, and Essex), one Jutish (Kent), and four Anglian (Bernicia, Deira, East Anglia, and Mercia). The British maintained for a somewhat longer period five states (Strath-Clyde, Cumbria, North and South Wales, and Cornwall). Egbert, king of Wessex, is commonly believed to have become about 830 the first king of all England. During his reign the invasions of the Danes began, who for a period of twenty-four years (1017–41) became masters of the kingdom. In 1041 the crown again devolved on an Anglo-Saxon prince, Edward the Confessor, but his authority was little more than nominal, six powerful earls, Danes and English, dividing the country between them. At his death, in 1066, Harold, earl of Wessex, seized the throne by force, but in the decisive battle of Hastings (Oct. 14, 1066) against another claimant to the throne, William, duke of Normandy, he was defeated and killed. With the reign of William, surnamed "the Conqueror," a new era of English history begins. The lands were divided into 60,000 knights' fees or estates among the followers of the Conqueror as feudal lords, and thus on the solid basis of extensive landed estates the firm foundation was laid of a powerful aristocracy, which amidst the social revolutions of centuries has more successfully defended its ascendency than that of any other country of Europe. The population of England at this time appears to have been from 2,000,000 to 3,000,000, and about 100 boroughs were governed by municipal customs or under the protection of the kings, nobles, or prelates, from whom in after times they purchased their franchises. In the course of time the distinction between the Norman conquerors and the conquered Saxons passed away, and from their union arose the English people as it now exists. The Norman line gave to England only three kings—William I. and his two sons, William II. and Henry I. The death of the latter in 1135 was followed by a war of succession between Stephen of Blois, his nephew, and his only daughter, Matilda, who was married to Geoffrey of Anjou. In 1155 the son of Matilda, Henry II., was generally recognized as king of England. He was the founder of the house of Plantagenet, which in direct line ruled in England until 1485. Henry possessed, besides England, the provinces of Anjou, Touraine, and Maine in France, to which he added Guienne and Poitou by marriage and Brittany by conquest. He conquered Ireland in 1171, and by the Constitutions of Clarendon in 1164 curtailed the privileges of the Church, but was forced, in consequence of the assassination of Archbishop Becket, to make his peace with the Church. He was in 1189 succeeded by his eldest son, Richard I. ("Cœur de Lion"), who distinguished himself in the Crusades, but could not prevent the nobility from increasing their power at the expense of the crown. The reign of his younger brother, John ("Lackland," 1199–1216), is one of the most inglorious in the English annals. He lost nearly all the possessions of the English sovereigns in France, and in 1213 consented to hold the English crown as a gift from Rome. His weakness, however, had some good results for the people of England. The separation of the Normans of England from those of France hastened the consolidation of the English nation; and when involved in disputes with the pope, he had to conciliate the barons, who were backed by the people, by the concession of the celebrated Great Charter (*Magna Charta*), signed at Runnymede in 1215. The charter secured to the English people, in advance of any other people of Europe, two great rights—that no man should suffer arbitrary imprisonment, and that no tax should be imposed without the consent of the council of the nation. When John showed an unwillingness to carry out some of his promises, the barons called Louis of France (son of the king, Philip Augustus) to their aid, who conquered a large portion of the country, but was compelled, soon after the death of John (Oct. 17, 1216), to make peace and renounce the project of annexing England to France. But while the national pride of the English people successfully prevented its subjection to France, anarchy rapidly increased during the reign of John's son, Henry III. (1216–72). As Henry at the death of his father was only a boy of nine years, the government was carried on first by the earl of Pembroke, and after his death by Hubert de Burgh and the bishop of Winchester, neither of whom was able to check the demands of the nobility for greater power. When Henry assumed the government himself, an open war with the barons soon broke out, who extorted from the king an enlargement of the Great Charter, and in 1264 took him and his eldest son, Edward, captives. The next year the first English Parliament was convened by the leader of the rebels, the earl of Leicester; but soon Prince Edward, who had been set free, broke the power of the barons in the battle of Evesham, in which the earl of Leicester fell, and restored the authority of the king. Henry deemed it, however, best to pursue a conciliatory policy, and in particular to confirm the Great Charter. Edward I. (1272–1307) had sufficient energy and statesmanship to put an end to the confusion into which the country in the latter years of his father's reign seemed to relapse, and considerably promoted the consolidation of the kingdom. He conquered in 1283 the last prince of Wales, and united this country, which thus far had been semi-independent, for ever with England, conferring on his eldest son the title of prince of Wales, which has ever since been borne by the eldest son of the English sovereign. He obtained a decisive victory over Scotland in the battle of Falkirk (1299), but under the leadership of Wallace, Comyn, Fraser, and Bruce the Scotch saved their independence. In a war with France the last English possession on the Continent, Guienne, was lost, but it was restored through the mediation of the pope. For the development of the English constitution his reign was of the greatest importance, as the council of the realm assumed a form resembling that of the modern Parliament by the separation of the greater barons from the tenants in chief, the latter ceasing to be summoned to Parliament, and being present only through their representatives. The first sitting of the Commons in a separate chamber took place in 1295, and in the following year the famous statute was passed that no manner of tax should be imposed without the common consent of the bishops, barons, and burgesses of the realm. Edward II. (1307–27) lost the footing which his father had gained in Scotland, and was finally dethroned by the prelates and nobles, who assumed the power of a Parliament. The reign of his son, Edward III. (1327–77), is regarded as one of the most brilliant periods of English history. His claim to the throne of France involved him in a war which, with few interruptions, lasted from 1337 to 1374, and which, notwithstanding the brilliant English victories of Cressy (1346) and Poitiers (1364), finally led to the surrender by the English king of all the English possessions in France, except Bordeaux, Bayonne, Calais, and a district of Gascony. The great expenditures required by the

war made the king dependent on his Parliament, which henceforth was directed by statute to be summoned annually. Another important result of the war was the entire fusion of the Normans and Saxons into the English nationality. The spirit of chivalry attained at the court of Edward its highest point of exaltation, but on the other hand the laboring-classes made their power felt for the first time; for as their service had become more valuable in consequence of the terrible ravages of the great pestilence in 1349, they demanded and received higher wages, and a series of despotic edicts ordering them to work at the former wages proved entirely inefficient. During the reign of Edward, Wycliffe began (about 1360) his attacks upon the abuses in the Church, and he was supported by Edward's fourth son, John of Gaunt, and by some of the principal nobility. As the king's eldest son, Edward, prince of Wales, known as the "Black Prince," died one year before his father (1376), the latter was succeeded by his grandson, Richard II. (1377–99), during whose weak reign an attempt to enforce the tyrannical labor laws brought on the famous rebellion of the peasantry under Wat Tyler, which, though suppressed with much bloodshed, relaxed the servitude of the peasantry. Richard was dethroned by his cousin Henry, duke of Lancaster, who ascended the throne as Henry IV. (1399–1413). His reign, which was greatly disturbed by rebellions and conspiracies, is remarkable for two events in the history of the English constitution—the fixing by statute of the parliamentary right of election for counties in all freeholders (afterwards restrained under Henry VI. to those who were worth forty shillings per annum), and the recognition of the two houses as bodies possessing distinct privileges, not to be interfered with by each other. The religious reformation of Wycliffe found in Henry a determined opponent, the act for the punishment of heretics under which so many atrocities were committed for nearly two hundred years being passed during his reign (1401). His son, Henry V. (1413–22), put down the religious movement of the Lollards with a strong hand, and renewed the claims of his ancestors to France. The new war between the two countries was favorable to England; Henry entered Paris, and on his death a large portion of France recognized, with England, his son, Henry VI. (1422–61), then only a boy of nine months, as king. After many campaigns the French were, however, ultimately successful, the exploits of Joan of Arc, Count Dunois, and other French leaders putting for ever an end to the English attempts to conquer France. Soon after that terrible civil war known as the war of the Red and White Roses began (see Roses, Red and White), Richard, duke of York, a descendant of the duke of Clarence, third son of Edward III., claimed a title to the throne preferable to that of King Henry, on the ground that the latter was only a descendent of the fourth son of Edward III., and that the pretensions of the king's grandfather, Henry IV., to be descendant from Edward, earl of Lancaster, according to popular tradition the eldest son of Henry III., and excluded from the succession on account of deformity, were apocryphal. Richard, duke of York, fell in the battle of Wakefield, Dec. 30, 1460, leaving his claims to his eldest son, Edward, the earl of March, a youth of nineteen, who was proclaimed king as Edward IV. in 1461, and maintained himself until his death (1483), with a short interruption (1470–71), when the rebellion of the earl of Warwick, formerly the most prominent among his supporters, compelled him to flee to Holland, and restored for the time Henry VI. The son of Edward (Edward V.), a minor, was after a reign of only thirteen days dethroned by his uncle, the duke of Gloucester, placed in confinement, and soon disappeared. The usurper made himself king under the name of Richard III. (1483–85), but soon a coalition of disaffected Yorkists and of the Lancastrians was formed against him, at the head of whom was Henry Tudor, earl of Richmond, who through his mother descended from the House of Lancaster, and to satisfy the Yorkists was to marry Elizabeth, the eldest daughter of Edward IV. In the decisive battle of Bosworth Field, in 1485, Richard lost his crown and his life, and Tudor ascended the throne as Henry VII. With him a new era begins in English history. The first years of Henry (1485–1509) were greatly disturbed by pretenders to the throne, who, personating the head of the House of York, claimed to be the legitimate heirs to the crown. But the chief feature of his reign is the large increase of the royal power at the expense of the high nobility and the Parliament. Many of the principal nobles having perished in the wars of the Roses, Henry succeeded in enforcing against the barons the laws forbidding them to give badges and liveries and to employ retainers. The change thus produced in the relation of the nobility to royalty became still greater from the fact that the former began to value money-payments from their tenants and dependants higher than personal services, while the lower classes of the people began to understand that hereafter they had to support themselves and to respect the laws, instead of looking to the nobility for support and for impunity in case they had committed lawless acts. The great event in the reign of his son, Henry VIII. (1509–47), was the separation of the Church of England from Rome. Henry was a violent opponent of Luther and the German Reformation, but when the pope refused to grant him a divorce from his wife, Catharine of Aragon, he renounced his communion with the pope and assumed the title of the Head of the Church. (See England, Church of.) His only son, Edward VI. (1547–53), succeeded at the age of nine years, and the country thenceforth was governed by a council of regency favorable to the Reformation, which now advanced from questions of government to questions of doctrines. The duke of Northumberland, who had caused one of his sons to marry Lady Jane Grey, great-granddaughter of Henry VII., caused Edward to bequeath the crown to his daughter-in-law; but the reign of Lady Jane lasted only ten days, when Mary (1553–58), the daughter of Henry VIII. and his first wife, Catharine of Aragon, ascended the throne. Mary was a devout Catholic, who obtained the consent of her Parliament to repeal (1553) the legislation of Edward VI. and that (1555) of Henry VIII., thus re-establishing the papal authority. When the chiefs of the Protestant party opposed the counter-reformation more than 200 of them suffered at the stake. Her marriage with Philip II. of Spain did not, however, save to the Catholic Church its ascendency in England, for Mary died in 1558 without issue, and on the other hand it cost England the last possession in France, Calais, which was taken by the duke of Guise. Mary was succeeded by her half-sister, Elizabeth (1558–1603), the daughter of Henry VIII. by his second wife, Anne Boleyn, who was strongly opposed to the supremacy of the pope, by whom she had been declared to be a bastard. Parliament in 1559 restored the royal supremacy of the Church, which, by the adjustment of the Prayer-Book and the Thirty-nine Articles, substantially received the form in which it still exists. The power of the Roman Catholics in England was completely broken; and when most of them embraced the cause of Mary, queen of Scotland, who, on seeking an asylum in England, had been imprisoned, Elizabeth ordered Mary to be executed. Abroad, she aided the Protestants of France and the Netherlands, and the crushing defeat of the Spaniards, whose Armada was destroyed in 1588, elevated England to a higher position among the countries of Europe than she ever had had before. Ireland was reduced to a state of entire submission, and the commerce and naval power of the country received a wonderful impulse by the establishment of commercial intercourse with India. Elizabeth was the last sovereign of the House of Tudor; she was succeeded by James VI., the son of the unfortunate Mary. Thus England, Scotland, and Ireland became united under one sovereign; and although the legislative union with Scotland was not consummated until 1707, and that of Ireland not until 1800, the three countries were, in fact, one empire, whose subsequent history we treat of in the article Great Britain.

Chronological Table of the Sovereigns of England from the Conquest to James I.

Kings and Queens.	Reigned.	Age.
Norman Line.		
William the Conqueror	1066–1087	60
William Rufus	1087–1100	43
Henry I	1100–1135	67
Stephen of Blois	1135–1154	49
House of Plantagenet.		
Henry II	1154–1189	55
Richard I	1189–1199	43
John	1199–1216	60
Henry III	1216–1272	65
Edward I	1272–1307	67
Edward II	1307–1327	43
Edward III	1327–1377	65
Richard II	1377–1399	33
House of Lancaster.		
Henry IV	1399–1413	46
Henry V	1413–1422	33
Henry VI	1422–1461	49
House of York.		
Edward IV	1461–1483	41
Edward V	1483–1483	12
Richard III	1483–1485	42
House of Tudor.		
Henry VII	1485–1509	52
Henry VIII	1509–1547	55
Edward VI	1547–1553	15
Queen Mary	1553–1558	42
Queen Elizabeth	1558–1603	69
House of Stuart.		
James I	1603–1625	59

A. J. Schem.

Genealogical Table of the Kings of England, from Egbert to James I.

SAXON LINE.

Egbert (first king of England), king, 827, d. 836.
- Ethelwolf, king, 836, d. 857.
  - Ethelbald, king, 858, d. 860.
  - Ethelbert, king, 860, d. 866.
  - Ethelred I., king, 866, d. 871.
  - Alfred the Great, king, 871, d. 900.
    - Edward the Elder, king, 900, d. 925.
      - Athelstane, king, 925, d. 941.
      - Edmund I., king, 941, d. 946.
        - Edwy, king, 955, d. 957.
        - Edgar, king, 957, d. 975.
          - Edward the Martyr, king, 975, d. 978.
          - Ethelred II., king, 978, d. 1016.
            - Edmund II. (Ironside), king, 1016, d. 1017.
            - Edward the Confessor, king, 1041, d. 1066.
      - Edred, king, 946, d. 955.
      - Thyra, married Gormon, king of Denmark.
        - Harold, king of Denmark, d. 985.
          - Sweyne, king, 1013, d. 1014.
            - Canute the Great, king, 1017, d. 1041.
              - Hardicanute, king, 1039, d. 1041.
              - Harold I., king, 1036, d. 1039.

Godwin, duke of Kent.
- Harold II., king, 1066, d. 1066.

NORMAN LINE.

William I. (the Conqueror), king in 1066, died 1087.
- William II., king, 1087, d. 1100.
- Adele, married in 1081 Stephen, count of Blois.
  - Stephen of Blois, king, 1135, d. 1154.
- Henry I., king, 1100, d. 1135.
  - Matilda, married to Geoffrey of Plantagenet, count of Anjou.
    - Henry II., king, 1155, d. 1189.

HOUSE OF ANJOU.

- Richard (Cœur de Lion), king, 1189, d. 1199.
- John (Lackland), king, 1199, d. 1216.
  - Henry III., king, 1216, d. 1272.
    - Edward I., king, 1272, d. 1307.
      - Edward II., king, 1307, d. 1327.
        - Edward III., king, 1327, d. 1377.
    - Edmund, count of Lancaster, d. 1296.
      - Henry, count of Lancaster, d. 1345.
        - Henry, duke of Lancaster, d. 1361.
          - Blanche, d. 1369; married John of Gaunt, fourth son of Edward III.

HOUSE OF LANCASTER (Red Rose).

- Edward, prince of Wales (the Black Prince), d. 1376.
  - Richard II., king, 1377, d. 1399.
- Lionel, duke of Clarence.
  - Philippina of Clarence, married Edmund Mortimer.
    - Roger Mortimer, declared heir to the crown in 1385, d. 1399.
      - Anne Mortimer, married Richard of York, count of Cambridge.
- John of Gaunt, duke of Lancaster, d. 1399.
  - Henry IV., king, 1399, d. 1413.
    - Henry V., king, 1413, d. 1422.
      - Henry VI., king, 1422, deposed 1461, d. 1472.
  - John Beaufort, count of Somerset, d. 1410.
    - John Beaufort, count of Somerset, d. 1444.
      - Margaret, d. 1509; married Edmund Tudor.

HOUSE OF YORK (White Rose).

- Edmund Langley, duke of York, d. 1402.
  - Richard of York, count of Cambridge, d. 1415; married Anne Mortimer.
    - Richard, duke of York.
      - Edward IV., king, 1461, d. 1483.
        - Edward V., king, 1483, d. 1483.
      - Richard III., king, 1483, d. 1485.
        - Elizabeth, married Henry VII.

HOUSE OF TUDOR.

- Henry VII., king, 1485, d. 1509; married Elizabeth of York, daughter of Edward IV.
  - Henry VIII., king, 1509, d. 1547.
    - Mary (Bloody), queen, 1553, d. 1558.
    - Elizabeth, queen, 1558, d. 1603.
    - Edward VI., king, 1547, d. 1553.

HOUSE OF STUART.

- Margaret, married James IV. of Scotland.
  - James V., king of Scotland, d. 1547.
    - Mary Stuart, queen of Scotland, d. 1587.
      - James I., king of Great Britain, 1603, d. 1625.

England, Church of, that portion of the Christian Church which has existed in England since the time of Saint Augustine (A. D. 597). The title is also sometimes given to the English Church with reference only to the period since the Reformation, but with no great accuracy, since the Church of England, like the other national churches of Europe, is, both in law and fact, a continuous body. Christianity was introduced into England, if not in the days of the apostles, at least very soon after them; and it speedily made its way even beyond the limits of the Roman settlements. The abandonment of Britain by the Romans, the invasion of the Saxons, and the consequent neglect or persecution of the native Christians, gave a serious check to the progress of the infant Church, and in the sixth century its influence was limited to the northern parts of the island, whither many of the Britons had retired to escape from the invaders. The mission of Augustine, however, was strictly to the heathen Saxons. Pope Gregory the Great had contemplated undertaking this mission in person, but upon his elevation to the papal throne had been compelled to abandon his design. Augustine (or Austin), prior of St. Andrew's monastery at Rome, was selected as his substitute. After a brief delay in France, where he was consecrated bishop by Vigilius of Arles, Saint Augustine arrived in Kent in the autumn of 596. His labors were crowned with success. The conversion of the kingdom of Kent was followed by the triumph of Christianity in all the kingdoms of the Heptarchy. The influence of the Italian missionaries, however, did not extend far, if at all, beyond the limits of the kingdom of Kent. The whole northern part of England was converted by British and Irish clergy. There was also, for many years, much jealousy between the native and foreign churchmen, but in process of time the two missions melted into one church; and it has long been customary to date the historical beginning of the Church of England and the succession of its prelates from the foundation of the see of Canterbury by Saint Augustine (A. D. 597).

At that time there was but one Christian Church, and the doctrines of the Church of England were of course the common faith of Christendom. In considering, as will be done presently, the events of the sixteenth century in England, it should be borne in mind that the abuses which were then removed had no existence in the sixth. The primacy of the pope had not then developed into a supremacy, but, as appears from the letters which passed between Gregory the Great and Saint Augustine, the authority of the former was limited to giving advice and counsel. The controversies about image-worship, which gave occasion to the Councils of Nice and Frankfort, did not reach their height until the eighth century. The mediæval teachings of purgatory and pardons were not fully developed until the twelfth, and the growth of the idea of papal supremacy was necessarily kept in check by the Eastern patriarchs until the eleventh. The final impetus was given to its growth by the separation of the Eastern and Western churches, and the general acceptance in the West of the pseudo-Isidorian Decretals.

As time went on these teachings made progress in England, as they did in the rest of Western Europe. As the papal authority took the obnoxious form of claiming a right to confirm the nominations of bishops and to hear appeals, it was met with frequent and vigorous opposition—not only in England, but also in the other kingdoms of Europe. Appeals to Rome had been prohibited in England from a very early period, and a vacancy in an episcocal see was apt to lead to a protracted controversy between the pope and the reigning sovereign, neither of whom was willing to admit the pretensions of the other.

When in the reign of Henry VIII. the Church and Parliament of England resolved to put an end to appeals to Rome, and to the claims of the pontiffs to a right to confirm the nominations of bishops (which, under certain circumstances, had been stretched into a claim to nominate in the first instance), they conceived that they were merely reasserting those ancient rights of the Church of England which, though they had been suffered to fall into disuse, had never been abandoned. This position was taken with great unanimity, and was adhered to consistently by Bishop Gardiner and the national (or, as it might now be called, the old Catholic) party in England. The king was drawn into the violent measures of the dissolution of the monasteries and the spoliation of the Church by other counsellors.

The efforts of the Church of England to regain its ancient liberties were contemporaneous with, though distinct from, the continental Reformation. That event, however, was not without its influence in England; and in the reign of Edward VI. men who sympathized with Luther or Calvin, or even with the teachings of Zuinglius, had gained control over the English Church and nation. Under their influence, indeed, England was becoming rapidly Protestantized; and, in all likelihood, had not their career been cut short by the death of the king, the religious condition of England would have been much the same as that of Switzerland or Scotland.

The accession of Queen Mary led to a violent reaction. The Protestant school of Cranmer and Ridley was forcibly suppressed, and the national party, of which Gardiner was the leader, was compelled to change its ground. The authority of the pope was restored in more than mediæval plenitude. Attempts were made not only to revive the state of things which existed in the early part of the reign of Henry VIII., but actually to destroy the ancient liberties of the Church of England. It is a grave question among historians whether Edward or Mary, both acting doubtless from the most conscientious motives, would, had their reigns been prolonged, have done more serious injury to the Church.

Queen Elizabeth, on coming to the throne, found herself encompassed with difficulties. There were then three schools or parties in the English Church: first, that of Gardiner and his followers, which had changed its ground, and was now disposed to maintain the papal supremacy, with all that it involved; second, that of Parker, which went beyond the former national school in its desire to reform what it believed to be abuses; and third, the Protestants, many of whom had taken refuge in Switzerland during the reign of Mary, and who returned full of admiration of the form of religion which they found established there, and anxious to introduce it into England. The private opinions of the queen, if indeed she had formed any, were not distinctly known, and it was for some time doubtful to which school she would give her influence and approbation. It may seem strange to minds educated in the ideas of the present age that the religious belief of great nations should have been directed or influenced by the private opinions of their sovereigns; but in the sixteenth century, and even later, the Church formed a part of the constitution of the nations of Western Europe. There was no idea that there could be more than one religious society in a nation, and therefore no idea of toleration or religious liberty. The history of England in the sixteenth century is not different from that of other European states. If the civil authority could carry out a reformation of religion in England and Sweden, it could suppress it in France and Spain and Italy.

Thus it was the purpose of any party that might succeed in gaining the favor of the queen to become not merely dominant, but exclusive. Its peculiar views were to be forced on all men. The Protestant (or, as it was soon afterwards called, the Puritan) school speedily put itself out of the question by the fact that its teachings would have led to the destruction of the Church of England, and the establishment of a new form of religion upon the plan adopted at Geneva. Various circumstances tended to alienate the queen from the papal (or, as it began to be styled, the Roman Catholic) party. The haughty discourtesy with which Pope Paul IV. received the information of her accession, which she sent to him in the usual form; the assumption of the title of queen of England by Mary of Scotland, with the great probability that France and Spain would proceed to assert the claims of the Scottish queen by force of arms; and the persistent attitude of opposition to all reforms maintained by the Marian bishops, compelled Elizabeth to put herself in the hands of the national or reforming party, of which Matthew Parker was the acknowledged leader. Like the national party in the reign of Henry VIII., this school was prepared to remove the jurisdiction which the pope had exercised within the realm of England. Like those earlier leaders, it desired to preserve the faith and discipline of the Church unaltered, but it went beyond them in proposing to remove certain abuses of teaching and practice which it conceived had led the people into superstition. These were the use of images, the invocation of the saints, the popular idea of purgatory, and the peculiar definition of the manner of the Real Presence in the blessed sacrament which is known as transubstantiation. These were doubtless developments, but, in the view of the school of thought which became dominant in England, unlawful developments of true doctrines. The Reformers thought that they could trace the progress of variation from the simpler teachings of the earlier Church, and their purpose was to carry back the Church of England, as nearly as possible, to its primitive simplicity. Whether they succeeded or not is a question which need not be now discussed; it will be sufficient to say that they proceeded to carry out their plans with promptitude and vigor. Parker was made archbishop of Canterbury in the place of Pole, who had died almost at the same time as Queen Mary. The majority of the bishops, refusing to co-operate with him, were removed or resigned their sees, and their places were filled by men whom he could trust. Attention was at once given to the reform of the service-books of the Church. Two prayer-books, compiled partly from the old Latin Uses of the Church of

England, had been set forth in 1549 and 1552, but had been suppressed in the reign of Mary. After much deliberation, it was determined to make the second of these the basis of the Prayer-Book, which was henceforth to be in English. The reforms in doctrine to which allusion has been made were indeed carried out, but care was taken to avoid touching any part of the common faith of Christendom. The famous principle of Vincent of Lerins, of universal acceptance as the test of Christian truth, was affirmed, and the authority of general councils was acknowledged. These arrangements received the approbation of Convocation and Parliament. Concessions had been made to both the extreme parties—to the Puritans, in adopting the second instead of the first prayer-book of Edward VI.; to the Roman Catholics, in leaving out certain expressions which were justly obnoxious to them—and it was thought that religious unity would thenceforward prevail in England.

This settlement, the joint work of Convocation and Parliament, was accepted by the great body of the nation; and, since all men continued to frequent the parish churches for about ten years, it was hoped that the unity of the English Church would continue unbroken. In 1570, however, after the excommunication of Queen Elizabeth by Pius V., the party afterwards called Roman Catholics, acting under the direction of the pope, separated from the Church. In those ages politics and religion were so singularly intermingled in Western Europe that any religious agitation commonly involved plots and treasons against the state, and sometimes open war. In this respect England was no better nor worse than other countries; and in this condition of affairs the true motive is to be found for the stringent laws which were enacted and put in force against "popish recusants." The penal laws, however, were the work of the State rather than of the Church; and they were intended not as a measure of unnecessary persecution, but as a precaution against the plots for the destruction of queen and government, which followed one another in quick succession.

Some of the extreme Protestants followed the example of separation in 1580 under the leadership of Robert Brown, who, however, returned to the Church and died in its communion. They were known at first by the name of Brownists, afterwards as Independents, and finally as Congregationalists. Others remained in the Church and demanded a further reformation, which, however, has never been conceded. The Prayer-Book has indeed been twice reviewed, but the tendency on both occasions has been to bring it into nearer accordance with the first book of Edward VI., which is supposed to have contained the true sentiments of the earlier Reformers.

The remaining history of the Church of England may be passed over briefly. After its suppression during the civil war—the success of which has, by some writers, been attributed to a temporary though secret combination between the extreme sections of its enemies—it was restored in 1660, since which time no change has been made in its doctrine or discipline. The exciting scenes of the sixteenth and seventeenth centuries, the successive attempts to restore the supremacy of the pope, culminating in the ill-advised measures of James II. and the consequent irritation of the people, led, first, to a reaction, and after the revolution of 1688 to a long period of religious indifference. The latter part of the seventeenth century was an age of immorality; the earlier part of the eighteenth was a time of negligence and indifference. Since the middle or early part of the eighteenth century there have been three great religious revivals. The first was that of John and Charles Wesley, both priests of the Church of England, who set themselves to the task of developing personal holiness (the great want of an age of religious indifference and immorality) in the members of their Church. Their labors were crowned with great and immediate success; but, partly by reason of the absence of encouragement from the leaders of the Church, and partly from the impatience of some of their own followers, they failed in accomplishing their designs. The Wesleys themselves lived and died in the communion of the Church, but many of their followers withdrew from it and formed a new body of dissenters.

The second revival was that of the "Evangelicals," as they were called, about 1798, of which such men as the Rev. Charles Simeon and the late Bishop Daniel Wilson were the leaders. The guiding thought in this movement also was the development of personal holiness. The movement was well adapted to the times, and may be regarded as successful while it lasted, but it lacked the elements of permanence. Its weakness lay in neglecting definite dogma, which experience has shown to be essential to any form of religion. The work of these good men, however, is worthy of all reverence. They accomplished a great deal in their generation, and they prepared the way for the revival which is now in progress.

While the aim of the Oxford divines, as they were called, was, equally with the others, the development of personal holiness, they endeavored to avoid the tendency of the first to schism, and of the second either to neglect dogma altogether or to give undue prominence to one or two points of Christian doctrine. Hence, they naturally dwelt much upon the authority of the Church; and their object seems, in their early history (1833–63), to have been simply to teach the Church to carry out in practice the doctrine, discipline, and manner of life which are set forth in the Prayer-Book. Of late years, however, the leaders of this school have given much thought to the relations of the Church of England to the rest of Christendom, and to the question of the restoration of visible unity among Christians. These points are discussed in the "Eirenicon" of the celebrated Dr. Pusey. Hence, much attention has been given to the study of church history, and the history of the English Church may be said to have been re-written within the last thirty years.

Both these schools still exist, and are commonly known as Low Church and High Church. The former claims, and no doubt justly, to be the representative of the Protestant or Puritan part of the Church in the reign of Elizabeth; the latter, of the Catholic or national school, which then gained the predominance, and, with the exception of the forty years of the evangelical revival, has always retained it. The peculiar character of the former is its claim to great liberty of private judgment; of the latter, its deference to authority. With the exception of a small party which has lately arisen, of which Dean Stanley is one of the leaders, and which is somewhat eclectic in its teachings, these two great historical schools may be regarded as comprising the whole Church of England.

The discipline of the Church of England has continued unchanged for many centuries. The bishoprics, with the addition of two or three which were created by Henry VIII., and those of Ripon and Manchester, erected within the present century, still remain in their ancient seats; and the succession of the bishops, of whom lists are extant, is traced in them to the sixth or seventh century. England and Wales are divided into two provinces, under the archbishops of Canterbury and York. The former has under him twenty bishops, the latter six. The episcopal incomes amount to £154,200. The population of the province of Canterbury in 1872 was about 15,742,404; of York, 7,174,638. In the former there were 4,374,880 church sittings; in the latter, 1,326,820; making a total of 22,917,042 for the population, and of 5,701,700 for the sittings. The actual church population is about 12,500,000. The system of parishes introduced by Theodore, the seventh archbishop of Canterbury (668–693), still exists. There were in 1872 12,837 parish priests and 6187 curates. The canon law, derived from the acts of successive English councils, still forms the basis of the ecclesiastical system. The revenues of the Church have been estimated at £5,000,000.

The great achievement of the English Church during the present century has been the establishment of the colonial episcopate. This began with the sending of Bishop Heber to Calcutta in 1814; there were in 1872 fifty-four dioceses in the English colonies and in missions. There are 1977 clergymen, and the income of the bishops is about £53,718. The amount raised in England for missions in 1871 by the members of the Church alone was £324,782, most of which was expended in the colonies. The total amount of British contributions for foreign missions in the same year (including those of nonconformists and of Scotch and Irish societies) was £855,742.

From time immemorial the archbishop of Canterbury has been held to be entitled to the dignity, though he has never borne the name, of a patriarch. That this is something more than an empty dignity would seem to be implied by the unanimity with which the late Archbishop Longley was accepted as the president of the conference or synod of bishops which sat at Lambeth in 1867, and by the general disposition to consider him as the spiritual head of the Anglican communion. This includes the Church of England (with Wales), of Ireland, the Church in the colonies, and the Episcopal churches in Scotland and in the United States of America. These churches, while they are one in doctrine, regulate their internal affairs for themselves, yet they may meet, as they have done once, in a synod of their bishops when any question of general interest arises. The whole number of episcopal sees and jurisdictions, as at present arranged, is 150, though the actual number of bishops is a little larger.

BEVERLEY R. BETTS, *Lib. of Columbia Coll.*

Eng'land (JOHN), D. D., was born in Cork, Ireland, Sept. 23, 1786. He was educated at Carlow College, and took orders in the Roman Catholic Church in 1808. He was greatly distinguished for his zeal, his benevolence, and his bold championship of Catholic emancipation. He was

also a prominent journalist, and was once fined £500 for his boldness in discussing political questions. In 1820 he became bishop of Charleston, S. C., and there founded the "Catholic Miscellany," the first journal of his Church in America. Died April 11, 1842. His works, in 5 vols. 8vo, appeared in 1849.

En'gles (William Morrison), D. D., was born in Philadelphia Oct. 12, 1797, and graduated at the University of Pennsylvania in 1815. In 1820 he became pastor of the Seventh Presbyterian church in Philadelphia, in 1834 editor of the "Presbyterian," and in 1863 president of the Presbyterian Board of Publication. Died Nov. 27, 1867. He was a man of marked ability and excellence. He published "Records of the Presbyterian Church," a "Bible Dictionary," and other works, chiefly devotional.

Eng'lewood, a post-village of Bergen co., N. J., on the Northern New Jersey R. R., 14 miles N. of New York. It is near the Palisades of the Hudson River, and has one weekly newspaper, four hotels, and a bank.

Englewood, a post-village of Cook co., Ill., at the junction of the Michigan Southern, the Pittsburg Fort Wayne and Chicago, and the Chicago Rock Island and Pacific R. Rs., 7 miles S. of Chicago. It is the site of the county normal school, which has a fine building and is very successful.

Eng'lish, a township of Iowa co., Ia. Pop. 1627.

English, a township of Lucas co., Ia. Pop. 960.

English (Earl), U. S. N., born Feb. 18, 1834, at Burlington, N. J., entered the navy as a midshipman Feb. 25, 1840, became a passed midshipman in 1846, a lieutenant in 1855, a lieutenant-commander in 1862, a commander in 1866, a captain in 1871. He was in the engagement with the Barrier-forts at the entrance to the Canton River, China, in 1856, and during 1862 and 1863 commanded several vessels of the Gulf blockading squadron. In 1864 and 1865 he commanded the steamer Wyalusing of the North Atlantic blockading squadron, and participated, in Oct., 1864, in the capture of Plymouth, N. C. F. A. Parker, U. S. N.

English (James E.), an American statesman, was born at New Haven, Conn., in Mar., 1812. He became a successful merchant and manufacturer, was a Democratic member of Congress (1861–65), and was elected governor of Connecticut in 1868 and 1870.

English (Thomas Dunn), M. D., an American poet and lawyer, born in Philadelphia June 29, 1819. He became a resident of New York City. Among his works is a novel, "Walter Woolfe" (1844), and a volume of poems (1855).

English Channel [Fr. *La Manche*, "the sleeve"], that portion of the Atlantic which separates England from France. It extends on the English side from Dover to Land's End, and on the French from Calais to the island of Ushant. On the E. it communicates with the German Ocean by the Strait of Dover, 21 miles wide, and on the W. it opens into the Atlantic by an entrance 100 miles wide. At its greatest width it is about 150 miles. On the English side off the coast of Hampshire lies the beautiful Isle of Wight. Guernsey, Jersey, and the other Channel Islands are situated off the N. coast of France.

English Harbor (West), a port of entry of Fortune Bay district, Newfoundland, has extensive cod and herring fisheries. Pop. 210.—There are several other fishing-towns of Newfoundland called English Harbor, one of which, a post-village of Trinity district, 7 miles by road and ferry from Trinity, has a pop. of 350.

English Language and Literature. The term "English language" may be briefly defined as the language which was formed in England during the period that elapsed between the Conquest (1066) and the time of Chaucer (about 1360), by a mingling of the elements of the indigenous Anglo-Saxon, Welsh, etc. with those of the newly imported Norman French. The very earliest date which can with any propriety be assigned to the composite language thus formed is about 1200, the date attributed by some critics to what has been called "the earliest known English love-song."* But at this period the English tongue may be said to have been in the crudest possible condition, a century and a half more being required to bring it up to the point at which we find it in the time of Chaucer. Macaulay refers the origin of our language to the "thirteenth century," when King John, through his very follies and vices (by which he lost his dominions in France), may be said to have given to the English nation an independent existence. "Then it was," says Macaulay, "that the great English people was formed, that the national character began to exhibit those peculiarities which it has ever since retained. . . . Then was formed that language, less musical indeed than the languages of the South, but in force, in richness, in aptitude for all the highest purposes of the poet, the philosopher, and the orator, inferior to the tongue of Greece alone." (*History of England*, chap. i.)

Until the time of John, Norman French was not only the language of the court, but of all the cultivated classes. Under him the descendants of the Normans first began to regard England as their country and the Saxon English as their countrymen. Then the Anglo-Saxon and the Norman French, though so utterly different in character, began to assimilate to each other; and this process was continued till a homogeneous compound was formed, constituting a language remarkable indeed for its copiousness and force, but still more remarkable as the basis on which has been erected the richest and grandest literature of modern times.

The English tongue, as we now find it, may be said to be made up of words derived from the following principal sources: 1. From the Celtic, which was the language of the country when it was first invaded by the Romans under Julius Cæsar (55 B. C.), and continued to be the principal language of the island until its conquest by the Saxons about the end of the fifth century. There are comparatively few English words of Celtic origin; among these few, *basket, bog,* and *mattock* may be cited as examples. But the names of several streams and mountains in England, as well as in Scotland, furnish ample evidence, even if we had no other, that people of the Celtic race were once widely diffused over the island of Great Britain. *Ben* or *Beinn,* a Celtic term for "hill" or "mountain" (probably akin to the Welsh *pen,* "head," a prefix of many names in the west and south-west of England), forms a part of several celebrated names of mountains in Scotland, as *Ben Nevis, Ben Lomond, Ben Ledi,* etc. *Pen,* the second syllable of *Apennine,* is supposed to be traceable to the same root.

2. From Teutonic sources, among which the Anglo-Saxon holds by far the most important place. It has not been deemed necessary to attempt here to discriminate between the different branches of the great Teutonic (or Germanic) family, as this could only be done properly in a very extended and elaborate treatise. It would indeed be extremely difficult, if not impossible, to determine in every instance whether an English word is properly derived from the Anglo-Saxon or from some other branch of the same family. Thus, our word "water" may come either from the Anglo-Saxon *wæter* or the Dutch *water,* or from some other nearly related but now forgotten dialect. Again, the English word "father" may be derived from the Anglo-Saxon *fæder* or from the Danish *fader* † (to which it almost exactly corresponds in sound), or possibly from some other source differing from them both. It may be proper to observe that what we call Anglo-Saxon is itself a mixture of various elements, including not merely the dialects spoken by the Angles and Saxons, but also that spoken by the Jutes, who appear to have been the first Germanic nation that established itself in Britain. But as Anglo-Saxon words form probably nine-tenths of the Teutonic portion of our language, the term may be conveniently used, as it often is in common parlance, to designate the whole.

It may be remarked that English words of Teutonic derivation constitute by far the largest and most important part of those employed in ordinary speech, although terms from the Latin and Greek form no inconsiderable proportion of the language used in the higher kinds of composition, and especially in scientific treatises.

3. From the French. This class properly includes those that were introduced at an early period by the Normans, as well as those of a later date. ‡ A large proportion of our words of French derivation are but little changed from the Latin or Greek, from which they have taken their origin. A comparatively few are from the Celtic, the Basque, the Arabic, and other tongues remotely related (if related at all) either to the Latin or to the Germanic languages.

4. From the Latin and Greek. These two languages have been classed together, because, with scarcely an exception, English or French words of Greek origin have come to us through the Latin. This class may properly include not only those directly derived from the Latin, but also all those of French derivation that have undergone no change except in the termination alone; such, for example, as "affection" (Lat. *affectio*), "excite" (Fr. *exciter;* Lat. *excito*), and so on. The convenient term *Romanic* is used in this

*Beginning thus:

"Blow northerne wynd send
Thou me my suetynge, blow,
Northerne wynd, blow, blow, blow.
Ich 'ot a burde in boure bryht
That fully semly is on syht," etc.

† This appears to have been the common, if not universal, English spelling of the English word in Chaucer's time.

‡ Many military terms, and others relating to the arts and sciences, have been introduced into our language from the French at a comparatively recent period.

article as a general appellation to include those words of our tongue that are not of Teutonic origin, but are derived from the French, Latin, or some other language belonging to the south of Europe.

Many of the more common English words of Latin origin coming to us through the French have been more or less modified in the transit, such as "able," formerly written "hable" (Fr. *habile;* Lat. *habilis*), to "ally" (Fr. *allier;* Lat. *alligare*), to "amend," (Fr. *amender;* Lat. *emendare*), etc. But in a very large majority of cases English words derived from the Latin undergo no change in spelling, except in the termination. Thus, English verbs are derived from Latin verbs (1) by simply dropping the *-o* or *-io* of the first person singular of the indicative present, as "append,"* from *appendo,* "assent," from *assentio,* etc.; (2) by changing the final *-o* or *-io* into *e* mute, as "acquire," from *acquiro,* "exclude," from *excludo,* etc.; or (3) from the supine by simply dropping the termination *-um,* as "affect,"† from *afficio,* supine *affectum,* "construct," from *construo, constructum,* etc.

English nouns and adjectives of Latin origin are variously derived: 1. They are often formed by simply dropping the last letter or last two letters of the Latin word, as "pen," from *penna,* "congress," from *congressus.*

The following examples of adjectives may be given: "apt," from *aptus,* "bland," from *blandus,* etc. It should be observed that when the Latin genitive has a consonant not found in the nominative, the English word is usually formed from the genitive by simply dropping the letters which follow such consonant; as "frond," from *frond-is,* the genitive of *frons,* a "leaf" or "foliage;" "front," from *front-is,* the genitive of *frons,* the "forehead;" and so on. It may be remarked that the great multitude of English verbal nouns ending in *-ion* are always derived from the Latin supine, or from the past participle of deponent verbs, by changing the last two letters of those parts into *-ion* (in Lat. *-io*); as "affection," from *affectum* (supine of the verb *afficio*), etc.

2. English nouns and adjectives are very frequently formed by changing the last syllable of the Latin into *e* mute; as "base," from *basis,* "pure," from *purus,* etc.

English nouns from a Latin or Greek word ending in *-ia* (not immediately preceded by *c* or *t*) are usually formed by changing that termination into *y,* as "apoplexy," from the Lat. *apoplexia* (Gr. ἀποπληξία), "dysentery," from the Lat. *dysenteria* (Gr. δυσεντερία), etc. In like manner we have "Italy," from *Italia,* "Sicily," from *Sicilia,* and "Thessaly," from *Thessalia.* But if the termination *-ia* be immediately preceded by *c* or *t,* it is usually replaced in English by *e* mute, and the preceding *t* is changed to *c; e. g. arrogantia* becomes "arrogance," *avaritia,* "avarice," *prudentia,* "prudence," etc. The Latin terminations in *-cium, -tium,* and *-tius* undergo a similar change; thus we have "novice," from *novitius,* "office," from *officium,* etc.

It has already been remarked that words of Teutonic origin constitute by far the largest portion of those used in ordinary speech; and we may add that the simpler the language the more, generally speaking, will this class of words be found to predominate. There are perhaps no finer specimens of pure and simple English than can be found in our common translation of the Bible. Throughout the whole of it the Anglo-Saxon element of our language may be said to abound, though the proportion varies considerably in different parts. For example, the first ten verses of Genesis contain in all 203 words, of which 189 are of Anglo-Saxon, and only 14 of Latin derivation. In the Gospel of Saint John the proportion of the former is still greater; of the 141 words found in the first ten verses of the first chapter, only one (viz. "comprehended" in the fifth verse) is from the Latin. Out of the 249 words (omitting, of course, proper names) in the first ten verses of the Acts, 20 are derived directly or indirectly from the Latin. Of the 186 contained in the first ten verses of Paul's Epistle to the Romans, 26 are from the Latin or Greek; and, though the proportions may vary somewhat in the different chapters, it will be found that in the common English version the writings of Saint Paul contain on an average a considerably larger portion of words from the Latin and Greek than either the Gospel or the Epistles of Saint John. The prose writings of Macaulay may be taken as a fair specimen of good modern English—perspicuous and elegant, indeed, but neither remarkable for plainness and simplicity nor for the opposite qualities. Of the 296 words (omitting names, as before) found in the first paragraph of his "History of England," about 80 are of Latin or French and 216 of Teutonic derivation. An examination of other portions of his "History" gives nearly the same result. This may be considered about a fair average of the relative proportions of the Romanic and Teutonic elements in common English prose. In other words, the Romanic element in ordinary prose constitutes from one-third to one-fourth of the whole. In scientific treatises, however, words from the Latin and Greek often form a much larger proportion of all those employed.

It may be observed that a large proportion of the abstract and verbal nouns in common use in our language are from the Latin, and consequently the English of those authors whose habits of thought lead them to make a frequent use of such nouns usually contains a larger proportion of words of Latin origin than the language of writers who are inclined to view things simply in their external and visible relations; or who, if they seek to teach spiritual or moral truths, make use of similes or allegories having constant reference to visible objects. Of the former class Saint Paul affords a good illustration; of the latter, Saint John and the author of "Pilgrim's Progress" are remarkable examples. Thus, Paul says: "Let all *bitterness* and *wrath* and *anger* and *clamor* and *evil-speaking* be put away from you, with all *malice.*" (Ephesians iv. 31.) Here in one short verse are six abstract nouns. John delights in direct and simple expressions; as, "He that loveth not, knoweth not God;" "If a man say, I love God, and hateth his brother, he is a liar; for he that loveth not his brother whom he hath seen, how can he love God whom he hath not seen?" (1 John iv. 8 and 20.) An image is usually presented to the eye more vividly and forcibly in Anglo-Saxon words than in those from the Latin. Hence, the former are more commonly used when the idea is pleasing or grand, for in such cases it cannot be presented too clearly; but if the idea suggests something unpleasant or offensive, good taste leads us to veil its disagreeable features under a word or phrase of Latin origin. This quality of our language, resulting from its composite character, by which we are enabled either to present an idea in the full light of day or to veil its more offensive features under terms derived from Latin or Greek, is one of no small importance. Another great advantage which we owe to the fact that our language is formed from such widely different elements is, that we have, so to speak, two or more sets of words relating to almost every object and to every idea of the mind, which gives a singular richness and copiousness to our tongue. Thus, we have not only the Anglo-Saxon "help," but the Latin "assist" and the French "aid," all meaning substantially the same thing. Again, we have "building," "edifice," "structure," and "fabric" as general terms for any work that is built or erected, while we possess, besides, a variety of words to denote the particular kind of building, as "temple," "palace," "mansion," "house," "cottage," etc. A multitude of similar examples might be adduced. Among words representing an abstract idea, we have "anger" from the Latin, "choler" from the Greek, and "wrath" from the Anglo-Saxon; again, we have from the Latin, "conception," "cogitation," and "notion;" from the Greek, "idea;" and from the Anglo-Saxon, "thought," and so on.

The Anglo-Saxon element of our language being, as already intimated, particularly adapted to present thoughts and images forcibly and vividly to the mind, words of this class will almost always be found to predominate in poetry far more than in prose. In the 148 words occurring in the first twenty lines of Milton's "Paradise Lost," only about 22—about one-seventh of the entire number—are of Latin origin. Opening again at random in the same poem, we come upon the famous address of Satan to the sun (in the fourth book). Out of the 163 words found in the first twenty lines of this address, 19 only are of Romanic origin—less than one-eighth of the whole; while in Milton's prose words of Latin derivation often constitute one-fourth, or even one-third, of the entire number employed. Although in Macaulay's prose, as already shown, Romanic words constitute between one-fourth and one-third of all those used, in his poetry they amount to probably less than one-tenth of the whole. Take, for example, his story of "Virginia," which has been selected as perhaps the least simple of his lays. In the beautiful passage (of sixteen lines) where Virginia is first introduced to the reader there are in all 185 words, of which only 11—less than one-sixteenth—are of Romanic derivation. In another passage, taken at random, out of 151 words, 14—about one-eleventh—are Romanic. It may also be cited as a striking proof (if any further proof were needed) of the important part which the Anglo-Saxon element of our language performs in poetry, that though Chaucer has been censured by some critics for his excessive employment of French words, yet this class of words constitutes but a small proportion of those used by him in his poems. Take, for example, the first twenty lines of the

* Generally, when the Latin verb ends in two consonants, one of these is dropped in the English, as *admitto,* "admit," *compello,* "compel," *extollo,* "extol," etc.

† This word may possibly be derived from the frequentative *affecto,* but in such case the meaning is different: "affect," from *affecto,* signifies to "aspire to."

Prologue to his "Canterbury Tales." These lines contain 125 words, of which only 18, or about one-seventh part, are of Romanic origin. In one of his other tales, out of 156 words but 19 are Romanic and 137 Teutonic. Many of the finest passages in Shakspeare contain a much smaller proportion of Romanic words. Of the 157 occurring in the first twenty lines of the passage in which Mercutio speaks of Queen Mab (in "Romeo and Juliet"), all but 6 are Teutonic.

It has been deemed proper to go somewhat fully into the consideration of this subject, because it relates to what is perhaps the most remarkable peculiarity of the English tongue. In no other European language is there anything comparable to it. It is not so much that it is composed of two great classes of words entirely distinct in their etymology, as that each class has, so to speak, its peculiar office, while the two are so completely assimilated that one may be used for the other without attracting any notice; and it is only when careful attention is bestowed upon them that we perceive the peculiar and important part which each plays in the great system of language.

The reader, however, would make a great mistake should he conclude, because Teutonic words constitute a large majority of those occurring in ordinary speech, that therefore they must form a majority of all the words found in an English dictionary. For in computing the relative number of words of each class contained in any given passage, we count every word as often as it occurs, though it should be repeated a dozen times or more. Now, those of Romanic derivation, being comparatively rare, seldom occur more than once in the short passages on which our estimates have been based; while many of those of Teutonic origin, including as these do nearly all the most common and short words in the language, are repeated many times. Thus, in the ten verses already referred to in the first chapter of the Gospel of Saint John, "the" occurs 17 times, "was" 15 times, "light" and "that," each 6 times, etc. In that celebrated passage of Shakspeare relating to Queen Mab, "of" occurs 12 times, "the" 11 times, "a" (or "an") 7 times, and so on. In point of fact, words from the Latin and Greek, forming as they do nearly all our scientific terms, constitute considerably more than three-fourths of the whole number given in any tolerably complete dictionary. A great number of pages, indeed, in Webster's "Quarto Dictionary" * will be found, on examination, to contain, among those of which definitions are given, not one Teutonic word. In Walker's Dictionary, published about the beginning of the present century, and containing comparatively few scientific terms, the relative proportion of Teutonic words is considerably greater. A careful computation made by counting the words in several different portions of that work shows that words of Teutonic origin constitute a little more than two-fifths; those of Romanic derivation amounting to very nearly three-fifths of all those given in the dictionary.

The history of the development of the English language may be divided into three great periods—the first, that of the "Early English," extending from the latter part of the twelfth century to the death of Chaucer (1400); the second period, or that of the "Middle English," as it has been termed, from the death of Chaucer to the time of Spenser (about 1590); and the third, the period of the "Later English," from the time of Spenser to the present day.

During the first period many grammatical forms now disused prevailed extensively, and many now obsolete words were in common use. Of the former the following examples may be given: 1. The plural of verbs in both the present and past tense very commonly ended in *-en* or *-n* as (in the present) "we *loven*," "ye *loven*," "they *loven*;" in the past, "we *loveden*," "ye *loveden*," "they *loveden*." Instances of this usage abound in Chaucer's works, as well as those of his contemporaries. The following examples may suffice to prove and to illustrate the point in question:

"And smale foules *maken* melodie
That *slepen* alle night with open eye." †

"Pilgrimes were they alle,
That toward Canterbury *wolden* ride,
The chambres and the stables *weren* wide,
And wel we *weren* esed (accommodated) atte beste."
Prologue to the Canterbury Tales.

In the play entitled "Pericles, Prince of Tyre," which goes under the name of Shakspeare, we find examples of this plural termination of verbs:

"All *perishen* of man, of pelf,
Ne aught *escapen* but himself."
Act II., Gower (as Chorus).

We often find in the English of the first period such forms as *slen* for *sle-en* (from *sle*, to "slay"), *sayn* for *say-en;* as,

"Ye *slen* me with your eyen, Emilie;
Ye ben the cause wherefor that I die."

"As olde bokes (books) *sayn*."
The Knightes Tale.

They used two forms of *haven* (to "have"); thus "we *haven*," "ye *haven*," "they *haven;*" but more frequently it was contracted to *han*, as "we *han*," "ye *han*," "they *han*." (The infinitive *haven* was also commonly contracted to *han*.)

"But natheless this maiden bright of hew
Fro foot to hed they clothed *han* all new:
Hire heres (hair) *han* they kempt," etc.
The Clerkes Tale.

Ben, the common form of the infinitive to "be," was very generally used for "are," as "we *ben*," "ye *ben*," "they *ben*:"

"This world n' is but a thurghfare ful of wo,
And we *ben* pilgrimes passing to and fro."

"O riche marchants, ful of wele *ben* ye."
The Knightes Tale.

2. The infinitive verb often had the termination in *-en* (corresponding to the Anglo-Saxon *-an*), which is the infinitive ending of the Dutch and German at the present day; as *tellen*, to "tell:"

"That eche of you to shorten with your way
In this viage (journey) shall *tellen* tales tway
To Canterbury ward, I mene it so,
And homeward he shall *tellen* other two."
Prologue to the Canterbury Tales.

Yet this form appears to have been in Chaucer's time already going out of usage; at all events, whenever it suited his verse he did not hesitate to drop the last syllable:

"And forth he rit (rode) there n' is no more to tell."

"And leten him in his prisón still dwelle;
And of Arcíta forth I wol you telle."
The Knightes Tale.

Don (written also *done* and *doon*) was the common form of the infinitive of the verb to "do:"

"Power to *don* in hem (them) correction."
The Freres Tale.

"And therefore wost (wottest) thou what is best to *done*."
The Milleres Tale.

Gon (or *gone*) is a frequent form of the infinitive to "go" in the Early English period; but *go* also was very common in Chaucer's time:

"Alas! unto the Barbare natión
I muste *gon*, sin that it is your will."
The Man of Lawes Tale.

"One foote further I will not *gone*."
The Chester Whitsun Playes,
quoted by Tyrwhitt.

3. The prefix *y* (corresponding to the Anglo-Saxon and also to the Dutch and German *ge*) was the common sign of the past participle; as,

"He for despit . . .
Of all our lordes which that ben *yslaw* (slain),
Hath all the bodies in a hepe *ydraw*,
And will not suffren hem by non assent,
Neyther to ben *yberied* ne *ybrent*."
The Knightes Tale.

This form, however, is not unusual with the poets of the Later English period. It is of frequent occurrence in the "Faerie Queen" of Spenser, and has been occasionally used by his imitators in comparatively recent times. Some of the grammatical forms of the pronouns common in the time of Chaucer are quite different from those now in use, the most important of which are perhaps the following: for "them" they used *hem* (Dutch *hen*); for "their," *hir* (Anglo-Saxon *hyra* or *hire;* Dutch *hare*); for "her," *hire* (Anglo-Saxon *hire;* Dutch *hare*).

In Chaucer's time and earlier (see below a quotation from the "Lives of the Saints," written about 1200) the use of a double negative was not uncommon: sometimes, but very rarely, we find three or four negatives joined in one sentence:

"He *never* yet *no* villanie *ne* said
In all his life unto *no* manere wights" (no kind of persons).
Prologue to the Canterbury Tales.

One of the principal discouragements to the modern English scholar in his attempts to read the authors of the Early English period arises from the number of obsolete and now

* For example, in the entire 40 pages of the "revised edition" (of 1864) extending from pp. 250 to 290, inclusive, there is not one genuine Saxon word, with the exception of *colly* (to "blacken").

† Another but much rarer form of the plural in the indicative present, evidently derived from the Anglo-Saxon, ends in *-eth*, as "we *loveth*," "ye *loveth*," "they *loveth*" (Anglo-Saxon, "we lufaðˇ," "ge lufaðˇ," "hi lufaðˇ"). It may be remarked that the second person plural of the imperative regularly terminated in *-eth*, as "*loveth* ye" (love you):

"*Haveth* som routhe (ruth or pity) en hire adversitee."
The Man of Lawes Tale.

unintelligible words which he constantly meets with. A large proportion, however, of these words can be readily mastered by one who is acquainted with the German and Dutch languages, or with the Anglo-Saxon. But as probably hundreds of persons in this country become tolerably conversant with German to one who makes himself a master of Anglo-Saxon (for this being a dead language, few except professed scholars have any particular inducement to study it), it will perhaps be more interesting to the majority of readers to call attention to the near resemblance which not a few of the obsolete words occurring in our early classics bear to the German, Dutch, or French. To illustrate this point a very few examples may suffice. The following words, which are either obsolete or have changed their original signification, may be readily understood by a reference to the Dutch or German: *Feele*, "many" (Ger. *viele*,* the *v* being pronounced like *f*; Dutch *veele*; Anglo-Saxon *fela*); *freten* or *fret*, to "eat" (Ger. *fressen*; Dutch *vreten*; Anglo-Saxon *fretan*, to "fret," to "gnaw"); *fong*, "take" (Ger. *fangen*, imperative *fange*, or *fang'*, pronounced almost *fong*); *hals*, "neck" (the same in German, Dutch, and Anglo-Saxon); *knave* or *knave-child*, "boy" or "male child" (Ger. *Knabe*, a "boy"); *shene*, "beautiful" (Ger. *schoen* or *schön*; Anglo-Saxon *sciene*); *sterve* or *sterven*, to "die" (Dutch *sterven*; Ger. *sterben*); *starf* or *starfe*, "died" (Ger. *starb*, *b* being pronounced like *p*); *suster*, "sister" (Anglo-Saxon *suster*; Dutch *zuster*).

Deer in the following line of Shakspeare—

"But mice and rats and such small deer"
(*King Lear*, Act iii., scene 4),

corresponds exactly in meaning to the German *Thier*, signifying an "animal" of any kind. *Jolly* or *iolly* in the first stanza of Spenser's "Faerie Queene" is simply the French *joli* or *joly*, "pretty," "handsome." A few of the obsolete words of Chaucer may be traced to the Italian or Spanish. In the following line—

"The blood *real* of Cadme and Amphion"
(*The Knightes Tale*),

real signifies "royal," like *real* in Spanish and *reale* in Italian. Chaucer also uses *realtee* for "royalty."

In the "Lives of the Saints," a composition in verse which Warton supposes to have been written about 1200 or earlier, are found some curious illustrations of the principle exemplified above. In the following passage, which relates to Saint Patrick's delivering Ireland from serpents, several points are deserving of notice:

"So ful of wormes that londe he fonde, that no man ne myghte gon
In some stede (places) for wormes that he nas (was not) iwenemyd (poisoned) anon.
Seynt Pateryk bade our lorde Cryst that the londe delivered were
Of thilke foul wormes, that none ne come there."

Worme, etymologically the same as the Swedish *orm* and Icelandic *ormr* (a "snake" or "serpent"), originally signified any crawling animal, and was often used for "serpent" in the Early English period. *No* and *ne* in the first, and *none* and *ne* in the last line, furnish examples of the double negative so common in the Early English period. *Iwenemyd* (the prefix of *i*, instead of *y*, and the ending *yd*, mark the past participle) affords a curious example of the transition state between the original Latin *venenum* and our "venom." *Bade* in the third line signified originally (as the Dutch *bad* and German *bat* do at present) "prayed" (not "ordered," according to its modern English acceptation). By a similar change the French *demander* has come to imply in its English form, "demand," something of the idea of bidding or ordering. *Were* in the third line (like the German *wäre* and the Anglo-Saxon *wære*) is equivalent to "might be," as it is sometimes in modern English.

A vast number of Old English words, essentially the same in etymology and signification with words now in use, were in the fourteenth century written in a manner so different from the usage of the present day as to be scarcely recognizable except by those who have made this subject one of especial study. Doubtless in some cases there was a corresponding difference in the pronunciation, but in many instances there is reason to believe that even where the spelling was quite different the pronunciation was essentially the same as that now prevailing; *e. g. blake*, for "black;" *brede*, for "bread;" *deinte*, for "dainty;" *here*, for "hair;" *herte*, for "heart;" *moche*, for "much;" etc.

English Literature.—This literature, using the term in its ordinary and popular acceptation, may be safely pronounced not only the most various, but the richest and grandest belonging to any modern language. Macaulay, in speaking of this "noble literature," justly calls it "the most splendid and the most durable of the many glories of England." In attempting to treat a subject at once so various and so vast in the comparatively limited space that can be allotted to it in a work like the present, it will, of course, be impossible to do more than briefly notice the most distinguished among the different authors who have illustrated its various departments. It will be most convenient to treat the different writers according to the periods (already defined) in which they flourished.

The first author of note belonging to the Early English period, and the earliest English prose-writer of any celebrity, was the famous traveller, Sir John Mandeville (1300–71). He is said to have left his native land at the age of twenty-two, and to have passed thirty-four years in visiting the various countries of the globe. On his return to England he committed to writing an account of all his travels. This work, though abounding in marvellous and even ridiculous stories, contains also much true information, which at that time was quite new to the people of England. "His book," says a writer in the "Retrospective Review" (iii. 269), "is to the Englishman doubly valuable, as establishing the title of his country to claim as its own the first example of the liberal and independent gentleman travelling over the world in the disinterested pursuit of knowledge." Mandeville, though writing nearly 150 years before the time of Columbus, announces in the most distinct and the fullest terms the spherical form of the earth. Among the other prominent writers of that period was Wycliffe (1324–84), who has been styled "the morning star of the Reformation," and who has the honor of having made the first English translation of the Scriptures. John Barbour (1326–96), a Scottish poet of merit, published a metrical history of Robert I. under the simple title of "Bruce."

But the first really great poet that we meet with in the annals of English literature is Geoffrey Chaucer (1328–1400), "compared with whose productions," says an able writer, "all that precedes is barbarism." Although partaking largely of the spirit of his age, which was still the age of chivalry, and though the plots of his different poems or tales are mostly taken from other authors, everything that he has written bears the stamp of a rare and original genius. Far inferior as he undoubtedly is to Shakspeare in depth and power, and though differing from him so widely in the cast of his genius, he may yet be said to bear some resemblance to that great poet in a certain kindly joyousness of spirit, and also in the skilful discrimination with which his various characters are drawn. But while Shakspeare reveals to us the inner workings of the mind, with its infinitely varied feelings, motives, and passions, Chaucer delights to exhibit his characters by a minute description of their external traits and peculiarities, rather than by their internal attributes. He is perhaps the most descriptive and the most picturesque of English poets. His senses are all alive to perceive and enjoy everything sweet or beautiful in nature and everything striking or splendid in art. It is his failing, indeed, to be too minute and diffuse in his descriptions as well as in his narrations. "His characters," says Taine, "speak too much, but then they speak so well." But in an age when books were few and rare this minuteness and prolixity were rather a recommendation than an objection in an author who had the skill to make every subject that he touched upon attractive. Perhaps the most remarkable among Chaucer's various characteristics is his serene and invincible cheerfulness. He is joyous, tender, pathetic, playful, and thoughtful by turns, but he is never gloomy or dejected. The effect of his most pathetic passages may be to touch or melt, but never to oppress or painfully agitate the hearts of his readers. It is to be lamented that a writer possessed of so many charming qualities should be guilty, as Chaucer frequently is, of such freedom, and even grossness, of thought and expression. This may be in part, but not wholly, excused by referring it to the spirit and manners of the age in which he lived.

The change in our language since the time of Chaucer has been very great. Many words then in use have become obsolete, and a multitude of others unknown to that age have been added to the English tongue; but these changes, important as they undoubtedly are, are not the most remarkable that have taken place.

Perhaps the greatest change of all, in our judgment, has been in the accentuation of words. From the time of the Conquest until the age of Edward III., French was the language of the Anglo-Norman court, and to a large extent of all the cultivated classes in England. Chaucer himself, being a courtier, was constantly associated with those who spoke only French. This may explain, if any explanation be needed, why he made no attempt to change the versification then in vogue. Accordingly, we find in his verse that his accentuation of words and the metre correspond, with rare exceptions, to the usages of French poetry. Hence, such words as *corage* ("courage"), *linage* ("lineage"), *visage*,

* When the meaning of the German or Dutch is not given, it is to be understood that it is the same as that of the obsolete English word.

conscience, reverence, sentence, daggere ("dagger"), *manere* ("manner"), etc., occurring in his verse, are always to be pronounced with the accent on the last syllable. Even such Saxon words as *brenning* ("burning"), *coming, wedding,* etc. were accentuated in a similar manner, as is shown by the following and other instances:

"What ladies fayrest ben, or best *dancing,*
Or which of hem can carole best or *sing.*"

"Thus was the halle full of *devining,**
Long after that the sonne gan up *spring.*"

The so-called *e* mute of the French tongue (always pronounced as a short syllable in French poetry, except when immediately followed by a word beginning with a vowel) is very generally, but not always, pronounced by Chaucer; but if immediately followed by a word beginning with a vowel, the sound of the mute *e* is invariably suppressed. For example, in the following couplet—

"And dounward from an hill under a bent
Ther stood the temple of Mars armipotent,"

the second line should be read as if written—

"There stood the templ' of (pronounced *templov*) Mars armipotént."

Another line—

"That highte the gret temple of Mars in Trace,"

should be read thus:

"That highte the great templ' of Mars in Thrace."

Chaucer often varies from his own spelling; thus he has both *grete* and *gret* (for "great"), *red* and *rede* (for "red"), *parfit* or *parfite* ("perfect"), etc.

The same general style of versification as that of Chaucer, including the peculiarities of the French accentuation and the pronunciation as a short syllable of the so-called *e* mute, except when followed immediately by a word beginning with a vowel, appears to have been common if not universal in the fourteenth century and long afterwards. In the poetry of Gower (who was Chaucer's contemporary; date of birth unknown; died in 1408), all these peculiarities are as strongly marked as in Chaucer himself. Dunbar, who lived more than a century later (1465–1530), places the accent in his verse on the last syllable even of such words as "treasure," "injure;" and traces of a similar accentuation are to be found in Spenser and Shakspeare, particularly in the case of such words as end in *-ion;* for example:

"Her heart gan melt in great compassiön,
And drizzling teares she shed for pure affectiön."
Faerie Queene, book i.

As there was no great English poet before Chaucer, so there was none of any note for a long time after him. The appearance in the very dawn, as it were, of English literature of an author so richly and rarely gifted, who had no successor to his fame for almost two hundred years, has been aptly compared to a bright and beautiful day in early spring, followed by a long period of dark and wintry weather, in which no opening flowers give forth their fragrance, no joyful birds sing in the groves. Indeed, after Chaucer's death, for an entire century, England produced scarcely one poet worthy of the name, and could boast of none of any celebrity, excepting Howard, earl of Surrey, until, almost at the close of another hundred years, Spenser gave to the world the first three books of his "Faerie Queene." But we are not to suppose that though this long period was unillustrated by any great or splendid name, it was without important fruits to English literature. It was, in fact, during this period that the elements of our language became thoroughly assimilated, and it acquired that fulness and flexibility which were necessary to render it a fit instrument to give expression to the beautiful visions of Spenser or to the wondrous and infinitely varied conceptions of Shakspeare.

After the mind of the English nation had lain fallow, so to speak, for almost two hundred years, there arose near the close of the sixteenth and in the early part of the seventeenth century a constellation of genius such as perhaps was never equalled in ancient or modern times. We can, however, in our narrow limits do scarcely more than name any but the most illustrious of the authors who adorned that glorious period of English history. First in order of time,† if not first for his rare and many-sided genius, was the chivalrous and accomplished Sir Philip Sidney (1554–86), poet, wit, courtier, and hero combined in one. Spenser (1553–99) comes next, whose "Faerie Queene," written in the very dawn of modern English literature, is not only unrivalled for the marvellous richness of imagination which it displays, but, what perhaps was less to be expected, for the grace, melody, and exquisite finish of its poetic diction. Next in order is Christopher Marlowe (1562–92), who has been called the true founder of the English dramatic school, and who, in the representation of the most terrible passions of the human soul, has been pronounced by able critics to be scarcely if at all inferior to Shakspeare. Nor must we omit among the illustrious prose-writers of that age Richard Hooker (1553–1600), who, according to Hallam, is "the finest, as well as the most philosophical, writer of the Elizabethan period."

Who shall have the hardihood to attempt in a few brief lines to do justice to Shakspeare's genius, which for its heights and depths, as well as for its breadth and never-ending variety, may be compared to the broad earth with its infinite diversity of surface and productions, its fertile valleys, its hills clad with verdure, its pleasant grottoes and gloomy caverns, its rugged and lofty mountains, and its vast, unfathomable seas? Perhaps no one has better characterized this greatest of dramatic poets in a few words than Dryden: "He was the man who of all modern and perhaps ancient poets had the largest and most comprehensive soul. All the images of nature were still present to him; . . . when he describes anything you more than see it, you feel it too. . . . I cannot say he is everywhere alike, . . . but he is always great when some great occasion is presented to him." Of the dramatic writers contemporary with Shakspeare, Ben Jonson, "take him for all in all," was unquestionably the greatest. If inferior to Marlowe and Webster in the representation of violent passions, he was much superior to them in the variety of his powers, as well as in his profound and varied learning. But his genius was intellectual, rather than imaginative; he especially excelled in satirical comedy. The principal other dramatists of that period were Massinger (1584–1640), Webster (date of birth and death unknown), Beaumont (1586–1616), and Fletcher (1576–1625). In literary history the two last named are always associated, from their having written most of their dramas in partnership. The reigns of Elizabeth and James I. constituted the most flourishing period of the English drama, conspicuous in which field, besides those already named, were Ford (1586), Decker, Heywood, Shirley (1594–1666), Middleton, and Rowley. Under Charles I. the theatre declined, and was not revived till the Restoration in 1660, but it never afterwards regained the popularity and influence it possessed under James I.

Francis Bacon (1561–1626), though perhaps not now estimated quite so highly as he was in the last century, was one of the most remarkable men of that remarkable age. A great lawyer and great wit, an able essayist and accomplished public speaker, he is now chiefly known to fame as a philosopher, in which character he has few if any superiors among the great men of modern Europe. He is regarded by some as the father of modern science, as the first who taught the true method of scientific investigation; but this distinction he can scarcely claim with justice. Some able judges, even in England, have considered him inferior as a philosopher to his contemporary, Galileo. But this, at least, may be said in favor of Bacon, that he was among the first and most influential of those who sought to emancipate Philosophy from the fetters imposed on her by an irrational and absurd reverence for the great names of antiquity; and he has probably done as much as any other writer to pave the way for that wonderful "advancement of the sciences" ‡ which may be said to constitute the peculiar glory of modern times.

George Chapman (1557–1634) was author of translations of Homer's "Iliad" and "Odyssey," executed with much spirit. They may be regarded as on the whole very remarkable productions for the time when they appeared. Bishop Hall (1574–1656) was a writer of merit both in prose and poetry. His best known poetical work is his "Bookes of Byting Satyres," which Pope considered to contain the best poetry and truest satire in the language. Of his prose works the most important are his "Contemplations on the Principal Passages of the Holy Story" and his "Occasional Meditations."

Proceeding in the order of time, we next come to Milton (1608–74), a genius as transcendent, perhaps, as that of Shakspeare, though in a very different field. For a harmonious union of imaginative, intellectual, and moral endowments of the very highest order he stands alone among the sons of men. As a poet or writer of prose he is not in his happier hours inferior to any of the great writers of antiquity, while in the dignity and grandeur of his life he is perhaps unsurpassed by any author, ancient or modern. "It is certain," says Hume, "that this author, when in a

* *I. e.* "conjecturing." See "The Knightes Tale," where many similar examples will be found.

† Although Sidney was born a year after Spenser, his fame may be said to have preceded that of Spenser by more than a decade of years.

‡ "The Advancement of the Sciences," or "The Advancement of Learning," as he himself called it (in Latin, "De Augmentis Scientiarum"), was one of Bacon's most celebrated works.

happy mood and employed on a noble subject, is the most wonderfully sublime of any poet in any language, Homer and Lucretius and Tasso not excepted." (*History of England.*) According to the illustrious French critic Villemain, "Milton's picture of our first parents in Eden surpasses in a graceful and charming simplicity anything to be found in ancient or modern poetry, and the human imagination has produced nothing more sublime* than some portions of 'Paradise Lost.'" It may be safely affirmed that Milton alone, of all modern poets, has in the grace and grandeur of his language, and in the majestic harmony of his numbers, equalled or surpassed the greatest poets of antiquity; and it may be added that the finest passages of his prose are scarcely, if at all, inferior to his poetry in grace, majesty, and splendor. "En sondant toutes les littératures," says Taine, "vous ne rencontrerez guère de poëtes égaux à ce prosateur."† Besides "Paradise Lost," his greatest work, Milton wrote several others, of which the most remarkable is "Comus," a sort of lyrical drama, pronounced by Macaulay "the noblest performance of the kind which exists in any language." Milton was also the author of several admirable lyrics, among which are his "Hymn on the Nativity," "L'Allegro," and "Il Penseroso." Of Milton's prose works the best, perhaps, is his "Areopagitica," or "Plea for Unlicensed Printing."

Among the minor poets contemporary with Milton perhaps the most remarkable was Abraham Cowley (1618–67), a man of decided genius, but the merit of his poetry is greatly diminished by his labored affectations and conceits. From these defects his prose is comparatively free. According to an able critic (Dr. Drake), "To Cowley we may justly ascribe the formation of a basis on which has since been constructed the present correct and admirable fabric of our language. His words are pure and well chosen, the collocation simple and perspicuous, and the members of his sentences distinct and harmonious." Edmund Waller (1605–87) was a poet of a very different character. With far less native genius and force than Cowley, yet being endowed with superior taste, a ready wit, and more tact, if not more skill in versification, he succeeded in acquiring a far greater popularity as a poet than many men who were his superiors in genius. But he is generally allowed, even by those who admire him least, to have given to English versification a smoothness and grace unknown to it before.

Several prose-writers of decided merit belong to this period: Thomas Chillingworth (1602–44), a divine of the Church of England, was especially distinguished as an able controversialist. He has been highly praised by Tillotson and Locke, and Lord Mansfield pronounced him "a perfect model of argumentation." Jeremy Taylor (1602–67), also a divine, was eminent for his rich imagination, eloquence, and learning. According to Hallam, he "may be said to have been the first who sapped and shook the foundations of dogmatism and pretended orthodoxy—the first who taught men to seek peace in unity of spirit rather than of belief." "His sermons," says the same able critic, "are far above any that had preceded them in the English Church." The Rev. Thomas Fuller (1608–61) was a man of multifarious information and rare richness of thought. As a writer he is eminently pithy and piquant. Among his principal works may be mentioned his "History of the Worthies of England" and "The Holy and Profane State," the former presenting examples for imitation, the latter for abhorrence. In the middle and latter part of the seventeenth century flourished two celebrated prose-writers who were no less eminent as pulpit-orators, both admirable as men and as teachers of Christianity, and whose influence has lasted to the present day. The one, Richard Baxter (1615–91), a nonconformist divine, was of the noblest and loftiest type of the Puritan character. The other, Archbishop Tillotson (1630–94), was no less distinguished for his piety than for his liberality of sentiment, a rare quality in that age. "His reasoning," says Macaulay, "was just sufficiently profound and sufficiently refined to be followed by a popular audience with that slight degree of intellectual exertion which is a pleasure. . . . The greatest charm of his composition, however, is derived from the benignity and candor which appear in every line, and which shone forth not less conspicuously in his life than in his writings." (*History of England*, vol. iii.) Isaac Barrow (1630–77) was almost equally distinguished as a learned and eloquent divine and as a profound mathematician. "His sermons," says Hallam, "display a strength of mind, a comprehensiveness, and fertility which have rarely been equalled." Robert South (1633–1716), another eminent English divine, was especially distinguished for his wit, learning, and eloquence. One of the most eminent of English dissenting divines was John Owen (1616–83), considered especially admirable as an expounder of Scripture. John Howe (1630–1705), another dissenting divine, was remarkable for his originality and his philosophic spirit. His "Living Temple" is regarded as one of the most extraordinary works in the English language.

Among the most remarkable writers in the annals of English literature was John Bunyan (1628–88), a man whose imagination was so vivid and powerful that though he wrote only in prose, he may without impropriety or exaggeration be pronounced one of the most genuine poets England has produced, if we use the word "poet" in its original sense, that of ποιητής or "creator"—that is, one who forms from his own imagination characters to whom he imparts all the vividness and seeming reality of actual life. Bunyan's principal production, "Pilgrim's Progress," as a work of rare genius is perhaps inferior to no single production in the language, "Paradise Lost" alone excepted.

Samuel Butler (1612–80) is celebrated as the author of "Hudibras," a very witty but rather coarse production, which owes no small part of the amusement it affords to its quaint and singular rhymes. The hero of this mock epic is Hudibras, a Puritan knight, the history of whose exploits as here related seems to be a sort of travesty of Cervantes' "Don Quixote."

John Dryden (1631–1700) has perhaps, save the immortal names of Chaucer, Spenser, Shakspeare, and Milton, no superior in the annals of English poetry. "The public voice," says Macaulay, "has assigned to Dryden the first place in the second rank of our poets." He cultivated almost every department of poetry with success, without taking the very highest rank in any. His "Absalom and Achitophel" is one of the most powerful and most successful satires in the language. "His command of language," says Macaulay, "was immense. With him died the secret of the old poetical diction of England—the art of producing rich effects by familiar words." In another place he says: "Dryden was an incomparable reasoner in verse;" and again: "He was certainly the best writer of heroic rhyme in our language." "He writes," says Taine, "stirring airs which shake all the senses if they do not sink into the heart. Such is 'Alexander's Feast,' an ode in honor of Saint Cecilia's Day, an admirable trumpet-blast in which metre and sound impress upon the nerves the emotions of the mind." His prose was perhaps even superior to his verse. Brougham praises "the matchless prose of Dryden, rich, various, natural, animated." Dryden wrote a number of dramas, which cannot be regarded as works of much merit. Several of his comedies are disfigured with passages of the grossest indecency. His translation of Virgil has been greatly admired. Pope considered it "the most noble and spirited translation he knew in any language." As a critic, Dryden has few if any superiors in English literature. Among his most important critical writings are his "Essay on Satire" and his "Essay on Dramatic Poetry." The latter was pronounced by Dr. Johnson "the first regular and valuable treatise [in the language] on the art of writing."

Probably no English author has contributed more to improve and refine our language than Joseph Addison (1672–1719), who in a certain easy elegance of style, rendered still more attractive by a vein of genial, delicate, and inimitable humor, surpassed all the prose-writers that had preceded him. But to Addison belongs a higher glory than that of being the most elegant writer and most fascinating wit of his age. He purified and elevated the public taste, and rescued the literature of his country from the degradation and infamy into which it had fallen under Charles II. "He not only made," says Dr. Johnson, "the proper use of wit himself, but taught it to others. . . . He has dissipated the prejudice that had long connected gayety with

*See Villemain's notice of Milton in the "Biographie Universelle."

†"In searching all literatures you will scarcely find any poets equal to this writer of prose." (*Histoire de la Littérature Anglaise*, livre ii., chap. vi.) And yet this critic, able, acute, and rarely appreciative as he unquestionably is on most points relating to our literature, in his ambition to say what is striking or piquant too often loses sight of justice and truth. Thus he says, referring to "Paradise Lost," "In this history of God the principal part (*rôle*) is taken by the devil." But it nowhere purports to be a "history of God" (such a history might be inconveniently voluminous for a work designed to be read by mortals), but simply a very small part of that history—only so much as relates to "justifying the ways of God to man." The imagery of "Paradise Lost" affords our critic an inexhaustible subject for ridicule. Referring to one of Milton's scenes of celestial splendor, M. Taine tells us, in substance, that all that was wanting to make it perfect were "the fireworks and ringing of bells as in London." He thinks that Milton made a mistake in representing our first parents in Eden as having angelic natures, with high intellectual, moral, and spiritual faculties; they should rather have been "glorious, strong, and voluptuous children, . . . with no more thought than the bull or mare lying on the grass beside them." From these and other passages the reader can judge how far M. Taine is qualified to do justice to the highest conceptions of a poet ideal in the loftiest sense, and filled with an intensity of devotion and living faith difficult to realize in this lukewarm, materialistic age.

vice, and easiness of manners with laxity of principles. He has restored virtue to its dignity, and taught innocence not to be ashamed. This is an elevation of literary character above all Greek, above all Roman fame." Addison's literary reputation rests chiefly on "The Spectator," a paper to which his sparkling wit and exquisite humor gave a popularity and influence that no similar publication has ever attained.

Contemporary with Addison was Jonathan Swift (1667–1745), an author of a very different character. He possessed a mind of great force and originality, but either constitutionally morbid or rendered so by the privations and disappointments of his early life. His poetry is always spirited, but even when exhibiting least fire it is remarkable for the easy, spontaneous flow of its numbers. But he is chiefly known as a writer of prose. In vigorous, pointed satire Swift is probably superior to any other author England has produced; and in the opinion of some able critics he has not been surpassed in this respect by any writer of any age or nation. "'The Tale of the Tub,'" says Hallam, "is, in my apprehension, the masterpiece of Swift: certainly Rabelais has nothing superior even in invention, nor anything so condensed, so pointed, so full of real meaning, of biting satire, of felicitous analogy." (*Introduction to the Literature of Europe.*) The great drawbacks on Swift's merits as an author are his excessive coarseness or obscenity, the bitter, misanthropical spirit, sometimes amounting to absolute malignity, which exhibits itself more or less in nearly all his works.

Alexander Pope (1688–1744) is commonly considered to rank next to Dryden in the second class of English poets, although not a few critics would place him at the head of this class. If inferior to Dryden in vigor and in imagination, he is much superior to that poet in delicacy of taste, refinement of language, and harmony of versification. In condensation he may be said to excel all other English poets. In didactic poetry he has perhaps no equal in English literature. His translation of Homer's "Iliad," though not very exact, is one of the most popular translations in our language. One of the most remarkable writers in the English language was Bishop Butler (1692–1752), whose celebrated "Analogy" is, according to Sir James Mackintosh, "the most original and profound work extant in any language on the philosophy of religion."

In the foregoing remarks it has been deemed proper to speak somewhat particularly of those great authors who have chiefly contributed to form and refine our language, and to lay the broad and solid foundations of our matchless literature. Our limits will compel us in what follows to use greater conciseness; and to this end, instead of treating the different authors, as we have hitherto done, chronologically and biographically, it will be expedient to classify them according to the particular department of literature which they have illustrated. In briefly stating the characteristics of the different writers care has been taken not to affirm anything not sanctioned by the authority of the best critics; and as the position of very recent (and especially of living) authors may in many instances be considered as not yet fully determined, these have usually been passed over with simply mentioning the name, or the name in conjunction with one or two of the author's principal works. It is scarcely necessary to add that those only have been given in whom it might be supposed every intelligent reader would naturally feel some interest.

Criticism has been illustrated by the eminent names of Dryden, Addison, Pope, Dr. Johnson, T. Warton, Dr. N. Drake, Coleridge, Hazlitt, Lord Jeffrey, Sidney Smith, Brougham, Gifford, Southey, Sir W. Scott, Hallam, Leigh Hunt, Carlyle, Collier, Macaulay. Among those who have written particular criticisms on Shakspeare are Dr. Johnson, Steevens, Malone, Dr. Drake, Coleridge, Hazlitt, Collier, R. Farmer, Dyce, J. O. Halliwell-Phillipps, H. N. Hudson, John Wilson, John Wilson Croker, J. G. Lockhart.

History.—The first truly able English historian was Edward Hyde, earl of Clarendon (1608–74), whose "History of the Rebellion" has been justly pronounced "one of the noblest historical works in the English language." It should be observed, however, that Clarendon was a royalist, and of course his history is not to be taken as absolutely impartial. Hume's "History of England" has been much admired for its graceful, natural, and perspicuous style; but as a historian he is justly censured as deficient in research, and as exhibiting in that portion of his work which treats of the civil war a decided partiality to the royal cause. Smollett (1721–71), who wrote a continuation of Hume's "History of England," has little to recommend him besides his style, which is much inferior to that of his predecessor. Robertson (1721–93) is one of the most meritorious of British historians. His style is elegant, clear, and vigorous, and in his narration he is usually accurate, judicious, and impartial. He wrote a "History of Scotland" and a "History of America" (treating of its discovery and conquest by the Spaniards), but the work on which his reputation chiefly rests is his excellent "History of the Emperor Charles V." John Lingard (1771–1851) was the author of a "History of England, from the First Invasion by the Romans to the Accession of William and Mary in 1688," which is highly esteemed. He was a Roman Catholic, and it is understood that his aim in writing the above-named work was to produce a history of England that might correct the partial or prejudiced representations of other historians. Edward Gibbon (1737–94), one of the greatest historians that England has produced, is chiefly known by his celebrated work, the "History of the Decline and Fall of the Roman Empire." He possesses many of the highest qualifications of a great historian. In thoroughness of research he has never been surpassed, and he usually evinces great judgment, as well as accuracy; but he is justly chargeable with unfairness towards the early Christians. (See on this subject some excellent remarks in Prescott's "Biographical and Critical Miscellanies.") Among later historians of distinction may be named Alison (1792–1867), who wrote a "History of Europe from the Commencement of the French Revolution to the Restoration of the Bourbons, 1815," a work of great merit, but disfigured by its inflated, grandiloquent style. Macaulay (1800–59), whose "History of England" is one of the most remarkable historical works ever produced. It is admirable for its clear and animated style, for the great research it evinces, and for the power and sustained interest of its narrative, but it is wanting in impartiality. Froude's "History of England from the Fall of Wolsey to the Death of Elizabeth" is a work of great merit, but its accuracy has been assailed by some critics; and on this point the opinion of the literary public may be said to be still unsettled. Grote's "History of Greece" (1846–56) is a work of immense learning and research, and of the highest merit. A critic in the "Quarterly Review" pronounces it "the most important contribution to historical literature in modern times." Thirlwall's "History of Greece" (1852) is also a work of great merit. Mitford's "History of Greece" (1818) displays much learning and ability, but its value is greatly impaired by the anti-democratic prejudices of its author. In his account of the conflict between Athens and Philip of Macedon he is guilty of the most glaring injustice. Gillies' "History of Ancient Greece and its Colonies" evinces considerable learning. Merivale's "History of the Romans under the Empire" (1850–62) is highly esteemed. A most valuable "History of Rome," by the Rev. Thomas Arnold of Rugby, was left unfinished at the author's death in 1842; it only comes down to the end of the Second Punic war. James Mill (1773–1836) wrote a "History of British India" (1817–19), which has been highly praised by eminent critics, including Mr. Grote, the historian. Among historical writers of less note are J. H. Burton, author of a valuable "History of Scotland" (1867), and E. A. Freeman, who has written, besides other historical works, a "History of the Norman Conquest of England" (1867–69), which gives proof of much research.

Philosophy.—In this field, after Bacon (noticed in the former part of this article), the most celebrated English writer was John Locke, a man of most estimable character and of liberal, philanthropic sentiments. The central position of his philosophy, as presented in his great work, the "Essay on the Human Understanding," is, that the mind has no innate ideas, but that all our notions are derived directly or through the medium of reflection from external impressions. Another celebrated philosophical writer was Thomas Hobbes (1588–1679), a man of exceedingly clear and vigorous but limited intellect. His philosophy may be defined as one which aims to reduce all the faculties of the mind and all the principles of morals or religion to a mathematical standard. According to Hume, his doctrines were "only fitted to promote tyranny and encourage licentiousness." Hobbes's great work is entitled the "Leviathan," which contains a complete system of his philosophy, including his political, moral, and theological opinions. The other leading names in philosophy are Shaftesbury (1671–1713), whose "Inquiry concerning Virtue" is highly praised by Sir James Mackintosh for its "perfect method, just reasoning, and precise and clear style." George Berkeley (1684–1753) was an accomplished scholar and acute reasoner. He was famous as teaching a system of pure idealism, in which he maintained that there is no proof anywhere of the existence of matter except in our own perceptions. "His works," says Sir James Mackintosh, "are beyond dispute the finest models of philosophical style since Cicero." Francis Hutcheson (1694–1747) wrote an "Inquiry into the Original of our Ideas of Beauty and Virtue," an "Essay on the Passions and Affections," and a "System of Moral Philosophy," which is his greatest work. According to Sir James Mackintosh, he "was the father

of the modern school of philosophy in Scotland." David Hartley (1705–57) was the author of an excellent philosophical work entitled "Observations on Man, his Frame, his Duties, and his Expectations," which has been highly praised by Dr. Parr, Dr. Priestly, and other distinguished writers. David Hume (1711–76) was one of the most acute and subtle thinkers that Great Britain has produced. In philosophy and religion he was a skeptic; in politics he was inclined to favor an arbitrary government. Thomas Reid (1710–96) was the founder of the Scottish school of philosophy, which has been characterized as the "philosophy of common sense." He wrote an "Inquiry into the Human Mind," and other works of a similar character. Among the most eminent of his followers were—Dugald Stewart (1753–1828), an able and profound thinker, who by his striking and impressive eloquence contributed much to render the study of mental philosophy popular in Great Britain; and Thomas Brown (1778–1820), whose most important work is "Observations on the Relation of Cause and Effect." He also published "Lectures on the Philosophy of the Human Mind," which enjoyed a great popularity. To the foregoing may be added the names of William Paley (1743–1805), author of "Principles of Moral and Political Philosophy:" he is charged with denying the existence of any moral sense, and he does, in effect, make expediency the test of right and wrong; and Sir James Mackintosh, who wrote an admirable work entitled "View of the Progress of Ethical Philosophy," which first appeared among the preliminary dissertations in the "Encyclopædia Britannica." Among more recent writers on philosophy and psychology are Sir William Hamilton (1788–1856), author of the "Philosophy of the Absolute," "Philosophy of Perception," etc.: he was an acute thinker, and he is perhaps unrivalled for a thorough acquaintance with the history of philosophy, both ancient and modern; Dr. Calderwood, J. Stuart Mill, Herbert Spencer, Alexander Bain, and Dr. James McCosh, among whose works that "On the Method of the Divine Government" is perhaps the most important; it has been highly commended by several able critics.

Novels, Romances, etc.—Sir Philip Sidney, "Arcadia." Samuel Richardson (1689–1761), called the founder of the modern novel. His most remarkable work is "Clarissa Harlowe." Richardson's aim was to promote virtue, but he is considered by some critics to have made his favorite characters unnatural by attempting to make them perfect as patterns for others to imitate. Henry Fielding (1707–54) appears to have erred in the opposite direction. His favorite characters are sometimes grossly immoral, but their vices are supposed to be redeemed by courage, generosity, and other manly virtues. "Joseph Andrews" and "Tom Jones" are considered to be his greatest works. Smollett joined to the faults of Fielding defects that were peculiarly his own. His characters exhibit the vices without the generosity attributed to those of Fielding. Goldsmith (see *Poetry, Descriptive*) was the author of the "Vicar of Wakefield," one of the most charming tales in the English language. "Of all romances in miniature," says Schlegel, "the 'Vicar of Wakefield' is the most exquisite." To this class properly belongs "Rasselas, a Tale of Abyssinia," by Dr. Johnson, a work which has been greatly admired by critics of the most diverse tastes. The greatest perhaps of British novelists was Walter Scott; at least he greatly surpassed all who had preceded him. Bulwer for a long time was considered to stand next to him, and if all his various merits are taken into consideration, he may still perhaps be allowed that distinction. Charles Dickens introduced a new style of novel, which by its piquant caricatures, as well as by the genuine power and pathos evinced by the author, acquired a popularity which seemed to eclipse all that had gone before it. William M. Thackeray followed in a still different style of novel, which had an extraordinary success. Besides these great masters in romance, there were many successful but less distinguished writers, of whom we have scarcely room to give the names. Among the most eminent of these are Anthony Trollope, Charles Reade, Wilkie Collins, Charlotte Brontë, Mrs. Gaskill, Miss Mulock (now Mrs. Craik), Miss Evans (now Mrs. Lewes), etc.

Poetry, Descriptive.—James Thomson (1700–48), the most celebrated descriptive poet in the language, is chiefly known as the author of the "Seasons," written in blank verse, although his "Castle of Indolence," composed in Spenserian measure, is a work of greater genius. His blank verse, though generally smooth and often majestic in its flow, is rather monotonous. Oliver Goldsmith (1728–74), author of "The Traveller" and "The Deserted Village," two short poems written with great simplicity and an exquisite grace. Nothing superior to them in their kind can be found in the language. (See next paragraph.) Cowper (noticed below as a didactic poet) excelled in description. He is not surpassed perhaps in this respect by any English poet. Many admirable descriptive passages are to be found in "The Task." Wordsworth (noticed below under *Didactic Poetry*) is scarcely excelled by any other poet in the exquisite beauty and vividness of some of his descriptions. Samuel Rogers (1763–1855), author of "Italy," not less remarkable for the grace and harmony of its versification than for the descriptive power displayed by the poet. Scott (see below, *Narrative Poetry*) is among the finest descriptive poets that have written in the English language; abundant examples of his power in this respect may be found in "The Lady of the Lake." Lord Byron (1788–1824), "take him for all in all," is probably the finest descriptive poet in the language. To the most vivid representation of external nature the latter poet adds a certain ineffable charm arising from his intense ideality. Nearly all his poems abound with exquisite descriptive passages, but we would particularly refer to the third and fourth cantos of "Childe Harold," and to the passage near the commencement of the "Giaour," beginning with—

"He who hath bent him o'er the dead," etc.

Didactic.—The greatest didactic poet perhaps in the language is Pope, already noticed. Dr. Young (1681–1765), author of "Night Thoughts" and "Resignation." Parnell (1679–1717), author of "The Hermit." Akenside (1721–70), of "The Pleasures of the Imagination." Dr. Johnson (1709–84), "London," "Vanity of Human Wishes." Cowper (1731–1800), best known as the author of "The Task," a poem in blank verse; he also wrote "Table Talk," "Hope," "The Progress of Error," etc., in rhyme. Cowper's merits as a poet are of a very high order: he is especially distinguished for originality, good sense, truthfulness, simplicity, and deep feeling. Goldsmith might be added to the foregoing names, but his poems have already been noticed under *Descriptive Poetry*. Rogers (noticed under *Descriptive Poetry*) was author of the "Pleasures of Memory," a poem remarkable for its beauty and grace. Campbell, author of the "Pleasures of Hope," perhaps the most beautiful didactic poem in the English language. William Wordsworth (1770–1850) may be pronounced the loftiest of our didactic poets, although none of his poems, perhaps, have the definite didactic form.

Lyric.—Passing over the splendid lyrics of Milton and Dryden's "Ode on Saint Cecilia's Day," already noticed, we come to one of England's rarest poets, Thomas Gray (1716–71), the author of several admirable lyrics, among which "The Progress of Poesy" is perhaps the finest, as it is the poem, if we except the "Elegy in a Country Churchyard," by which the poet is best known. It would perhaps be impossible to produce from any language lines more exquisite than the following from "The Progress of Poesy:"

"Hark, his hands the lyre explore!
Bright-eyed Fancy, hovering o'er,
Scatters from her pictured urn
Thoughts that breathe and words that burn."

William Collins (1720–56) was author of several beautiful and spirited odes, among which that to the "Passions" is especially admired. In this class also we may place Robert Burns (1759–96), the greatest of Scottish poets. In the department of amatory poetry he is without a rival among the bards of Britain, or perhaps of all Europe. Thomas Campbell (1777–1844) has produced the finest martial lyrics in the English language. Almost everything that he has written in this line displays the truest spirit of lyric poetry, united with the most exquisite finish of expression. Among the finest of his odes is that entitled "Ye Mariners of England." Thomas Moore (1779–1852) has given to the world some beautiful lyrics, although he is best known as the author of "Lalla Rookh," a collection or series of Oriental tales in verse. Many of his songs have enjoyed a great popularity; among them may be mentioned "The Last Rose of Summer" and "This World is All a Fleeting Show." Byron (already noticed under *Descriptive Poetry*) has composed several very spirited lyrics. Nothing in its way can be finer than his "Destruction of Sennacherib." Percy Bysshe Shelley (1792–1822), a man of the rarest imagination, united with intense poetic feeling, wrote much beautiful poetry, but his shorter pieces, such as his odes addressed to "The Skylark" and to "The Cloud," evince, of all his productions, the most genuine spirit of poetry. Tennyson (see below, *Poetry, Narrative*) is one of the most eminent of British lyric poets.

Poetry, Miscellaneous.—J. Montgomery, Mrs. Browning, Robert Browning, Tennyson, and Jean Ingelow, with numerous other almost equally distinguished names, are worthy of mention.

Poetry, Religious.—George Herbert, Isaac Watts, C. Wesley, John Newton, Cowper (see above, *Didactic Poetry*), James Montgomery, Pollok, author of the "Course of Time," Bickersteth, author of "Yesterday, To-day, and For Ever," are a few of the many eminent names in this department.

Narrative.—The most remarkable examples of narrative poetry in our language are presented in the "Faerie Queene" by Spenser, and in Milton's "Paradise Lost." Among more recent authors in this department are Robert Southey (1774–1843), whose leading productions are "Roderick, the Last of the Goths," "Thalaba, the Destroyer," "Madoc," etc. No English author has succeeded better in narrative poetry than Sir Walter Scott (1769–1832), whose "Marmion" and "Lady of the Lake," in the intense interest and vividness of the narrative, are perhaps superior to anything else in this department of poetry that has appeared since the "Iliad" and "Odyssey" of Homer. Moore's "Lalla Rookh," and several of Byron's poems, as "The Giaour," "The Siege of Corinth," and "The Corsair," afford beautiful specimens of narrative poetry. Moore's "Oriental Tales" have all the interest that beautiful, fervid language and a brilliant imagination, without deep or intense feeling, can give to such productions. Alfred Tennyson (born in 1809), whose "Idyls of the King" afford fine specimens of narrative poetry.

Translations, Poetical.—With the exception of Dryden's translation of Virgil, and Chapman's and Pope's translation of Homer (already referred to), the most important works of this class are Ogilby's translation of Virgil (1650), his translation of Homer (about 1660), Cowper's Homer, in blank verse (1790), remarkable for its fidelity to the original; Sotheby's Homer, Lord Derby's Homer, in blank verse (1865), one of the best translations of the Homeric epics; Creech's Lucretius, "De Rerum Naturâ" (1682); Dr. Good's Lucretius, a rather spiritless production; Francis's Horace (8th ed. 1778); Lord Lytton's translation of the Odes of Horace (1869); Fairfax's translation of Tasso's "Jerusalem Delivered," a work of much merit; Hoole's Tasso, an insipid, spiritless production; Wiffin's Tasso, in Spenserian measure; Gifford's Juvenal (1802); Bulwer's (Lord Lytton's) translation of Schiller's poems (1844). (See AMERICAN LITERATURE, below, for a notice of three excellent poetical translations—one of Homer, one of Dante, and one of Goethe's "Faust"—by three distinguished American poets.)

Reviewers, Contributors to Periodicals, Essayists, etc.—In this class may be placed Addison, Steele, Dr. Johnson, Hawksworth, John Foster, Mackenzie, Lord Jeffrey, Lord Brougham, Sidney Smith, Hazlitt, Carlyle, Macaulay, Ruskin, Arthur Helps, Prof. John Wilson, J. G. Lockhart.

Science and Discovery.—Sir Isaac Newton, Napier, Bradley, Briggs, Flamsteed, Harvey, Dr. Priestly, Dr. Black, John Hunter, William Herschel, Sir H. Davy, Sir John Herschel, Brewster, Faraday, Dalton, Dr. Buckland, Sir Charles Bell, Darwin, Huxley, Tyndall, Murchison, and Lyell, are all great names, though the list might be greatly extended.

American Literature.—Literatures are not to be distinguished from each other by geographical boundaries, but by the languages in which they exist. Were this otherwise, we should have not one Greek literature, but a literature for every dialect of ancient Greece; not one Italian literature, but a literature of Tuscany, Lombardy, or Piedmont. Hence, instead of treating the literary productions of America as a separate literature, we add to this article a history of American authorship, as a development and modification of the great literature to which Bryant and Motley, Prescott, Irving, and Longfellow, no less than Shakspeare and Bacon, Milton and Macaulay, belong.

Literature in the United States appears to divide itself into three periods: first, the colonial and Revolutionary period; second, the period extending from the final adoption of the Constitution to the rise of Washington Irving; and third, from the rise of Irving to the present day.

Colonial dependencies are not favorable to the cultivation of literature. Books, like other commodities more necessary but less valuable, are usually imported from the mother country. How many original works worthy of commemoration have emanated from Australia, New Zealand, the Cape of Good Hope, or even from the Dominion of Canada, unless written by officials from England and for the English market? In truth, the colonists of this continent, writing specially for themselves, have contributed more to the literature of the empire than any other of its dependencies where the English language is generally spoken. India is not a colony, but a vast empire annexed, and its English works of any consequence have been written for the instruction of Englishmen.

The earliest colonial writers were, as might be expected, mere imitators. Indeed, most of them were born and educated in Great Britain. The first independent thinkers on American soil were theologians, and one of the greatest thinkers this country has yet produced was a divine of New England, Jonathan Edwards (1703–58). In all parts of the old country where the theology of Calvin is studied, either for consent or refutation, he ranks as high for strength, depth, and breadth of thought as Barrow, Owen, and Butler. As extensively read in Great Britain, though by a different class and for a different reason, is the long series of discourses known as "Dwight's Theology." Clear in statement, ornate in style, and not contemptible in argument, this large work is as popular with religious persons, particularly the great body of dissenters from Anglicanism, as are the commentaries of Scott and Henry, or even as the sermons and treatises of Chalmers. It is true that Timothy Dwight (1760–1817) lived for a quarter of a century after the full settlement of our republican rule, but his mental development belongs to our first period. In connection with works of colonial theology, the Mather family, and especially its most distinguished member, Cotton (1663–1728), must not be left unnoticed. Dr. Cotton Mather was undoubtedly a man of extensive learning, acquired wholly in New England. Like other learned English writers of the time, he was pedantically fond of showing his scholarship in his works, but the impulses which moved his fertile pen were the conditions and opinions of the land in which he lived. He published nearly 400 books; the greatest and most voluminous being his "Magnalia Christi Americana, an Ecclesiastical History of New England, comprising also an Account of Harvard College, the Indian Wars, and the Notorious Witchcraft Trouble. 'Quorum pars magna fuit.'" And that we may do justice to the South as well as the North in this sketch, we include among the noted theologians of the period Dr. James Blair of Virginia, first president of William and Mary College, who in 1722 published five volumes of homilies on the Sermon on the Mount, highly commended by Doddridge in the last century, and characterized by Bickersteth in this as the best exposition of that divine discourse in the English language.

With the exception of a few books, such as "Good Newes from Virginia," by Alexander Whittaker, in prose, "New England's Prospect," partly in verse, by William Wood, and one or two poems, such as Sandys's translation into English heroic couplets of Ovid's "Metamorphoses," which both Dryden and Pope condescended to praise, and Morell's "Nova Anglia," in Latin hexameters, the publications of the early colonial period were all theological. In addition to the more distinguished names already mentioned, we note Richard Mather, John Eliot the apostle to the Indians, and Thomas Weld, authors of the "Bay Psalm-Book," a metrical version of the Psalter quite as good as that of Sternhold and Hopkins or that at present used in the Church of Scotland; John Cotton and Roger Williams, antagonists in controversial war; and Thomas Shepard, expositor of the Parable of the Ten Virgins.

As soon as the notion of independence began to stir the colonial mind, a new subject of engrossing interest stimulated it to new literary efforts, and religious topics gave place extensively to discussion of the rights of man, the government of nations, and the prerogatives of kings. Many of these discussions were conducted orally, and, because reporting was not then as now an art, they have come down to us in a form even more imperfect than the debates in the British Parliament during the same period. Hence, the reports of the speeches of such men as Patrick Henry in Virginia and James Otis in Massachusetts convey a very inadequate notion of their traditional power. But doubtless the foundation was then laid of that love for popular oratory which has made the term "oration" as common in the United States as it was in Greece and Rome. This American peculiarity has sometimes been chosen as a theme of ridicule both at home and abroad; nevertheless, it is a prominent feature in the history of our literature, and one of which we have not the smallest reason to feel ashamed.

While, however, many American thinkers in politics employed the platform to enunciate their thoughts, still more employed the press, and thus arose a galaxy of writers on political science whose productions deserve the careful study of statesmen. There was Washington himself; there were Adams the elder, Jefferson, Monroe, Madison, Franklin, and Jay, and greatest, perhaps, of them all, Alexander Hamilton, whose speculations were not merely theoretical, the calm studies of leisure hours, but original and practical, the product of a "time that tried men's souls," and implanted that political knowledge which has rendered the problem of self-government a success in the United States, while in France it has hitherto been, and in Spain may be, a failure. Of Hamilton, M. Guizot thus speaks: "Hamilton must be classed among the men who have best known the vital principles and fundamental conditions of a government—not a government like that of France, but a government worthy of its mission and its name. There is not in the Constitution of the United States an element of force, of order, or of duration which he has not powerfully contributed to introduce into it, and caused to predominate." The remarkable expression quoted above as descriptive of the times in which our Revolutionary authors wrote, and

which has taken its place among our household words, we owe to Thomas Paine, whose talents fairly entitle him to a place in the above enumeration. Paine's writings belong as much to England as to America, and underwent many an indignant criticism at the hands of Englishmen; but most of the American authors of the period, Franklin alone excepted, may have been little regarded in the United Kingdom; yet that day is now happily over, and Englishmen, instead of asking "Who reads an American book?" reflect that as Aristotle's politics would have been more complete had he known Carthage more intimately than by name, and Rome otherwise than by a rumor of her existence, so British statesmen may derive useful lessons from the political disquisitions of the founders of the great republic.

Under this head the publications worthy of notice are the official papers of Washington, collected by Jared Sparks, and the works of Franklin, edited by the same; "Novanglus," a history of the dispute with America, "Defence of the Constitutions of Government of the U. S. of America," and "Discourses on Davila," a series of papers on political history, all by John Adams. Particularly we note the "Federalist," mainly the work of Hamilton, but enriched by contributions from Madison and John Jay, author of the "Address to the People of Great Britain."

Along with serious dissertations, political revolutions usually give birth to humorous, witty, and satirical compositions. In this respect the American Revolution is not singular. Such brochures abound both in prose and verse, but they evince no originality, and form no peculiar element in our literary history. True American humor is of later origin. The best known humorous compositions of the time are several poems and prose pieces of Francis Hopkinson, the Hudibrastic poem of "McFingal" by Dr. John Trumbull, and the newspaper contributions of Philip Freneau, which held up the British to ridicule, educated the minds of the American people for independence, and helped to implant in them that settled hostility to England which, fortunately, is now passing away. To this epoch pertains a satire of a different kind, the "Triumph of Infidelity," dedicated to Voltaire, in which Dr. Timothy Dwight proved his versatility, as he did also in an epic called the "Conquest of Canaan" and the descriptive poem "America," in the style of Pope's "Windsor Forest." The "Triumph of Infidelity" is a respectable performance in musical couplets, and some of its sketches rival the delineations of Witherspoon's "Ecclesiastical Characteristics." These were prose pictures of the "moderate party" in the Church of Scotland, of which the author was a minister. The "Characteristics" were published in Scotland before Witherspoon was elected president of Princeton College; and though other works of this distinguished divine first saw the light in America, they have little more claim to a place among American literary works than the metaphysical treatises of his able compatriot and successor, Dr. James McCosh.

During the same period a more pretentious epic than the "Conquest of Canaan" was constructed by Joel Barlow, entitled the "Columbiad;" but as neither ambitious attempt is peculiarly characteristic of American genius, we pass both by without further notice than that they may take rank with Glover's "Leonidas" and Wilkie's "Epigoniad," the former an English, the latter a Scottish effusion.

The humorous and moral writings of Franklin stand alone. They are works of genius, and for all times and places, yet they are also essentially American—the natural embodiment of the prudence, thrift, and worldly wisdom of the Puritans of Massachusetts and the Quakers of Pennsylvania.

Our second period comprises less than forty years. After the Constitution was adopted in 1789, political discussion in its highest and most general sense gradually subsided. During the prolonged presidency of Washington the science of politics degenerated into an opposition of parties, and the country settled down into the normal condition of all republics where elections are frequent. Thus, literature and science began to be cultivated for their own sake, minds followed their own peculiar bent, and the usual divisions of literary history emerge into view. These are miscellaneous literature, including essay and fiction, science, history and biography, jurisprudence, philosophy, and poetry.

Under the first of these divisions we reckon Walsh's long essay written to refute the strictures of the "Edinburgh" and the "Quarterly Review" with respect to the government and people of the United States. It is entitled "An Appeal from the Judgments of Great Britain concerning the American Government and People." The facts, arguments, and style of this essay had a marked effect on the subsequent treatment of American questions in England. Mr. Walsh wrote much for various periodicals and newspapers, and spent the last twenty years of his long life in France as U. S. consul and correspondent of the "National Intelligencer" and the "Journal of Commerce" (1784–1859). William Wirt (1772–1834), one of the most eloquent forensic orators of any country, was the author of "Letters of the British Spy," the "Rainbow," and the "Old Bachelor;" all collections of essays. Some of Wirt's papers—for example, the "Blind Preacher"—are remarkable for pathos and descriptive power, but we have not room to quote them. Walsh and Wirt were the best known essayists of the time, but there were many others of less note. Walsh started the "American Review" (1811), the first quarterly ever attempted in the U. S. After two years it was suspended, but he revived it in 1827, and continued it for ten years.

The chief novelist of the period was Charles Brockden Brown. His genius was gloomy and sensational, but his power was, and still is, acknowledged. His tales, especially the "Sleep-walker," were quite popular in England, their characters and pictures of American scenery being fresh and strange.

In science, Audubon and Wilson are conspicuous—and would be conspicuous in any country—both for the extent of their researches and the beauty of their style. Audubon was a native of Louisiana, while Wilson was a Scotchman, but the subjects of both, the birds of America, render them equally American authors. In mathematics nothing original was produced; but Dr. Day, president of Yale College, led the way, by his mathematical publications, in the composition of educational text-books, for which the Northern States especially have become famous.

The only historical work at all worthy of mention during our second period was the "American Annals" of Abdiel Holmes, D. D., father of the present witty and popular essayist, poet, and novelist, Oliver Wendell Holmes. Of biographies we have some half dozen of Washington alone, the earliest being that by Chief-Justice Marshall.

In jurisprudence this period is conspicuous, being adorned by the great names of Marshall, Kent, and Story, whose reputation is world-wide, and to whom the English bar is nearly as much indebted as our own.

The philosophy of the period was closely connected with its theology. Samuel Stanhope Smith, D. D. (1750–1819), one of the presidents of Princeton, wrote on the "Variety of Complexion and Figure of the Human Species," which caused much discussion. The Rev. John Sherman (1772–1828), besides writing the first elaborate defence of Unitarianism in America, published also "The Philosophy of Language."

Our third period extends from the rise of Washington Irving to the present day.

Although inferior in genius to Bryant, Hawthorne, and Longfellow, and scarcely equal as an historian to Prescott and Motley, still, Irving having a name at once more famous and more dearly loved than any other in the annals of American literature, we instinctively feel that his rise as an author fitly marks the beginning of its latest and, as yet, its most brilliant epoch. The literature of this period, being more fully developed in all branches than that of the preceding, will admit of distribution under the following leading general heads: 1, Poetry; 2, Novels; 3, History and Biography; 4, Criticism and Philosophy; 5, Political Science; 6, General Science; 7, Theology; and 8, Miscellaneous Writers, as of essays, travels, sketches, and orations.

Of the poets of this period, the greatest are Bryant and Longfellow. As a versifier, Professor Longfellow is the most skilful that the U. S. have ever produced. In this art he is inferior only to Tennyson, and both these distinguished men have made it a special study, as Milton did before them when he set the sentiment of "Paradise Lost" to a sustained harmony which resembles a grand organ accompaniment. Poe did the same thing in his short poem of "The Bells," but his is a mere song, while theirs is a symphony. Milton's, indeed, is, as it were, a prolonged oratorio, and perhaps such strains came to him without study, as he talks of "unpremeditated verse" and "thoughts that voluntary move harmonious numbers." But whether this be true or no, Prof. Longfellow has, like Tennyson, diligently studied this art of Milton. Longellow's poetry is far more voluminous and varied and brilliant than Bryant's; and had neither poet undertaken the task of translating a large work, we should have had no hesitation in crowning Longfellow as the laureate of America. But Bryant's translations of the "Iliad" and the "Odyssey" have set the seal to his poetic fame. Mr. Longfellow had been noted for successful rendering from many languages, but the task he set himself of giving us the "Divina Commedia" literally, and yet in good pentameters, was so difficult that he has lost in spirit what he has gained in imitation. Byron attempted the same thing in rendering the episode of Francesca, with the additional fetter of rhyme. The obscurity incident to this double difficulty Longfellow has generally escaped, but

it seems a higher effort of skill to transfuse idea and spirit than to achieve literality. The latter may be wonderful, the former is re-creative. Still, it is not our desire to arbitrate between Bryant and Longfellow.

"Let old Timotheus yield the prize,
Or both divide the crown."

One of the most remarkable productions of American genius and skill is Bayard Taylor's translation of Goethe's "Faust."

The greater part, by far, of American poetry, has, as we might expect, been contributed to newspapers and magazines, and thereafter collected into volumes. It thus consists mainly of fugitive pieces, which, from their very nature, have not received the last polish of permanent productions. And, considering this, they compare favorably with other English poems of the same class. Only a few authors, such as Longfellow, have written verses as mere literary men. The U. S. cannot yet boast of Chaucers, Spensers, Miltons, Drydens, and Popes. The custom of the times has been much more favorable to periodical publication than it was in the days of the great men whose names fill the early roll of English authors; so much so, indeed, that even long works have lately been given to the reader in serial form. This peculiarity of the age has not encouraged an unmixed devotion to letters and the habit of producing extended poems. Longfellow, however, has entered the field of pure literature, and acquitted himself not ingloriously. He has given us several long poems, which, though not of the impassioned character of Byron's, nor lofty as those of Cowper and Wordsworth, are beautiful, pleasing, and characteristic. His "New England Tragedy" is so unlike the tragedy of Shakspeare and others as to be almost a misnomer, and his narrative poetry is so dissimilar to that of Scott, Moore, Morris, and the Brownings that we cannot class him with them; but his "Evangeline," "Miles Standish," and "Hiawatha" are fine works notwithstanding, and come nearer to satisfying the desire for purely American poetry than any others in the language. He has tried more experiments in versification than any other poet but Southey. "Evangeline" and "The Courtship of Miles Standish" are successful modifications of dactylic hexameter; and "Hiawatha" is written in trochaic tetrameters, without rhyme. In a work of such length the verse, not admitting the variety of heroics, becomes somewhat monotonous, but has proved on the whole a great success. Of other long poems, the "Culprit Fay" of Rodman Drake, the "Snow-bound" of Whittier, and the "Frontenac" of Alfred Street, are agreeable specimens. The latter two are full of faithful description of American scenery. J. R. Lowell is especially distinguished for the versatility of his powers. As a humorist he has few if any superiors, and in some of the higher departments of poetry he has scarcely an equal in our country.

Accomplished versifiers are so numerous in the U. S., and have given to the world so many pieces deserving preservation, that, however much we desire, we have not space to enumerate them. This, however, we must add as peculiar to the country, that education is so universal, and the temperament of American women so impressible, that the U. S. can claim a greater number of female poets who have written graceful, melodious, and tender verses than any other country in Christendom.

American novels are becoming extremely numerous, but only a few have any bearing on the development of American literature. Yet it is something to be able to venture the opinion that the finest tale of the century has been written in New England. The "Scarlet Letter" of Nathaniel Hawthorne, in its story, its characters, its dialogue, and its scenery, is equal to any Greek tragedy. There hangs over it the gloom of fate, and the whole plot is worked out with a skill and felicity that we find nowhere else in the annals of modern fiction. His "House with the Seven Gables" was another effort in the same direction, but not so successful. For some reason, a bookseller's probably, the story is huddled up, like Scott's "Black Dwarf," and the trial-scene, which, in Scott's hands, would have been the greatest in the book, is a failure. The long introduction to the "Scarlet Letter" clearly implies a resolution to write a series of New England tales. Had Hawthorne carried out this resolve, he would have perhaps rivalled Scott in fame.

The novels of Fenimore Cooper have had their influence on the reputation of America, but their effect on American literature is not conspicuous. His delineations of ocean and forest are drawn with the genius of an artist, but his Indian heroes are not copied from life. The original of Uncas has nowhere been met with, but we admit that in Leatherstocking he has created a character which bears successive reintroductions as well as Scott's Dugald Dalgetty or Thackeray's Major Pendennis and Captain Costigan.

Other novelists, some of whose stories may live, are William Gilmore Simms, Bayard Taylor, Oliver Wendell Holmes, Herman Melville, Marion Harland, etc. The chivalrous character and heroic death of Theodore Winthrop have invested his tales with an interest, over and above their intrinsic merit, which will long preserve them in his own country, while the anti-slavery tales of Mrs. Harriet Beecher Stowe, besides their native power, possess an historical value, as connected with emancipation in America and the great civil war, that will cause them to be read for generations to come. Posterity will not willingly let them die.

After novels come next in our order history and biography. The historians of the United States stand very high in English literature. The lives of Mohammed, Columbus, and Washington by Irving; the voluminous history of the United States by Bancroft, and the same, from a somewhat different point of view, by Hildreth; the history of Ferdinand and Isabella, of the conquest of Mexico and Peru, and of Philip II. by Prescott; the history of Charles the Bold by Kirk; and the histories by Motley, the Macaulay of America, and by Greeley, are all standard works, the fruit of careful, laborious, and extensive research, written in the dignified style that true history demands, yet aiming, according to the modern idea of history, to re-create the past, and deservedly assigned to the highest rank in prose, as the epic is to the highest rank in poetical composition. The Church histories of Schaff and H. B. Smith, and the denominational histories of Stevens, Dexter, and Benedict, are of the highest rank.

Besides the biographies and histories already mentioned, we cannot pass over the "Annals of the American Pulpit" by Dr. Sprague, a voluminous work that must serve as the quarry from which future ecclesiastical historians will dig their materials; and the biographies which have already proceeded from the pen of James Parton, who, though born in England, was reared in the United States, and whose style, a little journalistic, is yet vivacious and energetic to an extraordinary degree. Other biographers and historians we must leave unnamed, as not constituting important factors in the development of American literature; but at the close we shall recommend to the student a few collections where every author in the least degree known to fame is recorded, his biography outlined, and his works individually characterized.

After history and biography our next division is criticism and philosophy. Were we to specify merely the names of all the writers who are known to read critical lectures and contribute criticisms to American periodicals, our list would be a long one. We can mention only some of those whose critical labors have taken the shape of volumes.

American commentators on Shakspeare claim the first place. The chief of these are Richard Henry Dana, Gulian C. Verplanck, Richard Grant White, Henry Norman Hudson, H. H. Furness, and W. J. Rolfe. The ability of these writers is generally acknowledged on both sides of the Atlantic.

The "Encyclopædia" of the Duyckinck brothers is the most complete, indeed the only adequate, exponent of American literature down to 1856; and doubtless will be supplemented. Mr. Edwin P. Whipple has produced one of the most interesting works in the language on the "Literature of the Age of Elizabeth." Recently, Professor Lowell has published two popular volumes of lighter criticism—"Among my Books" and "My Study Window." He had previously delivered a course of lectures on the English poets, and edited several of the reprints in Little and Brown's series of the "British Poets." Mr. George Ripley has also edited fourteen volumes of "Specimens of Foreign Literature," and, with Bayard Taylor, a "Hand-book of Literature and the Fine Arts."

Among the addresses and orations so frequently delivered before literary societies in the U. S., critical discourses of merit are to be found.

In philosophy, America has not yet done much that is new. Many excellent text-books for colleges have been composed, the last being that of President Porter of Yale; but the only researches in philosophy that can claim originality are the "Moral Science" and the "Rational Psychology" of Dr. L. P. Hickok. Hickok is a disciple of Kant, and has endeavored to improve on the system of his master; but, like his master, he has had the misfortune to be misunderstood, and reviewed by persons who have not taken the trouble to comprehend him. His "Rational Psychology," starting from the primitive intuitions of space and time, professes to determine how an intellect must be constituted in order to cognize a universe or nature of things. The work is profound and very ingenious, and, like Kant's, may come to be better appreciated in the future. The introduction to his "Rational Cosmology," determining the conditions of a perfect science, is a valuable contribution to philosophy. The lectures on moral science by Drs. Wayland, Hopkins, Alexander, and others are well worthy of study.

In political science, including international law, our most distinguished writings are those of Dr. Lieber, President Woolsey, Prof. Wheaton, and the speeches of Calhoun, Webster, Seward, and other prominent statesmen.

In general science the names of Silliman, Henry, Bache, Pierce, Hare, Peters, Young, Blodget, F. A. P. Barnard, Hitchcock, Dana, Rood, Torrey, Gould, and Gray are as well known in England as in America. In philology and classical learning we may cite the names of Tayler Lewis, Anthon, Hadley, Harkness, and Goodwin.

In theology the foremost name, for depth and ability, is that of Dr. Hodge—perhaps the most able defender and the clearest expounder of the Calvinistic system in these later times. His colleague, Dr. Addison Alexander, has contributed some of the finest papers in the "Princeton Review," and Dr. Bushnell, in accordance with a less rigid creed, has written eloquently on "Christian Theology," "Nature and the Supernatural," "Politics of the Law of God," and "Moral Uses of Dark Things." The Protestant Episcopal Church has given us Adams's "Elements of Christian Science," an ingenious attempt to extract a system of philosophy from the Holy Scriptures. New England Congregationalism has produced such eminent names as Hopkins, Bellamy, Emmons, Stuart, and Taylor. Among rationalistic writers, Theodore Parker, John Weiss, and O. B. Frothingham should be mentioned. The late Dr. McClintock was a Methodist theologian of great learning and ability.

The authors of orations, essays, sketches, and other miscellaneous writings are so numerous, and their themes are so various, that only a very few can be here noticed. The oration is a composition almost peculiar to America. At college commencements, before lyceums—which are scattered all over the country—and on all important public occasions the foremost men in the land find both fame and profit by the delivery of orations. Many of these are too ambitious in style, but some of them may be pronounced models of eloquence in this particular department. The orations of Edward Everett will compare favorably with those of the rectors of the Scottish universities, even with the celebrated addresses of Brougham and Peel to the students of Glasgow. Other orators of the same class are Beecher, Chapin, Whipple, Emerson, Holmes, Saxe, Phillips, Curtis, and Sumner. The most popular essayists are Holmes in the "Breakfast Table" papers, Parton, T. W. Higginson, Grace Greenwood, Gail Hamilton, and others. Emerson's name is one of the first in American literature. His friend Thoreau, a man of rare though erratic genius, has written much that is peculiarly American. Among writers upon education the first rank is occupied by such men as Horace Mann, George B. Emerson, Henry Barnard, and F. A. P. Barnard.

In the foremost rank of American authors of light literature, as well as of historical biography, stands Washington Irving. He was the first to make generally known in Europe that the U. S. could really produce and relish writings of true artistic genius. The issue of his "Sketch-Book" by John Murray of London was, in fact, a literary event, and marks, as we have said, the rise of the present period of cis-Atlantic authorship. The work was refused at first by the English booksellers, and it was only through the persuasion of Sir Walter Scott that Mr. Murray consented to risk its publication. We have lived to see Irving's eminent merit recognized throughout the republic of letters, and to enjoy Thackeray's cordial declaration that Irving was "the first ambassador whom the New World of letters sent to the Old." Not excelled, perhaps not equalled, in description, humor, and pathos by any other American writer, he has, at least, the advantage of being earliest in the field as a widely-acknowledged literary artist; and neither the power of Wirt's "Blind Preacher," nor the exquisite beauty of Hawthorne's minor tales, with all their charm of New England habit and landscape, has been able to wean our affection from Irving's dear Hudson River and the eccentricities of his darling Dutchmen, whom, while he satirized, he yet loved with all his kind heart. The Knickerbockers, who were at first offended, are now among the readiest to recognize his claim as the greatest of American descriptive essayists.

Since the fuller opening of the great West a new variety of literature has sprung up. It is highly humorous, either graphically describing or cleverly burlesquing the manners and customs of that new region. Even its singular dialect is pressed into the service. The rising luminaries of this late dawn are Bret Harte, John Hay, Joaquin Miller, and Mark Twain. Twain's "Innocents Abroad" is one of the most amusing books of travel in the English language—if indeed the language can always be called English—and his later work, called "Roughing It," is in the same style—a little coarse occasionally, but often eloquent in a high degree. Artemus Ward (C. F. Browne) and others, like him and Mark Twain (Clemens), writing under feigned names, belong to the same school, and are the founders of a style and a humor original and peculiar to this continent.

Readers who desire a full and particular account of American literature in all its branches may be referred to Duyckinck's "Encyclopædia of American Literature," Griswold's "Poets and Prose Writers of America," Underwood's "Handbook," and Hart's "Manual of American Literature." In these compilations no name at all known to fame, local or extended, is omitted, and the illustrative extracts are varied and generally well chosen.

J. THOMAS.

English River, an estuary of South-eastern Africa, communicates with Delagoa Bay, about lat. 25° 58′ S. and lon. 32° 36′ E.

English River, a township of Keokuk co., Ia. P. 1221.

English River, a township of Washington co., Ia. Pop. 1501.

English Seventh-Day Baptists. See SEVENTH-DAY BAPTISTS.

Engrafting. See GRAFTING.

Engrailed, in heraldry, a line or other object edged with small semicircles or crescents, the points of which are turned outward.

Engraving. Engraving on precious stones, glass, or metals, in such a manner as to represent the figures or objects in relief, is a very ancient art, and, strictly speaking, a branch of sculpture.

We shall in this article confine ourselves wholly to the engraving, on metal or wood, of figures or designs, in such a way that when charged with any coloring-matter and pressed upon paper or parchment, an exact representation, in outline and shadow, of the engraved figures or designs will be produced. The impressions thus made are called engravings. This term is also applied in popular language to stone-printing or lithography, but as ordinarily there are no incisions made upon the face of the stone, and the processes differ widely from engraving proper, we prefer to treat of this branch of art under its appropriate title.

Engraving, in this restricted sense, is a modern invention, and grew into use and importance with the art of printing, of which, in fact, it forms a constituent part. Whether we consider the difficulty attending its execution, its value in multiplying the essentials of other departments of art, its use in illustrating science and industrial processes, engraving takes an elevated position, both from an æsthetic and a practical point of view.

In giving some account of the technical processes of various kinds of engraving we shall not hold in mind the necessities of the professional engraver seeking aid for perfecting himself in the art, but rather those of the general reader or connoisseur, who seeks the elementary knowledge requisite for an intelligent estimate of the best products of the engraver's skill. It has been well said by Adam Bartsch that it is impossible to convey in writing any but the most general instructions regarding the technical processes of the art. We shall, therefore, in the outline which we propose to give, exclude all details of handling not pertinent to the end we have in view.*

1. *Wood Engraving.*—This is the most ancient branch of the art, and for the purposes of illustration has been held to be of the greatest value from the time of its introduction. Boxwood is most generally used by engravers, although any hard and close-grained wood may be made available. It is first sawed across the fibre, in thickness equal to the length of ordinary metal types. The surface of the wood is then made smooth and covered with flake-white. Upon this is drawn in fine lines with pen or lead-pencil the design required. In many instances now the expense of drawing is entirely superseded by photographing, directly upon the block, the subject to be engraved; and there is still another process in use whereby the subject is copied by transferring an impression with ink upon the block, which also avoids the expense of drawing and greatly facilitates the work of the engraver. The white or untouched parts between the lines of the drawing are then cut out by means of variously formed chisels and gouges. This process leaves the outlines and shadows elevated, like the faces of type in a printer's form. When the blocks are inked by an ordinary roller, impressions may be taken off upon paper by means of a press. In point of fact, however, the wooden blocks are now scarcely ever used for printing. When the engraver's work upon the wood has been completed, a

**Publisher's Note.*—For a more practical view of some of the details of engraving, see the article ENGRAVING STEEL AND COPPER PLATES, ETC., written by a practical steel engraver of New York City. Though the two articles to some extent cover the same ground, their great excellence will, it is believed, warrant the publication of both.

mould of wax is taken from the block, and within this mould a thin plate of copper is deposited by electro-galvanic action. Upon the back of this copper a casting of type-metal is fixed, which by means of tin-foil is amalgamated with the copper, forming a solid plate of sufficient strength to be securely fastened upon a wooden block of the proper thickness for the printer's form. By this means also, a much larger number of clear impressions can be secured than from the block itself. In wood engraving effects are generally produced by parallel lines. In finer work, however, cross-hatching (or the use of lines transversely intersecting each other) is introduced, by which artists approach the delicate transitions and effects of line engraving on steel or copper.

2. *Etching.*—For this process a plate of metal, generally copper, is prepared with a perfectly even and smooth surface. It is then thinly covered with a varnish composed of various proportions of white wax, black and white pitch, and asphaltum. This varnish, technically called the "ground," is spread in a thin coating over the prepared plate, and afterwards smoked to give a black surface, the better to show the drawing of the artist's design. The drawing is made in reverse upon the varnished plate, generally by transfer of a drawing made upon paper with colored chalk. When the outlines are clearly marked upon the blackened surface, they are cut through the varnish by the etching-needle, laying bare the surface of the copper or metal used. The etching-needle is a steel instrument similar to a sharpened lead-pencil, and points of different degrees of fineness are used as a finer or heavier line is desired. When the outlines and shadows of the object to be etched are thus cut through the "ground," a rim, or dike, of wax is made around the border of the plate, and some corroding mixture (generally nitric acid mixed with an equal quantity of water) is poured upon the plate. By the action of the acid the lines laid bare with the etching-needle are bitten into the plate, each with a breadth corresponding to the surface laid bare by the needle. If it is desired that the lines shall be of unequal depth, the acid is poured off, and the lines whose depth is deemed sufficient are in technical language "stopped out" by being washed with water, dried, and covered with varnish, while upon the remaining parts the process of corrosion is continued till the unprotected lines are as deep as the etcher may desire. The ground or varnish is then removed from the plate, the oxidized portions are cleansed, and a proof is taken. If the work is in any part unsuccessful, it may be touched up and rendered more expressive by the "dry-point." This is a fine and sharply pointed steel instrument, by which scratches or shallow grooves of great delicacy are made on the smooth portion of the plate. Some etchers use the dry-point very little, if at all. Others rely upon it for their finest effects.

3. *Line Engraving.*—This is the most elaborate and costly process for the reproduction of works of art. The metal plates, whether of copper or softened steel, are prepared as for etching, but with a more careful polish. The work of art to be engraved is drawn from the original in the reduced size required for the engraving. The plate is generally covered with a thin coating of wax. The pencil drawing is then laid with its face upon the wax, and gently rubbed by a burnisher. This, as in the preparation for etching, transfers the outline to the wax. The design is then traced through the wax upon the metal with an etching-needle. The wax, when melted off, leaves the outline marked on the plate, ready for the burin. The burin or graver is a square, or lozenge-shaped, piece of steel inserted in a pear-shaped handle, the instrument itself being sufficiently thick not to bend under strong pressure of the hand. The end is diagonally ground, so that one side of the instrument presents an acute angle, which, when pushed forward by the hand, cuts out triangular grooves in the metal. The burnisher, above alluded to, is a piece of hardened steel, smooth and rounded for the purpose of toning down work too deeply cut, or for polishing the plate in case of accident to the surface. The "scraper," also used, is a triangular piece of steel, otherwise shaped like a knife, with its angles brought to a sharp edge, and inserted in a handle. This is used to scrape off the furrow of metal which is raised on the plate by the action of the graver. This raised furrow is called the "burr." Thus equipped, the engraver cuts grooves into the plate which, when filled with ink, come to represent by their curves, crossings, and varying depth and breadth all the outlines, shadows, and transitions of the picture from which he works. Of the combination of other modes of engraving with lines we shall speak hereafter.

4. *Mezzotint.*—This process was invented at a later period than either of those which we have described. It has been attributed to Prince Rupert by some, but on the authority of Heinecken to a German military officer named Von Siegen. The plate should be prepared as for the graver. By the means of a rocker used by the hand, or a machine covered with fine teeth, the whole surface of the plate is covered with a compact series of minute incisions—so compact that if filled with ink the plate would give a printed surface on paper quite black. Upon this surface, thus covered with "burr," the outlines of the picture are drawn, and where lights are desired the burr is removed by the scraper and made smooth by the burnisher. The transitions from the high lights to the deep shadows are delicately marked by the continuously increasing amount of the "burr" which is left on the plate.

5. *Stippling.*—This consists in puncturing the metal plate by dots made with the point of the graver or by corrosion with acid. Sometimes these dots are made by slight blows upon the graver. The greater or less number of these dots gives in printing all varieties of shading. This was a favorite method with Bartolozzi and his school.

6. *Aquatint.*—This method of engraving, now little used, is designed to imitate drawings in India ink, bistre, or sepia, especially those which are on a large scale. The method generally followed is this: The outline of the objects is first etched in the usual manner. The plate, when cleaned, is evenly covered with finely powdered mastic. It is then warmed till the mastic particles are melted sufficiently to cause them to adhere to the plate. Between the particles of the mastic bare spots are left, upon which the acid can afterwards act. Upon those parts of the plate where shadows are not required a thick varnish is laid on with a brush, to protect it. The acid is then poured on as in etching. When the lightest shadows are sufficiently bitten by the acid, those parts are stopped out by varnish, and the work is permitted to go on until the deepest shadows are finished. For landscapes or trees, where special freedom is required, modifications of this process are made which are not sufficiently important for description.

7. *Graphotype.*—This is a modern invention, a description of which we copy from a recent writer: "Finely powdered chalk is spread thickly on a metal plate, and then subjected to hydraulic pressure till it becomes a solid mass with a beautiful white surface, slightly shining, but not inconveniently brilliant. On this surface the artist draws in a glutinous ink, perfectly black, flowing from a finely pointed little brush; the pen cannot be used, on account of the friability of the chalk. The ink glues the particles of chalk where it passes, and when the drawing is complete the white spaces between the lines are easily hollowed by rubbing them gently with a piece of velvet or a light brush. The black lines remain in relief, like the lines of a wood-cut. The plate is then dipped in a solution of flint, and so hardened, after which a stereotype cast or an electrotype copy is taken from it, and this is used as a stereotype or electrotype." The effect produced is somewhat similar to that of wood engraving.

8. *Combination of Processes.*—For the sake of clearness we have described the different modes of engraving as distinct processes, but they are quite often combined. In etching, the dry-point is constantly made use of, and not seldom the graver. In line engravings the outlines are often etched, while the most important and expressive parts are worked out with the graver. Stippling is made use of at times to give softness to the expression of the face. In etching, parts of the plate are sometimes made to give delicate shadows and transitions by the "burr" used in mezzotint. In line engraving, short lines or dots are inserted in the lozenge-shaped intervals between the cross hatchings made by the graver.

9. *Handling.*—Every engraver of note adopts some methods of producing his desired effects peculiar to himself. This is technically called "handling." Many of the elements which enter into handling are common to the painter and the engraver. Both alike must attend to drawing, anatomy, and perspective, both linear and aërial; to chiaroscuro, or the general distribution of lights and shadows in a picture, and the various gradations of depth and delicacy of the latter as they recede from the focus of light. They must both alike seek for truth and force in the representation of the outline surface and texture of bodies; they must alike take account of the variations which distance, quality of the light, and atmosphere produce in objects by their manifold changes. In addition to these, the engraver (if he does not engrave his own design) must be a translator of another's thought into a different language. This he can never accomplish without the greatest familiarity with his own language, as well as that of the painter. Literal interpretation will fail as really as in the case of translating a great poem. The chief study of the engraver is so to arrange his lines as to mark the character of each object and feature, distinguish it from every other, and give it the proper prominence and importance with regard to the total scene or event which the picture is designed to represent. The color of the picture, it is true, cannot be, strictly speak-

ing, translated, but it is possible to convey an accurate idea of the relations of the lights and shadows which the different colors embody. Painters select colors with reference to their desire to make special objects prominent, and to attract and fix upon them the eye of the spectator. Now, the engraver, if he cannot imitate the *color*, can produce by his lines such an effect as shall imitate the *emphasis* which the painter expresses by actual color. From this point of view critics speak of "color" in an engraving. The methods in which different artists express color, flesh, hair, drapery, etc. would extend this article beyond the limits we have set to ourselves. These are best studied by the learner in the works of eminent engravers through a comparison of their methods with each other.

10. *Printing.*—Much of the effect of all engravings is dependent upon printing. In wood engraving, by reason of the lines being raised in relief like types, the difficulty of printing is less than in other branches of the art. It requires, however, to make good impressions, all the accessories for the best work of the printer's art. Clearness, delicacy, and softness in wood-cuts are greatly dependent upon the skill and judgment of the printer. In those departments of the art in which the ink or coloring-matter is received into grooves or dots sunk beneath the surface, the process of printing is much slower and more difficult. The ink is forced carefully into the depressions with a soft ball or dabber, and afterwards the portions of the plate between the grooves, and also the lightly worked parts which represent the lights, are carefully cleaned with a soft cloth and the palm of the hand before it is ready for the press. This process is a slow one, and requires special training on the part of workmen. The printing of etchings is so important that many etchers provide themselves with hand-presses, and work off their own proofs. Hamerton, in his "Etching and Etchers," names specially one house in Paris and one in London which alone he speaks of as capable of good work in printing etchings. A copper plate soon wears so much as to give blurred and imperfect impressions. Two hundred impressions of an etching and five hundred of a line engraving are said to be the limit which a copper plate can furnish without an appreciable deterioration of quality. Since the art of coating the copper plates with a thin layer of steel has been introduced, a much larger number can be produced. Since the time of our countryman, Jacob Perkins, who introduced the use of steel plates, copper has been to a great extent laid aside, so far as line and mezzotint engraving is concerned. Steel has been made especially useful in engraving banknotes, in which especial complications and delicacy of lines are desirable in order to increase the difficulty of counterfeiting. Engraved steel plates, when hardened, are capable of giving to steel cylinders rolled over them, under enormous pressure, a representation in relief of the sunken lines of the plate. These cylinders, when hardened, are made to transfer the lines to other plates of softened metal, which in turn are hardened and used for printing. These plates, when worn, are retouched by reapplication of the same cylinders. In this way plates may be duplicated, or the same plate be made to give an almost unlimited number of impressions.

At an early period the practice of using two or more blocks in wood engraving was introduced. The outline was made by one block, and the different degrees of shading by others. This was called engraving in chiaroscuro. This led to printing in gradations of color by means of several blocks, each giving a single color or shade. This has been carried to a high degree of perfection. A similar process has been introduced in lithography. By this means chromo-lithographs, as they are called, have been printed which imitate the colors of small pictures with an accuracy which, though necessarily somewhat mechanical, is really surprising. In all methods which lay on colors by successively applied stones or blocks the matter of printing becomes of chief importance.

11. *Painter-Engravers.*—This is the designation given by Bartsch to those artists who have engraved their own designs, either as studies for paintings or with a purpose of giving them no further representation in color. These works are not translations or copies, as are ordinary engravings, but real autographs—direct expressions of the artist's mind. In the modern tendency to specialize and divide labor, artists have to a great extent laid aside this practice, but with the older artists it was very common. Collectors place a high value upon these autographs. They are becoming rare, and are of course much advanced in commercial value. Bartsch's great work ("Peintre-Graveur," in 21 vols.) is devoted entirely to engravings and etchings of this class.

12. *Relative Artistic Value.*—The relative importance, for art purposes, of the different modes of engraving is difficult to determine. Each has its own advantages and limitations. New processes like the graphotype have not yet been sufficiently tested to determine their permanent value. Wood engraving has a very decided advantage over the other forms of the art in respect to cheapness and facility of execution and printing. These circumstances adapt it to the purpose of illustrating books, magazines, and newspapers, and also render it liable to degradation through haste and carelessness in execution. In the hands of good artists, however, it is capable of high excellence. The best wood engraving has a softness and grace which are attractive to all. But in all the elements of truthfulness and force the distinct, sharp lines of the etching-needle and dry-point are vastly superior. In etching, the artist must secure his effects by clear outlines, each of which must tell its own distinct story. The softness and amenity of wood engraving are denied to the etcher, but he may accomplish results which are vastly superior in all the higher elements of expression. For this very reason etching is never popular with persons untaught in the grammar of art. It generally fails in rendering the delicate gradations of shadow in clouds, and rarely succeeds in perfect modelling of flesh. But in "freedom, precision, and power" it is superior to all methods of engraving. For this reason, high success in etching requires special capacity, which stands somewhat apart from the art-faculty in general.

Mezzotint, like wood engraving, is popular from its softness and the perfect gradations of tint which it secures. The process is also cheaper than that of line engraving, and the facility with which it can represent strong contrasts in lights and darks and the faces of the young and fair make it a process next in popularity to wood engraving. In the hands of masters like Earlom, McArdell, and Bond it has given us works of great beauty and power. Line engraving, if not the most difficult, is the most laborious method of engraving, and for this reason, as well as for its inherent capacity for force and variety of effect, stands in the first rank among methods of engraving. It is likely, by the time which it consumes and the great manual dexterity which it requires, to become mechanical, and deficient in the breadth, freedom, and boldness of etching. But when, under the hand of a real artist, it combines these elements with perfect moulding of flesh, delicacy of tone, and gradation of shadows, it stands unrivalled among its sister branches of the art. The strength of Goltzius and Cornelius Visscher, the bold relief and brilliant contrasts of Strange and Edelinck, the aërial grace and spiritual expression of Raphael Morghen and Toschi, are sufficient to vindicate the claim of line engraving to the position which the common judgment has assigned it.

History of Engraving.—The origin of this invention is obscure. It is, however, well settled that playing cards were printed from wood blocks in the beginning of the fourteenth century, and this is ordinarily supposed to be the origin of the invention. Papillon, a French wood engraver, and author of a treatise on wood engraving in two volumes (Paris, 1766), professed, however, to have seen a volume of wood-cuts engraved at Ravenna by Alexander Alberic Cunio and his twin-sister Isabella, during the papacy of Honorius IV., A. D. 1285–87. The practice of printing cards from wood blocks continued in various parts of Europe through the fourteenth and fifteenth centuries. In the early part of the fifteenth century images of saints and other religious pictures were produced. A picture of St. Christopher, dated 1423, was until recently regarded as the earliest known wood-cut with a date, but within a few years past it has been claimed that earlier dated specimens have been discovered. At this same period, within the first half of the fifteenth century, began to appear in Holland and Germany those works now known as block-books (see TYPOGRAPHY), which were printed from engraved wood blocks. Immediately on the invention of printing with movable type, ornamental letters were cut on wood and used to beautify the printed pages. The Psalter of Gutenberg (1457) was thus ornamented. The idea seems to have been to imitate manuscript of the period, and in 1475 a Durandus was published by Zainer, at Ulm, with an ornamental vignette border to the first page, after which such borders engraved on wood were frequently used. The first book with wood-cut illustrations was a book of fables, printed at Bamberg by Pfister in 1461. Numerous books of the fifteenth century were illustrated with wood-cuts, and the art was extensively practised. We do not know the names of any wood engravers of the earliest period, but towards the close of the century we begin to meet with names. Michael Wohlgemuth is among the first, if he be not the first, wood engraver whose name can be connected with his work. To him are attributed the illustrations of the great "Chronicle" of Schedel, commonly called the "Nuremberg Chronicle," published at Nuremberg in 1493; and he is named in the work as one of the superintendents of its execution.

The early style of wood engraving was rude, but not

without artistic force. In general, however, little was attempted by the early engravers beyond outline representation. Shading and what is sometimes called "color" were unknown at the first. The earliest specimen of shading by cross lines, commonly called cross-hatching, is found in a wood-cut on the title-page of Breydenbach (Mentz, 1486).

Wohlgemuth dealt freely in heavy shading, and other work of his time shows the advance of the art in Germany. It was not, however, until the influence of Albert Dürer began to be felt that the old conventional styles were abandoned. Dürer was a pupil of Wohlgemuth. In 1498 he published his "Apocalypsis." It was the beginning of a new era in the art. Dürer applied to the work of drawing on wood, in so far as they were applicable, the same principles which governed oil painting. The result was that a wood engraving became a history or a poem. Germany at first, and afterward all Europe, felt the new inspiration. Artists appeared in all directions, and the most eminent painters did not disdain to draw on wood. During the sixteenth century a very large proportion of published books were illustrated with wood-cuts. Even statutes and books of instruction in the practice of law were illustrated. Contemporary with Dürer were such artists as Hans Burgmair, Hans Schauffelin, Urse Graff, Wechtlin, Holbein, Lucas Cranach, and many others in Germany. In regard to Hans Holbein's engravings much uncertainty exists. Some inferior work is signed with his name or initials, and pretty much all the good work of the period is attributed to him by his admirers.

Considerable discussion has been wasted on the question whether any, and if any which, of the artists actually cut wood blocks with the graver. The subject is of slight importance. They drew pictures on the wood to be engraved there, and probably directed the workmen if they did not handle the tools. They are as properly called wood engravers as Canova and Thorwaldsen are called sculptors. Lucas Cranach appears to have been the inventor of the application of wood engraving to printing in chiaroscuro, which consisted in the engraving of two or more blocks to be used in impressing different colors on the same print. An engraving of this kind by Cranach is extant, bearing date 1509. Ugo da Carpi in Italy, about 1518, adopted the suggestion of Cranach, or invented the plan anew, and the art reached great perfection in Italy, though almost abandoned in Germany.

In France the art of wood engraving was seized with alacrity in the latter part of the fifteenth century, and applied with great skill to the ornamentation of the borders of pages. The superb books of devotion which issued from the Parisian presses at this period are unrivalled elsewhere. It is impossible, however, to name with any certainty a French engraver on wood until the period of the fine issues of the presses at Lyons, after 1520, when Bernard Solomon, commonly called "Little Bernard," executed very beautiful illustrations of the Bible, Ovid, etc.

The early history of the art in Italy is also obscure. Some Italian publications of the fifteenth century seem to have been illustrated by German workmen or from their designs. Others, however, are unmistakably Italian, the vast superiority of drawing, especially of the human form, being at once visible.

At the close of the fifteenth and beginning of the sixteenth century there seems to have been in the north of Italy, possibly at Venice, an artist on wood who was employed by the book publishers in that city, in Milan, and elsewhere, and who was evidently the father of the art in Italy. Numerous cuts by him are found with the signature J A, and the name Joan Andrea has been given to him. His name is, however, doubtful. The "Poliphilus" published by Aldus (1499) was doubtless illustrated by him, and is the masterpiece of wood-cut illustration in Italy for the fifteenth century.

The art flourished in Europe till the close of the sixteenth century, when its decadence was manifest, and in the seventeenth century it passed almost entirely out of use, except in rude and worthless styles, of which examples are seen in old chap-books and cheap works for the common people. Metal engraving had usurped its place in the illustration of books. The revival of the art is to be attributed to Thomas Bewick, an English wood engraver (born 1753), whose "British Birds" (1804), drawn and engraved by himself, present manifold instances of rare truthfulness and beauty. His work, at first rude, improved rapidly, and at length took high rank in the art. He was followed by his own pupils and by a succession of others, but it is only since 1830 that the art began to assume the high character which it now possesses. At present few of the eminent artists who draw on wood engrave their own designs. It is consequently difficult to determine the relative contributions to the total excellence of the brilliant wood engraving of the present day which have been made respectively by the draughtsman and the engraver. The importance of division of labor is so well understood that the draughtsman and engraver are seldom the same person. Some of the best painters draw on blocks for engravers, whose work is to give an adequate representation of the design. Birket Foster, Harrison Weir, John Tenniel, Gilbert Maclise, Stanfield, Leech, Doyle, Creswick, either painters or professional draughtsmen on wood, have been interpreted by Evans, Vizitelly, Greenaway, Palmer, Wright, Dalziel, Folkard, Thomas, Swan, and Williams. (A long list of designers and engravers on wood will be found at the end of the eighth chapter of JACKSON and CHATTO's "History of Wood Engraving.")

The origin of the art of metal engraving has been disputed. Germany claims that the oldest dated specimens are by German artists. Italy claims the invention for Finiguerra, and the claim of Italy is now generally acquiesced in. Maso Finiguerra was a Florentine goldsmith, and according to Vasari, about A. D. 1460, having engraved a metal plate to receive enamel for ornamental use, poured on it some melted sulphur to take a cast, when he observed that the dirt in the incisions had adhered to the sulphur, making a picture in black. He thereupon rubbed ink into the lines of the engraving, and took an impression with wet paper. Since Vasari's time it has been well established that Finiguerra took impressions as early as 1450, and possibly 1445. Baccio Baldini, another Florentine goldsmith, seems to have learned the art from Finiguerra, and executed some plates, among which were nineteen which appeared in an edition of Dante published at Florence in 1481. The first book illustrated with copper plates was "Il Monte Sancto di Dio," published at Florence in 1477, containing three large plates, which are probably by Baldini. The art advanced rapidly to its highest state in Italy. In the commencement of the sixteenth century there were numerous copperplate engravers of great eminence in Italy, at the head of whom stood Marc Antonio Raimondi, whose works mark an important era in Italian engraving, and good impressions of whose prints are now valued at fabulous prices. He obtained the friendship of Raphael, and engraved under the painter's own eye very many of his works. His handling is peculiar, and though his engravings are deficient in "color" and effective distribution of light and shadow, he still holds a position among the very ablest engravers of any time. His scholars, who worked with him while living, Marco of Ravenna and Agostino of Venice, succeeded him and perpetuated his style. Giorgio Ghisi, born in 1524 at Mantua, and Bonasoni of Bologna (1498–1570) were engravers of distinction, and also painters. Cornelius Cort, a Dutch engraver (born 1536, died 1578), removed to Italy, where he was brought under the influence of Titian, and introduced a better representation of chiaroscuro and a breadth of manner not before attained. Agostino Caracci (born 1558 at Bologna, died 1602) was a pupil of Cort, and engraved a large number of plates, attaining high reputation, especially for his drawing. Martin Rota, a Dalmatian, whose prints range from 1558 to 1586, was an imitator of the school of Cort. Agostino Caracci, already named, Spagnaletto Guercino, Carlo Maratti, Guido Reni, Salvator Rosa, Claude Lorrain, Canaletti, and Piranesi were also known as painter-engravers, and maintained the reputation of this branch of Italian art. In later years, Volpato, Raphael Morghen, Toschi, and Longhi have produced works representing the great masters of Italy, which take a higher rank relatively than contemporary Italian painting.

Copperplate engraving seems to have been practised in Germany in the middle of the fifteenth century, and German work of the latter part of that century is superior to the Italian. Prints are extant with signatures of unknown artists which antedate those of artists who are known. Martin Schoen (or Schoengauer) of Colmar is regarded as the father of the art in Germany. The dates of his birth and death are in dispute, but his work was in the last quarter of the fifteenth century. He executed a large number of prints which are extant, and of which good impressions are highly prized. He was contemporary with many other copperplate engravers, and seems to have lived until the time of Dürer. The art reached high excellence in Germany in the time of Dürer (who died 1528). Marc Antonio in Italy confessed his indebtedness to Germany by reproducing in facsimile a considerable number of the works of Dürer. Dürer was also, if not the inventor, one of the earliest practitioners, of the process of etching. The principal German engravers after Dürer are his pupil Aldegraver, the two Behams, Altdorfer, Bink, Penz, etc. But the German school proper soon became absorbed in that of Italy, losing its peculiar characteristics. Since the beginning of the nineteenth century, engraving, like all branches of literature and art, has made steady progress in Germany.

Among the large number of distinguished men a few only can be named. C. F. Müller, though he died at thirty-three, is reckoned among the ablest engravers of all time. His "Madonna di San Sisto" is unrivalled. Steinla has a very high repute. The revival of the old religious style of art by Cornelius, Overbeck, and Kaulbach has had its effect upon engraving, and produced a peculiar style of handling, marked by the simplicity, purity, and religious feeling of the great painters just named. Amsler, the Felsings, Merz, and Mandel, though some of them may be charged with mannerism, are artists of great truthfulness and power.

France did not accept copperplate engraving at an early period, and hence contributed little to the early history of the art. The earliest engravings on metal which take rank in history are a collection due to artists employed in the decoration of the palace of Fontainebleau, about the middle of the sixteenth century. A large number of these are described by Bartsch under the name of the school of Fontainebleau. Most of them are anonymous, though they are thought to be the work of the painters themselves. The real history of the French school, as it is ordinarily understood, begins with the administration of Colbert, under Louis XIV. Among those we may name the Audran family, of whom Gerard is by far the ablest. He is said to be the first who united line engraving and etching in the same plate. Gerard Edelinck, though born at Antwerp, is placed in the French school. His facility and skill in execution were remarkable, and he carried "color" in engraving to a perfection never before reached. Nanteuil, the three Drevets, Callot (remarkable as an etcher), Leclerc, Chereau, Beauvarlet, Dupuis, not to name others, produced works in large numbers which are marked with great excellence and power. Wille, though a German by birth, belongs to this school, and is specially noted for his skill in imitating particular objects and articles of dress. It must be admitted that this school allowed their mechanical dexterity to lead them away from the higher ends of artistic expression. French engravers of the present day devote themselves in a great degree to the reproduction of modern paintings. Among these are Desnoyers, who died in 1857, Prevost, Forster, Richehomme, Lignon, Gerard, Prudhomme, C. R. J. François, and Girardet. There is now a society of etchers in Paris, which has published a series of yearly volumes which contain many etchings of great spirit and beauty. Lalanne, Calame, Meryon, Jacquement, and Hillemacher stand out among other names as etchers of high reputation.

Holland and Belgium have been prolific in engravers. The earliest of note is Lucas von Leyden. He was a contemporary of Albert Dürer, born in 1494. The Sadeler family and Abraham Bloemart carried forward the art, while Goltzius, Lucas Kilian, and Saerendam maintained the reputation early acquired by their masters. A class of engravers gathered around Rubens who profited by his suggestions. Among these are the Bolswerts, Vosterman, Paul Pontius, and Peter de Jode the younger. As painter-engravers we may name the incomparable Rembrandt, Ostade, Waterloo, Swanenelt, Paul Potter, Berghem, Karel du Jardin, Everdingen, and De Hooghe. These produced their effects mainly by etching, and as they engraved their own designs, their works have a constant artistic value as the autograph expressions of men of genius.

England seems to have had no great artists in wood or metal until a late period. It is probable that some rude wood-cuts were executed there in the fifteenth century, but the best illustrated books then published were illustrated by cuts imported from the Continent until the seventeenth century. The art of mezzotint engraving, in which English artists have greatly excelled, was introduced into England at the time of the Restoration. Hollar, a Bohemian by birth, was among the first English engravers of European reputation. William Faithorne first made mezzotint engraving popular in England. George Vertue, Vivares, and John Brown maintained the reputation of the art till the time of Strange. Strange was born in the Orkneys in 1721, and died in 1792. He was the father of line engraving in England. In this branch he reached at a bound the very highest point of excellence. Good impressions of his works are now sought for at high prices by all intelligent collectors. Woollett (born in 1735) is another engraver of high rank, especially in landscape. Sharpe has a high reputation in portrait engraving. McArdell, Green, and Earlom carried mezzotint engraving to high perfection. Etching has of late been revived in England, and the attention of the public has been attracted to it by the brilliant work of P. G. Hamerton, already mentioned. Turner exercised his genius in etching. Ruskin, his eulogist, has etched many of the illustrations of his works. Whistler, an American by birth, has achieved a high reputation in this branch of art. Haden, an amateur artist, has been given a very high position by Hamerton. Hamerton himself, in the pages of the "Portfolio," has given many pleasing illustrations of his devotion to this department of engraving, while his writings are likely to add greatly to its popularity among connoisseurs. Cruikshank and Doyle have been known as etchers, but have made the art subservient to caricature.

Engraving in Spain did not flourish until about the middle of the eighteenth century. A considerable number of Spanish engravers are given by historians of the art, but their works are not widely known beyond their own country. Carmona (born in Madrid in 1740) and his pupil, Selma, are names of special distinction.

Unless it be in the department of banknote engraving, Americans have not developed anything which may be called a school of the art. In the department named they are unrivalled, and have shown mechanical and artistic skill which, with proper patronage from the public, would command success in any sphere of the art. Wood engraving has taken relatively a higher rank than the other processes. But it is difficult without doing injustice to make critical estimates of artists of merit who may not have reached their highest degree of excellence, and we forbear to make selections.

The place of engraving in the general study of art is important. It interprets all the fundamental ideas of painting with the exception of color. This, within certain limits, it can suggest, if it cannot imitate. Printing in colors, even if the imitation be mechanical, tends to develop a taste for better things. Autograph engravings, or etchings from artists of distinction, enable the art-student or amateur to study in his own lines the artist's chosen expressions for his thought. In a country like ours, in which access to large collections of paintings is not possible, engraving furnishes the readiest, cheapest, and most practicable means of studying the history and growth of the arts of design in all departments. Architecture, sculpture, and pottery are alike dependent upon engraving for making their results intimately known to the great majority of those interested in their study. Relatively to art in general it sustains the same relation as does printing to literature. It makes the best ideas of the few available for the elevation of the many. As a means of popular education in art, engravings stand unrivalled. No lover of elegant culture can fail to rejoice that so many large and valuable collections of engravings are in the process of formation in all parts of our country.

The literature of the subject is extensive. The collector will find catalogues of the works of the most eminent engravers published as separate volumes, and often many catalogues of the same engraver by various editors. He will find general catalogues of all the important engravers, as "Le Peintre-Graveur" of Bartsch and the "Kunstler-Lexicon" of Nagler. (We append the titles of various authorities which are of most importance to the student of the art: Duplessis, Georges, "Essai de Bibliographe contenant l'indication des ouvrages relatifs a l'histoire de la gravure et des graveurs," Paris, 1862; Ottley, "Inquiry into the Origin and Early History of Engraving," 2 vols., London, 1816; Palgrave, F. T., "Essay on the First Century of Italian Engraving" (in Kugler's "Hand-book of Painting," vol. ii.); J. D. Passavant, "Le Peintre-graveur," 6 tom., Leipsic, 1860–66; Bartsch, "Anleitung zur Kupferstichkunde," 2 bde., Weiss., 1821; Dusmenil, Robert, "Le Peintre-graveur Français," 10 tom., Paris, 1835–69; Brulliot, François, "Dictionnaire des Monogrammes, Marques figurées, Lettres Initiales," etc., Munich, 1832; Bartsch, Adam, "Le Peintre-graveur," 21 vols. and supplement, Vienna, 1803–21; Bryan, Michael, "A Biographical and Critical Dictionary of Painters and Engravers," new ed. by George Stanley, London, 1858; Jackson and Chatto, "A Treatise on Wood Engraving," London, 1861; Heinecken, "Idée Génèrale d'une collection complette d'estampes," etc., Leipsic, 1771; "Biographical History of the Fine Arts," Spooner, New York, 1845; Nagler, "Neue Allgemeine Kunstler-Lexicon," etc., 18 vols., Munich, 1835–48; Hamerton's "Etching and Etchers," London, 1866.) M. B. Anderson.

Engraving Maps and Charts.—The best maps are engraved on copper, and sometimes on steel, which is, however, at present not much used, being liable to rust. The design is drawn on paper, and is transferred to tracing paper by going over the lines of the drawing with a material composed of Frankfort black and urine. The design is then divided both ways through the centre by lines drawn to match similar lines on the copper plate.

The copper is burnished after all the imperfections are removed. It is then "coaled" over with mahogany charcoal, and is next rubbed with oil and rotten-stone, and afterwards thoroughly washed with soap and water and dried, and then rubbed with whiting. The plate is then warmed and white wax is applied. The wax having melted, a folded

rag is drawn across it until the wax is of even thickness. The plate is cooled, and is then ready for use. The tracing paper, with the design upon it, is laid face downward upon the waxed surface. The tracing paper is rubbed with the burnisher, which causes the transfer of the lines to the wax. The coast-lines, rivers, railways, and common roads are engraved upon the copper by suitable gravers, towns are indicated by the stroke of a punch, boundary-lines are run over by the roulette, and the lines are finished after the wax is removed. Topographic marks (mountains, etc.) are dry-pointed lightly. The wax is then removed by melting; the cut lines are scraped to remove the "burr;" the plate is coaled and rubbed. The topography, coast or water lines, and the necessary lettering are next cut. After this, degree-lines (parallels, meridians, etc.) are ruled in. The mountains or topography are usually bitten-in by acid (see paragraph "Etching" in the article ENGRAVING), the heavy shadings being commonly added by means of the square graver. The tools employed are the eye-glass, burnisher, scraper, roulette, gouge, callipers, rules, gauges, gravers, punches, etc.

At present, maps are not printed directly from the copper plates, but the printing is generally done by the lithographic process, as follows: The copper plate is used for making an impression upon autographic paper, prepared with a coating of starch, gum, etc. in variable proportions. The ink used is a mixture of ordinary lithographic ink with oil, soap, tallow, varnish, etc. The impression is made with great care upon the starched side of the paper. This paper, carefully moistened, is laid upon a polished lithographic stone, "backed" with great care by folds of paper, and then pressed with great force, in a lithographic press, upon the stone. The paper, on being stripped away, leaves, if the work is well done, all its lines beautifully transferred to the stone. After washing and drying, the stone is used for printing as in ordinary lithography. From two to five thousand first-class impressions can be taken from one transfer if skilfully done.

Lithography proper [from the Gr. λίθος, a "stone," and γράφω, to "write"] may be considered as a branch of engraving. It owes its existence to the fact that certain slates of the middle oolite (found in the highest perfection at Solenhofen in Bavaria) and various subcarboniferous and other limestones of greatly inferior quality, found in Missouri, Canada, and other regions, though compact, have a surface of somewhat open grain, capable of absorbing and retaining water, oils, and inks made with fats, etc. Now, if parts of the smooth stone be covered with a drawing in oil, the remaining parts can be wet without wetting the oiled parts. If "fat" ink be now applied to the stone, it will adhere to the dry parts, but not to the wet. By alternately wetting and inking the stone, a great number of impressions can be taken.

There are several methods of drawing upon the stone, besides the transferring process mentioned in the paragraph on map engraving. Drawing is done by the crayon, pen, or brush. The stone is often cut by the needle or dry-point, the latter being true engraving. Engraved stone, however, though capable of giving fine results if great care be used, is ordinarily very much inferior to engraving upon steel or copper plates.

Color-printing on stone, or chromo-lithography, has of late years been employed with surprising success in the production of cheap imitations of oil paintings; for although it is true that the greater part of this kind of imitation is inferior in quality, the best examples are in reality artistic, and are highly admirable. Each color is applied by using a different stone.

In all processes, except in stone engraving with the dry-point, relief is generally given to the design by washing the stone in dilute acid, which attacks the parts unprotected by oil, and thus, when skilfully handled, gives increased clearness to the impression. One of the latest inventions in this line is photo-lithography.

ENGRAVING STEEL AND COPPER PLATES.—The origin of engraving on metal, from which printed impressions were taken, dates A. D. 1450. In that year, Maso Finiguerra, an engraver on gold and silver plate, a native of Florence, being engaged on an engraving of a "pax" ordered by the brothers of the church of St. John, and wishing to see the effect of his work, filled the lines cut by his graver with a mixture of oil and soot. A pile of damp linen was, by chance, placed upon the silver plate thus prepared, and the cut lines filled with the black mixture were transferred upon the linen. The original plate of the "Coronation of the Virgin," a niello engraved in 1452 by Maso Finiguerra, is in the Uffizi Gallery at Florence, and the only known impression from it is carefully preserved in the Bibliothèque de Paris.

The first engravings on metal plates for the purpose of printing therefrom, executed in Italy, are found in the "Monte Santo di Dio" (1477) and in an edition of Dante (1481). Sandro Botticelli, a great painter, supplied the designs and assisted in the engraving; but the oldest copperplate print in existence—a German one—bears the date of 1461. Before the close of the fifteenth century many books were published which were filled with illustrations and maps printed from metal plates. The graver was skilfully used by many eminent painters, such as Albert Dürer, Rembrandt, and Vandyke, while Raphael had Marc Antonio and other Italian engravers transfer his designs to plates for reproduction. The discovery of etching—that is, where the work is "bitten in" on the plate by acid—is attributed to both Parmegiano and to Albert Dürer. The spread of the art of engraving on metal was rapid, and it was known in England as early as 1483. The earlier styles or processes were confined to *line*, executed entirely with the graver, and to *etching*, done by a sharp point or needle. The style called *mezzotinto* or *mezzotint* was probably invented about 1600, for François Aspruck engraved in 1601, by means of a process resembling mezzotint, a series of thirteen plates of Christ and the apostles, and one of Venus and Cupid. In the year 1643, Louis of Siegen, a German officer, employed it for his portrait of Amelia Elizabeth, the landgravine of Hesse-Cassel; and Prince Rupert, the nephew of Charles I., was led to its discovery when living in retirement at Brussels after the year 1649, through observing a sentinel scraping the rust from his gun-barrel; yet the honor of its first invention cannot be ascribed to him. The *aquatint* process, which resembles mezzotint in its results, was invented by J. B. Leprince about 1787. The *stipple* or dot style has been used for a long time in combination with other styles of engraving; it is chiefly employed in the rendering of flesh and in producing copies of statuary. Another style, termed the *chalk* style, has its use in representing sketchy subjects done with the pencil, chalk, or crayon.

Up to the year 1815—except a single print in London in 1805—copper was exclusively used to engrave upon. *Engraving on steel* is an American invention, due to Jacob Perkins of Newburyport, Mass. In 1814 he went to Philadelphia, where he associated himself with an engraving firm for the purpose of carrying his invention into practical operation. The processes for engraving on steel or copper are similar, but the superiority of steel plates, in consequence of their hardness, the sharpness and piquancy of the printed impressions therefrom, and the great number of impressions that can be taken before the plate is worn, renders them preferable for engraving purposes, unless it be for letter engraving when small numbers are required to be taken from the plate.

Engraving on Steel, the Processes.—The plate on which the engraving is executed is ground and polished by the plate-maker until its mirror-like surface is free from all scratches or blemishes. The edges are bevelled, so that it may readily pass between the rollers of the printing-press when completed. An etching-ground is then laid upon the plate by the engraver. This ground consists of a mixture of burgundy pitch, rosin and asphaltum; it is applied to the heated plate by "dabbing" it over the surface; it resists acid, but great care must be taken in preventing any dust settling in the ground when heated, else when the acid is applied "false biting" of dust-specks will result. When the ground is cold, the outline of the subject, prepared by finely-traced lines with the "dry-point" on gelatine paper, is transferred upon the ground by laying thereon the traced side of the paper filled with scrapings from a lead-pencil or red chalk, and the back of the paper gently rubbed with a burnisher. The etching process is then commenced by cutting the lines or dots desired with the dry-point through the etching-ground. The width between the lines or dots is carefully studied, and laid in with reference to the final result when "bitten-in." When completed, a wall of wax is placed around the edges of the plate to prevent the acid from running off, and the "biting-in" process is begun by pouring on the acid (generally one part of nitric acid to three parts of water), which is immediately poured off for the more delicate biting, and water washed over the work and removed, and the surface blown dry with a common bellows. The delicate work is then "stopped out" with asphaltum varnish, and the biting resumed until the darkest or heaviest lines are bitten sufficiently. The ground is then removed with turpentine, and such parts of the work needing further biting may be "re-bitten" by laying a re-biting ground dexterously dabbed on the surface, so as to leave each line or dot perfectly clean; and then proceed with the acid as at first. Most plates are etched at first, whether completed in line, mezzotint, or stipple style, the style of the etching being varied according to the manner in which the work is to be finished. *Pure line engraving* is produced by cutting lines, broken lines, or dots on the steel with a tool called the graver; but this style is now

rarely ever used except in banknote engraving, the vignettes of which are engraved in this style, on die steel, which is hardened for transferring to other steel plates; and so any number of copies of the original plate may be duplicated on other softer plates, which, when hardened, are used in printing the engravings. *Line-and-stipple* engraving is rendered by cutting or etching the lines on draperies, and dotting (stippling) the lighter parts of draperies and flesh with the graver or dry-point. *Mezzotint* engraving is produced by laying a "mezzotint ground" over the surface of the etched subject by means of a "rocking-tool" (sometimes termed a "cradle") with fine teeth, which are impressed into the plate by a rocking motion of the tool; after rocking over the plate a great number of "ways," the surface becomes filled with fine dots, which, if printed from, would give a perfectly black tint. The high lights, half tints, and gradations are then "scraped" out with a tool termed the "scraper," and the work finished with the burnisher. This style produces a very soft and pleasing engraving, and with a well-prepared etching of under-work in line-and-stipple is extensively used by some engravers in producing the finest engravings. It is more generally known as the *mixed* style—line, mezzotint, and stipple. Pure mezzotint engraving has become quite obsolete, as it will not admit of being printed from in large quantities, but when mixed with other styles from 30,000 to 50,000 fair impressions may be taken from a single plate. *Aquatint* engraving is often confounded with mezzotint from its resemblance to it, but the process is quite different. An aquatint ground is laid on the surface of the plate by pouring a resinous substance which has the peculiarity of separating its particles so as to leave bare spaces, or eccentric rings left bare, which when exposed to acid are corroded. The laying of the ground requires the greatest dexterity and judgment, and must be done in a dry atmosphere. The tone produced resembles that of a washed drawing in India ink, soft and harmonious. Aquatint engraving is used for reproducing geological specimens, as fossils, shells, stones, etc., with great success.

Steel and Copper Plate Printing.—When the engraver has completed his work, a proof of the same is taken, and usually on India paper, which has the quality of taking up the ink more perfectly from the engraved lines or dots, and leaving the precise tone of the work, than ordinary white plate paper. Proofs on India paper are considered much more valuable than plain impressions. The process of plate-printing is as follows, viz.: the paper is "wet down" in alternate layers of wet and dry sheets, and allowed to moisten evenly. Much depends on the even moisture of the paper in obtaining good impressions. The plate is warmed by soapstone plates heated underneath, and the ink rolled upon its surface. It is then removed, and the ink "wiped," by several rags or pieces of millinet, from the surface; and finally the entire surface of the plate is polished with whiting on the palm of the hand. The plate is then placed on the press, consisting of a bed-piece running between two heavy iron rollers, with blankets around the upper roller to prevent injury to the plate; and a sheet of the dampened paper adjusted carefully to the inked surface of the plate, and passed through the press. The impression is then dried, and pressed in a "standing press," to give the surface of the paper its proper finish or polish.

GEO. E. PERINE, *Engraver on Steel*, New York City.

Engraving, Bank-Note. See NOTE, BANK ENGRAVING, by JOHN E. GAVIT, ESQ.

Engros'sing [from the Fr. *grossoyer*, to "write in a large hand"], the writing of a deed in proper legible characters. Among lawyers it signifies especially the copying of any instrument or document on parchment or stamped paper. In the English statute law engrossing signifies the purchase of large quantities of any commodity, in order to sell it again at an exorbitant price, or in order to raise the market-price of the same.

Enguera, a town of Spain, in the province of Valencia, 46 miles S. W. of Valencia, has manufactures of linen and woollen goods. Pop. 6000.

Enharmon'ic [Gr. *ἐν*, "in," and *ἁρμονία*, "harmony," "concord"], in music, one of the three genera (chromatic, diatonic, and enharmonic) of ancient music. The enharmonic genus of the Greeks was distinguished by the use of small intervals or quarter tones. In modern music, intervals much less than a semitone owe their origin to the slight difference of pitch which the same (nominal) note takes according as it is adjusted to one or another fundamental note or *tonic*. Thus C♯ and D♭ are, at least on keyed instruments, practically the same note, though strictly the former should be produced by $\frac{15}{16}$ of the whole string sounding; the latter, by $\frac{9}{10}$. The passage from one to another of these intervals is called an "enharmonic change," and a change of key so effected, an "enharmonic modulation."

Enig'ma [Gr. *αἴνιγμα*, from *αἰνίσσομαι*, to "speak darkly" (from *αἶνος*, a "fable"); Fr. *énigme*], an obscure question; a riddle; a proposition put in obscure or ambiguous terms to puzzle or exercise the ingenuity in discovering its meaning. Formerly it was deemed a matter of such importance that Eastern monarchs sometimes sent embassies for the solution of enigmas. Among the famous enigmas of antiquity were that which Samson proposed to the Philistines, and that which the Sphinx propounded to Œdipus. (See SPHINX.)

Enkhuysen, ĕnk-hoi'zẹn, or **Enkhuizen,** a fortified seaport-town of the Netherlands, is in the province of North Holland, on the Zuyder Zee, 30 miles N. E. of Amsterdam. It has a fine town-hall, several churches, a cannon-foundry, and several shipbuilding yards. Butter, cheese, timber, and fish are exported hence. Pop. in 1867, 5625.

Enlist'ment, the voluntary enrolment of men in the military or naval service. In the U. S. service enlistments are under a detailed officer styled superintendent of the general recruiting service, assisted by other officers, each detailed for two years by the war department. The superintendent's office is in New York. Men are enlisted for five years' duty in every branch of service. Recruits are enlisted (1874) at twenty rendezvous, one at each of the following cities: Albany, Baltimore, Boston, Brooklyn, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Dubuque, Elmira (N. Y.), Evansville (Ind.), Indianapolis, Jersey City, Louisville, New York City (two rendezvous), Philadelphia, Springfield (Ill.), and St. Louis. They are sent for examination and training to two dépôts—one at Fort Columbus, Governor's Island (N. Y. harbor), and one at Newport Barracks, Ky. Thence they are assigned to regiments by order of the war department.

En'neagon [from the Gr. *ἐννέα*, "nine," and *γωνία*, an "angle"], a plane rectilineal figure having nine sides and angles. The area of a regular or equilateral enneagon is approximately 6.18182 times that of the square of one of its sides.

Ennean'dria [from the Gr. *ἐννέα*, "nine," and *ἀνήρ*, *ἀνδρός*, a "man" or "male"], the ninth class of plants in the artificial system of Linnæus, so called because each flower has nine stems. The term *enneandrous* is applied to these plants or flowers.

En'nemo'ser (JOSEPH), M. D., a German writer on physiology and animal magnetism, was born in the Tyrol Nov. 15, 1787. He fought against Napoleon in 1813 and 1814, and graduated as M. D. at Berlin in 1816. He became in 1820 professor of medicine at Bonn, and removed in 1841 to Munich, where he practised with success. Among his works are "Magnetism in its Relations to Nature and Religion" (1842) and "History of Magnetism" (1844), the first volume of which (the "History of Magic") was translated into English by William Howitt (1854). Died in 1854.

En'nis, a market-town of Ireland, the capital of the county of Clare, on the river Fergus, 20 miles W. N. W. of Limerick. It has a town-hall, a classical school called Ennis College, and the ruins of an abbey founded in 1240. It returns one member to Parliament. Here is a valuable limestone quarry. Pop. in 1871, 6101.

En'niscorthy, a market-town of Ireland, in the county of Wexford, on the river Slaney, 14 miles N. N. W. of Wexford. It has a Roman Catholic cathedral, and a stately Norman castle many centuries old, but still entire. It has a large trade in grain. The Irish rebels took it by storm and burned it in 1798. Pop. in 1871, 5369.

En'niskillen, a parliamentary borough of Ireland, the capital of the county of Fermanagh, is finely situated on the river Erne, which connects the Upper and Lower Lough Erne, about 75 miles W. S. W. of Belfast. It has a town-hall, a barrack, two forts, a linen hall, and manufactures of cutlery. There are handsome mansions and beautiful scenery in the vicinity. The people of Enniskillen warmly supported the Protestant cause in 1689. Here the troops of William III. defeated those of James II. in that year. Pop. in 1871, 5906.

En'nius (QUINTUS), a celebrated Roman epic poet, born of a Greek family at Rudiæ, in Calabria, about 240 B. C. He acquired the rights and privileges of a Roman citizen, and enjoyed the friendship and patronage of Cato and Scipio Africanus. It is said that he supported himself by teaching the Greek language. He contributed greatly to the formation of the national literature of Rome, and was the first great Latin poet. His most important work was an historical epic poem entitled "The Annals," which was for many years the most popular poem in the language. His works, which included tragedies and comedies, are all lost except some fragments. His poetry was admired by Lucretius and by

Cicero, who often quotes him. He died in 169 B. C. Among the best editions of his works are those by Spangenberg (1825) and Vahlen (1869). (See SELLAR, "Roman Poets of the Republic," chap. iv.; VOSSIUS, "De Poetis Latinis.")

Enns, or **Ens** (anc. *An'isus* or *An'esus*), a river of Austria, rises in the crown-land of Salzburg, 11 miles S. of Radstadt. It flows through Styria, forms the boundary between Upper and Lower Austria, and enters the Danube 11 miles below Lintz. Length, about 120 miles.

Enns, a town of Austria, on the Danube, at or near the mouth of the Enns, about 96 miles W. of Vienna. It has manufactures of iron, steel, and cotton. It was the headquarters of Napoleon in 1809. Pop. in 1869, 3784.

E'noch, or **He'noch** [Heb., "initiated" or "teacher"], the name of five persons mentioned in the sacred books (canonical and apocryphal) of the Hebrews. The second in the order of time, and the most important, was "the seventh from Adam," who "prophesied," and was translated at the age of 365. (Gen. v. 23.)

Enoch, Book of, quoted by the apostle Jude (vv. 14, 15), an apocryphal book of 108 chapters, of unknown authorship and of uncertain date, critical conjecture ranging from 144 B. C. to 135 A. D. It was probably written in Hebrew by a Palestinian. The early Christian Fathers used it, but for some centuries only fragments of it were known to European scholars, till in 1773 James Bruce brought home with him from Africa three copies of an Ethiopic version of it, made apparently from the Greek about 350 or 400 A. D. It was published in 1838 by Archbishop Laurence, who had previously (in 1821) published an English translation of it, and by Prof. Dillmann (1851). The book contains many curious passages, but its leading idea is that of Divine justice dealing sternly with sinners. Special works on the book of Enoch have been written by Ewald (1854), Philippi (1868), and others.

Enoch, a post-township of Noble co., O. Pop. 1362.

E'non, a post-township of Bullock co., Ala. Pop. 1748.

E'nos (anc. *Æ'nos* or *Ænus*), a seaport-town of European Turkey, in Room-Elee, on the Ægean Sea, at the mouth of the river Maritza (*Hebrus*), about 75 miles S. by W. from Adrianople, of which it is the port. Its harbor admits only small vessels. Pop. about 6500. Here is a small bay called the Gulf of Enos. *Ænos* is mentioned by Homer in the "Iliad," book iv.

E'nos (ROGER), GENERAL, born in 1736, was a lieutenant-colonel in Arnold's Quebec expedition (1775), but by a council of war held on the Dead River in Maine was sent back to Cambridge with a part of the troops, on account of the lack of provisions. He commanded at Castleton, Vt., in 1781, and became afterwards a major-general of Vermont militia, and one of the first men of the State. Died at Colchester, Vt., Oct. 6, 1808.

E'nosburg, a township and post-village of Franklin co., Vt., on the eastern division of the Vermont Central R. R. It has nine churches, and manufactures of leather, carriages, lumber, woollens, and other goods. Pop. 2077.

Enrol'ment signifies in law the registering or entering of a document or lawful act in the rolls of the chancery or superior courts of common law or in the records of the quarter sessions. Such enrolment was rendered necessary in different cases by statute. In the reign of Henry VIII. of England a statute was enacted that no transfer of land should be effected by bargain and sale unless the deed were enrolled within six months after its date. A decree in chancery does not take full effect until it has been enrolled. Before the enrolment the cause may be removed to the court of appeal, which may reverse the decision, but after the enrolment it can only be heard in the House of Lords.

Ens (gen. **Entis**), a Latin term used in metaphysics to denote being, entity, or essence (Gr. τὸ ὄν). *Ens reale*, a positive or real being, is distinguished from *ens rationis*, which exists only in idea. The mediæval alchemists and pharmaceutists used the word *ens* in a variety of senses. Thus, they speak of the *ens Dei*, "the power of God;" *ens astrorum*, "the influence of the stars;" *ens morborum*, the "principle of diseases;" *ens de potentibus spiritibus*, the "activity of powerful spirits." *Ens primum*, the "first essence," was a hypothetical preparation believed to have power to transmute the metals. *Ens martis* was a certain preparation of iron; *ens veneris*, the "essence of Venus" (or copper), was cupric ammonio-chloride.

Enschede, ĕn'skā'dĕh, a frontier town of the Netherlands, province of Overyssel, about 90 miles E. by S. from Amsterdam. It has manufactures of cotton. Pop. in 1867, 5134.

Ensemble, ôn'sôm'bl', a French word signifying "together" or "the whole," is used to express the general effect produced by a picture or by the various parts of a musical performance; also the masses and details of a painting considered with relation to each other.

En'siform Car'tilage [Lat. *cartila'go ensifor'mis*, from *ensis*, a "sword," and *forma*, "shape"], called also the **Xiphoid Cartilage** or **Ensiform Appendix,** in human anatomy, is the third and lowest piece of the sternum or breast-bone. It is smaller than either the first piece (*manubrium*) or the second (*gladiolus*). It is of various form, usually more or less dagger-shaped, sometimes perforated, sometimes 2-pointed, and is usually cartilaginous until the seventeenth or eighteenth year, when a centre of ossification appears in its upper part, and the whole takes on, very slowly, a somewhat bony character. It appears to represent the united hæmal spines of those vertebræ to which the floating (eleventh and twelfth) ribs are attached.

En'sign [Lat. *insig'ne*, neut. of *insig'nis*, "remarkable," "striking" (from *in*, "in" or "for," and *signum*, a "sign"); Fr. *enseigne* or *drapeau*], the national flag or banner carried by a ship of war, and usually hoisted at the peak or on a flagstaff at the stern. Its chief purpose is to indicate the nationality of a ship when it meets another vessel at sea. In the navy of the U. S. the ensign is the national flag. All British men of war since 1864 carry the St. George's ensign—viz., a white ensign with a red cross, and a union-jack in the left-hand upper quarter. The English ensign is a red, white, or blue flag, having the union in the upper corner next the mast.

ENSIGN is the title of the lowest commissioned officer in the British army. He performs the usual duties of a subaltern. There are as many ensigns in a regiment of infantry as there are companies, and the junior of these carries the regimental colors.

ENSIGN in the U. S. navy is the eighth grade of commissioned officers, ranking below that of master and above that of midshipman. The highest pay is $1400 a year.

Ensinal', a county in the S. of Texas. Area, 1610 square miles. The Rio Nueces touches the north-eastern corner of this county, which is drained by several affluents of the Nueces. It is almost exclusively devoted to sheep and cattle ranges. Water and wood are scarce. Pop. 427.

Ens'ley, a post-township of Newaygo co., Mich. Pop. 606.

Ens Mar'tis [Lat.], (*i. e.* the "essence of Mars" (iron)), an old alchemical name for the ammonio-chloride of iron, formerly used in medicine. It is an uncertain aperient and chalybeate tonic.

Entab'lature [Mod. Lat. *intabulamen'tum*, from *in*, "upon," and *tab'ula*, a "board" or "plank;" literally, "placing boards upon;" applied originally to the roofing of a house, and especially to the horizontal covering which rested upon the upright supports of a building], in architecture, the portion of a building between the columns and the roof, running round the edifice. It consists of architrave, frieze, and cornice. In ordinary building the term is applied to the course of masonry on a wall immediately below the roof.

Entail'. By this term is meant an estate in fee limited to certain classes of descendants. Thus, a fee simple would be regularly created by the word "heirs," as, for example, to "A and his heirs," and would descend to any heirs, however remote. An estate given to "A" and "the heirs of his body" would be confined to descendants. This is an example of the proper words to create an estate tail. The descent might be still more strictly confined, as to male issue or the issue born of some specified mother. The peculiar features of an entail depend upon a well-known English statute termed *De donis*, the regular effect of which was to confine the property to the specified mode of descent. The result was that the tenant in tail had the general characteristics of owner, except that he could not sell, and that the land could not be seized for his debt. The courts permitted the entail to be destroyed by a fictitious legal proceeding called a "fine," and more completely by another like proceeding called a "common recovery," instituted in behalf of the tenant. He could thus, if he saw fit, become absolute owner. The "common recovery" is now abolished by statute in England, and under certain limitations the tenant may resort to a conveyance called a "disentailing deed," and thus acquire a fee simple. In the United States words constituting an estate tail according to English law will usually be construed to create a fee simple, unless the property is given over to some other person on default of issue surviving the first taker; in which case the secondary gift would be upheld, and would take effect should no issue survive. This last point will be more fully noticed under the titles PERPETUITIES and REMOTENESS.

En'tasis [Gr.], a delicate and almost imperceptible swelling of the shaft of a column, is found in nearly all ancient Greek examples. It was adopted to prevent the shafts being strictly frusta of cones, in which case there would, by a simple optical law, be an incorrect impression made upon the eye as to the proportions of the column. The curve of the entasis was usually either part of a hyperbola or of a conchoid. It was one of the most delicate yet important of the refinements of Greek architecture, and has not been accurately attained in modern imitations. In the columns of the Parthenon the entasis amounts to $\frac{1}{550}$ of the whole height of the column.

Entel'echy [from ἐντελής, "perfect," and ἔχειν, to "have"] is a metaphysical term from the Aristotelian philosophy, denoting the fundamental idea of the whole system. Cicero defined this idea as *energy*, but the Greek philosophers who, in the fifteenth century, moved from Constantinople to Italy—and among them especially Argyropolus—ridiculed him for the definition, and gave *perfection* as the constituent element of the idea. Melanchthon, however, and Leibnitz, and all modern philosophers almost without exception, follow Cicero; and when the "Entelechy" of Aristotle is compared with the "Idea" of Plato or the "Absolute Negativität" of Hegel, or other fundamental ideas of other philosophical systems, it is evident that *energy* covers a much larger part of the Aristotelian idea than *perfection*. The abstract repose of the Platonic "Idea" is supplanted by the energy of reality in the Aristotelian "Entelechy;" its potentiality becomes actuality. Aristotle calls truth an idea, but the soul he defines as an ἐντελέχεια; and when Dr. Reid tells his readers that he can make no sense of this definition, he seems to forget that there are confessions which it is utterly unnecessary to make. The best explanations of the entelechy, and its relations to the whole system of Aristotelian philosophy, are given by Brandis in his "Aristoteles und seine Akademischen Zeitgenossen," Berlin, 1857, and by Thurot in his "Études sur Aristote," Paris, 1860.

Entel'lus, one of the mythical companions of Æneas. He was an aged hero of Troy or Sicily, who at the games in honor of Anchises defeated in a boxing contest the youthful champion Dares, who was almost killed in the struggle.

Entel'lus Monkey, or **Honuman** (*Semnopithecus Entellus*), a species of East Indian monkey, having long limbs and a very long and powerful but not prehensile tail.

Entellus Monkey.

It is regarded as sacred by the Hindoos, who dedicate temples to it, and erect hospitals for it when sick or wounded. It exhibits a familiarity bordering on impudence, and often plunders gardens with impunity, as the Hindoos consider it an honor to be robbed by it. They believe that it is a metamorphosed prince, and to kill it is considered a deadly sin; and hence these monkeys absolutely swarm in many places, especially in the vicinity of the temples.

Enteral'gia [from the Gr. ἔντερον, the "intestine," and ἄλγος, "pain"], a name given in some medical works to colic, especially of the form attended by spasmodic contractions in the muscular coat of the intestine. This intensely painful form of disease is often chronic in character, though the individual attacks are usually short—a character in which it differs from spasms of the stomach, which are often long continued. The disease is best relieved by hot applications and by the cautious use of chloroform. The tendency of late writers is to limit the use of the term *enteralgia* to cases of NEURALGIA (which see) of the intestines.

Enteri'tis [from the Gr. ἔντερον, "bowel," "intestine," and the termination *-itis*, denoting, in modern medical nomenclature, "inflammation"], an inflammation of the small intestines. The term is somewhat vaguely used by medical writers. Active inflammation of the bowels, in adults at least, is very frequently confined, for the most part, to the peritoneal coat, and the disease is hence called peritonitis. When the mucous coat of the bowels alone is actively involved, it is frequently a fatal disease in children, but in adults, with care, the majority of cases recover. Catarrhal enteritis is benefited, and generally cured, by gentle purgation. But in active disease of this kind cathartics will often greatly aggravate the evil. Such cases are best treated by rest, opiates, poultices to the abdomen, and bland nourishment. "Typhlo-enteritis" or inflammation of the cæcum, when caused by abscess or perforation of the appendix cæci, is not unfrequently fatal; when otherwise caused, recovery is to be looked for.

En'terprise, a post-village, capital of Volusia co., Fla., 12 miles below the head of steamboat navigation on St. John's River (although steamers have ascended sixty miles higher), 80 miles S. of St. Augustine. It is a place of winter resort, and the head-quarters of sportsmen (both for fishing and gunning) in this part of Florida. Here is the "Green Spring," a remarkable sulphur spring 80 feet in diameter and 100 feet deep. Enterprise has a court-house and good hotels.

Enterprise, a post-village, capital of Clark co., Miss., has two weekly newspapers.

Enterprise, a township of Linn co., Mo. Pop. 322.

Enterprise, a village of Lanier township, Preble co., O. Pop. 61.

Enthu'siasm [Gr. ἐνθουσιασμός, "inspiration," from ἐν, "within," and θεός, a "god"] refers to the emotions; inspiration to the imagination; revelation to the intellect. An idea may burst upon a man as a revelation; he throws it upon the world as an inspiration; it belongs to the world to receive it with enthusiasm. Enthusiasm is merely passive, a merely receptive state of mind; and it is important, both in religion and æsthetics, to be fully aware of this being its true character, for in religion it causes pitiful misery when every upheaval of our feelings is mistaken for a divine revelation—the more so as enthusiasm, in accordance with its merely passive nature, is as ready to run after a foolish whim as it is to follow the exalted wisdom. And in æsthetics nine-tenths of that disagreeable stuff with which modern literatures are loaded under the names of poems, novels, tales, etc. would never have been read, perhaps even not written, if people had understood thoroughly that art depends for its production wholly on inspiration, whilst enthusiasm only makes us fit for the enjoyment of its gifts.

En'thymeme [from the Gr. ἐν, "in," and θυμός, "mind"], in logic, a syllogism of which one of the three parts (generally the major premise) is suppressed or held in mind—*e. g.* "The freedmen ought not to vote, because they cannot read." According to De Quincey (*Historical Essays*, vol. ii., p. 215 seq.), the Aristotelian enthymeme is an argument in respect to matters probable rather than demonstrable. (So also THOMSON, "Laws of Thought," p. 284.) Aristotle's own definition for the rhetorical enthymeme is, "a syllogism from probable propositions or from signs." By *probable propositions* he means those which are general, but not at all universal, as "Injured men seek revenge." By *signs* he designates facts or marks, such as attend upon other facts or conceptions, so that from the presence of the sign we suspect or know that the thing signified is also present. The rhetorical enthymeme, when based on signs, is always affirmative, taking no account of negative indications. Its results are universal, and may amount to practical or even formal demonstration.

Entomology is the department of zoology which treats of Insects. It includes the study of their form, structure, development, habits, names, classification, and geographical distribution; and also the examination of the relations which Insects sustain to other animals and to Man. The name of the science is derived from two Greek words—ἔντομον, *entomon*, an "insect," and λόγος, *logos*, a "discourse."

In general terms it may be stated that the science of Entomology dates from the time of Aristotle; for this accurate observer and learned scholar, whose writings on Natural History are the more admired the more they are studied, considered insects also, as well as other animals, scientifically, pointing out the limits of this interesting group of animals, and subdividing them into minor groups, with a wonderful degree of accuracy. From the time of Aristotle for a period of about 1800 years, little or nothing was done, so far as we know, in the science of Entomology. After this long period of inactivity in this science, Conrad Gesner, a poor Swiss, born in 1516, became a physician at Zurich, and, in addition to his other duties, gave much time to natural history subjects, collecting all that was then known of the natural history of animals in general, and writing special papers on Insects, which were published after his death, by Thomas Mouffet, an English physician and naturalist, who died about the year 1600, and whose entomological writings were published in one folio volume, illustrated with 500 wood-cuts, in London, in 1634.

From the times of Gesner and Mouffet the science of Entomology has always had many votaries—so many that the whole space allotted to this article would not contain even a list of their names and the titles of the books and papers which they have published on this interesting and important subject. Nay, it requires two octavo volumes to enumerate the writers on Entomology and to give the full titles, and dates, and places of their publications, as may be seen by examining Dr. Hagen's valuable work, "Bibliotheca Entomologica," 2 vols. 8vo, Leipsic, 1862–63. And it should be added here, that since the publication of that work new writers have come forward, so that several scores of writers and hundreds of papers must be added to the lists enumerated in Dr. Hagen's volumes of ten years ago.

But while no complete list even of the names of the writers on Entomology can here be given, we must not fail to mention a few such names as Redi, Goedart, Malpighi, Swammerdam, Lyster, Madame Merian, Leuwenhoeck, Vallisnieri, Ray, Réaumur, Linnæus, Charles de Geer, Roesel de Rosenhof, Bonnet, Clerck, Lyonnet, Sepp, Geoffroy, Schæffer, Brunnich, Pallas, Drury, Cramer, Fabricius, Esper, Stoll, Moses Harris, Schrank, Schiffermuller, Villiers, Thunburg, Rossi, Olivier, Smith and Abbot, Pierre Andre Latreille the "Prince of Entomologists," Panzer, Herbst, Sturm, Illiger, Marsham, Kirby and Spence, Palisot de Beauvois, .Paykul, Meigen, Jurine, Savigny, the Hubers (father and son), Schœnherr, Treviranus, Wiedman, Ramdohr, Gyllenhal, Ochsenheimer, Hubner, Fallen, Herold, Klug, Gravenhorst, Meckel, Marcel de Serres, Leach, Suckow, Walckenaer, Macleay, Carl Ernst von Baer, Straus-Durckheim, Lepelletier de St. Fargeau, Dalman, Waldheim, Dumeril, Dufour, Duponchel, Curtis, Stephens, Stainton, Swainson, Wood, Horsfield, Gebler, Germar, Étienne Geoffroy Saint-Hilaire, Eschscholtz, Godart, Bonelli, Carus, Mannerheim, Guerin-Meneville, Rathke, Macquart, Audouin, Zetterstedt, Milne-Edwards, Boisduval, Rennie, Spinola, Kolliker, Leuckart, Brullé, Gené, Guénée, Pictet, Rambur, Kollar, Dahlbom, Say, Van der Hœven, Zaddach, Lucas, Dejean, Wagner, De Castelnau, Griffith, Lacordaire, Audinet-Serville, Gray, White, Walker, Dallas, Smith, Doubleday, Cuvier, Burmeister, Shuckard, Westwood, Heer, Erichson, Dujardin, Herrich-Shæffer, Newport, Blanchard, Longchamps, Bowerbank, Leconte, Haldeman, Harris, Siebold, Gegenbaur, Rondani, Murray, Lucaze-Duthiers, Agassiz, Hagen, Melsheimer, Giebel, Berendt, Uhler, Fitch, Loew, Duval and Migneaux, Wollaston, Osten-Sacken, Langstroth, Huxley, Wallace, Leidy, Packard, Scudder, Grote, Norton, Edwards, Trimble, Claparede, Gerstæcker, Lubbock, MacLachlan, Walsh, Thorell, etc., etc.

The vast numbers of insects, their varied forms, beautiful and in many cases splendid colors, wonderful transformations, and their not less wonderful instincts and habits, and the intimate and important relations which they sustain to other animals and to Man, combine to render the science of Entomology exceedingly fascinating and highly important, and worthy the attention it has received and is still receiving from the ablest minds.

The science of Entomology is of the highest importance, when considered merely from the so-called practical point of view; for it teaches what kinds of insects are beneficial to man, and what kinds are injurious, and thus it shows him which to preserve and which to destroy. It makes him acquainted with the habits of insects, and thus enables him the better to preserve those that are beneficial, and to meet and resist the ravages of those that are injurious to the crops of the field, orchard, and garden, and of those which are injurious to the food and clothing in the store-rooms and closets.

The important relations, however, which insects hold to Man, and the corresponding importance of Entomology, are but little understood except by those who have given some attention to these animals and to this fascinating and exceedingly important science. The masses of men little realize the fact that some kinds of insects destroy millions of dollars' worth of property annually in every country, and that other kinds furnish the world with many of the comforts and even with the luxuries of civilized life—with silks, satins, and velvets, and with dyes whose fame is as old as history and as wide as the civilized world, and even with every drop of black ink which flows from the pen of the schoolboy, accountant, philosopher, and poet.

The position which Insects hold in the Animal Kingdom may be readily seen by the following classification:

Vertebrates	Mammals, Birds, Reptiles, Batrachians, Fishes.
Articulates	Insects, Crustaceans, Worms.
Mollusks	Cephalopods, Gasteropods, Acephals, Brachiopods, Tunicates, Polyzoans or Bryozoans.
Radiates	Echinoderms, Acalephs, Polyps.
Protozoans	Infusoria, Porifera, Rhizopoda.

It is thus seen that Insects are the highest class of the Articulates; and it is this class with which the science of Entomology exclusively deals. And this class is now to be defined and classified, so far as our limits permit.

Insects are animals whose bodies are divided transversely into rings or joints more or less movable upon one another, and whose hard parts are upon the outside, and whose respiratory apparatus consists of air-holes, called stigmata, placed along the side of the body, and which open into a system of air-tubes which branch throughout the interior of the body, and thus carry air into every part. These air-tubes each consist of two membranes enclosing between them a spirally coiled fibre, thereby having great strength and flexibility. As in all other articulated animals, their alimentary canal occupies the central line of the body, and above it is the dorsal vessel or so-called heart; and their nervous system consists of a sort of brain lying above the œsophagus, from which two threads, passing around and below the œsophagus, extend beneath the alimentary canal along the floor of the general cavity of the body, and connect at certain distances small nervous centres or ganglia, whence arise the nerves of the body and limbs.

The class of Insects is by far the largest in the Animal Kingdom. It is regarded as much larger than all other classes combined. About 200,000 species of insects are already known, and the whole number may be safely estimated as high as 500,000 species. The species are mostly small—many are microscopic in size—but some kinds in the warm regions are several inches, even a foot, in length. The average length, however, is probably much less than one inch. This vast class may be divided into three groups, which Leuckart and many others regard as orders:

Insecta, or Insects.

I. Hexapoda, or Insects proper, as Bees, Butterflies, Flies, Beetles, Bugs, Grasshoppers and Dragon-flies.
II. Arachnida, as Spiders and Scorpions.
III. Myriapoda, as "Galley-worms," Centipedes, etc.

Dr. A. S. Packard, Jr., in his valuable work entitled "A Guide to the Study of Insects," gives the following tabular view of the Classification of Insects, which we gladly insert here, as valuable both to the entomological student and to the general reader:

The Class of Insects.

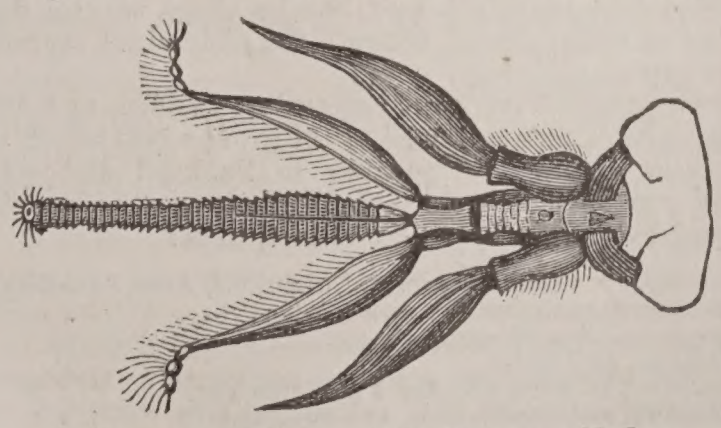
Order I.—Segments grouped into three distinct regions; eyes compound and simple; two pairs of wings (some kinds are wingless, and some, as the Diptera, have only one pair); six thoracic legs; one pair of jointed abdominal appendages. A more or less complete metamorphosis.	Hexapoda, or Six-footed Insects.

Order II.—Segments grouped into two regions, a false cephalothorax (the so-called cephalothorax of Spiders is not like that region in Crabs, the head being much freer from the thorax), and an abdomen; no antennæ; eyes simple; wingless; four pairs of thoracic legs; three pairs of jointed abdominal appendages (spinnerets) often present. No metamorphosis.	ARACHNIDA, or SPIDERS.
Order III.—Body cylindrical and worm-like. Segments not grouped into regions (except in the recently hatched young). Head free; eyes simple; antennæ present; wingless; yolk-sac present for a short period after hatching. No metamorphosis.	MYRIAPODA, or CENTIPEDES.

These three groups or orders may now be briefly noticed.

HEXAPODA.—The first order, Insects proper, is composed of insects which have their body divided into three plainly marked regions—the head, thorax, and hind-body or abdomen. The head is furnished with mouth, eyes and antennæ; to the thorax are appended the legs and wings; and the abdomen contains the principal organs of digestion, and other viscera, and to it also belong the piercer and sting with which many kinds of insects are provided. The Insects proper have only six legs—and hence are often called Hexapod Insects—and these are attached to the under side of the thorax, one pair to each of the three rings of which the thorax is composed. The leg consists of the hip-joint, by which it is fastened to the body, the thigh, the shank, and the foot, the last consisting generally of five pieces placed end to end and called tarsi, and generally armed at the end with one or two claws. The wings are normally four, but in some, as in Flies, etc., there are only two, and in others, as in Fleas, etc., these organs are wholly wanting. The wings of insects are at first little, soft, sac-like bodies containing tracheæ. They grow from the side of the thorax of the pupa at points above the insertion of the legs. During the pupa stage they are pad-like, but when the pupa-skin is shed, they rapidly expand with air and become broad and delicate wings. The wings of insects are thus simple expansions of the general covering of the body spread over a network of horn-like tubes. These tubes, it may be remarked here, are found to be double, consisting of a central air-tube enclosed within a larger tube filled with blood; and hence the aëration of the blood is also carried on in the wings, and thus these organs serve both the purpose of lungs and of flight. And it may be further remarked here that the number and position of these veins are of very great importance to the entomologist in classifying the genera and species of insects. The typical number of primary veins is five. They diverge from the base of the wing, and divide into veinlets, from which cross-veins arise, all together forming a network of veins and veinlets. The five main veins are, beginning at the front edge, the costal, the sub-costal, the median, the sub-median, and internal. Sometimes the median divides into four. The front or costal vein is undivided; the sub-costal and median are divided into several branches; the submedian and internal are generally simple. The piercer mentioned above is properly an ovipositor, and is in some cases a jointed tube, and is used for conducting eggs into holes where they are to be left to be hatched; in other cases it is a scabbard containing a central borer, or saws in some cases, which are used in making holes in which eggs are to be deposited. The sting with which many insects, as bees and wasps, are provided, is merely a modified ovipositor, and consists of a sheath covering a sharp instrument for inflicting wounds, and connecting with it inside of the body is a sac of poison.

The digestive system of insects consists of a mouth whose parts are variously modified in the different groups



Mouth and Tongue of the Bee, magnified.

of these animals. In some kinds the mouth parts are modified for biting and chewing purposes; in others they are so modified as to be adapted for sucking organs. The parts called mandibles are organs situated on each side of the mouth-opening, and they vary greatly in form and size. They usually consist of a single joint; and this joint or part is often subdivided into three parts, each ending in a sort of tooth for the purpose of cutting food. The cutting edges are opposed to each other, or overlap, and their motion is horizontal or side-wise, instead of vertical as in the motion of the jaws of vertebrated animals.

The parts called maxillæ are much more complicated organs than the mandibles, and are inserted on the under side of the head, and just behind the mouth. Their function is to seize food and retain it within the mouth, and to aid the mandibles in comminuting it. Each maxilla consists of a basal joint, beyond which it is divided into three lobes—namely, the footstalk, the palpus-bearer, and the blade. The maxillary palpi are slender-jointed organs, very flexible and sensitive. Insects have a pharynx, a gullet, a first stomach or crop, a second stomach or gizzard, a small intestine, a cæcum, etc.

The circulatory system is imperfect, as it exists only in a rudimentary form. Just under the covering of the back there is a long tube which is called the heart, and this organ performs regular alternate movements of contraction and dilatation. The blood enters this tubular organ by openings along its sides, the openings being furnished with valves which prevent its return, and the blood escapes at the foremost end as the organ contracts, and thus the blood is kept in motion throughout the interior of the animal, and thus the waste of the body is supplied and growth secured. The blood of Insects is colorless, and, as already indicated, is not contained in arteries and veins as in the higher animals, but it fills all the interior of the animal not occupied by internal organs, and it permeates the tissues of the organs themselves.

As already indicated, the respiratory system is very different from that of the higher animals. On the sides of the body are generally breathing-holes or stigmata, nine on each side, and these open into air-tubes called tracheæ, which branch throughout the body, carrying air into every part, and thus aërating the blood in the most perfect manner, and thereby fitting these animals for rapid and long-continued motion.

The muscular system of Insects is beneath but continuous with the integument, and it corresponds to the jointed structure of these animals. It consists of straight fibres, more or less isolated, and not gathered into bundles as in the vertebrates, although they are in many cases striated, as in the latter branch. The muscles are colorless, or transparent, or yellowish-white, and very soft. The muscular system is found to be the simplest in the lowest insects, and in the larvæ of all forms; and it is more complex in the head than elsewhere, and more complex in the thorax than in the abdomen. The muscles in Insects are exceedingly numerous. Lyonnet found 3993 muscles in a single larva (*Cossus ligniperda*), 228 of these being in the head. The muscular power of Insects is perfectly enormous. It is stated on good authority that the flea can leap 200 times its own height, that beetles have been known to gnaw through lead pipes, and that the European Stag-beetle (*Lucanus cervus*) has gnawed a hole an inch in diameter through the side of an iron canister in which it was confined!

The organs of sight in Insects consist of ocelli and eyes. Theoretically, the ocelli are the most anterior organs of the head, but in the process of development they are carried backward, so that in the adult insect they appear on top of the head. The ocellus is the simplest form of the eye. The ocellus consists of a "very convex, smooth, single cornea, beneath which is a spherical crystalline lens, resting upon the plano-convex surface of the expanded vitreous humor, the analogue of the transparent cones of the compound eyes." The ocelli constitute the only visual organs of most of the Myriapod, of all of the Arachnid, and of the larvæ of manyof the Hexapod Insects. The number of ocelli in adult insects is generally three. These organs are generally present except in the large majority of Beetles. The real eyes of Insects are compound, and are made up of a congeries of simple eyes. During the development or growth of the

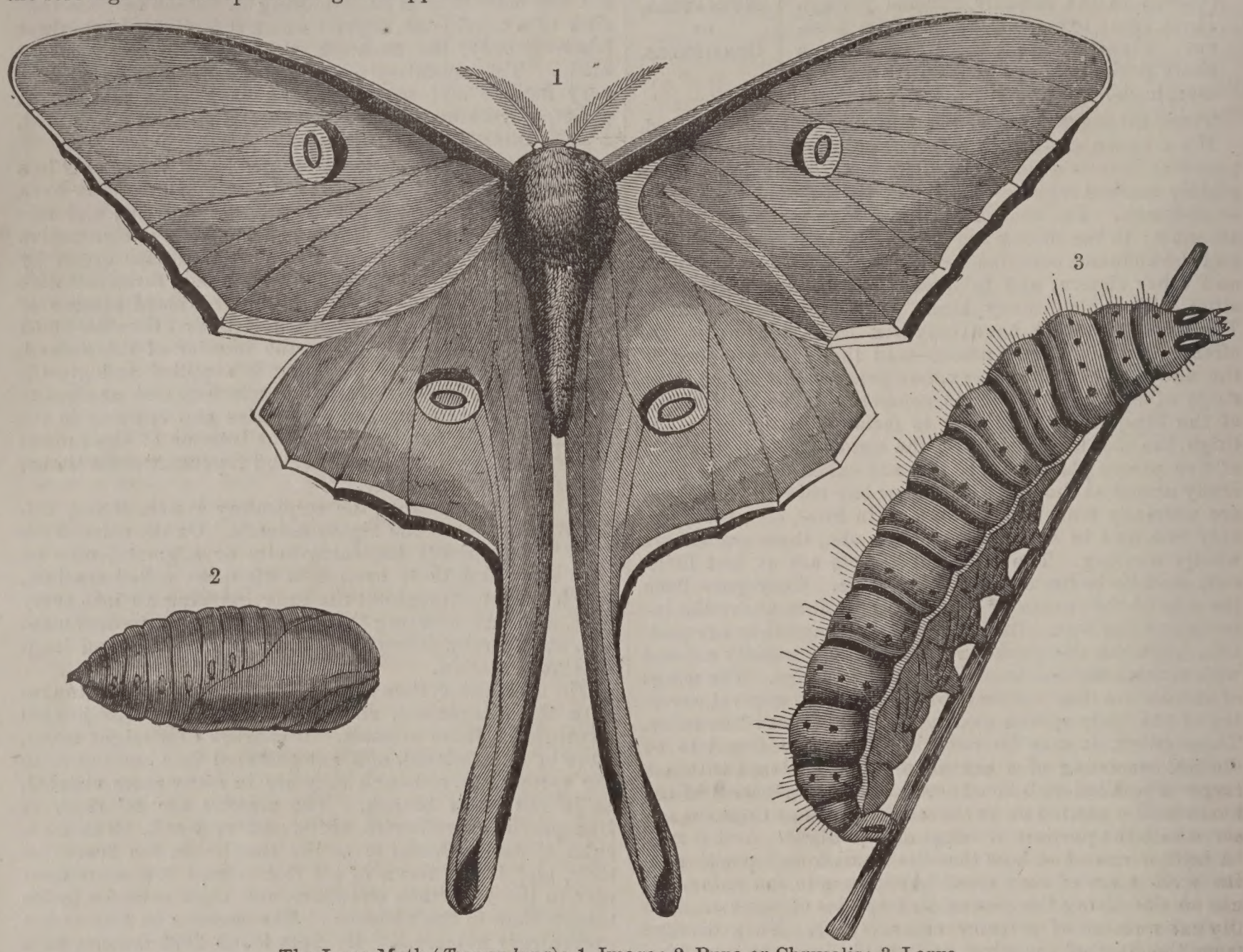
Head and Eyes of the Bee, magnified.

insect the simple eyes of the larvæ increase in number, and at length coalesce to form the compound eye. The number of facets or corneæ in the compound eye is very great in some kinds of insects, 3650 having been counted in the eye of a butterfly. The form of the facets is generally hexagonal, but in some species it is quadrangular.

As to the organs of hearing, smell, taste, and touch, but little is positively known. The antennæ seem to serve the purpose of feelers, and it is believed that they are also connected with the sense of hearing. But it should be remarked here that Siebold found an auditory apparatus in the fore legs of some species of grasshoppers.

Their nervous system, as already stated, consists of a double series of nervous ganglions or knots of nervous matter connected by a double chain of nervous threads; and these are situated along the ventral side of the animal, connected, however, with a nervous centre in the head. From these ganglia arise the nerves of the body and limbs.

It is hardly necessary to say that insects are never spontaneously generated, as some persons suppose, but they are produced from eggs, which are hatched after they are laid in some favorable place; or, in some cases, they are hatched in the body of the parent insect, and then brought forth as moving forms.



The Luna Moth (*Tropœa luna*): 1, Imago; 2, Pupa or Chrysalis; 3, Larva.

In passing from the egg state to the adult state, Insects undergo great changes of form and habit. These changes are called transformations or metamorphoses, and they are so great in most cases that the same insect at different ages may easily be mistaken, by one not an entomologist, for as many different animals. There are at least three more or less distinctly marked stages in the life of every insect after it leaves the egg—viz., the *larva*, the *pupa* or *chrysalis*, and the *imago* state.

In the larva state Insects are more or less worm-like, and consist of thirteen or fourteen apparent segments, besides the head; and they pass most of their time in eating, and as a consequence of this they grow very rapidly. When the larva of an insect has attained its full growth as a larva, it retires to some suitable place, and in many cases it spins a silken covering called a cocoon, then sheds its skin, and appears as a much shortened, oblong, oval, or conical body, apparently lifeless; in this form it is called a *pupa* or *chrysalis*. In a majority of species, however, no silken covering or cocoon is made, but the pupa itself is essentially of the same form as those found enclosed in a cocoon. At the end of the pupa state, which varies greatly in duration in the different species, the insect sheds its pupa-skin and comes forth fully grown, and in most species provided with wings; and in this state it is called a perfect insect or *imago*. After insects enter upon the adult or imago state they do not increase in size. They now provide for a continuation of their species, and then, in most cases, soon perish. All insects which pass through the changes described above are said to undergo a complete transformation. This word "transformation" does not, however, convey the exact idea of the changes, for the changes are those resulting merely from growth and development, and not from true transformations. In a word, the animal is one and the same during all its various forms.

But there are some kinds of insects which do not apparently pass through all the changes enumerated above, but whose larvæ pass by insensible gradations to the pupa state, and from the latter to the perfect insects, all the while remaining in a state of activity. These are said to undergo only a partial transformation. The grasshopper, for example, is hatched from the egg as a wingless insect. It eats voraciously, grows rapidly, hops about without the use of wings, sheds its skin more or less regularly, and appears after each shedding with longer wings and more completely developed limbs, until at length it ceases to grow, and then, shedding the skin for the last time, comes forth an imago or adult grasshopper. The larvæ of those insects which undergo only a partial transformation have only six legs, the same as adult insects. But of the larvæ which undergo a complete transformation, some kinds, as maggots, have no legs; others have a pair of legs to each of the three first segments; others have a pair to each of the three first segments, and, besides these, several fleshy legs, ten or more, placed beneath the abdominal segments, and known as prop-legs.

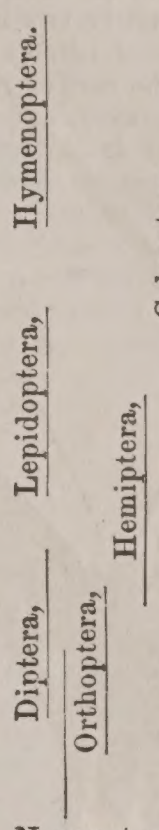
Insects proper have been variously classified, and different ranks have been assigned to the groups into which they have been divided. According to Packard and others, Insects proper may be divided into seven groups (first proposed by Linnæus) or sub-orders, thus:

1. *Hymenoptera*, as Bees, Wasps, Ichneumons, Ants, Saw-flies, etc.
2. *Lepidoptera*, as Butterflies and Moths.
3. *Diptera*, as Flies, Mosquitoes, etc.
4. *Coleoptera*, as Beetles.
5. *Hemiptera*, as Bugs, Cicadas, Plant-lice, etc.
6. *Orthoptera*, as Grasshoppers, Crickets, etc.
7. *Neuroptera*, as Dragon-flies, May-flies, Ant-lions, etc.

Dr. A. S. Packard, Jr., recognizes two series in these seven sub-orders—a higher and a lower—and arranges them thus:

First and Higher Series.—Body usually cylindrical; prothorax small; mouth-parts more generally haustellate (formed for sucking); metamorphosis complete; pupa inactive; larva usually cylindrical, very unlike the adult.	1. HYMENOPTERA. 2. LEPIDOPTERA. 3. DIPTERA.
Second and Lower Series.—Body usually flattened; prothorax large and squarish; mouth-parts usually adapted for biting; metamorphosis incomplete; pupa often inactive; larva flattened, often resembling the adult.	4. COLEOPTERA. 5. HEMIPTERA. 6. ORTHOPTERA. 7. NEUROPTERA.

In order to show, in a general way, the relative rank of the seven sub-orders and of two series of Six-footed Insects, Dr. A. S. Packard gives the following diagram:



It must be here stated that many naturalists regard these groups as real orders instead of sub-orders; and they stand as orders in many books which the student and reader may have occasion to consult on this subject.

A brief notice of each of these groups may now be given, with such illustrations as will give the general reader a clear idea of some of the characteristic forms in each group.

HYMENOPTERA.—The Hymenoptera (*ὑμήν, hymen*, a "membrane;" *πτερόν, pteron*, a "wing") have four membranous wings, the hind pair the smaller, and all traversed by a comparatively few veins. These insects have four jaws, the upper pair fitted for biting, and the lower pair the longer and softer, and with the lower lip in many cases adapted for collecting honey. The females are provided with stings, but the males have no weapons excepting their jaws. In passing from the egg state to the imago state they undergo a complete transformation. All of the Hymenopters are diurnal in their habits, and they fly swiftly. They are regarded by Dana as exhibiting the normal size of the Insect type. Of all the Hymenoptera, the Bees are of the greatest popular interest, even if we may not say that they are of the greatest scientific interest; and a volume might well be devoted to their intensely interesting and fascinating history. Thanks to Réaumur, the Hubers, and others, we have volumes of interesting and reliable information in regard to the Hive-Bee (*Apis*), the most wonderful representative of this group.

In general, Bees are eminently social in their habits, and the species are composed of three sorts of individuals—*females* or *queens*, *males* or *drones*, and *imperfectly developed females* or *workers;* the last are smaller than the others, and are often improperly called *neuters*. In a single community of the Hive-bee (*Apis mellifica*) there are sometimes 50,000 workers, 2000 males, but only one adult queen. This species has now been introduced in all countries of the civilized world. The celebrated Italian bee is regarded as one of its varieties. The Hive-bee has engaged the attention of the best observers for more than one hundred and fifty years, and many interesting and wonderful things have been found out regarding its structure and habits; but much still remains to be studied in connection with this wonderful insect.

As regards the workers, they are believed to be of two kinds—the nurses, whose function is to build the cells, collect honey, and feed the larvæ; and the wax-makers, which, from the food they eat, secrete wax beneath their ventral segments, from which it is taken in thin scales. The bee cells are theoretically hexagons with pyramidal bases, and the greater angles are given as 109° 28′, and the lesser as 70° 34′. I say that the cells are hexagons, theoretically, because it has been shown by Prof. Jeffries Wyman (*Proc. Am. Acad. of Arts and Sci.*, vol. vii., 1866) that the cells are all more or less imperfect when considered mathematically. And it may be added here that it is still an open question as to the exact way in which the form of the cell is secured or brought out. Some naturalists regard the cell as the result of the labor of the bee directed by mere instinct; others believe the bee to be directed in the work by a sort of reason; and others, still, believe that the form of the cell is a necessary resultant of the labor of bees working together.

The cells are of sizes in accordance with the three sizes—queens, drones, and workers—of bees to be produced. The ordinary cells are arranged horizontally—that is, the comb is made to assume a vertical position; but the queen cells, where the queens are reared, are in a vertical position, mouth downward, and are somewhat pear-shaped, and vastly larger than ordinary cells. The bottoms of the cells of the two tiers do not come directly opposite each other, cell to cell, but the bottom of each cell forms a portion of the bottom of each of three opposite cells, and thus the strength of the cells is greatly increased. The diameter of the cells for the larvæ of the workers is two and two-fifths lines; for the larvæ of the males, three and one-third lines; and the male cells are generally in the middle of the combs.

The bee-larvæ are fed with bee-bread, after it has been worked over in the stomach of the bee; this bread is composed of the pollen of flowers. When bees lose a queen they select an ordinary larva, and by giving it more room and better food they cause it to develop into a queen bee. When the larvæ are ready to go into the pupa state the foster-parents close up the cells with a lid of wax, convex on the drone-cells, and nearly flat on the worker-cells; then the larvæ spin their cocoon. The queen is about sixteen days in coming to maturity; workers twenty days, and drones twenty-four days. The queen sometimes lays 2000 to 3000 eggs in a day, and during her lifetime—perhaps five years—she lays more than a million of eggs. The laying of worker eggs begins in January and February; after this, in the spring, male eggs are laid.

Bees gather the nectar or honey of flowers, pollen, and resinous wax or propolis. When covered with pollen they collect every particle and knead it into little masses, one of which is placed on each hind leg, and in this way it is carried home to the hive. They get the resinous wax or propolis from resinous leaf-buds and leaves, and they use it in finishing the combs and in stopping crevices, etc.

But our space will not allow us to describe these insects at length, and so we may take our leave of them by enumerating here a few of their instincts and habits mentioned above, together with a few others not less wonderful than these. We may here say, then, that when about to swarm Hive-bees send out scouts; they follow their queen; they carefully cleanse their selected abode; they stop all crevices with propolis; they ventilate the hive by the rapid movements of their wings; they guard the entrance; they keep equal spaces between their combs in the hive; they solder the angles of cells and polish the interior; they produce a yellow tinge to the comb, as is believed, by a sort of varnishing; they extract honey from flowers; they collect pollen, and, as is believed, only from one species of flower on a given excursion; they hasten home on the approach of rain; they find their way back after the most extended wanderings; they feed their companions on their return to the hive; they store away the surplus pollen; they swallow pollen and change it into fit food for the larvæ; they feed the larvæ with the right sort of food; they cover the grub-cells with a waxen lid, convex or concave according as the grub is a drone or a worker; they cleanse the cells after the young bees leave them; they retain the young queens in the cells till they are wanted, and they feed them while thus kept confined; they release the queens in the order of their age, the oldest being released first; they cause the queens to fight, and they devotedly follow the survivors, and if they lose their queen they immediately go to work to raise another by giving extra food and room to an ordinary larva or grub; they kill the drones, and drag them from the hive when they are not wanted; and finally, they all have their appropriate parts to perform, and they perform these parts with unerring regularity and in the most perfect manner.

The Humble-Bees (*Bombus*) are in general of large size, and have exceedingly hirsute bodies. They build their nests in or on the ground, and their cells are large, oval, and more or less separate, and their communities are much smaller than those of the hive-bee, but there are in some

cases several hundreds of humble-bees in a single community, and each community arises from a single female which has survived the storms of winter; for the community, as a community, does not survive the winter.

The Wasps (Vespidæ) are other representatives of the Hymenoptera, and like the Bees many species live in colonies composed of females, males, and workers. They construct complex nests under ground or attached to overhanging rocks, to trees, fences, or buildings. These nests consist of tiers of hexagonal cells with their mouths downward, and supported by pedicels; and the cells in a single nest, in some cases, number 16,000. These representatives of the Hymenoptera are especially interesting as being the first paper-makers. Their nests are made of a paper-like substance, which is merely wood reduced to a paste by the action of the jaws of these insects, and this, put into the required form, is left to dry—essentially the same thing that our paper-manufacturers are doing by other processes and on a large scale in their mills to-day. The Wasp communities, like those of the Humble-Bees, are dissolved on the approach of winter; and each female that survives the winter founds a new colony the ensuing spring. Some kinds of wasps, however, are solitary in their habits.

The Ants (Formicidæ) are other members of the Hymenoptera which live in communities composed of females, males, and workers; the two former are furnished with loosely attached wings, and the last are destitute of wings. The workers have the care of the nest and of the rearing of the young; they go in search of food, feed the larvæ, take them into the sunshine in fine weather, and back again into the nest at night or when bad weather comes, and they watch over them with a wonderful fidelity. Most ant-hill communities are composed of individuals of one and the same species; but in some cases the workers procure auxiliaries by visiting the ant-hills of other species, and forcibly taking the larvæ and pupæ and bringing them to their own nest, and there having them reared and trained to work for the community in which they are reared!

The Ichneumons (Ichneumonidæ) are members of the Hymenoptera which are interesting not only on account of their structure, but because of the fact that they are very destructive to other insects, especially to those, as the Lepidoptera, which in the larva state are injurious to vegetation. They are therefore very useful insects. Ichneumons deposit their eggs on the eggs, larvæ, and pupæ of other insects, and upon these the larva-ichneumon feeds when hatched. These insects have the body long and narrow, the antennæ long, the ovipositor generally long and protected by two thread-like organs of the same length as

Ichneumon.

the ovipositor itself. The color of the Ichneumon is generally black, varied with red, yellow, or white. Some species, however, are wholly reddish.

Of all the Hymenoptera none are more interesting, considered from one point of view, than the Gall-flies (Cynipidæ), since these small insects, by puncturing a species of oak growing in Western Asia, produce the nut-galls of commerce, and these supply the world with ink. The Gall-flies have the head short and broad, the thorax thick and oval, and the abdomen much compressed and attached to the thorax by a very short peduncle. They are very numerous, and the different kinds attack different kinds of plants. Some species attack the Oak, others the Rose, etc. The females have a long ovipositor, with which they insert their eggs into leaves and other parts of plants, and these punctures cause galls; and the form and nature of the gall depends both upon the kind of gall-fly and upon the kind and part of the plant punctured.

Among the largest of the Hymenoptera are those Boring Saw-flies known as "Horntails," which have the body long, nearly cylindrical, and the blunt abdomen ending in a horny point. Beneath this abdomen they have a long saw-like and powerful borer, with which they bore holes into trees, in which they deposit their eggs; and it may be added that their larvæ are among the great host of tree-borers.

There are other saw-flies belonging to the Hymenoptera, but they belong to a separate family—namely, to the Tenthredinidæ. These Saw-flies are of various species, some of which attack the Rose, others the Vine, others the Elm, etc. All have an ovipositor consisting of double saws, lodged under the body and covered by two pieces as a sheath. They are sluggish in their habits. Their larvæ have from eighteen to twenty-two legs, and are found in communities on the leaves of birch and alder, holding fast by their true legs, while the rest of the body is curved upward. Other species, however, appear like slugs on the leaves of the rose and of fruit trees. The larva of the Elm Saw-fly is large, and covered with a thick skin with numerous transverse wrinkles, and when at rest it is coiled so as to somewhat resemble a snail-shell.

LEPIDOPTERA.—The second group of Insects proper—namely, the Lepidoptera (λεπίς, *lepis*, a "scale;" πτερόν, *pteron*, a "wing")—is composed of insects which have

The Peacock Butterfly, *Vanessa Io*.

four wings covered with scales that are easily removed. The Lepidoptera have a tongue consisting of two grooved threads placed side by side, so that the grooved sides come together and form a channel by their junction, and thus the tongue is adapted for sucking purposes; and accordingly these insects drink the dew and feed upon the honey of flowers. When not in use this tongue is rolled up like a watch-spring beneath the head, and more or less concealed on each side by an organ called a palpus. The legs of the Lepidopters are six in number, but the forward pair is short, and sometimes rudimentary, or wanting. In the larva state these insects are called caterpillars, and they have from ten to sixteen legs. Most kinds of caterpillars feed upon plants. Some kinds eat the leaves, others the blossoms, others the seeds, others the stems, and others the roots. Other kinds, however, eat fabrics, furs, feathers, leather, meat, lard, and even wax. In coming to their full growth as larvæ they usually change their skins four times.

The Lepidopters include the Butterflies and the Moths. The former are readily distinguished by their knobbed antennæ, and by the fact that they hold their wings erect when they alight. The Moths have variously formed, but never knobbed, antennæ, and their wings are sloping when they alight. All of the Lepidopters pass through a complete transformation in coming to maturity. Many of the caterpillars of the Moths spin cocoons; many, however, do not, and none of the caterpillars of the Butterflies spin cocoons.

The Butterflies of North America are numerous, and many of them are exceedingly beautiful, as any one may see by examining them, or the splendidly illustrated works of Edwards, and those of Scudder, as well as the illustrations of our butterflies in foreign works.

Of the Moths we have room only to mention the Sphinges or Hawk Moths, and a few of the broad-winged moths. The Hawk Moths (Sphingidæ) are mostly very large lepidopters, and the wings are long and comparatively narrow. These moths fly with great rapidity, and with few excep-

tions they visit the flowers to secure honey in the morning and evening twilight; and as they balance themselves before the petunias and other flowers, by the rapid movements of their wings, they may easily be mistaken for humming-birds. Their tongue is exceedingly long—in some cases five or six inches. The caterpillars of these moths are very large, and they assume curious attitudes. Supporting themselves on their hind legs, they elevate the forward part of the body, and remain for hours in this sphinx-like position.

Some of the broad-winged or Silkworm Moths (Bombycidæ), as *Cecropia*, *Polyphemus*, *Luna*, etc., are remarkable for their large size; others, as the beautiful *Deïopeia* and the Wood-Nymphs (*Eudryas*), are remarkable for their beauty; and all in the larva state spin silken cocoons, in

Silkworm, Moth, Larva, and Chrysalis.

which they pass into the pupa state. One of the most common of the small broad-winged moths, is the Tent-caterpillar Moth, which in the larva state lives upon neglected apple trees, and upon wild-cherry trees, and spins the well-known tent-like nests.

Diptera. — The Diptera (δίς, *dis*, "double;" πτερόν, *pteron*, a "wing") are so named from the fact that they have only two real wings, the place of the hind wings being occupied by two knobbed threads called poisers or balancers. Their mouth is modified for either sucking or lapping. The sucker or proboscis is composed of two to six bristle-like organs, in some cases as sharp as are the sharpest needles, and either enclosed in the grove of a sheath terminated by two lips, or covered by one or two laminæ which serve the purpose of a sheath. They undergo a complete transformation in coming to maturity. Their larvæ are without feet, and are called maggots. The pupæ are in most cases enclosed in the dried skin of the larvæ. Some kinds of dipters, as Mosquitoes, lay their eggs in the water, and their larvæ may be seen in summer in all stagnant pools, where they are popularly known as "wrigglers." They rest with their head downward, and the hind extremity, which contains the respiratory organs, is at such times at the surface of the water. They are very active, and move with a wriggling motion through the water, but come to the surface from time to time to secure air through their respiratory organs. At the end of their larval state they shed their skin, but still remain in the water, and move by means of their hind-body; but now they assume a different attitude, and the respiration is carried on through two tubes situated on the thorax. At the end of the pupa state, which lasts only a few days, the skin splits upon the back, between the breathing-tubes, and the winged insect or imago appears, and after resting a while on its empty pupa-case as it floats upon the water, it flies away in search of a victim whom it may pierce for blood. These kinds of dipters discharge a poisonous fluid into the wounds which they inflict, and this is the cause of the irritation which follows their attacks.

Some species of the Diptera, as the Hessian Fly (*Cecidomyia destructor*, Say) and the Wheat-fly (*Cecidomyia tritici*, Kirby), are very injurious to the farmer, sometimes destroying whole wheat-fields. The Hessian Fly received its name from the popular belief that it was brought to this country, in straw, by the Hessian troops. It is very small, only about one-tenth of an inch in length. The females lay their eggs on the young blades of wheat, and the eggs hatch in about four days, producing pale red maggots. The larvæ crawl down the leaf, and get between the latter and the main stalk near the joint, and here they injure and often destroy the plant by sucking the sap. The Wheat-fly, on the contrary, lays its eggs in the opening flowers of the wheat, also in those of rye, barley, and oats. In about eight days the eggs hatch, producing little yellow larvæ or maggots, which are found within the chaffy scales of the grain.

Several species of the Diptera are very injurious, or at least annoying, to cattle and horses. One of these is known as the Black Horse-fly (*Tabanus atratus*, Fabricius), another as the Orange-belted Horse-fly (*T. cinctus*, Fabr.), and another the Lined Horse-fly (*T. lineola*, Fabr.). All of these have the eyes very large, covering nearly the whole head, and they have a proboscis enclosing six sharp lancets in the female, and four in the male.

Other members of the Diptera, as the Asilus Flies (*Asilici*), are very long-bodied, and very destructive in their larva state to the roots of plants, and in the adult state they are very rapacious, seizing and destroying other insects.

Other dipters still are the Bot-flies (Œstridæ), which in the larva state inhabit various parts of the body of herbivorous animals, as horses, cattle, sheep, etc. These flies have very short antennæ, large head, and the wings cover the balancers; and the hind-body of the females has a conical tube bent under the body, and with it they lay their eggs when flying. One species lays her eggs upon the fore legs of the horse, another upon the lips, and another on the throat. By biting the parts where the eggs are laid, the horse gets them into his mouth, and swallows them. The larvæ, by means of hooks, cling to the walls of the stomach till they come to the end of their larval life. Another species (*Œstrus bovis*, Fabr.) lays her eggs on the backs of the cattle, and the larvæ penetrate the skin and live there in open sores. Another species (*Cephalomyia ovis*, Linn.) lays her eggs in the nostrils of sheep, and the larvæ crawl into the cavities of the head, and in many cases produce death.

But by far the largest group of all the Diptera is that

Flies.

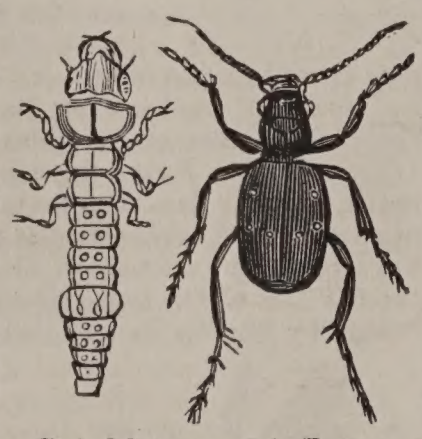
which Latreille called the Muscidæ, which includes about one-third of all the members of this sub-order, and which are known under the popular names of House-flies, Flesh-flies, Blow-flies, Cheese-flies, etc. Meigen has already, a long time ago, described 1700 species of these flies as belonging to Europe, and there is probably even a greater number in this country. These flies have a wonderful power of reproduction. Some species, as the Flesh-flies, are viviparous. Réaumur found 2000 larvæ in a single specimen of this sort.

Among the Diptera there are, as in other groups, some apparently anomalous forms. One of these is seen in the Fleas (Pulicidæ), which are wingless flies with hard, com-

pressed bodies, with two simple eyes instead of compound eyes, a sucker-like arrangement of mouth-parts, and hind legs specially adapted for leaping. By many writers the Fleas are regarded as constituting a distinct order—"Aphaniptera" (*ἀφανίζω, aphanizo*, "to hide;" *πτερόν, pteron*, a "wing"). Other anomalous forms of the Diptera are seen in the Horse-ticks (*Hippobosca*), Sheep-ticks (*Mellophaga*), Bird-ticks (*Ornithomyia*), etc. These have a horny flattened body, flat head, large eyes, rudimentary antennæ, and a proboscis formed by the labrum and maxillæ. They are parasites, and differ from all other insects in their mode of development. Each female produces only one or two larvæ, and when first hatched the larva is not divided into rings, but is smooth and egg-like, the whole covering being a puparium-like case in which the larva becomes a pupa immediately after it is born. The spider-shaped Bat-ticks (Nycteribidæ), which are parasites on the Bat, and the Bee-lice (Braulina), minute, wingless, blind insects, parasites on Bees, are other anomalous forms of the Diptera.

COLEOPTERA.—The Coleoptera (*κολεός, coleos*, a "sheath;" *πτερόν, pteron*, a "wing") or Beetles are insects whose upper or anterior wings, called elytra, are more or less horny, and they meet in a straight line upon the top of the back; and in general there is a small triangular piece, called scutellum, between their bases. Their hind or under wings are thin, and when not in use are folded longitudinally and transversely. The Coleoptera have two pairs of jaws, which move sidewise, and the larvæ, which are called grubs, undergo a complete transformation in coming to maturity. There are probably more than 100,000 species of these insects, and they present a great diversity of form, size, color, structure, and habits.

Some kinds, as the Tiger Beetles (Cicindelidæ), have a large head, globose eyes, long antennæ, and toothed mandibles, and are very rapacious in their habits, devouring other insects, which constitute their principal food. Their larvæ are provided with powerful jaws, and, like the adults, are rapacious in their habits. These larvæ dig vertical holes in the ground, in which they remain, the head just fitting the entrance, and when any insect passes near enough they seize it and devour it.



Cicindela campestris (Imago and Larva).

The Predaceous Ground Beetles (Carabidæ) are also rapacious, and several species are known as Caterpillar Hunters, on account of the warfare which they wage against various kinds of lepidopterous larvæ.

Other kinds of beetles, as the Dytiscidæ, are fitted for a residence in the water, and these have their hind legs specially fitted for swimming. They are also exceedingly rapacious, both in the larva and in the adult state, devouring all kinds of small aquatic animals, even fishes.

Other kinds of beetles, as the Gyrindæ, are found moving in all sorts of curves and gyrations on the smooth surface of standing waters; and these too swim by means of the fringed hind legs.

Some kinds, as the Carrion Beetles (Silphidæ), are true scavengers. Living together in great numbers, they perform a most useful service in removing noxious substances. Some species of this family have the habit of burying all the small dead animals which they find. They dig beneath the animal till they sink it out of sight, then deposit their eggs in it; and as soon as the young hatch, the latter begin to devour it, and thus the noxious substance is soon converted into living tissues.

The Dermestidæ are small beetles which in the larva state attack skins and bodies and all parts of dried animals. They often commit great havoc in zoological collections.

The Horn-bugs (Lucanidæ) are beetles whose head is very large and broad, and whose upper jaws are very large, curved, and often branched. They fly only in the night. In the grub state they live in the roots and trunks of trees, and some of the species are six years in coming to maturity.

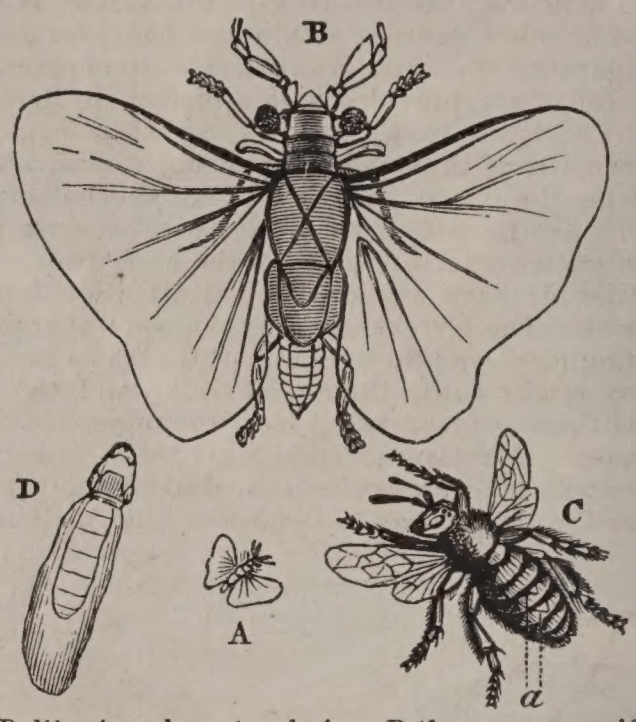
But of all the groups of the Coleoptera, the Scarabæans (Scarabæidæ) are one of the most extensive. Here belong the May-Beetle, Rose-Chafers, Goldsmith Beetles, and a host of others. They differ from one another in many important respects, but agree in having a rather short convex form, the antennæ ending in a knob composed of three or more leaf-like pieces, a visor-like piece which extends forward over the face, and their legs are fitted for digging.

The Buprestians (Buprestidæ) are beetles which have the head apparently sunk into the thorax nearly up to their eyes, and the whole form somewhat flattened and very solid. The lustre is metallic, more or less bronze-like. They are found on trees, and feign death when disturbed. In the larva state they bore the peach, plum, pine, oak, hickory, etc.

The Elaters (Elateridæ) are also beetles which have a hard body, and their head sunk to the eyes in the thorax, and the latter is as broad as any part of the body. In the larva state they are called wire-worms, and in this state they devour roots and wood. In the adult state they have attracted much attention from their habit of springing upward w h a jerk after they have been placed upon the back.

Some of the representatives of the Coleoptera are very important in their relations to pharmacy. This is true of the Cantharides (Meloidæ), extensively used for blistering purposes. They have a broad head, long antennæ, and soft wing-covers, which are more or less bent downward.

The Stylopidæ are minute beetles, so apparently abnormal in their appearance and structure that they have by some naturalists been referred to a distinct order called



Stylops Dalii: A, male, natural size; *B*, the same magnified; *C*, a bee, with the head of a stylops (*a*) projecting from between the abdominal rings; *D*, female, magnified.

"Strepsiptera" (from *στρέψις, strepsis*, a "twisting," and *πτερόν*, a "wing"). In the larva state these beetles live as parasites in the body of the bee.

Of the small members of the Coleoptera, none are more destructive than the Weevils (Curculionidæ). Some kinds of weevils attack the pea, others the plum, others grain, others rice, others stored grain, and others the pine, etc. All of the Curculios are hard-shelled, and the fore part of the head is generally prolonged into a slender snout, at the extremity of which is the mouth armed with small horny jaws. In the larva state they are white grubs.

The Long-horn Beetles (Cerambycidæ) are those which have exceedingly long antennæ. When caught they generally make a squeaking noise. The larvæ are wood-borers, and they are the most destructive of all wood-eating insects. In some species they are three or more years in coming to maturity as larvæ; they then go into the pupa state in their burrows, and at length appear as adult beetles. To the Long-horns belong the Oak-Pruner (*Stenocorus villosus*, Fabr.), the Beautiful Clytus (*Clytus speciosus*, Say), the Painted Clytus (*Clytus flexuosus*, Fabr.), the Apple-tree Borer (*Saperda bivittata*, Say), etc.

A large number of beautiful, golden, green, and blue beetles are included under the name of Chrysomelidæ. Their form is hemispherical or oval, the head is sunken, and the antennæ are wide apart. All of these are gayly colored.

And lastly we may notice the Lady-birds (Coccinellidæ) as representatives of the Coleoptera. These are small beetles, more or less hemispherical in form, and of a black, red, or yellow color, ornamented with spots. They are rapacious in their habits, both in the larva and in their adult state, devouring plant-lice.

HEMIPTERA.—The Hemiptera (*ἡμι, hemi*, "half;" *πτερόν, pteron*, a "wing") are insects which have the mouth-parts in the form of a slender horny beak, consisting of a horny sheath enclosing three sharp bristle-like organs, the whole being fitted for a sucking apparatus. When not in use this beak is bent under the body, and lies upon the breast. Bugs, Cicadas, Plant-lice, etc. are familiar examples of this group of insects. The Bugs may be regarded as the typical members of the group, as their wings are thick in their basal portion and thin towards their tips; that is, in general terms, half of the wing is of one degree of thickness, and the other half of another degree, and hence the name Hemiptera. As the wings of Bugs thus differ in the two regions, basal and terminal, these insects are often called Hemiptera heteroptera.

On the contrary, other hemiptera, as Cicadas, Plant-

lice, etc., have the wings of uniform thickness throughout, and they do not lie flat upon the back, as in the Hemiptera heteroptera; and having wings of uniform thickness throughout, they are called Hemiptera homoptera. Of the Hemiptera homoptera, few if any are more interesting than the Cicadas or Harvest-flies (Cicadidæ). These insects have a broad head, large eyes, and three eyelets on the crown. Both pairs of wings are transparent and distinctly veined. The males are furnished with an apparatus by which they produce a loud buzzing sound. This apparatus consists of a pair of organs which have been aptly compared to a pair of kettle-drums—one situated in each side of the abdomen, and each formed of convex pieces of a parchment-like membrane, finely plaited, and played upon by means of muscular fibres fastened to the inside; and thus, by the rapid contraction and relaxation of these fibres, the drum-heads are alternately tightened and loosened, and the sounds above named produced. And it may be added here that the intensity of the sounds is greatly increased by other cavities within the body, formed, or at least separated, by thin transparent membranes. The female cicadas are provided with a piercer for perforating the limbs of trees, in which they lay their eggs. This piercer consists of three pieces—two outer ones, which are grooved on the inside, and toothed on the outside like a saw, and a central piece, which is a sort of spear-pointed borer, which moves freely between the other two.

The Cicadas have attracted much attention from very early times. The Greeks, we are told, were charmed with their "singing;" and they often kept these insects in cages that they might enjoy their "music." And the Greeks also used them as food, eating both the pupæ and the perfect cicadas. Our common species are the Dog-day Cicada or Harvest-fly (*Cicada canicularis*, Harris) and the Seventeen-year Cicada (*Cicada septendecim*, Linn.), often incorrectly called the Seventeen-year Locust. It is believed that the latter insect appears in the same locality only at intervals of seventeen years, and hence its specific name. The Seventeen-year Cicadas come in swarms in the early part of summer, and the forests then resound with their singing from morning till night. After pairing, the females lay their eggs. Selecting small branches, they clasp them with their legs, and then they repeatedly thrust their piercers obliquely into the bark and wood in the direction of the fibres, and at the same time they detach little splinters of wood at one end, and these serve as a fibrous cover to the perforations. After thus forming a fissure, they deposit therein from ten to twenty eggs, which are conveyed to their places by means of the grooved side-pieces of the piercers. When one fissure is filled, another is made and filled, and so on, till each female has deposited her whole stock of four or five hundred eggs. When the eggs hatch, the young fall to the ground and immediately burrow to the roots of the tree, upon whose juices they subsist. They live in this way till the time of their transformation approaches, when they gradually ascend towards the surface, and at length they leave the ground, generally or always in the night, and crawl up the trunks of trees, where they fix their feet firmly to the bark. Their covering is now dry and hard. After some effort they open a longitudinal fissure in the skin of the back, and through this opening the perfect Cicada comes forth, leaving its dry and empty pupa skin attached to the tree.

European Cicada.

Other examples of the Hemiptera homoptera are seen in the little Tree-hoppers (Cercopidæ) which are found upon grass, herbs, and trees, upon the sap of which they subsist, imbibing such quantities that it oozes out of their bodies in the form of little bubbles, thus soon covering the insect in a mass of frothy foam. Of all the Hemiptera, none are more remarkable than these for their curious, and, in many cases, grotesque forms.

Of the very small and minute Hemiptera homoptera, none perhaps are more remarkable than the Plant-lice (Aphidæ) and the Bark-lice (Coccidæ). The former have on the hind part of their short body two minute tubes or pores, from which exude minute drops of a sweet fluid. And this fact explains the reason why ants collect in great numbers wherever plant-lice abound, for the ants delight to feed upon this honey-like fluid, and the most friendly relations exist between these two kinds of insects. The ants even caress the plant-lice with their antennæ, apparently soliciting them to give out the sweet fluid; and it is stated, on what seems to be good authority, that an aphis or plant-louse has been seen to give a drop of fluid to each of a number of ants waiting to receive it! The Aphidæ multiply with astonishing rapidity, and in this multiplication they admirably illustrate what has been called Parthenogenesis.

It is well understood among physiologists that it is the contact of the male sperm-cell with the yolk, which fertilizes the egg, and that from the moment of this contact the life of the embryo, which is to be the future animal, begins. This fertilization of the female germ by means of the male element through the pairing of the sexes, is the general rule among bisexual animals. But among insects there are exceptions, so that in some species an embryo may, and does, begin its life without the interposition of the male; and this mode of reproduction has been called by Owen, Parthenogenesis.

The young aphides are hatched in the spring from impregnated eggs laid the previous autumn, and soon they come to maturity, and the whole brood consists of wingless females. These females bring forth living young, each female producing in some cases twenty in a day. These young are also wingless females, and soon they bring forth living young, which are also wingless females, and in their turn bring forth living young. And in this way brood after brood is brought forth, even to the fourteenth generation, in a single season; and this, too, without the appearance of a single male. But the latest brood in autumn is composed of both males and females, which have wings; these pair, stock the plants with eggs, and then perish. We get some idea of the rapidity of the multiplication of these animals when we remember that Réaumur has proved that a single plant-louse may become, in five generations, the progenitor of 6,000,000,000 descendants!

The Bark-lice (Coccidæ) are Hemiptera in which the males alone are winged; the females always remaining in a sort of scale-like form, such as may be found at all times on the apple tree. Coccidæ are famous for the dyes which they have furnished the world for hundreds and even thousands of years. They furnished the *Kokkos* of the Greeks, the *Coccus* of the Romans, the *Kermes* of the Arabs, the *Alkermes* of the Persians; and the *Scarlet Grain* of Poland and the *Cochineal* of Mexico are insects of this family of the Hemiptera.

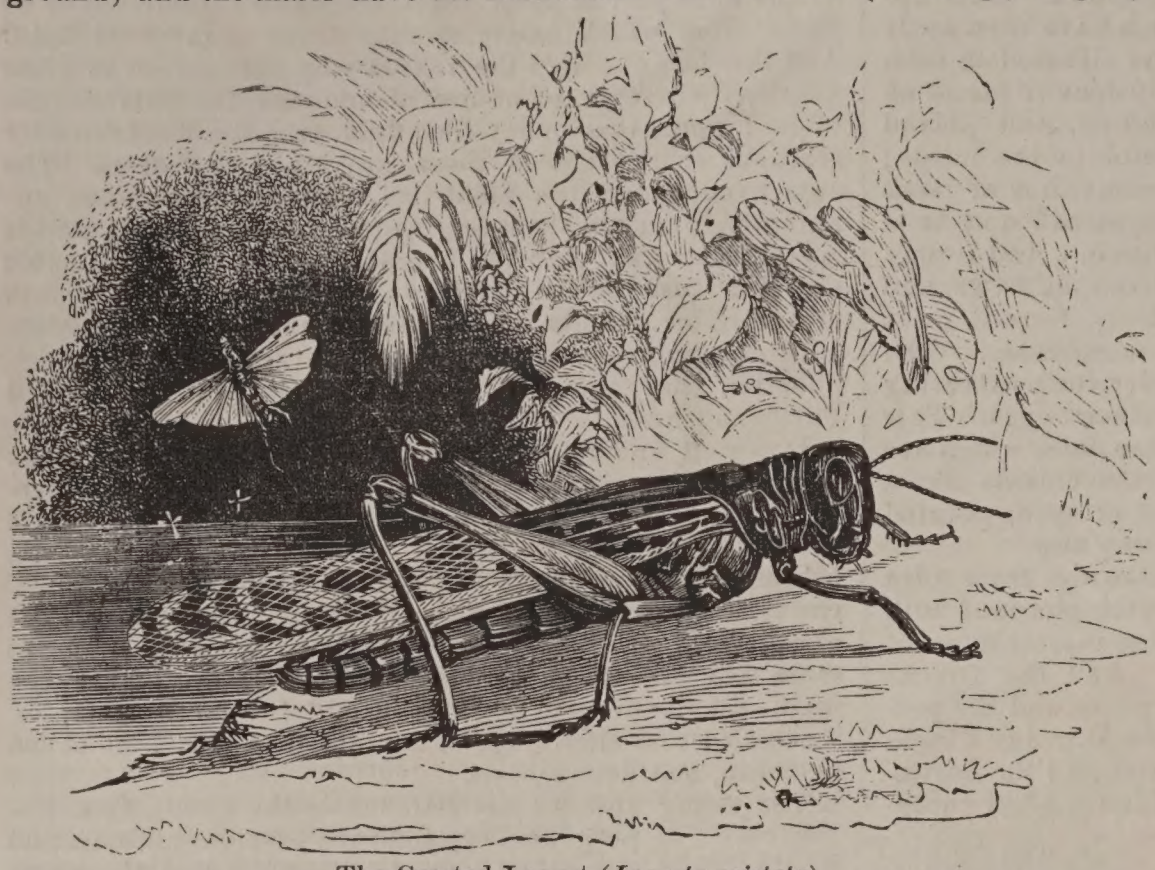
Some kinds of the Hemiptera, as the Boat-flies (Notonectidæ), live in the water, and are noted for their habit of swimming on their backs; others, as the Scorpion-bugs (Nepidæ), live in the water, and are adapted for seizing prey by their fore legs, which flex upon themselves, and thus act as pincers; others, as the Water-measurers (Hydrometridæ), are found on the water, over the surface of which they move with a gliding motion.

To the Hemiptera also belong the Squash-bugs (Coreidæ), the minute insects included in the Thripsidæ, the Bed-bugs (Cimicidæ), and the Lice (Pediculidæ).

Orthoptera.—The Orthoptera (ὀρθός, *orthos*, "straight," πτερόν, *pteron*, a "wing"), named from the nature of their wings, which lie straight along the back, have their upper wings rather thick, the under ones the larger and thinner, and folded in plaits like a fan. As already shown in our general remarks, they do not undergo a complete transformation, but they pass by insensible gradations from the larval to the adult stage, all the while remaining active.

Some kinds, as the so-called Earwigs (Forficulidæ), have the body flattened and armed at the hind extremity with a pair of pointed nippers. Others, as the Cockroaches (Blattidæ), have the body broader, flattened, and the hind extremity furnished with conical articulated appendages.

Others, as the Walking-sticks and Walking-leaves (Phasmidæ), closely resemble twigs and leaves. Others, as the Mantes (Mantidæ), are much elongated, and have the fore legs formed for seizing and holding prey; and they sit for hours holding up their fore legs, ready to seize any insect within their reach. Still others, as the Crickets (Gryllidæ), have an oblong flattened body, long stylets at the hind extremity of the body, and the females are provided with a very long ovipositor for introducing their eggs into the ground; and the males have the membranes and nervures



The Crested Locust (*Locusta cristata*).

at the base of the wings so specialized that, by the rubbing the wings upon each other, they can produce a sound known as a chirrup. Others, as the Locusts (Locustidæ), are grasshopper-like, and have very long antennæ and four jointed tarsi, and the females have a long ovipositor. Some kinds of the Locustidæ, as *Ceuthophilus*, are wingless and live under stones; others, as the Katydid (*Cyrtophyllus concavus*, Scudder), have the wings broad in the middle, and concave; others, as the Oblong Leaf-winged Grasshoppers (*Phylloptera*), have the wing-covers shorter than the under wings; others (*Phaneroptera*) have the ovipositor curved sharply upward; others (*Conocephalus*) have the head ending in a conical projection; and others (*Orchelimum*) have the ovipositor sabre-like in form.

The Migratory Locusts and their allies (*Acrydii* of Latreille) are orthoptera which have a large head, short antennæ, three-jointed tarsi, instead of four-jointed, as in the Locustidæ, and they have no projecting ovipositor. Such are the Red-legged Locusts (*Caloptenus*), the Coral-winged, and the Carolina Locusts (*Œdipoda*), etc.

Neuroptera.—The Neuroptera (*νεῦρον, neuron*, a "nerve;" *πτερόν, pteron*, a "wing") have a long body, and four long, thin, membranous, and finely-netted veined wings, the anterior pair generally, or at least sometimes, being the smaller; in some genera, however, the hind pair is the smaller, or even obsolete. These insects have large eyes and large mandibles. They are destitute of weapons, except their jaws, being without a sting or piercer. Most of the Neuropters are aquatic in the larva and pupa state. Many species do not undergo a complete metamorphosis.

Some of the representatives of the Neuropters, as the White Ants or Termites (Termitidæ), inhabit only warm countries, and in the larva state feed upon wood, devouring all kinds of wooden furniture, and even whole houses, as they have done in the Isle of France. Those called Stone-flies (Perlidæ) are oblong, depressed, and have many-jointed antennæ, and the abdomen has two long-jointed appendages. In the larva and pupa state they are found under stones in the water. Some families, as the May-flies (Ephemeridæ), are very short-lived, living in the imago state scarcely more than a few hours or a day, although their larva and pupa state extends through several years, all of which they pass in the water.

The Dragon-flies (Odonata) are among the best representatives of the Neuroptera, and have a long body, exceedingly large eyes, powerful jaws, and large and lustrous wings. They fly with great velocity and remain long upon the wing. In the larva and pupa state they live in the water; and when the time comes for them to complete their transformation, they crawl up the stems of plants, and, having withdrawn from the pupa-skin, which remains fixed to the plant, and having become dry, they fly swiftly away. At all periods of their life they are exceedingly rapacious, feeding upon all insects which they can capture.

To the Neuroptera also belong the Horned Corydalis and its allies (Sialidæ), the Ant-lions and other Lace-wings (Hemerobini), and the Caddice-flies (Phryganidæ). The Ant-lions are famous for the pitfalls which, while in the larva state, they make in the sands, and at the bottom of which they lie concealed, all but the jaws, and there await insects which fall into their pit; these they at once seize and devour.

Some of the Neuroptera are wingless, and are called degradational forms, and closely resemble the Myriapoda. Such are the Spring-tails (Thysanoura or Podaridæ), which have a cylindrical scaly or hairy body, short and four- to six-jointed antennæ, four to eight simple eyes on each side, and whose anal bristles are united and bent under the body, forming a sort of spring by means of which these insects leap. They are seen in gardens, and also on the surface of pools of water. Such also are the Bristle-tails (Lepismatidæ), which have a long body covered with silvery-like scales, and the abdomen furnished with three long bristles. They are found among old books and woollens, and also under stones and rubbish in damp situations. The species of both these families are small, the largest rarely having bodies over an inch in length.

Dragon-fly (*Æschna*).

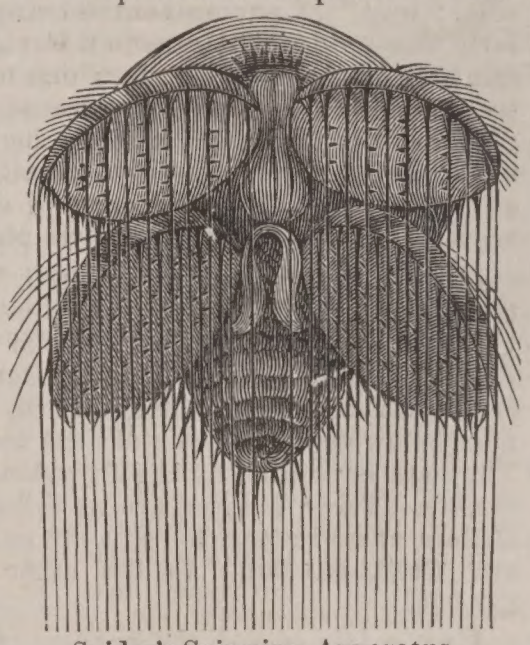
Arachnida.—The Arachnida are insects which have the body divided into only two well-marked regions, the head and the hind-body, the head and thorax being closely united into one piece, thereby resembling in this respect the head and thorax of the Crustaceans. The Arachnids have simple eyes, four pairs of legs, attached to the thorax, and they are without antennæ, compound eyes, and wings; and they do not change in general form in coming to maturity, which they reach after moulting the

skin six times. The Arachnids are divided into three sub-orders:

1. *Araneina*, or Spiders proper.
2. *Pedipalpi*, or Scorpions.
3. *Acarina*, or Mites.

ARANEINA.—The Araneina (*aranea*, a "spider"), or Spiders proper, have mandibles formed exclusively for biting, a more or less spherical abdomen, which is not divided into segments, and this abdomen is attached to the cephalothorax by a slender pedicel. They perform their respiration by means both of lungs and tracheæ, and they undergo no metamorphosis in coming to maturity. The mandibles end in a powerful hook, in the end of which there is an opening to a duct which connects with a poison-gland situated in the head. The palpi resemble shorter legs; they are in fact the maxillæ. In the female they are simple, but in the male the terminal joint is modified so as to be a sexual organ. Most species of Spiders have eight ocelli, but some have only six, some have only two, and certain cave species are said to be blind.

One of the most curious things about Spiders is their silk-spinning apparatus. On the abdominal extremity there are from four to six protuberances, each of which is perforated with a great number of minute holes—in some species as many as a thousand in each protuberance. From these minute holes passes the adhesive fluid or liquid silk, which has its origin in internal reservoirs; and as soon as the fine streams of this material come to the air they harden into silk. It is said that the Spider has the power of uniting all the minute fibres into one or into several threads, according to the use it would make of the silk. The Spiders' webs are very curiously constructed, and well repay the most careful observation and study.



Spider's Spinning-Apparatus, magnified.

The eggs of Spiders are enclosed in cocoons spun from the same kind of material of which they construct their webs, and the form of the egg-cases or cocoons varies according to the species. The young remain in the cocoon for a long time, and grow to double the size which they have when hatched, apparently without food.

The Tetrapneumones are large hairy spiders which have four lung-sacs and four stigmata, and two pairs of spinnerets. They live in cylindrical holes which they make in the earth. They are found mainly in warm climates. Here belong the Trap-door Spiders, described by some writers under the name of Territelariæ, or "Under-ground Weavers," and by others under the name of *Mygale*. These spiders are named from the fact that they close the entrance of their burrows with a sort of trap-door. This door is made of earth lined beneath with silk, or in some species it is wholly of silk.

The Dipneumones, and all other true spiders except the preceding family, have two lung-sacs, two or four stigmata, and three pairs of spinnerets. Some of the species of this family are known as the "Wanderers," others as the "Sedentary" spiders. The latter spin webs, and watch them that they may secure prey. Some kinds (*Clubione*) construct tubes of silk under the bark of trees and under stones. Others, as the Water Spider (*Argyroneta aquatica*, Linn.) of Europe, live under the surface of the water, there making their nest, which is filled with air. Others (*Tegenaria*) make a horizontal web, connected with which is a tubular retreat, where the spider remains till some fly or other insect becomes entangled in the web. Those belonging to the genus *Theridion* have the four inner ocelli larger than the four outer ones, and the first and last pair of legs longest; and they make webs of threads crossing in all directions. The genus *Epeira* includes those which have a large globular abdomen. They are sedentary species, constructing a web formed of spiral threads, and other threads radiating from a centre. *Nephila* is a genus of large spiders characterized by a long, cylindrical abdomen. *Nephila plumipes* of the Southern States has become celebrated from the interesting experiments made with it by Dr. B. G. Wilder, in the production of silk. The genus *Thomisus* includes "wanderers" which have very small cheliceres. *Dolomedes* includes wanderers which hide under stones, and not unfrequently dive under water, and which make an orbicular cocoon which is carried by the mother. *Lycosa* is a genus of large hairy spiders, with large cheliceres, with the fourth pair of feet the longest, and the third pair shortest. The species make no silk. They hide under stones. The Tarantula belongs to this genus. The genus *Salticus* includes the leaping Spiders; they have a large square cephalothorax, and the hind-body is of an oval cylindrical form.

The Tarantula of Europe, *Lycosa tarantula*.

PEDIPALPI.—Here belong the Scorpions and allied forms. They have the maxillary palpi greatly enlarged, and in most cases ending in forceps, and their abdomen is distinctly jointed; and in the true scorpions the hind-body is very long, and ends in a curved point or sting which discharges a poisonous fluid contained in an internal reservoir.

The True Scorpions (Scorpionidæ) have enormous forceps-like maxillæ. The False Scorpions (Pseudo-scorpiones) are minute forms which have maxillary palpi resembling the claws of the true Scorpions. They are often found in old books and in neglected drawers. The Harvestmen, or Daddy Long-legs (Phalangidæ), have a cephalothorax which is not jointed, the abdomen is short and thick, and the maxillary palpi end in a single claw, and the mandibles end in forceps, and their legs are excessively elongated.

ACARINA.—The Acarina or Mites are arachnids which have oval or rounded bodies which exhibit no articulation or divisions into segments, the cephalothorax and abdomen being merged together. Most of the species are very minute in size; a few, however, as the Ticks—which are the largest of all—attain the length of half an inch. The Red Mites (Trombididæ) are common in hot-houses and in hot-beds, and in the dry warm beds of the garden. The Water-mites (Hydrachnidæ) are found in both fresh and salt water. The Ticks (Ixodidæ) are large mites with leather-like bodies, and they attach themselves to man and animals, especially in warm countries. Some species, however, are found in temperate regions. Of the true Mites (Acaridæ), we may mention the Sugar-mite (*Tyroglyphus sachari*), common in unrefined sugar; the Cheese-mite (*Tyroglyphus siro*), the Flour-mite (*Tyroglyphus farinæ*), the Itch-mite (*Sarcoptes scabiei*); the last being the insect which, by burrowing and breeding under the skin, causes the loathsome disease which bears its name; and to the true Mites belong various species inhabiting domestic animals, and which entomologists refer to the genus *Dermatodectes;* and here also belongs the curious animal known as the Nose-mite, which buries itself in the follicles of the human nose.

MYRIAPODA.—The insects which belong to this order are more or less worm-like, and are composed of ten to two hundred or more segments. The head is free from the body, and is similar to that of typical insects. They may be divided into two sub-orders:

1. *Chilopoda.*
2. *Chilognatha.*

CHILOPODA.—The sub-order of Chilopoda (χεῖλος, *cheilos*, a "lip," and πούς, ποδός, *pous, podos*, a "foot"), or the highest group, includes those myriapods which have each segment or ring simple, and bearing but a single pair of feet, and which have the head divided into two regions, one before and the other behind the mouth. To this sub-order belong the so-called "Earwigs" (Lithobiidæ), which have a broad and flat head and forty-jointed antennæ, and which feed mainly upon earth-worms; the Centipedes (Scolopendridæ), which have from twenty-one to twenty-three feet-bearing segments, and which in some species, as those of the tropics, are six to nine inches long; and the Geophilidæ, which are characterized by their slender form, and by their great number of segments, varying in the different species from thirty to two hundred, each formed of two complete sub-segments, and bearing only a single pair of feet.

CHILOGNATHA.—The Chilognaths (χεῖλος, *cheilos*, a "lip;"

γνάθος, *gnathos*, a "jaw") have very short and few-jointed antennæ, very numerous segments, and each segment has two pairs of feet. Here belong the Millipedes, also known as "Thousand Legs" (Julidæ), which have the body long, nearly cylindrical, and made up of numerous nearly equal segments. And here also belong the Polydesmidæ, which have the body broad and flattened and the head large; and the Glomeridæ, which have the form of the body half cylindrical, and composed of twelve or thirteen segments, the head large and free, the first thoracic ring small, and the last ring of the body shield-shaped.

And now, having given a brief outline of the nature and of the history of the science of Entomology, and having described and illustrated a few of the more important typical forms of which it treats, we leave the subject with our readers, commending it as one worthy of the attention of the ablest minds. SANBORN TENNEY.

Entomos'traca [from the Gr. ἔντομον, an "insect," and ὄστρακόν, a "shell"], one of the orders of crustaceans, including those species having normally five or six cephalic segments in the form of a shell, and five or more rings of the foot series, the hinder ones being generally obsolete. The abdomen has no appendages. The species of this division are very numerous, and most existing species are of small size, except the king-crab (*Limulus*), which some recent theorists place in a new order by itself. Many of them are found in fresh and salt water, and some are parasitic. They differ greatly in general form, and in the number of their organs of locomotion, which in some species are more than 100, and in others are entirely absent. The order includes the carcinoids, ostracoids (with the cirripeds), limuloids (doubtful), and rotifers. Entomostracous shells are peculiarly abundant in certain palæozoic rocks. They first appear in the Silurian strata.

Entozo'a [from the Gr. ἐντός, "in" or "within," and ζῶον, an "animal"], a name applied to those animals which dwell within the bodies of other animals. They belong to the Vermes (true worms), the lowest form of articulate animals. They are divided into (1) cestoid worms, or tapeworms, which are all more or less jointed, of a ribbon-like form, each joint of hermaphrodite conformation, and dwelling in the intestines. The embryonic worms penetrate the tissues, become surrounded by a cyst, and are known as "cystic" worms. They have no alimentary canal. (2) The flukes or trematode worms, of flat oval form, smooth, soft, and not jointed. They have an hermaphrodite development, the sexual organs pervading a great part of the body of the adult. They afford many wonderful examples of the so-called alternate generation and of parthenogenesis in some of the generations. The disease called "rot" in sheep is caused by their presence in the biliary passages. In man they cause the hæmaturia prevailing at the Cape of Good Hope and the endemic dysentery of Egypt. They inhabit the liver, kidneys, lungs, etc. Among the genera are *Distoma*, *Bilharzia*, and many others. When perfect, they have an alimentary canal without vent. (3) The Nematelmia or round worms, having long, cylindroid forms, and in the more perfect forms an intestinal canal with mouth and vent, and distinct sexes. This class includes pinworms, *Ascarides*, the *Trichina*, the Guinea worm, and many others.

Entre Douro e Minho ("between the Douro and the Minho," rivers which bound it on the S. and N. respectively), a province of Portugal, is bounded on the N. by Spain, on the E. by Traz os Montes and Beira, on the S. by Estremadura, and on the W. by the Atlantic. Area, 2808 square miles. It is the most populous, the richest, and the best cultivated province of the kingdom. Everywhere are fertile valleys, rich meadows, fields, and vineyards. The products are fruit, wine, oil, figs, oranges, barley, rye, and wheat. Chief town, Oporto. Pop. 988,985.

Entre Rios, ĕn'trā ree'ŏs (*i. e.* "between the rivers"), a province of the Argentine Republic, is bounded on the N. by the province of Corrientes, on the E. by the river Uruguay, and on the S. and W. by the Paraná. Area, 52,110 square miles. The surface is level, and partly occupied by swamps and prairies or grassy plains. Many cattle and horses feed on these plains. The chief exports are hides, horns, and tallow. Pop. in 1869, 134,271. Capital, Concepcion.

Entry, the act of entering. In criminal law, in addition to breaking, entry is necessary to constitute the crime of burglary, but this need not be with the whole body. If the hand or any part of the body goes into the building with intent to commit a felony, it is sufficient; and if only the instrument intended to be used in the commission of the crime enters, it is enough to constitute the offence.

In the law of real estate, entry is the taking actual possession of land. A writ of entry was a common-law action, now disused, to recover the possession of land from one who wrongfully withheld it. Any going upon the land of another is often termed an entry, and unless done with the permission of the owner, is in most instances unlawful and a trespass.

En'velope [from the Fr. *envelopper*, to "wrap up," to "cover," "enclose"], in geometry, a curve or surface generated by the repeated intersections of given curves or surfaces, whose position, form, and magnitude are allowed to vary according to some invariable law. A tubular surface is the envelope generated by a moving sphere of constant radius; the plane curve is the envelope of its tangent, etc.

Envelopes, for letters, are a comparatively recent development of civilization, the demand for them having been created by cheap postal service. They were at first cut, folded, and gummed by hand, but the great call for them stimulated the production of machines for doing the work. These machines are of various kinds; and, not to specify the names of the somewhat numerous rival inventors, it may be remarked that in latter years these machines turn out surprising numbers of envelopes, and that the quality of the work is absolutely perfect—very far ahead of what could be done by hand. Stamped envelopes for letters and newspapers are issued and sold by nearly all civilized governments, but the products of private enterprise are more generally used.

En'voy [from the Fr. *envoyer*, to "send" (that is, to "put or start on the way"), from *en*, "in" or "on," and *voie*, "way"], a person sent on any mission, but particularly one sent on business to a foreign court; a diplomatic minister of the second order; one who is inferior in rank to an ambassador, and who cannot demand a private audience of the sovereign to whom he is accredited, but must negotiate with the minister of foreign affairs. Besides the ordinary envoy, there is a class of diplomatists styled envoys extraordinary and ministers plenipotentiary.

Envoy Extraordinary and Minister Plenipotentiary, the title of the principal representatives of the U. S. government at the capitals of the following nations: Great Britain, France, Russia, Germany, Austria, Italy, Spain, China, Brazil, Mexico, Peru, and Chili. They rank next below ambassadors and next above ministers resident. They are appointed by the President and confirmed by the Senate. Their salaries are as follows: ministers to Great Britain and France, each $17,500 annually; to Italy, Peru, and Chili, $10,000; to the other countries mentioned, $12,000.

Eny'o [Gr. Ἐννώ], the goddess of war in the Greek mythology. (See BELLONA.)

Enz'ina (or **Encina**), **de la** (JUAN), a popular Spanish poet, born in Old Castile in 1468. He was patronized by King Ferdinand V. In 1496 he published a volume containing several comedies and odes and a poem called a "Vision of the Temple of Fame." He is considered the founder of the Spanish theatre. Among his dramas, which are remarkable for purity of style and natural imagery, is "Placida y Victoriano." He performed a pilgrimage to Palestine in 1519. Died in 1534.

Enzio, or **Enzo,** a natural son of the emperor Frederick II. of Germany, was born about 1224. He fought for his father against the pope and the Guelphs, and assumed the title of king of Sardinia. Having obtained command of the imperial fleet, he gained a great naval victory over the Genoese in 1241. In 1249 he was taken prisoner by the Guelphs, who confined him until his death in 1272.

E'ocene [from the Gr. ἠώς, "dawn," and καινός, "recent;" that is, belonging to the dawn of the cenozoic period], in geology, a term applied to the lower tertiary strata, and originally suggested by the occurrence in those strata of a few faint dawnings of living species of fossils. The term was originally limited by the percentage ($3\frac{1}{2}$) of recent or living to extinct species found in a collection of older tertiary shells of the Paris basin, but it is now known that all the eocene species are extinct. The eocene beds rest on the chalk, and occupy small areas compared with the older formations. They are generally well developed in the vicinity of the three great capitals of Western Europe, London, Paris, and Brussels, each of which is built on a special tertiary basin of this period. They contain many interesting fossils of vertebrates, mollusks, radiata, etc. The eocene strata are divided into upper, middle, and lower eocene. The London clay belongs to the lower division.

In America the eocene strata form a belt of outcrop extending from New Jersey around, parallel with the Atlantic and Gulf coasts, to the Mississippi, and are represented in the interior of the continent by certain estuary and freshwater deposits of Wyoming Territory, etc. On the west coast the eocene has not been distinctly recognized. In

Eastern America the eocene strata are divided into the Claiborne, Jackson, and Vicksburg beds, of which the last are most recent. They contain numerous fossils, mostly marine mollusks, but also include some gigantic vertebrates, as *Zeuglodon cetoides*, a carnivorous cetacean seventy feet in length, and *Carcharodon megalodon*, a shark of which the teeth are sometimes six inches in length. Leaves and fruits occur in the eocene at Brandon, Vt., and in Mississippi. Like the flora of the European eocene, they indicate a tropical or sub-tropical climate. The eocene beds of Wyoming have furnished the remains of a remarkable group of mammals, which are thought by Prof. Marsh to form a new order, which he has named "Dinocerata." The largest of these (*Dinoceras mirabilis*) had the bulk of an elephant, and was provided with three pairs of horns and a pair of great sabre-like canine teeth. Many other vertebrate remains from these deposits have been described by Profs. Marsh and Cope.

Eolian Harp. See ÆOLIAN HARP.

Éon de Beaumont, d' (CHARLES GENEVIÈVE LOUIS AUGUSTE ANDRÉ TIMOTHÉE), called **Chevalier d'Éon,** a French diplomatist and writer, born at Tonnere Oct. 5, 1728. He was employed in an important mission to Russia in 1755, and served as captain in the French army in 1759. About 1761 he became minister plenipotentiary in London, but he was soon deprived of that office by secret intrigues of his enemies in Paris. He remained as an exile in England for many years, during which much sensation was excited by a report that he was a female. He returned to France in 1777, after which he wore the female dress, in compliance, it is said, with the order of the king. He died poor in London May 21, 1810.

Eon (or **Eudo**) **de Stella,** a fanatic of the twelfth century, an ignorant (and perhaps insane) nobleman of Bretagne, who, having heard, during the act of exorcism, the words "through Him" (*per Eum*, etc., in Latin) "who will come to judge the quick and dead," concluded, from the resemblance between his own name *Eon* and the Latin *Eum*, that he was the one appointed as the final judge of mankind. He taught a reformed doctrine, and gained many disciples. He was captured in 1148, and many of his followers (called Eonians) were burned, but Eon himself was pronounced insane, and seems to have been spared.

E'os [Gr. Ἠώς, the "dawn"], in the Greek mythology, a daughter of Hyperion, a sister of Helios (the sun), and the wife of Tithonus. She corresponds to the Latin Aurora, the goddess of the morning. (See AURORA.)

Eötvös, or **Eoetvoes** (JOSEPH), FREIHERR VON, an eminent Hungarian author and statesman, born at Buda Sept. 3, 1813, was educated at the University of Pesth. About the age of twenty he produced "Revenge," a tragedy, and two successful comedies entitled "The Critics" and "The Wedding." His "Carthusian" (1838–41), a novel, was generally admired. He also gained distinction as a political writer and orator of the popular party. Among his works are a political novel entitled "The Village Notary" (1844–46), which was translated into English, a work on the "Equal Rights of Nationalities" (1851), and another on "The Influence of the Ideas of the Nineteenth Century" (2 vols., 1851–54). He was minister of public instruction in 1848, but he resigned the same year. In 1865 he began to edit a political paper. In 1867, after the reconciliation between the Magyars and the emperor of Austria had been effected, he was again appointed minister of public instruction, which place he retained until his death. Died Feb. 2, 1871.

Eozo'on [from the Gr. ἠώς, the "dawn," and ζῶον, an "animal," implying an animal existing at the dawn of creation], one of the oldest geological representatives of animal life, a gigantic marine animal whose remains have been found in the Laurentian rocks of Canada. The *Eozoon Canadense* belonged to the Foraminifera, animals of very low organization, even lower in the scale than sponges. It had no proper organs, but consisted probably of a jelly-like mass, having the power of secreting a calcareous shell. It was doubtless sessile, adding as it grew crust after crust of chalky matter, probably living on from age to age until it constituted whole beds of limestone. What are supposed to be other species of *Eozoon* have been found in the oldest rocks of Europe. The organic character of *Eozoon* is denied by many palæontologists.

Epacrida'ceæ [from *Epa'cris*, one of the genera], a natural order of exogenous plants (shrubs and small trees), mostly natives of Australia, Polynesia, and the Indian Archipelago. They resemble Ericaceæ in many respects, but differ from them in the structure of the anther, which is 1-celled and destitute of appendages. The leaves are parallel-veined and have no midrib. The corolla is generally tubular; the fruit is in many cases an edible berry, in others a capsule or drupe. The *Lissan'the sap'ida* bears an edible fruit, which is called the Australian cranberry. Several species of *Epacris* are cultivated in greenhouses for their very beautiful flowers. This order also comprises the *Sphenotoma*, *Lysinema*, *Styphelia*, and many other genera.

E'pact [Gr. ἐπακτός, "added," from ἐπάγω, to "bring to"], the excess of the mean solar month (the twelfth part of a tropical year) over the mean lunar synodical month, or mean lunation; that is, inasmuch as the mean lunation is less than the mean solar month, the epact is properly the amount to be added to the former to bring it up, or make it equal, to the latter. Practically, in the Church calendar, however, the epact is the number of days which intervene between the end of the ecclesiastical year in December and the first day of January succeeding; or, as it is commonly expressed, the epact is the age of the moon, estimated in entire days, at the beginning of the civil year. According to the definition given first above, it is manifest that the epact must increase from month to month, but for the purposes of the ecclesiastical calendar this monthly increase is not considered; the entire increase for each year being supposed to take place at the end of the year. This calendar is extremely artificial, the calendar moon being a sort of fiction of which the periods only approximately correspond with those of the moon in the heavens; so that the calendar months and the true or mean astronomical lunar months rarely begin or end exactly together. In the reckoning of the epact the following arbitrary assumptions are made: 1. The mean synodical month is 29½ days long (it is, in fact, 44 minutes 2.84 seconds longer). 2. The lunar year consists of 12 lunar months, or 354 days. 3. The solar year is always 365 days (it is really 5 hours 48 minutes 46.05444 seconds longer). 4. The calendar months are alternately 30 days and 29 days long. Thus, the first day of the second ecclesiastical month is the 31st of January; the first day of the third ecclesiastical month is the 1st of March; of the fourth, March 31st; of the fifth, April 29th, and so on. Thus, the last day of the lunar year is December 20th; so that if new moon occurs at the beginning of the civil year exactly, the epact at the beginning of the next civil year is 11. In another year this epact will be doubled, and become 22; and at the end of a third it will be 33 days, or more than a month; so that on the 1st of January the moon will be somewhat advanced in a second lunation. The completed lunation is counted 30 days, and the epact is thus reduced to *three* days at the beginning of the fourth year. The month thus passed over, or dropped, is called an *embolismic* month. As the epacts accumulate, six such embolismic months of 30 days each are dropped; and finally we reach a point where the epact is 29, which we consider to be a complete embolismic month also, and drop it; so that the next following year begins with the epact 0, like the first. This occurs at the end of the nineteenth year, so that in every cycle of nineteen years the epacts recur in the same order.

All the foregoing assumptions are separately inexact, but in combination their inaccuracies nearly balance each other; and accordingly it happens that, at the end of the nineteen-year cycle, the calendar moon, the true moon, and the sun occupy almost exactly the same relative places as at the beginning. That is, supposing the sun and the true moon to leave some determinate point—say the equinox—together at the beginning of the cycle, then at the end of the nineteenth year or the beginning of the twentieth the sun will be truly in the equinox again, and the moon very nearly so, but not quite, being behind by about two hours and four and a half minutes. In something less than twelve cycles (about 220 years), therefore, the true moon will have lost a day on her epact. If the calendar moon lost nothing, its epact would consequently be too great. But the calendar moon loses more than the true moon, as will appear from the following comparison, made for a period of four cycles, or 76 true astronomical (tropical) years and 940 lunations:

940 calendar lunations, of 29½ days each, give.....	27,730 days.
24 embolismic months too long, and 4 too short, add	10 "
19 intercalary days, ignored in the lunar calendar..	19 "
Total days in 4 calendar cycles.....	27,759.000
" " 940 true lunations.....	27,758.753
" " 76 true years.....	27,758.407

It thus appears that the calendar moon falls behind the true moon 0.247 of a day, or nearly 6 hours, in 76 years; and its epact not only absolutely diminishes, but diminishes relatively to that of the true moon also. The effect of this is to cause the successive calendar new moons to occur too late by an amount slowly but constantly increasing; the increase amounting to one entire day in something more than 4 times 76, or 304 years—more exactly 308 years. No account of this circumstance was taken, however, for nearly sixteen centuries after the commencement of our era. At the time of the reformation of the calendar by Pope Gregory XIII., in 1582, the epact had become too small by nearly five days.

It was not this discrepancy, however, which led to the reformation, though occasion was taken at that time to cor-

rect it. The real cause which prompted the action of Pope Gregory was the observation that, through the error of the Julian intercalation (of one day in every four years—every leap-year, as it is called), the adjustment of the months to the seasons was becoming slowly displaced, the equinox going backward towards the first of March. At the time of the Council of Nicæa (A. D. 325) the equinox fell, or was supposed to fall, on the 21st of March; in 1575 it fell upon the 11th. A retrogradation of ten days had occurred in 1250 years. Pope Gregory thought it expedient to put back the equinox again to the 21st, which he could do in no other way than by adding *ten* to the count of every day in the year; and this he accordingly did. It did not matter at what place in the year the change of count began. He actually commenced by calling the fourth day of October, 1582, the fourteenth day of that month. This change has had no other practical effect but to perplex systematic chronology. The displacement of the seasons had not become so great as to occasion any inconvenience. It *was*, however, desirable to provide against any further displacement for the future; and this part of Pope Gregory's reform is only to be spoken of in terms of admiration. The Julian intercalation of one day in every fourth year produces an error of excess in the calendar year, which by accumulation amounts to about three-quarters of a day in a century, or three days in every four centuries. The intercalary day is, therefore, in the Gregorian system, omitted in the centurial years which are not multiples of 400, and retained in those which are. The dropping of an intercalary day has the effect to make the succeeding year begin a day sooner than it otherwise would, and it therefore diminishes the moon's epact by the same amount. The Gregorian correction of the civil year accordingly requires a reduction of the epact by three days in every four hundred years. If the epact, as it had been previously reckoned, had been truly adjusted to the astronomical year, this correction would be all that would be necessary to keep it permanently right. But in point of fact the Julian intercalation made the mean year too long, in reference to the moon, by about six hours in 76 years, or one day in 304 years (if the more exact numbers are taken, one day in 308 years), making the epact correspondingly too great. The principal mathematician employed on the calendar by Pope Gregory, Christopher Clavius, made the period 312½ years, which would give eight days in 2500 years. To correct the epact *to the Julian year*, therefore, it is necessary to add to it eight days in every twenty-five centuries; and to correct it from the Julian to the true year, it is necessary to subtract three days in every four centuries. In 100 centuries the epact is accordingly increased by 32 days, and diminished by 75 days, the diminution amounting on the whole to 43 days. The larger of these corrections, called the solar, which is subtractive, is applied of course in each non-bissextile centurial year. The smaller has to be applied at periods regulated by arbitrary rule. As 25 is not divisible by 8 without a remainder, the intervals between the corrections cannot be entirely uniform. There are seven intervals of three centuries each, and an eighth of four centuries. The first application of this correction after the promulgation of the Gregorian reformation was made in 1800, which century was assumed to end one of the periods of twenty-five. The correction is to be made at the end of every third century after 1800, until 3900, after which it will be deferred till the year 4300. In the Church Prayer-Book, at the end of the introductory matter relating to the calendar, there are three tables called General; of which the second embraces the resultant effect of these corrections of the epact up to the end of the eighty-fifth century, when the correction amounts to one entire embolismic month of thirty days.

The use of the epact of the year in the calendar of Pope Gregory was to lead to the determination of paschal full moon, and so, by consequence, of Easter. (See EASTER.) The epact being the age of the moon in entire days at the beginning of the (lunar) month, the place of new moon in March would be found by counting backward from the 30th of March (which we have seen to be the last day of the third lunar month), including this 30th day itself in the count, a number of days equal to the epact. The date in March thus found is the *first* day of the moon, and thirteen days more added bring us to the fourteenth; the day of March thus found will be the date of paschal full moon, unless it happens to be less than the 21st. In this latter case we must go to the month of April, and count backward from the end of the fourth lunar month, which is April 29th. To facilitate this counting backward, or to make actual counting unnecessary, Clavius introduced a row of numeral letters into the calendar page opposite the days of the month, in reversed order, I. being opposite March 30, and XXX., or 0, standing opposite March 1. This is extended through all the months in the year, as in the following illustration, which presents the months of March and April only:

Day of Month.	March. Epact.	Letter.	Day of Month.	April. Epact.	Letter.
1	0, or XXX.	D	1	XXIX.	G
2	XXIX.	E	2	XXVIII.	A
3	XXVIII.	F	3	XXVII.	B
4	XXVII.	G	4	XXVI., 25	C
5	XXVI., 25	A	5	XXIV., XXV.	D
6	XXV.	B	6	XXIII.	E
7	XXIV.	C	7	XXII.	F
8	XXIII.	D	8	XXI.	G
9	XXII.	E	9	XX.	A
10	XXI.	F	10	XIX.	B
11	XX.	G	11	XVIII.	C
12	XIX.	A	12	XVII.	D
13	XVIII.	B	13	XVI.	E
14	XVII.	C	14	XV.	F
15	XVI.	D	15	XIV.	G
16	XV.	E	16	XIII.	A
17	XIV.	F	17	XII.	B
18	XIII.	G	18	XI.	C
19	XII.	A	19	X.	D
20	XI.	B	20	IX.	E
21	X.	C	21	VIII.	F
22	IX.	D	22	VII.	G
23	VIII.	E	23	VI.	A
24	VII.	F	24	V.	B
25	VI.	G	25	IV.	C
26	V.	A	26	III.	D
27	IV.	B	27	II.	E
28	III.	C	28	I.	F
29	II.	D	29	0, or XXX.	G
30	I.	E	30	XXIX.	A
31	0, or XXX.	F			

In this little table one peculiarity will attract attention. Though the third lunar month has thirty days, and the fourth only twenty-nine, yet each has thirty epact numbers. There seemed to be a necessity for this; otherwise, when the epact is XXIX. it would be equivalent to zero in the short months (the hollow months as they were called), but not so in the full months. The epacts XXIV. and XXV. are therefore placed opposite the same day. During the same cycle three consecutive numbers like XXIV., XXV., and XXVI. will never all be found among the epacts. When XXIV. and XXV. are both present, XXVI. will be absent; and in that case XXV. is transferred to the place of XXVI., as indicated by the Arabic numeral 25 opposite that epact. Thus, notwithstanding this duplication, two epacts will never fall on the same day of the month. (For a more full explanation of this matter, see the little treatise by the writer of this article, entitled "How to Find the Church Festivals.")

The use of epacts for finding paschal full moon and Easter is not very convenient. The simple rules given in the article on EASTER in this volume will be found much more so. But this is a suitable place to explain how to find the value of the numerical term proper to be used in calculating the date of paschal full moon in the article referred to. The General Table II. of the Prayer-Book, above spoken of, contains the resultant corrections of the epact for all the centuries from 1600 to 8500. From 1600 to 1700 this correction was zero. From 1700 to 1800, and further from 1800 to 1900, it is 1; and in subsequent centuries it goes on, somewhat irregularly, to increase. Now, the numerical term in the formula given in the article EASTER for computing the date of paschal full moon (when the golden number is odd) is at present 10, from 1600 to 1700 was 9, and after 1900 will be 11. It is, in short, always 9, increased by the correction of the epact found in the General Table II. just mentioned; which for convenience we may call the secular correction of the epact. And an extremely simple rule for finding this numerical term is the following: *From the number of the centuries in the given year of our Lord take its fourth part and its third part (disregarding fractions), and increase the result by* TWO. This is true up to 4200. But in that year and the centuries following, up to 6700, the number of the century must be diminished by *one* before taking the *third* part. In other respects the rule remains unaltered. In 6700 and the centuries following, up to 9200, the number of the century must be diminished by *two* before taking the third part. In 9200, and up to 11,700, the rule is the same as given at first, except that the result is to be increased by *three* instead of *two*. The Gregorian calendar will, however, itself require correction before the year 4000. As an example, let it be required to find the numerical term for the computation of paschal full moon during the century beginning with 4100 and ending with 4200. Putting S for this term, we have $S = 41 - \frac{1}{4}(41) - \frac{1}{3}(41) + 2 = 41 - 10 - 13 + 2 = 20$. In General Table II. of the Prayer-Book we find opposite to 4100 the number 11. And $11 + 9 = 20$, thus verifying the statement made above. F. A. P. BARNARD.

Epaminon'das [Gr. Ἐπαμεινώνδας or Ἐπαμινώνδας], an illustrious Greek statesman and general, born at Thebes about 418 B. C. He was a pupil of Lysis, a Pythagorean

philosopher. His youth was passed in retirement and study. He was temperate and virtuous, and is said to have despised riches. He formed an intimate friendship with Pelopidas. In 385 he served with distinction at the battle of Mantinea, after which he passed many years in private life. He was one of the deputies sent by Thebes in 371 B. C. to a congress of the Grecian states, in which he opposed the policy of Sparta and defended the interest and rights of Thebes in an eloquent speech. War speedily ensued between Sparta and Thebes, and Epaminondas was chosen commander of the Theban army, which amounted to only 6500 men. He defeated the Spartans in 371 B. C. at the battle of Leuctra, which was fatal to the supremacy of Sparta. In this action he displayed great military genius, and owed his success partly to his novel manœuvres and combinations. He invaded Peloponnesus in 369, and marched against Sparta, which was defended with success by Agesilaus. He commanded the Theban army which defeated the Spartans at Mantinea in 363 B. C. (or, as some say, 362), but he was killed in this action. He left a pure and exalted reputation as a patriot, a statesman, and a sage, and is universally admitted to have been one of the greatest captains of antiquity. Cicero expressed the opinion that Epaminondas was the greatest man that Greece has produced. (See CORNELIUS NEPOS, "Epaminondas;" GROTE, "History of Greece," chaps. lxviii., lxix., and lxxx.; E. BAUCH, "Epaminondas und Theben's Kampf um die Hegemonie," 1834.)

Epanome'ria, a town at the N. W. point of the island of Santorini (*Thera*) in the Grecian Archipelago. The houses are partly excavated in the face of a cliff of pozzuolana which is nearly perpendicular and is close to the sea. The lowest of fifteen tiers of houses is about 400 feet above the sea.

Ep'arch [Gr. ἔπαρχος, from ἐπί, "upon" or "over," and ἀρχή, "government"], in ancient Greece the title of the governor of a province, a ship's master, a satrap, or the prefect of a region under the Roman rule. The province itself was called an eparchy. In modern Greece the primary subdivision of a nomarchy is called an eparchy. In Russia an eparchy is the diocese or archdiocese of a bishop or archbishop of the Greek Church.

Epaulement [Fr., from *epaule*, "shoulder"], a military term which, from its derivation, would signify, as defined by Webster, a *side* work, a work to cover *sidewise*—*e. g.* a *traverse*, or a short parapet made at the flank of a battery or end of a parallel; but practically its meaning is extended to any covering made of earth, stone, wood, or iron, when intended simply as a screen—*e. g.* to cover cavalry waiting to be brought into action. (See MAHAN, "Military Engineering.")

Epaulette, an ornamental article of uniform of military and naval officers, worn on the shoulders, as the name indicates; a plate or strap extending along the shoulder from near the collar, and terminating with a fringe of gold or silver bullion, which falls over the shoulder. Rank is indicated by the size of the bullion and by devices on the strap, such as stars, anchors, crowns, etc. In the American army the epaulette, hitherto worn by officers of all grades (as still in the navy), is now confined to general officers, its place being supplied, for the lower grades, by the "shoulder-knot" of gilt cord. The practice varies in the different services of Europe.

Epaulette, a town of the Netherlands, province of Guelderland. Pop. in 1867, 7705.

Épée, de l' (CHARLES MICHEL), ABBÉ, a French teacher of the deaf and dumb, was born at Versailles Nov. 25, 1712. He was a Jansenist preacher, and for some time canon at Troyes. About 1755 he began to devote himself to the gratuitous instruction of the deaf and dumb. He is said to have been the first who used gestures or the language of signs in their education, on which subject he wrote several treatises. He founded in Paris an institution which was successful. Died Dec. 23, 1789.

Epeirus. See EPIRUS.

Epei'ra [from the Gr. ἐπί, "on," "together" and εἴρω, to "fasten"], a genus of spiders belonging to the Epeiridæ, are distinguished for the brilliancy of their colors and the geometric regularity of their webs, which are formed by concentric circles and straight radii. *Epeira diadema* is a large species found in Great Britain. These spiders are very numerous in tropical countries, where they grow to great size. Several species occur in the U. S.

Eperies, ā'pĕr-yĕsh or ā'pā-re-ĕsh, or **Heperjes** [Lat. *Eperiæ* or *Fragopolis*], an old town of Hungary, the capital of the county of Saros, is on the river Tarcza, about 148 miles N. E. of Pesth. It is surrounded by walls, and is one of the most beautiful towns of Upper Hungary. It is a bishop's see, has five churches, a college, and manufactures of linens, woollen goods, and earthenware. A royal salt-mine is worked in the vicinity. Pop. in 1869, 10,772.

Épernay, ā'pĕR'nā' [Lat. *Aquæ Perennes*], a town of France, in the department of Marne, on the river Marne, about 80 miles E. by N. from Paris. It is on the railway from Paris to Chalons, 20 miles W. N. W. of the latter. It is well built, clean and well paved, and has a town-hall and a public library. Here are manufactures of hosiery, earthenware, and refined sugar; also many elegant villas, with wine-vaults. Épernay is a great entrepôt or market for champagne wine, which is produced in the vicinity. Pop. 11,704.

Eper'ua, a genus of trees of the order Leguminosæ, one species of which (*Eperua falcata*), called wallaba, is abundant in Guiana. Its hard, durable, heavy, resinous timber, which is of a bright red-brown color, with white veins, is much used for shingles. The tree has pinnate leaves and a regular monopetalous flower.

E'phah, a Hebrew measure of capacity containing 27.83 pints, or three English pecks and three pints.

Ephem'era [from the Gr. ἐφήμερος, "lasting for a day" (from ἐπί, "on" or "for," and ἡμέρα, a "day")], a genus of neuropterous insects, commonly called day-fly or may-fly, are allied to the dragon-flies or Libellulidæ. In the larva and pupa states they live a year or more in the water, but their existence in the perfect state is very brief. They are used by anglers as bait. They give name to the family Ephemeridæ, of which many species occur in the U. S.

Ephem'eris [Gr. ἐφημερίς, a "diary," from ἐπί, "on" or "for," and ἡμέρα, a "day"], **Astronomical Ephemeris, Nautical Almanac.** Ephemeris and almanac are chiefly applied to two distinct classes of publications. An almanac is usually an annual which gives a calendar of the civil and ecclesiastical divisions of the year, with the dates of festivals and fasts and other days of special commemoration, and for each day or some longer interval the times of passing the meridian and of the rising and setting of the sun, moon, and principal planets, and their places in the zodiac, together with the phases of the moon and the times of eclipses and other important astronomical phenomena. With these is combined a variety of other matter, according to the special object of the publication. The astronomical tables which almanacs contain are ordinarily given with little precision, and are for the most part adapted only to a particular latitude. Such tables are said to have been constructed even in the time of Ptolemy. They were indispensable to the astrologers of later days, who doubtless had them for finding the positions of the planets at some future or past date, compiled with sufficient accuracy to make their prognostications.

Since the invention of printing, almanacs have appeared in large numbers in every part of the civilized world. They supplied an extensive popular demand, but added to the real information which they contained astrological and meteorological predictions, and other matter much more objectionable.

The "British Almanac," published by the Society for the Diffusion of Useful Knowledge, for the year 1828, introduced a decided reform in this class of works. And now there are many, and in all civilized countries, which contain valuable statistics of various kinds and essays on various subjects, such as are adapted to the classes of readers for which each may be specially designed. Some of them have a permanent value as works of reference. The "Tidal Almanac" of the U. S. Coast Survey is an example of a special class.

An ephemeris of a fixed star is a table of its apparent right ascension and declination at equal intervals of time. An ephemeris of a primary body of the solar system gives for each day, or for some regular longer or shorter interval, its direction and distance from the earth or sun, or both. The apparent semi-diameter, horizontal parallax, phases, and degree of brilliancy may also be given at stated intervals. The ephemerides of satellites give their positions with reference to their primaries, with their occultations, eclipses, and transits.

Observations furnish the data for computing the elements of a planet's orbit, and the ephemeris is prepared either directly from these elements or from tables derived from them, constructed to facilitate computations, and in which the attractions of other bodies are taken into account. The places of the planet tabulated in the ephemeris, whether for past or future times, may readily be compared with those derived from observations; and thus, as observations accumulate, the astronomer may determine more accurately the planet's orbit, and by a new and more trustworthy ephemeris again subject the theory of its motion to the test of observations. The history of astronomy furnishes an instructive example of the alternate improvement in the means and methods of observation, and the advance of

theory and scientific knowledge. At one time observations are more precise than theory; at another, the theory of the motions of a heavenly body may give its position more accurately than any single observation. It has been by such successive advances, alternately in theory and in the precision of observations, that practical astronomy has attained its present approximation to perfect accuracy. Tables of some of the planets are extended to several centuries in the future, with full confidence that an astronomer of those remote times will find them not only within the field of his telescope, but near its centre.

An astronomical ephemeris is a collection of such ephemerides for a particular year or series of years, with the times of eclipses, occultations, and other astronomical phenomena, or the means of determining them. The more complete works of this kind are intended to furnish the astronomical observer, whether at an observatory, in the field of a survey, or at sea, with all the data relating to the sun, moon, planets, and some of the principal fixed stars, which he needs to facilitate the prosecution of his work. From the design of some of them, and the special adaptation of portions to the wants of navigators, they are also called "nautical almanacs."

Although prepared for a particular meridian, they can readily be adapted to any other by interpolating for the difference of longitude or of the local times of the two meridians. Their use, therefore, is general, and not restricted to any part of the earth.

The earliest astronomical ephemeris noticed in astronomical bibliographies is that of Iarchus in 1150; the first printed ephemerides were published in 1475 for the years 1475 to 1506, and in 1499 for the years 1475 to 1531, though doubtless portions were prepared earlier; both were prepared by Regiomontanus. The latter extends through three cycles of nineteen years, and gives the longitudes of the sun and moon, and the phases of the moon and of eclipses occurring from 1483 to 1530, with explanations and useful tables. These have been the precursors of a succession of ephemerides, defective at first, but improving as astronomy advanced.

The "Connaissance des temps ou des mouvements célestes," commenced by Picard for the year 1679, has appeared for each succeeding year, without interruption, to the present time. Additions and improvements were made by La Lande in 1760, who subsequently added lunar distances, with the design of making it more useful at sea. This and almost all the subsequent volumes have been enriched by valuable memoirs by the most eminent French astronomers, thus carrying out the purpose of La Lande to make this annual a journal of astronomy. For many years it has been prepared under the direction of the Bureau des Longitudes of France. Improvements have been made in it from time to time by the use of more precise tables in its preparation. At present it is under the immediate supervision of M. Mathieu, and is among the most valuable of this class of works.

The "Nautical Almanac and Astronomical Ephemeris," published by the British Admiralty, was commenced by Maskelyne for the year 1767. He undertook its preparation, after a plan sketched by La Caille, for the purpose of meeting the wants of navigators, and especially of supplying facilities for using the method of finding the longitude by the distance of the moon from the sun or a star, which Halley had proposed in 1731. Mayer's new tables of the moon for the first time gave the moon's place with sufficient precision to make this method available. The successive annual volumes have been issued, usually three years in advance, to the present time. It was not until 1834 that it came up to the requirements of an astronomical ephemeris. Other improvements and additions have since been made. Under its present superintendent, Mr. J. R. Hind, new tables of the sun, moon, and all but two of the planets have been introduced, so that it has no superior either as an astronomical ephemeris or an almanac for the use of navigators. Many of its volumes contain valuable contributions to practical astronomy by English astronomers.

The "Berliner Astronomisches Jahrbuch" first appeared for the year 1776, and has been continued by Bode, Encke, and its present superintendent, Prof. Foerster, without interruption. It was mainly designed to supply the wants of astronomers, though those of the navigator were not overlooked. As an astronomical ephemeris it was in advance of all others until the later improvements in its British contemporary. Its volumes contain valuable astronomical memoirs from many of the most distinguished German astronomers. Of later years it has contained ephemerides of most of the asteroids.

The preparation of the "American Ephemeris and Nautical Almanac" was begun in 1849, under the superintendence of Lieutenant (now Rear-Admiral) Davis, U. S. navy, in accordance with an act of the Congress of the U. S. The theoretical portions of the work were placed under the special direction of Prof. Benjamin Pierce of Harvard University. The construction of tables of the moon and of some of the planets, with corrected elements and in a form which would facilitate the computation of their ephemerides, was first undertaken, and so successfully accomplished that from its commencement the "American Ephemeris" has ranked among the highest works of this class in extent, completeness, and adaptation to the wants of astronomers and navigators. The first volume was for 1855. In the preparation of later volumes new and more accurate tables of the sun and planets (except Jupiter and Saturn) have been employed. Several of its volumes contain valuable papers by American astronomers.

It consists of two parts—the first arranged specially for the use of navigators, and computed for the meridian of Greenwich; the other prepared for astronomers, and adapted to the meridian of Washington. The first part is also published separately. Tables of the moon, Mercury, Venus, the standard stars, and four asteroids have also been published. The preparation of ephemerides of twenty-three asteroids discovered by American astronomers has also been undertaken.

Prof. Joseph Winlock, U. S. navy, now director of Harvard Observatory, succeeded Admiral Davis in the charge of the work; in 1866 it was placed under the direction of the writer of this article. The successive volumes have appeared for each year without interruption, and that for 1876 was published in Sept., 1873. Several of them contain valuable memoirs. The continuance of the work is dependent upon annual appropriations by Congress.

J. H. C. COFFIN.

Ephe'sians, The Epistle of Saint Paul to the, was written probably in the year 61 or 62, during the apostle's first imprisonment at Rome, and shortly after the Epistle to the Colossians. The words ἐν Ἐφέσῳ, "at Ephesus" (i. 1), are wanting in the "Codex Sinaiticus" and some other manuscripts, but the weight of diplomatic evidence on the whole preponderates in their favor. The absence of personal greetings is not so easily explained. It is one of the richest and most glowing of the Pauline Epistles. The first three chapters are doctrinal; the last three, hortatory and practical. Of the many commentaries which have been written, those of Harless (German), 1834–58, and Eadie (Scotch), 1854, are among the best.

Eph'esus [Gr. Ἔφεσος; Fr. *Éphèse*], an important ancient Greek city of Asia Minor, in Lydia, on the river Cayster near its entrance into the sea, 35 miles S. S. E. of Smyrna. It was one of the twelve Ionian cities, and had several ancient names, among which were *Samorna* and *Ortygia*. The name of Ephesus does not occur in the Homeric poems. According to Strabo, it was founded by Androclus, a son of Codrus. It passed successively under the dominion of the kings of Lydia and those of Persia. The Spartan general Lysander entered in 407 B. C. the port of Ephesus with a fleet, and defeated the Athenians at Notium near Ephesus. Here was a famous temple of Diana (Artemis), which was one of the Seven Wonders of the World, and was burned by Herostratus in 356 B. C. It was rebuilt with greater splendor, but 220 years passed before the new temple was finished. It was a marble edifice of the Ionic order, 425 feet long by 225 feet wide, and was adorned with 127 columns sixty feet high. This was the largest of all the Greek temples, and was embellished by numerous works of eminent sculptors and painters. It was nearly destroyed by the Goths in 280 A. D. Ephesus was an important commercial city. Strabo, who lived in the reign of Augustus, states that it was in his time "the greatest place of trade of all the cities of Asia west of Mount Taurus." Ephesus was the place where the Romans usually landed when they visited Asia. The apostle Paul passed three years in this city, where he planted a church. In the book of Revelations the church of Ephesus is placed first among the seven churches of Asia. It was the native place of Parrhasius the painter, of Hipponax the poet, of Callinus, and of Heraclitus and Hermodorus, eminent philosophers. The third general council of the Church was held here in 431 A. D. During the reigns of the Christian emperors of the East, Ephesus was styled "the first and greatest metropolis of Asia." The site is now occupied by a village called *Ayasalook*, and remains of a large theatre, a stadium 687 feet long, and other ruins. The disappearance of so large a mass as the temple of Diana can only be explained by the fact that the materials have been carried away for modern buildings. (See FALKENER'S work on Ephesus, 1862.)

Ephial'tes [Gr. Ἐφιάλτης; Fr. *Éphialte*], an Athenian statesman and general, was a friend of Pericles. He was the chief promoter of a law which reduced the power of the Areopagus and converted the government into a pure democracy. He was assassinated by the aristocrats in 456 B. C.

Ephial'tes, the name of a famous giant in the Greek mythology, said to have been a son of Neptune.

Ephialtes [Fr. *cauchemar;* Lat. *in'cubus*], a name for nightmare, an affection consisting of horrid dreams, with a sensation of pressure upon the body and of unavailing efforts to run away and cry for help.

Eph'od [from the Heb. *aphad*, to "put on"], a Jewish robe or tunic worn originally by the high priest; afterwards by all priests. It was made of fine linen. The ephod of the high priest had a breastplate attached to it containing twelve precious stones, on which were engraved the names of the twelve tribes. The relation of these twelve stones to the Urim and Thummim is still an open question.

Eph'ori, or **Eph'ors** [Gr. ἔφοροι (sing. ἔφορος, from ἐπί, "on" or "over," and ὁράω, to "see"); Lat. *ephori*], the title of magistrates common to many of the Dorian states of ancient Greece. In the political constitution of Sparta the ephors exercised supreme power. The Spartan ephors were five in number, and were elected from the body of the ruling caste. Their term of office was one year. Besides their judicial authority, they exercised a control over the functions of the kings and the senate, and sometimes recalled the former from their foreign expeditions. They negotiated treaties with foreign states, and possessed nearly all the executive power of the government.

Eph'orus [Gr. Ἔφορος], an eminent Greek historian who flourished about 380–340 B. C., was a pupil of Isocrates the orator. He wrote a general history of Greece and the Barbarians from the siege of Troy to 340 B. C., which is not extant. It was esteemed a valuable work.

E'phraem (or **Ephraim**) THE SYRIAN [Lat. *Ephræ'mus Sy'rus*], a celebrated ecclesiastic and writer, born at Nisibis, in Asia Minor. He was a young man when he attended the Council of Nice in 325 A. D. He was a zealous opponent of Arianism, became a hermit or anchorite in the prime of life, and lived in a cave near Edessa. He was venerated as a saint and a prophet by his contemporaries, and received the offer of the bishopric of Edessa, but he declined it. He wrote in Syriac numerous religious works, among which are hymns and commentaries on Scripture. Died about 378 A. D. His works were published in Syriac and Greek at Rome by the Assemani, in 6 vols., 1732–46. A German translation of a selection of his works was published by Zingerle (6 vols., 1830–37).

E'phraim, one of the Hebrew patriarchs, was the second son of Joseph, and the head or founder of one of the twelve tribes of Israel. The territory of the tribe of Ephraim extended from the river Jordan to the Mediterranean Sea, and was bounded on the N. by Manasseh and on the S. by Benjamin and Dan; and was about 55 miles from E. to W. by 70 from N. to S.

Ephraim City, a post-village of San Pete co., Ut., 8 miles N. N. E. of Manti.

Ephra'ta, a post-township of Lancaster co., Pa. Pop. 2695. In the eighteenth century Ephrata was for a long time the centre of a religious denomination called the Seventh-Day German Baptists. Ephrata Springs are a pleasant summer resort for health and pleasure.

Eph'ratah [Heb. "fruitful"], the grandmother of Caleb the spy (1 Chron. ii. 19, 50), and the ancient name of Bethlehem (Gen. xxxv. 19), the birthplace of Christ (Mic. v. 2; Matt. ii. 6).

Ephra'tah, a post-township of Fulton co., N. Y. It has manufactures of leather. Pop. 2207.

Ep'ic [from the Gr. ἔπος, a "word," also a "narrative" or "tale"], relating to epic poetry; also an epic poem. (See EPIC POETRY.)

Ep'icarp [from the Gr. ἐπί, "upon," and καρπός, "fruit"], in botany, the outermost layer of the pericarp or fruit. When the walls are separable into three layers, the outer layer is named either exocarp or epicarp.

Epichar'mus [Gr. Ἐπίχαρμος], an eminent Greek poet and philosopher, born in the island of Cos about 540 B. C., was a pupil of Pythagoras. He removed about 485 B. C. to Syracuse, where he passed the greater part of his mature life. According to Aristotle, he was the inventor of comedy. Plato assigns him as high a rank among comic writers as that of Homer among epic poets. Epicharmus wrote, besides dramas, treatises on philosophy, mythology, etc. He appears to have been an original genius and elegant writer. His works are not extant. Died about 450 B. C. (See O. MÜLLER, "The Dorians;" HARLESS, "De Epicharmo," 1822.)

Ep'ic Po'etry, or **The Ep'os,** is that class of poetry which relates the history of a series of events, taking the series as a whole, apart from what precedes or follows. Epic poetry is chiefly of a narrative nature, and represents the subject of which it treats as a unit, with a definite beginning and an end. In a wider sense, epic poetry comprises the ballad, the romance, and even the fable, but in its more limited use it may simply denote the popular legends and tales of a nation or tribe which have been collected and arranged. Of the Greek epics, two only, the "Iliad" and the "Odyssey," have come down to us, and the study of these has helped us very much to understand the true nature of the epic. Until the close of the last century, Homer was regarded as the original author of these epics. But in 1795 F. A. Wolf, a learned German philologist, broached the theory that the poems of Homer were not the work of one, but of many poets. In fact, they appear to be, to some extent at least, a collection of Greek legends and tales, arranged (as is now generally admitted) by the master-mind of a great poetic genius. A similar origin must be predicated for the Hindoo epics "Râmâyana" and "Mahâbhârata," the "Shah Nameh" of the Persian Firdousee, the Finnish "Kalevala," and the German "Nibelungen."

From the manner in which it originated, the nature of the epic is easily deduced. As the poetical summation of the popular legends of a race or tribe, in which all the thoughts and feelings of the race are depicted, it must embody the peculiarities of the nation, and must be a complete and true picture of the life and doings of a race. Thus it is that in the same nation different epics may exist. While, for instance, the "Iliad" is a collection of the war-legends of the Greeks, the "Odyssey" treats of the family life and travels on land and on sea. But as the epic must be such a complete picture, and must be, in contrast to the former legends, a complete whole, it takes from the primitive history of the nation a prominent fact as a central figure, and groups around this the single legends; and this centre is only the frame which holds together the single, otherwise unconnected, legends.

This form of an epic is only possible in the early youth of a nation, when the legends still circulate among the people and are believed by them. But there have nevertheless been attempts at epics in later times, which have been the work of a single poet. This is the difference between Virgil and Homer. Among the more prominent epic poets of modern times are Dante, Ariosto, Tasso, Camoens, Milton, and Klopstock. But the more practical and prosaic the world becomes, the more this form of poetry will disappear, and it is only a romantic or a comic epic, like Byron's "Don Juan," that will be successful in these days, while the novel takes the place of the epic. (See ZIMMERMANN, "Ueber den Begriff des Epos," 1848.)

Epicte'tus [Gr. Ἐπίκτητος; Fr. *Épictète;* Ger. *Epiktet;* It. *Epitetto*], an eminent Stoic philosopher, born at Hierapolis, in Phrygia, about 60 A. D. He was in his youth a slave of Epaphroditus, a favorite of the emperor Nero, and lived at Rome. He became a freedman, and was banished with other philosophers from Rome by Domitian in 89 A. D., after which he lived at Nicopolis in Epirus. He was a man of excellent moral character, and acquired a high reputation as a teacher of philosophy, but he wrote little if anything. His temper and doctrines were less austere than those of most other Stoics, and were essentially Christian in their nature. It does not appear, however, that he had any connection with the Christian Church, or that he was a believer in the mysteries of that religion. Among his favorite maxims was "Suffer and abstain." His disciple Arrian collected his maxims and doctrines in a work called "Enchiridion," which has been translated into English by Mrs. Carter (1758), and by T. W. Higginson (1865). (See RITTER, "History of Philosophy;" G. BOILEAU, "Vie d'Épictète et sa Philosophie," 1655, in English by J. DAVIES, 1670; FARRAR, "Seekers after God," 1869.

Epicure'an Philos'ophy, a system of philosophical teaching which took its name from Epicurus (337–270 B. C.), its founder. It originated in a reaction against the teachings of Socrates and his followers. Throughout the period of Greek decline and the last ages of republican Rome it exercised a profound influence, which was perpetuated through the days of the Roman empire, in spite of the opposition of Stoicism and of Christianity. It is a remarkable fact that it always remained substantially as Epicurus left it.

The writings of Epicurus are lost, with the exception of fragments chiefly preserved by Cicero, Seneca, and Diogenes Laertius, but the sublime poem of Lucretius, "De Rerum Naturâ," is an exposition of the teachings of Epicurus.

In theology, Epicureanism was essentially atheism. The gods were eternal, immutable, and entirely unconscious of human affairs. Human responsibility for wrong-doing was consequently reduced to the minimum. The highest positive duty was made to be the pursuit of pleasure—not necessarily sensual enjoyment, for Epicurus himself taught that repose was the highest pleasure. Whatever the virtues of Epicurus may have been, the results of his system of ethics were thoroughly bad. The moral corruption of ancient Greece

and Rome was in part the fruit of this system. The genial temper, the elegant habits of life, and the moral indifference exhibited in the writings of Horace were among the least objectionable of the effects of the widespread Epicurean teachings. It is not too much to assert that Epicureanism produced not one thoroughly admirable character in ancient history.

The physical doctrine taught by Epicurus and Lucretius was not unlike that of certain modern evolutionists. They held that matter is uncreated, indestructible, and that all material things were self-evolved, without a supervising or directing Intelligence. (See LUCRETIUS, "De Rerum Naturâ;" GASSENDI, "Syntagma Philosophiæ Epicuri;" and HENNE'S article "Épicure" in the "Dictionnaire des Sciences Philosophiques.")

Epicu'rus [Gr. Ἐπίκουρος], a celebrated Greek philosopher, the founder of the Epicurean sect, was born in the island of Samos in 337 (or, as some say, 341) B. C. He was a son of Neocles, an Athenian, and is said to have been a pupil of Xenocrates, but he professed to be self-taught. He visited Athens at the age of eighteen, afterwards travelled in Ionia, and opened a school at Mitylene, where he taught new doctrines. About the year 306 he removed to Athens, where he purchased a garden and founded a celebrated school of philosophy. He was very popular as a teacher, and gained a great number of disciples. He recognized pleasure as the chief good, and consequently was calumniated by the Stoics, but it appears that his habits were temperate and virtuous. His physical philosophy was based on the atomic theory of Democritus. He treated ethics as the most important department of philosophy, and studied nature with an ethical rather than a scientific purpose. He opposed the popular superstition, and refused to recognize the gods of the Greek mythology, but taught that the gods live in a state of passionless tranquillity, and give no attention to sublunary affairs, which they consider beneath their notice. Epicurus took no part in political affairs. He wrote numerous works on ethics, natural philosophy, etc., which are not extant, but several of his letters have been preserved by Diogenes Laertius. His opponents admitted that he was personally amiable and virtuous. Our knowledge of his doctrines is derived chiefly from the works of Cicero and Lucretius, who in his poem "De Rerum Naturâ" amply illustrates his philosophy, and expresses great admiration of Epicurus. Among the eminent men who favored Epicurean principles were Horace, Atticus, Gassendi, Rousseau, and Voltaire. Died in 270 B. C. (See GASSENDI, "De Vita et Moribus Epicuri," 1647; RITTER, "History of Philosophy;" G. H. LEWES, "Biographical History of Philosophy.")

Ep'icycle [from the Gr. ἐπί, "upon," and κύκλος, a "circle"], in ancient astronomy, a circle having its centre moving along the circumference of another circle. It was a favorite opinion of the Greek astronomers that all the celestial motions must be uniform and circular, because the circle is the most perfect of plane figures. The phenomena of the stations and retrogradations of the planets were apparently inconsistent with this notion; and in order to explain them, Apollonius of Perga imagined the theory of *epicycles* and *deferents*. He supposed every planet to move uniformly in the small circle or epicycle, the centre of which is carried uniformly forward along the circumference of the large circle or deferent, of which the earth occupies the centre. Hipparchus, having discovered the eccentricity of the solar orbit, supposed the motions to be performed in eccentric circles. The celebrated astronomer Ptolemy adopted the hypotheses both of Apollonius and Hipparchus; that is, he supposed the earth to be placed at a small distance from the centre of the deferent circle (which consequently was called an *eccentric*), and the planet to move uniformly in the epicycle, the centre of which also moves uniformly in the deferent. By means of these suppositions, and by assigning proper ratios (determined by observation) between the radius of the deferent and the radius of the epicycle, and also between the velocity of the planet in the epicycle and the velocity of the centre of the epicycle on the deferent, he was enabled to represent with considerable accuracy the apparent motions of the planets, and particularly their stations and retrogradations. As a first step towards connecting the sciences of astronomy and geometry the hypothesis of epicycles does great honor to its inventors.

Epicy'cloid [etymology same as for EPICYCLE], a curve traced by a point on the circumference of a circle which rolls on the convex side of a given fixed circle. It belongs to the class of curves called roulettes, and is not invariably a transcendental curve. It is always of a finite order when the circumferences of the two circles are commensurable. The normal of the epicycloid is easily constructed; it always coincides with the line which joins the generating point to the corresponding point of contact of the two circles. The evolute of the epicycloid is a similar epicycloid, the radii of the circles being merely altered in a certain ratio. When the circles are equal the epicycloid is similar, and similarly placed to the pedal of the fixed circle with respect to a point in the circumference. The curve is the cardioid, which is the inverse of a parabola. The epicycloid was invented by Romer, the Danish astronomer, who about 1674 proposed this curve as the best form for the teeth of wheels, in order to prevent friction. Newton gave its rectification in his "Principia."

Epidamnus. See DURAZZO.

Epidau'rus [Gr. Ἐπίδαυρος], an ancient town of Greece, on the E. coast of the Peloponnesus and on the Saronic Gulf, about 45 miles S. W. of Athens. It was an independent state, and possessed a small territory called *Epidauria*. As early as 600 B. C. it was one of the chief commercial cities of the Peloponnesus. It derived much importance from its temple of Æsculapius (situated 5 miles from the town), which was one of the most celebrated sanctuaries in Greece, and was frequented by patients from all of the Hellenic states. They came to be cured of their diseases. Here are the ruins of a magnificent theatre, which Mr. Leake says is in better preservation than any other in Greece. It is 370 feet in diameter. Once in four years a festival was celebrated here in honor of Æsculapius, with musical and gymnastic games. On or near the site of Epidaurus is a small village called *Epidavro*, at which the Greek congress assembled in 1821.

Epidau'rus Limc'ra, an ancient seaport-town of Greece, on the eastern coast of Laconia. In the Middle Ages it was the most important Greek town in the Morea. The ruins of its temples are visible at *Old Monemvasia*, 3 miles N. of Monemvasia.

Epidem'ic [from the Gr. ἐπί, "upon," and δῆμος, a "people"]. A disease is said to be epidemic when it attacks a considerable number of people, spreading rapidly throughout a community for a time, but not becoming permanent and *endemic* (*i. e.* not remaining as a disease characteristic of that particular community). Few subjects connected with medicine have given rise to more speculation than the cause and progress of epidemics. It appears certain that there must be either distempered conditions influencing the people who are subject to an epidemic, and predisposing them to the reception of disease-poisons, or else, what is more probable, that some peculiar disease-germs are present in air, water, or food during epidemics. Contagious epidemics, such as smallpox, measles, etc., are demonstrably propagated in this way. Others, like influenza and cholera, will propagate themselves in spite of personal quarantines, *cordons militaires*, and even of intervening oceans, though they may be intensified by near association with the sick. Some observers ascribe certain epidemics to the excess or deficiency of ozone in the air.

The germ-theory, which ascribes disease to microscopic vegetation, is a favorite with many; and some observers believe that they have detected the cause of various epidemics. For example, the cause of measles has been ascribed with confidence to the presence in the air of the spores of an organism identical with the rust of barley straw. Further observations will quickly establish or overthrow all such theories.

Mental epidemics, such as the dancing mania, lycanthropy, witchcraft, and the mania for suicide, are not improbably owing to physical conditions, like other epidemics.

The following laws or general statements with regard to epidemics appear to be established: (1) An "epidemic influence" appears at times to intensify disease, and immensely to stimulate the propagation of endemic diseases, thus converting them into epidemics. Thus, smallpox, typhus, typhoid, and scarlatina, usually endemic, sometimes rage with great violence as epidemics. (2) Sometimes an epidemic influence shows itself in the character of non-epidemic diseases. Thus, in some seasons pneumonia is of an active, sthenic type; at other times it almost uniformly assumes a low or typhoid character. In some seasons nearly all inflammations take on an erysipelatous form. (3) When a decided epidemic prevails, non-epidemic disease is very apt to show some of the features of the prevailing epidemic. Even before the advent of an epidemic these features may be observed. (4) The first onset of an epidemic is usually, not always, its most severe and fatal stage, but many such diseases have periods of exacerbation and of intermission. (5) Epidemics would appear to alternate in successive cycles, smallpox being followed, for example, by measles, scarlatina, or typhoid. (6) Some diseases occur both as epidemics and as sporadic diseases. In the former case the disease usually exhibits a greater tendency to depression and a larger proportionate mortality. (7) The lower animals to some extent share with man in special epidemic influences.

Facts are not wanting which give reason to hope that epidemics will become limited in their ravages. The plague and other destructive epidemics have become localized or endemic; and the introduction of thorough sewerage in cities, underground drainage in the country, habits of personal cleanliness, and other hygienic conditions cannot fail to accomplish much good. CHARLES W. GREENE.

Epiden′drum [from the Gr. ἐπί, "upon," and δένδρον, a "tree"], a large Linnæan genus of epiphytic orchids, which, as originally constituted, included the vanilla and many other species now excluded. It is worthy of mention as affording within the limits of the U. S. two examples of the tree orchids or epiphytes so abundant in the tropics. The *Epidendrum conopseum* grows principally upon magnolia trees, and is found in South Carolina, Georgia, and Florida. *Epidendrum venosum* grows in Florida. Both have greenish-purple flowers in large clusters. Some of the tropical species have cathartic properties.

Epider′mis [from the Gr. ἐπί, "on," and δέρμα, "skin"], called also **Cu′ticle** or **Scarf-skin,** in anatomy, is in structure a modification of the epithelium, accurately moulded to the papillary layer of the true skin or derma. When exposed to pressure and friction it becomes hard and thick, as in the palms of the hands; otherwise it is soft. It is composed of agglutinated, flattened cells, but in the deep layers the cells are rounded or columnar, and filled with soft contents. In most races of men these deep cells contain more or less pigmentary matter, which gives the skin its various shades from black to white. The epidermis is penetrated by the ducts of the sweat-glands and oil-glands of the skin. Its cells are developed in the liquor sanguinis, which is poured out on the external surface of the true skin. The hair and nails in man, and also the horns in lower animals, are modifications of the epidermis.

The epidermis in plants is a layer of thick-walled cells, of character varying extremely in different species. It is entirely homologous in structure with animal epidermis. Upon leaves it is penetrated by the stomata, and both transmits exhalations and absorbs carbonic acid, the most important part of the plant's food.

Ep′idote [from the Gr. ἐπί, "upon" (implying "addition"), and δίδωμι, to "give," so named, it is said, because the series of the secondary forms are an enlargement on the base of the primary], a mineral which consists essentially of silica and alumina, combined with portions of lime, oxide of iron, or peroxide of manganese. A variety containing lime is called *zoisite*, and another containing manganese is termed *pistacite*. It is often found crystallized in prisms, and sometimes occurs massive. The color is generally green, yellow, or red.

Epido′tes [Gr. Ἐπιδώτης, the "liberal giver"], a Greek divinity worshipped at Lacedæmon. Of his mythus little is known. Also, the god of sleep, worshipped at Sicyon. The name was also a title of Zeus and other beneficent deities.

Epigæ′a [from the Gr. ἐπί, "on," and γῆ, "earth," "ground"], the name of a genus of plants. (See next article.)

Epigæ′a re′pens, the botanical name of the trailing arbutus or mayflower, an early spring flower of the U. S., well known for its beauty and fragrance. It belongs to the Ericaceæ, and in the Southern States is called ground laurel. It has decided diuretic powers.

Epiglot′tis [from the Gr. ἐπί, "upon," and γλωττίς, the "glottis," a name suggested by its position], the thin fibro-cartilaginous lid of the glottis. It is attached in front to the thyroid cartilage by two ligaments constituting a narrow neck. During respiration the epiglottis is vertical, and in the act of swallowing it automatically falls backward and closes the larnyx, thus preventing the passage of food into that organ.

Epig′oni [Gr. Ἐπίγονοι (from ἐπί, "on" or "after," and γένω, to "be born"); Fr. *Épigones*], a term signifying "successors" or "heirs," was a collective appellation of the sons of the seven Greek chiefs who conducted the expedition against Thebes. Their names were Alcmaeon, Thersander, Diomedes, Ægialeus, Promachus, Euryalus, and Sthenelus. They renewed the war and took Thebes. In the history of literature the name is sometimes applied to those writers who confine themselves to the further development of the ideas of the great masters of the classic period.

Ep′igram [Gr. ἐπίγραμμα, from ἐπί, "on," and γράφω, to "write;" Fr. *épigramme*], originally an "inscription" or brief writing; a short poem or piece of verse which has only one subject, and ends with a witty or ingenious turn of thought; an interesting idea expressed happily in a few words. The first of these definitions is nearly correct for a modern epigram, but differs widely from the original sense of the word in Greek. The Greek epigram was at first a short collection of lines inscribed on a monument or statue, and the word was afterwards transferred to short poems suitable for inscriptions. The general characteristics of Greek epigrams are perfect simplicity and the seemingly studied absence of that *point* which characterizes the modern epigram. But perhaps this seeming pointlessness is due to our ignorance of the circumstances under which they were written and to which they allude. It appears that the first and indispensable requirement of an epigram is not brevity nor sharpness, but *antithesis*. Epigrams are nearly all in one form of metre, the elegiac. Some of the epigrams of Catullus and Martial present the modern epigrammatic character; and Martial has in fact afforded the model on which the modern epigram has been framed. The French writers have been more successful in epigrams than any other modern writers, and they excel especially in those which are intended to be satirical and *piquant*.

Epig′ynous [from the Gr. ἐπί, "upon," and γυνή, a "female"], a botanical term applied to stamens and petals which grow on the summit of the ovary. These sometimes appear to be inserted on the ovary, in consequence of the coherence of the calyx with the ovary.

Ep′ilepsy [Lat. *epilep′sia;* Gr. ἐπιληψία, from ἐπί, "upon," and λαμβάνω, to "take," to "seize"], a disease of the nervous system, in which there are occasional seizures or fits of sudden and complete loss of consciousness, usually associated with convulsions, which become clonic, and finally impede respiration. The attack may last from two to twenty minutes, and is followed by exhaustion and sleep. In other cases, called *petit mal* (Fr. for "little sickness"), the loss of consciousness is but momentary, and there is no convulsion or falling down, as in ordinary attacks.

It has been customary to say that this disease is merely functional, because in most cases there is little or no apparent organic change of the brain observable after death; but the present opinion of pathologists appears to be that sufficiently careful observation will detect lesions, however minute, sufficient to account for the symptoms. Dilatation of blood-vessels in the medulla oblongata is frequently observed. The disease itself is of a frightful character, apart from the unhappy effects it may produce upon the mind of the patient.

When occurring in childhood, and especially during the period of dentition, it may after a time be spontaneously cured. It is sometimes hereditary, and often is caused by various excesses, by blows on the head, or by excessive fright.

The treatment during the paroxysm, if it be habitual, is simply to place the patient where he cannot hurt himself, to loosen his clothing, and give him plenty of fresh air. Between the paroxysms the patient should avoid all excesses of eating, of drinking, or of any other kind. Systematic exercise, and even gymnastics, never carried so far as to produce much weariness, are often beneficial. Nutritious food, with avoidance of coffee, tobacco, and stimulants, is usually advisable. A seton in the back of the neck is frequently useful. Of medicines, the bromides of potassium and of ammonium are useful in warding off the attacks, but they have little curative influence. Indeed, in the adult patient there is usually but little prospect of cure, though perfect recovery is not unknown. Tonics, such as iron, arsenic, and quinia, are useful in special cases, but in others are apparently worse than useless.

Notwithstanding the terrible effects of this disease upon the minds of many of its victims, not a few distinguished men have been epileptics, as were Cambyses, Cæsar, Mohammed, Petrarch, Henry IV. of England, Napoleon, and Byron. The ancients, it is said, sometimes called this disease *morbus basilicus* ("kings' disease"), from the idea that great men were especially liable to it; and among its numerous names was *morbus sacer* (the "sacred disease"), because the gods were believed to have especial care over its victims.

Epilo′bium [barbarously derived from the Gr. ἐπί λοβοῦ ἴον, a "violet on a pod"], or **Willow Herb,** a genus of herbaceous perennial plants of the natural order Onagraceæ, natives of temperate and cold climates. They have eight stamens and four petals. The fruit is an elongated many-seeded pod or capsule. Some of the species bear beautiful flowers. The *Epilobium angustifolium*, a native of Europe and of the U. S., has showy pink-purple flowers, and is sometimes planted in gardens. Several other species are indigenous in the U. S. The popular name willow herb was given in reference to the leaves, which resemble those of a willow. These leaves have astringent properties, and are reputed to have other active powers.

Ep′ilogue [Gr. ἐπίλογος, from ἐπί, "upon" or "after," and λόγος; Lat. *epilogus*], in dramatic poetry, the closing address to the audience at the end of a play. It was usually spoken by one of the actors, and was cheerful and familiar in tone. The term was sometimes applied to the conclusion of an oration.

Epim′achus, a genus of tenuirostral birds inhabiting Australia and Papua, and formerly classed with the birds

Epimachus Magnus, or Grand Plume-Bird.

of paradise. The *Epimachus albus* is of a fine violet-black color, with a broad collar of feathers, margined with green, at the base of the neck. Floating plumes, very long, white and silky, arise from the back and rump. Twelve of the lowest of these end in long thread-like points; hence it has been called the "twelve-threaded bird of paradise." The grand plume-bird (*Epimachus magnus*) is found in Papua. Its body is one foot long, its tail three feet. Its color is black-brown, the side-feathers curled and raised upward, glittering with changeable blue and green tints. The head and belly are of a lustrous blue. It is one of the most beautiful of all known birds.

Epimen′ides [Gr. Ἐπιμενίδης; Fr. *Épiménide*], a famous Greek poet and prophet, was a native of Crete, and flourished about 600 B. C. According to tradition, he fell asleep in a cave, and awaked after the lapse of more than fifty years with a large increase of wisdom and inspiration. He wrote a poem on the voyage of the Argonauts. At the request of the Athenians, who were afflicted with the plague, he visited Athens about 596 B. C. and purified that city. Goethe wrote a poem called "Des Epimenides Erwachen."

Epime′theus [Gr. Ἐπιμηθεύς; Fr. *Épiméthée*], a personage of the Greek mythology, was said to be a brother of Prometheus and the husband of Pandora. His name (from ἐπί, "on" or "after," and μῆδος, "consideration," "thought") signifies "afterthought."

Épinal, ā′pe′nȧl′, a handsome town of France, capital of the department of Vosges, is pleasantly situated at the western base of the Vosges Mountains, on both sides of the Moselle, about 200 miles E. S. E. of Paris. It has a ruined castle, a fine Gothic church, a theatre, a hospital, a public library, and a museum of pictures and antiquities. Here are manufactures of cutlery, paper, hosiery, lace, chemicals, pottery, and linen fabrics. Pop. in 1866, 11,870.

Épinay, d' (Louise Florence Pétronille de la Live), Madame, a French literary lady, born about 1725. She was married at an early age to M. d'Épinay, but they were soon separated. She was intimate with Rousseau, for whom she built the hermitage at Montmorenci. Her work on education, entitled "Conversations of Emilie" (1783), gained a prize of the French Academy. Died in April, 1783. She left autobiographic memoirs (3 vols., 1818). (See Fallu, "La Marquise d'Épinay," 1866.)

Epiphania. See Hamah.

Epipha′nius [Gr. Ἐπιφάνιος; Fr. *Épiphane*], Saint, a bishop and polemic, born at Eleutheropolis, in Palestine, about 310 A. D. He was educated in Egypt by certain monks, who instilled into his mind ascetic notions, and became afterwards a disciple of Hilarion. In 367 he became bishop of Constantia (formerly Salamis) in the island of Cyprus. He was an adversary of Origen, whom he denounced as a heretic, and he co-operated with those who deposed Chrysostom. He wrote, besides other works in Greek, a treatise against heresies, entitled "Panarium," which is one of the most important sources of information for the history of the ancient Christian Church. Best edition of his works by W. Dindorf (5 vols., 1859–63). (See Lipsius, "Zur Quellenkritik des Epiphanius," 1865.) Died in 402 A. D.

Epiph′any [Gr. Ἐπιφάνεια, from ἐπί, "on," "over," "before," and φαίνομαι, to "appear;" Lat. *Epiphani′a;* Fr. *Épiphanie*], the name of a festival in the Christian Church, celebrated the twelfth day after Christmas (Jan. 6), to commemorate four events: (1) Christ's baptism; (2) his birth; (3) his manifestation to the magi; (4) the manifestation of his divinity in the miracle at Cana. Later, especially in the Western Church, it popularly commemorated the visit of the three wise men to the infant Jesus. The eve of Epiphany, called "Twelfth Night" in England and "Three Kings' Night" in Germany, was anciently a great popular festival. Its celebration is still kept up.

Epiphe′gus [from the Gr. ἐπί, "upon," and φηγός, a "beech tree," because it is found growing on the roots of that tree], a genus of herbs of the order Orobanchaceæ. Like all the order, it is a root-parasite, growing apparently from the ground, but really from the roots of trees. This genus is found only under beech trees; the herbs are purplish or yellow-brown, slender branched, with scales in place of leaves, and from six to twelve inches high. The *Epiphegus Virginiana,* common in the U. S., is called "cancer root," from the idea that it is curative of cancer.

Ep′iphyte [from the Gr. ἐπί, "upon," and φυτόν, a "plant"], the name of a parasitical plant which attaches itself to the bark of decaying trees, and derives its nourishment chiefly from the air, whence the popular name of air-plant. These plants are found generally in tropical countries, and prefer moist and shady situations. The orchideous epiphytes have recently been cultivated with great success in green-houses. Many of them are of exquisite beauty, and others are remarkable for their singular and grotesque forms.

Epi′rus, or Epei′rus [Gr. Ἤπειρος; Fr. *Épire*], a country of ancient Greece, bounded on the E. by the chain of Pindus, on the S. by the Ambracian Gulf, and on the W. by the Ionian Sea. It corresponds to the southern portion of the modern Albania, a wild and mountainous region which in all ages has been occupied by semi-civilized and robber tribes, called *Epirots* or *Epirotes.* It is adapted to pastoral pursuits, and its fine horses, oxen, and Molossian dogs were celebrated in antiquity. The three most important tribes of Epirots were the Chaones, Molossi, and Thesproti. The Molossi eventually became the masters of all Epirus. Among the Molossian kings was Alexander, whose sister Olympias was married to Philip of Macedon. The most celebrated king of Epirus was Pyrrhus, under whose reign this kingdom attained its greatest power and splendor. He waged war against the Romans in Italy. Died in 272 B. C. Epirus became a Roman province in 168 B. C., and was conquered by the Turks in 1466. The chief towns of Epirus were Ambracia, Buthrotum, and Dodona. This region is still frequently called Epirus or "the Epirus." (See Merleker, "Das Land und die Bewohner von Epirus," 1841.)

Episcopal Church, The Protestant, the religious body formerly known as "the Church of England in America." The full official title of this communion is "The Protestant Episcopal Church in the United States of America," a name assumed, it has been surmised, to distinguish it from those Christians, on the one hand, who acknowledge the papal supremacy, and from those, on the other, who reject the authority of bishops. Whether this were really intended or not is perhaps doubtful; the name, however, describes with sufficient accuracy the relations of this Church to the other religious bodies in the United States.

The Episcopal Church is the descendant and representative of that branch of the Church of England which was

established in the North American colonies in the seventeenth century. The English adventurers of that and the preceding age, like the Spaniards and Portuguese, carried their national religion with them, and introduced it wherever they gained a footing. The instructions given to Sir Humphrey Gilbert in 1578 gave him authority to settle in any country which was not in the possession of any Christian prince. He was to govern his colonies by laws agreeable to the policy of England, and not against the Christian faith professed in the Church of England. This expedition terminated, indeed, in disaster and in the death of the commander; but similar principles guided the expedition which set sail for the "western parts of America" in 1607, under the command of Captain Newport, of which the Rev. Robert Hunt, a man of energy and ability in civil affairs, as well as a learned and devout divine, was the chaplain. Under his guidance and supervision the foundations of the Church in Virginia were laid; and although it doubtless suffered from his early death, it gradually increased in strength and influence, and became the established religion of that colony. In Maryland, and in what are now called the Middle States, the Church of England was introduced at an early date. In New England, where Puritanism had a predominating influence, churchmen were longer in gaining a footing, which, when gained, they were obliged to make good against determined opposition.

Without tracing the history of the Church through the colonial period, it may be sufficient to say that, notwithstanding many drawbacks, it had in the year 1776 gained a very respectable position. It had been all along, however, obliged to contend not only with open enemies, but with injudicious friends. The violent measures of Andros and others had tended in some places to increase the dislike to the English Church which was felt by the Puritans of New England and New York, and by the numerous sectaries who, attracted by Lord Baltimore's proclamation of a general toleration, had swarmed into Maryland. The attempts which were made from time to time to procure bishops for America had failed, principally from political causes, and the Church, thus deprived of the presence of the highest order of its ministry, was necessarily crippled in the performance of its functions. The want of bishops threw difficulties in the way of raising up a native ministry. Young men who sought holy orders were obliged to make a long and perilous voyage to England to be ordained, and they were fortunate if they returned in safety. The smallpox in the eighteenth century was the peculiar scourge of the colonists who visited England; and this disease, justly dreaded in those days, carried off many of the most promising youths of America. The devotion of colonial churchmen, however, to their religion continued firm and unwavering; and although they encountered further trials at the time of the Revolution, they were able not merely to overcome them, but to place their Church in a position which has enabled it ever since to increase in influence and members.

At the beginning of the Revolutionary war there were in the Middle and Eastern States about eighty parochial clergymen. These gentlemen, with the exception of those in the great cities, were for the most part dependent for their support upon the Society for the Propagation of the Gospel. This society, however, withdrew its gifts after the termination of the war. In other respects, also, the conclusion of peace left the Church in a depressed condition. Many of the clergy and laity had adhered to the Crown during the struggle, and at its close withdrew themselves to England or to the colonies which continued loyal. The peace was soon followed by the confiscation of the landed endowments of the Church in Virginia, and the numerous churchmen in that State were thrown upon their own resources. The Church was poor, and its prospects were not hopeful.

Two important measures were immediately necessary—to obtain an episcopate, and to promote a closer union between the churches in the several States. The first was necessary to the existence, the second to the well-being, of the Church. Under the old Confederation the States regarded themselves as independent sovereignties, and by consequence the churches in them conceived themselves to be so many national churches. This position, if it had continued, would not indeed have affected their faith and doctrine, which are unchangeable, but it might nevertheless have produced many inconveniences. By the principles of the Church of England, every national church, while it is bound to adhere to the common faith of Christendom as a heritage from the apostles, has a wide liberty in regulating its own ceremonial, discipline, and worship. Thus, the Prayer-Book might have been altered in a different way in different States, and divergences in discipline and government might have been developed to such an extent as to make the relations between the churches an alliance rather than a union. This danger was averted, almost by an accident. A few clergymen from New York, New Jersey, and Pennsylvania met at New Brunswick, in New Jersey, to take measures for reviving an old society (which still exists) for the support of the widows and children of the clergy. They naturally discussed the condition of the Church, and made arrangements for a larger meeting to be held soon afterwards in New York, to which representatives of the laity were to be invited. This meeting, however, did little more than lay down certain general principles—with reference particularly to episcopacy and the Common Prayer-Book, which they rightly conceived would tend to promote a real union between the churches in the several States—and issue a call for a similar meeting to be held the next year in Philadelphia. This was the beginning of the General Convention, which has ever since been regarded as the governing body of the Church in the United States.

The constitution of this body, as it was soon afterwards established, required it to consist of all the bishops, and of four clergymen and as many laymen from each State. By later amendments, when more than one bishop was placed in a State, every diocese or episcopal jurisdiction became entitled to a representation of four clerical and four lay deputies, and the lay deputies were required to be communicants. All the bishops were entitled to seats *ex officio;* and it was arranged that as soon as there should be three or more they should sit in a separate house. Every act was to receive the approbation of both houses. Authority was given to the General Convention to prescribe the qualifications for ordination and to set forth a Book of Common Prayer—the two things that were most necessary for establishing such a union as was desired. It was also directed that there should be a convention in every State, consisting of clergy and laity, the powers of which were not in any way defined. It seems to have been assumed, however, that these conventions were to exercise supervision over the affairs of the Church in every State—or, to use the more recent expression, in every diocese—in all matters which did not come within the immediate jurisdiction of the bishop.

This constitution was adopted in the several States, though not immediately in all. The Convention of 1785 had consisted of delegates from what were afterwards called the Middle States, and from Maryland, Virginia, and South Carolina. Much doubt was felt in the East, particularly in Connecticut, as to the wisdom of some of its provisions. The introduction of the laity especially into what was conceived to be a Church council was regarded as an experiment of questionable expediency, and some of the powers which were given them were thought to be without precedent. These objections, however, were gradually removed or waived; and in 1789, Bishop Seabury, with a deputation from Connecticut, took his seat in the General Convention, and the union of the Episcopal churches in the United States was completed. Although the constitution proposed in 1785, and adopted in an amended and completed form in 1789, all along contemplated the presence of bishops, there really were none in the United States at that time except Bishop Seabury, who took no part in the proceedings of the Convention. This gentleman (the second of a family which for five generations has furnished a line of clergymen, all able and some distinguished) had been sent to England soon after the peace by the clergy of Connecticut to obtain consecration from the English bishops. He had found an obstacle, however, in the oath of allegiance, which forms a part of the English consecration office, and which, of course, could not be taken by any one but a British subject. After some delay, and much negotiation, he succeeded in obtaining consecration from the Scottish bishops, and, returning to America in 1785, was received as bishop of Connecticut and Rhode Island.

The rule of the Church, believed to have come down from the apostles themselves, requires the presence of at least three bishops at every consecration; and it was necessary that there should be at least that number in the United States to maintain an episcopal succession. Application was therefore made in 1786 to the English bishops in behalf of the Rev. William White and the Rev. Samuel Provoost, who had been chosen to the episcopate in Pennsylvania and New York. The obstacle arising from the oath of allegiance was removed by an act of Parliament; but a new difficulty was found in a revised Prayer-Book which had been proposed for use in the United States in 1785, and in which the English bishops thought that they perceived indications of a disposition to depart from the doctrine of the Church of England. After a correspondence between some of the most learned divines in England and the United States, in which the principle was clearly brought out that "this Church does not intend to depart from the Church of England in any essential point of doctrine, discipline, or wor-

ship, or further than local circumstances require," it was agreed to proceed with the consecration of these gentlemen, and they were accordingly consecrated bishops on the 4th of February, 1789, in the archbishop's chapel at Lambeth, by the Most Rev. John Moore, archbishop of Canterbury, assisted by other bishops. Partly because it was desirable that there should be more than the lowest number of bishops necessary to maintain a succession, and partly to keep up the succession in the English line, the Rev. James Madison obtained consecration in 1790 as bishop of Virginia.

The "Proposed Prayer-Book," as it was called, which had never met with much favor, was allowed to fall into oblivion, and it has now become one of the curiosities of ritual literature. A new revision of the Prayer-Book was made upon the principle just indicated. The English Prayer-Book was retained, with such alterations as were necessary to adapt it to the changes in the political condition of the country, and with many other (chiefly verbal) modifications. The promise, however, to adhere to the doctrine, discipline, and worship of the Church of England was, upon the whole, strictly adhered to. The most important changes were the introduction of a communion office closely resembling that of the Scottish Episcopal Church, and more nearly approaching the older liturgies of England, which was done at the request of Bishop Seabury and at the instance of the Scottish bishops; the omission of the Athanasian Creed; and the leaving out the precise directions about confession which occur in the English Office for the Visitation of the Sick. This omission was perhaps balanced, and the mind of the Church sufficiently declared, by the stringent rules about confession which are found in the Office for the Visitation of Prisoners, borrowed from the Irish Prayer-Book. The Prayer-Book, thus revised, was ratified in 1789. It came into immediate and general use, and has ever since been, without material alteration, the "use of the Protestant Episcopal Church in the United States."

The two objects which the Convention had in view in 1785 were thus attained in 1789. There was a sufficient number of bishops, and the union of the Church in the United States was perfected. Since that time a hundred bishops have been consecrated, of whom fifty-one are living. There are nearly 3000 priests and deacons, and the number of communicants is computed at 235,000. The Church has extended into every State and Territory, and its missionaries have penetrated into Western Africa, China, and Japan. In the General Convention of 1789 (that in which the union of the Church was perfected) two bishops sat with twenty-nine clerical and lay deputies. That of 1871 consisted of forty-two bishops and three hundred and twelve clergymen and laymen. The number of churches and chapels is estimated at about 2700. There is a general theological seminary in the city of New York, and there are divinity schools in Connecticut, Ohio, Pennsylvania, Massachusetts, Wisconsin, and Minnesota. Several colleges are connected with this Church, among which are Trinity College, Hartford, Hobart College, Geneva, Racine College and Burlington College, in the States of Connecticut, New York, Wisconsin, and New Jersey. The University of the South was begun a few years ago with some prospects of success, but the events of the war delayed its progress, and its usefulness will probably be rather in the future than in the present. Faculties of divinity and grammar-schools are attached to several of the colleges. St. Stephen's College, Annandale, N. Y., receives at an early age youths who are designed for holy orders, and carries them to the point at which they begin their theological training. Trinity School, N. Y., an endowed grammar-school established in 1706, receives seventy-two boys on the foundation.

The doctrine of the Episcopal Church is that of the Church of England, believed to have been the common faith of Christendom while it continued undivided. The relations of this Church to the rest of Christendom were clearly defined by the bishops who met in conference at Lambeth in 1867. More than seventy bishops from England, Scotland, Ireland, the colonies, and the United States met in that year to take into consideration the state and best interests of the churches of the Anglican communion. One of their first acts was to express the deep sorrow with which they viewed "the divided condition of the flock of Christ throughout the world," and to record their conviction that "unity will be most effectually promoted by maintaining the faith in its purity and integrity, as taught in the Holy Scriptures, held by the primitive Church, summed up by the creeds, and affirmed by the undisputed general councils; and by drawing each of us closer to our common Lord, by giving ourselves to much prayer and intercession, by the cultivation of a spirit of charity and a love of the Lord's appearing."

The Episcopal Church, while it receives the Holy Scriptures as the ultimate rule of faith, does not throw them open to the varying interpretations of every man's private judgment, but explains them by the aid of traditions which it believes to have come down through an unbroken line of teachers from the apostles themselves, by the creeds, and by the definitions of Christian doctrine made by the general councils. Candidates for baptism are required to confess their faith in the words of the Apostles' Creed—adults in person, and infants by their sponsors. Communicants must receive also the Nicene Creed, which contains the same teachings in a more expanded form. Nothing is required from laymen, beyond acceptance of the Prayer-Book and a proper deference to the instructions of the clergy, who are believed to derive their doctrine and their right to teach by a succession from the apostles. The XXXIX. Articles of the Church of England (except the twenty-first, "of the power of Christian princes in relation to general councils") are still commonly bound up with the Prayer-Book, but the practice of signing them has been laid aside since the Revolution. The clergy sign, instead, a general declaration that they "believe the Holy Scriptures of the Old and New Testament to be the Word of God, and to contain all things necessary to salvation;" and they "solemnly engage to conform to the doctrines and worship of the Protestant Episcopal Church in the United States." The mode in which the teachings of Holy Scripture are ascertained has been already pointed out.

Thus, the Episcopal Church would seem to be one of the most liberal and comprehensive of religious bodies. It *may* contain within itself (it is not, however, asserted that it *does*) those, on the one hand, who apparently differ from Roman Catholics in little more than in denying the pope's jurisdiction in countries which are or have been included in the British empire, and, on the other, those who are to be distinguished from Presbyterians only by their acceptance of episcopacy and the Prayer-Book. Within these possible limits there would appear to be ample scope for religious thought; and the great freedom of religious thought accounts for the schools of teaching which have long existed. As men incline toward authority on the one hand, or individual judgment on the other, they are said to be High Church or Low Church. The lines of thought, however, are not sharply drawn, and the schools melt into each other by imperceptible degrees. The principles laid down by the Fathers at Lambeth (themselves men of every conceivable school of thought) have been long tested, and have been found sufficient to maintain the unity and harmony of the Church.

BEVERLEY R. BETTS, *Lib. of Columbia Coll.*

Episcopal System, in the Roman Catholic Church, is that theory according to which the highest clerical power is vested in the whole body of bishops. This theory was most prominently brought forward in the papal elections of the fourteenth century, and its followers declared the Church, as represented in its general assemblies, to be above the pope. In France the University of Paris was the chief supporter of this theory, and the Gallican Church accepted it as one of its fundamental laws. In Germany the coadjutant bishop of Treves, Nikolaus von Hontheim, who was one of its chief supporters, wrote a celebrated book, in which he clearly defined the episcopal system, "De statu ecclesiæ et legitima potestate Romani Pontificis" (1763). The Punctations of Ems (see EMS) had the same fundamental idea, and although they failed in their purpose, the system continued to spread in Germany. But the declaration of papal infallibility has put an end to these differences, and made an impossibility of the episcopal system. In the German Protestant churches the episcopal system is that theory according to which the authority of the bishops, which had been suspended in the Protestant countries in consequence of the peace of 1555, was transferred to the ruler of the country.

Episco'pius (SIMON), a learned Dutch divine whose original name was BISSCHOP, was born in Amsterdam in Jan., 1583. He was distinguished for his liberality, moderation, and other virtues, and became the chief pillar and champion of the Arminians or Remonstrants. He was appointed professor of theology in the University of Leyden in 1612, but he was accused of Socinianism by the Calvinists (Gomarists), and was banished in 1618 by the Synod of Dort. He retired to France, returned to Holland in 1626, and became rector of a college in Amsterdam in 1634. His principal works are the "Confession of the Remonstrants" (1621) and "Institutiones Theologicæ." Died in 1643.

Ep'isode [Gr. ἐπεισόδιον, from ἐπί, "on," "in addition to," εἰς, "in" or "into," and ὁδός, a "road," a "journey," a "coming;" *i. e.* something that comes in besides the main plot or poem] was originally one of those parts of an ancient classical drama which were performed between the entrances of the chorus. In modern use it signifies an incidental narrative or digression in a poem, more or less connected with the main plot, but not essential to its development.

Epis'tates [Gr. ἐπιστάτης, from ἐπί, "on" or "over," and ἵσταμαι, to "be placed," to "stand"], literally, "one set or placed over," the title of the presidents of the two great councils of the ancient Athenians—viz., the Ecclesia and the senate of Five Hundred. Their term of office was one day.

Epis'tle [Lat. *epis'tola;* Gr. ἐπιστολή, from ἐπιστέλλω, to "send"], literally, a thing *sent*, hence a letter. The name is now given especially to the twenty-one epistles of the New Testament. The writings ascribed to the so-called Apostolic Fathers (Clement of Rome, Barnabas, Ignatius, Polycarp, and Hermas) are for the most part epistolary in form. Of quite inferior dignity and value are the following undoubtedly spurious epistles: Abgarus of Edessa to Christ, and Christ to Abgarus; Lentulus to the Roman Senate; several of the Virgin Mary; Paul to the Laodiceans; the Third of Paul to the Corinthians, and one of the Corinthians to Paul; Peter to James; eight of Seneca the philosopher to Paul, and six of Paul to Seneca.

Epis'tolæ Obscuro'rum Viro'rum [Lat. for "letters of obscure men"], a famous collection of satirical letters directed against the monks and the Roman Catholic Church. They were published in three parts—the first at Haguenau (1515), the second at Bâle (1517), and a third at a later date. They were probably written jointly by Ulrich von Hutten, Crotus Rubianus, and Buschius. They are an admirable imitation of the barbarous Latinity of the monks of those days. Certain Dominicans at Cologne, under the lead of one Pfefferkorn, a baptized Jew, advocated the expulsion of all Jews from Germany, the forcible education of their children in Christian doctrine, and the burning of their books. This attempt was opposed by Reuchlin; and pending the decision of the question by the pope the "Epistolæ" appeared. Says Sir William Hamilton: "The 'Epistolæ' are at once the most cruel and most natural of satires, and as such they were the most effective. They converted the tragedy of Reuchlin's persecution into a farce; annihilated, in public estimation, the enemies of intellectual improvement; and even the friends of Luther, in Luther's lifetime, acknowledged that no other writings had contributed so powerfully to the downfall of the papal domination." Many editions of the "Epistolæ" have been published, the best of which is that of Boecking, Leipsic, 1858.

Ep'itaph [Lat. *epita'phium*, from the Gr. ἐπί, "upon," and τάφος, a "tomb"] was anciently the name of the monument or tomb over a grave, and was especially applied to the funeral oration delivered at the grave. It is, however, universally applied at present to the inscriptions upon tombstones. The literature of epitaphs is very considerable. Greek epitaphs are preserved in great numbers in the Anthology. Of Latin epitaphs, many exist both in literature and upon the tombs themselves. Numerous interesting examples of early Christian epitaphs have been taken from the Catacombs. Many collections of remarkable epitaphs in modern languages have also been made.

Epithala'mium [from the Gr. ἐπί, "on" or "near," and θάλαμος, a "bridal chamber;" also "marriage"], a bridal hymn; a chorus sung, in ancient Greece, near the door of the bridal chamber. It appears to have been a formal part of the marriage ceremony. Among the ancient Romans the rude Fescennine songs, which seem to have been of a phallic character, were often sung at weddings, and are hence called epithalamia. The term is often given to formal poems composed in honor of a particular marriage. Anacreon and Pindar composed poems of this kind. The most perfect example of it now extant is the epithalamium of Peleus and Thetis, by Catullus.

Epithelio'ma [from EPITHELIUM, which see], a variety of cancer which attacks most frequently the surfaces which are covered with pavement epithelium or with epidermis. Many pathologists class it with "cancroid" disease, because it appears to be less malignant than true cancer. Indeed, if removed early, the patient has a fair prospect of future exemption from the disease, but in neglected cases it assumes the malignancy and other dreadful characters of true cancer. The lips, especially the upper lip, are the most frequent seat of epithelioma, but it may attack even internal organs. Histologically, it appears to be composed of epithelial elements.

Epithe'lium [from the Gr. ἐπί, "on," and θῆλυς, "soft," "delicate," "tender," because used to protect the delicate tissues beneath], in anatomy, is the layer of cells which lines the serous (or closed) and the mucous (or open) cavities of the body, the mucous epithelium being continuous with the epidermis, which is a modification of the epithelium.

Epithelium is of two principal kinds: (1) "Pavement" epithelium, consisting of rounded or polygonal cells. This variety is especially found in the closed cavities, but is not confined to them. (2) "Columnar" or cylinder epithelium, found chiefly upon mucous membrane. This kind has many varieties of form, one of the most important being "ciliated epithelium," which is provided with fine hair-like processes (cilia), whose length varies from one one-thousandth to one twelve-thousandth of an inch. These cilia have a rapid automatic motion in one direction, moving from 150 to 250 times in a minute. These motions are no doubt highly important in physiology, but their mechanism is little understood. In some instances these motions obviously assist in discharging excretions, etc., but in others their use is quite unknown. The epithelial cells have a very important part in the secretion of many fluids. For example, mucus is formed by the bursting of epithelial cells and the discharge of their soft contents, mingled with the débris of the old cell-walls. This process of destruction is attended by continual renewal of the cells.

Ep'ithet [from ἐπί, and τίθημι, to "put upon"], a word or clause which expresses some attribute of an object that is prominent in thought, but is not made the basis of a discrimination or classification; *e. g.* "*Frail* man is mortal;" "Earthly pleasures, *which are fleeting and unsubstantial*, are not the highest for man." Used in opposition to DEFINITIVE (from *de* and *finio*, to "mark out the *fines* or boundaries"), by which we understand a word or clause which expresses some attribute that *is* made the basis of a discrimination or classification; *e. g.* "*Good* men [*i. e.* only good men] are a blessing to the community;" "Those pleasures *that are from the earth* are not the highest for man."

Great care should be taken that epithets be not too frequently employed, and that there be something in the thought to which they actually and exactly correspond. The felicitous employment of epithets is one of the attributes of genius which gives to literature its highest charm. See Milton's

"Drew *iron* tears down Pluto's cheek."

Epit'ome [Gr. ἐπιτομή, a "cutting short" (from ἐπιτέμνω, to "cut," to "gash," also to "abridge")], in literature, an abridgment; a work in which the contents of a former work are reduced into a smaller space by curtailment and condensation. In the declining age of the Western Roman empire the practice of epitomizing the works of older writers, especially in history, became very prevalent. In several instances a valuable original work has been lost which perhaps would have been preserved if an epitome had not been substituted for it. Among the best known works of this class are the epitome of Florus, "Epitome Rerum Romanarum," and that of Eutropius, "Breviarum Historiæ Romanæ," both abridgments of the history of Rome.

Epitro'choid [from the Gr. ἐπί, "on," and τρόχος, a "wheel"] is a curve traced by a point in the plane of a circle which rolls on the convex side of a fixed circle. The curve thus generated is one of the family of roulettes, and becomes an epicycloid when the generating point is in the circumference of the rolling circle. When the two circles are equal the epitrochoid becomes similar to the pedal of the fixed circle with respect to a certain fixed point in its plane. But the pedal being always the inverse of the reciprocal of the primitive curve, the epitrochoid in this case must be the inverse of a conic with respect to one of its foci, which latter is a curve of the fourth order, belonging to the Cartesian ovals, and called the *limaçon*. Epitrochoids are generally transcendental curves; it is only when the circumference of the fixed and rolling circles are commensurable that the epitrochoid returns into itself and becomes an algebraical curve.

Epizo'a [a Gr. term, from ἐπί, "on," and ζῶον, an "animal"], a name given to animals living upon the skin and among the hairs of other animals, as fleas, lice, ticks, mites, etc. Some of these, like the itch-mites, are Acarina—spiders of low grade of development—but most are insects of spider-like character, low forms of Diptera and Hemiptera. Most mammals, many birds, and a great many insects are infested by insect parasites. The *Cyamus ceti*, or whale-louse, living upon whales and fishes, is a crustacean. Many Cirripedia live in a similar way upon whales and sharks. Most Epizoa live as true parasites upon the blood and secretions of the animal which they infest. Others, especially the Cirripedia, appear to feed upon other food, making the skin of a larger animal merely their place of abode. The very great majority of Epizoa are articulate animals.

Epizoöt'ic [from the Gr. ἐπί, "upon," and ζῶον, an "animal"], a disease which attacks the lower animals, or any one species of them, as epidemics attack men. The term is objectionable, because, with some limitations, these diseases chiefly attack but one species, instead of all animals; and moreover, as man is an animal, all epidemics are epizootics. The so-called epizootic diseases follow the general laws of epidemics, and they would appear to attack especially the

domesticated animals. Some diseases attack both man and the lower animals. Thus, smallpox affects the horse, cow, and sheep, assuming in each a modified form. Among the more important epizootic diseases are the rinderpest, the contagious pleuro-pneumonia, and the "foot-and-mouth disease" (all attacking neat cattle); the remarkable influenza which attacked horses and mules, arising in Canada Sept. 30, 1872, and rapidly moving southward and westward over the whole of North America; the scab, foot-rot, and other diseases of sheep. The "reds," the *muscardine*, *pébrine*, and other diseases of the silkworm have been the cause of serious calamities to operatives, and at times have almost threatened the existence of the silk manufacture.

The epizootic influenza of 1872–73, above alluded to, destroyed, according to Dr. A. B. Judson of New York, 1500 horses and mules in New York, or 4 per cent. of the total number in the city. The disease reached Chicago Oct. 29, St. Louis Dec. 1, Salt Lake Jan. 11, 1873, and San Francisco April 15. It is thought that the disease spread chiefly by contagion, and not by atmospheric influence.

E Plu'ribus U'num [Lat.], "One composed of many," the motto of the U. S., consisting of many States confederated.— *Webster*. [Lat.], "One of many," the motto of the U. S.; the allusion being to the formation of one federal government out of several independent States.— *Worcester*.

After the Declaration of their independence by the States was announced on the 4th of July, 1776, and before the adjournment of that day's session, it was resolved, "That Dr. Franklin, Mr. J. Adams, and Mr. Jefferson be a committee to prepare a device for a seal for the United States of America." The result of their joint work was the present seal of the U. S., which has not been changed since its first adoption. The six sections, or quarterings, upon the escutcheon or shield were intended to denote the countries (England, Scotland, Ireland, France, Germany, and Holland) from which the States so united had been, respectively, chiefly peopled. The motto adopted on this seal, and which has ever since been retained, was intended to denote the character of the federal government in its formation, as stated by the great American lexicographers, Webster and Worcester, in their above definitions. From the six quarterings on the shield, with the necessary seven attending spaces outside of the sections or quarterings, arose the original thirteen stripes, as they are called, which were transferred to the flag of the Union in 1777. The stars were intended to represent the number of the States, while the origin of the stripes was the quarterings or sections of the shield, as stated. ALEXANDER H. STEPHENS.

Eppard's Point, a twp. of Livingston co., Ill. P. 861.

Ep'ping, a town of England, in Essex, is at the N. end of Epping Forest, 16 miles N. N. E. of London. It is noted for its cream, butter, and sausages. Epping Royal Forest, formerly Waltham Forest, covers 60,000 acres, but was once much more extensive. 12,000 acres are in woods and wastes, and the other part is enclosed. Pop. 5566.

Epping, a post-township of Rockingham co., N. H., on the Portsmouth R. R., 39 miles S. E. of Concord. It has four churches, and manufactures of shoes, brick, lumber, woollen goods, etc. Pop. 1270.

Epps, a township of Butler co., Mo. Pop. 263.

Ep'som, a market-town of England, county of Surrey, 14 miles by railway S. S. W. of London. It has a mineral spring containing sulphate of magnesia, which derives from this place the name of Epsom salt. Here is a royal medical college. Epsom is famous for its horse-races, which are held yearly on the Downs, 1½ miles S. of the town. The races last four days, one of which is called "Derby Day," and are more numerously attended than any other races in the kingdom. Pop. 4882.

Epsom, a post-township of Merrimack co., N. H. It has manufactures of lumber, etc. Pop. 993.

Ep'som Salt [Lat. *magnesiæ sulphas* (*i. e.* "sulphate of magnesia"); Ger. *Schwefelsaure Magnesia*], the magnesium sulphate (SO_4Mg7OH_2), a salt, when pure, usually found in colorless acicular crystals derived from the right rhombic prism, and containing 51.22 per cent. of water of crystallization. It is somewhat efflorescent, for at 32° Fahrenheit water will dissolve over one-fourth its weight of the anhydrous salt, and as the temperature is raised the solubility increases. The salt was formerly manufactured from the waters of the mineral spring of Epsom, England. It also exists largely in sea-water, from which it was formerly prepared in large quantities. In Italy it is now prepared from a schistose rock; in England, from dolomite; in Pennsylvania and Maryland, from magnesite. This salt is used in medicine as a cooling and generally safe cathartic. It is nauseous to the taste, but may be easily taken in "soda-water" with lemon syrup. In the household it is an excellent addition to starch, decidedly increasing its stiffening powers. Mixed with ordinary whitewash, it gives a fine pearly whiteness to walls.

Equal'ity, a post-village of Gallatin co., Ill. Pop. 356.

Equality, a township of Miller co., Mo. Pop. 1068.

Equa'tion [Lat. *æqua'tio*, *æqua're*, to "make equal"], in algebra and the calculus, an expression denoting that two quantities symbolically expressed are equal. The sign = placed between the two quantities equated denotes this relation. Either quantity may be expressed in a single term, or in more terms than one, connected by the sign + or −. The term or terms on the left of the sign of equality constitutes what is called the first member of the equation; the term or terms on the right, the second member. In analysis there occur equations of two classes, distinguished as *algebraic* and *transcendental*. Algebraic equations are those in which the quantities employed are subjected to no operations but the operations of common algebra, including addition, subtraction, multiplication, division, and involution to powers or evolution of roots, expressed by constant indices. Transcendental equations are those whereinto relations are introduced to which the ordinary operations of algebra are inadequate, as when the exponents of powers are variable, or when the trigonometrical functions of variable angles enter as terms or factors. Such relations are called transcendental (see TRANSCENDENTALS), and give name to the equations in which they occur. The object of algebraic equations is usually to ascertain the value of some unknown quantity through its relations to other quantities which are known. If there is but one unknown quantity, a single equation will suffice for the solution. If there are two or more, there must be as many equations expressing relations independent of each other as there are unknown quantities. If the number of independent equations is smaller than the number of unknown quantities, the problem to which they belong is indeterminate. It can then be made determinate by forming a sufficient number of independent equations with arbitrary conditions. If the number of independent equations is greater than the number of unknown quantities, the problem to which they are supposed to belong is impossible. In this case some of the conditions which these equations express are incompatible with each other; but if, after eliminating all the unknown quantities from them, we treat the constants which remain as if they were unknowns—that is, make them arbitrary constants—the resolution of the group with respect to these will show what relations they must have to each other, or the conditions which must exist, in order to render the original set of equations determinate. They are therefore called *equations of condition;* which term is generally applicable to all equations which express necessary relations between quantities, without any regard to their absolute value.

The equality between the members of an equation is not affected by subjecting both to the same operation. Thus, if both members be multiplied or divided by the same quantity, increased or diminished by the same quantity, raised to the same power, depressed to the same root, made the values of similar trigonometrical functions of the same angle, or taken as the exponents or logarithms of the same assumed constant or variable, under all these transformations the relation of equality between them is preserved. If any term be transposed from one member to the other of an equation, the equality is still maintained, provided the sign of the term transposed be changed from + to −, or from − to +, at the same time. If all the terms of one member be thus transposed to the other, this member is reduced to 0, but the equality is still preserved. In all general discussions of the theory of equations it is common to consider the equation under this form; *i. e.* with the significant terms on one side and *zero* on the other.

An *identical* equation is one in which precisely the same terms are found on one side as on the other, or in which this exact similarity is producible by performing operations on one side or the other, which change the form without altering the value. Thus,

$$\frac{cy^2 + cx^2 + 2axy + ay^2 + 2cxy + ax^2}{a + c} = (x + y)^2$$

is an identical equation, because, by properly arranging the terms of the first member, and actually performing the division by $a + c$, and by developing the second member at the same time, we have $x^2 + 2xy + y^2 = x^2 + 2xy + y^2$. An identical equation is obviously no help towards the solution of a problem.

The *degree* of an algebraic equation is denoted by the highest power of the unknown quantity contained in it, if it has but one, and by the greatest sum that can be found by adding together the exponents of all the unknowns which are factors in any single term, if there are several. An equation of the first degree is called a simple equation. If it has but one unknown, it is resolved by transposing

all the terms into which the unknown enters to the first member, and all those into which it does not enter to the second; then resolving the first member into two factors, of which one shall be the unknown; and, finally, dividing both members by the second factor of the first member—that is, by the coefficient of the unknown quantity. If a simple equation contains more than one unknown, then singly it is indeterminate. To be determinate there must be just as many equations (not transformable into each other) as there are unknowns. In this case, if we find from one of the equations the value of one of the unknown quantities in terms of the others (*i. e.* by treating all the other unknowns as knowns for the time being), and substitute the value so found in all the remaining equations, we shall have eliminated, or got rid of, one of the unknowns, and have made the number of equations one less at the same time. Following up this mode of proceeding, we shall at length have but one equation and one unknown quantity; of which last therefore the value is obtainable in known terms. The values of the rest are then easily deducible by successive substitutions.

Equations of the second degree can always be reduced to the form $x^2+2px=q$. For if originally there are many terms containing x^2 and x, and also many known quantities, all the unknowns having been brought to the first member and the knowns to the second, the term or group of terms containing x^2 may be resolved into two factors, of which one shall be x^2 itself, and the whole equation may then be divided by the other factor. Then all the knowns forming the coefficient of x may be represented by $2p$, and the entire second member may be represented by q. In this case it *may* happen that the coefficient of x is negative. If so, the *implicit* value of p is said to be negative, while its *explicit sign* is positive. This matter must be attended to when the values which p replaces are restored. The quadratic having the form above, its solution, which presents two values, either of them capable of satisfying the equation, is as follows:

$$x=-p+\sqrt{q+p^2},$$

$$x=-p-\sqrt{q+p^2}.$$

Any equation, whatever its degree, which contains but two powers of the unknown, is reducible precisely like a quadratic, provided that the indexes of the two powers are in the relation of 2 to 1. For, supposing the two powers to be m and n, we can always reduce the equation to the form $x^m+2px^n=q$, or $x^{2n}+2px^n=q$. Hence, from what has just been said it appears that $x=(-p\pm\sqrt{q+p^2})^{\frac{1}{n}}$.

For the manner of reducing cubic, biquadratic, and higher equations resort must be had to systematic treatises. The following are a few of the propositions of general interest in regard to the theory of equations which are admissible in an article having the necessarily limited scope of the present.

Every equation of whatever degree (say the m^{th}) is capable of being reduced to the form $x^m+Ax^{m-1}+Bx^{m-2}+Cx^{m-3}\ldots\ldots+Px+Q=0$; in which the coefficients A, B, C, etc. are positive or negative, whole or fractional, real or imaginary, as it may happen. If an equation has as many real roots as its degree indicates, the coefficient A will be the sum of all these roots with signs reversed. If the several roots are a, b, c, etc., the equation itself is the product of the binomial factors $x-a$, $x-b$, $x-c$, and so on; so that the constant (or known) term Q is the *product* of all the roots a, b, c, etc., with signs reversed. If there are not so many different real quantities which will satisfy the equation as the number of units in the exponent of the degree, then there will be *imaginary* roots (quantities containing an *even root of a negative* quantity), and these, when present, are always present in pairs, each member of a pair containing the same real and imaginary terms, the imaginary term with contrary signs. Such pairs of roots are called conjugate roots. If one of the real roots (as a) of an equation is known, the equation is divisible by the binomial $x-a$, and may thus be depressed in degree to the next lower order. If the coefficients of all the different powers of the unknown quantity from m downward are whole numbers, all the commensurable roots are whole numbers. Every equation in which some of the coefficients are fractional can be transformed into another of the same form as given above, in which all the coefficients shall be whole numbers; but in this case x will have to give place to some other unknown, as y in the expression $y=kx$. After the transformation we shall have $y^m+A'y^{m-1}+B'y^{m-2}+C'y^{m-3}\ldots\ldots P'x+Q'=0$.

Every equation can be transformed into another in which the second term shall be wanting by assuming $x=y-\frac{A}{m}$, and substituting this value of x for x itself in the given equation. This transformation is always necessary preliminarily to the reduction of cubics, and generally to that of biquadratics. Every equation in which the signs are all positive must have all its real roots negative. Every *complete* equation (*i. e.* one in which all the powers of x are present) which has its signs alternately positive and negative must have all its real roots positive; and this will be true of incomplete equations if we replace the missing terms by *zeros*. When the last (the known) term of an equation is positive, the number of its real positive roots is even; when it is negative, the number of such roots is uneven. Every equation of an even degree, in which the coefficients are real and the last term negative, has at least two real roots—one positive, and the other negative. Every equation of an odd degree, in which the coefficients are real, has at least one root of a sign contrary to that of the last term. When the roots of an equation are all real, the number of positive roots is equal to the number of variations of sign (changes from + to −, or the contrary in proceeding from left to right), and the number of negative roots is equal to the number of permanences of sign.

The number of real roots of any numerical equation in which the roots are all unequal may be found by means of its first derivative (see DERIVATIVE), as follows: Operate on the equation and its derivative as for finding greatest common measure, using only positive multipliers or divisors in preparing the several steps, and change the signs of the successive remainders thus found. Set down then in a row the first terms (only) of the given equation, the derivative, and the several remainders prepared as above (including the last remainder, which will have but one term), with their signs. Suppose the unknown to be positive, and write under each term of this row the sign of that term resulting from this supposition. Then suppose the unknown to be negative, and write under the sign last written the sign resulting from this second supposition. Count the number of variations in the first of these rows of resultant signs, and also the number of variations in the second of the rows. The difference between these numbers is the number of real roots in the original equation.

If, as above supposed, the original equation has no equal roots, no common measure will be found by the first operation above, and the last remainder will be a constant. But if it *has* equal roots, a common measure will be found. In this case divide the original equation by this common measure, and the quotient will be a new equation having the same roots as the given one, the equal roots of that equation entering it but once. Proceed with it as above. If the given equation contain but one set of equal roots, the greatest common measure found in the operation above described will be a binomial, or a complete power of a binomial; and the common value of the equal roots will be found by extracting the numerical root of the known term which corresponds in degree to this power. If the given equation contained more than one set of equal roots, the greatest common measure found as above will be the product of the same number of binomials or binomial powers; and by putting this equal to zero, and pursuing with it the same treatment as with the original equation, the number of real roots in it will be ultimately found.

If, instead of taking the *first terms* of the quantities above specified—viz. the equation, the derivative, and the remainders (with signs reversed)—those expressions be written out in full, and their resultant signs ascertained and written down for any assumed value of the unknown, as p, and for other values as p, $p_2\ldots p_n$, etc., increasing or diminishing by minute differences; and if at length a value, as p_n, be found which gives one variation more or one fewer than the value p_{n-1}, next greater, or next less; then one of the real roots of the equation lies between p_{n-1} and p_n. It thus appears that all the real roots of any numerical equation of whatever degree may be found by approximation.

F. A. P. BARNARD.

Equa'tion of Time is the difference in mean solar time between the sun's apparent or true right ascension and its mean right ascension; or, in other words, the difference between sun time and clock time. This difference arises—(1st) from the sun's unequal motion in longitude because of the eccentricity of the earth's orbit; (2d) from the obliquity of the ecliptic; and (3d) to some small extent from the perturbations of the moon and planets. Sun time and clock time agree about Dec. 25th, April 16th, June 16th, and Sept. 1st. The equation of time is greatest about Nov. 1st, when the clock is sixteen minutes and sixteen seconds faster than the sun.

Equa'tion, Per'sonal. It is found by experience that different persons, in recording the results of astronomical observations, will make various errors, some anticipating the event, but others failing to record it at the proper time. When it is found possible, by examining a long series of records made of the same events by two observers,

to discover the average difference between their records of events, a very important correction of time-intervals may sometimes be introduced into a computation based upon such records. Such a correction is called the relative personal equation of the two astronomers. When it is found that an observer habitually makes, or is likely to make, a certain error in his time-records, such error (or absolute personal equation) can be readily allowed for.

Equa'tor [Lat. *æqua'tor*, from *æquo*, *æqua'tum*, to "make equal;" Sp. *ecuador*], literally, "that which makes equal," or which divides equally the surface of the earth, in geography, is a great circle of the terrestrial sphere which is equidistant from the two poles, and divides the earth into northern and southern hemispheres. Latitudes are counted from the equator along the meridian, and longitudes are measured on the equator or on some circle parallel with it.

EQUATOR, in astronomy, is the great circle of the celestial sphere, of which the plane is perpendicular to the axis of the earth's diurnal motion. It is called the equator because when the sun is in its plane the days and nights are exactly equal all over the world. The equator divides the sphere into northern and southern hemispheres, and is often styled the *equinoctial*. The apparent diurnal motions of all the celestial bodies are performed in circles which are parallel to it. The right ascensions are measured on it.

Equatorial Current. See CURRENTS, MARINE.

Equato'rial Tel'escope, a telescope mounted upon a fixed axis parallel to the axis of the earth, and turning also upon a second movable axis parallel to the equator, for the continuous observation of heavenly bodies, and for noting their right ascension and declination. The motion of the telescope round its fixed or "polar" axis is necessarily parallel to the equator, and this gives the instrument its name. In order to maintain the object observed steadily in the field of view, the telescope is made to revolve round the polar axis by an attached clockwork, which admits of being regulated so as to vary the velocity of rotation, according as the object under examination is the sun, the moon, a planet, or a fixed star.

Eques'trian [Lat. *eques'tris*, "belonging to a horse or horseman" (from *e'quus*, a "horse")], pertaining to horses; riding on horseback; skilled in horsemanship; representing a person on horseback, as a statue.

Eques'trian Or'der [Lat. *or'do eques'tris* or *equites*, the plu. of *e'ques*, a "horseman"], also called **Knights,** the name of an important division of the citizens of ancient Rome. They were originally a military organization, and formed the cavalry of the Roman army. According to Livy, Romulus constituted three centuries (300) of equites, to whom he gave the several names of Ramnenses, Titienses, and Luceres. Down to the year 123 B. C. the equites formed simply a division of the army, and their centuries were composed of patricians and plebeians, but C. Gracchus in that year procured the passage of the *Lex Sempronia*, which instituted a new class or political order called *ordo equestris*, from whom all the *judices* (judges) must be selected. The reform of Sulla deprived them of the sole right of being chosen as judices, who thenceforth were selected from the senators, equites, and *tribuni ærarii*. The equites also enjoyed the privilege of officiating as *publicani* or farmers of the public revenue. According to Cicero, who belonged to this order, these publicani "comprised the flower of the Roman chivalry, the ornament of Rome, the firm support (*firmamentum*) of the republic." The badges of the equites were a gold ring and a robe with a narrow purple border.

Eques'trian Stat'ue, a complete figure of a person on horseback, executed generally in bronze or stone. In ancient Greece, where plastic art attained its highest perfection, statues of men and of horses were often of the first excellence; but horses were more commonly represented as attached to the chariot. In Rome, equestrian statues of the emperors were common. The finest extant Roman work of the kind is a bronze equestrian statue of M. Aurelius Antoninus. Among the famous modern equestrian works are the noble colossal statue of Peter the Great at St. Petersburg, and that of Frederick the Great at Berlin by Rauch. Recent works of the kind are very numerous.

Equian'gular, having equal angles. A figure is equiangular when all its angles are equal, as a square. Two or more figures of the same kind (usually rectilinear) are said to be equiangular when the angles of the one taken consecutively are respectively equal to the angles of the other.

Equian'gular Spi'ral, a term applied to the logarithmic spiral, from its having the property of cutting all its polar radii vectores at the same angle.

Eq'uidæ [from the Lat. *equus*, a "horse"], the family which is formed by the horse, ass, etc., a section (Solidungula) of the order Ungulata. The most characteristic feature of the Equidæ is the solid, one-toed foot formed by the union of the central phalanges and the atrophy of the lateral ones. Single-toed horses began in the pliocene. In the miocene epoch our horses were represented by *Hipparion*, etc., which had two small lateral toes or hoofs, of which some traces may be often found in living horses. In the lower miocene *Anchitherium* represents the Equidæ, and connects the horse with *Palæotherium*, *Pliolophus*, etc. of the eocene and with the tapirs of the present day. The genealogy of the Equidæ is better known and more instructive than that of any other group of mammals. Nearly twenty species of equine quadrupeds have been described from the tertiary and quaternary deposits of America, but it is supposed that no horse existed with the New World at the time of the advent of the Europeans. (See HORSE and HIPPARION.)

Equilat'eral [from the Lat *æ'quus*, "equal," and *la'tus* (gen. *lat'eris*), a "side"], having equal sides. In geometry a rectilinear figure is said to be equilateral when all its sides are equal. If, moreover, its angles are all equal, it is called *regular*. Every equilateral figure inscribed in a circle is equiangular, and therefore regular. The converse theorem, however, is only true for polygons with an odd number of sides. An equilateral hyperbola is that of which the axes are equal.

Equilib'rium [Lat. *æquilibrium*, from *æ'quus*, "equal," and *li'bra*, a "balance;" Fr. *équilibre*], the state of rest produced by two or more mutually counteracting forces; equipoise.

EQUILIBRIUM, in the fine arts, the just place or balance of a figure or other object, so that it may appear to stand firmly. Also the due equipoise of objects, lights, shadows, etc. against each other.

EQUILIBRIUM, in politics. See BALANCE OF POWER.

Equinoctial. See EQUINOX.

Equinoc'tial Points, the two opposite points of the celestial sphere in which the ecliptic and equator intersect each other, the one being the first point of Aries, and the other the first point of Libra. These points do not retain a fixed position in relation to the stars, but retrograde from E. to W. with a slow motion, requiring 25,000 years to accomplish a complete revolution. This motion is called the "precession of the equinoxes."

E'quinox [from the Lat. *æ'quus*, "equal," and *nox*, "night," *i. e.* the time when the night equals the day in length], in astronomy, the time when the sun passes through the equator in one of the equinoctial points. When the sun is in the equator the days and nights are equal all over the world, hence the derivation of the term. This happens twice every year—viz., about the 21st of March and the 22d of September; the former is called the *vernal*, and the latter the *autumnal* equinox. The equinoxes do not divide the year into portions of equal length, but the interval from the vernal to the autumnal equinox is greater than that from the autumnal to the vernal; in other words, the sun continues longer on the northern than on the southern side of the equator, because it is more distant from the earth in our summer than in winter, and its angular motion in its orbit is consequently slower between March and September than in the other part of the year. In 1800 the difference amounted to seven days sixteen hours and fifty-one minutes.

Eq'uipage [from the Fr. *équiper*, to "equip," to "fit out," to "furnish"] in ordinary language signifies the carriage, horses, and liveries which indicate the fortune or rank of a nobleman or gentleman; a carriage of state; a retinue; ornamental furniture. In marine affairs it signifies the crew of a ship, together with all a ship's furniture, masts, sails, ammunition, etc. In military language the term "camp and garrison equipage" is applied to the tents and other furniture of an army.

Equip'ment, the act of equipping or fitting for an expedition; furniture, accoutrements, or warlike apparatus. The equipment of a private soldier comprises his clothes, arms, and other necessary articles. In civil engineering the term is applied to the rolling stock of a railroad—*i. e.* the locomotives and cars.

Equipment and Recruiting, Bureau of, in the U. S. navy department, has charge of supplying cables, rigging, anchors, sails, blocks, and fuel for ships in commission. It controls the government ropewalks and other manufactories of that class of goods which it supplies. It also has control of naval enlistments of seamen, landsmen, and boys, and of the recruiting rendezvous and the receiving ships.

Equiseta'ceæ [from *Equise'tum*, one of the genera], a natural order of cryptogamous plants, growing in ditches, wet ground, and rivers in many parts of the world. They have no decided affinity with any known order, and have no medicinal qualities. They have hollow and jointed

stems. They are found fossil in coal, and were in ancient geologic periods very much larger and more numerous than at present.

Equise'tum [from *e'quus*, a "horse," and *se'ta*, a "bristle"], a genus of plants of the order Equisetaceæ, comprises numerous species called horsetail. The fructification is in the form of a cone or spike. To the base of each spore are attached four thread-like and club-shaped elastic filaments, which roll up closely around the spore when moist, and uncoil when dry. The *Equisetum hyemale* (scouring rush) is indigenous in the U. S. and also in Europe. The abundant silex in its cuticle renders it useful for polishing furniture and for scouring utensils. The U. S. have also several other species. True *Equiseta* date back to the trias, when they were numerous, and attained the height of twenty feet. In the carboniferous rocks the *Equiseta* are represented by *Calamites, Calamodendron*, etc.

Eq'uitant [from *eq'uito*, to "ride"], a botanical term signifying "riding astride," is applied to leaves which overlap each other without any involution, as those of the iris.

Equites. See Equestrian Order.

Eq'uity [Lat. *æquitas*, "equality," "justice," from *æquus*, "just," "even," "equal"]. This word is used to indicate a portion of the mass of English jurisprudence, derived from the decisions of courts and the rules of approved text-writers. It originated in the same general way as that branch of jurisprudence technically called "common law." It is, in a sense, common law itself when considered in contrast with statutes. The relation of equity to common law can be best understood by a brief historical survey. After the Norman conquest of England the king was deemed to be the fountain of justice. Ultimately, certain great courts of general jurisdiction came into active operation, known as "king's courts." These were the common pleas, the king's bench, and the exchequer. At first, their functions were quite distinct, but in course of time, by fictions of law, jurisdiction was assumed, so that in some respects it became concurrent in these tribunals. The regular mode of bringing a question before one of these courts for adjudication was by an action, in which there was a plaintiff and a defendant. A formal statement of the plaintiff's claim and of the defendant's defence was made in written allegations termed pleadings, and the question thus raised was called the issue. A judge and jury disposed of issues of fact. The action must be commenced by a so-called *writ*, purporting to emanate from the king and addressed to the sheriff, who caused the defendant to be brought before the court. There was an office in chancery, from which the writs issued. They were framed in a technical manner. The clerks would only grant a writ when they could find a precise precedent in their office. Actions were real, personal, or mixed. A real action was adapted to the recovery of land; personal actions were used to recover money; and the two were combined in a mixed action. The personal actions were framed on the theory either of contract or wrong (technically called tort). Originally, they were debt, covenant, and detinue in cases of contract; and in case of tort, trespass, trover, and replevin. The object of the action of debt was to recover a specific sum of money due to the plaintiff. The action of covenant was brought upon an instrument under seal. "Detinue" was resorted to in order to recover a specific chattel which the defendant had received as a bailee. (See Bailment.) The action of trespass was instituted for an immediate and direct injury to person or property; trover was the appropriate means to recover the value of personal property wrongfully converted by the defendant; while replevin was used to recover the property itself.

It was found at an early day that the personal actions were quite insufficient to give full relief. A statute was enacted in 13 Edw. I. (ch. 24) which led to the introduction of a new form of action, termed "trespass on the case." This was a comprehensive name for all actions for wrongs where the injury was indirect and consequential, as in the case of negligence. It also included many cases now recognized as strictly actions upon contract, and called "assumpsit." If this statute had been wisely interpreted, no court of equity would have been necessary, nor would any probably have arisen. But the judges of the so-called common-law courts adopted very strict and narrow rules of construction, and confined the remedy under the statute to the same kind of relief as had been already recognized. All the relief granted in these courts may be summed up in a single phrase: one can recover money only or specific real or personal property. As society advanced in wealth and civilization, such a system of remedial justice was lamentably imperfect. Out of its imperfection grew the jurisdiction of courts of equity. The residuum of justice not granted to the common-law courts remained in the king. It became a practice to address petitions to him in particular cases for relief which those courts could not grant. These were referred to the privy council, a powerful body of men selected by the monarch for their wealth or capacity. In process of time the disposal of these petitions devolved upon one of their number, the lord chancellor, who was a great officer, and who had usually the legal training which would fit him to dispose of the important questions submitted to him. Such matters were not presented by writ, as in the common-law courts, but by an application in the nature of a petition; and this commonly closed with the stereotyped phrase that the petitioner, having no sufficient remedy at common law, asked for relief "for the love of God and in the way of charity." At an early day the chancellor devised a writ called a writ of subpœna, whereby a party to a suit could be compelled to disclose upon his oath facts bearing upon the controversy between him and the opposite party. This is called "discovery." No such power inhered in common-law courts. In this way the court of chancery became a regular tribunal for the administration of justice. It followed precedent, and has worked out a scientific system of equity jurisprudence. It has now become so bound down by rules that new principles can only be introduced by legislation. This point is treated in a masterly manner by Mr. Maine in his work on "Ancient Law." It should be remarked that other courts besides the court of chancery acquired equity jurisdiction. Thus, the court of exchequer had until modern times equity powers. There may thus be courts of *equity* which are not strictly courts of *chancery*.

When English jurisprudence had assumed a precise and fixed character, there were thus two sets of tribunals, called respectively courts of common law and courts of equity. In some cases the jurisdiction of the two courts was concurrent; in others the equity court had exclusive authority, as in the case of trusts. The courts differed in three principal respects: two of these were in matters of procedure, while the third distinction was radical and substantial. They differed as to the mode of proof and of trial, and in respect to the nature of the relief granted. The first two distinctions have been largely modified in this country in a considerable number of the States. In these law and equity are administered by a single court and under the same system of pleading, so that there is no distinction between an action at law and a suit in equity. Even in these States the difference in relief still continues. When the action is for the recovery of money only, or of specific real or personal property, a writ issues to the sheriff to carry the judgment into effect. In other (or equity) actions, as when a defendant is required to execute or cancel a written instrument, or to refrain from doing an act, the order of the court is directed to him; and if he wilfully disobeys it, he may be punished for contempt of court. This consolidation of law and equity was first attempted in a "code of procedure" adopted in New York in 1848. This has been substantially enacted in a number of other States, and has had much effect upon legal opinion in England. Courts of equity have adopted certain maxims which have had a large influence on the development of the system. They are such as these: (1) Equity follows the law; (2) He who comes into equity must come with clean hands; (3) He who asks equity must do equity; (4) Where the equities are equal, the legal title must prevail; (5) Equality is equity; (6) Equity regards that as done which ought to be done.

A brief exposition of a few of these maxims will show the principles which guide the action of the court. The maxim that "He who comes into equity must come with clean hands," does not refer to general moral delinquency. It only applies to the subject before the court. It then assumes a comprehensive meaning. Under it the court would not protect the copyright of an immoral book, or a trademark which was so used as to deceive the public. The maxim that "He who asks equity must do equity," means that the court will only grant relief to a plaintiff upon the condition that he will render justice to the defendant. For example, a borrower could not succeed in setting aside an instrument on the ground of usury, except upon the condition of paying to the creditor the debt and lawful interest. The maxim that "Where the equities are equal, the legal title must prevail," means that the court will not, on the application of a plaintiff, deprive a defendant, being a purchaser for a valuable consideration, of a title recognized in a court of common law, unless he has acted in bad faith or with notice of the existing rights of the plaintiff. An illustration will show its application. If A has taken an informal mortgage upon land, and accordingly one not valid in law, and yet a good claim in equity, and B, without notice of A's rights, has taken, for a valuable consideration, a subsequent regular or formal mortgage or conveyance, B will have superior legal rights, which will be recognized in a court of equity. If B had acted with notice of the informal mortgage, A's equity would have been superior. The rule that "Equality is equity" is applied

to persons who ought to bear a common burden equally, as in case of the duty of co-sureties to contribute equally to pay the debt for which they are bound, or in cases of general average in the law of shipping. It is the principle which underlies the distribution of assets among creditors in cases of bankruptcy, or in the administration of the estates of intestates. The rule that "Equity regards that as done which ought to be done," is one of great importance. It leads to a doctrine peculiar to this court, known as "equitable conversion." This phrase means that the owner of property, by the mere expression of his will according to legal rules, can change its legal character, and thus give to money the qualities of land, or to land those of money. Thus, if a testator orders his land to be sold and converted into money, the land from the moment of his death is deemed to be personal property. The same result would follow if he had directed money to be laid out in land. So, if an owner of land contracts to sell it, his interest before any conveyance is made is deemed to be money, while that of the purchaser is regarded as land. This doctrine is attended with important practical consequences, to which the limits of this article do not permit a reference.

It is an important rule that the jurisdiction of this court attaches to the person of a litigant, without reference to the situation of the property in controversy. Thus, the court of chancery in England might order a defendant within its jurisdiction to execute a conveyance of land situated in this country. It would proceed upon the theory that he was under a legal duty or obligation to do the act which as a matter of conscience he was bound to perform. The court was at one time termed a "court of conscience," and in the older law digests or abridgments, the equity law is placed under that head. It should be added that mere gratuitous executory promises are not enforceable in this court. Attention is only paid to the claims of purchasers for a valuable consideration.

The topics of equity jurisprudence are usually considered by text-writers in their relations to the jurisdiction of the courts of common law. In this aspect equity jurisdiction may be regarded either as auxiliary to the jurisdiction of those courts, or as concurrent or exclusive. This method is necessarily discarded in those States where law and equity are administered under a uniform system of pleading and practice, as in New York. The principal subjects may be enumerated under the following heads: Cases of accident or mistake (as where a clause is omitted from an instrument by accident); cases of fraud, either actual or constructive; specific performance of contracts (*e. g.* requiring a party who has promised to execute a conveyance to fulfil his contract); cases of interpleader, whereby a mere stakeholder can be relieved from the results of a litigation; cases of accounts, including a variety of instances; cases of trusts, whether created by express words or arising from implication of law. The court also protects all persons under actual or legal disability, such as infants, married women, and persons of unsound mind. Under these and other heads the court may cancel, modify, or reinstate instruments, and in general adjust the rights of the respective parties to the controversy. In some of these cases actions may be brought in a court of law. Thus, in case of fraud, if the injured party desired pecuniary damages, he would bring his action at law; if he desired to set an instrument aside, he would proceed in equity. A person who would have a good defence on the ground of fraud to an action at law, may in some instances become plaintiff in equity, and have the instrument cancelled, as in the case of a negotiable promissory note. The most extensive of all of these topics is the subject of trusts. Strict trusts are solely cognizable in this court.

The remedies in this court are flexible and readily adapted to the exigencies of the case. The most liberal rules prevail as to parties. Every person can be made a party whose presence is necessary to a complete determination of the matter in controversy. The court has power to prevent apprehended injuries to property by means of an injunction, or to place the property itself in the possession of one of its own officers, termed a receiver, until the rights of the parties are finally established.

The tendency of modern times would seem to be to blend the two systems of common law and equity jurisprudence into one, when the common law will prevail as *modified* by the rules of equity. T. W. Dwight.

Eq'uity of Redemp'tion, the right which the owner of mortgaged property has to redeem it after the condition of the mortgage has been broken. A mortgage is in form a conveyance of property, with a provision that it shall be void on the performance by the maker, within a given time, of a certain condition, usually the payment of a sum of money; and by the common law, if the condition is not performed the conveyance becomes absolute, and the maker of the mortgage, called the mortgagor, loses all right to the property. But the English court of chancery, an equity tribunal, as early as the reign of Charles I. asserted its power to remedy this hardship by compelling the mortgagee to give up the land on payment of the debt with interest. This right in equity to redeem the property after the conveyance has become absolute at law has in modern times come to be regarded as an estate in the land, and can be conveyed or mortgaged or devised by its owner. It passes by descent to his heirs; it is liable for the debts of his creditors, and can be sold on execution against him, and is subject to dower and curtesy. This right to redeem lasts till cut off by foreclosure of the mortgage, which is usually effected by an action in a court of equity. The foreclosure may result in giving a complete title to the mortgagee (called a *strict* foreclosure), or it may result in a sale of the premises and the payment of the debt out of the proceeds, the surplus being returned to the mortgagor or to those who claim under him. The right to redeem from the mortgage extends to all who acquire an interest in the land under the mortgagor after the making of the mortgage; and all such persons must be made parties to a proceeding to foreclose the mortgage, otherwise their right to redeem will not be affected. Formerly, unless restrained by some clause in the mortgage, the mortgagee could at once take possession of the premises, although equity compelled him to account for the rents and profits upon redemption. Now, however, the mortgagor has in general the right of possession till the condition is broken, and in some States till foreclosure, except when after default, where the security is inadequate, a receiver is appointed to take charge of the property under the direction of the court. T. W. Dwight.

Equivalents, Chemical. See Chemistry.

Equiv'ocal Term, in logic, a term which has several significations applying respectively and equally to several objects. A word is generally said to be employed equivocally where the middle term is used in different senses in the two premisses, or where a proposition is liable to be understood in various senses.

Equus, the name of the genus which includes the horse, ass, zebra, etc., and type of the family Equidæ (which see).

E'ra [Lat. *æ'ra;* Fr. *ére,* probably from a root akin to the Basque *era,* "time"], a period of time; an account of time reckoned from some particular date or epoch; a succession of years computed from some fixed point of time.

Era, Christian. See Christian Era.

Érard (Sébastien), an inventor and maker of musical instruments, born in Strasbourg April 5, 1752. He was the son of a poor cabinet-maker. His first pianoforte, constructed in 1780, may be said to have introduced that instrument into France. He soon became the best pianoforte manufacturer in Europe. He, in connection with his brother, established a manufactory in London. To Érard the piano owes some of its noblest qualities as a musical instrument. The grand piano, with single and double action, was his invention. He built the great organ for the royal chapel of the Tuileries. The pianos of Érard still preserve their reputation, though great improvements have been made in the instrument since his day, in a very large degree by American manufacturers. Sébastien Érard was inventor of a double-action harp which had immense popularity in London, and took out patents for many other improvements, all of which were of value. Died near Paris in 1831. A nephew, who succeeded him in the business, wrote an account of his uncle's work.

Erased [from the Lat. *e,* "out" or "off," and *ra'do, ra'sum,* to "scratch," to "scrape"], in heraldry, signifies that an object is forcibly torn off, so that the edges are ragged or jagged.

Erasis'tratus [Gr. Ἐρασίστρατος], an eminent Greek physician and anatomist, is supposed to have been born in the island of Ceos. He flourished about 300–260 B. C., and practised for many years at Alexandria, where he taught anatomy and founded a school. He attended Antiochus, the son of Seleucus Nicator, at the court of the latter, and discovered that his malady was caused by a secret amorous passion for Stratonice, his stepmother. His principal discoveries were those of the *vix lactex* and the functions of the brain and nerves. He wrote several works, which are not extant.

Eras'mus (Desiderius), [Fr. *Didier* or *Désiré Érasme*], a celebrated Dutch scholar and philosopher, born at Rotterdam on the 28th of October, 1465. He was a natural son of Gerard Praet, and was called in his childhood Gerhardus Gerhardi, which he exchanged for the Latin and Greek equivalents, each signifying "the well-beloved." He attended for about six years the school of the Brethren of the Common Life at Deventer, where he was a pupil of Alex-

ander Hegius. Having become an orphan about 1478, he was urged by his guardians to enter a monastery, in order that they might defraud him of his patrimony. Although he regarded a monastic life with aversion, he was at length induced in 1482 or 1483 to enter the Augustinian convent of Stein by the hope that he might there have opportunity for study. He pursued the study of the classics and distinguished himself as a Latin scholar. He became in 1492 a priest and secretary to the bishop of Cambray, with whom he remained nearly five years, and in 1496 went to Paris, probably for the purpose of completing his education. He was then nearly destitute of pecuniary resources, and gained a subsistence in Paris by teaching school. Between 1498 and 1500 he passed about two years in England, where he formed friendships with Sir Thomas More and John Colet. He resided at both the universities, and during his third and longest visit (1511–14) was professor of Greek at Cambridge. Impelled by a strong passion for travel, he visited various countries of Europe, and never remained long in one place. In 1508 he commenced a tour in Italy, where he passed several years, perfected his knowledge of the Greek language, and associated with the most eminent scholars. He obtained from the pope a dispensation from his monastic vows, and received the degree of D. D. at Turin. He revisited England in 1511, and was appointed professor of Greek at Cambridge. In 1511 he published "The Praise of Folly ("Encomium Moriæ"), a witty satire, in which he exposed the follies and foibles of monks, priests, and men of various other professions. It was generally admired, and obtained a large circulation.

Having established his reputation as the most eminent scholar and the most witty writer of his time, he received invitations from several monarchs, and in 1514 or 1515 visited the court of the archduke Charles (afterwards Charles V.), who gave him the title of royal councillor, with a pension of 400 florins, and liberty to travel or reside wherever he might prefer. He produced in 1516 a good edition of the Greek New Testament—the first edition ever printed—with a corrected Latin version and notes. He was on friendly terms with Luther in the first stage of the Reformation, which he efficiently promoted by his witty satires against the monks and priests, and by his censure of the corruptions of the Church of Rome. But he disliked dogmatism, was too liberal and moderate to please the zealous supporters of either side in a religious controversy, and he dissented from some of the doctrines of Luther, who denounced him in severe terms as a coward and time-server.

Erasmus became a resident of Bâle about the year 1515, and published there in 1527 his celebrated "Colloquies" ("Colloquia"), which some consider his capital work. It is ostensibly intended for the instruction of youth in Latin and morals, but abounds in satire and invective directed against the monks and the abuses of the Roman Church. It is stated that 24,000 copies of it were sold in one year. He was involved in a dispute with Luther on the doctrine of free will in 1524, and wrote on that subject "De Libero Arbitrio." He was condemned as a heretic by the Sorbonne of Paris, but he persisted in maintaining the attitude of a neutral or mediator, and never formally revolted against the pope. In 1529 he removed to Freyburg, where he passed several years. He died at Bâle on the 12th of July, 1536. Among his works is "Adagia," a collection of proverbs, which displays immense learning. He greatly excelled as an editor of the Greek and Latin classics, for which he was qualified by superior critical sagacity as well as accurate scholarship. He was pre-eminent as a restorer of classical learning and sound philosophy. His voluminous "Epistles" contain valuable materials for literary history. His complete works were published by Beatus Rhenanus (9 vols., 1541), and by Leclerc (10 vols., Leyden, 1603–06). (See Burigny, "Vie d'Erasme," 1757; Knight, "Life of Erasmus," 1726; Jortin, "Life of Erasmus," 1758; Adolph Müller, "Life of Erasmus" (in German), 1828; Charles Butler, "Life of Erasmus," 1825; Glasius, "Erasmus alt Kirchenreformator," 1850.)

Eras'tians, a name given to the adherents of the Swiss physician Erastus on church discipline. Erastus earnestly opposed the use by Protestant churches of ecclesiastical censures and punishments, and held that the Church ought merely to decide who by soundness of faith were to be regarded as members, but should not take upon herself to punish moral offences by withholding her privileges. This view is particularly developed in his posthumous work, "Explicatio gravissimæ quæstionis utrum excommunicatio mandato nitatur divino an," etc. (1589). The common belief that Erastus intended to subject all ecclesiastical bodies to the control of the state authorities is at least an exaggeration. During the great conflict in the Church of Scotland which led to the establishment of the Free Church, those who maintained that the Church had no power to nullify by law the operation of lay patronage were called by their opponents Erastians, but they protested against this use of the word.

Eras'tus (Thomas), M. D., a Swiss physician and theologian, whose proper name was Liebler or Lieber, was born at Baden in Switzerland (according to others, at Angen, near Badenweiler), Sept. 7, 1524. He took the degree of M. D. at Bologna, wrote several medical treatises, and became a skilful practitioner. He was appointed physician to Frederick, the elector palatine, and was for many years professor of medicine at Heidelberg, which was the capital of that prince. As member of the church council he advocated the Zwinglian views of the Lord's Supper and of church discipline. He was charged with Socinianism, but without just ground. In 1580 he obtained a chair of moral philosophy at Bâle, where he died Dec. 31, 1583. His views on church discipline excited much controversy. (See Erastians.)

E'rath, a county in N. Central Texas. Area, 1000 square miles. It is drained by Bosque River, which rises in it, and by Paloxy Creek. The surface is broken and hilly, but is partly prairie. The soil is good. Stock-raising is the chief industry. Grain and wool are raised. Timber abounds, as well as building-stone. Capital, Stephensville. Pop. 1801.

Er'ato [Gr. Ἐρατώ], the sixth in order of the Nine Muses. She was the muse of the poetry of love, that being the significance of her name.

Eratos'thenes [Gr. Ἐρατοσθένης], a celebrated Greek astronomer and geometer, born at Cyrene in 276 B. C., was a pupil of Callimachus the poet. He became superintendent of the great library of Alexandria in the reign of Ptolemy Euergetes, and rendered important services to the sciences of astronomy and geography. He displayed great versatility of genius, and wrote numerous works on philosophy, history, grammar, etc. Among his memorable performances was the measurement of the obliquity of the ecliptic, which he computed to be 23° 51′ 20″. In an attempt to ascertain the dimensions of the earth he invented a method which has been employed with success in modern times. His writings are not extant, but fragments of his work on chronology have been preserved by Syncellus. His computation of Egyptian chronology has been adopted by Bunsen. "Eratosthenes was," says Bunsen, "next to Aristotle, the most illustrious of Greek men of learning, and as far superior to him in the extent of his knowledge as inferior in grasp of intellect." Died about 196 B. C. The fragments of his works were published by Bernhardy (1822).

Er'ben (Henry), U. S. N., born Sept. 6, 1832, in the city of New York, entered the navy as a midshipman June 17, 1848, became a passed midshipman in 1855, a lieutenant in 1856, a lieutenant-commander in 1862, a commander in 1868, took part in the engagements at Fort Pillow, Memphis, Vicksburg, and Baton Rouge during the year 1862, and in 1863 in the operations against Fort McAllister, Ga., and Forts Sumter and Moultrie, S. C.

Foxhall A. Parker, U. S. N.

Er'bium [named from the last two syllables of *Ytterby*, a town of Sweden, whence gadolinite is procured], a rare dyad earth-metal, chiefly procured, as an oxide called *erbia*, from gadolinite, along with yttria, both earths existing naturally as silicates. Metallic erbium (symbol E; atomic weight, 112.6) has not been separated. Its salts have mostly a rose-color.

Erci'lla y Zuñi'ga (Alonso), a Spanish epic poet, born Aug. 7, 1533, was a son of Fortunio Garcia, lord of Ercilla. He was in his youth a page of Philip II., whom he accompanied in a voyage to England in 1554. Having enlisted in the army, he went to South America in that year to fight against the Araucanians, a warlike tribe whom the Spaniards were never able to subjugate. He served with distinction in this war, returned to Spain in 1562, and published his "Araucana" (first part, 1569), which is considered the best heroic poem in the Spanish language, and is said to be a faithful narrative of the events which he had witnessed. He was afterwards a gentleman of the bedchamber to the emperor Rudolph II., but appears to have passed his latter years in poverty and obscurity. Died after 1590. (See Ticknor, "History of Spanish Literature.")

Erckmann-Chatrian, the name of two French novelists whose works are jointly produced, and whose names, like those of Beaumont and Fletcher, are inseparably united. Émile Erckmann, born at Pfalzburg May 20, 1822, was the son of a bookseller, and after studying at the college of Pfalzburg applied himself to reading law in Paris. Alexandre Chatrian was born at Soldatenthal, near Pfalzburg, Dec. 18, 1826, and was an usher in the Pfalzburg college when he made the acquaintance of Erckmann in 1847. The two became fast friends, and composed numerous stories, feuilletons, and dramatic pieces without much

success. Unable to live in this way, Erckmann applied himself to the law, while Chatrian found employment in a railway-office. "L'Illustre Docteur Mathéus" (1859) was the first of their writings which attained any popularity. Their novels upon the events of the Revolution and the First Empire were much read, and after the German annexation of Alsace they produced a novel under the title of "The Story of the Plébiscite, related by one of the 7,500,000 who voted Yes," which made quite a sensation. Also, their drama "Le Juif Polonais" was very successful.

Ercsi, an Hungarian town, in the county of Stuhlweissenburg, on the Danube, 18 miles S. S. W. from Pesth. Its industries are weaving, brewing, and tilemaking. Pop. 5540.

Erd'mann (JOHANN EDUARD), born June 13, 1805, in Livonia, became professor of philosophy at Halle in 1836. He wrote, among other works, "Versuch einer wissenschaftlichen Darstellung der Geschichte der neueren Philosophie" (3 vols., 1834–53), "Grundriss der Logik und Metaphysik" (4th ed. 1864), and "Grundriss der Geschichte de Philosophie" (2 vols., 1866).

Erdmann (OTTO LINNÉ), a German chemist, born at Dresden April 11, 1804. He became in 1830 professor of chemistry at Leipsic. Died Oct. 9, 1869. Among his works is a valuable "Manual of Chemistry" (1828). He published after 1834 the "Journal für praktische Chemie."

Er'ebus [Gr. Ἔρεβος, probably from ἐρέφω, to "cover"], in classic mythology, the son of Chaos; also the name of a dark and gloomy region or subterranean cavern through which souls were supposed to pass after death.

Erebus, Mount, and **Mount Terror,** are two volcanoes in South Victoria Land, in lat. 77½° S., discovered by J. C. Ross Jan. 27, 1841. Mount Erebus, 12,400 feet high, is, as far as is known, the nearest volcano to the south pole, and when discovered was emitting flame and smoke in great profusion. Mount Terror, 10,900 feet high, is believed to be an extinct volcano. These two mountains were named from the British ships in which Ross's expedition sailed.

Erechthe'um [Gr. Ἐρέχθειον], in ancient Athens a sacred edifice on the Acropolis, consisting of the two temples of Athena Polias and Pandrosus. Its name was derived from Erechtheus (see below). It was burned by the Persians, rebuilt about 393 B. C., and became the most sacred of all the Athenian sanctuaries. The renewed Erechtheum was a most beautiful structure of the Ionic order. Unlike all other Grecian temples, it had three porticoes. It anciently contained a salt-well made by Poseidon's trident (not flowing in modern times), also the sacred olive tree of Athena, and the olive-wood image of that goddess, which is fabled to have fallen from the sky. The ruins of the Erechtheum stand north of the Parthenon, and are among the most interesting relics of antiquity. The six caryatides (gigantic female figures gracefully draped) which supported the roof of the southern portico are particularly fine. One of these is now in the British Museum.

Erech'theus [Gr. Ἐρεχθεύς; Fr. *Érecthée*], a hero of ancient Greek legends, was said to be a son of Vulcan or of Pandion, and the father of Cecrops. Homer represents him as a king of Athens. According to tradition, he was the founder of the Erectheum, a temple of Minerva on the Acropolis of Athens. He was sometimes called *Erichthonius*.

Er'eglee', or **Erekli** (anc. *Heraclea*), a seaport of Asia Minor on the Black Sea, 122 miles E. by N. of Constantinople. It has a good harbor, from which timber, silk, and wax are exported. The ancient *Heraclea* was an important town. Lat. 41° 17′ N., lon. 31° 25′ E.

Ere'tria [Gr. Ἐρέτρια; Fr. *Érétrie*], an ancient city on the island of Eubœa, is mentioned by Homer ("Iliad," book ii.). At an early period it was a prosperous and independent state, and one of the chief maritime cities of Greece. It was captured and ruined by the Persians in 490 B. C., but was soon rebuilt. Eretria was the seat of a celebrated school of philosophy, founded by Menedemus about 330 B. C.

Er'furt, or **Erfurth** [Lat. *Erphordia* and *Erfurtum*], a fortified town of Prussian Saxony, on the river Gera and the Thuringian Railway, 15 miles W. of Weimar and 14 miles E. of Gotha. It is defended by two citadels, and is important as a military position. It has an old Gothic cathedral with a bell which weighs 275 hundredweight, fourteen Protestant churches, a royal academy, a public library of about 50,000 volumes, a normal school, and an edifice formerly occupied by the University of Erfurt, which was founded in 1392 and closed in 1816. Here was the Augustine convent of which Luther was an inmate for several years; it is now used as an orphan asylum. Erfurt has manufactures of cotton and woollen fabrics, hosiery, shoes, leather, etc. It was more populous in the Middle Ages than it is now. The Congress of Erfurt, held here in Sept.–Oct., 1808, was attended by Napoleon and Alexander I. of Russia. In March and April, 1850, the so-called "Union Parliament" held its sessions here. (See GERMANY.) Pop. in 1871, 43,616.

Er'got [from the Fr. *ergot*, a "cock's spur;" Late Lat. *ergota;* Ger. *Mutterkorn*], or **Spurred Rye,** a curious fungus, the compact mycelium of the *Claviceps purpurea* of Tulasne, growing frequently in the heads of rye, though found on all grasses and some Cyperaceæ. It was long believed to consist of diseased kernels of rye, but microscopical examination shows that it has nothing at all in common with the rye, but growing originally from the ovary, it naturally assumes something of the shape of the mould in which it grows. It is believed that spores of this plant are taken up by the roots of the rye, and that they germinate in the ovary, where they are deposited from the sap.

Ergot is generally procured from rye after threshing. It is usually shaped somewhat like a cock's spur, and is from half an inch to one inch and a half long. It contains a volatile alkaloid secalia, identical or perhaps only isomeric with propylamia; also ergotic acid, and several other compounds which are little understood, including an oil which appears to be inert, and mycose, a peculiar sugar.

Ergot is much used in medicine, especially for the purpose of exciting uterine contractions in child-bearing. As a rule, it should never be administered except by persons skilled in its use. The contractions induced by ergot differ from the natural uterine effort, which is intermittent, with intervals of more or less perfect rest, while ergot causes a uniform and constant expulsive effort. In skilled hands it is a remedy of great value. Administered late in labor, it often prevents dangerous loss of blood, and it is further useful in some cases of menorrhagia and other hæmorrhages. It is also useful in puerile paralysis, and probably in other diseases requiring treatment which produces contraction of the muscular coat of the blood-vessels.

Er'gotism, or **Rapha'nia,** a disease or train of symptoms produced by the long-continued use of grain in which ergot is mixed. It is characterized by stupor, convulsions, diarrhœa, and vomiting, often accompanied by morbid increase of appetite, by purpura, and at last by a dry, chronic gangrene of the extremities. Rye and wheat are especially apt to be infested with ergot when sown late in the season; and in some years the ergot has been observed in parts of Europe to exceed one-fourth of the whole amount of the winnowed grain; and several severe epidemics of this fatal disease have been observed in Europe. It is rare in the U. S., but in 1819 the cattle throughout a part of the State of New York suffered extensively from an epizootic of this nature, caused by ergot in the blue-grass crop (*Poa pratensis*). The poisonous qualities of the darnel grass (*Lolium temulentum*), so well known even in Virgil's time, are now ascribed to the presence of ergot, which is well known to infest many of the grasses. The treatment to be pursued is a supporting one—the use of concentrated food, stimulants, pure air, bathing, friction of the skin, with gentle purgation. No antidote to the severer effects of ergot is known.

The medicinal use of ergot is very seldom followed by any of the above-mentioned symptoms, but a few well-established cases are on record, showing the danger of excessive and long-continued use of the drug.

Er'ic XIV., king of Sweden, born Dec. 13, 1533, was a son of Gustavus Vasa, whom he succeeded in 1560. He made an overture of marriage to Queen Elizabeth of England, but he married a Swedish peasant named Catharine Monsdoter. He was capricious, imprudent, momentarily insane, and always addicted to violent paroxysms of anger and cruelty. In his reign Sweden was involved in a war against Denmark. Several noblemen were unjustly put to death by his order. A conspiracy was formed against him by his own brothers and other nobles, who deposed him in 1568, and confined him in prison, where he died Feb. 16, 1577.

Erica'ceæ, or **Heathworts** [from *Erica*, one of the genera], a large natural order of beautiful exogenous plants, mostly shrubs, natives of Europe, Asia, South Africa, and North America. The leaves are entire, generally evergreen, and rigid or coriaceous. The anther is 2-celled. This order comprises about 900 known species, many of which have beautiful flowers. Among those which are natives of the U. S. are the KALMIA, VACCINIUM, AZALEA, RHODODENDRON, PYROLA, GAULTHERIA, CLETHRA, and EPIGÆA, which will be noticed under their respective heads. The genus *Erica* (heath) abounds in South Africa. (See HEATH.) Many of the Ericaceæ are social plants, and a single species in some cases covers a tract of ground, of which it forms the almost exclusive vegetation. Several species bear edible berries, as *Vaccinium* and *Gaultheria* (wintergreen).

Er'icsson (JOHN), LL.D., an eminent mechanician, was born in Vermeland, a province of Sweden, July 31, 1803.

Showing decided mechanical ingenuity in childhood, he was appointed at the age of eleven to a cadetship in the engineer corps, in which he rose to a lieutenancy. In 1826 he visited England to introduce a "flame engine" of his own invention, but it was discovered that though it worked with a wood-fire, it failed when coal was used. He made improvements in steam boilers, and in 1829 produced a locomotive, the "Novelty," which ran fifty miles an hour, a great advance in speed over anything then attained, winning a prize of £500. He soon after made a steam fire-engine (1832) and a hot-air engine (1833). He also first successfully applied the screw to the propulsion of steam-vessels; but the invention not being at first well received in England, he came in 1839 to New York, and the U. S. screw-steamer Princeton was built under his direction. Since then, this invention, with many modifications, has come into very extensive use. In 1852 the ship Ericsson, propelled by hot air, was launched. He has also invented a "solar engine," a pyrometer, an alarm barometer, a sea-lead, a hydrostatic gauge, and numerous other ingenious instruments. Mar. 9, 1862, his iron-clad vessel, the Monitor, just built, attacked and repulsed the Confederate iron-clad ram Virginia, formerly the U. S. steamer Merrimack. Thus Ericsson has the honor of first successfully employing the armed turret in naval shipbuilding.

Eric the Red, a reputed discoverer of America, was a Norwegian who emigrated to Iceland about 982 A. D. He made a voyage to Greenland, and there founded a colony. In 1000 A. D. his son Liefr sailed southward, visiting a country called by him Markland (perhaps Nova Scotia), and another called Vinland, which appears to have been South-eastern New England. With far less probability it is said that Eric planted a colony in Vinland.

E'rie, a county in the W. of New York. Area, 1071 square miles. It is bounded on the N. by Tonawanda Creek and on the W. by Lake Erie and Niagara River. It is drained by Buffalo Creek and other streams. The surface is undulating; the soil fertile. Dairy products, grain, wool, hay, fruit, and cattle are the staples. The manufactures and commerce are treated of in the article on BUFFALO (which see). Iron ore and limestone are found here. It is intersected by the Erie Canal, the Buffalo New York and Philadelphia, and the Lake Shore and Michigan Southern R. Rs., and by several branches of the Central and Erie R. Rs., converging to Buffalo, which is the capital of the county. Pop. 178,699.

Erie, a county in the N. of Ohio. Area, 250 square miles. It is bounded on the N. by Lake Erie, and intersected by Huron and Vermilion rivers. The surface is nearly level; the soil is alluvial and very fertile. Cattle, grain, wool, hay, fruit, and dairy produce are raised. The fisheries are important. The manufactures include flour, clothing, wine, brick, cooperage, shipping, carriages, etc. Fine limestone valuable for building abounds here. This county is traversed by the Lake Shore and Michigan Southern R. R., the Sandusky Mansfield and Newark R. R., and the Cincinnati Sandusky and Cleveland R. R. Capital, Sandusky. Pop. 28,188.

Erie, a county constituting the N. W. extremity of Pennsylvania. Area, 740 square miles. It is bounded on the N. W. by Lake Erie, and partly drained by Conneaut and French creeks. The surface is mostly undulating; the soil is clayey and productive. Cattle, grain, wool, potatoes, hay, dairy products, and fruit are the staples. Flour, leather, lumber, machinery, iron, saddlery, carriages, furniture, and metallic wares are manufactured. Sandstone and slate occur here as surface-rocks. It is intersected by the Philadelphia and Erie, the Erie and Pittsburg, the Atlantic and Great Western, the Buffalo Corry and Pittsburg, and the Lake Shore and Michigan Southern R. Rs. Capital, Erie. Pop. 65,973.

Erie, a post-village of Boulder co., Col., on the Boulder Valley R. R., 34 miles N. E. of Denver. It is an important coal-mining centre.

Erie, a post-township of Whitesides co., Ill. Pop. 695.

Erie, a township of Miami co., Ind. Pop. 599.

Erie, a township, post-village, and capital of Neosho co., Kan. Pop. 1350; of village, 418.

Erie, a post-township of Monroe co., Mich. Pop. 1527.

Erie, a post-township of McDonald co., Mo. Pop. 615.

Erie, a township of Ottawa co., O. Pop. 455.

Erie, a city and the county-town of Erie co., Pa., is the only lake-port of the State. It has the largest land-locked harbor on Lake Erie, being 5 miles in length by 1 in width. The Pennsylvania R. R. Company runs a line of first-class propellers between this port and the upper lakes, and over fifty sailing-vessels are owned here. The imports are principally grain, lumber, and iron ore, and the exports bituminous and anthracite coal and the merchant and pig iron, engines, and other manufactured products of the port. It is very nearly equidistant from Cleveland and Buffalo on the Lake Shore R. R., which gives communication E. and W., and is the northern terminus of the Philadelphia and Erie R. R., which penetrates the lumber-region of the State, and also gives connection with Harrisburg and Philadelphia and the anthracite coal-fields. Erie is also the northern terminus of the Erie and Pittsburg R. R., which passes through the bituminous coal-regions. The Pennsylvania Petroleum R. R., now building, will give direct communication with the oil-producing section, and furnish a competing route to the bituminous coal-mines. The facilities for the receipt of raw material and cheap fuel, and the shipment of products by rail and water, have given Erie manufacturing interests a great impetus since about 1866. A brief summary shows 24 iron-works, including a car manufactory producing 15 complete cars and 300 wheels per day; a blast-furnace, a rolling-mill, 2 very large stove-foundries, 4 tanneries, 2 boot-and-shoe factories, 6 oil-refineries, 1 church-organ and 2 parlor-organ factories, 1 piano-factory, 1 paper-mill, 13 planing-mills, 4 pump-factories, 2 spice-mills, 7 breweries, 3 malt-houses, 5 brick-yards, 1 stoneware-factory, 2 lime companies, 4 steam flouring-mills, 2 grain-elevators, 10 chair, carriage, and other woodworking factories, 1 daily and 6 weekly newspapers, etc. Erie is the market for a rich farming country. It has a custom-house, 4 national banks, 26 churches, 1 academy, a very complete free-school system, and water-works which cost $750,000. It is already the largest and most central point in a section covering the ten north-western counties of Pennsylvania, and its growth henceforth promises to be marvellous. Pop. 19,646.

F. A. CRANDALL, ED. "GAZETTE."

E'rie Canal', the most important, as well as the largest, canal in the U. S., extends from Buffalo to Albany, N. Y., and is 363 miles long. De Witt Clinton, whose name is identified with the construction of this great public work, was in 1809 appointed a member of a commission to explore and survey a route for the proposed canal from the lakes to the Hudson; and his memorial to the State legislature in 1815 ensured the success of the undertaking. The bill for its construction was passed in 1817, but the "canal policy" was for years strenuously opposed. In 1825 the canal was completed at a cost of $7,602,000, and navigation was opened in October with great rejoicings. Its original width was forty feet at the surface, with a depth of four feet; but the canal has been subsequently so enlarged that the surface-width is seventy feet, the bottom-width forty-two feet, and the depth seven feet. The commercial importance of this canal is very great. It is chiefly employed for transporting grain and such other bulky articles as do not require quick transit. (See INLAND NAVIGATION.)

Erie, Lake, one of the chain of great lakes drained by the St. Lawrence, is bounded on the N. by Ontario, a province of the Dominion of Canada, and on the S. by Ohio, Pennsylvania, and New York. It is the lowest of that chain of lakes, except Lake Ontario, into which its water is discharged through the Niagara River. It is 290 miles long, is 57 miles wide at the broadest part, and has an area of about 10,000 square miles. The surface is 334 feet higher than Lake Ontario. It is shallow compared with the other lakes of this series, the greatest depth yet obtained being 312 feet. The mean depth is about 120 feet. The principal supply of water comes through Detroit River, which enters the W. end of the lake. The chief cities on its shores are Buffalo, Cleveland, Toledo, Erie, and Sandusky, which have good harbors. This lake is very important as a channel of trade and steam navigation. It is liable to violent storms, which sometimes cause disastrous shipwrecks. Large vessels can pass from Lake Erie into Lake Ontario through the Welland Canal. The navigation of the former is suspended for three or four months in winter, in consequence of the shallow parts being frozen. The fisheries are important.

Com. Perry of the U. S. navy gained an important victory over the British commander Barclay in the western part of this lake, Sept. 10, 1813. This was called the battle of Lake Erie, and was fought near the Bass Islands, about 36 miles E. of Toledo.

Erie Shale, the name given by the Ohio geologists to the westward extension of the Chemung and Upper Portage rocks of New York. The oil-wells of Western Pennsylvania are bored on this foundation, though the petroleum which is found in it emanates from the Huron shale below.

E'rieville, a post-village of Nelson township, Madison co., N. Y., has 3 churches and an important canal reservoir.

Erig'ena (*i. e.* the "Irishman"), (JOHANNES SCOTUS), the boldest and most brilliant thinker of his century. The events of his life are involved in some obscurity. He was

probably born in Ireland between 800–815 A. D., and educated in the Irish monasteries. Between 840–845 he appears to have gone to France, where he was patronized by Charles the Bald. He is credited with one of the best repartees on record. At table one day the king asked him, "Quid distat inter Sotum et Scotum?" Erigena instantly replied, "Mensa tantum." What happened to him after the death of Charles the Bald, in 877, is not so clear. According to one account, he went to England about 883, on the invitation of Alfred the Great, and was murdered by his pupils at Malmesbury in 891. Some who deny the Malmesbury story, say that Scotus Erigena has been confounded with an Anglo-Saxon monk whom Alfred invited over from France to teach at Oxford. Erigena has been called "the morning star of scholasticism." He rebelled against Augustinianism, asserted the supremacy of reason, and wrought out a vague pantheism. He also translated into Latin the works (spurious) of Dionysius the Areopagite (of the fourth or fifth century), and thus planted the seeds of the mediæval mysticism. He wrote against Gottschalk (851 A. D.) on predestination, and against Paschasius Radbert on transubstantiation, and was condemned as a heretic at Paris in 1209. Of his other works, the most important is a treatise in five books, "De Divisione Naturæ." It was printed at Oxford in 1681. (See THEODOR CHRISTLIEB'S "Leben und Lehre des Johannes Scotus Erigena," 1860; and JOHANNES HUBER'S "Johannes Scotus Erigena," 1861.)

Erig'eron [Gr. ἠριγέρων, "early old," from ἦρ, "spring," and γέρων, an "old man," because the plants have a hoary appearance], a genus of herbs of the order Compositæ, including the fleabanes (which are weeds of several species, very common in Europe and North America) and other plants, such as poor robin's plantain (*Erigeron bellidifolium*), etc. The *Erigeron Philadelphicum, Erigeron Canadense,* and others are used as diuretics, and contain a volatile oil which varies somewhat in different species. The oil has a pungent, disagreeable odor, and sometimes takes on a tarry or oleo-resinous character. It is used in medicine.

Erin. See IRELAND.

Er'in, a post-village and township of Wellington co., Ontario, Canada, has quarries of building-stone and manufactures of various kinds. Pop. of village, about 600.

Erin, a township of Stephenson co., Ill. Pop. 877.

Erin, a township of Macomb co., Mich. Pop. 2466.

Erin, a township of Rice co., Minn. Pop. 526.

Erin, a post-township of Chemung co., N. Y., has a valuable mineral spring and manufactures of lumber. Pop. 1392.

Erin, a post-village, capital of Houston co., Tex.

Erin, a post-township of St. Croix co., Wis. Pop. 1024.

Erin, a township of Washington co., Wis. Pop. 1266.

Erina'ceus, the genus that includes the hedgehogs of

Erinaceus Europæus, the European Hedgehog.

the Old World, of which there are several species, inhabiting Asia, Africa, and Europe. The common hedgehog of England may be considered a type of the group. It is a harmless little nocturnal animal, which subsists mainly on insects, though sometimes eating fruit and even reptiles. The back of the hedgehog is covered with spines, and when attacked he rolls himself into a ball from which they radiate in every direction, and serve as a defence that enables him to defy all his enemies but man. Zoologically, the hedgehog is of special interest, as he stands at the head of the order of Insectivora, and, though the sport of the schoolboy and scorn of his dog, he is king of the moles and shrews.

Erin'na [Gr. Ἤριννα], a Greek poetess who lived about 600 B. C., and was a friend of Sappho. She acquired a high reputation by her lyric and other poems, among which was "The Distaff." It is said that she died at the age of nineteen.

Erin'nys [Gr. Ἐριννύς or Ἐρινύς; plu. **Erin'nyes**], a name given to the Furies or EUMENIDES (which see).

Eriocaulona'ceæ [from *Eriocaulon,* one of the genera], a natural order of herbaceous endogenous plants, are nearly allied to Restiaceæ. They are mostly natives of the tropical parts of America and Australia. Many of the species are aquatic or grow in marshes. The flowers grow in close heads. Some of the *Eriocaulons* of Brazil are six feet high. Those of the U. S. are stemless. The *Eriocaulon septangulare* (pipewort) is indigenous both in the U. S. and in Ireland, and is interesting in reference to geographical distribution. It grows in ponds. Three genera and seven species of the order are found in the Atlantic States.

Erioden'dron [from the Gr. ἔριον, "wool," and δένδρον, a "tree"], a genus of trees of the natural order Sterculiaceæ, natives of tropical climates. They have large and beautiful flowers. They are sometimes called wool trees, because the capsules enclose a fibrous woolly or cottony substance. The cotton of *Eriodendron Samanna* is used in Brazil for stuffing pillows. The *Eriodendron anfractuosum,* which grows in the East Indies, Africa, etc., has edible seeds about the size of a pea. Other species yield useful medicines. The cotton produced by these trees cannot be spun, but its use in the paper manufacture has been proposed.

Erivân' [Lat. *Erivana;* Pers. *Rewân* or *Revân*], a fortified town of Russian Armenia, in the government of Erivan, on the river Zenga, an affluent of the Aras, and near the latter river, 115 miles S. by W. from Tiflis. It has a citadel on a high rock, several Armenian churches, a large bazaar, and a few mosques; also a cannon-foundry and manufactures of cotton goods, earthenware, and leather. It was stormed and taken by the Russian general Paskewitch in 1827, and was ceded to Russia by Persia in 1828. Pop. in 1867, 14,342.

Er'langen, a handsome town of Bavaria, on the river Regnitz and on the railway from Bamberg to Nuremberg, 11 miles N. of the latter. It is enclosed by walls, and is divided into the old and new town, the latter of which is very well built. Here is the University of Erlangen, which was founded in 1742, and is celebrated as a school of Protestant theology. It has a library of 100,000 volumes, and a botanic garden. Erlangen has manufactures of hosiery, gloves, mirrors, plate glass, combs, and hats. Pop. in 1871, 12,511.

Erlau, ĕR'loŭ [Hung. *Eger*], a fortified episcopal city of Hungary, capital of the county of Heves, is on the river Erlau or Eger, about 75 miles E. N. E. of Pesth. It is enclosed by walls, and is pleasantly situated amid vine-clad hills. It has a cathedral, a bishop's palace, a gymnasium, a normal school, a lyceum, and a richly endowed hospital. Here are manufactures of linen and woollen fabrics. Erlau has an extensive trade in red wine of superior quality, which is produced in the vicinity. A bishopric was founded here in the eleventh century. Pop. in 1869, 19,150.

Erl'king [Ger. *Erlkönig;* Dan. *Elverkonge, i. e.* "king of the elves"], in German and Scandinavian mythology, a fabulous being, which through seductive allurements causes injury and destruction to human beings, especially to children. This tale has become widely known through the ballad of that name by Goethe.

Er'man (GEORG ADOLF), a German natural philosopher, born in Berlin May 12, 1806. He performed in 1828–30 a voyage around the world, during which he made a series of magnetic observations, and published a "Voyage Around the World, through Northern Asia and the Two Oceans" (5 vols., 1833–42). He became professor of physics in the University of Berlin.

Erman (PAUL), a natural philosopher, the father of the

preceding, was born in Berlin Feb. 29, 1764. He became professor of physics in the university of that city and secretary of the Academy of Sciences. He wrote on electricity and other branches of physics, as well as mathematical and other subjects. Died Oct. 11, 1851.

Ermenonville, a village of France, department of Oise, 7 miles S. E. of Senlis. Here is a beautiful château with an extensive park, which is visited in summer by many Parisians. Among the attractions of the place is the tomb of J. J. Rousseau, who died here in 1778.

Ermine, er'min, in heraldry, one of the furs used in blazonry. It represents the skin of the ermine, white, spotted or timbered with black. The arrangement of the spots varies with the wearer's rank. A black fur with white spots is called *contre ermine* or *ermines*.

Ermine, or **Stoat** (*Putorius erminea*), a carnivorous

Ermine or Stoat.

animal nearly allied to the weasel, which it resembles in its slender form and its habits, but it is larger and has a longer tail. It is a native of the northern parts of Asia and Europe, and perhaps of America. It is about ten inches long, exclusive of the tail. In the summer the color of the upper parts is a pale reddish brown, and that of the under parts nearly white. In winter the whole of the body is covered with white fur, slightly tinged with yellow, but the tip of the tail remains black in all seasons. The fur is closer and finer in winter, and that which is obtained from Siberia, Norway, and other cold countries is one of the most valuable of furs. It is used for ladies' winter apparel and for the robes of kings and nobles. When made up the tails are inserted one to each skin, at regular distances and in the quincunx order or otherwise, according to the wearer's rank. The fur called miniver is a variety of spotted, "powdered," or "timbered" ermine. The ermine fur forms the distinctive doubling of the state robes of sovereigns and nobles, as well as of their crowns and coronets. It is also worn by judges in some countries. The ermine preys on mice, poultry, eggs, young rabbits, etc. Most of the so-called ermine fur of commerce is simply white rabbit fur, with spots of black rabbit fur inserted.

The U. S. have several white weasels which are properly classed as ermines, having white winter fur and the tip of the tail black. Such are *Putorius noveboracensis*, or common white weasel; *Putorius Kanei*, or Kane's ermine, of Alaska and Siberia; *Putorius Cicognonii*, a small species; *Putorius Richardsonii*, called little ermine; *Putorius longicauda*, or long-tailed ermine, etc. North America, however, furnishes a very small part of the ermine fur of commerce.

The ermines, like the other weasels, have the power of emitting a most offensive odor when irritated. The common stoat of Great Britain produces a fur much inferior to that of the same species in the far North. It is regarded as vermin, and zealously hunted by foresters, warreners, and park-keepers, for it is a most destructive pest among rabbits, hares, and fowl, wild and domestic. It is caught in snares or traps. It is most active by night.

Erne, ẹrn [from the Ang.-Sax. *earn*, an "eagle"], or **Sea Eagle** (*Haliaëtus*), a genus of eagles differing from other eagles in having no feathers on the toes and the lower part of the tarsi, also in the greater length of the bill. They have less courage than the eagle, and resemble the vulture in feeding on carrion as well as other prey. The common erne, cinereous eagle, or sea eagle (*Haliaëtus albicilla*) is the only species known in Great Britain. It makes its nest on the ledges of high precipices on the sea-coast, and sometimes near inland lakes, feeding on fish and waterfowl. It is about thirty-three inches long, the plumage brown, with a paler tinge on the head, and the tail of the adult pure white. The American white-headed eagle or bald eagle (*Haliaëtus leucocephalus*) is found throughout the whole of North America, frequenting the sea-coasts as well as the mouths of large rivers. (See Bald Eagle.) There is also an Australian species (*Haliaëtus leucogaster*) and the Pondicherry kite (*Haliaëtus Ponticerianus*), an Indian species, both of smaller size than the sea eagle.

Erne, a river of Ireland, in Ulster, flows nearly northwestward through the county of Fermanagh, and expands into two beautiful lakes, called Upper and Lower Lough Erne. After a course of 72 miles it enters Donegal Bay. The Lower Lough is 20 miles long, 7 miles wide, and over 200 feet deep. The Upper Lough is smaller. Each of them encloses numerous islands. The banks of these lakes and of the river present fine scenery. The town of Enniskillen stands upon an island between the loughs. On another island is the seat of the marquis of Ely. The loughs cover 40,000 acres, and are 140 feet above the sea. The salmon and other fisheries are very productive. The river and both loughs are deep, and have lines of steamboats, but the river has several cataracts.

Ernée, a town of France, in the department of Mayenne, 17 miles N. W. of Laval. It manufactures carpet-tacks and linseed oil, and trades in hemp, flax, and cloverseed. Pop. 5476.

Ernest (Ernst), elector of Saxony, the founder of the line called Ernestine or Ernestinian, was born Mar. 25, 1441. He succeeded his father, Frederick II., in 1464, and annexed Thuringia to his dominions in 1482. "This prince loved a quiet life, and sought it by all the means in his power, at the same time permitting no man to offend him with impunity." He did much for the development of the resources of his territories. Died Mar. 22, 1486.

Ernest (Ernst) I., surnamed the Pious, duke of Saxe-Gotha, born Dec. 24, 1601, at the castle of Altenburg, was a brother of the famous Bernard of Saxe-Weimar. In the Thirty Years' war he served with distinction under Gustavus Adolphus as a colonel of horse. He completed the victory of the Swedish army at Lützen, where Gustavus was killed. He was a zealous Protestant, and a ruler of great wisdom and activity. He instituted reforms, some of which were very fruitful of good. Many of his institutions exist to this day. Died in 1675.

Ernest (Ernst) IV., or **Ernst II.** of Saxe-Coburg-Gotha, duke of Saxe-Coburg, was born at Coburg June 21, 1817. His younger brother, Albert, married Queen Victoria of England. He succeeded his father in 1844, and sympathized with the efforts to promote the unity and nationality of the Germans. He composed operas entitled "Zayre" and "Casilda." In 1863 he declined the crown of Greece.

Er'nest Augus'tus, king of Hanover, born Jan. 5, 1771, was a younger son of George III. of England. He was styled the duke of Cumberland before he became king, and was a field-marshal in the British army. On the death of his brother, William IV., in 1837, he inherited the throne of Hanover, which was then separated from Great Britain, because it was not lawful for a woman to reign over Hanover. He was the object of intense popular dislike both in England and Germany. In the House of Lords he belonged to the extreme Tory party. In Hanover he was a tyrant, the unyielding defender of absolutism. He was generally considered, and with good reason, to be a man of grossly licentious habits. Died Nov. 18, 1851. He was succeeded by his blind son, George V., the last king of Hanover and the present duke of Cumberland.

Ernes'ti (August Wilhelm), a German philologist, born in Thuringia Nov. 26, 1733, was a nephew of the following. He became a good Latin scholar, and was professor of eloquence at Leipsic in 1770. He produced a good edition of Livy (3 vols., 1769) and other works, several of which were explanatory of the text of Livy's writings, and are still valued. Died July 20, 1801.

Ernesti (Johann August), a celebrated German critic and the founder of a school of theology, was born at Tennstedt, in Thuringia, Aug. 4, 1707. He was liberally educated at Wittenberg and Leipsic, and was so excellent a Latin scholar that he was called the "German Cicero." He became professor of ancient literature in the University of Leipsic in 1742, and obtained the chair of rhetoric in 1756, to which the chair of theology was added in 1758. In theology he was liberal or rationalistic. He proposed a new system of biblical criticism in his "Institutes of an Interpreter of the New Testament" ("Institutio Interpretis Novi Testamenti," 1761). He wrote other theological

works, and published an excellent edition of Cicero (5 vols., 1737–39), to which he added a "Clavis Ciceroniana." Died Sept. 11, 1781. (See A. W. ERNESTI, "Memoria J. A. Ernesti," 1781; J. VAN VOORST, "Oratio de J. A. Ernesto," 1804.)

E'ros [Ἔρως (gen. Ἔρωτος)], the Greek name of the god of Love, corresponding to the Cupi'do of the Romans. In Hesiod, Eros is one of the great cosmogonic powers, but later poets represent him as a son of Aphrodite (Venus). (See CUPID.)

Ero'sion [from the Lat. *e*, "out," "away," and *ro'do*, *ro'sum*, to "gnaw" or "eat"], a geological term used to express the action of a river in excavating or enlarging its channel, the gradual abrasion of strata, by rain, frost, glaciers, etc. The deep hollows occupied by most lakes and rivers are supposed to have been formed by the action of rivers or glaciers, and are called "valleys of erosion." The action of atmospheric agencies, glaciers, etc. in wearing away the general surface of a country or district is called *surface erosion* or *denudation*. The changes wrought by this agency on the superficial features of the earth are much more grand and interesting than they are generally supposed to be; and it may be said that the surface configuration of the earth, and indeed the whole "aspects of nature," are the result of the antagonistic action of surface erosion and internal elevatory forces. (See SURFACE GEOLOGY.)

Erot'ic [Gr. ἐρωτικός, from ἔρως, "love" (see EROS); Fr. *érotique*], an epithet applied generally to that which relates to love or excites amorous passion. In a more restricted sense it is applied to poems of which love is the subject, and to classic authors of whom love is the favorite theme, as Anacreon, Sappho, Ovid, and Tibullus.

Erpe'nius, or **Van Er'pen** (THOMAS), an eminent Dutch Orientalist, born at Gorkum Sept. 7, 1584. He graduated at Leyden in 1608, after which he visited France, England, Italy, and Germany. In 1613 he became professor of Arabic and other Oriental languages at the University of Leyden. A second chair of Hebrew was founded for him in 1619. He printed a number of Arabic works with a press which he kept in his own house. He produced in 1613 an "Arabic Grammar," the first ever written in Europe. Among his other works are a "Collection of Lokmân's Arabic Proverbs," with Latin version, and "Historia Saracenica," which is an edition of Elmacin's history with a Latin translation (1625). Died in Nov., 1624.

Errard (CHARLES), a French painter and architect, born at Nantes in 1606. He was patronized by Louis XIV., for whom he adorned the Louvre, Tuileries, and other palaces. He was one of the twelve artists who founded the Academy of Painting in Paris in 1648, and was the principal founder of the French Academy of Art in Rome (1666). He died in Rome May 15, 1689.

Erra'ta [the plu. of the Latin *erra'tum*, a "mistake," from *er'ro*, *erra'tum*, to "err"], a term applied to the list of errors or faults committed in printing a book. This list is usually placed at the end or the beginning of the book.

Errat'ic Blocks, or **Erratics,** a geological term applied to fragments of rock which are found on the surface of the ground, and have been transported from a distance by glaciers, icebergs, etc. They are most numerous in northern regions. "The erratics which cover the Jura," says Lyell, "present a phenomenon which has perplexed the geologist for more than half a century. No conclusion can be more incontestable than that these angular blocks of granite, gneiss, and other crystalline formations came from the Alps, and that they have been brought for a distance of fifty miles across one of the widest and deepest valleys in the world." Many of them are as large as cottages. (See DRIFT.)

Er'roll, a post-township of Coos co., N. H. Pop. 178.

Ersch (JOHANN SAMUEL), a German bibliographer, born at Gross-Glogau, in Silesia, June 23, 1766. He became professor of geography at Halle in 1803, and published, besides other works, a "Handbook of German Literature from the middle of the Eighteenth Century" (4 vols., 1812–14) and a "General Repertory of Literature" (8 vols., 1793–1809). His capital work is the excellent "Encyclopædia of Sciences and Arts" ("Allgemeine Encyklopädie der Wissenschaften und Künste"), which he began conjointly with Gruber, and of which he edited seventeen volumes (1818–28). After his death, which occurred Jan. 16, 1828, it was continued by Gruber and others. He is called the founder of German bibliography.

Erse. See GAELIC LANGUAGE.

Ers'kine (DAVID STEWART), F. R. S., ELEVENTH EARL OF BUCHAN, and LORD CARDROSS, born in 1742, a brother of Lord Chancellor Erskine, was the author of several antiquarian papers, "Lives and Writings of Fletcher of Saltoun and the Poet Thomson" (1792), and other works. He was a man of eccentric character. Died in 1829.

Erskine (EBENEZER), a Scottish preacher and the founder of the Secession Church, was born June 22, 1680. He preached at Portmoak, in Kinross, from 1703 to 1731, and acquired a high reputation. In 1731 he removed to Sterling, where he advocated popular rights in the settlement of ministers, and differed from the majority of the General Assembly in relation to lay patronage. He was deposed or suspended in 1733. In 1736, Erskine and his friends formally seceded and organized the Secession Church. Died June 22, 1756. In 1847 the Secession Church united with the Relief Church to form the United Presbyterians.

Erskine (HENRY), an able Scottish lawyer, born in Edinburgh in 1746, was a brother of Thomas, Lord Erskine, noticed below. He was a Whig in politics, became lord advocate of Scotland in 1782, and again in 1806. He was eloquent and witty, and was distinguished for tact and fascination of manner. During some part of his career he was the most eminent member of the Scottish bar. Died in 1817.

Erskine (JOHN), eleventh earl of Mar, a Scottish Jacobite and ambitious politician, was born at Alloa in 1675. He was appointed secretary for Scotland in 1708. In Sept., 1715, he took arms for the Pretender, and obtained the command of about 12,000 insurgents. He was defeated by the duke of Argyle at Dunblane in November of that year, and soon escaped to the Continent. Died in May, 1732.

Erskine (JOHN), D. D., a Scottish divine, a son of the preceding, was born June 2, 1721. He was ordained minister of Kirkintilloch in 1744, and of Culross in 1753. In 1758 he was translated to the New Grey Friars' church, Edinburgh, where he became the leader of the orthodox and popular party in the Church. He was promoted in 1767 to the Old Grey Friars' church, where he was a colleague of Dr. Robertson, who was the leader of the moderate party. Erskine wrote many theological works, which are highly esteemed. Died Jan. 19, 1803. (See SIR H. M. WELLWOOD, "Life of John Erskine," 1818.)

Erskine (JOHN) OF CARNOCH, an eminent Scottish jurist, born in 1695, was a son of Col. John Erskine and a grandson of Lord Cardross. He was appointed professor of Scottish law in the University of Edinburgh in 1737, and filled that chair until 1765. He published in 1754 "Principles of the Law of Scotland," and wrote an important standard work entitled "Institutes of the Law of Scotland," which was published in 1773. It is a work of high authority. Died in 1765.

Erskine (RALPH), a Scottish theologian, born at Monilaws March 18, 1685, was a brother of Ebenezer, noticed above. He was ordained minister of Dunfermline in 1711, and attained eminence as a preacher. In 1737 he joined the Secession Church. He was author of "Gospel Sonnets" and other religious works. Died Nov. 6, 1752.

Erskine (THOMAS), LORD, a celebrated British orator and lawyer, born in Edinburgh Jan. 21, 1750, was the youngest son of Henry David, earl of Buchan. His father, whose income was about £200 a year, could not afford to give him a liberal education for a learned profession. Young Erskine therefore entered the navy in 1764 as a midshipman, after he had attended the High School of Edinburgh. Four years later he purchased a commission in the army, and in 1770 he married a daughter of Daniel Moore, M. P. In the social circles of London he was admired for his elegant manners, colloquial powers, and genial disposition. Renouncing the military profession, which he disliked, he resolved to study law, and was admitted as a student in Lincoln's Inn in April, 1775. In Jan., 1776, he entered Trinity College, Cambridge, as a gentleman commoner. It is said that in this part of his career he was very poor, suffered great privations, and boasted that he did not know a lord *out of his own family*. He was called to the bar in 1778, and obtained immediate and rapid success in his profession. One of his first clients was Capt. Baillie, prosecuted for a libel on Lord Sandwich, who was then a cabinet minister. He made his *début* in a court crowded with eminent men, yet when the judge interrupted him by the assertion that Lord Sandwich was not before the court, he had the courage to reply, "I know that he is not before the court, and for that reason I intend to bring him before the court." Lord Campbell expresses the opinion that Erskine's plea in this case was "the most wonderful forensic effort of which we have any account in our annals." In 1781 he defended Lord George Gordon, who was tried for treason and was acquitted. He was elected in 1783 to Parliament, in which his success was not so brilliant as in the forum. He was a Whig in politics, and was re-elected in 1790. In several political trials that occurred during the excitement of the French revolution he bravely defended the liberty of

the press and the friends of reform whom the ministers prosecuted on a charge of constructive treason. He was counsel for Mr. Hardy and Horne Tooke, who were tried in 1794 and were acquitted. On the formation of a Whig ministry by Fox and Grenville in Feb., 1806, he was appointed lord chancellor, and was raised to the peerage as Baron Erskine of Restormel Castle. He resigned this office when the Tories came into power early in 1807. He was the author of "Armata," a political romance, and a "View of the Causes and Consequences of the War with France," which ran through forty-eight editions. He died Nov. 17, 1823, leaving a son and several daughters. Many persons consider him the greatest advocate who ever practised at the English bar. "He spoke," says Lord Campbell, "as his clients respectively would have spoken, being endowed with his genius; and those who heard him seemed to be inspired with a new ethereal existence." His printed speeches, enriched with noble thoughts, brilliant imagery, and beautiful diction, retain in a great measure their original impressiveness. (See Lord Campbell, "Lives of the Lord Chancellors;" Lord Brougham, "Memoir of Erskine," prefixed to a collection of Erskine's speeches, 4 vols., 1847.)

Erskine (Thomas) of Linlethan, a member of the Scottish bar, who published several theological treatises, the best known and most valuable of which is "On the Internal Evidence for the Truth of Revealed Religion," 3d ed. Edinburgh, 1821.

Erskine College, at Due West, Abbeville co., S. C., was organized in 1839, with the Rev. E. E. Pressly (afterwards made D. D.) for its president, assisted by several professors, and belongs to and is under the supervision of the Associated Reformed Synod of the South. Although the college had to struggle with low salaries for professors, with the want of suitable buildings, libraries, and scientific apparatus, and other inconveniences, it had a reasonable share of prosperity for the first seven years of its existence. Dr. Pressly resigned the presidency in 1846, and was succeeded by the Rev. R. C. Grier, D. D. About 1853 the plan of endowing the college by the sale of scholarships was adopted, and the result was that some $50,000 were raised. These figures were enlarged afterwards by private donations of Capt. John Blair and Col. William Wright of Yorkville, S. C., and of Christopher Strong, Esq., of Tennessee, making the sum-total amount to $70,000. In the mean time four large and beautiful buildings were erected for college uses—the college proper, Lindsay Hall, the Euphemian and Philomathean Halls—while a fine telescope, the gift of William Johnson of Alabama, crowns the observatory. In 1858, Dr. Grier, finding that the presidency of the college and the pastorate of Due West congregation were too exacting on his time and ability, resigned the former, that he might devote himself more fully to the latter. In 1859 the Rev. E. L. Patton was elected president, but the war breaking out some two years afterwards, he resigned, soon after which the institution was suspended.

The college was re-opened at the close of the war under unfavorable auspices, the country being demoralized and private and public institutions impoverished. Dr. Grier was re-elected in 1867, and with the assistance of the professors and other friends succeeded in resuscitating the college. Unfortunately, however, he died in 1871, leaving a vacancy which was hard to fill. In September of that year the synod elected the Rev. William Moffat Grier to fill the place of his father. For the last few years the institution has subsisted chiefly on what is termed the "five years' endowment." Efforts are now being made to raise a new and more permanent endowment of $100,000, and if successful the institution will no longer be in a precarious condition.

The faculty now consists of the Rev. William M. Grier, D. D., president and professor of mental and moral science; Rev. J. P. Pressly, D. D., professor of Greek; Rev. J. N. Young, professor of mathematics and the natural sciences; William S. Lowry, A. M., professor of the Latin language; and William Hood, A. M., professor of chemistry, history, and belles lettres. William M. Grier.

Er'ving, a post-township of Franklin co., Mass., on the Vermont and Massachusetts R. R., 42 miles W. of Fitchburg. Pop. 579.

Er'win, a township of Steuben co., N. Y. It has extensive manufactures of lumber and other commodities, and contains the village of Painted Post. Pop. 1977.

Erwin (Alexander R.), D. D., a minister of the Methodist Episcopal Church South, born in Louisiana Jan. 12, 1820. His father was a Baptist minister. He was licensed to preach in 1840, and joined the Tennessee Conference in 1842. He occupied a high rank in the ministry, presided over the Clarksville Female Academy and the Huntsville Female College, and while stationed in Nashville received the degree of D. D. from the Nashville University. He died of consumption in Huntsville, Ala., Jan. 10, 1860. T. O. Summers.

Erysip'elas [Gr. ἐρυσίπελας, probably from ἐρυθρός, "red," and πέλος, akin to the Lat. *pellis*, "skin"], a disease probably of miasmatic origin, sometimes associated with a peculiar rose-colored eruption of the skin, whence the name. The inflammation attending this disease is of a peculiar low type which is but little understood. It may terminate favorably by resolution, less favorably by abscess (which is apt to be diffuse—*i. e.* not limited to a single spot—and is then very dangerous), or the termination may be in gangrene and the death of the patient. The disease is very common in military hospitals, seating itself in wounds, when it proves frequently fatal. Erysipelatous diseases sometimes assume an infectious and almost an epidemic character. Puerperal fever, peritonitis, phlebitis, and a long catalogue of diseases of low type are akin to erysipelas. Its infectious character is admitted. The famous old "Dreadnaught" hospital-ship in the Thames became so poisoned by it that she had to be destroyed. The best treatment is a sustaining one. Pure air, a milk diet, and the use of quinia and iron, with stimulants, are in general indicated. The sulphites and other disinfectant remedies may be employed. Externally, it is safest to use only the blandest applications, carbolized lotions, etc.

Erzgebirge, ĕrts-gą-beer'gą (*i. e.* "ore mountains"), a mountain-chain of Southern Germany, extends along the boundary between Bohemia and Saxony, and is nearly 120 miles in length. The Schwarzwald and Keilberg, the highest parts of this chain, have an altitude of about 4000 feet, and are of granitic formation. The Erzgebirge is rich in minerals, among which are silver, tin, iron, and cobalt. On the S. E. side it presents a steep, abrupt declivity.

Erzroom', Erzroum, or **Erzrum** [*i.e.* "land of Rome" or Byzantium, so called because it was originally founded under the Eastern Roman empire], a fortified town of Armenia (Asiatic Turkey), is on a fertile plain on the river Kara-Soo, a branch of the Euphrates, about 120 miles S. E. of Trebizond. It is about 6000 feet above the level of the sea. The streets are narrow and filthy; the houses are mostly built of mud, wood, or sun-dried bricks. It is the seat of an Armenian archbishop. It has a large citadel, a custom-house, about forty mosques, several Armenian and Greek churches, and a number of bazaars. Its position renders it an important military post. Erzroom has an extensive trade, which is carried on partly by caravans. Pop. estimated at 50,000, five-sixths of whom are Turks. A town called *Theodosiopolis* was founded here in 415 A. D. In 1201 it was taken by the Seljooks, who are said to have destroyed here 100 churches. In 1859 an earthquake destroyed a considerable portion of the town.

Esarhad'don [called in the cuneiform inscriptions *Asshur-akh-iddina*], the Old Testament name of an Assyrian king, the son and successor of Sennacherib. He appears to have reigned from 680 to about 667 or 660 B. C. He is shown by the monuments to have been one of the most powerful of Assyrian monarchs. His rule extended northward to Armenia, on the west it included Syria and Cyprus, while on the south Egypt, and even Ethiopia, were claimed by him. He built a palace at Babylon. Among the numerous and splendid remains of his reign is the south-west palace of Nimrood.

E'sau ("rough," "hairy"), the elder twin-brother of the patriarch Jacob (Israel), and the son of Isaac and Rebekah. He took his name from his hairiness of body. The story of his marriage to two Canaanitish and an Ishmaelite woman, of his loss of birthright through the craft of Rebekah and Jacob, and of his quarrel and reconciliation with Jacob, are beautifully told in the book of Genesis. He was the progenitor of the Edomites, who dwelt in Mount Seir, otherwise called Edom.

Escalade [Lat. *scala*, "ladder"], an operation of war, is an assault aided by ladders as the instrument of surmounting the obstacles presented by the scarp and counterscarp walls (or slopes) of a fortification in which no breach has been made; sometimes even a rapid blow directed at an unbesieged place with hope of success by surprise (*e. g.* the capture by the English troops of Almarez, Sept., 1812). Among the most famous escalades are those of Adrianople by the Goths; of Beauvais by Charles the Bold, in 1472; of Fecamp in 1593; of Prague in 1741: still more remarkable, that at Corfu in 1717 by Count Schulenberg, who, reduced to extremity in the defence by the capture of the outworks, hastily prepared ladders, and by a desperate assault by escalade, retook them, and thus saved the place. The second siege of Badajos (1812) presents an event unparalleled in the history of sieges, that after twenty days' open trenches and the opening of three practicable breaches,

two entire divisions of troops should, at the moment of assault, be employed to escalade the defences where entire; that each should *succeed*, while the regular assault on the breaches should be repulsed with terrible slaughter. The castle was successfully scaled where the walls were eighteen to twenty-four feet high, and "tolerably flanked;" the Bastion St. Vincente had a scarp-wall thirty-one and a half feet high, flanked by four guns, palisaded covered way, a counterscarp wall twelve feet high, and a "cunette" ditch five and a half feet deep.

Escalop Shell, in heraldry, is a shell used to decorate palmers and crusaders, and signifies that the bearer has made long voyages by sea. The common name is scallop shell. The edible escalop of Europe (*Pecten maximus*) is considered a great delicacy. It belongs to the oyster family. The heraldic escalop-shell, worn by palmers, belonged to the *Pecten Jacobæus*, which, as monkish writers assert, was the cognizance of Saint James the Less. The genus is very large and worldwide in distribution, there being more than 100 living and nearly 500 extinct species.

Escam'bia, a county in the S. of Alabama. Area, 1000 square miles. It is intersected by the Conecuh and Escambia rivers. The surface is level. Corn, rice, and wool are staple products. It is traversed by the Mobile and Montgomery R. R. Capital, Pollard. Pop. 4041.

Escambia, a county which forms the W. extremity of Florida, bordering on the Gulf of Mexico. It is bounded on the E. by the Escambia River and on the W. by the Perdido. The surface is level; some of the soil sandy, but a part is very fertile. There are extensive forests of pine and hard wood. Lumber, rice, wool, etc. are the chief products. It is traversed by the Pensacola and Louisville R. R. Capital, Pensacola. Pop. 7817.

Escanaw'ba, or **Escanaba,** a post-village, capital of Delta co., Mich., 360 miles N. of Chicago, on the N. end of Green Bay and on the line of the Peninsular division of the Chicago and North-western R. R. It has a savings bank, three churches, a blast-furnace, eight hotels, and one newspaper. It has a good harbor, and the principal business is shipping Lake Superior iron ores: upwards of 500,000 tons are sent yearly. Pop. of township, 1370.

CHARLES D. JEWELL, PROP. "TRIBUNE."

Escape, in law, means the departure of a prisoner from confinement before he has been released by process of law. Any liberty given to a prisoner not authorized by law is technically an escape. Escapes may occur either in civil or criminal cases. They are either negligent or voluntary —negligent, when the prisoner escapes without the consent of the officer having him in custody; voluntary, when such officer consents to the escape. In criminal cases an escape is a public offence, of which the prisoner may be convicted, as also the officer through whose act or neglect the escape occurs. In civil actions there is an important distinction between *mesne* and final process, the former being that which is issued between the commencement and the termination of the action; and the latter, that which is used to enforce the judgment. If the escape be voluntary, the officer is liable in either case; but if he be negligent, he will not be liable in the case of *mesne* process if the prisoner is returned to his custody before an action is commenced against him for his neglect; though he will be liable in any event in the case of final process. The damages recoverable are measured by the injury sustained. In final process these would in general be the amount of the judgment. Nothing will excuse an escape but an act of God or of the public enemy or of the law. An instance of the latter would be an order of the House of Representatives at Washington directing the attendance of a person as a witness who was held by a sheriff of a State court in custody under an execution in a civil action against his person.

Escapement, in watches and clocks, the device by which the rotatory motion of the wheels gives rise to or perpetuates the vibration of a pendulum or balance-wheel.

Escapements have received various forms, many of which are still in use. The earliest, introduced by Huyghens, about 1650, was called the crown-wheel or vertical escapement. The crown-wheel has its teeth not in the plane of the wheel, but in a cylindrical surface of which the axis of the wheel is the axis. In the crown-wheel of the clock or watch, the teeth were acute-angled, and inclined in a common direction like saw-teeth. The axis of the pendulum, or balance, was longer than the diameter of the crown-wheel over which it extended. It carried two short arms or projections, called pallets, set in different azimuths, in such a manner that when one of them, being encountered by a tooth, was pushed out of the way by the advancing wheel, the opposite one was caught by another tooth, which pushed in the opposite direction. Thus the wheel made an intermittent progress as the teeth successively escaped from the pallets.

In a clock, when the pendulum is disturbed from the mean position, it is brought back by gravity. In the watch the same result is produced for the balance wheel by the action of the spiral spring attached to the verge, called the hair spring. The escapement most commonly in use for both clocks and watches is the anchor escapement, first introduced by Hooke in 1656. It is so called from its resemblance to the flukes of an anchor, the shaft of the anchor in the clock being parallel to the pendulum and connected with it. The escapement-wheel is a spear-wheel. The pallets project from the extremities of the anchor flukes, meeting the wheel at the points where tangent lines from the centre of motion would touch it. When one pallet is engaged with the wheel, the other is free; and *v. v.* The extremity of the pallet is inclined in such a manner that, as the tooth escapes, it gives an impulse to the pendulum. As, after the pallet first engages a tooth, the swing continues for some time in the same direction, anchor escapements are of two kinds, according to the manner of their action upon the train during this swing. In Hooke's escapement, the surfaces of the pallets are so inclined that by their pressure on the tooth, they turn the train slightly backward, or cause it to *recoil*, up to the end of the swing. In the *dead-beat* escapement, invented by Graham early in the last century, the surfaces of the pallets are circular arcs having the centre of motion for their centre; so that during the swing the train simply stands still. Though the dead-beat escapement is now generally used in clocks, there are not wanting those who prefer the recoiling escapement. Besides the anchor dead-beat, there are several other very ingenious forms, among which may be mentioned Lepante's pin-wheel escapement, McDowall's ruby-disk escapement, and Denison's three-legged dead escapement.

The only escapement used for watches till about 1700, was the crown-wheel escapement. Graham invented the cylinder escapement, so called because a hollow cylinder of steel or ruby replaces in part the verge of the balance. This cylinder is cut away on one side for about one-fourth of the circumference, in order to admit the pallets, which are small triangular pieces of steel, to enter the interior. During the swing the pallet rests with little friction on the smooth exterior or interior surface. In entering and in escaping, it gives an impulse to the balance. The pallet is not in the plane of the wheel, but stands on a short stem at right angles to this plane. Hence, the cylinder must be much more extensively cut away at the point where the wheel passes; and on this account, the cylinder escapement, though performing very well, is too frail to be popular in use. The duplex escapement of Lepine receives its name from having a double escapement. The escapement-wheel carries spur teeth rather widely separated, which engage at every double vibration with a notch in a cylinder forming part of the verge, and constructed of a gem. The verge itself carries also an arm which engages with a set of pins, or crown-wheel teeth, fixed in the escapement-wheel at right angles to its plane. The impulse is chiefly derived from the escapes of this arm, but proceeds to some extent from those of the spur teeth also. It takes place only in one direction, and hence the system is called by the French an escapement *à coup perdu*. The duplex escapement, though attended with little friction and running without oil, is subject to the disadvantage that a sudden jerk may check the swing of the balance and prevent the escape. If a single such failure occurs, the watch will stop.

The lever escapement is a dead-beat anchor escapement, first applied to the watch by Mudge, in 1793. The lever is attached to the anchor, generally crosswise, or at right angles to the proper position of the anchor-shaft. At one extremity it presents a notch into which a pin attached to the verge strikes at each swing in either direction. This tilts the anchor and allows a tooth to escape. Except at these moments of locking and unlocking, the balance swings entirely free. The lever carries also a pin just at the summit of the notch, which enters an indent in the verge as the lever passes. As there is no other indent, the lever cannot tilt except when the verge pin strikes it.

The escapement which interferes least with the uniformity of movement of the train, is the chronometer escapement, introduced into England about a century ago by Earnshaw, though said to have originated in France. In this, the train is locked by a tooth projecting from a light bar tangent to the escapement-wheel, which yields by bending and not by turning on a pivot, the fixed extremity being a spring. The free extremity carries another delicate spring parallel to itself and extending a little beyond it. A tooth on the verge passes this slight spring in one direction without sensible resistance. On its return the bar behind the spring prevents its bending, and so is carried along with it, unlocking the train. The train being released, a tooth of the escapement-wheel strikes a pin, or enters a notch, connected with the verge, and gives an impulse to the balance.

This, like the duplex, is an escapement *à coup perdu*, and is liable like that to stop when subjected to sudden jerks. Hence chronometers carried on the person sometimes stop; but with nautical chronometers this accident hardly ever occurs.

The chronometer escapement is sometimes called a free escapement; since the balance is wholly free from contact with any other part of the work, except in the instant of unlocking and receiving the impulse. This is true also of the lever escapement; but in that, the unlocking requires more force, and is attended with larger friction.

F. A. P. BARNARD.

Escarp'ment, a geological term applied to the steep faces which are often presented by the abrupt terminations of strata, and resemble sea-cliffs. These have been caused by subaërial denudation, according to Lyell, who thinks the term escarpment "should be confined to the outcrop of particular formations having a scarped outline, as distinct from cliffs due to marine action."

Escataw'ba, a post-township of Washington co., Ala. Pop. 585.

Eschar, ĕs'kar [from the Gr. *ἐσχάρα*, "scurf," "scab"], a term applied to the slough caused by fire or caustics; the crust or scab, which is dry, rough, and of a gray color. (The word "scar" is supposed to have been derived from *eschar*.)

Eschatol'ogy [Gr. *ἐσχατολογία*, "doctrine respecting the last things"] is that section in dogmatics which treats of the second advent, the intermediate state, the resurrection, the last judgment, heaven, and hell. Upon these themes revelation does not go into minute details, while yet the salient points are strongly marked. The passages which must be relied upon to furnish the data are Matt. xxv., 1 Cor. xv., 2 Thess. ii., Rev. xx. and xxi.

As regards the second advent, the statement in the Apostles' Creed expresses the catholic faith. Christ "ascended into heaven, and sitteth at the right hand of God the Father Almighty; from *thence* he shall come to judge the quick and the dead." According to this symbol, which unquestionably presents the doctrine current in the primitive Church, there is no advent of Christ upon earth, after his ascension, until he leaves his session with the Father and comes directly to the final judgment of all mankind. This statement precludes millenarianism. According to this theory, there are two resurrections—the first of the righteous dead only at the time of the second advent of Christ, and the second that of the righteous and the wicked at the end of the world. Between these two resurrections a thousand years intervene, during which time Christ reigns personally, in corporeal presence, upon the renovated earth. Millenarianism was a revival of the later Jewish doctrine of the Messianic kingdom. Its most flourishing period was between 150 and 250 A. D. That it was not the general belief of the Church even then is proved by the above-quoted statement in the Apostles' Creed. Since that time it has had occasional advocacy, as by the Anabaptists of the Reformation period and the modern Millenarians.

The doctrine of the intermediate state has been somewhat fluctuating in its form, owing to the paucity of the Scripture data. The representation in the parable of Lazarus and Dives has furnished the basis of the general statement that the believer is happy and the unbeliever is wretched between death and the final judgment; yet the resurrection of the body adds somewhat to both the happiness of the believer and the misery of the lost. The majority of the ancient Fathers, in the opinion of Hagenbach, believed that men do not receive their full recompense of either reward or penalty until after the resurrection of the body. The doctrine of the intermediate state was soon vitiated, so far as the righteous dead are concerned, by the papal notion of purgatory; according to which the believer between death and the resurrection goes through a painful process that cleanses him from remaining sin. The Protestant rejects this, and affirms that at death the soul of a believer is made perfect in holiness. What precisely is the difference between the condition of a believer as disembodied and as re-embodied he does not affirm. He is content with denying purgatorial pains and purification, as well as an unconscious sleep of the soul between death and the resurrection.

The doctrine of the resurrection of the body was from the beginning a cardinal and striking tenet of Christianity. Perhaps no article of the new faith made greater impression at first view upon the pagan. When the philosophers of Athens "heard of the resurrection of the dead, some mocked, and others said, We will hear thee again of this matter." All the early Fathers maintain this dogma with great earnestness and unanimity against the objections of skeptics, of whom Celsus was acute and scoffing in his attack. Most of them believed in the resuscitation of the very same body materially. Justin Martyr says that cripples will rise as cripples, but at the instant of resurrection, if believers, will be made physically perfect. The Alexdrine school alone adopted a spiritual theory of the resurrection. Origen went so far in this direction as to assert that a belief in the resurrection of the body is not absolutely essential to the profession of Christianity, provided the immortality of the soul were maintained. But these idealizing views were generally combated with great earnestness, and in some instances evoked an extremely gross and carnal view in opposition. The Patristic theory of the resurrection passed into the Middle Ages with little variation, excepting that in connection with the materialism of the papacy it naturally became more materialistic in its structure. The poetry of Dante and the painting of Angelo powerfully exhibit it. In the Protestant Church the existence of a real body, and of a body that preserves the personal identity, is affirmed; but the materialism of the Papal, and to some degree of the Patristic, Church is avoided by a careful attention to Saint Paul's dictum: "There is a natural body (*σῶμα ψυχικὸν*), and there is a spiritual body (*σῶμα πνευματικὸν*)."

The doctrine of the last judgment was, from the first, immediately connected with that of the resurrection of the body. Mankind "must all appear before the judgment-seat of Christ, that every one may receive the things done in his body." 2 Cor. v. 10. The Fathers founded their views of the day of doom upon the representations and imagery of Scripture. They believed that a general conflagration will accompany the last judgment which will destroy the world, though some ascribed a purifying agency to it. Some of them, like Tertullian and the more rhetorical of the Greek Fathers, enter into minute details, while others, like Augustine, endeavor to define dogmatically the facts couched in the figurative language of the Bible. In the Middle Ages representations varied with the bent of the individual theologian. One popular opinion was that the judgment will be held in the valley of Jehoshaphat. Aquinas maintained that the last judgment will take place *mentaliter*, because the oral trial of each individual would require too much time. In the modern Church the course of thought upon this doctrine has been similar to that in the ancient and mediæval. The symbols of the different Protestant communions explicitly affirm a day of judgment at the end of the world, but enter into no description. Individual speculations, as of old, vibrate between the extremes of materialism and idealism.

That the blessedness of the redeemed is endless has been the uniform faith of the Church. Representations concerning the nature of this happiness vary with the culture and intellectual spirit of the age and the individual. Justin Martyr regards the blessedness of heaven as consisting mainly in the continuation and increase of the happiness of the millennial reign. Origen holds that the blessed dwell in the aërial regions, and pass from one heaven to another as they advance in holiness; at the same time he condemns those who expect merely sensuous enjoyment. The Greek theologians Gregory of Nazianzum and Gregory of Nyssa follow Origen. Augustine believed that the heavenly happiness consists in the enjoyment of peace which passes knowledge and the beatific vision of God. One important element in it consists in deliverance from all hazard of apostasy—the *non posse peccare et mori*. The Schoolmen held the Patristic theories, but with an endeavor to systematize. They divided heaven into three parts—the visible heaven, or the firmament; the spiritual heaven, where saints and angels dwell; and the intellectual heaven, where the beatific vision of the Trinity is enjoyed. The modern Church maintains the doctrine of everlasting blessedness in substantially the same form with the ancient and mediæval. The tendency to materialize or to spiritualize it varies with the grade of culture and modes of thinking.

The punishment inflicted upon the lost was regarded by the ancient Church as endless. The principal exception appears in the Alexandrine school, represented by Clement and Origen. But Clement is careful to say that the doctrine of endless perdition must be preached, in order to deter men from sin, although the hope of the final restoration of all is permitted to the thinker. Some faint traces of a belief in the remission of penalty in the future life are visible in the writings of Didymus of Alexandria. Gregory of Nyssa speaks more distinctly, pointing out the corrective design of punishment inflicted upon the wicked. The annihilation of the wicked was broached by Arnobius. The mediæval Church was likewise a unit in holding to the endlessness of punishment. The modern Church has also received the historical faith upon the subject, though recently a tendency appears in individuals and parties to the doctrine of a second probation and the final restoration of all mankind. The argument most relied upon is derived from the general nature of the Divine benevolence, rather

than from the testimony of Scripture. It is generally allowed, even by opponents, that the Bible, taken as a whole, apparently teaches the doctrine of endless punishment, and especially that the descriptions which Christ gives of the transactions and decisions of the day of judgment preclude the idea of a second probation. W. G. T. SHEDD.

Escheat′, a reverting of lands to their original owner (lord of the fee) because of some obstruction in the course of descent, either by failure of heirs or attainder of treason or felony; and the estate itself thus reverting is sometimes called an *escheat*. It differs from forfeiture in the fact that the latter is a penalty for a crime, and the property forfeited accrues to the king; while escheat depends solely on the failure of heirs, and the land reverts to the former proprietor. It was one of the incidents of the feudal system that when the heirs of the person last seized failed, the land reverted to the lord of the fee from whom it was derived. In this country, where the feudal tenure does not exist, the doctrine of escheat has a limited application; still, if an owner of land dies without heirs it escheats to the state. Incorporeal rights, such as ways and commons, do not escheat, but become extinct. It is still an unsettled question whether a trust estate will escheat by the death of the beneficiary without heirs, some authorities maintaining that the trustee is rather discharged from the trust. The land of a corporation, in case it becomes extinct, reverts to the grantor, and not to the state. The state takes an escheat subject to any charges or encumbrances attaching to the land when its title accrued. A proprietor may prevent an escheat by conveying or devising his estate. In this country the subject is generally regulated by statute.

Esch′enbach′, von (WOLFRAM), a famous German mediæval poet or minnesinger, was born in Bavaria of a noble family. In the year 1204 he came to the court of Hermann, landgrave of Thuringia, whose bounty he enjoyed. He died after 1218 and before 1225. His principal poems are "Parcival" and "Titurel," which have been translated into modern German, and are much admired. They display a rich imagination and great mastery of language.

Esch′enmay′er (KARL ADOLF), a German philosopher and mystic, born at Neuenberg, in Würtemberg, July 4, 1768. He became professor of philosophy and medicine at Tübingen in 1811, and obtained the chair of practical philosophy there in 1818. He wrote, besides other works, "The Philosophy of Religion" (3 vols., 1818–24). Died Nov. 17, 1852.

Esch′er (JOHANN HEINRICH ALFRED), a Swiss lawyer and statesman, born at Zurich Feb. 20, 1819, was liberal in politics. He opposed the Jesuits and the Sonderbund, was elected a member of the council of the interior in 1845, and became president of the grand council in 1847. He advocated a reform of the federal system and a greater centralization. In Dec., 1848, he was chosen president of the new council of regency.

Eschscholt′zia Califor′nica, the systematic name of a plant of the natural order Papaveraceæ, a native of California. It is cultivated for the beauty of its flowers, which are yellow. The calyx separates from the flower-stalk when the flower expands, and resembles the extinguisher of a candle. This genus was named in honor of J. F. Eschscholtz (1795–1831), a German botanist.

Eschwege, ĕsh-vā′gạ, a walled town of Prussia, in the province of Hesse-Nassau, is on the river Werra, 26 miles E. S. E. of Cassel. It has a castle, a realschule, and manufactures of linen and woollen goods. Pop. in 1871, 7377.

Eschweiler, ĕsh′vī′lẹr, a town of Rhenish Prussia, is on the railway from Cologne to Aix-la-Chapelle, 8 miles by railway E. N. E. of the latter. It has extensive manufactures of ribbons, canvas, needles, glass, machinery, and woollen goods. Mines of zinc and lead occur in the vicinity. Pop. in 1871, 15,550.

Escobar′ y Mendo′za (ANTONIO), a Spanish Jesuit and casuist, born at Valladolid in 1589. He wrote "Moral Theology" (1646), "Summula Casuum Conscientiæ" (1626), and other works. The lax morality of his writings was censured by Pascal in some of his "Provincial Letters." Died July 4, 1669.

Escosu′ra, de la (PATRICIO), a Spanish author, was born in Madrid Nov. 5, 1807. He was banished as early as 1824 on account of his connection with a secret political society. In 1826 he returned and joined the army, after having studied in Paris and London. In 1829 he became an officer, and joining the Carlists was exiled in 1834, but returned in 1835. Having been again banished, he was made secretary of state (in 1843) under Narvaez, and minister of the interior. Besides several novels, plays, and poems, he published a "Constitutional History of England" (1859), "Artistic and Monumental Spain," and other works.

Escrow, a deed deposited by a grantor with a third person, to be delivered to the grantee on the happening of a certain condition. Until the condition is fulfilled and the escrow delivered, it has no effect as a deed, and the title of the estate remains in the grantor. It takes effect, in general, as a deed from the second delivery. Where the ends of justice require it, it may be referred, for its validity by a fiction of law, termed "relation," back to the first delivery.

Escu′rial, or **Esco′rial** [Sp. *escoria*, "dross," applied to all places where there are old or exhausted mines], a monastery and royal palace near Madrid, in Spain, built by Philip II., and dedicated to Saint Lawrence on occasion of the victory of St.-Quentin in 1557, on that saint's day. It is whimsically built in the form of the gridiron on which that saint is said to have been broiled alive. The work was begun by Juan Bautista de Toledo in 1563, and completed by his pupil, Juan de Herrara, in 1584. The cross-bars of the gridiron are represented by ranges of buildings separated by intervening courts, and which were formerly inhabited by monks and ecclesiastics. The main portion of the building is 740 Spanish feet long, and 580 in breadth. The projection which forms the royal palace is 460 feet in length. The height of the edifice is about sixty feet, and at each angle is a square tower 200 feet high. It is one of the largest and perhaps one of the most tasteless buildings in Europe, though grand from its size. The church in the centre of this enormous mass of stone is very large and rich. The Pantheon, a repository beneath this church, is the place of interment for the royal family, whose remains are deposited in tombs of marble placed in niches, one above another. The richest part of this edifice, however, was that which contained the valuable pictures, and which altogether formed the best collection of the productions of the first masters that any place in Europe displayed. The French, when in possession of the Escurial, removed many of its best treasures, which included the finest productions of Rubens, Titian, Spagnoletto, Raphael, Baroccio, Velasquez, Murillo, and others. The most valuable treasures of the Escurial, however, are the immense collection of ancient manuscripts preserved in the library, especially those of the Arabian writers. (*Encyc. Brit.*) In 1872 it was fired by lightning, suffering some damage.

Escutch′eon [Fr. *écusson*, from the Lat. *scutum*, a "shield"], a heraldic term applied to a shield on which arms are represented. The points of the escutcheon are nine in number, being the parts named in order to express the local position of the charges borne on the field. An escutcheon of pretence is the shield on which a man carries the arms of his wife, if she is an heiress and has children. It is placed in the centre of his own shield, and is mostly of the same form.

Escutcheon, or **The Milk Mirror,** in the Guénon method of selecting milch cows, is the shield-like outline upon the back of the cow's udder and the adjacent parts, formed by the upward growth of the hair. Some writers call the whole outline the "mirror," and the upper part only the "escutcheon." It is found by careful observation that the size and perfection of these marks afford valuable means of judging of the milking qualities of cows, though much experience is required in learning to make the estimate. (See C. L. FLINT, "Milch Cows and Dairy Farming," 1859.)

Esdrae′lon, in the apocryphal book of Judith, **Esdrelom** [from the Gr. Ἐσδραηλά, a corruption of the Hebrew *Jezreel*], the most picturesque, most fertile, and historically most important plain in Palestine, "lying between Tabor and Carmel, and between the hills of Galilee on the north and those of Samaria on the south." In Scripture it is twice (2 Chron. xxxv. 22; Zech. xii. 11) called "the valley (plain) of Megiddo." Jezreel is properly the south-eastern part of it, although this name is sometimes given to the whole. It is triangular in form, the length of its south-eastern side being about 15 miles, its south-western about 18 miles, and its northern about 12 miles. Its surface, whose elevation is about 400 feet above the Mediterranean, is slightly undulating. It sends off towards the Jordan three great arms or branches, which are separated from each other by the mountains of Gilboa and Little Hermon. Only one of these arms, however (the middle one), declines eastward. The greater part of the plain is drained by the Kishon, which empties into the Mediterranean near Acre. This great plain has been the scene of several important battles, and with it are associated the names of Barak, Gideon, Saul, Josiah, and Napoleon. (See ROBINSON, "Physical Geography of the Holy Land," 1865.)

Es′dras, Books of, are certain books of the Old Testament and of the Apocrypha ascribed to Ezra, whose name is Græcised into *Esdras*, following the Septuagint. The canonical books of Ezra and Nehemiah (as they are called in the authorized English version) are denominated in the

Vulgate and in the Thirty-nine Articles of the Anglican Church the first and second books of Esdras, while the apocryphal books, now generally known as the first and second of Esdras, are there called the third and fourth of Esdras. The Geneva Bible (1560) first adopted the present nomenclature, calling the two apocryphal books first and second Esdras.

The first (apocryphal) book of Esdras was written in very good Greek, but whether in Palestine or in Egypt, and at what time, cannot be determined. It is not without historical value, and is for the most part a history of the restoration of the Jews after the Babylonian captivity. It is not received into the canon of either Jews or Christians.

The second apocryphal book of Esdras is purely pseudepigraphic, being a record of pretended revelations made to Ezra for the encouragement of the suffering Jews. Many interpolations have been made to it by some over-zealous Christian. The original is believed to have been written by a Jew of Egypt in the Greek tongue, either just before or soon after the Christian era. The original Greek is lost, but Latin, Ethiopic, and Arabic versions exist. It is canonical in the Abyssinian Church. English versions are the authorized, from the Latin, Ockley's, from the Arabic (1711), and Laurence's, from the Ethiopic (1820).

Esk, a small river of Scotland, in the county of Dumfries, flows southward through Eskdale Muir, and enters Solway Frith. Length, about 40 miles. Its valley is noted for picturesque scenery. Another river Esk is formed by the union of the North and South Esk, which meet in Dalkeith Park, Edinburghshire. It enters the Frith of Forth at Musselburgh.

Esk'ee Sa'ra, or **Eski Sagra,** a town of European Turkey, province of Room-Elee, on the south slope of the Balkan Mountains, 70 miles N. W. of Adrianople. It has manufactures of carpets, coarse linen, and leather. Here are several mineral springs. Pop. estimated at 18,000.

Eskilstuna, a Swedish town, 55 miles W. of Stockholm. It is the principal place for the manufacture of the better sorts of iron. Pop. 5088.

Eskridge, a thriving post-village of Wabaunsee co., Kan., near the centre of the county, has one weekly newspaper.

Es'men, a township of Livingston co., Ill. Pop. 917.

Esmeral'da, a county in the S. W. of Nevada, bordering on California. The surface is mountainous; the soil is sterile except along the streams. It contains Walker's Lake, which is about 30 miles long and has no outlet. Silver-mines have been opened in several parts of the county. Gold, copper, iron, salt, lead, and mercury are found. Cattle and grain are raised. Capital, Aurora. Pop. 1553.

Es'neh, Esné (anc. *Latopolis*), a town of Upper Egypt, on the left bank of the Nile, about 30 miles above Thebes. It has manufactures of blue cotton and pottery; also an active trade with Sennaar and Abyssinia. Here are the ruins of the populous ancient city of *Latopolis*, so called from the worship of the *latus* fish. Among them is a well-preserved portico of a grand temple, with twenty-four beautiful columns standing, and a zodiac on the ceiling like that at Denderah. All the rest of the temple is literally buried, the houses of the modern town standing even upon its roof. In visiting the portico, one goes down as into a deep vault. It was cleared of rubbish by order of Mohammed Ali in 1842. An older temple appears to have been built there by Thothmes III. of the eighteenth dynasty, but the present edifice dates from the times of Tiberius, Vespasian, Trajan, Hadrian, and Antoninus. On the river-bank are also the remains of a Roman quay. Pop. 12,000.

Esop. See ÆSOP.

Eso'pus, a post-township of Ulster co., N. Y. It contains Port Ewen and other villages, produces much ice, fruit, and hydraulic cement, and is a place of summer resort. It takes its name from a tribe of Algonkin Indians long since extinct. Pop. 4557.

Esoteric, ês-o-tĕr'ik [from the Gr. ἐσωτερικός, "inner," "intimate"], a term applied to those doctrines which are designed for the initiated only. The ancient philosophers are supposed to have had a set of mysterious doctrines, which they imparted to their more enlightened and intimate disciples, and other doctrines, more popular, for the benefit of the multitude. This opinion is to some extent well founded as regards Aristotle, except so far as relates to the suspicion of intentional concealment, which is implied. His exoteric or published writings appear to have been written as dialogues, and are not extant. His esoteric works, as may be inferred from the synonymous term *acroamatic*, were not intended to supersede the necessity of oral instruction to render them intelligible, and this may account for the perplexed arrangement, brevity, and repetitions of his surviving works.

E'sox, a genus of fishes which includes the pikes, and the type of the family of the Esocidæ. These are the most voracious of all fresh-water fishes, attain a large size, and live to a great age. The habits of the European pike (*Esox lucius*) have been often described. In North America there are many species of the genus *Esox*, of which the largest and finest is the muskallunge (*Esox Estor*). The pickerel (*Esox reticulatus*) is perhaps the most common and best known of our pikes.

Esox lucius.

Espalier [Fr.], in horticulture, a railing or trellis-work used as a substitute for a wall, on which to train fruit trees or ornamental shrubs. The objects are to hasten the ripening of fruit by exposing the foliage of the plants more freely to the light, to prevent the branches from being blown about by the winds, and to economize space. The espalier is constructed of wood or iron, and consists of horizontal rails supported by upright posts. Apples, peaches, and pears are trained on espaliers in England.

Esparte'ro (JOAQUIM BALDOMERO), duke of Vittoria, was born Feb. 27, 1792, at Granatula, La Mancha. He was the son of a cartwright. He enlisted in the army in 1808, served as an officer against the French, against Bolivar (1815–25), and against the Carlists (1833–40). He became a lieutenant-general in 1835, a grandee in 1838, regent of Spain in 1841, was banished by Narvaez in 1843, and became prime minister in 1854. Under King Amadeus (1872) he was senior captain-general of the army. (See J. S. FLOREZ, "Espartero: Historia de sa Vida," 3 vols., 1844.)

Espar'to (*Sti'pa* or *Macroch'loa tenacis'sima*), a species of grass growing in Spain, Barbary, etc., has a very strong fibre, which is used by the Spaniards for making cordage, mats, nets, etc. Large amounts are used in Great Britain in the manufacture of paper. Its culture in the U. S. has been recommended. Esparto, the *halfa* of Algiers, was first used for paper by an Englishman named Routledge, whose patent was issued in 1846. The paper produced is generally of good quality.

Es'perance, a post-township of Schoharie co., N. Y. Pop. 1276.

Espinasse, de l' (CLAIRE FRANÇOISE, or JULIE JEANNE ÉLÉONORE), a fascinating French lady, born in Nov., 1732. She was distinguished for her imagination and sensibility. In 1752 she went to live in Paris as companion to Madame du Deffaud, in whose house she remained nearly ten years. She gained the affection of D'Alembert, and became about 1762 mistress of a *salon* which was frequented by a brilliant literary coterie. Died in May, 1776. Her published letters are much admired.

Espinasse (ÉSPRIT CHARLES MARIE), a French general, born at Saissac, in Aude, April 2, 1815. He served in the Crimean war as a general, and distinguished himself at the Tchernaya (1855). In 1858 he was minister of the interior for about four months. He was killed at the battle of Magenta June 4, 1859.

Espinel' (VINCENTE), a popular Spanish poet, born at Ronda about 1544. He learned several ancient and modern languages, and became a priest. It is stated that he served some years as a soldier, and led an adventurous life in several foreign countries. Among his works are numerous songs, the "House of Memory" ("La Casa de Memoria"), and a novel entitled "Marcos de Obregon" (1618), from which Le Sage borrowed incidents of "Gil Blas." Espinel ranked among the best poets of his time. Died in 1634.

Espinha'ço, Ser'ra do, a mountain-chain of Brazil, in the provinces of Bahia and Minas Geraes. It contains diamond-mines.

Espir'ito San'to (*i. e.* "Holy Spirit"), [Port.], a province of Brazil, is bounded on the N. by Bahia, on the E. by the Atlantic, on the S. by Rio Janeiro, and on the W. by Minas Geraes. It is partly drained by the Rio Doce. The soil is very fertile, but a large part of the province is still covered with forests, in which are many valuable woods and drugs. The lowlands along the coast produce sugar, cotton, rice, and manioc. Capital, Vittoria. Pop. 65,000, of whom 15,000 are slaves.

Espiritu Santo [Sp.], a town of Cuba, near the middle of the island, about 240 miles E. S. E. of Havana. Pop. about 10,000.

Esplanade, ês'plan-ād' in fortification, is an open

space of ground left between the glacis of a citadel or fort and the houses of a town, in order to prevent the enemy erecting breaching-batteries under cover of buildings. The term has also been applied to the glacis of the counterscarp, or the slope of the parapet of the covered way towards the country.

Es'py (James P.), an American meteorologist, styled the "storm-king," born in Washington co., Pa., May 9, 1785. He was the author of a theory of storms which excited some controversy, and which he published in 1841, in systematic form, under the title "The Philosophy of Storms." According to this theory, every great atmospheric disturbance commences with the uprising of a body of air which has been rarefied by heat. The heavier air, flowing in beneath, creates currents converging from all directions to the central point. The rising mass dilates as it rises, in consequence of diminished pressure, and its temperature falls, in consequence of this dilatation, down to the dew-point and below, precipitating its contained vapor in the form of cloud. The latent heat of elasticity thus liberated dilates the air still more, and disturbs the equilibrium anew, so that the rising continues to go on, till the moisture in the air forming the upward current is practically exhausted. As the heavier air flowing in beneath finds a diminished pressure above it, this air also rises, causing still greater drafts upon the surrounding air, and establishing permanent converging currents, which meet in the centre and rush upward, with constantly increasing violence. The vast amount of aqueous vapor precipitated during this atmospheric commotion gives rise to heavy rains. Mr. Espy's theory found many adherents. The physical principles on which it rests are sound, and it is so far supported by observation. It received also the approval of the French Academy of Sciences in a formal report. But his views as to the mechanics of storms are untenable, and are contrary to observed facts. Converging currents invariably produce rotation, and hence, though storms doubtless often originate in the causes assigned by him, their characteristic action is rotatory or spiral. A lively controversy was for some time maintained between the supporters of Mr. Espy and those of his principal opponent, Mr. Redfield, who held the rotatory theory. This long ago ceased, and the rotatory theory is now generally accepted. It has given to meteorology the familiar term *cyclone*. It has also been made the basis of instructions, for the use of navigators, by the British Admiralty and the U. S. bureau of navigation.

Mr. Espy entertained a sanguine belief that rains could be brought on at any time by means of great fires, kept up long enough and over a sufficiently large surface to initiate a powerful upward movement, relying on natural causes to maintain the current when once started. He even supposed that it might be possible in this way to maintain the navigation of the upper Ohio River through the dry season. He therefore petitioned Congress and the legislature of Pennsylvania to make a sufficient appropriation to enable him to try the experiment; but without success. He received, however, an appointment as meteorological observer under the government; and while holding this position he made arrangements, in accordance with a judicious suggestion of the Hon. A. H. Stephens of Georgia, with the press and with the various lines of telegraph converging to the capital, to publish daily bulletins of the state of the weather in different and distant localities. These were doubtless the first weather-telegrams ever regularly made public. The system, discontinued during the war, has been since revived and largely extended. It has also been introduced into England and into parts of continental Europe. While enjoying its benefits the world should not forget the meritorious observer with whom it originated. He died in Cincinnati Jan. 24, 1860. F. A. P. Barnard.

Esquimaux, es'ke-mo' (plu.), [a French orthography of the Algonquin *eskemo,* an "eater of raw flesh;" called in their own tongue *Innuit,* "men"], a race of men inhabiting the Arctic coasts of North America and its islands, and the coast of Labrador nearly as far south as the Gulf of St. Lawrence; also found on the extreme north of the Pacific coast of Alaska, and to some extent in the N. E. part of Asia. They are short, though broad and muscular, very seldom exceeding five and a half feet in height. In color they are of a rather light brown, and in features they approach the Mongolian type. Their food consists of the flesh of whales, seals, the walrus, birds, and fish. They have remarkable skill in fishing and hunting. Their only domestic animal is the dog, of which they possess a large and powerful variety, very useful to them, not only in the chase, but for drawing sledges. Their personal habits are extremely filthy. Their dress is made of skins, and is nearly the same in both sexes. Their religion is a rude superstition, in which only the vaguest notions of a Supreme Being can be found. In Greenland and on the Labrador coast the Moravian and the Danish Lutheran missionaries have, since 1721, brought to many of them the knowledge of Christianity.

The ethnological relations of the Esquimaux are not well understood. Physically, they approach the Mongolian type, and their presence in Asia would appear to confirm this view of their origin, but their language is of the American structure and inflection. There appears to be a remarkable uniformity in their vocabulary throughout the whole race. The opinion of Pritchard, that they are a link in the chain connecting the Mongolian and the American races, seems to be the prevailing belief with ethnologists. Their numbers in America are estimated at 47,500, of whom about 20,000 are in Greenland, 1500 in Labrador, 4000 on the coasts of Hudson's Bay, and 17,000 in Alaska. (See Montémont, "Mœurs et Coutumes des Esquimaux," 1841; C. F. Hall, "Life with the Esquimaux," 1864.)

Esquire [from the Sp. *escude'ro* (*i. e.* a "shield-bearer"); Old Fr. *escuyer*], a name originally given to an armor-bearer, an attendant on a knight. As this office in times of chivalry was mostly borne by persons of good family, the word esquire came to be used in England for the rank next below knight and above simple gentleman. The younger sons of peers, who are now called honorables, their eldest sons, and those of knights, the justices of the peace, sheriffs of counties, sergeants-at-law, and doctors of divinity, are esquires by virtue of their rank or office. Heads of ancient families are esquires by prescription, and hence the word has come to be used as a common addition to the names of all who hold the rank of gentleman. An esquire was formerly created by the king by putting a silver collar of *SS* around his neck and bestowing on him a pair of silver spurs.

Esquirol (Jean Étienne Dominique), M. D., a French physician and philanthropist, born at Toulouse Jan. 4, 1772. He founded at Paris in 1799 an asylum for the insane, which was a model institution, and he initiated a reform in the treatment of the insane. In 1817 he began a course of clinical lectures for mental maladies, on which he wrote a valuable work, "Des Maladies Mentales" (2 vols., 1838). He became in 1826 chief physician of the asylum at Charenton. Died Dec. 12, 1840.

Esquiros (Henri Alphonse), a French poet and novelist, born in Paris in 1814. On account of his work, "The Gospel of the People," he was in 1840 sentenced to eight months' imprisonment, during which time he became an intimate friend of Lamennais. After the revolution of 1848 he was elected a member of the Legislative Assembly, in which he belonged to the extreme Left. In consequence of the *coup-d'état* of 1851, he had to leave France, and lived in England until 1869, when the amnesty proclaimed by Napoleon allowed him to return. Soon after he was elected a member of the Legislative Body. After the overthrow of the empire, in Sept., 1870, the provisional government sent him as administrator-general of the department of Rhone to Marseilles, where he succeeded in suppressing anarchical tendencies. He favored the separation of the south of France from the north, and for a while refused to recognize the decree of Gambetta which suspended him, but finally resigned in Nov., 1870, in order to avoid a civil war. In Feb., 1871, he was elected a member of the National Assembly, and took his seat at the extreme Left. He published, besides other works, "The Magician" (1837), "Charlotte Çorday," a novel (1840), "The Gospel of the People" ("Évangile du Peuple," 1840), "The History of the Mountain" ("Montagnards," 1847), "La Morale Universelle" (1859), "l'Angleterre et la vie anglaise" (5 vols., 1859–70); and in the English language, "Religious Life in England" (London, 1867), "English Seamen" (1868).

Ess, van (Leander), a German Catholic theologian, distinguished at once for his learning and his liberality of opinion, especially with respect to the circulation of the Scriptures, was born at Warburg, in Westphalia, Feb. 15, 1772. In 1790 he entered the Benedictine monastery of Marienmünster in Paderborn, in 1796 became priest, afterwards pastor at Schmalenberg, and in 1813 professor extraordinary of theology at Marburg. He aided his cousin, Karl van Ess (1770–1824), in publishing a German translation of the New Testament (1807), and twelve years later (1819), without assistance from his cousin, who had meanwhile given up his liberal opinions, published also a translation of the Old Testament. His edition of the Vulgate appeared in 1822, and his edition of the Septuagint in 1824. He lived in seclusion for several years, and died Oct. 13, 1847. His library, rich in Bibles, patristic, mediæval, and Reformation literature, and making some 18,000 volumes, now belongs to the Union Theological Seminary in New York City.

Es'say [Fr. *essai*], an attempt; an experiment; a lit-

erary composition. In literature this title is generally given to short disquisitions on subjects of taste, philosophy, morality, etc. In this sense it has been applied to periodical papers published at regular intervals under a collective name by one or more writers. From the appearance of the "Tatler," which was chiefly written by Sir Richard Steele, this species of literature continued to be a favorite in England for seventy years. Many series of essays were produced, the best of which are united in one collection under the name of "The English Essayists." The most celebrated of these writings was "The Spectator," to which Addison contributed the best essays; and next to it the "Rambler," chiefly written by Dr. Johnson. Among the eminent essayists of more recent times is Macaulay. The title of *essay* has been also adopted by way of indicating diffidence in the completeness of their work by authors of more extended performances, as by Locke, "Essay on the Human Understanding."

Essek. See ESZEK.

Es'sen, a town of Rhenish Prussia, on the Cologne and Minden Railway, and near the river Ruhr, 27 miles by railway N. E. of Düsseldorf. It has a cathedral, a gymnasium, a realschule, and a female high school; also manufactures of steam-engines, firearms, woollen cloth, paper, and iron wares. It derives its prosperity chiefly from the rich coal-mines which surround it. In the vicinity is a large iron-foundry, copper-mills, and Krupp's extensive manufactory of steel. Pop. in 1871, 51,526.

Es'sen (HANS HENRIK), COUNT OF, a Swedish general, born in West Gothland in 1755. He was appointed governor of Stockholm in 1795, and obtained in 1807 the command of an army with which he defended Stralsund against the French. He was sent as ambassador to Paris by Charles XIII., who became king in 1809. In 1814 he was raised to the rank of field-marshal and governor-general of Norway. Died July 28, 1824.

Essence, a solution of an essential oil in alcohol or rectified spirit. (See ESSENTIAL OILS.)

Es'sence [Lat. *essen'tia*, from *esse*, "to be," literally, "being"]. Chauvin, in his "Lexicon Rationale" (1713), gives the following definition of this word: "All that by virtue of which anything is, and is what it is." The "essential qualities" of an object or being consist of those elements each and all of which are necessary to its existence. The term essence is used to denote the sum of these essential qualities. The term is used as a general name for the essential qualities or elements of all objects or beings in general, or to denote similar elements in a single object or being. Much confusion in thought arises from the failure to distinguish between the general and singular use of this term and the closely allied word *substance*. By the modern Platonists the word is used to denote the real being, "idea," or spiritual substance of objects, as distinguished from the matter which represents the "idea" to the outward senses. The Scholastics, who adopted the Aristotelian distinction of "matter" and form, departed somewhat from the Aristotelian conception, and called the matter of any object its substance, and the "form" or force which shaped the matter and determined its genus or species, the essence of the object, as made up of all those modalities without which the object, as such, would cease to exist. This mode of statement was specially adopted by the Scotists. Descartes so defined substance that the term was applicable to God only, and denominated by essence all those forms of matter which determine species and genera, and without which they would cease to be. The words *essence* and *substance* in modern writers are often used as substantial synonyms, denoting all that in any object the knowledge of which is impossible to the human mind; while quality or accident is used to name all that can be actually known. Few terms in philosophy and theology are used with more confusion and vagueness. It is always requisite in reading discussions in which they frequently occur to ascertain the exact or inexact sense in which an author uses them.

Essenes, ês-seenz' [Gr. Ἐσσηνοί; Lat. *Esse'ni*], or **Essæans** [Gr. Ἐσσαῖοι], the latest, and apparently the smallest, of the three Jewish sects in existence in the time of Christ. They are not mentioned in the New Testament. The etymology of the name is doubtful, and the history of the sect obscure. The Essenes were mystics, and most of them celibates. They are not to be confounded with the Therapeutæ, although a kindred sect. The greater part of them lived by themselves near the N. W. shore of the Dead Sea, but they were also scattered in various parts of Palestine, and are supposed to have numbered in all some 4000 or 5000. The first distinct trace of them is about 110 B. C., and they disappear from history after the destruction of Jerusalem by the Romans.

Essen'tial Oils [so called because they were formerly supposed to contain the essence or active principle of the plant or substance from which they are extracted], called also **Vol'atile Oils,** a large class of compounds, mostly of vegetable origin, though some are derived from animal sources. They mostly exist already formed in plants. With a few exceptions they are colorless, and have in most cases a powerful odor and pungent taste, resembling that of the plant whence they are derived. A large number of them are isomeric (or identical in composition) with oil of turpentine and with caoutchouc. These are called terpenes ($C_{10}H_{16}$); others are aldehydes; still others appear to be compounds of alcohol radicals with organic acids, etc. A very few contain sulphur. Most of them are obtained by distillation with water, others by pressure. They are in many cases changed by time and exposure into resins, or resolved into several distinct substances.

Essequi'bo, a river of British Guiana, rises near the S. frontier, flows northward through forests of gigantic trees, and enters the Atlantic by an estuary 20 miles wide; lat. 7° 0′ 20″ N., lon. 56° 42′ 31″ W. Length, 500 miles. It is navigable 60 miles.

Es'ses, Collar of, or **Collar of *SS*,** a heraldic ornament composed of *S*-shaped links joined together or embroidered somewhat after the manner of a chain. It enters into the insignia of various officers in England, and was, it is said, anciently worn by all esquires. It is claimed by some that the *SS* is emblematic of Saint Simplicius.

Es'sex ["East Saxons"], a county of England, bounded on the E. by the North Sea and on the S. by the estuary of the Thames. Area, 1657 square miles, of which nine-tenths are arable. It is partly drained by the Stour, the Lea, and the Chelmer rivers. The surface is pleasantly diversified, except the flat marshy land near the sea. The soil is mostly a fertile loam, which produces wheat, barley, oats, beans, hops, potatoes, etc. Essex is an agricultural county, having comparatively few manufactures. Many sheep are raised. The chief towns are Chelmsford (the capital), Colchester, Harwich, and Maldon. Essex was a kingdom of the Anglo-Saxon Heptarchy, which comprised Essex and parts of Middlesex, Hertford, and Bedford. Pop. 466,427.

Essex, a county which forms the S. W. extremity of Ontario, Dominion of Canada. Area, 677 square miles. It is bounded on the N. by Lake St. Clair, on the S. by Lake Erie, and on the W. by Detroit River. The soil is productive. It is intersected by the Great Western Railway. Capital, Sandwich. Pop. in 1871, 32,697.

Essex, a county which forms the N. E. extremity of Massachusetts. Area, 500 square miles. It is bounded on the E. by the Atlantic Ocean and on the S. E. by Massachusetts Bay. It is intersected by the Merrimack River, and has several good harbors on the coast. The surface near the sea is rugged and rocky, but the soil is generally fertile. Fruit, hay, grain, and garden and dairy products are raised extensively. The inhabitants of Gloucester, Marblehead, Beverly, Salem, and Newburyport are extensively employed in commerce and the fisheries. Essex county is traversed by the Boston and Maine, the Essex, the Eastern, and the Newburyport R. Rs. Here are extensive manufactures of carriages, leather, shoes, machinery, cotton, linen, wool, and many other goods. Lawrence, Lynn, Haverhill, Salem, Marblehead, Peabody, Gloucester, Newburyport, Andover, Amesbury, and Danvers are large and important towns. Ice and granite are largely exported. Capitals, Salem, Newburyport, and Lawrence. Pop. 200,843.

Essex, a county in the N. E. of New Jersey. Area, about 130 square miles. It is bounded on the E. by the Passaic River and Newark Bay, and on the W. by the Passaic River. The surface is nearly level, except the western part; the soil is productive. Hay, grain, dairy and garden produce are raised extensively. The manufactures include boots, shoes, metallic wares, saddlery, carriages, and a great variety of commodities. It is intersected by the Morris and Essex, the Paterson and Newark, and the New Jersey R. Rs.; also the Morris Canal. This is the most populous county in the State. Capital, Newark. Pop. 143,839.

Essex, a county in the N. E. of New York. Area, 1926 square miles. It is bounded on the E. by Lake Champlain, and contains several small lakes. The Au Sable River forms part of the northern boundary of the county, which is partly drained by the Hudson River. The surface is mountainous, and mostly covered with forests. Essex county comprises a large part of the Adirondac Mountains, and Mount Marcy, the highest point in the State, here rises 5467 feet above the level of the sea. Among its mineral resources are iron ore and limestone. Potatoes, grain, wool, hay, and dairy products are raised extensively. Lumber, leather, cooperage, iron, and starch are among

the manufactured commodities. Capital, Elizabethtown. Pop. 29,042.

Essex, a county which forms the N. E. extremity of Vermont. Area, 790 square miles. It is bounded on the E. by the Connecticut River, and is partly drained by the Passumpsic. The surface is mountainous. It is intersected by the Grand Trunk and the Portland and Ogdensburg R. Rs. Capital, Guildhall. Pop. 6811.

Essex, a county in the E. of Virginia. Area, 300 square miles. It is bounded on the N. E. by the navigable Rappahannock River. The soil is sandy and moderately fertile. Grain and wool are produced. Capital, Tappahannock. Pop. 9927.

Essex, a post-village of Middlesex co., Conn., on the Connecticut River, 7 miles from its mouth, and about 17 miles W. of New London. It has one national bank, and manufactures of carriages and soap. Pop., including Essex township, 1669.

Essex, a township of Kankakee co., Ill. Pop. 990.

Essex, a township of Stark co., Ill. Pop. 1538.

Essex, a township of Porter co., Ind. Pop. 228.

Essex, a post-township of Essex co., Mass., on a branch of the Eastern R. R. It has ten shipyards. Essex-built vessels have a high reputation. Pop. 1614.

Essex, a post-township of Clinton co., Mich. Pop. 1501.

Essex, a post-township of Essex co., N. Y. romantically situated on Lake Champlain. It has manufactures of iron, lumber, lime, shipping, woollen goods, etc. Pop. 1600.

Essex, a post-township of Chittenden co., Vt., 8 miles E. of Burlington, at the junction of the Burlington division with the main line of the Vermont Central R. R. Essex has a classical institute, and manufactures of wall-paper, gloves, shirts, metallic wares, furniture, brick, and other goods. Pop. 2022.

Essex (Robert **Devereux**), second earl of, an English courtier, born in Herefordshire Nov. 10, 1567, was the eldest son of Walter, the first earl of Essex. He served with distinction at the battle of Zutphen in 1586, and became master of the horse in 1587. In 1588 he succeeded the earl of Leicester as the prime favorite of Queen Elizabeth. He had a handsome person, agreeable manners, and other popular qualities. He married, in 1590, Sir Philip Sidney's widow, who was a daughter of Sir Francis Walsingham. He commanded the land forces of the expedition which took Cadiz in 1596, and he became earl-marshal of England in 1597. He was appointed lord lieutenant of Ireland, and was sent in 1599 to subdue a revolt of the Irish, but was not successful. Having been removed from office in disgrace, he returned to London, and provoked the queen by his rash and disrespectful conduct. It is stated that he tried to excite an insurrection in London. He was tried for treason, and beheaded Feb. 25, 1601. He was brave and generous, but too vain and ambitious.

Essex (Thomas Cromwell), earl of. See Cromwell.

Ess'ling, a village of Austria, on the Danube, 7 miles E. of Vienna, was the scene of an indecisive battle between Napoleon and the Austrians in May, 1809. (See Aspern.)

Esslingen, a town of Würtemberg, on the river Neckar, 9 miles by rail E. S. E. of Stuttgart. It is on the railway which connects Stuttgart with Ulm, is enclosed by walls, and has an old castle. It has a splendid Gothic church, built in 1440, with a spire 230 feet high, a handsome town-hall, and a richly endowed hospital. Here are important manufactures of machinery, cotton and woollen stuffs, paper, silver-ware, and wine. Esslingen became in 1209 a free city of the German empire. Pop. in 1871, 17,941.

Established Church, a term applied to any church organization which is exclusively recognized by the government of a country, or which has peculiar privileges under any government. Most Mohammedan and heathen countries have an established religion, though in nearly all more or less freedom of opinion is allowed. Christianity first became the established religion of the Roman world under Constantine the Great. Charlemagne strengthened the Church establishment in the West; and throughout the Middle Ages the unity and authority of the Church exercised a great, and in some respects a very salutary, influence upon the crude society of those times. Some of the early Protestant Reformers advocated a separation of Church and State, but in every European country where Protestantism prevailed some one of its divisions became the State Church; and the same was the case in most of the English North American colonies. Whatever may have been the effect for good or evil in those times, it is not only the popular opinion, but the conclusion of the best thinkers of our time, that the day for church establishments has gone by, and that the voluntary system is on all accounts greatly to be preferred.

Estafette, ĕs'tă'fĕt', a French word which is used in nearly all the countries of Europe to signify an *express* employed to convey packages, letters, etc. Articles sent by the estafette are consigned to the care of successive postilions, who are changed with every relay of horses.

Estaing, d' (Charles Hector), Count, a French naval officer, born in Auvergne in 1729. He served in the land army in India, and was appointed lieutenant-general of the naval armies in 1763. He commanded as vice-admiral a fleet sent in 1778 to fight for the U. S. His fleet was damaged by a storm near Newport in August of that year. He soon repaired his ships, and sailed to the West Indies, where he captured Grenada in 1779. In September of that year he attacked the British at Savannah without success. He returned to France in 1780, and was guillotined April 28, 1794.

Estaires, a town of France, department of Nord, on the Lys. It has considerable manufactures of linen, napkins, soap, candles, and oil. Pop. 7120.

Estate, a word sometimes used to indicate property generally, whether real or personal. Sometimes it includes land alone. In law it denotes the interest which one may have in property. It means the time during which ownership exists, as for a year, or for life, or for ever. Under the common law, estates in land are divided, as regards the *quantity* of interest, into two general divisions: 1st, freehold estates; 2d, estates less than freehold.

1st. A freehold is an estate which may last for life or longer. An estate which is circumscribed within a certain number of years, or one in which the possessor has no fixed right of enjoyment, is less than freehold; and although, in fact, it may endure longer than the life of its first possessor, still the law regards it as a lower estate than a freehold; it is in the eye of the law personal property, and does not descend to heirs, though it may pass to executors or administrators.

Freehold estates are divided into estates of inheritance, which pass to heirs, and estates not of inheritance; the former are again divided into estates in fee simple and estates in fee tail. A fee simple is the most extensive and highest interest a man can have in land. If not aliened or devised, it passes to heirs generally. A fee tail, on the other hand, is an estate which is limited to certain particular heirs or to a certain class of heirs, to the exclusion of the others, as to the heirs of one's body, which excludes collateral heirs, or to the heirs male of one's body, which excludes females. Fee tails have had only a limited existence in this country, and are now, in general, abolished. In New York, by the law of 1782, they were changed into estates in fee simple.

Freeholds not of inheritance are for life only, either for the life of the tenant or of some other person or persons, when the estate is called an estate *pur autre vie*. Life estates are created by the act of the parties or by operation of law. An example of the former is where A conveys land to B for the term of his natural life, or where A conveys land to B without expressing the duration of the term. Here, under the common law, B would take only a life estate, but by statute in New York and many other States a grant or devise of real estate passes all the interest of the grantor or testator, unless the intent to pass a less estate or interest appears in express terms or by necessary implication. Curtesy and dower are life estates created by act or operation of law. When a man marries a woman seized at any time during the coverture of an estate of inheritance, and has issue born alive during the life of the wife, which might possibly inherit from the mother, the husband on the death of the wife has an estate for his life in her land, which is termed curtesy. In many of the States a wife may alien or devise her land so as to defeat this estate, and in some it is altogether abolished. When a husband dies, the wife has a life estate in a third of all the land in which at any time during coverture he had an estate of inheritance. This estate of the wife is termed dower. In some of the States, by statute, a wife is entitled to dower only in the land of which her husband died seized, and in most of the States the interest which a wife takes in the land of her deceased husband has been a matter of statutory regulation.

2d. Estates less than freehold. These are divided into estates for years, at will, and by sufferance. An estate for years is an estate for a determinate period, whether it be for a longer number of years than a human life, or for only a portion of one year. An estate at will is where one man lets land to another to hold at his will, as well as that of the lessee. Such an estate is terminated by either party on due notice. Out of estates at will a class of estates has grown up called estates from year to year, which can be terminated only by six months' notice, expiring at the end of the year. An important element in creating this estate

is the payment of rent. An estate by sufferance arises when one comes into the possession of land by agreement, and holds over after his original estate has expired, and without any agreement, express or implied, by which it is continued. The landlord has a right to enter at any time, and dispossess the occupant without notice.

These estates may be created upon condition—that is, their existence may depend on the happening or not happening of some event whereby the estate may be created, enlarged, or defeated. A fee, a freehold, or a term for years may thus be upon condition. The condition must either be precedent—that is, must happen before the estate can vest or be enlarged—or subsequent, when it will defeat an estate already vested.

Estates may also be legal or equitable. They are called "equitable" when the formal ownership is in one person and the beneficial ownership is in another. Another form of expression is that a trust is created. This distinction does not affect the nature of the estate. Thus, a trust estate may be a life estate or a fee, and in the latter case is transmissible to heirs as though it were a strict legal estate.

In regard to the time of enjoyment, estates are divided into estates in possession and estates in expectancy. An estate in possession is one in which there is a present right of enjoyment. Estates in expectancy are those which give either a vested or contingent right of future enjoyment. They are subdivided into remainders, which are created by the express words of the parties, as where one gives a life estate in land to A, and the remainder to B; and reversions, which arise by operation of law, as where one gives an estate for life to A; here, on the death of A, the estate reverts to the grantor or his heirs, who, until the termination of A's estate, are said to have a reversion in the land. Besides these, there are future estates introduced into the law by the doctrine of uses (see USES) which are not governed by the technical rules applicable to remainders. They are called "springing and shifting uses." Similar provisions in a will are termed "executory devises."

In regard to the number of owners, estates are divided into estates in severalty, in joint tenancy, in common, and in coparcenary. An estate in severalty is one which has only a single owner. An estate in joint tenancy is an estate owned jointly by two or more persons, whose title is created by the same instrument. The distinguishing characteristic is the right of survivorship. On the death of any tenant his interest is extinguished, and the estate goes to the survivors. By the common law, where an estate is conveyed to two or more persons without indicating how it is to be held, it is understood to be in joint tenancy. But in most of the U. S. this rule has been changed by statute, and persons to whom an estate is conveyed or given take as tenants in common, unless they hold as trustees. An estate in common is where separate and distinct but undivided interests in land are held by two or more persons. Each tenant is considered as solely seized of his share, which on his death descends to his heirs. An estate in coparcenary is the estate which female heirs take in the land of an intestate ancestor. In this country this estate is essentially extinguished, and heirs take as tenants in common.

The English classification of estates in land has been much modified by statute in the U. S., but it forms the basis of the law of real estate throughout the American Union, except in Louisiana, where the civil law prevails.

T. W. DWIGHT.

Estates, The Three, or the **Estates of the Realm** [Fr. *Les États Généraux*], the political name designating the three classes of feudal society: 1, the nobles; 2, the clergy; and 3, the commons, including the bourgeois or middle class of towns and the peasantry. The term "estates of the realm" was used in Scotland before the Union (1707) as synonymous with Parliament. It consisted of lords spiritual (or mitred clergy), lords temporal (including the nobles and the commissioners of shires and stewartries), and the representatives, called burgesses or commissioners, of royal burghs. They met in one assembly, and usually voted in one body. The "States General" of France were rarely convened after the fourteenth century, and had little or no legislative power. One of the exciting causes of the French Revolution was the dispute which arose between the "third estate" (*tiers état*), or bourgeois, and the nobles and clergy, as to whether the third estate had a right to sit with the first and second. This dispute arose in 1789. In Sweden there were four estates—nobles, clergy, bourgeois (middle class), and peasants, each sitting in a separate house; but since 1865 there are but two legislative houses, both representative. A convention of the States General was long (1580–1795) the supreme power in the Dutch republic.

Es'te (anc. *Ates'te*), a town of Italy, in the province of Padua, is picturesquely situated on the slope of the Euganean Hills, 18 miles, by rail, S. S. W. of Padua. Here is a fine feudal castle called Rocca belonging to the noble family of Este; also an interesting Romanesque church with a leaning tower. Este has manufactures of silk goods, hats, and earthenware. Pop. 8697.

Es'te, an ancient sovereign family of Italy, from which the monarchs of Great Britain are descended. Among the first princes of this family was Oberto I., who married a daughter of Otho, king of Italy, and died about 927 A. D., leaving a son, Oberto II. The family received several districts and towns to be held as fiefs of the German empire. Albertazzo II., who succeeded Oberto II. about 1020, married a German princess of the house of Guelph or Welf. Their son, Guelph IV., received in 1071 the investiture of the duchy of Bavaria. He was the ancestor of the houses of Brunswick and Hanover. Obizzo took the title of marquis of Este in 1137, and Azzo VI., marquis of Este, was chosen as their sovereign by the people of Ferrara in 1208. Azzo VII. of Este was the chief of the Guelph faction in the civil war which they waged against the Ghibelines. He died after a long reign in 1264. His successor, Obizzo II., added to his dominions in 1288 the city of Módena, at the request of its citizens, who chose him as their sovereign. Died in 1293. Ercole (or Hercules) I., who began to reign in 1433, was noted as a patron of literary men. His son, Alfonzo I., duke of Ferrara and Módena, who reigned from 1505 to 1534, was an able statesman and general. He married the notorious Lucretia Borgia. He was succeeded by his son, Ercole II., who married Renée, the Protestant daughter of Louis XII. of France. Died in 1559. The next duke of Ferrara was Alfonzo II., a son of Ercole II. He was a patron of the poet Tasso, whom he afterwards imprisoned and treated with cruelty. He died without issue in 1597, when his cousin Cesare became duke of Módena, but lost Ferrara, which was annexed to the Papal States. The dukes who reigned after the death of Alfonzo II. were comparatively obscure and feeble. Alfonzo IV., who became duke of Módena in 1658, had a daughter Mary, who was the second wife of James II. of England, and a son, Francis II., who died without issue in 1694. The title was then inherited by Rinaldo, who, by his marriage with a daughter of the duke of Brunswick-Luneburg, united the Italian and German branches of the family. He died in 1737, and was succeeded by his son, Francis III., who died in 1780. Maria Beatrice, a granddaughter of Francis III., was married to Ferdinand, archduke of Austria. They had a son, Francis, who became duke of Módena in 1814, and died in 1846, leaving a son, Francis V., who was the last duke of Módena. He was deposed in 1859 by his revolted subjects joining the general movement for Italian unity. (See POMPEO LITTA, "Famiglia Celebri Italiane.")

Estella [Sp. pron. ês-têl'yâ], a city of Spain, in the province of Navarre, 22 miles S. W. of Pampeluna. It is well built, and has a fine church with a lofty tower, a college, and a hospital; also manufactures of linen and woollen fabrics, brandy, and earthenware. Pop. 5593.

Este'pa (anc. *Astapa*), a town of Spain, in the province of Seville, 60 miles E. S. E. of Seville. It has a church which is a noble specimen of Gothic architecture, and a fine palace; also manufactures of baize, oil, etc. Marble is quarried in the vicinity. Pop. 8133.

Estepo'na, a town of Spain, in the province of Malaga, on the Mediterranean, 63 miles E. of Cadiz. It has an old Roman castle, is well built, and has extensive sardine-fisheries. Pop. 9316.

Es'terhazy, an ancient and noble family of Hungary, which has produced many eminent men and which owns large estates.

Esterhazy (NICHOLAS JOSEPH), a grandson of Paul, was born Dec. 18, 1714. He became a privy councillor and field-marshal-general. He was a liberal patron of musicians. Died Sept. 20, 1790.

Esterhazy de Galantha (NICHOLAS), PRINCE, a son of the preceding, was born Dec. 12, 1765. He was distinguished as a diplomatist, and obtained the military rank of field-marshal. He was employed as ambassador to Paris, London, and St. Petersburg between 1801 and 1816. He owned an immense fortune, and founded a rich collection of paintings in Vienna. Died Nov. 25, 1833.

Esterhazy de Galantha (PAUL), PRINCE, was born Sept. 8, 1635. He became a field-marshal in the Austrian army before the age of thirty, and was chosen palatine of Hungary in 1681. In 1686 he took Buda from the Turks, and in 1687 was created a prince of the empire. Died Mar. 26, 1713.

Esterhazy de Galantha (PAUL ANTONY), PRINCE, born Mar. 10, 1786, was a son of Nicholas, noticed above. He was ambassador from Austria to London in 1815–18, and again in 1830–38. In Mar., 1848, he became minister of foreign affairs in the liberal ministry of Hungary,

but he prudently resigned about the time when the war broke out, and he took no part in the war. He owned more land than any subject of the Austrian empire, and had a fine palace at Eisenstadt. Died May 21, 1866.

Es'ther [which means "star"], the Persian name of **Hadas'sah** [which means "myrtle"], a beautiful Jewish maiden, who became the queen of Xerxes, king of Persia (B. C. 486–465). Some critics make her a niece, others a cousin, of Mordecai the Benjamite, who became prime minister of Persia in place of Haman the Amalekite. She is certainly not to be identified with Amestris, the "Persian Jezebel." Her connection with Xerxes was subsequent to his disastrous invasion of Greece.

Esther, Book of, one of the latest of the canonical books of the Old Testament, consisting of ten chapters, and relating events which gave rise to the Jewish feast of Purim. The Jews call it emphatically *Megillah*, "the Roll." The whole of it is read in Jewish synagogues every year at the feast whose origin it explains; and still, in many synagogues, with noisy demonstrations, such as hissing, and clapping of hands, and stamping of feet at the mention of Haman's name. The inspiration of the book and its right to a place in the canon have been sharply questioned. Much account is made of the singular fact that the name of God does not once occur; that, although fasting is spoken of, no mention is made of prayer; and that the religious tone of the book throughout is low. On the other side it is urged that the providence of God is magnified; that we have a vivid picture of manners and morals at the Persian court; and, above all, a most valuable exemplification of the unspiritual character of that portion of the Hebrew people who chose not to return to the Holy Land. The book appears to have been written in Persia soon after the occurrence of the events related in it, but by whom critics are not agreed. Its authorship cannot be determined.

Esther, Apocryphal Book of, consists of the ten canonical chapters described above, with interpolations here and there, and the addition of six chapters at the end. These additions are found in the Septuagint, and in versions made from it, but not in the Hebrew. For this reason Jerome placed them together at the end of Esther, but Luther was the first to place them in the Apocrypha. The object of the unknown author was to give a more religious tone to the book of Esther than it originally possessed. Though considered spurious by all Protestant churches, the Greek, Armenian, and Roman Catholic churches accept these additions as canonical.

Es'therville, a post-village, capital of Emmett co., Ia., is a rapidly growing town, pleasantly situated on the E. branch of the Des Moines River. It has a school-house costing $8000, and superior educational advantages, a bank, newspaper, machine-shop, two hotels, two saw and grist mills, two churches, etc. Principal business, farming and stock-raising. Pop. of village, 168; of township, 480.

DAY & JENKINS, EDS. "VINDICATOR."

Estho'nia, or **Reval** [Ger. *Esthland*], a government of Russia, and one of the Baltic provinces, is bounded on the N. by the Gulf of Finland, on the E. by St. Petersburg, on the S. by Livonia, and on the W. by the Baltic Sea. Area, 7610 square miles. The surface is generally flat, and extensively covered with forests of pine; the soil is sandy, and in some parts marshy. The staple products are grain, hemp, flax, tobacco, and cattle. The population of the towns and the nobility are predominantly German, while the people of the rural districts are mostly Esthonians, who belong to the Finnish race. Ninety-six per cent. of the population belongs to the Lutheran Church. The language of the Esthonians is soft and melodious. Their literature consists chiefly of poems, the most important of which is the epic poem "Kalexa Poig." The Esthonian tribe inhabits also a part of Livonia, and embraces an aggregate population of about 600,000. Esthonia was conquered from the Swedes by Peter the Great in 1710. Capital, Reval. Pop. in 1867, 322,668.

Es'till, a county in E. Central Kentucky. Area, 300 square miles. It is intersected by Kentucky River. The surface is hilly; the soil fertile. Coal and iron are found. Grain and tobacco are produced. Capital, Irvine. Pop. 9198.

Es'tillville, a post-village, capital of Scott co., Va., about 350 miles W. by S. from Richmond. Pop. of Estillville township, 2400.

Estop'pel, a principle of law, whereby one is bound by his previous admission or declaration—not on the ground that it is true, but because to dispute it is regarded as contrary to sound policy or as subversive of the ends of justice. Estoppels are: of record, of deed, and *in pais*.

1. *Estoppel of Record.*—By record is here meant the record of a tribunal of a judicial character. No one is permitted in a legal proceeding to contradict an admission made by him in his pleading. So the judgment of a court of competent jurisdiction is in most instances absolutely unimpeachable. If the judgment is *in rem*.—that is, if it determines the status of a person or thing—it is binding on all persons, whether rendered by a domestic or a foreign tribunal. If the judgment is *in personam*, it is conclusive if rendered by a domestic court, and the better opinion is that the same rule applies to a foreign judgment, unless it be shown in either case that the court which pronounced it did not acquire jurisdiction, or that the judgment was obtained by fraud. This respect for the decisions of foreign tribunals is based on the comity which nations show each other, and on the necessities of commerce. The Constitution of the U. S. provides that full faith and credit shall be given in each State to the public acts, records, and judicial proceedings of every other State. Under this provision the judgments of the courts in one State are binding on the tribunals of another State, without reference to the doctrine of the comity of nations. But a judgment *in personam* has no binding force except as to the parties to the action in which it is rendered, and those who claim under them, who are technically said to be in privity with them. The doctrine of estoppel by record does not prevent one injured by a judgment from taking direct proceedings to attack it, and judgments are often set aside on application to the court in which they are rendered. In certain cases courts of equity interfere by injunction to stay proceedings on judgments obtained in courts of law.

2. *Estoppel by Deed.*—A party to an instrument under seal is bound by the statements contained in it to those who have acted upon such statements, or, as Lord Mansfield puts it, no man is allowed to dispute his own solemn deed. The estoppel applies to recitals as well as to direct averments. To create an estoppel the recital must be clear and of a material fact, and consistent with the general scope of the deed. As a general rule, estoppels of this class are reciprocal. Thus, in the case of a lease, while the tenant cannot dispute the title of the landlord, the latter cannot deny the right of the tenant. There is also an estoppel by deed of a more technical nature. This grows out of a covenant of warranty. Thus, should a person having no title to land convey with covenant of warranty, and afterwards acquire the title, he would be estopped by his covenant from asserting his claim to the land. The object of this rule is to avoid "circuity of action."

3. *Estoppel in Pais.*—In the time of Lord Coke this division of the principle was applied only to certain acts relative to the title of real estate which the law regarded as possessing equal solemnity and notoriety with a deed. Since then the principle has been greatly extended, and now presents a twofold aspect. In the first place, it is rigorously applied, from motives of general policy, to certain classes of cases. A bailee in general cannot dispute the title of his bailor, neither is the endorser or acceptor of negotiable paper allowed to deny the genuineness of any of the preceding names to the paper. In the second place, it is applied when good conscience requires that one should not be allowed to insist on his strict legal rights. The rule which governs its application here may be thus stated: Where one has made a representation or an admission by his words, his action, or, in cases where it is his duty to speak, by his silence, with the intent or expectation, or reasonable grounds for expectation, that others should rely and act thereon, he shall not be permitted to prove that the representation or admission was untrue, if thereby injury would result to one who has in good faith acted upon it. It was at one time supposed that *fraud* was an essential element to constitute an estoppel *in pais*. The better opinion is that no fraudulent design is necessary. It is enough if the party claiming the benefit of the estoppel has acted upon the representations as before stated. The principle, thus limited and applied, is free from the technicalities and harshness which for a long time caused the doctrine of estoppel to be regarded with suspicion by the courts: it is constantly invoked for the prevention of fraud and injustice, and has become one of the most effective agencies of the law. A few instances of its practical application may be cited: A principal may by his conduct be estopped to deny that a certain person is his agent; one who has permitted himself to be held out as a member of a mercantile firm may be estopped as to creditors from denying his membership; a man who has held out a woman as his wife may be estopped from proving that she is not as to tradesmen who have in good faith supplied her with the necessaries of life on his credit. The principle has been extended to the law of real estate. An owner of land who has induced another to incur heavy expenditure on the representation that the latter was owner would be estopped from asserting his own title.

T. W. DWIGHT.

Esto'vers, the right of a tenant to take wood from the

demised premises for fuel, fences, and general agricultural purposes. This right may be claimed by any tenant, whether for life, for years, or at will, unless forbidden in his lease. But only a reasonable amount of wood can be taken; the tenant must not destroy the timber, nor do any permanent injury to the inheritance.

Estrades, d' (GODEFROI), COMTE, a marshal of France and able diplomatist, born at Agen in 1607. He negotiated the cession of Dunkirk to France in 1662, and rendered important military services in Holland between 1672 and 1675. He represented France at the congress of Nymwegen, 1678. Died Feb. 26, 1686.

Estray' [remotely from the Lat. *extra*, "outside," and *vagor, vagari*, to "wander"], in law, is a domestic animal (the owner of which is unknown) found wandering outside the pasture or other enclosure where it belongs. In England the owner has a year and a day to claim such cattle in, and the proprietor of the enclosure where they are found must make due proclamation in a church and in two market-towns. When these conditions are fulfilled, they belong to the proprietor of the enclosure where they are found. The law of estrays varies in the different States of the Union. In some, after the estray has been duly advertised and kept a certain length of time, it is sold to pay the charges for advertising and keeping, any balance going to the town treasury. Cattle running about contrary to local, municipal, or other regulations, or breaking into growing crops and doing damage to them or to other property, can in most places be sent to a public pound, and after a short time sold to pay damages and expenses.

Estrées, d' (GABRIELLE), a beautiful Frenchwoman, born in 1571, was a sister of the first duke of Estrées. She was the mistress of Henry IV., who gave her the title of duchess. It is said that he intended to marry her, but he was prevented by her early death (April 10, 1599). She was amiable and graceful. Her brother, the duc d'Estrées, was a marshal of France, and had a son who was also a marshal.

Estremadu'ra, a province of Portugal, is bounded on the N. by Beira, on the E. and S. by Alemtejo, and on the W. by the Atlantic, and intersected by the river Tagus. Area, 6873 square miles. The surface is mostly hilly; the soil is partly fertile and partly sterile. It is subject to frequent earthquakes. Among the minerals are granite, marble, and coal. The staple productions are wine, oil, cork, fruits, and grain. Pop. in 1868, 837,451. Capital, Lisbon.

Estremadu'ra, a former province of Spain, was bounded on the N. by Leon, on the E. by New Castile, on the S. by Andalusia, and on the W. by Portugal, and intersected by the rivers Tagus and Guadiana. Between these rivers a long chain of mountains extends nearly E. and W. The northern and southern parts are also mountainous. The soil is fertile, but not cultivated to much extent. Large flocks of sheep are pastured on it. This province contains mines of copper, lead, silver, and coal, which are neglected. It is comprised in the present provinces of Badajos and Cacéres. Pop. in 1867, 733,749.

Estremoz', a fortified town of Portugal, in Alemtejo, is about 23 miles N. E. of Evora and 82 miles E. of Lisbon. It has a strong castle on a hill, around the base of which the town is built. Here are famous manufactures of porous jars which have the property of keeping water cool. The forms of these jars are said to be classical. Pop. in 1863, 7274.

Es'tuary, or **Æs'tuary** [Lat. *æstua'rium*, from *æs'tus*, the "tide," because the tide is apt to be felt even more in an estuary than in the open sea], in geography, a term applied to the wide mouth of a river where the tide meets the current; also an arm of the sea or a frith.

Esz'ek, Es'sek, or **Esseck** (anc. *Mur'sia* or *Mur'sa*), a strongly fortified town of the Austro-Hungarian monarchy, the capital of Slavonia, is on the river Drave, 13 miles from its entrance into the Danube, and 150 miles S. by W. from Pesth. It has a prosperous trade, facilitated by the steam navigation of the river. It contains an arsenal, a town-house, and a normal school. Pop. in 1869, 17,247.

Étampes, formerly **Estampes** (anc. *Stam'pæ*), a town of France, in the department of Seine-et-Oise, is on the Paris and Orléans Railway, 31 miles by rail S. S. W. of Paris. It has an old Gothic church, a castle, and many flouring mills; also manufactures of hosiery, linen thread, counterpanes, and soap. Pop. in 1866, 8288.

Étampes, or **Estampes** (ANNE), DUCHESS OF, a French lady, born in 1508. She was a favorite mistress of Francis I., and exerted much influence over public affairs. She is said to have been a woman of superior talents. Died in 1576.

Et'anin [Arab.], the fixed star called γ Draconis. Observations made on this star by James Bradley led him in 1727 to the discovery of the aberration of the fixed stars.

Eta'wah, a decayed town of India, in the N. W. Provinces, is on the Jumna, about 70 miles below Agra, and on the East Indian Railway, 97 miles N. W. of Cawnpore, and 837 miles from Calcutta. It presents some remains of former grandeur. Pop. about 20,000.

Etching. See ENGRAVING, by PRES. M. B. ANDERSON, LL.D.

Ete'ocles [Gr. Ἐτεοκλῆς], a mythical king of Thebes (in Bœotia) and a son of Œdipus. He and his brother Polynices agreed to reign alternately over Thebes, but Eteocles usurped the throne when his brother's turn came to reign. The famous expedition of the Seven against Thebes was undertaken to restore Polynices, who killed Eteocles in single combat.

Ete'sian Winds [Gr. ἐτησίαι, or ἐτησίαι ἄνεμοι; *i. e.* "annual (or periodical) winds," from ἔτος, a "year"], northerly and north-easterly winds which prevail in summer throughout a great part of Europe and in Northern Africa. The name occurs in its Greek form in several ancient writers, and is now occasionally seen in meteorological works. These winds arise in a great degree from the heat of the African Sahara.

Étex (ANTOINE), a sculptor, painter, engraver, architect, and author, was born at Paris Mar. 20, 1806, was educated at Paris and Rome, and has achieved distinction in all the departments to which he has given attention. He has published an "Essai sur le Beau" (1851), "Cours Élémentaire de Dessin" (1859), and "J. Pradier, Ary Scheffer: Études" (1859).

Ethal. See SPERMACETI, by PROF. B. SILLIMAN, M. D.

Eth'elbert, king of Kent, ascended the throne about 560 A. D. He became the head or most powerful prince (bretwalda) of the Heptarchy about 590. His wife Bertha, a daughter of the king of Paris, was a Christian, and induced Ethelbert and his subjects to profess Christianity in 597 A. D. Saint Augustine was instrumental in their conversion. Ethelbert gave to the Anglo-Saxons their first written code of laws. Died in 616 A. D.

Ethelbert, Anglo-Saxon king of England, was a son of Ethelwolf. He began to reign over Kent, Essex, and Sussex in 852 A. D., and obtained also the throne of Wessex on the death of his brother Ethelbald in 860. He died in 865 A. D.

Eth'elred (or **Æthelred**) **I.,** Anglo-Saxon king of England, succeeded his brother Ethelbert in 866 A. D. In the first year of his reign the island was invaded by Danes, who conquered a large part of his kingdom. His brother Alfred defeated the Danes in 870. Ethelred was killed in battle at Merton in 871 A. D., and was succeeded by Alfred the Great.

Ethelred II., surnamed THE UNREADY, Anglo-Saxon king of England, a son of Edgar, was born in 968 A. D. His mother was Elfrida, notorious for her crimes. He succeeded his half-brother, Edward the Martyr, in 978. In his disastrous and inglorious reign the kingdom was invaded and ravaged by the Danes, to whom he paid large sums of money to purchase peace, but they soon renewed their piratical incursions. The Danish king Sweyn took London in 1014, and Ethelred fled to the court of the duke of Normandy, who was his wife's brother. He died in 1016, leaving two sons—Edmund Ironside and Edward the Confessor.

Eth'elwolf, Anglo-Saxon king of England, was the eldest son of Egbert, whom he succeeded in 836 A. D. His kingdom was harassed by several incursions of the Danes, who pillaged London in 851. He defeated these invaders at Okely in that year. He married, in 856, Judith, a daughter of Charles the Bald, king of France. Died in 858 A. D. He left four sons—Ethelbald, Ethelbert, Ethelred, and Alfred the Great.

Ethene. See ETHYLENE.

E'ther [Gr. αἰθήρ; Lat. *æ'ther*, originally applied to the purer upper air; hence any subtile fluid], in organic chemistry, is a name given to numerous compounds, which are usually very volatile, fragrant, and, with a few exceptions, highly inflammable; they are generally derived from alcohols by the action of acids. When the alcohols are simply dehydrated by the action of the acid, "simple ethers" are produced, which are oxides of the alcohol radicals analogous to metallic oxides. Thus,

Common Alcohol.		Common Ether.		Water.
$2C_2H_5.H.O$	=	$(C_2H_5)_2O$	+	$H_2O.$

When the acids combine with the alcohol radical, "compound ethers" are produced, analogous to metallic salts. Thus,

Common Alcohol.		Acetic Acid.		Ethyl Acetate.		Water.
$C_2H_5.H.O$	+	$H.C_2H_3O_2$	=	$C_2H_5.C_2H_3O_2$	+	$H_2O.$

"Haloid ethers" are compounds of the alcohol radicals with the halogens, chlorine, bromine, iodine, etc. They

are analogous to common salt (NaCl). Amyl chloride ($C_5H_{11}Cl$) and methyl iodide (CH_3I) are examples.

Sulphur, selenium, etc. form compounds analogous to the simple or oxygen ethers.

Common ether, properly known as ethylic ether, commonly and very incorrectly called sulphuric ether ($(C_2H_5)_2O$, is generally regarded as an oxygen ether, and in this view is sometimes called ethyl oxide. It is formed by the action of sulphuric acid or some other dehydrating agent upon strong ethylic (common) alcohol. Ethylic ether is a fragrant, colorless, transparent, and highly mobile liquid, with a specific gravity of .720, and a boiling-point of 96° Fahrenheit. It is extremely combustible, and so volatile that when applied to the hand it causes a profound sensation of cold. Though very light in the liquid state, its vapor is more than twice as heavy as air. It is very useful in the chemical laboratory, especially as a solvent of fats and oils.

Ether is much used in medicine and surgery, both as a diffusible stimulant and as an anæsthetic. It was probably the first complete anæsthetic ever employed. It was introduced by Dr. Morton of Boston, Mass. (See ANÆSTHETICS.)

The other more important ethers are "acetic ether" (ethyl acetate, $C_2H_5.C_2H_3O_2$), an exceedingly fragrant stimulant and antispasmodic; "butyric ether" (ethyl butyrate, $C_2H_5.C_4H_7O_2$), used in preparing artificial pineapple syrup; "pelargonic ether" (ethyl pelargonate), for making artificial quince flavor; "amyl acetate," for making "jargonelle pear essence," extensively used in confections, besides an immense number of other ethers and mixtures used in artificial flavoring; "iodic ether" (ethyl iodide), used in medicine; "nitrous ether" (ethyl nitrite, $C_2H_5.NO_2$), used in making "sweet spirits of nitre."

Ether, a hypothetical medium which is assumed to pervade all space, and which is regarded as possessing extreme tenuity and elasticity, and as being the medium of the transmission of light and heat, these forces being transmitted by vibrations or undulations of this ether.

Eth'erege, or **Etheridge** (Sir GEORGE), an English dramatist, born in 1636. He wrote "Love in a Tub," "Sir Fopling Flutter, or the Man of Mode," and other successful comedies. He was a wit and libertine. Died about 1692.

Ethics. See MORAL PHILOSOPHY, by PRES. NOAH PORTER, S. T. D., LL.D.

Ethio'pia [Lat. *Æthiopia;* Gr. Αἰθιοπία, from αἴθω, to "burn," and ὤψ, "face;" Heb. *Cush*], a name given by ancient geographers to the regions situated S. of Egypt and Libya. The name Ethiopians was originally applied by the Greeks to all the peoples who lived in the southern parts of the known world, including the dark-colored natives of India. As the ancient Greeks and Romans had but little intercourse with the Ethiopians, the accounts which they have transmitted to us are very defective and uncertain. They supposed Ethiopia to be inhabited by several races called Troglodytes, Pygmies, Macrobii, and Blemmyes. According to some traditions, the Egyptians derived their civilization or came themselves from Ethiopia. The connection between Egypt and Ethiopia was at all periods intimate, but it is now generally believed that civilization ascended the Nile, instead of descending it. In its extended sense, Ethiopia corresponded to the modern Nubia, Sennaar, Kordofan, and Northern Abyssinia. The population of this vague region was a mixture of Arabian and Libyan races with the genuine Ethiopians. The latter had well-formed limbs, and a facial outline resembling the Caucasian in all but its inclination to prominent lips and a somewhat sloping forehead. Their language was Semitic. The Nubians and Shangallas of the present time are probably their descendants.

The term Ethiopia Proper was restricted to the kingdom of Meroë. The high civilization of Ethiopia, as attested by historians and confirmed by monuments, was confined to the island of Meroë and *Æthiopia Ægypti.* The kingdom of Meroë was bounded on the E. by the river Astaboras (Atbara) and on the W. by the desert of Bahiouda. It probably extended southward to the junction of the Blue Nile with the White Nile. The capital of this kingdom was Napata, on the Nile. It became one of the most powerful and civilized nations of the world as early as 1000 B. C. The government was a sacerdotal monarchy, the priests being the ruling class, as in Egypt. The military power of the Ethiopians was celebrated by Isaiah (xx. 5) and other Hebrew prophets, and the sacred history records their invasion of Palestine. In the eighth century B. C. an Ethiopian dynasty (the twenty-fifth of Egypt) reigned in Lower Egypt. The first king of this dynasty was Sabaco, whose son and successor, Sebichus (the So or Seva of the Bible), was an ally of Hoshea, king of Israel, in 722 B. C. It is stated that in the reign of the Egyptian king Psammetichus (630 B. C.) the military caste, numbering 240,000, migrated into Ethiopia. It was invaded by the army of Cambyses, king of Persia, in 530 B. C. According to Josephus, he conquered Meroë. In the reign of Augustus Cæsar, Candace, queen of Ethiopia, waged war against the Romans. Having been defeated, she sued for peace and became tributary to him in 22 B. C., but the Roman tenure of Ethiopia was always precarious. Early in the fourth century many Christian churches were planted in Ethiopia. (See ABYSSINIA, by PROF. A. J. SCHEM.)

Ethiopic Language and Literature. The name "Ethiopic language" is at present generally applied to the old written language of the Abyssinian Church. The name "Chaldæan language," which was given to it at the time when the knowledge of it was first introduced into Europe by J. Potken (1513), was incorrect. But even the name "Ethiopic language," by which it has been known since the middle of the sixteenth century, does not seem to fit exactly, for it has nothing in common with the language of that race called by the ancients Æthiopes (the Cushites of the Bible); and in the large empire of Abyssinia, which was called in the Middle Ages Ethiopia, there were and still are many other languages, some of which are related to, while others are of entirely different stock from, the Ethiopian. The native name is the Geez language. Geez, or, in the plural, *Ag' âzi* (*i. e.* "those who have travelled," or "the free"), was the name which the race who once spoke this language applied to itself, and consequently to its language; and modern philologists have begun to use "Geez" as the more accurate, in preference to "Ethiopic" language, the more general term. The Geez were one of the Semitic tribes, who had emigrated from Arabia to Abyssinia, and had settled in Tigre and its capital, Axoom. In the large Abyssinian empire which grew up around Axoom, and which was gradually Christianized after the fourth century, this Geez language became the official and the church language, beside which the dialects and languages of the different native tribes still continued to exist, but were not used as written languages. In this ruling position as the official language of the empire it continued to maintain itself until the middle of the thirteenth century, when, in consequence of a change of dynasties, the Amharic language gradually gained the ascendency at the imperial court, and entirely superseded the Ethiopic as the official language. But its position as the language of the Church and of the scholars of Christian Abyssinia it did not lose in consequence of this political revolution. The clergy and literary men were for centuries compelled to have a knowledge of it, and understood it even well enough to write books; and even at the present day the old Geez books continue to be copied. During the last three hundred years books of all kinds have been prepared in the Amharic language, which is more familiar to the people, and even the Bible or parts of it have been translated, especially at the instance of the Protestant missionaries, into the modern languages of Abyssinia, in particular into the Amharic and Tigre, without diminishing, however, the influence of the old Geez translations. As a popular language the Geez has died out even in Tigre, its original home, or rather it has been modified in the mouths of the people into dialects. Among these descendants of the Geez language two principal dialects are distinguished: the Tigre, which is closely allied to the Geez, and which is spoken by nomadic tribes in the extreme north, in the regions bordering on Nubia and Sennaar, which for a long time have been cut loose from Abyssinia; and the Tigriña, which is spoken in the old province of Tigre and the neighboring districts, and which has degenerated more than the other in sounds, forms, and fulness of words, and is largely mixed with Amharic words. (A grammar of this language has recently been published by Prætorius, "Grammatik der Tigriñasprache," 1872.)

The Geez is a purely Semitic language, but still, in its way, is very peculiar, and is justly regarded as a special branch of the Semitic family. Its relation to the language of the Himyaritic monuments can hardly be said to be nearer than its relation to the Arabic as now written. It has, however, much in common with the entire Arabic group of languages, not only in regard to the stock of words, but also in regard to the system of sounds and the formation of words; and although it has never attained the fulness of forms of the Arabic, it has developed some Semitic peculiarities, even more consistently than the written Arabic. But in many words, roots, forms, and even in many syntactic forms, it agrees more with the northern Semitic languages, especially with the Hebrew, but also with the Aramaic and the Assyrian. It must therefore be assumed that the Geez, after its branching off from the northern Semitic, continued to develop itself in connection with the southern Semitic (Arabic) languages, but separated itself very early from these, and continued to go along its own path. For this reason it has still many peculiarities of the ancient Semitic languages—peculiarities which have been aban-

doned even in the Arabic; and in some respects has retained the most ancient forms (*e. g.* it has no article). Other forms it has developed in a peculiar manner, contrary to the method of all other Semitic languages (*e. g.* most of the prepositions and conjunctions). Especially in the method of construction it has formations which are hardly to be found in the other Semitic languages, and has acquired a flexibility of syntax which distinguishes it favorably from all the other languages related to it. On the other hand, besides many ancient and peculiar forms in the Geez, we meet, strange to say, with many forms which the other Semitic languages only reached in their latest stages of development (*e. g.* the disappearance of the inner passive and of the participial form, the dropping of short vowels, etc.); and we may infer from this that the Geez, as it is presented to us in the Abyssinian books, has already passed through a long stage of development. From this it is seen that the study of the Geez is very important and instructive to the Semitic philologist.

The Geez has never been grammatically treated by native (Abyssinian) scholars. In Europe, after several very incomplete attempts in the sixteenth and seventeenth centuries, it was treated of in a grammatical and lexicographical exposition, which for its time was excellent, by Hiob Ludolf ("Grammar and Lexicon," 1661; 2d ed., Lexicon, 1699, Grammar, 1702). In accordance with the demand of modern linguistics, and on the basis of a much fuller knowledge of Ethiopic literature, the language has recently been treated of by A. Dillmann ("Grammar," 1857; "Lexikon," 1865).

The Geez is written with peculiar characters, which originally were identical with the Himyaritic and old Arabic characters found in the inscriptions of Syria and Assyria, and were afterwards only slightly modified. It is written not from right to left, but from left to right, and is also remarkable in that it separates the single words by two dots (:), and that the writing of vowels by means of little lines and hooks, which are attached to the consonants, is uniformly carried out. These characters were subsequently used in Abyssinia for the other dialects and languages also, especially for the Amharic and the Tigriña, but enriched by several new characters, so that they can be said to have become the universal alphabet of Abyssinia.

The oldest monuments of the Ethiopic characters and language which are known at present do not date beyond the first centuries of our era. They are coins and inscriptions; among the latter especially the large inscriptions of Axoom, which have been made known to the world by Rüppel in the account of his travels. They mostly show an archaic mode of writing the consonants, and the vowel-signs are only in their infancy. An Ethiopic literature began to exist since the introduction of Christianity into Abyssinia (in the fourth century), and has always retained a predominantly religious character. Its basis was the translation of the Bible, both the Old and New Testament, together with the semi-biblical, apocryphal, and pseudepigraphic books belonging thereto, which in the other churches were rejected or lost (as the book of Jubilees, of Enoch, the Apocalypse of Ezra, the Ascension of Isaiah, the Shepherd of Hermas, and others). The entire translation has been made from the Greek, but was afterwards revised several times—the Old Testament at last even from the Hebrew; and we must therefore distinguish between the old, middle, and latest revisions of the text. The pseudepigraphic books are nearly all printed. A critical edition of the Old Testament has been begun by Prof. Dillmann, but has only progressed to the second book of Kings. The Psalms and Solomon's Song have been published already several times. The New Testament was printed at Rome in 1548, and was reproduced in the London Polyglot with many mistakes. The edition (now out of print) of the English Bible Society (by P. Platt, 1826) gives a mixed text, which cannot be used for critical purposes. The other literature consists, for a large part, of translations of Greek and even Coptic works, and after Mohammedanism had taken root in Egypt, the mother-country of the Abyssinian Church, Arabic works also were translated. The literature comprises theological and religious works of every kind, such as collections of old canons (Clementina, Didascalia, Synodus), catenæ, and homilies, exegetical and dogmatic writings (especially those of Cyril, Epiphanius, Chrysostom, and also of the Syrian Fathers, especially those of the Monophysitic Church); Haimânôta Aban (*i. e.* a large collection of confessions of faith of the monophysitic teachers); lectionaries for the whole year, especially for the fasts and the Passion-time; horologia, liturgies of the mass, and church-books for the other sacraments, and for burials, church discipline (Faus Manfasawi), and church law (Fetha Nagast), Acta Sanctorum (Synaxa), a large number of monastic rules and monastic writings; in sacred and profane history and chronology the works of Joseph Ben Gorion, George Ben Amid, Abuschaker, and others, and even something relating to philosophy and the natural sciences.

Among the native productions of the Abyssinians themselves are dogmatic treatises, pseudonymous apocalyptical writings, numerous prayer-books and formulas, meditations, eulogies and biographies of saints, martyrs, monks, and archangels in prose and verse, mostly productions of monkish imagination and an insane belief in miracles. More important in their way are the large ancient hymn-books (Degnâ, Marâs'et, Me'raf), with hymns and antiphonies, not only for Sundays and holidays, but also for every day in the year, and containing formulas for the ceremonies in honor of all the saints of the calendar, with peculiar notes for singing, the use of which has been very imperfectly explained up to the present time. Most of these works, which indicate a considerable progress in religious poetry and music, have been traced back to a certain Jared in the sixth century. Besides these there were also large works on native history, and explicit annals of the several kings (from which J. Bruce in the second volume of his travels has given extracts), which were written in a peculiar language, a mixture of the Geez and the Amharic. After the extinction of the Geez a beginning of grammatical and lexicographical works was made, and was deposited in many Ethiopic-Amharic glossaries (Savasev). Much was also written in this period on medicine, witchcraft, exorcism, and divination for the superstitious people, either in Ethiopic-Amharic or entirely in the Amharic language. The poetry was almost entirely in the service of the Church and of religion. At all events, poems on secular affairs in the Geez language have not come down to us. Besides the peculiarly arranged hymns, only lyrical poetry was developed. The poems are divided into strophes of equal length. The construction of the strophes shows many varieties: the lines are rhymed; the syllables are neither measured nor counted. Of real poetic genius there are but few traces in these poems; many have of poetry nothing but the rhyme.

Of the entire literature very little has been printed besides the Bible. But it is at present very fully represented in manuscripts in all the large libraries of Europe, especially in Rome, Paris, Oxford, London, Tübingen, Frankfort-on-the Main, Vienna, and Berlin. The largest collection of manuscripts until lately was in the possession of Antoine d'Abbadie in France. But since the Abyssinian war the collection of the British Museum has been so largely increased that it is without doubt the largest in Europe. All the older and most of the later manuscripts are written on beautiful parchment. Among the manuscripts brought to Europe within the last century none date farther back than the fifteenth century.

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E'thiops Min'eral, the black powder obtained by triturating mercury with sulphur. It is a sulphide of mercury. The term Ethiops was formerly applied to other black powders.

Eth'moid [from the Gr. ἠθμός, a "sieve," and εἶδος, "form"] **Bone,** a spongy, irregularly cubical bone, situated below the anterior part of the brain, between the orbits of the eyes and at the roots of the nose. In man it consists of four parts—the cribriform plate, the perpendicular plate, and the two lateral masses. It is developed from three centres, commencing about the fifth month of fœtal life, and is completed about the sixth year of childhood. It appears to be formed of the united neurapophyses of the first cephalic vertebra.

Ethnology. See MAN AND HIS MIGRATIONS. By PRES. M. B. ANDERSON, LL.D.

E'thyl, or **E'thule** [from the Gr. αἰθήρ and ὑλή, "substance;" literally, a "substance of ether"], a name given to the organic radical (C_2H_5) contained in ether and alcohol. It may be obtained by the action of zinc on ethyl iodide. It is at ordinary temperatures a colorless and invisible gas, possessing a slight ethereal odor, and burning with a brilliant white flame. It is insoluble in water, but soluble in alcohol. It may be condensed to a liquid by the pressure of two and one-fourth atmospheres.

Ethyl'amin, a compound ammonia in which one atom of the hydrogen of the NH_3 is replaced by ethyl, C_2H_5. Thus,

Ammonia.	Ethylamin.
$N\begin{cases} H, \\ H, \\ H. \end{cases}$	$N\begin{cases} C_2H_5, \\ H, \\ H. \end{cases}$

It is a mobile liquid, with a boiling-point of only 66° Fahrenheit, and a specific gravity of 0.6964. It has the odor and many of the reactions of ammonia, being a powerful alkaline base. Its vapor, however, is inflammable. There is also a diethylamin, $NH(C_2H_5)_2$, a triethylamin, $N(C_2H_5)_3$, and a tetrethylammonium, $N(C_2H_5)_4$.

Ethyl-Carbamides, or **Ethyl-Ureas,** compounds derived from carbamide or urea by the substitution of one

or more atoms of ethyl for a corresponding number of atoms of hydrogen.

Carbamide or urea $= N_2(CO)'' H_4$.
Ethyl-carbamide $= N_2(CO).''C_2H_5.H_3$.
Diethyl-carbamide $= N_2(CO)''(C_2H_5)_2H_2$.
Triethyl-carbamide $= N_2(CO)''(C_2H_5)_3H$.

Eth'ylene (C_2H_4), **Ethene, Olefiant Gas,** or **Bicarburetted Hydrogen,** produced by heating alcohol with strong sulphuric acid or boric anhydride; also by the dry distillation of many organic bodies, as fats, resins, wood, coal, many salts of organic acids, etc. It is an important constituent of coal gas, the illuminating power of which is largely due to its presence. It is a colorless gas, having a faint ethereal odor, which is attributed to a slight contamination with ether vapor. Its specific gravity is 0.9784. By pressure and cold it may be condensed to a limpid liquid. It burns in the air with a bright white flame which is very luminous. It is a diatomic radical, uniting with two atoms of Cl, B_2, Cy, and other monatomic radicals, and with one atom of O, S, and other diatomic radicals. By replacing hydrogen in two or more molecules of ammonia, it produces diamines, triamines, etc. (See Ethylene Bases.) Its compound with chlorine ($C_2H_4Cl_2$) has long been known as "Dutch liquid."

Eth'ylene Ba'ses. By the action of ethylene chloride, bromide, or iodide on ammonia, when heated in sealed tubes, Cloez, Nalanson, and Hofmann have shown that a series of compound ammonias are generated. When a molecule of ethylene replaces an atom of hydrogen in each of two molecules of ammonia, an ethylene diamine is produced, $C_2H_8N_2 = N_2\left\{\begin{matrix}H_2\\(C_2H_4)''\\H_2\end{matrix}\right.$. Two molecules of ethylene, replacing two atoms of hydrogen in each molecule of ammonia, yield diethylene-diamine. Three ethylenes, replacing all six atoms of H, yield triethylene diamine, $N_2(C_2H_4)''_3$. In the same manner, by replacements of hydrogen in three and four molecules of ammonia by ethylene, there are produced triamines and tetramines of various grades. The hydrogen remaining in the triamine or tetramine may be further replaced by the monatomic alcohol radicals, methyl, ethyl, etc.

Eth'ylene Car'bamides, or **Ethylene Ureas,** compounds produced by the action of cyanic acid and the cyanic ethers on ethylene-diamines. Ethylene-dicarbamide may be considered as formed of two molecules of urea or carbamide, in each of which one atom of hydrogen is replaced by a molecule of ethylene, thus: Urea $= N_2(CO).''H_4$; ethylene-dicarbamide $= N_4(CO)_2''(C_2H_4).''H_6 = \left.\begin{matrix}N_2(CO)''\\N_2(CO)''\end{matrix}\right\}(C_2H_4)''\left\{\begin{matrix}H_3.\\H_3.\end{matrix}\right.$

Ethylenic Alcohols. By replacing two, four, six or more atoms of hydrogen in as many molecules of water, ethylene gives rise to a series of alcohols.

Etiola'tion [Fr. *étiolement*, from *étiolé*, "blanched"], the state of a plant which is deprived of green color by the exclusion of light. When it is obtained by keeping plants in the dark in order to render them tender and less acrid, it is called *blanching*, as in the case of celery.

Etiquette [from the Gr. ἦθος, plu. ἤθεα, "manners" or "morals," and the Fr. affix *ette*, meaning "little;" literally, "minute morals or manners"], the name given to the ceremonial forms required by good breeding to be observed in social or official life. Ceremonial observances were carried to the greatest extent by the Byzantine court, but the spirit of etiquette was probably never so tyrannical and predominant as at the court of Louis XIV.

Et'ive, Loch, in Scotland, is a salt-water lake or inlet of the sea in the county of Argyle. It is 20 miles long, and varies in width from half a mile to 3 miles. It receives the river Awe, and communicates with the Frith of Lorn. Grand and romantic scenery occurs along its banks.

Et'na [Gr. Αἴτνη; Lat. *Æt'na;* Sicilian, *Mongibel'lo*], a celebrated volcanic mountain of Sicily, is in the N. E. part of the island, adjacent to the sea and very near to the city of Catania. It is an isolated mass of conical form, having no connection with the other Sicilian mountains, from which it is separated by the valley of the river Alcantara. It has an altitude of 10,935 feet above the level of the sea, and its base is about 90 miles in circumference. The volcanic phenomena which it presents on a greater scale than is elsewhere seen in Europe early attracted the attention of the ancients, and were described by Pindar, who mentions the rivers of fiery lava rolling down its sides into the sea. Thucydides informs us that an eruption occurred in 425 B. C. Four violent eruptions are recorded to have occurred in a period of twenty years—viz., 140, 135, 126, and 121 B. C. It appears that the volcanic action of Etna was in ancient, as it continues to be in modern times, irregular and intermittent. The city of Catania has repeatedly been nearly ruined by the eruptions and earthquakes. From the expressions of Strabo in his description of Etna, it is evident that in his time the ascent of the mountain to its summit was a common achievement. Several ancient writers describe the upper part of Etna as covered with per-

Etna.

petual snow, but at present the snow remains only eight or nine months of the year. Sir John Herschel, who ascended to the top of Etna in 1824, describes parts of its scenery in these terms: "Ascending from Catania, you skirt the stream of lava which destroyed a large part of that city in 1669, and which ran into the sea, forming a jetty or breakwater that now gives Catania what it never had before, the advantage of a harbor." "Among the remarkable features of Etna is that of its flanks, bristling over with innumerable smaller volcanoes. For the height is so great that the lava now scarcely ever rises to the top of the crater, for before that its immense weight breaks through at the sides." "From the summit," he adds, "extends a view of extraordinary magnificence." The last great eruption was in 1868.

Etna, a township of Kosciusko co., Ind. Pop. 1007.

Etna, a township of Whitley co., Ind. Pop. 429.

Etna, a township of Hardin co., Ia. Pop. 1849.

Etna, a post-township of Penobscot co., Me., on the Maine Central R. R., 17 miles from Bangor. Pop. 844.

Etna, a post-village of Dryden township, Tompkins co., N. Y. Pop. 230.

Etna, a post-township of Licking co., O. Pop. of village, 258; of township, 1224.

Etna, a post-borough of Shaler township, Allegheny co., Pa. Pop. 1447.

Etna Green, a village in Etna township, Kosciusko co., Ind. Pop. 397.

E'ton, a town of England, in the county of Bucks, is on the Thames, opposite Windsor, 22 miles W. of London. It is the site of Eton College, one of the most famous educational institutions of England, founded and richly endowed in 1440 by Henry VI., but the buildings were not completed until 1523. It is a favorite school of preliminary instruction for the sons of the nobility and gentry. Many scholars are at the age of seventeen elected to valuable scholarships at King's College, Cambridge. Eton is governed by a provost and seven fellows. The main portion of the establishment, numbering nearly 900, consists of the *oppidans,* who live outside of the college, and for whose tuition the same price is paid as for that of the *collegers* or scholars. The number of the latter is limited to seventy.

Et'owah, a county in the N. E. of Alabama. Area, 650 square miles. It is intersected by the Coosa River. The surface is partly hilly; the soil is productive. Corn, wheat, cotton, tobacco, and wool are staple products. It is traversed by the Alabama and Chattanooga R. R. Capital, Gadsden. Pop. 10,109.

Etru'ria, or **Tuscia,** an important country of ancient Italy, was called **Tyrrhenia** (Τυρρηνία) by the Greeks. It was bounded on the N. by the Apennines, on the E. by the Tiber, and on the W. by the Mediterranean or Tyrrhenian Sea. The inhabitants were called Etruscans (*Etrus'ci*) and Tuscans (*Tus'ci*) by the classic Latin writers, but the Greeks always called them Tyrrhenians or Tyrsenians. Their national name in the Etruscan language was *Rasena.*

Among the physical features of this country are the Monte Amiata, which rises 5794 feet above the level of the sea, the

river Arnus (now Arno), and the Lacus Trasimenus, now called Lago Trasimeno or Lake of Perugia. Ancient writers concur in the statement that the government of the Etruscans was a confederacy of twelve cities or cantons, each of which was independent and had the right of internal self-government. The chief rulers bore the general title of *lucumo*. The cities which composed the league of Etruria Proper are universally reckoned as twelve in number, but these cannot be all identified, as no ancient writer has preserved a list of their names. Among the most important of these twelve cities were Tarquinii, Veii, Clusium, Volsinii, Cortona, Cære, Perusia, Arretium. The early traditions mention several Etruscan kings, as Porsena, king of Clusium, but during the greater part of the historic period the political constitution was an aristocracy. The Etruscans were very superstitious, and distinguished for their devotion to their national religion and the zeal with which they performed its rites and ceremonies (a word derived from *Cære*). The most important of the deities whom they worshipped were Tinia or Tina (Jupiter), Capra (Juno), and Minerva, whose name was the same in the Etruscan as in the Latin language. Besides these, and others whose names have been preserved, there were twelve divinities (six male and six female) whose proper names were unknown, but who were termed collectively *Dii Consentes*, and were counsellors of Tinia. They were believed to preside over the powers of nature. Superior to these, and to Tinia himself, were certain mysterious *Dii Involuti*, who were supposed to exercise an irresistible controlling power over the gods, like the Fates of the Greek and Roman mythology.

Origin and History.—The question of the origin and affinities of the Etruscans has long exercised the ingenuity of scholars and antiquaries, but it still remains undecided. The opinion generally adopted by Roman writers ascribed to them a Lydian origin. The earliest authority for this tradition is Herodotus, who states that he received it from the Lydians. This opinion was rejected by Hellanicus, who represents the Etruscans as Pelasgians, and by Dionysius of Halicarnassus, who considered them indigenous (*autochthones*), and states that in his time they were very distinct from every other people in language as well as manners and customs. Niebuhr maintained that they were a mixture of Pelasgians and Umbrians with a race of northern invaders (*Rasena*), who conquered the same at an unknown date. He believed that the Rasena or Etruscan nobility came originally from the Rhætian Alps. Our knowledge of the history of the Etruscans, even during the period of their greatest power and prosperity, is very vague and imperfect. The Etruscan language is thought to be Indo-European in its grammatical construction, though its vocabulary, so far as ascertained, cannot be with any certainty affiliated. There is no Etruscan literature extant, and no bilingual inscriptions of any length have been found. There were three Etrurian centres of occupation: (1) from the Tiber northward to Pisa, where the Etruscans seem to have been limited by the Ligurians; (2) the settlement on the Po, of which Bologna, Verona, and Mantua were the principal cities; the Etrurian population is shown by inscriptions to have extended northward to the Rhætian Alps; (3) that in the Phlegræan plains surrounding Capua and Nola, which are regarded as Etruscan cities. Livy informs us that before the Romans became the dominant people of Italy the power of the Tuscans was widely extended both by sea and land. Several Greek writers attest the facts that they were bold and enterprising navigators, and fitted out large fleets for naval warfare. In 538 B. C. they fought a naval battle against the Phocæans at Corsica. The Tuscans and Carthaginians were allies on this occasion, and in other battles against the Greek colonies of Italy. Besides the twelve cities of Etruria Proper, these people possessed another state or confederacy on the northern side of the Apennines. According to the Roman traditions, the Tuscans were a powerful nation before the foundation of Rome, 752 B. C. It probably attained its greatest power about 150 years later. The Tuscan cities of Clusium and Veii were involved in several wars against the rising power of Rome. Tradition indicates the establishment of an Etruscan dynasty at Rome under the later kings, the two Tarquins, and assigns to this period of Etruscan domination the construction of the Cloaca Maxima and the Capitol. About 508 B. C., Porsena, king of Clusium, marched against Rome, which the best critics think he captured. Hostilities continued, with occasional intervals, between the Romans and the Veientes from 483 B. C. to 396 B. C., when Veii was captured by Camillus and destroyed. It does not appear that the other Tuscan cities gave any aid to Veii during this period. This apparent neutrality may be explained by the fact that their northern frontier was then infested by predatory hordes of Gauls, whom they were scarcely able to repel. In the subsequent wars it was sometimes Tarquinii and sometimes Volsinii that fought against Rome. About 309 B. C. the combined forces of several Etruscan cities were defeated by Fabius Maximus in a battle which gave the first decisive blow to their power. The conquest was completed by a victory which the Romans gained at the Vadimonian Lake in 283 B. C. The Etruscans, however, retained long after this event their own language, customs, religious rites, and nationality. They were admitted to the Roman franchise in 89 B. C.

Arts and Civilization.—Ancient writers concur in representing the Etruscans as the most cultivated and refined people of ancient Italy, and as especially skilful in ornamental and useful arts. They often evince a singular similarity to Egyptian ideas and patterns which has astonished antiquarians. The Romans derived from them many arts and inventions that conduce to the comfort of life, besides the toga and other articles of dress, the curule chair, and the triumphal pomp. The genius of the Etruscans appears to have been practical rather than speculative. They excelled in agriculture, navigation, engineering, and in useful public works. They had made great progress in architecture, sculpture, and painting. The so-called Tuscan order of architecture is a modification of the Doric. The Cloaca Maxima at Rome proves that they were acquainted with the true principle of the arch, and exemplifies their skill in the construction of sewers. Of their temples, theatres, and amphitheatres no considerable remains have been preserved. Among the existing monuments of their massive and cyclopean masonry are fragments of walls which defended the cities of Cortona, Fæsulæ, Clusium, and Volaterræ. Their tombs present one of the most peculiar features in Etruscan antiquities. These are in some cases chambers hewn in a cliff or solid rock, and adorned outside with façades of temples. The interior walls are decorated with paintings, and the tombs contain vast numbers of vases, tripods, urns, etc. The Etruscans excelled in several branches of plastic art, especially in the fabrication of bronze articles and pottery. Bronze statues and utensils were exported from Etruria in immense numbers. Among the extant specimens of their bronze-work are the figure of a she-wolf in the Capitol of Rome, and the Chimæra in the Museum of Florence. It appears that the painted vases called Etruscan which have been found in great numbers especially at Chiusi (Clusium) and Vulci are Greek in design and workmanship. The metallic specula or mirrors, one side of which is adorned with figures, are peculiarly Etruscan, and are prized as illustrative of their customs, mythology, etc. (See K. O. Müller, "Die Etrusker," 2 vols. 8vo, 1828; Abeken, "Mittel Italien," 1843; Dennis, "Cities and Cemeteries of Etruria," 2 vols. 8vo, 1848; Inghirami, "Monumenti Etruschi," 7 vols. 4to, 1821–26; Micali, "Storia degli Antichi Popoli Italiani," 3 vols., 1832.)

Etruria, a township of Halifax co., N. C. Pop. 2938.

Etruria, Kingdom of, in Italy, was founded by Napoleon I. Mar. 21, 1801. Louis, duke of Parma (1773–1803), was the first king. His son Charles Louis succeeded him May 27, 1803, but Napoleon annexed the kingdom in 1807 to the French empire. Its capital was Florence.

Etruscan Language. See Etruria.

Etruscans. See Etruria.

Etshmiadzin. See Echmiedzin.

Et'tlingen, a town of Baden, on the river Alb and on a railway, 4 miles by rail S. of Carlsruhe. It has manufactures of gunpowder, cotton goods, and paper. Pop. in 1871, 5092.

Ett'müller (Ernst Moritz Ludwig), a German philologist and antiquary, born at Gersdorf, near Löbau, Oct. 5, 1802, studied at Leipsic and Jena. He became professor of German at Zurich in 1833, and gained distinction by his researches in mediæval German literature. He produced in 1844 an epic poem called "The Chiefs of the Royal German Houses" ("Deutsche Stammkönige"), and in 1852 an "Anglo-Saxon Lexicon." He also edited several old German poets.

Et'trick, a pastoral vale of Scotland, in Selkirkshire, extends along the Ettrick River, which, after a course of 28 miles, enters the Tweed 2 miles below Selkirk. It is remarkable for beautiful scenery. Ettrick Forest, a royal hunting tract, included all Selkirkshire. It is nearly divested of trees. James Hogg the poet, called the "Ettrick Shepherd," was born in the vale and parish of Ettrick.

Ettrick, a post-township of Trempealeau co., Wis. Pop. 1214.

Et'ty (William), an English painter, born at York Mar. 10, 1787, was a pupil of Sir Thomas Lawrence. He was admitted as a student into the Royal Academy in 1806, and visited Italy in 1816. In 1821 he exhibited in the Academy "Cleopatra arriving in Cilicia." He was elected an acade-

mician in 1828. Among his works, which were greatly admired and brought high prices, are "Pandora Crowned by the Seasons" (1824), "The Combat: Woman pleading for the Vanquished" (1824), three pictures illustrating the acts of Judith (1827–31), "Joan of Arc" (1847), "The Judgment of Paris" (1826), and "Youth at the Prow and Pleasure at the Helm" (1832). He was an excellent colorist. Died Nov. 30, 1849. (See A. GILCHRIST, "Life of William Etty," 1855.)

Etymolog'icum Mag'num, a valuable lexicon or vocabulary of the Greek language by an unknown author. It is said to be the oldest extant Greek lexicon, and it contains many traditions respecting old and uncommon words. It is referred to the tenth century A. D. Editions of it have been published by Sylburg (1594), Schäfer (1816), Sturz (Leipsic, 1818), and Gaisford (Oxford, 1849).

Etymol'ogy [from the Gr. ἔτυμον, "literal sense," and λόγος, a "discourse"] is that branch of philology which traces the history of a word and of its grammatical variation from its primitive roots, and which shows the relationship of different languages by finding the same roots in these different languages. In grammar it is used in a more limited sense, as the name of that part of grammar which treats of the various parts of speech, the variations of declension, conjugation, etc. It is often used as nearly synonymous with the word "derivation." The study of the derivation of words is almost as old as civilization. Moses, Homer, and other very ancient writers often give explanations of the origin of proper names. Many tales of the Greek mythology give real or fanciful accounts of the appellations of gods and heroes. The Greek philosophers, the Alexandrian grammarians, the Roman Varro, and the later scholiasts wrote much upon the derivation of words, but to little purpose. They went to work with scanty information and with defective knowledge of the principles underlying a sound philology. Many of the derivations suggested by them are simply ludicrous, being suggested by mere resemblances of sound. Our knowledge of their labors is principally derived from the "Etymologicum Magnum" and "Etymologicum Gudianum," both probably written in the tenth century.

The revival of learning in the fourteenth century aroused anew the interest in etymological science; but it was not till the British occupation of India, and the beginning of the study of Sanscrit literature, that etymology received philosophical treatment. It is now known that the languages are properly regarded as members of greater or smaller groups or families; our own language being a member of the Teutonic group, which is itself a subdivision of the great Indo-European family, which comprehends many of the languages of Asia, and by far the greater number of those of Europe. A philosophic etymology seeks the derivation of words by judicious comparison of the vocabularies, the religious faith, the history, and the literature of nations ethnologically related, rather than by the comparison of words of any one or two languages.

The great etymologists are all modern, and are nearly all German, as is shown by the names of Adelung, Bopp, Pott, W. Humboldt, Grimm, Curtius, Benfey, and Schleicher. For Ugrian etymologies, the Finlanders Carsten and Ahlquist are high authorities.

Eu [Lat. *Au'ga* or *Augium*], a town of France, department of Seine-Inférieure, is about 20 miles E. N. E. of Dieppe and 5 miles from the sea. It has a fine Gothic church, and manufactures of lace, silk, and soap. Here is the château d'Eu, which was owned by King Louis Philippe, and is surrounded by a large and beautiful park. It contains a unique portrait-gallery, which is said to be the finest collection of historical portraits in France. Pop. in 1866, 4168.

Eu (PRINCE LOUIS PHILIPPE MARIE FERDINAND GASTON D'ORLÉANS), COMTE D', was born at the château of Neuilly, April 28, 1842, the eldest son of the duc de Nemours, and a grandson of Louis Philippe, king of the French. In 1864 he married Isabella, daughter of Dom Pedro II., emperor of Brazil. As marshal of the empire he took command of the allied forces operating against Paraguay, and Mar. 1, 1870, the war was ended by the death of the dictator Lopez, who was killed in a battle at Aquidubon.

Eubœ'a [Gr. Εὔβοια; Fr. *Eubée;* Turkish, *Egripo* or *Egripos;* It. *Negroponte*], formerly called **Negropont,** a Greek island, the largest island in the Ægean Sea, is about 90 miles long and comparatively narrow; the greatest breadth is about 30 miles. Area, 1574 square miles. It is separated from the N. E. coasts of Attica and Bœotia by the narrow channels of Egripo (*Euri'pus*) and Talanta. It is connected with the mainland of Bœotia by a bridge across the channel at Chalcis. The surface is mountainous. Mount Delphi, near the middle of the island, is said to be 7266 feet high. It is of limestone formation. The soil of the valleys is fertile, and produces cotton, wheat, grapes, etc. Among the exports are wool, hides, and oil. The chief towns are Chalcis and Carystus. In ancient times Eubœa belonged to the Athenian republic. It now forms a nomarchy of the kingdom of Greece. Pop. in 1870, 82,541.

Eubu'lides [Gr. Εὐβουλίδης], a Greek philosopher of the Megaric school, flourished about 350 B. C. He was a native of Miletus, a disciple of Euclid, and an adversary of Aristotle. He was the inventor of several sophistical syllogisms, including the *sorites*.

Eubu'lus [Εὔβουλος], an Athenian comic poet of the middle comedy, flourished about 375 B. C. He wrote numerous comedies on mythological subjects, of which only small fragments are extant. His language is elegant.

Eucalyp'tus (plu. **Eucalypti**), a genus of trees of the natural order Myrtaceæ, comprises numerous species, mostly natives of Australia. They form a characteristic feature of the peculiar vegetation of that island, having entire leathery leaves, of which one edge is directed towards the sky, so that both surfaces are equally exposed to the light. The *Eucalypti* are called "gum trees," because they abound in resinous exudations. The timber is excellent, and is used for shipbuilding and other purposes. The *Eucalyptus gigantea,* called "stringy bark," it is said sometimes attains a height of 480 feet and a diameter of 27 feet. Mr. George Robbins reports trees of this kind 500 feet high. They are probably the tallest trees on the globe. The bark of several species abounds in tannin, and is used for tanning leather. The *Eucalyptus resinifera,* which grows to a great height, yields a red astringent gum, which is called "Botany Bay kino," and is used in medicine as a substitute for kino. An exudation resembling manna in medicinal properties is obtained from the leaves of *Eucalyptus mannifera* and *dumosa.* The blue gum (*Eucalyptus globosa*) produces ship-timber of the best quality. It is said to furnish a febrifuge principle surpassing quinia in efficiency. Several species of *Eucalyptus* have been successfully introduced into California and Europe.

Eu'charist [Gr. εὐχαριστία, "the giving of thanks"], a name applied to the sacrament of the Holy Communion, or the feast of the Lord's Supper, in allusion to the blessing and thanksgiving with which the last supper of our Saviour with his disciples began and ended. This solemn festival has been kept in all Christian churches from the time of the resurrection, in commemoration of the passion and death of our Lord, and in obedience to his own divine institution. Among the earliest disciples in Judæa, the Lord's Supper seems to have been a regular meal, probably the principal meal of the day in each family, into which the commemorative breaking of bread and partaking of the cup of blessing were introduced as a part. Subsequently the disciples of many families came together and held a festival in common—a practice in which originated the ἀγάπη, or love-feast, in the course of which the brethren saluted each other with a holy kiss. The abuses which grew out of this, and which are severely rebuked by Saint Paul in the First Epistle to the Corinthians, led to a separation of the two institutions; and the commemorative observance has since been celebrated, with a solemnity in harmony with its character, by itself.

No part of the Christian practice and doctrine has given rise to larger diversities of opinion or to a more voluminous polemical literature than the sacrament of the Eucharist. These controversies were not known to the Church during its first eight or nine centuries. It seems entirely just to believe that, during all this early period, the visible elements employed in the celebration, the consecrated bread and wine, were regarded only as symbols and emblems of the body and blood of Christ given for our redemption; inasmuch as the expression of an opinion or doctrine different from this appears to have been first publicly made in the year 831 by a monk, subsequently abbot of Corbey in France, named Pascasius Radbert, who maintained the two following propositions, which he declared to be the true doctrine of the Church, but which were received with loud and general remonstrance: viz., first, that, "after the consecration of the bread and wine in the Lord's Supper, nothing remains but the outward figure, under which the body and blood of Christ are really and locally present"—that is to say, the doctrine more recently known under the name of *transubstantiation;* and secondly, that "the body of Christ thus present in the Eucharist is the same body that was born of the Virgin, that suffered on the cross, and that was raised from the dead." The excitement which followed this announcement was such that the emperor of Germany, Charles II. (I. of France, called "the Bald"), directed counter-expositions to be prepared by Johannes Scotus, and Ratramn (otherwise called Bertramn). The work of Scotus, though often cited in subsequent centuries, has perished; that of Ratramn is still extant. Both held that the consecrated bread and wine in the Eucharist are

only signs or symbols, and not the veritable body and blood of Christ; but in the work of Ratramn there are some things said on this point which are ambiguous or obscure, while Scotus, on the other hand, is said to have been perspicuous, distinct, and intelligible. Out of this dispute arose some extraordinary and repulsive secondary controversies, as to the natural consequences of taking into the stomach and digesting the consecrated elements, whatever view be taken of their nature, for which those who desire to understand them must refer to the ecclesiastical histories.

The doctrine of Pascasius, or at least his first proposition, found no small number of adherents, but the struggle, though warm, was a struggle of private opinions, and not of opinions with authority. The Church set forth no definition of her own views on the subject, and the excitement after a time abated. About two centuries later, however, the controversy was renewed in a manner which presently led to the interposition of the Roman pontiffs, and subsequently of councils of the Church. The first incident in this renewal was a declaration, in 1004, by Leutheric, archbishop of Sens, to the effect that none but the sincerely pious receive the body of Christ in the Holy Communion. It is easy to see what questions may arise out of a doctrine like this, especially with those who hold the certainty of the Real Presence. Later, in 1045, the celebrated Berenger, at that time archdeacon of Angers, taking the work of Johannes Scotus, above mentioned, as his text and guide, attacked with vehemence the doctrine of the Real Presence. He was met by Bruno, his own bishop (of Angers), and also by Hugh of Langres and Adelman of Bresse. But his most powerful and most dangerous antagonist was the pope, Leo IX., who assembled two councils in 1050—one at Rome and one at Vercelli—where he caused the writings of Berenger to be condemned and burned, and excommunicated their author. Retiring into Normandy, Berenger sought the support of William (afterwards "the conqueror" of England), but this prince having convened an assembly of the principal prelates and theologians of his province, the unfortunate polemist was again condemned; and in the Council of Paris, called by Henry I. in the same year (1050), he was not only condemned still a third time, but deprived of his benefices. The subsequent history of Berenger is a painful one. On three different occasions, under three different successive popes, Victor II., Nicholas II., and Gregory VII., he was compelled by threats and intimidation to renounce his opinions; and on two of these occasions, to subscribe to declarations drawn up for him by his enemies. The first of these declarations, made at what may be called his second trial, under Nicholas II., was to the effect that "the bread and wine after consecration are not only a sacrament, but also the real body and blood of Jesus Christ; and that this body and blood are handled by the priests and consumed by the faithful, and not in a sacramental sense, but in reality and truth, as other sensible objects are." This declaration he was not only forced to subscribe, but also to confirm with an oath; but hardly had he returned to France before he abjured it utterly, and resumed the teaching of his former views. He was accordingly arraigned a third time, and this arraignment took place under Gregory VII. (Hildebrand), who seems himself not to have partaken of the extreme views of Berenger's relentless persecutors, yet to have felt compelled to oblige him to renounce his own. The unfortunate man constrained himself consequently to subscribe to his belief of the following proposition, and to confirm this declaration by an oath—viz., that "the bread laid on the altar becomes, after consecration, the true body of Christ, which was born of the Virgin, suffered on the cross, and now sits at the right hand of the Father; and the wine placed on the altar becomes, after consecration, the true blood which flowed from the side of Christ." There was affirmed to be an ambiguity in this declaration, perhaps growing out of the construction to be put upon the words "laid, or placed, upon the altar." At any rate, it did not satisfy the enemies of Berenger, and he was therefore subjected to the humiliation of subscribing and making oath to still another confession of faith, in the following words—viz., that "the bread and wine are, by the mysterious influence of the holy prayer and the words of our Redeemer, substantially changed into the true, proper, and vivifying body and blood of Jesus Christ;" to which was added, that "the bread and wine are, after consecration, converted into the real body and blood of Christ, not only in quality of external signs and sacramental representations, but in their essential properties and substantial reality." This form of submission having been fully completed, Pope Gregory dismissed the humbled prelate with many marks of personal esteem, and visible and liberal evidences of his friendship. Notwithstanding which, no sooner was Berenger in his own country again, than he retracted this last declaration, as he had done all the former, and prepared an elaborate refutation of the doctrines to which he had just subscribed. The pope took no notice of this retractation, whence the inference has been drawn that Gregory himself was personally not far from entertaining the same opinions as Berenger. The evening of the days of this greatly tried champion of the right to freedom of opinion where the Church has not spoken, was passed in acts of penance and mortification, to which he subjected himself in expiation of the guilt of his dissimulation and perjury at Rome.

It was not till the assembling of the fourth Lateran Council by Innocent III., in the year 1215, that the voice of the Roman Church was authoritatively uttered as to the true doctrine of the Eucharist. That pope, through a decree of that council, declared the true faith to be that the elements of bread and wine are really and truly, after consecration, the body and blood of Jesus Christ in actual substance, remaining bread and wine only to outward appearance; and he himself invented and introduced the term "transubstantiation," by which this doctrine has been ever since known and recognized as a doctrine of the Roman Church. It was a natural consequence of the admission of this doctrine as an established dogma, that that view of the Eucharist which regards the ceremonial consecration and placing upon the altar of the elements, as a *sacrifice*, in which the original great sacrifice upon Calvary is perpetually renewed, found easy acceptance; and other consequences have been the worship of the consecrated elements, as being a worship directly paid to Christ himself; the elevation of the Host in the celebration of mass, that it may be seen and reverenced by the people; and the custom, prevalent in Roman Catholic countries, of carrying this consecrated bread about in solemn processions through the public streets, to be administered to the sick and dying.

Another controversy in regard to the Eucharist arose in the sixteenth century, which continues still to divide opinions, the Church not having formally declared on either side. It was (and is) held by the Jesuits and Dominicans, that the sacraments have in themselves an instrumental and efficient power, by virtue of which they work in the soul, independently of any previous preparation or state of the propensities, a disposition to receive the divine grace; and this they call the *opus operatum*. Thus, according to their view, neither knowledge, nor wisdom, nor humility, nor faith, nor devotion is necessary to the efficacy of the sacraments, whose prevailing energy nothing but a mortal sin can resist. Hence, therefore, according to them, priests may give immediate absolution to all who confess their misdeeds and evil thoughts and wicked sentiments and propensities, and admit them directly to the use of the sacraments. This view was resisted by the Jansenists, and is rejected by all in the Roman communion who have the progress of vital and practical religion truly at heart. These demand that none shall be admitted to the sacrament of the Holy Communion, who do not give evidence of true penitence, and of an intent henceforth to lead a new life, following the commandments of God, and walking in His holy ways.

The same century saw the great uprising against the abuses which had gradually crept into the Church of Rome, commonly called the Reformation, inaugurated by the monk Martin Luther. It soon appeared that, upon some essential points of doctrine, there was as little harmony of doctrine in the ranks of the Reformers, as there had been in those of the Church. In regard to the Eucharist, the difference between Luther and Zwingle, if not quite so wide, was at least as irreconcilable as that between the Jesuits and the Jansenists, or that of the ninth century between Radbert and Scotus. Luther maintained that the body and blood of Christ are really, though in a manner far beyond human comprehension, present in the Eucharist, and are exhibited together with the bread and wine. This is the doctrine since known as "consubstantiation." Zwingle, on the other hand, regarded the bread and wine as being only symbols present, and typifying the body and blood of Christ, which themselves are absent. Numbers of zealous and able men enrolled themselves in this controversy, on both sides, and the consequent danger to the common cause of Protestantism was such, that Philip, margrave of Hesse, whose devotion to this cause was deep and sincere, appointed a conference to be held at Morpung between Luther, Zwingle, and other doctors of both parties. The result, so far as the main point is concerned, was a failure. The two great leaders separated without either having been able to convince the other, and without having been able to agree upon any statement of doctrine in regard to Christ's presence in the Eucharist which both could accept.

The doctrine of the Anglican Church, which is that of the Episcopal Church in America on this subject, is briefly set forth in the catechism, where, after defining a sacrament to be an outward and visible *sign* of an inward and spiritual grace, and affirming the object for which the sacrament of the Lord's Supper was ordained to have been "for the con-

tinual remembrance of the sacrifice of the death of Christ, and of the benefits which we receive thereby," it is declared that in this sacrament the outward and visible part or sign is the "bread and wine which the Lord hath commanded to be received," and that the thing signified is "the body and blood of Christ, which are spiritually taken and received by the faithful in the Lord's Supper." And in the "Articles of Religion, as established by the bishops, clergy, and laity of the Protestant Episcopal Church in the United States of America, in convention, on the 12th day of September, in the year of our Lord 1801," which are, with some alterations of minor importance, identical with the Thirty-nine Articles of the Church of England, it is declared (in "Art. xxviii.; of the Lord's Supper") that "transubstantiation (or the change of the substance of the bread and wine) in the supper of our Lord, cannot be proved by Holy Writ; but is repugnant to the plain words of Scripture, overthroweth the nature of a sacrament, and hath given occasion to many superstitions." And further, "that the body of Christ is given, taken, and eaten in the Supper, only after an heavenly and spiritual manner. And the mean whereby the body of Christ is received and eaten in the Supper, is faith." F. A. P. BARNARD.

Euchee Anna. See UCHEE ANNA.

Euchlo'rine [from the Gr. εὔχλωρος, "bright green"], a name given to a green gas liberated when potassic chlorate is acted upon by hydrochloric or sulphuric acid. The gas is a mixture probably of chlorine (Cl) and perchloric oxide (Cl_2O_4). It possesses bleaching properties. It is prepared by heating gently a mixture of two parts of sulphuric acid, two of water, and one of chlorate of potash.

Eu'chre, a game of cards, originally German, but now a favorite in the U. S., chiefly as a social game. "Four-handed" euchre, where four persons are engaged, is the best form of the play, but two, three or even more than four persons may play, the rules being variously modified to suit such changes. Properly, two or four persons should play. The "euchre deck" contains the aces, the face-cards, and all spot-cards above the sixes, though many players reject all below the nines. In four-handed play the parties draw for deal, which falls to the one who draws the first jack. The right-hand adversary cuts, and the cards are dealt by threes and twos, or twos and threes, from left to right. The uppermost undealt card is turned for trump; the oldest hand "orders up" this card as trump if he sees fit; otherwise he "passes" to the next, who exercises the same choice, and so on. If not "ordered" or "taken" up the first time around, the players have in turn their choice of making a new trump or passing again. When a trump is "ordered" or "taken," the dealer may discard his poorest card, and take up the trump from the deck. The side which orders or takes up must take at least three tricks (one point), or lose two points (a euchre) to the other side. Four tricks also count one, but five tricks (a march) count two. In case one of the four players has a strong hand, he is at liberty to play alone, without his partner's help. In this case, if he makes a march, his side scores four; if he is euchred, the opposite side scores four. Five points make the game.

Another peculiarity of the game is, that the highest trump (right bower) is always the jack of trumps; the jack of the "next" suit—that of corresponding color—being always second best trump (left bower), the ace of trumps is third, the king fourth, etc. Jacks of a suit not trumps rank next below the queen of their suit. Euchre is an easy and simple game, and is consequently popular as a social pastime. Many varieties of it have sprung up, and at present almost every coterie has its own set of rules; some having a blank card for the highest trump, the bowers following; others allowing the victors to count on the next game all the points they have made above the five necessary to the victory, or allowing the possessor of a "lone hand" to call for his partner's best card, etc.

Euclase [from the Gr. εὖ, "good," "well," "easily," and κλάω, to "break," because it is so easily broken], a silicate of alumina and glucina which occurs in greenish crystals in Peru and Brazil. It is well adapted for jewelry, on account of its great hardness and the fine polish of which it is susceptible, but it is not much used as a gem in consequence of its rarity and fragility.

Eu'clid [Gr. Εὐκλείδης] OF ALEXANDRIA, a celebrated Greek, called the "father of geometry." He was born at Alexandria in Egypt, and lived about 300 B. C., and is said to have belonged to the Platonic school of philosophy. The events of his life are mostly unknown, except that he taught mathematics in the reign of Ptolemy I. (Soter), who died about 282 B. C. He made important discoveries in geometry, and surpassed all preceding geometers in the rigorous method and arrangement of his demonstrations. When Ptolemy I. asked him if geometry could not be mastered by an easier process than the ordinary one, he returned the celebrated answer, "There is no royal road to geometry." His "Elements of Geometry" present the most ancient system of that science that is extant, and have been considered an excellent standard work for 2000 years. (See SMITH, "Dictionary of Greek and Roman Biography.")

Euclid OF MEGARA, an eminent Greek disciple of Socrates, flourished about 400 B. C. He is said to have witnessed the death of Socrates (399 B. C.), after which he founded at Megara a school called the Megaric or Dialectic. His system was based on or partly derived from the principles of the Eleatic school, to which he added the ethics of Socrates.

Euclid, a post-village of Clay township, Onondaga co., N. Y. Pop. 138.

Euclid, a post-township of Cuyahoga co., O. P. 2188.

Eude'mus [Gr. Εὔδημος] OF RHODES, a Greek Peripatetic philosopher who lived about 320 B. C., was a disciple of Aristotle. He was a meritorious editor and commentator of Aristotle's works, and he wrote a "History of Geometry and Astronomy," which is not extant.

Eudiom'eter [from the Gr. εὖ, "good," and Διός, the genitive of Ζεύς, "Jupiter," regarded as the personification of the atmosphere, and μέτρον, a "measure"], an instrument originally intended for ascertaining the proportion of oxygen in the air, with a view of judging of its purity or impurity; but it is also employed to test the composition of any mixed gases. Many forms have been used, but one of the best consists of a graduated glass tube having two platinum electrodes within it, the tube closed at one end. To test the composition of air, for example, the carbon dioxide (carbonic acid) of the air within the tube is removed by strong liquor potassæ over a mercury bath, when the rise of the mercury within the tube indicates the proportion of carbon dioxide in the atmosphere. A large but determinate proportion of hydrogen is then introduced and exploded by means of the electrodes. After cooling, one-third of the loss of gas by explosion is the volume of free oxygen in the tube. Allowing for the hydrogen unconsumed, the volume of nitrogen is readily seen. The results are then reduced to a percentage of volumes.

Eudo'cia [Gr. Εὐδοκία; Fr. *Eudocie*], sometimes called **Eudoxia,** a beautiful Roman empress, born at Athens about 394 A. D. She was originally named ATHENAÏS, and assumed the name of Eudocia when she was converted to the Christian religion. In 421 she was married to the emperor Theodosius II. She was a woman of superior talents, and author of several poems. Having offended Theodosius and his sister Pulcheria, she was banished in 449, after which she resided in Palestine, and founded several convents in that country. Died in 460 or 461 A. D.

Eudo'ra, a post-village of Douglas co., Kan., on the Kansas River and the Missouri Pacific R. R., 8 miles E. of Lawrence. Pop. of Eudora township, 1901.

Eudox'us [Gr. Εὔδοξος], a Greek astronomer, born at Cnidos in Caria, flourished about 366 B. C. He was a pupil of Archytas and of Plato, and he opened a school at Athens or Cnidos. Cicero called him the prince of astronomers. Eudoxus computed the length of the year to be 365¼ days, and appears to have originated the doctrine of concentric solid crystalline spheres, by which he explained the apparent motions of the sun, moon, and planets.

Eufa'la, a township of Tallapoosa co., Ala. Pop. 595.

Eufau'la, a city of Barbour co., Ala., is on the right bank of the Chattahoochee River, which is navigable to this point for the largest boats at all seasons, 350 miles by river from Appalachicola, and 80 miles E. S. E. from Montgomery by the Montgomery and Eufaula R. R. It is the terminus of three railroads—the South-western Georgia, the Montgomery and Eufaula, and the Vicksburg and Brunswick. It has five churches, a Jewish synagogue, a female college, a school for colored people, and three private banking-houses, besides a building and loan and a savings bank and loan association, four cotton-warehouses, a public hall, a fair-ground, and one daily, one tri-weekly, and two weekly newspapers. Over 30,000 bales of cotton are sold here annually. Pop. 3185.

J. M. MACON, ED. "TIMES."

Eugene, a post-township of Vermillion co., Ind. Pop. of village, 347; of township, 1396.

Eugene, ū-jeen' [Fr. *Eugène;* Ger. *Eugen*], PRINCE, or, more fully, **François Eugène de Savoy,** a celebrated general, born in Paris Oct. 18, 1663. He was a son of Eugène Maurice, count of Soissons, and Olympia Mancini, a niece of Cardinal Mazarin. Having been offended by Louis XIV. of France, he entered the service of the emperor of Austria in 1683. He served with distinction in the war against the Turks, and was rapidly promoted. In 1691 he

obtained command of the imperial army in Piedmont, where he fought against the French. Louis XIV. afterwards offered him a marshal's bâton if he would enter the French service, but he declined. Having been appointed commander of the Austrian army in Hungary, he gained a decisive victory over the Turks at Zenta Sept. 11, 1697. In the great European war of the Spanish succession, which broke out in 1701, Eugene first commanded in Italy, where he was opposed by the able French marshal Catinat, and afterwards by Villeroi, whom he surprised at Cremona and took prisoner in Jan., 1702. An indecisive battle was fought at Luzara in Aug., 1702, by Prince Eugene and the duke of Vendôme. About the end of that year he was appointed president of the council of war in Vienna. He commanded the imperial army which co-operated in Germany with the English army under the duke of Marlborough. These allies defeated the French and Bavarians at the great battle of Blenheim, Aug. 13, 1704. In 1705 he took command of the army in Italy, and was defeated by the duke of Vendôme at Cassano in August of that year. He gained a victory over the French duke of Orleans at Turin in Sept., 1706, expelled the French from Italy, and returned to Vienna in 1707. The seat of war was next transferred to Flanders, where Prince Eugene was associated with the duke of Marlborough in the command of the combined armies. They defeated the French at Oudenarde (1708), and claimed the victory at the great battle of Malplaquet (Sept. 11, 1709), although they lost there about 25,000 men. In 1712 he was sent to London on a diplomatic mission, the object of which was to persuade the English to continue the war and to restore Marlborough to the command, but he was not successful. A victory which Marshal Villars gained over Prince Eugene at Denain in July, 1712, induced Austria to negotiate for peace. In Mar., 1714, he signed a treaty of peace at Rastadt. He defeated a large Turkish army at Peterwardein Aug. 5, 1716, and took Belgrade from the same enemy in 1717. After the end of this war, in 1718, he rendered important services as a statesman, and enjoyed the confidence of the emperor of Germany. He died in Vienna April 21, 1736. He was never married. Though he made no great improvement in tactics, he is reputed one of the greatest generals of modern times, being distinguished for his rapidity of perception, his decision, and his promptitude to rectify his errors. (See JOHN CAMPBELL, "Military History of Prince Eugene and Marlborough," 2 vols., 1736.)

Eugene City, the capital of Lane co., Or., is on the W. bank of Willamette River, here navigable for steamboats, and on the Oregon and California R. R., 71 miles S. of Salem. The State university is to be established here. It has two weekly newspapers. Pop. 861.

Euge'nia, a genus of trees and shrubs of the natural order Myrtaceæ, nearly related to the myrtle. It comprises numerous species, which are natives of tropical and subtropical countries, and some of them produce delicious fruits remarkable for their pleasant balsamic odors. The fruit is a berry of one or two cells, with one seed in each cell. The allspice or pimento of commerce is the unripe, sun-dried berry of the *Eugenia Pimenta*, which is indigenous in the West Indies. The *Eugenia Malaccensis*, a native of the Malayan Archipelago, is a small tree which bears a red fruit nearly as large as an apple, with a juicy pulp and an agreeable odor like that of a rose; hence it is called rose apple. The last name is also applied to the fruit of the *Eugenia Jambos*, an East Indian tree, now cultivated extensively in many tropical countries. The *Eugenia Ugni*, a native of Chili, has a small edible fruit, from which a refreshing beverage is obtained. Florida has five or more unimportant species.

Eugenia, a post-village of Grey co., Ontario, 28 miles from Collingwood. It is noted for its scenery. Here the Beaver River falls 334 feet in a mile, including a perpendicular descent of 70 feet. There are manufactures of lumber and woollen goods. Pop. about 100.

Eugénie, or, more fully, **Eugénie Marie de Montijo,** empress of France, was born at Granada, in Spain, May 5, 1826. Her father was the Spanish count de Montijo, and her mother was Maria Manuela Kirkpatrick, a woman of Scottish extraction. Eugénie was styled the countess of Teba in her youth. She was married to Napoleon III. in Jan., 1853, and bore a son in Mar., 1856. As a zealous Catholic she used her influence to promote the power of the pope. In Oct., 1869, she made a voyage to Venice, Constantinople, and Egypt, was present at the formal opening of the Suez Canal (Nov. 17), and returned to France at the end of November. After Napoleon put himself at the head of the army, about Aug. 1, 1870, she acted as regent until the people of Paris proclaimed a republic, Sept. 4, 1870. She then escaped to England.

Euge'nius I. was chosen pope in 654 A. D. as the successor of Martin I., who was banished by the emperor Constans. Died in 658.

Eugenius II., a native of Rome, succeeded Pascal I. as pope in 824 A. D. He called a council, which met at Rome in 826 for the reformation of the clergy. He died in 827, and was succeeded by Valentinus.

Eugenius III., a native of Pisa, was chosen pope in 1145, in place of Lucius II. The Romans, excited by the preaching of Arnaldo da Brescia, had revolted against Pope Lucius. Eugenius, being unable to enforce his authority, retired to France and held a council at Rheims in 1148. He also promoted the second Crusade. He died in 1153, and was succeeded by Anastasius IV.

Eugenius IV. (GABRIELE CONDOLMERO), a native of Venice, was chosen pope in 1431 as the successor of Martin V., who had convoked a council at Bâle. This council refused to recognize the supremacy of the pope. Eugenius therefore issued a bull proclaiming that the Council of Bâle was or must be dissolved, and he called another council at Ferrara in 1437. The Council of Bâle in 1438 deposed the pope, and elected as his successor Amadeus of Savoy, who assumed the name of Felix V. The result of this election was a schism in the Church, for Eugenius continued to act as pope in Rome, and was recognized by several powers. At the Council of Ferrara, Eugenius and John Palæologus signed in 1439 a convention for the union of the Greek and Latin churches, but this convention had no permanent effect. He died in 1447, and was succeeded by Nicholas V.

Eugu'bian Tables, the name of certain bronze tablets found near Gubbio (the ancient *Iguvium*) in 1444. Five of the inscriptions are in Etruscan and Umbrian characters, the other two in Latin. They were published by Lepsius in his "Inscriptiones Umbricæ et Oscæ" (1841).

Eula'lia, a post-township of Potter co., Pa. Pop. 353.

Eu'lenburg (FRIEDRICH ALBERT), GRAF ZU, a Prussian statesman, was born Jan. 29, 1815, went in 1859 as envoy extraordinary and minister plenipotentiary to China, Japan, and Siam, concluded (Jan. 1, 1861) a treaty of navigation with the government of Japan, and in September of the same year another with China. He became, Dec. 9, 1862, minister of the interior.

Eu'lenstein (KARL), born in Heilbronn, Würtemberg, in 1802, was apprenticed in youth to an ironmonger, who would not allow him to cultivate his musical tastes, which were naturally strong. As a last resort, he took up the Jew's harp, and, devoting his spare time to that instrument, he acquired such astonishing skill in playing it that his reputation extended throughout Europe.

Eu'ler (LEONARD), an eminent Swiss geometer, born at Bâle April 15, 1707. He was educated at the university of that city, and went to St. Petersburg with his friend Daniel Bernoulli. In 1733 he became professor of mathematics in the Academy of St. Petersburg. He displayed great fecundity and inventive genius by the composition of a multitude of treatises on mathematics. It is said that he wrote more than half of the forty-six quarto volumes published by the Academy between 1727 and 1783. Having been invited by Frederick the Great, he removed to Berlin in 1741. He improved the integral calculus and the science of mechanics. Among his numerous works are "Mechanics, or the Science of Motion analytically explained" (in Latin, 2 vols., 1736–42), a "Treatise on Naval Science" (1749), a "Treatise on the Integral Calculus" ("Institutiones Calculi Integralis," 1768), "Letters to a German Princess" (in French, 1768), a "Treatise on Dioptrics" (1771), and "Theory of the Moon's Motion" (1772). He became blind about 1767, after which he resided in St. Petersburg until his death, Sept. 7, 1783. Condorcet, who wrote a eulogy on him, says, "He multiplied his productions marvellously, and yet was original in each."

Eu'logy [Gr. εὐλογία, "praise," from εὖ, "good," and λόγος, "word;" Fr. *éloge*], an encomium pronounced on a person; a laudatory speech or written composition. In ecclesiastical history it was applied to a present bestowed on the Church after having been *blessed*.

Eu'lytine, Silicate of Bismuth, Bismuthblende, a rare mineral found at Schneeberg in Saxony.

Eu'menes [Gr. Εὐμένης], a favorite officer of Alexander the Great, was born at Cardia, in Thrace, about 360 B. C. He had a high command in the army which Alexander conducted against Persia in 334 B. C., and gained the confidence of that prince. On the death of Alexander, Eumenes became governor of Cappadocia and Pontus. As an ally of Perdiccas he defeated Craterus in the year 321, soon after which Antigonus and Antipater formed a coalition against him. Eumenes was captured and put to death by Antigonus in 317 or 316 B. C. (See PLUTARCH, "Life of Eumenes.")

Eumen'ides [Gr. Εὐμενίδες (from εὖ, "good," and μένος, "mind," "disposition"), *i. e.* the "gracious ones," so called for the sake of propitiating them], or **Erinnyes,** the Greek name of the Furies, whom the Romans called Furiæ or Diræ. They were supposed to be goddesses who punished crimes and pursued the guilty with burning torches. According to the later tradition, there were three Furies—namely, Tisiphone, Alecto, and Megæra. The Cave of the Eumenides is at the N. E. angle of the Areopagus, immediately below the seats of the judges.

Eumol'pus [Gr. Εὔμολπος], a personage of the Greek mythology, was supposed to be a Thracian bard, a son of Neptune, and the founder of the Eleusinian mysteries. Musæus is said to have had a son named Eumolpus, who was an instructor of Hercules.

Euna'pius [Gr. Εὐνάπιος], a sophist and physician, born at Sardis, in Lydia, about 348 A. D. He was a Neo-Platonist, an opponent of Christianity, and a partisan of Julian the Apostate. He lived at Athens, and wrote in Greek "The Lives of Philosophers and Sophists," which is highly prized. It was published by Boissonade in 1822. Died about 420.

Euno'mians, the followers of Eunomius, a strict Arian, who was made bishop of Cyzicus, in Asia Minor, in 360 A. D., but soon resigned on account of his theological opinions. The Eunomians were for a time very numerous, but the sect soon died out.

Euno'mius [Gr. Εὐνόμιος], the founder of an Arian sect called Eunomians, was born in Cappadocia. He was appointed bishop of Cyzicus in 360 A. D. by Eudoxius, bishop of Antioch, who afterwards deposed him for heresy. Eunomius was a man of superior abilities, and maintained the extreme Arian doctrines, for which he was several times banished. Died in 394 A. D.

Eu'nuch [Gr. εὐνοῦχος (from εὐνή, a "bed," and ἔχω, to "have" or "keep"), *i. e.* "having charge of the beds or chambers of the women"] was at first the title of servants who had the care of bed-chambers; and from the custom of placing women's apartments under the care of mutilated persons, the name came to be applied to the latter class exclusively. Mutilation was a very ancient practice, and was especially frequent in Syria and the East. It is a natural consequence of the system of polygamy. In Greece it was not common until the Byzantine period. In Rome under the emperors many eunuchs were kept. It is asserted that they were made to a considerable extent in mediæval Europe. In Italy they were formerly kept for their fine soprano singing. At present they are chiefly found in Mohammedan countries. At Moscow a community of eunuchs exists, who are jewellers by profession, and who add to their numbers by the purchase and mutilation of children. Eunuchs as a class are small, beardless, and weak, with a jealous, cowardly, and intriguing character; yet some, like Bagoas, the Persian minister, Philetærus, king of Pergama, and Narses, the Byzantine general, have possessed energy and ability. As used in the Bible and the classics, the word often means simply a chamberlain.

Euon'ymus [from the Gr. εὐ, "well," "propitious," and ὄνυμα, a "name," by euphemism because it is poisonous], a genus of shrubs of the natural order Celastraceæ, natives of Europe and the U. S. The fruit is a capsule, with seeds enclosed in a red aril. The flowers, foliage, and fruit of some of the species are poisonous. The wood of the *Euonymus Europæus,* an ornamental shrub, is strong, compact, and yellow, and is applied to various useful purposes. The *Euon'ymus atropurpu'reus* (burning bush or wahoo), a native of the U. S., is an ornamental shrub, with crimson fruit drooping on long peduncles. The bark is used as a remedy for dropsy and other diseases, and has active properties. The *Euonymus Americanus,* or strawberry bush, is often cultivated for ornament.

Eupato'ria, formerly **Koslof,** a seaport of Russia, in the government of Taurida, is on the Black Sea, and on the W. coast of the Crimea, 38 miles W. N. W. of Simferopol. It has a shallow harbor, a custom-house, a hospital, and a handsome Tartar mosque. Grain, wool, hides, and salt are exported from this place. The English and French armies landed here in Sept., 1854, and the Russians were repulsed here in Feb., 1855. Pop. 7730.

Eupato'rium [Gr. εὐπατόριον, said to have been named in honor of *Eu'pator,* a king of Pontus], a genus of plants of the natural order Compositæ, having the florets all tubular and perfect. It comprises many species of perennial herbs, mostly American. The *Eupato'rium perfolia'tum,* called boneset and thoroughwort, is a native of the U. S., and is used in medicine as a tonic, stimulant, and sudorific. The leaves, as the specific name denotes, are connate-perfoliate—*i. e.* united at the base around the stem. The hemp agrimony (*Eupato'rium cannab'inum*), which grows wild in England, has been used in medicine. The *Eupatorium purpureum* and several other American species appear to have valuable diuretic properties.

Eu'pen, oi'pẹn [Fr. *Néau*], a manufacturing town of Rhenish Prussia, on the Vesdre, and in a beautiful valley 10 miles by rail S. S. W. of Aix-la-Chapelle. It is well built and flourishing, and derives its prosperity chiefly from its manufactures of woollen goods (broadcloths and cassimeres). It has fourteen woollen-mills, dyeworks, and manufactures of machinery. Pop. 14,696.

Euphemia, a post-village of Harrison township, Preble co., O. Pop. 107.

Eu'phemism [Gr. εὐφημισμός], a figure in rhetoric by which an unpleasant idea is expressed by indirect and milder terms. The euphemisms of the ancient heathens generally originated in a desire to deprecate the ill-will of malevolent powers, by attributing to them characteristics opposite to those which really belonged to them. Thus, the Furies were termed Eumenides, "gentle," by the Greeks.

Eu'phony [Gr. εὐφωνία, "goodness of voice" (from εὖ, "good," and φωνή, "voice")], agreeable sound; that quality in language which results from happy combinations of the enunciative elements, such especially as, though essentially different in their characteristic powers, easily melt into or blend with each other, so as to maintain an uninterupted flow. It is the reverse of *cacophony.*

Euphor'bia [named in honor of *Euphor'bus,* physician to Juba, king of Mauritania], a genus of plants of the natural order Euphorbiaceæ, having an acrid, milky juice and monœcious flowers, included in a cup-shaped, four to five-lobed involucre resembling a calyx. Almost 100 species of this genus are natives of the U. S. An acrid drug called euphorbium is obtained from the *Euphorbia officina'rum* and from other species. Several species bear the popular name of spurge. The seeds of "caper spurge" (*Euphorbia Lathyris*) of Europe and the U. S. yield the fixed oil known as oil of euphorbia, a powerful cathartic. Some African Euphorbias are large trees.

Euphorbia'ceæ [from *Euphor'bia,* the typical genus], a large natural order of exogenous plants which abound in tropical America, and are found in nearly all parts of the globe. They mostly have an acrid and poisonous milky juice and diclinous or monœcious flowers. They may be distinguished from other diclinous orders by their tricoccous or 3-lobed fruit, and their definite suspended anatropous ovules. This order comprises, besides the EUPHORBIA (which see), the *Riç'inus* (castor-oil plant), the *Croton,* which yields croton oil, the *Sipho'nia,* from which caoutchouc is obtained, the *Bux'us semper'virens* (common box), and the *Jatropha Manihot,* the stem of which yields a nutritious food called cassava, manioc, or tapioca.

Euphor'bium, an acrid and inodorous gum-resin, is produced by the *Euphorbia officinarum* of Southern Africa and some other species, including *Euphorbia Canariensis* of Western Africa and *Euphorbia antiquarum* of the Levant. It is a violent emetic and purgative, and is sometimes used in the composition of plasters and in veterinary medicine.

Eupho'rion [Εὐφορίων], an Athenian tragic poet, was a son of Æschylus. He gained prizes with his father's dramas when Sophocles and Euripides were competitors.

Euphorion, an eminent Greek poet and grammarian, born at Chalcis in Eubœa, flourished about 250–220 B. C. He became librarian to Antiochus the Great. He produced epic poems entitled "Hesiodos," "Mopsopia," and "Chiliades," which were very popular; also several prose works. None of his works are extant.

Euphra'nor [Εὐφράνωρ], an eminent Greek painter and sculptor, born at Corinth, flourished about 350 B. C., and was a contemporary of Apelles. He excelled both in painting and in sculpture. Among his works, which are highly praised by Pliny and Plutarch, was a painting of the feigned insanity of Ulysses.

Eu'phrasy [Gr. εὐφρασία, from εὐφραίνω, to "delight"], or **Eyebright,** a plant of the order Scrophulariacæ, the *Euphra'sia officina'lis,* a small annual herb from two to eight inches high, a native of Asia, Europe, and North America. Milton in his "Paradise Lost" speaks of its virtues in clearing the eyesight. It is not improbably somewhat useful in inflammation of the eyes, from its astringent character. Some varieties are said to have in their blossoms a spot or "signature" resembling the eye, and this spot caused, or at least strengthened, the popular faith in its powers.

Euphra'tes [Gr. Εὐφράτης; Turk. *El-Frat*], a large river of Western Asia, celebrated in all periods of history for the important events which have occurred on its banks, and the magnificence of the cities whose walls it washed. It rises in Armenia, in the Anti-Taurus Moun-

tains, by two branches—the Moorad and Kara-Soo—which unite near lat. 39° N. and lon. 39° E. The stream formed by this junction flows first south-westward, effects a passage through a defile of Mount Taurus, and forms the boundary between ancient Syria and Mesopotamia. Near the town of Bir it approaches within 100 miles of the Mediterranean. After crossing the 36th parallel of N. latitude it pursues a general south-eastern direction, flows through the extensive alluvial plains of Babylonia and Chaldæa, and enters the Persian Gulf at its north-western extremity. Its total length, says Guyot, is 1750 miles, and the area of its drainage is 255,000 square miles. It is navigable from Someisat to its mouth, 1195 miles. Its principal affluent is the Tigris, which is nearly as large as the Euphrates itself. It receives no large tributary from the right hand. The width in some places is nearly 600 yards, but below Hillah its volume and width are reduced by numerous canals cut for irrigation. The name Shatt-el-Arab is given by the natives to that part of the river below the mouth of the Tigris. The melted snows of the mountains of the Taurus and Anti-Taurus cause a periodical inundation of the Euphrates in the spring. The water is highest in May and June. In some parts of its course above Someisat the river passes through deep and narrow defiles or gorges between precipices nearly 1500 feet high, and presents much picturesque scenery. In ancient times the chief city on its banks was Babylon.

Euphros'yne [Gr. Εὐφροσύνη, from εὖ, "good," "easy," and φρήν, "mind"], one of the three Graces in Greek mythology, was supposed to be the daughter of Venus, and was a personification of the genius of mirth or joy.

Eu'phuism [from the Gr. εὐφυής, "graceful" (from εὖ, "good," and φυή, "growth," "form")], an affected style of speaking and writing which became a fashion in the reign of Queen Elizabeth. The term originated in the title of a pedantic romance called "Euphues" (1580), which was written by John Lilly (Lyly) and which abounded in affected conceits and extravagant antitheses. This style was ridiculed by Shakspeare and Ben Jonson.

Eu'pion [from the Gr. εὖ, "good," "very," and πίων, "fat," "rich," named in allusion to its oily nature], a limpid, inodorous, and oily liquid obtained by destructive distillation of various vegetable and animal substances, as coal, wood, oils, bones, etc. It is of a highly inflammable nature, dissolves in ether and alcohol, but is insoluble in water. Its specific gravity is 0.74, and it boils and evaporates at 340°. It consists essentially, according to Frankland, of hydrate of amyl, $C_5H_{11}H$.

Eu'polis [Εὔπολις], an eminent Athenian comic poet of the Old Comedy, was born about 446 B. C. He was a competitor of Aristophanes, whom, as some critics think, he surpassed in the charms of diction. Horace considered him worthy to be ranked with Cratinus and Aristophanes. Eupolis often satirized the persons and conduct of his eminent contemporaries, including Alcibiades. Died about 410 B. C. His works are lost except small fragments.

Eura'sians [contracted from *Europe* and *Asia*], or **Half-Castes,** is the name given in East India to the descendants of Europeans and Indian mothers, who are especially numerous in the large cities, as Calcutta, Madras, and Bombay. They generally receive a European education, but, although they speak the English grammatically, they have a peculiarly disagreeable pronunciation. The girls are often very beautiful, and generally marry English officers; while the young men enter the government offices or serve as clerks with merchants. They are very useful in this position, but as soon as they become rich, or advance to higher offices, they generally become insolent and wild. The Europeans, who also call them "Vepery Brahmins," do not hold them in high estimation. The natives call them "Tschitschi." Their number is estimated at 91,000.

Eure, a department in the N. W. part of France, is a part of the old province of Normandy. It is bounded on the N. by Seine Inférieure, on the E. by Oise and Seine-et-Oise, on the S. by Eure-et-Loir, and on the W. by Orne and Calvados. Area, 2301 square miles. It is intersected by the rivers Seine and Eure, and is bounded on the N. W. by the estuary of the former. The surface is mostly level; the soil is fertile. The staple productions are grain, hemp, flax, apples, and pears. Good horses, cattle, and sheep are reared here. Eure has important manufactures of cotton and woollen stuffs, paper, glass, stoneware, and copper-ware. Pop. in 1872, 377,874. Capital, Evreux.

Eure-et-Loir, a department in the N. W. part of France, is bounded on the N. by Eure, on the E. by Seine-et-Oise and Loiret, on the S. by Loir-et-Cher, and on the W. by Sarthe and Orne. Area, 2268 square miles. It is drained by the rivers Eure and Loir. The surface is partly level, and is in some parts diversified by hills and valleys. The soil is very fertile, and produces large crops of wheat. Good cavalry horses are raised here. This department is traversed by a railway connecting Paris with Chartres and Le Mans. Capital, Chartres. Pop. in 1872, 282,622.

Eure'ka, a post-village, capital of Humboldt co., Cal., is on Humboldt Bay, 7 miles from the ocean and about 225 miles N. N. W. of San Francisco. It has a safe harbor, with fifteen feet of water at low tide, and a daily and one weekly newspaper. Redwood lumber is largely shipped from this point. Pop. of Eureka township, 2049.
"Humboldt Times."

Eureka, a township of Nevada co., Cal. Pop. 1249.

Eureka, a township of Sierra co., Cal. Pop. 350.

Eureka, a post-village of Olio township, Woodford co., Ill., at the crossing of the Toledo Peoria and Warsaw and the Chicago Pekin and South-western R. Rs., 19 miles E. of Peoria. It has three churches and one weekly newspaper, and is the seat of Eureka College, connected with which is a normal school and a biblical school of the Disciples of Christ. Pop. 1233. E. Lowry, Pub. "Journal."

Eureka, a city, capital of Greenwood co., Kan., 110 miles S. S. W. of Topeka, in the centre of a fine grazing-region. It has one weekly newspaper, fine county buildings, public school-house, and five churches. Pop. of township, 1040. S. G. Mead, Ed. & Prop. of "Herald."

Eureka, a township of Montcalm co., Mich. P. 2775.

Eureka, a township of Dakota co., Minn. Pop. 924.

Eureka, a post-village of Lander co., Nev., is situated about midway between Salt Lake and San Francisco, and 80 miles S. of the Central Pacific R. R. The town will be connected by rail with the Central Pacific at Palisade, the branch, narrow gauge, being in course of construction. Eureka is the second town in importance in the State, Virginia City alone excelling it. The principal business is mining. It produces daily about 100 tons of lead and silver ore. It has one weekly newspaper. Pop. of Eureka district, 640. George W. Cassidy, Ed. "Sentinel."

Eureka, a post-village of Rushford township, Winnebago co., Wis. Pop. 317.

Eurip'ides [Gr. Εὐριπίδης], an eminent Athenian dramatist, and the latest of the three great tragic poets of Greece, was born in the island of Salamis in 480 B. C., or, according to the Arundel Marbles, in 485. According to a tradition, he was born on the day of the battle of Salamis, Sept. 23, 480. He was the son of an Athenian citizen named Mnesarchus, who sought refuge in Salamis when the Persian army captured Athens. He was a pupil of the great philosopher Anaxagoras, and he studied rhetoric under Prodicus. He also enjoyed the intimate friendship of Socrates. About 456 B. C. he produced "Peliades," the first of his dramas that was performed. As a rival of Sophocles he gained the first prize in several dramatic contests. His religious opinions were liberal, and excited the hostility of the conservative party, of which Aristophanes was the champion. Like Socrates, he was accused of impiety and unbelief in the gods. It appears that it was the violence and scurrility of these unscrupulous enemies that induced Euripides to remove from Athens about the year 408. He then retired to the court of Archelaus, king of Macedon, who treated him with kindness. Euripides composed seventy-five, or, as some say, ninety-two, tragedies, of which eighteen are extant—namely, "Alcestis" (438 B. C.), "Medea" (431), "Hippolytus" (428), "Hecuba" (424), "Heraclidæ" (421?), "Supplices" (421?), "Ion," "Hercules Furens," "Andromache," "Troades" (415), "Electra," "Helena" (412), "Iphigenia in Tauris," "Orestes" (408), "Phenissæ," "Bacchæ," "Iphigenia in Aulis," and "Rhesus." His style is remarkable for its brilliancy and pompous elegance. Among the warm admirers of Euripides were Aristotle (who calls him the most tragic of poets), Cicero, and Milton. "He was," says A. W. Schlegel, "a man of infinite talent and invention, possessed of the most varied intellectual accomplishments; but, although abounding in brilliant and attractive qualities, he wanted the sublime earnestness and artistic skill which we admire in Æschylus and Sophocles." According to a doubtful tradition, he was killed by hounds in 406 B. C., and buried at Pella. His works display great insight into human passions and skill in the analysis of character. Though his plots are censured as inartistic, he stands pre-eminent among the Greek tragic poets in the vigorous expression of individual passions and in knowledge of human nature. Among the best editions of Euripides are those of Musgrave, Oxford (4 vols., 1778), of Matthiæ, Leipsic (9 vols., 1813–20), of Kirchhoff, Berlin (2 vols., 1855), and of Nauck (2 vols.; 2d ed. 1857).

Euroc'lydon [Gr. εὐροκλύδων, from εὖρος, the "east wind," and κλύδων, a "billow"], the name of a violent wind of the Mediterranean, mentioned in Acts xxvii. 14. The Vulgate renders it *euro-aquilo, i. e.* "north-east wind."

But in some of the best manuscripts (Sinaitic, Vatican, and Alexandrian) εὐρακύλων, "E. N. E. wind," is the reading, instead of εὐροκλύδων, "N. E. wind;" and this reading is adopted by the best recent editors. The wind in question is said to be half a point N. of E. N. E. (See SMITH's "Voyage and Shipwreck of St. Paul," 1856; 3d ed. 1866.)

Euro'pa [Gr. Εὐρώπη], in classic mythology, a daughter of Agenor, king of Phœnicia, and a sister of Cadmus. According to the poetic legend, she was carried to Crete by Jupiter, who for that occasion assumed the form of a bull, and she was the mother of Minos and Rhadamanthus.

Eu'rope [Gr. Εὐρώπη; Lat. *Euro'pa;* by the ancients derived from *Europa*, a Phœnician princess; modern etymologists derive it from the Semitic word *ereb*, "dark," thus representing Europe as the dark or mysterious country, as compared with Asia] is the fourth among the great divisions of the globe in point of extent, the second in point of population, and the first as regards density of population. For more than 2000 years it has marched at the head of the Old World in everything that relates to progress and civilization. Nearly the whole of Australasia, the larger portion of Asia, and a considerable part of Africa and America are the dependencies of European countries, and notwithstanding the rapid rise of the New World, it continues to be the foremost standard-bearer of Christianity, for three-fourths of the entire Christian population of the globe live in Europe.

The superficial area of Europe is estimated at about 3,814,600 square miles. (See BEHM and WAGNER, "Bevölkerung der Erde," Gotha, 1872.) It is bounded on the N. by the Arctic Ocean, on the E. by Asia, on the S. by Asia and the Mediterranean Sea (which separates it from Africa), and on the W. by the Atlantic. The greatest extent of Europe is from S. W. to N. E., a line from Cape St. Vincent to the mouth of the Rara River measuring about 3400 miles, while the distance from Cape Nordkun, the northernmost point of Scandinavia, to Cape Matapan, the southern extremity of Greece, amounts to 2400 miles. The northernmost cape of Europe is the North Cape, on the little island of Mageroe, lat. 71° 11′ 40″ N. and lon. 25° 46′ E.; the southernmost, Cape Tarifa, lat 35° 59′ 57″ N. and lon. 5° 37′ W.; the connecting line between these two lines is 2406 miles long. The most western point is Cape la Roca, lat. 38° 46′ 30″ N. and lon. 9° 29′ W.; the eastern extremity lies in the Ural Mountains; the connecting line has 3200 miles. With the exception of a small tract reaching beyond the polar circle, the whole of Europe is situated in the northern temperate zone.

The coast-line of Europe is very fully developed, and it is more accessible from the sea-side than either Asia or Africa. The coast of its continent is estimated at 20,700 miles, of which about 2600 belong to the Arctic Ocean, 10,900 to the Atlantic Ocean, and 7200 to the Mediterranean and Black Seas. The bulk of Europe has the shape of an almost right-angled triangle, which covers about two-thirds of the entire area, and in the west more and more loses its continental character, and in its stead becomes oceanic. The points of the triangle are—to the S. W., the angular point of the Bay of Biscay; to the N. E., that of the Karskaia Gulf; and to the S. E., the northern extremity of the Caspian Sea. The proportion of the peninsulas to the main body is as one to four. The Arctic Ocean has only the small peninsulas of Kanin and Kola; Scandinavia, Jutland, Normandy, and Bretagne stretch into the Atlantic Ocean; the Pyrenean peninsula (Spain and Portugal) is washed by both the Atlantic and the Mediterranean, and forms the transition to Africa; the Balkan peninsula in the East connects with Asia Minor and the Crimea; the most south-eastern limb of the continent belongs to the Black Sea. The situation of the islands, which cover an area of 191,000 square miles (about one-twentieth of all Europe), is one very conducive to the progress of commerce and civilization. The most important of them are Great Britain, Ireland, the Balearic Islands, Sardinia, Corsica, Sicily, Malta, Crete, the Ionian Islands; Iceland, though it lies nearest to Greenland, is regarded as belonging to Europe, because from thence it has been peopled and civilized. Of the Portuguese possessions, the Azores and Madeira are generally included in the area of Europe. By means of a large number of navigable rivers and canals the inland countries to a large extent participate in the advantages of the maritime situation of Europe.

Political Divisions.—Politically, Europe was in 1873 divided into twenty sovereign states, of which three were empires (Germany, the Austro-Hungarian monarchy, and Russia), one a sultanate (Turkey, also sometimes counted among the empires), nine kingdoms (Great Britain, Portugal, Italy, Sweden, Norway, the Netherlands, Belgium, Denmark, Greece), one grand-duchy (Luxemburg), two principalities (Liechtenstein and Monaco), and five republics (Switzerland, San Marino, Andorra, France, and Spain). Four of these states (Liechtenstein, Monaco, San Marino, and Andorra) are so insignificant that many geographers do not enumerate them among the sovereign states. Luxemburg has the same ruler as the Netherlands, and Norway the same as Sweden; but, as they have nothing else in common, they must be counted as sovereign states. Germany and Switzerland are federal states, consisting, the former of twenty-six states (three of which are free cities), and the latter of twenty-two cantons, which have ceded part of their sovereignty to the central power of the federal state, but reserved to themselves the sovereignty in all points not expressly ceded. A large majority of the European states are monarchies, but only Turkey is a despotism. Since 1848 absolutism has steadily been losing ground, and in nearly every European country the sovereign shares the legislative function with a representative body, which in some is elected by universal suffrage. In one monarchy (Norway) the king has only a suspensive veto. Republican tendencies are at work in nearly every monarchy of Europe; and as they have been successful in France in 1848, and again in 1870, and in Spain in 1873, they are expected to extend ere long the territory of republicanism at the expense of monarchical institutions.

The following table exhibits the area and population of each sovereign country of Europe at the beginning of 1873:

Countries.	Sq. Miles.	Population.
German empire	208,619	41,058,139
Austro-Hungarian monarchy	240,348	35,904,435
Principality of Liechtenstein	62	8,320
Republic of Switzerland	15,992	2,669,147
Kingdom of Denmark (inclusive of Faröe Islands and Iceland)	55,020	1,864,496
Kingdom of Sweden	170,592	4,168,525
Kingdom of Norway	122,280	1,753,000
Kingdom of the Netherlands	12,680	3,688,337
Grand-duchy of Luxemburg	999	197,504
Kingdom of Belgium	11,373	5,021,336
Kingdom of Great Britain and Ireland (inclusive of Heligoland, Gibraltar, and Malta)	121,260	31,977,377
Republic of France	204,090	36,102,821
Republic of Spain (inclusive of the Canary Islands)	195,774	16,641,880
Kingdom of Portugal (inclusive of the Azores and Madeira Isles)	35,812	4,360,974
Republic of Andorra	149	12,000
Kingdom of Italy	114,295	26,716,809
Principality of Monaco	3,6	3,127
Republic of San Marino	22	7,303
Turkey in Europe (inclusive of the	133,995	10,510,000
Principality of Roumania	(46,710)	(4,500,000)
Principality of Servia	(16,817)	(1,319,283)
Principality of Montenegro)	(1,701)	(100,000)
Russia in Europe (inclusive of Poland and Finland)	2,059,226	71,195,405
Kingdom of Greece	19,353	1,457,894
Total	3,787,178	301,605,227

With regard to their size, population, and power, the states of Europe are divided into states of the first, second, third, and fourth class. To the first class belong Great Britain, France, Germany, Austria, Russia, and Italy. Their aggregate area and population is more than double the area and population of all the remainder of Europe. They are therefore commonly called the "great powers of Europe." Whenever they agree on international questions their agreement is the law of Europe; and they frequently hold international conferences to avert, if possible, impending wars. Nine of the European states (Great Britain, Turkey, the Netherlands, Russia, Spain, France, Portugal, Denmark, and Sweden) have possessions in other divisions of the world, the aggregate area of which is nearly five times as large as that of all Europe, while their population (250,000,000) does not quite reach that of Europe.

Physical Geography.—With regard to its orographic condition, Europe may be divided into two large, unequal portions. North-eastern Europe is a vast plain of great uniformity, while South-western Europe is a table-land, but frequently intersected by small plains, and therefore presenting considerable variety. The table-land of Europe is estimated at over two-sevenths of the entire area, while not quite five-sevenths consists of plains. The central table-land of Europe contains a vast triangle of mountains, the system of the Alps forming the base, and the European Middle Mountains furnishing the sides. The principal portions of the latter are the French Middle Mountains, the highest point of which is Mont Dore; the German Middle Mountains, with the Riesengebirge as the highest range; and the Carpathian Middle Mountains, which reach their highest point in the Gerlsdorfer Spitze. The system of the Balkan, which traverses Turkey and Greece, and the Apennines of Italy, are also connected with the Alps, while the Pyrenees, the mountains of the Iberian and the Scandina-

MAP OF EUROPE

Drawn and Engraved on Copper-Plate EXPRESSLY FOR JOHNSON'S UNIVERSAL CYCLOPÆDIA

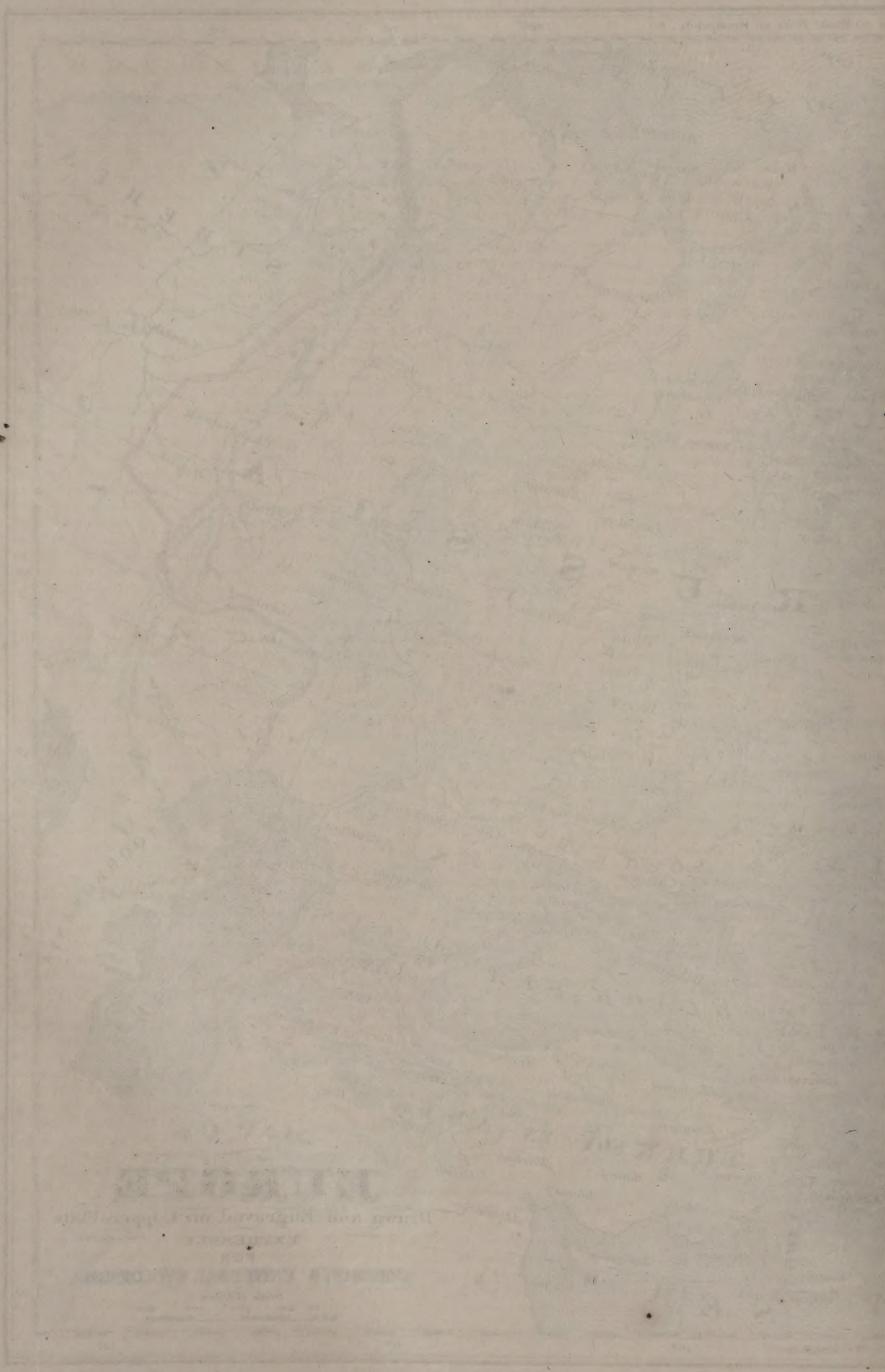
Scale of Miles 50 100 200 300 400

Long. West / Longitude East from Greenwich

40 30 20 10 0 10 20 30 40 50 60 70 80

67 77 87 97 107 117 127 Longitude East from Washington

60 55 50 45 40 35 30



vian peninsulas, as well as those of the British and other islands, are isolated masses. The character of the European mountains, in comparison with those of other large divisions of the globe, is more distinguished for a variety of combinations than for grand developments. The mountains yield, on the whole, but small amounts of the precious metals, while, in accordance with the prevailing feature of the physical geography of Europe, the useful metal, iron, is found in very large quantities.

The hydrographic relations of Europe are characterized by abundance and variety. Europe has no river-system of such colossal dimensions as are found in Asia and America, and the largest European river, the Volga, sends its water eastward to the Caspian Sea, which Europe has in common with Asia. On the other hand, the rivers of Europe are more advantageously distributed than those of any other large continent. They penetrate every part of it, fertilize every country, and give to each a considerable share in its flourishing commerce and industry. These advantages are still further increased by the numerous canals which the fortunate formation of the soil has allowed to be constructed for the connection of the large rivers. The largest number of European rivers flow into the Atlantic Ocean, which receives the Tornea in Sweden, the Neva, Duna, Niemen, and Pregel in Russia, the Vistula, Oder, Elbe, Weser, Ems in Germany, the Rhine and Scheldt in the Netherlands and Belgium, the Thames and Severn in England, the Seine, Loire, Garonne in France, the Duero, Tagus, Guadiana, and Guadalquivir in Spain and Portugal. The Ebro in Spain, the Rhone in France, the Arno, Tiber, Po, and Adige in Italy, flow into the Mediterranean; the Danube, Dniester, Dnieper, and Don into the Black Sea; the Volga into the Caspian; and the Petchora and the Dwina into the Arctic Ocean. In inland lakes Europe is richer than any other great division of the globe except North America. The lakes group themselves around two centres, the Baltic Sea and the Alps. To the former class belong the Ladoga and Onega lakes, the largest fresh-water lakes of Europe.

The following parts of Europe, according to the map in Lyell's "Principles of Geology," consist chiefly of primitive or transition formations: The Uralian Mountains in Russia; nearly the whole of the Scandinavian peninsula; most of Scotland, one-half of Ireland, the western part of Wales, the northern counties and Devon and Cornwall in England; a large portion of Northern and Central France; the high ranges of the Alps; a large portion of Central Italy and of the adjacent islands (Corsica, Sardinia, and Sicily); of the Austro-Hungarian monarchy, Bohemia, Carinthia, Styria, parts of Hungary, and Transylvania; the eastern half of the Balkan peninsula and the central chain of the Caucasus. The parts principally composed of secondary formations are—in the British Isles, the Lowlands of Scotland, the centre of Ireland, the north-eastern, central, and most of the southern counties of England; most of France and Western Germany; the loftiest summits of the Pyrenees; Southern and part of Central Italy; of the Austro-Hungarian monarchy, Istria, Dalmatia, Galicia, and the eastern districts of Transylvania; of Russia, some extensive tracts on the Volga and Kami, and the northern declivity of the Caucasus. The remainder of Europe—in particular most of Russia and Prussia, all Denmark, North-western Germany and Holland, a large portion of Belgium, the northern part of Switzerland, the basins of the Loire, Rhone, and Garonne in France, the plains of Lombardy, Hungary, Wallachia, and Bulgaria—is chiefly occupied by tertiary, alluvial, and diluvial formations. Granite, gneiss, and syenite are among the chief primary rocks of the great table-land of Europe. Gneiss is the rock in which the Saxon, Bohemian, and Austrian metallic mines are principally situated, while granite abounds in most of the countries where primary formations are found. Active volcanoes at present are only met with in Italy (Stromboli, Vesuvius, and Etna) and Iceland, but there are traces of former volcanic activity in France, Greece, Germany, and other countries. Of mineral springs Europe has an abundance and a great variety.

Europe is the only one among the great divisions of the globe which nowhere touches the torrid zone, and only a comparatively small portion extends about 280 miles into the northern frigid zone. The bulk of the continent belongs to the northern temperate zone. The climate of Europe is a mixture of the continental and the oceanic, and is throughout more temperate than in non-European countries of equal latitude. In North-eastern Europe the continental climate prevails, with its clear sky and dry air, while Southern and South-western Europe have more an oceanic, uniform, and mild climate, with humid air and frequent winter rains. The extremes of temperature are −58° and 106° Fahrenheit.

In the geography of European plants four zones may be distinguished: 1. The northern zone embraces Iceland, the Scandinavian peninsula north of 64°, and Russia north of 62°. The vegetation of this zone is poor. Lichens and mosses are frequent; the only species of grain to be found are oats, rye, and barley, the two former only along the southern margin of the zone, but barley up to 70°. The forests consist of birches and firs, but they are crippled N. of 64°. 2. The northern middle zone, extending southward to 51° and 48°, comprises the British Isles, Denmark, Southern Scandinavia, Finland, Central Russia, Northern France, Belgium and the Netherlands, Northern Germany and Italy. Besides the species of grain found in the northern zone, wheat is also found. Buckwheat, potatoes, leguminous plants, hemp, flax, and many kinds of northern fruit, as apples, pears, cherries, etc., are extensively cultivated. The beech and the oak prevail in the forests. 3. The southern middle zone extends southward to the Pyrenees, the Alps, and the Balkan. Southern France, Switzerland, Southern Germany and Lombardy, the Carpathian countries, the larger portion of Turkey and Southern Russia, belong to this zone. The mountains have forests of pine trees; the plains, oaks, beeches, and chestnut. Wheat and wine are extensively grown. 4. The southern or evergreen zone, embracing the three southern peninsulas and the southern coast of France. The vegetation of this zone is luxurious; it is noted for its olives and evergreen woods and its fiery wines. The orange flourishes in the southern portion of it, and rice is cultivated in Northern Italy and Eastern Spain.

The character of the European fauna fully corresponds to the physiognomy of the continent. Vast formations are wholly wanting. The class of rapacious animals has its largest representatives in the wolf, lynx, and bear. The number of reptiles is small. On the other hand, the domestic animals are more largely extended and more improved in Europe than in any other country of the world. Peculiar to the north of Europe is the reindeer. The birds are inferior to those of other divisions in their size and brilliancy of color, but are noted for the sweetness of their voices and their melodious songs. Northern Europe has a larger number of species of animals, but the south has a larger number of individuals. The northern seas, lakes, and rivers have a larger abundance of fish than those of the south.

Population, Races of People, Language, and Religion.—The entire population of Europe at the beginning of the year 1873 amounted to 300,800,000. The vast majority of the inhabitants belong to the Caucasian race; only about one-nineteenth are Mongolians. The Caucasian race comprises in Europe three large groups, which conjointly constitute the bulk of the population, and several fragments of nations which, in former times widely extended, are now reduced to small limits. The three large groups are the Germanic, the Greco-Romanic, and the Slavic. The Germanic is subdivided into the Germans proper, inclusive of the Dutch, Frisians, and Flemish (about 56,500,000), the Scandinavians (8,000,000), and the Anglo-Saxons or English (about 29,500,000), in all, 94,000,000, or 31.2 per cent. of the population of Europe. The whole of Germany, Holland, Denmark, Sweden, Norway, Great Britain is occupied by the Germanic race, which also prevails, as to influence, in the western half of Austria and the Baltic Provinces of Russia; as regards number, in Belgium; and as regards both influence and number, in Switzerland. The Greco-Romanic group occupies the south and the south-west of Europe. The chief nationalities belonging to it are the French, 41,260,000; Italian, 27,620,000; Spanish and Portuguese, 16,320,000; Daco-Rumanian and Macedo-Wallachian, 8,100,000; Greek, 2,450,000; and Albanians, 1,440,000; in all, 97,200,000, or 32.3 per cent. of the entire population. It controls the destinies of France, Spain, Portugal, Italy, seven cantons of Switzerland, Greece, and Rumania; it predominates in several provinces of European Turkey, Southern Hungary, and Transylvania; and its influence prevails in Belgium, though it does not form the majority of its population. The Slavic group, though in numbers somewhat inferior to the Germanic and Greco-Romanic, and containing only 27.3 per cent. of the aggregate population of Europe, occupies fully three-fifths of its area. Its chief branches are the Russians and Ruthenians, 54,530,000; the Poles, 9,420,000; the Czechs and Wends, 6,900,000; the Servians, Croatians, and Sloventzi, 7,200,000; the Bulgarians, 4,080,000. It rules in only one large sovereign country, Russia; to which may be added the principality of Montenegro and the semi-independent principality of Servia; but both in the Austro-Hungarian monarchy and in European Turkey it constitutes a plurality of the population, and even in the formerly Polish districts of Prussia it constitutes a compact population of over 2,000,000. Besides these three large groups, the Caucasian race also embraces the remnants of the Celts, Lithuanians, and Iberians or Basques. The Celts, who at one time ruled in Northern Italy, France, and the British Isles, now only linger in French Bretagne, in Wales, Ireland, and High Scotland. In France their language is still spoken by a population of

1,100,000, and in the British Isles by about 2,300,000. The Lithuanians, embracing the Lithuanians proper, the Letts, and the Prussians, live on the Baltic Sea, and number 2,900,000, while the Basques, the descendants of the aboriginal inhabitants of Spain, live in the Western Pyrenees, and have been reduced to about 1,000,000. To the Semitic race belong about 5,000,000 Israelites, who are scattered throughout Europe. There are also a few hundred thousand Gypsies. A branch of the Mongolian race, the Finns, which was formerly spread over a vast area, includes the Finns proper, the Esthonians and Livonians, the Lapps, the Samoyedes, and other tribes on the Arctic Ocean, and, as far as the language is concerned, also the Magyars, who by some ethnographic writers are classed as a branch of the Mongolians different from the Finns. These Finnish tribes number in all about 10,000,000. Whether the Turks belong to the Mongolian or to the Caucasian race is still a matter of dispute, though most writers regard them as Mongolians, and explain the Caucasian features which have been observed by their mixture with the Caucasian tribes living near and among them. The Calmucks of Russia are another Mongolian tribe.

Religion.—The entire population of Europe, with the exception of 5,000,000 Jews, 6,800,000 Mohammedans, and 500,000 Pagans in Russia and Turkey, belongs to Christianity, which by doctrinal differences is split into three main divisions—the Roman Catholic, the Orthodox Greek, and the Protestant churches. By far the largest population belongs to the Roman Catholic Church, to which the overwhelming majority of the Greco-Romanic nations also adheres, as well as nearly one-half of the Germanic; the Poles, Czechs, Croatians, Slovacks, Ruthenians, among the Slavi; the majority of the Magyars, the Lithuanians, the Celts of Ireland and France, and the Basques. It comprises more than 98 per cent. of the population in Spain, Portugal, Italy, Belgium, Luxemburg, and France; 92 per cent. in Cisleithan and 59 in Transleithan Austria; from 40 to 36 per cent. in Switzerland, the Netherlands, and Germany; 17½ per cent. in Great Britain and Ireland; and less than 10 per cent. in every other country of Europe. The aggregate population connected with it was estimated in 1872 at 147,700,000, or over 49 per cent. of the population of Europe. The Orthodox Greek Church (with a population of 69,200,000, or 23 per cent. of all Europeans) embraces the large majority of all the Slavic tribes and the Greeks and Rumanians of the Greco-Romanic. It constitutes about 99 per cent. in Servia, 97 in Greece, 95 in Rumania, 85 in Russia, 48 in Turkey, and 17 per cent. in Transleithan Austria. Protestantism, which is subdivided into a number of religious denominations, has its stronghold in the Germanic countries, where more than one-half of the entire population belongs to it. Sweden, Norway, and Denmark are almost entirely Protestant (over 99 per cent. of the total population); in Great Britain and Ireland the Protestant population is estimated at 83 per cent., in Germany at 62, in the Netherlands at 61, in Switzerland at 59. Outside of the Germanic world Protestantism also prevails in the grand duchy of Finland (97.7 per cent.), among the Letts in the Baltic Provinces of Russia, and among the Celts of Wales and Scotland.

History.—The authentic history of the European states begins with the tribes of Greece, which also occupied the coast of Asia Minor, and which, after founding a number of flourishing commonwealths in the territory of the modern kingdom of Greece and the southern part of modern Turkey, vied with the Phœnicians in establishing flourishing colonies on the coasts of the Mediterranean and the Black Sea. But they never succeeded in founding a powerful state, which, for the first time in Europe, was done in the fourth century B. C. by Alexander the Great, whose achievements were, however, of comparatively little influence on the destinies of Europe, as they mostly concerned Asia, and as his world-empire collapsed at his premature death. Of more lasting influence was the rise of the Roman republic, which in Europe annexed not only the whole of Italy, but Greece, Gaul, Spain, and portions of Germany, Britain, and Eastern Europe, and which, by consolidating a large portion of Europe under one rule, contributed considerably to the rapid spread of the Christian religion. (See the Map of Europe under the Romans.) Under the emperors the vast extent of the state was not only preserved, but even enlarged; but with the increase of territory also increased the corruption of the masses and the weakness of the government, which at the close of the fourth century of the Christian era found itself no longer able to resist the onset and invasion of the vigorous but barbarian tribes of Germans and Mongolians. In 476 the Western Roman empire succumbed to the attack of the German prince Odoacer, and was shattered to pieces, many of which, in Italy, Spain, Gaul, and Britain, were reconstructed as Germanic kingdoms. Under the Merovingians the kingdom of the Franks became the predominant power in Central Europe, and under Charlemagne the incorporation with it of nearly the whole of modern Germany made it the great Christian empire of the globe, whose rulers on that account appeared to be well entitled to the revived title of Roman emperor. (See the Map of Europe under the Carlovingians.) About the same time the union of the smaller divisions of Britain laid the foundation of the kingdom of England, and in North-eastern Europe the first Slavic states were organized. The empire of Charlemagne was divided by his grandsons into France, Germany, and Italy, and though for short intervals the whole empire was reunited in one hand, these divisions, to which for several centuries a kingdom of Burgundy was added as the fourth, became permanent. In Spain, where the Mohammedans had established on the ruins of the Christian kingdoms of the Germanic tribes the powerful and flourishing califate of Córdova, the Christians, who at the time of Charlemagne only maintained themselves with difficulty in the northwestern kingdom of Asturias, gradually gained ground in the tenth and eleventh centuries, and at the time of the Hohenstaufens, in the twelfth century, had reconquered more than one-half of the Peninsula and reconstructed it into several Christian kingdoms. In Eastern Europe the Slavi organized the large Christian empires of Poland and Russia in North-eastern, and the smaller states of Servia and Bulgaria in South-eastern, Europe, and even the large kingdom founded by the Mongolian tribe of Magyars became Christianized. While thus the division of Europe into independent states became perpetuated, the Christian religion became a powerful bond of union, notwithstanding the split into the Eastern (or Greek) and the Western (or Roman) Catholic churches. The theocratic supremacy which several great popes like Gregory VII. and Innocent III. succeeded in establishing over all the states belonging to the Roman Catholic Church, created the consciousness of a community of interests, which found its strongest expression in the Crusades. In Eastern Europe the Eastern Roman or Byzantine empire, which ever since the division of the Roman empire into an eastern and a western half, had gradually been declining in extent and influence, was shaken to its foundation by the invasion of the Turks, who finally (in 1453) conquered Constantinople and established a Mohammedan despotism. On the other hand, the Mohammedans constantly lost ground in the Pyrenean peninsula, until at the close of the fifteenth century their last stronghold was conquered. At the same time Russia succeeded in throwing off the yoke of the Mongolians, in driving them back to Asia, and in building up a powerful Christian empire in the east of Europe. Thus the whole of Europe, with the single exception of the Balkan peninsula, which had fallen under Mohammedan rule, was occupied by Christian nations, which during this period, by circumnavigating Africa, by gaining a firm footing in Southern Asia, and by discovering and conquering America, greatly extended the influence of European civilization and of the Christian religion over the other great divisions of the globe. The religious Reformation of the sixteenth century added another to the two large divisions which had existed in the Christian Church since the ninth century. England, the Scandinavian kingdoms, the Netherlands, and a number of the German states and Swiss cantons seceded from the Roman Catholic Church, and established new forms of religious organization. Several wars, among which the Thirty Years' war (1618–48) was the most terrible, sprang from this ecclesiastical separation; but the revolt against the spiritual authority, which demanded from all minds (and enforced as much as it could) absolute submission to its decrees, and the emulation between the states embracing the new form of religion and those adhering to the old Church, gave a powerful impulse to the progress of civilization, literature, and art, and in particular to free political institutions.

The two most powerful princes of Christendom, the emperor of Germany (who was at the same time king of Spain) and the king of France, both repelled the Reformation and remained in connection with the Church of Rome; and when the power of the former became more and more neutralized by the growing independence of the princes, one-half of whom were Protestants, the emperors of Austria—who since 1526 had united the lands of the Hungarian crown with their own dominions, and who, with only one short interval, remained German emperors until the dissolution of the empire in 1806—became the steadfast and influential patrons of the interests of the Catholic Church. But the union of Scotland with England established at the beginning of the sixteenth century the first Protestant great power of Europe, and the kingdom of Prussia, which was founded in 1701, fully established by the Seven Years' war (1756–63) its claim to be regarded as the second. The same rank could now no longer be re-

EUROPE UNDER THE ROMANS (2nd CENTURY).

EUROPE UNDER NAPOLEON I. (1810-1812).

EUROPE UNDER THE CARLOVINGIANS (9th CENTURY).

MAP OF THE LANGUAGES OF EUROPE.

fused to Russia, which had snatched from Sweden its possessions on the Baltic Sea, and extended its rule far into Asia. Another large country of Eastern Europe, Poland, which under more favorable circumstances might likewise have become one of the great powers of Europe, was at the close of the eighteenth century dismembered and divided between Prussia, Russia, and Austria, after its vitality had long been fully exhausted by chronic anarchy. The ascendency of France, Austria, Great Britain, Prussia, and Russia, as the five great powers of Europe, was thus fully established when the French Revolution of 1789, and still more the empire of the first Napoleon, which arose out of its ashes, shook the whole system of European states to its foundation. The subjection, direct or indirect, of Spain, Portugal, Italy, the Netherlands, Switzerland, and a large portion of Germany to the rule of Napoleon (see the Map of Europe under Napoleon I.) appeared to usher in a new world-empire; but his downfall in 1814 and 1815 restored, on the whole, the frontiers of the European states as they existed before the Revolution. The five great powers reassumed their former ascendency, and at the Congress of Vienna (1816) arranged anew the map of Europe. This arrangement suffered during the next fifty years but few changes, the most important of which was the establishment of the new kingdoms of Greece (1821) and Belgium (1830). In 1848 a new revolution made France again a republic, and called forth in Germany, Austria, and Italy a powerful agitation for a radical reconstruction of these countries. The French republic soon gave way to the empire of Napoleon III., who believed it in his interest to encourage the aspirations of the suppressed and dismembered nationalities for a reconstruction of their national unity. The struggles and conflicts arising out of the nationality question are one of the prominent features of the history of Europe since 1851. (The great conflicts which are described in the following lines are illustrated by the Map of the Languages of Europe.) The first great success was won by the Italians, who by the Congress of Vienna had been placed under nine different governments, and who at once organized a movement for the establishment of a united Italy. Until 1848 the Austrian bayonets kept this movement at bay; a temporary success in 1848 ended simultaneously with the downfall of the French republic; but in 1859 the king of Sardinia, who had made himself the banner-bearer of the union party, snatched, with the aid of France, Lombardy from Austria, and annexed the duchies of Central Italy and two-thirds of the Papal territory, to which in the next year the kingdom of the Two Sicilies was added. The new kingdom of Italy in 1866 joined Prussia in her war against Austria, and received as a reward the kingdom of Venetia. Thus the bulk of the Italian nationality became one state, to which in 1870 the remainder of the Papal territory was added as soon as the French patronage ceased, and which is now generally recognized as one of the great powers of Europe.

The agitation of the German people for the reconstruction of a united Germany was chiefly retarded by the rivalry of Austria and Prussia, which in 1866 led to a short but most decisive war between these two countries; in consequence of which Austria had to surrender the leadership in German affairs to Prussia, which organized the North German Confederation, and annexed Hanover, Hesse, Nassau, and Frankfort to its own dominions. The real question at issue in the memorable war of 1870 between France and Germany was whether Germany was strong enough to effect, or France strong enough to prevent, the progress of Germany to a complete reconstruction of the German empire. The overwhelming success of the Germans, which crushed Napoleon, reannexed the lost Reichsland, Elsass-Lothringen, and reestablished their empire, was the second grand triumph of the nationality principle. In other parts of Europe many of the nationalities which are subject to foreign rule are still struggling to establish their independence. The Poles are undismayed by their want of success during the last century, and while they are unable to make headway in Prussia and Russia, they have obtained considerable concessions to their nationality from the weak government of Austria. The Czechs of Bohemia and Moravia, the Slovacks of South-western Austria, the Croatians and Servians in Southern Austria and North-western Turkey, the Rumanians in South-eastern Austria and North-eastern Turkey, the Bulgarians in Turkey, are all dreaming of achieving the establishment of either independent kingdoms of their own nationalities, or at least a separate administration of their affairs on a strictly national basis. The final issue of these national aspirations will decide the ultimate fate of Austria and Turkey. A large portion of the Germans of Austria are looking forward to a reunion with Germany, and among the Slavic tribes of Austria and Turkey the Panslavic movement, which aims at a close confederation of all the Slavic countries under the protectorate of Russia, is gaining strength to an alarming extent. Turkey, in particular, is threatened by the increasing power of the Slavi. It was only the intervention of England and France which, in the Crimean war, prevented Russia from solving the Eastern question according to her own plans; but the early downfall of the Turkish rule is regarded as inevitable by nearly all prominent European statesmen. While the attention of Eastern Europe is almost wholly absorbed by the nationality question, Western Europe is considerably agitated by the struggle between the republican and monarchical forms of government. The crushing defeat of Louis Napoleon, as was to be expected, was followed by a revolution in Paris and the proclamation of the republic, which successfully suppressed a civil war begun by the Paris Commune, and which under the administration of Thiers maintained itself for two years, until in May, 1873, the majority of the National Assembly accepted the resignation of Thiers and elected as president Marshal McMahon, who was expected to co-operate with the majority of the National Assembly in restoring a monarchical rule. In Feb., 1873, the example of France was imitated by Spain, where, after the voluntary abdication of King Amadeus, the majority of the Cortes proclaimed the republic. At the first election of a Constituent Assembly in May, 1873, an overwhelming majority of the electoral districts chose deputies favorable to the establishment of a federal republic. Different from the republicans as a party is the Internationale, a socialistic organization founded in 1867, which aims not only at overthrowing all the monarchies of Europe, but also at destroying the Christian religion, and at a radical change of the present relation between labor and capital. The Internationale already has its representatives in most of the legislative assemblies of Europe, and constitutes an element in European society which can no longer be overlooked. In addition to these conflicts of nationalities, forms of government, and systems of society, the relation between Church and State occupies a large share of the attention of every European legislature. The system of state-churchism, which at the beginning of the century existed in every European state, has been greatly modified. The state governments are loosening their hold of the government of the churches, and conceding to them a higher degree of self-control; and even the principle of a complete separation of Church and State has made considerable progress. The proclamation of papal infallibility by the Vatican Council in 1870 has added new fuel to the conflicts already existing between the Roman Catholic Church and a number of state governments. (See HOFFMANN, "Europa und seine Bewohner," 1835–40, 8 vols.; SCHUBERT, "Handbuch der allgemeinen Staatskunde von Europa," 1835–48, 7 vols.; BRACHELLI, "Die Staaten Europa's," 2d ed. 1864.)

A. J. SCHEM.

Euro'tas [Gr. Εὐρώτας], the ancient name of a river of Greece (in Laconia), now called *Vasilee* or *Vasiliko*. The city of Sparta was situated on this river, which flows through beautiful scenery into the Gulf of Kolokythia (anc. *Laconicus Sinus*).

Euryd'ice [Gr. Εὐρυδίκη], the wife of Orpheus, died in consequence of the sting of a serpent. According to the poetic legend, Orpheus descended to the infernal regions, and persuaded Pluto to restore her to him on condition that she should walk behind Orpheus, and that he should not look back until they had reached the upper world. But he was tempted to look back, and finally lost her. (See VIRGIL, "Georgics," book iv. 454.)

Eusebius, bishop of Emesa, was born near Edessa about 300 A. D. He declined the bishopric of Alexandria, which was offered to him when Athanasius was deposed in the year 341, but he afterwards accepted that of Emesa. He appears to have held the principles called Semi-Arian, and to have been distinguished for his moderation and aversion to controversy. He died at Antioch in 360 A. D., leaving many eloquent homilies, some of which are extant.

Euse'bius [Gr. Εὐσέβιος] OF NICOMEDIA, an ambitious Arian prelate, was a member of the Council of Nice in 325 A. D., having previously become bishop of Nicomedia. He was banished because he defended Arius in this council, but was soon restored to his bishopric, and gained great influence at court. After the death of Arius, Eusebius was the head of the Arian party, who were often called Eusebians. In 339 A. D. he became patriarch of Constantinople. Died in 342 A. D.

Euse'bius Pam'phili, bishop of Cæsarea, an eminent theologian and writer of ecclesiastical history, was born in Palestine about 265 A. D. He assumed the surname PAMPHILI in honor of his friend Pamphilus the martyr. He became bishop of Cæsarea in 314 or 315 A. D., and took a prominent part in the Council of Nice

(325 A. D.). The emperor Constantine the Great, who was his friend, selected him to open this council by an oration. Eusebius was inclined to moderation and peace, used his influence to reinstate Arius, and was a leader of the Semi-Arians. He was one of the bishops who censured Athanasius at the Council of Tyre (334). He was very eminent for learning, as well as for talents. He wrote in Greek, besides several works that are lost, an "Ecclesiastical History from the Christian Era to 324 A. D.," which is of great value, a "Life of Constantine the Great," "Gospel Preparation" ("Præparatio Evangelica"), a "Universal History or Chronicle," and a work "On the Proof or Demonstration of the Gospel" ("De Demonstratione Evangelica"). Died about 340 A. D. Complete editions of his works have been published by Migne in his Patrologia Græca (6 vols., 1856–57), and by Dindorf (1865, *seq.*). A new critical edition of his historical works has been published by Heinichen (1868, *seq.*). (See BAUR, "Die Epochen der Kirchlichen Geschichtsohreibung," 1852.)

Eusta'chian Tube [named in honor of *Eustachius*, its discoverer], in anatomy, a canal leading from the middle ear to the pharynx. In man the Eustachian tube is nearly two inches long. Beginning at the ear, its first half inch is formed by a passage in the temporal bone, between the petrous and the squamous portions. The fishes have no true Eustachian tube, though some of them have a homologous passage from the ear to the air-bladder; but it exists in the true reptiles, in birds, and in mammals. Its use is probably to enable the hearer unconsciously to increase or diminish the tension of the air within the tympanum, and thus to increase or decrease the sensitiveness to sounds. Closure of the tube impairs the hearing. This organ is sometimes the seat of disease, which may be reached by the catheter, the syringe, and other instruments. Its surgical treatment requires great skill.

Eusta'chius [It. *Eustachio* or *Eustachi*], (BARTHOLOMÆUS), an eminent Italian anatomist, born at San Severino in the March of Ancona, studied medicine in Rome. The events of his life are mostly unknown. He was a professor in the College della Sapienza, Rome, 1562. He made important discoveries in anatomy, among which was the Eustachian tube, and was the first anatomist who illustrated his works with good engravings on copper. His anatomical plates were engraved in 1552, but were lost for a long time, and were not published until 1714. He wrote a work "On the Controversies of Anatomists" ("De Anatomicorum Controversiis"), which is not extant. He published "Opuscula Anatomica" (1563). He died in poverty in 1574. (See G. C. GENTILI, "Elogio di B. Eustachio," 1837.)

Eusta'thius, one of the Church Fathers of the fourth century, is well known on account of his firm adherence to the canons of Nicæa. He was banished in 331 because he would not associate with some anti-Nicæans who had been recalled from exile, and Meletius, then bishop of Sebaste, was appointed in his place. But his adherents did not recognize Meletius, and formed the separate party of the Eustathians. Died about 360.

Eustathius, a monk in Pontus, and after 355 bishop of Sebaste in Armenia, introduced monachism into Pontus. He went so far in his ideas of asceticism as to be condemned by the synod of Gangra in Paphlagonia, because he completely rejected marriage. His followers (the Eustathians) rejected holy ceremonies if performed by married priests, persuaded women to leave their husbands, and are said to have fasted on the Sabbath, which was condemned as heretical.

Eustathius, a celebrated Greek commentator on Homer, was first deacon and then teacher of rhetoric in Constantinople, and after 1155 archbishop of Thessalonica, where he died in 1198. His chief work, a commentary on Homer (7 vols., Rome, 1542–50; 3 vols., Bâle, 1559–60; 4 vols., Leipzic, 1825–30), is considered a rich source of philological learning. Of his commentary on the odes of Pindar only the Proemium has been preserved.

Eus'tis (ABRAHAM), born at Boston, Mass., Mar. 28, 1786, graduated at Harvard in 1804, was called to the bar in 1807, entered the army as captain of artillery in 1808, served with distinction in the war of 1812–15, received in 1834 a brevet of brigadier-general, and in the same year became colonel of the First Artillery. Died June 27, 1843.

Eustis (GEORGE), LL.D., born at Boston, Mass., Oct. 20, 1796, graduated at Harvard in 1815, was private secretary to his uncle, Gov. William Eustis, when the latter was minister at The Hague, removed to New Orleans in 1817, admitted to the bar in 1822, where he took a prominent part in public affairs, and was for some years chief-justice of the State supreme court. He was profoundly versed in the civil law. Died Dec. 23, 1858.

Eustis (HENRY LAWRENCE), an American officer and engineer, born Feb. 1, 1819, at Fort Independence, Mass., studied at Harvard, and graduated at West Point in 1842, served as lieutenant of engineers in the construction of fortifications, etc., and assistant professor at the Military Academy till he resigned (Nov. 30, 1849), to become professor of engineering in Lawrence Scientific School of Harvard University, Mass. In the civil war he was colonel of the Tenth Massachusetts Volunteers, serving at Williamsport, Fredericksburg, Marye Heights, Salem, Gettysburg, Rappahannock Station, Mine Run, Wilderness, Spottsylvania, Cold Harbor, and many minor actions; and became brigadier-general of volunteers in 1863, but resigned June 27, 1864, to resume his professorship at Cambridge, Mass.

GEORGE W. CULLUM, U. S. A.

Eustis (WILLIAM), LL.D., an American physician, born in Cambridge, Mass., June 10, 1753. He served as a surgeon in the war of Independence, after which he practised medicine in Boston, and was a member of Congress (1800–05 and 1820–23). He was secretary of war from 1809 to 1812, and was sent as minister to Holland in 1814. In 1823 he was elected governor of Massachusetts. Died Feb. 6, 1825.

Eu'taw, a township and post-village, capital of Greene co., Ala., on the Alabama and Chattanooga R. R., 35 miles S. W. of Tuscaloosa. It has several churches and seminaries and one weekly newspaper. Pop. of township, 1920.

Eu'taw Springs, Battle of, was fought in South Carolina, about 60 miles N. W. of Charleston, Sept. 8, 1781. Gen. Greene, having about 2000 men, attacked a British force under Col. Stuart, who was compelled to retreat, and lost about 630, including prisoners. Gen. Greene lost 535, killed, wounded, and missing.

Eutro'pius, or **Flavius Eutropius,** a Latin historian who flourished about 350–375 A. D. The events of his life are mostly unknown, except that he was secretary to the emperor Julian, and accompanied him in his expedition against the Parthians. He wrote an "Epitome of Roman History" from the foundation of Rome to the time of Valens ("Breviarium Rerum Romanarum"), which became very popular, and has been extensively used as a school-book in modern times. His Latinity is pure and his style simple.

Eu'tyches [Gr. Εὐτύχης], the founder of the heretical sect of Eutychians, was superior of a monastery near Constantinople. He was a zealous opponent of the doctrines of the Nestorians, and was charged with teaching that there is in Christ only one nature—that is, the divine. He was condemned by the Council of Constantinople in 448 A. D., but this decision was reversed by the Council of Ephesus in 449. This triumph was obtained by the violent and disorderly acts of the soldiery and monks. The doctrines of Eutyches were again condemned as heretical by the general Council of Chalcedon in 451 A. D. He was then above seventy years of age. The Eutychians were often called *Monophysites*. (See MONOPHYSITES and JACOBITES.)

Euxine Sea. See BLACK SEA.

Evag'oras [Gr. Εὐαγόρας], king of Salamis in Cyprus, was descended from Teucer, a famous hero. He began to reign in 410 B. C., and as an ally of the Athenians and Egyptians waged a long war against the king of Persia, who invaded Cyprus. He was assassinated in 374 B. C., and was succeeded by his son Nicocles.

Eva'grius, a Church historian, born about 536, was at first a lawyer, and defended the patriarch Gregory of Antioch so well that he was appointed city prefect by the emperor Mauricius. He continued the Church histories of Socrates and Theodoret in six books from 431–594. His Church history is compiled with great care and impartiality. The best edition was published by Reading (Cambridge, 1720).

Evangelical Alliance. This is a voluntary association of evangelical Christians from different churches and countries for the purpose of promoting religious liberty, Christian union, and co-operation in every good work. It owes its origin to a widespread and growing desire for a closer union among Protestants, both for its own sake and for a more successful conflict with infidelity on the one hand and superstition on the other. Its object is not to create a union, but to acknowledge, exhibit, and strengthen that spiritual union which has always existed among true Christians as members of Christ's body, but which is sadly marred and obstructed by the many divisions and rivalries of Protestant denominations and sects. It aims not at an organic union, nor at a confederation of churches as such, but simply at a free Christian union of individual members from different churches who hold essentially the same faith; although such a union will naturally tend to bring gradually the churches themselves into closer fellowship and mutual recognition. It claims no official and legis-

lative authority that might in any way interfere with the internal affairs of the denominational organizations or the loyalty of its members to their particular communion. It relies solely on the moral power of truth and love. After a number of preparatory meetings and conferences, the Alliance was founded in a remarkable and enthusiastic meeting held in Freemasons' Hall in London Aug. 19–23, 1846, composed of some eight hundred Christians—Episcopalians, Presbyterians, Independents, Methodists, Baptists, Lutherans, Reformed, Moravians, and others, and including many of the most distinguished divines, preachers, and philanthropists from England, Scotland, Ireland, Germany, France, Switzerland, the U. S., and other countries. Sir Culling Eardly, Bart., presided and became the first president of the British branch. Eloquent addresses were delivered, fervent prayers offered, and nine doctrinal articles adopted; not, however, as a binding creed or confession, but simply as an expression of the essential consensus of evangelical Christians whom it seemed desirable to embrace in the Alliance. These articles are as follows:

"1. The divine inspiration, authority, and sufficiency of the Holy Scriptures.

"2. The right and duty of private judgment in the interpretation of the Holy Scriptures.

"3. The Unity of the Godhead, and the Trinity of the Persons therein.

"4. The utter depravity of human nature in consequence of the Fall.

"5. The incarnation of the Son of God, his work of atonement for the sins of mankind, and his mediatorial intercession and reign.

"6. The justification of the sinner by faith alone.

"7. The work of the Holy Spirit in the conversion and sanctification of the sinner.

"8. The immortality of the soul, the resurrection of the body, the judgment of the world by our Lord Jesus Christ, with the eternal blessedness of the righteous and the eternal punishment of the wicked.

"9. The divine institution of the Christian ministry, and the obligation and perpetuity of the ordinances of Baptism and the Lord's Supper."

Some regard this doctrinal statement as too liberal, others as too narrow (especially on account of Art. 9, which excludes the Quakers, and Art. 8, which excludes the Universalists), while still others would have preferred no creed, or only the Apostles' Creed, the simplest and most generally accepted of all creeds. Nevertheless, it has answered a good purpose, and maintained the positive evangelical character of the Alliance. The American branch, at its organization (1867), adopted the nine London articles, with the following important explanatory and qualifying preamble:

"*Resolved,* That in forming an Evangelical Alliance for the U. S. in co-operative union with other branches of the Alliance, we have no intention to give rise to a new denomination; or to effect an amalgamation of churches, except in the way of facilitating personal Christian intercourse and a mutual good understanding; or to interfere in any way whatever with the internal affairs of the various denominations; but simply to bring individual Christians into closer fellowship and co-operation, on the basis of the spiritual union which already exists in the vital relation of Christ to the members of his body in all ages and countries.

"*Resolved,* That in the same spirit we propose no new creed; but, taking broad, historical, and evangelical catholic ground, we solemnly reaffirm and profess our faith in all the doctrines of the inspired word of God, and in the *consensus* of doctrines as held by all true Christians from the beginning. And we do more especially affirm our belief in the *divine-human person and atoning work of our Lord and Saviour Jesus Christ,* as the only and sufficient source of salvation, as the heart and soul of Christianity, and as the centre of all true Christian union and fellowship.

"*Resolved,* That, with this explanation, and in the spirit of a just Christian liberality in regard to the minor differences of theological schools and religious denominations, we also adopt, as a summary of the *consensus* of the various Evangelical Confessions of Faith, the Articles and Explanatory Statement set forth and agreed on by the Evangelical Alliance at its formation in London, 1846, and approved by the separate European organizations; which articles are as follows," etc.

The Evangelical Alliance thus auspiciously organized soon spread throughout the Protestant world. Branch Alliances were formed in Great Britain, Germany, France, Switzerland, Sweden, and even among the missionaries in Turkey and East India; quite recently also in Australia, in Brazil, and among the Protestant missionaries in Japan (Dec., 1873). There is no central organization with any controlling authority, and the General Alliance appears in active operation only from time to time when it meets in general conference, which has assumed the character of a Protestant œcumenical council, but differs from the œcumenical councils of the Greek and Roman churches in claiming only moral and spiritual power. The various national branches are related to each other as members of a confederation with equal rights. The British branch, being the oldest and largest, and having the most complete organization, with a house (in London, No. 7 Adam street, Strand) and regular officers who devote their whole time to it, has been heretofore the most influential; the continental branches are more elastic, and confine themselves to occasional work; the American branch, which was organized at the Bible House, New York, in 1867 (a previous attempt having failed on account of the anti-slavery agitation before the civil war), has in a short time become the most vigorous and popular; for in the U. S., where all Christian sects are represented on a basis of equality before the law, there is also the greatest appreciation of religious freedom, the strongest desire for Christian union and co-operation, and the widest field for the realization of the idea of a universal Christian brotherhood on the basis of a free development of denominational peculiarities in dogma, discipline, and worship. We now give a brief summary of the history and results of the Alliance.

1. As regards the promotion and defence of *religious liberty* wherever assailed. The Alliance assumed from the beginning that freedom of conscience and Christian union, far from being inconsistent with each other, are one and inseparable; that freedom is the basis of union, and union the result and support of freedom; that a union without freedom is only a dead mechanical uniformity; that true union implies variety and distinction, and a full recognition of the rights and peculiar gifts and mission of other members and branches of Christ's kingdom. The Roman Church maintains union at the expense of freedom, and, while advocating liberty of conscience for herself, denies it to all others in principle, and, where she has the power, in practice also. Since the formation of the Alliance many cases of persecution more or less severe have occurred, especially in Southern Europe, under the operation of penal laws against religious dissenters; and the united efforts of the different branches of the Alliance, through the press and by deputations, have had a considerable moral influence in bringing about those remarkable changes in favor of religious liberty which have taken place among the Latin races and in Turkey within the last twenty years. The Alliance has successfully exerted its influence for the release of the Madiai family in Tuscany, and of Matamoros, Carrasco, and their friends who, during the reign of Queen Isabella in Spain, were thrown into prison and condemned to the galleys for the sole crime of reading the Bible and holding private meetings for devotion. It aided in inducing the sultan of Turkey to abolish the death-penalty for apostasy from Mohammedanism in his dominions. It interceded for the Methodists and Baptists in Sweden, which has since abrogated the penal laws against Roman Catholics and Protestants not belonging to the Lutheran Confession. It sent in 1871 a large deputation, in which prominent citizens of the U. S. took the leading part, to the czar of Russia to plead for the oppressed Lutherans in the Baltic Provinces, and these have not been disturbed since that time. It sent a similar deputation to the embassy from Japan, when they visited this country and the courts of Europe in 1872, to remonstrate against the persecution of Christians, mostly Roman Catholics, in that distant empire of the East, and the persecution has since ceased. It has not forgotten the Nestorians in Persia, who appealed to the Alliance for protection against the oppression of a Mohammedan government; and just now (1874) it prepared a memorial to the czar on the persecution of Baptists in the south of Russia. The force of public opinion on the subject of freedom of conscience and religious worship, as expressed by the Alliance, has always found a respectful hearing, and must sooner or later be obeyed by every civilized government on the globe.

2. As regards the cause of *Christian union,* which is the other great object of the Alliance, it is promoted mainly by means of general conferences of an international and interdenominational character, which are arranged from time to time in different capitals by the branch in whose bounds it meets, with the co-operation of the sister branches. These meetings last several days, and are spent in prayer and praise, brotherly communion, and discussions of the most important religious questions of the age. Six general conferences have been held so far. The first general conference took place in London in 1851, the year of the great exhibition of the works of industry of all nations in the British metropolis; the second in Paris, 1855; the third in Berlin, 1857; the

fourth in Geneva, 1861; the fifth in Amsterdam, 1867; the sixth in New York, 1873. Rome is spoken of as the place for the next conference. These meetings were all well attended, and left a most favorable impression upon the delegates and the country in which they were held. But the most popular, enthusiastic, and effective of all was the one held in New York, Oct. 2–12, 1873, which from the beginning to the close was a most complete success, surpassing every expectation. For the first time in history, American, European, and Asiatic Christianity met face to face in the New World, and took counsel together on the state of Christendom, on Christian union, Christian life, Christianity and infidelity, Christianity and superstition, Christianity and civil government, Christian missions at home and abroad, Christian philanthropy and reform of social evils. The religious community of our commercial metropolis took the deepest interest, and thronged the meetings by thousands in the several churches and public halls from morning till night, and the secular and religious press, without exception, spread the reports among millions of readers. The foreign delegates were deeply impressed with the life and energy of American Christianity and American institutions, and spread their new convictions all over the Old World. "It is quite impossible," writes Charles Reed, an influential member of the British Parliament, and one of the delegates (in one of the British periodicals), "to describe the course of these meetings in New York, much less the spirit in which they were conducted. The numbers of delegates from all parts of Europe and Asia, the attendance daily for ten days of thousands of persons, the subjects of discussion, are evidence of the success of the gathering, while the full reports by the daily press and the attention paid by public bodies showed that the influence spread far and wide among the population of the city. . . . It was occasionally felt that such a conference could not have been held elsewhere than in New York. . . . No words can convey the sense I have of the importance of this conference, as inaugurating a new era in the history of Christian union." The same testimony, in even more enthusiastic language, came back after the return of the delegates from every part of Europe, and the effect of the conference in encouraging faith and Christian work and cementing the bond of union, especially between Great Britain and America, cannot be estimated. For a full report of the addresses and proceedings see the stately volume, "History, Essays, Orations, and other Documents of the Sixth General Conference of the Evangelical Alliance held in New York," edited by Schaff and Prime, and published by the Harpers, New York, 1874 (pp. 773). The proceedings of the previous meetings were published by the British branch in English, and also in German, Dutch, and French by the continental branches. The American branch has issued ten documents of minor importance from its office in the Bible House, New York. Biennial meetings are hereafter to be held in the U. S. for the discussion of topics of general interest to the religious community in America. PHILIP SCHAFF.

Evangel'ical Associa'tion, popularly but incorrectly known as the **German Methodist Church,** a body of American Christians, chiefly of German descent, organized by the Rev. Jacob Albright, a native of Eastern Pennsylvania. Regarding the doctrines and morals that prevailed in the German churches of that part of Pennsylvania as corrupt, Albright undertook about 1790 a work of reform among them. At a meeting of his converts in 1800, called for the purpose of deliberating on the measures best suited for advancing the new religious movement, Albright was unanimously elected pastor or bishop, and authorized to exercise all the functions of the ministerial office over the members of the organization. In the course of time annual conferences were established, and in 1816 the first general conference was held in Union co., Pa., consisting of all the elders in the ministry. Since 1843 the general conference, consisting of delegates from the annual conferences, has regularly met once every fourth year. During the first thirty years of its existence the Evangelical Association met with violent opposition, but since then it has quietly and rapidly advanced. As the church repeatedly took action on the slavery question and sided with the anti-slavery churches, its progress was wholly within the boundaries of the Northern States, and even in 1873 no conference had been established in the Southern States. In 1863 there was one in Canada and one in Germany.

In doctrine and theology the Evangelical Association is Arminian; with regard to sanctification, Wesleyan; in the form of government and mode of worship it generally agrees with the Methodist Episcopal Church (of which Albright, prior to beginning his reformatory labors in the German churches, was a member). The ministers, who, like the Methodists, practice itineracy, are divided into deacons and elders; the bishops and presiding elders are elected for a term of only four years—the former by the general conference, the latter by the individual conferences. The general conference is the highest legislative and judicial authority in the Church; the transactions of the annual and quarterly conferences are mostly of an executive and practical nature. A charitable society for the support of the widows and orphans of poor itinerant preachers was established in 1835, and a missionary society in 1838. There is moreover a Sunday school and tract society, and church-building societies have been established in several conferences. A denominational publishing-house at Cleveland, O., publishes six periodicals—three in German and three in English; besides, two periodicals are published in Germany. The literary institutions of the Church in 1872 were—the North-western College, in Naperville, Ill; the Union Seminary, in New Berlin, Pa.; the Blairstown Seminary, in Blairstown, Ia.; and the Ebenezer Orphan Institution, at Flat Rock, O. In 1871 the Church had fifteen annual conferences, inclusive of those of Canada and Germany, 587 itinerant and 401 local preachers; 905 churches; 1033 Sunday-schools, with 56,028 scholars and 11,646 officers and teachers; and 72,979 members. A history of the Association has been begun by W. W. Orwig.

Evangel'ical Church Con'ference, the name applied to periodical meetings of the Protestant state churches of Germany. The idea of these meetings originated with King William of Würtemberg in 1815. The first conference, held at Berlin in 1846, had representatives from almost every German state. At the second conference, held in 1852 at Eisenach, an official central organ was established at Stuttgart ("Allgemeine Kirchenblatt für das evangel. Deutschland"). The conferences from 1855 to 1868 were all held at Eisenach.

Evangel'ical Chur'ches are those bodies of Christians which believe in the divinity of Christ, in the necessity of his atonement, and in personal repentance and faith as essential to salvation.

"Evangelische Kirche" ("Evangelical Church") is the official title of the Established Church of Prussia, formed in 1817 by the union of the Lutheran and the Reformed churches. The Lutherans and Reformed (Calvinistic) churches of Baden, Würtemberg, and other German states have been similarly united.

The "evangelical party" in the Church of England is that section of the Church which professes to attach especial importance to the teachings of the New Testament, and which is charged with neglecting or slighting church authority and underrating the efficacy of the sacraments.

Evangel'ical Coun'sels [Lat. *consilia evangelica*] are such directions or admonitions in the Roman Catholic Church as are not in themselves obligatory upon any one, but are recommended by the Church to some persons as highly advantageous to spiritual excellence. The chief evangelical counsels are voluntary virginity, poverty, and obedience to monastic rules. Some writers reckon as evangelical counsels the scriptural recommendation to turn the left cheek to the man who has struck one's right cheek, to go two miles with a person who desires one's company for one mile, etc. There are reckoned twelve of these counsels.

Evangel'ical U'nion, a body of Scotch Independents, called **Morisonians,** from Rev. James Morison, their original leader. In 1843 they left the United Secession Church. They have been joined by some Congregational churches of Scotland and England. They reject a part of the Calvinistic doctrines, and have a theological school at Glasgow.

Evan'geline, a twp. of Charlevoix co., Mich. Pop. 90.

E'vans, a post-village, capital of Weld co., Col., 47 miles N. by E. of Denver, where the Denver Pacific R. R. crosses South Platte River and also the Golden and Julesburg R. R. It has one bank, three hotels, two churches, a court-house, a large flouring-mill, and one newspaper. It is the centre of the St. Louis Western colony. It has a thriving trade, good water-power, and ample means for irrigating the excellent lands which surround the town. Pop. 189. A. C. TODD, ED. "EVANS JOURNAL."

Evans, a township of Marshall co., Ill. Pop. 1989.

Evans, a twp. and post-village of Erie co., N. Y. The township lies on Lake Erie, and contains a number of villages. Pop. of Evans Centre, 150; of township, 2593.

Evans (AUGUSTA J.; since 1868 Mrs. L. M. WILSON), born near Columbus, Ga., in 1836, removed in childhood, with her father, to Texas, and in 1849 removed to Mobile. She has published "Inez, a Tale of the Alamo," "Beulah" (1859), "Macaria" (1864), "St. Elmo" (1866), "Vashti" (1869). She is a novelist of great talent.

Evans (Sir DE LACY), D. C. L., a British general, born at Moig, in Ireland, in 1787. He served at the battles of Baltimore (1814), New Orleans (1815), and Waterloo (1815). He was a Liberal member of Parliament from 1831 to 1841.

In 1835 he was appointed commander of a legion of 10,000 men raised in Great Britain to fight for the queen of Spain. He defeated the Carlists at several places in 1836 and 1837. In 1846 he was returned to Parliament for Westminster, which he represented for many years. Having been raised to the rank of lieutenant-general, he commanded a division at the battle of the Alma and at Sebastopol, in Oct., 1854. Died Jan. 9, 1870.

Evans (Ellicott), LL.D., was born at Batavia, Genesee co., N. Y., June 19, 1819, and was educated at Harvard. In 1860 he became professor of law and political economy at Hamilton College, Clinton, N. Y.

Evans (Frederick William), born at Leominster, England, June 9, 1808, came in 1820 to the U. S. with his father. He was apprenticed to a hatter, and occupied his leisure hours with study. He became in theory a socialist, and studied the works of Owen, Fourier, and other leaders in the various projects for social reform. He visited England, and after his return went to visit the communities of United Shakers at Mount Lebanon, N. Y., for the purpose of studying their system, to which he became a convert. He afterwards became the presiding elder brother of the communities of that place and the leader of the sect in the U. S. His teachings have added new dogmas and considerably modified the old doctrines of Shakerism. He is known as a public lecturer, a contributor to periodical literature, and author of an "Autobiography," "Anne Lee," "Religious Communism," and other works.

Evans (George), born at Hallowell, Me., Jan. 12, 1797, graduated at Bowdoin in 1815, called to the bar in 1818, was a member of Congress from Maine (1829–41), U. S. Senator (1841–47), and held various important offices in his native State. Died April 5, 1867.

Evans (Hugh Davy), LL.D., born at Baltimore, Md., in 1792, was a prominent jurist and strong friend of the Protestant Episcopal Church. He wrote an "Essay on Pleading" (1827), "Maryland Common-Law Practice" (1839), and "Essays" upon various Church questions (1844, 1851, 1855, etc.). Died July 16, 1868.

Evans (John), M. D., geologist, was born at Portsmouth, N. H., Feb. 14, 1812, graduated at the St. Louis Medical College, served on several State and Territorial geological surveys under Dr. D. D. Owen, and discovered remarkable fossil deposits in the Bad Lands of Nebraska. He afterwards performed the U. S. geological survey of Oregon and Washington Territory. Died April 13, 1861.

Evans (Marian C.). See Lewes (Marian E.).

Evans (Oliver), an American inventor, born in 1755 at Newport, Del. Died in New York April 25, 1819. His most valuable inventions were the automatic flour-mill and the high-pressure steam-engine. Before his time grain and flour were moved in the mill by manual labor. His improvements, which effected a complete revolution in the manufacture of flour, consisted of the elevator, the conveyer, the hopper-boy, the drill, and the descender. By means of this machinery grain was conveyed from a wagon or a boat into the mill, then cleaned, ground, bolted, and delivered into barrels without the intervention of human hands. After great opposition these improvements were introduced into the celebrated Ellicott Mills, near Baltimore, where 325 barrels of flour were daily made. The saving there effected by Evans's contrivances was estimated at more than fifty cents per barrel. As the production of wheat alone in the U. S. in 1870 exceeded 287,000,000 bushels, the benefits arising from the use of the automatic flour-mill are not likely to be over-estimated.

In 1772, while yet an apprentice, Evans endeavored to discover some substitute for animal power in moving wagons; fortunately, an incident, related by his brother, gave the right direction to his investigations. In a blacksmith shop near by about a gill of water was poured into a gun-barrel, after stopping up its touch-hole; then a tight wad was rammed into the barrel, and it was placed in the smith's fire; "presently the barrel discharged itself with a loud crack, as if it had been loaded with powder." It instantly occurred to Evans that this was the power he wanted. He subsequently found a book containing a description of the atmospheric steam-pump used at the English coal-mines, and was astonished to find that steam was solely employed for obtaining a vacuum by its condensation, thus allowing only the pressure of the atmosphere to move the piston. He made experiments in which the pressure of steam moved the piston, and in 1781 announced that he could propel boats and wagons by means of steam. No attempt was made to introduce this invention until after the close of the Revolutionary war. In 1786 the State of Pennsylvania gave him the exclusive right to use in that State his flour-mill, but refused to grant the same right to use his steam-wagon. In 1787, however, Maryland granted him the right to use both inventions in that State. In order to obtain assistance in building his road-engine, he exhibited his drawings and plans to capitalists and engineers; failing to find one who would join him in the enterprise, he twice sent his plan and specifications to England, in the vain hope of convincing foreign engineers of the feasibility of his device. Finally, in 1801 he decided to devote all his earnings from his other inventions, about $3700, to the construction of a stationary steam-engine on the direct-pressure plan. It was completed and put into operation in the city of Philadelphia, and continued to be used successfully for many years in sawing marble and grinding gypsum. Thus, 1801 marks a new era—the introduction of the most important of all engines. Soon after, by order of the board of health of Philadelphia, Evans constructed a device for cleaning or dredging docks. It consisted of a small scow or flatboat, with a small steam-engine of five-horse power and boiler on board to work the dredging machinery. In order to show its adaptability to locomotion, he connected his engine, by means of pulleys and bands, with four wooden wheels turning on wooden axles beneath the boat, also with a paddle-wheel behind it. This singular contrivance for moving on land and water he called the "Eructor amphibolis." By steam alone it was driven over the highway from his workshop to the Schuylkill River, about one mile and a half, where it was launched, and from thence propelled down the Schuylkill to its mouth, and up the Delaware River to the city, a distance of fourteen or fifteen miles. This was the first application of the high-pressure principle to locomotion, and the Evans engine, with important improvements made since his day, drives all the locomotives and steam-carriages now in use. Evans also invented the cylinder boiler, with a cylindrical internal flue, commonly known as the "Cornish boiler."

Three varieties of steam-engines are now in use—namely, the condensing or low-pressure engine, the non-condensing or high-pressure engine, and a combination of these two, called the compound engine. In the condensing and the compound engines power is derived from heat, which converts water into steam; also from cold, which reconverts steam into water. These engines are only available where the large quantity of cold water required for condensing steam can be readily obtained. No such condition attends the use of the Evans non-condensing engine, in which the direct action of high-pressure steam on a relatively small piston moving with great velocity gives the required power. Compared with the other two, it is small, of simple construction, cheap, always available, and therefore of almost universal application. Experience warrants the assertion that the high-pressure steam-engine is the most valuable prime mover ever devised. A great invention when brought into practical operation is an important element in human progress, for its power outlasts its originator and increases with time. It is a continual source of wealth, because labor saved is, virtually, labor gained. The devices of Oliver Evans were of this stamp, and have won for him a high place among the benefactors of our race.

Samuel D. Tillman.

Evans (Robley D.), U. S. N., born Aug. 18, 1844, in Floyd co., Va., entered the navy as a midshipman Sept. 20, 1860, became an ensign in 1863, a lieutenant in 1866, a lieutenant-commander in 1868, served in both attacks upon Fort Fisher, N. C., and in the attempt to storm the fort was four times wounded. Foxhall A. Parker, U. S. N.

Ev'ansburg, a post-village of Sadsbury township, Crawford co., Pa. Evansburg Station (Stony Point P. O.) is 2¾ miles S., on the Atlantic and Great Western R. R. The village is on Conneaut Lake, which is 1074 feet above the sea. Pop. 174.

Evans Centre (Evans P. O.), a village of Evans township, Erie co., N. Y., on Big Sister Creek, 1½ miles from Angola, has some manufactures. Pop. 150.

Evans Mills, a post-village of Le Ray township, Jefferson co., N. Y., on the Rome Watertown and Ogdensburg R. R., 11 miles N. N. E. of Watertown. Pop. 500.

Ev'ansport, a post-village of Tiffin township, Defiance co., O. Pop. 191.

Ev'anston, a post-village of Cook co., Ill., on Lake Michigan and the Chicago and North-western R. R. (Milwaukee division), 12 miles N. of Chicago. It is a very handsome suburban town, the seat of the North-western University, a wealthy and flourishing institution, having substantial and costly buildings, extensive libraries, and a museum. It is noted for its pleasant situation, its numerous churches, rapid growth, and social attractions. It has one newspaper, two banks, gas-works, numerous stores, etc. No intoxicating liquors can legally be sold within 4 miles of the university. It is also the seat of Garrett Biblical

Institute. Many of its citizens do business in Chicago. Pop. of township, 3062.

ALFRED L. SEWELL, ED. OF "INDEX."

Evanston, a post-village, county-seat of Uintah co., Wy. Ter., situated on Bear River and on the Union Pacific R. R., 76 miles E. of Ogden, and halfway between Omaha and San Francisco. The railroad machine-shops are here, employing over 100 men; it has also a large steam saw-mill, one library, three churches, public school, four hotels, a railroad eating-house, two banks, and thirty business-houses. An abundance of coal is found within three miles, of which over 100 cars are shipped per day. Iron ore is also found. It has one weekly newspaper.

WM. E. WHEELER, PROP. "AGE."

Ev'ansville, a city and port of entry, capital of Vanderburg co., Ind., is on the Ohio River, 185 miles below Louisville and 192 above Cairo. It is the southern terminus of the Wabash and Erie Canal, and of the Evansville and Crawfordsville R. R., which connects it with Terre Haute, 109 miles distant. It is 161 miles E. S. E. of St. Louis by the St. Louis Evansville Henderson and Nashville R. R. Evansville is pleasantly situated on a high bank, has an extensive trade, and is the principal shipping-point of South-western Indiana. It has a fine court-house, a U. S. marine hospital, several public halls, and four national banks; also a number of flour-mills, iron-foundries, machine-shops, and manufactures of wool, leather, etc. Four daily newspapers are issued here. Pop. in 1860, 11,484; in 1870, 21,830.

Evansville, a post-township of Douglas co., Minn. Pop. 250.

Evansville, a post-village of Rock co., Wis., on the Chicago and North-western R. R. (Madison division), 22 miles S. by E. of Madison. It has a national bank, one weekly newspaper, a graded school, seminary, one machine-shop, one steam cabinet-manufactory, grist-mill, five churches, and two hotels. Principal business, farming.

I. A. HOXIE, ED. "REVIEW."

Evapora'tion [from the Lat. *e*, "out," "off," and *vapor*, "steam" or "vapor;" literally, the act of going off as vapor] is the passage of a substance from the liquid or solid state to the condition of vapor, especially applied to such a change when it takes place at a temperature below the boiling-point. It was once taught that the air had a sponge-like power of taking up or dissolving a certain quantity of vapor of water and other liquids, and that this power increased with the temperature; but it is now known that evaporation takes place to the same degree in a vacuum as in the air, and far more rapidly. It has been shown by Dalton that the elastic force of all vapors is the same, whether mixed with gas or air, or not; and that air is never truly saturated with vapor unless it contains an amount sufficient to saturate a vacuum of the same extent.

Heat is the great cause of evaporation; so that the hotter the air becomes the more rapidly is vapor formed. When the air is at rest the space near an evaporating surface becomes loaded with vapor, and the process becomes much slower than when the air is in motion, both by reason of increased tension and of loss of heat; for evaporation is a great absorber of heat. Indeed, the most intense degree of cold with which we are acquainted is caused by the evaporation of volatile liquids, such as ether, rhigoline, etc.; the lowest point yet reported being —220° F., artificially produced by the evaporation in vacuo of a mixture of liquid nitrous oxide (N_2O) and carbon disulphide (CS_2).

Ev'art, a post-village of Osceola co., Mich., situated in the heart of a great lumber country, about midway between the two great lakes. It is a place of two years' growth, and has seven saw and shingle mills, a foundry and machine-shop, two church societies, and one newspaper. Pop. of township, 168. HESS & CHASE, PROPS. "REVIEW."

Ev'arts (JEREMIAH), an American editor, born in Sunderland, Vt., Feb. 3, 1781, graduated at Yale College in 1802. Having studied law, he was admitted to the bar in 1806, and became editor of the "Panoplist," a religious paper of Boston, about 1810. In 1821 he was chosen corresponding secretary of the board of commissioners for foreign missions. Died May 10, 1831. He was a man of rare fineness and force of character.

Evarts (WILLIAM MAXWELL), LL.D., an eminent lawyer, a son of the preceding, was born in Boston, Mass., in Feb., 1818. He graduated at Yale College in 1837, and studied law, which he practised with great distinction in the city of New York, where he was admitted to the bar in 1840. He became a Republican soon after that party was organized. He was the leading counsel employed for the defence of President Johnson in his trial before the Senate in April and May, 1868, and was attorney-general of the U. S. from July, 1868, to Mar. 4, 1869. He was one of three lawyers appointed by President Grant in 1871 to defend the interests of citizens of the U. S. before the tribunal of arbitrators who met at Geneva to settle the "Alabama claims." He is one of the most eloquent advocates in the U. S. He has written several legal works.

Eve, a township of Monroe co., Ark. Pop. 297.

Eve. See ADAM.

Eve (PAUL FITZSIMONS), M. D., was born June 27, 1806, near Augusta, Ga., graduated at the University of Georgia in 1826, graduated as M. D. at the University of Pennsylvania in 1828, and studied several years in Europe, was a surgeon in the Polish revolution of 1831, and received the Golden Cross of Honor of Poland in that year, became professor of surgery in the Medical College of Georgia in 1832, in Louisville University (Ky.) in 1849, in Nashville University (Tenn.) in 1850, and in Missouri Medical College, St. Louis, in 1868. In 1870 he became professor of operative and clinical surgery in the University of Nashville. Prof. Eve was president of the American Medical Association in 1857. He served as a surgeon in the Confederate army. He has been editorially connected with professional journalism for many years, and is the author of very numerous monographs upon surgery, etc. Dr. Eve has long held a high position among the surgeons of the U. S. He has crossed the Atlantic fourteen times in the interest of his profession. His youthful service in Poland was voluntary and without pay. In the University of Georgia he delivered eighteen courses of lectures. He has declined professorships in New York City and Philadelphia, and the surgeon-generalship of Tennessee. He has had remarkable success as a lithotomist. Of 92 bilateral operations for stone in the bladder, 8 only terminated fatally; of the last 48 cases, 46 recovered; of 105 applicants for relief, not one was refused.

Evec'tion [from the Lat. *e*, "out," and *veho, vectum*, to "carry;" literally, "being carried out" of its proper or natural position], an inequality of the moon's motion, depending on the position of the transverse axis of the moon's orbit, as compared with the earth's radius vector. The eccentricity of the lunar orbit varies with the relative position of these lines. It is maximum when they are coincident, and minimum when they are perpendicular to each other. The variation of the eccentricity affects the equation of the centre, increasing or diminishing correspondingly the moon's mean longitude. This inequality is called evection.

Ev'eline, a township of Charlevoix co., Mich. Pop. 294.

Evening Schools are established in many of the larger towns of Great Britain and Ireland, and in the greater part of the cities of the U. S., for the instruction of artisans and others who have been unable to receive education in childhood. In many instances such schools have been maintained by private benevolence, but of late years they are, at least in the U. S., generally established, and wholly or in part maintained, by local or municipal authorities. Their sphere of usefulness is rapidly extending, and the course of study becomes more and more important. Boston, Mass., has an evening high school, and in our larger cities, as in nearly all the important towns of Massachusetts, industrial and free-hand drawing is taught. The Cooper Union, N. Y., has a flourishing evening school of design. Nearly 22,000 names of pupils were registered in the evening schools of N. Y., for the year 1869–70.

Evening Shades, a post-village, capital of Sharpe co., Ark., about 22 miles N. of Batesville.

Ev'erdingen, van (ALDERT), a painter of landscapes, born in Holland in 1621. His taste was for wild scenery, rocks, torrents, the stormy sea; his pencil was bold, his coloring strong and effective. His etchings are famous. Died in 1675.

Ev'erest, Mount, the highest mountain of the earth, is in the eastern range of the Himalayas, in Northern Nepaul; lat. 27° 59′ N., lon. 86° 54′ E. According to the measurement of Waugh in 1856, the altitude is 29,002.

Ev'erett, a thriving post-township of Middlesex co., Mass. Until 1870 it formed a part of Malden. It is supplied with water from the Spot Pond Works of Malden. It is two miles from Boston, and connected therewith by the Eastern R. R. and the Middlesex horse-railroad. It has four churches and excellent schools; also one weekly newspaper. Pop. 2220.

GRAY & METCALF, EDS. AND PUBS. "PIONEER."

Everett, a township of Newaygo co., Mich. Pop. 231.

Everett, a post-township of Cass co., Mo. Pop. 905.

Everett, a township of Burt co., Neb. Pop. 277.

Everett, a post-village of Bedford co., Pa., has one weekly newspaper.

Ev'erett (Alexander Hill), LL.D., an American scholar and diplomatist, born in Boston Mar. 19, 1792, was a brother of Edward Everett, noticed below. He graduated at Harvard in 1806, and studied law in the office of John Q. Adams, with whom he went to Russia as secretary of legation in 1809. Having returned home in 1812, he began to practise law in Boston, and married Lucretia Peabody. He was chargé d'affaires at The Hague for nearly six years (1818–24), and published in 1821 an able work entitled "Europe, or a General Survey of the Principal Powers," etc. In 1825 he was appointed minister to the court of Spain by President Adams. During his residence at Madrid he wrote "America, or a General Survey of the Political Situation of the Several Powers of the Western Continent" (1827). He returned home in 1829, and became editor of the "North American Review," which he conducted with ability for about five years. He became an active Democratic politician. He was appointed commissioner to China by President Polk in 1845. Died at Canton June 29, 1847.

Everett (Edward), LL.D., D. C. L., an orator and statesman, born in Dorchester, Mass., April 11, 1794. He was a son of Rev. Oliver Everett, who died in 1802. He attended a school in Boston, at which Daniel Webster for a short time supplied the place of his brother, Ezekiel Webster, the regular master. He was twice a "Franklin medal scholar" of the Boston public schools, and for a few months a pupil of Exeter Academy. In 1811 he graduated at Harvard University with the highest honors of his class, being then little more than seventeen years of age. In 1812 he was appointed a tutor at Harvard while pursuing theological studies in preparation for the ministry. On Feb. 9, 1814, he was ordained as pastor of the Brattle street (Unitarian) church in Boston, where the fascination of his manner and the power and beauty of his sermons made the deepest impression on his hearers. In Mar., 1815, he accepted the Eliot professorship of Greek literature at Harvard, and terminated his career as a settled clergyman before he was quite twenty-one years of age. Proceeding at once to Europe, he studied for two years at the University of Göttingen, of which he became Ph. D. in 1817, and then travelled extensively in Europe, making special visits to Athens and Constantinople with a view to thorough preparation for the studies of his professorship, upon which he entered soon after his return in 1819. A brilliant course of lectures on ancient Greece and its architecture, with illustrations of the magnificent ruins which he had just visited, inaugurated his accession to the chair, which he held until 1825. His fame as a secular orator—which will probably outlast all his other titles to the remembrance of posterity—may be dated from the delivery of his Phi Beta Kappa oration at Cambridge in Aug., 1824, when the presence of La Fayette inspired him with an eloquence which had never been equalled within the walls of the university, and which won for him a widespread popular celebrity. Succeeded as it was in a few months by his oration at Plymouth on the 22d of December of the same year, an enthusiastic admiration was kindled and kept alive, which could only be satisfied by calling him into political service. A nomination for Representative in Congress soon followed, and Mr. Everett served the district of Middlesex in that capacity from 1825 to 1835, distinguishing himself greatly by unwearied devotion to duty, as well as by elaborate and masterly speeches. In 1836, after ten years of congressional service at Washington, he was called home to be governor of Massachusetts, and was continued in that office, by successive annual elections of the people, until 1840. A single vote, out of more than a hundred thousand, defeated his re-election. Going at once, for a second time, to Europe, he established himself in one of the Medicean villas at Florence, and prepared to enter upon his long-cherished purpose of writing history. "Rome in the time of Cicero" was one among many of the congenial themes which he had meditated. But hardly a year had elapsed before he received a call to proceed without delay to London as minister plenipotentiary of the U. S., and he entered upon that mission in 1841 at a moment when questions of the greatest delicacy were pending between the two nations. Returning home in 1845 after four years of diplomatic service in England, he was met almost at the wharf on landing with an inexorable demand that he should assume the then vacant presidency of the university at Cambridge. Accepting the position reluctantly, he gave three years of anxious and strenuous labor to its duties, and then eagerly laid them down. A brief interval of rest, which he sorely needed and had richly earned, afforded him time to establish himself again in Boston with a choice library around him, and to contemplate afresh some larger literary work than had yet seriously engaged him. But the death of Mr. Webster in Nov., 1852, left a vacancy in the department of state at Washington, which he was immediately summoned to fill; and on the expiration of his brief term as secretary of state, by the termination of President Fillmore's administration in 1853, he was elected by the legislature of Massachusetts a Senator in Congress. He held that place but a single year, when, owing to ill-health, he retired finally, as it proved, from the cares and burdens of official life. In 1860, indeed, he accepted a nomination for the vice-presidency of the U. S., but failed of an election; and the last ten years of his life were thus left undisturbed by political responsibilities. But nothing like private life, as that phrase is commonly understood, awaited his retirement. Calls were soon heard from a hundred sources for the exercise of his personal influence and his oratorical powers in behalf of some charitable institution, or in commemorating some historical event, or in eulogizing some illustrious person. It was not in his nature to decline such calls. During the first half of these last ten years his topics were within the common range of occasional discourses—"Dorchester (his native place) in 1630, 1776, and 1856;" "The Uses of Astronomy;" "The Importance of Agriculture;" "Charitable Institutions and Charity;" "Daniel Webster;" "Thomas Dowse;" "Academical Education;" "The Dedication of the Boston Public Library," of which he was one of the building commissioners, as well as president of the trustees. To this period also belongs his memorable and patriotic pilgrimage in the cause of rescuing Mount Vernon from the danger of falling into the hands of speculators, and securing it as a national possession; during which he delivered his address on "The Character of Washington" in all quarters of the Union, and paid over about $60,000 to the treasurer of the fund as the product of his eloquence. But the remainder of these last ten years of his life was to be mainly devoted to more painful and pressing themes. The opening of the civil war gave a new field to the labors of his pen and of his tongue, and from "The Flag-raising in Chester Square" (Boston), on the 27th of April, 1861, to his last utterance for "The Relief of Savannah," in Faneuil Hall on the 9th of Jan., 1865, just six days before he died, his thoughts, his time, and almost all his numerous addresses, filling nearly 350 pages of an octavo volume, were given to the support of the Union cause. He died in Boston Jan. 15, 1865.

Of such a career the records are happily abundant. His political and congressional speeches and his official papers have, it is true, never been collected, and are to be found only in separate pamphlets or in the columns of newspapers. They would make an interesting and valuable volume. His literary essays, too, must be sought for in the pages of the "North American Review," of which he was for several years editor, and to which he contributed many admirable articles. An attractive and instructive volume of literary miscellanies cannot fail to be forthcoming at no distant day from these materials. His contributions to the "New York Ledger" during the war were collected and published by himself in a volume entitled "The Mount Vernon Papers." So also he published, in an independent volume, his "Biography of Washington," prepared for the "Encyclopædia Britannica" at the request of Lord Macaulay. His "Defence of Christianity," a little work printed as long ago as 1814, is to be found on the shelves of public libraries or among the rarities of bookworms, but it ought never to be omitted from the catalogue of his earliest and most remarkable manifestations. His fame, however, as a scholar, an orator, a philanthropist, and a patriot will mainly rest on the four substantial volumes of his "Orations and Speeches"—two of them published in 1850, the third in 1859, and the fourth (by his sons) in 1868. The exhaustive index to the three first, prepared as a labor of love by Dr. Allibone, affords an easy reference to their rich and curiously diversified contents. They form together a most striking illustration of the times in which he lived, as well as an almost perfect picture, in the choicest mosaic, of the man himself. The materials of a complete autobiography might wellnigh be found in them, in language which could not be improved. The ardent and gifted young scholar, the accomplished and devoted professor, the cautious and conservative statesman, the sincere and earnest patriot, the exhaustless and consummate rhetorician are depicted in these volumes with the exactness of a photograph. The true man, the ever-obliging and faithful friend, the good citizen, are not less clearly delineated. It is too early to pronounce upon the permanent influence of such a career. His life must be taken as a whole, in order to form any adequate appreciation of its value. Certainly, there have been wiser and profounder statesmen among us, and scholars as learned and accomplished; but we think the annals of our country to the day of his death will be searched in vain for another so ready, prolific, and brilliant a writer and speaker, or for one who has done more both to adorn American literature and to advocate and advance every public interest and

patriotic cause. The statue of him by Story, ordered by his fellow-citizens, and placed (by no means to advantage) in the Public Garden of Boston, portrays him in the relation to his times in which he will longest be remembered —as one whose every word and gesture was untiringly and grandly employed in animating his hearers to the best and loftiest ends.

Mr. Everett's repeated visits to Europe, and his residence in London as American minister for four years, afforded him an opportunity of becoming personally known and appreciated in other lands besides his own. Sir Robert Peel and Lord Aberdeen, Rogers, Hallam, and Macaulay, were among his warmest English friends. Lord Macaulay died with an unfinished letter to him on his table or in his pocket. He received the highest literary honors from Cambridge and Oxford at a time when those universities were more chary than of late in decorating Americans. Humboldt and Guizot were among his friends on the Continent. The Institute of France enrolled him as a corresponding member. At home he enjoyed the lifelong intimacy and confidence of Daniel Webster, whose collected works he edited and published in 1851 in six volumes, with a carefully written biography in the first volume.

In 1822, Mr. Everett married Miss Charlotte Gray, daughter of the Hon. Peter C. Brooks, a distinguished merchant of Boston, of whom he prepared an elaborate memoir, which is included in the third volume of his "Orations and Speeches." Two sons and a daughter survived him. ROBERT C. WINTHROP.

Everett (HORACE), LL.D., born in 1780, graduated at Brown University in 1797, settled as a lawyer at Windsor, Vt., became a prominent politician, holding important positions in Vermont. He was a member of Congress (1829–43), and was distinguished as a friend of the Indians. Died Jan. 30, 1851.

Ev'erghem, a Belgian town, a railway station in East Flanders. It makes cotton lace and beer. Pop. 6447.

Ev'erglades, a marshy region in Southern Florida, S. of Lake Okeechobee, itself resembling a great shallow lake abounding in low islands, which are covered with a dense jungle of pines, palmettoes, vines, and tropical trees, many of which are found only in this State and the West Indies. The water between the islands is from one to six feet deep, and is covered with tall grass, which grows from the bottom and gives the region a beautiful appearance. The Everglades will no doubt in time become valuable for the cultivation of bananas and tropical fruits. They abound in game. They are 160 miles long and 60 broad. There are about 300 Seminole Indians remaining here. The Everglades are elevated several feet above the sea, which often approaches within half a mile. Their drainage could therefore be easily accomplished.

Ev'ergreen, a post-village, capital of Conecuh co., Ala., on the Mobile and Montgomery R. R., 97 miles N. E. of Mobile. It has one weekly newspaper. Pop. of Evergreen township, 1760.

Evergreen, a township of Montcalm co., Mich. P. 489.

Evergreen [Lat. *sempervirens*], a term applied to trees and shrubs whose leaves are not deciduous, but persistent, retaining their verdure throughout the winter. Evergreen leaves are mostly thicker and firmer in texture than the leaves of deciduous trees. The greater part of the trees of the natural order Coniferæ are evergreen, as the pine and cedar. Among other evergreens are the holly, orange, ivy, myrtle, box, and laurel. In general, the duration of the life of leaves is in inverse ratio to the activity of their evaporation. According to W. B. Carpenter, "Trees and shrubs which are spoken of as evergreen do not really retain their leaves for more than a year; but they are not cast off until a new crop appears, and the exchange does not take place suddenly, but gradually." (*Vegetable Physiology.*) "There are some falling leaves," says De Candolle, "as those of firs, which remain two, three, or more years, but which ought not to be confounded with persistent leaves, although both constitute the permanent foliage of evergreen trees and shrubs."

The following is a list of the more important coniferous evergreen trees indigenous to the United States.

Common Names.	Botanic Names.
White Spruce	Abies alba.
Hemlock	Abies Canadensis.
California Spruce	Abies amabilis.
Douglass Spruce	Abies Douglassii.
Menzies Spruce	Abies Menziesii.
Mexican Spruce	Abies Mexicana.
Black Spruce	Abies nigra.
Red Spruce	Abies rubra.
Sabine's California Spruce	Abies Sabini.
California White Cedar	Libocedrus decurrens.
White Cedar	Cupressus thyoides.
Lambert's Cypress	Cupressus Lambertiana.
Great Coned Cypress	Cupressus macrocarpa.
Mexican Cypress	Cupressus Mexicana.
Red Cedar	Juniperus Virginiana
Great Flowered Magnolia	Magnolia grandiflora.
Balsam Fir	Abies balsamea.
California Noble Fir	Abies nobilis.
White Pine	Pinus strobus
Yellow Pine	Pinus mitis.
California Yellow Pine	Pinus brachypterus.
California Nut Pine	Pinus edulis.
Jersey Pine	Pinus inops.
Scrub Pine	Pinus Banksiana.
Pitch Pine	Pinus rigida.
Long-leaved Pine	Pinus australis.
Pond Pine	Pinus serotina.
Spruce Pine	Pinus glabra.
Mountain Pine	Pinus pungens.
Loblolly Pine	Pinus tæda.
Lambert's Californian	Pinus Lambertiana.
Red Pine	Pinus resinosa.
Bald Cypress	Taxodium distichum.
American Yew	Taxus baccata Canadensis.
Florida Yew	Taxus Floridana.
American Arbor Vitæ	Thuya occidentalis.
Giant Arbor Vitæ	Thuya gigantea.
Florida Torreya	Torreya taxifolia.
California Torreya	Torreya Californica.
Great California tree	Sequoia gigantea.
Redwood	Sequoia sempervirens.

Foreign coniferous evergreen trees common in the nurseries of this country:

Common Names.	Botanic Names.
Silver Spruce	Abies argentea.
Dwarf Alpine Spruce	Abies crunoniana.
Blue Spruce	Abies cerulea.
Norway Spruce	Abies excelsa.
Spruce, Himalaya	Abies morinda.
Spruce, Mucronate	Abies mucronata.
Spruce, New Holland	Abies Novæ Hollandiæ.
Spruce, Yew-leaved	Abies taxifolia.
Spruce, Narrow-leaved	Abies tenuifolia.
Chili Pine	Araucaria imbricata.
Chinese Lance-leaved Pine	Araucaria lanceolata.
Brazil Pine	Araucaria Braziliensis.
Bidwill's Pine	Araucaria Bidwillii.
Moreton Pine	Araucaria Cunninghamii.
Norfolk Island Pine	Araucaria excelsa.
Graceful Pine	Araucaria gracilis.
Cedar, African Green	Cedrus Africanus viridis.
Cedar, Deodar, silvery foliage	Cedrus deodara.
Cedar, Green Deodar	Cedrus deodara viridis.
Cedar of Lebanon	Cedrus Libani.
Mount Atlas Silvery Cedar	Cedrus Libani argentea.
Japan Dark-green Yew	Cephalotaxus adpressus.
Fortune's Chinese Yew	Cephalotaxus Fortunei.
Mountain Yew	Cephalotaxus montana.
Chinese Yew	Cephalotaxus Chinensis.
Japan Weeping Cypress	Cryptomeria Japonica.
Japan Dwarf Cypress	Cryptomeria nana.
Cypress, Australian	Cupressus Australis.
Cypress, Spreading	Cupressus expansa.
Cypress, Chinese	Cupressus funebris.
Cypress, Graceful	Cupressus gracilis.
Cypress, Weeping	Cupressus pendula.
Cypress, Pyramidal	Cupressus pyramidalis.
Cypress, Sacred	Cupressus religiosa.
Juniper, Silver-leaved	Juniperus argentea.
Juniper, Berry-bearing	Juniperus bacciformis.
Juniper, Bermuda Cedar	Juniperus Bermudiana.
Juniper, Chinese	Juniperus Chinensis.
Juniper, English	Juniperus communis.
Juniper, Cracow	Juniperus Cracovia.
Juniper, Himalaya	Juniperus excelsa.
Juniper, Irish Spiral	Juniperus Hibernica.
Juniper, Hudson's	Juniperus Hudsonii.
Juniper, Japan	Juniperus Japonica.
Juniper, Phœnician	Juniperus Phœnicia.
Juniper, Sacred	Juniperus religiosa.
Juniper, Swedish	Juniperus Suecica.
Juniper, Spanish Incense	Juniperus thurifera.
Fir, or Spruce, European Silver	Picea pectinata.
Fir, Weeping Silver	Picea pectinata pendula.
Fir, Kumaon Pindrow	Picea Pindrow.
Fir, Altaic	Picea Sibirica.
Fir, Mount Atlas	Picea pinsapo.
Fir, Nepal purple-coned	Picea Webbiana.
Pine, Austrian Black	Picea Austriaca.
Pine, Calabrian	Pinus Calabriensis.
Pine, Siberian Cembran	Pinus cembra.
Pine, Nepal short-leaved	Pinus Gerardiana.
Pine, Haguenea	Pinus Haguensis.
Pine, Aleppo	Pinus Halepensis.
Pine, Dwarf Mountain	Pinus pumilio.
Pine, Italian Stone	Pinus pines.
Pine, Scotch Pine, or Fir	Pinus Sylvestris.
Yew, English	Taxus baccata.
Yew, Silver-striped	Taxus baccata argenteia.
Yew, Weeping	Taxus Dovastonii pendula.
Yew, Irish Spiral	Taxus Hibernica fastigiata.
Arbor Vitæ, Fern-leaved	Thuya asplenifolia.
Arbor Vitæ, Australian	Thuya Australis.
Arbor Vitæ, Japan	Thuya Japonica.
Arbor Vitæ, Nepaul, or Tartarian	Thuya Nepalensis.
Arbor Vitæ, Chinese	Thuya Orientalis.
Arbor Vitæ, Siberian	Thuya Sibirica.

Everlasting Flowers, the common name of several genera of the order Compositæ, having flowers which if

dried and preserved retain their form and color many years. They are often called immortelles.

Ev'ersley (CHARLES SHAW-LEFEVRE), VISCOUNT, D. C. L., an English liberal, was born in London Feb. 22, 1794, was educated at the University of Cambridge, and was admitted to the bar. From 1830 to 1857 he was a member of Parliament, and for eighteen years (1839–57) was Speaker of the House of Commons. He became Viscount Eversley in 1857.

E'versmann (EDUARD FRIEDRICH), a German traveller and naturalist, born in 1794, went to Bokhara with the Russian embassy in 1820, to the shores of the Caspian Sea in 1825, and afterwards to the Southern Ural, Caucasia, and Algeria. In 1828 he became professor of zoology and botany in the University of Kasan, and died there in 1860. He published several accounts of his travels.

Ev'erts (W. W.), D. D., a Baptist minister, born in Granville, N. Y., in 1815, graduated at Madison University in 1839, preached in New York City (1839–50), in Louisville (1852–59); since which time he has been a pastor in Chicago. He has published the "Pastor's Handbook," "Life of Foster," "Bible Manual," "Free Manhood," "Childhood, its Promise and Training," "Bible Prayer-book," and other works.

Evesham, a parliamentary borough of England, in Worcestershire, is on the navigable river Avon and in the beautiful Vale of Evesham, 15 miles S. E. of Worcester. It has remains of an abbey built about 700 A. D. It sends one member to Parliament. Here Edward, prince of Wales, afterwards Edward I., defeated Simon de Montfort and the barons in 1265. Pop. in 1871, 4887.

Evesham, a township of Burlington co., N. J. Pop. 3351.

Evic'tion [Lat. *evic'tio,* from *e* (*ex*), "out," and *vin'co, victum,* to "conquer"], the act of dispossessing one of his lands or tenements, as when a third person evicts a tenant by means of a title superior to that of the landlord, or a vendee by a title superior to that of the vendor. Technically, an eviction must be by judgment of law, but in the case of a tenant many acts done by the landlord to impair the enjoyment of the premises will amount to an eviction in law, and justify the tenant in leaving them; but in such cases he must actually leave, otherwise he cannot claim to have been evicted. When the grantee of premises is evicted, if the conveyance to him was with a covenant of warranty, he can recover from the grantor the consideration-money, with interest, but not, in general, the increased value of the premises, even if caused by improvements made by him on them. If evicted from part of the premises only, he recovers a proportionate part of the consideration. In case of a lessee, however, as the rent is regarded only a fair compensation for the use of the premises, and as it ceases on eviction, he can as a general rule recover only the expenses of defending his possession. When a lessee is evicted in part by one having a superior title, the rent is apportioned.

Evi'dence [Lat. *evidentia,* from *e,* "out," implying "clearness," and *video,* to "see"], in law, is the means of establishing an allegation made in a court of justice. In an action the respective parties make written statements of their cause of action and defence. The matter thus in dispute between them is called an issue. The object of evidence is to establish or disprove the propositions alleged. The result of the evidence is called proof. Evidence may be considered under a number of divisions: 1. Its nature and the doctrine of presumptions; 2. The rules that govern in the production and exclusion of testimony; 3. Its effect; 4. The instruments of evidence, including witnesses, and the mode of making use of them as well as writings.

1. *Its Nature, etc.*—The object of evidence is to establish a fact. It presupposes a disposition in the mind of a listener to believe upon sufficient grounds. Belief on the part of mankind is instinctive, yet this instinct is modified by the results of observation and reflection. When evidence is offered in a court of justice, it is assumed to be addressed to minds competent to give it such weight as its quality justifies. It may be either direct or circumstantial. It is said to be direct when it is offered simply to establish the fact which it concerns; it is circumstantial when its object is to lead the mind of the hearer to *deduce* or *infer* some other fact from it. In the case of circumstantial evidence the minds of the jury or judge, as the case may be, go through a process of reasoning to arrive at the principal fact in dispute. It must be resorted to with caution, in order that the conclusion arrived at may be sound and logical.

Reference may now be made to the subject of presumptions. These are of two kinds—of law and of fact. Presumptions of law are either conclusive or disputable. A conclusive presumption of law takes place when a legal conclusion is arrived at which no evidence is admissible to rebut. This doctrine is based largely on public policy, and leads to a series of artificial and arbitrary subordinate rules. An illustration is, that a child under seven years of age cannot commit a felonious crime. The doctrine of estoppel is another illustration. When evidence can be offered to rebut a presumption of law, it is said to be disputable. An instance is the ordinary rule in criminal law, that one charged with crime is presumed to be innocent until he is proved to be guilty, or that one having possession of stolen goods immediately after a theft became possessed of them unlawfully. Under this theory, when a state of facts is once established, it is presumed to exist until there is some evidence to the contrary. Thus, a man engaged in trade is assumed to follow the ordinary course of business, or the incumbent of a public office to perform its duties in the usual manner. Life is presumed to continue unless there is evidence of death, or sanity until evidence is offered to establish insanity. A presumption of fact is not a rule of law which can be announced to a jury as binding upon them, but in each case must be found by them as a matter of fact, though the court may direct their attention to the propriety of forming the conclusion. An illustration is the testimony of an accomplice, which is generally deemed to be untrustworthy without corroboration from other and trustworthy sources, and an observation to that effect may be made by the judge. Still, the jury has the legal power to find a verdict upon the uncorroborated testimony of an accomplice.

2. *The Rules which prevail as to the Production of Evidence.*—The leading rules are the following: Rule 1. Certain matters may be judicially taken notice of without proof; Rule 2. Evidence must correspond with the allegations in the pleadings, and be confined to the points in issue; Rule 3. Only the substance of the issue need be proved; Rule 4. The burden of proof is with him who holds the affirmative; Rule 5. The best evidence must be produced of which the nature of the case admits; Rule 6. Hearsay evidence is in general inadmissible; Rule 7. Testimony should in general concern matters of knowledge as distinguished from opinion (though to this rule there are well-established exceptions); Rule 8. Certain evidence, otherwise admissible, is excluded on grounds of public policy; Rule 9. In certain cases, principally by statute law, written evidence must be resorted to rather than oral; Rule 10. Oral contemporaneous evidence is not admissible to vary the terms of a written instrument. These rules require some explanation. It should be premised, however, that on a trial, with or without a jury, it rests with the judge to determine whether the evidence is admissible under these rules. Whichever way he may decide, the opposing party may except, and make his exception the subject of an appeal.

Rule 1. There are certain facts of general notoriety in respect to which it is not worth while to take up time to adduce evidence, such as the recurrence of the seasons. The same rule applies to the existence of foreign nations recognized by the executive power of the nation, and to general statutes of the legislature. Of such facts a court is said to take "judicial notice," and, if necessary, may resort for information to books and other sources of knowledge.

Rule 2. The second rule excludes all immaterial evidence, and confines the trial to matters in issue. Immaterial allegations in the pleadings cannot be proved. For example, evidence of the intent of a party would not be admissible unless intent was material; and the same remark may be applied to evidence of good or bad character. In an action to recover money loaned, evidence of the bad intent of the debtor in delaying payment, or of the creditor's bad character, would be plainly inadmissible, while in an action for slander the plaintiff's character would be to a certain extent in issue.

Rule 3. This rule means that the minor and unimportant allegations relating to the issue need not be established as stated. They are such as the statements respecting the time or place where an event occurred, or the value of an item of property. Still, even allegations in their nature unimportant may become material by the mode in which they are stated, as if they are made descriptive. In such a case a difference between the pleadings and the evidence, called a variance, may be fatal. The effect of this stringent rule has in a number of the States of this country been greatly modified as to civil actions by statutes of amendments. The criminal law is still disfigured by extreme technicality in this respect, and needs the hand of a discreet reformer, who, while he carefully preserves in favor of one accused of crime all necessary safeguards, at the same time subserves the interests of the public by removing all useless impediments to the due administration of justice.

Rule 4. Under this rule he who makes an allegation which is disputed, so as to be at issue, must establish it by evi-

dence. The burden of proof is usually with the plaintiff, though in some instances it devolves upon the defendant, as where he admits the plaintiff's case, but seeks to avoid its effect by new allegations—as, for example, infancy. The person who has the burden of proof has the right to open the case and close it. This in jury trials is often deemed to be a matter of much importance, so that each of the respective parties insists on an adjudication that the burden of proof belongs to him.

Rule 5. Under this rule evidence is divided into primary and secondary. If the primary evidence is accessible, it must in general be produced; if it be lost or destroyed, resort may be had to that which is secondary. Thus, where the law requires a contract to be reduced to writing, or where the parties have written out a contract which might have been oral, the written instrument must itself be produced if it can be obtained. The rule is relaxed in certain cases where public convenience may require it. For this reason a public record may be proved by an authorized copy, without the production of the record itself.

Rule 6. The word "hearsay" is infelicitous, including not only what is said, but what is written, or even acted. The rule means that evidence must be given in by one who is personally cognizant of the fact to be proved, and not by one who may have gained his knowledge at second hand, from the act or narration of another. Bentham distinguished between a "perceiving" and a "narrating" witness with the same general view. The reasons for excluding "hearsay" evidence are so obvious that it is unnecessary to refer to them. Great care must be taken in distinguishing between hearsay evidence and that which is original. Thus, when the very subject of inquiry is whether a certain thing was or was not said by a person, evidence that it was said is clearly admissible. So when a statement forms a part of a transaction, or, in technical language, *res gestæ*, evidence of it is not hearsay. Where the testimony is clearly hearsay, there are certain exceptional instances in which it is admissible, as in matters of public or general interest, or of ancient possessions, or of dying declarations in cases of homicide. It should be added that the admissions or confessions, when voluntary, of a party to an action are received in evidence against him on mixed grounds, partly as a substitute for more regular methods of proof, and partly as a branch of the law of *res gestæ*.

Rule 7. Under this rule a witness must in general testify only to facts of which he is personally cognizant, without giving his opinions as to their effect. There is a class of witnesses, termed "experts," who are allowed to give their opinions upon facts of which they have no personal knowledge. For example, the testimony of persons acquainted with the facts may be read over to the expert, and his opinion asked as to the conclusion which should be drawn from it; or a hypothetical question, embracing the facts assumed to be established, may be put to him. An "expert" is one skilled in a particular trade, art, or profession. An instance is a superintendent of an insane asylum as to matters connected with the subject of insanity. There are a few instances in which persons who are not experts are from the necessity of the case, or by a special rule of law, allowed to testify as to their opinions.

Rule 8. This rule shuts out evidence in a number of cases where strong reasons of a public nature demand that it should be excluded. A leading instance is that of confidential communications between an attorney and client, and similar communications between husband and wife. It also prevents a judicial inquiry into "secrets of state," and, to a certain extent, into the deliberations of judges in forming a judgment or of juries in arriving at a verdict.

Rule 9. There is a great statute in the English law, termed the "statute of frauds," requiring certain transactions to be evidenced by writing, such as conveyances or leases of land, wills of land, and some executory contracts, as, for example, contracts to convey land or to be answerable for the debt of another. These are but instances of a more extended class of cases. Without the writing as evidence these contracts or transactions cannot be established. It should, however, be added, that if such contracts, etc. have once been written and cannot be produced, their contents may be proved by oral evidence.

Rule 10. This is an inflexible rule, applicable to contracts, wills, etc. Even if a contract need not have been written, yet if the parties choose to have it so, no contemporaneous oral evidence can be offered to show different or additional terms. There is a conclusive presumption of law that the parties intended to merge all anterior and contemporaneous propositions in the writing. That is the sole repository of their intention; the rule, from the nature of the case, does not preclude oral proof of a subsequent modification of the contract, nor does it prevent the introduction of oral evidence to explain the writing. Thus, the meaning of technical words may be shown by the testimony of experts, and oral evidence may be used to show the circumstances surrounding the transaction, so as to place the court in the position of the parties. This is a rule of interpretation. It assumes that the instrument is valid. When the validity of the instrument itself comes in question the rule has no application. Oral evidence may accordingly be offered to show that the instrument is void. So if a clause has been omitted or inserted by mistake, a court of equity will, on sufficient oral evidence, rectify the instrument, or, in technical language, "re-form" it, and give it the form intended by the parties.

3. *The Effect of Evidence.*—In general, evidence is to be weighed by the jury or judge, as the case may be, and a decision to be rendered in view of all the circumstances of the case. In some instances its effect is governed by technical rules. This remark is particularly applicable to matters embraced under the head of estoppel. (See ESTOPPEL.) The evidence in this class of cases is conclusive. The most important instance of the application of this principle is that of a judgment recovered in a court of justice. Judgments are of two general classes—*in rem* or *in personam*. In the one case the action or proceeding is instituted against a "thing," such as a ship or article of merchandise, to fix its ownership, or to establish the *status* of a person, as to have an adjudication that he is a lunatic. The judgment itself accomplishes the result declared. The person in the case supposed becomes, in legal view, a lunatic, whether he be so in fact or not. So the ownership of the property is in the same way established, as in the case of the adjudication of prizes in time of war. The effect of the judgment is accordingly conclusive. By a fiction of law all persons are supposed to be parties to such a proceeding, and to be bound by it. An action *in personam* is brought against a person to obtain a judicial declaration or sentence concerning his duty or obligation. The sentence does not of itself accomplish the required result, but a mandate to an executive officer is necessary, in the nature of an execution. (See EXECUTION.) It is illustrated by an ordinary judgment for a sum of money. The sheriff proceeds to sell the debtor's property, and thus obtains the money. A judgment in this class of cases is only conclusive evidence upon the same subject matter between the parties to the action and those claiming under such parties, such as heirs and administrators. There must also have been an adjudication upon the merits of the case. Thus, if an action be dismissed because it is prematurely brought—*e. g.*, before a claim is due—a new action can be instituted. It is a further remark that the judgment is only conclusive upon matters really in issue, and therefore not upon such as were incidentally considered, nor upon matters that could be inferred by argument from the judgment. There is an admirable statement of the rule in all its branches by Lord Chief-Justice de Grey in the famous case of the Duchess of Kingston (20 Howell's State Trials, 538).

It should be added that in some cases the law gives to certain acts the force of *primâ facie* evidence, which, as the phrase implies, is liable to be rebutted. Thus, a promissory note is presumptively made upon a valuable consideration. Statute law frequently declares that a particular transaction shall have this force. The rules of evidence are under the control of the legislature so long as they do not impair vested rights or violate in any manner constitutional law in its letter or spirit.

4. *The Instruments of Evidence.*—These are either witnesses or writings. (1.) *Witnesses.*—A witness, when within the jurisdiction of the court, must in general attend in person. He can be compelled to attend by a writ termed a subpœna, and in the same way to bring writings which are required. When beyond the jurisdiction, his testimony is taken under a commission issuing from the court in which the case is pending. This matter is in some respects governed by statute, though in some of the courts, as in equity and admiralty, there is an inherent power to issue commissions. The testimony, when taken in the foreign country, is returned to the court, subject to any objections which may properly be taken to it. Certain classes of persons are excluded from testifying. The rules upon this subject are to some extent arbitrary. They have been modified in recent times by statute. Thus, parties to the action were at one time wholly excluded in the courts of common law. They are now by statutes generally admitted. The same remarks may be made as to persons having a pecuniary interest in the event of the litigation. Persons are still incompetent who have a defect of understanding, or who are supposed to be insensible to the obligations of an oath. Thus, persons convicted of an infamous crime are excluded from testifying in the courts of the State where the conviction took place. The tendency of modern law is to allow as wide a range as possible, and to permit objections to witnesses which were formerly grounds of exclusion to be only urged as affecting the value of their testimony. In technical language the

objection does not go "to the competency, but to the credibility of the witness." The examination of witnesses is governed by rules which are to some extent discretionary, and in other respects absolutely binding. The principal rules are these: *a*. Leading questions are not, in general, to be asked on the direct examination. *b*. The party calling the witness cannot attack his character, though he may show by independent testimony that his version of the facts is not correct. *c*. The range of cross-examination is much wider than the direct, and leading questions are permissible. A witness cannot on cross-examination be asked a collateral question for the purpose of contradicting him in case his answer should be untrue. He may, however, be asked, under proper limitations, with a view to contradiction and the discredit of his testimony, if he has not given out of court a different version of the facts from that to which he now testifies, and in the same way as to expressions of hostility towards the party against whom the testimony is given. *d*. A witness is privileged from answering a question if such answer would tend to convict him of a crime or to subject him to a penalty or a forfeiture, though this rule would not extend to the case where he might simply be made liable in a civil action for a debt, etc. How far he can refuse to answer a question which if answered would tend to degrade him in the estimation of his fellows, is not fully settled. *e*. The character of a witness may be attacked by the opposing party, either by direct evidence of his bad character, or rather reputation, or by showing that he has from time to time given different versions of the facts. *f*. A cross-examination is to be confined to the matters brought out on the direct examination, and the same remark is applicable to the re-direct and subsequent examinations. (2.) *Writings* for the purposes of the law of evidence are either public or private. Public writings are either judicial or not judicial. The law provides compulsory modes of producing public writings for the purposes of testimony. Copies are in general resorted to, on grounds of public convenience. The officer having the document in custody has, in general, the power to give a certified copy, which is admissible in evidence. Copies of judicial records are of three varieties: exemplified (a copy either under the great seal of state or under the seal of the court), office (certified by the clerk or other custodian), or sworn. A sworn copy is authenticated by the testimony of a witness who has compared the original with the copy. An act of Congress, authorized by the U. S. Constitution, provides a convenient mode of authenticating a judgment or decree of the courts of record of one State to be used in the courts of another State. Should a record be destroyed, its contents may be proved by oral evidence. A private writing is proved by the production of the writing itself, and its existence established by the testimony of a witness. Where the writing cannot be produced, secondary evidence of its contents may be given. In the special case where it is in the possession of the opposite party reasonable notice should be given to him to produce it at the trial. If he fails to produce it, secondary evidence may be given as before. When a private writing is executed in the presence of a witness subscribing his name at the request of the maker of it, this witness, called a "subscribing witness," is the proper person to prove it. If he be dead, or for any sufficient reason cannot be produced, his handwriting may be proved, with some evidence to identify the party to the action as being the person who executed the instrument. When there is no subscribing witness, the proper course is to call a witness acquainted with the handwriting of the maker of the instrument to testify that in his opinion the instrument or the signature is in the handwriting of the party. Though this is matter of opinion, it is admitted from the necessity of the case. Knowledge of the handwriting may be acquired in various modes, usually by seeing the person write or by having transactions or correspondence with him. The testimony of experts as to handwriting is in some cases admitted, though the law as to the extent to which they may be examined varies in the different States. In some of the States there are convenient statutory modes of proving private writings. A single instance may be cited from the law of New York, which allows nearly every contract, if acknowledged by the maker before an authorized officer, such as a notary public, to be put in evidence without other testimony by way of authentication.

The final remark may be made, that the rules of evidence, though positive and in some respects arbitrary, are largely based upon public convenience, and are adapted to the wants and habits of the community.

T. W. Dwight.

Evidences of Christianity, The. The Evidences of Christianity, by the very fact of their existence, afford a strong presumption in its favor. They place it before the world as at least claiming to be founded in truth and suited to the reason of man. Had it made its way by mere force and policy, or did it now require assent without testimony and argument, there would be no need even to investigate its merits. It might be classed at once with the false religions which are confessedly without reasonable evidence, if not beneath discussion. But in distinction from all other systems it possesses a recognized body of proof which has been accumulating for eighteen centuries under the most varied and searching criticism, and which, when examined, is found to be all that the case admits or that an intelligent inquirer could demand. Such an inquirer may therefore be challenged at the threshold to acquaint himself with the history of the Christian evidences before he proceeds to judge them in detail.

History of the Christian Evidences.—The history of Christianity is, in one view, but the history of its evidences. Externally, at least, its course through the world has been marked by successive crises, when it encountered various forms of incredulity which it became necessary to repel with suitable evidence; and out of every such conflict it has emerged with a triumphant vindication of its claims and a fresh contribution of proof to after generations.

Its first conflict was with Judaism. On its native soil and at its very origin it excited the bitter unbelief of the Jewish rulers and people, who repudiated it as an impious caricature of their own ancient religion, stigmatized its author as an impostor or false Messiah, and at length compelled him by the death of the cross to become the first great martyr to its truth. Judaism, as a distinct system, from that moment declined into a mere dead tradition, and has since, by its own predicted fate, served but as an unwilling witness for that Christianity which has been spreading over the globe and becoming the common heritage of all nations and races. The life and death of our Lord, including his discourses, parables, and miracles, as recorded in the four Gospels, constitute the evidences of Christianity afforded at its origin.

Its next conflict was with Paganism. No sooner had it been proclaimed outside of Judæa as a gospel to the nations than it encountered the decaying religions of Greece and Rome, which desperately rallied against it as a common enemy. But its course from city to city was marked with crowds of converts, as well as with persecutions and conflicts, everywhere accelerating the decline of those old mythologies, which now figure only in the classic literature made tributary to its own defence and illustration. The planting and training of the Church, as narrated in the Acts and Epistles of the apostles, together with the Apologies of Justin, Tatian, Athenagoras, and Theophilus, yield the evidences belonging to this period.

Its next conflict was with Philosophy. So long as it was contending with mere Jewish and heathen superstitions the learned class could treat it with disdainful silence, such great writers as Plutarch, Seneca, and Tacitus alluding to it only in the most distant manner; but as its exclusive claims gradually became known, its advance was met by an infidel wing of the Neo-Platonic school, led by Celsus, Porphyry, and Hierocles, who assailed it as a vulgar imposture, and at length provoked the series of bloody persecutions which filled the cities of the empire with Christian martyrs. Its apparent defeat, however, was followed by a victory almost ruinous. It had already won from the very ranks of Plato its first great apologist, Justin Martyr, and it now wrested so much of philosophy itself as could be wrought into its own theology; and at length appeared upon the throne of Constantine as the visible head of a new Christian civilization. Besides these worldly trophies, its direct evidences for this period are to be found in the testimony of the martyrs and the apologetical writings of Tertullian, Clement, Origen, Eusebius, Cyril, Arnobius, Lactantius, and Augustine.

Its next conflict was with Barbarism. In the Dark Ages following the barbarian conquest and the wreck of the Roman empire, though it was now deprived of all earthly aid, it subdued the rude religions of the North as it had already vanquished the classic mythologies of the South, and treasured up from the civilization of the past all that was valuable for that of the future. While contending with such savage foes it could have no other evidences than such as appeared practically in the Germanic missions and in the great Christian schools of the Middle Ages.

Its next conflict was with Mohammedanism. The Saracen was invading its domains with the sword and the Koran from the East to the shores of Spain; but the fierce Goths whom it had trained into Christian knights now by successive crusades battled for the tomb of the Saviour, until Europe was delivered from the infidel. Its evidences for this epoch were all that could be expected—the exploits of Christian chivalry, the prizes wrested from Arabian learning, and the apologetical writings of the Schoolmen against the Jews and Mohammedans in Moorish Spain.

Its next conflict was with modern Rationalism. Divided at the Reformation into Catholicism and Protestantism, it encountered a treacherous foe which for several centuries past, under various guises, has been subjecting its divine revelations to the test of mere human reason. But hitherto the strength of its evidences has only been proved by each successive assault. The Italian naturalists of the sixteenth century, such as Pomponatius, Cæsalpin, and Cremoninus, who held Aristotelian opinions subversive of revealed religion at the very court of Rome and under feigned respect to the Church, wrought their own defeat by their shameless hypocrisy and vice. The English deists of the seventeenth century (such as Herbert, Hobbes, and Toland), and of the eighteenth century (such as Collins, Tyndal, and Bolingbroke), who professed mere natural religion as essential Christianity, were so completely repulsed by the great apologists, Cudworth, Bentley, Berkeley, and Butler, that their very works have become obsolete or linger only as brilliant names in literature. The French atheists of the last century, such as Helvetius, Diderot, and D'Holbach, who assailed Christian morality itself with a sensual fatalism, only precipitated that terrible Revolution which has made them infamous as enemies of civilization, no less than of religion. The German pantheists of the present century, such as Strauss, Bauer, and Feuerbach, who have been striving to resolve Christianity into mere mythology, were routed upon their own ground and with their own weapons by such learned and acute writers as Neander, Ebrard, and Ullmann. And it is safe to predict that the sciolists of our own day, who are opposing it with science falsely so called, are but ensuring a like failure and defeat.

But the still remaining and perhaps final conflict is to be with modern Heathenism. Having developed for itself in the western nations of Europe and America during the last eighteen hundred years a civilization the highest the world has yet ever seen, it would be strange if it could not now cope with those eastern nations of Asia and Africa which meanwhile have remained stationary or relapsed to a savage state. And accordingly, for the last half century it has been slowly enveloping the globe with a network of missions, which, in connection with advancing science, commerce, and diplomacy, already betokens the ultimate triumph of Christian civilization over heathen barbarism throughout the earth.

Classification of the Christian Evidences.—On reviewing now the evidences which have thus been accumulating during this exciting history, we at once become embarrassed by their richness and fulness. Much ingenuity has, in fact, been exercised in digesting and arranging them, but the most common and serviceable classification is that by which they are divided as *external* and *internal*, with suitable subdivisions.

The external evidences are such as relate to the fact or existence of Christianity, rather than to its nature or system—the mere credentials of revelation as distinguished from its contents. They will naturally distribute themselves into the following groups: 1st, *Prophecies*, which have been fulfilled in the course of ancient empires, in the coming of Messiah, in the fortunes and fate of the Jews, and in the progress of the Christian Church; 2d, *Miracles*, which were wrought by prophets and apostles in attestation of their divine commission as teachers, disclosed in the life and death of Christ, the Son of God, and confirmed by the supernatural success of Christianity in the first age; 3d, *Historical Testimonies* to the authenticity and genuineness of the sacred writings, afforded not only by undesigned coincidences among them, but by contemporaneous heathen literature and by modern antiquarian research. Collections of the first kind of evidence may be found in the works of Newton and Keith; of the second, in those of Watson, Sherlock, Lesley, and Campbell in reply to Gibbon, Hume, and Paine; and of the third, in those of Lardner, Paley, Norton, Greenleaf, and Rawlinson.

The internal evidences are such as appear in Christianity itself, in the purport of the revelation which has been so miraculously attested. An argument for its divine excellence may be traced in all that distinguishes it from other mere human systems: 1st, in its *doctrines*, transcending the highest philosophy, such as the existence, perfections, and policy of the Creator, the origin of the world, the scheme of redemption, the state and destiny of man; 2d, in its *precepts*, surpassing the purest ethics, such as the Ten Commandments, the Sermon on the Mount, the counsels of the apostles; 3d, in its *examples*, unapproached by worldly heroes, such as those of evangelists, saints, and martyrs, and, above all, the immaculate Jesus himself; 4th, in its *effects*, not only upon the welfare of individuals, but upon the interests of society, as seen in works of charity and philanthropy, in the arts of peace, in humane laws and free institutions, and in the entire civilization which for centuries it has been unfolding. Specimens of such arguments may be found in the treatises of Jenyns and Warburton, of Archibald Alexander, Hopkins, and McIlvaine, and of Luthardt and Delitsch.

Still further classes of evidence are of a mixed nature, being partly external and partly internal, and serving to show the connection and consistency of Christianity with other facts and truths. They also may be indicated under several heads: 1st, *Experimental* evidences, acquired by those who have personally tested in their own faith and practice the doctrines, precepts, and promises of the gospel, and thus offer new and original testimony; 2d, *Scientific* evidences, collected from the sciences which illustrate the existence and attributes of the Deity, and confirm the incidental allusions of Scripture to physical, mental, and moral phenomena; 3d, *Philosophical* evidences, derived from right reason and large experience as to the probable existence of a Divine government, a future state, a supernatural revelation, and a scheme of redemption, such as are found in the Scriptures, and also from the view of religion and nature as but consistent parts of one system, having the same Author. Examples of such high orders of evidence may be seen in the works of Locke, Browne, Butler, Paley, the Bridgewater Treatises, and the recent Bampton Lectures.

These various classes of evidence, when grouped together in one view, tend to produce a conviction which has been well likened by Bishop Butler to what is called the *effect* in architecture or other works of art. Examined separately, they may excite as little emotion as scattered stones upon a plain, but when combined, as they have been by this great architectonic genius, in one compact, cumulative argument, their resulting impression is like that of the same materials after they have been chiselled and fashioned into a magnificent building. But we already trench upon the next topic.

Logic of the Christian Evidences.—A far more important question than the mere classification of these evidences is that of their logical nature and value. Viewed from this point, they must ever take rank as the highest branch of applied logic, as well for the difficult problems which they involve as for the kinds of reasoning employed. And the practical bearing of the inquiry is shown by the fact that different apologists, in treating of the evidences, have more or less consciously exaggerated one class of them at the expense of the other, until, like a divided army wrangling in the face of an enemy, they have allowed infidels to involve both of them in doubt and suspicion. Of the two evidential schools which have thus taken opposite grounds, the one would render Christianity reasonable, the other present it as simply credible; the one would claim for it demonstrative evidence carrying full conviction, the other seek only probable evidence accumulating towards certainty; the one would dwell upon the internal philosophical proof, the other upon the external historical testimony; and at length the one ends in testing the whole content of revelation by mere reason, whilst the other virtually destroys all rational conditions of faith. The former method has been successively pursued to its extreme by Descartes, Clarke, and Wolf, and the latter by Butler, Chalmers, and Mansel.

It is enough here to assert the validity of both methods within the limits they impose upon each other. Each has had its value at different times and for different minds. The primitive apologists needed the external evidence for the Jews, who required a sign, as well as the internal evidence for the Greeks, who sought wisdom. And from that day till the present there have been infidels who were won by the doctrine and example of Jesus before they could admit his miracles, as there have been believers who ceased to find difficulties in Scripture after they had accepted it as an attested revelation. The simple truth is, that neither kind of proof can be spared from the high argument, and that both must be ultimately combined in order to ensure full conviction.

At this point the logical question we are considering begins to involve an ethical or moral element. It should be carefully observed that the apparent deficiency in the Christian evidences neither necessitates unbelief nor releases from obligation. On the contrary, the inquirer simply becomes accountable in proportion to the evidence perceived and the interests at stake. He is still to be tested and judged by the light which he has. Moreover, his incredulity may be his own fault. It is certain that the Christian evidences have hitherto proved sufficient for the greatest minds of the race. Are they now on the wane or on the increase? This is the remaining question.

Progress of the Christian Evidences.—A distinguished mathematician of the seventeenth century, John Craig, professed to calculate, on the hypothesis that the suspicions against historical evidence increase with the square of the time, that the evidence of Christianity will become extinct about the year 3150, when the Son of man will come and no longer find faith on the earth. And a school of

modern skeptics, including poets as well as philosophers, is already sighing over the decay of Christianity as but the last of the world's mythologies, destined to be superseded by the perfect religion of the future. If all that is meant by such writers is the decay of their own Christian faith, it need not be denied that many restless, speculative minds are breaking away from their moorings in false creeds and corrupt systems claiming to be Christian; but if the apprehension is that Christianity itself is dying out or losing its hold upon the world, such forebodings are to be no more seriously treated than the outcries of men losing their anchorage who fancy it is the immovable shore and not their own little vessel that is drifting away. Christianity has in fact lost nothing of the evidence which it has been accumulating since the time when first its miracles were wrought and its prophecies spoken. Not only does the testimony to those miracles remain unimpeached, not only is the fulfilment of those prophecies still passing before our eyes, but the human sciences since then unfolded are yielding it a new class of evidences, affording it fresh confirmation and illustration, and commending it to the highest intellect and culture of the time; and the reasonable presumption is that, one after another, they will yet corroborate all revealed facts and doctrines, until everywhere there shall be an intelligible triumph of the Divine through the human reason over all earthly error and sin.

That such an increase of evidence in this quarter is probable may be argued from the very nature of science and revelation as complementary factors of knowledge. It is inconceivable that the word of God should contradict his works, or that human reason could supersede a divine revelation; and when any discrepancies appear between Nature and Scripture, we must simply assume that there has been some wrong induction from either or both of them, and that ultimately, after the whole truth is known, they will confirm and illustrate each other. This has, in fact, been the result of past conflicts between the scientific and religious parties. Geography, in the early Church, repudiated the idea of an inhabited globe as contrary to the Scriptures, but ships now carry the same Scriptures to the antipodes. Astronomy, during the Middle Ages, described the heavens as huge crystal spheres revolving about our earth, but the very same heavens, as devoutly interpreted by Kepler, Newton, and Herschel, still declare the glory of God. Geology, of late years, has seemed inconsistent with the long-received interpretation of Genesis, but the story of the earth itself, as read by Miller, Hitchcock, and Guyot, still tells how it was made in six days. Anthropology, at the present moment, is full of conflicting theories, some of which menace the Scripture doctrine of the first Adam, but he must simply prejudge the whole question against all precedent who asserts that man was not made in the image of God. And in the region of the mental, moral, and social sciences, where the need and fact of a revelation are so much more obvious, the likelihood increases that there will hereafter be still higher and grander illustrations of Christian doctrine.

It is an encouraging sign of progress in the evidences of Christianity that so many organized efforts are on foot for their promotion, and some of them in the interest of true science as well as of religion. The Royal Society itself was founded by philosophers and divines who vindicated the consistency of natural with supernatural knowledge. Other institutions have followed, expressly designed for the defence of the Christian religion, such as the Boyle Lectures, the Bampton Sermons, the Bridgewater Treatises, the Burnet Essays in Great Britain, and the Lowell, Graham, and Ely Lectures in this country, together with more permanent educational appliances, such as chairs of Christian apologetics in divinity schools and of science and religion in our colleges. And the literature which has grown up in connection with these institutions, and by other independent efforts, is already of surprising extent and richness. Notices of this literature may be found in the appendix to Farrar's "Critical History of Free Thought," and the Abbé Migne has published a series of twenty volumes, 4to, entitled "Demonstrations Evangéliques," containing a full collection of the principal evidential treatises, of all schools in all ages, chronologically arranged, as a work equally important to the infidel, to the skeptic, and to the believer.

CHARLES W. SHIELDS.

E'vil, the total or partial absence or negation of good, and the presence of imperfection, suffering, or sin. The question of the origin of evil has in every age attracted the attention of thoughtful minds. The Zoroastrians and Gnostics tried to solve it by the dualistic theory of the opposition of a good and an evil principle. Others have maintained that evil is a necessary part of the Divine economy, and that under the superintendence of Infinite Wisdom evil will result in the highest possible good. It seems certain that moral freedom itself implies at least the possibility of an evil choice, so that evil must potentially exist where goodness exists. The solution of such questions is, however, beyond the power of any finite mind.

Evil Eye, the mysterious power of injury which in former ages was generally ascribed to the look of a malevolent person. The Greek and Roman classics contain numerous references to this belief, which was also very common in the Middle Ages in Europe. In Mohammedan and uncivilized countries this superstition is still almost universal, and it is by no means extinct among the peasantry of more civilized lands. It especially prevails in Western Africa. It is perhaps based upon the supposed powers of fascination possessed by serpents, of which much exaggerated stories were told and believed. Charms were much worn to prevent the mischief which it was believed could be done by the evil eye, which was considered especially dangerous to young children.

Ev'olute [for etymology see EVOLUTION], literally, "something unfolded or unwrapped," in mathematics, is a curve, plane or otherwise, around which, if a flexible and inextensible string be wrapped, and then unwrapped under tension, there result other parallel curves called *involutes*, one of which is described by every point of the tense string in unwinding. Every plane curve has its plane evolute, besides an infinite number of helical evolutes lying in the curved surface of the solid generated by the motion of the given plane curve parallel to itself. The common cycloid, the epicycloids, and the hypocycloids have plane evolutes exactly similar to themselves, but inverted in position. The logarithmic spiral is the only curve having all its evolutes similar to itself.

Evolu'tion [Lat. *evolu'tio*, from *e*, "out," and *vol'vo*, *volu'tum*, to "roll," whence *evol'vo*, to "unfold" or "evolve"], the act of unfolding, development; in algebra and arithmetic, the extraction of roots; in other words, the inverse operation to involution. The object of evolution, therefore, is to ascertain the quantity which multiplied by itself a stated number of times yields a given result. In a wider sense, evolution may be regarded as synonymous with the solution of a binomial equation, for it is obvious that the n^{th} root of any number a satisfies or is a root of the equation $x^n - a = 0$. This root is indicated by the symbol $\sqrt[n]{a}$ or $a^{\frac{1}{n}}$.

Evolution, Hypothesis of; also called **The Theory of Development.** According to this, in its simplest form, the universe as it now exists is the result of "an immense series of changes," related to and dependent upon each other, as successive steps, or rather growths, constituting a progress; analogous to the unfolding or evolving of the parts of a growing organism. Evolution is defined by Herbert Spencer as consisting in a progress from the homogeneous to the heterogeneous, from general to special, from the simple to the complex; and this process is considered to be traceable in the formation of the worlds in space, in the multiplication of the types and species of plants and animals on the globe, in the origination and diversity of languages, literature, arts, and sciences, and in all the changes of human institutions and society.

History.—Faint gleams only of the idea of evolution appeared among the ancients. An old Egyptian cosmological myth was that of a chaotic or mundane egg, from which all things successively emerged; with the belief, also, that repeated creations and destructions of the world have occurred. Thales taught that in the beginning all matter was in a fluid state. Anaxagoras held that all consisted at first of atoms, infinitely numerous and eternal; among which orderly arrangement was produced by a shaping *Nous* or intelligent Power, infinite and self-existent. Opposed to this conception was that of Democritus and Epicurus, as represented in the poem of Lucretius, "De Rerum Naturâ," according to which *chance*, not intelligence, wrought, in infinite time, out of numberless atoms, all existing things. Not far removed from this was the notion of Empedocles, mentioned by Aristotle (*Phys.* ii. 8), that many monsters were formed by the spontaneous efforts of nature before man appeared. More clear seems the reference to creative development in the words of David (Psalm cxxxix.): "My substance was not hid from thee, when I was made in secret, and curiously wrought in the lowest parts of the earth. Thine eyes did see my substance, yet being unperfect; and in thy book all my members were written, which in continuance were fashioned, when as yet there was none of them."

Leibnitz, in modern times, first definitely proposed the opinion that the world was once in a fluid condition (*Protogæa*, 1693). De Maillet (who died in 1738) and Wright of Durham, as well as, perhaps, Lambert, preceded Kant in expanding this thought. But Kant, in his "Theory of the Heavens" (1755), originated the nebular hypothesis.

Laplace (*Système du Monde*, 1796, and *Mécanique Céleste*, 1799–1825) elaborated this into a theory of the solar system; while Sir William Herschel (*Proc. Royal Society*, 1811) gave it a nearer approach to perfection in its general *cosmic* relations as a theory of the stellar universe. Sir John Herschel's hypothesis of "sidereal aggregation" presents a further modification of this. (See NEBULAR HYPOTHESIS.)

In biology, Buffon (*Histoire Naturelle*, 1749–88) is credited with distinctly advocating the transmutation of species. The most important beginning, however, of those inductions which have made possible the science of embryology, and have contributed most largely to the general theory of development, was that of Wolff (*Epigenesis*, 1759; *Theoria Generationis*, 1764). He first discerned the importance of the transmutations of structure and form which the parts of plants and animals undergo, by means of which, from almost formless seeds or eggs, come their diverse and complex organisms. Goethe (*Metamorphose der Pflanzen*, 1790) apprehended, independently, the same truth. Oken (*History of the Development of the Intestinal Canal*, 1803), Pander (1817), and, still more important, Von Baer (from 1819), carried out this idea as an extensive generalization, supported by numberless facts. Many other laborers have since worked in the same field.

In like direction have tended the results of inquiries into the ultimate elementary forms and proximate materials of animal and vegetable tissues: Schleiden and Schwann (1838) showing the *cell-form* to be common to both kingdoms in all their classes and orders; and Von Mohl and Max Schultze (1850–61), that a *protoplasmic* material, similar but not identical, is found in them all. (See CELLS and PROTOPLASM.)

In regard to the transmutation of *species*, Lord Monboddo in 1774 suggested the possible origin of man from the ape. With more scientific ability and knowledge, Lamarck (*Philosophie Zoologique*, 1809) proposed the hypothesis of organic development, which is chiefly associated with his name. One of his leading conceptions was that of the elevation of an animal (*e. g.* ape) to a higher range of faculties and appropriate organs by the prolonged and repeated *efforts* made by it to attain to conditions and advantages just within, or, at first, beyond, its reach. Dr. Erasmus Darwin (author of "Phytologia," "Zoonomia," etc.) about 1794–95 published speculative views containing at least the germ of the "Darwinism" of to-day. Dr. W. C. Wells proposed the application of natural selection to the natural history of man in 1813. W. Herbert in 1822 asserted the probable transmutation of species in plants. Prof. R. E. Grant advocated the same opinion about 1826.

Immediately connected with this progress of investigation were some important inquiries concerning the *correlation of forces* in nature, and the conservation or "persistence of force." First in the order of generalization or logical discovery on this subject are to be named B. Thompson (Count Rumford), 1798–1806, and Oersted, 1812–20; next to these, Seguin of France, Grove and Joule of England, Mayer of Germany, and Colding of Denmark; all of whom about 1842 announced, independently of each other, the idea of the essential unity of force, as involved in the mutual convertibility of the "modes of motion," observed by us as mechanical movement, heat, light, and electricity, into each other, under changed conditions. Since that time the correlations of the physical forces have been studied especially by Helmholtz, Faraday, Henry, and Tyndall. Vital force has been regarded as belonging to the same series of correlations in the writings of Liebig, Carpenter, Hinton, Waters, Barker, and others; and even mind-force is so included by Morell, Laycock, and Maudsley, as well as by Moleschott, Büchner, and other materialists.

Returning to the path of biological inquiry, we find that Geoffroy St.-Hilaire contended against Cuvier, in the early part of the present century, in favor of the transmutation of species. Popular interest in this subject was awakened by the publication, in 1844, of the "Vestiges of Creation," an anonymous work showing great ingenuity, but only a moderate acquaintance with the facts of science. Alexander Humboldt also, in 1844, declared his conviction that species are not immutable. Richard Owen, in 1850, referred to the struggle for existence as a cause of destruction of types least fitted for the conditions around them, and proposed about the same time the theory of the origin of species by "derivation" in a pre-ordained succession. Naudin, a French botanist, and Prof. Asa Gray of Cambridge, Mass., as early as 1856, drew somewhat similar inferences from their observations. More prominently, however, than any other since 1852, has the name of Herbert Spencer been connected with the theory of development, both in cosmology and biology. His "First Principles of Philosophy," "Illustrations of Universal Progress," and "Principles of Biology" have, with much labor both of synthesis and analysis, and great adroitness of reasoning and clearness of expression, wrought out what may be called a philosophy of evolution. Baden Powell of Oxford, England, in an able work on the "Unity of Worlds," in 1855, argued forcibly for the probable *continuity* of the process of creation throughout time. Alfred R. Wallace and Charles Darwin, in 1858, separately proposed the hypothesis of the origin of species by spontaneous variation, and the survival of the fittest through natural selection and the struggle for existence. In 1859 appeared Darwin's treatise on the "Origin of Species." (See DARWINISM.)

Strenuous opponents as well as advocates of the views above referred to have not been wanting. B. Peirce, R. Proctor, and others among astronomers have found serious difficulties in the way of adopting the nebular hypothesis as a finality. Organic evolution, including the transmutation of species, has been opposed by De Blainville, Milne Edwards, Sedgwick, Brewster, Balfour, Agassiz, Barrande, Dana, and Dawson. Besides those already named, it has been accepted in some form (not always that of Darwin) by Huxley, Vogt, Fritz Müller, Hæckel, Gegenbaur, Mivart, Hooker, Lubbock, and others in Europe, and by Clark, Cope, Hyatt, Hayden, and other naturalists in America. Among its ablest defenders has been Prof. E. L. Youmans. (See an "Exposition of the Development Hypothesis" by this author, and an admirable "Criticism" of the same, in "Johnson's Natural History," by Julius H. Seelye, D. D.) A majority of the scientists of the present day are on the side of the general theory of evolution. "Scarcely a single competent general naturalist," wrote in 1873 Prof. Wyville Thomson of Edinburgh, "fails to accept it, in some form or other." In the words of Prof. Youmans (*Popular Science Monthly*, Nov., 1872), "Darwin may be in error, Huxley may be wrong, Mivart may be wide of the mark, Hæckel may be mistaken, Cope may misjudge, and Spencer be at fault; but, in common with a large and increasing body of scientific men, they are all agreed as to one thing, that evolution is a great and established fact—a wide and valid induction from the observed order of nature, the complete elucidation of which is the grand scientific task of the future."

The application of the idea of development to sociology and history has been made by Herbert Spencer, J. W. Draper, and Bagehot, although earlier suggested by Herder (*Ideas of the Philosophy of the History of Mankind*) about the beginning of the present century. George Darwin has written recently upon development in dress; and Dr. James Ross upon natural selection in the causation of diseases (*The Graft Theory of Disease*, 1872). In the above list of authors, moreover, we have not mentioned several of eminence who have written especially upon the relation of the theory of development to theology; as Leifchild (*Higher Ministry of Nature*), the Duke of Argyll (*The Reign of Law*), and Dr. McCosh (*Christianity and Positivism*). (See, also, *The Evolution of Life*, by H. C. Chapman, 1872, and *Philosophy of Evolution*, by B. T. Lowne, 1873.)

Without space in this work for an exhaustive discussion of the subject of evolution, its importance requires a brief statement of the main elements of the inquiry.

Is Progress a Fact in Nature? Cosmologists and naturalists are all agreed upon this. In the language of the Duke of Argyll, "It is as certain as any fact of science that creation has had a history. It has not been a single act, done and finished once for all, but a long series of acts—a work continuously pursued through an inconceivable lapse of time. It is another fact, equally certain, respecting this work, that as it has been pursued in time, so also it has been pursued by method. There is an observed order of facts in the history of creation, both in the organic and in the inorganic world." Prof. Leconte asserts 390 coincidences in the solar system which are conformable to the nebular hypothesis. Some experimental support for it has also been afforded by the physicist Plateau. Lord Rosse's telescope diminished for a time the strength of the evidence in its favor by resolving many nebulæ into star-clusters, and leaving it in doubt whether there were any really consisting of unorganized "star-dust" or "world-stuff." Huggins, however, with the spectroscope, ascertained in 1864 that a nebula in the constellation Draco consists of gaseous matter; and since that time several others have been found to have that character. (See SPECTROSCOPE.) The spiral form of a number of nebulæ, and the annular shape of others, agree well with the rotary movement supposed in world-formation according to the nebular hypothesis. Some astronomers also consider that a sudden appearance in τ Coronæ, observed in 1868, indicated an alteration in the substance of that star, such as the incandescence of a gaseous material like hydrogen would produce. R. Proctor has written upon "star-drifts," showing a certain orderly arrangement of the bodies in space outside of our solar system. The spectroscope has contributed much towards the theory of cosmic development, by exhibiting

the close correspondence in the material composition of all the worlds. Durocher also (*Essai de Géologie Comparée*, 1857) proved the originally molten condition of our earth's surface by a careful comparative study of the specific gravities and the order of successive deposition of crystalline rocks. In organic nature on the earth, geology, zoology, embryology, and botany unite in asserting progress. (See GEOLOGY.) Prof. Dana, one of the highest authorities in natural science, and an opponent of the development hypothesis, may be quoted to this effect (*Text-Book of Geology*, pp. 250, 255): "Life commenced among plants in sea-weeds, and it ended in palms, oaks, elms, the orange, rose, etc. It commenced among animals in Lingulæ (mollusks standing on a stem like a plant) and in crinoids and trilobites, if not earlier in the simple, systemless protozoans" (see EOZOON); "it ended in man. Sea-weeds were followed by ferns and other flowerless plants, and by gymnosperms, the lowest of flowering plants; these finally by the higher flowering species, the palms and angiosperms. Radiates, mollusks, and articulates of the Silurian afterwards had fishes associated with them; later, reptiles; later, birds and inferior mammals; later, higher mammals, as beasts of prey and cattle; lastly, man." "There were higher and lower species created through all the ages, but the successive populations were still, in their general range, of higher and higher grade; and thus the progress was ever upward." "With every new fauna and flora in the passing periods there was a fuller and higher exhibition of the kingdoms of life."

Admitting, then, this universal fact of progress in nature, some further propositions may be laid down as proven:

1. The method of progress has been, on the whole, from generalized types to those more special—*i. e.* with multiplication of organs and functions, or *differentiation*. Comprehensive types of earlier periods have sometimes been called by palæontologists "prophetic" types, containing elements which become distributed amongst those which succeed them. Examples of these are the following: *Ichthyosaurus*, comprising or combining the types of the fish and the reptile; *Pterodactyl*, *Archæopteryx*, and *Compsognathus*, those of reptile and bird; *Archegosaurus*, of amphibian and true reptile; *Sivatherium*, called in description a "pachydermoid antelope;" *Oreodon*, a "ruminating hog;" *Anomœpus*, an "ornithoid, marsupialoid quadruped." All of these are *fossil*, and now extinct. Examples of an analogous kind are seen in a few animals of to-day, as *Ornithorhynchus*, a duck-billed quadruped; *Lepidosiren*, which combines some of the characters both of the reptile and the fish, etc. The molluscan group of cephalopods represents, in a manner, all four of the great types of Cuvier. "The beak, complex eye, tongue, ear, crop, gizzard, and cartilages analogous to the spine, point to the vertebrates; sucker-bearing arms and long axis, to radiates; cut off the mouth and its surroundings from the rest of the body, and we have the semblance of the star-fish; while the tentacles lead to the antennæ of the articulates." (*Ward, Descriptive Catalogue of Fossils*, etc.) Among plants, the fossil *Lycopodia* comprehend characters both of ferns and pines; *Cycads*, peculiarities of ferns, pines, and palms, etc.

2. *Unity of plan* pervades all organic nature, as exhibited in the *homology* or correspondence of parts which prevails throughout the animal and vegetable kingdoms. (See ANATOMY, and COMPARATIVE ANATOMY.)

3. Many *gradations* and *transitional forms* intervene between those great groups into which animals and plants are divided or classified. The comprehensive types above mentioned may be regarded as transitional. Such, too, are the Odontornithes (birds with teeth) and Ichthyornithes (fish-like birds), lately described by Marsh, and the Eobasileidæ and other tertiary forms between proboscidians and ungulates, described by Leidy, Marsh, and Cope. The last-named naturalist (*Evolution and its Consequences*, 1872) enumerates many genera in which, between the so-called species, there are determinable gradations; as of birds, *Corvus, Empidonax, Buteo, Falco;* reptiles, *Entænia, Anolis, Lycodon, Naja, Caudisona, Elaps;* batrachians, *Rana, Hyla, Choraphilus, Borborocœtes, Amblystoma, Spelerpes;* fishes, *Ptychostomus, Plecostomus, Salmo, Perca*, and others. A group of worms receives the name Gephyræa, because of its "bridging over" the gap between Vermes and Echinodermata. *Amphioxus* (lancelet) appears to connect vertebrates with the mollusca. Between *Polycistina* and *Spongia*, as Carpenter shows, comes *Acanthometrina*. Among fungous plants, especially those discerned by aid of the microscope, distinctions of a permanent kind are difficult to establish, and Kützing and Schleiden have asserted that "there are no *species*, but only *forms*, of Algæ."

4. A very remarkable correspondence prevails amongst animals and plants in *three orders of relative succession: a*, in geological time; *b*, in zoological rank; *c*, in embryological development. No naturalist has done more to establish the generality of this threefold correspondence than Agassiz, who, nevertheless, continues to oppose the hypothesis of evolution by transmutation or modification of specific types. What is meant by the above proposition is, that when one animal is known to be, *geologically*, more recent in its appearance on the globe than another somewhat allied to it, it will (generally) be found also to rank higher than it in the *zoological* scale, as measured by complication of structure, variety of powers, and, in some groups at least, greater intelligence; also, the more recent type passes, in its *embryological* development, through successive stages of change, including those of the less recent allied type, whose *adult* condition represents, more or less nearly, an *immature* or embryonic state of the higher and later, more advanced type. Some of the examples of this *parallelism* have long been familiar to naturalists; others have been but lately fully studied, especially by E. D. Cope in Salamandridæ (*Origin of Genera*, 1868) and Alpheus Hyatt in Cephalopoda (*Fossil Cephalopods*, etc., 1872). A few instances will answer our purpose. Trilobites, of the palæozoic era, resemble the embryonic state of *Limulus* of to-day. *Labyrinthodon*, of the trias, is like an arrested development of the later saurians. *Anoplotherium* recalls an embryonic stage of ruminants; the extinct dodo has been compared to an incompletely developed duck or goose; the siren manifests a similar relation to the lung-breathing batrachians. "Man presents in his earliest stages of embryonic growth a skeleton of cartilage, like that of the lamprey; also, five origins of the aorta and five slits on the neck, like the lamprey and the shark. Later, he has but four aortic origins, and a heart now divided into two chambers, like bony fishes; the optic lobes of his brain also having a very fish-like predominance in size. Three chambers of the heart and three aortic origins follow, presenting a condition permanent in the Batrachia; then two origins, with enlarged hemispheres of the brain, as in reptiles. Four heart-chambers, and one aortic root on each side, with slight development of the cerebellum, agree with the characters of the crocodiles, and immediately precede the special mammalian conditions—a single aortic root and the full development of the cerebellum. Later comes that of the cerebrum also in its higher mammalian and human traits." In all this succession and parallelism it is important to remember that the human embryo at no time assumes the *exact* or *entire* character of that of any other order of mammals, or that of reptile, bird, or fish. It is only *assimilated* to these lower types, without ever being identified with either of them. Yet this assimilation is a fact of very great importance.

5. *Teleology* is the name given to the study of another class of facts, coextensive with our acquaintance with nature, and especially obvious in the structures of the higher beings—viz., those which display *adaptation* and give evidence of purpose. These are most of all familiar in our own bodies, as the complex formation of the eye as an instrument of vision, with a nerve to convey the impression of light and a brain to perceive it, the hand for prehension, the mouth for speech, the foot for support and locomotion, the stomach for digestion, etc. Natural science furnishes no more beautiful and wonderful instances of such adaptation than those carefully studied and described by Darwin in the formation of many plants, so as to be fertilized by the interposition of insects which visit the flowers for their food. (*Darwin on the Fertilization of Orchids; Gray, How Plants Behave.*) Such facts, and thousands of others in nature proving adaptation, are too clear to be ignored, although speculative reasoning has introduced a question in regard to their origin or causation. The simple truth is, that design is to be inferred, as *purposive adaptation* adheres to the facts; *is itself a fact.*

6. *Modification according to surrounding conditions* occurs, to a limited extent, both in animals and plants. Some dependence upon conditions is inevitable. Thus, the earliest consolidation of the surface of the earth made it ready only for the simplest and lowest of plants. The animals of primitive periods were all aquatic. The first land-plants and land animals appeared on the earth in the Devonian age. The soil of the mesozoic period, almost certainly, would not have supported our vegetation, nor any vegetation capable of maintaining the now existing types of animal life. The atmosphere, the oceanic and inland waters, and all other terrene conditions have been different in the succeeding epochs. The mould of the field and forest of our day is the result of an immensely complex series of productions and decompositions going on through all ages since the azoic era. Each time, by its actions and reactions, prepares the way for the next. Man was, probably, *necessarily*, the last created animal, because the highest and most complicated, and thus requiring the latest and highest elaboration of terrestrial conditions.

But *modification* by changed conditions, acting upon ex-

isting types, appears only within limitations. In organisms of little motility a law may be enunciated—that "extension occurs chiefly in the direction of least resistance, and increase of density in the direction of greatest resistance." It is proper to give some examples to illustrate "conditional action" on individuals and species in nature.

Fungi are said by some botanists to be very variable, according to the places and circumstances of their growth. With higher aquatic plants, some individuals of which may have their leaves out of and others in the water, the air-pores or *stomata* are often on the under side in the former case, and on the upper side in the latter. Tendrils of climbing plants cease growing when finding nothing to clasp, but grow thick and strong after taking hold of a support. Shells of oysters are thicker on a wave-washed shore than where the water is always tranquil. Tadpoles develop into frogs in a few weeks when exposed to sunlight; in the dark, they may be kept as tadpoles for months. *Cysticercus*, a small animal parasite, when lodged in the liver or brain of a man, ox, or hog, becomes a hydatid surrounded by a watery tumor; in the intestinal canal, a tape-worm ten or twenty feet long. When the queen-bee of a hive is destroyed, the workers will select a neuter larva, and by placing it in a royal cell and feeding it with queen's food, convert it into a queen. Late observations (*Am. Naturalist*, May, 1873) make it appear that the sex of butterflies may be controlled by diminishing or increasing the supply of food to the caterpillars; short allowance promoting a preponderance of the male sex. Wallace found in the Malay Archipelago a marked influence of locality in the characteristics of Papilionidæ. Some moles have rudimentary eyes, as if they had lost them gradually by want of use; and the same may be said of blind fish in large caves. (See AMBLYOPSIS.) Lewes (*Nature*, Mar. 27, 1873) mentions that, while the young of salamanders usually undergo their transformation in the water, *Salamandra atra*, living high upon mountains, is born completely formed. M. Baray has observed that frogs in the volcanic island of Guadaloupe go through the tadpole changes *in the egg*. Domestic ducks have the leg-bones heavier; wild ones, those of the wings. Udders of cows in the domestic state are much larger than when wild. The drooping ears of several domestic animals follow the change from the wild condition. The heads of wild hogs, and those of the horses of steppes or pampas, are larger than those of the domesticated animals. *Artificial selection* and breeding cause great diversities in animals and plants. Of the latter, witness the double flowers and numberless varieties "created" by the horticulturists, and such changes as those from the wild to the cultivated cabbage, broccoli, and cauliflower. Ancon sheep and the Otter breed of cattle are merely extreme instances of the many effects of utilized and directed variations. English greyhounds taken to hunt on a high Mexican plateau, 9000 feet above the level of the ocean, failed for want of breath, but their offspring acquired a capacity to run as well there as elsewhere. *Acquired instincts* are familiar, yet remarkable; as the fear of man amongst wild birds and animals, those of a newly-visited country being always "tame." Hounds of different breeds, pointers, setters, retrievers, require almost no training to fit them for their parts in hunting, yet no such proclivities belong to the dog in the wild state; they are undoubtedly transmitted by inheritance. While several generations must be required to make a breed or variety with such distinct endowments, yet variations are sometimes quite *suddenly established*. Darwin mentions this of the black-shouldered peacock, occurring in five distinct cases among those of the ordinary kind, and, in at least one case, to the extinction of the previously existing breed. The same authority (*Animals and Plants under Domestication*, vol. i.) states that "climate directly affects the skin and hair of cattle." Angora goats, of the same original stock as those of Europe, acquire a long silky fleece. Sheep and some other animals are subject to enormous fattening of the tail near the Cape of Good Hope. Other examples might be easily added.

7. *Conditions favorable to the support of particular species of plants and animals do not necessitate their existence.* Prof. Asa Gray (*On the Derivation of American Plants: Pop. Science Monthly*, Oct., 1872) illustrates this fact as follows: "When we see how Australian eucalyptus trees thrive upon the California coast, and how our redwoods flourish upon another continent; how the so-called wild oat (*Avena sterilis* of the Old World) has taken full possession of California; how that cattle and horses, introduced by the Spaniards, have spread as widely and made themselves as much at home on the plains of La Plata as those of Tartary; . . . when we consider how the indigenous flora of islands generally succumbs to the foreigners that come in the train of man, and that most weeds (*i. e.* the prepotent plants in open soil) of all temperate climates are not 'to the manor born,' but are self-invited intruders,—we must needs abandon the notion of any *primordial* and *absolute* adaptation of plants and animals to their habitat which may stand in lieu of explanation." While a few naturalists (as Mivart, and, in regard to races of mankind, Agassiz) have advocated the view that the same species may have originated independently in several localities, the weight of evidence seems to be largely in favor of the opinion that *each species* (if not every *greater* group or type) *has had but one origin;* all "representative" species, such as those nearly, sometimes quite, identical on the two sides of the Atlantic, or otherwise locally remote from each other, being really the same in stock, only more or less modified after divergence and permanent separation in place and circumstances.

8. *Certain types vary, through long periods, very little, under any circumstances.* Among domestic species the turkey and peacock are examples of considerable stability. Gould asserts of humming-birds that, with many thousands of them passing through his hands, he has "never observed an instance of any variation which would lead to the supposition that it was the result of a union of two species." (*Introduction to Trochilidæ.*) Several "persistent types," through extremely long periods, are well known to geologists. *Lingula, Discina, Rhynconella, Crania* have continued from the Silurian age to the present time. Some palæozoic corals are yet building islands or reefs in the ocean. Genera of carboniferous plants, insects, and Arachnida closely resemble some of those of to-day. The *Araucaria* of the oolite has left cones scarcely distinguishable from those of the same genus now growing. *Pleuracanthus*, a fish of the Devonian and carboniferous eras, was as similar to sharks now existing as they are to one another. Some triassic mammals were equally close in alliance to those of recent times. Carpenter and Wyville Thomson have proved that a cretaceous fauna exists now at the bottom of the ocean. Hence is to be inferred the propriety of the admission of Darwin: "I believe in no law of *necessary development*." Huxley also, who has especially studied these persistent types, emphatically declares that their existence must be recognized in any theory of evolution.

9. While progress has been the rule (as already shown) in the great changes of nature through geological time, evidence also exists of the *decline and extinction of types*. Says Dana: "Five hundred species of trilobite lived in the course of the palæozoic ages; afterwards there were none. Nine hundred species of the ammonite group existed in the mesozoic—not all at once, but, as in the case of the trilobites, in a succession of genera and species; the last then disappeared. There have been 450 species of the nautilus tribe in existence; now there are but two or three, and these are peculiar to the present age. Seven hundred species of ganoids have been found fossil; the tribe is now nearly extinct." Barrande has studied trilobites exhaustively; he remarks (*Trilobites*, par Joachim Barrande, à Prague et à Paris, 1871) upon the notable diminution of their size, as well as of the numbers of their genera and species, after a *maximum* in the second of the three periods of their history; also, that such an order of increase, culmination, and decline was observed in all quarters of the globe alike. The same naturalist has likewise examined in detail the history of ancient cephalopods (*Distribution des Cephalopodes dans les contrées Siluriennes*, 1870), and points out the occurrence of some simple forms, later than others which were more complex. Alpheus Hyatt has given attention to the same succession; and he, with some others, understands the fossil Cephalopoda to exhibit, as it were, the *biography* of a type, closely analogous, in all its changes, to that of an individual cephalopod. Opening with the straight *Orthoceras* of the Silurian, it advanced through the coiled and more complex ammonite of the Jurassic, and declined through half-uncoiled forms of the cretaceous, to end in the straight baculite. Also, the ammonite family itself, beginning with the *Goniatites* of discoidal shape, passed through the compactly coiled and elaborate true ammonites, to decline through the half-coiled *Scaphites;* the last being the old age of the type. Other instances would probably be more familiarly known if the attention of naturalists was generally directed towards this class of facts.

10. *Rudimentary parts* furnish one of the strongest arguments in favor of the hypothesis of a genetic connection among all animals (including man); at least among all those belonging to the same great types. By rudiments, in anatomy, are meant organs or structures imperfectly developed, so as to be almost or entirely without functional use. Each of them represents in germ, as it were, in one animal (or plant) that which is perfect and useful in another type. Examples are as follows: In plants, incomplete petals, stamens, or pistils in a great many instances; notably, undeveloped pistils in the male florets of some Compositæ. Among animals, the minute and useless wings of certain beetles and other insects; teeth in the jaws of fœtal whalebone whales, which are toothless

when mature; teeth also in the front part of the upper jaw in the embryos of ruminant quadrupeds (as the ox) and of a few birds; the mammary teats of male mammals; two imperfect udders in cows; imperfect wings of the penguin and apteryx; the splint-bones of the horse; unused hinder toes of several quadrupeds; small limb-bones under the skin of serpents, and similar ones of the pelvis and hinder limbs of whales. Man has a number of clearly marked rudimentary parts. Such are the three small and useless motor muscles of the external ear; the platysma myoides of the neck, homologous with the useful panniculus carnosus of the horse and ox; the little fold or caruncle at the inner margin of the eye, representing the nictitating membrane of birds; the os coccygis at the lower end of the spinal column, in place of the tail of lower animals, and which at one time in the human fœtus is longer than the limbs; the vermiform appendix of the large intestine, which in man has no use, but in one marsupial is three times the length of its body. The "lanugo" or hairy covering of the human fœtus at the fifth month is supposed by Darwin to be a rudimentary appearance of the first hairy covering of other mammals. Some anatomists regard the whole outer ear in man as a mere rudiment of the movable external ears of quadrupeds. The last molar (wisdom) tooth has the character of incomplete development, especially among civilized races of men. For the existence of any of those which are certainly rudiments no rational "final cause" has ever been proposed. It is intelligible *only* upon the supposition of their being relics of a long past descent from a *common stock* with those species, genera, or larger groups which now present the same organs in perfect development and answering a useful purpose. Their gradual disappearance when their utility has ceased is not strange upon such a view. Paget has given an additional reason why that disappearance should not be sudden, in the facts of "complementary nutrition;" that is, as every part, by taking some material from the blood, makes it more exactly fitted to the nutrition of the rest, rudimentary organs may serve this purpose for a while, after their own direct functional action has ceased.

Different Theories of Evolution.—It is a popular error that "Darwinism" is a precise synonym of "the theory of development." Several distinct views have been held, agreeing merely as to the one belief, of a *genetic* relation between the present and the past in all parts of nature; which is what we mean by evolution. Thus, for the origin of diverse species amongst plants and animals there have been (though not altogether mutually exclusive) the following hypotheses: 1. Self-elevation by "appetency," or use and effort: Monboddo, Lamarck, and Cope. 2. Modification by the surrounding conditions of the "medium:" Geoffroy St.-Hilaire, Quatrefages, Draper, and Spencer. 3. Natural selection, under the struggle for existence, with spontaneous variability, causing the "survival of the fittest:" Darwin, Wallace, and Hæckel. 4. Derivation by "pre-ordained succession of organic forms," under an "innate tendency" or "internal force:" Owen and Mivart. 5. Evolution by "unconscious intelligence:" Morell, Laycock, Murphy. 6. Less defined, so far, as a distinct hypothesis, but clearly implied in the writings of Prof. Asa Gray, Dr. McCosh, Baden Powell, the Duke of Argyll, and others, is the view of orderly creation "by law," through the immanent action and direction of Divine Power, working by the purposive collocation and adjustment of natural causes or forces. This is not accurately described as a theory of "supernatural or miraculous *interference.*" It should be designated, rather, as that of *creative evolution.*

Mivart, the Duke of Argyll, and others have abundantly shown that there is no antagonism whatever between the two ideas of creation and evolution. Excluding a very few atheists and positivists, the great controversy has been, of late years, upon the question whether a right interpretation of the facts should lead us to conclude that creative power was exerted *only at the beginning,* all afterwards being only the manifold progressive results of "natural laws" acting without traceable design; or that, instead, the *immanence* of Divine Power is everywhere shown by nature in forms and processes specially exhibiting design, in such a sense that, in the words of David Hume (*Dialogues concerning Natural Religion,* Part iv.), "the whole chorus of nature raises one hymn to the praise of its Creator."

Descent of Man.—Darwin gives the following conclusion in his work on this subject (1871): "The most ancient progenitors in the kingdom of the Vertebrata at which we are able to obtain an obscure glance apparently consisted of a group of marine animals resembling the larvæ of existing ascidians. These animals probably gave rise to a group of fishes as lowly organized as the lancelet; and from these the ganoids, and other fishes like the lepidosiren, must have been developed. From such a fish a very small advance would carry us on to the amphibians. We have seen that birds and reptiles were once intimately connected together; and the Monotremata now, in a slight degree, connect mammals with reptiles. But no one can at present say by what line of descent the three higher and related classes—namely, mammals, birds, and reptiles—were derived from either of the two lower vertebrate classes—namely, amphibians and fishes. In the class of mammals the steps are not difficult to conceive which led from the ancient Monotremata to the ancient marsupials, and from these to the early progenitors of the placental mammals. We may thus ascend to the Lemuridæ; and the interval is not wide from these to the Simiadæ. The Simiadæ then branched off into two great stems, the New World and Old World monkeys; and from the latter, at a remote period, man, the wonder and glory of the universe, proceeded." Wallace (*Essays on Natural Selection,* 1870) furnished, in anticipation of Darwin's work on that subject, what still remains to be the most effective reply to its arguments in favor of the sufficiency of the hypothesis of natural selection to explain the origin of man. Wallace shows that in several important respects the advances from the *simian* to the *human* type of organization are such as cannot be accounted for by any possible fitness for success in the struggle for existence—namely, the superiority of the human larynx for voice and musical expression, of man's foot for progression in the erect posture, of his hand for delicate touch and varied prehension, the greatly increased size and capacity of his brain, and the entire absence of hairy covering from his back and shoulders. Hence Wallace writes (*op. citat.*) as follows: "The inference I would draw from this class of phenomena is, that *a superior Intelligence has guided the development of man in a definite direction* and for a special purpose, just as man guides the development of many animal and vegetable forms." It need scarcely be remarked that this evidence, coming from one of the originators of the hypothesis of natural selection, has still further importance in suggesting that this "intelligent guidance in definite directions for special purposes," so obvious in the nature of man, who is best known to us, will be likely to be equally manifest elsewhere in the organic kingdom when our knowledge of all its parts becomes more complete.

Sexual selection, urged by Darwin to supplement his theory, falls short of its purpose in several ways—especially as a *general* hypothesis—because it requires considerable intelligence in all the animals which exercise it as a supposed means of advancement in beauty of form, color, etc.; and yet very remarkable developments of similar traits and endowments appear in invertebrated animals (*e. g.* butterflies and other brilliantly beautiful insects, and varied and elegant shells of mollusks), and in the high ornamentation of flowers and leaves in many plants. Another cumbrous rather than serviceable speculative addition of Darwin's to his general theory has been that of *pangenesis.* Something very much like it was suggested by Owen in 1849, in his treatise on parthenogenesis, but it is quite as incredible, if not as inconceivable, as the "monadology" of Leibnitz. (See PANGENESIS.)

Evolution of Mind and Consciousness.—On this topic Darwin (*Descent of Man* and *Expression in Man and Animals*) has written with much ability; and so, amongst others, also have Cope (*Evolution and its Consequences: Penn Monthly,* Aug., 1872) and Chauncey Wright (*North American Review,* April, 1873, on the "Evolution of Consciousness"). Some success has been undoubtedly reached by these authors in framing a conceivable hypothesis for the transition from the "rudimentary" mental faculties of brutes to those fully developed in the human mind. Conscience is thus traced back, by Darwin, to a germinal appearance in the higher animals, originated by conflicts between "permanent social instincts and affections" and "more transitory individual instincts and propensities." Yet there is obviously truth in the statement of Huxley, that between the mind of the highest anthropoid apes and that of man there is an "enormous gap"—a distance "practically infinite." Tyndall also is often quoted on this subject (*Address to Physical Section of British Association,* 1868) as follows: "The passage from the physics of the brain to the corresponding facts of consciousness is unthinkable. . . . Were our minds and senses so expanded, strengthened, and illuminated as to enable us to see and feel the very molecules of the brain; were we capable of following all their motions, all their groupings, all their electric discharges, if such there be; and were we intimately acquainted with the corresponding states of thought and feeling,—we should be as far as ever from the solution of the problem, 'How are these physical processes connected with the facts of consciousness?' The chasm between the two classes of phenomena would still remain intellectually impassable." Aristotle was impressed with a similar conviction more than two thousand years ago, when he wrote (*De Gen. Anim.* II., iii., 10) that *reason* has

nothing in common with the material elements of the body, but that it alone comes from without, and is divine: "*λείπεται δε τὸν νοῦν μόνον θύραθεν ἐπεισιέναι καὶ θεῖον εἶναι μόνον.*" It does not need for us to determine here upon a precise theory of the nature of mind to enable us to see how these conclusions bear upon the supposition of the *spontaneous* evolution of mind from matter, as well as somewhat less directly upon that of the spontaneous ascent of the mind of the brutes up to that of man.

The probable method of evolution of instincts in animals, by "accumulated and transmitted experiences" (Darwin, Spencer), or as "lapsed intelligence" (G. H. Lewes), has been well studied of late by the authors quoted, and by Carpenter, Spalding, Wallace, and many others. (See INSTINCT.) Here also we have to stop, at last, at the yet unbridged gap between insensitive, unconscious matter and sensitive, impressible nerve-substance, capable at first of reflex automatic action, and then, higher, of intelligence, impulse, and volition.

We are now prepared to approach a conclusion by attempting an answer to the question whether the facts giving strength to the hypothesis of evolution really eliminate the evidence of *design*, of special purposes, in nature; and whether, admitting "creation" in any sense, science compels us to remit it altogether to an inconceivably remote origin of the universe. For the following reasons, principally, we must unite with Carpenter, Dana, Agassiz, Henry, Sir John Herschel, Sir William Thomson, Asa Gray, and many other recent scientists of the highest class in denying absolutely the insufficiency of the proofs of design in nature; and also in refusing to admit the elimination of *special* creative action or direct modification of nature from all periods since the first origination of the universe.

1. As Whewell (*Indications of the Creator*) has pointed out, the nebular hypothesis is null without a creative act to produce the required "inequality of distribution" of cosmic matter in space. Hæckel (*Nat. History of Creation*, Berlin, 1868) admits that the hypothesis is weak on at least two points—the heat of the gaseous nebular mass, and its rotary motion. "Every attempt," he adds, "to explain these facts leads us inevitably to the untenable theory of an absolute beginning." We may avoid the contradiction herein involved by holding simply that what is *inevitable* must be pre-eminently a *tenable* conclusion. Herbert Spencer has also committed himself to a self-destructive process of reasoning in his "First Principles," as has been clearly shown by an American reviewer (*New Englander*, Jan., 1872, and Jan., 1873). The "instability of the homogeneous," on which Spencer builds large consequences, might, as that reviewer observes, account for chaos, but never for a universe. For *action* and *reaction* there must be heterogeneity, a plurality of factors. Traced backward, the principle of "uniformity of force" in physics must necessarily have been powerless to make any *beginning* whatever. Carried forward without designing *will-force* to modify them, natural cosmic forces tend always to *equilibration*, and consequent *dissolution*. The universe must thus become, as it has been said, "its own cemetery." Sir William Thomson asserts (*On Geological Dynamics*) that "as energy is being continually lost from the earth by conduction through the upper strata, the whole quantity of plutonic energy must have been greater in past times than in the present." Yet in organic nature there has been a constantly increasing complexity and exaltation of types—integration of matter with accumulation of force ("bottled sunshine" of some authors); and this under the "struggle for existence" against a steadily increasing resistance. As stated by Prof. Cope (*Method of Creation of Organic Types*, 1871), "While the amount of growth-force potential in adult living animals has varied very irregularly throughout the animal kingdom, there being large and small, simple and complex, in every division, it would seem to have accumulated, on the whole, with the rising scale of animal types." Mivart's special hypothesis of an "internal force" determinative of evolutionary changes in organisms is vague and unsatisfactory while detached from the "will-force" (Wallace) of an immanent Creative Power. The "unconscious intelligence" of Morell, Laycock, and J. J. Murphy is certainly an *unthinkable* phrase, a "pseudo-idea," when proposed as the designation of an active power in nature. The presumption against organic evolution, with *true ascent* of types, being in any sense the result of the action of mere *cosmic* forces, is of the same nature with that against perpetual motion; it contradicts the doctrine of the conservation or persistence of force. As Leifchild puts it (*Higher Ministry of Nature*, pp. 325, 327), the assertion that "No-will has evolved will" is as absurd as "ex nihilo aliquid."

2. *Variation* is necessary to the Darwinian or any other "non-teleological" theory; and no such theory accounts for variation. Darwin requires also almost *infinite* variability of plants and animals; but, so far from infinite, observation shows it to be confined within very narrow limits. The *non-fertility of hybrids* of two nearly-allied species is a very important indication of the present fixedness of those limitations. Also, species do not pass, in any case, into each other. Palæontology and recent zoology and botany are declared by Agassiz, Barrande, Dawson, Gould, Balfour, and Thomson to establish this. Thus writes Sir William Thomson (*Nature*, Nov. 9, 1871): "In successive geological formations, although new species are constantly appearing, and there is abundant evidence of progressive change, no single case has yet been observed of one species passing through a series of inappreciable modifications into another." Embryology is regarded by Agassiz as affording concurrent testimony in regard to the essential diversity of types. In a lecture at Cambridge, Mass., Mar. 6, 1873, he used the following language: "No invertebrate animal has any structural relation to man whatever, while every member of his own type has an intimate structural relation with him. You may compare a quadruped in certain phases of its growth with the adult condition of some lower kinds of vertebrates, and be amazed at the resemblance; but you cannot carry the comparison over into the type of articulates, or into any other type of the animal kingdom based upon a different plan. Within each type the development has a character as distinct as the plan on which the type is built. An insect, for instance, can never at any time of its development, after it has passed out of that universal condition of the ovarian egg to which I alluded, be compared to an oyster or a fish, but it passes through phases where it can hardly be distinguished from a worm; that is, in the course of its development it bears a transient likeness to the adult condition of a being standing lower in the type of articulates to which they both belong. In short, every animal belonging to any one of the higher groups, during the transformations by which he reaches the adult state, may pass through modified conditions, in each of which he resembles some being of his own type of the animal kingdom for whom that condition is final."

3. Were variation infinite, without the *regulation* of selective or directive design, a simple calculation of probabilities (see "North British Review," June, 1867) shows that a merely chaotic complication of forms must result, the "struggle for existence" notwithstanding.

4. Infinite time has been proposed as affording a solution of the difficulties of natural selection. But infinite time would not alter the nature of the necessary result of infinite variations, nor would it regulate finite ones. Further, Sir William Thomson, Croll, and Gould have shown, from various *data*, that so far from infinite time, not more than one hundred millions of years can have been the duration of the present relation of our planet to the sun—a period quite too short (were *any* duration of time sufficient) for the genesis of organic nature merely by spontaneous modification and natural selection.

5. Without design (as Mivart has shown) *incipient* structures, which become useful only when completely developed, have no explanation at all. Further *items* of fact unexplained, apart from teleology, are—the opposition of the *sexes* in plants and animals; the *metamorphoses* of insects; the cessation of the individual life; and the renewal of life-progress by parental reproduction. Moreover, as to the origin of a *new species*, whose relation to an earlier allied species is supposed to be similar to the connection between the different stages of the life of one individual, we have the *fact* of individual reproduction exemplified under our knowledge; but what corresponds, in the birth of a *new type*, to the sexual reproduction of a new individual, especially in the case of the *first* created type?

Accepting, then, with Herbert Spencer, the evidence found everywhere of the unity of the "inscrutable universal Power" which is the Cause of nature, there is proof, also, in the multiplicity and adjustment of the manifestations of that Power, that it has the attributes of Intelligence and Will. Every *specialization*, each true *elevation* of type (which is a different thing from modification on the same plane of being), involves new force-expenditure. Certain *factors* have been *added* in the evolution of nature whose origin is a "mystery" as yet quite unsolved by science. It is rational and philosophical, therefore, in the absence of any solution by secondary causation, to refer them, provisionally at least, to the direct creative action (whether sudden or gradual we cannot know) of the First Cause. Such "factors," superadded from time to time in the past history of our globe, have been—1, life; 2, animality, as distinct from vegetative life; 3, mind-force, instinct, intelligence, *ψυχή*; 4, *πνεῦμα* or spirit (see 1 Cor. xv. 46), possessed by man alone of all creatures on the earth. While *Theism* must rest essentially upon evidence other and higher than that of physical science, it would appear that the facts of evolution tend to confirm and strengthen that evidence. "If there

has been an evolution," writes Canon Kingsley, "there must be an Evolver." "Let us hope," says Prof. Gray (*Address before Am. Associa. for Adv. Science*, 1872), "that the religious faith which survived, without a shock, the notion of the fixity of the earth itself, may equally outlast the notion of the absolute fixity of the species which inhabit it—that in the future, even more than in the past, faith in an *order*, which is the basis of science, will not (as it cannot reasonably) be dissevered from faith in an *Ordainer*, which is the basis of religion." We find development in the succession of divine dispensations described in the Old and New Testaments—of the patriarchs, of Moses, the judges, prophets, and kings in the Old, and of Christ in the New Covenant. "The law made nothing perfect, but the bringing in of a better hope did." (Heb. vii. 19.)

Evolution in Human History—Dr. McCosh has referred (*Christianity and Positivism*, 1872) to some phases of the progress of mankind, of which three stages are distinguishable—the era of the *predominance of physical force*, that of *intellectual supremacy*, and that (hardly culminated as yet) of *moral and spiritual power*.

As a question in archæology, it has been often argued whether man was originally savage (Tylor, Lubbock, Darwin), and thence self-elevated into civilization, or was at the beginning (Whately) supernaturally gifted with such knowledge as prepared him for refined life and culture, afterwards, in many places, to be lost and regained, again and again, through the ages. Neither of these alternatives compels our entire or exclusive assent. Probably man was at first infantile or puerile, both in innocency and ignorance. (See "Primeval Man," by the Duke of Argyll.) Normally in communion with his Maker, his destination was to continue morally pure and to advance in mental culture. History shows, instead, barbaric degeneration to have been the rule before the Christian era, with partial renewals and expansions of civilization in certain localities at different times. There is no proven instance of any nation or race having initiated its own advancement out of barbarism, while there are many examples of the deterioration of powerful empires and centres of magnificent culture into the savage or almost savage state. Always *a force from without* has begun the elevation of a race or community. Where history has failed to reach such beginnings, tradition follows its clues towards them, and always with the same indication—Egypt from India, Greece by Cadmus, Rome from Greece, Europe first from Rome, and afterwards from Palestine.

If India and China furnish no clear traces of such foreign origins of their advancement, what does this amount to? In the one instance, an old culture vanishing away; in the other, petrifaction into a half civilization, ceasing, many centuries since, to make further progress. After Greece and Rome had exemplified and fallen from the very culmination of intellectual and imperial development, the world (it may be believed) would have totally degenerated into a more than mediæval darkness but for the coming of a "force from above" in the advent of Christianity. By it, as now known in Europe and America, has been made possible and actual, for the first time in the world's history, a *continuously progressive civilization*.

We may conclude this article by a brief general statement upon the whole subject of development: "The only idea of creation which is at all *conceivable* is creation by a process, the steps of which have a succession, which, if known, would be rationally comprehensible." So regarded, evolution or development is the only expression according to which any consistent statement of the facts of nature can be made. But evolution is not a force, cause, or "law." It is a summary term for the general mode of succession of the complex results of *all* natural forces and laws under the Divine government.

HENRY HARTSHORNE.

Evolu'tions, Mil'itary, the movements by which troops change the order, position, and direction of their primary formation. All such movements as marching, countermarching, changing front, forming line, facing, wheeling, defiling, deploying, etc., come under the general head of evolutions. All evolutions are performed according to a regulated system, which differs in its details in the armies of different nations.

Ev'ora (anc. *Ebora* and *Liberalitas Julia*), a town of Portugal, capital of the province of Alemtejo, is pleasantly situated about 73 miles by rail E. by S. from Lisbon. It has two ruined forts, a large Gothic cathedral founded in 1186, several convents, and a library of about 50,000 volumes. It has been an archbishop's see since 1541. Here are manufactures of ironware and leather. Ebora was taken by Sertorius about 80 B. C. Here are Roman antiquities which are more interesting than any others in Portugal. Among them are an aqueduct said to have been built by Sertorius; a temple of Diana with beautiful Corinthian columns; and a brick tower adorned with columns of the Ionic order. Pop. 11,965.

Évremond (CHARLES DE SAINT-DÉNIS), seigneur de Saint-Évremond, a French courtier and *littérateur*, born near Coutances, in Normandy, April 1, 1613. He was witty and accomplished, a perfect specimen of an Epicurean of that time, squandering his life in the pursuit of frivolous pleasures, but ready to give it up at any moment for the sake of a bon-mot. He entered the army about 1629, and became a friend of Turenne and the prince of Condé. Having given offence to Louis XIV. by his raillery and sarcastic wit, he took refuge in England in 1662. He gained the favor of Charles II., who granted him a pension of £300, and he never returned to France. He wrote dramas, essays, and letters, of which his "Comedie des Academistes pour la Reformation de la Langue Francois" is an exceedingly witty, elegant, and entertaining production. His "Sir Politics," which he made in company with Buckingham, is very weak. Died in Sept., 1703.

Évreux, ā'VRUH' (anc. *Mediolanum*, afterwards *Eburovices*), a city of France, capital of the department of Eure, is pleasantly situated on the Iton about 67 miles by rail W. N. W. of Paris, with which it is connected by railway. It is a bishop's see, and has a fine old cathedral, an episcopal palace, a theatre, a clock-tower built in 1417, and a botanic garden. Here are manufactures of cotton and woollen fabrics, leather, etc. Évreux has sustained numerous sieges. It was taken and pillaged by Rollo the Norman in 892 A. D., and was burned by Henry I. of England in 1119. Pop. 12,320.

Evron, a town of France, in the department of Mayenne. Here is an ancient Benedictine abbey. The chief manufacture is table linen. Pop. 5243.

Ew'ald (JOHANNES), a Danish poet, was born in Copenhagen in 1743. In his early youth he lost his father, who was a minister, and soon after, yielding to the fantastic impulses of his nature, he gave up his studies and enlisted in the Prussian army. He felt very disappointed, however, as people of his character always do when they meet the reality. He deserted and joined the Austrians. But they did not satisfy him either. He deserted a second time, and returned to Copenhagen, where he spent the rest of his life as a literary man. He died in 1781 in utter poverty and degradation: he was a drunkard. In his literary business, however, Ewald was very industrious and conscientious. All his works bear evidence of great study, deep meditation, and untiring labor; there is no rashness, no halfness about them. He did the very best he could. Yet his writings—with the exception of some few genuine pearls among his songs, as "King Christian," which became the national hymn of the Danes, "Liden Gunver," "Rungsted's Lyksalighed," etc., and his essay "On Bachelors," which is a specimen of the most elegant humor—are marked with the same empty enthusiasm and fantastic excitement as was his life. The innermost kernel of his tragedies "Adam and Eve" and "Balder's Death" is vapor. To a sound taste they are tiresome and unpleasant. They are interesting only as historical documents to the scholar who does not consider them from a merely artistic point of view, but looks at them in their connection with the period in which they were produced. Holberg had taught the Danish people how to read. He had made them eager after books. Through his influence it had become as necessary for them to have a literature as to keep an army. But he had not taught them how to write. He had left them as types no models which could be used; and it took two generations before he came who did—Adam Oehlensläger. Meanwhile, the public arranged itself into two camps—one, "The Norwegian Club," importing French forms and French tastes; and the other, "The Danish Society," importing German ideas and German principles. Klopstock lived at that time at the Danish court, from which he had a pension, and Ewald, who was his admirer, and who in the Danish literature represents the same ideas, though not the same influence as Klopstock in the German, became the hero of "The Danish Society." A fearful battle issued between these two parties—noise and smoke, rattling and booming, as from the fight of two hostile armies. What was said during the evening in the club or in the society became the topic of conversation next day all over the country, from the drawing-room to the barber-shop, and fifty years later old men would still tell with pride how they had been present when this or that epigram was first recited or this or that song first sung. Fearful also was the result of the battle, for in artistic respects it was next to nothing.

Among all which the Danish literature produced between Holberg and Oehlensläger that which is good can be read in one short hour, and no great harm would be done if it

were forgotten in the next. But by studying the period in its details, it is possible to show how all the mental powers of the nation then awakened, and how they sought and found the same course, until at last, through Oehlensläger, they broke forth in one broad, glittering stream, useful to the world; and in this study every line of Ewald is interesting and important. CLEMENS PETERSEN.

E'wald, von (GEORG HEINRICH AUGUST), a celebrated German Orientalist and biblical critic, born at Göttingen Nov. 16, 1803. He became in 1831 professor of philosophy in the University of Göttingen, and he obtained the chair of Oriental languages in 1835. In 1837 he was removed on account of his liberal political opinions; he and five other professors, among whom were Gervinus and Grimm, solemnly protesting against the abolition of the free constitution which the Hanoverian king had felt himself compelled to give during the revolutionary commotions in 1830. Ewald went to Tübingen as professor in theology in 1838, but his position here was not very pleasant, as he had to defend himself against the attacks and intrigues both of the Roman Catholic party and the Hegelians. He was reinstated in his chair at Göttingen in 1848, and was elected a member of the North German Parliament in 1869. Among his numerous works are a "Hebrew Grammar" (8th ed. 1870), "The Poetical Books of the Old Testament" (4 vols., 1835–37), a "History of the People of Israel until the Advent of Christ" ("Geschichte des Volkes Israel bis auf Christus," 7 vols., 3d ed. 1864–69), "The History of Christ and his Time" (1857), and "The History of the Apostolic Age" (1858). In 1848 he founded at Göttingen "The Year-Book of Biblical Science" ("Jahrbuch der Biblischen Wissenchaft"). About the influence which he exercised on the theological study of the Bible there may be different opinions, but his contributions to a better understanding of the language of the Old Testament are of undoubted value.

Ew'bank (THOMAS), a writer on mechanics, was born in the county of Durham, England, Mar. 11, 1792. He emigrated to New York in his youth, and was appointed commissioner of patents by the President of the U. S. in 1849. He published, besides other works, a "Descriptive and Historical Account of Hydraulic and other Machines, Ancient and Modern" (1842), and "Thoughts on Matter and Force" (1858). Died Sept. 16, 1870.

Ew'ell (BENJAMIN S.), LL.D., an American officer and educator, born in 1810 in the District of Columbia, graduated at West Point in 1832, served while lieutenant of artillery as assistant professor at the Military Academy, till he resigned, Sept. 30, 1836; civil engineer (1836–39), professor of mathematics at Hampden-Sidney College, Va. (1839–42), and of mathematics and natural philosophy (1842–46), professor of mathematics and military science in Washington College, Va. (1846–48), professor of mathematics and acting president of William and Mary College, Va. (1848–49), professor of mathematics and natural sciences (1849–61), and president of William and Mary College (1854–61) and since the civil war. GEORGE W. CULLUM, U. S. A.

Ewell (RICHARD STODDARD), GENERAL, born Oct., 1816, in the District of Columbia, graduated at West Point in 1840, served on the Western frontier (1840–45), on coast survey (1846), in the war with Mexico (1846–48), engaged at Vera Cruz, Cerro Gordo, Contreras, Churubusco, Molino del Rey, and Chapultepec; became captain of dragoons in 1849, and did frontier duty in New Mexico (1850–61), and engaged on the Gila and Pinal Apache expeditions (1857 and 1859), encountering the Apaches on the Gila River in a skirmish. Resigning May 7, 1861, from the U. S. army, he joined the Southern forces in the civil war, serving in the Manassas campaign (1861), engaged at Blackburn's Ford and Bull Run (1862), engaged at White Oak Swamp and Cedar Mountain, defeated at Kettle Run, and engaged at Manassas (1862), in the Maryland campaign (1862), in which he was severely wounded; became lieutenant-general in 1863, and succeeded Stonewall Jackson at his request, being in command of Second Corps at Winchester, Gettysburg, Wilderness, and subsequent operations of the campaign; and was captured April 6, 1865, at Sailor's Creek. He was a bold, blunt, honest soldier, and on the collapse of the Southern Confederacy accepted in good faith its results. Died Jan. 25, 1872, near Spring Hill, Tenn.
GEORGE W. CULLUM, U. S. A.

Ew'ing, a post-village in Franklin co., Ill., 8 miles N. E. of Benton, noted for its large woollen-factory, and as the seat of the Ewing High School, a flourishing institution. J. S. BARR, PUB. "BENTON STANDARD."

Ewing, a township of Mercer co., N. J. Pop. 2477.

Ewing, a post-village of Washington township, Hocking co., O. Pop. 50.

Ewing (CHARLES), LL.D., born in Burlington co., N. J., July 8, 1780, graduated at Princeton in 1798, was called to the bar in 1802, practised at Trenton, and was chief-justice of New Jersey 1824–32. Died Aug. 5, 1832.

Ewing (Rev. FINIS), one of the fathers of the Cumberland Presbyterian Church, was born in Bedford co., Va., July 10, 1773, of Scotch-Irish stock, and is said to have studied for a time in college. He removed to a place near Nashville, Tenn., and in 1823 married a daughter of Gen. William Davidson, joined a Presbyterian church, and soon after removed to Kentucky. Awakened in 1800 to a new religious life, he was licensed to preach, and in 1803 was ordained by the Cumberland Presbytery. His ordination not being recognized by the Kentucky synod, the presbytery being dissolved, and the action of the synod being sustained by the General Assembly, he with two others in 1810 formed the germ of the new Cumberland Presbyterian Church. In 1820 he removed to Missouri. Died at Lexington, Mo., July 4, 1841.

Ewing (JOHN), D. D., an American Presbyterian minister, born in Nottingham, Md., June 22, 1732. He became pastor of the First Presbyterian church of Philadelphia in 1759, and provost of the University of Pennsylvania in 1779. Died in Sept., 1802.

Ewing (THOMAS), LL.D., a statesman, was born in Ohio co., Va., Dec. 28, 1789. In 1792 he removed with his parents to Ohio. In his youth he prepared himself for college by night-study while employed in the Kanawha salt-works. In 1815 he graduated at Ohio University at Athens, receiving the first degree of A. B. ever conferred in that State. He was called to the bar in 1816, and was U. S. Senator from Ohio (1831–37 and 1850–51), U. S. secretary of the treasury (1841) under Harrison, and secretary of the interior under Taylor (1849). He was the father of Gen. Thomas Ewing and father-in-law of Gen. W. T. Sherman. Died Oct. 26, 1871.

Ewing (THOMAS, JR.), a son of the foregoing, was born at Lancaster, O., Aug. 7, 1829, was educated at Brown University, was private secretary of President Taylor (1849–50) studied law at Cincinnati, removed in 1856 to Leavenworth, Kan., was chief-justice of Kansas (1861–62), colonel of the Eleventh Kansas Volunteers, 1862, served with distinction in the civil war, chiefly in Missouri and Arkansas, becoming a brigadier-general of volunteers in 1863, and major-general by brevet in 1864. Since the war he has been a lawyer in Washington, D. C.

Ew'ington, a post-village of Huntingdon township, Gallia co., O. Pop. 191.

Ex'actions [from Lat. *exactiones, tallice*] was a legal term of ecclesiastical jurisprudence, used in the Middle Ages to denote such duties or contributions, demanded by the clergy of their parishioners, as were extraordinary, either because they were new and against custom, or because their amount was unduly increased. They were illicit, and it was found necessary repeatedly to denounce their unlawfulness. The power of the clergy over their parishioners, or of the bishops over the subordinate clergy, was so great that it was easy for them to make the most outrageous exactions. In 589 the third Council of Toledo forbade the bishops "exactiones diociesi vel damna infligare;" and the meaning of this is more exactly defined by Leo IV., who in 853 forbade the bishops to exact from the clergy and ecclesiastical institutions of their dioceses "dationes ultra statuta patrum aut super appositæ in angariis." Yet, in 1179, Alexander III. found it necessary to repeat: "Prohibemus ne ab abbatibus, vel episcopis, aliisve prælatis novi census imponantur ecclesiis, nec veteres augeantur, nec partem redituum suis usibus appropriare præsumant."

Exarch [Gr. ἔξαρχος, a "leader"] was in ancient Greece the title given to him who conducted the dramatic chorus during the performance, as distinguished from the coryphæus and the choregos; the former of which titles denoted the teacher of the chorus, him who taught them the songs and dances, which office generally was filled by the author of the play; while the latter title, that of choregos, simply was given to some rich citizen who supplied the costs of the outfit of the chorus.

Later on the title was used in the Eastern Church to denote the highest ecclesiastical dignity, and was bestowed on the bishops of Alexandria, Antioch, Ephesus, Cæsarea, and Constantinople, but was soon exchanged in most places for that of patriarch, though it never was wholly abolished. At present it denotes a chancellor or deputy under the patriarch in the Russian Greek Church. He travels as a delegate from the patriarch through the diocese, investigating the discipline of the monasteries and the observance of the canons, and forming a kind of court of appeals in all ecclesiastical cases arising between the clergy and the people.

Ex'archate, the title of exarch was, for some time, ap-

plied also to civil dignitaries of the highest rank—to the viceroys who ruled over those border provinces of the Byzantine empire which were most exposed to the danger of being invaded by the barbarians. Thus, an exarchate was established in Africa in 534, and existed till 698, when it was finally overthrown by the Arabian conquest. The most important of these exarchates, however, was that established in Italy in the time of Justinian I. by Narses. In 552, Narses, who originally was a eunuch belonging to the household of Justinian, but who turned out a military commander and statesman of great talent, led an army consisting of Lombards, Huns, Heruli, Armenians, and Persians—which incongruous mass he swayed with indomitable power—along the coasts of the Adriatic, until he, S. of Ravenna, crossed the Apennines and met the Goths at Tagina, where he totally defeated them; their king Totila fell in the battle. Narses now took Rome, and the end of the Ostrogothic empire in Italy was at hand. Teias, the successor of Totila, was defeated and slain in a battle at the banks of the Sarno, near Naples, which lasted two days, and Narses immediately commenced the organization of Italy as a province of the Byzantine empire. He had to fight once more, however. New swarms of barbarians, mostly consisting of Franks and Alemanni, poured down the Alps and spread devastation before them wherever they came. Narses waited for some time, but when he saw that the luxurious and riotous life to which Italy induced them had thoroughly demoralized them, he attacked them at Casilinum in Campania, and hardly 5000 out of 75,000 escaped from the massacre. From this time (554–567) Narses ruled Italy as a province of the Byzantine empire, under the title of exarch, and with full civil, military, and judicial authority. After his death, in 567, followed Flavius Longinus, and the Roman exarchate continued to exist, though with various fortunes, till 752. The exarchs placed *duces* (dukes) at the head of the administration of the different provinces, but the dukes of Venice and Naples soon made themselves independent. So did the bishop of Rome, Gregory II., and the dominion of the exarchs, by degrees, dwindled down to a very limited extension, comprising only a few provinces of Central Italy around the city of Ravenna, which was their residence. The last exarch was Eutychius. In 752, Aistulf, king of the Lombards, conquered Ravenna, but in 755 he had to give most of the possessions of the exarchate to the see of Rome, compelled to do so by Pepin the Little. The title of exarch was used, however, in Western Europe as a civil and military title till the middle of the twelfth century. CLEMENS PETERSEN.

Exauvilliez (PHILIPPE-IRÉNÉT BOISTEL D'), a French author, was born at Amiens Dec. 6, 1786. In 1815 he lost the greater part of his fortune, and went to seek some employment. Having failed to secure any, he turned to literature, and wrote a great number of religious and moral sketches and pamphlets, which were not without effect. His essay, "Le Bibliothéque de Saint-Gervais," 1831, gave the first impulse to the establishment of small libraries all over France, which have proved of great benefit to the general elevation of the people. Exceedingly curious is his translation of Walter Scott's novels (1840), from which he blotted out every passage which in any way could be interpreted as telling against the Roman Catholic religion, and also all love-passages as far as possible. He was editor of the "Journal des Personnes pieuses." Died in 1858.

Excam'bion [from the It. *cam'bio*, "exchange"], in Scotland, is the legal name for an exchange of lands, or the contract by which one piece of land is exchanged for another. Heirs possessing under deeds of entail are empowered to exchange or excamb certain portions of the entailed lands.

Ex Cathedrâ, a Latin phrase originally applied to decisions given by popes or prelates from their *cathedrâ* (chair), *i. e.* in a solemn judicial manner. Hence it is applied to every decision pronounced by any one in the exercise of his proper authority, as a judge on the bench, etc.

Ex'cellency [Lat. *excellen'tia*, from *excello*, to "excel"], a title of honor which was borne successively by the mediæval Lombard kings, by several emperors of the West, and by other Italian potentates. It is now given to ambassadors, governors of British colonies, and the governor of Massachusetts. The President of the U. S. and the governors of many of the States have the same title by courtesy.

Excelmans, or **Exelmans** (REMI JOSEPH ISIDORE), BARON, a French marshal, born at Bar-le-duc Nov. 13, 1775. He entered the army in 1791, and became aide-de-camp to Murat in 1801. He served with distinction at Austerlitz (1805), and gained the rank of general of brigade for his conduct at Eylau (1807). In the Russian campaign (1812) he commanded a division, and gave proof of much skill. He directed a corps at the battle of Waterloo (1815), after which he passed four years in exile. He was restored to his title as a peer in 1831, and became a marshal of France in 1851. Died July, 1852.

Excel'sior [the comparative degree of the Lat. *excel'sus*, "high," "elevated"] signifies "higher." It is the motto of the State of New York.

Excelsior, a post-township of Hennepin co., Minn. Pop. 335.

Excelsior, a township of Sauk co., Wis. Pop. 874.

Exchange. 1, THEORY OF; 2, BILLS OF; 3, PAR OF; 4, USANCE OF; 5, BOURSE.

1. *The Theory and Practice of Exchange* would demand but little elucidation were the moneys of all countries the same. Unfortunately, this is not the case, and a simple matter becomes in consequence enveloped in much perplexity. Exchange is simply the equivalent or transfer of a given weight of pure metal in the coins of one country for the same weight in those of another. This quantity, when exactly expressed in the coins of the two countries, is called the *par of exchange* between them. Thus, the par of exchange between the U. S. and England is £1 = $4.87, gold, because it requires precisely the weight of pure metal contained in the latter sum to equal the weight of pure metal in an English sovereign. It is, however, customarily expressed in this country thus: 109⅜; nine and five-eighths per cent. being the difference between the value of the pound sterling, $4.44, as fixed by the act of Mar. 2, 1799, and the true present value, or $4.87. The act of 1799 was based on the then value of the pound in Spanish silver dollars, and although amended by act of July 14, 1832, making the pound $4.80, and again by act of July 27,1842, making it $4.84, the ancient custom has prevailed. The subject of exchange is much complicated by the fact that not only are the coins of various countries of various weights, the units of which belong to discordant systems, but they are of various finenesses. Thus, the coins of England and America are aliquot parts or multiples of the Troy ounce, while those of France and continental Europe generally are metrical. British gold coins are 916⅔ thousandths fine, while American, French, and the coins of continental Europe generally are 900 thousandths fine. Another source of perplexity arises from the fact that some countries (France, for example) employ two metals, silver and gold, as co-ordinate legal standards; and still another difficulty occurs when one country uses a gold standard and the other silver, as China, or paper, as Russia. In such cases there can be no true or fixed par of exchange, because the relative market value of gold and silver or paper credit (no matter what their legal relations may be) is constantly fluctuating. The only correct mode of expressing exchange in such cases is to term it the *usual par* or the *usual rate* of exchange, as the case may be. When there is more money due to a foreign country than there is due by that country to our own, bills of exchange upon that country are, with us, at a premium (which premium, however, can never permanently exceed the cost of transmitting bullion in the place of bills), and the exchange is then called *adverse; vice versâ*, it is at a discount, and is called *favorable*. These phrases grew out of the old theory that trade was benefited when the flow of money was inward, and injured when the flow was outward; but whatever the footing the terms once possessed, they are now erroneous and misleading. Adverse exchange only injures him who has to buy it, while it correspondingly benefits the seller.

The fact as to the condition of the exchanges is ascertained by the coming together of merchants and bankers having bills to buy or sell at some common place of resort, commonly called *an exchange* or *a bourse*. Here the contentions of buyers and sellers naturally result in a market price.

It is commonly supposed that a balance of payments to be made by one country to another is the only cause that affects the shipment of specie or bullion, and consequently the rate of exchange, but this is erroneous. The exchanges do not depend on the balance of debts and credits with each country separately, but, so far as they depend at all on this cause, with those of all countries taken together. Thus, while exchange with England may be adverse to us, it might at the same time be to a still greater extent favorable to us with other countries. In such case we should pay our debts to England with bills on the latter countries. This is technically called *arbitration of exchange*.

The prevailing theory of exchange is erroneous in other respects. Not only the balance of payments to be made, but, as before said, the state of the foreign exchanges generally; the condition of the currency; taxation; the product of bullion and its relative value in various countries; the remittances made to this country to meet payments due to other countries; the political security of this and other countries with which it trades; the temporary state of the

money market; the comparative permanent rates of interest in this and other countries; the course of travel and emigration; and the temporary movement of foreign commerce as affected by war, subsidies, indemnities, blockades, tariffs, etc.,—all these are sources of disturbance to exchange; and some of them often affect it much more seriously than a mere unknown and unknowable balance of payments between countries. Thus, when the rate of discount or loanable value of money in neighboring countries differs, it is a common practice to fabricate bills of exchange in the cheaper money market on the dearer, in order to transmit the money to the latter for more profitable employment.

2. *Bills of Exchange.*—Formerly, any written direction from one person to another to pay a sum of money to some person named, or his order, was called a bill of exchange. The term is now generally restricted to bills drawn on distant places, either inland or foreign. Though there is not lacking evidence that their use was perceived in more ancient times (especially in India), bills of exchange are essentially products of the Middle Ages, when commercial pursuits had outgrown their ancient stigma, and the great middle class first evolved itself from the ranks of men. It could not be until both commerce and commercial integrity—the essential basis of bills of exchange—were encouraged and protected by the laws that bills of exchange grew into use. This took place in the Italian republics about the middle of the twelfth century. The introduction of bills of exchange is more particularly ascribed to the Jews of Lombardy about A. D. 1164. The lower rates of interest for money which at that period prevailed in Italy, as compared with other commercial countries, bespeak a state of wealth and security that highly favors the supposition. Another important consideration is that although wealth, as compared with population, was increasing in Italy, it was at least stationary throughout Europe generally, while money was gradually disappearing from circulation in all countries through the failure of the mines; leaving a void which, until the opening of the mines of Potosi some centuries later, could only be filled by some negotiable form of credit. By the commencement of the fourteenth century bills of exchange were used in all the commercial states of Europe, but the custom of assigning them by endorsement does not appear to have grown into use until a long time afterward.

The utility of bills of exchange is fivefold: 1st. They enable a sum of money paid at one place to be exchanged for an equal sum received at another, thus obviating the expense and risk of carrying the money from one place to another. It was to this office that they were originally confined. Money had to be transported under convoy, and consequently only in large sums and at great expense and risk. Pending such convoys, bills of exchange became instruments of the highest value in completing the operations of commerce. As commerce increased, one set of bills was offset against another, treasure ceased to be transported except on rare occasions, and armed convoys in times of peace disappeared altogether. 2d. Bills of exchange postpone the day of payment, and enable debts to wholly or partly offset each other. 3d. They economize coinage. If, for want of bills of exchange, foreign debts were paid in coins, and the same carried from one country to another where they would be uncurrent, they would either have to be reshipped to their country of origin, or recoined, thus occasioning a deficit of coin in one place and a surplus in another. 4th. They equalize the rate of interest for money in various countries, as explained under the head of "The Theory and Practice of Exchange." 5th. They economize currency by performing its functions. Pending the maturity of a bill of exchange the holder may use it in the purchase of commodities, and assign it by endorsement to another party, who may assign it in turn to answer a similar purpose. In this way bills of exchange have sometimes numerous endorsements, each attesting a separate commercial transaction. The amount of bills of exchange in use among various commercial nations cannot be ascertained, varying as it does constantly with the demands of commerce, the mutations of credit, and many other circumstances. In 1825, a year of wild speculation, their amount outstanding in England was estimated at £400,000,000, while forty years later they scarcely exceeded £50,000,000. Through their use, and that of bank-cheques, instruments formerly classed as bills of exchange, all the large transactions of commerce are effected, leaving a much smaller amount of legal-tender money than formerly sufficient for the purposes of trade.

Besides the *drawer* of a bill of exchange, there is a *drawee*, or person to whom it is directed, and who, when it has been presented and accepted, becomes the *acceptor*, and a *payee*, or him to whom it is to be paid. The term *endorser* signifies one who previous to the payment of the bill may have endorsed it, while the person in whose possession the bill is at any given period is called the *holder*.

The chief characteristic of a bill of exchange is its negotiability, to ensure which it must possess several essential qualities. It must be dated; payable at a fixed time or upon the happening of an inevitable contingency; and payable in money. Wanting in these essentials, it becomes unnegotiable, but is not necessarily vitiated as a contract between the original parties; only in such case it falls to the rank of an ordinary personal contract, in which, for example, valuable consideration must be proved, not implied, and which is subject to any pleas, legal or equitable, that may exist between the parties and are pertinent to personal contracts generally. In a properly drawn bill of exchange it is not necessary to express a consideration, or even the ordinary words "value received." A bill of exchange given for a wager or involving usury or fraud is invalidated as between the original parties, but not to the injury of an innocent third party who holds it fairly. A stolen or lost bill is valid in the hands of an innocent party who employed ordinary circumspection as to its title. When acceptance or payment of a bill of exchange is refused it must be legally protested, in order to hold all the parties to it, and unless due notice of the same is given to the drawer and endorsers they are discharged from liability. Acceptance or payment *supra protest* is when a third party intervenes to save the honor of the bill. When a foreign bill is protested the law allows fixed damages against the delinquent. Inland bills of exchange have generally been subjected by statute to the same principles and rules that govern promissory notes. (See PROMISSORY NOTE.) The drawee of a bill is entitled to keep it twenty-four hours after presentation for acceptance. When the bill is payable at a certain time *after sight*, the acceptor should write upon it the date of the acceptance. If a bill of exchange is not presented when due, all the parties except the drawer or acceptor are discharged from liability upon it. Stamps on bills of exchange in the U. S. were abolished by act of June 6, 1872, § 36.

3. *Par of Exchange.*—The par of exchange (the true or usual par) and the charges on gold remittances between New York and the principal money markets of Europe, respectively, are computed as follows:

Sterling: par value of gold 9⅛ per cent. premium, add charges, ⅜ per cent. premium, and ½ per cent. on the gross amount.....=110.550
Francs: par value of gold 517; less charges, 1¼ per cent...=510.538
Dutch Guilders, based on sterling sight in Amsterdam at 11.70, and in New York at 110.55.....= 41.994
Banco-Marcs, based on sterling sight in Hamburg at 13.3½, and in New York at 110.55.....= 37.169
Frankfort Florins, based on sterling sight in Frankfort at 117 1/16, and in New York at 110.55.....= 41.749
Bremen Rixdollars, based on sterling sight in Bremen at 612, and in New York at 110.55.....= 80.283
Prussian Thalers, based on sterling sight in Berlin at 6.22, and in New York at 110.55.....= 72.970

4. *Usance of Exchange.*—As the drawer of a bill of exchange is supposed to be obliged to remit the money wherewith to meet it, though this is not always the fact, custom has accorded him a certain time wherein to effect the transaction. Thus, if a person pays a sum of money into a bank in Edinburgh and desires for it a bill on London, he will receive one payable twenty days after date, exclusive of the customary three days' grace. The interest on the sum during that time defrays the banker's expense in transmitting the money from Edinburgh to London. In case the payee desires a bill payable at sight, the banker will deduct the interest at the market rate for twenty-three days, and give him a sight bill for the remainder. These twenty days are called the *usance of exchange*. The duration of the usance is a matter of custom, which settled it long previous to the advent of modern railways and steam-vessels. Previous to 1825 the usance between Edinburgh and London was fifty days, and though it has since been reduced to twenty, it is still excessive, as indeed it is in most cases. The usance between New York and London is sixty days.

5. *Bourse.*—A place of gathering for the transaction of commercial affairs. A *Collegium Mercatorum* existed at Rome 493 B. C.; but the modern bourse (from Lat. *bursa*, a "purse") originated about the fifteenth century. Bruges and Amsterdam contend for the honor of having erected the first bourse. In 1566 a site was purchased on Cornhill, London, for an exchange, which was erected in 1571, and called the Royal Exchange; destroyed by fire in 1666; rebuilt, enlarged, in 1667; destroyed again by fire in 1838, and rebuilt on a scale of greater magnificence in 1842. This edifice is the market in London for all classes of negotiable paper, the corn and other produce exchanges being in the neighborhood of Mark and Mincing lanes. The next most celebrated bourse in Europe is that of Paris, built 1808–26; then those of Hamburg, Berlin, St. Petersburg, and Amsterdam, the latter dating from 1613.

The New York Stock Exchange owes its origin to an organization of stock-brokers effected May 17, 1792. They subsequently occupied a building in Wall street, which was

destroyed by fire in 1835. A new building was erected on the same site in 1836–40. This was occupied by the stock-brokers for several years. They eventually erected their own building, the present Stock Exchange in Broad street, built 1866, cost $750,000. The entrance fee to the Stock Exchange is $10,000; number of members, 1050, no limit; public admitted to the galleries free. Stocks are "called" from a list by a presiding officer at intervals during the day, and transactions invited and permitted in the stock "called" until the next stock is "called." These transactions fix the market price, at or near which a far greater amount of business is subsequently transacted. This system is entirely different from that pursued in Europe. Bills of exchange are not dealt in at the New York exchanges. During the civil war speculation in stocks and gold ran to such a height that several bourses were sustained during the day in the lower part of the city, besides one or more at night at or near the Fifth Avenue Hotel.

The merchants, produce dealers, etc. have exchanges of their own, the principal one being the Produce Exchange in Whitehall street. ALEXANDER DELMAR.

Exchange Hotel, a township of Montgomery co., Ala. Pop. 1600.

Excheq'uer. The origin of the term commonly accepted is that given by Madox in his "History of the Exchequer"—viz., from Fr. *eschequier*, "chessboard;" Lat. *scaccarium*. Madox attributes this to the fact that a chequered cloth covered the table in the court of the exchequer of the Norman kings of England. The term is probably a corruption. The exchequer or court of the exchequer was formerly part of the *curia regis*, or king's court, composed of the principal officers of state, held in or near the king's palace, and often presided over by the monarch in person. The exchequer is traced to Normandy, whose conquering dukes carried the institution into England, Naples, etc. In time it became separated from the king's court, though still presided over as before. It adjudged causes or common pleas, transacted the ordinary business of the realm, and even important affairs of state policy, besides all matters relating to revenue and expenditure. After a gradual process of differentiation, it has become in modern days a superior court of revenue and common law, its former fiscal functions being separately organized as the treasury. This branch of the British government is managed by five lords commissioners—the first lord (the premier or leader of the ministry), the chancellor of the exchequer, and three others. A somewhat similar arrangement of the fiscal department of the government exists in the U. S. All fiscal affairs are entrusted to the treasury department, all juridical ones to the courts. The law invests the secretary of the treasury, who is the sole presiding officer of that institution, with numerous important discretionary powers, often requiring for their proper exercise the aid of judicial methods and rules; but his decisions, in common with other causes of action, are subject to adjudication in the ordinary courts of law. The various States of the U. S. have treasury departments organized in a somewhat similar manner, except that the functions of the chief officer are commonly little more than ministerial. The treasury of Great Britain and other countries, and from this pecuniary affairs generally, are called the exchequer. ALEX. DELMAR.

Exchequer, Bills of, promissory notes issued from the British exchequer by authority of law, usually in limited amounts, and for the purpose of anticipating the revenues. They bear interest, and are not a legal tender. Similar obligations were issued by the U. S. under act March 1, 1862, called certificates of indebtedness, payable in one year from date, or earlier at option of the government, and bearing interest at the rate of 6 per cent. per annum. These have since been retired. ALEX. DELMAR.

Exchequer Chamber, Court of, in England, was originally a court of all the judges in England, assembled for the decision of matters of law. By 1 Will. IV. c. 70, this court is constituted the proper tribunal for the trial of writs of error from the three superior courts of common law. The judges of two of these courts always form the court of appeal, which reviews the decisions of the third. (See COURTS, by GEORGE CHASE, LL.B.)

Exchequer, Chancellor of the, is the title of the highest finance minister of the British government. This office is from its nature necessarily entrusted to a commoner. When the prime minister is a member of the House of Commons, he sometimes holds the office of chancellor of the exchequer.

Exchequer, Court of, in England, is one of the supreme courts of common law. It was originally established for the recovery of the king's debts and ordinary revenues of the Crown. The judges of this court consisted originally of the lord treasurer, the chancellor of the exchequer, and three puisne judges, which last were called barons of the exchequer. In its modern shape it is, in fact, a combination of eight distinct ancient courts. It acquired concurrent jurisdiction with the other two superior courts in all personal actions by the fiction of the plaintiff being a debtor to the king—a fiction which is now removed. It has exclusive jurisdiction in cases in which the royal revenue is concerned. It had formerly also an equitable jurisdiction, which was abolished by 5 Vict. c. 5, and transferred to the court of chancery. The court now consists of five judges—viz., the chief baron and four barons of exchequer. From this court an appeal lies in error to the court of EXCHEQUER CHAMBER (which see; also COURTS).

Excip'ient [Lat. *excip'iens*, pres. part. of the verb *excip'io*, to "receive"], or **Ve'hicle,** in pharmacy, is an inert substance used to give form and consistence to solid preparations, such as pills and dragées, or to give palatability and the necessary qualities for administration to any medicine. The various conserves, also honey, treacle, simple syrups, glycerine, white of egg, and mucilage of acacia are among the most useful excipients.

Excise [from the Lat. *excido, excisum*, to "cut off," from *cædo*, "to cut"], in Europe, a tax on the production, annual use, sale, or consumption of domestic commodities. In the U. S. the term is confined to the tax on the production or sale of spirituous or fermented liquors, or the productive capacity of liquor stills, revenue from liquor stamps, etc. The term "internal revenue tax," used here, comprises all that is or was formerly meant in Europe by excise, as well also the taxes on slaughtered animals, gross receipts, licenses, incomes, legacies, passports, the dividends, circulation, deposits, or capital of banks, insurance and railway companies, and newspapers, penalties, etc. (See INTERNAL REVENUE.) Excise or accize is traceable to the fifteenth century, and was the method by which the towns and boroughs of continental Europe recouped themselves from their inhabitants for the talliages levied upon them by the sovereign, each district imposing such excises as best suited its peculiar circumstances. This, in Holland, eventually ripened into a system of national taxation; and in this form it found its way to England in the early part of the seventeenth century, where it has since remained firmly established. From England it was transplanted to this country. Excise is imposed here not only by the Federal, but also by the State and municipal governments. The former first imposed excise in the year 1792. The tax was discontinued in 1801, having meanwhile caused a rebellion in Pennsylvania. It was again imposed in 1814, during the war with England, and discontinued in 1817. In 1863, during the civil war, it was imposed again, and has continued to the present time. During the first period its product sustained the average proportion of 4 per cent. to the total gross revenues of the Federal government from all sources; during the second period, $6\frac{7}{10}$ per cent.; and during the present period it has averaged, so far, about 10 per cent. This leaves out of view the heavy customs duties on imported liquors and the excise taxes levied by the various States and municipalities. The following table exhibits the annual product of the Federal excise at each period named:

Calendar year.	Total revenues from various taxes on distilled spirits.	Calendar year.	Total revenues from various taxes on distilled spirits.
1792	$631,170	1799	$573,086
1793	422,026	1800	577,559
1794	480,229	1801	504,902
1795	397,728		
1796	481,947	1814	1,681,086
1797	565,984	1815	3,048,906
1798	584,923	1816	2,002,761

Fiscal year.	Distillation, capacity, sales, stills, stamps and license, and taxes on distilled spirits.	Taxes on fermented liquors.	Spirits, Act March 7, 1864.	Wine from grapes.	Total revenues from excise.
1863	$5,176,530	$1,628,934		$8,824	$6,814,288
1864	30,329,150	2,290,009	$176,039	28,303	32,823,501
1865	18,731,422	3,734,928	252,690	34,739	22,753,779
1866	33,268,172	5,220,553	200	51,616	38,540,541
1867	33,542,952	6,057,501			39,600,453
1868	18,655,631	5,955,869			24,611,500
1869	45,026,402	6,099,880			51,126,282
1870	55,581,599	6,319,127			61,900,726
1871	46,281,848	7,389,502			53,671,350

The principal excise tax has been that on the production of distilled spirits. The rate of this tax during the last (present) period was first fixed by act of July 1, 1862, at 20 cents per gallon. This was equal to nearly 100 per cent. ad valorem, the average wholesale price of spirits in New York having been in 1858, 24½ cents; 1859, 27 cents; 1860, 22 cents; 1861, 18¾ cents; and 1862, 29 cents. It afterwards rose in 1863 to 53 cents (paper currency, the same in which the tax was imposed), in 1864, to $1.45, and to still higher

prices afterwards, though it was frequently sold for less than the amount of the tax. On March 7, 1864, the production tax was raised to 60 cents per gallon; on July 1, 1864, this was further raised to $1.50 per gallon, and on Jan. 1, 1865, to $2 per gallon. This rate was continued until by the act of July 20, 1868, it was lowered to 50 cents, where it now stands. The violent fluctuations shown in the product of the tax were the result of speculation and jobbery in anticipating the passage of laws imposing or changing the rates. The annual consumption of spirits in the U. S. was estimated by Alexander Hamilton in 1792 at three gallons per capita of population; in 1810, by Adam Seybert, at four and a quarter gallons; in 1860, by the superintendent of the census, at about three gallons; and this is believed to be the average consumption still, it being borne in mind that a large portion of this is consumed in the arts and for other purposes than beverages. The difference between this amount of consumption and the results shown by the tax returns is chiefly accounted for by illicit distillation. (See TAXATION.)

Distilled spirits in the U. S. are made for the most part from grain, and it is estimated that about 40,000,000 bushels per annum, mainly of Indian corn, are used up in this way. ALEX. DELMAR.

Ex'cito-mo'tor Action, in physiology, is that variety of reflex action which, arising from impressions made at the periphery (internal or external), is first transmitted by afferent nerve-filaments to a nerve-centre, and thence reflected without volition along motor (deferent) nerve-filaments to a muscle, which is thereby aroused to action. For example, a sudden impression of light causes the pupil of the eye to contract; the presence of a particle of food in the glottis causes intense involuntary coughing. (See REFLEX ACTION.) Excito-motor action is peculiarly active in very young children and in many of the lower animals. In some diseases (tetanus, hydrophobia, strychnia poisoning) it is immensely increased. Chloral, belladonna, curari poison, and especially the alkaloid curaria, all appear powerfully to reduce action of this kind.

Exclu'sion Bill, in English history, a bill which was designed to exclude the duke of York (King James II.) from the throne, because he was a Roman Catholic. It was adopted by the House of Commons in 1679, but was rejected by the House of Lords.

Excommunica'tion [Lat. *excommunicatio*, from *ex*, "out" or "out from," and *communico, communica'tum*, to "share," to "partake;" the act of putting one out from, so that he has no share in, the privileges and protection of the Church], the formal expulsion of a person from privileges religious or social, inflicted by church authority upon persons accused of misconduct or heresy. The ancient Israelites excommunicated offenders by exclusion from the camp, by "cutting off from the people," and in later times by "putting out of the synagogue." This punishment, in extreme cases at least, was a social interdict of the severest kind. Excommunication in the Christian Church was established by Christ's teachings, and by the precept and example of the apostles, and was necessary both for the self-preservation of the Church and for the spiritual and moral good of the offender. In early times—as also in the Roman Catholic and in several Protestant churches at present—there was a lesser and a greater excommunication; the former a virtual suspension from church privileges, the latter a formal expulsion. The greater excommunication in the Latin Church is less severe than the anathema. Excommunication was not unfrequently employed by the popes in former times as a punishment for refractory monarchs, and even for whole nations, but in later times it has not been so employed, the so-called excommunication of Victor Emmanuel in 1860 being merely a statement of the ecclesiastical penalties which the pope might inflict upon the invaders of the pontifical domains. In Prussia and Switzerland the excommunication of the Old Catholic priests by the Catholic bishops has recently brought on severe conflicts between the State and the Church.

Exe (anc. *Isaca*), a river of England, rises in Exmoor, in Somersetshire, flows generally southward through Devonshire, and after a course of 54 miles enters the English Channel at Exmouth. The chief towns on its banks are Tiverton and Exeter.

Execu'tion [Lat. *execu'tio*, from *ex*, "out," and *se'quor, secu'tus*, to "follow;" literally, a "following or carrying out" of some design or of a legal sentence], the infliction of the death-penalty by the proper civil, military, or naval authorities. In the U. S. this act is performed by the county sheriff in the precincts of a jail or prison, in presence of certain officials and other witnesses, and hanging is the only method employed. Military executions are performed by a provost-marshal and his guard, either by shooting with small-arms or by hanging. Naval executions are generally by hanging at the yard-arm. In Western Europe hanging is the more common method in civil cases, except in France, where the guillotine is employed, and in Spain the garrote takes its place. Burning, drowning, stoning, and a great variety of methods have been practised in former times. In the Indian mutiny of 1857 many of the captured Sepoys were blown from the cannon's mouth.

Execution, the formality of signing, sealing, and delivering a deed, or of signing and publishing a will; in criminal law, the carrying into effect the sentence of the law by putting the criminal to death; in civil actions, the carrying out the final judgment of the court, or, more strictly, the writ directing the sheriff, coroner, or marshal to carry such judgment into effect.

Under the law of England, there were three writs in constant use to enforce a judgment for the payment of money: 1st, a writ of *fieri facias*, commonly called a *fi. fa.*, directing the officer to cause to be made the amount of the judgment out of the goods and chattels of the debtor; 2d, a writ of *elegit*, given by statute of 13 Edw. II., directing the officer to deliver the goods and chattels of the debtor to the creditor at an appraised value, in satisfaction of the judgment, and, if these are insufficient, to put him in possession of one-half the debtor's land till the rents and profits satisfy the judgment; 3d, a writ of *capias ad satisfaciendum*, commonly called a *ca. sa.*, directing the officer to arrest the debtor and keep him in confinement till he satisfies the judgment.

The English practice has been somewhat changed in the State of New York. There are two writs of execution—one against the property, and one against the person, of the debtor. The former, which resembles the *fi. fa.*, directs the sheriff to satisfy the judgment out of the personal property of the debtor within the county, and, if sufficient cannot be found, then out of his real property, and to return the writ within sixty days. The latter, like the *ca. sa.*, directs the officer to arrest the debtor and keep him in jail till he pays the judgment or is discharged according to law. Since the act of 1831 abolishing imprisonment for debt, this writ is allowed in comparatively few cases, as when the debt was contracted in fraud, or the debtor has attempted to remove his property, or has violated his duty in some trust relation. Under the execution against the property the sheriff sells at public auction the real and personal property of the debtor, though a variety of articles necessary for the prosecution of a business and support of a family are exempted, as also a homestead to the value of one thousand dollars, subject to certain conditions. If the judgment is for the recovery of specific real or personal property, the execution directs the sheriff to deliver such property to the plaintiff. Many of the other States have closely followed the New York practice.

Although these proceedings are instituted by the party in whose favor the judgment is rendered, they are considered as the acts of the law, and the officer entrusted with their performance is responsible to the party aggrieved for any misconduct or neglect of duty.

Executive Department, The, in the U. S. government, is that branch of the public service which attends to the execution of the laws of the general government. This department is under the direct control of the President, who is the principal executive officer. The duties of the executive department are the most extensive of all. It makes all civil, naval, and military appointments, and manages the army and navy, collects customs and internal revenue, sells public lands, and pays all appropriations authorized by Congress. Each of the secretaries of inferior departments, including the postmaster-general and attorney-general, take rank next the President as officers of the executive department. They together constitute the so-called "Cabinet," which, by usage, has become a consulting or advisory council to the President. These officers are the secretary of state, of the treasury, of the interior, of war, of the navy, and the postmaster-general and the attorney-general. (See UNITED STATES.)

Exec'utor [from the Lat. *ex*, "out," and *sequor, secutus*, to "follow"], one to whom a testator commits the execution of his last will. The will is the source of the executor's title, and the probate (or proof) of the will is merely evidence of it. As a general rule, any one capable of making a contract can be an executor. By the law of England, an infant can act as executor after the age of seventeen. In many of the U. S. it is provided by statute that no person under twenty-one is competent to act as executor. The chief duties of an executor are to bury the deceased in a manner suitable to the estate which he leaves, to prove the will, make an inventory of his goods, collect the assets, and pay the debts and legacies. An executor has general control over the personal estate, and possesses the same property in it as the testator had when living, and the same remedies to recover it. He has no power over the real

estate, unless it is given to him by the will, or unless the local law gives it to him when the personal property is insufficient to pay the debts. When he has authority given to him in a will to control the real estate, he is not deemed to act as an executor, but either as a trustee or the grantee of a power, according to the nature of the authority conferred upon him.

An executor *de son tort* is one who interferes with the goods of a deceased without lawful authority. He has the trouble of an executor without the advantages. He may be sued as executor if any assets have come into his hands, but cannot bring an action as executor.

In some States, executors are required to give bonds for the faithful discharge of their duties, and in others the probate court has a right to require them to furnish security if there is any doubt of their solvency.

Exege'sis, or **Exeget'ical Theol'ogy** [Gr. ἐξήγησις, from ἐξηγέομαι, to "lead," also to "teach," to "expound" (from ἐξ for ἐκ, "out," also "intensive," and ἡγέομαι, to "lead," to "guide," to "point out the way"); ἐξηγητής, originally, among the Athenians, the interpreter of the oracles of Delphi, the signs of heaven, and sacred rites; among Christians, the interpreter of the Holy Scriptures], is the first and most important part of theological science, and covers the whole field of biblical literature, or all that pertains to the learned explanation of the Old and New Testaments. It originated among the Jewish rabbis, but was afterwards far more extensively cultivated among the Christian Fathers, the Reformers, and the divines of all ages. It is taught as a science and practised as an art in all theological institutions, and its results are applied from every pulpit throughout the Christian world. No knowledge is more useful and indispensable to a clergyman than the knowledge of the Bible, which he has to explain from Sunday to Sunday, and which among Protestants is the only infallible source and rule of faith and morals and all that pertains to the eternal interests of men.

I. *Kinds of Exegesis.*—(1) *Philological* or grammatico-historical exegesis is the basis on which all other interpretation and application must rest. It aims simply at the meaning of the writer according to the recognized laws of language and the *usus loquendi* at the time of composition, and according to the historical situation of the writer, irrespective of any doctrinal or sectarian bias. It implies a thorough knowledge of Greek and Hebrew, and familiarity with contemporary literature. (2) *Theological* exegesis develops the doctrinal and ethical ideas of the writer in organic connection with the whole teaching of the Scriptures and according to the analogy of faith. (3) *Homiletical* or practical exegesis is the application of the well-ascertained results of grammatical and theological interpretation to the wants of the Christian congregation, and belongs properly to the pulpit.

II. *Auxiliary and Supplementary Branches.*—(1) *Sacred Philology,* the science of the languages in which the Bible was originally written—viz., the Hebrew in the Old Testament (with a few sections in the cognate Semitic dialect called Chaldee or East Aramaic), and the Greek in the New Testament. The latter is not the classical Greek, but the Macedonian or Alexandrian dialect, with a strong Hebrew coloring (hence called the Hellenistic, because spoken by the Hellenists, *i. e.* the Greek Jews) and the infusion of the spirit of Christianity, which created new words or inspired a deeper meaning into old words. The New Testament Greek requires, therefore, a particular study, special grammars (*i. e.* Winer, Buttmann, Jr.), and special dictionaries (Wahl, Bretschneider, Wilke, Grimm, Cremer, Robinson).

(2) *Biblical Archæology* or *Antiquities*—*i. e.* a systematic description of the external and internal condition of the nations among which, and the countries in which, the Bible was composed. This includes, again, the geography and natural history of Palestine and adjacent countries, the topography of Jerusalem, an account of the domestic habits, social institutions, agriculture, arts and science, religious rites, and ceremonies of the Hebrews. The material of Jewish antiquities is derived mostly from the Bible itself, but also from Philo and Josephus, the "Talmud," the monumental remains of Egypt, Assyria, Babylon, and the accounts of modern explorers down to the labors of the English and American Palestine Exploration Societies now in progress. Dr. Robinson of New York (died 1863) broke the way for truly independent critical research of the localities of Jerusalem above the surface, while the Palestine Exploration Society of England has begun to make us acquainted with subterranean Jerusalem as it was before the destruction.

(3) *Biblical Criticism* aims at the approximate restoration of the original text of the Bible as it came from the hands of the inspired authors. The autographs being lost, we are confined to the oldest uncial manuscripts, which date from the fourth and fifth centuries. Besides, we have partial and secondary sources of the Greek text in the very numerous Scripture quotations of the Christian Fathers (Origen, Irenæus, Chrysostom, etc.), and the old translations (especially the Syriac, Peshito, and the Latin Itala and the improved Vulgate of Jerome). Textual criticism includes a discussion of the merits of the received text (*textus receptus,* derived from Erasmus, Stephens, Beza, and Elzevir), the principles for ascertaining the oldest and purest text, the classification of manuscripts and different readings, and a history of the printed text from Erasmus and the Complutensian Polyglot down to Lachmann, Tischendorf, and Tregelles. There is a gradual approach to an agreement among the best critics, and the conviction of the essential integrity of the primitive text has been greatly strengthened by the latest discoveries (*e. g.* the "Codex Sinaiticus") and investigations.

(4) *Historico-Critical Introduction to the Books of the Old and New Testaments* is a literary history of the Bible, and includes all the introductory information necessary for the proper understanding of its contents, as the question of the genuineness and integrity of the book, the persons addressed, the place and time of composition, the object and aim of the writer. It gives also a history of the canon or collection of the several books of the Bible into one authoritative code, distinct from all other books, and recognized as a rule (κανών) of faith and morals by those who receive them. The principal works on introduction are by De Wette, Hug, Reuss, Bleek, Guericke, Horne, Davidson. Compare also the "Bible Dictionaries" of Kitto (3d ed. by William L. Alexander, 3 vols.), William Smith (ed. with improvements by Hackett and Abbot, in 4 vols.), Fairbairn, Winer, Schenkel.

(5) *Biblical Hermeneutics*—*i. e.* the science of the principles of interpretation, and the necessary qualifications for an expounder of the Scriptures. These qualifications are partly intellectual (familiarity with the general laws of thought and speech, knowledge of the particular languages of the Bible, sound judgment) and partly moral (freedom from prejudice, readiness to do justice to the author, sympathy with his spirit and ideas).

(6) *Biblical Theology of the Old and New Testaments* is a summing up of the results of exegesis in systematic order, and presents a full view of the teaching of the Scriptures, irrespective of the subsequent systems of denominational dogmatics and ethics derived from them. This branch of exegetical theology is of recent growth, and has thus far been mostly cultivated by Continental scholars. There are also special treatises on the theology of Christ, the theology of Paul, John, and Peter. Each of the apostles, as he has his own peculiar style, represents also a special aspect of the Christian system; yet all harmonize and exhibit together the fulness of the gospel. (Compare the works of Schmid and Van Oosterzee on New Testament Theology, recently translated into English; Ewald, Schultz, and Oehler on Old Testament Theology.)

III. *History of Exegesis and Principal Commentaries.*—(1) *Jewish* exegesis, confined to the Old Testament. It began soon after the close of the canon. It was especially devoted to the Law (the Thorah), *i. e.* the Pentateuch, and derived from it minute rules for the individual, social, and ecclesiastical relations. The body of these interpretations is called *Midrash.* The prevailing method of exegesis was the rabbinical or literal; it excluded all foreign ideas, and was subservient to the strict legalism of the Pharisees. But among the Hellenist (Greek-speaking) Jews, especially in Alexandria, the allegorizing method obtained favor, especially through Philo (died about 40 A. D.), who endeavored to combine the Mosaic religion with Platonic philosophy, and prepared the way for the allegorizing exegesis of Clement and Origen of Alexandria. The Jewish rabbins of the Middle Ages cultivated grammatical exegesis at a time when the knowledge of Hebrew had died out in the Christian Church. The most distinguished among them are Ibn Ezra (died 1167), R. Sal. Isaak or Raschi (died 1105), David Kimchi (died 1190), Moses Maimonides (died 1204). Their commentaries are printed separately, and also in the so-called Rabbinical Bibles (*e. g.* of Buxtorf, Bâle, 1618, 3 vols. fol.).

(2) *Patristic Exegesis.* The first use made of the Bible in the Church was practical and homiletical. It was to the early Christians what it still is to the great mass of believers, and will be to the end of time—a book of life, of spiritual instruction and edification, of hope and comfort. Scientific or learned exegesis began when the Bible was perverted by heretics and made to serve all sorts of errors. The Greek Church took the lead. Origen (180–254), the greatest scholar of his age, a man of genius and iron industry, is the father of critical exegesis. He is full of suggestive ideas, but far from being sound. His theory of hermeneutics is untenable, and opens the way for the most fanciful and arbitrary expositions or impositions. He distinguishes three senses in the Bible, corresponding to the

three parts of man: (*a*) a literal or bodily sense; (*b*) a moral or psychic sense; (*c*) an allegorical or mystic, spiritual sense. Where the literal sense is offensive, he escaped the difficulty by adopting a purely spiritual sense. The greatest commentators of the Greek Church are Chrysostom (died 407), who in his "Homilies" explained the principal books of the Old and New Testaments, Theodore of Mopsuestia (died 429), Theodoret of Cyros (died 457). Among the Latin Fathers, Augustine (died 430) is the profoundest and most spiritual, Jerome (died 419) the most learned expounder. The latter achieved the highest merit by his improved Latin version of the Bible (the Vulgate), which remains to this day the standard version of the Roman Church. The Council of Trent forbade the interpretation of Scriptures except according to "the unanimous consent of the Fathers." But this rule would prevent all progress in theology; and besides, such a "unanimous consent" does not exist except in the most fundamental doctrines.

(3) *Mediæval exegesis* was purely traditional, and consisted of brief glosses (*glossaria*) or of extracts from the Fathers (called *catenæ Patrum*). The original languages of the Bible were unknown in the West, and even the first among the scholastics had to depend upon Jerome's version for their knowledge of God's word. The prevailing method distinguished four senses of the Scriptures: (*a*) the literal or historical; (*b*) the spiritual or mystic, corresponding to faith, teaching what to believe (*credenda*); (*c*) the moral or tropological, which corresponds to love or charity, and teaches what to do (*agenda*); (*d*) the anagogical, which refers to hope (*speranda*). The principal patristic compilations are (*a*) in the Greek Church, those of Œcumenius (died 990), Theophylactus (died 1007), Enthymais Zigabenus (died 1118), and Nicephorus (fourteenth century); (*b*) in the Latin Church, Wallafried Strabo (died 849), Thomas Aquinas (died 1274). The *Catena aurea in Evangelia* of Aquinas has been recently reproduced in an English translation by Pusey, Keble, and Newman. Among the more independent biblical scholars of the Middle Ages who prepared the way for the Reformation must be mentioned Nicolaus à Lyra (died 1340: "Si Lyra non lyrasset, Lutherus non saltasset"), and Laurentius Valla (died 1465).

(4) The exegesis of the *Protestant Reformers* of the sixteenth century marks a new epoch. It is full of enthusiasm for the word of God in the Bible as the only rule of Christian faith and practice, and free from the slavery of ecclesiastical tradition. It went directly to the original Greek and Hebrew Scriptures, and furnished the best translations for the benefit of the people, while Romanism regards the Bible as a book for the priesthood, and discourages or prohibits efforts for its general circulation without note or comments. All the Reformers wrote commentaries more or less extensive on various books of the Bible—Luther (died 1546), Melanchthon (died 1560), Zwingli (died 1531), Œcolampadius (died 1531)—but the ablest of them are Calvin (died 1564) and his pupil Beza (died 1603). Calvin combines almost all the qualifications of an expounder in rare harmony, and his commentaries on Genesis, the Psalms, the Prophets, and all the books of the New Testament (except Revelation) are valuable to this day.

(5) Protestant commentaries of the seventeenth and eighteenth centuries by Hugo Grotius (died 1645, Arminian), Vitringa (died 1722, Dutch Calvinist), Hammond (died 1660, Church of England), Mathew Poole (Presbyterian, died 1679, "Annotations upon the Whole Bible," an English synopsis from his Latin synopsis), Matthew Henry (Independent, died 1714, the best homiletical commentator of England), John Gill (Baptist, died 1771), Philip Doddridge (Independent, died 1751, author of "Family Expositor"), Calovius (Lutheran, died 1686, "Biblia Illustrata" versus Grotius), J. A. Bengel (Lutheran, died 1752, author of the "Gnomon of the New Testament," in Latin, twice translated into English, an admirable specimen of *multum in parvo*). Collective works: "Critici Sacri," London, 1660, 9 tom.; Amsterdam, 1698–1732, in 13 vols. (compiled from the principal commentators as an appendix to Walton's "Polyglot," under the direction of Bishop Pearson and others); Poole's "Synopsis Criticorum aliorumque S. Scripturæ interpretum," London, 1669–76, 4 vols. in 5 fol. (a very useful abridgment from the "Critici Sacri" and other commentators).

(6) Modern commentaries, chiefly German, English, and American: (*a*) On the whole Bible: Lange's "Bibelwerk," Bielefeld and Leipsic, 1857 seq. (a threefold commentary, critical, doctrinal, and homiletical, prepared by a number of Continental, mostly German, divines, and to be completed in about 30 parts, chiefly for the use of ministers and students); the same in English, with large improvements and additions by more than forty American scholars of all denominations, under the editorial care of Philip Schaff, New York and Edinburgh, 1864 seq. (to be completed in 23 vols., of which 18 had appeared in 1873); "The Speaker's Commentary," suggested by the Speaker of the House of Commons, ed. by Canon F. C. Cook, aided by a number of bishops and presbyters of the Church of England, London and New York, 1871 seq., to be completed in 8 vols. (so far two vols., from Genesis to Kings, mainly for the lay reader). (*b*) On the New Testament: Olshausen, De Wette, and especially Meyer (the first philological commentator now living), among the Germans, Alford and Wordsworth among the English; all for critical students. Of popular commentaries of the New Testament, Barnes has had by far the widest circulation in America and England. The present century has also produced a large number of exegetical works of the first order on separate books of the Bible, which it would be impossible here to enumerate. Among recent commentators on one or more books of the Old Testament, Gesenius, Ewald, Hupfeld, Hitzig, Hengstenberg, Delitzsch, Schlottmann, Stuart, Joseph A. Alexander, occupy the first rank. Of New Testament commentators must be mentioned Winer, Fritzsche, Tholuck, Lücke, Bleek, Harless, Godet, Stuart, Hodge, Stanley, Jowett, Ellicott, and Lightfoot. Among these, again, Tholuck on Romans and the Sermon on the Mount, Lücke on the Writings of St. John, Harless on Ephesians, Hodge on Romans, Ellicott on Galatians, Ephesians, Thessalonians, and Pastoral Epistles (republished in Andover), Lightfoot on Galatians and Philippians, are most useful for the critical study of the Greek Testament.

Philip Schaff.

Exete'r [Lat. *Isca* or *Exonia*], a city and seaport of England, the capital of Devonshire and a separate county, is on the river Exe, about 10 miles from the sea, and 170 miles W. S. W. of London, with which it is connected by railway. It is pleasantly situated on the sides and summit of an acclivity, and is well built, well paved, and liberally supplied with water. Exeter is the see of a bishop, and has a magnificent cathedral, which was commenced in 1280; it is 408 feet long, and has two Norman towers 145 feet high. The W. front is richly decorated, and presents a façade which is one of the most beautiful in England. In one of the towers is the Great Tom of Exeter, or Peter's Bell, which weighs 12,500 pounds. Exeter contains a theatre, twenty-four Episcopal churches and chapels, and a lunatic asylum. It returns two members to Parliament. Vessels of 400 tons can ascend the Exe to this place, from which dairy produce, fruits, and other articles are exported. Here are several large nurseries. Pop. of municipal borough in 1871, 34,646.

Exeter, a post-village of Huron co., Ontario, Canada, has quite extensive manufactures and a thriving trade. Pop. about 1000.

Exeter, a post-township of Penobscot co., Me. It has manufactures of lumber, shingles, carriages, etc. P. 1424.

Exeter, a post-township of Monroe co., Mich. P. 1067.

Exeter, a post-village, one of the capitals of Rockingham co., N. H., on the Squamscott River and the Boston and Maine R. R., 50 miles N. of Boston. It has the county offices, a national bank, two savings banks, four hotels, Phillips Academy, a richly-endowed institution founded in 1781, Robinson's Femal Seeminary, a high school, one weekly newspaper, seven churches, a large cotton-mill and machine-shop, railroad round-house, and manufactures of lumber, castings, and carriages. Pop. of Exeter township, 3437. Charles Marseilles, Pub. "News Letter."

Exeter, a post-twp. of Otsego co., N. Y. Pop. 1256.

Exeter, a township of Berks co., Pa. Pop. 2239.

Exeter, a post-township of Luzerne co., Pa. Pop. 742.

Exeter, a township of Wyoming co., Pa. Pop. 211.

Exeter, a post-twp. of Washington co., R. I. P. 1462.

Exeter, a post-township of Green co., Wis. Pop. 949.

Exeter Hall, a building in the Strand, London, erected in 1831, and remodelled in 1850. It is celebrated as the place of assembly of many of the religious and philanthropic societies of England. "Exeter Hall philanthropy" is a term applied to public efforts in behalf of the poor and degraded, implying (often with injustice) that such efforts are ostentatious and ineffectual.

Ex'ile [Lat. *exi'lis*, remotely from *ex*, "out," and *a'go*, to "drive"], involuntary removal to a foreign country for residence; the person so removed. The term exile, when applied to persons, is now generally confined to mean such as are removed to a foreign country through public misfortunes in their own, as famines, etc., or from political reasons, as being obnoxious to the prevailing government. The civil and religious liberties of Holland, England, and the U. S. have rendered those countries the principal resort of exiles during the past three centuries. Great liberality was exercised towards foreigners in the mediæval

Italian republics, but the only state which previous to the independence of Holland is believed to have afforded complete protection to exiles, regardless of religion or politics, was the califate of Córdova under the Moorish conquerors of Spain. The liberality thus displayed met with rich return, and Córdova for several centuries became the resort of the most eminent scholars of Europe, and the depository of that torch of civilization which had else been extinguished in the surrounding darkness of the age. (*Draper's Intellectual Development.*) Up to A. D. 1377 exiles in England were deprived of all protection, and barely tolerated. In 1430 it was provided that if they were tried criminally, the juries might be composed one-half of foreigners, if the accused desired. In 1483 they were restrained from exercising any trade or handicraft by retail. This restriction continued to exist in England until the eighteenth century. The Netherlands first set the example of tolerating and protecting exiles in more modern times, this practice dating from the revolution and independence of that country. As a consequence, it became the home of not only exiles, but enterprising persons from all countries, and this added greatly to its wealth and prosperity. In France political exiles were first tolerated during the Revolution of 1789, though at the same time a considerable portion of the most educated classes of her own population were forced, from the selfishness and excesses of their class and the vengeance and ferocity of the revolutionists, to flee for safety to England and other countries. The Moors and Jews were banished from Spain about the time of the discovery of America, and many of the latter, known as Spanish and Portuguese Jews, eventually found their way to the West Indies, which, for a long time after, particularly when the Dutch and English had planted colonies there, became a favorite place of refuge for exiles. Switzerland has enjoyed a similar distinction for a long time. North America from its earliest settlement has been a place of exile for banished Europeans, whether for religious, political, or other reasons. The following are among the distinguished exiles to the U. S. since its establishment as an independent government:

Thaddeus Kosciusko, Poland, born 1755, embarked for America 1776; departed at conclusion of war for independence; Poland 1789; defeated 1794; imprisoned at St. Petersburg; liberated; revisited the U. S. 1797; France until 1814; Switzerland 1816.

Louis Philippe, France, born 1773, exiled to Switzerland 1793; Hamburg 1795; U. S. 1796, accompanied by Duke Montpensier and Count de Beaujolais; left New York for England 1799; Messina 1808; England 1809; Italy 1809; returned to France 1814, after an exile of twenty-one years. Again exiled 1815; returned 1817; elected king 1830; reigned till 1848, and then exiled to England, where he resided till his death.

Joseph Garibaldi, Italy, born 1807; exiled 1831; returned and exiled again 1834; South America 1836; Italy 1847; defeated and exiled to U. S. 1848; South America, England 1854; retired to Caprera, Marsala 1860; Caprera, Aspromonte 1862; pardoned; England 1864; Caprera 1864.

Louis Napoleon Bonaparte, France, born 1808; exiled with his mother to Holland soon after his birth; Italy 1830; England 1831; Strasbourg revolt 1836; exiled to U. S. 1837; South America 1837; Switzerland 1837; England 1837; Boulogne exploit 1840; imprisoned in Ham 1840; escaped to England 1846; returned to Paris 1848; elected president 1848; emperor 1852; reigned till 1870, when he was defeated and exiled to England, where he died 1873.

Louis Kossuth, Hungary, born 1802; fled to Turkey 1849; liberated and conveyed as the guest of the nation to the U. S. 1851; departed 1852 for England, where he resided until his death.

Thomas Addis Emmet, Ireland, born 1765; imprisoned 1798; exiled to France 1802; Brussels 1803–04; New York 1804, where he died 1827.

William Smith O'Brien, Ireland, born 1803; exiled 1848 to Australia; pardoned 1856; visited U. S. 1859.

ALEX. DELMAR.

Exi'ra, a post-village, capital of Audubon co., Ia., beautifully situated on the Nishnabatona River, 70 miles W. of Des Moines, in a fertile, well-timbered region abounding in lignite, peat, potters' clay, and chalybeate mineral springs. It has a public square, two churches, a weekly newspaper, and a fine school-house. Pop. of village, 161; of township, 426.

D. M. HARRIS, ED. "DEFENDER."

Ex'moor For'est, England, is partly in Devonshire and partly in Somersetshire. It is mostly uncultivated, and is occupied by dark ranges of hills and lonely valleys. The surface-rocks are Devonian slate and new red sandstone. The highest point of the hills is 1668 feet. Exmoor is partly covered with heath, and contains considerable meadow-land.

Ex'mouth, a town and watering-place of England, in Devonshire, is on the English Channel at the mouth of the Exe, 10 miles S. E. of Exeter. The mildness of the climate and the beauty of its scenery render it a favorite place of resort. Here Sueno the Dane landed in 1003. Pop. 5220.

Ex'mouth (EDWARD PELLEW), VISCOUNT, an English admiral, born at Dover April 19, 1757. He served with distinction at the battle of Lake Champlain in Oct., 1776, and became a post-captain in 1782. In 1804 he obtained the rank of rear-admiral, and in 1808 that of vice-admiral of the blue. He was created Baron Exmouth in 1814, and was raised to the rank of admiral. He commanded a fleet which in 1816 was sent to enforce a treaty which the dey of Algiers had violated. This fleet, aided by a Dutch fleet, bombarded Algiers in August of that year, and reduced the dey to submission. He received the title of viscount in Dec., 1816. Died Jan. 23, 1833. (See E. OSLER, "Life of Admiral Exmouth," 1835.)

Ex'ner (FRANZ), a German philosopher, born in 1802, became in 1831 professor of philosophy in the University of Prague, and was appointed counsellor in the Austrian ministry of public education in 1848. Died in 1853. He wrote, among other works, "Die Psychologie der Hegel'schen Schule" (1842–44), and "Uber die Lehre von der Einheit des Denkens und Seins" (1845).

Ex'odus [from the Gr. ἐξ, "out," and ὁδός, a "way" or "journey"], the banishment or departure from a country of a large body of people. The most ancient as well as the most remarkable instance of this kind is that related of the children of Israel, who departed from Egypt to take up their abode in Canaan about the fourteenth or fifteenth century B. C. The history of this people affords many other removals of the sort, their race and religion subsequently rendering them objects of persecution in all ages and countries of the world. During their captivity in Babylon that city was taken by Cyrus (B. C. 538), and the Jews were allowed to return to their own country. After the second destruction of the Temple, in June, A. D. 70, the Jews ceased to be a nation, and the people were scattered all over the world, in which condition they have since remained. They were horribly persecuted in Germany, whence they were repeatedly banished; expelled from England in 1290; Spain, 1391–92; France, 1395; Spain, 1492; Sicily, 1493; Portugal, 1495; but in no case failed to return and make good their footing. The exoduses from Spain, Germany, and Austria were full of the most cruel and affecting circumstances. The exodus of the Moors from Spain occurred 1492, after a residence in that country of over seven hundred years. Detached parties of Huguenots sailed from France after the Massacre of St. Bartholomew, and particularly after the assassination of their protector, Henry of Navarre, in 1610; and when the Edict of Nantes was revoked in 1685 by Louis XIV., at least half a million of them sought refuge in foreign countries, as many as 16,000 settling in South Carolina. During the war of Louis XIV. against Holland an exodus of the entire people of that country to South Africa was contemplated; and although this plan was renounced, a few families of boers or farmers found their way to the Cape, and established a Dutch colony there. In 1814, Cape Colony was seized by England; in 1833 the emancipation of the Caffir slaves took place, and the boers found themselves deprived of the most essential element of their prosperity. A complete exodus of these people, now grown to be very numerous, occurred in 1835, and thus were founded the present republics of Orange River and Traansvaal, the independence of which was recognized by Great Britain in February, 1854. The most remarkable exodus of modern times, however, is that of the Mormons, who were driven out of Missouri in 1835, and settled in Carthage co., Ill., where they afterwards founded a city called Nauvoo. The practice of polygamy by Joe Smith, which had begun in 1838, and was probably indulged in by his principal followers, was kept secret until 1843, when an exposure took place. During the two following years this exposure created so much excitement that in 1845 the charter of the city of Nauvoo was repealed by the legislature of Illinois, Smith having meanwhile lost his life, and been succeeded by Brigham Young. The great exodus took place in 1847, and many thousands of these deluded people began a march across the desert which only ended on the banks of the Jordan, a small river emptying into Great Salt Lake, Utah Territory. Here they built another city, and founded a state differing in religion, laws, and social observances from all others. Their numbers at the time of the exodus did not probably exceed 10,000 or 15,000; they now number about 100,000.

ALEX. DELMAR.

Exodus, The Book of, was so named by the Alexandrian translators of the Old Testament. The Hebrews

of Palestine designated it by its opening words, *Elleh Shemoth*, "these are the words." It consists of two distinct portions; the former (chaps. i.–xix.) describing the deliverance of the Israelites from Egypt; the latter (chaps. xx.–xl.) describing the giving of the Law. Its Mosaic authorship, though denied by some, is generally conceded. Its date depends, of course, upon that of Moses himself.

Exog′enous Plants, or **Ex′ogens** [from the Gr. ἔξω, "without," and γένω, to "be born," to "grow"], the first or most highly developed of the two primary classes of phænogamous or flowering plants. They are called exogens because their stems grow by successive external additions, and are sometimes termed *dicotyledonous*, because the seed has usually two cotyledons. This class is characterized by net-veined (reticulated) leaves, and by stems which present distinct formations of bark, wood, and pith, the wood forming a zone between the other two, and increasing, when the stem continues from year to year, by the annual addition of a new layer to the outside. The flowers are usually formed on a quinary, more rarely on a quaternary, type. The bark is very distinct from the woody or fibro-vascular part which it surrounds. A transverse section of the stem exhibits a central cellular substance (*pith*), an external cellular and fibrous ring or bark, and an intermediate woody mass traversed by *medullary rays*, which radiate from the pith to the bark. A viscid secretion called *cambium* is formed between the bark and the *alburnum* (sap-wood) in the spring, and is supposed to be the matter out of which new wood is made. The age of exogenous trees can often be computed by the concentric rings annually produced. More than 1200 rings or layers have been counted on a stump. All trees of cold or temperate climates, and most trees of tropical regions, are exogenous. The total number of exogenous plants is much greater than that of the endogens. The medullary rays are thin plates of cellular tissue, which on a cross section appear like fine lines, but in wood cut lengthwise, parallel to them, they present an appearance called *silver grain*, and their faces show as glimmering plates.

Ex′orcism [Gr. ἐξορκισμός, from ἐξ (for ἐκ), "out," and ὁρκίζω, to "adjure" (from ὅρκος, an "oath")], a ceremony designed to expel dæmons or evil spirits from persons, places, or things. Exorcisms of various kinds have been practised from remote antiquity in nearly all nations and races. The ancient Jews, as we learn from Josephus, the Talmud, and the New Testament, had a class of persons professing to be skilled in casting out devils. Miracles of this kind are recorded as having been performed by Christ and his apostles, and in the early ages of the Church a separate class of exorcists arose who claimed special powers of controlling evil spirits. Many ceremonies were instituted by them, and their powers were exerted not only over those possessed by the devil, but over all candidates for baptism, over the baptismal water, and other sacred things and places. At present in the Church of Rome there is a special order of exorcists, one of the four orders of the minor clergy. All persons in superior orders must pass through this degree. In the Greek Church a similar order exists. Exorcism is now obsolete in all Protestant denominations, though formerly recognized in several.

Exosmose. See Endosmose.

Exoteric. See Esoteric.

Exosto′sis [Gr. ἐξόστωσις (from the Gr. ἐξ, "without," and ὀστέον, a "bone")], a bony tumor, a circumscribed, non-malignant mass of bone, usually an abnormal outgrowth from one of the bones of the skeleton. In man the disease especially seats itself upon the femur or on some of the bones of the skull. In the latter case it sometimes assumes a peculiar ivory-like character (eburnized exostosis), from the presence of an excess of calcium phosphate. It is usually developed from an inflammation-exudate, and is ordinarily formed with the exact structure of true bone. The disease is commonly painless. Some classes arise from a syphilitic taint, others from a rheumatic or gouty diathesis, others from no known cause.

Some writers include all bony outgrowths, malignant and other, under this head, but the best pathologists restrict the name to the one disease. Discutient remedies, mercurials and iodides, have been recommended for this disease, but ordinarily the only cure is in ablation, which, however, is liable to be followed by erysipelas.

Expan′sion [Lat. *expansio*, from *ex*, "out," and *pando*, *pansum*, to "open," to "spread"], an increase in the bulk of solid, liquid, or gaseous matter, due to the increase of heat. Heat is believed to consist of a very rapid molecular vibration, and the addition of this motion to a collection of particles must obviously tend to separate them and enlarge the mass. Expansion accordingly takes place in nearly all solids on the addition of heat up to the point of fusion; and in most substances expansion continues through the process of fusion, and beyond it; but ice, bismuth, antimony, paraffin, and a few other substances contract in fusing, but go on expanding if heat be added after fusion.

Iodide of silver contracts uniformly under heat; and it is certain that some crystals expand in some directions and contract in others, the general result being an expansion. Non-crystalline bodies usually expand uniformly in every direction, provided heat be uniformly applied. Liquids, like solids, expand at an increasing rate with the increase of heat. Gases expand almost uniformly $\frac{1}{490}$ of their volume for 1° Fahrenheit.

Allowance is always made for expansion and contraction in large iron bridges, buildings, etc.; for if no play were allowed at the joints, hot and cold weather would distort or destroy such structures; and it must especially be remembered that superficial expansion is twice as great, and cubical expansion three times as great, as the linear.

Ex Par′te, a Latin legal phrase signifying "of one party." A commission *ex parte* in chancery is that which is taken out and executed by one side or party alone, the other party neglecting or refusing to join.

Expatriation [from the Lat. *ex*, "out," and *patria*, "one's native land"], the voluntary abandonment of one's native country with the intention of becoming a citizen of another state. The right of a person to throw off the obligation of allegiance has been denied by eminent writers and some governments. The true view would seem to be that the power to determine when the allegiance of the citizen may cease belongs to the state of which he is a member, rather than to himself. At the same time, the freedom of intercourse between nations in modern times and the interests of civilization require that the various nations should provide liberal rules by which at proper times the relation of the citizen to the state may cease, and the individual, freed from the ties of burdensome allegiance, may assume another citizenship if he so desire. In this spirit may now be found statutory declarations by leading states on this subject, as well as treaty stipulations. By the act of Congress of July 27, 1868, § 1, it is recited that the act of expatriation is a natural and inherent right of all people, and it is enacted that any declaration or instruction or decision of any officer of the government which denies, restricts, or questions the right of expatriation is inconsistent with the fundamental principle of the government. In England, by 33 Vict. ch. 14, § 6, British subjects in general cease to be such upon becoming naturalized in a foreign state. The laws of the various states upon this subject are collected under the direction of the U. S. government in a publication entitled "Opinions of the Principal Officers of the Executive Departments, and other papers, relating to Expatriation, Naturalization, and Change of Allegiance," Washington, 1873.

If the right of expatriation be admitted except in certain cases, such as where the person holds a public trust, or is liable to do military service, or is charged with crime, a question of practical difficulty remains as to the mode in which his election to abandon his citizenship shall be evidenced. In some countries—*e. g.* France and Prussia—it may be shown by the fact that the person has taken his domicile in a foreign country in such a sense that he has abandoned all intent to return to his former home. This rule is not very satisfactory, as questions of domicile are frequently very difficult of solution, as they depend upon a judicial inquiry into the intent of the party, and this in turn depends upon an examination into a great variety of circumstances, and often ranging over many years. A much more convenient test is that of the English statute already cited. This provides that naturalization in a foreign country shall be evidence of an intent to renounce English citizenship. Should the former subject wish at any time to resume his relations with England, he can be naturalized under the laws of that country. The whole subject is not so important in the domain of private law as it was formerly, when aliens were subject to serious disabilities, particularly in respect to the acquisition of land. In a political aspect it is, however, of much consequence, and it is quite desirable that Congress should pass a comprehensive statute setting forth upon what terms expatriation may take place, the evidence by which it may be properly established, and how citizenship may be resumed. The general declaration in the law of July 27, 1868, that expatriation is a natural right, etc., is of but little practical value in settling the questions that from time to time arise upon this intricate subject. There is a special point of considerable moment as to the *status* of naturalized citizens of the U. S. becoming again domiciled in their native country, as to whom other considerations are presented from those which prevail in the case of such a domicile by one

who was born an American citizen. (For further information, consult INTERNATIONAL LAW, and text-books upon that subject; also CITIZEN.) T. W. DWIGHT.

Expec'torant [from the Lat. *ex*, "out," and *pectus* (gen. *pectoris*), the "breast"], a medicine which facilitates or causes the discharge of mucous secretions from the air-passages within the chest. Many balms, gums, and nauseating medicines, as well as demulcents and other drugs, are reputed to have expectorant properties. Some medicines not usually considered expectorant appear to stimulate the secretion of mucus in the air-passages, as the ammonium chloride (sal-ammoniac) and the potassium hypophosphite. Among the most useful expectorants are ipecac, squill, lobelia, and blood-root. These are also emetics, sedatives, and diaphoretics.

Expira'tion [Lat. *expiratio*, from *ex*, "out," and *spiro*, *spiratum*, to "breathe"], in physiology, the operation or movement by which the air that has been changed by the respiratory process is expelled from the lungs. This movement is effected partly by the elastic contraction of the lungs and the walls of the chest, which were dilated by the act of inspiration, but the resiliency of the chest-walls is greatly assisted by the action of numerous muscles, especially in forcible expiration.

Exploita'tion [from *exploiter*, to "improve," to "work"], a French term signifying the improvement of lands, the working of a mine; in general, the act of using anything as a source of profit or rendering it profitable.

Exploits, River of, traverses nearly the whole breadth of Newfoundland from S. W. to N. E. It is navigable for steamers 12 miles to the rapids, and above these small boats can go to within 50 miles of the S. W. coast. Its valley is level, well timbered, and abounds in game and fish, but has few inhabitants. This valley is recommended for colonization by the provincial government, and is believed to contain nearly all the habitable land in the interior of that large island.

Explo'sion [Lat. *explo'sio*, from *explo'do*, *explo'sum*, to "explode," "hiss off the stage or drive out"], a bursting with a loud report; in natural philosophy, the sudden and violent expansion of the parts of a body, caused by heat or chemical affinity. Explosions are often caused by the elastic force of steam confined in boilers, etc. The explosion of gunpowder is the result of the sudden formation and expansion of gases, into which the powder is converted by chemical agency. This term is also applied to the violent eruption or discharge of a volcano. Humboldt heard the explosion of Cotopaxi at the distance of 130 miles.

Explo'sives [from the Lat. *ex*, "out," and *plaudo*, to "make a burst of sound"]. Under this head will be considered the compounds practically available in war, in mining, and in general use for the sudden development of immense force. They comprise gunpowder; guncotton; Schultze powder; nitro-glycerine, with its compounds known as dynamite, or giant powder, glyoxiline, lithofracteur, and dualin; admixtures of potassium chlorate with readily oxidizable substances; and the picrate compounds. The various fulminates of mercury, silver, copper, etc., although very powerful agents, are too liable to accidental explosion for practical use, except in very small quantities, as primings for percussion-caps, fuses, etc., and they are therefore excluded from consideration.

Gunpowder, which was first employed in war about the year 1350, is the oldest and most generally useful of these agents. It is a mechanical mixture of potassium nitrate, carbon, and sulphur, in proportions usually varying but little from 75, 13, and 12 respectively. Purity is essential to excellence. The manipulations of manufacture consist, in general terms, in very finely pulverizing the ingredients, thoroughly incorporating them, compressing them into a cake, granulating it, separating the different sizes of grain by sieves, glazing, drying, and finally removing all dust by the use of fine sieves.

In the storage of gunpowder special precautions against fire and moisture are needed. A spark, friction between hard bodies, or a temperature raised suddenly to 572 degrees Fahrenheit, determine an explosion; while slight moisture, which may readily be absorbed from damp air, produces caking and deterioration. A wetting is permanently destructive to the compound. Frost produces no injurious effects, either temporary or permanent.

Being a simple mechanical mixture, the properties of gunpowder may readily be varied to suit the requirements of a quick-burning or a slow-burning explosive. Its expansive power is due to two distinct causes—the sudden transformation from a solid to a gaseous form of vastly greater volume, and the heat developed by the chemical change, which induces enormous tension. It is apparent, therefore, that a variation in the relative proportions and condition of the ingredients, by changing the chemical products of the explosion, must affect the expansive force; and also that a similar result may be obtained by mechanical means directed to modifying the duration of the time required for combustion.

It is to a skilful application of the last method that the recent improvements in gunpowder designed for heavy ordnance are due. General Rodman, of the U. S. army, inaugurated a series of experiments directed to this end in 1856, and from the results of his labors this country was provided in advance of European nations with an explosive suited to modern cannon. His mammoth and perforated-cake powders—the former consisting of large irregular grains, tested by two standard sieves of six-tenths and nine-tenths of an inch respectively, and the latter of hexagonal or cylindrical cakes perforated by holes—have been copied in the English pebble and pellet, and the Russian prismatic powders; by the aid of which the recent improvements in their artillery have been rendered possible. Pebble powder is simply pressed cake, broken into large irregular pieces and glazed. Pellet powder consists of mealed powder compressed into small blocks, of regular and sometimes indented forms, and of dimensions varying for different calibres. Prismatic powder consists of mealed powder compressed into flat, perforated cakes of hexagonal form, about an inch thick and an inch and a half on the longest diameter. This subject is still undergoing investigation; the facts having been developed that the time of burning, and hence the strain upon the gun for a given initial velocity in the projectile, may be modified by varying the size and form of the grains, their density and hardness, and the mechanical condition of the exterior.

By replacing a part of the carbon with uncarbonized peat, Mr. Oliver now manufactures a variety of gunpowder which, when well rammed, is claimed to give a higher initial velocity with a less recoil and less smoke than the ordinary grades. This advantage is attributed to slow burning.

The maximum pressure of exploded gunpowder, unrelieved by expansion, has been investigated by various parties, whose results range from 7 tons to 662 tons to the square inch, the latest authorities indicating about 40 tons.

The difficulty of obtaining saltpetre in large quantities, and hence its cost, has induced many attempts to replace it by other nitrates, such as those of sodium, lead, and barium; but although good blasting powders have been thus prepared, none suited to propelling purposes have been obtained.

Guncotton.—In 1832, Braconnet discovered that by dissolving starch in nitric acid, and adding water, a white explosive substance was precipitated, to which the name xyloidin was given. Shortly after, Pelouse obtained a similar compound by treating paper, or cotton or linen fabrics, with nitric acid, and named it pyroxilin. These were the precursors of guncotton, which was discovered by Schönbein in 1846, and at once excited much attention as a possible substitute for gunpowder. Adverse official reports, however, were soon made in France, the U. S., Germany, England, and Austria, and the explosive fell into general disfavor on account of its liability to spontaneous explosion, its corroding residua, and its excessively violent and irregular character, all of which unfitted it for most military uses. Baron von Lenk, a member of the Austrian commission, was not so readily discouraged. He continued a series of experiments for several years, which ultimately led to so great improvements in manufacture that in 1853 he was able to construct a successful twelve-pounder battery employing guncotton. This led to its temporary introduction into the Austrian military service, and again attracted the attention of foreign nations to the new explosive.

Baron von Lenk's system consisted in cleansing the long-staple variety of raw cotton in an alkaline wash, followed by one in pure water; thoroughly drying it; steeping it for forty-eight hours in a cold mixture of strong nitric and sulphuric acids—one part of the former to three parts of the latter by weight; freeing the resulting tri-nitro-cellulose from the acids by a centrifugal machine, by thorough rinsing, and finally by the action of running water for a period of six or eight weeks, alternated with a boiling potash bath and hand washing; air-drying it; rinsing it in a hot solution of potassium silicate to retard the rapidity of combustion; and, lastly, again washing and thoroughly drying it. He partially regulated the suddenness of explosion by twisting the guncotton into ropes or weaving it into cloth to secure a more uniform density. Musket cartridges were formed by wrapping the thread around wooden plugs, to prevent unequal ramming. An admixture of a certain proportion of ordinary cotton was also employed to reduce the violence of action.

In 1863, Mr. Abel, as a member of a committee appointed

by the British war office, undertook an experimental investigation into the merits of this system, and succeeded in materially improving it. Instead of the costly long-staple cotton, he employs ordinary cotton waste, which is treated with the mixed acids, one part of nitric to three of sulphuric by weight, without any preliminary process except careful drying. It is then rinsed in a large volume of water, and dried by a centrifugal apparatus three or four times. Next, it is placed in a pulping engine, like those commonly used in the manufacture of paper, and reduced to a state of fine subdivision. It is then transferred, in quantities of at least ten hundredweight, to a poaching engine, where it is beaten for about forty-eight hours until it remains uniformly suspended in a large volume of warm water, continually renewed, and finally rendered slightly alkaline. It is then dried in a centrifugal machine, and moulded into disks of the desired form and dimensions, which receive a pressure ranging from four to six tons per square inch. Up to this point the guncotton has been in a damp, and consequently entirely safe, state, and if desired it may be so stored for an indefinite period of time without losing its peculiar properties. To prepare it for use it is dried upon hot plates, freely open on every side to the air. This system of manufacture is the best now known, and yields a product so uniform and safe as to be employed in England almost to the exclusion of all the other modern explosives.

In appearance, Abel guncotton consists of regular cylinders, of dimensions varying with the use proposed. It is white in color, hard to the touch, and sinks readily in water. Ignited, unconfined, by a flame, it burns with a strong blaze. Fired by a detonating fuse, or raised to a temperature of about 340° Fahrenheit in a strong case, it explodes with great violence—a single ounce being sufficient to indent a plate of iron or disrupt a thin slab of stone upon which it is loosely laid. The character of the detonation varies with the fulminate employed, being most sudden with fulminating mercury. Even in a damp state—containing twenty per cent. of moisture—it may be exploded without much loss of power by a disk of dry guncotton in contact. It is believed, upon good grounds, to be free from danger of spontaneous explosion. The English government has adopted it as the explosive best suited to submarine warfare, and has accumulated large quantities in store.

Guncotton produces little smoke, and leaves a very small residuum of solid matter, the chief products of combustion being carbonic oxide, carbonic acid, water, and nitrogen. It is unalterable in water, no matter how long submerged. It contains about 2 per cent. of moisture in its normal condition, and even when exposed to ordinary damp air it absorbs but little more—a property which gives it a great advantage over gunpowder. Chemically, the purest guncotton may be regarded as cellulose, in which three atoms of hydrogen are replaced by three molecules of peroxide of nitrogen. Thus constituted, it is insoluble in mixtures of ether and alcohol. If, however, great care has not been observed in the manufacture, less simple compounds are formed, which may readily be dissolved in these mixtures, forming collodion, so much used in photography and the arts.

Quite recently, Punshon has succeeded in so reducing the quickness of action of guncotton by mixing with it nitre and crystals of cane-sugar as to make it well suited for use in small-arms. Indeed, the present subject for investigation in connection with guncotton appears to be the admixture with it of some oxidizing agent, such as potassium or sodium nitrate; experiments have indicated that an increase of power may thus be gained.

Schultze Powder.—The conversion of lignin or wood-fibre into an explosive similar to guncotton was attempted soon after the discovery of that compound, especially by Captain Schultze, acting for the Prussian government. His method consisted in soaking the wood—preferably alder—in water, to give it toughness; cutting it by fine saws into a kind of cross-grained veneering; and subsequently punching it into small cubes, of which the size varied with the use for which the powder was designed. The grains thus produced were boiled in a solution of soda, and afterwards alternately exposed to steam and washed in a solution of chlorine to free them from resins, etc. They were next treated for several hours with mixed nitric and sulphuric acids, kept cool by constant stirring, and afterwards were thoroughly washed and dried. In this state the powder is but slightly explosive, and it may be kept in store indefinitely. For use, the grains must be submerged for about twenty minutes in a solution of nitrate of potassa and baryta, and then carefully dried and sifted. The necessary oxygen having been now supplied, the powder has a high explosive power. It burns with but little solid residuum or smoke, and is said to be both cheaper and stronger than common gunpowder, weight for weight. It, however, readily attracts moisture, is liable to form dust by attrition, and is more bulky than gunpowder, in the proportion of 3 to 1.

Nitro-glycerine or *glonoin oil* was discovered in 1847 by Ascagne Sobrero, but remained unapplied to practical uses until 1864, when Alfred Nobel, a Swedish engineer, began to develop its industrial value. Since then it has been largely employed upon the continents of Europe and America. It is prepared by the action of a mixture of concentrated nitric and sulphuric acids upon glycerine introduced drop by drop. At ordinary temperatures it is an oily liquid, usually colorless if made from good glycerine, but sometimes discolored by causes not well understood. It has no odor, and is of a sweet and slightly pungent taste. It is highly poisonous, even short contact with the skin being sufficient to produce severe headache. Its specific gravity is 1.6. When first made it has a milky appearance, which ultimately disappears. Nitro-glycerine incompletely freed from the acids undergoes spontaneous decomposition, is dangerous to handle, and ultimately may lose its explosive properties. When pure it congeals at from 40° to 45° Fahrenheit, and is then nearly or quite incapable of explosion. At 212° Fahrenheit it begins to decompose; at 365° Fahrenheit it throws off yellow or reddish fumes; at 423° Fahrenheit it deflagrates violently. When uncongealed, nitro-glycerine may readily be exploded by concussion, which renders it quite unfit for transportation in that state. In store it should be kept in a cool place, under pure water, in open vessels, and, if practicable, in a frozen condition. For use, it should be thawed very gradually, by placing the can in warm water raised to a temperature not exceeding blood heat. Any leakage should be carefully avoided at all times, and emptied cans should be destroyed. Flame applied to small quantities of nitro-glycerine causes it to burn with difficulty like ordinary oil, but a fulminate exploded in contact with it produces a tremendous detonation. To develop its full effect, fulminating mercury, in quantities not less than fifteen Troy grains, and confined in a strong copper capsule, is recommended. Its advantages as an explosive consist in its instantaneous development of force, due to the fact that, pound for pound, it produces at least three and a half times as much gas, and twice as much heat, as gunpowder; its high specific gravity, which permits the use of small drill holes; its admitting of water, or loose clay, or even air, tamping; and finally, the facility with which it can be made upon the spot for immediate use. Its disadvantages are the severe headaches it causes to those not habituated to its use, its liability to spontaneous explosion, the dangers sure to attend its careless handling, and, especially for military uses, its unfitness for being kept long on hand, unless prepared and treated with a degree of care not readily to be secured. To these may be added the fact that its rate of explosion is not under control, which restricts its economical use to blasting in hard rock or under water. In soft rock or clay its power at equal cost is inferior to that of common gunpowder, because its action is akin to a sudden blow, rather than to a continued push.

Dynamite, called in the United States "giant powder," was invented in 1866–67 by Nobel; it consists of nitro-glycerine absorbed by some porous inert solid. The percentage of the former is of course limited by the capacity of the absorbent. The best material is a silicious infusorial earth found in Hanover, and known as *kieselguhr*. It is when dried a white, impalpable powder, showing under the microscope a cellular structure. It will absorb and safely retain three times its weight of nitro-glycerine. Many experiments were made in Paris during the late siege to discover the most suitable substitute there available. Finally, a residue from the gas-works was adopted, which would take up and retain a little more than its own weight of nitro-glycerine.

Dynamite made from kieselguhr has the appearance and consistence of heavy brown sugar. It possesses most of the virtues of the parent nitro-glycerine, with some peculiar to itself; of which the chief are, exemption from liability to spontaneous explosion and to detonation from moderate shocks, both of which result from the exceedingly fine granulation of the nitro-glycerine. It has been very largely used in this country, especially in California, and these important advantages are now generally admitted. Dynamite possesses another decided advantage over nitro-glycerine. If kept in the state of loose powder without compression into cartridges, it may be exposed to any natural temperature without losing its explosive properties when subjected to the action of a primer charged with fifteen grains of fulminating mercury; and this too without becoming more sensitive to ordinary shocks and handling. In the form of compressed cartridges it is as inexplosive when thoroughly frozen as nitro-glycerine itself. Saturated with water, it loses only a very small percentage of its explosive power, but requires a primer much more powerful than those ordinarily used. Ignited by a flame, and unconfined, it burns quietly without detonation. Experiment indicates that its explosive force is not quite so instantaneous as that of pure

nitro-glycerine; hence, in certain kinds of resisting media, where a sustained pressure is required, the mechanical work performed by three-quarters of a pound of nitro-glycerine in the form of dynamite may largely exceed that produced by a full pound of the unabsorbed material. This apparent paradox actually occurs in submarine mines, usually called torpedoes. For rock-blasting, dynamite should be pressed firmly home and tamped with sand.

Dynamite possesses another merit. By combining its ingredients in judicious percentages, a certain control can be exerted over the quickness of its action, and a classification similar to that of the different grades of gunpowder, but much more restricted in range, may be made.

Various have been the attempts to improve upon dynamite by replacing its inert base with different explosive materials. Of such compounds, glyoxiline, lithofracteur, and dualin are the best known; but none of them are believed to be improvements for rock-blasting, chiefly for the reason that the bulk is increased in a higher ratio than the power, and hence, as the cost is largely dependent upon the size of the drill-holes, no real economic gain is made.

Glyoxiline was invented by Abel shortly after the introduction of dynamite. It consisted of a mixture of guncotton pulp and potassium nitrate, saturated with nitro-glycerine, and was made both in a granular and a cake form. It proved to be less troublesome in handling, owing to the granules being coated with an impermeable material which reduced the tendency to produce headache, but it was never largely introduced into practical use.

Lithofracteur was devised about the same time by Prof. Engels of Cologne. Its precise composition is not made public, further than that it consists of 525 parts of nitro-glycerine, 225 parts of silica, and 250 parts of mineral bodies; and analyses of different samples have exhibited varying results. One authority (Trauzl) reports 52 parts of nitro-glycerine, 30 parts of kieselguhr, 12 parts of coal, 4 parts of sodium nitrate, and 2 parts of sulphur. Others place the proportion of sodium nitrate as high as 25 per cent.; others add guncotton. Lithofracteur is a pasty substance of dark color. Like the other compounds of nitro-glycerine, it burns quietly when ignited by a flame, and explodes violently when fired by a detonating fuse. Water dissolves the sodium nitrate, and thus sets free a certain part of the nitro-glycerine—of course a decided disadvantage. The compound exhibits explosive properties similar to dynamite, and offers equal security against concussion. Its use heretofore has been restricted chiefly to Germany and Belgium, although it has been experimentally tried in England, and was employed by the Germans in the late war with France.

Dualin was invented by Dittmar shortly after dynamite, and its use has been chiefly restricted to Germany and the U. S. The patent describes it as consisting of "cellulose, nitro-cellulose, nitro-starch, nitro-mannite, and nitro-glycerine, mixed in different combinations, depending on the degree of strength which it is desired the powder should possess in adapting its use to various purposes." A sample supplied by the inventor for trial at the Hoosac Tunnel was found by analysis to consist of 60 per cent. of nitro-glycerine and 40 per cent. of washed sawdust, not treated with nitric and sulphuric acids. Trauzl reports it as consisting of 50 parts of nitro-glycerine, 30 parts of fine sawdust, and 20 parts of potassium nitrate. The best variety now manufactured is believed to be cellulose derived from poplar pulp, treated with nitric and sulphuric acids, and saturated with nitro-glycerine.

Having a less specific gravity than dynamite, dualin is slightly inferior to it, bulk for bulk, in explosive energy. When thoroughly soaked in water, it can only be exploded by a very violent detonation, much exceeding that of the ordinary fuse, and even then it loses more than half its power. It congeals at about 45° Fahrenheit, and in this state readily explodes, becoming so sensitive to friction as to make it dangerous to tamp in cold weather. In other respects its properties resemble those of dynamite.

The Chlorates.—The violent action of potassium chlorate upon readily oxidizable substances has given rise to many attempts to employ it in the preparation of substitutes for gunpowder. Under the names of white gunpowder and German gunpowder a mixture of this salt with potassium ferro and ferri-cyanide and sugar has long been known. Mixed with nut-galls, resins, and other vegetable substances, it has been repeatedly introduced to temporary use as Horsley's powder, Ehrhardt's powder, etc. The form best known in this country consists of potassium chlorate, potassium nitrate, and crude gamboge, which, under the name of Oriental powder, or safety compound of the Oriental Powder Company, was at one time considerably employed in the oil-wells of Pennsylvania and for other blasting purposes. Its dangerous sensibility to friction, and the consolidating effect of heat upon the gum, have prevented its general use. With some of these chlorate compounds sulphur enters as an ingredient, which intensifies the chief objection against them—their liability to explode from slight friction or percussion. As a class, they have many times the explosive intensity of gunpowder, but are also more dangerous to handle. For special purposes they are extremely useful—for instance, a mixture of potassium chlorate and sulphur, formed into a paste, and dried to fit small cartridge-cases of lead, has been found to be terribly effective as a charge for explosive bullets. They may be fired with safety from a musket, but explode with great violence, even in penetrating flesh.

The Picrates.—Picric acid was discovered in 1788 by Haussman while treating indigo with concentrated nitric acid. Within a few years chemists have derived it from other substances, especially from carbolic acid. It has been called *amer d'indigo, amer de Welter,* carbo-nitric acid, nitro-picric acid, carbazotic acid, and tri-nitro-carbolic acid. It is a crystalline body of a brilliant golden yellow, very bitter to the taste, and is largely used as a dye. When heated to 600° Fahrenheit it detonates with violence.

The salts obtained by treating many of the bases with picric acid possess its characteristic properties; that best known is the potassium picrate. This forms golden crystals having a metallic reflection. Insoluble in alcohol, and but slightly soluble in water, it detonates violently at 600° Fahrenheit. Its action is akin to that of the fulminates in suddenness; and to regulate this property, Designolle has mixed it with charcoal and potassium nitrate, thus forming a compound similar to, but more powerful than, ordinary gunpowder. To obtain the maximum explosive energy, he employs equal parts of potassium nitrate and potassium picrate. For use in rifles from 12 to 20 per cent. of potassium picrate is used, with a small amount of charcoal. For cannon only from 8 to 12 per cent. of potassium picrate is employed. Under the name of *poudre Designolle* this compound has been considerably manufactured in France for military purposes, both for large guns and for torpedoes.

Brugière powder consists of an admixture of ammonium picrate and saltpetre. It is comparatively a slow powder, less liable to attract moisture than ordinary gunpowder, and yielding but little smoke. In England, Abel has experimented with a similar compound, to which he has given the name of picric powder, and which he considers especially suited for use in shells, because, although little liable to explode from concussion or friction—the great objection to the potassium picrate compounds—its effects when strongly confined are more violent than those of gunpowder.

H. L. Abbot, U. S. A.

Expo'nent [Lat. *expo'nens,* from *ex,* "out," "forth," and *pono,* to "put," to "set"], literally "setting forth" or indicating; hence an index or representative; in algebra, a number or symbol representing a number which, when written above and at the right hand of any symbol of quantity, indicates a corresponding power of that quantity. Thus a^3 denotes the *third power of* a, and 3 is said to be the *exponent* or index of that power; usually, though less correctly, it is called the exponent of a. Thus a^3 is merely an abbreviation of aaa, and from the definition of an exponent it follows at once that $a^{m+n} = a^m a^n$. The notation of exponents was introduced by Descartes, and being very convenient was soon extended. The convention on which the extension is based is the general truth of the above equation. Thus, if we ask for the meaning of a negative or fractional exponent, on the hypothesis that the above equation shall hold for all values of m and n, we find that since $a^m = a^{m+0} = a^m a^0$, a^0 must be a symbol for 1, no matter what a represents.

Exponen'tial Equa'tion is one involving terms wherein the unknown quantity is an exponent or constituent of an exponent. The simplest form of such an equation is $a_x = b$; one of its solutions is the logarithm of b to the base a, or, what is the same thing, the ratio of the logarithm of b to that of a, the bases being the same, but arbitrary. This is one solution only; the equation has many other imaginary roots, and is consequently transcendental. A curve in whose equation the co-ordinates appear as exponents is also called an exponential curve. The logarithmic curve is an example.

Exports. See Commerce, by Hon. Alex. Delmar.

Exposi'tion, Interna'tional and **Univer'sal,** a name applied to the great public exhibitions which have been held, within the last twenty-five years, in various countries, of the products of the industry and of the evidences of culture, intellectual and æsthetic, of all nations; notably, to those of London in 1851 and 1862; to those of Paris in 1855 and 1867; and to that of Vienna of the present year (1873). These grand displays may be regarded as the development on the largest scale of an idea which, for the preceding fifty or sixty years, had had many

less imposing manifestations—the idea that, in order to the improvement of the arts of industry, the first requisite and the most effectual incitement is to be found in acquainting a people with the actual state of those arts as they exist. These expositions, therefore, though nominally universal, comprehended in their first conception and in their earliest practical illustrations only what are called the useful arts, in contradistinction to the liberal and the fine arts; and they furthermore omitted from their scheme the evidences of that kind of moral activity among peoples, which aims to ameliorate the condition of the human race by repressing vice and crime, by relieving distress, by diminishing the amount of disease, by the improvement of prison discipline, by softening the horrors of war, and by other means analogous to these; all of which have been kept more or less in view in the later. The early international expositions, moreover, omitted to provide, or at least provided only on a limited scale, for the display of animals useful to man, or of living and growing vegetables, plants and flowers, or for illustrating the operations of the garden, the field, the farm, and the dairy. The later have given to these objects a very large portion of their space.

Public exhibitions of the products of industry were in the first instance held as marts or fairs. (See FAIRS.) The earliest held not for commercial purposes, but strictly for the promotion of improvements in the useful arts, were instituted by the Society of Arts of London. This society has held such exhibitions annually since 1760. The first properly national exhibition of this kind, the first that is to say organized under government direction, took place in France in 1798. Since that time, the French government has given a similar exhibition every four or five years. The effect has been greatly to improve the quality and to enlarge the quantity of production in all the departments of industry throughout France. "The French writers," says Judge Daly (*Address before the Am. Inst.*, 1863), "attribute the wonderful progress of French industry to four causes: 1, the diffusion of knowledge, scientific and practical, among the working classes, through the establishment of free local libraries, museums, drawing-schools, and other means of practical instruction; 2d, inventions and discoveries; 3d, the repeal of restrictive laws; and lastly, the effect of the great industrial exhibitions. The effect of these exhibitions may be briefly stated. They have focalized the industry of the country, by bringing it under view as one spectacle, thus enabling all to know from time to time, the exact state of it. They have afforded means of comparison which did not previously exist, not only to those engaged in a particular pursuit, but also to those employed in those pursuits which act reciprocally upon each other. They have created a mutual interest between the man of science, the manufacturer, the capitalist, and the working classes. The intelligent criticism to which they have given rise in the various industrial journals, not only from scientific men but from manufacturers and workmen, has been of the greatest benefit. Their regular recurrence has kept up a spirit of emulation, in the desire to produce something better and cheaper than before. They have served as a means of advertising new or superior productions, upon a scale the most extensive; and have led to the gradual development of the business theory of large sales with small profits. They have stimulated inventions, by keeping up the constant desire for new discoveries, improved methods, and better machinery; and lastly they have dignified labor by giving it something more to struggle for than mere pecuniary compensation."

In the United States, since early in the present century, exhibitions for the encouragement of agricultural or mechanical industry have been annually held under State and county organizations, with partial aid from the State governments, in some States of the Union, and more recently in many. The Franklin Institute, founded in 1824, in Philadelphia, the American Institute established four years later in New York, and many less conspicuous though perhaps not less useful associations organized for promoting industrial improvement, have relied on public exhibitions as among the most effectual means of accomplishing their objects.

Of international expositions, the first in the series, that of 1851 in London, was undertaken at the suggestion, and successfully carried out through the influence, of Prince Albert, who was at that time the president of the London Society of Arts. A building was erected in Hyde Park for the accommodation of the objects entered for exhibition, upon a design of an entirely novel and original character proposed by Joseph (afterwards Sir Joseph) Paxton, a landscape gardener, at that time in charge of the gardens of the duke of Devonshire at Chatsworth. The materials employed were almost exclusively iron and glass, whence the structure received the name of "the crystal palace," a name which has been applied to other similar constructions since. The plan was a long rectangle with a transept crossing the centre, the whole covering an area of more than twenty acres of ground. In the contract for the erection of the building it was stipulated that, at the close of the exhibition, it should remain the property of the contractors, which stipulation reduced the cost to the commissioners by £100,000 or half a million of dollars. The total cost for building, maintenance, superintendence, recompenses to exhibitors, legal expenses, etc. etc., was about £293,000. The total receipts from all sources were £506,000, showing that the exhibition, apart from the large and permanent indirect benefits accruing from it, was a direct financial success. This cannot be said of any of those which have succeeded it.

The universal admiration attracted by the exposition of 1851 and its brilliant results, stimulated a similar undertaking, two years later, in New York. The short intervening time allowed for preparation, and the distance of the place of exhibition from the countries most advanced in manufactures and other productive arts, suggested a large reduction in the scale of the display. The location selected was a public square, 445 feet by 455 feet only in dimensions, or about 4¾ acres. Upon this a "crystal palace" was erected octagonal in ground plan, but having above two naves intersecting symmetrically at right angles, each 365 feet 5 inches by 149 feet 5 inches. The intersection was crowned by a hemispherical dome, 100 feet in diameter, the height of the springing line being 70 feet, and the total height to the summit above the crown 123 feet. In order to increase the extent of floor surface for the purposes of the exhibition, spacious galleries were constructed in the arms of the building, the total surface thus secured amounting to 250,000 square feet or 5¾ acres. The cost of the building was about $200,000, to defray which and to maintain the exhibition, money was raised by an issue of stock, at first to $300,000, afterwards increased to $500,000, in shares of $100 each. These shares soon rose in value, and they were at one time at a premium of 75 per cent. The enterprise nevertheless resulted in loss, the destruction of the building by fire a few years later having finally destroyed all prospect of redeeming its fortunes.

During the same year, 1853, a similar international exhibition was held in Dublin, in a building forming a series of parallel halls. The cost was £80,000; the receipts, £47,000.

The Paris International Exposition of 1855 was in effect a private enterprise, but it was conducted by a commission appointed by the government, who also undertook to secure it against loss. The principal building on this occasion was erected of masonry in the Champs Elysées. The great hall devoted to the exposition was lighted from the roof. This building provided an extent of 1,770,000 square feet of floor surface to the industrial departments not employing machinery in motion. The machinery was established in an "annex" on the bank of the Seine, four thousand feet long. The fine arts were provided for in another building; and the tapestries and carpets of the imperial establishments, as well as the crown jewels, in still another. This exposition cost 11,264,520 francs = $2,253,000, not including the cost of the main building, which was preserved as the property of the government, under the name of the "Palais de l'Industrie," to be used for annual exhibitions of various kinds and for public ceremonials.

The second London Universal Exposition was held in 1862. For this, the location chosen was upon a ground which had been purchased at South Kensington by the commissioners of the exposition of 1851, with the surplus proceeds of that exposition and some aid from the government. The principal building was nearly rectangular, and covered about seven acres. The whole area covered by roofs was about twenty-three acres. The buildings were subsequently removed, the space occupied by them being required for government purposes, and the principal one was transferred to the north of London, where, under the name of the Alexandra Palace, it was totally destroyed by fire in June, 1873.

The international exposition of 1867 at Paris was the most comprehensive in its plan, the most elaborate in its preparations, and the most colossal in its dimensions, of all which had been held up to that time. The government announced its intention four years in advance. In June, 1865, an imperial decree created a commission to direct the work, under the presidency of Prince Napoleon, who shortly after resigned, and was replaced, in February, 1866, by the Prince Imperial. The place fixed upon for the principal exhibition was the Champ de Mars, the large parade-ground in front of the *Ecole Militaire*, containing about 111 acres. For the exhibition of farm and dairy operations, animals and stock, the island of Billancourt in the Seine, two and a half miles from the Champ de Mars, was chosen, having an area of 74 acres. For the competitive trials of mowers and reapers and other field operations,

portions of the emperor's farms at Fouilleuse near St. Cloud, and of those at Vincennes, were given up as occasion required. The margin of the Seine in front of the Champ de Mars (from which it is separated by the quay D'Orsay) offering an area of about three acres, was devoted to objects connected with navigation, to diving apparatus, and to machinery for raising water. Here also was found a convenient place for a chemical laboratory in which experimental lectures were delivered during the exposition. The principal exposition building was constructed mainly of iron, and was of enormous dimensions. The entire space enclosed within its exterior walls was 36 acres, but there was an open central court of about one acre in the centre. This building occupied the centre of the Champ de Mars. The surrounding area was called the park, and was allotted to the different countries represented in the exposition, for the construction of buildings to accommodate objects or to facilitate operations which could not be allowed in the main building, or to illustrate the characteristic domestic or school architecture of different peoples; or for more imposing structures representing the temples and palaces of pre-historic antiquity. The entire area of the park was about 75 acres; but of this, 12½ acres, in the south-eastern angle, were cut off from the rest by an enclosure, and devoted to a horticultural and botanical exhibition under the name of the Reserved Garden. The park and the garden, as well as the farming and agricultural exhibitions at Billancourt, were new features in these great undertakings; and to many visitors the two former were quite as attractive as the display within the palace, or even more so. The whole area was laid out with much taste, the grassplots, always vividly green, being intersected by winding walks with here and there a limpid stream, the various buildings erected without any obvious order presenting an endless variety of aspects from different points of view. In the reserved garden, an immense structure of glass occupying an artificial eminence protected a magnificent collection of tropical trees and plants, while the shrubbery of all the forests of Europe covered the side slopes. Two huge aquaria also, within this same enclosure, presented specimens of the most remarkable and the most interesting inhabitants of the ocean and of inland waters. The construction of these was such that the spectator as he advanced found himself in a cavern beneath the surface of the water, through the glazed roof of which he saw the animals sporting above his head, while they were at the same time around him on every side.

The principal building, or so called palace, was constructed without any attempt at architectural effect, but with the design to make as conspicuous as possible the method of arrangement with reference to the plan of classification by correlated groups of objects, and by countries; and so to facilitate to the visitor the study of the exhibition and to enable him readily to find any particular object sought. It had the form of an ellipse with flattened sides, or more properly of a parallelogram with circular ends, the extreme length being 490 mètres, or 1607.64 feet, and the extreme breadth 380 mètres, or 1246.74 feet. The entire cost of the structure, including the necessary excavations and other earthworks, was about 11,785,000 francs = $2,357,000. During the last six months of 1866, there were employed in the Champ de Mars, principally upon the palace, 1477 workmen.

In plan, the palace was divided into seven concentric halls, or galleries, corresponding to seven of the ten groups in the scheme of classification. The other three groups embracing live stock, agricultural exhibitions, etc., could not be introduced into the building. These halls were intersected by radial lines, forming boundaries between the spaces allotted to the different countries. This plan had the apparent disadvantage of allotting to every country the same proportionate space for the several groups; while in these several groups different countries are differently prolific. This disadvantage, however, was got over by allowing departures when necessary from the regularity of the elliptical divisions, without, however, allowing the elliptical passages, or promenades, to be interfered with. Sixteen of the radial divisions were formed by open passages, the principal entrance, on the main axis, being 15 mètres, or 49¼ feet wide; the opposite one, at the other extremity of this axis, 10 mètres, or 32.81 feet; which latter breadth was also given to the passages corresponding to the minor axis. Besides these, there were 12 other radial passages, 5 mètres, or 16.41 feet wide. The gallery of the fine arts, which formed the inner hall, though divided by partitions to mark the countries, afforded, through large open doors, an unobstructed passage around the whole ellipse; and the same was true of the gallery of machinery which was outermost. There were, besides these, three other perfectly free concentric passages, of 5 mètres, or 16.41 feet each, making the complete circuit of the building. A verandah roof exterior to the main building surrounded it entirely, sheltering a "gallery of aliments," or series of restaurants, characteristic of different countries, 10 mètres = 32.81 feet broad, and also a colonnade 5 mètres = 16.41 feet wide, beyond this. As an afterthought, an additional gallery was introduced into the plan, during the construction of the building, inside the gallery of the fine arts, 8½ mètres = 27.9 feet wide, within which still was a sheltered promenade 5.65 mètres = 18.55 feet wide, and within that the central court, adorned with fountains and flowers. Finally, in the midst of this court, stood a beautiful pavilion, where there were exhibited the standard weights and measures of all nations, and all their varieties of coins. Surmounting the dome of this pavilion was a large artificial globe, with its axis parallel to the axis of the earth, which, being driven by clockwork, revolved like the earth once in the twenty-four hours.

The park, besides the objects which have been mentioned above, contained "annexes" in which were exhibited objects which might be called the overflow of the palace—the space allowed the exhibitors within the buildings not sufficing for their purposes. Thus, here were seen the most magnificent displays of galvanoplastic work, of photographic enamelling for stained-glass windows, of costly India shawls, etc. etc. Here also were seen objects not enumerated in the original scheme, especially ordnance and the material of war generally; first-class lighthouses of full dimensions; the ambulances and other apparatus of the American Sanitary Commission, and of similar associations in other countries; objects gathered by Christian missions among savage nations, with specimens of the publications of missionary societies in all languages; a complete model in relief of the valley of the Nile; a diorama showing the Suez ship-canal throughout its whole length, with models of the machines employed in its construction, and others illustrating the system of traction, by which vessels are conducted through it from sea to sea. These are only examples of a very numerous and miscellaneous class of exhibitions of high interest, which found their place in the park.

The total expense of the exposition on all accounts, from the beginning to the final liquidation, amounted to 22,983,817.99 francs = $4,596,764. The total return produced by the exposition was only 14,114,662.09 francs = $2,822,900; but there was a "subvention" of 6,000,000 by the government, and another of like amount from the city of Paris, making the total receipts 26,114,662.09 francs; giving an excess of 3,130,844.10 francs = $626,000 above expenditure.

The number of exhibitors, visitors, jurors and awards at each of the four great international expositions as yet held, is presented in the following summary:

Year.	Place.	No. of Exhibitors.	No. of Visitors.	No. of Jurors.	No. of Awards.
1851	London...	15,500	6,039,195	318	5,248
1855	Paris.....	23,954	5,162,330	398	11,073
1862	London...	28,653	6,225,000	620	13,423
1867	Paris.....	52,200	9,238,967	693	19,776

The awards in every instance include *honorable mentions* as well as the more substantial recompenses. The number of honorable mentions has usually been something less than half the entire total. The number of visitors as given for 1867, embraces only the paying visitors, and includes the subscribers for the season or for various lengths of time from a week upward, 95,688 in all, only once each; whereas the holders of subscription tickets probably used them many times. Moreover, the exhibitors and their assistants, the employés of the administration, the foreign commissioners, the jurors, and the royal and imperial visitors, entered free. From calculations made by the imperial commissioners in their final report, it appears that the actual number of admissions to the exposition during its continuance, including repeated admissions of the same person, was 15,000,000, or upwards, and the average number of admissions daily was nearly 70,000. The total number of exhibitors given above (52,200) includes 381 entries made by different sovereigns and governments, which, not being designed for competition, should be deducted. Curiously enough, the French final report includes these entries *"hors concours"* among the awards. They should be deducted on both sides, when the result will be, exhibitors, 51,819; awards, 19,395, of which the distribution among the principal countries is as follows: France 15,804 exhibitors, 9938 awards; U. S. of America, 536 exhibitors, 291 awards; Holland, 587 exhibitors, 198 awards; Bavaria, 404 exhibitors, 183 awards; Belgium, 1909 exhibitors, 972 awards; Prussia and North Germany, 2447 exhibitors, 1132 awards; Austria, 2018 exhibitors, 1035 awards; Switzerland, 1001 exhibitors, 351 awards; Spain, 2636 exhibitors, 509 awards; Portugal, 1881 exhibitors, 268 awards; Sweden and Norway, 1077 exhibitors, 323 awards; Italy, 4144 exhibitors, 795 awards; Turkey, 4196

exhibitors, 134 awards; Brazil, 1336 exhibitors, 97 awards; Great Britain, 6032 exhibitors, 1702 awards.

The management of a great international exposition is an undertaking which exacts for its success the exercise of administrative and executive ability of the highest order. The difficulties which attend the task are peculiar. A formidable one, which presents itself in the very beginning, is the selection of a suitable site. So vast has been the scale which the more recent exhibitions of this kind have spontaneously taken, as illustrated at Paris, and in the exposition now in progress at Vienna, that no open areas adequate to their purposes can any longer be looked for in the interior of large cities. Yet it is only in presence of large cities that such expositions can exist; for the great multitude of exhibitors and visitors whom they invite must have the accommodations which only such cities can furnish. If not held *in* cities, therefore, they must be held in the immediate vicinity of cities, and in situations easy of access from them. The site must also lie upon some great line of transportation, or better at the point of convergence of many such lines; and if possible it should be approachable for vessels of burden by water. The next difficulty arises out of the necessity of improvising structures of great magnitude and of very substantial character, for the accommodation of the objects to be exhibited, in very brief time. The preparation of suitable grounds, also, is sometimes a work of almost equal magnitude. In the Champ de Mars, for example, one hundred and twenty acres of arid sand were converted into a lovely landscape garden in a single season. In the preparation of these buildings and grounds, moreover, provision must be made for thorough ventilation, drainage, water supply, and gas lighting, on a scale to meet the wants of fifty thousand people constantly, and the occasional wants of more than twice as many. The hydraulic service must be ample, so as to meet at once and effectually any danger from fire; and it should have a head above the level of the highest buildings. There must furthermore be a watchful and intelligent sanitary service, not only to afford relief in case of accident or sudden illness among the assembled multitudes, but also to guard against the first possible approaches of epidemic. The daily care of the buildings and grounds, for purposes merely of security and cleanliness, requires the employment and constant supervision of an army of inferior employés; and to all these provisions must be added that of an efficient police, subject to the direction of the managers of the exposition. The installation of the objects to be exhibited is another task of immense magnitude, of which the difficulty is enormously enhanced, not only by the brevity of the time allowed in which to accomplish it, but on account of the almost endless multiplicity of details which it involves. Compared with this, to move the material of an army of a hundred thousand men is a work of comparative simplicity; for in that case the material, though cumbrous, is in great homogeneous masses, the masses are limited in variety, and the sources from which supplies are to be drawn are few and generally known. In the case of the exposition, the material to be received and disposed of is almost infinite in variety, and it comes in an endless number of independent parcels. All these parcels, to the extent of many thousands of tons, arriving almost simultaneously, render the regulation of the system of transportation and of installation, a task exceedingly perplexing. Many of the objects, especially the machines, are so cumbrous as to require foundations of masonry to be provided for them; and these require excavations; all which work has to be done for all nations within the space of a few weeks. The arrangements necessary for the supply of motive-power to the machines, it being consistent neither with safety nor with comfort to allow powerful engines with their furnaces and boilers within the building, add another element to the complication; so, that, taking all things into consideration, the punctuality with which the great expositions have been hitherto opened on the days originally appointed, is evidence that they have been ably and efficiently directed; notwithstanding that here and there exhibitors have been caught unprepared. In regard to these accidents, it must be borne in mind that the chief commissioners have no such absolute control over exhibitors as a general has over his troops; and that they cannot always force the laggards who have once secured their places, to complete their arrangements with the promptness demanded.

Since the exposition of 1867, the question has been somewhat discussed whether the advantages secured by displays so ephemeral, on a scale so gigantic, are sufficient to compensate for the great labor, expense, loss of time and temporary locking up of capital, which necessarily attend them. The benefits are undeniably great, but it is just as they are beginning to be really felt, that the whole scene disappears. To study and understand a display of such magnitude, is a task which may occupy the clearest mind for weeks or months. The opportunity is lost just as the visitor who comes to learn is beginning to profit by it. The imperial commissioners of 1867, therefore, in their final report, express, very decidedly, their opinion, that hereafter, temporary expositions should no more be encouraged; but that permanent museums of industry should be established in large capitals, or in their neighborhood, embodying and even improving upon the best features of those great industrial displays which have gone before; and keeping constantly under the eyes of all mankind everything which may serve in any manner as an indication of the existing state of the world's civilization. Of course, to sustain such permanent museums, the commercial feature must enter in. The commissioners believe that such a modification is practicable, and that it will be advantageous to the industrial interests of the capitals where such museums shall be established. The experience to be acquired at the exposition of the present year (1873) at Vienna, and at the centennial exposition of the U. S. at Philadelphia in 1876, may throw some additional light upon this question. Meantime a company in New York has obtained a charter from the legislature for the establishment of a permanent industrial exposition in that city; and it is possible that an experiment upon such a plan may be there tried. F. A. P. Barnard.

Exposition, The International Universal, at Vienna, Austria, 1873, was opened on the first day of May and closed on the third day of November. The attention of the Austrian people appears to have been directed towards holding a great exhibition some time before the Paris Exposition of 1867 was projected, but the attempt to realize their wishes in the fullest degree was postponed in favor of the French enterprise. An exhibition of considerable pretensions was, however, held in the year 1866, under the auspices of the government, through the department of agriculture and forestry. The Prater was the locality. It was opened on the 17th of May, and closed on the 14th of June. Its duration appears to have been cut short by the war with Prussia. The first proposition to hold a great international exhibition at Vienna in the year 1873 is said to have proceeded from the Trades' Union of the city, a very wealthy and influential organization, with Baron Wertheimer, a safe-manufacturer, at its head.

It was supposed that it could be so carried out that the receipts would nearly cover the expenditures; at any rate, it was decided that a guarantee-fund of 3,000,000 florins would be sufficient to cover all possible deficiencies, and subscriptions to this amount having been obtained, chiefly among members of the society, the government was induced to take an active part in the matter, and to announce, May 24, 1870, by an imperial and royal decree, "that, under the august patronage of His Imperial and Royal Majesty the emperor, an international exhibition will be held at Vienna in the year 1873, having for its aim to represent the present state of modern civilization and the entire sphere of national economy, and to promote its further development and progress." The enterprise was thus from the outset under the immediate patronage and control of the imperial government. It had not only its sanction, but its heartiest sympathy and support, and it was finally sustained by government appropriations.

An imperial commission was named, consisting of 175 members, selected from the chief officers of the departments of the government, and from the leading men of science, art, and industry in the empire, especially of those who had taken part in former international exhibitions as members of the commissions or as jurors, delegates, or reporters, and who had gained honor and distinction in their respective spheres of duty. The archduke Charles Louis was named as the protector, and the archduke Regnier the president.

By the imperial decree of the 29th Sept., 1871, the whole direction, administration, and carrying out of the exhibition, as also by private imperial letter and decree of Jan. 9 of the same year, were conferred upon the privy counsellor Dr. William Baron von Schwarz-Senborn, as administrator of the exhibition, with the title of the Imperial and Royal General Director. To a high and just appreciation of the functions of great international exhibitions, and of their importance to nations and civilization, the baron added great experience in their organization and management by his official connection with them as commissioner of the Austrian government in London in the years 1851 and 1862, and in Paris in 1867. All the imperial and royal authorities were obliged in their intercourse with the general director to assist him as much and as promptly as possible. A regiment of sappers and miners was detailed for duty in the exhibition grounds, and not only assisted in the construction, but in guarding the buildings after the opening.

The location selected was the famous Prater, the park

and place of resort of the Viennese, lying about one and a half miles from the centre of the city, and between it and the Danube. It was also in the immediate vicinity of the great engineering work undertaken for the regulation of the flow of that river. The surface consisted of the almost level alluvion of the river, and was raised in some portions by the addition of about four feet of gravel dredged from the river-bed.

About 280 acres, or 1,131,235 square mètres, were enclosed by a high board fence. The extreme length of the tract, approximately a rectangle in form, extending E. and W., was about 1400 mètres, and the width 720 mètres. The total length of the fencing was about 4500 mètres, or 14,763 feet.

The principal buildings, all of one story and without galleries, were the Industry Palace, Machinery Hall, Art Buildings, and Agricultural Halls, ranged side by side in three zones. The total length of the Industry Palace was about 3000 feet, and its floor-area, exclusive of the courts, 78,328 square mètres, or 19.35 acres. It consisted of one main transept, crossed by sixteen galleries, giving thirty-two arms or wings, each 75 mètres long by 25 mètres wide. Between these galleries there were open courts, most of which were roofed over to gain additional space. The rotunda, rising in the centre of the transept, was the chief architectural feature of the exhibition; it was designed by Mr. Scott Russell, and constructed of wrought iron. It is a flat truncated cone, with a pitch or slope of about 31°; a diameter to the edge of the base of 354 feet 8 inches, and is supported on thirty-two wrought-iron columns 24.4 mètres high. The interior height to the base of the large lantern is 158 feet, and to the top of the crown 276 feet. It cost $500,000. (For dimensions and form, as compared with St. Peter's and other domes, see ROTUNDA.) The plan of the Machinery Hall was a simple rectangle, 2620 feet long and 165 feet wide, covering an area of 9 acres. The Fine Art Gallery afforded 30,800 feet of wall-length, and covered 1½ acres; the three agricultural buildings covered 6 acres; and the building for the amateurs' exhibition and museum, 0.8 of an acre; giving a total floor-area for these chief buildings of nearly 37 acres. This is exclusive of several buildings and of the covered courts.

The official maps and lists of buildings in the three zones of the exhibition-area enumerated no less than 185 separate constructions, many of them of a costly character, erected as types of the architecture of the different nations. Besides these, there were the permanent attractions of the adjoining "Wurstel," or People's Prater, outside of the gates, numbering 103 buildings, chiefly restaurants and places of amusement. To the E. of the chief enclosure of the exhibition there was an almost unlimited space of open ground, where the exhibitions of cattle and horses, and the races, were held.

The façades of the Industry Palace and of the Art Buildings, as well as several smaller constructions, were elegantly decorated by cornices and bas-reliefs of stucco formed of plaster or cement, and colored to resemble stone. The floors of all the buildings were of wood, with narrow spaces left between the planks for the dust to fall through. The main entrances were at the S. and W. The access was chiefly by carriages, horse-railways, and omnibuses, but was not by any means adequate, and was never equal to emergencies, such as storms or special attractions drawing a larger crowd than usual.

The regulations and details of the conduct of the exhibition were early made known to the world by a series of carefully prepared circulars, numbered from 1 to 104, and onward. These were printed in German, English, and French in quarto form, and they give a very complete view of the organization and progress of the undertaking. Among these are several upon special industries or features of the exhibition, giving very comprehensive views of the condition and needs of those industries.

The classification comprised twenty-six groups, with numerous subdivisions. The arrangement of the objects did not follow the sequence of the groups. It was not systematic, and it was unsatisfactory. The space was apportioned "in block" to each country, and the placing or installation of the objects was left to the convenience or caprice of each of the foreign commissions. A geographical order of succession of the countries was adopted, the Eastern nations taking space at the eastern ends of the buildings, and the Western nations at the western ends. Japan thus occupied one end, and the U. S. the other end, while Prussia and Austria occupied the central portions.

Regret was very generally expressed, not only by the commissioners and jurors, but by the visitors and exhibitors, that the dual system of arrangement introduced in the Paris Exhibition of 1867 had not been adopted at Vienna. By this system, as is well known, similar objects from different countries are placed together, while at the same time the grouping by countries is preserved. Such an arrangement greatly facilitates study and comparison, and consequently promotes one great object of exhibitions—education. It saves a great deal of time and confusion, and makes the labors of jurors and experts much more satisfactory. In Vienna it was extremely difficult to find all the objects of any one group or class, and the direct comparison of such objects was impossible. The form of the building rendered such a systematic arrangement impracticable, and the only approximation to it was placing the machinery in one building, the agricultural implements in another, manufactures and products in a third, and fine arts in a fourth.

The display in all departments was very large and costly, and exceeded that in Paris in 1867. The aggregate weight and number of objects, and the outlay for show-cases and decorations, were much greater. The number of exhibitors is stated at 70,000.

The exhibition was particularly rich in the educational appliances and statistics of all countries, special attention to the subject having been requested in the official programmes. The collections so brought together are to remain in a special museum at Vienna. The several departments of government of the Austro-Hungarian monarchy made extensive and instructive exhibitions, particularly in forestry, mining, and commerce. The special exhibitions in Group I. (mining, metallurgy, etc.) by Prussia, Carinthia, and other countries, were remarkable for the thorough representation of those industries in a liberal and costly way. Japan made a very complete and creditable exhibition, giving a better representation of the arts and industries and resources of that empire than has ever before been seen. The machinery and agricultural implements from the U. S. were very creditable, and attracted much attention, but in these and in other departments the representation was by no means commensurate with the extent and resources of the country.

The international jury consisted of about 600 members from all countries, appointed by each commission in the general ratio of one juror for every 100 exhibitors in each group. The officers of the jury were apportioned among the nations by the imperial commission. The jury-work commenced in July, and the announcement of the awards was made in August. These awards were not internationally comparative, but were absolute, and were liberally bestowed. The medals were all of bronze, and of the same size, each seven centimètres in diameter, but of five different kinds, though not in gradation of merit or value; namely, 1, medal for fine arts; 2, medal for good taste; 3, medal for progress; 4, medal for co-operators; 5, medal for merit. The medal for *fine arts* was reserved for distinguished art productions exhibited in Group XXV. The medal for *good taste* was designed for exhibitors of articles of industry, the form and color of which constitute the characteristic features for adjudication. The medal for *progress* was given to exhibitors in Groups I. to XXIII., and in Group XXVI., who, compared with the productions exhibited at previous exhibitions, proved noticeable progress made since then in new inventions, in the introduction of new materials and contrivances, etc. The medal for *co-operators* was designated for persons who, as managers of manufactories, as foremen, designers of patterns, modellers, or as assistants in a general way, were nominated on the part of the exhibitors on account of the leading part they had taken in the features of excellence of the productions or in the increase of their sale. It shows on the reverse side a mechanic examining the parts of a machine which his aspiring assistant has just finished, and for the completion of which, as an acknowledgment, the Genius of Labor presents him with a laurel wreath. The medal of *merit* was awarded to exhibitors who could lay claim to excellence and perfection in material and workmanship, large extent of production, the opening of new markets, the employment of improved tools and machinery, and cheapness of production. There were also diplomas of merit and of honor, the latter having the character of a peculiar distinction for eminent merit in the domain of science and its applications.

A succession of international congresses during the progress of the exhibition was a marked feature, and contributed to its interest and good results. The Medical Congress, the Congress on a Uniform Numbering of Yarn, the Flax Congress, and the International Patent Congress were among the most important. The latter was well attended, and resulted in the formation of a permanent international executive committee under the presidency of Baron Schwarz-Senborn, with power to enroll members and call another meeting in 1876 or before.

From the opening until November 3 there were 7,254,687 visitors or entries recorded by the turnstiles. This number includes all, whether paying or free, and of course does

not represent different persons, each visit of the same person counting one. This number is equivalent to about 20 per cent. of the population of Austria. The visitors in London in 1862 were equal to about 20 per cent. of the population of Great Britain.

There were several concurrent unfavorable conditions tending to prevent a large influx of visitors. In the first place, the exhibition was not fairly ready to receive visitors until after the first of June. The month of May was cold and rainy, and the first impression produced on the public was unfavorable. The press also was in a critical mood, and the vexations and fatigue attending a study of the exhibition disgusted those who arrived with the expectation of being satisfied without effort. Later in the season the presence of cholera to a limited extent sufficed to keep away many tourists who had deferred their visits. The sovereigns of Europe visited the exhibition in succession. Delegations of artisans were sent by Switzerland and other nations. The free list was large, including all the foreign commissioners, jurors, and exhibitors.

The receipts were much less than was expected, being only about 2,600,000 florins (or $1,300,000) from visitors, as far as ascertained at the closing; but this does not represent all, as the full reports had not been received from the railways. There were in addition certain revenues from the rent of space, each country paying a small sum per square mètre, and from the concessions. The buildings are also to be sold. But the gross revenues will probably not exceed $2,000,000 in round numbers, while the expenditures are reported as equivalent to $9,850,000, leaving a deficiency of $7,850,000, already mostly provided for by government appropriations. WM. P. BLAKE.

Ex post Fact'o, a legal term introduced from the civil to the common law. Its literal translation is, "by subsequent matter," or "in consequence of something done afterwards." An *ex post facto* law is a law that operates by after-enactments. By the Constitution of the U. S., neither Congress nor the State legislatures can pass *ex post facto* laws, and the meaning of the term thus used has been often defined and is fully settled by judicial decisions. It refers to criminal and penal statutes only, and not to those which simply affect private property. Chief-Justice Marshall defined an *ex post facto* law to be one which rendered an act punishable in a manner in which it was not punishable when it was committed. The more specific definition usually laid down by the courts is: 1, any law which makes an innocent act, done before its passage, criminal; 2, any law which aggravates a crime, and makes it legally greater than when it was committed; 3, any law which changes the punishment, and inflicts a greater punishment than the law affixed to the crime when it was committed, or perhaps one different in kind; 4, any law that alters the legal rules of evidence applicable to an offence already committed, and to the injury of the offender.

Express' [from the Lat. *ex*, "out," and *premo, pressum*, to "press," to "drive"], a messenger or conveyance that performs particular errands; a public parcels delivery. Beyond the province of news-carrying, the express system has hitherto made little progress in Europe, owing to its divided nationalities, their varied customs and passport regulations, and their unconnected railway and packet lines. The nearest approach to the comprehensive system known in the U. S. as express lines are the local parcels deliveries in London, Paris, etc. In the U. S. the system penetrates to all parts of the country, even the remotest villages and frontier settlements being brought within its operation; and without leaving their residences persons at the greatest distances apart can despatch parcels to one another, with assurance of the same certainty and celerity as ordinarily attend the operations of the post-office. The express lines, moreover, undertake collections of money, draw inland bills of exchange, and convey freight, the invoice for, as well as the charges on which, is collectable on delivery. Not only goods, but bank-notes, bullion, and even live animals, are conveyed by express. Under the State banks system, as well as under the present National banking system, the express lines conveyed the circulating notes of the banks from the centres of trade, whither they had found their way, to the places of issue for redemption; and the government now employs one or more lines (the Adams Express Company, etc.) to transport funds to and from the Treasury. The express system in this country owes its origin, as it does in Europe, to the desire of obtaining early information of public events. Hale & Halleck of the New York "Journal of Commerce" established a horse express, with eight relays, from Philadelphia to New York in 1833. This was afterwards extended to Washington, employing twenty-four relays and performing the distance in twenty hours. The Cincinnati "Gazette" ran an express, conveying the President's message, from Washington to Cincinnati in sixty hours, at a cost of two hundred dollars, in 1835. In 1839, Alvin Adams and William F. Harnden and brother, of Boston, started expresses on the Providence and Worcester Railroad. The Harndens had been railway guards or conductors, and were frequently desired to carry newspapers, parcels, and money. These facts suggested the express business. In 1841, Harnden and Adams extended their lines to Philadelphia. In 1843, Gay and Kingsley started an express line between New York and Boston. The first express W. of Buffalo was established in 1845 by Wells, Fargo, and Dunning. Adams and Company started a California express in 1849, soon after the opening of the mines. Previous to the completion of the Pacific Railway, Butterfield's Pony Express crossed the Plains with letters and parcels in eight days. The numerous out-of-town lines once in operation have gradually become consolidated into a few leading ones, as shown below; each of the great railway lines and connections being usually monopolized by a single express company. The local lines, confined to separate cities and towns, are still numerous, though in some of the large cities consolidation has taken place with these as well.

Table showing the Statistics of the Principal Out-of-town Express Lines in the U. S.

Name of Line.	Par Value of Shares.	Amount Outstanding.	Dividend	When Payable.	Last Dividend.
Adams Ex. Co.	$100	$10,000,000	2	Q.-M.	Mar. 3, 1873
Amer'n Merch'ts Union.	100	18,000,000	3	J. and J.	Jan. 2, 1873
U. S. Exp. Co.	100	6,000,000	2	Q.-F.	Feb. 1, 1873
Wells, Fargo & Co.'s Exp.....	100	5,000,000	3½	J. and J.	Jan. 1, 1873

ALEX. DELMAR.

Ex'tra, a township of Ashley co., Ark. Pop. 603.

Ex'tract [Lat. *extractum*, from *ex*, "out," and *traho, tractum*, to "draw"], in pharmacy, is a name given to any solid substance (called simply an extract) or to a liquid substance (fluid extract) made by evaporating solutions containing medicinal principles, chiefly of vegetable origin. These solutions are made (1) by expressing the juices of fresh plants, or of dried ones after maceration, by means of hydraulic or other presses; (2) by means of liquid solvents, as water, alcohol, or ether, from which result "aqueous," "alcoholic," and "ethereal" extracts. These various methods are employed, some extracts being better prepared by one and some by another process. Sometimes the menstruum is allowed slowly to percolate and repercolate through the powdered drug, the solvent being at last removed by evaporation or distillation. Evaporation is frequently carried on *in vacuo* with great advantage, for a high degree of heat is injurious to many vegetable principles.

Extract of Meat [Lat. *extractum carnis*] is a preparation of beef, and sometimes of mutton, or of both combined, in which the muscular fibre, fat, and gelatine are removed, and the highly nitrogenous elements preserved and condensed into a semi-solid mass of about the consistence of ordinary butter. Commercial extract of beef is prepared on a large scale in the Argentine Republic, in Texas, and in other countries. Most of what is sold in Europe and the U. S. comes from Buenos Ayres, where its manufacture was first established under the supervision of the chemist Liebig. One establishment at Fray Bentos slaughters 400 oxen daily. In general, the finely cut beef is allowed to stand for a few hours in cold water; the liquid is then boiled for a time, and afterwards evaporated in a vacuum-pan. In some places the mincemeat is steamed, and the resulting liquids evaporated on rapidly revolving steel plates. In other establishments superheated steam is employed under pressure; the material is then submitted to powerful hydraulic compression, and the expressed liquid partially dried *in vacuo*.

Extract of meat is of variable quality and composition, and at the best but imperfectly represents the beef it was made from. Nevertheless, it is useful in preparing soups, and especially in nourishing those who are sick of low fevers, pyæmia, and other like diseases.

Extraction of Roots. See EVOLUTION.

Extradi''tion [from the Lat. *ex*, "out," and *trado, traditum*, to "convey"], the surrender by one state or nation to another of fugitives from justice. The subject will be considered under two general divisions: 1, the surrender of fugitives from justice from one State of the U. S. to another; 2, the like surrender as between one nation and another.

1. The U. S. Constitution provides that "a person charged in any State with treason, felony, or other crime, who shall flee from justice and be found in another State,

shall, on demand of the executive authority of the State from which he fled, be delivered up to be removed to the State having jurisdiction of the crime." A like clause is found in the Articles of Confederation. The propriety and necessity of such a provision in the case of States bound so closely together as are those of the American Union, and yet exercising independent criminal jurisdiction, will not be questioned. It tends to promote harmony between the States and to repress crime, while it aids in the discharge of a high moral obligation. An act of Congress of 12th Feb., 1793, ch. 7, § 1, carries the constitutional provision into practical effect by declaring that the demand shall be accompanied by a copy of an indictment found against the alleged fugitive, or by an affidavit made before a magistrate of a State, etc., charging the fugitive with having committed a crime. These documents are to be certified as authentic by the governor or chief magistrate of the State whence the demand comes. It is thereupon made the duty of the governor on whom the demand is made to issue his warrant and to cause the fugitive to be arrested and delivered over to the agent of the demanding State. The essential ingredients of the case are—that there must be a charge that an act has been committed which is a crime under the laws of the State where it took place, and that the person so charged has fled from justice. The governor of the State where the fugitive is found is bound to comply with the demand when properly made and authenticated. Still, there are no legal means whereby, in case that he fails to do his duty, he can be compelled to perform it. (*Kentucky against Governor Dennison of Ohio,* 24 Howard's Reports, 66.) If the fugitive is supposed to be arrested on insufficient papers, the regular course to test their validity in his behalf is to apply for a writ of *habeas corpus.* If they turn out to be defective, he will be discharged. When the proceedings are sustained, the effect of them is to return the fugitive to the State whence he came, where he will be entitled to his trial under the ordinary course of judicial proceedings.

2. Extradition as between separate nations. This is a topic belonging to international law, and will be noticed under that general subject. It was at one time supposed that it was the duty of a state under the law of nations to surrender up a fugitive from justice upon demand after the civil magistrate had ascertained the existence of reasonable grounds for subjecting the accused to a criminal trial. Those who maintained this doctrine found much difficulty in drawing the line between the graver crimes to which it was claimed that this rule was applicable and those of a minor character to which it could scarcely be considered that it would extend. (1 Kent's "Commentaries," 37.) The better opinion now is, that whatever obligation may exist in such a case is an imperfect one, and cannot be insisted upon by the demanding nation unless there be a treaty stipulation. It is quite clear that courts have no power in such cases independent of treaties, and it is a matter of grave doubt whether the executive authority can properly exercise it. So a State of the Union cannot assume to make a surrender of an alleged fugitive to a foreign nation, and an act of a State legislature authorizing it is unconstitutional and void. (*People against Curtis,* 50 New York Reports, 321, A. D. 1872.) The U. S. have treaties upon this subject with a large number of foreign nations, including Great Britain, France, Austria, the German empire, Norway, Sweden, Italy, Switzerland, Mexico, etc. The treaties are not precisely identical, though of the same general scope and character. They all include the more heinous crimes, such as murder and piracy, while some of them embrace robbery, burglary, arson, rape, embezzlement, and the fabrication and circulation of counterfeit coin or paper. The words here employed would refer to the offences named as understood in the general jurisprudence of the two nations, and accordingly would not extend to a new statutory crime established by one of the States of this country, and called by a name used in the treaty, such as forgery. This conclusion was reached in England in the case of Winsor, 6 Best & Smith's Reports, 522. On the other hand, it has been considered that the word "piracy," as used in the treaty with England, does not refer to that offence as recognized in the law of nations, as the offender can be tried in the state where he is. Its reference is to piracy under the municipal law of the state making the demand. (*In re Tivnan,* 5 Best & Smith, 645.) The treaties require that the offence should be committed within the "jurisdiction" or within the "territories and jurisdiction" of the demanding nation. An interesting question has recently arisén in this country whether these words would include the case where a nation by statute law made it a crime for one of its own subjects to commit an act like murder beyond its own territory, so that a surrender could be demanded by that nation, though the act were committed within the territory of a nation with which the U. S. had no extradition treaty. This was the case of Vogt, and though the attorney-general of the U. S. advised against the surrender, the point can scarcely be deemed to be finally settled. In order to carry an extradition treaty into practical effect, domestic legislation is necessary. Under the laws of Congress and the practice of the courts the following points must be observed: (1) There must be a demand from the supreme political authority of the state seeking the return of the fugitive; (2) There should be an authorization or a mandate by the President of the U. S., directed to a judge or U. S. commissioner, to examine into the case; (3) Complaint under oath should be made to the judge or commissioner by a proper person, such as a consul-general of the foreign country, showing the commission of the act on which the demand for the surrender is based; (4) There should be a warrant by the commissioner, etc. for the apprehension of the party charged; (5) The charge should be sustained before the commissioner by suitable evidence, such, for example, as would justify his commitment had the act taken place here; (6) On the certificate of the judge or commissioner that there is a probable ground to believe that the offence has been committed, and such certificate is satisfactory to the President of the U. S., the surrender is made to the agent of the demanding state. If the proceedings are defective, the prisoner may be discharged on a writ of *habeas corpus.* The statutes will be found in 9 U. S. Stat. at Large, 302 (12 Aug., 1848); 12 id., 84 (22 June, 1860); 15 id., 337 (Mar. 3, 1869). Consult also *Matter of Farez,* 7 Blatchford Reports, 345, 491; BRIGHTLY'S and ABBOTT'S "Digests," title *Extradition;* WHEATON'S "International Law," notes of LAWRENCE and DANA; CLARKE "On Extradition," etc.; the recent English statutes, 33 & 34 Vict. ch. 52 (1870); 36 & 37 Vict. ch. 60 (1873). T. W. DWIGHT.

Extreme Unction [Lat. *extrema unctio,* the "last anointing"], the fifth of the seven sacraments of the Roman Catholic Church, consisting of the application, by a priest, of consecrated oil of olives to the eyes, ears, nostrils, lips, hands, feet, and reins of a dying person or of one whose illness is alarming. It is administered after confession and the Eucharist, and is believed to remove the last stains of sin. The Greek and Coptic churches recognize unction (which is by no means always administered *in extremis*) as a sacrament, and the Jacobites and Armenians have a similar practice. Certain ritualists among the Anglicans and Lutherans advocate a return to this ceremony.

Exuda'tion [Lat. *exudatio,* from *ex,* "out," and *sudo, sudatum,* to "sweat"], the passage of a liquid outward through the walls (or membranes) of the vessel containing it. The term is also applied to certain substances which *exude* or come out of trees, as gum-resin, manna, etc. In pathology, a material product of inflammation; a gaseous, liquid, or solid substance foreign to the tissues, and resulting from disease. These morbid products, when solid, sometimes become organized and capable of growth.

Exu'ma, Great and **Little,** two of the Bahama Islands. The former is about 30 miles long and 3 miles wide, and has one of the best harbors in the Bahamas. Salt is exported from them. Great Exuma is crossed by the Tropic of Cancer. The N. W. point is in lat. 23° 42′ N., lon. 76° W.

Exu'viæ (plu.), [Lat. for "cast-off clothing"], in natural history, the name for the slough or cast-off skin of reptiles, crustaceans, etc.; the moulted feathers of birds; the hair of quadrupeds, which is shed at a particular season of the year. It is sometimes a general name for fossil organic remains. It was anciently used to designate the personal spoils taken from an enemy in battle, hence it sometimes meant all booty taken in war.

Eyck, van (HUBERT and JAN), two brothers, born at Maaseyk, Holland—Hubert in 1366, Jan about four years later. They lived and wrought as artists together. Their chief works were executed in Ghent. The two brothers are considered the founders of the Flemish school of painting. (An account of their labors, with an estimate of their merits and a just assignment of their place in art, may be found in a book on "Early Flemish Painters" by CAVALCASELLE, London, 1856, and in DR. LÜBKE'S "History of Art," translated by F. E. BUNNETT, London, 1868; STANLEY'S "Dutch and Flemish Painters," Bohn's ed.) Jan died in 1440, Hubert in 1426. The former is often called "John of Bruges."

Eye, a market-town of England, is in the county of Suffolk, 75 miles N. E. of London. The houses are low, with thatched roofs, and the streets unpaved. Pop. 6721.

Eye, the organ of vision in animals. In organisms below the rank of the Echinodermata eyes can scarcely be said to exist, but among star-fishes and Echinida eye-spots

connected with nerve-filaments are found. Among the lowest articulates rudimentary eyes are seen, not always on the head, but on various parts of the body, and sometimes even at the end of the tail. In tunicaries and true mollusks vision exists, sometimes performed by means of eyes of considerably high development. Most of the high articulates have compound eyes. Insects have large eyes, each with a vast number of hexagonal or quadrangular doubly convex facets, every one of which brings to a focus the rays received in one particular direction. In the *Mordella* beetle the eyes have 25,000 of these facets or corneas (*Carpenter*), but the number is usually very much less. Faceted eyes are common among crustaceans, and are often well marked in the remains of trilobites. Spiders and others of the lower insects have only a few eyes, which are not compound. Many facet-eyed insects have also single rudimentary eyes.

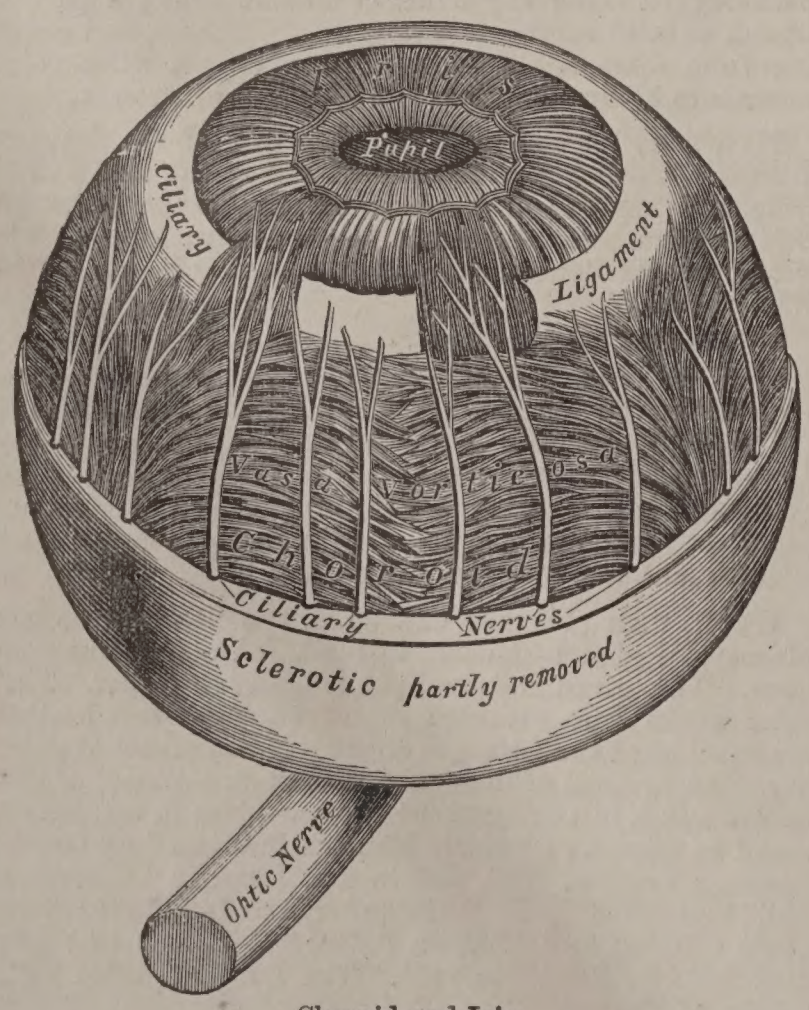
The vertebrates nearly all have eyes which approximate more or less completely to those of man, some, as the birds, probably far surpassing man in visual power. The eye of fishes and cetaceans is peculiar in its spherical and dense crystalline lens. There are many other special modifications in the eyes of lower animals, adapting them to their peculiar modes of life.

The human eye is placed in a bony cavity called the orbit, and is further protected by the fatty cushion within which it rests, as well as by the brows, eyelids, and eyelashes. Other appendages are the tear-glands and the sac connected with it; the Meibomian glands, whose secretion lubricates the eyelids and the eye itself; the numerous muscles which direct its range, and the nerves and blood-vessels which supply it.

The human eye is a globe, with the segment of a smaller globe planted upon its anterior aspect. Its antero-posterior diameter is one inch, its transverse one, $\frac{1}{12}$ of an inch. The larger sphere has about five-sixths of the whole surface. The two eyes have their axes almost parallel, except that in looking at near objects they decidedly converge. The eye is invested by three coats: First, the sclerotica, a white, tough, fibrous substance, the "white of the eye," visible through the delicate conjunctiva which lines the orbit and is reflected over the sclerotica and cornea. Inwardly it is brown. The muscles are attached to it, and through a sieve-like, "cribriform lamina" it transmits the filaments of the optic and other nerves and blood-vessels.

The anterior one-sixth of the eye's surface is occupied by the cornea, a concavo-convex lens, projecting, transparent, and in intimate structure resembling the sclerotica. It is composed of more than sixty laminæ, the innermost and outermost of which are highly elastic. The posterior layer is lined by a "pavement" epithelium of polygonal cells. The cornea is well supplied with nerves, called *ciliary*.

FIG. 1.



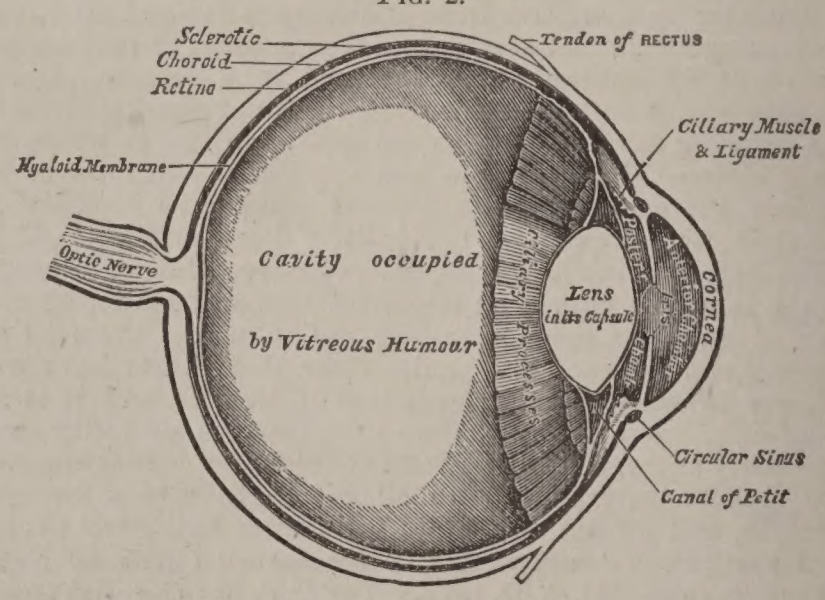
Choroid and Iris.

The second coat of the eye is composed of the choroid tunic, the iris, the ciliary processes, muscle, and ligament. The choroid is a vascular, thin, chocolate-colored membrane, lining the sclerotica, and separated from it by the delicate membrana fusca. The choroid itself has three layers: an *outer*, consisting chiefly of blood-vessels (vasa vorticosa) and pigment-cells; a *middle* layer, of fine capillary vessels (Ruysch's layer); and an *inner* layer, of tesselated, hexagonal cells, laden with pigmentary matter, except in albinoes. The ciliary processes are folds or plaits running forward from the edge of the choroid to the suspensory ligament of the crystalline lens. They number about 70. The iris ("rainbow") takes its name from its various colors in different persons. It is the colored curtain which surrounds the pupil, its central opening. It contains both circular and radiating involuntary muscle-fibres—the circular to contract, the radiating to expand, the pupil. The ciliary ligament unites the choroid and cornea. The circular sinus is a canal which runs around the eye outside the ciliary ligament. The ciliary muscle is a circular band of involuntary muscle-fibre which passes back from the junction of the cornea and sclerotic to the choroid. It is probable that through the ciliary processes it acts upon the lens, adjusting the eye for nice observations.

The third coat of the eye is the retina. Without is the choroid—within, the vitreous humor. The retina has four layers. The *outer*, or Jacob's membrane, consists of columnar rods and bulbous, hollow cones filled with fluid. The *granular* layer consists of globular particles, lined inwardly by a hyaline substance. The *nummular* layer looks on the inside as if composed of particles resembling pieces of money seen edgewise. The *nervous* layer of the retina is an expansion of the optic nerve, and consists of both tubular and vesicular neurine. This layer is separated within from the vitreous humor by the exceedingly delicate membrana limitans, and by the hyaloid membrane; the former regarded as belonging to the retina, the latter to the vitreous humor.

The contents of the eye are the aqueous humor, the crystalline lens, and the vitreous humor. The aqueous humor consists of about four or five grains of water, with a very small proportion of common salt and others matters in solution. It occupies the space between the cornea in front and the crystalline lens behind. This space is divided into the anterior and the posterior chambers, which the iris separates from each other. After birth these chambers communicate through the pupil. (Fig. 2, Vertical section of the human eye.) Behind the aqueous humor comes the

FIG. 2.



Vertical Section of the Eye.

crystalline lens, suspended in the capsule, an elastic, transparent membrane which is retained in place by the ciliary processes and a suspensory ligament. Between this ligament and the hyaloid membrane is the space called the canal of Petit. The lens itself consists, as is seen when it has been boiled or hardened in alcohol, of layers of transparent matter arranged in three triangular segments. The vitreous humor occupies four-fifths of the cavity of the eyeball. Like all the contents proper of the eye, it is transparent. It consists of a thin, jelly-like, albuminous fluid. When the aqueous humor has been evacuated by accident or operative interference, it is speedily restored like other serous fluids, but if the vitreous humor is once lost, it is never renewed.

(The wonderful physiology and physics of the eye, its nice self-adjusting powers, and its almost perfect achromatism are considered in the articles LIGHT and VISION. The various diseases of the eye are treated each under its own name.) CHARLES W. GREENE.

Eye-Bolt, on shipboard, a pointed iron bar with a hole in the thick end. It is intended to be driven into one of the timbers, and then to have a rope passed through the hole.

Eyebright. See EUPHRASY.

Eye-Piece, the lens or combination of lenses used in microscopes and telescopes to examine the aërial image formed at the focus of the object-glass. The ordinary eye-piece is a combination, and may be either positive or negative.

The former consists of two plano-convex lenses, with their convex sides towards each other, and is used for micrometers. The negative consists of similar lenses with the convex sides turned away from the eye. Besides these, there are in use for observations of the sun a diagonal eye-piece, in which a very small percentage of the sun's light and heat is reflected from the first surface of a prism, the rest being transmitted; and Dawes's solar eye-piece, in which the light is reduced by observing only a very minute part of the solar surface.

Eye-Stones (*oculi cancrorum*) is the name given to the two semi-circular calcareous concretions which are found in the common European crawfish, in August, shortly before the moulting season, in the space between the inner and outer coats of the stomach. They consist of carbonate and phosphate of lime and animal gelatin, and were formerly used in a powdered state in medicine as an antacid. They are sometimes used to remove small particles of dirt from the eyes, a method which is entirely to be condemned. They are collected in brooks in Dauphiny, near Astrakhan, etc.

Eye, von (Johann Ludolf August), a German art-historian, born 1825, wrote many valuable works on ancient and modern art. Among these are "Kunst und Leben der Vorzeit" (3 vols., 3d ed. 1868), "Leben und Wirken Albrecht Dürer's" (1860). He also wrote several philosophical works, the most prominent of which is "Wesen und Werth des Daseins" (1870).

Eylau, or **Eilau,** ī′lŏw′, often called **Prussian Eylau,** a small town of Prussia, is in the province of Prussia, on the Pasmar, 22 miles S. of Königsberg. A great battle was fought here Feb. 8, 1807, between Napoleon, who had about 80,000 men, and the allied armies of Russia and Prussia, commanded by Gen. Bennigsen, who had fewer men, but more guns. Both sides claimed the victory. The allies lost about 20,000, and retreated from the field, but the French loss was probably the greater. Pop. in 1867, 3518.

Ey′lert (Ruhlemann Friedrich), born at Hamm, Westphalia, April 5, 1770, studied at Halle, and in 1794 began to preach in his native town, became court-preacher at Potsdam in 1806, and in 1817 Prussian superintendent and minister of public instruction. He was at first a moderate rationalist, but became orthodox, and was one of the founders of the national Church of Prussia and of its liturgy. He had great influence with King Frederick William III. Died Feb. 3, 1852, leaving numerous writings, chiefly religious.

Ey′meric (Nicholas), a famous inquisitor, born at Girona, a town of Catalonia, Spain, became a Dominican friar in 1334, was appointed by Innocent VI. to be inquisitor-general of Aragon (1356), and became chaplain and judge of heresies to Gregory XI. at Avignon (1371). Died at Girona Jan. 4, 1399. As an inquisitor his zeal was so great that he was for some years suspended from his office. He especially pursued the followers of Raymond Lully. His "Directorium Inquisitorum" (1503; 6th ed. 1607) was his principal work.

Eyo′ta, a township and post-village of Olmstead co., Minn., has a monthly publication. It is on the Winona and St. Peter R. R., 37 miles W. of Winona. Pop. 1140.

Eyre (Most Rev. Charles), archbishop of Anazarba *in partibus*, and apostolic delegate of the Roman Catholic Church for Scotland, was born in 1817 in Yorkshire, England, and was educated at Durham and at Rome. He received his present position in 1869. He has published a "History of Saint Cuthbert" (1849).

Eyre (Edward John), an English explorer, born in 1817. He emigrated to Australia about 1833, and began in 1840 the exploration of the unknown region between South Australia and Western Australia. In this sterile region he performed a journey of nearly 1000 miles almost alone. He published in 1845 "Discoveries in Central Australia." In 1862 he was appointed governor of Jamaica, where he suppressed an insurrection in Oct., 1865. He was censured and removed from his office for the execution of Gordon by court-martial. John Stuart Mill and others took measures to try him for murder, but failed, Eyre being justified or excused by the British public.

Eyre (John), an Anglican clergyman, born at Bodmin, Cornwall, in Jan., 1754, was apprenticed to a clothier, but, having become awakened to a religious life, was driven from his father's house. He went to Lady Huntingdon's college at Trevecca, studied for a time at Oxford, and soon entered the ministry. He was a popular speaker, and was chiefly distinguished for his benevolence and zeal for missions. He was one of the founders of the London Missionary Society and of Hackney Seminary. Died Mar. 28, 1803.

Eyre (Sir Vincent), K. C. S. I., C. B., born about 1810, received a military education in the college of Addiscombe, joined the Bengal artillery in 1828, was badly wounded at Cabul in 1842, while serving in the horse artillery, and was taken prisoner by the Afghans, but escaped in Sept., 1842. He has published "Military Operations at Cabul" (1843), "Metallic Boats and Floating Wagons" (1854), and "A Fortnight's Tour among French Ambulances" (1870).

Eyriès (Jean Baptiste Benoît), a French savant, born in Marseilles, published numerous geographical papers, mostly translations, wrote much for the "Biographie Universelle," and, with John Pinkerton, published an "Abridgment of Modern Geography" (1827), a work of value in its day. He was one of the originators of the Geographical Society. Died in 1846.

Eys′ter (Michael), an American Lutheran minister, was born May 16, 1814, in York co., Pa., was educated at Gettysburg, and licensed to preach in 1838. His influence as a pulpit orator was very great. Died Aug. 12, 1853.

Ey′telwein (Johann Albert), an excellent Prussian civil engineer and physicist, born at Frankfort-on-the-Main Dec. 31, 1764, entered the artillery in his youth, where he acquired the foundation of his future eminence. He afterwards held important civil offices, and was employed on a great variety of public works. Died Aug. 18, 1848. He published a "Handbook of Mechanics, of Solids, and of Hydraulics" (1801), "Handbook of the Statics of Solid Bodies" (1808), "Handbook of Perspective" (1810), "Elements of the Higher Analysis" (1824), etc.

Eze′kiel (*i. e.* "God will strengthen"), one of the four greater prophets of the Hebrew Scriptures, the author of a canonical book which bears his name. He was the son of a priest, and was one of those who were carried away in what is known as the second of the four deportations (597 B. C.). He was sent to dwell on the river Chebar or Chaboras, a branch of the Euphrates. From that place he exercised his prophetical calling by pronouncing warnings and rebukes against Jerusalem so long as it stood, and also by denouncing woes upon Judah's heathen neighbors for their attitude towards her in her distress. His activity covered a period of twenty-two years, from the fifth to the twenty-seventh year of the Captivity. The book consists of two parts, the former (chaps. i.–xxiv.) containing predictions delivered before the destruction of Jerusalem in 586 B. C.; the latter (chaps. xxv.–xlviii.) containing predictions delivered after that event. Having formed an ideal of what the restored Israel was to be, he describes the new temple, the reformed ritual, and a re-division of the country into twelve parts, which is set forth in mathematical and geometrical descriptions. These descriptions do not apply to anything which ever existed, either before or after, and this has been a ground of much unfounded anxiety lest here should be an unfulfilled prophecy. It is evident, however, that the prophet had a vision of a restored, perfect, and ideal theocracy, and this is set forth in mathematical and geometrical arrangements which are ideally perfect, and take no note of physical circumstances. In his general tone Ezekiel is independent of Jewish dogmas. He gives fresh and true interpretations and applications of the Mosaic law, which contradict the traditional interpretations. His view of the Gentiles is also free from the severity of the traditional dogma of Israel's election. Fürst finds authority in the "Talmud" for the assertion that, on account of these things, the position of the book of Ezekiel in the canon was uncertain at the time of our Lord.

E′zion-ge′ber, or **Ezion-gaber,** an ancient port on the Elanitic arm of the Red Sea. From this point Solomon sent a fleet to Ophir, and King Jehoshaphat also built ships here for the same destination. It probably stood near Elath, and is thought by many to have been at the north-western extremity of the Gulf of Akabah. It is believed that no trace of it now remains.

Ez′ra [Heb. "help;" Gr. Ἔσδρας], the name of several persons mentioned in the Bible, the most important of whom was the famous priest and scribe who came with some 6000 Hebrew exiles from Babylon to Jerusalem about the year 458 B. C. In no long time, probably, he went back to Babylon, and returned to Jerusalem with Nehemiah in 445 B. C. As he is not mentioned after Nehemiah's return to Babylon in 433 B. C., he had probably died, or gone back to Babylon, before this. His reputed sepulchre is shown at a place on the Tigris, near its junction with the Euphrates.

Ez′ra, The Book of, called in the Thirty-nine Articles of the Anglican Church "The First Book of Esdras," following the Vulgate. It narrates the history of the Jewish nation on their return to Jerusalem from the Babylonian captivity, and during the subsequent period of their re-establishment in the land of their fathers. It is a continuation of the books of Chronicles, and is mostly a compilation, probably by Ezra, who, though he put the whole together, himself wrote only the last four chapters. It is written partly in Hebrew and partly in Chaldee, the Chaldee portion beginning at iv. 8 and extending to vi. 18.

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